

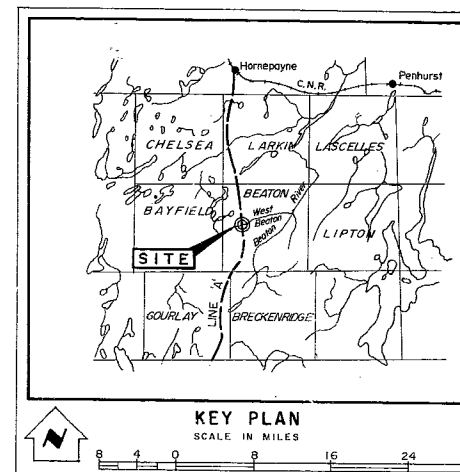
#65-f-206

W.P.# 145-64

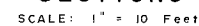
HWY.# 631

& WEST

BEATON RIVER



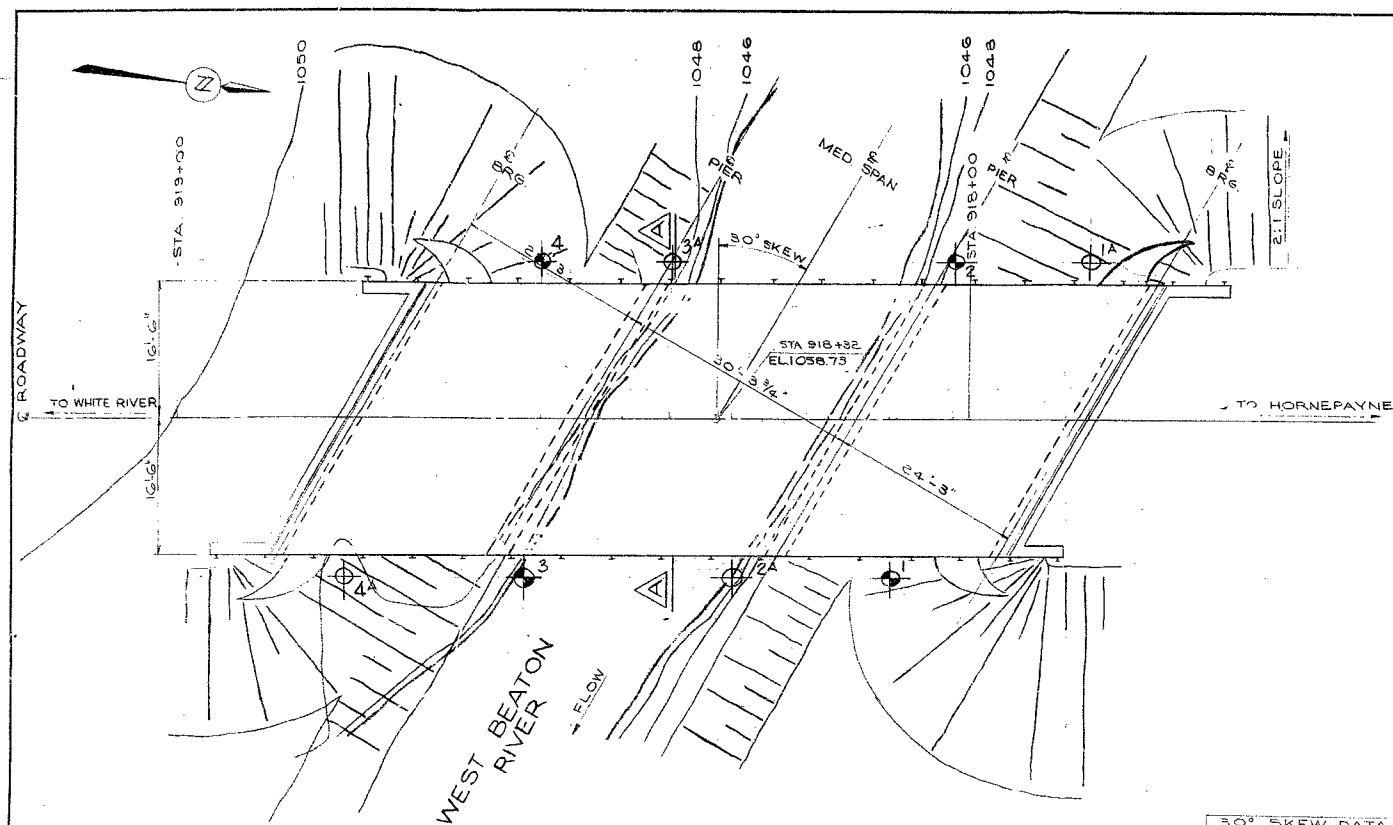
SCALE: 1" = 20 Feet



- NOTE -

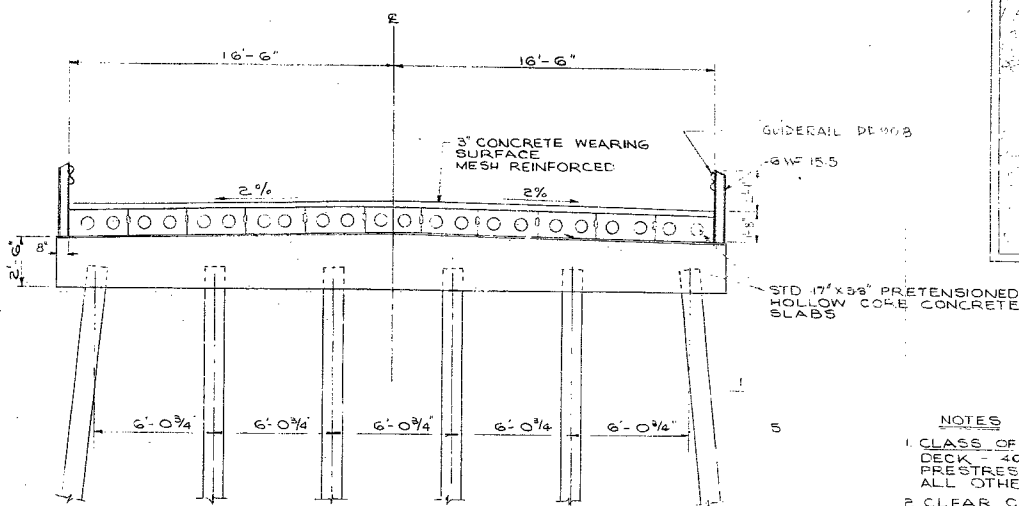
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS					
DATE	BY	DESCRIPTION			
DOMINION SOIL INVESTIGATION LIMITED					
DEPARTMENT OF HIGHWAYS - ONTARIO					
MATERIALS & TESTING DIVISION - FOUNDATION SECTION					
PROPOSED CROSSING AT					
WEST BEATON ROAD					
AND					
PROPOSED ACCESS ROAD - Line 'A'					
KING'S HIGHWAY NO. _____				DIST. NO. 18	
DIST. ALGOMA _____					
TWP. BEATON _____		LOT _____		CON. _____	
BOREHOLE LOCATIONS & SOIL STRATA					
SUBWD. I. L.	CHECKED	W.P. NO. 145 - 64	DRAWING NO.		
DRAWN D. M.	CHECKED	JOB NO. 6 - 3 - 3	6 - 3 - 3		
DATE MAR 24, 1966		SITE NO.	BRIDGE DRAWING NO.		
APPROVED _____		CONY. NO. _____			



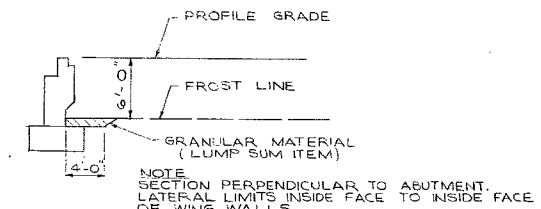
PLAN  
SCALE 1"=10'-0"

