

SUPPLEMENTARY
FOUNDATION INVESTIGATION REPORT
For

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

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 subssoil conditions prevailing at each structure location, together with our final recommendations for the structure foundations.

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

cont'd. /2 ...

STRUCTURE #1 - W.P. 33-65 -- W.J. 65-F-104 -

1. Soil Conditions:

Six bore and cone penetration holes were carried out at this site. Holes #6 and 7 were lowered during the preliminary field work, while holes #53, 54, 55 and 129 were drilled additionally, by Dominion Soil Investigation Ltd.

A rather uniform soil stratigraphy was disclosed by the borings. The upper layer consists of sandy silt fill, and silt and sand deposits of compact to very dense nature. At el. 358 - 355 ft. a clayey silt glacial till follows. A silt pocket within the till was revealed in borehole #53; otherwise, the layer is plastic, exhibiting hard consistency. Between el. 344 and 350 ft. shale bedrock underlies the till. (Refer Drawing No. 65-F-104T.)

2. Recommendations:

The Q.E.W. underpass at Evans Ave. is proposed to be a four-span structure with closed type abutments. Subsoil conditions are favourable for spread footings for the abutments as well as for the piers. Abutments may be supported within the hard glacial till stratum; the piers, however, should be lowered to the bedrock, in order to obtain sufficient bearing capacity.

The exact footing elevations for each substructure, together with the elevation of bedrock and the allowable bearing capacities, are tabulated below:

	<u>Ftg. Elev.</u>	<u>Rock Elev.</u>	<u>Allow. B.C. (t.s.f.)</u>
West Abutment	358.0	347.0 - 348.0	3.0
Pier No. 1	345.0	345.0	10.0
Pier No. 2	343.5	344.0	10.0
Pier No. 3	345.0	346.0 - 347.0	10.0
East Abutment	358.0	347.5	3.0

cont'd. /31...

Provisions should be made for mass concrete to be placed in case the bedrock surface is found to be uneven, or some rock has to be excavated because it is weathered.

No major dewatering problem is anticipated.

cnnt'd. /32...

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 65-F-104

LOCATION 177.020 N 208.060 E

ORIGINATED BY P. Mc

W.P. 275-64-1

BORING DATE Oct. 18, 1965.

COMPILED BY H.S.

DATUM G.S.C.

BOREHOLE TYPE Washboring - NX & 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	25	50	75	100	125	PLASTIC LIMIT — WP	WATER CONTENT — W		
363.3	Groundlevel															
0.0	Sand, silt & gravel (Fill)															
361.3																
2.0	Fine sand (with coarse gravel below Elev. 357.3')		1	SS	14	360										
	Compact to v. dense		2	SS	50											
					for 4"											
355.3																
8.0	Clayey silt with some sand & gravel. (Glacial Till)		3	SS	69											
	Very dense (with fragments of shale below El 332.3)		4	SS	31	350										
347.3			5	SS	50											
16.0	Shaley Limestone with intermittent limestone.				for 5"											
					70%											
					100%											
340.3						340										
23.0	End of borehole.															

G.W.L. 3.4'

Gr 14% Sa 24%
Si 43% Cl 19%

Gr 71% Sa 12%
Si & Cl 17%

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 65-F-104 LOCATION 176,838 N 207,716 E ORIGINATED BY P.Mc
W P 275-64-1 BORING DATE Oct. 15, 1965. COMPILED BY H.S.
DATUM G.S.C. BOREHOLE TYPE Washboring - NX Casing. CHECKED BY SK

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL			BULK DENSITY P.C.F.	REMARKS						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	BLOWS / FOOT					PLASTIC LIMIT — WP									
							25 50 75 100 125					WATER CONTENT — W									
							SHEAR STRENGTH P.S.F.					WP — WL									
											WATER CONTENT %										
											20 40 60										

364.3	Groundlevel														
0.0	Sand & Gravel (Till)														
	Fine sand to sandy silt.		1	SS	40	360									
	Dense														
358.3			2	SS	50 for 3"										
6.0															
	Clayey silt with some sand, gravel and fragments of shale.		3	SS	75										
	(Glacial Till)		4	SS	53 for 6"										
	V. dense.					350									
			5	SS	40 for 2"										
19.5			6	RC	90%										
	Shaley limestone with intermittent limestone.		7	RC	95%	340									
337.3															
27.0	End of borehole.														
						330									

Gr 7% Sa 26%
Si 45% Cl 22%

GWL
5.6'

GWL

5.6'

Gr 7% Sa 26%
Si 45% Cl 22%

all

Mr. A. McKim,
Bridge Control Engineer,
Bridge Control Section,
Admin. Bldg.

