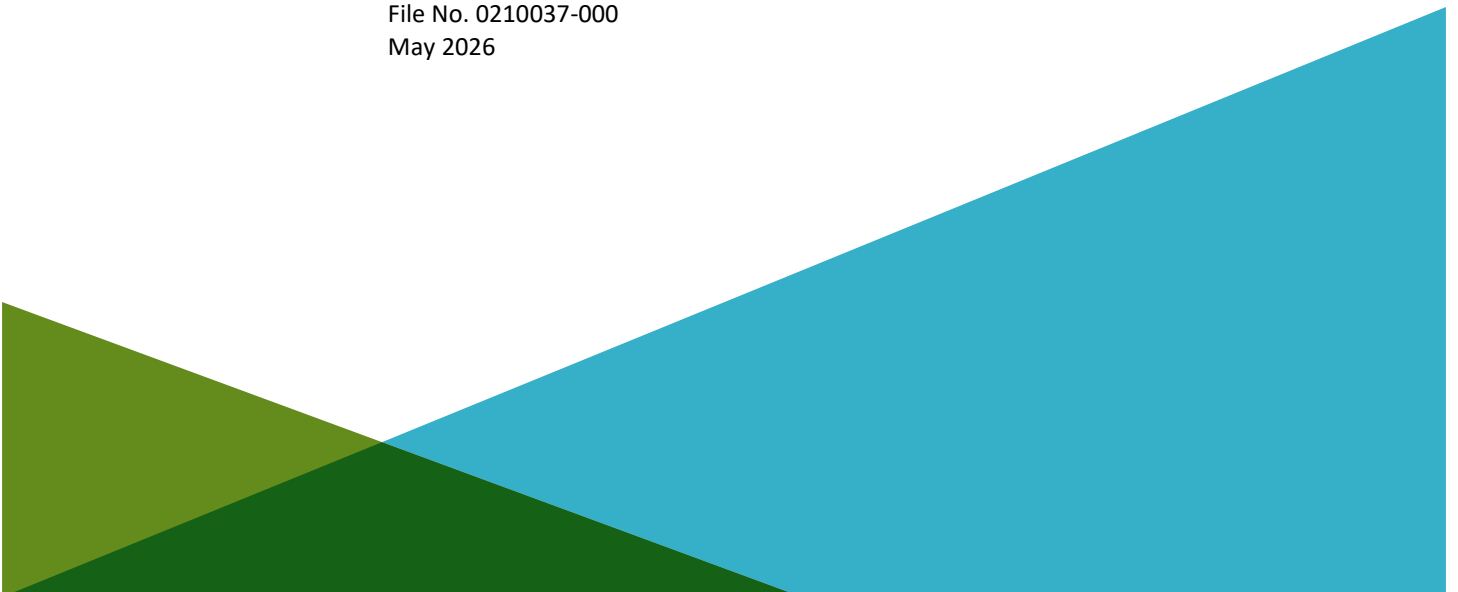


PHASE I GEOTECHNICAL DATA REPORT
INTERSTATE 395 OVER MAIN STREET
BRIDGE NO. 5799, MAINEDOT WIN 029484.00
BANGOR, MAINE

by
Haley & Aldrich, Inc.
Portland, Maine

for
Maine Department of Transportation
Augusta, Maine

File No. 0210037-000
May 2026





HALEY & ALDRICH, INC.
75 Washington Avenue
Suite 1A
Portland, ME 04101
207.482.4600

May 15, 2026
File No. 0210037-000

Maine Department of Transportation
16 State House Station
Augusta, Maine 04333-0016

Attention: Laura Krusinski, P.E.
Senior Geotechnical Engineer

Subject: Phase I Geotechnical Data Report
Interstate 395 over Main Street
Bridge No. 5799, MaineDOT WIN 029484.00
Bangor, Maine

Ladies and Gentlemen:

This Phase I Geotechnical Data Report presents the compilation of subsurface data and results of the historical geotechnical field investigations completed for construction of the existing Interstate 395 (I-395) over Main Street bridge (existing bridge) in Bangor, Maine (see Figures 1 and 2). This report is intended to provide Maine Department of Transportation (MaineDOT) and their bridge subconsultant with initial geotechnical information for the proposed bridge rehabilitation. Per discussions with MaineDOT, a site-specific field investigation was not conducted to support this phase of the project. This work has been completed in accordance with our proposal dated March 5, 2024, which was authorized on March 18, 2024.

Project Background

EXISTING BRIDGE STRUCTURE

The existing 111-foot (ft)-long, single-span bridge carries I-395 over Main Street (see Figure 2).

Abutment No. 1 and Right Wingwall

Based on our review of the historical bridge drawings (dated October 1984) the existing cast-in-place concrete Abutment No. 1 and right wingwall are supported on vertical and battered (3.5 horizontal:12 vertical), steel, end-bearing, HP 14x89 piles, with a maximum pile load of 120 tons (see historical bridge drawing Sheet No. 7). Based on Sheet 7, Note No. 3 of the historical bridge drawings, the estimated number of piles required to support Abutment No. 1 is 50, 10-ft-long, HP 14x89 piles. However, per Sheet No. 7 of the historical bridge drawings, 49, HP 14x89 piles are shown supporting Abutment No. 1 and the right wingwall.

Abutment No. 1 Left Wingwall

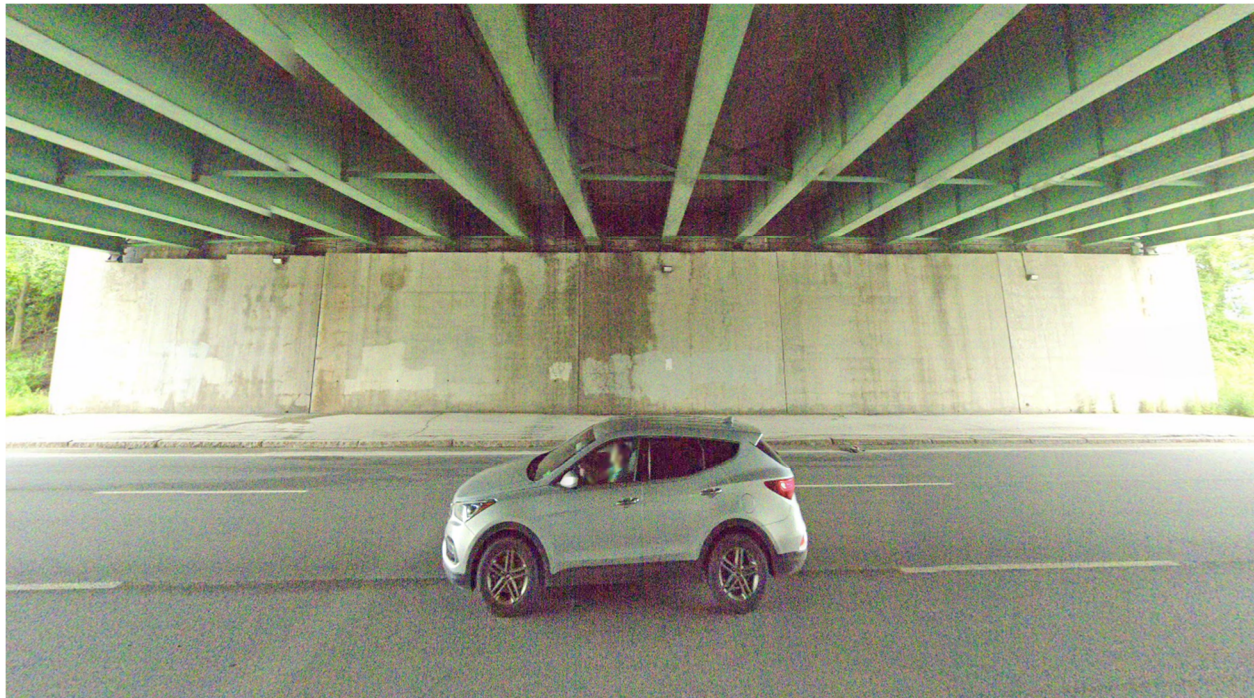
The existing Abutment No. 1 left wingwall appears to be supported on a spread footing (see Sheet No. 10 in the historical bridge drawings). Based on the bottom of the left wingwall spread footing (El. 39) on Sheet Nos. 4 and 10 of the historical bridge drawings, the spread footings appear to be bearing on “loose brown and gray clayey silty fine sand and sandy silt, gravel, with a few rocks.”

Abutment No. 2 and Wingwalls

The existing cast-in-place Abutment No. 2 and wingwalls appear to be supported on spread footings (see Sheet Nos. 4 and 14 in the historical bridge drawings), bearing on “assorted cobbles, pebbles, and boulders” at El. 39 (bottom of spread footing).



Photograph 1 – Abutment No. 1 (west side of existing bridge) supported on steel HP 14x89 piles.



Photograph 2 – Abutment No. 2 (east side of existing bridge) supported on spread footings.

Geologic Setting

According to Maine Geological Survey's Bangor Surficial Geology Quadrangle, Maine (Open-File No. 11-6, 2011), the surficial geologic unit mapped within the site vicinity is the Presumpscot Formation which consists of silt, clay, and sand. According to Maine Geological Survey's Bangor Bedrock Geology Quadrangle, Maine (Open-File 11-57, 2011), bedrock at the site vicinity is mapped as the Penobscot River Member of the Vassalboro Group which consists of Silurian Age medium-grained to very fine-grained feldspathic metawacke.

Historical Geotechnical Field Investigation

A geotechnical field investigation (investigation) was conducted at the subject site by MaineDOT in February, March, and May 1984. The results of the investigation are summarized in the report titled, "Soils Report 84-22, Bangor – Penobscot, I-395-8(79), I-395 over Main Street, July 1984," (Soils Report) and is included for reference in Appendix A. Based on Sheet Nos. 2 and 3 in the Soils Report, the investigations consisted of conducting 13 wash borings (borings) and three test pits to support design and construction of the existing bridge. In addition, three borings from 1956 were also included in the report. Please note that a reference elevation datum was not indicated in the Soils Report. Refer to Figure 2 for approximate locations of historical borings and test pits.

A second investigation was conducted to support the redesigned Main Street interchange in the report titled, "Soils Report 85-8, Bangor – Penobscot County, 395-8(79), I-395 – Main Street Interchange,

February 1985.” (Soils Report Interchange). We have included the Soils Report Interchange in Appendix A for reference.

Generalized Subsurface Conditions

The subsurface conditions encountered in the investigation (1984) generally consisted of the following geologic units presented in order of increasing depth below ground surface (BGS) along the existing bridge alignment: in-situ fill, glacial till, and bedrock. The Soils Report did not provide a geologic unit classification for the glacial till.

A general description of each geologic and bedrock unit encountered in the available historical borings is provided separately below.

GENERALIZED GEOLOGIC UNIT DESCRIPTIONS

Geologic Unit	Approximate Range in Encountered Thickness (ft)	Generalized Description
In-situ Fill ¹	0 to 7	Abutment No. 2 only: brown and grey, Silty sandy GRAVEL and “assorted fill materials.”
Glacial Till ²	5 to 16	Abutment No. 1: Loose ³ , brown and grey, Clayey silty fine SAND and Sandy silty GRAVEL, with “rocks.” Abutment No. 2: “assorted cobbles, pebbles, and boulders.”

Notes:

1. The Soils Report indicates that the surficial (in-situ fill) soils are likely re-worked native soils.
2. Based on the descriptions of this stratum on the boring logs, we have classified these strata as glacial till.
3. Please note that field blow counts per foot (i.e., uncorrected N-values) and corresponding densities in the table below were based on a Sprague & Henwood soil sampler.

BEDROCK CONDITIONS

In the historical borings, the top of the bedrock surface ranged from approximately 12 ft to 16 ft BGS (El. 28 to El. 32). The cored bedrock was generally described as metasiltstone and metagraywacke, with quartz and calcite veins, and high angles of foliation.

GROUNDWATER ELEVATIONS

Historical groundwater levels were not recorded. An indication of soil sample saturation was not indicated on the historical boring logs.

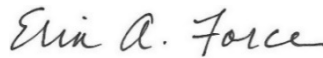
Closure

We appreciate the opportunity to provide engineering services on this project. Please do not hesitate to contact us if you have any questions or comments.

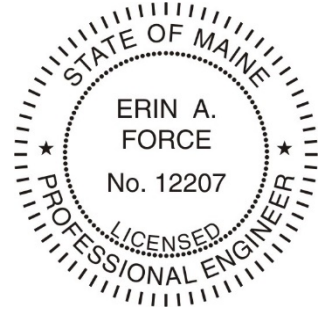
Sincerely yours,
HALEY & ALDRICH, INC.



Nathan A. Sherwood, P.E.
Senior Project Manager



Erin A. Force, P.E.
Senior Associate



Enclosures:

- Figure 1 – Project Locus
- Figure 2 – Historical Boring and Test Pit Location Plan
- Appendix A – Historical Soils Reports

<https://haleyaldrich.sharepoint.com/sites/MaineDepartmentofTransportation2/Shared Documents/0210037.MainedOT-Brewer I-395 Design Build/Deliverables/Phase 1 - Historic Geotech Data Reports/395 over Main St. Bridge No. 5799/2026-0515-HAI-395 over Main Street-Phase I GR-F.docx>

References

1. Syverson, Kent M., & Thompson, Andrew H., Surficial Geology Bangor Quadrangle, Maine, Maine Geological Survey, Department of Conservation, Augusta, Maine, Open File Report No. 11-6, 2011.
2. Pollock, Stephen G., Bedrock Geology of the Bangor Quadrangle, Maine, Maine Geological Survey, Department of Conservation, Augusta, Maine, Open File Report No. 11-57, 2011.

<https://haleyaldrich.sharepoint.com/sites/MaineDepartmentofTransportation2/Shared Documents/0210037.MaineDOT-Brewer I-395 Design Build/Deliverables/Phase 1 - Historic Geotech Data Reports/395 over Main St. Bridge No. 5799/2026-0515-HAI-395 over Main Street-Phase I GR-F.docx>

FIGURES



0210037.000 LOCUS HALEYALDRICHUBOIS



SITE COORDINATES: 44°47'07"N, 68°46'46"W



MAP SOURCE: USGS

**HALEY
ALDRICH**

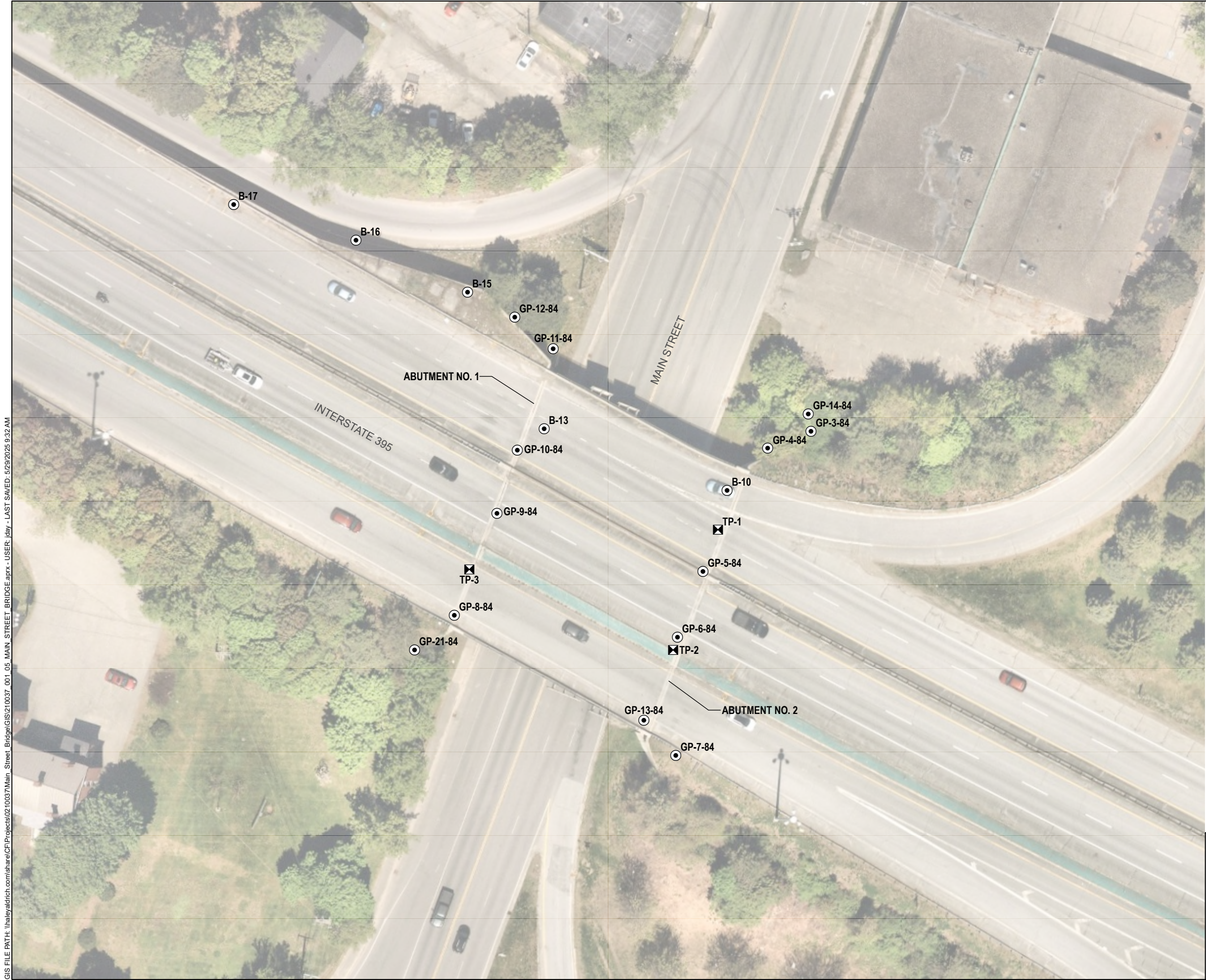
INTERSTATE 395 OVER MAIN STREET
BRIDGE NO. 5799, MAINEDOT WIN 029484.00
BANGOR, MAINE

PROJECT LOCUS

APPROXIMATE SCALE: 1 INCH = 2,000 FEET
MAY 2026

FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\02\10037\Main Street Bridge\GIS\210037 001 05 MAIN STREET BRIDGE.aprx - USER jday - LAST SAVED: 5/29/2025 9:32 AM



LEGEND

- HISTORICAL BORING BASED ON SHEET NO. 4 FROM OCTOBER 1984
- HISTORICAL TEST PIT BASED ON SHEET NO. 4 FROM OCTOBER 1984 HISTORICAL DRAWINGS

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: NEARMAP, 22 MAY 2023



0 50 100
SCALE IN FEET

**HALEY
ALDRICH**

INTERSTATE 395 OVER MAIN STREET
BRIDGE NO. 5799, MAINEDOT WIN 029484.00
BANGOR, MAINE

**HISTORICAL BORING AND TEST PIT
LOCATION PLAN**

SCALE: AS SHOWN
MAY 2026

FIGURE 2

APPENDIX A

Historical Soils Reports

Soils Report 84-22
Bangor - Penobscot
I-395-8(79)
I-395 over Main Street
July, 1984

Maine Department of Transportation
Materials and Research Division
Soils Section

SUBSURFACE INVESTIGATION FOR THE PROPOSED
RECONSTRUCTION OF THE I-395 BRIDGE OVER
MAIN ST. IN THE CITY OF BANGOR

Prepared By

Peter M. Coughlan
Associate Geotechnical Engineer

Approved By

Melvin W. Morgan
Soils Engineer

Penobscot County

Project I-395-8(79)
July 1984

Soils Report 84-22

BANGOR

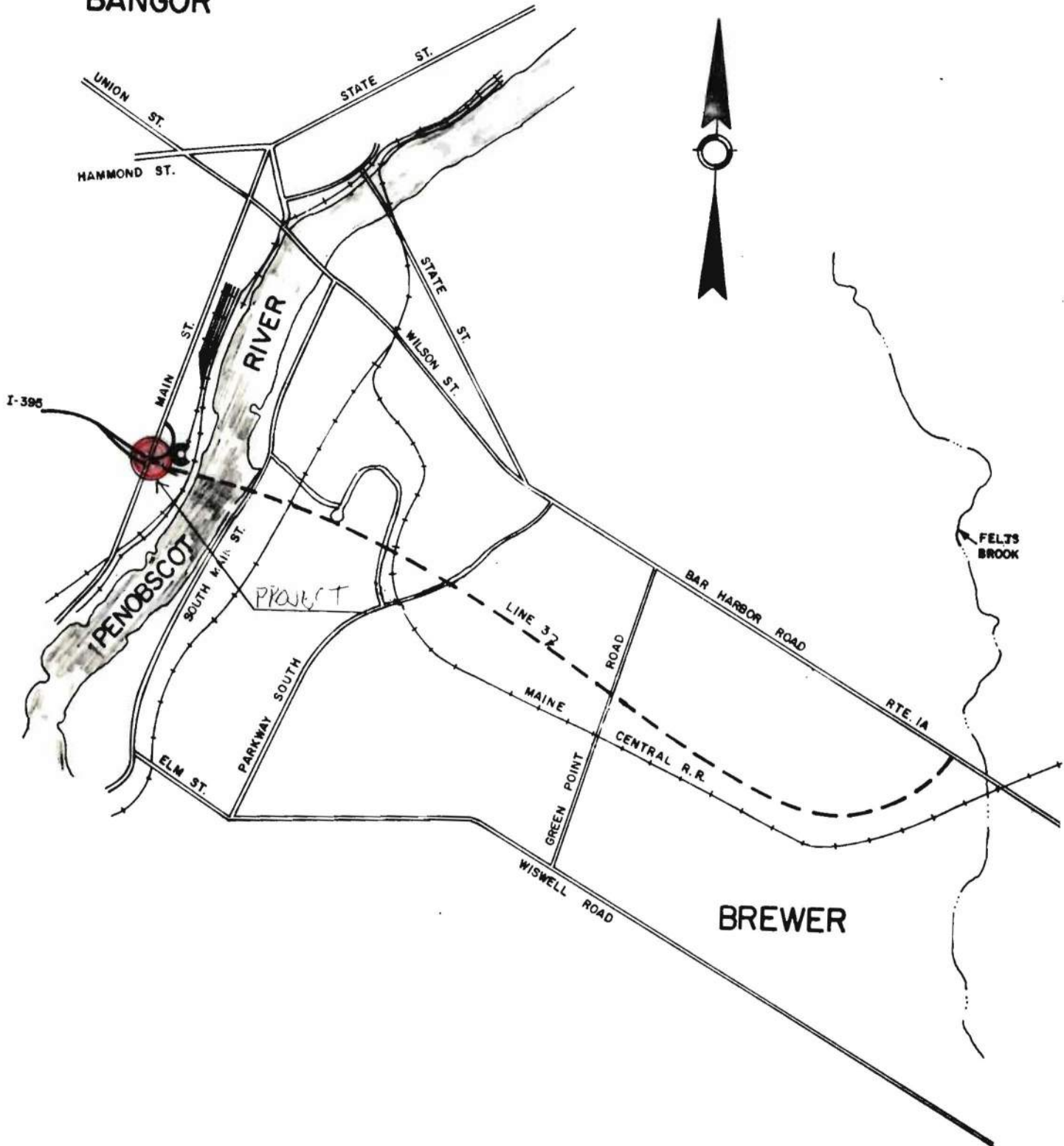


TABLE OF CONTENTS

<u>Text</u>	<u>Page</u>
INTRODUCTION	1
GENERAL CONDITIONS	2
SUBSURFACE DETAILS	3
<u>Abutment No. 1.</u>	3
<u>Abutment No. 2.</u>	6
DESIGN CONSIDERATIONS.	9
SUMMARY.	10

<u>Illustrations</u>	<u>Sheet</u>
Bearing Capacity Chart	1
Washboring Details	2,3
Foundation Survey (Plan, Profile & Transverse Sections)	4

INTRODUCTION

A subsurface soils investigation has been completed for the construction of a new bridge to carry the proposed I-395 roadway over Main Street in Bangor, Penobscot County. This project is in conjunction with the proposed third Bangor-Brewer bridge over the Penobscot River and it will result in a significantly wider bridge than the existing I-395 structure over Main Street. Also included in this project is the reconstruction of the main line roadway and the interchange ramps with Main Street. This report summarizes the soils investigations that were made for the Main Street Bridge and the remaining soils work that was made for the other parts of this project are included in a separate Soils Report to be published at a future date.

Several washborings were made at the proposed abutment locations in February and March, 1984 by a crew under the supervision of Mr. Gary Paine. In May, 1984, three backhoe test pits were dug in the proposed abutment areas to verify the washboring data. The locations and details of these explorations are shown on Sheets 2 through 4. All soil and rock samples were forwarded to the Central Laboratory in Bangor for identification.

Several washborings were made in 1956 for the construction of the existing I-395 structure and this data was used to supplement the more recent information. The locations of

these borings are also shown on the plan diagram on Sheet 4 and are designated by a "B", e.g. B-10. Details of the 1956 borings are shown on Sheets 2 and 3.

GENERAL CONDITIONS

The proposed abutment footings extend to the south of two of the existing piers adjacent to Main Street. Before the existing bridge was built in the late 1950's this area was the site of the old Farm Road intersection with Main Street and the site of several commercial establishments as evidenced by the remains of old foundations on the east side of Main Street. Thus, it appears that the surficial soils at this site have been reworked and are not truly indicative of the native soils in this section of Bangor.

Generally, there exists $11\pm$ feet to $16\pm$ of soil above the ledge surface in the two proposed abutment areas. Different soil conditions exist at the two abutment locations. The ledge surface was encountered at Elevation 30 ± 2 feet and core drilled with very good recovery results. The ledge was generally described as metamorphosed siltstone and graywacke with some quartz and calcite intrusions and the typical high angle of foliation.

Also, due to the urban nature of this project, there are several utility lines running through this area, both active and abandoned.

SUBSURFACE DETAILS

Abutment No. 1:

Several washborings were made along the proposed centerline of bearing and wings for this abutment. The centerline of bearing intersects the I-395 construction centerline at Station 157+61.38 and is skewed ahead 7 degrees 54 minutes 2 seconds on the right.

Under the existing I-395 bridge, two recent washborings were made. Washboring GP-11-84 was made at Station 157+50, 65 feet left of the I-395 construction centerline. There exists 16 feet of loose gray-brown clayey silty sand with pebbles above the ledge surface which was encountered at Elevation 28.1. This rock was core drilled for 4 feet 9 inches with 100 percent recovery and later described as metamorphosed siltstone and graywacke with quartz and calcite veins and a high angle of foliation.

In the adjacent proposed wing area, Washboring GP-12-84 was made at Station 157+23, 68 feet left of the I-395 centerline. Eleven feet two inches of loose gray and brown clayey silty fine to medium sand with pebbles was found before 1 1/2 feet of rocks and cobbles was core drilled. Solid ledge was encountered at Elevation 32.6 and 8 feet 6 inches of core drilled rock was described the same as that mentioned above.

Several older washborings were made in this immediate area in 1956 before the existing abutment and pier were con-

structed. Although some of the rock coring data from the boring log sheets is somewhat inconclusive, it appears that the ledge surface rises gradually to the west. The core drilling recovery was relatively poor and the rock description was quite general but the rock surface elevations tend to increase from east to west. This information is shown on the detail sheets for borings B-15 and B-13 on Sheet 2.

Nearer the centerline, Washboring GP-10-84 was made at Station 157+59, 8 feet left. There exists 15 feet of loose brown clayey sandy silty gravel over the ledge surface which was encountered at Elevation 29.6. This ledge was core drilled for 5 feet with a 100 percent recovery and described as metagraywacke and metasiltstone with quartz and calcite veins and a high angle of foliation.

Twenty-seven feet right of Station 157+65, Washboring GP-9-84 was made. Fifteen feet of loose brown and gray sandy gravel with some rocks is found over the ledge surface. At Elevation 29.3, the ledge was encountered and core drilled for 5 feet with 100 percent recovery and the rock was described the same as that for boring GP-10-84.

Near the right end of the proposed abutment footing, Washboring GP-8-84 was made at Station 157+72, 85 feet right of the I-395 centerline. The drilling record indicates that there is 10 feet of loose density clayey silty fine sand with a few rocks and pebbles over a 3 foot layer of loose

gray silty sandy angular gravel. Ledge was encountered at Elevation 30.0 and core drilled 4 feet and described as metagraywacke and phyllite with some quartz and calcite veins and a high angle of foliation.

Along the proposed right wing of this abutment, Washboring GP-21-84 was made at Station 157+60, 112 feet right. The soil overburden consists of 14 feet 4 inches of loose density brown and gray pebbly silty fine sand. Ledge was encountered at Elevation 28.4 and core drilled for 5 feet with 100 percent recovery. This rock is described as metagraywacke with quartz and calcite veins and a high angle of foliation.

In May, 1984 a backhoe test pit (TP-3) was dug at a location 61 feet right of Station 157+67 to verify the washboring information. Six feet of brown sandy silt was found before 3 feet of gray pebbly clayey sandy silt was excavated. Groundwater seepage was noted at the transition depth of 6 feet. The lower 3 feet of material was found to be very plastic and easily excavated. The material from this one test pit was found to be similar to the materials described in the adjacent washboring explorations except that it was not as gravelly as some of the boring samples.

The details of the washborings are shown on Sheet 2 and a transverse section of the subsurface conditions along the proposed abutment is shown on Sheet 4. The ledge surface is

relatively flat and ranges between Elevations 28₊ and 30₊.

Abutment No. 2:

The centerline of bearing of this proposed abutment intersects the I-395 construction centerline at Station 158+72.88 at the same skew as Abutment No. 1. Several washborings were made in the proposed abutment footing area.

In the left wingwall area under the existing bridge, Washboring GP-3-84 was drilled to a total depth of 11 feet. Five feet of brown gravel was encountered before 6 feet of core drilling was undertaken through an assortment of cobbles and pebbles. Ledge was not encountered at this location. Adjacent to this boring, Washboring GP-14-84 was made at Station 158+85, 98 feet left of the I-395 centerline. Seven feet of dense brown sandy gravel and rocks was encountered before core drilling was begun at the depth of 7 feet. The initial 5 feet of core drilling was through an assortment of pebbles and cobbles and then the ledge surface was encountered at Elevation 32.2. Four feet of metasiltstone and slate with a high angle of foliation was core drilled with 100 percent recovery.

A short distance away, Washboring GP-4-84 was made at Station 158+74, 72 feet left. Three and one-half feet of brown gravel was penetrated before core drilling was started through a rocky layer. Eight feet of various types and sizes of pebbles and rocks including quartzite, gneiss and siltstone was drilled until the ledge surface was encountered at Elevation

31.8. Five feet of this ledge was core drilled with 95 percent recovery. This siltstone and phyllite rock contains quartz and calcite intrusions and exhibits a high angle of foliation.

Two feet to the right of Station 158+75 on the I-395 centerline, Washboring GP-5-84 was made. After 5 feet of brown gravel was penetrated, core drilling was undertaken for the following 16 feet. The initial 10 1/2 feet of core drilling was through various pebbles and rocks composed of quartzite, gneiss, siltstone and granite. At Elevation 29.2, ledge was encountered and core drilled for 5.5 feet and described as metagraywacke with quartz and calcite intrusions and a high angle of foliation.

At 39 feet right of Station 158+80, Washboring GP-6-84 was made. Fourteen feet of dense brown and gray silty sandy gravel was penetrated before the ledge surface was encountered at Elevation 30.0. Five and one-half feet of rock was core drilled and was typically described as metamorphosed graywacke and siltstone with quartz and calcite veins and a high angle of foliation.

At the right end of the proposed abutment, Washboring GP-13-84 was made at Station 158+85, 86 feet right of the I-395 centerline. The overburden was found to be dense and is described as a 12 foot 12 inch layer of dense brown sandy silt and gravel. Underlying this material is 2 feet 4 inches of boulders and cobbles that required drilling with a coring

bit. Ledge was encountered at Elevation 29.9 and core drilled for 6 feet and the rock sample was described as metasiltstone with a high angle of foliation and some eroded zones and quartz and calcite veins.

In the vicinity of the proposed wing area, Washboring GP-7-84 was made at Station 159+07, 95 feet right of center-line. The boring found 6 feet 2 inches of gray and brown silty sandy gravel and rocks over a 7.5 foot zone of assorted pebbles and rocks that required core drilling. Ledge was encountered at Elevation 30.7 and core drilled for 2 feet 10 inches with 95 percent recovery. The rock was described as metasiltstone with a high angle of foliation.

Two backhoe test pits (TP-1 and TP-2) were made along the proposed abutment location in May, 1984. At the depths of 4 feet and 5 feet (Elevation 40 \pm) in the two pits, the surface of the rocky stratum was encountered. The rocks and boulders (up to 18 inch diameter) were in a relatively dense and well packed state and presented some difficulty during digging. No groundwater was noted in these excavations.

These washboring details are shown on Sheet 3 and a transverse section showing the subsurface conditions is shown on Sheet 4. The ledge surface appears to exist between Elevations 29 \pm and 31 \pm in the proposed abutment area and slightly higher at Elevation 32.2 in the left wing area.

DESIGN CONSIDERATIONS

As shown on the two transverse sections on Sheet 4, the subsurface conditions at each proposed abutment location are somewhat different with respect to density and materials.

At the site of the proposed westerly abutment (adjacent to the existing Pier "A"), the soil is loose density brown and gray clayey silty fine sand and sandy silty gravel mixed with a few rocks. The ledge surface rises slightly from Elevation 28.1 \pm on the left end to Elevation 30 \pm on the right end. The "as-built" plans for the existing Pier "A" indicate that the top of the individual pier column footings to be at Elevation 42.50. The bottom elevations are not known but the footings were built on compacted gravel borrow.

At the proposed location of Abutment No. 2, the subsurface conditions are more variable and there is a considerable amount of cobbles, boulders, etc. above the ledge surface that required core drilling with a diamond bit. The ledge surface dips slightly from Elevation 32 \pm in the proposed left wing area to Elevation 30 \pm along the proposed centerline of bearing for Abutment No. 2. The "as-built" plans for Pier "B" indicate that the top of the concrete footings for the middle and southerly columns were constructed at Elevation 41.50. It is not known at what elevation the bottom of the footings are located, but it may be on the rocks and boulders stratum.

One foundation design method would be to construct the two abutment footings directly on the ledge surface (near

Elevation 30). This would involve a substantial volume of concrete fill whether a continuous footing or individual pedestals were constructed.

Another method at Abutment No. 2 would be to excavate the sandy gravel and fill overburden and construct a spread footing on the rock and boulder layer. Our exploration work indicates this material appears to be in a relatively dense state and could adequately provide foundation support. The bearing capacity chart for this design is shown on Sheet 1. It is important to note that a 6 foot cover above the footing elevation was utilized in this design and that the groundwater table was located at the bottom of the footing. Because the water table was not seen in the two test pits and is believed to be lower than the proposed footing elevation, the design calculations are on the conservative side.

At the site of Abutment No. 1, the use of short end-bearing piles could be utilized for foundation support. The piles would be 10⁺ feet long and should be driven to the ledge surface which exists between Elevations 28⁺ and 30⁺.

SUMMARY

A subsurface investigation has been completed for the replacement of the I-395 bridge over Main Street in conjunction with the building of a third bridge over the Penobscot River between Bangor and Brewer. A total of thirteen washborings and three backhoe test pits was completed in early 1984 along

the proposed footing and wing areas of each abutment. Data from washboring work done in 1956 was also utilized along with data from the as-built plans relative to the foundations of the existing piers. The boring details and locations are shown on Sheets 2, 3 and 4.

The soil conditions at each abutment are variable and are generally granular in nature. At the site of Abutment No. 1 on the west side of Main Street, the soil is described as loose brown and gray clayey silty fine sand and sandy silty gravel with a few rocks. Ledge was encountered near Elevation 29.5_± in the six borings and core drilled with a high rate of recovery.

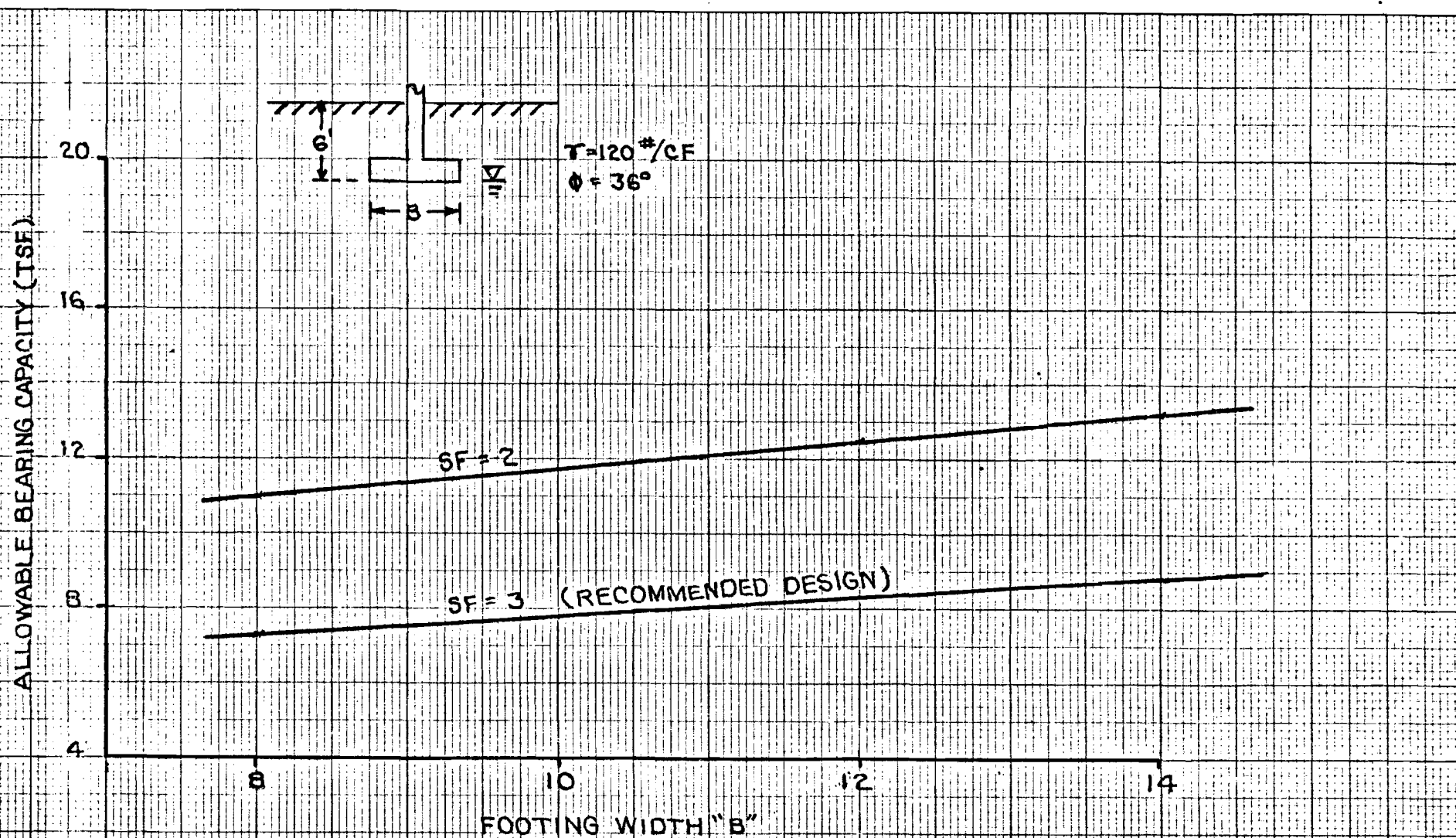
On the east side of Main Street at the proposed site of Abutment No. 2 the surficial soils have been reworked due to the past existence of several commercial establishments. The soil is described as variably dense brown and gray silty sand gravel and assorted fill materials underlain by assorted cobbles, pebbles and boulders. Ledge was encountered near Elevation 30_± in most of the borings except in the left wing area where the ledge surface appears to rise to Elevation 32_±.

The magnitude of these abutments and their estimated design loadings mandate the need for stable foundation conditions. One foundation method would involve excavating the existing overburden and constructing the footing(s) on the ledge surface. A significant volume of concrete would be

necessary to replace the 15⁺ feet of existing soil overburden.

According to the Design Section, a more economical alternative would be to construct a spread footing on the rock and boulder stratum at the proposed site of Abutment No. 2. Field explorations indicate relatively dense conditions which could provide satisfactory foundation conditions when used in conjunction with the bearing capacity chart on Sheet 1.

At the site of Abutment No. 1, short end-bearing piles could be used when driven to the ledge surface. These piles would have to be of a heavier design due to the short lengths. The ledge surface is relatively flat and varies slightly between Elevations 28⁺ and 30⁺ across the proposed Abutment No. 1 site.

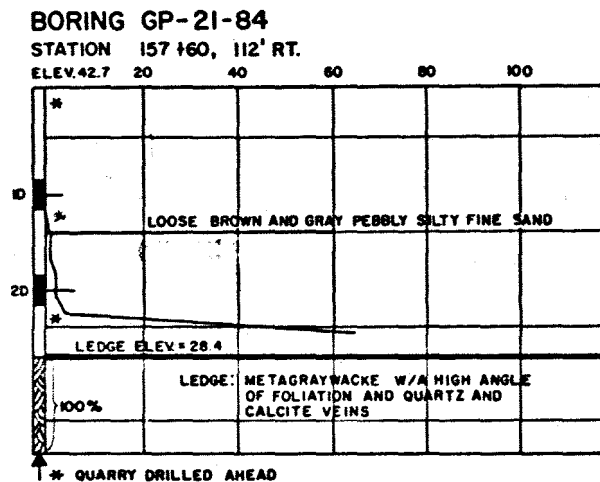
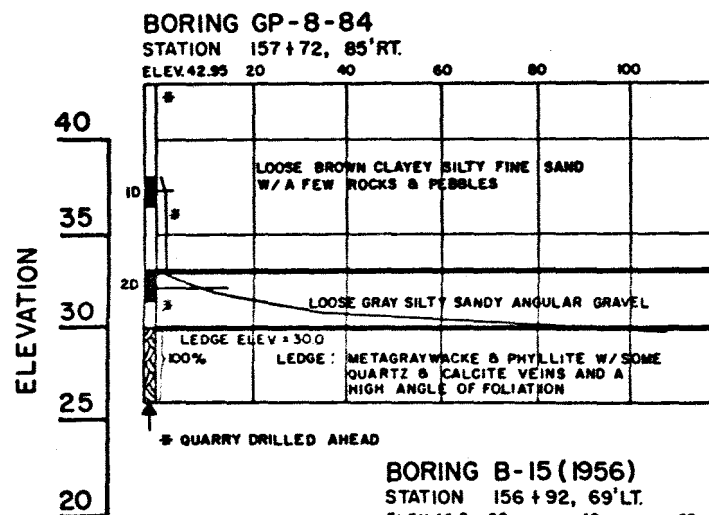
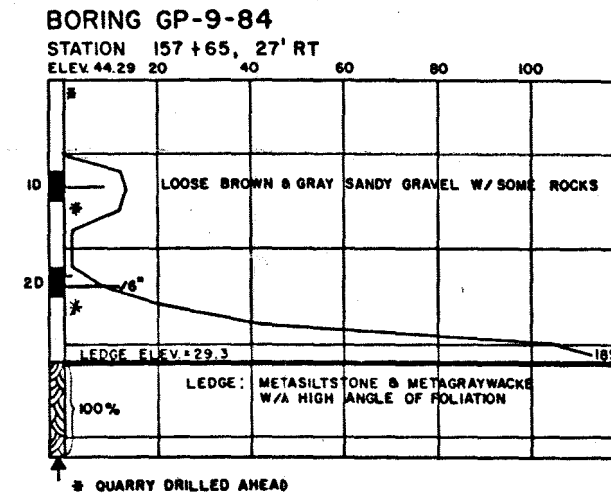
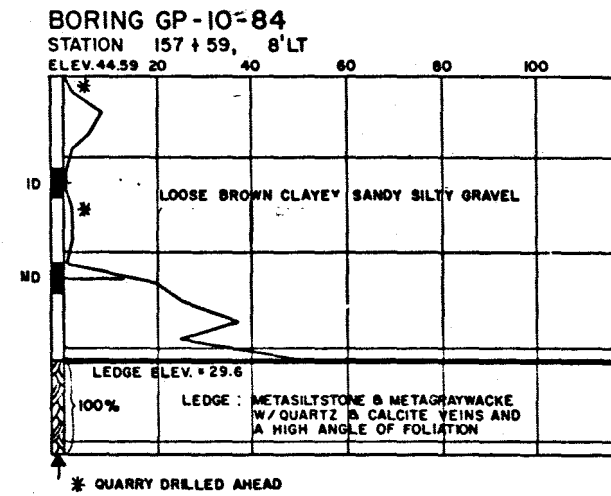
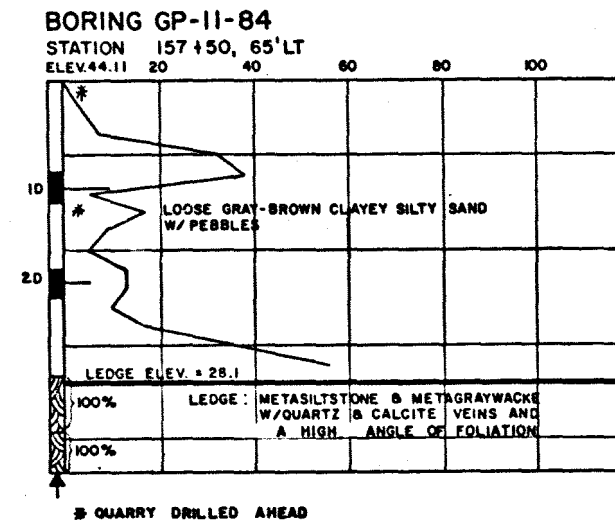
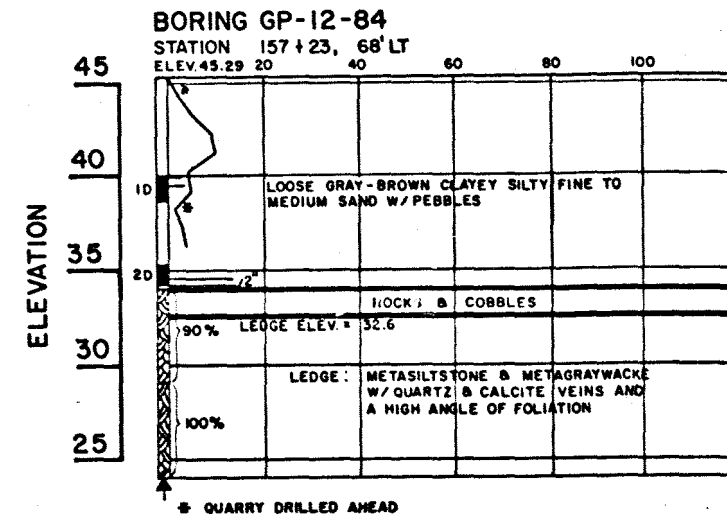


BEARING CAPACITY
SPREAD FOOTING ON
DENSE GRAVEL
BANGOR
395-B (79)

SHEET NO. 1

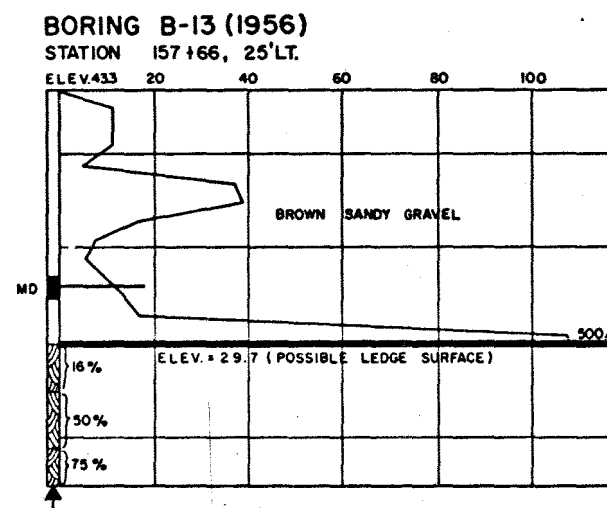
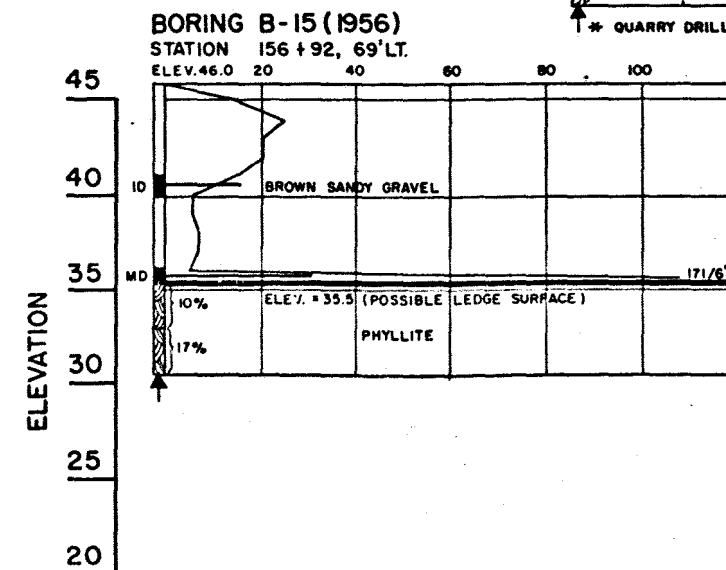
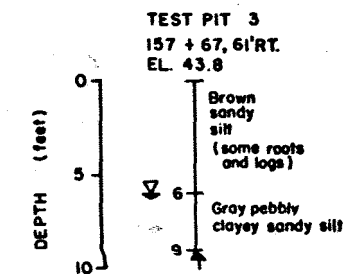
BORING DETAILS

F.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE		2	



BORING NOTES

- All samples and vane are made ahead of casing
- Number of blows required to drive extra heavy casing one foot with 400 ft. lbs. of energy per blow
- Location of sample or sample attempt
- Number and type of dry sample
- ID S & H Sampler #1290's
- MD Unsuccessful sample attempt and type of sampler
- Number of blows required to drive spoon or tubing one foot with 350 ft. lbs. of energy per blow
- Bottom of boring (may not be bottom of soil strata)
- 77% Locations cored by diamond bit and percent recovery of rock

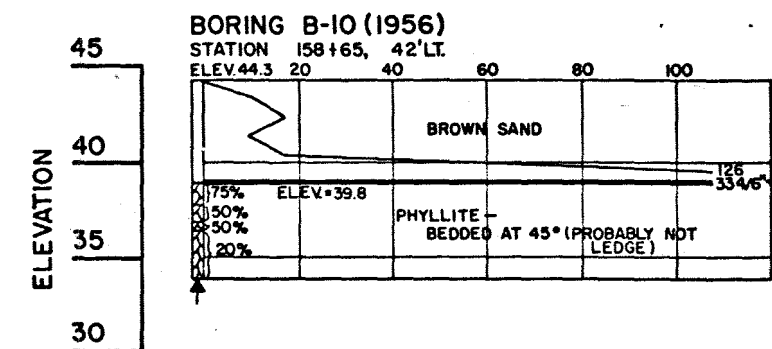
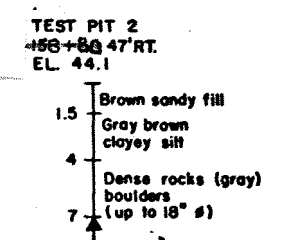
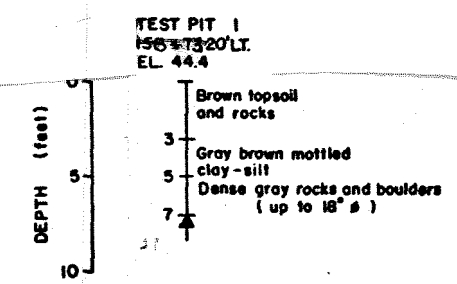
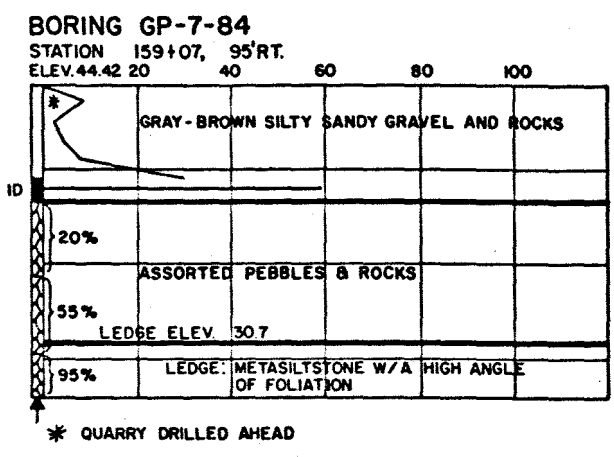
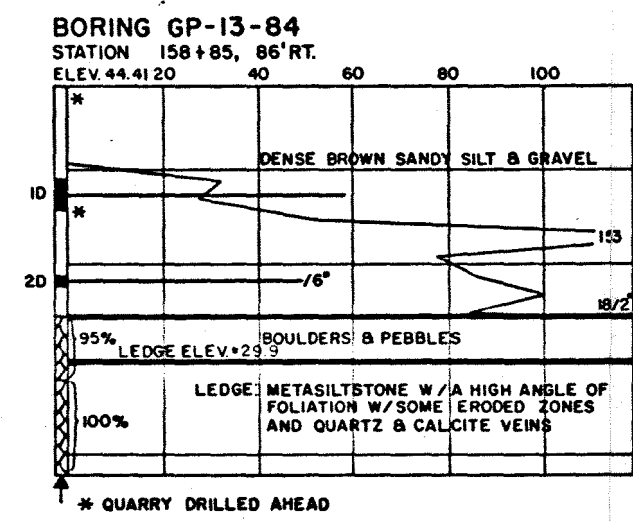
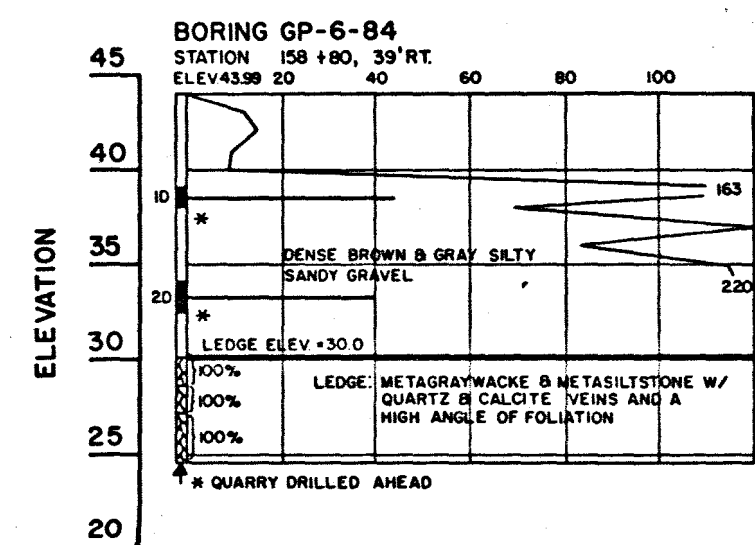
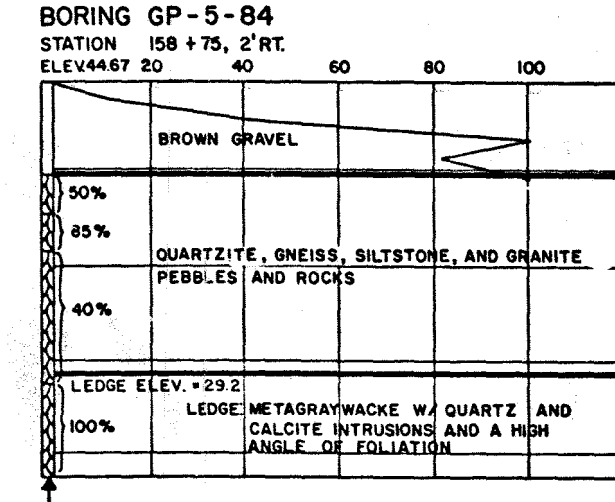
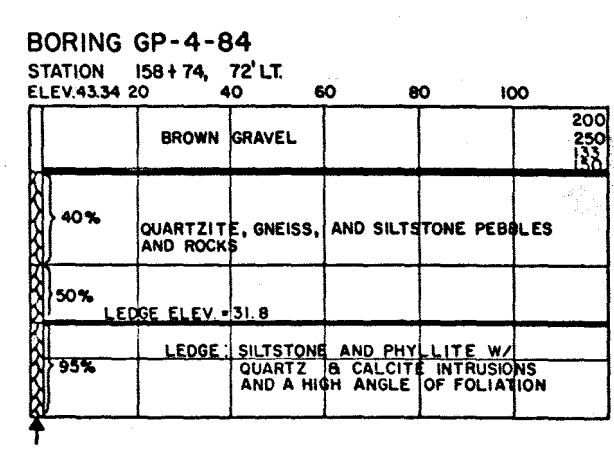
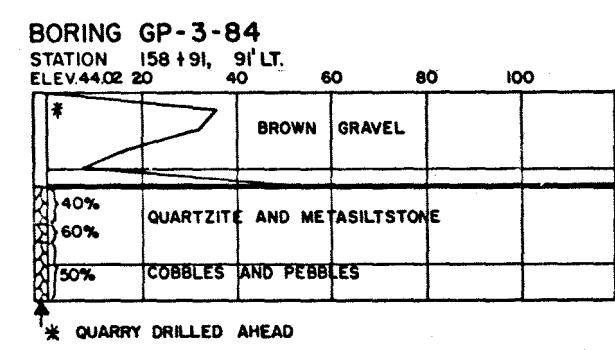
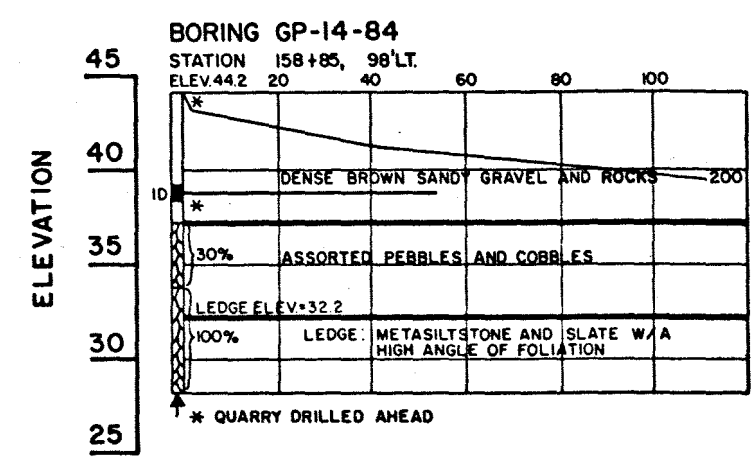


STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

I-395
OVER
MAIN STREET
IN THE CITY OF
BANGOR
PENOBSCOT COUNTY
BORING DETAILS

PROJECT DESIGN ENGINEER	BY	DATE
DESIGN - DETAILED		
CHECKED		
REVISIONS		
FIELD CHANGES		

PLANS



BANGOR

395.8 / 79/

85.8

Soils Report. 85-8
Bangor - Penobscot County
395-8(79)
I-395 - Main St. Interchange
February, 1985

85-08

Maine Department of Transportation

Materials and Research Division

Soils Section

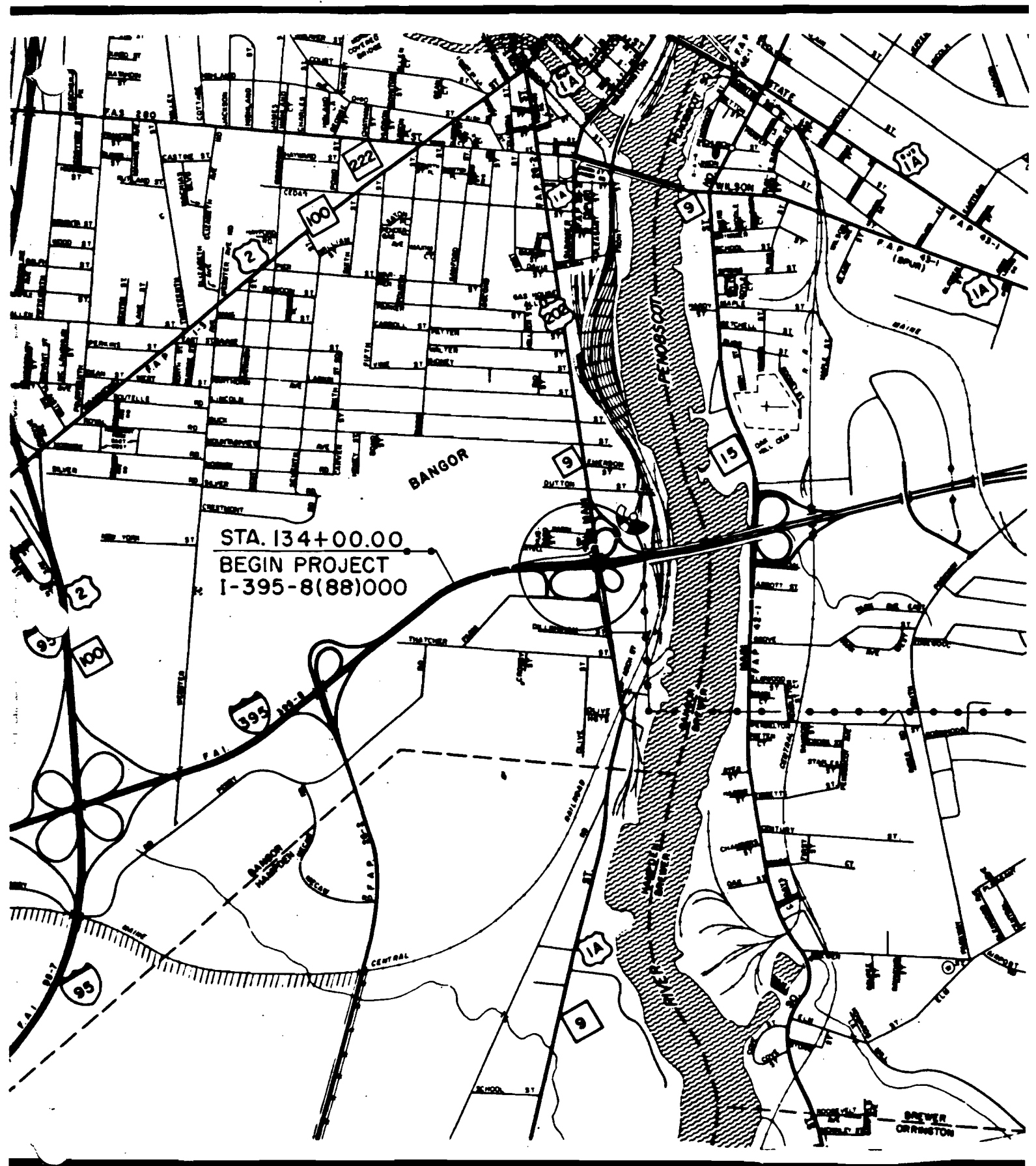
SUBSURFACE INVESTIGATION FOR THE PROPOSED RECONSTRUCTION
OF THE I-395 MAIN STREET INTERCHANGE IN THE CITY OF BANGOR

Prepared by:

Alan R. King
Engineering Technician

Approved by:

Melvin W. Morgan
Soils Engineer



A PORTION OF PENOBSCOT COUNTY

TABLE OF CONTENTS

<u>Text</u>	<u>Page No.</u>
INTRODUCTION.	1
RECOMMENDATIONS	2
CONCLUSIONS	3
GENERAL CONDITIONS.	7
DETAILED CONDITIONS	
Mainline Eastbound	8
Ramp FR-1.	8
Ramp FR-3.	9
Farm Road.	10
Ramp MS-3.	11
Ramp MS-1.	12
Ramp MS-2.	13
Ramp MS-4.	13
Main Street.	14
SAMPLE TABULATION	16

<u>Illustrations</u>	<u>Sheet No.</u>
Grain Size Distribution Curves.	1-4
Washboring Notes.	5
Washboring Details	
Boring B-15-56 Station 156+92, 69 left, I-395.	6
Boring B-16-56 Station 156+32, 63 left, I-395.	7
Boring B-17-56 Station 155+65, 48 left, I-395.	8
Boring GP-22-83 Station 9+47, 5 left, MS-2.	9

Boring GP-23-83	Station 9+25, 16 left, MS-2	10
Boring GP-24-83	Station 9+58, 31 left, MS-2	11
Boring GP-25-83	Station 13+06, 74 right, MS-4	12
Boring GP-26-83	Station 7+35, 59 right, MS-2.	13
Boring GP-27-83	Station 7+75, 50 right, MS-2.	14
Boring GP-28-83	Station 8+20, 33 right, MS-2.	15
Boring GP-29-83	Station 8+70, 23 right, MS-2.	16
Boring GP-30-83	Station 9+08, 26 right, MS-2.	17
Boring GP-31-83	Station 163+43, 70 right, I-395	18
Boring GP-32-83	Station 163+43, centerline, I-395	19
Boring GP-33-83	Station 163+43, 70 left, I-395.	20
Boring GP-34-83	Station 6+85, 35 right, MS-2.	21
Boring GP-35-83	Station 163+00, centerline, I-395	22
Boring GP-36-83	Station 161+85, centerline, I-395	23
Boring GP-15-84	Station 8+06, 17 right, FR-1.	24
Boring GP-16-84	Station 7+70, 29 left, FR-3	25
Boring GP-17-84	Station 6+40, 20 left, FR-3	26
Boring GP-18-84	Station 10+75, 21 right, FR-1	27
Boring GP-19-84	Station 1+00, 43 right, FR-1.	28
Boring GP-20-84	Station 142+00, 110 right, I-395.	29
Boring GP-28-84	Station 9+13, 22 right, FR-1.	30
Boring GP-29-84	Station 7+50, 24 right, FR-1.	31
Boring GP-30-84	Station 6+00, 50 right, FR-1.	32
Boring GP-31-84	Station 7+45, centerline, FR-3.	33
Boring GP-32-84	Station 4+50, 8 right, FR-1	34
Boring GP-51-84	Station 4+50, 10 left, Farm Road.	35

Boring GP-3-84	Station 158+91, 91 left, I-395.	36
Boring GP-4-84	Station 158+74, 72 left, I-395.	36
Boring GP-5-84	Station 158+75, 2 right, I-395.	36
Boring GP-6-84	Station 158+80, 39 right, I-395.	36
Boring GP-7-84	Station 159+07, 95 right, I-395.	36
Boring GP-13-84	Station 158+85, 86 right, I-395.	36
Boring GP-14-84	Station 158+85, 98 left, I-395.	36
Boring B-10-56	Station 158+65, 42 left, I-395.	36
Boring GP-8-84	Station 157+72, 85 right, I-395.	37
Boring GP-9-84	Station 157+65, 27 right, I-395.	37
Boring GP-10-84	Station 157+59, 8 left, I-395.	37
Boring GP-11-84	Station 157+50, 65 left, I-395.	37
Boring GP-12-84	Station 157+23, 68 left, I-395.	37
Boring GP-21-84	Station 157+60, 112 right, I-395.	37
Boring B-13-56	Station 157+66, 25 left, I-395.	37

Power Auger Boring Details

Boring B-1	Station 8+00, 30 left, MS-1	38
Boring B-2	Station 7+20, 30 left, MS-1	39
Boring B-3	Station 6+90, 40 left, MS-1	40
Boring B-4	Station 6+50, 55 left, MS-1	41
Boring B-5	Station 10+54, centerline, MS-1	42
Boring B-5A	Station 10+50, centerline, MS-1	42
Boring B-6	Station 9+75, 15 right, MS-1.	43
Boring B-6A	Station 9+75, 20 right, MS-1.	43
Boring B-7	Station 8+00, 100 right, MS-1	44
Boring B-8	Station 6+00, 70 right, MS-1.	44
Boring B-9	Station 4+50, centerline, MS-1.	45

Boring B-10	Station 13+44, centerline, MS-4.	45
Boring B-11	Station 13+00, 32 left, MS-4	46
Boring B-11A	Station 13+00, 34 left, MS-4	46
Boring B-12	Station 9+25, 70 left, MS-2.	46
Boring B-13	Station 9+00, 35 left, MS-2.	47
Boring B-14	Station 1+70, 36 left, MS-3.	47
Boring B-15	Station 2+50, 20 left, MS-3.	47
Boring B-16	Station 3+50, 22 left, MS-3.	48
Boring B-17	Station 4+50, 23 left, MS-3.	48
Boring B-18	Station 6+00, 13 right, Farm Road.	48
Boring B-19	Station 8+00, 12 right, Farm Road.	49
Boring B-20	Station 10+00, 15 right, Farm Road.	50
Boring B-21	Station 12+00, 13 right, Farm Road	50
Boring B-21A	Station 12+02, 13 right, Farm Road	50
Boring B-22	Station 8+40, 10 left, MS-2.	51
Boring B-23	Station 11+00, 12 right, Farm Road	51
Boring B-1-85	Station 6+00, 42 left, Ramp MS-1 (Revised)	52
Boring B-2-85	Station 6+90, 53 left, Ramp MS-1 (Revised)	53
Boring B-3-85	Station 8+00, 45 left, Ramp MS-1 (Revised)	54
Boring B-4-85	Station 9+00, 40 left, Ramp MS-1 (Revised)	55
Boring B-5-85	Station 10+00, 37 left, Ramp MS-1 (Revised)	56
Boring B-6-85	Station 4+80, 62 left, Ramp MS-1 (Revised)	57
Legend.		58
Geological Explorations		59-66
Summary of Pavement Core Data, Main Street.		67-68
Profiles		
Ramp MS-1, 30 feet left.		69

Ramp MS-1, Proposed Sewer Line	70
Ramp MS-1, (Revised) Proposed Retaining Wall	71
Station 160+00 - Station 162+00, I-395, Proposed Sewer Line.	72
Ramp MS-3.	73
Farm Road, Ramp FR-1, FR-3	74
Plan and Profile, I-395 over Main Street	75
Plan	76-78

Appendices

Drainage Study.	B
-------------------------	---

1. INTRODUCTION

1.1 A subsurface investigation has been completed for the proposed reconstruction of the I-395 Main Street interchange in Bangor, Penobscot County. The project is in conjunction with construction of a third bridge over the Penobscot River and extension of I-395 connecting with Route 1A in Brewer. The proposed construction will include realignment of a portion of the I-395 roadway, new structures over Main Street, reconstruction of existing ramps and construction of additional ramps, reconstruction of Farm Road and widening and overlaying a portion of Main Street. This report covers the roadway portion of the project. A separate report covering the Main Street structures was published in July of 1984 (Soils Report 84-22).

1.2 The field explorations for this project included washborings, power auger borings, backhoe test pits and hand rod soundings. The washborings were completed by a crew under the supervision of Mr. Gary Paine. Rod soundings and test pits were under the direction of Regional Geologist Albert Eggleston. Power auger borings were completed by Maine Test Borings, Inc. The locations of the various explorations have been plotted on a plan of the project area included as Sheets 76, 77 and 78 of the illustrations following the text of this report. Details of the explorations are shown on Sheets 6 through 66. In addition, the explorations have been plotted on a set of plans and cross sections which have been forwarded to the Design Division with this report. Most of the soils data along with design recommendations, was furnished to the Design Division earlier in memorandums to Andy Hendrickson from Peter Coughlan.

1.3 A materials inventory for the Bangor-Brewer projects, prepared by Charles Norburg, was published under separate cover in February 1983 (Report 83-204). A drainage study prepared by Wilbur Tidd is included at the end of this report as Appendix B.

2. RECOMMENDATIONS

2.1 A soils support(s) value of 3.0 is recommended in those areas where silty clay soils are of subgrade. Where dense silty sandy gravelly till soils are at subgrade, a soils support value of 3.5 to 4.0 may be used.

2.2 It is concluded that the proposed underdrain at various locations is needed and adequate.

3. CONCLUSIONS

3.1 Earth Excavation:

3.1.1 Earth excavation for this project will consist of both natural or native soils and fill materials. On the west side of Main Street, excavation for ditch and backslope cuts along the I-395 centerline and for ramps FR-1 and FR-3 will consist primarily of sandy marine clay silts and silty clays similar to Samples GP-18-1D, GP-19-1D or GP-17-1D. Some silty glacial till similar to Sample GP-28-3D will probably be encountered near the bottom of the cuts. Excavation for Ramps FR-1 and FR-3 will also include some sandy silty gravel fill materials which exist at the surface in the area of the former television station building. Excavation for Farm Road will consist of existing pavement and base materials, stiff sandy silty clay, silty sand with clay layers similar to Samples B-19-2D and dense gravelly silty glacial till similar to Sample B-18-1D. Excavation for Ramp MS-3 should consist primarily of existing fill materials.

3.1.2 Limited excavation on the east side of Main Street for subgrade and the installation of drainage will consist for the most part of fill soils including some pavement and base materials of existing roadways and mixed fill materials primarily silty sand and gravel containing cobbles and broken ledge.

3.1.3 The more granular soils in excavation should provide good material for embankment construction. The silt and clay soils could be difficult to use particularly during a wet construction season.

3.2 Rock Excavation:

3.2.1 On Farm Road, some rock excavation may be required for subgrade between Station 4+00 and 7+00 and at the right in the vicinity of Station 12+00. Rock excavation will probably also be required in these areas for the installation of drainage pipes and catch basins. On Ramp FR-1, rod soundings indicate rock excavation may also be required for the proposed catch basin and connecting pipes at Station 6+00. On the east side of Main Street, rock excavation is expected along a portion of two proposed sewer lines which will extend easterly from Main Street towards the river.

3.3 Organic Soils:

3.3.1 No organic or soft soils of any consequence were noted on this project and muck excavation is therefore not anticipated.

3.4 Embankment Foundations:

3.4.1 Cuts for backslopes along the right of the I-395 eastbound lane between Stations 134+00 and 143+00 will be in clay silt soils. The proposed 2:1 slopes are similar to the existing slope which is stable and no problems are anticipated in this area.

3.4.2 Substantial cuts for subgrade and backslopes are proposed between Stations 5+00 and 11+50 of Ramp FR-1 much of which will occur in clay soils. Due to the backslope restrictions imposed by a large commercial building, a metal bin type retaining wall is proposed along the right from Station 5+31.53 to Station 9+07.31. The clay soils are quite stiff and firm as indicated by vane shear strengths of 0.6 to 0.8 tons per square foot. (Borings GP-28-84 and GP-31-84) and natural water contents are generally below the liquid limit of the clay. Proposed 2:1 slopes in the clay soils should be adequate once stabilized from erosion. A stability analysis indicates temporary 1:1 slopes should be possible during construction of the bin wall.

3.4.3 In general, the underlying soils in the project area are quite firm and should provide adequate support where embankment fills are proposed.

3.5 Subgrade Considerations:

3.5.1 The anticipated subgrade soils for that portion of the proposed project west of Main Street will include existing fill materials, silty clay, silty sandy glacial till and new embankment. Ledge may also be at subgrade at a few locations on Farm Road. East of Main Street the subgrade soils will consist for the most part of new embankment with some minor amounts of existing fill materials.

3.5.2 A summary of the anticipated subgrade materials is as follows:

<u>Stations</u>	<u>Subgrade Materials</u>
<u>I-395 E.B.</u> 150+00 to 157+50+ (Bridge abutment)	New embankment
<u>I-395 W.B.</u> 151+00 to 157+50+ (Bridge abutment)	Existing embankment fill (not sampled)
<u>I-395 E.B. & W.B.</u> 158+80+ (Bridge abutment) to 163+00+	New embankment
<u>Ramp FR-1</u> 0+00 to 1+50 1+50 to 4+00 4+00 to 11+50	Silty Clay (GP-19-1D) Existing embankment fill (not sampled) Gravelly sandy silty till (GP-28-3D)
<u>Ramp FR-3</u> 0+00 to 2+00 2+00 to 5+00 5+00 to 8+50 8+50 to 10+50	Silty gravelly sand Gravelly sandy silty till (GP-28-3D) Silty clay (GP-17-2D) over till New embankment
<u>Farm Road</u> 3+50 to 7+00 7+00 to 10+00 10+00 to 13+00	Gravelly sandy silty till (B-18-1D) ledge Silty clay (B-19-1D) silty sand with clay layers, till (B-19-3D) Silty gravelly sand, ledge
<u>Ramp MS-3</u> 0+00 to 5+00 5+00 to 13+50+	Silty gravelly sand, sandy gravel Existing embankment fill (not sampled)

<u>Ramp MS-1</u>	
3+00 to 9+50	New embankment fill
9+50 to 11+00	Sandy silty gravel fill
<u>Ramp MS-2</u>	
7+00 to 12+50	New embankment fill
12+50 to 17+00	Silty sandy gravel
<u>Ramp MS-4</u>	
7+00 to 9+00	Silty sandy gravel
9+00 to 15+00	New embankment fill

3.5.3 The relative amounts of the various materials at subgrade are as follows:

<u>Subgrade Material</u>	<u>AASHTO Classification</u>	<u>Frost Rating</u>	<u>Percentage</u>
New embankment	-	-	35%
Gravelly sandy silty till	A-4, A-2-4	III, II	20%
Silty clay	A-4, A-6	IV	10%
Existing embankment fill	-	-	20%
Silty sandy gravel	-	-	13%
Ledge	-	-	2%

3.5.4 Freezing index and frost penetration estimates are as follows:

<u>Freezing Index</u>	<u>Total Frost Penetration</u>		<u>Frost Penetration into Subgrade</u>	
	<u>Nongranular Subgrade</u>	<u>Granular Subgrade</u>	<u>Nongranular Subgrade</u>	<u>Granular Subgrade</u>
50 inches of base and pavement (I-395)				
Mean 1200	56"	64"	6"	14"
Design 1700	64"	85"	14"	35"
40 inches of base and pavement (Farm Road, Ramps FR-3, MS-2)				
Mean 1200	50"	64"	10"	24"
Design 1700	56"	85"	16"	45"
33 inches of base and pavement (Ramps FR-1, MS-1, MS-3, MS-4)				
Mean 1200	45"	64"	12"	31"
Design 1700	56"	85"	23"	52"

3.6 Drainage:

3.6.1 The soils in the project area are generally well drained. Only two explorations encountered groundwater, a test pit located 61 feet right of Station 157+67 on the west side of Main Street, at a depth of 6 feet, and a power auger boring at Station 1+00 of Ramp FR-1, at a depth of 9 feet. Surface drainage along Main Street and west of Main Street is through an existing system of catch basins. East of Main Street, surface drainage would flow into the Penobscot River. A drainage study by Wilbur Tidd is included in this report as Appendix B.

3.7 Erosion:

3.7.1 The marine silts and clays and the glacial till soils are susceptible to erosion once disturbed by construction activities. Backslopes in the cut sections where these materials are exposed will provide the potential for erosion problems in the event of heavy or prolonged rainfall and should be stabilized as soon as possible.

4. GENERAL CONDITIONS

4.1 The proposed project will extend the existing I-395 roadway, which currently terminates at Main Street, easterly to form the west approach to the new third bridge across the Penobscot River now under construction. The I-395 spur and Main Street intersection were built in the late 1950's in conjunction with the I-95 roadway through Bangor.

4.2 The project area on the east side of Main Street, between Main Street and the Maine Central Railroad tracks which lie along the west bank of the river, was once occupied by a number of commercial and industrial buildings including a foundry. Many of these were torn down when the existing Main Street overpass and ramp system were built. The remainder of the area has more recently been cleared in preparation for the upcoming project. The top 5 to 7 feet of soil in this area, therefore, consists mostly of fill material including silty sand, and sandy gravel with cobbles and broken ledge. Below the fill soils is a layer of loose to medium density brown silty fine sand with clay layers and then dense brown sandy silty gravel, which is probably glacial till, overlying bedrock. At some locations a thin layer of silty clay was found overlying the dense till. The bedrock surface is generally shallow throughout the area varying in depth from 2 feet or about elevation 45 near the Anah Shrine Temple Building, 15 feet or elevation 30+ along Main Street and 21 feet or elevation 23+ near Station 7+00 of ramp MS-1. Ledge is visible along the western perimeter of the Maine Central Railroad roundhouse and some rock was evidently excavated when the structure was built. The ledge was identified from rock cores as metasiltstone and metagraywacke with quartz and calcite intrusions but also includes some phyllite and slate.

4.3 On the west side of Main Street the terrain rises from about elevation 43 at the street level to a flat but deeply eroded clay plain which lies at about elevation 100. The existing I-395 roadway is in a cut through this plain except for a short approach fill at the Main Street overpass. The underlying soils west of Main Street consist generally of sandy marine silt and clay overlying dense gravelly sandy silty glacial till. The ledge surface on this side is also variable, rising to within 3 to 4 feet from the surface or about elevation 84 in the vicinity of Station 4+50 on Farm Road but dropping off to below elevation 55 at Station 4+50 on Ramp FR-1.

4.4 Drainage in the project area is generally good. Surface water drains through an extensive existing drainage system.

5. DETAILED CONDITIONS

Main Line Eastbound

5.1 Station 134+00 to Station 143+00, Main Line Eastbound:

5.1.1 The proposed construction between these stations will involve widening the existing roadway on the right to provide an auxiliary or approach lane for a new off ramp, Ramp FR-1, which will connect to Main Street via Farm Road. The proposed design will require cuts of up to four feet along the existing right shoulder for new base and pavement and cuts of up to eight feet for the ditch and backslope.

5.1.2 Explorations for this section consisted of rod soundings and one washboring which were placed to probe for ledge and to sample the underlying soils. The soundings at all locations penetrated well below the proposed limits of construction without refusal and rock should therefore not be encountered in the excavation. The washboring, GP-20-84 (Sheet 29) was located 110 feet right of Station 142+00 and found medium to stiff gray and brown mottled silty clay to a depth of about 16 feet and then gray silty clay. At a depth of about 23 feet the gray clay changed to brown till. The medium to stiff gray brown mottled silty clay should comprise most of the excavation for ditch and backslope cuts and will probably be at subgrade in the shoulder area. Excavation for new base will consist primarily of fill soils of the existing roadway embankment which were not sampled. The shoulder materials will probably be suitable for use in embankment construction elsewhere on the project. The clay silt soils however, may be difficult to use particularly during a wet construction season.

Ramp FR-1

5.2 Station 0+00 to Station 6+00, FR-1 (Station 143+00 to Station 149+00 I-395 E.B.):

5.2.1 Ramp FR-1 will be a new off ramp connecting the eastbound lane of I-395 with the southbound lane of Main Street via Farm Road. This first 600 feet generally parallels the eastbound lane of I-395 and the cross sections for the ramp are shown on the I-395 eastbound lane sections. (Station 143+00 to Station 149+00. This portion of the proposed ramp will require cuts of up to 4 feet in the shoulder and ditch areas of the eastbound lane for new base and pavement and cuts of up to 7.5 feet for the right ditch and backslope. Some shallow fills will also be involved.

5.2.2 Explorations for this section consisted of soundings and washborings which show the ledge surface to be below the limits of the proposed excavation at most locations. At Station 6+00, a washboring (GP-30-84) and rod soundings indicate some rock excavation may be required for the proposed catch basin and associated drainage pipes. Washborings GP-19-84 and GP-32-84 show that excavation for ditch and backslope cuts will consist essentially of medium to stiff gray brown mottled silty clay similar to Sample 1D taken from boring GP-19-84. The silty clay is also expected to be the subgrade soil for much of this section along with sandy pebbly clayey silty glacial till similar to Sample GP-28-84, 3D, and existing fill materials. Excavation for new base on the left will consist of existing embankment materials.

5.3 Station 6+00 to Station 11+50, FR-1:

5.3.1 From Station 6+50, the centerline for Ramp FR-1 curves sharply to the right or south to Station 10+15.56 then continues on a tangent to Station 10+99.94 where it curves again to merge with Farm Road. For most of the section, the roadway will be in a cut which reaches a maximum of about 18 feet to finished grade at Station 8+00. Because the proposed ramp will pass close to a large commercial building located on the right off Farm Road, a retaining wall is proposed along this side to reduce the length of backslope cuts. The proposed retaining wall will be a metal bin type and will extend from Station 5+31.53 to Station 9+07.31.

5.3.2 Explorations for this section consisted of five wash-borings and a number of hand rod soundings. Because of commercial development in this area, the original ground surface has been altered. Eight feet of silty gravel fill was encountered by Boring GP-29-84 located 24 feet right of Station 7+50 at the edge of the paved area behind the New England Pipe and Supply building. At other locations, silty gravel fill was encountered to depths of 2 to 5 feet. Below the fill the boring found stiff to medium brown to gray mottled silty clay over dense brown and gray pebbly sandy clay silt till over ledge. The ledge surface appears to be somewhat variable lying at about elevation 65 at Station 6+00, dropping to about elevation 60 at Station 8+00 and Station 9+00 and then rising to about elevation 80 or only 4 to 5 feet below the ground surface at Farm Road (Station 6+00).

5.3.3 Excavation will include the silty gravel fill soils and some glacial till near subgrade but will consist primarily of the stiff to medium brown and gray silty clay. Dense glacial till or a thin layer of silty clay over glacial till will be at subgrade. Some rock excavation may be required for the proposed catch basin and associated pipes at Station 6+00. Some of the hand rod soundings may have reached refusal in the glacial till soils which are very dense, rather than on ledge. At most locations the footing for the proposed bin wall will be in the dense glacial till layer.

Ramp FR-3

5.4 Station 0+00 to Station 2+00, FR-3:

5.4.1 Ramp FR-3 will be a new on ramp and will provide access to the eastbound lane of I-395 for traffic travelling south on Main Street. As is the case with Ramp FR-1, Ramp FR-3 will utilize a portion of Farm Road.

5.4.2 This first 200 foot section of Ramp FR-3 is on new location on the north side of the intersection of Farm Road and Main Street cutting across the corner on a sharp curve. Cuts of 5 to 6 feet will be required for subgrade with deeper structural excavation for drainage. A power auger boring was made on centerline at Station 1+00 and penetrated to a depth of 10 feet in brown silty gravelly sand without refusal. Water was encountered at a depth of 7.5 feet. The 10 foot depth is below the limits of any construction

at this station and rock excavation is therefore not anticipated. A second power auger boring (48PA) made for Farm Road is located approximately 18 feet left of the Ramp FR-3 centerline at about Station 1+80. This boring reached refusal at a depth of 6.9 feet and some rock excavation may be required for the proposed catch basin and connecting pipes at Station 2+00. Soils in excavation for this portion of the ramp should consist of brown silty gravelly sand which will also be at subgrade.

5.5 Station 2+00 to Station 5+00, FR-3:

5.5.1 The details for Farm Road, Station 9+00 to Station 12+00, would apply to this section of Ramp FR-3.

5.6 Station 5+00 to Station 10+50, FR-3:

5.6.1 Beginning at about Station 4+75 (Station 9+00 Farm Road), the alignment for Ramp FR-3 curves sharply to the right to intersect with the eastbound lane of I-395 at about Station 10+50 (Station 155+00+ I-395). For the first 350 feet, or up to about Station 8+50, the ramp will be in a cut which reaches a maximum to finished grade of about 13 feet on centerline at Station 6+50. Ahead of Station 8+50, the ramp will be constructed on a fill of up to 18 feet where it merges with I-395 at Station 10+50.

5.6.2 Explorations for this portion of the ramp consisted of 3 washborings and two rod soundings which were made in the cut area between Station 6+00 and Station 8+00. The washborings show the ledge surface to be below the limits of any construction. Rock excavation is therefore not anticipated in this cut. Boring GP-17-84, located 20 feet left of Station 6+40 found 2 feet of gravel fill at the surface underlain by medium to stiff brown and gray mottled sandy silty clay to a depth of 17 feet and then brown silty till. Borings GP-16-84 and GP-31-84, made in the vicinity of Station 7+50 found 5.5 to 7 feet of brown sandy clay silt with wood and brick pieces at the surface, which is possibly fill material, underlain by medium to stiff brown sandy silty clay to a depth of 18 feet and then brown pebbly silty till. The ledge surface was reached on boring GP-31-84 at a depth of 28.5 feet or about elevation 56.5. The silty clay soils will comprise most of the excavation for this portion of the ramp and a thin (2 to 4 feet) layer of the clay silt over glacial till will be the subgrade soil. The clay silt soils are quite firm and should provide adequate support for the proposed fills between Stations 8+50 and 10+50.

Farm Road

5.7 Station 3+50 to Station 13+00, Farm Road:

5.7.1 Farm road is a local way leading from Main Street to the City's Industrial Park. The alignment runs from east to west sloping downward from about elevation 87 at Station 3+50 to about elevation 40.5 at its intersection with Main Street. Beal College lies to the left or north side of the street and the Maine National Guard Armory on the right or south side. The proposed new grade will be in a cut throughout with a maximum of 8 feet to subgrade at Station 8+00. Some deeper structural excavation will be required for drainage pipe and catch basins.

5.7.2 Explorations for Farm Road included one washboring GP-51-84 located 10 feet left of Station 4+50, power auger borings and hand rod soundings and auger borings. A profile illustrating the underlying soil stratification and ledge surface is included on Sheet 74 of the illustrations. As shown on the profile, the ledge surface appears to be quite shallow at the top of the hill varying in depth from about 3 feet, 10 feet left of Station 4+50 to 10 feet at Station 7+00. Ahead of Station 7+00 as the ground surface slopes down, the ledge surface also drops off. Borings At Stations 8+00 and 9+00 penetrated to a depth of 20 feet without refusal. At the bottom of the hill near Main Street, the ledge surface appears to be shallow once again with borings at Station 12+00 encountering refusals at depths of 4.5 to 7 feet. The overlying soils were found to consist of 2 to 4 feet of sand and gravel base of the existing roadway, stiff gray brown mottled silty clay, fine silty sand with clay layers and dense brown clayey silty sandy glacial till. The clay and fine silty sand layers were not encountered underlying the first 200 to 300 feet and may have been removed when Farm Road was constructed.

5.7.3 Excavation for Farm Road will include sand and gravel base and pavement of the existing roadway, stiff gray brown mottled silty clay, fine silty sand and glacial till. Ledge may be encountered close to subgrade along the left between Stations 4+00 and 7+00 and along the right in the vicinity of Station 12+00. Some rock excavation may be required for the installation of drainage pipes and catch basin in these areas. Subgrade will vary from glacial till and possible ledge, Station 3+50 to Station 7+00, fine silty sand Station 7+00 to 8+00, stiff clay silt Station 8+00 to 10+00 and glacial till from Station 10+00 to Main Street.

Ramp MS-3

5.8 Station 0+00 to Station 13+51.86, MS-3:

5.8.1 This is an existing ramp connecting Main Street southbound with I-395 westbound. Beginning at Main Street the ramp slopes up an incline to I-395 which is constructed on an embankment fill. A concrete retaining wall separates the two roadways. To accommodate a wider I-395 roadway, a new concrete retaining wall is proposed in front of the existing wall. The new wall will extend from the bridge abutment west to about Station 7+50 (Station 151+00, I-395) or approximately 180 feet beyond the existing wall. A Gabion wall is also proposed along the right or north side of the ramp from Station 5+00 to Station 7+50 to allow the ramp to be widened without extending the limits of the existing fill.

5.8.2 Explorations for the ramp consisted of four power auger borings which were located in front of the existing concrete retaining wall between Station 1+50 and Station 4+50. All four borings penetrated to a depth of 5 feet in brown silty fine to medium sand with gravel without encountering refusal. Other explorations consisting of washborings made in 1956 for the existing Main Street overpass abutment wingwall (Borings B-15 (1956), B-16 (1956) and B-17 (1956)), show the ledge surface between Station 2+00 and 3+00 to be at a depth of 9 to 10 feet or between elevation 36 and 37. A profile of the ramp showing the explorations as well as the bottom of the proposed retaining wall footing and underdrain flow line is included in the illustrations as Sheet 73.

5.8.3 The soils in the area of the proposed retaining wall are anticipated to be firm and should provide adequate support. No rock excavation is expected for the wall or any of the proposed drainage. The proposed Gabion wall will be constructed in the existing embankment fill and no problems are anticipated. Excavation for new base and drainage should consist primarily of existing fill materials.

Ramp MS-1 (Revised)

5.9 Station 3+00 to Station 13+00, MS-1 (Revised):

5.9.1 This ramp will be located on the east side of Main Street and will be an off ramp for traffic travelling east on I-395. Beginning at about Station 162+00 of I-395, the ramp curves to the right on an elliptical pattern to merge with the northbound lane of Main Street at about Station 48+00. Due to the grade difference between Main Street and I-395, the ramp will require an embankment fill the full length reaching a maximum height of about 39 feet at Station 4+00+. To reduce the degree of curvature for traffic entering the ramp, the original design was expanded which brings the new alignment closer to the Maine Central Railroad tracks on the east and the Bangor Hydro-Electric Company garage on the south. Because of fill restrictions imposed by the tracks and building, a retaining wall is proposed around the perimeter of the ramp.

5.9.2 Explorations for the proposed ramp consisted of power auger borings. These are numbered on the plan as borings B-1 through B-9 and B-1-85 through B-6-85. Borings B-1 through B-4 were made for a retaining wall which was proposed along the south side of the ramp under the original design. A profile incorporating these borings (Sheet 69) shows the top 5 to 7 feet of soil in this area to consist of silty fine sand and gravel with cobbles which appears to be old fill. Below this, the boring encountered medium density brown silty fine sand and stiff brown sandy silty clay overlying dense brown silty sand and gravel which is probably a glacial till. A refusal surface indicated as the possible ledge surface, was found at a depth of eight feet on Boring B-1 closest to Main Street, sloping towards the river to a depth of about 21 feet at borings B-3 and B-4. Explorations B-5 through B-9 made for a proposed sewer line through the middle of the ramp generally found similar soils conditions. The underlying soils should provide adequate support for the proposed fills.

5.9.3 In addition to borings B-1 through B-9, six additional borings B-1-85 through B-6-85 were made along the location of the proposed retaining wall around the perimeter of the revised ramp. A profile along the wall location showing the underlying soils stratification is included as Sheet 71 of the illustrations. As shown, dense granular soils consisting of slightly silty sand and gravel with cobbles underlies most of the proposed wall location. At the easternmost end of the wall Boring B-6-85 encountered some looser density soils overlying the dense layer including approximately six feet of fill soils consisting of medium density brown silty sand and gravel with cobbles and coal ashes and six feet of medium density brown silty fine sand with silty clay layers. Near the other end of the proposed wall in the parking lot of the Bangor Hydro-Electric Company garage, boring B-4-85

encountered 4.3 feet of silty sand and gravel fill and then a layer of wood and brown silty fine to medium sand over the dense granular soils. Some excavation of these upper layers of looser density soils may be required depending on the type of wall chosen and footing elevation.

5.9.4 Various types of soil will be in excavation for the proposed sewer line through the center of the ramp including the possibility of some ledge near the Main Street end of the proposed line (See Sheet 70).

Ramp MS-2

5.10 Station 7+00 to Station 12+50, MS-2:

5.10.1 This proposed ramp will provide an exit onto Main Street for traffic travelling west on I-395. Due to the height differential between I-395 and Main Street, the ramp will require embankment fills to reach the desired grade. The close proximity of the ramp to the Maine Central Railroad round house will require that a retaining wall be constructed along the outside of the ramp. A portion of this wall adjacent to the west abutment of the I-395 bridge over the Penobscot River has already been constructed and some fill placed under the bridge contract.

5.10.2 Explorations in the vicinity of the proposed ramp included power auger borings B-12, B-13 and B-22, washborings GP-22-83, GP-23-83 and GP-24-83 and GP-26-83 through GP-30-83, and several test pits. The power auger borings were made for a proposed sewer line and indicate the ledge surface in this area to be shallow and overlain generally by granular soils consisting of brown silty sand and gravel with cobbles. The washborings which were made to determine the subsurface conditions for the proposed retaining wall, found similar conditions generally confirming the refusal surface encountered by the power auger borings as ledge.

5.10.3 The granular soils and shallow ledge should provide adequate support for the proposed fills and for the retaining wall which probably will be founded on the ledge surface. Ledge excavation is anticipated for the sewer line as shown on Sheet 72.

5.11 Station 12+50 to Station 17+00, MS-2:

5.11.1 This portion of Ramp MS-2 terminating at Main Street will consist of reconstructing an existing ramp. The reconstruction will include some minor widening and slight changes in the grade and new base and pavement. Excavation for this ramp will consist primarily of existing base and pavement materials.

Ramp MS-4

5.12 Station 7+00 to Station 15+00, MS-4:

5.12.1 This will be an on ramp connecting the northbound lane of Main Street with the westbound lane of I-395. From Station 7+00 of Main

Street ahead to about Station 11+50 the proposed alignment follows that of an existing ramp with some modification to the width and grade. The remaining portion of the ramp will be realigned slightly to the south to merge with the relocated I-395 westbound lane.

5.12.2 Shallow cuts will be required for the first 200 feet of the proposed ramp for rebasing and new pavement and for the installation of drainage. Embankment fills will be required for the remainder of the ramp reaching a maximum height of 28 feet at Station 14+00. A portion of an existing retaining wall along the right between Station 10+50 and Station 12+50 will be replaced while the remainder will be modified to accommodate a higher grade.

5.12.3 Explorations in the vicinity of the ramp included two power auger borings, B-10 and B-11 located near Stations 13+00 and 13+50 and made for a proposed sewer line, a washboring GP-25-83 located 74 feet right of Station 13+06, and a number of washborings located along the east side of Main Street which were completed for the proposed I-395 overpass. At Main Street the borings show a 3 to 7 foot layer of sandy gravel and assorted fill materials overlying a dense layer of cobbles, pebbles and boulders resting on ledge. Borings in the vicinity of Station 13+00 show the subsurface conditions to consist of a thin layer of granular soils overlying shallow ledge. These materials should provide more than adequate support for the proposed fills. Shallow excavation for rebasing and drainage at the beginning of the ramp should consist primarily of existing pavement and base and fill materials. Rock excavation is anticipated for the proposed sewer line which crosses the alignment at about Station 13+50.

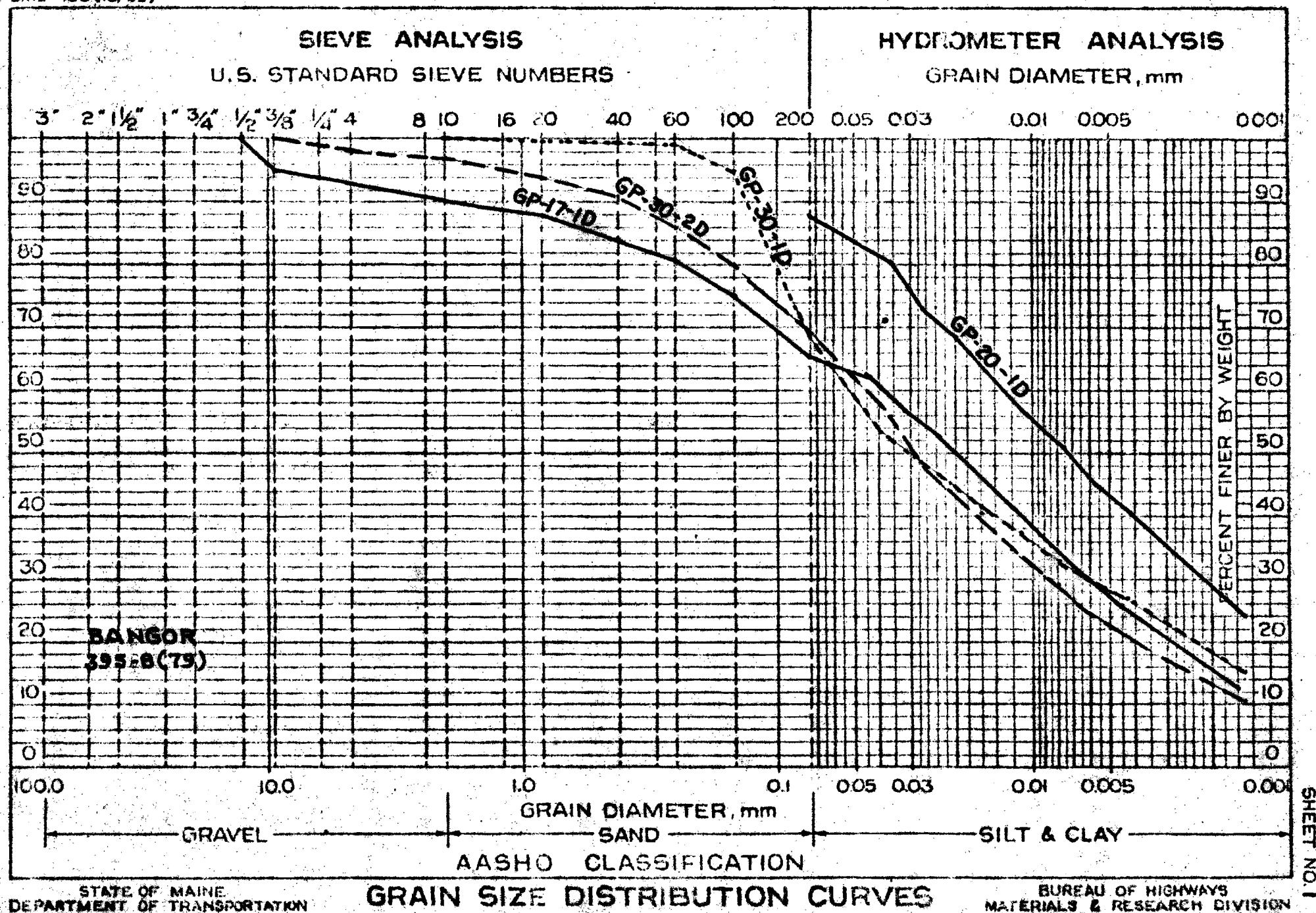
Main Street

5.13 Station 43+40 to Station 58+50, Main Street:

5.13.1 The proposed construction along this section of Main Street within the area of the I-395 Main Street interchange includes some widening both left and right to provide additional traffic lanes at ramp entrances and exits, curb and sidewalk construction, the installation of a median strip, drainage and the removal of the top 3 inches of existing pavement and replacing with new pavement.

5.13.2 A total of 20 pavement cores were cut in the area of the existing interchange to determine the thickness and condition of the present pavement. These cores indicate the roadway was originally constructed with a Portland cement concrete pavement 8 to 10 inches in thickness. The concrete has since been overlaid with bituminous pavement which at some locations is up to 8-1/2 inches in thickness. The width of the concrete pavement appears to be approximately 40 feet as indicated by longitudinal cracks in the bituminous pavement 20 feet left and right of centerline and from information from pavement cores. A dual set of trolley tracks which ran down the center of the roadway are apparently still in place but are buried under the bituminous pavement. A summary of the pavement core data is included as Sheets 67 and 68. These indicate that the concrete appears to be disintegrating at some locations. At two locations, 28 feet left of Station 52+25 and 26 feet left of Station 50+00, the concrete was found beyond the 20 foot offset from centerline. It is believed that the concrete at these locations may be

from an old sidewalk or possibly from an entrance to a side street. The concrete pavement is underlain by gravel base material the thickness of which is unknown since the coring apparatus was limited to a depth of 15 inches.

