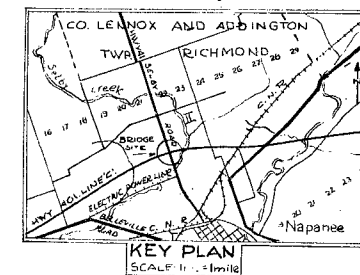
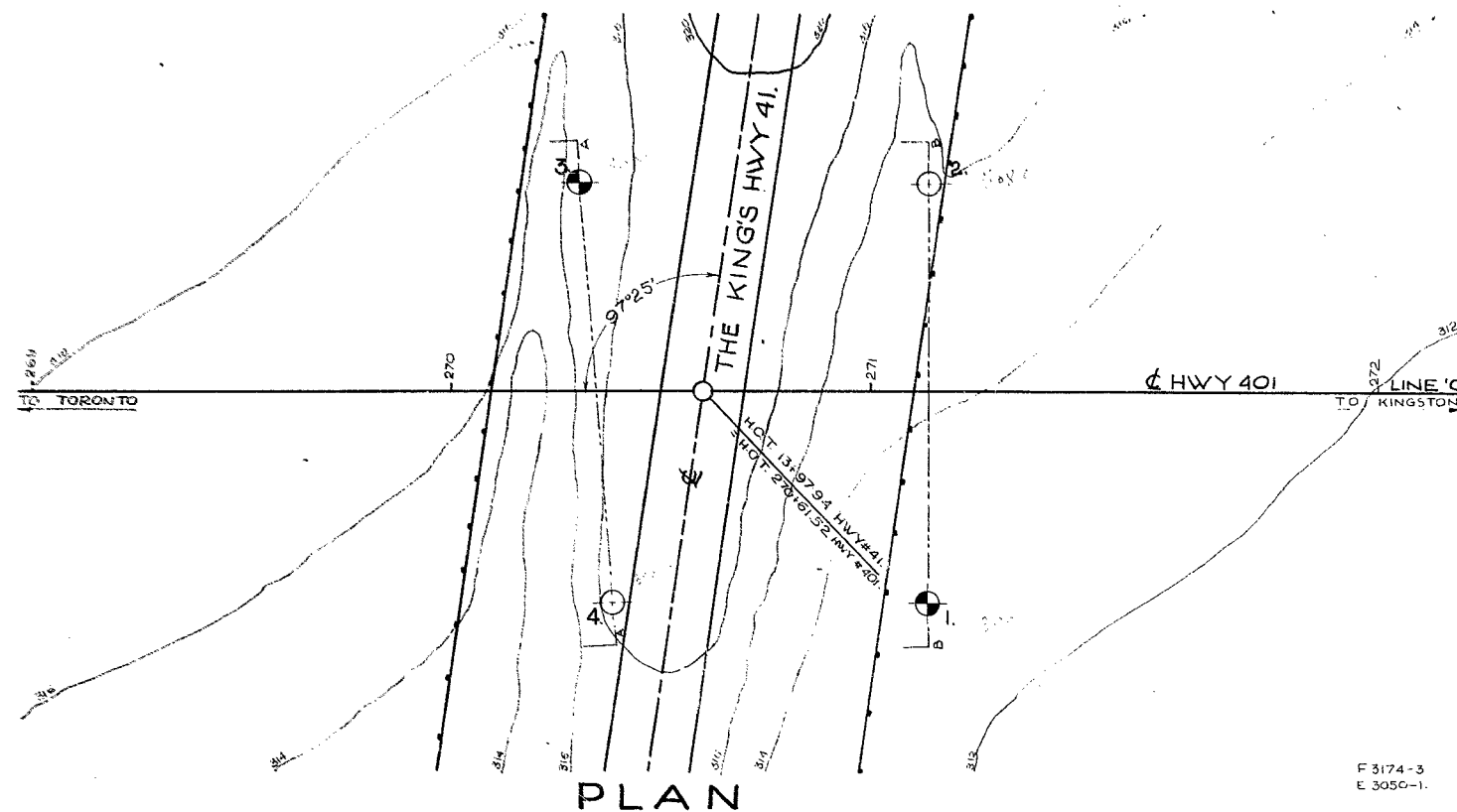
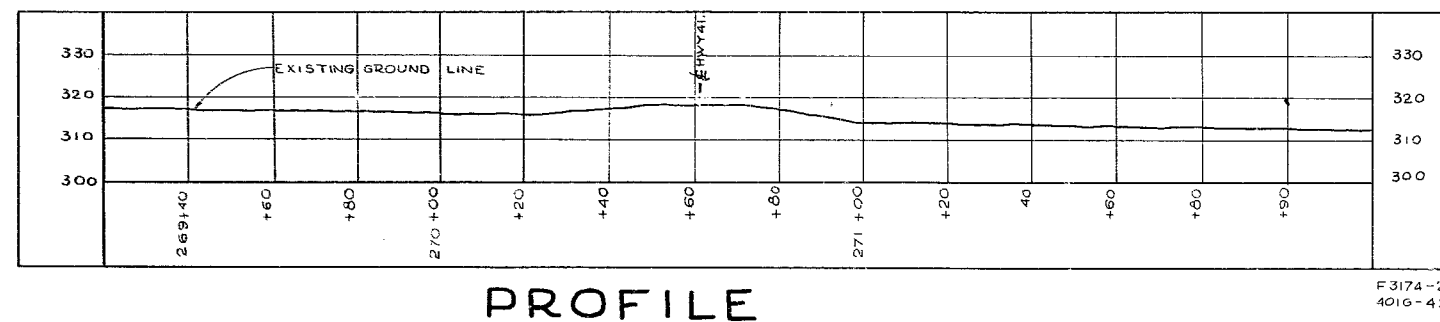


