Maine Department of Transportation
Highway Program

Report of

GEOTECHNICAL DATA REPORT FOR CONSTRUCTION OF A NOISE WALL IN THE CITY OF SOUTH PORTLAND, CUMBERLAND COUNTY

Prepared by

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Cumberland County PIN 12800.00 Soils Report 2009-103
Federal No. IM-A280(000)E
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Table of Contents

1.0 Introduction

Maine DOT proposes to build a noise barrier wall on the east side of Interstate 295 between Exit 3 and Exit 4. The offset of the wall varies between 65 and 85 feet right of the existing shoulder. The terrain is gently rolling, and the wall is set at or near the top of the backslope. Abutting buildings are quite close to the proposed wall in several locations. An oil pipeline runs approximately parallel to the wall for most of the length of the project, but it is entirely outside MDOT Right of Way.

2.0 Site and Subsurface Conditions

2.1 General Site Conditions

Maine DOT proposes to build a noise wall to protect properties adjacent to the northbound lanes of Interstate 295 between Exit 3 and Exit 4, and to widen the shoulder for this section of highway. The terrain is gently rolling, and the wall is set into the backslope. Abutting buildings are quite close to the proposed wall in several locations. There is a fence approximately 10 feet east of the wall for much of the length of the project. An oil pipeline crosses under the wall at Station 7+50 and extends south of the wall from this station to the end of the project, entirely outside MaineDOT Right of Way. Another oil pipeline crosses under the wall at Station 14+70. A Portland Water District Pipe and a sewer pipe also cross under the wall.

Interstate 295 was built in 1967. Much of the northbound lane was originally built as a cut, with the shoulder below original grade. The wall will be between 65 and 85 feet right of the existing shoulder.

2.2 Mapped Data

This area is shown on the Maine Surficial Geology Map, Portland West quadrangle, as Presumpscot Formation soils. These consist of silt, clay and sand, and typically are compressible soils of moderate to high plasticity and sensitivity. A section of the Surficial Geology map is included in Appendix A.

The NRCS Soil survey indicates that surficial soils in the area of the noise wall are sandy loam and loamy sand, but only the upper five feet of soil is considered in this mapping. The NRCS soils map of the area is included in Appendix A.

No wetlands are shown in the area of this project on the National Wetlands Inventory map.

2.3 Subsurface Investigation

Data is available from the 1966 explorations, and subsurface conditions are quite variable along the wall. The original soils report included data from nine borings in the general area of the noise wall. An additional seven borings were drilled in October, 2008 for the noise wall project in the general area of the wall, to confirm the 1966 data.

This report presents data collected in this area and test results from the original 1967 subsurface investigation and from borings drilled in October, 2008 in the area of the proposed noise wall. The original geotechnical report is not included because the stationing is not the same as for the original project. The Geoplans included as Appendix B show the boring locations and a brief description of the soils encountered.

2.4 Native Soils

Native soils include layers of organic soils and peat at the southern end of the project, silts and clay-silts or the Presumpscot Formation for much of the project, and gravelly sands over shallow bedrock at the northern end of the project.

2.5 Subsurface Ledge

Shallow ledge was encountered at the north end of the wall. The original soils report listed ledge refusals in borings from approximately Station 30+00 north, at depths of 6 to 15 feet, but since these borings were stationed from a centerline that was not used, it is difficult to precisely locate these refusals with respect to the noise wall. The 1966 centerline profile also showed ledge refusals near the beginning of the project and at Station 13+50 under the drainage swale.

2.6 Subsurface Soils

Organic soils were encountered at the southern end of the wall, near Westbrook Street and the ramp. Farther north, borings encountered clay-silts of the Presumpscot Formation and loose to very loose sand. Frost action should be considered in the design; frost induced differential heave will not be accepted. At the northern end of the project shallow ledge is anticipated. The following Table lists the soils conditions along and near the wall using stations and offsets to the wall alignment. Offsets from the original borings to the proposed wall are approximate, and soils descriptions taken from the original report may not be accurate according to the Modified Burmister System for soils descriptions. Densities from the original borings may not reflect current descriptions as the hammer weight and drop used at the time are not known. Grain size curves and boring logs are shown in Appendix C.

Table 1
Native Soils

Station	Offset	Depth	curve	Sheet	density	
2+00	15 RT	0-3			loose	SAND, tr gavel
		3-6			Very soft	clay-SILT, some fine SAND
		6-7.5				PEAT
		7.5-12			med soft	clay-SILT, tr fine SAND
7+00	24 LT	0-2			Very loose	SAND, some silt
		2-5				Organic SILT
		5-8.5			very loose	SAND, little silt
		8.5-12			very soft	clay-SILT, tr fine SAND

Station	Offset	Depth	curve	Sheet	Density	
9+60	65 LT	21-24.5	D-229	7		Sandy SILT
		24.5-26	D-230	7		Clay-SILT
		26-27	D-231	7		Clayey SILT
12+00	32 LT	0-3.5			loose to	SAND some Silt
		3.5-9			very loose	SAND some Silt
		9-12			very loose	SAND some Silt
13+75	60 LT	0-11.5	CB-47, 1D		stiff	SILT, some Sand, tr Clay
		11.5-14	CB-47, 2D		loose	SILT, little Sand, tr Clay
		14-23			med stiff	Silty CLAY with silt-sand layers
		23-33			med stiff	Silty CLAY with black spots
		33-40			med stiff	Silty CLAY with black bands and silt-sand layers
15+25	130 LT	4-4.5	D-283	5		SAND, some silt
		10-14.5	D-284	6		SILT, some Sand, tr Clay
		14.2-15.8	D-285	6		SILT, little Clay, tr Sand
16+75	50 LT	1.3-2.4	D-238	4		SAND, tr SILT
		4.5-5.5	D-239	4		SAND
		5.5-6	D-240	4		SILT, tr Sand, tr Clay
		6-12.7	D-241	4		SILT, tr Sand, tr Clay
		12.7-13.3	D-242	5		SILT, some Clay
		14.3-14.8	D-243	5		SILT, some Clay
		14.8-16.5	D-244	5		SILT, little Clay, tr Sand
		16.5-18	D-245	5		SILT, some Clay
17+00	25 LT	0-3			loose	SAND, some Silt, tr Gravel
		3-7.5			loose	SAND, some Silt
		7.5-12			very soft	clayey SILT, tr Gravel
17+30	25 LT	3-5	CB-53 1C	13	loose	SAND, tr SILT
		6-8	CB-53 2C	13	loose	SILT, some Sand, tr Clay
		9-11	CB-53 3C	13	stiff	SILT, little Clay
19+75	25 LT	3-5	CB-56 1D	14	stiff	SILT, little Clay
		6-8	CB-56 2D	14	Stiff	SILT, little Clay, tr Sand
		9-11	CB-56-1C	13	med stiff	Clayey SILT
22+00	15 LT	0-8.5			stiff	clay-SILT, tr Sand
		8.5-12			med stiff	SILT, some Sand, Tr organics

Station	Offset	Depth	Curve	Sheet	Density	
23+65	30 LT	3-5	CB-58 1D	15	med stiff	Sandy SILT, little Clay
		5-7	CB-58 2D	16	stiff	SILT, some Clay tr Sand
		7-9	CB-58 3D	16	med stiff	SILT, some Clay tr Sand
		9-11	CB-58 4D	16	stiff	SILT, some Clay tr Sand
27+00	15 LT	0-9			stiff	Clayey-Silt, tr Sand
		9-12			very soft	Clay-Silt, tr Sand
35+60	40 LT	3-5.2	D 273	2		Silty SAND, little Gravel trace Clay
34+10	60 LT	6-10	D 315	1		Gravelly SAND, tr silt

2.6.1 *Peat and Organic soils* were encountered in borings at the southern end of the project. They may occur in layers of varying thickness and depth. A centerline profile from the 1966 Soils Report shows a layer of organic soils extending from the beginning of the project to approximately Station 8+00 on the noise wall, with a maximum depth on the order of 10 feet. The 2008 borings confirmed that these soils extend east from the I-295 centerline to the proposed noise wall or farther. Organic soils are also shown along the centerline profile in the drainage swale at Station 11+00, with depth of approximately 5 feet. The over- and underlying soils in this area were loose sands and soft clays or clay-silts.

2.6.2 *Clay-Silts of the Presumpscot Formation* were encountered in borings from the beginning of the project to Station 33+00.

The 1966 centerline profile indicates “blue-gray silty clay or clayey silt with a few sand layers” from Station 5+00 to Station 27+00 in a stratum 8 to 15 feet below the ground surface. Borings from the original construction indicated medium and stiff gray silty clays. The 2008 investigation encountered gray, wet, soft clay-silts at Station 17+00 and Station 27+00, at a depth of approximately 8 feet.

Medium-stiff to stiff weathered clay-silt was encountered in borings at Stations 22+00 and 27+00. The 1966 centerline profile shows a layer of weathered clay-silt from approximately station 5+70 to the end of the project, and stiff to medium stiff brown clay-silts were encountered in several of the original borings.

The 1966 boring logs indicated shear strength of the clay-silt soils to be generally between 0.2 and 0.4 TSF although lower and higher values were shown in some borings from that project. The vane size used and testing protocol from 1966 are not known. Several consolidation tests were done from samples in the general area of the wall, and in this area preconsolidation stress was found to be generally near 3.1 TSF or higher at depths of at least 12 feet. The consolidation test from a

sample in the boring nearest the wall showed C_c of 0.68 and C_r of 0.05. Other samples in the area showed C_c of 0.511 and 0.38 with C_r of 0.05 in both cases. Boring logs showing vane shear strength and consolidation test results are included in Appendix C.

2.6.3 *Sands* were encountered at the surface of most borings. The 1966 report indicates a thin surficial layer of sand, silty sand or sandy silt, and a stratum of sand below the clay-silts, at depths of 15 to 50 feet. Current borings encountered sand strata of varying depth, thickness and density for the full length of the wall.

All grain size curves, boring logs and lab test data from the original report are included in the appendices as are current boring logs. We do not know the size and drop of the hammer or the size of vanes used in the 1966 investigation.

2.7 Frost Action

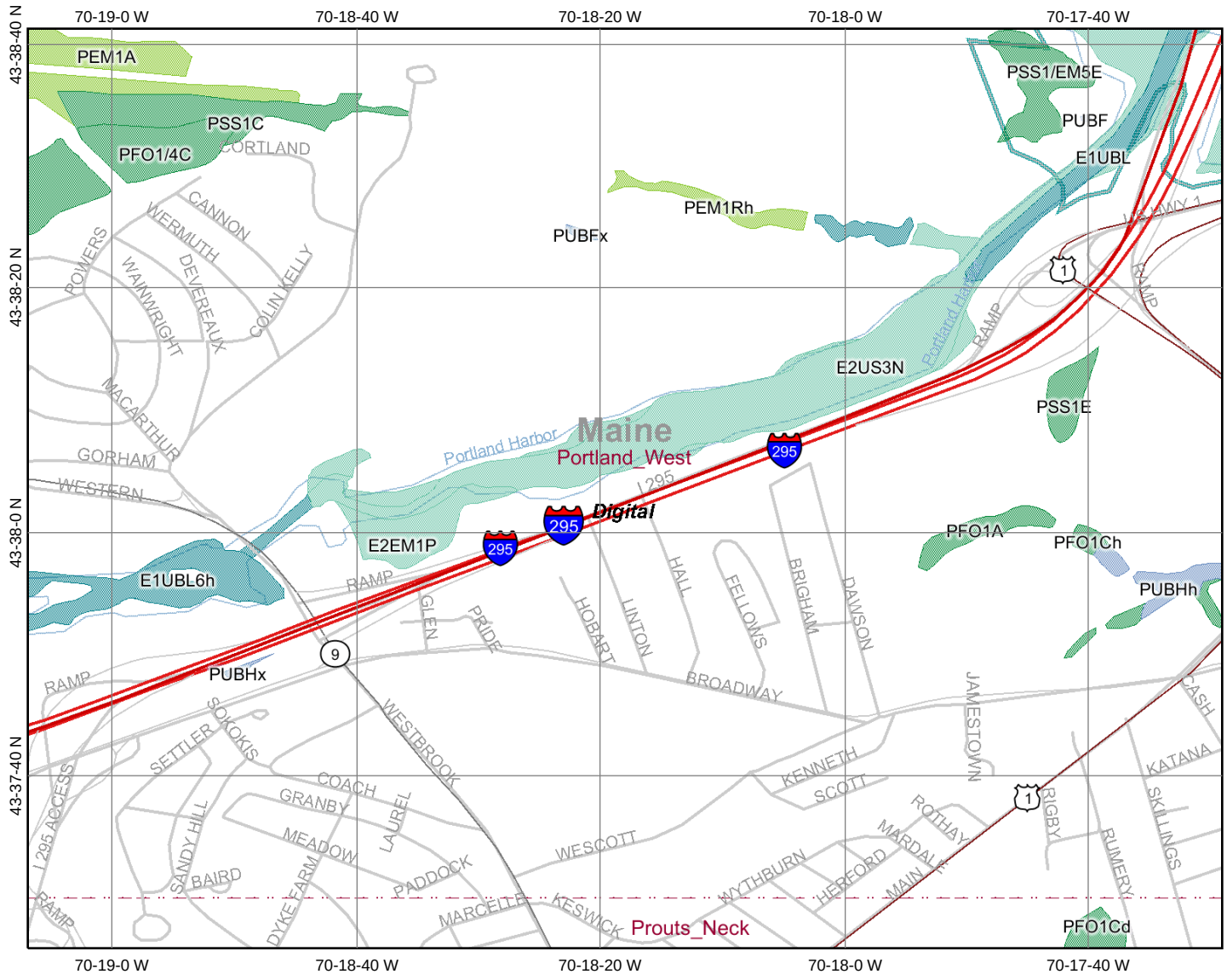
Soils in the area of the proposed wall are considered frost susceptible. The design freezing index in South Portland is 1250 based on Corps of Engineers design charts, included in Appendix D.

