MaineDOT

Highway Program

Brad Foley, Program Manager
Rich Crawford & Heath Cowan, Assistant Program Managers
Phone: 624-3480 Fax: 624-3481

Memorandum

To: Ernie Martin
From: Karen Gross
Date: 2/11/2011
Subject: Final Geotechnical Information
Series 100 Report No. 2011-102
Biddeford, Elm Street (Rte. 1), PIN 14814.00

==========

All subsurface investigations and lab testing information have been completed for the Route 1 (Elm Street) project in Biddeford. The primary focus of these investigations is to determine the general types of pavement materials and subsurface soils in order to select the appropriate pavement treatment for this project.

Background Information

The project begins at the intersection with Beaudoin Avenue and extends southerly 0.54 miles to the intersection with Grayson Street. Route 1 at this location is classified as a minor arterial and is non-NHS. Traffic volumes are high with a current AADT of 13390, with 4% heavy trucks (536 heavy trucks per day). The 18-kip Equivalent Single Axel Loads (ESAL's) for a 20-year design period are 1,708.200.

The proposed scope of work includes widening for additional lanes, drainage improvements, and pavement structure improvements. The project is located in an urban area with a mix of commercial and residential properties, and a cemetery along the northbound lane. The immediate surrounding topography is considered flat.

Site Evaluation

A site visit was done to evaluate the existing pavement structure condition, to identify the types of pavement distress, to confirm as-built plan information, to note geological features, and to establish the preliminary subsurface investigation program.

The existing pavement is approximately 32' total width (12-foot travel lanes and a southbound 8-foot paved shoulder), with a 5-foot wide gravel shoulder on the northbound side of the roadway. The pavement is moderately to severely distressed throughout the project. The primary types of distress are reflective cracking of longitudinal and transverse concrete joints up through the asphalt surface. There is also evidence of reflective "D" cracking (durability cracking). Using coarse aggregate in the concrete mix that is susceptible to freeze-thaw deterioration is the underlying cause of D-cracking. It always is located at the pavement joints, cracks or free edges. Cracking usually begins at the bottom of the slab and moves upward with

time. Therefore, the bottom of the slab may be severely deteriorated before the cracks appear at the surface.

There is currently no ditching or underdrain present at this location. Standing water can be seen on the shoulders after rainstorms and during spring thaw. This standing water is a source of water for the formation of D-cracking and can enter the pavement through surface cracks as well as from the saturated underlying base material.

As-Built Information

As-built plans from 1932 indicate that the roadway was originally constructed with three 10-foot wide, 40-foot long, continuously reinforced concrete slabs. The slabs were constructed at variable thicknesses, ranging from 7" inches thick at the center of the slab, and widening to 7½" thick at the outside of the slabs. The as-built plan sheets indicate that 8" of base gravel was placed under the concrete pavement in this section of Route 1. At some point, the roadway was overlayed with bituminous pavement.

Geology

The Maine Surficial Geology map for the Biddeford Quadrangle shows that the surficial soils at this location are Marine shoreline deposits that consist predominately of sands and gravels. The Soil Survey of York County indicates that the surficial soils are of the Adams series (AgB), which consists of sand and small quantities of silt size particles, with the amount of silt size particles decreasing with depth. Adams soils are well draining, with permeability rates increasing with depth (a function of the decreasing silt size particles). Ponding of water on the surface is common in the late winter. The Soil Survey also has information on the engineering index properties, classifications, and land use considerations. Table 1 summarizes the information from the Soil Survey.

Table 1: Soil Survey Summary

Soil Unit	Unified Classification	AASHTO Classification	Depth to H_2O	Depth to Bedrock	Frost Action	Permeability
Adams (AgB)	SM, SP-SM, SW-SM, SP	A-1, A-2, A-3	> 6'	> 6'	Low	6 – 20 in/hr

The Maine Design Freezing Index for this site is approximately 1250. For snow free pavement, the anticipated depth of frost penetration beneath the pavement structure is 68" for sand deposits. Natural soils at this location are considered only slightly frost susceptible, therefore the formation of ice lens and associated frost heaving/thaw weakening damage to the pavement is not probable.

Subsurface Investigations and Lab Testing

Roadway Investigations and Lab Testing

Eight borings were drilled (May 2008) in the roadway to determine the subsurface material types, to confirm the existence of a concrete roadway, to collect representative samples and depths of the existing base/subbase gravels, to identify shallow bedrock, and to identify the depth to groundwater. Borings were drilled to a depth of approximately 5' or refusal, which

ever was encountered first. Pavement cores were also collected at two locations to confirm the HMA and concrete thicknesses, and material quality. No shallow refusals or groundwater were encountered in any borings.

Boring and core information indicates that the pavement structure consists of approximately 3.6" to 6.0" of HMA, 4.8" to 7.2" of concrete pavement, and 16.8" to 25.2" of granular material. A core collected in a joint location at Station 43+25 revealed that the bottom of the slab at that location was severely deteriorated.

Laboratory testing was completed on eight samples to determine the grain size distribution, water content, the Unified (USCS) and AASHTO Classifications, and the Frost Susceptibility Rating of the existing subbase and subgrade.

The subbase samples test results indicate that the existing material has a Unified classification of SM and an AASHTO classification of A-1-B or A-2-4. The existing subbase exceeds the MaineDOT maximum of 7% passing the #200 sieve and therefore does not meet the MaineDOT requirements for base or subbase aggregate.

All subgrade samples tested have a Unified Classification of SP-SM or SM and an AASHTO Classification of A-1-B or A-2-4. The subgrade soils are considered slightly frost susceptible. Test results confirm the soils information in the Soil Survey and on the Surficial Geology map. Testing results indicate that there are higher water contents in the subgrade samples at Stations 50+96 and 63+13. Roadway photographs indicate that water ponds on the surface in this general location.

Table 2 summarizes the subsurface information and lab testing data. Please refer to the detailed boring logs and the lab testing data attached at the end of this report for more specific information.

Table 2: Geotechnical Investigations and Lab Testing Summary-Roadway

Boring No.	Station	Offset (ft)	Drilling Depth (ft)	Depth to water (ft)	Pavement Thickness			Total Pavement Thickness (in)	Subbase Class (USCS & AASHTO)	Subgrade Type
					HMA (in)	Concrete (in)	Subbase (in)			
HB-BIDD-101	63+13	6.4 L	5.0	xxx	3.6	7.2	25.2	36.0	SM / A-2-4	SAND
HB-BIDD-102	56+23	4.1 R	5.0	xxx	4.8	6.0	19.2	30.0	SM / A-1-b	SAND
HB-BIDD-103	52+84	4.1 R	5.0	xxx	4.8	6.0	19.2	30.0	SM / A-1-b	SAND
HB-BIDD-104	50+96	4.2 L	5.0	xxx	4.8	4.8	16.8	26.4	SM / A-2-4	SAND
HB-BIDD-105	48+08	4.8 L	5.0	xxx	4.8	6.0	19.2	30.0	SM / A-1-b	SAND
HB-BIDD-106	46+38	6.4 L	5.0	xxx	6.0	4.8	19.2	30.0	SM / A-2-4	SAND
HB-BIDD-107	43+52	12.4 R	5.0	xxx	6.0	6.0	18.0	30.0	SM / A-2-4	SAND
HB-BIDD-108	40+33	4.5 R	5.0	xxx	6.0	6.0	18.0	30.0	SM / A-2-4	SAND

Drainage Outlet Investigations and Lab Testing

Six borings were drilled off alignment from Station 50+75 to 51+80 for a proposed drainage outlet location and for environmental purposes. Borings HB-BIDD 201 through HB-BIDD-205 were located in a fill area that consisted of tailings and waste soils from the Biddeford Wal-Mart construction project several years ago. All borings were drilled to 30' (+/-) below the existing ground surface, or to refusal, which ever was encountered first. The materials encountered included sand, gravel, silt, clay, asphalt, brick, and rock fragments. Refusal was encountered at a few locations and based on the drill bit response, the drillers believe that refusal was on boulder sized material and not bedrock. Boulder sized tailings are visible at the edge of the fill area, so it is assumed that the refusal was on similar sized pieces of rock. Native soils encountered below the fill consist primarily of sand with small amounts of gravel. Groundwater was encountered in one boring at an elevation 136.8' (corresponds to 28.2' b.g.s). This elevation was measured during the drilling process and probably does not represent a stabilized groundwater elevation. Wet soils were encountered within some of the fill material, therefore the drainage capabilities of the fill is expected to be variable.

One boring (HB-BIDD-206) was drilled in what is believed to be native soils at Station 50+60 and approximately 434.4' to the northwest of Route 1. This boring was drilled to a depth of 12' below the existing ground surface. Soils at this location consist of sand with small amounts of gravel and silt. Groundwater was encountered at elevation of 133.7' (8.8' b.g.s.) Again, this depth was measured during the drilling process and probably does not represent a stabilized groundwater level. The Soil Survey of York County indicates that the surficial soils at this location are of the Colton series (CoB), which consists primarily of sand and gravel. Colton soils typically have a very rapid permeability rate. As per the Soil Survey, there is a hazard of groundwater contamination because of the rapid permeability of this soil.

Table 3 summarizes the investigations and lab testing information at the proposed drainage outlet location.

Table 3: Geotechnical Investigations and Lab Testing Summary-Drainage Outlet

Boring No.	Station	Offset (ft)	Drilling Depth (ft)	Depth to refusal (ft)	Depth of fill (ft)	Fill - USCS/AASHTO Classification	Natural soil - USCS/AASHTO Classification	Depth to water (ft)	Comments
HB-BIDD-201	50+79.3	201.7 R	31.5		14	SW-SM, A-1-b	SP/A-3	28.2	g.w. elev. 136.2"
HB-BIDD-202	51+35	220.4 R	27		23	ML, A-4	SP-SM/ A-3		wet soils @ 10'
HB-BIDD-203	51+79.8	239.5 R	32		29	SM, A-1-b	SP-SM/ A-1-b		wet soils @ 10'
HB-BIDD-204	51+15.5	300.1 R	15.8	15.8	15.8	GM, A-2-4			
HB-BIDD-205	50+74.5	322.1 R	17.1	17.1	17.1	ML, A-4			wet soils @ 5'
HB-BIDD-206	50+60	434.4 R	12				SM, SP-SM/A-1-b	8.8	g.w. elev. 133.7'

Design Considerations

Pavement Structure

The D-cracking in the existing concrete pavement is considered medium to high severity, and it is expected that the underside of the concrete is highly deteriorated at joint locations. The pavement core in photo C-2 shows the deterioration at the bottom of the slab. D-cracking is a

non-repairable materials issue and will eventually result in slab disintegration and loss of support for traffic loadings. The existing subbase does not meet the MaineDOT requirements for base or subbase aggregate. Removing the existing concrete pavement and underlying gravel and constructing a new 30" thick pavement structure is recommended.

Subgrade

The subgrade soils consist primarily of sand with varying amounts of silt. This soil type should provide excellent foundation support for the pavement structure. Based on the boring information and correlations to Soil Support Values, the recommended Subgrade Resilient Modulus (Mr) value to use for the pavement design is 4800 psi. Testing results indicate that there are higher water contents in the subgrade samples at Stations 50+96 and 63+13.

Bedrock

No shallow refusals were encountered in the borings therefore bedrock excavation is not expected on this project. Geology maps also indicate that there is no shallow bedrock at this location.

Drainage

The existing underlying natural soils have good drainage properties and the permeability increases as the depth below the surface increases. No shallow groundwater issues are expected. Since the surface soils may have a lower permeability rate, positive drainage of the pavement structure is recommended to prolong pavement service life. Surface water should be removed either by ditching or by a closed drainage system.

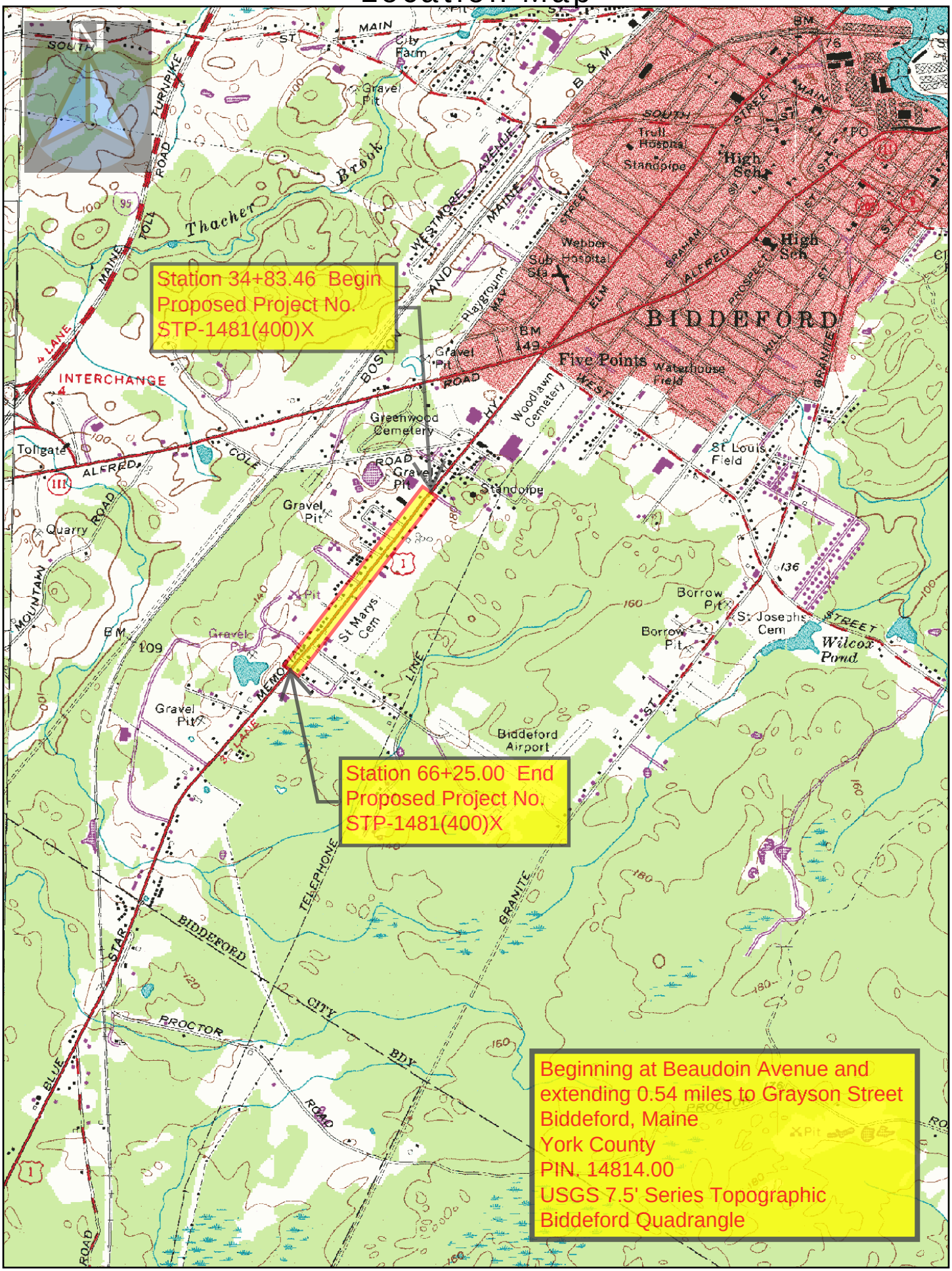
Construction Considerations

Soil Survey maps indicate that the existing natural soils tend to cave when excavated, therefore trenches for underdrain and cross pipes may be difficult to keep open. If groundwater is encountered in deeper excavations, dewatering may be necessary to keep the trench in the dry and the soils stable.

Attachments:

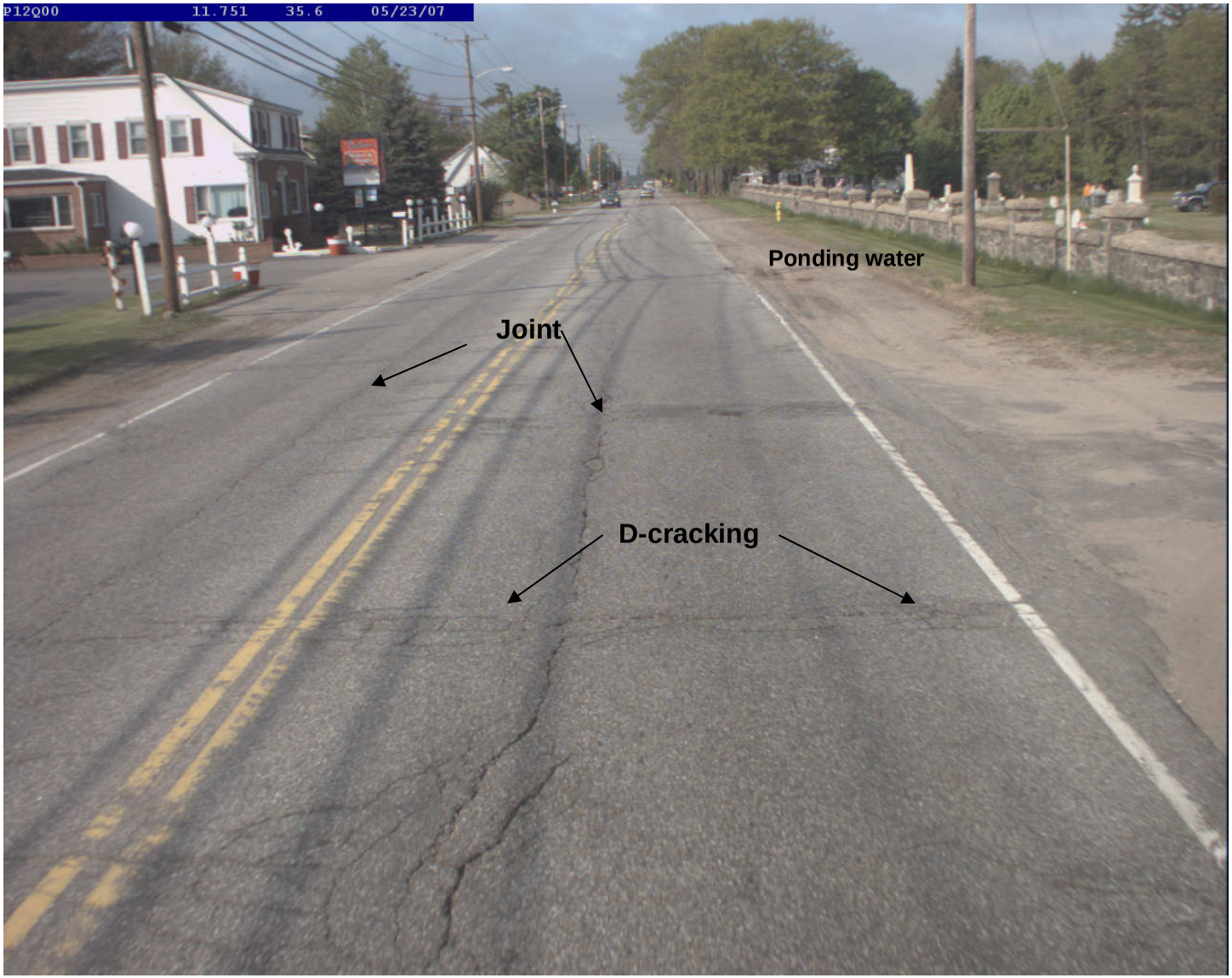
Project Location Map
Project Pavement Photo's
As-built Plans
Maine Surficial Geology Map (Biddeford Quadrangle)
Soil Survey of York County
Design Freezing Index/Frost Depth Chart
Boring Logs
Pavement Core Photo's
Laboratory Testing Summary Sheet
Grain Size Curves
Subgrade Resilient Modulus Charts
Geoplans

