

Mr. A..Toye.

July 22nd, 1957.

Bridge Engineer.

Re: Foundation Report.

Mr. F.C. Brownridge.

Hwy. 401 3 mi.N. of Streetsville

W.P. 77-57. W.J. F-57-8.

Attached herewith are two copies of the above mentioned Foundation Report. In view of the satisfactory bearing capacity of the soil at this location, it would appear that spread footings would be suitable.

F.C. Brownridge.  
Materials & Research Engineer.

per:



A. Rutka.  
Principal Soils Engineer.

c.c. Mr. H. Tregaskes.  
Mr. D.G. Ramsay.  
Mr. J.B. Milkes.  
Foundation Section.  
File.

# FOUNDATION REPORT

on

New Highway 401 (line "A" and proposed side road  
(Revision line "A") crossing 3 miles  
north of Streetsville.

Site plan: E-3205-1  
Stations: 563+82

## Distribution:

Mr. A. Toye Bridge Engineer	(2)
Mr. H. Tregaskes Construction Engineer	(1)
Mr. D. G. Ramsay Design Engineer	(1)
Mr. J. B. Wilkes Dist. Eng. Toronto	(1)
Foundation Section	(1)
FILE	(1)

E.J. P-57-8  
W.P. 77-57

## INTRODUCTION

A subsoil investigation was carried out to determine the bearing value of the layers for supporting the foundations of the proposed structure. The site is some 3 miles north of Streetsville, where the new Highway 401 (line "A") underpasses the proposed side road revision line "A", (Station 503+82, profile No. F-3522-8). The work started on April 29, 1957 and was completed on May 4, 1957.

## APPARATUS

The subsoil investigation was carried out by a skid mounted coredrill machine. Two boreholes with dynamic cone penetration tests and two separate dynamic cone penetration tests were made. Boreholes No. 1 and 2 are located on the north side and boreholes No. 3 and 4 are located on the south side of the Highway 401 centre line.

These locations of the boreholes are shown in Drawing No. F-57-8A and their logs under Appendix I.

## SOIL FINDINGS AND ANALYSIS

The terrain is till plain. The subsoil investigations revealed the following stratigraphy:

Under the topsoil the layer is typical grey and red, bouldery clay till. It becomes harder and more bouldery by depth. This till layer is underlain by red and grey shale which was encountered at depths of 21.5 and 23 ft. respectively below the ground surface. Some undisturbed samples were extracted from the boreholes and tested in the laboratories. The results indicate the soil being mainly clay mixed with silt, sand and boulders. The soil has average values of 28.1% for liquid limit, 17% for plastic limit and 15.6% for moisture content, and is classified as inorganic clay of low plasticity.

The samples extracted from the top 6 ft. were undisturbed and of uniform material so that the results of the unconfined compression tests showed shear strength about 2.5 T.s.f. with an average standard penetration value of 35 blows per foot.

#### SOIL FINDINGS AND ANALYSIS (Continued)

The samples extracted below this depth were mostly disturbed and the soil too bouldery. Hence, not many dependable unconfined compression tests could be made. However, the field penetration results of 80-100 blows per foot indicate the very hard nature of the remaining layer. The layer is considered to be impervious.

The underlying shale layer was drilled and core samples were extracted.

#### CONCLUSIONS AND RECOMMENDATIONS

From the above discussion it will follow that:

1. The layer is clay till reaching a depth of 21 - 23 ft. depth from the ground surface. Red and grey shale is the underlying bedrock.
2. It will be convenient to support the structure on spread footing foundations placed at elevation about 587 ft. at this elevation the soil can provide 2 t.s.f. bearing value with a safety factor of 3. A higher bearing value of 3 t.s.f. could be expected at elevation 585 ft. with the same safety factor.
3. The approach fills to the structure do not present any stability problem.

V. Gorin  
Foundation Engineer

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION BORE & PENET'N  
CASING BX (standard samplers to fit unless noted)  
SAMPLER HAMMER WT. 250 LBS. DROP 23 INCHES

JOB F-57-B WP 77-57  
DATUM GEODETIC  
COMPILED BY H.S. CHECKED BY AL

BORING 1 STA 563+54 (10' RT)  
DATE REPORT JUNE 1957  
DATE BORING 30 APRIL 1957

**ABBREVIATIONS**

V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY  
M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION  
U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING  
Q<sub>c</sub> - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL γ - UNIT WEIGHT

**SAMPLE TYPES**

C.S. - CHUNK D.O. - DRIVE OPEN PS - PISTON SAMPLE  
D.F. - DRIVE FOOT VALVE WS - WASHED SAMPLE  
T.O. - THIN WALLED OPEN RC - ROCK CORE

