SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

GEOTECHNICAL DESIGN REPORT FOR THE RECONSTRUCTION OF MAINE ROUTE 4 MADRID-PHILLIPS, MAINE MaineDOT WIN 18247.00

PREPARED FOR:

Maine Department of Transportation
Augusta, Maine

PREPARED BY:

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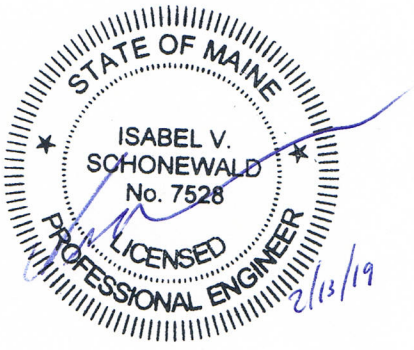

REVIEWED BY:

Kathleen Maguire, P.E.
MaineDOT Senior Geotechnical Engineer

February 2019

SchonewaldEA Project No. 17-101

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INTRODUCTION

Schonewald Engineering Associates, Inc. (SchonewaldEA has prepared this Geotechnical Design Report for the Maine Department of Transportation (MaineDOT) to present subsurface information and provide geotechnical design and construction recommendations for the reconstruction of a 4.42-mile section of Maine Route 4 in Madrid and Phillips, Maine (MaineDOT WIN 18247.00). The location of the project is depicted on Sheet 1-Location Map. The project includes replacing two bridges; Weymouth Bridge over the Sandy River in Madrid and Wing Bridge over the Sandy River in Phillips. Separate geotechnical design reports were prepared for the bridge projects.

SchonewaldEA's work on this project has been completed under multiple contracts. The 2014 subsurface investigation program and the subsequent geotechnical design work through February 2017's draft PIC submittal were completed in accordance with separate contracts under SchonewaldEA's GCAs with MaineDOT. SchonewaldEA's final design work commenced in Spring 2017 under a separate Project-Specific Project Contract Under GCA dated April 3, 2017. This report is subject to the limitations contained in the Closure section of the report. A quality assurance review of the technical aspects of SchonewaldEA's work was completed by MaineDOT

PROJECT DESCRIPTION

The purpose of the project is to improve the safety and operation of this section of roadway by improving sight distance, paving existing gravel shoulders, and upgrading existing guardrail. The roadway section has been widened to accommodate 11-foot wide travel lanes and to provide 4- to 5-foot wide paved shoulders. Existing over-steep backslopes and foreslopes have also been flattened to acceptable slopes where feasible to improve overall stability and erosion control, thereby increasing safety and reducing long-term maintenance issues. The horizontal alignment generally follows the existing centerline with a few notable exceptions necessary to accommodate the wider road cross-section while addressing safety, environmental, and constructability concerns. Likewise, the vertical alignment generally follows existing ground with minor variations to minimize impacts to drives and adjacent properties and a few exceptions to address safety concerns.

GEOLOGICAL SETTING

Surficial geology along the Sandy River through Madrid and Phillips, including the project alignment, is mapped as glacial till and shallow bedrock (thin drift) (Surficial Geologic Map of Maine, 1985).

Bedrock underlying the alignment is mapped as metasedimentary rock of moderate metamorphic grade associated with the Kearsarge Central Maine Synclinorium. The alignment is underlain by bedrock of the Smalls Falls Formation (a meta carbonaceous pelite (mud stone) of Silurian age), the Madrid Formation (a meta interbedded sandstone and limestone of Devonian-Silurian age), and the massive pelite member of the Carrabassett Formation (a meta pelite (mudstone) of Devonian age). The alignment is in close proximity to two muscovite granodiorite intrusive bodies that post-date the Smalls Falls, Madrid, and Carrabassett Formations. (Bedrock Geologic Map of Maine, 1985).

SUBSURFACE INVESTIGATION

A subsurface exploration program was completed in August-September 2014. The program consisted of completing 66 test borings and 12 test probes along the project alignment. The highway test borings were designated HB-PM-101 through -162 and -114A, -137A, -154A and -159A. The test probes were designated HP-PM-1 through -12. The approximate locations of the test borings and test probes are depicted on Sheets 2 through 40 –Boring Location Plans, as well as on the project plans.

The objectives of the subsurface exploration program were to evaluate 1) the type and character of the soils at discrete points along the project alignment; and 2) the depth to refusal in proposed excavation and cut areas along the alignment. Subsurface conditions encountered in each of the test borings and probes are described on separate logs (test borings) or summary table (test probes) that are included in Appendix A.

SchonewaldEA coordinated the execution of the subsurface exploration program. The explorations were drilled by New England Boring Contractors (NEBC), formerly named Maine Test Borings, of Hermon, Maine, and were observed and logged by a SchonewaldEA geotechnical engineer. Control for exploration layout was established by MaineDOT prior to SchonewaldEA mobilizing the drill rig. The as-drilled locations of the test borings were determined by MaineDOT using optical survey methods. The as-drilled locations of the test probes were determined by SchonewaldEA in the field by measuring from prominent site features (HP-PM-1 through -11) or by MaineDOT using optical survey methods (HP-PM-12). The as-drilled locations and ground surface elevations are included on the logs and summary table included in Appendix A.

The test borings were typically advanced using solid-stem or hollow-stem auger boring techniques to avoid the use of drilling fluid (water). Standard Penetration Tests (SPTs) were completed and split-spoon soil samples obtained typically near the ground surface and at approximately 5-foot intervals thereafter in the test borings. Subsurface conditions between sample intervals were based on visual examination of auger cuttings, as well as drilling behavior. During SPT sampling, the sampler is driven 24 inches and the hammer blows for each 6-inch interval of penetration is recorded. The sum of the blows for the second and third intervals is the N-value or standard penetration resistance. SPTs for this project were conducted using a rope and cathead, which is considered the “standard” hammer system and requires no correction to obtain the N_{60} value.

Rock core was obtained in six test borings that were located at strategic locations along the project alignment where rock was exposed in the vicinity of (backslope) cuts. Rock core was obtained in test borings HB-PM-104 (Station 515+03), -122 (Station 577+99), -126 (Station 582+99), -135 (Station 634+98) -138 (Station 642+49), and -162 (Station 738+54). The rock core test borings were advanced using cased boring techniques during which casing was spun using water to seat it into bedrock. Each boring was extended through overburden to refusal and 5 feet of NQ2 (N-size, double-barrel core barrel) rock core was obtained. Standard Penetration Tests (SPTs) were completed and split-spoon soil samples obtained near the ground surface and at five-foot intervals to the bottom of the overburden. The rock core is described on the boring logs included as Appendix A and photos of the rock core are included as Appendix B.

The test probes were completed subsequent to completing the test boring program. Probe locations were selected based on the preliminary project plans and were intended to capture additional information in anticipated cut areas. The test probes were typically advanced using solid-stem augers without SPTs or split-spoon samples. Representative grab samples were obtained from the auger flights at select depths in some probes. Subsurface conditions were based on visual examination of auger cuttings, as well as drilling behavior.

The explorations were terminated at auger refusal or below the anticipated depth of the bottom of the excavation or cut at the exploration location, whichever was shallower. The boreholes were backfilled with cuttings, supplemented with manufactured sand and gravel, upon completion of the explorations. Pavement was patched. Soils samples and rock core were delivered to the MaineDOT geotechnical laboratory in Bangor.

LABORATORY TESTING

A laboratory testing program consisting of standard grain size analyses (AASHTO T88-93-Grain Size Distribution Curve) was conducted on soil samples obtained in the test borings to assist in soil classification, evaluation of engineering properties of the soils, and geologic assessment of the project site. Laboratory

testing consisted of 128 standard grain size analyses and 14 grain size analyses with hydrometer. Due to the age of the samples when the grain size testing was completed, no water content information was determined in the lab. One sample was tested for organic content (AASHTO T267-Loss on Ignition). The results of the laboratory tests are provided in Appendix C. Laboratory test results are also summarized on the boring logs included in Appendix A.

SUBSURFACE CONDITIONS

Overburden Soils: A relatively thin layer of granular fill was encountered near the ground surface in some of the explorations.

Overburden soils encountered along the project alignment consist predominantly of medium dense to very dense silty sands and gravels (glacial till), with numerous cobbles. Grain size analyses conducted on the glacial till soil samples obtained in the test borings 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 a GM, GW-GM, GC-GM, SM, SW-SM or ML under then Unified Classification System. Glacial till soils are characterized as a mixture of silt, sands and gravel as evidenced by the results of the gradation tests.

Organic soils consisting of organic silt and sandy silt with varying amounts fibrous peat and/or inorganic sands and silt were encountered in four locations along the project:

- Between approximate Stations 535+00 and 537+00 near the outlet to Harvey Pond (HB-PM-109 through -113);
- Approximate Station 630+42 (HB-PM-134);
- Between approximate Stations 657+00 and 663+50 (HB-PM-144 and -145); and
- Approximate Station 687+11 (HB-PM-152).

The organic soils ranged from less than one foot thick to about 3 feet thick and were encountered at depths ranging from approximately 0.8 to 10 feet below ground surface (BGS). Grain size analyses conducted on samples of organic soils resulted in the soil being classified as A-4 under the AASHTO Soil Classification System and an SM or ML under the Unified Soil Classification System.

Detailed descriptions of the soils encountered in the test borings are provided on the logs included in Appendix A.

Refusal: Refusal of the drilling tools was encountered in many of the test borings and probes at depths ranging from approximately 1.2 to 15.9 feet BGS. Refusal information is provided on the logs and summary table included in Appendix A. Refusal refers to the inability to advance the exploration deeper using standard overburden drilling procedures. In the absence of rock core, the exact nature of the refusal surface was not determined in the explorations.

Bedrock: Rock core was obtained in six of the test borings. Rock core was obtained in test borings HB-PM-104 (Station 515+03), -122 (Station 577+99), -126 (Station 582+99), -135 (Station 634+98) -138 (Station 642+49), and -162 (Station 738+54).

The bedrock core obtained in borings HB-PM-104, -135, -138, and -162 consisted of a Phyllite. Phyllite is a metamorphosed mudstone (pelite) of moderate metamorphic grade. The Phyllite that was cored had Rock Quality Designations (RQDs) ranging from 14% to 83%, which correlates to a Rock Quality of very poor to good.

The bedrock core obtained in borings HB-PM-122 and -126 consisted of Granite that had RQDs ranging from 72% to 90%, which correlates to a Rock Quality of fair to good.

Groundwater: The depth at which groundwater was observed in the explorations ranged from 2.2 to 14.6 feet BGS and is noted on the logs or probe summary table in Appendix A. Groundwater elevations will vary over time due to a number of factors including seasonal fluctuations, local soil conditions, topography, precipitation, and construction activity.

GEOTECHNICAL DESIGN AND CONSTRUCTION RECOMMENDATIONS

SchonewaldEA provides the following geotechnical design and construction recommendations for the reconstruction of the 4.42-mile section of Maine Route 4 in Madrid and Phillips, Maine (MaineDOT WIN 18247.00):

GENERAL EARTHWORK

Cut /backslopes are anticipated to be soil or a mixture of soil, cemented soil, boulders, and/or poor quality, intact bedrock. In the absence of groundwater seepage conditions, the glacial till soils should be considered stable for 2H:1V earth cut slopes. Fill and cut slopes shall be graded no steeper than 2H:1V. Isolated, low, and short lengths of 1.5H:1V cut slopes are permissible to accommodate drainage features provided no groundwater seeps or other wet areas are observed and provided erosion control / surface protection is provided. For such over-steepened slopes, protection shall consist of 2 feet of plain riprap underlain by non-woven erosion control geotextile.

Isolated areas of shallow refusal on bedrock should be expected. Bedrock will likely be encountered above the bottom of cuts to achieve roadway subgrade, excavations for drainage structures, and ditch/ backslope cuts in some areas of the project. If bedrock is encountered during excavation work, removal will be necessary. Machinery capable of removing intact rock, such as heavy-duty backhoes with rock ripping teeth, hydraulic thumbs, or pneumatic rock breaking equipment should be anticipated for this work. The nature, slope and degree of fracturing of the bedrock surface will not become evident until the excavations are underway and the bedrock surface is exposed. There is also a possibility that rock excavation will require blasting or pre-splitting. Construction activities shall not be permitted to disturb the bedrock mass or to create any rock falls or any open fissures. The final excavated bedrock surface shall be approved by the Resident. Blasting, if necessary, shall be conducted in accordance with Standard Specification Sections 105.2.7 and 203. In accordance with Standard Specification 203, the Contractor shall conduct pre-blast surveys, as well as blast vibration monitoring at any nearby structures in accordance with industry standards at the time of the blast. Strict measures shall be implemented to control flyrock.

It is anticipated that there may be seepage of water from fractures and joints exposed in some bedrock cut surfaces. Water shall be controlled by pumping from sumps until permanent drainage measures are in place.

Portions of the project alignment require new embankment construction or fill slopes to be constructed over existing embankment. Fill slopes shall be graded no steeper than 2H:1V. All existing vegetation, unsuitable existing fill materials, asphalt, topsoil and other organic or deleterious material shall be removed to expose suitable subgrade soils consisting of inorganic soils prior to fill placement for embankment construction. At the discretion of the Resident, unsuitable soils exposed at embankment subgrade shall be overexcavated and replaced using granular material that meets the material specifications for Granular Borrow for Underwater Backfill (703.19). The subgrade shall be prepared in this manner up to the limit of fill in embankment areas of the project.

Where proposed slopes are constructed against existing slopes, the existing slope shall be continuously benched by excavating steps into the existing slope. Benching is intended to key new fill into the existing slope to limit a potential slip surface and future differential settlement at the interface of the

existing and new material that can lead to erosion issues. Benching shall not be so excessive that the existing slope is destabilized. The Contractor is responsible for means and methods, adherence to all applicable OSHA standards, and maintaining a stable work area.

Where silt content is high, glacial till soils can exhibit low permeability and care during construction is often needed to maintain proper moisture content and not to overwork (pump) glacial till subgrade and fill soils. Resulting fill surfaces shall be firm and stable under the action of construction equipment.

The glacial till soils should be considered susceptible to erosion. To limit erosion of slopes in the glacial till soils, upgradient areas should be graded to limit convergent flow at the top of slope and implementation of stormwater best management practices are particularly important.

REINFORCED SOIL SLOPE

During the design process, a section of the alignment between approximately Stations 566+00 and 578+00 was shifted to the right to limit excavation of a particularly steep and high (approximately 70 to 80 feet) backslope above the active roadway. The alignment shifted towards the Sandy River and protected natural resources located at the toe of the foreslope. To accommodate the alignment shift without encroaching on the protected natural resources requires construction of a high embankment having a slope of 1.5H:1V from approximately Station 573+00 to Station 576+70, RT.

Stability analyses of the 1.5H:1V embankment were completed and are summarized in Appendix D. The analyses indicate the 1.5H:1V embankment would have a factor of safety less than the required 1.3 for failure surfaces that extend into the right travel lane of the roadway, even with the new 1.5H:1V embankment constructed using a well-compacted MaineDOT Granular Borrow and faced with a 3-foot thickness of riprap. We note that deep seated foundation stability is adequate. To achieve an adequate factor of safety and provide a stable slope, the 1.5H:1V slope shall be constructed with geosynthetic reinforcing to form a Reinforced Soil Slope (RSS). The RSS requirements are set forth in the project plan set. The RSS runs from approximately Station 573+00 to Station 576+70, RT, as depicted on the project plans.

The design requirements for the RSS were developed based on the required height of the slope, the permissible slope of the temporary excavation to achieve the RSS envelope (subgrade) per OSHA regulations, and the resulting available space to accommodate the geosynthetic reinforcing. Design analyses were completed to identify the critical geometric constraints of height of 1.5H:1V slope and available space to accommodate reinforcing. Two critical sections were identified. These geometries were then evaluated using reinforced soil slope analysis software entitled ReSlope that was developed by Adama Engineering. The ReSlope analyses were used to determine the requirements for the reinforcing elements (strength, length, and vertical spacing) and reinforced soil (strength in terms of internal angle of friction). ReSlope analyzes three failure scenarios (internal stability or tieback analysis; overall rotational stability or compound analysis; and overall translational stability or direct sliding analysis) to check that the selected reinforcement and reinforced soil system achieves the following minimum factors of safety:

- direct sliding or block translation (required minimum factor of safety (FSmin) ≥ 1.1);
- pullout resistance (required FSmin ≥ 1.5);
- geosynthetic strength (required FSmin ≥ 1.3); and
- deep seated foundation stability (soil shear strength) (required FSmin ≥ 1.3).

The results of the analyses indicate that overall rotational stability or compound failure controls at the bottom layer of reinforcing since this indicates that both pullout resistance and geosynthetic strength are adequate. The length of the bottom layer of reinforcing and, therefore, the overall RSS design, is essentially established under the compound failure mode.

Two RSS design sections were necessary based on the outcome of the analyses. The standard RSS section uses both geotextile reinforcing with gravel borrow reinforced soil and geogrid reinforcing with 2-inch crushed stone reinforced soil. The standard RSS section applies between Stations 573+00 RT to 575+65 RT and between Stations 576+30 RT and 576+70 RT. A special RSS section uses only geogrid reinforcing with 2-inch crushed stone reinforced soil. The special RSS section applies between Stations 575+65 RT to 576+30 RT. Details for standard and special RSS sections are set forth on the project plans. The RSS shall include a riprap toe key. The design analysis for the RSS is provided in Appendix D. Special Provision 620 has been developed for the RSS and is included in Appendix E.

The surface of the RSS shall be covered with a Turf Reinforcement Mat system with a special seed mix per the project documents. Special Provisions 613, 615, and 618 have been developed for the Turf Reinforcement Mat system and are included in Appendix E.

SLOPE SURFACE PROTECTION

Earth fill embankment slopes and soil cut slopes flatter than 2H:1V or 2H:1V and less than 15 feet high shall be covered with a loam and seed finished surface, unless special circumstances such as observed seeps are encountered. Prior to loam placement, the slope surface should be scarified. Protection of the seeded surface of 2H:1V slopes from erosion and sloughing until vegetation is established is recommended. Slopes that are graded to 2H:1V and are between 15 and 30 feet high shall also be covered with a loam and seed finished surface. The seeded surface should be protected from erosion by placement of erosion control mat. Slopes graded to 2H:1V and that are higher than 30 feet shall be covered with a Turf Reinforcement Mat system with a special seed mix per the project documents. Special Provisions 613, 615, and 618 have been developed for the Turf Reinforcement Mat system and are included in Appendix E.

At locations where groundwater seepage is observed in earth cuts, a stone erosion control blanket shall be installed as directed by the Resident to protect the cut slope from sloughing and erosion. The stone erosion control blanket shall consist of a compacted 8-inch-thick layer of material meeting the requirements for Stone for French Drains (703.24) with a layer of non-woven separation geotextile placed between the subgrade and the stone; the slope surface shall be scarified prior to installing the geotextile and stone. The stone erosion control blanket shall be constructed so that water that travels through the blanket discharges into a ditch. Where seepage rates are excessive, the slope shall be benched for better stabilization.

TOE OF SLOPE IN WET AREAS

Where the toe of fill slopes is subject to potentially flowing water, such as between approximately Stations 691+60 and 691+90, the toe shall be keyed 2 feet into the existing subgrade as depicted on the project plans. The key shall be constructed of plain riprap underlain by non-woven erosion control geotextile and shall extend upward approximately 7 feet (vertically). A detail is provided on the project plans.

ORGANIC SOILS

Organic soils were encountered at four locations along the project. The organic soils consist of organic silt with varying amounts fibrous peat and/or inorganic sands and silt. Any organic or loose soils or soft or unsuitable materials encountered in excavations shall be removed and replaced with Granular Borrow Material for Underwater Backfill (MaineDOT 703.19) or Crushed Stone ¾-Inch (MaineDOT 703.13).

A relatively thin layer of organic soils was encountered near the outlet to Harvey Pond where proposed grades will be 4 to 5 feet higher than existing grades. Organic soils shall be removed beneath the proposed outlet pipe at Station 536+76.25 by excavating a trapezoidal-shaped trench down to

approximate Elevation 981. The trench shall have a minimum base width as depicted in the project plans. The overexcavation shall be backfilled with ¾-Inch Crushed Stone that is wrapped in non-woven erosion control geotextile.

CULVERTS

Several existing culverts will be removed as part of this work. Care shall be taken to backfill the excavations with material similar to the adjacent material that is to remain. The backfill should be compacted such that it "mimics" the adjacent material to remain and that it is firm and stable. The intent is to limit post-construction differential frost movement across the backfilled excavation.

The exposed subgrade for new culverts shall consist of inorganic soils that are firm and stable. If the subgrade consists of unsuitable material and/or is soft and yielding, the unsatisfactory material shall be removed and replaced with material meeting the requirements for Granular Borrow for Underwater Backfill (MaineDOT 703.19) or Crushed Stone ¾-Inch (MaineDOT 703.13).

Temporary dewatering will be required to control groundwater inflow or surface water run-on into excavations. The Contractor shall sequence the work such that the effective drainage systems are installed as the work progresses. The Contractor is responsible for controlling surface runoff, infiltration and water from all other sources by methods that preserve the undisturbed condition of the subgrade and permit construction in-the-dry.

CLOSURE

This report has been prepared for the use of the Maine Department of Transportation for specific application to the design for the reconstruction of 4.42 miles of Maine Route 4 in Madrid-Phillips, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

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

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

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FIGURES

SHEETS 1 THROUGH 40

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Division: GEOTECH

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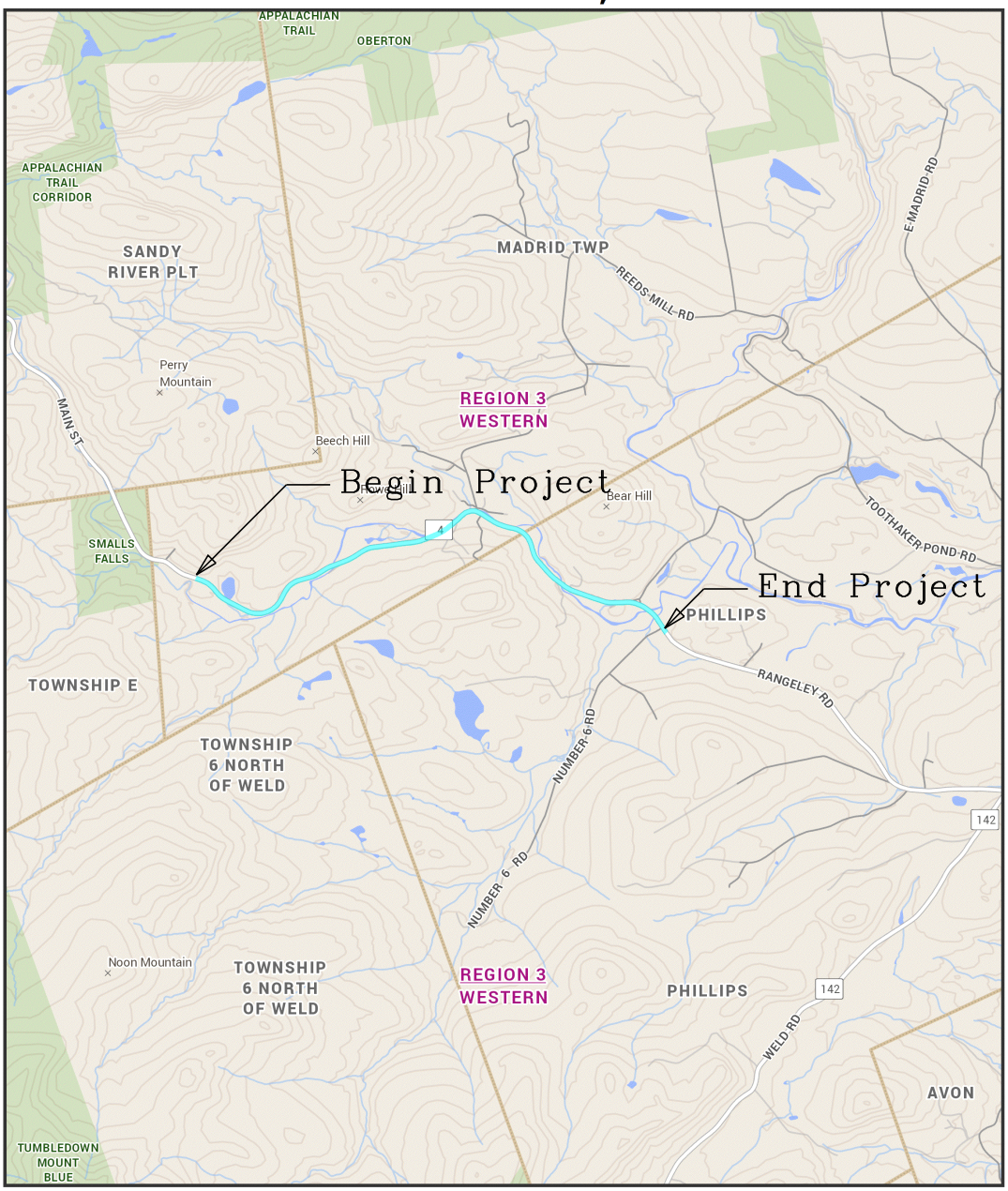
MADRID-PHILLIPS, MAINE



1 Miles

1 inch = 1.42 miles

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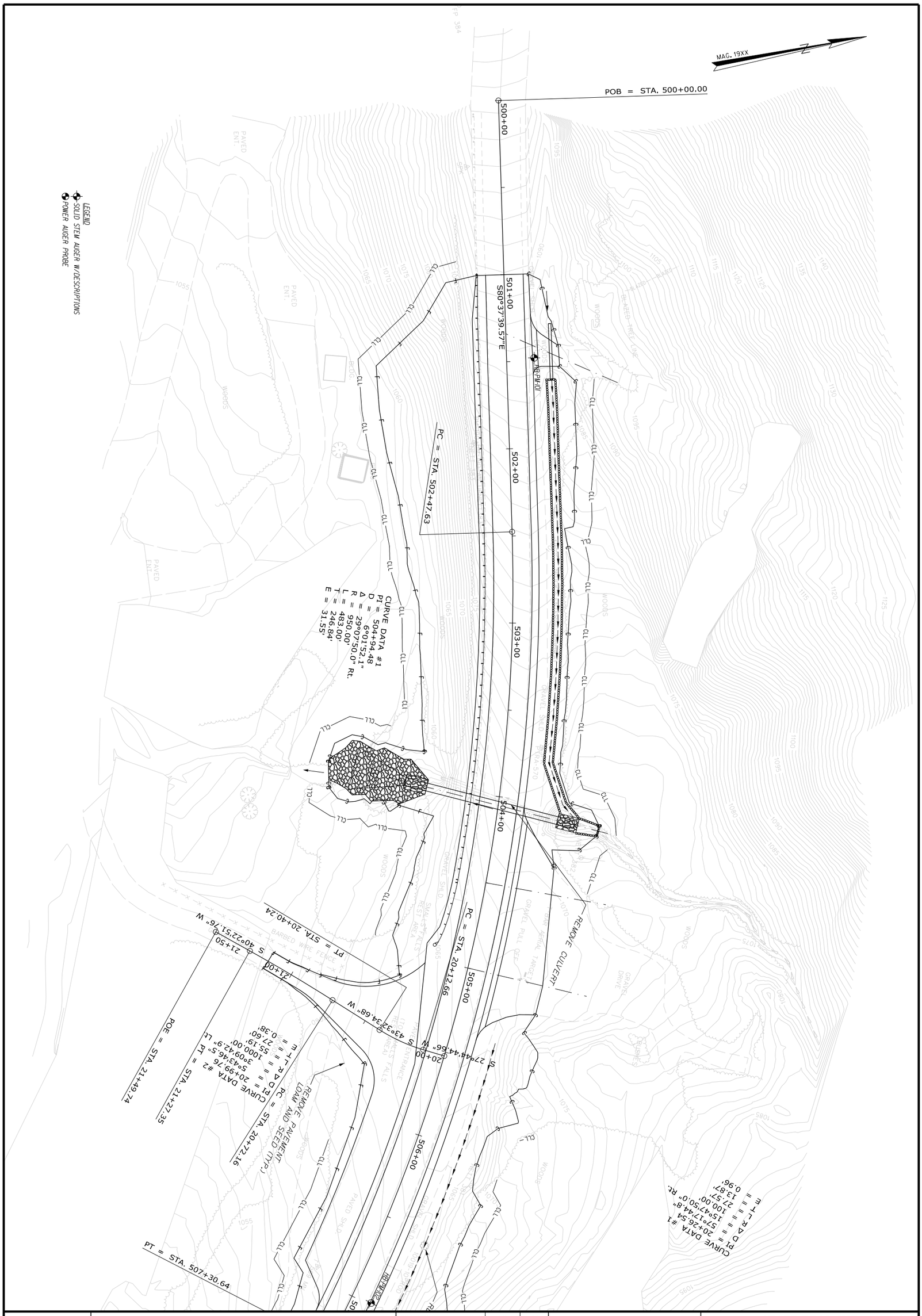

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MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

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PIN 18247.00 HIGHWAY PLANS

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BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

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PIN 18247.00 HIGHWAY PLANS

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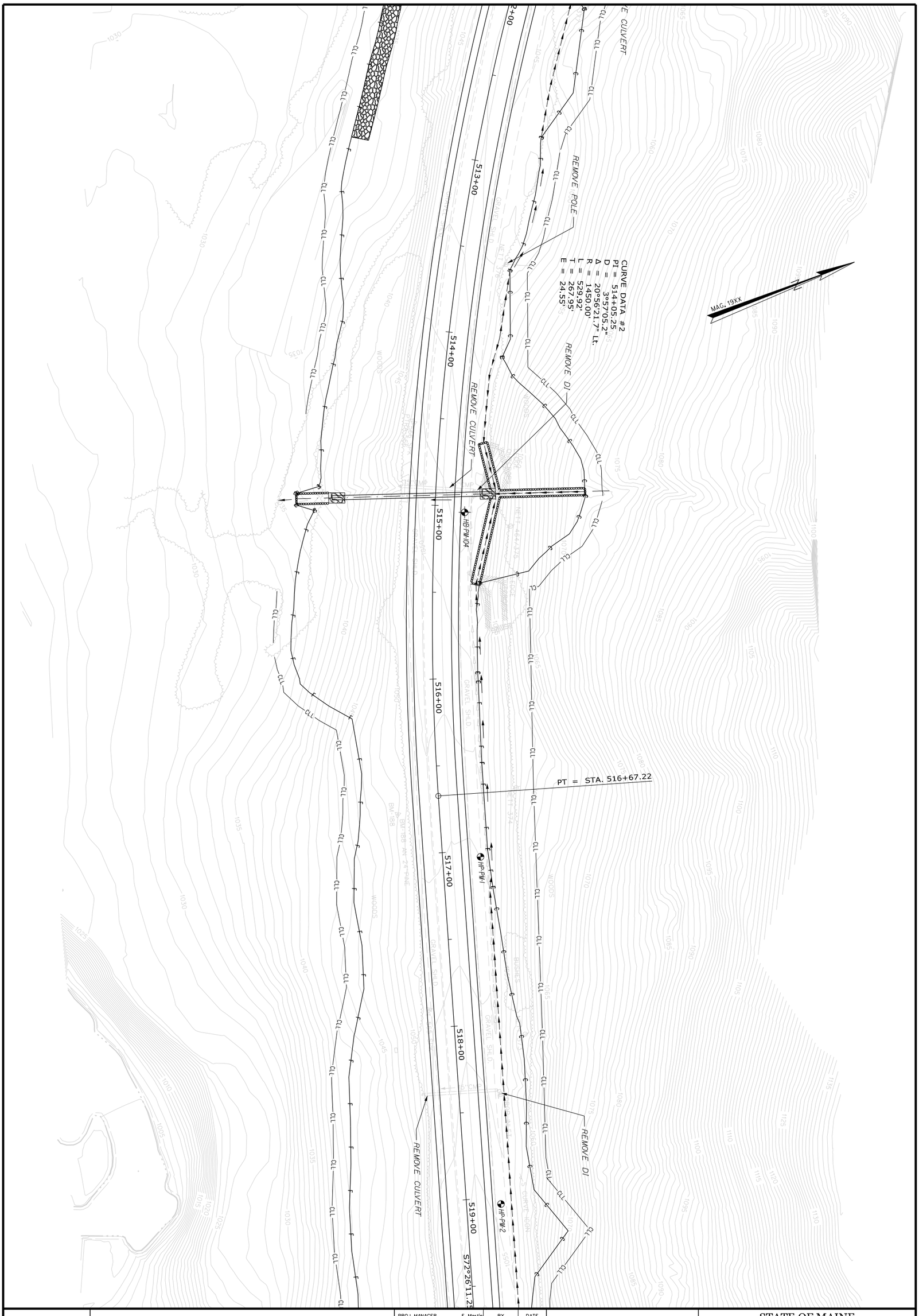

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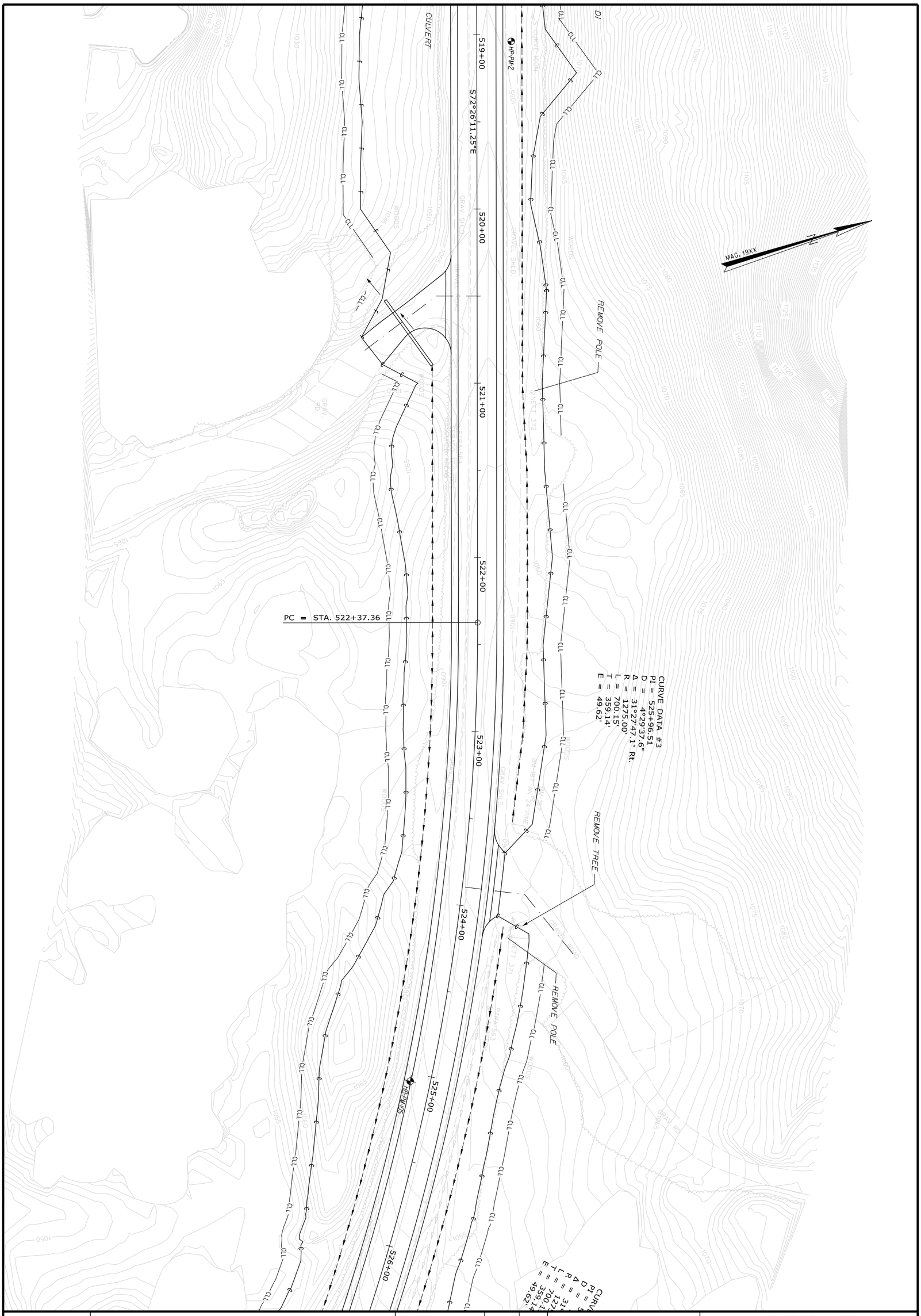

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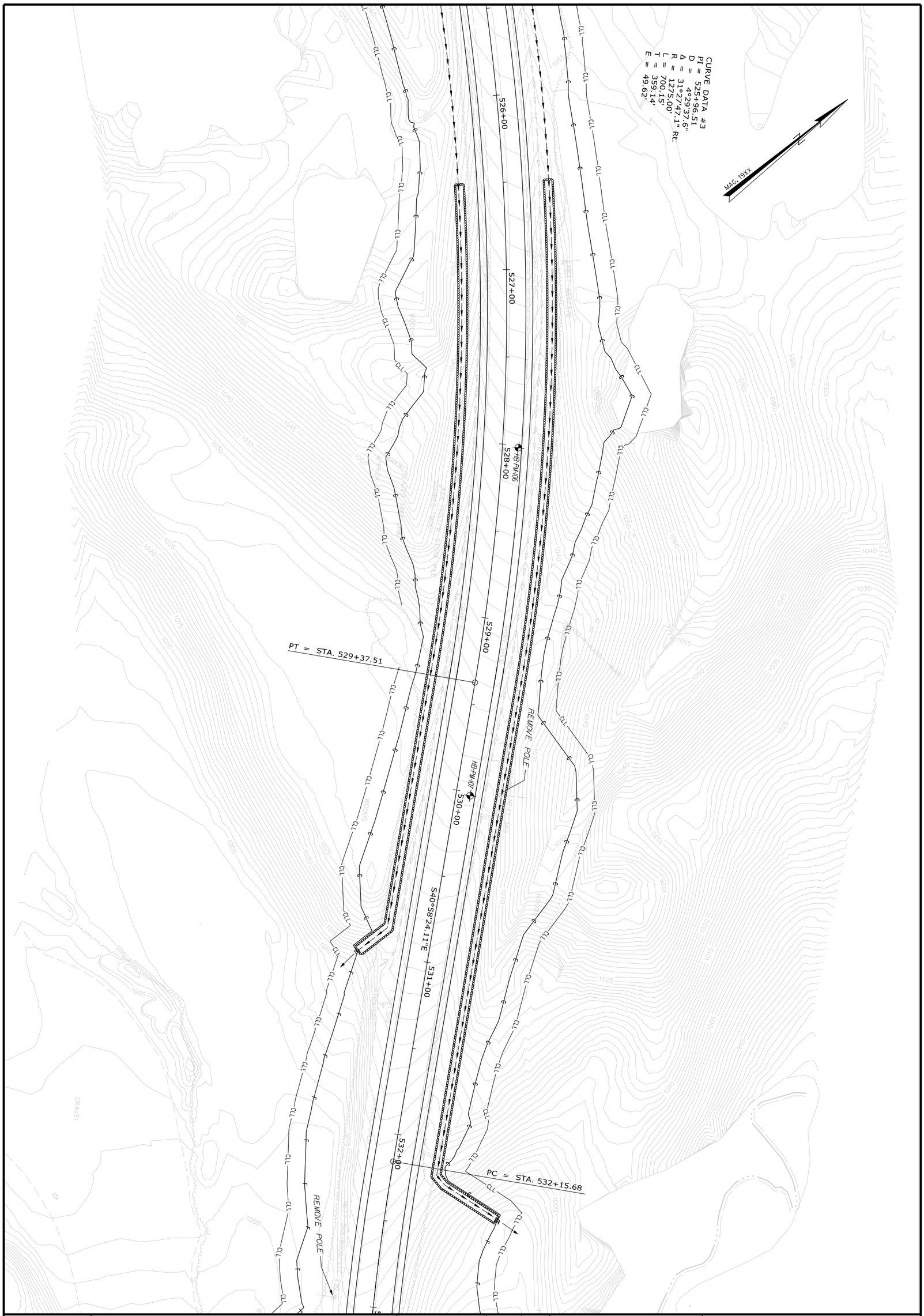

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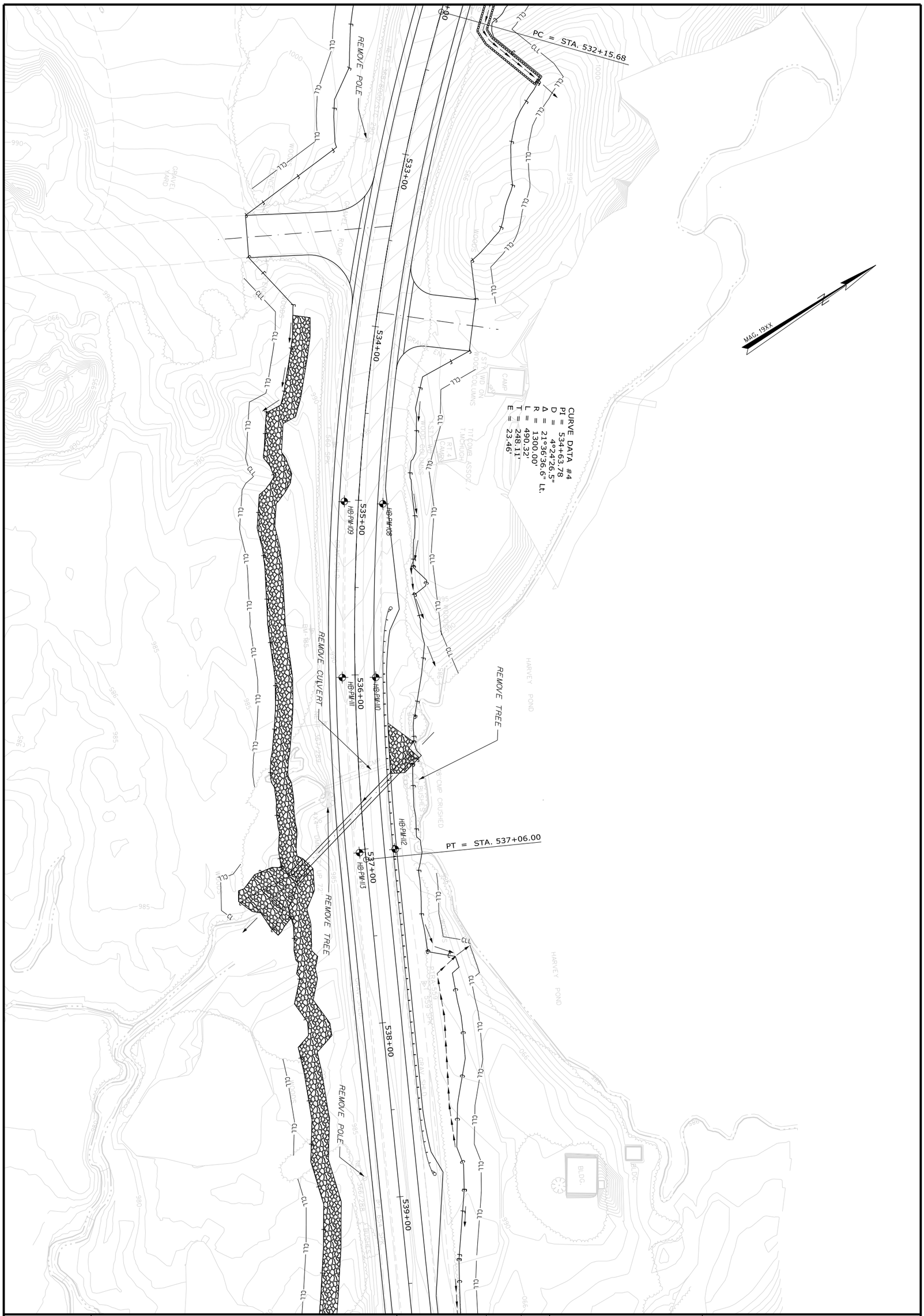

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FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 2 OF 40

MADRID\PHILLIPS ROUTE 4

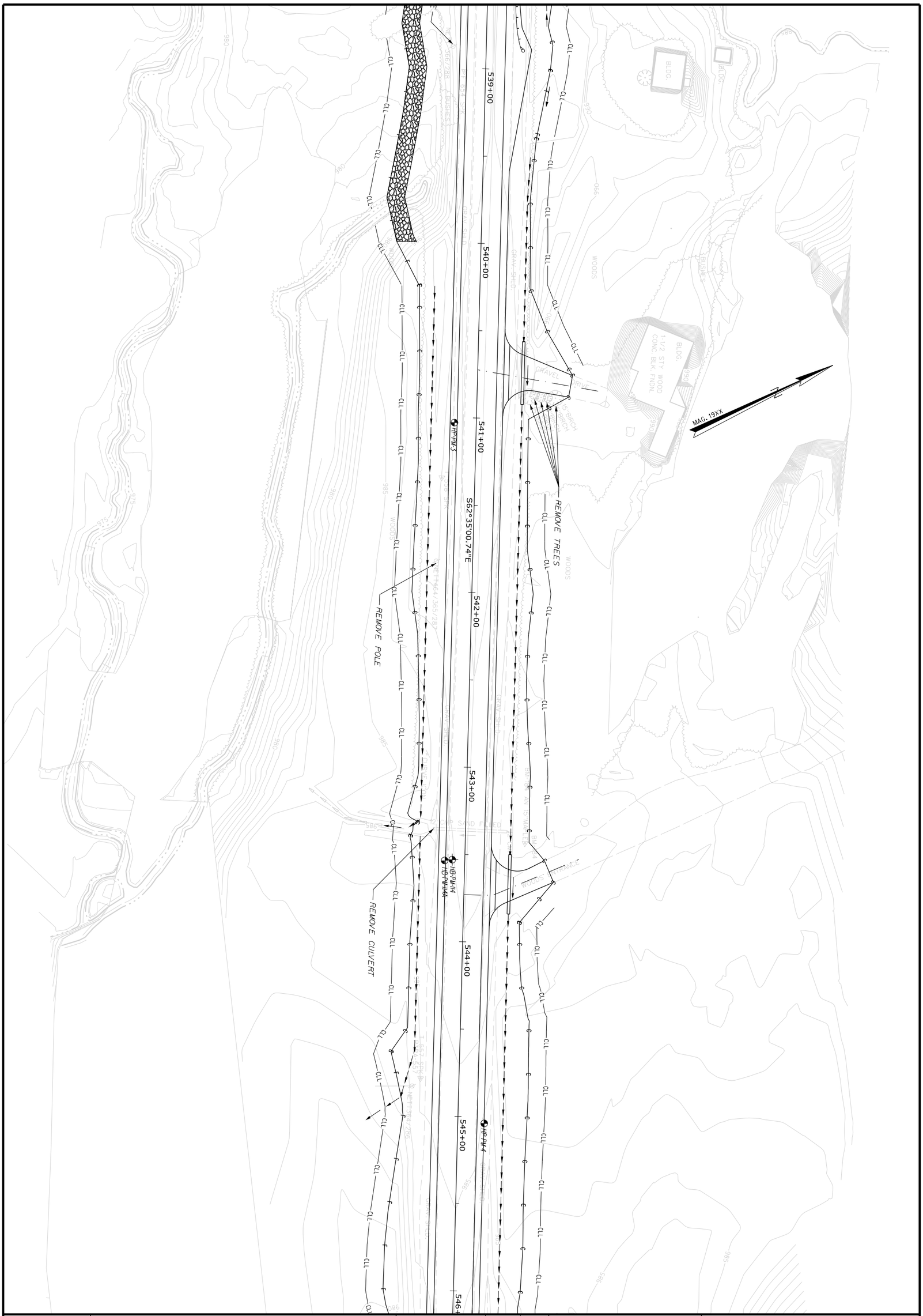
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\008_BLP7.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 8 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

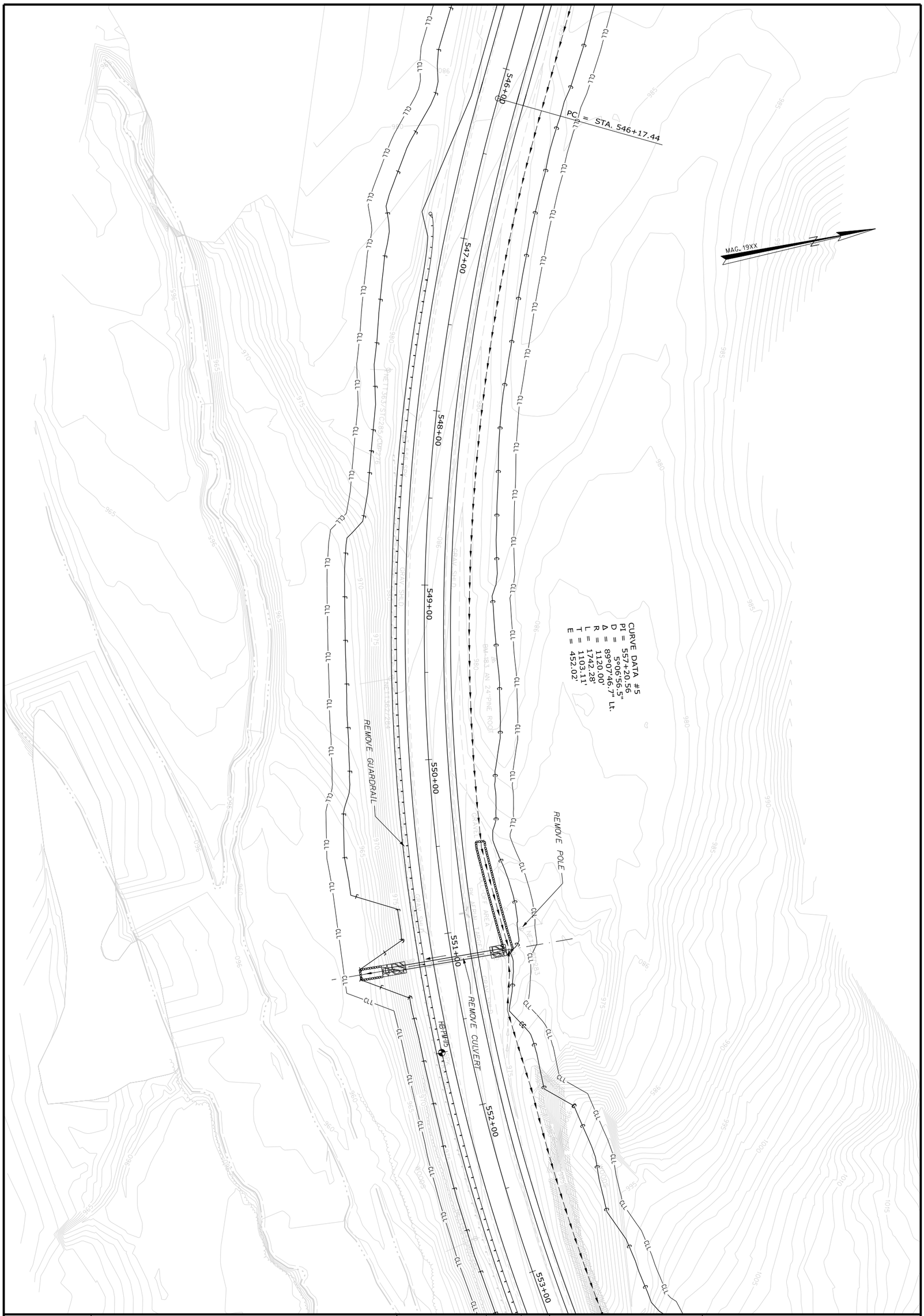
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00

HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\009_BLP8.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 9 OF 40

MADRID\PHILLIPS ROUTE 4

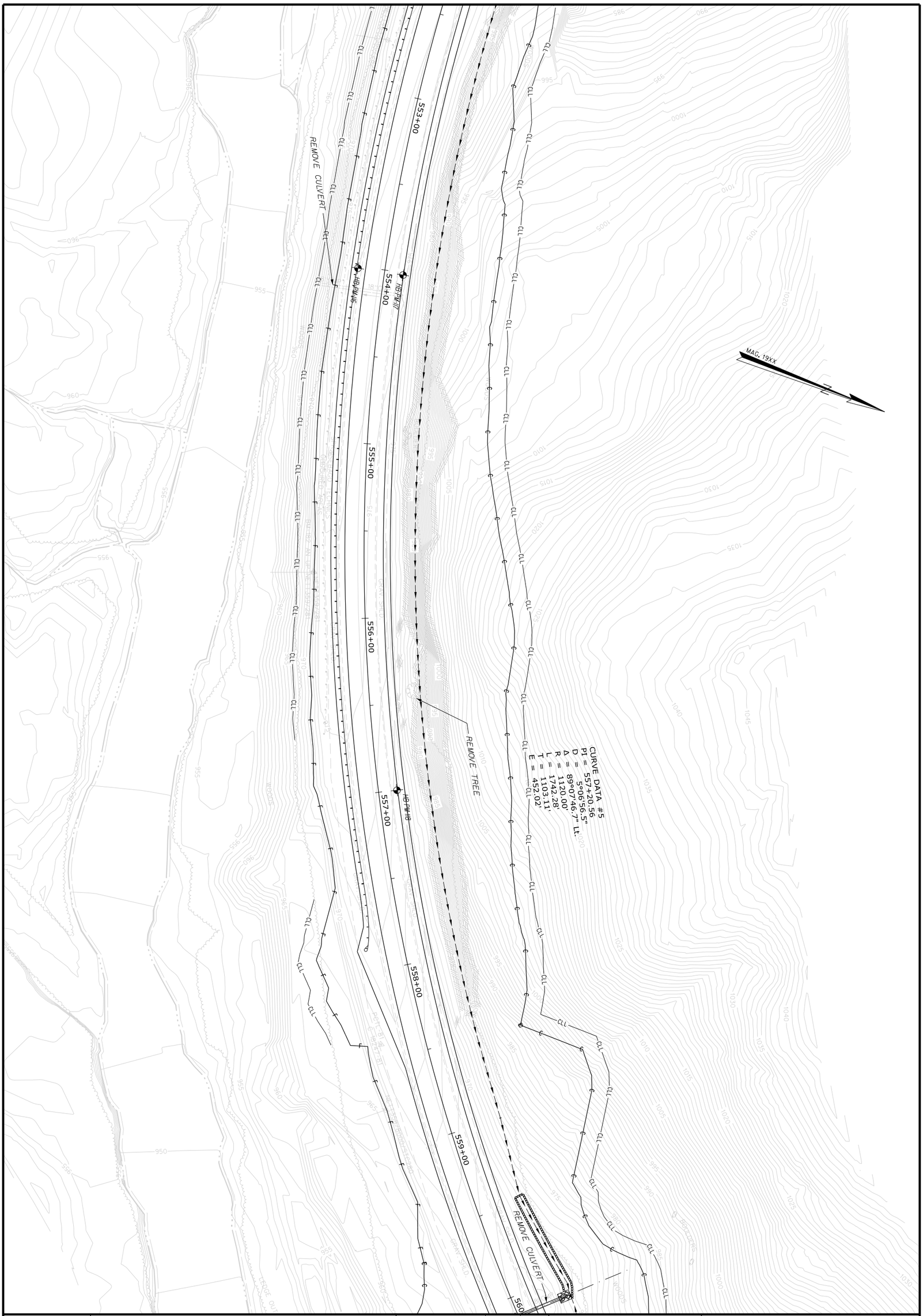
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

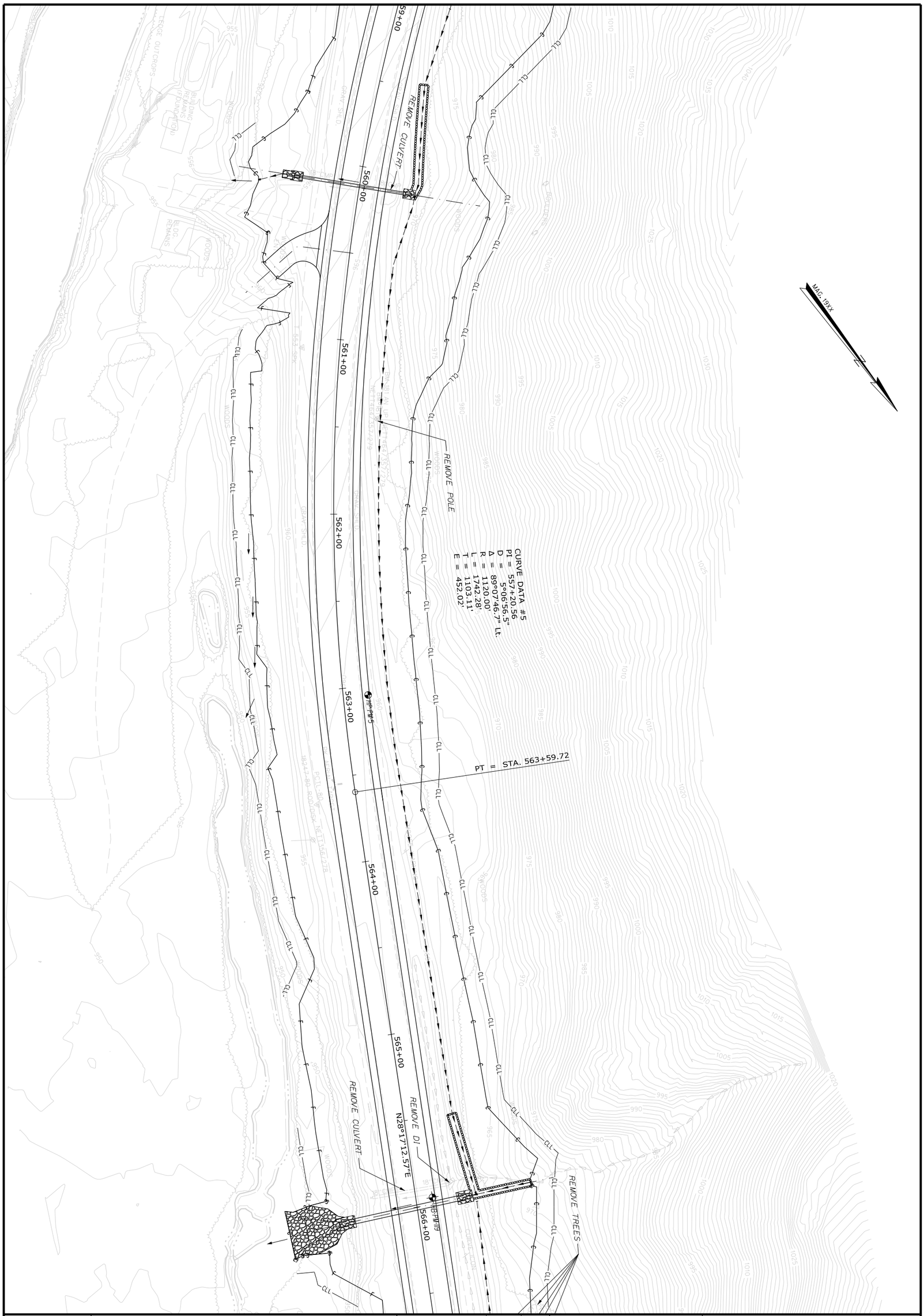
PIN 18247.00

HIGHWAY PLANS



SHEET NUMBER 10 OF 40	MADRID\PHILLIPS ROUTE 4	PROJ. MANAGER: E. Martin	STATE OF MAINE DEPARTMENT OF TRANSPORTATION
	BORING LOCATION PLAN	DESIGN-DETAILED: T. WOLFEL	STP-1824(700)
		CHECKED-REVIEWED: _____ _____ _____	SIGNATURE
		DESIGN2-DETAILED2: C.RUSSELL T.WHITE DEC 2018	P.E. NUMBER
		DESIGN3-DETAILED3: _____ _____ _____	DATE
		REVISIONS 1: _____ _____	PIN 18247.00 HIGHWAY PLANS
		REVISIONS 2: _____ _____	
		REVISIONS 3: _____ _____	
		REVISIONS 4: _____ _____	
		FIELD CHANGES: _____ _____	

