

FOUNDATION INVESTIGATION REPORT

W.P. 122-61, HIGHWAY 62

INDIAN RIVER IN ALICE

DISTRICT NO. 10 BANCROFT

DEPARTMENT OF HIGHWAYS OF ONTARIO

Submitted By

ASSOCIATED GEOTECHNICAL SERVICES LIMITED
211 Davenport Road, Toronto 5, Ontario.

January 10, 1962.

Mr. A. M. Foye,

Bridge Engineer.

Materials & Research Division,

(Foundation Section)

Attention: Mr. S. McCoskie.

January 18, 1962.

FOUNDATION INVESTIGATION REPORT

By: Associated Geotechnical
Services, Limited.

Re: S.P. 122-61, Highway 62,
Indian River in Alice,
District No. 10, Bazaroft.

Attached, we are sending you the above-mentioned report submitted by the Consultant, Associated Geotechnical Services, Ltd., Toronto, Ont.

We have reviewed the report and, subsequently, had some discussions with the Consultant concerning the amount of settlement of the structure.

The settlement analysis was carried out on the basis of only one oedometer test. The moisture content of the tested sample is 51.4%, which is higher than any other sample, and can therefore hardly be regarded as representative. The settlement result was not corrected for the discrepancy resulting from the use of oedometer results.

In the light of the above-mentioned facts, it is our opinion that the settlements mentioned in the report can be reduced some 40 to 50%. Since the rate of settlements will be quite slow, we believe that serious consideration can be given to a spread footing design.

We believe that the report and the above-mentioned additions will prove to be sufficient for your future design work. However, should there be any other questions that you would like to discuss, please feel free to contact our Office.

402 / 4167

Attach.

cc: Messrs. A. M. Foye (2)
E. A. Fregashas
H. C. McMillan
J. Ford
C. S. Robertson
J. C. Graspier
H. J. Kovich
A. Foy

Afternoon
A. C. Stemas,
PRINCIPAL FOUNDATION ENGINEER

E. E. Saint
F. Norman
A. Watt
Foundations Office
Gen. Files.

Pembroke, Ont.
Dec 7, 1961

Mr. A. Rutka,

A/Materials & Research Engineer

Department of Highways,

Parliament Buildings,

Toronto 5, Ont.

Attn. Mr. A. Stemas.

Dear Sir:-

Re: W.P. 122-61. Hwy #62, Indian
River in alio, District #10, Bancroft

Please find attached one copy
of a preliminary borehole log for the
first boring at the above site.

Yours very truly,

John Kilgour

enc.

YOUR REF.

OUR REF.

211 DAVENPORT ROAD
TORONTO 8, ONTARIO
WA. 3-3271Borehole Log

Project: W.P. 122-61

Location: Chag 141+10 - 35' E (approx. only)
approx. elev. 452Borehole # 10-2 ft. - brown organic material
(recent alluvium)2' - 33.5 - very stiff grey clay with
silt; occasional horizontal fine
sand parting in bottom few feet.
In-situ shear strength as determined
by vane tests ≈ 3000 lbs per
square foot33.5 - 38.0 - medium dense gravel with
sand; water bearing, head =
ground level plus one foot, flow at
ground level about one cup per
minute

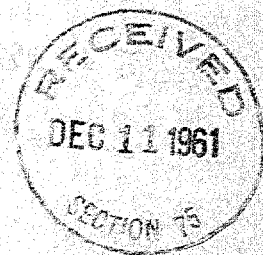
(over)

38.0 - 47.5 medium dense gray sand
(well graded fine to coarse)

41.5 - 47.5 - very dense gray sand
(interbedded fine to medium and
coarse) penetration resistance
= 148 blows per foot.

47.5 end of borehole.

Note During making water when casing
removed, however, the water stopped when
the hole was backfilled with soil.



OFFICE LOCATION -
DOWNSVIEW AVE.,
KEELE ST. - HIGHWAY 401
TORONTO, ONTARIO.



ONTARIO
DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS -
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS,
TORONTO 5, ONTARIO.

Bridge Division,
November 20, 1961.

MEMORANDUM TO:

Mr. A. G. Stermac,
Principal Foundation Engineer,
Department of Highways,
Room 107, Lab. Bldg.,
DOWNSVIEW, Ontario.

RE: W.P. 122-61
Indian River Bridge at Alice
Hwy. No. 62 - Line "D"
District No. 10

Enclosed find one copy of the site plan for the
above proposed structure indicating the probable
footing locations.

Would you kindly arrange to have a foundation
investigation of sufficient magnitude carried out
to enable us to design the structure.

JBC/ea
cc. D. Smith
R. Fitzgibbon

J. B. Curtis,
Bridge Location Engineer.

This job has been given to Associated Geotechnical (John K...)
on Nov 29th 1961. Lett. of authority has been sent.
M. Benda
also Bancroft district
and arranged to survey Line D.

Re: W.P. 122-61, Highway 62.

Indian River in Ellice

Dist. No 10, ~~Area~~ Ramerote.

Mr. J. Curtis of Bridge office requested this section whether they can use $1\frac{1}{2}\%$ slopes for the approach fills. It is also indicated by structure may not be a single span structure.

This Section reviewed the Submittal Conditions and made the following comments to Mr. J. Curtis on the phone.

1) The forward slopes of the structure can be constructed with $1\frac{1}{2}\%$ slopes provided the slopes are protected with rip-rap. The toe of the forward slopes should be at the proposed alignment shown on page 2 of the report. (This can only be completed if the proposed structure will be more than eight spans).

2) The side slopes for the embankment should be as recommended.

M. Nevada

Feb 21/62



ONTARIO

DEPARTMENT OF HIGHWAYS

Bridge Division.

Memo to	Mr. A. G. Stermac, Principal Foundation Eng., Room 107, Lab. Bldg.	Date	April 9, 1962.
From	J. B. Curtis	Subject	W.P. 122-61 - Dist. #10 Hwy. #62 at the Indian River Bridge Approx. 1.4 mi. E. of Alice

Enclosed find one copy of the Preliminary Plan for the structure proposed at the above location.

The designer has specified H-piles driven as indicated in the Foundation Report as done by Assoc. Geotechnical Services.

The use of piers on abutments in the river necessitated the use of considerable sheet piling both for unwatering and scour protection. This proposal will obviate any such difficulties.

JBC/ea
cc. N. D. Smith

J. B. Curtis,
Bridge Location Engineer.

1961 NOV 30 AM 9:58

file WP 122-61

DOWN BANC 1 NOV 30 9:18 AM

MR K G SELBY OR M DEVATA - MAT AND RESEARCH

RE INDIAN RIVER BRIDGE - W P 122-61 HWY 62 ALICE TWP

THIS IS TO CONFIRM THAT THE CENTRE LINE ON LINE "D", IN

THE VICINITY OF THE A/M STRUCTURE WILL BE RUN-IN BY TUES

DEC 4, 1961. WHEN SPEAKING ON THE PHONE I WAS THINKING OF

THE INDIAN RIVER BRIDGE IN PEMBROKE ON HWY 41.

K WESTERBY FOR C R ROBERTSON DIST ENGR

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SECTION 1

INTRODUCTION

The purpose of this report is to present the results of a foundation investigation carried out in connection with the proposed new bridge on Highway 62, revision line "D" over the Indian River. The site is located in lot 10, Concession X in the Township of Alice, County of Renfrew.

The work was authorized by Mr. A. Rutka, A/Materials and Research Engineer, on November 28, 1961.

SECTION 2SUMMARY

The soil conditions at the site consisted of a shallow depth of granular material overlying about 35 feet of very stiff sensitive glacial clay which in turn overlay several feet of very dense sand, some gravel.

Considering a single span structure, retaining wall type abutments founded on spread footings, would have an allowable bearing capacity of about 5 kips per square foot. However, settlement was estimated at 3.4 inches for the north abutment and 4.8 inches for the south abutment.

A three span structure with piers located at chainages 140 + 11 and 139 + 39 founded on spread footings would have an allowable bearing capacity of about 5 kips per square foot. Settlements have been calculated at 2.3 inches for the north pier and 2.7 inches for the south pier.

Alternatively the structure may be supported on end bearing piles driven to refusal in the very dense sand stratum underlying the clay.

No stability problems are anticipated with the approach fills.

DISCUSSION OF PROCEDURES

3 (a) Field Procedures

The borehole layout for this investigation was established by the field Soils Engineer. The locations of the boreholes are shown on the plan (Figure 1) in the Appendix. Initially, the borings were laid out in the field by chaining from a set of centreline chainage stakes established by D.H.O. surveyors. The locations of the borings were more accurately determined later by a D.H.O. survey crew.

The field drilling program consisted of four soil borings and four dynamic cone probes. One trailer mounted Boyles screw feed drilling rig was used on this project. All soil boring and sampling operations were completed by an experienced soil sampling crew under the full time supervision of a qualified Soils Engineer.

The soil boring was carried out using normal wash boring techniques. Samples of cohesionless soil were obtained in split spoon samplers in conjunction with the standard penetration test. Samples of cohesive soil for laboratory testing were obtained by pushing a 2 inch diameter Shelby tube into the soil. Insitu measurements of soil shear strength were made using 2 inch and 1.5 inch diameter vanes and a torqometer calibrated in inch-lbs. Dynamic cone probes were made by using a 2-inch O.D. 60 degree cone point attached to the end of an A-rod. The probe was advanced into the soil by ramming, using a 140 lb hammer falling freely 30 inches. The number of blows for each foot of penetration was recorded. The depths at which samples were taken in each borehole, the vane shear tests and the dynamic cone probe penetration resistance have been plotted on the borehole logs included in the Appendix.

