

SUPPLEMENTARY  
FOUNDATION INVESTIGATION REPORT

For

S.E.W. and Hwy. #27 Interchange,  
Twp. of Etobicoke, County of York,  
District #6 (Toronto),  
W.P. 275-64-1 and W.P. 275-64-4  
W.J. 65-P-104

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INTRODUCTION:

Since the original foundation investigation report for the above mentioned interchange was prepared, we have received the preliminary plans for the individual structures involved which show the exact locations of each. We have reviewed these plans with respect to the available soil information, and as a result of this review, we arranged for more borings to be carried out in the field to obtain additional information.

Field work, laboratory work, and the preparation of the Record of Borehole sheets, for the additional borings, were undertaken by Dominion Soil Investigation Ltd. at our request and according to a program decided upon by us.

The following pages contain a description of the subsoil conditions prevailing at each structure location, together with our final recommendations for the structure foundations.

This report was prepared by Mr. A. Barsvary, Senior Foundation Engineer, under the general supervision of Mr. K. G. Selby, Supervising Foundation Engineer.

cont'd. /2 ...

STRUCTURE #5 - W.P. 238-61-4 -

1. Soil Conditions:

Seven boreholes were located at the vicinity of Bridge #5. The numbers of the borings are: 3, 9, 11, 12, 89, 91, and 103.

In most of the holes the uppermost soil stratum was found to be a heterogeneous fill, consisting of sand, silt and clay with traces of gravel. Underlying the fill and at certain areas right beneath the ground surface, a compact to dense silty sand layer was exposed, having an average thickness of 5 ft. Clayey silt and sandy silt (glacial till) follows the sand stratum at about el. 360 ft. along the south section of the bridge, rising gradually to el. 364 ft. at Piers #9 and 10. The glacial deposit was missing entirely in boreholes #103 and 12. A considerable amount of shale fragments was observed within the till. The relative density of the granular portion of the material was established to be very dense, while the cohesive portion exhibited a hard consistency. The upper surface of the shale bedrock was encountered around el. 353 ft. between Sta. 756+00 and 761+00; from Sta. 761+00 it rises, and was found to be at el. 364 ft. around Sta. 765+00. An estimated 10 - 15 ft. thickness of the bedrock is believed to be weathered.

The groundwater table lies within the silty sand, around el. 365 ft.

The locations and elevations of the borings as well as the soil stratigraphy along the proposed structure, are shown on Drawing #65-F-104Q.

2. Recommendations:

The bridge is designed to be a 12-span structure with perched abutments.

cont'd. /24...

STRUCTURE #5 - W.P. 238-61-4 - (cont'd.) ...

2. Recommendations: (cont'd.) ...

2.1) The footings of the abutments should be placed within the approach fills and be supported on steel H-piles driven to bedrock. The maximum allowable load for the section used may be employed on the piles.

2.2) Piers #1 and 2 will necessarily be supported on spread footings within the bedrock. The footings should be placed at a minimum depth of 4 ft. below finished ground.

2.3) The rest of the piers may be supported either on bedrock or within the glacial till deposit. The suggested elevations of the base of each footing for both cases, are tabulated below:

Pier No.	-- ELEVATIONS OF BASE OF FOOTINGS (Ft.) --	
	In Bedrock	In Glacial Till
3	354 or below	360 or below
4	354 " "	362 " "
5	355 " "	363 " "
6	357 " "	363 " "
7	359 " "	363 " "
8	359 " "	363 " "
9	360 " "	364 " "
10	362 " "	364 " "
11	364 " "	(Layer missing) - 364

A safe design load of 4.5 t.s.f. may be assumed for foundations within the glacial till, and a design load of 10 t.s.f. is applicable by lowering the footings to bedrock.

cont'd. /25...

STRUCTURE #5 - W.P. 238-61-4 - (cont'd)....

2. Recommendations: (cont'd.) ...

2.3) (cont'd.) ...

The sand and silt glacial till is susceptible to conditions of unbalanced hydrostatic head. By placing the footings within the till, some dewatering problems may be encountered, especially around Piers #3 and 4.

cont'd./26 ...

