

FOUNDATION REPORT

on

Proposed Subway at Chedoke Expressway  
and T.H. & B. Railway Crossing in  
Hamilton, Twp. of Ancaster, Dist. #4.

Station: 502+67

Plan No: F 3637-9

Distribution:

Mr. A. M. Teye,  
Bridge Engineer. (2)

Mr. H. A. Tregaskes,  
Construction Engineer. (1)

Mr. D. G. Ramsay,  
Md. Design Engineer. (1)

Mr. J. Ford,  
Project Design Engineer. (1)

Mr. H. E. Richardson,  
District Engr., Hamilton. (1)

Mr. P. F. Weber,  
Regional Soils Engineer. (1)

Mr. A. Watt,  
Ontario Water Resources Comm. (1)

Foundation Section (1)

Gen. Files. (1)

W.J. P-59-109

W.P. 144-60

## INTRODUCTION:

This report covers the foundation investigation carried out to determine the bearing capacity of the subsoil at the proposed subway site.

The site is located in the Hamilton Golf Course where the Chedoke Expressway underpasses the T.N. & B. Railway, Twp. of Ancaster, (Station 502+67, Profile No. P 3637-3).

The field work started on November 2, 1959 and was completed on November 20, 1959.

## DESCRIPTION OF SITE AND GEOLOGY:

Dundas Valley is located in the topographic area of Niagara Escarpment. Geologically, this is believed to be of Paleozoic Age. The bedrock structure is made up of relatively erosion-resistant limestone, underlain by soft, easily eroded shales. The escarpment has been formed by the erosion of soft shales and the break-off of the harder upper layers during pre-glacial times. The entire area has been subjected to glaciation; the last ice advance (Wisconsin) re-worked the pre-Wisconsin drift and effected a general levelling of the Dundas Valley area.

The proposed Expressway centre line intersects the Railway centre line at a location where the Railway changes from cut to fill. The Railway fill is approximately 20 feet high at the centre line intersection point.

A small creek traverses the golf course property immediately west of the subway location and flows under the railway fill through a concrete culvert. Shale bedrock is exposed in the creek bottom. The culvert is located approximately 150 ft. right of road centre line, Chainage 570+00.

## DESCRIPTION OF FIELD & LABORATORY WORK:

The investigations were carried out by means of a core drill machine adapted for soil sampling. Eight boreholes were made by conventional wash boring procedures. Samples were obtained by means of 2" I.D., thin-walled Shelby tube sampler and 2" O.D. split-barrelled spoon sampler. The dimensions of the spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration Test. The bedrock was proved by drilling - AXF core size. In addition, dynamic cone penetration tests were carried out adjacent to each sampled borehole.

The samples were visually examined and identified in the field. In the laboratory, routine index tests were carried out on selected, representative samples.

Laboratory and field test results have been summarized in Table No. 1 and are included under Appendix I. The borehole locations and estimated subsoil stratigraphy between borings are shown on Drawing No. F 59-109.

### SOIL TYPES ENCOUNTERED:

Reference to the detailed boring logs appended to this report shows that the Queenston shale bedrock formation at the structure location, is overlain by a shallow layer of silty clay overburden. The railway embankment consists of a clayey type fill with minor percentages of cinders and gravel.

#### (1) Fill Material:

This material was encountered in borings numbered 1, 2, 3, and 4. Samples obtained in Boring Number 1 were subjected to routine laboratory tests and the following index values are considered representative:-

Moisture Content Range .....	17% - 27%.
Range in % of Clay Fraction (< .002)..	10% - 50%.

cont'd. /3 ...

Fill Material: (cont'd.) ...

In-situ Unit Weight ..... 120 p.c.f.  
Undrained Shear Strength of Sample  
containing 35% Clay Fraction = 1600 p.s.f.

This fill material is derived principally from the weathered shale and will behave as a cohesive material. Conservative representative values of strength (i.e., apparent cohesion in terms of total stresses) and unit weight for use in stability analyses or earth pressure calculations, are as follows:-

Unit Weight                       $\gamma = 120$  p.c.f.  
Apparent Cohesion               $C = 1000$  p.s.f.

(2) Brown Silty Clay:

The natural stratum of cohesive material overlying the shale bedrock consists of weathered shale containing a minor percentage of fine to medium sand. Representative conservative strength and unit weight values are as follows:-

Unit Weight                       $\gamma = 110$  p.c.f.  
Apparent Cohesion               $C = 500$  p.s.f.

(3) Shale Bedrock:

Beneath the shallow mantle of overburden, the Queenston shale bedrock formation was encountered. At this structure location the shale is characterized by thin layers which are alternately red and green-grey in colour. The upper 2 to 3 feet of the shale was found to be fragmented and exhibited varying degrees of weathering. Below this upper, weathered zone, the shale is sound and competent to support footing pressures up to 10 tons/sq.ft.

The shale surface drops appreciably from East to West across the site and this will necessitate some cutting with exposed shale slopes. Because of the extensive weathering rate of the Queenston shale, unprotected slopes should be trimmed to a minimum of 2:1.

cont'd. /4 ...

#### FOUNDATION CONSIDERATIONS:

The cohesive overburden layer at this location is not suitable for the direct support of the foundation members. Queenston shale bedrock was contacted at a relatively shallow depth below profile grade and footings should be supported on this bedrock formation.

The upper zone of the shale formation was found to be badly fragmented and weathered. Foundation excavations will have to be carried into sound shale, bypassing the upper incompetent zone. Based upon the condition of core recovered in the borings, the weathered shale zone was not thicker than 2 feet.

The allowable pressure for footings founded in sound shale is considered to be at least 10 tons/sq. ft.

Experience with the rate of weathering of exposed shale, leads to the recommendation that excavations be filled with concrete as soon as practicably possible. Where it is necessary to carry out an excavation and leave it open for a period of a day or two prior to pouring footing concrete, the weathered surfaces, if they occur, should be scaled prior to pouring concrete. Flooding open excavations in shale, if they have to be left open, has been successful in minimizing weathering.

#### SUMMARY:

- (1) Soil types encountered in the borings carried out at this site, consist of:-
  - (a) Railway Embankment Fill which is a fine-grained, cohesive material containing various percentages of sand, gravel and cinders.
  - (b) Natural stratum of brown silty clay overlying bedrock. This is a cohesive material existing in a soft to medium stiff condition.
  - (c) Bedrock formation of Queenston shale. The upper 2 feet of this shale showed evidence of weathering and fragmentation.

SUMMARY: (cont'd.) ...

- (2) Spread footing support is recommended for this structure. Footings should be founded upon sound shale and the recommended safe gross footing pressure is 10 tons/sq. ft.
- (3) Where cuttings are required in the Queenston shale formation, side slopes of 2:1 are recommended.

January 28, 1940.

  
J. G. Soderman  
- V. Korlu,  
Project Foundation Engr.

APPENDIX I.