30° SKEW DATA	
SIN	.50000
COS	.86603
TAN	.57735
SEC	1.15470

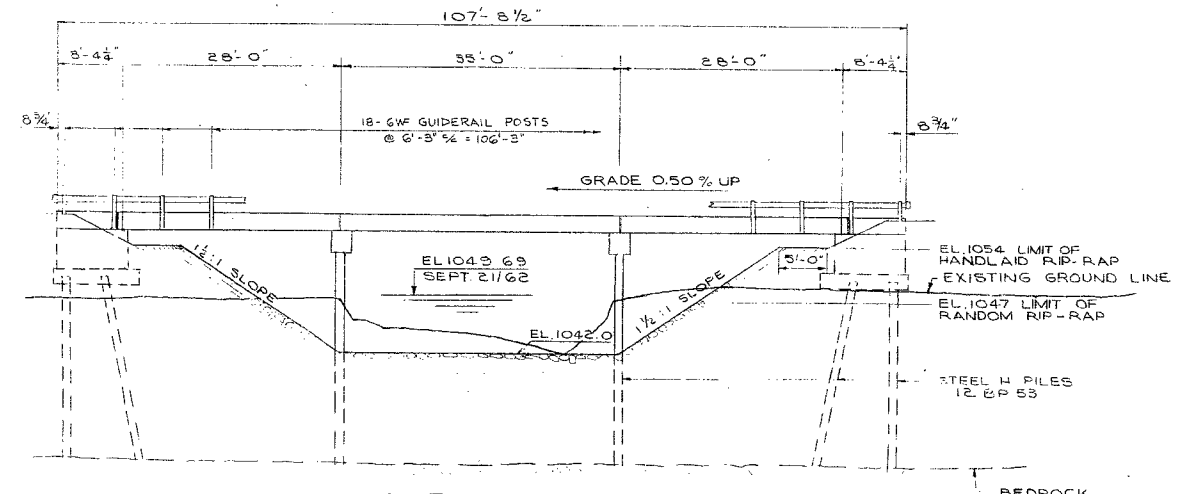


NOTES

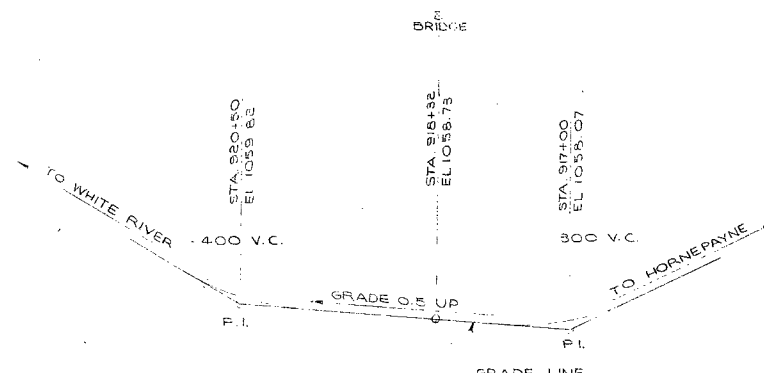
1. CLASS OF CONCRETE  
DECK - 4000 P.S.I.  
PRESTRESSED CONCRETE SLABS - 5000 P.S.I.  
ALL OTHER - 3000 P.S.I.
2. CLEAR COVER ON REINFORCING STEEL  
FOOTINGS 1 1/2"  
ABUTMENTS 1 1/2"  
SIDEWALKS 1 1/2"  
PARAPET WALLS 1 1/2"
3. THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH TOLERANCES OF ± 1/8"



DETAILS OF MINIMUM GRANULAR  
BACKFILL REQUIREMENT



ELEVATION  
SCALE 1"=10'-0"



PROFILE GRADE  
N.T.S.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
WEST BEATON RIVER BRIDGE			
KING'S HIGHWAY No. 631		DIST. No. 18	
CO. ALGOMA		TWP. BEATON	
LOT		CON.	
PRELIMINARY			
APPROVED		SITE No. SSN-8, W.P. No. 145-64	
DESIGN	DSM. CHECK	CONTRACT	No.
DRAWING	PA.H. CHECK	DRAWING	No.
DATE	DEC 66	LOADING	H520-44
D-5920-1			



REPORT ON SOIL INVESTIGATION  
FOR  
PROPOSED CROSSING OF HWY. 631  
AT WEST BEATON RIVER  
DISTRICT OF ALGOMA  
TOWNSHIP OF BEATON, ONTARIO  
(W.P. 145-64)

ONTARIO DEPARTMENT OF HIGHWAYS

RESEARCH DIVISION

DOWNSVIEW, ONTARIO.

REPORT ON

SOIL INVESTIGATION

FOR

PROPOSED CROSSING OF HWY. 631

AT WEST BEATON RIVER

DISTRICT OF ALGOMA

TOWNSHIP OF BEATON, ONTARIO

(W.P. 145-64)

SUBMITTED BY

DOMINION SOIL INVESTIGATION LIMITED  
77 CROCKFORD BOULEVARD  
SCARBOROUGH - ONTARIO

REFERENCE

6-3-3

MARCH - 1966

## C O N T E N T S

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PROCEDURES .....	1
DESCRIPTION OF THE SITE AND SUBSURFACE CONDITIONS .....	2
DISCUSSION .....	4
CONCLUSIONS .....	6

## E N C L O S U R E S

LIST OF SYMBOLS, ABBREVIATIONS, ETC. ....	#1
GEOTECHNICAL DATA SHEETS .....	#2 - #5 incl.
GRAIN SIZE DISTRIBUTION .....	#6 - #11 incl.
PLAN AND PROFILE DRAWING .....	No. 1 - in pocket at rear.

INTRODUCTION

The soil investigation described in this report was authorized by the Department of Highways in a letter dated February 24th, 1966.

Information about the proposed 3-span bridge structure, its location and other pertinent data was obtained from a drawing prepared by the Department (Plan No. E-4208-1) and forwarded together with the letter of authorization.

The purpose of the investigation was to determine the subsurface conditions at the location of the proposed crossing as relevant to the foundation design and construction of the structure. The results of the investigation, together with the interpretation of the data and recommendations for foundation design are presented in the following paragraphs.

PROCEDURES

The work in the field was carried out during the period between March 4th and 10th, 1966, and consisted of 4 exploratory boreholes each with an adjacent cone penetration test and 4 additional dynamic cone penetration tests. The location of the boreholes and cone tests is indicated on the plan and profile drawing enclosed in the side pocket at the rear of this report.

The borings were executed by a standard diamond drill machine equipped for soil testing and rock coring. The depths of the boreholes range between 22 and 26 feet and were generally carried 5 ft. into the bedrock. The overburden overlying the bedrock was sampled at 2½ and 5 ft. intervals of depth, performing Standard Penetration Tests at the same time.

A detailed log for each borehole is given on the Geotechnical Data Sheets for the boreholes at the end of this report. Sections and profiles of the inferred soil stratigraphy are given on Drawing No. 1.

The samples obtained during this investigation were brought to the laboratory of Dominion Soil Investigation Limited for examination and testing. The results of the laboratory testing are shown on Enclosures No. 6 to 11 inclusive.

All elevations of this report are referred to a nail in the stump of a 0.6 ft. diameter pine tree located 59 ft. right of Station 916 + 76. This bench mark was established by the Department of Highways and its elevation was given as 1055.29 ft. above the Geodetic Datum.

#### DESCRIPTION OF THE SITE AND SUBSURFACE CONDITIONS

The bridge site is located at about chainage 918 + 00 on the proposed access road - "Line A" - connecting Hornepayne and White River. The proposed access road runs through virgin bushland and the bridge site is approximately 17.3 miles south of Hornepayne. The terrain in the area is uneven and rolling with several small but rather steep-sided hills and occasional rock outcrops. The area is heavily treed, most of it pine, and the drainage appears to be good to normal with only a few occasional swampy or wet areas. The West Beaton River in this area follows a rather meandering course with an approximately 200 ft. wide flood plain.

On the basis of the investigation the soil stratigraphy in the area of the bridge site can be described as follows:

Soft to Loose dark-brown Organic Silt ( $4\frac{1}{2}$  ft. to  $10\frac{1}{2}$  ft. thick)

Very Loose to Compact Fine to Medium Sand (0 to 10 ft. thick)



Compact to Dense Silt (8 to 11 ft. thick)

Granite Bedrock at depths ranging between 12½ and 25 ft.

Details of the soil conditions encountered are shown on the individual Geotechnical Data Sheets and the main characteristics of the soil types are discussed below.

#### Organic Silt

Below the ground surface, which in the area of the structure lies at elevation 1049+ ft., the first stratum encountered was a 4½ to 10½ ft. thick dark-brown coloured organic deposit. The stratum consists mostly of fine sand and silt particles with appreciable amount of organic matter. Leaves, twigs, and pieces of wood indicate that this stratum is a flood plain deposit. Both the standard and cone penetration tests indicate that this stratum has a soft consistency or a loose relative density.

#### Fine to Medium Sand

In boreholes No. 1, 2 and 4 the above-described organic deposit was underlain by a 4 to 10 ft. thick sand deposit. Typical grain size distribution curves of this stratum are shown on Enclosures No. 6, 7 and 8 indicating that the deposit consists mostly of fine sand particles with some silt and occasional medium or coarse sand. The stratum is poorly graded and its coefficient of uniformity ranges between 3 and 4. The "N" values range between 1 and 6 blows per foot, indicating a very loose to loose relative density. Only in borehole No. 4 has the cone penetration test indicated a somewhat higher degree of compaction.

#### Silt

At a depth ranging between 8½ and 16 ft. below the ground surface, an approximately 8 to 11 ft. thick silt deposit was encountered.

