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Attention: Mr. S. McCombie

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Foundation Section,  
Materials & Research Division.

August 7, 1963

D.H.O. FOUNDATION INVESTIGATION REPORT --  
Proposed New Underpass of Hwy. No. 401  
and Weston Road in Metropolitan Toronto  
Township of North York, District No. 6.  
W.J. 63-F-70 -- W.P. 236-60

Attached, we are forwarding to you, our detailed  
foundation investigation report on the subsoil conditions  
existing at the above structure site.

We believe that you will find the factual data and  
recommendations contained therein, adequate for your future  
design work. Should additional information be required,  
please do not hesitate to contact our Office.

KYL/MdeF  
Attach.

cc: Messrs.

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# FOUNDATION INVESTIGATION

For

Proposed New Underpass of Hwy. No. 401  
and Weston Road in Metropolitan Toronto  
Township of North York, District No. 6.  
W.J. 63-F-70    --    W.P. 236-60

## 1. INTRODUCTION:

A verbal request to carry out a foundation investigation at the existing Hwy. #401 and Weston Road Underpass, was received from Mr. J. Curtis, Bridge Location Engineer during June, 1963.

It is proposed to erect a new underpass to carry Weston Road over Hwy. #401. The site of the proposed underpass is located in Metropolitan Toronto, Twp. of North York. At this location, the chainage of Hwy. #401 is 5+05, and that of Weston Road, from 13+40 to 16+70.

In order to determine the soil properties and decide on the type of foundations, an investigation was carried out by this Section. Results and the discussions of the field and laboratory investigation, as well as conclusions and recommendations for the future design work, are contained in the following paragraphs of this report.

## 2. DESCRIPTION OF SITE:

The site of the proposed underpass is located approximately 1 mile west of the intersection of Hwy. #401 and Hwy. #400. The surrounding area is generally flat terrain.

Physiographically, the site is located on the so-called South Slope, Region of Southern Ontario.

### 3. FIELD AND LABORATORY WORK:

In order to obtain sufficient information on the type and properties of the subsoil, four sampled boreholes, and one dynamic cone penetration test, were carried out at this site.

Split-spoon samples were taken at various depth intervals. Samples recovered in the split-spoon sampler were used to determine the following physical properties:

1. Natural Moisture Content.
2. Atterberg Limits.
3. Grain Size Distribution.

Results of these laboratory tests are summarized in Appendix I of this report.

### 4. SUBSOIL CONDITIONS:

#### 4.1) General:

The stratigraphy of the soil at the site was found to be generally uniform. A detailed description of various soil types encountered during the investigation, is shown in Appendix I of this report, and is also given in subsequent paragraphs. The estimated stratigraphical profile, shown on Dwg. No. 63-F-70A, is based upon this information.

#### 4.2) Clayey Sandy Silt - Stiff to Hard:

The upper and lower boundaries of this layer vary considerably:

In B.H. #1	from El. 454.0	to El. 425.5
B.H. #2	from El. 428.2	to El. 408.7
B.H. #3	from El. 418.2	to El. 400.2
B.H. #4	from El. 446.0	to El. 422.0

4. SUBSOIL CONDITIONS: (cont'd.) ...

4.2) Clayey Sandy Silt - Stiff to Hard: (cont'd.) ...

This layer has been subjected to some oxidation and exhibits a predominantly brownish-grey colour. The percentage of clay in this layer is 24%, sand forms 20%, and the rest of 56%, is silt. Moisture content determinations for this layer varied from 12% to 22.4%. Liquid limits for this layer vary from 22.3% to 36.1%, while plastic limits range from 12.5% to 19.5%. The overall layer was found in a stiff to hard state with the 'N' values ranging from 15 to 48 with an average 'N' - 35 blows/foot.

4.3) Clayey Silty Sand (Glacial Till) - Dense to very Dense:

Immediately below the layer of clayey, sandy silt is a stratum of dark grey, clayey silty sand (Glacial Till).