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

March 28, 1968

Bridge #1 - Q.E.W. and Hwy. #27 Interchange

65-F-104

The Foundation Section was requested verbally by Mr. K. I. Inkolov of the Bridge Control Section, to visit the site of Bridge #1 of the Q.E.W. and Hwy. #27 interchange, and to form an opinion as to the surficial soil conditions in view of supporting the falsework of the bridge.

Subsequently, Mr. A. K. Barsvary of our Section, visited the site accompanied by Mr. Inkolov, and his findings are summarized as follows:

The falsework of the bridge was almost completed at the time of the visit (March 28, 1968), but no concrete was poured as yet. The scaffolds were placed on timbers, which in turn were supported by the melted sandy silt to silt soil. Spot checks indicated that the ground was thawed down to approx. 6 - 12", under which still frozen material was detected. Due to this frozen layer, the high moisture content of the upper thawed portion cannot seep into the lower zones, but makes the surface soft, soaked and, in some places, soupy. This stratum can support no loads, but will be partially or entirely displaced under the imposed pressure of more than 1 TSP. As a consequence, differential settlements under the falsework are very likely.

Further settlements may be expected when the still frozen soil layer melts and becomes soft and wet. Since the depth of the still frozen portion is not known, the magnitude of this part of the settlement cannot be forecast.

During the visit it was noted that the contractor was placing G.B.C. 'A' material on the top of the soft soil in between - but not beneath - the timbers. It is our opinion that this operation is not beneficial but rather harmful, because it may prevent the soil from hardening by surface evaporation.

cont'd. /2

Mr. A. McKim,
Bridge Control Engineer,
Bridge Control Section,
Admin. Bldg.

March 28, 1965

At the north side of the construction - some 5 - 10 ft. from the legs of the scaffolds, open and unprotected excavations were noticed, with almost vertical walls. Some protection of these exposed walls appears to be warranted, in view of a prospective failure due to the external load.

It is our conclusion that differential settlements will occur due to above described circumstances, under the expected load in excess of 1 TSP.

If differential settlements cannot be tolerated under the scaffolds, the pouring of the concrete should not be commenced until the frost disappears along the entire depth and the soil dries out.

A. G. Selby

KGS/mdeF

for K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

cc: Foundations Files ✓
Gen. Files

Mr. A. McKim,
Bridge Control Engineer,
Bridge Control Section,
Admin. Bldg.

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

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March 28, 1968

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KGS/MdeF

cc: Foundations Files
Gen. Files ✓

A. V. Damsky
for K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

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 17, 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. 33-65
W.P. 32-66

Enclosed, please find the results of our final
foundation investigations for Structures No's
1 (W.P. 33-65), and 23 (W.P. 32-66).

Please attach these 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

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

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

October 5, 1966

Bridge No. 1 (W.P. 33-65) and
Bridge No. 23 (W.P. 32-66) --
Q.E.W. & Hwy. #27 Interchange.

In response to your verbal request regarding the foundation recommendations for Bridges No. 1 and 23, Q.E.W. and Hwy. #27 Interchange, we wish to advise you that the reports will be issued most probably by the end of next week. However, to enable you to proceed with your design work, we are listing below, the recommended footing elevations and corresponding allowable bearing capacities.

Bridge No. 1 (W.P. 33-65) -

	<u>Ftg. Elev.</u>	<u>Rock Elev.</u>	<u>Allow. B.C. (t.s.f.)</u>
West Abutment	358.0	347.0 - 348.0	3.0
Pier No. 1	345.0	345.0	10.0
Pier No. 2	343.5	344.0	10.0
Pier No. 3	345.0	346.0 - 347.0	10.0
East Abutment	358.0	347.5	3.0

Provisions should be made for mass concrete to be placed in case the bedrock surface is found to be uneven, or some rock has to be excavated because it is weathered.

cont'd. /2 ...

DOMINION SOIL INVESTIGATION LIMITED

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

BRANCH
869 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: 66886

Our Ref: 6-7-14
Your Ref: W.E.32-65

September 7, 1966.

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 # 1

Dear Sirs:

Further to our discussion we have put down an additional borehole for the above structure which supplements the results of your boreholes # 6 and 7. Eleven copies of the records of borehole # 129 are attached to this letter. Copies of typical grain size distribution curves are also enclosed. Further information about the subsurface conditions in the area of the proposed abutments can be obtained from boreholes # 53 and 55. These have been already reported to you on June 15 and 29, 1966.