Table No. 1

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-109

W.P. 144-60

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENETIN RESIST. BLOWS/FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
1	S1	5'-6.5'	Medium brown silty clay with sand & gravel (fill material)	15	19.8	-	-	-	-	Queenston Formation - Shale interbedded with clay layers. 100 % recovery of core samples
	S2	10'-11.5'	"	7	27.0	-	-	-	-	
	T3	15'-17'	"	-	25.4	20.1	31.5	1613	125.0	
	S4	20'-21.5'	"	12	16.9	-	-	-	-	
	S5	25'-26.5'	"	17	17.6	-	-	-	-	
	RC6	30'-35'	Bedrock - Red & grey shale	-	-	-	-	-	-	
	RC7	35'-40'	"	-	-	-	-	-	-	
	RC8	40'-45'	"	-	-	-	-	-	-	
2	RC1	30'-35'	Bedrock-Decomposed Red Shale & hard clay	-	-	-	-	-	-	Recovery 40 %
	RC2	35'-40'	Bedrock - Red Shale	-	-	-	-	-	-	Recovery 77 %
	RC3	40'-45'	Sound Bedrock-Red & grey shale	-	-	-	-	-	-	Recovery 100 %
3	S1	5'-6.5'	Soft to Medium brown silty clay with sand & gravel (fill material)	23.0	-	-	-	-	-	Recovery 45 % Recovery 90 % Recovery 100 % Recovery 100 % Recovery 90 %
	RC2	10'-15'	Bedrock-Decomposed Red Shale & Hard Clay	-	-	-	-	-	-	
	RC3	15'-20'	Sound Bedrock-red shale	-	-	-	-	-	-	
	RC4	20'-25'	"	-	-	-	-	-	-	
	RC5	25'-30'	"	-	-	-	-	-	-	
	RC6	30'-35'	Sound Bedrock-red & grey Shale	-	-	-	-	-	-	
4	S1	5'-6.5'	Soft to Med. brown silty clay with sand & gravel (fill mat'l)	11	18.4	-	-	-	-	70 for 5'
	S2	10'-11.5'	"	70 for 5'	-	-	-	-	-	



# SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-109

W.P. 144-60

HOLE NO	SAMP NO	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
4	RC3	11.5'-15'	Bedrock-Decomposed Red Shale & Hard Clay	-	-	-	-	-	-	50 % Recovery
	RC4	15'-20'	Sound bedrock-red & grey Shale	-	-	-	-	-	-	100 % Recovery
	RC5	20'-25'	"	-	-	-	-	-	-	76 % Recovery
	RC6	25'-30'	"	-	-	-	-	-	-	100 % Recovery
	RC7	30'-35'	"	-	-	-	-	-	-	100 % Recovery
5	RC1	5'-10'	Bedrock-red & grey Shale	-	-	-	-	-	-	100 % Recovery
6	RC1	5'-10'	Bedrock-red & grey Shale	-	-	-	-	-	-	100 % Recovery
7	S1	5'-6.5'	Stiff brown silty clay with sand	42	13.7	-	-	-	-	
	RC2	9.2'-14.2'	Sound bedrock-red & grey Shale	-	-	-	-	-	-	100 % Recovery
	RC3	14.2'-19.2'	"	-	-	-	-	-	-	95 % Recovery
	RC4	19.2'-24.2'	"	-	-	-	-	-	-	100 % Recovery
	RC5	24.2'-29.2'	"	-	-	-	-	-	-	100 % Recovery
8	H1	-	Brown silty clay	-	-	-	-	-	-	
	RC2	4'-9'	Bedrock-red & grey shale	-	-	-	-	-	-	70 % Recovery
	RC3	9'-14'	Sound bedrock-red & grey Shale	-	-	-	-	-	-	100 % Recovery
			S denotes split spoon sample RC " rock core H " hand sample T " shelby tube sample							


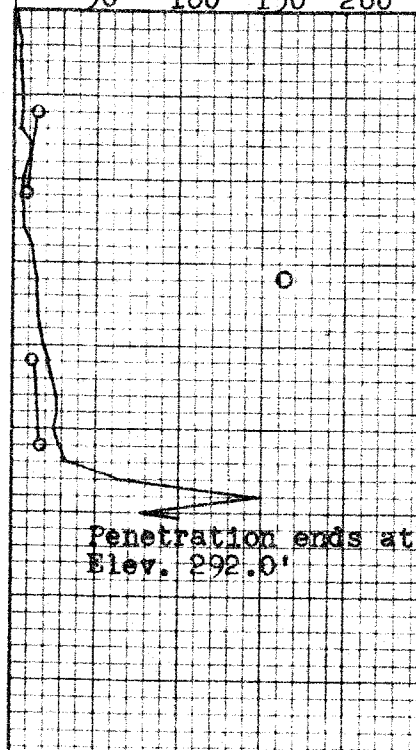

## MATERIALS AND RESEARCH SECTION

W.P. 144-60 BORE HOLE NO. 1  
JOB F 59-109 STATION 503+40 (55' RT)  
DATUM 322.3' COMPILED BY B.K.  
BORING DATE Nov. 2/59. CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

## LEGEND

1/2 UNCONFINED COMPRESSION (Qu) --- 0  
VANE TEST (C) AND SENSITIVITY (S) --- +5  
NATURAL MOISTURE AND LIQUIDITY INDEX --- LI  
LIQUID LIMIT --- X  
PLASTIC LIMIT ---

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				P.S.F. BLOWS/FT.			
				5000	1000	1500	2000
	↓ Groundlevel			50	100	150	200
	Medium brown silty clay with sand & gravel  (Fill material)	322.3	0	 Penetration ends at Elev. 292.0'			
			10				
			20				
			30				
	Bedrock Red & Grey Shale  (Queenston formation)	292.3	30				
			40				
		277.3					

CONSISTENCY		SAMPLE	NATURAL UNIT WT P.C.F.
MOIST. CONTENT- % DRY WT.			
10	20	30	
	X		S1 -
		X	S2 -
	X	X	T3 125.0
	X		S4 -
	X		S5 -
			Rc6 -
			Rc7 0
			Rc8 --

End of borehole

Penetration resistance profile shown, obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350' lb. per blow.