Filename: ...\00\GEOTECH\MSTA\011_BLP10.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 11 OF 40

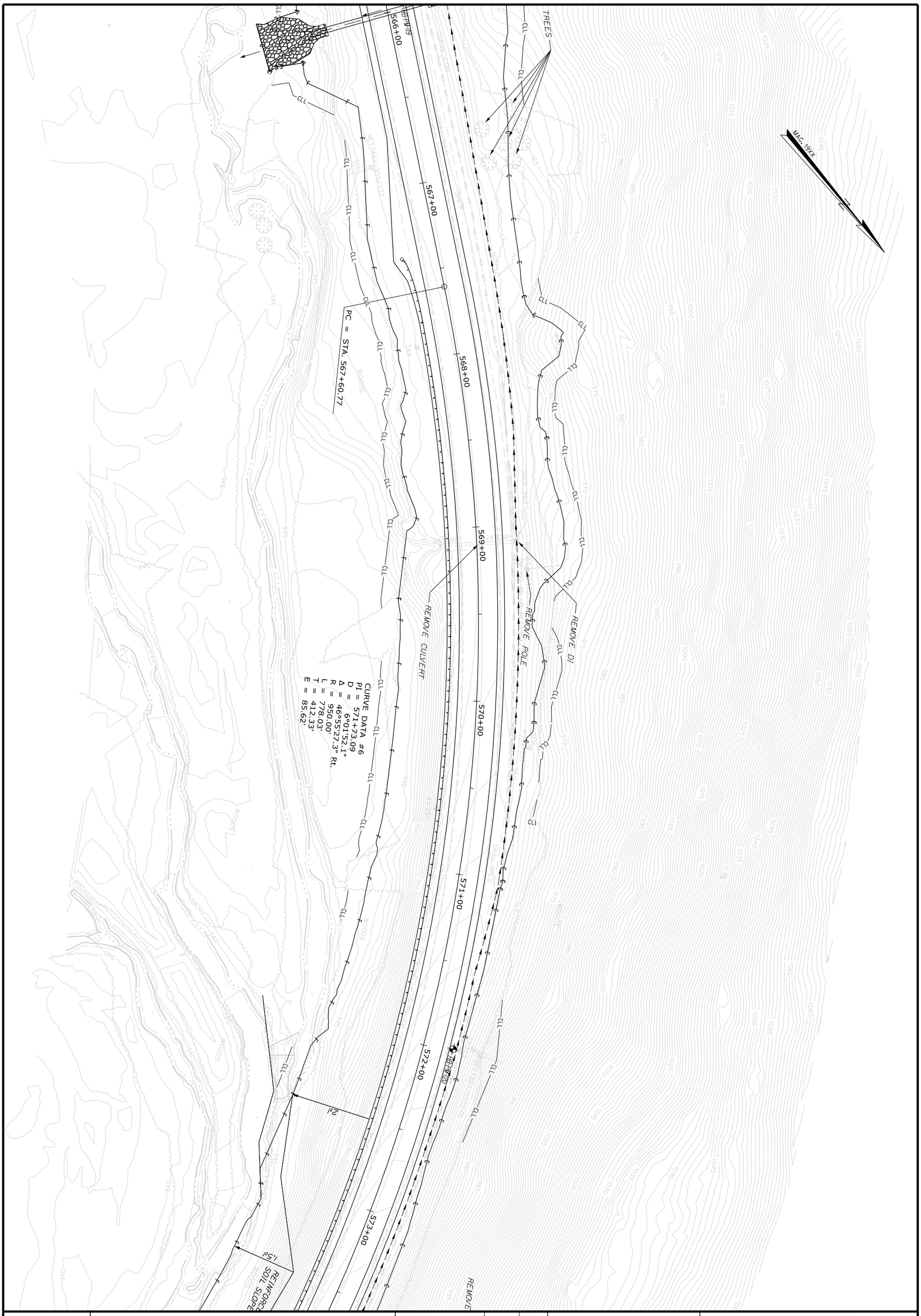
MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



SHEET NUMBER 12 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

	PROJ. MANAGER	E. Martin	BY	DATE
	DESIGN-DETAILED	T. WOLFEL		
	CHECKED-REVIEWED			
SIGNATURE	DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
	DESIGN3-DETAILED3			
P.E. NUMBER	REVISIONS 1			
	REVISIONS 2			
	REVISIONS 3			
DATE	REVISIONS 4			
	FIELD CHANGES			

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\013_BLP12.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019

MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

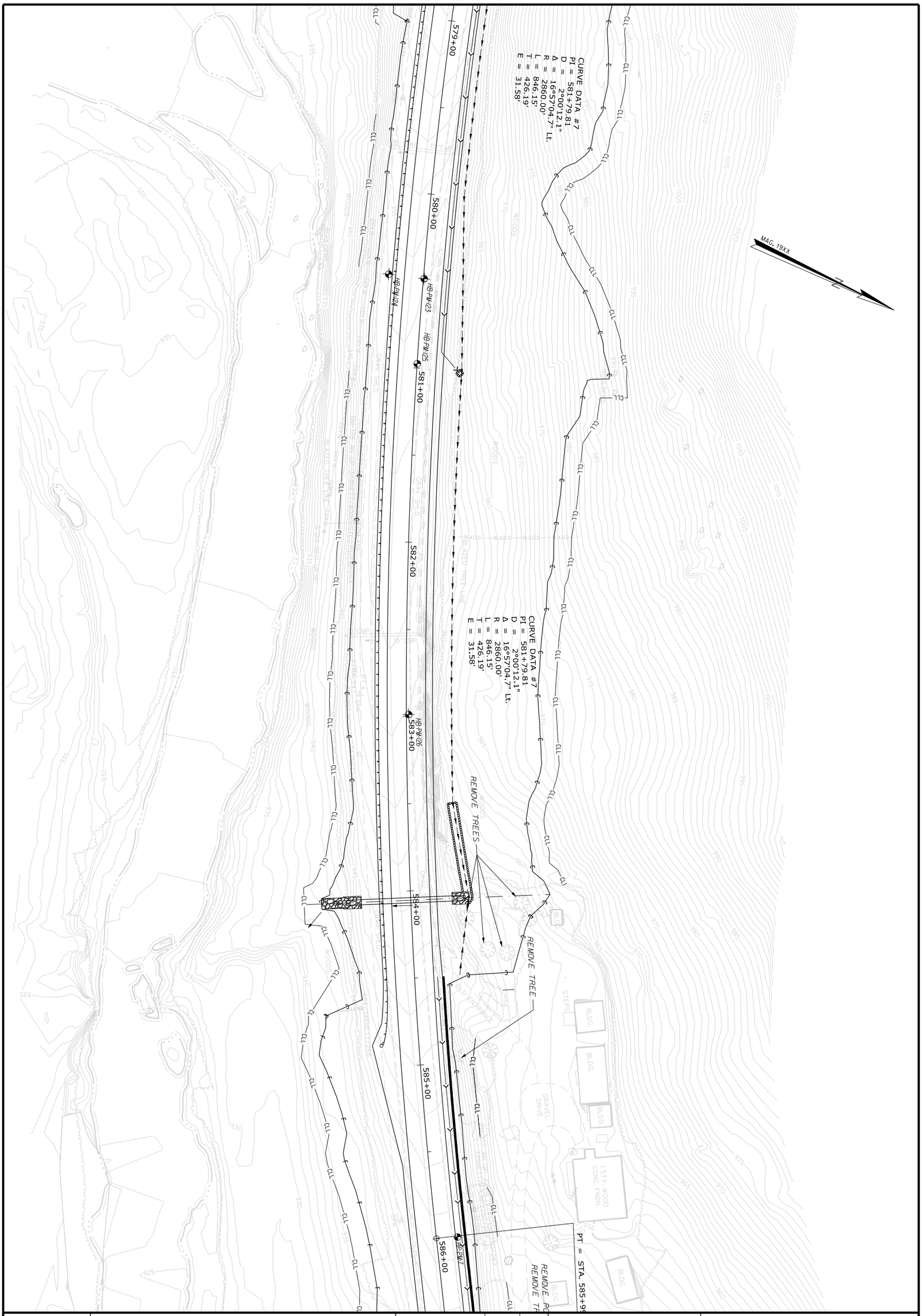
STP-1824(700)

PIN
18247.00

HIGHWAY PLANS

SHEET NUMBER
13
OF 40

Filename: ...\00\GEOTECH\MSTA\014_BLP13.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 14 OF 40

MADRID\PHILLIPS ROUTE 4

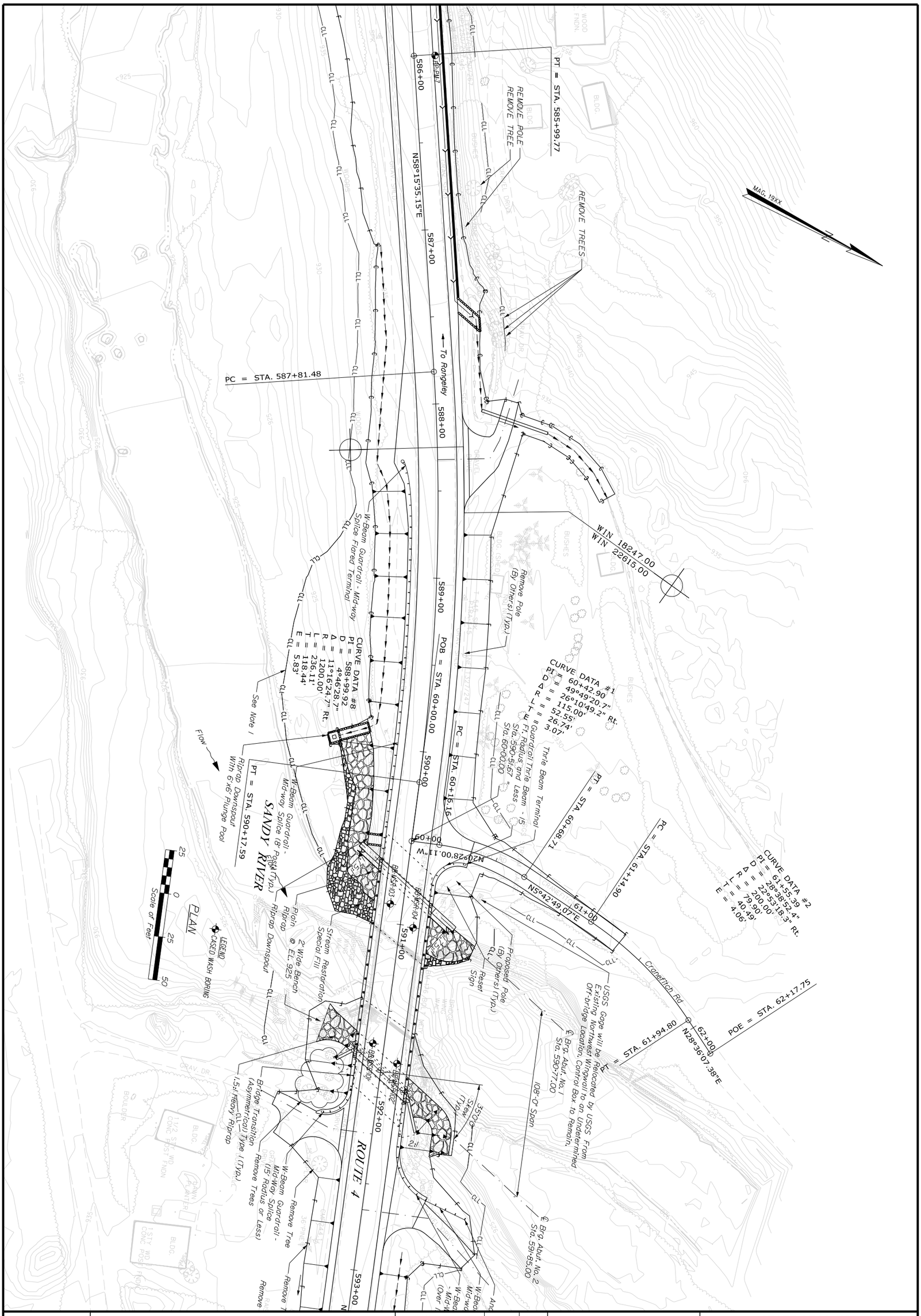
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\015_BLP14.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



SHEET NUMBER 15 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\016_BLP15.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 16 OF 40

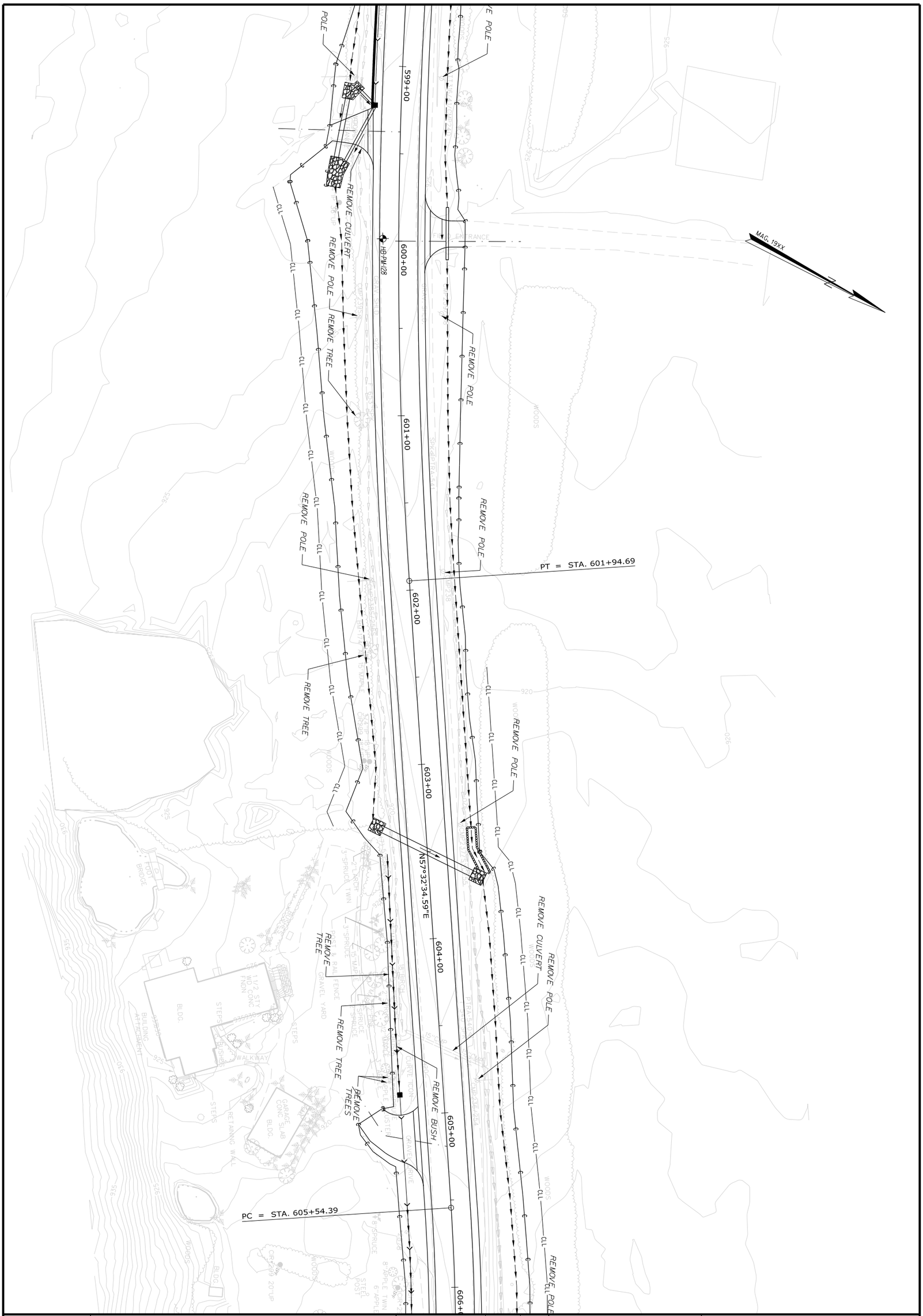
MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



SHEET NUMBER 17 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

	PROJ. MANAGER	E. Martin	BY	DATE
	DESIGN-DETAILED	T. WOLFEL		
	CHECKED-REVIEWED			
SIGNATURE	DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
	DESIGN3-DETAILED3			
P.E. NUMBER	REVISIONS 1			
	REVISIONS 2			
DATE	REVISIONS 3			
	REVISIONS 4			
	FIELD CHANGES			

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

REMOVE TREES
REMOVE CULVERT
REMOVE POLE
REMOVE POLE
REMOVE CULVERT
REMOVE POLE
POB = STA. 1+50.00
POE = STA. 2+17.41
N59°07'03.58"E
2.00
1+50
606+00
607+00
608+00
609+00
610+00
611+00
612+00
HB-PM-129
MAG. 19XX
PC = STA. 605+54.39
PT = STA. 610+67.79

CURVE DATA #10
PI = 608+15.44
D = 4°58'56.1"
Δ = 25°34'43.1" Rt.
R = 1150.00'
L = 513.40'
T = 261.05'
E = 29.26'

CURVE DATA #10
PI = 608+15.44
D = 4°58'56.1"
Δ = 25°34'43.1" Rt.
R = 1150.00'
L = 513.40'
T = 261.05'
E = 29.26'

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN
18247.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER	E. Morlen	---
DESIGN-DETAILED	T. WOLFEL	-----
CHECKED-REVIEWED	-----	-----
DESIGN2-DETAILED2	C.RUSSELL	T. WHITE
DESIGN3-DETAILED3	-----	-----
REVISIONS 1	-----	-----
REVISIONS 2	-----	-----
REVISIONS 3	-----	-----
REVISIONS 4	-----	-----
FIELD CHANGES	-----	-----

SIGNATURE

DEC. 2018

P.E. NUMBER

DATE

MADRID\PHILLIPS
ROUTE 4

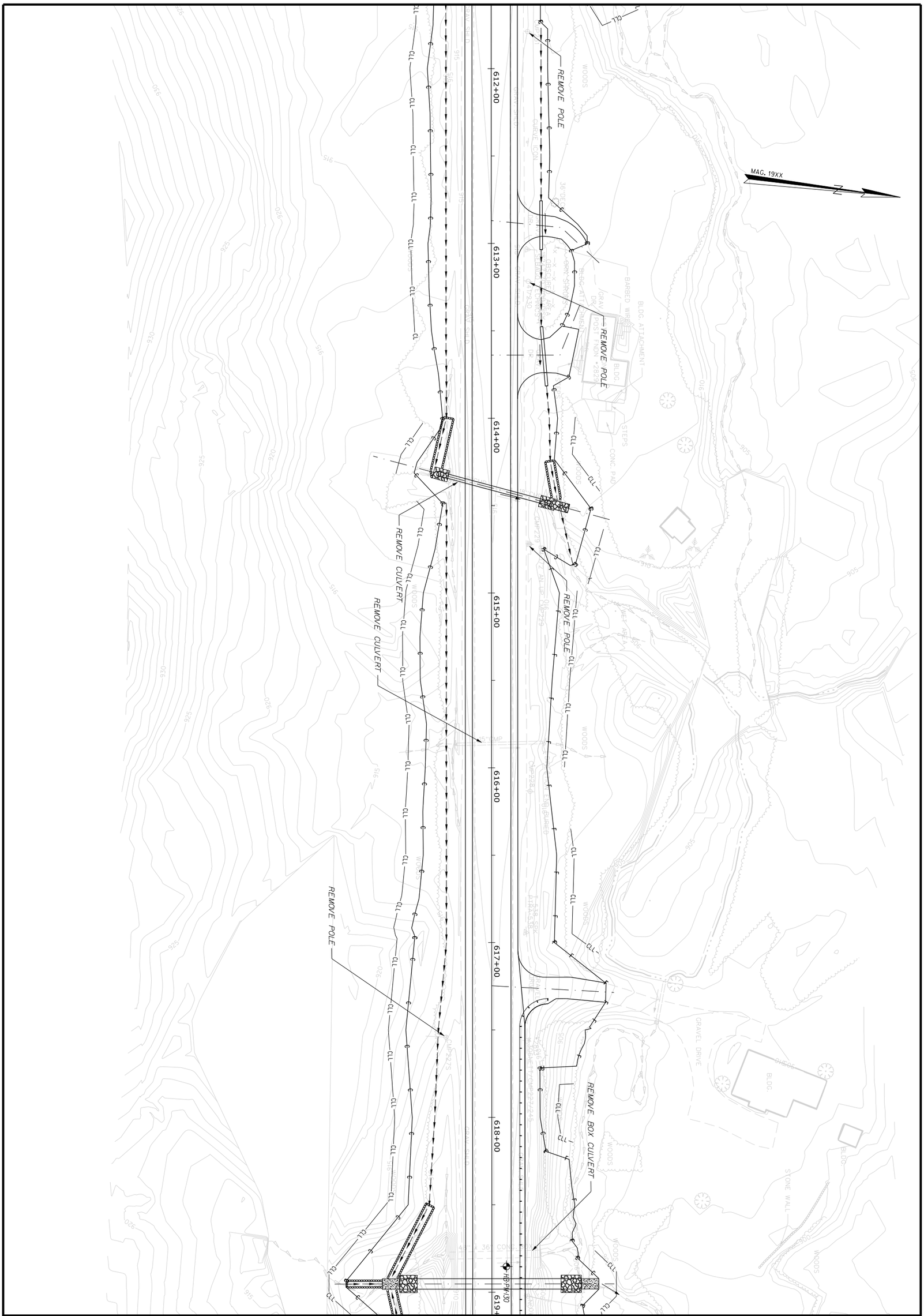
BORING LOCATION PLAN

SHEET NUMBER

18

OF 40

Filename: ...\00\GEOTECH\MSTA\019_BLP18.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



SHEET NUMBER 19 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

	PROJ. MANAGER	E. Martin	BY	DATE
	DESIGN-DETAILED	T. WOLFEL		
	CHECKED-REVIEWED			
	DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
	DESIGN3-DETAILED3			
	REVISIONS 1			
	REVISIONS 2			
	REVISIONS 3			
	REVISIONS 4			
	FIELD CHANGES			

SIGNATURE

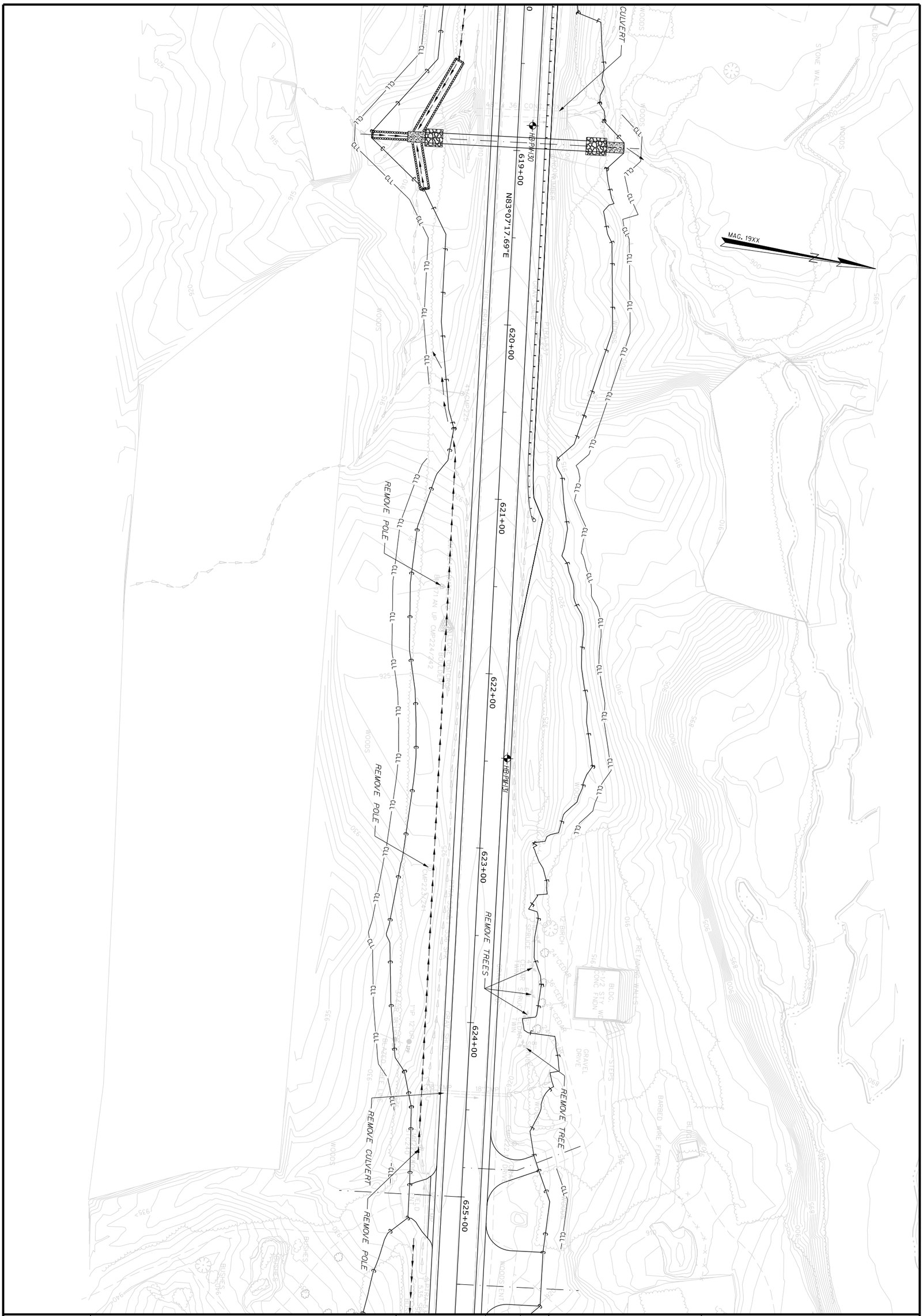
P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 20 OF 40

MADRID\PHILLIPS ROUTE 4

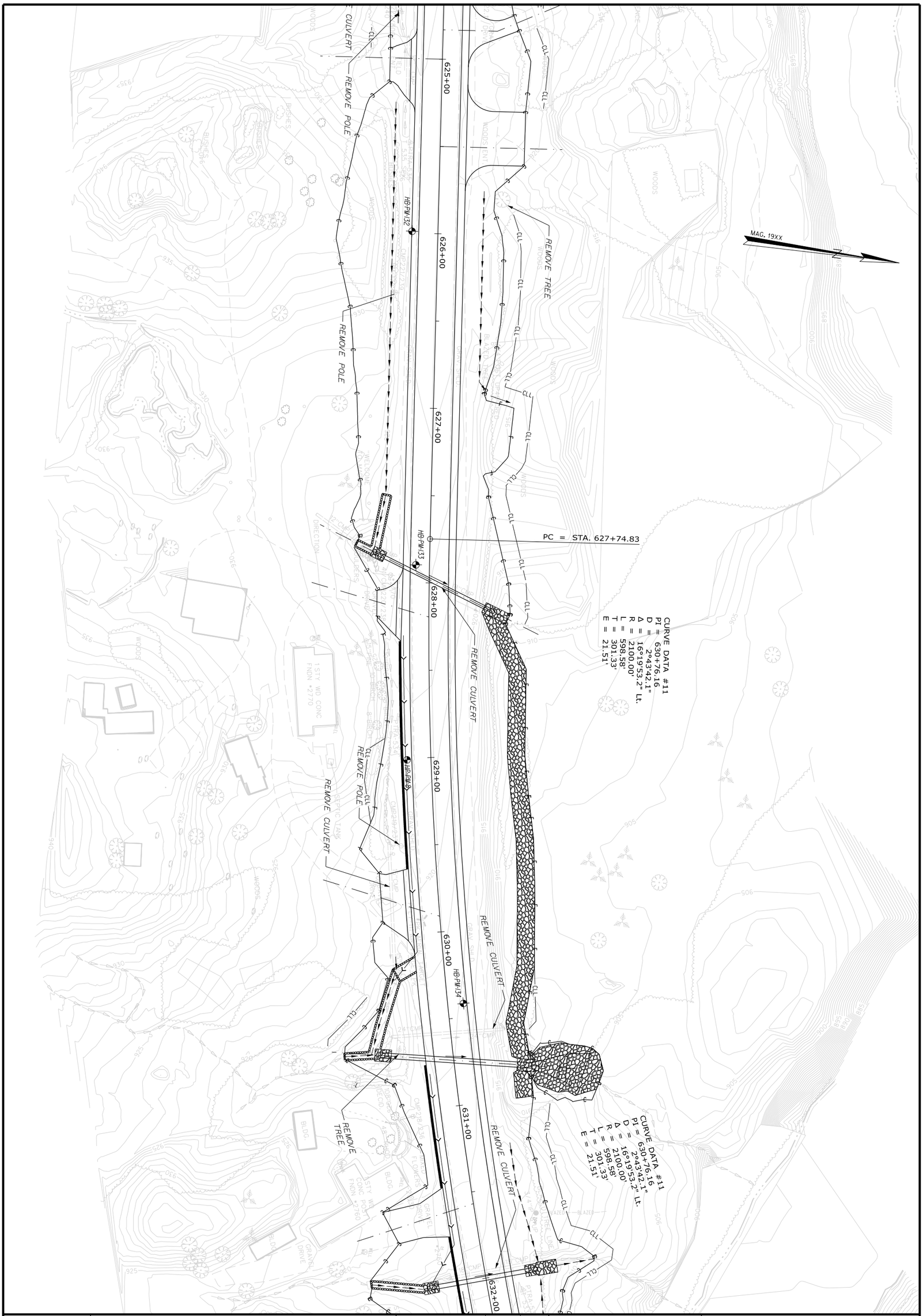
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00

HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 21 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\022_BLP21.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

MADRID\PHILLIPS ROUTE 4

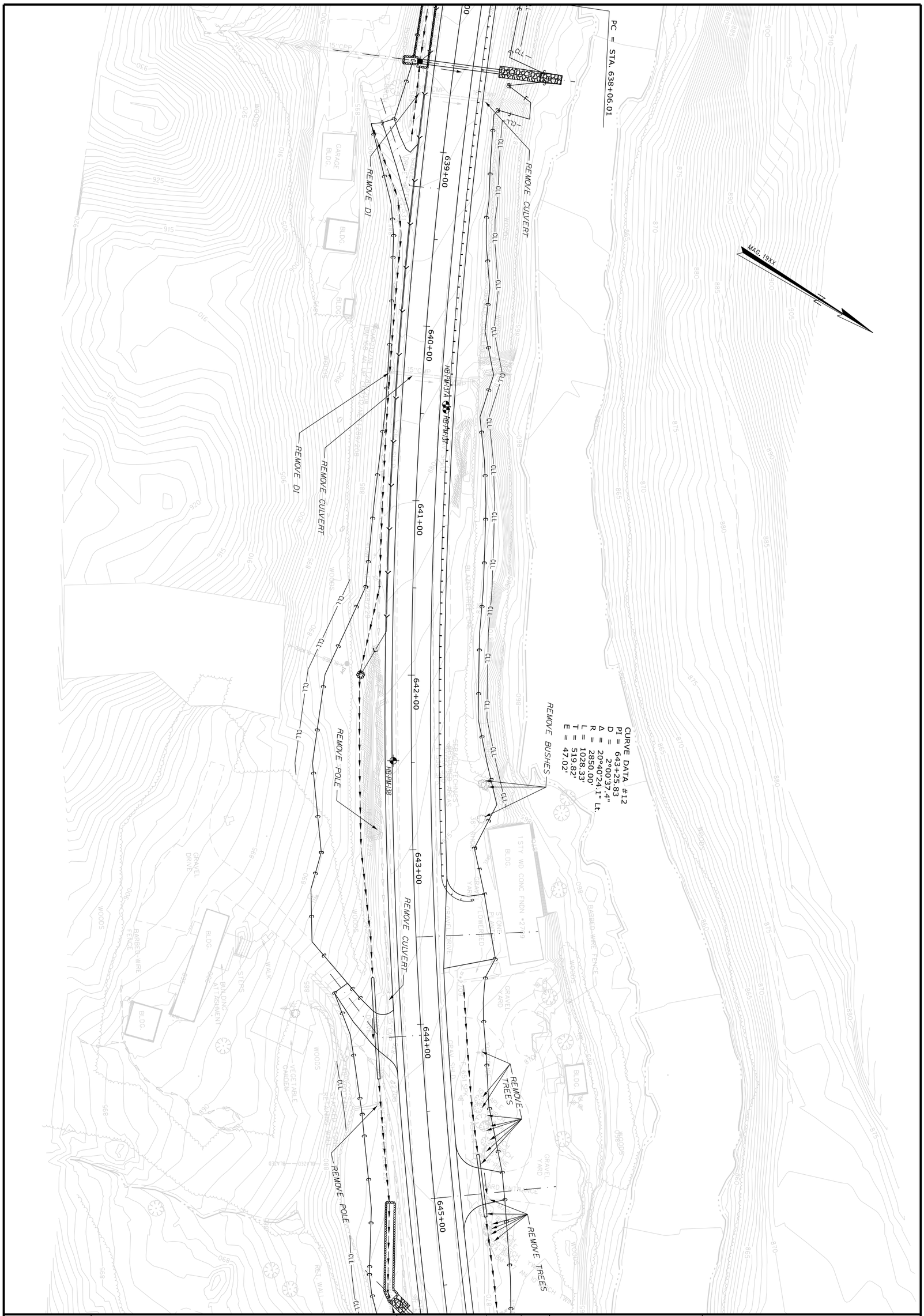
BORING LOCATION PLAN

SHEET NUMBER 22 OF 40

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SHEET NUMBER 23 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

SIGNATURE

P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\024_BLP23.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED	_____	_____	_____
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3	_____	_____	_____
REVISIONS 1	_____		_____
REVISIONS 2	_____		_____
REVISIONS 3	_____		_____
REVISIONS 4	_____		_____
FIELD CHANGES	_____		_____

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 24 OF 40

MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

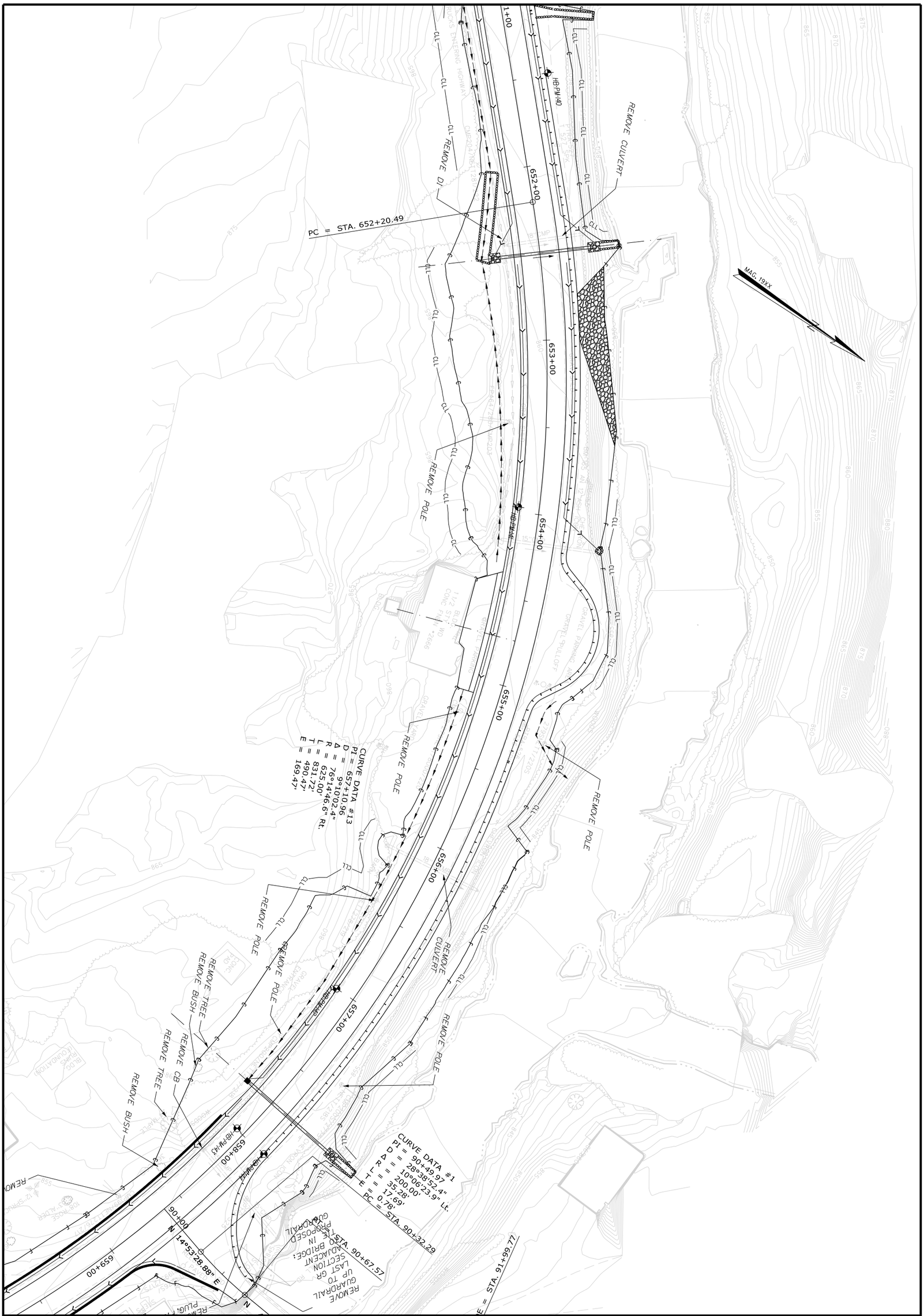
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN
18247.00

HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\025_BLP24.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



SHEET NUMBER 25 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

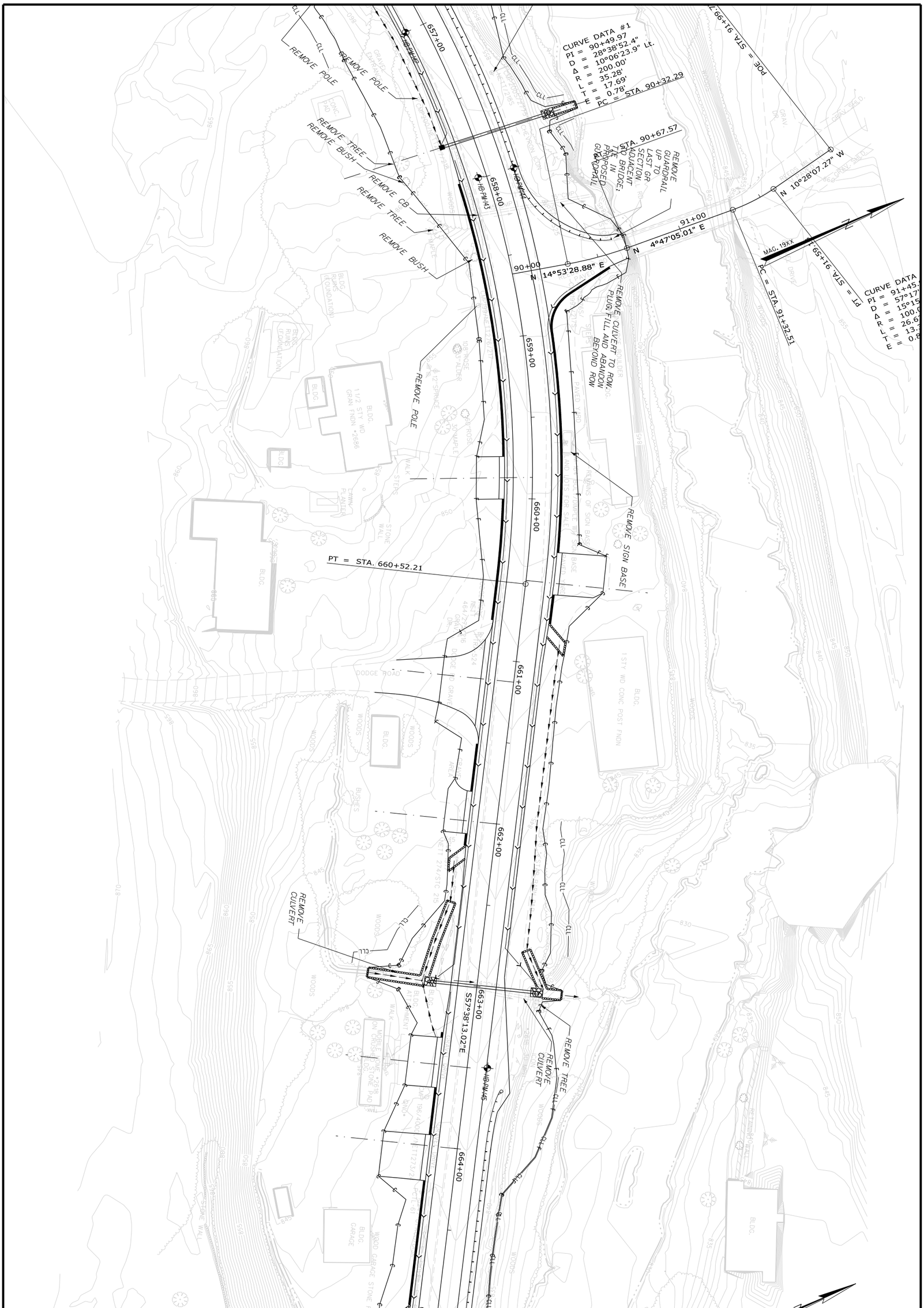
DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\026_BLP25.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

MADRID\PHILLIPS ROUTE 4

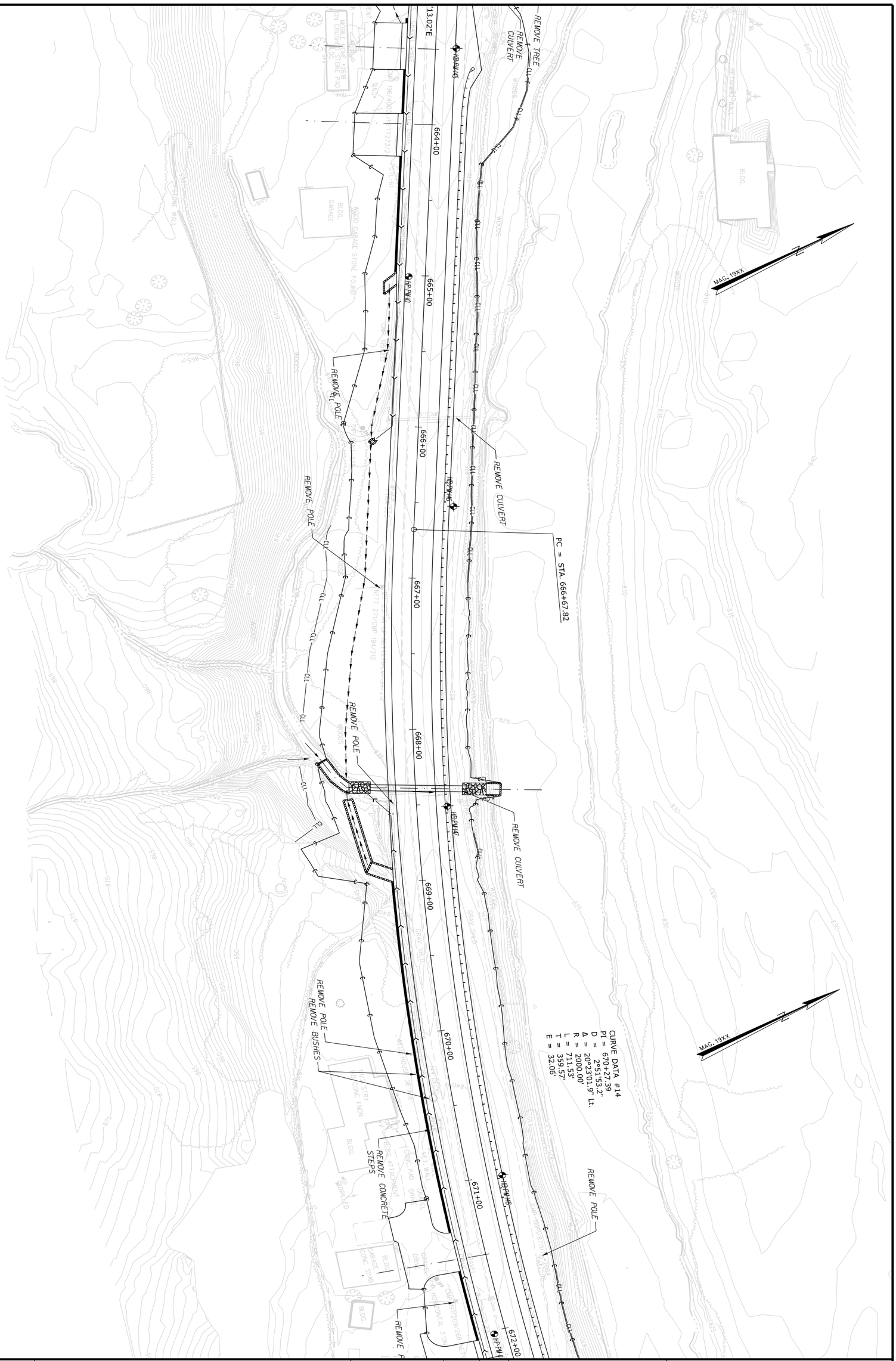
BORING LOCATION PLAN

SHEET NUMBER 26 OF 40

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 27 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SHEET NUMBER 28 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

SIGNATURE

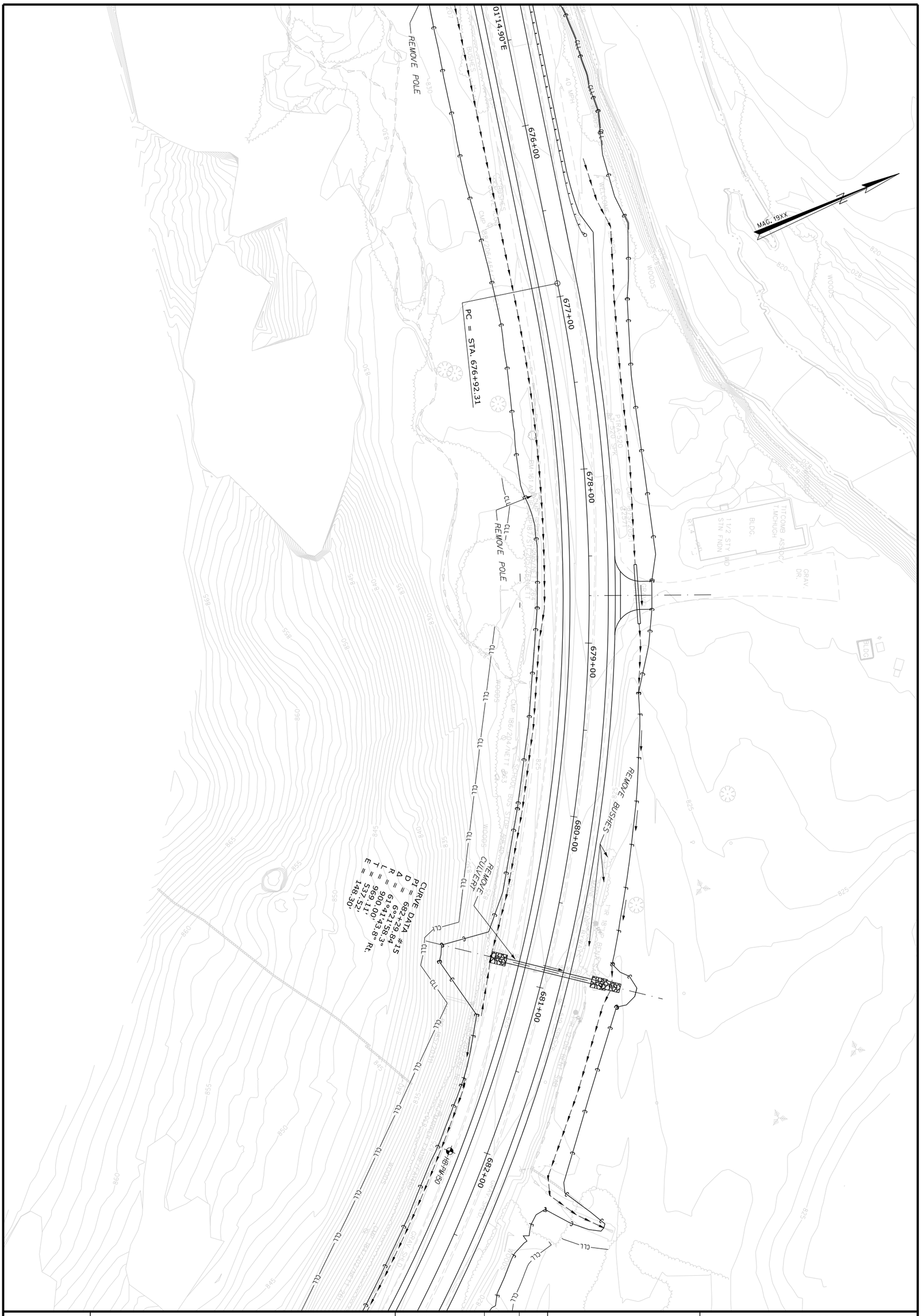
P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 29 OF 40

MADRID\PHILLIPS ROUTE 4

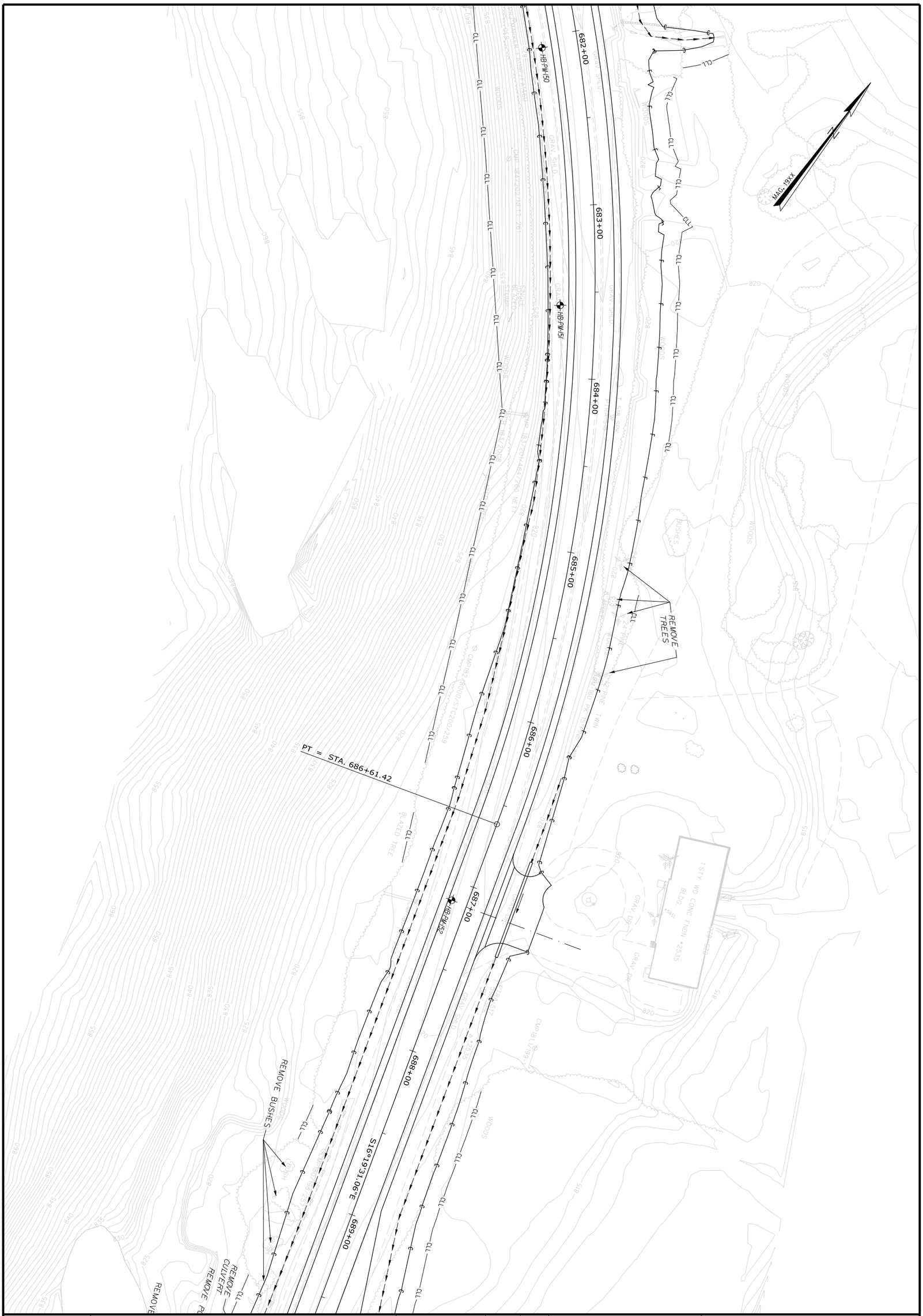
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\030_BLP29.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



SHEET NUMBER 30 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\031_BLP30.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019

SHEET NUMBER 31 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

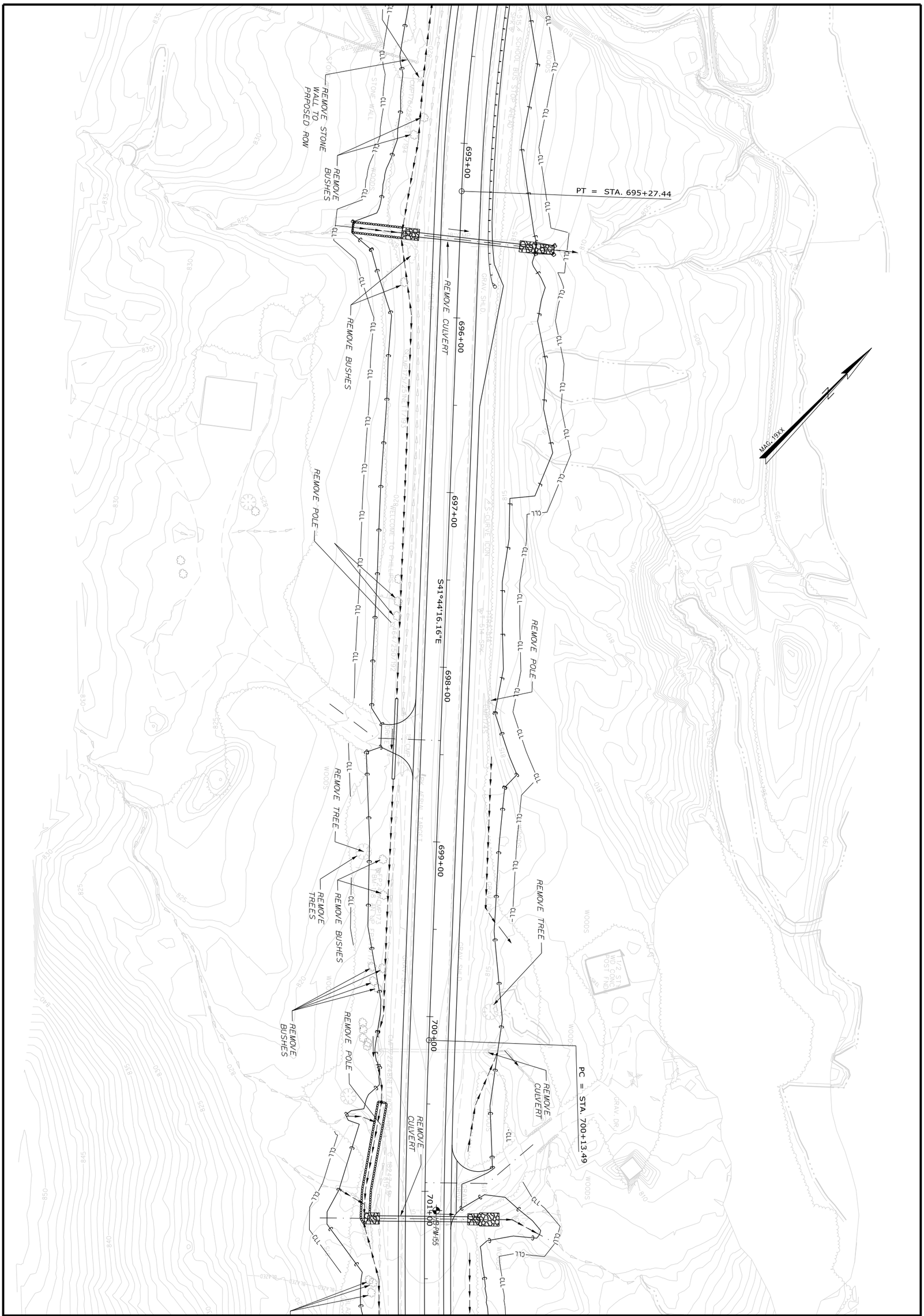
DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

Filename: ...\00\GEOTECH\MSTA\032_BLP31.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019



SHEET NUMBER 32 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

PC = STA. 700+13.49

REMOVE CULVERT

REMOVE CULVERT

REMOVE CULVERT

REMOVE CULVERT

REMOVE BUSHES

REMOVE POLE

REMOVE POLE

REMOVE POLE

REMOVE TREE

REMOVE AND RESET

REMOVE TREE

REMOVE BUSH

CURVE DATA #17
PI = 703+84.74
D = 1°38'13.3"
Δ = 12°06'33.9" Lt.
R = 3500.00'
L = 739.72'
T = 371.24'
E = 19.63'

CURVE DATA #17
PI = 703+84.74
D = 1°38'13.3"
Δ = 12°06'33.9" Lt.
R = 3500.00'
L = 739.72'
T = 371.24'
E = 19.63'

WIN 18247.00
WIN 22616.00

STA. 705+50
BEGIN PROJECT
NO. 22616.00

Riprap Downspout With 6'x6' Plunge Pool (Omit If Shallow Ledge Present)

31" W-Beam Guardrail - Mid-way Splice Flared Terminal

PT = STA. 707+53.22

Sta. 706+22.12 = Sta. 110+00.00

To Madrid

Remove Tree

UD Type B

PC = STA. 110+18.49

S 38°17'55.62" W

Curb Type 3 Mold 3 (Typ.)