3.0 Closure

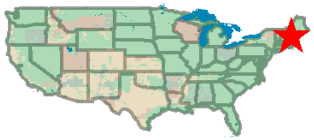
This report has been prepared to compile the subsurface information for PIN 12800.00, the Noise Wall along the northbound lane of I-295, South Portland. No other intended use is implied. The information presented is based on borings in discrete locations; subsurface conditions between borings may differ from conditions observed in the borings. The Department is not responsible for any conclusions it interpretations made by the Design-Build team. Additional borings may be required during the design and/or construction phase of the project.

Appendix A
Resource Maps
Surficial Geology
NRCS Soil Survey

South Portland, I 295



Map center: 43° 38' 4" N, 70° 18' 18" W



Legend

Ohio_wet_scan
- 0
- 1
- Out of range

Interstate Major Roads
- Other Road
- Interstate
- State highway
- US highway

Roads

Cities

USGS Quad Index 24K

Lower 48 Wetland Polygons
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Lower 48 Available Wetland Data
- Non-Digital
- Digital
- No Data
- Scan

NHD Streams

Counties 100K

States 100K

South America

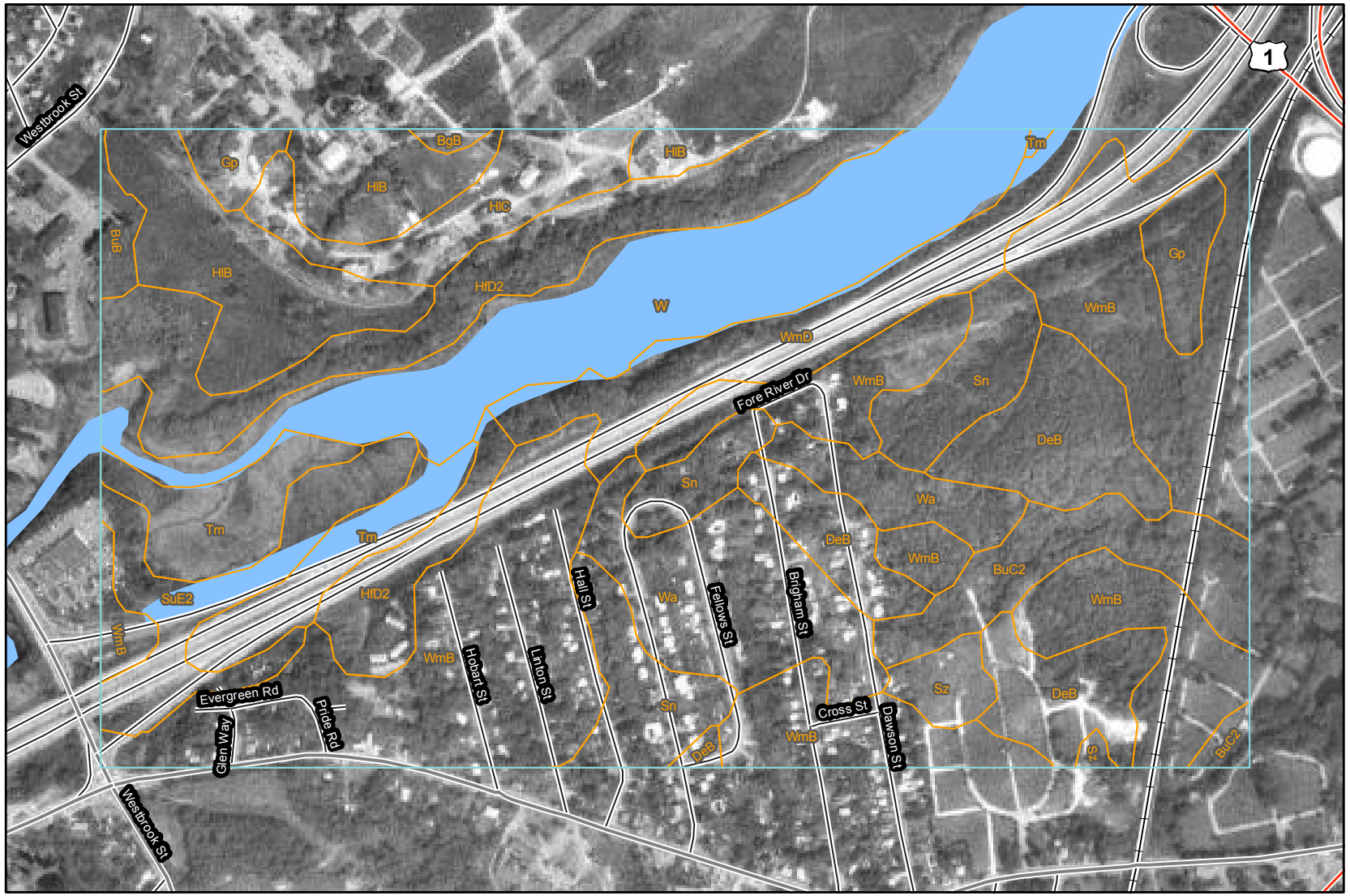
North America

N

Scale: 1:16,305

Soil Map—Cumberland County and Part of Oxford County, Maine
(PIN 12800.00 South Portland)

70° 18' 47"
70° 17' 34"
43° 38' 20"
43° 38' 21"



43° 37' 45"
43° 37' 45"

70° 18' 46"
70° 17' 33"

Map Scale: 1:7,780 if printed on A size (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1,600 2,400

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:7,780 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 6, Nov 22, 2006

Date(s) aerial images were photographed: 4/29/1998; 6/7/1997

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Cumberland County and Part of Oxford County, Maine (ME005)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BgB	Belgrade very fine sandy loam, 0 to 8 percent slopes	0.5	0.2%
BuB	Buxton silt loam, 3 to 8 percent slopes	1.7	0.6%
BuC2	Buxton silt loam, 8 to 15 percent slopes, eroded	10.4	3.8%
DeB	Deerfield loamy sand, 3 to 8 percent slopes	20.6	7.6%
Gp	Gravel pits	5.4	2.0%
HfD2	Hartland very fine sandy loam, 15 to 25 percent slopes, eroded	24.7	9.1%
HlB	Hinckley gravelly sandy loam, 3 to 8 percent slopes	20.9	7.7%
HlC	Hinckley gravelly sandy loam, 8 to 15 percent slopes	8.7	3.2%
Sn	Scantic silt loam	15.4	5.6%
SuE2	Suffield silt loam, 25 to 45 percent slopes, eroded	10.2	3.8%
Sz	Swanton fine sandy loam	2.9	1.1%
Tm	Tidal marsh	12.5	4.6%
W	Water	30.2	11.1%
Wa	Walpole fine sandy loam	19.2	7.1%
WmB	Windsor loamy sand, 0 to 8 percent slopes	73.6	27.1%
WmD	Windsor loamy sand, 15 to 30 percent slopes	15.3	5.6%
Totals for Area of Interest		**271.8**	**100.0%**

Appendix B
Geoplans
1966 I-295 Centerline Profile

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

IM-A280(000)E

PIN
12800.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER ERNEST MARTIN		
DESIGN-DETAILED	K. BRESKIN	NOV 2008
CHECKED-REVIEWED	T. WHITE	-----
DESIGN2-DETAILED2	-----	-----
DESIGN3-DETAILED3	-----	-----
REVISIONS 1	-----	-----
REVISIONS 2	-----	-----
REVISIONS 3	-----	-----
REVISIONS 4	-----	-----
FIELD CHANGES	-----	-----

SIGNATURE

P.E. NUMBER

DATE

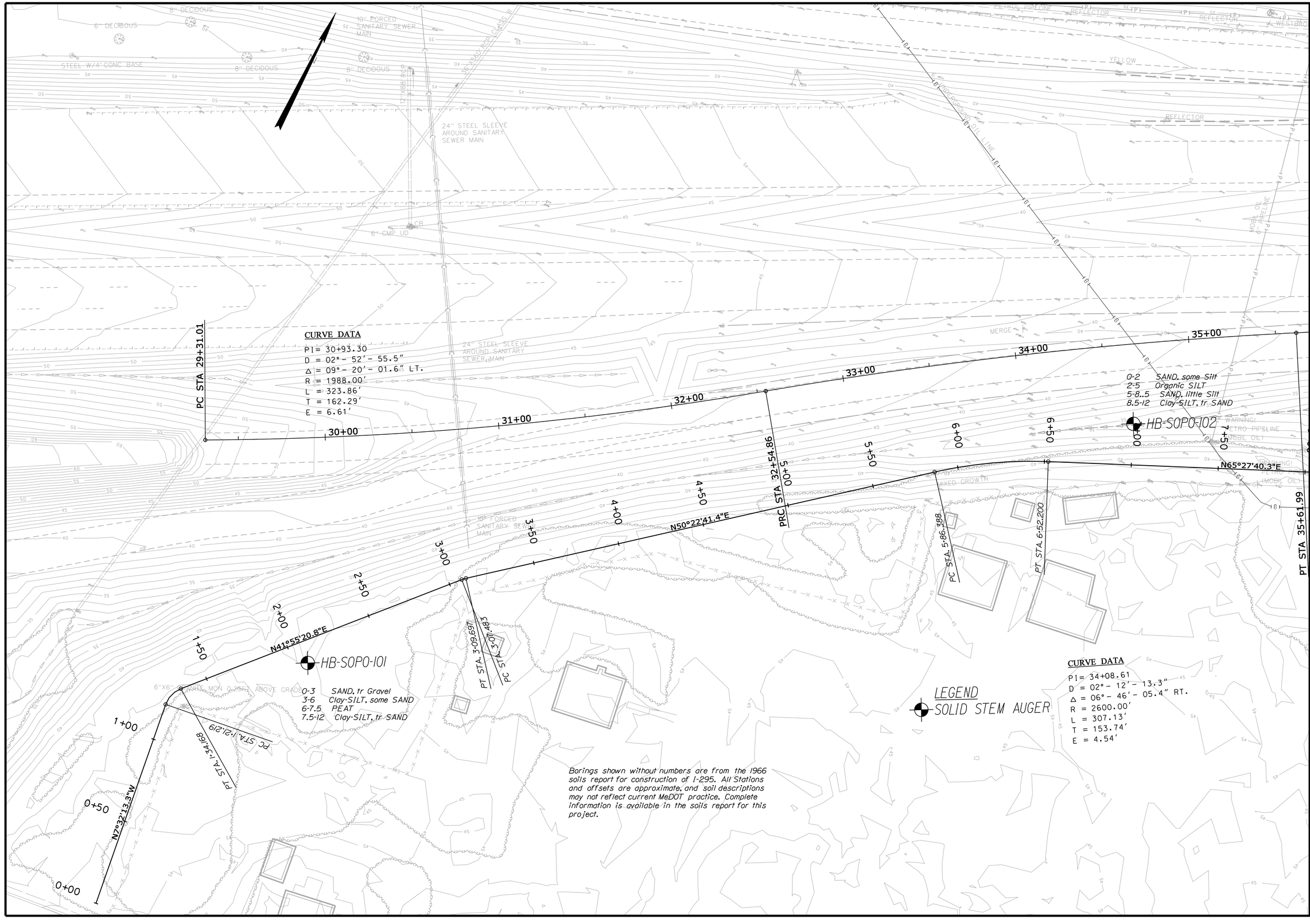
SOUTH PORTLAND
I-295 NB EXITS 3 & 4

GEOPLANS

SHEET NUMBER

1

OF 7



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

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PIN
12800.00

HIGHWAY PLANS

	BY	DATE
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DESIGN-DETAILED	K. BRESKIN	NOV. 2008
CHECKED-REVIEWED	T. WHITE	-----
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DESIGN3-DETAILED3	-----	-----
REVISIONS 1	-----	-----
REVISIONS 2	-----	-----
REVISIONS 3	-----	-----
REVISIONS 4	-----	-----
FIELD CHANGES	-----	-----

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DATE

SOUTH PORTLAND
I-295 NB EXITS 3 & 4

GEOPLANS

SHEET NUMBER

2

OF 7

CURVE DATA

PI= 41+09.81
D = 05°- 43'- 46.5"
Δ = 02°- 17'- 37.8" RT.
R = 1000.00'
L = 40.03'
T = 20.02'
E = 0.20'

TA

3.61
12'- 13.3"
46'- 05.4" RT.
.00'
13'
74'
'

Filename: ...\geotech\msto\003_Geoplan3.dgn Division: GEOTECH Username: kitty.breskin Date:1/20/2009

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

IM-A280(000)E

PIN
12800.00

HIGHWAY PLANS

PROJ. MANAGER ERNEST MARTIN
DESIGN-DETAILED K. BRESKIN
CHECKED-REVIEWED
DESIGN2-DETAILED2
DESIGN3-DETAILED3

	BY	DATE
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES	T. WHITE	NOV 2008