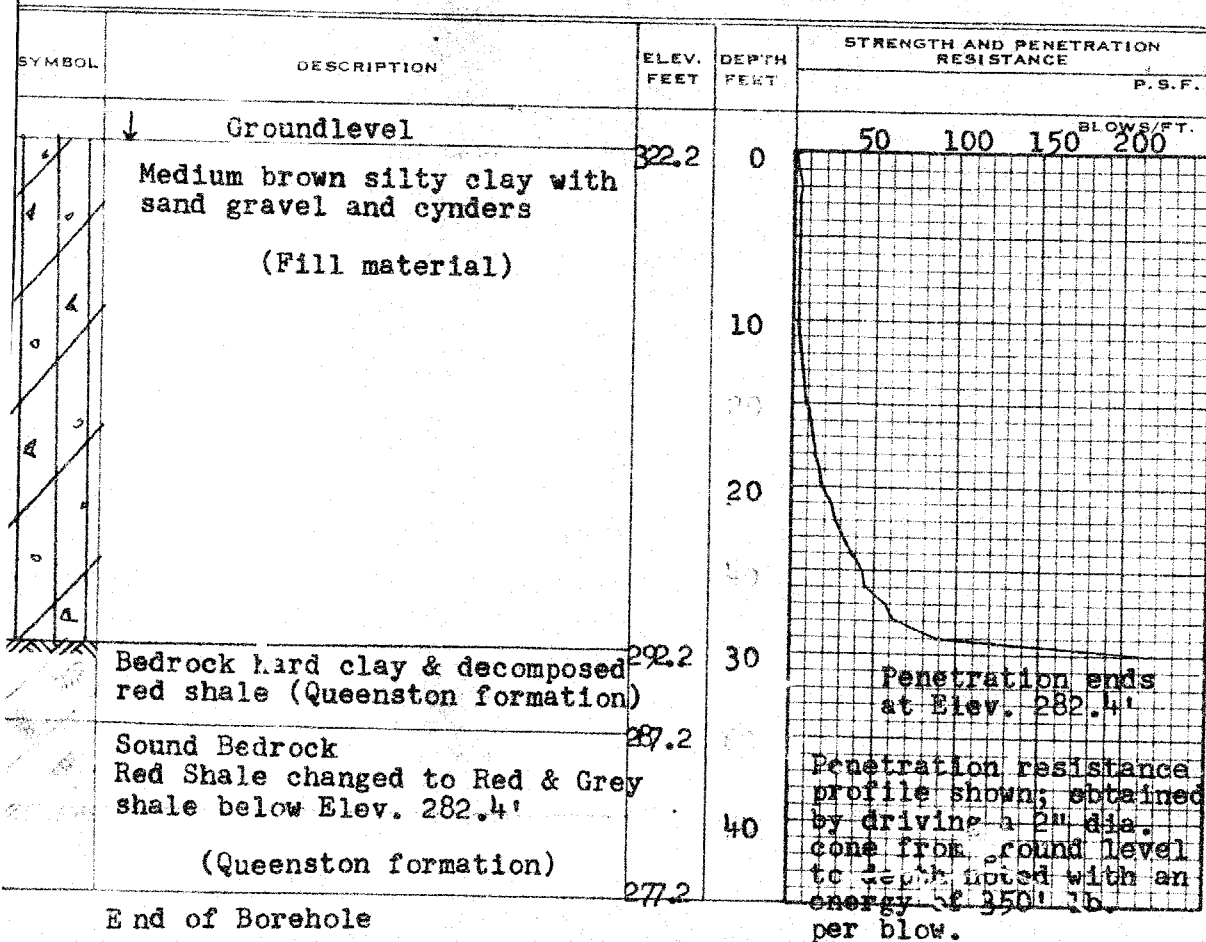
**DEPARTMENT OF HIGHWAYS - ONTARIO**  
**MATERIALS AND RESEARCH SECTION**

W.P. 144-60 BORE HOLE NO. 2  
 JOB F 59-109 STATION 503+07 (1' LT)  
 DATUM 322.4' COMPILED BY B.K.  
 BORING DATE Nov. 5/59. CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE  
 2" SHELBY TUBE  
 2" SPLIT TUBE  
 2" DIA. CONE  
 2" SHELBY  
 CASING

**LEGEND**

1/2 UNCONFINED COMPRESSION (Qu) O  
 VANE TEST (C) AND SENSITIVITY (S) + S  
 NATURAL MOISTURE AND LIQUIDITY INDEX LI  
 LIQUID LIMIT X  
 PLASTIC LIMIT



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	Rc1	-
	Rc2	-
	Rc3	-

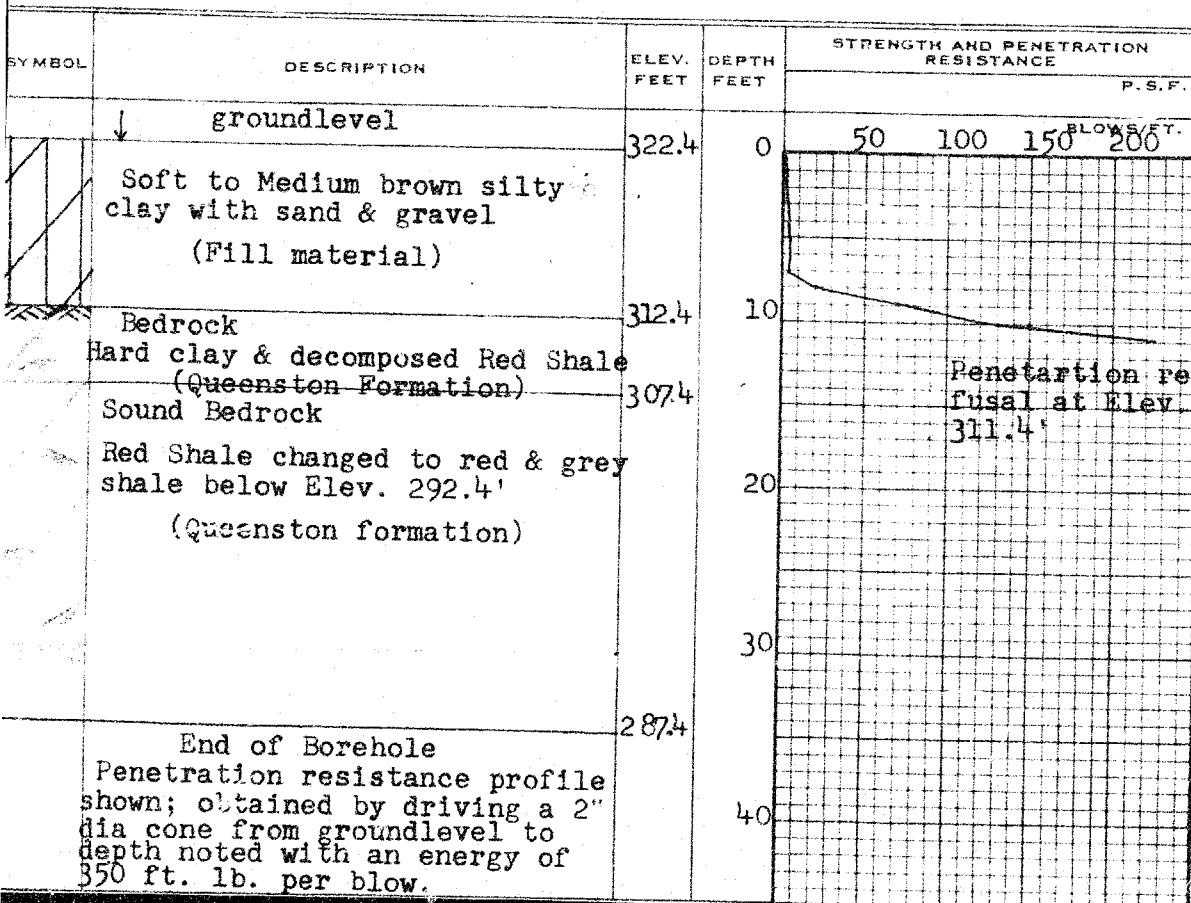
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 144-60 BORE HOLE NO. 3  
JOB F 59-109 STATION 502+78 (51' LT)  
DATUM 322.4' COMPILED BY B.K.  
BORING DATE Nov. 6/59 CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

## LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O  
VANE TEST (C) AND SENSITIVITY (S) +S  
NATURAL MOISTURE AND LIQUIDITY INDEX LI  
LIQUID LIMIT X  
PLASTIC LIMIT



CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.				
10	20	30		
			S 1	-
			RC 2	-
			RC 3	-
			RC 4	-
			RC 5	-
			RC 6	-

