STRUCTURE #6 - W.P. 227-64 - (cont'd.) ...

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

Due to the cohesive nature of the clayey silt stratum, and because of the structure being supported within the bedrock, no major dewatering problems are foreseen.

STRUCTURE #16 - W.P. 278-64 -

1. Soil Conditions:

A total of six sampled boreholes was carried out at the site of the proposed C.P.R. overhead. Two of the boreholes (No's 21 and 22) formed part of the preliminary soils investigation, while B.H.'s 99, 100, 101 and 102 were drilled in June 1966, in order to obtain more detailed information.

The existing Hwy. 27 embankment is approximately 30 ft. high consisting of gravelly sand material, having loose to dense relative density.

Below the highway fill at the west abutment, a thin (2 - 4 ft.) layer of organic sandy silt was revealed, which probably is the original topsoil.

Underlying the fill and the organic layer, a heterogeneous mixture of gravel, sand, silt and clay was encountered (glacial till). Depending upon the grain-size distribution of the deposit, it may be classified as clayey silt with traces of gravel and sand or sandy silt with traces of gravel and clay. The stratum exhibits a very dense relative density or hard consistency.

Below approximate el. 373 - 370 ft., intermittent weathered shale was observed within the glacial till, extending to the full depth of the layer, el. 366 - 347 ft.

cont'd. /6 ...

STRUCTURE #16 - W.P. 278-64 - (cont'd.) ...

1. Soil Conditions: (cont'd.) ...

Underlying the glacial till, sound shale bedrock with bands of limestone was proved by drilling to a minimum depth of 5 ft. below the bedrock surface.

Groundwater level was observed in each borehole between el. 389.0 ft. and el. 384.0 ft. Free water was also found within the existing fill at el. 415 ft.

The locations and elevations of the boreholes as well as the stratigraphical profiles, may be seen on attached Drawing No. 65-F-104M.

2. Recommendations:

The proposed structure may be supported on spread footings within the hard and very dense glacial till deposit.

Due to the variations of soil properties within the upper layers, it is recommended to place the footings at el. 384.0 ft. for the abutments of the east extension, and at el. 381.0 for the west extension. At the above elevations a design load of 3 t.s.f. may be assumed for design purposes.

Since the non-cohesive portion of the subsoil may become "quick" under an unbalanced hydrostatic head, a dewatering scheme may be required.

cont'd. /7 ...

DEPARTMENT OF HIGHWAYS ONTARIO

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: August 9, 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. 275-64-1

Enclosed, please find the results of our final foundation investigations for Structures No's 6 and 16.

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

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeP
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. Allen
T. J. Koulah
W. B. Kellyvenan
A. Watts
Foundations Office
Gen. Files

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.
34 BRENTFORD ROAD,
KINGSTON 5, JAMAICA, WEST INDIES
TELEPHONE: 66826

July 12, 1966.

Our Ref. 6-6-25
Your Ref. W. P. 278-64

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. 16.

Dear Sirs:

At your request we have put down four (4) boreholes (Boreholes No. 99, 100, 101, and 102) at the location of the above structure. Eleven copies of the records of the borings, together with the laboratory test results, are attached to this letter.

The subsurface conditions encountered in the boreholes are favourable for spread footing design. The natural overburden is a thick (25 to 40 ft.) and very dense or very hard glacial deposit. Considerable variation was, however, noticed in the rock surface as well as in the soundness of the predominantly shaley bedrock as indicated on the borehole logs.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

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

IPL/ds

FORM 08-MT-126 (FORMERLY 08-ML-126)
65-1831

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 21

FOUNDATION SECTION

JOB 65-F-104 LOCATION 181,875 N - 208,101 E ORIGINATED BY P.Mc
W.P. 275-64-1 BORING DATE Oct. 7, 1965. COMPILED BY H.S.
DATUM G.S.C. BOREHOLE TYPE Washboring - NX Casing. CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE
393.4	Groundlevel					
	Sand & gravel. Loose to dense. (Fill)					
	~~Organics~~		1A / 1B	SS	40	390
386.6	Organics		2A / 2R	SS	16	
6.8	Clayey silt with some sand and traces of gravel.		3	SS	62	
	Dense to very dense.		4	SS	75	380
	(Glacial till)		5	SS	42	
				Drill		
371.4			6	SS	74 for 10"	
22.0	Layers of weathered shale and silty clay.			Drill		370
366.4				Drill	5%	
27.0	Shaley limestone with intermittent limestone.			Drill	63%	
361.4				Drill	100%	
32.0	End of borehole.					360

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 25 50 75 100 125
SHEAR STRENGTH P.S.F.