U.D. Outlet Type B

Downspout

Quantity Match Line Sta. 705+50

Reset Sign

31" W-Beam Guardrail - Mid-way Splice Flared Terminal

L.O.W. Sta. 111+25.00

S 27°25'10.63" E

PT = STA. 110+93.04

PC = STA. 111+22.78

CURVE DATA #1
PI = 110+60.47
D = 88°08'50.5"
Δ = 65°43'06.3" Lt.
R = 65.00'
L = 74.56'
T = 41.98'
E = 12.38'

CURVE DATA #2
PI = 111+60.72
D = 12°43'56.6"
Δ = 99°38'16.9" L
R = 450.00'
L = 75.70'
T = 37.94'
E = 1.60'

701+00
702+00
703+00
704+00
705+00
706+00
707+00
110+00
111+00

4'-0"
11'-0"
11'-0"
5'-0"
4'-0"

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN
18247.00

HIGHWAY PLANS

	BY	DATE	SIGNATURE
PROJ. MANAGER	E. Morlen	---	
DESIGN-DETAILED	T. WOLFEL	---	
CHECKED-REVIEWED	-----	-----	-----
DESIGN2-DETAILED2	C.RUSSELL	DEC. 2018	
DESIGN3-DETAILED3	T. WHITE	-----	-----
REVISIONS 1	-----	-----	-----
REVISIONS 2	-----	-----	-----
REVISIONS 3	-----	-----	-----
REVISIONS 4	-----	-----	-----
FIELD CHANGES	-----	-----	-----

P.E. NUMBER ----------

DATE ----------

MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

SHEET NUMBER

33

OF 40

Filename: ...\00\GEOTECH\MSTA\034_BLP33.dgn Division: GEOTECH Username: Terry.White Date:1/17/2019

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN
18247.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER	E. Morlan	---
DESIGN- DETAILED	T. WOLFEL	---
CHECKED-REVIEWED	-----	-----
DESIGN2- DETAILED2	C.RUSSELL	T. WHITE	DEC. 2018
DESIGN3- DETAILED3	-----	-----	-----
REVISIONS 1	-----	-----	-----
REVISIONS 2	-----	-----	-----
REVISIONS 3	-----	-----	-----
REVISIONS 4	-----	-----	-----
FIELD CHANGES	-----	-----	-----

SIGNATURE

P.E. NUMBER

DATE

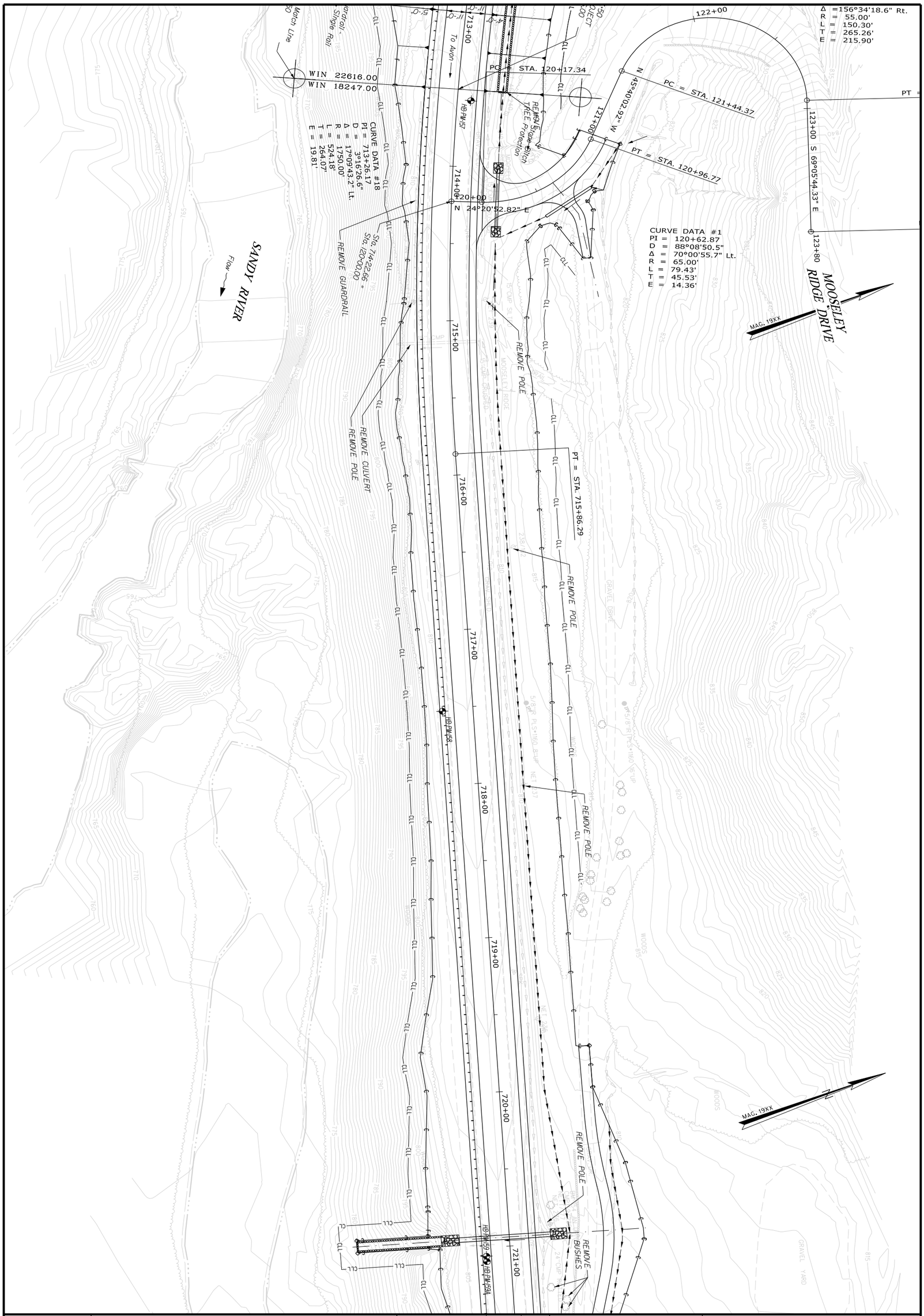
MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

SHEET NUMBER

34

OF 40



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 35 OF 40

MADRID\PHILLIPS ROUTE 4

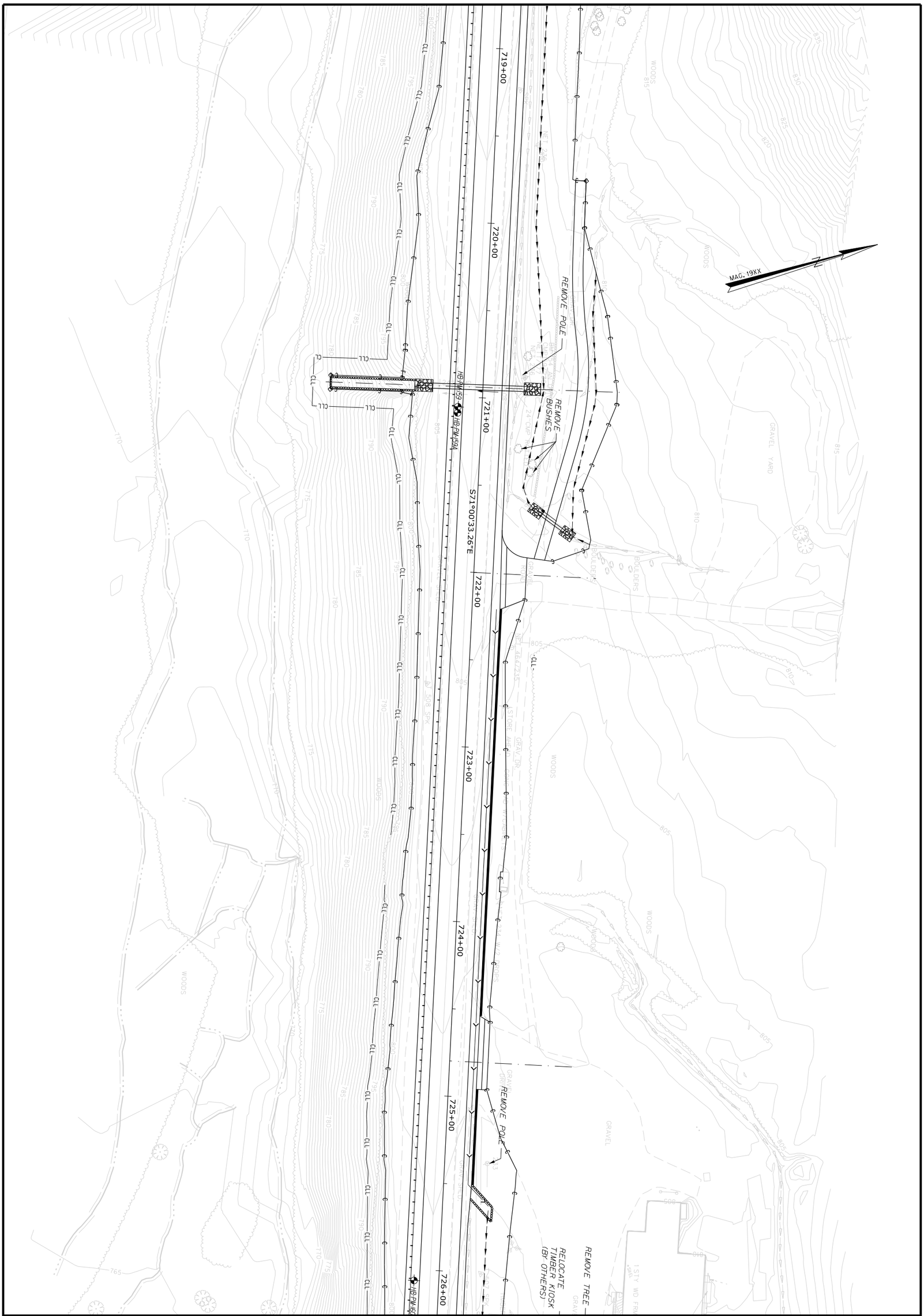
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00

HIGHWAY PLANS



SHEET NUMBER 36 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

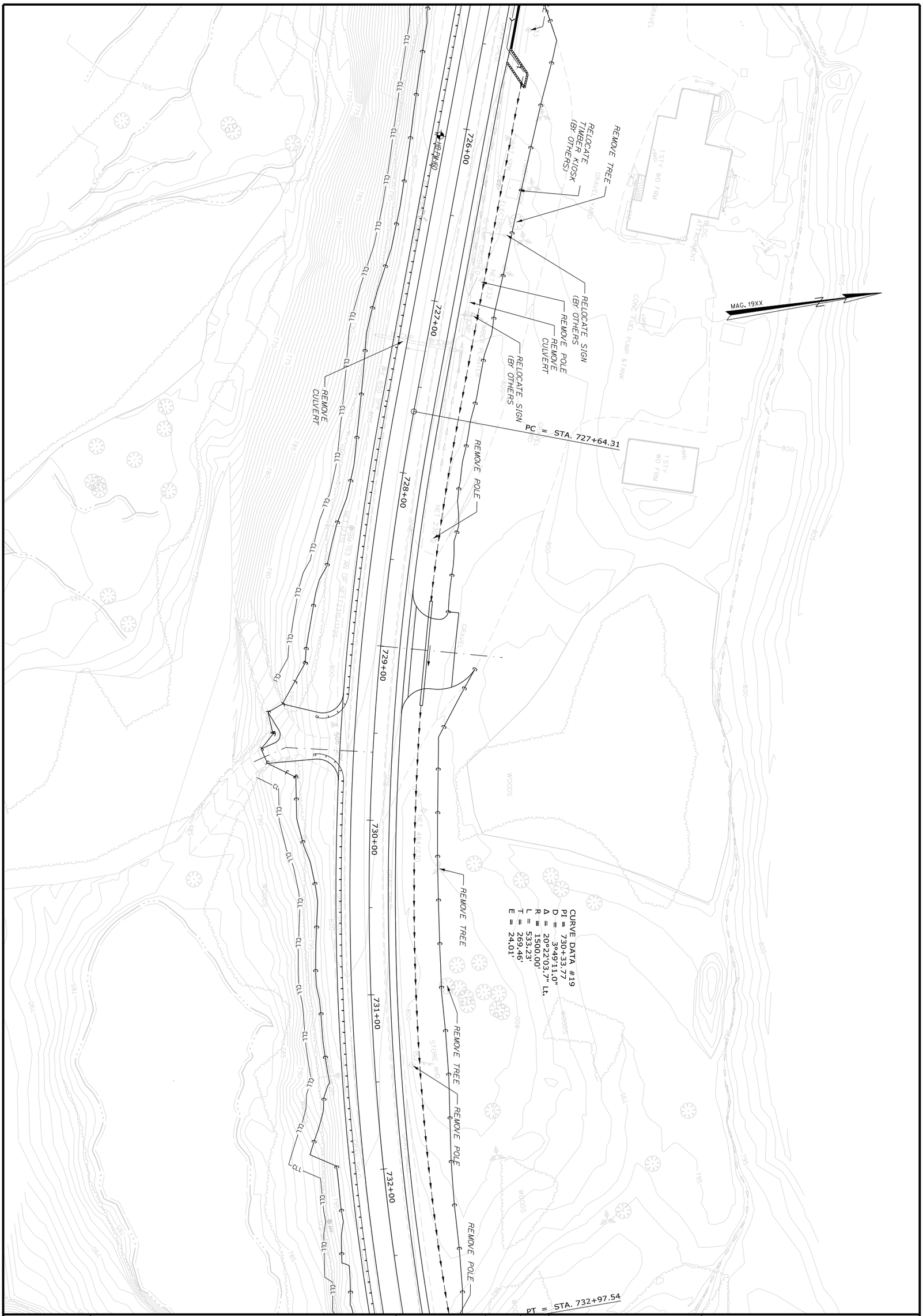
DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00

HIGHWAY PLANS



SHEET NUMBER 37 OF 40

MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

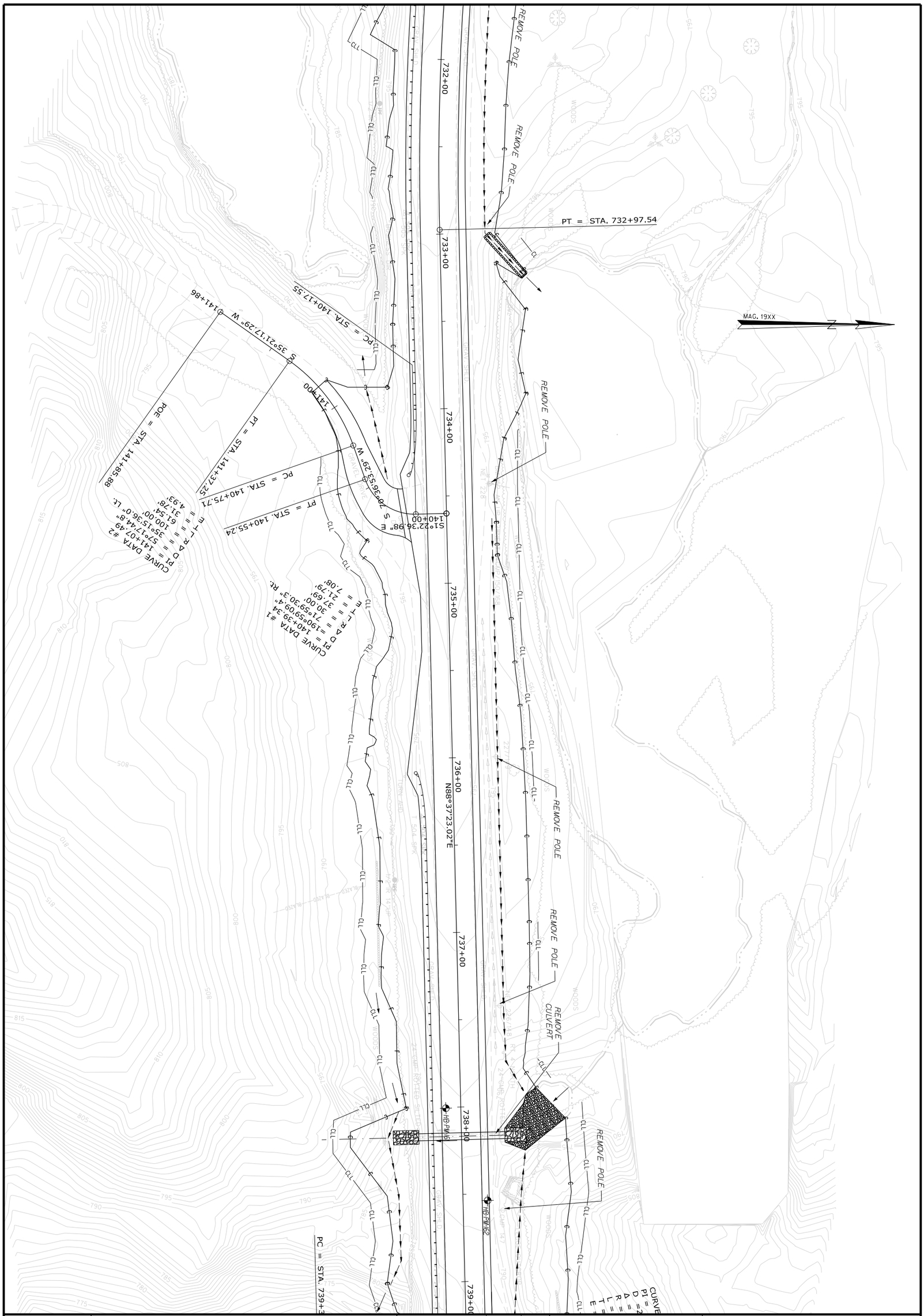
P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 38 OF 40

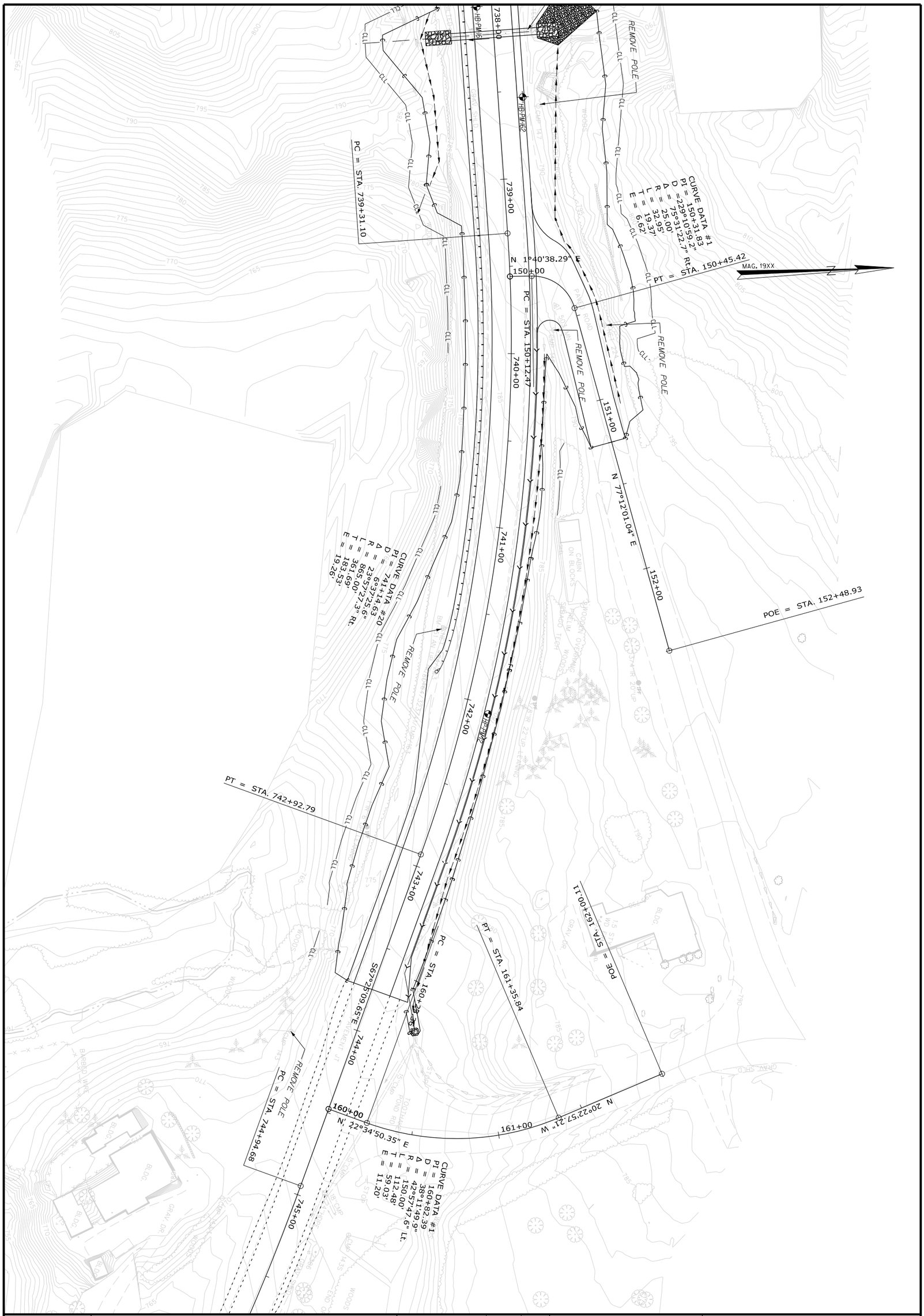
MADRID\PHILLIPS ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE	
DESIGN-DETAILED	T. WOLFEL			
CHECKED-REVIEWED				SIGNATURE
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018	
DESIGN3-DETAILED3				P.E. NUMBER
REVISIONS 1				
REVISIONS 2				
REVISIONS 3				DATE
REVISIONS 4				
FIELD CHANGES				

SHEET NUMBER 39 OF 40

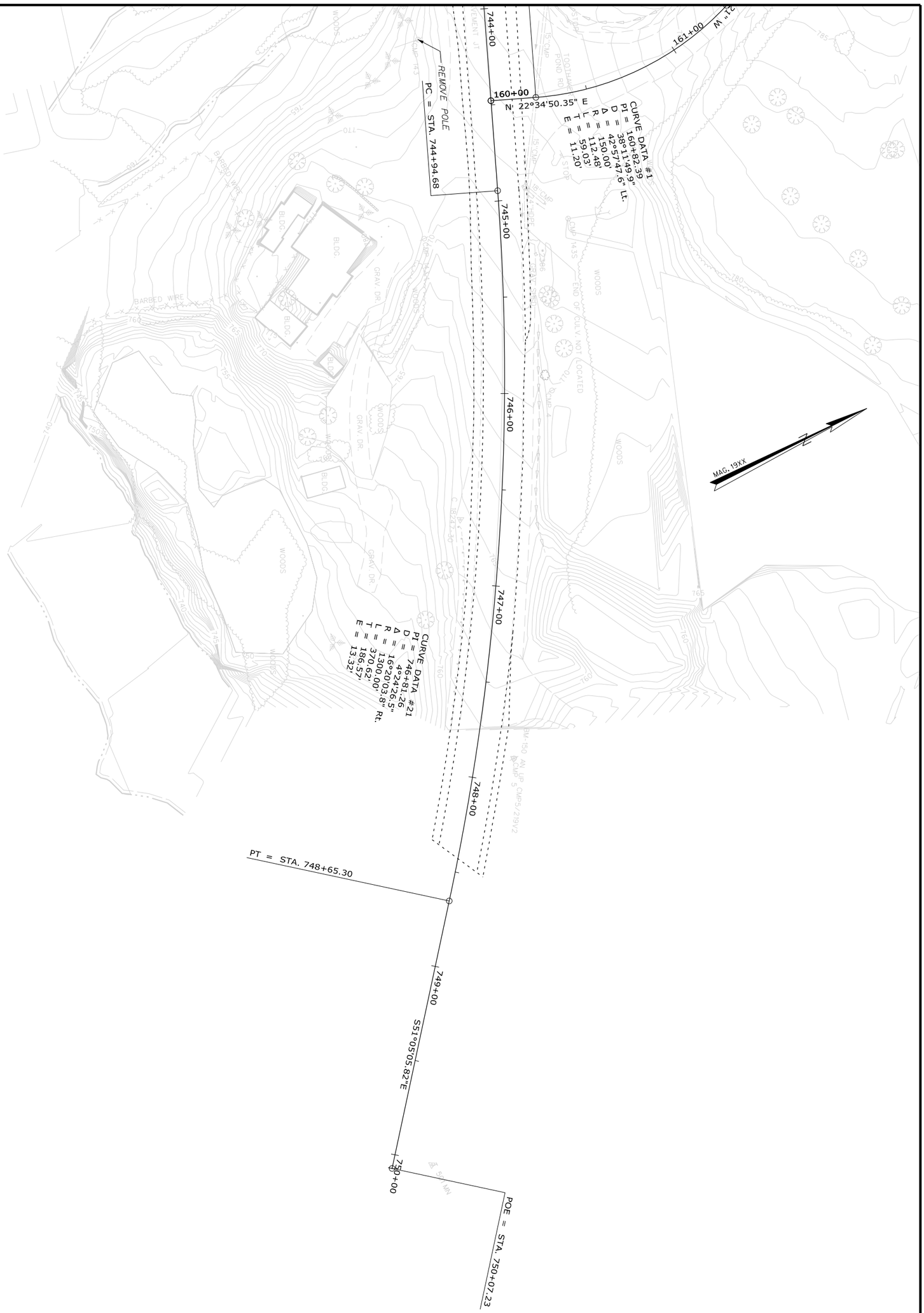
MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS



PROJ. MANAGER	E. Martin	BY	DATE
DESIGN-DETAILED	T. WOLFEL		
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2018
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 40 OF 40

MADRID\PHILLIPS
ROUTE 4

BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1824(700)

PIN 18247.00 HIGHWAY PLANS

SCHONEWALD ENGINEERING ASSOCIATES, INC.

APPENDIX A

TEST PROBE SUMMARY TABLE
AND
TEST BORING LOGS

PROBE SUMMARY
MaineDOT WIN 18247.00
MAINE ROUTE 4 MADRID-PHILLIPS

APPROX. STATION (ft)	OFFSET (ft)	EXPLORATION NO.	REFUSAL DEPTH (ft, BGS)	REFUSAL TYPE	BOTTOM OF PROBE (ft, BGS)	GROUND-WATER
517 + 04	21.8 LT	HP-PM-1	9.6	auger	9.6	none observed
519 + 04	20.0 LT	HP-PM-2	5.2	auger	5.2	none observed
541 + 04	12.8 RT	HP-PM-3	6.8	auger	6.8	none observed
545 + 04	15.1 LT	HP-PM-4	6.7	auger	6.7	none observed
563 + 05	14.2 LT	HP-PM-5	4.0	auger	4.0	none observed
576 + 03	19.7 LT	HP-PM-6	none	n/a	15.0	none observed
586 + 00	12.2 LT	HP-PM-7	10.5	auger	10.5	none observed
629 + 01	13.7 RT	HP-PM-8	5.5	auger	5.5	none observed
638 + 01	13.6 RT	HP-PM-9	4.8	auger	4.8	4.8
665 + 01	9.2 RT	HP-PM-10	6.3	auger	6.3	6.3
672 + 02	6.8 RT	HP-PM-11	12.5	auger	12.5	none observed
742 + 05	13.2 LT	HP-PM-12	3.8	auger	3.8	none observed

BGS refers to depth Below (existing) Ground Surface

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-101
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1087.6	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 12:40-13:10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	501+48.4, 15.7 ft Lt. Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/7	1.00 - 3.00	7/4/1/1	5				Greyish-tan, dry, loose, fine to coarse Sandy GRAVEL, trace silt. Soil in tip of spoon moist.	G#243269 A-1-a GW-GM
5	2D	4.8/4.8	5.00 - 5.40	50(4.8")	---				Grey, dry, Sandy GRAVEL, little silt; broken rock.	G#243270 A-1-b GM
							1080.6		7.0	
									Bottom of Exploration at 7.0 feet below ground surface. REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-102
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1061.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 13:15-13:45	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	506+98.9, 11.7 ft Lt. Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/14	1.00 - 3.00	9/3/10/14	13		1059.5		Top 9": Brown, damp, medium dense, Gravelly fine to medium SAND, little silt, trace coarse sand, (Fill).	G#243271 A-1-b GM
									1.8	
									Bottom 5"; Grey, dry, GRAVEL, some fine to coarse sand, some silt, broken rock.	
5	2D	24/16	5.00 - 7.00	18/29/20/25	49				Brown, and grey, damp, dense, GRAVEL, some fine to coarse sand, little silt, includes broken rock.	G#243272 A-1-b GM
10	3D	24/15	10.00 - 12.00	12/20/30/19	50				Brown and grey, damp, dense, GRAVEL, some fine to coarse sand, little silt, broken rock.	G#243273 A-1-a GM
							1049.2		12.0	
									Bottom of Exploration at 12.0 feet below ground surface. NO REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-103
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1046.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 13:50-14:25	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	511+50.4, 6.1 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	1045.5		8" HMA (0.7)	
	1D	24/13	1.00 - 3.00	13/12/36/14	48				Brown, damp, dense, Sandy GRAVEL, little silt.	G#243274 A-1-a GM
	2D	24/19	3.00 - 5.00	6/12/14/9	26				Brown, damp, medium dense, Silty SAND, some gravel.	G#243275 A-4 SM
5	3D	24/10	5.00 - 7.00	5/2/3/6	5				Brown, damp, loose, GRAVEL, some sand, some silt.	G#263276 A-1-b SM
10	4D	24/18	10.00 - 12.00	6/4/3/28	7				Brown, moist, medium stiff, SILT, some sand, trace gravel.	G#263277 A-4 ML
							1034.2		(12.0) **Bottom of Exploration at 12.0 feet below ground surface.** NO REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-104
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1048.7	**Auger ID/OD:**	N/A
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 14:30-15:45	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	515+03.3, 17.2 ft Lt., Gravel Shoulder	**Casing ID/OD:**	NW	**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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN				
	1D	24/16	1.00 - 3.00	5/7/8/9	15				Greyish-brown, damp, medium dense, Sandy GRAVEL, some silt.	G#263278 A-1-b GM
	2D	15.6/15	4.00 - 5.30	35/49/50(3.6")	>99				Red-brown, mottled, moist, very dense, Silty fine to coarse SAND, little gravel.	G#263279 A-4 SM
5	R1	48/44	6.50 - 10.50	RQD = 21%		NQ-2	1042.2		6.5 Top of Bedrock at Elev. 1042.2 ft. R1:Bedrock: Medium to hard, fresh to slightly weathered, aphanitic, light grey PHYLLITE; relic bedding undulating and near vertical. Very close to close, high angle breaks; undulating, smooth (mica) to rough, discolored and wide with weathered till-like infilling. Shattered from 10.1-10.5 ft bgs. Rock Mass Quality = Very Poor. R1:Core Times (min:sec) 6.5-7.5 ft (0:40) 7.5-8.5 ft (0:50) 8.5-9.5 ft (0:30) 9.5-10.5 ft (0:55) 92% Recovery	
10	R2	48/46	10.50 - 14.50	RQD = 83%					R2:Bedrock: Same as R1, except only 2 near horizontal breaks; slightly discolored; no infilling. Rock Mass Quality = Good. R2:Core Times (min:sec) 10.5-11.5 ft (0:55) 11.5-12.5 ft (0:50) 12.5-13.5 ft (0:50) 13.5-14.5 ft (0:55) 96% Recovery	
15							1034.2		14.5 **Bottom of Exploration at 14.5 feet below ground surface.**	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-105
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1054.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 15:55-16:25	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	525+04.8, 11.5 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	16.8/13	4.00 - 5.40	14/39/50(4.8")	>89				Brown, damp, very dense, GRAVEL, some sand, little silt.	G#263280 A-1-b GM
5										
							1045.4		Possible top of Bedrock or cemented brown Till at 9.2 ft bgs.	
10									**Bottom of Exploration at 9.5 feet below ground surface.** AUGER REFUSAL (9.5)	
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-106
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1040.5	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 16:30-17:05	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	528+01.6, 9.2 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	1040.1		5" HMA (0.4)	
	1D	18/14	1.00 - 2.50	20/16/62	78				Top 8"; Brown, damp, GRAVEL, some sand, little silt. Bottom 6"; Grey, dry, GRAVEL, little fine to coarse sand, little silt, broken rock. Very difficult to advance augers at 2.5 ft bgs; drilling behavior suggests cemented tight till with layers of interlocked gravel.	G#263281 A-1-b GM
5										
10	2D	6/4	10.00 - 10.50	62	---		1030.0		Grey, damp, SAND, some gravel, some silt. Gravel appears to be broken rock pieces. (10.5) **Bottom of Exploration at 10.5 feet below ground surface.** NO REFUSAL	G#263282 A-1-b SM
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-107
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	1026.4	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/28/2014; 17:10-17:45	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	530+01.8, 8.2 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	1025.9		6" HMA (0.5)	
	1D	24/12	1.00 - 3.00	14/17/24/11	41				Greyish-tan, dry to damp, dense, GRAVEL, some sand, little silt.	G#263283 A-1-b GM
									Boney material at 4.0 ft bgs.	
5	2D	10.8/9	5.00 - 5.90	37/50(4.8")	---				Greyish-tan, dry to damp, dense, GRAVEL, some silt, little silt. Appears to be pulverized rock.	G#263284 A-1-b GM
									Very difficult auguring at 7.0 ft bgs; suggests broken/weathered rock and or cemented till	
10	3D	24/18	10.00 - 12.00	15/26/26/27	52		1015.6		Greyish-tan, dry, fine to coarse SAND, little silt, trace gravel, possible pulverized rock. (10.8)	G#263285 A-1-b SM
							1014.4		Changing at 10.8 ft bgs to (3D) Brown, damp, fine to coarse SAND, trace gravel, trace silt, cemented. (12.0)	
15									**Bottom of Exploration at 12.0 feet below ground surface.** NO REFUSAL	
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-108
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	992.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 10:05-10:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	535+01.3, 14.0 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	7.5 ft open hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	991.7		6" HMA (0.5)	
	1D	24/14	1.00 - 3.00	12/17/13/13	30				Greyish-brown, damp, medium dense, Sandy GRAVEL, little silt.	G#263286 A-1-a GM
5	2D	24/7	5.00 - 7.00	9/15/6/5	21				Greyish-brown, damp, medium dense, GRAVEL, some sand, little silt.	G#263287 A-1-b GM
10	3D	24/7	10.00 - 12.00	5/12/15/16	27				Greyish-brown, wet, medium dense, GRAVEL, some sand, little silt.	G#263288 A-1-b GM
							980.2		(12.0) **Bottom of Exploration at 12.0 feet below ground surface.** NO REFUSAL	
15										
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-109
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	993.5	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 07:50-08:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	535+01.2, 8.1 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	9/34/44/18	78				Brown, damp, very dense, fine to coarse Sandy GRAVEL, little silt; bottom 6" of sample broken rock.	G#263289 A-1-b GM
5	2D	24/8	5.00 - 7.00	6/15/7/5	22				Brown, damp, medium dense, Gravelly fine to coarse SAND, little silt.	G#263290 A-1-b SM
							984.5		9.0	
10	3D	24/18	10.00 - 12.00	2/3/7/8	10				Possible change to organic soils at 9.0 ft bgs. Greyish-brown, stiff, loose, Sandy SILT, trace gravel, grading to Silty fine SAND with organic matter including roots fibrous peat, organic silt. Change to Dark grey till of spoon.	G#263291 A-4 ML
							981.5		12.0	
15									**Bottom of Exploration at 12.0 feet below ground surface.** NO REFUSAL, possible change to Till.	
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-110
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	989.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 10:45-11:15	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	536+01.9, 11.7 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	6.7 ft open hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	988.6		7" HMA	
									0.6	
	1D	24/14	1.00 - 3.00	13/16/15/40	31				Brown, damp, dense, Gravelly SAND, little silt.	G#263292 A-1-b SM
							985.2		4.0	
									Possible change to organic soils at 4.0 ft bgs.	
5	2D	24/12	5.00 - 7.00	1/1/1/4	2				Brown, moist, very loose, FIBROUS PEAT. Grey SAND, some gravel, little silt (Till) in tip of spoon.	G#263293 A-1-b SW-SM
							982.2		7.0	
	3D	24/9	7.00 - 9.00	24/33/18/22	51				Dark grey, damp, very dense, GRAVEL, some sand, little silt, (Till).	G#263294 A-1-b GM
10							979.2		10.0	
									Bottom of Exploration at 10.0 feet below ground surface. NO REFUSAL	
15										
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-111
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	990.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 08:40-09:10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	536+01.6, 7.5 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	7.3 ft open hole

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/10	1.00 - 3.00	6/6/6/11	12				Brown, damp, medium dense, Gravelly fine to coarse SAND, little silt.	G#263295 A-1-b SM
5	2D	24/18	5.00 - 7.00	35/17/14/11	31				Brown, damp, Gravelly fine to medium SAND, little silt, trace coarse sand.	G#263296 A-2-4 SM
							984.4		5.8	
	3D	24/13	7.00 - 9.00	12/11/9/11	20				(2D) Grey, moist, dense, fine to coarse SAND, some gravel, little organic silt, with wood, roots. Similar to above.	G#263297 A-1-b SM
							981.7		8.5	
10	4D	24/15	10.00 - 12.00	4/11/5/3	16				(3D) Fine to coarse SAND, some gravel, little silt, no organic material visible, but strong organic odor. Dark grey, wet, medium dense, Gravelly, fine to coarse SAND, little silt, (Till).	G#263298 A-1-a SW-SM
							978.2		12.0	
									Bottom of Exploration at 12.0 feet below ground surface. NO REFUSAL	
15										
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-112
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	987.7	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 11:20-11:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	537+01.6, 17.1 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	5.0 ft open hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	12/8/4/4	12				Greyish-brown, damp, medium dense, SAND, some gravel, little silt, with pieces asphalt, (Fill).	G#263299 A-1-b SM
							983.2		4.5	
5	2D	24/7	5.00 - 7.00	13/24/28/24	52		982.7		Possible thin layer of PEAT from 4.5-5.0 ft bgs. 5.0 Brownish-grey, wet, very dense, Sandy GRAVEL, little silt.	G#263300 A-1-b GM
10	3D	18/10	10.00 - 11.50	10/11/18	29				Grey, wet, medium dense, fine to coarse SAND, little gravel, little silt. Broken rock in tip of spoon.	G#270001 A-1-b SM
							976.2		11.5	
15									**Bottom of Exploration at 11.5 feet below ground surface.** SPOON REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-113
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	988.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 11:20-11:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	537+01.9, 3.5 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Approx. 6.5 ft bgs.

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); WC = Water Content, percent ≅ = Similar or Equal too
LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; G = Grain Size Analysis; C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	988.3		6" HMA	
									0.5	
	1D	24/14	2.00 - 4.00	9/12/9/22	21				Brown, damp, medium dense, fine to coarse Sandy GRAVEL, little silt.	G#270002 A-1-b GM
5	2D	24/11	5.00 - 7.00	5/6/6/9	12				Greyish-brown, damp, medium dense, SAND, some gravel, little silt.	G#270003 A-1-b SM
							982.5		6.3	
	3D	24/17	7.00 - 9.00	8/12/29/37	41				(2D) Dark brown, moist to wet, PEAT and fine sandy organic SILT with wood, roots, and fibrous peat. (3D) Dark brown, wet, fine to medium Sandy ORGANIC SILT, little gravel, trace coarse sand.	G#270004 A-2-4 SM
							980.5		8.3	
10							979.1		Grey, fine to coarse SAND, some gravel, little silt. Blow counts affected by gravel. 9.7 **Bottom of Exploration at 9.7 feet below ground surface.** REFUSAL, likely on grey partially cemented till.	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-114
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	986.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 12:00-12:55	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	543+53.1, 7.3 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	986.2		8" HMA — 0.7	
	1D	24/15	1.00 - 3.00	21/23/11/10	34				Reddish-brown, dry to damp, dense, fine to coarse SAND, some gravel, some silt, with 3" layer weathered asphalt at approx. 2.0 ft bgs.	G#270005 A-1-b SM
5							982.2		Very difficult drilling below 3.9 ft, able to penetrate to 4.7 ft bgs, possible cemented brown till. — 4.7	
									Bottom of Exploration at 4.7 feet below ground surface. REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-114A
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	986.7	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 12:00-12:55	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	543+53.8, 11.6 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
									Very boney, many boulders at 1.5 ft bgs.	
5										
10									Reddish-brown, clean sand on augers; partially cemented.	
							973.2		13.5	
									Bottom of Exploration at 13.5 feet below ground surface. REFUSAL, possibly in cemented brown till.	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-115
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	978.3	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/29/2014; 12:00-12:55	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	551+66.1, 16.1 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	977.7		7" HMA (0.6)	
	1D	15.6/7	2.00 - 3.30	6/10/34(3.6")	>44				Greyish-brown, damp, dense, SAND, some gravel, some silt. Broken rock in tip of spoon, (Fill).	G#270006 A-2-4 SM
5	2D	24/11	5.00 - 7.00	6/8/8/5	16				Greyish-brown, damp, medium dense, fine to medium SAND, some gravel, some silt, trace coarse sand, reworked, (Fill).	G#270007 A-2-4 SM
10	3D	15.6/10	10.00 - 11.30	21/50/50(3.6")	>100				Greyish-brown, damp, very dense, GRAVEL, some sand, little silt, reworked, (Fill). Loose, boney material below 11.3 ft bgs.	G#270008 A-1-b GM
15							963.3		(15.0) **Bottom of Exploration at 15.0 feet below ground surface.** NO REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-116
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	977.0	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014; 09:55-11:00	**Drilling Method:**	SSA/Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	554+01.1, 15.4 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	8/14/9/8	23				Light brown, dry, medium dense, Gravelly fine to coarse SAND, some silt, (Granular Fill).	G#270009 A-1-b SM
									(1D) Reddish-brown, damp, Gravelly fine to medium SAND, some silt, trace coarse sand, (Till Fill).	
5						HSA				
	2D	24/7	6.00 - 8.00	2/2/2/3	4				Light brown, dry, loose, Sandy GRAVEL, little silt, (Fill).	G#270010 A-1-a GM
							969.0		8.0	
10	3D	1.2/1.2	10.00 - 10.10	70(1.2")	---		966.9		Light brown-grey, dry, fine to coarse SAND, some gravel, some silt. 10.1	G#270011 A-2-4 SM
									Very difficult drilling, possible top of weathered bedrock.	
							964.8		12.2	
									Bottom of Exploration at 12.2 feet below ground surface. Auger REFUSAL, possible sound bedrock.	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-117
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	975.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014; 11:05-11:25	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	554+01.2, 10.8 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	3.6/3.6	1.00 - 1.30	50(3.6")	---		973.9		Grey, dry, fine to coarse SAND, some gravel, some silt. — 1.3	G#270012 A-1-b SM
							972.7		Very difficult drilling, likely weathered bedrock. — 2.5	
									Bottom of Exploration at 2.5 feet below ground surface. Auger REFUSAL, possible sound bedrock.	
5										
10										
15										
20										
25										

Remarks:

Bedrock exposed in back slope. Strike roughly parallel to centerline, dip near vertical. Slate to phyllite with lighter colored beds highly weathered.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-118
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	972.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014; 11:05-11:25	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	557+00.1, 10.5 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	14.4/9	1.00 - 2.20	8/9/40(2.4")	---				Brown to reddish-brown, moist, fine to medium Sandy GRAVEL, little silt, trace coarse sand, (Fill).	G#270013 A-1-a GM
							970.6		2.2	
							970.0		Very difficult drilling, likely weathered bedrock.	
									2.8	
									Bottom of Exploration at 2.8 feet below ground surface. Auger REFUSAL, possible sound bedrock.	
5										
10										
15										
20										
25										

Remarks:

Bedrock exposed in back slope. Strike roughly parallel to centerline, dip near vertical. Slate to phyllite with lighter colored beds highly weathered.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-119
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	958.6	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014; 11:55-12:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	565+95.7, 9.7 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	957.9		8½" HMA	
									0.7	
	1D	24/12	1.00 - 3.00	39/26/13/13	39				Greyish-tan and reddish-brown, dry to damp, dense, Sandy GRAVEL, little silt.	G#270014 A-1-b GM
5	2D	9.6/8	5.00 - 5.80	33/67(3.6")	---				Reddish-brown, moist, SAND, some gravel, little silt.	G#270015 A-1-b SM
							951.1		7.5	
									Possible weathered rock.	
							949.6		9.0	
10									**Bottom of Exploration at 9.0 feet below ground surface.** Auger REFUSAL, possible sound bedrock.	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-120
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	964.7	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014; 12:35-13:05	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	571+97.9, 16.8 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/5	1.00 - 3.00	5/4/5/4	9				Reddish-brown, damp, loose, GRAVEL, some sand, some silt. Piece of gravel in tip of spoon, rounded.	G#270016 A-1-b GM
5	2D	24/4	5.00 - 7.00	10/9/11/15	20				Reddish-brown, damp, medium dense, SAND, some gravel, some silt. Large piece of gravel in tip of spoon, angular, fresh surfaces.	G#270017 A-2-4 SM
10	3D	3.6/3.6	10.00 - 10.30	50(3.6")	---		954.2		Brown, damp, SAND, some gravel, some silt. 10.5	G#270018 A-2-4 SM
									Bottom of Exploration at 10.5 feet below ground surface. Auger REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-121
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	969.7	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014; 13:15-14:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	575+97, 3.7 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN	969.0		9" HMA (0.8)	
	1D	24/16	1.00 - 3.00	10/16/15/13	31				Brown to reddish-brown, dry, dense, fine to coarse SAND, some gravel, little silt.	G#270019 A-1-b SM
							967.7		(2.0) Possible change from granular Fill to Common Borrow.	
5	2D	15.6/12	5.00 - 6.30	23/76/50(3.6")	>126				Brown to grey, dry to damp, very dense, fine to coarse SAND, some gravel, silt, broken rock in bottom of sample.	G#270020 A-2-4 SM
10	3D	9.6/8	10.00 - 10.80	31/50(3.6")	---				Dark grey, dry to damp, SILT, some sand, some gravel, (Till, partially cemented). Boney layers between 10.8 and 15.0 ft bgs.	G#270021 A-4 SM
15							954.7		(15.0) **Bottom of Exploration at 15.0 feet below ground surface.** NO REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-122
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	963.6	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/2/2014-9/3/2014	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	577+98.8, 12.3 ft Lt.	**Casing ID/OD:**	NW-Spun	**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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN				
	1D	24/10	1.00 - 3.00	9/5/5/6	10				Reddish-brown, moist to damp, loose, SAND, some gravel, some silt, (Fill).	G#270022 A-2-4 SM
5	2D	6/5	5.00 - 5.50	50	---				Reddish-brown to brownish-grey, damp, Sandy SILT, little gravel.	G#270023 A-4, SM
	R1	60/8	6.40 - 11.40	RQD = 0%		NQ-2	957.5		6.1 Very difficult drilling, possible weathered rock. Auger REFUSAL, spin NW to 6.4 ft bgs. R1: Cored through cobble underlain by dark grey cemented Till.	
10										
						SPUN			Pulled NW, attempted to drive HW, refusal at 6.4 ft, roller cone ahead, unable to drive HW past cobble, try driving NW.	
									Rock or Boulder at 13.7 ft bgs.	
15										
	R2	12/12	15.80 - 16.80	RQD = 83%		NQ-2	947.8		15.8	
	R3	52.8/52	16.80 - 21.20	RQD = 72%					Top of Bedrock at Elev. 947.8 ft. R2:Bedrock: Hard, fresh, medium to coarse grained, light grey to white GRANITE, close horizontal fractures, undulating, rough, fresh, and open. Rock Mass Quality = Good. R2: 100% Recovery R3:Bedrock: Similar to R2. Close to moderately spaced, horizontal fractures, undulating, rough, fresh to discolored (chlorite and rust staining), open, and occasionally infilled with mud. Rock Mass Quality = Fair. R3:Core Times (min:sec) 16.8-17.8 ft (1:15) 17.8-18.8 ft (1:05) 18.8-19.8 ft (1:25) 19.8-20.8 ft (1:20) 20.8-21.2 ft (-) 98% Recovery	
20										
							942.4		21.2	
									Bottom of Exploration at 21.2 feet below ground surface.	
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-123
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	954.1	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/3/2014; 13:15-14:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	580+48.7, 0.6 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	4.8 ft Open Hole

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA			14" HMA	
							952.9		1.2	
	1D	24/6	2.00 - 4.00	2/3/2/5	5				Reddish-brown, wet, loose, SAND, some silt, some gravel, trace clay.	G#270024 A-2-4 SC-SM
5	2D	16.8/11	5.00 - 6.40	8/40/50(4.8")	>90				Reddish-brown, wet, very dense, GRAVEL, little silt, trace fine to coarse sand.	G#270025 A-2-4, GC-GM
							947.6		6.5	
									Bottom of Exploration at 6.5 feet below ground surface. Auger REFUSAL, likely on bedrock, based on drilling behavior.	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-124
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	954.1	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/3/2014; 09:35-10:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	580+47.7, 20.1 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	14.3 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/12	2.00 - 4.00	10/7/7/5	14				Reddish-brown, damp to moist, medium dense, Sandy GRAVEL, some silt, (Fill).	G#270026 A-1-b GM
									Root on auger at about 4.5 ft bgs.	
5							949.1		5.0	
	2D	4.8/3	5.00 - 5.40	50(4.8")	---				Reddish-brown, moist, SAND, some silt, some gravel.	G#270027 A-2-4 SM
	3D	24/10	6.00 - 8.00	5/9/7/7	16				Reddish-brown, moist, medium dense, Silty SAND, little gravel.	G#270028 A-4 SM
10	4D	10.8/9	10.00 - 10.90	4/50(4.8")	---				Reddish-brown, moist, fine to coarse SAND, some silt, some gravel, trace clay. Boney layers from 10.9-13.5 ft bgs.	G#270029 A-4 SC-SM
							940.6		13.5	
									Possible change to dense brown till, coincident with topographic shelf above current river elevation	
15							938.9		15.2	
	MD		15.20 - 15.20						**Bottom of Exploration at 15.2 feet below ground surface.** Failed sample attempt. Auger REFUSAL, appears to be in cemented brown till similar to Small Falls area.	
20										
25										

Remarks:

Sharp bend of Sandy River, pavement distressed, top of slope dropping.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-125
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	953.4	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/3/2014; 11:20-11:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	580+97.6, 0.2 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	952.6		10" HMA (0.8)	
5							947.4		(6.0) **Bottom of Exploration at 6.0 feet below ground surface.** REFUSAL	
10										
15										
20										
25										

Remarks:

Complete as Bedrock probe, no sampling or testing.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-126
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	950.9	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/3/2014; 11:50-14:15	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	582+98.9, 1.3 ft Lt.	**Casing ID/OD:**	NW-Spun	**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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN	950.2		9" HMA (0.8)	
	1D	9.6/7	1.00 - 1.80	19/50(3.6")	---				Dark brownish-black to brown, dry, Gravelly SAND, little silt, (Fill).	G#270030 A-1-a SW-SM
	MR								Failed Core sample attempt, possible cobble or boulder.	
	R1	39.6/39.6	4.50 - 7.80	RQD = 90%		NQ-2	946.4		(4.5) Top of Bedrock at Elev. 946.4 ft. R1:Bedrock: Hard, fresh to slightly weathered, medium grained, light grey to white GRANITE, moderately spaced, horizontal fractures, undulating, rough, discolored (black) and open, staining of parent rock either side of most fractures. Rock Mass Quality = Good. R1:Core Times (min:sec) 4.5-5.0 ft (-) 5.0-6.0 ft (2:30) 6.0-7.0 ft (2:30) 7.0-7.8 (2:15) 100% Recovery	
5										
	R2	63.6/61	7.80 - 13.10	RQD = 88%					R2:Bedrock: Hard, fresh to slightly weathered at depth, medium to coarse grained, light grey to white, GRANITE, with possible hornfels inclusion at 12.9 ft., close to moderately spaced, horizontal fractures, undulating, rough, discolored (black) and open, few vertical cracks forming, staining of parent rock either side of most fractures, dropped through open fracture at about 12.5 ft. Rock Mass Quality = Good. R2:Core Times (min:sec) 7.8-8.8 ft (1:55) 8.8-9.8 ft (2:00) 9.8-10.8 ft (2:25) 10.8-11.8 ft (2:05) 11.5-12.8 ft (2:05) 12.8-13.1 ft (-) 95% Recovery	
10							937.8		(13.1) **Bottom of Exploration at 13.1 feet below ground surface.**	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-127
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	930.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/3/2014; 14:35-15:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	594+98.5, 7.9 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	930.2		8" HMA	
									0.7	
	1D	24/12	1.00 - 3.00	20/22/8/9	30				Tan, dry, medium dense, fine to coarse Sandy GRAVEL, some silt, (Granular Fill).	G#270031 A-1-b GM
							928.5		2.4	
									(1D) Reddish-brown, damp, GRAVEL, some sand, little silt.	
5	2D	22.8/13	5.00 - 6.90	21/31/42/50(4.8)	73				Reddish tan, dry to damp, very dense, GRAVEL, some sand, little silt.	G#270032 A-1-a GM
							923.3		7.6	
									Bottom of Exploration at 7.6 feet below ground surface. Auger REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-128
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	926.1	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/3/2014; 15:00-15:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	599+98.7, 9.2 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	925.4		8" HMA — 0.7	
									Fill	
							923.3		— 2.8	
	1D	21.6/14	3.00 - 4.80	17/17/19/50(3.6)	36				Bottom of Road base. Reddish-tan, dry, dense, fine to coarse Sandy GRAVEL, little silt.	G#270033 A-1-a GW-GM
5	2D	24/16	5.00 - 7.00	28/54/39/38	93				Grey and brown, dry to damp, very dense, GRAVEL, some sand, little silt.	G#270034 A-1-a GM
							919.5		— 6.6	
10									**Bottom of Exploration at 6.6 feet below ground surface.** Auger REFUSAL, bit sheared off of lead auger.	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-129
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	916.2	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/4/2014; 13:25-14:10	**Drilling Method:**	SSA/Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	611+02.1, 6.2 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	6.2 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	915.6		7" HMA (0.6)	
	1D	24/13	1.00 - 3.00	12/17/15/12	32				Greyish-brown, dry to damp, dense, Gravelly fine to coarse SAND, little silt. Changing to reddish-brown at 2.2 ft bgs.	G#270035 A-1-b SM
5	2D	22.8/15	5.00 - 6.90	22/19/35/50(4.8)	54	HSA			Brown, moist to wet, very dense, fine to medium Sandy GRAVEL, little silt, trace coarse sand, trace clay.	G#270036 A-1-a GC-GM
10	3D	24/15	10.00 - 12.00	11/17/17/16	34				Brown, wet, dense, fine to coarse SAND, little silt, little gravel, minor organic odor.	G#270037 A-2-4 SM
							904.2		(12.0) **Bottom of Exploration at 12.0 feet below ground surface.** NO REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-130
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	913.0	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/4/2014; 14:15-15:10	**Drilling Method:**	SSA/Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	618+85.3, 8.3 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	12.8 ft inside HSA

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	912.4		7" HMA (0.6)	
	1D	24/14	1.00 - 3.00	19/37/18/17	55				Brown, dry to damp, very dense, Sandy GRAVEL, little silt.	G#270038 A-1-b GM
									Changing to reddish-brown at 2.2 ft bgs.	
5	2D	24/3	5.00 - 7.00	12/11/9/4	20	HSA			Reddish-brown, damp, medium dense, Sandy GRAVEL, some silt.	G#270039 A-1-b GM
10	3D	24/11	10.00 - 12.00	2/3/5/4	8				Reddish-brown, damp to moist, loose, fine to coarse SAND, some gravel, little silt, upper 2" contains minor organics (roots), no organic odor.	G#270040 A-1-b SM
15	4D	24/10	15.00 - 17.00	8/16/26/17	42				Reddish-brown, wet, dense, fine to coarse Sandy GRAVEL, little silt, trace clay.	G#270041 A-1-b GC-GM
							896.0		(17.0) **Bottom of Exploration at 17.0 feet below ground surface.** NO REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-131
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	923.1	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/4/2014; 15:15-15:45	**Drilling Method:**	SSA/Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	622+47.9, 13.0 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	7/9/10/8	19				Reddish-brown grading to grayish-brown, damp, medium dense, SAND, some gravel, some silt.	G#270042 A-2-4 SM
5	2D	10.8/10.8	5.00 - 5.90	39/50(4.8")	---	HSA			Grey, mottled, damp, SILT, some sand, trace gravel, (Native Till).	G#270043 A-4 ML
							916.4		6.7	
							916.2		Possible Bedrock.	
									6.9	
10									**Bottom of Exploration at 6.9 feet below ground surface.** Auger REFUSAL	
15										
20										
25										

Remarks:

Outcrop observed in adjacent Lt. backslope.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-132
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	924.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/4/2014; 15:50-16:05	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	625+99, 14.9 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	15.6/13	1.00 - 2.30	7/12/50(3.6")	---				Greyish-brown, damp, dense, GRAVEL, some sand, little silt.	G#270044 A-1-a GM
							921.9		2.3	
									Possible Bedrock.	
							920.4		3.8	
									Bottom of Exploration at 3.8 feet below ground surface. Auger REFUSAL	
5										
10										
15										
20										
25										

Remarks:

Rock, ledge or boulder exposed in Rt. backslope.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-133
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	923.0	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/4/2014; 16:15-16:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	627+89.8, 7.7 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	7.1 ft Open Hole

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	922.3		9" HMA 0.8	
	1D	24/14	1.00 - 3.00	16/20/15/12	35				Greyish-brown, dry to damp, dense, GRAVEL, some sand, trace silt, (Fill).	G#270045 A-1-a GW-GM
							919.5		3.5	
									Organic sand on augers from 3.5-4.5 ft bgs.	
5	2D	24/14	5.00 - 7.00	10/16/4/5	20				Dark brown, moist to wet, medium dense, fine to medium SAND, some silt, little gravel. Possibly fill placed in low area.	G#270046 A-2-4 SM
10	3D	3.6/2	10.00 - 10.30	50	---		912.7		Reddish-brown, wet, SILT, some sand, some gravel, (Till). 10.3	G#270047 A-4 SM
									Bottom of Exploration at 10.3 feet below ground surface. Spoon REFUSAL, possibly cemented brown till or bedrock.	
15										
20										
25										

Remarks:

Appears to be wetland/bog Lt. of Mainline.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-134
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	917.8	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/4/2014; 16:55-18:15	**Drilling Method:**	SSA/Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	630+42.1, 9.1 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	917.3		6" HMA	
									0.5	
	1D	24/14	2.00 - 4.00	4/2/8/9	10				Reddish-brown, damp to moist, loose, Silty SAND, trace gravel, (Fill).	G#270048 A-4 SM
5	2D	24/10	5.50 - 7.50	4/4/3/2	7	HSA	912.3		5.5	G#270049 A-2-4 SM
									Reddish-brown, moist, loose, fine to coarse SAND, little silt.	
									Soft material at 6.5 ft bgs.	
10							907.8		10.0	
	3D/A	24/20	10.00 - 12.00	1-12"/2/2	2		907.3		(3D) 10.0-10.5 Brown, moist, silty FIBEROUS PEAT, some sand, trace clay.	G#270050 A-4 OL
									10.5	
									(3D/A) 10.5-12.0 Grey, Silty SAND, trace gravel.	G#271176 A-4 SM
									Dense, boney material at 13.5 ft bgs.	
15	MD/S1	10.8/0	15.00 - 15.90	17/50(4.8")	---				Failed sample attempt, sampled material off lead auger.	
							901.9		15.9	
									Bottom of Exploration at 15.9 feet below ground surface. Spoon REFUSAL, possible cemented brown till or bedrock.	
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-135
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	900.7	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 09:25-10:025	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	634+98, 13.3 ft Rt., Gravel Shoulder	**Casing ID/OD:**	NW-Spun	**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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN				
	1D	15.6/7	1.00 - 2.30	10/17/50(3.6")	---				Greyish-brown, damp, GRAVEL, some sand, little silt, (Fill).	G#271177 A-1-a GW-GM
							897.7		3.0	
									Possible bedrock at 3.0 ft bgs., driller notes relatively soft, but not ripable.	
							896.7		4.0	
	R1	60/60	4.00 - 9.00	RQD = 75%		NQ-2			Top of Intact Bedrock at Elev. 896.7 ft. Auger REFUSAL R1:Bedrock: Hard, fresh to slightly weathered, aphanitic, light grey, PHYLLITE. Some relic bedding visible, high-angled, no visible phenocrysts. Close to moderately spaced, high angle and horizontal breaks, undulating, rough, typically discolored (rust) and moderately wide with reddish-brown mud infilling, few vertical cracks forming. Rock Mass Quality = Fair. R1:Core Times (min:sec) 4.0-5.0 ft (1:25) 5.0-6.0 ft (1:20) 6.0-7.0 ft (1:10) 7.0-8.0 ft (1:05) 8.0-9.0 ft (1:05) 100% Recovery	
5							891.7		9.0	
10									**Bottom of Exploration at 9.0 feet below ground surface.**	
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-136
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	890.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 10:35-11:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	636+97.4, 12.7 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	6/10/28/7	38				Greyish-brown and reddish-brown, damp, dense, Sandy GRAVEL, some silt.	G#271178 A-1-b GM
5							886.1		4.8	
							885.7		Possible Bedrock, grind for extended period.	
									5.2	
									Bottom of Exploration at 5.2 feet below ground surface. Auger REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-137
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	880.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 11:05-11:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	640+47.1, 14.7 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
							879.0		1.2	
									Bottom of Exploration at 1.2 feet below ground surface. REFUSAL, could be boulders.	
5										
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-137A
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	880.4	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 11:05-11:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	640+44.1, 14.1 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
									Possible boulders at 2.0 ft bgs.	
							876.4		4.0	
									Bottom of Exploration at 4.0 feet below ground surface. REFUSAL	
5										
10										
15										
20										
25										

Remarks:

Rock exposed in adjacent backslope, possible boulders.