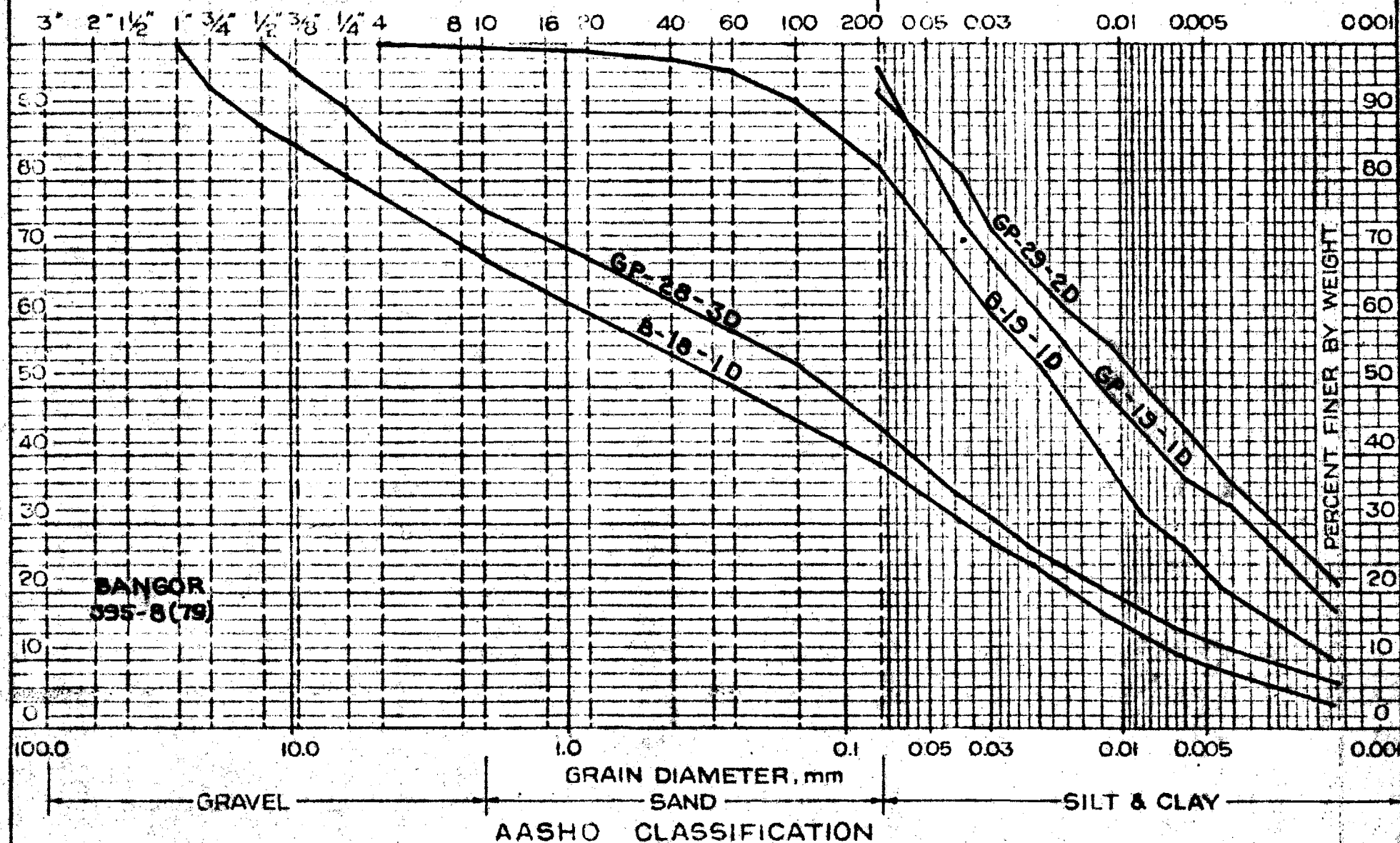


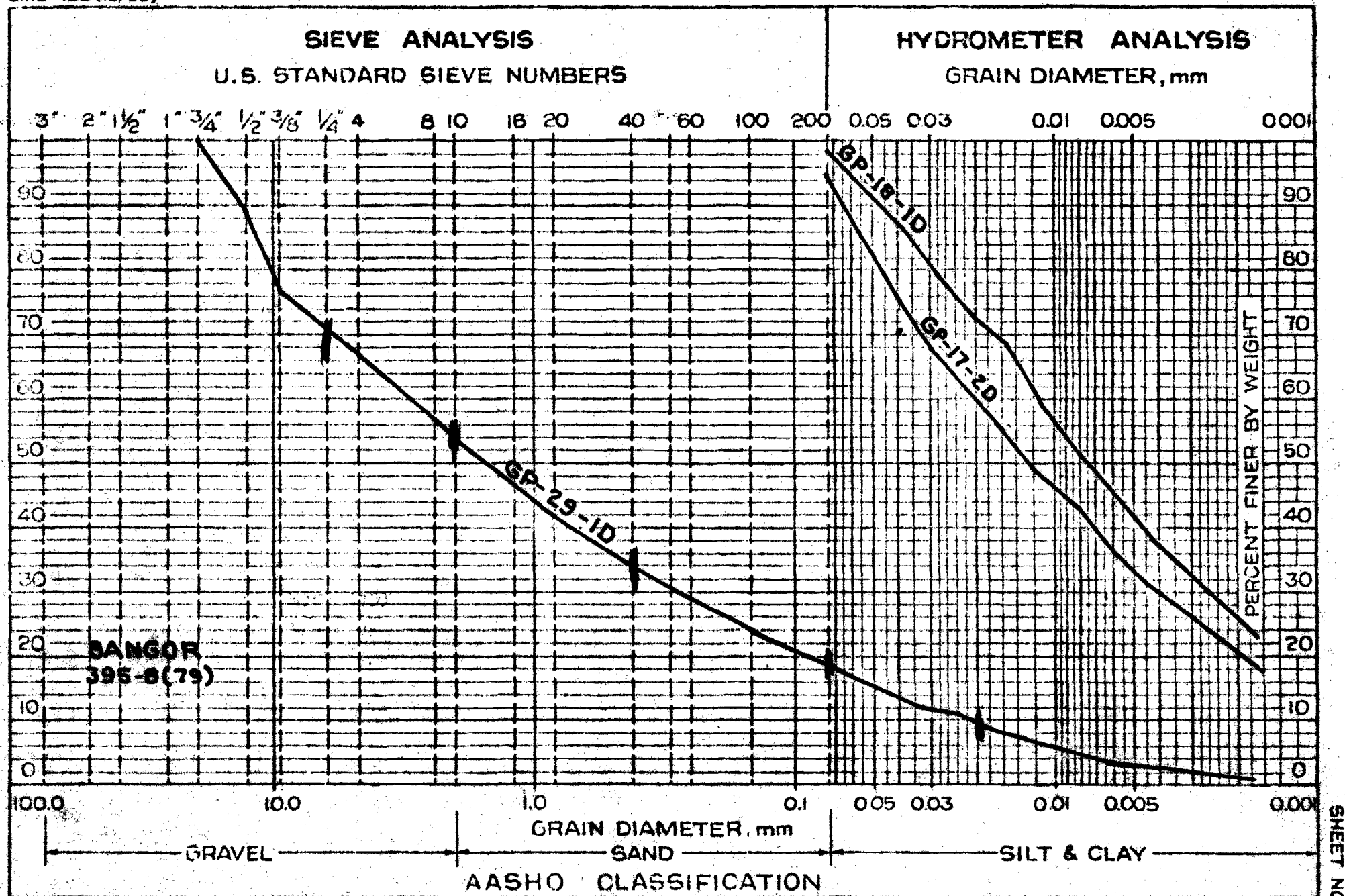
SIEVE ANALYSIS

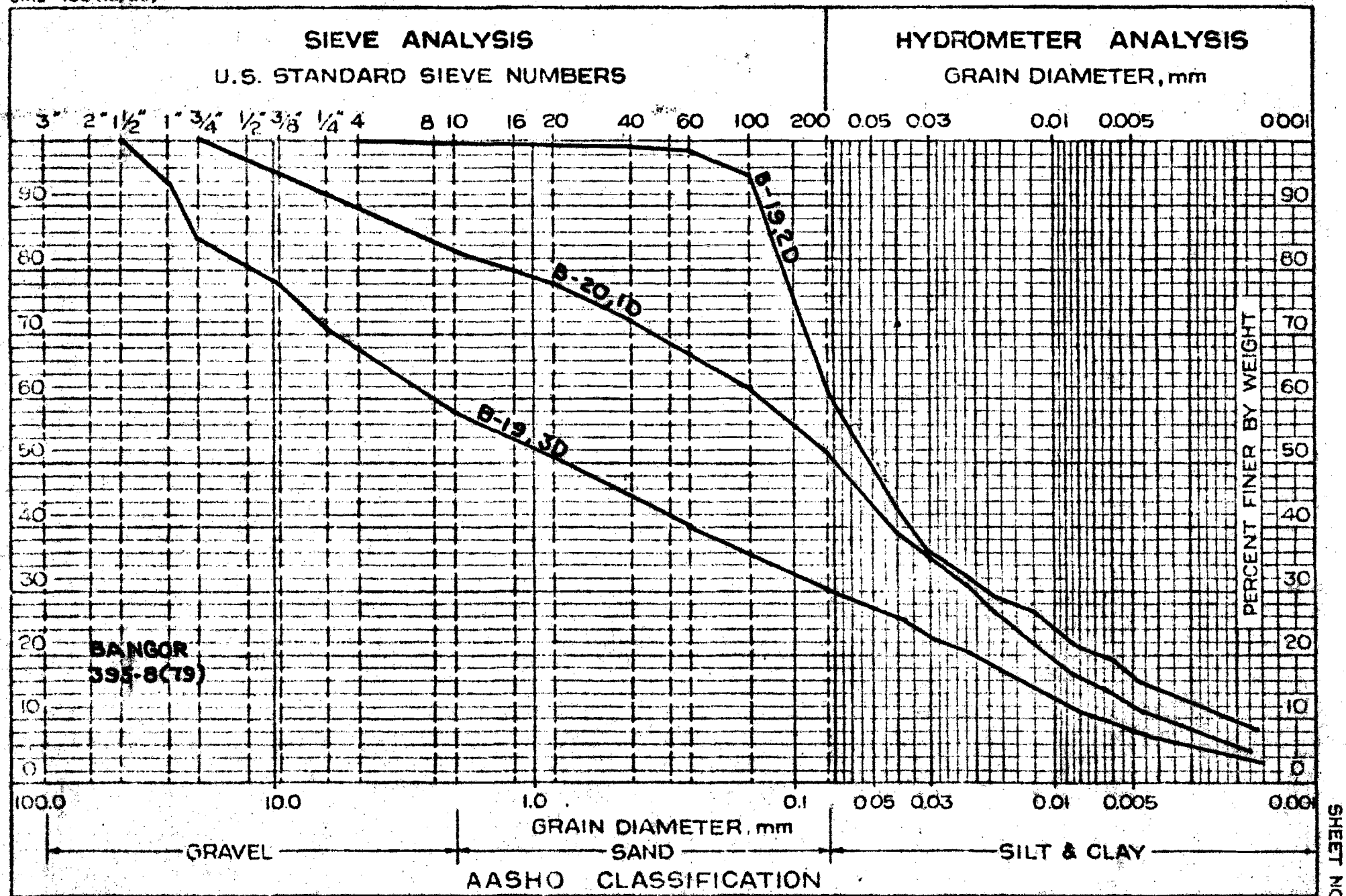
U.S. STANDARD SIEVE NUMBERS

HYDROMETER ANALYSIS

GRAIN DIAMETER, mm







BORING NOTES

All samples and vanes are made ahead of casing



Water elevation



Number of blows required to drive extra heavy casing one foot with 400 ft. lbs. of energy per blow



Location of sample or sample attempt

Number and type of dry sample

ID 5 & H Sampler #1290's

IC 2" O.D. 16 ga. seamless tubing

IU 3 1/2" O.D 16 ga. seamless tubing

IW Wash sample and number

MD Unsuccessful sample attempt and type of sampler



Number of blows required to drive spoon or tubing one foot with 350 ft. lbs. of energy per blow

H Sampling spoon or seamless tubing driven by static weight of drill rods and hammer

P Piston sampler



Field vane test



Bottom of boring (may not be bottom of soil strata)



Refusal of drill rods or casing (may not be ledge)



Locations cored by diamond bit and per cent recovery of rock

SHEAR NOTES

● Field vane shear strengths

X Laboratory vane shear strengths



Shear strengths in excess of capacity of equipment

O One half unconfined compressive strengths

WATER CONTENT NOTES

O Natural water contents, given as per cent of dry weight

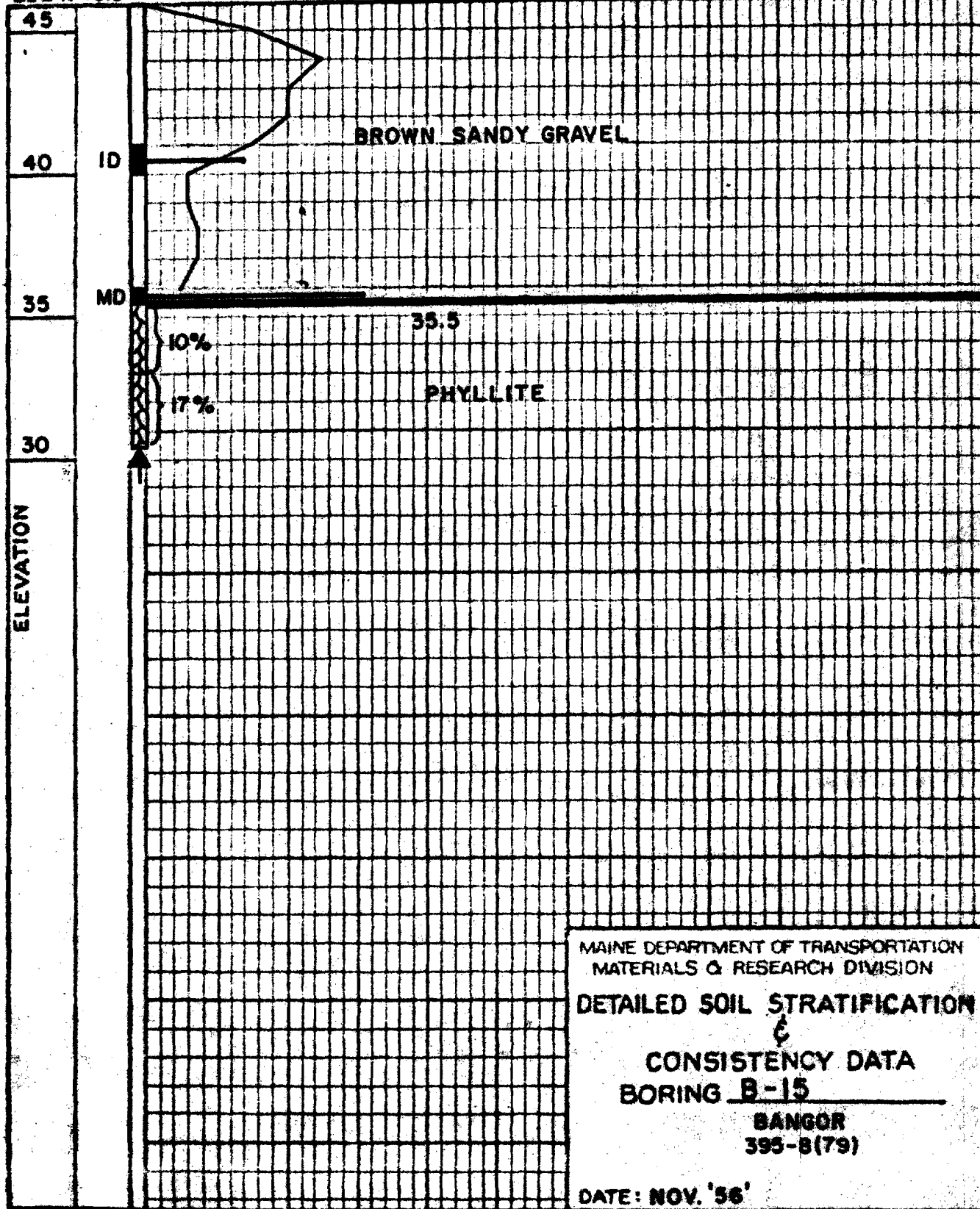
●---X Plastic and liquid limits

Ignition losses are given as per cent of dry weight

BORING B-15(1956)STATION 156+92, 69' LT.

CASING SIZE 2-1/2"	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 46.0

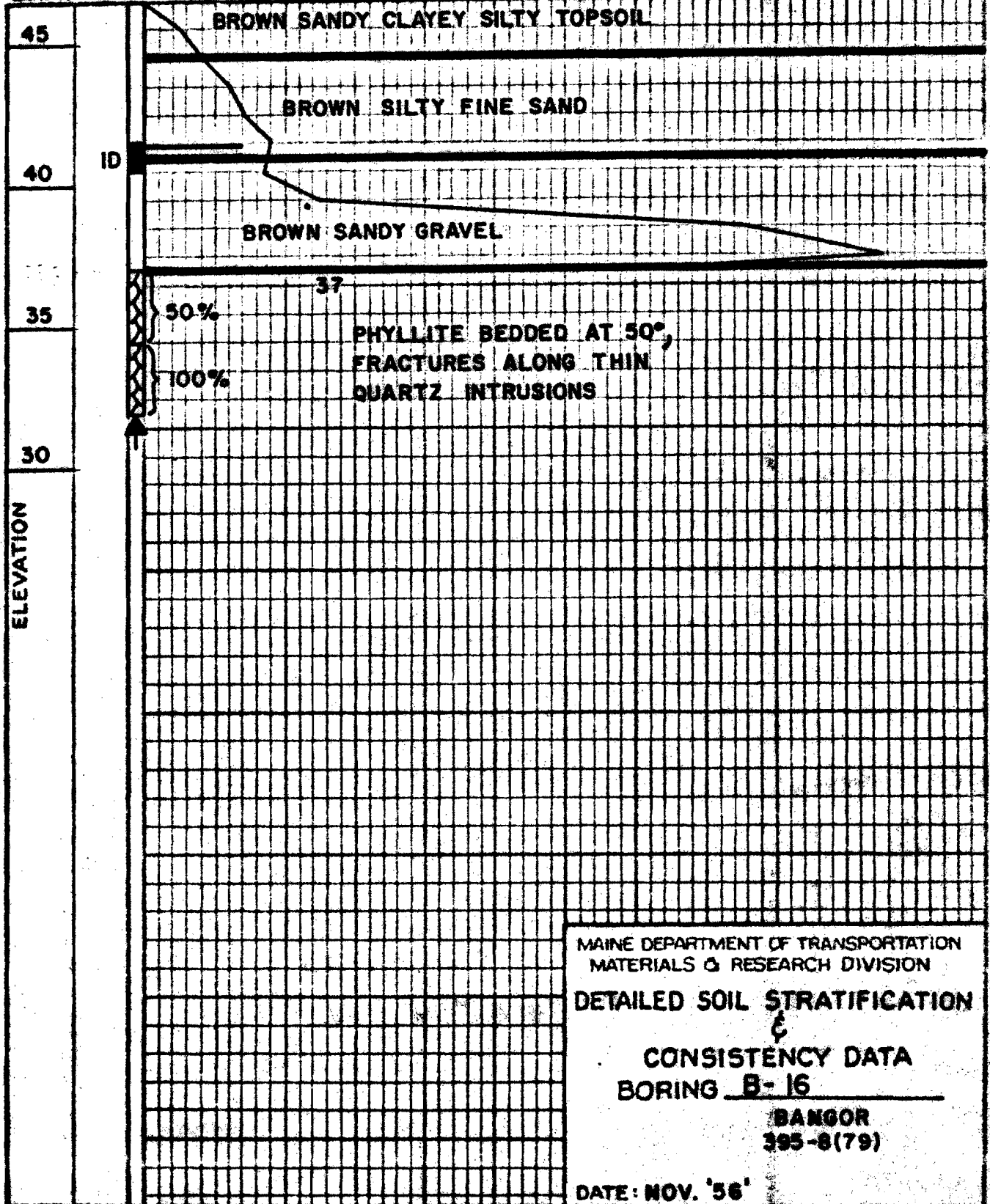


SM-202(8-72)

BORING B-16 (1956) STATION 156+32, 63' LT.

CASING SIZE 2-1/2"	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	

ELEV. 46.5



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING B-16
BANGOR
395-8(79)

DATE: NOV. '56

ELEVATION

45

40

35

30

ID

50%

100%

37

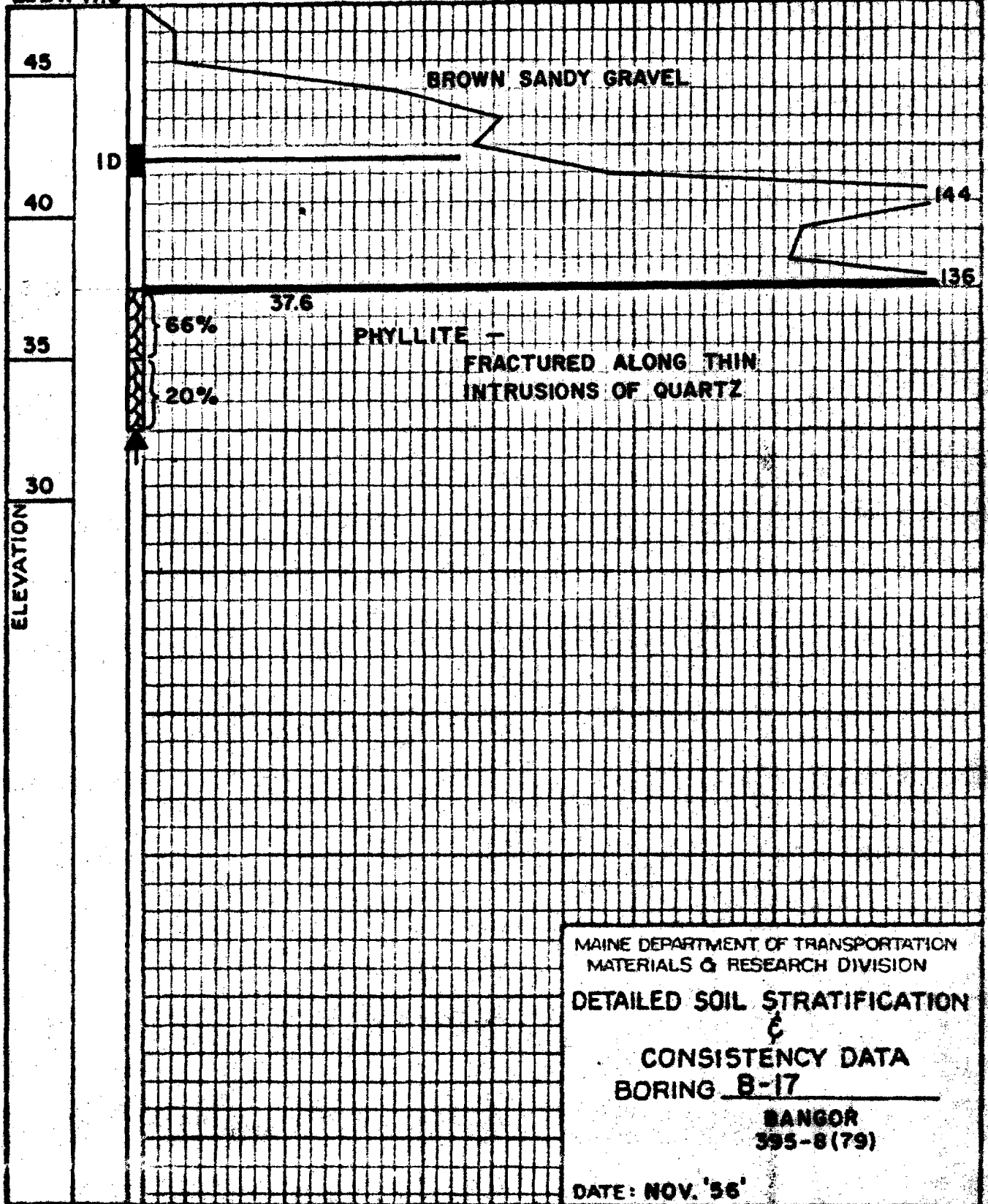
PHYLLITE BEDDED AT 50°,
FRACTURES ALONG THIN
QUARTZ INTRUSIONS

SML-202(8-72)

BORING B-17(1956) STATION 155 + 65, 48' LT.

CASING SIZE 2-1/2	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	

ELEV. 47.6

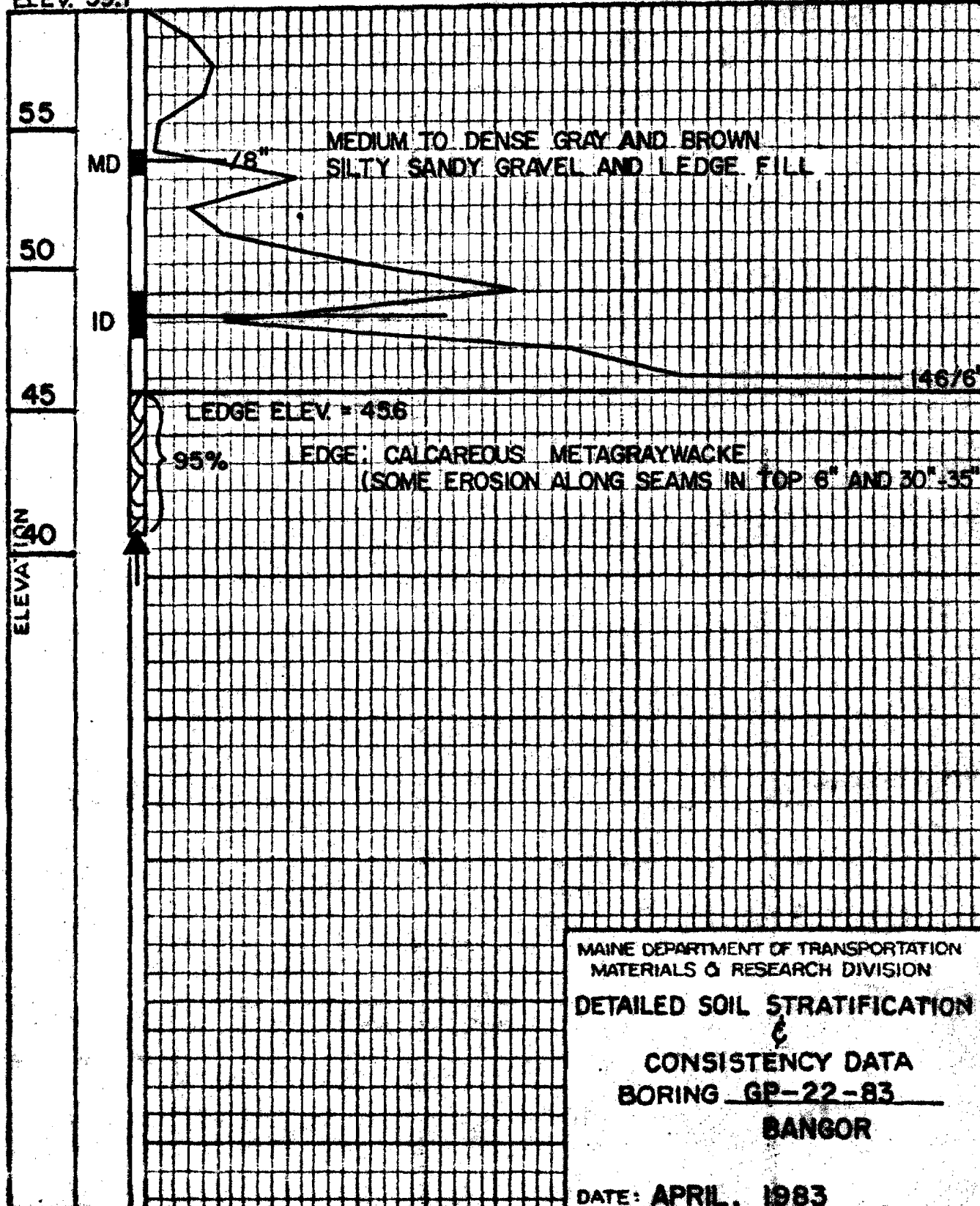


SML-208(8-72)

BORING GP-22-83 STATION 9+47, 5' LT. (MS-2)

CASING SIZE 2 1/2"	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 59.



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

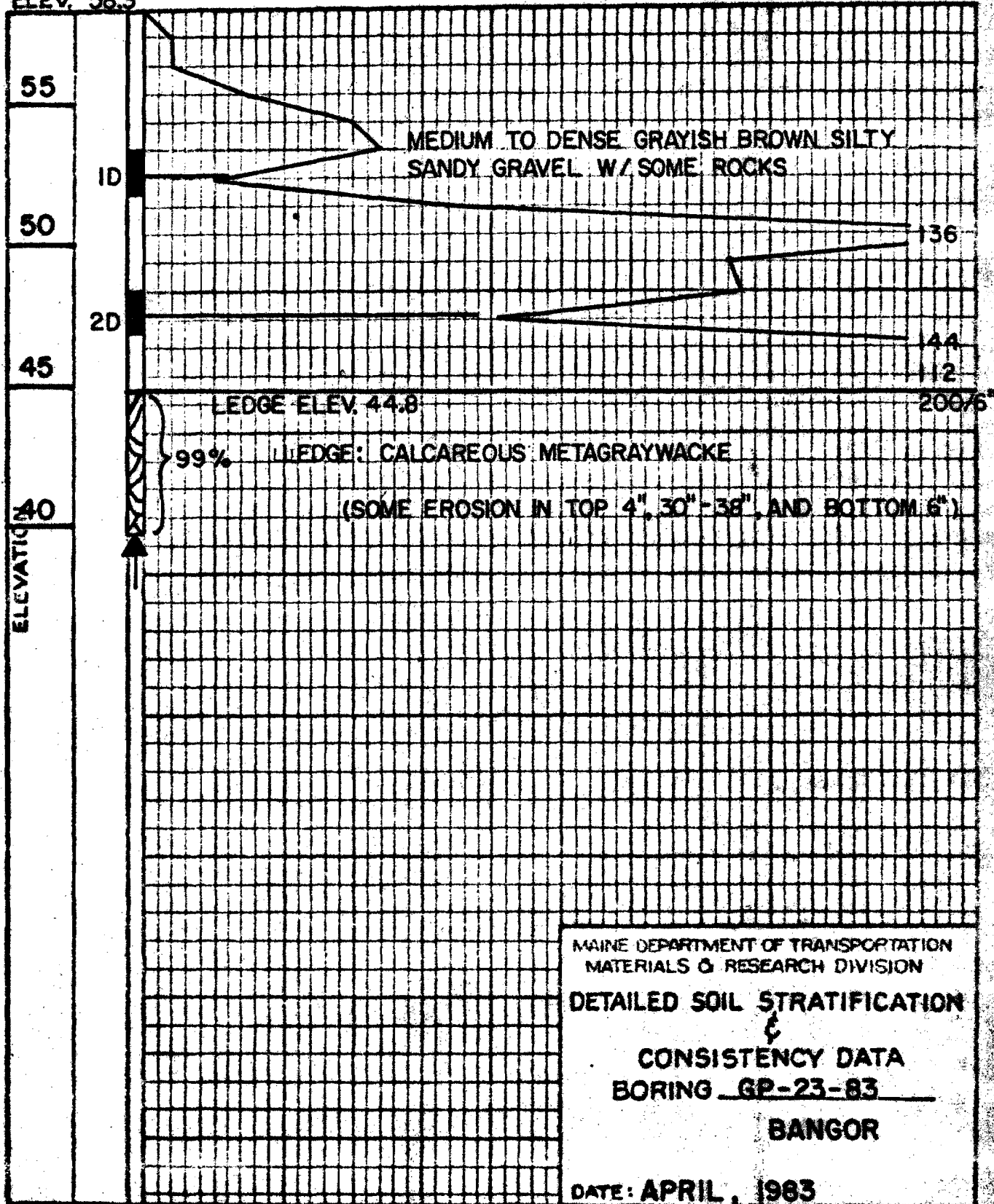
CONSISTENCY DATA
BORING GP-22-83
BANGOR

DATE: APRIL, 1983

BORING GP-23-83 STATION 9+25.16' LT. (MS-2)

CASING SIZE 2 1/2"	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 58.3

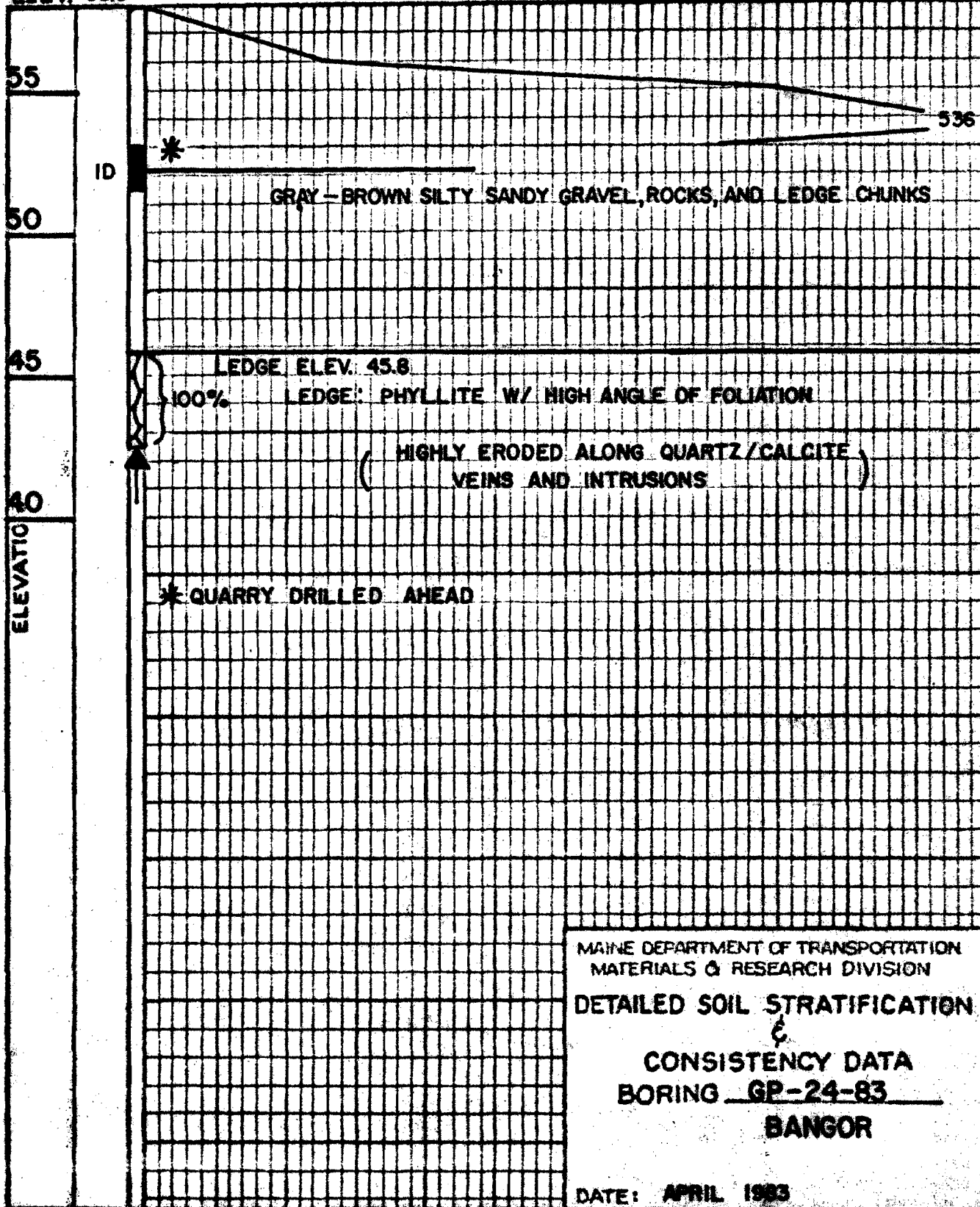


SM-202(8-72)

BORING GP-24-83 STATION 9+58, 31' LT. (MS-2)

CASING SIZE 2 1/2"	DRIVING RESISTANCE ——— Blows/Ft.				
	20	40	60	80	100

ELEV. 58.0



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-24-83
BANGOR

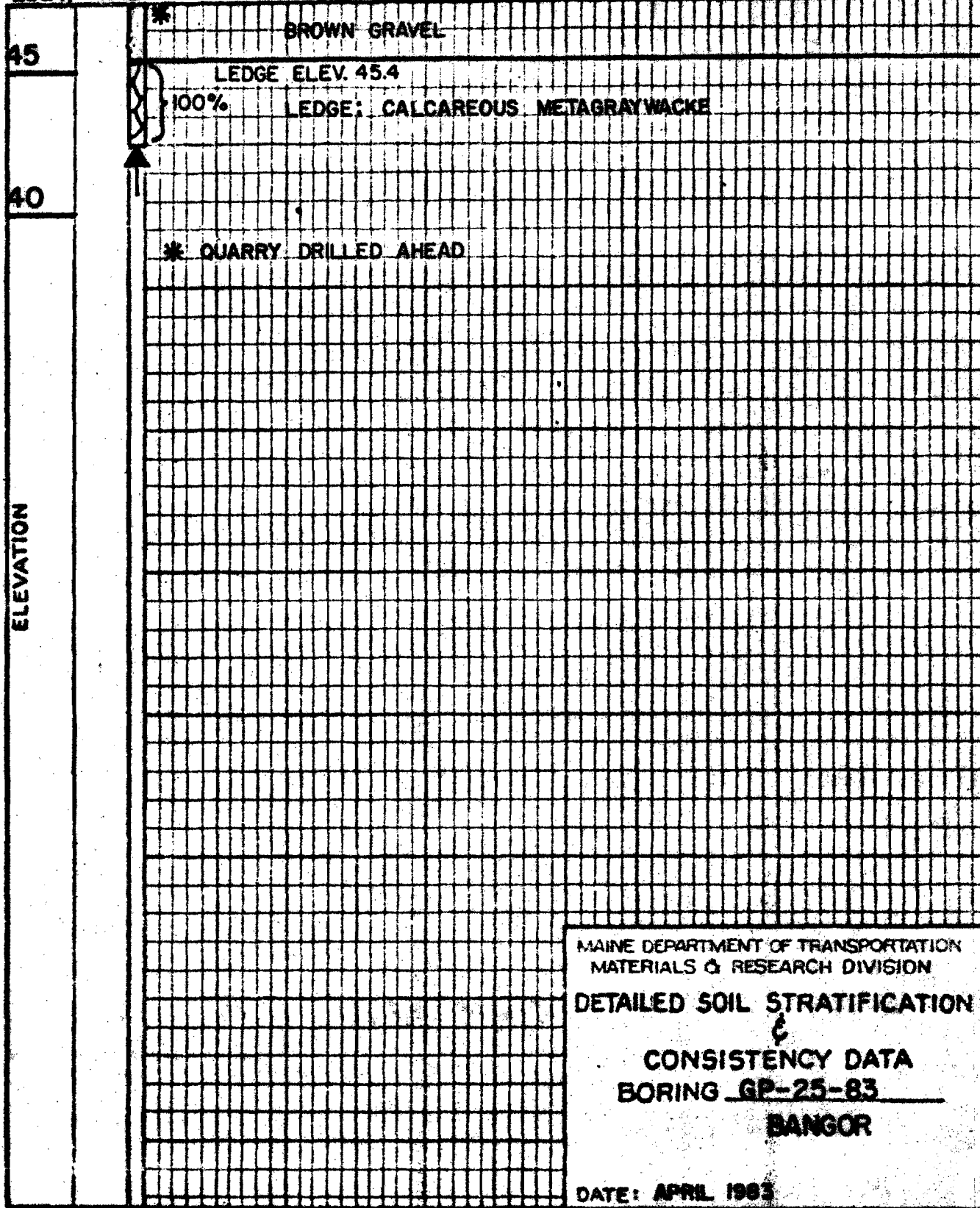
DATE: APRIL 1983

SML-202 (8-72)

BORING GP-25-83 STATION 13+06, 74' RT. (MS-4)

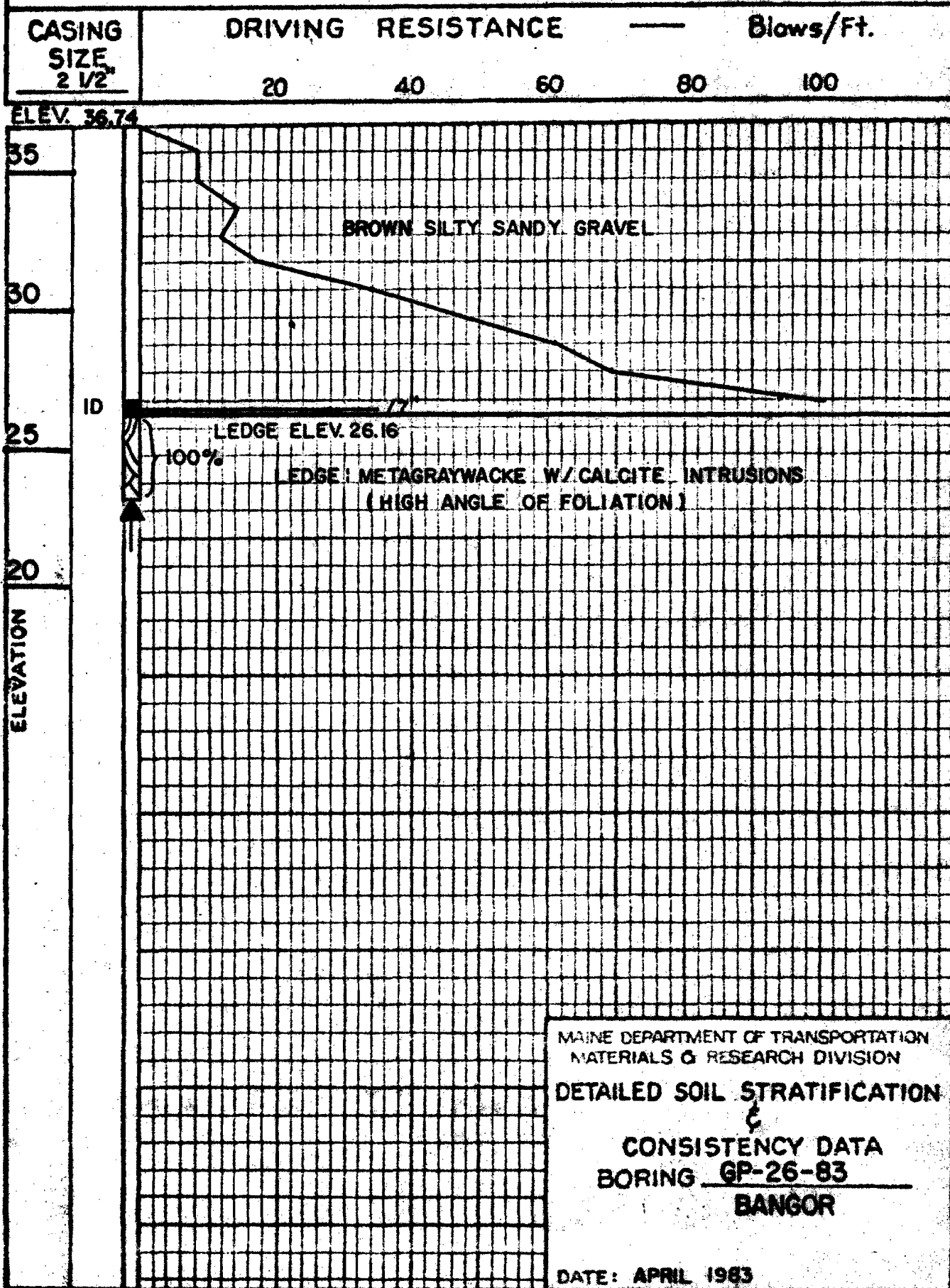
CASING SIZE	DRIVING RESISTANCE — Blows/Ft.				
	20	40	60	80	100

ELEV. 47.42



5M1-208(8-72)

BORING GP-26-83 STATION 7+35.59' RT (MS-2)

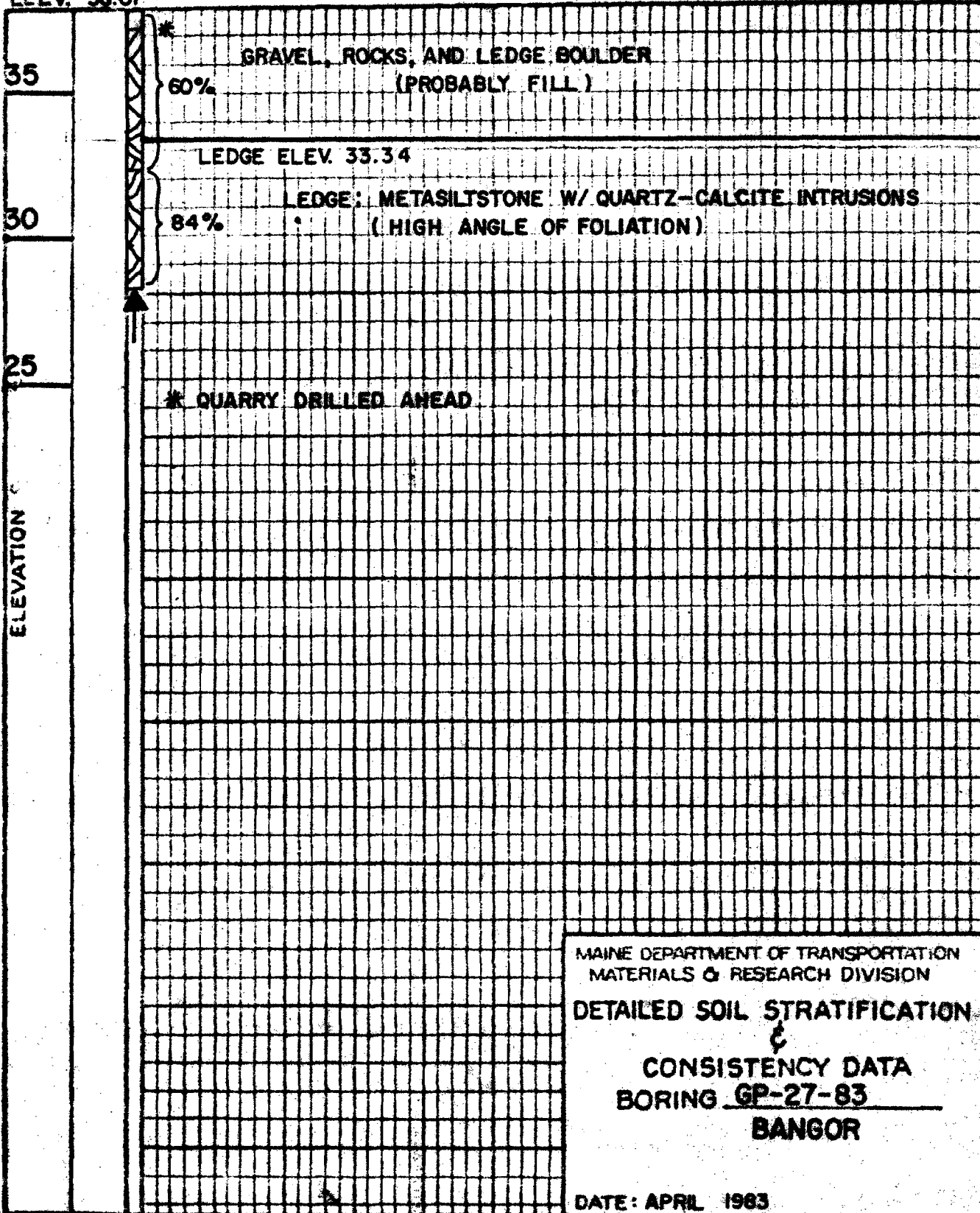


SML-202(8-72)

BORING GP-27-83 STATION 7+75, 50' RT. (MS-2)

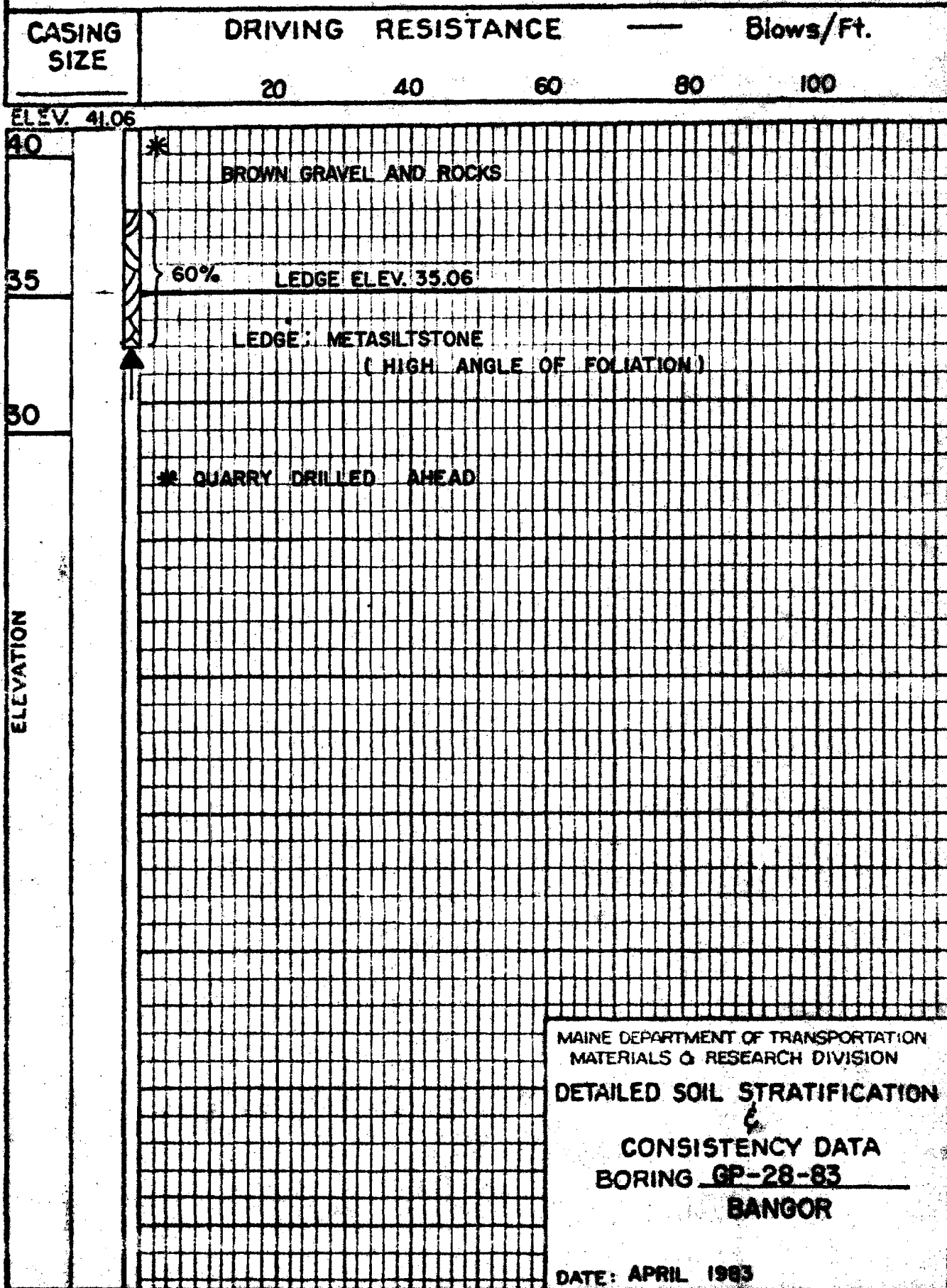
CASING SIZE	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 38.01



SML-202 (3-72)

BORING GP-28-83 STATION 8+20, 33' RT (MS-2)

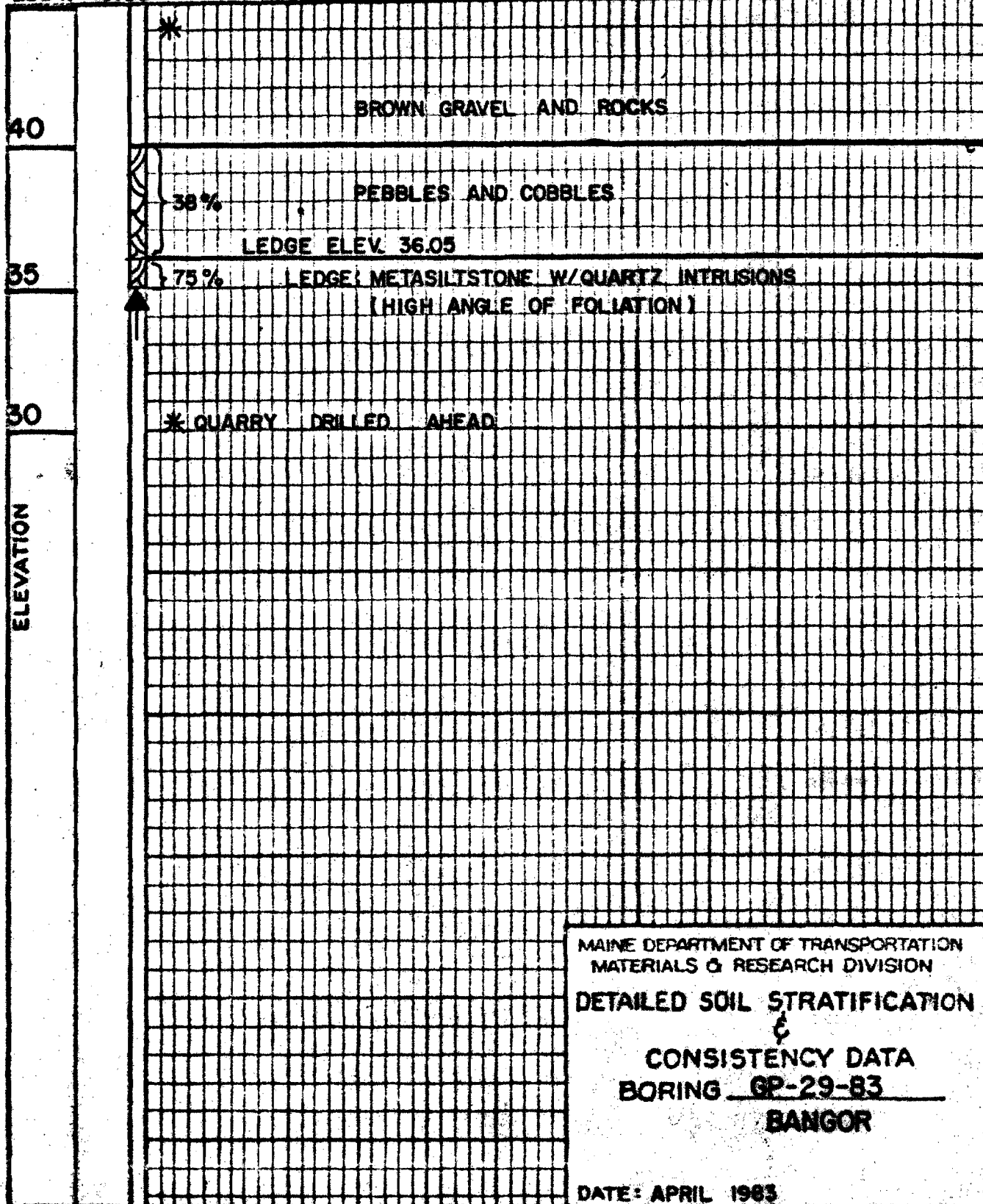


SML-202(8-72)

BORING GP-29-83 STATION 8+70.23 RT (MS-2)

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

ELEV. 45.05

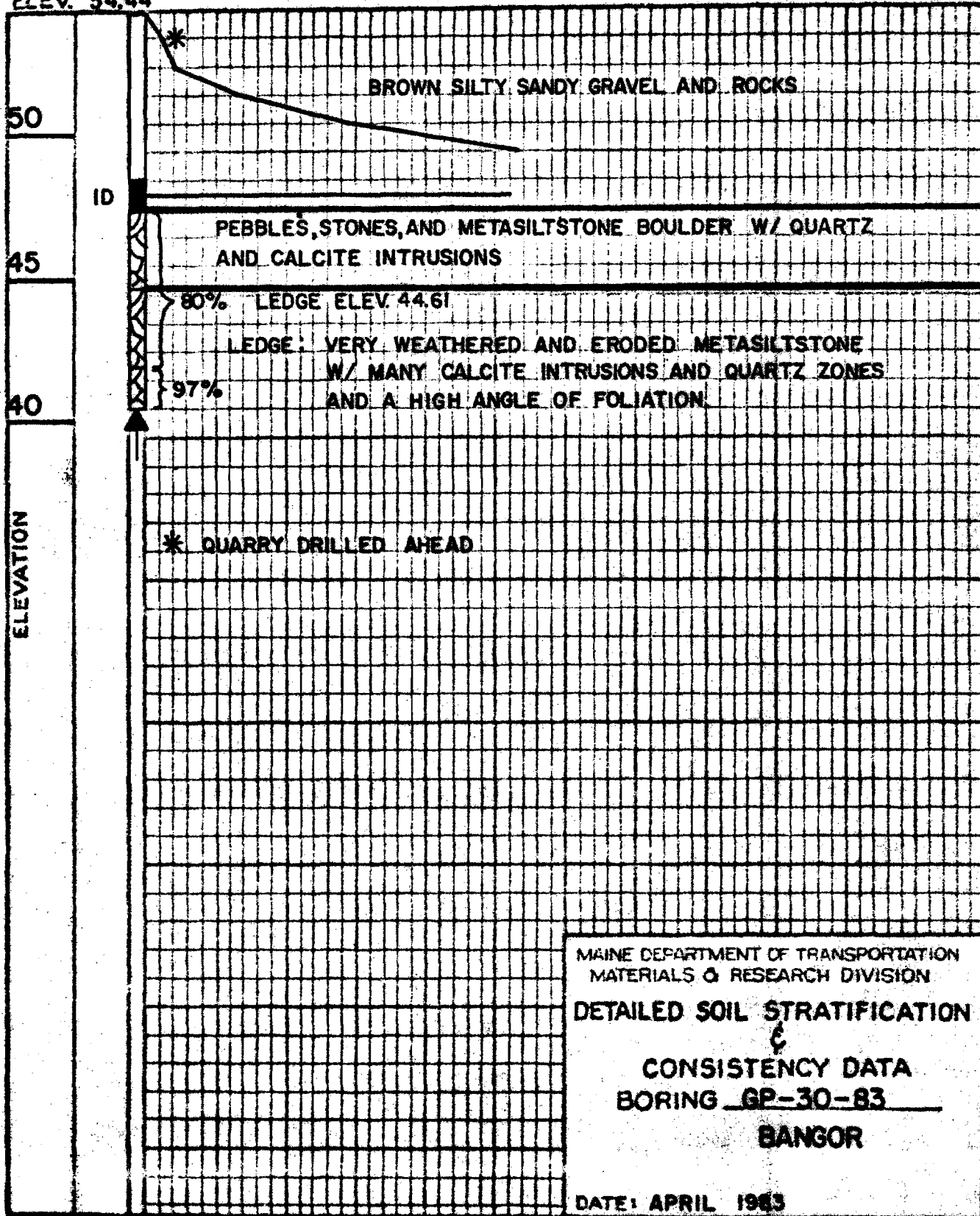


SML-202(8-72)

BORING GP-30-83 STATION 9+08, 26' RT. (MS-2)

CASING SIZE 2 1/2"	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 54.44



SML-202(8-72)

BORING GP-31-83 STATION 163 + 43, 70' RT.

(ABUT #1)

CASING
SIZE
2 1/2"

DRIVING RESISTANCE

Blows/Ft.