Grain size distribution curves indicated that this stratum is composed of 20% clay, 32% silt and 48% sand. Liquid limits for this stratum vary from 15% to 20.6%, while plastic limits range from 12.7% to 15.8%. The average moisture content in this stratum was found to be about 10.8%, ranging from 6.2% to 14.6%. The overall stratum is in a dense to very dense condition, with an average 'N' value in excess of 150 blows/foot. Plasticity charts for all boreholes are given in Appendix I of this report.

cont'd. /4 ...

5. GROUND WATER CONDITIONS:

The ground water level, at the time of the investigation, was found at the following elevations:

In B.H. #1 at El. 417.4  
B.H. #2 at El. 418.6  
B.H. #3 at El. 407.0  
B.H. #4 at El. 410.0

It may be assumed that the water level will vary with the seasons of the year.

No artesian water conditions were encountered.

6. DISCUSSION AND RECOMMENDATIONS:

In conjunction with the future widening of Hwy. #401, it is proposed to construct a new underpass at the existing location of the Weston Road interchange. Centre lines and profile grades of the proposed construction will be approximately the same as those existing at present, in which case, foundations for the new bridge will be located either in cut sections or in original ground.

Subsoil conditions at the site are such that adequate support for spread footing type foundations can be obtained at relatively shallow depths below finished grades. It is recommended, therefore, that the proposed pier footings be founded approximately six feet or more below the finished level of the adjoining Hwy. #401, and that the proposed abutment footings be founded six feet or more below the finished level of the future Weston Road. In all cases, a net allowable pressure of 3 t.s.f. may be assumed for design purposes.

cont'd. /5 ...

6. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

Since the subsoil consists of relatively impermeable material, dewatering of the proposed excavations should present no major problems.

The proposed 2:1 cut slopes of Hwy. #401 should present no stability problems.

7. SUMMARY:

A foundation investigation at the site of the proposed new Weston Road and Hwy. #401 underpass, is reported.

Subsoil was found to consist generally, of dense to very dense glacial deposits down to depths of at least 30 feet below the existing Hwy. #401.

Spread footings with an allowable net pressure of 3 t.s.f. are recommended for footings placed at depths of about 6 feet below finished grades.

No dewatering problems are anticipated.

No stability problems for the proposed 2:1 cut slopes of Hwy. #401 are anticipated.

