

Files.

July 30th, 1962.

Hwy. #10, Contract #62-115,

Materials & Research.

Stream diversion-Port Credit.

At the request of the Toronto District, the excavation for the creek diversion near Hwy. #10 at Port Credit was visited on Saturday, July 28th, 1962 to appraise seepage conditions on the side slopes. The visit was made in company with Mr. M. Devata of the Foundation Section who conducted the original site investigation in January 1960.

The excavation had progressed from station 25/00 to station 19/00. The fluted grey dense till is overlain by a layer of varved grey dense silt which has a near horizontal surface. Over the grey silt there is a 5'-6' thick deposit of yellow brown fine sandy silt with irregular seams of sandy clay. For approx. 50% of the excavation the grey silt is absent and the brown sandy silt rests immediately on the till.

The grey silt and the grey till are relatively impervious when compared with the brown sandy silt. After the heavy rains from July 23rd to July 26th, seepage and washouts occurred in the  $1\frac{1}{2}$  - 1 side slopes of the excavation, mainly in the bottom part of the brown sandy silt where it overlies the more impervious materials. Except for light signs of previous seepage between station 24 and station 25, only localized seepage was observed in the grey silt; there is no seepage from the till.

It was therefore recommended to intercept seepage water at the contact elevation of the brown sandy silt and the dense grey silt with a ditch and bench the excavation slope. At intervals the water from this ditch should be drained to the diversion channel.

.../2

No changes in the design of the concrete liner of the bottom portion of the diversion are required other than to provide for 4" steel drainage pipes every other section near the bottom of the liner to relieve hydrostatic pressure caused by seepage water in back of the liner. The 6" G.B.C. "B" under the liner in the design is considered adequate for the conditions encountered.

NB. Only light seepage at the contact between brown silty sand and grey silt was observed in the excavation between station 20 and station 19 which was excavated on Friday, July 27th, (last rain on Thursday morning).



P. Arkema,  
Project Soils Engineer.

PA/hl

*Shovel Files 10A-4*

Mr. D. G. Ramsay,

February 19, 1960.

Road Design Engineer.

D.H.O. FOUNDATION INVESTIGATION

Materials & Research Section.

W.J. F-59-124.

Attention: Mr. H. D. McMillan.

Re: Proposed Creek Diversion at Port Credit  
Hwy. #10 -- Dist. #6.

At the request of Giffels & Vallat, Ltd., Consulting Engineers, a detailed foundation investigation has been carried out at the above site.

For your convenience, the conclusions of the report are repeated below:-

1. The site is generally underlain by a dense, glacial till. This glacial till is covered with a thin layer of fine sand.
2. The subsoil is such that excavations may be carried out at the proposed side slopes of 1 1/2 horizontal to 1 vertical. Seepage water entering these excavations should be of minor quantities.
3. Support for the proposed culverts may be obtained from spread footings founded at the elevations suggested in the report. The subsoil is such that an allowable bearing pressure of 3 T/ft.<sup>2</sup> may be used in the design of these spread footings.
4. A 6" layer of G.B.C. 'B' should be placed in the area of the proposed concrete-lined channel. This granular pad will provide a working mat for the base of the concrete channel, and also provide a good bearing surface for the proposed precast lining.

cont'd. /2 ...

Conclusions: (cont'd.) ...

5. If the concrete-lined channel does not extend above the water table, minor problems may arise. These problems will be associated with small movements of the side slope material.
6. The excavated granular and till material may be used for embankment construction.

If further queries arise regarding the conclusions of this report, please contact the Foundation Section.

RF/ndef  
Attach.

L. G. Soderman,  
PRINCIPAL SOILS & FOUNDATIONS ENGR.

per:

*K. Peaker*

(K. Peaker,  
FOUNDATION FIELD SUPERVISING ENGR.)

cc: Memo. B. C. Mansay (3)  
H. A. Trogaskes  
I. Campbell  
C. Fraser  
P. F. Weber  
Giffels & Vallet, Ltd.  
Foundations Office,  
Gen. Files.

## SUBSOIL INVESTIGATION

for

Proposed Creek Diversion at Port Credit  
Hwy. #10, Dist. #6 -- W.J. F-59-124.

### INTRODUCTION:

This report presents the results of an investigation carried out to determine the subsoil conditions at the above mentioned site. The proposed creek runs parallel to the existing Hwy. #10 (on the West side) and then parallel to the C.N.R. tracks, until it joins with the Credit River. This work includes two culvert installations, one at the beginning of the creek diversion and the other at Stavebank Rd. where it crosses the proposed creek.

The field work was carried out on two separate occasions. The initial portion of this field work commenced on December 16th, 1959, and was completed on December 18th, 1959. Subsoil Investigation near Stavebank Rd. was carried on from January 27th to January 29th, 1960.

### FIELD INVESTIGATION:

The initial field work consisted of 6 sampled boreholes and dynamic cone penetration test, and was carried out by a trailer-mounted, continuous flight auger. The field work near Stavebank Road, consisting of 1 sampled borehole and two dynamic cone penetration tests, was carried out by a skid-mounted diamond drill. Conventional auger boring and wash boring procedures were followed, respectively. Samples were recovered at depths required by means of 2" O.D. split barrelled spoon sampler and 2" I.D. thin-walled Shelby sampler. The dimensions of the spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration Test. Samples were visually examined and classified at the site, and wax-sealed or placed in moisture proof containers. Upon receipt in the laboratory, samples were

cont'd. /2 ...

FIELD INVESTIGATION: (cont'd.) ...

visually examined and identified. Routine index tests were performed on selected representative samples. The detailed results of our field and laboratory findings are presented in the borehole logs and summarized in Table No. 1. The location of borings and cone tests, as well as their subsoil stratigraphy, are shown in the accompanying Drawing No. F-59-124-A.

SUBSOIL CONDITIONS:

This can be sub-divided into three parts, as follows:-

- a) Culvert at approx. Sta. 1+50.
- b) Creek Diversion.
- c) Culvert at Stavebank Road.

a) Culvert at Sta. 1+50 -

It is understood that the above culvert will be located under the new service road, North-West of Oriole Avenue. During the time of the investigation, two sampled boreholes (B.H. #1 & #2) were carried out at the above mentioned location.

In general, the subsoil at the above site is composed of a dense, glacial till stratum overlying probably shale bedrock. In Boring #1, the subsoil consists of a layer of granular fill material overlying a stratum of silty sand, underlain by dense, glacial till of silty clay to silty sand with gravel. Similar subsoil conditions were encountered in Boring #2, except the overlying material is of medium brown, sandy clay. The upper portion of sand to sandy clay strata has been subjected to oxidation, resulting in its present brownish colour. Below the oxidized zone, the colour is predominantly grey. The representative index properties of the till and the overlying material are as follows:-

cont'd. /3 ...