20

40

60

80

100

ELEV. 36.63

35

30

25

20

ELEVATION

ID

2D

LOOSE GRAY AND BROWN SILTY FINE SAND
AND SOME PEBBLY GRAVEL

DENSE BROWN AND GRAY
SILTY SAND, GRAVEL, AND
LEDGE FRAGMENTS

EDGE ELEV. 22.9

153

96% LEDGE METAGRAYWACKE, PHYLLITE, AND SLATE
W/ CALCITE SEAMS AND HIGH ANGLE OF FOLIATION

* QUARRY DRILLED AHEAD

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-31-83

BANGOR

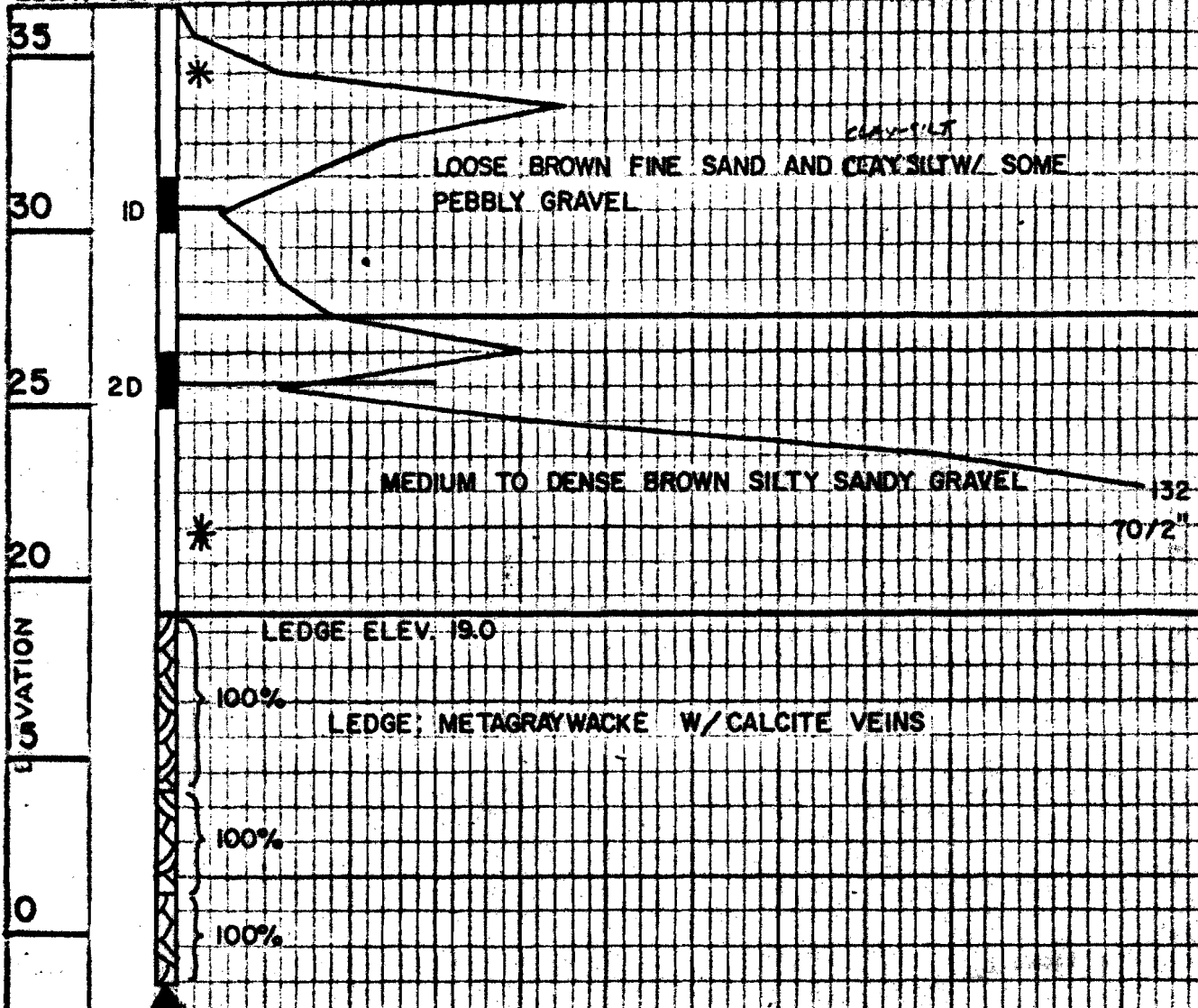
DATE: APRIL 1983

SML-202 (3-72)

BORING GP-32-83 STATION 163 + 43, C (ABUT[#] 1)

CASING SIZE 2 1/2"	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 36.42



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING GP-32-83
BANGOR

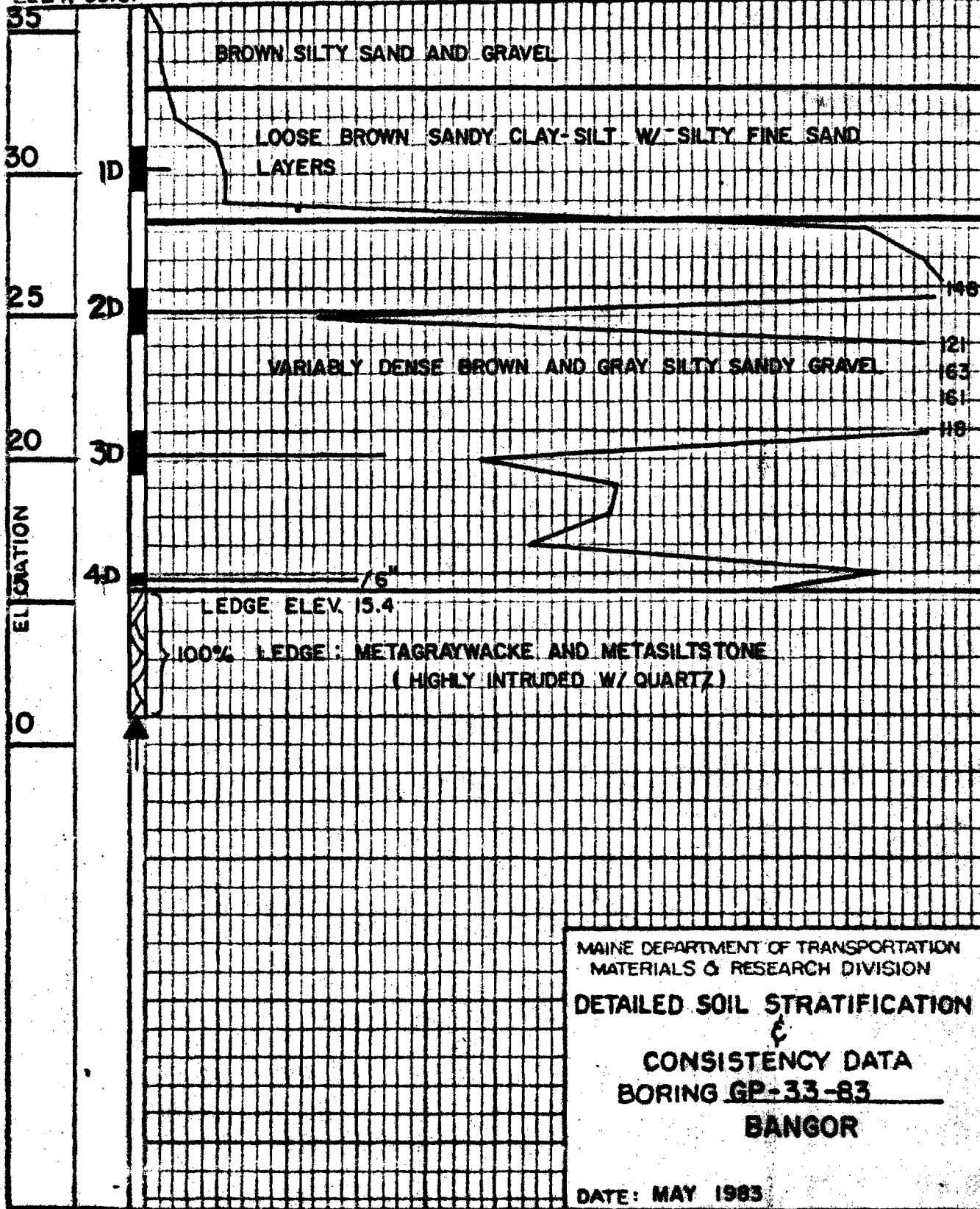
DATE: MAY 1983

SML-202(8-72)

BORING GP-33-83 STATION 163+43, 70' LT (ABUT 1)

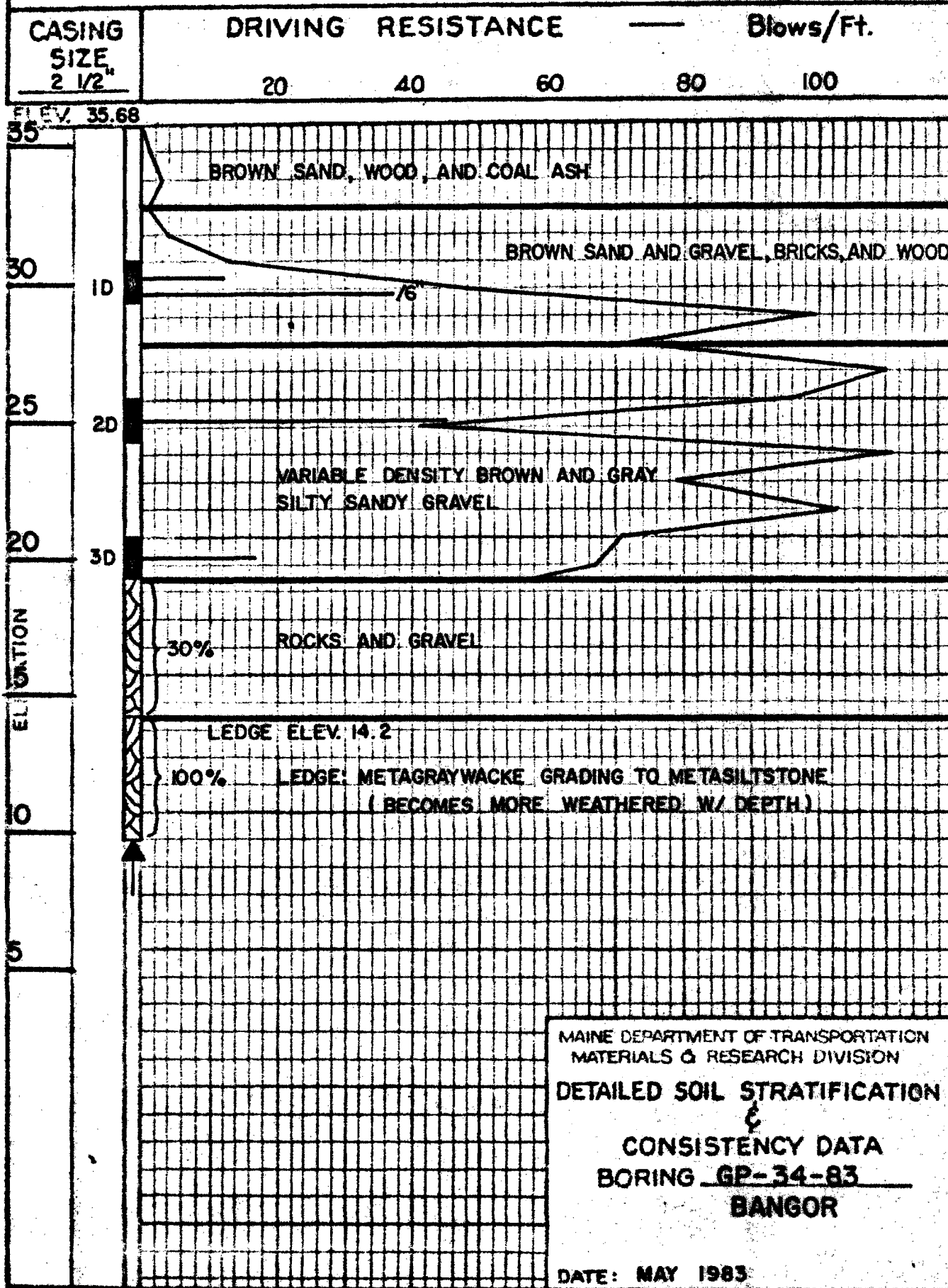
CASING SIZE 2 1/2"	DRIVING RESISTANCE ————— Blows/Ft.				
	20	40	60	80	100

ELEV. 35.87



SML-202(8-72)

BORING GP-34-83 STATION 6+85, 35' RT. (MS-2)



SML-202(8-72)

BORING GP-35-83 STATION 163 +00, C

CASING
SIZE
2 1/2"

DRIVING RESISTANCE

Blows/Ft.

20

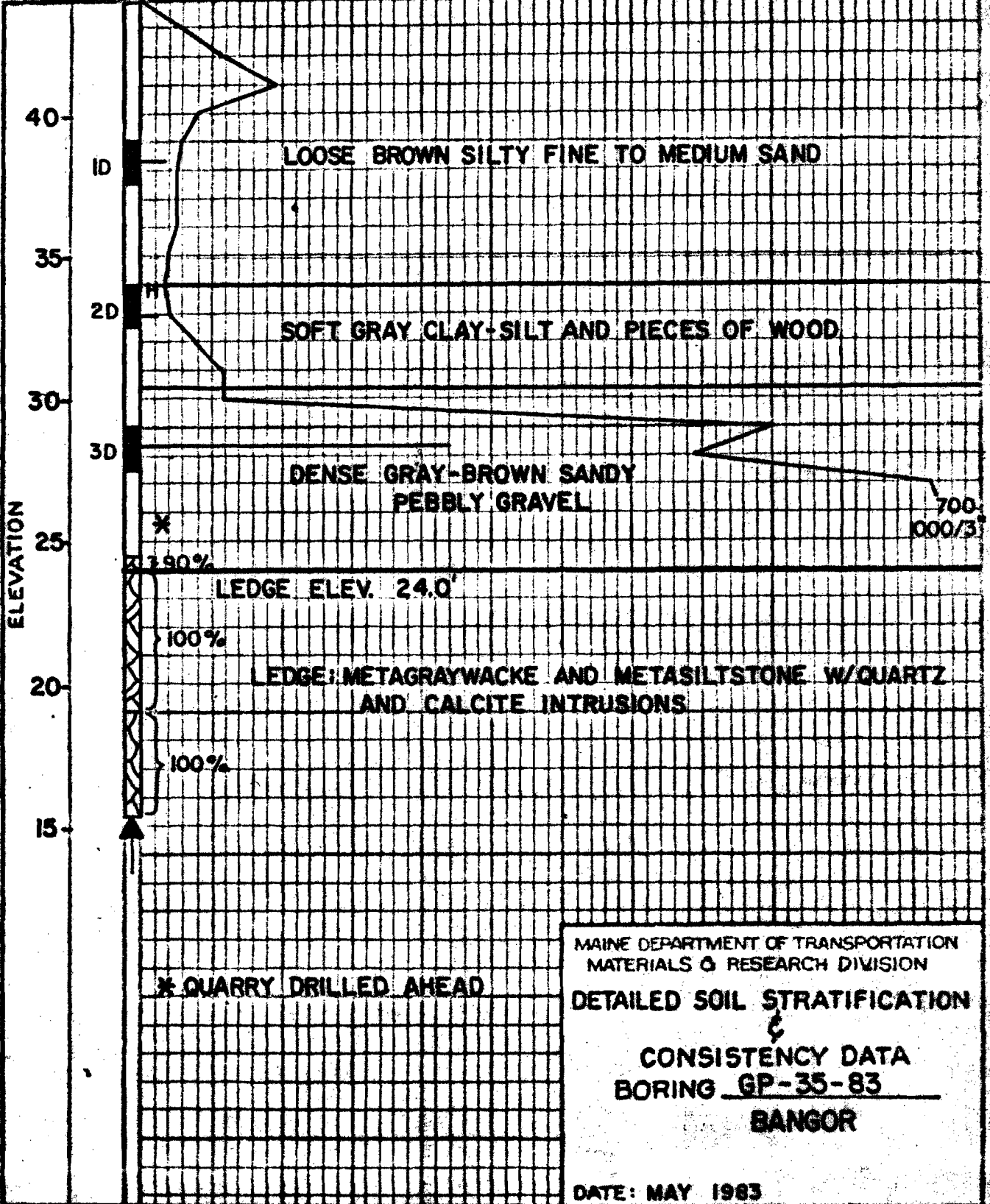
40

60

80

100

ELEV. 44.04



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING GP-35-83
BANGOR

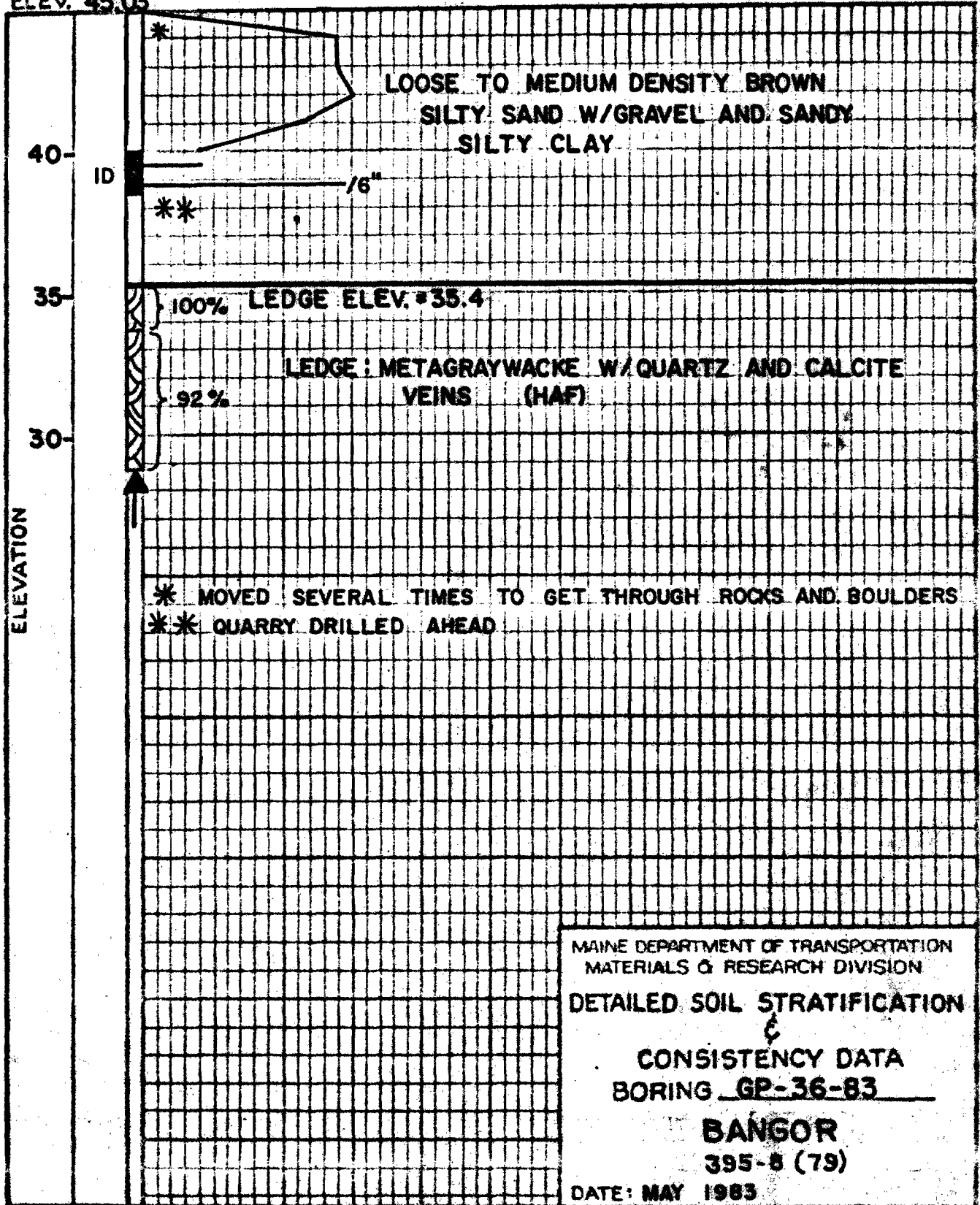
DATE: MAY 1983

SML-202(8-72)

BORING GP-36-83 STATION 161+85, C

CASING SIZE, 2 1/2"	DRIVING RESISTANCE ———					Blows/Ft.
	20	40	60	80	100	

ELEV. 45.03

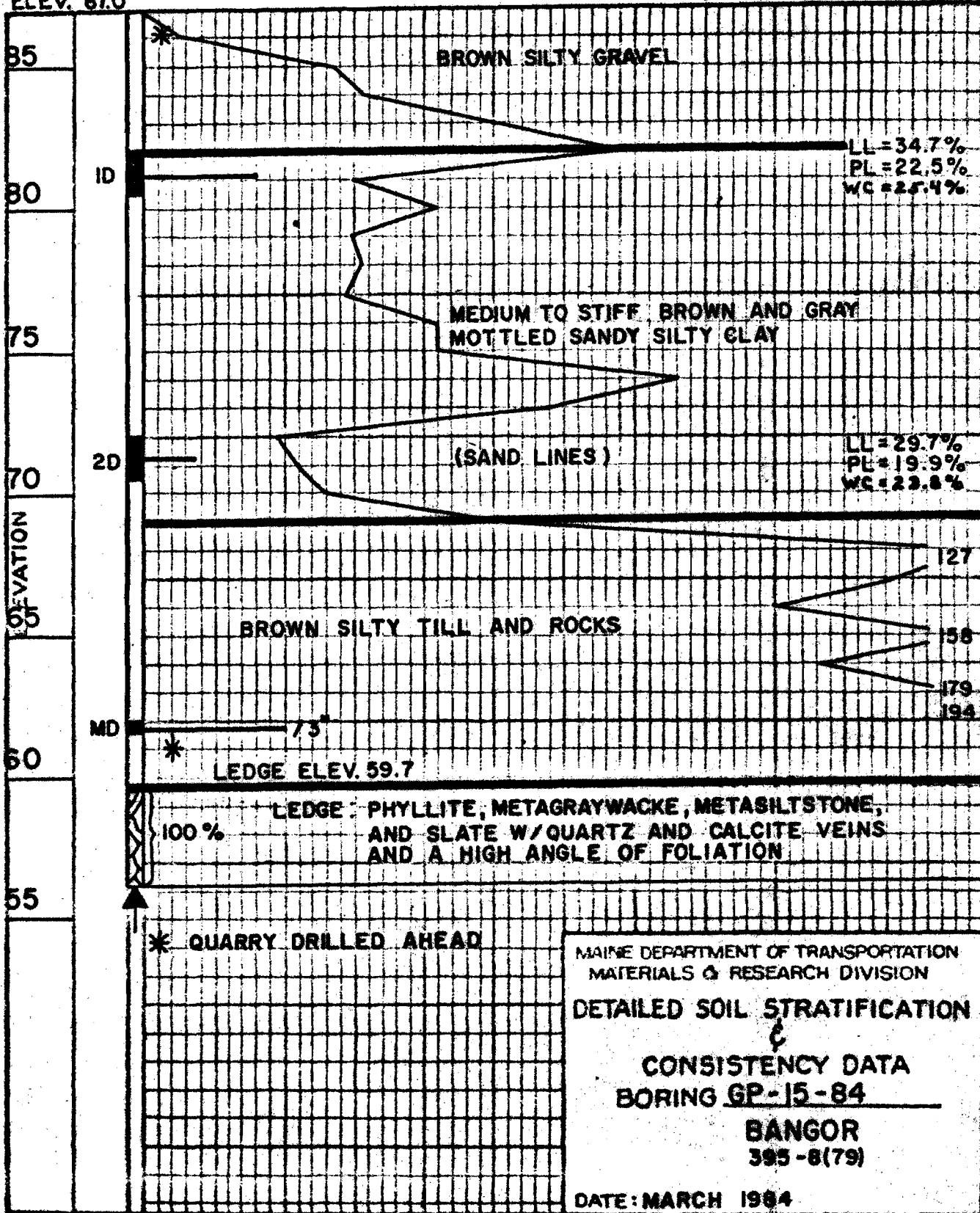


SML-202 (8-72)

BORING GP-15-84 STATION 8+06.17' RT. (RAMP FR-1)

CASING SIZE 2-1/2"	DRIVING RESISTANCE ————					Blows/Ft.
	20	40	60	80	100	

ELEV. 87.0

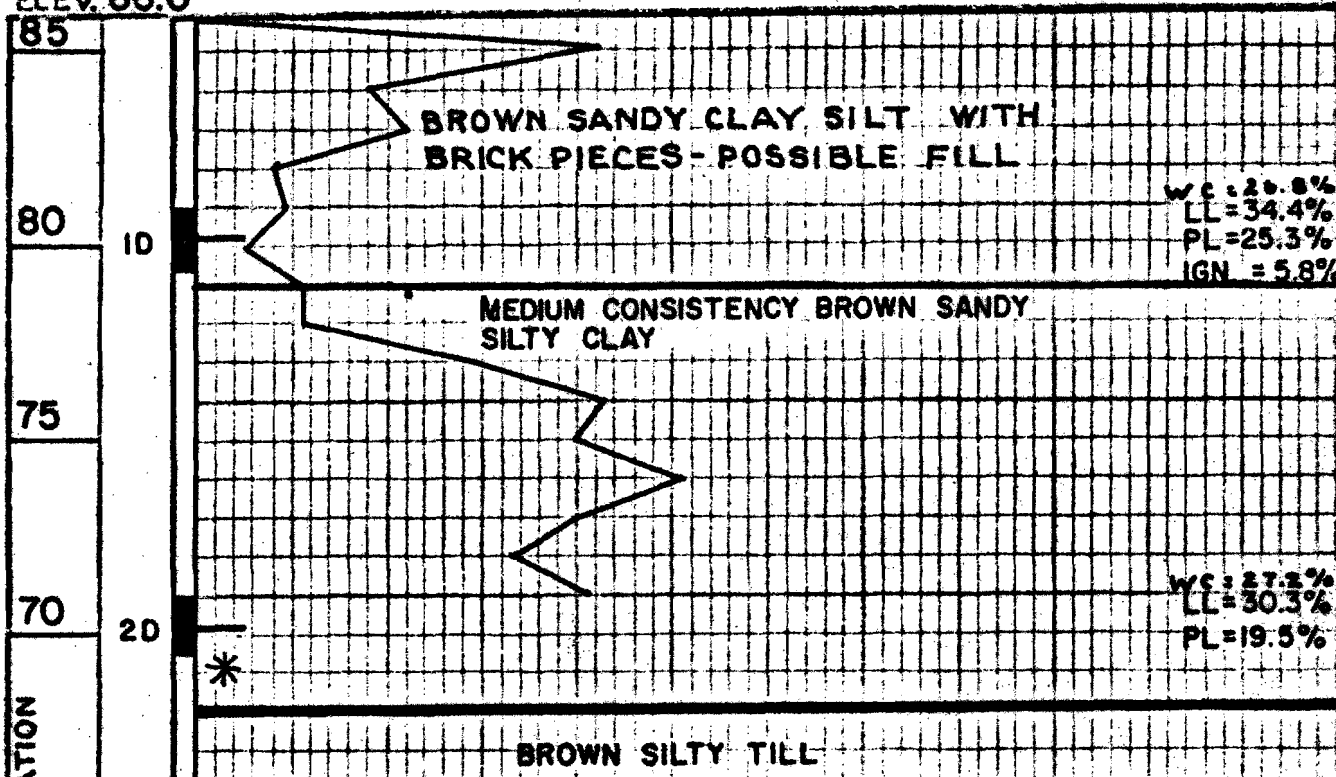


SML-202(8-72)

BORING GP-16-84 STATION 7+70.29' LT. (RAMP FR-3)

CASING SIZE 2-1/2"	DRIVING RESISTANCE ————					Blows/Ft.
	20	40	60	80	100	

ELEV. 86.0



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

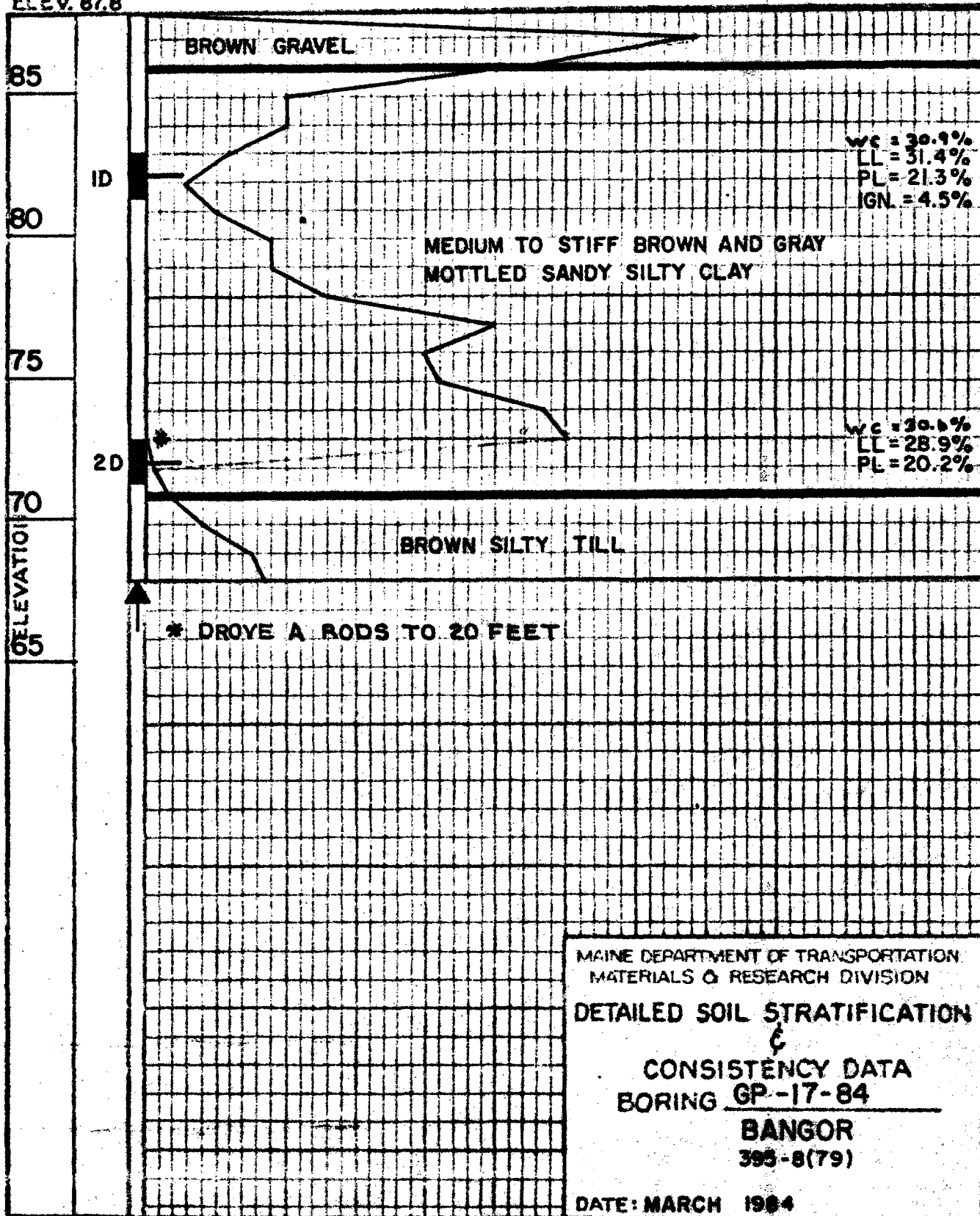
CONSISTENCY DATA
BORING GP-16-84
BANGOR
395-8(79)

DATE: MARCH 1984

BORING GP-17-84 STATION 6+40, 20' LT (RAMP FR-3)

CASING SIZE 2-1/2"	DRIVING RESISTANCE				Blows/Ft.
	20	40	60	80	100

ELEV. 87.8



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-17-84

BANGOR
395-8(79)

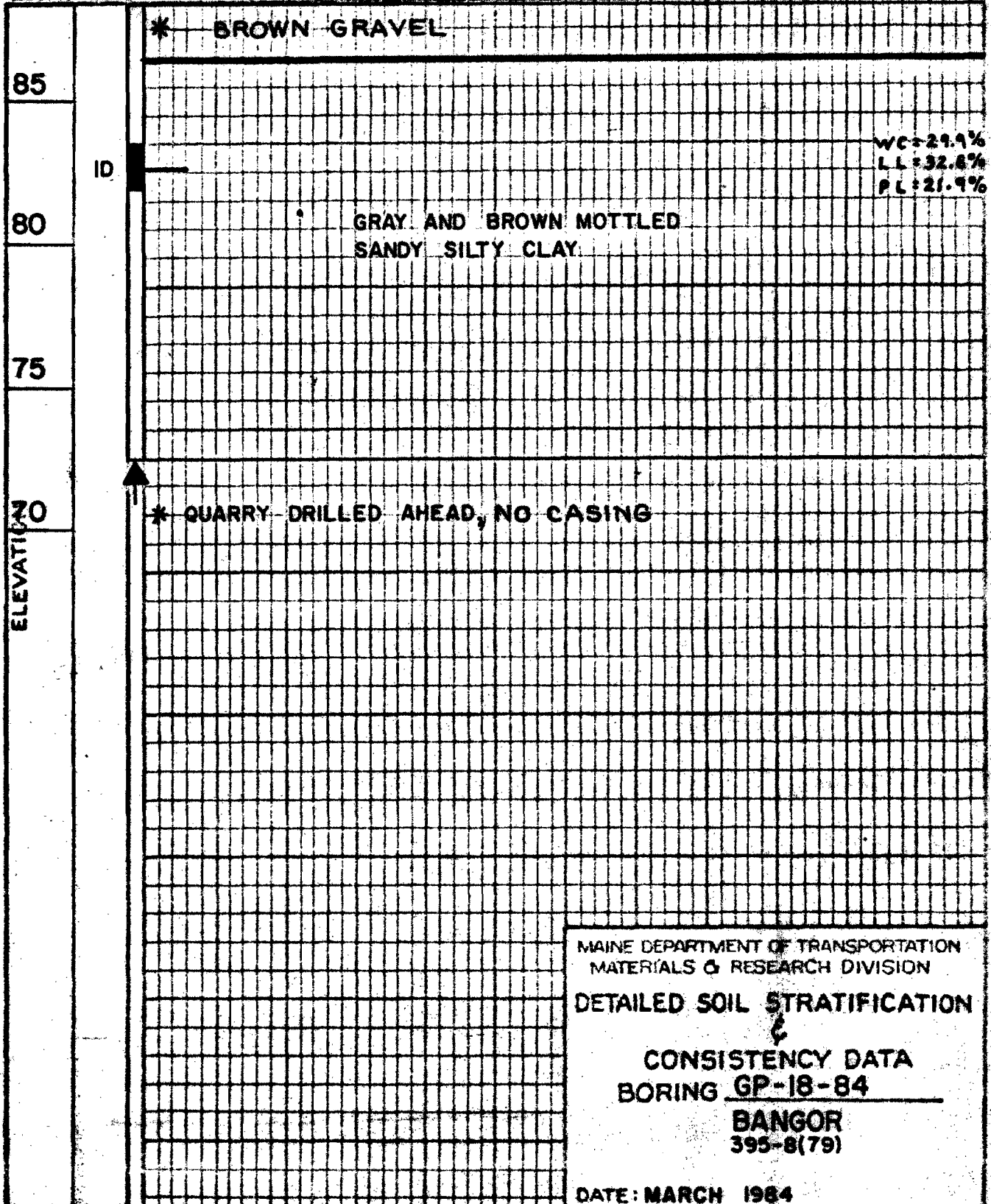
DATE: MARCH 1984

SML-202(8-72)

BORING GP-18-84 STATION 10+75.21 RT. (RAMP FR-1)

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

ELEV. 88.5

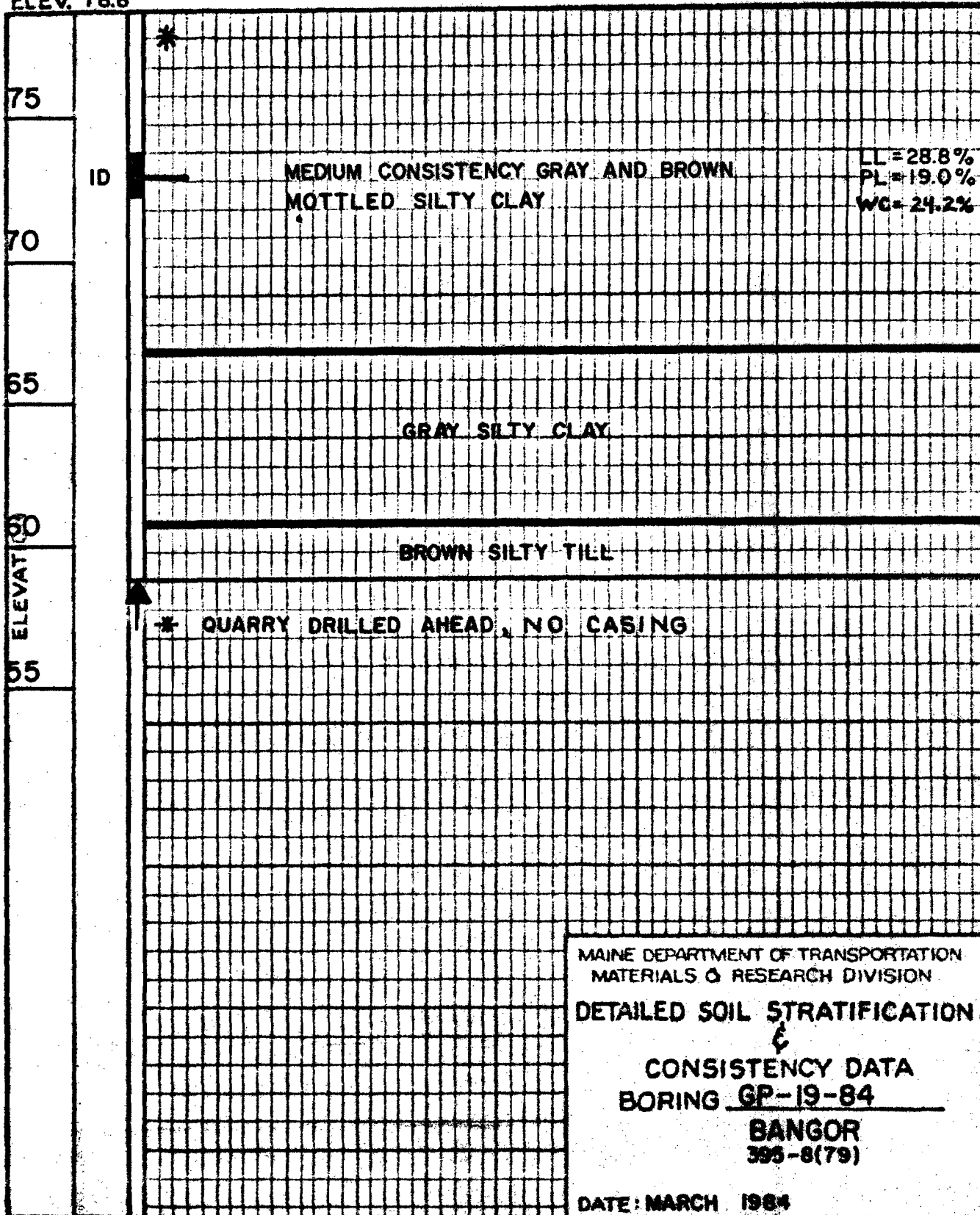


SML-202(8-72)

BORING GP-19-84 STATION 1+00, 43' RT. (RAMP FR-1)

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

ELEV. 78.8

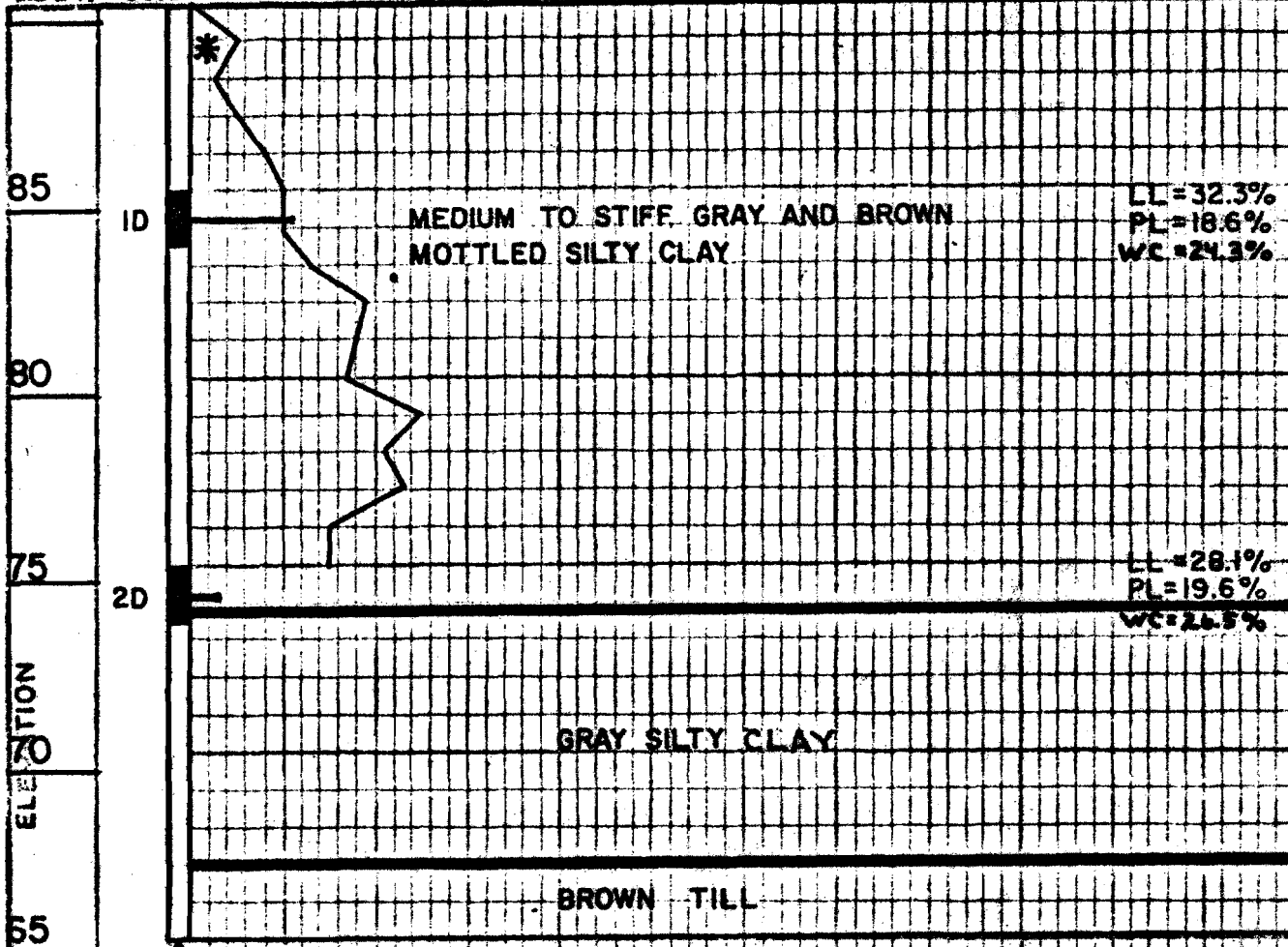


SML-202(8-72)

BORING GP-20-84 STATION 142+00, 110' RT

CASING SIZE 2-1/2"	DRIVING RESISTANCE					Blows/Ft.
	20	40	60	80	100	

ELEV. 90.5



* QUARRY DRILLED AHEAD TO 15 FEET
DROVE A RODS FROM 15 TO 25 FEET

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-20-84

BANGOR
395-8(79)

DATE: MARCH 1984

SML-202(8-72)

BORING GP-28-84

STATION 9+13 22 RT (FR-1)

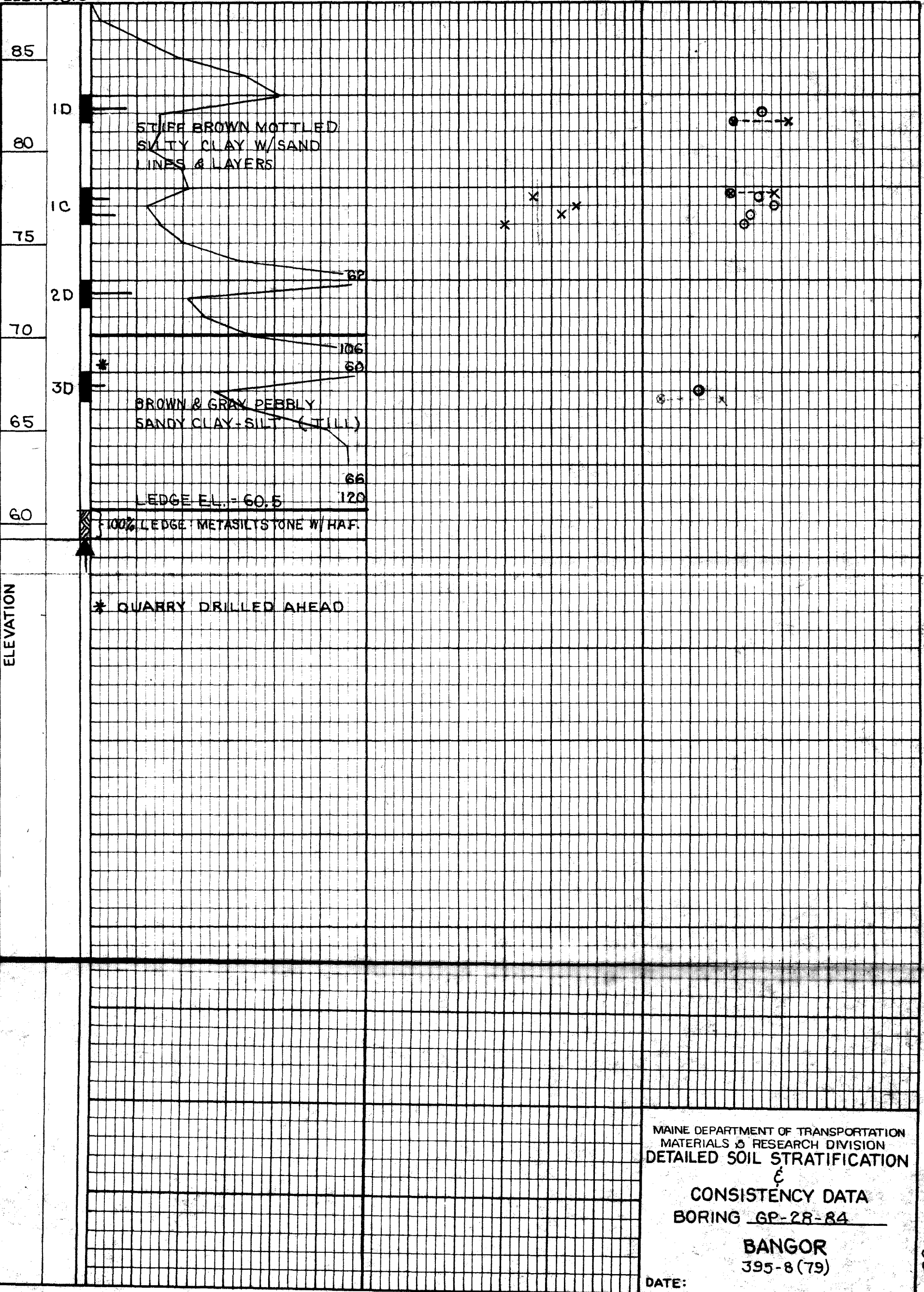
CASING
SIZE
2 1/2"

DRIVING RESISTANCE
Blows/Ft.
20 40

VANE SHEAR STRENGTH
Tons/Sq. Ft.
0.4 0.8

WATER CONTENT
Percent
20 40

ELEV. 88.0



BORING GP-29-84 STATION 7+50, 24' RT. (FR-1)

CASING
SIZE
2 1/2"

DRIVING RESISTANCE

Blows/Ft.

20

40

60

80

100

ELEV. 87.0

85

BROWN SANDY SILTY GRAVEL

80

ID

75

2D

MEDIUM CONSISTENCY BROWN SANDY
CLAY SILT

W.C. = 19.9%
LL = 26.0%
PL = 18.1%

70

3D

MEDIUM DENSITY BROWN
SILTY FINE SAND

65

*

DENSE BROWN PEBBLY SILTY TILL

60

63%

ASSORTED PEBBLES AND BOULDERS

LEDGE ELEV. = 62.0

LEDGE: METAGRAYWACKE W/ A HIGH ANGLE OF FOLIATION

* QUARRY DRILLED AHEAD

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-29-84

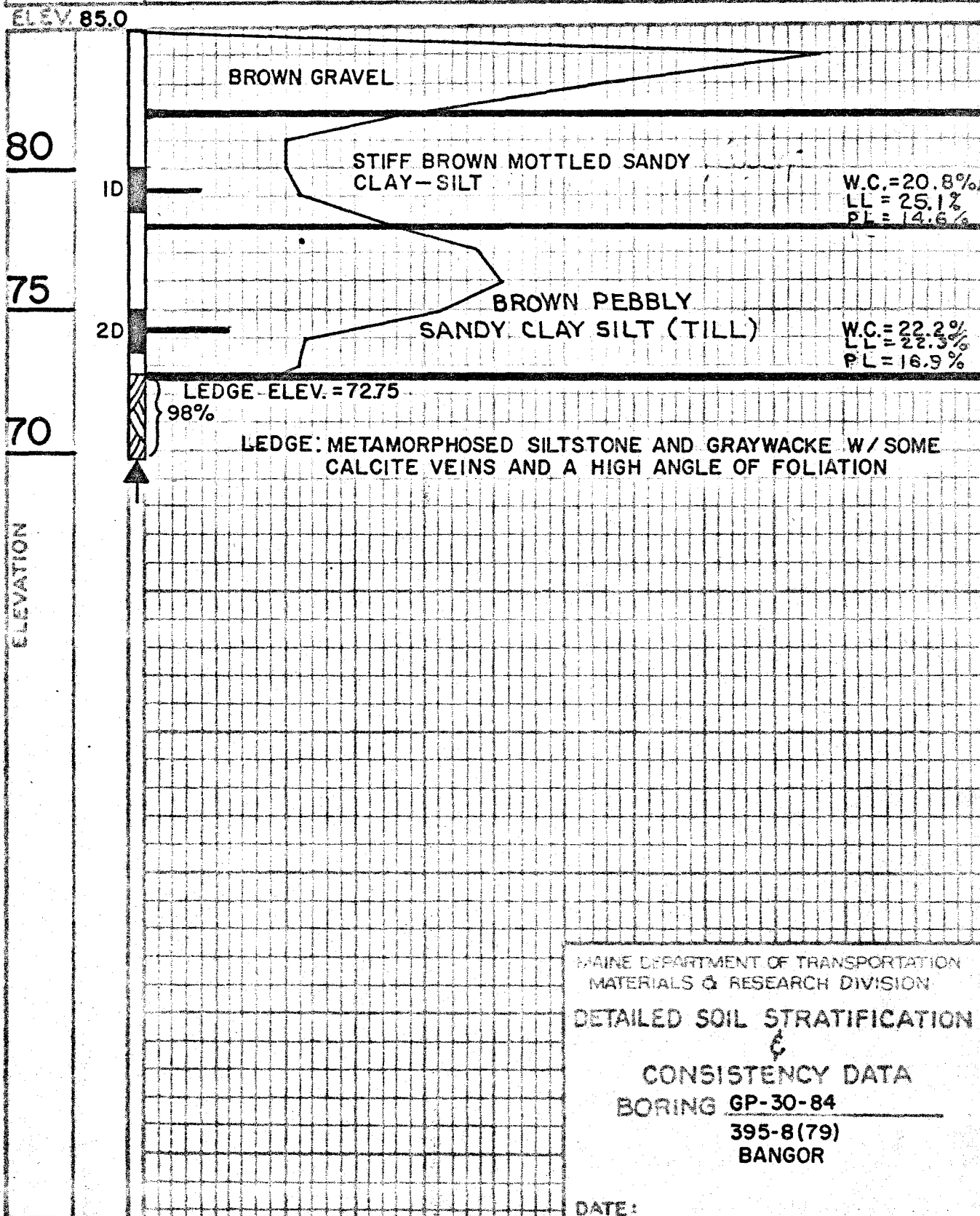
395-8(79)
BANGOR

DATE:

SML-202(8-72)

BORING GP-30-84 STATION 6+00, 50' RT. (FR-1)

CASING SIZE 2 1/2"	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-30-84
395-8(79)
BANGOR

DATE:

BORING GP-31-84

STATION 7+45, \downarrow

(FR-3)

CASING
SIZE
2 1/2"

DRIVING RESISTANCE
Blows/Ft.
20 40

VANE SHEAR STRENGTH
Tons/Sq.Ft.
0.4 0.8

WATER CONTENT
Percent
20 40

ELEV. 85.0

80

IC

BROWN SANDY
CLAY-SILT W/ WOOD
PIECES

x

x

●

○

x

75

MC

STIFF BROWN SANDY
CLAY SILT WITH SAND
LINES

x

x

x

x

x

●

○

○

○

○

○

70

2C

65

MD

BROWN PEBBLY
SILTY TILL

60

66%

ROCKS AND BOULDERS

50%

LEDGE ELEV.=56.5

LEDGE: METAGRAYWACKE W/
CALCITE INTRUSIONS

ELEVATION

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION

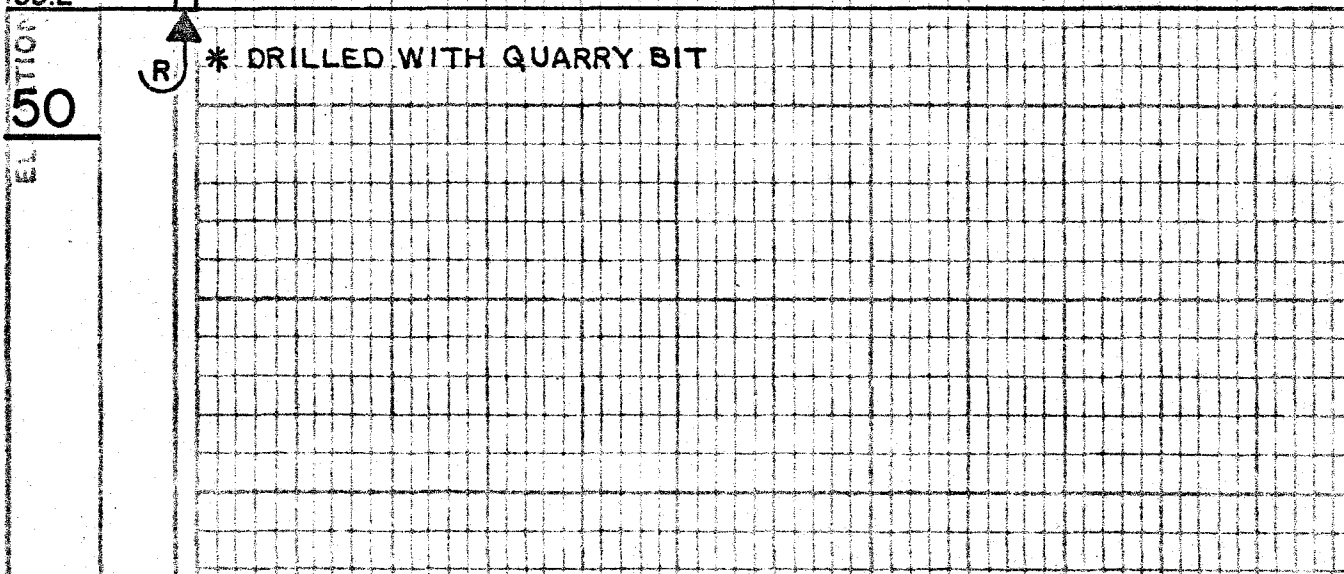
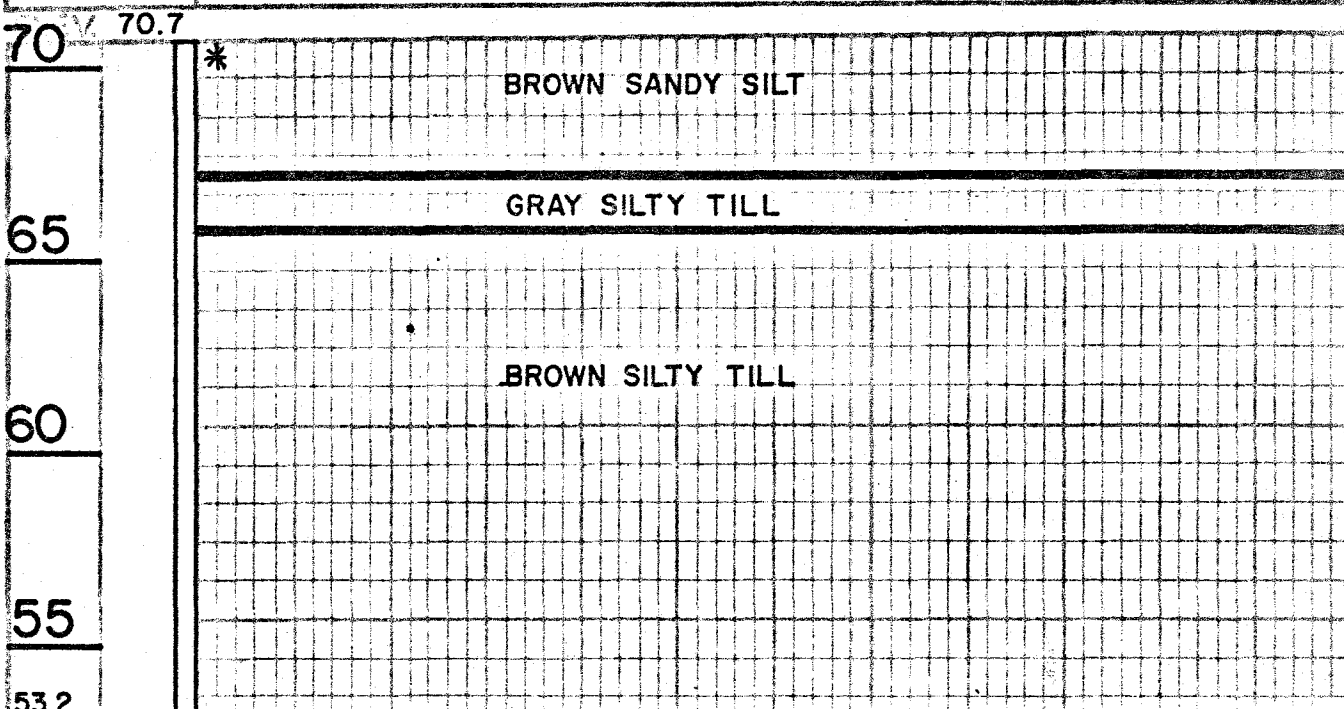
CONSISTENCY DATA
BORING GP-31-84
395-8(79)
BANGOR

DATE:

SHEET NO. 33

BORING GP-32-84 STATION 4+50, 8' RT. (FR-I)

CASING SIZE 2 1/2"	DRIVING RESISTANCE ———					Blows/Ft.
	20	40	60	80	100	



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING GP-32-84
395-8(79)
BANGOR

DATE:

SML-202(8-72)

BORING GP-51-84 STATION 4+50 10LT FARM RD.

