

Soils Report 71-50  
Eel Weir Bridge  
Burnham-Pittsfield  
Waldo-Somerset Counties  
Bridge No. 6209  
October 1971

*Office*

Maine State Highway Commission  
Materials and Research Division  
Soils Section

SUBSURFACE INVESTIGATION FOR A NEW EEL WEIR BRIDGE  
OVER THE SEBASTICOOK RIVER BETWEEN THE TOWNS OF  
BURNHAM AND PITTSFIELD

Waldo-Somerset Counties

Bridge No. 6209

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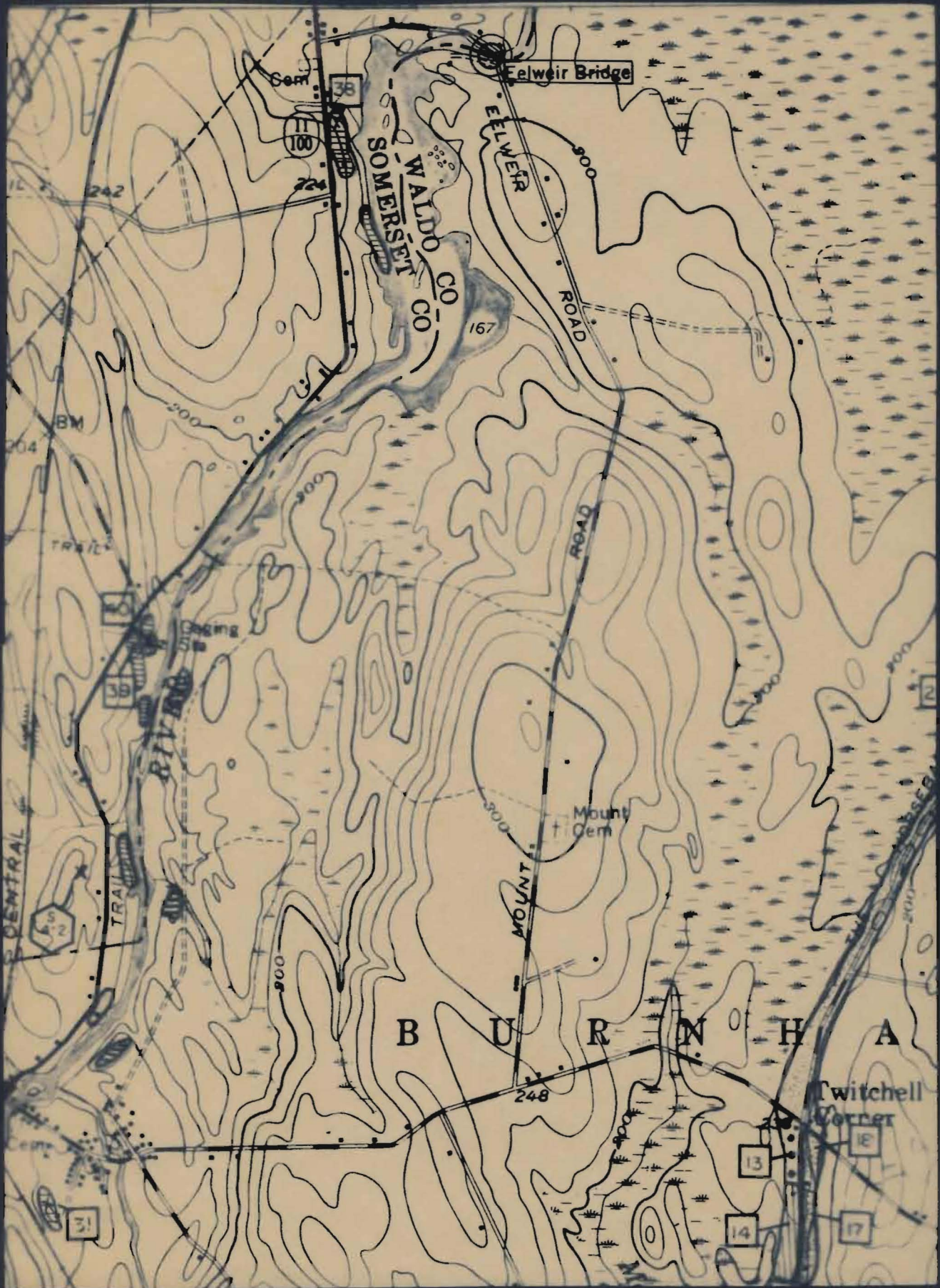


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## INTRODUCTION

A subsurface investigation has been completed for a new bridge over the Sebasticook River between the towns of Burnham and Pittsfield in Waldo and Somerset Counties. The proposed bridge will replace the existing Eel Weir Bridge which is located just upstream.

Eight borings were made during July and August of 1971 under the supervision of Mr. Chester Brown.

The plan and profile of the proposed bridge site together with the results of the explorations are shown on sheets 5 and 6 of the illustrations.

## GENERAL CONDITIONS

The Eel Weir Bridge is located approximately two miles east of the intersection of Eel Weir Road and Route 100. The proposed three span structure will replace a single span bridge in poor condition. A boring was made at Abutment No. 1 and three were made at Pier No. 1. Two borings were also made at each remaining pier and abutment. The south bank of the river is composed of medium density gray pebbly sandy silt. The north bank is composed of dense brown gravelly sand. The streambed consists of dense to very dense grayish brown gravelly silty sand. At approximately elevation 15 a thin layer of hard blue gray clay silt exists. Beneath this layer is dense to very dense gray sandy silt, pebbles and boulders.

