

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

GEOTECHNICAL DESIGN REPORT

For the Reconstruction of:

**US ROUTE 302
FRYEBURG, MAINE**

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Oxford County
WIN 17280.00

Soils Report 2018-03
Federal No. NH-1728(000)E

December 11, 2018

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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 reconstruction of an approximately 4.33-mile portion of US Route 302 in Fryeburg. The project is broken into two (2) sections, east and west of downtown Fryeburg, as shown on Sheet 1 – Location Map. The project is needed to correct deficiencies in roadway pavement, subbase, and safety while improving surface and subsurface drainage. The scope includes reconstruction or rehabilitation of the existing travel lanes and shoulders, two (2) large culvert replacements, and drainage improvements. US Route 302 is a Highway Corridor Priority 1 road.

2.0 GEOLOGIC SETTING

According to the Surficial Geology Map entitled Fryeburg Quadrangle, Maine, Open File No. 14-29 (2014) published by the Maine Geological Survey (MGS), the following surficial soils are present along the project:

- Eolian deposits consisting of windblown sands.
- Till consisting of a mixture of sand, silt, and gravel-size rock deposited by glacial ice.
- Lake Pigwacket Fryeburg stage deposits consisting of fluvial and deltaic sand, silt, and gravel sediments deposited in a late stage of Lake Pigwacket.
- Stream alluvium consisting of sand, silt, gravel, and organic material deposited on flood plains of modern streams and in stream channels.
- Lake Pigwacket Lake-bottom deposits consisting of silt, clay, and sand deposited on the floor of Lake Pigwacket.

According to the MGS map titled Bedrock Geologic Map of Maine (1985) the bedrock along the project is carboniferous granite with biotite and muscovite inclusions commonly referred to as the Sebago Pluton.

3.0 SUBSURFACE INVESTIGATION

Subsurface conditions at the site were explored by drilling a total of thirty-three (33) test borings, forty-eight (48) probes, and four (4) test pits.

Borings HB-BRFR-116 through HB-BRFR-120, were drilled on December 20, 2010 by the MaineDOT drill crew. The 100-series borings were drilled to a depth of approximately 5.0 feet below ground surface (bgs) using solid stem auger drilling techniques. Borings HB-FRYE-201, HB-FRYE-204, and HB-FRYE-206 and probes HB-FRYE-202, HB-FRYE-203, HB-FRYE-205A, and HB-FRYE-205 were drilled on March 10, 2015 by Northern Test Boring. The 200-series borings were drilled to depths ranging from approximately 17.0 to 32.0 feet bgs using hollow stem auger drilling techniques and the 200-series probes were drilled to depths ranging from approximately 2.5 to 30.0 feet bgs using solid stem auger drilling techniques. Borings HB-FRYE-301 through HB-FRYE-319 were drilled between April 27 and April 28, 2011 by the MaineDOT drill crew. The 300-series borings were drilled to depths ranging from approximately 2.2 to 10.0

feet bgs drilled using solid stem auger drilling techniques. Borings HB-FRYE-401 through HB-FRYE-404 were drilled on August 19, 2015 by the MaineDOT drill crew. The 400-series borings were drilled to depths ranging from approximately 2.3 feet to 3.5 feet bgs using solid stem auger drilling techniques. Borings HB-FRYE-501 and HB-FRYE-503 and probes HB-FRYE-502 and HB-FRYE-504 were drilled on June 9, 2016. The 500-series explorations ranged in depth from approximately 30 to 32 feet bgs using solid stem auger, cased wash boring, and open hole drilling techniques. Test Pits TP-2 through TP-5 were excavated on August 19, 2015 by a MaineDOT maintenance crew. The test pits were excavated to depths ranging from approximately 2.0 to 3.8 feet bgs. Forty-five (45) unnamed probes were drilled on March 10, 2015 to depths ranging from approximately 1.7 to 10.0 feet bgs. These probes were drilled using solid stem auger drilling techniques. Boring and probe locations are shown on the Sheets 2 through 49 Boring Location Plans. Boring Logs and probe information are presented in Appendix A.

Soil samples were obtained in the 200- and 500-series borings at standard 5-foot intervals using Standard Penetration Testing (SPT). Soil samples were obtained off the auger flights in the 100-, 300- and 400-series borings. No bedrock cores were taken during the course of the explorations. Several refusal surfaces were encountered along the project. The exact nature of the refusal surfaces was not determined. No soil sampling was done in probes.

The MaineDOT and NTB drill rigs are equipped with automatic hammers to drive the split-spoon for soil sampling. The automatic hammers are calibrated each year and are typically found to deliver more energy during driving than the standard rope and cathead system. All N-values discussed in this report are corrected N-values (N_{60}) computed by applying a hammer efficiency factor to the raw field N-values. Since the borings for this project were conducted over several years, using different rigs, two (2) hammer efficiency factors were used to correct the raw field N-values. Both the raw field N-value and the corrected N_{60} -values are shown on the boring logs. The table below lists the hammer information and efficiency factors that were applied to the raw field N-values for each drill rig.

Boring Series	Drill Rig	Hammer Type	Calibration Year	Hammer Efficiency Factor
200-series	Diedrich D-50	Automatic	2015	0.879
500-series	CME 45C	Automatic	2016	0.908

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 and test pits to assist in soil classification, evaluation of engineering properties of the soils and geologic assessment of the project site. Laboratory testing consisted of forty-five (45) standard grain size analyses and natural water content. 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, probes and test pits along the project generally consisted of pavement and fill soils overlying native sand, silt and sandy silt with one location that encountered peat. Sandy silt and silt layers were encountered at several locations but were not noted along the whole project. The boring locations are shown on Sheets 2 through 49 - Boring Location Plans. The boring logs are 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 4 to 13 inches. The fill soils consisted of:

- Light brown, brown to reddish-brown, dry to wet, sand, trace to some silt, trace to some gravel with occasional cobbles
- Brown, dry to damp, gravelly sand, trace silt with occasional cobbles, and
- Grey-brown, wet, silt, little sand, trace gravel.

The thickness of the fill ranged from approximately 0.7 feet to 22.2 feet but was fill soils were not fully penetrated in all the explorations. SPT N_{60} -values obtained the in the fill sand ranged from 4 to 47 blows per foot (bpf) indicating that the fill sand is very loose to dense in consistency. One SPT N_{60} -value obtained the in the fill silt was 4 bpf indicating that the fill silt is soft in consistency.

Water contents from twenty-nine (29) samples obtained within the fill sand layer range from approximately 2% to 46%. Grain size analyses conducted on twenty-nine (29) samples of the fill sand resulted in the soil being classified as an A-1-a, A-1-b, A-2-4, or A-3 under the AASHTO Soil Classification System and an SM, SP-SM, SW-SM, SW or SP under then Unified Classification System. One (1) water content from a sample of the fill silt layer was approximately 29%. One (1) grain size analysis conducted on a sample of fill silt resulted in the soil being classified as an A-4 under the AASHTO Classification System and an ML under the Unified Classification System.

5.2 Native Sand

In most areas, the fill is underlain by a layer of native sand. The sand consisted of light brown, brown, grey, and tan, damp to wet, fine to coarse sand, trace to some silt, trace to some gravel with occasional cobbles. The thickness of the sand ranged from approximately 2.8 feet to 13.5 feet but the native sands were not fully penetrated in all the explorations. SPT N_{60} -values obtained in the sand ranged from 3 to 101 bpf indicating that the fill is very loose to very dense in consistency.

Water contents from eleven (11) samples obtained within the sand layer range from approximately 4% to 27%. Grain size analyses conducted on eleven (11) samples of the sand resulted in the soil being classified as an A-1-b, A-2-4, or A-3 under the AASHTO Soil Classification System.

5.3 Native Silt and Sandy Silt

Native silt and sandy silt layers were encountered in some areas. The layers were comprised of:

- Brown, wet, silt, little fine to medium sand and
- Brown and tan, wet, fine to coarse sandy silt, trace gravel.

The thickness of the silt and sandy silt layers ranged from approximately 7.4 feet to 9.0 feet. The full depth of the silt and sandy silt was not penetrated in the explorations. SPT N_{60} -values obtained in the silt layer ranged from 28 to 31 bpf indicating that the silt is very stiff to hard in consistency.

Water contents from four (4) samples obtained within the silt layer range from approximately 11% to 26%. Grain size analyses conducted on four (4) samples of silt and sandy silt resulted in the soil being classified as A-4 under the AASHTO Soil Classification System and an ML under the Unified Soil Classification System.

5.4 Peat

An approximately 1.5-foot thick layer of peat was encountered in boring HB-FRYE-206 at approximate Station 209+95.

5.5 Shallow Refusal Surfaces

Shallow refusal surfaces were encountered at varying depths along the project. Refusal of the drilling tools varied from a depth of approximately 1.7 feet to 19.8 feet bgs. The exact nature of the refusal surfaces was not determined in the explorations. Bedrock outcrops were observed on both sides of the road between Stations 172+00 and 172+50 and between Stations 267+95 and 270+00. The table below summarizes the refusal surfaces encountered.

Approximate Station	Approximate Depth to Refusal (feet bgs)
59+00	2.5
171+00 to 173+50	1.7-5.9
198+00 to 199+00	8.1-9.0
209+70 to 209+95	6.1-19.8
219+00 to 220+50	4.3-6.1
243+00 to 244+00	6.4-9.4
268+00 to 270+00	2.2-5.6

5.6 Groundwater

Groundwater levels were observed in two (2) borings. The measured groundwater levels in the borings where groundwater was observed ranged were approximately 2.0 and 3.4 feet bgs. The water levels observed are indicated on the boring logs in Appendix A. Note that in some cases water was introduced into the boreholes during the drilling operations. 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 are:

- Large Culvert at approximate Station 177+66
- Fight Brook Bridge at approximate Station 209+92
- Potential Bedrock Removal

6.1 Large Culvert at approximate Station 177+66

6.1.1 General Information - The existing culvert at approximate Station 177+66 is a 36-inch reinforced concrete pipe (RCP). The proposed replacement structure is a 72-inch diameter, 136-foot long RCP on an approximately 27-degree skew with an inlet elevation of approximately 380.6 feet and an outlet elevation of approximately 378.2 feet.

One (1) boring and (1) probe were drilled at the existing culvert. The boring locations and the interpretive subsurface profile are shown on Sheet 50 - Boring Location Plan & Interpretive Subsurface Profile. The boring logs are provided in Appendix A – Boring Logs.

Boring HB-FRYE-503 was drilled through fill sand and native sand to a depth of approximately 32.0 feet bgs and did not encounter a refusal surface. SPT N_{60} -values in the fill sand ranged from 5 to 11 bpf indicating that the fill is loose to medium dense in consistency. SPT N_{60} -values in the native sand ranged from 3 to 101 bpf indicating that the native sand is very loose to very dense in consistency. Probe HB-FRY-504 was drilled to a depth of approximately 30.0 feet bgs and did not encounter refusal surface.

6.1.2 Construction – The proposed RCP culvert at approximate Station 177+66 shall be constructed in accordance with MaineDOT Standard Specification Section 603 and the Contract Plans. The bottom of the large culvert will be partially filled with Special Fill and Stream Channel Rock bands to facilitate fish passage. The Special Fill will have a depth of 2 feet at the culvert centerline and 3.0 feet at the bank line to create a 3.5-foot to 4.0-foot wide channel along the centerline of the culvert.

The 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 entire culvert bedding subgrade should be proof-rolled with multiple passes of a static roller to identify loose or weaving areas that require over-excavation and replacement and to achieve a firm and stable surface for construction. All subgrade surfaces shall be protected from any unnecessary construction traffic.

The full nature of the culvert bearing surface will not become evident until the culvert excavation is made at each location. Any loose soils or soft or unsuitable materials encountered in the excavations shall be removed and replaced with Granular Borrow Material for Underwater Backfill (MaineDOT 703.19) or Crushed Stone $\frac{3}{4}$ -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 $\frac{3}{4}$ -Inch.

The soil envelope and backfill shall also 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.

6.2 Fight Brook Bridge

6.2.1 General Information - The existing culvert at approximate Station 209+85 is a 4-foot span by 3-foot rise concrete box culvert. The proposed replacement structure is a 10-foot span by 6-foot rise, 87-foot long precast concrete box culvert on an approximately 8-degree skew with an inlet elevation of approximately 363.6 feet and an outlet elevation of approximately 363.6 feet.

Two (2) probes and one (1) boring were drilled at existing culvert. The boring locations and the interpretive subsurface profile are shown on Sheet 51 - Boring Location Plan & Interpretive Subsurface Profile. The boring logs are provided in Appendix A – Boring Logs.

Probe HB-FRYE-205 was drilled to a depth of approximately 6.1 feet bgs where it encountered a refusal surface. The exact nature of the refusal surface was not determined in the explorations. Probe HB-FRYE-205A was drilled to a depth of approximately 19.8 feet bgs without encountering a refusal surface. Boring HB-FRYE-206 was drilled through fill sand, fill silt, peat, and native sand to a depth of approximately 18.9 feet bgs. No refusal surface was encountered in the boring. One SPT N_{60} -value obtained in the fill silt was 4 bpf indicating that the fill silt is soft in consistency. SPT N_{60} -values in the native sand ranged from 16 to 41 bpf indicating that the sand is medium dense to dense in consistency.

6.2.2 Design and Construction – Fight Brook Bridge at approximate Station 209+85 shall be designed and constructed in accordance with MaineDOT Standard Specification Section 534 and the Contract Plans. The bottom of the precast concrete box culvert will be partially filled with 2 feet of Stream Channel Rock and Special Fill as shown on the Plans facilitate fish passage. The Special Fill will have a 2-foot-wide flow channel at the box culvert centerline. The Special Fill and Stream Channel Rock will tie into the existing bank lines outside the culvert.

An approximately 1.5-foot thick layer of peat was encountered in boring HB-FRYE-206, near the proposed Fight Brook Bridge. Any peat encountered at the box culvert bearing location shall be fully removed and replaced with compacted Granular Borrow, Material for Underwater Backfill (MaineDOT 703.19) or Crushed Stone $\frac{3}{4}$ -Inch (MaineDOT 703.13). Any loose soils or soft or unsuitable materials (native or manmade) encountered in the excavation shall be removed and replaced with compacted Granular Borrow Material for Underwater Backfill or Crushed Stone $\frac{3}{4}$ -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 $\frac{3}{4}$ -Inch (MaineDOT 703.13).

The culvert shall be bedded on a 1-foot thick layer of compacted Granular Borrow Material for Underwater Backfill meeting the requirements of MaineDOT Standard Specification 703.19. The bedding material should be placed in lift 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 entire culvert bedding subgrade should be proof-rolled with multiple passes of a static roller to identify loose or weaving areas that require over-excavation and replacement and to achieve a firm and stable surface for construction. All subgrade surfaces shall be protected from any unnecessary construction traffic.

The soil envelope and backfill shall also 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.

Bearing Resistance - The factored bearing resistances for the Fight Brook Bridge bearing on compacted granular bedding placed on dense sand at the service and strength limit states are presented in the table below. Supporting calculations in accordance with AASHTO LRFD Bridge Design Specifications 8th Edition 2017 (LRFD) are provided in Appendix C – Calculations.

Limit State	Resistance Factor ϕ_b	AASHTO LRFD Reference	Factored Bearing Resistance (ksf)
Service	1.0	Article 10.5.5.1	5.0
Strength	0.45	Table 10.5.5.2.2-1	6.0

Modulus of Subgrade Reaction - A modulus of subgrade reaction equal to 150 pounds per cubic inch shall be used for the structural design of the box culvert's base slab. See Appendix C – Calculations for supporting documentation.

6.3 Settlement

No settlement issues are anticipated for either the roadway or the proposed structures. The installation of the larger proposed culverts will result in a net unloading of the site soils at the structure locations. Placement of fill soils at the location of the existing structures is not anticipated to exceed the past loading condition of the site soils.

6.4 Scour and Riprap

Both the inlet and outlet of the proposed large culvert and the proposed box culvert shall be armored with riprap conforming to MaineDOT Supplemental 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 non-woven Class 1 erosion control geotextile that meets the requirements for MaineDOT Standard Specification 722.03 that is underlain by a 1-foot layer of protective aggregate cushion conforming to MaineDOT Standard Specification 703.19 Granular Borrow Material for Underwater Backfill.

6.5 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.

6.6 Additional Construction Considerations

Construction of the proposed RCP and 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.

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.

6.7 Bedrock Removal

Refusal of the drilling tools was encountered in several borings and probes along the project (see Section 5.6). Bedrock removal is anticipated for drainage and subgrade installation near these locations. Additional shallow bedrock may be encountered 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.

7.0 CLOSURE

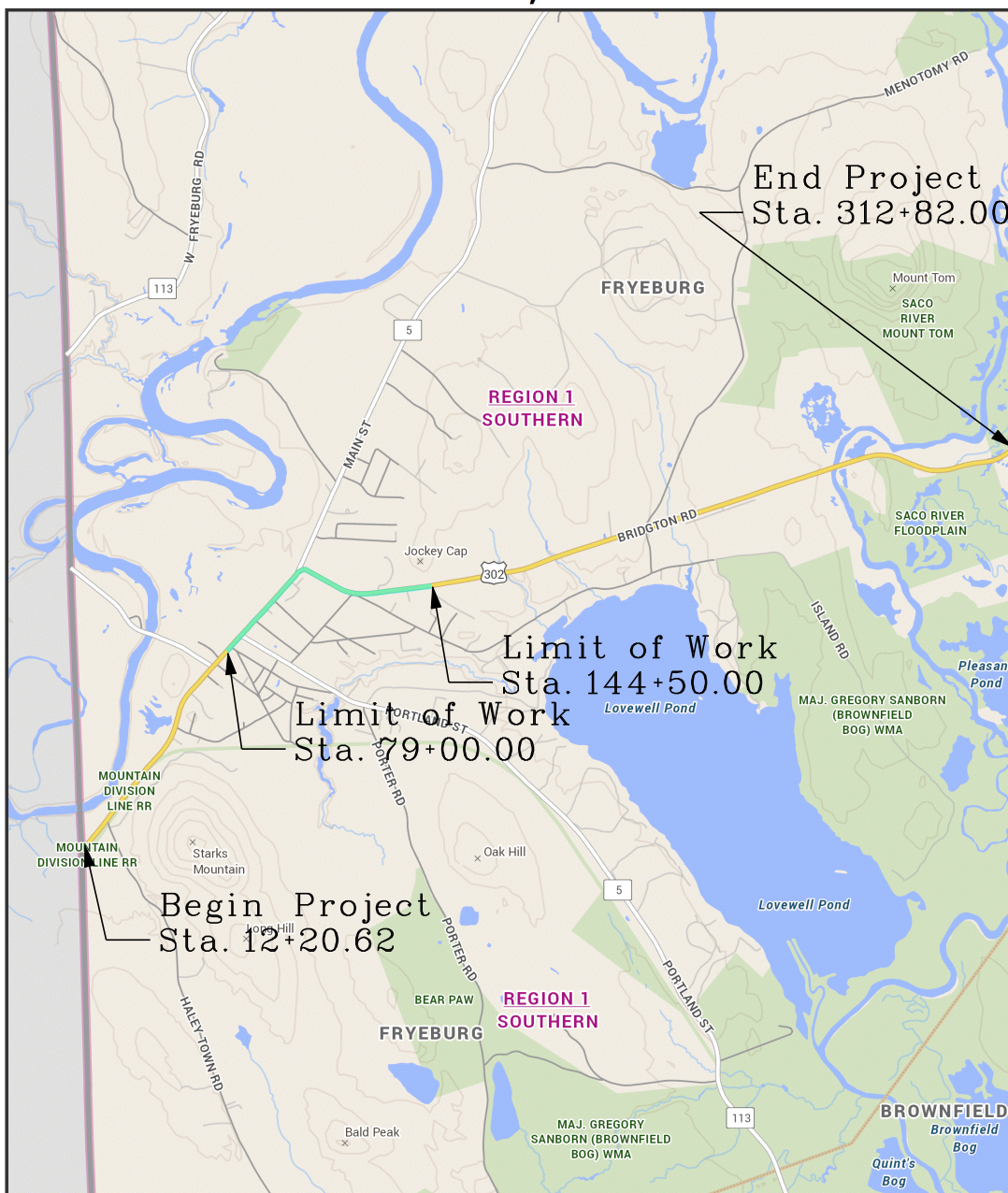
This report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed reconstruction of US Route 302 in Fryeburg, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed 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.

Sheets

FRYEBURG, MAINE



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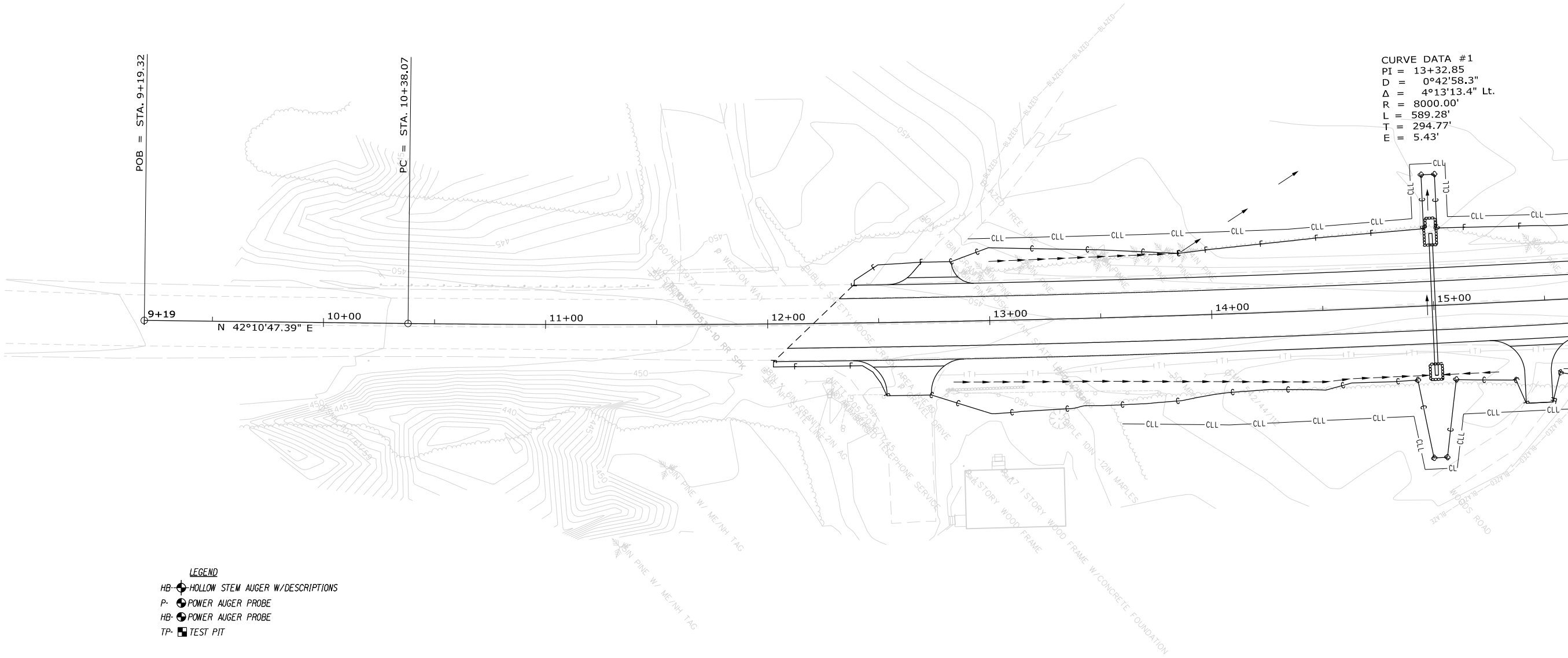
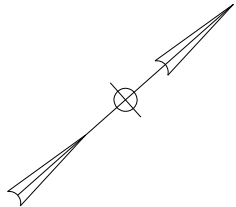
LOCATION MAP

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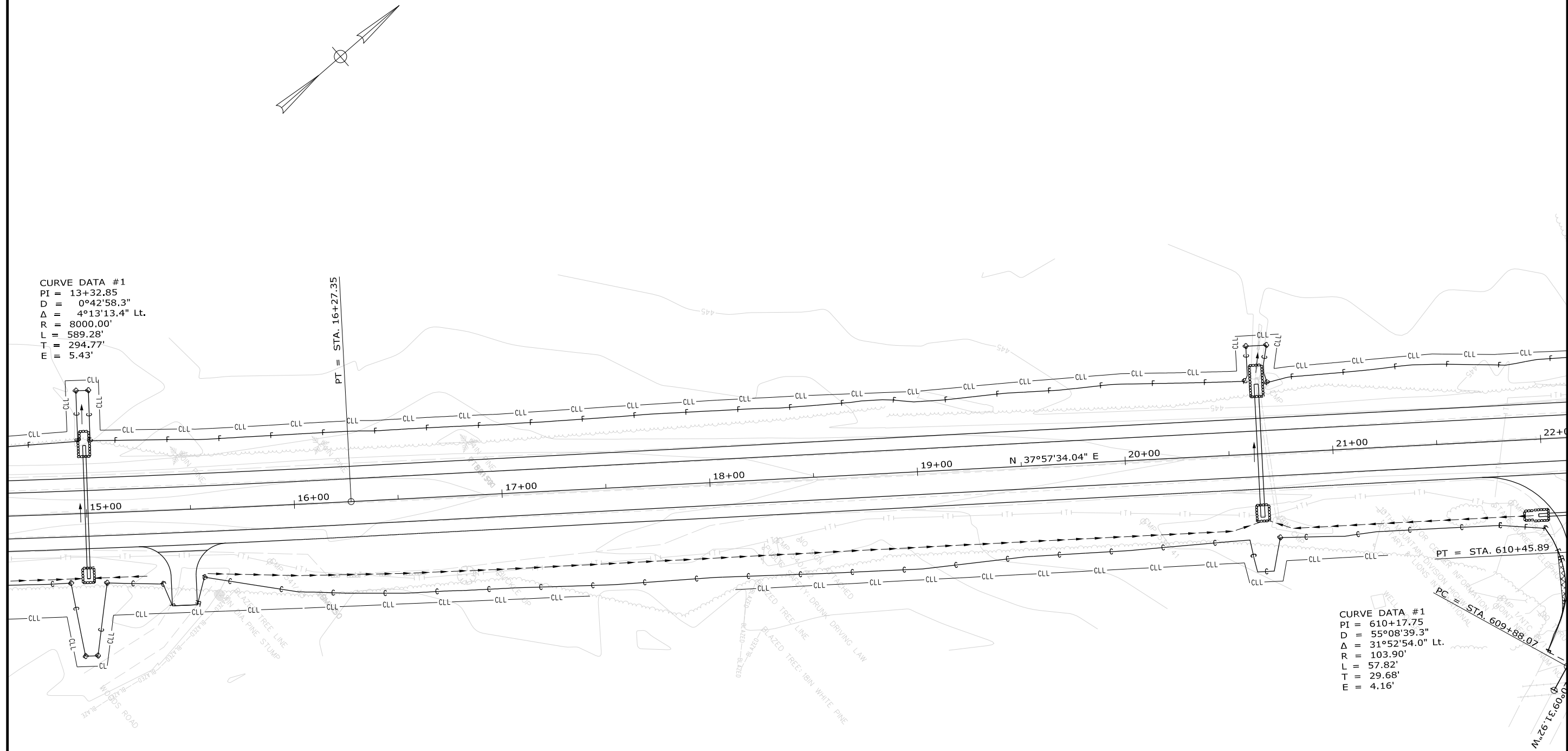
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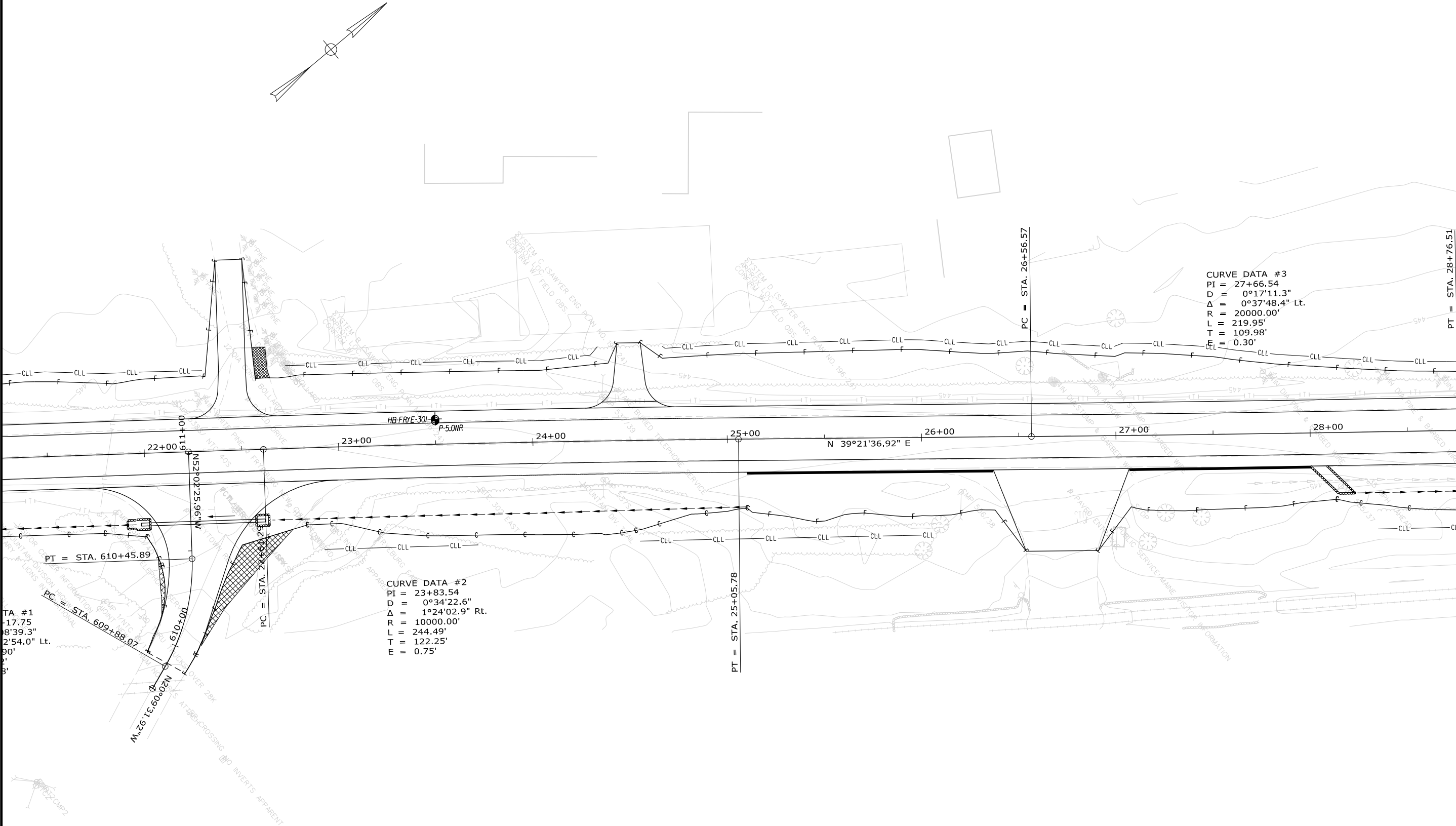
HIGHWAY PLANS



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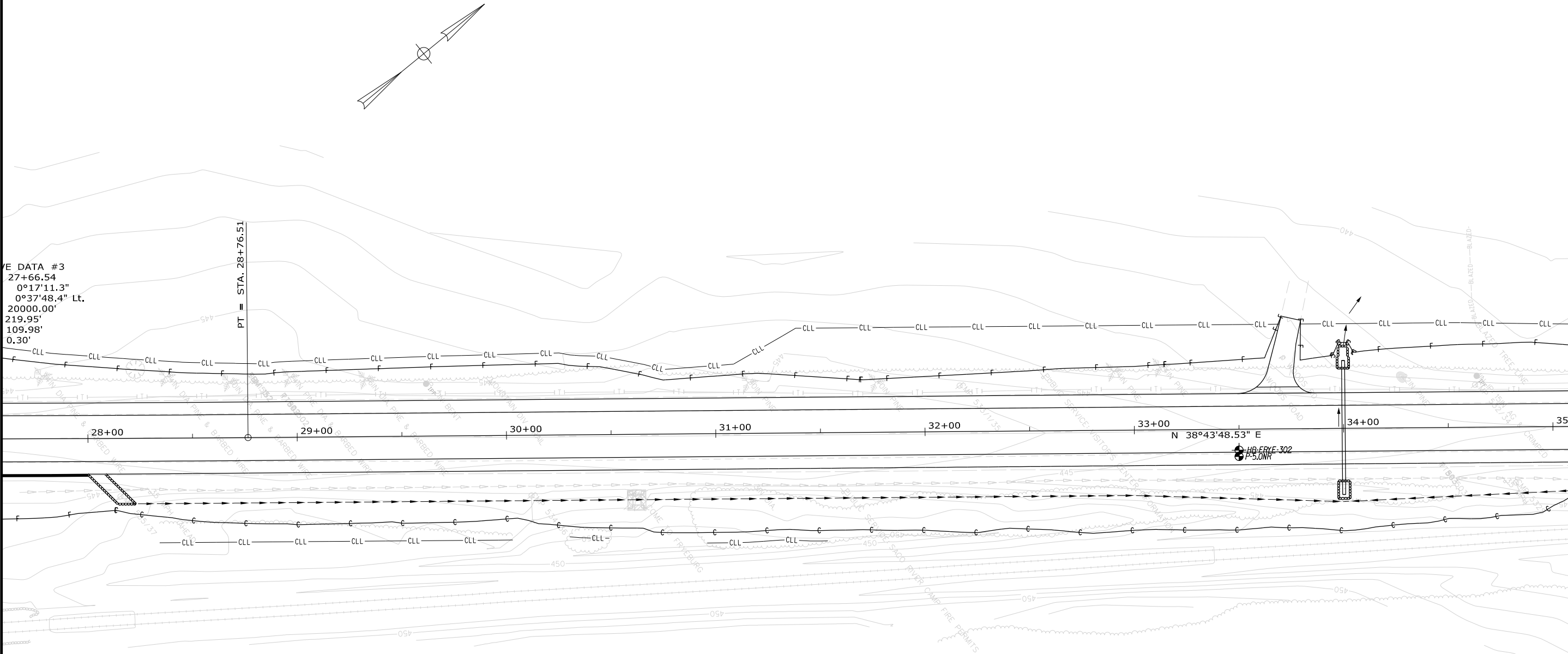