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

a) Culvert at Sta. 1+50 - (cont'd.) ...

i) Silty Sand:

Natural Unit Weight = 120 p.c.f.  
Moisture Content = 20% - 30%  
N Value (average) = 16.

ii) Glacial Till of Silty Clay to Silty Sand with Gravel:

Natural Unit Weight = 145 p.c.f.  
Moisture Content = 5% - 11%.  
N Values = 49 - 101.

b) Creek Diversion:

In general, the proposed diversion is underlain by a stratum of dense, glacial till which is covered by a shallow layer of brown, silty sand to sand. The top layers have been subjected to oxidation and exhibit a predominantly brownish colour. Below the oxidized zone, the colour is generally grey-brown to grey.

i) Medium to Dense, Grey-brown Silty Sand:

The stratum of silty sand was encountered throughout from the surface to a depth of 8 to 15 ft. Samples obtained were subjected to routine laboratory tests and the following index values are considered representative:-

Medium Sand - Natural Unit Weight = 120 p.c.f.  
Moisture Content = 20% - 35%.  
N Value Range = 11 - 18.

Dense Sand - Natural Unit Weight = 140 p.c.f.  
Moisture Content = 10% - 20%.  
N Value Range = 31 - 54.

cont'd. /4 ...

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

b) Creek Diversion: (cont'd.) ...

ii) Dense Glacial Till:

The dense glacial till is composed of grey silty clay with fine gravel to sand with gravel. This was encountered in each of the sampled boreholes at approximately elevations - 269.0' to 251.0'. In general, the content of gravel, as well as the penetration resistance increases with depth. The representative index properties of till are as follows:-

Natural Unit Weight	=	145 p.c.f.
Moisture Content	=	8% - 12%.
N Value (Average)	=	50.

The subsoil conditions encountered in B.H. 1, 2, 6, 7 & 8, were described under "Culvert Locations".

c) Culvert at Stavebank Road:

Two sampled borings with dynamic cone penetration tests adjacent to these borings (B.H. 6 & 7) and also, a separate dynamic cone penetration test revealed the following subsoil conditions:-

In general, the subsoil at the site is composed of medium to dense glacial till overlying shale and limestone bedrock.

Medium to dense sand was encountered in this vicinity except for a thin layer of 2 to 3 ft. of sandy topsoil in Boring #7. The colour changes from brown at the top, to grey at the bottom, indicating that the top layers were subjected to oxidation. Underlying the sand stratum, a shallow layer of medium clay silt in Boring #7 and a layer of medium to dense sandy silt in Boring #6, was encountered. Following this strata, a medium to dense layer of glacial till consisting of grey silty clay to sand with gravel was found.

cont'd. /5 ...



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

c) Culvert at Stavebank Road: (cont'd.) ...

Underneath the dense glacial till, the bedrock was encountered at approximately elevation 235.0'. In Boring #7, bedrock was drilled and proved as grey limestone with interbedded layers of grey shale. Bedrock has not been proven in Boring #6, since the auger was not equipped to take rock core samples.

GROUND WATER OBSERVATIONS:

Field observations and measurements carried out during the exploration programme, indicate that the ground water level was at approximately Elev. 269.0 to 271.0' in the vicinity of B.H. #1 to #4.

In Boring #1, a thin layer of water-bearing sand was encountered at Elev. 262.0'.

In Borings #5, 6 & 7 (near the culvert location at Stavebank Rd.) the ground water level was at approximately Elev. 260.0' to 263.0'.

During the boring operation, seepage inflow into the boreholes from the upper sand layers was observed in Borings #1, 2, 3 & 5. The observed water level in Borings #6 & 7 was slightly higher than the water level in the creek which was at Elev. 253.0'.

Based on the borehole observations, the seepage water during construction, over the entire site, should be of minor quantity, and readily handled by low-capacity pumps.

FOUNDATION CONSIDERATIONS:

a) Culvert at approximately Sta. 1+50:

The dense till stratum is competent to provide adequate foundation support for the proposed culvert. According to the available information and from the Borings #1 & 2, it is understood that the invert elevation of the proposed creek diversion will be within the dense till stratum.

cont'd. /6 ...

FOUNDATION CONSIDERATIONS: (cont'd.) ...

a) Culvert at approximately Sta. 1+50 - (cont'd.) ...

Strength and compressibility characteristics are such that spread footing support can be obtained in the dense till stratum at invert elevation or below. At this elevation or below, an allowable bearing pressure of 3 t.s.f. can be used for footing design. Little settlement of any consequence, need be anticipated.

b) Creek Diversion:

Giffels & Vallet, Consulting Engineers who are the designers for the complete project, indicate that the proposed channel will be concrete-lined.

From the beginning of the creek diversion to approximately Sta. 21+50, the proposed channel will be in cut sections. No excavation problems are anticipated except that of seepage from the top layers of sand. A thin layer of organic matter was encountered in Boring #5 at Elev. 264.0' and above. It is understood that the invert elevation of the proposed creek diversion will be within this material. Excavation shall be carried below the organic material in the vicinity of Sta. 15+00 to Sta. 18+00, and shall be backfilled to the required grade with suitable material.

At Sta. 21+50 to Sta. 31+50, all topsoil shall be removed and also any organic material encountered below the topsoil shall be excavated prior to placing the embankment fill. In order to prevent local softening of dense layers of material at the foundation level during construction, a bedding of granular material will be required for the concrete-lined channel. Therefore, a 6" layer of G.B.C. class 'B' should be placed in the area of the concrete-lined channel. This granular pad will provide a working mat for the base of the concrete channel, and also provide a good bearing surface for the precast lining.

The excavated material from Sta. 1+00 to Sta. 15+00 can be used for embankment construction.

cont'd. /7 ...

FOUNDATION CONSIDERATIONS: ( cont'd.) ...

c) Culvert Under Stavebank Road:

The foundation consideration will be identical to that of the culvert at Sta. 1+50. It can be seen from the accompanying drawing that the dense glacial till was encountered about 4 to 5 feet below the invert of the proposed creek diversion. Spread footing support can be obtained in the till material at elevation 246.0' or below. A safe allowable bearing pressure of 3 t.s.f. can be used for footing design. Settlements consequent upon application of the footing pressure will be within tolerable limits.

CONCLUSIONS & RECOMMENDATIONS:

1. In general, the subsoil consists of a layer of glacial till to bedrock. The glacial till is overlying a stratum of fine silty sand.
2. Strength and compressibility characteristics are such that spread footings for the proposed culverts can be founded at elevations suggested in the report. At these elevations bearing pressure of 3.t.s.f. can be used for footing design. Settlements are considered negligible.
3. Ground water seepage inflow during footing excavation and channel excavation for the creek will be local and can be readily handled by low-capacity pumps. Shoring operations appear to be necessary during construction. In Boring #1 a water bearing sand seam was encountered at Elev. 262.0', but in view of the fact that this condition was not observed throughout, it is believed to be a localized condition. When the channel liner is below ground water level, seepage can be anticipated from the top layers of sand into the channel. This seepage may cause minor localized problems in the stability of side slopes of the proposed channel.