## DETAILED CONDITIONS

### Abutment No. 1:

Boring CB-40-71 was made at station 11+16 three feet left of centerline. The boring encountered seven feet of medium density gray pebbly sandy silt. From 7 to 25 feet in depth dense brown gravelly silty sand was encountered.

Hard gray laminated clay silt was encountered in the next two feet. At a depth of 27 feet dense gray sandy silt, pebbles and boulders (till) was encountered. The boring was continued to a depth of 48 feet without refusal.

The approach to Abutment No. 1 of the existing bridge is composed of boulder fill. This material is in the area of the proposed Abutment No. 1. The boulder fill should be removed at the location of the proposed abutment and replaced with granular fill material.

It is recommended that Abutment No. 1 be supported on steel piles driven to adequate bearing or practical refusal. A spread footing is not advisable in this situation, because it is doubtful that adequate compaction of the fill material placed in the river can be achieved. It is estimated that the piles will penetrate to approximately elevation 8.

Pier No. 1:

Three borings were made at the Pier No. 1 location and similar conditions were encountered. CB-41 was made at station 11+62, 18 feet right of centerline. CB-44 was made at station 11+95, 14 feet left of centerline. A sample of the clay silt layer was not successfully taken, so CB-45 was made at nearly the same location. The borings encountered grayish brown gravelly silty sand to approximately elevation 15. A five to seven foot layer of hard gray clay silt with black specks and sand lines was then encountered. Beneath this layer very dense gray sandy clayey pebbly silt and boulders was encountered. CB-41 was continued to elevation -17 with no refusal encountered.

It is recommended that the pier be supported on a spread footing at a lower footing elevation of 25. If the design bearing pressure is two tons per square foot the settlement should be less than one inch. Adequate scour protection should be provided.

Pier No. 2:

Two borings were made at the location of Pier No. 2. CB-42 was made at station 12+94 of the tangent, 20 feet left. CB-43 was made at station 12+57 along the tangent, 17 feet right. Similar conditions were encountered at each boring. Very dense grayish brown gravelly silty sand was encountered to approximately elevation 11. Beneath this sand, the borings encountered hard gray clay silt with black specks and sand lines to approximately elevation 4. Beneath this layer, very dense gray sandy clayey silt, pebbles and boulders were encountered. CB-42 was continued to elevation -27 without encountering ledge.

It is recommended that the pier be supported on a spread footing at an elevation of 25. If the design bearing pressure is two tons per square foot the settlement should be less than one inch. Adequate protection against scour should be provided.

Abutment No. 2:

Two borings were made at the Abutment No. 2 location. CB-38 and CB-39 encountered similar conditions. Dense brown gravelly sand was encountered to an elevation of 39 in CB-38 and to elevation 33 in CB-39. Beneath this layer dense to very dense brown gravelly silty sand was encountered to approximately elevation 14. CB-39 was stopped at elevation 25 without encountering refusal. CB-38 encountered hard gray clay silt with sand lines and lenses between elevations 15 and 6. At elevation 6 very dense gray sandy silt, pebbles and boulders was encountered. The boring was continued to approximately elevation -46 without encountering ledge.

It is recommended that the abutment be supported on a spread footing. The footing elevation should be lowered to elevation 42 to let the entire footing

rest on the dense gravelly sand. Acceptable design bearing pressures are shown on sheet 1 of the illustrations. The fill material should be well compacted and scour protection should be provided. The existing soil is dense and should present no problem in adequately supporting the approach fill.

An alternate to lowering the footing and using a spread footing would be the use of piles driven to adequate bearing or practical refusal. It is estimated that piles would penetrate to approximately elevation 25.

#### SUMMARY

The foundation survey of the Eel Weir Bridge is shown on sheet 5 of the illustrations. The boring details are shown on sheet 6. The river bank at Abutment No. 1 was found to be medium density gray pebbly sandy silt with boulder fill in the existing abutment approach. The bank at Abutment No. 2 was found to be dense brown gravelly sand. The streambed is composed of dense to very dense grayish brown gravelly silty sand. At approximately elevation 15 a layer of hard blue gray clay silt was encountered. This layer was found to be approximately seven feet thick. Beneath this layer dense to very dense gray sandy silt, pebbles, and boulders was encountered.

A settlement analysis of the clay silt layer revealed that the layer is over consolidated. The analysis was conducted assuming that the contact pressure of the footings was 2.0 tons per square foot. Results showed that the settlement in the clay silt layer should generally not exceed one inch and should occur within the first few months after the footings are placed and loaded.

It is recommended that Abutment No. 1 be supported on steel piles driven to adequate bearing or practical refusal because of the problem of obtaining a well compacted embankment in the water.

It is recommended that the two piers and Abutment No. 2 be supported on spread footings. Acceptable design bearing pressures are shown on sheet 1 of the illustrations.

The footing elevations at the two piers should be lowered to elevation 25 to place them in the dense gravelly silty sand.

The footing at Abutment No. 2 should be placed at the lower elevation of 42 if a spread footing is used. This will allow the entire footing to be resting on the dense brown gravelly sand. The fill material should be well compacted.

Adequate scour protection should be provided around the piers as well as at the abutments.

Prepared by Robert M. Harmon  
Robert M. Harmon  
Assist. Soils Engineer

Approved by Melvin W. Morgan  
Melvin W. Morgan  
Soils Engineer

ALLOWABLE PRESSURE (TONS/SQ.FT.)

