

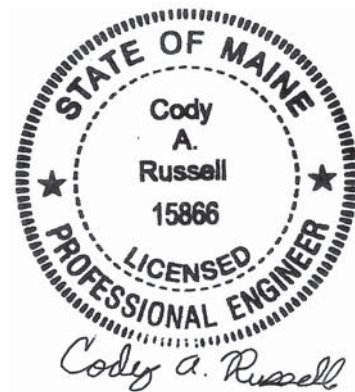
**MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE**

GEOTECHNICAL DESIGN REPORT

For the Reconstruction of:

**STATE ROUTE 6
ABBOT, MAINE**

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Piscataquis County
WIN 22646.00

Soils Report 2019-38
Federal No. STP-2264(600)

November 6, 2019

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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 2.69-mile portion of US Route 6 in Abbot, shown on Sheet 1 – Location Map. The project is needed to improve the failing roadway structure, provide adequate drainage, and improve safety. The scope includes reconstruction or rehabilitation of the existing travel lanes and shoulders, three (3) large culvert replacements, and drainage improvements. US Route 6 is a Highway Corridor Priority 2 road.

2.0 GEOLOGIC SETTING

According to the Surficial Geology Map entitled Reconnaissance Surficial Geology of the Guilford Quadrangle, Maine, Open File No. 81-18 (1981) published by the Maine Geological Survey (MGS), the following surficial soils are present along the project:

- Glacial-stream deposits consisting of sand and gravel.
- Till consisting of sand, silt, clay, and cobbles and boulders.
- Stream Alluvium consisting of sand, gravel, and silt.
- Swamp and tidal-marsh deposits consisting of peat, silt, clay, and sand.

According to the MGS map titled Bedrock Geologic Map of Maine (1985) the bedrock along the project consists of the following:

- Calcareous sandstone and interbedded sandstone and impure limestone of the Madrid Formation.
- Conglomerate of the Sangerville Formation Conglomerate Member.
- Interbedded pelite, sandstone, and limestone and/or dolostone of the Sangerville Formation.
- Limestone and/or dolostone of the Sangerville Formation Limestone Member.

3.0 SUBSURFACE INVESTIGATION

Subsurface conditions at the site were explored by drilling a total of twenty-one (21) test borings and three (3) probes.

Borings HB-ABB-101 through HB-ABB-108 were drilled on July 18, 2016 by the MaineDOT drill crew. Borings HB-ABB-109 through HB-ABB-118 were drilled on August 15, 2016 by the MaineDOT drill crew. The 100-series borings were drilled to depths ranging from approximately 2.3 feet to 5.0 feet below ground surface (bgs) using solid stem auger drilling techniques. Borings HB-ABB-201, HB-ABB-203, and HB-ABB-205 and probes HB-ABB-202, HB-ABB-204, and HB-ABB-206 were drilled on February 9, 2018 by S.W. Cole. The 200-series borings were drilled to depths ranging from approximately 20.0 to 37.0 feet bgs using hollow stem auger drilling techniques and the 200-series probes were drilled to depths ranging from approximately 20.0 to 25.0 feet bgs using solid stem auger drilling techniques. Boring and probe locations are shown on

the Sheets 2 through 24 Boring Location Plans. Boring and probe logs are presented in Appendix A.

Soil samples were obtained off the auger flights in the 100-series borings. Soil samples were obtained in the 200-series borings at standard 5-foot intervals using Standard Penetration Testing (SPT). The S.W. Cole drill rig is equipped with an automatic hammer to drive the split spoon. The S.W. Cole calibrated automatic hammer delivers approximately 32 percent more energy during driving than the standard rope and cathead system. All N-values discussed in this report are corrected values (N_{60}) computed by applying an average energy transfer factor of 0.79 to the raw field N-values. No soil samples were obtained in the probe. No bedrock cores were taken during the course of the explorations. One (1) boring encountered a refusal surface. The exact nature of the refusal surface was not determined. No soil sampling was done in the probes.

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 thirty-one (31) standard grain size analyses and natural water content, twelve (12) grain size analyses with hydrometer and natural water content, and five (5) Atterberg Limits tests. The results of the laboratory tests are in Appendix B – Laboratory Test Results. Laboratory test results are also summarized on the boring logs in Appendix A.

5.0 SUBSURFACE CONDITIONS

Subsurface conditions encountered at the test borings and probes 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 24 – Boring Location Plans. The boring and probe 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 5 to 12 inches. The fill soils consisted of:

- Brown to black-brown, damp, gravelly fine to coarse sand, trace to little silt, no to occasional cobbles.
- Brown, damp to moist, fine to coarse sand, little to some gravel, trace to some silt, no to occasional cobbles.
- Brown, damp, fine to coarse sandy gravel, trace to little silt, occasional cobbles.
- Brown, damp, gravel, some fine to coarse sand, trace silt, occasional cobbles.
- Brown, moist, silty fine to coarse sand, little clay, trace gravel, little wood.

The thickness of the fill ranged from approximately 1.1 feet to 12.0 feet but fill soils were not fully penetrated in all the explorations. SPT N_{60} -values obtained in the fill sand ranged from 3 to 191 blows per foot (bpf) indicating that the fill is very loose to very dense in consistency.

Water contents from twenty-five (25) samples obtained within the fill layer range from approximately 1% to 23%. Grain size analyses conducted on twenty-five (25) samples of the fill resulted in the soil being classified as an A-1-a, A-1-b, A-2-4, or A-4 under the AASHTO Soil Classification System and an SC-SM, SW-SM, SM, GW-GM, or CL, under the Unified Classification System.

5.2 Native Sand and Silty Sand

Layers of native sand and silty sand were encountered throughout the project, either underlying the fill or interbedded with layers of silt and sandy silt. The layers consisted of:

- Brown and dark brown, damp to wet, fine to coarse sand, trace to little gravel, trace to some silt, trace clay, trace organics.
- Light Brown and Brown, wet, fine to coarse silty sand, trace gravel, trace clay.

The thickness of the sand and silty sand layers ranged from approximately 1.5 feet to 11.0 feet but the native sand and silty sand were not fully penetrated in all the explorations. SPT N_{60} -values obtained in the sand ranged from 1 to 42 bpf indicating that the fill is very loose to dense in consistency.

Water contents from seven (7) samples obtained within the sand and silty sand layers range from approximately 4% to 40%. Grain size analyses conducted on seven (7) samples of the sand and silty sand resulted in the soil being classified as an A-1-b, A-2-4, A-3, or A-4 under the AASHTO Soil Classification System and an SC-SM, SM, SP-SM, SW-SM under the Unified Classification System.

5.3 Native Silt and Sandy Silt

Native silt and sandy silt layers were encountered in some areas, either underlying the fill or interbedded with layers of sand and silty sand. The layers were comprised of:

- Grey, brown, light brown, and black, damp to wet, silt, trace to some fine to coarse sand, trace to little gravel, trace clay, trace organics.

- Grey, moist, fine to coarse sandy silt, little gravel.

The thickness of the silt and sandy silt layers ranged from approximately 1.0 feet to 25.0 feet. The full depth of the silt and sandy silt was not penetrated in the explorations. SPT N_{60} -values obtained in the silt and sandy silt layers ranged from 3 to 25 bpf indicating that the silt and sandy silt is soft to very stiff in consistency.

Water contents from eleven (11) samples obtained within the silt layers range from approximately 12% to 40%. Grain size analyses conducted on eleven (11) samples of silt and sandy silt resulted in the soil being classified as A-4 under the AASHTO Soil Classification System and an SM or CL under the Unified Soil Classification System. Atterberg Limits tests conducted on five (5) samples of silt determined that soil is non-plastic.

5.4 Peat

An approximately 0.2-foot thick layer of peat was encountered in boring HB-ABB-203 at approximate Station 85+10.

5.5 Shallow Refusal Surfaces

A shallow refusal surface was encountered at a depth approximately 2.3 feet bgs in boring HB-ABB-103 at approximate Station 23+18. The exact nature of the refusal surface was not determined in the exploration. Bedrock outcrops were located by MaineDOT survey at approximate Stations 50+50 right and 71+90 right.

5.6 Groundwater

Groundwater levels were observed in five (5) explorations. The measured groundwater levels in the explorations where groundwater was observed ranged from approximately 3.4 to 11.0 feet bgs. The water levels observed are indicated on the boring logs in Appendix A. Groundwater levels can be expected to fluctuate subject to seasonal variations, local soil conditions, topography, precipitation, and construction activity.

6.0 GEOTECHNICAL RECOMMENDATIONS

The following sections discuss the geotechnical-related design features of this project. Areas of geotechnical concern are:

- Large Culvert at approximate Station 77+43
- Large Culvert at approximate Station 85+27
- Large Culvert at approximate Station 139+64
- Potential Bedrock Removal

6.1 Large Culvert at approximate Station 77+43

6.1.1 General Information – The existing culvert (XC-104771) at approximate Station 77+43 is a 48-inch corrugated metal pipe (CMP). The proposed replacement structure is an 84-inch diameter, 84-foot long reinforced concrete pipe (RCP) on an approximately 5-degree skew with an inlet elevation of approximately 389.4 feet and an outlet elevation of approximately 389.0 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 25 – Boring Location Plan & Interpretive Subsurface Profile. The boring logs are provided in Appendix A – Boring Logs.

Boring HB-ABB-201 was drilled through fill sand and native sand, silty sand, and silt to a depth of approximately 22.0 feet bgs and did not encounter a refusal surface. One SPT N_{60} -value obtained in the fill sand was 3 bpf indicating that the fill very loose in consistency. SPT N_{60} -values in the native sand silty sand ranged from 1 to 42 bpf indicating that the native sand and silty sand is very loose to dense in consistency. Probe HB-ABB-202 was drilled to a depth of approximately 20.0 feet bgs and did not encounter refusal surface.

6.1.2 Construction – The proposed RCP culvert at approximate Station 77+43 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 Cobble Bars to facilitate fish passage. The Special Fill will have a depth of 2 feet at the culvert centerline.

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 Large Culvert at approximate Station 85+27

6.2.1 General Information - The existing culvert (XC-115625) at approximate Station 85+27 is a 48-inch corrugated metal pipe (CMP). The proposed replacement structure is a 96-inch diameter, 94-foot long reinforced concrete pipe (RCP) on an approximately 1-degree skew with an inlet elevation of approximately 385.4 feet and an outlet elevation of approximately 385.0 feet.

One (1) boring and one (1) probe were drilled at the existing culvert. The boring locations and the interpretive subsurface profile are shown on Sheet 26 – Boring Location Plan & Interpretive Subsurface Profile. The boring logs are provided in Appendix A – Boring Logs.

Boring HB-ABB-203 was drilled through fill sand and gravelly sand, peat and native silt to a depth of approximately 37.0 feet bgs and did not encounter a refusal surface. SPT N_{60} -values in the fill ranged from 3 to 34 bpf indicating that the fill very loose to dense in consistency. SPT N_{60} -values in the native silt ranged from 3 to 25 bpf indicating that the silt is soft to very stiff in consistency. A thin layer peat was observed within the silt layer at a depth of approximately 15.5 feet bgs and was found to have a thickness of approximately 0.2 feet. Probe HB-ABB-204 was drilled to a depth of approximately 25.0 feet bgs and did not encounter refusal surface.

6.2.2 Design and Construction – The proposed RCP culvert at approximate Station 85+27 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 Cobble Bars to facilitate fish passage. The Special Fill will have a depth of 2 feet at the culvert centerline.

An approximately 0.2-foot thick layer of peat was encountered in boring HB-ABB-203. 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 proposed structure shall be bedded on a 2-foot thick, geotextile wrapped, geogrid reinforced, crushed stone mat (Underdrain Backfill Material, Type C; Pay Item 203.55, see Special Provision 203, attached). The geogrid reinforcement shall meet the requirements of Special Provision 620, attached. The Reinforcement Geotextile wrap shall meet the requirements of MaineDOT Standard Specification 722.01. The soils at the bedding elevation shall be excavated using a smooth-edged backhoe bucket to limit disturbance. Any disturbed soils at the bedding elevation resulting from excavation activities shall be removed by hand prior to placement of the geotextile wrapped, geogrid reinforced, crushed stone mat. 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 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, backfill soil shall be compacted to at least 92 percent of the AASHTO T-180 maximum dry density.

6.3 Large Culvert at approximate Station 139+64

6.3.1 General Information – The existing culvert at approximate Station 139+64 (XC-115622) is a 48-inch corrugated metal pipe (CMP). The proposed replacement structure is an 8-foot span by 6-foot rise by 76-foot long reinforced concrete box culvert with an inlet elevation of approximately 394.8 feet and an outlet elevation of approximately 395.0 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 26 – Boring Location Plan & Interpretive Subsurface Profile. The boring logs are provided in Appendix A – Boring Logs.

Boring HB-ABB-205 was drilled through fill sand and silty sand and native sand and silt to a depth of approximately 20.0 feet bgs and did not encounter a refusal surface. SPT N_{60} -values in the fill ranged from 4 to 191 bpf indicating that the fill is very loose to very dense in consistency. One SPT N_{60} -value obtained in the native sand was 5 bpf indicating that the native sand is loose in consistency. One SPT N_{60} -value obtained in the native silt was 9 bpf indicating that the native silt is stiff in consistency. Probe HB-ABB-206 was drilled to a depth of approximately 20.0 feet bgs and did not encounter refusal surface.

6.3.2 Construction – The proposed reinforced concrete box culvert at approximate Station 139+64 shall be constructed in accordance with MaineDOT Standard Specification Section 534 and the Contract Plans. The bottom of the large culvert will be partially filled with Special Fill and Cobble Bars to facilitate fish passage. The Special Fill will have a depth of 2 feet at the culvert centerline.

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 ¾-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 ¾-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.

Bearing Resistance - The factored bearing resistances for the proposed reinforced concrete box culvert at approximate Station 139+64 bearing on compacted granular bedding placed on very loose silty 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	3.0
Strength	0.45	Table 10.5.5.2.2-1	5.0

Modulus of Subgrade Reaction - A modulus of subgrade reaction equal to 50 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.

6.4 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. The proposed roadway grade in the vicinity of the proposed box culvert at approximate Station 139+64 will be raised approximately 2 feet. Due to the presence of granular soils at this location settlement is not anticipated to be of concern.

6.5 Scour and Riprap

Both the inlet and outlet of the proposed large culverts 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.

6.6 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.

6.7 Additional Construction Considerations

Construction of the proposed large culverts will require deep 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.

6.8 Bedrock Removal

Refusal of the drilling tools was encountered in one (1) boring and survey picked up bedrock outcrops at several locations along the project (see Section 5.5). 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 State Route 6 in Abbot, 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.

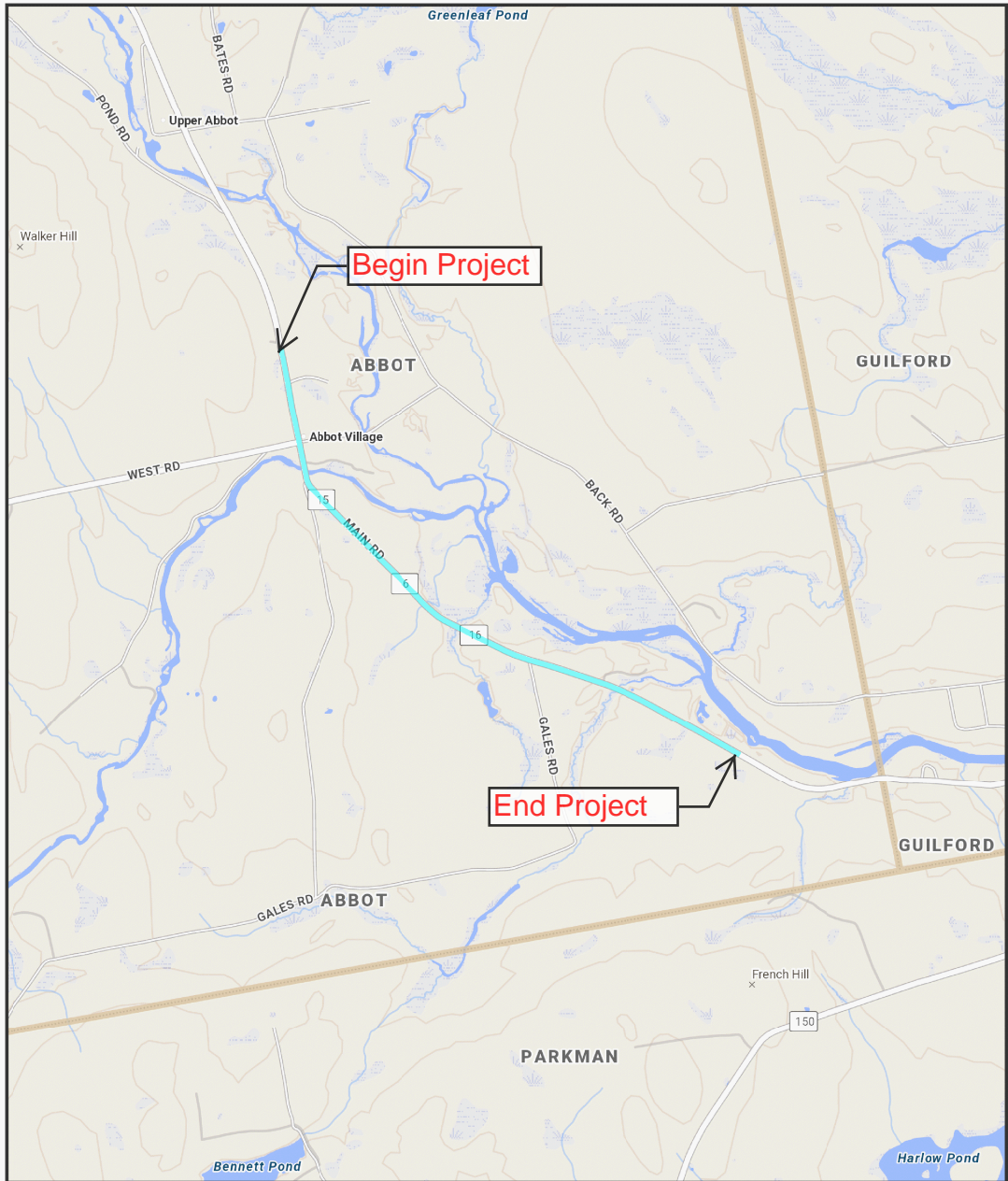
It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that the earthwork and foundation recommendations and

construction considerations presented in this report are properly interpreted and implemented in the design and specifications.

Sheets



ABBOT, MAINE



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

0.65 Miles
1 inch = 0.72 miles

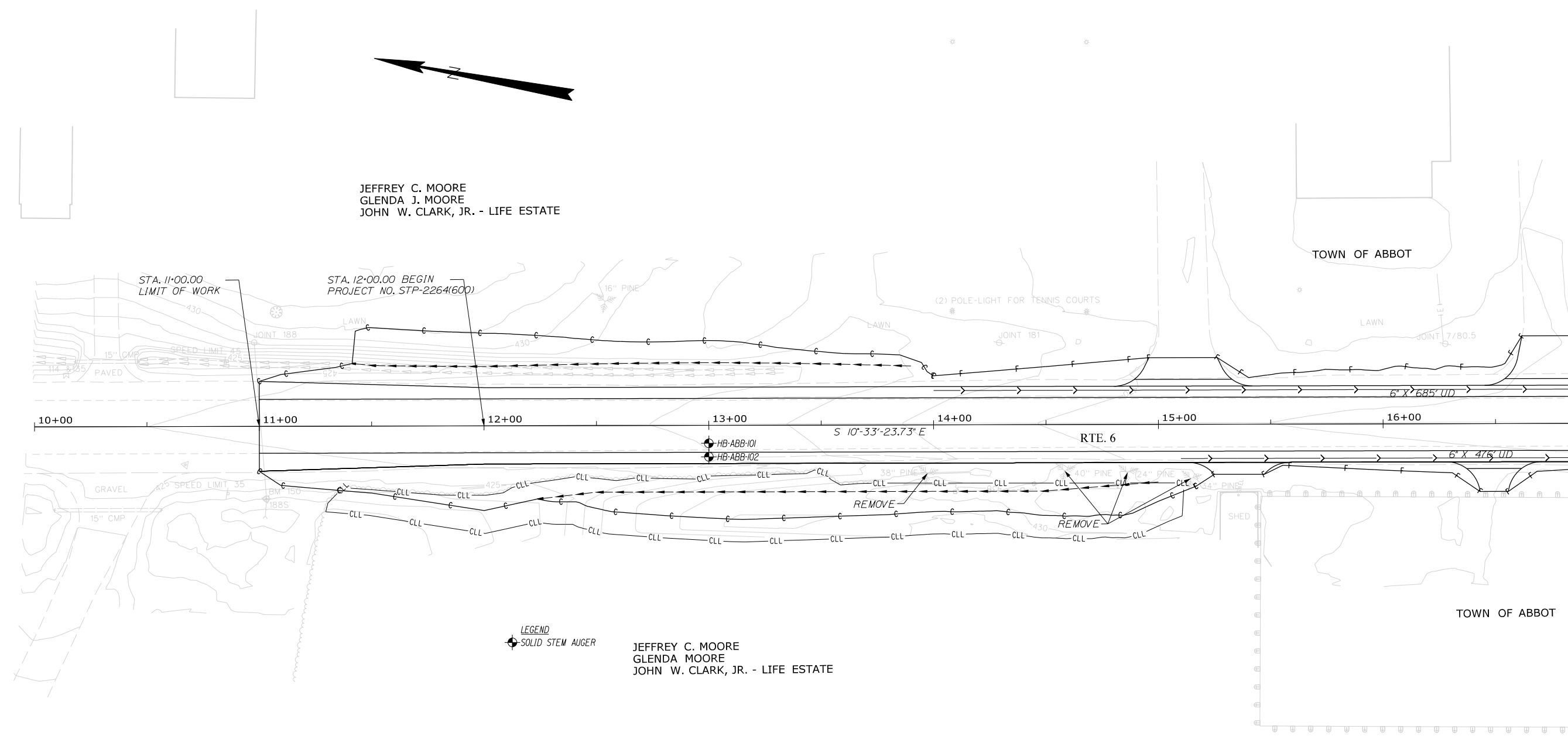
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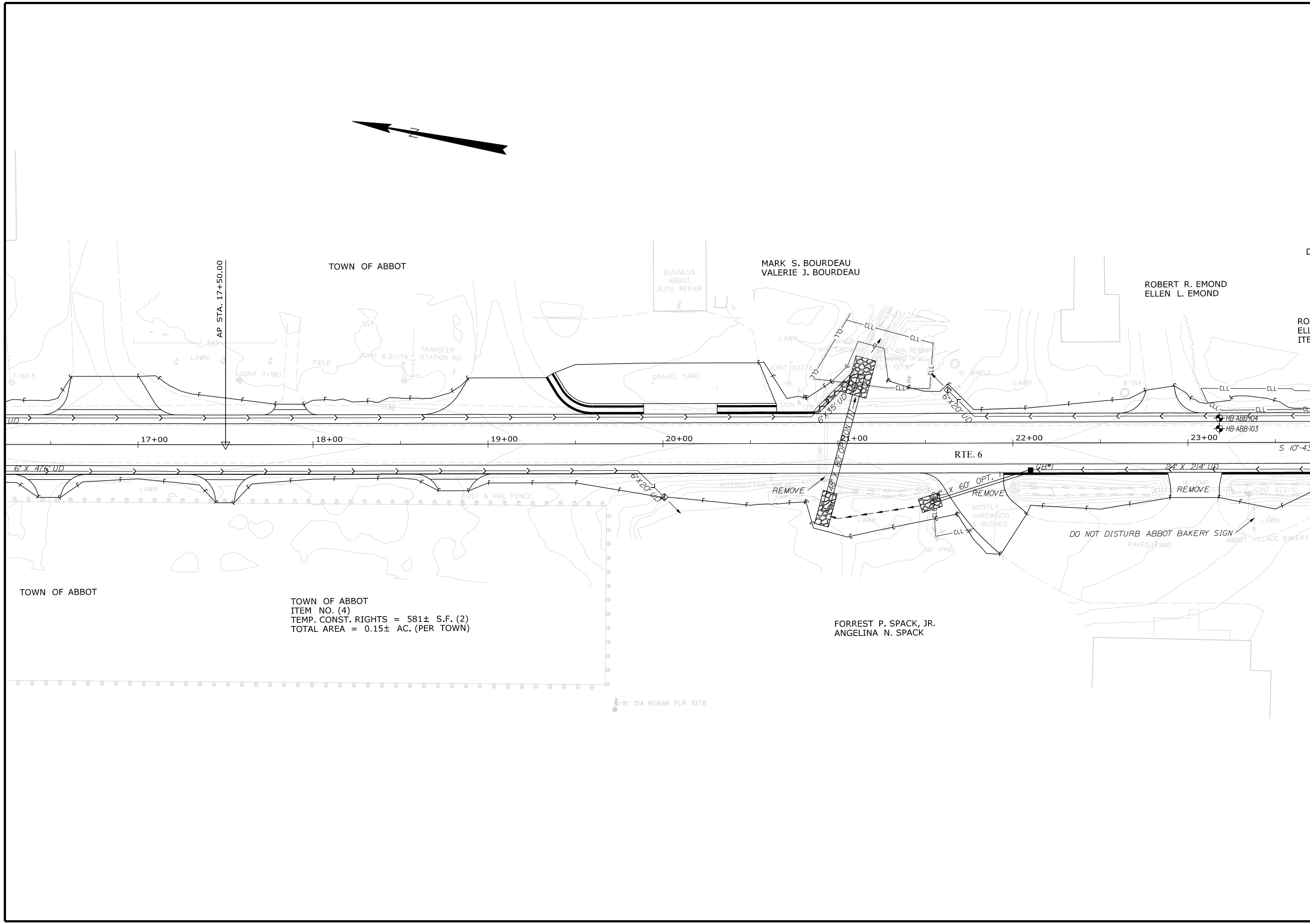


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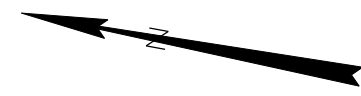
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TOWN OF ABBOT
 ITEM NO. (4)
 TEMP. CONST. RIGHTS = 581± S.F. (2)
 TOTAL AREA = 0.15± AC. (PER TOWN)



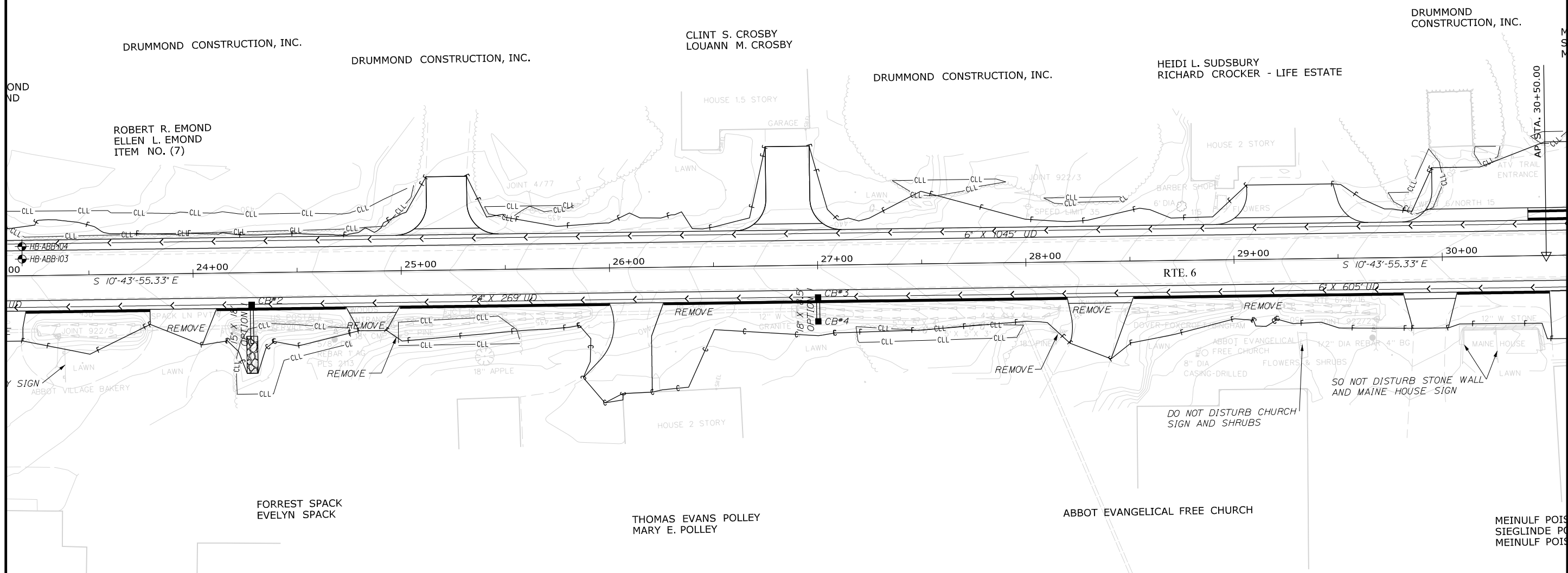
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ABBOT ROUTE 6
BORING LOCATION PLAN