SIGNATURE

P.E. NUMBER

DATE

SOUTH PORTLAND
I-295 NB EXITS 3 & 4

GEOPLANS

SHEET NUMBER
3
OF 7

PROPOSED BORING LOC.
VARIED PLANTS IN BED OF MULCH
14" WILLOW
LIGHT POLE W7 4 LIGHTS (CIRCULAR BASE)
WARN. CRUDE OIL PIPELINE EXCAV. (PORTLAND PIPELINE)
(2) REFLECTORS
EXIT 7 30 MPH SIGN POST
REFLECTOR
12"X116' RCP CLASS III
12"X128' RCP CLASS III
24" OIL (PORTLAND PIPELINE)
LIGHT POLE W7 CIRCULAR CONC BASE
STEEL
24"X96' RCP CLASS III
6"X108' UD
12"X280' UD
15"X608' UD
CB
4-4.5 SAND, some Silt
10-14.2 SILT, some Sand, tr Clay
14.2-15.8 SILT, little Clay, tr Sand
41+00 42+00 43+00 44+00 45+00 46+00 47+00 48+00
N 62°- 34'- 16.4" E
0-11.5 SILT, some Sand, tr Clay
11.5-14 SILT, little Sand, tr Clay
14-23 Silty CLAY with silt-sand layers
23-33 Silty CLAY with black spots
33-40 Some w/ black bands and silt sand layers
1.3-2.4 SAND, tr Silt
4.5 5.5 SAND
5.5-12.7 SILT, tr Sand, tr Clay
12.7-14.8 SILT, some Clay
14.8-16.5 SILT, little Clay, tr SAND
16.5-18 SILT, some Clay
0-3 SAND, some Silt, tr Gravel
3-7.5 SAND, some Silt
7.5-12 Clayey-SILT, tr Sand
3-5 SAND, tr Silt
6-8 SILT, some Sand, tr Clay
9-11 SILT, little Clay
3-5 SILT, little Clay
6-8 SILT, little Clay, tr SAND
9-11 Clayey SILT
HB-SOPO-104
PC STA 40+89.79
PT STA 41+29.83
AP STA. 14+35.333
AP STA. 14+83.727
AP STA. 16+88.354
AP STA. 17+34.910
N60°48'2.1"E
N57°46'10.8"E
N56°44'49.9"E
N58°20'20.6"E
N62°27'23.9"E
13+50
14+00
14+50
15+00
15+50
16+00
16+50
17+00
17+50
18+00
18+50
19+00
19+50
20+00
20+50
MIXED GROWTH
WARNING OIL PIPELINE (PORTLAND PIPELINE)
HOBART ST
LINTON ST
HALL ST
EXIT PORTLAND DOWNTOWN
8"UNDERGROUND OIL LINE
8"X6" GRANITE MON WIDTH 1.5 ABOVE

Filename: ...\geotech\msta\004_Geoplan4.dgn Division: GEOTECH Username: kitty.breskin Date:1/20/2009

PROJ. MANAGER	ERNEST MARTIN	BY	DATE
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REVISIONS 2	_____	_____	_____
REVISIONS 3	_____	_____	_____
REVISIONS 4	_____	_____	_____
FIELD CHANGES	_____	_____	_____

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P.E. NUMBER

DATE

SHEET NUMBER 4 OF 7

SOUTH PORTLAND
I-295 NB EXITS 3 & 4

GEOPLANS

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

IM-A280(000)E

PIN 12800.00

HIGHWAY PLANS

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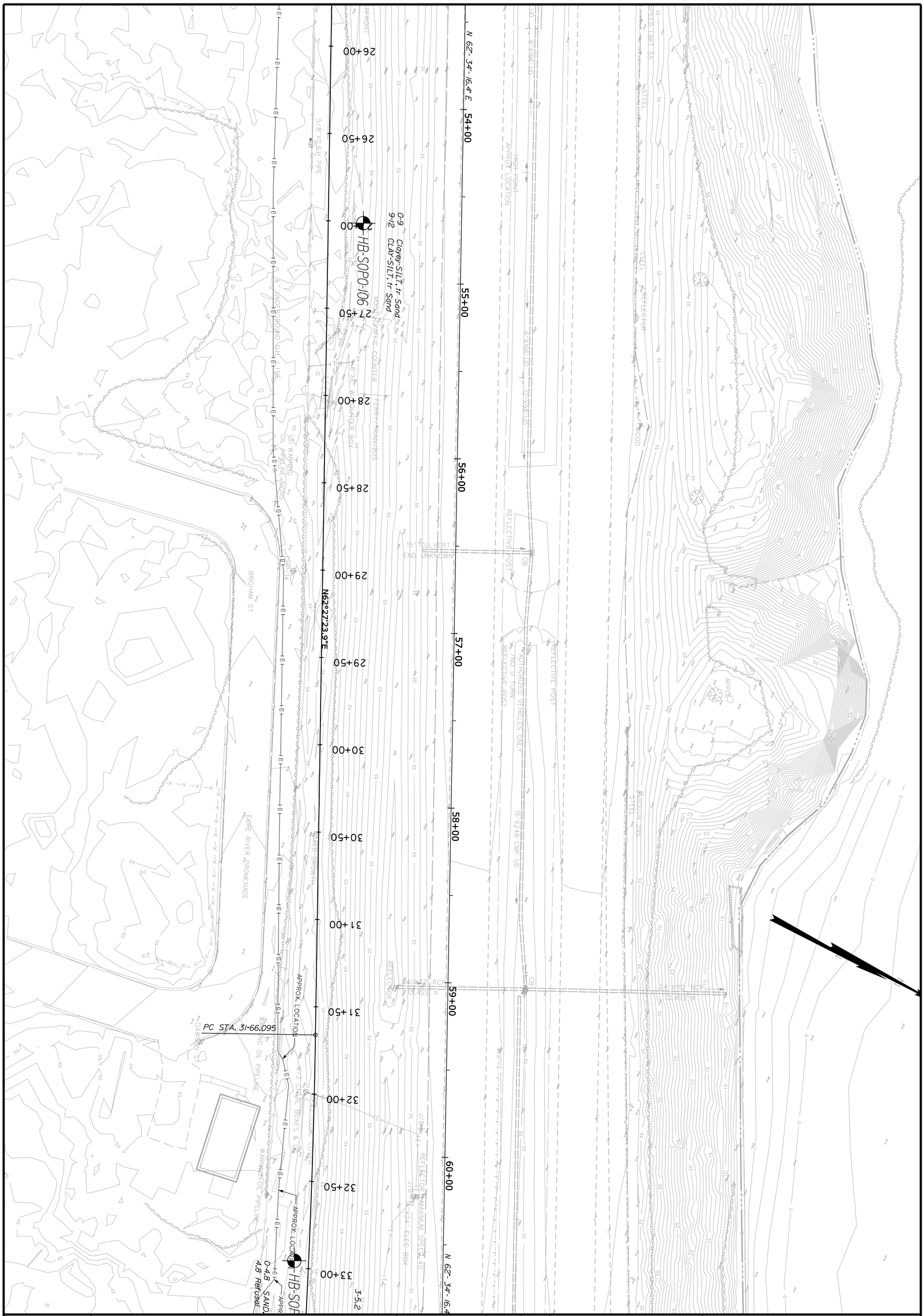

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FIELD CHANGES	_____		_____

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SOUTH PORTLAND
I-295 NB EXITS 3 & 4

GEOPLANS

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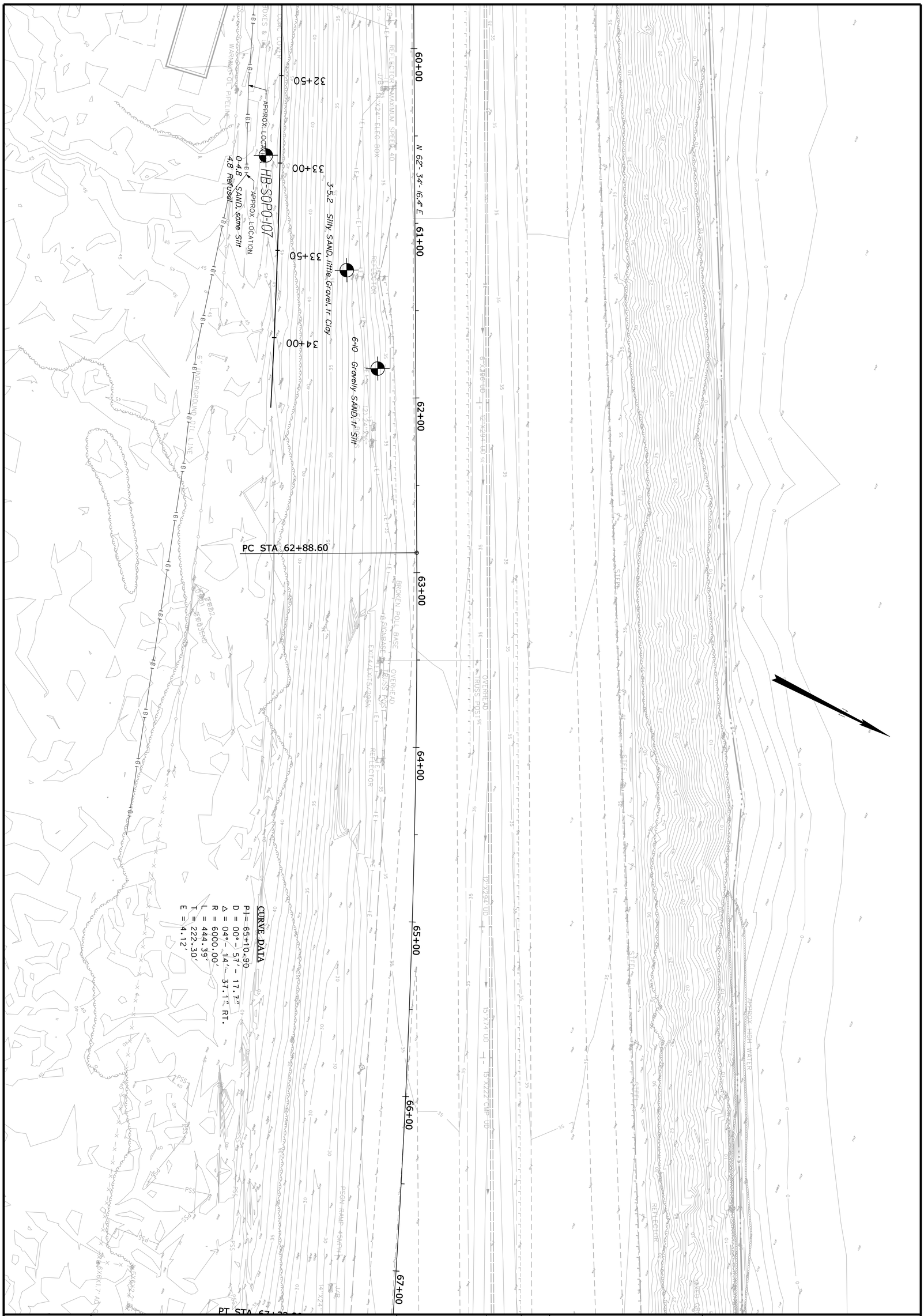
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

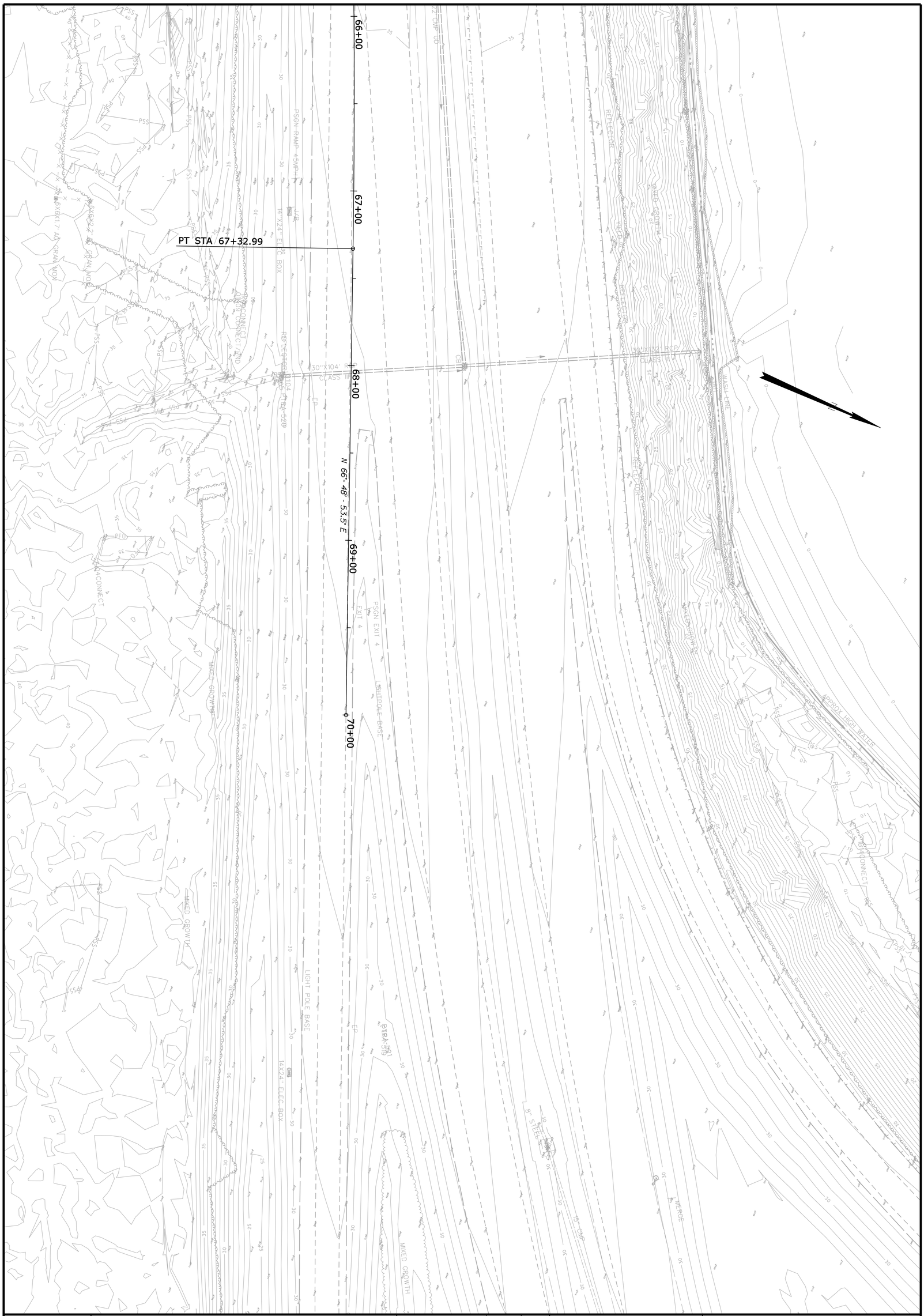
IM-A280(000)E

PIN
12800.00

HIGHWAY PLANS



SHEET NUMBER 6 OF 7	SOUTH PORTLAND I-295 NB EXITS 3 & 4 GEOPLANS	PROJ. MANAGER ERNEST MARTIN / BY / DATE DESIGN-DETAILED K. BRESKIN / T. WHITE / NOV 2008 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 IM-A280(000)E PIN 12800.00 HIGHWAY PLANS



