

Mr. D. G. Ramsay,
Road Design Engineer.
Materials & Research Section.

February 29, 1960.

Re: D.H.O. FOUNDATION REPORT --
W.P. 101-58 -- W.J.F-59-120.

Attention: Mr. H. D. McMillan.

Re: Proposed Storm Sewer at Cooksville,
District No. 6 -- Hwy. No. 10.

Accompanying this memo is a detailed foundation report prepared by this Section at the request of Giffels and Vallet, Ltd., Consulting Engineers. This report has been prepared on the assumption that the designer will utilize a storm sewer made up of a flexible corrugated arch resting on a 6" concrete slab, and that a minimum cover of 1 foot will be maintained above the top of this arch.

For your convenience, the contents of this report are summarized below:-

- (1) The predominant overburden at this site is a silty glacial till. The glacial till is overlain by more recent sand and sandy clay deposits, and is underlain by shale bedrock.
- (2) The base for the proposed storm sewer will be founded in the glacial till. Bearing pressures of 3 T/ft.² may be used in this till. Settlements for the proposed structure will be negligible.
- (3) Information obtained from the borings indicates that seepage water entering excavations, will be small.
- (4) Bedding and backfilling procedures should be specified and supervised. For corrugated metal arch structures, backfilling on one side may cause the arch to shift sideways, while filling too much along both sides before the fill is placed over top, may cause the crown to rise; an ideal method of backfilling is to build the fill over the arch in layers conforming to the arch shape. The material excavated from

cont'd. /2 ...

(4) (cont'd.) ...

the trench will be suitable for backfilling. Care should be taken to ensure that the pipe is not damaged by construction equipment during the backfilling operation.

If we can be of further assistance in connection with the design of this project, please call upon us.

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

f. Peaker

(E. Peaker,
FOUNDATION SUPERVISING FIELD ENGR.)

HP/MdeP
Attach.

cc: Messrs. D. G. Ramsay (3)
H. A. Tregaskes
C. Fraser
I. Campbell
F. F. Weber
Giffels & Vallet, Ltd.
Foundations Office
Gen. Files. ✓

FOUNDATION INVESTIGATION

for

The Proposed Storm Sewer at Cocksville
District #6 - Hwy. #10 - W.P. 101-58.

W.J. F 59-120.

INTRODUCTION:

Presented herein are the results of a subsoil investigation carried out for the proposed sewer at Cocksville. It is understood that the proposed storm sewer will be located at an offset distance of approximately 37 ft. East of the Centre line of existing Hwy. 10 to Paisley Blvd., and then via Paisley Blvd. and Lancelot Cres. to Cocksville Creek.

The subsoil investigation was requested by Giffels and Vallet, Ltd., Consulting Engineers responsible for the design of this project.

The exploration programme commenced on November 30, 1959, and was completed on December 9, 1959. The detailed investigation consisting of 19 sampled boreholes including dynamic cone penetrations, were carried out by a trailer-mounted continuous flight auger. Samples were recovered at depths required by means of a 2" O.D. split-barrelled spoon sampler and a 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 as well as at the laboratory. 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 59-120A.

cont'd. /2 ...

SOIL TYPES ENCOUNTERED:

Reference to the detailed boring logs appended to this report shows, in general, the subsoil consists of glacial deposits overlain by a layer of granular fill material (sand & gravel), and underlain by shale bedrock.

1. Fill Material:

This material was encountered in most of the borings except in Borings 1, 18 & 19, where a thin layer of topsoil was found. The fill is composed of predominantly granular material with very little traces of cohesive material, and extends 2' to 4 ft. from the ground surface. The representative values of the granular fill are as follows:-

Moisture Content = 7% - 14%.

'N' Value = 5 - 16

2. Post Glacial Deposits:

a) Loose to Medium Brown Fine Sand :-

Immediately below the fill material in Borings 2, 6 & 17 and below the topsoil in Borings 18 & 19, the natural stratum of granular material was found. It varies in thickness from 2' to 6' and contains a small amount of gravel. The sand stratum has been subjected to oxidation, resulting in its present brownish colour. The representative index properties of the sand are as follows:-

Average Unit Weight ... = 135 p.c.f.

Moisture Content = 8% - 11%.

'N' Value = 9 - 31.

cont'd. /3 ...

SOIL TYPES ENCOUNTERED: (cont'd.) ...

2. Post Glacial Deposits: (cont'd.) ...

b) Stiff Grey-brown Sandy Clay:-

The natural stratum of cohesive material was encountered below the fill material in B.H. #3, 4, 7, 8, 9, 10 & 11, and below the topsoil in Boring #1. In B.H. #2 this material is overlain by a thin layer of sand. The stratum of sandy clay varies in thickness from 2' to 4 ft. and predominantly exhibits a grey-brown colour. This material contains a small amount of fine sand and also occasional layers of fine sand; but retains the characteristics of stiff clay.

Samples obtained were subjected to routine laboratory tests and the following values are considered representative:-

Natural Unit Weight = 140 p.c.f.
Moisture Content = 8% - 22%.
Plastic Limit = 17% - 30%.
Liquid Limit = 24% - 58%.
Undrained Shear Strength "C" = 3000 p.s.f.

3. Dense Glacial Till:-

The dense glacial till generally, is composed of grey, sandy clay to silty clay with gravel. In B.H.'s #10 to #15, the grey sandy clay is followed by silty sand with gravel.

The glacial till was encountered in all the sampled boreholes about 4 to 6 ft. below ground surface. In general, the content of gravel, as well as the penetration resistance, increases with the depth. The representative index properties of the till are as follows:-

Natural Unit Weight = 145 p.c.f.
Moisture Content = 5% - 12%
'N' Value = 31 - 97

SOIL TYPES ENCOUNTERED: (cont'd.) ...

4. Weathered Shale:-

Beneath the shallow mantle of overburden, shale bedrock was contacted. The upper layers of shale were found to be fragmented and exhibited varying degrees of weathering. Since the auger was not equipped to take rock core samples, bedrock has not been drilled in any of the borings.

GROUND WATER OBSERVATIONS:

Field observations and measurements carried out during the exploration programme, indicate that ground water level was at approximately 2 to 5' below the ground surface. At the time of investigation, the average water level of Cooksville Creek was found to be at approx. Elev. 331.5' which is slightly lower than the water level observed in the boreholes.

No artesian conditions or water-bearing sand seams were observed in any of the borings.

FOUNDATION CONSIDERATIONS:

It is understood that the proposed storm sewer will be of a structural plate pipe arch. The base of the structural plate pipe arch consists of a 6" concrete slab. The dense till stratum is competent to provide adequate foundation support for the proposed sewer system.

It can be seen from the accompanying drawings that the invert elevation of the proposed storm sewer will be within the dense till stratum. A safe bearing pressure of 3 Tons/ft.² can be used for the design of footing support.

cont'd. /5 ...

SUMMARY:

1. In general, the subsoil consists of a layer of silty glacial till overlain by a stratum of granular fill and underlain by shale bedrock.
2. Strength and compressibility characteristics are such that footings for the proposed sewer system can be founded within the dense till stratum, using a bearing pressure of 3 t.s.f. Settlements will be negligible.
3. Ground water seepage inflow during trench excavation, will be small, and readily handled by low-capacity pumps. Shoring operations appear to be necessary during construction.
4. The excavated material from the conduit trench will be suitable backfill material. Bedding and backfilling procedures should be clearly specified and closely supervised.
5. During construction, sufficient cover must be provided to protect the arch pipe from damage due to the movement of construction equipment.

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

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-120

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
1	S1	2'-3.5'	Top Soil mixed with br. sand and clay	5	-	-	-	-	-	
	T2	5'-6'	Medium Brown sandy clay	17-6"	10.3	16.1	24.3	-	144.4	
	S3	7.5'-9'	Dense glacial till of grey clay with fine to med. gravel	30	-	-	-	-	-	
	S4	10'-11.5'	"	42	7.0	-	-	-	-	
	S5	12.5'-14'	"	40	6.8	-	-	-	-	
	S6	15'-16.5'	Dense glacial till of grey silty clay with gravel & fragments of Shale	107	-	-	-	-	-	
	G7	17'	"	-	-	-	-	-	-	
2	S1	2.5'-4'	Med. brown sand with gravel	9	11.3	-	-	-	-	
	T2	4'-5.5'	Stiff grey clay with sand	P	19.2	21.9	38.6	-	119.0	
	S3	7'-8.5'	Dense glacial Till of grey silty clay with gravel	58	-	-	-	-	-	
	S4	10'-11.5'	"	50	9.3	-	-	-	-	
3	T1	3'-4.5'	Stiff grey brown clay	P	20.7	21.6	38.0	3000	123.3	Probably sat. grey coars sand
	S2	5.5'-7'	No Recovery of sample	40	-	-	-	-	-	
	S3	7.5'-9'	Dense grey coarse sand with gravel changing to grey silty clay	62	15.4	-	-	-	-	
	S4	10'-11.5'	Dense glacial Till of grey clay with gravel.	62	-	-	-	-	-	
	S5	15'-15.5'	" and with traces of fragments of shale	67-6"	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-120

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
4	S1	2.5'-4'	Hard Brown Sandy clay	32	10.1	17.8	29.8	-	142.0	
	S2	5'-6.5'	Dense glacial Till of brown sandy clay with gravel.	48	9.9	-	-	-	142.0	
	S3	7.5'-9'	" " "	46	10.4	-	-	-	120.0	
	S4	10'-11.5'	Dense glacial Till of grey silty clay with fine to med. gravel	41	6.4	-	-	-	147.0	
	S5	13.5'-15'	" " "	78	-	-	-	-	-	
5	S1	3'-4.5'	Dense Glacial Till of Brown Sandy clay with gravel.	37	11.7	-	-	-	146.0	
	S2	6'-7.5'	" " " of Brown silty clay with gravel	45	12.2	-	-	-	158.0	
	S3	9'-10.5'	" " " of grey silty clay with gravel	49	10.1	-	-	-	137.1	
	S4	13.5'-15'	" " "	84	5.5	-	-	-	-	
6	T1	3'-4.5'	Loose br. fine sand with clay	P	8.1	-	-	-	-	
	S2	6'-7.5'	Dense glacial Till of Brown silty clay with sand & gravel	46	-	-	-	-	-	
	S3	9'-10.2'	Dense glacial Till of Grey silty clay with gravel	70	-	-	-	-	-	
	S4	15'-16.5'	Badly weathered shale	81 for 13"	5.9	-	-	-	-	
7	S1	3'-4.5'	Hard grey brown clay with fine sand	34	-	-	-	-	-	
	S2	6'-7.5'	Dense glacial Till of grey silty clay with fine gravel	35	11.3	-	-	-	147.2	
	S3	9'-9.8'	" " "	55-9"	8.1	-	-	-	-	
	S4	15'-16'	Weathered Shale	100	7.3	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-120