LIQUID LIMIT ——— w_L
PLASTIC LIMIT ——— w_P
WATER CONTENT ——— w
w_P w w_L
WATER CONTENT % 20 40 60

BULK DENSITY γ P.C.F.

REMARKS

FORM OB-MT-126 (FORMERLY OB-ML-126)
65-F-104

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 22

FOUNDATION SECTION

JOB 65-F-104 LOCATION 181,780 N 207,854 E ORIGINATED BY P.Mc
W.P. 275-64-1 BORING DATE Oct. 13, 1965. COMPILED BY H.S.
DATUM G.S.C. BOREHOLE TYPE Washboring - NX & BX Casing. CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE
390.1	Groundlevel					
389.2	Topsoil					
0.9	Clayey silt with some sand & gravel & organics. Compact. (Fill)					
3.3	Sand with organics. Compact.		1	SS	14	
383.7						
5.5			2	SS	44	
			3	SS	57	380
			4	SS	41	
			5	SS	73 for 6"	
	Clayey silt. Sand and gravel. V. dense. (Glacial Till) Contains shale boulders below 20.0'			Drill		
			6	SS	130 for 6"	370
			7	SS	93 for 3"	
				Drill		
				Drill	50%	360
29.0	Shaley limestone with intermittent limestone.			Drill	100%	
355.1						350
35.0	End of borehole.					

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 25 50 75 100 125
SHEAR STRENGTH P.S.F.

LIQUID LIMIT — w_L
PLASTIC LIMIT — w_P
WATER CONTENT — w
w_P w w_L
WATER CONTENT % 20 40 60

BULK DENSITY γ P.C.F.

REMARKS

GWL ▼ 6.3'

Gr3% Sa45% Si50% Cl 2%

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 101 .

OUR REFERENCE NO. 5-6-25

CLIENT: D.H.O.
PROJECT: Q.E.W. & HWY. no. 27 INTERCHANGE
LOCATION: 181,871 N ; 207,957 E
DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING & WASHBORING
DIAMETER OF BOREHOLE: 4 1/2" – 2 3/8"
DATE: JUNE 16–21, 1966
W.P. 278-64
ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N — or Advancement of Sampler	PENETRATION RESISTANCE blows per foot (2,0 4,0 6,0 8,0 10,0) / SHEAR STRENGTH lbs./sq.ft.	CONSISTENCY water content % (PL W LL; 10 20 30 40)	REMARKS
422·1	0	GROUND SURFACE							
420·0		Loose to Compact brown Gravelly SAND with some Silt (FILL)		1	SS	18			HOLE DRY. CAVE-IN 419·0 ft. JUNE 25, 1966
415·0	5								Gr. 32 % ; Sa. 48 % Si. 20 %
	10			2	SS	8			W.L. 414·8 ft. JUNE 22, 1966
410·0									Gr. 42 % ; Sa. 46 % Si. 12 %
	15			3	SS	11			
405·0									
	20			4	SS	19			
400·0									
	25			5	SS	25			Gr. 35 % ; Sa. 53 % Si. 12 %
395·0									
393·1	29 30	Dense to		6	SS	34			Gr. 5 % ; Sa. 45 % Si. 40 % ; Cl. 10 %
390·0									
389·1	33	SILTY F. SAND Seam							
	35	Very Dense SAND and SILT with a trace of brown grey Gravel and Clay (Glacial Till)		7	SS	87/9 1/2"			Gr. 3 % ; Sa. 37 % Si. 50 % ; Cl. 10 %
385·0				8	SS	97/11"			
	40			9	SS	67/4"			Gr. 4 % ; Sa. 38 % Si. 48 % ; Cl. 10 %
380·0				10	SS	86/7 1/2"			
	45			11	SS	99/9"			
375·0									
374·5	47·5			12	SS	100/1"			
	50	Intermittent layers of SHALE and occasional SAND seams		13	RC. 44·8 %				
				14	SS	71/7 1/2"			
370·0				15	RC. 31·4 %				
	55			16	RC. 58·3 %				
365·0				17	RC. (1")				
	60			18	WS				
361·8	60·3	grey Calcareous SHALE BEDROCK		19	RC. 56 %				
360·0									
359·2									
	65	END OF BOREHOLE							

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 100 .

OUR REFERENCE NO 6-6-25

CLIENT D.H.O.
PROJECT Q.E.W. & HWY no. 27 INTERCHANGE
LOCATION 181,645 N ; 207,857 E
DATUM ELEVATION G.S.C.