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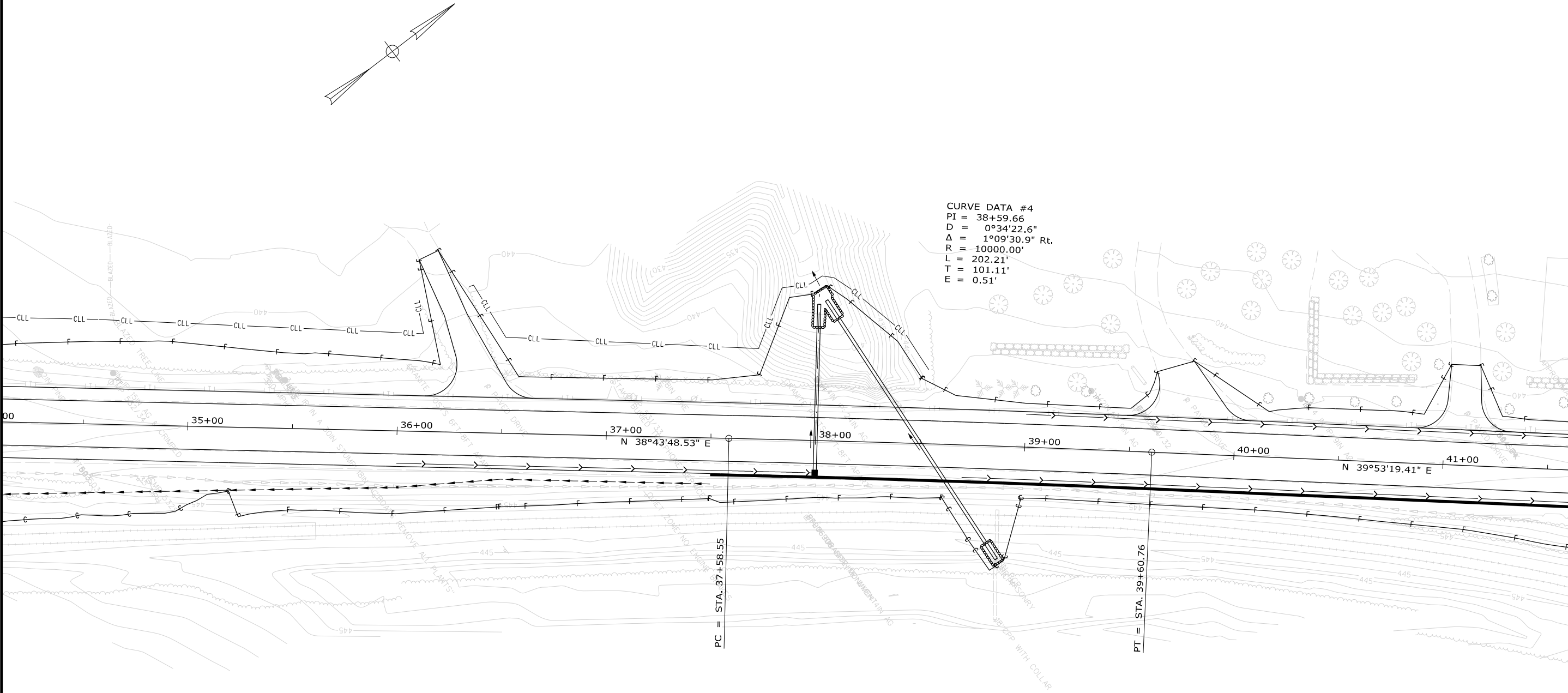
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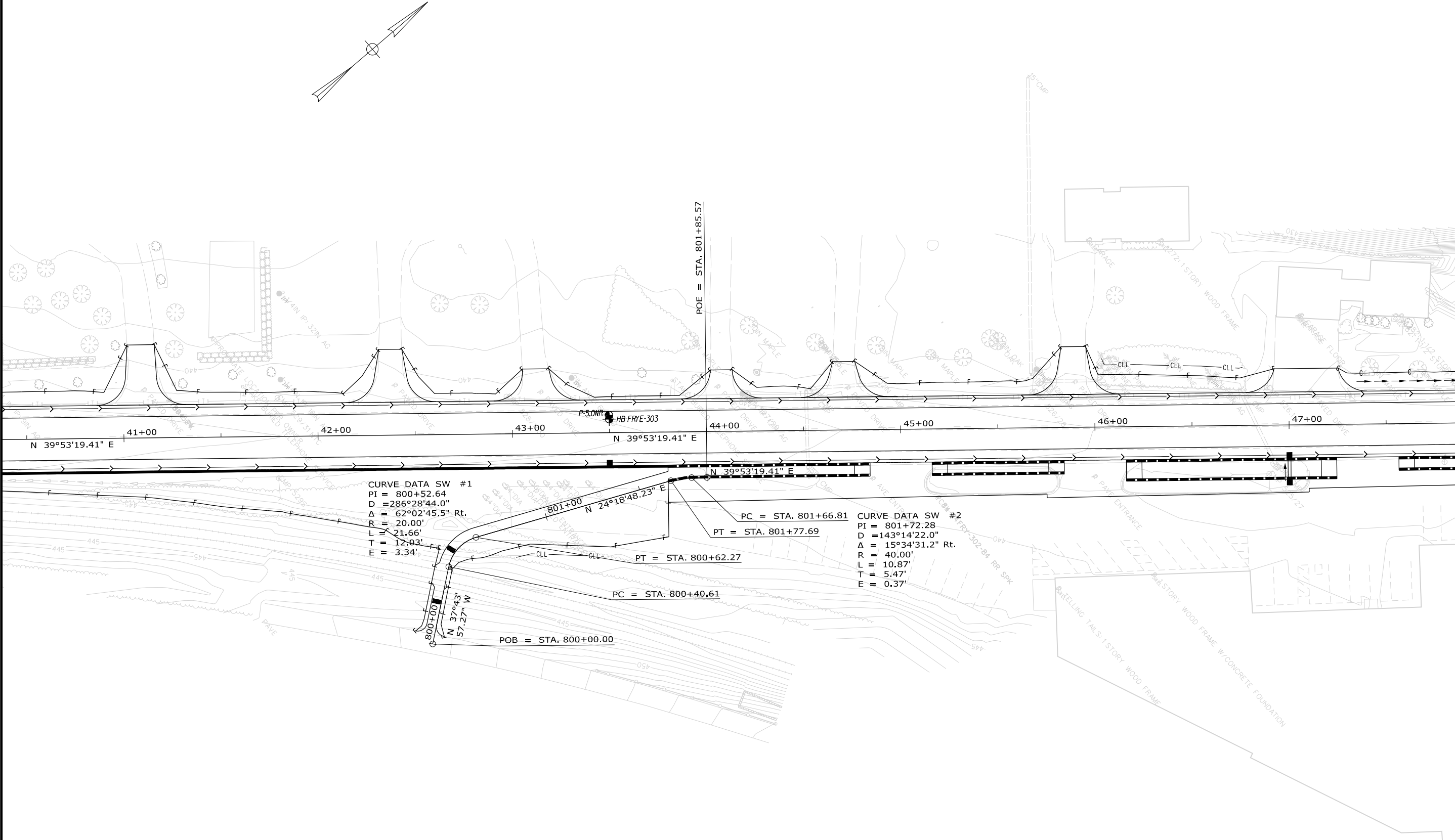
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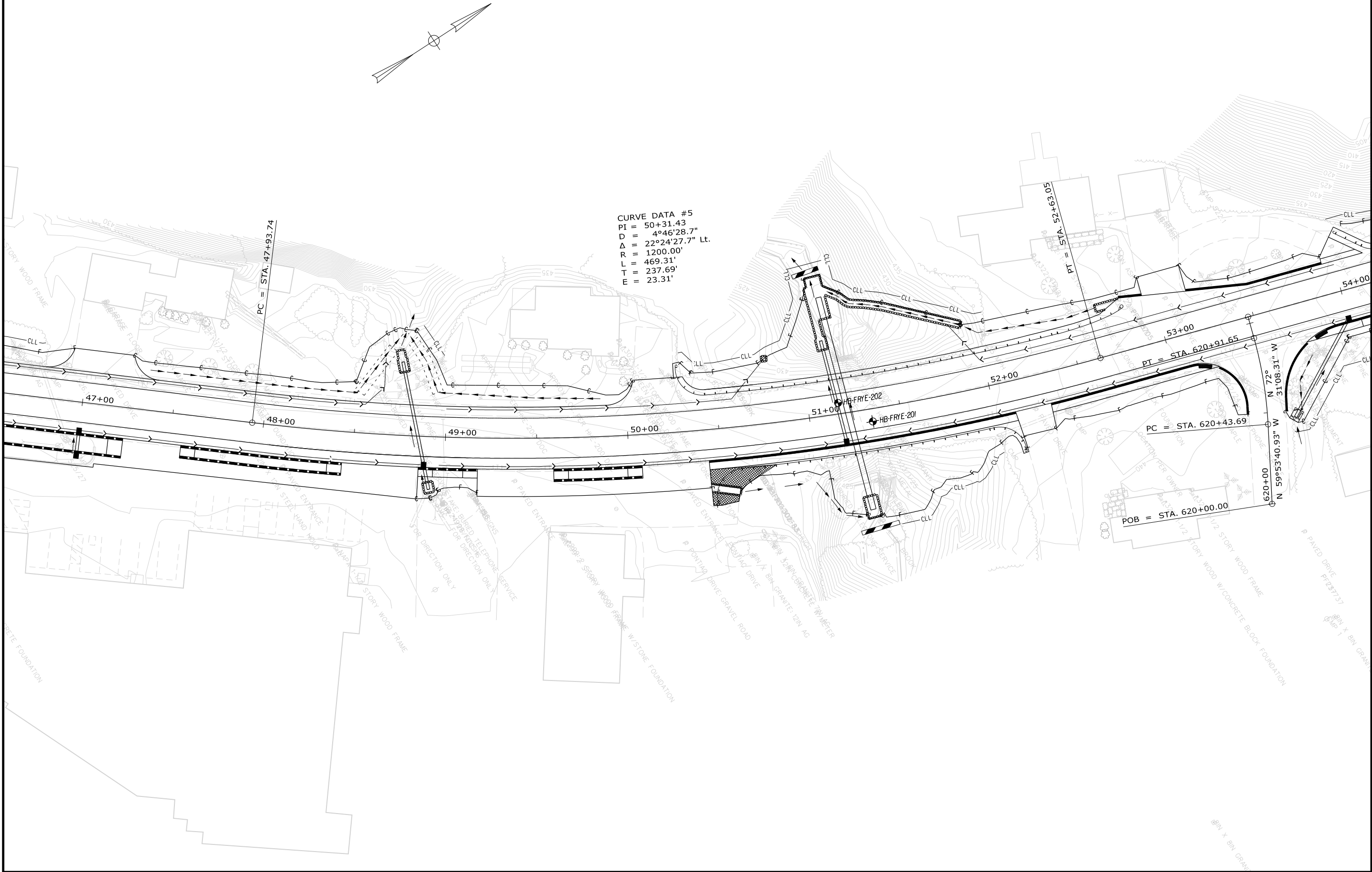
DATE

FRYEBURG
U.S. ROUTE 302

BORING LOCATION PLANS

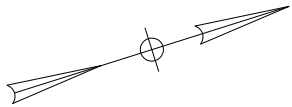
SHEET NUMBER
2

OF 51

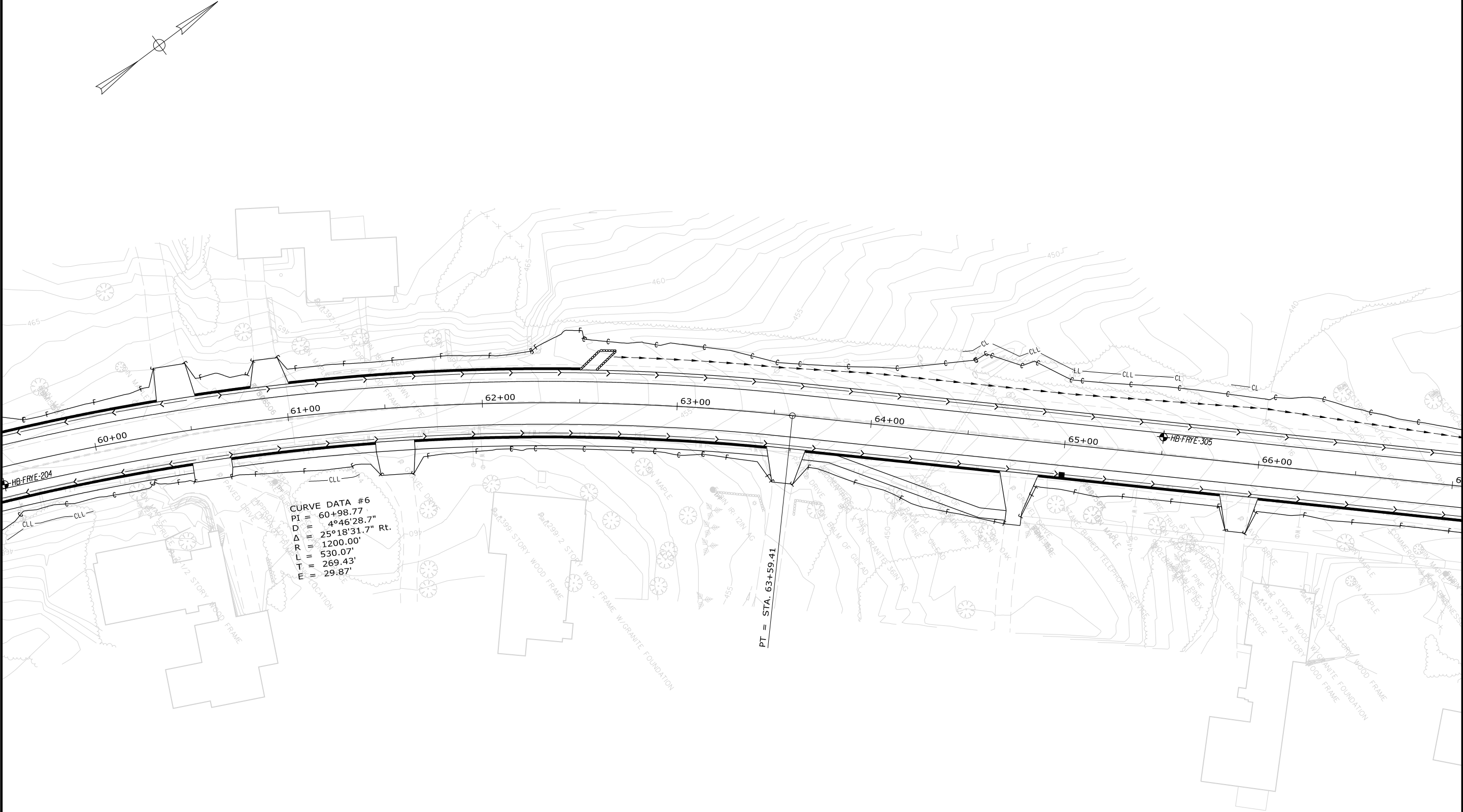


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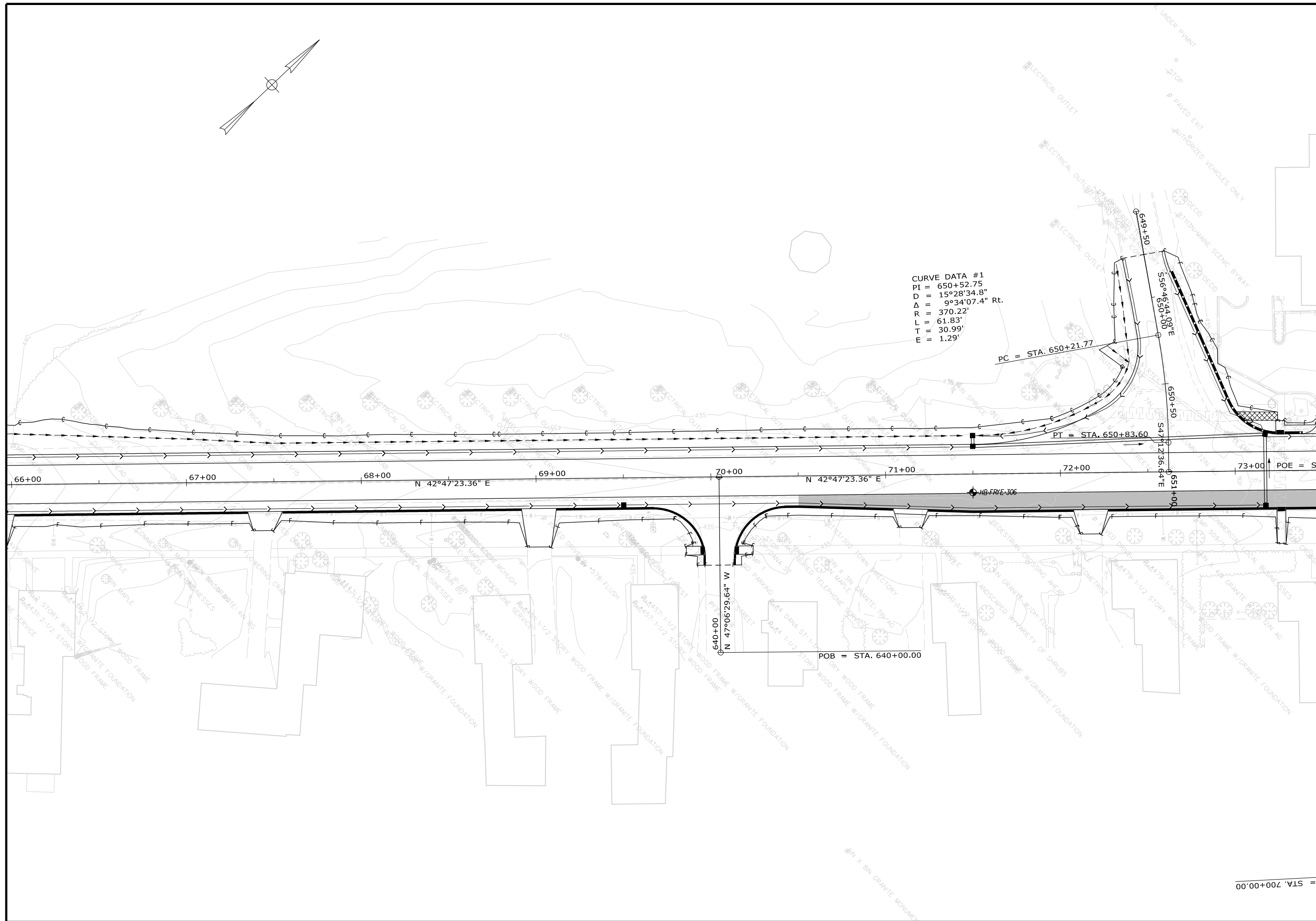
STATE OF MAINE		DEPARTMENT OF TRANSPORTATION	
NH-1728(000)E		SIGNATURE	
WIN		TNS2011 P.E. NUMBER	
17280.00		DATE	
HIGHWAY PLANS		FIELD CHANGES	
FRYEBURG		PROJ. MANAGER	BY
U.S. ROUTE 302		CHECKED-REVIEWED	R. BETZ
BORING LOCATION PLANS		DESIGNED-DRAWN	K. MAGUIRE
SHEET NUMBER		DESIGNED-DRAWN	T. WHITE
8		REVISIONS 1	REVISIONS 1
OF 51		REVISIONS 2	REVISIONS 2
		REVISIONS 3	REVISIONS 3
		REVISIONS 4	REVISIONS 4

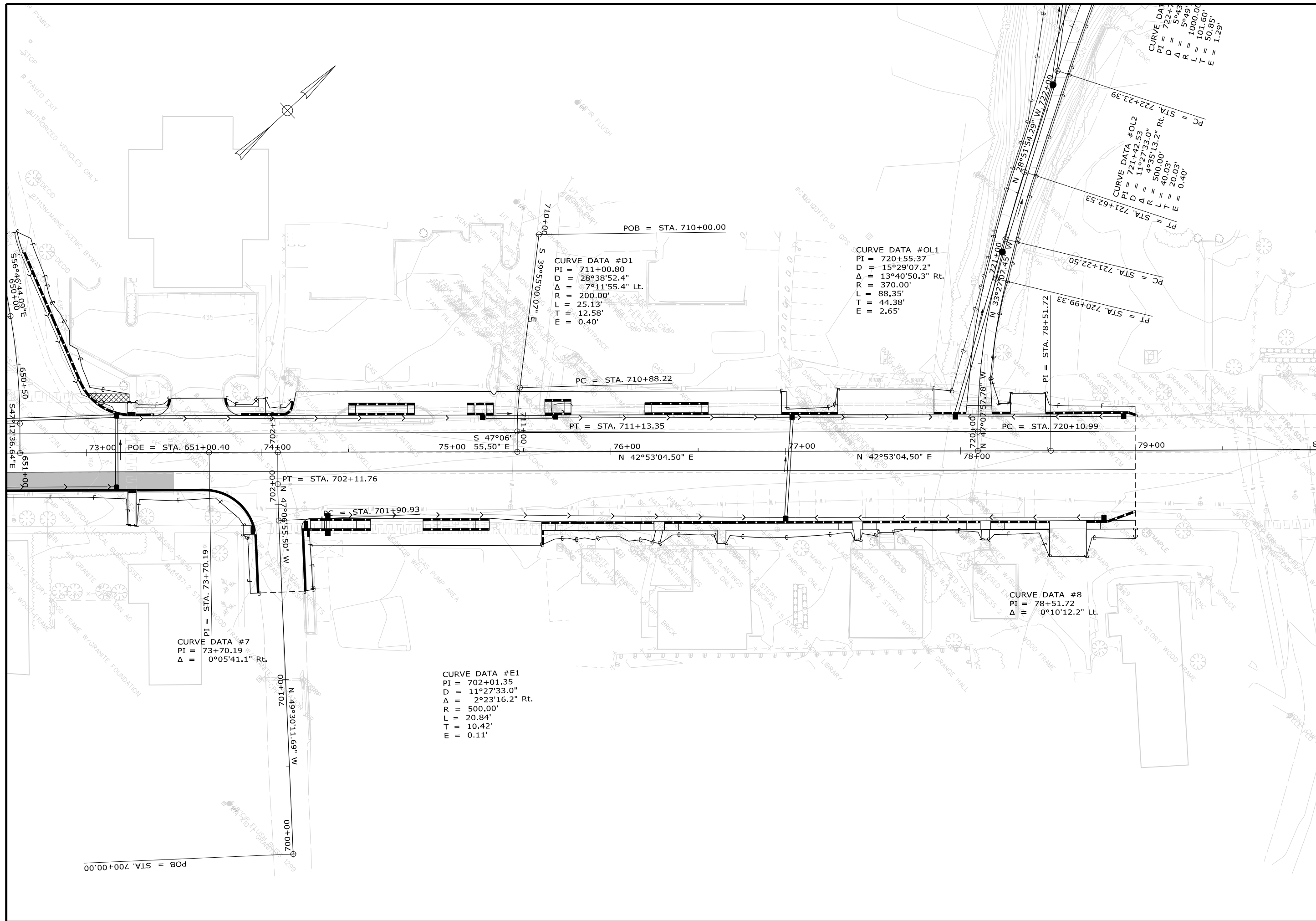


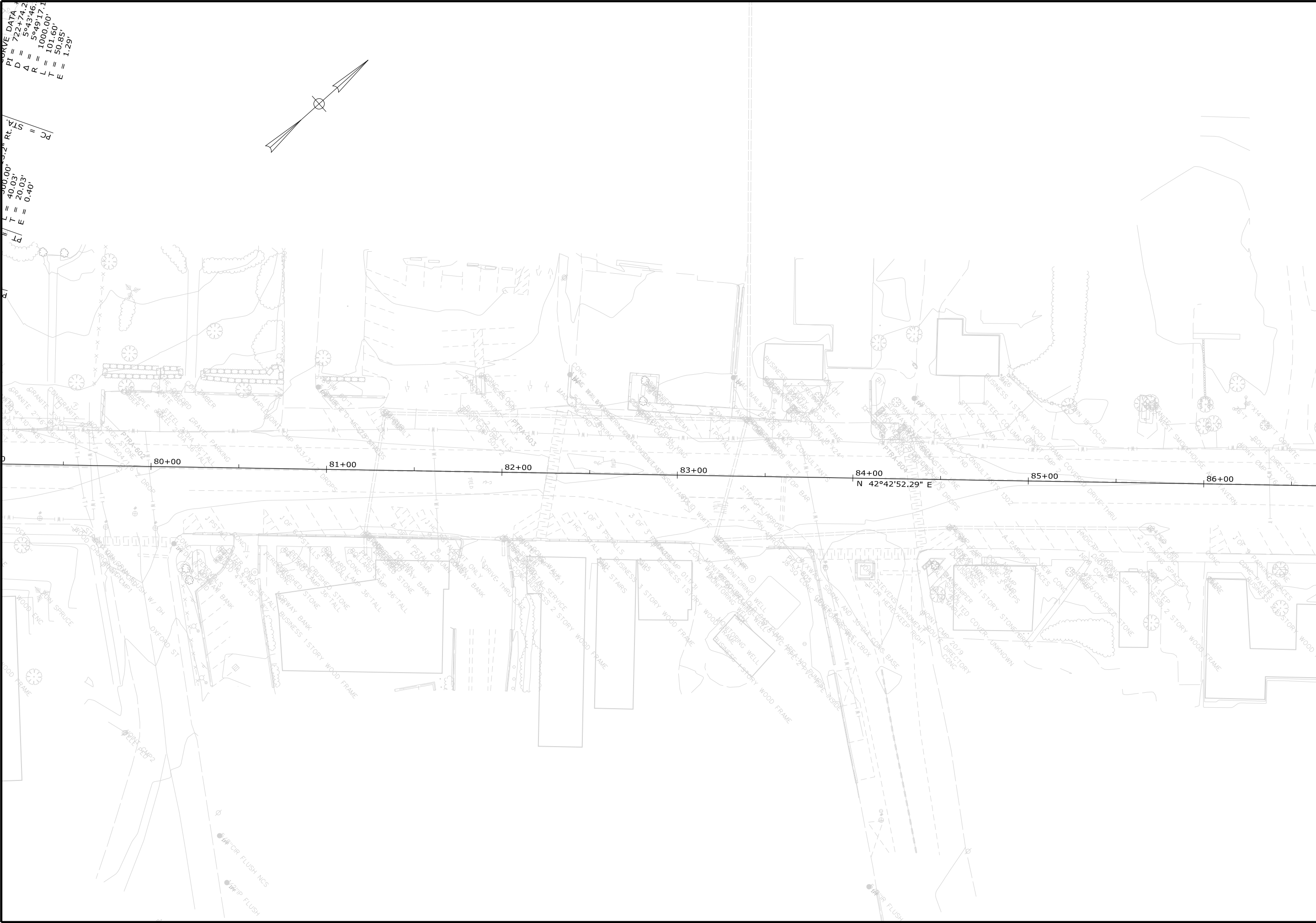
9 OF 51	SHEET NUMBER	FRYEBURG U.S. ROUTE 302	PROJ. MANAGER		R. HUGH	BY	DATE
			DESIGN-DETAILED	R. BETZ			
			CHECKED-REVIEWED				
			DESIGN2-DETAILED2	K. MAGUIRE	T. WHITE	OCT 2018	
			DESIGN3-DETAILED3				
BORING LOCATION PLANS			REVISIONS 1				WIN2011
			REVISIONS 2				
			REVISIONS 3				
			REVISIONS 4				DATE
			FIELD CHANGES				
STATE OF MAINE DEPARTMENT OF TRANSPORTATION		NH-1728(000)E					
WIN 17280.00		HIGHWAY PLANS					



PROJ. MANAGER	R. BETZ	BY	R. HUGH	DATE	
DESIGN-DETAILED	R. BETZ	CHECKED-REVIEWED	T. WHITE	OCT 2018	SIGNATURE
DESIGN-DETAILED	K. MAGUIRE	DESIGN-DETAILED	R. BETZ	NOV 2011	P.E. NUMBER
REVISIONS 1		REVISIONS 2			DATE
REVISIONS 3		REVISIONS 4			
FIELD CHANGES					



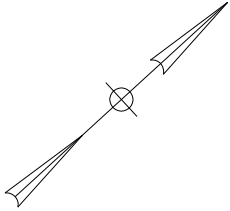


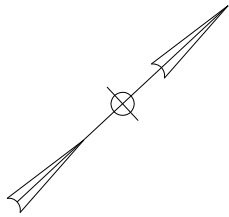


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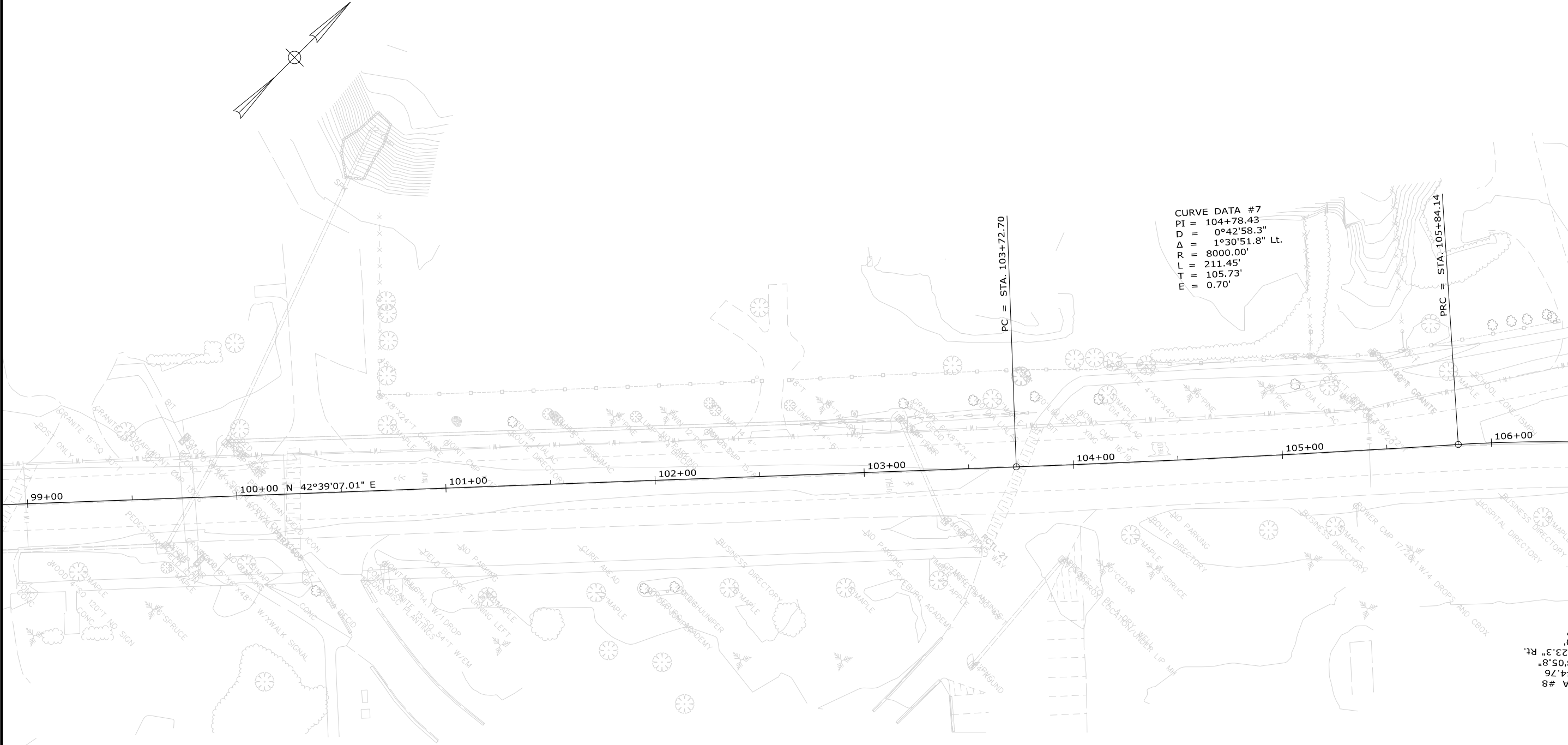
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STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E	PROJ. MANAGER CHECKED-DETAILED DESIGNS DET-ILED DESIGNS DET-ILED REVISIONS 1 REVISIONS 2 REVISIONS 3 FIELD CHANGES		BY R. HUGH R. BETZ T. WHITE R. BETZ	DATE OCT 2018 TNS2011
	SIGNATURE P.E. NUMBER DATE			
	SHEET NUMBER 13 OF 51		BORING LOCATION PLANS	

[illegible]



FRYEBURG U.S. ROUTE 302 BORING LOCATION PLANS	SHEET NUMBER		15		OF 51	
	PROJ. MANAGER		R. HUGH	BY	DATE	
	DESIGN-DETAILED		R. BETZ			
	CHECKED-REVIEWED					
	DESIGN2-DETAILED2		K. MAGUIRE	T. WHITE	OCT 2018	SIGNATURE
	DESIGN3-DETAILED3					
		R. BETZ		JAN2019	P.E. NUMBER	NH-1728(000)E
		REVISONS 1				
		REVISONS 2				
		REVISONS 3				
		REVISONS 4				
		FIELD CHANGES			DATE	WIN 17280.00
						HIGHWAY PLANS