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 65-F-104 LOCATION 178,359 N 209,622 E ORIGINATED BY P.Mc  
 W.P. 275-64-1 BORING DATE Oct. 20, 1965. COMPILED BY H.S.  
 DATUM G.S.C. BOREHOLE TYPE Washboring - NX Casing. CHECKED BY [Signature]

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	25	50	75	100	125	WP	W		
365.6	Groundlevel														
0.0	(Fill) Clayey silt with some sand, fragments of shale & occasional gravel.  (Glacial Till) ↙	[Hatched]	1	SS	39										
			2	SS	86										
			3	SS	81 for 9"										
353.1	Dense to v. dense.	[Hatched]	4	RC	97%										
12.5	Shaley limestone with intermittent limestone.	[Hatched]	5	RC	81%										
349.2															
10.4	End of borehole.														

W.L.  $\nabla$  2.6'  
 Gr 8% Sa 33%  
 Si & Cl 69%  
  
 Gr 33% Sa 31%  
 Si & Cl 36%



RECORD OF BOREHOLE NO. 11

FOUNDATION SECTION

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING DIVISION

JOB 65-F-104

LOCATION 178,622 N 208,935E

ORIGINATED BY P.Mc

W.P. 275-64-1

BORING DATE Oct. 22, 1965.

COMPILED BY H.S.

DATUM G.S.C.

BOREHOLE TYPE Washboring - NX Casing.

CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	25	50	75	100	125	WP	W		
371.7	Groundlevel Topsoil															
0.4	Sandy silt with some clay & gravel (Fill)	[Hatched]	1	SS	16	370										
366.7	Compact.	[Hatched]														
5.0	Sand	[Dotted]	2	SS	23											
363.7	Compact	[Dotted]														
8.0	Clayey silt with some sand & gravel (Glacial Till)	[Hatched]	3	RC	-											
359.7	V. dense.	[Hatched]														
12.0	Shaley limestone	[Cross-hatched]	4	RC	70%	360										
356.2	End of borehole.					350										

Blocked with wet sand 5.6'

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 12

FOUNDATION SECTION

JOB 65-F-104 LOCATION 179,146 N 208,716 E ORIGINATED BY P.Mc  
 W.P. 275-64-1 BORING DATE Sept. 29, 1965. COMPILED BY H.S.  
 DATUM G.S.C. BOREHOLE TYPE Washboring - BX Casing. CHECKED BY HL

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL		BULK DENSITY	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	BLOWS / FOOT					WATER CONTENT — W		
						25	50	75	100	125	WP ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W WP ——— W ——— WL WATER CONTENT %		γ <sub>B</sub> P.C.F.	
369.7	Ground level													
	Topsoil													
0.5	Sand													
364.4	Loose to dense.													
5.3	Weathered shale.		1	RC										Blocked dry 4.2' BGL
			2	RC	40%									
360.7			3	RC	87%									
9.0	Shaley limestone.		4	RC	91%									
355.7														
14.0	End of borehole.													

Refusal at 5.5'

360

350

## MEMORANDUM

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

FROM: Bridge Division,  
Downsview, Ontario

DATE: September 21, 1967

OUR FILE REF.

IN REPLY TO

SUBJECT: Bridge No. 5  
Turning Roadway N.E.  
W.P. 238-61-4, Site 37-715  
Q.E.W. & Hwy. 27 Interchange

At a recent Regional Review Meeting it was agreed that rock line elevations have to be shown on our Drawing D5847-1 for payment purposes. These elevations were to be taken from your Soils Drawing 65-F-104Q.

On reviewing your drawing for the above-named structure we have the following observations to make:

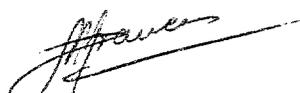
1. The pier centre-lines are not plotted correctly on the profile.
2. Piers 1 to 9 should run from right to left and not the other way around.
3. The last two chainages shown on the right hand side of the profile centre-line should be 768 + 00 and 769 + 00.

The above will also affect the table of elevations shown on page 24 of your Supplementary Foundation Investigation Report for the Q.E.W. and Highway #27 Interchange issued on December 14th, 1966.