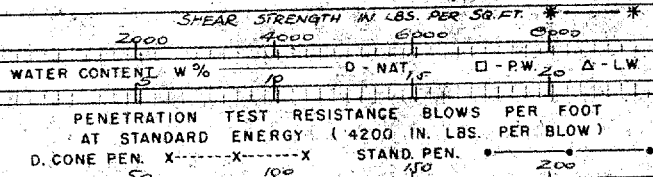
**SAMPLE CONDITION**



- DISTURBED  
- FAIR  
- GOOD  
- LOST

**SOIL PROFILE**

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE
590.44		GROUND LEVEL		590
589.44'	1.0	TOP SOIL		
585		HARD GREY CLAY WITH SOME GRAVEL (TILL)		585
579.94'	10.5	VERY HARD RED GRAVELLY CLAY LOAM (TILL)		580
575				575
570				570
567.44'	23.0	BEDROCK		565
562.44'	28.0	SHALE		560
560		END OF BOREHOLE		



CASING BLOWS  
(ACTUAL)

**SAMPLES**

OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE %	ELEV. RECOV.
					590.44
					589.44
					586.44
					585.44
					584.44
					583.44
					582.44
					581.44
					580.44
					579.44
					578.44
					577.44
					576.44
					575.44
					574.44
					573.44
					572.44
					571.44
					570.44
					569.44
					568.44
					567.44
					566.44
					565.44
					564.44
					563.44
					562.44
					561.44
					560.44

NOTE: UNCONFINED COMPRESSION TEST RESULTS ARE INACCURATE  
DUE TO PRESENCE OF GRAVEL

DEPARTMENT OF HIGHWAYS - ONTARIO  
 MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION PENETRATION JOB F-57-B WP 77-57 BORING 2 STA. 563+83(34' R)  
 CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT JUNE 1957  
 SAMPLER HAMMER WT. 250 LBS. DROP 23 INCHES COMPILED BY MS CHECKED BY AL DATE BORING 2 MAY 1957

## ABBREVIATIONS

V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY  
 M - MECHANICAL ANALYSIS S - TRIAXIAL SLOW C - CONSOLIDATION  
 U - UNCONFINED COMPRESSION WL - WATER LEVEL IN CASING CA - CASING  
 Q<sub>c</sub> TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL  $\gamma$  - UNIT WEIGHT

## SAMPLE TYPES

CS - CHUNK SS - SLEEVE SAMPLE  
 DO - DRIVE OPEN PS - PISTON SAMPLE  
 DF - DRIVE FOOT VALVE WS - WASHED SAMPLE  
 TO - THIN WALLED OPEN RC - ROCK CORE