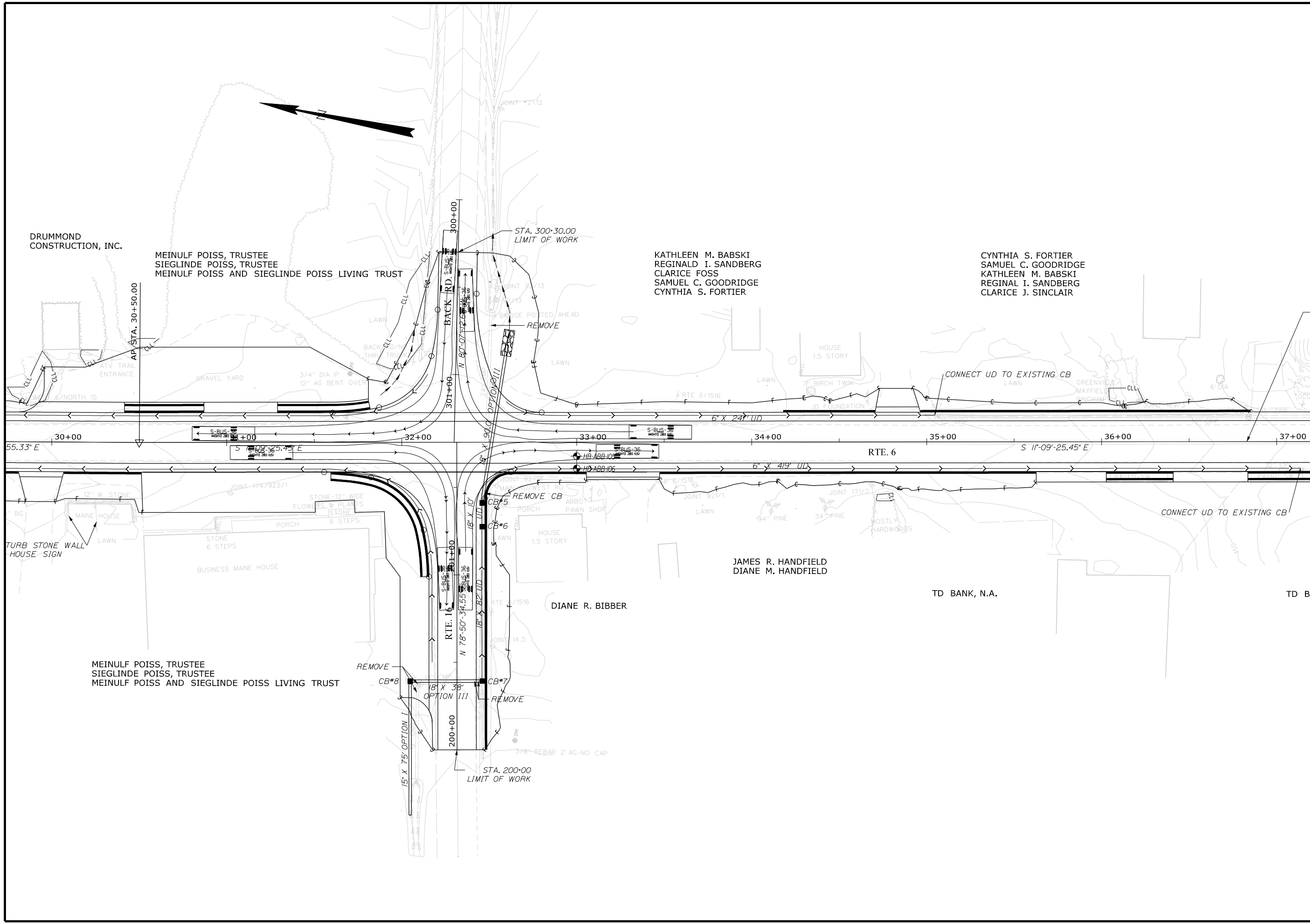
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Username: terry.white

Division: GEOTECH

Filename: ... \00\GEOTECH\MSTAN005_BLP4.dgn



STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION
 STP-2264(600)

WIN
 22646.00
 HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
DESIGN-DETAILED C. SULLOWAY		
CHECKED-REVIEWED T. WHITE		
DESIGNS-DETAILED C. RUSSELL		NOV 2019
DESIGNS-DETAILED T. WHITE		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

ABBOT
 ROUTE 6
 BORING LOCATION PLAN

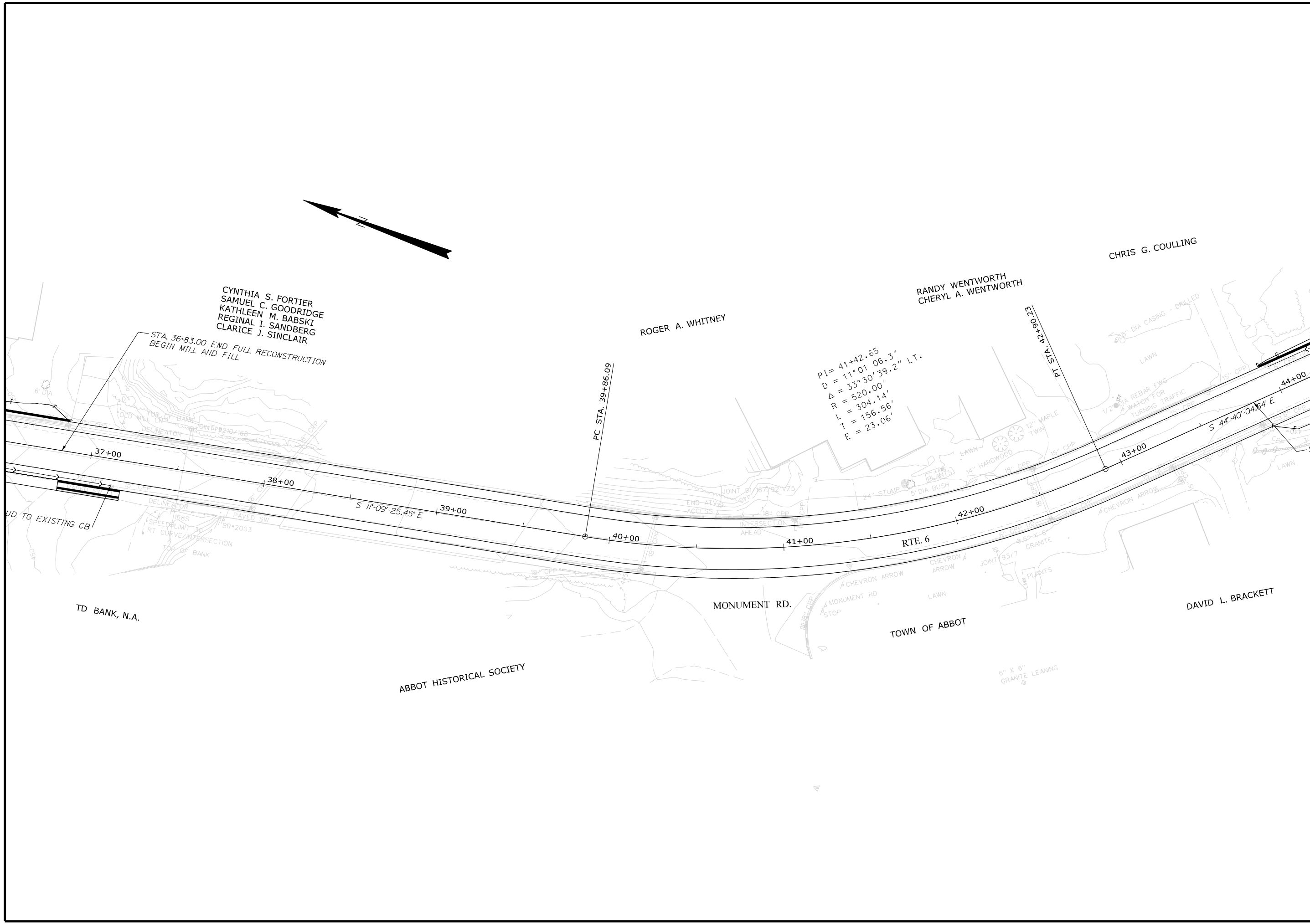
SHEET NUMBER
 5
 OF 27

Date: 11/18/2019

Username: terry.white

Division: GEOTECH

Filename: ... \00\GEOTECH\MSTAN\006_BLP5.dgn



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)

WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	DATE	BY
DESIGN-DETAILED	C. SULLOWAY	
CHECKED-REVIEWED	C. RUSSELL	T. WHITE
DESIGN-DETAILED	C. RUSSELL	T. WHITE
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

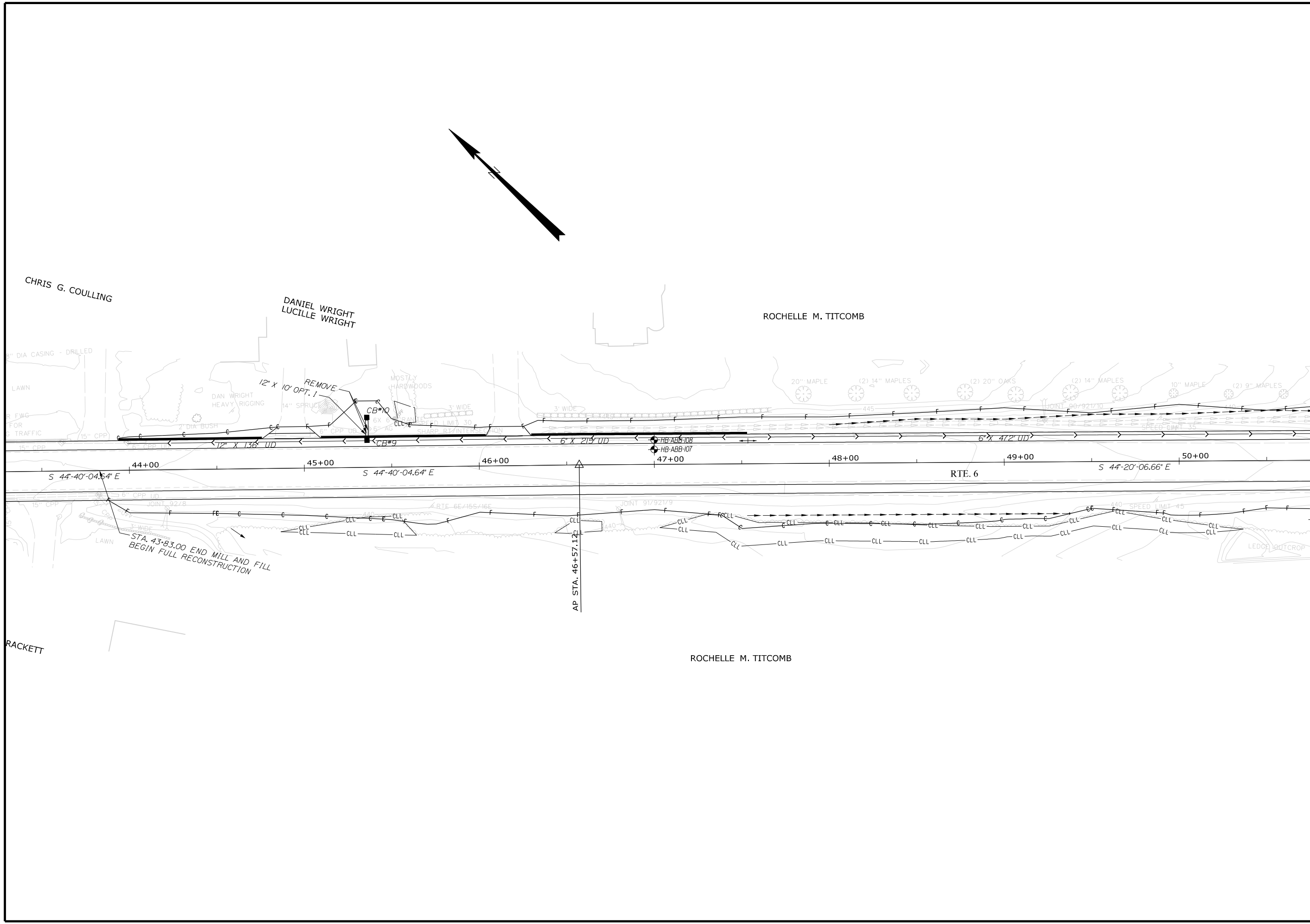
ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
6
OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTAN\007_BLP6.dgn Division: GEOTECH



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)

BY	DATE	SIGNATURE	P.E. NUMBER	DATE
T. WHITE <td>NOV 2019 <td></td> <td></td> <td></td> </td>	NOV 2019 <td></td> <td></td> <td></td>			

PROJ. MANAGER	DESIGN-DETAILED	CHECKED-REVIEWED	DESIGNS-DETAILED	REVISIONS 1	REVISIONS 2	REVISIONS 3	REVISIONS 4	FIELD CHANGES
C. SULLOWAY <td></td> <td>C. RUSSELL <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </td>		C. RUSSELL <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						

ABBOT
ROUTE 6
BORING LOCATION PLAN

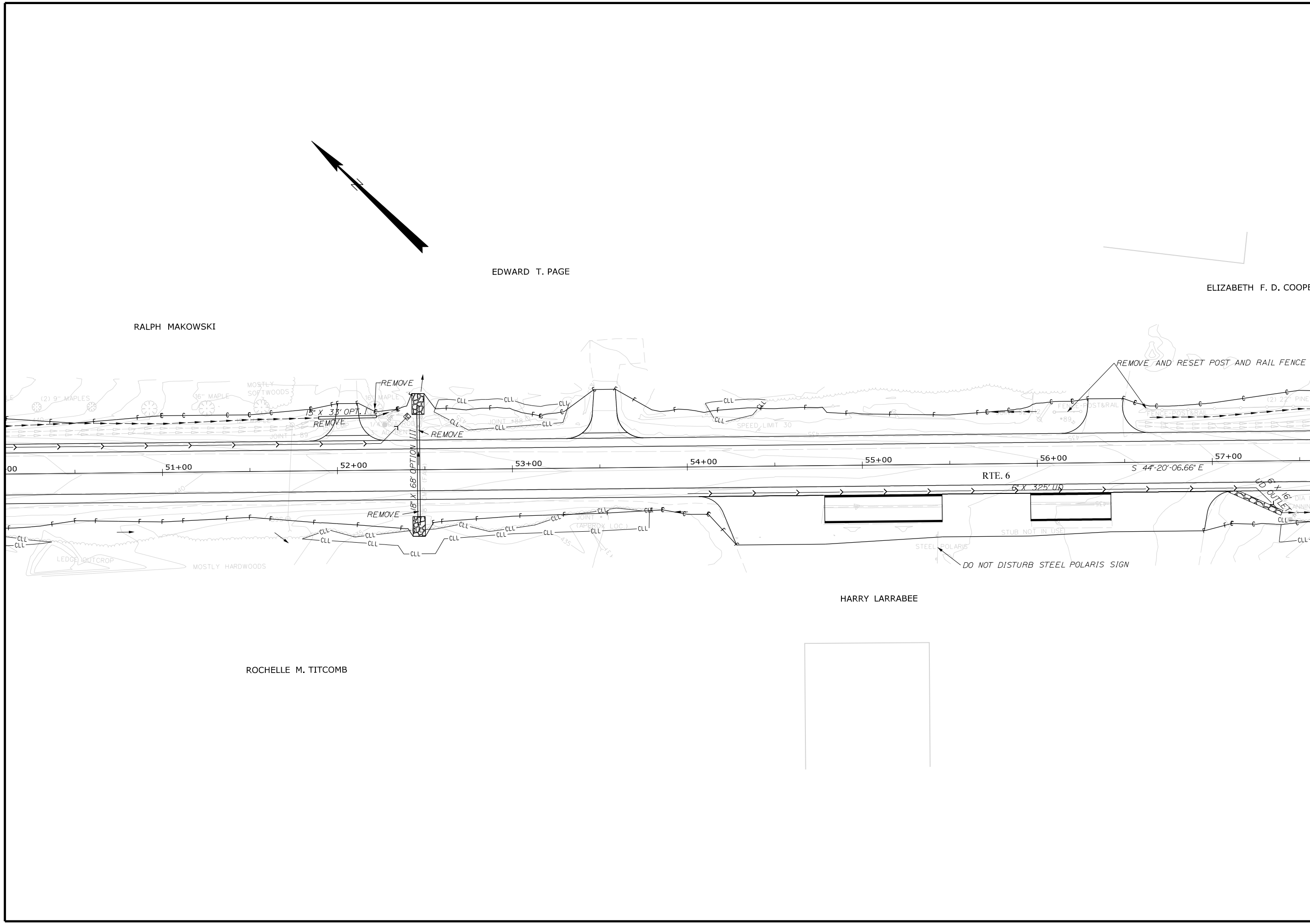
SHEET NUMBER
27
OF 27

WIN
22646.00
HIGHWAY PLANS

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA\008_BLP7.dgn Division: GEOTECH



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
C. SULLOWAY	T. WHITE	NOV 2019

DESIGN-REVIEWED	CHECKED	DATE
C. RUSSELL	T. WHITE	NOV 2019

DESIGN-DETAILED	BY	DATE
C. RUSSELL	T. WHITE	NOV 2019

REVISIONS	NO.	DATE	DESCRIPTION
1			
2			
3			
4			

SIGNATURE	P.E. NUMBER	DATE

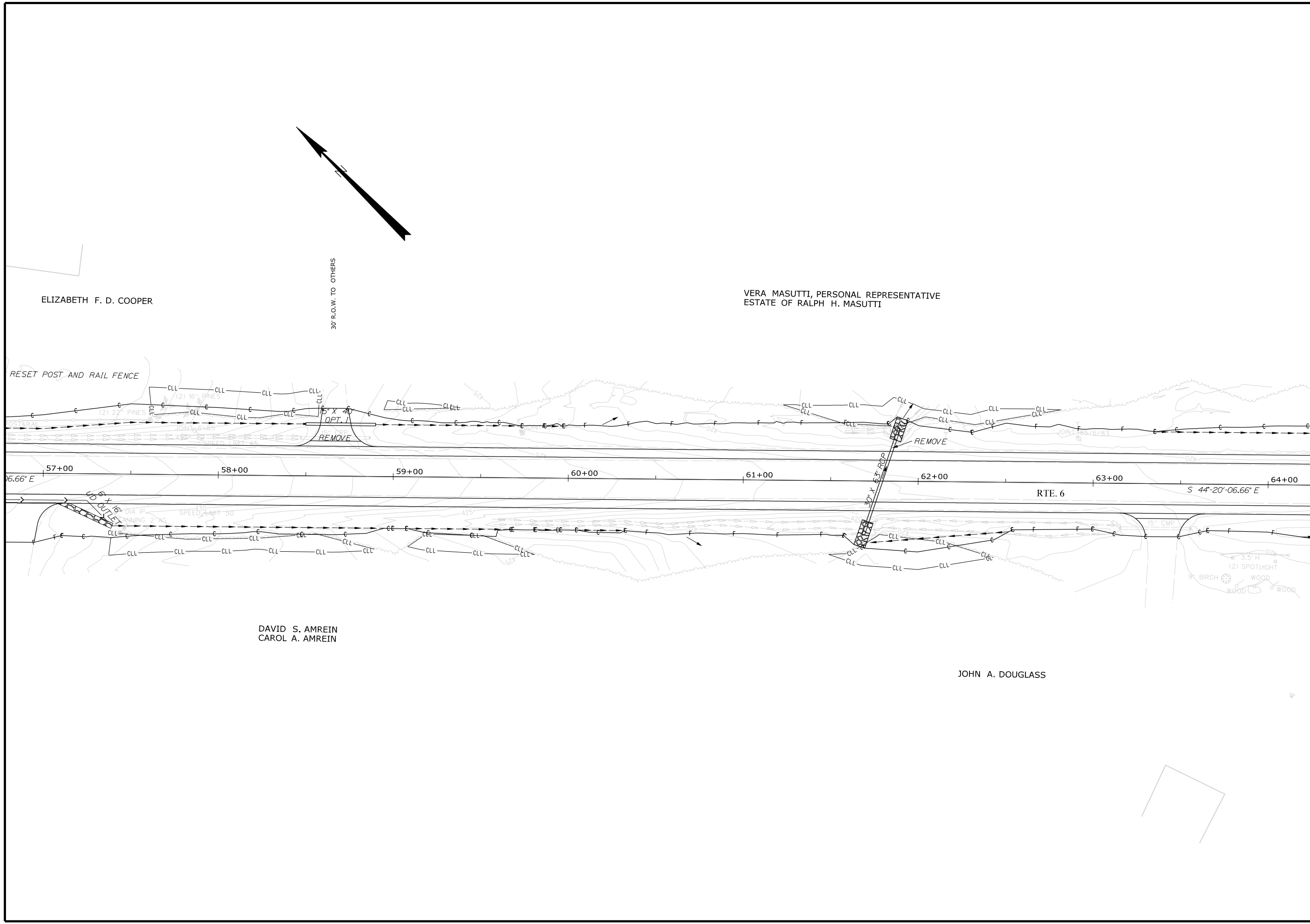
ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
8
OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA\009_BLP8.dgn Division: GEOTECH

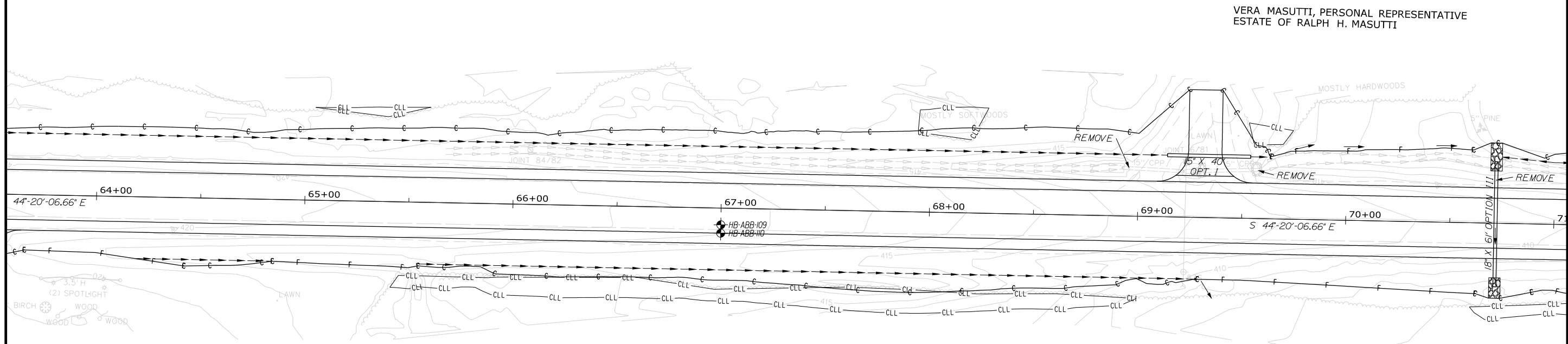
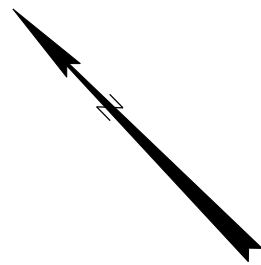


STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
C. SULLOWAY	T. WHITE	NOV 2019
CHECKED-REVIEWED	SIGNATURE	
DESIGNS-DETAILED	P.E. NUMBER	
DESIGNS-DETAILED	DATE	
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
9
OF 27



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	DATE	BY	SIGNATURE	P.E. NUMBER	DATE
DESIGN-DETAILED	C. SULLOWAY				
CHECKED-REVIEWED	C. RUSSELL	T. WHITE	NOV 2019		
DESIGNS-DETAILED					
REVISIONS 1					
REVISIONS 2					
REVISIONS 3					
REVISIONS 4					
FIELD CHANGES					

ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
10
OF 27

Date: 11/18/2019

Username: terry.white

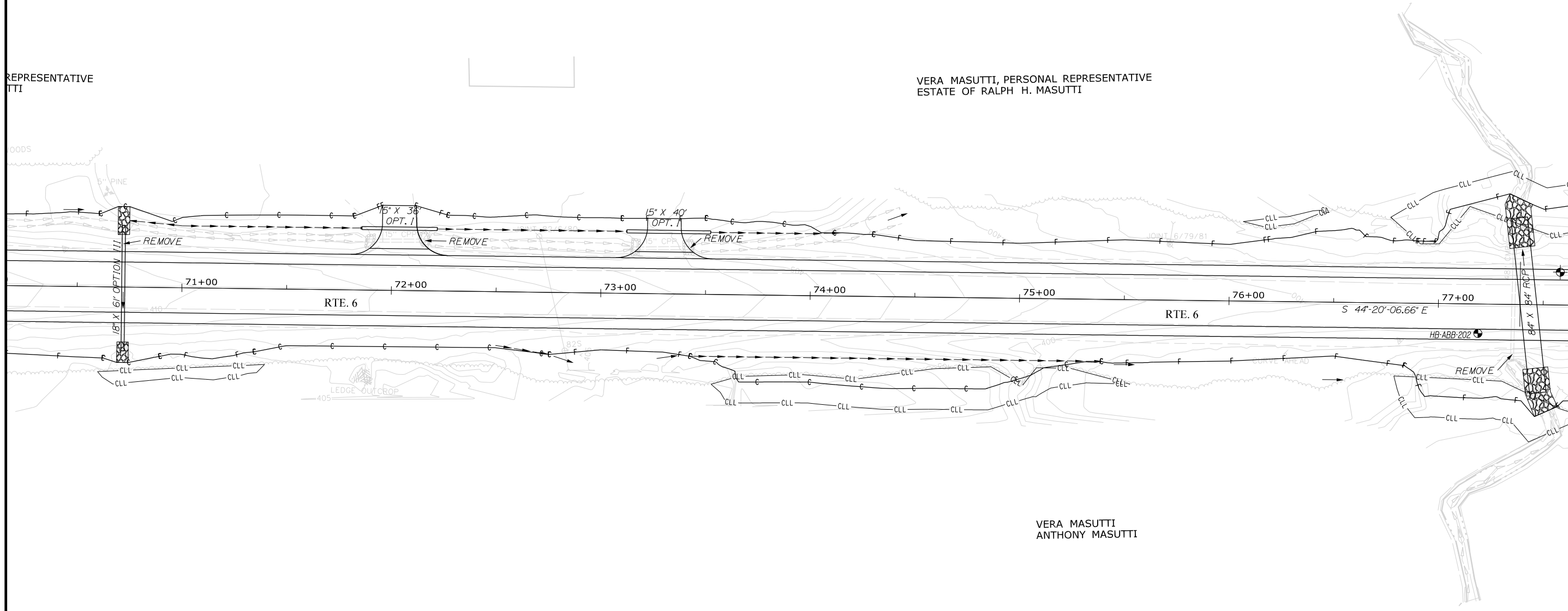
Division: GEOTECH

Filename: ... \00\GEOTECH\MSTAN011_BLP10.dgn

REPRESENTATIVE
MASUTTI

VERA MASUTTI, PERSONAL REPRESENTATIVE
ESTATE OF RALPH H. MASUTTI

VERA MASUTTI
ANTHONY MASUTTI



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	BY	DATE	SIGNATURE	P.E. NUMBER	DATE
C. SULLOWAY	T. WHITE	NOV 2019			
CHECKED-REVIEWED	C. RUSSELL				
DESIGNS-DETAILED					
DESIGNS-DETAILED					
REVISIONS 1					
REVISIONS 2					
REVISIONS 3					
REVISIONS 4					
FIELD CHANGES					