CONCLUSIONS & RECOMMENDATIONS: (cont'd.) ...

4. All topsoil shall be removed prior to placing any fill material.
5. Organic matter encountered in the vicinity of Sta. 16+50 shall be excavated and backfilled with suitable material.
6. A granular pad of 6" G.B.C. class 'B' shall be required underneath the concrete-lined channel and also the precast concrete-lined side slopes of the channel.
7. All the excavated granular and till material can be used for embankment construction.

*M. Devata*  
M. Devata,  
PROJECT FOUNDATION ENGR.

APPENDIX I.

## SUMMARY OF FIELD &amp; LABORATORY TESTS

JOB F 59-124

W.P. 101-58

WELL 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
1	T1	3'-4.5'	Grey silty fine sand with clay	P	33.2	--	--	--	--	
	S2	6'-7.5'	Dense glacial till of grey silty clay with fine gravel	49	11.9	--	--	--	138.2	
	S3	10'-11'	Dense glacial till of grey silty fine sand	85	8.4	--	--	--	--	
	S4	15'-16.5'	Dense glacial till of grey fine to med. sand with fine gravel	51	8.3	--	--	--	--	
	S5	20'-21.5'	Dense glacial till of grey med. to coarse sand with fine gravel	99	10.8	--	--	--	--	
	S6	25'-26.5'	Dense glacial till of grey fine to coarse sand with fine gravel	65	8.9	--	--	--	--	
2	S1	3'-4.5'	Med. grey brown sandy clay with fine gravel	16	22.6	--	--	--	122.2	
	S2	6'-7.5'	Dense glacial till of grey brown silty clay	71	11.0	--	--	--	--	
	S3	10'-11.5'	Dense glacial till of grey silty clay with fine gravel	78	9.3	--	--	--	--	
	S4	15'-16'	Dense glacial till of grey clayey silt with fine gravel	101	8.2	--	--	--	--	
	S5	20'-20.5'	Dense glacial till of grey sand and gravel	66-6"	5.3	--	--	--	--	
3	S1	3'-4.5'	Dense oxidized brown silty sand with clay	42	16.1	--	--	--	--	
	S2	6'-7.5'	Dense grey fine sand	54	13.7	--	--	--	122.0	
	S3	10'-11.5'	Dense glacial till of grey silty clay with sand and fine gravel	57	9.0	--	--	--	145.0	

# SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-124

W.P. 101 - 58

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENETN RESIST. BLOWS/FT	MOIST CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH PSI	UNIT WEIGHT PCF	REMARKS
3	S4	15'-16.5'	Dense glacial till of grey silty clay with sand and fine gravel	50	9.7	--	--	--	150.0	
4	S1	3'-4.5'	Dense brown silty fine sand	31	20.5	--	--	--	--	
	S2	6'-7.5'	Dense grey brown silty fine sand with a seam of brown sandy clay	42	16.6	--	--	--	--	
	S3	10'-11.5'	Med. brown silty sand	18	19.5	--	--	--	--	
	S4	15'-16.5'	Dense glacial till of grey silty clay with sand and fine gravel	49	9.7	--	--	--	--	
5	S1	3'-4.5'	Med. brown silty sand (fill material)	11	42.0	--	--	--	--	
	S2	6'-7.5'	Med. brown Med. sand	13	21.0	--	--	--	--	
	S3	10'-11.5'	Dense grey fine sand with silt	50	13.2	--	--	--	141.0	
	S4	15'-16.5'	Dense glacial till of grey silty clay	47	8.6	--	--	--	143.8	
6	S1	5'-6.5'	Dense grey sandy silt with clay	32	15.6	--	--	--	139.2	
	S2	10'-11.5'	Dense grey sandy silt	30	18.9	--	--	--	--	
	S3	15'-16.5'	Medium glacial till of grey silty clay	20	15.5	--	--	--	--	
	S4	20'-21.5'	Dense glacial till of grey sandy clay	38	11.4	--	--	--	148.2	
	S5	25'-26'	Dense glacial till of grey sandy clay with fine gravel	83	7.0	--	--	--	--	
	S6	30'-30.3'	Layer of grey shale	72-3"	--	--	--	--	--	

# SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-124

W.P. 101 - 58

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
7	S1	2.5'-4'	Loose brown sand mixed with topsoil	3	20.9	--	--	--	--	
	S2	5'-6.5'	Medium light brown fine sand	22	18.6	--	--	--	--	
	S3	7.5'-9'	Dense grey brown fine sand	59	15.6	--	--	--	--	
	S4	10'-11.5'	Dense grey brown sand and grey clayey silt	38	17.1	--	--	--	129.0	
	S5	13.5'-15'	Medium grey clayey silt changing to grey sandy clay	8	17.0	15.5	27.7	--	--	
	T6	15'-16.5'	Stiff grey sandy clay	12-9"	12.9	14.7	19.9	--	145.0	
	S7	20'-21.5'	Dense glacial till of grey sandy clay with silt and fine to med. gravel	71	11.0	--	--	--	--	
	S8	25'-25.2'	No recovery	28-2"	--	--	--	--	--	Probably saturated sand and gravel
	RC9	28.8'-32.8'	Grey limestone with interbedded layers of grey shale	--	--	--	--	--	--	
8										Cone only
9	-	5.0 - 10.0	Grey brown fine sand							
		10.0-12.0	Grey silty clay till							hand auger hole
			S denotes split spoon sample T denotes shelby tube sample							