59-F-28
W.P. # 28-59
Hwy. # 401 ;
Hwy. # 41
CROSSING
CON. # 2
1 MILE N. OF
NAPANEE

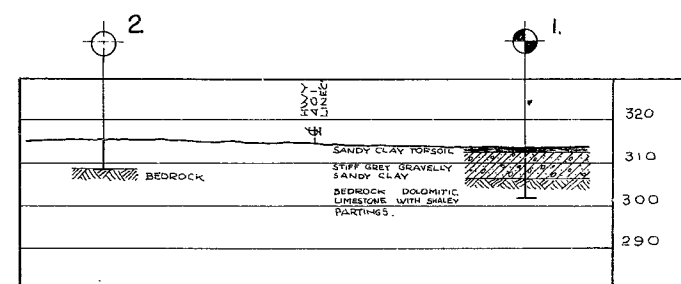
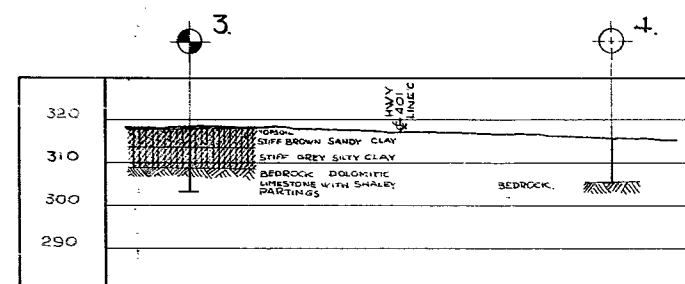


LEGEND			
BORE & PENETRATION HOLE			
PENETRATION HOLE			
HOLE NO.	ELEVATION	STATION	DISTANCE FROM C
1.	313.4	271+14	50 RT.
2.	315.8	271+14	50 LT.
3.	318.7	270+30	50 LT.
4.	315.9	270+38	50 RT.