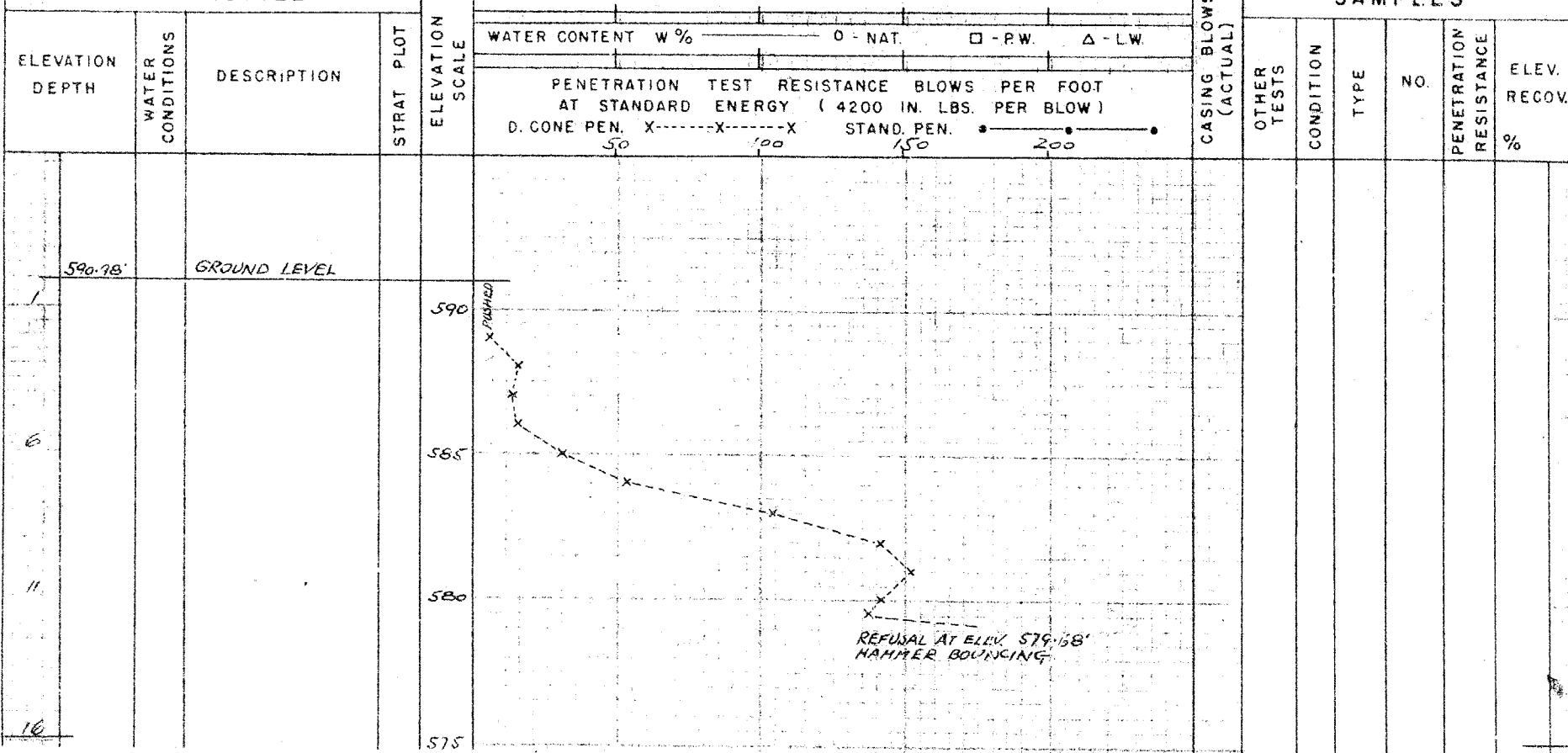
## SAMPLE CONDITION



- DISTURBED  
 - FAIR  
 - GOOD  
 - LOST

## SOIL PROFILE

## SAMPLES



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-2 OPERATION BORE & PENET'N  
CASING 8x (standard samplers to fit unless noted)  
SAMPLER HAMMER WT. 250 LBS. DROP 23 INCHES

JOB F-57-B W.P. 77-57  
 DATUM GEODETIC  
 COMPILED BY H.S. CHECKED BY A.L.

BORING 3 STA. 564+34 (93 LT.)  
DATE REPORT JUNE 1957  
DATE BORING 2 MAY 1957

## ABBREVIATIONS

V - INSITU VANE SHEAR TEST      Q - TRIAXIAL QUICK      K - PERMIABILITY  
M - MECHANICAL ANALYSIS      S - TRIAXIAL SLOW      C - CONSOLIDATION  
U - UNCONFINED COMPRESSION      WL - WATER LEVEL IN CASING      CA - CASING  
QC - TRIAXIAL CONSOLIDATED QUICK      WT - WATER TABLE IN SOIL      γ - UNIT WEIGHT

## SAMPLE TYPES

S.S. - SLEEVE SAMPLE  
P.S. - PISTON SAMPLE  
W.S. - WASHED SAMPLE  
R.C. - ROCK CORE

**SAMPLE CONDITION**



- DISTURBED
- FAIR
- GOOD
- LOST

## SOIL PROFILE

ELEVATION DEPTH		WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT W % 10 0 - NAT. 15 0 - P.W. 20 0 - L.W.				PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY ( 4200 IN. LBS. PER BLOW ) D. CONE PEN. X-----X-----X STAND. PEN. •-----•-----•	CASING BLOW (ACTUAL)	OTHER TESTS	CONDITION	TYPE.	NO.	PENETRATION RESISTANCE	ELEV. RECOVER
						50 100 150 200											%
593.2'			GROUND LEVEL														593.2'
592.2'	1.0'		TOPSOIL														591.2'
5			HARD GREY CLAY WITH SOME GRAVEL (TILL)		590										10	86.4	83
															20	p.c.f.	589.2'
586.2	7.0'				585										13	140.0	88
8															24	p.c.f.	
			VERY HARD RED GRAVELLY CLAY LOAM (TILL)		580												585.2'
13					575												
18																	579.2'
573.2'	20'		BEDROCK		570												63
23																	573.2'
566.4'	24.8'		SHALE		565												
26			END OF BOREHOLE														

NOTE: UNCONFINED COMPRESSION TEST RESULTS ARE INACCURATE  
DUE TO PRESENCE OF GRAVEL.