PROJ. MANAGER ERNEST MARTIN		BY	DATE
DESIGN-DETAILED	K . BRESKIN	T. WHITE	NOV 2008
CHECKED-REVIEWED	_____	_____	_____
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DESIGN3-DETAILED3	_____	_____	_____
REVISIONS 1	_____		_____
REVISIONS 2	_____		_____
REVISIONS 3	_____		_____
REVISIONS 4	_____		_____
FIELD CHANGES	_____		_____

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 2 OF 7

SOUTH PORTLAND
I-295 NB EXITS 3 & 4

GEOPLANS

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

IM-A280(000)E

PIN 12800.00

HIGHWAY PLANS

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

I-295
50 PORTLAND
LONG CREEK
SOILS PLAN AND PROFILE
FEBR 1956

1966 Borings

FILL
SILTY SAND
ORGANIC SILT CLAYEY SILT SAND SILT
SANDY SILT OR SILTY SAND
FIRM SOIL - STONY SILTY SAND STONY
SILT WITH A FEW SAND LAYERS
BLUE GRAY SILTY CLAY OR CLAYEY
OR SILT WITH SILTY SAND OR SAND LAYERS
BROWN WEATHERED CLAYEY SILT, SILTY CLAY
SANDY SILT
SAND SILTY SAND OR

NEW STA 180
35+00
30+00
25+00
20+00
15+00
10+00
5+00
NEW F.G.
EST. MEDIAN ℄
EST. SOUTHBOUND LANE
0
20
40

CEMETERY
DAWSON ST
BRIGHAM ST
WATER MAIN
HALL ST
BROADWAY
GLEN WAY
30 CO C WATER MAIN
SOCONY VACUUM PIPE
PROPOSED MED ℄
WESTBROOK ST
BOSTON & MAINE WESTERN
24 WATER PIPE
OIL PIPE LINES
GREEK
LONG
Pride's Island

Appendix C
Exploration Data
Soils Descriptions
Boring Logs
Lab Test Data

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly-graded sands, gravelly sand, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Desired Soil Observations: (in this order)

Color (Munsell color chart)
Moisture (dry, damp, moist, wet, saturated)
Density/Consistency (from above right hand side)
Name (sand, silty sand, clay, etc., including portions - trace, little, etc.)
Gradation (well-graded, poorly-graded, uniform, etc.)
Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic)
Structure (layering, fractures, cracks, etc.)
Bonding (well, moderately, loosely, etc., if applicable)
Cementation (weak, moderate, or strong, if applicable, ASTM D 2488)
Geologic Origin (till, marine clay, alluvium, etc.)
Unified Soil Classification Designation
Groundwater level

TERMS DESCRIBING DENSITY/CONSISTENCY

Coarse-grained soils (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) silty or clayey gravels; and (3) silty, clayey or gravelly sands. Consistency is rated according to standard penetration resistance.

Modified Burmister System

Descriptive Term	Portion of Total
trace	0% - 10%
little	11% - 20%
some	21% - 35%
adjective (e.g. sandy, clayey)	36% - 50%

Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine-grained soils (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) gravelly, sandy or silty clays; and (3) clayey silts. Consistency is rated according to shear strength as indicated.

Consistency of Cohesive soils	SPT N-Value blows per foot	Approximate Undrained Shear Strength (psf)	Field Guidelines
Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily Penetrates
Soft	2 - 4	250 - 500	Thumb easily penetrates
Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort
Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort
Very Stiff	16 - 30	2000 - 4000	Indented by thumbnai
Hard	>30	over 4000	Indented by thumbnail with difficulty

Rock Quality Designation (RQD):

$$RQD = \frac{\text{sum of the lengths of intact pieces of core* > 100 mm}}{\text{length of core advance}}$$

*Minimum NQ rock core (1.88 in. OD of core)

Correlation of RQD to Rock Mass Quality

Rock Mass Quality	RQD
Very Poor	<25%
Poor	26% - 50%
Fair	51% - 75%
Good	76% - 90%
Excellent	91% - 100%

Desired Rock Observations: (in this order)

Color (Munsell color chart)
Texture (aphanitic, fine-grained, etc.)
Lithology (igneous, sedimentary, metamorphic, etc.)
Hardness (very hard, hard, mod. hard, etc.)
Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)
Geologic discontinuities/jointing:
- -dip (horiz - 0-5, low angle - 5-35, mod. dipping - 35-55, steep - 55-85, vertical - 85-90)
- -spacing (very close - <5 cm, close - 5-30 cm, mod. close 30-100 cm, wide - 1-3 m, very wide >3 m)
- -tightness (tight, open or healed)
- -infilling (grain size, color, etc.)

Formation (Waterville, Ellsworth, Cape Elizabeth, etc.)
RQD and correlation to rock mass quality (very poor, poor, etc.)
ref: AASHTO Standard Specification for Highway Bridges 17th Ed. Table 4.4.8.1.2A
Recovery

Sample Container Labeling Requirements:

PIN
Bridge Name / Town
Boring Number
Sample Number
Sample Depth
Blow Counts
Sample Recovery
Date
Personnel Initials

Maine Department of Transportation
Geotechnical Section
Key to Soil and Rock Descriptions and Terms
Field Identification Information

January 2008

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-101
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	43.0	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 08:00-08:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	2+00, 15.0 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	5.0' bgs.
Hammer Efficiency Factor:	0.633	**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
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 = weight of rods
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	24/16	0.00 - 2.00	2/2/3/3	5	5	SSA	42.60		Topsoil, (Sod). 0.40	
										Olive-brown, moist, loose, silty fine to medium SAND, trace gravel.	
								40.00		3.00	
										Olive, wet, very soft, clayey-SILT, some fine sand.	
5	2D/A	24/24	5.00 - 7.00	WOH/WOH/WOH/2	---					(2D) 5.0-6.0' bgs.	
								37.00		6.00	
										(2D/A) 6.0-7.0' bgs. PEAT.	
								35.50		7.50	
10	3D	24/24	10.00 - 12.00	2/3/4/4	7	7				Olive-brown, wet, medium stiff, clay-SILT, trace fine sand.	
								31.00		12.00	
										Bottom of Exploration at 12.00 feet below ground surface. NO REFUSAL	
15											
20											
25											

Remarks:

Auto Hammer #283

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-102
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	34.8	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 08:30-09:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	7+00, 24.0 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	2.8' bgs.
Hammer Efficiency Factor:	0.633	**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
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 = weight of rods
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	24/14	0.00 - 2.00	1/2/2/2	4	4	SSA	34.40		Topsoil, (Sod).	
										0.40	
										Brown, moist, very loose, fine to medium SAND, some silt, little organics.	
								32.80		2.00	
										Dark brown, organic SILT, some roots.	
5	2D	24/18	5.00 - 7.00	1/1/1/1	2	2		29.80		5.00	
										Brown, wet, very loose, fine to medium SAND, little silt.	
								26.30		8.50	
10	3D	24/15	10.00 - 12.00	1/1/1/1	2	2				Grey, saturated, very soft, clayey-SILT, trace fine sand, trace gravel.	
								22.80		12.00	
										Bottom of Exploration at 12.00 feet below ground surface. NO REFUSAL	
15											
20											
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: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-103
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	28.3	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 09:00-09:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	12+00, 32.0 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	1.2' bgs.
Hammer Efficiency Factor:	0.633	**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
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 = weight of rods
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							SSA	27.90		Topsoil, (Sod). 0.40	
	1D	24/13	1.00 - 3.00	1/2/3/4	5	5				Brown, saturated, loose, fine to coarse SAND, some silt.	
								24.80		3.50	
5	2D	24/24	5.00 - 7.00	1/1/2/3	3	3				Brown, saturated, very loose, fine SAND, some clay-silt.	
								19.30		9.00	
10	3D	24/24	10.00 - 12.00	2/2/2/4	4	4				Brown, wet, very loose, fine to medium SAND, some silt.	
								16.30		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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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-104
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	32.1	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 09:30-10:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	17+00, 25.0 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	1.8' bgs.
Hammer Efficiency Factor:	0.633	**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 = weight of rods
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							SSA	31.70		Topsoil, (Sod). 0.40	
	1D	24/15	1.00 - 3.00	5/4/5/6	9	9				Brown, saturated, loose, fine to coarse SAND, some silt, trace gravel.	
								29.10		3.00	
5	2D	24/22	5.00 - 7.00	2/3/2/2	5	5				Brown, saturated, loose, fine SAND, some silt.	
								24.60		7.50	
10	3D	24/24	10.00 - 12.00	1/1/1/1	2	2				Grey, wet, very soft, clayey-SILT, trace fine sand.	
								20.10		12.00	
15										**Bottom of Exploration at 12.00 feet below ground surface.** NO REFUSAL	
20											
25											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-105
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	40.0	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 10:00-10:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	22+00, 15.0 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	9.0' bgs.
Hammer Efficiency Factor:	0.633	**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 = weight of rods
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							SSA	39.60		Topsoil, (Sod). 0.40	
	1D	24/24	1.00 - 3.00	3/4/8/10	12	13				Olive-brown, moist, stiff, clayey-SILT, trace fine sand.	
5	2D	24/24	5.00 - 7.00	4/4/5/5	9	9				Similar to above.	
								31.50		8.50	
10	3D	24/24	10.00 - 12.00	3/3/3/3	6	6				Olive-brown, wet, medium stiff, SILT, some fine sand, trace organics.	
								28.00		12.00	
15										**Bottom of Exploration at 12.00 feet below ground surface.** NO REFUSAL	
20											
25											

Remarks:

Auto Hammer #283

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-106
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	40.0	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 10:30-10:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	27+00, 15.0 Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	9.0' bgs.
Hammer Efficiency Factor:	0.633	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
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MV = Unsuccessful Insitu Vane Shear Test attempt
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SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
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WOR = weight of rods
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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							SSA	39.60		Topsoil, (Sod). 0.40	
	1D	24/24	1.00 - 3.00	3/5/5/6	10	11				Olive-brown, moist, stiff, clayey-SILT, trace fine sand.	
5	2D	24/24	5.00 - 7.00	3/4/4/6	8	8				Similar to above, but medium stiff.	
								31.00		9.00	
10	3D	24/24	10.00 - 12.00	2/2/1/2	3	3				Grey, wet, very soft, marine clay-SILT, trace fine sand.	
								28.00		12.00	
15										**Bottom of Exploration at 12.00 feet below ground surface.** NO REFUSAL	
20											
25											

Remarks:

Auto Hammer #283

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: I-295, Exit 3 and 4, Noise Barrier Wall
Location: South Portland, Maine

Boring No.: HB-SOPO-107
PIN: 12800.00

Driller:	MaineDOT	**Elevation (ft.)**	46.5	**Auger ID/OD:**	5" Dia.
Operator:	Mike/Nick	**Datum:**	NAVD 88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	10/9/08; 12:00-12:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	33+00, 8.0 Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.633	**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
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 = weight of rods
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							SSA	46.10		Topsoil, (Sod). 0.40	
	1D	24/18	1.00 - 3.00	5/7/15/17	22	23				Brown, moist, medium dense, fine to coarse SAND, some silt.	
	MD	1.2/0	4.70 - 4.80	25(1.2")	---			41.70		Failed sample attempt. 4.80	
										Bottom of Exploration at 4.80 feet below ground surface. REFUSAL	

Remarks:

Auto Hammer #283

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

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

BORING CB-47 STATION 9+60 65 LT.

CASING SIZE	DRIVING RESISTANCE Blows/Ft	VANE SHEAR STRENGTH Tons/Sq Ft	WATER CONTENT Percent
4"	20 40	0 4 0 8	20 40

ELEV 42 6

40

MEDIUM DENSITY BROWN FINE SANDY SILT.

1D — 75 90

35

85 60

2D

30

LOOSE BROWN SILT

MU

25

MEDIUM CONSISTENCY BROWN CHANGING TO GRAY SILTY CLAY WITH SILT-SAND LAYERS.

1U

20

2U

MEDIUM CONSISTENCY GRAY SILTY CLAY WITH BLACK SPOTS.

15

3U

ELEVATION

10

MEDIUM CONSISTENCY GRAY SILTY CLAY WITH BLACK BANDS AND SILT-SAND LAYERS

4U

5

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA

BORING CB-47

I-295
SO. PORTLAND

DATE JAN 1966

SHEET NO 34

BORING CB-46 STATION 11+60 65 LT

CASING SIZE	DRIVING RESISTANCE Blows/Ft.	VANE SHEAR STRENGTH Tons/Sq.Ft.	WATER CONTENT Percent
4"	20 40	0.4 0.8	20 40

ELEV. 40.9

ELEVATION

40
35
30
25
20
15
10
5
0
-5
-10
-15

1D
2D
3D
MU
1U
2U
3U
4U
5U
6U
4D

H
H
H
H
H
H
H

100
75
102
125
125
81
87
69
115

LOOSE BROWN FINE SAND.

LOOSE BROWN FINE SANDY SILT.

STIFF BROWN SILTY CLAY WITH SILT-SAND LAYERS.

MEDIUM CONSISTENCY GRAY SILTY CLAY WITH SILT-SAND LAYERS.

