

SUPPLEMENTARY
FOUNDATION INVESTIGATION REPORT
For
Q.E.W. and Hwy. #27 Interchange,
Twp. of Stobbrooks, County of York,
District 46 (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 general conditions prevailing at each structure location, together with our final recommendations for the structure foundations.

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

STRUCTURE #8 - W.P. 34-65-1 -

1. Soil Conditions:

A total of six borings was drilled at the site of the proposed bridge. Boreholes #14 and 95 were placed at the location of the east abutment, holes #114 and 122 at the pier, and holes #94 and 113 in the proximity of the future west abutment.

Right below ground level, within the whole area investigated, a layer of compact to very dense sand and silty sand was revealed. The depth of the sand varies from four to ten ft., and was underlain by shale bedrock. The upper two- to thirty-ft. portion of the bedrock was observed to be extremely weathered, in some instances, to such a degree, that it was very difficult to determine whether the material was really rock or hard overburden. The depths of weathering were also very irregular; therefore, the stratigraphical cross sections, shown on Drawing #65-F-104S, should be considered a very crude approximation only.

Groundwater level lies within the sand at el. 365 - 366 ft.

2. Recommendations:

The preliminary design calls for a 2-span structure at this site, the grade of Hwy. #27 being around el. 358 - 360 ft.

The entire structure may be founded on spread footings, supported within the weathered shale bedrock, or at lower elevations within the relatively sound rock.

- 2.1) By placing the footings of the east abutment anywhere between el. 355 and 362 ft., a safe pressure of 5 t.s.f. may be employed. Lowering the footing below el. 355 ft., a design load of 10 t.s.f. can be utilized.
- 2.2) The spread footings of the pier should be placed at or below el. 354 ft. At el. 354 ft. an allowable bearing capacity of 5 t.s.f. may be assumed for design purposes.

cont'd. /29...

STRUCTURE #8 - W.P. 34-65-1 - (cont'd.) ...

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

- 2.3) At the location of the west abutment, the surface of the bedrock appears to be inclined towards the south, being around el. 365 ft. in borehole #113, and 358 ft. in hole #94.

The spread footings of the abutment may be placed below the elevations quoted above, possibly stepped, and the use of 5 t.s.f. safe pressure is recommended on the footing base.

The design load may also be increased to 10 t.s.f. by lowering the footing to or below el. 355 ft.

- 2.4) Four ft. minimum cover should be provided above the bottom of footings for frost protection. No major dewatering problems are foreseen for the excavations.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 14

FOUNDATION SECTION

JOB 65-F-104LOCATION 179,305 N 209,344EORIGINATED BY P. McW.P. 275-64-1BORING DATE Sept. 29, 1965.COMPILED BY H.S.DATUM G.S.C.BOREHOLE TYPE Washboring - NX Casing.CHECKED BY HL

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	WL	W		
369.8	Groundlevel															
0.3	Topsoil															
	Sand															
364.8	Loose to dense.															
5.0	Weathered shale.															
363.3																
6.5																
	Shaley limestone with intermittent limestone		1	RC	77%											
			2	RC	87%	360										
			3	RC	80%											
			4	RC	93%											
352.2																
17.6	End of borehole.					350										

Refusal at 5.4'

G.W.L.

2.7'

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario

DATE: November 25, 1966

OUR FILE REF.

IN REPLY TO

SUBJECT: Q.E.W./Hwy. 27 Interchange
Bridge #8, W.P. 34-65-1
District No. 6

We have just received the Foundation Report for this structure which recommends a foundation pressure of 5 T.S.F. The Preliminary Foundation Report suggested 10 T.S.F. and the design and drawings have already been completed on the basis of the preliminary report. Some extensive changes are necessary with consequent delay.

It was anticipated that the preliminary recommendations for some of the many structures in the interchange would be subject to change, and you are to be congratulated that there have been so few changes. However, you may wish to review this particular case in view of the large discrepancy.

B.S. Richardson

B.S. Richardson,
Senior Bridge Project Engineer

BSR:rd

c.c. S. McCombie
R. Strain

*Revised BSR and drawings
that are based on foundation recommendations
which are subject to change and which
change again as the design evolves. The
revisions are being made as the design evolves.*

DOMINION SOIL INVESTIGATION LIMITED
77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 751-6565

RANCH
69 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: 68896

Our Ref. No: 6-9-19
Your Ref: W.P. 34-65-1

4th November 1966.