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

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

Boring No.: HB-PM-137A

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-138
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	877.1	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 11:35-12:50	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	642+48.9, 10.3 ft Rt., Gravel Shoulder	**Casing ID/OD:**	NW-Spun	**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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN				
	1D	24/9	1.00 - 3.00	8/8/9/8	17				Greyish-brown, damp, medium dense, fine to coarse Sandy GRAVEL, trace silt.	G#271179 A-1-a GW-GM
							872.6		4.5	
5	MR	10.8/6	5.50 - 6.40			NQ-2			Possible Bedrock at 4.5 ft bgs. (MR) Gravel pieces, indeterminate whether boulders of bedrock.	
	MD	0/0	6.40 - 6.40	RQD = 14%			870.6		Failed sample attempt, unable to penetrate past 6.4 ft.	
	R1	27.6/27.6	6.50 - 8.80						6.5 Top of Intact Bedrock at Elev. 870.6 ft. R1:Bedrock: Hard, fresh to slightly weathered, aphanitic, light grey, PHYLLITE, minor relic bedding visible, no visible phencrysts. Very close to close, vertical and horizontal breaks (blocky), undulating, rough, discolored (rusty) and open to moderately wide with sandy silt infilling. Rock Mass Quality = Very Poor. R1:Core Times (min:sec) 6.5-7.5 ft (1:35) 7.5-8.5 ft (1:25) 8.5-8.8 ft (-) 100% Recovery	
							868.3		8.8 **Bottom of Exploration at 8.8 feet below ground surface.**	
10										
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-139
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	869.5	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 13:05-13:25	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	647+45.4, 7.3 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	868.9		7" HMA (0.6)	
	1D	24/13	1.00 - 3.00	17/20/13/13	33				Reddish-brown, damp, dense, Gravelly SAND, little silt.	G#271180 A-1-b SM
							865.8		(3.7) Possible Rock, soft like Phyllite.	
5							864.2		(5.3) **Bottom of Exploration at 5.3 feet below ground surface.** Auger REFUSAL	
10										
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-140
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	862.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/5/2014; 13:30-14:15	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	651+49.1, 20.2 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	4.7 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/12	1.00 - 3.00	5/5/11/12	16				Greyish-brown, moist, medium dense, GRAVEL, some sand, little silt.	G#271181 A-2-4 SM
5	2D	24/8	5.00 - 7.00	6/14/43/29	57				Brown, wet, very dense, GRAVEL, some sand, little silt, trace clay.	G#271182 A-1-b GC-GM
									Fewer cobbles and boulders at 8.0 ft bgs.	
10	3D	24/5	10.00 - 12.00	7/9/10/13	19				Grey, moist, medium dense, Gravelly fine to coarse SAND, little silt, trace clay.	G#271183 A-1-b SC-SM
							850.8		12.0	
									Bottom of Exploration at 12.0 feet below ground surface. NO REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-141
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	858.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 10:10-10:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	653+97, 12.1 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/8	1.00 - 3.00	4/5/5/7	10				Brown, damp, loose, GRAVEL, some sand, little silt, trace clay.	G#271184 A-1-b GC-GM
5	2D	12/10	5.00 - 6.00	36/64/50(0")	>114		852.2		Boney and difficult drilling. Greyish-brown, damp, very dense, GRAVEL, some sand, little silt. (6.0) Top of Rock or boney layer. (6.7)	G#271185 A-1-a GW-GM
							851.5		**Bottom of Exploration at 6.7 feet below ground surface.** Auger REFUSAL, possibly in cemented brown till.	
10										
15										
20										
25										

Remarks:

Rock exposed in adjacent back slope, likely boulders,

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-142
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	855.4	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 10:55-11:20	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	657+00.1, 11.5 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	21.6/12	1.00 - 2.80	7/10/20/50(3.6)	30				Greyish-brown, damp to dry, medium dense, SAND, some silt, some gravel, pulverized rock in bottom of sample.	G#271186 A-2-4 SM
							852.6		2.8	
							852.1		Top of Rock,or boney layer.	
									3.3	
5									**Bottom of Exploration at 3.3 feet below ground surface.** Auger REFUSAL, possibly in cemented brown till.	
10										
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-143
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	853.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 11:20-11:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	657+99.5, 4.9 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	853.3		6" HMA	
									0.5	
	1D	24/13	1.00 - 3.00	17/23/11/12	34				Brown and grey, damp, dense, Gravelly fine to coarse SAND, little silt, 2" seam at 2.8 ft bgs contains wood and peat.	G#271187 A-1-b SM
							849.8		4.0	
							849.6		Top of Rock or cemented brown till.	
5									4.2	
									Bottom of Exploration at 4.2 feet below ground surface. Auger REFUSAL	
10										
15										
20										
25										

Remarks:

Rock exposed in adjacent back slope, likely boulders,

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-144
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	854.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 11:45-12:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	657+99.4, 16.3 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D/A	24/19	1.00 - 3.00	3/3/2/2	5				Brown, damp, loose, fine to coarse SAND, little silt, trace gravel, (Fill).	
							851.8		2.4	#271188 (T267) Loss 13.1% WC=40.5% G#271189 A-4 ML
							851.6		1D (2.4-2.6 ft) Dark brown, SILTY FIBROUS PEAT. 2.6	
							850.7		1D/A (2.6-3.0 ft) Red-brown, Sandy SILT, trace gravel. 3.5	
							849.9		Top of Rock or cemented brown till. 4.3	
5									**Bottom of Exploration at 4.3 feet below ground surface.** Auger REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-145
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	842.6	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 12:10-12:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	663+49.1, 11.5 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	5.4 ft caved

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	841.9		8" HMA (0.7)	
									Fill	
							839.9		(2.7)	
	1D	24/14	3.00 - 5.00	1/8/28/31	36		838.8		Bottom of existing road gravels. Dark brown, damp to moist, Sandy ORGANIC SILT, trace gravel. (3.8)	G#271190 A-4 ML
									Grey, dry, SAND, some silt, little gravel, broken rock.	
5	2D	8.4/6	5.20 - 5.90	56/50(2.4")	---		837.1		Greyish-brown, moist to wet, fine to coarse sand, little gravel, little silt. (5.5)	G#271191 A-2-4 SM
									Top of Rock or cemented brown till.	
							835.8		(6.8)	
									Bottom of Exploration at 6.8 feet below ground surface. Auger REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-146
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	836.6	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 13:00-13:45	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	666+51.8, 21.3 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/13	2.00 - 4.00	34/31/9/9	40				Grey, dry, dense, GRAVEL, some sand, little silt, broken rock.	G#271192 A-1-b GM
									Boulders and Cobbles at ±4.0 ft.	
5	2D	9.6/5	5.00 - 5.80	19/50(3.6")	---		830.5		Brownish-grey, damp, fine to coarse GRAVEL, some sand, little silt. 6.1	G#271193 A-1-b GM
									Bottom of Exploration at 6.1 feet below ground surface. Auger REFUSAL, not rock, rather boulders and cobbles, likely cemented brown till.	
10										
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-147
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	836.0	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 13:45-14:35	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	668+51.9, 17.1 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	7.3 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	835.4		7½" HMA — 0.6	
	1D	24/7	1.00 - 3.00	14/39/18/17	57				Greyish-tan, dry, very dense, Gravelly fine to coarse SAND, little silt.	G#271194 A-1-a SW-SM
5	2D	24/10	5.00 - 7.00	9/28/9/6	37				Brown, damp, dense, Gravelly fine to coarse SAND, little silt, roots in bottom 2" of sample.	G#271195 A-1-b SM
							826.9		9.1 — Possible Weathered ROCK, nested Boulders.	
10							825.6		10.4	
							825.5		Top of competent Rock or cemented brown till. — 10.5	
									Bottom of Exploration at 10.5 feet below ground surface. Auger REFUSAL	
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-148
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	839.4	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 15:20-16:10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	671+00, 18.9 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	14.6 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	838.9		5½" HMA (0.5)	
	1D	24/13	1.00 - 3.00	12/9/9/9	18				Reddish-brown, damp, medium dense, SAND, some gravel, some silt.	G#271196 A-1-b SM
5	2D	9.6/2	5.00 - 5.80	2/50(3.6")	---				Reddish-brown, damp, SAND, some silt, some gravel.	G#271197 A-2-4 SM
									Popped through boney material at 6.5 ft bgs, very easy drilling, no auger cuttings.	
10	3D/A	24/15	10.00 - 12.00	2/3/13/19	16				3D (10.0-11.0 ft) Brown with rust mottling, damp, medium dense, fine to medium SAND, some silt.	G#271198 A-2-4 SM
									3D/A (11.0-12.0 ft) Reddish-brown, moist, SAND, some silt, some gravel.	G#271199 A-2-4 SM
									Boney material, difficult drilling, likely cemented brown till.	
15	MD	0/0	15.00 - 15.00	50(0")	---		824.4		**Bottom of Exploration at 15.0 feet below ground surface.** (15.0) Blue-grey, fine to medium SAND, little gravel, trace silt, trace coarse sand, (Till) in tip of spoon. NO REFUSAL	
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-149
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	833.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 16:15-17:10	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	674+49.4, 12.6 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	18/42/49/46	91				Reddish-brown and grey, dry to damp, very dense, Sandy GRAVEL, little silt, contains seams of till and seams of broken rock.	G#271200 A-1-a GM
5	2D	8.4/8.4	5.00 - 5.70	11/50(2.4")	---				Greyish-brown, dry to damp, SAND, some gravel, little silt, predominately broken rock.	G#271201 A-1-b SM
10	MD	4.8/0	10.00 - 10.40	50(4.8")	---		823.3		Broken rock in tip of spoon, spoon walking left. Hard, angled surface auger, walking left at 10.4 ft bgs. 10.5 **Bottom of Exploration at 10.5 feet below ground surface.** Auger REFUSAL	
15										
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-150
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	823.5	**Auger ID/OD:**	-
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 07:30-08:45	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	682+06.6, 20.6 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	2.2 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						HSA				
	1D	24/7	1.00 - 3.00	4/9/6/4	15				Reddish-brown, moist, medium dense, SAND, some silt, some gravel, trace clay.	G#271202 A-4 SC-SM
5	2D	21.6/15	5.00 - 6.80	10/26/28/50(3.6)	54				Reddish-brown, wet, very dense, GRAVEL, some sand, little silt, trace clay.	G#271203 A-1-b GC-GM
10	3D	21.6/20	10.00 - 11.80	29/49/48/50(3.6)	97				Brownish-red, wet, very dense, fine SAND, some silt, little medium to coarse sand, trace gravel.	G#271204 A-2-4 SM
15							808.2		Hard, boney material. 15.3	
									Bottom of Exploration at 15.3 feet below ground surface. Auger REFUSAL, likely on cemented brown till.	
20										
25										

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-151
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	822.3	**Auger ID/OD:**	-
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 08:50-10:10	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	683+57.9, 19.8 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	3.1 ft

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						HSA				
	1D	24/11	1.00 - 3.00	6/7/8/6	15				Reddish-brown and grey, moist, medium dense, fine to coarse Sandy GRAVEL, little silt.	G#271205 A-1-b GM
5	2D	24/15	5.00 - 7.00	8/9/8/11	17				Greyish-brown, mottled, moist, very stiff, SILT, some sand, some gravel.	G#271206 A-4 SM
									Less boney, less tighter packed at 9.0 ft bgs.	
10	3D	24/17	10.00 - 12.00	17/28/30/51	58				Reddish-brown, wet, very dense, GRAVEL, some sand, some silt.	G3271207 A-1-b GM
15	MD	0/0	15.00 - 15.00	50(0')	---		807.3		15.0 **Bottom of Exploration at 15.0 feet below ground surface.** Spoon and auger REFUSAL. Grey sandy till in tip of spoon.	
20										
25										

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-152
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	819.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 10:15-10:55	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	687+11.3, 9.1 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	819.0		10" HMA (0.8)	
	1D	24/21	3.00 - 5.00	2/1/3/2	4		815.8		(1D)(Composite) Dark-brown, moist, soft, ORGANIC SILT, Wood, Fibrous PEAT, some sand, trace clay, trace gravel. (4.0)	G#271208 A-4 CL
5	2D	24/15	5.00 - 7.00	3/4/23/31	27		813.5		Greyish-brown, wet, Gravelly SAND, little silt. (6.3) (2D) Reddish-brown, damp, fine to coarse Sandy GRAVEL, trace silt.	G#271209 A-1-b SM
10	3D	24/17	10.00 - 12.00	12/16/16/19	32		807.8		Reddish-brown, damp, dense, SAND, little silt, little gravel, with layers having more silt and others more gravel. (12.0)	G#271210 A-1-b SM
15									**Bottom of Exploration at 12.0 feet below ground surface.** NO REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-153
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	819.1	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 11:00-11:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	691+11.6, 13.4 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	6.7 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/11	1.00 - 3.00	6/5/5/7	10				Greyish-brown, damp, loose, fine to coarse SAND, some gravel, little silt.	G#271211 A-1-b SM
5	2D	24/14	5.00 - 7.00	12/28/42/31	70				Reddish-brown, damp, very dense, Gravelly fine to coarse SAND, trace silt, with one 3" layer crushed rock in bottom of spoon.	G#271212 A-1-a SW-SM
10	3D	24/6	10.00 - 12.00	49/37/38/37	75				Reddish-brown, moist to wet, very dense, Gravelly SAND, little silt.	G#271213 A-1-b SM
							807.1		12.0	
									Bottom of Exploration at 12.0 feet below ground surface. NO REFUSAL	
15										
20										
25										

Remarks:

Rock visible in Rt. backslope, appear to be Boulders.

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

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

Boring No.: HB-PM-153

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-154
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	818.0	**Auger ID/OD:**	--
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 11:50-12:50	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	693+61.3, 14.8 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						HSA				
	1D	24/7	1.00 - 3.00	4/5/6/10	11				Brown, damp, medium dense, SAND, some gravel, little silt.	G#271214 A-1-b SM
5	2D	8.4/3	5.00 - 5.70	48/50(2.4")	---		812.3		Brown, moist, fine to coarse Sandy GRAVEL, little silt. 5.7	G#271215 A-1-b GM
									Bottom of Exploration at 5.7 feet below ground surface. Auger REFUSAL, likely brown cemented till.	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-154A
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	817.8	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/8/2014; 11:00-11:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	693+50.6, 15.1 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA			Auger Probe.	
5										
							810.6		7.2	
									Bottom of Exploration at 7.2 feet below ground surface. Auger REFUSAL, likely brown cemented till.	
10										
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-155
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	816.2	**Auger ID/OD:**	--
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 13:00-13:45	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	701+10.8, 6.6 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	5.3 ft in augers

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						HSA	815.5		8" HMA (0.7)	
	1D	24/8	1.00 - 3.00	10/14/19/15	33				Greyish-brown, damp, dense, fine to coarse Sandy GRAVEL, little silt.	G#271216 A-1-a GM
5	2D	24/7	5.00 - 7.00	12/14/12/11	26				Greyish-brown, damp, medium dense, fine to coarse Gravelly SAND, little silt.	G#271217 A-1-a SM
									Driller notes looser, more open material at 7.0 ft bgs.	
									Very boney material, difficult drilling.	
10	MD	0/0	10.00 - 10.00	50(0")	---		806.2		Auger REFUSAL, walking left. (10.0) **Bottom of Exploration at 10.0 feet below ground surface.** Spoon REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-156
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	794.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 13:55-14:50	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	710+58.8, 7.9 ft Lt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	6.2 ft Open Hole

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/9	1.00 - 3.00	5/7/8/5	15				Brown, damp to moist, medium dense, SAND, some gravel, some silt, (Fill).	G#271218 A-2-4 SM
5	2D	24/12	5.00 - 7.00	6/8/10/15	18				Reddish-brown, damp to moist, medium dense, fine to coarse Sandy GRAVEL, little silt, (Fill).	G#271219 A-1-a GM
10	3D	24/17	10.00 - 12.00	42/35/38/61	73		784.2		Reddish-brown, wet, very dense, Gravelly SAND, little silt. (10.0)	G#271220 A-1-a SW-SM
							781.6		Weathered ROCK or Cemented Till. (12.6)	
							780.2		**Bottom of Exploration at 14.0 feet below ground surface.** Auger REFUSAL (14.0)	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-157
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	808.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/9/2014; 115:00-16:35	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	713+57, 7.7 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	14.0 ft Open Hole

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	807.5		8" HMA (0.7)	
	1D	24/13	1.00 - 3.00	14/14/14/21	28				Brown, damp, medium dense, Gravelly fine to coarse SAND, little silt, (Fill).	G#271221 A-1-a SW-SM
5	2D	3.6/3.6	5.00 - 5.30	75(3.6")	---		803.2		(5.0) Greyish-brown, damp, SAND, some gravel, some silt. Very difficult drilling, not rock or boulders, likely boney till.	G#271222 A-1-b SM
	3D	14.4/8	9.80 - 11.00	58/110/100(2.4")	>210				Greyish-brown with orange particles, damp, very dense, GRAVEL, some sand, some silt. Brown Cemented Till.	G#271223 A-1-b GM
10										
	4D	4.8/3	14.90 - 15.30	100(4.8")	---					
15							792.9		Able to penetrate to 14.9 ft bgs, very slow, augers and cutting smoking hot. Greyish-brown, wet, fine to coarse SAND, some gravel, little silt. (15.3)	G#271224 A-1-b SC-SM
									Bottom of Exploration at 15.3 feet below ground surface. Auger REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-158
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	809.7	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/10/2014; 07:20-09:05	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	717+52.1, 17.5 ft Rt., Gravel Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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 No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
	1D	24/8	1.00 - 3.00	10/5/10/8	15				Brown, damp, medium dense, fine to coarse SAND, some gravel, little silt.	G#271225 A-1-b SM
							806.7		3.0	
									Bottom of Roadway, top of boulders/cobbles.	
5	2D	7.2/6	5.00 - 5.60	39/69(1.2")	---				Greyish-brown, damp, fine to coarse SAND, some gravel, some silt, larger pieces of gravel have rounded faces. Top of cemented till at 5.0 ft bgs.	G#271226 A-1-b SM
	3D	24/15	9.80 - 11.80	80/102/44/53	146				Reddish-brown, damp, very dense, fine to coarse SAND, some gravel, little silt, bottom 5" fine to coarse SAND, little silt and cemented brown till.	G#271227 A-1-b SM
10							797.9		11.8	
									Bottom of Exploration at 11.8 feet below ground surface. Spoon REFUSAL	
15										
20										
25										

Remarks:

Several attempts, hitting boulders and cobbles at approximately 3.0-4.5 ft bgs, believe Roadway Fill.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-159
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	806.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/10/2014; 09:10-10:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	721+05.7, 13.7 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	805.7		6" HMA (0.5)	
	1D	24/11	2.00 - 4.00	7/10/18/43	28				Brown, damp, medium dense, GRAVEL, some sand, some silt, broken rock/ gravel in tip of spoon, (Fill).	G#271228 A-1-b GM
5	2D	24/14	5.00 - 7.00	10/15/20/12	35				Reddish-brown, damp, dense, fine to coarse SAND, some silt, some gravel, appears reworked (Fill).	G#271229 A-2-4 SM
									More difficult drilling, cobble and boulders.	
10							796.6		(9.6) **Bottom of Exploration at 9.6 feet below ground surface.** Auger REFUSAL, likely brown cemented till.	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-159A
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	806.1	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/10/2014; 09:10-10:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	721+09.3, 13.7 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA				
									Boney at 3.5 ft bgs.	
5										
10									Very difficult drilling at 12.0 ft bgs.	
15	1D	4.8/3	15.00 - 15.40	150(4.8")	---		790.7		Reddish-brown, damp, very dense, SAND, some gravel, little silt, cemented, gravel interlocked. Auger cutting are powdery, greyish-brown, brown cemented till.	G#271230 A-1-b SM
									15.4 **Bottom of Exploration at 15.4 feet below ground surface.** REFUSAL	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-160
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	801.5	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/10/2014; 10:45-11:40	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	726+06.2, 14.2 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	800.9		7" HMA	
									0.6	
	1D	24/12	2.50 - 4.50	6/5/24/25	29				Reddish-brown, Till, (Fill).	G#271231 A-1-b GM
							797.7		3.8	
									(1D) Reddish-brown, damp, dense, GRAVEL, some sand, little silt, native.	
5	2D	24/12	5.00 - 7.00	32/28/23/26	51				Reddish-brown, dry to damp, very dense, fine to coarse Sandy GRAVEL, trace silt.	G#271232 A-1-a GW-GM
10	3D	24/12	10.00 - 12.00	11/17/21/26	38				Reddish-brown, dry to damp, dense, GRAVEL, some sand, little silt. Brown Cemented Till.	G#271233 A-1-a GM
							787.0		14.5	
15									**Bottom of Exploration at 14.5 feet below ground surface.** Auger REFUSAL, still in cemented till.	
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-161
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	791.6	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-47 (Trailer)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/10/2014; 11:50-12:45	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	738+00.6, 8.4 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	Dry

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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	791.0		7" HMA — 0.6	
	1D	9.6/3	2.00 - 2.80	9/50(3.6')	---				Greyish-brown, damp, fine to medium GRAVEL, some sand, trace silt. Boney material, difficult drilling at 2. 5 ft bgs.	G#271234 A-1-a GW-GM
5							787.1		4.5 — Broke through at 4.5 ft bgs.	
	2D	24/4	5.00 - 7.00	18/2/7/7	9				Reddish-brown, damp, fine to coarse SAND, some gravel, little silt.	G#271235 A-1-b SM
							784.6		7.0	
							784.3		Top of Bedrock or Cemented Till. — 7.3	
10									**Bottom of Exploration at 7.3 feet below ground surface.** Auger REFUSAL	
15										
20										
25										

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 4 Reconstruction
Location: Madrid-Phillips, Maine

Boring No.: HB-PM-162
WIN: 18247.00

Drilling Contractor:	New England Boring	**Elevation (ft.)**	790.3	**Auger ID/OD:**	5" Solid Stem
Operator:	Enos/Dube	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	Be Schonewald	**Rig Type:**	Mobile Drill B-51 (Track)	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	9/10/2014; 12:45-14:05	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	NQ-2"
Boring Location:	738+54, 14.3 ft Lt., Gravel Shoulder	**Casing ID/OD:**	NW-Spun	**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: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SPUN				
	1D	22.8/9	1.00 - 2.90	5/14/10/50(4.8")	24				Brown and grey, damp to dry, medium dense, GRAVEL, some sand, little silt, minor organics in top of sample, broken rock in bottom of sample.	G#271236 A-1-b GM
							787.4		2.9	
									Top of Bedrock at Elev. 787.4 ft.	
	R1	57.6/56.6	4.00 - 8.80	RQD = 33%		NQ-2			R1:Bedrock: Hard, fresh, aphanitic, light grey PHYLLITE, with some relic bedding visible. Typically close, high angle and horizontal breaks (blocky), undulating, rough, fresh to slightly discolored, and open. Rock Mass Quality = Poor. R1:Core times (min:sec) 4.0-5.0 ft (2:15) 5.0-6.0 ft (2:55) 6.0-7.0 ft (3:10) 7.0-8.0 ft (3:30) 8.0-8.8 ft (-) 98% Recovery	
5							781.5		8.8	
									Bottom of Exploration at 8.8 feet below ground surface.	
10										
15										
20										
25										

Remarks:

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

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

SCHONEWALD ENGINEERING ASSOCIATES, INC.

APPENDIX B

ROCK CORE PHOTOGRAPHS

Photo 1: Core box containing wetted rock core from test borings HB-PM-104 and HB-PM-122 - left side of core box (top portion of cores).
Slots from top to bottom:
1) HB-PM-104, R1
2) HB-PM-104, R2
3) HB-PM-122, R2/R3.

Photo 2: Core box containing wetted rock core from test borings HB-PM-104 and HB-PM-122 – right side of core box (bottom portion of cores).
Slots from top to bottom
1) HB-PM-104, R1
2) HB-PM-104, R2 / HB-PM-122, R1/R2
3) HB-PM-122, R3.

SCHONEWALD ENGINEERING ASSOCIATES, INC.

ROCK CORE PHOTOGRAPHS
MAINE ROUTE 4 RECONSTRUCTION
MADRID-PHILLIPS, MAINE
MAINE-DOT WIN 18247.00

Photo 3: Core box containing wetted rock core from test borings HB-PM-126, HB-PM-135, and HB-PM-138 - left side of core box (top portion of cores).
Slots from top to bottom:
1) HB-PM-126, R1
2) HB-PM-126, R2
3) HB-PM-135, R1
4) HB-PM-138, R1.

Photo 4: Core box containing wetted rock core from test borings HB-PM-126, HB-PM-135, and HB-PM-138 – right side of core box (bottom portion of cores).
Slots from top to bottom
1) HB-PM-126, R1/R2
2) HB-PM-126, R2
3) HB-PM-135, R1

SCHONEWALD ENGINEERING ASSOCIATES, INC.

ROCK CORE PHOTOGRAPHS
MAINE ROUTE 4 RECONSTRUCTION
MADRID-PHILLIPS, MAINE
MAINE-DOT WIN 18247.00

Photo 5: Core box containing wetted rock core from test borings HB-PM-162 - left side of core box (top portion of cores).
Slots from top to bottom:
1) HB-PM-162, R1

Photo 6: Core box containing wetted rock core from test boring HB-PM-162 – right side of core box (bottom portion of cores).
Slots from top to bottom
1) HB-PM-162, R1

SCHONEWALD ENGINEERING ASSOCIATES, INC.

ROCK CORE PHOTOGRAPHS
MAINE ROUTE 4 RECONSTRUCTION
MADRID-PHILLIPS, MAINE
MAINE-DOT WIN 18247.00

Sheet No.:

3 of 3

SCHONEWALD ENGINEERING ASSOCIATES, INC.

APPENDIX C

LABORATORY TEST REPORTS

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Phillips-Madrid Work Number: 18247.00

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-PM-101, 1D	501+48.4	15.7 Lt.	1.0-3.0	243269	1				GW-GM	A-1-a	0
HB-PM-101, 2D	501+48.4	15.7 Lt.	5.0-5.4	243270	1				GM	A-1-b	I
HB-PM-102, 1D	506+98.9	11.7 Lt.	1.0-3.0	243271	1				GM	A-1-b	I
HB-PM-102, 2D	506+98.9	11.7 Lt.	5.0-7.0	243272	1				GM	A-1-b	I
HB-PM-102, 3D	506+98.9	11.7 Lt.	10.0-12.0	243273	1				GM	A-1-a	I
HB-PM-103, 1D	511+50.4	6.1 Lt.	1.0-3.0	243274	2				GM	A-1-a	I
HB-PM-103, 2D	511+50.4	6.1 Lt.	3.0-5.0	243275	2				SM	A-4	III
HB-PM-103, 3D	511+50.4	6.1 Lt.	5.0-7.0	263276	2				SM	A-1-b	I
HB-PM-103, 4D	511+50.4	6.1 Lt.	10.0-12.0	263277	2				ML	A-4	IV
HB-PM-104, 1D	515+03.3	17.2 Lt.	1.0-3.0	263278	2				GM	A-1-b	I
HB-PM-104, 2D	515+03.3	17.2 Lt.	4.0-5.3	263279	2				SM	A-4	III
HB-PM-105, 1D	525+04.8	11.5 Rt.	4.0-5.4	263280	3				GM	A-1-b	I
HB-PM-106, 1D	528+01.6	9.2 Lt.	1.0-2.5	263281	3				GM	A-1-b	I
HB-PM-106, 2D	528+01.6	9.2 Lt.	10.0-10.5	263282	3				SM	A-1-b	II
HB-PM-107, 1D	530+01.8	8.2 Lt.	1.0-3.0	263283	3				GM	A-1-b	I
HB-PM-107, 2D	530+01.8	8.2 Lt.	5.0-5.9	263284	3				GM	A-1-b	I
HB-PM-107, 3D	530+01.8	8.2 Lt.	10.0-12.0	263285	3				SM	A-1-b	II
HB-PM-108, 1D	535+01.3	14.0 Lt.	1.0-3.0	263286	4				GM	A-1-a	I
HB-PM-108, 2D	535+01.3	14.0 Lt.	5.0-7.0	263287	4				GM	A-1-b	I
HB-PM-108, 3D	535+01.3	14.0 Lt.	10.0-12.0	263288	4				GM	A-1-b	I
HB-PM-109, 1D	535+01.2	8.1 Rt.	1.0-3.0	263289	4				GM	A-1-b	I
HB-PM-109, 2D	535+01.2	8.1 Rt.	5.0-7.0	263290	4				SM	A-1-b	II
HB-PM-109, 3D	535+01.2	8.1 Rt.	10.0-12.0	263291	4				ML	A-4	IV
HB-PM-110, 1D	536+01.9	11.7 Lt.	1.0-3.0	263292	5				SM	A-1-b	II
HB-PM-110, 2D	536+01.9	11.7 Lt.	5.0-7.0	263293	5				SW-SM	A-1-b	0
HB-PM-110, 3D	536+01.9	11.7 Lt.	7.0-9.0	263294	5				GM	A-1-b	I
HB-PM-111, 1D	536+01.6	7.5 Rt.	1.0-3.0	263295	6				SM	A-1-b	II
HB-PM-111, 2D	536+01.6	7.5 Rt.	5.0-7.0	263296	6				SM	A-2-4	II
HB-PM-111, 3D	536+01.6	7.5 Rt.	7.0-9.0	263297	6				SM	A-1-b	II
HB-PM-111, 4D	536+01.6	7.5 Rt.	10.0-12.0	263298	6				SW-SM	A-1-a	0
HB-PM-112, 1D	537+01.6	17.1 Lt.	1.0-3.0	263299	7				SM	A-1-b	II
HB-PM-112, 2D	537+01.6	17.1 Lt.	5.0-7.0	263300	7				GM	A-1-b	I
HB-PM-112, 3D	537+01.6	17.1 Lt.	10.0-11.5	270001	7				SM	A-1-b	II
HB-PM-113, 1D	537+01.9	3.5 Rt.	2.0-4.0	270002	7				GM	A-1-b	I
HB-PM-113, 2D	537+01.9	3.5 Rt.	5.0-7.0	270003	7				SM	A-1-b	II
HB-PM-113, 3D	537+01.9	3.5 Rt.	7.0-9.0	270004	7				SM	A-2-4	II
HB-PM-114, 1D	543+53.1	7.3 Rt.	1.0-3.0	270005	8				SM	A-1-b	II
HB-PM-115, 1D	551+66.1	16.1 Rt.	2.0-3.3	270006	8				SM	A-2-4	II
HB-PM-115, 2D	551+66.1	16.1 Rt.	5.0-7.0	270007	8				SM	A-2-4	II
HB-PM-115, 3D	551+66.1	16.1 Rt.	10.0-11.3	270008	8				GM	A-1-b	I
HB-PM-116, 1D	554+01.1	15.4 Rt.	1.0-3.0	270009	9				SM	A-1-b	II
HB-PM-116, 2D	554+01.1	15.4 Rt.	6.0-8.0	270010	9				GM	A-1-a	I
HB-PM-116, 3D	554+01.1	15.4 Rt.	10.0-10.1	270011	9				SM	A-2-4	II

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

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

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

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

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

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Phillips-Madrid Work Number: 18247.00

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-PM-117, 1D	554+01.2	10.8 Lt.	1.0-1.3	270012	10				SM	A-1-b	II
HB-PM-118, 1D	557+00.1	10.5 Lt.	1.0-2.2	270013	10				GM	A-1-a	I
HB-PM-119, 1D	565+95.7	9.7 Lt.	1.0-3.0	270014	10				GM	A-1-b	I
HB-PM-119, 2D	565+95.7	9.7 Lt.	5.0-5.8	270015	10				SM	A-1-b	II
HB-PM-120, 1D	571+97.9	16.8 Lt.	1.0-3.0	270016	11				GM	A-1-b	I
HB-PM-120, 2D	571+97.9	16.8 Lt.	5.0-7.0	270017	11				SM	A-2-4	II
HB-PM-120, 3D	571+97.9	16.8 Lt.	10.0-10.3	270018	11				SM	A-2-4	II
HB-PM-121, 1D	575+97	3.7 Rt.	1.0-3.0	270019	11				SM	A-1-b	II
HB-PM-121, 2D	575+97	3.7 Rt.	5.0-6.3	270020	11				SM	A-2-4	II
HB-PM-121, 3D	575+97	3.7 Rt.	10.0-10.8	270021	11				SM	A-4	III
HB-PM-122, 1D	577+98.8	12.3 Lt.	1.0-3.0	270022	12				SM	A-2-4	II
HB-PM-122, 2D	577+98.8	12.3 Lt.	5.0-5.5	270023	12				SM	A-4	III
HB-PM-123, 1D	580+48.7	0.6 Lt.	2.0-4.0	270024	12				SC-SM	A-2-4	III
HB-PM-123, 2D	580+48.7	0.6 Lt.	5.0-6.4	270025	12				GC-GM	A-2-4	II
HB-PM-124, 1D	580+47.7	20.1 Rt.	2.0-4.0	270026	13				GM	A-1-b	I
HB-PM-124, 2D	580+47.7	20.1 Rt.	5.0-5.4	270027	13				SM	A-2-4	II
HB-PM-124, 3D	580+47.7	20.1 Rt.	6.0-8.0	270028	13				SM	A-4	III
HB-PM-124, 4D	580+47.7	20.1 Rt.	10.0-10.9	270029	13				SC-SM	A-4	III
HB-PM-126, 1D	582+98.9	1.3 Lt.	1.0-1.8	270030	13				SW-SM	A-1-a	0
HB-PM-127, 1D	594+98.5	7.9 Rt.	1.0-3.0	270031	14				GM	A-1-b	I
HB-PM-127, 2D	594+98.5	7.9 Rt.	5.0-6.9	270032	14				GM	A-1-a	I
HB-PM-128, 1D	599+98.7	9.2 Rt.	3.0-4.8	270033	14				GW-GM	A-1-a	0
HB-PM-128, 2D	599+98.7	9.2 Rt.	5.0-7.0	270034	14				GM	A-1-a	I
HB-PM-129, 1D	611+02.1	6.2 Rt.	1.0-3.0	270035	15				SM	A-1-b	II
HB-PM-129, 2D	611+02.1	6.2 Rt.	5.0-6.9	270036	15				GC-GM	A-1-a	I
HB-PM-129, 3D	611+02.1	6.2 Rt.	10.0-12.0	270037	15				SM	A-2-4	II
HB-PM-130, 1D	618+85.3	8.3 Lt.	1.0-3.0	270038	16				GM	A-1-b	I
HB-PM-130, 2D	618+85.3	8.3 Lt.	5.0-7.0	270039	16				GM	A-1-b	I
HB-PM-130, 3D	618+85.3	8.3 Lt.	10.0-12.0	270040	16				SM	A-1-b	II
HB-PM-130, 4D	618+85.3	8.3 Lt.	15.0-17.0	270041	16				GC-GM	A-1-b	I
HB-PM-131, 1D	622+47.9	13.0 Lt.	1.0-3.0	270042	16				SM	A-2-4	II
HB-PM-131, 2D	622+47.9	13.0 Lt.	5.0-5.9	270043	16				ML	A-4	IV
HB-PM-132, 1D	625+99	14.9 Rt.	1.0-2.3	270044	17				GM	A-1-a	I
HB-PM-133, 1D	627+89.8	7.7 Rt.	1.0-3.0	270045	17				GW-GM	A-1-a	0
HB-PM-133, 2D	627+89.8	7.7 Rt.	5.0-7.0	270046	17				SM	A-2-4	II
HB-PM-133, 3D	627+89.8	7.7 Rt.	10.0-10.3	270047	17				SM	A-4	III
HB-PM-134, 1D	630+42.1	9.1 Lt.	2.0-4.0	270048	18				SM	A-4	III
HB-PM-134, 2D	630+42.1	9.1 Lt.	5.5-7.5	270049	18				SM	A-2-4	II
HB-PM-134, 3D	630+42.1	9.1 Lt.	10.0-12.0	270050	18				OL	A-4	IV
HB-PM-134, 3D/A	630+42.1	9.1 Lt.	15.0-15.9	271176	18				SM	A-4	III
HB-PM-135, 1D	634+98	13.3 Rt.	1.0-2.3	271177	19				GW-GM	A-1-a	0
HB-PM-136, 1D	636+97.4	12.7 Lt.	1.0-3.0	271178	19				GM	A-1-b	I
HB-PM-138, 1D	642+48.9	10.3 Rt.	1.0-3.0	271179	19				GW-GM	A-1-a	0

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)

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State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Phillips-Madrid Work Number: 18247.00

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-PM-139, 1D	647+45.4	7.3 Rt.	1.0-3.0	271180	19				SM	A-1-b	II
HB-PM-140, 1D	651+49.1	20.2 Lt.	1.0-3.0	271181	20				SM	A-2-4	II
HB-PM-140, 2D	651+49.1	20.2 Lt.	5.0-7.0	271182	20				GC-GM	A-1-b	I
HB-PM-140, 3D	651+49.1	20.2 Lt.	10.0-12.0	271183	20				SC-SM	A-1-b	II
HB-PM-141, 1D	653+97	12.1 Rt.	1.0-3.0	271184	20				GC-GM	A-1-b	I
HB-PM-141, 2D	653+97	12.1 Rt.	5.0-6.0	271185	20				GW-GM	A-1-a	0
HB-PM-142, 1D	657+00.1	11.5 Rt.	1.0-2.8	271186	20				SM	A-2-4	II
HB-PM-143, 1D	657+99.5	4.9 Rt.	1.0-3.0	271187	21				SM	A-1-b	II
HB-PM-144, 1D	657+99.4	16.3 Lt.	2.4-2.6	271188	---	40.5	Loss on Ignition (T267) 13.1%				
HB-PM-144, 1D/A	657+99.4	16.3 Lt.	2.6-3.0	271189	21				ML	A-4	IV
HB-PM-145, 1D	663+49.1	11.5 Lt.	3.0-5.0	271190	21				ML	A-4	IV
HB-PM-145, 2D	663+49.1	11.5 Lt.	5.2-5.9	271191	21				SM	A-2-4	II
HB-PM-146, 1D	666+51.8	21.3 Lt.	2.0-4.0	271192	22				GM	A-1-b	I
HB-PM-146, 2D	666+51.8	21.3 Lt.	5.0-5.8	271193	22				GM	A-1-b	I
HB-PM-147, 1D	668+51.9	17.1 Lt.	1.0-3.0	271194	22				SW-SM	A-1-a	0
HB-PM-147, 2D	668+51.9	17.1 Lt.	5.0-7.0	271195	22				SM	A-1-b	II
HB-PM-148, 1D	671+00	18.9 Lt.	1.0-3.0	271196	23				SM	A-1-b	II
HB-PM-148, 2D	671+00	18.9 Lt.	5.0-5.8	271197	23				SM	A-2-4	II
HB-PM-148, 3D	671+00	18.9 Lt.	10.0-11.0	271198	23				SM	A-2-4	II
HB-PM-148, 3D/A	671+00	18.9 Lt.	11.0-12.0	271199	23				SM	A-2-4	II
HB-PM-149, 1D	674+49.4	12.6 Lt.	1.0-3.0	271200	23				GM	A-1-a	I
HB-PM-149, 2D	674+49.4	12.6 Lt.	5.0-5.7	271201	23				SM	A-1-b	II
HB-PM-150, 1D	682+06.6	20.6 Rt.	1.0-3.0	271202	24				SC-SM	A-4	III
HB-PM-150, 2D	682+06.6	20.6 Rt.	5.0-6.8	271203	24				GC-GM	A-1-b	I
HB-PM-150, 3D	682+06.6	20.6 Rt.	10.0-11.8	271204	24				SM	A-2-4	II
HB-PM-151, 1D	683+57.9	19.8 Rt.	1.0-3.0	271205	24				GM	A-1-b	I
HB-PM-151, 2D	683+57.9	19.8 Rt.	5.0-7.0	271206	24				SM	A-4	III
HB-PM-151, 3D	683+57.9	19.8 Rt.	10.0-12.0	271207	24				GM	A-1-b	I
HB-PM-152, 1D	687+11.3	9.1 Lt.	3.0-5.0	271208	25				CL	A-4	IV
HB-PM-152, 2D	687+11.3	9.1 Lt.	5.0-7.0	271209	25				SM	A-1-b	II
HB-PM-152, 3D	687+11.3	9.1 Lt.	10.0-12.0	271210	25				SM	A-1-b	II
HB-PM-153, 1D	691+11.6	13.4 Rt.	1.0-3.0	271211	25				SM	A-1-b	II
HB-PM-153, 2D	691+11.6	13.4 Rt.	5.0-7.0	271212	25				SW-SM	A-1-a	0
HB-PM-153, 3D	691+11.6	13.4 Rt.	10.0-12.0	271213	25				SM	A-1-b	II
HB-PM-154, 1D	693+61.3	14.8 Lt.	1.0-3.0	271214	26				SM	A-1-b	II
HB-PM-154, 2D	693+61.3	14.8 Lt.	5.0-5.7	271215	26				GM	A-1-b	I
HB-PM-155, 1D	701+10.8	6.6 Lt.	1.0-3.0	271216	26				GM	A-1-a	I
HB-PM-155, 2D	701+10.8	6.6 Lt.	5.0-7.0	271217	26				SM	A-1-a	II
HB-PM-156, 1D	710+58.8	7.9 Lt.	1.0-3.0	271218	27				SM	A-2-4	II
HB-PM-156, 2D	710+58.8	7.9 Lt.	5.0-7.0	271219	27				GM	A-1-a	I
HB-PM-156, 3D	710+58.8	7.9 Lt.	10.0-12.0	271220	27				SW-SM	A-1-a	0

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.

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State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Phillips-Madrid Work Number: 18247.00

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-PM-157, 1D	713+57	7.7 Lt.	1.0-3.0	271221	28				SW-SM	A-1-a	0
HB-PM-157, 2D	713+57	7.7 Lt.	5.0-5.3	271222	28				SM	A-1-b	II
HB-PM-157, 3D	713+57	7.7 Lt.	9.8-11.0	271223	28				GM	A-1-b	I
HB-PM-157, 4D	713+57	7.7 Lt.	14.9-15.3	271224	28				SC-SM	A-1-b	III
HB-PM-158, 1D	717+52.1	17.5 Rt.	1.0-3.0	271225	29				SM	A-1-b	II
HB-PM-158, 2D	717+52.1	17.5 Rt.	5.0-5.6	271226	29				SM	A-1-b	II
HB-PM-158, 3D	717+52.1	17.5 Rt.	9.8-11.8	271227	29				SM	A-1-b	II
HB-PM-159, 1D	721+05.7	13.7 Rt.	2.0-4.0	271228	30				GM	A-1-b	I
HB-PM-159, 2D	721+05.7	13.7 Rt.	5.0-7.0	271229	30				SM	A-2-4	II
HB-PM-159A, 1D	721+09.3	13.7 Rt.	15.0-15.4	271230	30				SM	A-1-b	II
HB-PM-160, 1D	726+06.2	14.2 Rt.	2.5-4.5	271231	30				GM	A-1-b	I
HB-PM-160, 2D	726+06.2	14.2 Rt.	5.0-7.0	271232	30				GW-GM	A-1-a	0
HB-PM-160, 3D	726+06.2	14.2 Rt.	10.0-12.0	271233	30				GM	A-1-a	I
HB-PM-161, 1D	738+00.6	8.4 Rt.	2.0-2.8	271234	31				GW-GM	A-1-a	0
HB-PM-161, 2D	738+00.6	8.4 Rt.	5.0-7.0	271235	31				SM	A-1-b	II
HB-PM-162, 1D	738+54	14.3 Lt.	1.0-2.9	271236	31				GM	A-1-b	I

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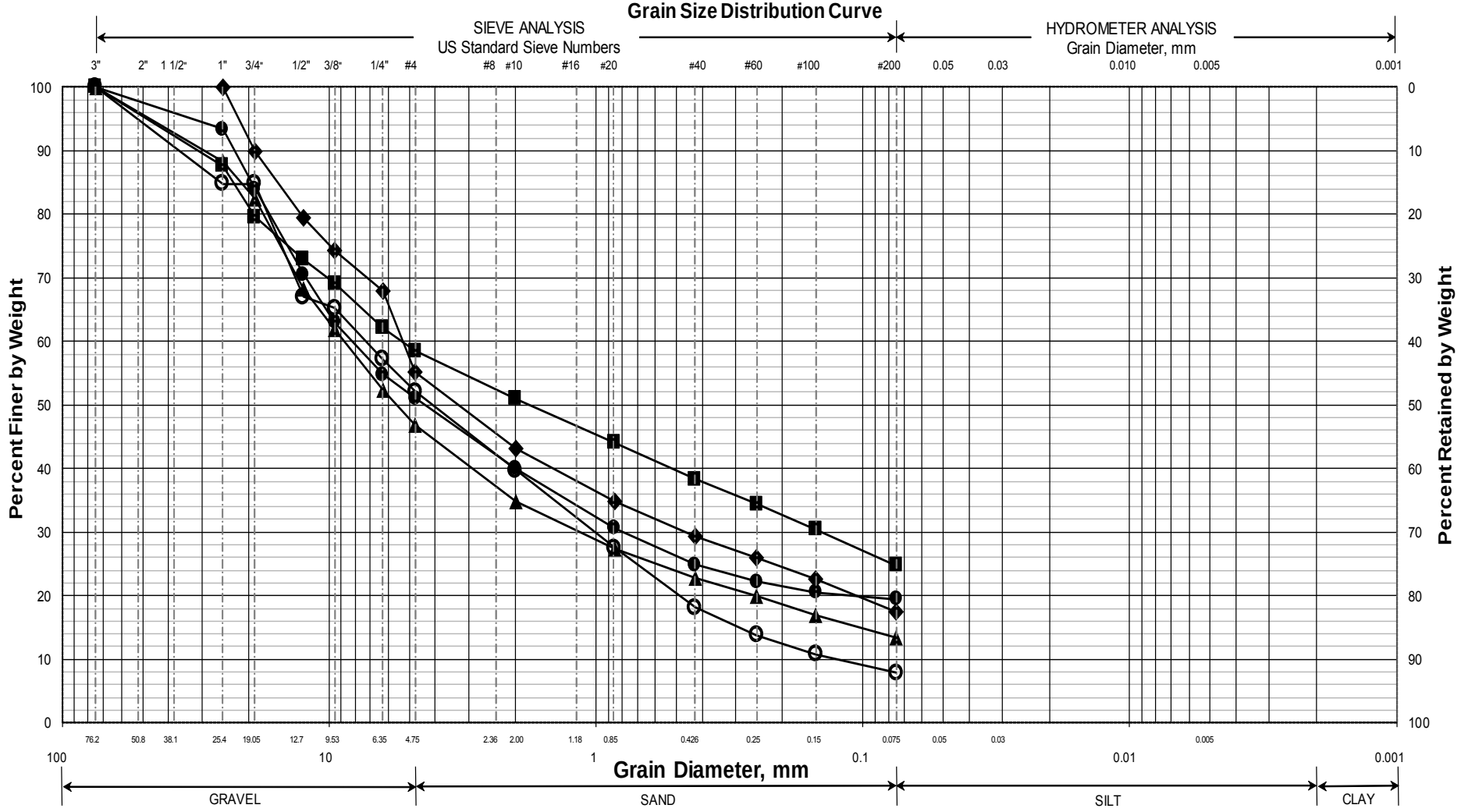
Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-101/1D	501+48.4	15.7 LT	1.0-3.0	Sandy GRAVEL, trace silt.				
◆	HB-PM-101/2D	501+48.4	15.7 LT	5.0-5.4	Sandy GRAVEL, little silt.				
■	HB-PM-102/1D	506+98.9	11.7 LT	1.0-3.0	GRAVEL, some sand, some silt.				
●	HB-PM-102/2D	506+98.9	11.7 LT	5.0-7.0	GRAVEL, some sand, little silt.				
▲	HB-PM-102/3D	506+98.9	11.7 LT	10.0-12.0	GRAVEL, some sand, little silt.				
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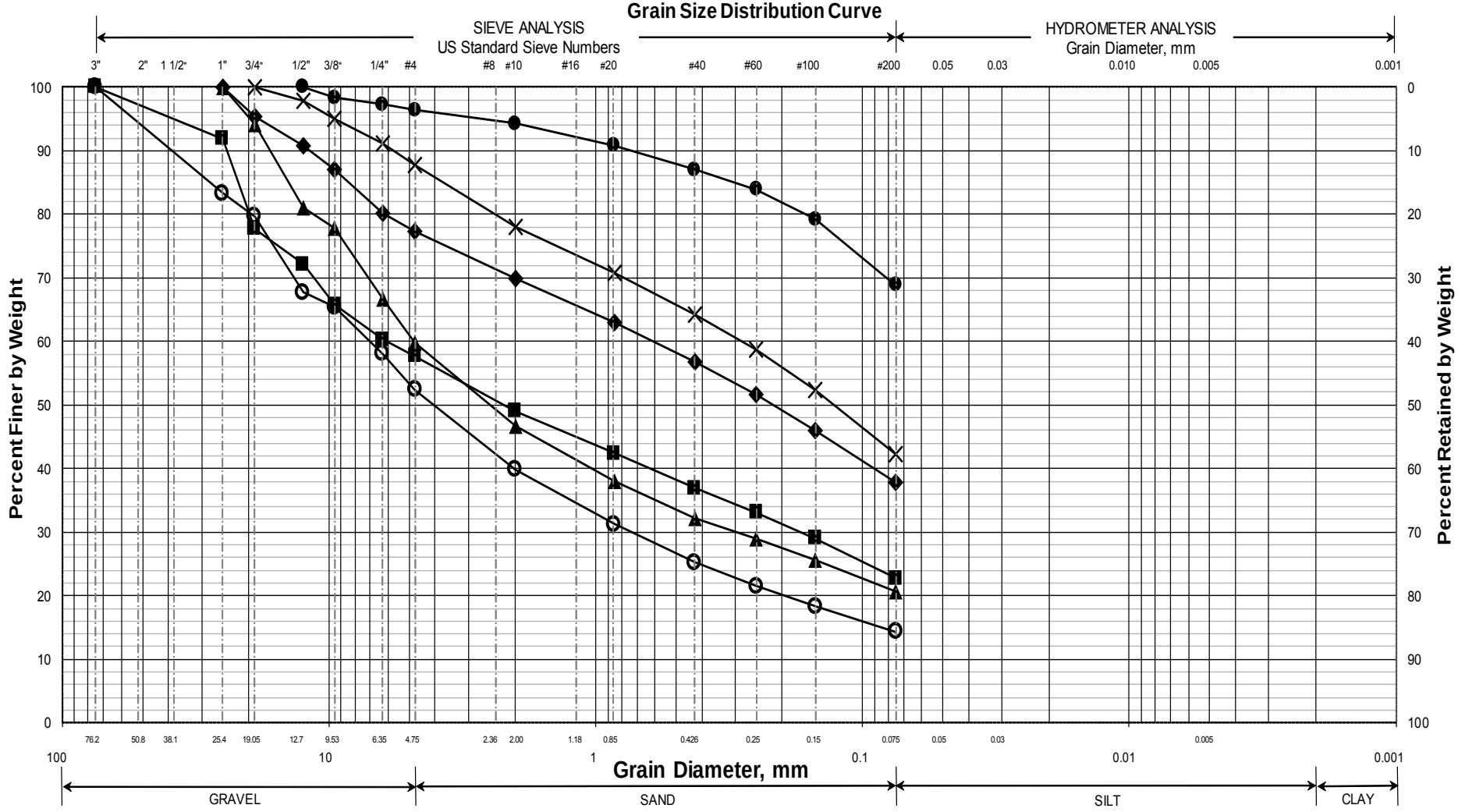
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-103/1D	511+50.4	6.1 LT	1.0-3.0	Sandy GRAVEL, little silt.				
◆	HB-PM-103/2D	511+50.4	6.1 LT	3.0-5.0	Silty SAND, some gravel.				
■	HB-PM-103/3D	511+50.4	6.1 LT	5.0-7.0	GRAVEL, some sand, some silt.				
●	HB-PM-103/4D	511+50.4	6.1 LT	10.0-12.0	SILT, some sand, trace gravel.				
▲	HB-PM-104/1D	515+03.3	17.2 LT	1.0-3.0	Sandy GRAVEL, some silt.				
×	HB-PM-104/2D	515+03.3	17.2 LT	4.0-5.3	Silty SAND, little gravel.				

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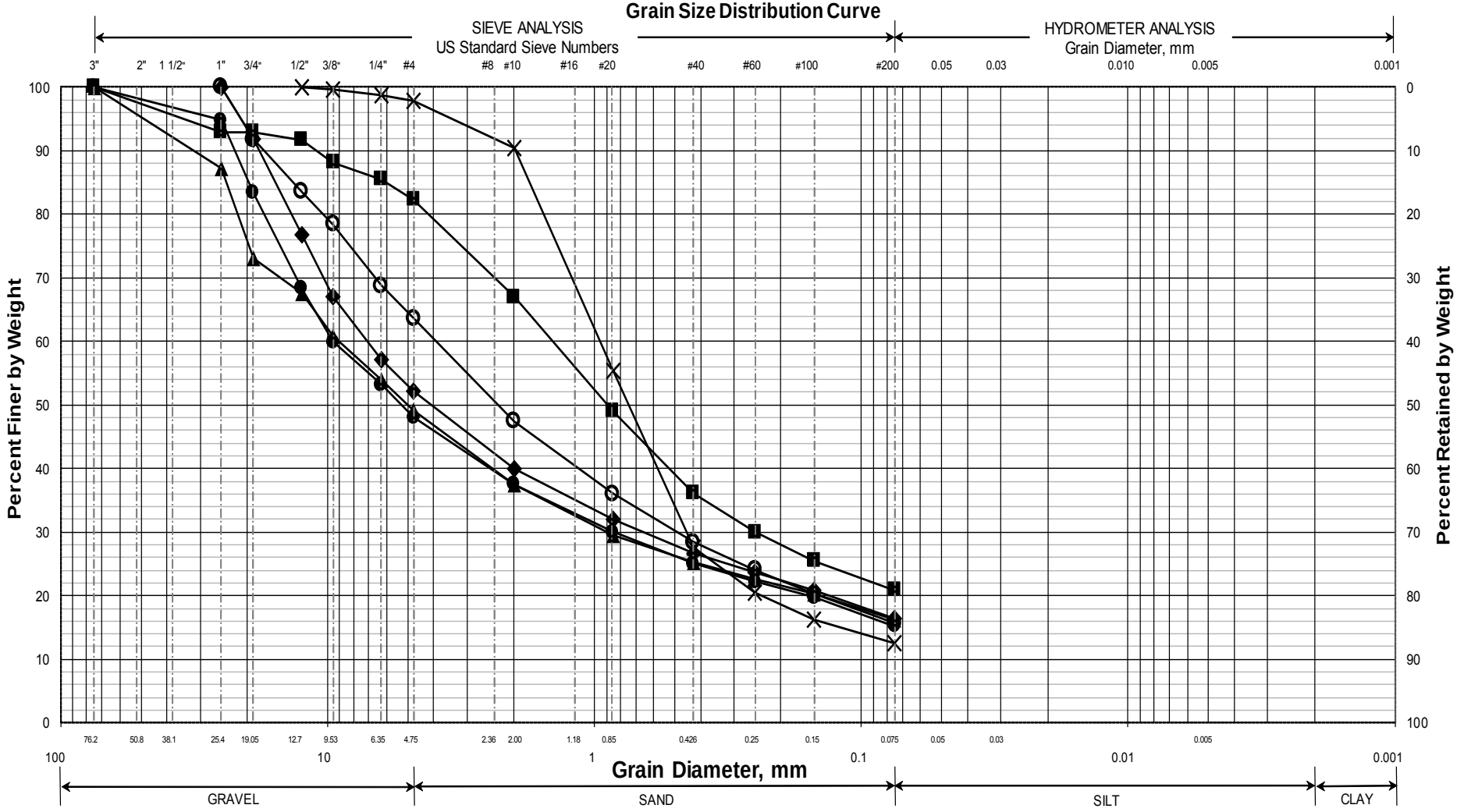

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-105/1D	525+04.8	11.5 RT	4.0-5.4	GRAVEL, some sand, little silt.				
◆	HB-PM-106/1D	528+01.6	9.2 LT	1.0-2.5	GRAVEL, some sand, little silt.				
■	HB-PM-106/2D	528+01.6	9.2 LT	10.0-10.5	SAND, some gravel, some silt.				
●	HB-PM-107/1D	530+01.8	8.2 LT	1.0-3.0	GRAVEL, some sand, little silt.				
▲	HB-PM-107/2D	530+01.8	8.2 LT	5.0-5.9	GRAVEL, some sand, little silt.				
×	HB-PM-107/3D	530+01.8	8.2 LT	10.0-12.0	SAND, little silt, trace gravel.				