CASING SIZE 2 1/2"	DRIVING RESISTANCE				Blows/Ft.
	20	40	60	80	100

ELEV. 86.8

85	1D	DENSE BROWN SAND & GRAVEL
	2D	LEDGE ELEV. 84.5
		83% LEDGE METASILTSTONE SCHIST WITH QUARTZ AND CALCITE INTRUSIONS

ELEVATION

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

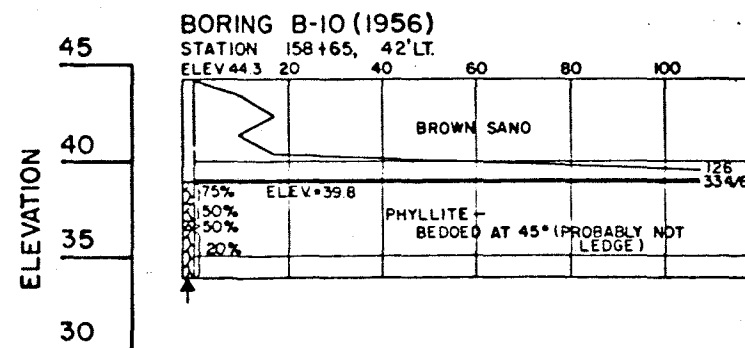
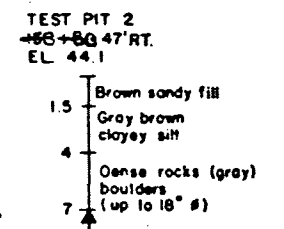
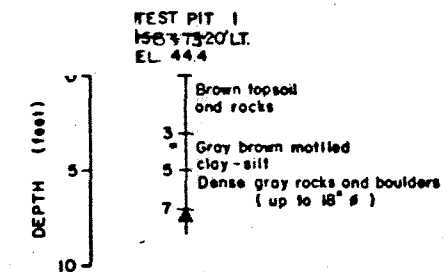
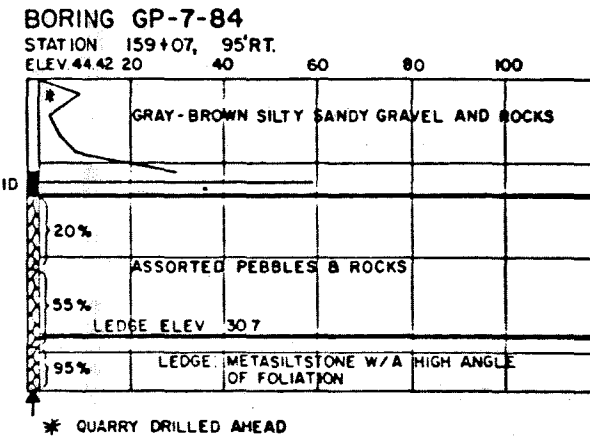
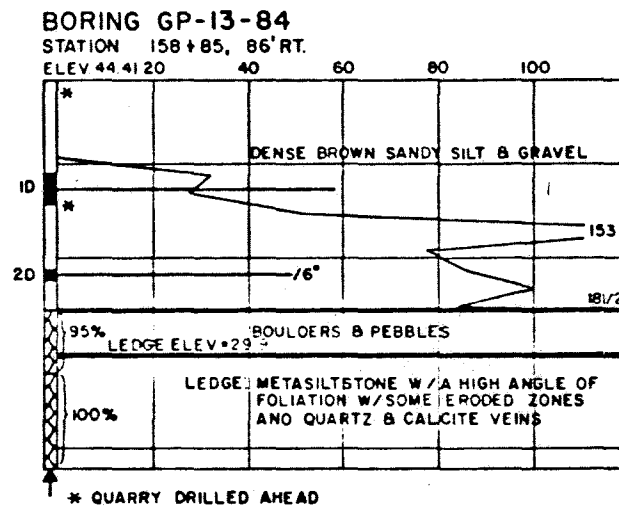
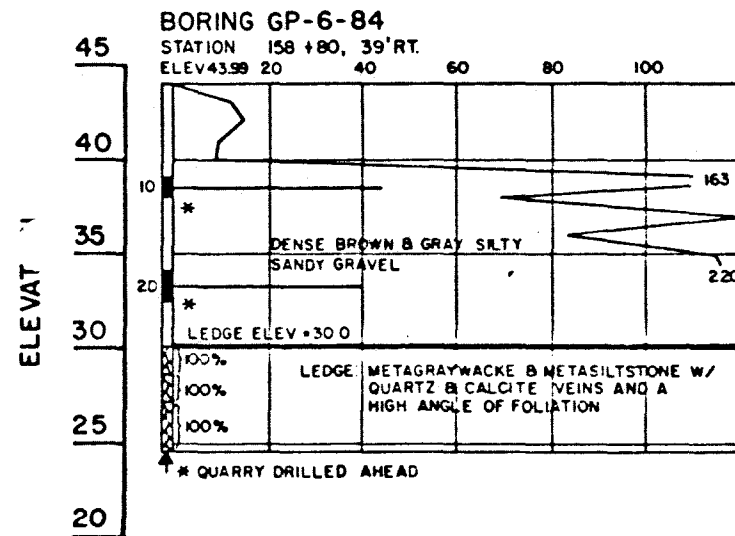
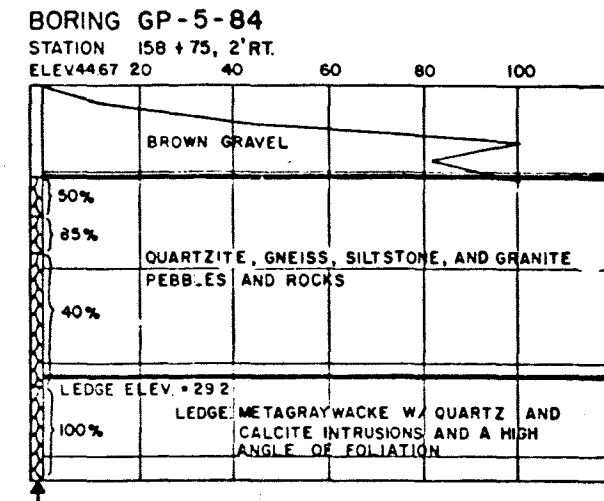
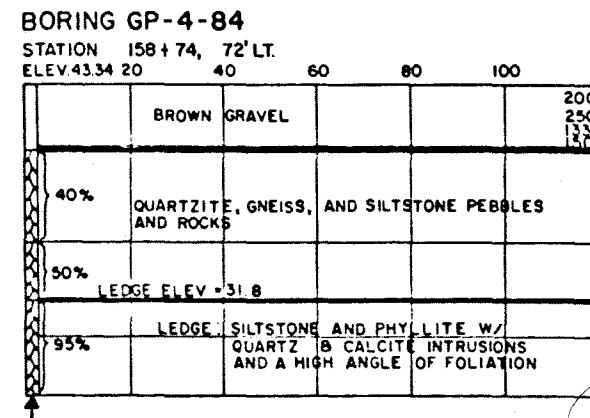
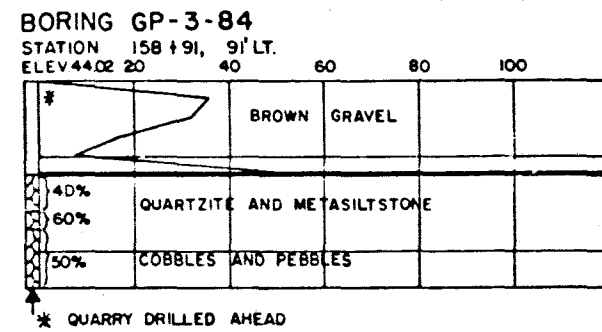
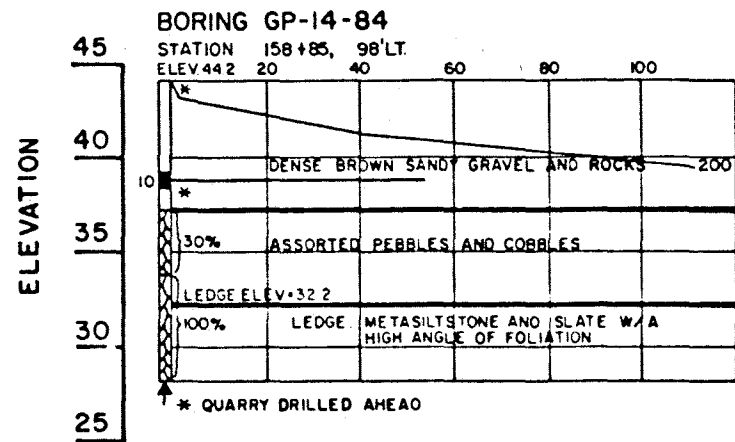
DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING GP-51-84

BANGOR
395-8(79)

DATE: SEPTEMBER 1984

SML-202(8-72)

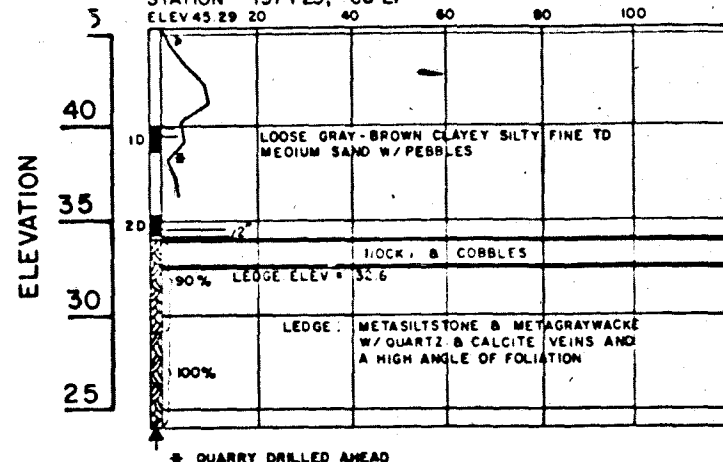


BORING DETAILS

NO.	DATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE		37	

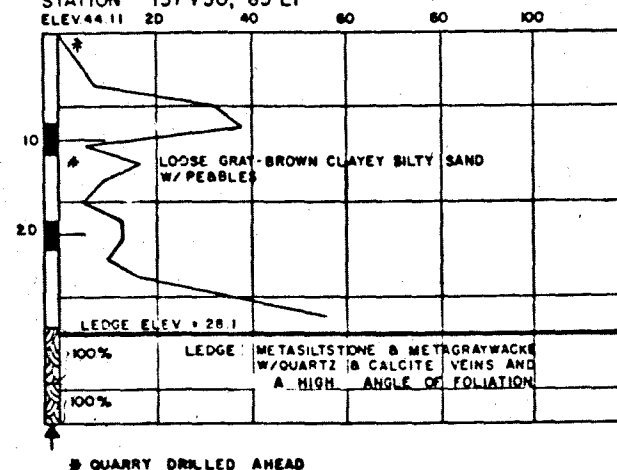
BORING GP-12-84

STATION 157+23, 68' LT
ELEV 45.29 20 40 60 80 100



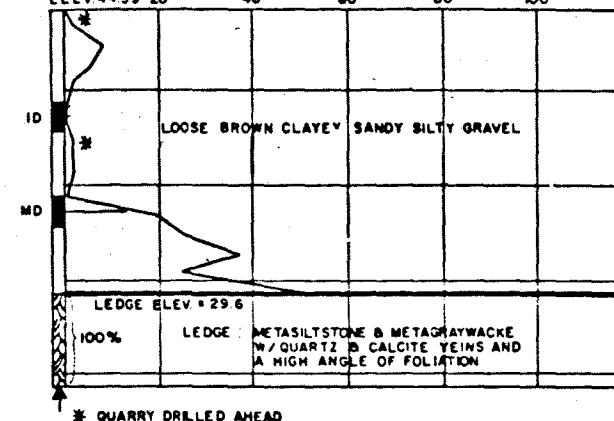
BORING GP-11-84

STATION 157+50, 65' LT
ELEV 44.11 20 40 60 80 100



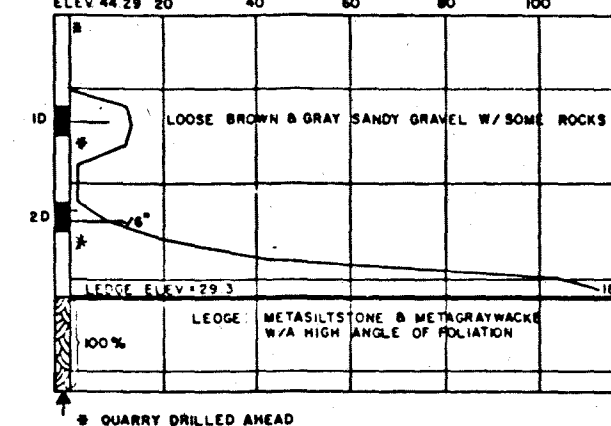
BORING GP-10-84

STATION 157+59, 8' LT
ELEV 44.59 20 40 60 80 100



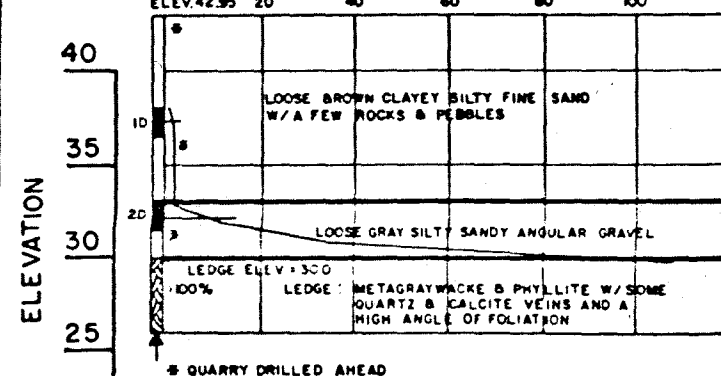
BORING GP-9-84

STATION 157+65, 27' RT
ELEV 44.29 20 40 60 80 100



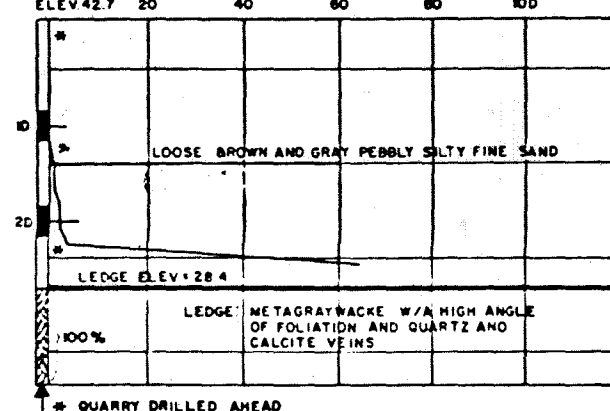
BORING GP-8-84

STATION 157+72, 85' RT
ELEV 42.95 20 40 60 80 100



BORING GP-21-84

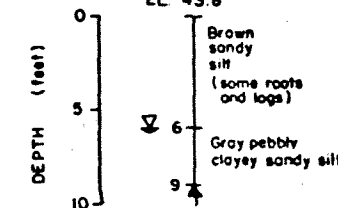
STATION 157+60, 112' RT
ELEV 42.7 20 40 60 80 100



BORING NOTES

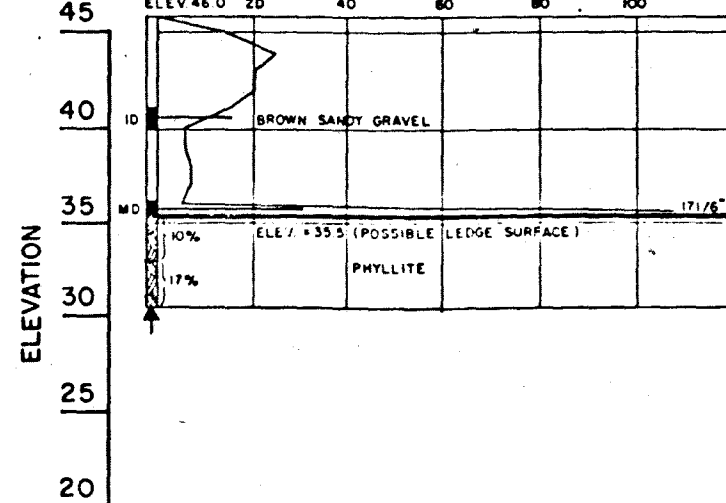
- All samples and vials are made ahead of casing
- Number of blows required to drive extra heavy casing one foot with 400 ft lbs. of energy per blow
- Location of sample or sample attempt
- Number and type of dry sample
- ID S & H Sampler #1290's
- MD Unsuccessful sample attempt and type of sampler
- Number of blows required to drive spoon or tubing one foot with 350 ft lbs. of energy per blow
- Bottom of boring (may not be bottom of soil strata)
- 77% Locations cored by diamond bit and percent recovery of rock

TEST PIT 3
157+67, 61' RT.
EL 43.8



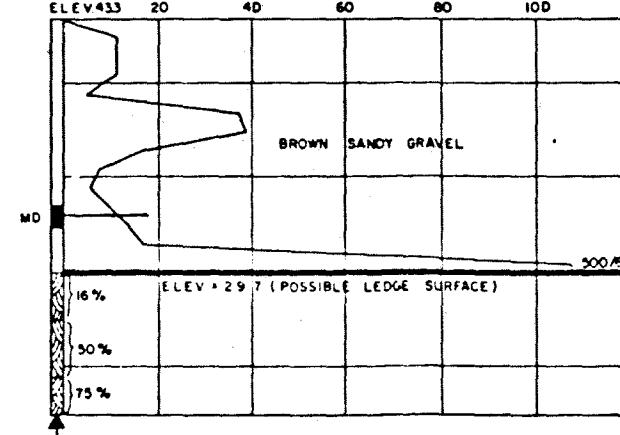
BORING B-15 (1956)

STATION 156+92, 69' LT
ELEV 46.0 20 40 60 80 100



BORING B-13 (1956)

STATION 157+66, 25' LT
ELEV 43.3 20 40 60 80 100



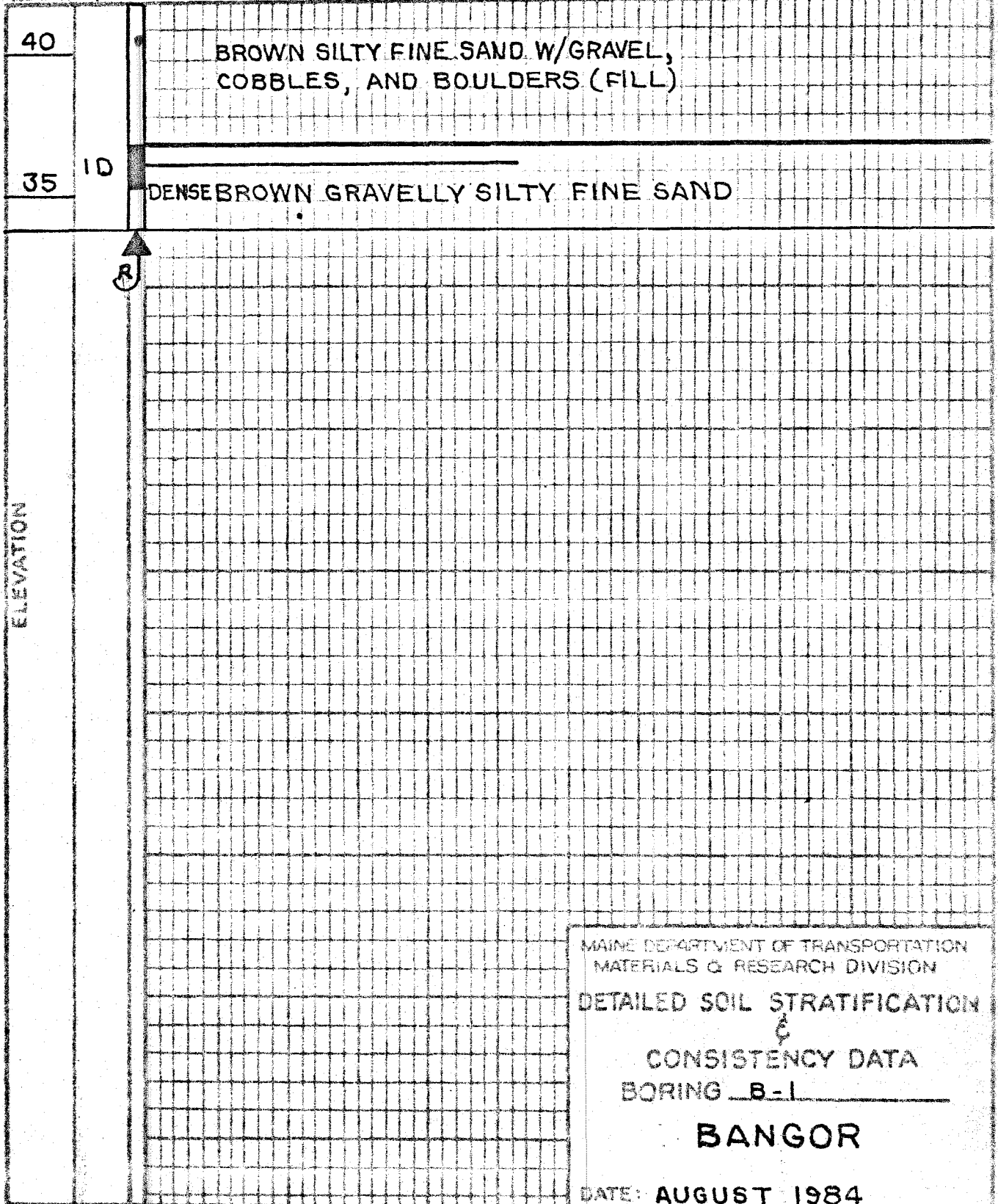
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

I-395
OVER
MAIN STREET
IN THE CITY OF
BANGOR
PENOBSCOT COUNTY
BORING DETAILS

BORING B-1 STATION 8+00 30' LT. MS-1

CASING SIZE 2 1/2"	DRIVING RESISTANCE — Blows/Ft.				
	20	40	60	80	100

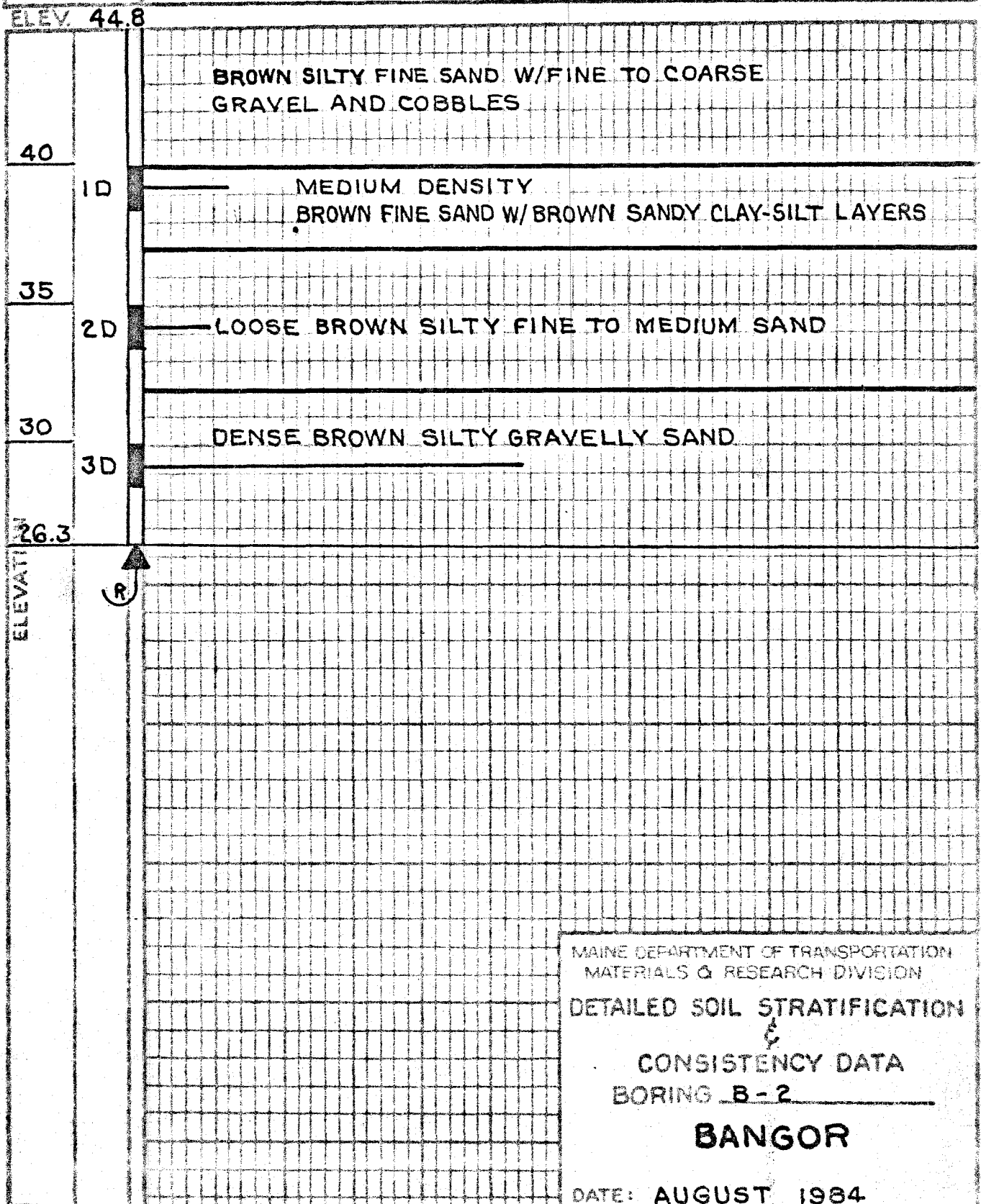
ELEV. 41.7



SML-202 (3-72)

BORING B-2 STATION 7+20 30' LT. MS-1

CASING SIZE 2 1/2"	DRIVING RESISTANCE ————— Blows/Ft.				
	20	40	60	80	100



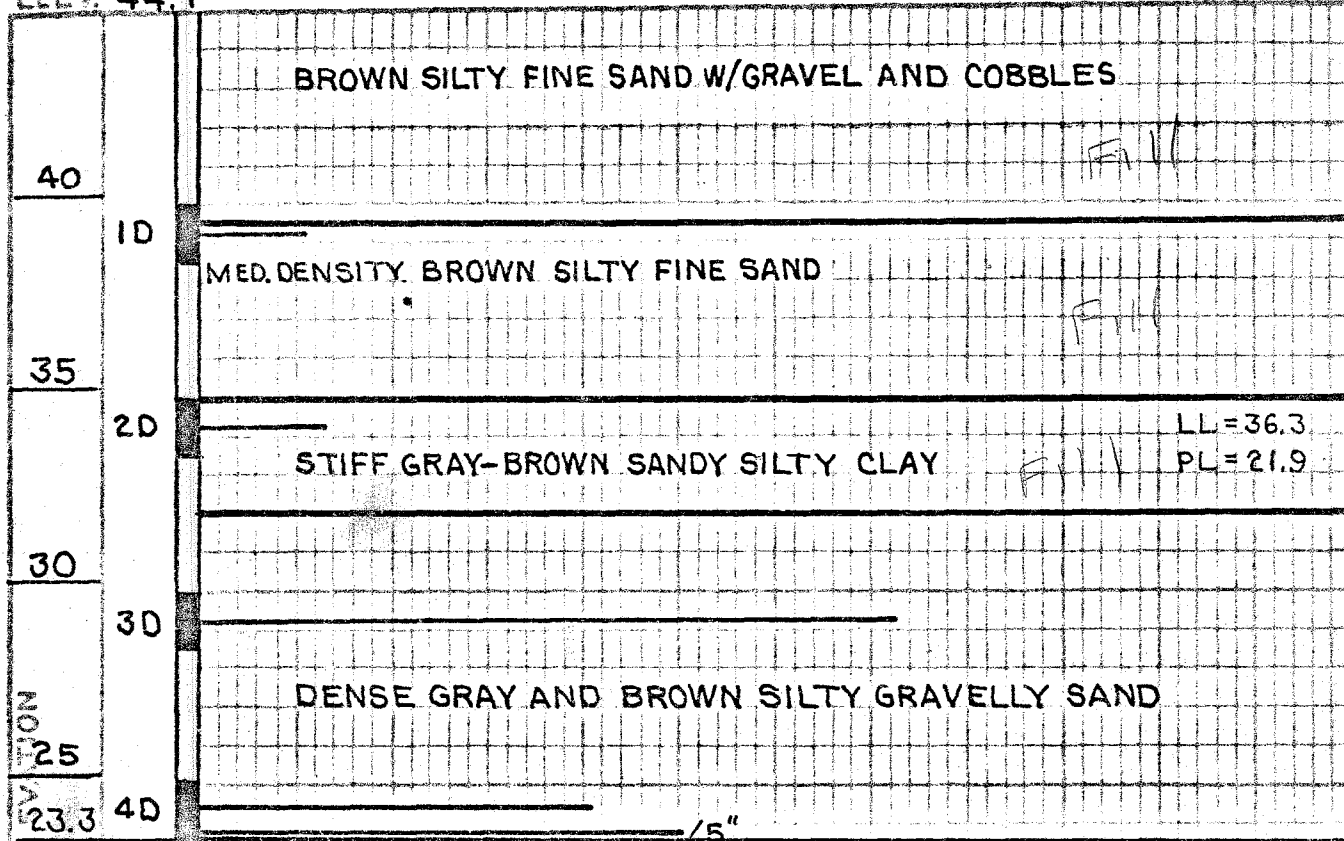
MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
CONSISTENCY DATA
BORING B-2
BANGOR
DATE: AUGUST 1984

SML-202(8-72)

BORING B-3 STATION 6+90 40' LT. MS-1

CASING SIZE 2 1/2"	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	

ELEV. 44.7



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA

BORING B-3

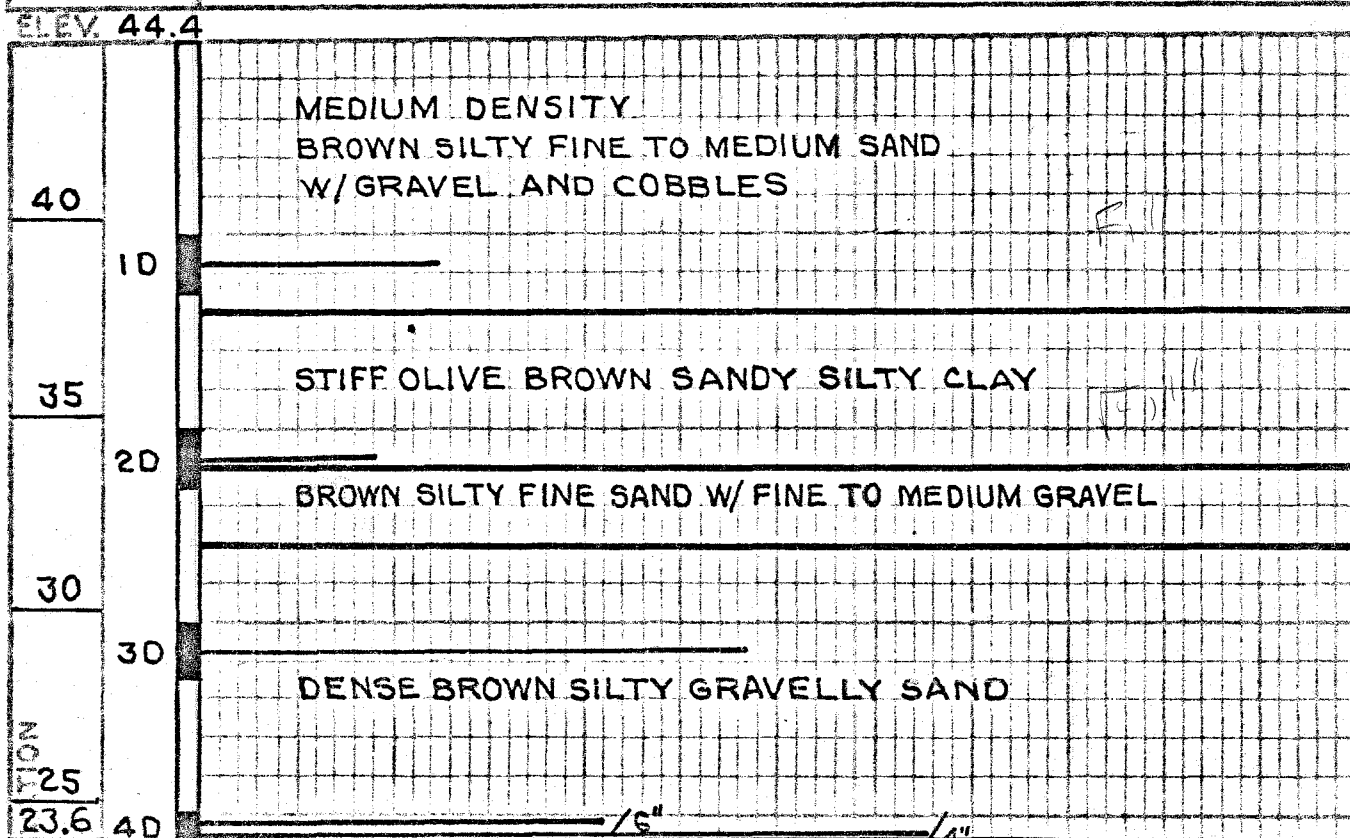
BANGOR

DATE: AUGUST 1984

SML-202(8-72)

BORING B-4 STATION 6+50 55' LT. MS-1

CASING SIZE 2 1/2"	DRIVING RESISTANCE ———					Blows/Ft.
	20	40	60	80	100	



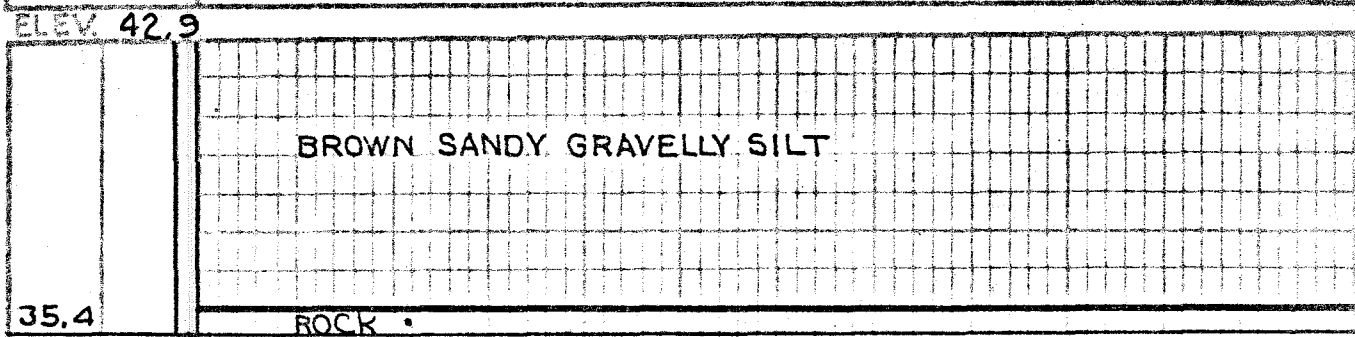
MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING B-4

BANGOR

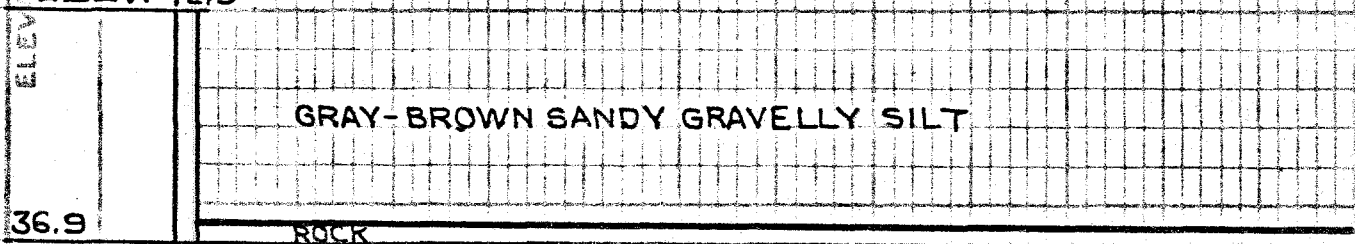
DATE: AUGUST 1984

BORING B-5-A STATION 10+54 @ MS-1

CASING SIZE 2 1/2	DRIVING RESISTANCE				Blows/Ft.
	20	40	60	80	100



BORING B-5 STATION 10+50 @ MS-1



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-5A & B-5

BANGOR
395-8(79)

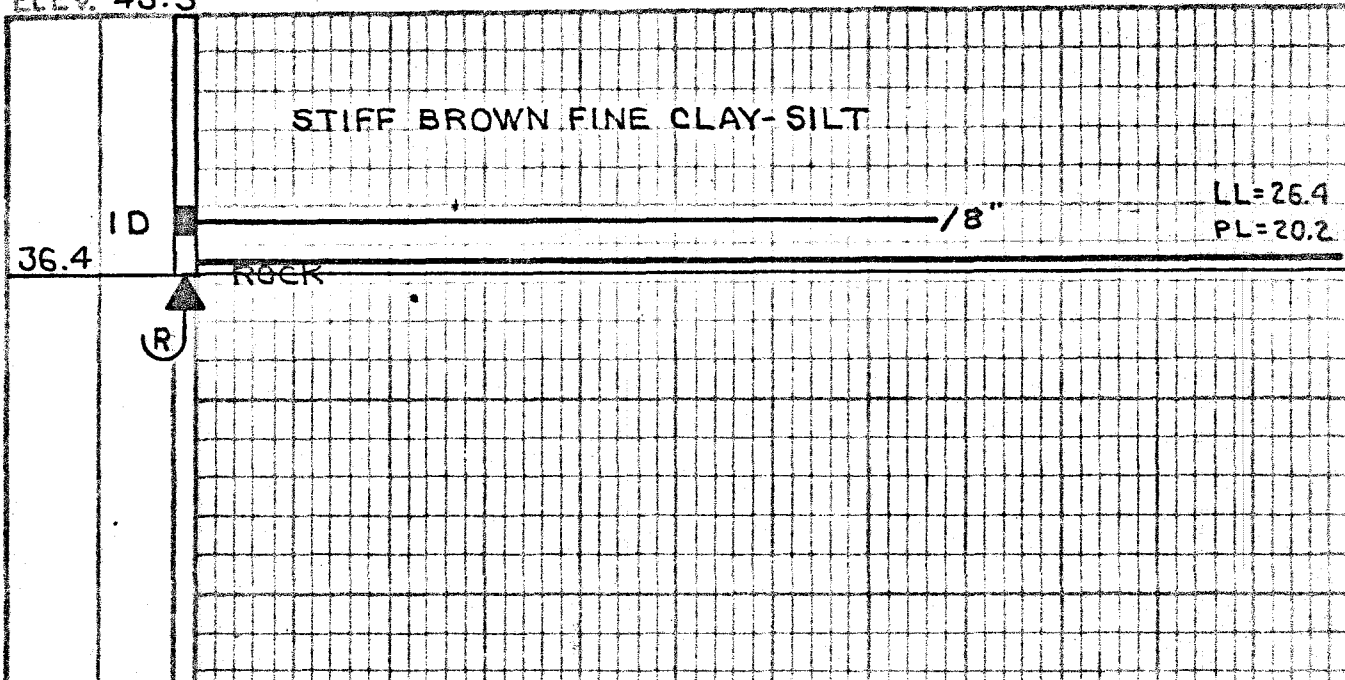
DATE: SEPTEMBER 1984

SML-202(8-72)

BORING B-6 STATION 9+75 15' RT. MS-1

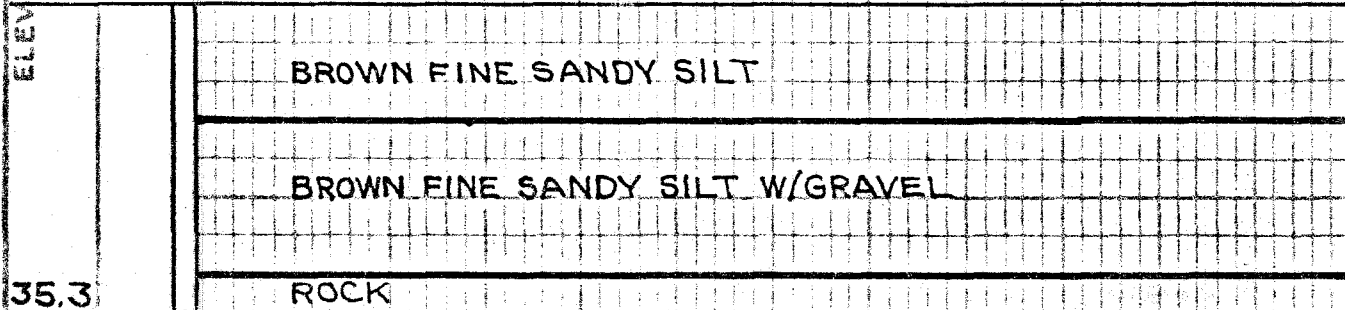
CASING SIZE 2 1/2"	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	

ELEV. 43.3



LL=26.4
PL=20.2

BORING B-6-A STATION 9+75 20' RT. MS-1
ELEV. 43.3



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-6 & B-6-A

BANGOR

395-8(79)

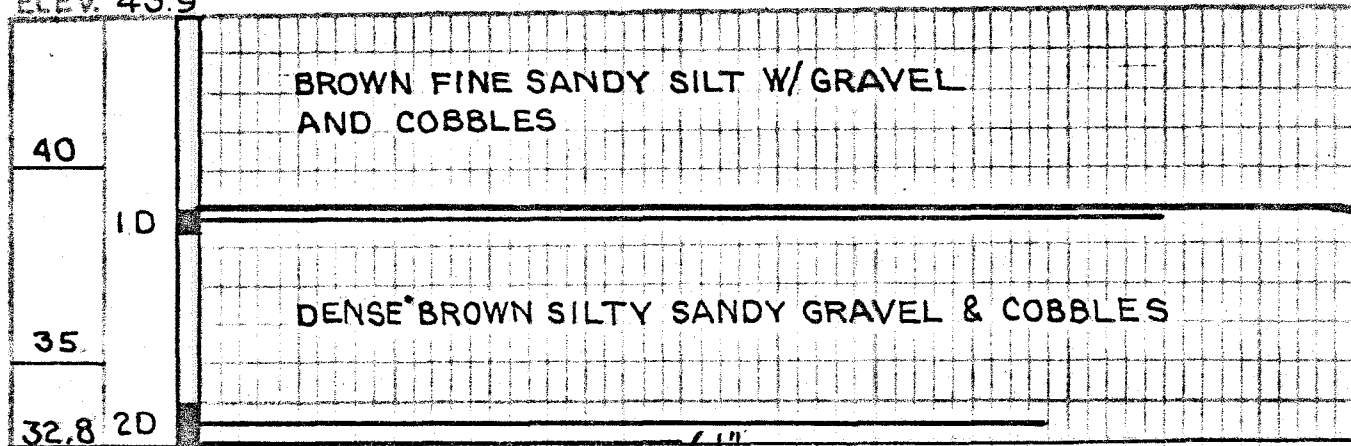
DATE: SEPTEMBER 1984

SAIL-202(3-72)

BORING B-7 STATION 8+00 100' RT. MS-1

CASING SIZE 2 1/2"	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	

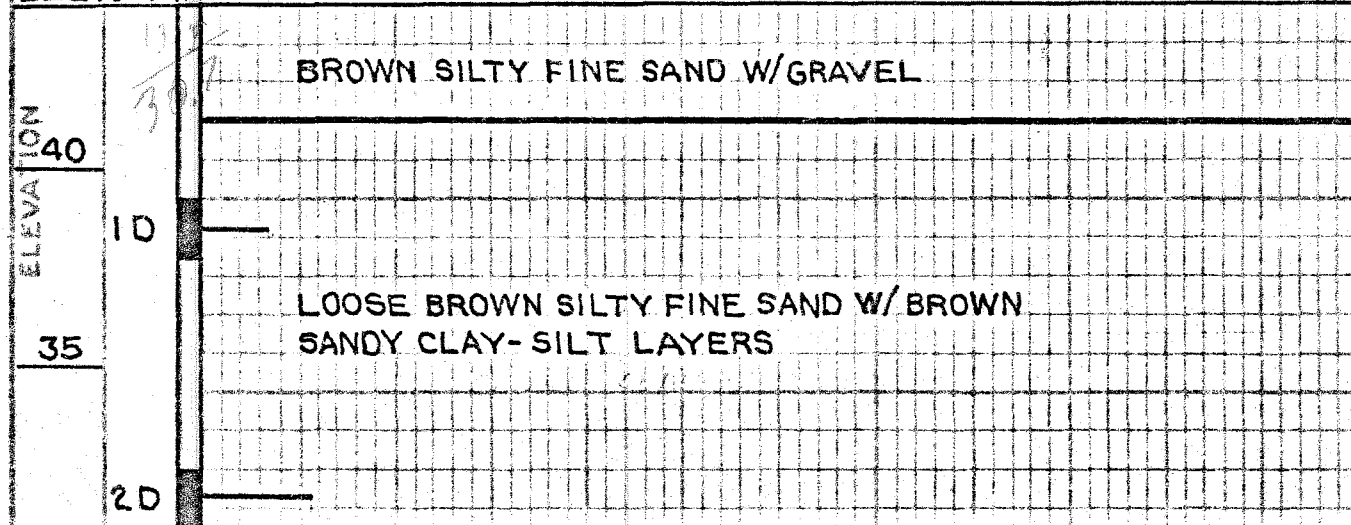
ELEV. 43.9



BORING B-8

STATION 6+00 70' RT. MS-1

ELEV. 44.2



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA

BORING B-7 & B-8

BANGOR

395-8 (79)

DATE: SEPTEMBER 1984

SM-202 (8-72)

BORING B-9 STATION 4+50 & MS-1

CASING
SIZE
2 1/2"

DRIVING RESISTANCE

Blows/Ft.

20

40

60

80

100

ELEV. 44.5

BROWN SILTY FINE TO MEDIUM SAND
W/ COBBLES AND BOULDERS

40

1D

LOOSE BROWN FINE TO MEDIUM SAND

35

BROWN AND GRAY SILTY GRAVELLY SAND

2D

ELEVATION

BORING B-10

STATION 13+44 & MS-4

ELEV. 47.5

BROWN SILTY SAND W/ GRAVEL

44.0

ROCK

(R)

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-9 & B-10

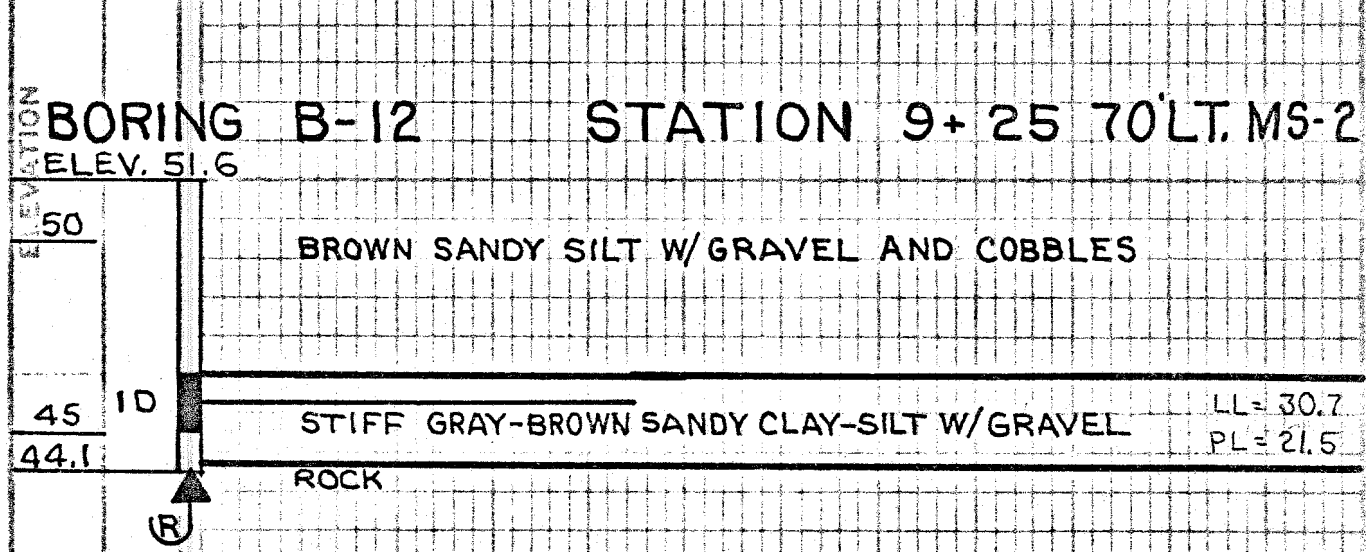
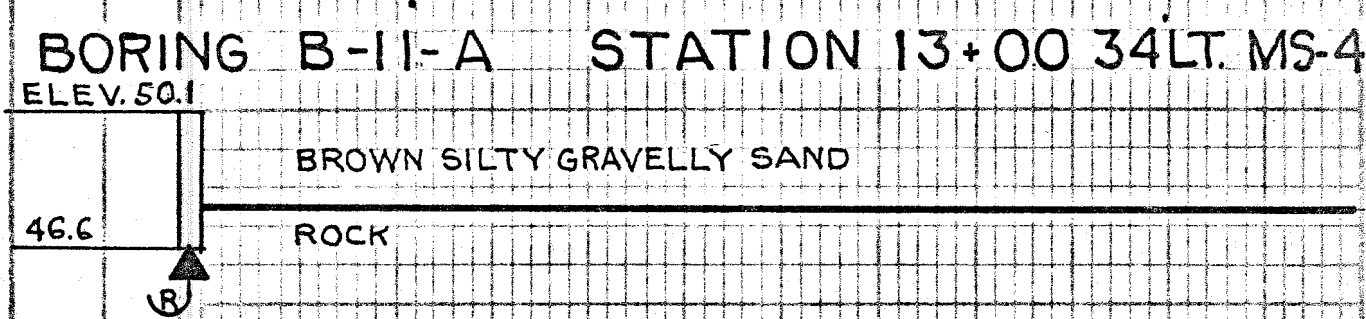
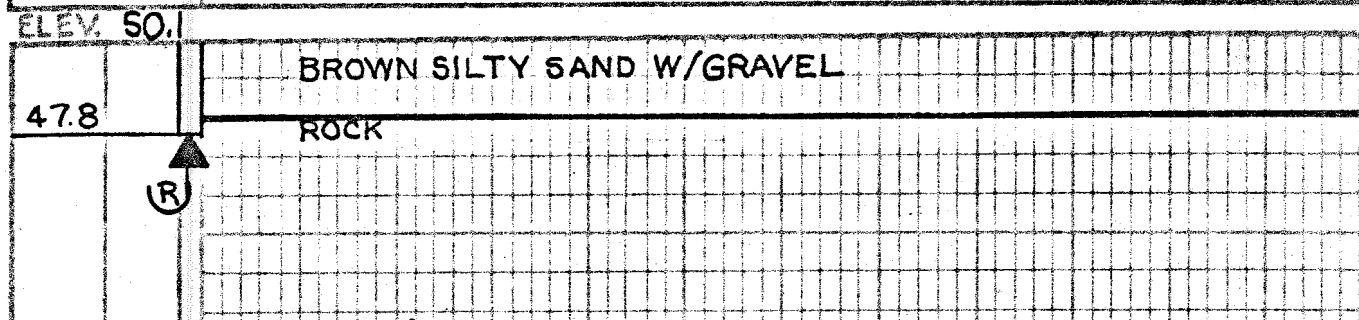
BANGOR

395-8 (79)

DATE: SEPTEMBER 1984

SHL-202(3-72)

BORING <u>B-11</u>		STATION <u>13+00 32'LT. MS-4</u>			
CASING SIZE <u>2 1/2"</u>	DRIVING RESISTANCE			—	Blows/Ft.
	20	40	60	80	100



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-11, B-11A & B-12

BANGOR

395-8 (79)

DATE: SEPTEMBER 1984

SML-202(8-72)

BORING B-13 STATION 9+00 35' LT. MS-2

CASING SIZE 2 1/2"	DRIVING RESISTANCE				Blows/Ft.
	20	40	60	80	100

ELEV. 50.0

BROWN SANDY GRAVEL W/SOME COBBLES

42.1

ROCK

(R)

BORING B-14 STATION 1+70 36' LT. MS-3

ELEV. 45.5

BROWN SILTY FINE TO
MEDIUM SAND W/GRAVEL

ELEVATION

BORING B-15 STATION 2+50 20' LT. MS-3

ELEV. 46.6

BROWN SILTY FINE TO MEDIUM
SAND W/GRAVELMAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA

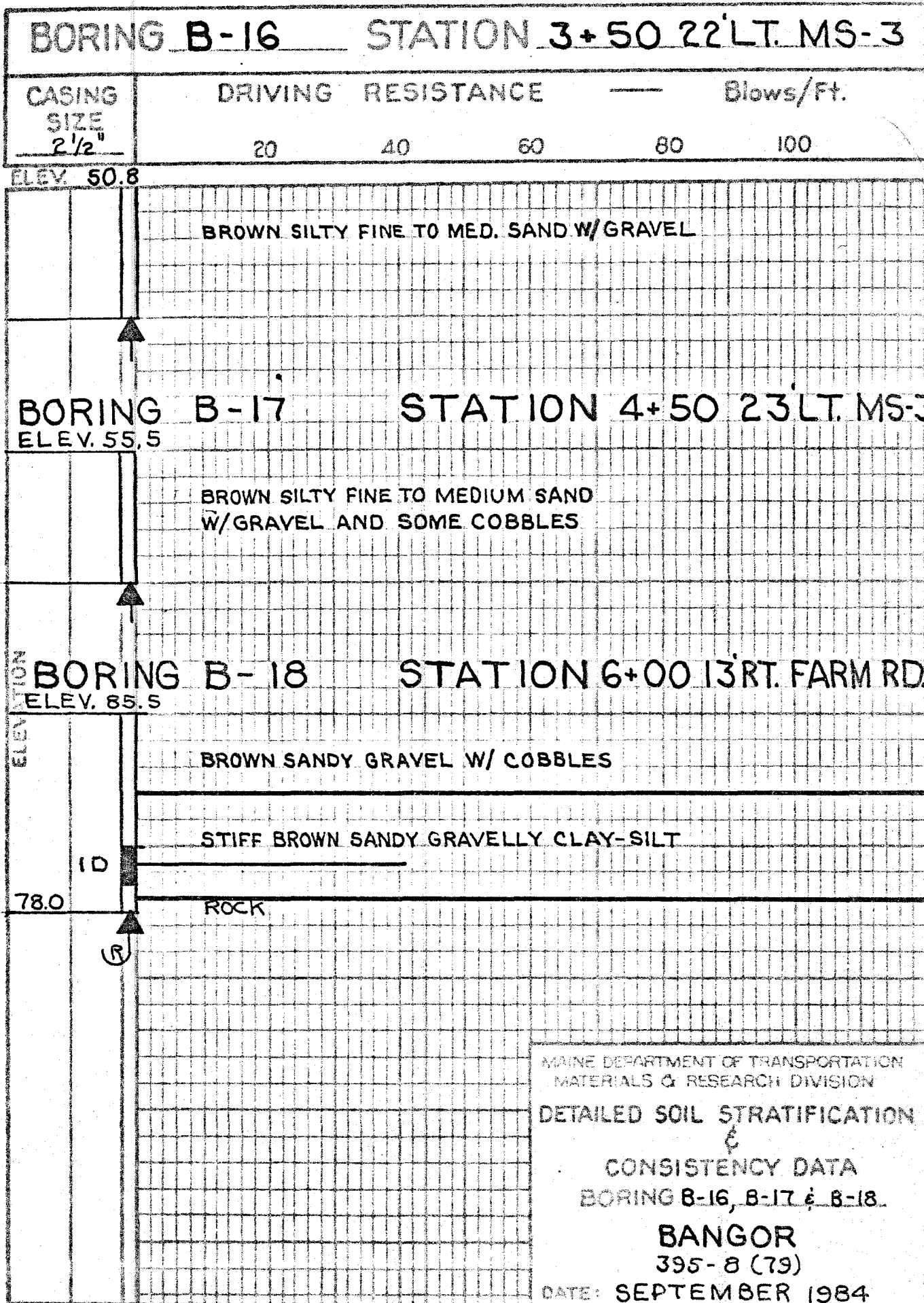
BORING B-13, B-14 & B-15

BANGOR

395-8 (79)

DATE: SEPTEMBER 1984

SML-202(8-72)



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

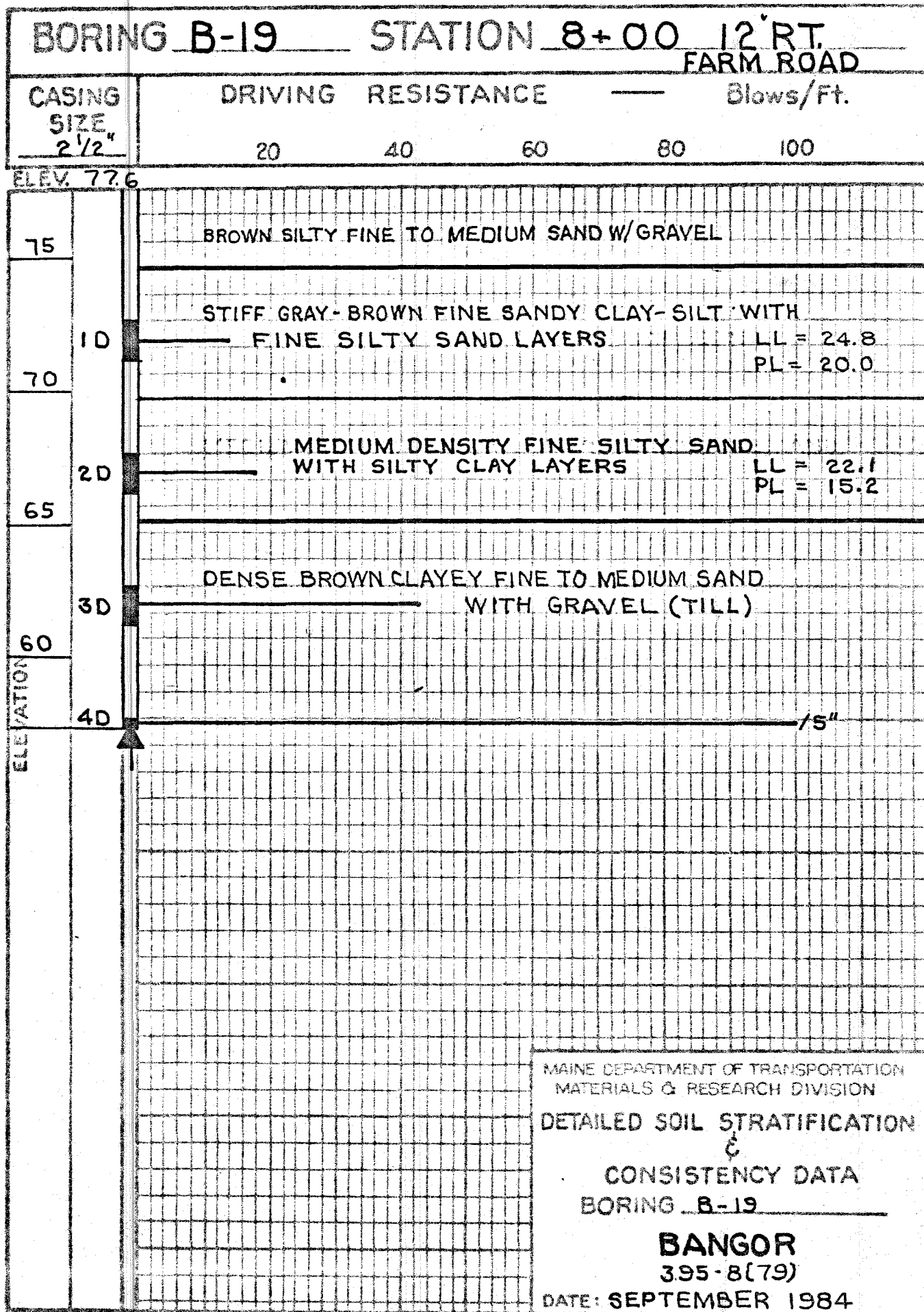
DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-16, B-17 & B-18

BANGOR
395-8 (79)

DATE: SEPTEMBER 1984

SML-202 (8-72)



SML-202(8-72)

BORING B-20 STATION 10+00 15' RT. FARM RD.				
CASING SIZE 2 1/2"	DRIVING RESISTANCE			Blows/Ft.
	20	40	60	80 100

ELEV. 59.5

ID	BROWN SILTY GRAVELLY SAND W/ COBBLES	
	STIFF GRAY-BROWN SANDY CLAY-SILT LL-19.8 PL-14.8	
	GRAY BROWN SANDY CLAY SILT WITH GRAVEL	
	DENSE BROWN SILTY FINE TO MED. SAND W/ GRAVEL	

48.5 20

BORING B-21 STATION 12+00 13' RT. FARM RD.	
ELEV. 47.3	

ELEVATION 43.1	BROWN SANDY GRAVEL W/ COBBLES & BOULDERS	

BORING B-21-A STATION 12+02 13' RT. FARM RD.	
ELEV. 47.0	

ELEVATION 43.5	BROWN SANDY GRAVEL W/ COBBLES	

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-20, B-21 & B-21A

BANGOR
395-8 (79)

DATE: SEPTEMBER 1984

SML-202(8-72)

BORING B-22 STATION 8+40 10' LT. MS-2

CASING
SIZE
2 1/2"

DRIVING RESISTANCE

Blows/Ft.