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

NH-1728(000)E

WIN
17280.00
HIGHWAY PLANS

FRYEBURG
U.S. ROUTE 302

BORING LOCATION PLANS

SHEET NUMBER

16

OF 51

PROJ. MANAGER	BY	DATE	SIGNATURE
R. HUGHES	T. WHITE	OCT 2018	
CHECKED-REVIEWED			
DESIGNED-DRAWN			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			



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E = 78.07'

STATE OF MAINE DEPARTMENT OF TRANSPORTATION	SIGNATURE			
	P.E. NUMBER			
	DATE			
SHEET NUMBER		BORING LOCATION PLANS		
19				
OF 51				
		PROJ. MANAGER	R. HOUGH	BY
		CHECKED-REVIEWED	R. BETZ	DATE
		DESIGN-DETAILED	T. WHITE	OCT 2018
		DESIGN-DETAILED	R. BETZ	NOV 2011
		REVISIONS 1		
		REVISIONS 2		
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		REVISIONS 4		
		FIELD CHANGES		
		WIN		
		17280.00		
		HIGHWAY PLANS		



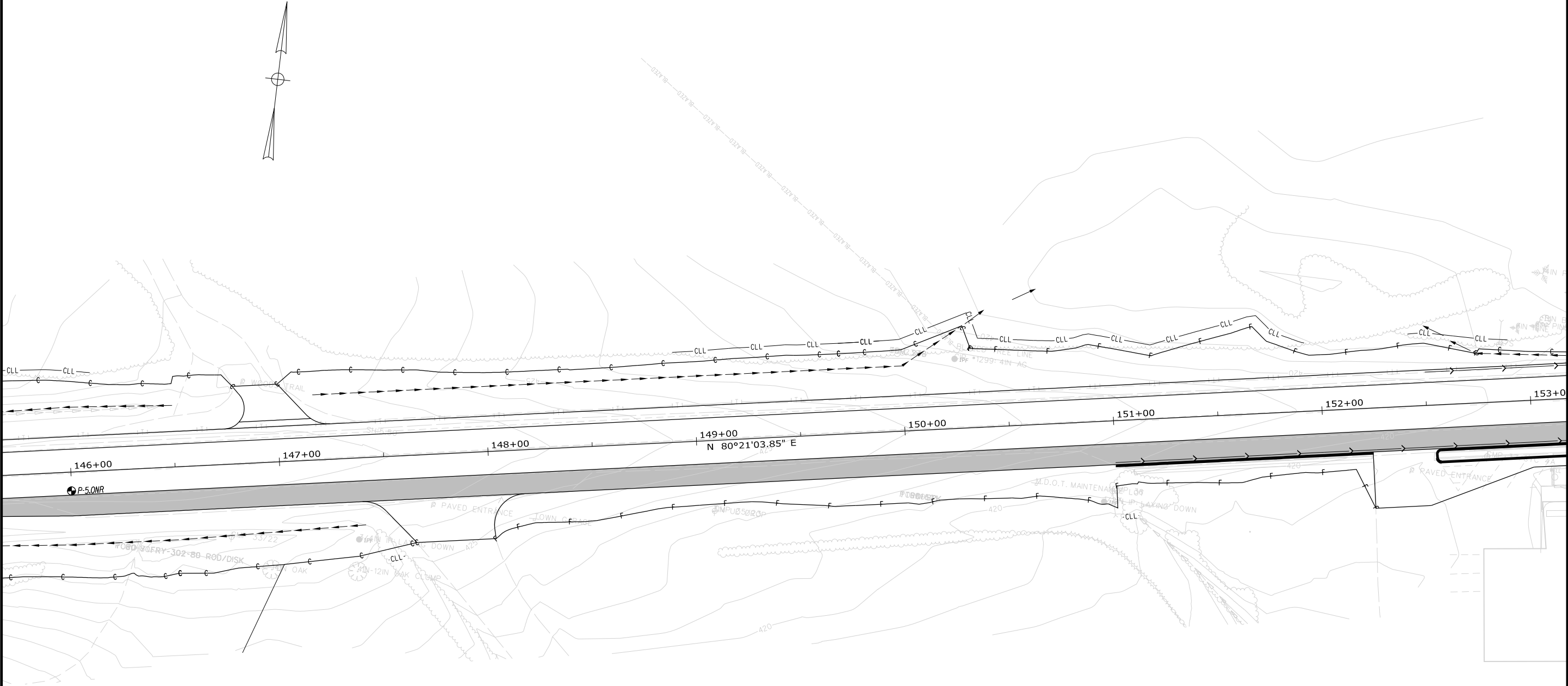
STATE OF MAINE DEPARTMENT OF TRANSPORTATION	<table><tr><td colspan="2">SIGNATURE</td></tr><tr><td colspan="2">OCT 2018</td></tr><tr><td colspan="2">P.E. NUMBER</td></tr><tr><td colspan="2">DATE</td></tr></table>				SIGNATURE		OCT 2018		P.E. NUMBER		DATE	
					SIGNATURE							
					OCT 2018							
P.E. NUMBER												
DATE												
NH-1728(000)E												
WIN 17280.00 HIGHWAY PLANS												

FRYEBURG U.S. ROUTE 302 BORING LOCATION PLANS	PROJ. MANAGER	BY	DATE
	DESIGN-DETAILED	R. BETZ	
	CHECKED-REVIEWED	T. WHITE	OCT 2018
	DESIGN-DETAILED	K. MAGUIRE	
	REVISIONS 1	R. BETZ	
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

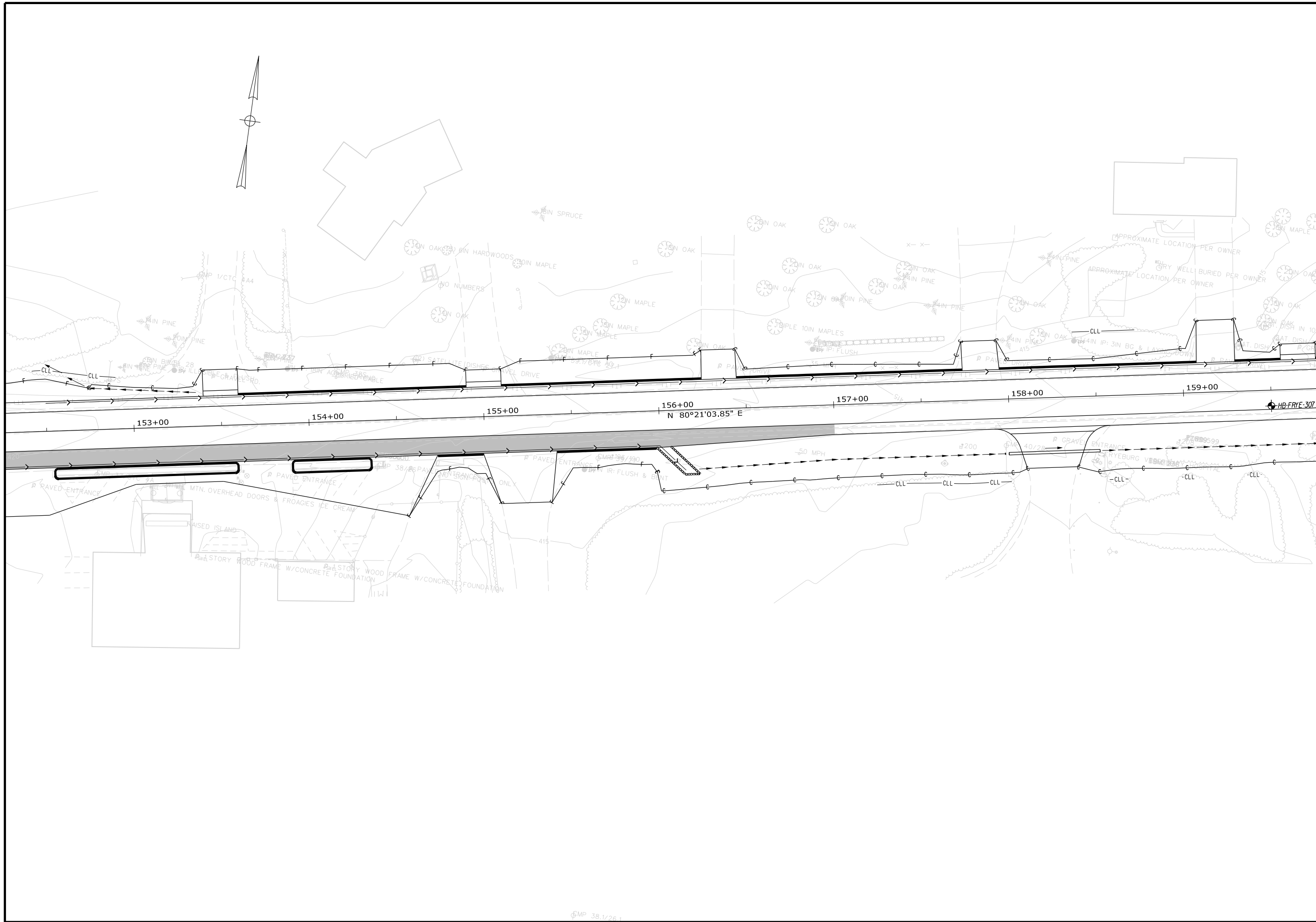
SHEET NUMBER
20
OF 51



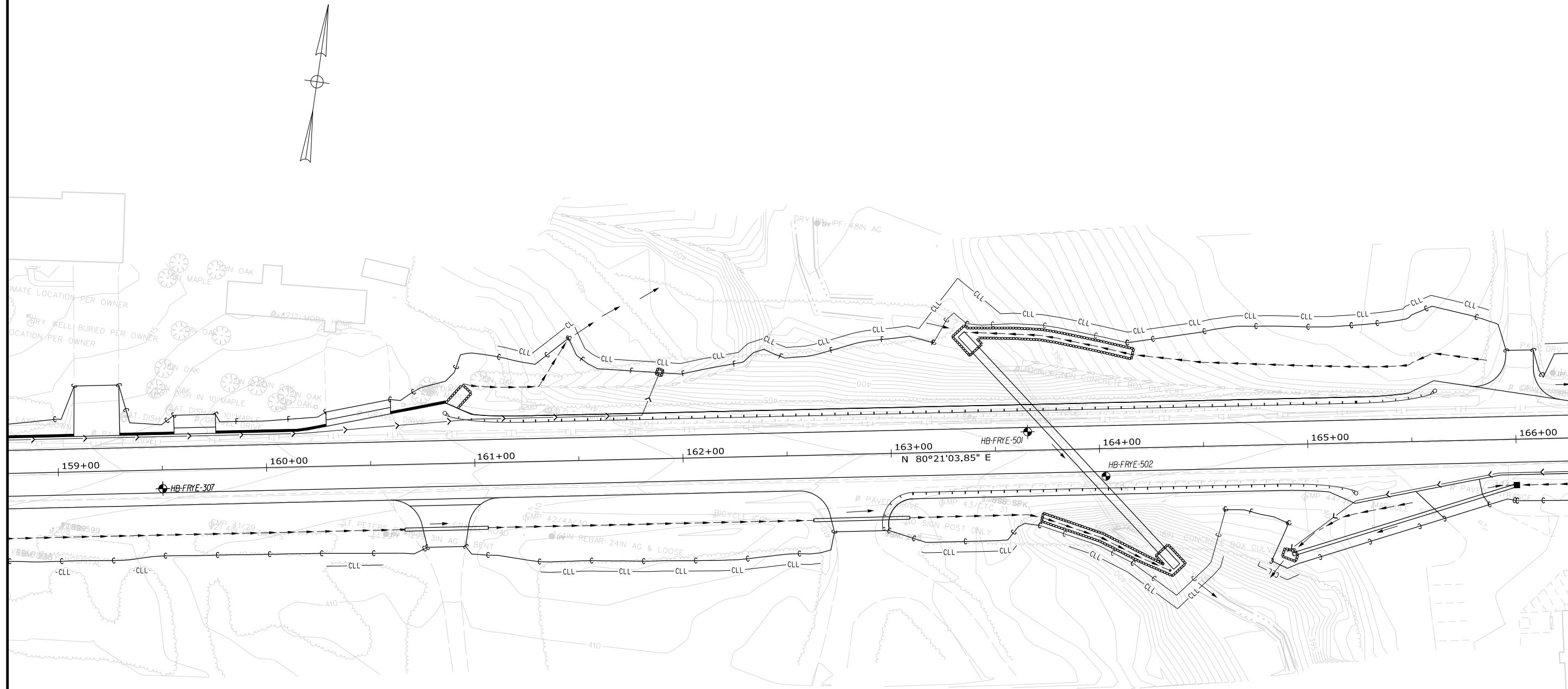
FRYEBURG U.S. ROUTE 302 BORING LOCATION PLANS	SHEET NUMBER		21		OF 51	
	PROJ. MANAGER		R. HUGH	BY	DATE	
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	CHECKED-REVIEWED					
	DESIGN2-DETAILED2		K. MAGUIRE	T. WHITE	OCT 2018	SIGNATURE
	DESIGN3-DETAILED3					
		P.E. NUMBER				
REVISONS 1		R. BETZ				
REVISONS 2						
REVISONS 3						
REVISONS 4						
FIELD CHANGES		DATE				
STATE OF MAINE						
DEPARTMENT OF TRANSPORTATION						
NH-1728(000)E						
WIN						
17280.00						
HIGHWAY PLANS						



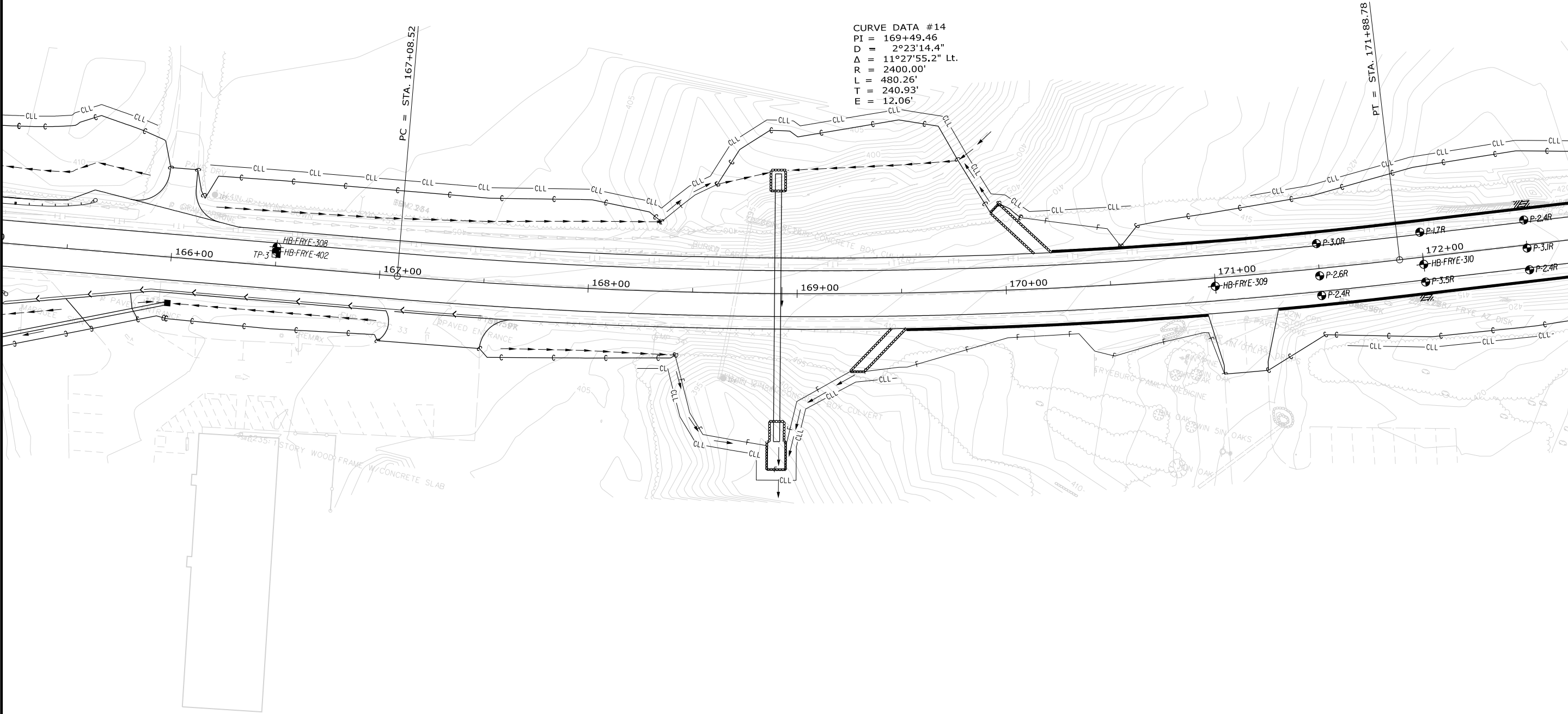
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PROJECT MANAGER R. BETZ		BY T. WHITE		DATE OCT 2018		SIGNATURE T. WHITE	
CHECKED-REVIEWED K. MAGUIRE		DESIGN-DETAILED R. BETZ		DATE JUN 2011		P.E. NUMBER	
REVISIONS 1		REVISIONS 2		REVISIONS 3		REVISIONS 4	
FIELD CHANGES		DATE		DATE		DATE	
SHEET NUMBER		BORING LOCATION PLANS		DATE		DATE	
23		OF 51		DATE		DATE	



FRYEBURG U.S. ROUTE 302		PROJ. MANAGER				R. HOUGH	BY	DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E
		DESIGN-DETAILED				R. BETZ			
		CHECKED-REVIEWED						SIGNATURE	
		DESIGN2-DETAILED2				K. MAQUIRE	T. WHITE	OCT 2018	
		DESIGN3-DETAILED3						P.E. NUMBER	
BORING LOCATION PLANS		REVISIONS 1						11/3/2011	WIN 17280.00 HIGHWAY PLANS
		REVISIONS 2							
		REVISIONS 3							
		REVISIONS 4						DATE	
		FIELD CHANGES							



25 OF 51		SHEET NUMBER	FRYEBURG U.S. ROUTE 302		PROJ. MANAGER		R. HUGH	BY	DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E WIN 17280.00 HIGHWAY PLANS
					DESIGN-DETAILED	R. BETZ				
BORING LOCATION PLANS		CHECKED-REVIEWED	SIGNATURE							
		DESIGN2-DETAILED2	K. MAGUIRE	OCT 2018						
		DESIGN3-DETAILED3	P.E. NUMBER							
		REVISIONS 1	R. BETZ	JUN2017						
		REVISIONS 2								
		REVISIONS 3								
		REVISIONS 4								
		FIELD CHANGES								



STATE OF MAINE		DEPARTMENT OF TRANSPORTATION	
NH-1728(000)E		WIN	
17280.00		HIGHWAY PLANS	
PROJECT NUMBER		SIGNATURE	
BORING LOCATION PLANS		DATE	
SHEET NUMBER		P.E. NUMBER	
26		TNS2011	
OF 51		FIELD CHANGES	
PROJ. MANAGER		BY	
DESIGN-DETAILED		R. BETZ	
CHECKED-REVIEWED		T. WHITE	
DESIGN-DETAILED		K. MAGUIRE	
DESIGN-DETAILED		R. BETZ	
REVISIONS 1		REVISIONS 2	
REVISIONS 2		REVISIONS 3	
REVISIONS 3		REVISIONS 4	
REVISIONS 4		FIELD CHANGES	

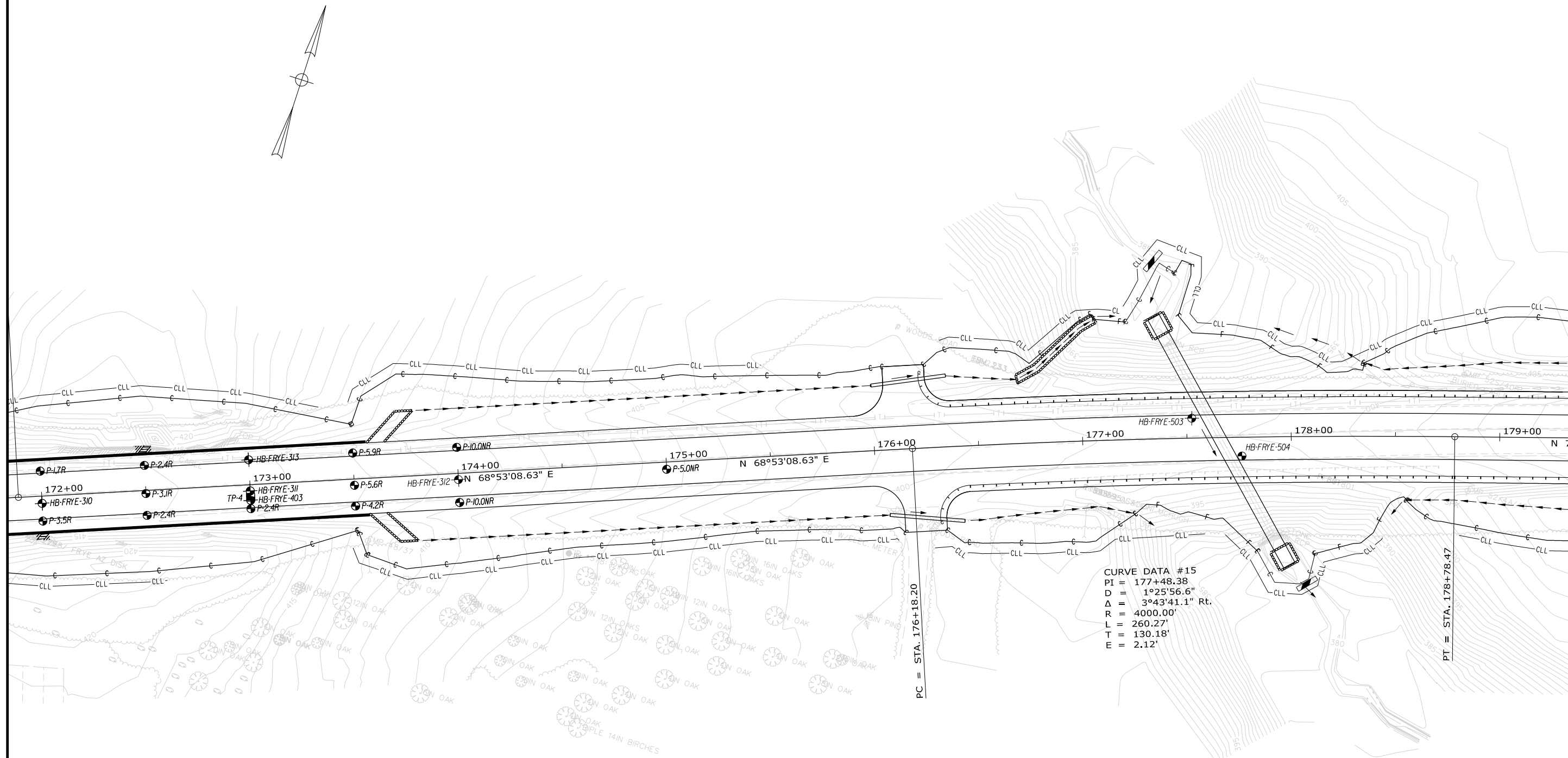
FRYEBURG
U.S. ROUTE 302

BORING LOCATION PLANS

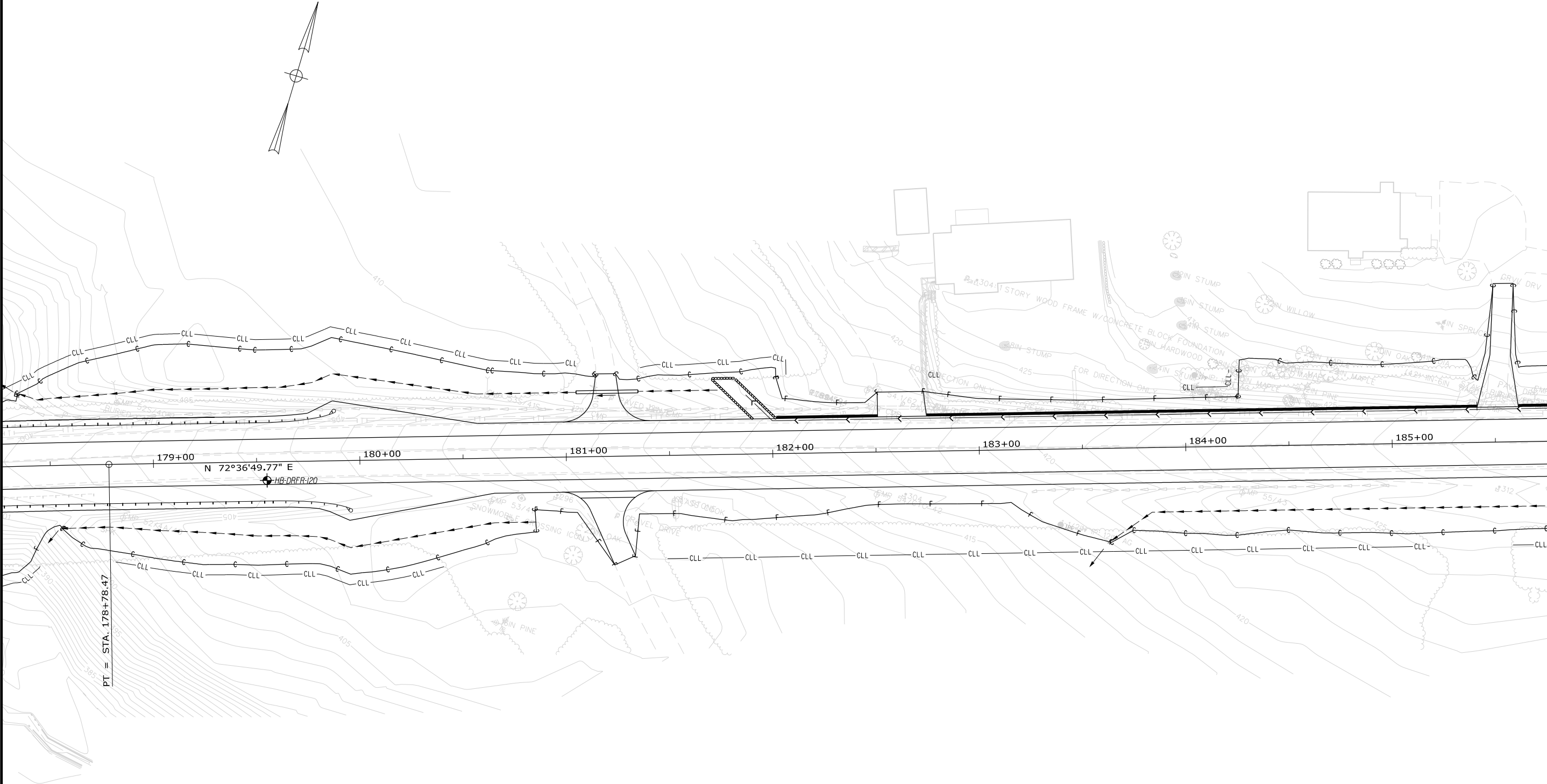
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26

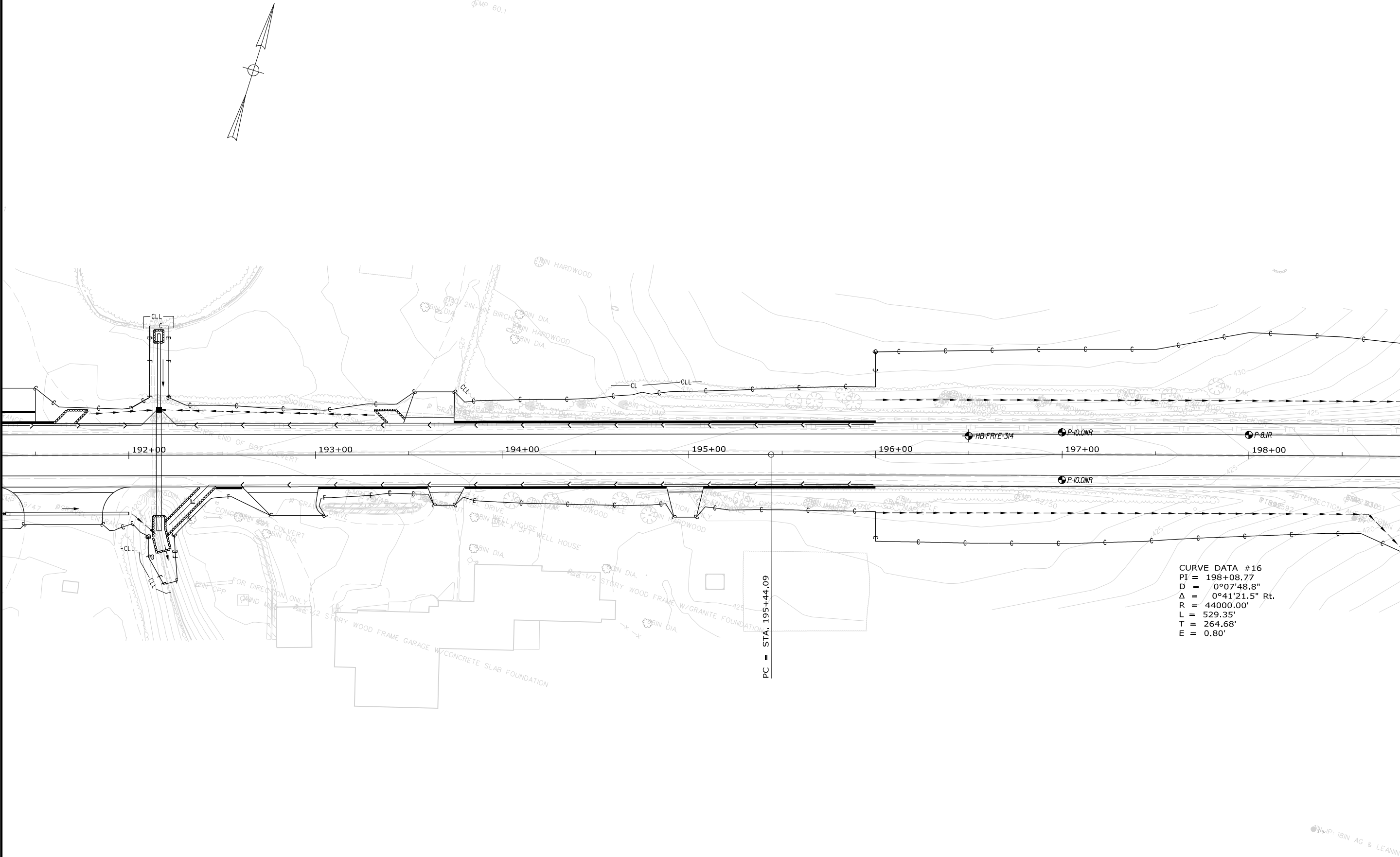
OF 51



27 OF 51	SHEET NUMBER	FRYEBURG U.S. ROUTE 302	PROJ. MANAGER				R. HOUGH	BY	DATE
			DESIGN-DETAILED		R. BETZ				
			CHECKED-REVIEWED						
			DESIGN2-DETAILED2		K. MAQUIRE		T. WHITE	OCT 2018	
			SIGNATURE						
BORING LOCATION PLANS	DESIGN3-DETAILED3								
	REVISIONS 1		R. BETZ		JUNY2011				
	REVISIONS 2								
	REVISIONS 3								
	REVISIONS 4								
FIELD CHANGES				DATE					
STATE OF MAINE		DEPARTMENT OF TRANSPORTATION		NH-1728(000)E		WIN 17280.00		HIGHWAY PLANS	



STATE OF MAINE		DEPARTMENT OF TRANSPORTATION	
NH-1728(000)E		WIN	
17280.00		HIGHWAY PLANS	
FRYEBURG		BORING LOCATION PLANS	
U.S. ROUTE 302		SHEET NUMBER	
		28	
		OF 51	
PROJ. MANAGER		BY	
DESIGN-DETAILED		DATE	
CHECKED-REVIEWED		SIGNATURE	
DESIGN-DETAILED		P.E. NUMBER	
REVISIONS 1		DATE	
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			