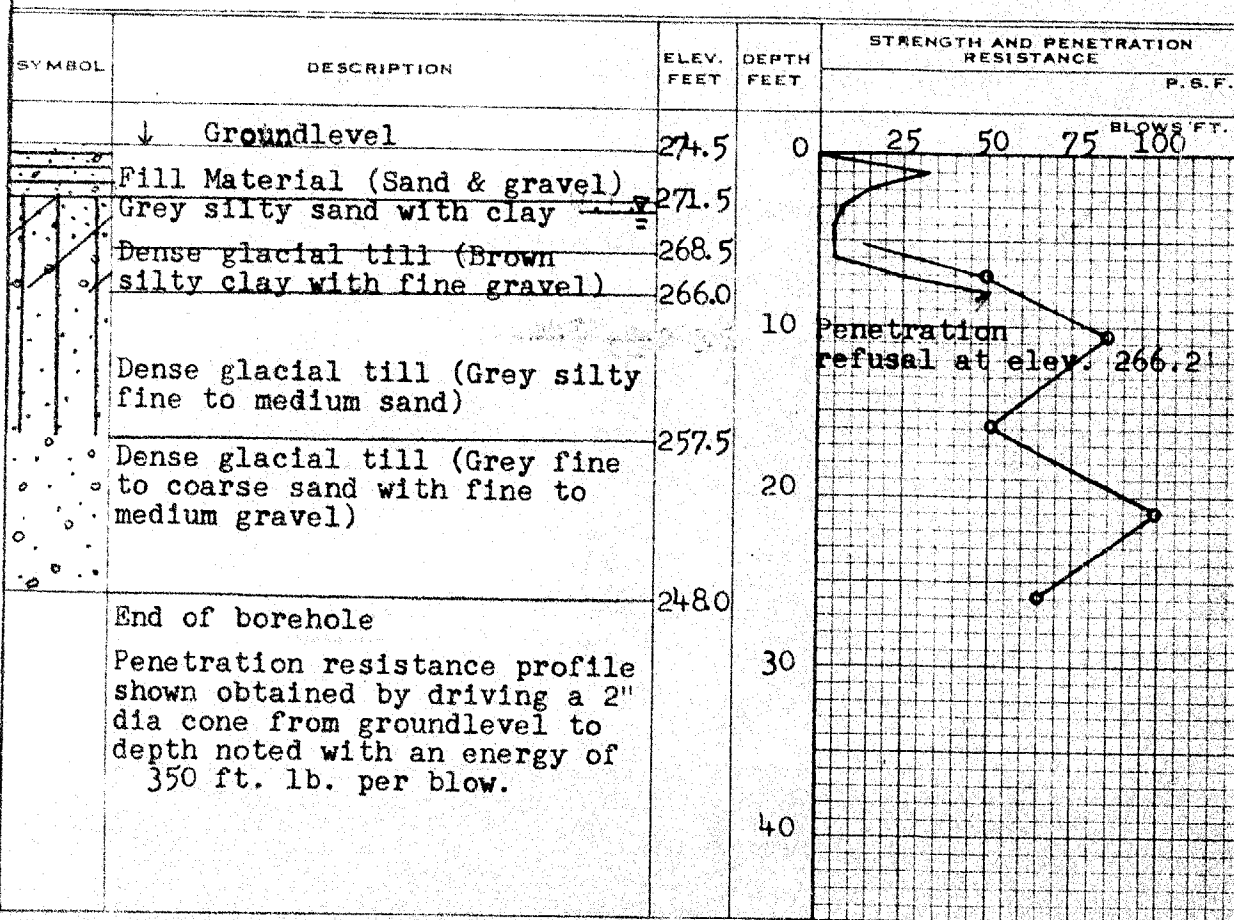
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 1  
JOB F 59-124 STATION 1 + 20 E  
DATUM 274.5' COMPILED BY B.K.  
BORING DATE Dec. 15/59 CHECKED BY MD & AL

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.			
10 20 30			
		T 1	-
		S 2	138.2
		S 3	-
		S 4	-
		S 5	-
		S 6	-

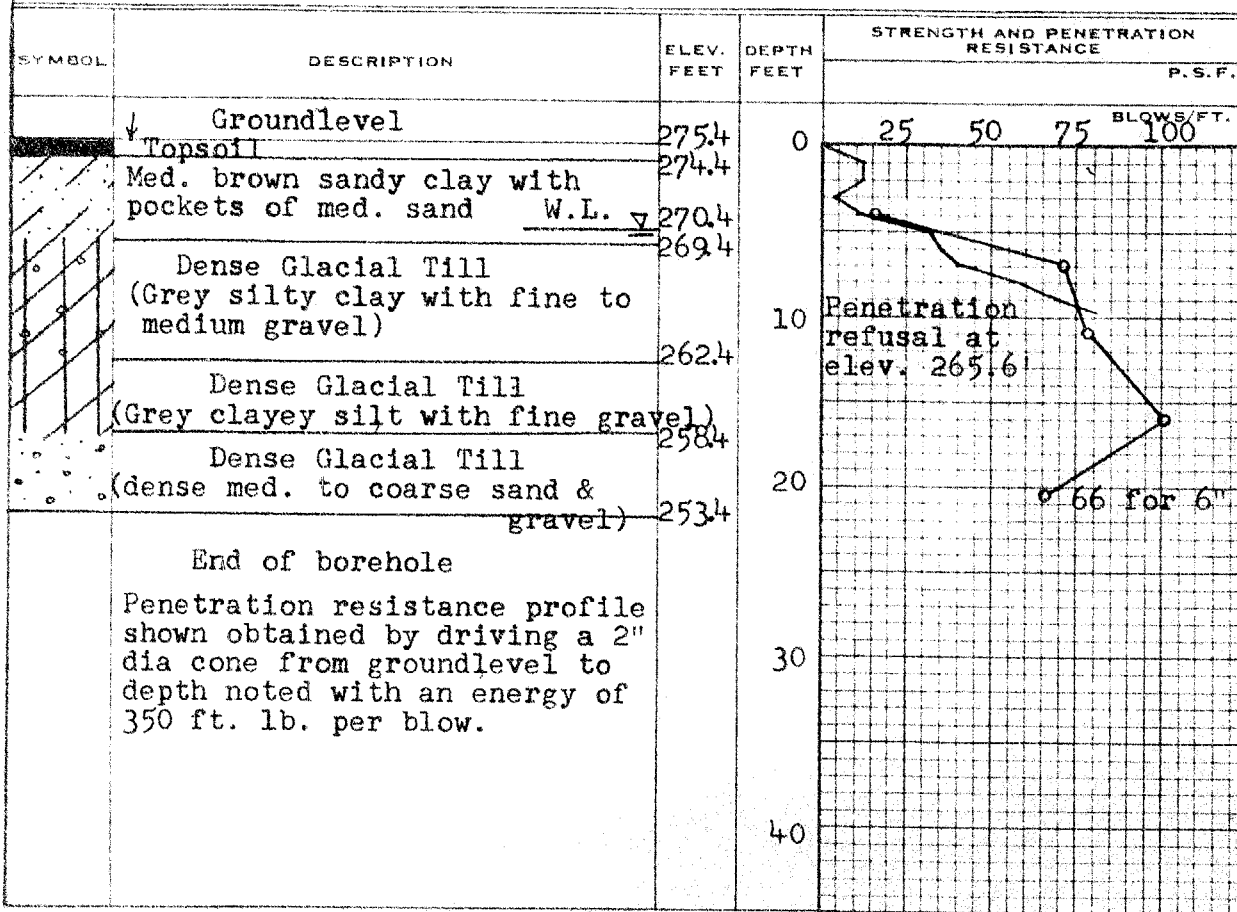
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 101-58 ----- BORE HOLE NO. 2 -----  
 JOB F 59-124 ----- STATION 1 + 90 E -----  
 DATUM 275.4' ----- COMPILED BY B.K. -----  
 BORING DATE Dec. 16/59 CHECKED BY M.D. & 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) ----- +S  
 NATURAL MOISTURE AND LIQUIDITY INDEX ----- X  
 LIQUID LIMIT -----  
 PLASTIC LIMIT -----



CONSISTENCY		SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.			
10 20 30			
		S 1	122.2
		S 2	-
		S 3	-
		S 4	-
		S 5	-

# DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 3  
 JOB F 59-124 STATION 6 + 50 ±  
 DATUM 276.6 COMPILED BY B.K.  
 BORING DATE Dec. 17/59 CHECKED BY M.D. & A.L.