- 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

HIGHWAY 41 PROPOSED CROSSING

SHOWING POSITIONS & ELEVATIONS OF HOLES

HWY. 401 LINE 'C' DISTRICT 8 COUNTY, LENNOX AND ADDINGTON

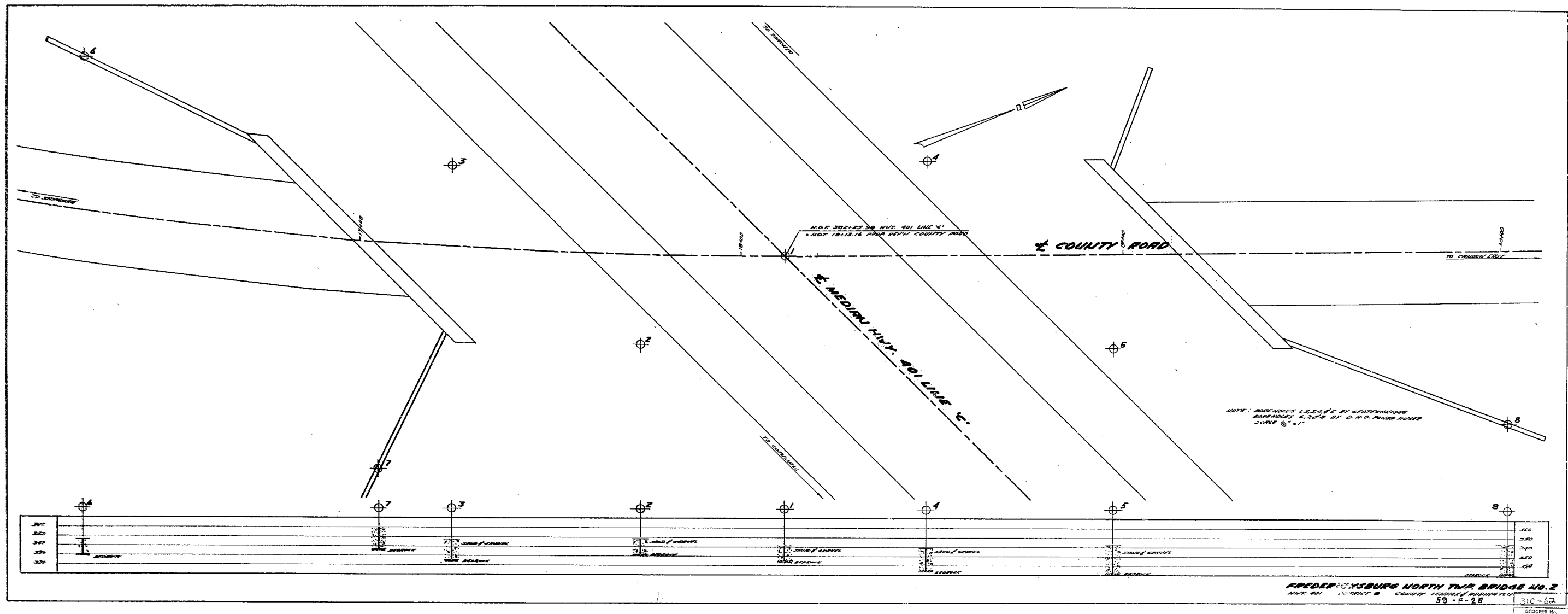
TOWNSHIP RICHMOND 101 21 22 CON II

LOCATION 1 mile NORTH OF NAPANEE

DRAWN BY T. SZEGVARY CHECKED BY W.P. 28-59

DATE 1. JUNE 1959 APPROVED BY DRAWING NO. F 59-28A

SCALE 1" = 20'



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

June 22, 1959.

Re: FOUNDATION REPORT -
W.P. 28-59 - W.J. F-59-28.

Attention: Mr. S. McCombie.

Hwy. 401 Line 'C' & Hwy. 41 Crossing,
Lots 21 & 22, Con. II, Twp. of Richmond,
Approximately 1 Mile North of Napanee.

Enclosed herewith is our report on the subsoil conditions existing at the above noted site. The field work which consisted of two sampled borings and two dynamic cone penetration tests, shows that the shallow overburden layer of stiff clay overlies sound limestone bedrock at this structure location.

It is recommended that spread footings for this structure be founded directly on the limestone bedrock which has been noted at elevations 306' to 308'. This will involve excavations to a depth of 7' - 10' below existing ground surface. An allowable footing pressure of at least 10 tons/sq. ft. can be applied to the bedrock. Ground water conditions are such that excavations will be sensibly dry. No problems need be anticipated with respect to embankment loadings, for either an overpass or underpass structure.

If any questions arise with respect to the contents of this report, please contact our office.

L. G. Soderman

LGS/MdeF
Encl.