6  
5  
4  
3  
2  
1  
0

4 6 8 10 12

WIDTH OF FOOTING (FT)

ABUTMENT #2

DO NOT EXCEED THIS VALUE

RECOMMENDED DESIGN PRESSURE

DESIGN PRESSURES

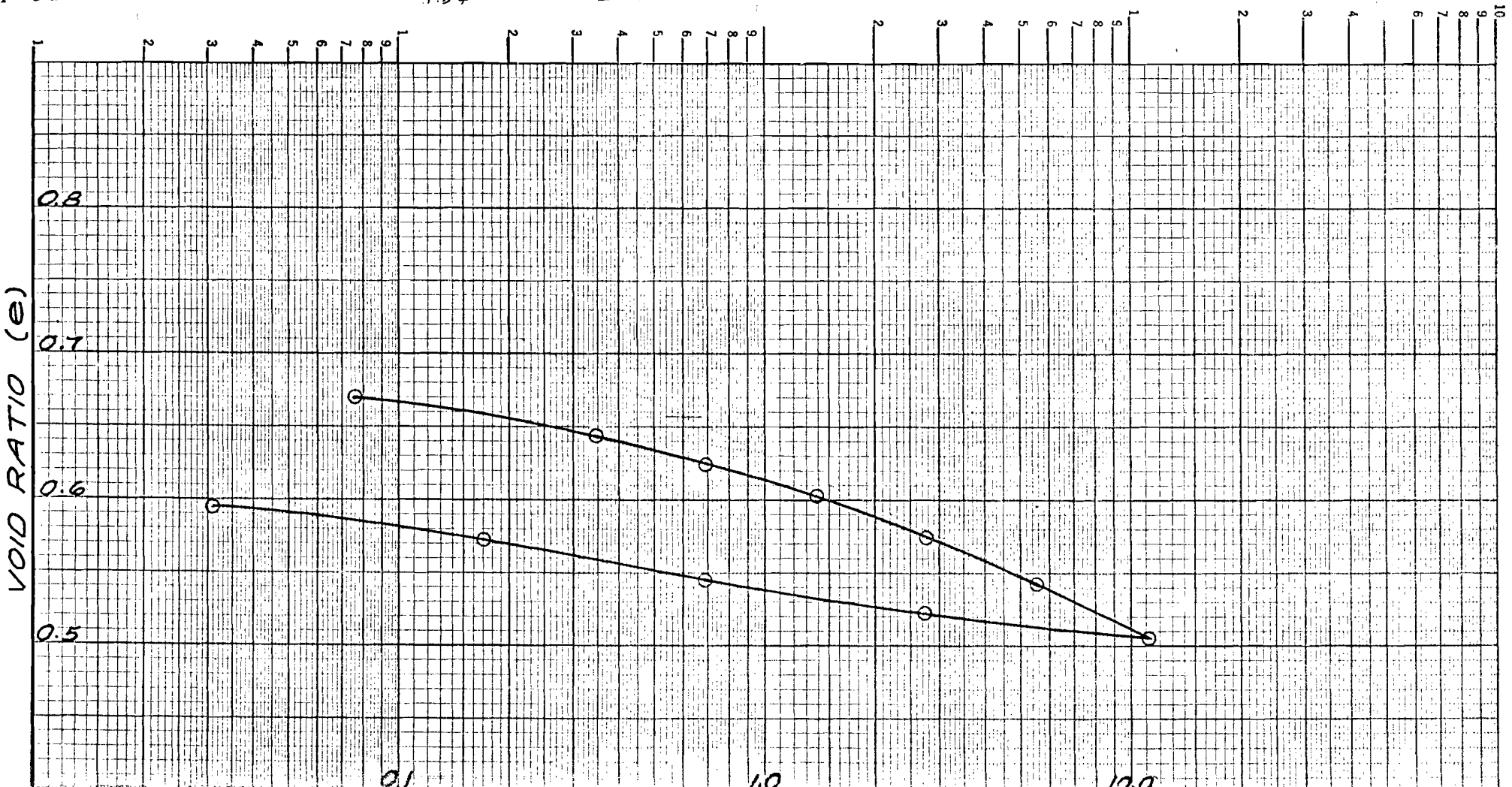
EEL WEIR BRIDGE  
BRIDGE NO. 6209

BURNHAM & PITTSFIELD

OCTOBER, 1971

K&E 10 X 10 TO THE INCH 0782  
7 X 10 INCHES  
MADE IN U.S.A.  
KEUFFEL & ESSER CO.

$G = 2.78$   
 $w = 87.30$   
 $s = 52.14$   
 $W_L = 25$   
 $W_P = 23$   
 71  
 SEMI-LOGARITHMIC  
 4 CYCLES X 70 DIVISIONS  
 KEUFFEL & ESSER CO.  
 Pent. 4.5+  
 LC-96  
 $C_c = 0.12$   
 $4.50$   
 $0.6$   
 $19$   
 $C_v = 146$   
 $72.45$   
 $25$   
 $16$   
 $63$



0.1 1.0 10.0  
PRESSURE (TONS/SQ. FT.)

MAINE STATE HIGHWAY COMMISSION  
 PRESSURE-VOID RATIO DIAGRAM  
**PITTSFIELD**  
 6209  
 BORING CB-43-71 SAMPLE 3U  
 OCTOBER 1971 LC-96  
 SOILS ENGINEERING LAB