3 (b) Laboratory Procedures

Various laboratory tests have been carried out on representative samples of the clay layer found beneath the proposed structure. These include:

1. Moisture Content
2. Plastic and Liquid Limit
3. Unit Weight
4. Consolidated Undrained Triaxial Compression
5. Consolidation

All soil tests were carried out in the soils laboratory of Associated Geotechnical Services Limited. In general, the methods of test followed those outlined in "Soils Testing For Engineers" by T.W. Lambe and "The Triaxial Test" by Bishop and Henkel.

SECTION 4

DISCUSSION OF SITE

The soils at the site are shown in profile on Figures 1 and 2 in the Appendix. The soil data details for each borehole are shown on the borehole logs and in the laboratory test results. Bedrock was not encountered in any of the borings at the site.

The Indian River flows from west to east in the site vicinity and is bounded on the north by a 13 foot high bank and on the south by a 4 foot bank. The main types of soil encountered on the north side of the river are listed below in order of their occurrence below ground surface on the top of the river bank.

1. 4.5 feet of medium dense sand and gravel.
2. 3 feet of stiff grey clay.
3. 1.7 feet of sand and gravel.
4. 3.2 feet of very stiff grey clay.
5. 13.5 feet of very dense sand, some gravel.

On the south bank the soils encountered were as follows:

1. 6.5 feet of medium dense sand, some silt.
2. 3.7 feet of very stiff grey clay.
3. More than 8 feet of very dense sand, some gravel.

A series of laboratory tests were carried out on clay samples from Borehole No. 3. These samples were chosen as representative of the clay soil profile. The results of moisture content, unit weight and Atterberg limit determinations carried out on samples from this Borehole are listed below in Table 1.

TABLE NO. 1
SUMMARY OF LABORATORY TESTS

BOREHOLE NO. 3

CLAY STRATUM

<u>Sample No.</u>	<u>Percent Moisture Content</u>	<u>Unit Weight (pcf)</u>	<u>Liquid Limit</u>	<u>Plastic Limit</u>	<u>Plastic Index</u>
2	42.0	113.4	-	-	-
3	42.2	-	27.2	19.9	7.3
4	39.7	115.5	-	-	-
5	46.5	-	37.5	21.9	15.6
6	46.2	115.0	-	-	-
7	44.2	-	44.8	23.4	21.4
8	42.8	114.8	-	-	-
9	38.6	-	36.8	20.6	16.2

The results of the Atterberg limit determinations have been plotted on Casagrande's plasticity chart (Chart overleaf) and were found to form a straight line roughly parallel to the A line and falling within the boundary of typical clays.

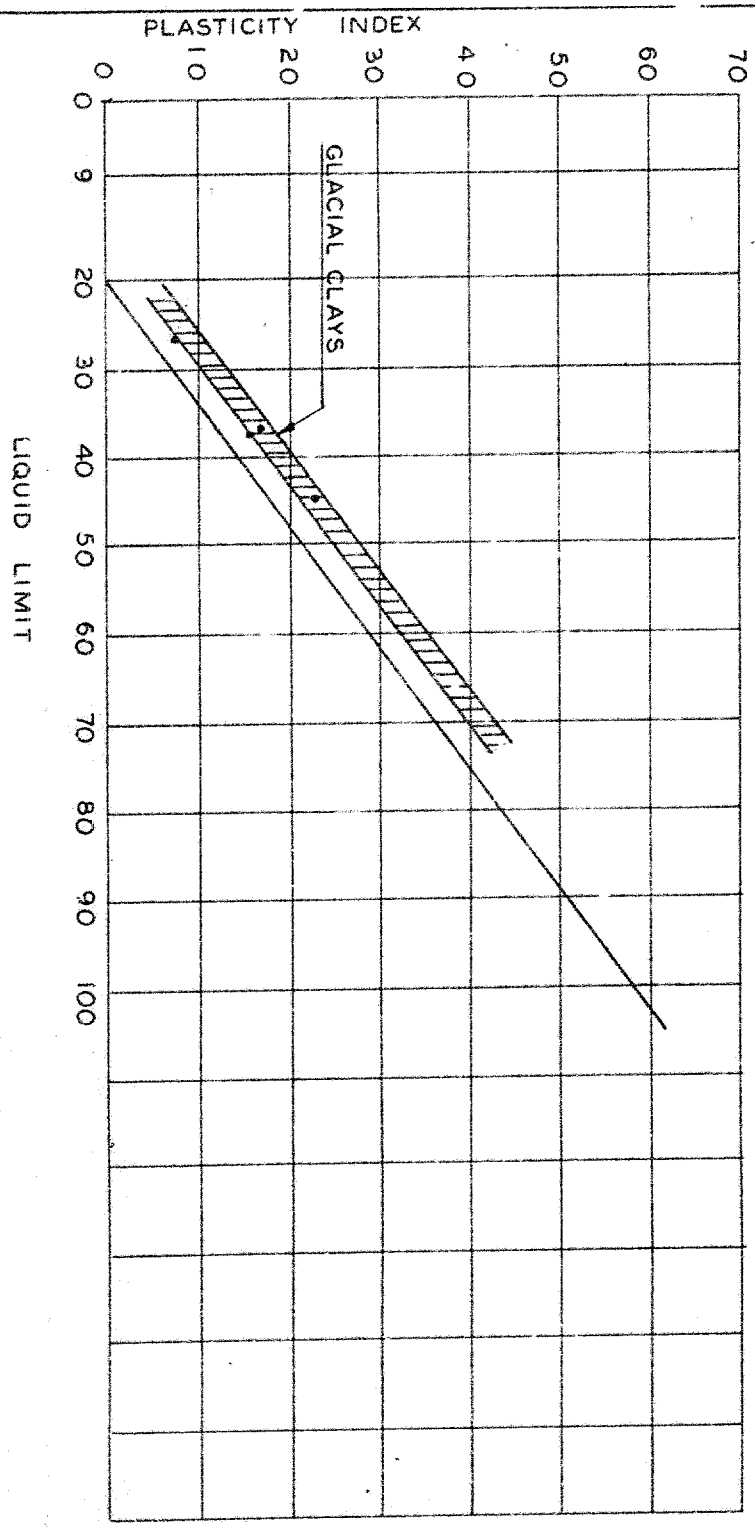
The undisturbed shear strength of the clay layer was determined by insitu vane shear tests and found to vary from about 1.3 to 2.5 tons per square foot. The remoulded shear strength was found to vary between 0.1 and 0.5 tons per square foot. In general, the shear strength was found to increase with depth.

In order to assess the vane shear results, three undisturbed samples from Borehole No. 3 were consolidated in a triaxial cell at the estimated present overburden pressure. The specimens were then failed to determine their consolidated, undrained shear strength in terms of total stress. The results of these tests have been plotted on the borehole logs and are also included with other laboratory test data in the Appendix.

A consolidation test was carried out on Sample No. 4 from Borehole No. 3. The results of this test are summarized on Chart 2 overleaf. It should be noted that the clay from this sample had an apparent pre-consolidation load of about 4.2 Kg/cm^2 .

CLIENT DEPARTMENT OF HIGHWAYS - ONTARIO
JOB. NO. 6143 LOCATION INDIAN RIVER BRIDGE
BOREHOLE NUMBER _____ DEPTH _____
SAMPLE NUMBER _____ DATE _____

PLASTICITY CHART



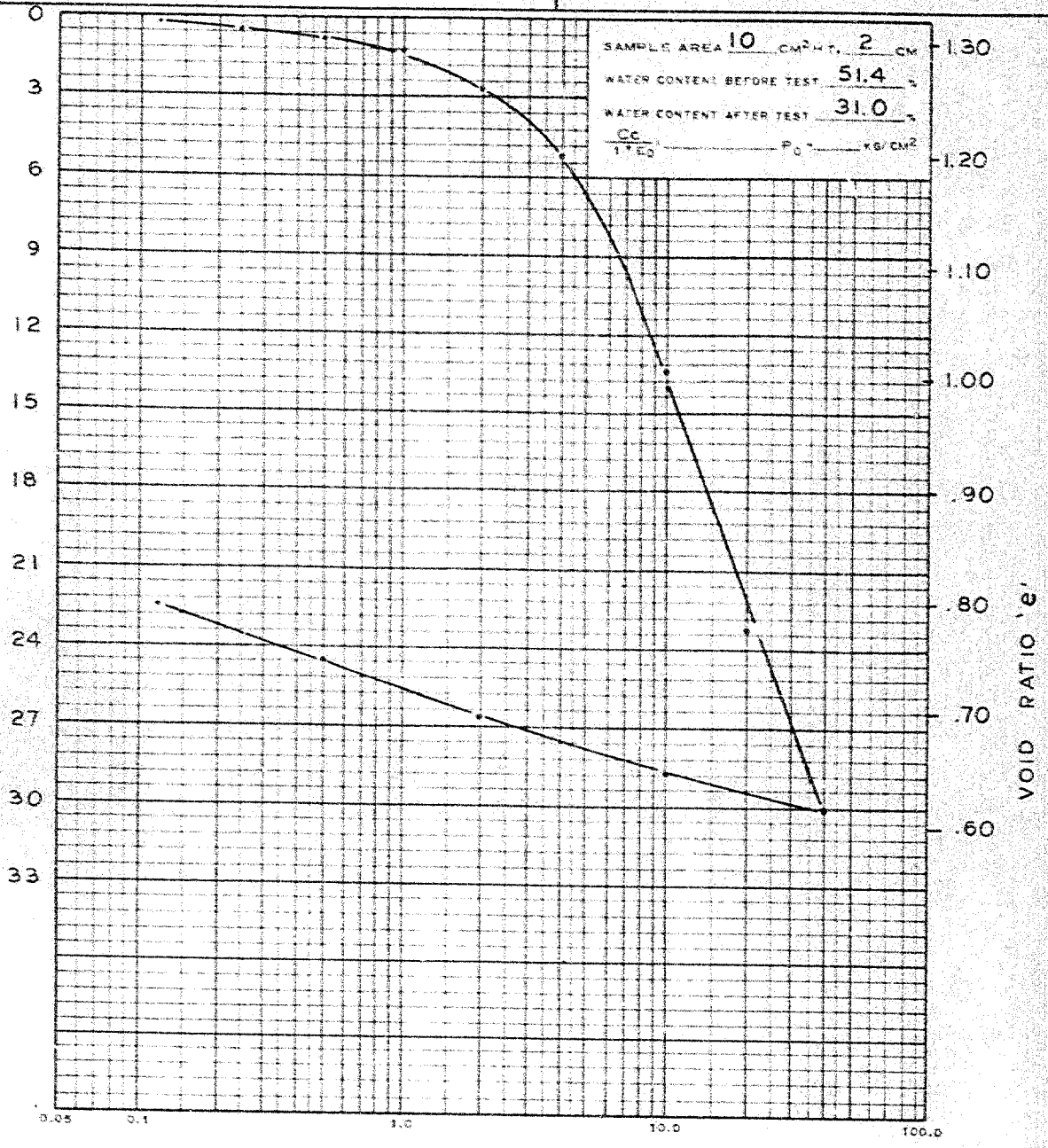
CLIENT DEPARTMENT OF HIGHWAYS - ONTARIO
 JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE
 BOREHOLE NUMBER 3 DEPTH 20'
 SAMPLE NUMBER 4 DATE 10-1-62