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

cc: Messrs. A. M. Toye
H. A. Tregaskes
D. G. Ramsay
S. Markiewicz
L. E. Walker
J. E. Gruspier
Dr. P. Karrow
Foundation Section
Gen. Files.

FOUNDATION REPORT

on

Hwy. 401 Line 'C' & Hwy. 41 Crossing,
Lots 21 & 22, Con. II, Twp. of Richmond,
Approximately 1 Mile North of Napanee.

Plan No: F-3174-3

Profile No: F-3174-2

Chainage: Sta. 270+61.52.

Distribution:

Mr. A. M. Toye, Bridge Engineer.	(2)
Mr. H. A. Tregaskes, Construction Engineer.	(1)
Mr. D. G. Ramsay, Design Engineer.	(1)
Mr. S. Markiewicz, Project Design Engineer.	(1)
Mr. L. E. Walker, District Engineer, Kingston, Ontario.	(1)
Mr. J. E. Gruspier, Regional Soils Engineer, Kingston, Ontario.	(1)
Dr. P. Karrow, Department of Mines.	(1)
Foundation Section.	(1)
Gen. Files.	(1)

W.P. 28-59.

W.J. F-59-28.

INTRODUCTION:

Presented in this report are the results of a subsoil investigation carried out at a structure location approximately one mile north of Napanee, where proposed Hwy. 401 Line 'C' crosses existing Hwy. 41 in Lots 21 & 22, Con. II, Twp. of Richmond (Station 270+61.52, Profile No. F-3174-2). This report contains the field and laboratory findings and recommendations for the foundation of the structure.

The field work commenced on April 16, 1959 and was completed on April 17, 1959.

DESCRIPTION OF THE SITE & GEOLOGY:

The topography of the site and its surrounding areas is generally level to undulating. The areas on both sides of existing Hwy. 41 are presently uncultivated and in pasture. Limestone rock outcrops are visible in the vicinity of the crossing site. At the time of the investigation, the area was covered with water resulting from spring thaw and rain.

Physiographically, the site is located on the Napanee Plain, a flat to undulating plain of limestone, from which the glaciers stripped most of its overburden. At this site, a surface layer of stiff clay overlies the limestone bedrock.

DESCRIPTION OF FIELD & LABORATORY WORK:

Field work consisted of 2 sampled boreholes with dynamic cone penetration test adjacent to each hole and 2 separate dynamic cone penetration tests. The exploration programme was carried out by a standard diamond drill adapted for soil sampling.

DESCRIPTION OF FIELD & LABORATORY WORK: (cont'd.) ...

Conventional wash boring procedures were followed. Samples were recovered at depths required by means of 2" I.D. thin-walled shelby tube samplers or a 2" O.D. split spoon sampler. The dimensions of this spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration test. Rock samples were obtained by rotary drilling using an AXT corebit and retained in a 5-ft. double-tube core-barrel.

Upon receipt in the laboratory, samples were visually examined and identified. Routine index tests were performed on selected representative samples. Laboratory test results have been presented in the borehole logs and detailed in tabular form.

The location plan and subsoil profile are presented in Drawing No. F-59-28A.

SUBSOIL CONDITIONS:

The site is underlain by limestone bedrock covered by a shallow overburden of stiff clay.

In each of the sampled boreholes, the topsoil was found to be underlain by a 7' to 10' layer of stiff clay extending from Elevations 312.4' to 306.2' in Boring 1, and 318.7' to 308.7' in Boring 3. The stiff clay was underlain by limestone bedrock. Bedrock was drilled and cored to Elev. 301.4' in Boring 1, and Elev. 303.7' in Boring 3 to determine its quality and soundness.

cont'd. /3 ...

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

In the order of stratigraphic succession, the following soil types are defined:-

1. Stiff Clay -

This layer of stiff clay was encountered immediately below the topsoil in both Borings 1 & 3. Its thickness ranges from approximately 7 ft. in Boring 1, to 10 ft. in Boring 3. Its colour is predominantly grey except that in Boring 3, the upper 5 ft. has been subjected to oxidation resulting in its present brownish colour. The stiff clay contains 20% to 30% sand and 21% to 35% silt. The average unit weight and moisture content were found to be 130 p.c.f. and 30%, respectively. Laboratory test results show its shear strength ranges from 1100 p.s.f. to 5600 p.s.f. It is of medium plasticity.