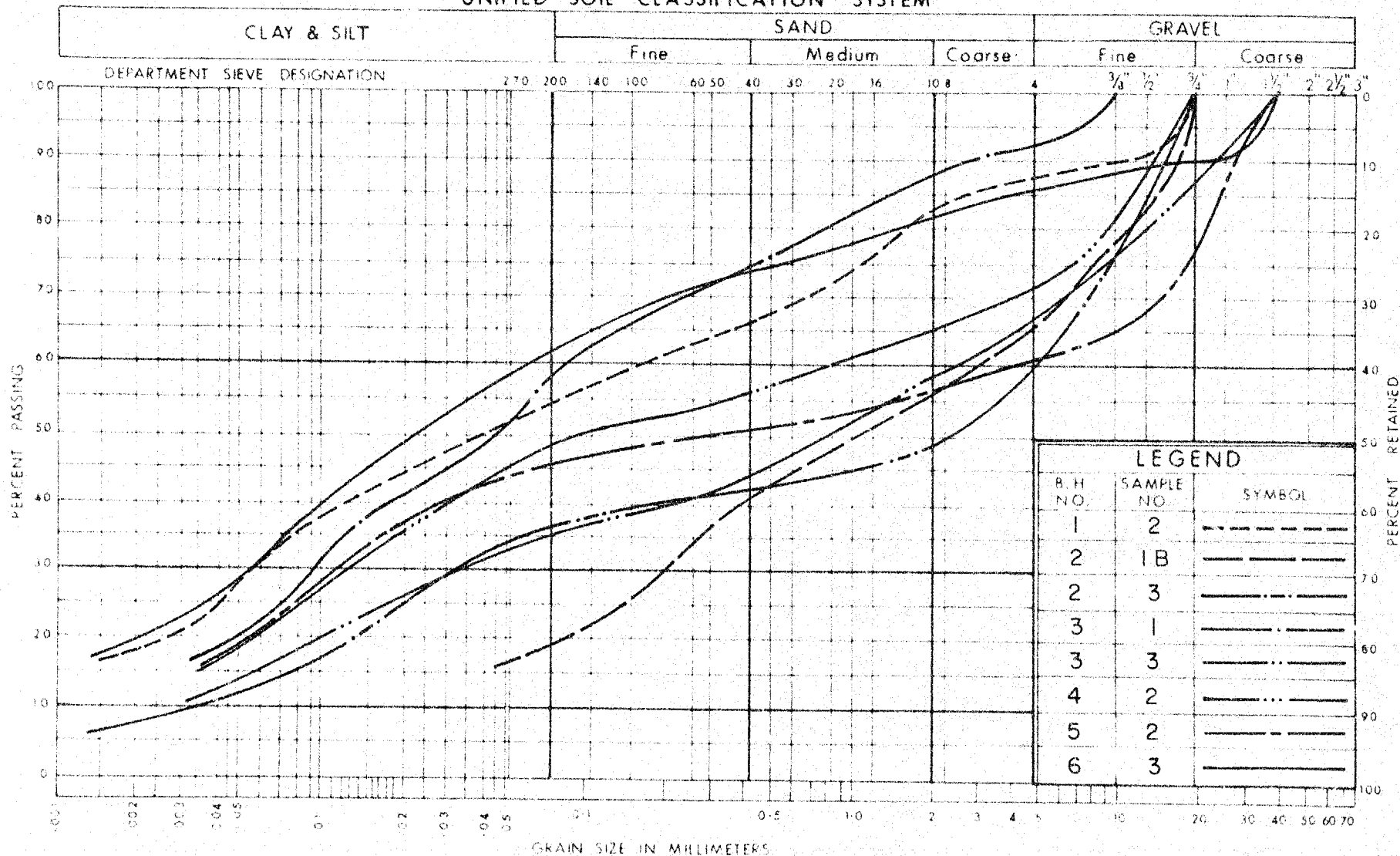
Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

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

Enc.