ABBOT
ROUTE 6
BORING LOCATION PLAN

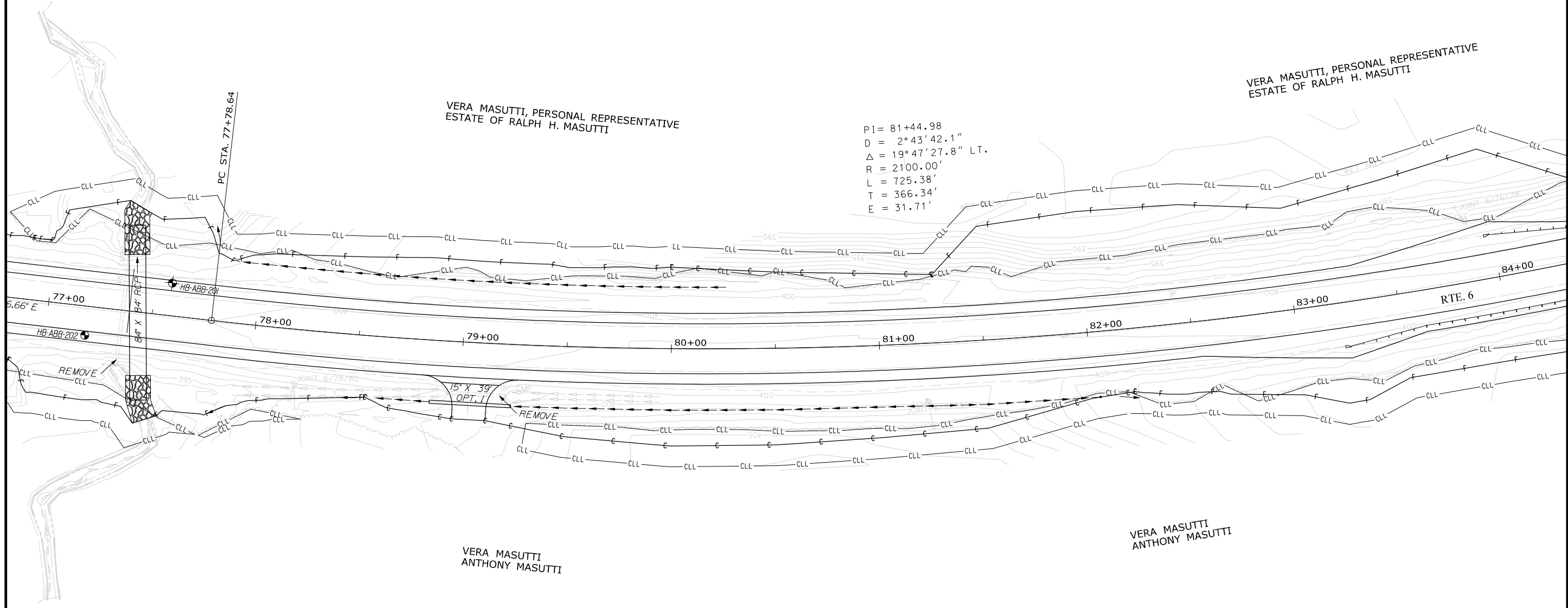
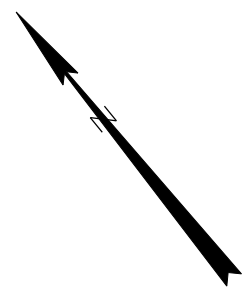
SHEET NUMBER
11
OF 27

Date: 11/18/2019

Username: terry.white

Division: GEOTECH

Filename: ... \00\GEOTECH\MSTA\012_BLP11.dgn



VERA MASUTTI, PERSONAL REPRESENTATIVE
ESTATE OF RALPH H. MASUTTI

PI = 81+44.98
 D = 2° 43' 42.1"
 Δ = 19° 47' 27.8" LT.
 R = 2100.00'
 L = 725.38'
 T = 366.34'
 E = 31.71'

VERA MASUTTI, PERSONAL REPRESENTATIVE
ESTATE OF RALPH H. MASUTTI

VERA MASUTTI
ANTHONY MASUTTI

VERA MASUTTI
ANTHONY MASUTTI

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

DESIGN-DETAILED	CHECKED-REVIEWED	DESIGN-DETAILED	CHECKED-REVIEWED	SIGNATURE
C. SULLOWAY	C. SULLOWAY	C. RUSSELL	T. WHITE	NOV 2019

PROJ. MANAGER	BY	DATE
C. SULLOWAY	C. SULLOWAY	NOV 2019

DESIGN-DETAILED	CHECKED-REVIEWED	DESIGN-DETAILED	CHECKED-REVIEWED	SIGNATURE
C. SULLOWAY	C. SULLOWAY	C. RUSSELL	T. WHITE	NOV 2019

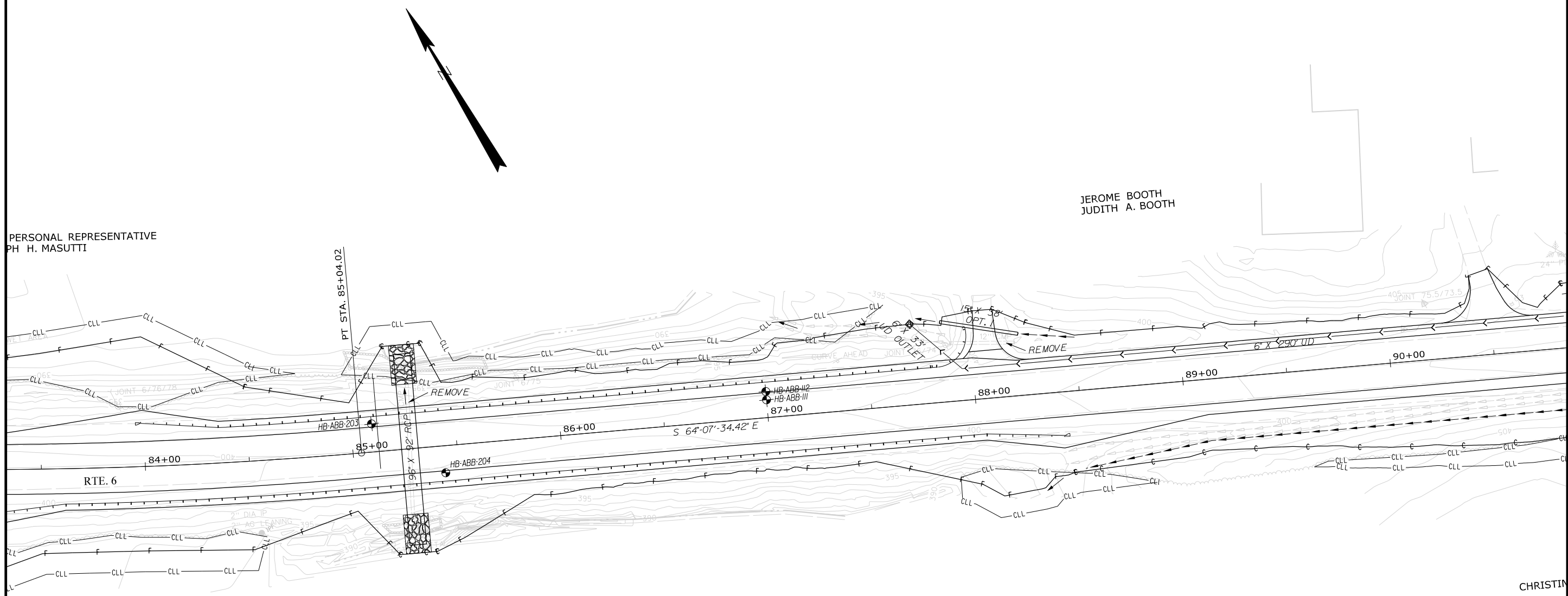
SHEET NUMBER
12
OF 27

ABBOT
ROUTE 6
BORING LOCATION PLAN

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA\013_BLP12.dgn Division: GEOTECH



CHRISTINE ANN MCKENNEY

CHRISTINE

STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION
STP-2264(600)
 WIN
 22646.00
 HIGHWAY PLANS

SIGNATURE	NOV 2019
P.E. NUMBER	
DATE	

PROJ. MANAGER	BY	DATE
DESIGN-DETAILED C. SULLOWAY		
CHECKED-REVIEWED C. RUSSELL	T. WHITE	NOV 2019
DESIGN-DETAILED C. RUSSELL		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

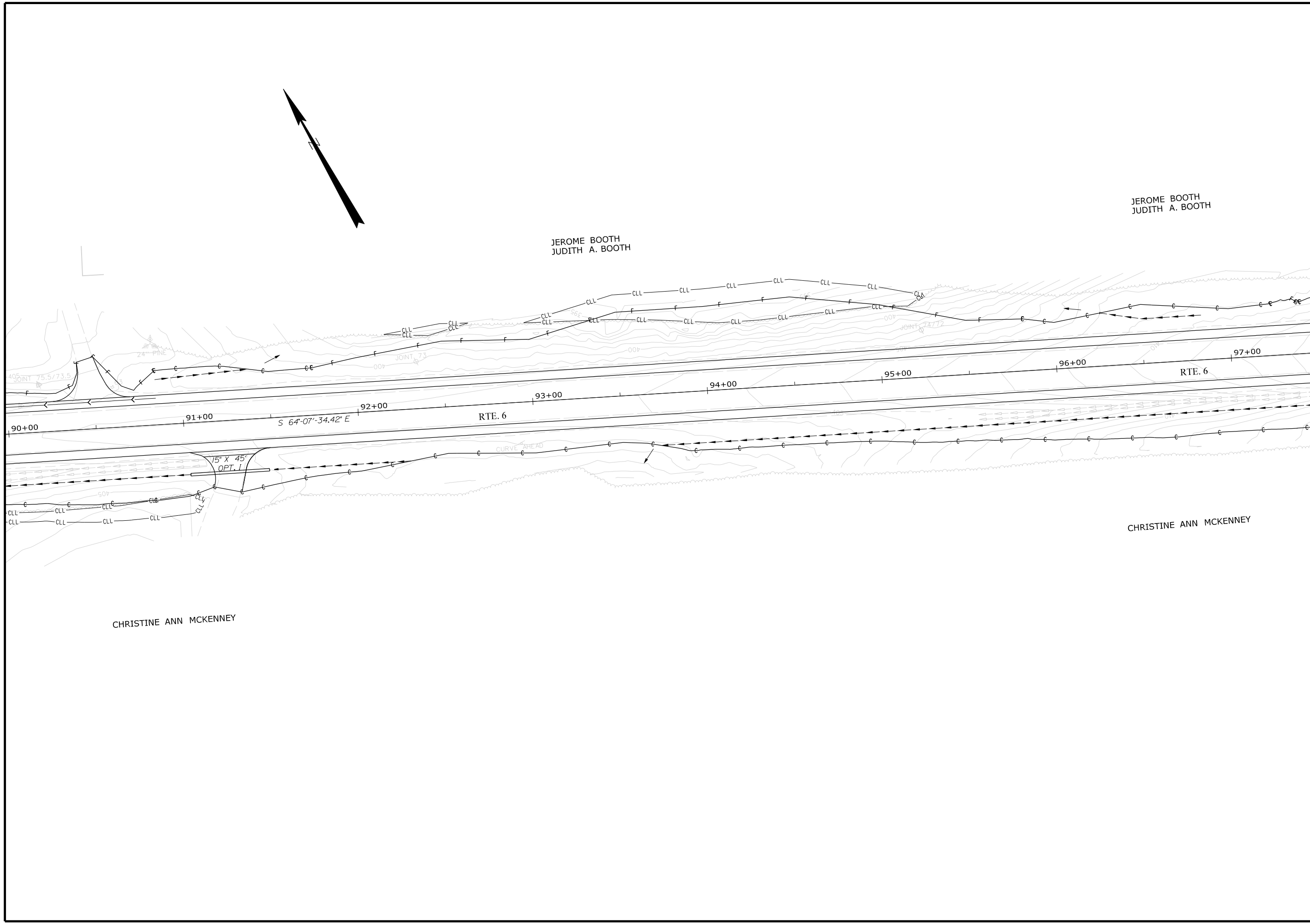
ABBOT
 ROUTE 6
 BORING LOCATION PLAN

SHEET NUMBER
13
 OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA014_BLP13.dgn Division: GEOTECH



CHRISTINE ANN MCKENNEY

JEROME BOOTH
JUDITH A. BOOTH

JEROME BOOTH
JUDITH A. BOOTH

CHRISTINE ANN MCKENNEY

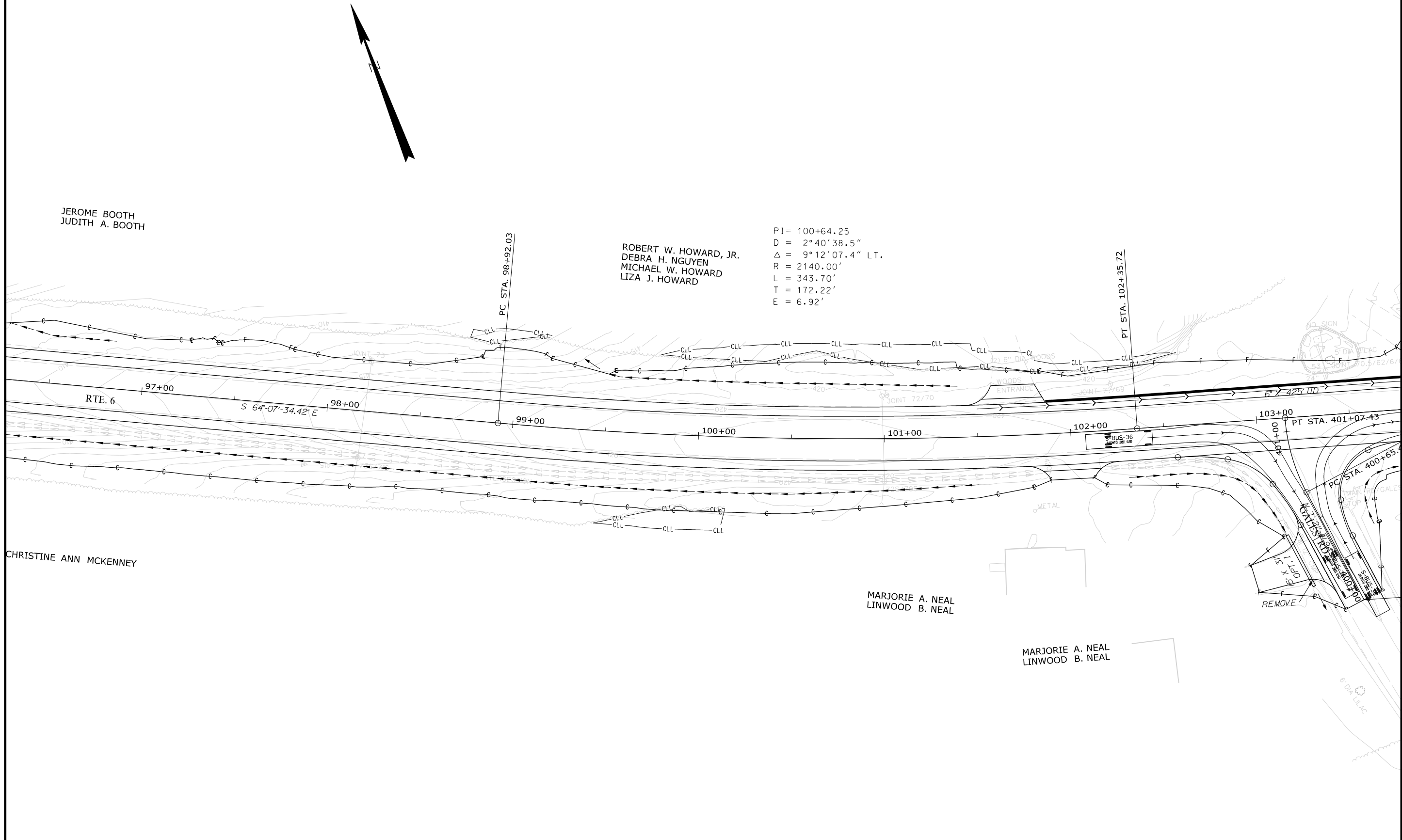
STATE OF MAINE DEPARTMENT OF TRANSPORTATION		STP-2264(600)	
		WIN 22646.00	
		HIGHWAY PLANS	
ABBOT ROUTE 6		BORING LOCATION PLAN	
SHEET NUMBER		14	
		OF 27	
PROJ. MANAGER	BY	DATE	SIGNATURE
DESIGN-DETAILED C. SULLOWAY	C. SULLOWAY	NOV 2019	T. WHITE
CHECKED-REVIEWED	C. RUSSELL		
DESIGN-DETAILED			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			
P.E. NUMBER		DATE	

Date: 11/18/2019

Username: terry.white

Division: GEOTECH

Filename: ... \00\GEOTECH\MSTA015_BLP14.dgn



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

DESIGN-DETAILED	C. SULLOWAY	DATE
CHECKED-REVIEWED	T. WHITE <td>NOV 2019 </td>	NOV 2019
DESIGNS-DETAILED	C. RUSSELL <td>T. WHITE </td>	T. WHITE
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

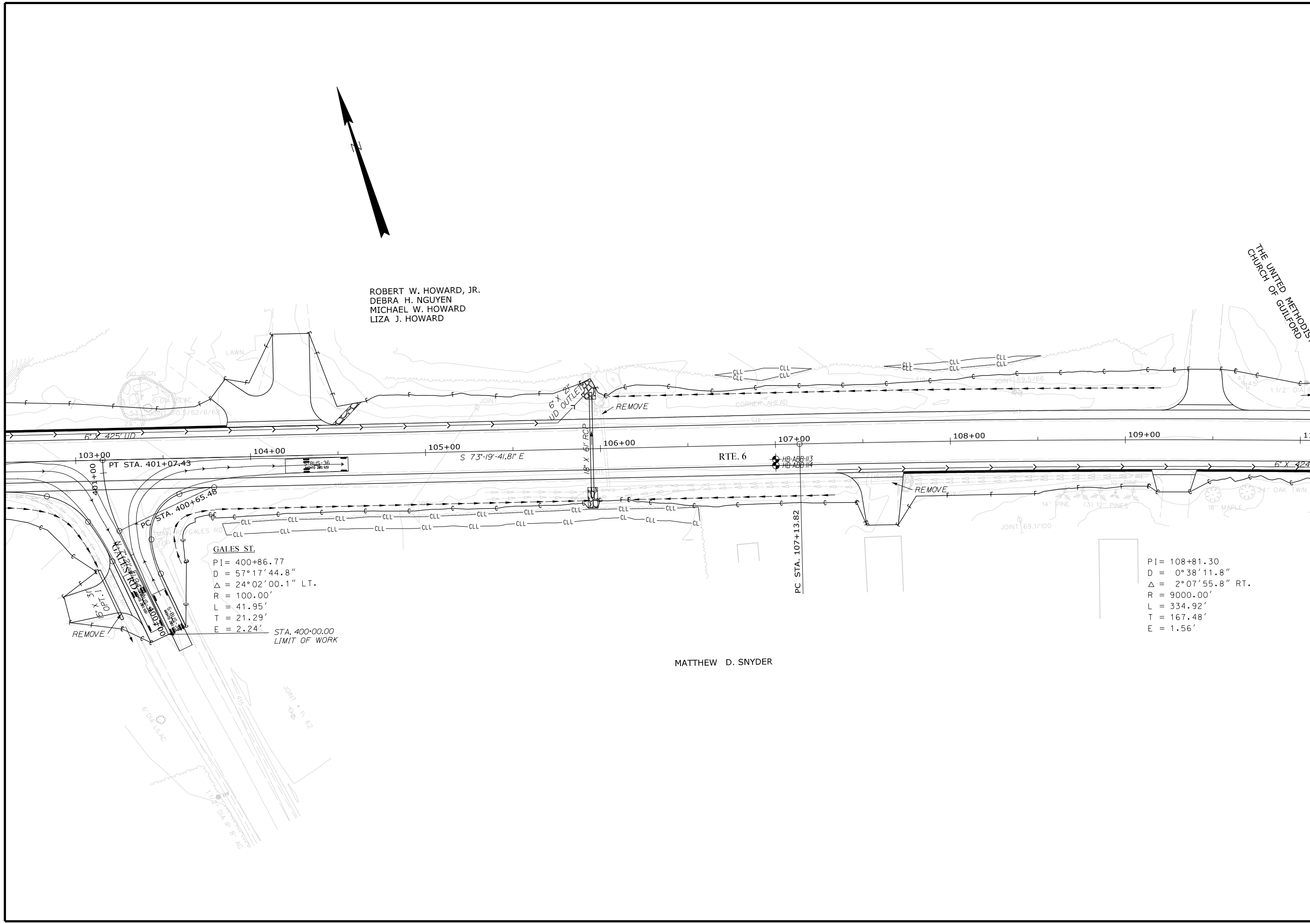
PROJ. MANAGER
ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
15
OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTAN016_BLP15.dgn Division: GEOTECH



ROBERT W. HOWARD, JR.
 DEBRA H. NGUYEN
 MICHAEL W. HOWARD
 LIZA J. HOWARD

THE UNITED METHODIST
 CHURCH OF GUILFORD

GALES ST.
 PI = 400+86.77
 D = 57° 17' 44.8"
 Δ = 24° 02' 00.1" LT.
 R = 100.00'
 L = 41.95'
 T = 21.29'
 E = 2.24'
 STA. 400+00.00
 LIMIT OF WORK

PI = 108+81.30
 D = 0° 38' 11.8"
 Δ = 2° 07' 55.8" RT.
 R = 9000.00'
 L = 334.92'
 T = 167.48'
 E = 1.56'

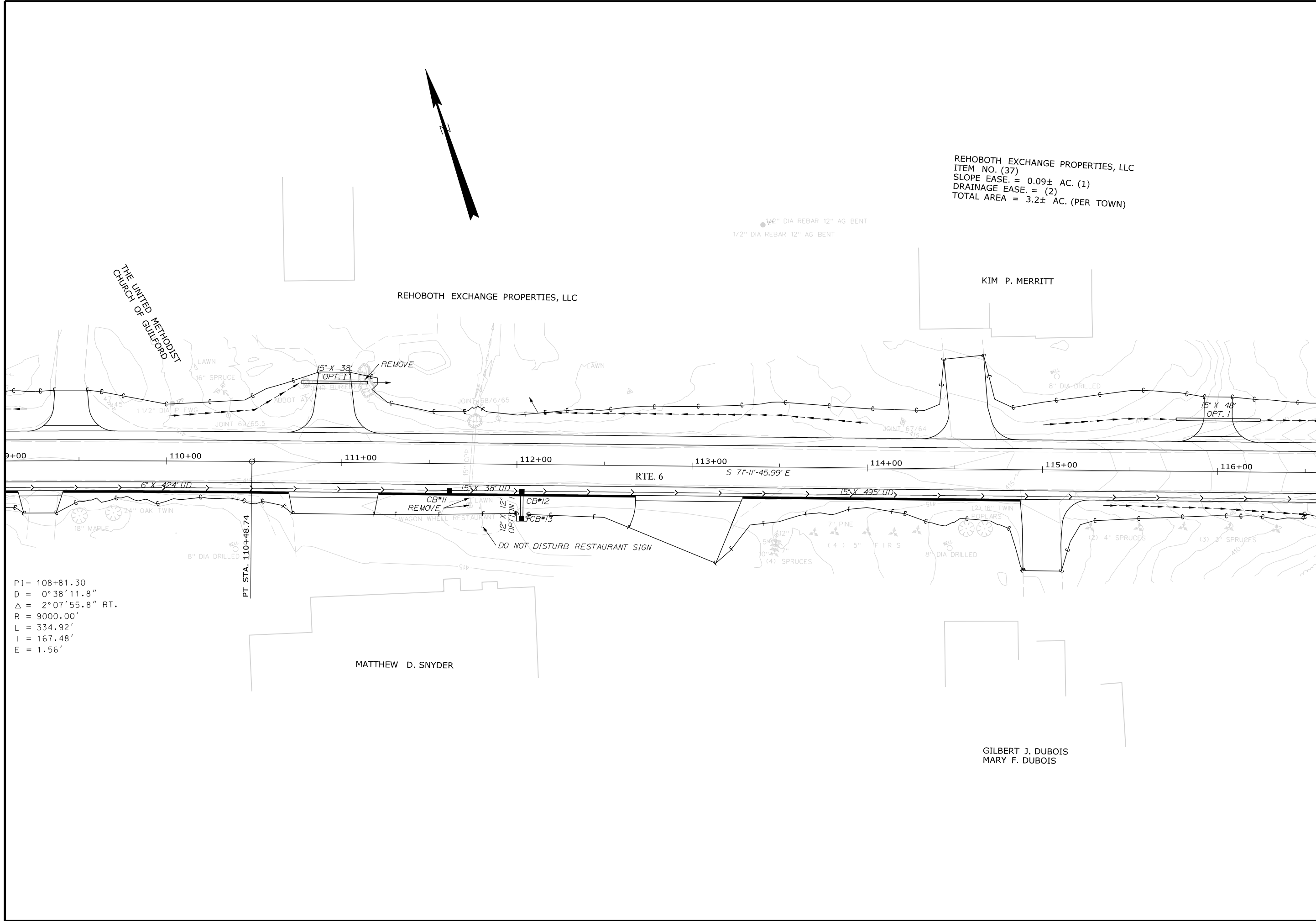
MATTHEW D. SNYDER

STATE OF MAINE		DEPARTMENT OF TRANSPORTATION		STP-2264(600)		WIN 22646.00		HIGHWAY PLANS	
PROJECT TITLE		PROJECT NUMBER		DATE		BY		DATE	
ABBOT ROUTE 6		BORING LOCATION PLAN		NOV 2019		T. WHITE		NOV 2019	
SHEET NUMBER		SHEET NUMBER		SIGNATURE		P.E. NUMBER		DATE	
16		16		[Signature]		[P.E. Number]		[Date]	
OF 27		OF 27		DESIGN-REVIEWED		DESIGN-REVIEWED		DESIGN-REVIEWED	
				C. SULLOWAY		C. RUSSELL		T. WHITE	
				DESIGNS-DETAILED		DESIGNS-DETAILED		DESIGNS-DETAILED	
				REVISIONS 1		REVISIONS 1		REVISIONS 1	
				REVISIONS 2		REVISIONS 2		REVISIONS 2	
				REVISIONS 3		REVISIONS 3		REVISIONS 3	
				REVISIONS 4		REVISIONS 4		REVISIONS 4	
				FIELD CHANGES		FIELD CHANGES		FIELD CHANGES	

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTAN017_BLP16.dgn Division: GEOTECH



$PI = 108+81.30$
 $D = 0^{\circ}38'11.8''$
 $\Delta = 2^{\circ}07'55.8'' \text{ RT.}$
 $R = 9000.00'$
 $L = 334.92'$
 $T = 167.48'$
 $E = 1.56'$

REHOBOTH EXCHANGE PROPERTIES, LLC
 ITEM NO. (37)
 SLOPE EASE. = $0.09 \pm$ AC. (1)
 DRAINAGE EASE. = (2)
 TOTAL AREA = $3.2 \pm$ AC. (PER TOWN)

STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION
STP-2264(600)
 WIN
 22646.00
 HIGHWAY PLANS

PROJ. MANAGER	DATE	BY	SIGNATURE	P.E. NUMBER	DATE
C. SULLOWAY					
CHECKED-REVIEWED					
DESIGNS-DETAILED		C. RUSSELL	T. WHITE		NOV 2019
DESIGNS-DETAILED					
REVISIONS 1					
REVISIONS 2					
REVISIONS 3					
REVISIONS 4					
FIELD CHANGES					

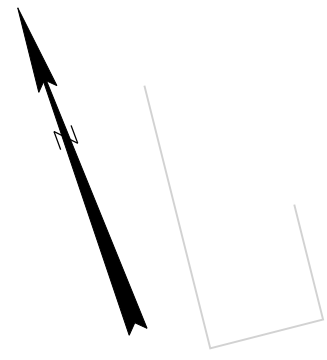
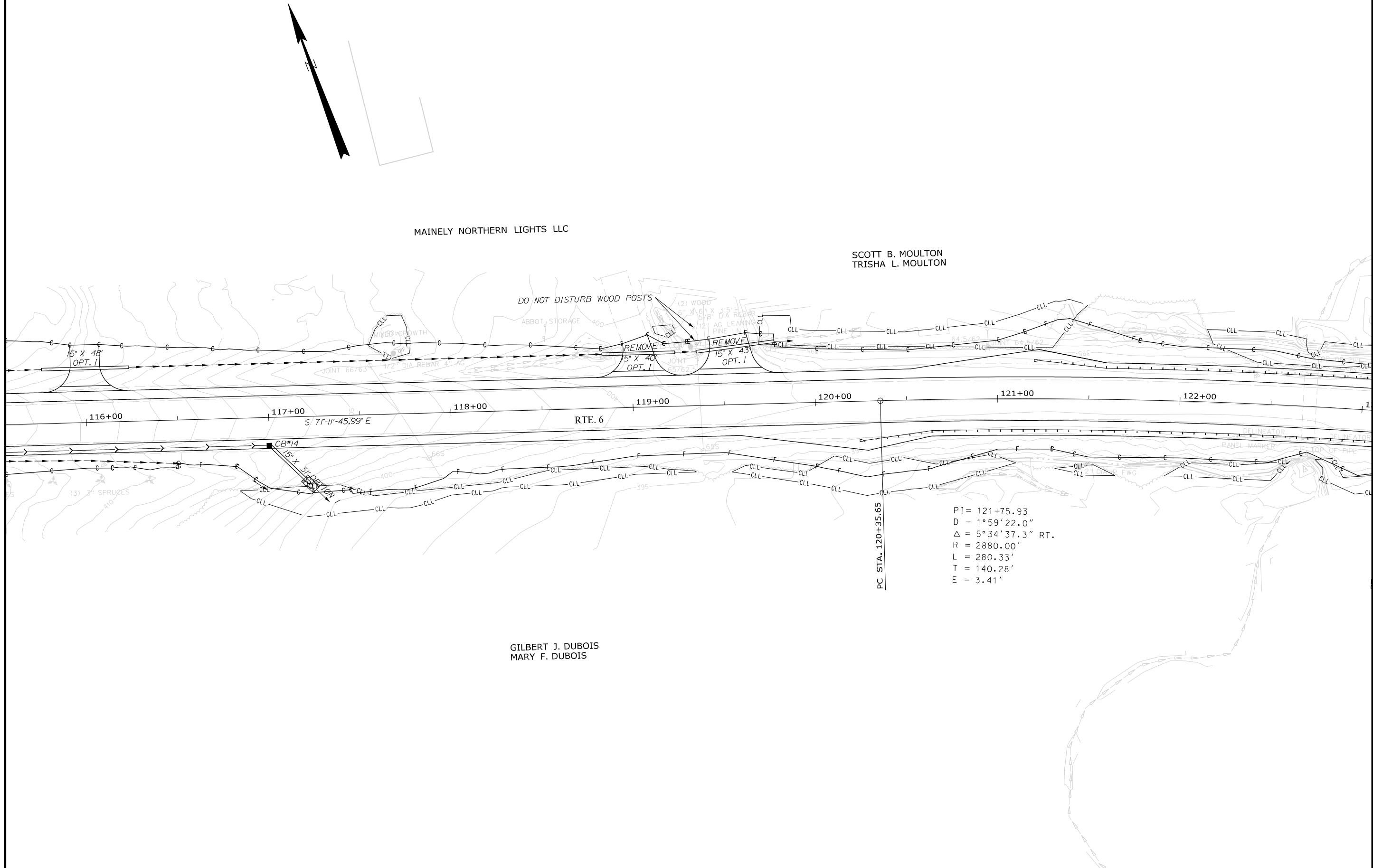
**ABBOT
 ROUTE 6
 BORING LOCATION PLAN**

SHEET NUMBER
17
 OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA018_BLP17.dgn Division: GEOTECH



MAINELY NORTHERN LIGHTS LLC

SCOTT B. MOULTON
TRISHA L. MOULTON

GILBERT J. DUBOIS
MARY F. DUBOIS

$PI = 121+75.93$
 $D = 1^{\circ}59'22.0''$
 $\Delta = 5^{\circ}34'37.3'' \text{ RT.}$
 $R = 2880.00'$
 $L = 280.33'$
 $T = 140.28'$
 $E = 3.41'$

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	DATE	BY
C. SULLOWAY		
CHECKED-REVIEWED		
DESIGN-REVIEWED	NOV 2019	T. WHITE
DESIGN-DETAILED		
DESIGN-DETAILED		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

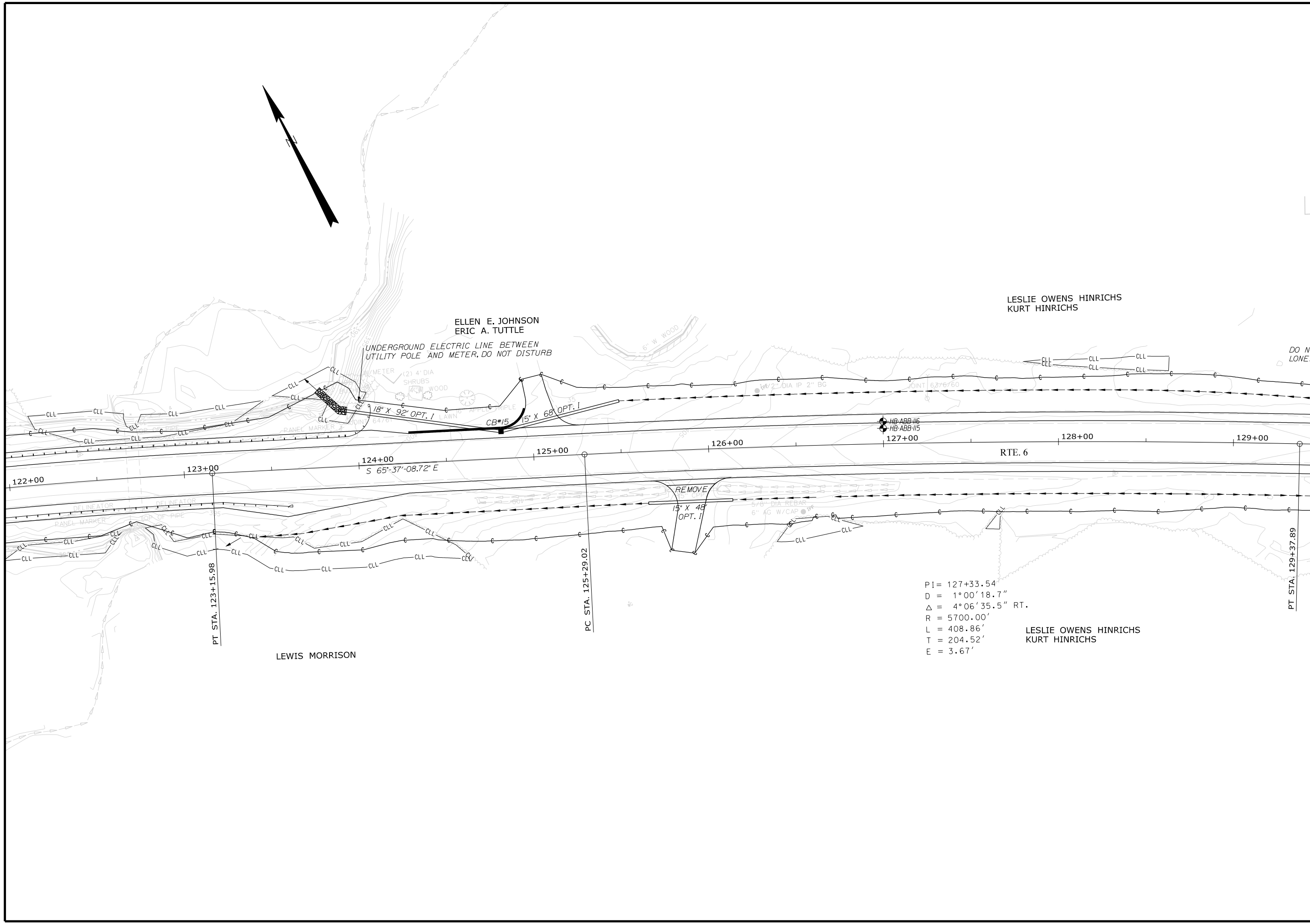
ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
18
OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA019_BLP18.dgn Division: GEOTECH



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
DESIGN-DETAILED C. SULLOWAY		
CHECKED-REVIEWED T. WHITE		NOV 2019
DESIGN-DETAILED C. RUSSELL		
DESIGN-DETAILED T. WHITE		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

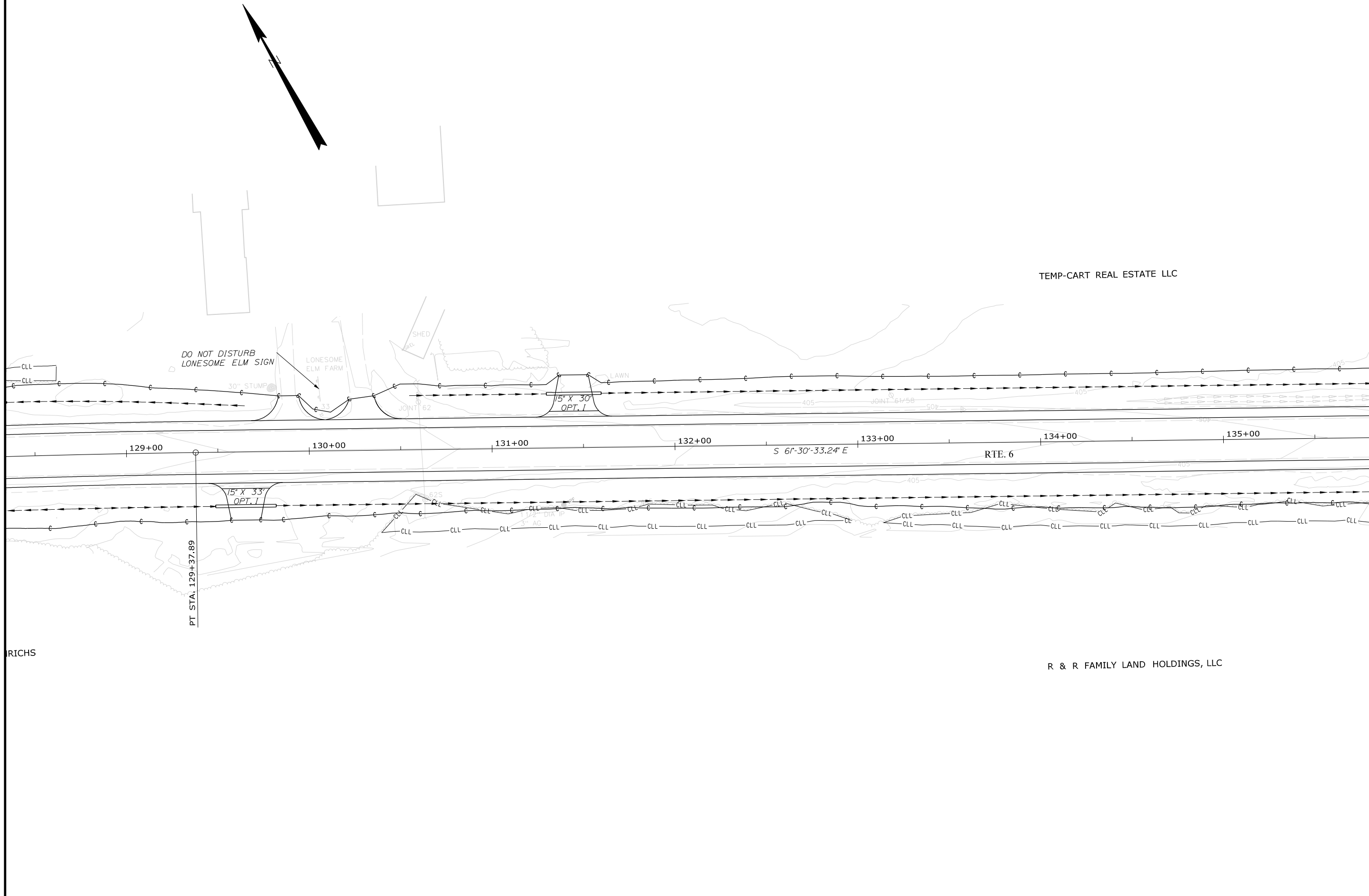
ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
19
OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA020_BLP19.dgn Division: GEOTECH

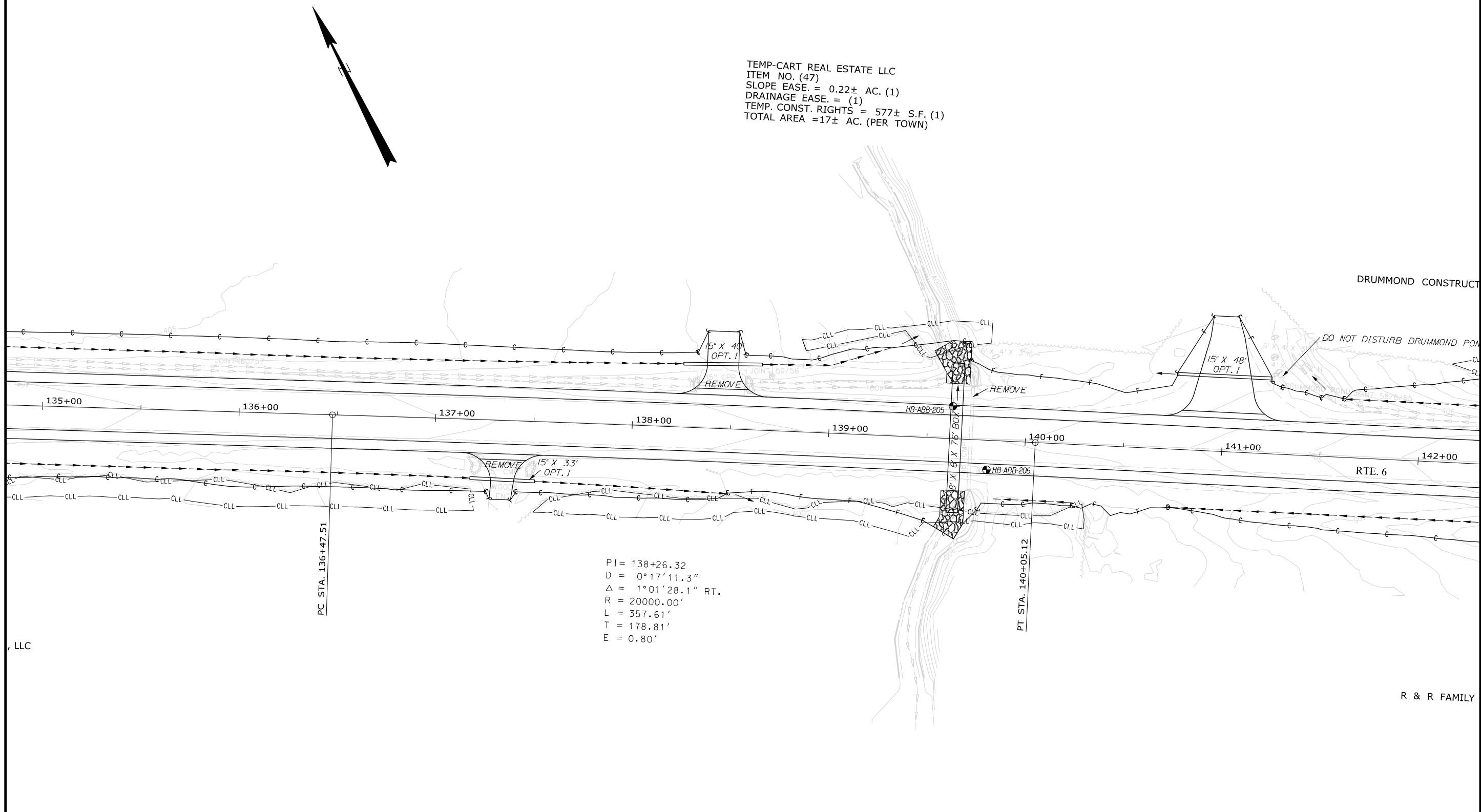


STATE OF MAINE DEPARTMENT OF TRANSPORTATION STP-2264(600)		SIGNATURE NOV 2019		P.E. NUMBER	
SHEET NUMBER 20 OF 27		DATE		HIGHWAY PLANS WIN 22646.00	
ABBOT ROUTE 6		BY C. SULLOWAY		DATE	
BORING LOCATION PLAN		DESIGN-REVIEWED C. SULLOWAY		SIGNATURE	
		DESIGN-REVIEWED C. RUSSELL		NOV 2019	
		DESIGN-REVIEWED T. WHITE		P.E. NUMBER	
		REVISIONS 1		DATE	
		REVISIONS 2			
		REVISIONS 3			
		REVISIONS 4			
		FIELD CHANGES			

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTAN021_BLP20.dgn Division: GEOTECH



TEMP-CART REAL ESTATE LLC
 ITEM NO. (47)
 SLOPE EASE. = 0.22± AC. (1)
 DRAINAGE EASE. = (1)
 TEMP. CONST. RIGHTS = 577± S.F. (1)
 TOTAL AREA = 17± AC. (PER TOWN)

PI = 138+26.32
 D = 0°17'11.3"
 Δ = 1°01'28.1" RT.
 R = 20000.00'
 L = 357.61'
 T = 178.81'
 E = 0.80'

STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION
 STP-2264(600)
 WIN
 22646.00
 HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
C. SULLOWAY	C. SULLOWAY	NOV 2019
CHECKED-REVIEWED	SIGNATURE	
C. RUSSELL	T. WHITE	NOV 2019
DESIGNS-DETAILED	P.E. NUMBER	
REVISIONS 1	DATE	
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

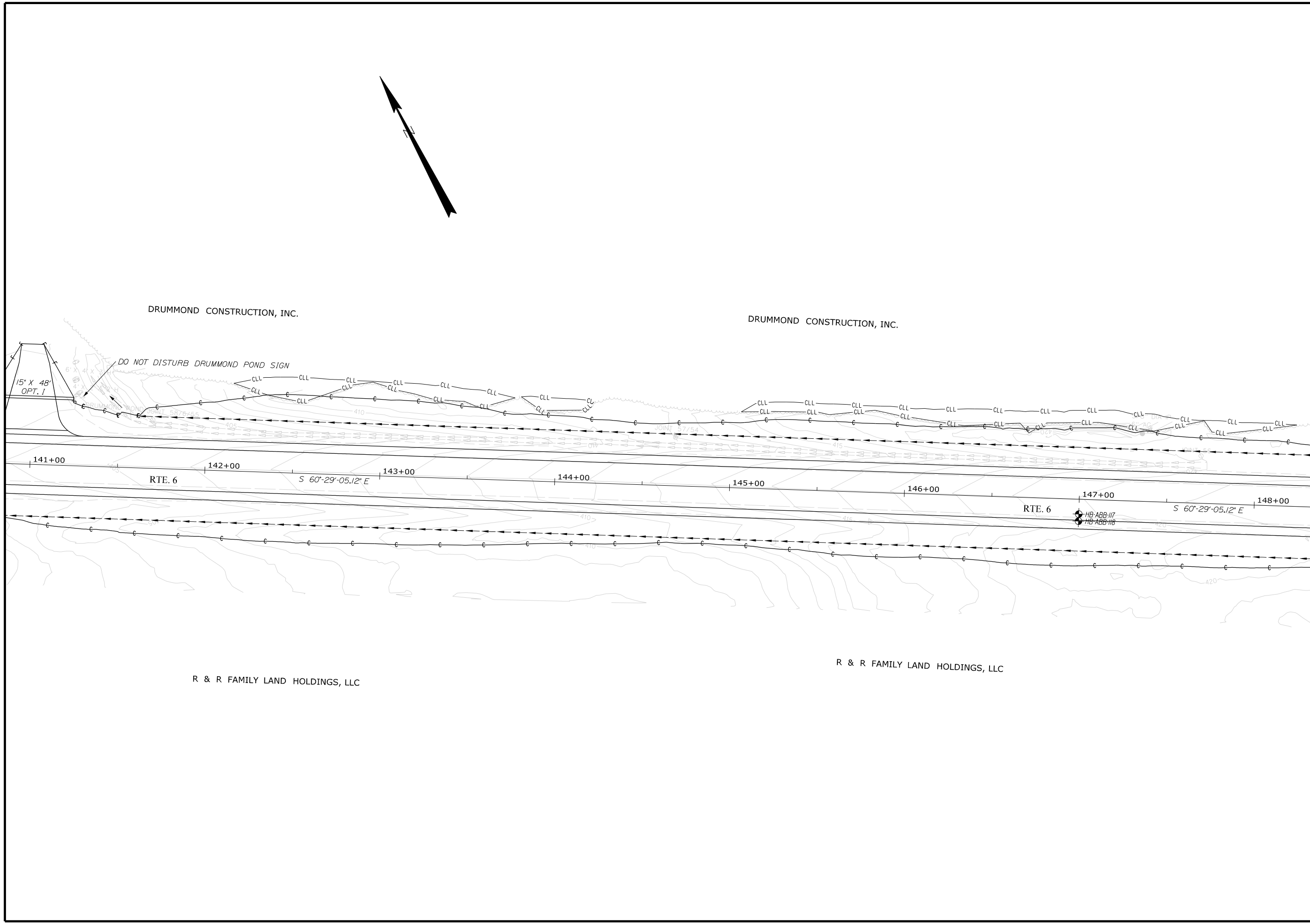
ABBOT
 ROUTE 6
 BORING LOCATION PLAN

SHEET NUMBER
 21
 OF 27

Date: 11/18/2019

Username: terry.white

Filename: ... \00\GEOTECH\MSTA\022_BLP21.dgn Division: GEOTECH



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)

WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
DESIGN-DETAILED C. SULLOWAY		
CHECKED-REVIEWED C. RUSSELL	T. WHITE	NOV. 2019
DESIGN-DETAILED		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

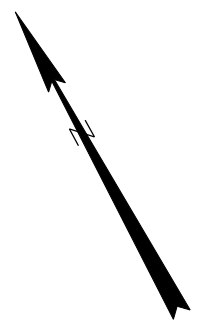
ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
22
OF 27

Date: 11/18/2019

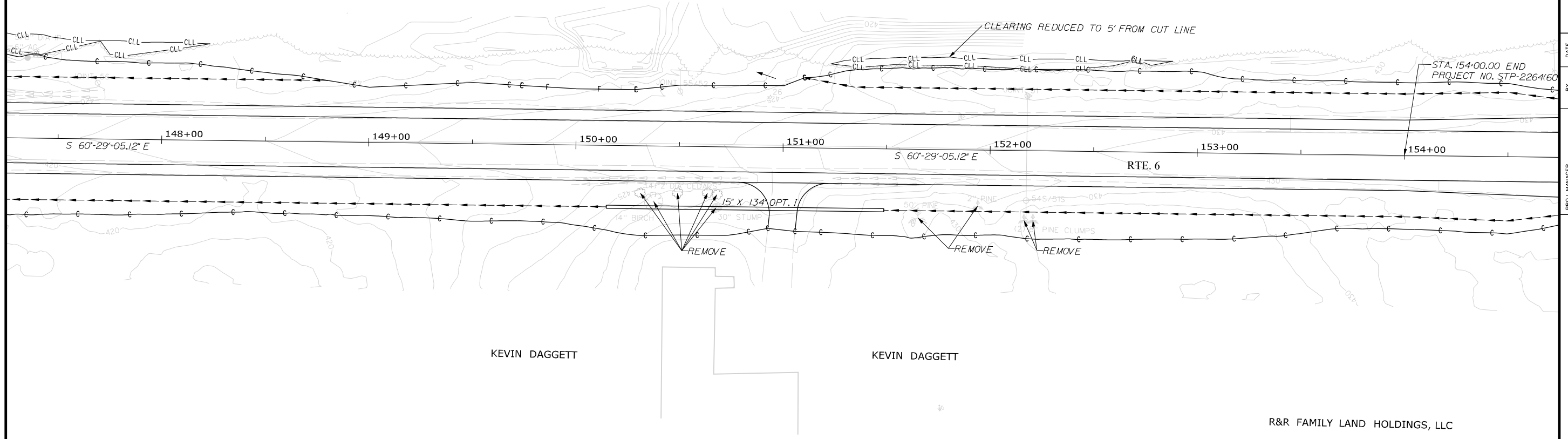
Username: terry.white

Filename: ... \00\GEOTECH\MSTA\023_BLP22.dgn Division: GEOTECH



LOUANNE CARR KERR
LORHYTA CARR BENNETT
LEONARD SCOTT CARR
DORINE C. CARR - LIFE ESTATE

LOUANNE CARR KERR
LORHYTA CARR BENNETT
LEONARD SCOTT CARR
DORINE C. CARR - LIFE ESTATE

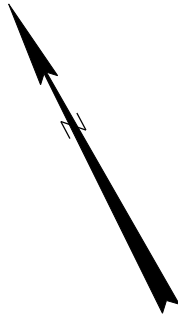
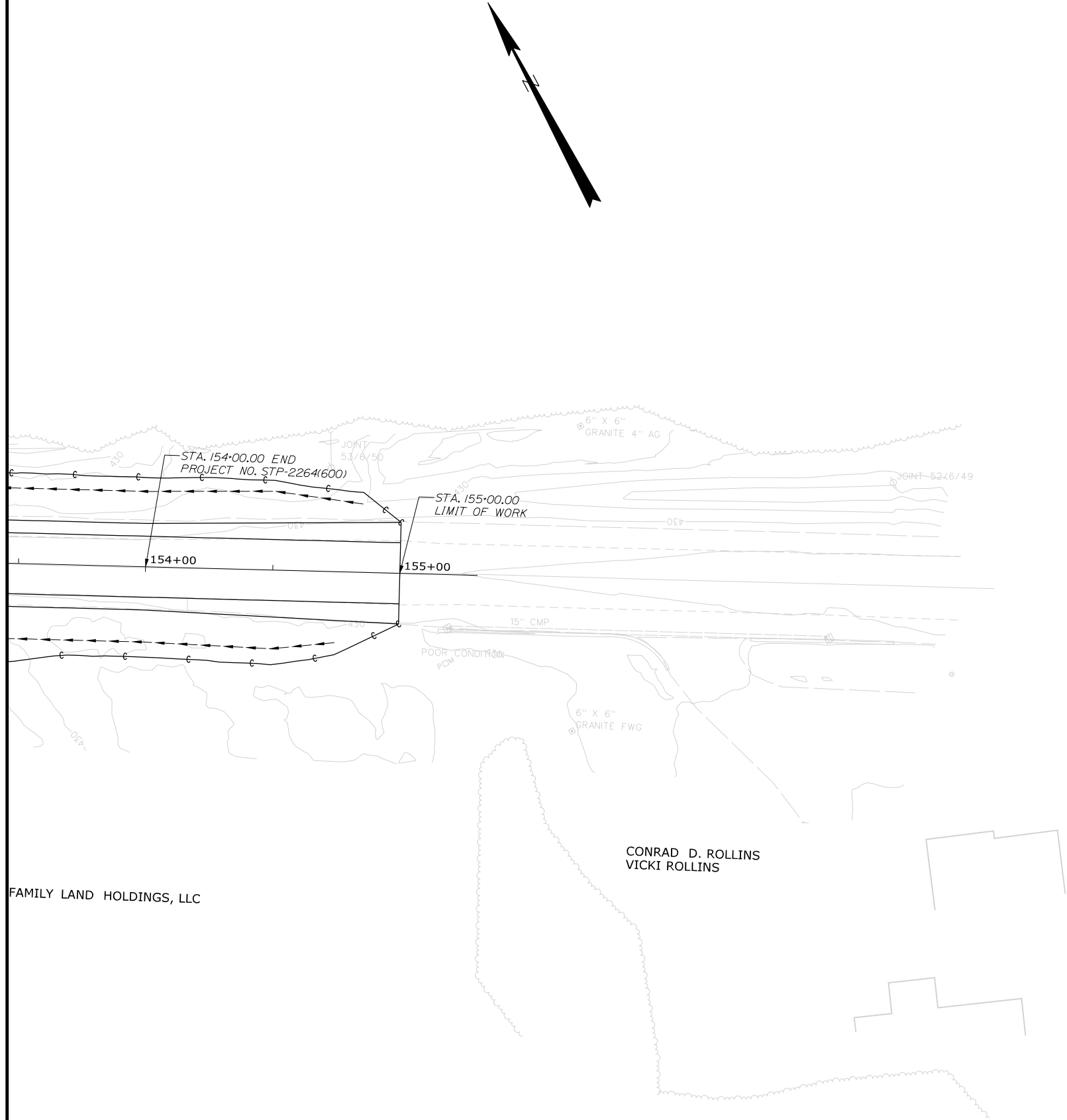


STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	DATE	BY	SIGNATURE	P.E. NUMBER	DATE
C. SULLOWAY					
CHECKED-REVIEWED					
DESIGNS-DETAILED					
DESIGNS-DETAILED					
REVISIONS 1					
REVISIONS 2					
REVISIONS 3					
REVISIONS 4					
FIELD CHANGES					

ABBOT
ROUTE 6
BORING LOCATION PLAN

SHEET NUMBER
23
OF 27



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN
22646.00
HIGHWAY PLANS

PROJ. MANAGER	BY	DATE
C. SULLOWAY	T. WHITE	NOV. 2019
CHECKED-REVIEWED	SIGNATURE	
C. RUSSELL		
DESIGNS-DETAILED	P.E. NUMBER	
REVISIONS 1	DATE	
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

ABBOT
ROUTE 6
BORING LOCATION PLAN

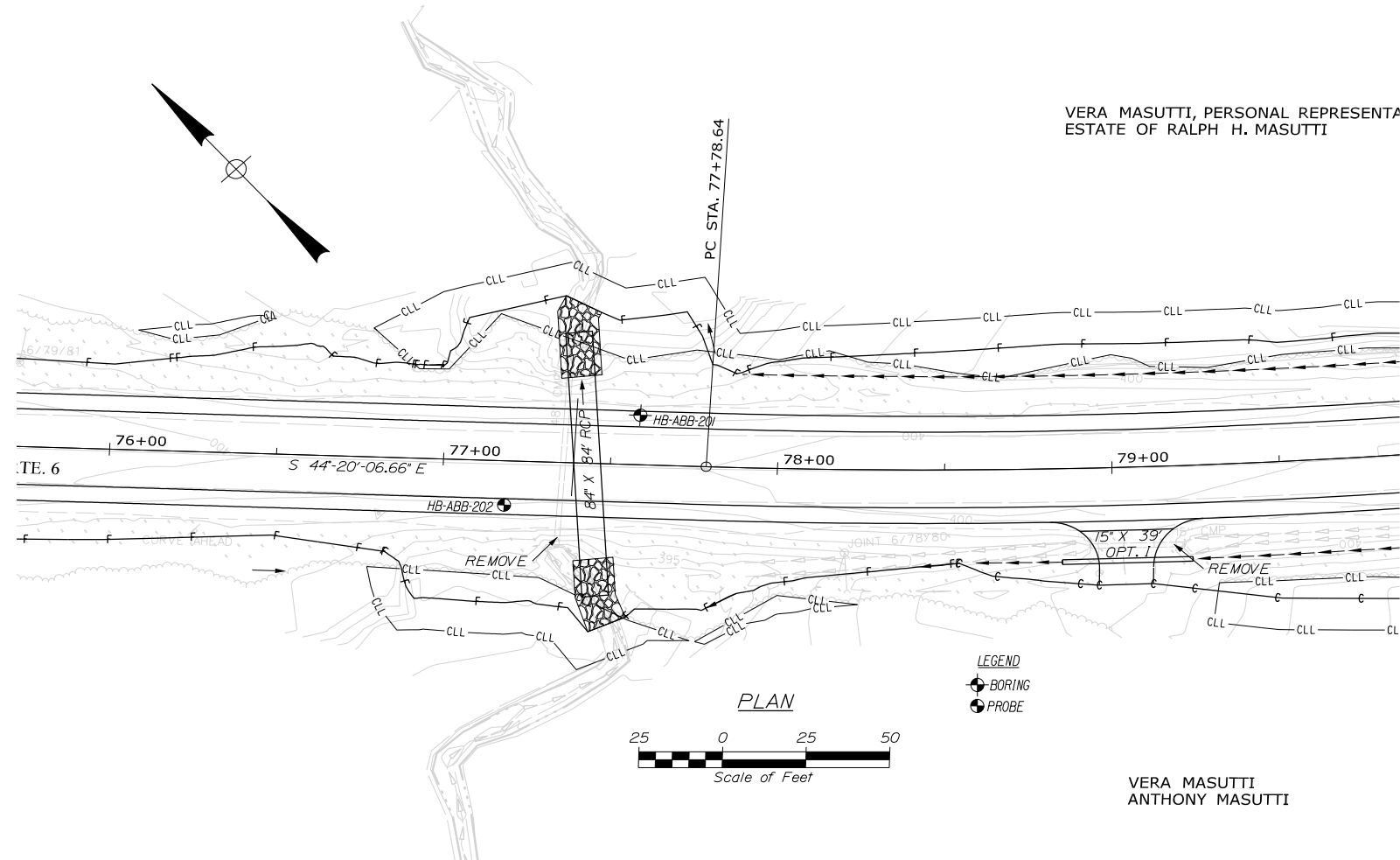
SHEET NUMBER
24
OF 27

Date: 11/18/2019

Username: terry.white

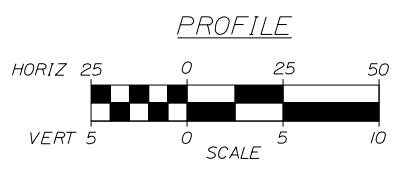
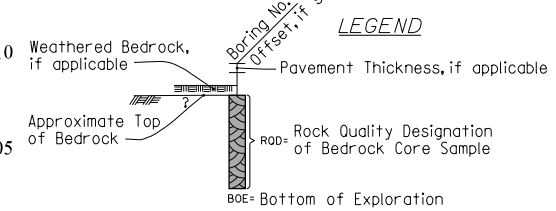
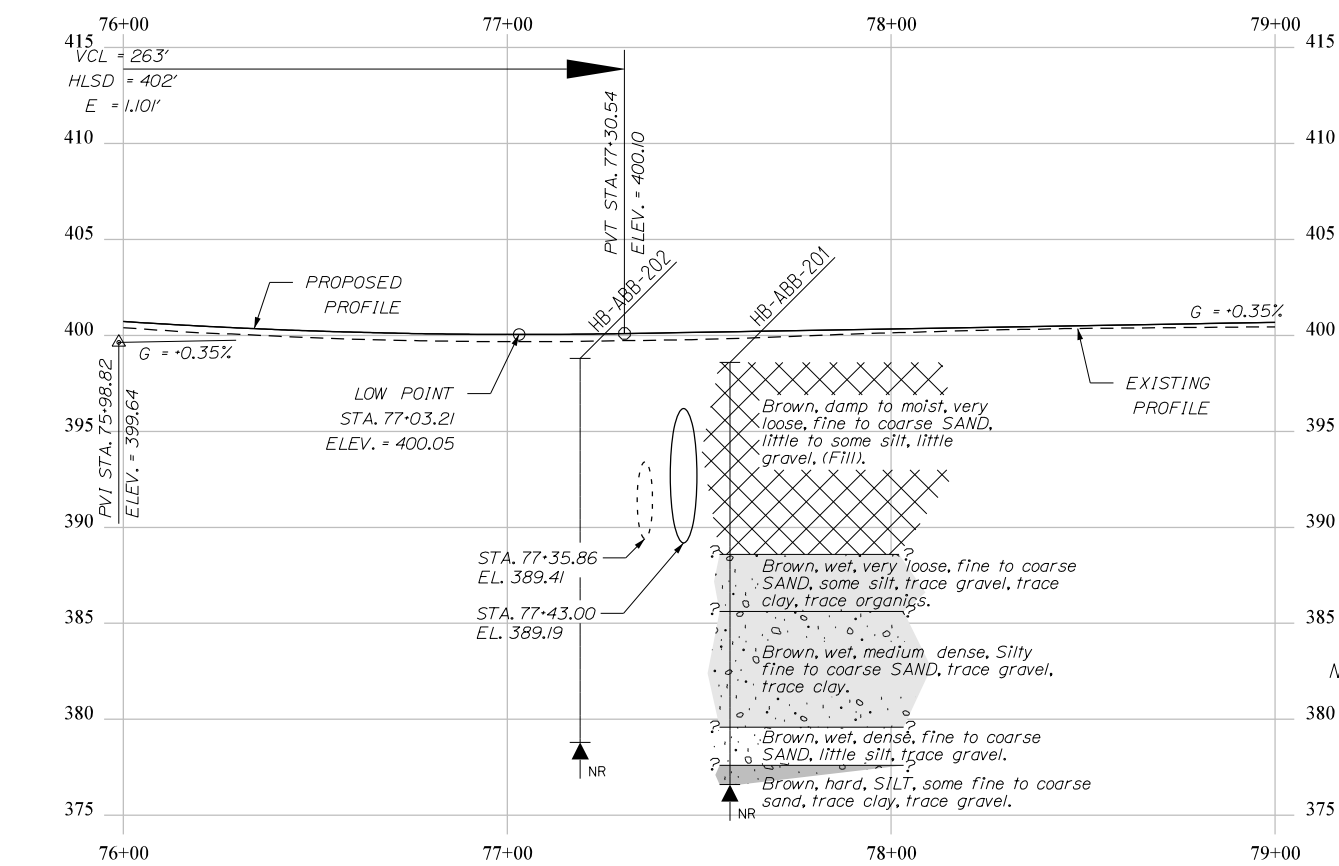
Division: GEOTECH

Filename: ...025_BLP&SP_WBL 7730 1.dgn



VERA MASUTTI, PERSONAL REPRESENTATIVE
ESTATE OF RALPH H. MASUTTI

VERA MASUTTI
ANTHONY MASUTTI



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 spacings may vary and are probably more erratic. For more specific information refer to the exploration logs.

Maine Department of Transportation Soil/Bank Exploration Log US CUSTOMARY UNITS		Project: Route 6 Highway Improvements		Boring No.: HB-ABB-201																																																																																									
Location: Abbot, Maine		WIN: 22646.00																																																																																											
Driller: S.W. Cole	Elevation (ft.): 398.6	Auger ID/OD: 2.25/6.25"																																																																																											
Operator: Hanson/Lymard/Doggett	Soil: NA088	Sampler: Standard Split Spoon																																																																																											
Logged By: C. Russell	Rtg Type: Detail D-50 Track	Sampler Wt./Fall: N/A																																																																																											
Date Start/Finish: 2/9/2018 12:30-13:30	Drilling Method: Hollow Stem Auger	Core Barrels: N/A																																																																																											
Boring Location: 77+08.15, 7 ft. L.	Coating ID/OD: N/A	Water Level: 9.0 ft bgs.																																																																																											
Number of Fracture Fractures: 0.75	Number Types: Asymptotic	Hydraulic: <input type="checkbox"/> Non-Hydraulic: <input type="checkbox"/>																																																																																											
<table border="1"> <thead> <tr> <th>Sample No.</th> <th>Pen. Rec. (ft.)</th> <th>Sample Depth (ft.)</th> <th>Sample Length (ft.)</th> <th>Sample Type</th> <th>Sample No.</th> <th>Sample Depth (ft.)</th> <th>Sample Length (ft.)</th> <th>Sample Type</th> <th>Visual Description and Remarks</th> <th>Laboratory Testing Results/AASHTO and Unified Class</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>12/12</td> <td>1.00 - 2.00</td> <td>70/100</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> <td>---</td> <td>Brown, damp, very dense, fine to coarse SAND, little silt, little gravel, (Fill).</td> <td>GS03196 A-1-B, SM MC=1.95</td> </tr> <tr> <td>20</td> <td>24/6</td> <td>5.00 - 7.00</td> <td>2/1/1/1</td> <td>2</td> <td>3</td> <td>---</td> <td>---</td> <td>---</td> <td>Brown, moist, very loose, fine to coarse SAND, some silt, little gravel, (Fill).</td> <td>GS03197 A-2-A, SM MC=18.45</td> </tr> <tr> <td>30</td> <td>24/6</td> <td>10.00 - 12.00</td> <td>1/80/1/1</td> <td>1</td> <td>1</td> <td>---</td> <td>---</td> <td>---</td> <td>Brown, wet, very loose, fine to coarse SAND, some silt, trace gravel, trace clay, trace organics.</td> <td>GS03198 A-4, SC-SM MC=40.45</td> </tr> <tr> <td>40</td> <td>24/18</td> <td>15.00 - 17.00</td> <td>1/8/9/12</td> <td>17</td> <td>32</td> <td>---</td> <td>---</td> <td>---</td> <td>Brown, wet, medium dense, silty fine to coarse SAND, trace gravel, trace clay.</td> <td>GS03199 A-4, SC-SM MC=21.75</td> </tr> <tr> <td>50/A</td> <td>24/18</td> <td>20.00 - 22.00</td> <td>12/16/16/15</td> <td>32</td> <td>42</td> <td>---</td> <td>---</td> <td>---</td> <td>SD (20.0-21.0 ft bgs) Brown, wet, dense, fine to coarse SAND, little silt, trace gravel.</td> <td>GS03200 A-2-A, SM MC=18.15</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>---</td> <td>---</td> <td>---</td> <td>SD/A (21.0-22.0 ft bgs) Brown, hard, silt, some fine to coarse sand, trace clay, trace gravel.</td> <td>GS03201 A-4, SC MC=21.85</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 22.0 feet below ground surface. NO REFUSAL.</td> <td></td> </tr> </tbody> </table>						Sample No.	Pen. Rec. (ft.)	Sample Depth (ft.)	Sample Length (ft.)	Sample Type	Sample No.	Sample Depth (ft.)	Sample Length (ft.)	Sample Type	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class	10	12/12	1.00 - 2.00	70/100	---	---	---	---	---	Brown, damp, very dense, fine to coarse SAND, little silt, little gravel, (Fill).	GS03196 A-1-B, SM MC=1.95	20	24/6	5.00 - 7.00	2/1/1/1	2	3	---	---	---	Brown, moist, very loose, fine to coarse SAND, some silt, little gravel, (Fill).	GS03197 A-2-A, SM MC=18.45	30	24/6	10.00 - 12.00	1/80/1/1	1	1	---	---	---	Brown, wet, very loose, fine to coarse SAND, some silt, trace gravel, trace clay, trace organics.	GS03198 A-4, SC-SM MC=40.45	40	24/18	15.00 - 17.00	1/8/9/12	17	32	---	---	---	Brown, wet, medium dense, silty fine to coarse SAND, trace gravel, trace clay.	GS03199 A-4, SC-SM MC=21.75	50/A	24/18	20.00 - 22.00	12/16/16/15	32	42	---	---	---	SD (20.0-21.0 ft bgs) Brown, wet, dense, fine to coarse SAND, little silt, trace gravel.	GS03200 A-2-A, SM MC=18.15							---	---	---	SD/A (21.0-22.0 ft bgs) Brown, hard, silt, some fine to coarse sand, trace clay, trace gravel.	GS03201 A-4, SC MC=21.85							---	---	---	Bottom of Exploration at 22.0 feet below ground surface. NO REFUSAL.	
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Maine Department of Transportation Soil/Bank Exploration Log US CUSTOMARY UNITS		Project: Route 6 Highway Improvements		Boring No.: HB-ABB-202																																		
Location: Abbot, Maine		WIN: 22646.00																																				
Drilling Contractor: S.W. Cole	Elevation (ft.): 398.8	Auger ID/OD: 5" dia.																																				
Operator: Hanson/Lymard/Doggett	Soil: NA088	Sampler: N/A																																				
Logged By: C. Russell	Rtg Type: Detail D-50 Track	Sampler Wt./Fall: N/A																																				
Date Start/Finish: 2/9/2018 12:00-12:25	Drilling Method: Solid Stem Auger	Core Barrels: N/A																																				
Boring Location: 77+19.14, 0 ft. R.	Coating ID/OD: N/A	Water Level: 3.4 ft bgs.																																				
<table border="1"> <thead> <tr> <th>Sample No.</th> <th>Pen. Rec. (ft.)</th> <th>Sample Depth (ft.)</th> <th>Sample Length (ft.)</th> <th>Sample Type</th> <th>Sample No.</th> <th>Sample Depth (ft.)</th> <th>Sample Length (ft.)</th> <th>Sample Type</th> <th>Visual Description and Remarks</th> <th>Laboratory Testing Results/AASHTO and Unified Class</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Probes: no material descriptions given.</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 20.0 feet below ground surface. NO REFUSAL.</td> <td></td> </tr> </tbody> </table>						Sample No.	Pen. Rec. (ft.)	Sample Depth (ft.)	Sample Length (ft.)	Sample Type	Sample No.	Sample Depth (ft.)	Sample Length (ft.)	Sample Type	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class										Probes: no material descriptions given.											Bottom of Exploration at 20.0 feet below ground surface. NO REFUSAL.	
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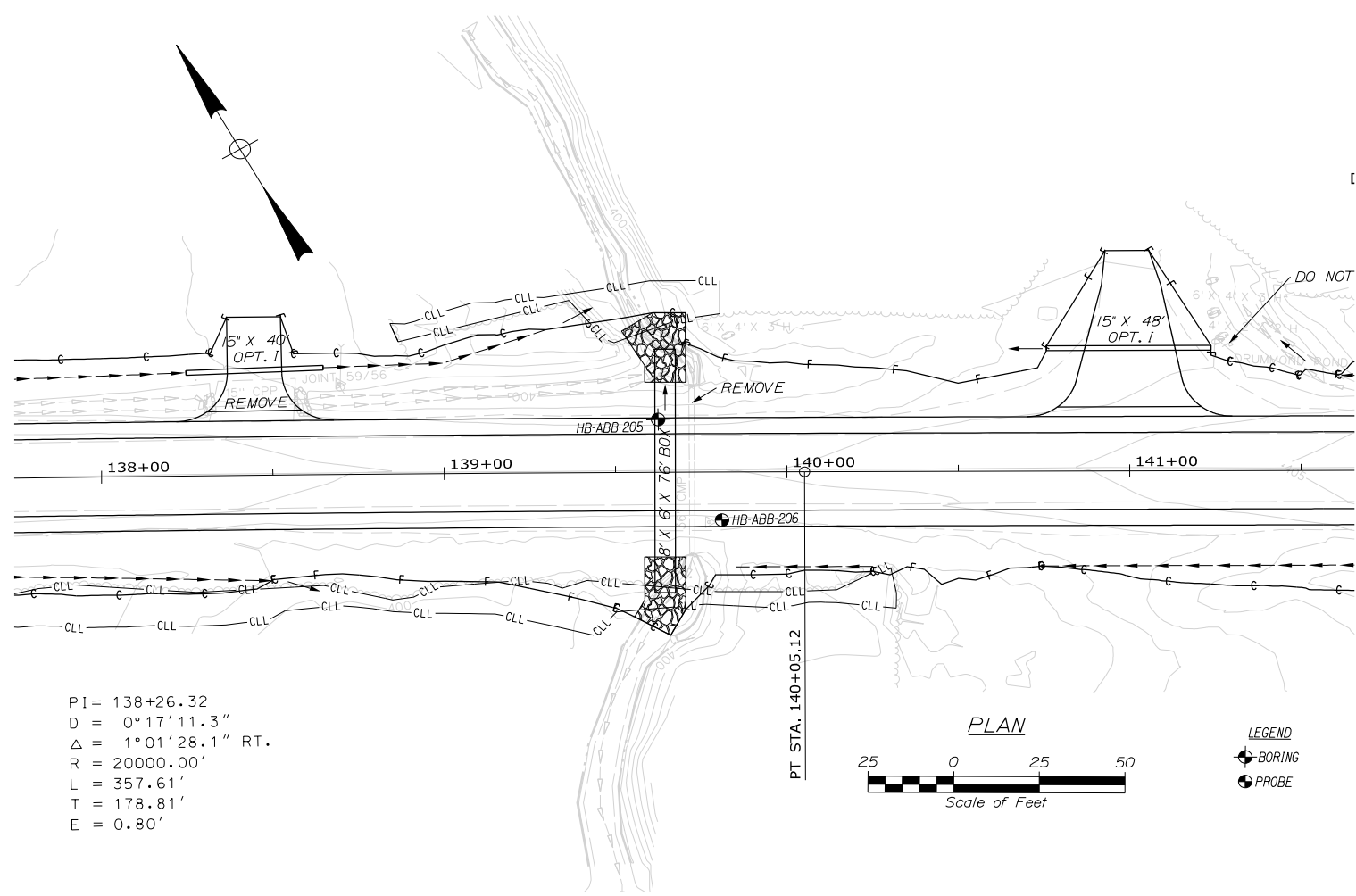
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)
WIN 22646.00
HIGHWAY PLANS

ABBOT ROUTE 6
BORING LOCATION PLAN & INTERPRETIVE SUBSURFACE PROFILE WITH BORING LOGS

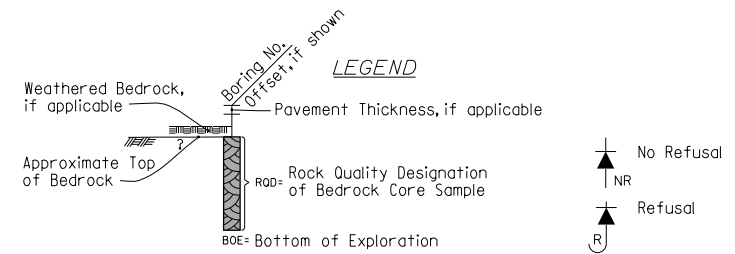
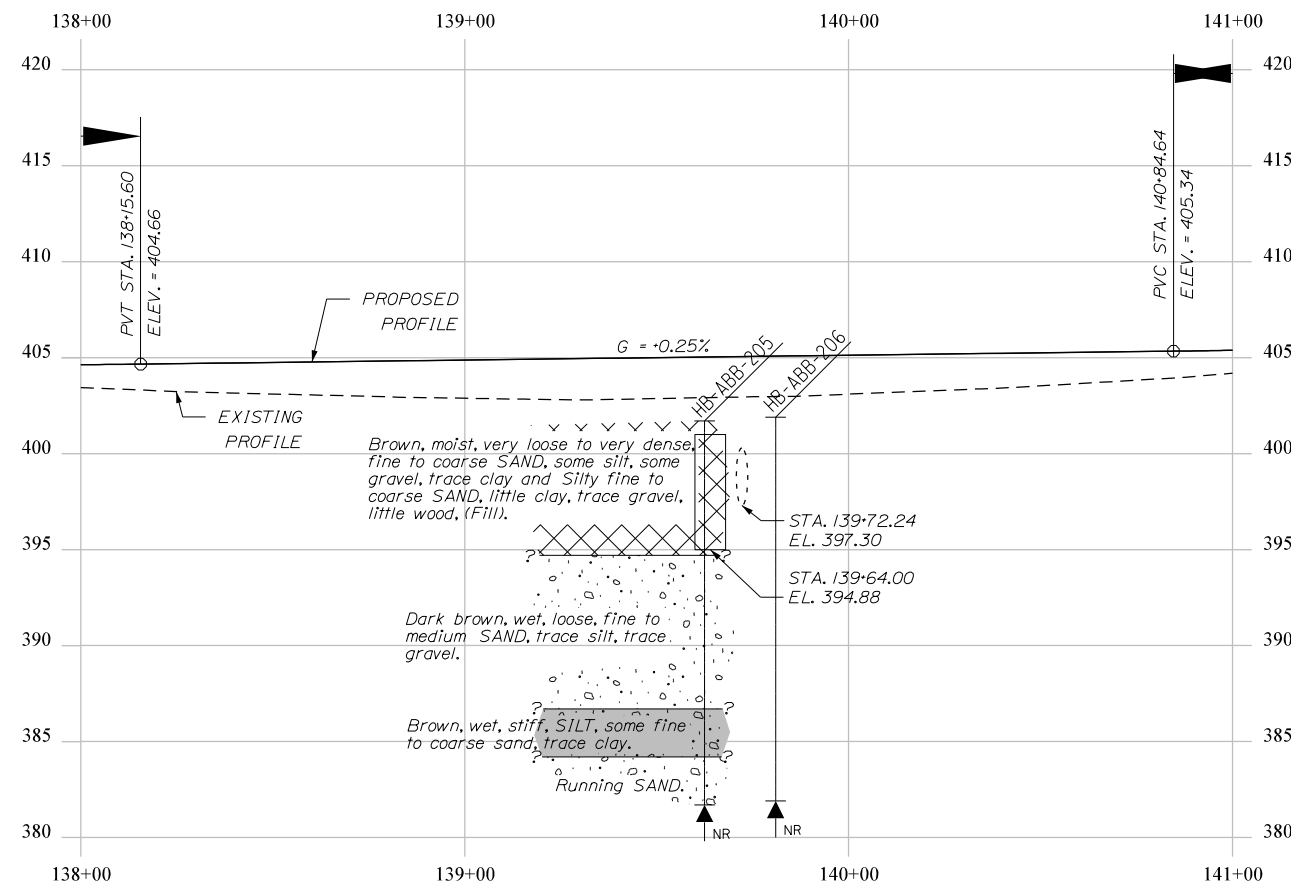
SHEET NUMBER
25
OF 27

PROJ. MANAGER	DESIGN-DETAILED	CHECKED-REVIEWED	DESIGNS-DETAILED	DESIGNS-DETAILED	REVISIONS 1	REVISIONS 2	REVISIONS 3	REVISIONS 4	FIELD CHANGES
	C. SULLOWAY		C. RUSSELL	T. WHITE	NOV 2019				
BY	DATE	SIGNATURE	P.E. NUMBER	DATE					

Filename: ... \027_BLP\SP WBL 13960 3.dgn Division: GEOTECH Username: terry.white Date: 11/18/2019



$PI = 138+26.32$
 $D = 0^{\circ}17'11.3''$
 $\Delta = 1^{\circ}01'28.1''$ RT.
 $R = 20000.00'$
 $L = 357.61'$
 $T = 178.81'$
 $E = 0.80'$



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.