ASSOCIATED GEOTECHNICAL SERVICES

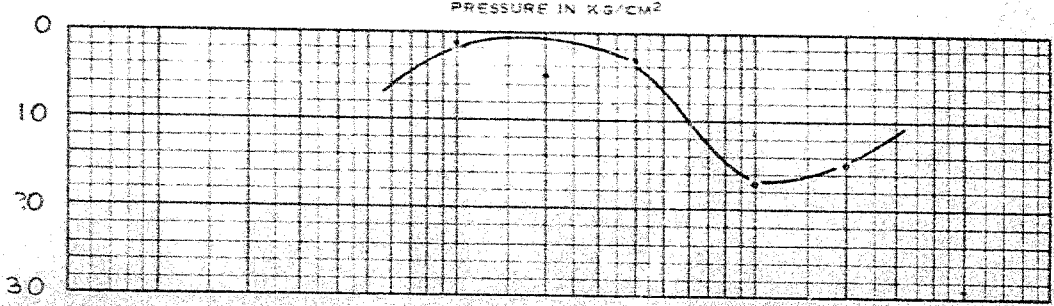
Limited

SOIL MECHANICS LABORATORY
 CONSOLIDATION TEST

STRAIN $\epsilon = \frac{\Delta h}{h_0}$ PERCENT



CONSOLIDATION CV, -4
 IN CM²/SEC. X 10



No laboratory tests were carried out on the sand samples from above or below the clay layer.

Artesian water conditions were found to exist below the clay layer. Measurements of the flows and static heads encountered are recorded on the borehole logs.

SECTION 5

DISCUSSION OF PROPOSED STRUCTURE

Prior to the writing of this report, a single span structure had been considered at this site with abutments near chainages 139 + 39 and 140 + 11. The abutments had been skewed at an angle of 20° from the perpendicular to the centreline of roadway. The abutments were located near soil profiles A-A and B-B shown on Figure 1 in the Appendix.

The proposed road grade is shown on Figure 2 in the Appendix. The approach fill to the south abutment would be about 16 feet high behind the south abutment. The north approach fill would be in the order of 8 feet high at the top of the north river bank.

Consideration has been given to the possibility that a 3-span structure may be economically feasible at the site.

(a) Spread Footings

Considering the use of spread footings to support a single span structure, we have assumed that the method of placing the footings would be as follows:

1. A steel sheet piled cofferdam would be driven down to an elevation about 5 feet below the existing stream bed, i.e., to elevation 440.
2. The soil inside the cofferdam would be excavated down to about elevation 445.
3. A concrete footing slab would be poured inside the cofferdam and the walls of the abutment formed.
4. The cofferdam would be backfilled with coarse granular material up to the sheet pile cut off elevation.

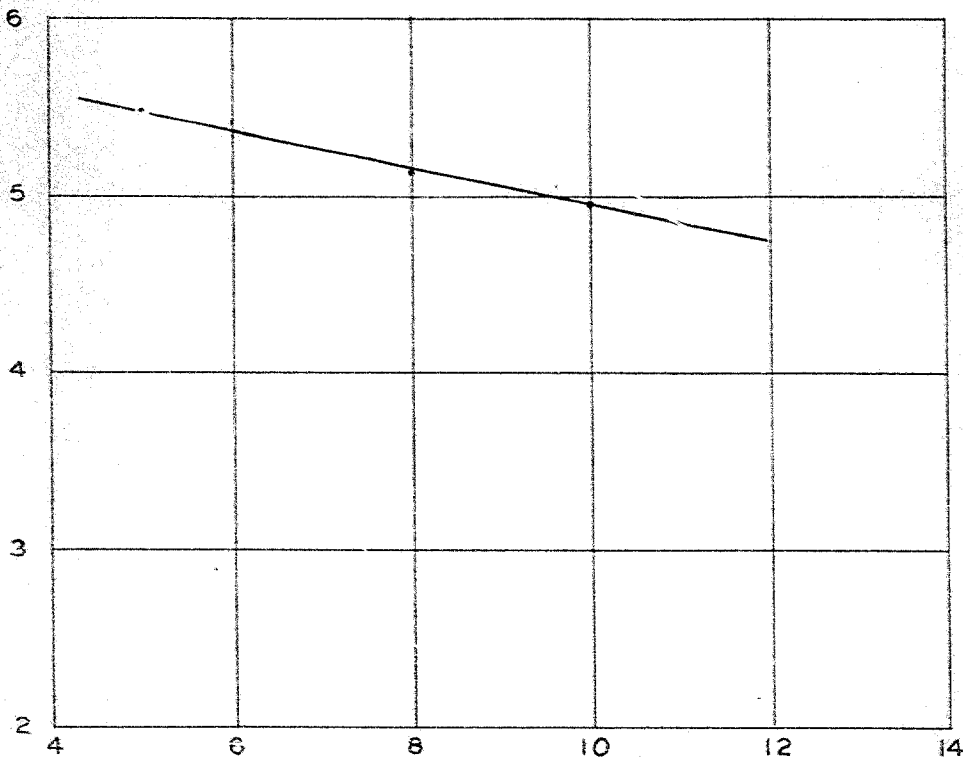
Assuming that the above method of construction is used, or any other method which in effect places the base of the footing at elevation 440, allowable soil bearing capacities for various widths of footing as shown on Chart 3 overleaf can be used.

CLIENT DEPARTMENT OF HIGHWAYS - ONTARIO
OBJ. NO. 6143 LOCATION INDIAN RIVER BRIDGE
BOREHOLE NUMBER _____ DEPTH _____
SAMPLE NUMBER _____ DATE _____

ASSOCIATED GEOTECHNICAL SERVICES
Limited

BEARING CAPACITY CHART

ALLOWABLE BEARING CAPACITY IN KIPS/FT² MINIMUM SOIL SURCHARGE = 5 FT.



EFFECTIVE FOOTING WIDTH (FT) AT ELEVATION 440

The bearing capacity calculations were made assuming

1. a clay shear strength beneath the footing of 2.6 kips per square foot,
2. a minimum soil surcharge surrounding the footing of 5 feet,
3. the unit weight of the clay to be 115 p.c.f.,
4. the ground water table to be at elevation 447.5.

An estimate of the amount of settlement of a retaining wall abutment having a footing size of 8' x 30' at chainage 140+11 was made and found to be in the order of 3.4 inches. A similar abutment at chainage 139+39 was estimated to settle 4.8 inches.

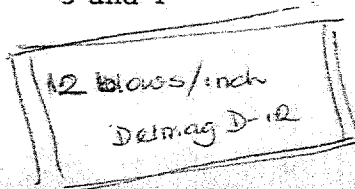
A three span structure was also considered with piers on spread footings at chainages 140+11 and 139+39. The allowable soil bearing capacities indicated on Chart 3 may be used for pier foundations placed at the same elevation. For this case the approach fills do not contribute to the footing settlement to the same extent as for the abutment retaining wall foundation. The settlement of the piers founded on spread footings approximately 8 feet wide by 30 feet long at elevation 440 was calculated. It was found that the north pier would settle about 2.3 inches and the south pier would settle 2.7 inches.

(b) Piles

In the event that elimination of settlement becomes a requirement of the structure design, the abutments in the case of a one span structure may be founded on end bearing piles driven to refusal in the very dense sand stratum underlying the clay. The piers and abutments of a three span structure may also be supported on end bearing piles. The pile tip elevations of H-piles driven to refusal in the very dense sand layer have been estimated and summarized in the following table.

TABLE NO. 2

<u>Location</u>	<u>Nearest Boring</u>	<u>Pile Tip El. Steel H-Piles</u>
Chng. 140+36	1 and 2	416
Chng. 140+11 - upstream	2	417
Chng. 140+11 - downstream	1	405
Chng. 139+39	3 and 4	405
Chng. 139+14	3 and 4	402



*Practical
refusal*

In our opinion friction piles in the clay layer would not provide a feasible method of structure support. In view of the high sensitivity of the clay, the shear strength along the circumference of the pile would be greatly reduced due to remoulding of the clay during driving. The regain in clay shear strength with time will never reach the original undisturbed shear strength due to the fact that the clay was preconsolidated.