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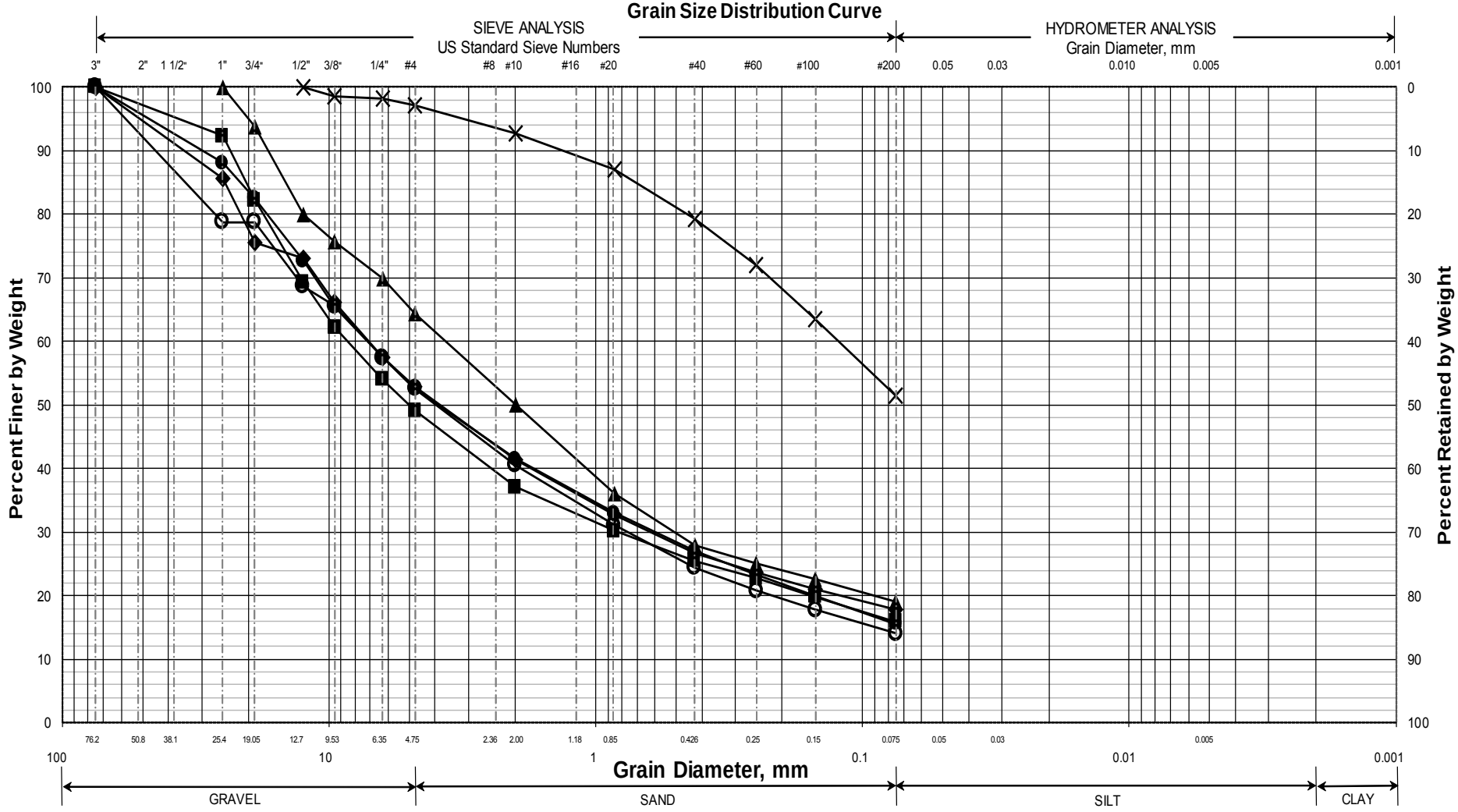
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-108/1D	535+01.3	14.0 LT	1.0-3.0	Sandy GRAVEL, little silt.				
◆	HB-PM-108/2D	535+01.3	14.0 LT	5.0-7.0	GRAVEL, some sand, little silt.				
■	HB-PM-108/3D	535+01.3	14.0 LT	10.0-12.0	GRAVEL, some sand, little silt.				
●	HB-PM-109/1D	535+01.2	8.1 RT	1.0-3.0	Sandy GRAVEL, little silt.				
▲	HB-PM-109/2D	535+01.2	8.1 RT	5.0-7.0	Gravelly SAND, little silt.				
×	HB-PM-109/3D	535+01.2	8.1 RT	10.0-12.0	Sandy SILT, trace gravel.				

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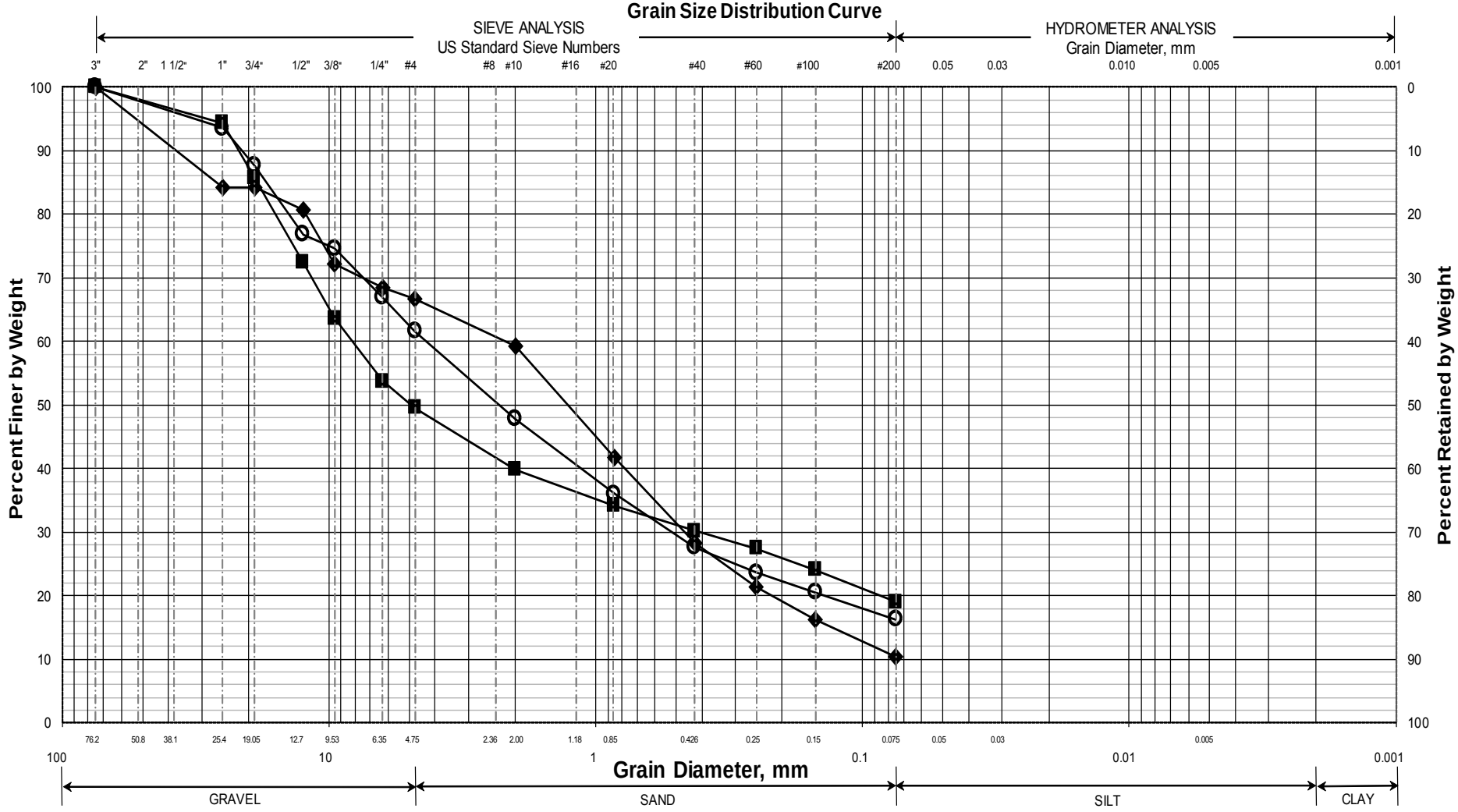
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-110/1D	536+01.9	11.7 LT	1.0-3.0	Gravelly SAND, little silt.				
◆	HB-PM-110/2D	536+01.9	11.7 LT	5.0-7.0	SAND, some gravel, little silt.				
■	HB-PM-110/3D	536+01.9	11.7 LT	7.0-9.0	GRAVEL, some sand, little silt.				
●									
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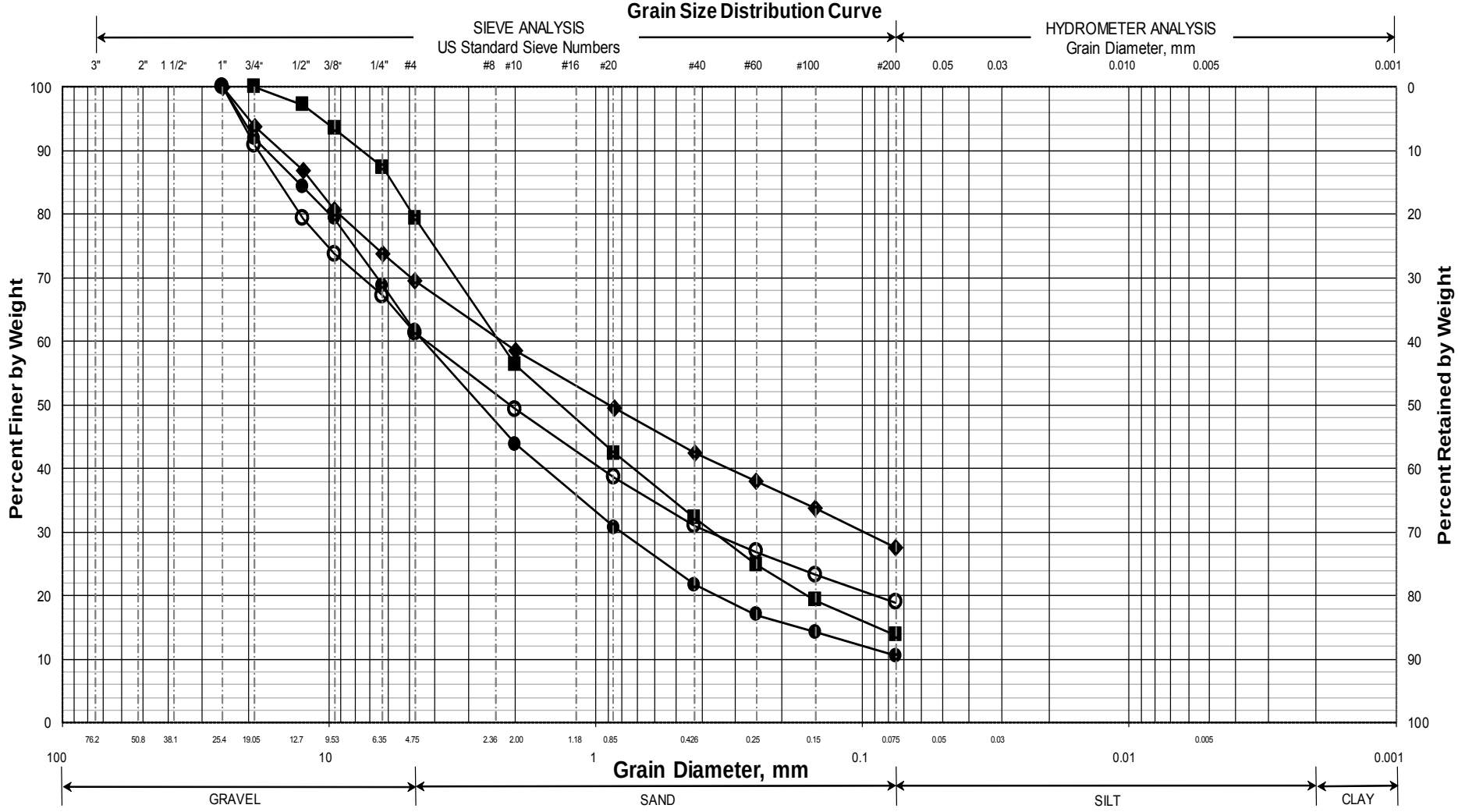
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-111/1D	536+01.6	7.5 RT	1.0-3.0	Gravelly SAND, little silt.				
◆	HB-PM-111/2D	536+01.6	7.5 RT	5.0-7.0	SAND, some gravel, some silt.				
■	HB-PM-111/3D	536+01.6	7.5 RT	7.0-9.0	SAND, some gravel, little silt.				
●	HB-PM-111/4D	536+01.6	7.5 RT	10.0-12.0	Gravelly SAND, little silt.				
▲									
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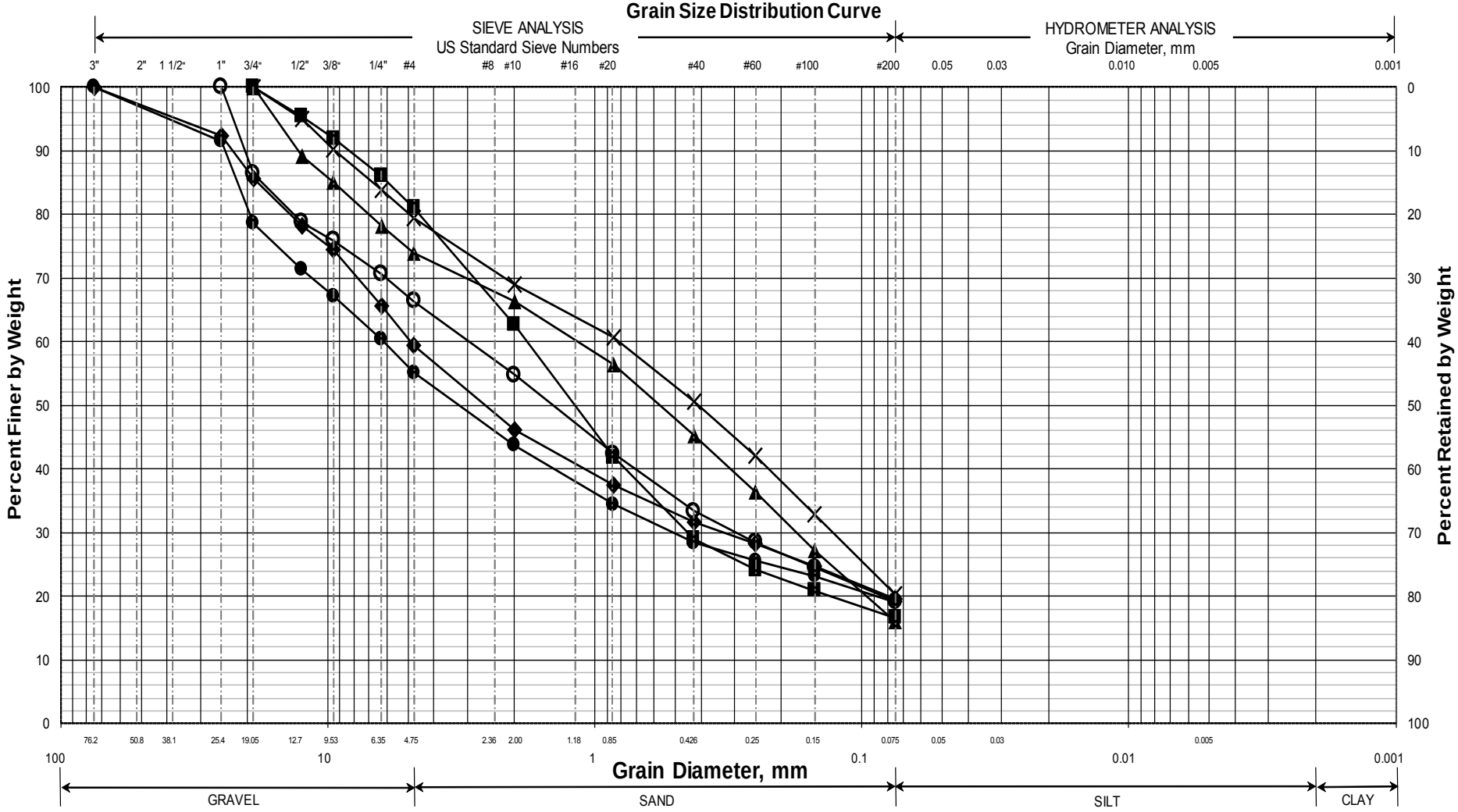
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-112/1D	537+01.6	17.1 LT	1.0-3.0	SAND, some gravel, little silt.				
◆	HB-PM-112/2D	537+01.6	17.1 LT	5.0-7.0	Sandy GRAVEL, little silt.				
■	HB-PM-112/3D	537+01.6	17.1 LT	10.0-11.5	SAND, little gravel, little silt.				
●	HB-PM-113/1D	537+01.9	3.5 RT	2.0-4.0	Sandy GRAVEL, little silt.				
▲	HB-PM-113/2D	537+01.9	3.5 RT	5.0-7.0	SAND, some gravel, little silt.				
×	HB-PM-113/3D	537+01.9	3.5 RT	7.0-9.0	SAND, some gravel, little silt.				

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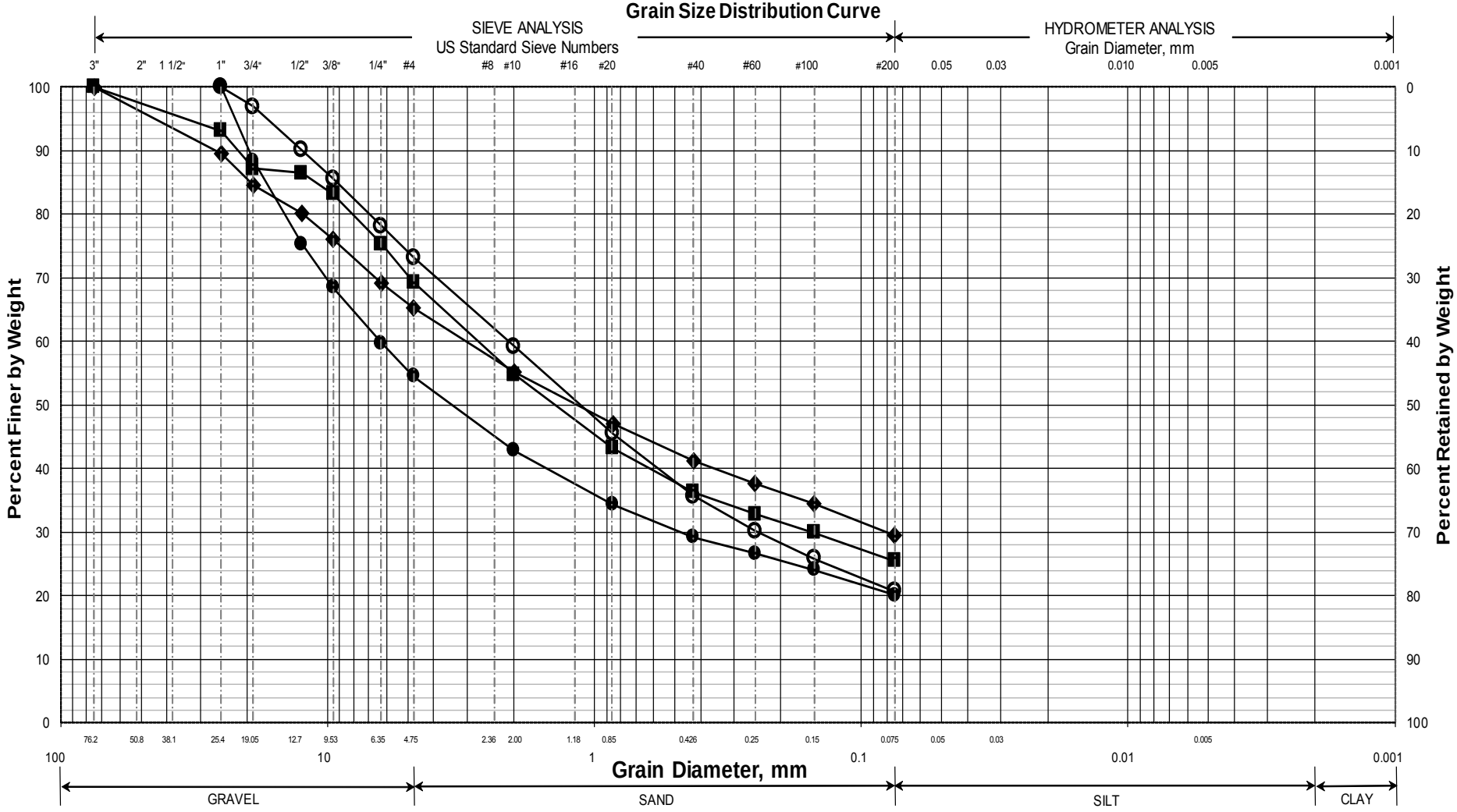
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-114/1D	543+53.1	7.3 RT	1.0-3.0	SAND, some gravel, some silt.				
◆	HB-PM-115/1D	551+66.1	16.1 RT	2.0-3.3	SAND, some gravel, some silt.				
■	HB-PM-115/2D	551+66.1	16.1 RT	5.0-7.0	SAND, some gravel, some silt.				
●	HB-PM-115/3D	551+66.1	16.1 RT	10.0-11.3	GRAVEL, some sand, little silt.				
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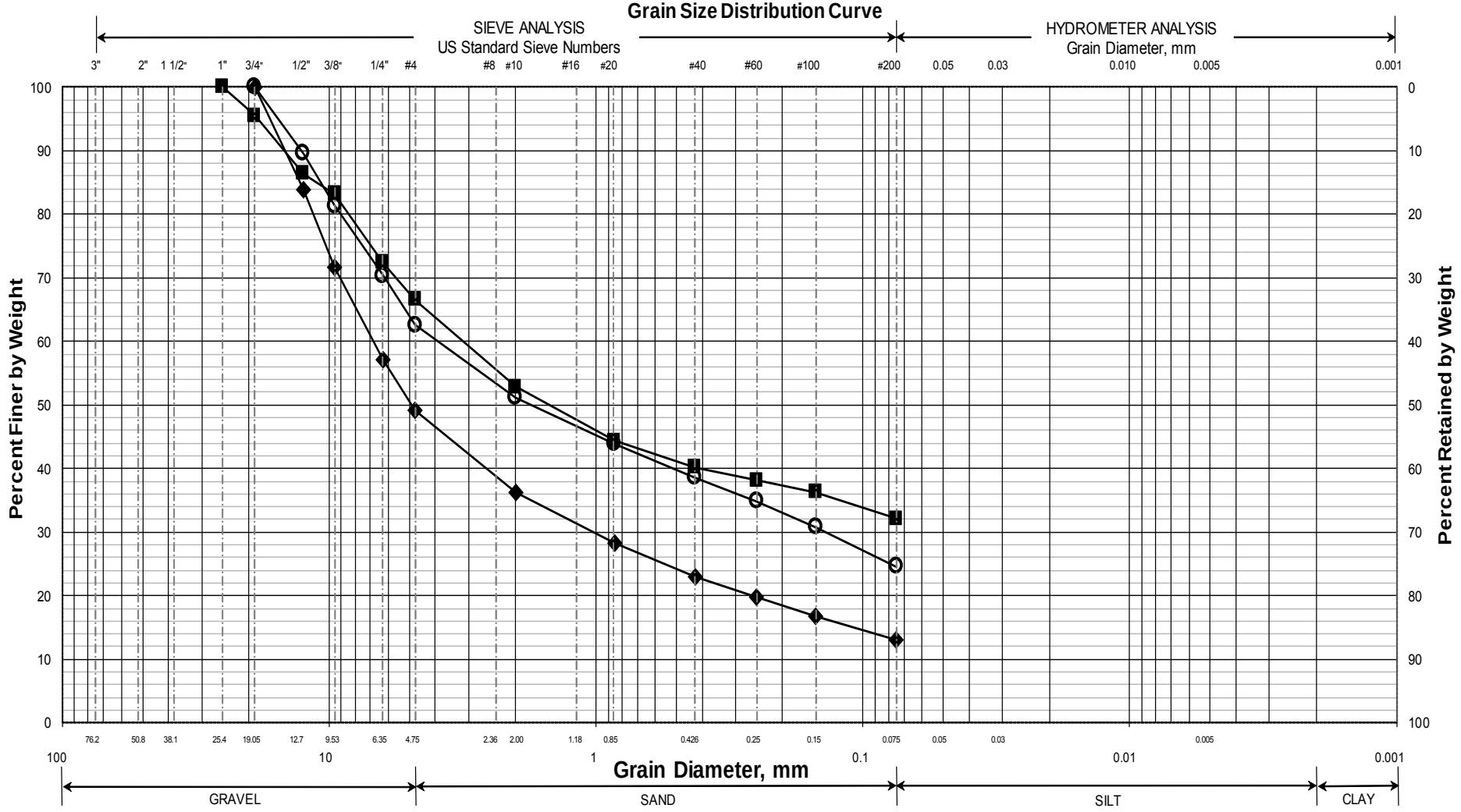
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-116/1D	554+01.1	15.4 RT	1.0-3.0	Gravelly SAND, some silt.				
◆	HB-PM-116/2D	554+01.1	15.4 RT	6.0-8.0	Sandy GRAVEL, little silt.				
■	HB-PM-116/3D	554+01.1	15.4 RT	10.0-10.1	SAND, some gravel, some silt.				
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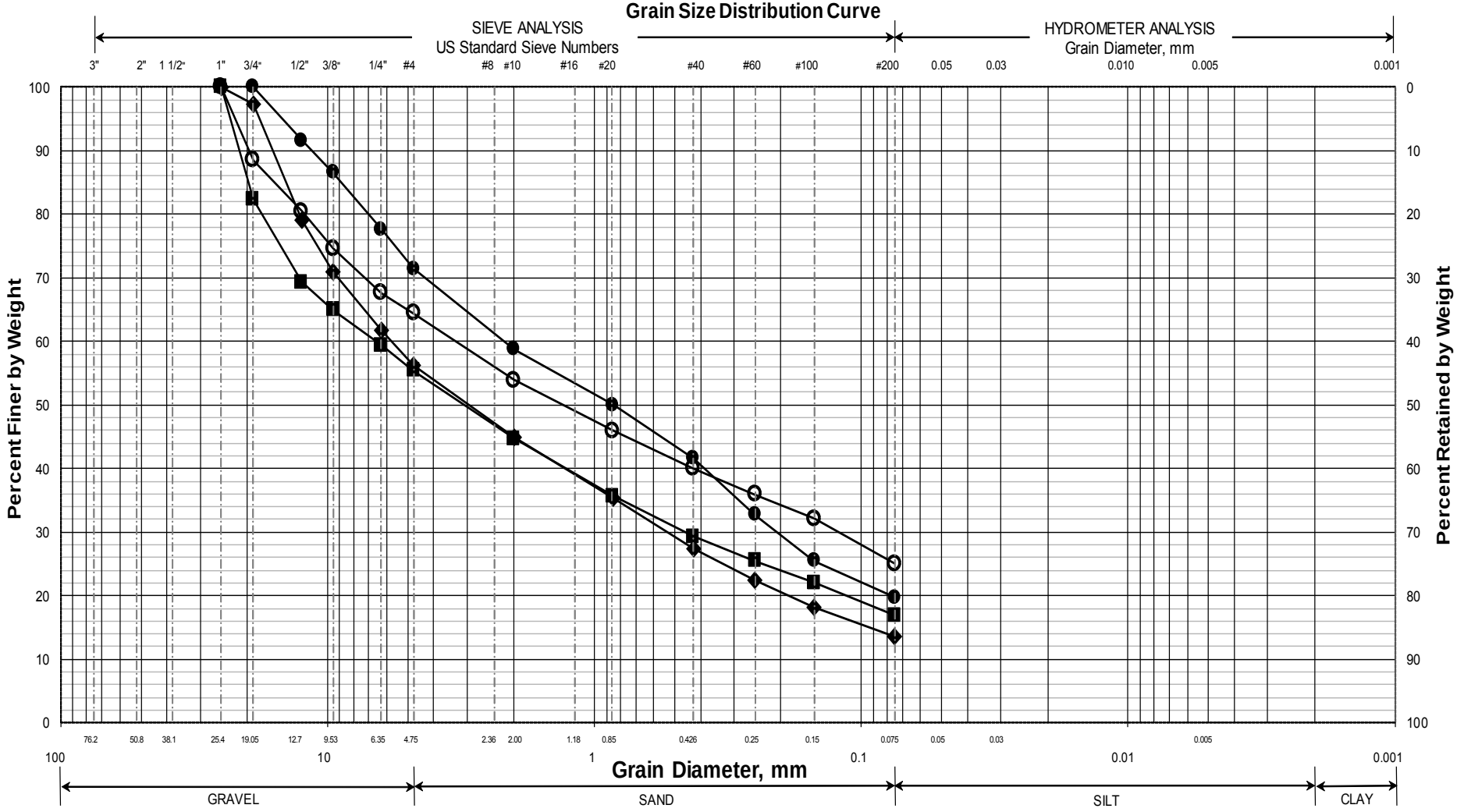
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-117/1D	554+01.2	10.8 LT	1.0-1.3	SAND, some gravel, some silt.				
◆	HB-PM-118/1D	557+00.1	10.5 LT	1.0-2.2	Sandy GRAVEL, little silt.				
■	HB-PM-119/1D	565+95.7	9.7 LT	1.0-3.0	Sandy GRAVEL, little silt.				
●	HB-PM-119/2D	565+95.7	9.7 LT	5.0-5.8	SAND, some gravel, little silt.				
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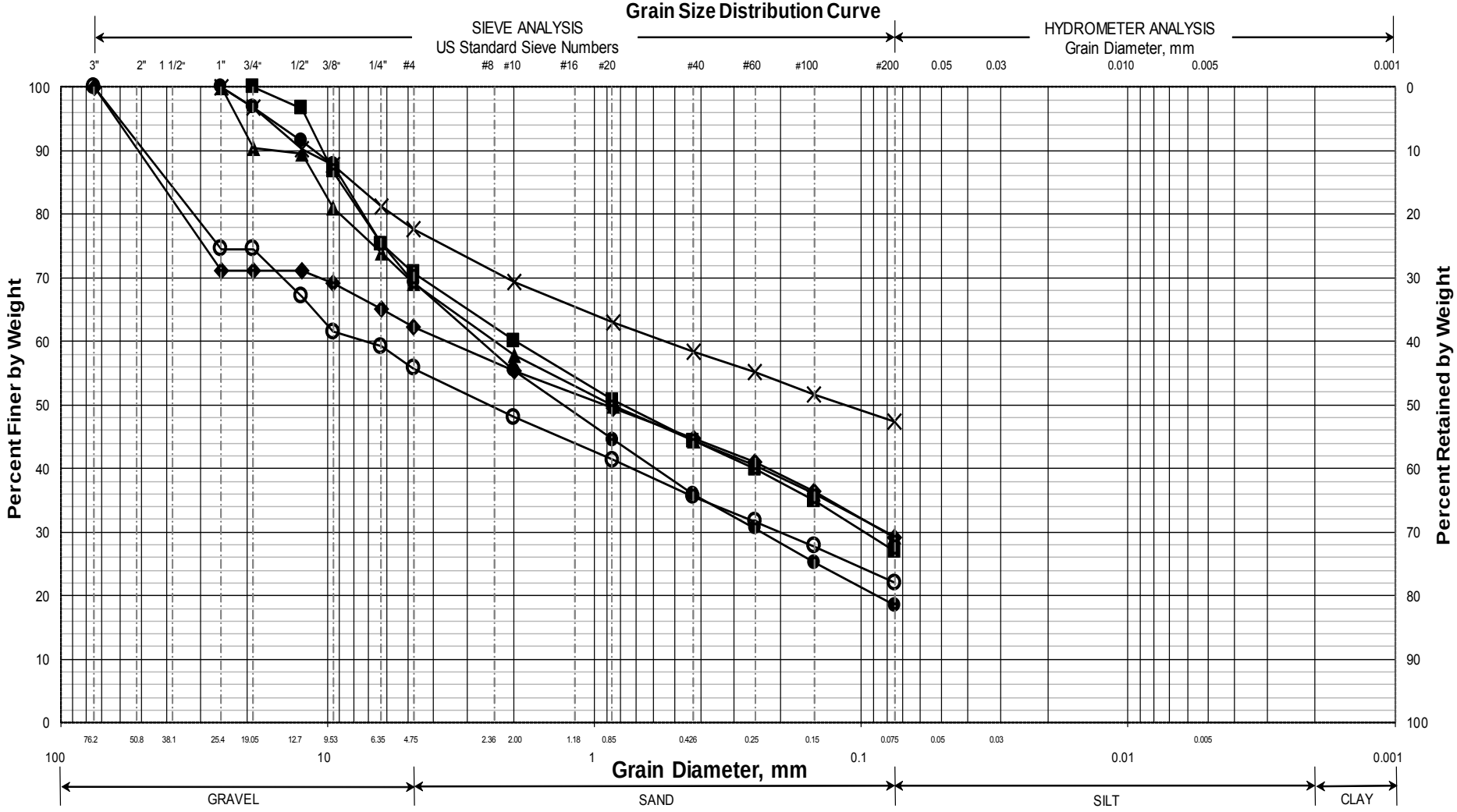
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-120/1D	571+97.9	16.8 LT	1.0-3.0	GRAVEL, some sand, some silt.				
◆	HB-PM-120/2D	571+97.9	16.8 LT	5.0-7.0	SAND, some gravel, some silt.				
■	HB-PM-120/3D	571+97.9	16.8 LT	10.0-10.3	SAND, some gravel, some silt.				
●	HB-PM-121/1D	575+97	3.7 RT	1.0-3.0	SAND, some gravel, little silt.				
▲	HB-PM-121/2D	575+97	3.7 RT	5.0-6.3	SAND, some gravel, some silt.				
×	HB-PM-121/3D	575+97	3.7 RT	10.0-10.8	SILT, some sand, some gravel.				

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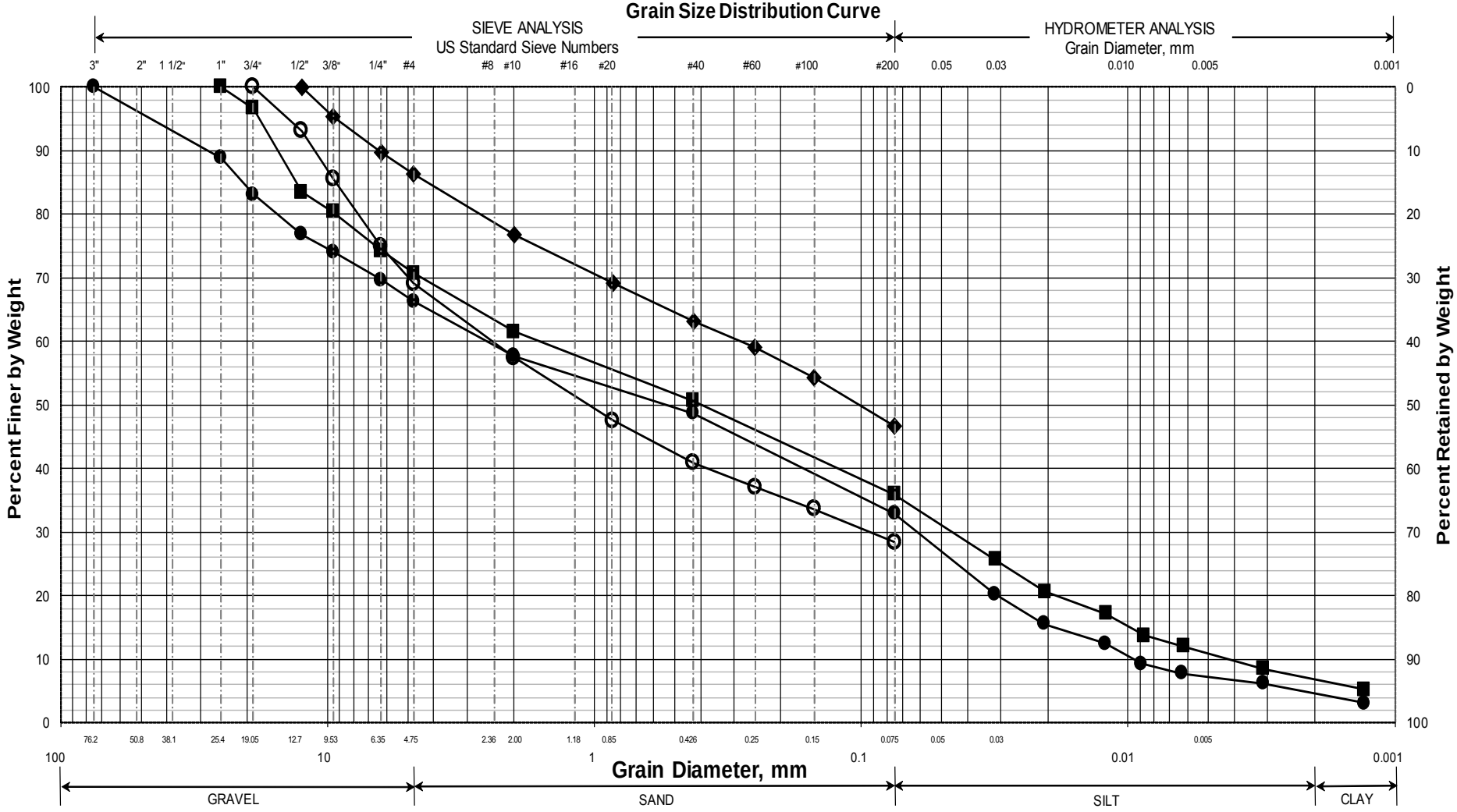

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-122/1D	577+98.8	12.3 LT	1.0-3.0	SAND, some gravel, some silt.				
◆	HB-PM-122/2D	577+98.8	12.3 LT	5.0-5.5	Sandy SILT, little gravel.				
■	HB-PM-123/1D	580+48.7	0.6 LT	2.0-4.0	SAND, some silt, some gravel, trace clay.				
●	HB-PM-123/2D	580+48.7	0.6 LT	5.0-6.4	GRAVEL, some sand, some silt, trace clay.				
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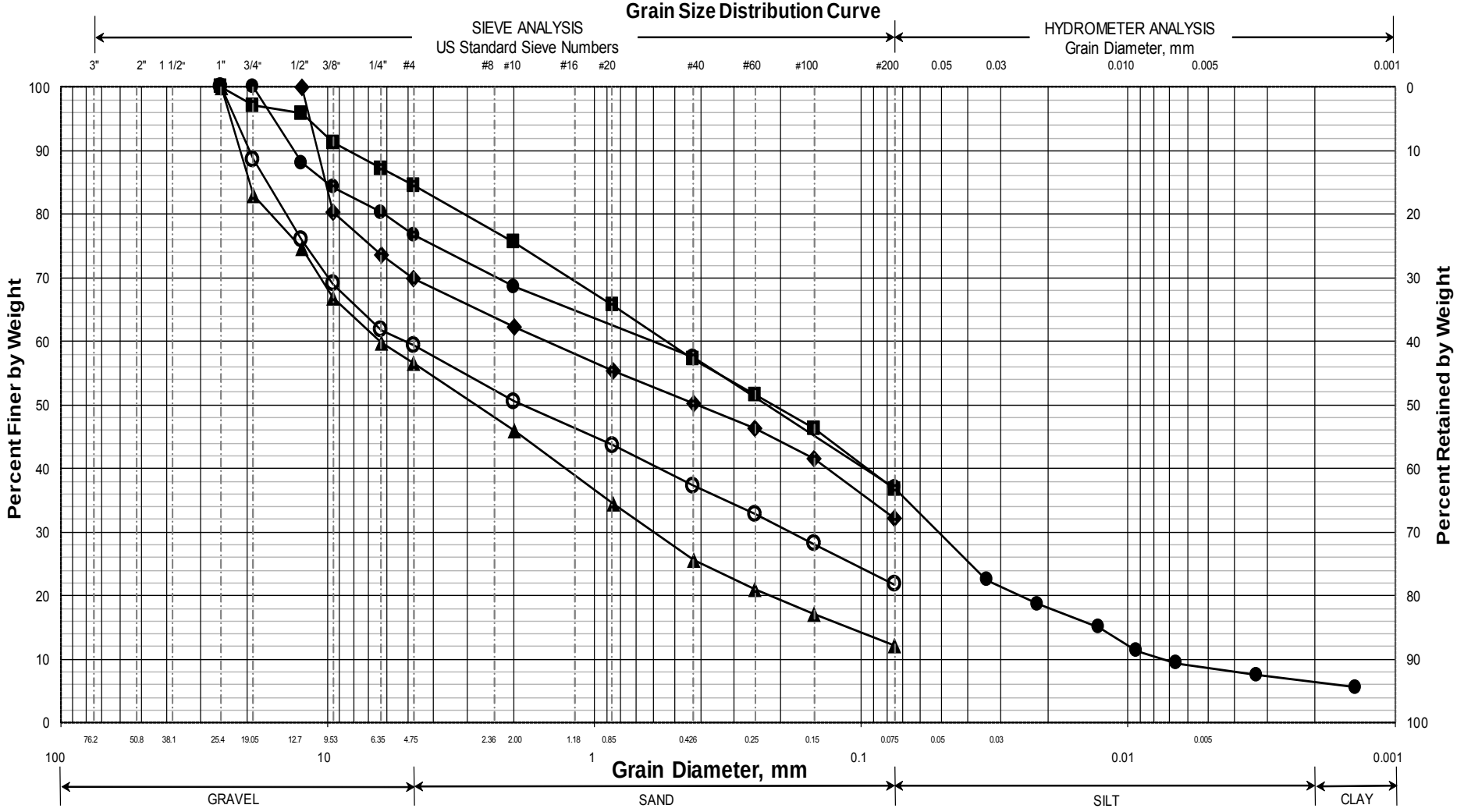

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-124/1D	580+47.7	20.1 RT	2.0-4.0	Sandy GRAVEL, some silt.				
◆	HB-PM-124/2D	580+47.7	20.1 RT	5.0-5.4	SAND, some silt, some gravel.				
■	HB-PM-124/3D	580+47.7	20.1 RT	6.0-8.0	Silty SAND, little gravel.				
●	HB-PM-124/4D	580+47.7	20.1 RT	10.0-10.9	SAND, some silt, some gravel, trace clay.				
▲	HB-PM-126/1D	582+98.9	1.3 LT	1.0-1.8	Gravelly SAND, little silt.				
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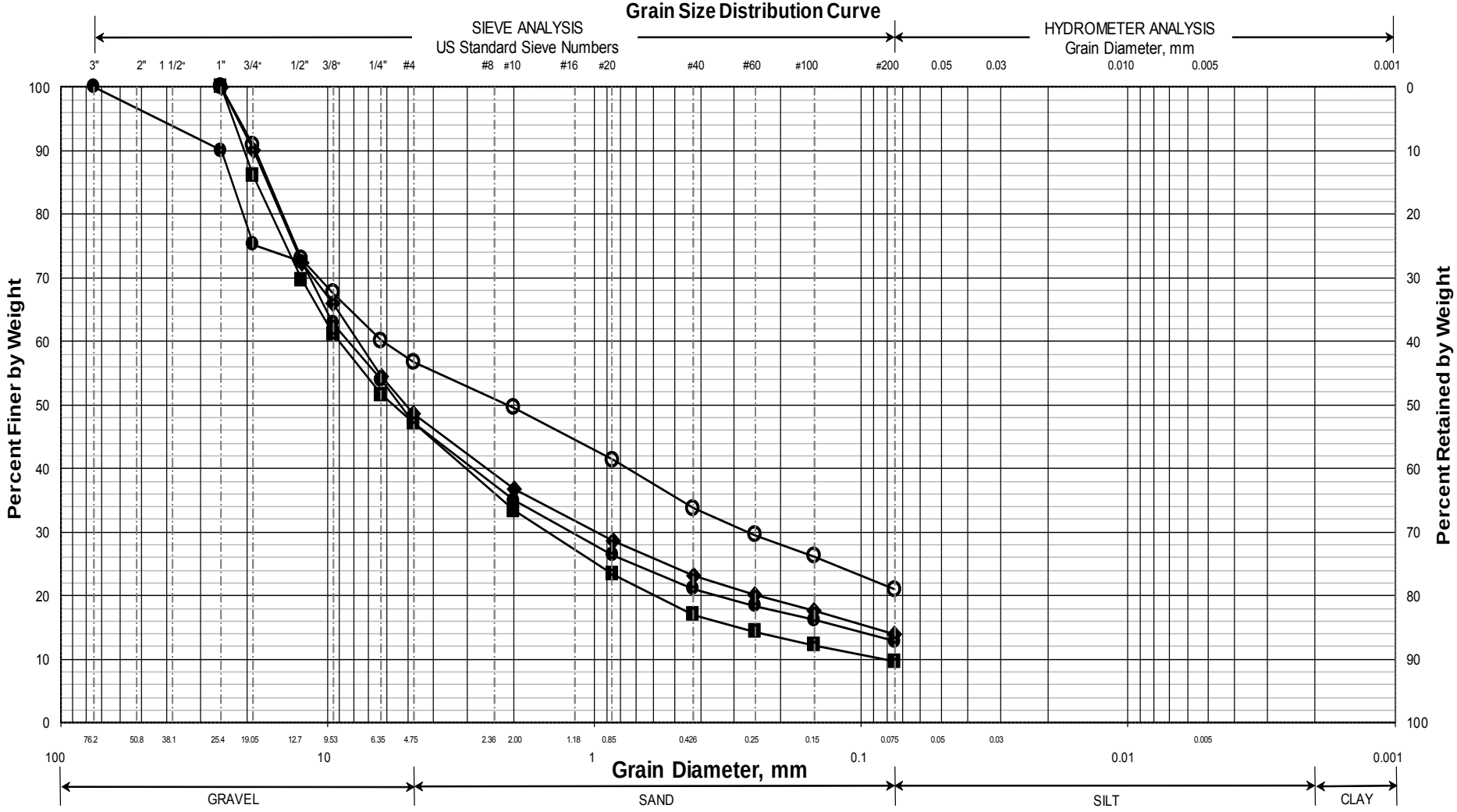

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-127/1D	594+98.5	7.9 RT	1.0-3.0	Sandy GRAVEL, some silt.				
◆	HB-PM-127/2D	594+98.5	7.9 RT	5.0-6.9	GRAVEL, some sand, little silt.				
■	HB-PM-128/1D	599+98.7	9.2 RT	3.0-4.8	Sandy GRAVEL, little silt.				
●	HB-PM-128/2D	599+98.7	9.2 RT	5.0-7.0	GRAVEL, some sand, little silt.				
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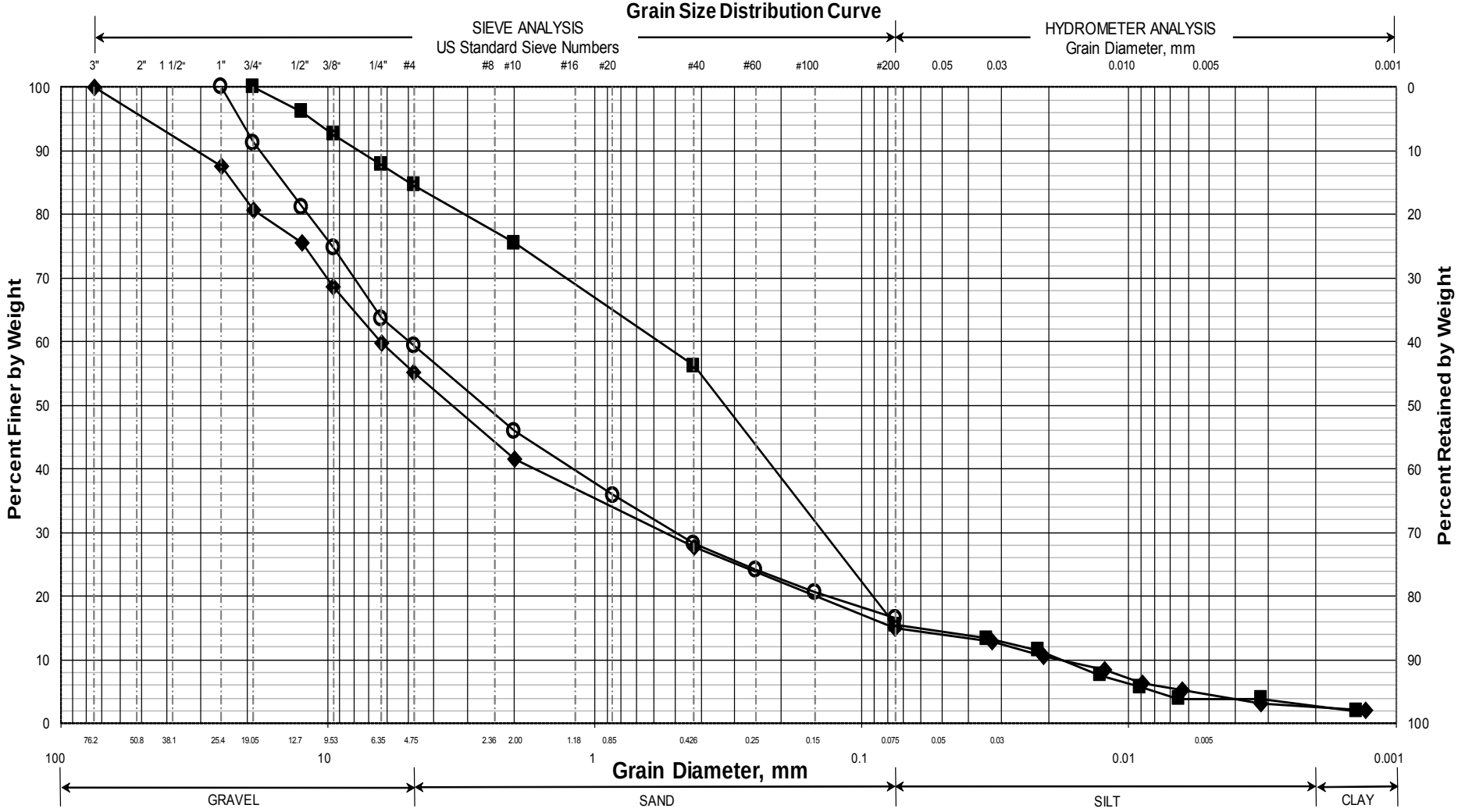

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-129/1D	611+02.1	6.2 RT	1.0-3.0	Gravelly SAND, little silt.				
◆	HB-PM-129/2D	611+02.1	6.2 RT	5.0-6.9	Sandy GRAVEL, little silt, trace clay.				
■	HB-PM-129/3D	611+02.1	6.2 RT	10.0-12.0	SAND, little silt, little gravel.				
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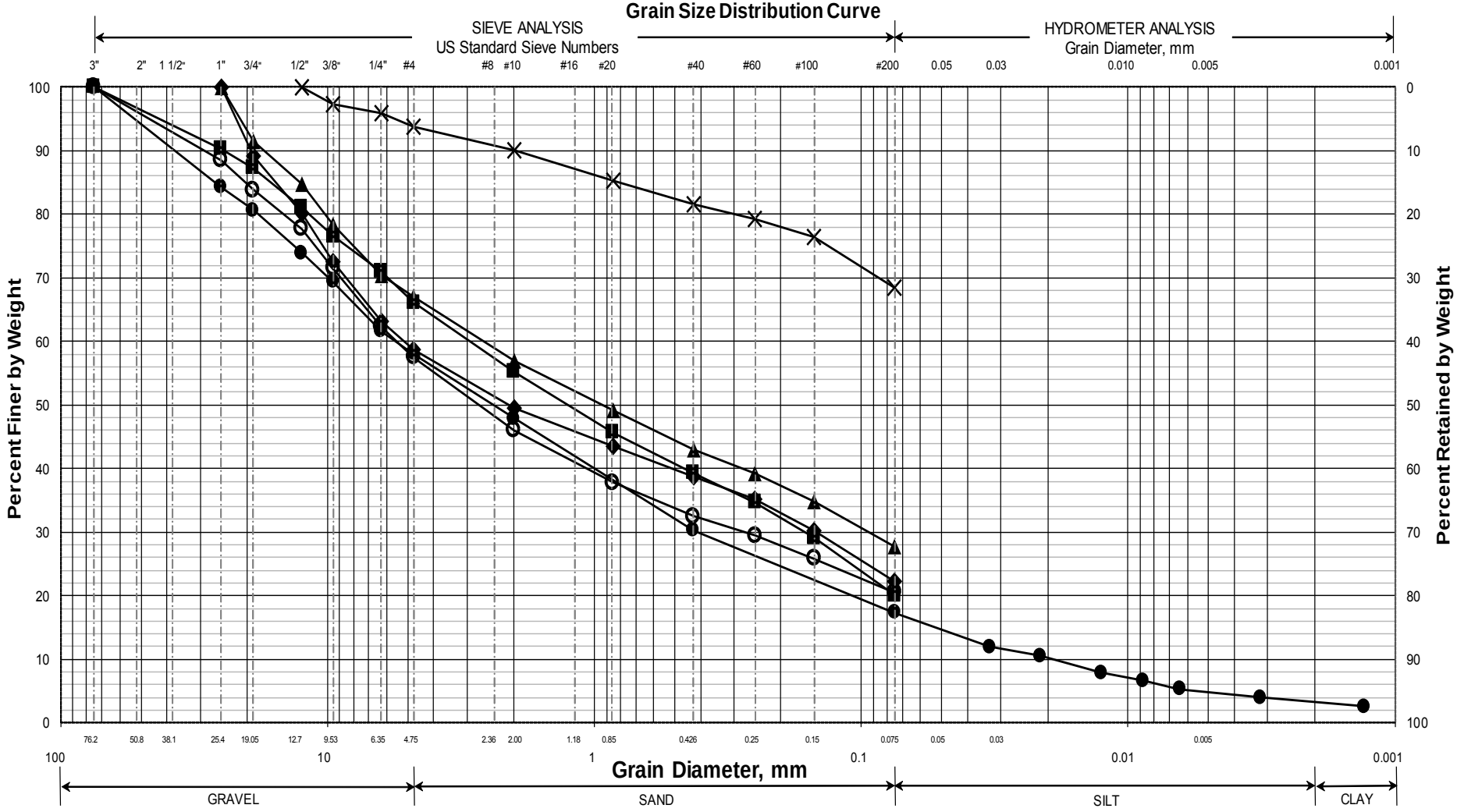

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-130/1D	618+85.3	8.3 LT	1.0-3.0	Sandy GRAVEL, little silt.				
◆	HB-PM-130/2D	618+85.3	8.3 LT	5.0-7.0	Sandy GRAVEL, some silt.				
■	HB-PM-130/3D	618+85.3	8.3 LT	10.0-12.0	SAND, some gravel, little silt.				
●	HB-PM-130/4D	618+85.3	8.3 LT	15.0-17.0	Sandy GRAVEL, little silt, trace clay.				
▲	HB-PM-131/1D	622+47.9	13.0 LT	1.0-3.0	SAND, some gravel, some silt.				
×	HB-PM-131/2D	622+47.9	13.0 LT	5.0-5.9	SILT, some sand, trace gravel.				