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.I.	UNIT WEIGHT P.C.F.	REMARKS
8	S1	3'-4.5'	Dense Br. sand with clay chang-	33	12.4	-	-	-	143.8	
	S2	6'-7.5'	ing to brown sandy clay. Dense glacial Till of grey	40	7.3	-	-	-	138.9	
	S3	9'-10.5'	silty clay with gravel	61	5.8	-	-	-	-	
	S4	15'-15.6'	" Weathered Shale	80-7"	5.3	-	-	-	-	
9	T1	3'-4.5'	Stiff br. clay with sand	P	8.5	-	-	-	-	
	S2	6'-7.5'	Dense glacial Till of grey	43	10.7	18.9	23.2	-	-	
	S3	9'-10.5'	sandy clay with gravel Dense glacial Till of grey	74	8.8	-	-	-	-	
	S4	14'-15.5'	silty clay with sand & gravel Dense glacial Till of grey	114	5.2	-	-	-	-	
10	T1	3'-4.5'	stilty clay with gravel changed to weathered grey shale							
	S2	6'-7.5'	Stiff grey br. clay with sand	P	14.2	30.1	58.8	4750	-	
	S3	9'-10.5'	Dense glacial Till of grey br.	34	10.0	-	-	-	-	
	S4	13.5'-15'	sandy clay with gravel Dense glacial Till of grey	41	10.9	-	-	-	-	
11	S1	3'-4.5'	silty fine sand with clay & gravel	97	5.0	-	-	-	-	
	S2	6'-7.5'	"							
	S3	10'-11.5'	Stiff grey brown sandy clay	10	22.9	82.3	28.3	-	-	
	S4	15'-16'	Dense glacial Till of grey	35	9.9	-	-	-	-	
	S1	3'-4.5'	sandy clay with gravel	86	9.1	-	-	-	-	
	S2	6'-7.5'	Dense glacial Till of grey							
	S3	10'-11.5'	silty fine to med. sand with gravel	106	-	-	-	-	-	
	S4	15'-16'	Dense glacial Till of grey							
	S1	3'-4.5'	stilty fine to med. sand with gravel changed to weathered shale at the bottom							
	S2	6'-7.5'								
	S3	10'-11.5'								
	S4	15'-16'								

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-120W.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
12	S1	5'-6.5'	Dense glacial Till of grey sandy clay with silty and gravel	58	11.8	-	-	-	-	
	S2	10'-11.5'	Dense glacial Till of grey silty sand cemented together with fragments of shale	95	7.6	-	-	-	-	
	S3	15'-16.5'		70	7.3	-	-	-	-	
	S4	19'-19.5'	Layers of weathered shale	48-8"	-	-	-	-	-	
13	S1	3'-4.5'	Fill material (gravel and sand with pockets of clay)	16	14.2	-	-	-	-	
	S2	6'-7.5'	Dense glacial Till of grey br. silty clay with fine gravel	43	11.6	-	-	-	-	
	S3	10'-11.5'	Dense glacial Till of grey silty sand cemented together with gravel & fragments of shale	81	8.8	-	-	-	-	
	S4	15'-15.8'	Layers of weathered shale	64	-	-	-	-	-	
14	S1	18'-18.3'	Layers of weathered shale	-	-	-	-	-	-	
15	S1	20'-20.5'	Layers of weathered shale	-	-	-	-	-	-	
16	S1	3'-4.5'	Fill material (brown sand & gravel with clay)	8	7.2	-	-	-	-	
	S2	6'-7.5'	Dense glacial Till of brown sandy clay with gravel	58	19.4	-	-	-	130.6	
	S3	10'-11.5'	Dense glacial Till of grey fine sandy silt with gravel	52	-	-	-	-	-	
	S4	15'-15.8'	Dense glacial Till of grey silty clay with gravel changing to weathered shale	104-9'	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-120

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
17	S1	3'-4.5'	Med. br. sand, gravel with clay (Fill)	11	10.1	-	-	-	-	150.0
	S2	6'-7.5'	Dense glacial Till of grey brown silty clay with gravel	32	12.9	-	-	-	-	
	S3	10'-11.5'	Dense glacial Till of grey silty clay with gravel	35	7.8	-	-	-	-	
	S4	15'-15.8'	Dense glacial Till of grey silty clay with gravel changing to weathered shale	100-9"	-	-	-	-	-	
18	S1	3'-4.5'	Med. Brown fine sand	20	17.4	-	-	-	-	
	S2	6'-7.5'	Dense Brown Sand changing grey silty clay with gravel	31	8.7	-	-	-	-	
	S3	10'-11.5'	Dense glacial Till of grey silty clay with gravel	83	6.5	-	-	-	-	
	S4	15'-15.2'	Weathered layers of shale	65-2"	-	-	-	-	-	
19	S1	5'-6.3'	Dense glacial Till of grey silty clay with gravel	50-9"	7.4	-	-	-	-	
	S2	10.5'-12'	Dense glacial Till of grey sandy clay with gravel	87	8.2	-	-	-	-	
			S denotes split spoon sample T " shelby tube sample G " grab sample							

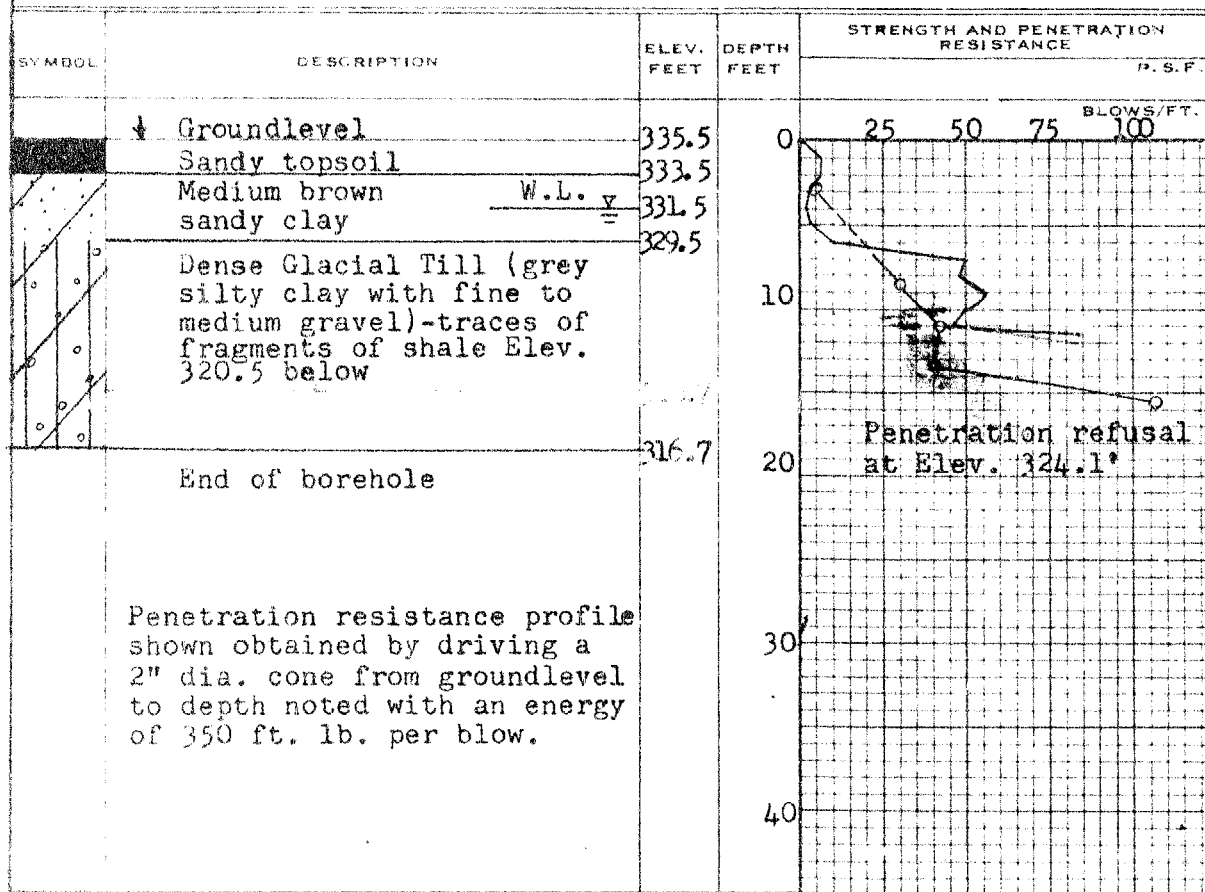
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 1
JOB F59-120 STATION 0+10 17' Lt. Sewer
DATUM 335.5' COMPILED BY BK
BORING DATE Nov. 30/59 CHECKED BY MD & AL

LEGEND

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

1/2 UNCONFINED COMPRESSION (Qu) 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.			
10 20 30			
		S1	-
		T2	144.4
		S3	-
		S4	-
		S5	-
		S6	-
		G7	-

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 2

JOB F59-120 STATION 0+88.10' LT. Sewer

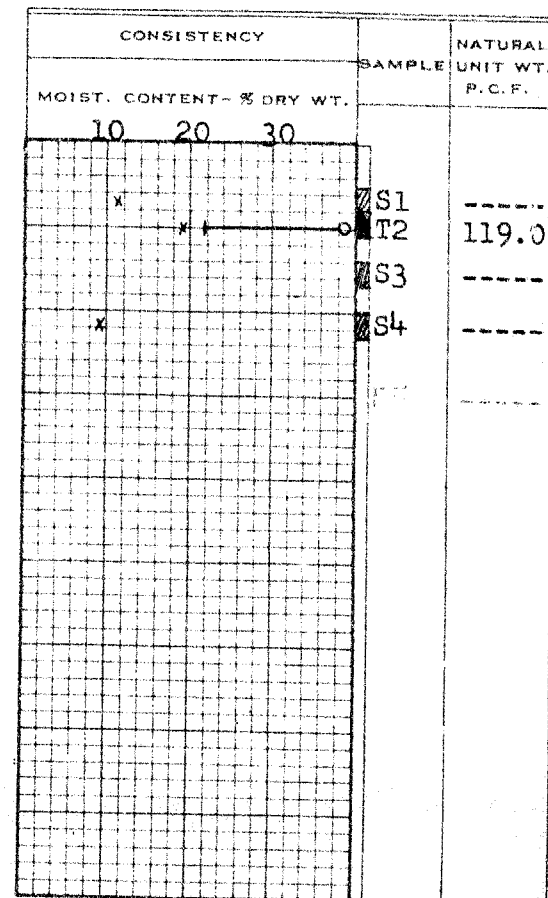
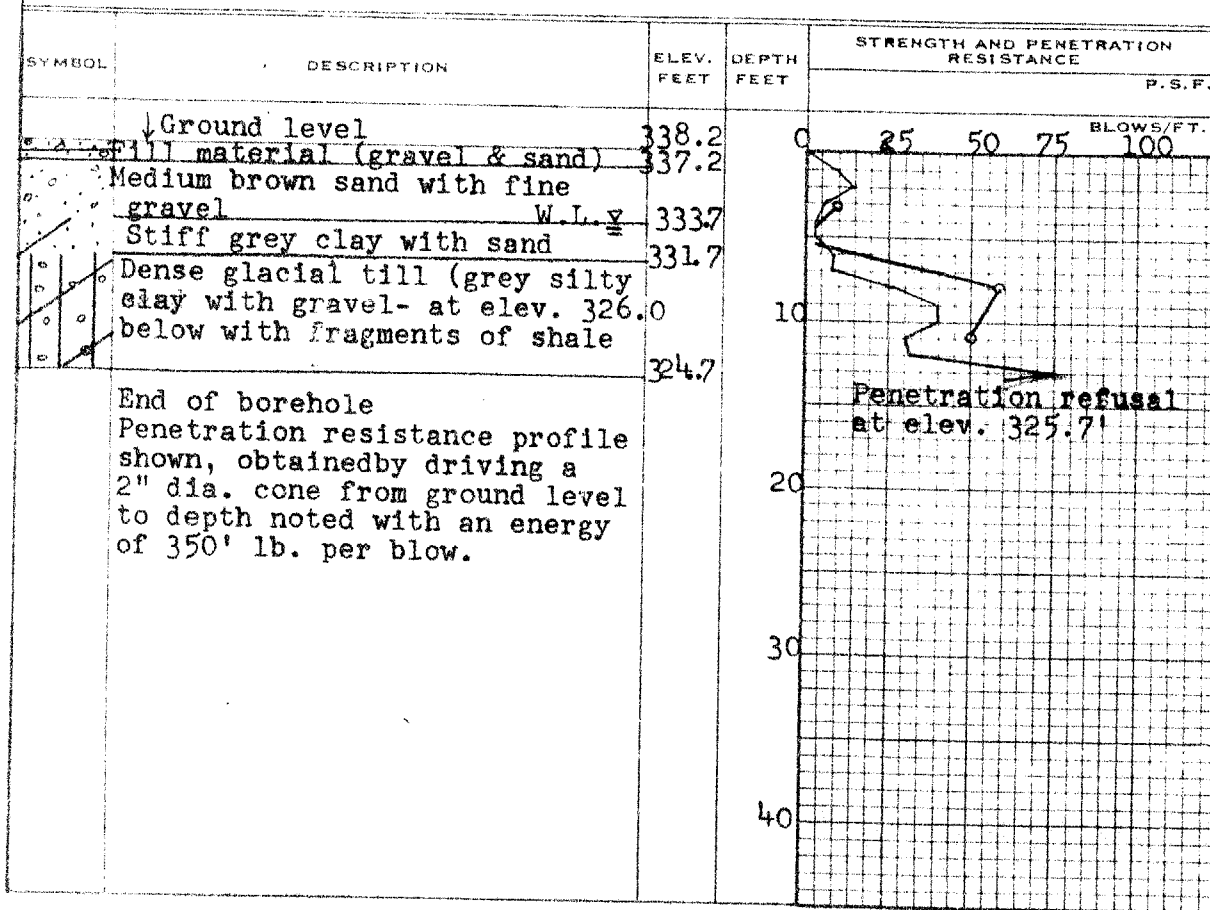
DATUM 338.2' COMPILED BY B.K.