Location Map

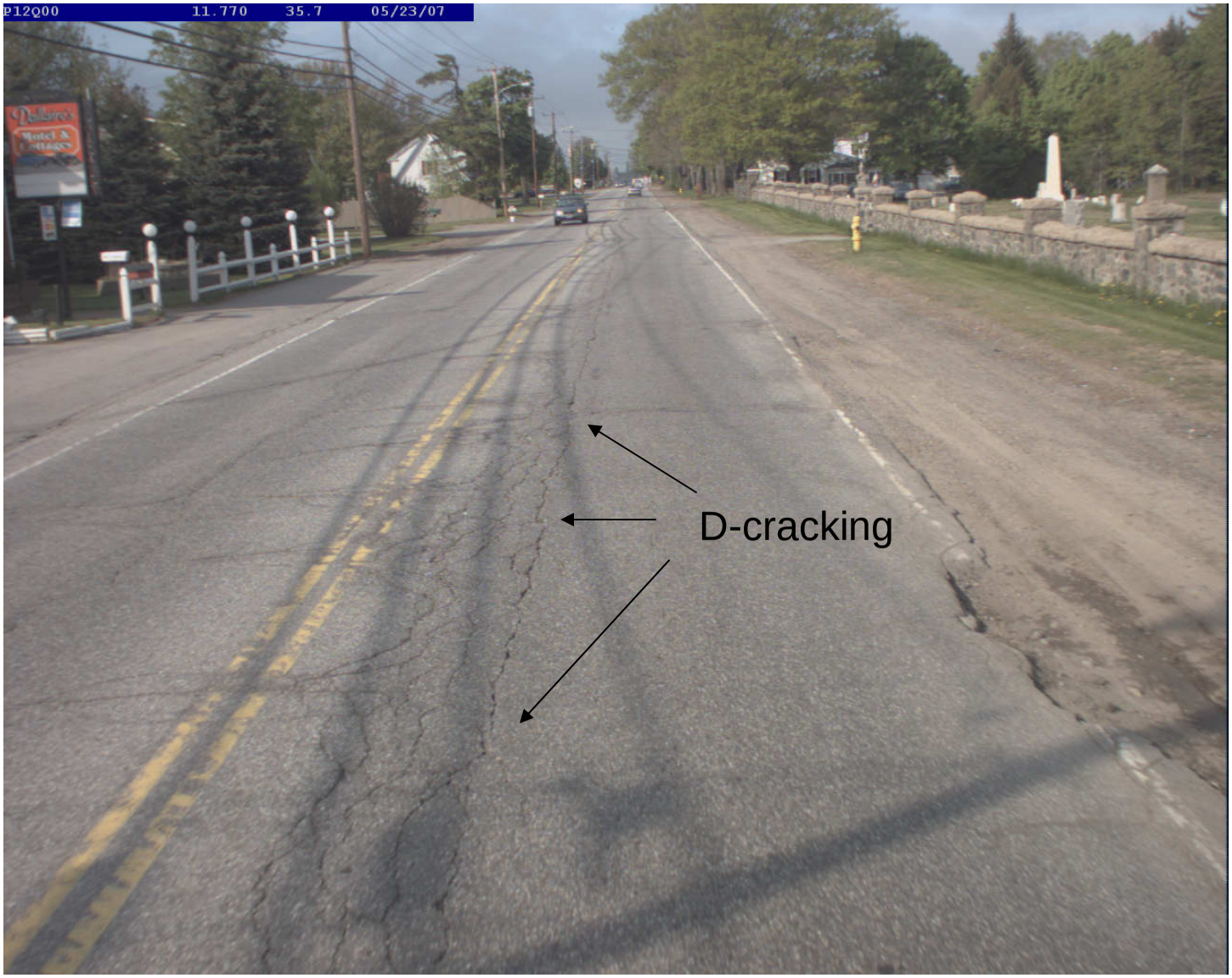


Map Scale 1:24000

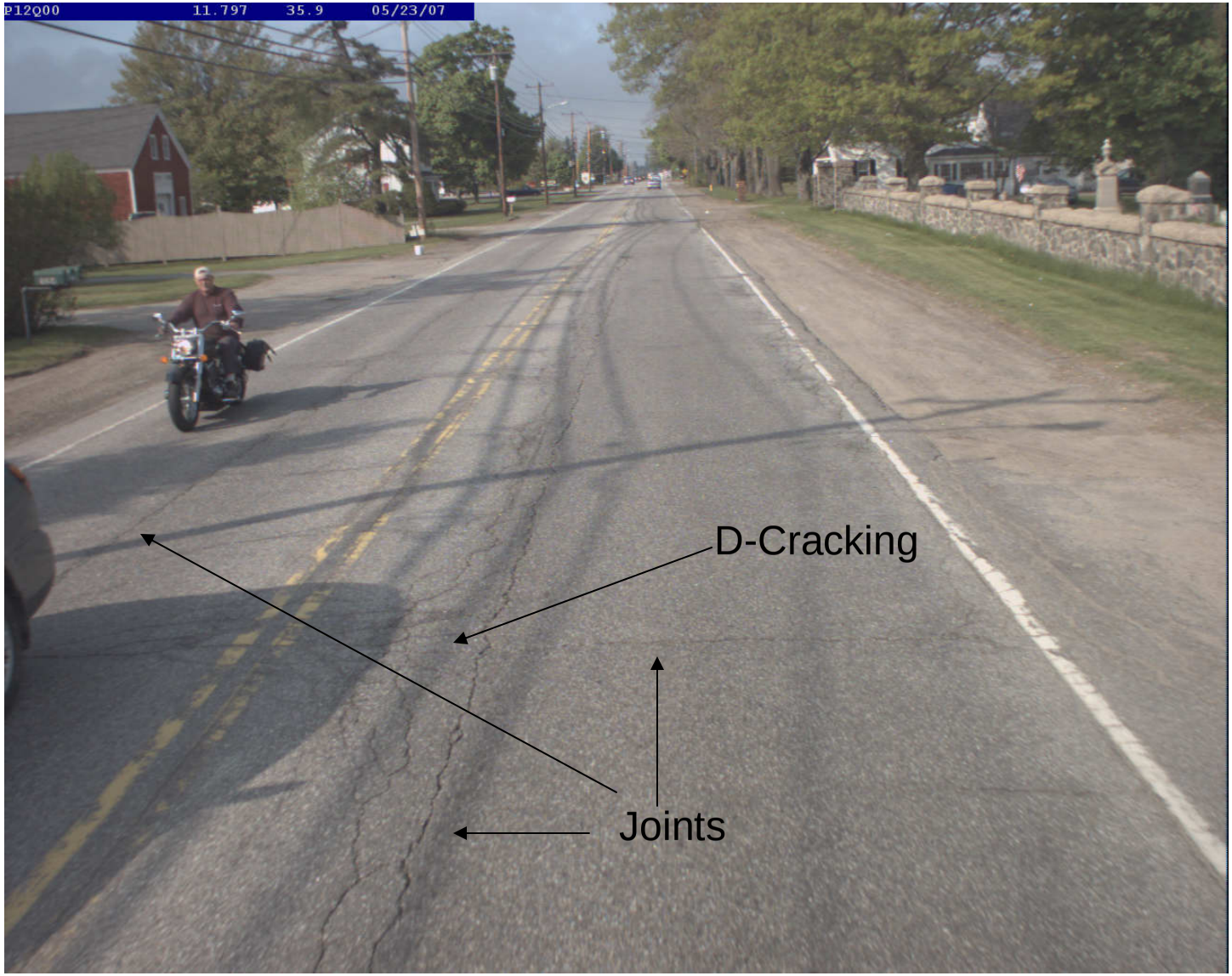
Station 58+00



Station 56+00



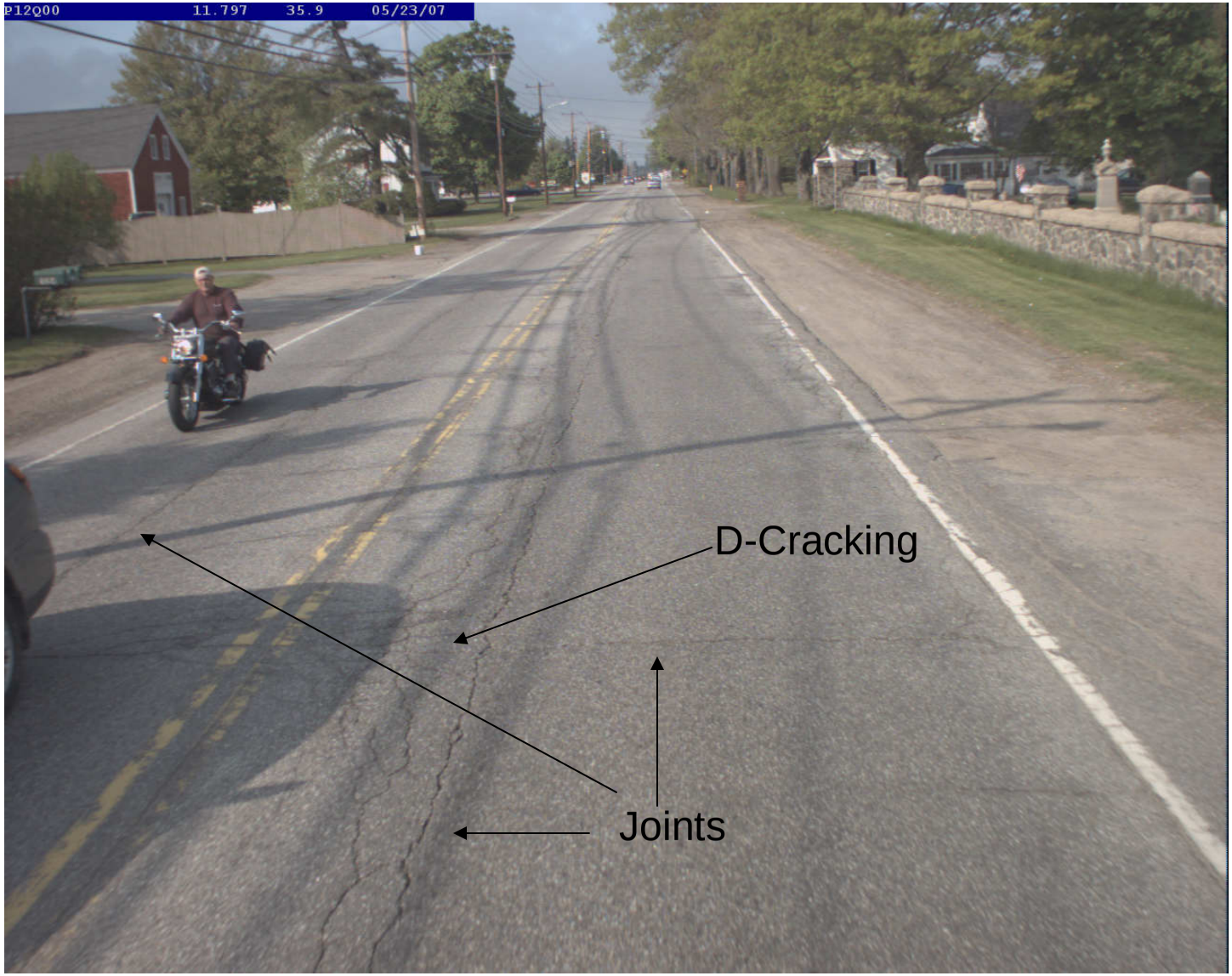
Station 54+00



Station 52+00

Station 41+00

Station 54+00



Station 52+00

Station 41+00

DURABILITY CRACKING ("D" CRACKING)

Description

Closely spaced crescent-shaped hairline cracking pattern.

Occurs adjacent to joints, cracks, or free edges; initiating in slab corners. Dark coloring of the cracking pattern and surrounding area.

How to Measure

Record number of slabs with "D" cracking and square meters of area affected at each severity level. The slab and affected area severity rating is based on the highest severity level present for at least 10 percent of the area affected.

Severity Levels

LOW

"D" cracks are tight, with no loose or missing pieces, and no patching is in the affected area.

MODERATE

"D" cracks are well-defined, and some small pieces are loose or have been displaced.

HIGH

"D" cracking has a well-developed pattern, with a significant amount of loose or missing material. Displaced pieces, up to 0.1 m², may have been patched.

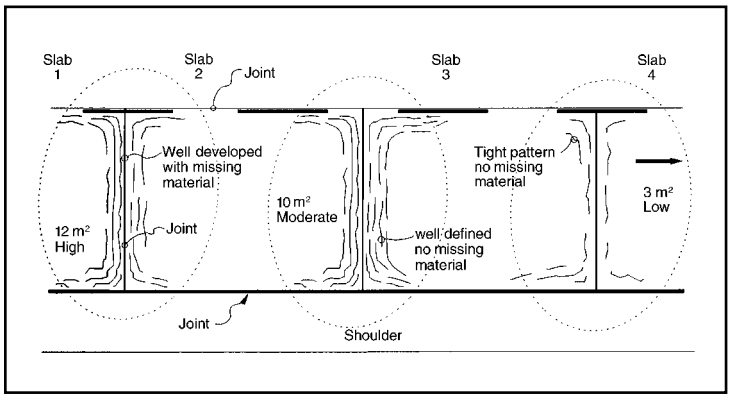
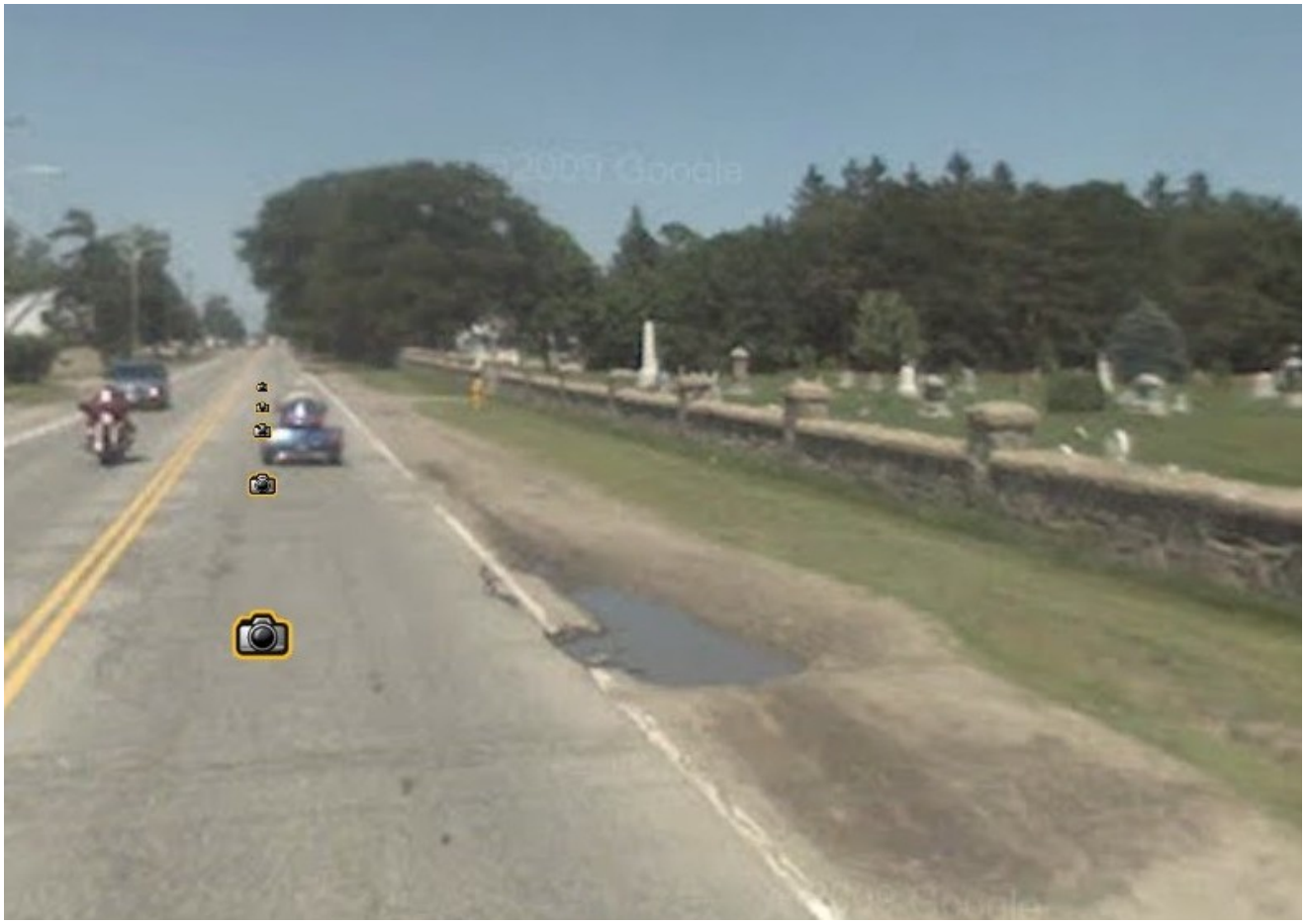


FIGURE 51
Distress Type JCP 2—Durability Cracking ("D" Cracking)

FIGURE 52
Distress Type JCP 2—Moderate Severity "D" Cracking with Well-Defined Pattern

FIGURE 53
Distress Type JCP 2—High Severity "D" Cracking with Loose and Missing Material

Route 1 (Elm Street) – Northbound
Station 61+00



Route 1 (Elm Street) – Northbound
Station 53+00

Route 1 (Elm Street) – Northbound
Station 49+00

Fed. Road Dist. No.	State	Fed. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
9	Maine	101-A		1	63

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLAN AND PROFILE

STATE HIGHWAY "A"

NORTH KENNEBUNKPORT
AND
BIDDEFORD

YORK COUNTY

FEDERAL AID PROJECT NO. 101-A

TOTAL LENGTH 6.032 MILES

SCALES: PLAN 1 IN. = 50 FT.
PROFILE HOR. 1 IN. = 50 FT. / VER. 1 IN. = 5 FT.
CROSS SECTIONS 1 IN. = 5 FT.

CONVENTIONAL SIGNS

State or National Line		Survey Line	
County Line		Culvert	
Town Line		Drop Inlet	
Unfenced Property		Trolley Pole	
Fence		Power Pole	
Right of Way Line		Tel. Pole	
Traveled Way		Marsh	
Railroad		Trees	
Retaining Wall		Stone Wall	

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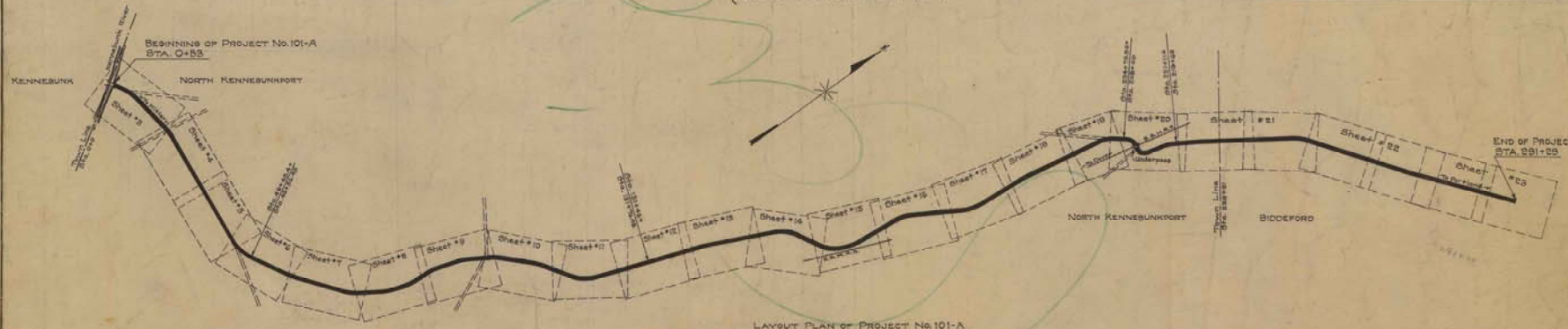
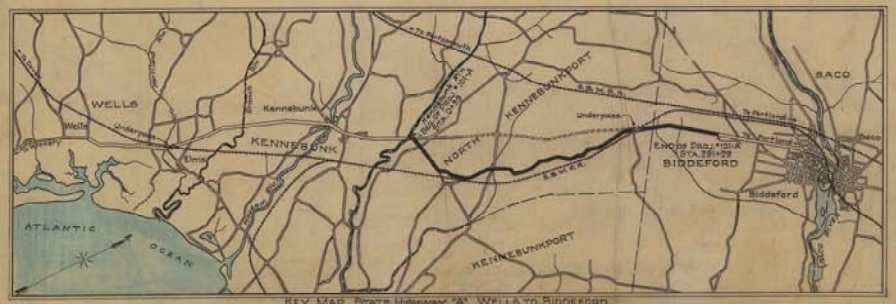


Layout Plan of Project No. 101-A
Scale: 1" = 1000'

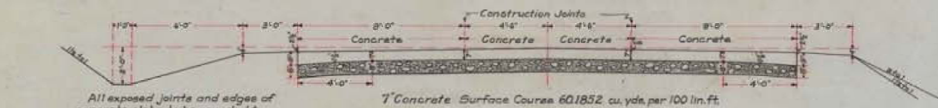


Key Map State Highway "A" Wells to Biddeford
Approx. Scale: 1 in. = 1 Mi.

Approved:
Maine State Highway Commission
Chairman
Commissioner
Commissioner
Chief Engineer

Approved:
U. S. Bureau of Public Roads
District Engineer
Chief Engineer
Director

STANDARD SECTIONS



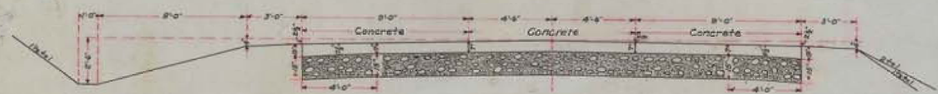
All exposed joints and edges of concrete slabs to be rounded to approximately ½" radius.

7" Concrete Surface Course 60.1852 cu. yds. per 100 lin. ft.

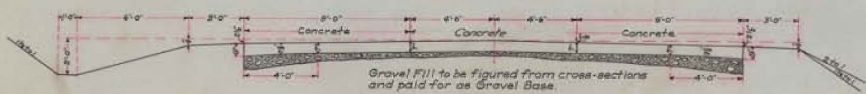
8" Gravel Base " 66.6667 " " " " " "

15" Gravel Base " 125.0000 " " " " " "

GRAVEL BASE SECTION

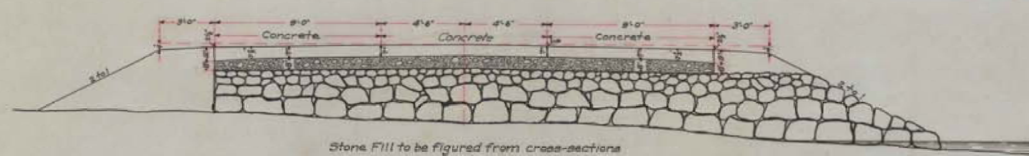


GRAVEL BASE SECTION



Gravel Fill to be figured from cross-sections and paid for as Gravel Base.

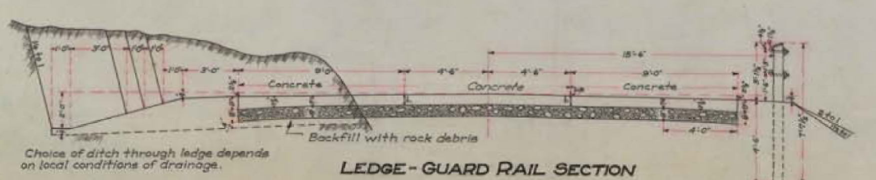
GRAVEL FILL SECTION



Stone Fill to be figured from cross-sections

When necessary extend Stone Fill through shoulders.

STONE FILL SECTION



Choice of ditch through ledge depends on local conditions of drainage.

LEDGE-GUARD RAIL SECTION

ESTIMATED QUANTITIES

ITEM	DESCRIPTION	QUANTITY	REMARKS
1	Earth Excavation	21,798 c.y.	Includes 900 c.y. Miscell. Excav.
2	Rock "	8,645 c.y.	
3	Borrow	6,612 c.y.	
4	Stone Fill	1,231 c.y.	
5	Gravel Base	26,280 c.y.	
12	Class "A" Concrete Masonry	179 c.y.	
13	" "B" " "	387 c.y.	
20	12" C.M.P. Culverts	224 lin. ft.	
22	16" " " " "	40 " "	
33	18" C.I.P. "	1254 " "	
34	24" " " "	54 " "	
37	Catch Basins	4	
38	Cobble Gutter	117 sq. yds.	
45	One Course Cement Con. Pavement	19,164 c.y.	
46	Steel Reinforcement in place	999,890 lbs.	
51	Wire Cable Guard Rail	13,766 ft.	

STA.	KIND	SIZE	LENGTH	REMARKS
[illegible]	Cor. Metal	12"	16'	11 Required No HW's
[illegible]	" "	12"	20	20 " " "
[illegible]	" "	12"	24	2 " " "
	" "	16"	20'	2 " " "
5+[illegible]	Cast Iron	18"	39'	2 End Walls
11+[illegible]	Concrete	3'×3'	40'	
21+[illegible]	Cast Iron	18"	45'	" " "
29+[illegible]	" "	18"	39	" " "
41+[illegible]	" "	18"	39'	" " "
45+[illegible]	Concrete	4'×4'	45'	
51+[illegible]	"	3'×2'	40'	
63+[illegible]	"	3'×2'	48'	
72+15	Cast Iron	18"	42'	" " "
83+72	" "	18"	37'	" " "
89+75	" "	18"	37'	" " "
95+[illegible]	Concrete	5'×6'	42'	
117+[illegible]	Cast Iron	18"	48'	" " "
121+[illegible]	" "	24"	54'	" " "
130+[illegible]	" "	18"	51'	" " "
134+[illegible]	" "	18"	57'	" " "
[illegible]	" "	18"	45'	" " "
146+[illegible]	Concrete	5'×8'	60'	
[illegible]	Cast Iron	18"	60'	" " "
[illegible]	" "	18"	42'	" " "
[illegible]	" "	18"	48'	" " "
[illegible]	" "	18"	42'	" " "
[illegible]	" "	18"	45'	" " "
[illegible]	" "	18"	45'	" " "
[illegible]	Concrete	4'×4'	54'	
191+65	Cast Iron	18"	45'	" " "
[illegible]	" "	18"	51'	" " "
[illegible]	" "	18"	51'	" " "
[illegible]	Concrete	4'×3'	40'	
[illegible]	Cast Iron	18"	48'	" " "
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[illegible]	Concrete	8'×4'	42'	
[illegible]	Cast Iron	18"	39'	" " "
[illegible]	" "	18"	39'	" " "
[illegible]	" "	18"	48'	" " "
[illegible]	Concrete	5'×6'	50'	
[illegible]	Cast Iron	18"	45'	" " "
[illegible]	" "	18"	45'	" " "
[illegible]	" "	18"	45'	" " "

Equation

Fed. Road Dist. No.	State	Fed. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
9	Maine	E-101-E		1	13

STATE OF MAINE

STATE HIGHWAY COMMISSION

PLAN AND PROFILE

STATE HIGHWAY "A"

BIDDEFORD

YORK COUNTY

FEDERAL AID PROJECT NO. E-101-E

TOTAL LENGTH 0.762 MILES

SCALES:
- PLAN 1 IN.= 50 FT.
- PROFILE: HOR. 1 IN.= 50 FT.; VER. 1 IN.= 5 FT.
- CROSS SECTIONS 1 IN.= 5 FT.