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

### LEGEND

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

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	BLOWS/FT.
	↓ Topsoil	276.6	0		25 50 75 100
	Med. to Dense silty fine to med. sand with clay	275.6			
	Dense grey fine sand	271.6			
	Dense Glacial Till	268.6			
	(Grey silty clay with gravel and pockets of fine sand)		10		
		260.1			
	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.		20		
			30		
			40		

CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.				
10	20	30		
	x		S 1	-
	x		S 2	122.0
x			S 3	145.0
x			S 4	150.0

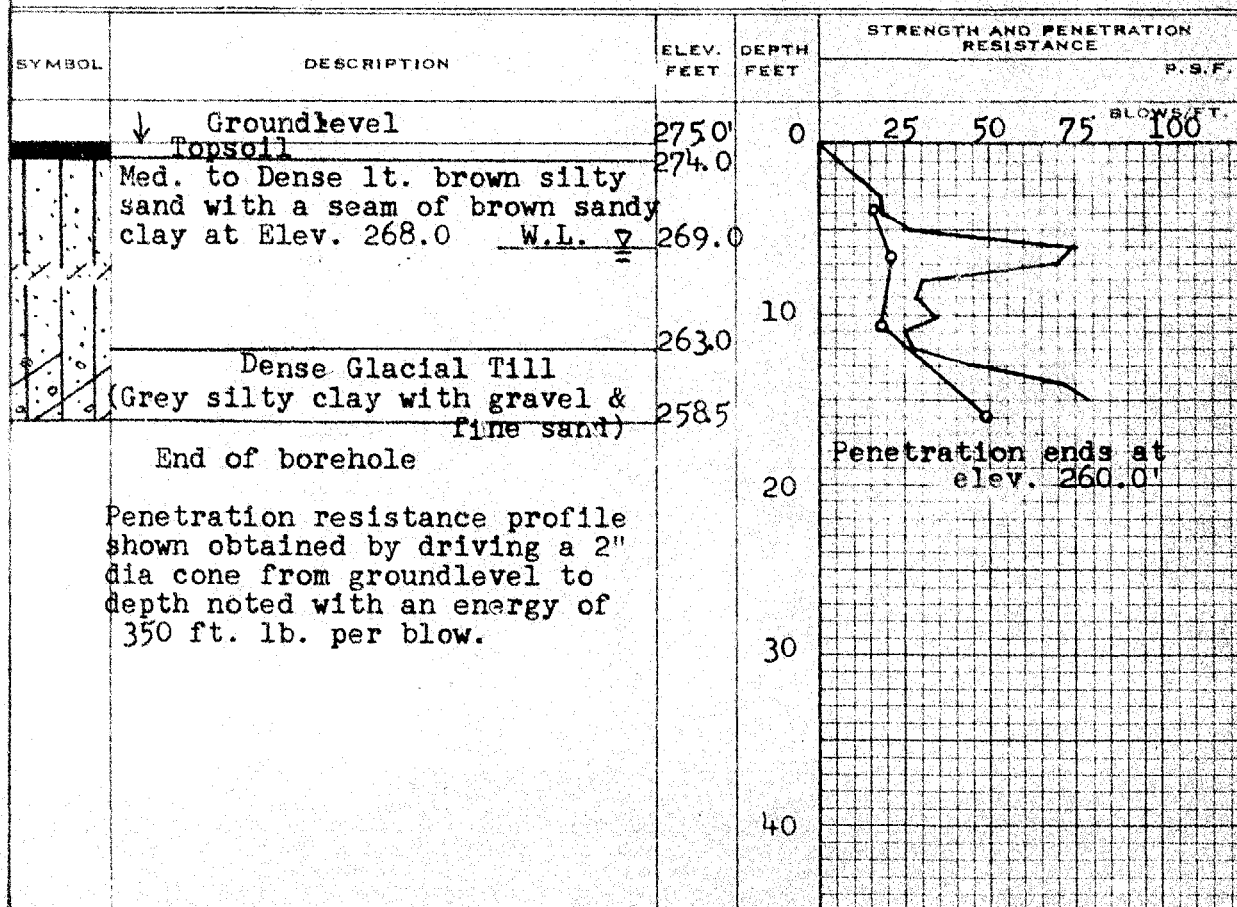
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 4  
 JOB F 59-124 STATION 11 + 50 E  
 DATUM 275.0' COMPILED BY B.K.  
 BORING DATE Dec. 17/59 CHECKED BY M.D. & 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. 10 20 30		
	S 1	-
	S 2	-
	S 3	-
	S 4	-

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 101-58 \_\_\_\_\_ BORE HOLE NO. 5 \_\_\_\_\_  
 JOB F 59-124 \_\_\_\_\_ STATION 16 + 50 ft \_\_\_\_\_  
 DATUM 269.8' \_\_\_\_\_ COMPILED BY B.K. \_\_\_\_\_  
 BORING DATE Dec. 18/59 \_\_\_\_\_ CHECKED BY M.D. & 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	L
LIQUIDITY INDEX -----	X
LIQUID LIMIT -----	—
PLASTIC LIMIT -----	—

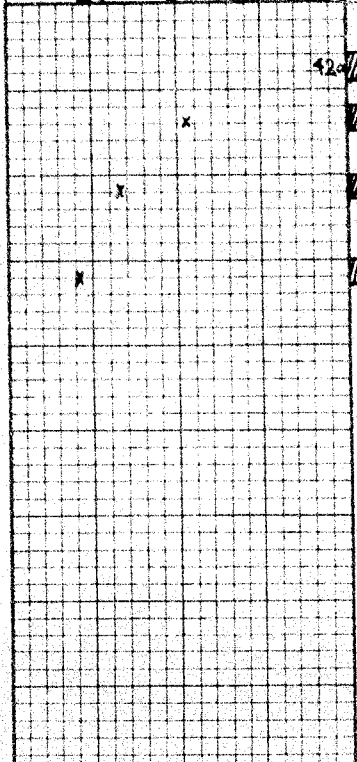
SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	
	Groundlevel	269.8	0		
	Topsoil	268.8			
	Fill Material (Med. brown fine sand)	265.8			
	Med. br. silty sand mixed with organic matter above Elev. W.L.	262.8			
	264	261.8			
	Dense grey fine sand with silt	257.8			
	Dense Glacial Till (Grey silty clay with fine gravel)	253.3			
	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.

BLAWS/FT.