METHOD OF BORING WASHBORING
DIAMETER OF BOREHOLE 2 3/8"
DATE JUNE 17 – 21, 1966
W.P. 278–64

ENCLOSURE NO

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N = No. of Advancement of Sampler	REMARKS
389·0	0	GROUND SURFACE					
		8" TOPSOIL					
		Loose, Brown Sandy SILT with some Clay (wet)					
385·0	5			1	SS	27	
	7	V. Stiff – V. Hard					
380·0		Clayey SILT with some Sand		2	SS	98	
	10			3	SS	70	
	12	brown – grey					
375·0		(Glacial Till)		4	SS	64	
	15			5	SS	80/6"	
373·0	16						
		Intermittent layers of Shale and occasional sand seams		6	R.C. 19 %		
370·0	20			7	SS	100/6"	
				8	R.C. 11 %		
365·0	25			9	SS	100/3"	
				10	R.C. 27%		
360·0	30	(Sand seams)					
				11	R.C. 60 %		
355·0	35						
354		SHALE BEDROCK		12	R.C. 80%		
350·0	40						
		END OF BOREHOLE					

PENETRATION RESISTANCE blows per foot: 2,0 4,0 6,0 8,0 10,0
SHEAR STRENGTH 1000 lbs. sq ft: 5 10 15 20

CONSISTENCY water content %: PL W LL; 10 20 30 40

W.L. 388·8 ft, June 21, 1966

γ = 121 P.C.F.

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE C.K. CH'D

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 99 . .

OUR REFERENCE NO. 6-6-25

CLIENT D.H.O.
PROJECT Q.E.W. & HWY. no. 27 INTERCHANGE
LOCATION 181,760 N ; 207,987 E
DATUM ELEVATION G.S.C.

METHOD OF BORING AUGERING & WASHBORING
DIAMETER OF BOREHOLE 4½" - 2¾"
DATE JUNE 21 - 23, 1966
W.P. 278-64

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N = No. of Blows required for Advancement of Sampler	PENETRATION RESISTANCE blows per foot 2,0 4,0 6,0 8,0 10,0 / SHEAR STRENGTH lbs/sq ft	CONSISTENCY water content % PL W LL	REMARKS
422.5	0	GROUND SURFACE							
		8" TOPSOIL							
420.0		Generally Compact To Dense Brown GRAVELLY SAND with some SILT (FILL)		1	SS	33			
415.0	5								
	10			2	SS	17			
410.0									
	15			3	SS	24			
405.0									
	20			4	SS	15			HOLE DRY CAVE-IN 401 Ft JUNE 25, 1966.
400.0									
	25			5	SS	35			
395.0									
	30			6	SS	54			
390.0									
				7	W.S				
387.8	35	Dark Brown Organic SANDY SILT		8	SS	47			W.L. 386.3 Ft. JUNE 24, 1966.
386.0	36.5	Very Dense SANDY SILT with some GRAVEL and CLAY (GLACIAL TILL)		9	SS	96			
385.0	40			10	SS	85/9"			
380.0				11	SS	85/9"			
	45	Brown / Grey		12	SS	94			
375.0	47	Numerous SHALE Fragments and BOULDERS		13		75/5½"			
	50			14	RC	23.7%			
370.0				15	SS	75/5"			
				16	RC	100%			
	55			17	RC	18.7%			
365.0	57.5	Grey SHALE with bands of LIMESTONE BEDROCK		18	RC	88.9%			
	60			19	RC	70.3%			
360.0		END OF BOREHOLE							
	65								

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 102 .

OUR REFERENCE NO 6-6-25

CLIENT D.H.O.
PROJECT Q.E.W. @ HWY. No. 27 INTERCHANGE
LOCATION 181, 980 N ; 208,074 E
DATUM ELEVATION G.S.C.