CONVENTIONAL SIGNS

State or National Line	Survey Line
County Line	Culvert
Town Line	Drop Inlet
Unfenced Property	Trolley Pole
Fence	Power Pole
Right of Way Line	Tel. Pole
Traveled Way	Marsh
Railroad	Trees
Retaining Wall	Stone Wall

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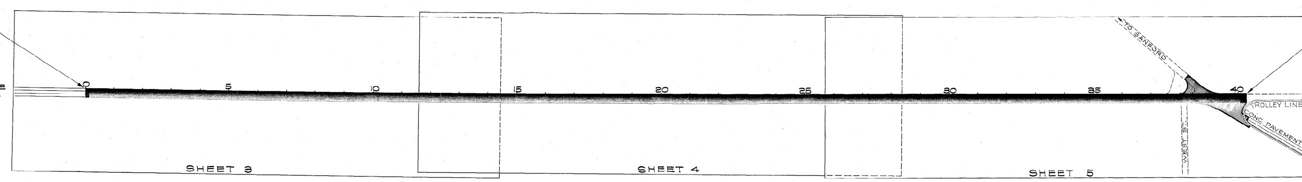
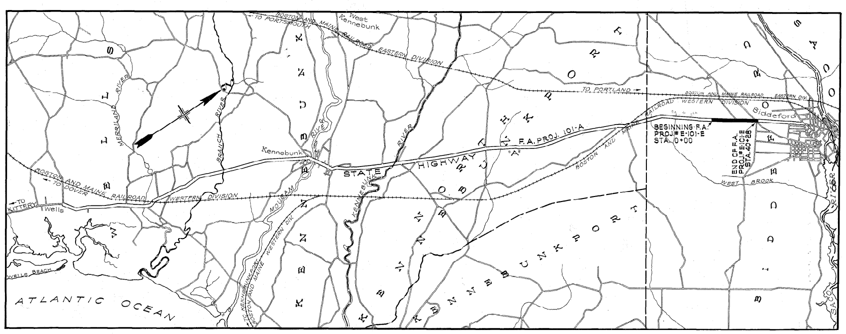


GENERAL LAYOUT
Scale: 1" = 200'



A PORTION OF YORK COUNTY
Scale: 1" = 1 Mile (Approx.)

Note:
All work contemplated under this contract to be governed by, and in conformity with, the specifications adopted March 21, 1932, except as modified on this plan.

APPROVED:
MAINE STATE HIGHWAY COMMISSION

CHAIRMAN

CHIEF ENGINEER.

APPROVED:
U. S. BUREAU OF PUBLIC ROADS

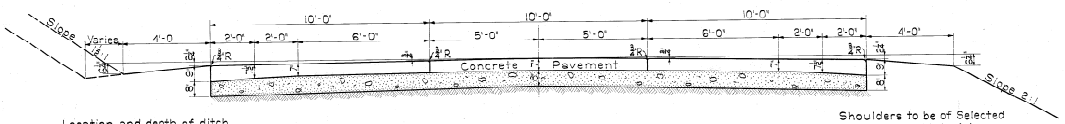
[redacted]
DISTRICT ENGINEER

[redacted]
CHIEF ENGINEER

[redacted]
DIRECTOR.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MAINE	E10-E	1	2	13

STANDARD SECTION 30' CONCRETE PAVEMENT



Location and depth of ditch to depend on local conditions.

Shoulders to be of Selected Excavated Material.

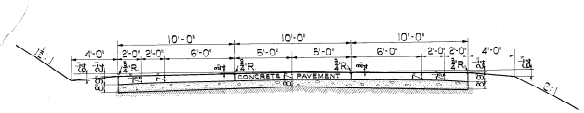
8" GRAVEL BASE

Cement Concrete Pavement = 66.46 Cu. Yds. per 100 Lin. Ft.
8" Gravel Base Course = 81.68 Cu. Yds. per 100 Lin. Ft.

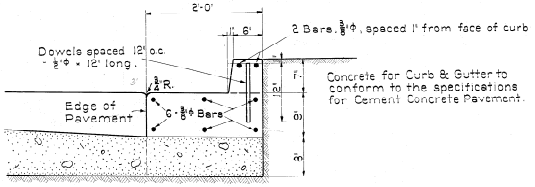
Gravel Base may be omitted, where, in the opinion of the Engineer, soil conditions are suitable.

ESTIMATE OF QUANTITIES

ITEM	DESCRIPTION	QUANTITY	UNIT	REMARKS
12A	Earth Excavation	7,765	Cu. Yds.	
13	Excavation for Structures	3,115	Cu. Yds.	680 additional cu. yds. allowed each extra depth of Catch Basins
23	Gravel Base Course	4,316	Cu. Yds.	
33	Cement Concrete Pavement	2,054	Cu. Yds.	
34A	Placing Reinf. for Pavement	153,855	Lbs.	
45A	Laying 8" Vitrified Clay Pipe	44	Lin. Ft.	
45C	Laying 12" Vitrified Clay Pipe	2,074	Lin. Ft.	
45D	Laying 15" Vitrified Clay Pipe	1,906	Lin. Ft.	
48A	Catch Basins (Brick)	27	Each	
50	Cobble Stone Gutter	85.5	Sq. Yds.	
55	Concrete Curb & Gutter	165	Lin. Ft.	

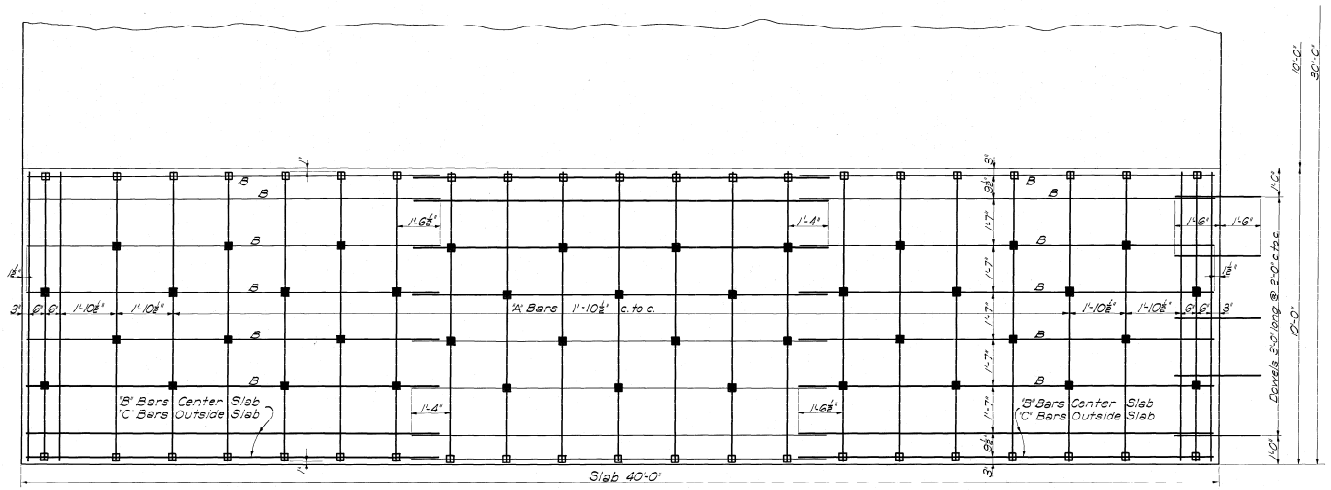


TYPICAL SECTION
Scale: 1" = 5'-0"



DETAIL
CURB & GUTTER
Scale: 1" = 1'-0"

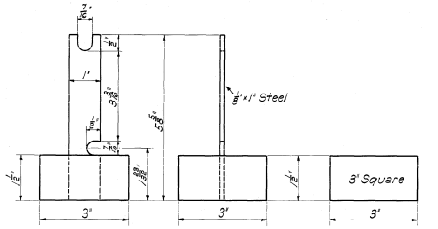
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MAINE	51(10)-B		3	13



All Bars $\frac{3}{8}$" ϕ; Dowels $\frac{3}{4}$" ϕ
All transverse bars are 'A' Bars

■ Blocks and Spacers
□ Cement Blocks

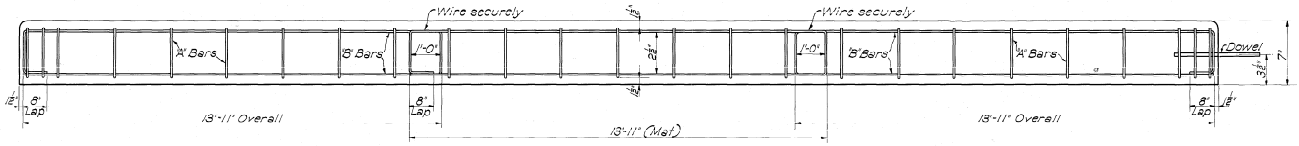
PLAN OF PAVEMENT REINFORCEMENT



BLOCK AND SPACER CEMENT BLOCK

Blocks to be made of one part of Portland Cement and two parts of approved sand and cured under cover for seven days.

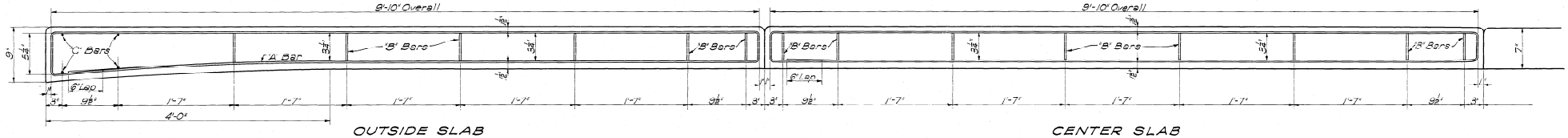
Other types of supports may be used if approved by the Engineer.



LONGITUDINAL SECTION SHOWING DETAIL OF "B" BARS

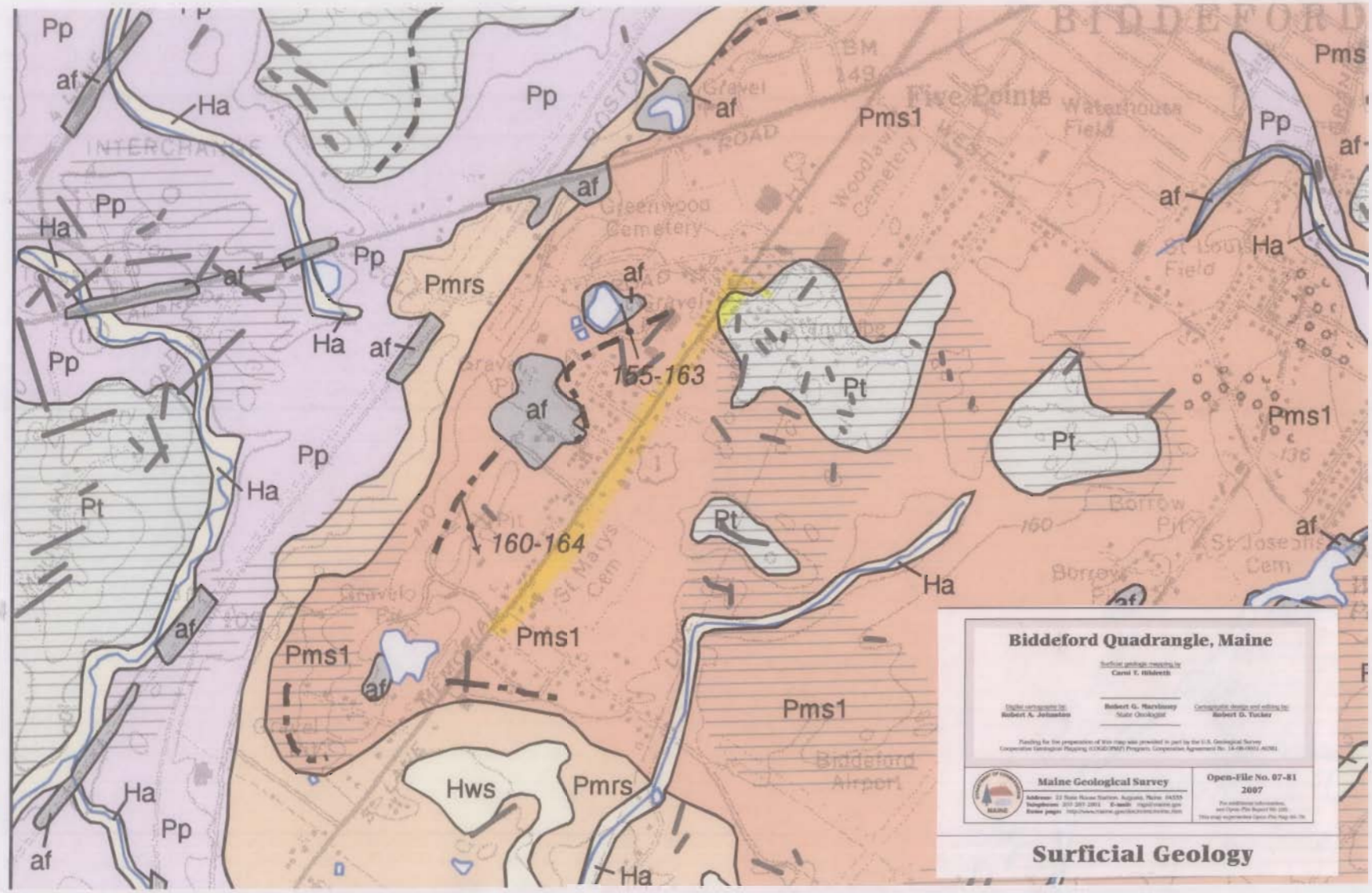
REINFORCING DATA

Bars $\frac{3}{8}$" Diameter, Plain Steel = 0.376 Lbs. per Lin. Ft.
Dowels $\frac{3}{4}$" Diameter, Plain Steel = 1.502 Lbs. per Lin. Ft.
Dowels 3'-0" long, ½ Encased in a Tube
'A' Bars Bent 9'-10" overall, Lapped 6" and Wired
'B' Bars Bent 13'-11" overall, Lapped 8" and Wired
'C' Bars Straight, 13'-11" long, Top and Bottom Ends are 1½" from edge of slab.
Each Outside 10'x40' Slab contains 25 'A' Bars, 18 'B' Bars, and 12 'C' Bars, made up in 3 sections, Center 10'x40' slab contains 25 'A' Bars and 24 'B' Bars, made up in 3 sections. Each section to be securely wired before placing.
Each 10'x40' Slab contains a minimum of 42 Cement Blocks and 42 Blocks and spacers to support steel. (See Detail)
Total Weight of Steel including Dowels = 10,145 lbs. per Sq. Yd.



OUTSIDE SLAB CENTER SLAB

TRANSVERSE SECTION SHOWING DETAIL OF "A" BARS



1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

af — **Artificial fill** - Artificially emplaced materials of nearly any composition, man-made or natural; areas filled may be either man-made or natural depressions; includes dumps, landfills and areas where the surface has been so altered by construction that the natural landscape has been obliterated -- such as in city centers. Thickness variable.

Ha — **Stream alluvium** - Fine sand, silt, and clay, with some gravel and organic matter in places. Deposited in flood plains of modern streams. Extent of alluvium approximates area of potential flooding. Thickness of deposits variable. In places merges with wetlands deposits.

Hlsd — **Landslide** - Recently slumped clay-silt deposits of the Presumpscot Formation on the banks of Moors Brook where the bank is a nearly vertical cliff about 15-20 feet high; each landslide is bounded by an arcuate fault scarp about 100 feet long, and extends a maximum of about 30 to 50 feet into the cliff; the toe of each landslide is being swiftly eroded by the brook. Three such landslides were found.

Hws — **Wetland, swamp*** - Peat, silt, clay, and sand. Poorly drained area with variable tree cover, often with standing water. Thickness variable.

Hwfm — **Wetland, freshwater marsh** - Peat, silt, clay, and sand. Poorly drained freshwater grassland, often with standing water and cattails. Thickness variable.

Hwsm — **Wetland, salt marsh*** - Peat, silt, clay, and sand. Coastal marsh subject to tidal flooding and containing salt marsh grasses, 0.5 to 2m thick; where 1 m or more thick, bottom part commonly peat rich.

Hms — **Marine shoreline deposit (beach)** - Sand and/or gravel, and minor silt. Developed along the present coast. 0.5 to 5 m thick. May include sand dunes in places.

Hd — **Sand dunes** - Sand with minor silt and gravel in places. Developed primarily along the present shoreline as part of barrier beach complexes, but two small deposits were found inland. 0.5 to 5 m thick.

Pmn_{1-2} — **Marine nearshore deposits** - Thin, discontinuous deposits of sand, gravel, silty clay, and reworked till overlying bedrock and till. Formed in shallow marine waters where glacial sediments were reworked by ocean waves and currents during regressive phase of late-glacial marine submergence. Average thickness probably less than 2 m. Subdivided into units 1 and 2 on the basis of elevation [Pmn_1 is above the 120-foot sea level stand of unit Pms_2 and Pmn_2 is below that level.]

Pms_{1-3} — **Marine shoreline deposits** - Predominantly sand and gravel. Consists of beach deposits formed during stillstands of relative sea level in regressive phase of marine submergence. Thickness variable, less that 3 m to more than 10 m. Pms_1 represents deposits that accumulated at stands of 160+ and 140+ ft, combined. Pms_2 , a stand of 120- ft; Pms_3 , combined stands of 80+ and 60+ ft; and Pms_4 (mapped only in the Biddeford Pool quad), a sea-level stand of 40- ft.

Pmrs — **Marine regressive sand deposits** - Massive to stratified and cross-stratified, well-sorted sand. Generally has gradational basal contact with Pp. Thickness 0.5 to 5 m. Deposited during regressive phase of marine submergence.

Pp — **Presumpscot Formation** - Massive to laminated, gray and blue-gray (weathering brown) silt and silty clay. Locally may contain boulders, sand, and gravel. Occurs as blanket deposit over bedrock and older glacial sediments. Variable thickness of 1-20 m. Deposited during period of late-glacial submergence.

Pt — **Till** - Gray to gray-brown poorly sorted mixture of silt, sand, pebbles, cobbles, and boulders. Forms a blanket deposit over bedrock, and is inferred to underlie younger sediments where not exposed at surface. Thin over topographic bedrock highs; thickens in topographic low areas; averages 3-5 m in thickness.

Bedrock - Rock units not distinguished. Individual outcrops not shown in areas of poor access. Ruled pattern indicates areas where surficial materials are thin (less than 1-2 m) and bedrock exposures are abundant. Areas of bedrock exposure (gray areas) are mapped in part from direct observation and in part from aerial photos.

Contact

Marine strandline - Defined by beach or base of wave-cut cliff.

Abandoned stream channel - Channel inferred to have been eroded by post-glacial stream during marine offlap. Arrow indicates inferred direction of flow.

135 — **Glacial Striation** - Includes striations, grooves, crag-and-tails and related ice-flow indicators on bedrock outcrops. Dot or center of arrow is point of observation. Arrowhead omitted where ice-flow direction is unknown. Flag indicates older trend.

Crossbeds - Arrow indicates average direction and dip of cross-bedding in glaciofluvial deposits. Tip of arrow is at point of observation.

10,150±450 — **Marine fossil locality** - Indicates site where marine fossils were located.

Area of many large boulders

*NOTE: Wetland symbols followed by "t" indicate areas where peat deposits probably do not constitute a significant commercial resource, either because they are thin (< 1.5 m), or they have an ash content greater than 25 percent. Symbols followed by "p" indicate peat deposits that are thicker (generally > 1.5 m), with ash content less than 25 percent, and thus may be suitable for commercial applications.

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

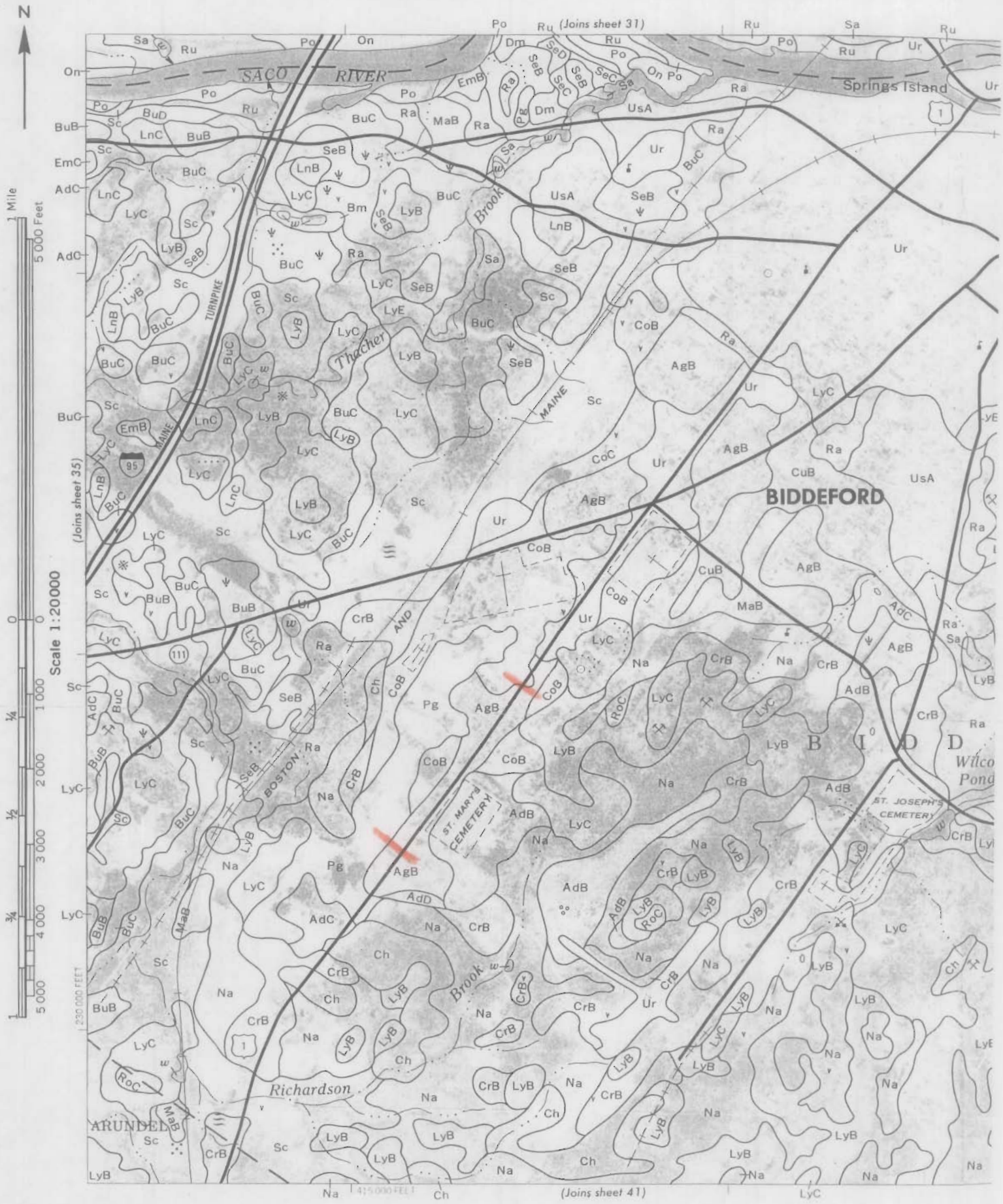
1. Hildreth, C. T., 1999, Surficial geology of the Biddeford 7.5-minute quadrangle, York County, Maine: Maine Geological Survey, Open-File Report 99-109, 6 p.
2. Hildreth, C. T., 1998, Surficial materials of the Biddeford quadrangle, Maine: Maine Geological Survey, Open-File Map 98-183.
3. Neil, C. D., 1998, Significant sand and gravel aquifers of the Biddeford quadrangle, Maine: Maine Geological Survey, Open-File Map 98-149.
4. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print)
5. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
6. Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G., 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.