SHEET NO. 2

6.2 2.79  
1.8764  
5.5583

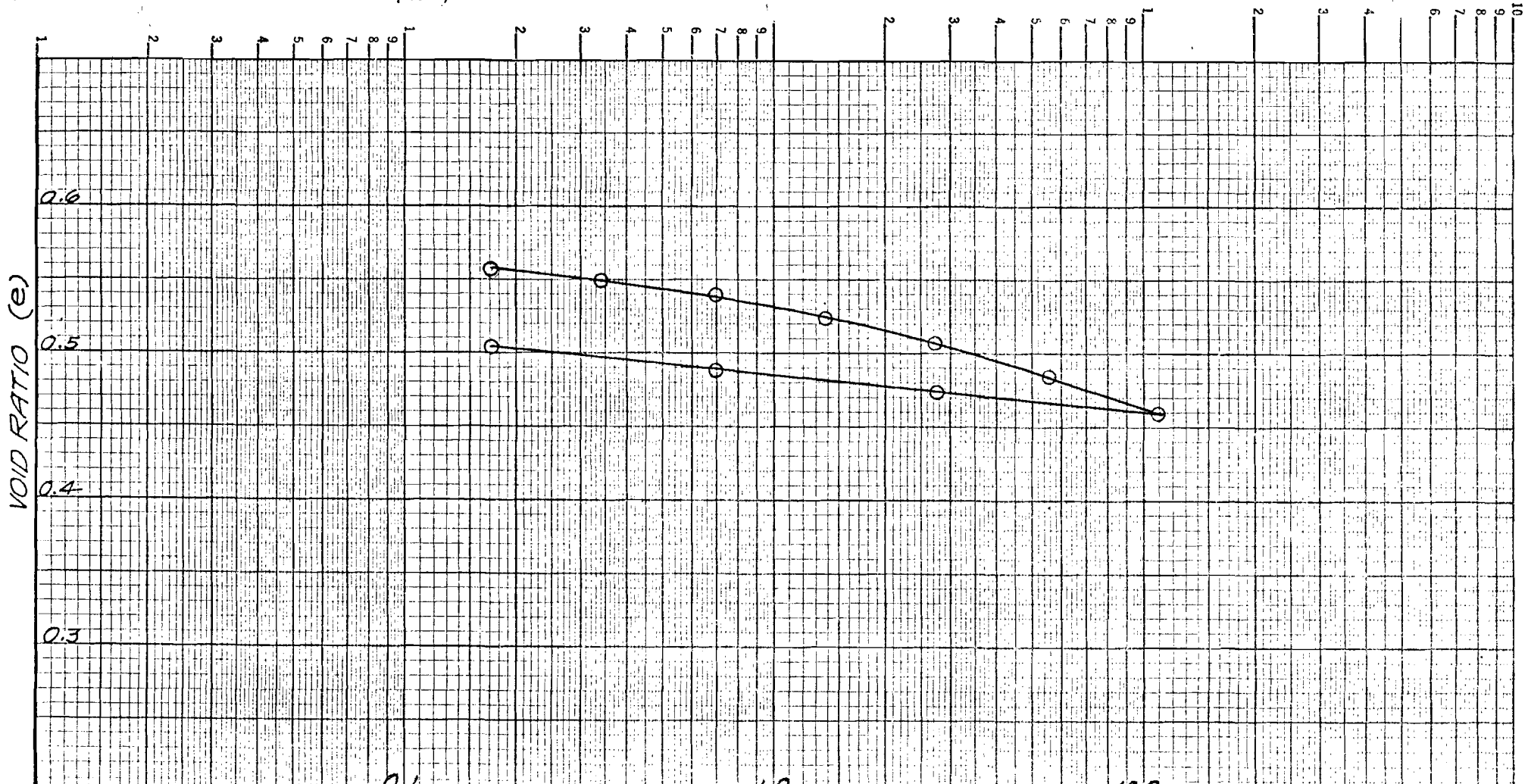
W<sub>c</sub> = 17  
W<sub>c</sub> = 18

SEMI-LOGARITHMIC  
4 CYCLES X 7 1/2 INCHES  
PILOT POINT 2.5+ KEUFFEL & ESSER CO. LC-95

C<sub>u</sub> = 0.08

V<sub>400+140</sub>

128 175



0.1 1.0 10.0  
PRESSURE (TONS/SQ. FT.)