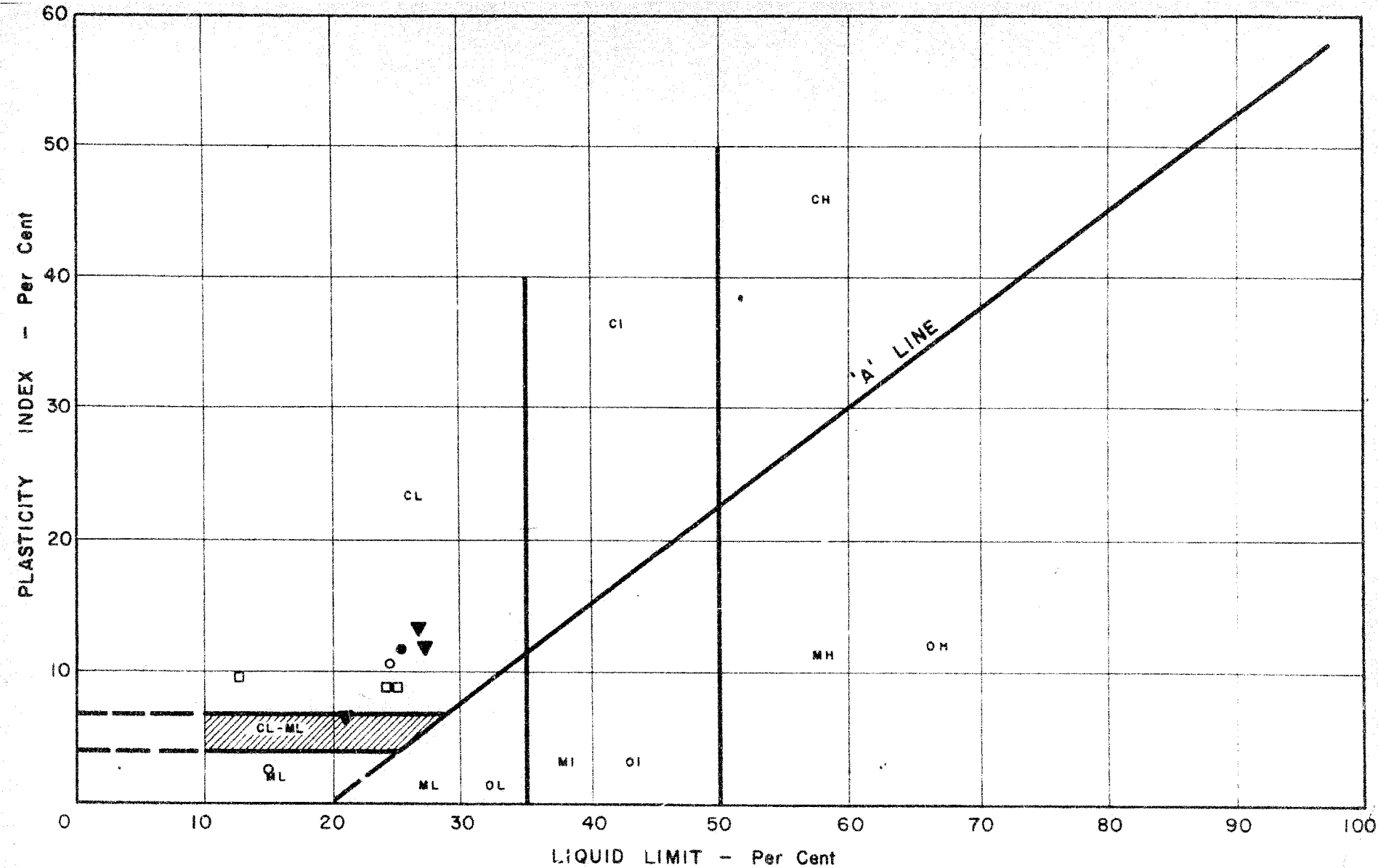
8. MISCELLANEOUS:

The field work, performed during the period from June 20 to June 24, 1963, together with the preparation of this report, was undertaken by Mr. W. W. Kulmatickas, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. K. G. Selby, Senior Foundation Engineer, who reviewed this report.

August 1963.

APPENDIX I.





**NOTES**

- - B.H. NO. 1
- - B.H. NO. 2
- - B.H. NO. 3
- ▽ - B.H. NO. 4

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION  
**PLASTICITY CHART**

Job No. 63-F-70 W.P. No. 236-60  
Location HWY. NO. 401 & WESTON RD.

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 63-F-70LOCATION Hwy. #401 and Weston Rd. Ch. 13/40 - 50'-0" Rt.ORIGINATED BY W.W.K.W.P. 236-60BORING DATE June 20, 1963.COMPILED BY W.W.K.DATUM 455.5BOREHOLE TYPE Pennndrill - Auger HoleCHECKED BY H.S.

SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	WATER CONTENT %		
455.5	Ground Elevation									
454.0	Black org. topsoil	~								
1.5	Clayey sandy silt.		1	SS	39	450				
	Stiff to hard.		2	SS	35					
			3	SS	43					
425.5	Clayey silty sand.									
30.0	(Glacial Till)									
	Dense to very dense.		4	SS	31					
394.0			5	SS	300					
61.5	End of borehole.									

142 Blows for 12"

W.L. Elev.  $\frac{V}{\bar{V}}$  417.4  
Observed in Auger Hole

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 63-F-70LOCATION Hwy. #401 and Weston Rd. Ch. 14/35 - 133'-0" Lt.ORIGINATED BY W.W.K.W.P. 236-60BORING DATE June 21, 1963.COMPILED BY W.W.K.DATUM 428.2BOREHOLE TYPE Pennndrill-Auger HoleCHECKED BY H.S.