BORING DATE Nov. 30/59 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



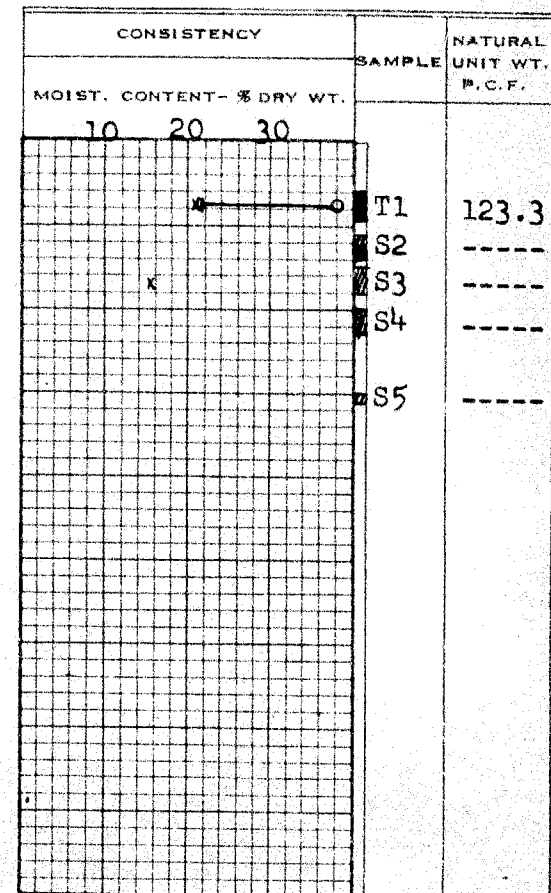
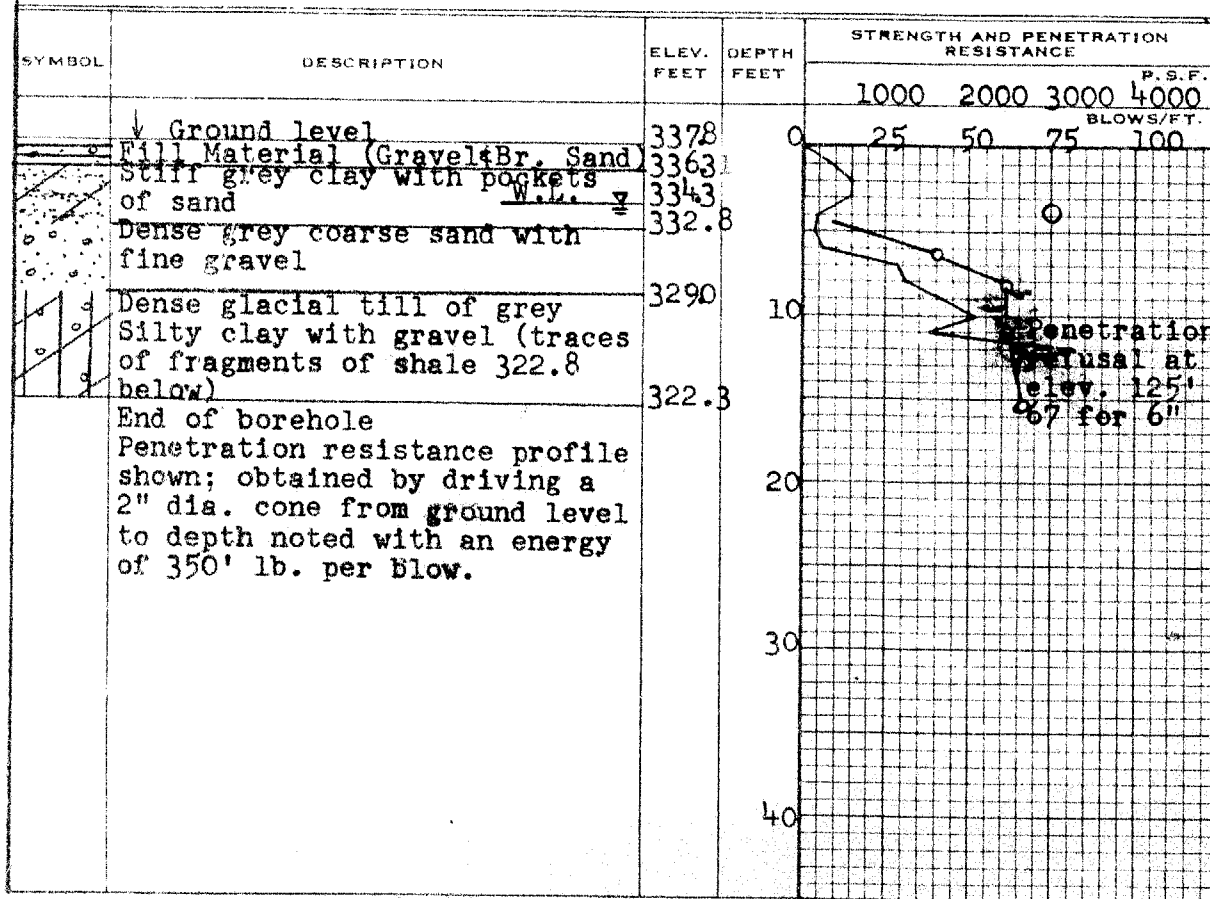
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 3
JOB F59-120 STATION 1+90 5' RT Sewer
DATUM 337.8 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) +
NATURAL MOISTURE AND LIQUIDITY INDEX LI
LIQUID LIMIT X
PLASTIC LIMIT



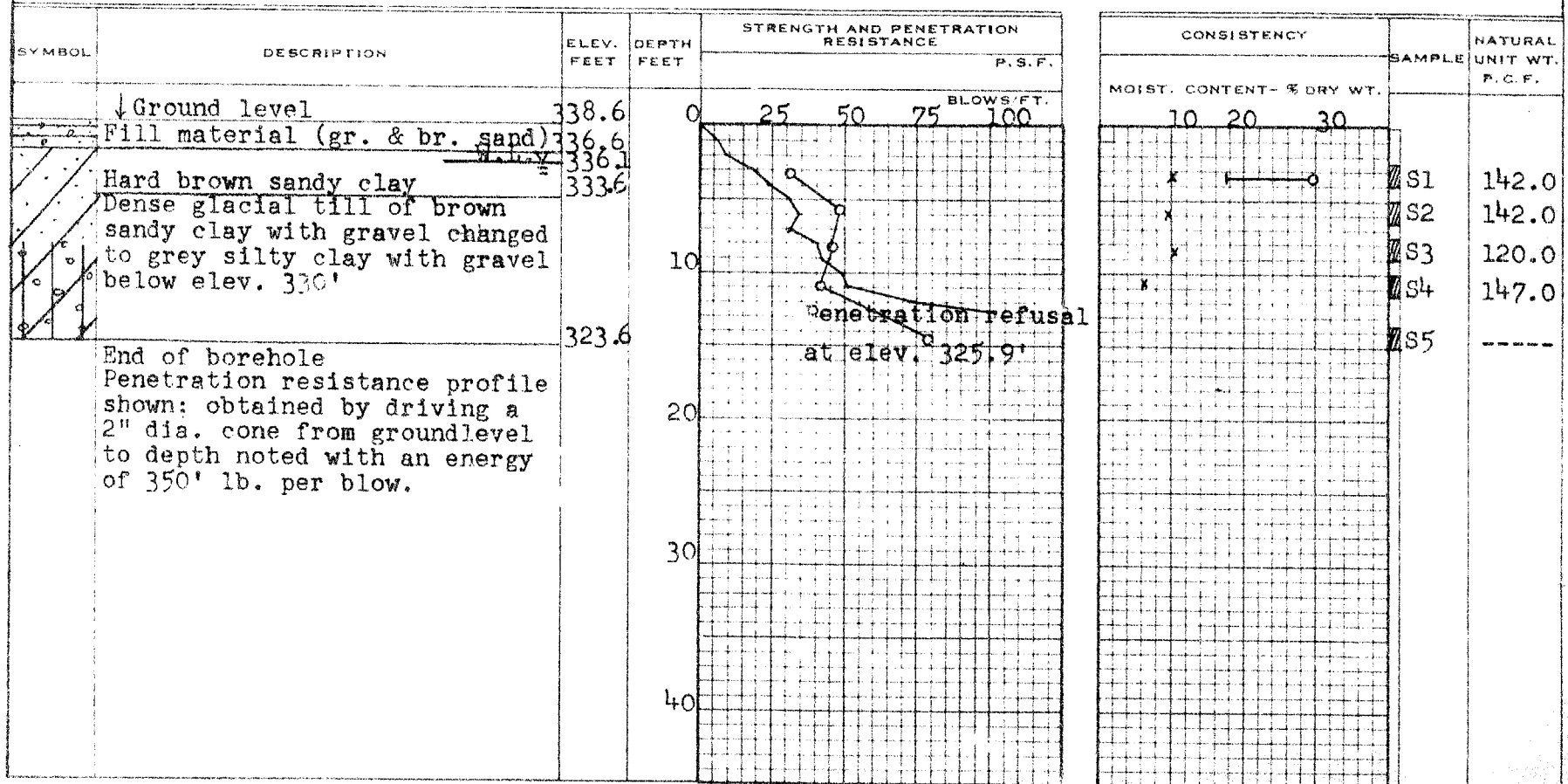
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 4
JOB F59-120 STATION 2+91.1 RT sewer
DATUM 338.6' COMPILED BY B.K.
BORING DATE Dec. 1/59 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 LIQUIDITY INDEX X
LIQUID LIMIT
PLASTIC LIMIT