MAINE STATE HIGHWAY COMMISSION  
PRESSURE - VOID RATIO DIAGRAM

PITTSFIELD  
6209

BORING CB-43-71 SAMPLE 4U  
AUGUST 1971 LC-95  
SOILS ENGINEERING LAB

SHEET NO. 3

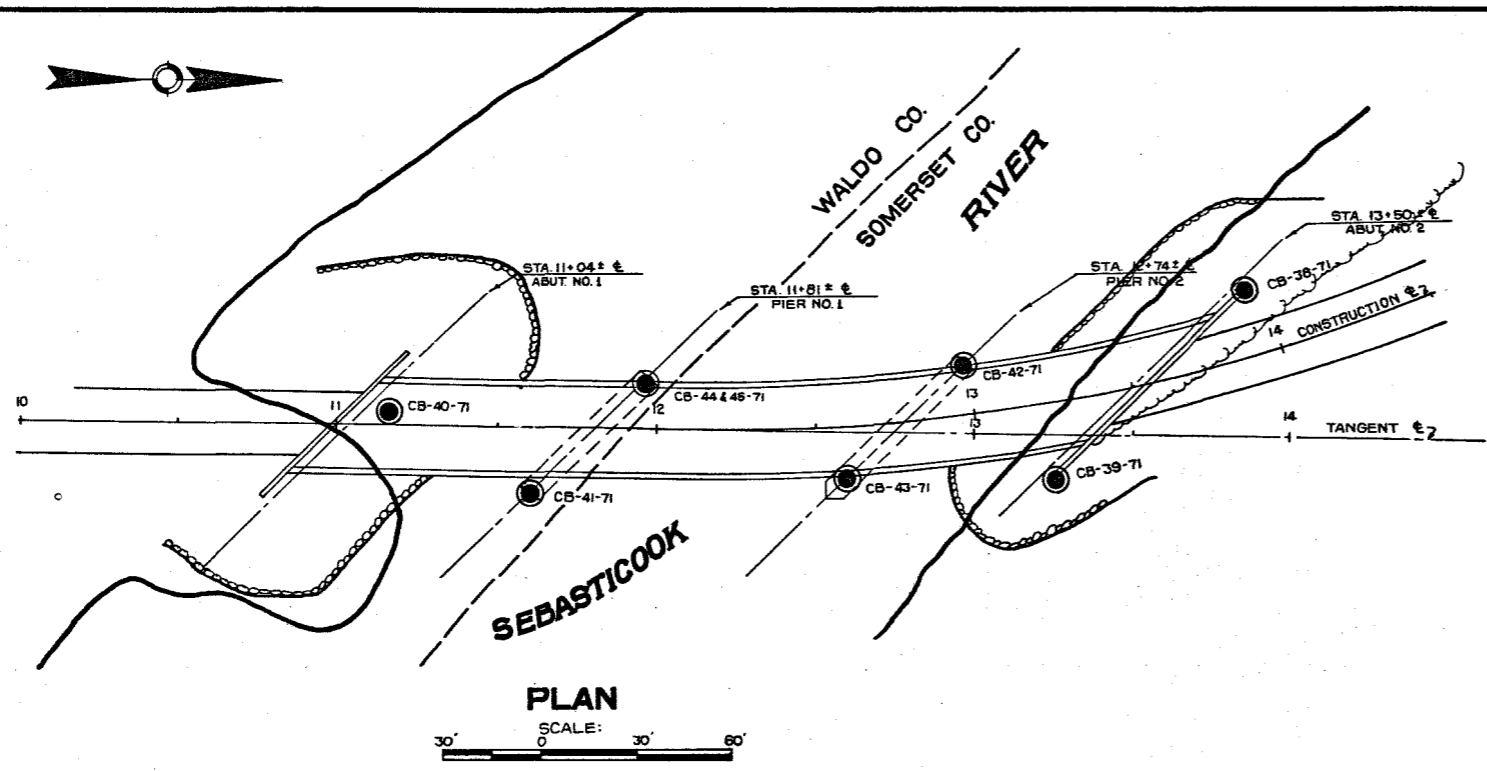
# LEGEND

## PLAN SYMBOLS

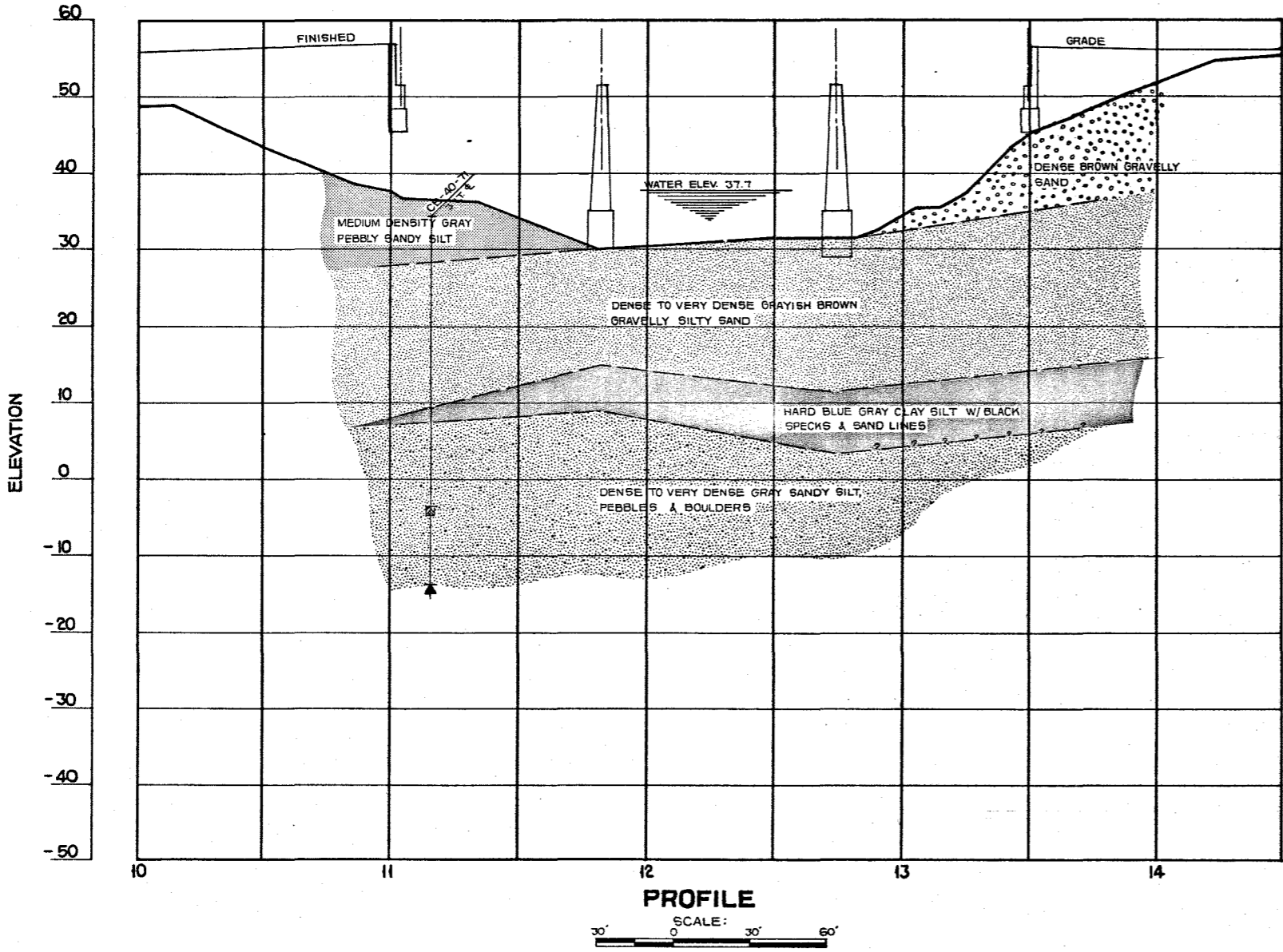
- ROD SOUNDING
- ⊗-----AUGER BORING
- ⊗-----BORING & SOUNDING
- ⊙-----WASH BORING
- ◇-----SEISMIC : SHOT LOCATION
- ◆-----RESISTIVITY : TEST LOCATION
- ⊠-----TEST PIT
- //////-----LEDGE ON SURFACE