The particle size distribution of this stratum was determined by 3 hydrometer tests, the results of which are shown on Enclosures No. 9, 10 and 11. As indicated here the stratum consists of about 15 to 50% of fine sand, 40 to 80% silt, and about 5% clay. This stratum is better graded than the overlying sand deposit and has a coefficient of uniformity ranging between 3 and 10. A field permeability test performed in Borehole No. 1 indicates that the average coefficient of permeability of the stratum is about  $7 \times 10^{-3}$  cm/sec. The "N" values obtained in the Standard Penetration Test range between 11 and 69 blows per foot indicating a generally compact to dense relative density.

#### Bedrock

The surface of the bedrock was encountered in the boreholes or inferred from the penetration tests at depths ranging between  $12\frac{1}{2}$  and 25 ft. This corresponds to elevations 1037 to 1023.5 ft. The presence of the bedrock was proven in Boreholes No. 2, 3 and 4 by coring in Ax size for a length of 5 ft. An inspection of the recovered cores and the high percentage of recovery indicate that the rock is in a very sound condition and is relatively free of joints. Based on visual inspection the bedrock is described as a multi-coloured, coarse-textured granite.

The position of the free standing water level in the boreholes was observed at elevation 1046.5± ft. This corresponds approximately to the ice level in the river which at the time of the investigation was at elevation 1046.8 ft.

#### DISCUSSION

It is understood that the proposed structure would be about 40 ft. wide and 70 ft. long and will consist of 3 spans measuring 30 ft.

at the interior and 20 ft. at the exterior panels. The proposed type of construction is not known, but it is believed that it will be of conventional reinforced concrete construction.

The investigation has indicated that the site is underlain by fine-textured non-cohesive granular deposits extending to the surface of the bedrock which was encountered between elevations 1037 and 1023.5 ft. At the proposed crossing the river bottom lies at elevation 1040 $\pm$  ft.

In the selection of the foundation level of particular significance is the susceptibility of the subsoil for erosion and scour and the generally loose or only slightly compact nature of the deposits above elevation 1030 ft.

Because of the uniform grading and the fine-textured non-cohesive nature of the fine sand and silt deposits, both soil strata are considered to be potentially endangered by the scour action of the river. Only in the full knowledge of the hydraulic conditions could the maximum depth of the possible scour be determined but under adverse conditions it is estimated that the river bottom could be scoured to depths exceeding 10 ft. For this reason, unless provisions are made to protect the foundations against scour, the footings will have to be carried to elevation about 1030 $\pm$  ft.

Because of the generally loose or only slightly compact relative density of the substrata above elevation 1030 ft., normal spread footing foundations could not be used above this level. At elevation 1030 ft. the allowable bearing pressure of the subsoil is 4,000 lbs. per square foot. This is based on the poorest conditions encountered in Borehole No. 1 and in Cone Penetration Tests 2A and 3A. It is

estimated that for the footing sizes likely to be required, the maximum total settlement will not exceed 1". However, because at elevation 1030 ft. part of the footings will rest either immediately on the bedrock or only a short distance above the rock surface, the maximum differential settlement will also be equal to 1 inch.

Because of this unfavourable condition of not having uniform support under different parts of the same footing and also the problems likely to be encountered during the deep excavations below the water table, it is recommended that consideration be given to support the structure on piles driven to the surface of the bedrock. It is believed that piled foundations will not only be safer and more economical, but will also greatly reduce the problems during construction. Either timber, concrete or steel H piles are considered to be suitable for this project and the choice between them should be based on economical considerations. There are no difficulties expected from driving through the overburden and reaching the surface of the bedrock. Since the piles will be driven to the sound bedrock the capacity of the individual piles will be almost equal to the capacity of the pile itself as a structural member. In case of steel H piles the compressive stress in the pile, however, should be limited to 10,000 p.s.i.

#### CONCLUSIONS

The investigation has revealed that the site is underlain by non-cohesive, fine-textured granular deposits generally of loose to compact relative density. The surface of the sound bedrock was encountered at depths ranging between 12½ and 25 ft.

For the purpose of scour protection and because of the generally loose nature of the overburden above elevation 1030 ft., it is recom-

mended that the foundations be carried at least to elevation 1030 ft. At this level the allowable bearing pressure is 4,000 lbs. per square foot but both the total and differential settlements are estimated to be of the order of 1".

Because of the variable depths to the surface of the bedrock, the support of the footings at El. 1030 ft. will be non-uniform. Therefore, and also because of the difficulties expected during excavation, it is recommended that the structure be supported on piles. For greatest economy the piles should be driven to the surface of the bedrock where they can develop high load carrying capacities.

DOMINION SOIL INVESTIGATION LIMITED,

*I. P. Lieszkowsky*  
I. P. Lieszkowsky, P.Eng.,  
Project Engineer.






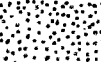
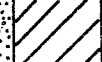

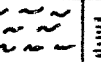

IPL/lis



E n c l o s u r e s

# LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

## SOIL COMPONENTS AND GROUND WATER CONDITIONS.

												
BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY	ORGANICS	BEDROCK	GROUND WATER LEVEL	DEPTH OF CAVE-IN
		COARSE	FINE	COARSE	MEDIUM	FINE						
Ø > 8"		3"	3/4"	4.76mm	2.0	0.42	0.074	0.002	>	NO SIZE LIMIT		

U.S. Standard Sieve Size: No.4 No.10 No.40 No.200

## SAMPLE TYPES.

AS Auger sample  
CS Sample from casing  
ChS Chunk sample

RC Rock core  
% Recovery  
SS Split spoon sample

TP Piston, thin walled tube sample  
TW Open, thin walled tube sample  
WS Wash sample

SAMPLER ADVANCED BY static weight : w  
" pressure : p  
" tapping : t

OBSERVATIONS  
MADE WHILE  
CORING

Steady pressure  
No pressure  
Intermittent pressure

Washwater returns  
Washwater lost

## PENETRATION RESISTANCES.

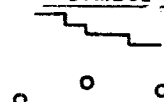
**DYNAMIC PENETRATION RESISTANCE** : to drive a 2"  $\phi$ , 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

**STANDARD PENETRATION RESISTANCE, -N-** : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.

### EXTRAPOLATED -N- VALUE

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

SYMBOL :



322

## SOIL PROPERTIES.

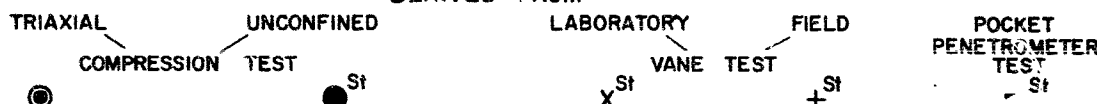
W %	Water content	$\gamma$	Natural bulk density (unit weight)	k	Coeff. of permeability
LL %	Liquid limit	e	Void ratio	C	Shear strength
PL %	Plastic limit	RD	Relative density	$\phi$	Angle of int. friction
PI %	Plasticity index	C <sub>v</sub>	Coeff. of consolidation	C'	Cohesion
LI	Liquidity index	m <sub>v</sub>	Coeff. of volume compressibility	$\phi'$	Angle of int. friction

in terms of total stress

in terms of effective stress

## UNDRAINED SHEAR STRENGTH.

- DERIVED FROM -



Strain at failure is represented by direction of stem

20%  
15%  
10%  
5%

St : sensitivity =  $\frac{\text{shear strength in undisturbed state}}{\text{shear strength in remoulded state}}$

## SOIL DESCRIPTION.

COHESIONLESS SOILS :

RD :

COHESIVE SOILS :

C lbs/sq.ft.

Very loose 0 - 15 %  
Loose 15 - 35 %  
Compact 35 - 65 %  
Dense 65 - 85 %  
Very dense 85 - 100 %

Very soft less than 250  
Soft 250 - 500  
Firm 500 - 1000  
Stiff 1000 - 2000  
Very stiff 2000 - 4000  
Hard over 4000

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . I. & C.T. 1A

OUR REFERENCE NO. 6-3-3

CLIENT: DEPT. OF HIGHWAYS - ONTARIO  
PROJECT: PROPOSED BRIDGE  
LOCATION: HORNEPAYNE, ONTARIO  
DATUM ELEVATION: GEODETIC

METHOD OF BORING: WASHBORING  
DIAMETER OF BOREHOLE: 2 3/8"

ENCLOSURE NO. 2

DATE: MAR 4, 1966 - B.H. N° 1  
MAR 10, 1966 - C.T. N° 1A

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	N- or Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PI	W		
1049.6	0	GROUND SURFACE					BOREHOLE N° 1								
1045.0	5	Soft Dark Brown ORGANIC SILT		1	S.S.	2									W.L. El. 1046.4' MAR. 10, 1966  GRAIN SIZE DISTR. (ENCL. N° 6)  GRAIN SIZE DISTR. (ENCL. N° 7)  FIELD PERMEABILITY TEST. K <sub>av</sub> = 7x10 <sup>-3</sup> cm/sec.  EXTRAPOLATED 'N' VALUE 45/2"
1040.0	10	Very Loose to Brown Grey Loose		2	S.S.	1									
1035.0	15	FINE TO MEDIUM SAND with some silt and organic matter		3	S.S.	6									
1030.0	20	Compact Grey Brown SILT with trace of clay and sand		4	S.S.	11									
1025.0	25	SAND & GRAVEL		5	S.S.	9									
1023.9	25.7	END OF BOREHOLE Refusal, possibly on Bedrock		6	S.S.	22									
				7	S.S.	270									
1049.5	0	GROUND SURFACE					CONE TEST N° 1A								
1045.0	5														Refusal, hammer bouncing probably Bedrock
1040.0	10														
1037.0	12.5	END OF CONE TEST													
1035.0	15														

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CH'D.