Maine Department of Transportation Self/Soak Exploration Log US CUSTOMER UNITS		Project: Route 6 Highway Improvements Location: Abbot, Maine		Boring No.: HB-ABB-205 WIN: 22646.00		
Drillers:	S.W. Cole	Elevation (ft.):	401.7	Auger ID/OD:	2.25/6.25"	
Operator:	Hanscomb/Lynor/Duggan	Datum:	NAVD88	Sampler:	Standard Split Spoon	
Logged By:	C. Russell	Rig Type:	Ditch D-50 Truck	Sampler Wt./Fall:	140#/30"	
Date Start/Finish:	2/9/2018: 08:45-09:40	Drilling Method:	Hollow Stem Auger	Core Barrel:	N/A	
Boring Location:	139+62.5, 16.5 ft L+	Costing ID/OD:	N/A	Water Level:	6.0 ft bgs.	
Header Efficiency Factor: 0.79						
Soil Test:						
S = Split Spoon Sample SA = Soak Core Sample Su (psi) = Unconfined Shear Strength (psi) Pu = Pocket Penetration (psi) W = Water Content, percent MD = Unsuccessful Split Spoon Sample MA = Moisture Seal Auger Su (psi) = Unconfined Shear Strength (psi) LL = Liquid Limit U = Thin Wall Tube Sample MC = Moisture Core Sample Np = Net Penetration (psi) Pp = Penetration (psi) Pp = Penetration (psi) W = Unsuccessful Thin Wall Tube Sample MW = Moisture Seal Np = Net Penetration (psi) Pp = Penetration (psi) Pp = Penetration (psi) W = Thin Wall Tube Sample PP = Pocket Penetration MW = Moisture Seal Np = Net Penetration (psi) Pp = Penetration (psi) Pp = Penetration (psi)						
Sample Information						
Depth (ft.)	Sample No.	Pen./Rec. (ft.)	Sample Depth (ft.)	Blow (1/8" In. Strength) (blows/ft)	Notes	
10	24/24	1.00 - 3.00	41.83/42.81	145 191	Brown, moist, very dense (frozen), fine to coarse SAND, some silt, some gravel, trace clay, (fill).	
5	20	24/12	5.00 - 7.00	1122/1122	3 4	Brown, moist, very loose, silty fine to coarse SAND, little clay, trace gravel, little wood.
10	30	24/24	10.00 - 12.00	3/2/2/3	4 5	Dark brown, wet, loose, fine to medium SAND, trace silt, trace gravel.
15	ND	24/21	15.00 - 17.00	2/2/5/6	7 9	Brown, wet, stiff, SILT, some fine to coarse sand, trace clay.
20	ND	0/0	20.00 - 20.00			Running sand starting at 17.5 ft bgs.
Bottom of Exploration at 20.0 feet below ground surface. No refusal.						
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.						
* Water level readings have been made at this and other conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.						

Maine Department of Transportation Self/Soak Exploration Log US CUSTOMER UNITS		Project: Route 6 Highway Improvements Location: Abbot, Maine		Boring No.: HB-ABB-206 WIN: 22646.00	
Drillers:	S.W. Cole	Elevation (ft.):	401.9	Auger ID/OD:	5" Dig.
Operator:	Hanscomb/Lynor/Duggan	Datum:	NAVD88	Sampler:	N/A
Logged By:	C. Russell	Rig Type:	Ditch D-50 Truck	Sampler Wt./Fall:	N/A
Date Start/Finish:	2/9/2018: 09:45-10:15	Drilling Method:	Self/Soak Auger	Core Barrel:	N/A
Boring Location:	139+81, 15.0 ft R+	Costing ID/OD:	N/A	Water Level:	8.5 ft bgs.
Header Efficiency Factor: 0.79					
Soil Test:					
S = Split Spoon Sample SA = Soak Core Sample Su (psi) = Unconfined Shear Strength (psi) Pu = Pocket Penetration (psi) W = Water Content, percent MD = Unsuccessful Split Spoon Sample MA = Moisture Seal Auger Su (psi) = Unconfined Shear Strength (psi) LL = Liquid Limit U = Thin Wall Tube Sample MC = Moisture Core Sample Np = Net Penetration (psi) Pp = Penetration (psi) Pp = Penetration (psi) W = Unsuccessful Thin Wall Tube Sample MW = Moisture Seal Np = Net Penetration (psi) Pp = Penetration (psi) Pp = Penetration (psi)					
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Depth (ft.)	Sample No.	Pen./Rec. (ft.)	Sample Depth (ft.)	Blow (1/8" In. Strength) (blows/ft)	Notes
4					Probe, no material descriptions given.
5					
10					
15					Running sand at 16.9 ft bgs.
20					Bottom of Exploration at 20.0 feet below ground surface. No refusal.
Stratification lines represent approximate boundaries between soil types; transitions may be gradual.					
* Water level readings have been made at this and other conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.					

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
STP-2264(600)

WIN 22646.00
HIGHWAY PLANS

ABBOT
ROUTE 6
BORING LOCATION PLAN &
INTERPRETIVE SUBSURFACE PROFILE
WITH BORING LOGS

SHEET NUMBER
27
OF 27

Appendix A

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM				MODIFIED BURMISTER SYSTEM																																																					
MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES	Descriptive Term	Portion of Total (%)																																																				
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. GP Poorly-graded gravels, gravel sand mixtures, little or no fines.	trace little some adjective (e.g. sandy, clayey)	0 - 10 11 - 20 21 - 35 36 - 50																																																				
		GRAVEL WITH FINES (Appreciable amount of fines)	GM Silty gravels, gravel-sand-silt mixtures. GC Clayey gravels, gravel-sand-clay mixtures.	TERMS DESCRIBING DENSITY/CONSISTENCY Coarse-grained soils (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). <table border="1"> <thead> <tr> <th>Density of Cohesionless Soils</th> <th>Standard Penetration Resistance N-Value (blows per foot)</th> </tr> </thead> <tbody> <tr><td>Very loose</td><td>0 - 4</td></tr> <tr><td>Loose</td><td>5 - 10</td></tr> <tr><td>Medium Dense</td><td>11 - 30</td></tr> <tr><td>Dense</td><td>31 - 50</td></tr> <tr><td>Very Dense</td><td>> 50</td></tr> </tbody> </table> Fine-grained soils (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. <table border="1"> <thead> <tr> <th>Consistency of Cohesive soils</th> <th>SPT N-Value (blows per foot)</th> <th>Approximate Undrained Shear Strength (psf)</th> <th>Field Guidelines</th> </tr> </thead> <tbody> <tr><td>Very Soft</td><td>WOH, WOR, WOP, <2</td><td>0 - 250</td><td>Fist easily penetrates</td></tr> <tr><td>Soft</td><td>2 - 4</td><td>250 - 500</td><td>Thumb easily penetrates</td></tr> <tr><td>Medium Stiff</td><td>5 - 8</td><td>500 - 1000</td><td>Thumb penetrates with moderate effort</td></tr> <tr><td>Stiff</td><td>9 - 15</td><td>1000 - 2000</td><td>Indented by thumb with great effort</td></tr> <tr><td>Very Stiff</td><td>16 - 30</td><td>2000 - 4000</td><td>Indented by thumbnail</td></tr> <tr><td>Hard</td><td>>30</td><td>over 4000</td><td>Indented by thumbnail with difficulty</td></tr> </tbody> </table> Rock Quality Designation (RQD): 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 <table border="1"> <thead> <tr> <th>Rock Mass Quality</th> <th>RQD (%)</th> </tr> </thead> <tbody> <tr><td>Very Poor</td><td>≤25</td></tr> <tr><td>Poor</td><td>26 - 50</td></tr> <tr><td>Fair</td><td>51 - 75</td></tr> <tr><td>Good</td><td>76 - 90</td></tr> <tr><td>Excellent</td><td>91 - 100</td></tr> </tbody> </table> Desired Rock Observations (in this order, if applicable): 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))			Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)	Very loose	0 - 4	Loose	5 - 10	Medium Dense	11 - 30	Dense	31 - 50	Very Dense	> 50	Consistency of Cohesive soils	SPT N-Value (blows per foot)	Approximate Undrained Shear Strength (psf)	Field Guidelines	Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily penetrates	Soft	2 - 4	250 - 500	Thumb easily penetrates	Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort	Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort	Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail	Hard	>30	over 4000	Indented by thumbnail with difficulty	Rock Mass Quality	RQD (%)	Very Poor	≤25	Poor	26 - 50	Fair	51 - 75	Good	76 - 90	Excellent
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Good	76 - 90																																																								
Excellent	91 - 100																																																								
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.	Desired Soil Observations (in this order, if applicable): Color (Munsell color chart) Moisture (dry, damp, moist, wet) Density/Consistency (from above right hand side) Texture (fine, medium, coarse, etc.) Name (sand, silty sand, clay, etc., including portions - trace, little, etc.) Gradation (well-graded, poorly-graded, uniform, etc.) Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic) Structure (layering, fractures, cracks, etc.) Bonding (well, moderately, loosely, etc.,) Cementation (weak, moderate, or strong) Geologic Origin (till, marine clay, alluvium, etc.) Groundwater level	Sample Container Labeling Requirements: WIN Blow Counts Bridge Name / Town Sample Recovery Boring Number Date Sample Number Personnel Initials Sample Depth																																																					
		CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.																																																							
		OL Organic silts and organic silty clays of low plasticity.																																																							
	SILTS AND CLAYS (liquid limit greater than 50)	MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.																																																							
CH Inorganic clays of high plasticity, fat clays.																																																									
HIGHLY ORGANIC SOILS	Pt Peat and other highly organic soils.	OH Organic clays of medium to high plasticity, organic silts.																																																							

Drilling Contractor: MaineDOT	Elevation (ft.): 427.1	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 7/18/2016-7/18/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 13+00, 8.0 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	B1		0.83 - 2.40				SSA	426.3		10" HMA.	
										Brown, damp, Gravelly fine to coarse SAND, trace silt, occasional cobble.	G#270067 A-1-a, SW-SM WC=2.8%
	S1		2.40 - 5.00					424.7		Brown, damp, fine to coarse SAND, little gravel, trace silt.	G#270110 A-1-b, SW-SM WC=4.3%
5								422.1		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 6 Highway Improvements Location: Abbot, Maine	Boring No.: HB-ABB-102 WIN: 22646.00
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Drilling Contractor: MaineDOT	Elevation (ft.): 426.9	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 7/18/2016-7/18/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 13+00, 14.0 ft Rt. Shoulder	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								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	B2		0.00 - 2.00			SSA	424.9		Brown, damp, SAND, little gravel, little silt.	G#270068 A-1-b, SW-SM WC=3.5%	
	S2		2.00 - 5.00						Brown, wet, SAND, trace silt, trace gravel.		
5						↓	421.9		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		
25											

Remarks:

Drilling Contractor: MaineDOT	Elevation (ft.): 429.8	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 7/18/2016-7/18/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 23+18, 8.0 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	428.8		12" HMA.	
	B3		1.00 - 2.30					427.5		Black-brown, damp, Gravelly fine to coarse SAND, trace silt.	G#270069 A-1-a, SW-SM WC=1.3%
										Bottom of Exploration at 2.3 feet below ground surface. REFUSAL, possible Boulder.	
5											
10											
15											
20											
25											

Remarks:

Drilling Contractor: MaineDOT	Elevation (ft.): 429.8	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 7/18/2016-7/18/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 23+18, 14.0 ft Lt. Shoulder	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	B4		0.00 - 1.10			SSA		428.7	[Dotted Pattern]	Brown, damp, SAND, some silt, some gravel, occasional cobble.	G#270070 A-1-b, SM WC=4.1% G#270111 A-4, CL WC=21.6%	
	S3		1.10 - 5.00						[Vertical Lines Pattern]	Brown, wet, SILT, some sand, little gravel.		
5						↓		424.8	[Vertical Lines Pattern]	Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		
10												
15												
20												
25												

Remarks:

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 6 Highway Improvements	Boring No.: HB-ABB-107
	Location: Abbot, Maine	WIN: 22646.00

Drilling Contractor: MaineDOT	Elevation (ft.): 443.4	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 7/18/2016-7/18/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 47+00, 8.5 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 S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) S_{u(lab)} = Lab Vane Undrained Shear Strength (psf) LL = Liquid Limit
 B = Bucket Sample off Auger Flights SSA = Solid Stem Auger S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) PL = Plastic Limit
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) PI = Plasticity Index
 U = Thin Wall Tube Sample RC = Roller Cone N-value = Raw Field SPT N-value G = Grain Size Analysis
 MV = Unsuccessful Field Vane Shear Test Attempt WOH = Weight of 140lb. Hammer T_v = Pocket Torvane Shear Strength (psf) C = Consolidation Test
 V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing WC = Water Content, percent ≈ = Similar or Equal too

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	B7		0.67 - 2.40			SSA	442.7		8" HMA.		
							441.0		Brown, damp, fine to coarse SAND, some gravel, trace silt, occasional cobble.	G#270073 A-1b, SW-SM WC=3.1%	
	S6		2.40 - 5.00						Light brown, moist, SILT, some fine to coarse sand, little gravel.	G#270113 A-4, CL WC=11.7%	
5							438.4		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		
10											
15											
20											
25											

Remarks:

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 6 Highway Improvements Location: Abbot, Maine	Boring No.: HB-ABB-108 WIN: 22646.00
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Drilling Contractor: MaineDOT	Elevation (ft.): 443.0	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 7/18/2016-7/18/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 47+00, 14.0 ft Lt. Shoulder	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	B8		0.00 - 1.60					441.4		Brown, damp, fine to coarse SAND, some gravel, little silt, occasional cobble.	G#270074 A-1-b, SM WC=2.9%	
								438.0		Light brown, SILT, some sand, little gravel.		
5										Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		
10												
15												
20												
25												

Remarks:

Drilling Contractor: MaineDOT	Elevation (ft.): 418.3	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 8/15/2016-8/15/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 67+00, 8.0 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	B9		0.42 - 1.50				SSA	417.9	5" HMA.	0.4	G#270075 A-1-a, SW-SM WC=2.4%
								416.8	Brown, damp, Gravelly fine to coarse SAND, little silt.	1.5	
	S7		2.90 - 5.00					416.4	Layer of Old HMA.	1.9	G#270114 A-1-b, SW-SM WC=4.9%
								415.4	Brown, damp, Gravelly fine to coarse SAND, little silt, mixed with pavement chips.	2.9	
									Brown, moist, fine to coarse SAND, little gravel, trace silt.	5.0	
5								413.3	Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL		
10											
15											
20											
25											

Remarks:

Drilling Contractor: MaineDOT	Elevation (ft.): 418.1	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 8/15/2016-8/15/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 67+00, 12.0 ft Rt. Shoulder	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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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	B10		0.00 - 3.50			SSA			Brown, damp, GRAVEL, some fine to coarse sand, trace silt, occasional cobble.	G#270101 A-1-a, GW-GM WC=2.8%
							414.6		Brown, moist, fine to coarse SAND, little gravel, trace silt.	
5							413.1		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Drilling Contractor: MaineDOT	Elevation (ft.): 399.1	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 8/15/2016-8/15/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 87+00, 8.5 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.)	Graphic Log		
0	B11		0.50 - 5.00			SSA	398.6		6" HMA.	
5							394.1		Brown, damp, Gravelly fine to coarse SAND, trace silt, occasional cobble, (Fill).	G#270102 A-1-a, SW-SM WC=2.2%
									Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 6 Highway Improvements	Boring No.: HB-ABB-116
	Location: Abbot, Maine	WIN: 22646.00

Drilling Contractor: MaineDOT	Elevation (ft.): 407.9	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 8/15/2016-8/15/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 127+00, 12.5 ft Lt. Shoulder	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								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	B16 S11		0.00 - 0.50 0.50 - 5.00			SSA	407.4		Brown, moist, fine to coarse SAND, little gravel, little silt.	G#270107 A-1-b, SM WC=2.9%
									Brown, moist, fine to coarse SAND, trace silt, trace gravel.	
5							402.9			
									Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Drilling Contractor: MaineDOT	Elevation (ft.): 419.8	Auger ID/OD: 10" Dia.
Operator: Daggett/Purpee	Datum: NAVD88	Sampler: Off Flights
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: N/A
Date Start/Finish: 8/15/2016-8/15/2016	Drilling Method: Solid Stem Auger	Core Barrel: N/A
Boring Location: 147+00, 8.5 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								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	B17		0.58 - 1.60			SSA	419.2		7" HMA.		
	S12		1.60 - 5.00				418.2		Brown, damp, Gravelly fine to coarse SAND, trace silt, occasional cobble.	0.6-	G#270108
									Brown, damp, SAND, trace silt, trace gravel.	1.6-	A-1-a, SW-SM WC=3.4%
5							414.8		Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	5.0-	
10											
15											
20											
25											

Remarks:

Driller: S.W. Cole	Elevation (ft.): 398.6	Auger ID/OD: 2.25/6.25"
Operator: Hanscomb/Lynard/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: C. Russell	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 2/9/2018; 12:30-13:30	Drilling Method: Hollow Stem Auger	Core Barrel: N/A
Boring Location: 77+58, 15.7 ft Lt.	Casing ID/OD: N/A	Water Level*: 8.0 ft bgs.

Hammer Efficiency Factor: 0.79 **Hammer Type:** Automatic Hydraulic Rope & Cathead

Definitions: R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf)
 D = Split Spoon Sample SSA = Solid Stem Auger S_{u(lab)} = Lab Vane Undrained Shear Strength (psf) WC = Water Content, percent
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) LL = Liquid Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-uncorrected = Raw Field SPT N-value PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weight of 140lb. Hammer Hammer Efficiency Factor = Rig Specific Annual Calibration Value PI = Plasticity Index
 V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing N₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency G = Grain Size Analysis
 MV = Unsuccessful Field Vane Shear Test Attempt WO1P = Weight of One Person N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected 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												
	1D	12/12	1.00 - 2.00	70/100	---						Brown, damp, very dense, fine to coarse SAND, little silt, little gravel, (Fill).	G#303196 A-1-b, SM WC=7.9%
5												
	2D	24/6	5.00 - 7.00	2/1/1/1	2	3					Brown, moist, very loose, fine to coarse SAND, some silt, little gravel, (Fill).	G#303197 A-2-4, SM WC=18.0%
10												
	3D	24/6	10.00 - 12.00	1/WOH/1/1	1	1			388.6		Brown, wet, very loose, fine to coarse SAND, some silt, trace gravel, trace clay, trace organics.	G#303198 A-2-4, SC-SM WC=40.4%
									385.6			
15												
	4D	24/18	15.00 - 17.00	7/8/9/12	17	22					Brown, wet, medium dense, Silty fine to coarse SAND, trace gravel, trace clay.	G#303199 A-4, SC-SM WC=21.7%
20												
	5D/A	24/18	20.00 - 22.00	12/16/16/15	32	42			379.6		5D (20.0-21.0 ft bgs) Brown, wet, dense, fine to coarse SAND, little silt, trace gravel.	G#303200 A-2-4, SM WC=19.8%
									377.6		5D/A (21.0-22.0 ft bgs) Brown, hard, SILT, some fine to coarse sand, trace clay, trace gravel.	G#303201 A-4, CL WC=21.8%
									376.6		Bottom of Exploration at 22.0 feet below ground surface. NO REFUSAL	
25												

Remarks:
Auto Hammer #367

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 6 Highway Improvements Location: Abbot, Maine	Boring No.: HB-ABB-202 WIN: 22646.00
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Drilling Contractor: S.W. Cole	Elevation (ft.): 398.8	Auger ID/OD: 5" Dia.
Operator: Hanscomb/Lynard/Daggett	Datum: NAVD88	Sampler: N/A
Logged By: C. Russell	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: N/A
Date Start/Finish: 2/9/2018; 12:00-12:25	Drilling Method: Soild Stem Auger	Core Barrel: N/A
Boring Location: 77+19, 14.0 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.)	Graphic Log		
0						SSA			Probe, no material descriptions given.	
5										
10										
15										
20							378.8		Bottom of Exploration at 20.0 feet below ground surface. NO REFUSAL	20.0
25										

Remarks:

Driller: S.W. Cole	Elevation (ft.): 399.0	Auger ID/OD: 2.25/6.25"
Operator: Hanscomb/Lynard/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: C. Russell	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 2/9/2018; 09:25-10:40	Drilling Method: Hollow Stem Auger	Core Barrel: N/A
Boring Location: 85+10, 13.5 ft Lt.	Casing ID/OD: N/A	Water Level*: 11.0 ft bgs, caved at 17.0 ft

Hammer Efficiency Factor: 0.79 **Hammer Type:** Automatic Hydraulic Rope & Cathead

Definitions: R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf)
 D = Split Spoon Sample SSA = Solid Stem Auger S_{u(lab)} = Lab Vane Undrained Shear Strength (psf) WC = Water Content, percent
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_p = Unconfined Compressive Strength (ksf) LL = Liquid Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-uncorrected = Raw Field SPT N-value PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weight of 140lb. Hammer Hammer Efficiency Factor = Rig Specific Annual Calibration Value
 V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing N₆₀ = SPT N-uncorrected Corrected for Hammer Efficiency
 MV = Unsuccessful Field Vane Shear Test Attempt WO1P = Weight of One Person N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected 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									398.6	5" HMA.		
	1D	12/12	1.00 - 2.00	50/110	---					Brown, damp, very dense (frozen), fine to coarse SAND, little silt, little gravel, (Fill).	G#303202 A-1-b, SM WC=7.7%	
5												
	2D	24/6	5.00 - 7.00	17/15/11/12	26	34				Brown, moist, dense, Gravelly fine to coarse SAND, little silt, (Fill).	G#303203 A-1-b, SM WC=4.8%	
10												
	3D	24/6	10.00 - 12.00	1/1/1/1	2	3				Brown, wet, very loose, fine to coarse SAND, some silt, some gravel, trace clay.	G#303204 A-4, SC-SM WC=23.2%	
15												
	4D	24/16	15.00 - 17.00	2/1/5/6	6	8				Grey, damp, medium stiff, SILT, little fine to coarse sand, trace clay, trace gravel, trace organics. Possible PEAT from 15.5-15.7 ft bgs.	G#303205 A-4, CL WC=26.4% Non-Plastic	
20												
	5D	24/24	20.00 - 22.00	1/1/1/1	2	3				Black, moist, soft, SILT, trace clay, trace fine sand, trace gravel.	G#303206 A-4, CL WC=40.3% Non-Plastic	
25												

Remarks:
Auto Hammer #367

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Route 6 Highway Improvements Location: Abbot, Maine	Boring No.: HB-ABB-203 WIN: 22646.00
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Driller: S.W. Cole	Elevation (ft.): 399.0	Auger ID/OD: 2.25/6.25"
Operator: Hanscomb/Lynard/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: C. Russell	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 2/9/2018; 09:25-10:40	Drilling Method: Hollow Stem Auger	Core Barrel: N/A
Boring Location: 85+10, 13.5 ft Lt.	Casing ID/OD: N/A	Water Level*: 11.0 ft bgs, caved at 17.0 ft

Hammer Efficiency Factor: 0.79 **Hammer Type:** Automatic Hydraulic Rope & Cathead

Definitions: R = Rock Core Sample S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf)
 D = Split Spoon Sample SSA = Solid Stem Auger $S_u(lab)$ = Lab Vane Undrained Shear Strength (psf) WC = Water Content, percent
 MD = Unsuccessful Split Spoon Sample Attempt HSA = Hollow Stem Auger q_u = Unconfined Compressive Strength (ksf) LL = Liquid Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-uncorrected = Raw Field SPT N-value PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample Attempt WOH = Weight of 140 lb. Hammer Hammer Efficiency Factor = Rig Specific Annual Calibration Value PI = Plasticity Index
 V = Field Vane Shear Test, PP = Pocket Penetrometer WOR/C = Weight of Rods or Casing N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency G = Grain Size Analysis
 MV = Unsuccessful Field Vane Shear Test Attempt WOTP = Weight of One Person N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected 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	6D	24/10	25.00 - 27.00	5/8/11/9	19	25		362.0	37.0	Grey, wet, very stiff, SILT, trace clay, trace fine sand.	G#303207 A-4, CL WC=24.3% Non-PLastic
30	7D	24/24	30.00 - 32.00	4/4/5/8	9	12				Grey, wet, stiff, SILT, trace clay, trace fine sand.	G#303208 A-4, CL WC=27.6% Non-Plastic
35	8D	24/24	35.00 - 37.00	3/4/5/6	9	12				Grey, wet, stiff, SILT, trace clay, trace fine sand.	G#303209 A-4, CL WC=25.0% Non-Plastic
										Bottom of Exploration at 37.0 feet below ground surface. NO REFUSAL	
40											
45											
50											

Remarks:
Auto Hammer #367

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS				Project: Route 6 Highway Improvements Location: Abbot, Maine				Boring No.: HB-ABB-205 WIN: 22646.00							
Driller: S.W. Cole				Elevation (ft.): 401.7				Auger ID/OD: 2.25/6.25"							
Operator: Hanscomb/Lynard/Daggett				Datum: NAVD88				Sampler: Standard Split Spoon							
Logged By: C. Russell				Rig Type: Diedrich D-50 Track				Hammer Wt./Fall: 140#/30"							
Date Start/Finish: 2/9/2018; 08:45-09:40				Drilling Method: Hollow Stem Auger				Core Barrel: N/A							
Boring Location: 139+62.5, 16.5 ft Lt.				Casing ID/OD: N/A				Water Level*: 6.0 ft bgs.							
Hammer Efficiency Factor: 0.79				Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>											
Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample Attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample Attempt V = Field Vane Shear Test, PP = Pocket Penetrometer MV = Unsuccessful Field Vane Shear Test Attempt				R = Rock Core Sample SSA = Solid Stem Auger HSA = Hollow Stem Auger RC = Roller Cone WOH = Weight of 140lb. Hammer WOR/C = Weight of Rods or Casing WO1P = Weight of One Person				S _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															
	1D	24/24	1.00 - 3.00	41/83/62/81	145	191					Brown, moist, very dense (frozen), fine to coarse SAND, some silt, some gravel, trace clay, (Fill).	G#303210 A-2-4, SC-SM WC=14.8%			
5															
	2D	24/12	5.00 - 7.00	1(12")/2/2	3	4					Brown, moist, very loose, Silty fine to coarse SAND, little clay, trace gravel, little wood.	G#303211 A-4, CL WC=9.2%			
								394.7							
10															
	3D	24/24	10.00 - 12.00	3/2/2/3	4	5					Dark brown, wet, loose, fine to medium SAND, trace silt, trace gravel.	G#303212 A-3, SP-SM WC=33.9%			
15															
	4D	24/21	15.00 - 17.00	2/2/5/6	7	9					Brown, wet, stiff, SILT, some fine to coarse sand, trace clay.	G#303213 A-4, CL WC=31.9%			
								386.7							
								384.2			Running sand starting at 17.5 ft bgs.				
20															
	MD	0/0	20.00 - 20.00								Bottom of Exploration at 20.0 feet below ground surface. Failed sample attempt, couldn't get spoon to 20.0 ft bgs, due to running sand in Hollow Stem Auger. NO REFUSAL				
								381.7							
25															

Remarks:

Auto Hammer #367

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

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

Appendix B

Laboratory Test Results

**State of Maine - Department of Transportation
Laboratory Testing Summary Sheet**

Town(s): Abbot

Work Number: 22646.00

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-ABB-101, B1	13+00	8.0 Rt.	0.83-2.4	270067	1	2.8			SW-SM	A-1-a	0
HB-ABB-102, B2	13+00	14.0 Rt.	0.0-2.0	270068	1	3.5			SW-SM	A-1-b	0
HB-ABB-103, B3	23+18	8.0 Lt.	1.0-2.3	270069	1	1.3			SW-SM	A-1-a	0
HB-ABB-104, B4	23+18	14.0 Lt.	0.0-1.1	270070	1	4.1			SM	A-1-b	II
HB-ABB-105, B5	33+00	8.0 Rt.	0.58-2.4	270071	1	3.1			GW-GM	A-1-a	0
HB-ABB-106, B6	33+00	15.0 Rt.	0.0-1.1	270072	1	2.9			SM	A-1-b	II
HB-ABB-107, B7	47+00	8.5 Lt.	0.67-2.4	270073	2	3.1			SW-SM	A-1-b	0
HB-ABB-108, B8	47+00	14.0 Lt.	0.0-1.6	270074	2	2.9			SM	A-1-b	II
HB-ABB-109, B9	67+00	8.0 Rt.	0.42-1.5	270075	2	2.4			SW-SM	A-1-a	0
HB-ABB-110, B10	67+00	12.0 Rt.	0.0-3.5	270101	2	2.8			GW-GM	A-1-a	0
HB-ABB-111, B11	87+00	8.5 Lt.	0.5-5.0	270102	2	2.2			SW-SM	A-1-a	0
HB-ABB-112, B12	87+00	12.5 Lt.	0.0-2.5	270103	2	2.9			SW-SM	A-1-a	0
HB-ABB-113, B13	107+00	8.5 Rt.	0.5-1.5	270104	3	2.8			SW-SM	A-1-a	0
HB-ABB-114, B14	107+00	12.0 Rt.	0.0-1.7	270105	3	2.1			SW-SM	A-1-a	0
HB-ABB-115, B15	127+00	8.5 Lt.	0.58-1.8	270106	3	2.8			GW-GM	A-1-a	0
HB-ABB-116, B16	127+00	12.5 Lt.	0.0-0.5	270107	3	2.9			SM	A-1-b	II
HB-ABB-117, B17	147+00	8.5 Rt.	0.58-1.6	270108	3	3.4			SW-SM	A-1-a	0
HB-ABB-118, B18	147+00	12.5 Rt.	0.0-0.5	270109	3	2.3			SM	A-1-b	0
HB-ABB-101, S1	13+00	8.0 Rt.	2.4-5.0	270110	4	4.3			SW-SM	A-1-b	0
HB-ABB-104, S3	23+18	14.0 Lt.	1.1-5.0	270111	4	21.6			CL	A-4	IV
HB-ABB-105, S4	33+00	8.0 Rt.	2.4-5.0	270112	4	18.3			SM	A-4	III
HB-ABB-107, S6	47+00	8.5 Lt.	2.4-5.0	270113	4	11.7			CL	A-4	IV
HB-ABB-109, S7	67+00	8.0 Rt.	2.9-5.0	270114	5	4.9			SW-SM	A-1-b	0
HB-ABB-113, S9	107+00	8.5 Rt.	2.9-5.0	270115	5	16.6			CL	A-4	IV
HB-ABB-115, S10	127+00	8.5 Lt.	1.8-5.0	270116	5	6.2			SP-SM	A-3	0
HB-ABB-201, 1D	77+58	15.7 Lt.	1.0-2.0	303196	6	7.9			SM	A-1-b	II
HB-ABB-201, 2D	77+58	15.7 Lt.	5.0-7.0	303197	6	18.0			SM	A-2-4	II
HB-ABB-201, 3D	77+58	15.7 Lt.	10.0-12.0	303198	6	40.4			SC-SM	A-2-4	III
HB-ABB-201, 4D	77+58	15.7 Lt.	15.0-17.0	303199	6	21.7			SC-SM	A-4	III
HB-ABB-201, 5D	77+58	15.7 Lt.	20.0-21.0	303200	6	19.8			SM	A-2-4	II
HB-ABB-201, 5D/A	77+58	15.7 Lt.	21.0-22.0	303201	6	21.8			CL	A-4	IV
HB-ABB-203, 1D	85+10	13.5 Lt.	1.0-2.0	303202	7	7.7			SM	A-1-b	II
HB-ABB-203, 2D	85+10	13.5 Lt.	5.0-7.0	303203	7	4.8			SM	A-1-b	II
HB-ABB-203, 3D	85+10	13.5 Lt.	10.0-12.0	303204	7	23.2			SC-SM	A-4	III
HB-ABB-203, 4D	85+10	13.5 Lt.	15.0-17.0	303205	7	26.4	-N	P-	CL	A-4	IV
HB-ABB-203, 5D	85+10	13.5 Lt.	20.0-22.0	303206	8	40.3	-N	P-	CL	A-4	IV
HB-ABB-203, 6D	85+10	13.5 Lt.	25.0-27.0	303207	8	24.3	-N	P-	CL	A-4	IV
HB-ABB-203, 7D	85+10	13.5 Lt.	30.0-32.0	303208	8	27.6	-N	P-	CL	A-4	III
HB-ABB-203, 8D	85+10	13.5 Lt.	35.0-37.0	303209	8	25.0	-N	P-	CL	A-4	IV
HB-ABB-205, 1D	139+62.5	16.5 Lt.	1.0-3.0	303210	9	14.8			SC-SM	A-2-4	II
HB-ABB-205, 2D	139+62.5	16.5 Lt.	5.0-7.0	303211	9	9.2			CL	A-4	IV
HB-ABB-205, 3D	139+62.5	16.5 Lt.	10.0-12.0	303212	9	33.9			SP-SM	A-3	0
HB-ABB-205, 4D	139+62.5	16.5 Lt.	15.0-17.0	303213	9	31.9			CL	A-4	IV

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.

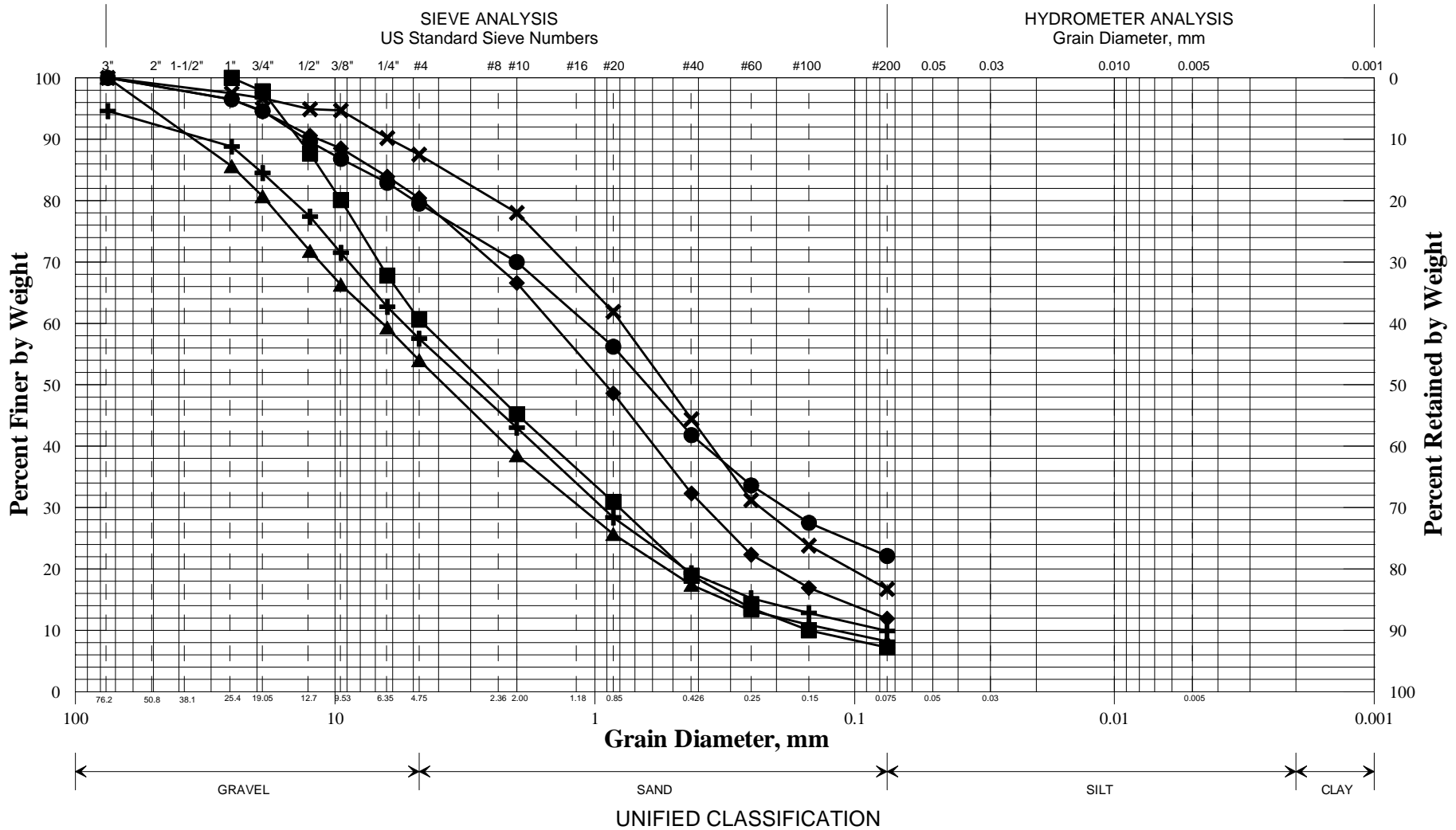
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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

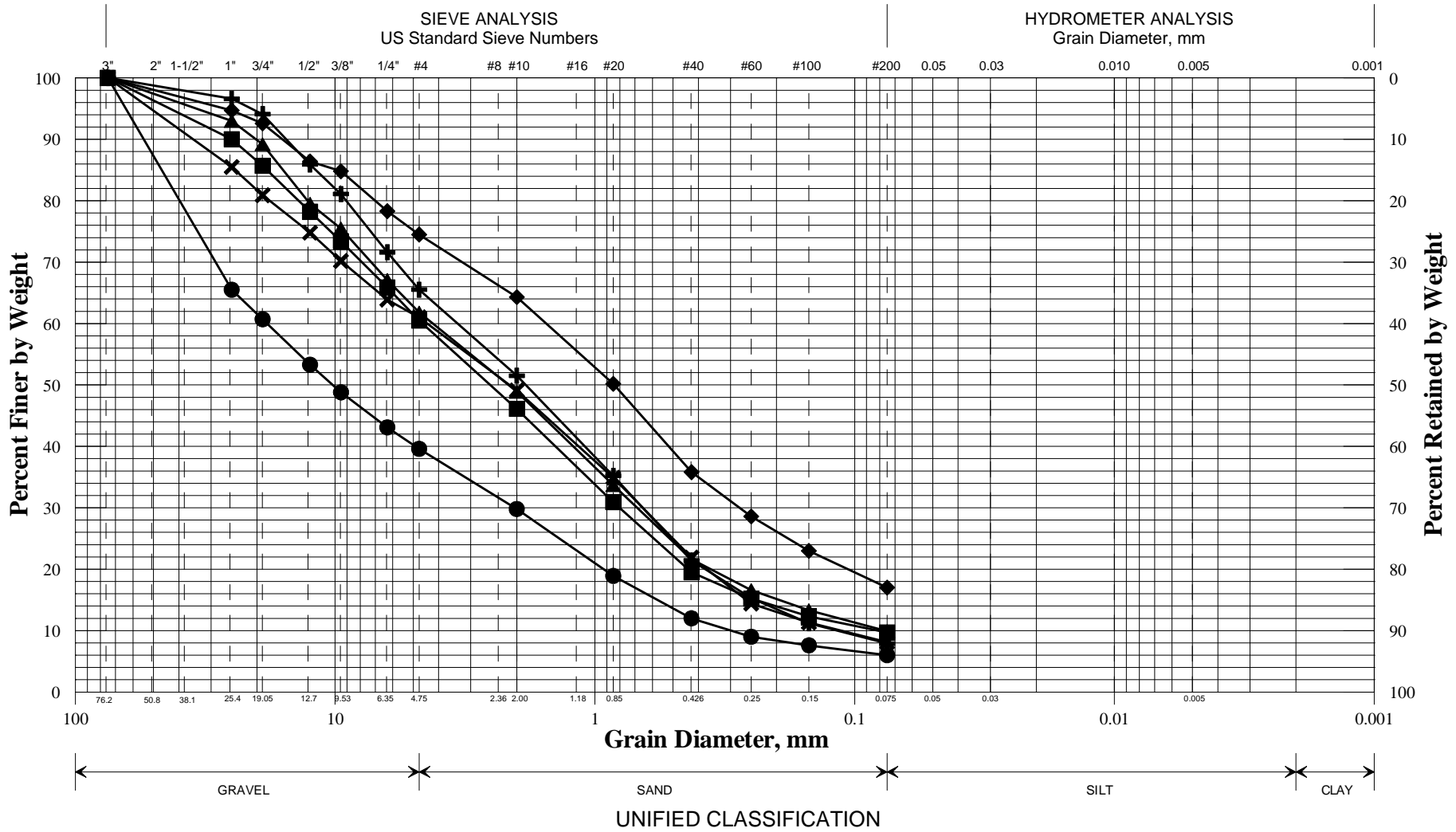
State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-101/B1	13+00	8.0 RT	0.83-2.4	Gravelly SAND, trace silt.	2.8			
◆	HB-ABB-102/B2	13+00	14.0 RT	0.0-2.0	SAND, little gravel, little silt.	3.5			
■	HB-ABB-103/B3	23+18	8.0 LT	1.0-2.3	Gravelly SAND, trace silt.	1.3			
●	HB-ABB-104/B4	23+18	14.0 LT	0.0-1.1	SAND, some silt, some gravel.	4.1			
▲	HB-ABB-105/B5	33+00	8.0 RT	0.58-2.4	Sandy GRAVEL, trace silt.	3.1			
×	HB-ABB-106/B6	33+00	15.0 RT	0.0-1.1	SAND, little silt, little gravel.	2.9			

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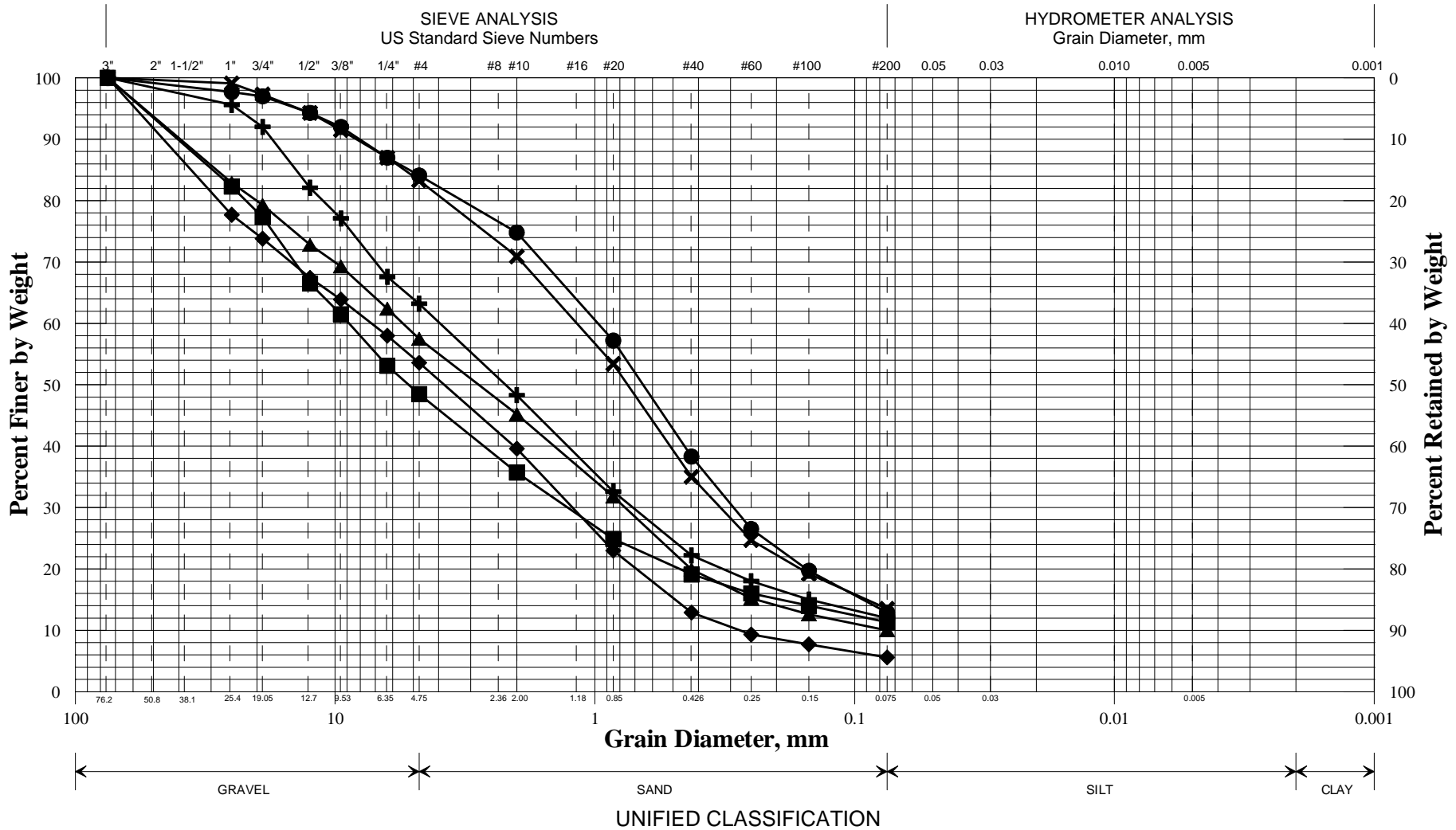
State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-107/B7	47+00	8.5 LT	0.67-2.4	SAND, some gravel, trace silt.	3.1			
◆	HB-ABB-108/B8	47+00	14.0 LT	0.0-1.6	SAND, some gravel, little silt.	2.9			
■	HB-ABB-109/B9	67+00	8.0 RT	0.42-1.5	Gravelly SAND, little silt.	2.4			
●	HB-ABB-110/B10	67+00	12.0 RT	0.0-3.5	GRAVEL, some sand, trace silt.	2.8			
▲	HB-ABB-111/B11	87+00	8.5 LT	0.5-5.0	Gravelly SAND, trace silt.	2.2			
×	HB-ABB-112/B12	87+00	12.5 LT	0.0-2.5	Gravelly SAND, trace silt.	2.9			

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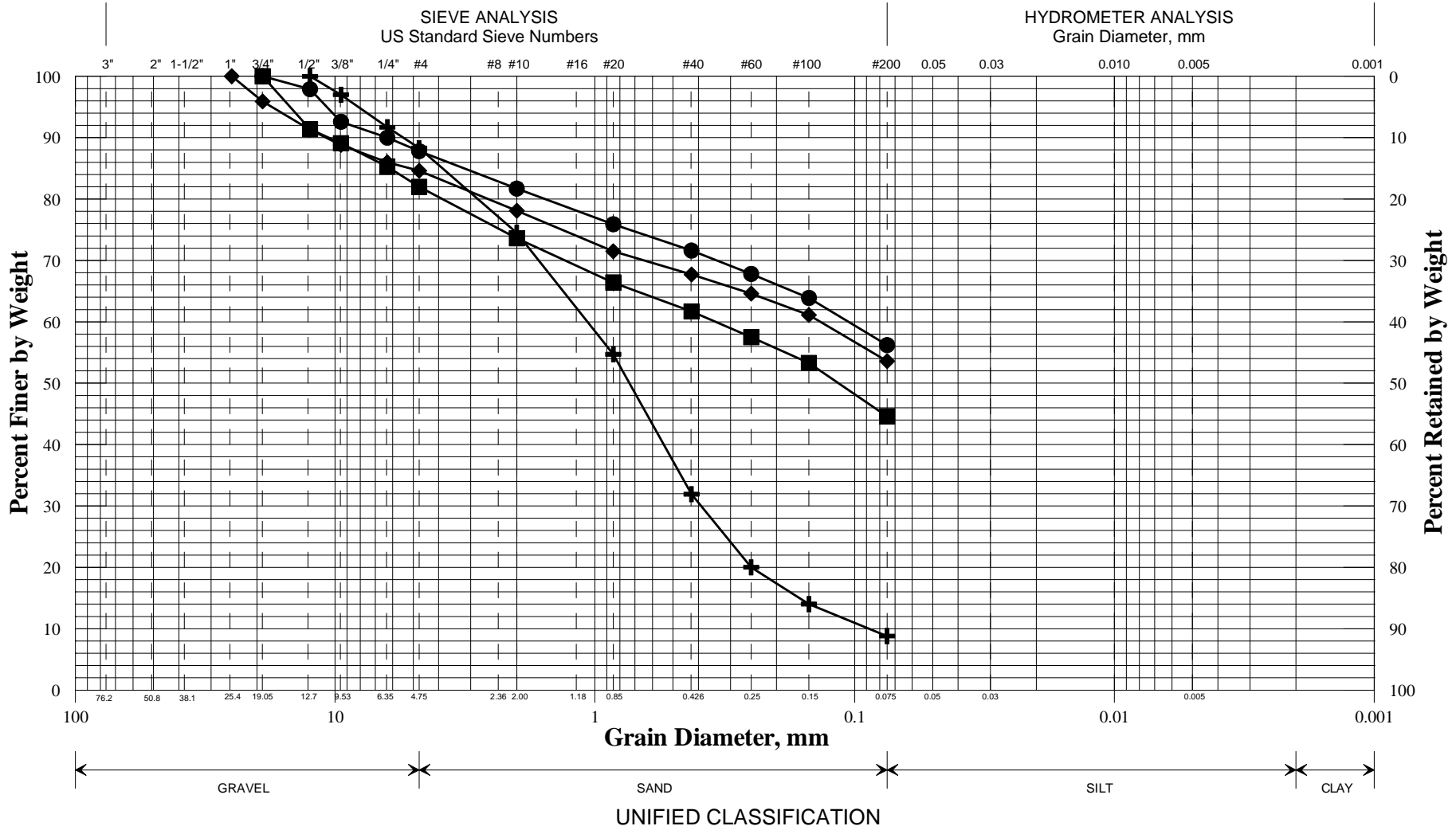
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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-113/B13	107+00	8.5 RT	0.5-1.5	Gravelly SAND, little silt.	2.8			
◆	HB-ABB-114/B14	107+00	12.0 RT	0.0-1.7	Gravelly SAND, trace silt.	2.1			
■	HB-ABB-115/B15	127+00	8.5 LT	0.58-1.8	Sandy GRAVEL, little silt.	2.8			
●	HB-ABB-116/B16	127+00	12.5 LT	0.0-0.5	SAND, little gravel, little silt.	2.9			
▲	HB-ABB-117/B17	147+00	8.5 RT	0.58-1.60	Gravelly SAND, trace silt.	3.4			
×	HB-ABB-118/B18	147+00	12.5 RT	0.0-0.5	SAND, little gravel, little silt.	2.3			

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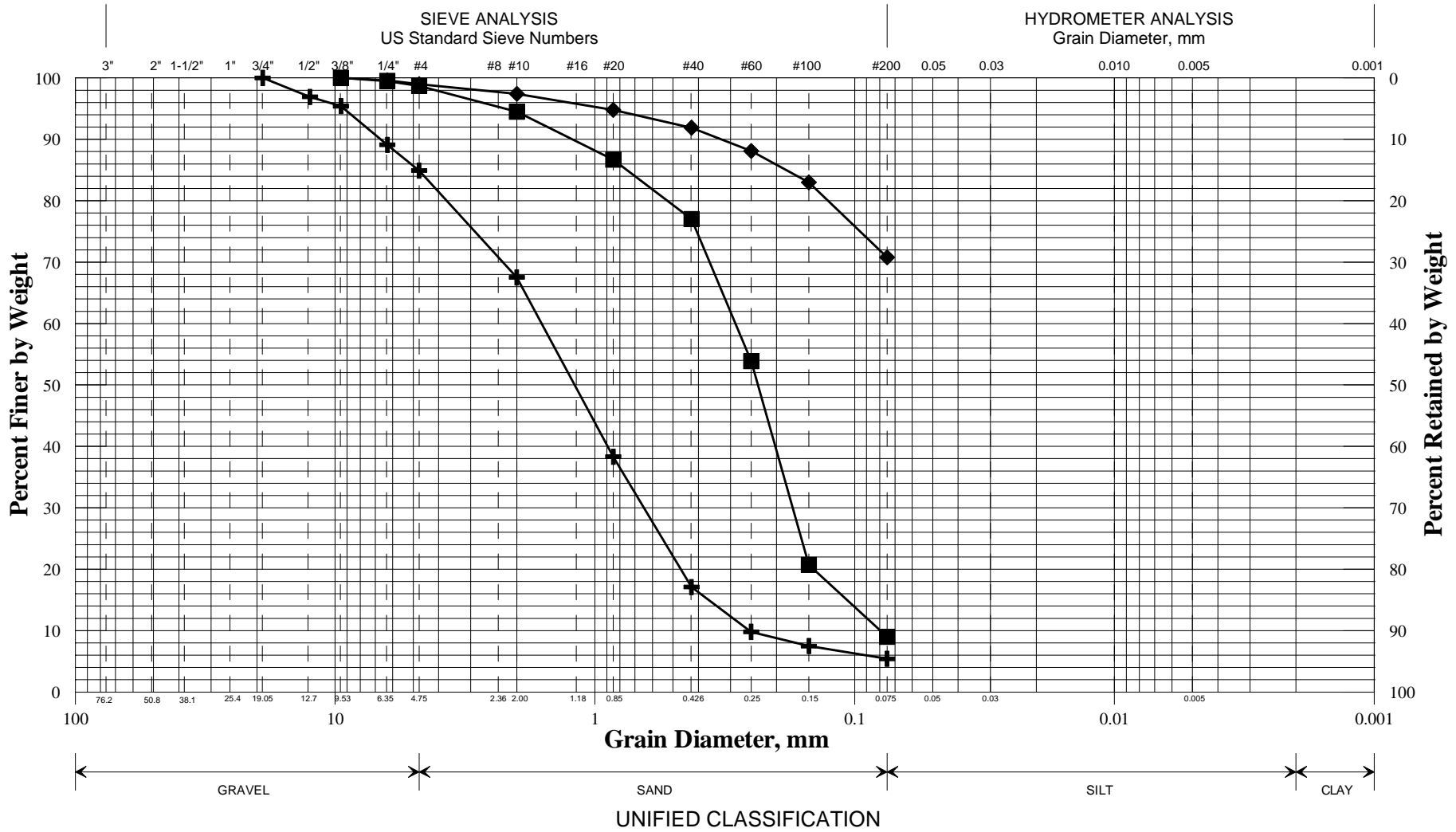
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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-101/S1	13+00	8.0 RT	2.4-5.0	SAND, little gravel, trace silt.	4.3			
◆	HB-ABB-104/S3	23+18	14.0 LT	1.1-5.0	SILT, some sand, little gravel.	21.6			
■	HB-ABB-105/S4	33+00	8.0 RT	2.4-5.0	Sandy SILT, little gravel.	18.3			
●	HB-ABB-107/S6	47+00	8.5 LT	2.4-5.0	SILT, some sand, little gravel.	11.7			
▲									
×									