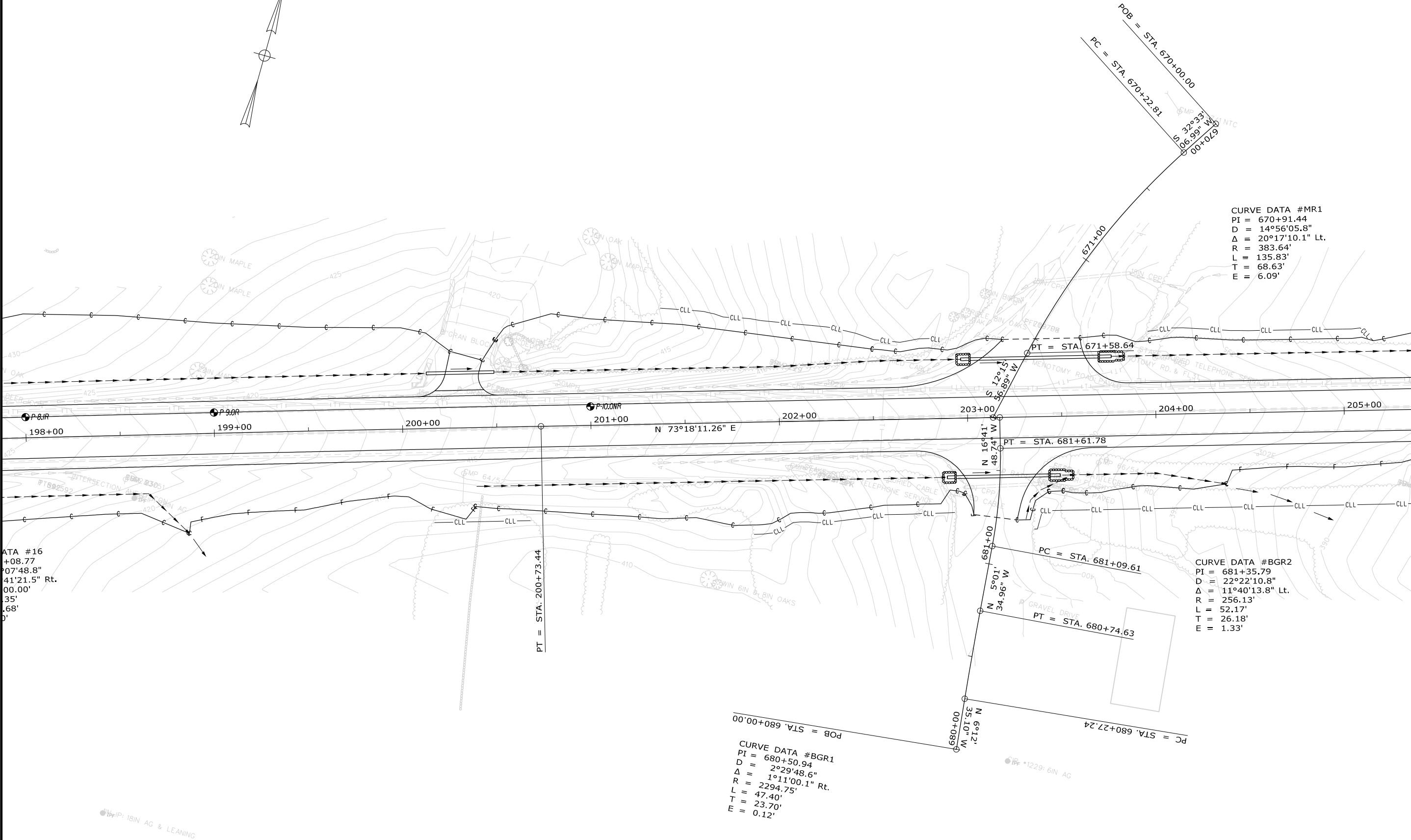
STATE OF MAINE DEPARTMENT OF TRANSPORTATION		SIGNATURE		DATE
		T. WHITE		OCT 2018
NH-1728(000)E		P.E. NUMBER		DATE
		1132011		
WIN 17280.00		HIGHWAY PLANS		
FRYEBURG U.S. ROUTE 302		SHEET NUMBER		
		30		
BORING LOCATION PLANS		OF 51		

Date:12/10/2018

Username: cody.a.russell

Filename: ... \00\GEOTECH\MSTA\031_BLP30.dgn
 Division: GEOTECH

DATA #16
 +08.77
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 41'21.5" Rt.
 00.00'
 35'
 .68'
 0'



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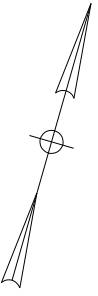
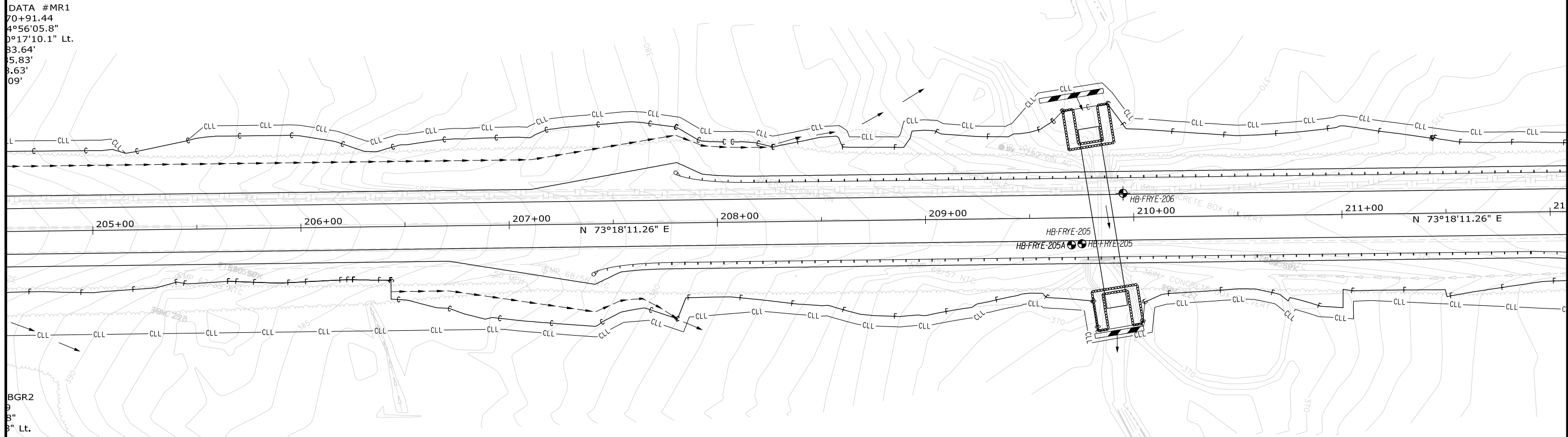
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 E = 1.33'

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 Δ = 1°11'00.1" Rt.
 R = 2294.75'
 L = 47.40'
 T = 23.70'
 E = 0.12'

PROJ. MANAGER	BY	DATE
R. BETZ	T. WHITE	OCT 2018
DESIGN-DETAILED	SIGNATURE	
CHECKED-REVIEWED		
DESIGN-DETAILED	P.E. NUMBER	1132011
REVISIONS 1	DATE	
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

Username: cody.a.russell

Filename: ... \00\GEOTECH\MSTA\032_BLP31.dgn Division: GEOTECH



STATE OF MAINE DEPARTMENT OF TRANSPORTATION	NH-1728(000)E	WIN 17280.00	HIGHWAY PLANS
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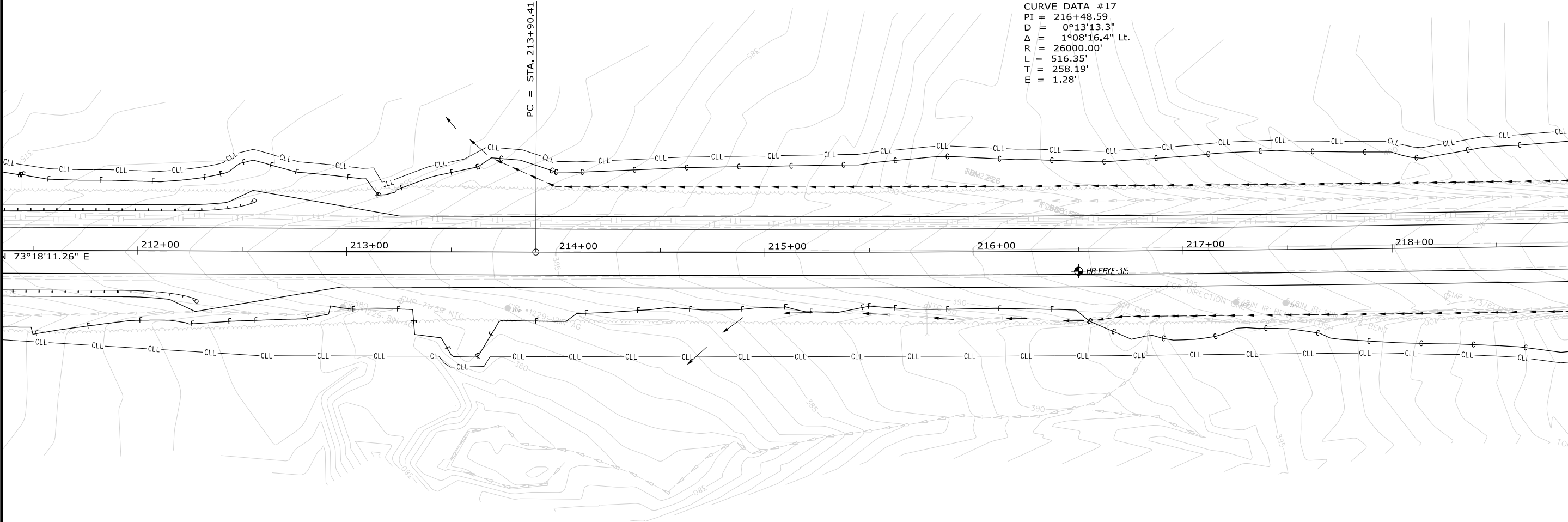
PROJ. MANAGER	R. HUGH	BY	DATE
DESIGN-DETAILED	R. BEITZ		
CHECKED-REVIEWED			
DESIGN-DETAILED	K. MAGUIRE		
DESIGN-DETAILED	J. WHITE		OCT 2018
REVISIONS 1	R. BEITZ		11/13/2011
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			
			DATE
			SIGNATURE
			P.E. NUMBER

FRYEBURG
U.S. ROUTE 302
BORING LOCATION PLANS

SHEET NUMBER

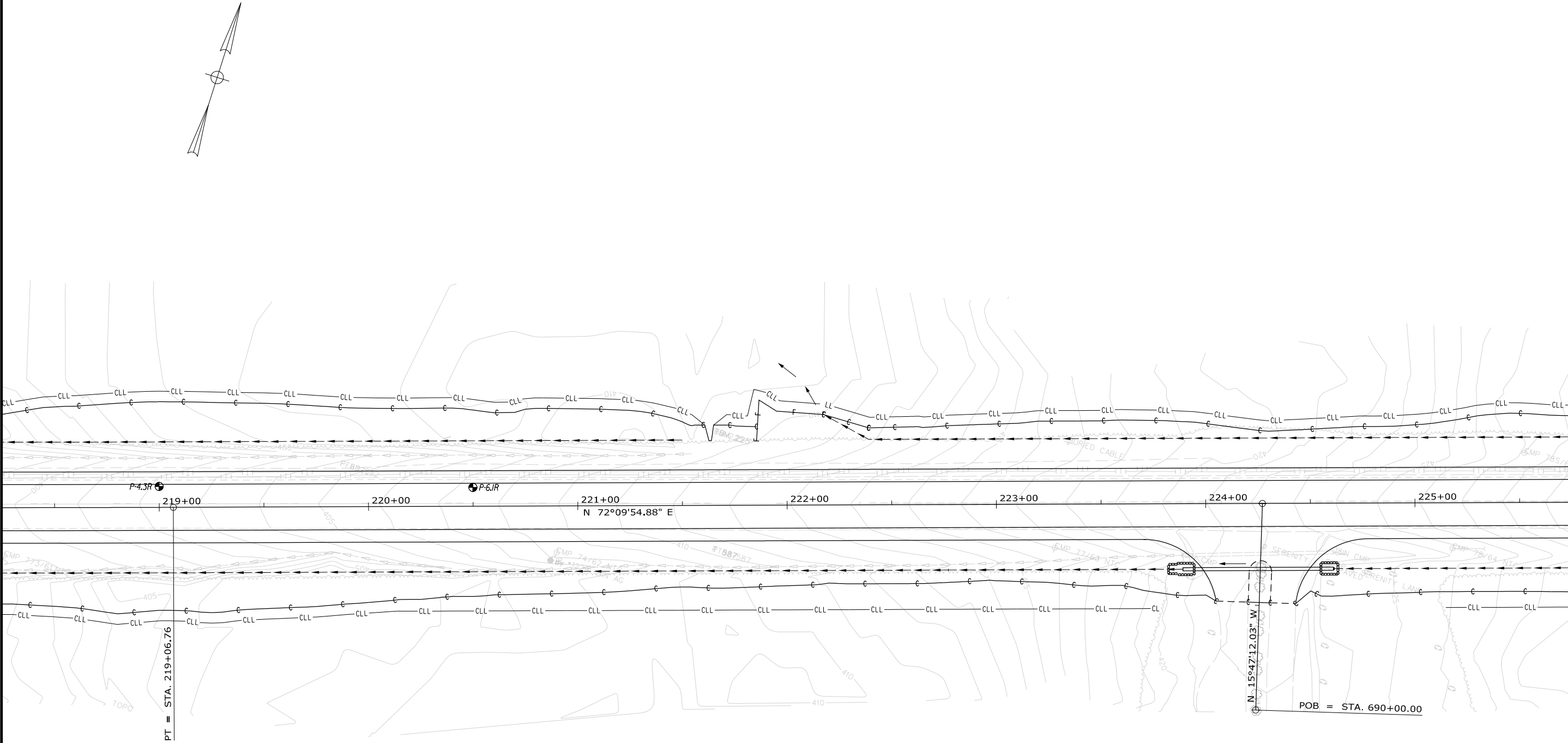
32

OF 51

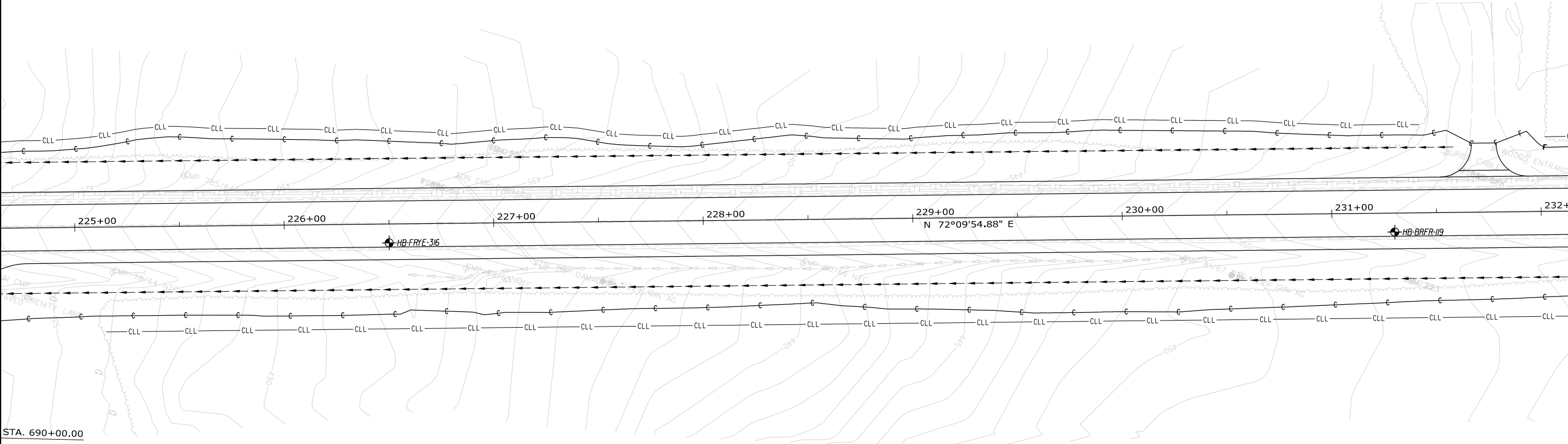
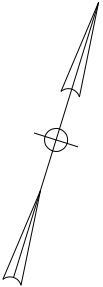


STATE OF MAINE DEPARTMENT OF TRANSPORTATION	SIGNATURE		DATE
	T. WHITE		OCT 2018
	T. WHITE		OCT 2018
NH-1728(000)E	P.E. NUMBER		DATE
	T. WHITE		OCT 2018
	T. WHITE		OCT 2018
WIN 17280.00 HIGHWAY PLANS	FIELD CHANGES		DATE
	T. WHITE		OCT 2018
	T. WHITE		OCT 2018

FRYEBURG
U.S. ROUTE 302
BORING LOCATION PLANS

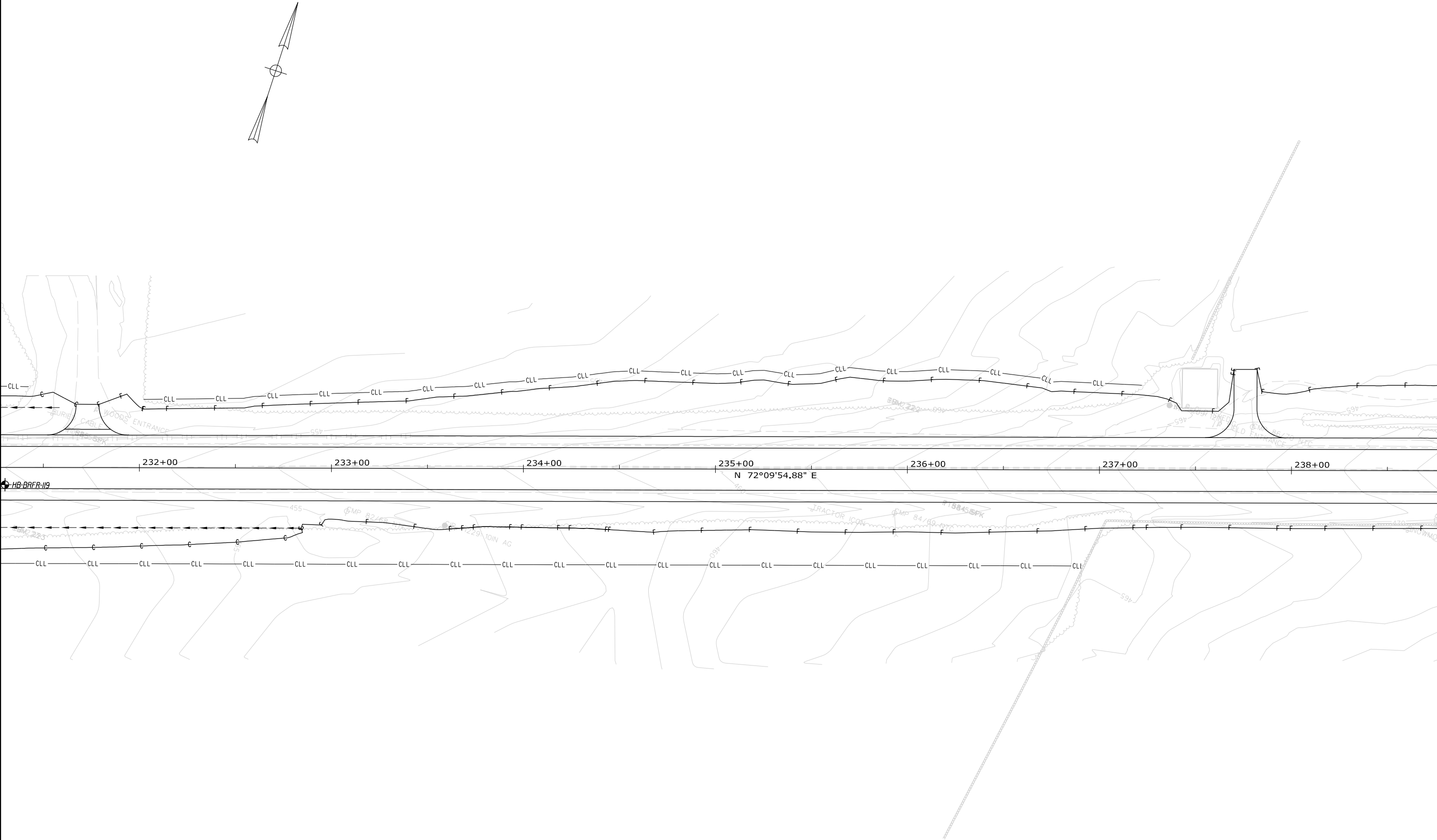


STATE OF MAINE DEPARTMENT OF TRANSPORTATION	SIGNATURE		DATE					
	NH-1728(000)E							
	WIN 17280.00		HIGHWAY PLANS					
FRYEBURG U.S. ROUTE 302 BORING LOCATION PLANS				PROJ. MANAGER	R. HUGHES	BY		
				CHECKED-DETAILED	R. BETZ			
				DESIGNED-DETAILED	K. MAGUIRE	T. WHITE	OCT 2018	
				DESIGNED-DETAILED				
				REVISIONS 1	R. BETZ			
REVISIONS 2								
REVISIONS 3								
REVISIONS 4								
FIELD CHANGES								
SHEET NUMBER				DATE				
34				DATE				
OF 51				DATE				

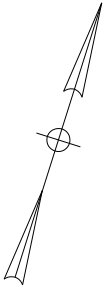
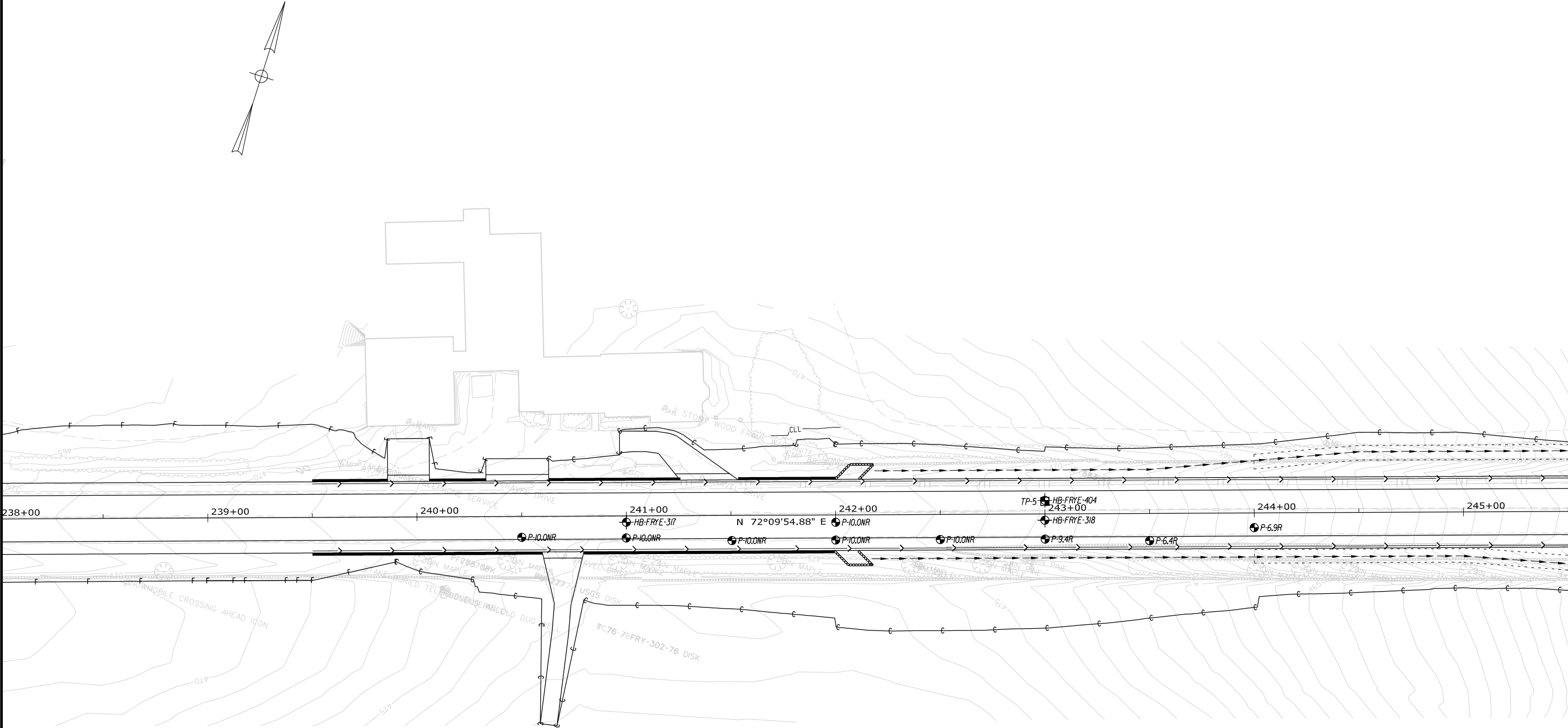


STATE OF MAINE DEPARTMENT OF TRANSPORTATION		SIGNATURE		DATE
		T. WHITE		OCT 2018
		P.E. NUMBER		1332011
NH-1728(000)E		DATE		
WIN		17280.00		HIGHWAY PLANS

FRYEBURG U.S. ROUTE 302		BORING LOCATION PLANS	
SHEET NUMBER		35	
		OF 51	



STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E	PROJ. MANAGER		BY	DATE
	DESIGN-DETAILED	CHECKED-REVIEWED	R. BETZ	
	DESIGN-DETAILED	DESIGN-DETAILED	T. WHITE	OCT 2018
	REVISIONS 1	REVISIONS 2	REVISIONS 3	REVISIONS 4
SHEET NUMBER		FIELD CHANGES		DATE
36		OF 51		
FRYEBURG U.S. ROUTE 302		BORING LOCATION PLANS		
		WIN		HIGHWAY PLANS
		17280.00		



STATE OF MAINE

DEPARTMENT OF TRANSPORTATION

NH-1728(000)E

WIN 17280.00 HIGHWAY PLANS

PROJ. MANAGER

CHECKED-REVIEWED

DESIGN-DETAILED

REVISIONS 1

REVISIONS 2

REVISIONS 3

REVISIONS 4

FIELD CHANGES

R. BETZ

K. MAGUIRE

R. BETZ

T. WHITE

T. WHITE

T. WHITE

OCT 2018

NOV2011

SIGNATURE

P.E. NUMBER

DATE

FRYEBURG

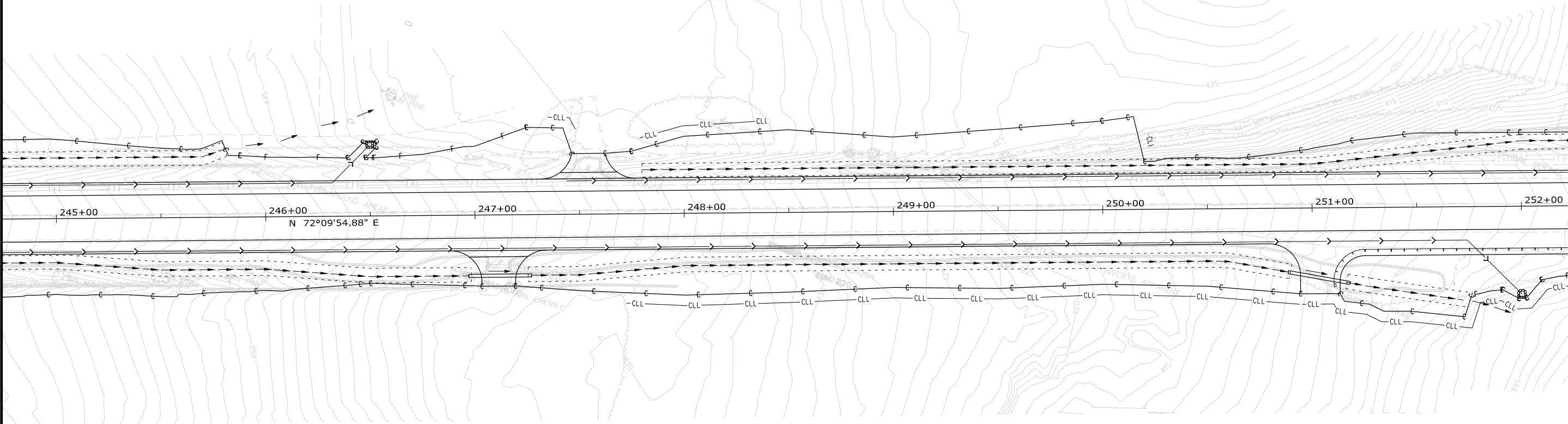
U.S. ROUTE 302

BORING LOCATION PLANS

SHEET NUMBER

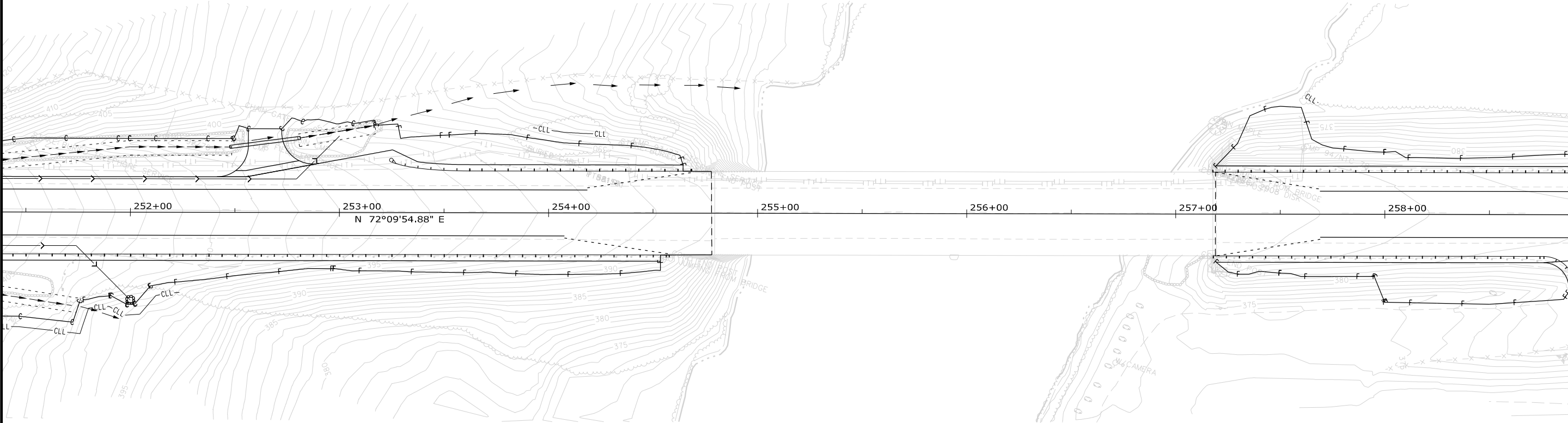
37

OF 51



STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E	SIGNATURE			
	OCT 2018			
	T. WHITE			
WIN 17280.00 HIGHWAY PLANS	P.E. NUMBER			
	TNS2011			
	DATE			
FIELD CHANGES		DATE		
REVISIONS 4		DATE		
REVISIONS 3		DATE		
REVISIONS 2		DATE		
REVISIONS 1		DATE		
DESIGN DETAIL D3		DATE		
DESIGN DETAIL D2		DATE		
CHECKED-REVIEWED		DATE		
DESIGN-DETAILED		DATE		
PROJ. MANAGER		DATE		
R. HUGH		DATE		
BY		DATE		
T. WHITE		DATE		
R. BETZ		DATE		
R. BETZ		DATE		

FRYEURG
U.S. ROUTE 302
BORING LOCATION PLANS

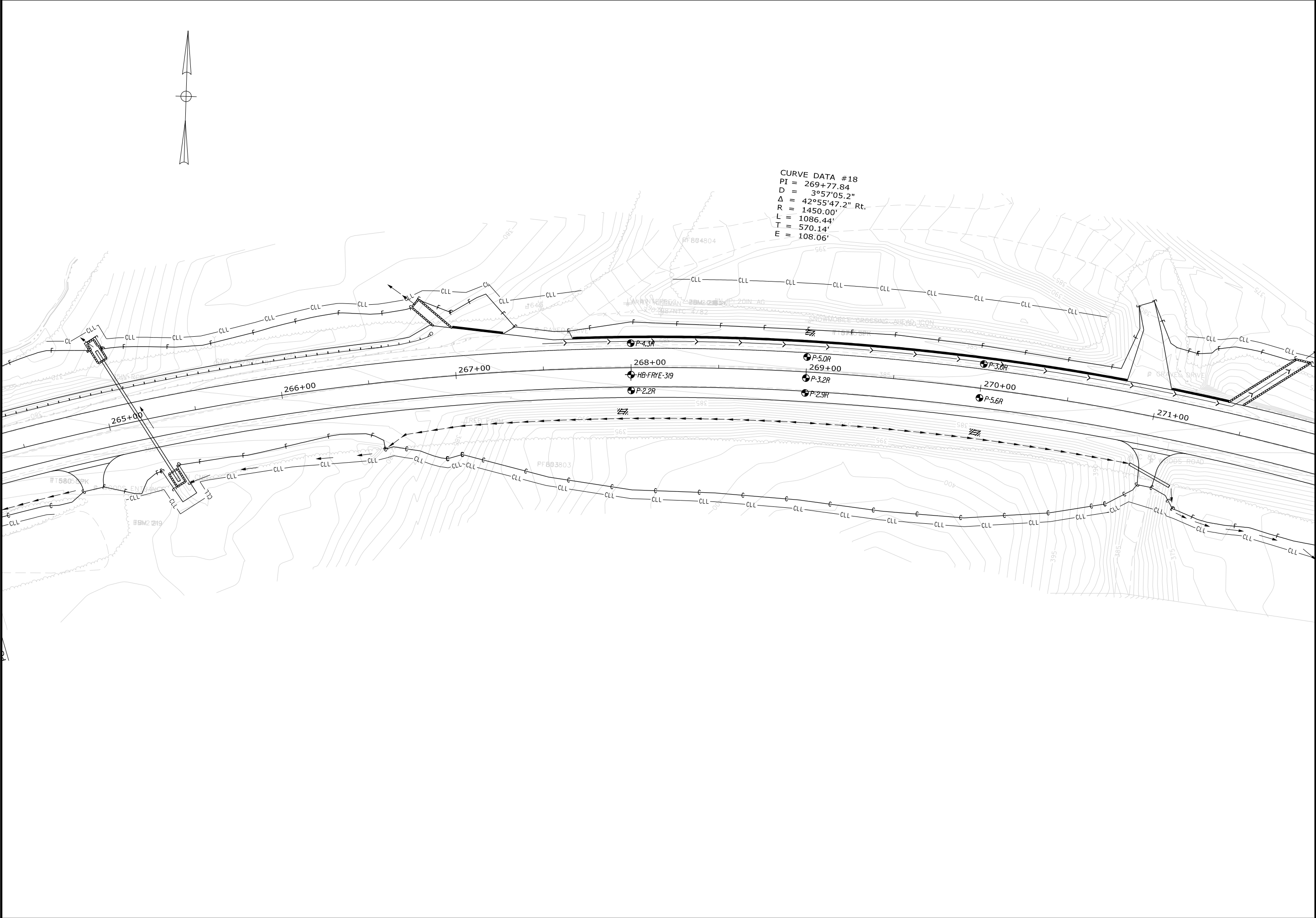


SHEET NUMBER
39
OF 51

FRYEBURG
U.S. ROUTE 302
BORING LOCATION PLANS

PROJ. MANAGER	BY	DATE
DESIGN-DETAILED R. BETZ		
CHECKED-REVIEWED T. WHITE		SIGNATURE
DESIGN-DETAILED K. MAGUIRE		OCT 2018
DESIGN-DETAILED J. WHITE		P.E. NUMBER
REVISIONS 1 R. BETZ		DATE
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