# GEOTECHNICAL DATA SHEET FOR BOREHOLE 2 & C.T. 2A

OUR REFERENCE NO. 6-3-3

CLIENT: DEPT. OF HIGHWAYS - ONTARIO  
PROJECT: PROPOSED BRIDGE

LOCATION: HORNEPAYNE, ONTARIO  
DATUM ELEVATION: GEODETIC

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

ENCLOSURE NO. 3

DATE: B.H. NO. 2 - MAR. 10, 1966

B.H. NO. 2A - MAR. 7, 1966

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	Advancement of Sample	2.0	4.0	6.0	8.0		10.0
1049.3	0	GROUND SURFACE					<b>BOREHOLE NO. 2</b>					
		Soft Dark Brown ORGANIC SILT										
1045.0	4.5	Very Loose SILTY FINE SAND		1	S.S.	1						GRAIN SIZE DISTR. (ENCL. NO. 8)
1040.0	9.5	Compact to Dense grey sand and gravel seam brown		2	S.S.	11						
1035.0	15	FINE SAND & SILT with a trace of clay		3	S.S.	33						GRAIN SIZE DISTR. (ENCL. NO. 9)
1031.8	17.5	Multicoloured GRANITE BEDROCK		4	R.C.	92%						
1030.0	20											
1025.0	22.5	END OF BOREHOLE										
1048.5	0	GROUND SURFACE					<b>CONE TEST NO. 2A</b>					
1045.0	5											
1040.0	10											
1035.0	15											
1030.0	20											
1025.0	25	END OF CONE TEST										Refusal, possibly on Bedrock

VERTICAL SCALE 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CHD

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 3 . 8 . C.T. 3A

OUR REFERENCE NO. 6-3-3

CLIENT: DEPT. OF HIGHWAYS - ONTARIO  
PROJECT: PROPOSED BRIDGE  
LOCATION: HORNEPAYNE, ONTARIO  
DATUM ELEVATION: GEODETIC

METHOD OF BORING: WASHBORING  
DIAMETER OF BOREHOLE: 2 3/8"

ENCLOSURE NO. 4

DATE: B.H. N° 3 - MAR. 8, 1966  
B.H. N° 3A - MAR. 9, 1966

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	N <sub>60</sub> or Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W		LI
1048.6	0	GROUND SURFACE		<b>BOREHOLE N° 3</b>											
1045.0	5	Loose Dark Brown ORGANIC FINE SAND & SILT		1	S.S.	6									<p>W.L. El. 1046.2' MAR. 10, 1966</p> <p>GRAIN SIZE DISTR. (ENCL. N° 10)</p> <p>GRAIN SIZE DISTR. (ENCL. N° 11)</p> <p>EXTRAPOLATED 'N' VALUE 9/6" 50/5"</p>
1040.0	10	Compact Yellowish Brown SILT with some fine sand and a trace of clay.		2	S.S.	13									
1035.0	15			3	S.S.	13									
1030.0	20			4	S.S.	69									
1027.2	21.4	Multicoloured GRANITE BEDROCK		5	R.C.	98%									
1025.0	25			6	R.C.	83%									
	26.5	END OF BOREHOLE													
1048.0	0	GROUND SURFACE		<b>CONE TEST N° 3A</b>											
1045.0	5														
1040.0	10														
1035.0	15														
1030.0	20														
1028.0		END OF CONE TEST Refusal possibly on Bedrock													

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CH'D

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 4 . 8 . C.T. 4A

OUR REFERENCE NO. 6 - 3 - 3

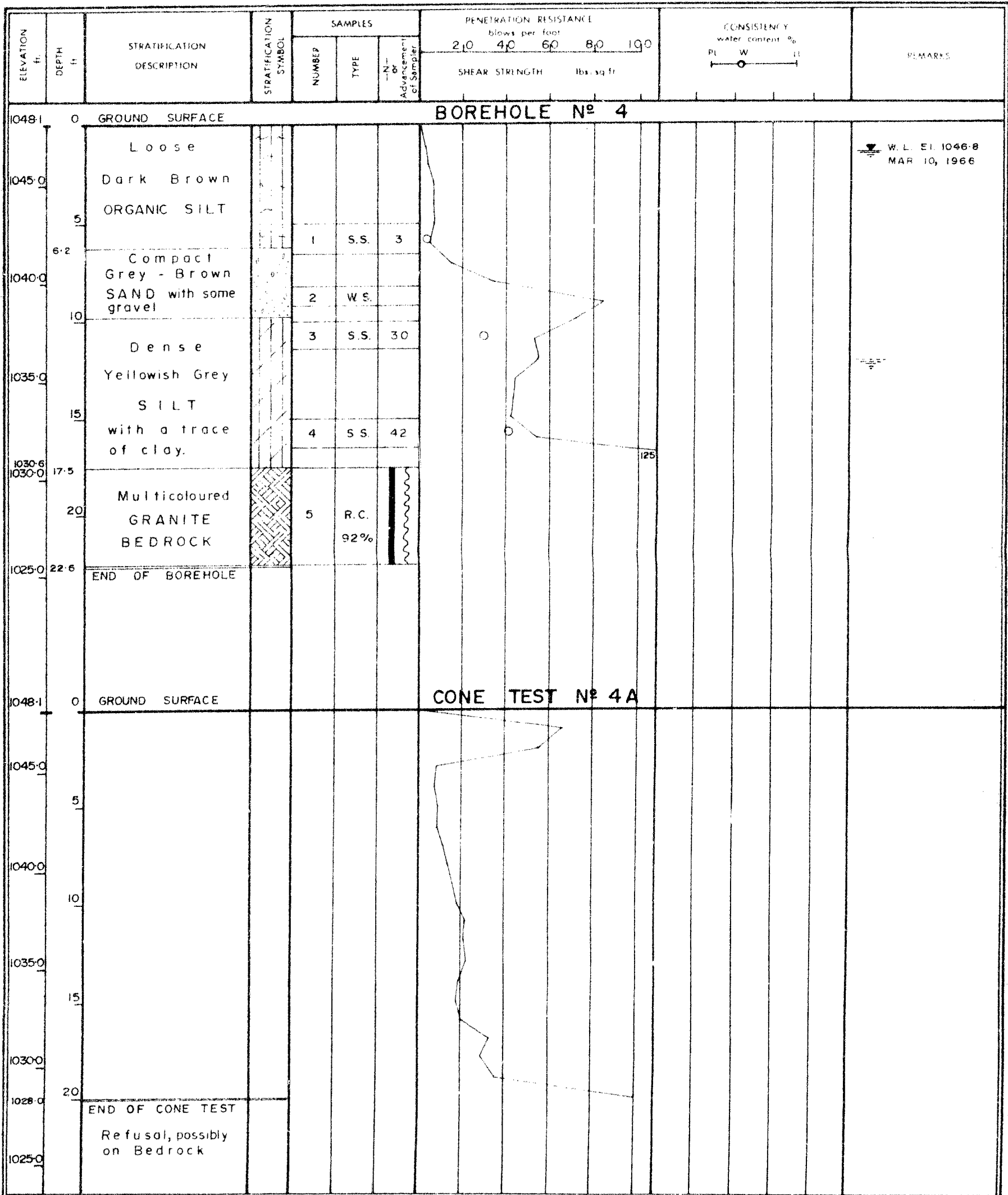
CLIENT: DEPT. OF HIGHWAYS - ONTARIO  
PROJECT: PROPOSED BRIDGE  
LOCATION: HORNEPAYNE, ONTARIO  
DATUM ELEVATION: GEODETIC

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 3/8"

ENCLOSURE NO. 5

DATE: B.H. N° 4 - MAR. 9, 1966  
B.H. N° 4A - MAR. 7, 1966



VERTICAL SCALE: 1 IN TO 5 FT.