(c) Approach Fills

The approach fill grade is shown on the profile in Figure 2. Assuming that a slope of two horizontal to one vertical is used, no problems are anticipated with the stability of the approach embankments.

Settlement of the south approach fill will amount to about 3.3 inches near the south abutment. However, this settlement can be expected to take place very slowly over the space of about 10 years, thus is not expected to seriously impair the operation of traffic.

JOB NO. **G143** LOCATION **HWY. N^o 62**
 PROJECT **PROPOSED INDIAN RIVER BRIDGE**
 DATE FIELD INVESTIGATION _____
 DATE REPORT _____ BY _____ CHKD. _____

HORIZONTAL **1" = 20'** (PLAN AND PROFILES)
 VERTICAL **1" = 10'**

ASSOCIATED GEOTECHNICAL SERVICES
 Limited
**BOREHOLE PLAN AND
 ABUTMENT SOIL PROFILE**

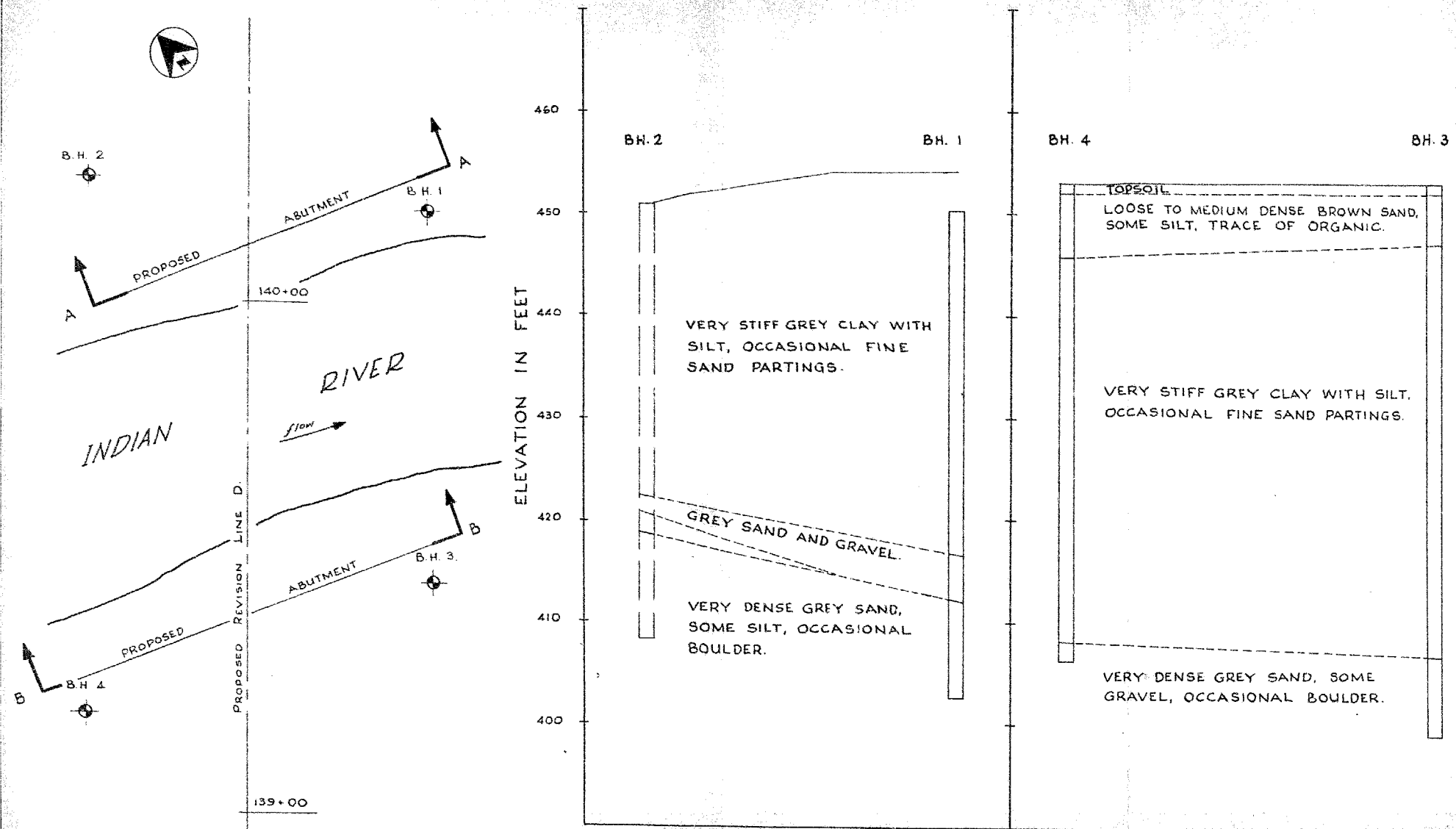


FIGURE 1

JOB NO. 6143 LOCATION HWY N^o 62
 PROJECT PROPOSED INDIAN RIVER BRIDGE
 DATE FIELD INVESTIGATION _____
 DATE REPORT _____ BY _____ CHKD. _____

HORIZONTAL 1" = 10'
 VERTICAL 1" = 10'

ASSOCIATED GEOTECHNICAL SERVICES
 Limited

SOIL PROFILE ALONG
 PROPOSED REVISION LINE 'D'

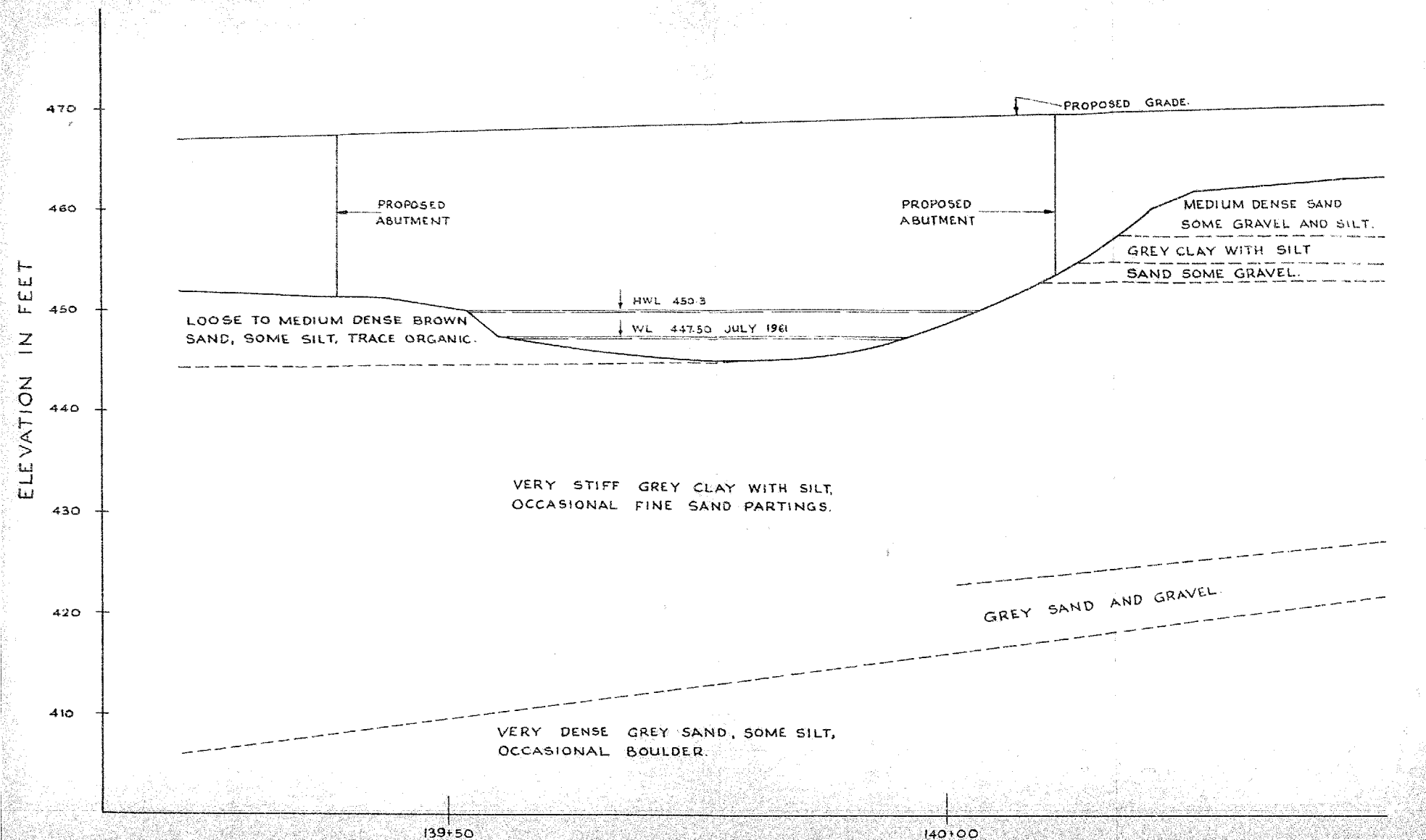


FIGURE 2

JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE
 CO-ORDINATES CHNG. 140+18.1 35.4 RT.
 ELEVATION (SURFACE) 449.9 (COLLAR) DATUM
 DATE (STARTED) DEC. 6/61 (FINISHED) DEC. 7/61 (COMPILED) DA
 RIG. NO. 1 TYPE FIELD SUP. JK