2. Bedrock -

Underneath the stiff clay layer, bedrock was encountered at Elev. 306.2' in Boring 1, and Elev. 308.7' in Boring 3. It was proven by core drilling down to Elev. 301.4' in Boring 1, and Elev. 308.7' in Boring 3. Bedrock is composed of fine-grained dolomitic limestone with shaley partings of the Black River Series. The limestone is in a very sound condition with no sign of fracture or weathering. The allowable bearing capacity of the limestone is estimated to be at least 10 t.s.f.

Laboratory and field test results have been summarized in Table No. I and are included in this report under Appendix I.

cont'd. /4 ...

WATER CONDITIONS:

Observations and measurements carried out during boring and sampling operations indicate that the ground water table is at approximately Elev. 313' to Elev. 315'. In view of the fact that no water-bearing sand seams of any significance, or artesian water conditions were encountered during the exploration programme, seepage inflow during footing excavations will be local and of minor quantities, only.

FOUNDATION CONSIDERATIONS:

Reference to the borehole logs shows that subsoil conditions at the site consist simply of a shallow overburden of 7' to 10' overlying limestone bedrock. The limestone is of good quality and soundness; henceforth, the proposed structure can safely be supported on spread footings placed directly on top of the bedrock surface, which commences at approximately Elev. 306' to Elev. 308'. An allowable bearing value of at least 10 t.s.f. can be used for spread footing design.

No excessive seepage problems with respect to footing excavations are anticipated.

No approach fill stability problems are anticipated, either for an overpass or underpass structure.

CONCLUSIONS & RECOMMENDATIONS:

- (1) The site is underlain by limestone bedrock of the Black River series, covered by a shallow overburden of stiff clay.

cont'd. /5 ...

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

- (2) The proposed structure can be supported on spread footings placed directly on top of the bedrock surface, which commences at approximately Elev. 306' to 308'. An allowable bearing value of at least 10 t.s.f. can be used.
- (3) No ground water problems with respect to footing excavations are anticipated.
- (4) No approach fill stability problems are anticipated, either for an overpass or underpass structure.

AKLH

A. K. Loh,
FOUNDATIONS ENGINEER.

APPENDIX I.

W.P. 28-59.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 28-59. BORE HOLE NO. 1
 JOB F 59-28. STATION 271/14 (50' Rt.)
 DATUM Geodetic COMPILED BY B.K.
 BORING DATE April 16/59 CHECKED BY A.L.

LEGEND

SS 1/2 UNCONFINED COMPRESSION (Q_u) O
 TW 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			
				2000	4000	6000	8000
	Ground Level. ∇	313.4		P.S.F.			
	Sandy Clay Topsoil	312.4		50 100			
	Stiff grey gravelly sandy clay.		5				
	Bedrock.	306.2	10				
	Dolomitic Limestone with Shaley Partings.	301.4	15				
	End of Borehole.		20				

CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	TW1	151.5
	RC	

Borehole No. 1.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 28-59. BORE HOLE NO. 2.
JOB F 59-28 STATION 271/14 (50' Lt.)
DATUM Geodetic. COMPILED BY B.K.
BORING DATE April 17/59 CHECKED BY A.L.

LEGEND

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

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000
↓	Ground Level.	315.8					
					50		100
///	Bedrock.	308.2					
			5				
			10				
			15				
			20				

[illegible]

Borehole No. 2

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 28-59. BORE HOLE NO. 3.
 JOB F 59-28. STATION 270+38 (50' Lt.)
 DATUM Geodetic. COMPILED BY B.K.
 BORING DATE April 17/59 CHECKED BY A.L.