## EXPLORATION NOTES

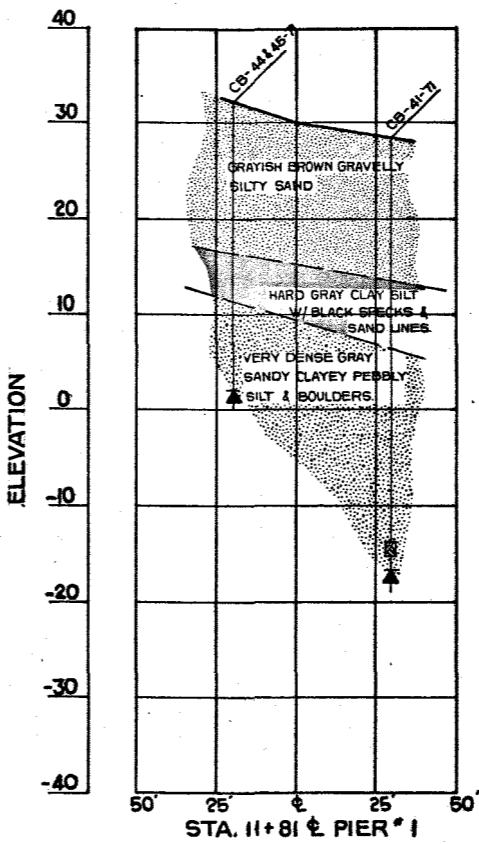
- ≡-----WATER LEVEL
- $\frac{10}{18}$ -----BLOWS PER FOOT - ROD SOUNDINGS
- $\frac{\text{CLAY}}{B-160}$ -----MATERIAL & SAMPLE NO.-AUGER BORINGS
- $\frac{2}{8}$ -----DEPTH OF MATERIAL CHANGE (IN FEET)
- ▲-----BOTTOM OF EXPLORATION
- ▲-----REFUSAL
- //////-----LEDGE



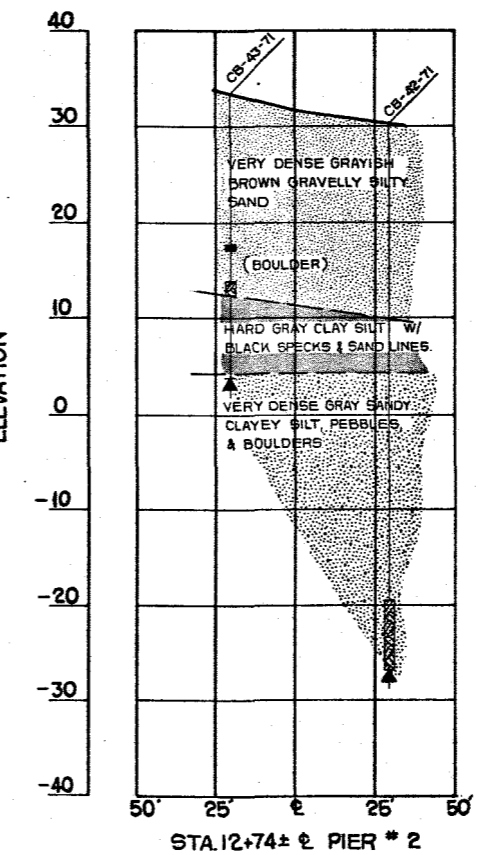
**PLAN**  
SCALE: 0 30' 60'



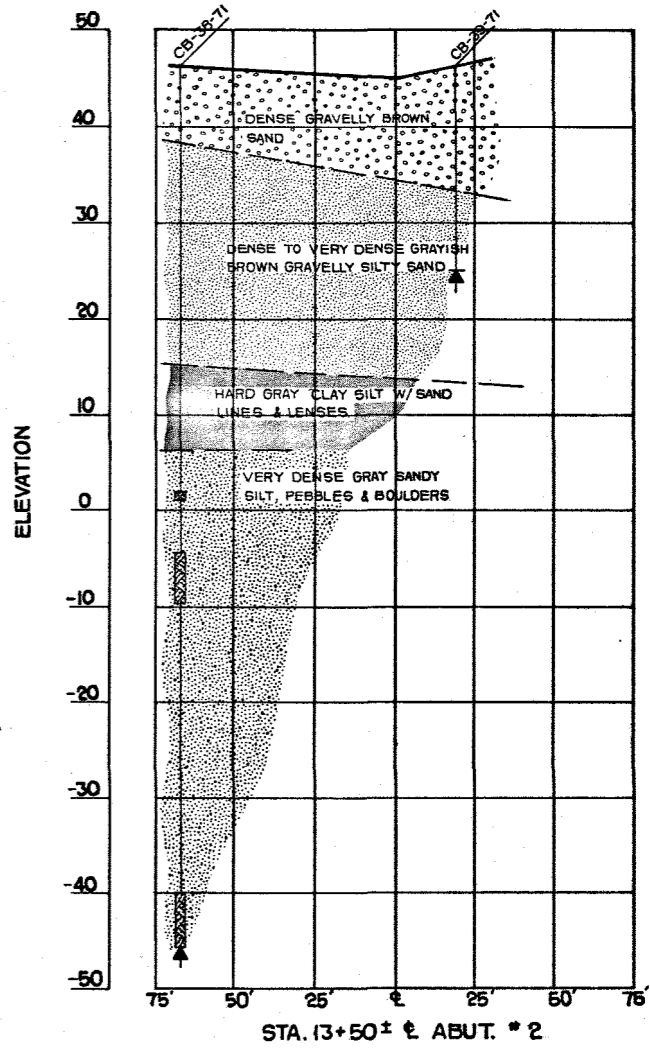
**PROFILE**  
SCALE: 0 30' 60'