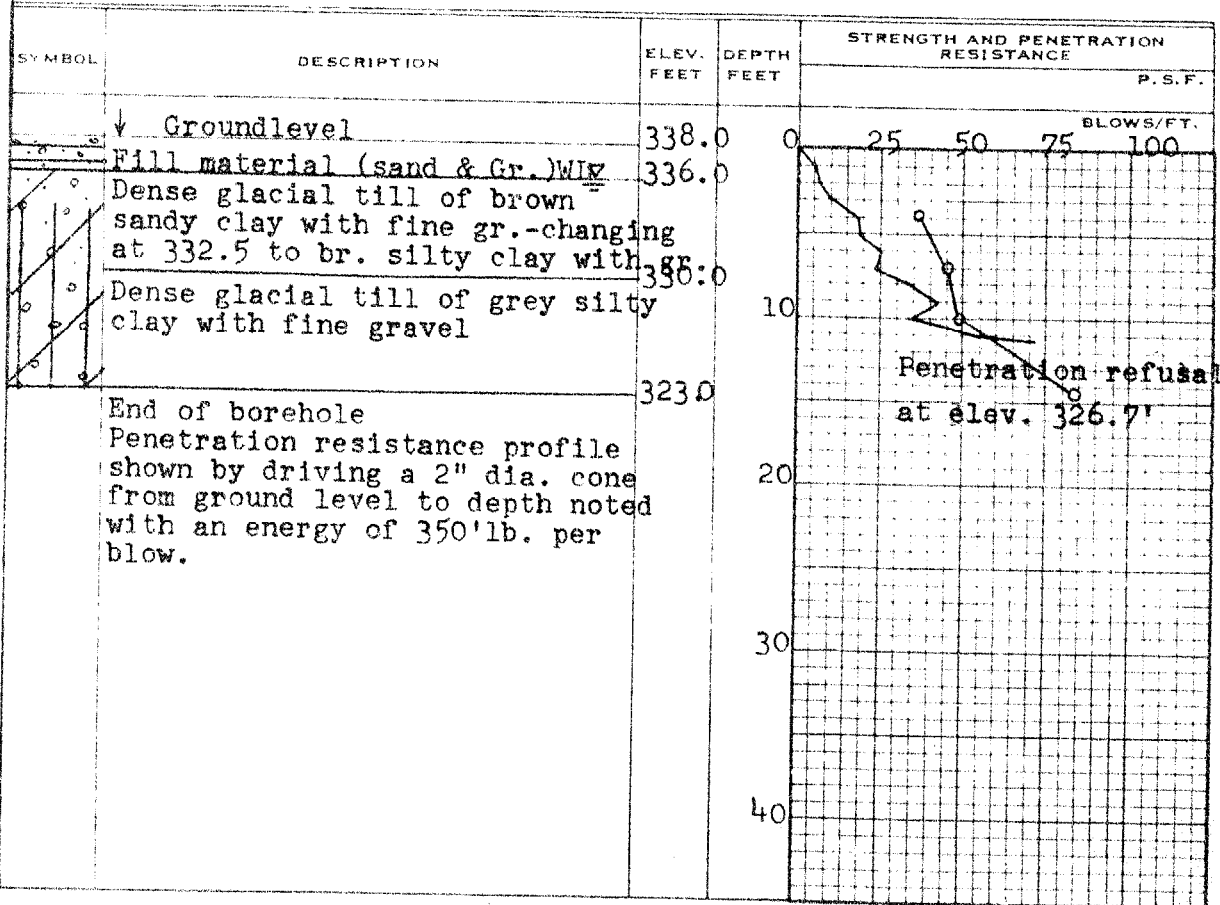
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 5
JOB F59-120 STATION 3+95.6' RT Sewer
DATUM 338.0' COMPILED BY B.K.
BORING DATE Dec. 2/59 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			
		S1	146.0
		S2	158.0
		S3	137.1
		S4	-----

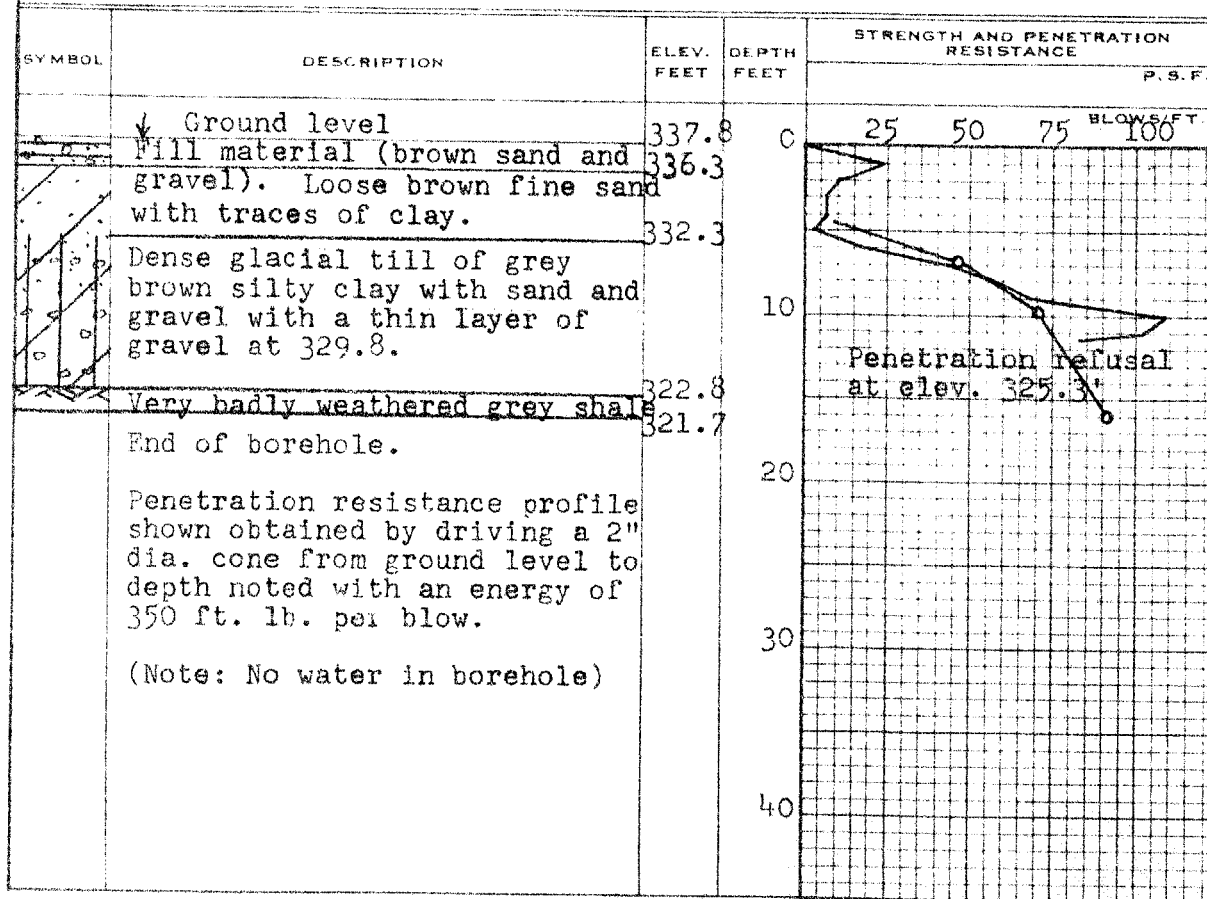
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 6
JOB F59-120 STATION 4+85.3' Rt.
sewer &
DATUM 337.8' COMPILED BY B.K.
BORING DATE Dec. 2/59 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) +
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		
x			T1	-
			S2	-
			S3	-
x			S4	-

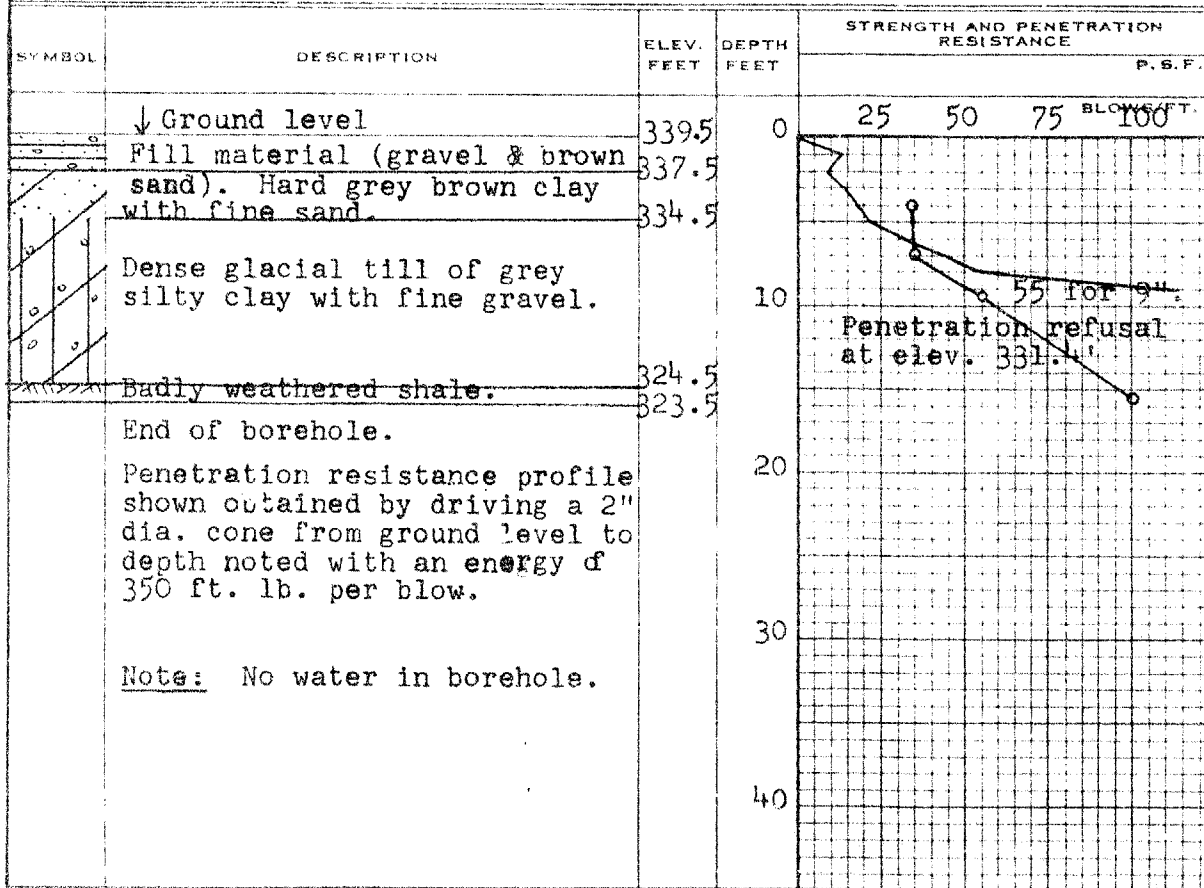
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 7
JOB F59-120 STATION 5+83.6' Rt.
Sewer E
DATUM 339.5' COMPILED BY B.K.
BORING DATE Dec. 3/59 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) +
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			
		S1	-
		S2	147.2
		S3	-
		S4	-