MEDIUM CONSISTENCY GRAY SILTY CLAY WITH SHELLS AND BLACK SPOTS.

MEDIUM CONSISTENCY GRAY SILTY CLAY WITH BLACK BANDS - SILT AND SAND LAYERS APPEAR WITH DEPTH.

MEDIUM DENSITY GRAVELLY CLAYEY SILTY SAND.

B

* DROVE "A" RODS

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING CB-46
I-295
SO. PORTLAND
DATE: JAN. 1966

SHEET NO. 33

BORING CB-56 STATION 19+75 25' LT.

CASING SIZE	DRIVING RESISTANCE Blows/Ft.	VANE SHEAF STRENGTH Tons, Sq.Ft.	WATER CONTENT Percent
2½"	20 40	0.4 0.8	20 40

ELEV. 41.0

40

MEDIUM DENSITY BROWN SILT

1D

35

2D

STIFF BROWN CLAYEY SILT

1C

30

MC

25

MC H — MEDIUM CONSISTENCY GRAY CLAYEY SILT WITH BLACK SPECKS, SHELLS AND THIN VERY FINE SAND LAYERS.

MC H

20

15

10

5

ELEVATION

0

-5

DROVE "A" RODS

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA

BORING CB-56

I-295
SO. PORTLAND

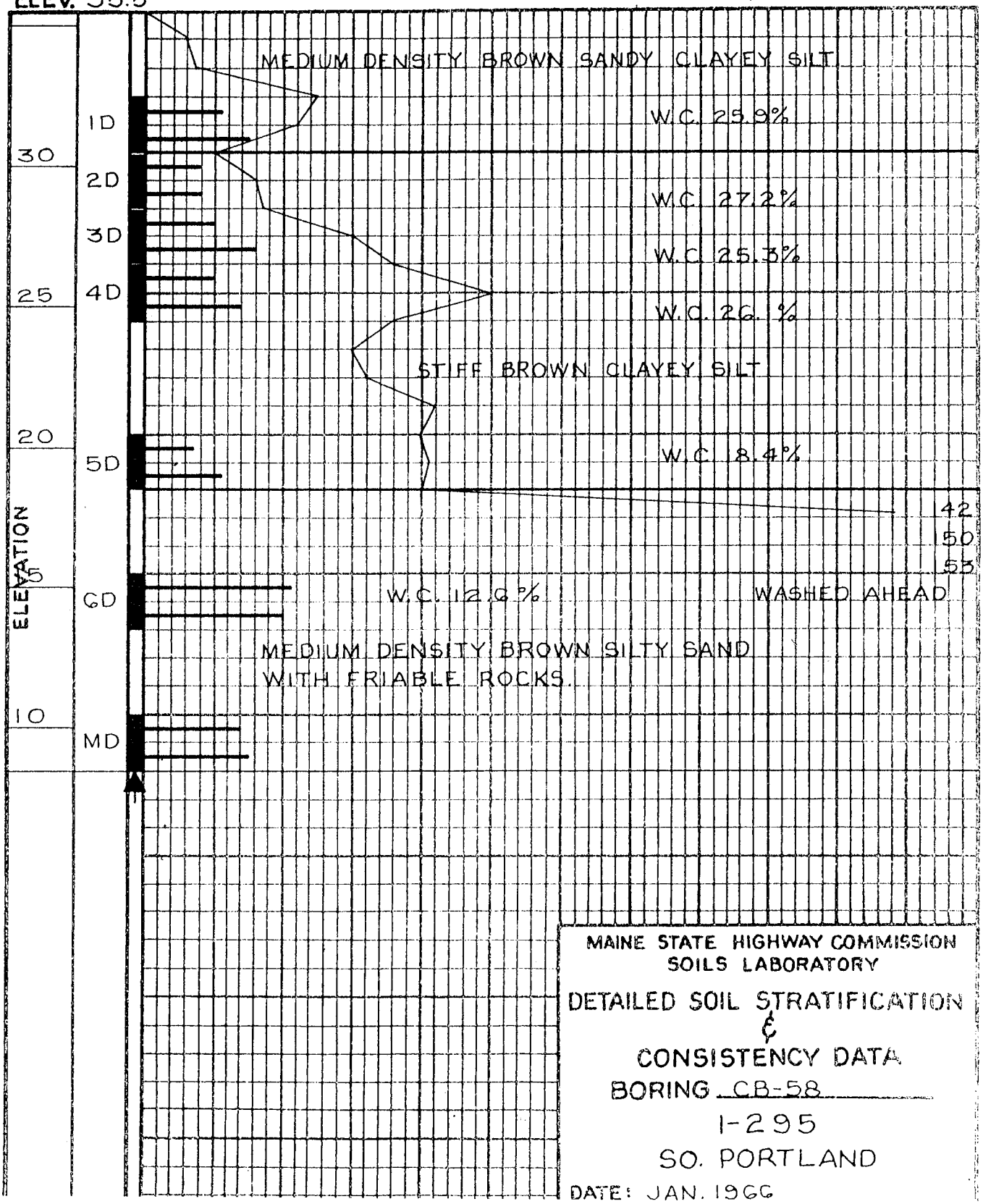
DATE: JAN. 1966

SHEET NO. 39

BORING CB-58 STATION 23+65 30 LT

CASING SIZE	DRIVING RESISTANCE — Blows/Ft.				
	20	40	60	80	100

ELEV. 35.5



MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA

BORING CB-58

I-295
SO. PORTLAND

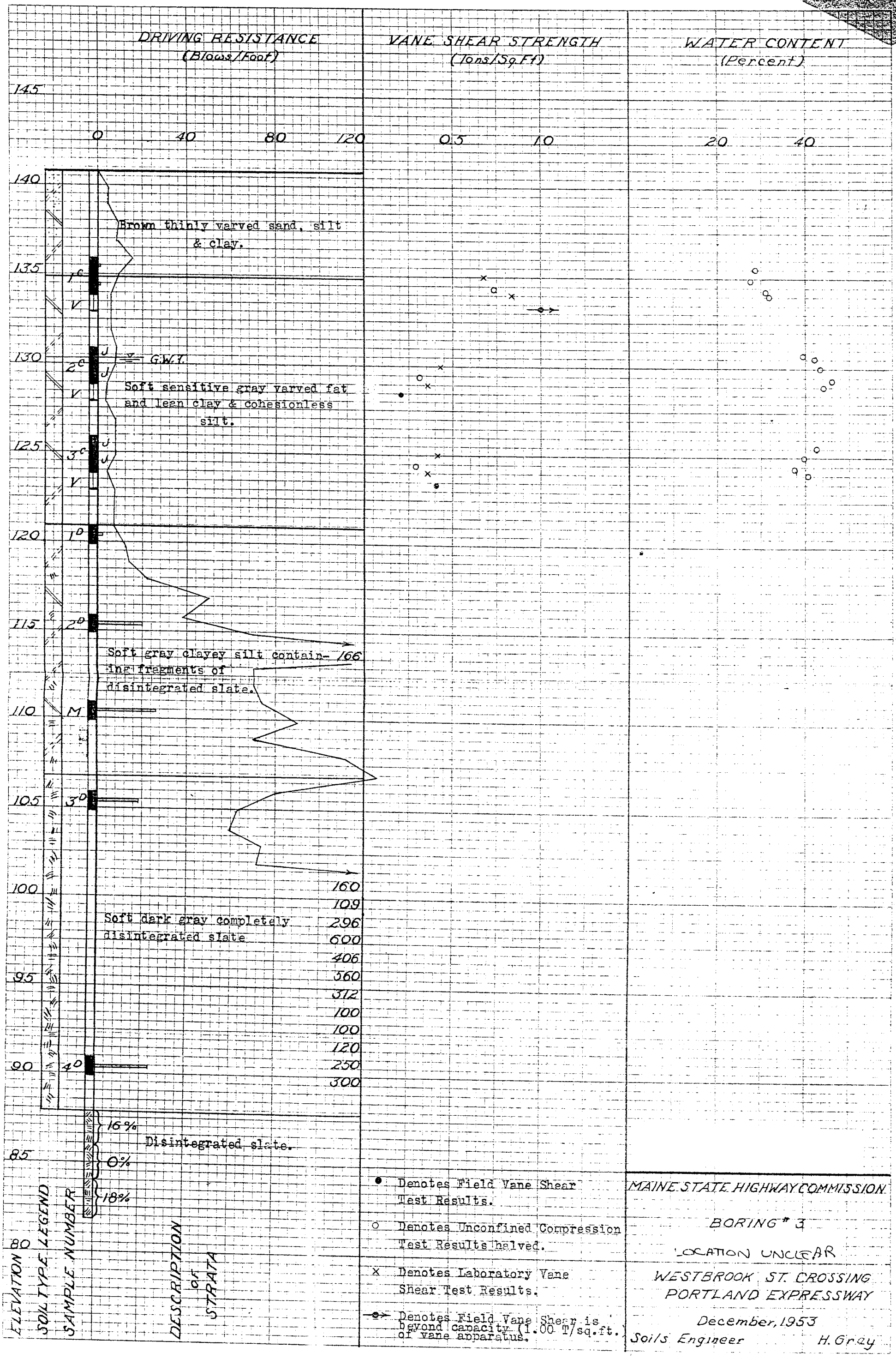
DATE: JAN. 1966

SML-202(3-62)

DRIVING RESISTANCE (Blows/Foot)

VANE SHEAR STRENGTH (Tons/Sq.Ft.)

WATER CONTENT (Percent)



● Denotes Field Vane Shear Test Results.

○ Denotes Unconfined Compression Test Results halved.

× Denotes Laboratory Vane Shear Test Results.

→ Denotes Field Vane Shear is beyond capacity (1.00 T/sq.ft. of vane apparatus.

MAINE STATE HIGHWAY COMMISSION

BORING # 3

LOCATION UNCLEAR

WESTBROOK ST. CROSSING
PORTLAND EXPRESSWAY

December, 1953

Soils Engineer H. Gray

SHEET # 26

K+E SEMI-LOGARITHMIC 47 6012
4 CYCLES X 150 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

ELAPSED TIME IN MINUTES

1.0 10.0 100.0 1000

DIAL READING IN INCHES

.0675 .0650
.0699 .0700
.0735 .0750
.0785 .0800
.0859 .0900
.0960
.1189 .1150
.1683
.1600
.1990

0.0764 TONS / SQ.FT.
0.1731 TONS / SQ.FT.
0.3462 TONS / SQ.FT.
0.6925 TONS / SQ.FT.
1.385 TONS / SQ.FT.
2.0775 TONS / SQ.FT.
3.1162 TONS / SQ.FT.
4.6743 TONS / SQ.FT.

VOID RATIO (e)

1.2
1.1
1.0
0.9

0.1 1.0 10.0

PRESSURE (TONS / SQ. FT.)

MAINE STATE HIGHWAY COMMISSION
TIME-CONSOLIDATION CURVES
PRESSURE-VOID RATIO DIAGRAM

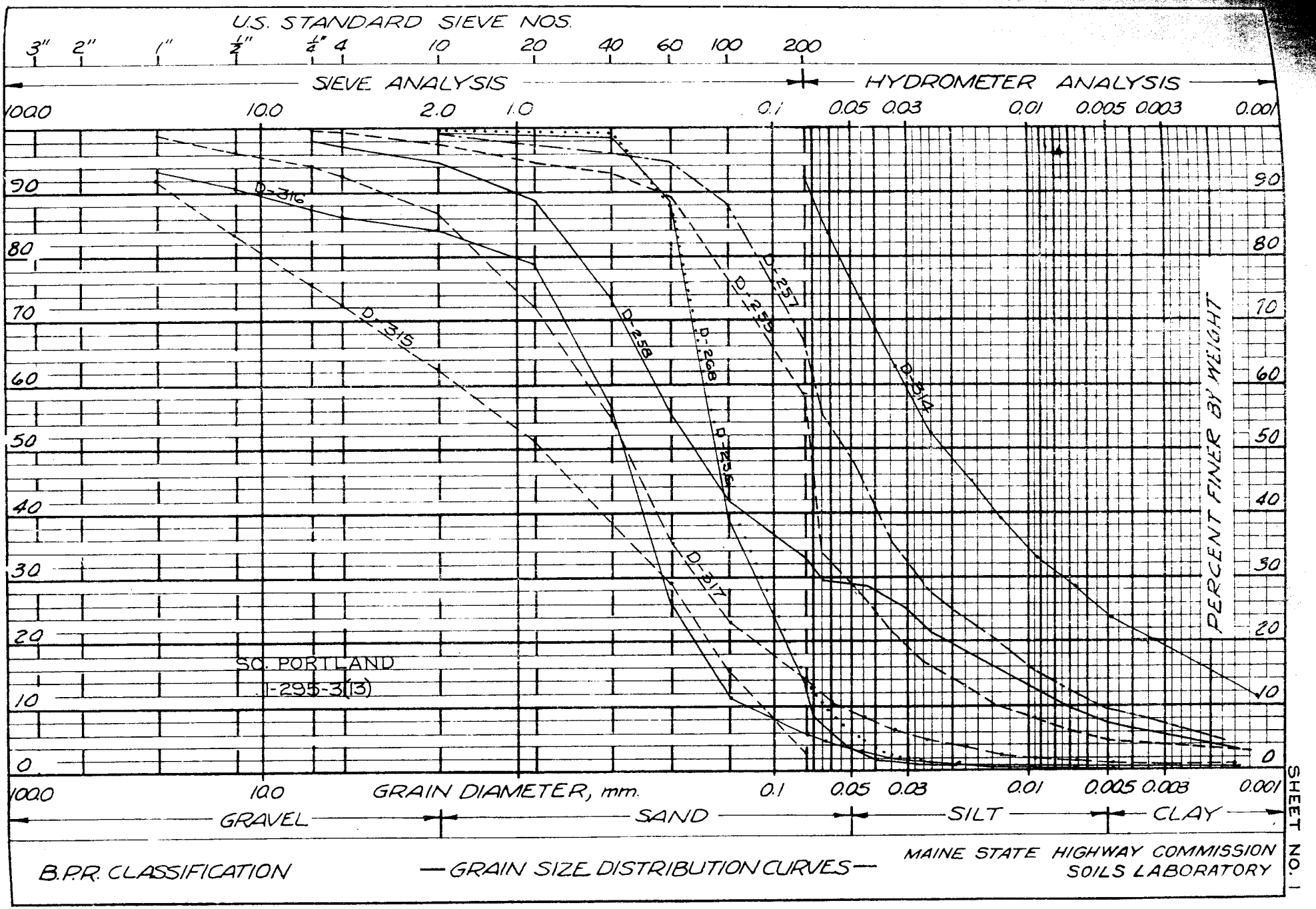
PORTLAND

I-295-3(13)