W.F. Reid Jr.
RAC —

SOIL SURVEY OF

York County Maine

United States Department of Agriculture, Soil Conservation Service
in cooperation with the Maine Agricultural Experiment Station
and the Maine Soil and Water Conservation Commission


N
Scale 1:20000
1 Mile
5 000 Feet
1 000
2 000
3 000
4 000
5 000
230 000 FEET
415 000 FEET
SACO RIVER
Springs Island
BIDDEFORD
Richardson
ARUNDEL
Thacher
Brook
Brook
TURNPIKE
MAINE
MAINE
BOSTON AND MAINE
ST. MARY'S CEMETERY
ST. JOSEPH'S CEMETERY
Wilco Pond
(Joins sheet 31)
(Joins sheet 35)
(Joins sheet 41)

Although this soil is mostly wooded, droughtiness and very low natural fertility limit productivity. Machinery operation on this soil is difficult because of the steep slopes. Logging roads and skid trails that are constructed on the contour help to reduce erosion.

The steep slopes make this soil poorly suited for most urban uses. The hazard of erosion at construction sites makes it necessary that removal of vegetation be held to a minimum and that a temporary plant cover be established as soon as possible. The rapid permeability of the soil causes a hazard of ground-water contamination from septic disposal systems. This soil is used as a source of poorly graded sand.

The capability subclass is VIIs.

AgB—Adams-Urban land complex, 0 to 8 percent slopes. This complex consists of areas of nearly level and gently sloping, excessively drained Adams soils and urbanized areas generally on plains and deltas. Much of the acreage of the Adams soils has been altered by grading for streets, housing, commercial buildings, and similar uses. Areas of the complex range from 10 to 200 acres. The complex consists of about 50 percent Adams soils, 40 percent urbanized areas, and 10 percent included soils. The soils and urban areas are in such an intricate pattern that it was not practical to map them separately.

Typically, undisturbed areas of the Adams soils have a surface layer of very dark grayish brown loamy sand about 7 inches thick. The subsoil is 11 inches thick. It is brown to dark brown loamy sand in the upper part and yellowish brown sand in the lower part. The substratum is light yellowish brown sand and coarse sand to a depth of 60 inches or more.

Included with this complex in mapping are small areas of Colton and Croghan soils. Also included are small areas of Adams soils with slopes of 8 to 15 percent.

The Adams soils in this complex have rapid or very rapid permeability. Surface runoff on the Adams soils is slow.

Most undisturbed areas of this complex consist of Adams soils between streets, houses, apartment buildings, or commercial buildings and in yards and playgrounds. The areas are generally less than 3 acres.

The Adams soils are well suited as a site for houses and commercial buildings. Ponding on the surface late in the winter is a concern in the nearly level areas. The Adams soils are poorly suited for grasses, trees, shrubs, and vegetable gardens because of their sandy texture and droughtiness.

An onsite investigation is needed to determine the suitability of this complex for any proposed use.

The unit is not assigned to a capability subclass.

AlB—Allagash very fine sandy loam, 3 to 8 percent slopes. This soil is gently sloping, well drained, and deep. It is generally on the tops of plains and terraces. Slopes are less than 400 feet long. Most areas of this soil are oval and range from 3 to 40 acres.

Typically, the surface layer is brown to dark brown very fine sandy loam 7 inches thick. The subsoil is 13 inches thick. The upper part is yellowish brown very fine sandy loam, and the lower part is brownish yellow and light olive brown fine sandy loam. The substratum is stratified light yellowish brown loamy fine sand and light olive brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Colton and Madawaska soils. Also included are small areas of Allagash soils with slopes of less than 3 percent. Included areas make up about 10 to 15 percent of this unit.

This Allagash soil has moderately rapid permeability to a depth of about 20 inches and rapid permeability at a depth of more than 20 inches. Surface runoff is medium. The available water capacity is moderate, and the natural fertility is low. The depth to bedrock is generally 5 feet or more. Unless limed, the surface layer is very strongly acid.

Most areas of this soil are used for cultivated crops. Some areas are wooded.

This soil is suited to cultivated crops such as corn. Controlling erosion and providing irrigation are major management concerns. Maintaining the organic matter content of the soil will help to improve tilth, increase available water capacity, and reduce runoff.

The soil is suited to pasture, but prevention of overgrazing during dry periods, the timely application of fertilizer and lime, and pasture rotation are major management needs.

This soil is suited to woodland. The available moisture and rooting depth of the soil are generally adequate for trees.

The soil is generally suitable as a site for housing and septic tank disposal. Contamination of ground water, however, is a hazard caused by the rapid permeability in the substratum.

The capability subclass is IIe.

AlC—Allagash very fine sandy loam, 8 to 15 percent slopes. This soil is sloping, well drained, and deep. It is generally on the sides of plains and terraces. Slopes are less than 200 feet long. Most areas of this soil are elongated or oval and range from 3 to 15 acres.

Typically, the surface layer is brown to dark brown very fine sandy loam 7 inches thick. The subsoil is 13 inches thick. The upper part is yellowish brown very fine sandy loam, and the lower part is brownish yellow and light olive brown fine sandy loam. The substratum is stratified light yellowish brown loamy fine sand and light olive brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Colton soils and small areas of Allagash soils with

TABLE 14.--ENGINEERING INDEX PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. NP = nonplastic]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AdB, AdC, AdD------ Adams	0-3	Loamy sand------	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	95-100	45-85	5-40	---	NP
	3-18	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	95-100	35-95	5-40	---	NP
	18-60	Sand, coarse sand.	SP-SM, SW-SM, SP	A-1, A-2, A-3	0-1	90-100	70-100	20-90	0-10	---	NP
AgB*: Adams----------	0-3	Loamy sand------	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	95-100	45-85	5-40	---	NP
	3-18	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	95-100	35-95	5-40	---	NP
	18-60	Sand, coarse sand.	SP-SM, SW-SM, SP	A-1, A-2, A-3	0-1	90-100	70-100	20-90	0-10	---	NP
Urban land.											
AlB, AlC---------- Allagash	0-7	Very fine sandy loam.	SM, ML	A-4, A-5	0	95-100	95-100	65-100	40-90	<44	NP-9
	7-20	Fine sandy loam, loam.	SM, ML	A-2, A-4	0	95-100	75-100	50-95	30-75	---	NP
	20-38	Fine sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-1, A-3	0	85-100	75-100	35-80	5-35	---	NP
	38-60	Stratified loamy fine sand to very gravelly sand.	SP, SM, SW	A-1, A-2, A-3	0-10	70-100	25-100	10-75	0-30	---	NP
Ba*. Beaches											
BcB, BcC, BcD------ Becket	0-6	Fine sandy loam	SM	A-2, A-4	0-15	85-95	55-90	35-75	20-50	---	---
	6-23	Fine sandy loam, sandy loam, gravelly sandy loam.	SM	A-2, A-4	5-15	70-90	60-85	50-75	25-40	---	---
	23-60	Gravelly loamy sand, gravelly loamy fine sand, gravelly sandy loam.	SM, SP-SM, GM, GP-GM	A-2	5-15	60-85	55-75	25-70	10-30	---	---

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
AdB, AdC, AdD----	0-3	0-5	1.10-1.40	6.0-20	0.05-0.10	4.5-5.5	Low----------	0.17	5	1-4
Adams	3-18	0-5	1.25-1.55	6.0-20	0.04-0.08	4.5-5.5	Low----------	0.17		
	18-60	0-5	1.45-1.65	>20	0.03-0.04	4.5-6.0	Low----------	0.17		
AgB*:										
Adams----------	0-3	0-5	1.10-1.40	6.0-20	0.05-0.10	4.5-5.5	Low----------	0.17	5	1-4
	3-18	0-5	1.25-1.55	6.0-20	0.04-0.08	4.5-5.5	Low----------	0.17		
	18-60	0-5	1.45-1.65	>20	0.03-0.04	4.5-6.0	Low----------	0.17		
Urban land.										
AlB, AlC---------	0-7	3-13	0.95-1.25	2.0-6.0	0.16-0.22	4.5-6.5	Low----------	0.28	3	2-8
Allagash	7-20	2-12	1.20-1.50	2.0-6.0	0.08-0.24	4.5-6.5	Low----------	0.28		
	20-38	2-5	1.35-1.65	6.0-20	0.06-0.18	4.5-6.5	Low----------	0.28		
	38-60	1-4	1.40-1.70	6.0-20	0.01-0.10	4.5-6.5	Low----------	0.28		
Ba*.										
Beaches										
BcB, BcC, BcD----	0-6	3-8	0.90-1.20	0.6-2.0	0.10-0.23	4.5-6.5	Low----------	0.20	3	3-7
Becket	6-23	3-8	1.20-1.50	0.6-2.0	0.05-0.16	5.1-6.5	Low----------	0.28		
	23-60	1-4	1.65-1.80	0.06-0.6	0.03-0.09	5.1-6.5	Low----------	0.17		
BeB, BeC, BeD----	0-2	3-8	0.90-1.20	0.6-2.0	0.10-0.23	4.5-6.5	Low----------	0.20	3	---
Becket	2-23	3-8	1.20-1.50	0.6-2.0	0.05-0.16	5.0-6.5	Low----------	0.28		
	23-60	1-4	1.65-1.80	0.06-0.6	0.03-0.09	5.0-6.5	Low----------	0.17		
Bm----------	14-0	---	0.10-0.30	2.0-6.0	0.20-0.43	5.1-6.5	----------	----	---	---
Biddeford	0-5	20-50	0.90-1.20	0.2-0.6	0.24-0.34	5.1-7.3	Low----------	----		
	5-36	35-55	1.60-1.80	<0.2	0.13-0.23	5.6-7.8	Moderate-----	----		
	36-60	35-55	1.70-1.95	<0.2	0.06-0.16	6.1-7.8	Moderate-----	----		
BrB*:										
Brayton----------	0-5	6-12	0.90-1.20	0.6-6.0	0.10-0.20	4.5-6.5	Low----------	0.28	3	2-8
	5-11	6-12	1.40-1.70	0.6-6.0	0.08-0.17	4.5-6.5	Low----------	0.24		
	11-60	6-12	1.70-2.00	<0.2	0.01-0.05	5.6-7.3	Low----------	0.24		
Westbury---------	0-4	3-12	0.90-1.20	0.6-2.0	0.08-0.16	3.6-6.0	Low----------	0.24	3	2-8
	4-23	3-12	1.40-1.70	0.6-2.0	0.07-0.15	3.6-6.0	Low----------	0.24		
	23-36	3-12	1.70-2.00	0.06-0.2	0.02-0.06	4.5-6.0	Low----------	0.24		
	36-60	3-12	1.70-2.00	0.06-0.2	0.02-0.06	5.1-7.3	Low----------	0.24		
BsB*:										
Brayton----------	0-5	6-12	0.90-1.20	0.6-6.0	0.08-0.17	4.5-6.5	Low----------	0.24	3	---
	5-11	6-12	1.40-1.70	0.6-6.0	0.08-0.17	4.5-6.5	Low----------	0.24		
	11-60	6-12	1.70-2.00	<0.2	0.01-0.05	5.6-7.3	Low----------	0.24		
Westbury---------	0-4	3-12	0.90-1.20	0.6-2.0	0.08-0.16	3.6-6.0	Low----------	0.24	3	2-8
	4-23	3-12	1.40-1.70	0.6-2.0	0.07-0.15	3.6-6.0	Low----------	0.24		
	23-36	3-12	1.70-2.00	0.06-0.2	0.02-0.06	4.5-6.0	Low----------	0.24		
	36-60	3-12	1.70-2.00	0.06-0.2	0.02-0.06	5.1-7.3	Low----------	0.24		
BuB, BuC, BuD----	0-7	15-30	0.90-1.20	0.2-2.0	0.18-0.28	4.5-6.5	Low----------	0.28	3	4-7
Buxton	7-19	20-40	1.20-1.55	0.2-0.6	0.13-0.23	4.5-6.5	Low----------	0.49		
	19-60	35-55	1.75-1.95	<0.2	0.06-0.16	5.6-7.3	Moderate-----	0.49		
Ch----------	0-32	---	<0.30	0.6-6.0	0.20-0.25	3.6-4.5	----------	----	---	---
Chocorua	32-60	---	<0.30	>6.0	0.01-0.11	4.5-6.0	----------	----		

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
AdB, AdC, AdD----- Adams	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
AgB*: Adams----------	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Urban land.											
AlB, AlC---------- Allagash	B	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Ba*. Beaches											
BcB, BcC, BcD----- Becket	C	None--------	---	---	2.0-3.0	Perched	Nov-Mar	>60	Moderate----	Low------	Moderate.
BeB, BeC, BeD----- Becket	C	None--------	---	---	2.0-3.0	Perched	Nov-Mar	>60	Moderate----	Low------	Moderate.
Bm---------- Biddeford	D	None--------	---	---	+1-0.5	Perched	Nov-Aug	>60	High--------	High-----	Moderate.
BrB*: Brayton----------	C	None--------	---	---	0.0-1.5	Perched	Nov-May	>60	High--------	High-----	Moderate.
Westbury---------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	High--------	Moderate	High.
BsB*: Brayton----------	C	None--------	---	---	0.0-1.5	Perched	Nov-May	>60	High--------	High-----	Moderate.
Westbury---------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	High--------	Moderate	High.
BuB, BuC, BuD----- Buxton	C	None--------	---	---	1.0-3.0	Perched	Nov-May	>60	High--------	High-----	Moderate.
Ch---------- Chocorua	D	Common------	Very long	Nov-May	0-0.5	Apparent	Jan-Dec	>60	High--------	Moderate	High.
CoB, CoC, CoD, CoE---------- Colton	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
CrB---------- Croghan	B	None--------	---	---	1.5-2.0	Apparent	Nov-May	>60	Moderate----	Low------	High.
CuB*: Croghan----------	B	None--------	---	---	1.5-2.0	Apparent	Nov-May	>60	Moderate----	Low------	High.
Urban land.											

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AdB---- Adams	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty, too sandy.
AdC---- Adams	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty, too sandy.
AdD---- Adams	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty, too sandy.
AgB*: Adams----	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty, too sandy.
Urban land.						
AlB---- Allagash	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
AlC---- Allagash	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Ba*. Beaches						
BcB---- Becket	Moderate: wetness.	Moderate: frost action, wetness.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.	Moderate: small stones.
BcC---- Becket	Moderate: wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: small stones, slope.
BcD---- Becket	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BeB---- Becket	Moderate: large stones, wetness.	Moderate: frost action, wetness.	Moderate: large stones, wetness.	Moderate: frost action, slope.	Moderate: frost action.	Moderate: large stones.
BeC---- Becket	Moderate: large stones, slope.	Moderate: frost action, slope.	Moderate: large stones, slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: large stones, slope.
BeD---- Becket	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bm---- Biddeford	Severe: wetness, too clayey.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, excess humus.
BrB*: Brayton----	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.	Moderate: wetness.
Westbury----	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action, wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AdB, AdC---------- Adams	Good----------	Good----------	Unsuited: excess fines.	Poor: too sandy.
AdD---------- Adams	Fair: slope.	Good----------	Unsuited: excess fines.	Poor: slope, too sandy.
AgB*: Adams----------	Good----------	Good----------	Unsuited: excess fines.	Poor: too sandy.
Urban land.				
AlB---------- Allagash	Good----------	Good----------	Unsuited: excess fines.	Good.
AlC---------- Allagash	Good----------	Good----------	Unsuited: excess fines.	Fair: slope.
Ba*. Beaches				
BcB, BcC---------- Becket	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
BcD---------- Becket	Fair: frost action, slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
BeB, BeC---------- Becket	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: large stones.
BeD---------- Becket	Fair: slope, frost action.	Poor: excess fines.	Poor: excess fines.	Poor: large stones, slope.
Bm---------- Biddeford	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, thin layer, too clayey.
BrB*: Brayton----------	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, wetness.
Westbury----------	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
BsB*: Brayton----------	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones, wetness.
Westbury----------	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
BuB---------- Buxton	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
BuC---------- Buxton	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey.

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BsB*: Westbury----------	0-4	Very stony fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	5-10	55-80	50-75	30-75	15-70	<15	NP-4
	4-23	Gravelly loam, silt loam, gravelly sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-5	55-95	50-90	30-90	15-80	<15	NP-4
	23-36	Gravelly sandy loam, very gravelly fine sandy loam, loam.	SM, GM, GW-GM, ML	A-1, A-2, A-4	0-5	40-90	35-85	20-80	10-65	<15	NP-4
	36-60	Gravelly sandy loam, very gravelly fine sandy loam, loam.	GM, GW-GM, SM, ML	A-1, A-2, A-4	0-5	40-90	35-85	20-80	10-65	<15	NP-4
BuB, BuC, BuD------ Buxton	0-7	Silt loam-------	ML, MH	A-4, A-6, A-7, A-5	0	98-100	95-100	95-100	85-100	36-55	5-20
	7-19	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7, A-5	0	98-100	95-100	95-100	85-100	25-55	5-20
	19-60	Silty clay, silty clay loam, clay.	CL, CL-ML ML	A-6, A-4	0	98-100	95-100	95-100	90-100	25-40	5-15
Ch---------- Chocorua	0-32	Peat----------	Pt	A-8	0	---	---	---	---	---	---
	32-60	Gravelly sand, loamy sand, loamy fine sand.	SP, SM	A-1, A-3	0	100	60-100	30-80	0-30	---	NP
CoB, CoC, CoD, CoE- Colton	0-10	Gravelly loamy coarse sand.	SM, SP, GW, GM	A-1, A-2, A-3	5-20	30-80	25-75	25-60	2-25	---	NP
	10-18	Gravelly loamy sand, very gravelly sand, cobbly sand.	SM, GM, SP, GP	A-1, A-2, A-3	5-20	30-80	25-75	20-50	2-20	---	NP
	18-60	Very gravelly sand, very cobbly sand.	GP, SP, GW, SW	A-1	10-45	20-55	15-50	10-30	0-5	---	NP
CrB---------- Croghan	0-7	Loamy sand------	SM, SP-SM, SW-SM	A-1, A-3, A-4, A-2	0	95-100	95-100	45-80	5-40	---	NP
	7-28	Sand, loamy sand, loamy fine sand.	SM, SP-SM, SW-SM	A-1, A-2, A-3, A-4	0	90-100	85-100	45-80	5-40	---	NP
	28-60	Sand, loamy sand	SM, SP-SM, SW-SM	A-1, A-2, A-3	0	90-100	85-100	45-75	5-30	---	NP