METHOD OF BORING WASHBORING
DIAMETER OF BOREHOLE 2 3/8"
DATE JUNE 21 - 24, 1966
W.P. 278-64

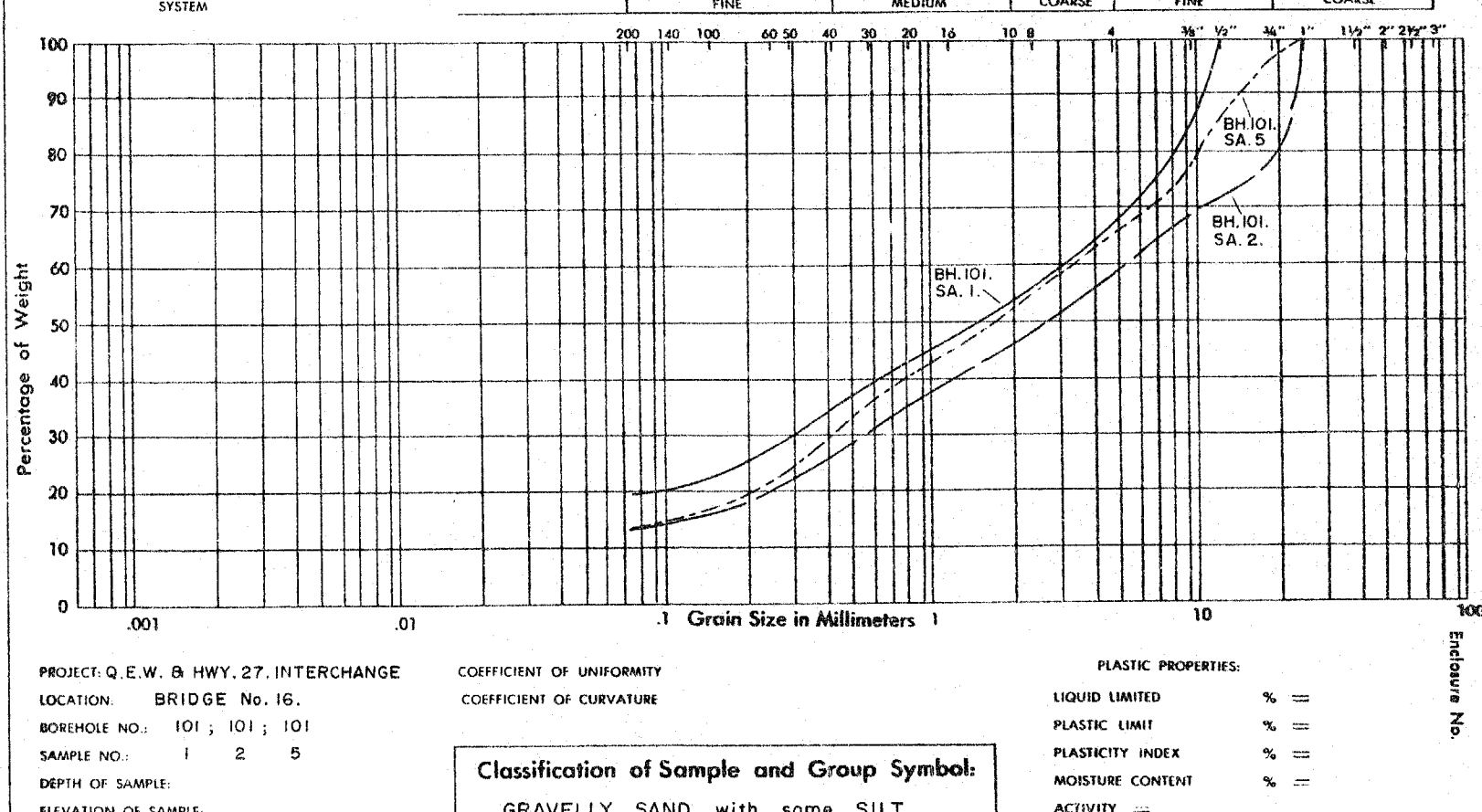
ENCLOSURE NO

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N = or Advancement of Sampler	PENETRATION RESISTANCE Blows per foot 2,0 4,0 6,0 8,0 10,0 / SHEAR STRENGTH lbs sq ft	CONSISTENCY water content % PL W LL	REMARKS
390·1	0	GROUND SURFACE							
	1	dark grey Silt seam							
	2	Very Dense							
385·0	5	Sandy SILT with some Gravel and Clay		1	SS	86			WL. 384·2 ft. JUNE 25, 1966
				2	SS	112			
380·0	10	brown grey (Glacial Till)		3	SS	90/10"			
				4	SS	75/6"			
375·0	15			5	SS	95/10"			
370·0	20			6	SS	100/2"			
369·6	20·5	Numerous SHALE layers and SAND seams		7	R.C. 12 %				CAVE - IN 369·0 ft. JUNE 25, 1966
365·0	25			8	SS	100/2"			
				9	R.C. 20 %				
360·0	30			10 A B	SS	100/3"			
				11	R.C. 0 %				
355·0	35			12	SS	100/5"			
350·0	40								
347·1	43			13	SS	100 no pen			
345·0	45	grey SHALE BEDROCK		14	R.C. 45 %				
340·0	50			15	R.C. 50 %				
335·0	55	Broken, weathered		16	R.C. 15 %				
		Sound							
330·0	60			17	R.C. 85 %				
327·0		END OF BOREHOLE							
325·0	65								

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-25
YOUR REF. No. WP.278-64



PROJECT: Q.E.W. & HWY. 27. INTERCHANGE
LOCATION: BRIDGE No. 16.
BOREHOLE NO.: 101 ; 101 ; 101
SAMPLE NO.: 1 2 5
DEPTH OF SAMPLE:
ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY
COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:
GRAVELLY SAND with some SILT

PLASTIC PROPERTIES:
LIQUID LIMITED % =
PLASTIC LIMIT % =
PLASTICITY INDEX % =
MOISTURE CONTENT % =
ACTIVITY =

Enclosure No.