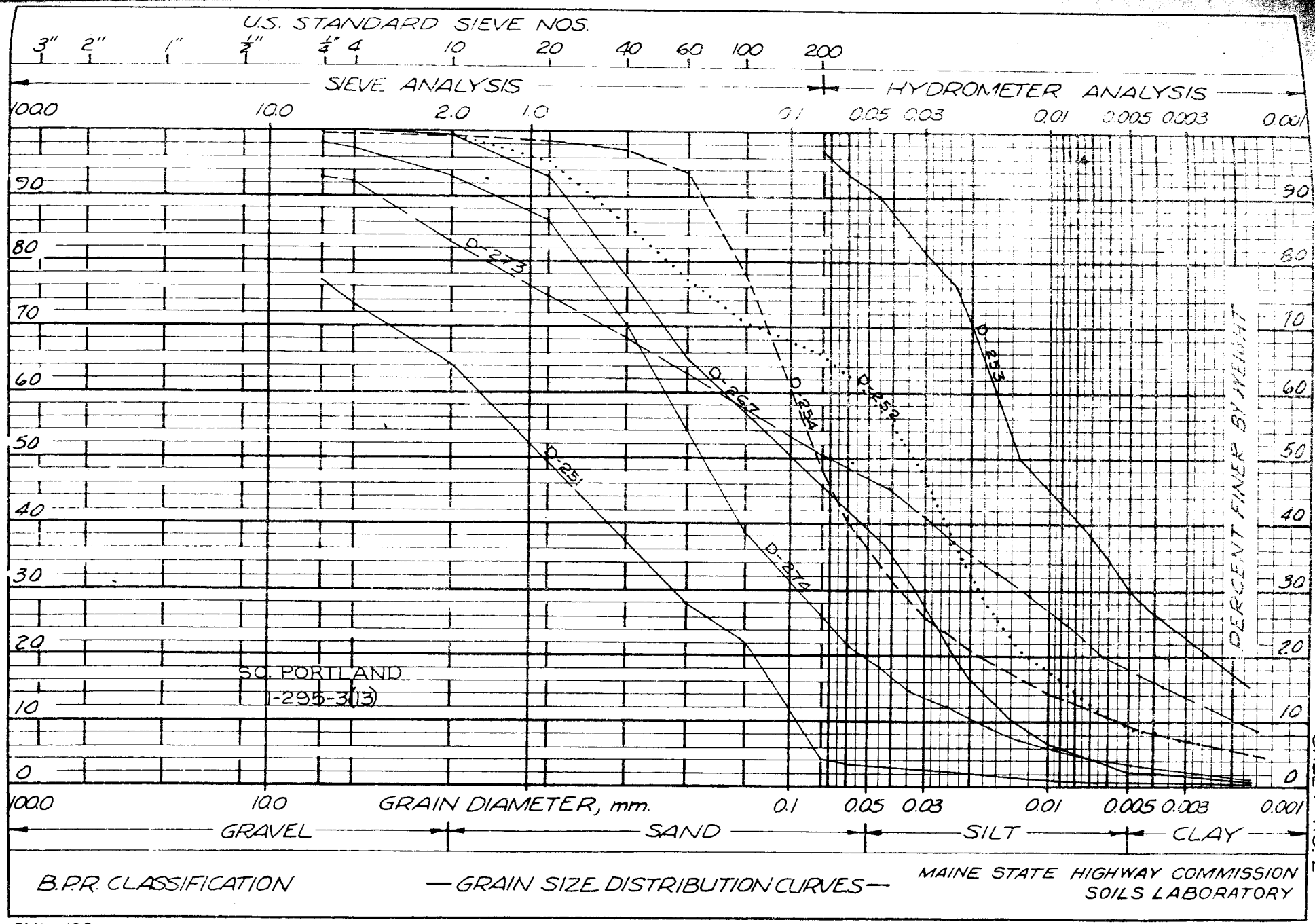
BORING CB-45 SAMPLE 3U

SOILS ENGINEERING LAB

SHEET NO. 46


U.S. STANDARD SIEVE NOS.
3" 2" 1" ½" ¼" 4 10 20 40 60 100 200
SIEVE ANALYSIS
HYDROMETER ANALYSIS
100.0 10.0 2.0 1.0 0.1 0.05 0.03 0.01 0.005 0.003 0.001
90 80 70 60 50 40 30 20 10 0
D-316
D-315
D-257
D-259
D-258
D-260
D-256
D-314
D-317
SO. PORTLAND
I-295-3(13)
PERCENT FINER BY WEIGHT
GRAIN DIAMETER, mm.
GRAVEL
SAND
SILT
CLAY
B.P.R. CLASSIFICATION
— GRAIN SIZE DISTRIBUTION CURVES —
MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY
SHEET NO. 1