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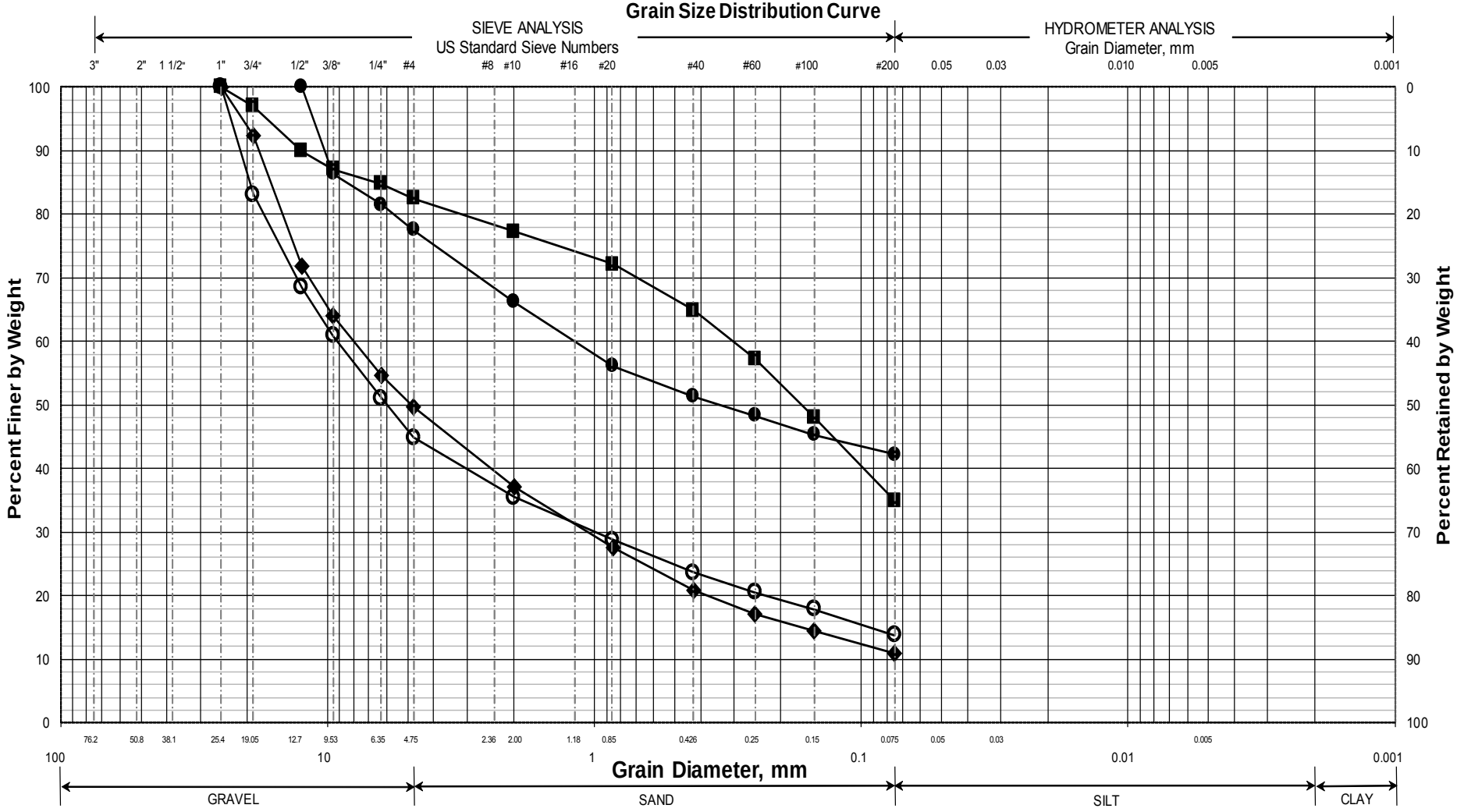

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-132/1D	625+99	14.9 RT	1.0-2.3	GRAVEL, some sand, little silt.				
◆	HB-PM-133/1D	627+89.8	7.7 RT	1.0-3.0	GRAVEL, some sand, trace silt.				
■	HB-PM-133/2D	627+89.8	7.7 RT	5.0-7.0	SAND, some silt, little gravel.				
●	HB-PM-133/3D	627+89.8	7.7 RT	10.0-10.3	SILT, some sand, some gravel.				
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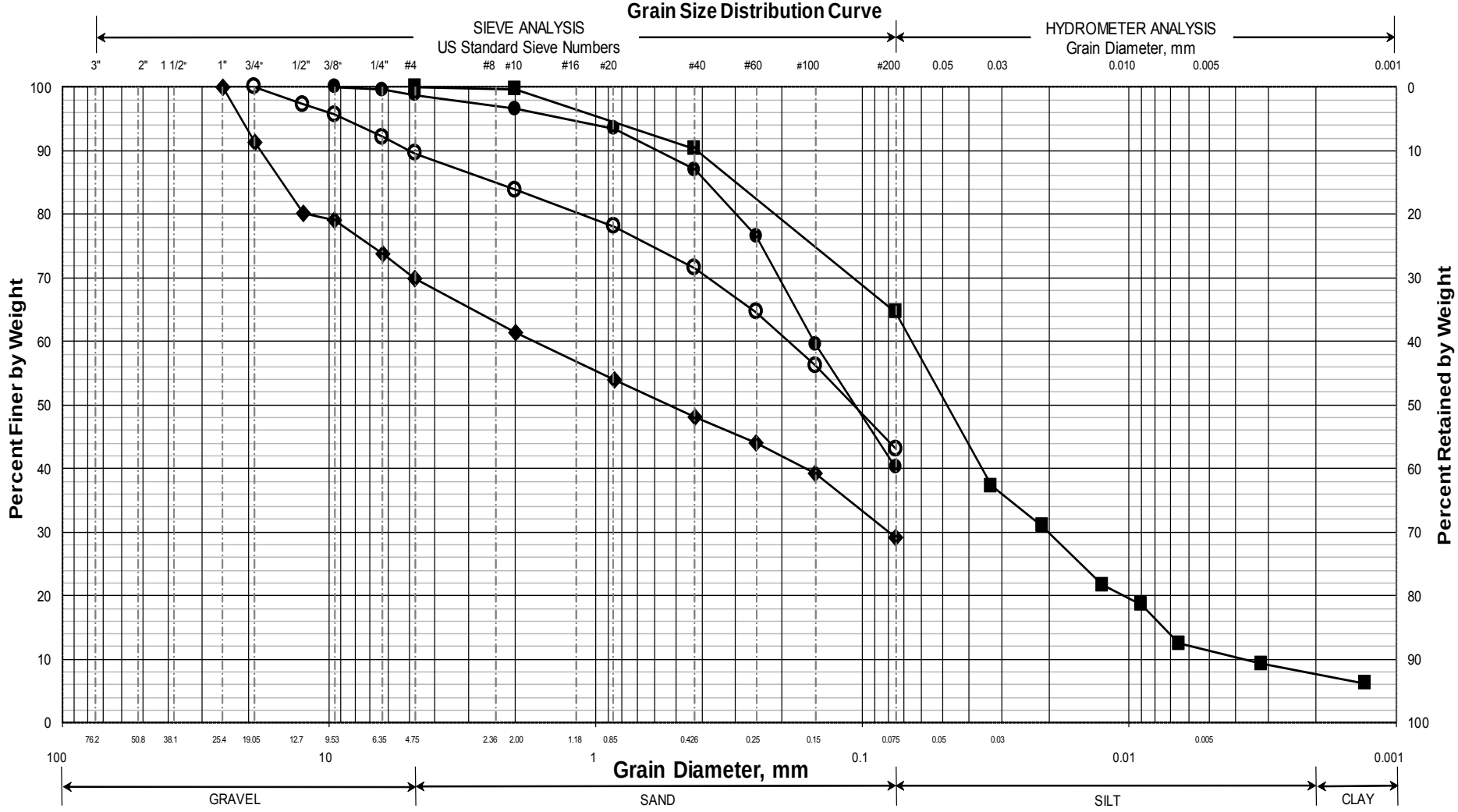

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-134/1D	630+42.1	9.1 LT	2.0-4.0	Silty SAND, trace gravel.				
◆	HB-PM-134/2D	630+42.1	9.1 LT	5.5-7.5	SAND, some gravel, some silt.				
■	HB-PM-134/3D	630+42.1	9.1 LT	10.0-12.0	SILT, some sand, trace clay.				
●	HB-PM-134/3DA	630+42.1	9.1 LT	15.0-15.9	Silty SAND, trace gravel.				
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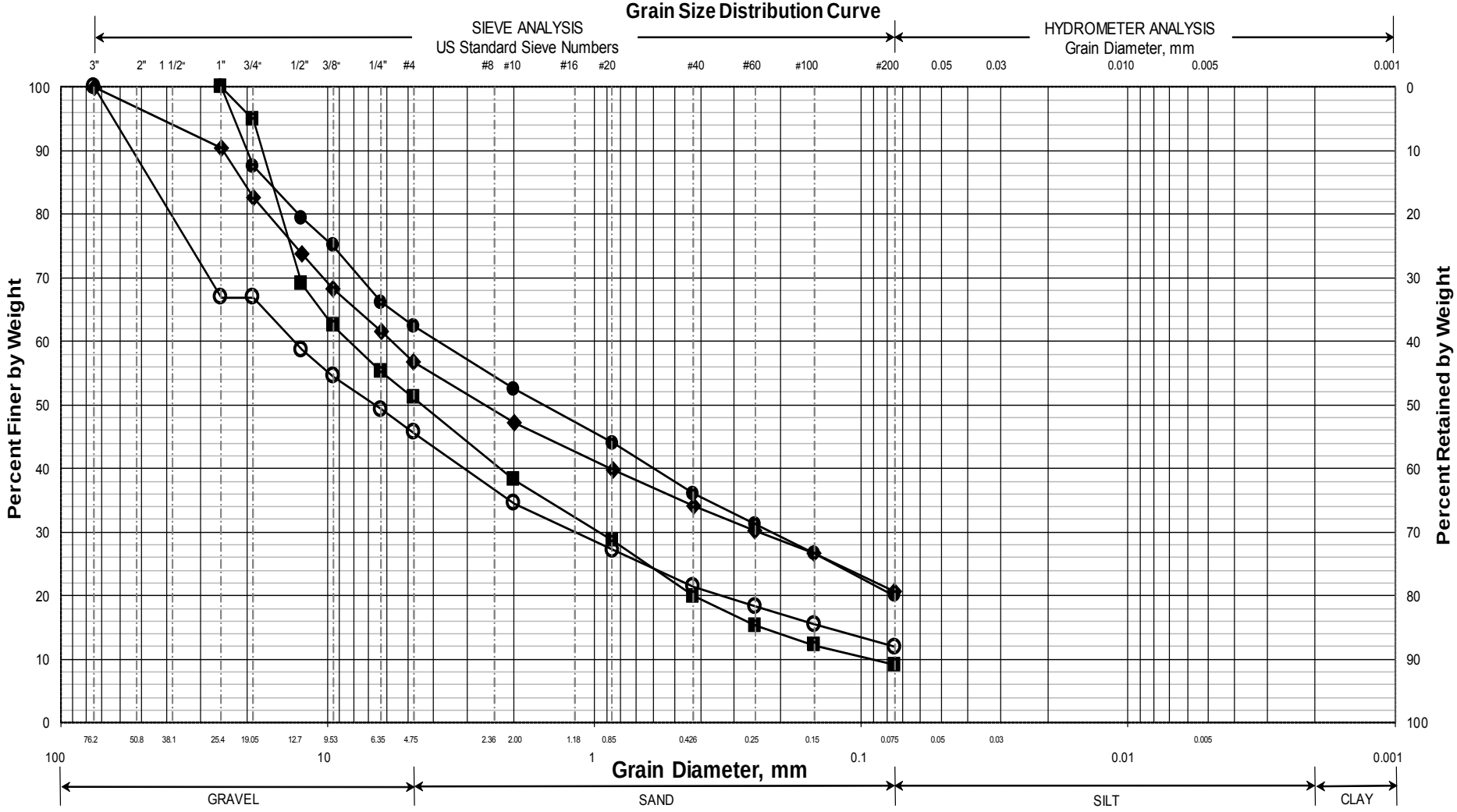
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-135/1D	634+98	13.3 RT	1.0-2.3	GRAVEL, some sand, little silt.				
◆	HB-PM-136/1D	636+97.4	12.7 LT	1.0-3.0	Sandy GRAVEL, some silt.				
■	HB-PM-138/1D	642+48.9	10.3 RT	1.0-3.0	Sandy GRAVEL, trace silt.				
●	HB-PM-139/1D	647+45.4	7.3 RT	1.0-3.0	Gravelly SAND, little silt.				
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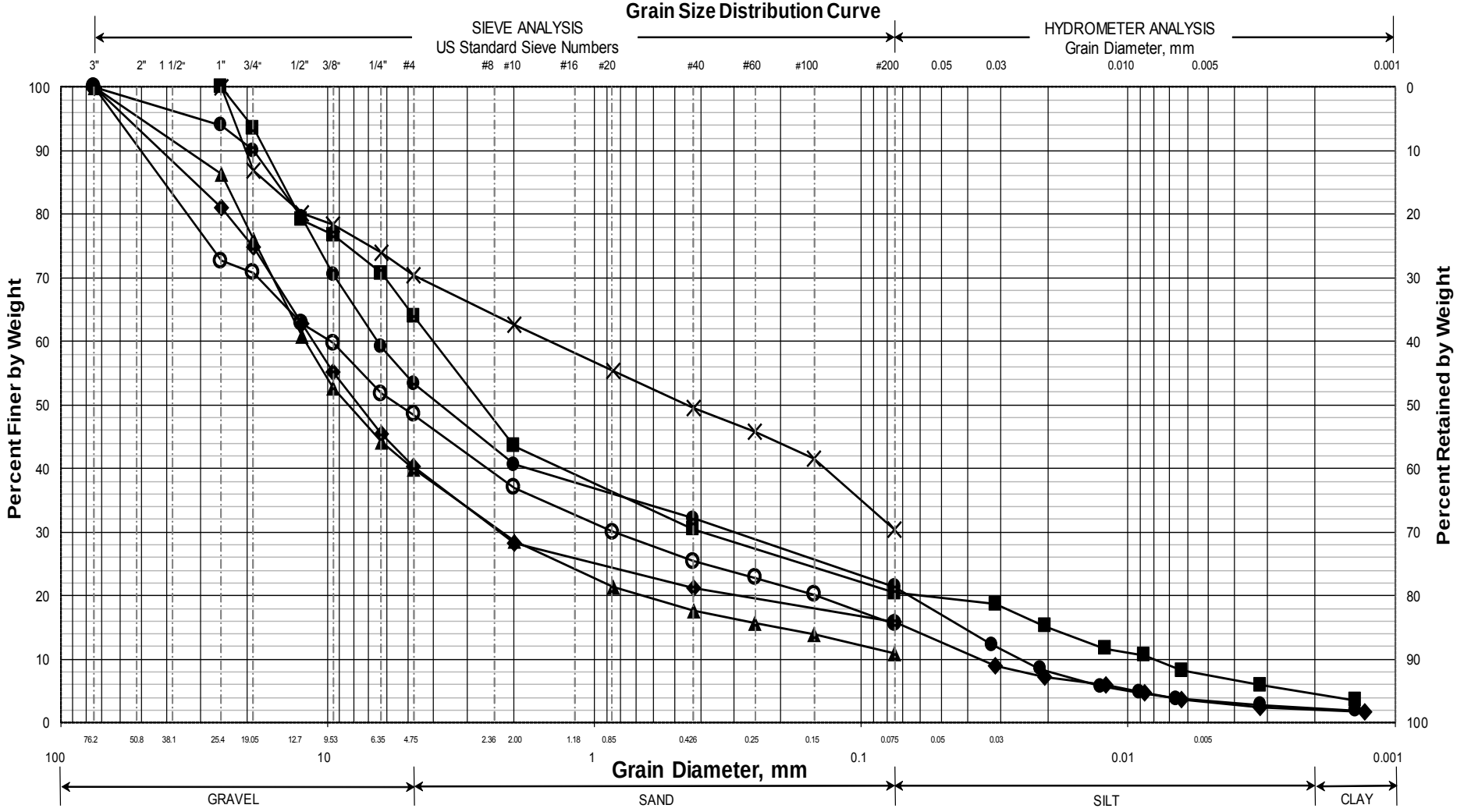

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-140/1D	651+49.1	20.2 LT	1.0-3.0	GRAVEL, some sand, little silt.				
◆	HB-PM-140/2D	651+49.1	20.2 LT	5.0-7.0	GRAVEL, some sand, little silt, trace clay.				
■	HB-PM-140/3D	651+49.1	20.2 LT	10.0-12.0	Gravelly SAND, little silt, trace clay.				
●	HB-PM-141/1D	653+97	12.1 RT	1.0-3.0	GRAVEL, some sand, little silt, trace clay.				
▲	HB-PM-141/2D	653+97	12.1 RT	5.0-6.0	GRAVEL, some sand, little silt.				
×	HB-PM-142/1D	657+00.1	11.5 RT	1.0-2.8	SAND, some silt, some gravel.				

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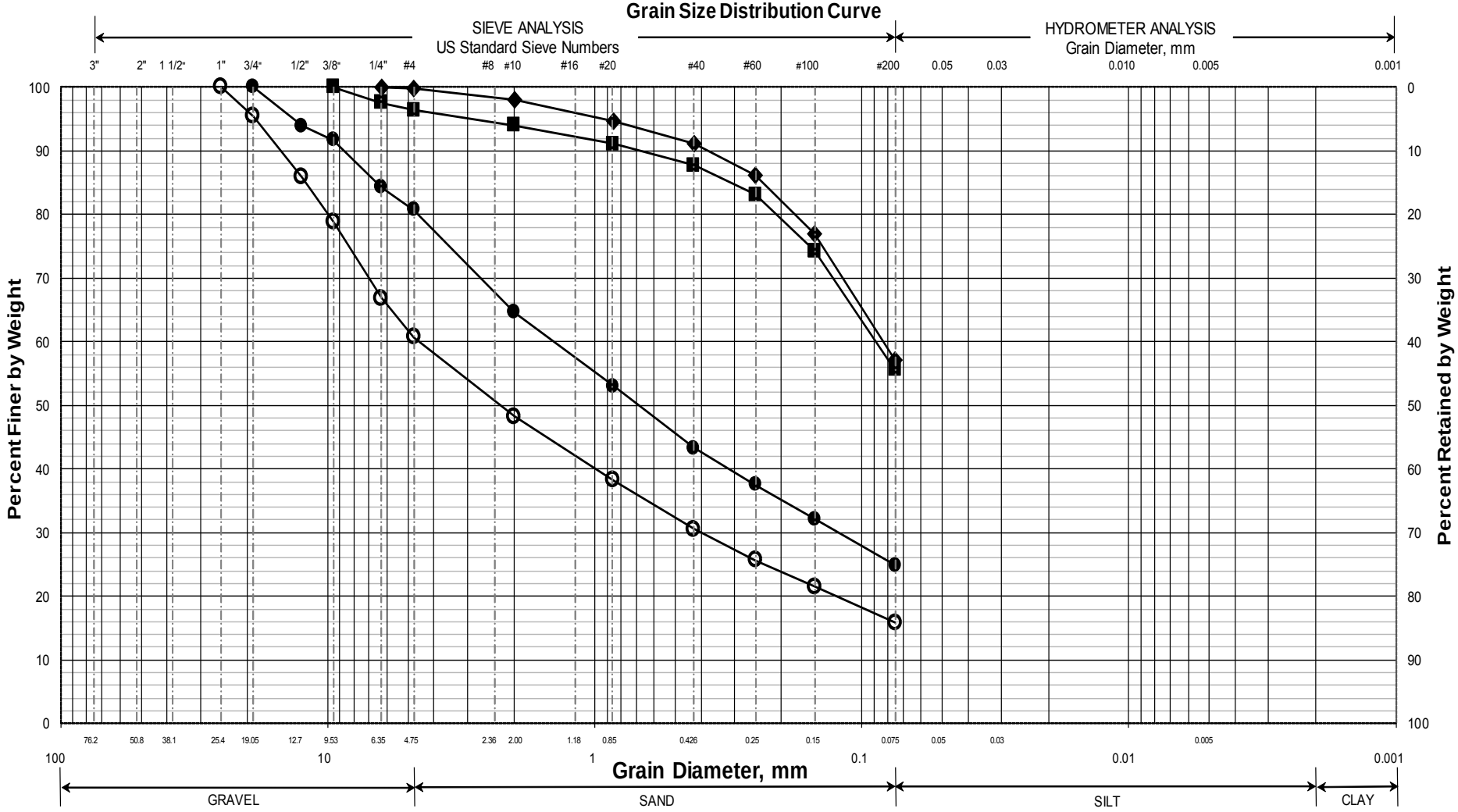

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-143/1D	657+99.5	4.9 RT	1.0-3.0	Gravelly SAND, little silt.				
◆	HB-PM-144/1DA	657+99.4	16.3 LT	1.0-3.0	Sandy SILT, trace gravel.				
■	HB-PM-145/1D	663+49.1	11.5 LT	3.0-5.0	Sandy SILT, trace gravel.				
●	HB-PM-145/2D	663+49.1	11.5 LT	5.2-5.9	SAND, some silt, little gravel.				
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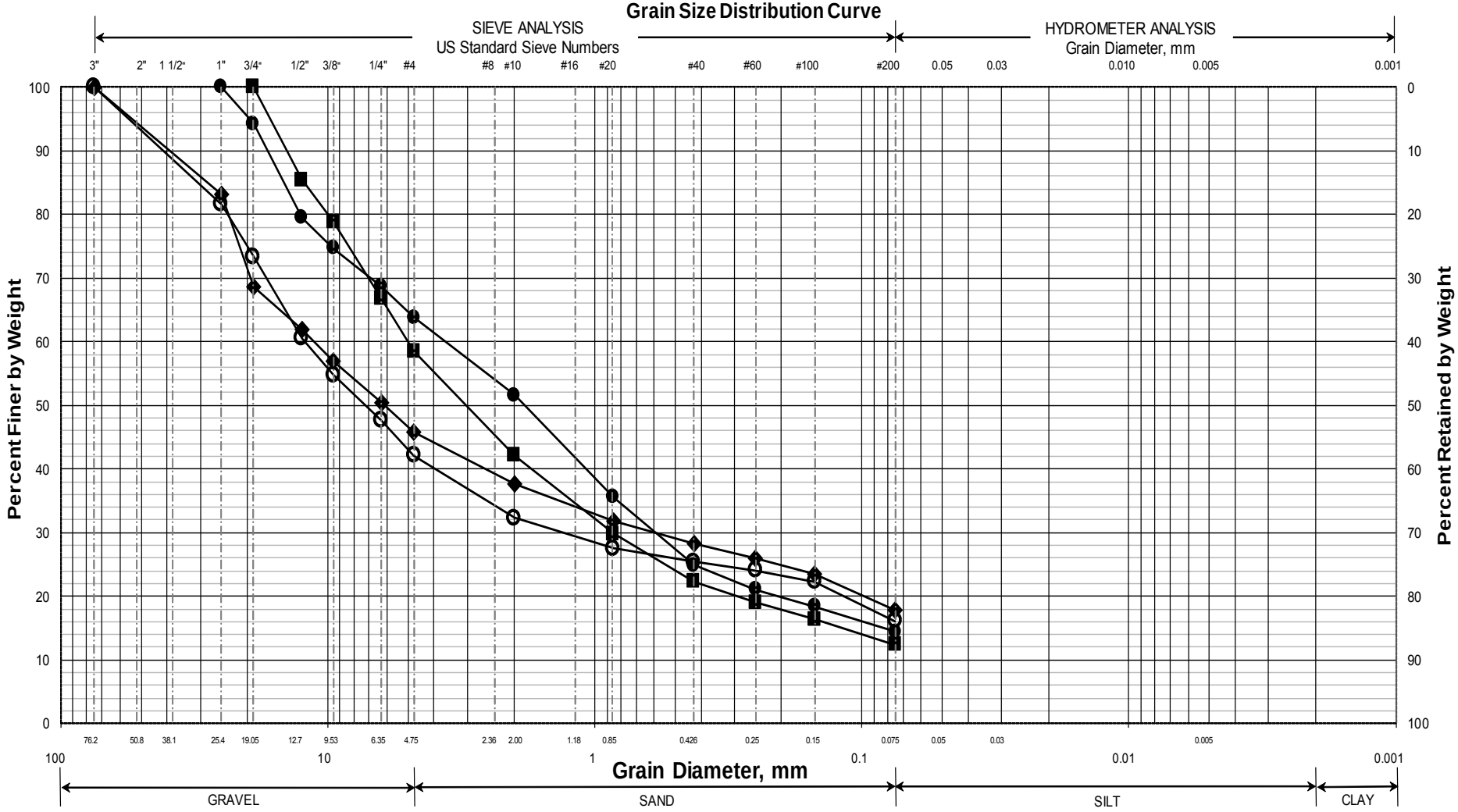

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-146/1D	666+51.8	21.3 LT	2.0-4.0	GRAVEL, some sand, little silt.				
◆	HB-PM-146/2D	666+51.8	21.3 LT	5.0-5.8	GRAVEL, some sand, little silt.				
■	HB-PM-147/1D	668+51.9	17.1 LT	1.0-3.0	Gravelly SAND, little silt.				
●	HB-PM-147/2D	668+51.9	17.1 LT	5.0-7.0	Gravelly SAND, little silt.				
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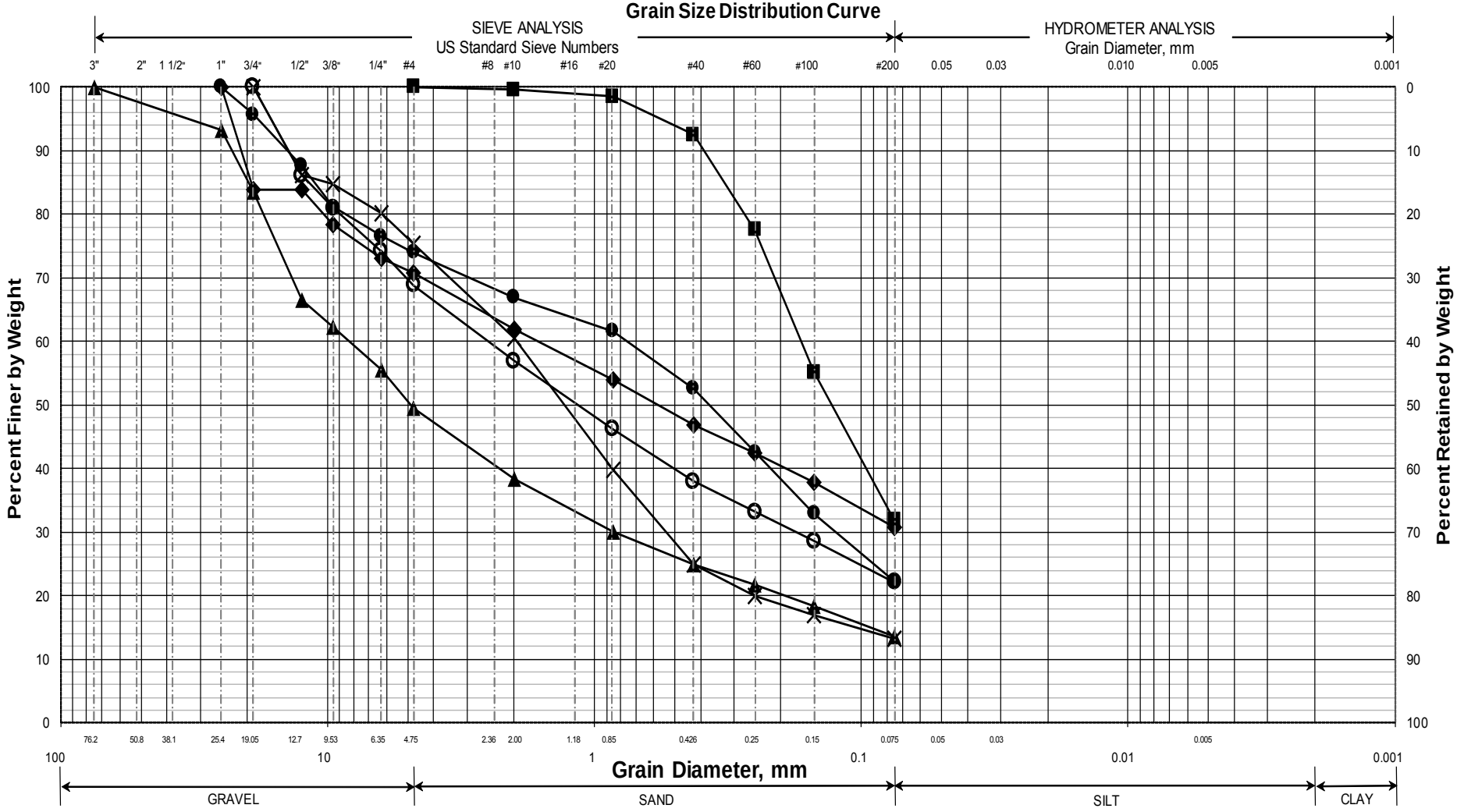

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-148/1D	671+00	18.9 LT	1.0-3.0	SAND, some gravel, some silt.				
◆	HB-PM-148/2D	671+00	18.9 LT	5.0-5.8	SAND, some silt, some gravel.				
■	HB-PM-148/3D	671+00	18.9 LT	10.0-11.0	SAND, some silt.				
●	HB-PM-148/3DA	671+00	18.9 LT	11.0-12.0	SAND, some silt, some gravel.				
▲	HB-PM-149/1D	674+49.4	12.6 LT	1.0-3.0	Sandy GRAVEL, little silt.				
×	HB-PM-149/2D	674+49.4	12.6 LT	5.0-5.7	SAND, some gravel, little silt.				

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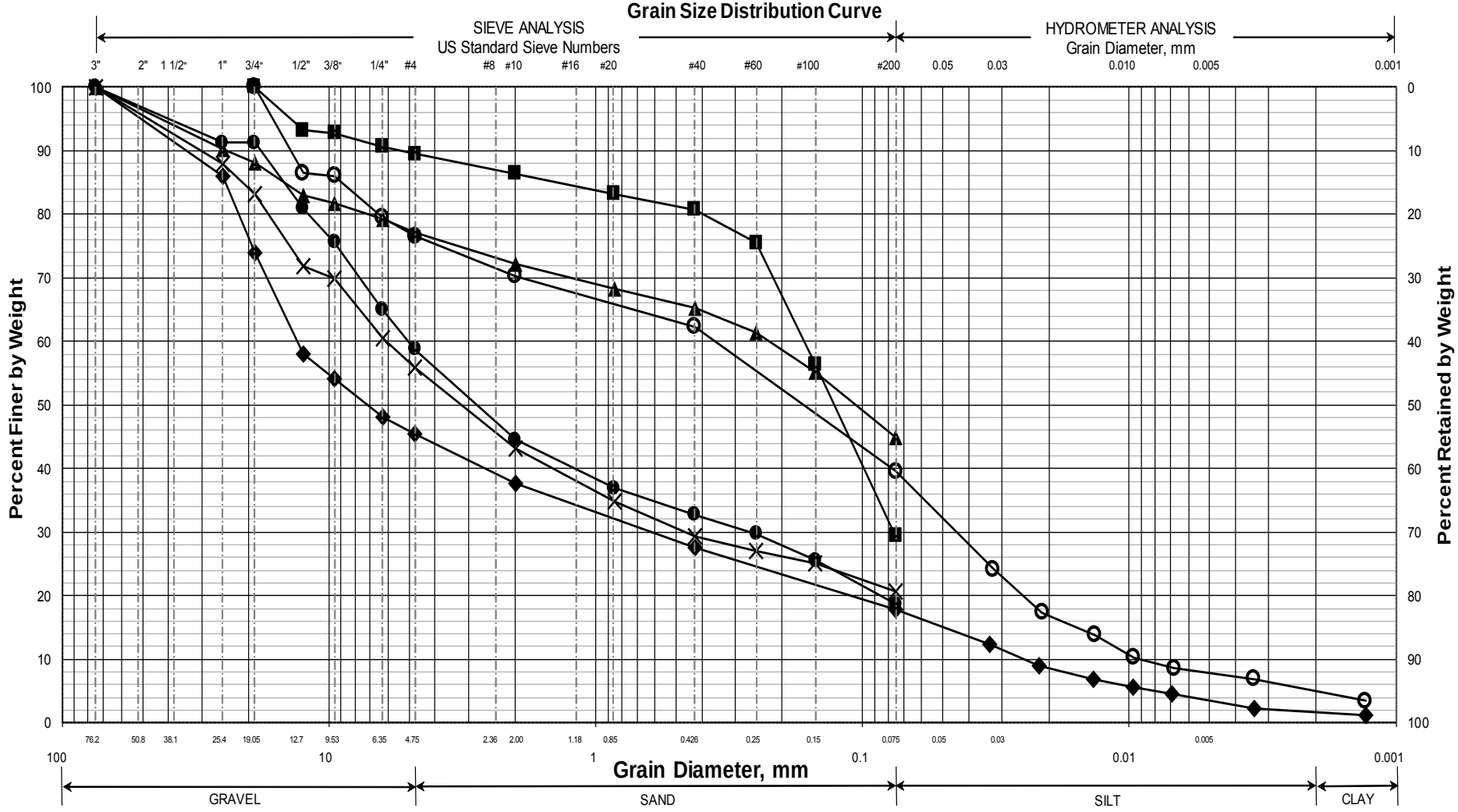

UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-150/1D	682+06.6	20.6 RT	1.0-3.0	SAND, some silt, some gravel, trace clay.				
◆	HB-PM-150/2D	682+06.6	20.6 RT	5.0-6.8	GRAVEL, some sand, little silt, trace clay.				
■	HB-PM-150/3D	682+06.6	20.6 RT	10.0-11.8	SAND, some silt, trace gravel.				
●	HB-PM-151/1D	683+57.9	19.8 RT	1.0-3.0	Sandy GRAVEL, little silt.				
▲	HB-PM-151/2D	683+57.9	19.8 RT	5.0-7.0	SILT, some sand, some gravel.				
×	HB-PM-151/3D	683+57.9	19.8 RT	10.0-12.0	GRAVEL, some sand, some silt.				

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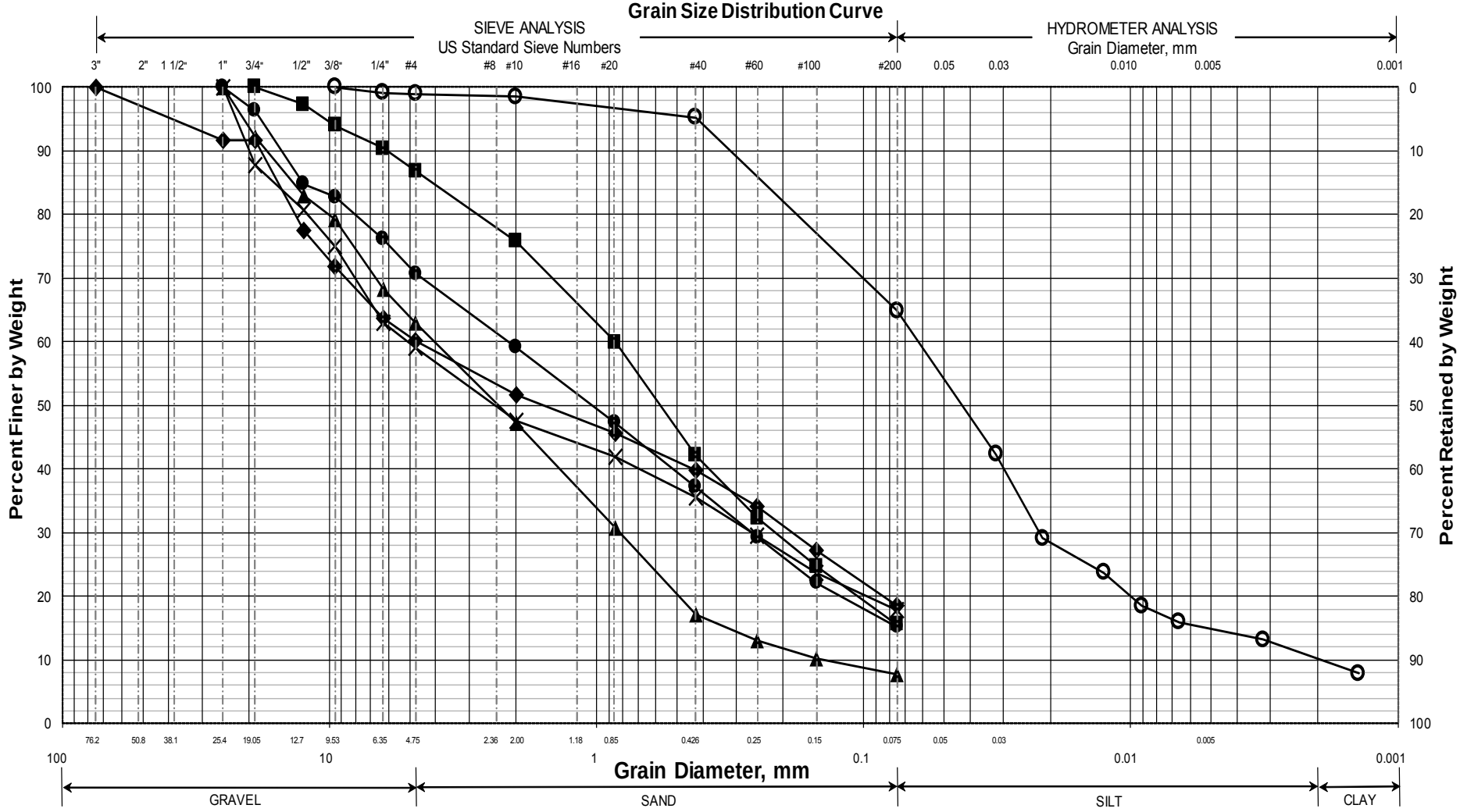

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	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-152/1D	687+11.3	9.1 LT	3.0-5.0	SILT, some sand, trace clay, trace gravel.				
◆	HB-PM-152/2D	687+11.3	9.1 LT	5.0-7.0	Gravelly SAND, little silt.				
■	HB-PM-152/3D	687+11.3	9.1 LT	10.0-12.0	SAND, little silt, little gravel.				
●	HB-PM-153/1D	691+11.6	13.4 RT	1.0-3.0	SAND, some gravel, little silt.				
▲	HB-PM-153/2D	691+11.6	13.4 RT	5.0-7.0	Gravelly SAND, trace silt.				
×	HB-PM-153/3D	691+11.6	13.4 RT	10.0-12.0	Gravelly SAND, little silt.				

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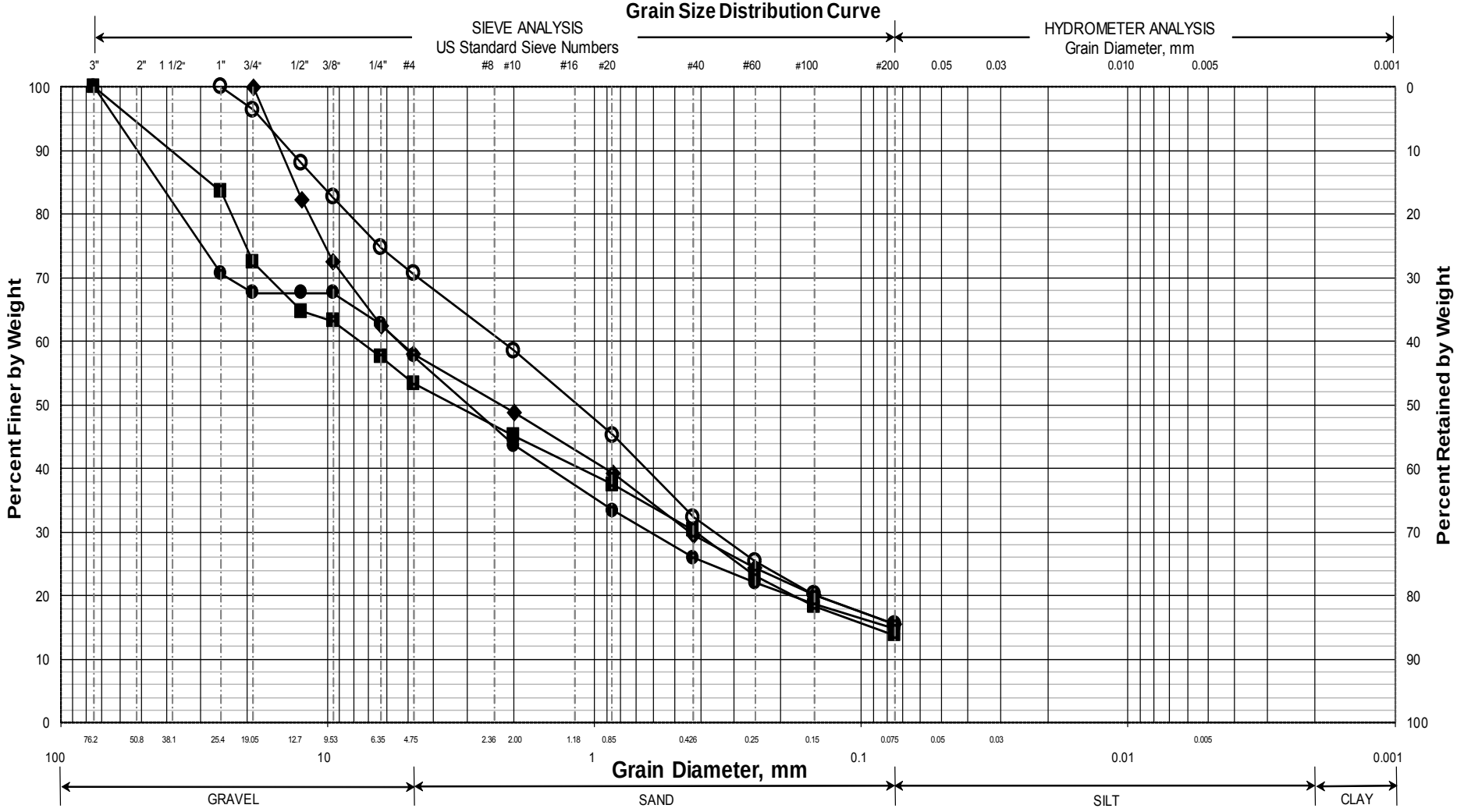
Maine Department of Transportation
Grain Size Distribution Curve

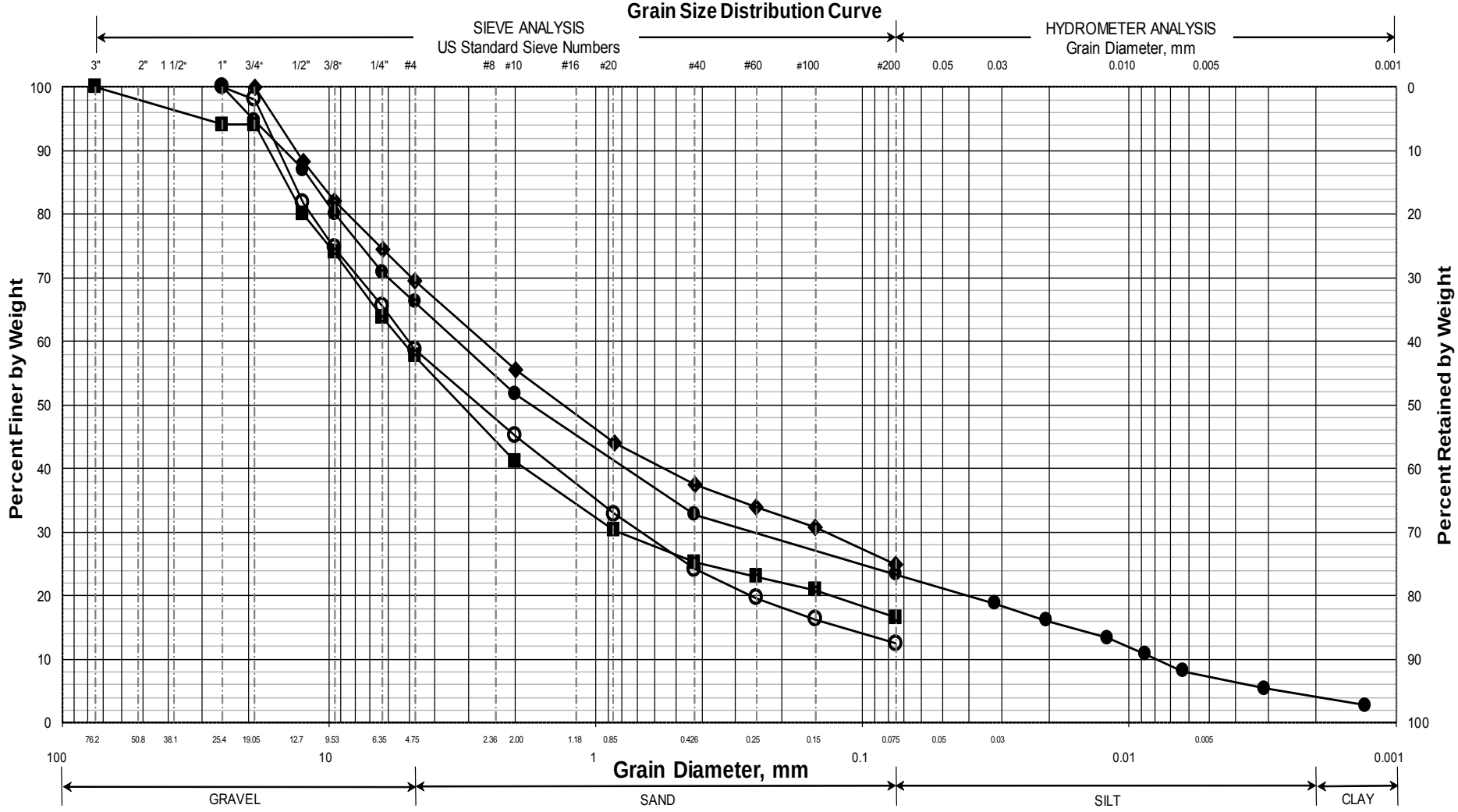


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-154/1D	693+61.3	14.8 LT	1.0-3.0	SAND, some gravel, little silt.				
◆	HB-PM-154/2D	693+61.3	14.8 LT	5.0-5.7	Sandy GRAVEL, little silt.				
■	HB-PM-155/1D	701+10.8	6.6 LT	1.0-3.0	Sandy GRAVEL, little silt.				
●	HB-PM-155/2D	701+10.8	6.6 LT	5.0-7.0	Gravelly SAND, little silt.				
▲									
×									

WIN
018247.00
Town
Madrid Twp, Phillips
Reported by/Date
WHITE, TERRY A 12/31/2018

Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-PM-157/1D	713+57	7.7 LT	1.0-3.0	Gravelly SAND, little silt.				
◆	HB-PM-157/2D	713+57	7.7 LT	5.0-5.3	SAND, some gravel, some silt.				
■	HB-PM-157/3D	713+57	7.7 LT	9.8-11.0	GRAVEL, some sand, some silt.				
●	HB-PM-157/4D	713+57	7.7 LT	14.9-15.3	SAND, some gravel, little silt, trace clay.				
▲									
×									

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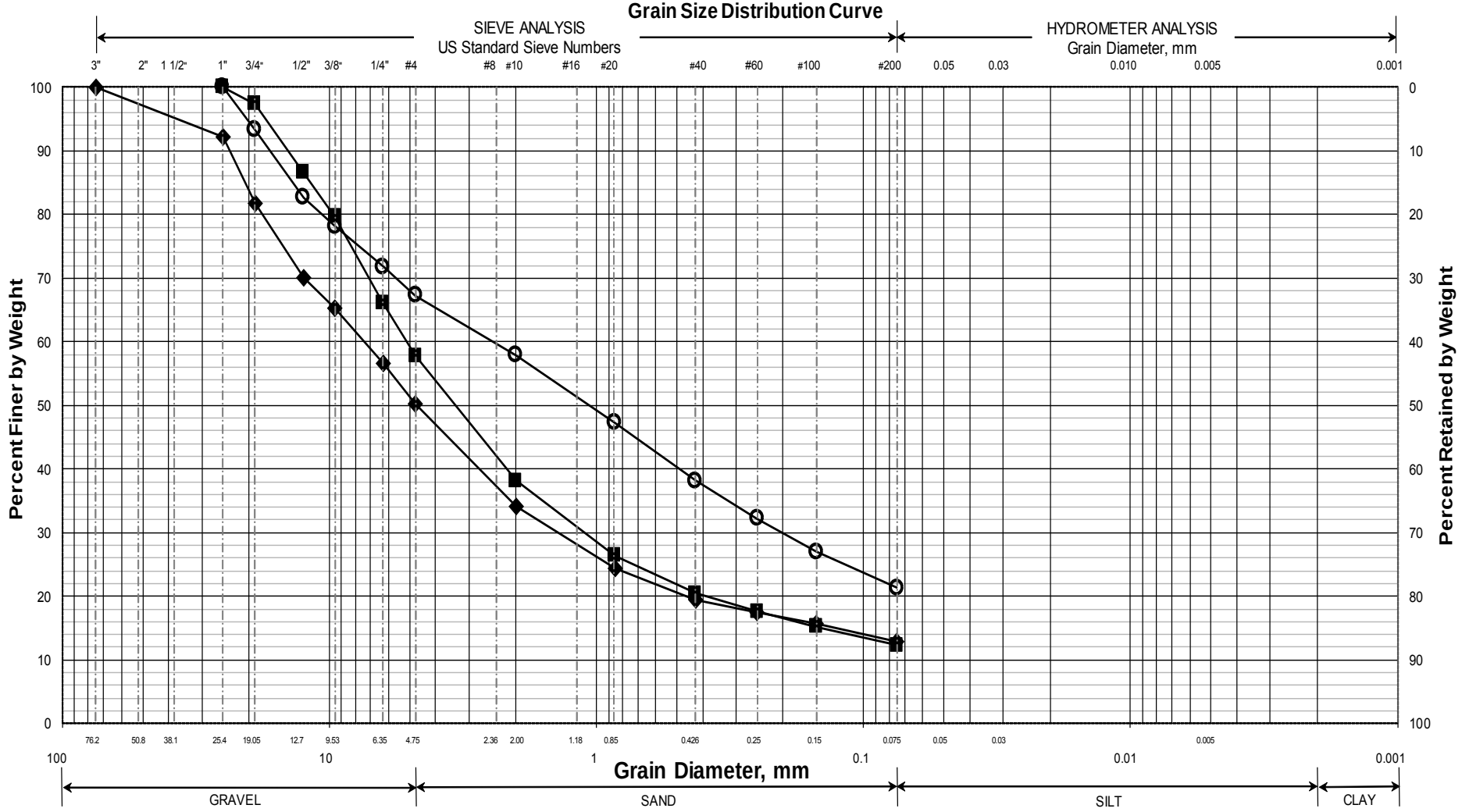
Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-156/1D	710+58.8	7.9 LT	1.0-3.0	SAND, some gravel, some silt.				
◆	HB-PM-156/2D	710+58.8	7.9 LT	5.0-7.0	Sandy GRAVEL, little silt.				
■	HB-PM-156/3D	710+58.8	7.9 LT	10.0-12.0	Gravelly SAND, little silt.				
●									
▲									
×									

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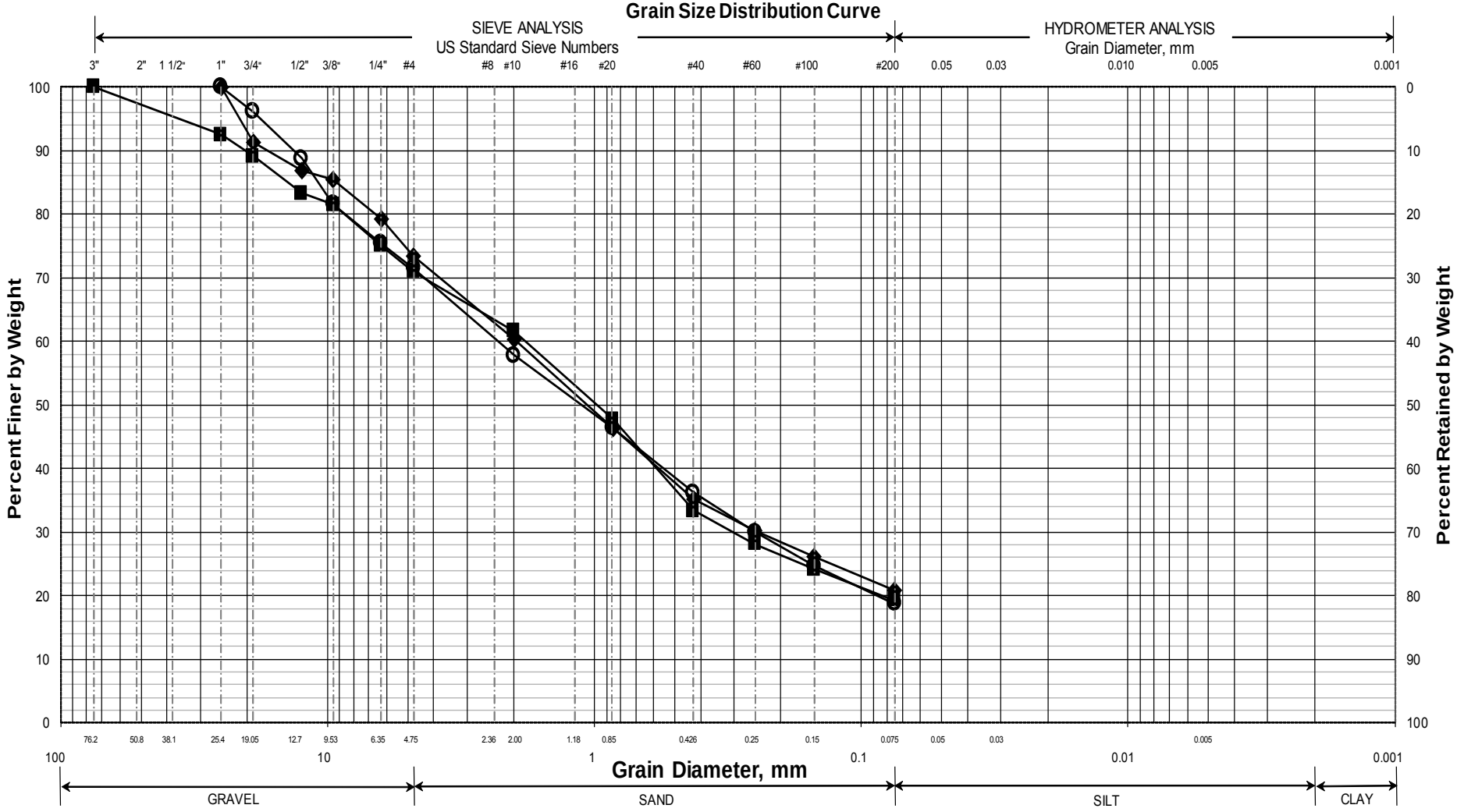
Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-158/1D	717+52.1	17.5 RT	1.0-3.0	SAND, some gravel, little silt.				
◆	HB-PM-158/2D	717+52.1	17.5 RT	5.0-5.6	SAND, some gravel, some silt.				
■	HB-PM-158/3D	717+52.1	17.5 RT	9.8-11.8	SAND, some gravel, little silt.				
●									
▲									
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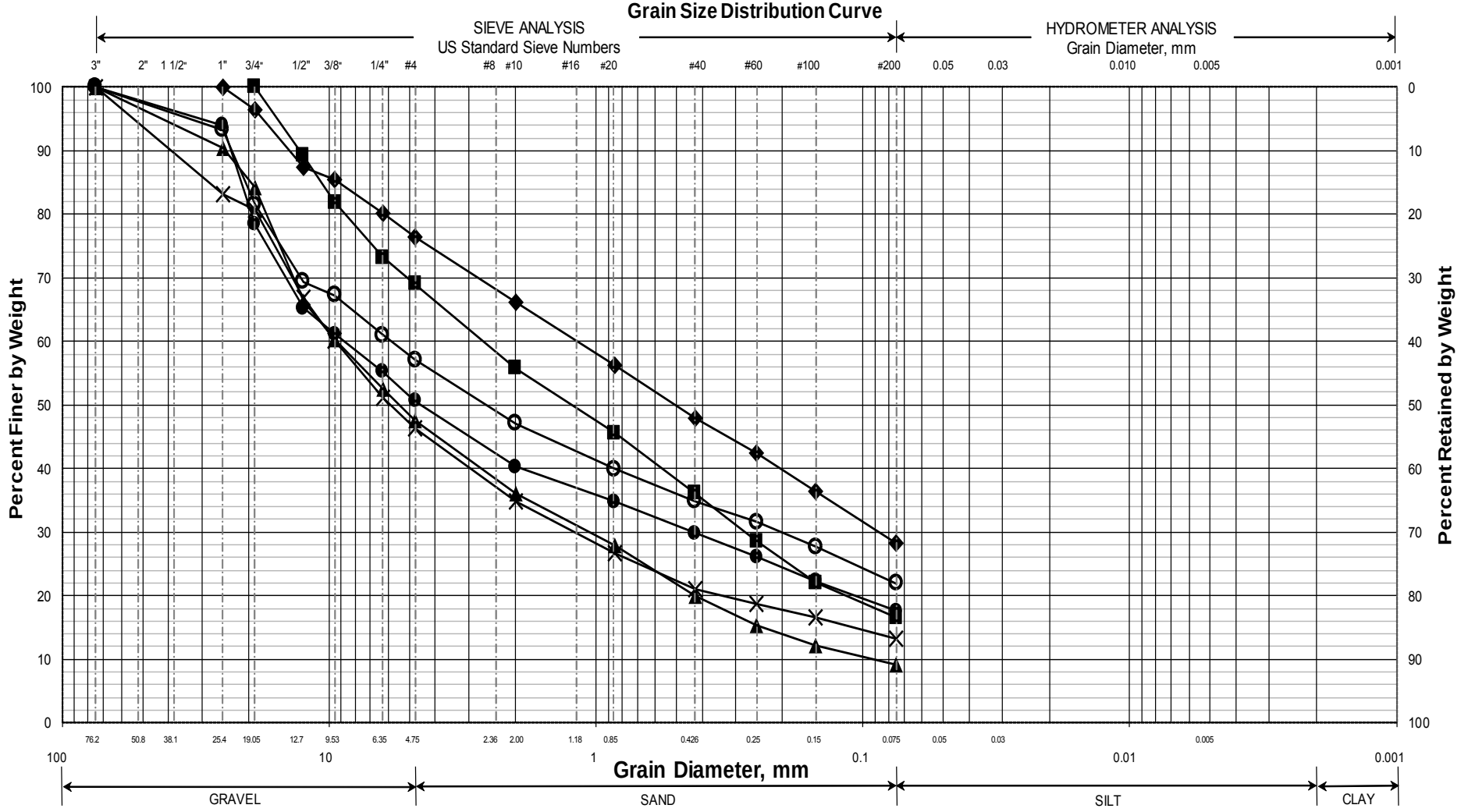
WHITE, TERRY A 12/31/2018

Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-159/1D	721+05.7	13.7 RT	2.0-4.0	GRAVEL, some sand, some silt.				
◆	HB-PM-159/2D	721+05.7	13.7 RT	5.0-7.0	SAND, some silt, some gravel.				
■	HB-PM-159A/1D	721+09.3	13.7 RT	15.0-15.4	SAND, some gravel, little silt.				
●	HB-PM-160/1D	726+06.2	14.2 RT	2.5-4.5	GRAVEL, some sand, little silt.				
▲	HB-PM-160/2D	726+06.2	14.2 RT	5.0-7.0	Sandy GRAVEL, trace silt.				
×	HB-PM-160/3D	726+06.2	14.2 RT	10.0-12.0	GRAVEL, some sand, little silt.				