Penetration ends at elev. 258.8'

CONSISTENCY		SAMPLE	NATURAL	
MOIST. CONTENT - % DRY WT.			UNIT WT. P.C.F.	
10	20	30		
			S 1	-
			S 2	-
			S 3	141.0
			S 4	143.8

# DEPARTMENT OF HIGHWAYS - ONTARIO

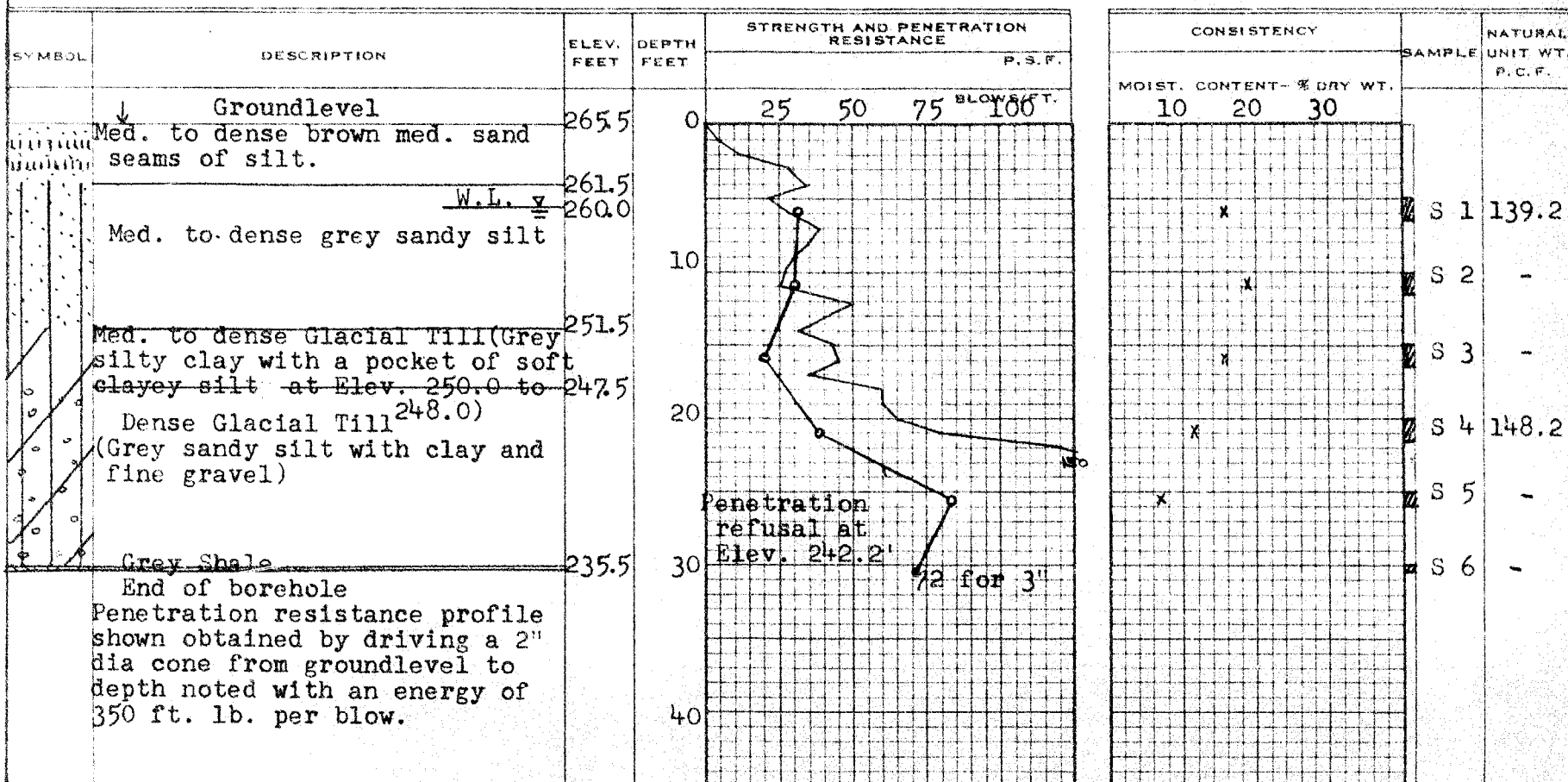
## MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 6  
 JOB F 59-124 STATION 26 + 15 (40 RT. &)  
 DATUM 265.5 COMPILED BY B.K.  
 BORING DATE Dec. 18/59 CHECKED BY M.D. & 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





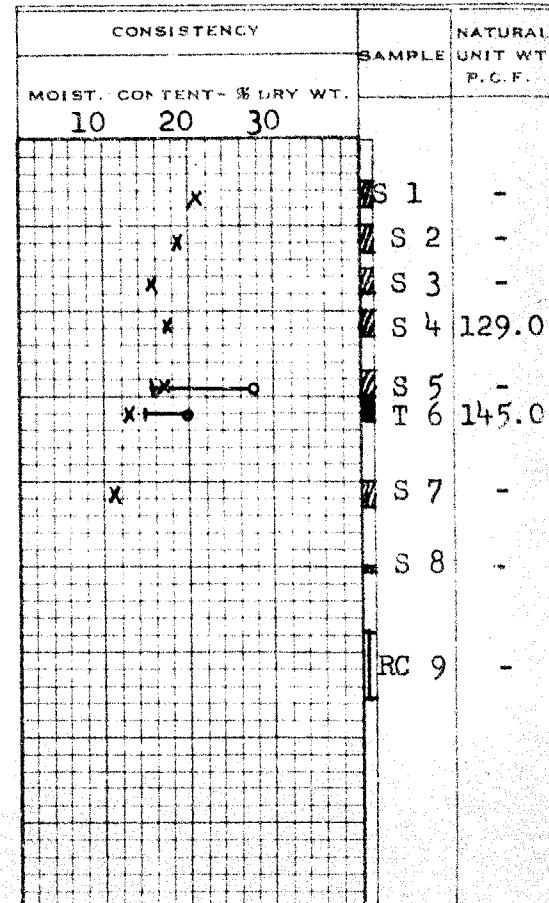
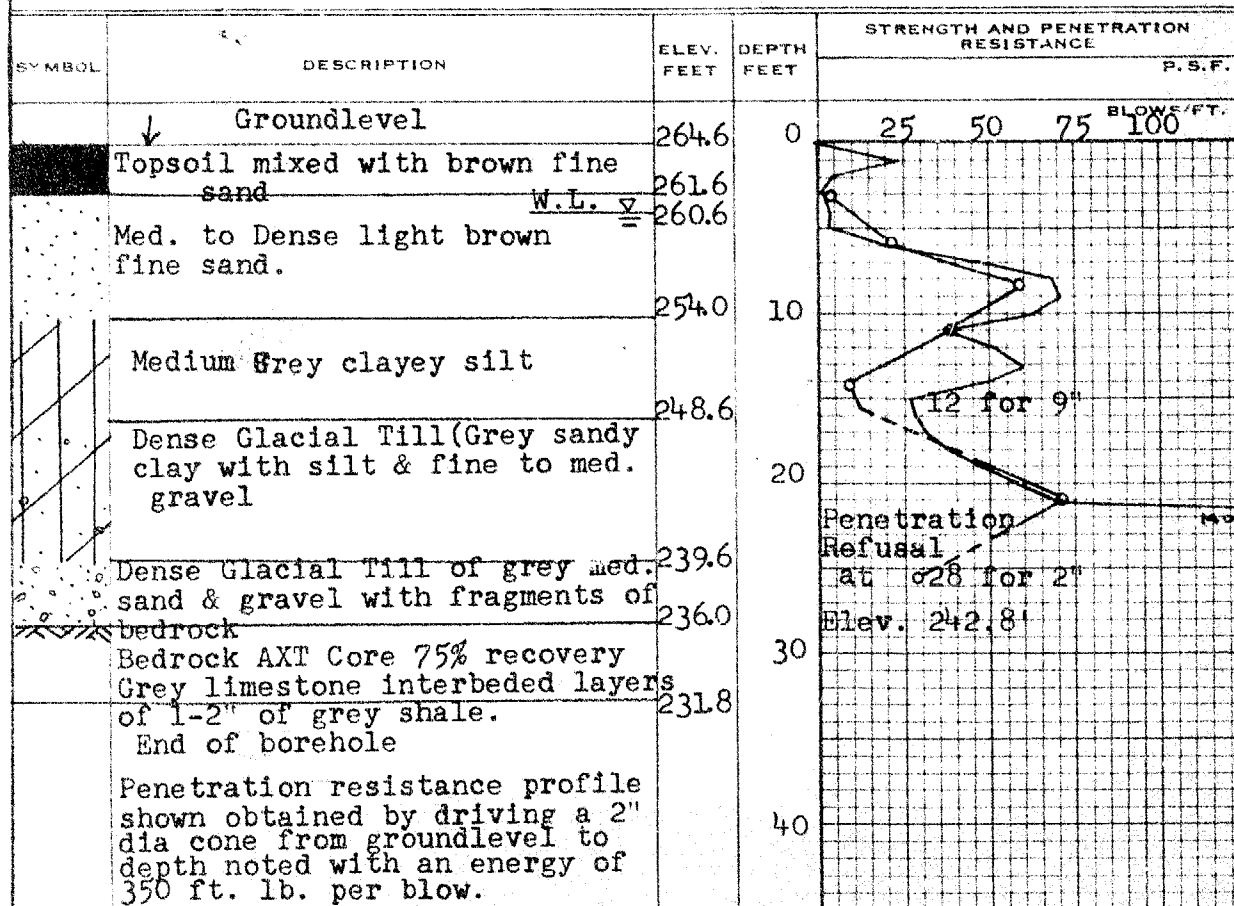
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 7  
JOB F 59-124 STATION 27+18 (10' LT. of)  
DATUM 264.6' COMPILED BY B.K.  
BORING DATE Jan. 27/60 CHECKED BY M.D. & 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 O  
PLASTIC LIMIT T