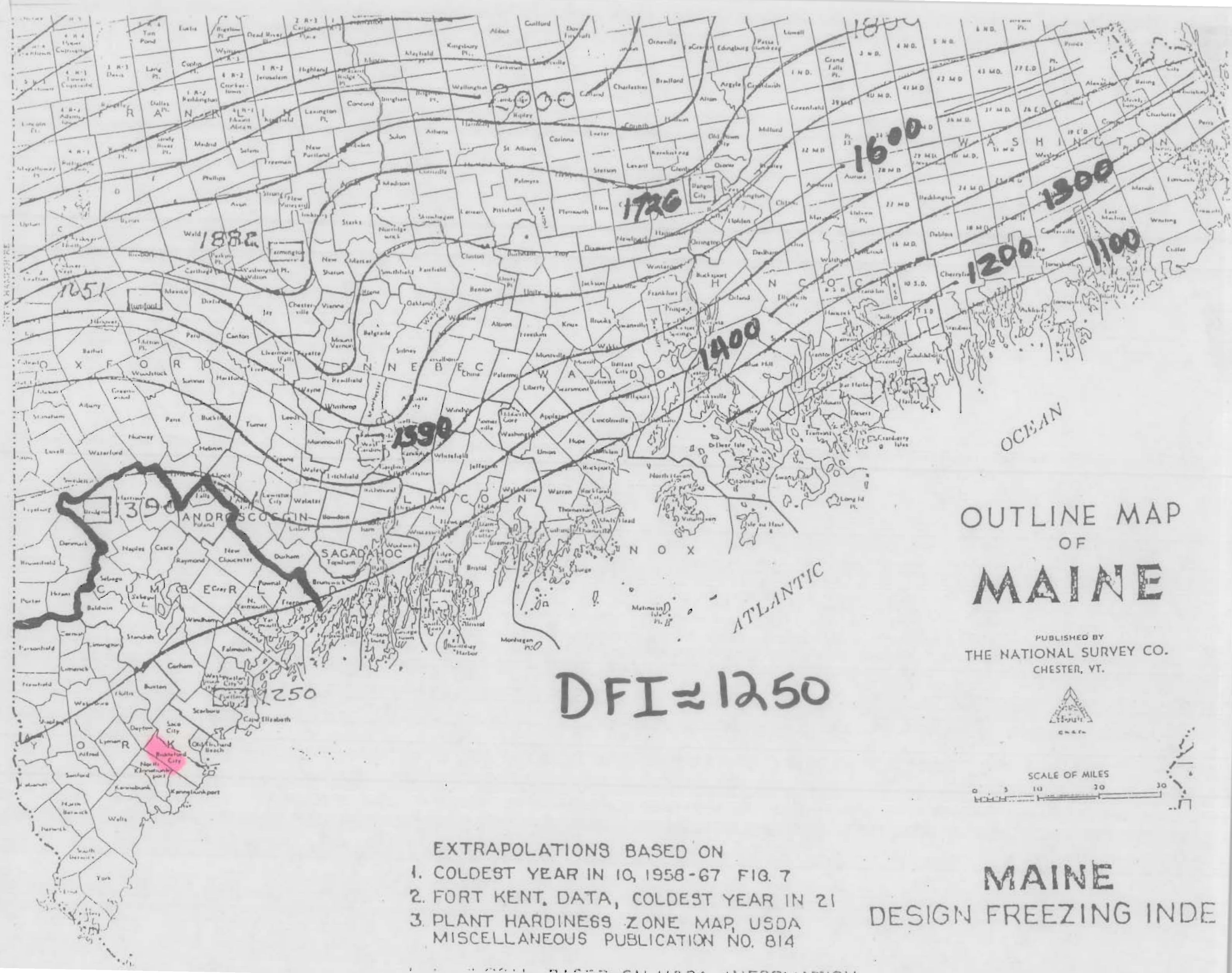
drainage area

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
CoB, CoC, CoD, CoE----------	0-10	1-5	1.10-1.40	>6.0	0.03-0.07	3.6-5.0	Low----------	0.17	3	3-7
Colton	10-18	1-5	1.25-1.55	>6.0	0.02-0.05	4.5-5.5	Low----------	0.17		
	18-60	0-3	1.45-1.65	>20	0.01-0.02	4.5-6.0	Low----------	0.17		
CrB----------	0-7	0-5	1.20-1.50	6.0-20	0.05-0.09	4.5-6.0	Low----------	0.17	5	2-9
Croghan	7-28	0-5	1.20-1.50	>20	0.03-0.07	4.5-6.0	Low----------	0.17		
	28-60	0-5	1.20-1.50	>20	0.03-0.06	4.5-6.0	Low----------	0.17		
CuB*:										
Croghan---------	0-7	0-5	1.20-1.50	6.0-20	0.05-0.09	4.5-6.0	Low----------	0.17	5	---
	7-28	0-5	1.20-1.50	>20	0.03-0.07	4.5-6.0	Low----------	0.17		
	28-60	0-5	1.20-1.50	>20	0.03-0.06	4.5-6.0	Low----------	0.17		
Urban land.										
Dm*.										
Dumps										
EmB, EmC---------	0-14	5-10	1.00-1.30	2.0-6.0	0.13-0.20	4.5-6.0	Low----------	0.32	3	3-7
Elmwood	14-20	5-12	1.15-1.45	2.0-6.0	0.13-0.22	5.6-6.5	Low----------	0.32		
	20-60	35-55	1.50-1.80	<0.2	0.12-0.18	6.1-7.3	Moderate-----	0.49		
HeB, HeC, HeD----	0-6	2-6	0.95-1.20	6.0-20	0.10-0.20	3.6-5.5	Low----------	0.17	3	3-7
Hermon	6-19	2-7	1.00-1.30	6.0-20	0.07-0.14	3.6-6.0	Low----------	0.17		
	19-60	1-4	1.50-1.80	6.0-20	0.01-0.10	5.1-6.0	Low----------	0.17		
HmB, HmC, HmD----	0-4	2-6	0.95-1.20	6.0-20	0.10-0.20	3.6-5.5	Low----------	0.17	3	---
Hermon	4-19	2-7	1.00-1.30	6.0-20	0.07-0.14	3.6-6.0	Low----------	0.17		
	19-60	1-4	1.50-1.80	6.0-20	0.01-0.10	5.1-6.0	Low----------	0.17		
HnC, HnE----------	0-4	2-6	0.95-1.20	6.0-20	0.08-0.18	3.6-5.5	Low----------	0.17	3	---
Hermon	4-19	2-7	1.00-1.30	6.0-20	0.07-0.14	3.6-6.0	Low----------	0.17		
	19-60	1-4	1.50-1.80	6.0-20	0.01-0.10	5.1-6.0	Low----------	0.17		
LnB, LnC, LnD----	0-4	2-10	0.90-1.20	2.0-6.0	0.11-0.20	3.6-6.0	Low----------	0.20	2	1-4
Lyman	4-18	2-10	1.20-1.40	2.0-6.0	0.07-0.16	3.6-6.0	Low----------	0.20		
	18	---	---	---	---	---	----------	----		
LyB*, LyC*, LyE*:										
Lyman----------	0-4	2-10	0.90-1.20	2.0-6.0	0.11-0.20	3.6-6.0	Low----------	0.20	2	1-4
	4-18	2-10	1.20-1.40	2.0-6.0	0.07-0.16	3.6-6.0	Low----------	0.20		
	18	---	---	---	---	---	----------	----		
Rock outcrop.										
MaB----------	0-10	3-13	0.95-1.25	2.0-6.0	0.11-0.25	4.5-6.0	Low----------	0.28	3	3-9
Madawaska	10-23	2-12	1.20-1.50	2.0-6.0	0.09-0.18	4.5-6.0	Low----------	0.28		
	23-60	0-5	1.35-1.65	6.0-20	0.02-0.08	4.5-6.0	Low----------	0.28		
MrB, MrC2, MrD2--	0-9	5-12	0.90-1.20	0.6-6.0	0.10-0.23	4.5-6.0	Low----------	0.24	3	3-8
Marlow	9-29	5-12	1.20-1.50	0.6-6.0	0.06-0.20	4.5-6.0	Low----------	0.43		
	29-60	5-12	1.70-2.00	0.06-0.6	0.05-0.12	4.5-6.0	Low----------	0.17		
MvB, MvC, MvD----	0-2	5-12	0.90-1.20	0.6-6.0	0.10-0.23	4.5-6.0	Low----------	0.24	3	---
Marlow	2-29	5-12	1.20-1.50	0.6-6.0	0.06-0.20	4.5-6.0	Low----------	0.43		
	29-60	5-12	1.70-2.00	0.06-6.0	0.05-0.12	4.5-6.0	Low----------	0.17		
Na----------	0-5	0-5	1.10-1.40	2.0-6.0	0.05-0.09	3.6-5.5	Low----------	0.17	5	2-7
Naumburg	5-28	0-5	1.25-1.55	6.0-20	0.06-0.08	3.6-5.5	Low----------	0.17		
	28-60	0-5	1.45-1.65	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.17		
On----------	0-9	0-10	1.10-1.40	2.0-6.0	0.12-0.26	4.5-6.5	Low----------	----	---	3-7
Ondawa	9-30	0-10	1.20-1.50	2.0-6.0	0.12-0.22	4.5-6.5	Low----------	----		
	30-60	0-5	1.20-1.50	2.0-20	0.01-0.13	4.5-6.5	Low----------	----		

See footnote at end of table.



EXTRAPOLATIONS BASED ON

1. COLDEST YEAR IN 10, 1958-67 FIG. 7
2. FORT KENT. DATA, COLDEST YEAR IN 21
3. PLANT HARDINESS ZONE MAP, USDA MISCELLANEOUS PUBLICATION NO. 814

MAINE

DESIGN FREEZING INDE

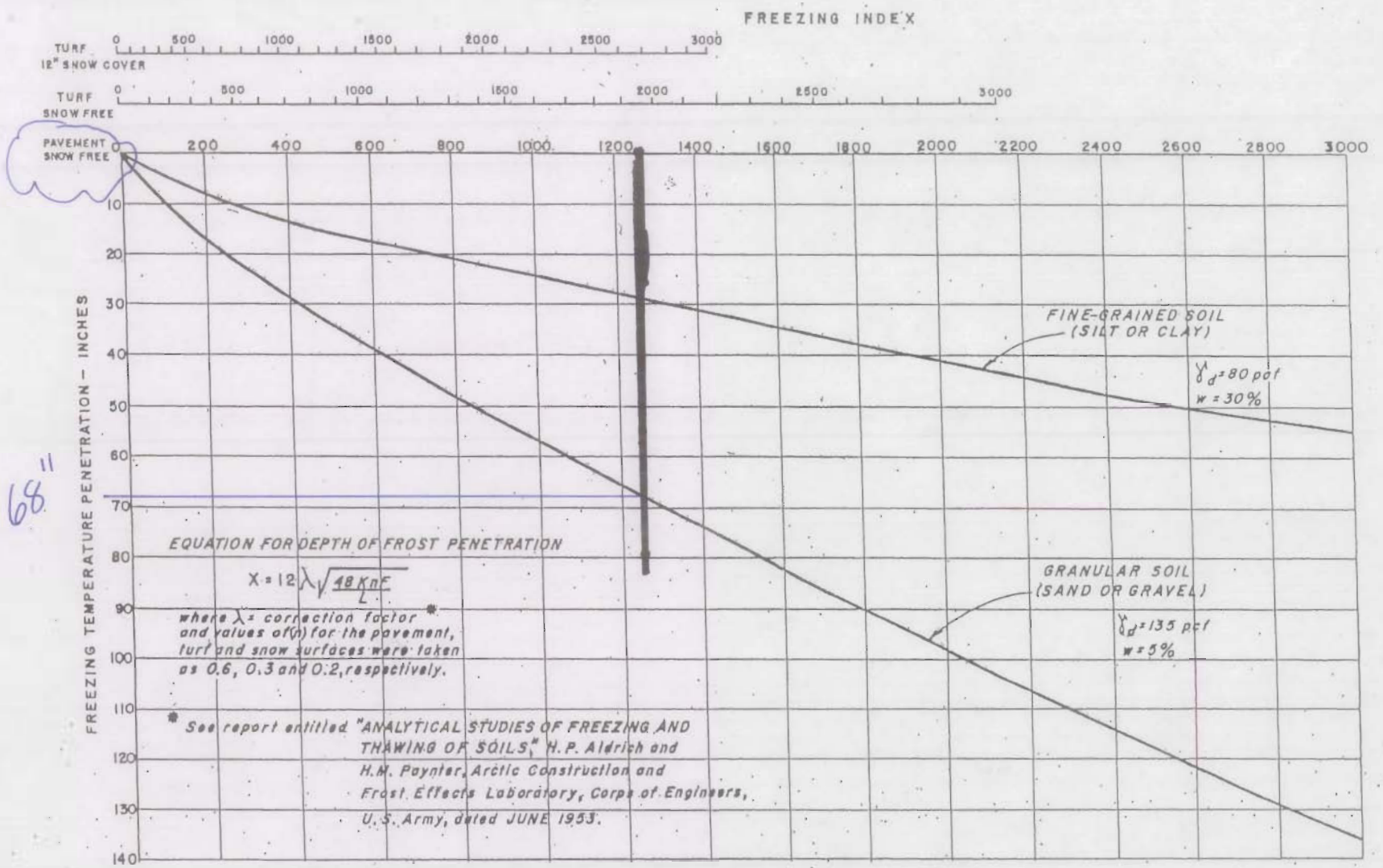


Figure 13-3 RELATIONSHIP BETWEEN FREEZING INDEX AND FREEZING TEMPERATURE PENETRATION FOR VARIOUS SURFACE CONDITIONS FOR GRANULAR AND FINE-GRAINED SOILS

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-101
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	63+13, 6.4 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.30		PAVEMENT. 0.30	
								-0.90		CONCRETE. 0.90	
	S1		1.10 - 3.00					-1.10		Brown, damp, fine to medium SAND, some gravel. 1.10	G#207234 A-2-4, SM WC=13.7%
										Dark brown, moist, fine to medium SAND some silt, trace gravel.	
	S2		3.00 - 5.00					-3.00		Gold, damp, fine to medium SAND, little gravel, trace silt. 3.00	G#207235 A-1-b, SP-SM WC=4.6
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-102
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	56+23, 4.1 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	C1		0.00 - 0.40				SSA	-0.40		PAVEMENT, (Core sample taken). 0.40	
	C1		0.40 - 0.90					-0.90		CONCRETE, (Core sample taken). 0.90	G#207236
	S3		0.90 - 5.00							Light brown, damp, fine to medium SAND, little silt, little gravel.	A-1-b, SM
											WC=4.2%
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-103
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	52+84, 4.1 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S4		0.90 - 5.00				SSA	-0.35		PAVEMENT. 0.35	
								-0.90		CONCRETE. 0.90	G#207237 A-1-b, SM WC=6.2%
										Brown, damp, fine to coarse SAND, some silt, little gravel.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-104
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	50+96, 4.2 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S5		0.80 - 2.20				SSA	-0.40		PAVEMENT.	
								-0.80		0.40	
										CONCRETE.	G#207238 A-2-4, SM WC=6.0%
										0.80	
	S6		2.20 - 5.00					-2.20		Brown, damp, fine to coarse SAND, some silt, little gravel.	
										2.20	G#207239 A-2-4, SM WC=21.5%
										Brown, moist, fine to medium SAND, some silt, trace gravel.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-105
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	48+08, 4.8 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S7		0.85 - 5.00				SSA	-0.40		PAVEMENT.	
								-0.85		0.40	
										CONCRETE.	
										0.85	
										Brown, moist, fine to coarse SAND, little silt, little gravel.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface.	
										NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-106
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	46+38, 6.4 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S8		0.90 - 5.00				SSA	-0.50		PAVEMENT. 0.50	
								-0.90		CONCRETE. 0.90	G#207240 A-1-b, SM WC=8.4%
										Brown, damp, fine to coarse SAND, little silt, little gravel.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-107
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	43+52, 12.4 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	C2		0.00 - 0.45				SSA	-0.45		PAVEMENT, (Core sample taken).	
	C2		0.45 - 1.00							0.45	
	S9		1.00 - 5.00					-1.00		CONCRETE, (Core sample taken).	G#207241 A-2-4, SM WC=4.1%
										1.00	
										Light brown, damp, fine to medium SAND, little gravel, little silt.	
5								-5.00		5.00	
										Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

Offsets are from Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Elm Street (Route 1)
Location: Biddeford, Maine

Boring No.: HB-BIDD-108
PIN: 14814.00

Driller:	MaineDOT	**Elevation (ft.)**	168.7	**Auger ID/OD:**	5" Dia.
Operator:	E. Giguere/C. Giles	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	5/8/08-5/8/08	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	40+33, 4.5 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WOH = weight of 140lb. hammer
WOR = weight of rods WOC = weight of casing

Definitions:
WC = water content, percent
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	168.25		PAVEMENT. 0.45	
							167.70		CONCRETE. 1.00	
	S10		1.00 - 5.00						Light brown, damp, fine to medium SAND, little gravel, litle silt.	
5							163.70		5.00	
									Bottom of Exploration at 5.00 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-201, B-1
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	165.0	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 09:30-10:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	50+79.3, 201.7 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	28.2 ft bgs.
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							HSA	164.70		TOPSOIL, (Sod). 0.30	
5	MD	1.2/0	5.00 - 5.10	25(1.2")	---					Failed sample attempt. Cobble from 5.0-5.6 ft bgs.	
10	1D	24/10	10.00 - 12.00	4/3/2/3	5	6				Brown, moist, loose, fine to coarse SAND, some gravel, little silt, (Fill).	G#239976 A-1-b, SW-SM WC=7.7%
								151.00		14.00	
15	2D	24/20	15.00 - 17.00	4/6/9/12	15	17				Brown, damp, medium dense, fine to medium SAND, trace silt, trace gravel, (Native Soil).	G#239977 A-3, SP WC=4.5%
20	3D	24/18	20.00 - 22.00	14/17/17/18	34	38				Similar to above.	
25											

Remarks:

Auto Hammer #283

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 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-201, B-1
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	165.0	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 09:30-10:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	50+79.3, 201.7 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	28.2 ft bgs.
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
30	4D	18/18	30.00 - 31.50	20/21/22	43	49		135.00		Brown, wet, dense, fine to coarse SAND, some gravel, trace silt. 30.00	
								133.50		31.50 **Bottom of Exploration at 31.50 feet below ground surface.** NO REFUSAL	

Remarks:

Auto Hammer #283

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 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-202, B-2
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	167.5	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 10:30-11:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	51+35, 220.4 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							HSA	167.20		TOPSOIL, (Sod). 0.30	
10	1D	24/18	10.00 - 12.00	3/3/6/8	9	10				Olive-brown, wet, loose, SILT, some sand, trace gravel, (Fill).	G#239978 A-4, ML WC=25.2%
20	2D	24/18	20.00 - 22.00	4/31/45/9	76	86		147.00		Dark brown, wet, silty, fine to medium SAND, gravel, (Fill). 20.50	
								146.00		Wood layer from 20.5-21.5 ft bgs. 21.50	
								144.50		23.00	
25											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-202, B-2
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	167.5	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 10:30-11:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	51+35, 220.4 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	3D	24/16	25.00 - 27.00	11/12/16/19	28	32		140.50		Brown, damp, medium dense, fine to medium SAND, trace silt, trace gravel, (Native Soil).	G#239980 A-3, SP-SM WC=3.9%
										27.00 **Bottom of Exploration at 27.00 feet below ground surface.** NO REFUSAL	
30											
35											
40											
45											
50											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-203, B-3
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	167.4	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 12:00-13:00	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	51+79.8, 239.5 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/18	0.00 - 2.00	6/6/8/6	14	16	HSA			Brown, moist, medium dense, fine to coarse SAND, some silt, little gravel, (Fill).	G#239981 A-2-4, SM WC=12.5%
5	2D	24/12	5.00 - 7.00	3/3/4/4	7	8		161.40		6.00 Olive-grey, loose, silty, fine to medium SAND, trace gravel, little clay, (Fill).	
10	3D	24/10	10.00 - 12.00	2/2/2/11	4	5		157.40		10.00 Olive-grey, wet, loose, silty, fine to medium SAND, old pavement, trace gravel, (Fill).	
15	4D	24/14	15.00 - 17.00	2/2/3/2	5	6		153.40		14.00 Olive, wet, loose, fine to coarse SAND, some silt, little gravel, (Fill).	G#239982 A-1-b, SM WC=14.1%
20	5D	24/16	20.00 - 22.00	4/3/3/3	6	7				Similar to above.	
25								143.40		24.00	

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-203, B-3
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	167.4	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 12:00-13:00	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	51+79.8, 239.5 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
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MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	6D	24/20	25.00 - 27.00	2/2/3/5	5	6				Grey-brown, wet, loose, sandy SILT, trace gravel, brick fragments, (Fill).	G#239983 A-4, SM WC=20.8%
								138.40		29.00	
30	7D	24/20	30.00 - 32.00	13/18/25/27	43	49				Brown, wet, dense, fine to coarse SAND, trace gravel, trace silt.	G#239984 A-1-b, SP-SM WC=15.0%
								135.40		32.00	
										Bottom of Exploration at 32.00 feet below ground surface. NO REFUSAL	
35											
40											
45											
50											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-204, B-4
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	162.6	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 13:00-13:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	51+15.5, 300.1 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							HSA	162.30		TOPSOIL, (Sod). 0.30	
										Cobble from 3.0-3.5 ft bgs.	
5	1D	24/14	5.00 - 7.00	2/3/2/5	5	6				Brown, moist, loose, GRAVEL, some sand, some silt, granite pieces, (Fill).	G#239985 A-2-4, GM WC=9.0%
10	2D	24/18	10.00 - 12.00	1/3/8/4	11	12				Cobble from 9.5-10.0 ft bgs. Similar to above, except medium dense, (Fill).	
15	3D	9.6/6	15.00 - 15.80	3/50(3.6")	---			146.80		Similar to above, (Fill). 15.80	
20										**Bottom of Exploration at 15.80 feet below ground surface.** BOULDER or GRANITE BLOCK REFUSAL	
25											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-205, B-5
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	159.0	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 13:30-14:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	50+74.5, 322.1 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							HSA	158.70		TOPSOIL, (Sod). 0.30	
5	1D	24/15	5.00 - 7.00	3/2/4/3	6	7				Olive-brown, wet, loose, SILT, some sand, little gravel, granite fragments, (Fill).	G#239986 A-4, ML WC=24.8%
10	2D	24/10	10.00 - 12.00	2/3/4/3	7	8				Similar to above, (Fill).	
15	3D	24/10	15.00 - 17.00	4/3/4/40	7	8				Similar to above, (Fill).	
								141.90		17.10 **Bottom of Exploration at 17.10 feet below ground surface.** BOULDER or GRANITE BLOCK REFUSAL	
20											
25											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1, Detention Basin
Location: Biddeford, Maine

Boring No.: HB-BIDD-206, B-6
PIN: 14814.00

Driller:	Northern Test Boring	**Elevation (ft.)**	142.5	**Auger ID/OD:**	2¾"/6¼"
Operator:	Mike/Mike	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/19/11; 14:30-15:30	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	50+60, 434.4 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	8.8 ft bgs.
Hammer Efficiency Factor:	0.678	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	1D	24/12	0.00 - 2.00	7/12/40/39	52	59	HSA			Brown, damp, dense, fine to coarse SAND, some gravel, little silt.	G#239987 A-1-b, SM WC=7.2%
								140.00		2.50	
5	2D	24/20	5.00 - 7.00	13/15/16/15	31	35				Light brown, damp, dense, fine to coarse SAND, little gravel, trace silt.	G#239988 A-1-b, SP-SM WC=3.7%
10	3D	24/18	10.00 - 12.00	7/12/13/13	25	28				Similar to above, except medium dense.	
								130.50		12.00	
										Bottom of Exploration at 12.00 feet below ground surface. NO REFUSAL	
15											
20											
25											

Remarks:

Auto Hammer #283

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Pavement Core
Station 56+23, 4.1' R

Pavement Core
Station 43+52, 12.4' R

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Biddeford Project Number: 14814.00

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-BIDD-101, S1	63+13	6.4 Lt.	1.1-3.0	207234	1	13.7			SM	A-2-4	II
HB-BIDD-101, S2	63+13	6.4 Lt.	3.0-5.0	207235	1	4.6			SP-SM	A-1-b	0
HB-BIDD-102, S3	56+23	4.1 Rt.	0.9-5.0	207236	1	4.2			SM	A-1-b	II
HB-BIDD-103, S4	52+84	4.1 Rt.	0.9-5.0	207237	1	6.2			SM	A-1-b	II
HB-BIDD-104, S5	50+96	4.2 Lt.	0.8-2.2	207238	2	6.0			SM	A-2-4	II
HB-BIDD-104, S6	50+96	4.2 Lt.	2.2-5.0	207239	2	21.5			SM	A-2-4	II
HB-BIDD-106, S8	46+38	6.4 Lt.	0.9-5.0	207240	2	8.4			SM	A-1-b	II
HB-BIDD-107, S9	43+52	12.4 Rt.	1.0-5.0	207241	2	4.1			SM	A-2-4	II
HB-BIDD-201, 1D	50+79.3	201.7 Rt.	10.0-12.0	239976	3	7.7			SW-SM	A-1-b	0
HB-BIDD-201, 2D	50+79.3	201.7 Rt.	15.0-17.0	239977	3	4.5			SP	A-3	0
HB-BIDD-202, 1D	51+35	220.4 Rt	10.0-12.0	239978	3	25.2			ML	A-4	IV
HB-BIDD-202, 3D	51+35	220.4 Rt	25.0-27.0	239980	3	3.9			SP-SM	A-3	0
HB-BIDD-203, 1D	51+79.8	239.5 Rt.	0.0-2.0	239981	4	12.5			SM	A-2-4	II
HB-BIDD-203, 4D	51+79.8	239.5 Rt.	15.0-17.0	239982	4	14.1			SM	A-1-b	II
HB-BIDD-203, 6D	51+79.8	239.5 Rt.	25.0-27.0	239983	4	20.8			SM	A-4	IV
HB-BIDD-203, 7D	51+79.8	239.5 Rt.	30.0-32.0	239984	4	15.0			SP-SM	A-1-b	0
HB-BIDD-204, 1D	51+15.5	300.1 Rt.	5.0-7.0	239985	5	9.0			GM	A-2-4	II
HB-BIDD-205, 1D	50+74.5	322.1 Rt.	5.0-7.0	239986	5	24.8			ML	A-4	IV
HB-BIDD-206, 1D	50+60	434.4 Rt.	0.0-2.0	239987	5	7.2			SM	A-1-b	II
HB-BIDD-206, 2D	50+60	434.4 Rt.	5.0-7.0	239988	5	3.7			SP-SM	A-1-b	0
Borings are in Boring & Sample order rather than Station order.											