# DEPARTMENT OF HIGHWAYS - ONTARIO

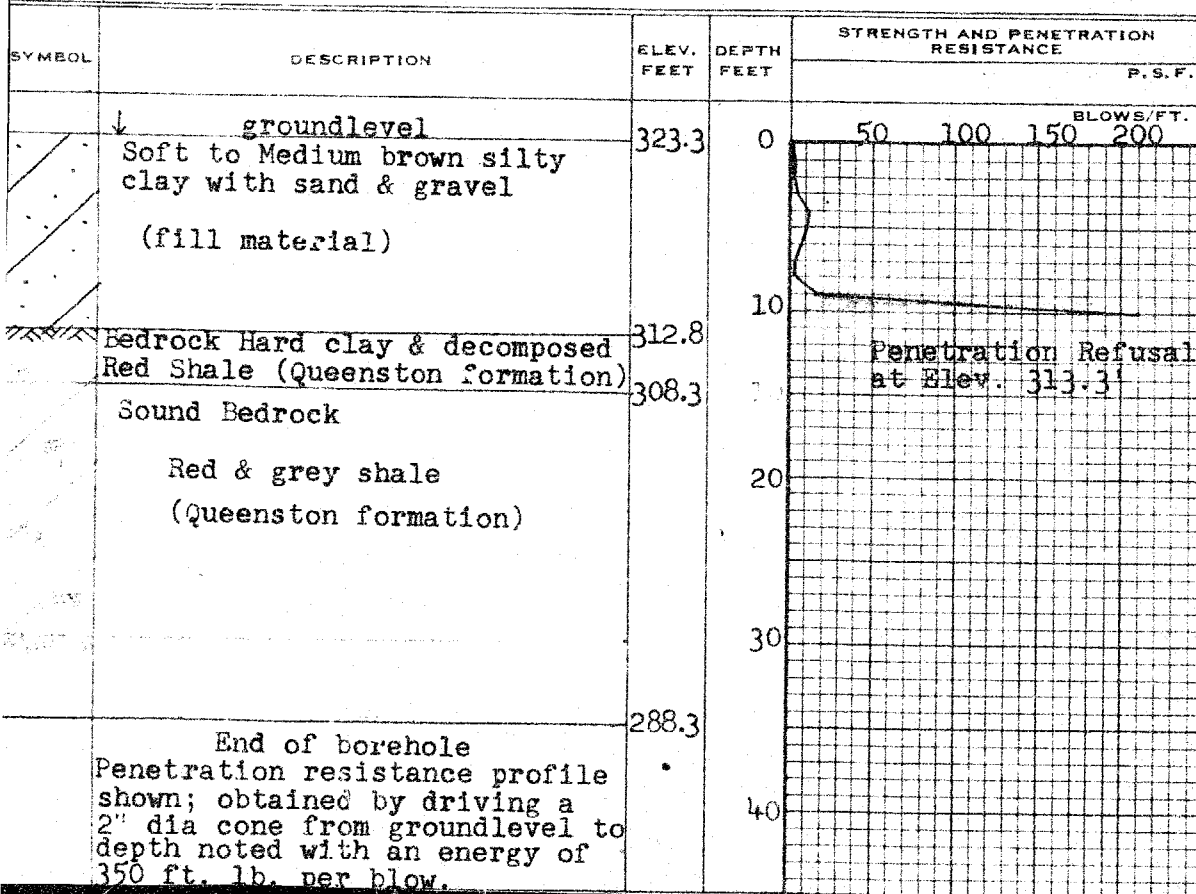
## MATERIALS AND RESEARCH SECTION

W.P. 144-60 BORE HOLE NO. 4  
 JOB F 59-109 STATION 501+90 (66' LT)  
 DATUM 323.3' COMPILED BY B.K.  
 BORING DATE Nov. 10/59 CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE  
 2" SHELBY TUBE  
 2" SPLIT TUBE  
 2" DIA. CONE  
 2" SHELBY  
 CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) — O  
 VANE TEST (C) AND SENSITIVITY (S) — +  
 NATURAL MOISTURE AND LIQUIDITY INDEX — LI  
 LIQUID LIMIT — X  
 PLASTIC LIMIT —



CONSISTENCY		SAMPLE	NATURAL UNIT WT P.C.F.
MOIST. CONTENT - % DRY WT.			
10 20 30			
		S 1	-
		S 2	-
		RC 3	-
		RC 4	-
		RC 5	-
		RC 6	-
		RC 7	-

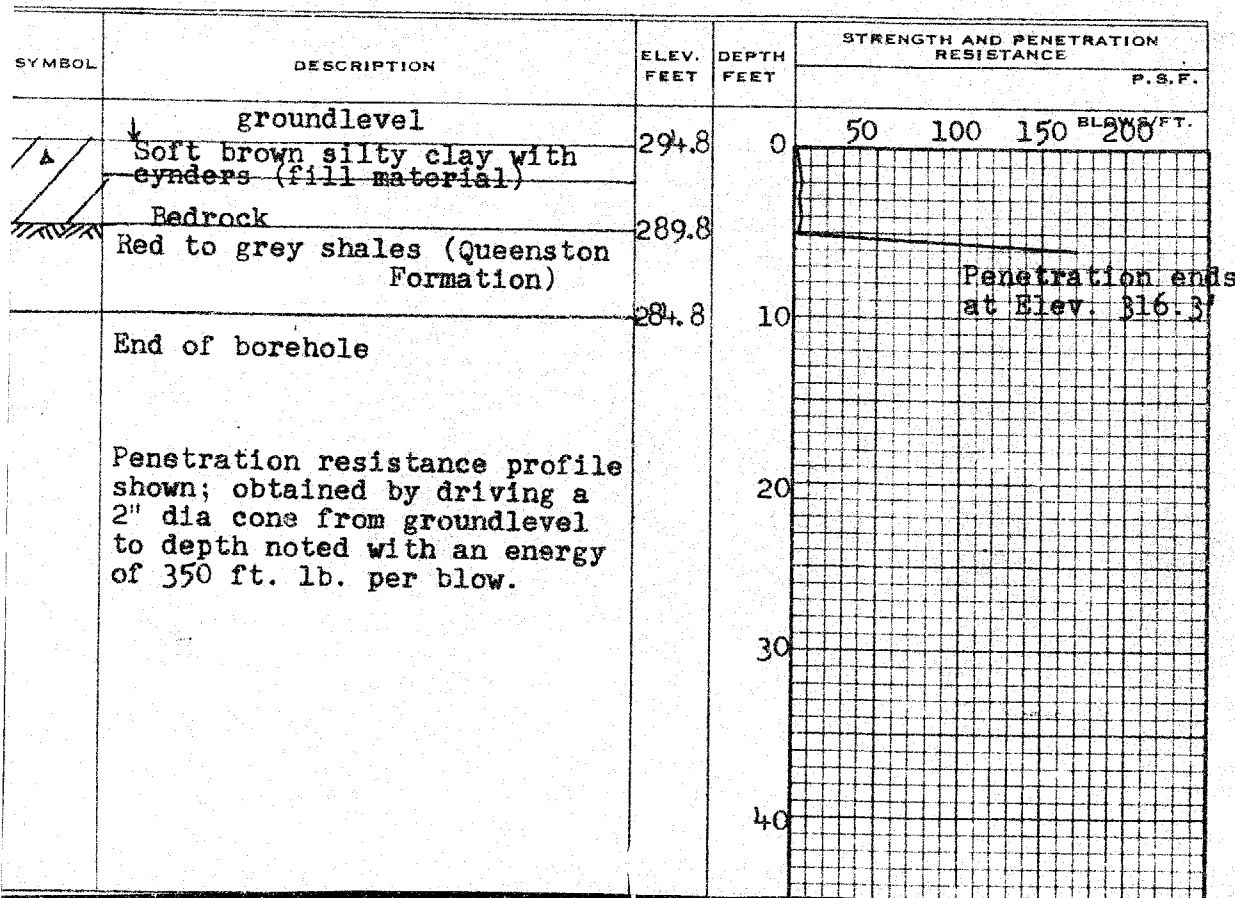
**DEPARTMENT OF HIGHWAYS - ONTARIO**  
**MATERIALS AND RESEARCH SECTION**