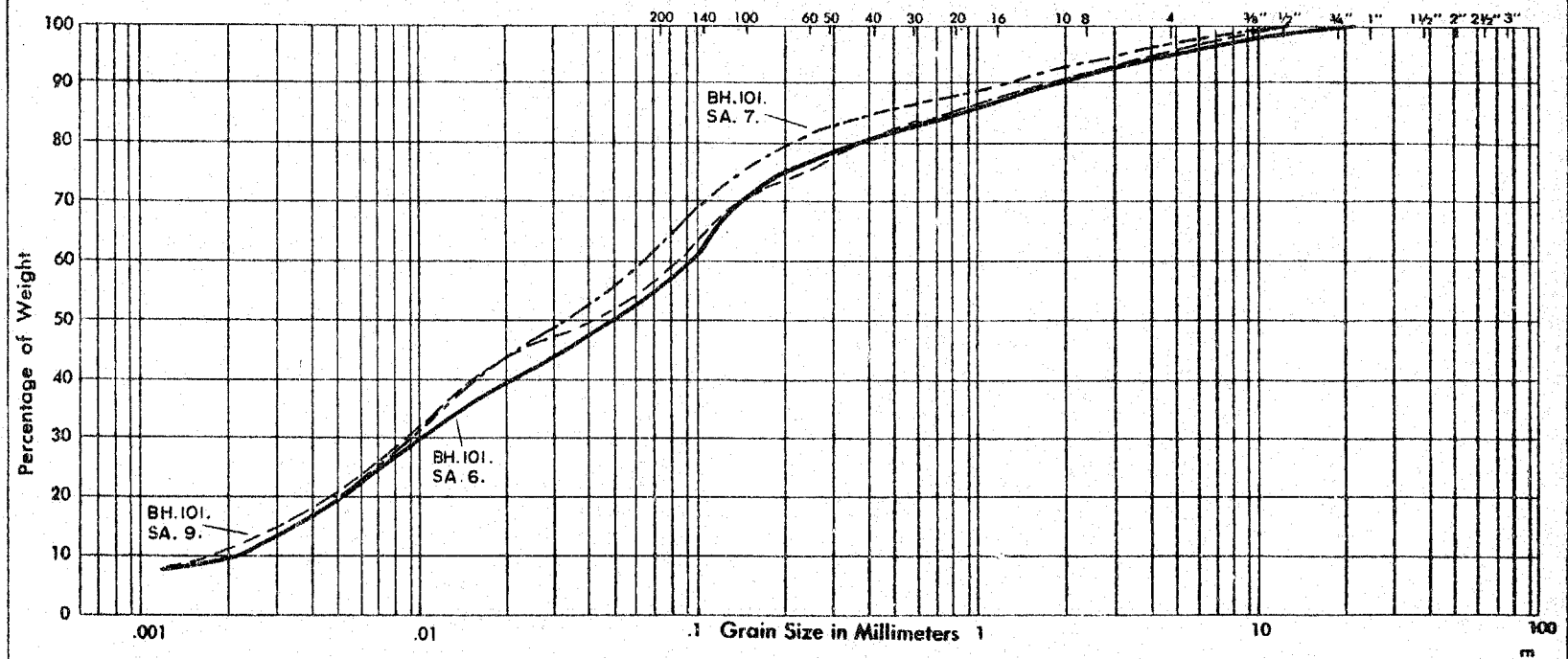
DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-6-25
YOUR REF. No. WP. 278-64

UNIFIED SOIL CLASSIFICATION SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: Q.E.W. & HWY. 27. INTERCHANGE
LOCATION: BRIDGE No. 16.
BOREHOLE NO.: 101 ; 101 ; 101
SAMPLE NO.: 6 7 9
DEPTH OF SAMPLE:
ELEVATION OF SAMPLE:

COEFFICIENT OF UNIFORMITY
COEFFICIENT OF CURVATURE

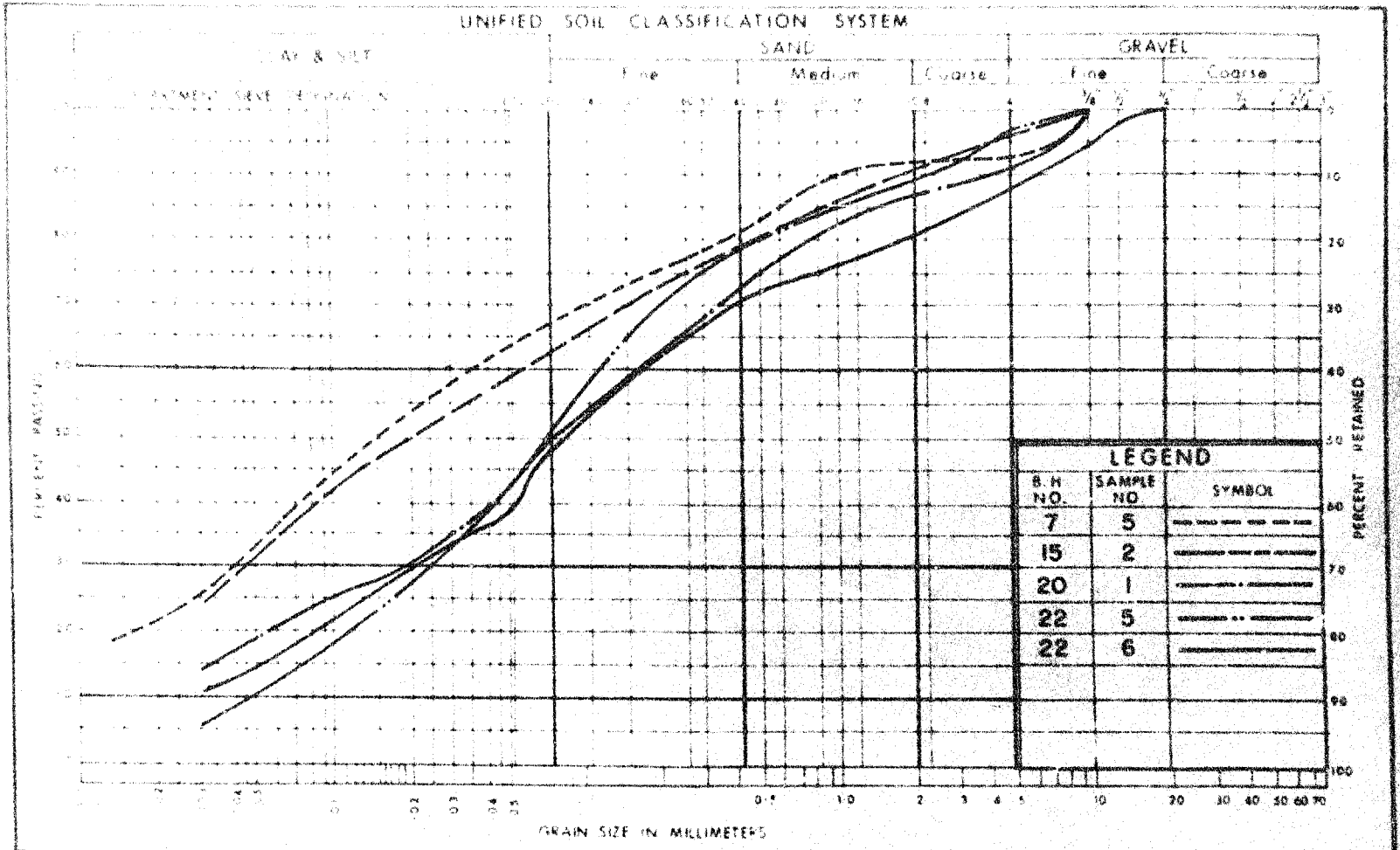
Classification of Sample and Group Symbol:
SAND and SILT
with a trace of GRAVEL and CLAY

PLASTIC PROPERTIES:

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

Enclosure No.