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 MDOT 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)

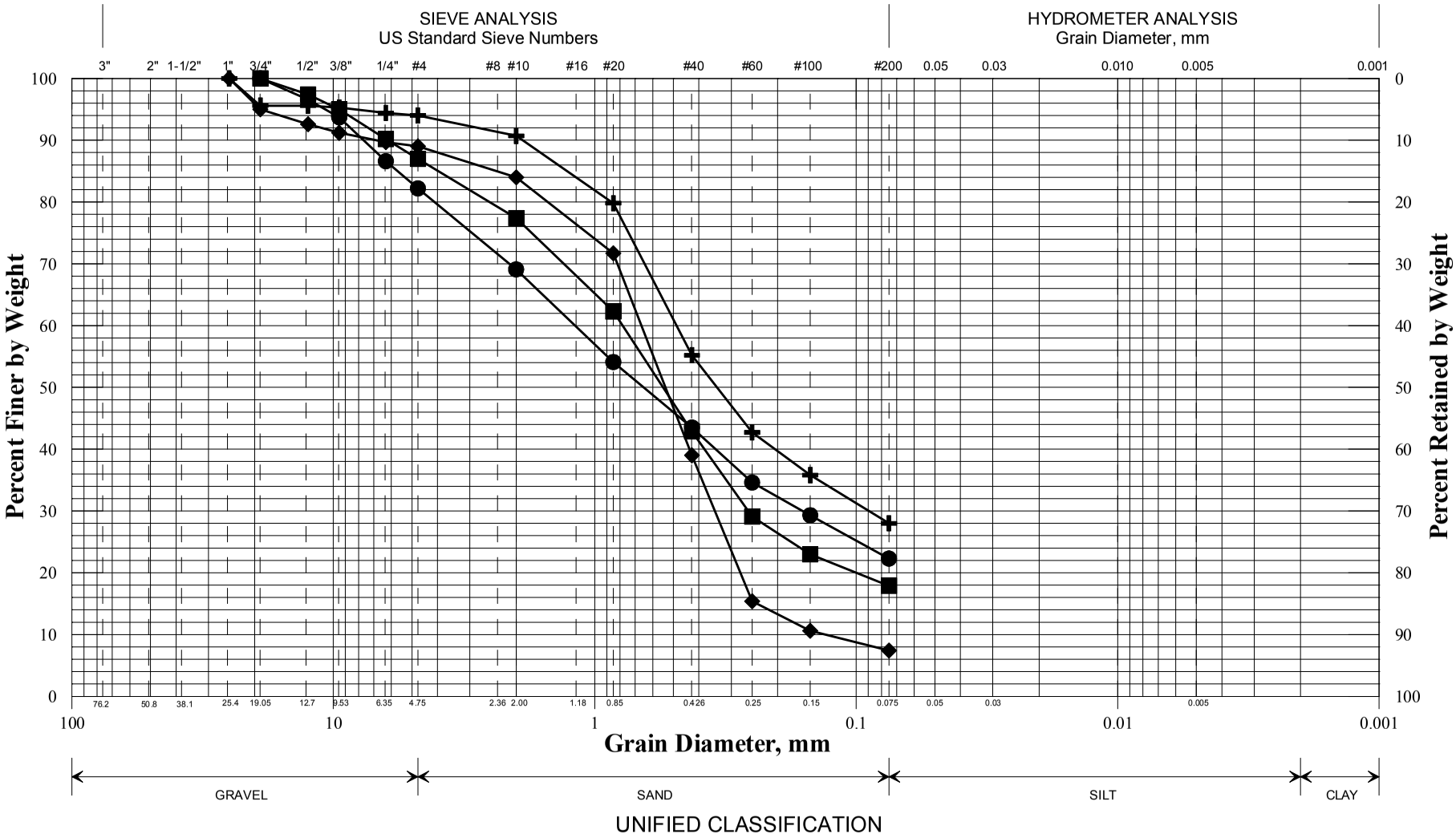
WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

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

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

State of Maine Department of Transportation

GRAIN SIZE DISTRIBUTION CURVE

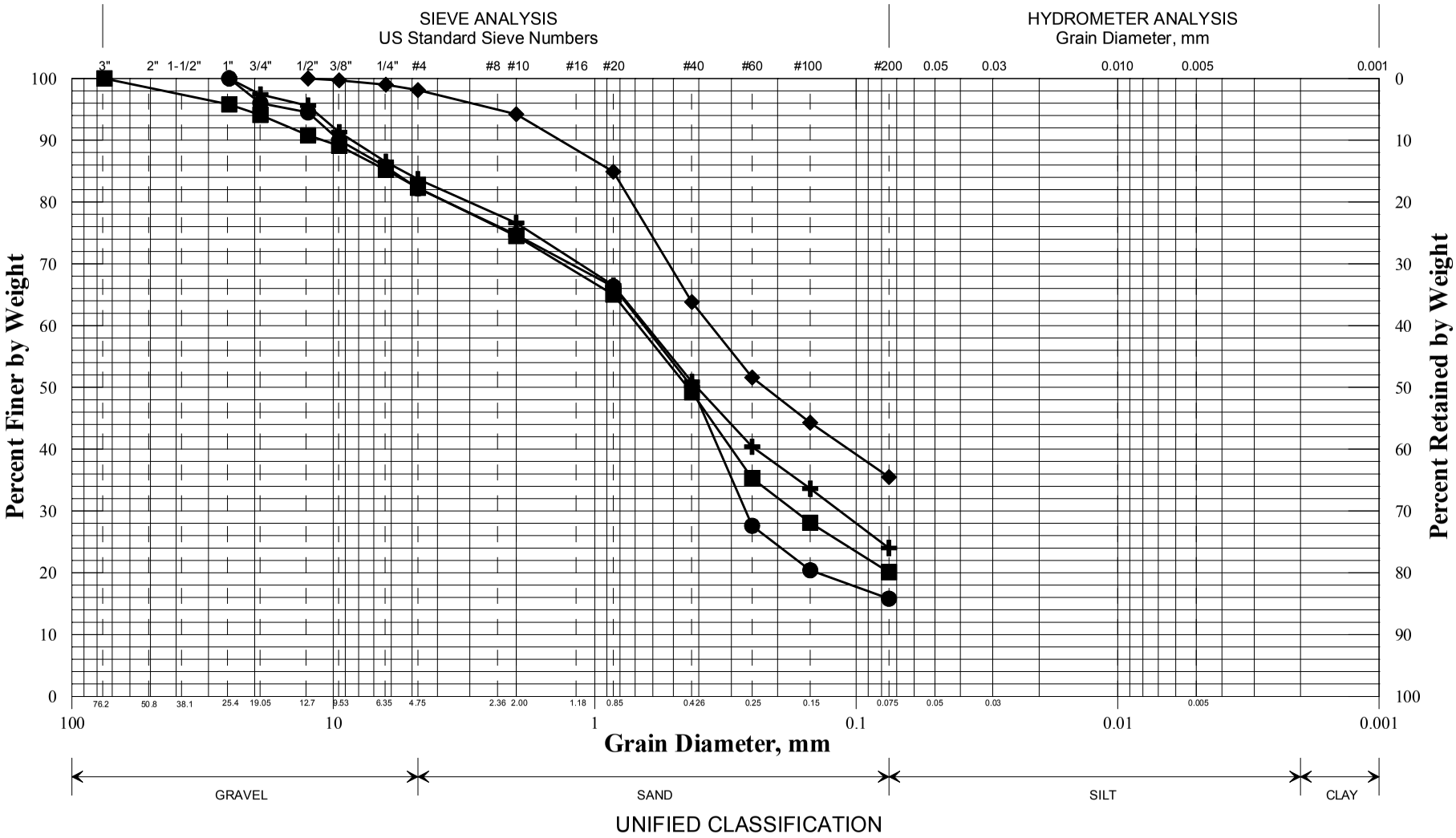


	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-BIDD-101/S1	63+13	6.4 LT	1.1-3.0	SAND, some silt, trace gravel.	13.7			
◆	HB-BIDD-101/S2	63+13	6.4 LT	3.0-5.0	SAND, little gravel, trace silt.	4.6			
■	HB-BIDD-102/S3	56+23	4.1 RT	0.9-5.0	SAND, little silt, little gravel.	4.2			
●	HB-BIDD-103/S4	52+84	4.1 RT	0.9-5.0	SAND, some silt, little gravel.	6.2			
▲									
✕									

PIN
014814.00
Town
Biddeford
Reported by/Date
WHITE, TERRY A 6/3/2008

State of Maine Department of Transportation

GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-BIDD-104/S5	50+96	4.2 LT	0.8-2.2	SAND, some silt, little gravel.	6.0			
◆	HB-BIDD-104/S6	50+96	4.2 LT	2.2-5.0	SAND, some silt, trace gravel.	21.5			
■	HB-BIDD-106/S8	46+38	6.4 LT	0.9-5.0	SAND, little silt, little gravel.	8.4			
●	HB-BIDD-107/S9	43+52	12.4 RT	1.0-5.0	SAND, little gravel, little silt.	4.1			
▲									
✖									

PIN
014814.00
Town
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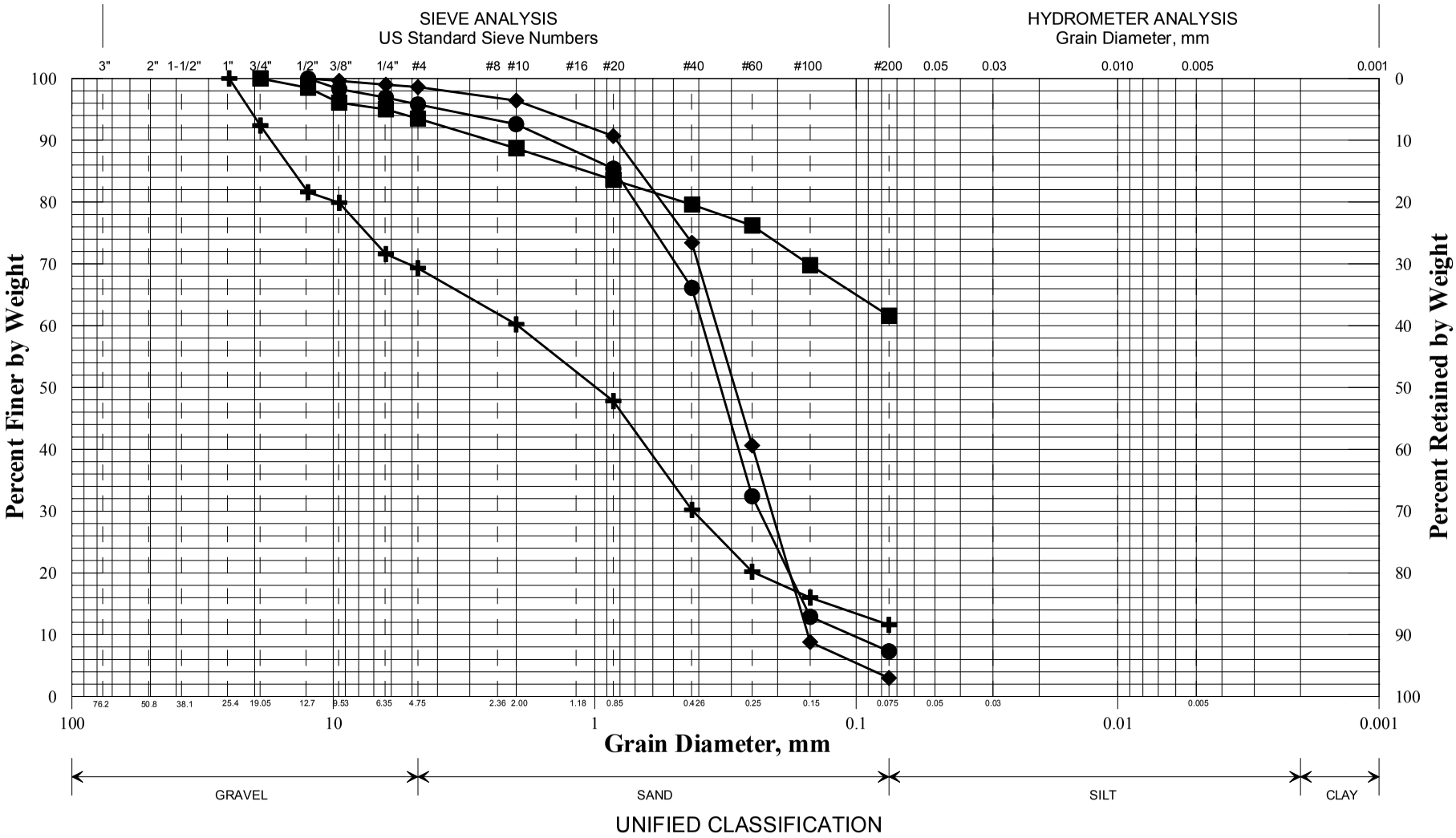
WHITE, TERRY A 6/3/2008

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-BIDD-201/1D	50+79.3	201.7 RT	10.0-12.0	SAND, some gravel, little silt.	7.7			
◆	HB-BIDD-201/2D	50+79.3	201.7 RT	15.0-17.0	SAND, trace silt, trace gravel.	4.5			
■	HB-BIDD-202/1D	51+35	220.4 RT	10.0-12.0	SILT, some sand, trace gravel.	25.2			
●	HB-BIDD-202/3D	51+35	220.4 RT	25.0-27.0	SAND, trace silt, trace gravel.	3.9			
▲									
✖									

PIN
014814.00
Town
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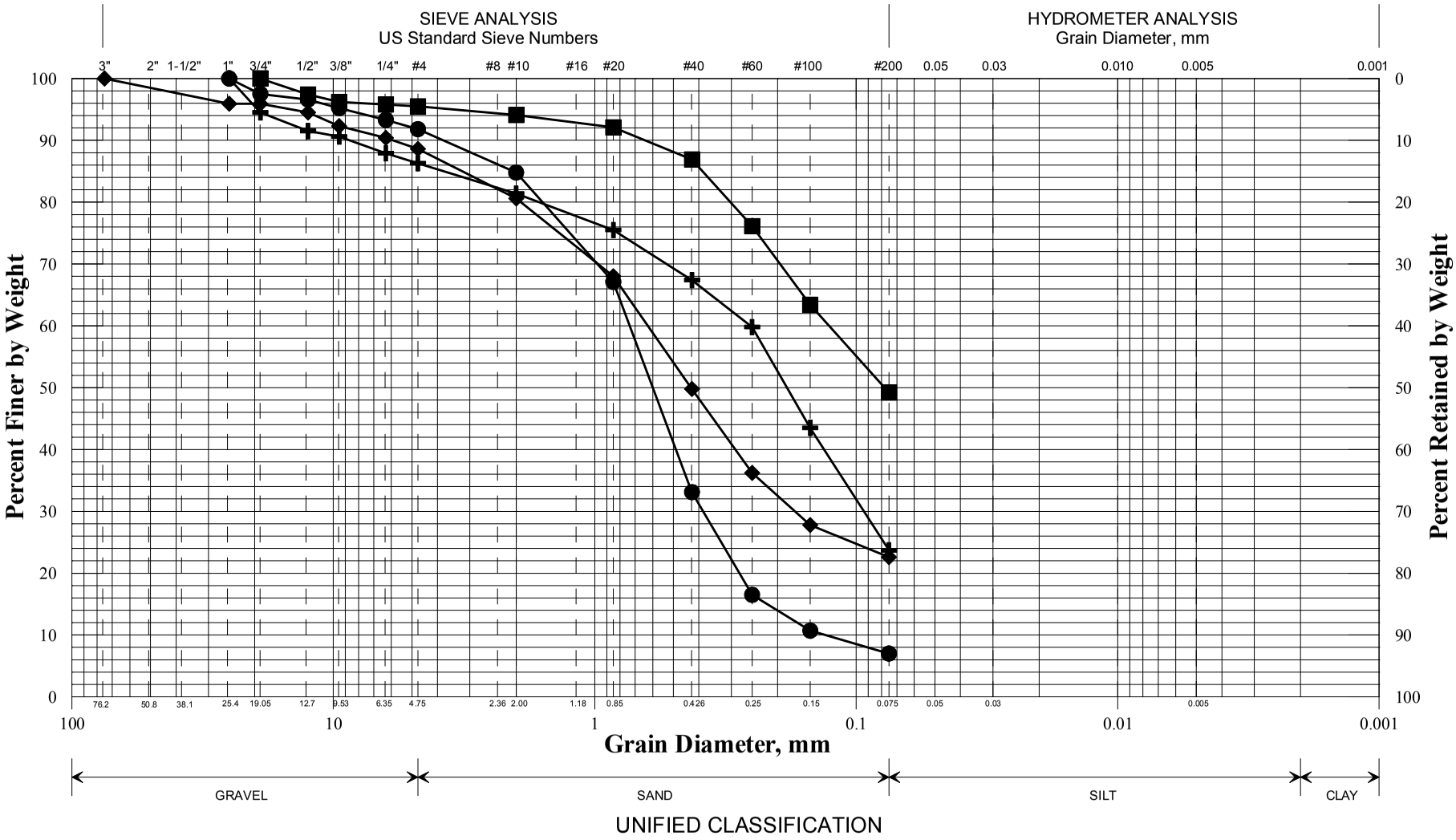
WHITE, TERRY A 2/8/2011

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-BIDD-203/1D	51+79.8	239.5 RT	0.0-2.0	SAND, some silt, little gravel.	12.5			
◆	HB-BIDD-203/4D	51+79.8	239.5 RT	15.0-17.0	SAND, some silt, little gravel.	14.1			
■	HB-BIDD-203/6D	51+79.8	239.5 RT	25.0-27.0	Sandy SILT, trace gravel.	20.8			
●	HB-BIDD-203/7D	51+79.8	239.5 RT	30.0-32.0	SAND, trace gravel, trace silt.	15.0			
▲									
✖									

PIN
014814.00
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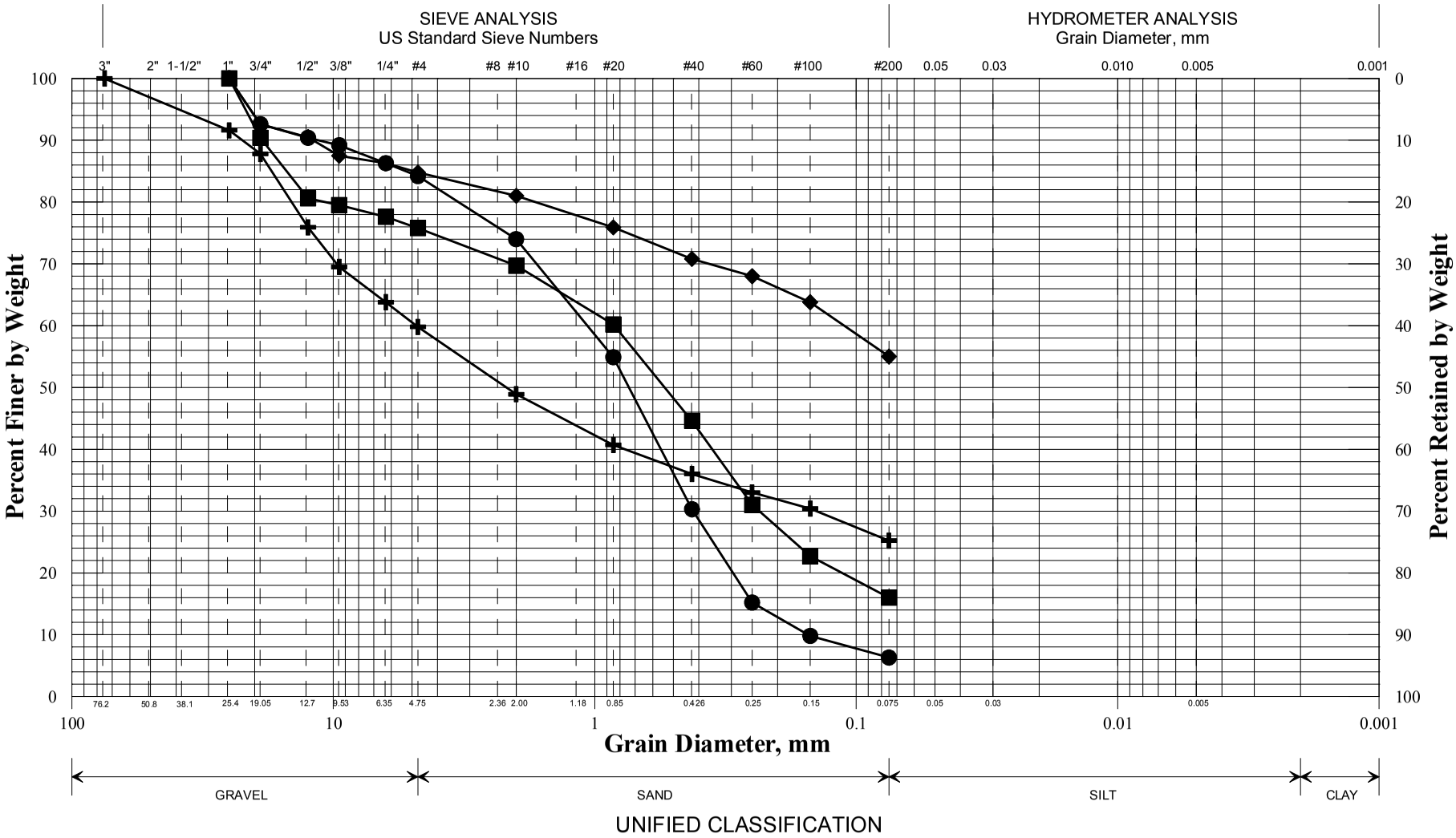
Biddeford
Reported by/Date
WHITE, TERRY A 2/8/2011

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-BIDD-204/1D	51+15.5	300.1 RT	5.0-7.0	GRAVEL, some sand, some silt.	9.0			
◆	HB-BIDD-205/1D	50+74.4	322.1 RT	5.0-7.0	SILT, some sand, little gravel.	24.8			
■	HB-BIDD-206/1D	50+60	434.4 RT	0.0-2.0	SAND, some gravel, little silt.	7.2			
●	HB-BIDD-206/2D	50+60	434.4 RT	5.0-7.0	SAND, little gravel, trace silt.	3.7			
▲									
✖									

PIN
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Town
Biddeford
Reported by/Date
WHITE, TERRY A 2/8/2011

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207234	**HB-BIDD-101/S1**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **63+13** Offset, ft: **6.4** **LT** Dbfg, ft: **1.1-3.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**95.6**
½ in. [12.5 mm]	**95.6**
⅜ in. [9.5 mm]	**95.3**
¼ in. [6.3 mm]	**94.4**
No. 4 [4.75 mm]	**94.0**
No. 10 [2.00 mm]	**90.7**
No. 20 [0.850 mm]	**79.8**
No. 40 [0.425 mm]	**55.2**
No. 60 [0.250 mm]	**42.7**
No. 100 [0.150 mm]	**35.8**
No. 200 [0.075 mm]	**28.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