W.P. 144-60 BORE HOLE NO. 5  
 JOB F 59-109 STATION 501+77(2' RT)  
 DATUM 322 3' COMPILED BY B.K.  
 BORING DATE Nov. 12/59 CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE \_\_\_\_\_  
 2" SHELBY TUBE \_\_\_\_\_  
 2" SPLIT TUBE \_\_\_\_\_  
 2" DIA. CONE \_\_\_\_\_  
 2" SHELBY \_\_\_\_\_  
 CASING \_\_\_\_\_

**LEGEND**

1/2 UNCONFINED COMPRESSION ( $Q_u$ ) \_\_\_\_\_ O  
 VANE TEST (C) AND SENSITIVITY (S) \_\_\_\_\_ +  
 NATURAL MOISTURE AND LIQUIDITY INDEX \_\_\_\_\_ X  
 LIQUID LIMIT \_\_\_\_\_  
 PLASTIC LIMIT \_\_\_\_\_



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.		
	RC	-

# DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS AND RESEARCH SECTION

W.P. 144-60 BORE HOLE NO. 6  
 JOB F 59-109 STATION 502+11 (54' RT)  
 DATUM 295.0' COMPILED BY B.K.  
 BORING DATE Nov. 12/59 CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE  
 2" SHELBY TUBE  
 2" SPLIT TUBE  
 2" DIA. CONE  
 2" SHELBY  
 CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O  
 VANE TEST (C) AND SENSITIVITY (S) +  
 NATURAL MOISTURE AND LIQUIDITY INDEX LI  
 LIQUID LIMIT X  
 PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	BLOWS/FT.
	groundlevel	295.0	0		50 100 150 200
	Soft brown silty clay with sand	291.0			
	Bedrock				
	Red & grey shale (Queenston formation)	285.0	10		
	End of borehole				
	Penetration resistance profile shown; obtained by driving a 2" dia cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.				

CONSISTENCY	SAMPLE	NATURAL UNIT WT P.C.F.
MOIST. CONTENT - % DRY WT.		
	RC1	-

**DEPARTMENT OF HIGHWAYS - ONTARIO**  
**MATERIALS AND RESEARCH SECTION**

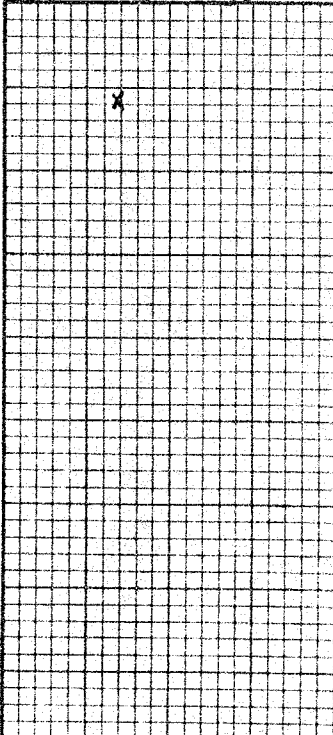
W.P. 144-60 BORE HOLE NO. 7  
 JOB F 59-109 STATION 503+92 (51' LT)  
 DATUM 324.2' COMPILED BY B.K.  
 BORING DATE Nov. 16/59 CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE \_\_\_\_\_  
 2" SHELBY TUBE \_\_\_\_\_  
 2" SPLIT TUBE \_\_\_\_\_  
 2" DIA. CONE \_\_\_\_\_  
 2" SHELBY \_\_\_\_\_  
 CASING \_\_\_\_\_

**LEGEND**

1/2 UNCONFINED COMPRESSION (Qu) \_\_\_\_\_ O  
 VANE TEST (C) AND SENSITIVITY (S) \_\_\_\_\_ +  
 NATURAL MOISTURE AND LIQUIDITY INDEX \_\_\_\_\_ X  
 LIQUID LIMIT \_\_\_\_\_  
 PLASTIC LIMIT \_\_\_\_\_

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	
	↓ groundlevel	324.2	0	50 100 150 200	BLOWS/FT.
	Medium brown silty clay with some sand				
	Bedrock	315.0	10	Penetration Refusal at Elev. 315.0'	
	Red & grey Shale (Queenston formation)				
			20		
	End of borehole	295.0	30		
	Penetration resistance profile shown; obtained by driving a 2" dia cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.		40		

CONSISTENCY			SAMPLE	NATURAL UNIT WT P.C.F.
MOIST. CONTENT- % DRY WT.				
10	20	30		
			S 1	-
			RC 2	-
			RC 3	-
			RC 4	-
			RC 5	-



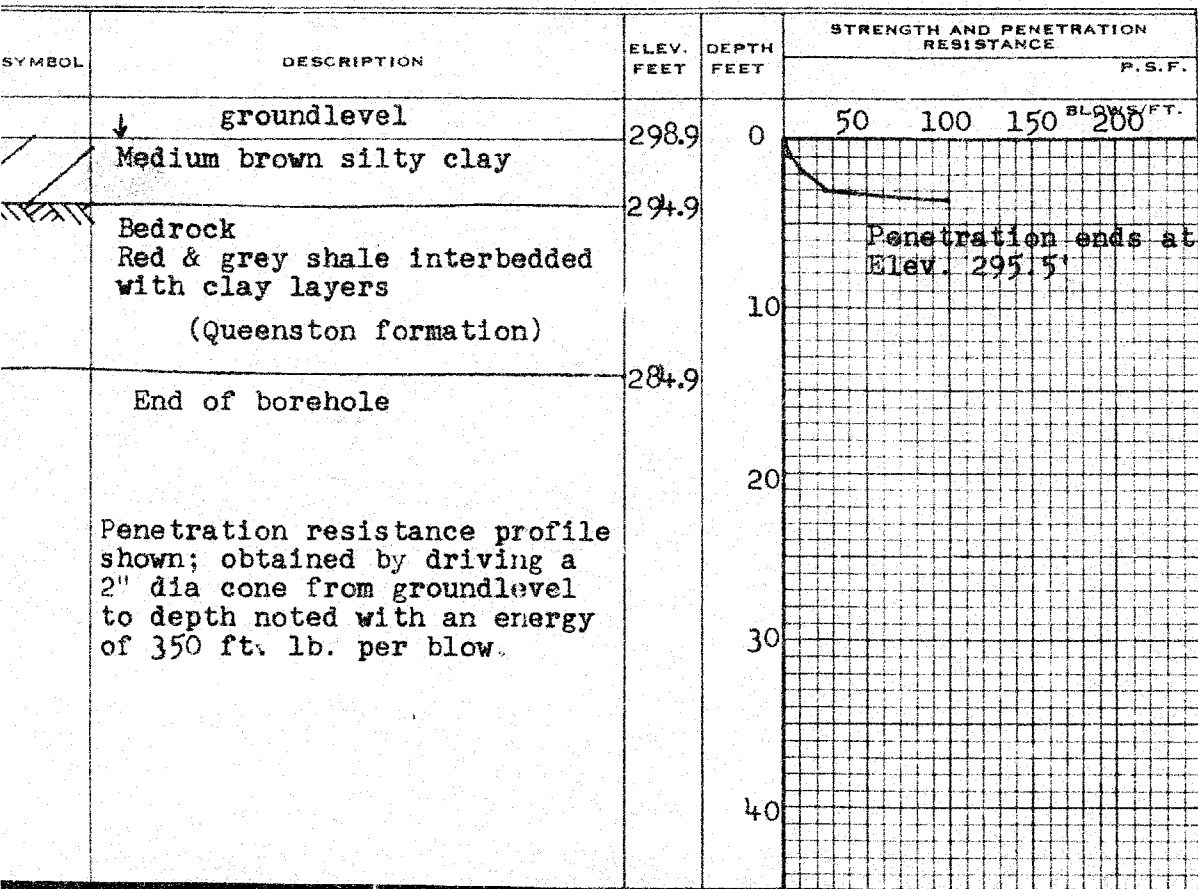
**DEPARTMENT OF HIGHWAYS - ONTARIO**  
**MATERIALS AND RESEARCH SECTION**