20

40

60

80

100

ELEV. 48.0

BROWN SANDY GRAVEL W/ COBBLES

41.4

ROCK

(R)

BORING B-23

STATION 11+00 12' RT. FARM RD.

ELEV. 53.0

ELEVATION

BROWN SANDY GRAVEL W/ COBBLES

43.9

ROCK

(R)

MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-22 & B-23

BANGOR

395-8 (79)

DATE: SEPTEMBER 1984

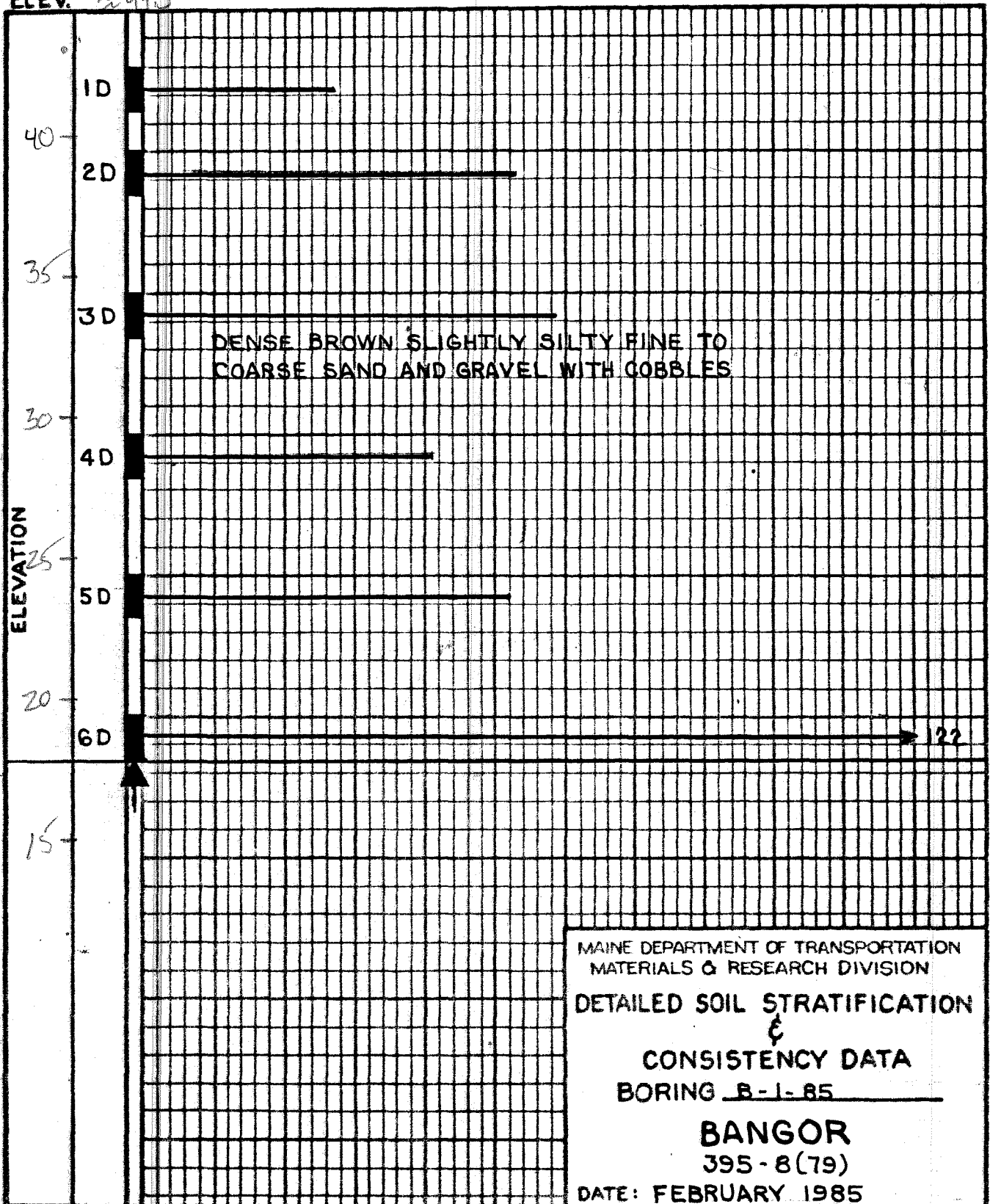
SML-202(8-72)

BORING B-1-85 STATION 6+00, 42' LT.

RAMP MS-1
(REVISED)

CASING SIZE	DRIVING RESISTANCE					Blows/Ft.
2 1/2"	20	40	60	80	100	

ELEV. 244.5



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING B-1-85
BANGOR
395 - 8(79)
DATE: FEBRUARY 1985

BORING B-2-85 STATION 6+90.53LT

RAMP MS-1
(REVISED)

CASING
SIZE
2 1/2"

DRIVING RESISTANCE

Blows/Ft.

20

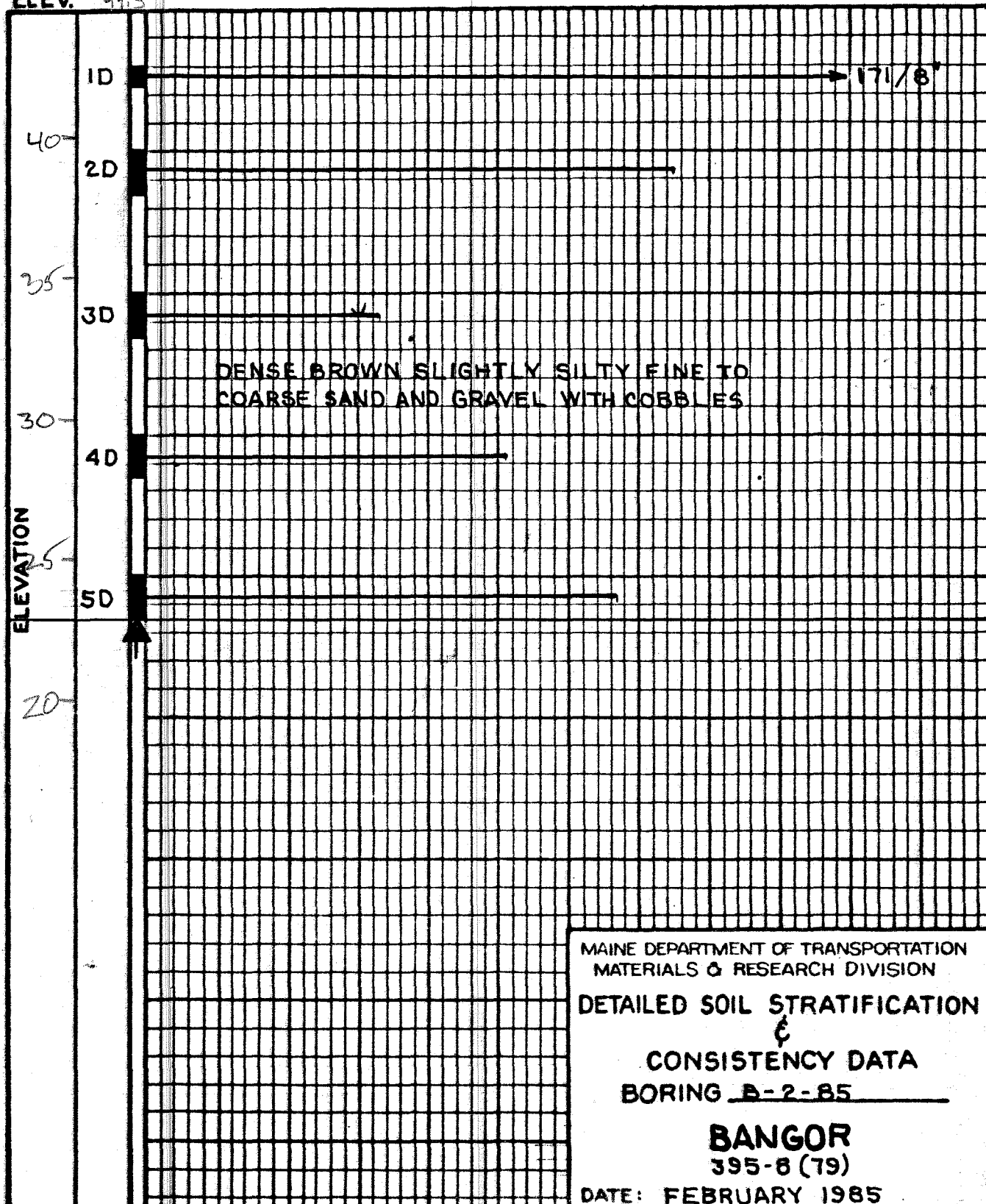
40

60

80

100

ELEV. 44.5



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

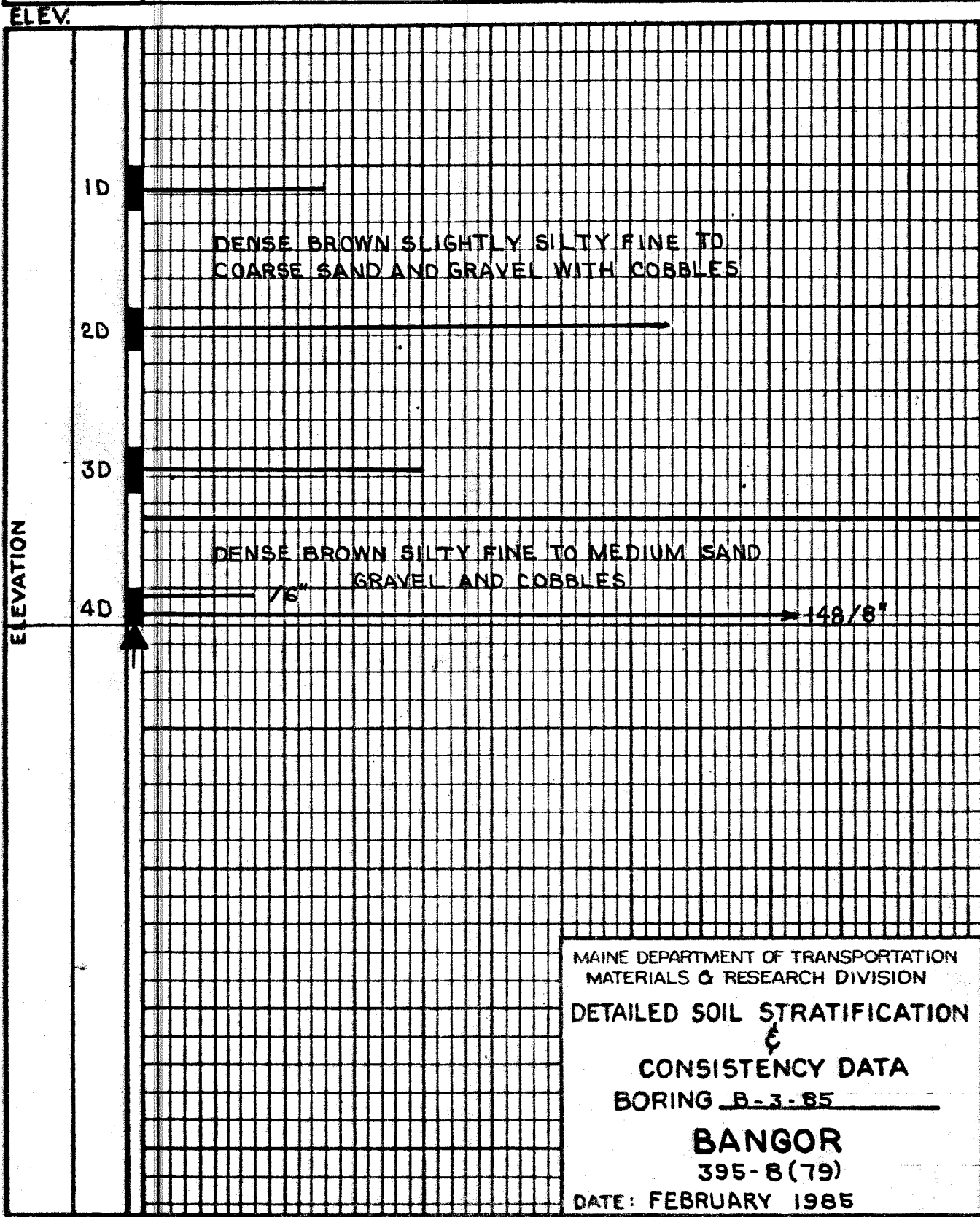
CONSISTENCY DATA
BORING B-2-85

BANGOR
395-8 (79)

DATE: FEBRUARY 1985

BORING B-3-85 STATION 8+00 45' LT. RAMP MS-1 (REVISED)

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



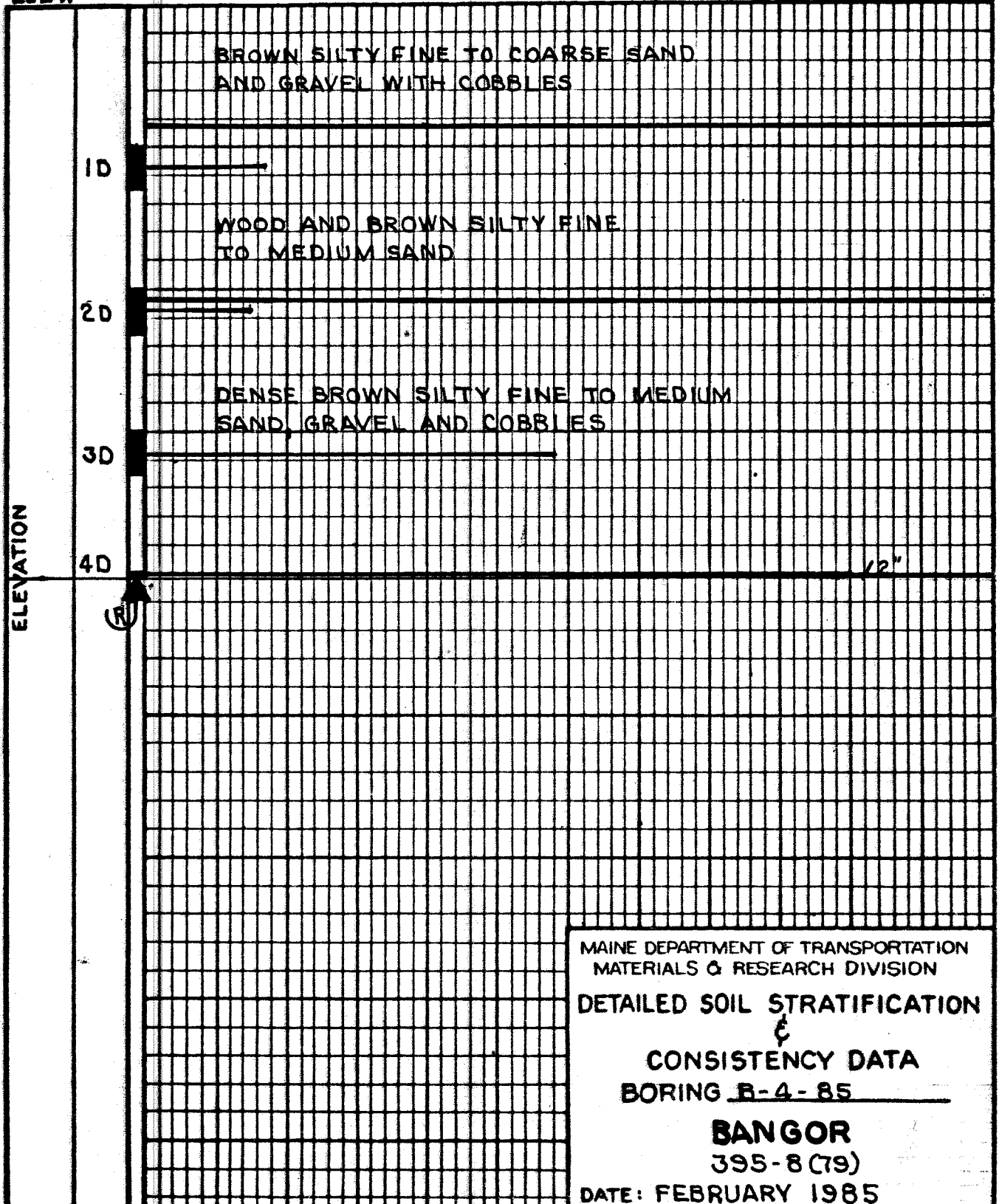
MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING B-3-85
BANGOR
395-8(79)
DATE: FEBRUARY 1985

SML-202(8-72)

BORING B-4-85 STATION 9+00, 40' LT. RAMP MS-1 (REVISED)

CASING SIZE <u>2 1/2"</u>	DRIVING RESISTANCE ———					Blows/Ft.
	20	40	60	80	100	

ELEV.

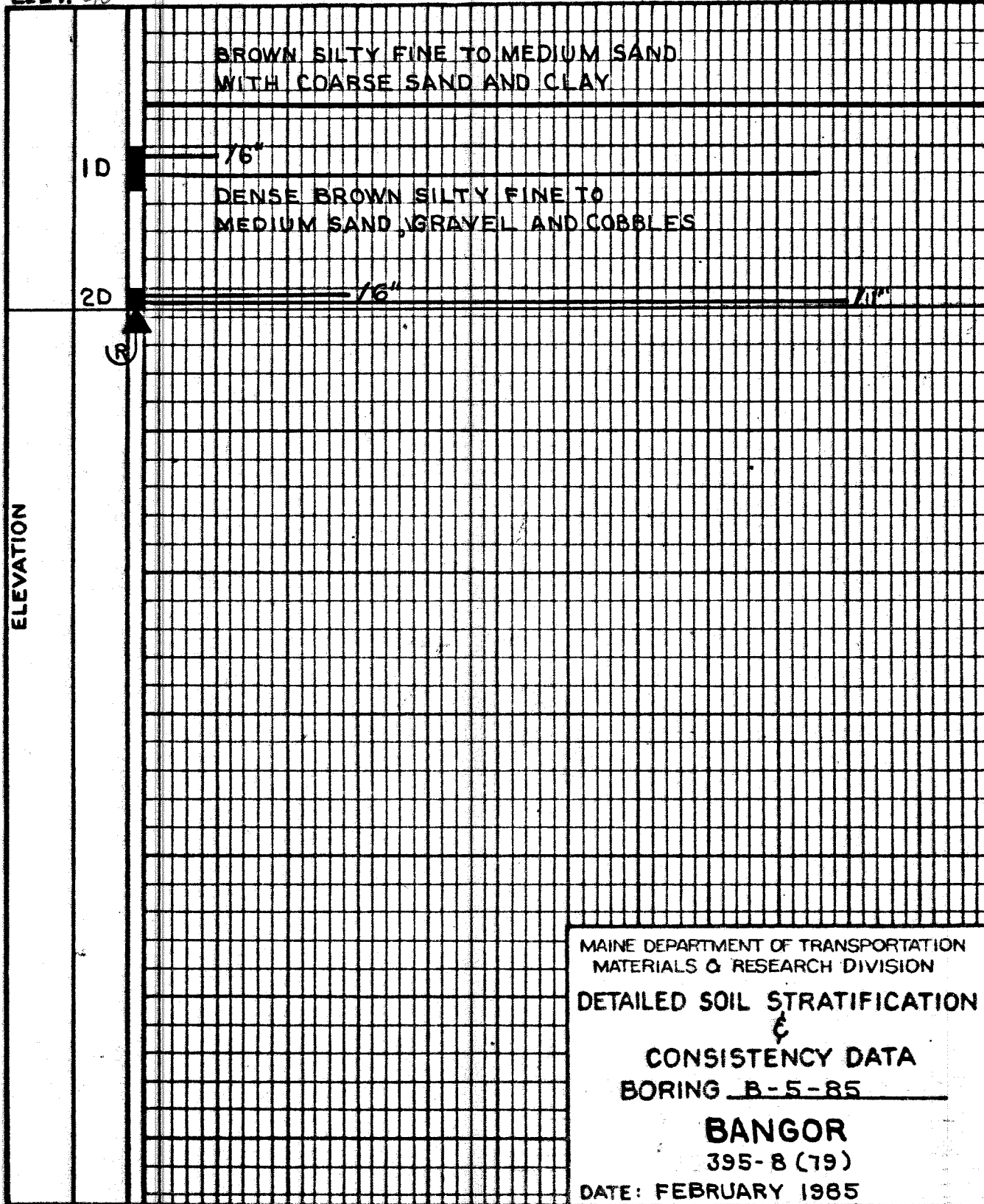


SML-202 (8-72)

BORING B-5-85 STATION 10+00, 37LT. RAMP MS-1
(REVISED)

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

ELEV. 40

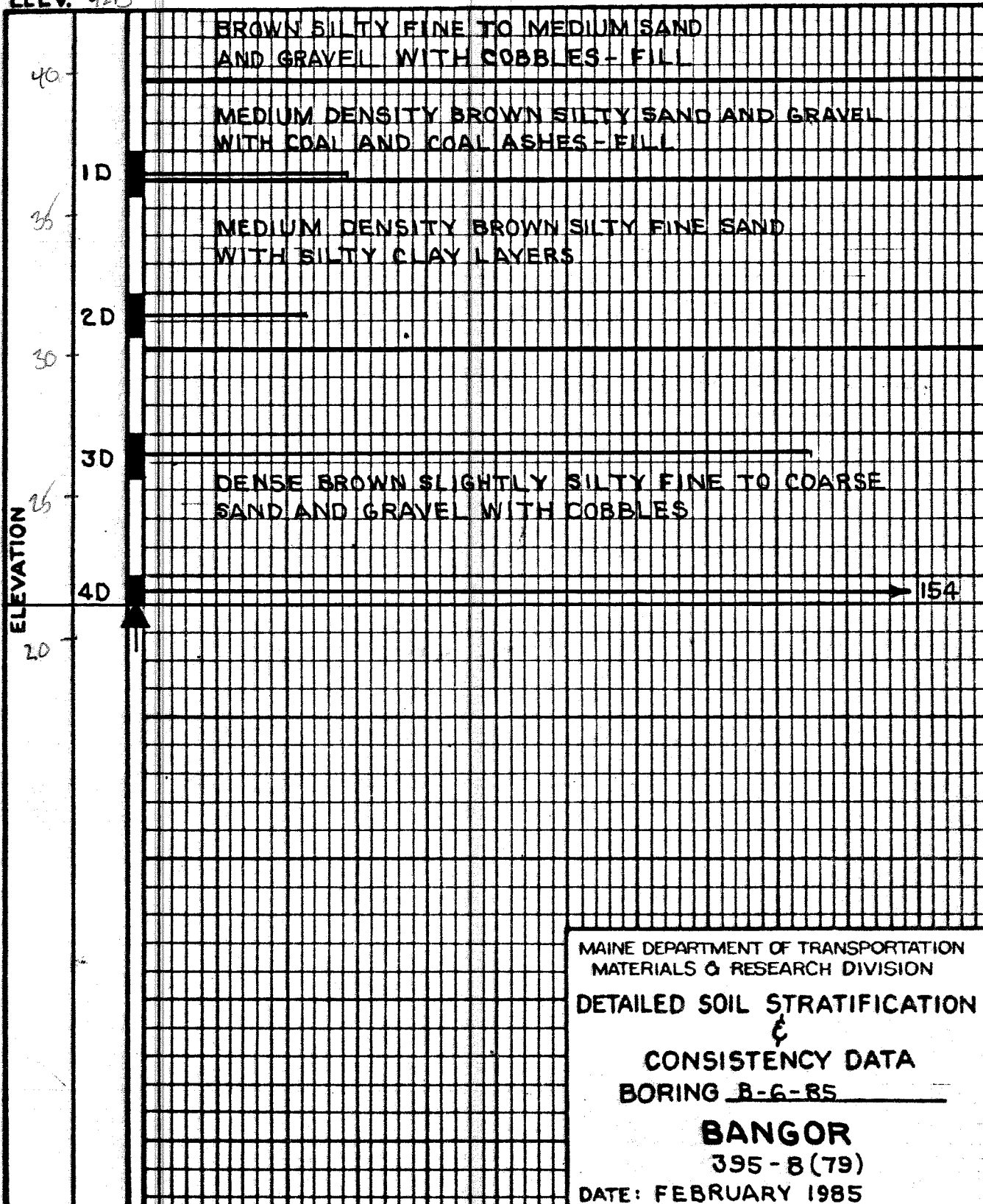


MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
DETAILED SOIL STRATIFICATION
&
CONSISTENCY DATA
BORING B-5-85
BANGOR
395-8 (79)
DATE: FEBRUARY 1985

BORING B-6-85 STATION 4+80.62LT. RAMP MS-1
(REVISED)

CASING SIZE <u>2 1/2"</u>	DRIVING RESISTANCE —————					Blows/Ft.
	20	40	60	80	100	

ELEV. 42.3



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA
BORING B-6-85










BANGOR

395 - 8 (79)








DATE: FEBRUARY 1985

LEGEND

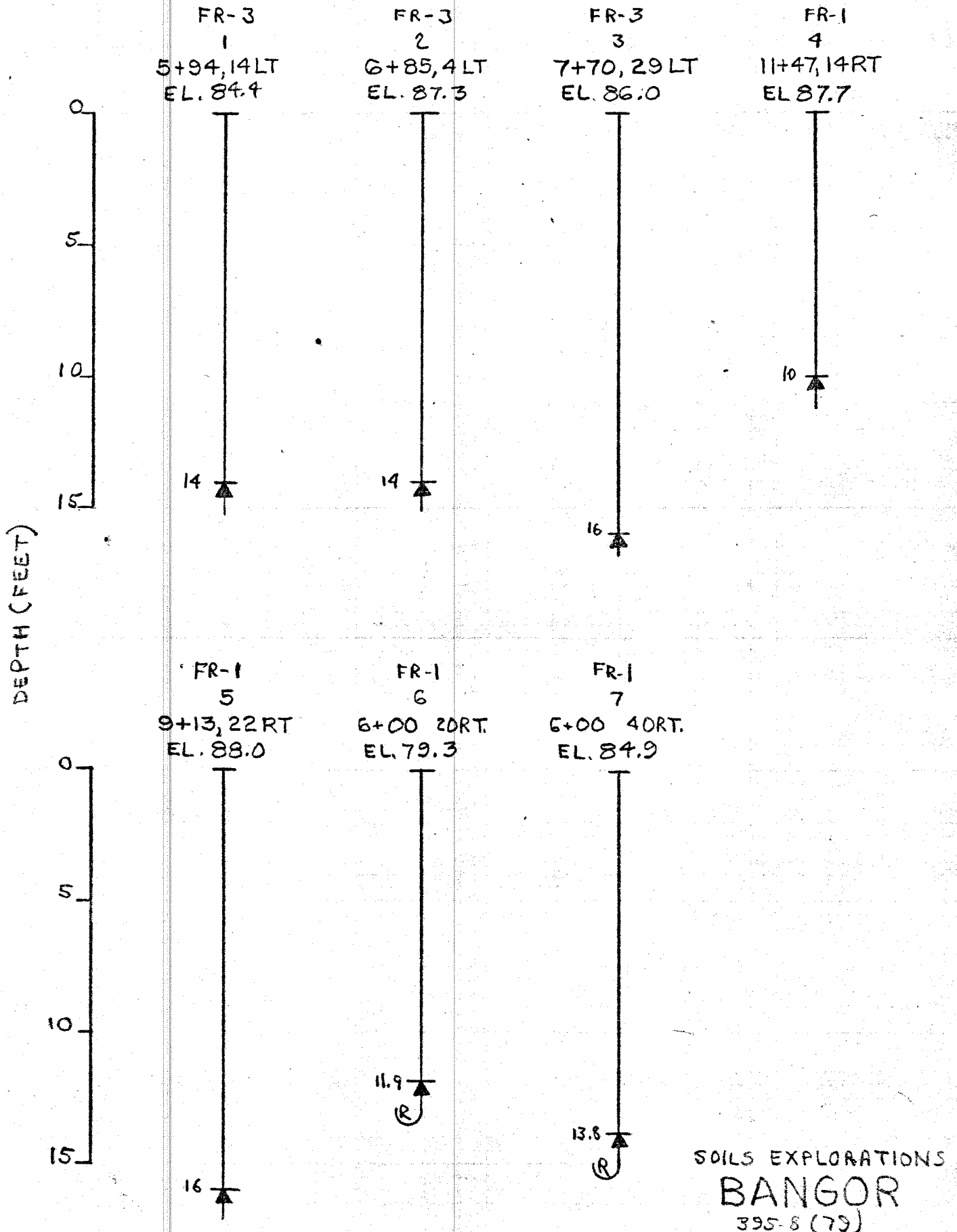
PLAN SYMBOLS

-  _____ ROD SOUNDING
-  _____ AUGER BORING
-  _____ BORING & SOUNDING
-  _____ POWER AUGER
-  _____ WASH BORING
-  _____ SEISMIC: SHOT LOCATION
-  _____ RESISTIVITY: TEST LOCATION
-  _____ TEST PIT
-  _____ LEDGE ON SURFACE

EXPLORATION NOTES

-  _____ WATER LEVEL
-  _____ BLOWS PER FOOT - ROD SOUNDINGS
-  _____ MATERIAL & SAMPLE NO. - AUGER BORING
-  _____ DEPTH OF MATERIAL CHANGE (IN FEET)
-  _____ BOTTOM OF EXPLORATION
-  _____ REFUSAL
-  _____ LEDGE

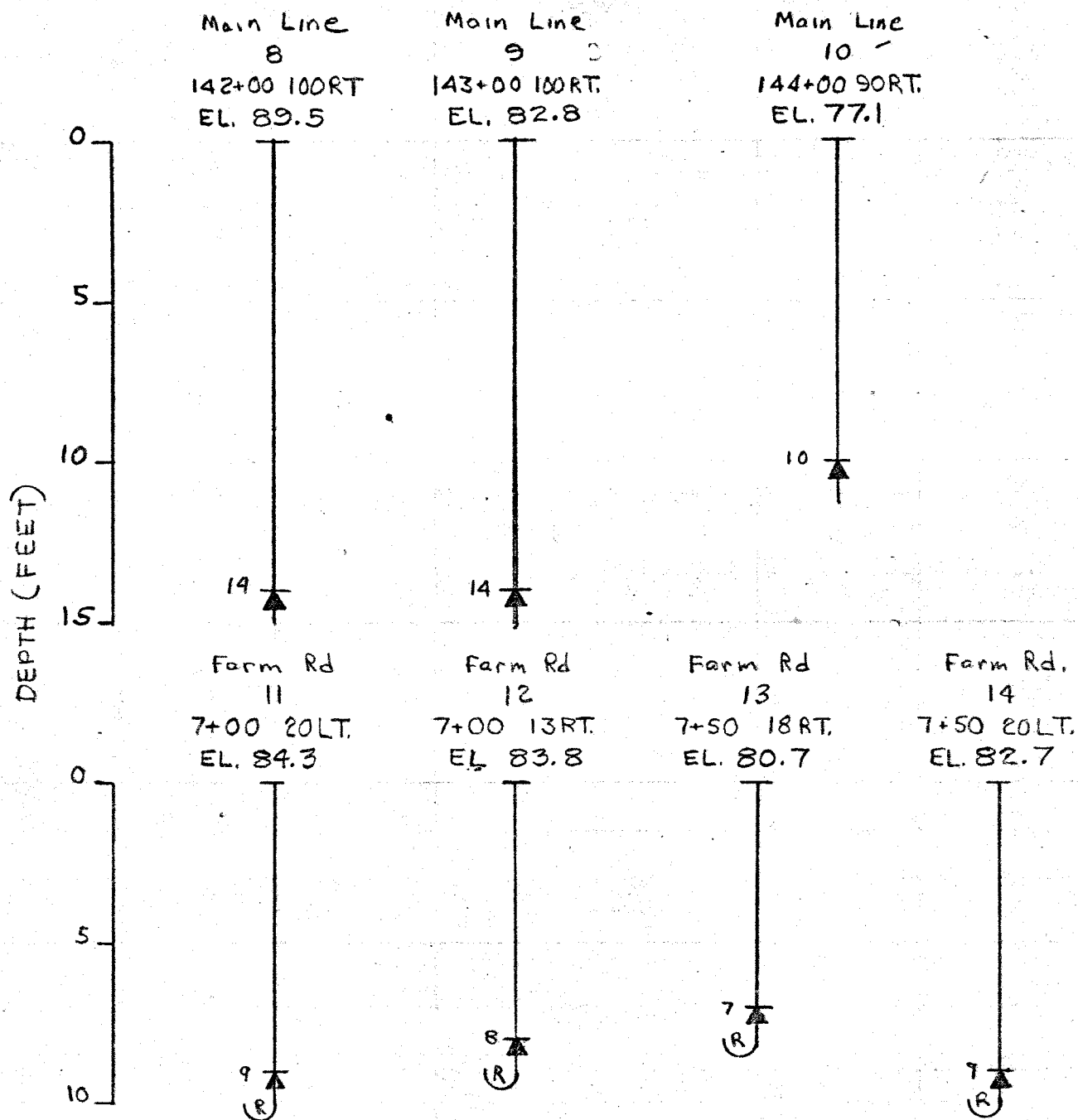
SHEET NO 59
EXPLORATIONS 1-7
SOUNDINGS



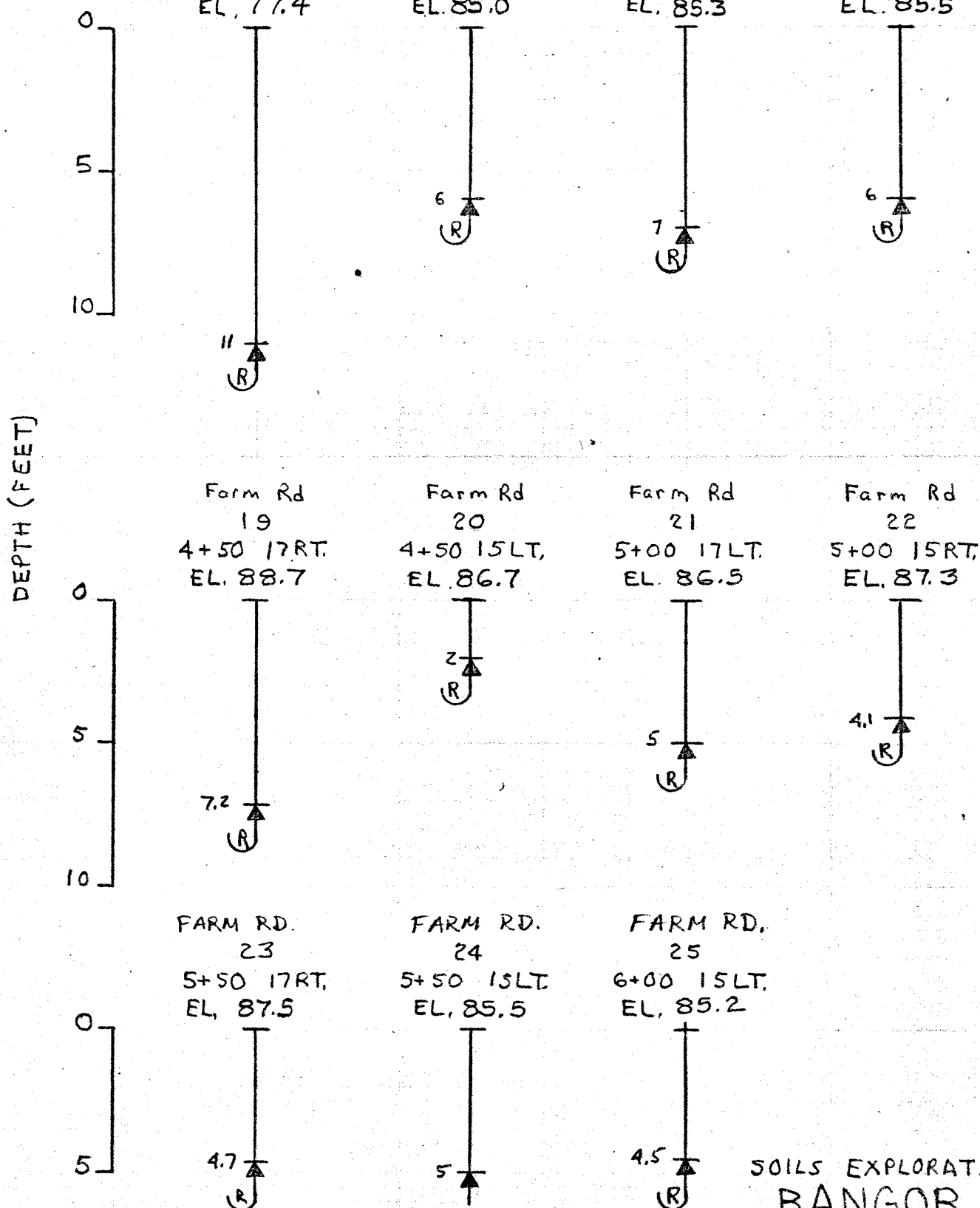
FEB. 1984

SOILS EXPLORATIONS
BANGOR
395-8 (79)

SHEET NO. 60
EXPLORATIONS 8-14
SOUNDINGS

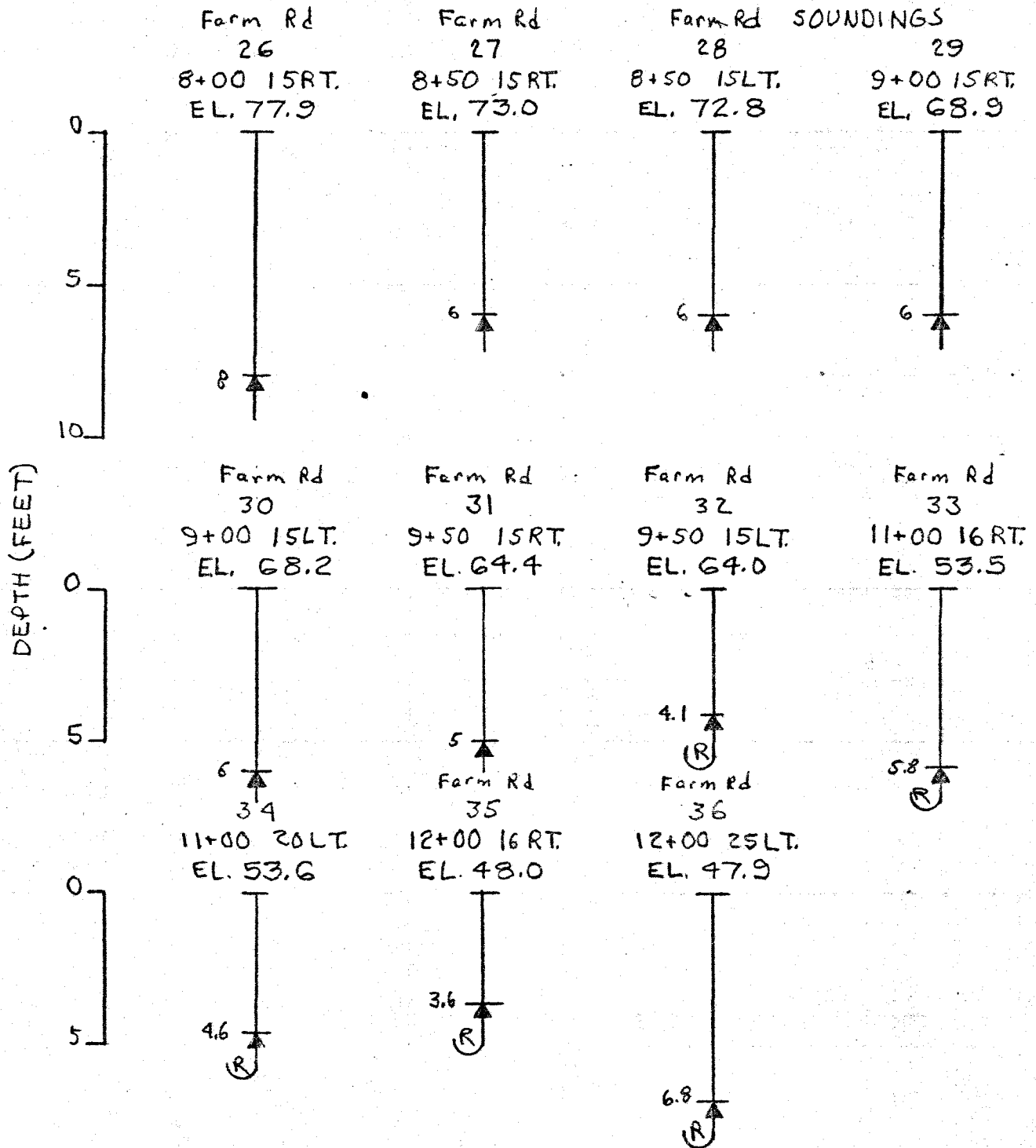


SOILS EXPLORATIONS
BANGOR
395-8 (79)

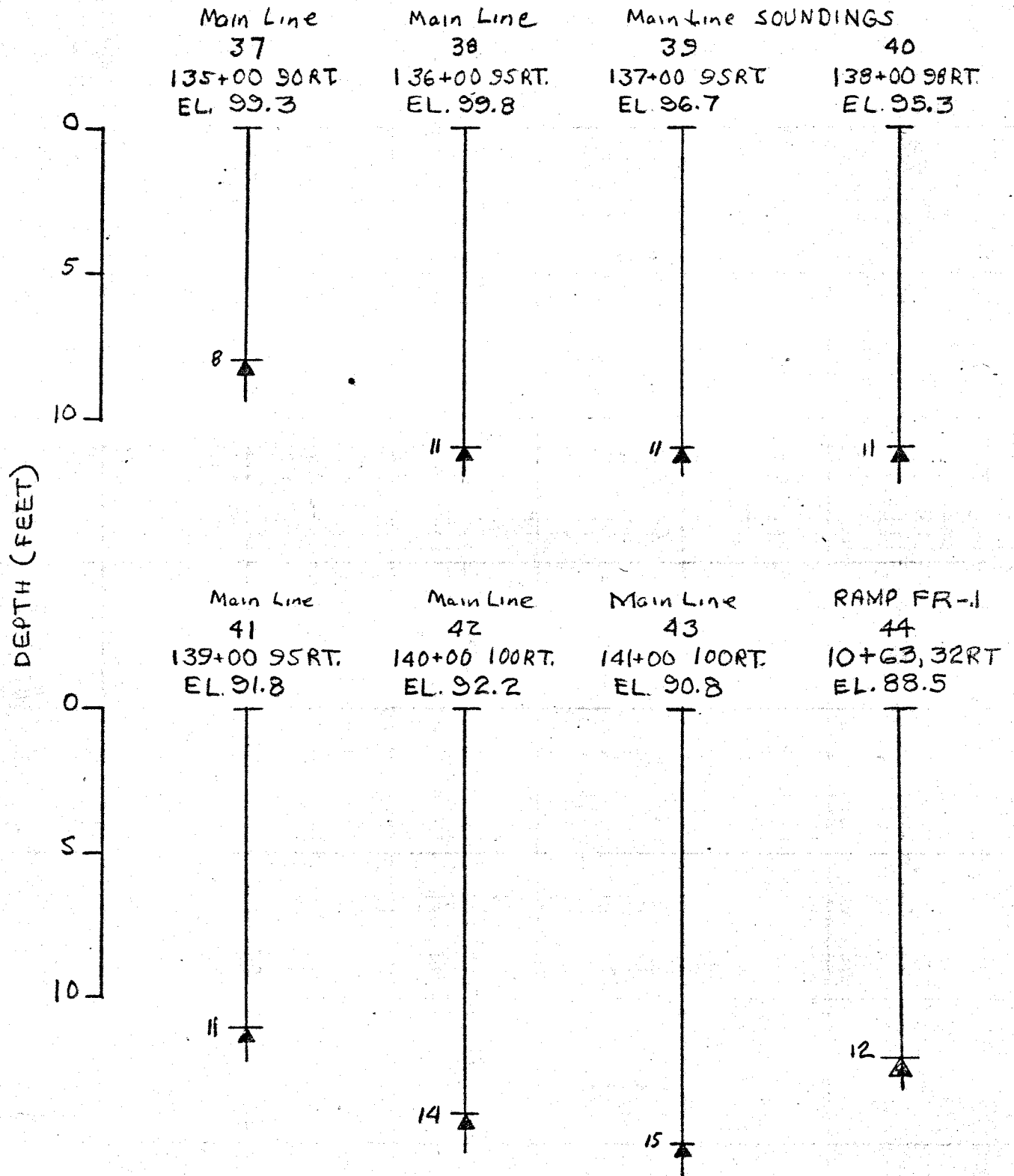
EXPLORATIONS 15-25
SOUNDINGS

SOILS EXPLORATIONS
BANGOR
395-8(79)

EXPLORATIONS 26 - 36
SOUNDINGS



EXPLORATIONS 37-44

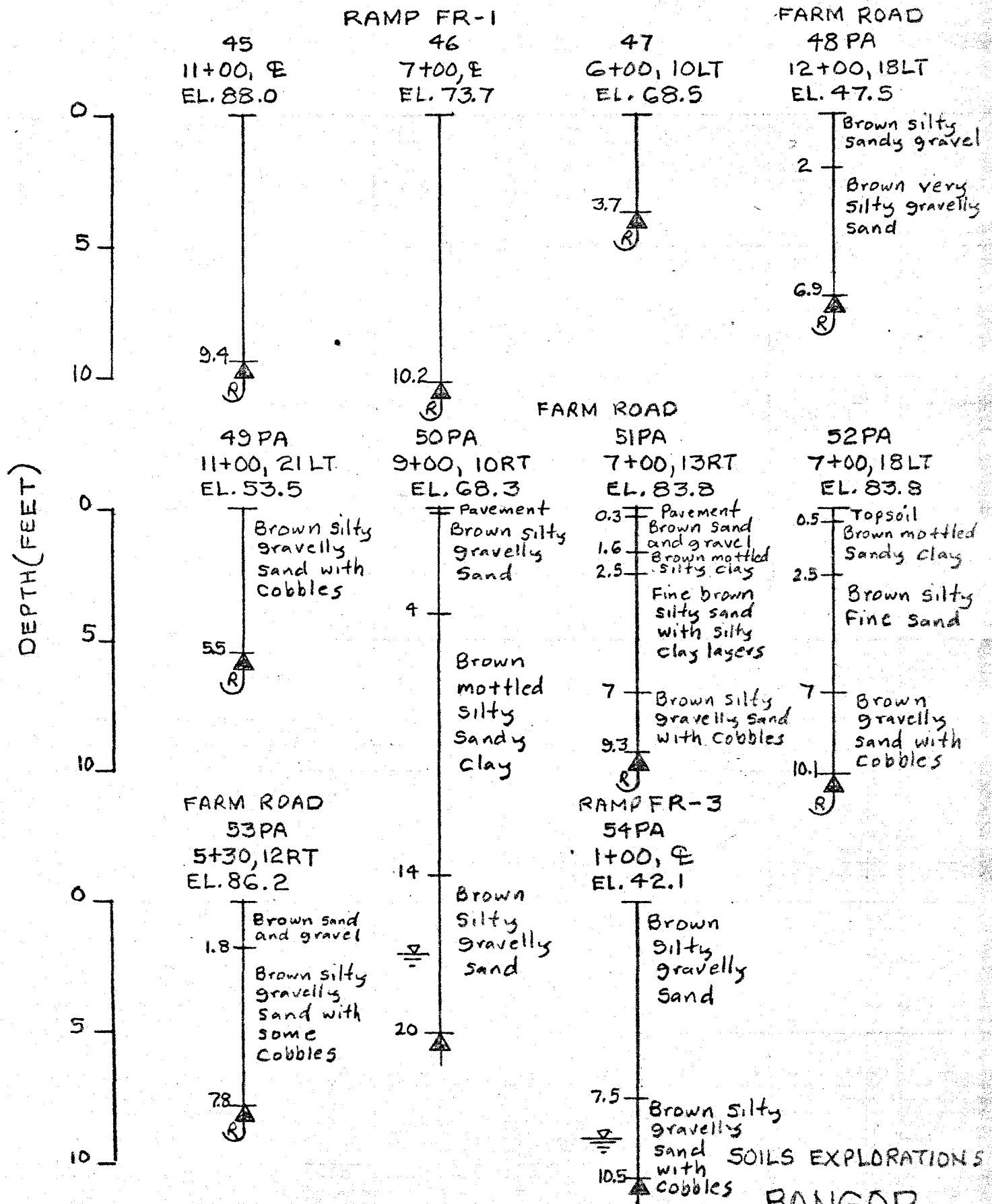


SOILS EXPLORATIONS

BANGOR

395-8 (79)