13.7

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/30/2008**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207235	**HB-BIDD-101/S2**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **63+13** Offset, ft: **6.4** **LT** Dbfg, ft: **3.0-5.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**95.0**
½ in. [12.5 mm]	**92.6**
⅜ in. [9.5 mm]	**91.2**
¼ in. [6.3 mm]	**89.7**
No. 4 [4.75 mm]	**89.0**
No. 10 [2.00 mm]	**84.0**
No. 20 [0.850 mm]	**71.7**
No. 40 [0.425 mm]	**39.0**
No. 60 [0.250 mm]	**15.4**
No. 100 [0.150 mm]	**10.6**
No. 200 [0.075 mm]	**7.4**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
4.6

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **5/30/2008**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207236	**HB-BIDD-102/S3**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **56+23** Offset, ft: **4.1** **RT** Dbfg, ft: **0.9-5.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**97.4**
⅜ in. [9.5 mm]	**95.0**
¼ in. [6.3 mm]	**90.2**
No. 4 [4.75 mm]	**87.0**
No. 10 [2.00 mm]	**77.4**
No. 20 [0.850 mm]	**62.3**
No. 40 [0.425 mm]	**42.9**
No. 60 [0.250 mm]	**29.1**
No. 100 [0.150 mm]	**23.0**
No. 200 [0.075 mm]	**17.9**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

4.2

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2008**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207237	**HB-BIDD-103/S4**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **52+84** Offset, ft: **4.1** **RT** Dbfg, ft: **0.9-5.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**96.6**
⅜ in. [9.5 mm]	**93.7**
¼ in. [6.3 mm]	**86.6**
No. 4 [4.75 mm]	**82.2**
No. 10 [2.00 mm]	**69.1**
No. 20 [0.850 mm]	**54.1**
No. 40 [0.425 mm]	**43.5**
No. 60 [0.250 mm]	**34.6**
No. 100 [0.150 mm]	**29.3**
No. 200 [0.075 mm]	**22.3**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

6.2

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2008**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207238	**HB-BIDD-104/S5**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+96** Offset, ft: **4.2** **LT** Dbfg, ft: **0.8-2.2**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**97.4**
½ in. [12.5 mm]	**95.6**
⅜ in. [9.5 mm]	**91.3**
¼ in. [6.3 mm]	**86.5**
No. 4 [4.75 mm]	**83.7**
No. 10 [2.00 mm]	**76.6**
No. 20 [0.850 mm]	**66.5**
No. 40 [0.425 mm]	**50.9**
No. 60 [0.250 mm]	**40.4**
No. 100 [0.150 mm]	**33.6**
No. 200 [0.075 mm]	**24.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

6.0

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2008**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207239	**HB-BIDD-104/S6**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+96** Offset, ft: **4.2** **LT** Dbfg, ft: **2.2-5.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	**100.0**
⅜ in. [9.5 mm]	**99.7**
¼ in. [6.3 mm]	**99.0**
No. 4 [4.75 mm]	**98.1**
No. 10 [2.00 mm]	**94.2**
No. 20 [0.850 mm]	**84.9**
No. 40 [0.425 mm]	**63.8**
No. 60 [0.250 mm]	**51.6**
No. 100 [0.150 mm]	**44.3**
No. 200 [0.075 mm]	**35.5**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

21.5

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2008**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207240	**HB-BIDD-106/S8**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **46+38** Offset, ft: **6.4** **LT** Dbfg, ft: **0.9-5.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**95.8**
¾ in. [19.0 mm]	**94.1**
½ in. [12.5 mm]	**90.8**
⅜ in. [9.5 mm]	**89.1**
¼ in. [6.3 mm]	**85.2**
No. 4 [4.75 mm]	**82.3**
No. 10 [2.00 mm]	**74.5**
No. 20 [0.850 mm]	**65.0**
No. 40 [0.425 mm]	**49.2**
No. 60 [0.250 mm]	**35.3**
No. 100 [0.150 mm]	**28.1**
No. 200 [0.075 mm]	**20.1**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
8.4

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2008**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
207241	**HB-BIDD-107/S9**	**GEOTECHNICAL (DISTURBED)**	**5/8/2008**	**5/23/2008**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **43+52** Offset, ft: **12.4** **RT** Dbfg, ft: **1.0-5.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**96.0**
½ in. [12.5 mm]	**94.5**
⅜ in. [9.5 mm]	**90.0**
¼ in. [6.3 mm]	**85.7**
No. 4 [4.75 mm]	**82.2**
No. 10 [2.00 mm]	**74.7**
No. 20 [0.850 mm]	**66.3**
No. 40 [0.425 mm]	**50.1**
No. 60 [0.250 mm]	**27.6**
No. 100 [0.150 mm]	**20.4**
No. 200 [0.075 mm]	**15.8**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

4.1

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **6/2/2008**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239976	**HB-BIDD-201/1D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+79.3** Offset, ft: **201. RT** Dbfg, ft: **10.0-12.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**92.4**
½ in. [12.5 mm]	**81.6**
⅜ in. [9.5 mm]	**79.9**
¼ in. [6.3 mm]	**71.6**
No. 4 [4.75 mm]	**69.3**
No. 10 [2.00 mm]	**60.2**
No. 20 [0.850 mm]	**47.8**
No. 40 [0.425 mm]	**30.2**
No. 60 [0.250 mm]	**20.2**
No. 100 [0.150 mm]	**16.0**
No. 200 [0.075 mm]	**11.6**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

7.7

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239977	**HB-BIDD-201/2D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+79.3** Offset, ft: **201. RT** Dbfg, ft: **15.0-17.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method: Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	**100.0**
⅜ in. [9.5 mm]	**99.6**
¼ in. [6.3 mm]	**99.0**
No. 4 [4.75 mm]	**98.6**
No. 10 [2.00 mm]	**96.4**
No. 20 [0.850 mm]	**90.7**
No. 40 [0.425 mm]	**73.4**
No. 60 [0.250 mm]	**40.6**
No. 100 [0.150 mm]	**8.8**
No. 200 [0.075 mm]	**3.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
4.5

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239978	**HB-BIDD-202/1D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+35** Offset, ft: **220. RT** Dbfg, ft: **10.0-12.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**98.5**
⅜ in. [9.5 mm]	**96.1**
¼ in. [6.3 mm]	**95.0**
No. 4 [4.75 mm]	**93.5**
No. 10 [2.00 mm]	**88.7**
No. 20 [0.850 mm]	**83.6**
No. 40 [0.425 mm]	**79.6**
No. 60 [0.250 mm]	**76.2**
No. 100 [0.150 mm]	**69.8**
No. 200 [0.075 mm]	**61.6**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

25.2

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239980	**HB-BIDD-202/3D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+35** Offset, ft: **220. RT** Dbfg, ft: **25.0-27.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method: Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	**100.0**
⅜ in. [9.5 mm]	**98.3**
¼ in. [6.3 mm]	**96.9**
No. 4 [4.75 mm]	**95.8**
No. 10 [2.00 mm]	**92.6**
No. 20 [0.850 mm]	**85.4**
No. 40 [0.425 mm]	**66.1**
No. 60 [0.250 mm]	**32.4**
No. 100 [0.150 mm]	**12.9**
No. 200 [0.075 mm]	**7.3**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
3.9

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239981	**HB-BIDD-203/1D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+79.8** Offset, ft: **239. RT** Dbfg, ft: **0.0-2.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**94.5**
½ in. [12.5 mm]	**91.5**
⅜ in. [9.5 mm]	**90.6**
¼ in. [6.3 mm]	**87.9**
No. 4 [4.75 mm]	**86.3**
No. 10 [2.00 mm]	**81.4**
No. 20 [0.850 mm]	**75.5**
No. 40 [0.425 mm]	**67.4**
No. 60 [0.250 mm]	**59.8**
No. 100 [0.150 mm]	**43.5**
No. 200 [0.075 mm]	**23.7**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

12.5

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239982	**HB-BIDD-203/4D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+79.8** Offset, ft: **239. RT** Dbfg, ft: **15.0-17.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**95.9**
¾ in. [19.0 mm]	**95.9**
½ in. [12.5 mm]	**94.5**
⅜ in. [9.5 mm]	**92.3**
¼ in. [6.3 mm]	**90.4**
No. 4 [4.75 mm]	**88.6**
No. 10 [2.00 mm]	**80.6**
No. 20 [0.850 mm]	**68.0**
No. 40 [0.425 mm]	**49.8**
No. 60 [0.250 mm]	**36.2**
No. 100 [0.150 mm]	**27.8**
No. 200 [0.075 mm]	**22.6**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)
Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
14.1

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239983	**HB-BIDD-203/6D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+79.8** Offset, ft: **239. RT** Dbfg, ft: **25.0-27.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**97.4**
⅜ in. [9.5 mm]	**96.2**
¼ in. [6.3 mm]	**95.8**
No. 4 [4.75 mm]	**95.5**
No. 10 [2.00 mm]	**94.1**
No. 20 [0.850 mm]	**92.1**
No. 40 [0.425 mm]	**86.9**
No. 60 [0.250 mm]	**76.1**
No. 100 [0.150 mm]	**63.4**
No. 200 [0.075 mm]	**49.2**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

20.8

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239984	**HB-BIDD-203/7D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+79.8** Offset, ft: **239. RT** Dbfg, ft: **30.0-32.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**97.5**
½ in. [12.5 mm]	**96.6**
⅜ in. [9.5 mm]	**95.2**
¼ in. [6.3 mm]	**93.3**
No. 4 [4.75 mm]	**91.8**
No. 10 [2.00 mm]	**84.8**
No. 20 [0.850 mm]	**67.1**
No. 40 [0.425 mm]	**33.1**
No. 60 [0.250 mm]	**16.5**
No. 100 [0.150 mm]	**10.7**
No. 200 [0.075 mm]	**7.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

15.0

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239985	**HB-BIDD-204/1D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **51+15.5** Offset, ft: **300. RT** Dbfg, ft: **5.0-7.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	**100.0**
1 in. [25.0 mm]	**91.6**
¾ in. [19.0 mm]	**87.8**
½ in. [12.5 mm]	**75.9**
⅜ in. [9.5 mm]	**69.5**
¼ in. [6.3 mm]	**63.8**
No. 4 [4.75 mm]	**59.8**
No. 10 [2.00 mm]	**48.9**
No. 20 [0.850 mm]	**40.7**
No. 40 [0.425 mm]	**36.0**
No. 60 [0.250 mm]	**33.0**
No. 100 [0.150 mm]	**30.4**
No. 200 [0.075 mm]	**25.2**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %
Plastic Limit (T 90), %
Plasticity Index (T 90), %
Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
9.0

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239986	**HB-BIDD-205/1D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+74.4** Offset, ft: **322. RT** Dbfg, ft: **5.0-7.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**92.6**
½ in. [12.5 mm]	**90.5**
⅜ in. [9.5 mm]	**87.5**
¼ in. [6.3 mm]	**86.3**
No. 4 [4.75 mm]	**84.8**
No. 10 [2.00 mm]	**81.0**
No. 20 [0.850 mm]	**75.9**
No. 40 [0.425 mm]	**70.8**
No. 60 [0.250 mm]	**68.0**
No. 100 [0.150 mm]	**63.8**
No. 200 [0.075 mm]	**55.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

24.8

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

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Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239987	**HB-BIDD-206/1D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+60** Offset, ft: **434.** **RT** Dbfg, ft: **0.0-2.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**90.4**
½ in. [12.5 mm]	**80.6**
⅜ in. [9.5 mm]	**79.5**
¼ in. [6.3 mm]	**77.6**
No. 4 [4.75 mm]	**75.8**
No. 10 [2.00 mm]	**69.7**
No. 20 [0.850 mm]	**60.2**
No. 40 [0.425 mm]	**44.6**
No. 60 [0.250 mm]	**31.0**
No. 100 [0.150 mm]	**22.7**
No. 200 [0.075 mm]	**16.0**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

7.2

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

Paper Copy: Lab File; Project File; Geotech File

Maine DOT, Materials Testing & Exploration, 219 Hogan Road, Bangor, Maine 04401

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239988	**HB-BIDD-206/2D**	**GEOTECHNICAL (DISTURBED)**	**1/19/2011**	**2/1/2011**

Sample Type: **GEOTECHNICAL** Location: **OTHER** Station: **50+60** Offset, ft: **434. RT** Dbfg, ft: **5.0-7.0**

PIN: **014814.00** Town: **Biddeford** Sampler: **GROSS, KAREN L**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**92.6**
½ in. [12.5 mm]	**90.4**
⅜ in. [9.5 mm]	**89.2**
¼ in. [6.3 mm]	**86.3**
No. 4 [4.75 mm]	**84.2**
No. 10 [2.00 mm]	**74.0**
No. 20 [0.850 mm]	**54.9**
No. 40 [0.425 mm]	**30.3**
No. 60 [0.250 mm]	**15.2**
No. 100 [0.150 mm]	**9.8**
No. 200 [0.075 mm]	**6.3**

Direct Shear (T 236)

Shear Angle, °			
Initial Water Content, %			
Normal Stress, psi			
Wet Density, lbs/ft³			
Dry Density, lbs/ft³			
Specimen Thickness, in			

Consolidation (T 216)

Trimmings, Water Content, %

	Initial	Final		Void Ratio	% Strain
Water Content, %			Pmin		
Dry Density, lbs/ft³			Pp		
Void Ratio			Pmax		
Saturation, %			Cc/C'c		

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

Specific Gravity, Corrected to 20°C (T 100)

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

3.7

Vane Shear Test on Shelby Tubes (Maine DOT)

Depth taken in tube, ft	3 In.		6 In.		Water Content, %	Description of Material Sampled at the Various Tube Depths
	U. Shear tons/ft²	Remold tons/ft²	U. Shear tons/ft²	Remold tons/ft²		

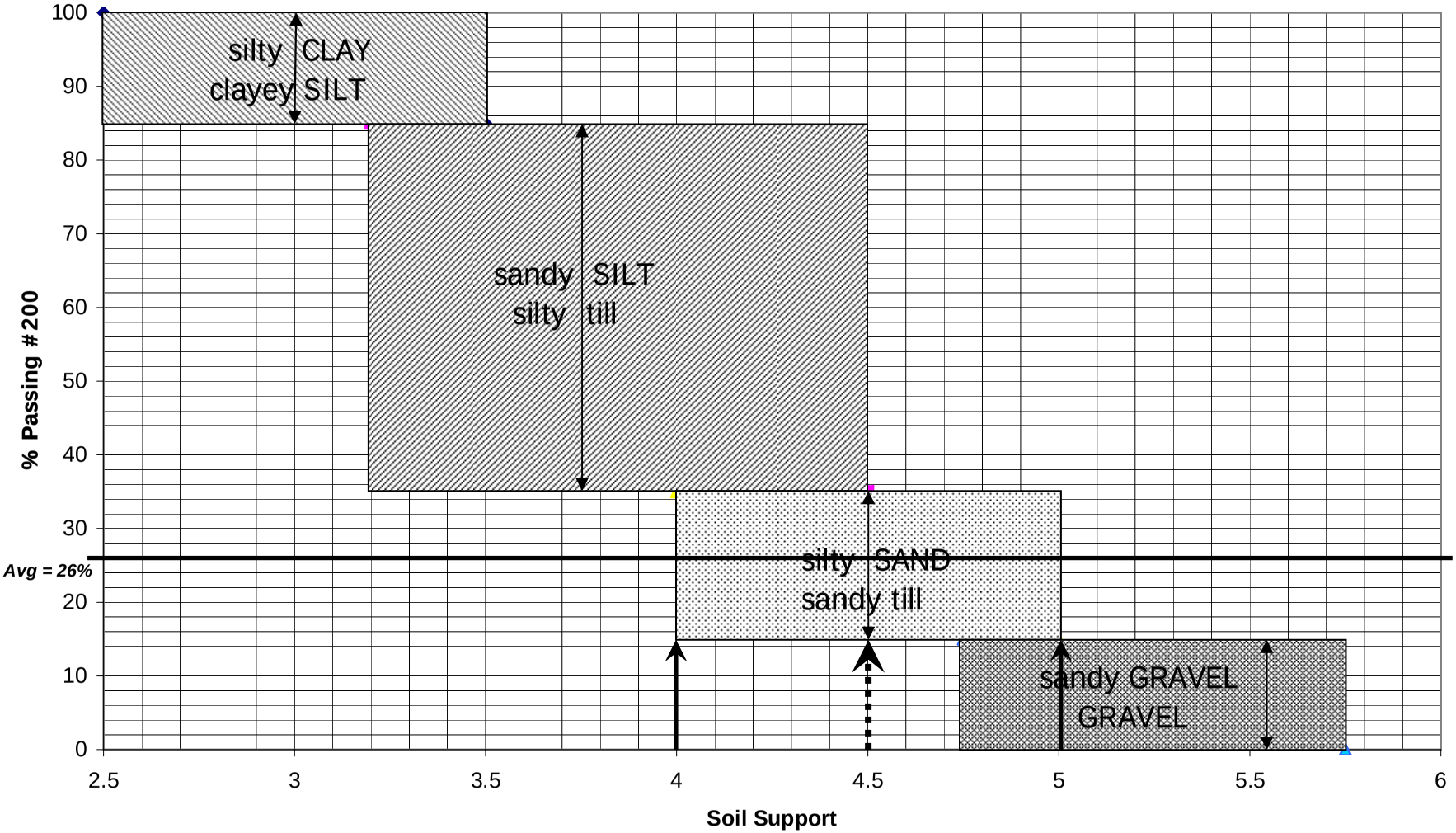
Comments:

AUTHORIZATION AND DISTRIBUTION

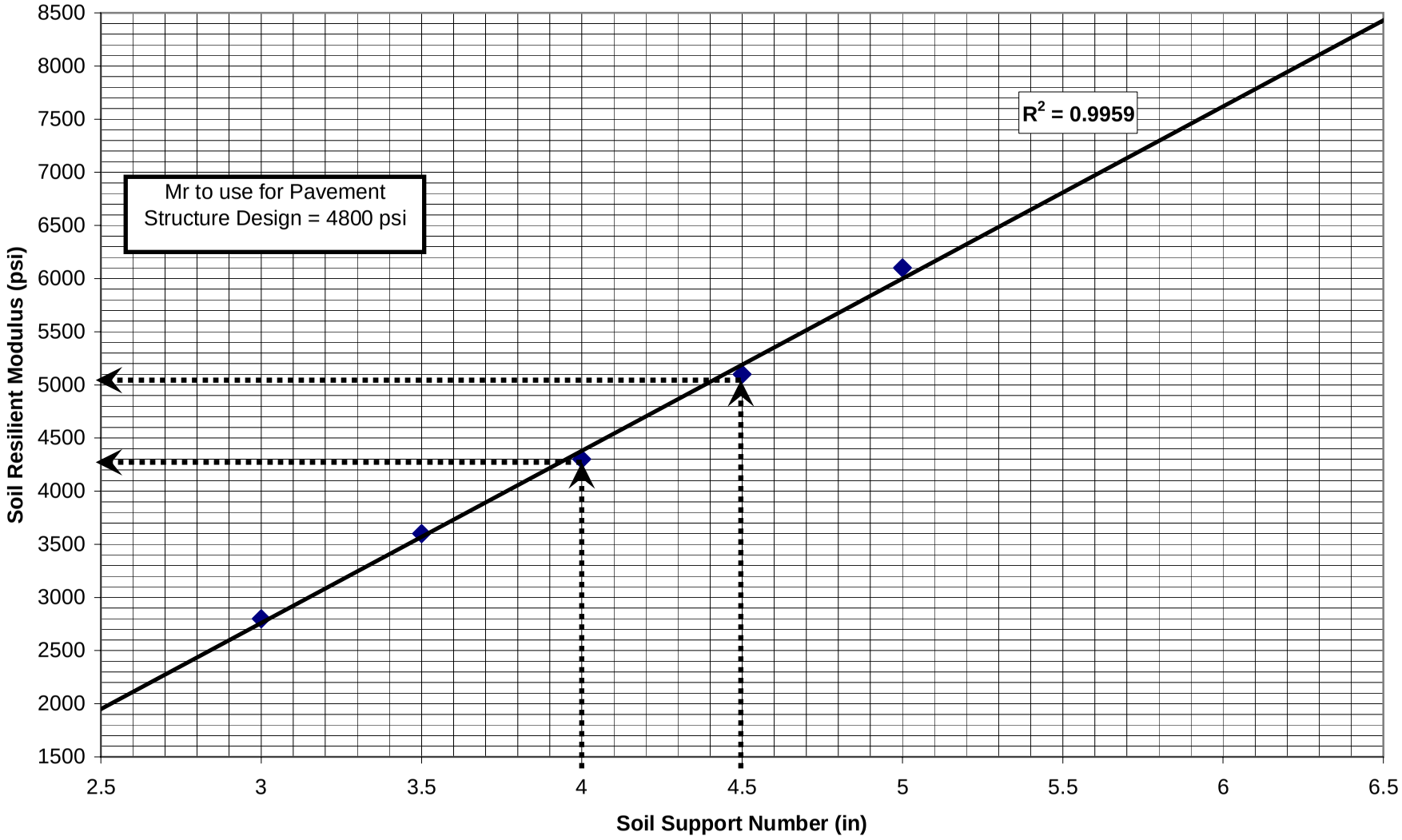
Reported by: **FOGG, BRIAN** Date Reported: **2/7/2011**