STATE OF MAINE DEPARTMENT OF TRANSPORTATION
NH-1728(000)E
WIN 17280.00 HIGHWAY PLANS

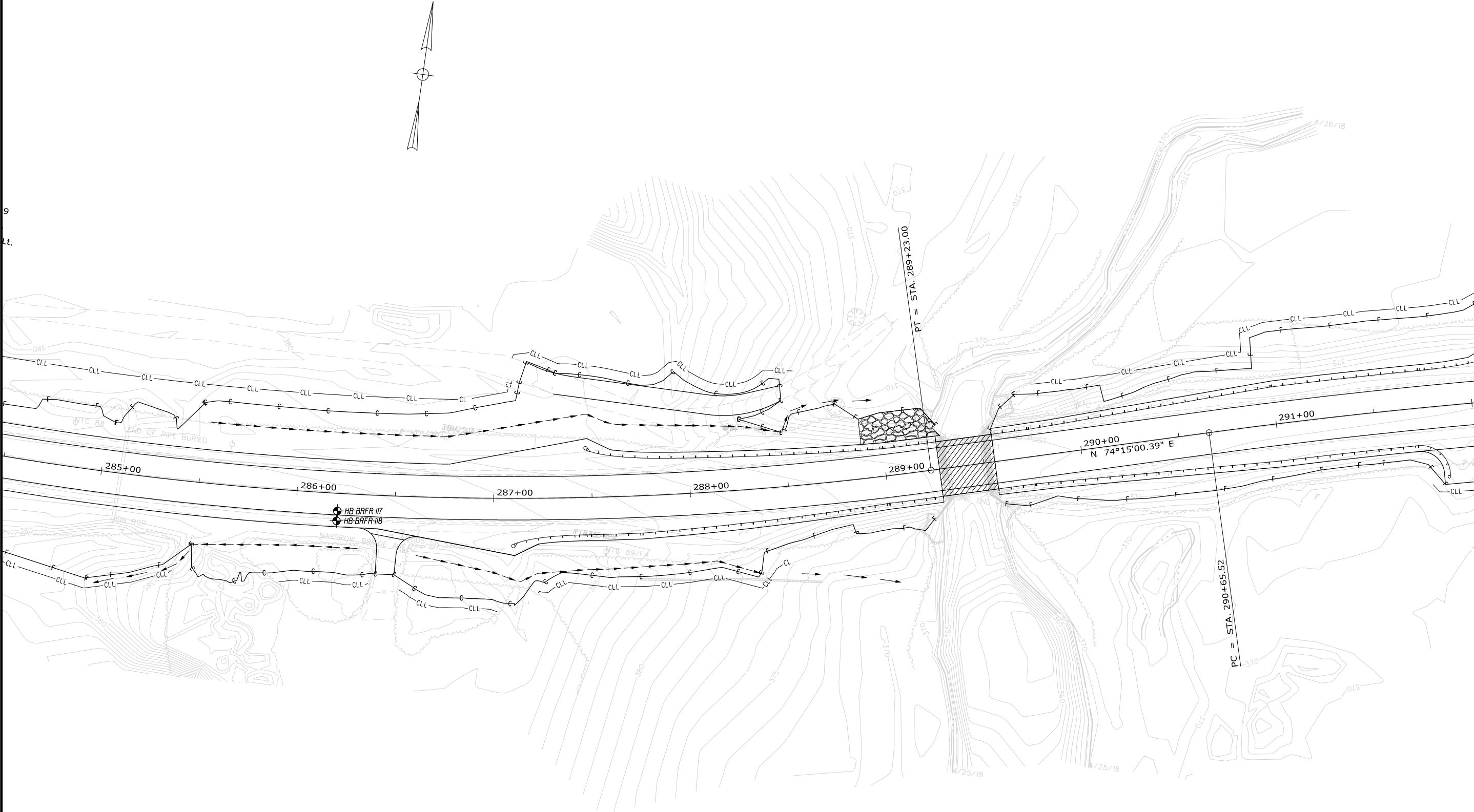


STATE OF MAINE DEPARTMENT OF TRANSPORTATION		NH-1728(000)E		WIN 17280.00		HIGHWAY PLANS	
PROJECT: FRYEBURG U.S. ROUTE 302		BORING LOCATION PLANS		SHEET NUMBER 41 OF 51			
PROJ. MANAGER	DESIGN-DETAILED	CHECKED-REVIEWED	DESIGN-DETAILED	REVISIONS 1	REVISIONS 2	REVISIONS 3	REVISIONS 4
R. HUGHES	R. BETZ	K. MAGUIRE	T. WHITE	R. BETZ			
BY	DATE	SIGNATURE	P.E. NUMBER	DATE			
		OCT 2018	TN32011				



CURVE DATA #19
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E = 105.97'

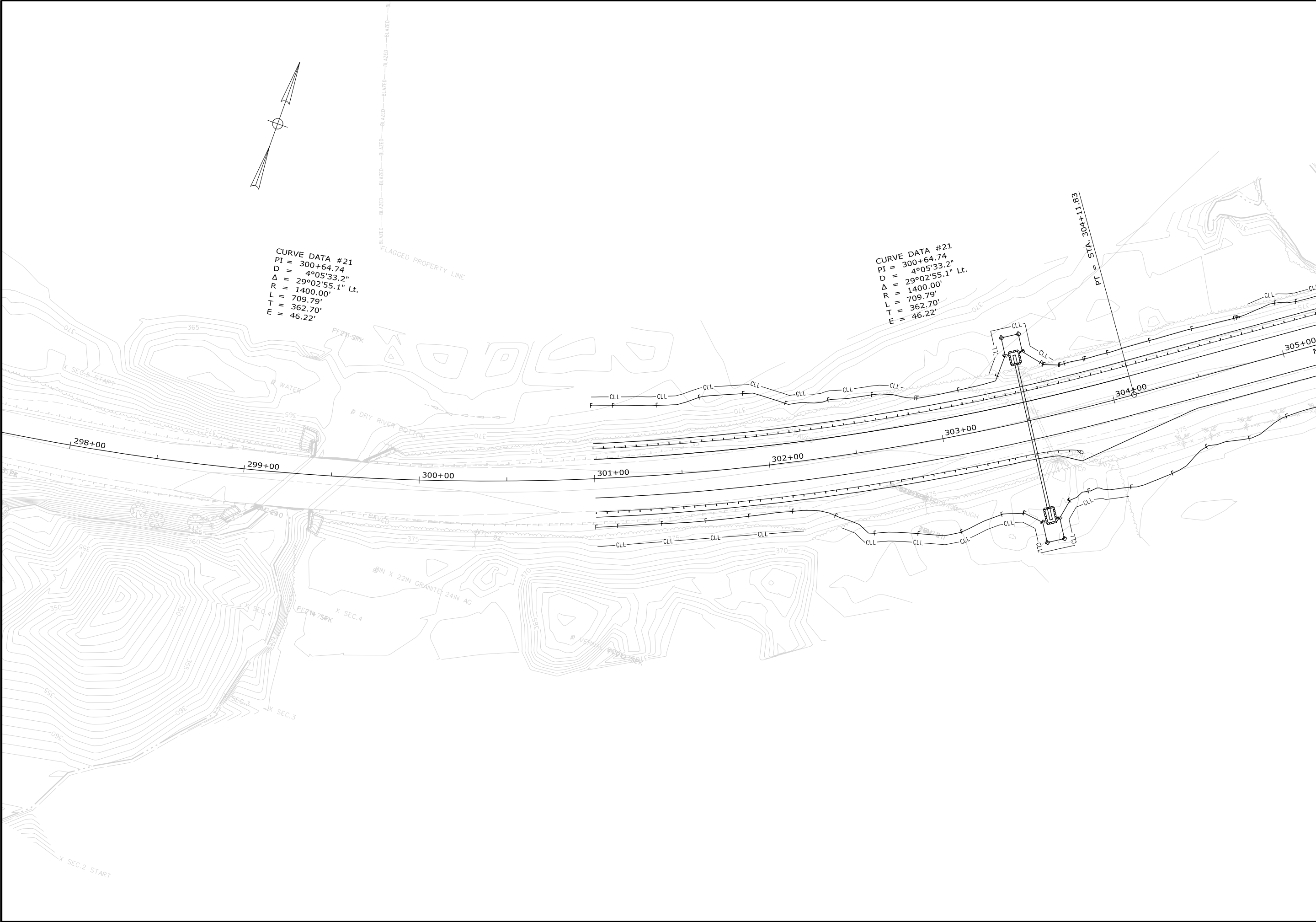
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STATE OF MAINE DEPARTMENT OF TRANSPORTATION		SIGNATURE OCT 2018		DATE	
NH-1728(000)E		T. WHITE		T. WHITE	
WIN 17280.00		R. BETZ		R. BETZ	
HIGHWAY PLANS		REVISIONS 1 REVISIONS 2 REVISIONS 3 REVISIONS 4		FIELD CHANGES	
FRYEBURG U.S. ROUTE 302		PROJ. MANAGER R. BETZ		BY R. HUGHES	
BORING LOCATION PLANS		CHECKED-REVIEWED DESIGN-DETAILED DESIGN-DETAILED DESIGN-DETAILED		DATE OCT 2018 OCT 2018 OCT 2018	
SHEET NUMBER 44 OF 51					



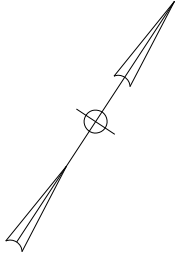
SHEET NUMBER		45		OF 51	
FRYEBURG U.S. ROUTE 302		PROJ. MANAGER DESIGN-DETAILED CHECKED-REVIEWED DESIGN2-DETAILED2 DESIGN3-DETAILED3		R. HOUGH R. BETZ K. MAGUIRE T. WHITE	
BORING LOCATION PLANS		DESIGN3-DETAILED3 REVISIONS 1 REVISIONS 2 REVISIONS 3 REVISIONS 4 FIELD CHANGES		BY DATE SIGNATURE P.E. NUMBER DATE	
				STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E WIN 17280.00 HIGHWAY PLANS	



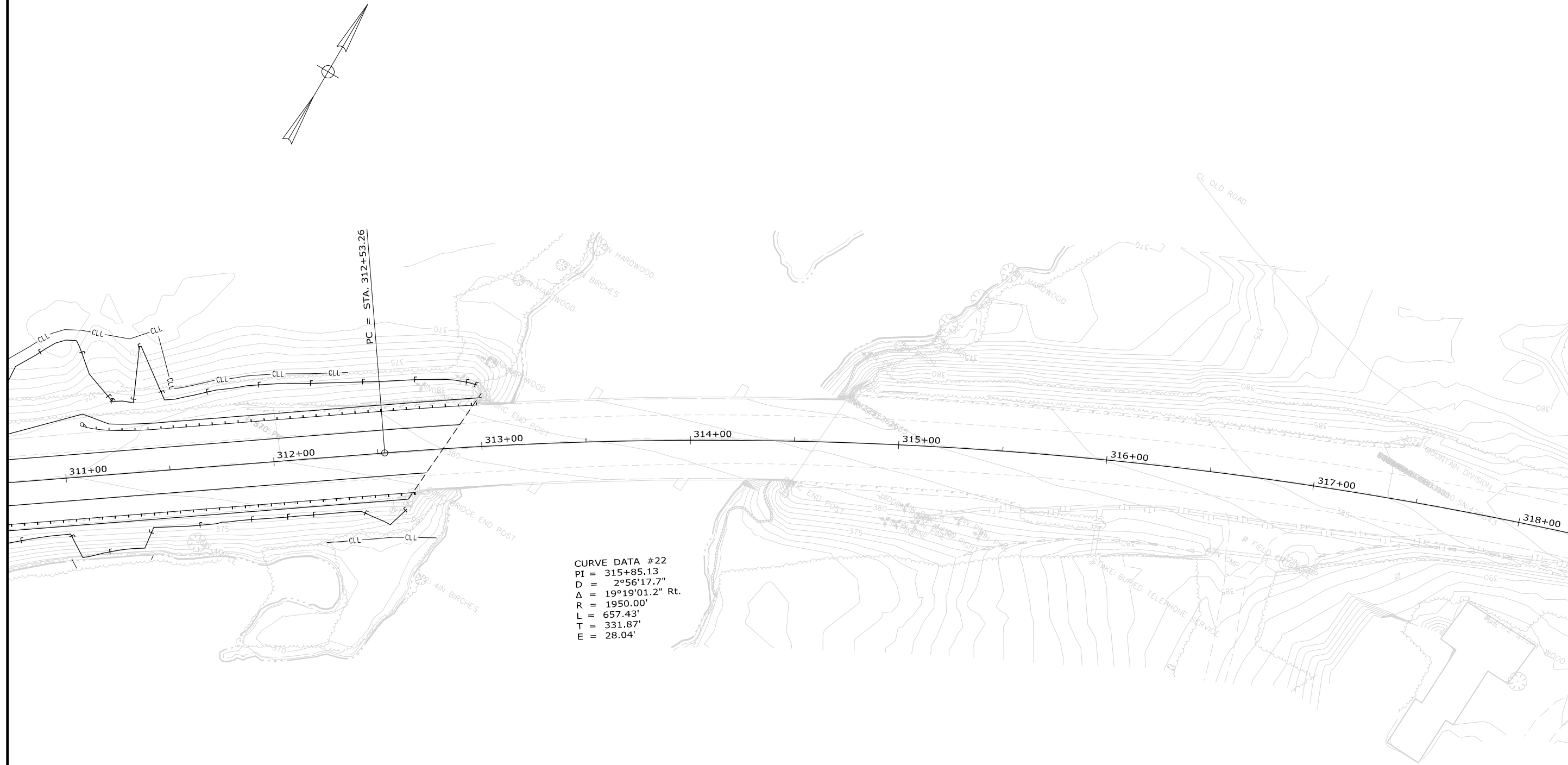
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PI = 300+64.74
D = 4°05'33.2"
Δ = 29°02'55.1" Lt.
R = 1400.00'
L = 709.79'
T = 362.70'
E = 46.22'

CURVE DATA #21
PI = 300+64.74
D = 4°05'33.2"
Δ = 29°02'55.1" Lt.
R = 1400.00'
L = 709.79'
T = 362.70'
E = 46.22'

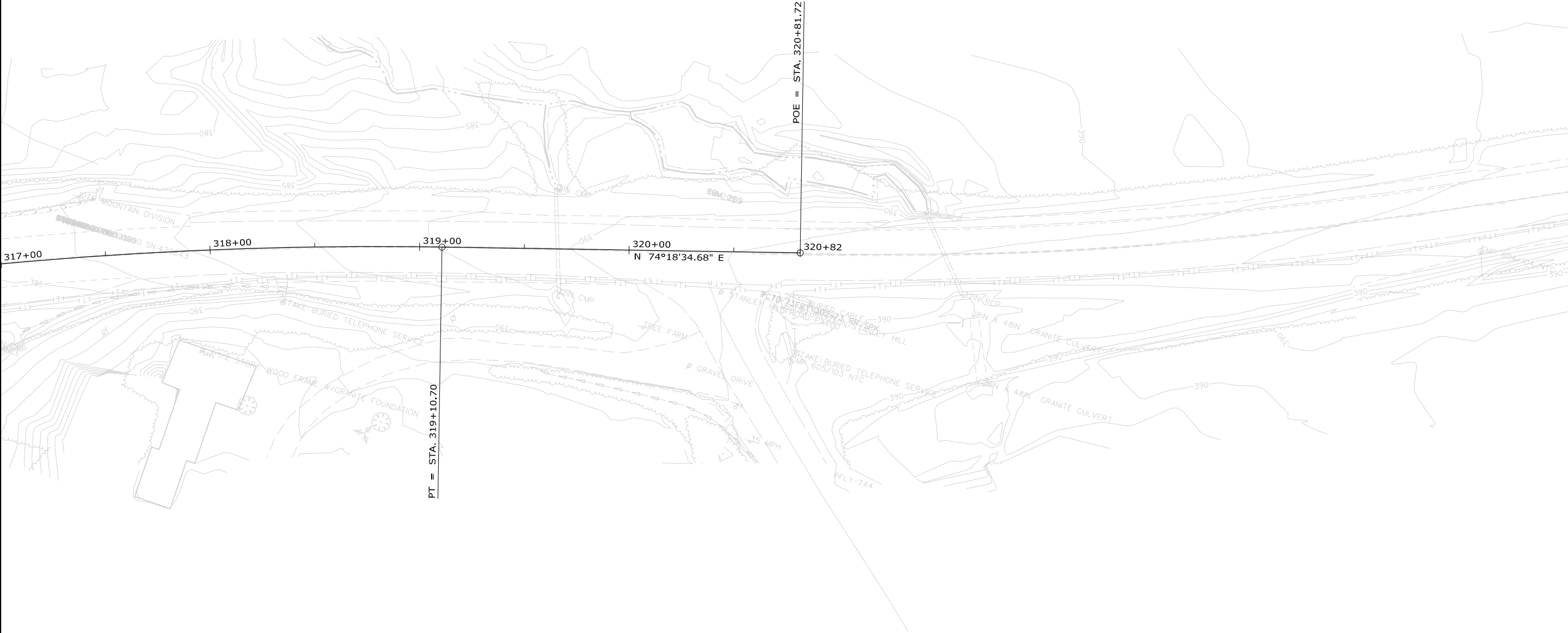
STATE OF MAINE		DEPARTMENT OF TRANSPORTATION	
NH-1728(000)E		WIN	
17280.00		HIGHWAY PLANS	
FRYEBURG		BORING LOCATION PLANS	
U.S. ROUTE 302		SHEET NUMBER	
46		OF 51	
PROJ. MANAGER	R. HOUGH	BY	DATE
DESIGN-DETAILED	R. BETZ		
CHECKED-REVIEWED	K. MAGUIRE	T. WHITE	OCT 2018
DESIGN-DETAILED	R. BETZ		
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES		SIGNATURE	
		P.E. NUMBER	
		DATE	



OF 51 47 SHEET NUMBER	FRYEBURG U.S. ROUTE 302 BORING LOCATION PLANS	PROJ. MANAGER	R. HOUGH	BY	DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E WIN 17280.00 HIGHWAY PLANS	
		CHECKED-REVIEWED	R. BETZ				
		DESIGN2-DETAILED2	K. MAGUIRE	T. WHITE	OCT 2018		SIGNATURE
		DESIGN3-DETAILED3					P.E. NUMBER
		REVISIONS 1	R. BETZ		JUN 2011		
		REVISIONS 2					
		REVISIONS 3					
		REVISIONS 4			DATE		
		FIELD CHANGES					



FRYEBURG U.S. ROUTE 302 <



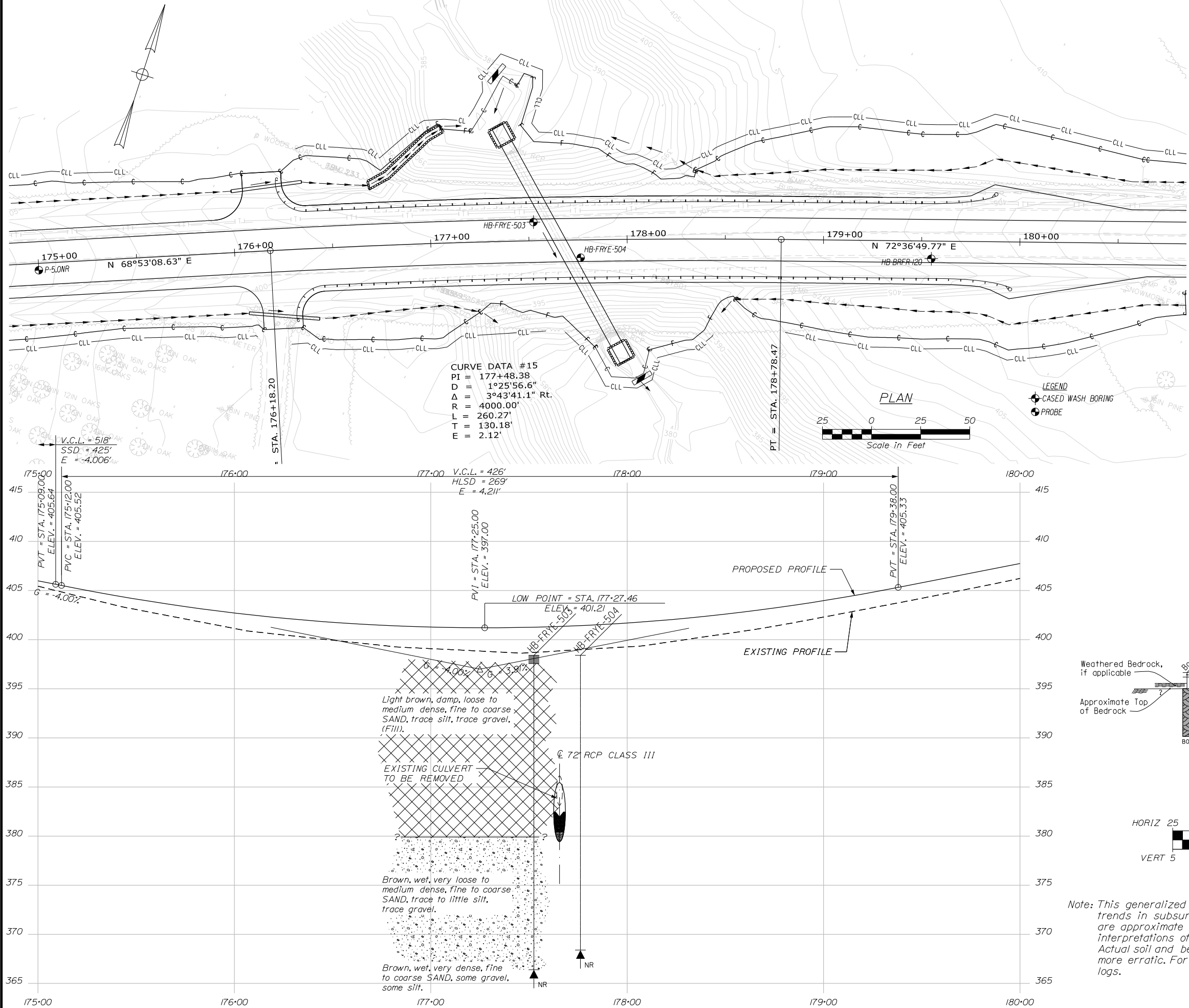
SHEET NUMBER 49 OF 51	FRYEBURG U.S. ROUTE 302 BORING LOCATION PLANS	STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E			
		SIGNATURE T. WHITE OCT 2018			
		P.E. NUMBER TWS2011 DATE			
WIN 17280.00		HIGHWAY PLANS			

Date:12/10/2018

Username: cody.a.russell

Division: GEOTECH

Filename: ... \MSTAN050_BLP8\SP177-65 .dgn



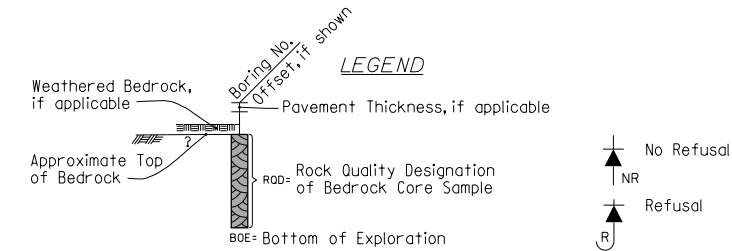
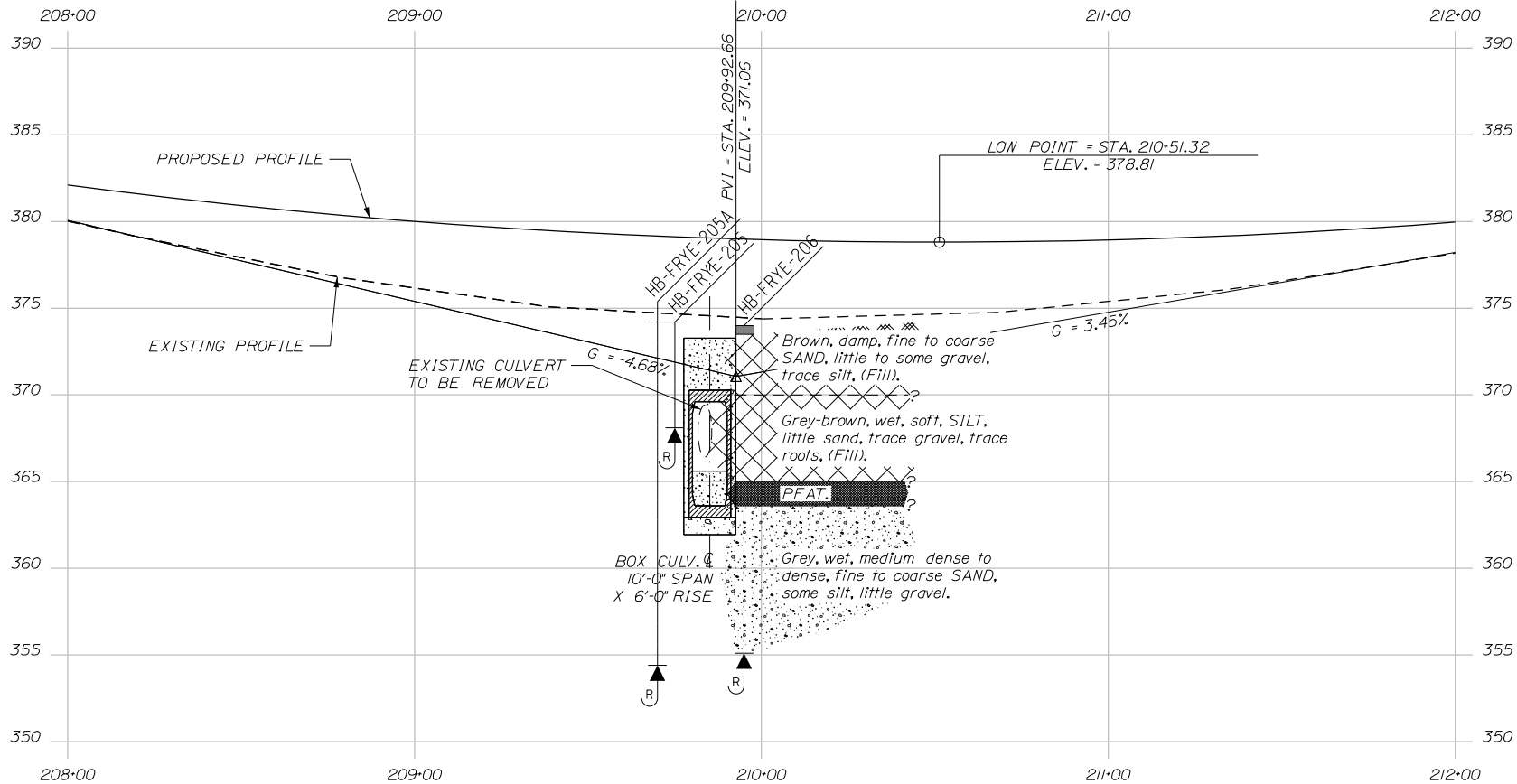
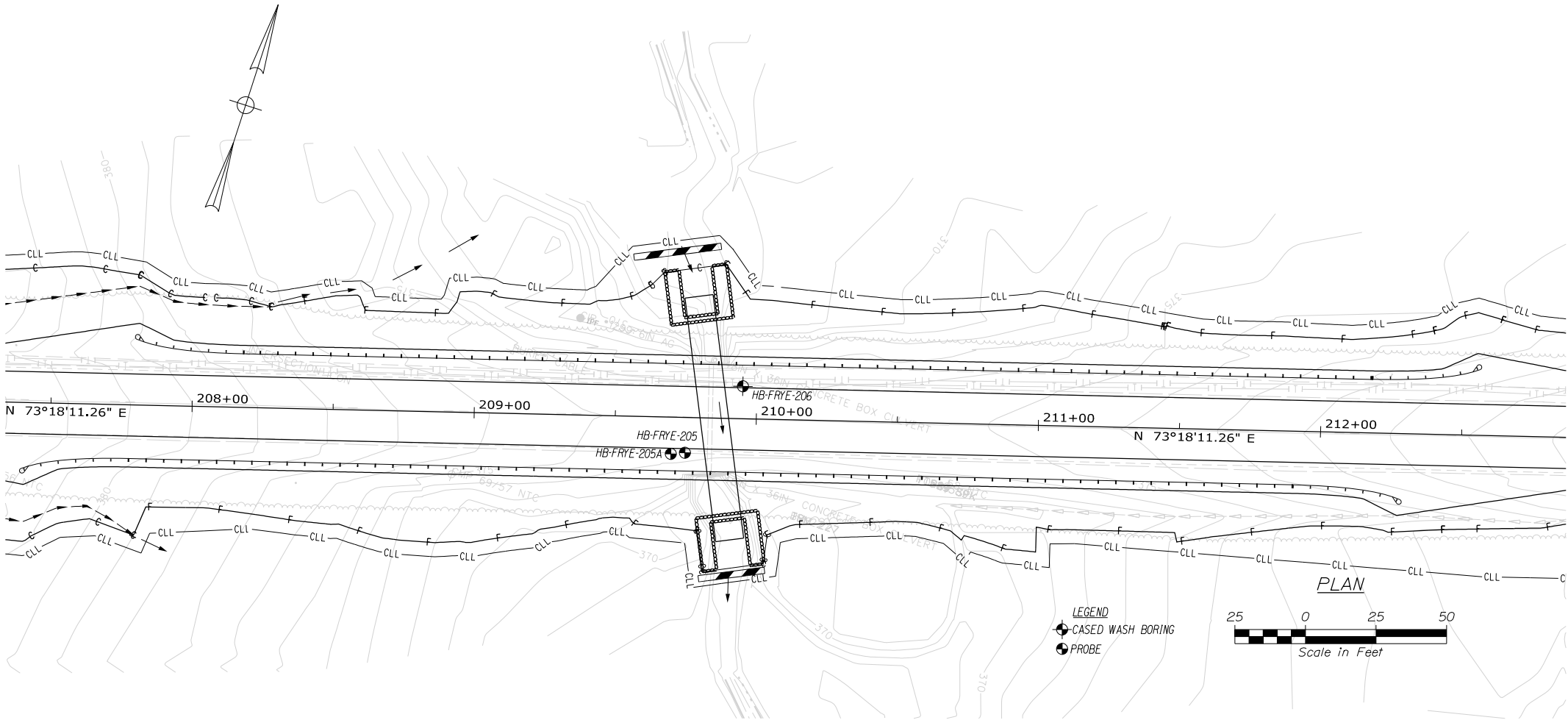
FRYEBURG U.S. ROUTE 302		PROJ. MANAGER R. HUGH	BY R. BETZ	DATE OCT 2018	STATE OF MAINE DEPARTMENT OF TRANSPORTATION NH-1728(000)E
		DESIGN-DETAILED CHECKED-REVIEWED DESIGN2-DETAILED2 DESIGN3-DETAILED3	SIGNATURE		
BORING LOCATION PLAN & INTERPRETIVE SUBSURFACE PROFILE		DESIGN3-DETAILED3	P.E. NUMBER		
		REVISED 1 REVISED 2 REVISED 3 REVISED 4	DATE		
		FIELD CHANGES			
SHEET NUMBER 50 OF 51					WIN 17280.00 HIGHWAY PLANS

Date:12/10/2018

Username: cody.a.russell

Division: GEOTECH

Filename: ... \MSTAND51_BLP&ISP2 209-85.dgn



Note: This generalized interpretive soil profile is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and have been developed by interpretations of widely spaced explorations and samples. Actual soil and bedrock transitions may vary and are probably more erratic. For more specific information refer to the exploration logs.