STA. 11+81± PIER # 1



STA. 12+74± PIER # 2



STA. 13+50± ABUT. # 2

TRANSVERSE SECTIONS

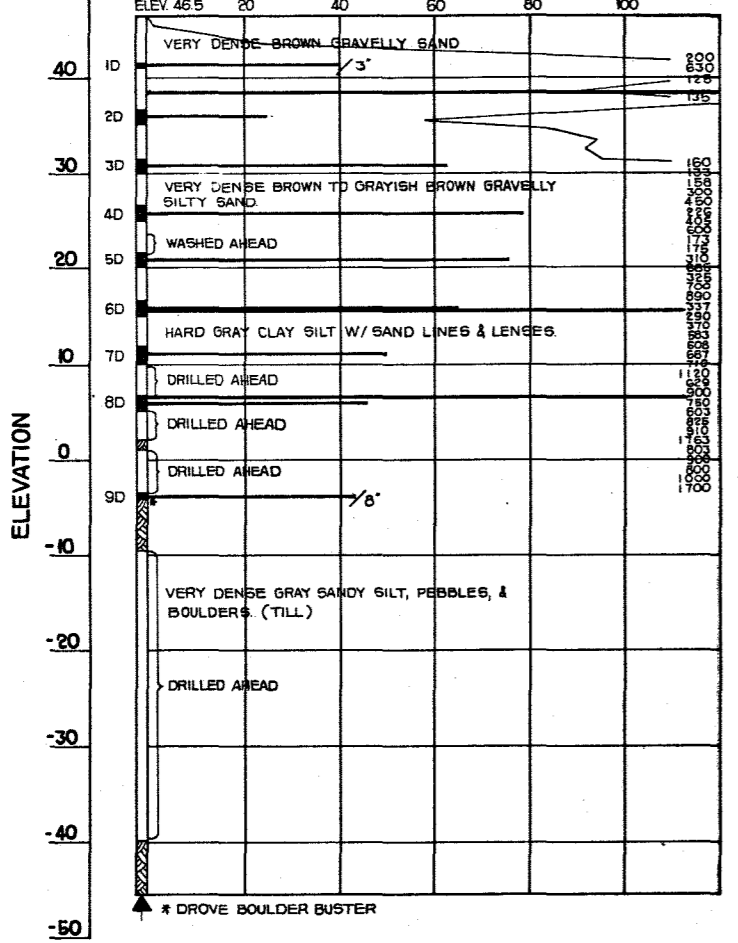
BY	DATE
DESIGN - DETAILED	
CHECKED	
REVISIONS	
FIELD CHANGES	

**PLANS**

STATE HIGHWAY COMMISSION  
**EEL WEIR BRIDGE**  
 OVER  
**SEBASTICOOK RIVER**  
 BETWEEN THE TOWNS OF  
**BURNHAM & PITTSFIELD**  
 WALDO & SOMERSET COUNTIES  
 FOUNDATION SURVEY  
 SHEET OF AUGUSTA, MAINE