SHEET NO 64
EXPLORATIONS 45-54
SOUNDINGS



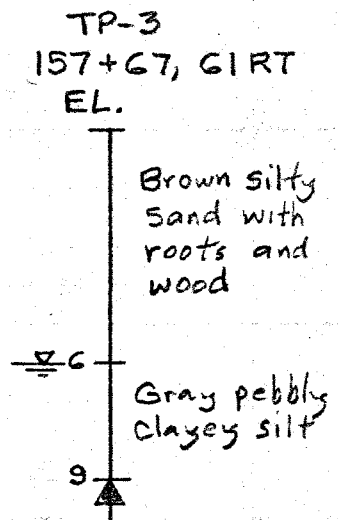
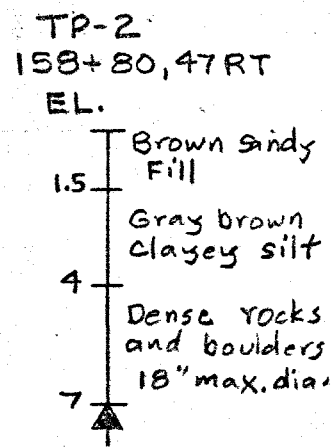
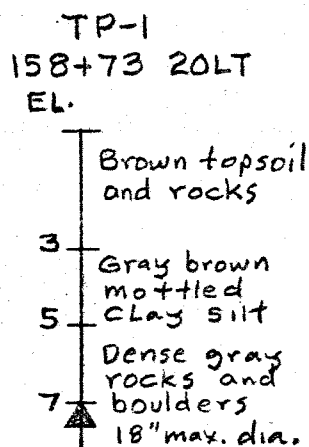
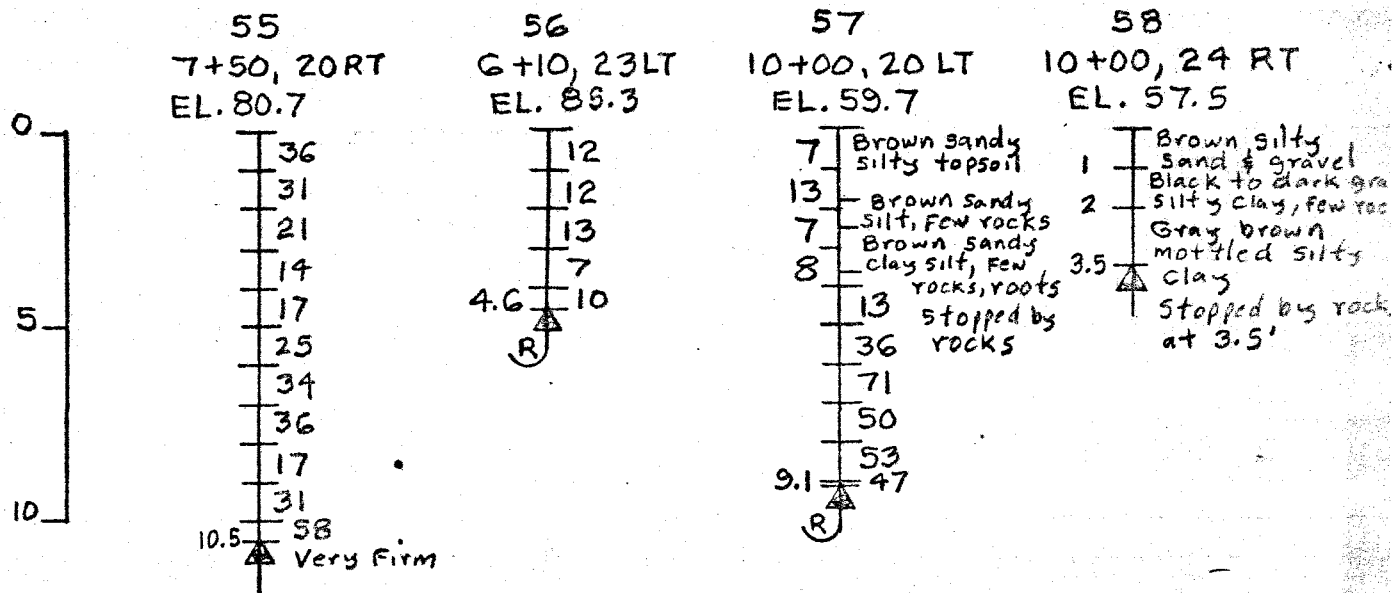
SOILS EXPLORATIONS

BANGOR

395-8 (79)

EXPLORATIONS 55-57
SOUNDINGS
TEST PITS 1-3

FARM ROAD



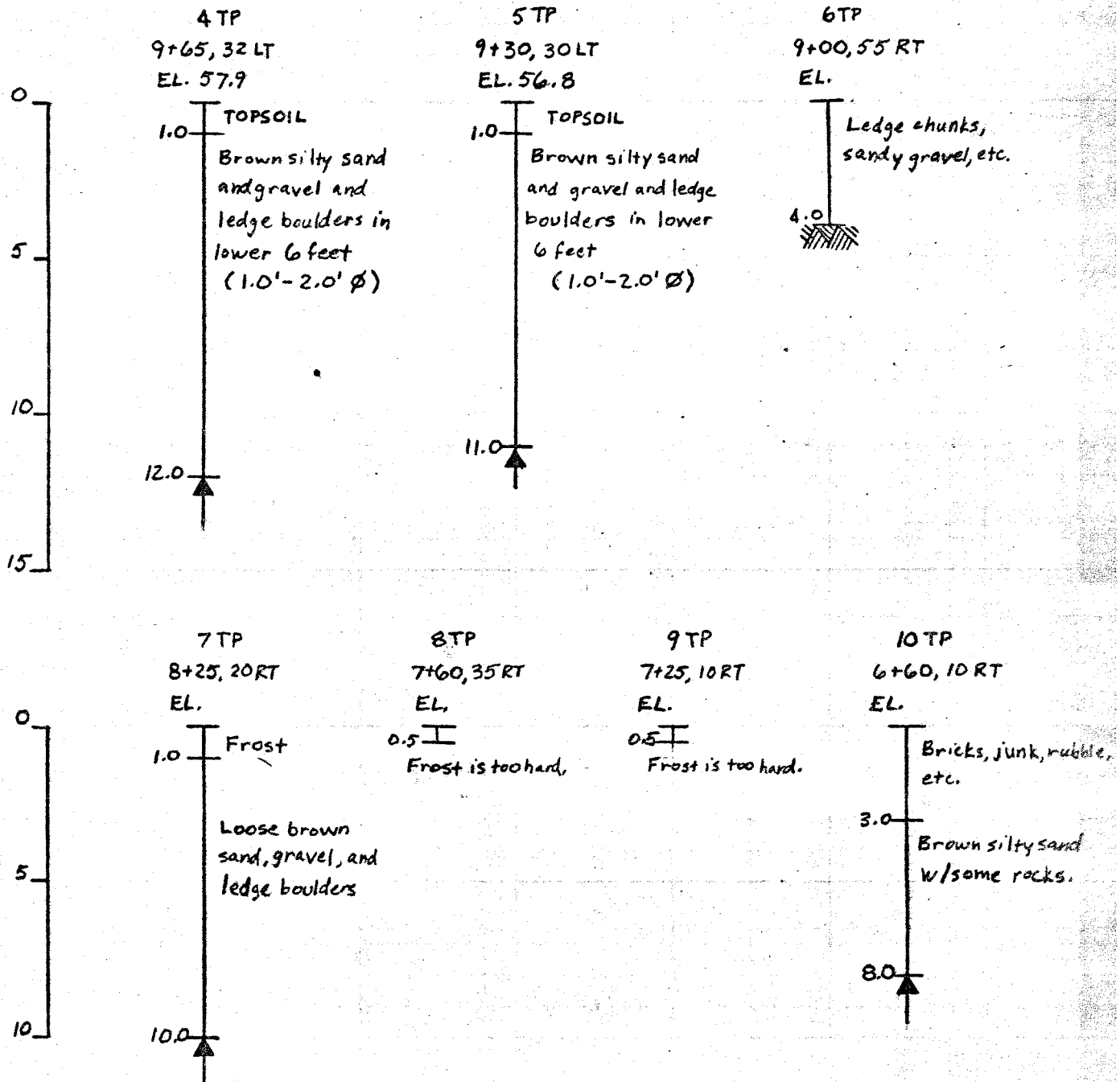
SOILS EXPLORATIONS

BANGOR

395-8(79)

EXPLORATIONS 4TP-10
TEST PITS

DEPTH (FEET)



FEB. 1983

SOILS EXPLORATIONS

BANGOR

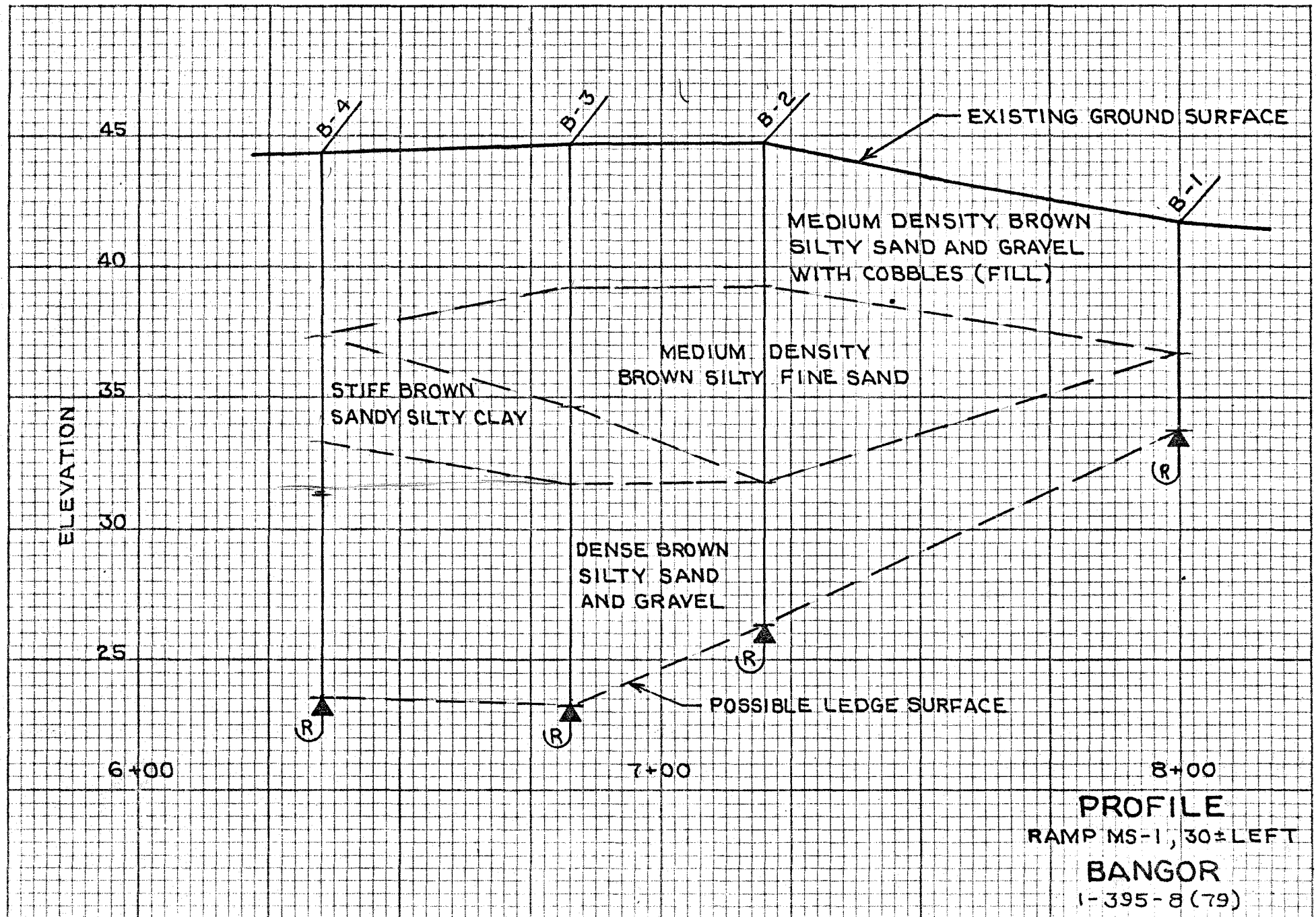
395-8 (079)

RAMP MS-2

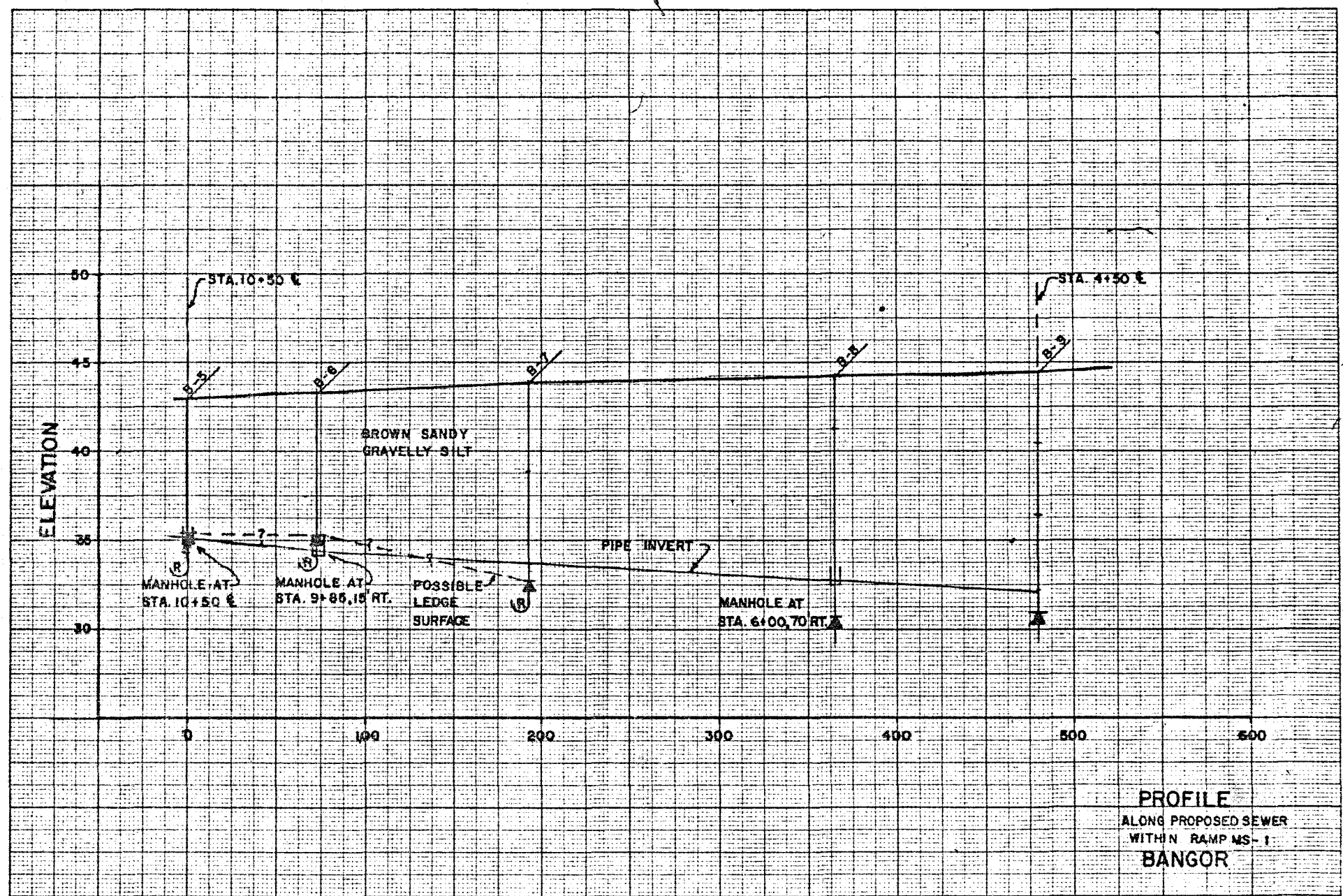
SUMMARY OF PAVEMENT CORE DATA
MAIN STREET, BANGOR

Core No. /	Station	Offset	Depth	Material
1	52+25	28 1t	0"-4" 4"-7" 7"-12"	bituminous pavement concrete, broken up & rotted concrete, solid
2	52+21	9 1t	0"-5" 6"-9" 9"-14"	bituminous pavement concrete solid concrete broken up & rotted
3	52+34	31 rt	0"-5" 5"-8½" 8½"-12"	bituminous pavement bituminous pavement with voids bituminous pavement, broken up
4	48+54	22 1t	0"-2¼" 2¼"-	bituminous pavement very silty sandy gravel
5	48+54	10 rt	0"-7-3/4" 7-3/4"-16"	bituminous pavement concrete pavement
6	48+60	28.5 rt	0"-5" 5"-11½"	bituminous pavement bituminous pavement, broken up
7	47+00	13.5 1t	0"-5" 5"-13" 13"-14"	bituminous pavement concrete pavement, solid gravel
8	47+00	17 1t	0"-2½" 2½"-4½" 4½"-6½" 6½"-14" 14"-	bituminous pavement, solid bituminous pavement, broken up concrete, broken up concrete, solid gravel
9	47+00	22.5 1t	0"-3" 3"-4" 4"-6"+	bituminous pavement, solid bituminous pavement, broken up gravel
10	47+00	20.5 1t	0"-4½" 4½"-6"+	bituminous pavement, solid gravel
11	49+00	17 1t	0"-5" 5"-11" 11"-	bituminous pavement, solid concrete, solid gravel
12	49+00	21.5 1t	0"-6" 6"-	bituminous pavement, solid gravel
13	50+00	17 1t	0"-3½" 3½"-7" 7"-14" 14"-15"+	bituminous pavement, solid concrete, broken up concrete, solid gravel

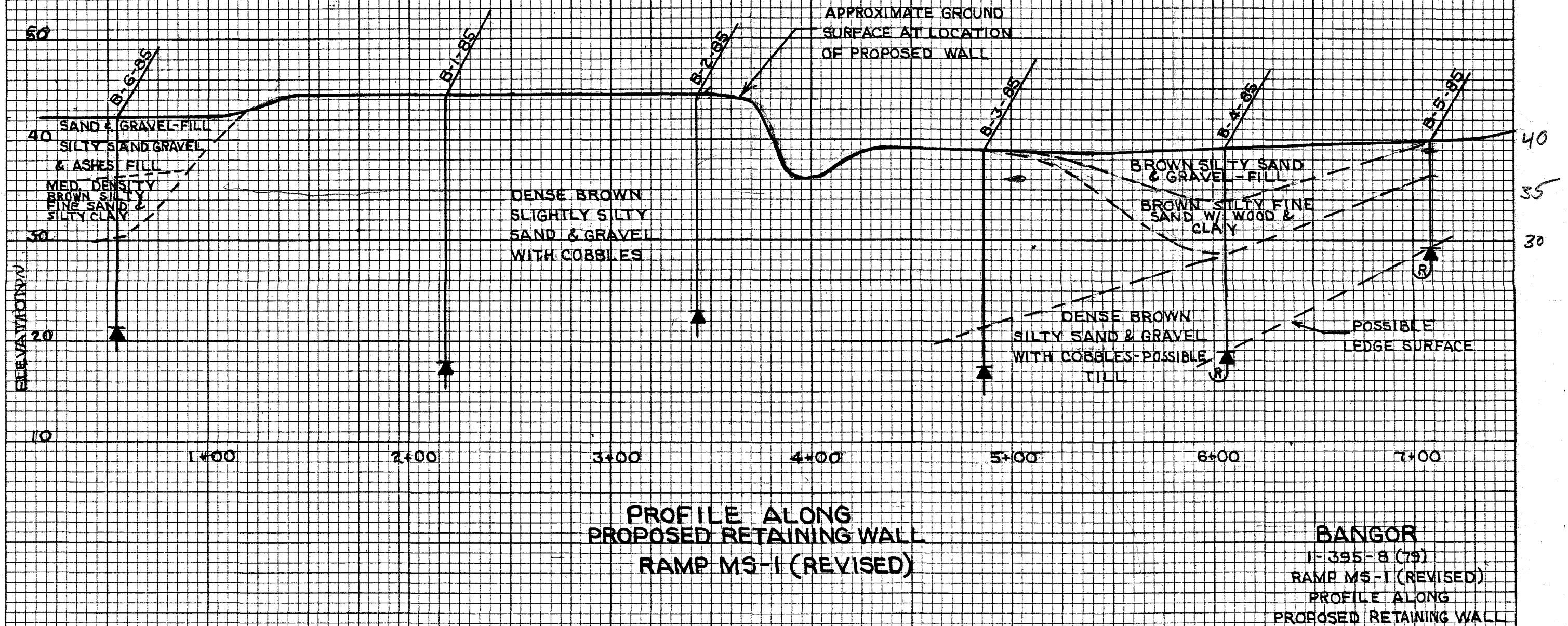
14	50+00	20.5 lt	0"-4½" 4½"-12" 12"-	bituminous pavement, solid concrete, solid with rebar gravel
15	50+00	24 lt	no depths	bituminous pavement over concrete
16	50+00	26 lt	0"-3" 3"-11" 11"-	bituminous pavement, solid concrete with large voids gravel
17	51+50	1 lt	0"-8½" 8½"-9½" 9½"-13"	bituminous pavement, solid steel, possible trolley track gravel
18	50+00	2 lt.	0"-7" 7"-13"	bituminous pavement, solid concrete, broken up
19	49+00	1.5 lt	0"-8½" 8½"-11"	bituminous pavement, solid sand and gravel
20	47+00	1 lt	0"-7½" 7½"-15"+	bituminous pavement, solid concrete, solid

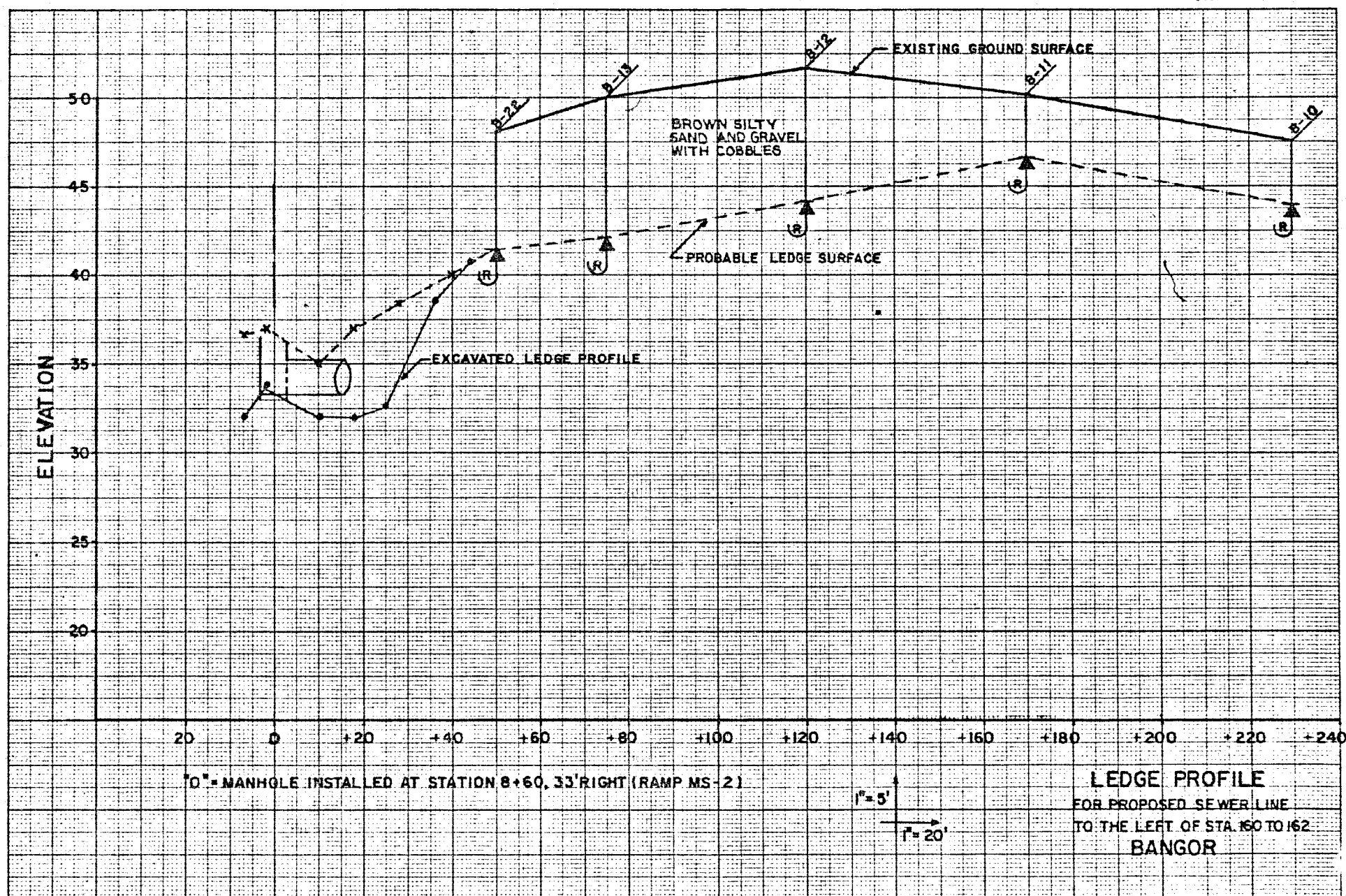


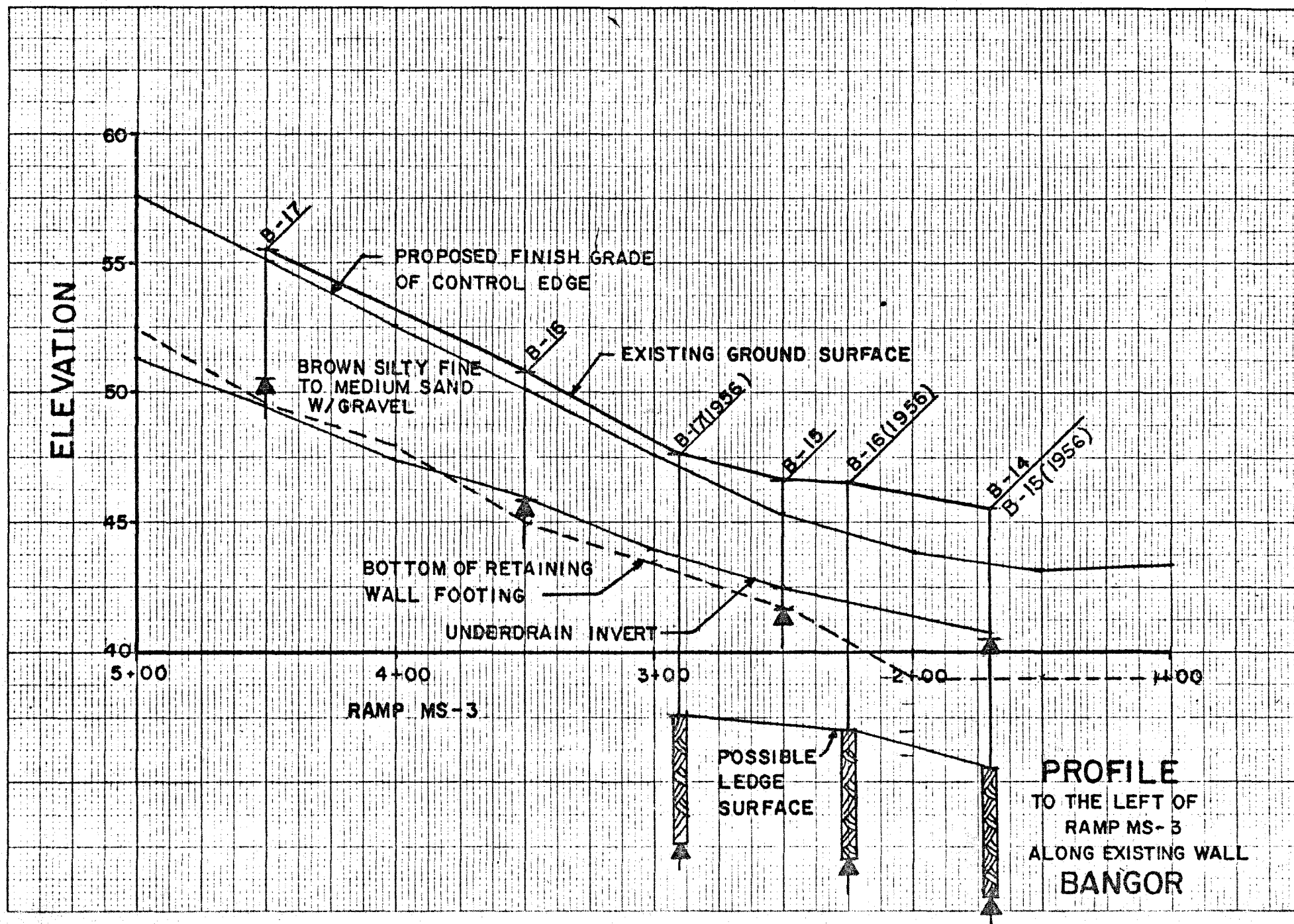
K-E 30 X 60 TO THE INCH 47 1242
10 X 15 INCHES
KLEPP & BROS. CO.

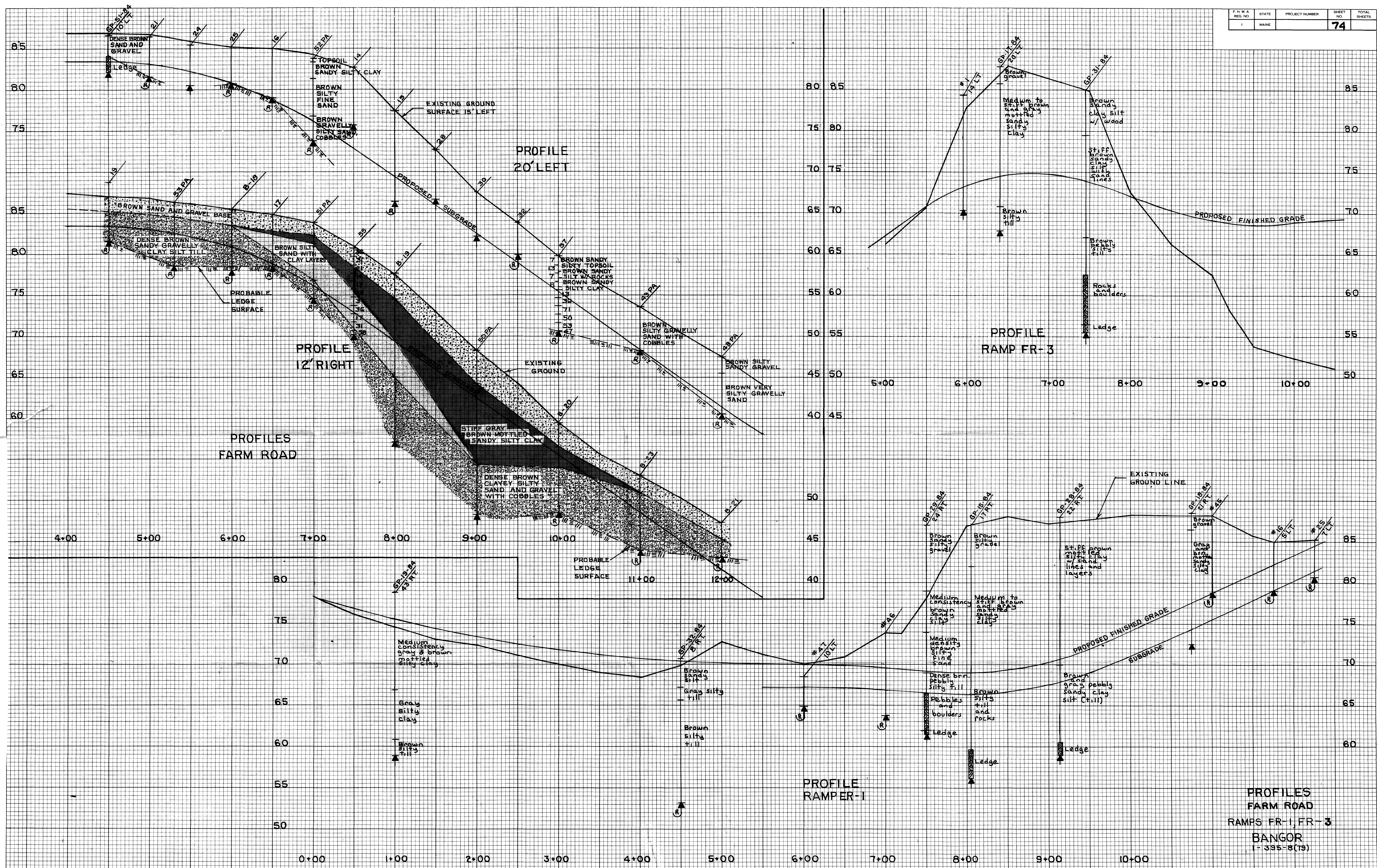


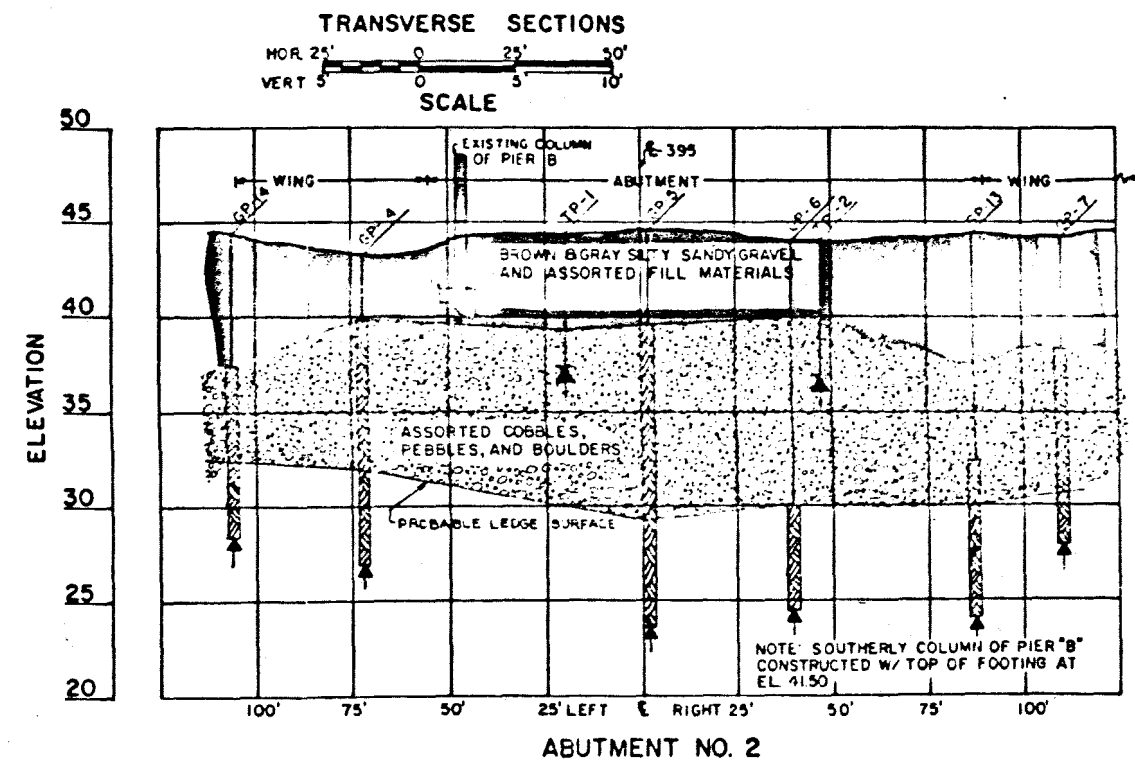
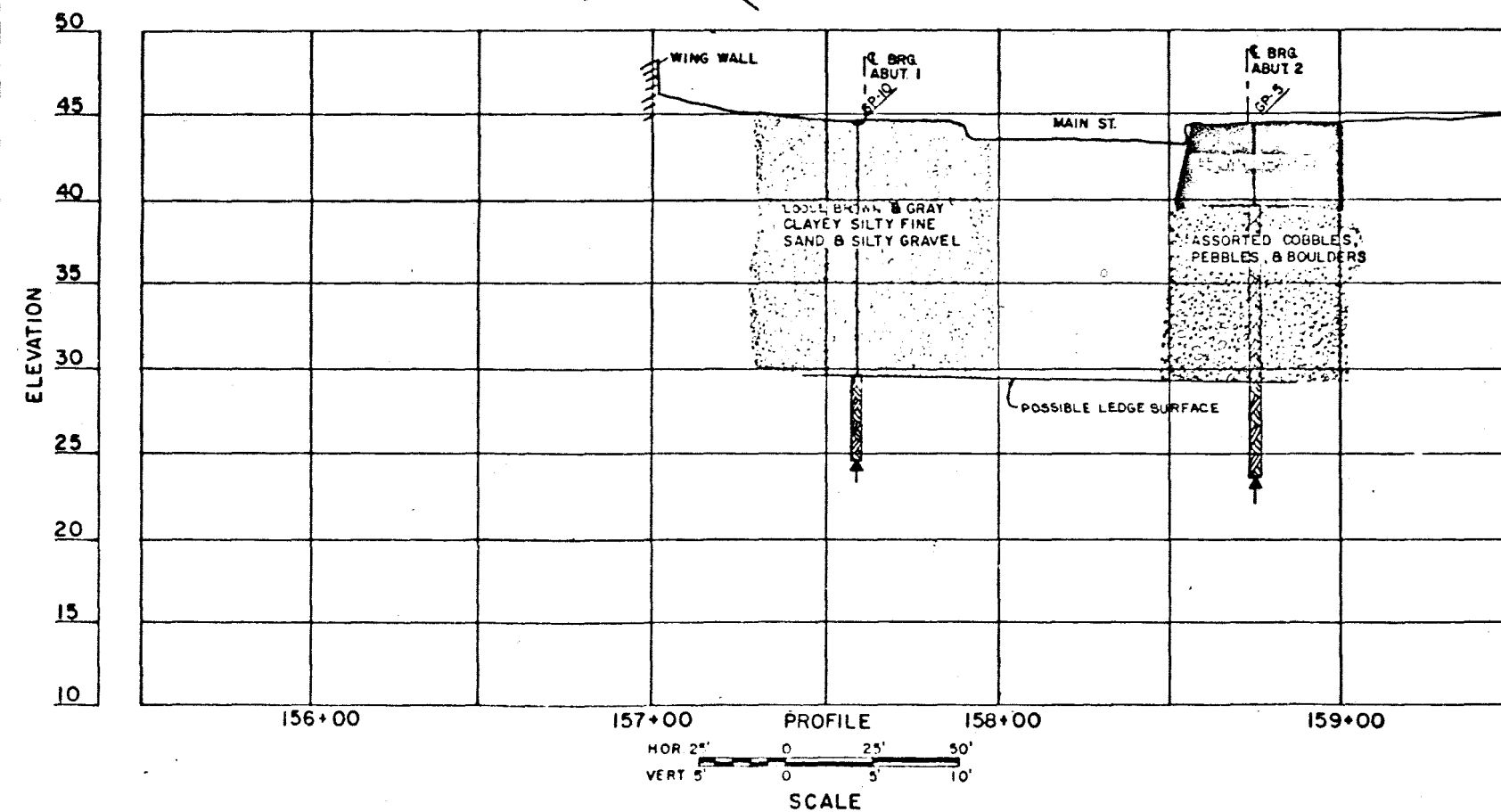
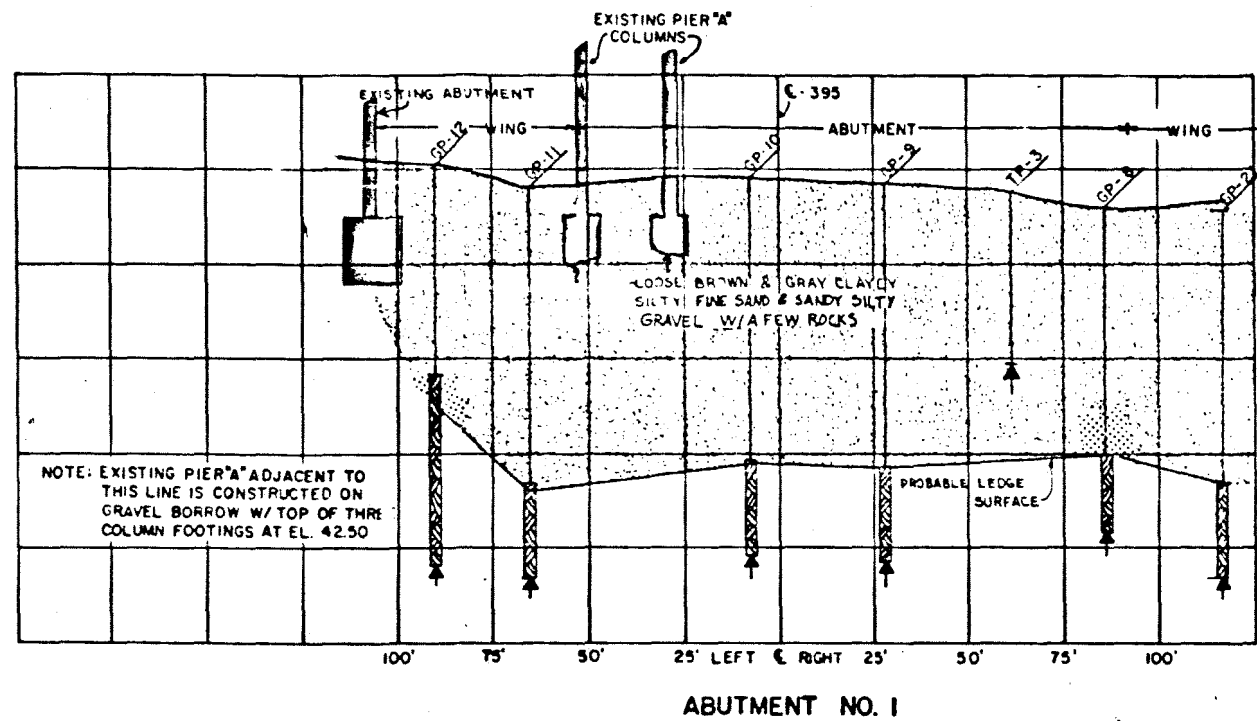
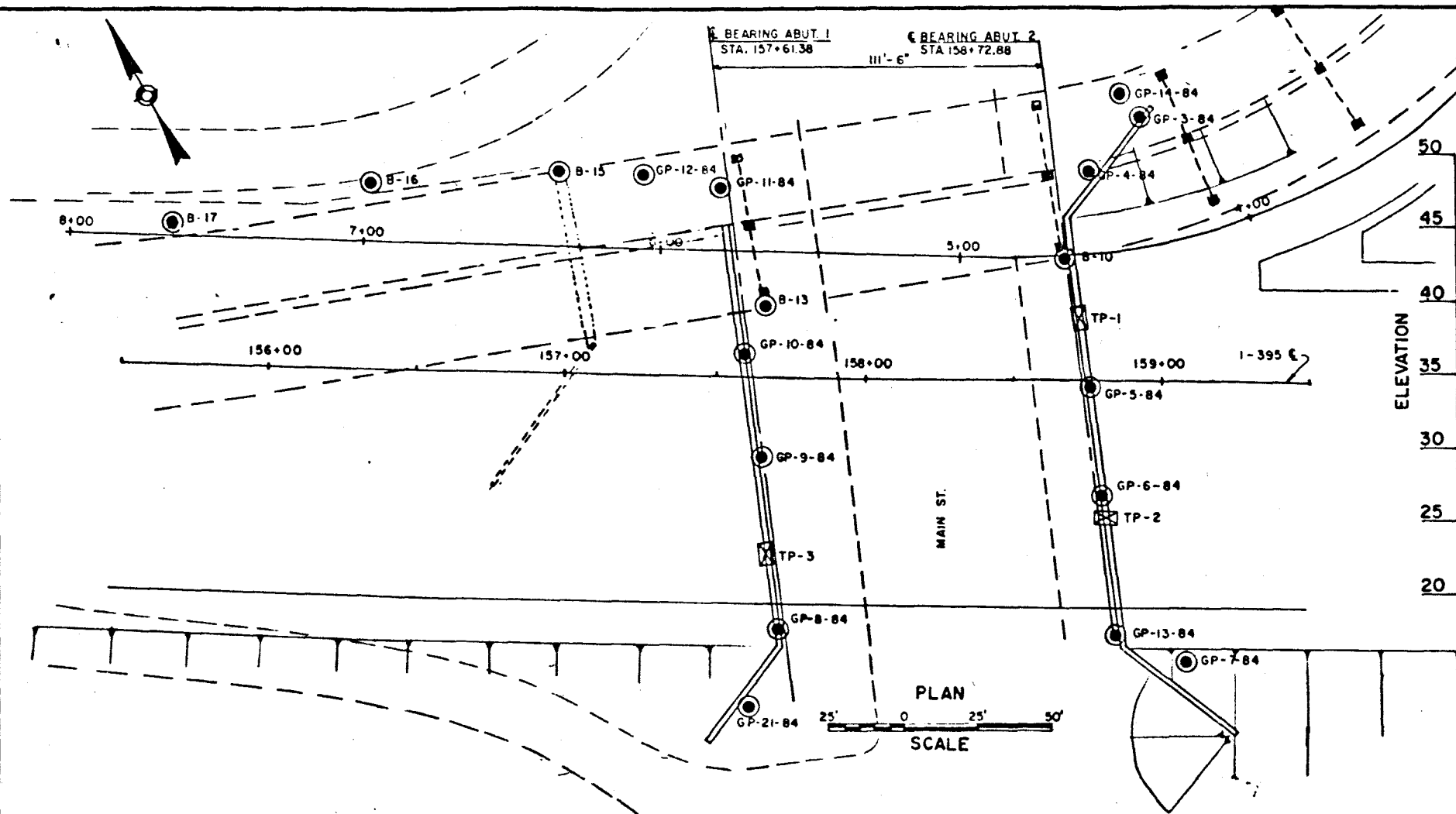
47 0782

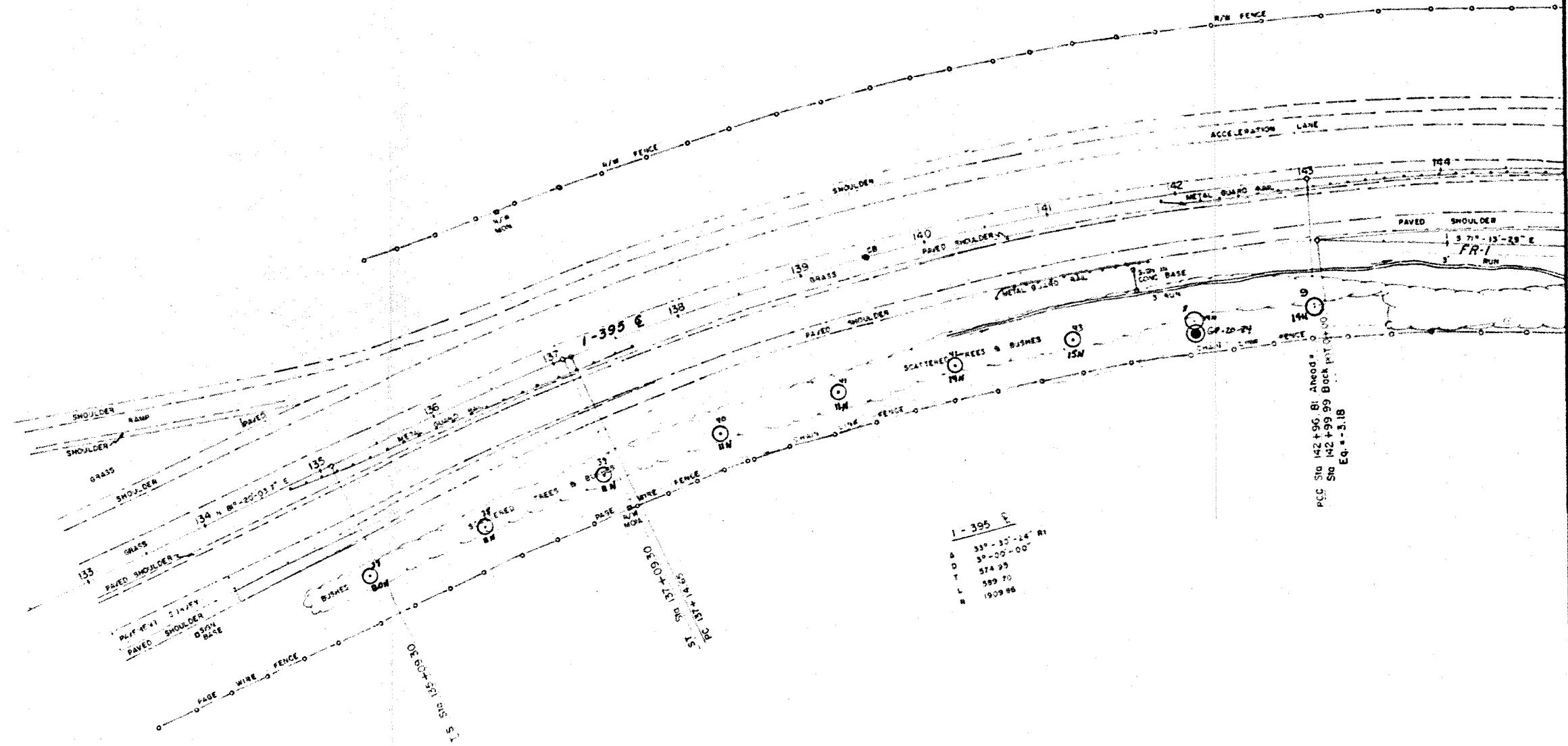
K&E
10 X 10 TO THE INCH • 10 X 15 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.









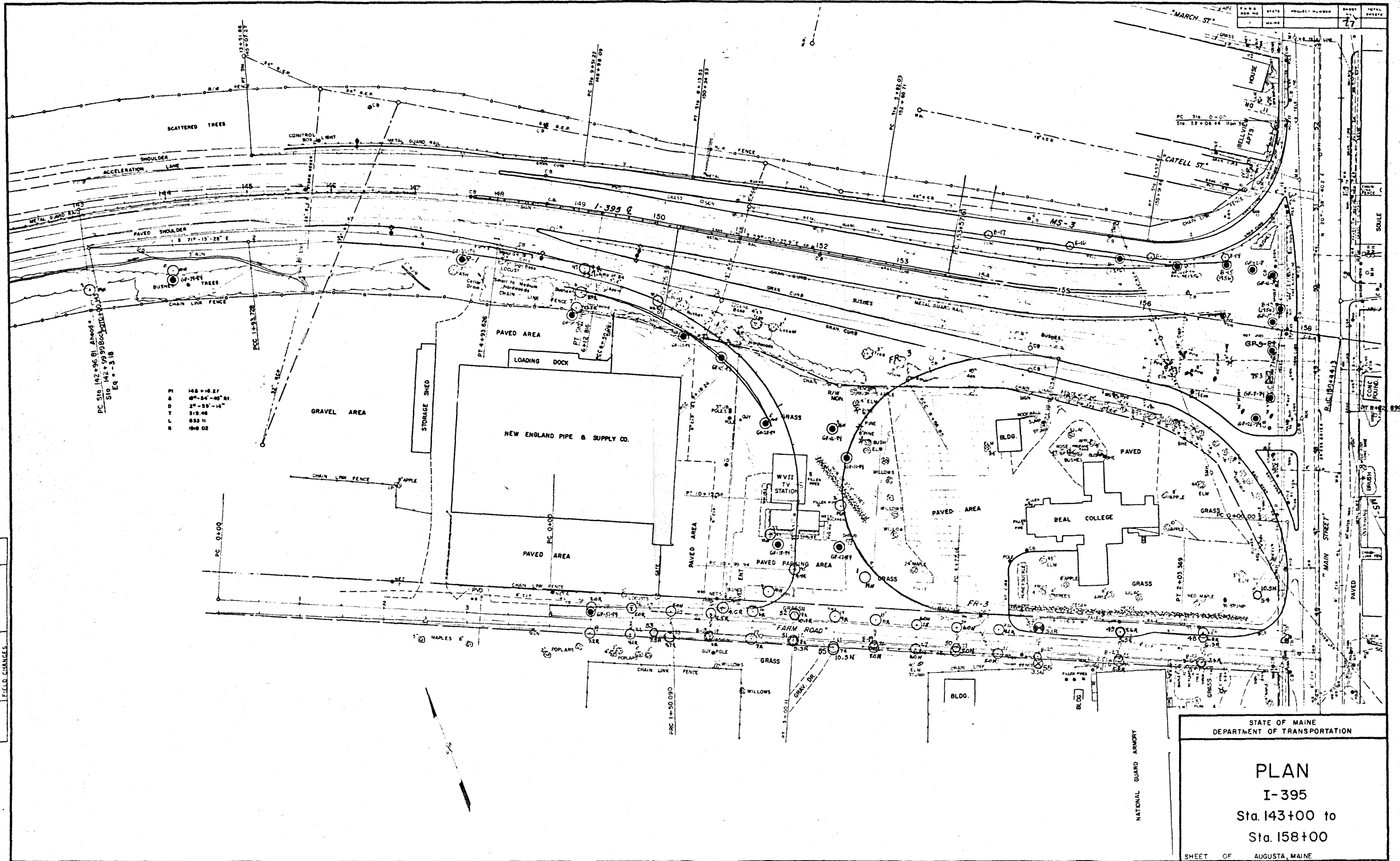


STATE OF MAINE DEPARTMENT OF TRANSPORTATION	
<p>PLAN</p> <p>I-395</p> <p>Sta. 133+00 to</p> <p>Sta. 144+00</p>	
SHEET OF	AUGUSTA, MAINE

PROJECT DESIGN ENGINEER	BY	DATE
CHECKED		
REVISIONS		
FIELD CHANGES		

ENGINEERING 44-11-45710

PROJECT DESIGN ENGINEER	DATE
DESIGN - DETAILED	
CHECKED	
REVISIONS	
FIELD CHANGES	
PLANS	



APPENDIX B

Project I-395-8(79)
Bangor - Brewer

Hydrologic data for 59 drainage areas for existing structures found in this project area are tabulated on the attached data page. Ridgelines and structure locations are shown on the attached Drainage Map. With the exception of two pipes the structures reported on in this study are catchbasins. Areas were delineated on good quality air photos flown 5-17-83 at a scale of 1" = 500'. Portions of the delineations have been field checked. Data reported are for existing conditions only.

Elevation data were estimated from City of Bangor topographic sheets having a scale of 1" = 200' and a contour interval of 5 feet. At some points the entire drainage area falls between contour lines in which case the elevation drop was estimated. When catchbasin grate elevations are known more accurate elevation drop estimates can be made.