W.P. 144-60 ----- BORE HOLE NO. 8  
JOB F 59-109 ----- STATION 504+58 (44' RT)  
DATUM 298.9' ----- COMPILED BY B.K.  
BORING DATE Nov. 17/59. CHECKED BY V.K. & A.L.

2" DIA. SPLIT TUBE ----- ☒  
2" SHELBY TUBE ----- ☒  
2" SPLIT TUBE ----- ☐  
2" DIA. CONE ----- ☐  
2" SHELBY ----- ☐  
CASING ----- ☒ ☒

**LEGEND**

1/2 UNCONFINED COMPRESSION ( $Q_u$ ) ----- ☐  
VANE TEST (C) AND SENSITIVITY (S) ----- ☒  
NATURAL MOISTURE AND LIQUIDITY INDEX ----- ☒  
LIQUID LIMIT ----- ☒  
PLASTIC LIMIT ----- ☒



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	H 1	-
	RC 2	-
	RC 3	-

Mr. A. M. Toye,  
Bridge Engineer.  
Materials & Research Section.

January 29, 1960.

RE: D.H.C. FOUNDATION REPORT -

W.F. 144-60 -- W.J. P 59-1

101-57

Attention: Mr. S. McCombie.

Re: Proposed Subway at Chedoke Expressway  
and T.H. & B. Railway Crossing in  
Hamilton, Twp. of Ancaster, Dist. #4.

Please find attached, our report on the  
subsoil conditions at the above noted structure site.

These conditions, etc., have been discussed  
with C.C. Parker & Associates, but they have not received  
a formal report. Would you please forward this on to them,  
as soon as possible. Thank you.

LCB/ndef  
Attach.

  
L. G. Coderman,  
PRINCIPAL SOILS & FOUNDATIONS ENGINEER

cc: Messrs. A. M. Toye (2)  
H. A. Fregaskes  
D. C. Ramsay  
J. Ford  
T. E. Richardson  
P. F. Weber  
A. Watt  
Foundation Section  
Gen. Files

3A 614

# RACEY, MacCALLUM AND ASSOCIATES

LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers  
AND ASSOCIATED STAFF

MONTREAL



VANCOUVER

TORONTO

DONALD C. MACCALLUM, B.ENG., M.E.I.C., P.ENG.

H. JOHN RACEY, B.SC., M.E.I.C., P.ENG.

A. ERIC RANKINE, B.SC., M.E.I.C., A.M.I.ELEC.E., P.ENG.

TORONTO DIVISION  
27 CARLTON STREET

Reference: S-500/T-744  
S-500/T-745

4 July 1957.

A.M. Toye, Esq.,  
Bridge Engineer,  
Department of Highways of Ontario,  
280 Davenport Road,  
TORONTO, Ontario.

Attention: Mr. S. McCombie

RE: FOUNDATION INVESTIGATION FOR THE  
PROPOSED RAILWAY UNDERPASS ON THE  
ANCASTER BYPASS, DISTRICT NO. 4.  
RE: FOUNDATION INVESTIGATION FOR THE  
PROPOSED HIGHWAY BRIDGE AT MOHAWK  
ROAD, ANCASTER BYPASS, DISTRICT  
NO. 4, ONTARIO.

Dear Sirs:

Two reports are enclosed, describing the subsoil investigations carried out at the above sites.

It will be seen from the results and conclusions of the reports, that foundation conditions at the two sites are similar, with depths of seven to eighteen feet of granular deposits overlying bedrock of weathered shale and limestone, respectively.

The suggestion is made that the footings be founded on top of the bedrock, when bearing capacities of up to twenty five tons per square foot can be used. At the first site care must be taken to ensure that the upper layers of weathered shale are removed, if the design is based on such high values. Some drainage will probably be required in the excavations at both sites. If you have any queries regarding these reports, please do not hesitate to contact us.

Yours very truly,  
RACEY, MacCALLUM AND ASSOCIATES LIMITED

*Donald F. Scott*

R.F. Scott, P. Eng.  
Divisional Soils Engineer

RFS/MD

2 July 1957

FOUNDATION INVESTIGATION FOR  
THE PROPOSED RAILWAY UNDERPASS  
ON THE ANCASTER BYPASS,  
DISTRICT NO.4, ONTARIO.

3045-39
GEOGRAPHIC No.

LOCATION OF THE SITE AND SCOPE OF THE INVESTIGATION

This report covers the field investigation for the determination of the foundation conditions for the proposed railway underpass on the Ancaster Bypass, District 4, Ontario. The site plan is shown on enclosure no.1, together with the locations of the soil investigation boreholes.

DRILLING WORK AND SUBSOIL CONDITIONS

The drill arrived at the site on 23 May 1957, and the drilling of four holes and penetration tests was completed on 27 May 1957. In all four holes bedrock of Queenstone shale was encountered at depths varying between seven and thirteen feet, underlying loose sand and weathered shale.

RESULTS AND CONCLUSIONS

Engineering data sheets, showing the penetration profiles, form the enclosures given at the end of this report. Water level measurements taken after the completion of the job, indicate that the water table is between one and four feet below the surface.

There should be no foundation problems if the underpass structure is founded directly upon the shale bedrock which, in a sound condition, will give bearing capacities of up to twenty five tons per square foot. However, an inspection of the excavation should be made, to ensure that the layer of weathered shale overlying sound bedrock has been removed. This layer of weathered shale is about two feet thick.

Some drainage will probably be required during excavation, to take care of the water at the level encountered after completion of the boreholes.