SILT CLAY SAND
 GRAVEL PEAT FILL
 A - VANE SHEAR (NATURAL)
 O - VANE SHEAR (REWOLDED)
 S - STANDARD PENETRATION

UNDISTURBED
 DISTURBED BUT REPRESENTATIVE
 FAIR
 LOST
 SS - SPLIT SPOON
 ST - SHELBY TUBE
 TWP - THIN WALLED PISTON
 DB - DIAMOND BIT
 C - CONSOLIDATION TEST
 M - MECHANICAL ANALYSIS
 T - TRIAXIAL COMPRESSION
 K - PERMEABILITY
 U - UNCONFINED COMP.
 PCF - POUNDS PER CUBIC FOOT
 WN - NATURAL WATER CONTENT

ASSOCIATED GEOTECHNICAL SERVICES
 Limited
 OFFICE BOREHOLE LOG
 BOREHOLE NO. 1

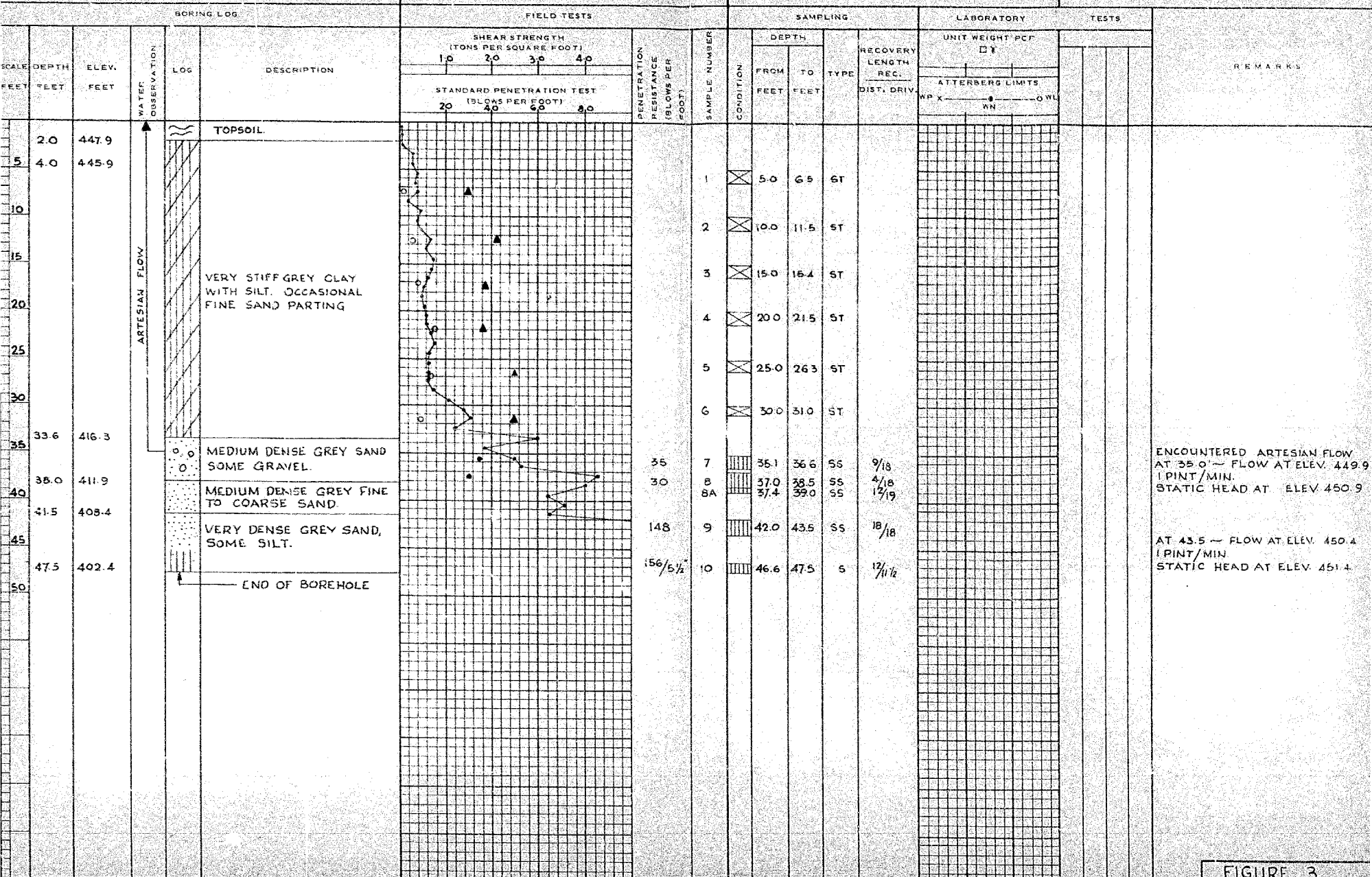


FIGURE 3

Limited

OFFICE BOREHOLE LOG
BOREHOLE NO. 2

JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE
CO-ORDINATES CHNG. 140+25 32.9 LT.
ELEVATION (SURFACE) 464.1 (COLLAR) DATUM
DATE (STARTED) DEC. 7/61 (FINISHED) DEC. 9/61 (COMPILED) RJG
FIG. NO. 1 TYPE FIELD SUP. JK

SILT GRAVEL
CLAY PEAT
SAND FILL
A - VANE SHEAR (NATURAL)
O - VANE SHEAR (REMOLDED)
• STANDARD PENETRATION

UNDISTURBED
DISTURBED BUT REPRESENTATIVE
FAIR
LOST
SS - SPLIT SPOON
ST - SHELBY TUBE
TWP. - THIN WALLED
PISTON
DB - DIAMOND BIT

C - CONSOLIDATION TEST
M - MECHANICAL ANALYSIS
T - TRIAXIAL COMPRESSION
K - PERMEABILITY
U - UNSATURATED COMP.
PCF - POUNDS PER CUBIC FOOT
WN - NATURAL WATER CONTENT

BORING LOG				FIELD TESTS				SAMPLING				LABORATORY		TESTS		REMARKS			
CALE FEET	DEPTH FEET	ELEV. FEET	LOG	DESCRIPTION	SHEAR STRENGTH (TONS PER SQUARE FOOT)				PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NUMBER	CONDITION	DEPTH		RECOVERY LENGTH REC. DIST. DRIV.	UNIT WEIGHT PCF U Y		ATTERBERG LIMITS		
					10	20	30	40				FROM FEET	TO FEET		TYPE		W _p X	W _L	W _N
					STANDARD PENETRATION TEST (BLOWS PER FOOT)														
					20	40	60	80											
	1.0	463.1		TOPSOIL															
	2.0	462.1		MEDIUM DENSE SAND, SOME GRAVEL AND SILT					24	1		4.0	5.5	SS	9/18			G.W.T. RECORDED 2 DAYS AFTER COMPLETED.	
5	6.0	458.1		GREY CLAY WITH SILT															
10	9.3	454.8		SAND SOME GRAVEL					9	2		9.0	9.9	ST	11/11			SAND AND GRAVEL LAYER WATER BEARING.	
11.0	453.1									3		9.9	11.4	SS					
15										4		14.0	15.5	ST	23/18				
20										5		19.0	20.8	ST	21/22				
25				VERY STIFF GREY CLAY WITH SILT OCCASIONAL FINE SAND PARTINGS						6		24.0	25.5	ST	20/18				
30										7		29.0	30.5	ST	18/18				
35										8		34.0	35.0	ST	19/18				
40										9		39.0	40.3	ST	16/16				
42.2	421.9			GREY SAND AND GRAVEL					78	10		44.0	45.5	SS	10/18				
45	44.0	420.1		GREY CLAY WITH SILT					26	11	11A	45.5	47.0	SS				REDROVE SS NO. 11A WITH TRAP.	
50				VERY DENSE GREY SAND, OCCASIONAL BOULDER.					200/10"	12		50.0	50.8	SS	17/10				
55										13		50.8	55.9	DB	12/60			RECOVERED 10' BOULDER CORE.	
55.9	408.2			END OF BOREHOLE															
60																			

FIGURE 4

CLIENT: DEPARTMENT OF HIGHWAYS - ONTARIO
 JOB NO. 6143 LOCATION: INDIAN RIVER BRIDGE
 CO-ORDINATES: CHNG 139+45 36.6 RT
 ELEVATION (SURFACE): 452.3 (COLLAR) DATUM
 DATE (STARTED): DEC 11/61 (FINISHED): DEC 12/61 (COMPILED): RJG
 HIG. NO. 1 TYPE FIELD SUP. JK

SYMBOLS
 SILT GRAVEL A - VANE SHEAR (NATURAL)
 CLAY O - VANE SHEAR (REMOLDED)
 SAND FILL
 PEAT
 STANDARD PENETRATION
 TRIAXIAL TEST

UNDISTURBED
 DISTURBED BUT REPRESENTATIVE
 FAIR
 LOST
 SS - SPLIT SPOON
 ST - SHELBY TUBE
 TWP - THIN WALLED PISTON
 DB - DIAMOND BIT
 C - CONSOLIDATION TEST
 M - MECHANICAL ANALYSIS
 T - TRIAXIAL COMPRESSION
 K - PERMEABILITY
 U - UNCONFINED COMP.
 PCF - POUNDS PER CUBIC FOOT
 WN - NATURAL WATER CONTENT