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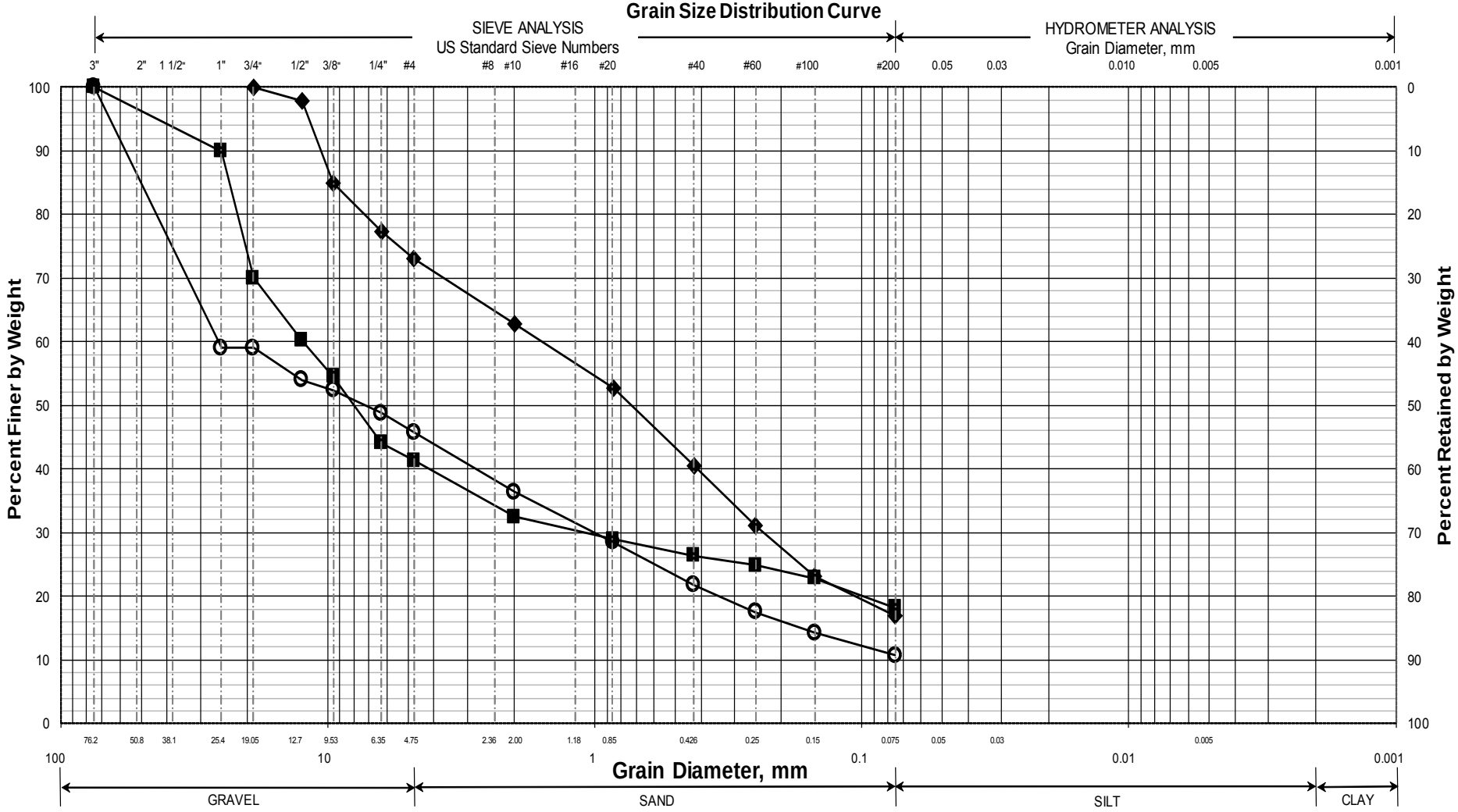
Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
O	HB-PM-161/1D	738+00.6	8.4 RT	2.0-2.8	GRAVEL, some sand, trace silt.				
◆	HB-PM-161/2D	738+00.6	8.4 RT	5.0-7.0	SAND, some gravel, little silt.				
■	HB-PM-162/1D	738+54	14.3 LT	1.0-2.9	GRAVEL, some sand, little silt.				
●									
▲									
×									

WIN
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Town
Madrid Twp, Phillips
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WHITE, TERRY A 12/31/2018

SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

APPENDIX D

SLOPE STABILITY ANALYSES
AND
REINFORCED SOIL SLOPE DESIGN

Project: MaineDOT Route 4 Reconstruction	WIN 18247.00		**Proj. No.**	17-101	
Location: Madrid-Phillips, ME	**Last updated:**	2/7/19	**By**	IVS	
Subject: Reinforced Soil Slope design	**Checked:**	2/12/19	**By**	KM	
			By		

NEEDS ASSESSMENT

A section of the alignment between approximately Stations 566 and 578 shifted RIGHT away from a steep, 70- to 80-foot high backslope to limit backslope excavation above the active roadway. Shift towards high-value natural resource at toe of foreslope identified by RUS line. To accommodate alignment shift without encroaching on RUS line requires construction of a high embankment having a slope of 1.5H:1V from approximately Station 573+00 to Station 576+70, RT.

Stability analyses of the 1.5H:1V embankment were completed and are summarized below. The analyses indicate the 1.5H:1V embankment would have a factor of safety less than the required 1.3 for failure surfaces that extend into the right travel lane of the roadway, even with the new 1.5H:1V embankment constructed using a well-compacted MaineDOT Granular Borrow and faced with a 3-foot thickness of riprap. We note that deep seated foundation stability is adequate. To achieve an adequate factor of safety and provide a stable slope, 1.5H:1V slope shall be constructed with geosynthetic reinforcing to form a Reinforced Soil Slope (RSS). The RSS requirements are set forth in the project plan set. The RSS runs from approximately Station 573+00 to Station 576+70, RT.

STABILITY EVALUATION OF THE 1.5H:1V EMBANKMENT

Evaluate the stability of the 1.5H:1V embankment with no reinforcing to determine if it has a minimum factor of safety (FSmin) greater than or equal to 1.3. Select a critical section common to the RSS analyses. (Station 574+50 RT). Use SLIDE2018 developed by Rocscience. Evaluate the section assuming three construction details:

1. Embankment fill consisting of compacted common borrow or more silty granular borrow having an in-place friction angle (φ) equal to 32 deg.
2. Embankment fill consisting of well-compacted granular borrow having an in-place friction angle (φ) equal to 34 deg.
3. Embankment fill consisting of well-compacted granular borrow having an in-place friction angle (φ) equal to 34 deg. faced with a 3-foot thickness of riprap.

Analyze each of the above using Bishop's simplified method, Janbu method, and Spencer method (most to least conservative).

The analyses indicate the 1.5H:1V embankment would have a factor of safety less than the required 1.3 for failure surfaces that extend into the right travel lane of the roadway, even with the new 1.5H:1V embankment constructed using a well-compacted MaineDOT Granular Borrow and faced with a 3-foot thickness of riprap. We note that deep seated foundation stability is adequate. Analysis output is attached.

RSS DESIGN PROCESS

The design requirements for the RSS were developed based on the required height of the slope, the permissible slope of the temporary excavation to achieve the RSS envelope (subgrade) per OSHA regulations, and the resulting available space to accommodate the geosynthetic reinforcing. Specific design steps, included:

1) Review test boring data in vicinity of RSS with respect to 1) global stability and 2) permissible slope of temporary excavation per OSHA 1926 Subpart P. Test borings HB-PM-120 through -122. Assume not cemented soil unless observed as such by geotechnical engineer during construction. Therefore, assume Soil Type B, so temporary slopes no steeper than 1H:1V when completed in accordance with OSHA regulations.

2) Review cross-sections, including additional cross-sections at reduced (closer than 50-foot) spacing, to determine 1) longitudinal limits of 1.5H:1V RSS, 2) embankment height, and 3) available space for geosynthetic reinforcing.

Based on the above work, two RSS design sections are necessary and are referred to as Standard RSS Section and Special RSS Section.

Overview of RSS configuration:

Station 572+70 to 573+00 RT	transition from typical 2H:1V embankment to Standard (1.5H:1V) RSS Section
Station 573+00 RT to 575+65 RT	Standard RSS Section
Station 575+65 RT to 576+30 RT	Special RSS Section
Station 576+30 RT and 576+70 RT	Standard RSS Section
Station 576+70 RT	tie into typical 2H:1V embankment

3) Evaluate both RSS sections using RSS-specific design and analysis software entitled ReSlope, Version 4.0 developed by Adama Engineering. The ReSlope analyses were used to determine the requirements for the reinforcing elements (strength, length, and vertical spacing) and reinforced soil (strength in terms of internal angle of friction).

ReSlope analyzes three failure scenarios (internal stability or tieback analysis; overall rotational stability or compound analysis; and overall translational stability or direct sliding analysis) to check that the selected reinforcement and reinforced soil system achieves the following minimum factors of safety:

direct sliding or block translation (required minimum factor of safety (FSmin) ≥ 1.1);
pullout resistance (required FSmin ≥ 1.5);
geosynthetic strength (required FSmin ≥ 1.3); and
deep seated foundation stability (soil shear strength) (required FSmin ≥ 1.3).

The results of the analyses should and do indicate that overall rotational stability or compound failure controls at the bottom layer of reinforcing since this indicates that both pullout resistance and geosynthetic strength are adequate. The length of the bottom layer of reinforcing and, therefore, the overall RSS design, is essentially established under the compound failure mode. Because different failure modes are acting at each layer of the RSS system, many of the factors of safety at intermediate reinforcing levels appear excessive. This should not be confused with “over design,” but rather that another failure mode controls but the required factors of safety are satisfied.

DESIGN ANALYSES

1) Select critical sections for the design of the Standard RSS Section and the Special RSS Section with respect to height of 1.5H:1V embankment and restrictions on length of reinforcing geosynthetics:

<u>Standard RSS Section:</u>
critical cross-section at Station 574+50, RT
total slope height (toe to roadway): 34 ft
maximum height of 1.5H:1V slope: 27 ft
maximum length of bottom geosynthetic layers: 15 to 17 ft

Special RSS Section:
critical cross-section at Station 576+00, RT
total slope height (toe to roadway): 33 ft
maximum height of 1.5H:1V slope: 33 ft
maximum length of bottom geosynthetic layers: 15 to 17 ft

2) Select parameters for modeling the two RSS sections

Parameters for RSS System earthen materials:

Foundation soil:	dense glacial till, phi=36 deg
Reinforced soils:	2-inch Crushed Stone, phi=40 deg
	Gravel Borrow, phi=36 deg
General backfill:	Granular Borrow, phi=34 deg

Parameters for RSS System geosynthetic materials:
(required to achieve satisfactory design)

Geogrid: Tult >= 5,900 lb/ft
polyester
(such as Miragrid 7XT)
2-inch Crushed Stone reinforcing soil
selected to interlock with geogrid and achieve strain compatibility

Geotextile: Tult >= 600 lb/in
woven; polypropylene
(such as Mirafi HP770)
Gravel Borrow reinforcing soil
must be confined by reinforcing geotextile by wrapping to achieve strain compatibility

Long-Term In-Situ reduction factors w/rt geosynthetic strength

Geogrid (polyester)

RFid	installation damage = 2.0
RFd	durability = 1.6
RFc	creep = 2.3

Geotextile (polypropylene)

RFid	installation damage = 2.0
RFd	durability = 1.6
RFc	creep = 4.5

Evaluate RSS section with geosynthetic material spaced 2-foot OC vertically

SUMMARY

1) Analyze Standard RSS Section by way of two models; one for the bottom portion of the slope where geogrid reinforcing geosynthetic and 2-inch crushed stone reinforced soil; and one for the upper portion of the slope where geotextile reinforcing geosynthetic and gravel borrow reinforced soil.

ReSlope runs INI3 and INI5 (output attached); compound failure mode governs; minimum length of reinforcing for geogrid base layer to achieve adequate FS-direct sliding = 15.1 ft; minimum length of reinforcing for geotextile base layer to achieve adequate FS-direct sliding = 12.8 ft

Standard RSS Section adequate (configuration attached)

2) Analyze Special RSS Section by way of one model for the entire slope where geogrid reinforcing geosynthetic and 2-inch crushed stone reinforced soil.

ReSlope runs INI1grid (output attached); compound failure mode governs; minimum length of reinforcing for geogrid base layer to achieve adequate FS-direct sliding = 15.9 ft

Special RSS Section adequate (configuration attached)

PREPARED DETAILS FOR PLAN SET FOR:

1) geotextile wrap

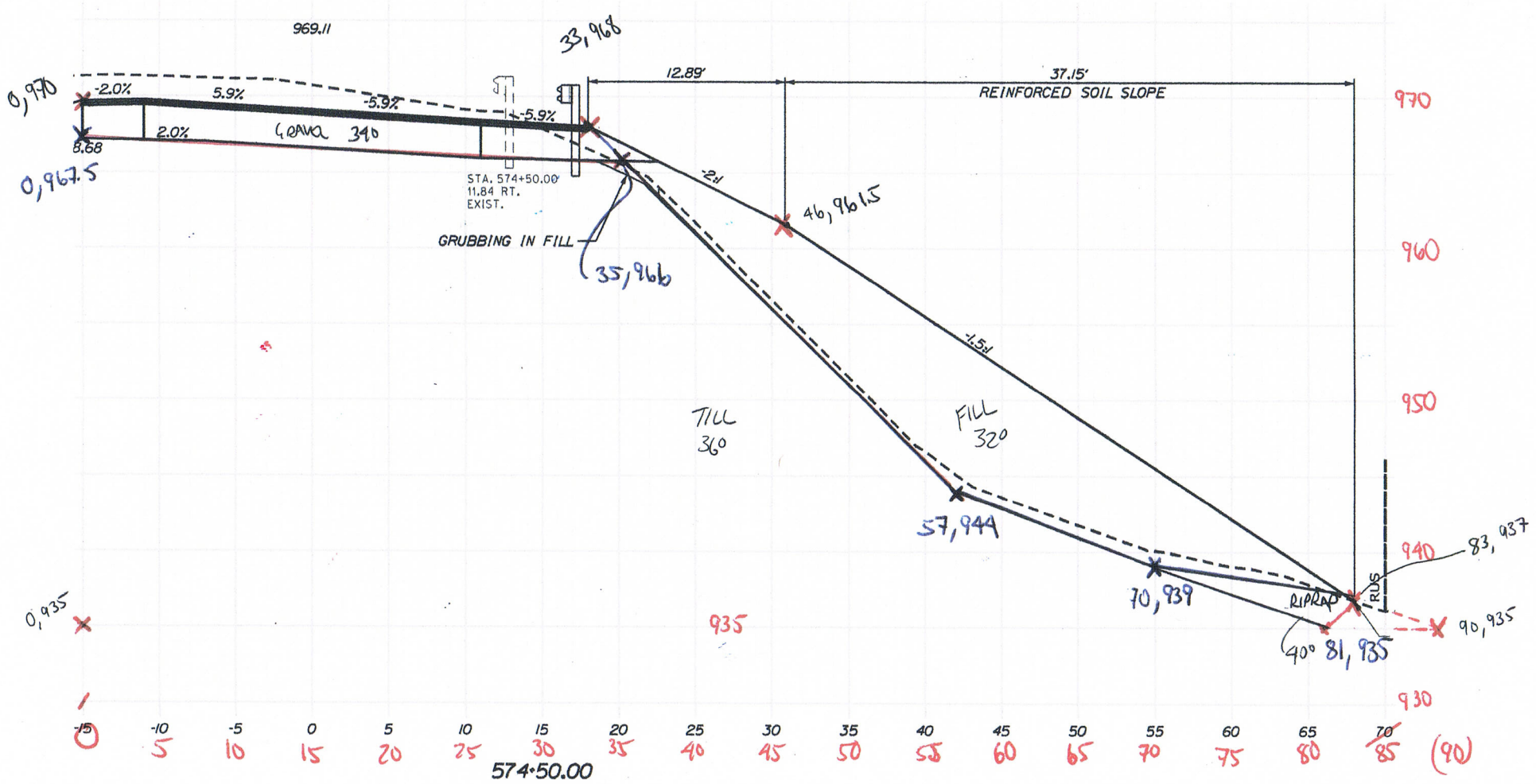
2) toe key and armor

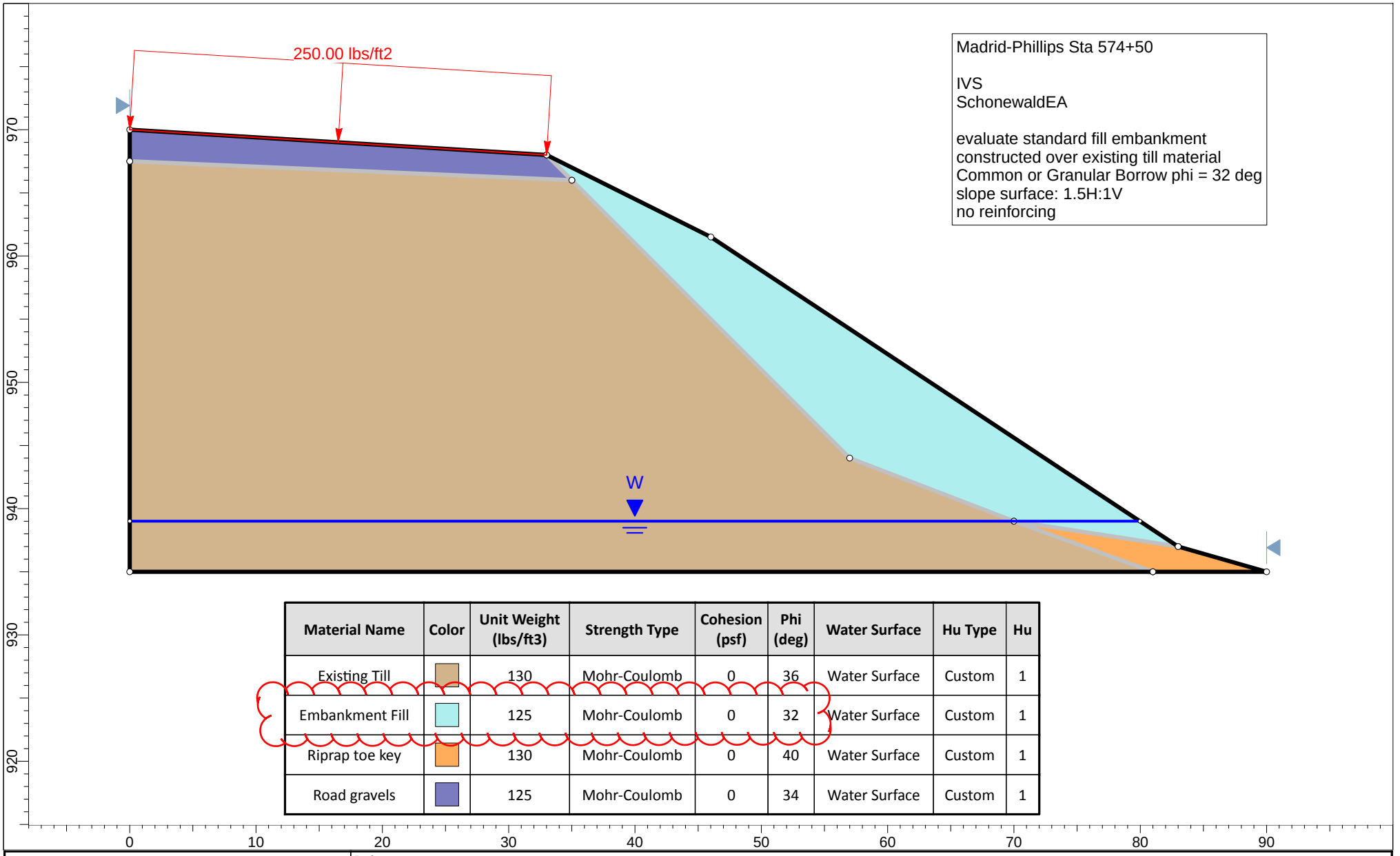
3) Turf Reinforcement Mat facing

4) RSS-specific notes

fill slope stability

1.5H:1V fill embankment along downhill side of Route 4



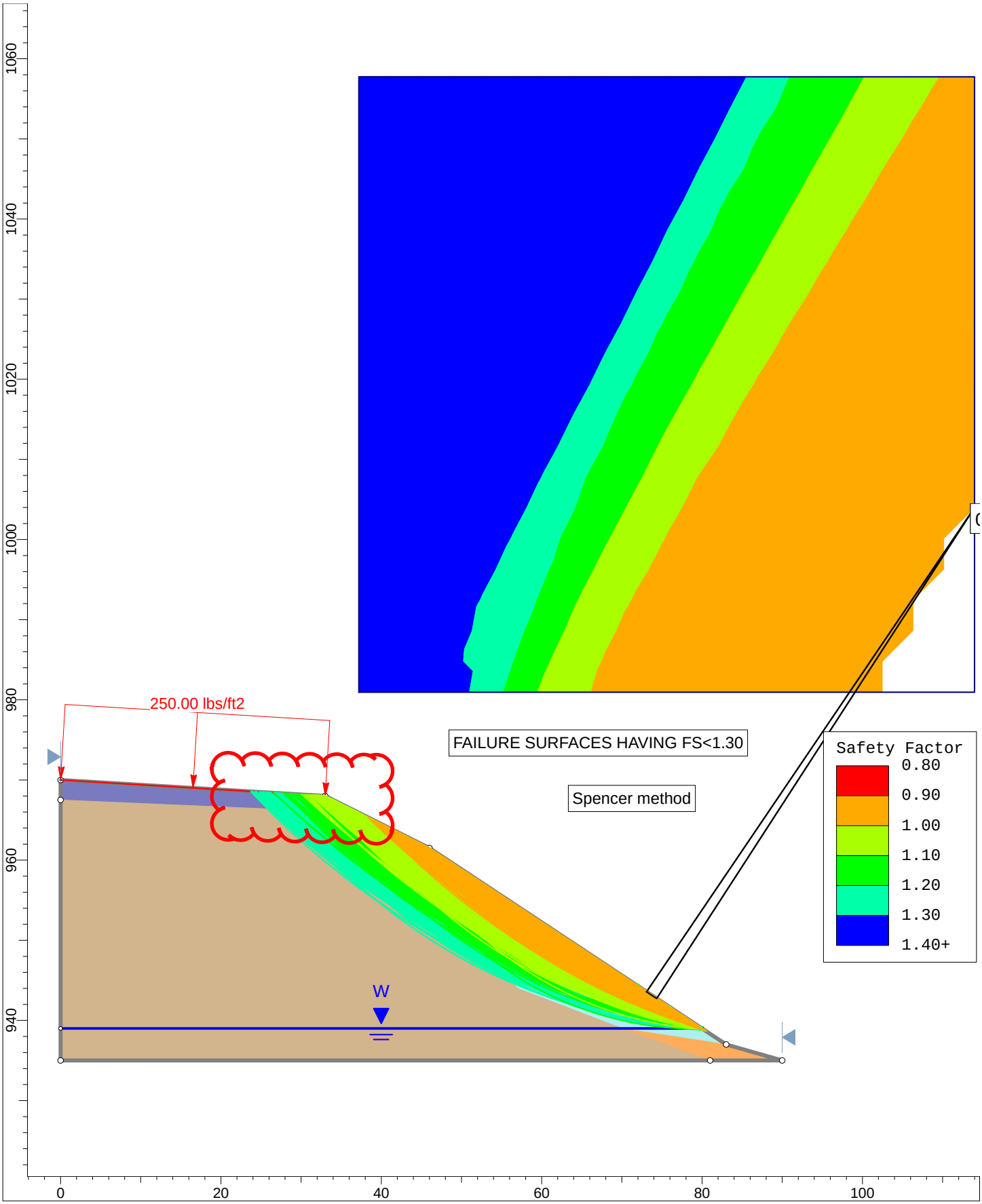


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Existing Till		130	Mohr-Coulomb	0	36	Water Surface	Custom	1
Embankment Fill		125	Mohr-Coulomb	0	32	Water Surface	Custom	1
Riprap toe key		130	Mohr-Coulomb	0	40	Water Surface	Custom	1
Road gravels		125	Mohr-Coulomb	0	34	Water Surface	Custom	1

rocscience

SLIDE 8.021

Project	Madrid-Phillips Sta 574+50		
Analysis Description			
Drawn By	IVS	Scale	1:126
Company	SchonewaldEA		
Date		File Name	C:\Latter 3-5-09\consulting RFPs-projects\MaineDOT\Phillips Madrid 18247-00\hiway geotech\gt report\Slide1.slmd


1060
1040
1020
1000
980
960
940
0
20
40
60
80
100
250.00 lbs/ft2
W
FAILURE SURFACES HAVING FS<1.30
Spencer method
Safety Factor
0.80
0.90
1.00
1.10
1.20
1.30
1.40+

SLIDEINTERPRET 8.021

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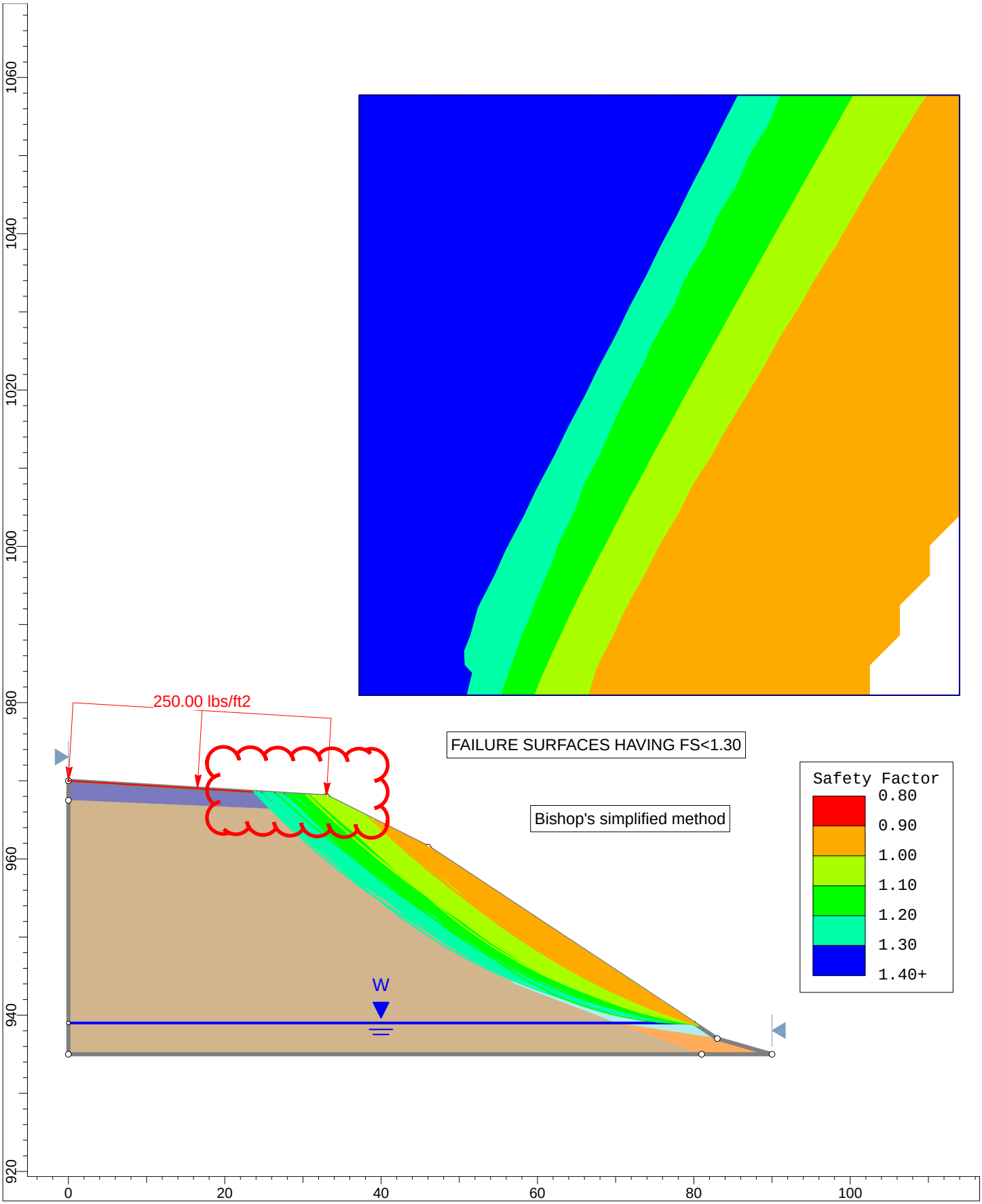
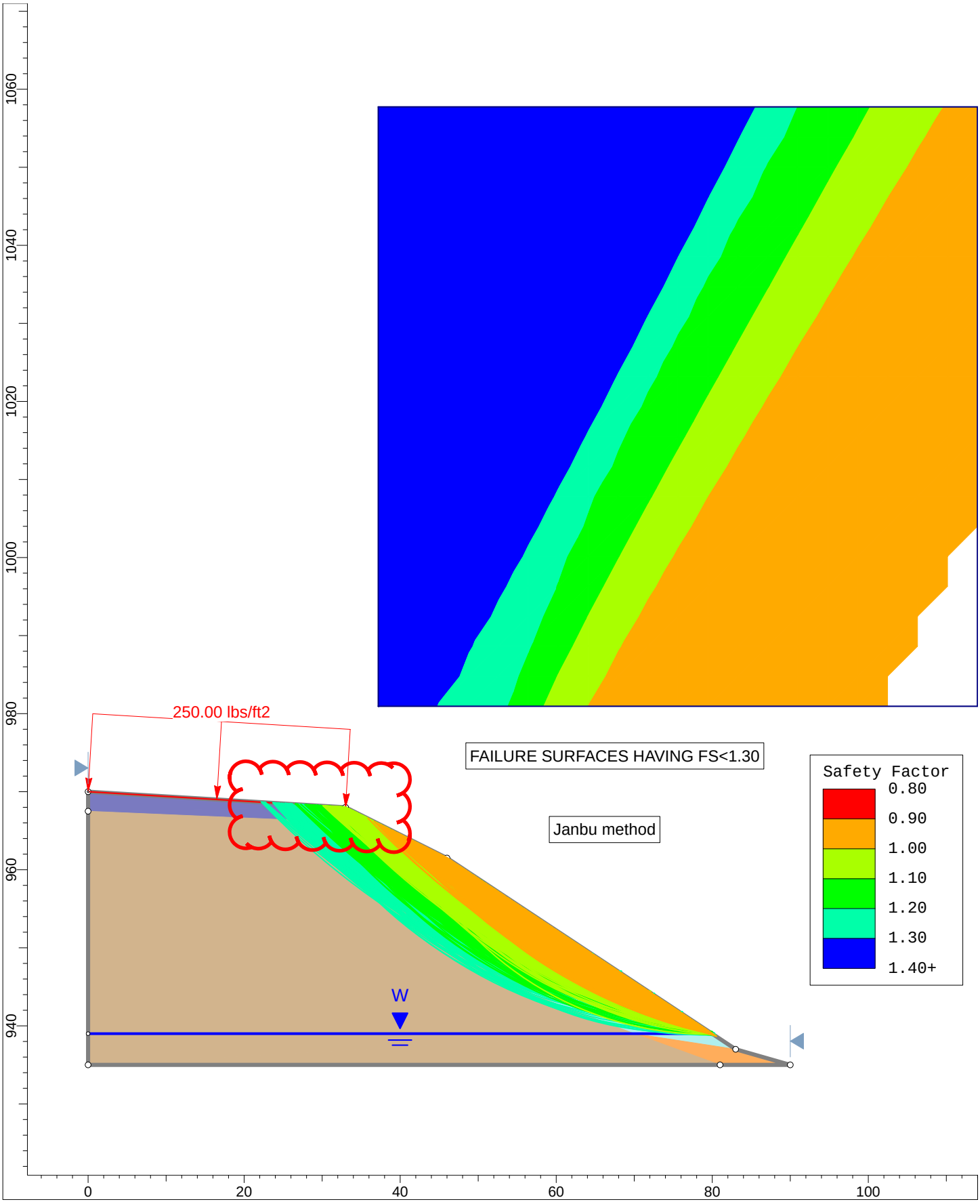
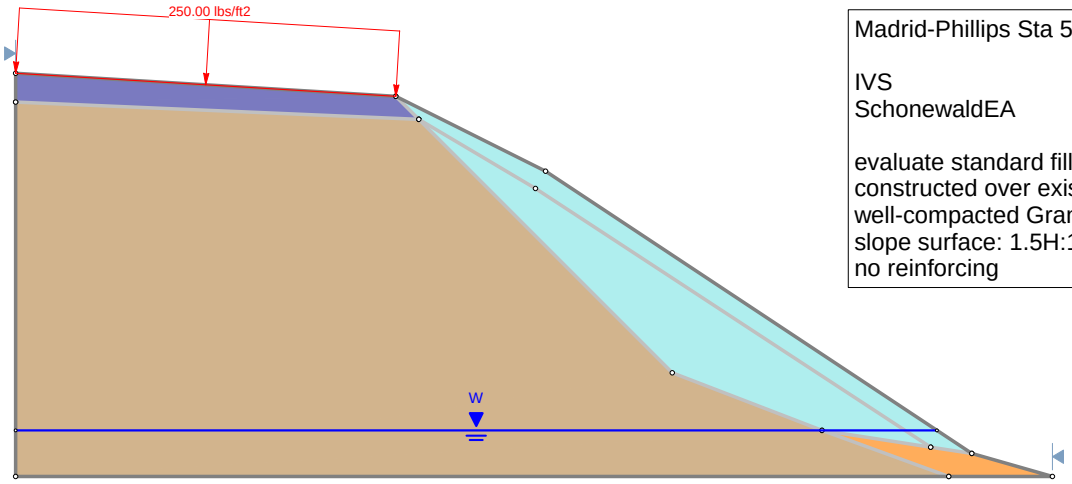


SLIDEINTERPRET 8.021

rocscience



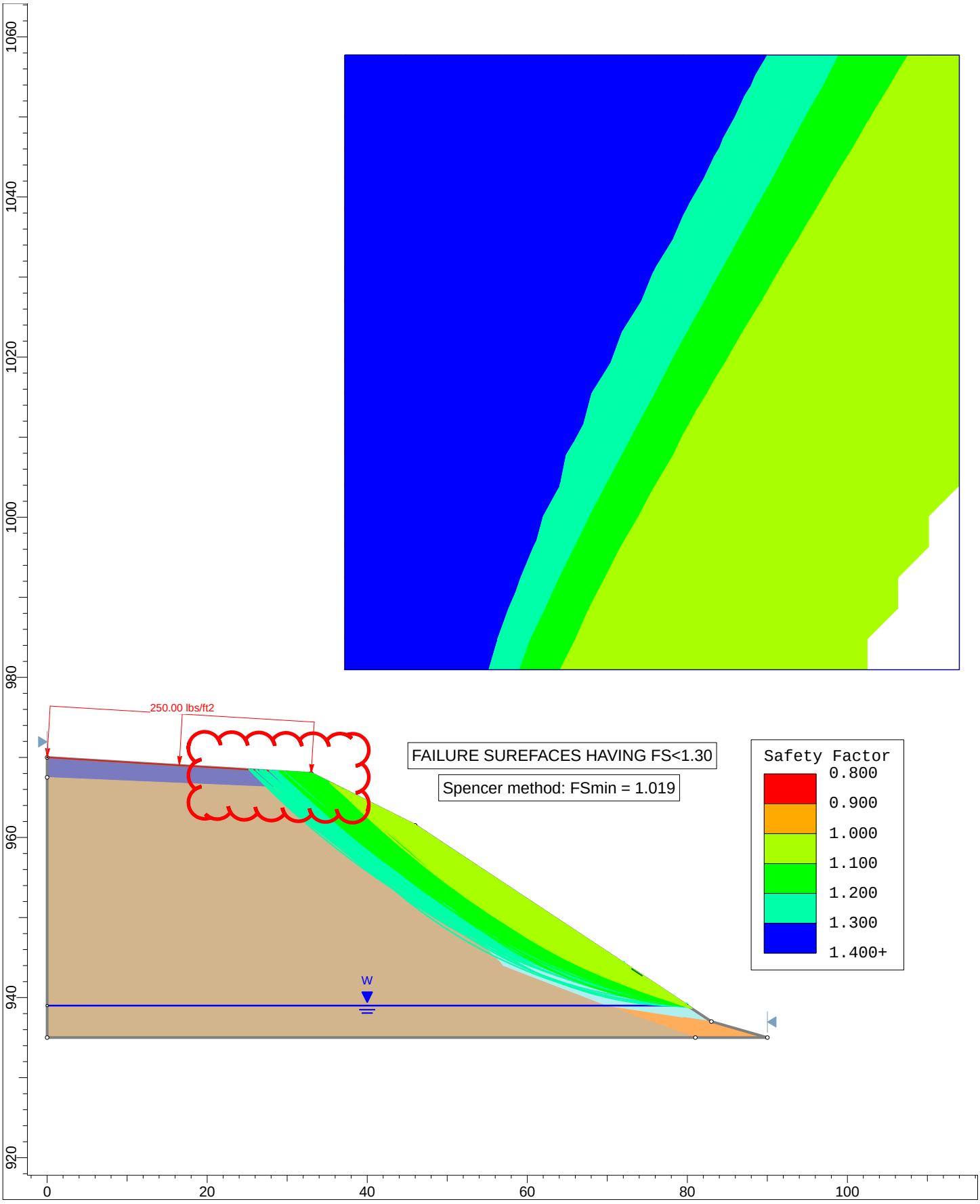


Madrid-Phillips Sta 574+50

IVS
SchonewaldEA

evaluate standard fill embankment
constructed over existing till material
well-compacted Granular Borrow phi = 34 deg
slope surface: 1.5H:1V
no reinforcing

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Existing Till		130	Mohr-Coulomb	0	36	Water Surface	Custom	1
Embankment Fill		125	Mohr-Coulomb	0	34	Water Surface	Custom	1
Riprap toe key		130	Mohr-Coulomb	0	40	Water Surface	Custom	1
Road gravels		125	Mohr-Coulomb	0	34	Water Surface	Custom	1


1060
1040
1020
1000
980
960
940
920
0
20
40
60
80
100
250.00 lbs/ft2
W
FAILURE SUREFACES HAVING FS<1.30
Spencer method: FSmin = 1.019
Safety Factor
0.800
0.900
1.000
1.100
1.200
1.300
1.400+

SLIDEINTERPRET 8.021

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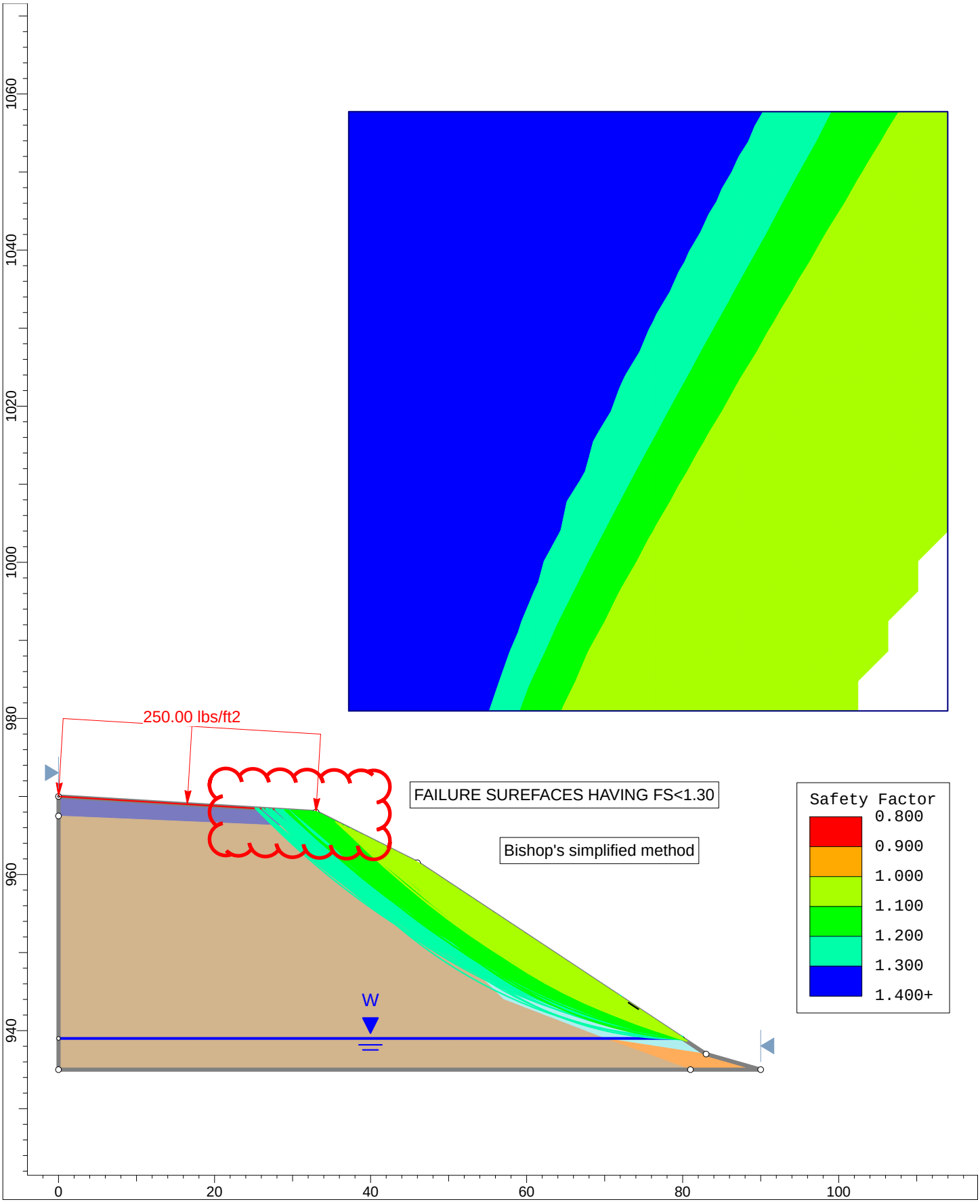

SLIDEINTERPRET 8.021

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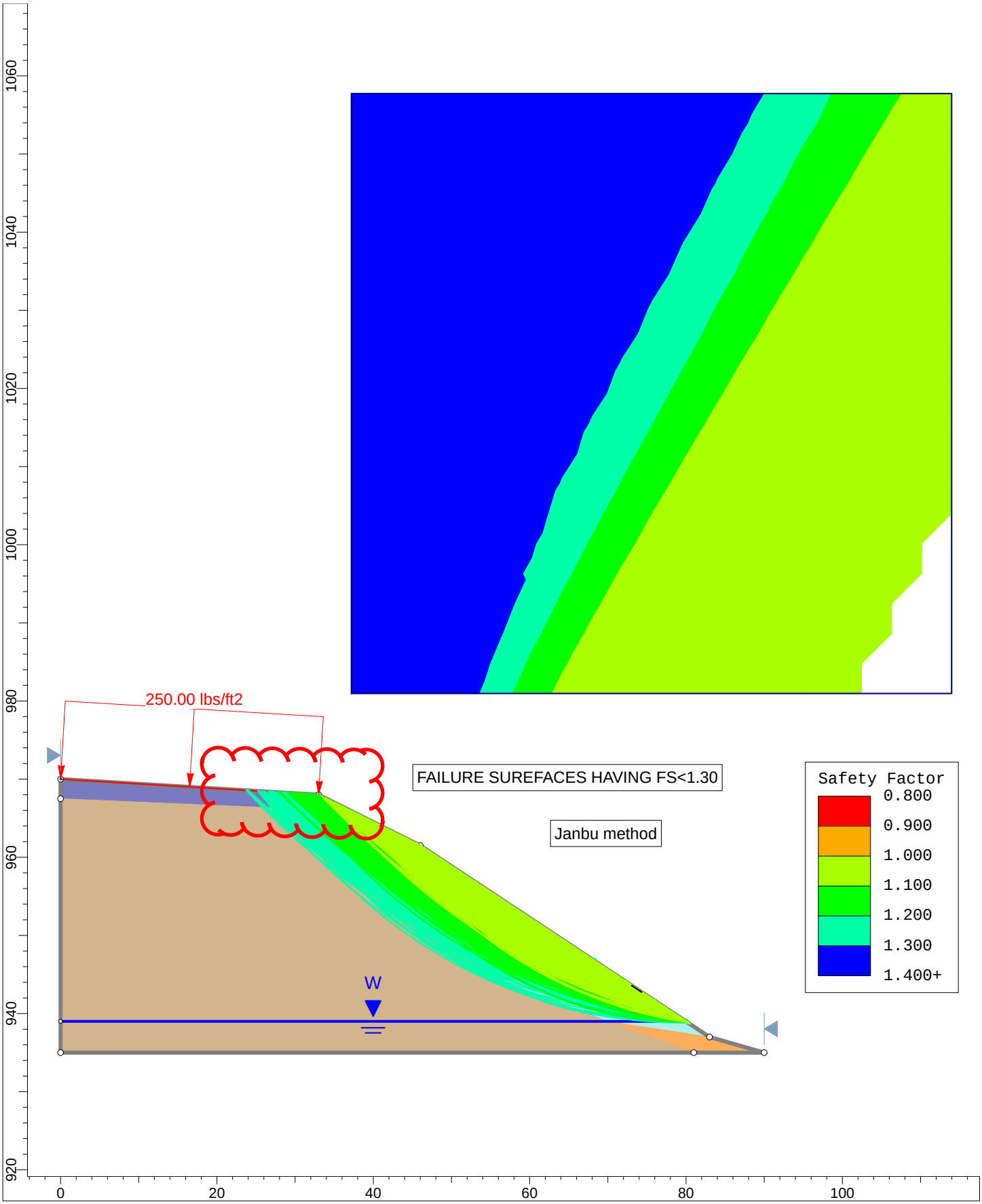

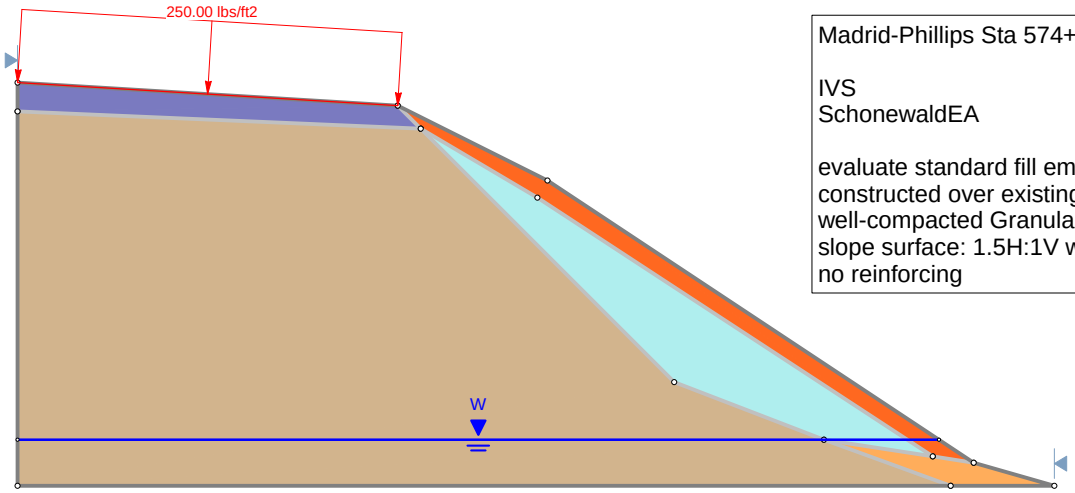

Madrid-Phillips Sta 574+50

IVS
SchonewaldEA

evaluate standard fill embankment
constructed over existing till material
well-compacted Granular Borrow phi = 34 deg
slope surface: 1.5H:1V with riprap surface protection
no reinforcing

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Existing Till		130	Mohr-Coulomb	0	36	Water Surface	Custom	1	
Embankment Fill		125	Mohr-Coulomb	0	34	Water Surface	Custom	1	
Riprap toe key		130	Mohr-Coulomb	0	40	Water Surface	Custom	1	
Road gravels		125	Mohr-Coulomb	0	34	Water Surface	Custom	1	
Riprap Surface		125	Mohr-Coulomb	0	38	None			0

rocscience

SLIDE 8.021

Project	Madrid-Phillips Sta 574+50		
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SLIDEINTERPRET 8.021

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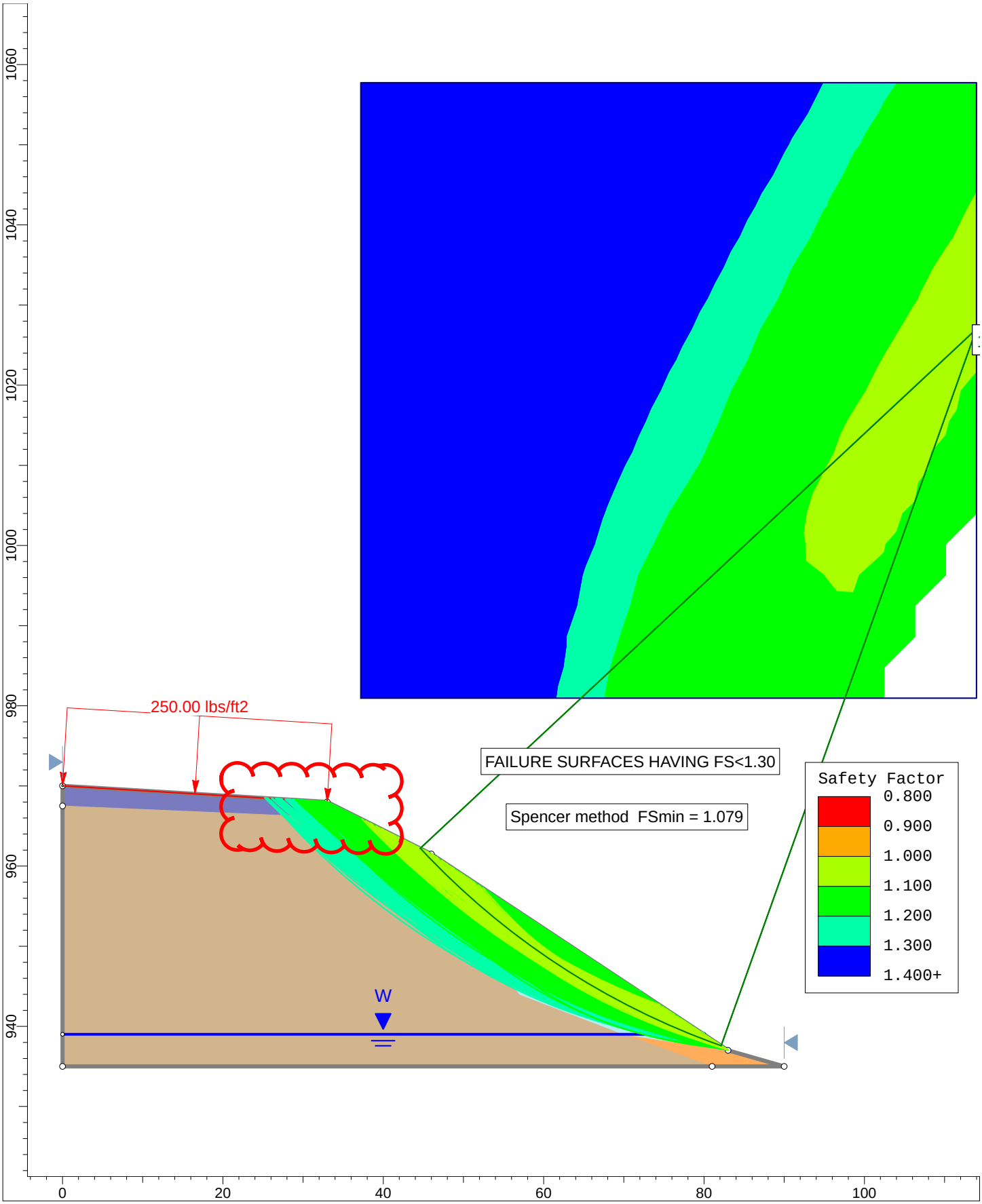

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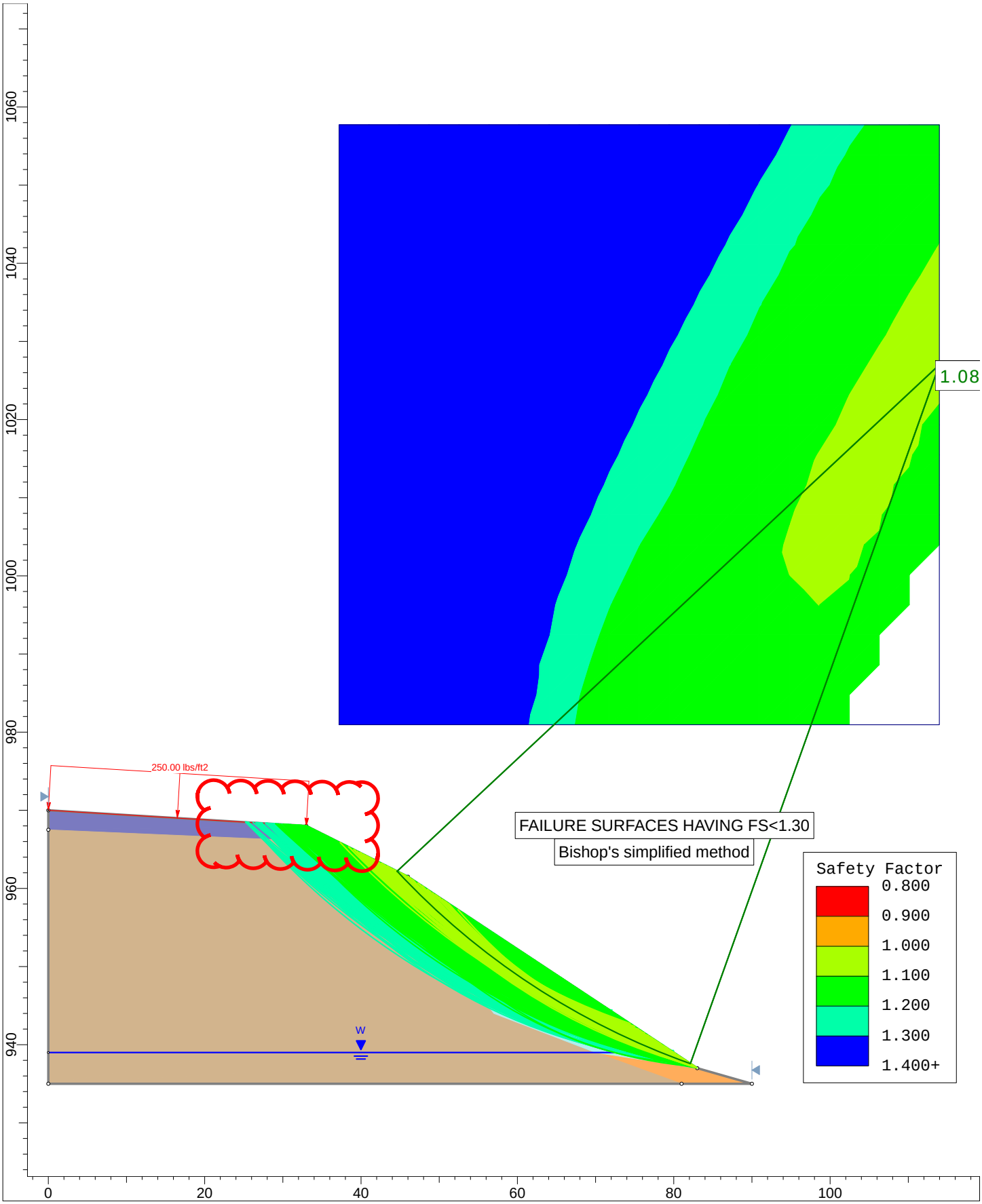

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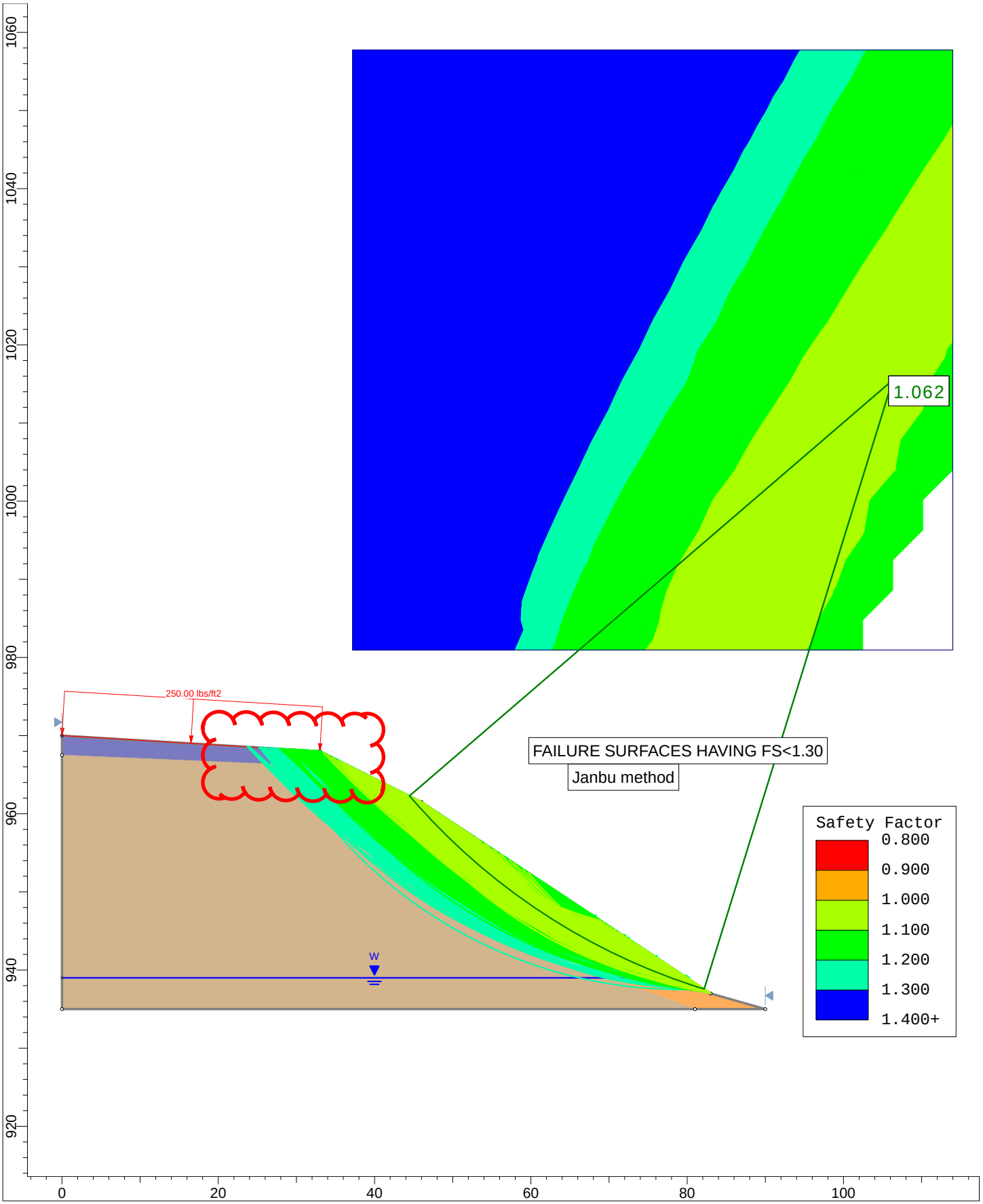
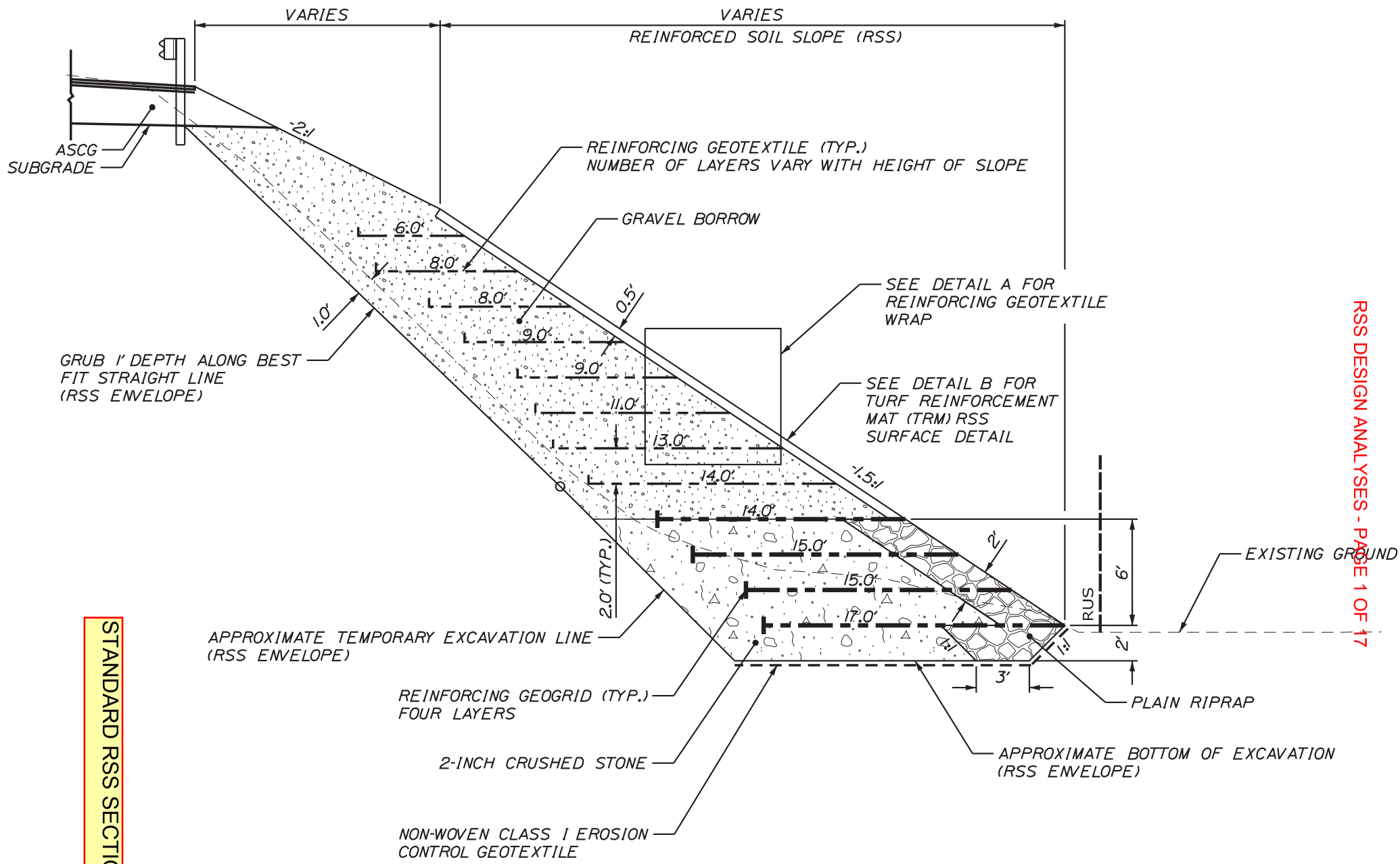
rocscience





STANDARD RSS SECTION

RSS DESIGN ANALYSES - PAGE 1 OF 17

REINFORCED SOIL SLOPE DETAIL

STA. 573+00 RT. TO STA. 575+65 RT.
STA. 576+30 RT. TO STA. 576+70 RT.