Mr. A.C. Stermac,
Principal Foundation Engineer,
Materials and 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. 8.

Dear Sirs,

Enclosed are eleven (11) copies of the revised log of boreholes No. 95 and 114 pertaining to the above structure.

The "clayey silt" layer between elevations 364 and 350 ft. has been reclassified as an "extremely weathered shale" to conform with nearby boreholes. Since no conclusive evidence was found to support either of these descriptions it was felt that from the construction bidding point of view the revised classification is more advantageous.

We trust that this meets with your approval.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED

I.P. Lieszkowsky
I.P. Lieszkowsky, P.Eng.,
Chief Engineer.

IPL/me
Enclosures.

DOMINION SOIL INVESTIGATION LIMITED

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

BRANCH

969 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: 86896

August 29, 1966.

Our Ref. No. 6-6-19

Your Ref. No. W. P. 34-65-1

Mr. A. G. Stermac,
Principal Foundation Engineer,
Materials and 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. 8.

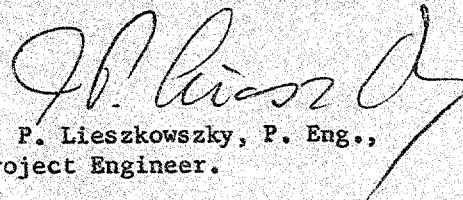
Dear Sirs:

At your request we have investigated the subsurface conditions at the site of the above structure. A total of five exploratory boreholes were put down bearing the numbers 94, 95, 113, 114, and 122. Eleven copies of the records of the boreholes and laboratory test results are enclosed with this letter. Further information about the subsurface conditions in this area can be obtained from your borehole No. 14 put down at the first phase of the investigation.

We trust that you will find the records forwarded to you to your satisfaction. However, if you have any questions please do not hesitate to contact us.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,


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

IPL/ds

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 95 . .

OUR REFERENCE NO. 6-6-19

CLIENT: D. H. O.
 PROJECT: Q.E.W. & HWY. No. 27, INTERCHANGE, BRIDGE No. 8.
 LOCATION: 179, 190 N ; 209, 408 E
 DATUM ELEVATION: G. S. C.

METHOD OF BORING: WASHBORING
 DIAMETER OF BOREHOLE: 3"
 DATE: JULY 8, 1966.
 W.P. 34-65-1

ENCLOSURE NO.

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	Advance- ment of Sampler	20	40	60	80	100	PL	W	LI	
370.2	0	GROUND SURFACE													
		Compact to Dense Brown SAND with some SILT		1	CS										
365.0	5			2 A	SS	78/9"									
364.0	6.2			B											
		Extremely Weathered		3	SS	100/2"									
360.0	10														
		Grey		4	SS	100/4"									
355.0	15			5	SS	100/2"									
		SHALE													
350.0	20			6	SS	100/2"									
		BEDROCK													
				7	RC	42 %									
345.0	25			8	RC	66 %									
		Weathered													
				9	RC	37 %									
340.0	30			10	SS	100/2"									
		Sound													
				11	RC	60 %									
335.0	35	END OF BOREHOLE													
330.0	40														

Sa. - 86 % , Si. - 14 %
 W.L. 364.2 Ft.
 JULY 28, 1966.

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CH'D.

OUR REFERENCE NO. 6-6-19

DATUM ELEVATION: G. S. C.

W. P. 34-65-1

ENCLOSURE NO.

[illegible]

GEOTECHNICAL DATA SHEET FOR BOREHOLE 114

OUR REFERENCE NO. 6-6-19

CLIENT: D. H. O.

PROJECT: Q.E.W. & HWY. No. 27. INTERCHANGE, BRIDGE No. 8.

LOCATION: 179, 240 N ; 209, 245 E

DATUM ELEVATION: G. S. C.