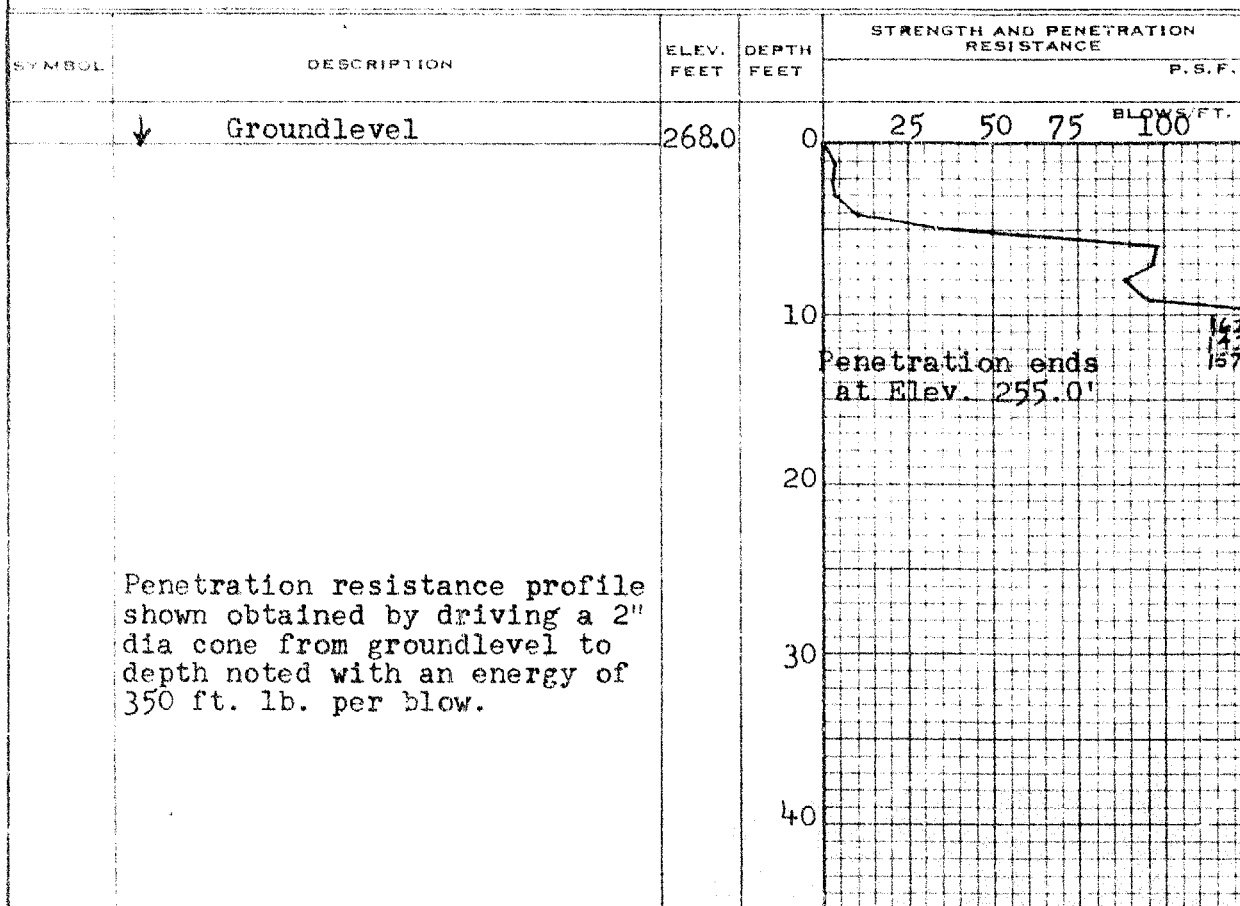
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 101-100 BORE HOLE NO. 8  
JOB F 59-124 STATION 27+42 (40 FT. of E)  
DATUM 268.0' COMPILED BY B.K.  
BORING DATE Jan. 29/60 CHECKED BY M.D. & 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 _____	L
LIQUIDITY INDEX _____	X
LIQUID LIMIT _____	
PLASTIC LIMIT _____	

[illegible]



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 101-58 \_\_\_\_\_ BORE HOLE NO. 9 (Hand Auger)

JOB F 59-124 STATION 20+50 c

DATUM 260.0' COMPILED BY B.K.