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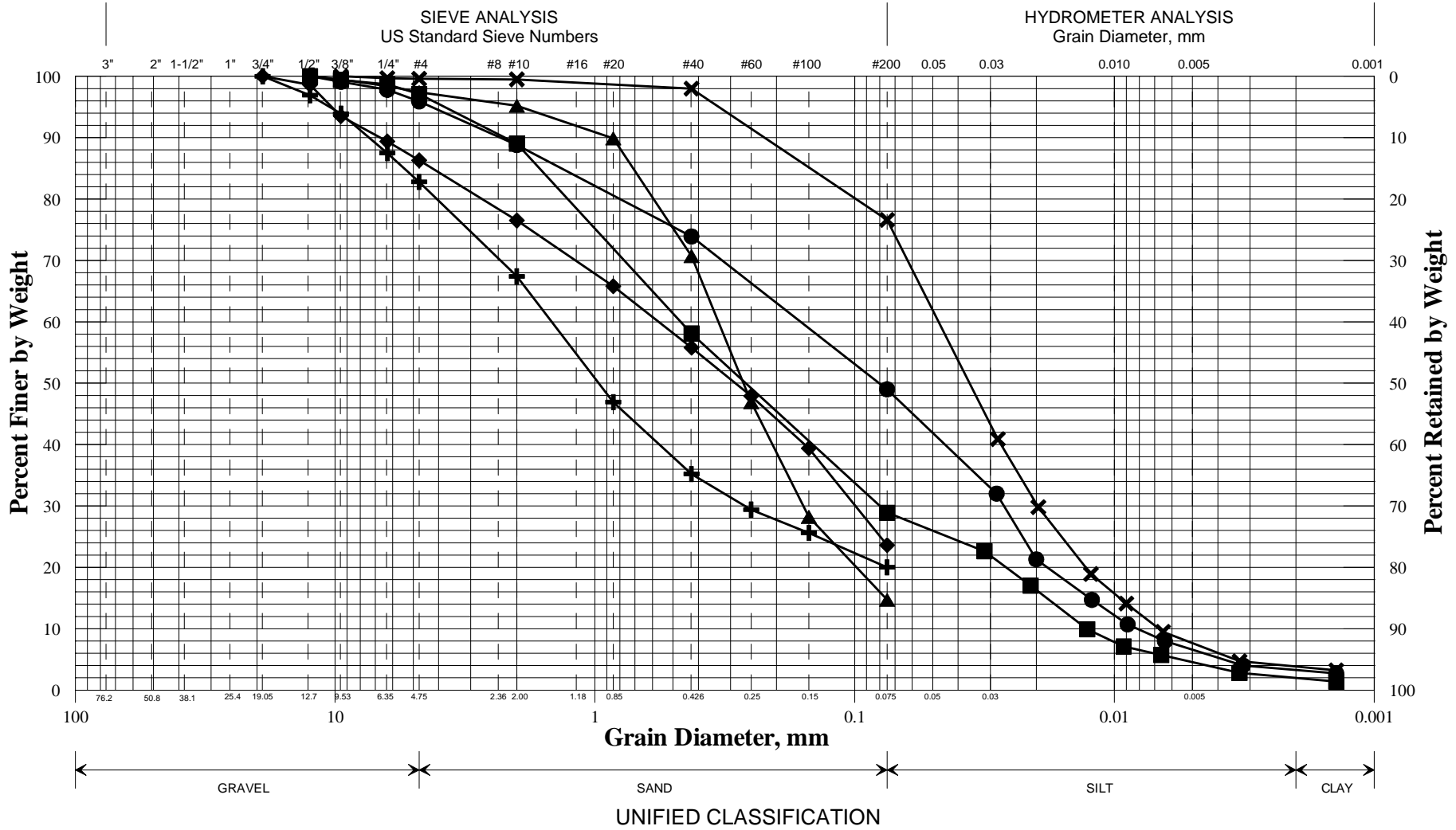
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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-109/S7	67+00	8.0 RT	2.9-5.0	SAND, little gravel, trace silt.	4.9			
◆	HB-ABB-113/S9	107+00	8.5 RT	2.9-5.0	SILT, some sand, trace gravel.	16.6			
■	HB-ABB-115/S10	127+00	8.5 LT	1.8-5.0	SAND, trace silt, trace gravel.	6.2			
●									
▲									
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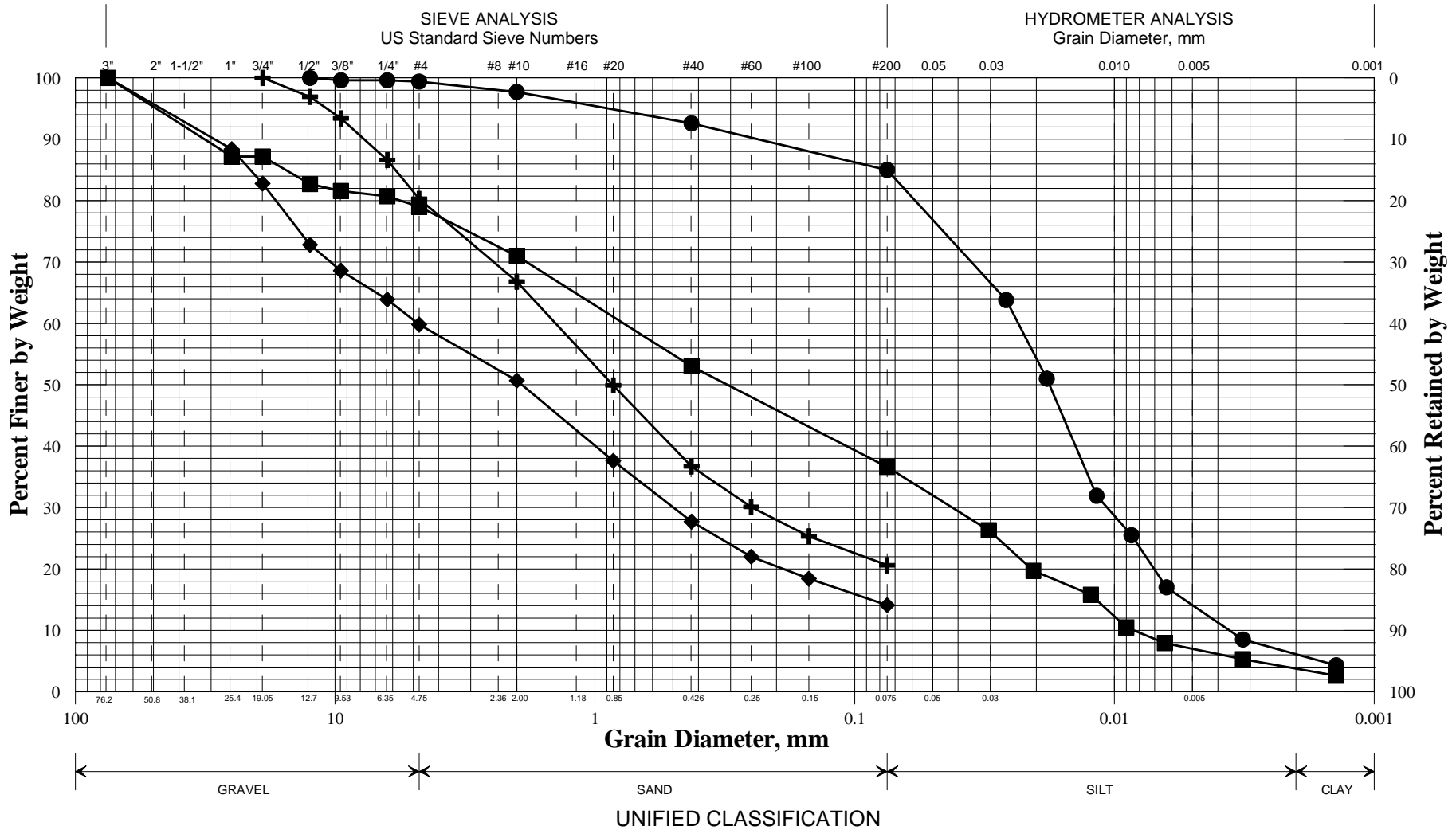
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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-201/1D	77+58	15.7 LT	1.0-2.0	SAND, little silt, little gravel.	7.9			
◆	HB-ABB-201/2D	77+58	15.7 LT	5.0-7.0	SAND, some silt, little gravel.	18.0			
■	HB-ABB-201/3D	77+58	15.7 LT	10.0-12.0	SAND, some silt, trace gravel, trace clay.	40.4			
●	HB-ABB-201/4D	77+58	15.7 LT	15.0-17.0	Silty SAND, trace gravel, trace clay.	21.7			
▲	HB-ABB-201/5D	77+58	15.7 LT	20.0-21.0	SAND, little silt, trace gravel.	19.8			
×	HB-ABB-201/5DA	77+58	15.7 LT	21.0-22.0	SILT, some sand, trace clay, trace gravel.	21.8			

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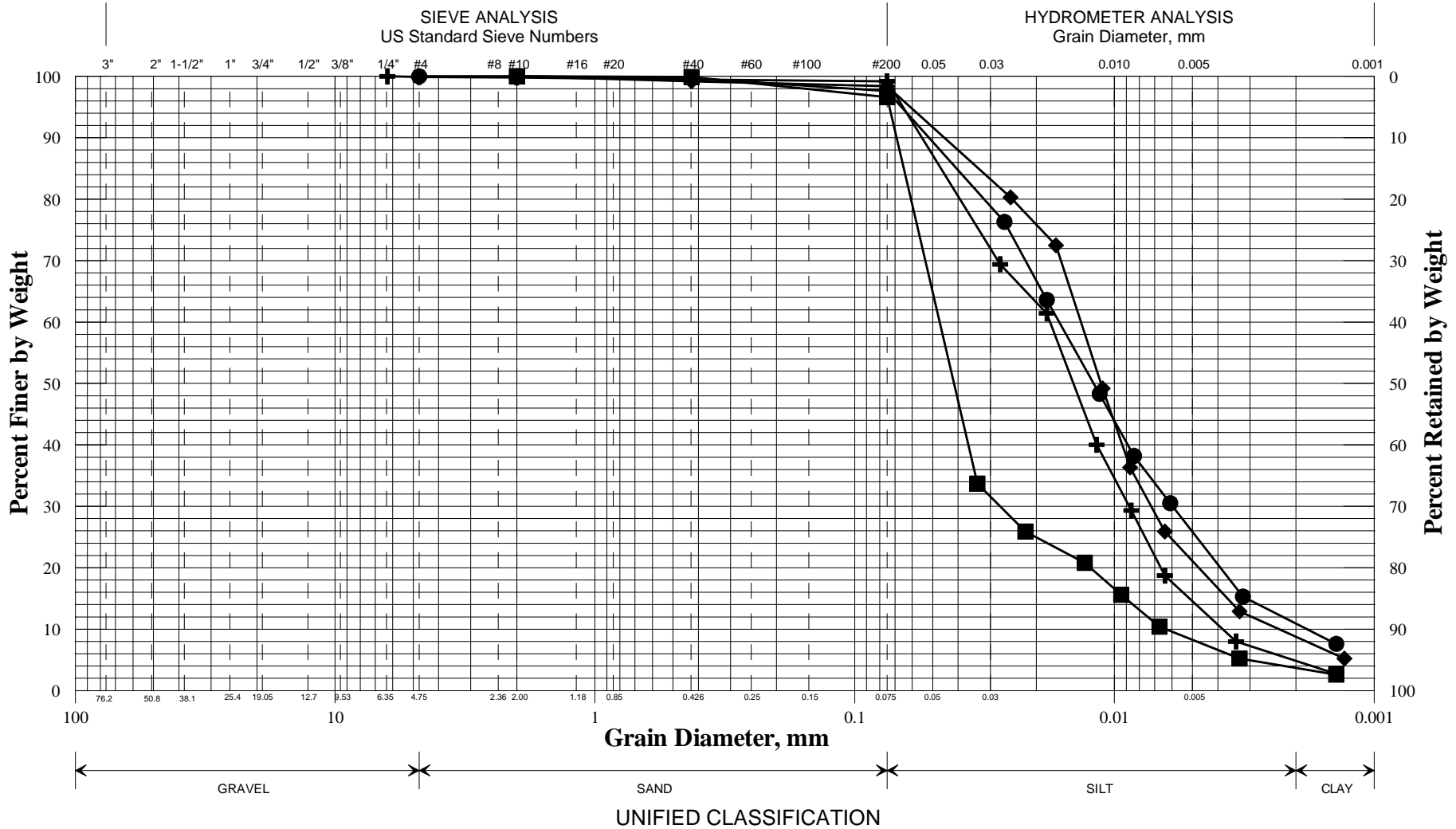
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GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-203/1D	85+10	13.5 LT	1.0-2.0	SAND, little silt, little gravel.	7.7			
◆	HB-ABB-203/2D	85+10	13.5 LT	5.0-7.0	Gravelly SAND, little silt.	4.8			
■	HB-ABB-203/3D	85+10	13.5 LT	10.0-12.0	SAND, some silt, some gravel, trace clay.	23.2			
●	HB-ABB-203/4D	85+10	13.5 LT	15.0-17.0	SILT, little sand, trace clay, trace gravel.	26.4			NP
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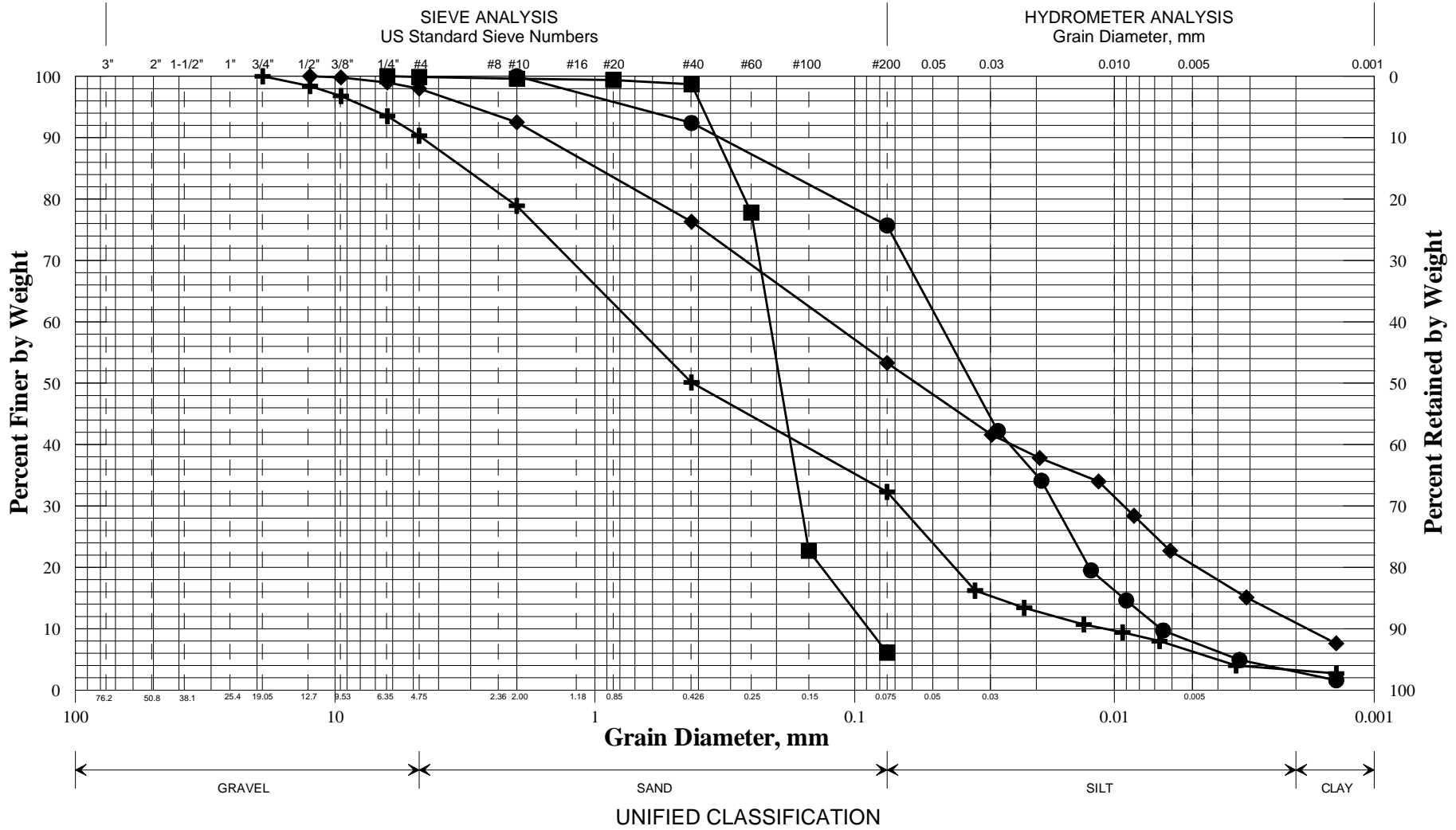
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GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-203/5D	85+10	13.5 LT	20.0-22.0	SILT, trace clay, trace sand, trace gravel.	40.3			NP
◆	HB-ABB-203/6D	85+10	13.5 LT	25.0-27.0	SILT, trace clay, trace sand.	24.3			NP
■	HB-ABB-203/7D	85+10	13.5 LT	30.0-32.0	SILT, trace clay, trace sand.	27.6			NP
●	HB-ABB-203/8D	85+10	13.5 LT	35.0-37.0	SILT, trace clay, trace sand.	25.0			NP
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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
+	HB-ABB-205/1D	139+62.5	16.5 LT	1.0-3.0	SAND, some silt, trace gravel, trace clay.	14.8			
◆	HB-ABB-205/2D	139+62.5	16.5 LT	5.0-7.0	Silty SAND, little clay, trace gravel.	9.2			
■	HB-ABB-205/3D	139+62.5	16.5 LT	10.0-12.0	SAND, trace silt, trace gravel.	33.9			
●	HB-ABB-205/4D	139+62.5	16.5 LT	15.0-17.0	SILT, some sand, trace clay.	31.9			
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Appendix C

Calculations

Bearing Resistance - Existing Soils:

Part 1 - Service Limit State

Nominal and factored Bearing Resistance - Box Culvert at Sta. 139+64 on Silty 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: Silty Sand (CL)

Based on N-values, soils are very loose at the bearing elevation

Density In Place: loose

Bearing Resistance: Ordinary Range (ksf) 2 to 4

Recommended Value of Use:

$$q_{nom} := 3 \cdot ksf$$

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

$$\phi_{service_bc} := 1.0$$

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

$$q_{factored_service_bc} = 3 \cdot ksf$$

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

Part 2 - Strength Limit State

Nominal and factored Bearing Resistance - Box Culvert on Silty Sand

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

Assumptions:

1. The box will be founded at ~ Elev 394.8

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 $B_{box} := 8 \cdot ft$

Length of box culvert, L $L_{box} := 76 \cdot ft$

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

$$s_c := 1 + \left(\frac{B_{\text{box}}}{L_{\text{box}}} \right) \left(\frac{N_q}{N_c} \right) \quad s_c = 1.07$$

$$s_\gamma := 1 - 0.4 \left(\frac{B_{\text{box}}}{L_{\text{box}}} \right) \quad s_\gamma = 0.9579$$

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

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

$$\frac{D_{\text{footing}}}{B_{\text{box}}} = 0.25 \quad \text{for } \phi=32 \text{ degrees} \quad d_q := 1.2$$

$N_{cm} := N_c \cdot s_c \cdot i_c$ $N_{cm} = 37.9421$ LRFD Eq. 10.6.3.1.2a-2

$N_{qm} := N_q \cdot s_q \cdot d_q \cdot i_q$ $N_{qm} = 29.67$ LRFD Eq. 10.6.3.1.2a-3

$N_{\gamma m} := N_\gamma \cdot s_\gamma \cdot i_\gamma$ $N_{\gamma m} = 28.93$ LRFD Eq. 10.6.3.1.2a-4

Coefficients for Groundwater Depths LRFD Table 10.6.3.1.2a-2

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

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

$$q_{\text{nominal}} = 10.9 \cdot \text{ksf}$$

Factored Bearing Resistance for Strength Limit State

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

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

$$q_{\text{factored}} = 4.9 \cdot \text{ksf}$$

Recommend a limiting factored bearing resistance of 5.0 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 $B_{\text{box}} := 8 \cdot \text{ft}$
 Length of box culvert, L $L_{\text{box}} := 76 \cdot \text{ft}$
 Thickness of box culvert, t $t_{\text{box}} := 12 \cdot \text{in}$ assumed
 Depth of box, D $D_{\text{box}} := 10 \cdot \text{ft}$
 Bearing Resistance: $q_{\text{factored_service_bc}} = 3 \cdot \text{ksf}$ Calculated above
 Modulus of Elasticity: Site soils at bearing elevation are Silty Sand (loose)
 From Bowles Table 2-8 Modulus E_s for silty sand ranges from 104 - 418 ksf

Use Modulus of Elasticity, $E_s := 275 \cdot \text{ksf}$
 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, $\mu := 0.35$

$$E_{\text{prime_s}} := \frac{1 - \mu^2}{E_s} \quad E_{\text{prime_s}} = 0.003191 \cdot \frac{\text{ft}^2}{\text{kip}}$$

Analyze corner:

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

$$H_{\text{inf}} := \frac{5 \cdot B_{\text{box}}}{B_{\text{box}}} \quad H_{\text{inf}} = 5 \quad \text{N in Table 5-2} \quad \text{From Table 5-2 for N=5 and M=9.5}$$

$$\frac{L_{\text{box}}}{B_{\text{box}}} = 9.5 \quad \text{M in Table 5-2} \quad I_1 := 0.535$$

$$I_2 := 0.139 \quad \text{by interpolation}$$

Determine Steinbrenner influence factor - Bowles Section 5-6:

$$I_s := I_1 + \left[\frac{1 - (2 \cdot \mu)}{1 - \mu} \right] \cdot I_2 \quad I_s = 0.5992$$

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

Depth ratio: $\frac{D_{\text{box}}}{B_{\text{box}}} = 1.25 \quad \frac{L_{\text{box}}}{B_{\text{box}}} = 9.5 \quad \mu = 0.35 \quad I_F := 0.78$

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

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

$$k_s = 49 \cdot \text{pci}$$

Recommend Modulus of Subgrade Reaction of 50 pci

Appendix D

Special Provisions

SPECIAL PROVISION
SECTION 203
EXCAVATION AND EMBANKMENT
(Culvert Bedding Stone)

Description This work shall consist of constructing a foundation pad of Culvert Bedding Stone in accordance with these specifications and in reasonably close conformity with the width, length, grade and thickness shown on the Plans or established by the Resident.

Materials Culvert Bedding Stone shall meet the requirements of Standard Specification Section 703.22, Underdrain Backfill Material, Type C.

Construction Requirements The Culvert Bedding Stone shall be placed and graded as shown on the Plans or as directed by the Resident, and shall be compacted as required to ensure that all voids in the stone are filled, as approved by the Resident.

Method of Measurement Culvert Bedding Stone will be measured by the cubic yard, complete, in place.

Basis of Payment The accepted quantity of Culvert Bedding Stone will be paid for at the Contract unit price per cubic yard, complete, in place.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
203.55 Culvert Bedding Stone	Cubic Yard

SPECIAL PROVISION
SECTION 620 - GEOTEXTILES
(Reinforcement Geogrid)

Amend Standard Specification 620 – GEOTEXTILES to include the following:

620.01 Description This work shall consist of furnishing and installing Reinforcement Geogrid within the Culvert Bedding Stone in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions shown on the plans or as directed by the Resident.

620.02 Material Reinforcement Geogrid shall consist of a regular network of woven, integrally formed, polymeric tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil, aggregate or other material. The Reinforcement Geogrid structure shall be dimensionally stable to retain its geometry under construction stresses and shall have high resistance to damage during construction, ultraviolet degradation, and all forms of chemical and biological degradation encountered in the soil being reinforced. Non-woven Reinforcement Geogrid are not acceptable for this application.

The Reinforcement Geogrid shall meet or exceed the Minimum Average Roll Values (MARV) of the properties in Table 1. Acceptable manufacturers for Reinforcement Geogrids must be approved by the Resident.

Table 1 - Physical Property Requirements
(Non-Woven Biaxial Reinforcement Geogrid)

Reinforcement Geogrid Mechanical Property	Test Method	Minimum Average Roll Value (MARV) ¹
Tensile strength at 5% Strain MD or XD	ASTM D 6637	1,200 lb/ft
Rib Junction Strength	GRI-GG2	1,000 lb/ft in both directions
Aperture Openings		Between 0.75 and 3 inches
Percent Open Area		50 to 80%

¹ Values are minimum average roll values determined in accordance with ASTM D 4759

A biaxial Reinforcement Geogrid shall be used in this application.

620.03 Placement Reinforcement Geogrid shall be installed, in accordance with the manufacturer's recommendations, unless otherwise modified by this Special Provision. The Reinforcement Geogrid shall be placed within the layers of Crushed Stone Bedding at the proper elevation and alignment as shown on the Plans or as directed by the Resident.

1. The Reinforcement Geogrid shall be placed in continuous longitudinal strips. Splicing along the length will not be allowed. Reinforcement Geogrid shall be oriented such that the roll length runs either parallel or perpendicular to the construction centerline. The Contractor shall verify correct orientation of the Reinforcement Geogrid.

2. Reinforcement Geogrid may be temporarily secured in-place with staples, pins, sand bags or backfill as required by fill properties, fill placement procedures, or weather conditions, or as directed by the Resident.
3. Coverage of less than 100 percent shall not be allowed.
4. The Reinforcement Geogrid shall be lightly anchored and pulled taut to reduce any slack as directed by the Resident.
5. Fill shall not be dumped directly onto the Reinforcement Geogrid. It shall be dumped at the edge of the Reinforcement Geogrid or on a previous course of fill with a minimum compacted depth of 8 inches.
6. The Reinforcement Geogrid shall be covered with fill materials within 7 days of placement to protect against unnecessary exposure.
7. Fill may then be pushed onto the Reinforcement Geogrid using a track mounted bulldozer. At no time shall construction equipment be allowed directly onto the Reinforcement Geogrid. Track mounted equipment shall be allowed on previous courses of fill with a minimum compacted depth of 8 inches. Smooth drum roller compaction equipment shall be allowed on previous courses of fill with a minimum compacted depth of 8 inches and spread fill with a minimum depth of 12 inches, loose measure. At no time shall rubber tired or sheeps-foot rollers be allowed onto the reinforced fill. Turning of vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the Reinforcement Geogrid. Sudden breaking and sharp turning shall be avoided. Equipment speeds over 10 MPH shall not be allowed.
8. Placement, spreading, and compaction of soil on top of the Reinforcement Geogrid shall advance from one end of the Reinforcement Geogrid and move towards the other. Care shall be taken to minimize the development of wrinkles and to ensure that the Reinforcement Geogrid doesn't move from its position during fill placement. A spotter shall observe all fill placement operations to ensure the Reinforcement Geogrid does not slip, achieves the minimum coverage specified on the Plans, and is not damaged by the work.
9. Fill shall be compacted as specified in (1) the Standard Specifications or (2) to at least 90 percent of the maximum dry density determined in accordance with AASHTO T-180, whichever is greater. Density testing shall be made at a minimum frequency of one (1) test per lift or as otherwise specified in the Standard Specifications. Care shall be taken not to drive test apparatus through the Reinforcement Geogrid tensile elements.
10. All rutting formed during construction shall be filled with new Culvert Bedding Stone. In no case shall rutting be filled by blading down

620.04 Overlap Adjacent rolls of Reinforcement Geogrid shall be overlapped a minimum of 1 foot.

620.05 Seams Seams along adjacent lengths of Reinforcement Geogrid shall be tied together with hog rings or cable ties every 3 to 6 feet.

620.06 Certification Prior to construction the Contractor shall submit to the Resident the Manufacturer's certification that the Reinforcement Geogrid supplied has been evaluated in full compliance with this Specification and is fit for long-term, critical soil reinforcement applications. The Contractor's submittal package shall include, but not be limited to, actual tests for tension/creep, durability/aging, construction damage, and quality control tensile testing.

620.08 Shipment, Storage, Protection, and Repair of Fabric The Contractor shall check the Reinforcement Geogrid upon delivery to ensure that the proper material has been received. Each Reinforcement Geogrid roll shall be shipped in a protective bag and clearly marked with roll number, lot number, geogrid style and principle strength direction. During all periods of shipment and storage, the Reinforcement Geogrid shall be protected from temperatures greater than 140°F and all deleterious materials that might otherwise become affixed to the Reinforcement Geogrid and effect its performance. The manufacturer's recommendations shall be followed with regard to protection from direct sunlight. The Reinforcement Geogrid shall be stored off the ground in a clean, dry environment out of the pathway of construction equipment.

Any Reinforcement Geogrid damage shall be repaired or replaced in accordance with the manufacturer's recommendations. The Contractor shall replace any Reinforcement Geogrid damaged during installation at no additional cost to the Department.

620.09 Method of Measurement Reinforcement Geogrid will be measured by the number of Square Yards of surface area installed. Overlaps for connections, splices, patches, and repairs of damaged Reinforcement Geogrid, etc. are incidental to this Pay Item.

620.10 Basis of Payment Reinforcement Geogrid placement will be paid for per Square Yard in-place which shall be full compensation for all off-loading, inspection, storage, labor, materials, equipment, tools and any incidentals to complete the installation.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
620.65 Reinforcement Geogrid	Square Yard