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P.S.F.	LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W WATER CONTENT % 15 30 45	BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE						
428.2	Ground Elevation				430					
0.0	Clayey sandy silt.									
	Stiff to hard.		1	SS	17	420				
			2	SS	43					
			3	SS	48	410				
408.7										
19.5	Clayey silty sand. (Glacial Till)		4	SS	270	400				
	Dense to very dense.									
396.7			5	SS	381					
31.5	End of borehole.					390				

W.L. Elev.  $\nabla$  418.6  
Observed in Auger Hole.

## RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 63-F-70 LOCATION Hwy. #401 and Weston Rd. Ch. 15+58 - 195'-0" Rt. ORIGINATED BY W.W.K.  
W.P. 236-60 BORING DATE June 24, 1963. COMPILED BY W.W.K.  
DATUM 420.2 BOREHOLE TYPE Penndrill - Auger Hole CHECKED BY H.S.

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		SHEAR STRENGTH P.S.F.			WATER CONTENT %				
							WP	W	WL	15	30	45		
420.2	Ground Elevation					420								
418.2	Sand & gravel Hwy. Fill													
2.0	Clayey sandy silt. Stiff to hard.		1	SS	15									
			2	SS	40	410								
			3	SS	115									
400.2						400								
20.0	Clayey silty sand (Glacial Till)													
393.7	Dense to very dense.		4	SS	400									
26.5	End of borehole.					390								
						380								

W.L. Elev.  
407.0

Observed in  
Auger Hole.

W.L. Elev.  
407.0Observed in  
Auger Hole.

# RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 63-F-70 LOCATION Hwy. #401 and Weston Rd. Ch. 16/20 - 45'-0" Lt. ORIGINATED BY W.W.K.  
W.P. 236-60 BORING DATE June 24, 1963. COMPILED BY W.W.K.  
DATUM 449.0 BOREHOLE TYPE Pennndrill - Auger Hole CHECKED BY H.S.

SOIL PROFILE			SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P S F.	PLASTIC LIMIT ——— WP	WATER CONTENT ——— W		
449.0	Ground Elevation				450						
0.0	Sand & gravel Hwy fill										
446.0											
3.0	Clayey sandy silt.		1	SS	39						
	Stiff to Hard.				440						
			2	SS	32						
					430						
422.0											
27.0	Clayey silty sand.		3	SS	32						
	(Glacial Till)				420						
	Dense to very dense.				410						
					400						
397.5			4	SS	108						
51.5	End of borehole.				390						

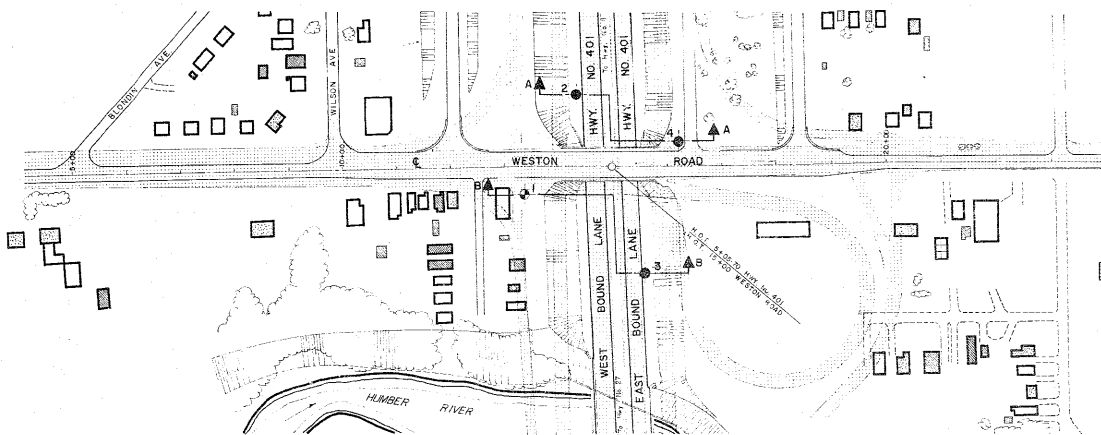
W.L. Elev.  
= 410.0  
Observed in  
Auger Hole.