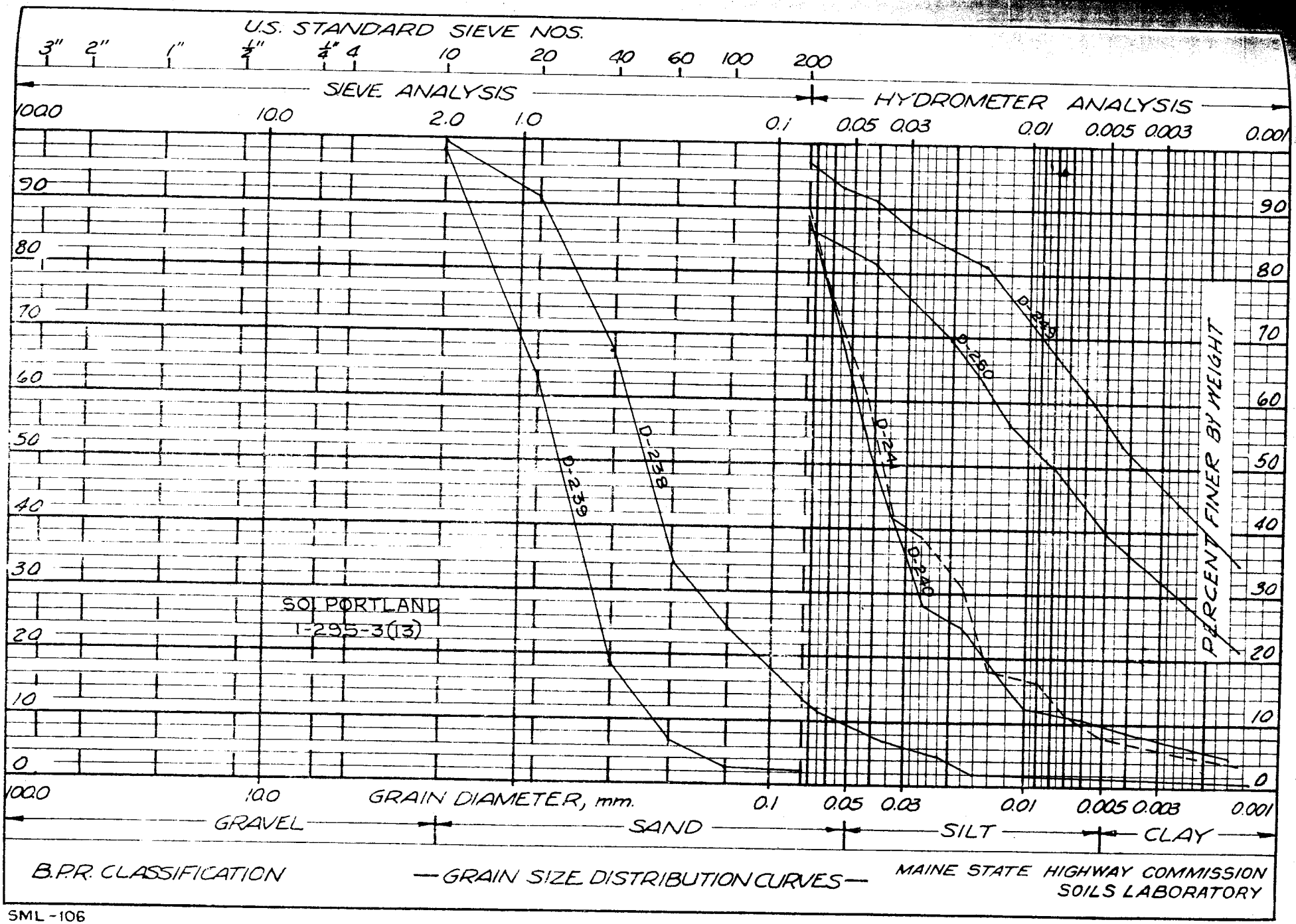
SML-106



B.P.R. CLASSIFICATION — GRAIN SIZE DISTRIBUTION CURVES —

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

SML - 106

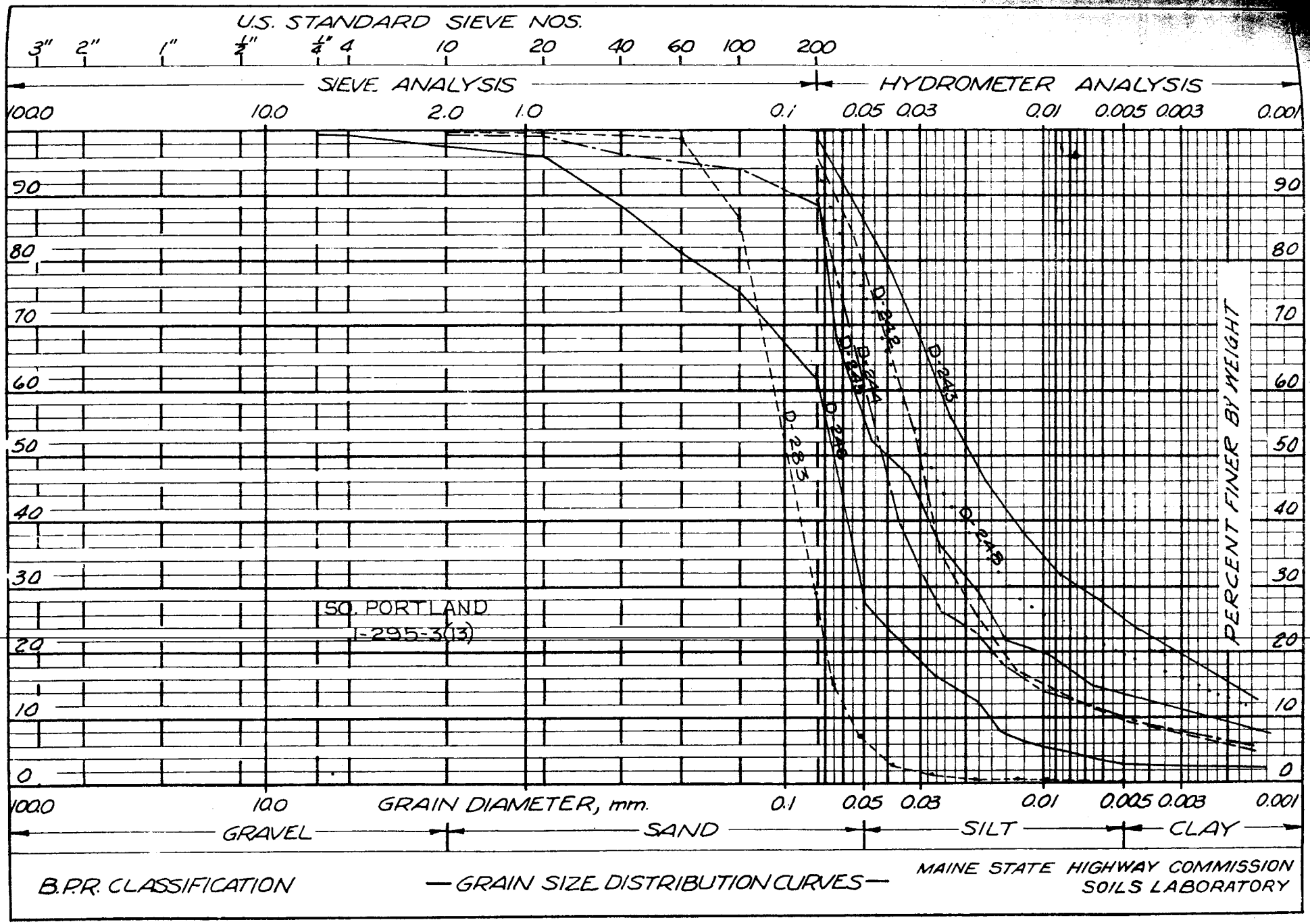


B.P.R. CLASSIFICATION — GRAIN SIZE DISTRIBUTION CURVES —

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

SHEET NO. 4

SML - 106

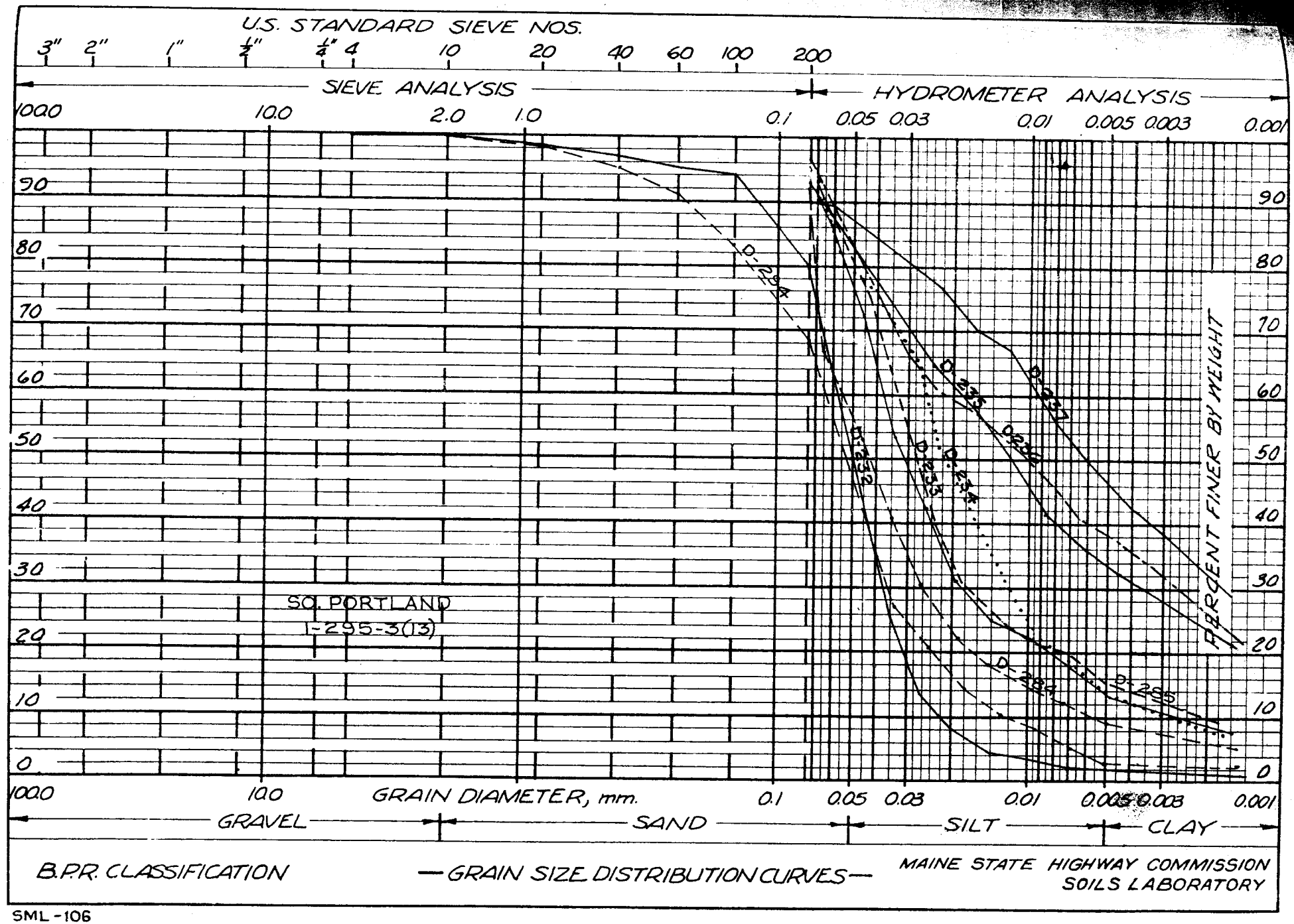


B.P.R. CLASSIFICATION — GRAIN SIZE DISTRIBUTION CURVES —

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

SHEET NO. 5

SML-106

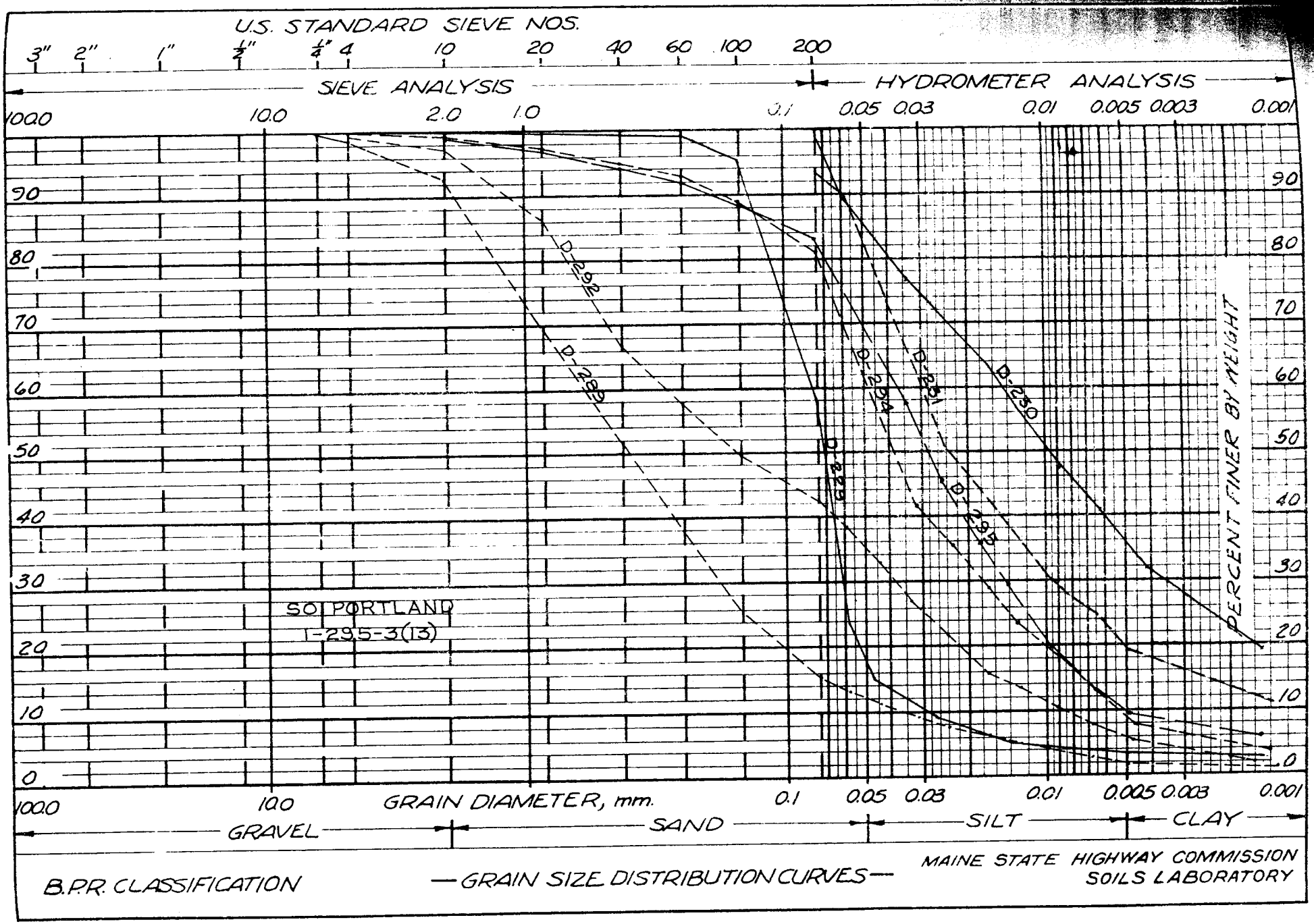


B.P.R. CLASSIFICATION — GRAIN SIZE DISTRIBUTION CURVES —

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

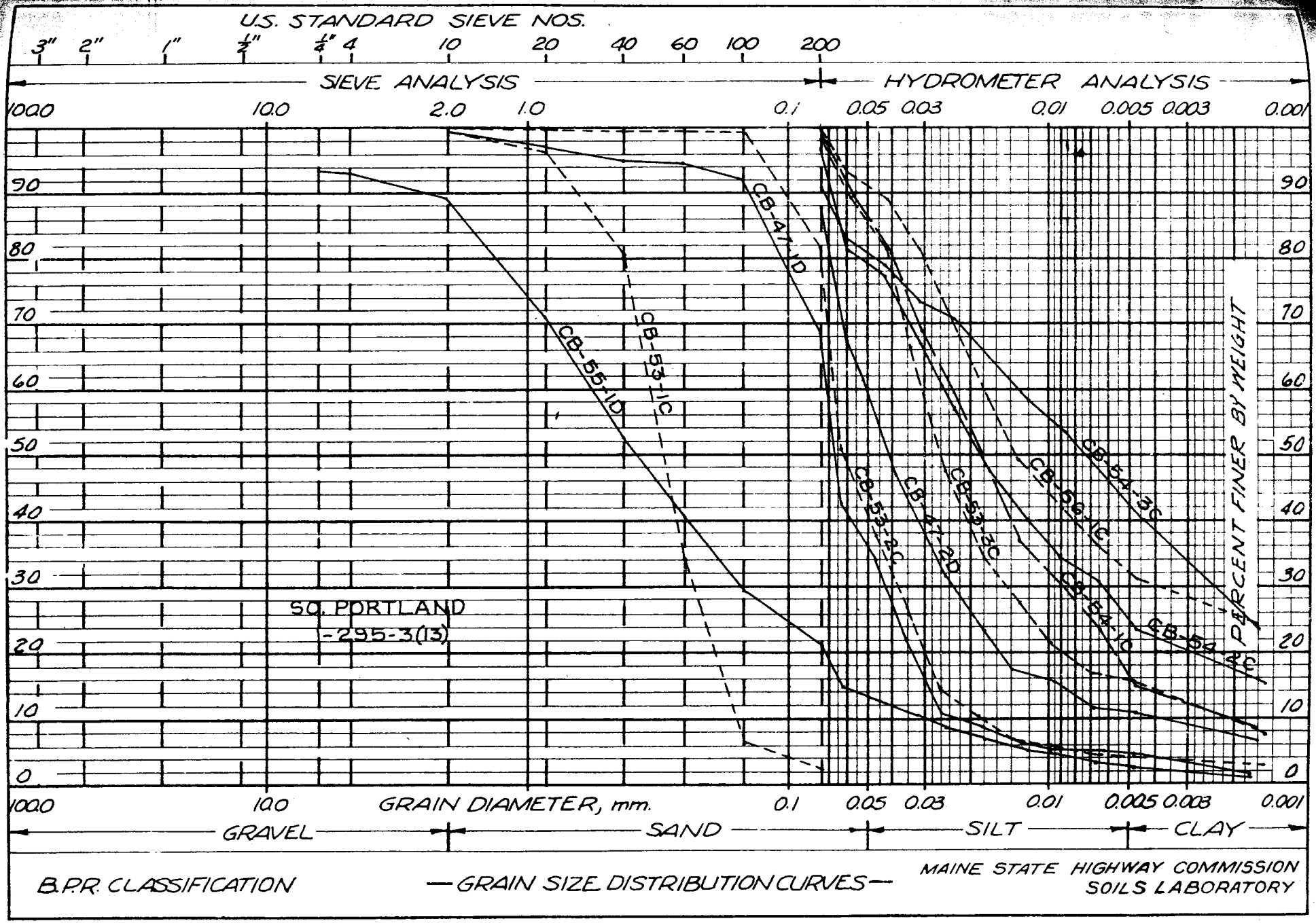
SHEET NO. 6

SML - 106



SHEET NO. 7

SML-106

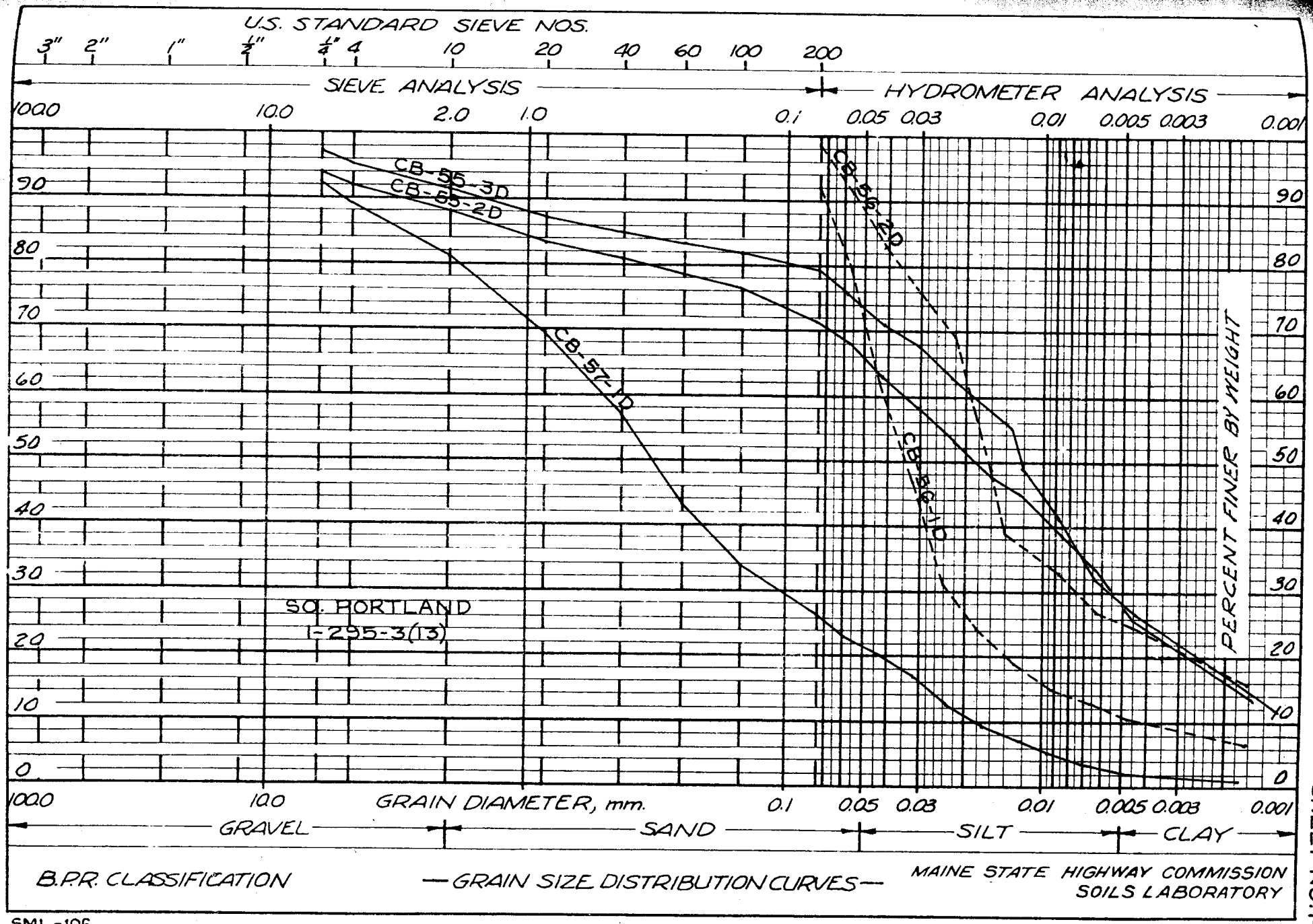