We are enclosing copies of our Drawings D5847-1 and 2 for your information.

LNF:rd

Encs.

  
L.N. Francis,  
Bridge Project Engineer

C. Grebski  
Bridge Division  
Admin. Bldg.

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

Attn: L. N. Francis  
Bridge Project Engineer

September 25, 1967

Bridge No. 5 - Turning Roadway N.E.  
Q. E. W. & Hwy. #27 Interchange  
Site 37-715  
W. J. 65-F-104 - W.P. 238-61-4

We have received your memo of Sept. 21, 1967 relating to certain apparent inaccuracies on Foundation Drawing 65-F-104Q. Please note the following:

1. The pier centre lines are plotted according to your Preliminary Bridge Plan Drawing D-5847-1 dated 29-4-66. This plan was the one made available to us at the time of the preparation of our report.
2. Piers 1 - 11 are shown running from left to right on Drawing 65-F-104Q as per your Preliminary Drawing D-5847-1.
3. Stations 768+00 and 769+00 are incorrectly plotted on our Drawing 65-F-104Q as Stations 766+00 and 765+00. We will amend this accordingly.

The Bridge Office has been supplied with a mylar which does not show footing locations or final grades since these are never available at the time of the preparation of the foundation report. The above points, other than (3), should therefore not affect you.

Since the foundation report is not a contract document it will not be necessary to amend our table of elevations on page 24. These elevations refer to points designated on Drawing 65-F-105Q which is part of the foundation report. This situation could well arise with every one of our foundation reports and it is for this reason that the mylar supplied to the Bridge Office does not show final grades or footing locations.

*K. G. Selby*

KGS:mt

cc: W. Melinyshyn  
Foundation Files ✓  
General Files

K. G. Selby  
Supervising Foundation Engineer  
for: A. G. Sternac  
PRINCIPAL FOUNDATION ENGINEER

## MEMORANDUM

To: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division.

Attention: Mr. S. McCombie

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

Date: October 27, 1966

OUR FILE REF.

IN REPLY TO:

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Q.E.W. and Hwy. #27 Interchange,  
Twp. of Etobicoke, County of York,  
District #6 (Toronto)  
W.J. 65-F-104 -- W.P. 238-61-4

Enclosed, please find the results of our  
final foundation investigation for Structure No. 5.

Please attach this to your copy(s) of  
Foundation Report #65-F-104.

AGS/MdeF  
Attach.

*A. G. Stermac*  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
G. K. Hunter (2)  
F. Allen  
T. J. Kovich  
W. S. Melinyshyn  
A. Watt

Foundations Office  
Gen. Files

**D O M I N I O N   S O I L   I N V E S T I G A T I O N   L I M I T E D**

**77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567**

**BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3651**



**FOUNDATION ENGINEERS**

**ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
34 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896**

August 17, 1966.

Our Ref. No. 6-6-16  
Your Ref. W. P. 238-61-4

Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Materials & Testing Division,  
Department of Highways,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. K. Selby, P. Eng.

Re: Soil Investigation for Q.E.W. and Hwy. # 27 Interchange,  
Bridge No. 5.

Dear Sirs:

This letter accompanies eleven (11) sets of the records of boreholes No. 89, 91, and 103. Also enclosed on a separate enclosure are the results of the laboratory tests performed on representative soil samples.

For additional information about the subsurface conditions, reference should be made to borehole No. 125 and borehole No. 74 which have been put down for retaining walls in the vicinity of this structure, but the results of which have not yet been forwarded to you. Boreholes No. 3, 9, 11, and 12 performed by yourself also pertain to this structure.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

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

IPL/ds

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY  
SOIL TESTING AND ENGINEERING LTD.  
94 BRENTFORD ROAD,  
KINGSTON 5, JAMAICA, WEST INDIES  
TELEPHONE: 66896

Our Ref: 6-6-16  
Your Ref: W.B. 238-61-4

Mr. A.G. Stermac  
Principal Foundation Engineer  
Materials Testing Division  
Department of Highways  
Downsview Avenue  
Downsview, Ontario

Attention: Mr. K. Selby, P. Eng.