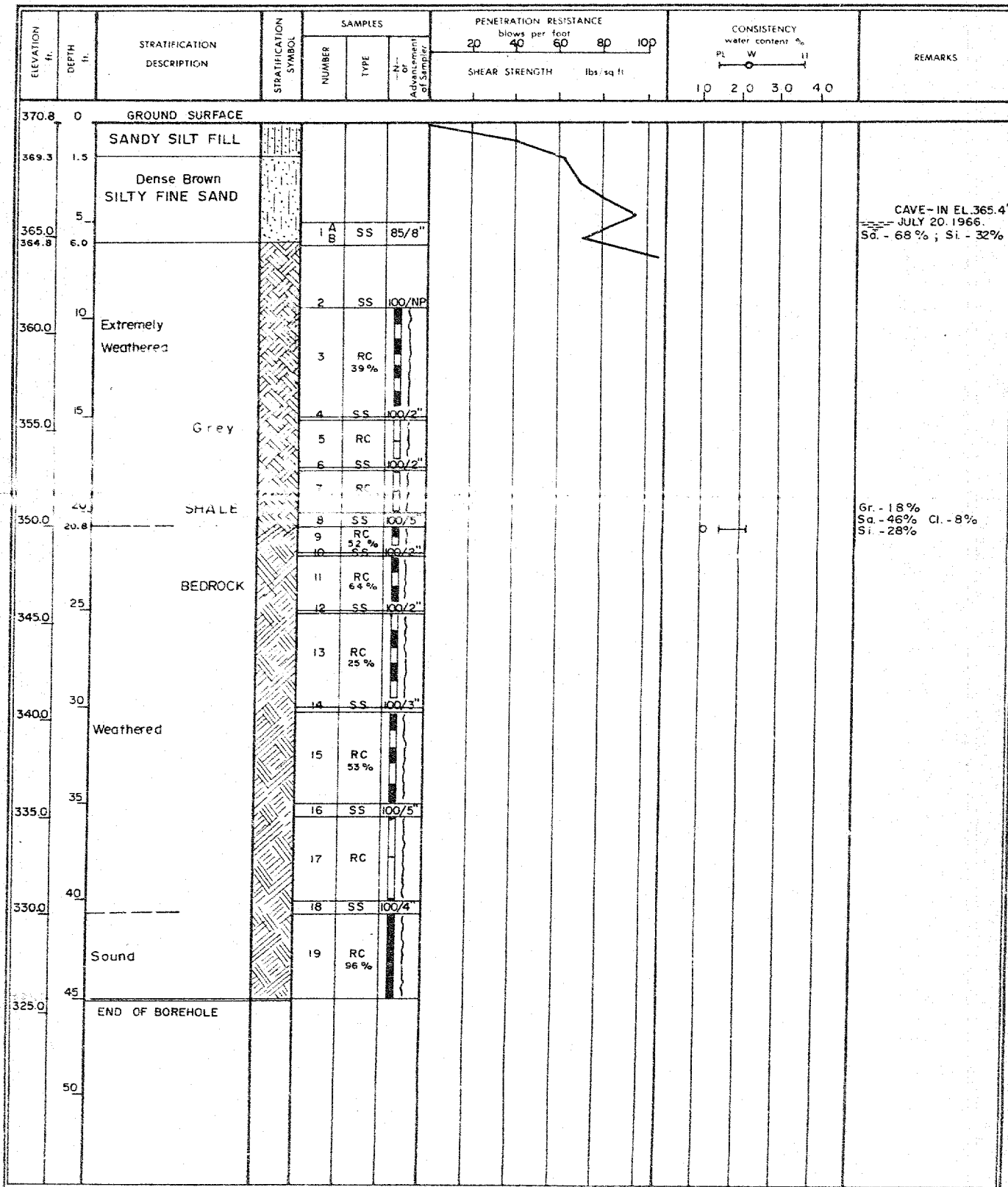
METHOD OF BORING: WASHBORING

DIAMETER OF BOREHOLE: 3"

DATE: JULY 13, 1966.

W.P. 34-65-1

ENCLOSURE NO.



VERTICAL SCALE 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CHD.

CLIENT: D. H. O.
PROJECT: Q. E. W. & HWY. No. 27. INTERCHANGE, BRIDGE No. 8.
LOCATION: 179, 160 N ; 209, 270 E
DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE 3"

DATE: JULY 14, 1966.