B.P.R. CLASSIFICATION — GRAIN SIZE DISTRIBUTION CURVES —

MAINE STATE HIGHWAY COMMISSION
SOILS LABORATORY

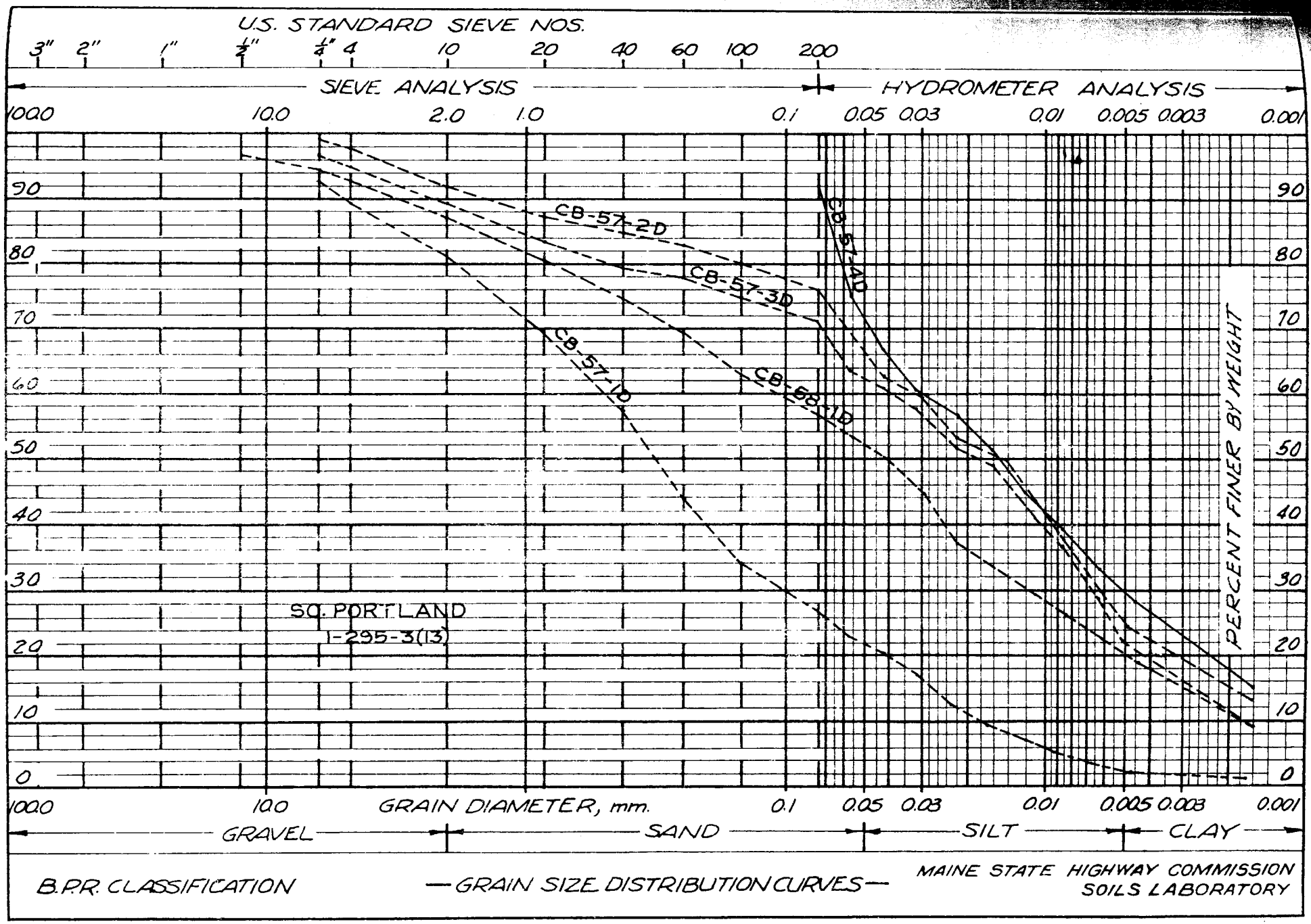
SHEET NO. 13

SML-106



SHEET NO. 14

SML-106



SHEET NO. 15

SML - 106

State of Maine - Department of Transportation

Ledge Outcrop Summary Sheet

Town(s): South Portland Project Number: 12800.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 10/9/2008
31+27+/-	30.0 Lt.					Ledge Outcrop
31+44+/-	30.0 Lt.					Ledge Outcrop
32+00+/-	17.0 Lt.					Ledge Outcrop

Logged By: B. Wilder

Appendix D
Frost Design Charts

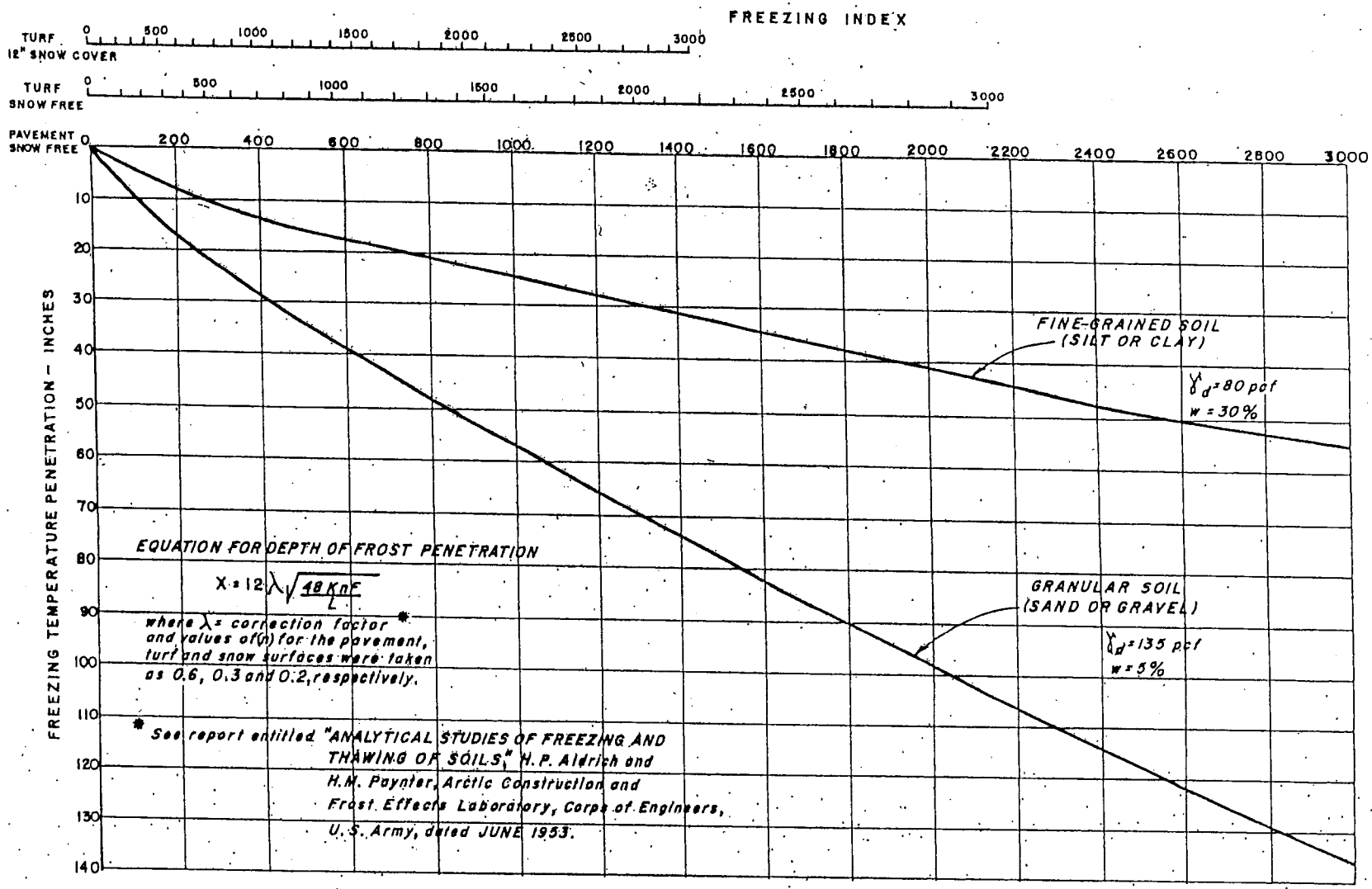
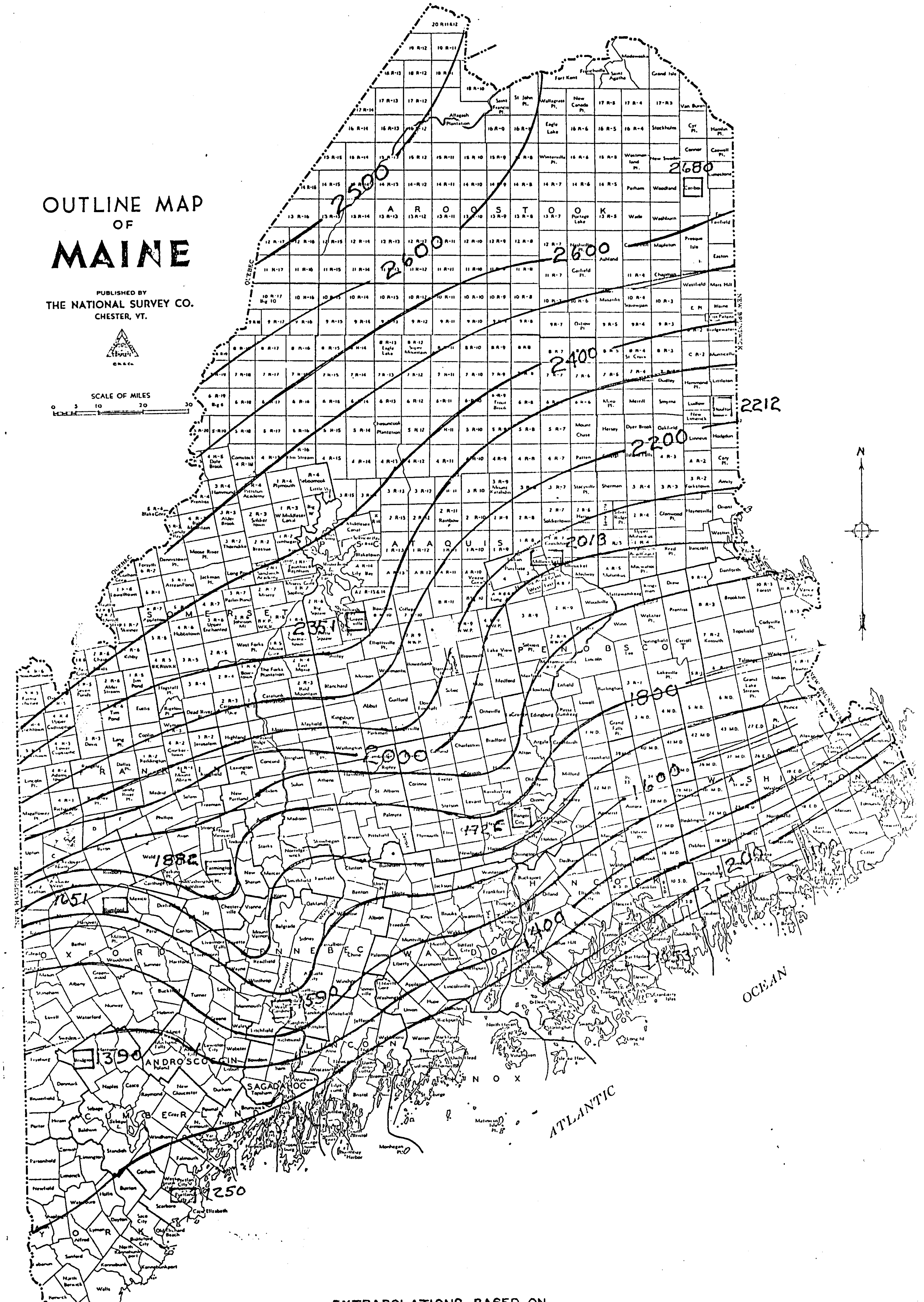


Figure 13-3 RELATIONSHIP BETWEEN FREEZING INDEX AND FREEZING TEMPERATURE PENETRATION FOR VARIOUS SURFACE CONDITIONS FOR GRANULAR AND FINE-GRAINED SOILS.



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 INDEX