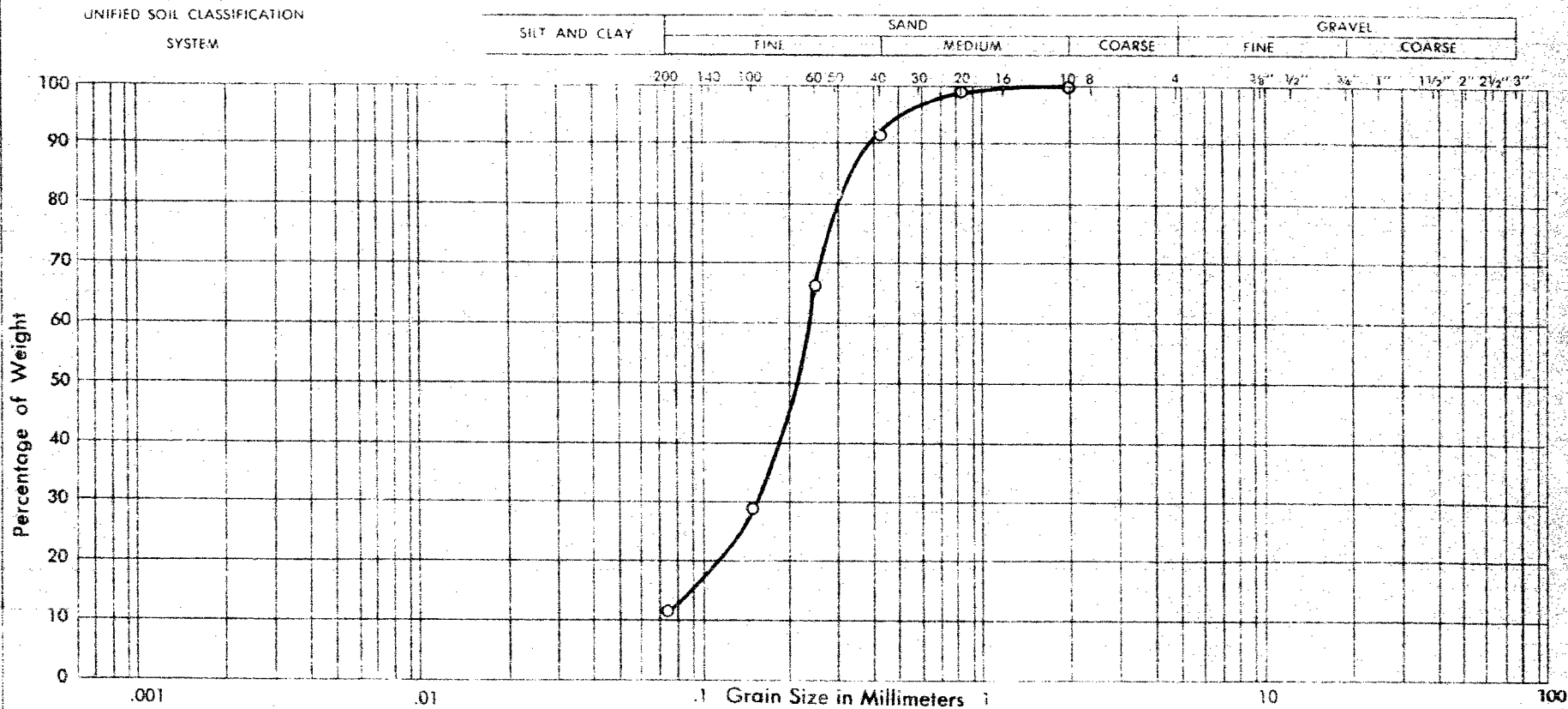
DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CHD

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-3-3



PROJECT: BRIDGE OVER WEST BEATON RIVER

LOCATION: NEAR HORNEPAYNE ONTARIO

BOREHOLE NO. 1

SAMPLE NO. 2

DEPTH OF SAMPLE: 10' - 11' 5'

ELEVATION OF SAMPLE: 1039 ± ft.

COEFFICIENT OF UNIFORMITY ~ 3

COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

FINE SAND with some silt

PLASTIC PROPERTIES:

LIQUID LIMIT % = —

PLASTIC LIMIT % = —

PLASTICITY INDEX % = —

MOISTURE CONTENT % = —

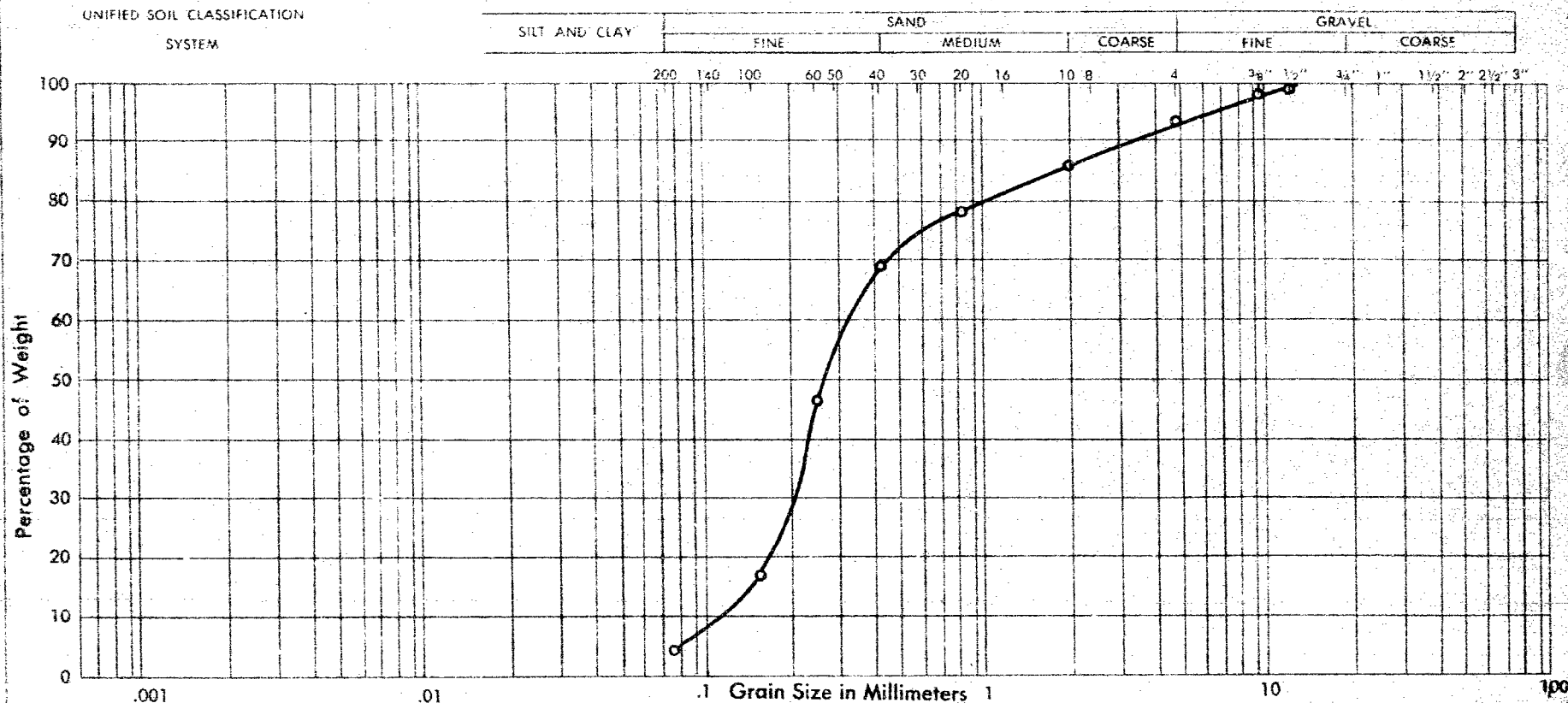
ACTIVITY = —

Enclosure No. 6

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-3-3



PROJECT: BRIDGE OVER WEST BEATON RIVER

COEFFICIENT OF UNIFORMITY ~ 3

LOCATION: NEAR HORNEPAYNE, ONTARIO

COEFFICIENT OF CURVATURE

BOREHOLE NO.: 1

SAMPLE NO.: 3

DEPTH OF SAMPLE: 12.5' - 14'

ELEVATION OF SAMPLE: 1037 ± ft.

**Classification of Sample and Group Symbol:**

FINE TO COARSE SAND with, trace  
of fine gravel and silt.