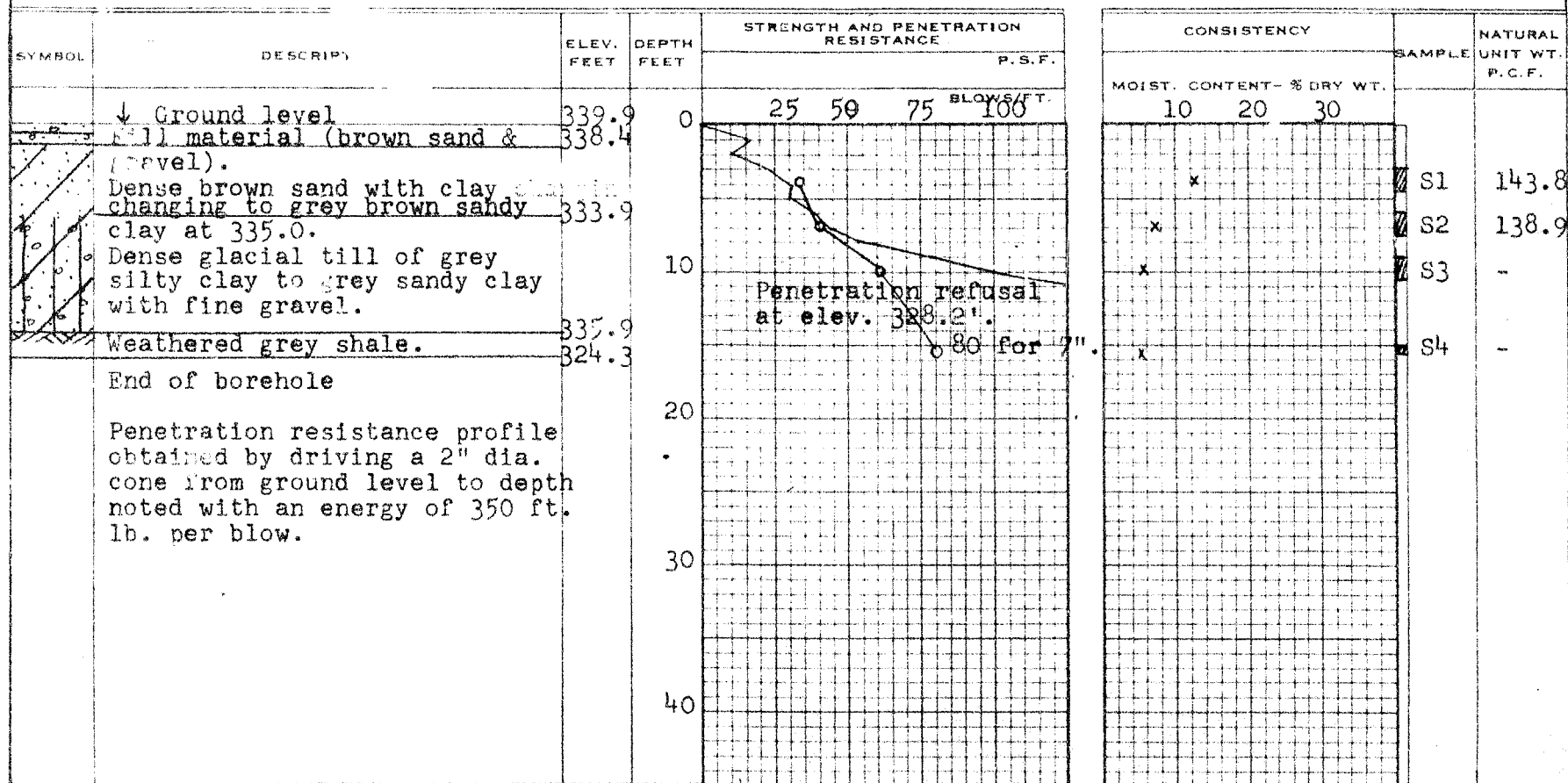
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-59 BORE HOLE NO. 8
JOB E59-120 STATION 7+12 3' lt.
sewer
DATUM 339.9 COMPILED BY B.K.
BORING DATE Dec. 3/59 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. 9
JOB F59-120 STATION Z+85 3' Lt. sewer
DATUM 340.2' COMPILED BY B.K.
BORING DATE Dec. 3/59 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) — +
NATURAL MOISTURE AND LIQUIDITY INDEX — X
LIQUID LIMIT — —
PLASTIC LIMIT — —

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P. S. F.	BLows/FT.
	↓ Ground level	340.2	0		
	Fill material (brown sand and gravel) W.L. ▽	337.2			
	Stiff brown clay with sand	334.2			
	Dense glacial till of grey sandy clay with gravel.	330.2	10		
	Dense glacial till of grey silty clay with sand and gravel, changed to weathered shale at 325.0.	324.7			
	End of borehole				
	Penetration resistance profile shown obtained by driving a 2" dia. cone from ground level to depth noted with an energy of 350 ft. lb. per blow.				

CONSISTENCY		SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.			
10	20	30	

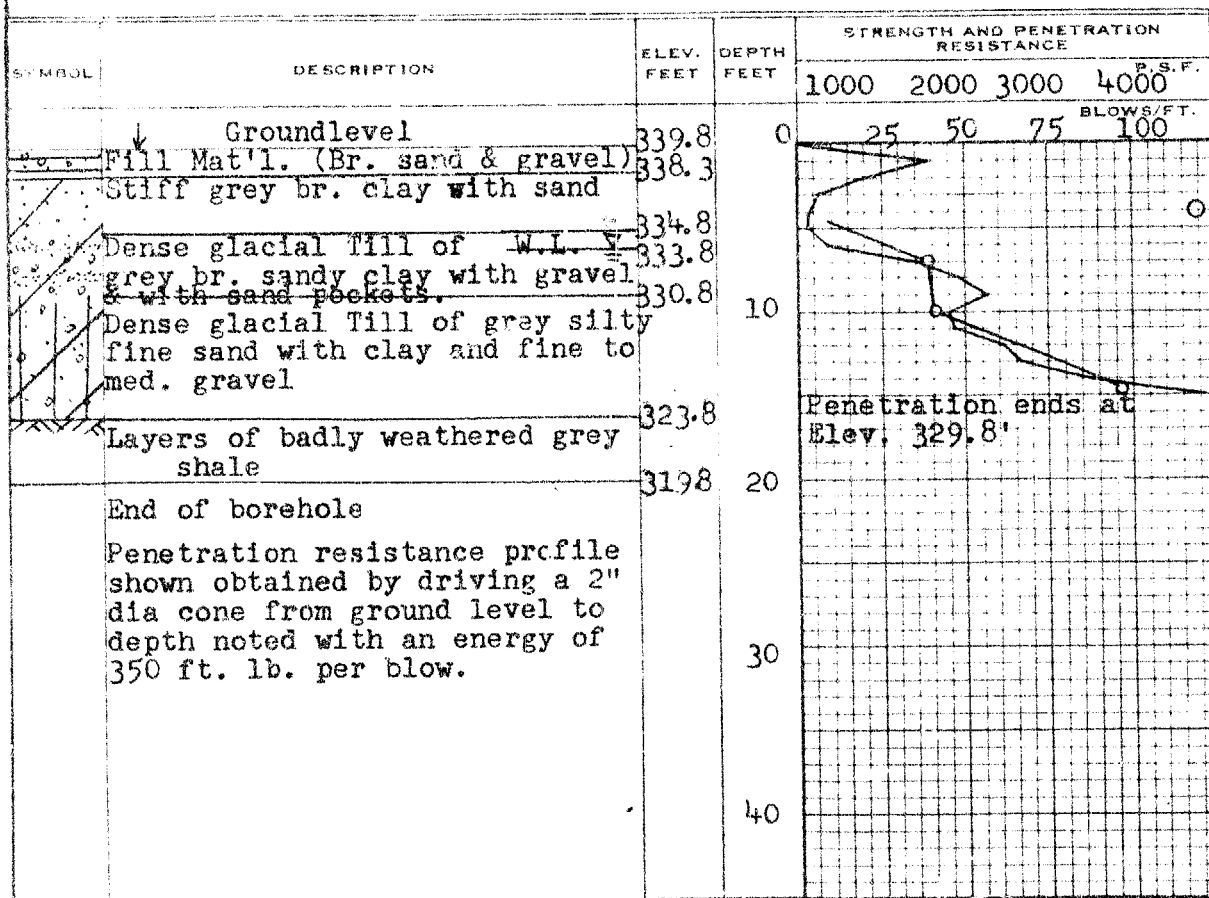
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 10
 JOB F 59-120 STATION 8+75 3' LT. Sewer
 DATUM 339.8' COMPILED BY B.K.
 BORING DATE Dec. 4/59 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) \bigcirc
 VANE TEST (C) AND SENSITIVITY (S) $+$
 NATURAL MOISTURE AND LIQUIDITY INDEX \times
 LIQUID LIMIT \bigcirc
 PLASTIC LIMIT \bigcirc



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

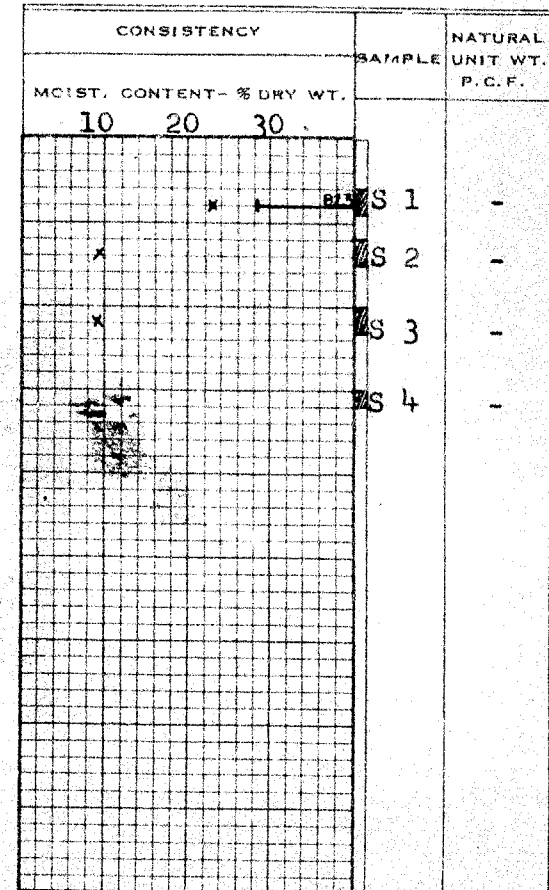
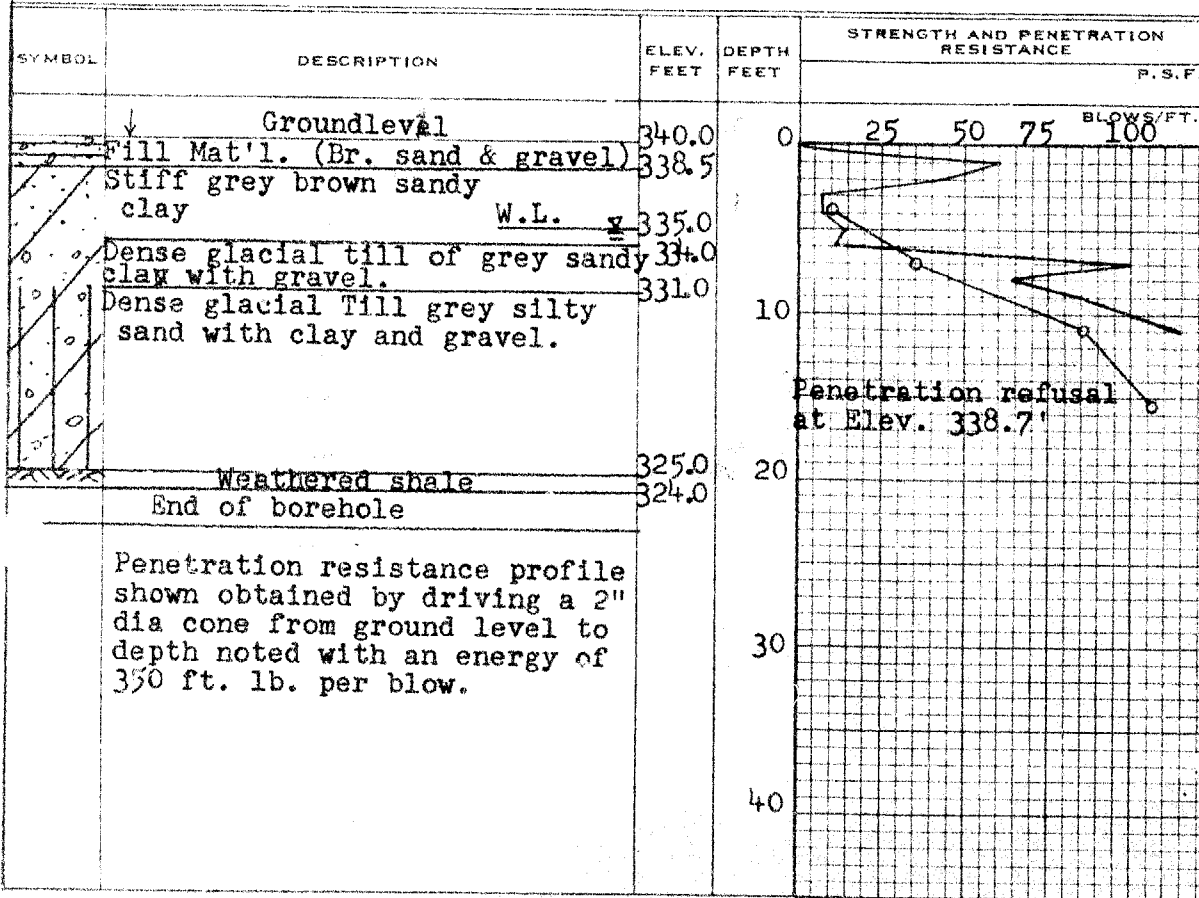
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 11
JOB F 59-120 STATION 9+82 2' LT Sewer
DATUM 340.0' COMPILED BY B.K.
BORING DATE Dec. 4/59 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) — +
NATURAL MOISTURE AND LIQUIDITY INDEX — X
LIQUID LIMIT —
PLASTIC LIMIT —