Wilbur H. Tidd
Soils Research Scientist

APPENDIX B DRAINAGE STUDY

TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(79)

DATE April, 1984 BY W. Tidd

AREA NO	STATION	AREA		POTTER	1021	BENSON		RATIONAL					REMARKS
		ACRES	SQ. MI.	STORAGE INDEX K (%)	LF	SLOPE FT./MI.	STORAGE ACRES	ELEVATION DROP- FEET	DISTANCE FEET	RUNOFF COEF C	CHANNEL TYPE FACTOR	% FOREST	
						Main Street							All data for catchbasins unless otherwise noted.
1	43+27 27' lt.	3.35	.00523	---	1.1	NA	---	50	1860	0.6	1.0	0	Drains area uphill from Armory to Dillingham St.
2	45+27 38' lt.	0.21	.00032	---	1.2	NA	---	2	200	0.7	0.4	0	Drains small area between sidewalk & center-line.
3	45+35 40' rt.	2.45	.00383	---	0.9	NA	---	3	400	0.5	0.7	0	Drains area on right from Bangor Hydro building to I-395 bridge.
4	45+70 35' lt.	2.64	.00412	---	0.9	NA	---	50	700	0.6	1.0	0	Drains area between Farm Rd. & Beal College. Some flow from Farm Rd. may bypass CB29 & 30 & flow to this area. This area also includes second CB at St. 45+50, 25' left.
5	47+20 50' lt.	2.15	.00359	---	1.0	NA	---	50	630	0.7	1.0	0	Receives flow from Beal College area.
6	48+25 60' lt.	0.65	.00102	---	0.8	NA	---	27	340	0.6	1.0	0	Grassed area.
7	48+30 22' lt.	0.14	.00022	---	1.0	NA	---	1	125	0.6	0.4	0	Small area-mostly paved.
8	49+63 22' lt.	.057	.00009	---	1.2	NA	---	1	50	0.6	0.4	0	Very small area under bridge.
9	50+10 60' lt.	0.41	.00065	---	1.2	NA	---	25	150	0.8	0.4	0	Receives flow from roadway and bridge above catchbasin.
10	50+13 25' lt.	0.57	.00009	---	1.2	NA	---	1	50	0.6	0.4	0	Very small area under bridge.

APPENDIX B DRAINAGE STUDY

TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(79)

DATE April, 1984 BY W. Tidd

AREA NO.	STATION	AREA		POTTER	1021	BENSON		RATIONAL					REMARKS
		ACRES	SQ. MI.	STORAGE INDEX K (%)	LF	SLOPE FT./MI.	STORAGE ACRES	ELEVATION DROP- FEET	DISTANCE FEET	RUNOFF COEF. C	CHANNEL TYPE FACTOR	% FOREST	
11	50+02 77' rt.	0.71	.00110	---	0.9	NA	---	12	200	0.7	1.0	0	Drains earth area north & south of bridge and bridge deck.
12	50+17 37' rt.	0.74	.00162	---	1.1	NA	---	2	360	0.8	0.4	0	Drains right side of Main St. & area of parking lot by Shrine building.
13	52+30 35' lt.			Most flow appears to bypass this catchbasin and flows to #48.									
14	52+90 50' lt.	1.01	.00158	---	1.2	NA	---	40	750	0.8	0.4	0	Drains southside of March St. & adjoining residential area.
15	53+25 50' lt.	0.67	.00105	---	1.2	NA	---	17	470	0.8	0.4	0	Drains northside of March Street and adjoining residential area.
16	53+35 35' lt.	1.26	.00197	---	1.2	NA	---	8	570	0.8	0.4	0	Appears to drain north side of Main St. up to Dutton St. plus a portion of adjacent paved area.
17	54+02 37' rt.	0.22	.00034	---	1.2	NA	---	2	230	0.8	0.4	0	Drains right side of Main Street up to catchbasin 22 plus end of Ramp L.
18	54+15 65' lt.	0.16	.00025	---	1.2	NA	---	9	200	0.8	0.4	0	In Burger King Parking lot.
19	54+58 48' lt.	0.27	.00042	---	1.2	NA	---	9	210	0.8	0.4	0	In Burger King drive.
20	54+80 110' rt.	0.44	.00069	---	0.6	NA	---	2	170	0.4	2.0	0	In grass area between Ramp M and Ramp L.
21	55+18 48' lt.	0.88	.00137	---	1.2	NA	---	12	260	0.8	0.4	0	In Burger King drive.

APPENDIX B DRAINAGE STUDY

TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(79)

DATE April, 1984 BY W. Tidd

AREA NO.	STATION	AREA		POTTER	1021	BENSON		RATIONAL					REMARKS
		ACRES	SQ. MI.	STORAGE INDEX K (%)	LF	SLOPE FT./MI.	STORAGE ACRES	ELEVATION DROP- FEET	DISTANCE FEET	RUNOFF COEF. C	CHANNEL TYPE FACTOR	% FOREST	
22	56+18 22' rt.	0.41	0.00065	---	1.1	NA	---	4	260	0.7	0.4	0	Appears to drain right side of Main St. to Dutton St. plus portion of NB lane of Ramp L & end of Dutton Street.

23	58+53 55' lt.	0.59	0.00092	---	1.2	NA	---	9	280	0.8	0.4	0	Drains south side of a portion of Dutton St. and adjacent paved area.
24	58+59 56' rt.	0.41	0.00064	---	1.2	NA	---	3	220	0.8	0.4	0	Drains a portion of Dutton St. & adjacent built up area.
25	58+83 34' rt.	0.49	0.00076	---	1.2	NA	---	3	230	0.8	0.4	0	Drains right side Main St. up to Emerson St. & adjacent buildup area.
26	53+89 52' lt.	0.64	0.00010	---	1.0	NA	---	16	480	0.6	0.4	0	Drains north side of Dutton St. and adjoining grass & paved area.
						Farm Road							
27	9+40 b	1.51	0.00235	---	1.2	NA	---	23	500	0.8	0.4	0	15" ACCMP-flows to #30.
28	10+67 27' rt.	0.47	0.00073	---	1.2	NA	---	10	250	0.8	1.0	0	Catchbasin in yard of Armory-most flow from Armory yard bypasses this catchbasin & goes to #30.
29	12+69 27' lt.	0.33	0.00052	---	1.0	NA	---	21	320	0.6	0.4	0	Drains north side of Farm Rd. up to #27 plus portion of adjoining lawn.

APPENDIX B DRAINAGE STUDY

TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(79)

DATE April, 1984 BY W. Tidd

AREA NO.	STATION	AREA		POTTER	IO2I	BENSON		RATIONAL					REMARKS
		ACRES	SQ. MI.	STORAGE INDEX K (%)	LF	SLOPE FT/MI.	STORAGE ACRES	ELEVATION DROP- FEET	DISTANCE FEET	RUNOFF COEF. C	CHANNEL TYPE FACTOR	% FOREST	
30	12+88 12' rt.	5.50	0.0861	---	0.8	NA	---	54	850	0.5	0.6	0	Some flow down Farm Road may bypass this catchbasin & flow to area #4. Also, there is a possibility of other catchbasins in locked storage yard at Armory.
				I-395 EB & WB & Ramps J, K, L, M									
31	146+80 90' lt.	24.44	0.3819		0.72	140	---	70	2500	0.48	1.0	0	Catchbasin receives Main flow from I-395 north ditch plus some flow from park area, has clogged & flooded & flow has gone to #42.
31A	147+66 b	0.32	0.0050	---	1.2	NA	---	2	180	0.8	0.4	0	Appears to drain a 230' section of WBL 395 and Ramp K.
32	148+23 58' rt.	0.35	0.0055	---	1.2	NA	---	4	300	0.8	0.4	0	12+79, 10' rt, Ramp J
33	148+53 35' lt.	0.05	0.0008	---	1.2	NA	---	1	60	0.8	0.4	0	Appears to drain only a small portion of Ramp K.
34	148+60 b	0.08	0.0012	---	1.2	NA	---	1	60	0.8	0.4	0	Appears to drain a small portion of WBL I-395.
35	148+72 28' rt.			Most flow presently bypasses this catchbasin and goes to #36.									
36	15+32 12' rt. Ramp J	0.87	0.0136	---	0.9	NA	---	7	330	0.6	0.6	0	Part of flow from paved portion of Ramp J & part from adjoining grass area.

APPENDIX B DRAINAGE STUDY

TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(29)

DATE April, 1984 BY W. Tidd

AREA NO.	STATION	AREA		POTTER	1021	BENSON		RATIONAL					REMARKS
		ACRES	SQ. MI.	STORAGE INDEX K (%)	LF	SLOPE FT/MI.	STORAGE ACRES	ELEVATION DROP- FEET	DISTANCE FEET	RUNOFF COEF. C	CHANNEL TYPE FACTOR	% FOREST	
37	151+05 40' lt.												This catchbasin appears to receive very little flow.
38	151+90 3' lt.	0.23	.00036	---	1.2	NA	---	1	290	0.8	0.4	0	Appears to receive flow from WBL back to about Station 149+00.
39	151+90 27' lt.	0.018	.00003	---	1.0	NA	---	0.3	80	0.6	1.0	0	Appears to drain only vicinity of guardrail area back to #37.
40	152+00 3' rt.	0.16	.00025	---	1.2	NA	---	0.5	200	0.6	0.4	0	Drains EBL back to Sta. 150+00+.
41	18+00 15' rt. Ramp J	0.51	.00080	---	1.0	NA	---	33	280	0.4	1.0	0	Drains steep grassed area right of Ramp J.
42	154+45 85' lt.	2.23	.00349	---	0.5	NA	---	8	770	0.25	1.0	0	At northside of Ramp K. This catchbasin flooded in Spring of 1984. This catchbasin will receive overland flow from CB#31 and City of Bangor CB just upstream from #31 when they overtop which appears to occur. Residents along Catell St. report flooding of houses due to high water in ditch between CB#31 and CB#42.
43	19+20 14' lt. Ramp J	0.105	.00016	---	1.2	NA	---	20	120	0.5	1.0	0	Appears to drain steep slope between Ramp J and EBL.

APPENDIX B DRAINAGE STUDY

TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(29)

DATE April, 1984 BY W. Tidd

AREA NO.	STATION	AREA		POTTER	1021	BENSON		RATIONAL					REMARKS
		ACRES	SQ. MI.	STORAGE INDEX K (%)	LF	SLOPE FT./MI.	STORAGE ACRES	ELEVATION DROP- FEET	DISTANCE FEET	RUNOFF COEF C	CHANNEL TYPE FACTOR	% FOREST	
44	19+20 14' rt Ramp J	0.64	0.00100	---	0.9	NA	---	13	450	0.6	0.4	0	Receives flow from RampJ back to #36 plus steep grass area each side of ramp.
45	20+49 10' lt Ramp K	0.66	0.00104	---	1.2	NA	---	23	630	0.8	0.4	0	Drains Ramp K back to the vicinity of #33 & #34 plus ditch area back to #42. Slope listed is for Ramp K. This catchbasin will also receive overflow from catchbasin #42. This catchbasin shows signs of having been over topped with flow going to #48.
46	156+35 28' lt.	0.35	0.00055	---	1.2	NA	---	3	435	0.8	0.4	0	Receives flow from WBL back to #38.
47	156+35 4' rt.	0.35	0.00055	---	1.2	NA	---	3	435	0.8	0.4	0	Receives flow from EBL back to #40.
48	22+50 10' lt. Ramp K	0.83	0.00129	---	1.2	NA	---	5	170	0.8	0.4	0	Receives flow from RampK and Main St. Also receives overflow from #45
49	163+12 10' lt. Ramp M	0.11	0.00017	---	1.2	NA	---	3	180	0.8	0.4	0	Receives flow from RampM back to bridge.
50	163+12 10' lt. Ramp L	0.11	0.00017	---	1.2	NA	---	3	180	0.8	0.4	0	Receives flow from RampL back to bridge.
51	165+75 10' lt. Ramp M	0.18	0.00028	---	1.2	NA	---	3	220	0.8	0.4	0	Receives flow from RampM back to #49 plus small adjoining grass area.

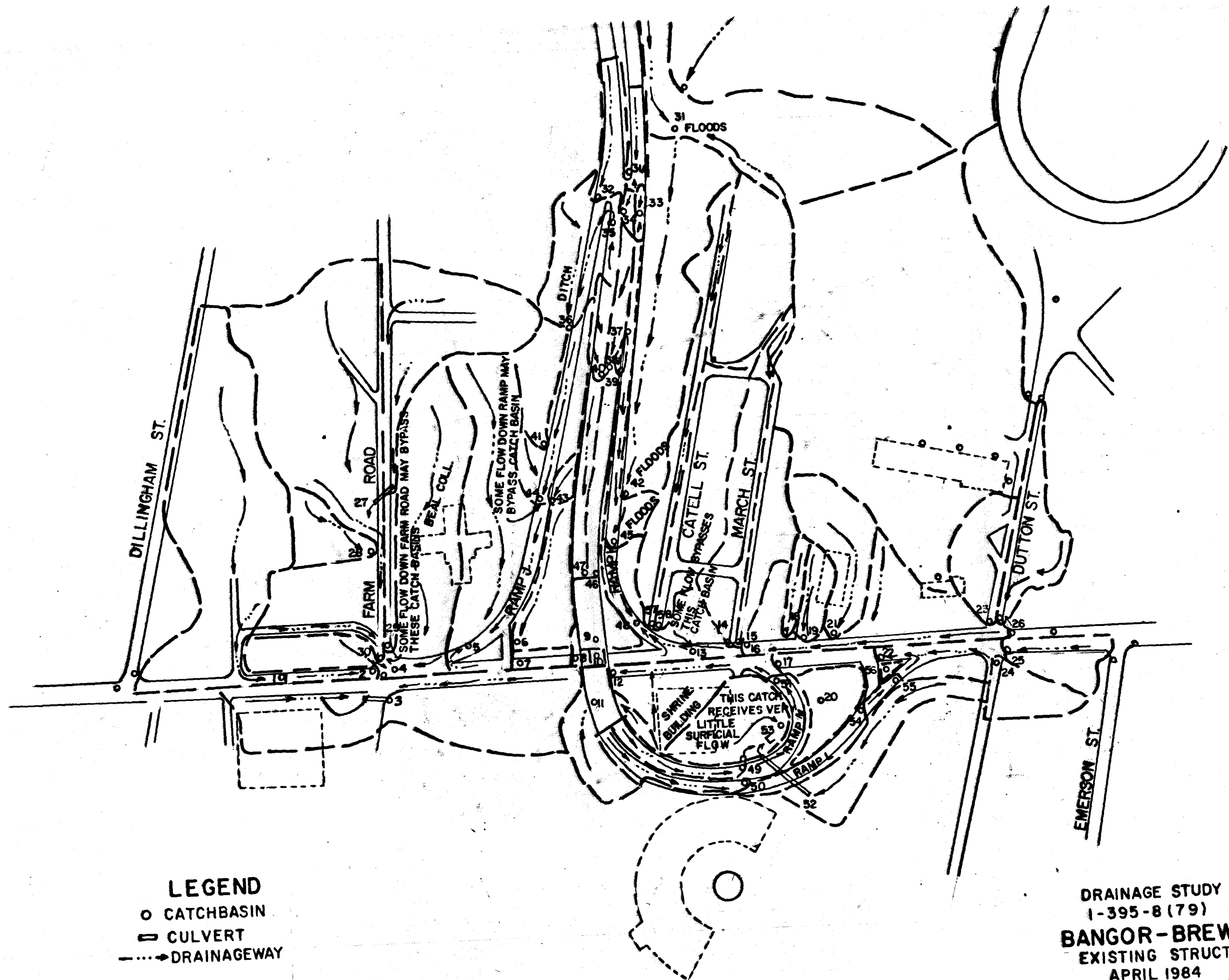
APPENDIX B DRAINAGE STUDY

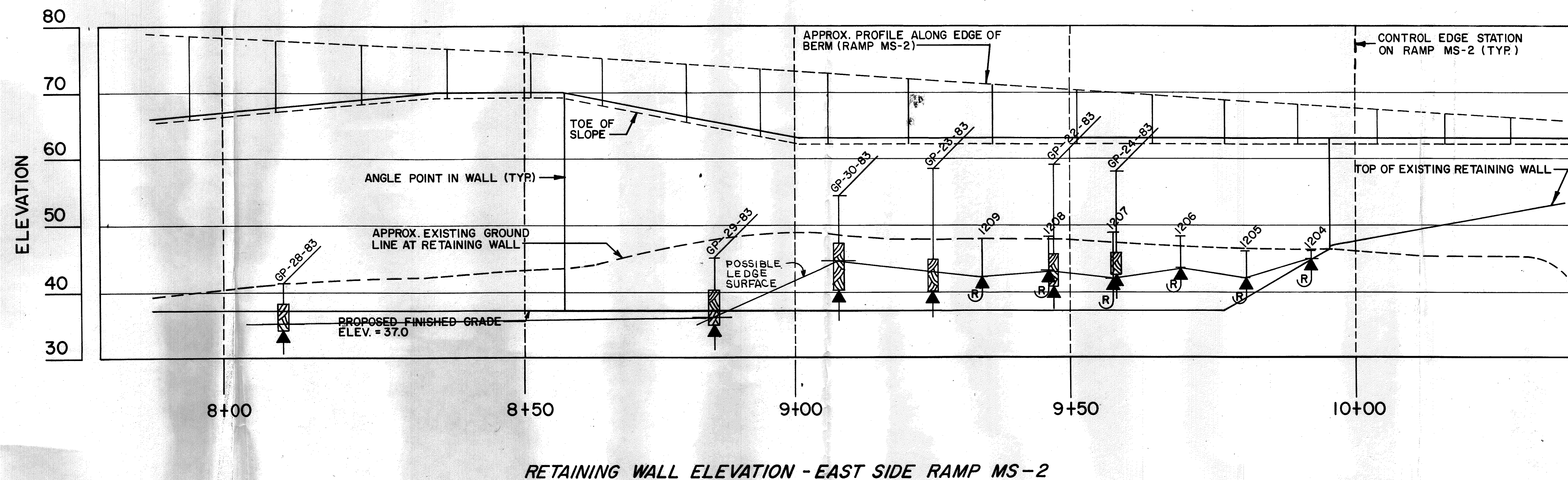
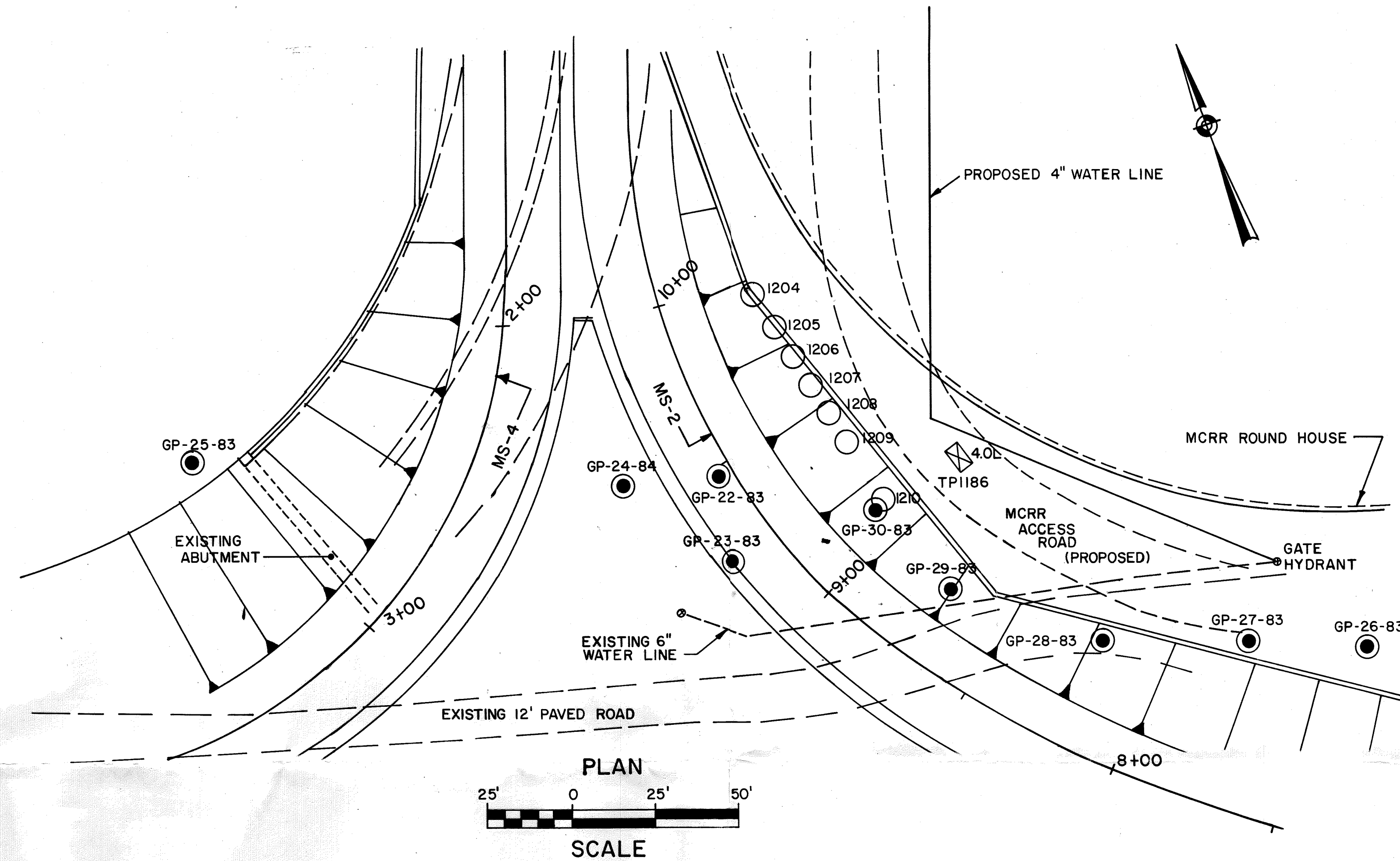
TOWN(S) BANGOR - BREWER
Existing Structures

PROJECT NO. I-395-8(79)

DATE April, 1984 BY W. Tidd

[illegible]





August 20, 1985

Andy Hendrickson

Design - Augusta

AK
Alan King

M&R Soils - Bangor

Exploratory borings for proposed drainage system, I-395, Bangor

Three power auger borings were completed on August 19 by Maine Test Borings, Inc. for the proposed drainage pipe between Main Street and the Penobscot River in the vicinity of the proposed ramp MS-1. The locations of the three borings designated PA-1, PA-2 and PA-3 are shown on the attached plan. Also attached are details of the borings and a profile along the proposed pipe location illustrating the underlying soil stratification.

The first boring, PA-1, was located between the main line and track number six of the railroad or approximately one hundred fifteen (115) feet left of Station 6+00 of Ramp MS-1. The boring penetrated to a depth of 31.5 feet in dense brown slightly silty sand and gravel without reaching refusal. Some cobbles were encountered below a depth of twenty-seven (27) feet. The results of this boring in conjunction with an earlier boring B-1-85, located forty-two (42) feet left of Station 6+00, which penetrated to a depth of 27.5 feet without refusal, indicating ledge to be well below the proposed pipe elevation and rock should therefore not be encountered in the jacking operation.

The second boring, PA-2, was made at a proposed catchbasin location ninety (90) feet right of Station 6+00 of Ramp MS-1 and penetrated to a depth of 22.4 feet or approximately two (2) feet below the bottom of the proposed catchbasin, without refusal. This boring found gravelly sandy silt, silty sand and clay silt, which appears to be old fill, to a depth of 18.5 feet. Below this the boring encountered dense brown silty sand and gravel containing cobbles and boulders. This area was formerly a borrow pit and the dense granular soils are apparently the original pit bottom.

The third boring, PA-3, was located thirty (30) feet right of Station 6+00, Ramp MS-1, or between borings PA-2 and B-1-85. This boring penetrated to a depth of 20.6 feet and encountered a soil stratification similar to PA-2.

Also shown on the attached profile at the pipe location is boring B-1 which was previously made in this area and is near another proposed catchbasin location approximately three hundred fifteen (315) feet right of Station 6+00. The refusal encountered by this boring at about elevation 34 could have been on a boulder in the layer of dense granular soils rather than on ledge. Another boring B-5-85 made near this location, encountered refusal at about elevation 29.4 and core borings made for the east abutment of the Main Street bridge found the ledge surface at about elevation 30. It is quite possible therefore, that the ledge surface along the Main Street end of the proposed pipe is deeper than elevation 36 as shown on a profile of the pipe in the construction plans. Some rock excavation will still probably be required for the installation of the catch basin and pipe in this area.

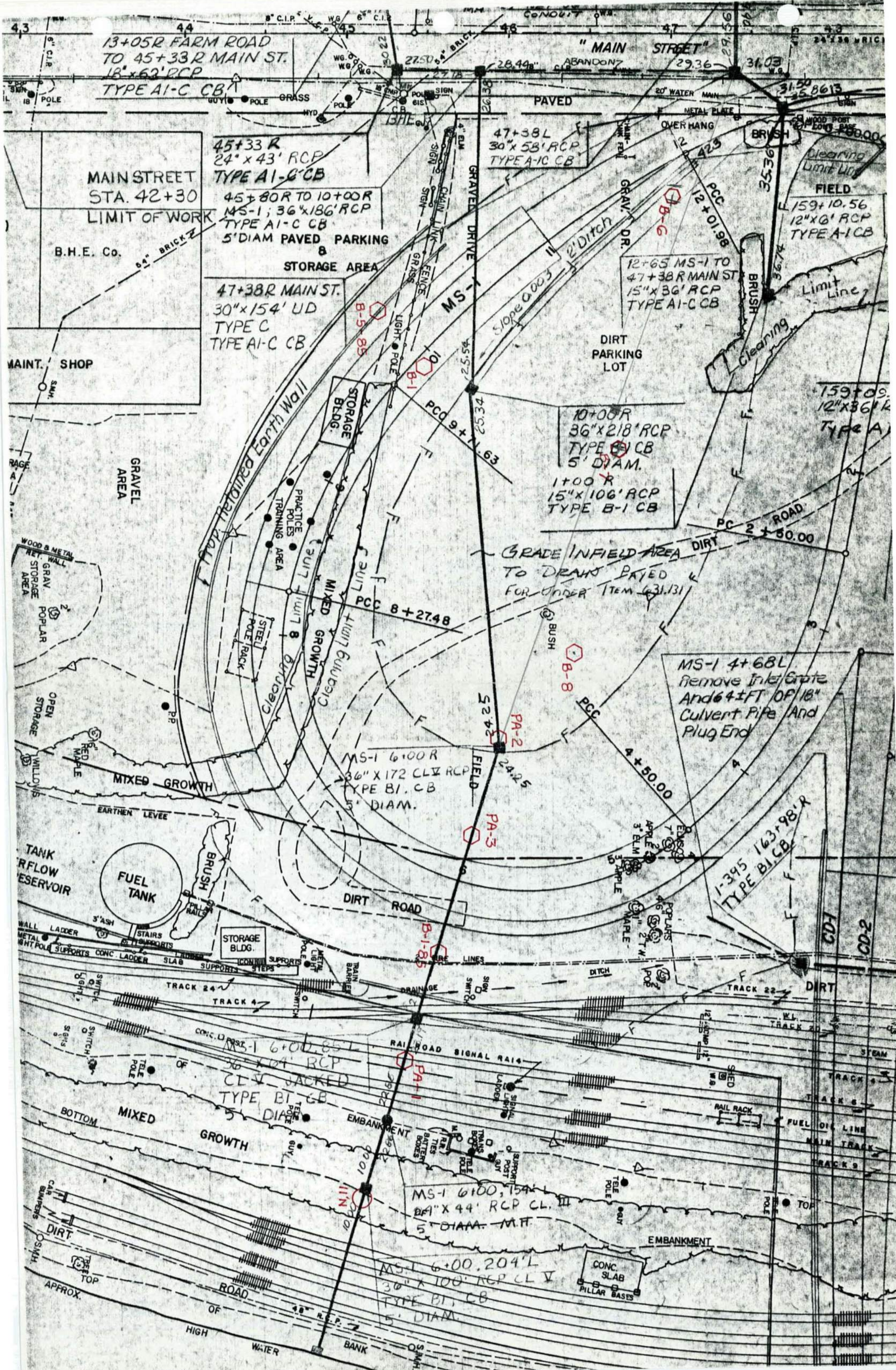
TO: Andy Hendrickson
FROM: Alan King
Dated: August 20, 1985

[2]

In addition to the power auger borings, a hand rod sounding was made at the toe of the slope at the lower track level approximately two hundred ten (210) feet left of Station 6+00 as shown on the plan. This sounding reached a depth of eleven (11) feet without refusal and no ledge is expected in the excavation for the pipe in this area.

rej
Attachment

cc: M. W. Morgan ,
T. H. Karasopoulos



13+05R FARM ROAD
TO 45+33R MAIN ST.
18"x62'RCP
TYPE A1-C CB

MAIN STREET
STA. 42+30
LIMIT OF WORK

45+33R
24"x43'RCP
TYPE A1-C CB

45+80R TO 10+00R
MS-1; 36"x186'RCP
TYPE A1-C CB
5'DIAM PAVED PARKING

47+38R MAIN ST.
30"x154' UD
TYPE C
TYPE A1-C CB

47+38L
30"x58'RCP
TYPE A1-C CB

12+65 MS-1 TO
47+38R MAIN ST.
15"x36'RCP
TYPE A1-C CB

10+00R
36"x218'RCP
TYPE B1 CB
5'DIAM.

1+00R
15"x106'RCP
TYPE B-1 CB

159+10.56
12"x8'RCP
TYPE A1-CB

159+09.
12"x36'RCP
TYPE A

MS-1 6+00R
36"x172 CLZ RCP
TYPE B1 CB
5'DIAM.

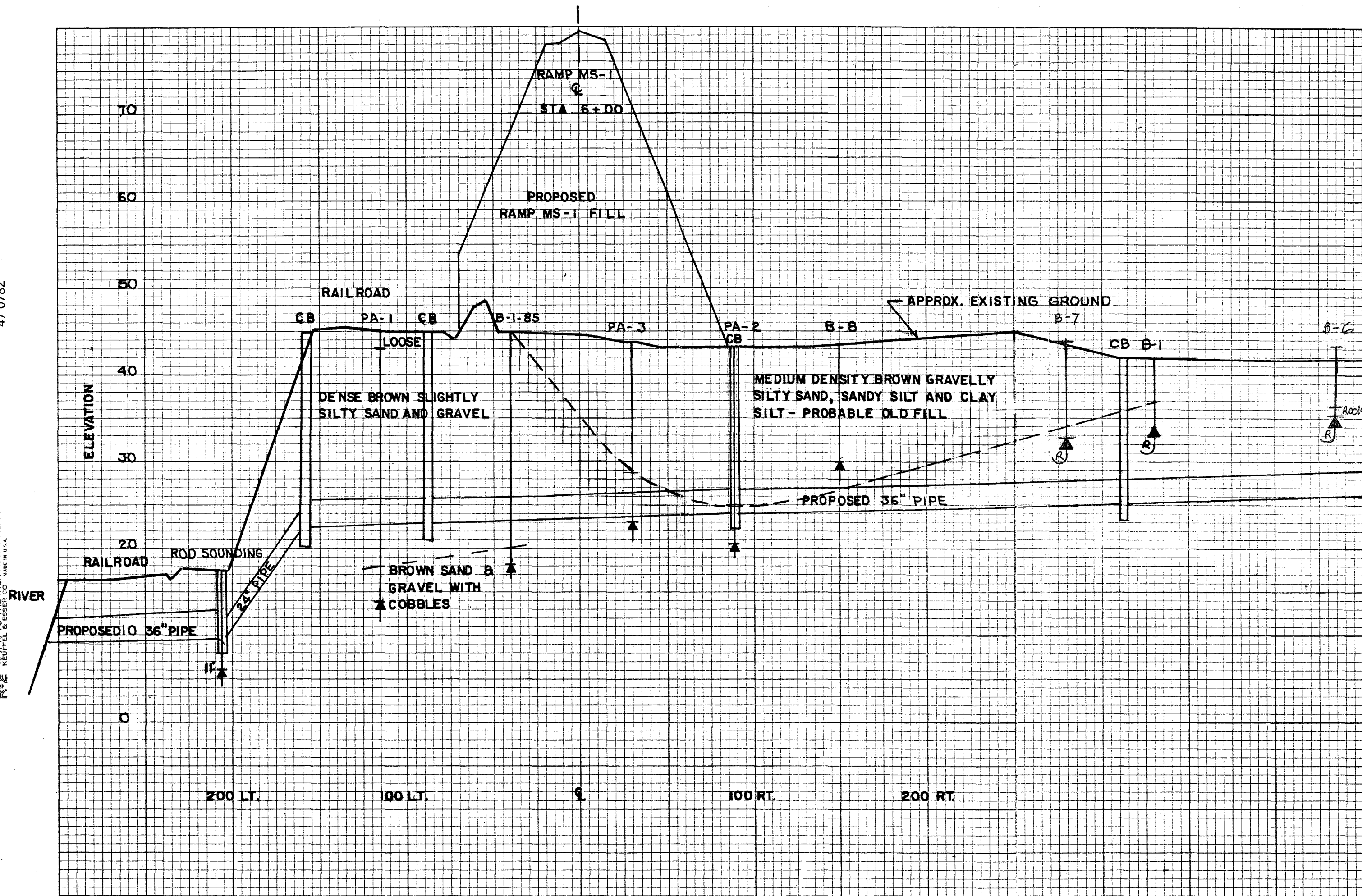
MS-1 4+68L
Remove Inlet/Grate
And 64±FT OF 18"
Culvert Pipe And
Plug End

1-395 163+98R
TYPE B1CB

MS-1 6+00.85L
36"x172 CLZ RCP
CL V JACKED
TYPE B1 CB
5'DIAM.

MS-1 6+00.154L
36"x172 CLZ RCP CL. III
5'DIAM. M.F.

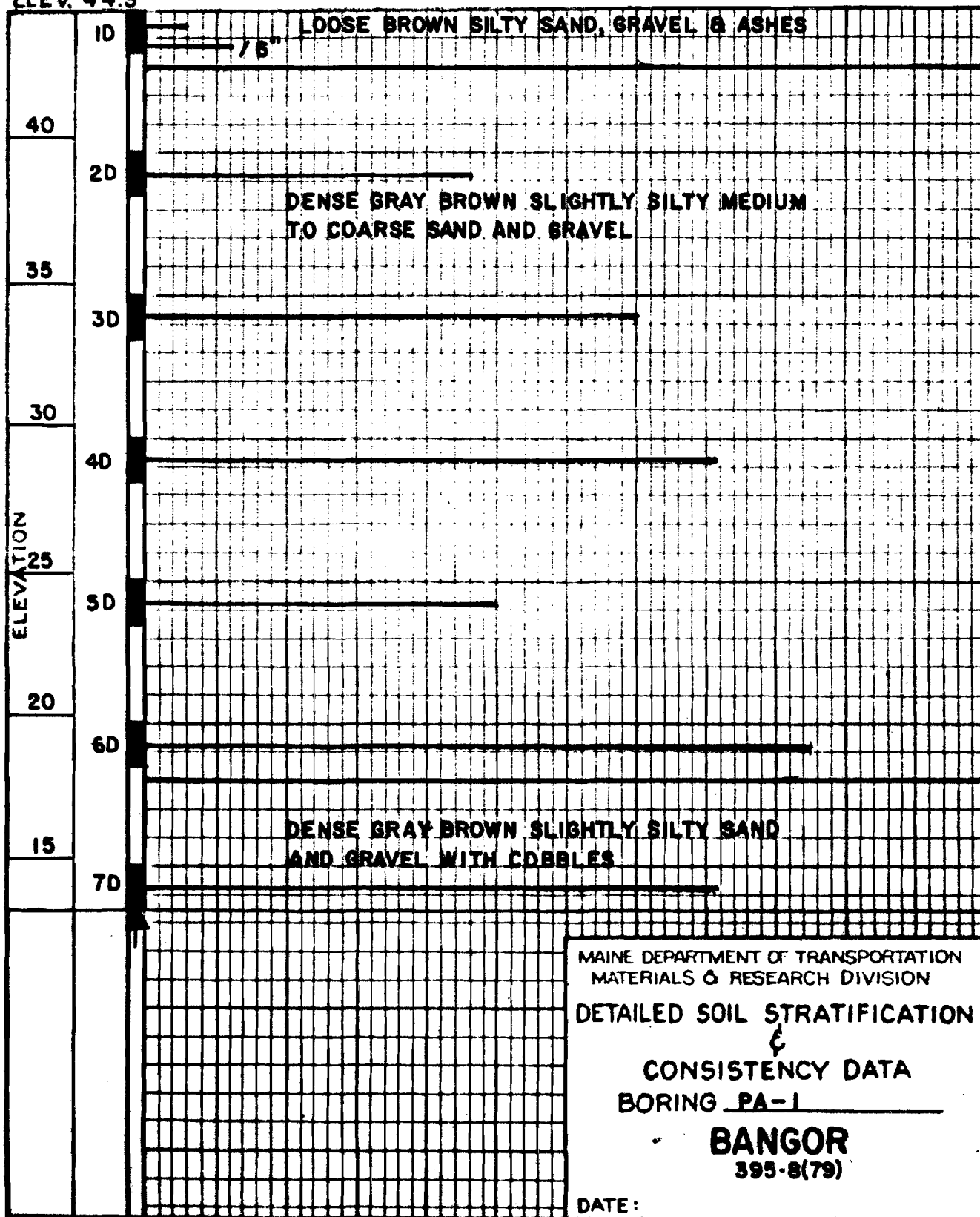
MS-1 6+00.204L
36"x172 CLZ RCP CL V
TYPE B1 CB
5'DIAM.



BORING PA-1 STATION 6+00 115' LT. MS-1

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

ELEV. 44.3



MAINE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION

DETAILED SOIL STRATIFICATION

CONSISTENCY DATA

BORING PA-1

BANGOR

395-8(79)

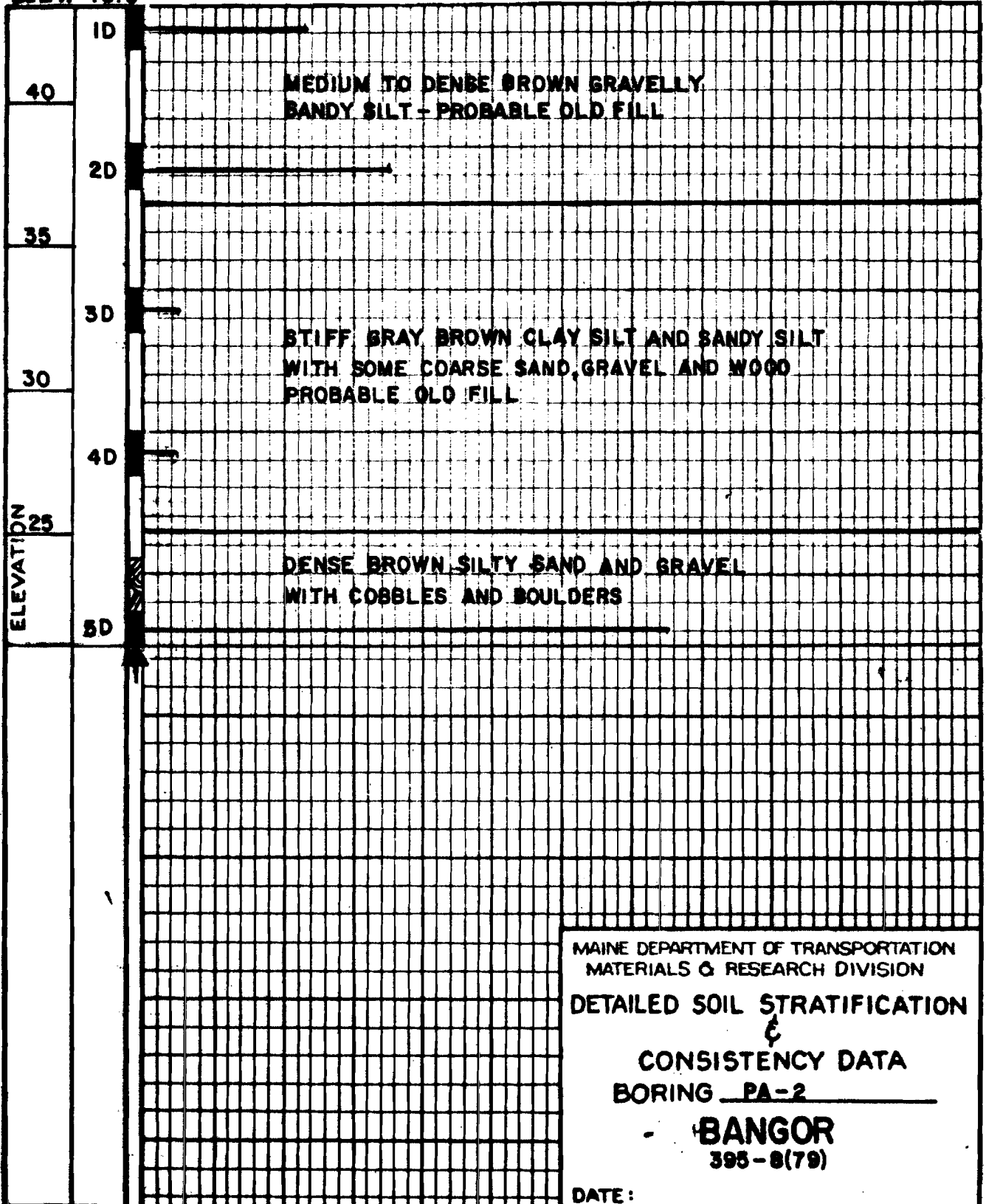
DATE:

SML-202(8-72)

BORING PA-2 STATION 6+00 90'RT MS-1

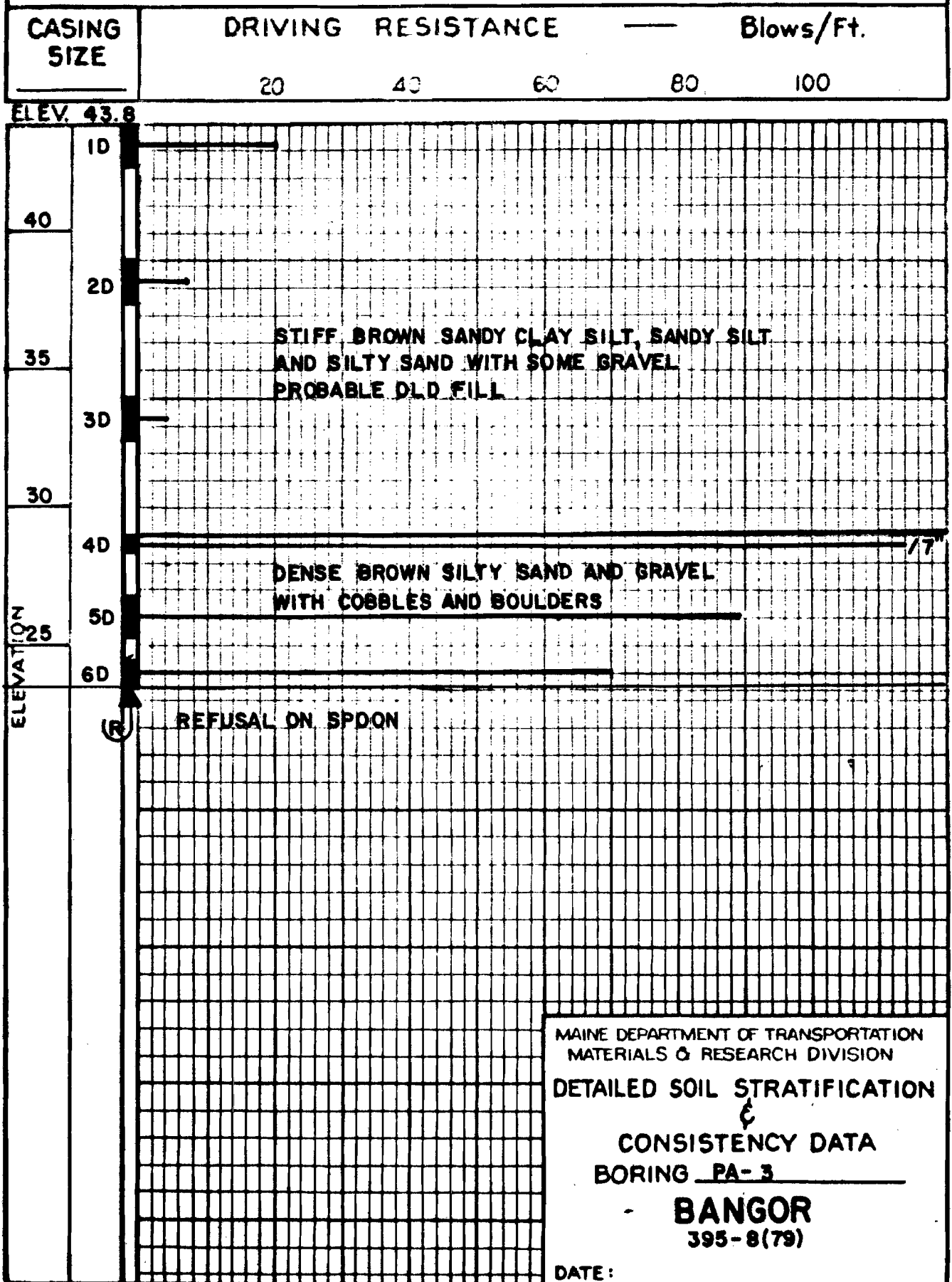
CASING SIZE	DRIVING RESISTANCE ———					Blows/Ft.
	20	40	60	80	100	

ELEV. 43.3



SWL-202 (8-12)

BORING PA-3 STATION 6+00 30'RT MS-1

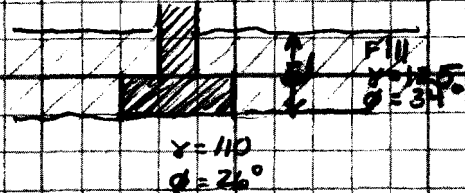


SML-202(8-72)

$$q_{ult} = c \bar{N}_c + (\gamma d) N_q + \frac{1}{2} (\gamma B) N_\gamma$$

WALL TO BE BUILT WITH A 6' COVER ON brown pebbly sandy clay-silty fill.
 Assume $\phi = 0$

$$q_{ult} = (\gamma d) N_q + \frac{1}{2} (\gamma B) N_\gamma$$



$$= (125 \times 5') 35 + \frac{1}{2} (110 B) 11$$

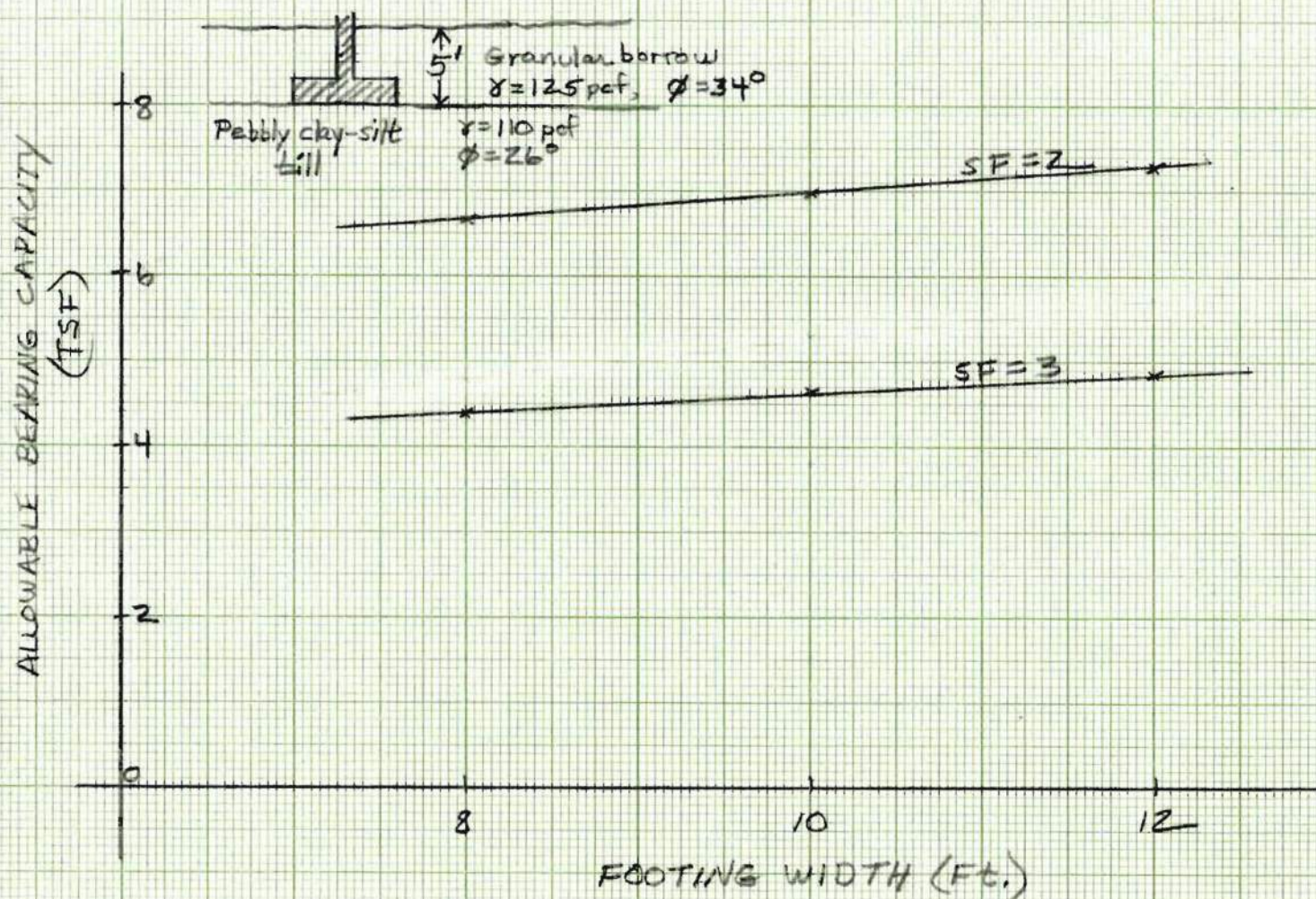
$$q_{ult} = 10.94 + .3B$$

B	q_{ult}	$FS=3$ q_{all}
8'	13.36	4.4
10'	13.96	4.65
12'	14.57	4.86

If a more conservative estimate is checked, then use
 surcharge $\gamma = 120 \text{ pcf}$ and $\phi = 32^\circ$

$$\text{Thus } q_{ult} = 8.4 + .3B$$

B	q_{ult}	$FS=3$ q_{all}
8'	10.82	3.6
10'	11.4	3.8
12'	12.0	4.0



BANGOR
FR-1

November 1, 1985

Norm Ricker

Design - Augusta

Pete Coughlan

M & R Soils - Bangor

Bangor - FR-1 Retaining Wall

At your request, I have reviewed the soil conditions along the proposed wall and visited the site to view the excavated conditions. As noted on the construction plans in the field office, ledge was encountered and removed at the following locations:

Ramp FR-1

Catchbasin at 6+00 -
Catchbasin at 8+00 -

Ledge Exaavation

El. 67.3 to 60.0
El. 61.0 to 57±

Mainline EB

Underdrain from
148+65 to 149+05 Rt.

El. 64.8 @ 148+65 to
66.0 @ 148+90 to
63.5 @ 149+05

Catchbasin @ 149+24

El. 63.0 to 60.0

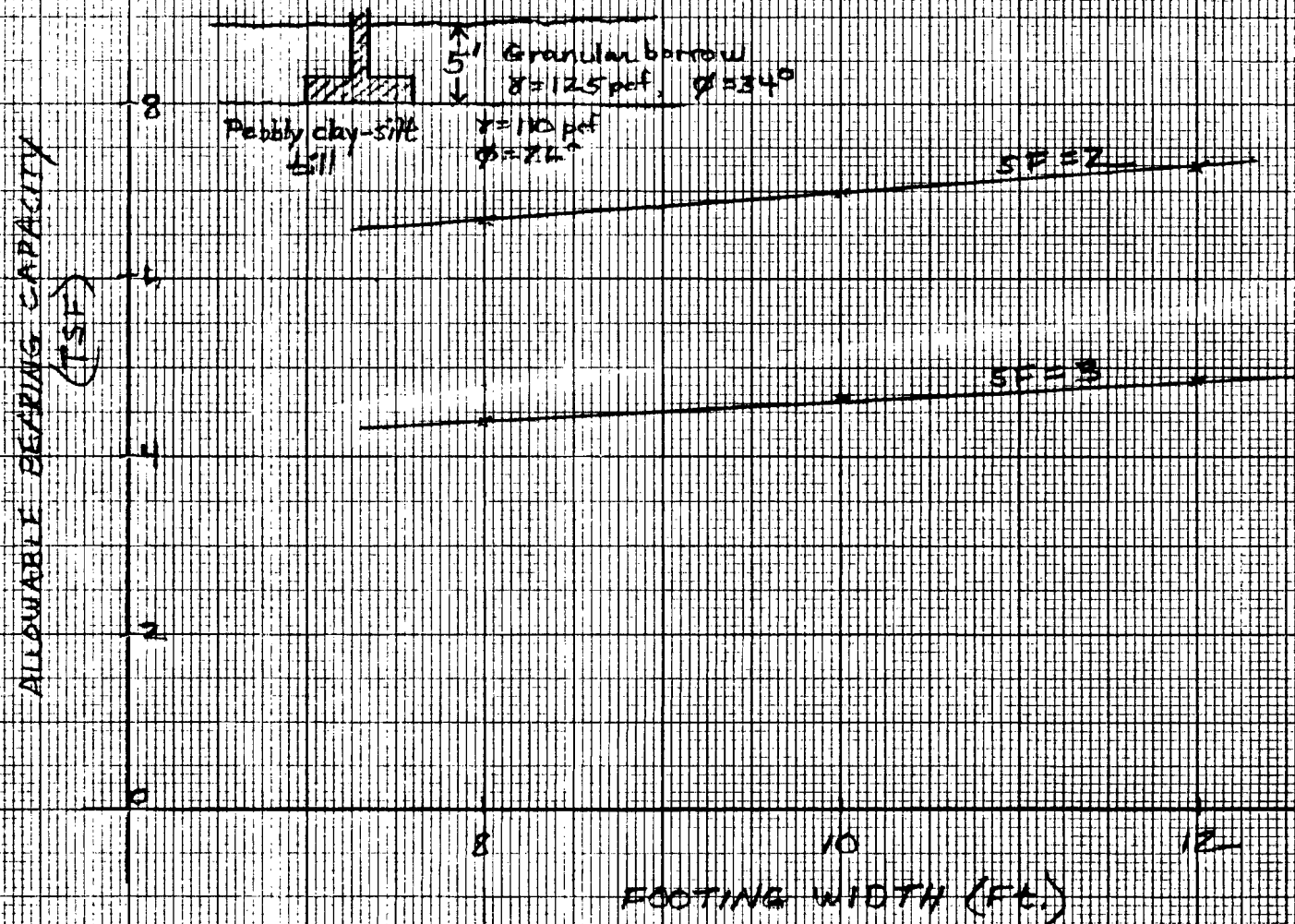
Also, a ledge outcrop is visible just to the right of the control edge from Station 5+50 to 6+00. It rises from approximately El. 69± to El. 72± at ten feet right of 5+70, and then down to Elevation +69±.

Realizing that the proposed wall will be located between Stations 5+72 and 9+07, it is obvious that ledge excavation is necessary for footing construction along a substantial length of the wall. If a five foot to six foot cover on the footing is required, then that puts the footing bottom near Elevation 64. From the ledge data that we have at this time, it appears that ledge excavation would be required along the first 150± feet of wall. The remaining 180± feet of wall footing appears to be above the ledge surface by a couple feet, however, the variability of the ledge surface may produce highpoints and lowpoints along this length.

It would probably be best to construct the entire footing along the ledge surface but, at your request, I am including a bearing capacity chart for construction of a footing on the native pebbly sandy silty till. This chart is highly dependent on the depth of footing (e.g. 5 foot cover of compacted granular borrow) and the backfill material's friction angle. Of lesser importance are the soil characteristics of the bearing materials.

Please call me if you would like to discuss this any further.

rej
cc: M. W. Morgan



BANGOR
FR-1