REV. APR 1963

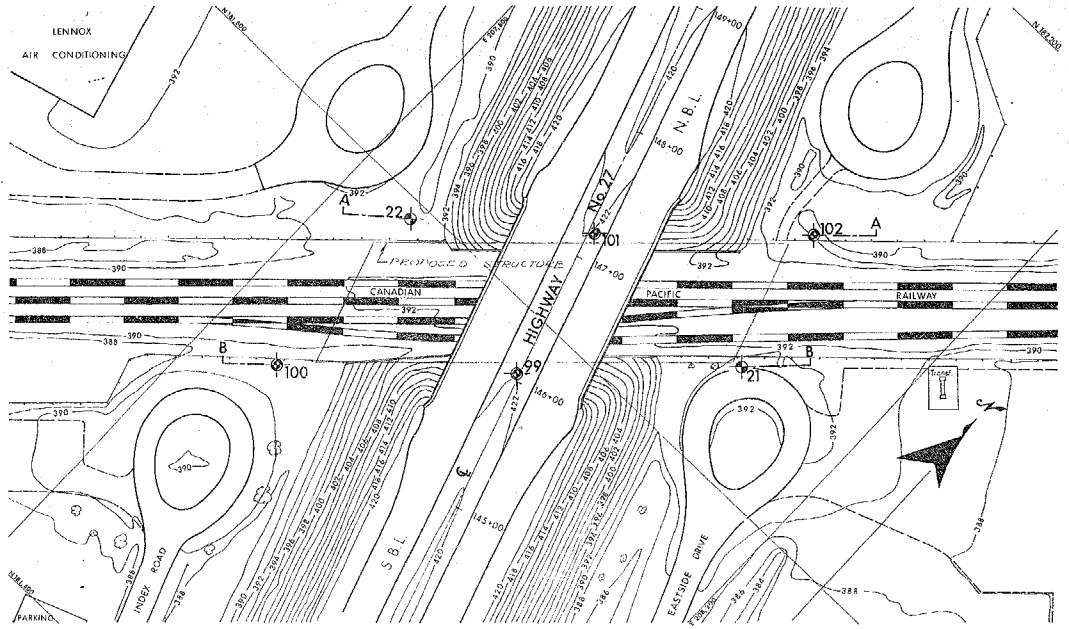


DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION
ONTARIO

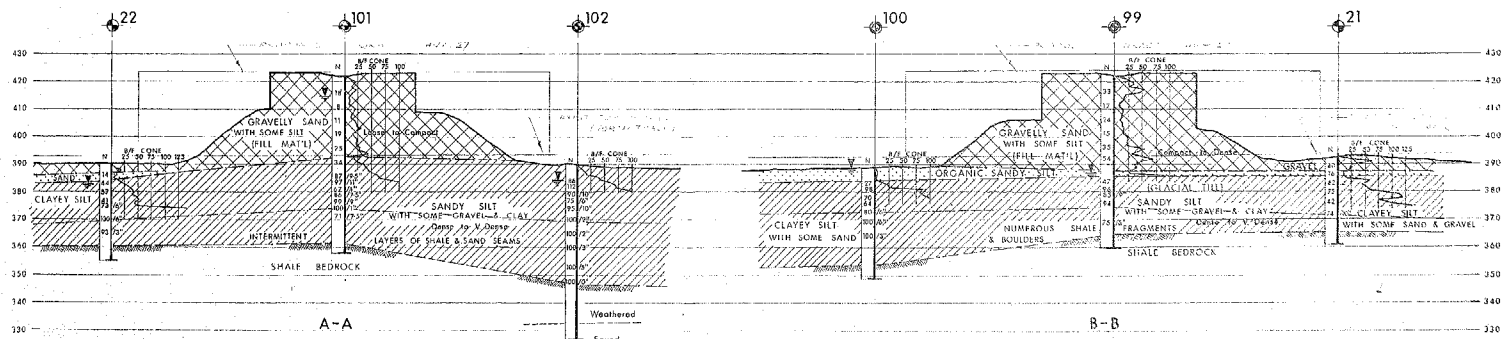
GRAIN SIZE DISTRIBUTION
CLAYEY SILT, SAND & GRAVEL
(GLACIAL TILL)

WP No.

JOB No. 65-F-104



PLAN
SCALE IN FEET
40 0 40 80 120



SECTIONS
SCALE IN FEET
20 0 20 40 60 VERT.
40 0 40 80 120 HOR.

SEE DRAWING No. 65-F-104 A

KEY PLAN
SCALE IN MILES

LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation.
- Bore & Cone (Dom. Soil Ltd.)

NO.	ELEVATION	CO-ORDINATES NORTH	EAST
21	393.4	181,875	208,101
22	390.1	181,788	207,854
99	422.5	181,760	207,987
100	389.0	181,645	207,857
101	422.1	181,871	207,957
K 2	390.1	181,980	208,074

- 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.