STATE OF MAINE		DEPARTMENT OF TRANSPORTATION	
NH-1728(000)E		WIN	
17280.00		HIGHWAY PLANS	
PROJ. MANAGER	R. HOUGH	BY	DATE
CHECKED-DETAILED	R. BETZ	SIGNATURE	OCT 2018
DESIGN-DETAILED	K. MAGUIRE	P.E. NUMBER	1132011
DESIGN-DETAILED	R. BETZ	DATE	
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			
FRYEBURG U.S. ROUTE 302 BORING LOCATION PLAN & INTERPRETIVE SUBSURFACE PROFILE			
SHEET NUMBER			
51			
OF 51			

Appendix A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM					MODIFIED BURMISTER SYSTEM			
MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES				
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	Descriptive Term		Portion of Total (%)	
		(little or no fines)	GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.	trace	0 - 10		
					little	11 - 20		
					some	21 - 35		
					adjective (e.g. sandy, clayey)	36 - 50		
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS	SW	Well-graded sands, gravelly sands, little or no fines	TERMS DESCRIBING DENSITY/CONSISTENCY			
		(little or no fines)	SP	Poorly-graded sands, gravelly sand, little or no fines.				
		SANDS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.	<u>Coarse-grained soils</u> (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) silty or clayey gravels; and (3) silty, clayey or gravelly sands. Density is rated according to standard penetration resistance (N-value).			
			GC	Clayey gravels, gravel-sand-clay mixtures.				
			FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.	Density of Cohesionless Soils	
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	Very loose			N-Value (blows per foot)			
OL	Organic silts and organic silty clays of low plasticity.	Loose			0 - 4			
SILTS AND CLAYS (liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	Medium Dense		5 - 10			
	CH	Inorganic clays of high plasticity, fat clays.	Dense		11 - 30			
	OH	Organic clays of medium to high plasticity, organic silts.	Very Dense		31 - 50			
HIGHLY ORGANIC SOILS	Pt	Peat and other highly organic soils.			> 50			
					<u>Fine-grained soils</u> (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) gravelly, sandy or silty clays; and (3) clayey silts. Consistency is rated according to undrained shear strength as indicated.			
					<u>Approximate Undrained Shear Strength (psf)</u>			
					<u>Consistency of Cohesive soils</u>	<u>SPT N-Value (blows per foot)</u>	<u>Field Guidelines</u>	
					Very Soft	WOH, WOR, WOP, <2	Fist easily penetrates	
					Soft	2 - 4	Thumb easily penetrates	
					Medium Stiff	5 - 8	Thumb penetrates with moderate effort	
					Stiff	9 - 15	Indented by thumb with great effort	
					Very Stiff	16 - 30	Indented by thumbnail	
					Hard	>30	Indented by thumbnail with difficulty	
					<u>Rock Quality Designation (RQD):</u>			
					RQD (%) = $\frac{\text{sum of the lengths of intact pieces of core} * > 4 \text{ inches}}{\text{length of core advance}}$			
					*Minimum NQ rock core (1.88 in. OD of core)			
					Correlation of RQD to Rock Mass Quality			
					<u>Rock Mass Quality</u>	<u>RQD (%)</u>		
					Very Poor	≤25		
					Poor	26 - 50		
					Fair	51 - 75		
					Good	76 - 90		
					Excellent	91 - 100		
					<u>Desired Rock Observations (in this order, if applicable):</u>			
					Color (Munsell color chart)			
					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.)			
					Geologic discontinuities/jointing:			
					-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 mass quality (very poor, poor, etc.)			
					ref: ASTM D6032 and AASHTO Standard Specification for Highway Bridges, 17th Ed. Table 4.4.8.1.2A			
					Recovery (inch/inch and percentage)			
					Rock Core Rate (X.X ft - Y.Y ft (min:sec))			
					<u>Sample Container Labeling Requirements:</u>			
					WIN	Blow Counts		
					Bridge Name / Town	Sample Recovery		
					Boring Number	Date		
					Sample Number	Personnel Initials		
					Sample Depth			
Maine Department of Transportation Geotechnical Section Key to Soil and Rock Descriptions and Terms Field Identification Information								

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> <u>US CUSTOMARY UNITS</u>				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-BRFR-116 WIN: 17280.00																																																																																															
Drilling Contractor: MaineDOT				Elevation (ft.): 336.7				Auger ID/OD: 5" Dia.																																																																																															
Operator: Giguere/Giles				Datum: NAVD88				Sampler: Off Flights																																																																																															
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A																																																																																															
Date Start/Finish: 12/20/10-12/20/10				Drilling Method: Solid Stem Auger				Core Barrel: N/A																																																																																															
Boring Location: 294+13, 9.0 ft. Rt.				Casing ID/OD: N/A				Water Level*: None Observed																																																																																															
Definitions: D = Split Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S_u(lab) = Lab Vane Undrained Shear Strength (psf) LL = Liquid Limit MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) PL = Plastic Limit U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value PI = Plasticity Index MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T_v = Pocket Torvane Shear Strength (psf) G = Grain Size Analysis V = Field Vane Shear Test PP= Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≈ = Similar or Equal too C = Consolidation Test																																																																																																							
<table><tr><th rowspan="2">Depth (ft.)</th><th colspan="8">Sample Information</th><th rowspan="2">Visual Description and Remarks</th><th rowspan="2">Laboratory Testing Results/ AASHTO and Unified Class.</th></tr><tr><th>Sample No.</th><th>Pen./Rec. (in.)</th><th>Sample Depth (ft.)</th><th>Blows (6 in.) Shear Strength (psf) or RQD (%)</th><th>N-value</th><th>Casing</th><th>Blows</th><th>Elevation (ft.)</th><th>Graphic Log</th></tr><tr><td>0</td><td></td><td></td><td></td><td></td><td></td><td>SSA</td><td></td><td>336.2</td><td></td><td>PAVEMENT. Light brown, damp, fine to coarse SAND, some gravel, (Fill).</td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>331.7</td><td></td><td>Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL</td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>												Depth (ft.)	Sample Information								Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing	Blows	Elevation (ft.)	Graphic Log	0						SSA		336.2		PAVEMENT. Light brown, damp, fine to coarse SAND, some gravel, (Fill).		5								331.7		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		10												15												20												25											
Depth (ft.)	Sample Information								Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.																																																																																													
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Stratification lines represent approximate boundaries between soil types; transitions may be gradual.																																																																																																							
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.																																																																																																							
Page 1 of 1 Boring No.: HB-BRFR-116																																																																																																							

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-BRFR-117 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 384.5				Auger ID/OD: 5" Dia.			
Operator: Giguere/Giles				Datum: NAVD88				Sampler: Off Flights			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 12/20/10-12/20/10				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 286+21, 9.0 ft. Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S13		0.60 - 5.00			SSA	383.9	PAVEMENT. Light brown, damp, fine to coarse SAND, some silt, little gravel, occasional cobbles, (Fill).	G#182548 A-2-4, SM WC=5.5%		
5							379.5	Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL			
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-BRFR-117			

Maine Department of Transportation

Soil/Rock Exploration Log

US CUSTOMARY UNITS

Project: Route 302 Reconstruction

Location: Fryeburg, Maine

Boring No.: HB-BRFR-118

WIN: 17280.00

Drilling Contractor: MaineDOT

Operator: Giguere/Giles

Logged By: B.Wilder

Date Start/Finish: 12/20/10-12/20/10

Boring Location: 286+21, 14.0 ft. Rt. Shoulder

Elevation (ft.) 384.6

Datum: NAVD88

Rig Type: CME 45C

Drilling Method: Solid Stem Auger

Casing ID/OD: N/A

Auger ID/OD: 5" Dia.

Sampler: Off Flights

Hammer Wt./Fall: N/A

Core Barrel: N/A

Water Level*: None Observed

Definitions: D = Spilt Spoon Sample
S = Sample off Auger Flights
B = Bucket Sample off Auger Flights
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MV = Unsuccessful Field Vane Shear Test Attempt
V = Field Vane Shear Test, PP= Pocket Penetrometer

MU = Unsuccessful Thin Wall Tube Sample Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing

WO1P = Weight of 1 Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
S_u(lab) = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-value = Raw Field SPT N-value
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent ≈ = Similar or Equal too

LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.			
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows								
0						SSA	379.6		Light brown, damp, fine to coarse SAND, some silt, little gravel, occasional cobbles, (Fill).					
5													Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	5.0
10														
15														
20														
25														

Remarks:

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

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

Page 1 of 1

Boring No.: HB-BRFR-118

Maine Department of Transportation						Project: Route 302 Reconstruction				Boring No.: HB-BRFR-119																																																																																								
Soil/Rock Exploration Log US CUSTOMARY UNITS						Location: Fryeburg, Maine				WIN: 17280.00																																																																																								
Drilling Contractor: MaineDOT						Elevation (ft.): 452.5				Auger ID/OD: 5" Dia.																																																																																								
Operator: Giguere/Giles						Datum: NAVD88				Sampler: Off Flights																																																																																								
Logged By: B.Wilder						Rig Type: CME 45C				Hammer Wt./Fall: N/A																																																																																								
Date Start/Finish: 12/20/10-12/20/10						Drilling Method: Solid Stem Auger				Core Barrel: N/A																																																																																								
Boring Location: 231+30, 9.0 ft. Rt.						Casing ID/OD: N/A				Water Level*: None Observed																																																																																								
Definitions: D = Split Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S _{u(lab)} = Lab Vane Undrained Shear Strength (psf) LL = Liquid Limit MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q _p = Unconfined Compressive Strength (ksf) PL = Plastic Limit U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value PI = Plasticity Index MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T _v = Pocket Torvane Shear Strength (psf) G = Grain Size Analysis V = Field Vane Shear Test PP= Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≈ = Similar or Equal too C = Consolidation Test																																																																																																		
<table border="1"><thead><tr><th rowspan="2">Depth (ft.)</th><th colspan="8">Sample Information</th><th rowspan="2">Visual Description and Remarks</th><th rowspan="2">Laboratory Testing Results/ AASHTO and Unified Class.</th></tr><tr><th>Sample No.</th><th>Pen./Rec. (in.)</th><th>Sample Depth (ft.)</th><th>Blows (6 in.) Shear Strength (psf) or RQD (%)</th><th>N-value</th><th>Casing Blows</th><th>Elevation (ft.)</th><th>Graphic Log</th></tr></thead><tbody><tr><td>0</td><td></td><td></td><td></td><td></td><td></td><td>SSA</td><td>452.0</td><td>[Pattern]</td><td>PAVEMENT. -0.6 Brown, damp, fine to coarse SAND, some gravel, trace silt, wetter with depth, (Fill). -2.2 Light brown, damp, fine to coarse SAND, some silt, little gravel, occasional cobbles. -5.0 </td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td>447.5</td><td></td><td>Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL</td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>														Depth (ft.)	Sample Information								Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	0						SSA	452.0	[Pattern]	PAVEMENT. -0.6 Brown, damp, fine to coarse SAND, some gravel, trace silt, wetter with depth, (Fill). -2.2 Light brown, damp, fine to coarse SAND, some silt, little gravel, occasional cobbles. -5.0		5							447.5		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		10											15											20											25										
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Boring No.: HB-BRFR-119																																																																																																		

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-BRFR-120 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 404.0				Auger ID/OD: 5" Dia.			
Operator: Giguere/Giles				Datum: NAVD88				Sampler: Off Flights			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 12/20/10-12/20/10				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 179+55, 9.0 ft. Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0						SSA	403.5	PAVEMENT.			
							402.4	Brown, damp, fine to coarse SAND, some gravel, trace silt, wetter with depth, (Fill).			
								Light brown, damp, fine to coarse SAND, some silt, little gravel, occasional cobbles.			
5							399.0	Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL			
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-BRFR-120			

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-201 WIN: 17280.00			
Driller: Northern Test Boring				Elevation (ft.): 434.5				Auger ID/OD: 2.75-6.25"			
Operator: Mike/Adam				Datum: NAVD88				Sampler: Standard Split Spoon			
Logged By: B.Wilder				Rig Type: Diedrich D-50 Track				Hammer Wt./Fall: 140#/30"			
Date Start/Finish: 3/10/2015; 08:00-10:00				Drilling Method: Hollow Stem Auger				Core Barrel: N/A			
Boring Location: 51+34, 7.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Hammer Efficiency Factor: 0.879				Hammer Type: Automatic ☒ Hydraulic ☐ Rope & Cathead ☐							
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S _u (lab) = Lab Vane Undrained Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N ₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected T _v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing	Blows				
0								HSA	433.8			
5	1D	24/20	5.00 - 7.00	4/3/2/2	5	7						
10	2D	24/22	10.00 - 12.00	2/2/1/1	3	4						
15	3D	24/18	15.00 - 17.00	5/3/2/1	5	7						
20	4D	24/17	20.00 - 22.00	3/2/2/1	4	6						
25									411.5			

Remarks:
 Auto Hammer #283

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

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

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 Boring No.: HB-FRYE-201

Maine Department of Transportation Soil/Rock Exploration Log <u>US CUSTOMARY UNITS</u>						Project: Route 302 Reconstruction Location: Fryeburg, Maine							Boring No.: HB-FRYE-201 WIN: 17280.00					
Driller: Northern Test Boring				Elevation (ft.): 434.5				Auger ID/OD: 2.75-6.25"										
Operator: Mike/Adam				Datum: NAVD88				Sampler: Standard Split Spoon										
Logged By: B.Wilder				Rig Type: Diedrich D-50 Track				Hammer Wt./Fall: 140#/30"										
Date Start/Finish: 3/10/2015; 08:00-10:00				Drilling Method: Hollow Stem Auger				Core Barrel: N/A										
Boring Location: 51+34, 7.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed										
Hammer Efficiency Factor: 0.879				Hammer Type: Automatic ☒ Hydraulic ☐ Rope & Cathead ☐														
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt				R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person					S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S _{u(lab)} = Lab Vane Undrained Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N ₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected					T _v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test				
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	Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows	Elevation (ft.)									
25	5D	24/19	25.00 - 27.00	7/8/13/14	21	31		402.5			Brown, wet, hard, SILT, little fine to medium sand.	G#266612 A-4, ML WC=26.2%						
30	6D	24/24	30.00 - 32.00	8/9/10/9	19	28				Brown, wet, very stiff, SILT, little fine to medium sand.	G#263314 A-4, ML WC=24.6%							
35																		
40																		
45																		
50																		
Remarks:																		
Auto Hammer #283																		
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.												Page 2 of 2						
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.												Boring No.: HB-FRYE-201						

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> <u>US CUSTOMARY UNITS</u>				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-202 WIN: 17280.00																																																																																																																																																																																																																																																																																																																																																																														
Drilling Contractor: Northern Test Boring				Elevation (ft.): 434.5				Auger ID/OD: 5" Dia.																																																																																																																																																																																																																																																																																																																																																																														
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Logged By: B.Wilder				Rig Type: Diedrich D-50				Hammer Wt./Fall: N/A																																																																																																																																																																																																																																																																																																																																																																														
Date Start/Finish: 3/10/2015-3/10/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A																																																																																																																																																																																																																																																																																																																																																																														
Boring Location: 51+17, 6.0 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed																																																																																																																																																																																																																																																																																																																																																																														
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[illegible]

[illegible]

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-204 WIN: 17280.00																																																																																																																																																																																																																																																																																																																																																																								
Driller: Northern Test Boring				Elevation (ft.): 460.6				Auger ID/OD: 2.75-6.25"																																																																																																																																																																																																																																																																																																																																																																								
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS						Project: Route 302 Reconstruction			Boring No.: HB-FRYE-205A																																																																																																																																																																																																																																																																																																																																													
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-206 WIN: 17280.00			
Driller: Northern Test Boring				Elevation (ft.): 374.0				Auger ID/OD: 2.75-6.25"			
Operator: Mike/Adam				Datum: NAVD88				Sampler: Standard Split Spoon			
Logged By: B.Wilder				Rig Type: Diedrich D-50 Track				Hammer Wt./Fall: 140#/30"			
Date Start/Finish: 3/10/2015; 12:30-14:00				Drilling Method: Hollow Stem Auger				Core Barrel: N/A			
Boring Location: 209+95, 11.5 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed			
Hammer Efficiency Factor: 0.879				Hammer Type: Automatic ☒ Hydraulic ☐ Rope & Cathead ☐							
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S _u (lab) = Lab Vane Undrained Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N ₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected T _v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows				
0							HSA	373.5		6" PAVEMENT.	G#266615 A-4, ML WC=29.1%
										Brown, damp, fine to coarse SAND, some gravel, trace silt, (Fill). Brown, damp, fine to coarse SAND, little gravel, (Fill).	
5	1D	24/15	5.00 - 7.00	2/2/1/1	3	4				Grey-brown, wet, soft, SILT, little sand, trace gravel, trace roots, (Fill).	
								365.0			G#266616 A-1-b, SM WC=11.1%
10	2D/A	24/18	10.00 - 12.00	3/14/14/14	28	41				2D/A (10.5-12.0 ft) Grey, wet, dense, fine to coarse SAND, some silt, little gravel.	
15	3D	24/19	15.00 - 17.00	7/5/6/9	11	16				Grey, wet, medium dense, fine to coarse SAND, some silt, little gravel.	
20								355.1		Bottom of Exploration at 18.9 feet below ground surface. REFUSAL	
25											
Remarks: Auto Hammer #283											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. * Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Page 1 of 1 Boring No.: HB-FRYE-206	

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> <u>US CUSTOMARY UNITS</u>				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-301 WIN: 17280.00																																																																																																																			
Drilling Contractor: MaineDOT				Elevation (ft.): 446.7				Auger ID/OD: 5" Dia.																																																																																																																			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A																																																																																																																			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A																																																																																																																			
Date Start/Finish: 4/27/2015-4/27/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A																																																																																																																			
Boring Location: 23+50, 13.0 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed																																																																																																																			
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Boring Location: 33+50, 10.0 ft Rt.						Casing ID/OD: N/A				Water Level*: None Observed																																																																																																												
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-305 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 444.9				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/27/2015-4/27/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 65+50, 9.0 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S _{u(lab)} = Lab Vane Undrained Shear Strength (psf) MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q _p = Unconfined Compressive Strength (ksf) U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T _v = Pocket Torvane Shear Strength (psf) V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≅ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows					
0							SSA	443.9		12" PAVEMENT.	
								443.2		Brown, damp, fine to coarse SAND, some gravel, trace silt, (Fill).	1.0
										Light brown, wet, fine to coarse SAND, trace silt.	1.7
5								439.9		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	5.0
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 of 1	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Boring No.: HB-FRYE-305	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-306 WIN: 17280.00																																																																																																																					
Drilling Contractor: MaineDOT				Elevation (ft.): 434.5				Auger ID/OD: 5" Dia.																																																																																																																					
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A																																																																																																																					
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A																																																																																																																					
Date Start/Finish: 4/27/2015-4/27/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A																																																																																																																					
Boring Location: 71+50, 10.5 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed																																																																																																																					
Definitions: D = Split Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test																																																																																																																													
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Page 1 of 1 Boring No.: HB-FRYE-306																																																																																																																													

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-307 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.) 412.3				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/27/2015-4/27/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 159+50, 9.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S9		0.42 - 1.60			SSA	411.9	 5" PAVEMENT. Brown, damp, fine to coarse SAND, some gravel, little silt, (Fill). Light brown, damp, fine to medium SAND, trace silt, trace gravel, trace coarse sand .	0.4 1.6 5.0	G#266789 A-1-b, SW-SM WC=4.9% G#266795 A-3, SP-SM WC=8.1%	
	S10		1.60 - 5.00				410.7				
							407.3				
5								Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL			
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									Page 1 of 1		
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.									Boring No.: HB-FRYE-307		

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-308 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 406.1				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/27/2015-4/27/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 166+50, 9.0 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S11		0.50 - 1.30			SSA	405.6	6" PAVEMENT. Brown, damp, fine to coarse SAND, some gravel, trace silt, (Fill). Light brown, damp, fine to medium SAND, trace silt.	0.5-1.3 G#266790 A-1-b, SW-SM WC=2.6%		
	S12		1.30 - 10.00				404.8				
5											
10							396.1	Bottom of Exploration at 10.0 feet below ground surface. NO REFUSAL	10.0		
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-308			

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-309 WIN: 17280.00																																																																																																																						
Drilling Contractor: MaineDOT				Elevation (ft.): 413.0				Auger ID/OD: 5" Dia.																																																																																																																						
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A																																																																																																																						
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A																																																																																																																						
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A																																																																																																																						
Boring Location: 171+00, 4.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed																																																																																																																						
Definitions: D = Split Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S_u(lab) = Lab Vane Undrained Shear Strength (psf) LL = Liquid Limit MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) PL = Plastic Limit U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value PI = Plasticity Index MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T_v = Pocket Torvane Shear Strength (psf) G = Grain Size Analysis V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≈ = Similar or Equal too C = Consolidation Test																																																																																																																														
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-310 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 413.5				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 172+00, 3.5 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S15		0.50 - 2.90			SSA	413.0	6" PAVEMENT. Brown, wet, fine to coarse SAND, some gravel, little silt, occasional cobble (Fill).	0.5-2.9		
							410.6				
5								Bottom of Exploration at 2.9 feet below ground surface. REFUSAL			
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-310			

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS							Project: Route 302 Reconstruction						Boring No.: HB-FRYE-311																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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Logged By: B.Wilder									Rig Type: CME 45C						Hammer Wt./Fall: N/A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Boring Location: 173+00, 3.0 ft Rt.									Casing ID/OD: N/A						Water Level*: None Observed																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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REFUSAL</td><td>-2.2</td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td>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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-312 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 409.6				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 174+00, 3.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S _u (lab) = Lab Vane Undrained Shear Strength (psf) MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q _p = Unconfined Compressive Strength (ksf) U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T _v = Pocket Torvane Shear Strength (psf) V = Field Vane Shear Test, PP= Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≡ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows					
0	S17		0.50 - 2.40			SSA	409.1		6" PAVEMENT.	G#266796 A-4, ML WC=16.0%	
									Brown, damp, fine to coarse SAND, some gravel, trace silt, (Fill).		
	S18		2.60 - 10.00				407.0		Brown, wet, fine to coarse Sandy SILT, trace gravel.		
5											
10							399.6		Bottom of Exploration at 10.0 feet below ground surface. NO REFUSAL		
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 of 1	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Boring No.: HB-FRYE-312	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-313 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 412.3				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 173+00, 12.0 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S _u (lab) = Lab Vane Undrained Shear Strength (psf) MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q _p = Unconfined Compressive Strength (ksf) U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T _v = Pocket Torvane Shear Strength (psf) V = Field Vane Shear Test, PP= Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows					
0	S19		0.42 - 3.20			SSA	411.9		5" PAVEMENT.	0.4	
									Brown, wet, fine to coarse SAND, some gravel, trace silt, (Fill).		
5									Bottom of Exploration at 3.2 feet below ground surface. REFUSAL	3.2	
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 1 of 1	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Boring No.: HB-FRYE-313	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-314 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 427.0				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 196+50, 10.0 ft Lt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S20		0.50 - 2.20			SSA	426.5	6" PAVEMENT.	0.5- G#266793 A-1-b, SM WC=6.6% 2.2- G#266797 A-4, ML WC=11.2%		
							424.8	Brown, wet, fine to coarse SAND, some silt, little gravel, (Fill).			
	S21		2.20 - 10.00					Tan, wet, fine to coarse Sandy SILT, trace gravel.			
5											
10							417.0	Bottom of Exploration at 10.0 feet below ground surface. NO REFUSAL			
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-314			

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-315 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 393.7				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 216+50, 9.5 ft Rt.				Casing ID/OD: N/A				Water Level*: 3.4 ft bgs.			
Definitions: D = Spilt Spoon Sample MU = Unsuccessful Thin Wall Tube Sample Attempt WO1P = Weight of 1 Person S = Sample off Auger Flights R = Rock Core Sample S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S _{u(lab)} = Lab Vane Undrained Shear Strength (psf) MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q _p = Unconfined Compressive Strength (ksf) U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T _v = Pocket Torvane Shear Strength (psf) V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≡ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S22		0.58 - 5.00			SSA	393.1	7" PAVEMENT.			
								Brown, damp, fine to coarse SAND, some gravel, little silt, (Fill).	0.6		
5							388.7	Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	5.0		
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-315			

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-316 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 432.8				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 226+50, 9.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S23		0.50 - 5.00			SSA	432.3	6" PAVEMENT. Brown, wet, fine to coarse SAND, some gravel, little silt, (Fill).	0.5		
5							427.8	Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	5.0		
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-316			

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Boring No.: HB-FRYE-317 WIN: 17280.00				
Drilling Contractor: MaineDOT			Elevation (ft.): 474.0		Auger ID/OD: 5" Dia.					
Operator: Giles/Daggett/Giles			Datum: NAVD88		Sampler: N/A					
Logged By: B.Wilder			Rig Type: CME 45C		Hammer Wt./Fall: N/A					
Date Start/Finish: 4/28/2015-4/28/2015			Drilling Method: Solid Stem Auger		Core Barrel: N/A					
Boring Location: 241+00, 3.0 ft Rt.			Casing ID/OD: N/A		Water Level*: None Observed					
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test										
Depth (ft.)	Sample Information						Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows				
0	S24		0.58 - 2.30			SSA	473.4		7" PAVEMENT.	
							471.7		Brown, damp, fine to coarse SAND, some gravel, little silt, (Fill).	0.6
	S25		2.30 - 10.00						Tan, wet, fine to medium SAND, little silt.	2.3
5										
10							464.0		Bottom of Exploration at 10.0 feet below ground surface. NO REFUSAL	10.0
25										
Remarks:										
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									Page 1 of 1	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.									Boring No.: HB-FRYE-317	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Boring No.: HB-FRYE-318 WIN: 17280.00			
Drilling Contractor: MaineDOT			Elevation (ft.): 469.8		Auger ID/OD: 5" Dia.				
Operator: Giles/Daggett/Giles			Datum: NAVD88		Sampler: N/A				
Logged By: B.Wilder			Rig Type: CME 45C		Hammer Wt./Fall: N/A				
Date Start/Finish: 4/28/2015-4/28/2015			Drilling Method: Solid Stem Auger		Core Barrel: N/A				
Boring Location: 243+00, 3.0 ft Rt.			Casing ID/OD: N/A		Water Level*: None Observed				
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test									
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)		
0	S26		0.58 - 2.10			SSA	469.2	7" PAVEMENT. Brown, damp, fine to coarse SAND, some gravel, trace silt, (Fill).	0.6- A-1-b, SW-SM WC=3.9%
							467.7		
	S27		2.10 - 10.00					Tan, wet, fine to medium SAND, little silt.	
5									
10							459.8	Bottom of Exploration at 10.0 feet below ground surface. NO REFUSAL	10.0
25									
Remarks:									
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-318	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-319 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 384.3				Auger ID/OD: 5" Dia.			
Operator: Giles/Daggett/Giles				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 4/28/2015-4/28/2015				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 268+00, 4.0 ft Rt.				Casing ID/OD: N/A				Water Level*: 2.0 ft bgs.			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)				
0	S28		0.58 - 2.40			SSA	383.7	7" PAVEMENT.	0.6		
							381.9	Brown, wet, fine to coarse SAND, some gravel, trace silt, (Fill).			
								Bottom of Exploration at 2.4 feet below ground surface. REFUSAL	2.4		
5											
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-319			

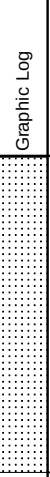
Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS						Project: Route 302 Reconstruction Location: Fryeburg, Maine						Boring No.: HB-FRYE-401 WIN: 17280.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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<table><thead><tr><th rowspan="2">Depth (ft.)</th><th colspan="9">Sample Information</th><th rowspan="2">Visual Description and Remarks</th><th rowspan="2">Laboratory Testing Results/ AASHTO and Unified Class.</th></tr><tr><th>Sample No.</th><th>Pen./Rec. (in.)</th><th>Sample Depth (ft.)</th><th>Blows (6 in.) Shear Strength (psf) or RQD (%)</th><th>N-value</th><th>Casing Blows</th><th>Elevation (ft.)</th><th>Graphic Log</th></tr></thead><tbody><tr><td>0</td><td>B1</td><td></td><td>0.58 - 1.20</td><td></td><td></td><td>SSA</td><td>447.1</td><td></td><td>7" PAVEMENT.</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>446.5</td><td></td><td>Brown, dry, Gravelly fine to coarse SAND, trace silt, occasional cobble, (Fill).</td><td>-0.6</td><td>G#264739</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>446.3</td><td></td><td></td><td></td><td>A-1-a, SW</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>445.7</td><td></td><td>Layer of Old PAVEMENT.</td><td>-1.2</td><td>WC=2.3%</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Reddish brown, damp, fine to coarse SAND, little gravel, trace silt, (Fill).</td><td>-1.4</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>444.2</td><td></td><td>Light brown, damp, fine to coarse SAND, little silt, trace gravel.</td><td>-2.0</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Bottom of Exploration at 3.5 feet below ground surface.</td><td>-3.5</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>NO REFUSAL</td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>25</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>																		Depth (ft.)	Sample Information									Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	0	B1		0.58 - 1.20			SSA	447.1		7" PAVEMENT.										446.5		Brown, dry, Gravelly fine to coarse SAND, trace silt, occasional cobble, (Fill).	-0.6	G#264739								446.3				A-1-a, SW								445.7		Layer of Old PAVEMENT.	-1.2	WC=2.3%										Reddish brown, damp, fine to coarse SAND, little gravel, trace silt, (Fill).	-1.4									444.2		Light brown, damp, fine to coarse SAND, little silt, trace gravel.	-2.0											Bottom of Exploration at 3.5 feet below ground surface.	-3.5											NO REFUSAL			5																																																																																																																																																																																																																								20																																																																																																												25											
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Boring No.: HB-FRYE-402 WIN: 17280.00			
Drilling Contractor: MaineDOT			Elevation (ft.) 406.1		Auger ID/OD: 10" Dia.				
Operator: Giles/Daggett/Giles			Datum: NAVD88		Sampler: Off Flights				
Logged By: B.Wilder			Rig Type: CME 45C		Hammer Wt./Fall: N/A				
Date Start/Finish: 8/19/2015-8/19/2015			Drilling Method: Solid Stem Auger		Core Barrel: N/A				
Boring Location: 166+50, 7.0 ft Lt.			Casing ID/OD: N/A		Water Level*: None Observed				
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test									
Depth (ft.)	Sample Information							Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)		
0	B2		0.67 - 1.50			SSA	405.4	8" PAVEMENT. Brown, damp, Gravelly fine to coarse SAND, trace silt, occasional cobble, (Fill). Light brown, damp, fine to coarse SAND, little silt. Bottom of Exploration at 3.5 feet below ground surface. NO REFUSAL	G#264740 A-1-a, SW WC=1.6%
							404.6		
							402.6		
5									
10									
15									
20									
25									
Remarks:									
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.								Page 1 of 1	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.								Boring No.: HB-FRYE-402	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS						Project: Route 302 Reconstruction			Boring No.: HB-FRYE-403																																																																																																																																																																																																																																																												
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS						Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-404 WIN: 17280.00																																																																																																																																																																																																																																																																																																																																																																											
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Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-501 WIN: 17280.00				
Driller: MaineDOT				Elevation (ft.): 407.7				Auger ID/OD: 5" Solid Stem				
Operator: Travis/Austin				Datum: NAVD88				Sampler: Standard Split Spoon				
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: 140#/30"				
Date Start/Finish: 6/9/2016; 07:00-09:30				Drilling Method: Cased Wash Boring				Core Barrel: N/A				
Boring Location: 163+66, 8.9 ft Lt.				Casing ID/OD: NW-3"				Water Level*: None Observed				
Hammer Efficiency Factor: 0.908				Hammer Type: Automatic ☒ Hydraulic ☐ Rope & Cathead ☐								
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S _u (lab) = Lab Vane Undrained Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N ₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected T _v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test												
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
0							SSA	406.9		10" HMA.	G#270726 A-2-4, SM WC=9.4% G#270727 A-3, SP-SM WC=7.3% G#270728 A-3, SP WC=17.0% G#270729 A-2-4, SM WC=26.8%	
5	1D	24/20	5.00 - 7.00	2/2/3/12	5	8		401.2		Light brown, moist, loose, fine to coarse SAND, little gravel, little silt, (Fill).		
								400.7		Layer of Old Pavement.		
10	2D	24/20	10.00 - 12.00	2/1/2/1	3	5				Light brown, damp, loose, fine to coarse SAND, trace silt, trace gravel, (Fill).		
15	3D	24/22	15.00 - 17.00	3/3/3/3	6	9	4			Light brown, damp, loose, fine to coarse SAND, trace silt, (Fill).		
							11					
							12					
							12					
							15					
20	4D	24/16	20.00 - 22.00	2/1/1/2	2	3	11	388.2		Grey, wet, very loose, fine to coarse SAND, little silt, trace gravel.		
							11					
							11					
							20					
25							22					
Remarks:												
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. * Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Page 1 of 2 Boring No.: HB-FRYE-501		

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Boring No.: HB-FRYE-501 WIN: 17280.00					
Driller: MaineDOT		Elevation (ft.) 407.7		Auger ID/OD: 5" Solid Stem							
Operator: Travis/Austin		Datum: NAVD88		Sampler: Standard Split Spoon							
Logged By: B.Wilder		Rig Type: CME 45C		Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 6/9/2016; 07:00-09:30		Drilling Method: Cased Wash Boring		Core Barrel: N/A							
Boring Location: 163+66, 8.9 ft Lt.		Casing ID/OD: NW-3"		Water Level*: None Observed							
Hammer Efficiency Factor: 0.908		Hammer Type: Automatic ☒ Hydraulic ☐ Rope & Cathead ☐									
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt		R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140 lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person		S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_u = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected		T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test					
Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows				
25	5D	24/15	25.00 - 27.00	2/3/3/5	6	9	OPEN	375.7		Grey, wet, loose, fine to coarse SAND, trace silt.	G#270730 A-3, SP WC=20.9%
							HOLE				
30	6D	24/18	30.00 - 32.00	4/4/5/6	9	14					
									Bottom of Exploration at 32.0 feet below ground surface. NO REFUSAL	G#270731 A-3, SP WC=22.2%	
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.										Page 2 of 2	
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Boring No.: HB-FRYE-501	

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-502 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.) 407.2				Auger ID/OD: 5" Dia.			
Operator: Travis/Austin				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 6/9/2016; 07:00-09:30				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 164+03, 13.3 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
Depth (ft.)	Sample Information								Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.	
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log			
0						SSA			Probe, no soil samples taken.		
5											
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									Page 1 of 2		
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.									Boring No.: HB-FRYE-502		

[illegible]