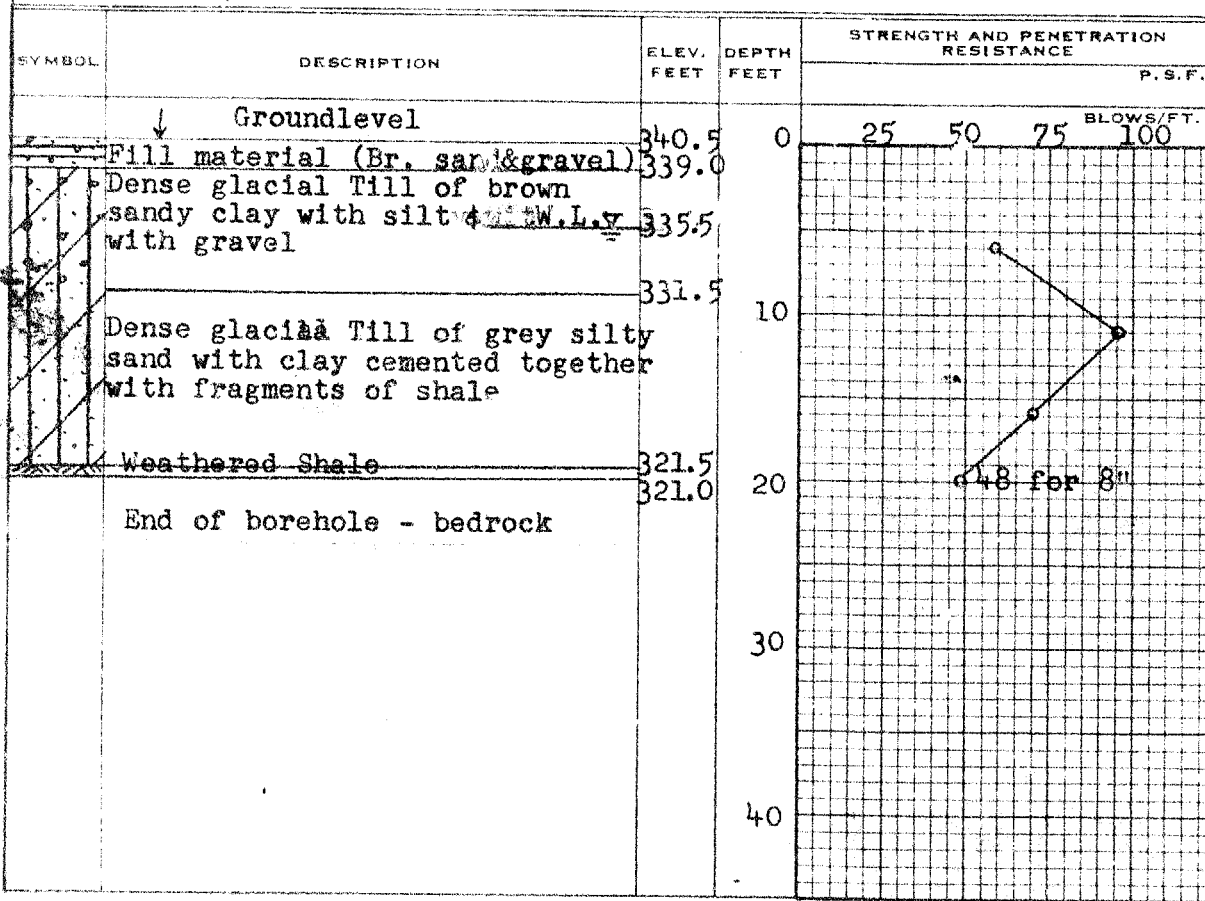
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 12
JOB F 59-120 STATION 10+74 Sewer @
DATUM 340.5' COMPILED BY B.K.
BORING DATE Dec. 7/59 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	-

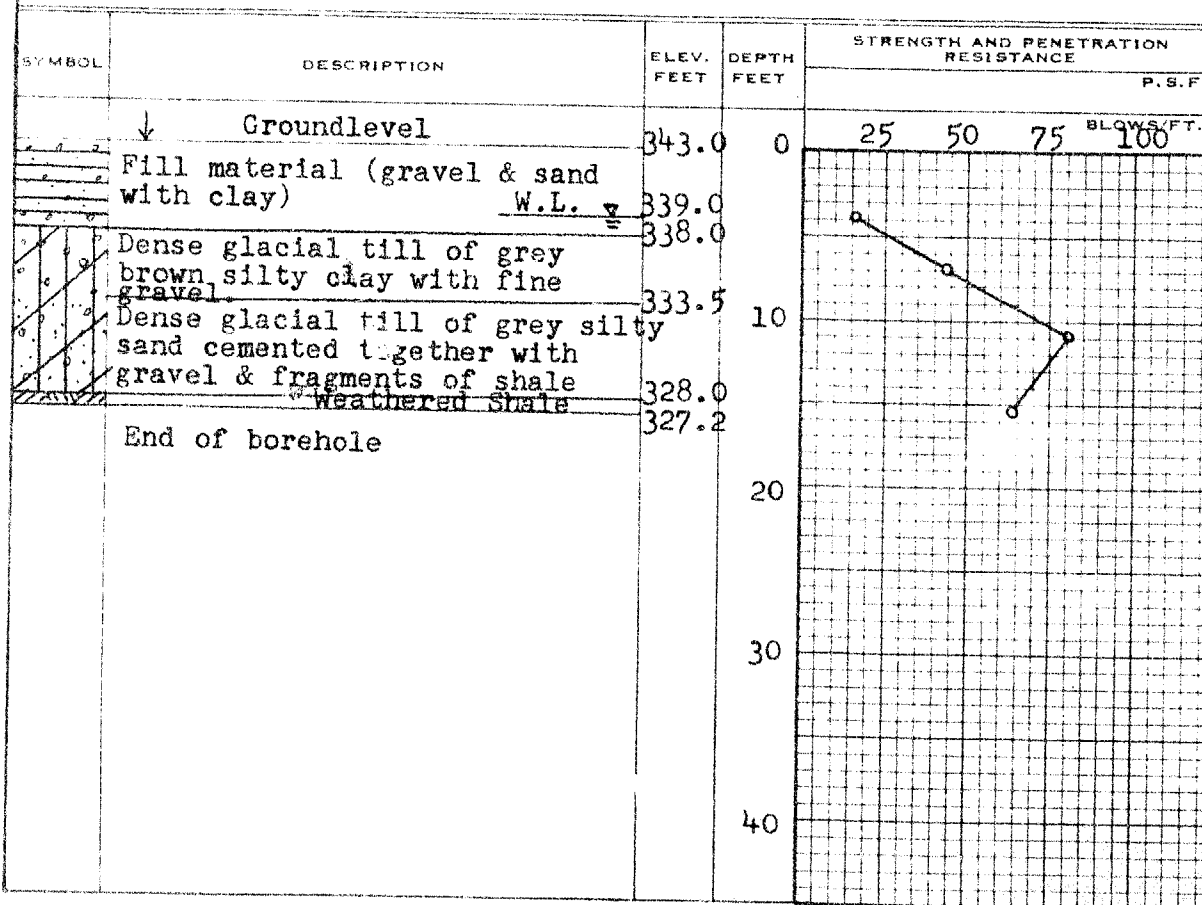
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 13 (Hwy. 10)
JOB F 59-120 STATION 107+00 37' RT. &
DATUM 343.0 COMPILED BY B.K.
BORING DATE Dec. 8/59 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. 14 (Hwy. 10)
 JOB F 59-120 STATION 106+55 37' RT &
 DATUM 342.7' COMPILED BY B.K.
 BORING DATE Dec. 8/59 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) +
 NATURAL MOISTURE AND LIQUIDITY INDEX X
 LIQUID LIMIT
 PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	BLOWS/FT.
	Groundlevel	342.7	0		
	Fill material (Brown med. sand & gravel)	338.7			
	Dense glacial till of grey brown silty clay with gravel	334.7			
	Dense glacial till of grey silty sand with fine to med. gravel - traces of fragments of shale		10		
	Elev. 326.0 below	327.7			
	Shale	324.7			
	End of borehole	324.4	20		
	(No water in B.H.)		30		
			40		

CONSISTENCY	SAMPLE	NATURAL
MOIST. CONTENT - % DRY WT.		UNIT WT. P.C.F.
	S 1	-

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 13
JOB F 59-120 STATION 107+90 37.5 RT. (Hwy. 10)
DATUM 342.4' COMPILED BY B.K.
BORING DATE Dec. 8/59 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) — 0
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.
	Groundlevel	342.4	0	BLOWS/FT.
	Fill material (Brown Sand and gravel)	338.4		
	Dense glacial Till of grey silty clay with gravel.	334.4		
	Dense glacial till of grey sand cemented together with fine to med. gravel - traces of fragments of shale Elev. 320.0 below.	334.4	10	
	Shale	322.4	20	
	End of borehole (No water in B.H.)	321.9		
			30	
			40	

CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	S 1	-

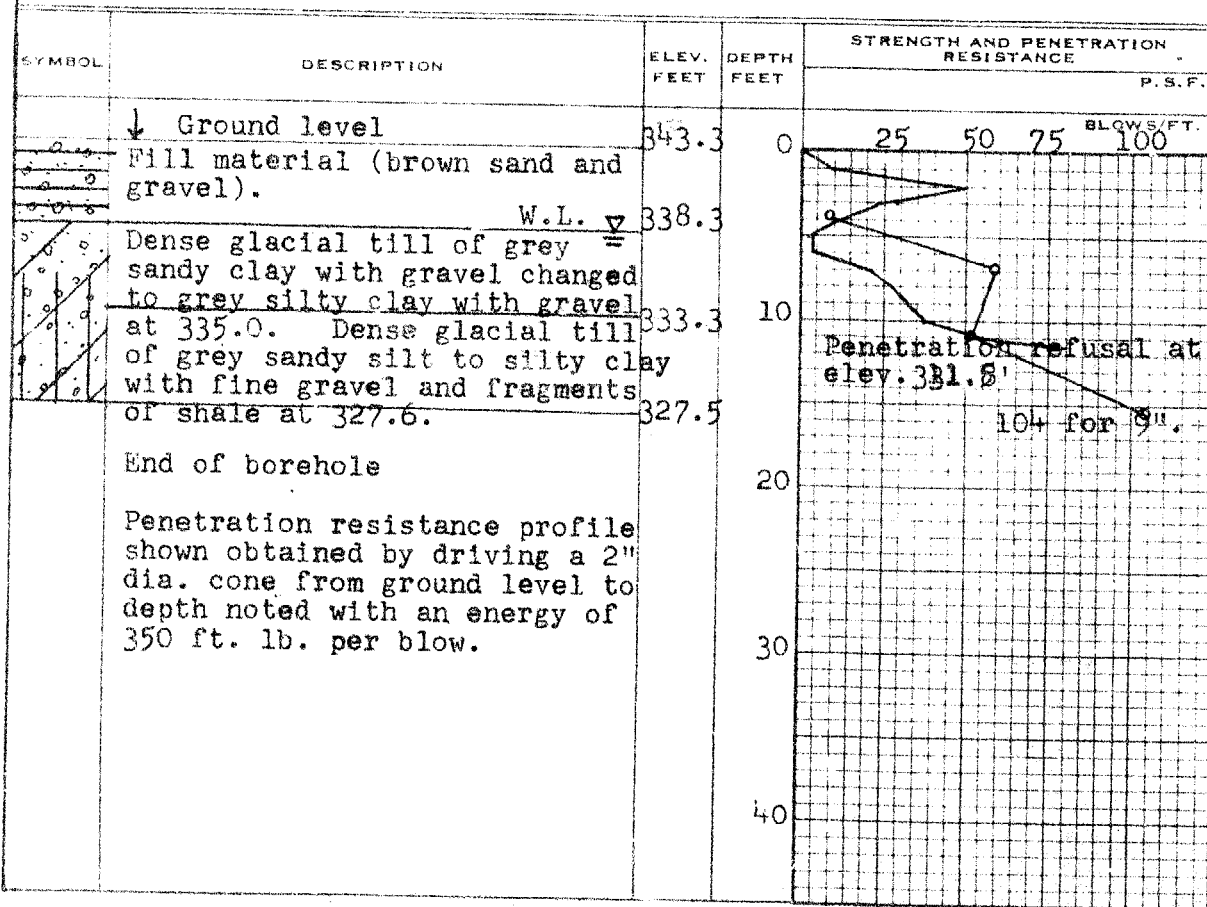
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101 - 58 BORE HOLE NO. 16
JOB F59-120 STATION 109+55 380 Rt. (Hwy. 10)
DATUM 343.3 COMPILED BY B.K.
BORING DATE Dec. 9/59 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) — +
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		
			S1	-
			S2	130.6
			S3	-
			S4	-

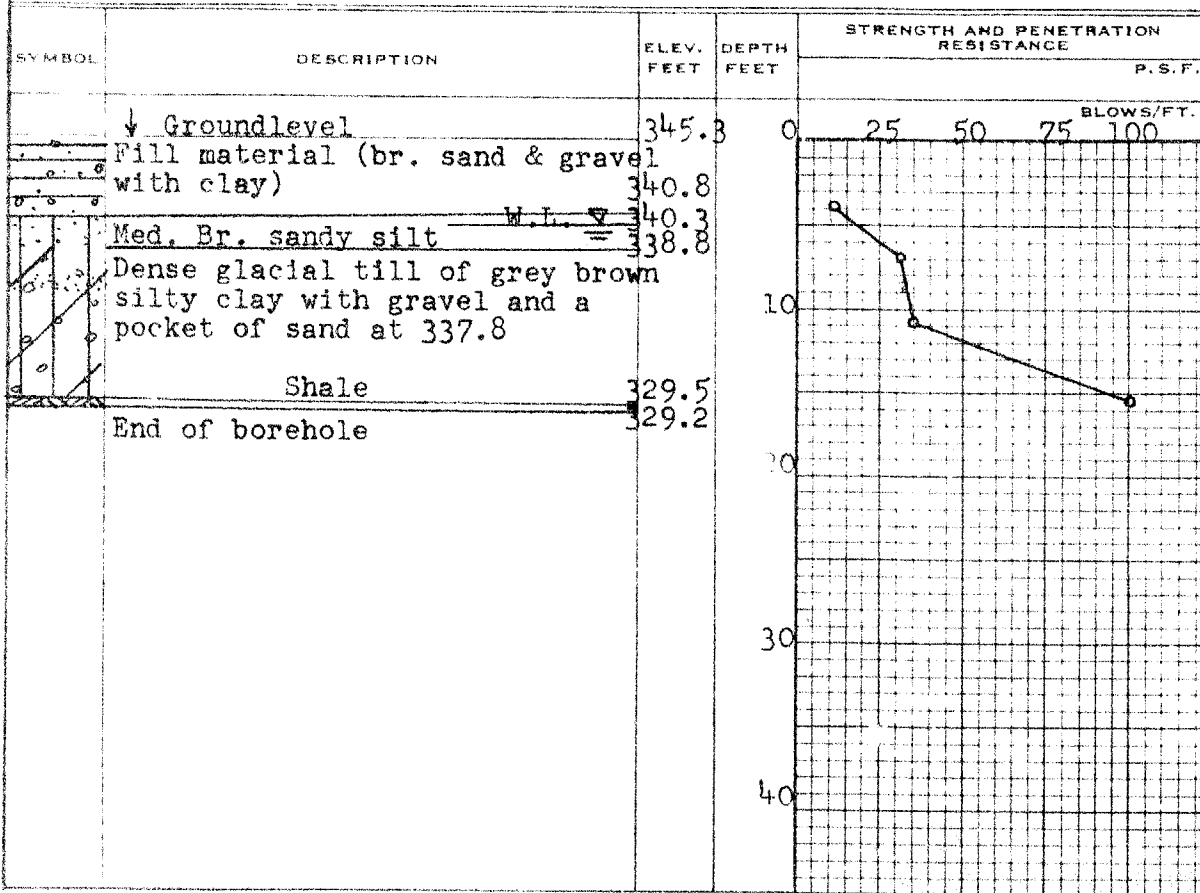
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 17
JOB F59-120 STATION 111+05-38 RT. 1
DATUM 345.3 COMPILED BY B.K.
BORING DATE 9/12/59 CHECKED BY M.D. & A.J.

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



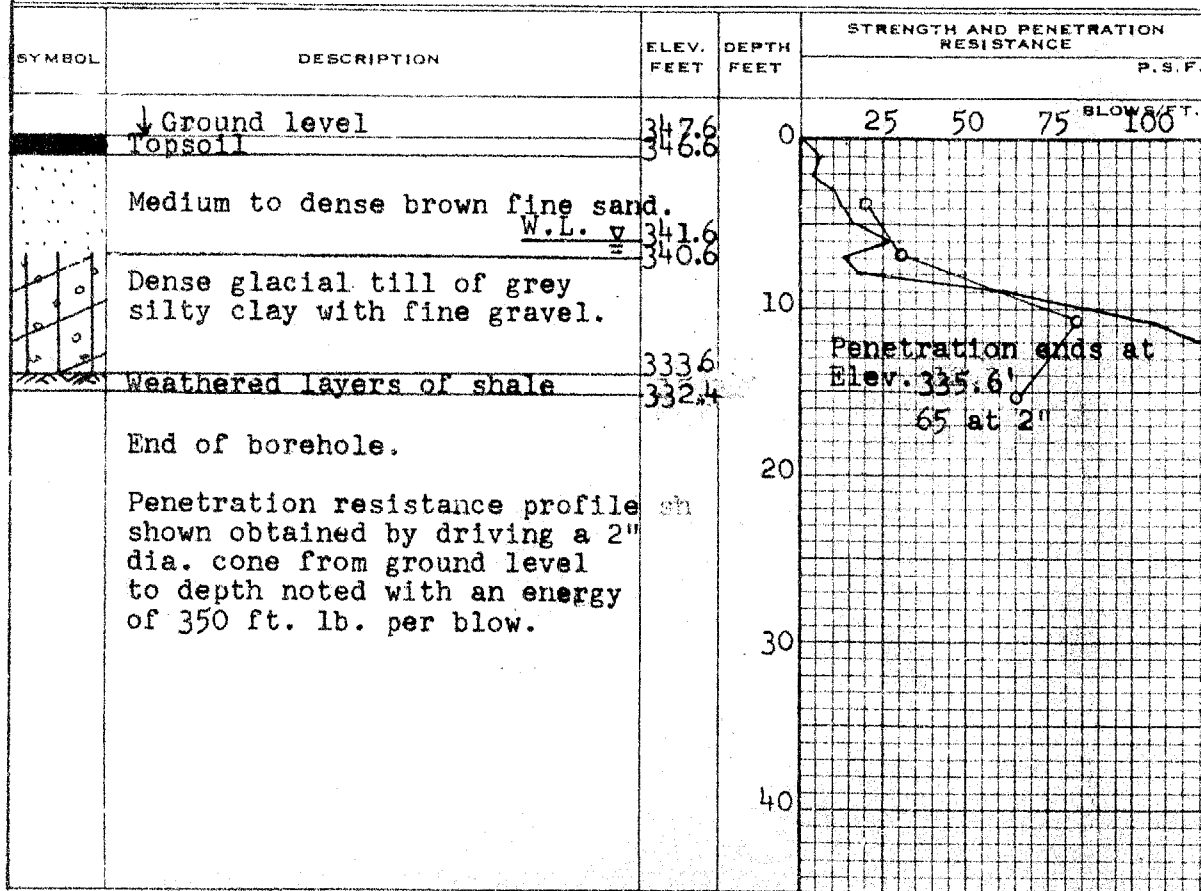
CONSISTENCY		SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.			
10 20 30			
		S1	-----
		S2	150.0
		S3	-----
		S4	-----

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101 - 58 BORE HOLE NO. 18
JOB F59-120 STATION 112+55 (37.5' ±)
DATUM 347.6 COMPILED BY B.K.
BORING DATE Dec. 9/59 CHECKED BY M.D. & A.J.