LEGEND

2" DIA. SPLIT TUBE --- SS
 2" SHELBY TUBE --- TW
 2" SPLIT TUBE --- O
 2" DIA. CONE --- LI
 2" SHELBY --- X
 CASING ---
 1/2 UNCONFINED COMPRESSION (Q_u) --- 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			
				2000	4000	6000	8000 P.S.F.
	Ground Level.	318.7			50		100
	TOP SOIL	2"					
	Stiff Brown Sandy Clay. <i>W.L. 315.7</i>	313.7	5				
	Stiff Grey Silty Clay.						
	Bedrock.	308.7	10				
	Dolomitic Limestone with Shaley Partings.						
	End of Borehole.	303.7	15				
			20				

CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.		
	TW 1	118.0
	SS 2	123.5
	RC	

Borehole No. 3.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 28-59. BORE HOLE NO. 2.
JOB F 59-28 STATION 270+38 (50' Rt.)
DATUM Geodetic COMPILED BY B.K.
BORING DATE April 17/59 CHECKED BY A.L.

2" DIA. SPLIT TUBE _____

2" SHELBY TUBE _____

2" SPLIT TUBE _____

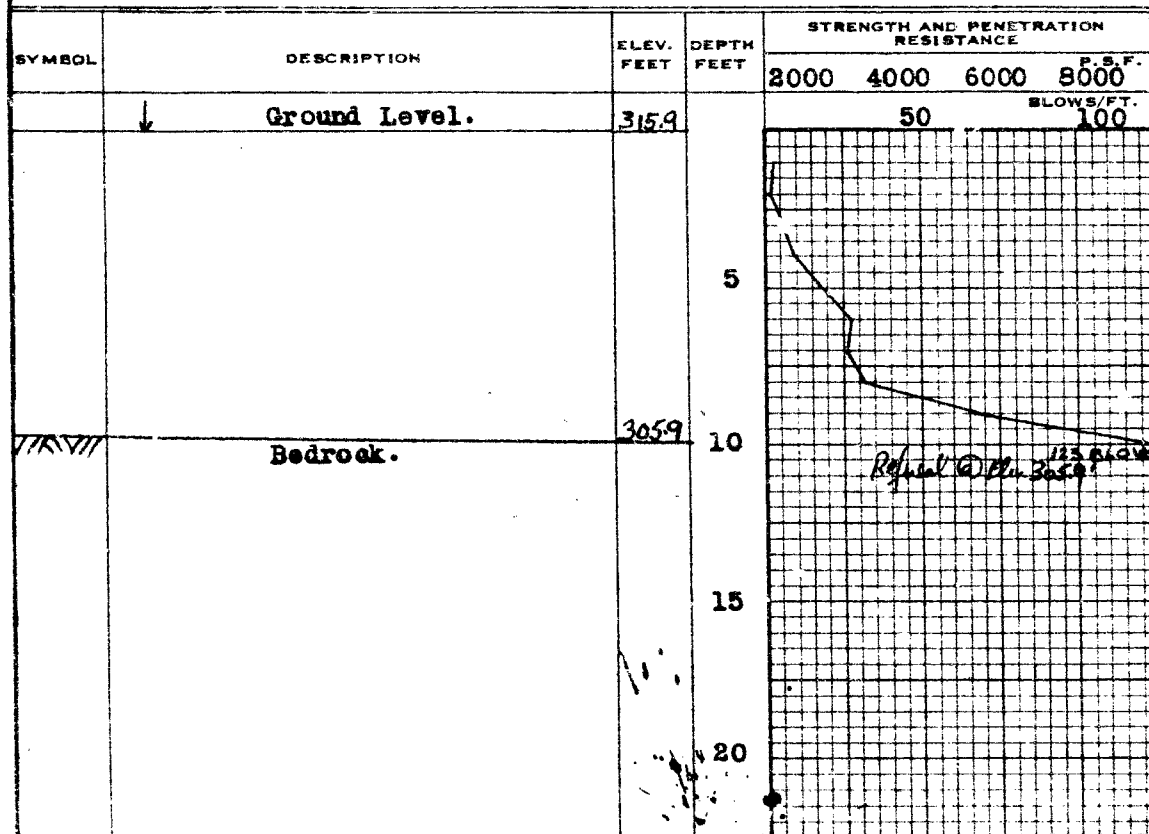
2" DIA. CONE _____

2" SHELBY _____

CASING _____

LEGEND

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

[illegible]