PRINT RECORD		
NO.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

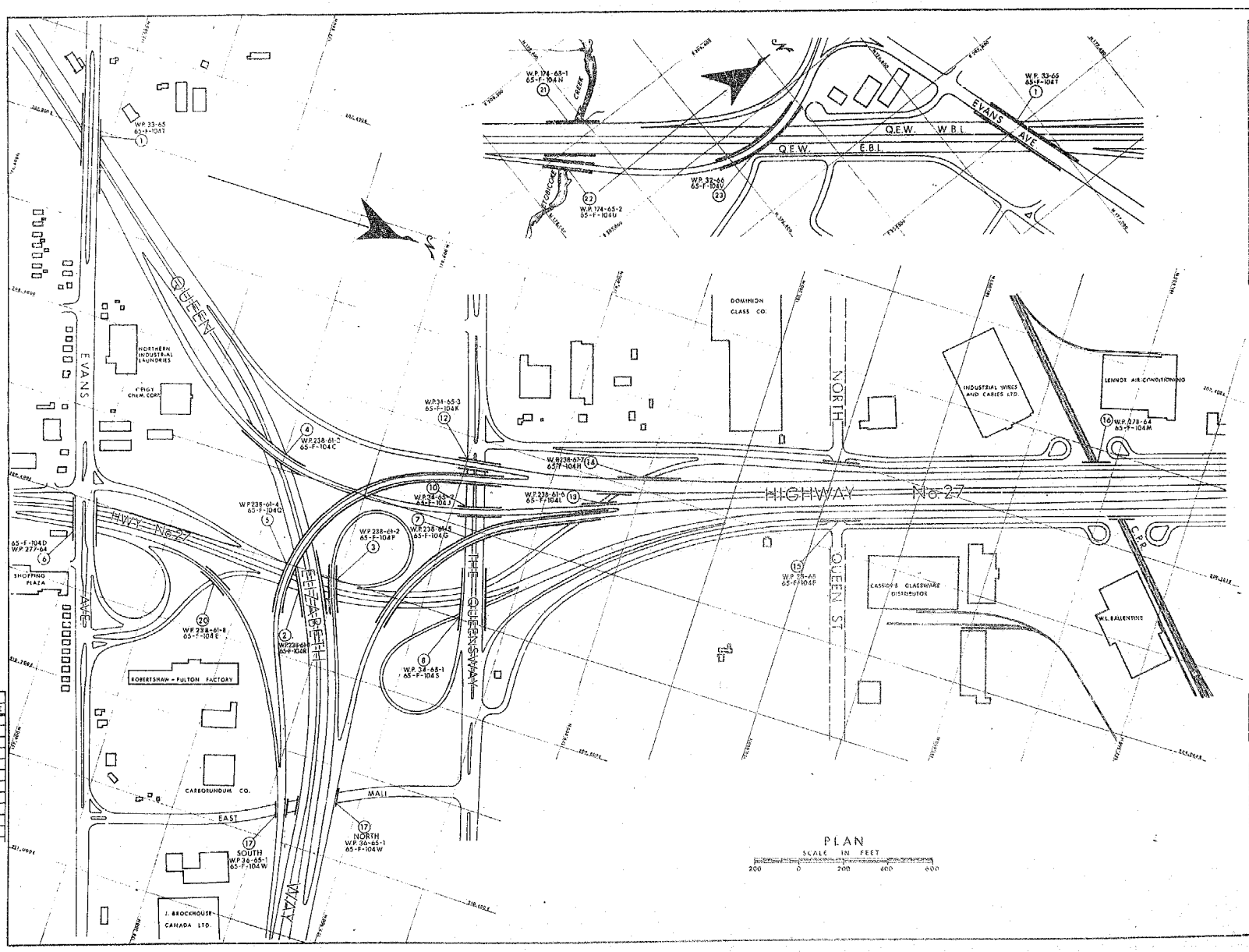
BRIDGE No. 16

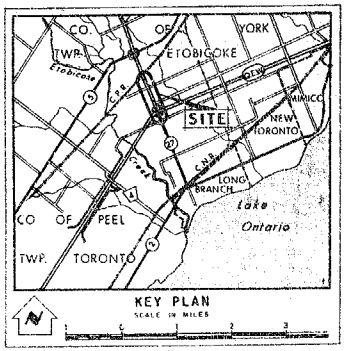
HWY. No. 27 OVER C.P.R.

KING'S HIGHWAY NO. Q.E.W. & HWY. 27 INTER. DIST. NO. 6
CO. YORK METRO TORONTO
TWP. ETOBICOKE LOT CON.

BORE HOLE LOCATIONS, & SOIL STRATA

SUBMD K.S	CHECKED G.D.	W.P. NO. 278-64	M.O.T. DRAWING NO. 65-F-104 M
DRAWN GDH	CHECKED K.S.	JOB NO. 65-F-104	
DATE 20 JULY 66		SITE NO.	BRIDGE DRAWING NO.
APPROVED A. Gittermann		CONT. NO.	





LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation.
- (21) Structure Number

NO.	ELEVATION	CO-ORDINATES NORTH	CO-ORDINATES EAST

— 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.

PRINT RECORD NO	FOR	DATE

REVISIONS DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

HIGHWAY No. 27 & Q.E.W. INTERCHANGE

KING'S HIGHWAY NO. _____ DIST. NO. 6
CO. YORK METROPOLITAN TORONTO
TWP. ETOBICOKE LOT _____ CON. _____

GENERAL LAYOUT

SUBM'D P. MY	CHECKED	W.P. NO.	M.S.T. DRAWING NO. 65-F-104A
DRAWN DGN	CHECKED	JOB NO. 65-F-104	
DATE 25 NOV. 1966		SITE NO.	BRIDGE DRAWING NO.
APPROVED		CONT. NO.	