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) — 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.				
10	20	30		
			S1	-
			S2	-
			S3	-
			S4	-

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 101-58 BORE HOLE NO. 19
JOB F59-120 STATION 113+15 38' 11" (Hwy 10)
DATUM 347.7' COMPILED BY BK
BORING DATE Dec. 9/59 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 (Qu) 0
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.	
	↓ Groundlevel	347.7	0	25 50 75 100 BLOWS/FT.	
	Medium brown fine sand	342.7			
	Dense glacial till of grey clayey silt with fine gravel changing to sandy clay with gravel.	335.7	10	50 for 9"	
	End of borehole		20		
	(No water in B.H.)		30		
			40		

CONSISTENCY			SAMPLE	NATURAL UNIT WT. P. C. F.
MOIST. CONTENT - % DRY WT.				
10	20	30		
X			S1	-
X			S2	-

#59-F-120

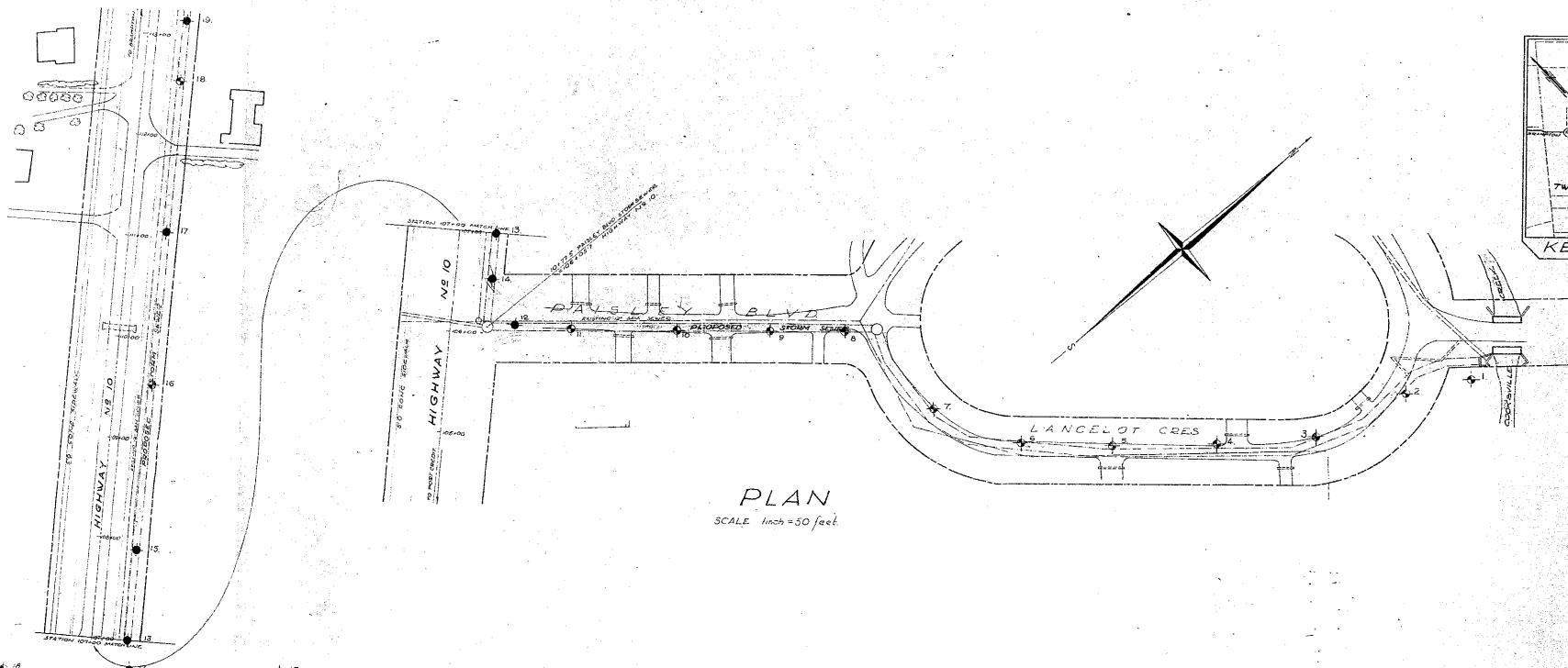
WP. #101-58

Hwy #10

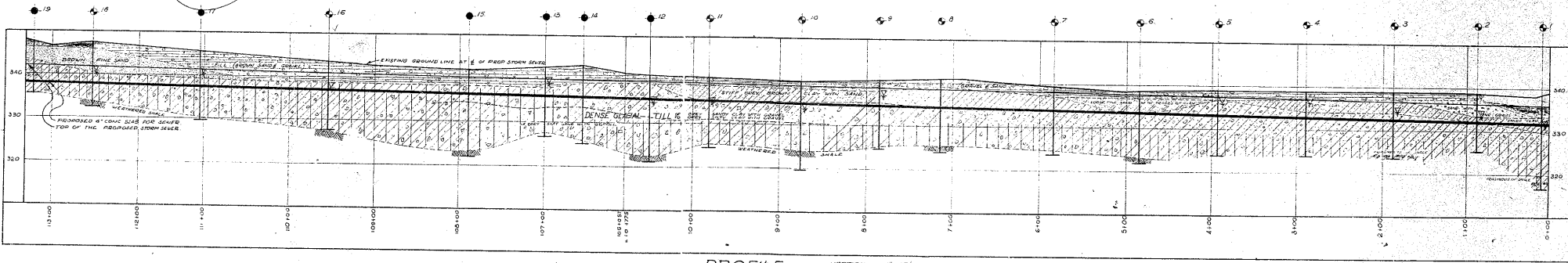
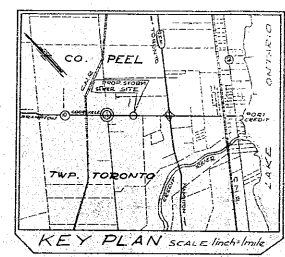
PROPOSED

STORM SEWER

COOKSVILLE



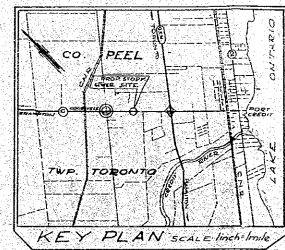
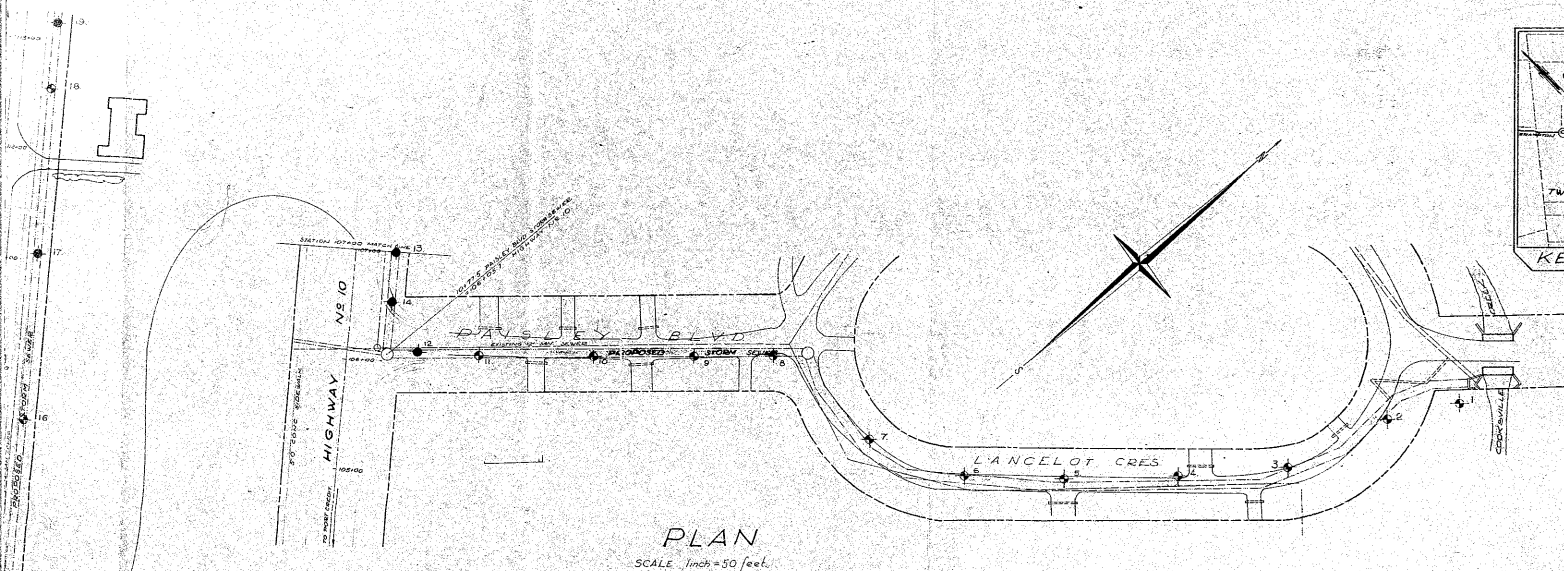
PLAN
SCALE 1 inch = 50 feet



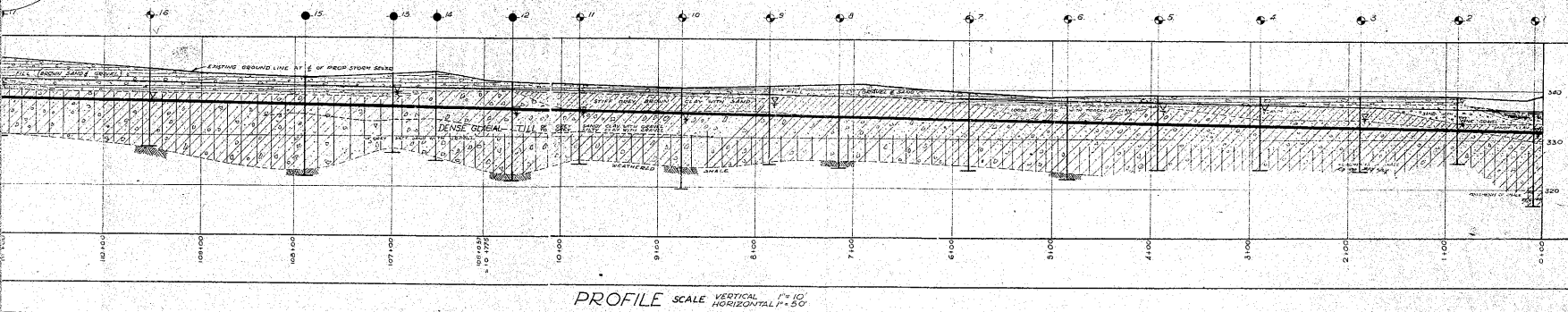
PROFILE SCALE VERTICAL 1" = 10'
HORIZONTAL 1" = 50'

412000
412500
17
WHITE

PR
HIGHWAY
HWY.
TOWNSHIP
LOCATION
DRAWN BY
DATE
SCALE 25'



LEGEND				
BORE HOLE				
BORE & PENETRATION HOLE				
EXISTING SANITARY SEWER				
WATER LEVEL IN BOREHOLES				
PROPOSED STORM SEWER				
CONCRETE SLAB				
HOLE NO.	ELEVATION	STATION	DISTANCE FROM PROPOSED STORM SEWER	
1	335.5	0+10	17' LT.	
2	336.2	0+88	10' LT.	
3	337.8	1+90	5' RT.	
4	338.6	2+91	7' RT.	
5	338.0	3+85	6' RT.	
6	337.8	4+85	3' RT.	
7	339.5	5+85	6' RT.	
8	339.9	7+12	3' LT.	
9	340.2	7+85	3' LT.	
10	339.8	8+75	5' LT.	
11	340.0	9+82	2' LT.	
12	340.5	10+74	2' LT.	
13	342.7	107+00	37' RT.	
14	343.1	106+55	37' RT.	
15	342.4	107+90	37.5' RT.	
16	343.3	109+55	38' RT.	
17	343.3	111+05	38' RT.	
18	347.0	112+52	37.5' RT.	
19	347.7	113+15	38' RT.	



616200
413500
17
30116

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.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION

PROPOSED STORM SEWER
HIGHWAY 10, FABLEY BLVD & LANCELOT CRES

SHOWING POSITIVE LINES & ELEVATIONS OF HOLES

HWY.	DISTRICT	COUNTY
TOWNSHIP	COOK'SVILLE	PEEL
LOCATION	COOK'SVILLE	PEEL
DATE	10/11/80	W.P. 101-50
DESIGNED BY	APPROVED BY	W.P. 101-50
W.P. 101-50	W.P. 101-50	W.P. 101-50