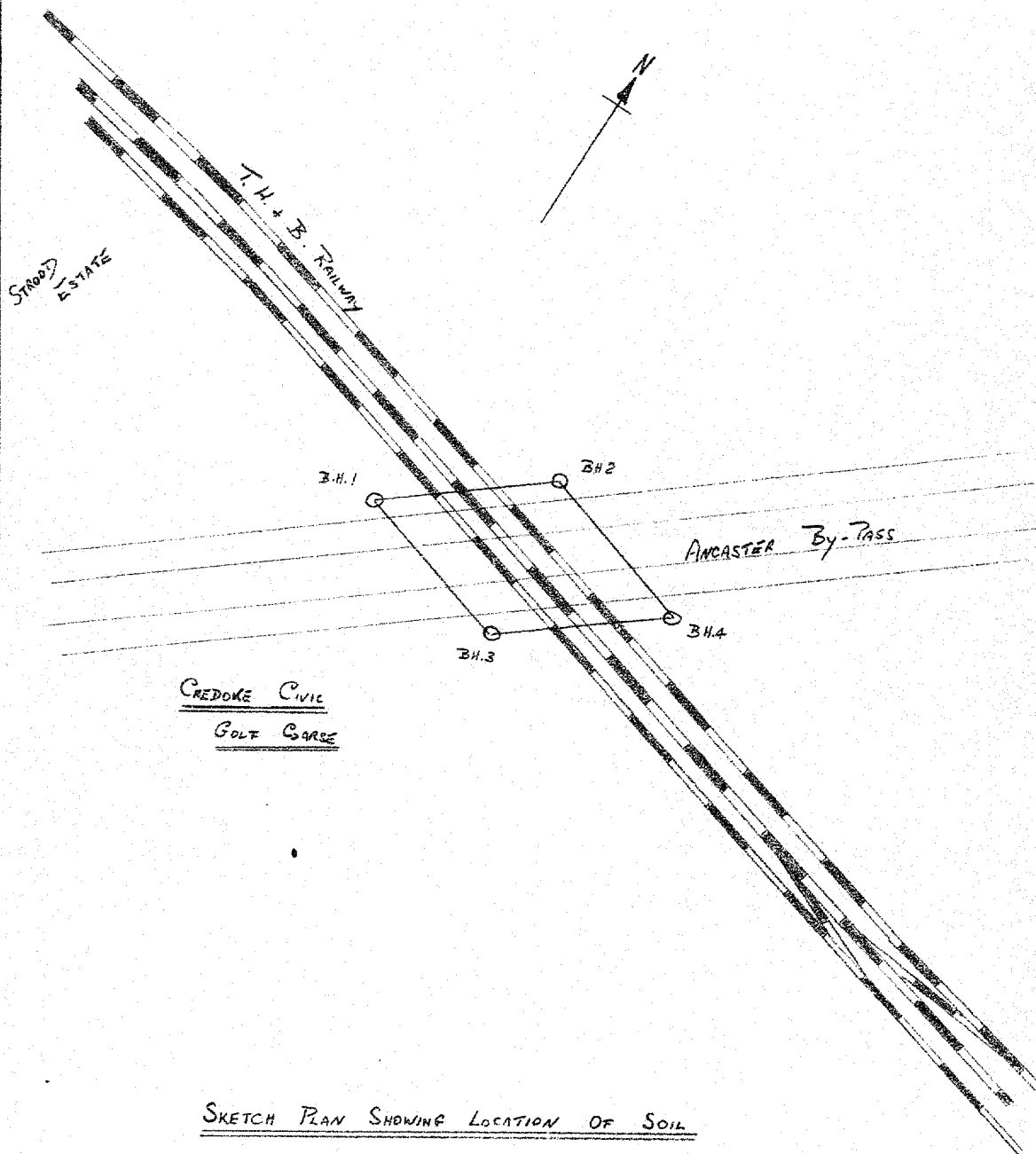


J.J. Schoustra

JJS/ED

In quadruplicate

Prep. By P.M.



SKETCH PLAN SHOWING LOCATION OF SOIL

INVESTIGATION BOREHOLES FOR THE PROPOSED

T.H. + B RAILWAY UNDERPASS ON THE ANCASTER

By-Pass ANCASTER ONTARIO

Hole Begun \_\_\_\_\_

Foundation Engineering Division

Hole Ended \_\_\_\_\_ Engineering Data Sheet for Borehole: 1

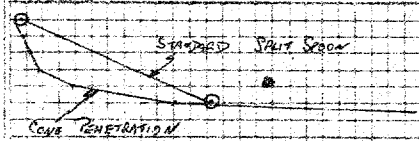
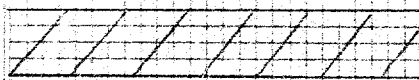
Job Name: Foundation Investigation For Railway Underpass

Job Located: Ancaster By-Pass Ontario

Hole Located: See Enclosure No.1

Hole Elevation: 324.5 Datum: M.S.L.

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_

DEPTH	EL.	THICK- NESS	SYMBOL	DESCRIPTION	Penetration Resistance					SAMPLING METHOD
					TABULAR VALUES					
					20	40	60	80	100	
0	324.5			Ground Surface						SS1
6	318.5			Brown medium sand with gravel						SS2
11	313.5			Weathered shale and limestone						
15	309.5			Red shale and limestone						