ASSOCIATED GEOTECHNICAL SERVICES
 Limited
 OFFICE BOREHOLE LOG
 BOREHOLE NO. 3

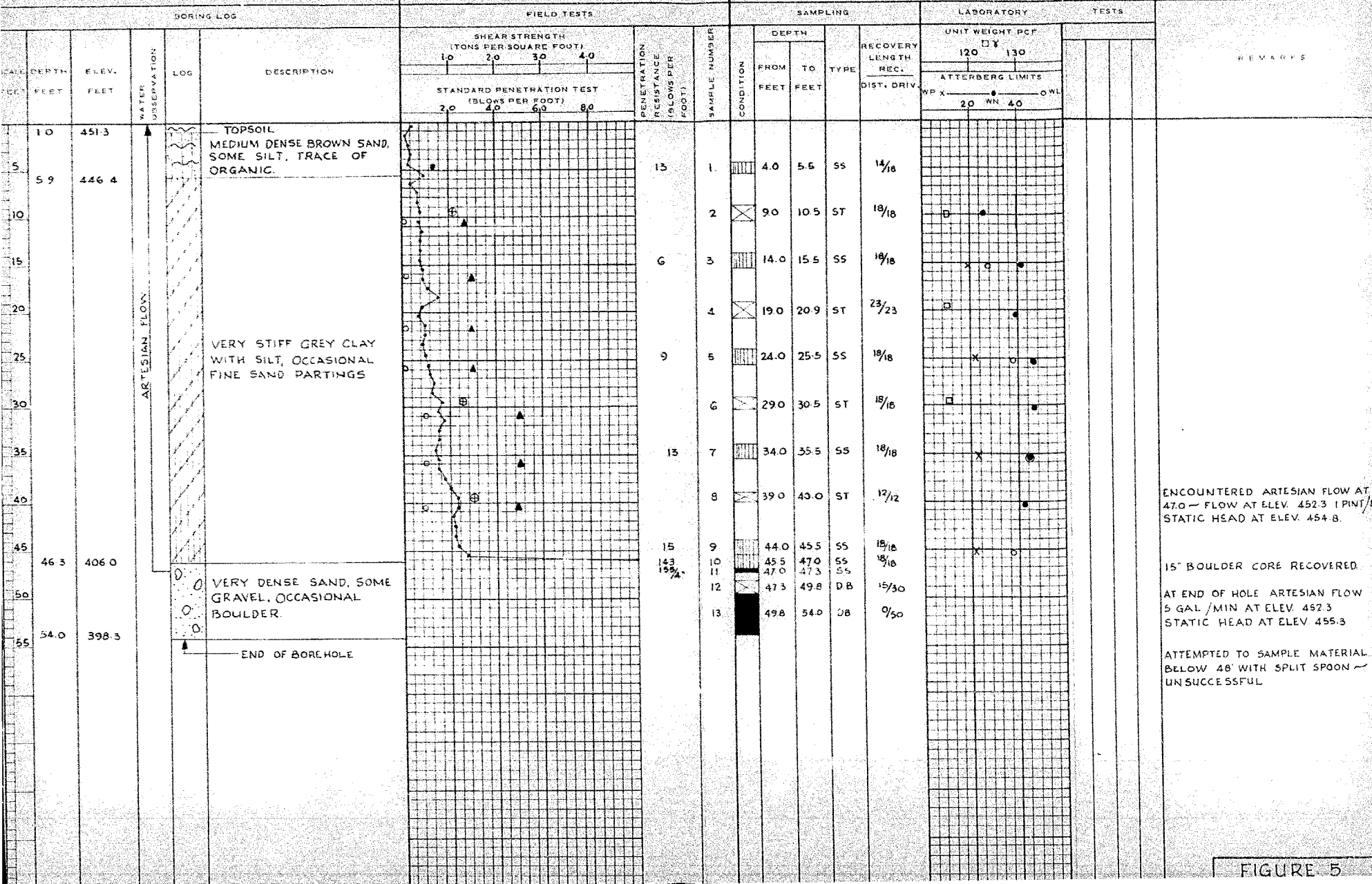












FIGURE 5

JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE
 CO-ORDINATES CHNG. 139+19.3 32.9' LT.
 ELEVATION (SURFACE) 452.4 (COLLAR) _____ DATUM _____
 DATE (STARTED) DEC.12/61 (FINISHED) DEC.12/61 (COMPILED) RJG
 FIG. NO. 1 TYPE _____ FIELD SUP. JK

 SILT  GRAVEL ▲ VANE SHEAR (NATURAL)
 CLAY ○ VANE SHEAR (REMOLDED)
 PEAT ● STANDARD PENETRATION
 SAND  FILL

	UNDISTURBED	SS-SPLIT SPOON
	DISTURBED BUT REPRESENTATIVE	ST-SHELBY TUBE
	FAIR	TWP.-THIN WALL PISTON
	LOST	DB-DIAMOND BIT

C - CONSOLIDATION TEST
M - MECHANICAL ANALYSIS
T - TRIAXIAL COMPRESSION
K - PERMEABILITY
U - UNCONFINED COMP.
PCF - POUNDS PER CUBIC FOOT
WN - NATURAL WATER CONTENT

OFFICE BOREHOLE LOG
BOREHOLE NO. 4.

BORING LOG				FIELD TESTS				SAMPLING				LABORATORY		TESTS		REMARKS		
DEPTH FEET	ELEV. FEET	LOG	DESCRIPTION	SHEAR STRENGTH (TONS PER SQUARE FOOT)				PENETRATION RESISTANCE (BLOWS PER FOOT)	SAMPLE NUMBER	DEPTH		RECOVERY LENGTH REC. DIST. DRIV.	UNIT WEIGHT PCF γ		ATTERBERG LIMITS			
				1.0	2.0	3.0	4.0			FROM FEET	TO FEET		TYPE					
				STANDARD PENETRATION TEST (BLOWS PER FOOT)														
				2.0	4.0	6.0	8.0							WP	WN	OWL		
10	451.4		TOPSOIL															
5			LOOSE BROWN SAND, SOME SILT						6	1	5.0	6.5	SS	18/18				
60	446.4		GREY SAND SOME SILT															
72	445.2																	
10									7	2	10.3	11.8	SS	18/18				
15																		
20																		
25			VERY STIFF GREY CLAY WITH SILT. OCCASIONAL FINE SAND PARTING.						9	4	20.0	21.5	SS	18/18				
30																		
35																		
40																		
45	449	407.5							12	8	40.0	41.5	SS	18/18				
46.7	405.7		VERY DENSE GREY SAND.						12	9	42.5	44.0	SS	18/18				
50			END OF BOREHOLE.						110	10	44.9	46.4	SS	10/18				

FREQUENT 1/2 INCH ORGANIC LAYERS TO 60 FEET.

OCCASIONAL LAYER OF FINE SAND FROM 7.2 TO 12.0 FEET.

FIGURE 6

CLIENT DEPARTMENT OF HIGHWAYS - ONTARIO

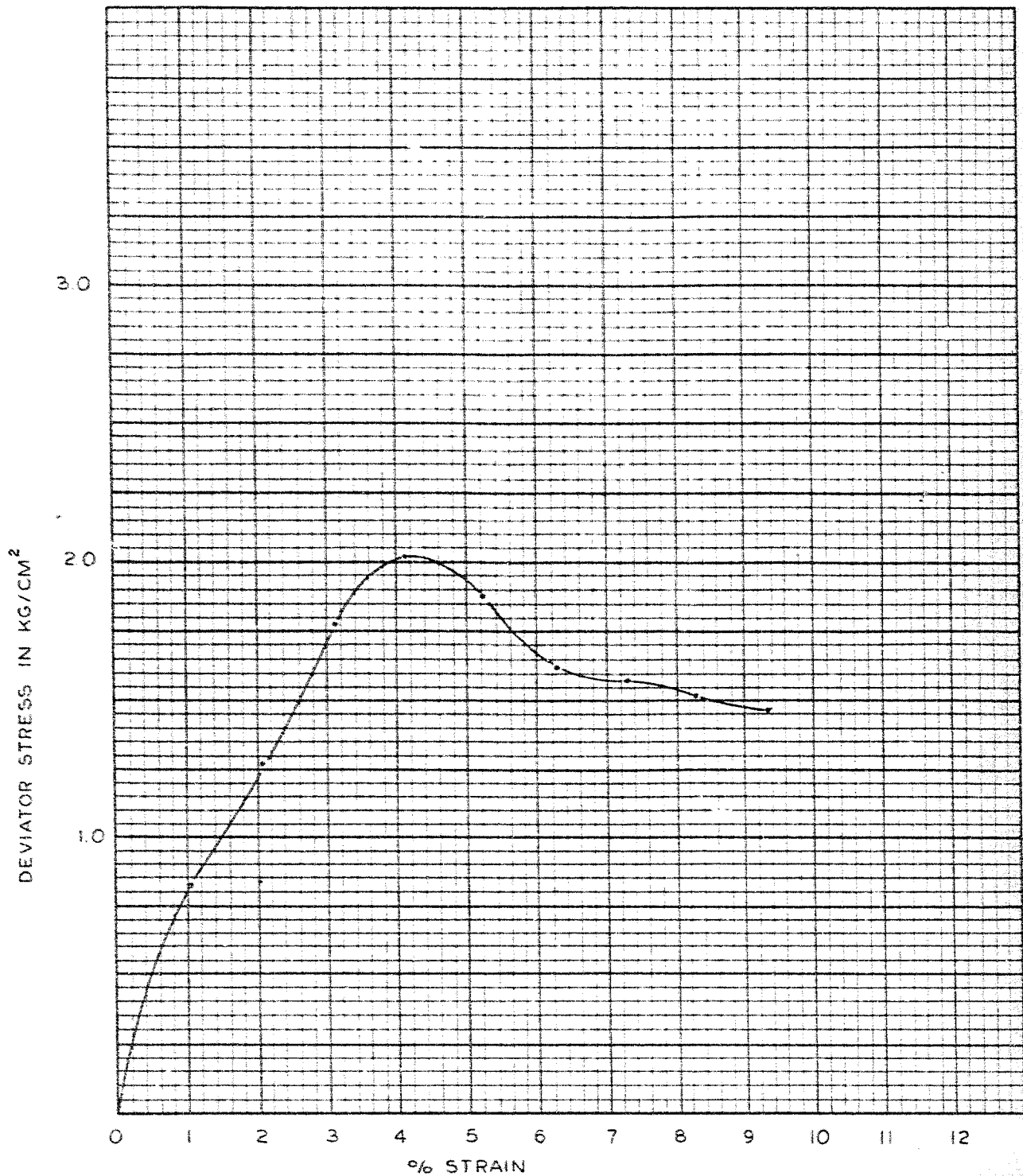
JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE