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-503 WIN: 17280.00				
Driller: MaineDOT				Elevation (ft.): 398.4				Auger ID/OD: 5" Solid Stem				
Operator: Travis/Austin				Datum: NAVD88				Sampler: Standard Split Spoon				
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: 140#/30"				
Date Start/Finish: 6/9/2016; 09:30-12:30				Drilling Method: Cased Wash Boring				Core Barrel: N/A				
Boring Location: 177+53, 9.5 ft Lt.				Casing ID/OD: NW-3"				Water Level*: None Observed				
Hammer Efficiency Factor: 0.908				Hammer Type: Automatic ☒ Hydraulic ☐ Rope & Cathead ☐								
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S _u (lab) = Lab Vane Undrained Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) N-uncorrected = Raw Field SPT N-value Hammer Efficiency Factor = Rig Specific Annual Calibration Value N ₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency N ₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected T _v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test												
Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
0							SSA	397.6		10" HMA.	0.8'	
5	1D	24/19	5.00 - 7.00	3/4/3/3	7	11				Light brown, damp, medium dense, fine to coarse SAND, trace silt, trace gravel, (Fill).	G#270732 A-3, SP-SM WC=6.9%	
10	2D	24/21	10.00 - 12.00	1/1/2/2	3	5				Light brown, damp, loose, fine to coarse SAND, trace silt, trace gravel, (Fill).	G#270733 A-3, SP WC=6.7%	
15	3D/A	24/17	15.00 - 17.00	2/2/2/2	4	6	4			3D (15.0-16.6 ft) Light brown, damp, loose, fine to coarse SAND, trace silt, trace gravel, (Fill).	G#270734 A-3, SP-SM WC=24.6%	
							18			3D/A (16.6-17.0) Wood.		
							9			Wood from 16.6-17.1 ft bgs.		
							15					
20	4D	24/16	20.00 - 22.00	6/6/6/6	12	18	7	379.9		Brown, wet, medium dense, fine to coarse SAND, trace silt, trace gravel.	G#270735 A-2-4, SP-SM WC=17.0%	
							21					
							25					
							14					
25							24					
Remarks:												
Stratification lines represent approximate boundaries between soil types; transitions may be gradual. * Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.										Page 1 of 2 Boring No.: HB-FRYE-503		

Maine Department of Transportation <u>Soil/Rock Exploration Log</u> <u>US CUSTOMARY UNITS</u>				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-503 WIN: 17280.00																																																																																																																																																																																																																																																																																																						
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Date Start/Finish: 6/9/2016; 09:30-12:30				Drilling Method: Cased Wash Boring				Core Barrel: N/A																																																																																																																																																																																																																																																																																																						
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Maine Department of Transportation <u>Soil/Rock Exploration Log</u> <u>US CUSTOMARY UNITS</u>				Project: Route 302 Reconstruction Location: Fryeburg, Maine				Boring No.: HB-FRYE-504 WIN: 17280.00			
Drilling Contractor: MaineDOT				Elevation (ft.): 398.4				Auger ID/OD: 5" Dia.			
Operator: Travis/Austin				Datum: NAVD88				Sampler: N/A			
Logged By: B.Wilder				Rig Type: CME 45C				Hammer Wt./Fall: N/A			
Date Start/Finish: 6/9/2016; 09:30-12:30				Drilling Method: Solid Stem Auger				Core Barrel: N/A			
Boring Location: 177+76, 9.0 ft Rt.				Casing ID/OD: N/A				Water Level*: None Observed			
Definitions: D = Spilt Spoon Sample S = Sample off Auger Flights B = Bucket Sample off Auger Flights MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MV = Unsuccessful Field Vane Shear Test Attempt V = Field Vane Shear Test, PP= Pocket Penetrometer MU = Unsuccessful Thin Wall Tube Sample Attempt R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of 1 Person S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_u(lab) = Lab Vane Undrained Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) N-value = Raw Field SPT N-value T_v = Pocket Torvane Shear Strength (psf) WC = Water Content, percent ≈ = Similar or Equal too LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test											
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0						SSA			Probe, no soil samples taken.		
5											
10											
15											
20											
25											
Remarks:											
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									Page 1 of 2		
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.									Boring No.: HB-FRYE-504		

[illegible]

Maine Department of Transportation Test Pit Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Test Pit No.: TP-2 PIN: 17280.00	
Contractor: MaineDOT			Equipment Type: Back-hoe			Elevation (ft.): 447.7	
Operator: N/A			Sampling Method: Off Flights			Datum: NAVD88	
Logged By: MDOT Project Inspector			Test Pit Dimensions (ft): ---				
Date Start/Finish: 8/19/2015-8/19/2015			Total Depth (ft): 2.0 ft				
Location: 55+50, 6.0 ft Rt.			Water Level* (ft): None Observed				
Definitions: S = Grab Sample V = Field Vane Shear Test U = Thin Wall Tube Sample			Definitions: S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf) q_u = Unconfined Compressive Strength (ksf) $S_u(\text{lab})$ = Lab Vane Undrained Shear Strength (psf)			Definitions: WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis	

Depth (ft.)	Sample Information					Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log		
0				446.95		9" PAVEMENT.	
				446.78		2" fine to coarse SAND, trace silt, trace gravel, (Fill).	0.8
				445.70		13" SAND, (Fill).	0.9
						Bottom of Test Pit at 2.0 feet below ground surface.	2.0
5							
10							
15							
20							
25							

Remarks:

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

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

Page 1 of 1
 Test Pit No.: TP-2

Maine Department of Transportation Test Pit Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Test Pit No.: TP-3 PIN: 17280.00			
Contractor: MaineDOT			Equipment Type: Back-hoe			Elevation (ft.): 406.2			
Operator: N/A			Sampling Method: Off Flights			Datum: NAVD88			
Logged By: MDOT Project Inspector			Test Pit Dimensions (ft): ---						
Date Start/Finish: 8/19/2015-8/19/2015			Total Depth (ft): 3.5 ft						
Location: 166+50, 6.0 ft Lt.			Water Level* (ft): None Observed						
Definitions: S = Grab Sample V = Field Vane Shear Test U = Thin Wall Tube Sample				Definitions: S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T _v = Pocket Torvane Shear Strength (psf) q _p = Unconfined Compressive Strength (ksf) S _{u(lab)} = Lab Vane Undrained Shear Strength (psf)				Definitions: WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis	
Depth (ft.)	Sample Information					Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log				
0				405.45		9" PAVEMENT.			
				404.45		12" fine to coarse SAND, some gravel, trace silt, (Fill).	0.8'		
				402.70		21" SAND, (Fill).	1.8'		
						Bottom of Test Pit at 3.5 feet below ground surface.	3.5'		
5									
10									
15									
20									
25									
Remarks:									
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.						Page 1 of 1			
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.						Test Pit No.: TP-3			

Maine Department of Transportation Test Pit Log US CUSTOMARY UNITS				Project: Route 302 Reconstruction Location: Fryeburg, Maine		Test Pit No.: TP-4 PIN: 17280.00			
Contractor: MaineDOT			Equipment Type: Back-hoe			Elevation (ft.): 412.3			
Operator: N/A			Sampling Method: Off Flights			Datum: NAVD88			
Logged By: MDOT Project Inspector			Test Pit Dimensions (ft): ---						
Date Start/Finish: 8/19/2015-8/19/2015			Total Depth (ft): 3.05 ft						
Location: 173+00, 6.0 ft Rt.			Water Level* (ft): None Observed						
Definitions: S = Grab Sample V = Field Vane Shear Test U = Thin Wall Tube Sample				Definitions: S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T _v = Pocket Torvane Shear Strength (psf) q _u = Unconfined Compressive Strength (ksf) S _u (lab) = Lab Vane Undrained Shear Strength (psf)				Definitions: WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis	
Depth (ft.)	Sample Information					Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.		
	Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log				
0				411.55		9" PAVEMENT.	G#264737 A-1-b, SW WC=1.5%		
				409.25		2.3 ft Gravelly SAND, trace silt, (Fill).			
						BEDROCK			
						Bottom of Test Pit at 3.1 feet below ground surface.			
5									
10									
15									
20									
25									
Remarks:									
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.									
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.						Page 1 of 1 Test Pit No.: TP-4			

Maine Department of Transportation				Project: Route 302 Reconstruction		Test Pit No.: TP-5	
Test Pit Log				Location: Fryeburg, Maine		PIN: 17280.00	
US CUSTOMARY UNITS							
Contractor: MaineDOT		Equipment Type: Back-hoe		Elevation (ft.): 469.8			
Operator: N/A		Sampling Method: Off Flights		Datum: NAVD88			
Logged By: MDOT Project Inspector		Test Pit Dimensions (ft): ---					
Date Start/Finish: 8/19/2015-8/19/2015		Total Depth (ft): 3.8 ft					
Location: 243+00, 6.0 ft Lt.		Water Level* (ft): None Observed					
Definitions: S = Grab Sample V = Field Vane Shear Test U = Thin Wall Tube Sample				Definitions: S _u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T _v = Pocket Torvane Shear Strength (psf) q _u = Unconfined Compressive Strength (ksf) S _{u(lab)} = Lab Vane Undrained Shear Strength (psf)			
				Definitions: WC = Water Content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis			
Depth (ft.)	Sample Information					Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Sample Depth (ft.)	Shear Strength (psf)	Elevation (ft.)	Graphic Log		
0						13" PAVEMENT.	
				468.72			
				468.22		6" fine to coarse SAND, some gravel, trace silt, (Fill).	1.1
						31" SAND, (Fill).	1.6
				466.00			
						Bottom of Test Pit at 3.8 feet below ground surface.	3.8
5							
10							
15							
20							
25							
Remarks:							
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.							
* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.						Page 1 of 1	
						Test Pit No.: TP-5	

State of Maine - Department of Transportation
Power Auger Probe Summary Sheet

Town(s): Fryeburg

Work Number: 17280.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 3/10/2015
23+50	12.0 Lt.			5.0		Northern Test Boring
33+50	13.0 Rt.			5.0		Northern Test Boring
43+50	9.0 Lt.			5.0		Northern Test Boring
146+00	9.0 Rt.			5.0		4/27/2015
171+50	12.0 Lt.		3.0			
171+50	3.5 Rt.		2.6			
171+50	13.0 Rt.		2.4			
172+00	12.0 Lt.		1.7			
172+00	12.0 Rt.		3.5			
172+00	19.0 Rt.					Bedrock Outcrop
172+50	12.0 Lt.		2.4			
172+50	1.5 Rt.		3.1			
172+50	12.0 Rt.		2.4			
172+50	20.0 Lt.					Bedrock Outcrop
173+00	11.5 Rt.		2.4			
173+50	12.5 Lt.		5.9			
173+50	3.0 Rt.		5.6			
173+50	13.0 Rt.		4.2			
174+00	12.5 Lt.			10.0		
174+00	14.0 Rt.			10.0		
175+00	3.5 Rt.			5.0		
197+00	12.0 Lt.			10.0		
197+00	13.5 Rt.			10.0		
198+00	11.0 Lt.		8.1			
199+00	11.0 Lt.		9.0			
201+00	10.0 Lt.			10.0	4.5	very wet
219+00	10.0 Lt.		4.3			
220+50	9.0 Lt.		6.1			
240+50	10.0 Rt.			10.0		
241+00	10.5 Rt.			10.0		
241+50	12.0 Rt.			10.0		
242+00	3.5 Rt.			10.0		Similar to HB-FRY-317
242+00	12.0 Rt.			10.0		
242+50	12.0 Rt.			10.0		
243+00	12.0 Rt.		9.4			
243+50	13.0 Rt.		6.4			
244+00	7.0 Rt.		6.9			
267+95	25.0 Rt.					Bedrock Outcrop
268+00	13.0 Rt.		2.2		1.0	
268+00	14.0 Lt.		4.3			
269+00	3.5 Rt.		3.2			Similar to HB-FRY-319
269+00	12.0 Rt.		2.9		0.9	
269+00	29.0 Lt.					Bedrock Outcrop
269+00	14.0 Lt.		5.0			
270+00	5.5 Rt.		5.6		3.2	
270+00	25.5 Rt.					Bedrock Outcrop
270+00	14.0 Lt.		3.0		2.9	

Appendix B

Laboratory Test Results

State of Maine - Department of Transportation
Laboratory Testing Summary Sheet

Town(s): Fryeburg

Work Number: 17280.00

Boring & Sample Identification Number	Station (Feet)	Offset (Feet)	Depth (Feet)	Reference Number	G.S.D.C. Sheet	W.C. %	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
HB-BRFR-117, S13	286+21	9.0 Rt.	0.6-5.0	182548	1	5.5			SM	A-2-4	II
HB-FRYE-201, 1D	51+34	7.0 Rt.	5.0-7.0	266609	2	8.0			SM	A-2-4	II
HB-FRYE-201, 2D	51+34	7.0 Rt.	10.0-12.0	266610	2	4.8			SP-SM	A-3	0
HB-FRYE-201, 4D	51+34	7.0 Rt.	20.0-22.0	266611	2	45.9			SM	A-2-4	II
HB-FRYE-201, 5D	51+34	7.0 Rt.	25.0-27.0	266612	2	26.2			ML	A-4	IV
HB-FRYE-201, 6D	51+34	7.0 Rt.	30.0-32.0	263314	2	24.6			ML	A-4	IV
HB-FRYE-204, 1D	59+50	9.0 Rt.	5.0-7.0	266613	3	2.0			SW-SM	A-1-b	0
HB-FRYE-204, 2D	59+50	9.0 Rt.	10.0-12.0	266614	3	17.7			SP-SM	A-3	0
HB-FRYE-206, 1D	209+95	11.5 Lt.	5.0-7.0	266615	3	29.1			ML	A-4	IV
HB-FRYE-206, 2D/A	209+95	11.5 Lt.	10.0-12.0	266616	3	11.1			SM	A-1-b	II
HB-FRYE-301, S1	23+50	13.0 Lt.	0.33-1.5	266783	4	6.2			SM	A-1-b	II
HB-FRYE-301, S2	23+50	13.0 Lt.	1.5-5.0	266787	4	5.0			SM	A-1-b	II
HB-FRYE-303, S3	43+50	7.0 Lt.	0.42-1.7	266784	4	5.7			SM	A-1-b	II
HB-FRYE-303, S4	43+50	7.0 Lt.	1.7-5.0	266788	4	3.9			SP-SM	A-2-4	0
HB-FRYE-304, S5	55+50	11.0 Lt.	0.42-2.0	266785	4	3.7			SW-SM	A-1-b	0
HB-FRYE-306, S7	71+50	10.5 Rt.	0.92-1.7	266786	4	2.0			SW-SM	A-1-a	0
HB-FRYE-307, S9	159+50	9.0 Rt.	0.42-1.6	266789	5	4.9			SW-SM	A-1-b	0
HB-FRYE-307, S10	159+50	9.0 Rt.	1.6-5.0	266795	5	8.1			SP-SM	A-3	0
HB-FRYE-308, S11	166+50	9.0 Lt.	0.5-1.3	266790	5	2.6			SW-SM	A-1-b	0
HB-FRYE-309, S13	171+00	4.0 Rt.	0.42-2.2	266791	5	2.7			SW-SM	A-1-b	0
HB-FRYE-311, S16	173+00	3.0 Rt.	0.54-2.2	266792	5	2.8			SW-SM	A-1-b	0
HB-FRYE-312, S18	174+00	3.0 Rt.	2.6-10.0	266796	6	16.0			ML	A-4	IV
HB-FRYE-314, S20	196+50	10.0 Lt.	0.5-2.2	266793	6	6.6			SM	A-1-b	II
HB-FRYE-314, S21	196+50	10.0 Lt.	2.2-10.0	266797	6	11.2			ML	A-4	IV
HB-FRYE-318, S26	243+00	3.0 Rt.	0.58-2.1	266794	6	3.9			SW-SM	A-1-b	0
HB-FRYE-401, B1	55+50	8.0 Rt.	0.58-1.2	264739	7	2.3			SW	A-1-a	0
HB-FRYE-402, B2	166+50	7.0 Lt.	0.67-1.5	264740	7	1.6			SW	A-1-a	0
HB-FRYE-403, B3	173+00	7.5 Rt.	0.75-2.3	264741	7	1.8			SW	A-1-a	0
HB-FRYE-404, B4	243+00	6.5 Lt.	1.0-2.1	264742	7	2.7			SW-SM	A-1-b	0
HB-FRYE-501, 1D	163+65.7	8.9 Lt.	5.0-7.0	270726	8	9.4			SM	A-2-4	II
HB-FRYE-501, 2D	163+65.7	8.9 Lt.	10.0-12.0	270727	8	7.3			SP-SM	A-3	0
HB-FRYE-501, 3D	163+65.7	8.9 Lt.	15.0-17.0	270728	8	17.0			SP	A-3	0
HB-FRYE-501, 4D	163+65.7	8.9 Lt.	20.0-22.0	270729	8	26.8			SM	A-2-4	II
HB-FRYE-501, 5D	163+65.7	8.9 Lt.	25.0-27.0	270730	8	20.9			SP	A-3	0
HB-FRYE-501, 6D	163+65.7	8.9 Lt.	30.0-32.0	270731	8	22.2			SP	A-3	0
HB-FRYE-503, 1D	177+52.5	9.5 Lt.	5.0-7.0	270732	9	6.9			SP-SM	A-3	0
HB-FRYE-503, 2D	177+52.5	9.5 Lt.	10.0-12.0	270733	9	6.7			SP	A-3	0
HB-FRYE-503, 3D	177+52.5	9.5 Lt.	15.0-16.6	270734	9	24.6			SP-SM	A-3	0
HB-FRYE-503, 4D	177+52.5	9.5 Lt.	20.0-22.0	270735	9	17.0			SP-SM	A-2-4	0
HB-FRYE-503, 5D	177+52.5	9.5 Lt.	25.0-27.0	270736	9	18.9			SM	A-2-4	II
HB-FRYE-503, 6D	177+52.5	9.5 Lt.	30.0-32.0	270737	9	11.9			SM	A-1-b	II

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible).

The "Frost Susceptibility Rating" is based upon the MaineDOT and Corps of Engineers Classification Systems.

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 NP = Non Plastic

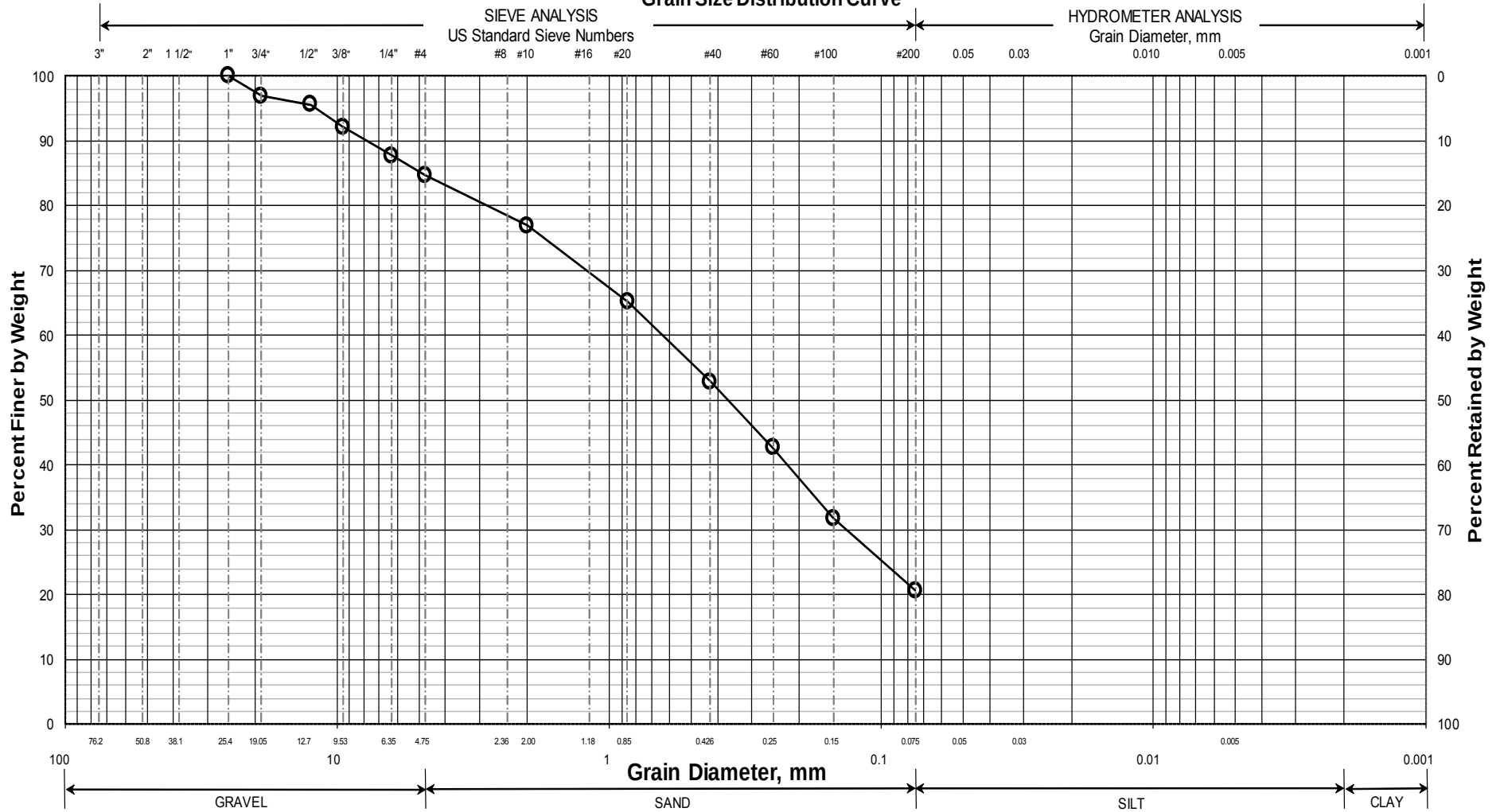
PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

Work Number: 17280.00

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MaineDOT and Corps of Engineers Classification Systems.

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

Maine Department of Transportation Grain Size Distribution Curve

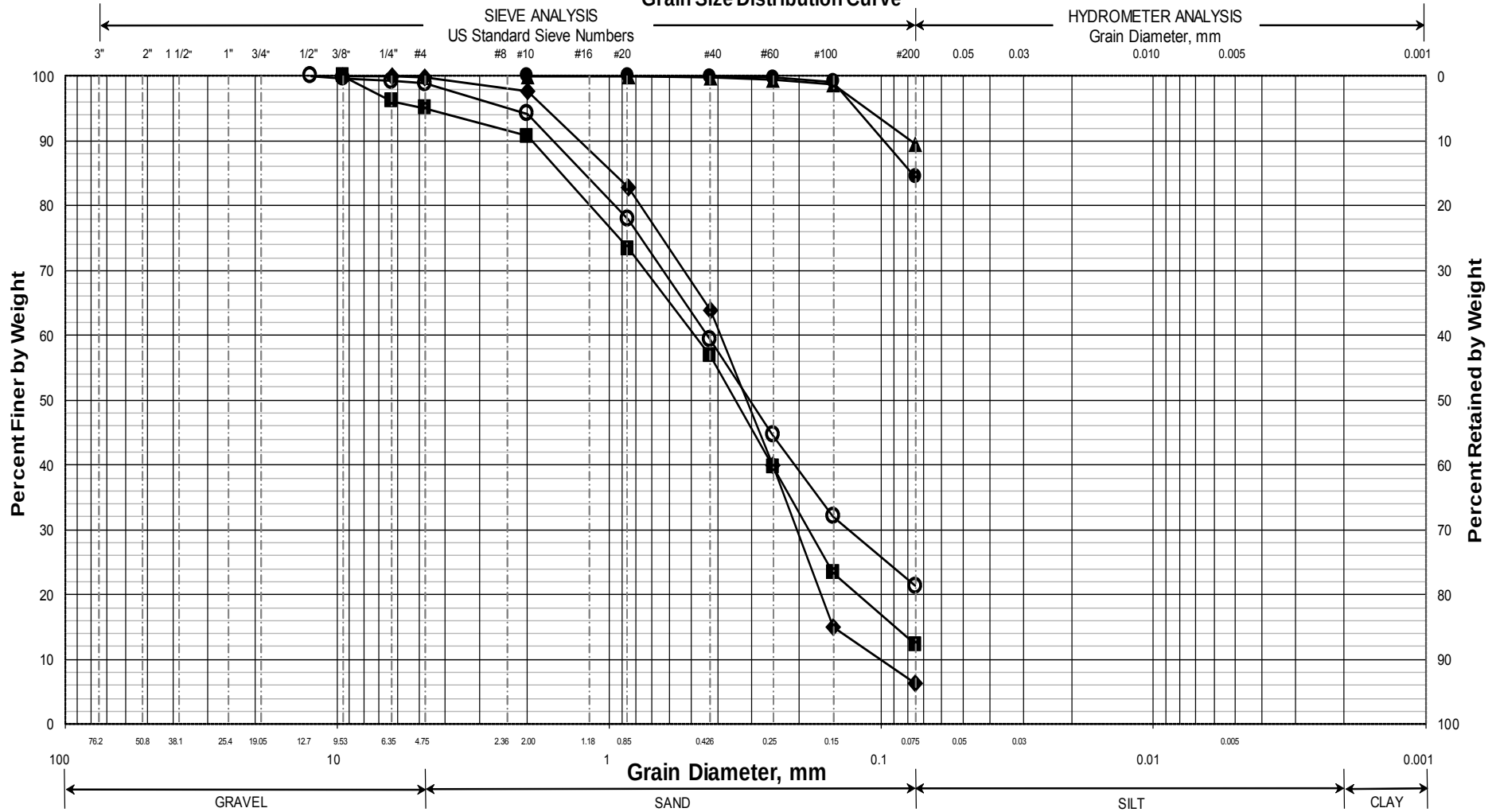


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-BRFR-117/S13	286+21	9.0 RT	0.6-5.0	SAND, some silt, little gravel.	5.5			
◆									
■									
●									
▲									
X									

WIN
017280.00
Town
Fryeburg
Reported by/Date
WHITE, TERRY A 12/10/2018

Maine Department of Transportation Grain Size Distribution Curve

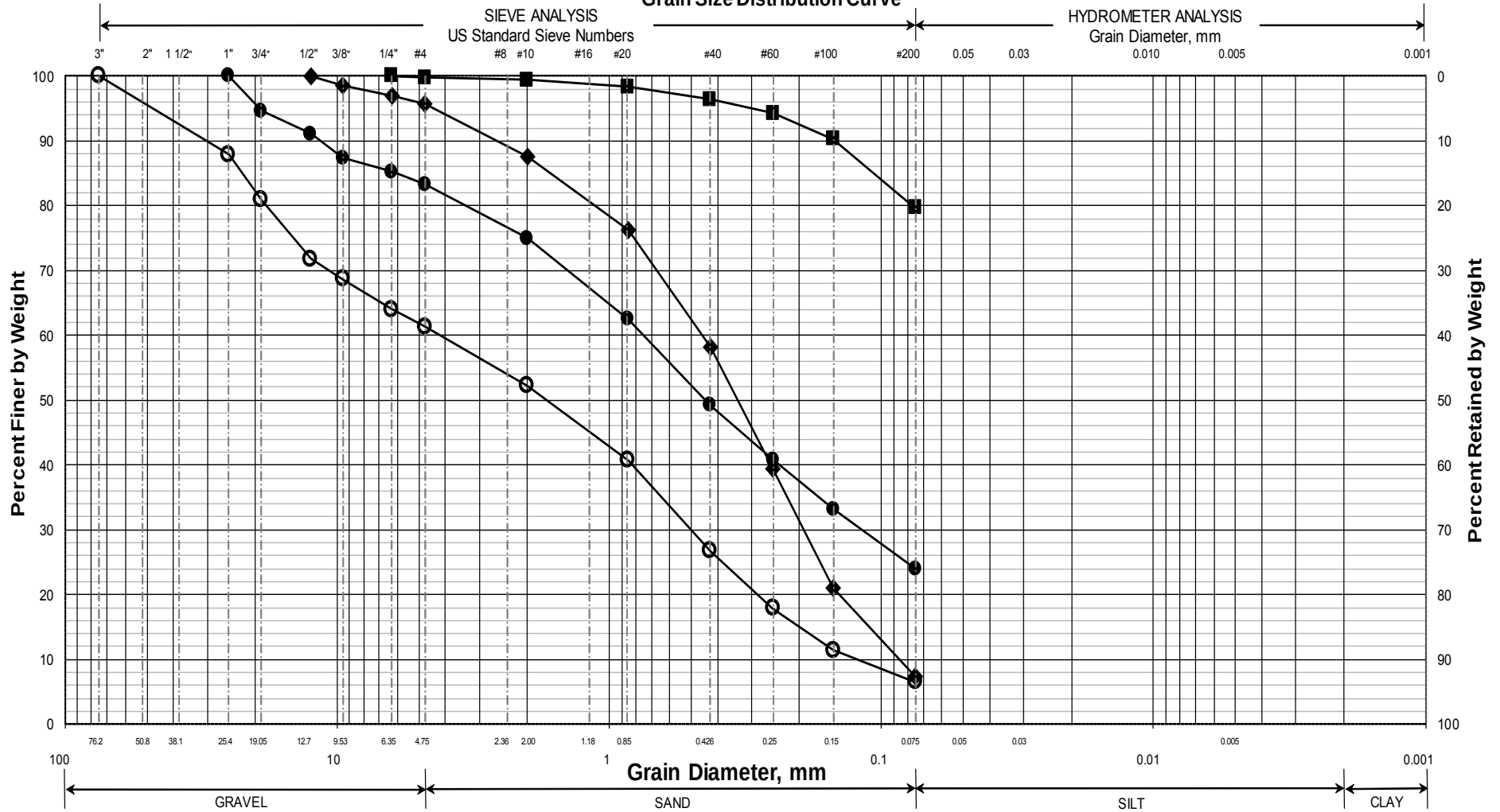


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-201/1D	51+34	7.0 RT	5.0-7.0	SAND, some silt, trace gravel.	8.0			
◆	HB-FRYE-201/2D	51+34	7.0 RT	10.0-12.0	SAND, trace silt, trace gravel.	4.8			
■	HB-FRYE-201/4D	51+34	7.0 RT	20.0-22.0	SAND, little silt, trace gravel.	45.9			
●	HB-FRYE-201/5D	51+34	7.0 RT	25.0-27.0	SILT, little sand.	26.2			
▲	HB-FRYE-201/6D	51+34	7.0 RT	30.0-32.0	SILT, little sand.	24.6			
X									

WIN	
017280.00	
Town	
Fryeburg	
Reported by/Date	
WHITE, TERRY A	10/16/2018

Maine Department of Transportation Grain Size Distribution Curve

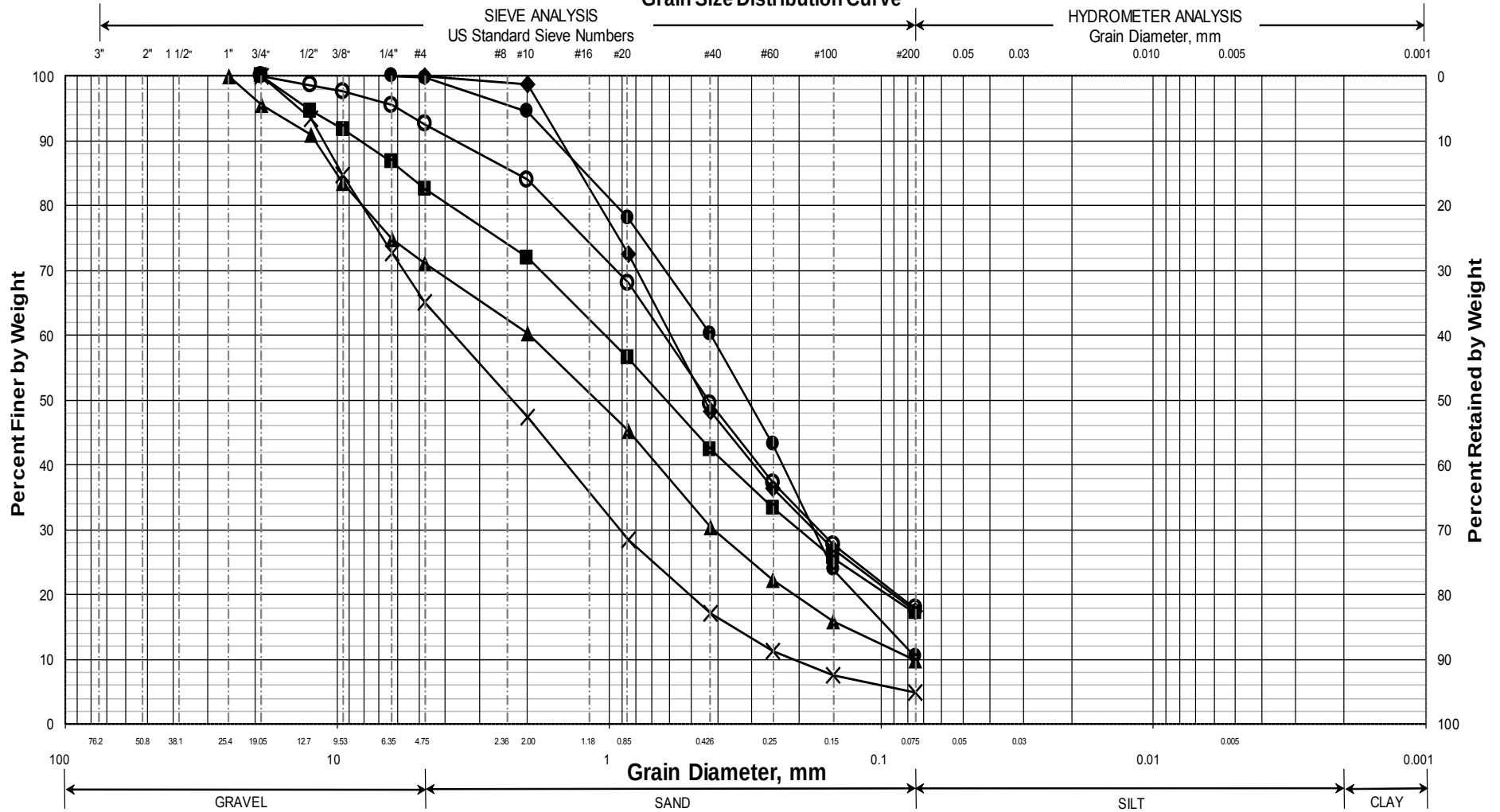


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-204/1D	59+50	9.0 RT	5.0-7.0	Gravelly SAND, trace silt.	2.0			
◆	HB-FRYE-204/2D	59+50	9.0 RT	10.0-12.0	SAND, trace silt, trace gravel.	17.7			
■	HB-FRYE-206/1D	209+95	11.5 LT	5.0-7.0	SILT, little sand, trace gravel.	29.1			
●	HB-FRYE-206/2DA	209+95	11.5 LT	10.0-12.0	SAND, some silt, little gravel.	11.1			
▲									
X									