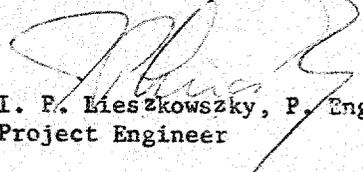
Re: Soil Investigation for Q.E.W. and Highway # 27,  
Interchange, Bridge # 5

Dear Sirs,

Enclosed are eleven copies of the revised borehole log for borehole # 103. The elevation of the ground surface has been changed from 365.0 to 370.8 ft.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

  
I. F. Lieszkowszky, P. Eng.,  
Project Engineer

Enc.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . . 91 . . .

OUR REFERENCE NO. 6-6-16

CLIENT: D. H. O.  
 PROJECT: BRIDGE No. 5, Q. E. W. & HWY. 27.  
 LOCATION: 178, 889 N ; 208, 820 E  
 DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING  
 DIAMETER OF BOREHOLE: 2 3/8"  
 DATE: JUNE 28, 1966.  
 W. P. 238-61-4

ENCLOSURE NO

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot		CONSISTENCY water content %		REMARKS	
				NUMBER	TYPE	N - Advancement of Sampler	20	40	60	80		100
372.1	0	GROUND SURFACE										
370.0	5	Compact to Dense Brown FINE SAND with some SILT	[Symbol]	1	SS	42						
365.0	7.5	Very Hard Grey CLAYEY SILT with SHALE fragments and occasional fine GRAVEL (GLACIAL TILL)	[Symbol]	2	SS	132/9						
364.6				3	SS	100/3						
360.0				4	SS	100/3						
359.3	12.8			4A	WS							
355.0	15	Grey SHALE	[Symbol]	5	RC	50%						
				6	SS	100/3						
				7	RC	42%						
				8	SS	100/4						
347.0	25	Broken Weathered										
345.0		Sound BEDROCK	[Symbol]	9	RC	59%						
				10	RC	95%						
340.0	30											
339.0		END OF BOREHOLE										
335.0	35											

Sa - 92% , Si - 8%  
 W.L. 365.1 Ft.  
 JUNE 29, 1966.