UNIFIED SOIL CLASSIFICATION SYSTEM



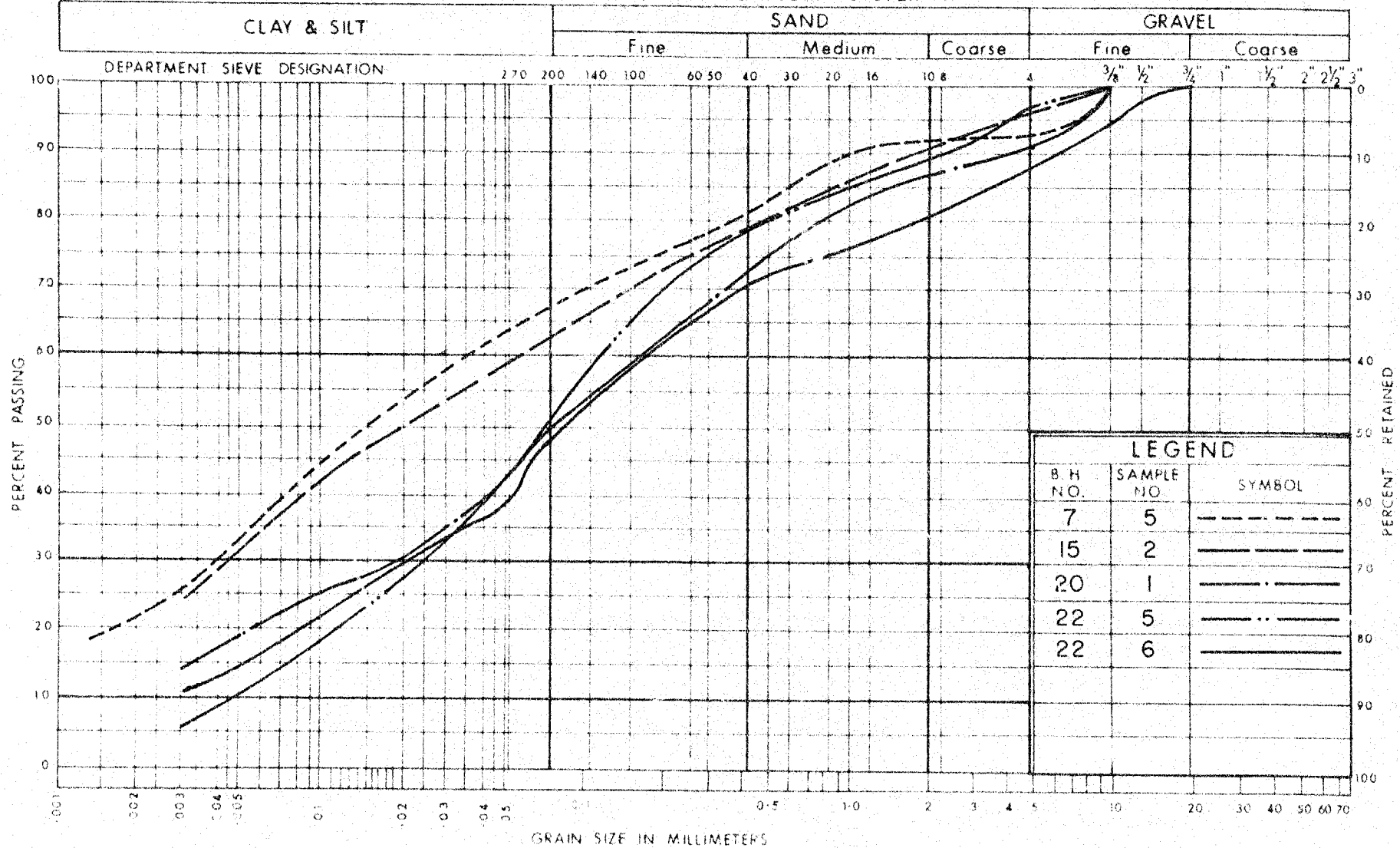
DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

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

W.P. No.

JOB No. 65-F-104

UNIFIED SOIL CLASSIFICATION SYSTEM



ONTARIO

DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

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

W.P. No.

JOB No. 65-F-104

GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 53 . .

OUR REFERENCE NO. 6 - 5 - 39

W.J. 66 - F - 47

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. # 27 INTERCHANGE

LOCATION: 176,875 N; 207,660 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING & CORING

DIAMETER OF BOREHOLE: 4"

DATE: MAY 26, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE					CONSISTENCY				REMARKS
				NUMBER	TYPE	N of Advancement of Sampler	blows per foot	2,0	4,0	6,0	8,0	100	PL	W	LI	
365.1	0	GROUND SURFACE														
363.1	2.0	TOPSOIL and Dark Brown SANDY SILT FILL														
360.0	5	Compact Very Dense Brown, Stratified SILTY FINE SAND		1	S.S.	64										
358.1	7.0	Very Hard Grey CLAYEY SILT with some embedded coarse sand and fine gravel. (GLACIAL TILL)		2	S.S.	85										
355.0	10	Very Dense Grey SILT with some sand and gravel, and a trace of clay. (GLACIAL TILL)		3	S.S.	50/3"										
352.1	13.0	Layers of CLAYEY SILT-SHALE		4	S.S.	50/3"										
350.0	15	Grey SHALE BEDROCK with intermittent bands of Hard LIMESTONE		5	R.C.	29%										
347.1	18.0			6	R.C.	80%										
345.0	20															
340.0	25	END OF BOREHOLE														