BOREHOLE NUMBER 3 DATE _____

SAMPLE NUMBER 2 DEPTH 10.0

ASSOCIATED GEOTECHNICAL SERVICES
Limited

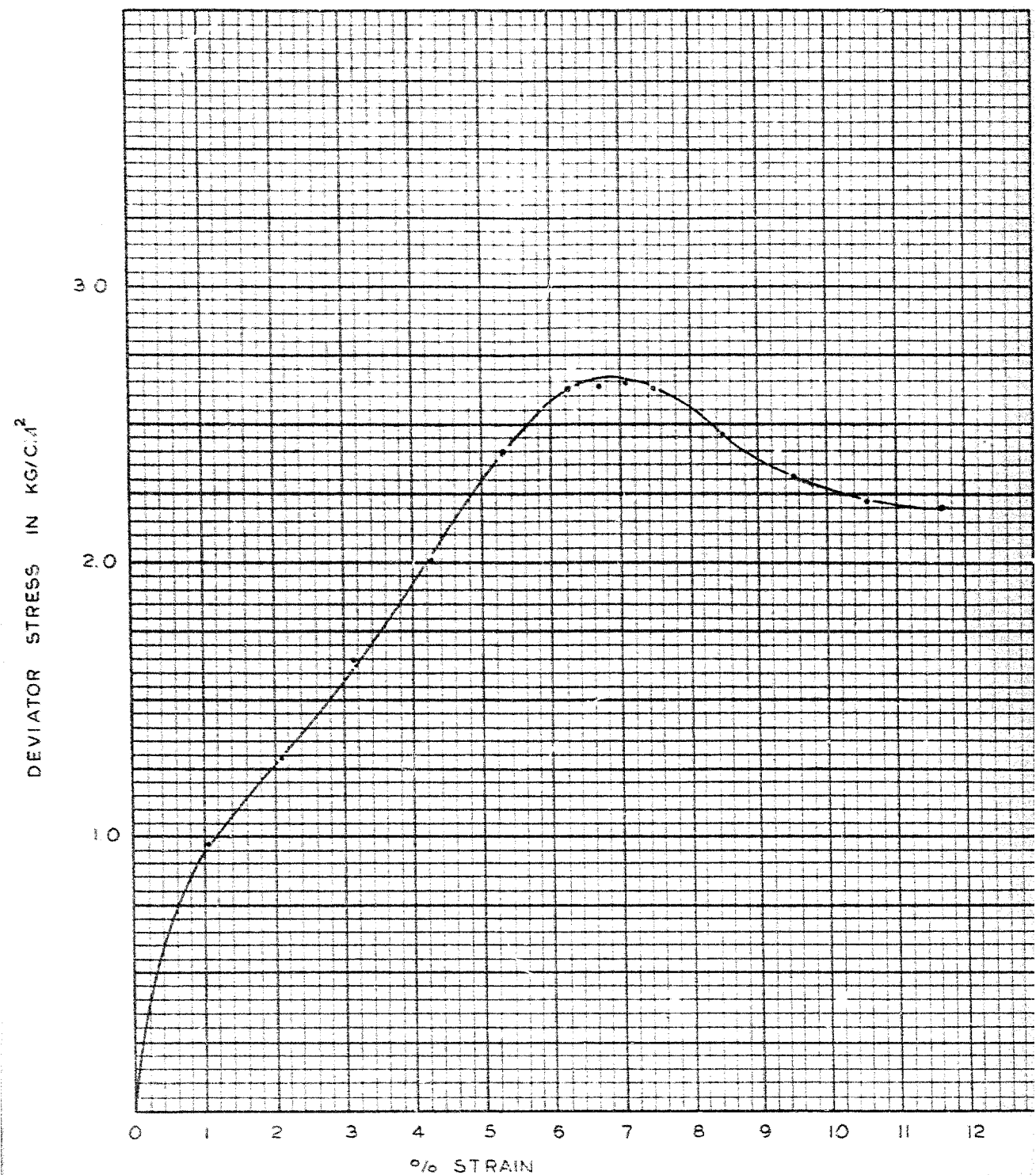
SOIL MECHANICS LABORATORY
CONSOLIDATED UNDRAINED TRIAXIAL TEST



CLIENT DEPARTMENT OF HIGHWAYS - ONTARIO
JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE
BOREHOLE NUMBER 3 DATE _____
SAMPLE NUMBER 6 DEPTH _____

ASSOCIATED GEOTECHNICAL SERVICES
Limited

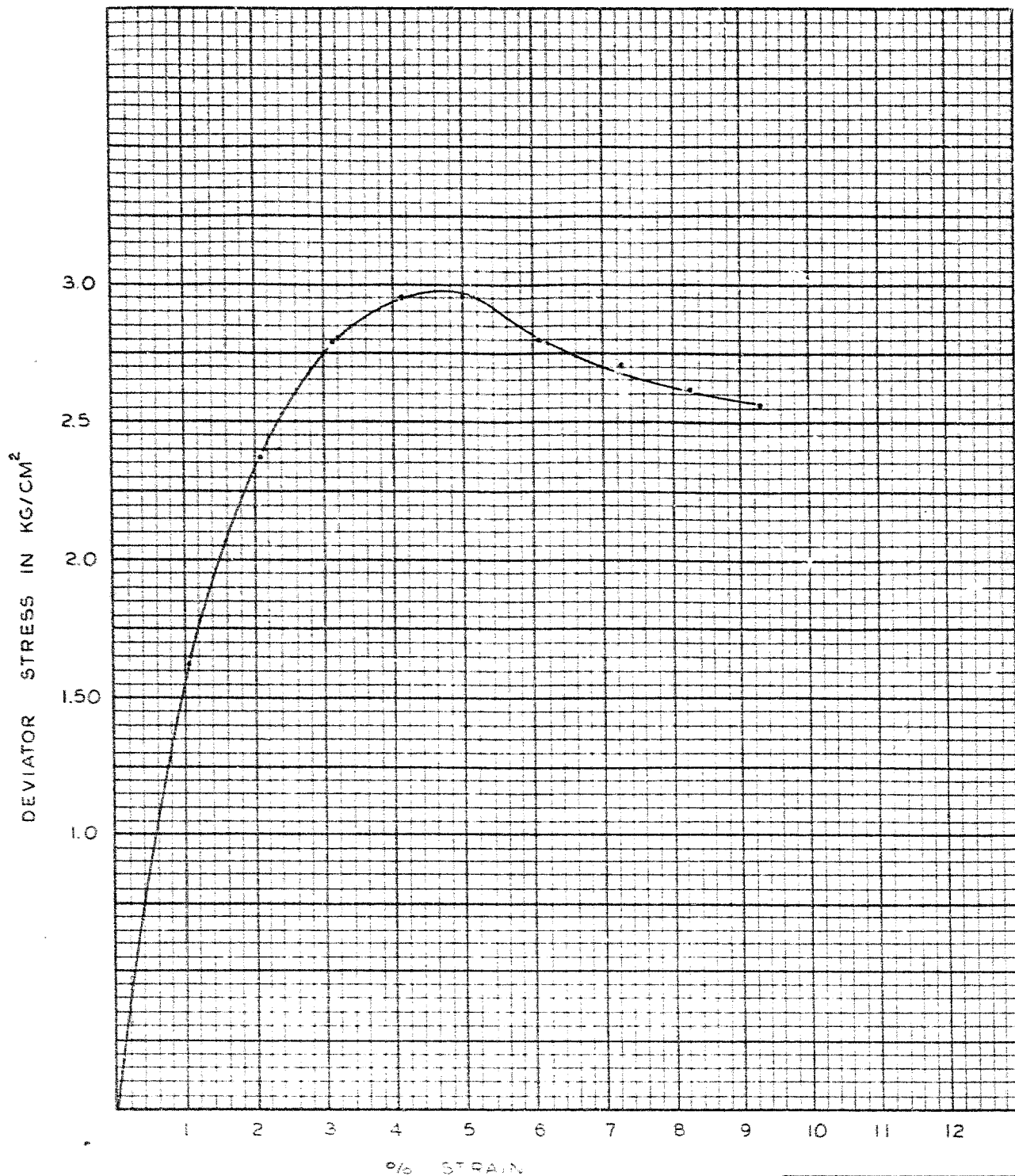
SOIL MECHANICS LABORATORY
CONSOLIDATED UNDRAINED TRIAXIAL TEST



CLIENT DEPARTMENT OF HIGHWAYS - ONTARIO
JOB NO. 6143 LOCATION INDIAN RIVER BRIDGE
BOREHOLE NUMBER 3 DATE _____
SAMPLE NUMBER 8 DEPTH _____