PLASTIC PROPERTIES:

LIQUID LIMIT	%	=	—
PLASTIC LIMIT	%	=	—
PLASTICITY INDEX	%	=	—
MOISTURE CONTENT	%	=	—
ACTIVITY		=	—

Enclosure No. 7

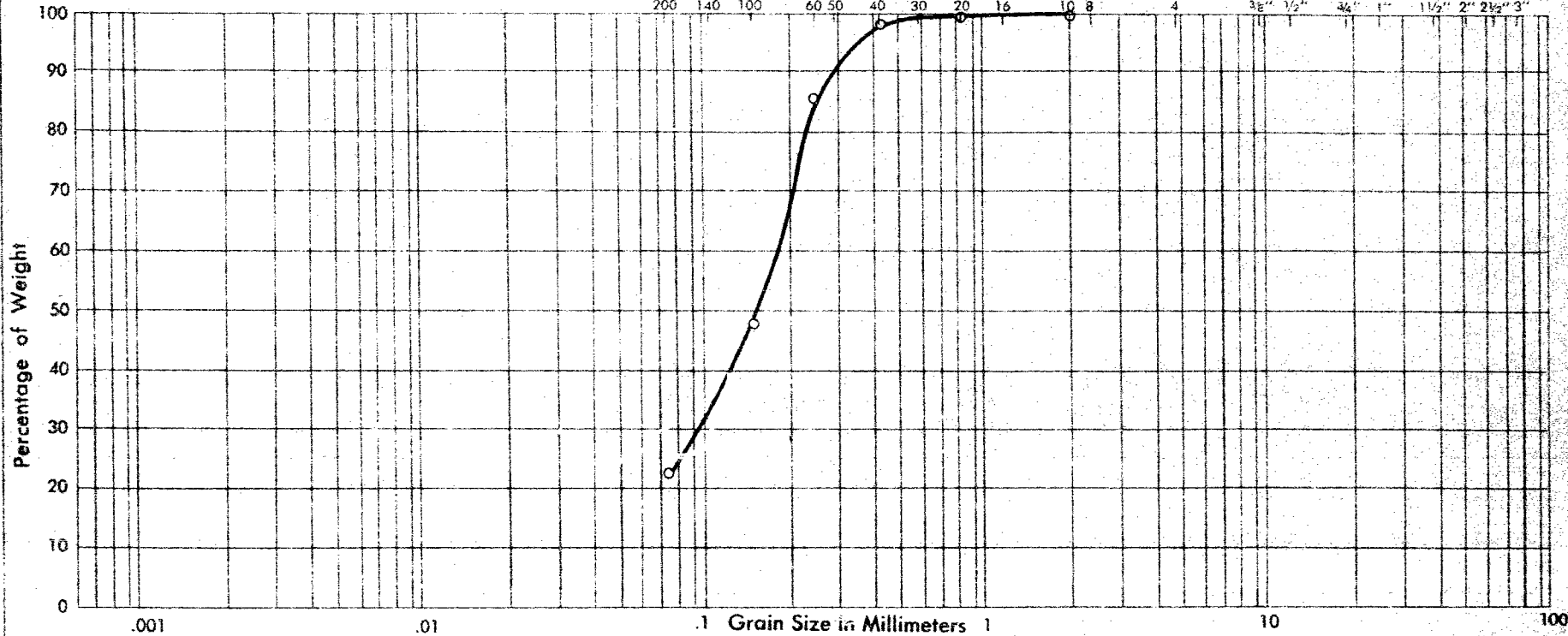
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-3-3

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: BRIDGE OVER WEST BEATON RIVER  
 LOCATION: NEAR HORNEPAYNE ONTARIO  
 BOREHOLE NO.: 2  
 SAMPLE NO.: 1  
 DEPTH OF SAMPLE: 5' - 6.5'  
 ELEVATION OF SAMPLE: 1043 ± ft.

COEFFICIENT OF UNIFORMITY ~ 4  
 COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**

SILTY FINE SAND

PLASTIC PROPERTIES:

LIQUID LIMIT	%	=	—
PLASTIC LIMIT	%	=	—
PLASTICITY INDEX	%	=	—
MOISTURE CONTENT	%	=	—
ACTIVITY		=	—

Enclosure No. 8

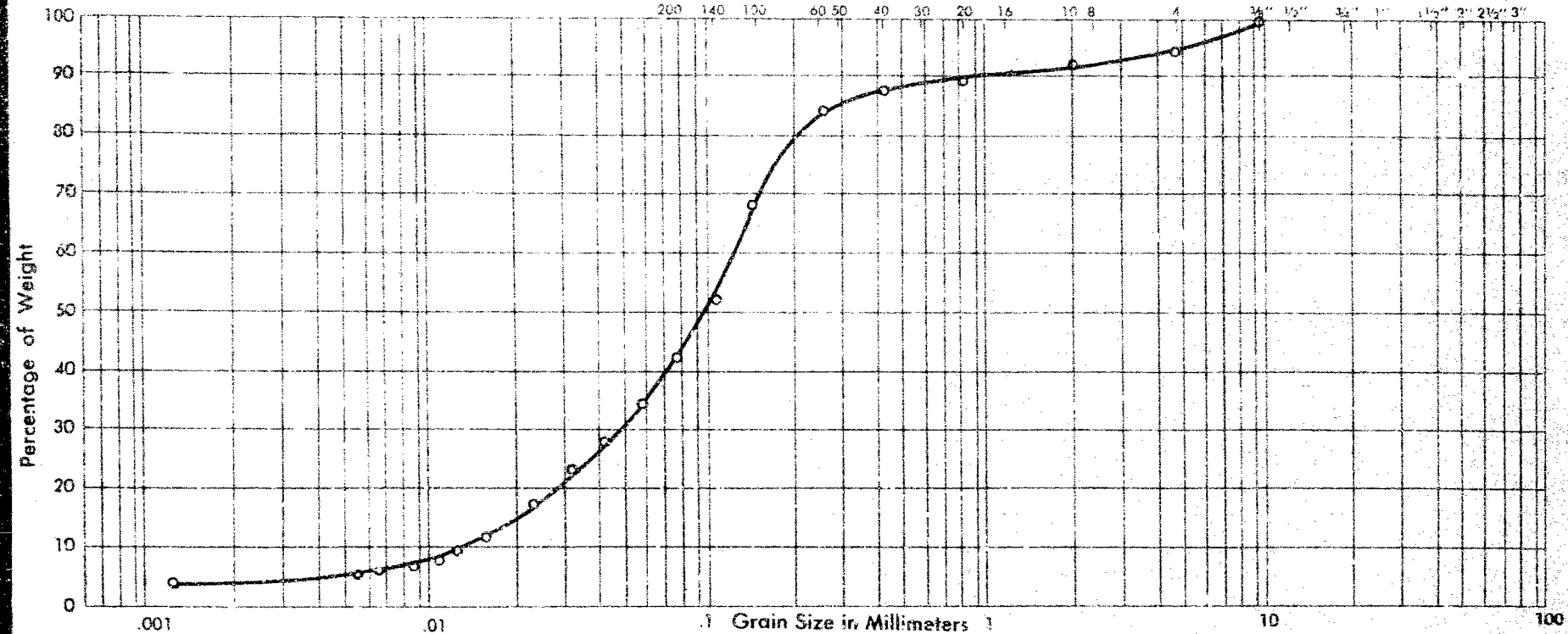
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-3-3

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: BRIDGE OVER WEST BEATON RIVER

LOCATION: NEAR HORNEPAYNE, ONTARIO

BOREHOLE NO.: 2

SAMPLE NO.: 3

DEPTH OF SAMPLE: 15' - 16.5'

ELEVATION OF SAMPLE: 1033 ± ft.

COEFFICIENT OF UNIFORMITY ~ 10

COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**

SILT & SAND with a trace of clay and fine gravel

PLASTIC PROPERTIES:

LIQUID LIMIT % = —

PLASTIC LIMIT % = —

PLASTICITY INDEX % = —

MOISTURE CONTENT % = —

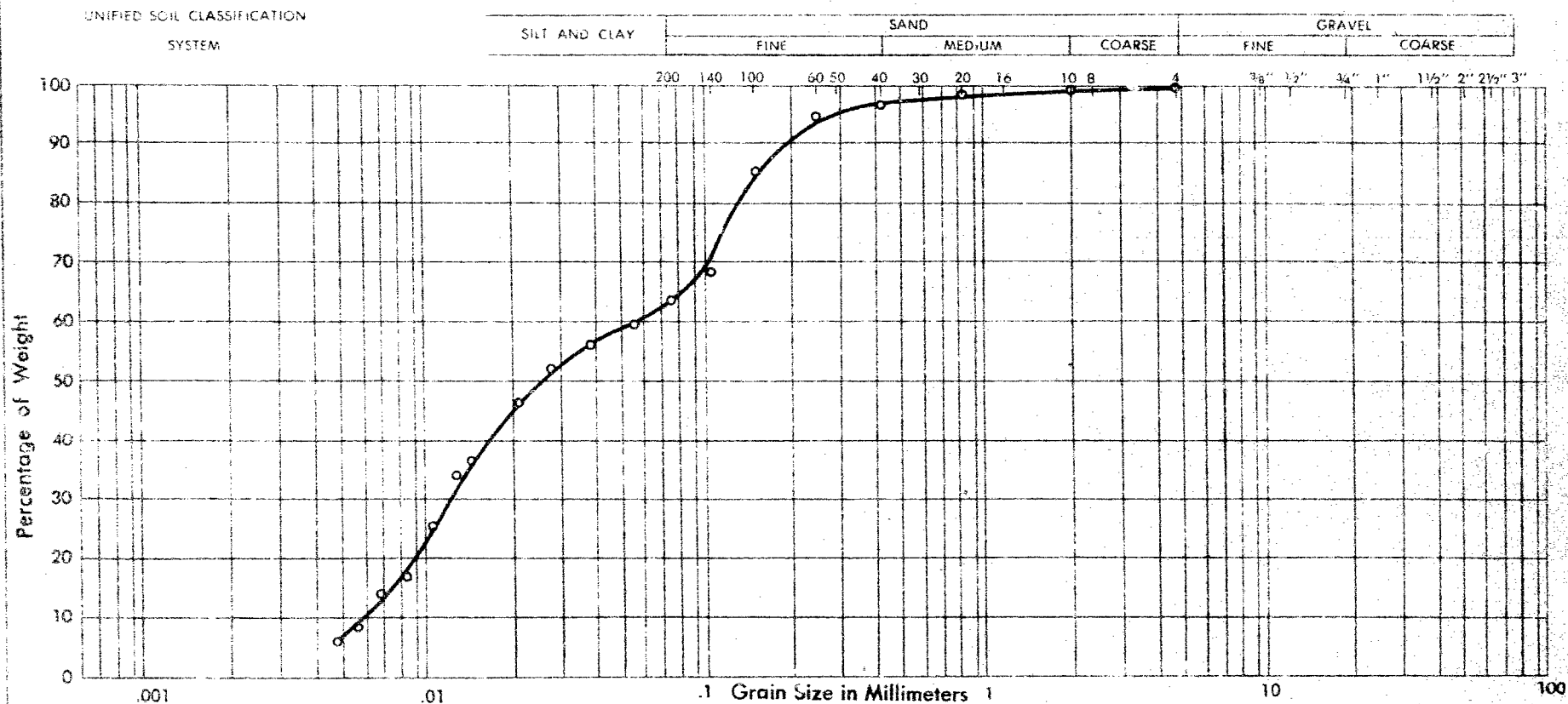
ACTIVITY = —

Enclosure No. 9

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 6-3-3



PROJECT: BRIDGE OVER WEST BEATON RIVER

LOCATION: NEAR HORNEPAYNE ONTARIO

BOREHOLE NO.: 3

SAMPLE NO.: 2

DEPTH OF SAMPLE: 10' - 11.5'

ELEVATION OF SAMPLE: 1038 ± ft.

COEFFICIENT OF UNIFORMITY ~ 10

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % ==

PLASTIC LIMIT % ==

PLASTICITY INDEX % ==

MOISTURE CONTENT % ==

ACTIVITY % ==

Classification of Sample and Group Symbol:

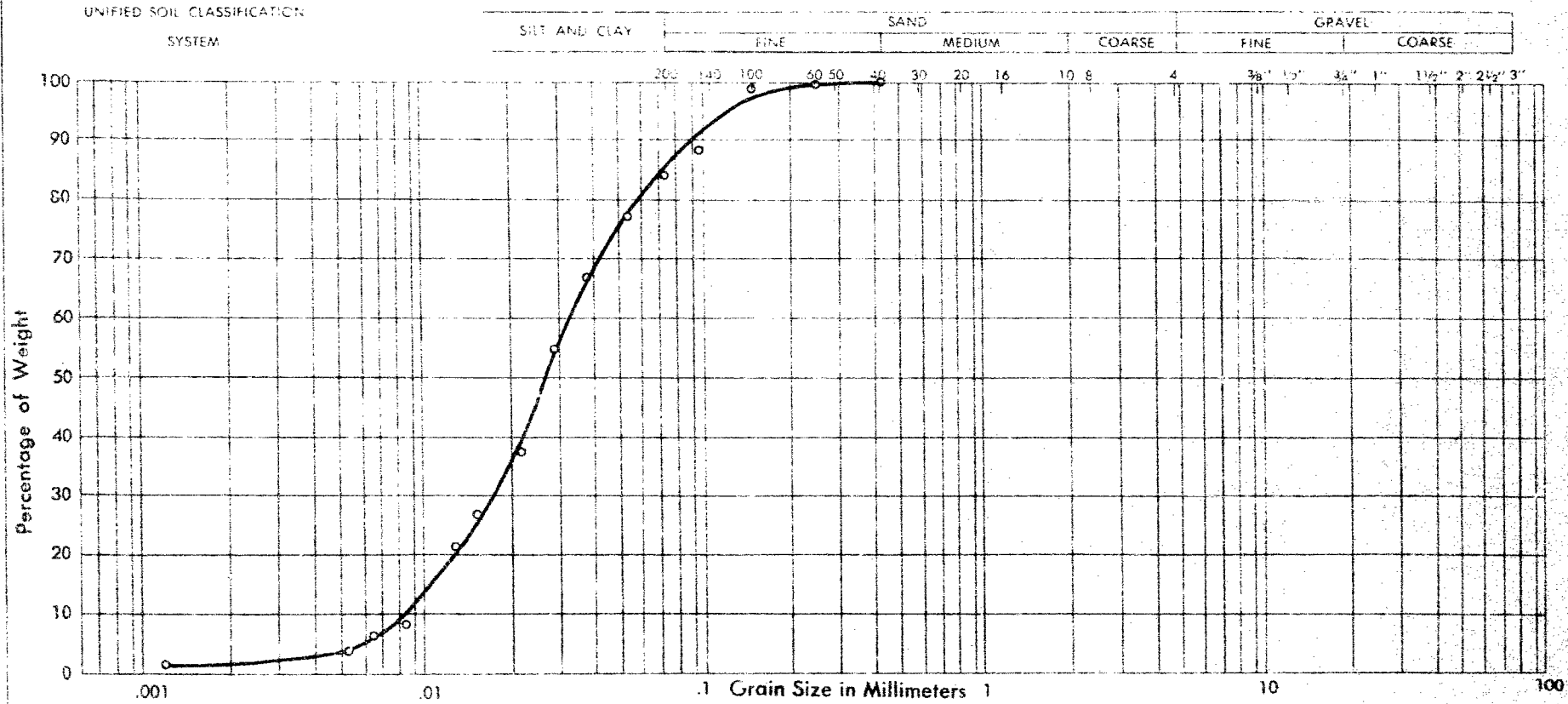
SANDY SILT



# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-3-3



PROJECT: BRIDGE OVER WEST BEATON RIVER  
 LOCATION: NEAR HORNEPAYNE ONTARIO  
 BOREHOLE NO.: 3  
 SAMPLE NO.: 3  
 DEPTH OF SAMPLE: 15' - 16.5'  
 ELEVATION OF SAMPLE: 1033 ± ft.

COEFFICIENT OF UNIFORMITY ~ 3  
 COEFFICIENT OF CURVATURE

### Classification of Sample and Group Symbol:

SILT with some fine sand and a trace of clay

### PLASTIC PROPERTIES:

LIQUID LIMIT % =  
 PLASTIC LIMIT % =  
 PLASTICITY INDEX % =  
 MOISTURE CONTENT % =  
 ACTIVITY =

Mr. S. H. Davis,  
Bridge Engineer,  
Bridge Division.

Attention: Mr. S. McComb

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

March 29, 1966

MAR 30 1966

FOUNDATION INVESTIGATION REPORT BY -  
Dominion Soil Investigation Limited  
W.P. 145-64, Proposed Crossing of Hwy. 631  
at West Beaton River, District of Algoma,  
Township of Beaton, Ontario,  
District #16 (Cochrane).

Attached, we are forwarding to you, the above mentioned report prepared by the consultant, Dominion Soil Investigation Ltd. we have reviewed the report and have found the factual information adequate and well presented. Regarding the recommendations contained in the report, we would like to make the following comments:

Because of appreciable construction difficulties, spread footings do not seem to be a practical alternative. The placement of footings partly on rock and partly on soil, does not seem to be a good suggestion, either. We would definitely support the recommendation to use piles driven to rock. Timber piles should not be considered because of possible overdriving and resulting damage to the piles. Steel tube piles are recommended. Because of difficulties to be encountered in the construction of a pile cap below ground or water, consideration should be given to using the piles as pier columns and capping them at the beam support elevation.

In view of the scourable nature of the soil at the crossing location, the necessity of keying the piles into rock should be considered and studied.

The organic deposit under the bridge approaches should be excavated and replaced with a granular material when placed under water, and with any other acceptable material when replaced above the ground or river water elevation. The extent of the sub-excavation should be determined by the Regional Materials Engineer's staff.

cont'd. /2 .....

Mr. S. H. Davis,  
Bridge Engineer, Bridge Div.  
Attn: Mr. S. McCombie.

- 2 -

March 29, 1966

we trust that this information will suffice for your further design work. Should you, however, have any additional queries or other alternatives that you would like to discuss, please feel free to contact our Office.