BORING DATE Dec. 18/59 CHECKED BY M.D. & 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) .....	+5
NATURAL MOISTURE AND	
LIQUIDITY INDEX .....	LI
LIQUID LIMIT .....	X
PLASTIC LIMIT .....	0

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	BLOWS/FT.
	↓ Ground level	261.0			
	Topsoil	260.0	0		
	Medium grey brown fine to medium sand. W.L. ▽	256.0			
⊗	Glacial Till (Grey silty clay with fine gravel)	251.0 249.0	10		
	End of borehole		20		
			30		
			40		

[illegible]

#59-F-124

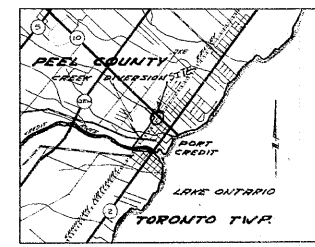
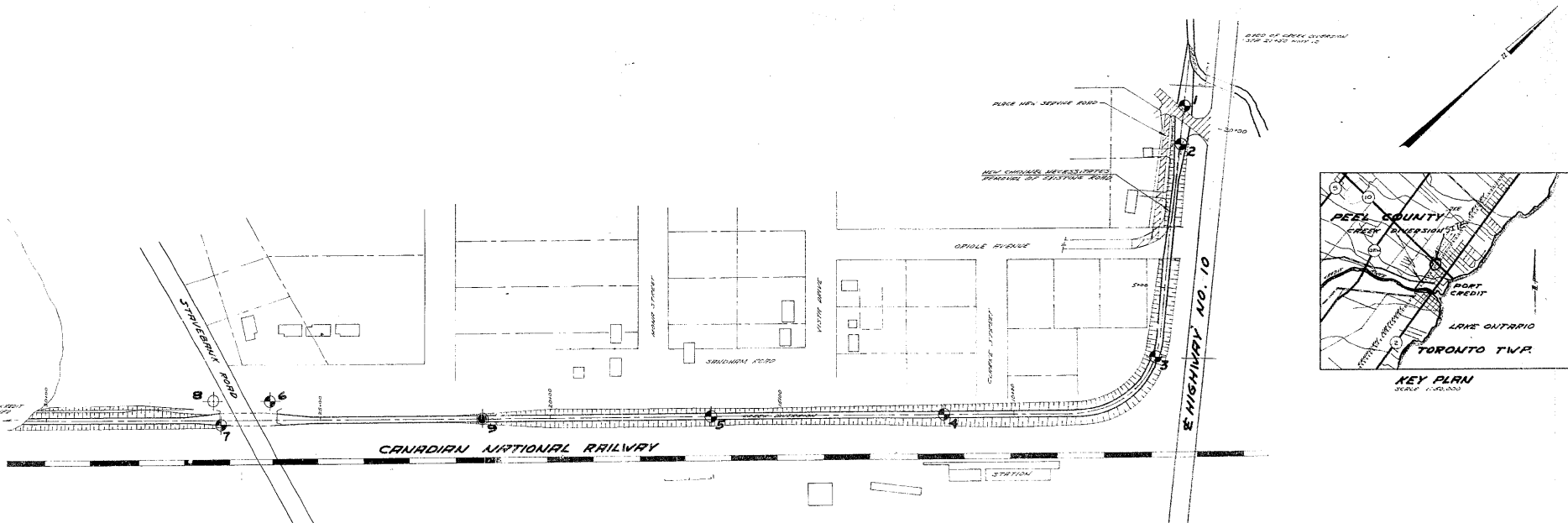
W.P.#101-58

HWY#10

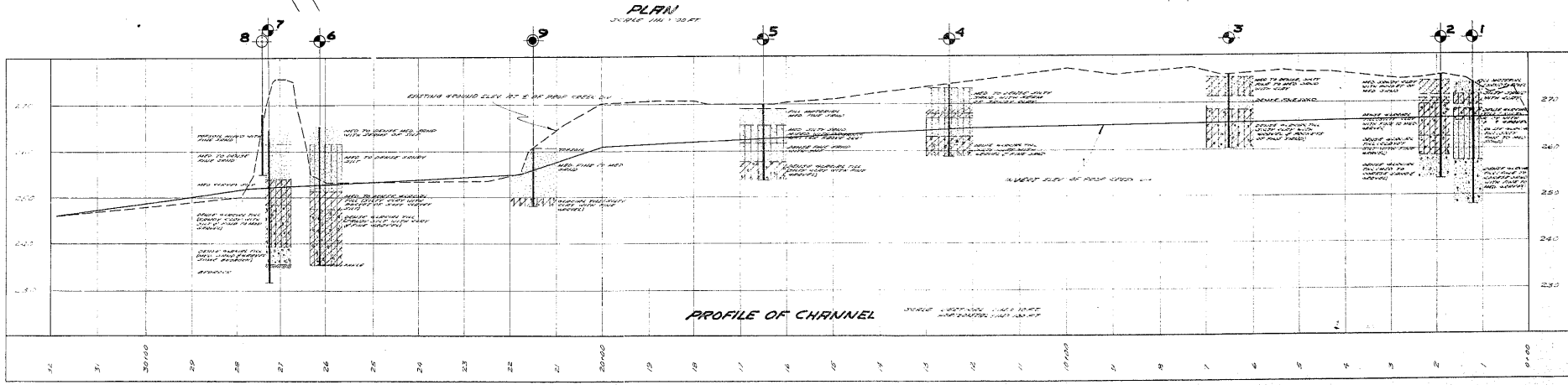
CREEK

DIVERSION

PORT CREDIT



LEGEND			
BOTT HOLE			
HEAD RUNOFF			
BOTTLE NEUTRALIZATION HOLE			
HOLE NO.	ELEVATION	COORDINATES	DEPTH
1	27.75	440	10
2	27.74	440	10
3	27.74	440	10
4	27.74	440	10
5	27.74	440	10
6	27.74	440	10
7	27.74	440	10
8	27.74	440	10
9	27.74	440	10



NOTE:  
THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY BY BORE HOLE LOCATIONS. BETWEEN BORE HOLES THE BOUNDARIES ARE ASSIGNED FROM GEOLOGICAL EVIDENCE AND MAY BE SUBJECT TO CONSIDERABLE ERROR.

DEPARTMENT OF HIGHWAYS - ONTARIO  
INTERNAL & RECORD SECTION

**CREEK DIVERSION  
PORT CREDIT**

SHOWING POSITIONS & ELEVATIONS OF HOLES

DATE: 1/1/60	DISTRICT: 1	LOT: 1	COUNTY: PEEL
DESIGNED BY: J. H. HARRIS	CHECKED BY: J. H. HARRIS	DATE: 1/1/60	SCALE: 1" = 100 FT
DRAWN BY: J. H. HARRIS			
APPROVED BY: J. H. HARRIS			
FILE NO: F59-12417			