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CH'D

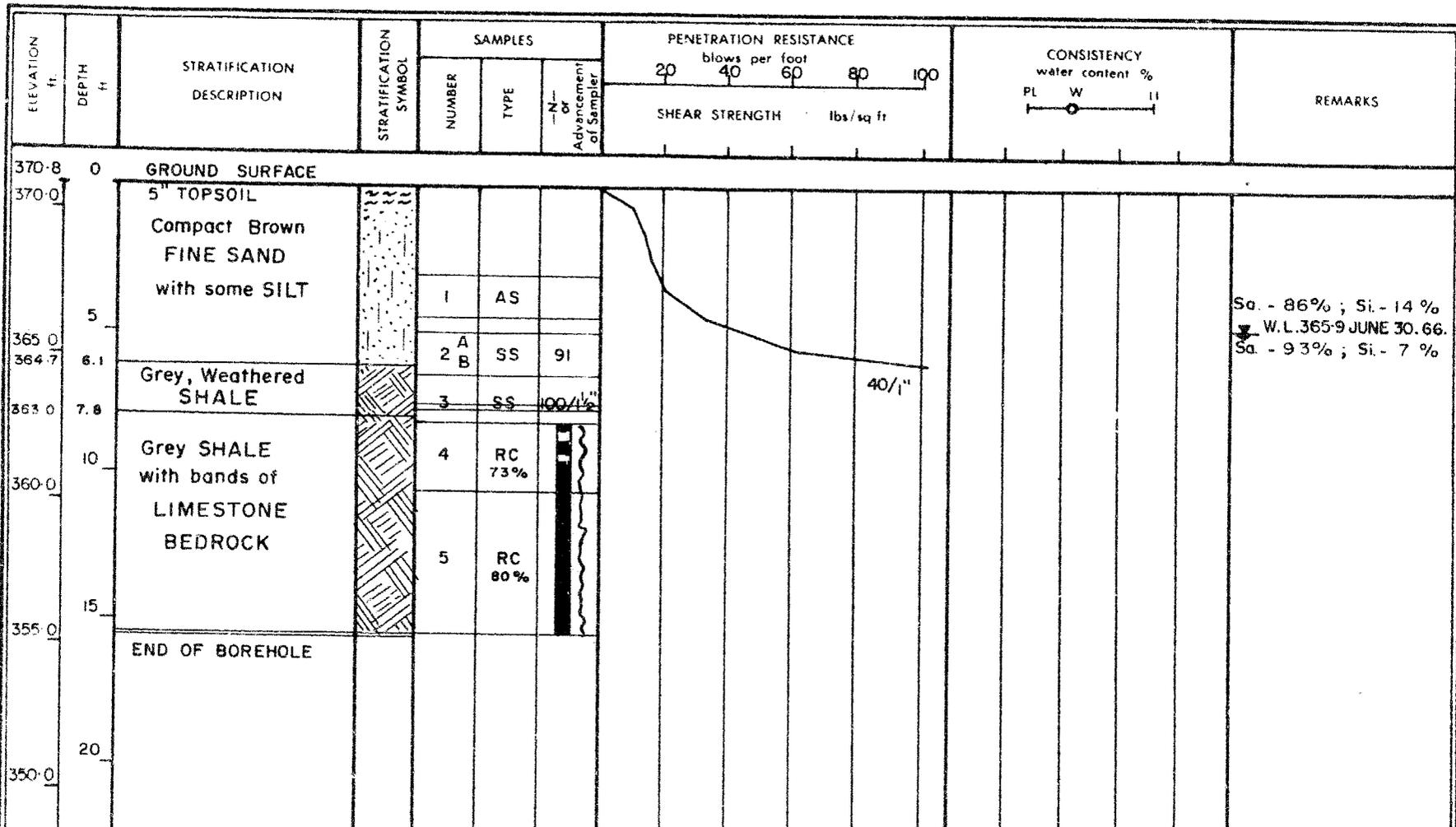
OUR REFERENCE NO 6-6-16

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . . . . 103

CLIENT: C. H. O.  
 PROJECT: BRIDGE No. 5. Q.E.W. & HWY. 27.  
 LOCATION: 179, 115 N ; 208, 754 E  