Hole Begun \_\_\_\_\_

Foundation Engineering Division

Hole Ended \_\_\_\_\_

Engineering Data Sheet for Borehole: 2

Job Name: Foundation Investigation For Railway Underpass

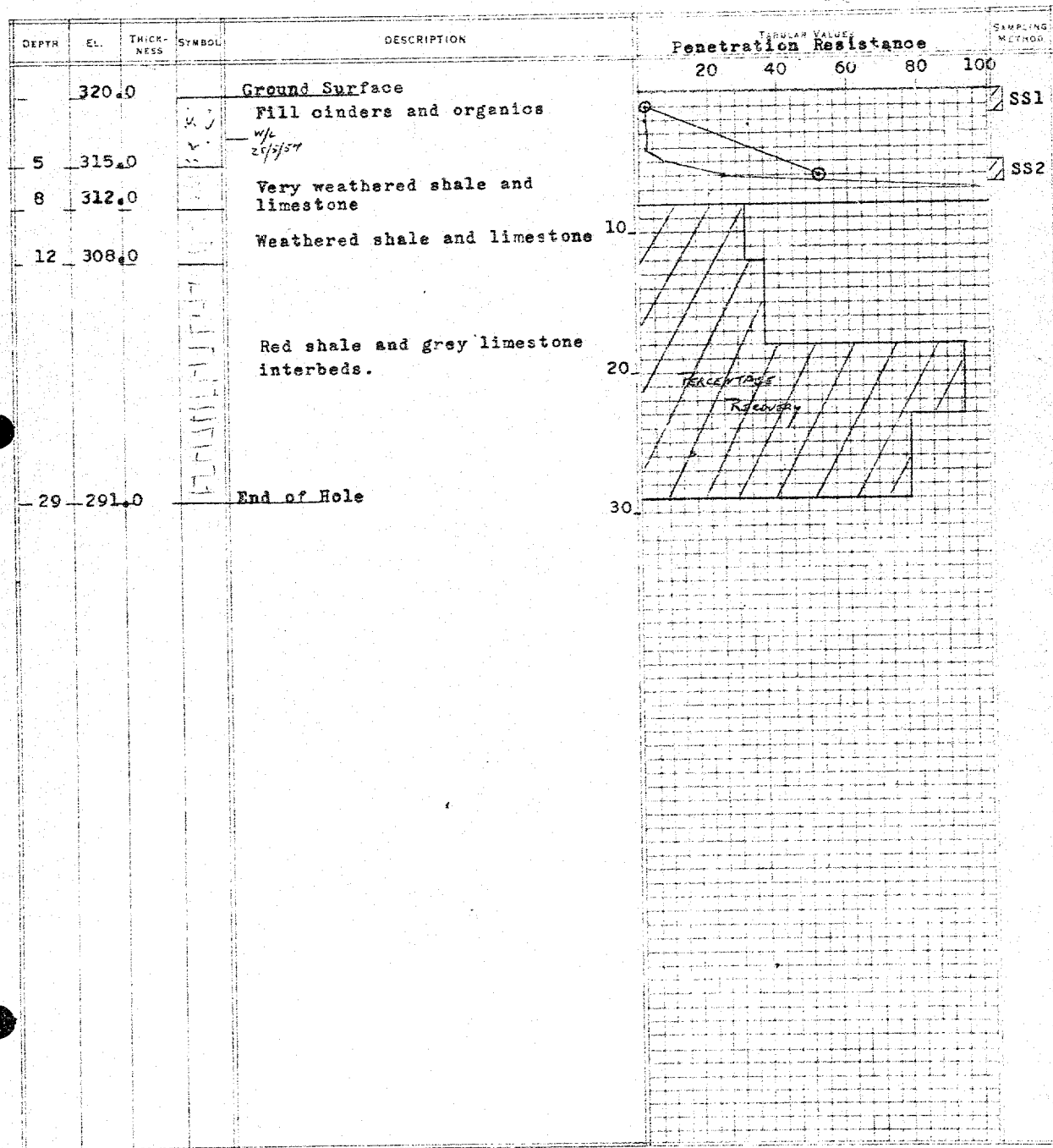
Job Located: Ancaster By-Pass Ontario

Hole Located: See Enclosure No. 1

Hole Elevation: 320.0 Datum: M.S.L.

Checked by \_\_\_\_\_

Day Month Year



Order No.: S/500/T-745 RACEY, MACCALLUM AND ASSOCIATES

LIMITED

Printer

Hole Begun \_\_\_\_\_

Foundation Engineering Division

Hole Ended \_\_\_\_\_ Engineering Data Sheet for Borehole: 3

Revised

Job Name: Foundation Investigation For Railway Underpass

Checked by \_\_\_\_\_

Job Located: Ancaster By-Pass OntarioHole Located: See Enclosure No. 1Hole Elevation: 327.0 Datum: M.S.L.

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_

DEPTH	EL.	THICK- NESS	SYMBOL	DESCRIPTION	Penetration Resistance	SAMPLING METHOD
					TABULAR VALUES 20 40 60 80 100	
0	327.0			Ground Surface		
3	324.0			Soft brown clayey organic topsoil		SS1
5	322.0			Loose brown sand		
11	216.0			Very stiff greyish brown clay with silt and sand partings		SS2 TW3
				Weathered shale		SS4
				Slightly weathered shale and limestone		
30				End of Hole		



Order No.: S/500/T-745 RACEY, MacCALLUM AND ASSOCIATES

LIMITED

Hole Begun \_\_\_\_\_

Foundation Engineering Division

Hole Ended \_\_\_\_\_

Engineering Data Sheet for Borehole: 4

Job Name: Foundation Investigation For Railway Underpass

Job Located: Ancaster By-pass Ontario

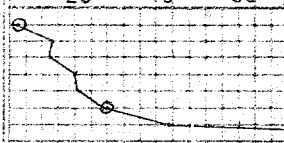
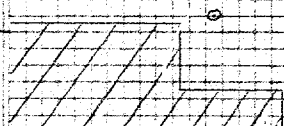
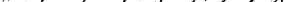
Hole Located: See Enclosure No. 1

Hole Elevation: 325.4 Datum: M.S.L.

P.M.

Checked by \_\_\_\_\_

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_

DEPTH	EL.	THICK- NESS	SYMBOL	DESCRIPTION	Penetration Resistance					SAMPLING METHOD
					TABULAR VALUES					
					20 40 60 80 100					
0	325.4			Ground Surface						SS1
				Black dirt fill cinders and organics						
4	321.4			Medium dense brown sandy clay with some gravel & weathered shale						SS2
8	317.4			Slightly weathered red shale and limestone interbeds						SS3
16	309.4			End of Hole						

#59-F-109

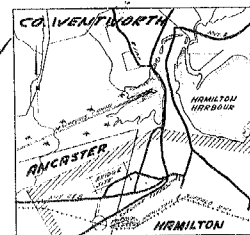
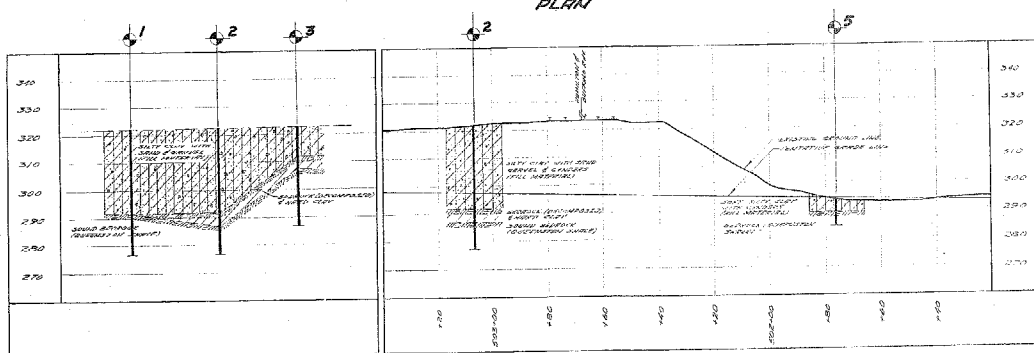
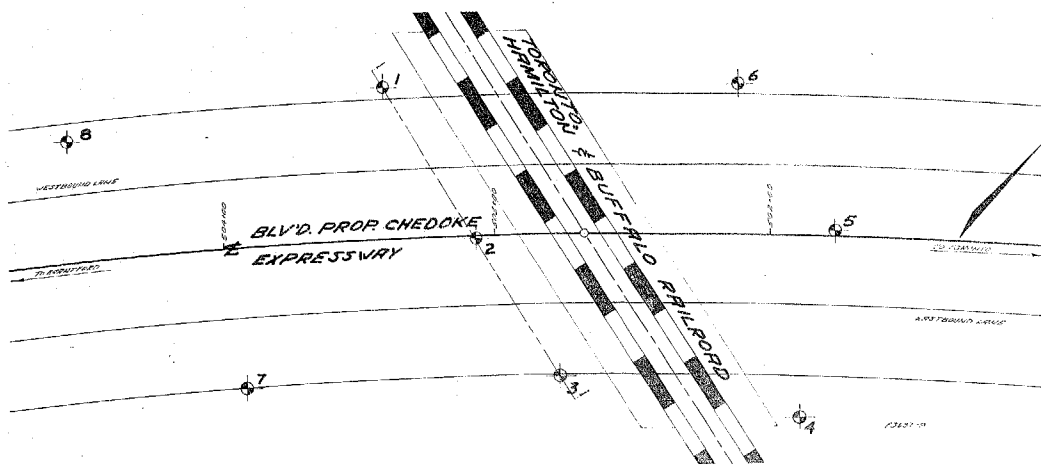
W.P. #101-57

CHEDOKE

EXPRESSWAY

ET. H. & B.

RWY.



LEGEND			
BOND HOUSE			
FEDERAL BUREAU OF INVESTIGATION			
UNITED STATES DEPARTMENT OF JUSTICE			
10000	2000000000	3000000000	4000000000
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90	1000000000	2000000000	3000000000
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[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
STATION 1, 1.7, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837