#63-F-70

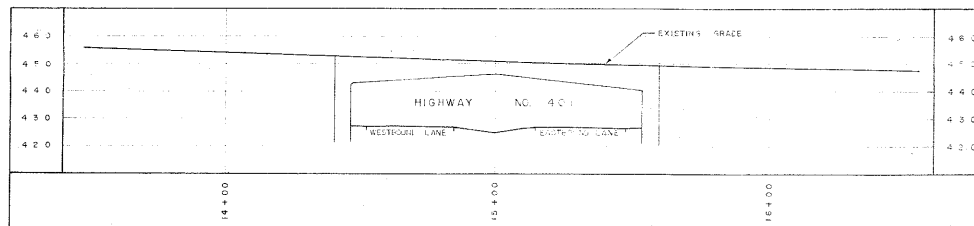
W.P. #236-60

HWY. #401 &

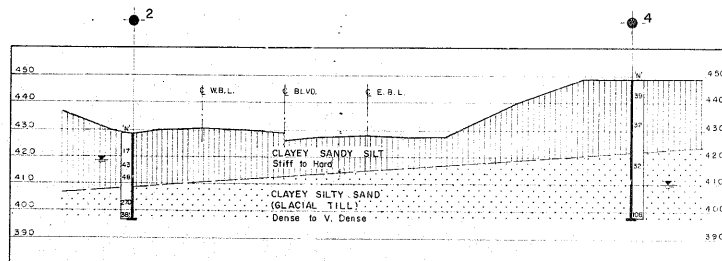
WESTON RD.



PLAN  
SCALE IN FEET  
100 50 0 100 200

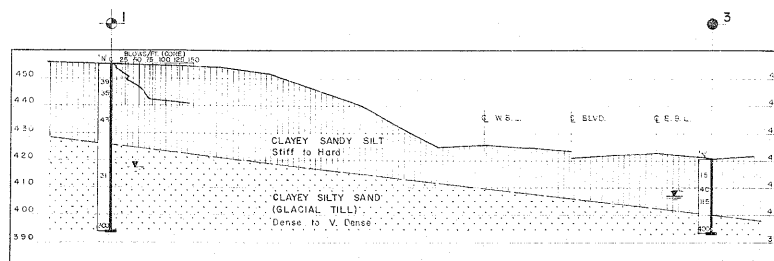


PROFILE  
SCALE IN FEET  
50 10 0 10 20

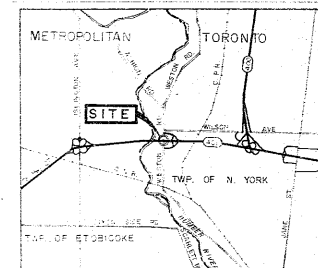


A - A

SECTIONS  
SCALE IN FEET  
20 10 0 20 40



B - B



KEY PLAN

LEGEND

- Bore Hole Location
- Bore Hole Location
- Bore Hole Location
- △ Water Level Station

NO.	ELEVATION	STATION	OFFSET
1	455.5	13+40	50' RT
2	425.2	14+35	133' LT
3	422.2	15+58	195' RT
4	449.0	16+20	45' LT

NOTE

The boundaries between the strata have been established only at the bore hole locations. Between bore holes the boundaries are assumed and geological evidence and may be subject to considerable error.

DEPARTMENT OF HIGHWAYS - ONTARIO

WESTON ROAD

KING'S HIGHWAY NO. 401	DIST. NO. 6
TWP. NORTH YORK	METROPOLITAN TORONTO
LOT	CON.
BORE HOLE LOCATIONS & SOIL STRATA	
DATE 24 JULY 1963	SITE NO. 63-F-70A
APPROVAL	BRIDGE DRAWING NO.

REF. NO. 26-B-80