Paper Copy: Lab File; Project File; Geotech File

Guidelines for Selection
of Soil Support Values for Pavement Design



Soil Resilient Modulus for DARWin Design



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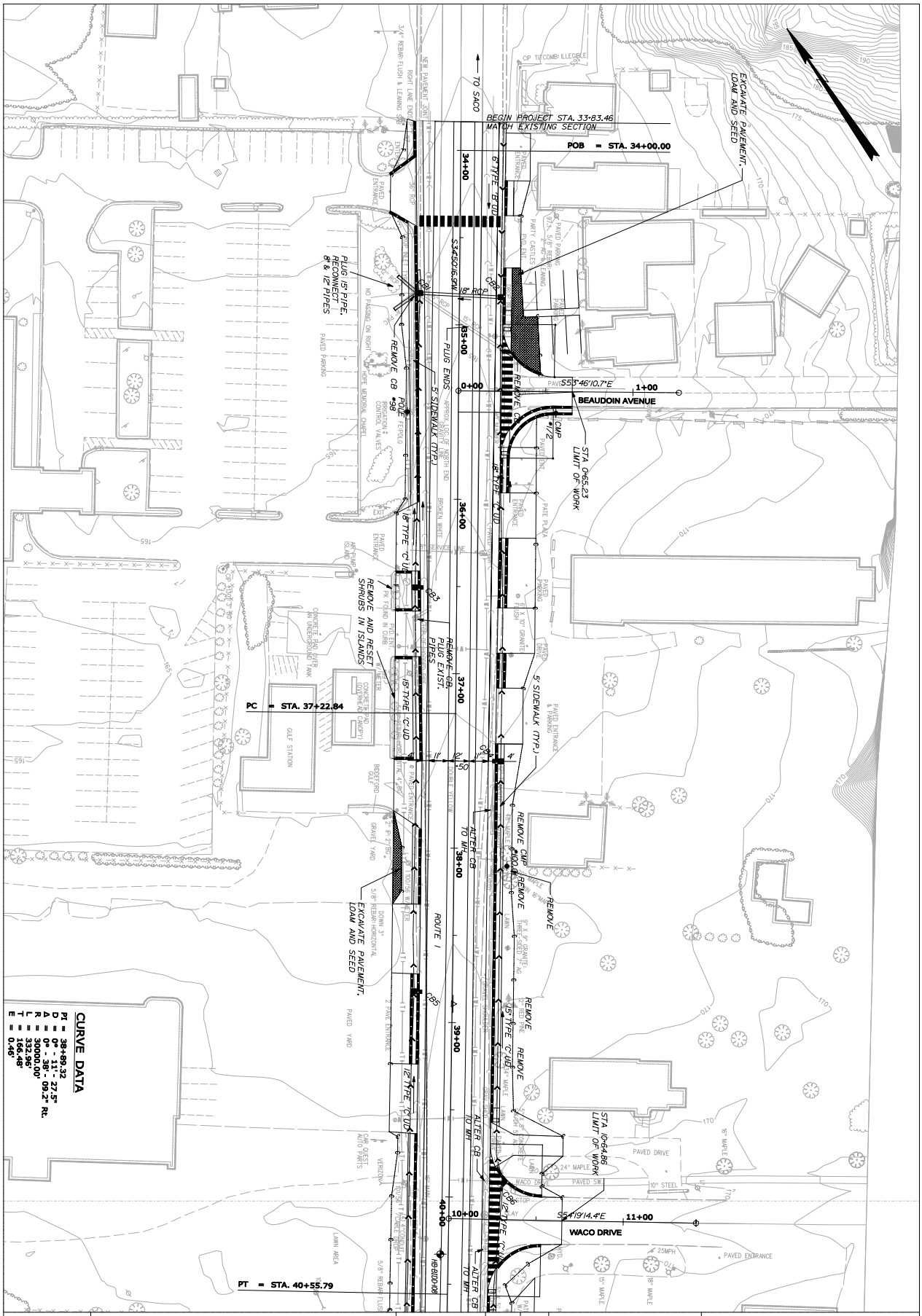


CURVE DATA

PI = 38+89.32
D = 0° - 11' - 27.5"
A = 0° - 38' - 09.2" Rt.
R = 300.00'
L = 332.96'
T = 166.48'
E = 0.46'

PROJ. MANAGER		BY	DATE
DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 1 OF 6

BIDDEFORD
ROUTE 1

GEOPLANS

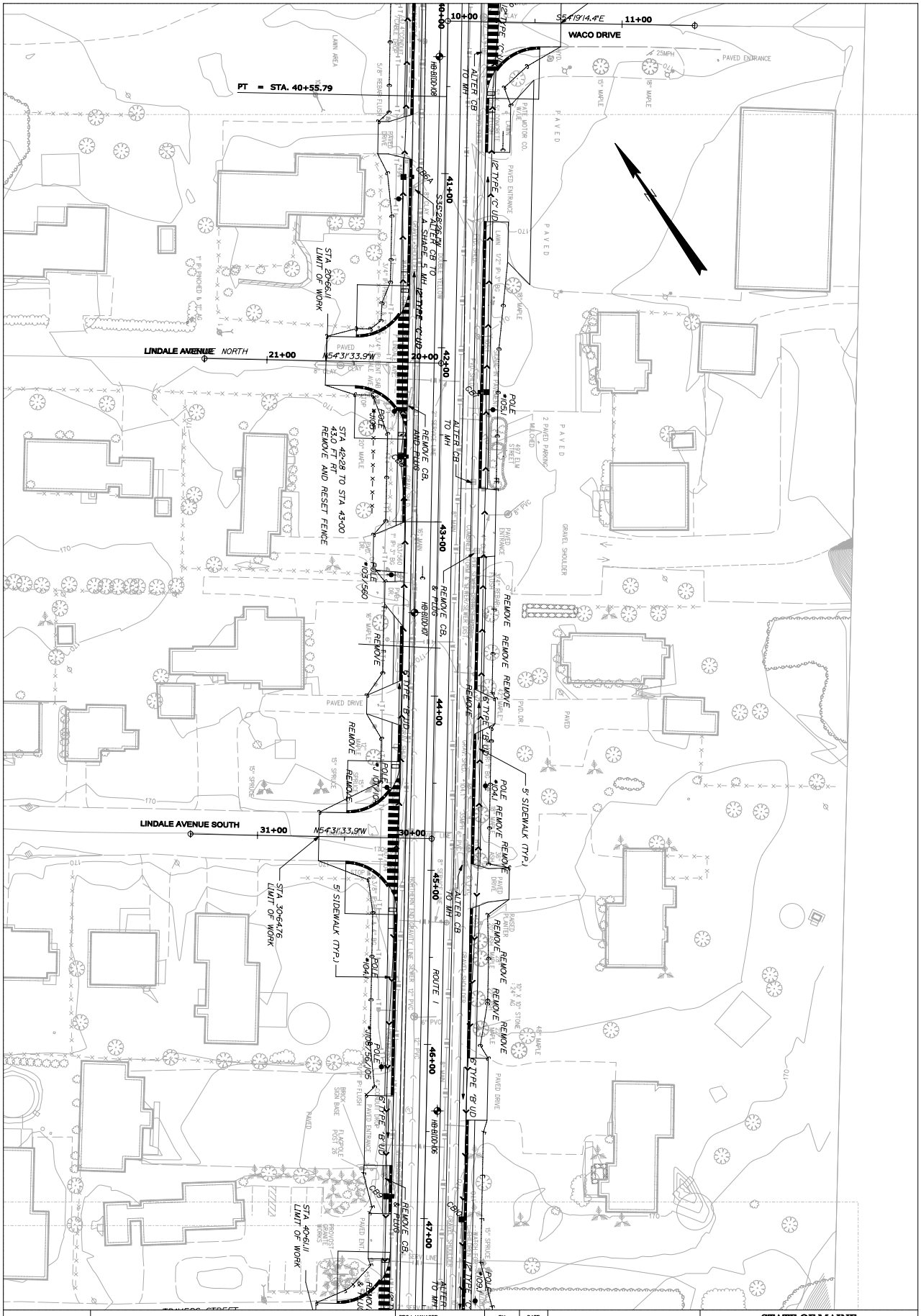
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1481(400)X

PIN
14814.00

HIGHWAY PLANS

Filename: ...\Final\002_Geoplan2.dgn Division: HIGHWAY Username: karen.gross Date:2/11/2011



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 2 OF 6

BIDDEFORD
ROUTE 1

GEOPLANS

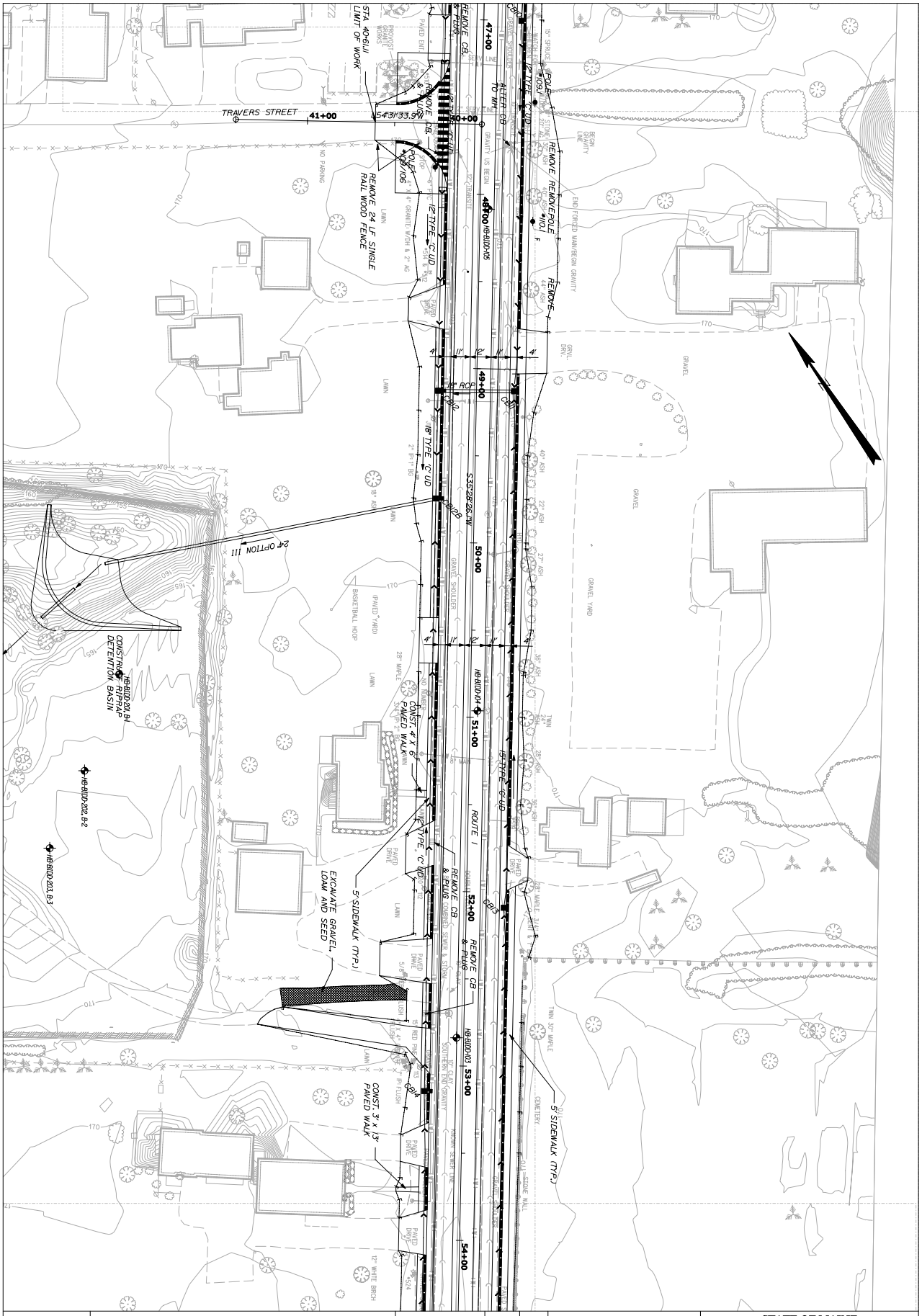
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1481(400)X

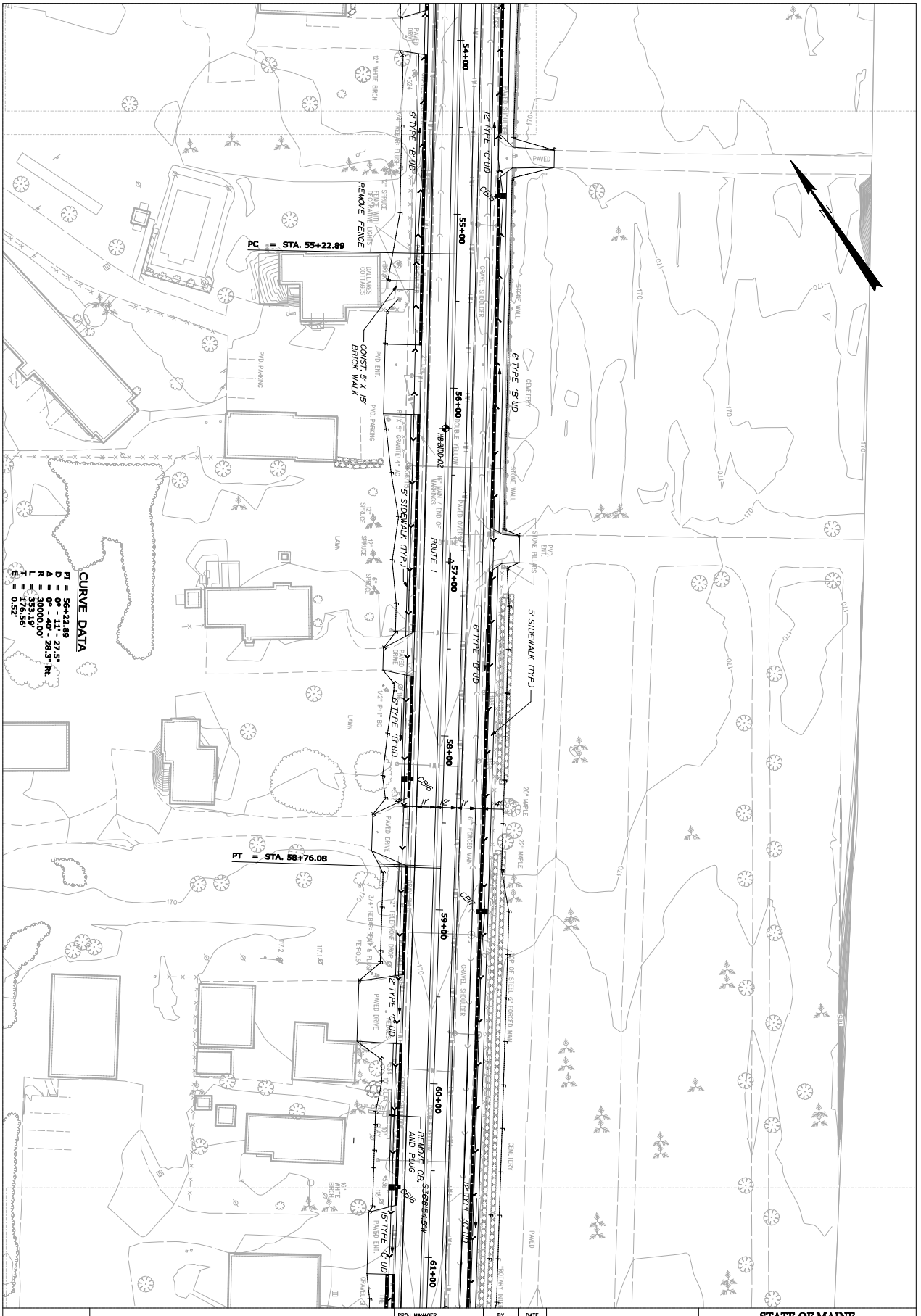
PIN
14814.00

HIGHWAY PLANS

Filename: ...\Final\003_Geoplan3.dgn Division: HIGHWAY Username: karen.gross Date:2/11/2011



SHEET NUMBER	BIDDEFORD ROUTE 1	PROJ. MANAGER		BY	DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION
3 OF 6	GEOPLANS	DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010	STP-1481(400)X
		CHECKED-REVIEWED			SIGNATURE	
		DESIGN2-DETAILED2				
		DESIGN3-DETAILED3			P.E. NUMBER	PIN 14814.00 HIGHWAY PLANS
		REVISIONS 1				
		REVISIONS 2				
		REVISIONS 3			DATE	
		REVISIONS 4				
		FIELD CHANGES				



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 4 OF 6

BIDDEFORD
ROUTE 1

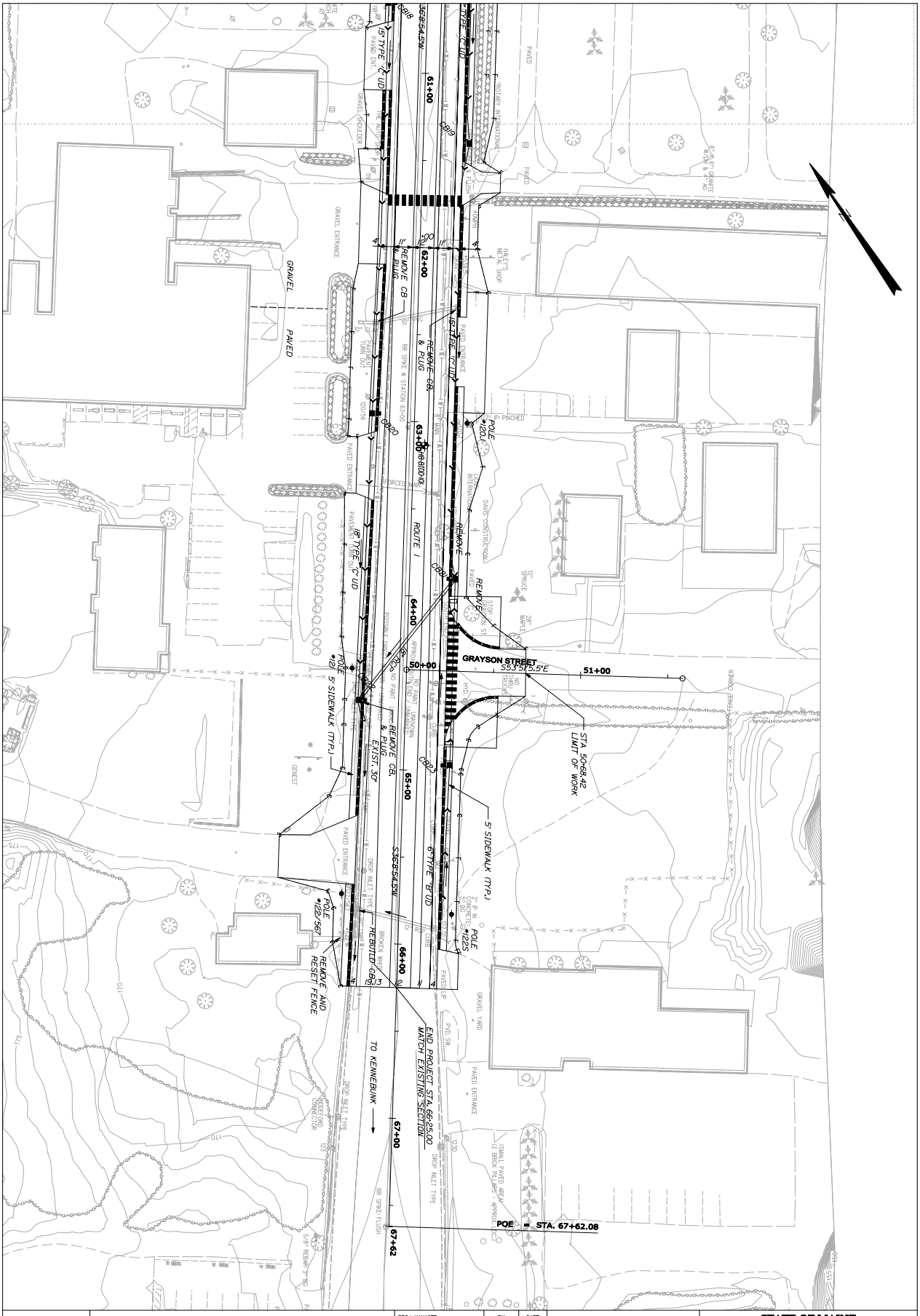
GEOPLANS

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1481(400)X

PIN
14814.00

HIGHWAY PLANS



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED	K.GROSS	T.WHITE	AUG 2010
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 5 OF 6

BIDDEFORD
ROUTE 1

GEOPLANS

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1481(400)X

PIN
14814.00

HIGHWAY PLANS

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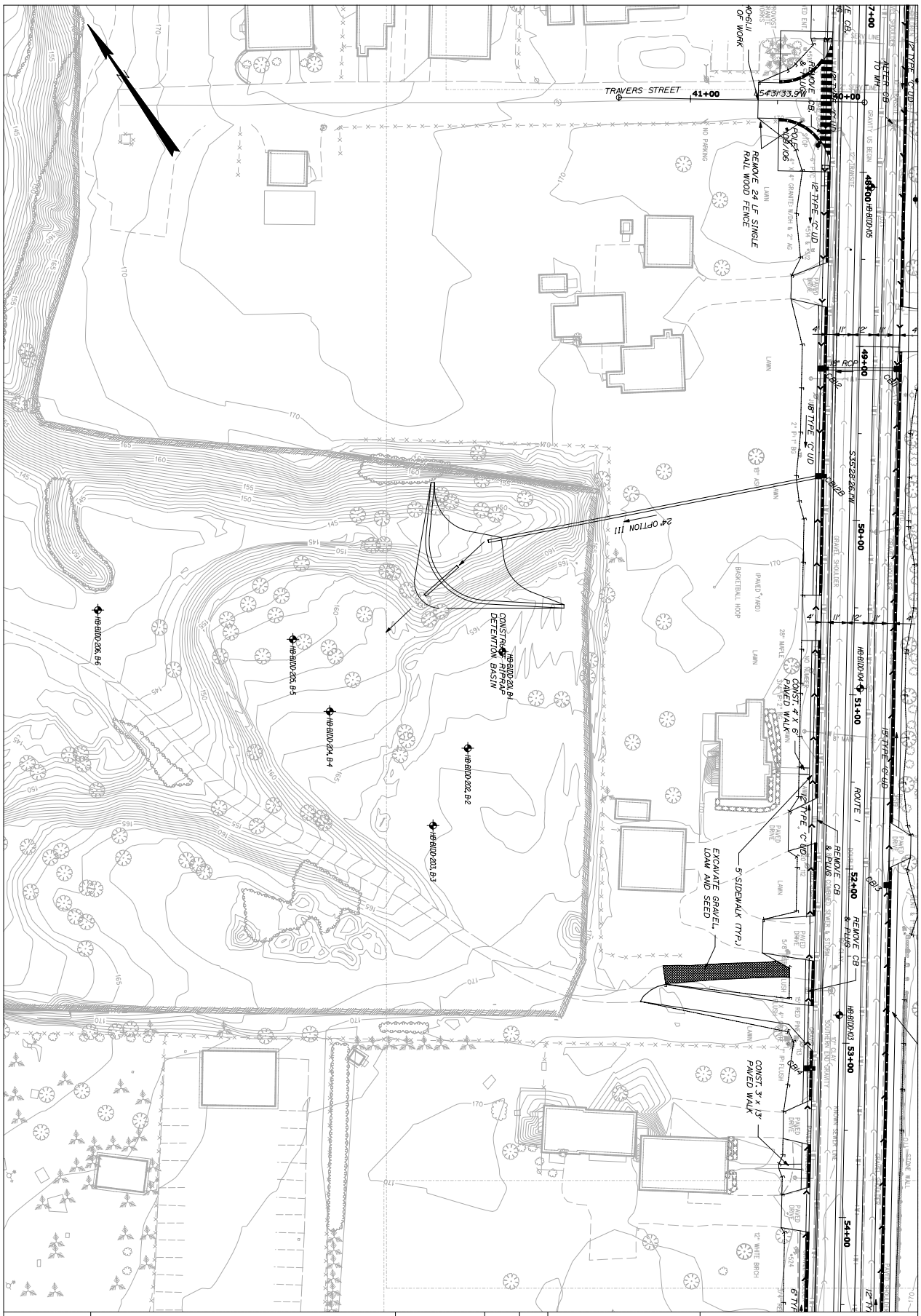

SHEET NUMBER 6 OF 6	BIDDEFORD ROUTE 1 GEOPLANS	PROJ. MANAGER ____ BY ____ DATE ____ DESIGN-DETAILED K.GROSS T.WHITE AUG 2010 CHECKED-REVIEWED DESIGN2-DETAILED2 DESIGN3-DETAILED3 REVISIONS 1 REVISIONS 2 REVISIONS 3 REVISIONS 4 FIELD CHANGES SIGNATURE P.E. NUMBER DATE	STATE OF MAINE DEPARTMENT OF TRANSPORTATION STP-1481(400)X PIN 14814.00 HIGHWAY PLANS