W. P. 34-65-1

ENCLOSURE NO

[illegible]

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: V. G. H. CH'D:

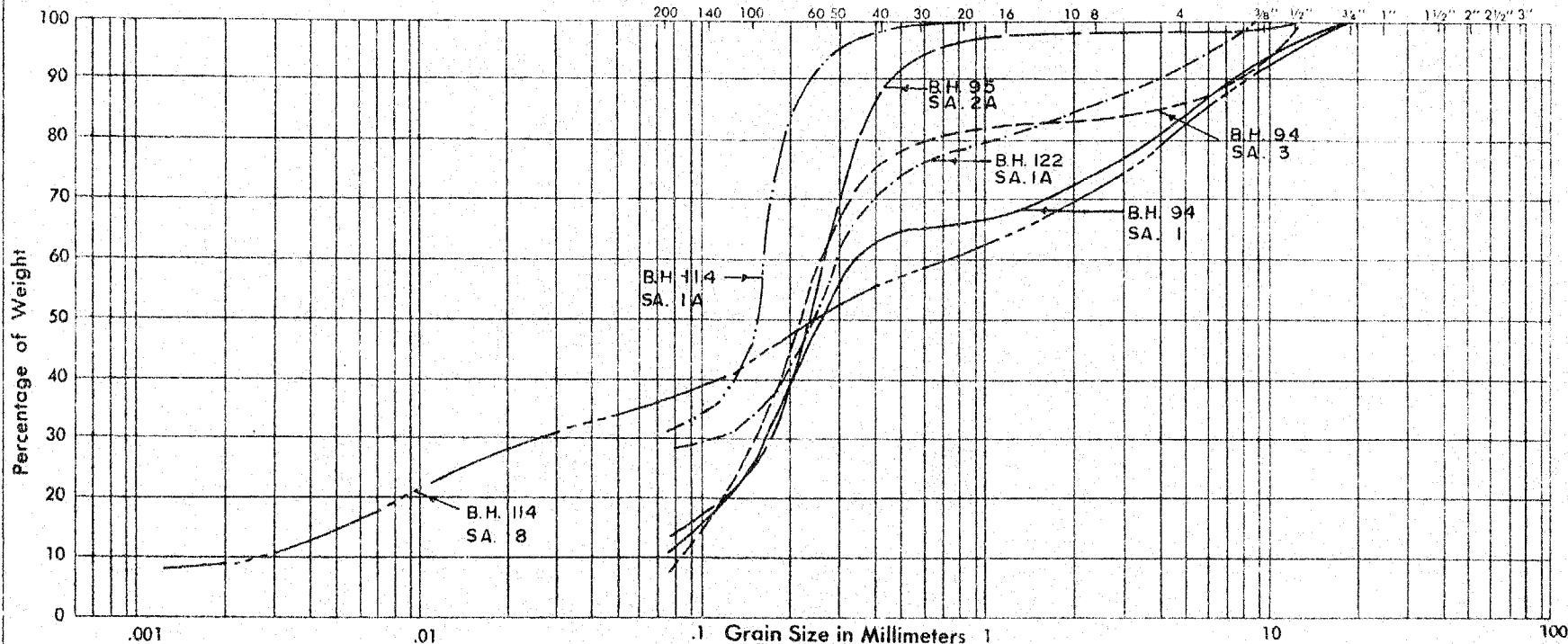
DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 6 - 19

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 8

BOREHOLE NO.: 94 94 95 114 114 122

SAMPLE NO.: 1 3 2A 1A 8 1A

DEPTH OF SAMPLE:

ELEVATION OF SAMPLE:

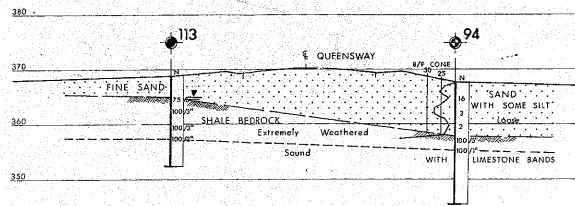
COEFFICIENT OF UNIFORMITY
COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

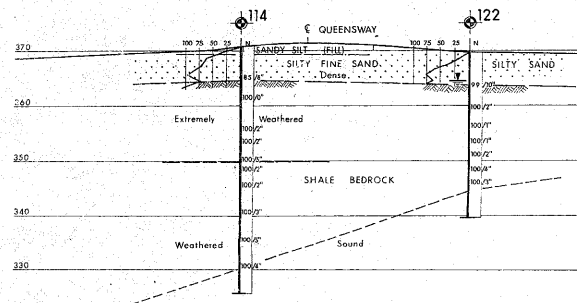
PLASTIC PROPERTIES:

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

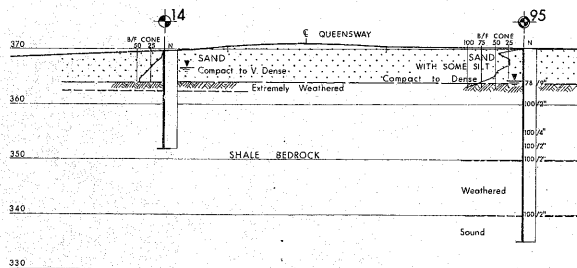
Enclosure No.



A-A

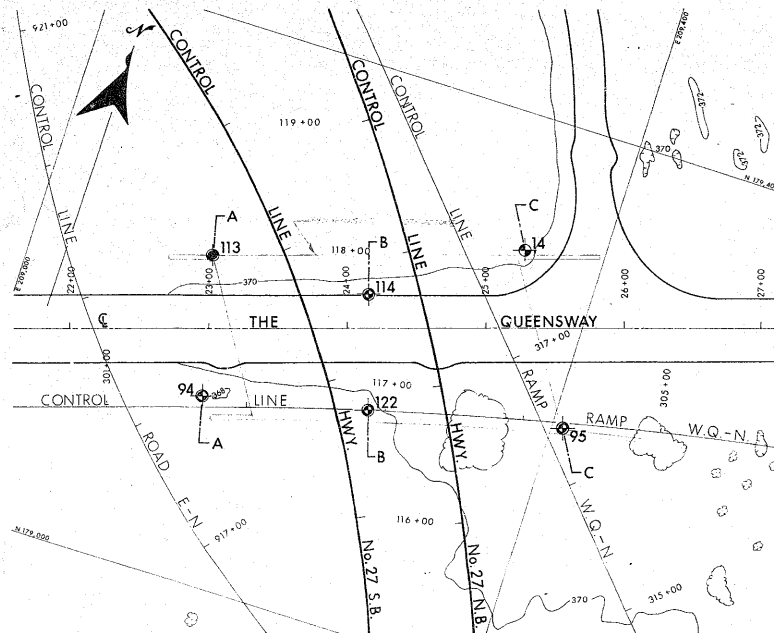


B-B



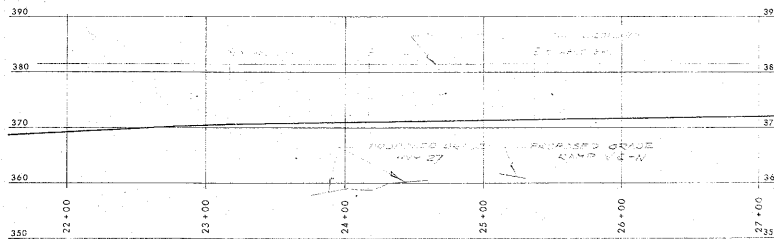
C-C

SECTIONS
SCALE IN FEET
10 20 30 40 50 VERT.
20 0 20 40 60 HOR.



PLAN

SCALE IN FEET
40 0 40 80 120



PROFILE

SCALE IN FEET
10 20 30 VERT.
40 0 40 80 120 HOR.

SEE DRAWING No. 65-F-104A

KEY PLAN
SCALE IN MILES

LEGEND

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

NO.	ELEVATION	CO-ORDINATES NORTH	EAST
14	369.8	179,303	209,344
94	368.0	179,133	209,134
95	370.2	179,190	209,406
113	369.3	179,233	209,129
114	370.8	179,240	209,245
122	369.7	179,160	209,270

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.

DATE	BY	DESCRIPTION

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

BRIDGE No. 8

QUEENSWAY OVER HWY. No. 27

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

BORE HOLE LOCATIONS & SOIL STRATA

SUBWD K.S.	CHECKED	W.P. NO. 34-65-1	M.S.T. DRAWING NO.
DRAWN D.P.	CHECKED	JOB NO. 65-F-104	65-F-104S
DATE 8 SEPT. 1966	SITE NO.		BRIDGE DRAWING NO.
APPROVED	DATE		