W.L. El. 360.9'
MAY 28, 1966

Gr. 5% ; Sa. 35%
Si. 45% ; Cl. 15%

Gr. 18% ; Sa. 37% ;
Si. 35% ; Cl. 5%

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 5.4 . .

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D. H. O.

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

LOCATION: 176,835 N; 207,528 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 2 5/8"

DATE: MAY 25 & 26, 1966

W. J. 275 - 64 - 4

ENCLOSURE NO.

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	100	PL	W	LI	
							SHEAR STRENGTH lbs/sq ft								
365.9	0	GROUND SURFACE													
		5" TOPSOIL													
363.4	2.5	SANDY SILT FILL													
		Brown													
360.0	5	Dense		1	S.S.	34									
		Very Dense SILTY													
		FINE SAND		2	S.S.	79									
		(layered structure)		3	S.S.	100/3									
356.4	9.5														
355.0	10	Very Hard, Grey		4	S.S.	70/6"									
		CLAYEY SILT													
		with some embedded													
		coarse sand and													
		fine gravel.		5	S.S.	82									
	15	(GLACIAL TILL)													
350.0	15.5	Alternate layers of		6	R.C.										
		Hard CLAYEY SILT													
		and SHALE.													
	20														
345.0		END OF BOREHOLE													

W.L. El. 362.1'
MAY 28, 1966
Sa. 75% ; Si. 25%

W.L. El. 362.1'
MAY 28, 1966
Sa. 75% ; Si. 25%

100/6"

OUR REFERENCE NO. 6 - 5 - 39

W. J. 66 - F - 47

CLIENT: D.H.O.

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

LOCATION: 176,838 N ; 207,892 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING AUGERING & CORING

DIAMETER OF BOREHOLE 4"

DATE: MAY 31, 1966

W. P. 275 - 64 - 4

ENCLOSURE NO

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE <small>blows per foot</small>		CONSISTENCY <small>water content %</small>		REMARKS
				NUMBER	TYPE	N- 6 Advancement of Sampler	20	40	PL	W	
							<small>SHEAR STRENGTH lbs./sq ft</small>				
364.1	0	GROUND SURFACE									
		6" ASPHALT	[Symbol]								
		Compact to Dense Brown - Grey SILT	[Symbol]								
360.0	5			1	S.S.	29					Sa. 10% ; Si. 88% Cl. 2%
357.0	6.5	Very Hard Grey (boulder)	[Symbol]	2	S.S.	40/2"					
355.0	10	CLAYEY SILT with some embedded gravel. (GLACIAL TILL)	[Symbol]	2A	R.C.						W.L. El. 358.5' JUNE 3, 1966
				3	S.S.	77/11"					Gr. 12% ; Sa. 28% Si. 48% ; Cl. 12%
350.0	15			4	S.S.	75/4 1/2"					
		(boulders)	[Symbol]	5	R.C.	38%					
345.0				6	S.S.	25/2"					
344.1	20	Dark Grey SHALE BEDROCK	[Symbol]	7	R.C.	27.2%					
340.0	25	END OF BOREHOLE	[Symbol]	8	R.C.	61.6%					

OUR REFERENCE NO 6-7-14

GEOTECHNICAL DATA SHEET FOR BOREHOLE 129.

CLIENT: D. H. O.

PROJECT: Q. E. W. & HWY. No. 27. INTERCHANGE, BRIDGE No 1

LOCATION: 176,935 N.; 208,050 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 3"


DATE: AUG. 8. 1966.

ENCLOSURE NO.