ASSOCIATED GEOTECHNICAL SERVICES
Limited

SOIL MECHANICS LABORATORY
CONSOLIDATED UNDRAINED TRIAXIAL TEST

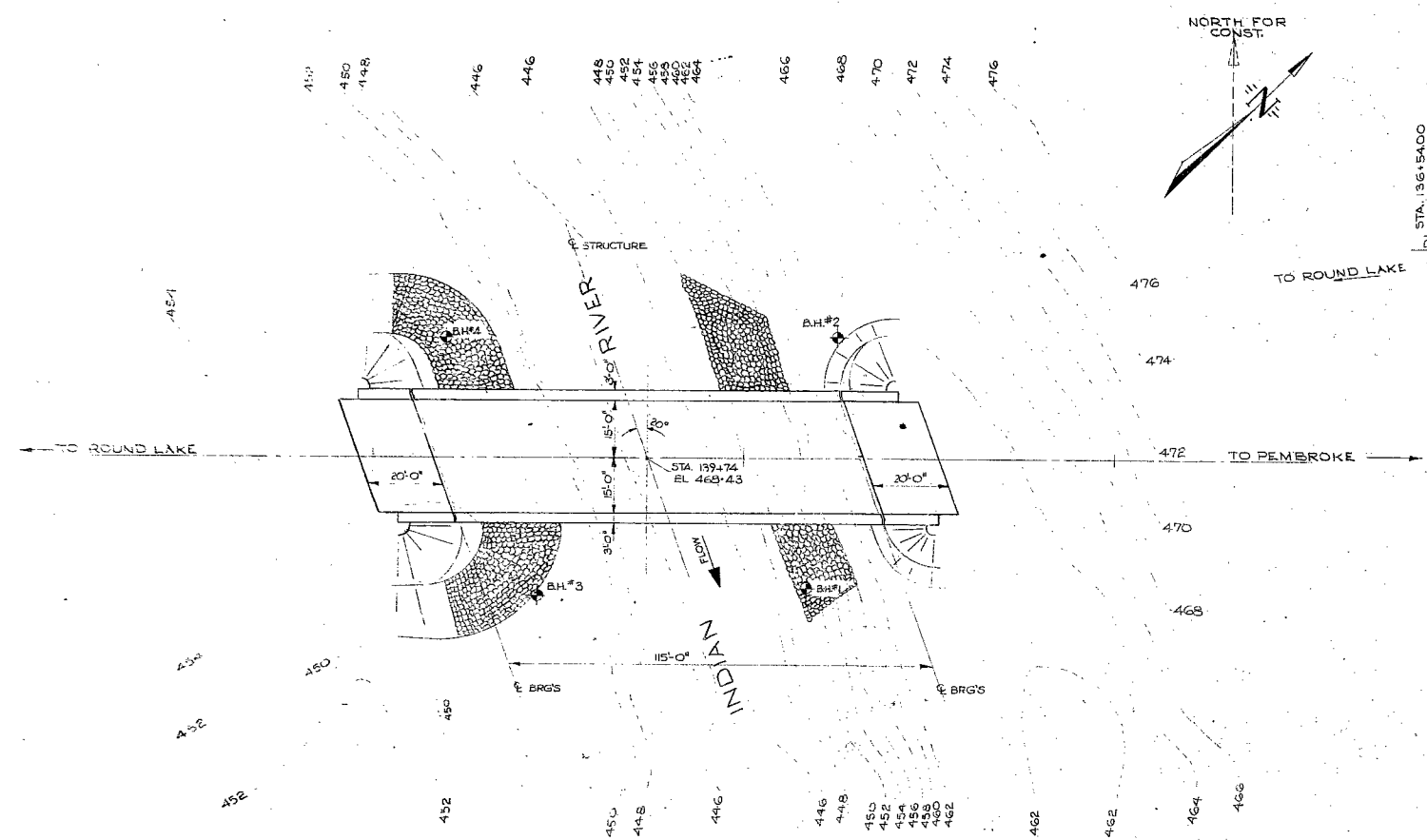


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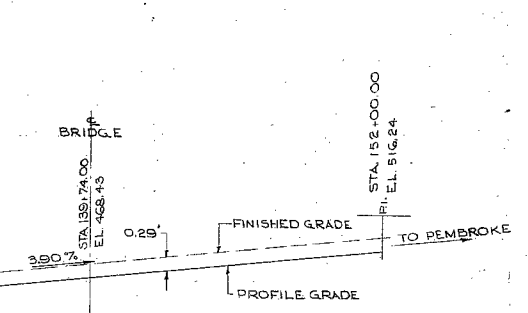
W.P.#122-61

HWY.#62

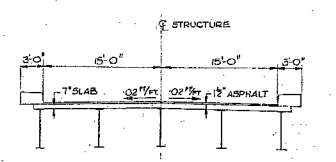
INDIAN RIVER
BRIDGE



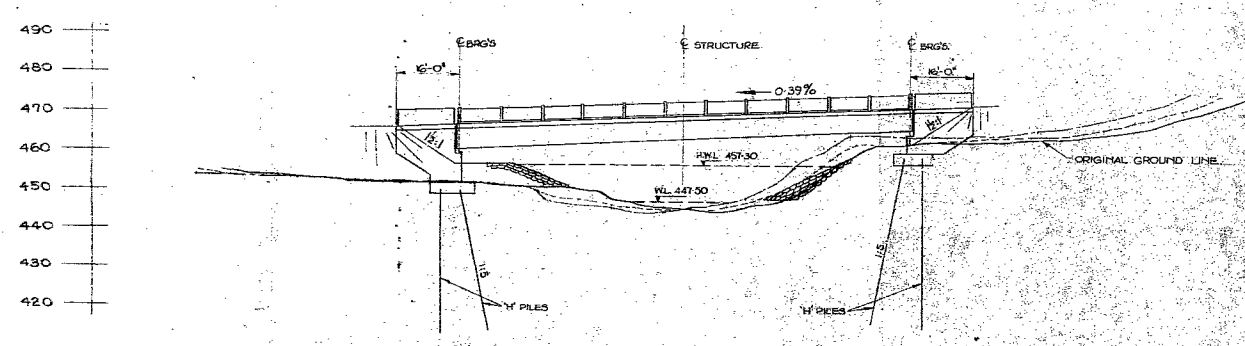
PLAN of BRIDGE
SCALE 1"=20 FT



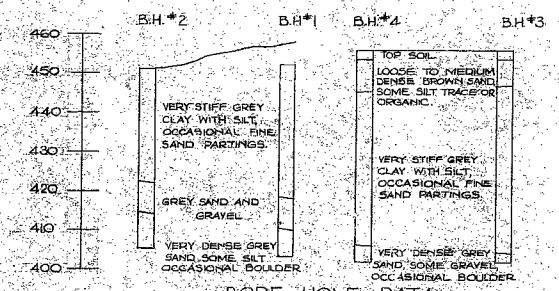
PROFILE of HWY #62
N.T.S.



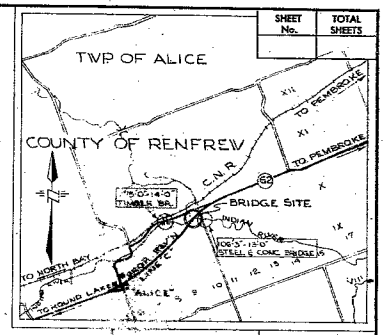
SECTION THRO DECK
SCALE 1"=10 FT



ELEVATION of BRIDGE
SCALE 1"=20 FT



BORE HOLE DATA
SCALE 1"=20 FT



NOTES
TO DISTRICT ENGINEER
CONCRETE WORK ON THIS STRUCTURE MUST BE COMMENCED WITHIN 10 DAYS OF THE DATE OF THE CONTRACT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE EXISTING STRUCTURE AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH SHALL BE BORNE BY THE DISTRICT ENGINEER.
CONCRETE MIX
APPROVED MIXTURES, SPECIFIED BY THE DISTRICT ENGINEER, SHALL BE ADDED TO ALL CONCRETE AS SPECIFIED BY THE DISTRICT ENGINEER.
THE COMPLETE SOIL INVESTIGATION REPORT, INCLUDING THE RESULTS OF THE BORING DATA, SHALL BE SUBMITTED TO THE DISTRICT ENGINEER FOR REVIEW AND APPROVAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE EXISTING STRUCTURE AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH SHALL BE BORNE BY THE DISTRICT ENGINEER.
CONSTRUCTION NOTES
ALL EXPOSED EDGES TO BE FINISHED TO THE DESIGN SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE EXISTING STRUCTURE AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH SHALL BE BORNE BY THE DISTRICT ENGINEER.
THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE EXISTING STRUCTURE AND THE SPECIAL PROVISIONS, EXTRA COSTS OF WHICH SHALL BE BORNE BY THE DISTRICT ENGINEER.
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Best foundation is one alternative and if analyses have shown that this solution is the most economical, there are no objections.
April 13, 1966
Aftermore,

PRINT RECORD		
No.	FOR	DATE

REVISIONS		DATE		BY	DESCRIPTION
<p align="center">DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION</p> <p align="center">INDIAN RIVER BRIDGE - HWY #62 (APPROX. 1.4 MILES EAST OF ALICE)</p> <p>KING'S HIGHWAY No. 62 DIST. No. 10 CO. RENFREW TWP. ALICE LOT 10 CON. 2</p> <p align="center">PRELIMINARY PLAN</p> <p>APPROVED: BRIDGE ENGINEER SITE No. W.P. No. 122-61</p> <p>DESIGN: CHECK: CONTRACT: No. No.</p> <p>DRAWING: CHECK: H-20: DRAWING: No. No.</p> <p>DATE: FEB. 62 LOADING: H-20: 5-16: No. No.</p> <p align="right">D-5025-P</p>					