AGC/10P  
attach.

cc: Messrs. S. H. Davis (2)  
R. A. Tregaskes  
L. J. Parren  
D. S. Burrell  
J. D. Foster  
E. R. Saint  
A. Witt  
F. De Visser

*Althman*  
A. G. Sternac,  
PRINCIPAL FOUNDATION ENGINEER

Foundations Office  
Gen. Files

Rwy. 401 & Kesle St.,  
Donnenvieu, Ontario.  
February 24, 1966

Materials and Testing Division

Dominion Well Investigation, Ltd.,  
77 Cressford Blvd.,  
Scarborough, Ontario.

Attention: Mr. E. A. King, Chief Engr.

Re: Foundation Investigation -  
H.R. 145-64, West Boston River,  
Site 38K-3, 17.5 mi. S. of Hornepayne,  
Rwy. 551, District 13 (Sault Ste. Marie).

Dear Sir:

This is to authorize you to carry out a foundation investigation at the above mentioned site.

The site is the same for which you were authorized to carry out the investigation on February 1, 1965. Due to the inaccessibility of the area, the work had to be postponed.

We are advised that the site is now accessible, but only with a four-wheel drive vehicle.

You are requested to investigate whether the cost of shipping the truck, drill, and all the equipment by C.N.R. to Hornepayne is less than bringing the equipment by road. Due to the need for a four-wheel drive vehicle, your Engineer would not require a car at the site and could, therefore, reach Hornepayne by train, also.

After all necessary arrangements have been completed, you are requested to advise the District Engineer in Sault Ste. Marie, Mr. J. A. Knowles, of your arrival date at the site. Also, please advise Mr. C. A. Saint, Regional Materials Engineer, North Bay.

We would expect you to start the field work during the first week in March. Eleven (11) copies of the final report should be submitted by not later than April 15, 1966. Previous requirements as to preliminary borehole information and laboratory testing program, should be followed.

Dominion Soil Investigation, Ltd.  
Attn: Mr. K. H. King, Chief Engr.

Page - 2 -

February 24, 1966

It will be appreciated if you would advise us of the day when your crew will be leaving the site.

Since the drawing accompanying the foundation report, showing the location of borings, the inferred subsoil conditions, etc., is to become a contract drawing, you are requested to prepare it in accordance with the D.S.O. standards. To enable you to do this, we are supplying you with a sample drawing with all the necessary explanations, together with a linen sheet for your drawing. You are also requested to provide us with a Cronaflex copy of the drawing.

Charges for the work performed will be in accordance with your schedule of rates, dated July 6, 1964, and invoice to be addressed to the attention of the undersigned.

We are attaching Purchase Order J 34807, covering the purchase of any new material required for this work, in order that you may use this as a basis for exemption from the Federal Tax for such purchases. The Exemption Certificate is printed thereon.

Yours very truly,



A. Rutha,

MATERIALS & TESTING ENGINEER

AGG/ALP  
Attach.

cc: Messrs. G. McCombie  
H. W. Murrell  
J. A. Knowles  
E. H. Saint  
P. De Visser  
H. Konings  
Mrs. I. Steinberg  
A. Crowley  
B. Szymanski (2) ✓  
Foundations Office  
Gen. Files (2)

Hwy. 401 & Eadie St.,  
Scumaview, Ontario.

February 1, 1965

Materials and Testing Division

Dominion Soil Investigation Ltd.,  
77 Crookford Blvd.,  
Scarborough, Ontario.

Attention: Mr. J. Benson

- 1) H.P. 145-64, Loc. Hwy. 631, West Benton M., 17.3 Mi. N. of Hornepayne.
- 2) H.P. 9130-64-75, Loc. Hwy. 574, Abitibi R. Bailey Br., Site #39-175.
- 3) Patrol Garage in Cochrane. -- District 16, Cochrane, Ont.

Dear Sir:

Please consider this your authority to carry out foundation investigations at the above sites. Plans and profiles were provided to your representative on January 26, 1965.

It is understood that a qualified Soils Engineer will be in charge of the field work at all times, and that both he and the drill rig will be mobilized from Sudbury and will return there upon completion of the field work.

Eleven copies of each completed foundation report, with one additional copy of each subsoil profile, should be submitted to the Foundation Section prior to March 24, 1965. Previous requirements as to preliminary borehole information and laboratory testing program, should be followed.

Because the drawings accompanying the foundation reports, showing the location of borings, the inferred subsoil conditions, etc., are to become contract drawings, you are requested to prepare them in accordance with the B.N.C. standards. To enable you to do this, we are supplying you with sample drawings with all the necessary explanations, together with linen sheets for your drawings. You are also requested to provide the B.N.C. with Cronaflex copies of the drawings.

Charges for the work performed will be in accordance with your schedule of Rates, dated July 6, 1964, and invoices to be addressed to the attention of the undersigned.

5001/468

Yours very truly,

*a. Rutka*

cc: Messrs. J. McCombie  
T. DeVissser  
H. Harrell  
J. D. Foster  
B. R. Saint

Mrs. T. Tate  
H. D. Smith (2)

a. Rutka,  
MATERIALS & TESTING DIVISION

Foundations Office  
Gen. Files (2)

## MEMORANDUM

To: Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Bldg.

From: 208 Simpson Street,  
FORT WILLIAM, Ontario.

DATE: January 25, 1965.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 145-64 Site 38 N-8  
West Beaton River  
17.3 Mi. South of Hornepayne  
Sec. Rd. 631 - Dist. 16

Enclosed please find a print of plan E-4208-1 on which is marked the footing lay-out for a proposed structure.

Would you please have a foundation Investigation carried out.

The site can be reached from Hornepayne over 15 miles of cleared right of way, and 2.3 miles of practically virgin bushland which is accessible in wintertime, using a bombardier type vehicle.

FDeV/sp

*S. McCombie*  
for F. DeVisser,  
Regional Bridge Location Engineer.

cc. R. Fitzgibbon  
N. D. Smith  
S. McCombie

*Dominion*

*Given to Dominion Eng. Inc. Ltd  
Jan 26/65*

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

February 16, 1967

A.P. 145-64,  
West Beaton River Bridge, Hwy. 631,  
District #18 (Sault Ste. Marie),  
(Report by Dominion Soil Investigation Ltd.) 165

We have reviewed the Preliminary Bridge Plan Drawing D-5920-1 for the above mentioned structure and submit the following comments:

1) In our memo dated March 29, 1966, to Mr. S. McCombie, steel tube piles are recommended, whereas steel H-piles are shown on the drawings.

2) It was recommended that all organic material be sub-excavated and replaced with suitable earth material prior to the construction of the approach embankments. These details are not shown on the preliminary drawing.

3) The design drawings indicate  $1\frac{1}{2}:1$  forward slopes for the approach fills instead of  $2:1$  slopes.

CO/ideP

cc: Messrs. S. McCombie  
F. De Visser  
F. Norman

Foundations Files ✓  
Gen. Files

*M. Devata*

M. Devata,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Sternac,  
PRINCIPAL FOUNDATION ENGR.

Further to the discussion with Bill Ashmun on May 18 1967, it was agreed that the former slopes of  $1\frac{1}{2}:1$  could be used provided they are protected with rip rap. Elsewhere  $2:1$  slopes for the sides should be used. All organic material should be removed.

*M. Devata*

May 1st 1967.



MEMORANDUM

Mr. A. Stermac,  
Principal Foundation Engineer,  
Laboratory Building,  
Downsview, Ontario.

FROM: Bridge Division,  
777 Memorial Avenue,  
P. O. Box 1170,  
Port Arthur, Ontario,  
DATE: February 13, 1967.

R FILE REF.

IN REPLY TO

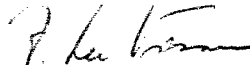
SUBJECT:

Site 38N-8, W. P. 145-64,  
West Beaton River Bridge,  
Highway 631, District 18.

*Don. Lail/65*

Attached is one print of Preliminary Plan  
D-5920-1 for the subject structure.

If you have any comments, would you please let  
us know as soon as possible.



FDV/mcr  
Enc.

F. DeVISSER,  
Regional Bridge Location Eng.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac, Principal Foundation Engineer,  
Room 107, Lab. Building

Mr. F. DeVisser,  
Regional Bridge Location Engineer,  
P.O. Box 1170,  
Port Arthur, Ontario

Bridge Division,  
Downsview, Ontario

February 9, 1967

West Beaton River Bridge  
W.P. 145-64, Site 38N-8  
Highway 631, District No. 18

Attached herewith are prints of the Preliminary Bridge  
Plan Drawing D-5920-1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$43,700.  
This cost includes tender, materials, engineering and sundry  
construction.

Any comments or revisions you may have should be submitted  
within three weeks.

CSG:rd

attach.

c.c. R. Forrest  
E. Cross  
A. Stermac  
S. McCombie

C.S. Grebski,  
Bridge Design Engineer