W. P. 33 - 65

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	20	40	60	80	100	PL	W	LI	
362.9	0	GROUND SURFACE													
		6" TOPSOIL													
360.0		Compact, Brown FINE SAND with some SILT		1	SS	26									
356.6	6.3			2	SS	97									
355.0		Very Dense Grey SANDY SILT with some CLAY and GRAVEL. (GLACIAL TILL)		3	SS	125									
	10	SHAPE FRAGMENTS BELOW EL. 351 ft.		4	SS	100/3"									
350.0				5	SS	100/6"									
347.4	15.5	Grey SHALEY LIMESTONE BED ROCK		6	SS	100/5"									
345.0				7	RC	80 %									
340.0	20	END OF BOREHOLE													

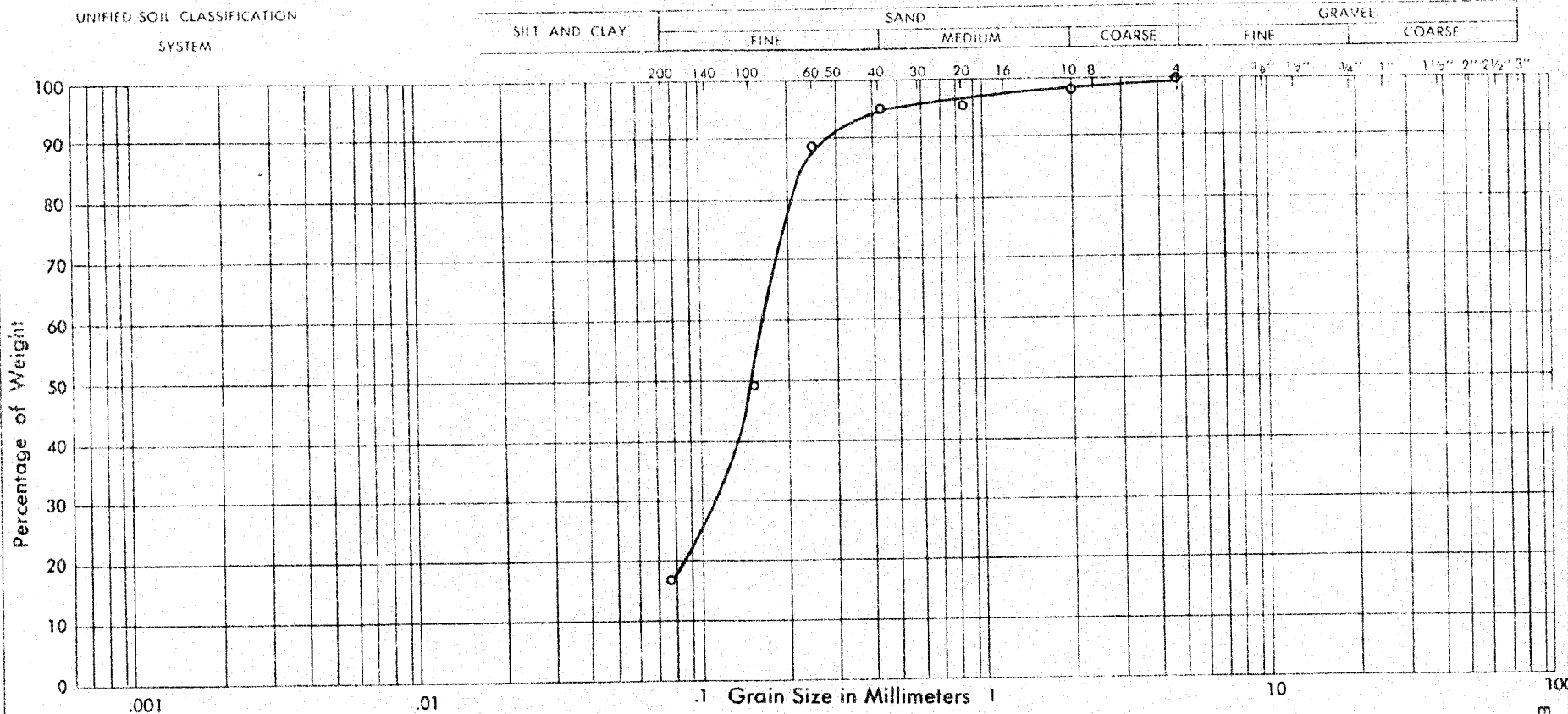
Sa. 82% ; Si. 18%

 WL 358.9 ft.
Aug. 10, 1966
Gr. 16% ; Sa. 22%
Si. 42% ; Cl. 20%

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUP REFERENCE NO. 6-7-14
Your Ref. No. WP 33-65



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

LOCATION: BRIDGE NO 1

BOREHOLE NO.: 129

SAMPLE NO.: 1

DEPTH OF SAMPLE: 2.5 ft.

ELEVATION OF SAMPLE: 360 ± ft.