WIN
017280.00
Town
Fryeburg
Reported by/Date
WHITE, TERRY A 10/16/2018

Maine Department of Transportation Grain Size Distribution Curve

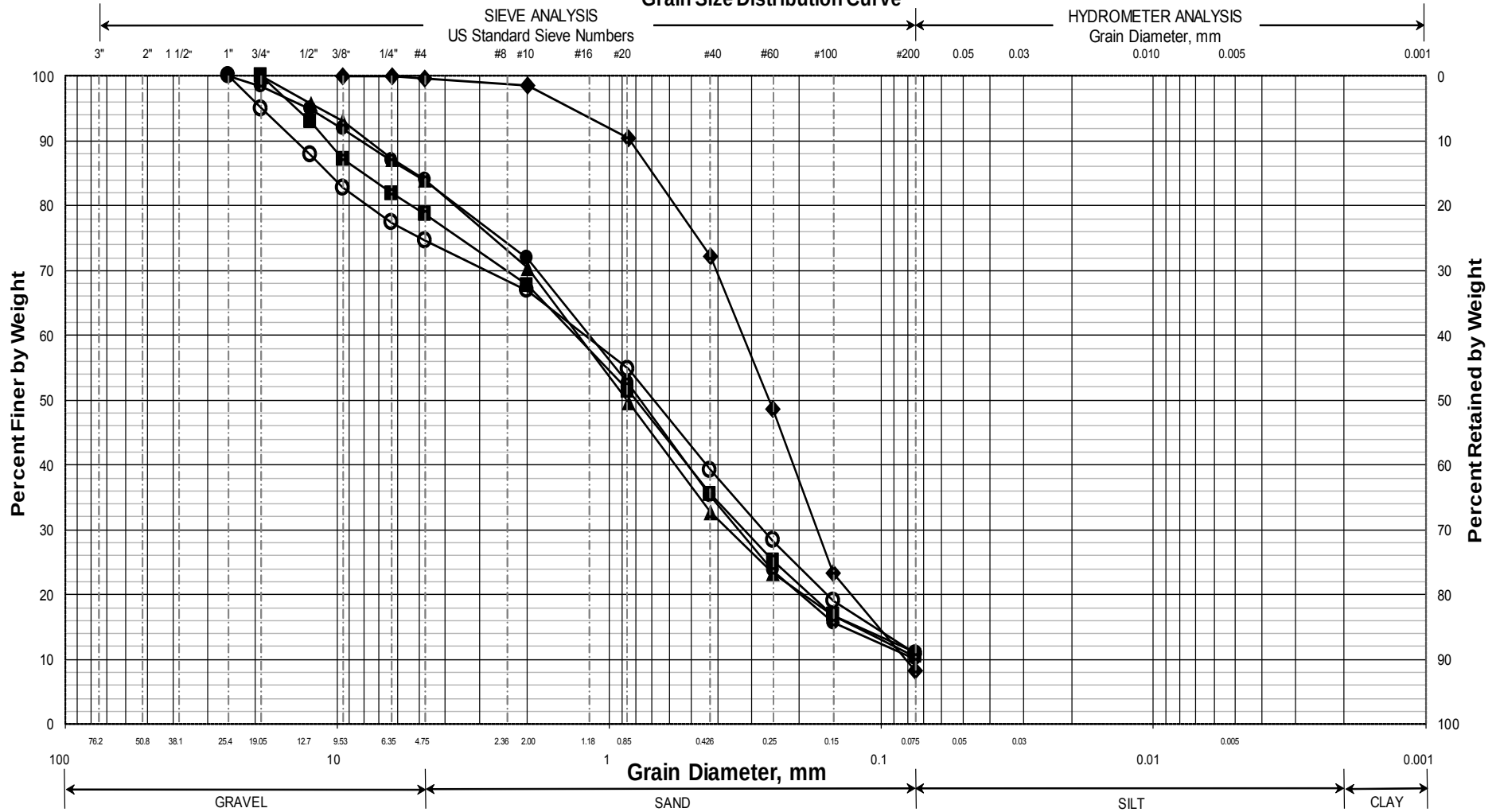


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-301/S1	23+50	3.0 LT	0.33-1.5	SAND, little silt, trace gravel.	6.2			
◆	HB-FRYE-301/S2	23+50	13.0 LT	1.5-5.0	SAND, little silt.	5.0			
■	HB-FRYE-303/S3	43+50	7.0 LT	0.42-1.7	SAND, little gravel, little silt.	5.7			
●	HB-FRYE-303/S4	43+50	7.0 LT	1.7-5.0	SAND, trace silt, trace gravel.	3.9			
▲	HB-FRYE-304/S5	55+50	11.0 LT	0.42-2.0	SAND, some gravel, trace silt.	3.7			
×	HB-FRYE-306/S7	71+50	10.5 RT	0.92-1.7	SAND, some gravel, trace silt.	2.0			

WIN
017280.00
Town
Fryeburg
Reported by/Date
WHITE, TERRY A 10/16/2018

Maine Department of Transportation Grain Size Distribution Curve

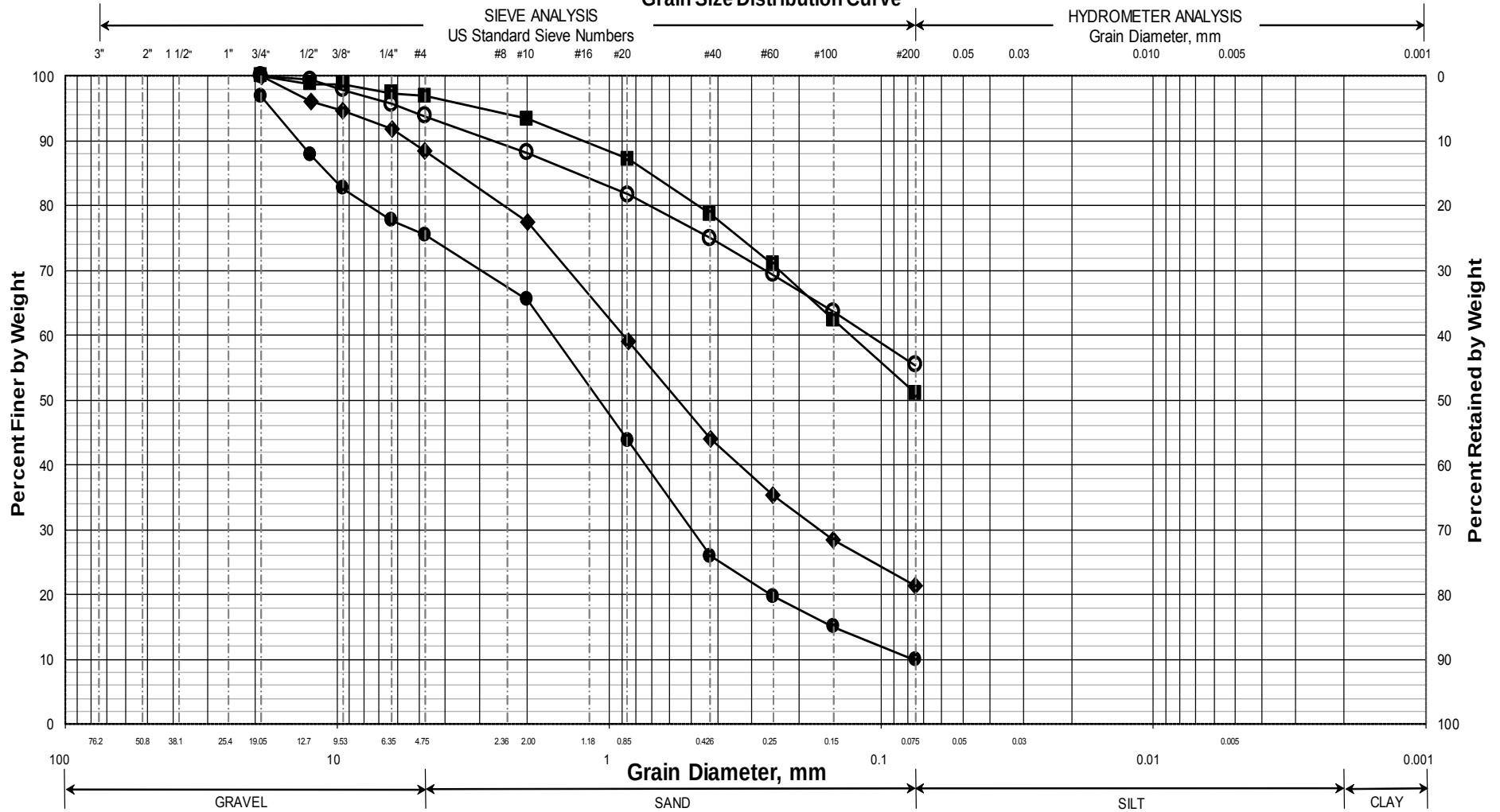


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-307/S9	159+50	9.0 RT	0.42-1.6	SAND, some gravel, little silt.	4.9			
◆	HB-FRYE-307/S10	159+50	9.0 RT	1.6-5.0	SAND, trace silt, trace gravel.	8.1			
■	HB-FRYE-308/S11	166+50	9.0 LT	0.5-1.3	SAND, some gravel, trace silt.	2.6			
●	HB-FRYE-309/S13	171+00	4.0 RT	0.42-2.2	SAND, little gravel, trace silt.	2.7			
▲	HB-FRYE-311/S16	173+00	3.0 RT	0.54-2.2	SAND, little gravel, little silt.	2.8			
X									

WIN
017280.00
Town
Fryeburg
Reported by/Date
WHITE, TERRY A 10/16/2018

Maine Department of Transportation Grain Size Distribution Curve

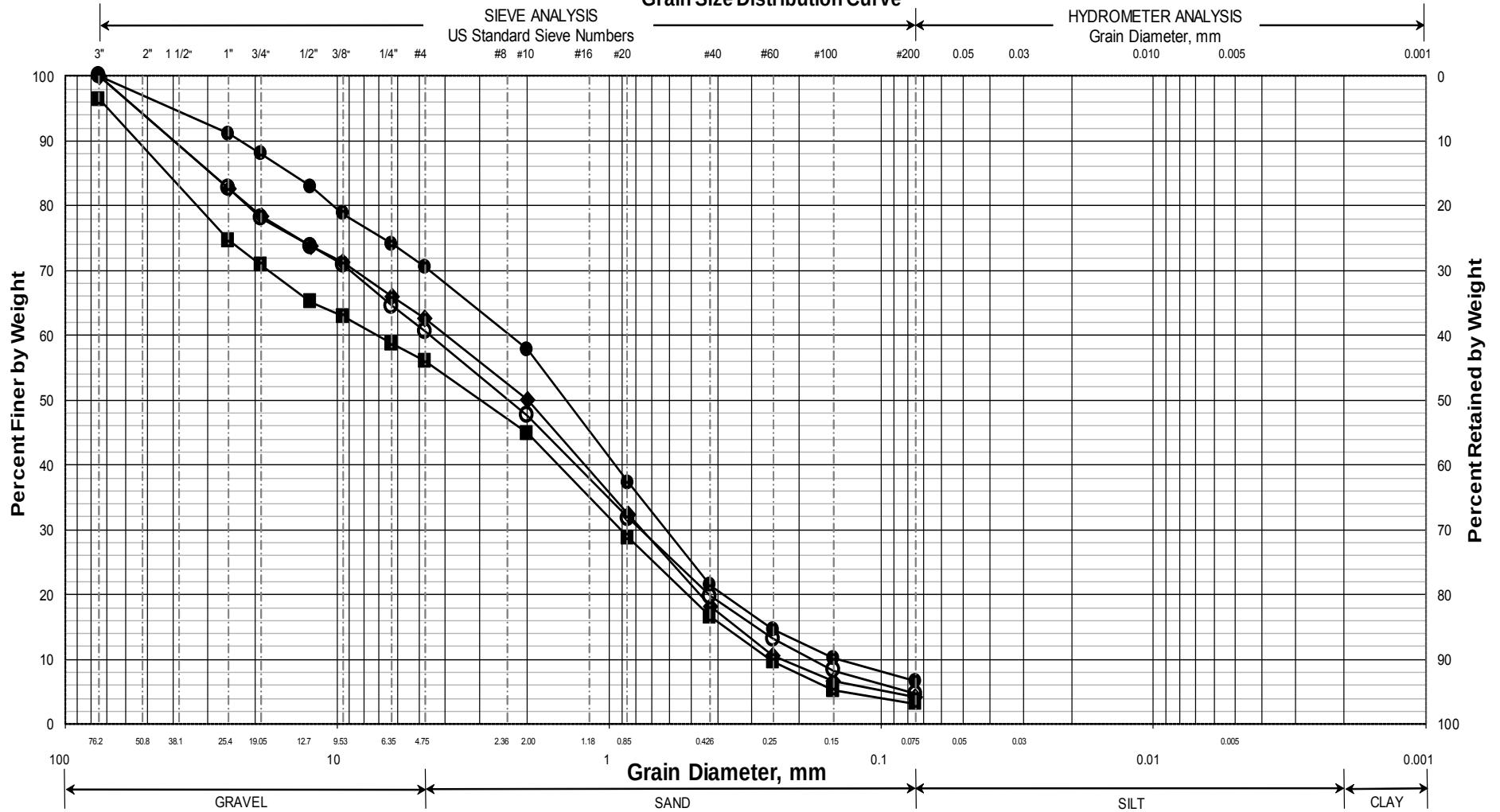


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-312/S18	174+00	3.0 RT	2.6-10.0	Sandy SILT, trace gravel.	16.0			
◆	HB-FRYE-314/S20	196+50	10.0 LT	0.5-2.2	SAND, some silt, little gravel.	6.6			
■	HB-FRYE-314/S21	196+50	10.0 LT	2.2-10.0	Sandy SILT, trace gravel.	11.2			
●	HB-FRYE-318/S26	243+00	3.0 RT	0.58-2.1	SAND, some gravel, trace silt.	3.9			
▲									
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Maine Department of Transportation Grain Size Distribution Curve

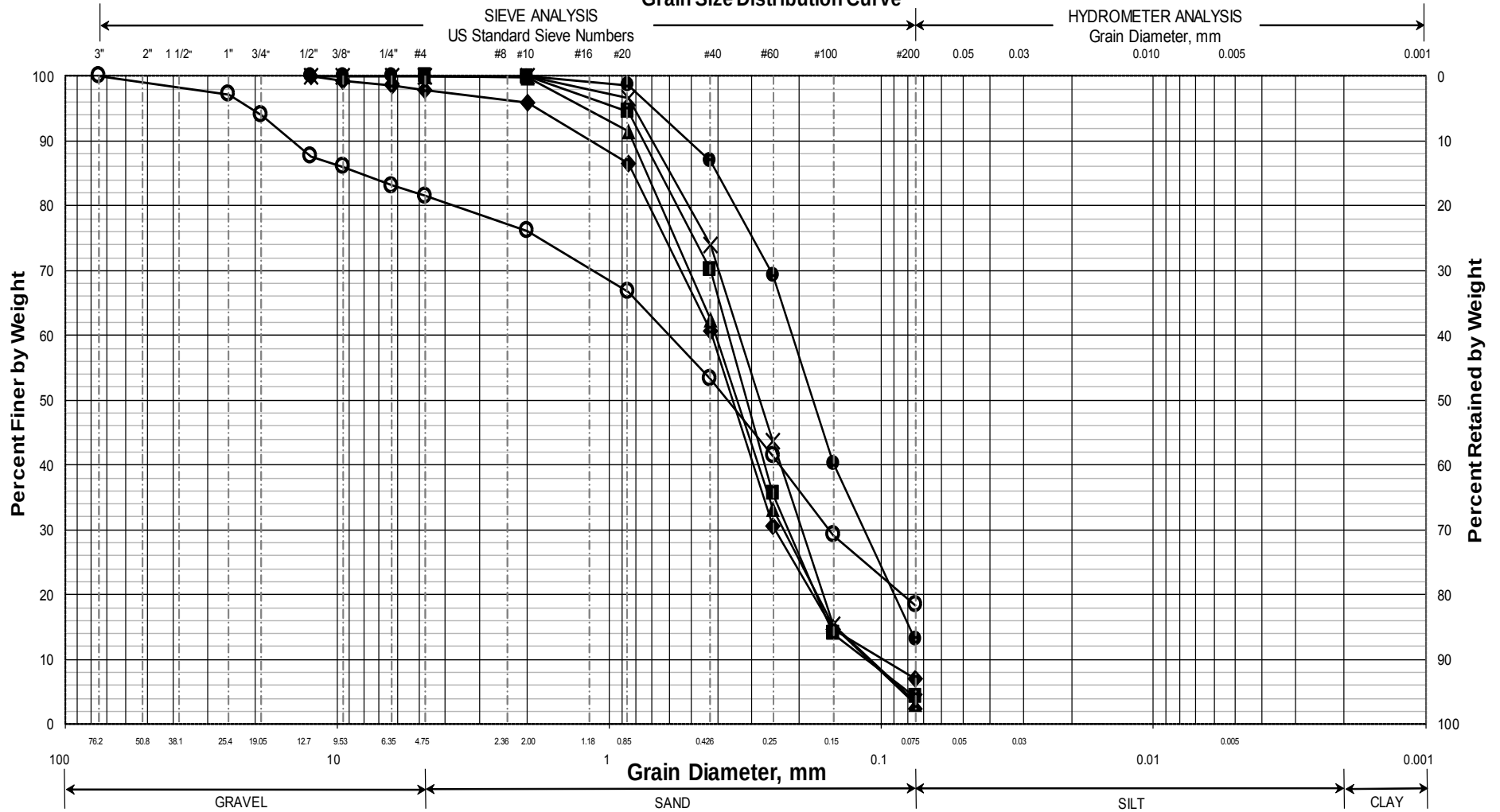


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-401/B1	55+50	8.0 RT	0.58-1.2	Gravelly SAND, trace silt.	2.3			
◆	HB-FRYE-402/B2	166+50	7.0 LT	0.67-1.5	Gravelly SAND, trace silt.	1.6			
■	HB-FRYE-403/B3	173+00	7.5 RT	0.75-2.3	Gravelly SAND, trace silt.	1.8			
●	HB-FRYE-404/B4	243+00	6.5 LT	1.0-2.1	SAND, some gravel, trace silt.	2.7			
▲									
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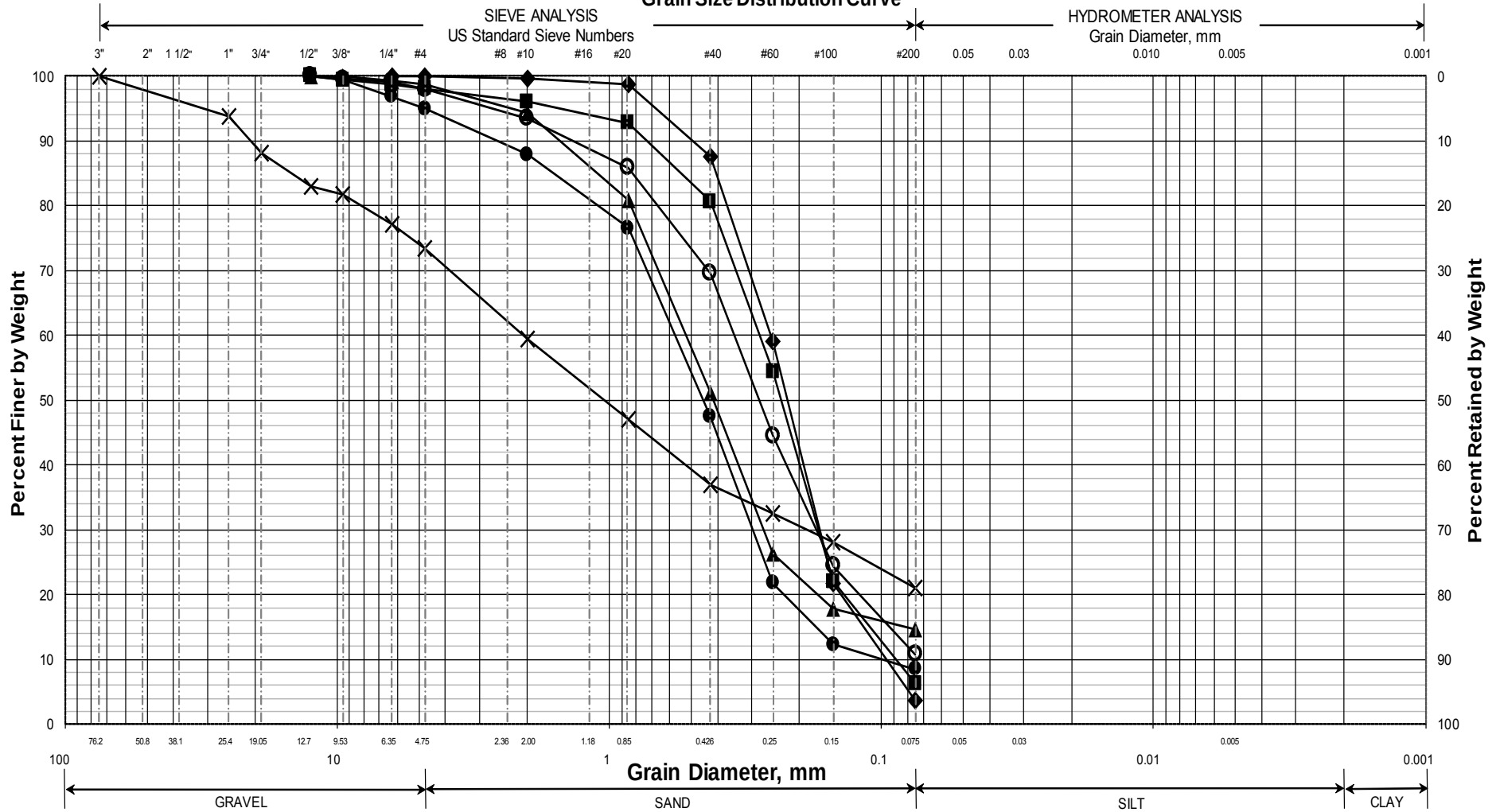


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-501/1D	163+65.7	8.9 LT	5.0-7.0	SAND, little gravel, little silt.	9.4			
◆	HB-FRYE-501/2D	163+65.7	8.9 LT	10.0-12.0	SAND, trace silt, trace gravel.	7.3			
■	HB-FRYE-501/3D	163+65.7	8.9 LT	15.0-17.0	SAND, trace silt.	17.0			
●	HB-FRYE-501/4D	163+65.7	8.9 LT	20.0-22.0	SAND, little silt, trace gravel.	26.8			
▲	HB-FRYE-501/5D	163+65.7	8.9 LT	25.0-27.0	SAND, trace silt.	20.9			
x	HB-FRYE-501/6D	163+65.7	8.9 LT	30.0-32.0	SAND, trace silt.	22.2			

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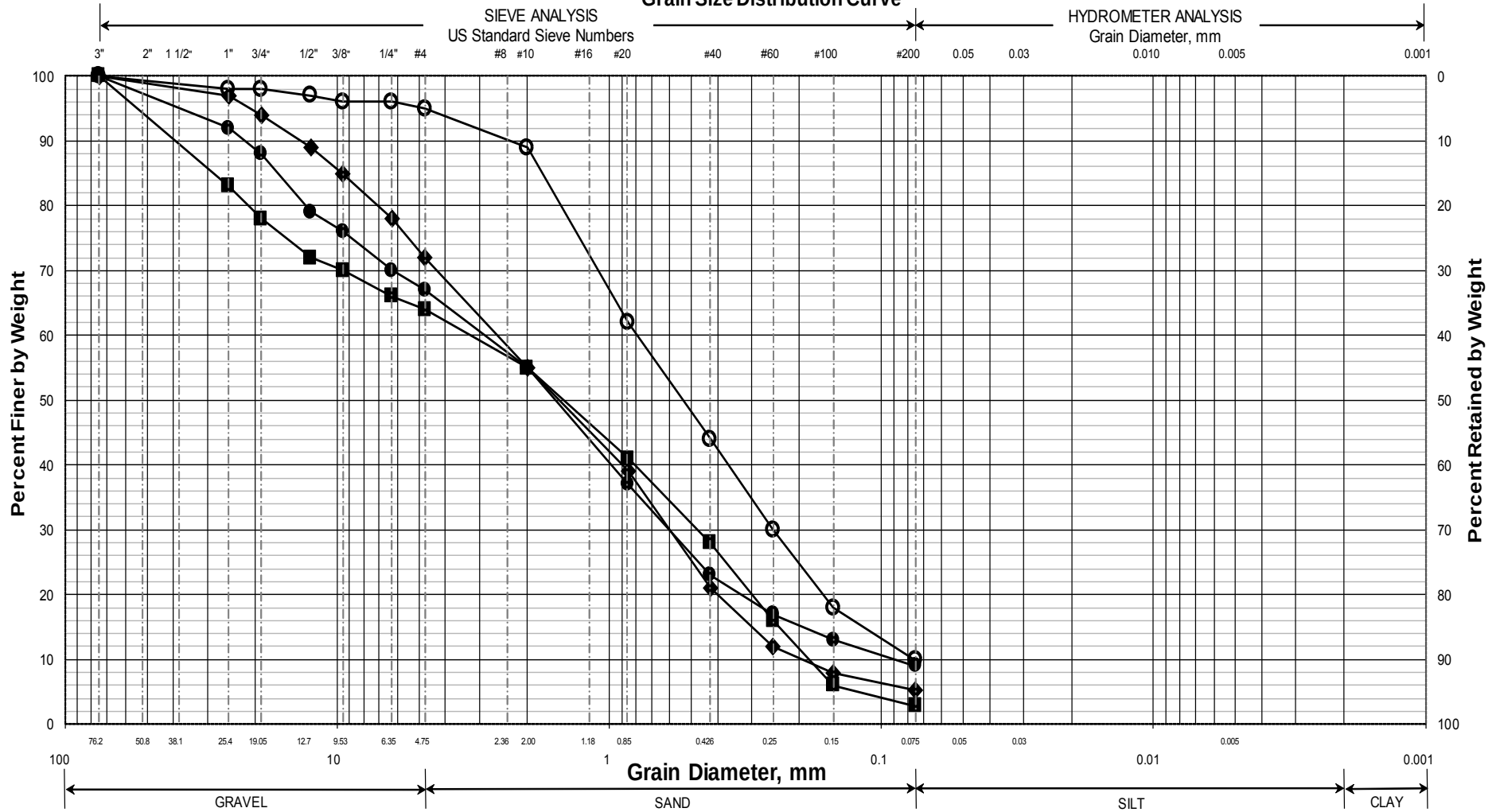


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-FRYE-503/1D	177+52.5	9.5 LT	5.0-7.0	SAND, trace silt, trace gravel.	6.9			
◆	HB-FRYE-503/2D	177+52.5	9.5 LT	10.0-12.0	SAND, trace silt, trace gravel.	6.7			
■	HB-FRYE-503/3D	177+52.5	9.5 LT	15.0-17.0	SAND, trace silt, trace gravel.	24.6			
●	HB-FRYE-503/4D	177+52.5	9.5 LT	20.0-22.0	SAND, trace silt, trace gravel.	17.0			
▲	HB-FRYE-503/5D	177+52.5	9.5 LT	25.0-27.0	SAND, little silt, trace gravel.	18.9			
X	HB-FRYE-503/6D	177+52.5	9.5 LT	30.0-32.0	SAND, some gravel, some silt.	11.9			

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UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	TP2	55+50	6.0 RT	0.75-2.0	SAND, trace silt, trace gravel.	2.9			
◆	TP3	166+50	6.0 LT	0.75-3.5	SAND, some gravel, trace silt.	1.7			
■	TP4	173+00	6.0 RT	0.75-3.05	Gravelly SAND, trace silt.	1.5			
●	TP5	243+00	6.0 LT	1.08-3.8	SAND, some gravel, trace silt.	3.5			
▲									
X									

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Appendix C

Calculations

Bearing Resistance - Existing 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 8th Edition 2017
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 at the bearing elevation

Density In Place: dense

Bearing Resistance: Ordinary Range (ksf) 4 to 8

Recommended Value of Use:

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

Resistance factor at the **service limit state** = 1.0 (LRFD Article 10.5.5.1) $\phi_{service_bc} := 1.0$

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

$$q_{factored_service_bc} = 5 \cdot ksf$$

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 Sand

Reference: AASHTO LRFD Bridge Design Specifications 8th Edition 2017 - Article 10.6.3.1

Assumptions:

1. The box will be founded at ~ Elev 363.6

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

2. Assumed parameters for fill soils:

Saturated unit weight: $\gamma_s := 125 \cdot pcf$

Internal friction angle: $\phi_{ns} := 32 \cdot deg$

Undrained shear strength: $c_{ns} := 0 \cdot psf$

3. Box Culvert parameters

Width of box culvert, B $B_{box} := 10 \cdot ft$

Length of box culvert, L $L_{box} := 87 \cdot ft$

Nominal Bearing Resistance per LRFD Equation 10.6.3.1.2a-1

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

Bearing Capacity Factors - LRFD Table 10.6.3.1.2a-1

For $\phi = 32$ deg $N_c := 35.5$ $N_q := 23.2$ $N_\gamma := 30.2$

Shape Correction Factors LRFD Table 10.6.3.1.2a.-3

for $\phi = 32$ degrees

$$s_c := 1 + \left(\frac{B_{box}}{L_{box}} \right) \left(\frac{N_q}{N_c} \right) \quad s_c = 1.08$$

$$s_\gamma := 1 - 0.4 \left(\frac{B_{box}}{L_{box}} \right) \quad s_\gamma = 0.954$$

$$s_q := 1 + \left(\frac{B_{box}}{L_{box}} \cdot \tan(\phi_{ns}) \right) \quad s_q = 1.07$$

Load Inclination Factors:

Assume all are 1.0 (LRFD Article C10.6.3.1.2a)

$i_c := 1.0$ $i_q := 1.0$ $i_\gamma := 1.0$

Depth Correction Factor LRFD Table 10.6.3.1.2a-4

$$\frac{D_{footing}}{B_{box}} = 0.2 \quad \text{for } \phi = 32 \text{ degrees} \quad d_q := 1.2$$

$$N_{cm} := N_c \cdot s_c \cdot i_c \quad N_{cm} = 38.1667 \quad \text{LRFD Eq. 10.6.3.1.2a-2}$$

$$N_{qm} := N_q \cdot s_q \cdot d_q \cdot i_q \quad N_{qm} = 29.84 \quad \text{LRFD Eq. 10.6.3.1.2a-3}$$

$$N_{\gamma m} := N_\gamma \cdot s_\gamma \cdot i_\gamma \quad N_{\gamma m} = 28.81 \quad \text{LRFD Eq. 10.6.3.1.2a-4}$$

Coefficients for Groundwater Depths LRFD Table 10.6.3.1.2a-2

Depth the water table: $D_w := 0 \cdot \text{ft}$ $C_{wq} := 0.5$ $C_{w\gamma} := 0.5$

$$q_{nominal} := c_{ns} \cdot N_{cm} + \gamma_s \cdot D_{footing} \cdot N_{qm} \cdot C_{wq} + 0.5(\gamma_s) B_{box} \cdot N_{\gamma m} \cdot C_{w\gamma}$$

$$q_{nominal} = 12.7 \cdot \text{ksf}$$

Factored Bearing Resistance for Strength Limit State

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

$$q_{factored} := q_{nominal} \cdot \phi_b$$

$$q_{factored} = 5.7 \cdot \text{ksf}$$

Recommend a limiting factored bearing resistance of 6.0 ksf for the Strength Limit State.

Modulus of Subgrade Reaction:

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

Width of box culvert, B $B_{box} := 10 \cdot \text{ft}$

Length of box culvert, L $L_{box} := 87 \cdot \text{ft}$

Thickness of box culvert, t $t_{box} := 12 \cdot \text{in}$ assumed

Depth of box, D $D_{box} := 16 \cdot \text{ft}$

Bearing Resistance: $q_{factored_service_bc} = 5 \cdot \text{ksf}$ Calculated above

Modulus of Site soils at bearing elevation are Sand (dense)

Elasticity: From Bowles Table 2-8 Modulus E_s for sand and gravel, dense ranges from 1000 - 1700 ksf

Use Modulus of Elasticity, E_s $E_s := 1100 \cdot \text{ksf}$

Poisson's Ratio: Site soils are Sand (dense)

From Bowles Table 2-7 Poisson's Ratio μ for Sand ranges from 0.3 - 0.4

Use Poisson's Ratio, μ $\mu := 0.35$

$$E_{prime_s} := \frac{1 - \mu^2}{E_s} \quad E_{prime_s} = 0.000798 \cdot \frac{\text{ft}^2}{\text{kip}}$$

Analyze corner:

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

$$H_{inf} := \frac{5 \cdot B_{box}}{B_{box}} \quad H_{inf} = 5 \quad N \text{ in Table 5-2}$$

From Table 5-2 for N=5 and M=8.7

$$\frac{L_{box}}{B_{box}} = 8.7 \quad M \text{ in Table 5-2}$$

$$I_1 := 0.537$$

$$I_2 := 0.139$$

by interpolation

Determine Steinbrenner influence factor - Bowles Section 5-6:

$$I_s := I_1 + \left[\frac{1 - (2 \cdot \mu)}{1 - \mu} \right] \cdot I_2 \quad I_s = 0.6012$$

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

$$\text{Depth ratio: } \frac{D_{box}}{B_{box}} = 1.6 \quad \frac{L_{box}}{B_{box}} = 8.7 \quad \mu = 0.35 \quad I_F := 0.82$$

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

$$k_s := \frac{1}{B_{box} \cdot E_{prime_s} \cdot I_s \cdot I_F} \quad \text{Bowles Eq. 9-7}$$

$$k_s = 147 \cdot \text{pci}$$

Recommend Modulus of Subgrade Reaction of 150 pci