 DATUM ELEVATION: G. S. C.

METHOD OF BORING AUGERING  
 DIAMETER OF BOREHOLE: 4"  
 DATE: JUNE 28, 1966.  
 W.P. 238-61-4

ENCLOSURE NO.



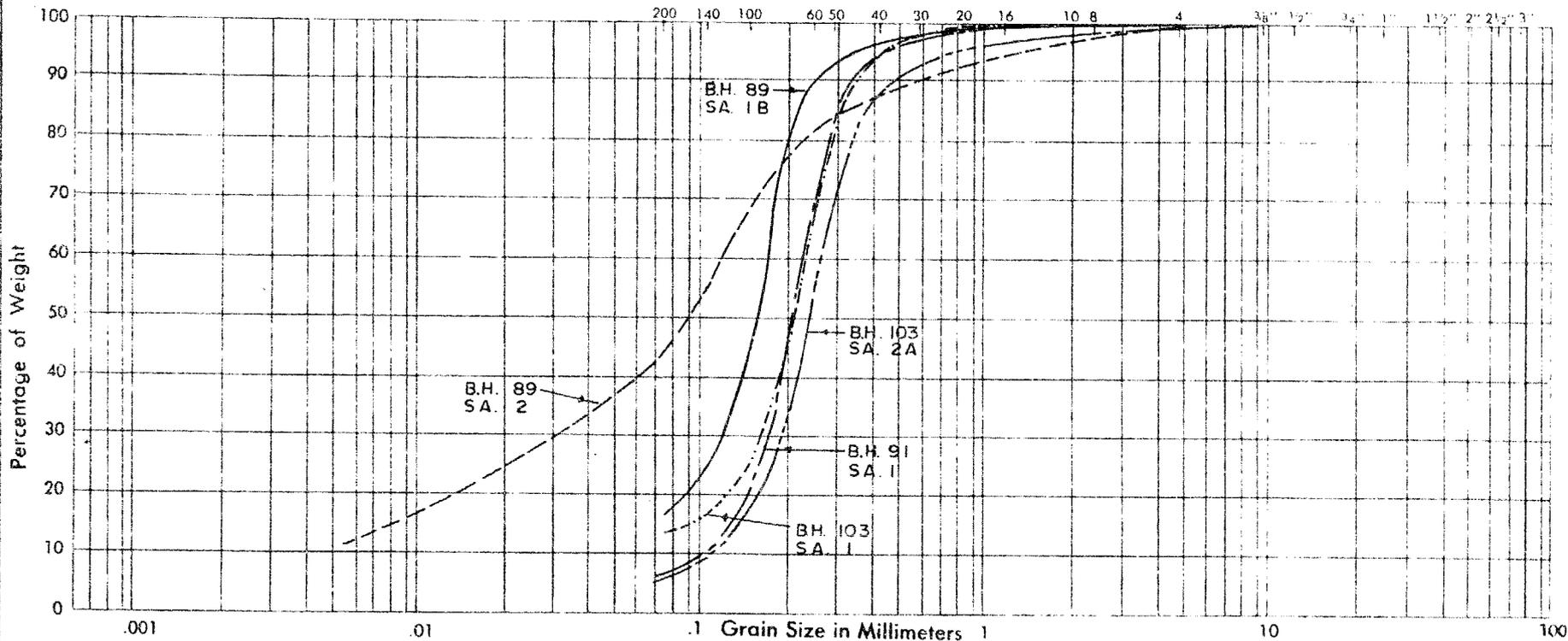
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-16  
YOUR REF. W.P. 238-61-4