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

FINE SAND with some SILT

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

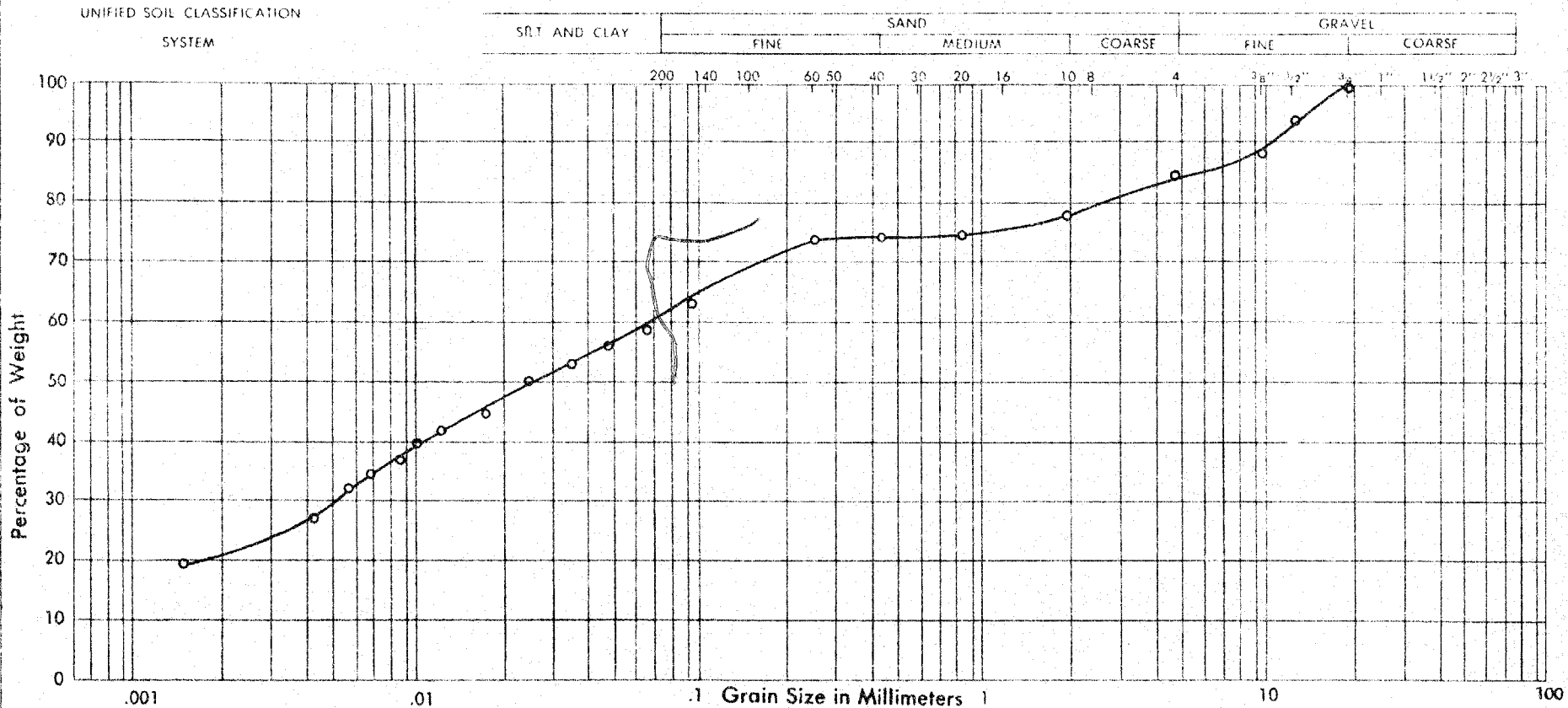
MOISTURE CONTENT % =

ACTIVITY =

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-7-14
Your Ref. No. W.P. 33-65



PROJECT: Q.E.W. & HWY. NO 27 INTERCHANGE
LOCATION: BRIDGE NO 1
BOREHOLE NO.: 129
SAMPLE NO.: 3
DEPTH OF SAMPLE: 7.5 ft.
ELEVATION OF SAMPLE: 355 ± ft.