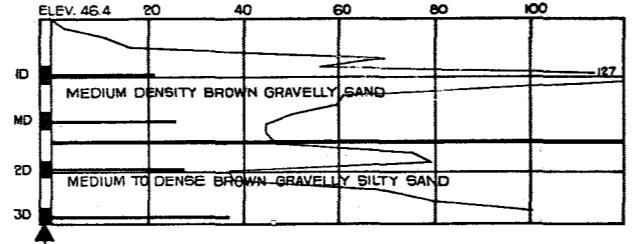
**BORING CB-38-71**

STA. 13+68 46' LT. OF TAN.  $\phi$



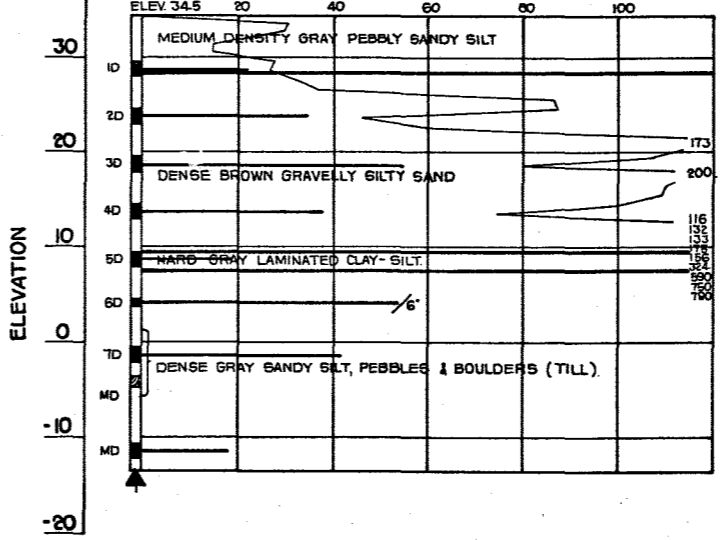
**BORING CB-39-71**

STA. 13+10 13' RT. OF TAN.  $\phi$



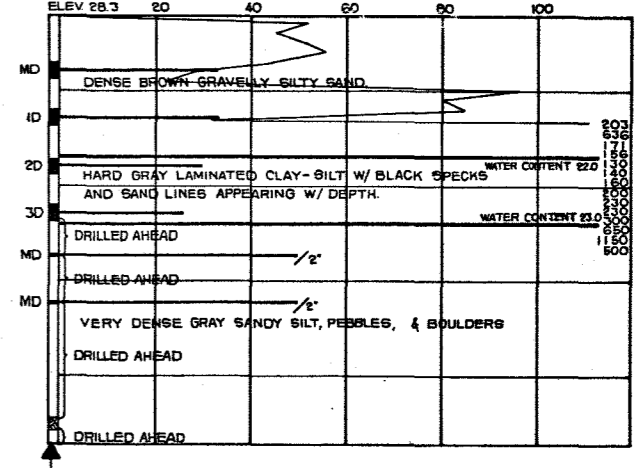
**BORING CB-40-71**

STA. 11+16 3' LT.



**BORING CB-41-71**

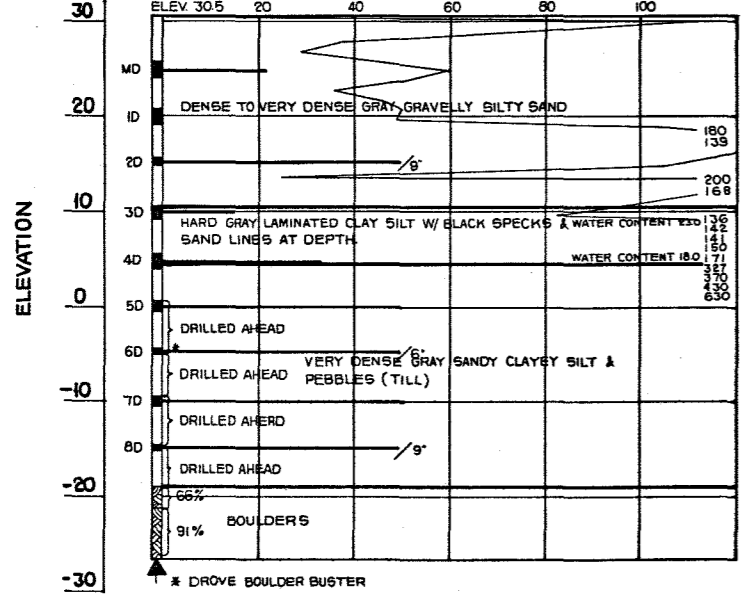
STA. 11+62 18' RT.



DATE	
BY	
DESIGN - DETAILED	
CHECKED	
REVISIONS	
FIELD CHANGES	
<b>PLANS</b>	

**BORING CB-42-71**

STA. 12+94 20' LT. OF TAN.  $\phi$

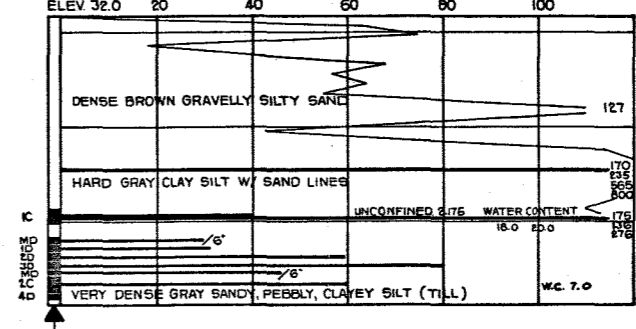


**BORING CB-43-71 STATION 12+57 17' RT. OF TAN.  $\phi$**

ELEVATION	CASING SIZE	DRIVING RESISTANCE		VANE SHEAR STRENGTH		WATER CONTENT	
		Blows / ft.		Tons / sq. ft.		Percent	
		20	40	0.4	0.8	20	40
33.6	4"						
32.0		860	300				
31.5		148	144				
31.0		211	179				
30.5		526	281				
30.0		108	108				
29.5		410	611				
29.0		900	600				
28.5		700	600				
28.0							
27.5							
27.0							
26.5							
26.0							
25.5							
25.0							
24.5							
24.0							
23.5							
23.0							
22.5							
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19.5							
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18.5							
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16.5							
16.0							
15.5							
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10.5							
10.0							
9.5							
9.0							
8.5							
8.0							
7.5							
7.0							
6.5							
6.0							
5.5							
5.0							
4.5							
4.0							
3.5							
3.0							
2.5							
2.0							
1.5							
1.0							
0.5							
0.0							
-0.5							
-1.0							
-1.5							
-2.0							
-2.5							
-3.0							

**BORING CB-44 & 45-71**

STA. 11+95 14' LT.



**BORING NOTES**

- All samples and vane 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 samples
- S 1/4 H sampler # 1290's
- 2" O.D. 16 ga seamless tubing
- 3 1/2" O.D. 16 ga seamless tubing
- 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)
- Locations cored by diamond bit and per cent recovery of rock
- WATER CONTENT NOTES**
- Natural water content, given as per cent of dry weight
- Plastic and liquid limits
- SHEAR NOTES**
- Shear strengths in excess of capacity of equipment
- One half unconfined compressive strengths

STATE HIGHWAY COMMISSION

**EEL WEIR BRIDGE**

OVER

**SEBASTICOOK RIVER**

BETWEEN THE TOWNS OF

**BURNHAM & PITTSFIELD**

**WALDO & SOMERSET COUNTIES**

BORING DETAILS

SHEET OF AUGUSTA, MAINE