STANDARD RSS SECTION- lower portion of RSS with geogrid reinforcing and 2-inch crushed stone reinforced soil

WIN18247 Madrid-Phillips, Rt 4, 574+50 initial (ini3)

PROJECT IDENTIFICATION

Title: WIN18247 Madrid-Phillips, Rt 4, 574+50 initial (ini3)
Project Number: 16-001
Designer: ivs

Description:

RUN ini3: develop initial reinforcing length and spacing requirements; H=27 ft; Tult geogrid=5,900 lb/ft; reinforced soil phi=40 deg., foundation soil phi=36 deg., reinforcement at 2.0 ft. vertical spacing with lowest layer at 0.0 ft depth

File path and name: C:\after 3-5-09\consulting RFPs-projects\MaineDOT\Phill..... .....18247-57450 ini3.NAT

Date and time of creating the input data file: 2/22/17

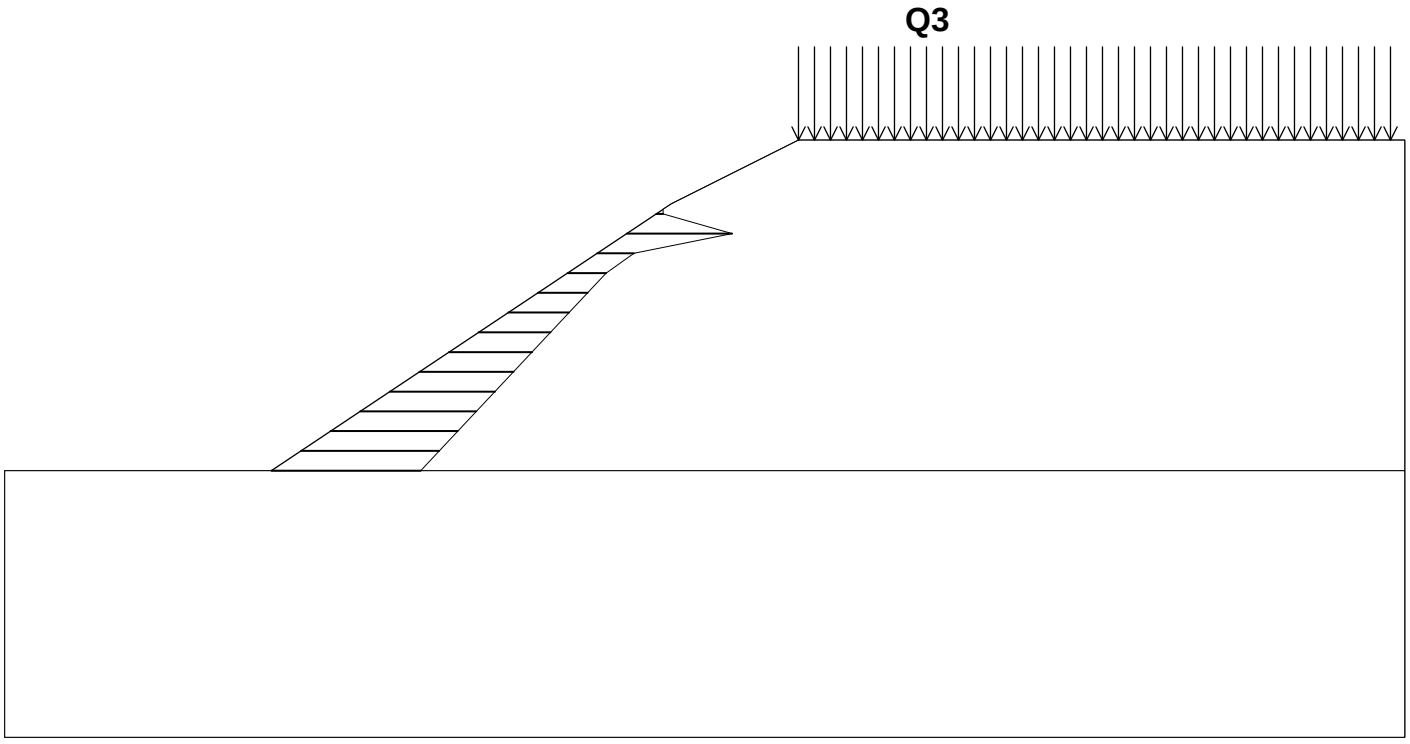
Design Philosophy and Program Developed by:

Dov Leshchinsky, Ph.D.
33 The Horseshoe
Newark, Delaware 19711, USA

GEOMETRY AND LOADING DATA

Height of slope, H [ft]	27.00
Slope angle, i °	33.70
Horizontal length, A [ft]	0.00
Horizontal length, B [ft]	12.90
Backslope angle, β °	26.60
Slope at bottom of wall, α °	0.00
Surcharge load over A, Q1 [lb/ft ²]	0.00
Surcharge load over backslope B, Q2 [lb/ft ²]	0.00
Surcharge load away from backslope, Q3 [lb/ft ²]	250.00

Water is not present.



SCALE:
0 10 20 30[ft]

SOIL DATA

REINFORCED SOIL:	Internal angle of friction, $\phi°$	40.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	135.00
BACKFILL SOIL:	Internal angle of friction, $\phi°$	34.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	120.00
FOUNDATION SOIL:	Internal angle of friction, $\phi°$	36.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	125.00

GENERAL DATA

Assumed angle of interwedge force (direct sliding analysis), $\delta°$	20.00
Pullout interaction coefficient (reinforced soil), Ci	0.90
Pullout interaction coefficient (foundation soil), Ci	0.90
Direct sliding coefficient (along reinforced soil), Cds	1.00
Direct sliding coefficient (along foundation soil), Cds	1.00

Minimum required length at each elevation was specified.

SEISMIC PARAMETERS

Horizontal seismic coefficient, Kh (100% used)	0.00
Vertical seismic coefficient, Kv	0.00

Kh and Kv ARE being applied to the reinforced mass and surcharge in direct sliding analysis.

FOUNDATION EFFECTS

Slip surfaces in tieback and compound analyses are allowed to penetrate the foundation soil.
Bishop's deepseated analysis was invoked and circles may penetrate the
foundation to a maximum depth of [ft] 30.00

GEOSYNTHETIC DESIGN PARAMETERS

(-------- Manual input data --------)

Reduction factor for installation damage, RFid	2.00
Reduction factor for durability, RFd	1.60
Reduction factor for creep, RFc	2.30
Coverage ratio, Rc	1.00

SPECIFIED FORCE ORIENTATION

Relative orientation of reinforcement is prescribed, ROR	0.00

GENERAL SAFETY FACTORS

Factor of safety on soil shear strength	1.30
Factor of safety on geosynthetic strength	1.30
Factor of safety on pullout resistance	1.50
Factor of safety on direct sliding resistance	1.10

SUMMARY OF TIEBACK AND COMPOUND RESULTS

#	Elevation [ft]	Length [ft]	Mode of Failure	Strength: Required, Tr [lb/ft]	Strength: Ultimate, T-ult [lb/ft]	Strength: Long-term (design) T-ltds [lb/ft]	Actual Overall Fs	Status
1	0.00	15.13	Compound	616.64	5900.00	801.63	> 1.30	OK
2	2.00	14.01	Tieback	6.56	5900.00	801.63	122.12	OK
3	4.00	12.89	Tieback	5.92	5900.00	801.63	135.35	OK
4	6.00	11.76	Tieback	5.47	5900.00	801.63	146.59	OK
5	8.00	10.64	Tieback	4.84	5900.00	801.63	165.48	OK
6	10.00	9.52	Tieback	4.37	5900.00	801.63	183.31	OK
7	12.00	8.40	Tieback	3.77	5900.00	801.63	212.86	OK
8	14.00	7.28	Tieback	4.01	5900.00	801.63	199.94	OK
9	16.00	6.16	Tieback	2.44	5900.00	801.63	329.00	OK
10	18.00	5.04	Tieback	1.68	5900.00	801.63	476.88	OK
11	20.00	3.92	Tieback	1.11	5900.00	801.63	723.04	OK
12	22.00	3.73	Tieback	1.32	5900.00	801.63	609.31	OK
13	24.00	10.68	Tieback	0.81	5900.00	801.63	992.53	OK
14	26.00	0.68	Tieback	0.08	5900.00	801.63	10582.95	OK

high factors of safety indicate internal stability is adequate; overall rotational stability controls design as noted for Layer #1

RESULTS OF DIRECT SLIDING AND DEEPSEATED ANALYSES

STANDARD RSS SECTION- lower portion of RSS with geogrid reinforcing and 2-inch crushed stone reinforced soil

DIRECT SLIDING

Required length of bottom layer to produce the
specified Fs-direct sliding = 1.10 is 15.13 ft.
Maximum length based on compound and tieback analyses to ensure
Fs-uncertainties = 1.30 and Fs-pullout = 1.50, is 10.68 ft.
Theta-critical = 37.7 degrees

DEEPSEATED

Global deepseated factor of safety, Fs-deepseated, based on Bishop's analysis, is 1.42.

The critical circle is forced to pass outside the reinforced zone defined by the bottom geosynthetic layer; its maximum potential depth is restricted to 30.00 ft.
The critical circle is at: Xc = 0.81, Yc = 54.00, Radius = 55.86 feet. Number of slices = 50.
In case the crest elevation is above H, ReSlope assumes a tension crack between the crest and H (see graphic screen).

NOTE: To obtain satisfactory Fs-deepseated, re-run ReSlope with a larger specified value of Fs-direct sliding. This will force deeper circles that should yield larger deepseated safety factor.

TIEBACK & COMPOUND

Tieback/compound slip surfaces are not restricted from penetrating the foundation soil.

STANDARD RSS SECTION- upper portion of RSS with geotextile reinforcing and Gravel Borrow reinforced soil

WIN18247 Madrid-Phillips, Rt 4, 574+50 initial (ini5)

PROJECT IDENTIFICATION

Title: WIN18247 Madrid-Phillips, Rt 4, 574+50 initial (ini5)
Project Number: 16-001
Designer: ivs

Description:

RUN ini5: develop initial reinforcing length and spacing requirements; Tult geotextile=600 lb/in; FSmin (deep seated) = 1.3; reinforced soil phi=36 deg., foundation soil phi=40 deg., reinforcement at 2.0 ft. vertical spacing with lowest layer at 0.0 ft of reduced height slope

File path and name: C:\after 3-5-09\consulting RFPs-projects\MaineDOT\Phill..... .....18247-57450 ini5.NAT

Date and time of creating the input data file: 2/22/17

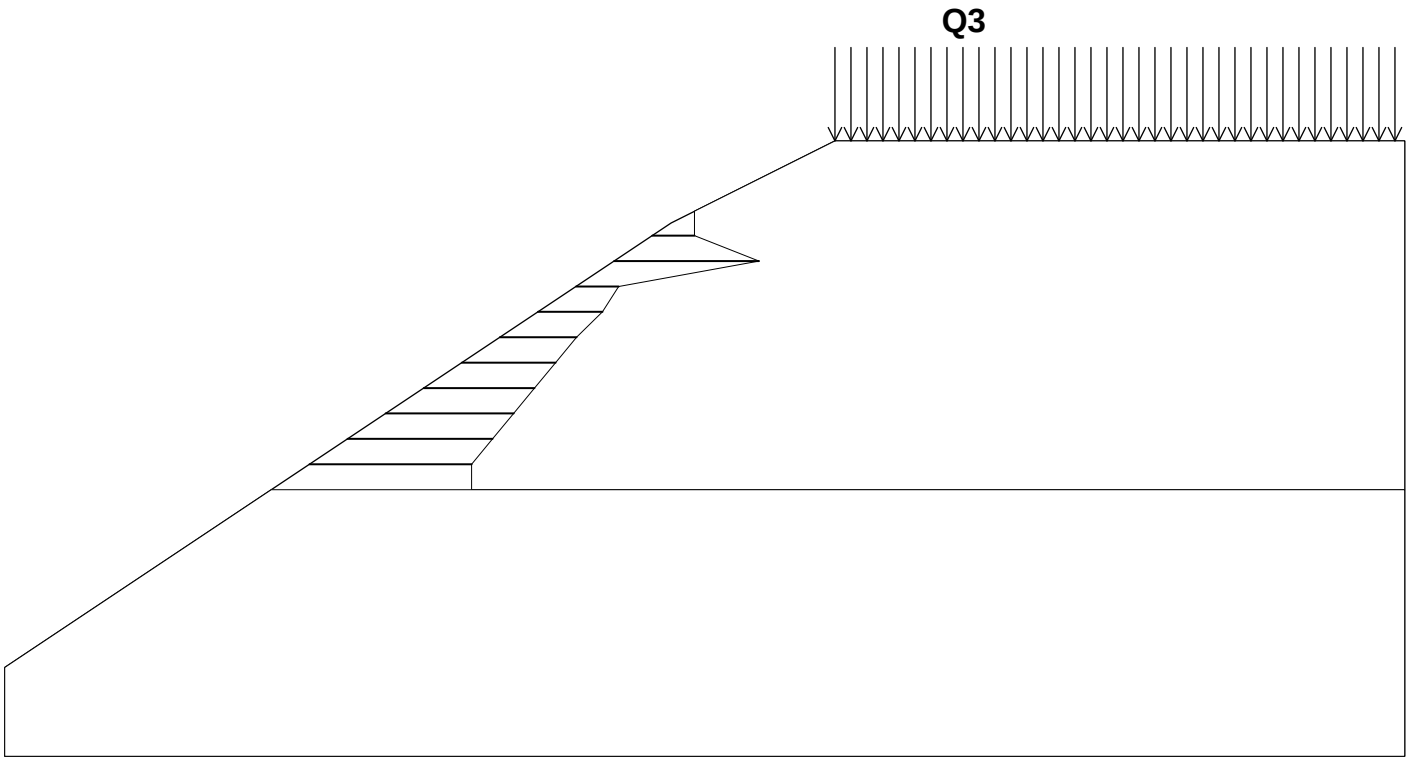
Design Philosophy and Program Developed by:

Dov Leshchinsky, Ph.D.
33 The Horseshoe
Newark, Delaware 19711, USA

GEOMETRY AND LOADING DATA

Height of slope, H [ft]	21.00
Slope angle, i °	33.70
Horizontal length, A [ft]	0.00
Horizontal length, B [ft]	12.90
Backslope angle, β °	26.60
Slope at bottom of wall, α °	33.70
Surcharge load over A, Q1 [lb/ft ^{2}]	0.00
Surcharge load over backslope B, Q2 [lb/ft ^{2}]	0.00
Surcharge load away from backslope, Q3 [lb/ft ^{2}]	250.00

Water is not present.



SCALE:
0 10 20 30 [ft]

SOIL DATA

REINFORCED SOIL:	Internal angle of friction, $\phi°$	37.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	125.00
BACKFILL SOIL:	Internal angle of friction, $\phi°$	34.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	120.00
FOUNDATION SOIL:	Internal angle of friction, $\phi°$	40.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	135.00

GENERAL DATA

Assumed angle of interwedge force (direct sliding analysis), $\delta°$	20.00
Pullout interaction coefficient (reinforced soil), Ci	0.90
Pullout interaction coefficient (foundation soil), Ci	0.90
Direct sliding coefficient (along reinforced soil), Cds	1.00
Direct sliding coefficient (along foundation soil), Cds	1.00

Minimum required length at each elevation was specified.

SEISMIC PARAMETERS

Horizontal seismic coefficient, Kh (100% used)	0.00
Vertical seismic coefficient, Kv	0.00

Kh and Kv ARE being applied to the reinforced mass and surcharge in direct sliding analysis.

FOUNDATION EFFECTS

Slip surfaces in tieback and compound analyses are allowed to penetrate the foundation soil.
Bishop's deepseated analysis was invoked and circles may penetrate the
foundation to a maximum depth of [ft] 6.00

GEOSYNTHETIC DESIGN PARAMETERS

(-------- Manual input data --------)

Reduction factor for installation damage, RFid	2.00
Reduction factor for durability, RFd	1.60
Reduction factor for creep, RFc	4.50
Coverage ratio, Rc	1.00

SPECIFIED FORCE ORIENTATION

Relative orientation of reinforcement is prescribed, ROR	0.00

GENERAL SAFETY FACTORS

Factor of safety on soil shear strength	1.30
Factor of safety on geosynthetic strength	1.30
Factor of safety on pullout resistance	1.50
Factor of safety on direct sliding resistance	1.10

SUMMARY OF TIEBACK AND COMPOUND RESULTS

#	Elevation [ft]	Length [ft]	Mode of Failure	Strength: Required, Tr [lb/ft]	Ultimate, T-ult [lb/ft]	Long-term (design) T-ltds [lb/ft]	Actual Overall Fs	Status
1	2.00	12.77	Compound	384.62	7200.00	500.00	> 1.30	OK
2	4.00	11.43	Compound	384.62	7200.00	500.00	> 1.30	OK
3	6.00	10.08	Tieback	54.33	7200.00	500.00	9.20	OK
4	8.00	8.74	Tieback	46.59	7200.00	500.00	10.73	OK
5	10.00	7.40	Tieback	38.49	7200.00	500.00	12.99	OK
6	12.00	6.05	Tieback	31.04	7200.00	500.00	16.11	OK
7	14.00	5.08	Tieback	36.43	7200.00	500.00	13.73	OK
8	16.00	3.36	Tieback	0.00	7200.00	500.00	729724591	OK15
9	18.00	11.41	Tieback	7.29	7200.00	500.00	68.58	OK
10	20.00	3.34	Tieback	0.89	7200.00	500.00	564.14	OK

high factors of safety indicate internal stability is adequate; overall rotational stability controls design as noted for Layer #1

RESULTS OF DIRECT SLIDING AND DEEPSEATED ANALYSES

STANDARD RSS SECTION- upper portion of RSS with geotextile reinforcing and Gravel Borrow reinforced soil

DIRECT SLIDING

Required length of bottom layer to produce the specified Fs-direct sliding = 1.10 is 12.77 ft.
Maximum length based on compound and tieback analyses to ensure Fs-uncertainties = 1.30 and Fs-pullout = 1.50, is 11.41 ft.
Theta-critical = 37.7 degrees

DEEPSEATED

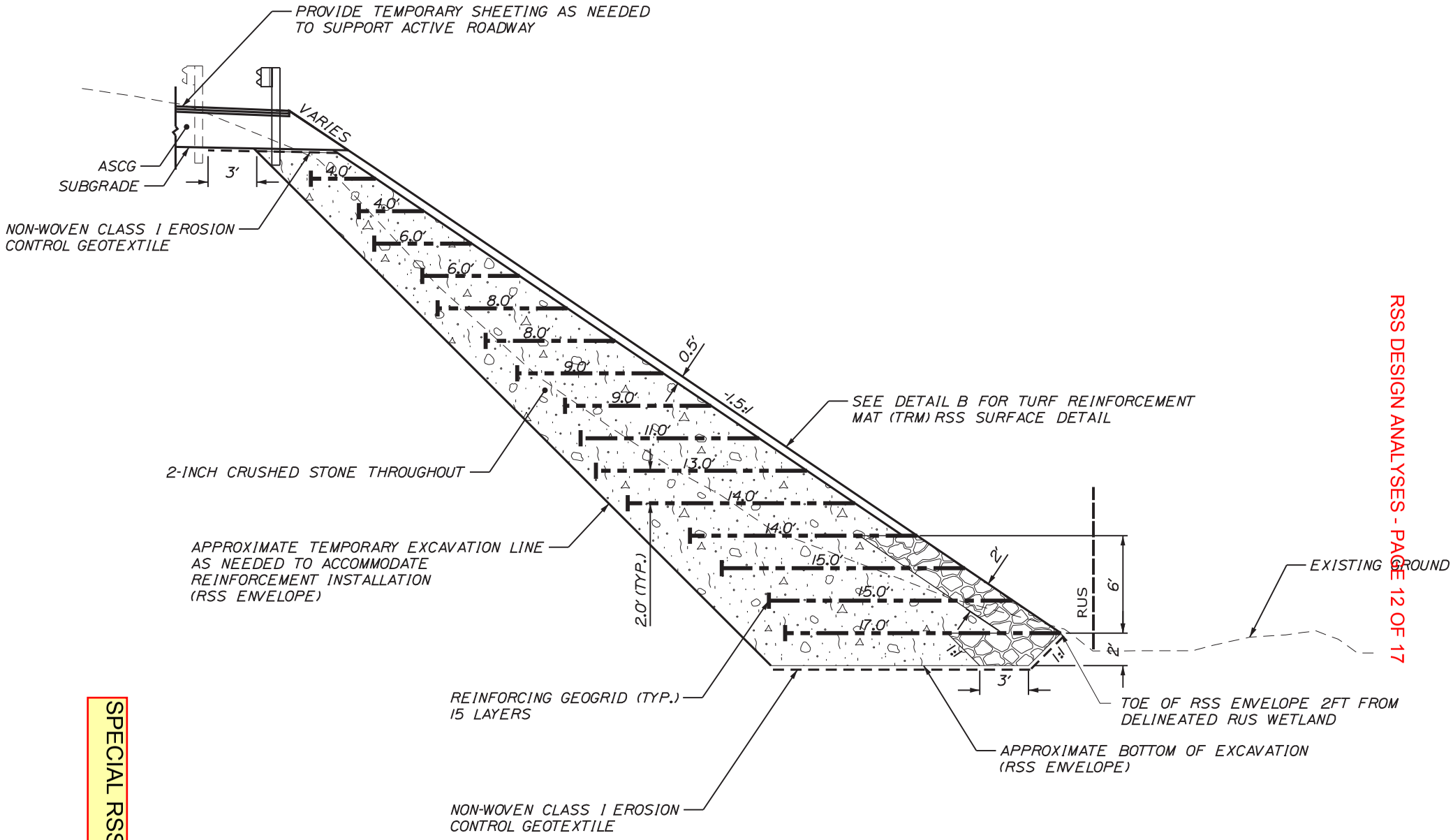
Global deepseated factor of safety, Fs-deepseated, based on Bishop's analysis, is 1.47.

The critical circle is forced to pass outside the reinforced zone defined by the bottom geosynthetic layer; its maximum potential depth is restricted to 6.00 ft.
The critical circle is at: Xc = -2.61, Yc = 42.00, Radius = 45.85 feet. Number of slices = 50.
In case the crest elevation is above H, ReSlope assumes a tension crack between the crest and H (see graphic screen).

NOTE: To obtain satisfactory Fs-deepseated, re-run ReSlope with a larger specified value of Fs-direct sliding. This will force deeper circles that should yield larger deepseated safety factor.

TIEBACK & COMPOUND

Tieback/compound slip surfaces are not restricted from penetrating the foundation soil.



SPECIAL RSS SECTION

SPECIAL REINFORCED SOIL SLOPE DETAIL
STA. 575+65 RT. TO STA. 576+30 RT.

RSS DESIGN ANALYSES - PAGE 12 OF 17

SPECIAL RSS SECTION-
geogrid reinforcing and 2-inch crushed stone reinforced soil

WIN18247 Madrid-Phillips, Rt 4, 576+00 initial (ini1) - grid

PROJECT IDENTIFICATION

Title: WIN18247 Madrid-Phillips, Rt 4, 576+00 initial (ini1) - grid
Project Number: 17-101
Designer: ivs

Description:

RUN ini1: develop initial reinforcing length and spacing requirements; H=33 ft; Tult geogrid=5,900 lb/ft; reinforced soil phi=40 deg. (2" crushed stone), foundation soil phi=36 deg., reinforcement at 2.0 ft. vertical spacing with lowest layer at 0.0 ft depth

File path and name: C:\after 3-5-09\consulting RFPs-projects\MaineDOT\Phill..... .....7-57600 ini1grid.NAT

Date and time of creating the input data file: 7/20/17

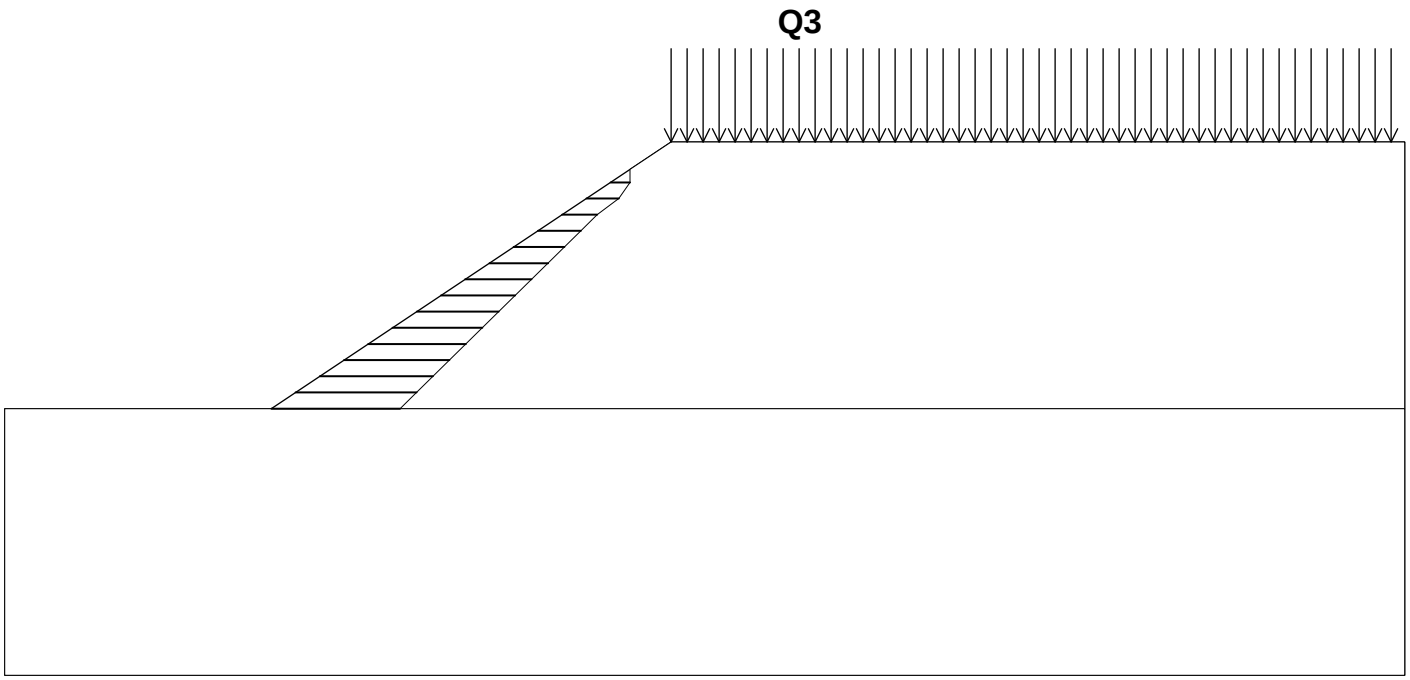
Design Philosophy and Program Developed by:

Dov Leshchinsky, Ph.D.
33 The Horseshoe
Newark, Delaware 19711, USA

GEOMETRY AND LOADING DATA

Height of slope, H [ft]	33.00
Slope angle, i °	33.70
Horizontal length, A [ft]	0.00
Horizontal length, B [ft]	0.00
Backslope angle, β °	0.00
Slope at bottom of wall, α °	0.00
Surcharge load over A, Q1 [lb/ft ²]	0.00
Surcharge load over backslope B, Q2 [lb/ft ²]	0.00
Surcharge load away from backslope, Q3 [lb/ft ²]	250.00

Water is not present.



SCALE:
0 10 20 30 40 50 [ft]

SOIL DATA

REINFORCED SOIL:	Internal angle of friction, $\phi°$	40.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	135.00
BACKFILL SOIL:	Internal angle of friction, $\phi°$	34.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	120.00
FOUNDATION SOIL:	Internal angle of friction, $\phi°$	36.0
	Cohesion, c [lb/ft ^{2}]	0.00
	Moist unit weight, γ [lb/ft ^{3}]	125.00

GENERAL DATA

Assumed angle of interwedge force (direct sliding analysis), $\delta°$	20.00
Pullout interaction coefficient (reinforced soil), Ci	0.90
Pullout interaction coefficient (foundation soil), Ci	0.90
Direct sliding coefficient (along reinforced soil), Cds	1.00
Direct sliding coefficient (along foundation soil), Cds	1.00

Minimum required length at each elevation was specified.

SEISMIC PARAMETERS

Horizontal seismic coefficient, Kh (100% used)	0.00
Vertical seismic coefficient, Kv	0.00

Kh and Kv ARE NOT applied to the reinforced mass and surcharge in direct sliding analysis.

FOUNDATION EFFECTS

Slip surfaces in tieback and compound analyses are allowed to penetrate the foundation soil.
Bishop's deepseated analysis was invoked and circles may penetrate the
foundation to a maximum depth of [ft] 30.00

GEOSYNTHETIC DESIGN PARAMETERS

(-------- Manual input data --------)

Reduction factor for installation damage, RFid	2.00
Reduction factor for durability, RFd	1.60
Reduction factor for creep, RFc	2.30
Coverage ratio, Rc	1.00

SPECIFIED FORCE ORIENTATION

Relative orientation of reinforcement is prescribed, ROR	0.00

GENERAL SAFETY FACTORS

Factor of safety on soil shear strength	1.30
Factor of safety on geosynthetic strength	1.30
Factor of safety on pullout resistance	1.50
Factor of safety on direct sliding resistance	1.10

SUMMARY OF TIEBACK AND COMPOUND RESULTS

#	Elevation [ft]	Length [ft]	Mode of Failure	Strength: Required, Tr [lb/ft]	Strength: Ultimate, T-ult [lb/ft]	Strength: Long-term (design) T-ltds [lb/ft]	Actual Overall Fs	Status
1	0.00	15.94	Compound ✓	616.64	5900.00	801.63	> 1.30 ✓	OK
2	2.00	14.98	Tieback	9.01	5900.00	801.63	88.93	OK
3	4.00	14.01	Tieback	8.52	5900.00	801.63	94.11	OK
4	6.00	13.05	Tieback	8.02	5900.00	801.63	99.95	OK
5	8.00	12.08	Tieback	0.10	5900.00	801.63	8260.27	OK
6	10.00	11.11	Tieback	0.00	5900.00	801.63	116993890	OK).36
7	12.00	10.15	Tieback	0.00	5900.00	801.63	116993890	OK).36
8	14.00	9.18	Tieback ✓	17.60	5900.00	801.63	45.54	OK
9	16.00	8.21	Tieback	0.00	5900.00	801.63	116993890	OK).36
10	18.00	7.25	Tieback	14.91	5900.00	801.63	53.76	OK
11	20.00	6.28	Tieback	0.00	5900.00	801.63	116993890	OK).36
12	22.00	5.31	Tieback	9.97	5900.00	801.63	80.40	OK
13	24.00	4.35	Tieback	0.00	5900.00	801.63	116993890	OK).36
14	26.00	4.02	Tieback	2.28	5900.00	801.63	351.29	OK
15	28.00	2.42	Tieback	15.08	5900.00	801.63	53.15	OK

high factors of safety indicate internal stability is adequate; overall rotational stability controls design as noted for Layer #1

RESULTS OF DIRECT SLIDING AND DEEPSEATED ANALYSES

SPECIAL RSS SECTION- geogrid reinforcing and 2-inch crushed stone reinforced soil

DIRECT SLIDING

Required length of bottom layer to produce the
specified Fs-direct sliding = 1.10 is 15.94 ft.
Maximum length based on compound and tieback analyses to ensure
Fs-uncertainties = 1.30 and Fs-pullout = 1.50, is 4.36 ft.
Theta-critical = 38.7 degrees

DEEPSEATED

Global deepseated factor of safety, Fs-deepseated, based on Bishop's analysis, is 1.37.

The critical circle is forced to pass outside the reinforced zone defined by the bottom
geosynthetic layer; its maximum potential depth is restricted to 30.00 ft.
The critical circle is at: Xc = 3.85, Yc = 49.50, Radius = 50.96 feet. Number of slices = 50.
In case the crest elevation is above H, ReSlope assumes a tension crack between the
crest and H (see graphic screen).

NOTE: To obtain satisfactory Fs-deepseated, re-run ReSlope with a larger specified
value of Fs-direct sliding. This will force deeper circles that should yield
larger deepseated safety factor.

TIEBACK & COMPOUND

Tieback/compound slip surfaces are not restricted from penetrating the foundation soil.

SCHONEWALD ENGINEERING ASSOCIATES, INC.

APPENDIX E

SPECIAL PROVISIONS

SPECIAL PROVISION
SECTION 613
(Turf Reinforcement Mat)

Supplement SECTION 613 - EROSION CONTROL BLANKETS with the following:

613.01 Description This work shall consist of furnishing and placing a Turf Reinforcement Mat (TRM) that is in reasonably close conformity with the locations called for on the Plans or as authorized. TRM shall be installed over a prepared Compost Blanket and subsequently seeded by hydraulically applying Flexible Growth Medium (FGM) and seed mix as set forth in Special Provisions 615 and 618, respectively.

613.02 Materials TRM shall be Enkamat® 7020, Futerra® 7020, or an approved equivalent permanent Turf Reinforcement Mat. The TRM shall be made from 100% synthetic material and contain no biodegradable or photodegradable components or materials.

The TRM shall be a homogeneous, three-dimensional matrix made of continuous monofilament yarns which are thermally fused at the crossover points to provide a structure that will maintain its three-dimensional stability without laminated or stitched layers. No nettings or stitching shall be permitted. The TRM shall have a sufficient Area Holding Capacity and a minimum 95% open space available for soil, FGM and root interaction. The TRM shall not lose its structural integrity and shall not unravel or separate when TRM is cut in the field.

The TRM shall exhibit no buoyancy factor (i.e., the specific gravity of the fibers used should be greater than 1.0) to allow the TRM to maintain intimate contact with the soil (particularly between fasteners) under low flow or submerged conditions.

The TRM shall meet the following property values:

PROPERTY	TEST METHOD	MINIMUM AVERAGE ROLL VALUE (MARV)
Mass Per Unit Area	ASTM D6566	11 oz/yd^2
Thickness	ASTM D6525	0.6 in
Tensile Strength - MD	ASTM D6818	175 lb/ft
UV Resistance (2000 hours)	ASTM D6818 & D7238	80.0 %
Resiliency	ASTM D6524	80.0 %
Functional Longevity[1]	Observed	> 36 months

1. Functional longevity is an estimate of product functionality and is dependent upon moisture, light, microbial and other environmental conditions.

613.031 Delivery, Storage, and Handling Deliver materials and products in UV and weather-resistant factory-labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations. Handle such that soil does not fill, clog, or otherwise reduce the infill area intended for the FGM.

613.04 Seeding Seeding shall be in accordance with Special Provision 618 and shall be done after the TRM is in place and accepted.

613.041 Surface Preparation The TRM substrate shall be Compost Blanket installed in accordance with Special Provision 615 and accepted. The surface to receive the TRM shall be prepared to relatively smooth conditions and free of obstructions, rocks, dirt clods, roots, stumps, depressions, debris, and soft or yielding areas. Erosion features such as rills, gullies, etc. shall be graded out of the surface and replaced with compost blanket before TRM deployment. The surface shall be proofrolled with a static smooth-drum compactor before deploying TRM to ensure the TRM makes intimate contact with the soil and to ensure that the soil has been lightly compacted. Overcompaction shall be avoided.

613.05 Installation The TRM shall be installed in general conformance with the manufacturer's instructions unless otherwise specified on the Plans or herein. On slopes, the long dimension of the TRM shall be aligned with the direction of water flow (down the fall line). Adjacent sheets of TRM shall overlap a minimum of 4 inches with the upslope sheet lapped over the downslope sheet. Anchor devices (pins or staples) shall be installed at the minimum frequency of 2-1/2 anchors per square yard. Seams between sheets of TRM shall be anchored at 1-foot centers. The TRM shall extend a minimum of 8 feet past the crest of the steep slope and be anchored with additional staples/pins (maximum spacing of 1-foot on center); no anchor trench shall be cut. Care shall be taken during installation to avoid damage occurring to the TRM or the TRM becoming clogged because of the installation process. Should the TRM become damaged or clogged during installation, a TRM patch shall be placed over the damaged area extending 3 feet beyond the perimeter of the damage and secured with multiple anchor devices as approved by the Resident.

613.08 Method of Measurement TRM will be measured by the Square Yard based upon the in-place area of TRM installed and accepted.

613.09 Basis of Payment TRM of the type specified will be paid for at the contract unit price per Square Yard complete in place and accepted. Subgrade preparation, lap and scrap, and anchoring devices will be considered incidental to the contract unit price of TRM.

Payment will be made under:

	Pay Item	Pay Unit
613.40	Turf Reinforcement Mat (TRM)	Square Yard

SPECIAL PROVISION
SECTION 615 - LOAM
(Compost Blanket)

Supplement SECTION 615 - LOAM with the following:

615.01 Description This work shall consist of furnishing and placing a 50% compost / 50% loam mix pneumatically to create a uniform fill blanket (Compost Blanket) that is in reasonably close conformity with the thicknesses and locations called for on the Plans or as authorized.

615.02 Materials Loam for the Compost Blanket shall meet the requirements set forth in Standard Specification Sections 615 and 717.09. Compost for the Compost Blanket shall meet the following requirements:

Compost shall be produced by the aerobic (biological) and biochemical decomposition of source separated organic materials. Compost shall be derived from a mixture of the following feedstock materials:

1. Green material consisting of chipped, shredded, or ground vegetation, or clean processed recycled wood products (MaineDEP Type IA, IB)
2. Biosolids (MaineDEP Type II)
3. Manure
4. Mixed food waste (MaineDEP Type 1B, IC)

Compost shall not be derived from mixed municipal solid waste and must be reasonably free of visible contaminates. Compost shall not contain paint, petroleum products, pesticides, industrial residuals or any other chemical residues harmful to animal life or plant growth. Compost shall not possess objectionable odors. The compost shall be produced at a licensed facility as specified under the State of Maine Department of Environmental Protection Chapter 410: Composting Facilities that regulates Solid Waste Facilities. If exempt from State permitting requirements, the composting facility shall certify that it follows guidelines and procedures for production of compost meeting the environmental standards of Chapter 410.

Compost shall meet the following parameters:

Parameter	Requirement	Parameter	Requirement
Acidity range	5.5 pH to 8.5 pH	Total Nitrogen	<1.7%
Moisture content	30-60 % wet weight basis	Organic N	<1.5%
Organic content	25-65 % dry weight basis	Total Phosphorous	<1.0%
Particle Size	100% passing 3 inch 90-100% passing 1 inch 65-100% passing 3/4 inch 0-75% passing ¼ inch	Total Potassium	<0.5%
Physical Contaminant	<1 % (dry weight basis)		
Soluble Salts	5.0 max m mh os/cm		
Carbon: Nitrogen Ratio	15-25:1		

Maturity Test: The finished compost must be tested and classified as "Very Mature" by one of the following methods.

Method	Units	Very Mature	Mature	Immature
Oxygen Uptake Rate (OUR Test)	O_2 / unit TS / hr	< 0.4	0.4 - 1.3	> 1.3
Specific Oxygen Uptake Rate (SOUR Test)	O_2 / unit BVS / hr	< 0.5	0.5 - 1.5	> 1.5
Dewar Self-Heating Test	Temp. rise (°C)	< 10	10 - 20	> 20
Solvita Test	Index value	7 - 8	5 – 6	< 5

Compost shall conform to all applicable specification requirements prior to its final placement on the project. The practice of culling deleterious or out-of-specification material after placement and/or grading in place will not be allowed.

615.021 Submittal Requirements The Contractor shall provide MaineDOT with a 5-gallon compost sample and documentation from the compost supplier of the following information:

1. The source(s) of compost.
2. Laboratory results that show that the compost delivered to the project meets the compost parameters listed above. An independent Seal of Testing Assurance (STA) Program certified laboratory shall perform the analysis.
3. Compost supplier references documenting that they are fully permitted by the MaineDEP to produce compost.

615.03 Preparing Areas All slopes and other areas where the compost blanket is to be placed shall be shaped to the required grade.

Areas of the project to receive Compost Blanket shall be uniformly graded and shall be free of obstructions, rocks, clods, roots and soft or low-density pockets of material that could result in the concentration of surface water drainage. This may require hand raking to meet this standard. Prior to placing compost, the slopes shall be scarified or roughened by tracking or rolling with a static sheepsfoot roller to ensure a stable bond between the subgrade and overlying Compost Blanket.

615.04 Placing Compost Blanket The Compost Blanket material (50% compost / 50% loam mix) shall be placed in the locations shown in the Plans. Compost Blanket shall be placed by the Contractor by mechanical means such as a spreader unit (e.g., bulldozer or manure spreader) or pneumatic blower. Unless otherwise directed by the Resident, the Compost Blanket shall be spread to the uniform final thickness of 6 inches over the Reinforced Soil Slope (RSS) or 3 inches elsewhere after light compaction. Compost shall be spread in a manner as to establish a reasonably loose and friable bedding layer for the Turf Reinforcement Mat (TRM). To insure adequate finished density, the compost shall be rolled with a 100 pound roller or other approved means after spreading with one of the aforementioned methods.

615.041 Maintenance and Inspections The Contractor shall maintain the installed Compost Blanket weekly and before and after storm events until the TRM is installed and seeded and vegetative cover is fully established. The Contractor shall maintain the Compost Blanket by repairing all damaged areas and by correcting all shifting of the blanket due to wind, water, or other causes.

615.05 Method of Measurement Compost Blanket (50% compost / 50% loam mix) will be measured by the Cubic Yard complete in place after finishing to the required depths as shown on the Plans or directed. Lateral measurements will be parallel with the slope of the ground.

615.06 Basis of Payment Compost Blanket will be paid for at the contract unit price per Cubic Yard, in place and accepted.

Payment will be made under:

	Pay Item	Pay Unit
615.081	Compost Blanket	Cubic Yard

SPECIAL PROVISION
SECTION 618 - SEEDING
(Hydraulically Applied Flexible Growth Medium and Special Seed Mix)

Supplement SECTION 618 - SEEDING with the following:

618.01 Description: This work shall consist of furnishing and installing by hydraulic application Flexible Growth Medium (FGM) and Special Seed Mix on prepared TRM and Compost Blanket surfaces as indicated on the Plans.

618.02 Materials:

Turf Reinforcement Mat (TRM) shall be as specified in Special Provision 613 and Compost Blanket shall be as specified in Special Provision 615.

FGM shall be composed of long strand thermally refined wood fibers, crimped interlocking man-made fibers, and performance-enhancing additives. The FGM shall be installed by hydraulic application and shall not require a curing period. The FGM shall infill and form an intimate bond with the seed, TRM, and Compost Blanket surface to create a continuous, porous, absorbent and flexible erosion resistant blanket that allows for rapid germination and accelerated plant growth.

The FGM shall be compatible with the approved TRM.

The FGM shall have the following composition:

COMPOSITION	
Thermally Processed Wood Fibers	74.5% ± 3.5%
Proprietary Crosslinked Hydro-Colloid Tackifiers and Activators	10% ± 1%
Proprietary Crimped, Interlocking Fibers	5% ± 1%
Moisture Content	10.5% ± 1.5%

The FGM shall meet the following requirements:

PROPERTY*	**TEST METHOD**	**REQUIREMENT**
PHYSICAL		
Mass Per Unit Area	ASTM D6566[1]	11.6 oz/yd[2]
Thickness	ASTM D6525[1]	.22 in
% Ground Cover	ASTM D7367[1]	99%
Water Holding Capacity	ASTM D7367	1700%
Cure Time	Observed	≤ 2 hr
Color (fugitive dye)	Observed	Green

PROPERTY*	TEST METHOD	REQUIREMENT
ENDURANCE		
Functional Longevity[2]	Observed	≤ 18 months
PERFORMANCE		
Cover Factor[3] (6 in/hr event)	ASTM D7101[1]	0.01
% Effectiveness[4]	ASTM D7101[1]	≥ 99%
Cover Factor[3]	Large Scale[5]	≤ 0.01
% Effectiveness[4]	Large Scale[5]	≥ 99.0%
Vegetation Establishment	ASTM D7322[1]	≥ 800%

* When uniformly applied at a rate of 3,500 pounds per acre under laboratory conditions.

1. ASTM test methods developed for Rolled Erosion Control Products and have been modified to accommodate hydraulically applied Erosion Control Products.
2. Functional longevity is an estimate of product functionality and is dependent upon moisture, light, microbial and other environmental conditions.
3. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
4. % Effectiveness = One minus Cover Factor multiplied by 100%.
5. Large scale testing conducted at Utah Water Research Laboratory.

A Special Seed Mix shall be used on the TRM slope portions of this project. The Special Seed Mix shall be used in conjunction with a Turf Reinforcement Mat (TRM) and a hydraulically applied Flexible Growth Medium (FGM) in accordance with this Special Provision, and shall consist of seed proportioned percent by weight as follows:

% of Mix (by weight)	Latin Name	Common Name
10	Agrostis perennans	Autumn Bentgrass
0.1	Asclepias syriaca	Common Milkweed
0.1	Aster laevis	Smooth Aster
0.1	Aster novae-angliae	New England Aster
0.1	Aster novi-belgii	New York Aster
12	Elymus canadensis	Canada Wildrye
10	Festuca ovina	Sheep fescue
10	Festuca rubra	Creeping Red Fescue
0.1	Geum canadense	White Avens
15	Lolium multiflorum	Annual Ryegrass
10	Lolium perenne	Perennial Ryegrass
1.1	Lupinus perennis	Perennial Lupine
0.1	Monarda fistulosa	Wild Bergamot
10	Panicum clandestinum	Deertongue
5	Panicum virgatum NJ	Switchgrass
5	Panicum virgatum xeric ecotype	Switchgrass
0.1	Pycnanthemum tenuifolium	Narrow Leaf Mountain Mint
10	Schizachyrium scoparium	Little Bluestem
0.1	Solidago bicolor	White Goldenrod
0.1	Solidago juncea	Early Goldenrod
1	Trifolium repens	White Clover
100	**TOTAL**	

All seed shall be certified as to mixture, germination, purity and live seed. Each variety shall conform to the following:

A. Percent germination > 80%
B. Pure Live Seed > 85%
C. Percent Purity >85%
D. Weed seed <1%
E. All seed shall be from the current year's crop.

618.021 Delivery, Storage, and Handling Deliver materials and products in UV and weather-resistant factory-labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures, and construction operations.

618.03 Rates of Application:

Special Seed Mix shall be applied at the rate of 3 lbs per unit (1,000 square feet).

FGM shall be applied at a rate of 4,000 lbs/acre, unless other application rate is recommended by the FGM manufacturer and approved by the Resident.

Fertilizer and lime shall be applied at the rates set forth in Standard Specification Section 618.03, Paragraphs a and b.

618.04 Time of Initial Seeding: TRM seeding dates shall be April 1 to June 15 (Spring) or August 15 to September 15 (Fall).

618.09 Construction:

Where seeding TRM surfaces, seed mix and FGM, together with fertilizer and lime, shall be applied hydraulically to the TRM after final inspection and acceptance of the TRM.

Strictly comply with manufacturer's mixing and installation instructions and recommendations.

A mechanically-agitated mixing device is recommended.

Use approved hydro-spraying machine with fan-type nozzle to achieve best soil coverage. Apply from opposing directions to ensure 100% surface coverage.

Apply in a 2-Step process as follows, to be completed in immediate succession such that the seed applied in Step 1 is not left unprotected, especially if precipitation is imminent:

- Step 1: apply fertilizer, lime, and 50% of seed with a small amount of FGM for visual metering;

- Step 2: mix balance of seed with and apply FGM at a rate of 50 lb per 125 gallons of water over freshly seeded surfaces.

618.10 Maintenance and Acceptance Maintenance and acceptance of special seeded areas shall be as set forth in Standard Specification Section 618.10.

618.11 Method of Measurement Special Seeding shall be measured for payment as set forth in standard specification Section 618.11.

618.12 Basis of Payment Special Seeding will be paid for at the contract unit price per unit (1,000 square feet) complete in place and accepted.

Payment will be made under:

	Pay Item	Pay Unit
618.146	Special Seeding	Unit

SPECIAL PROVISION
SECTION 620 - GEOTEXTILES
(Reinforced Soil Slope Construction)

Supplement SECTION 620 – GEOTEXTILES with the following:

620.01 RSS Construction Description This work shall consist of excavating for and constructing a Reinforced Soil Slope (RSS) in close conformity with the lines, grades, cross sections and typical details shown on the Plans. RSS Construction includes phased excavation to achieve the necessary RSS envelope, maintaining stable construction slopes, providing temporary shoring and/or measures to protect active traffic on Route 4, constructing temporary ramp(s) to access the RSS work area, constructing the riprap toe key, and furnishing and installing Reinforcing Geogrid and Reinforcing Geotextile, together with the associated reinforced soil, for the construction of the RSS.

620.02 Geosynthetic Materials for RSS Construction Reinforcing Geogrid and Reinforcing Geotextile shall meet the material requirements set forth in this Subsection.

620.021 Reinforcing Geogrid for RSS Construction Reinforcing Geogrid to be installed as RSS reinforcement layers where depicted on the Plans shall consist of a regular network of integrally formed, polymeric tensile elements with an aperture geometry sufficient to permit significant mechanical interlock with the surrounding aggregate specified on the drawings. The Reinforcing Geogrid structure shall be dimensionally stable and able 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. A uniaxial geogrid shall be used in this application. High-strength woven or non-woven geotextile fabrics are not acceptable for use as Reinforcing Geogrid.

The Reinforcing Geogrid shall be a uniaxial geogrid manufactured from polyester resin and shall meet or exceed the Minimum Average Roll Values (MARV) of the properties in Table 1.

Table 1 - Physical Property Requirements
(Reinforcing Geogrid)

Mechanical Property	**Test Method**	**Minimum Average Roll Value (MARV)[1]**
Ultimate Tensile strength MD or XD	ASTM D 6637	5,900 lb/ft
Tensile strength at 5% Strain MD or XD	ASTM D 6637	2,100 lb/ft
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

The proposed Reinforcing Geogrid shall be submitted for review and acceptance by the Geotechnical Engineer prior to use on the project. Acceptable products include the following, or approved equal:

Miragrid® 7XT as manufactured by TenCate Geosynthetics.
Stratagrid SG550 as manufactured by Strata Systems.

620.022 Reinforcing Geotextile for RSS Construction Reinforcing Geotextile to be installed as RSS reinforcement layers where depicted on the project drawings shall consist of an approved high ultimate strength, woven, polypropylene material 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.

The Reinforcing Geotextile shall be woven, manufactured from polypropylene material and shall meet or exceed the MARV of the properties in Table 2.

Table 2 - Physical Property Requirements
(Reinforcing Geotextile)

Mechanical Property	**Test Method**	**Minimum Average Roll Value (MARV)**
Wide Width Tensile strength MD	ASTM D 4595	600 lb/in
Puncture Resistance	ASTM D 6241	1,900 lb
Trapezoidal Tearing Strength MD	ASTM D 4533	200 lb
Grab Tensile Strength/Elongation MD	ASTM D 4632	550 lb/ 12%
M288 Survivability Class		Class 1
Apparent Opening Size (AOS) [(1)]	ASTM D 4751	0.085 mm (#20 U.S. Std. Sieve)

[(1)] Maximum average roll value

The proposed Reinforcing Geotextile shall be submitted for review and acceptance by the Geotechnical Engineer prior to use on the project. An acceptable product is the following, or approved equal:

Mirafi® HP770 as manufactured by TenCate Geosynthetics
FX®-665MF as manufactured by Carthage Mills, Inc.

620.03 RSS Construction and Placement

The Reinforced Soil Slope shall be constructed in accordance with the Contract Plans and this Special Provision. Refer to the Reinforced Soil Slope Notes in the Contract Plans for additional requirements for the Construction and Placement of the Reinforced Soil Slope.

The Reinforcing Geogrid and Reinforcing Geotextile, together with the associated reinforced soil shall be placed at the proper levels/elevations and alignments as shown on the Plans or as directed by the Resident.

Reinforcing Geogrid and Reinforcing Geotextile shall be installed in accordance with the manufacturer's recommendations, except as modified by this Special Provision.

Installation of the Reinforcing Geogrid and Reinforcing Geotextile shall be in general conformance with Standard Specification 620.03.A, except as modified by this Special Provision.

Each layer of Reinforcing Geogrid and Reinforcing Geotextile shall consist of one (1) continuous sheet of material and shall be oriented such that the machine (strong) direction of the material is perpendicular to the face of the RSS in plan view (machine direction runs down the RSS face's fall line).

The Contractor shall verify the correct orientation of the Reinforcing Geogrid and Reinforcing Geotextile installed in the project.

The Contractor shall confirm that the as-built RSS geometries conform to the approximate geometries shown on the Plans.

Filling operations shall not damage the Reinforcing Geogrid or Reinforcing Geotextile and shall accommodate proper placement of the 3-foot long anchor tail of each Reinforcing Geotextile layer.

Reinforcing Geogrid and Reinforcing Geotextile 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.

The Reinforcing Geogrid and Reinforcing Geotextile shall be covered with the specified reinforced soil on the same day the geosynthetic is deployed and immediately upon acceptance of the deployed geosynthetic.

Horizontal coverage of less than 100 percent shall not be allowed.

Care shall be taken during installation to avoid damage occurring to the Reinforcing Geogrid or Reinforcing Geotextile. When reinforced soil is placed over the geosynthetics, the material shall be placed so that it does not puncture, otherwise damage, or displace the geosynthetics. Field monitoring shall be performed during reinforced soil material placement over and around the geosynthetics. At no time shall equipment operate directly on the Reinforcing Geogrid and Reinforcing Geotextile. Only low ground pressure tracked equipment may operate on the Reinforcing Geogrid and Reinforcing Geotextile once a minimum compacted thickness of 8 inches of reinforced soil fill is in place. No turns shall be permitted.

Placement, spreading, and compaction of reinforced soil fill on top of the Reinforcing Geogrid and Reinforcing Geotextile shall advance from one end of the geosynthetics and move towards the other. Care shall be taken to minimize the development of wrinkles and to ensure that the geosynthetics do not move from their position during fill placement. A spotter shall observe all

fill placement operations over Reinforcing Geogrid and Reinforcing Geotextile to ensure the geosynthetics do not slip, achieve the minimum length specified on the plans when each layer is complete, and is not damaged by the work.

If rutting develops within the initial granular lift, rut depths shall not exceed 3 inches. It may be necessary to decrease the size and/or weight of the construction equipment if rut depths of 3 inches or less cannot be maintained.

All rutting formed during construction shall be filled with new reinforced soil material. In no case shall rutting be filled by blading down.

Should the Reinforcing Geogrid or Reinforcing Geotextile be damaged during installation or subsequent fill placement, the entire sheet of geosynthetic material shall be removed and replaced. If the material removed is of sufficient length in the machine direction to be used elsewhere once the damaged section is cut out, it may be reused if inspected and approved by the Resident. Under no circumstances shall damaged material be "patched" by overlaying an additional sheet of Reinforcing Geogrid or Reinforcing Geotextile over the damaged area.

620.04 Overlap Adjacent sheets of Reinforcing Geogrid or Reinforcing Geotextile shall be overlapped a minimum of 12 inches.

620.05 Seams Seams to join adjacent lengths of Reinforcing Geogrid or Reinforcing Geotextile shall not be permitted.

620.06 Reinforcing Geogrid and Geotextile Certification Four (4) weeks prior to construction of the RSS, the Contractor shall submit the Manufacturers' quality control certificates, signed by a responsible party employed by the Manufacturers, for the Reinforcing Geogrid and Reinforcing Geotextile to be used on the project. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for: ultimate tensile strength of the Reinforcing Geogrid and wide width tensile strength in the machine direction for the Reinforcing Geotextile. The manufacturers shall further certify that the actual materials supplied for the project have been evaluated and are in full compliance with the project specifications and is fit for long-term, critical soil reinforcement applications.

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

Any Reinforcing Geogrid and Reinforcing Geotextile that is delivered or becomes damaged shall be replaced in accordance with the manufacturer's recommendations at no additional cost to the Department.

620.09 Method of Measurement Reinforcing Geogrid and Reinforcing Geotextile installed as an integral part of Reinforced Soil Slope construction will be measured by the number of Square Yards of surface area installed. Lap and scrap, required overlaps of adjacent sheets and for connections, splices, and repairs of damaged Reinforcing Geogrid and Reinforcing Geotextile are incidental to this Pay Item.

620.10 Basis of Payment Reinforcing Geogrid and Reinforcing Geotextile installed as an integral part of Reinforced Soil Slope construction will be paid for per Square Yard in-place, which will be full compensation for all off-loading, material testing, inspection, and storage of the Reinforcing Geogrid and Reinforcing Geotextile; all labor, materials, equipment, and tools for the excavation for and construction of the complete RSS in accordance with the plans; and any incidentals related to completing RSS construction, including but not necessarily limited to temporary access ramps, temporary shoring, hauling and disposal of excavated materials, survey of RSS envelope and construction of the riprap toe key. The TRM surface treatment for RSS slopes, including compost blanket, TRM, Flexible Growth Medium, and Special Seeding, will be paid for separately.

Payment will be made under:

	Pay Item	Pay Unit
620.61	Reinforcing Geotextile	Square Yard
620.65	Reinforcing Geogrid	Square Yard