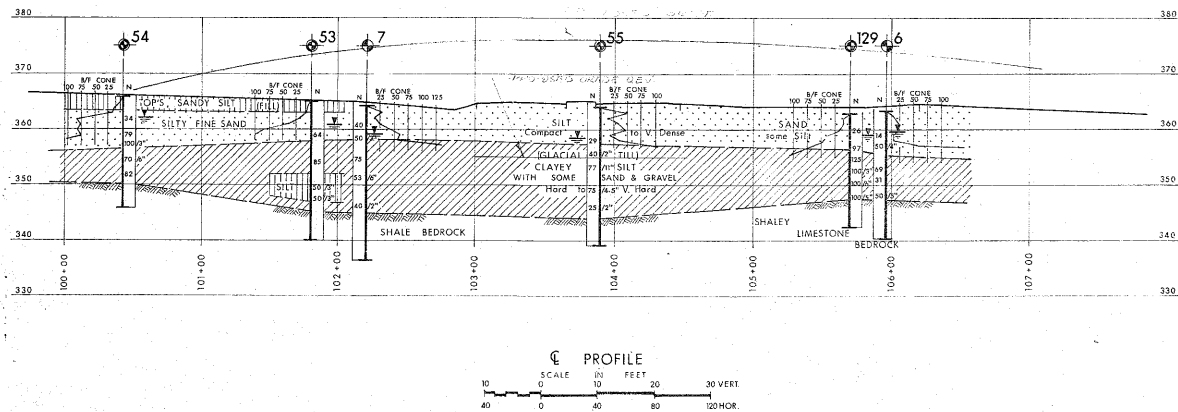
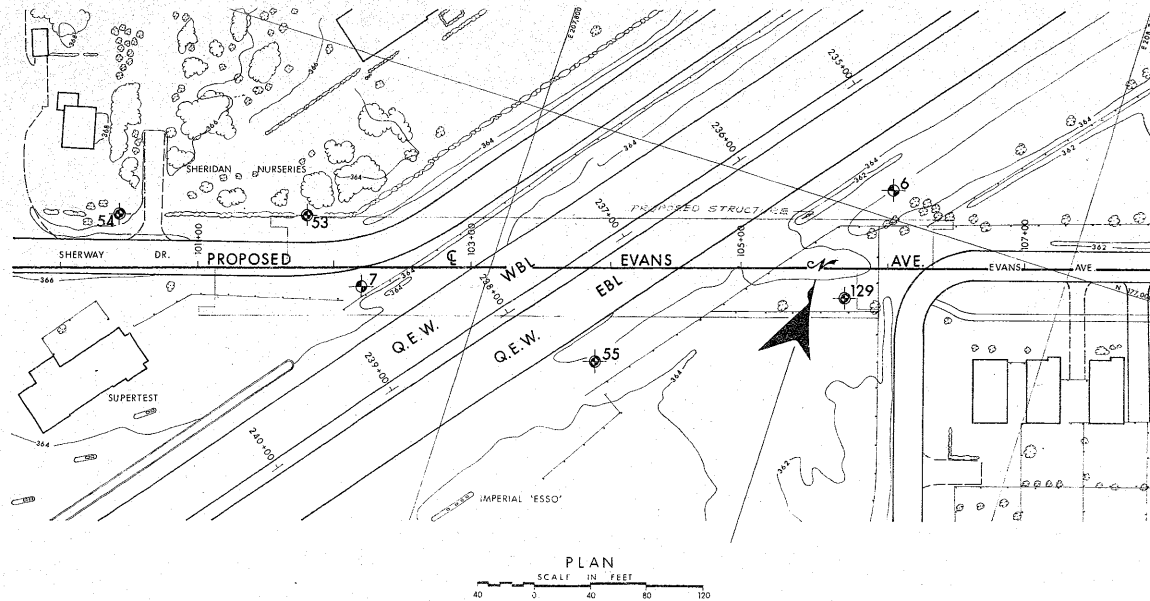
COEFFICIENT OF UNIFORMITY
COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

SANDY SILT with some CLAY and GRAVEL

PLASTIC PROPERTIES:






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



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.
 (Dam, Soil Ltd) Bore & Cone

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
6	363.3	177,020	208,060
7	364.3	176,838	207,716
53	365.1	176,875	207,660
54	365.9	176,835	207,528
55	364.1	176,836	207,892
129	362.9	176,935	208,050

- 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.

[illegible]

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

BRIDGE No.1

Q.E.W. UNDERPASS AT EVANS AVE.
S HIGHWAY NO. Q.E.W. & HWY.27 INTER. DIST.NO. 6
MARK M. TORONTO METRO TORONTO
ETOBICOKE LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUB'D K.S.	CHECKED <input checked="" type="checkbox"/>	W.P. NO. 33-65	M.B.T. DRAWING NO. 65-F-104T
DRAWN BY	CHECKED <input checked="" type="checkbox"/>	JOB NO. 65-F-104	
DATE 20 SEPT /66		SITE NO	
APPROVED <i>A.B. Thomas</i>		CONT. NO.	