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL		
	FINE	MEDIUM	COARSE	FINE	COARSE	



PROJECT: Q.E.W. & HWY. No 27 INTERCHANGE

LOCATION: BRIDGE No 5

BOREHOLE NO.: 89, 89, 91, 103, 103

SAMPLE NO.: 1B, 2, 1, 1, 2A

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT %

PLASTIC LIMIT %

PLASTICITY INDEX %

MOISTURE CONTENT %

ACTIVITY

**Classification of Sample and Group Symbol:**

FINE SAND  
with some SILT

Enclosure No.

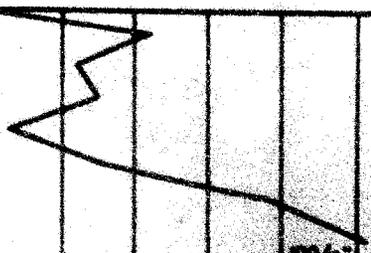
# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . . . . 89

CLIENT D. H. O.  
 PROJECT BRIDGE No 5 Q.E.W. & HWY. 27.  
 LOCATION 178,446 N ; 209,348 E  
 DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING  
 DIAMETER OF BOREHOLE 2 3/4"  
 DATE JUNE 30, 1966.  
 W.P. 238-61-4

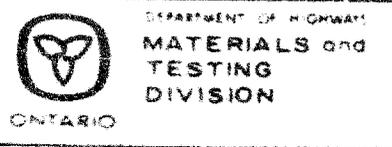
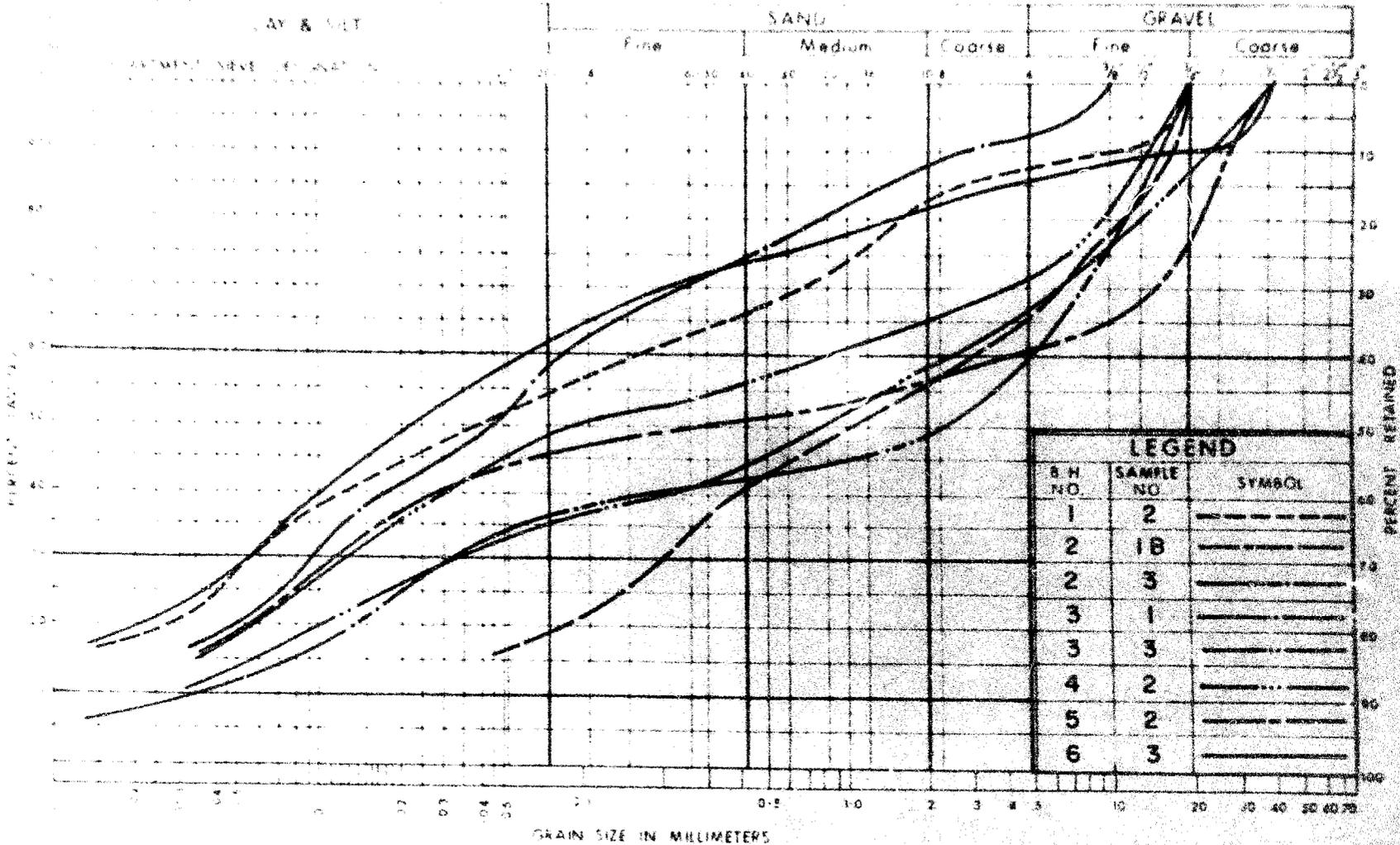
ENCLOSURE NO

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE					CONSISTENCY			REMARKS
				NUMBER	TYPE	Advancement of Sample	blows per foot 20 40 60 80 100					water content % PL W LI			
368.9	0	GROUND SURFACE													
367.4	1.5	Brown SAND (FILL)													
365.0	5	Dark Brown CLAYEY SILT with a trace of SAND and GRAVEL (FILL)													
363.9	5	Organic TOPSOIL													
363.0	3.9	Dense FINE SAND with some SILT		1	A	SS	SS								
361.4	7.3	Very Dense Grey SAND and SILT		2		SS	30/4"								
360.0	10	with numerous SHALE fragment and a trace of embedded fine GRAVEL (GLACIAL TILL)		3		SS	65/4"								
355.0				4		SS	100/4"								
353.9	15			5		SS	100/4"								
350.0		Grey SHALE BEDROCK		6		RC	89%								
348.7	20	END OF BOREHOLE													



W.L. 364.6 Ft.  
 JULY 6, 1966.  
 Sa - 83% ; Si - 17%  
 Sa - 98% ; Si - 44%

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION  
CLAYEY SILT, SAND & GRAVEL  
(GLACIAL TILL)

W.P. No.  
JOB No. 65-F-104