REFUSAL AT ELEV. 582.2'  
HAMMER BOUNCING

AX CASING SHOE



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW  
**OFFICE REPORT ON SOIL EXPLORATION**

DRILL RIG 54-2 OPERATION PENETRATION JOB F-57-B W.P. 77-57 BORING 4 STA. 563+95 (39' 1")  
 CASING 8X (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT JUNE 1957  
 SAMPLER HAMMER WT. 250 LBS. DROP 23 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 4 MAY 1957

**ABBREVIATIONS**

**SAMPLE TYPES**

**SAMPLE CONDITION**

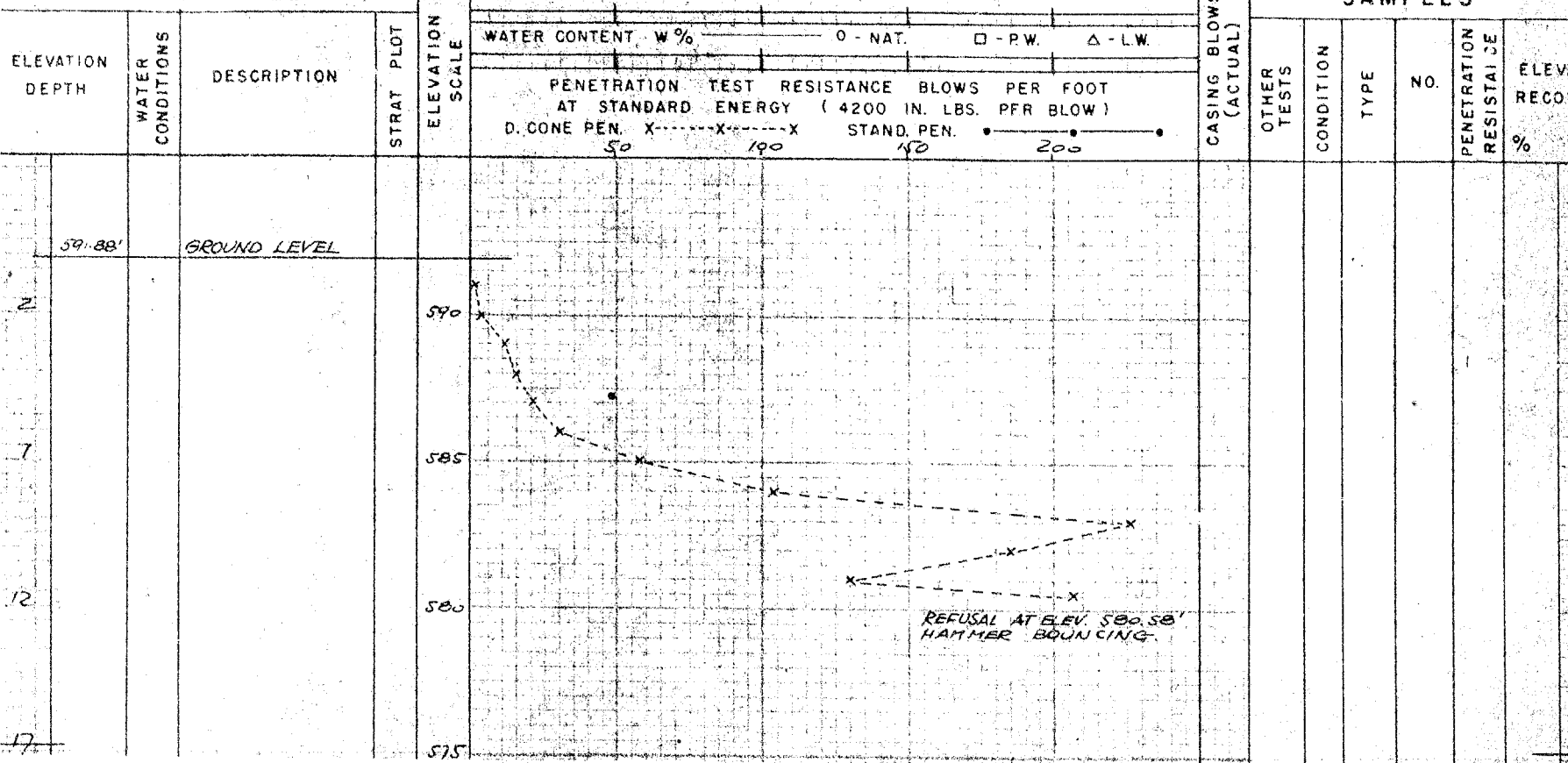
V - INSITU VANE SHEAR TEST Q - TRIAXIAL QUICK K - PERMIABILITY  
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 QC - TRIAXIAL CONSOLIDATED QUICK WT - WATER TABLE IN SOIL  $\gamma$  - UNIT WEIGHT

C.S. - CHUNK  
 D.O. - DRIVE OPEN  
 D.F. - DRIVE FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 S.S. - SLEEVE SAMPLE  
 P.S. - PISTON SAMPLE  
 W.S. - WASHED SAMPLE  
 R.C. - ROCK CORE


 - DISTURBED  
 - FAIR  
 - GOOD  
 - LOST

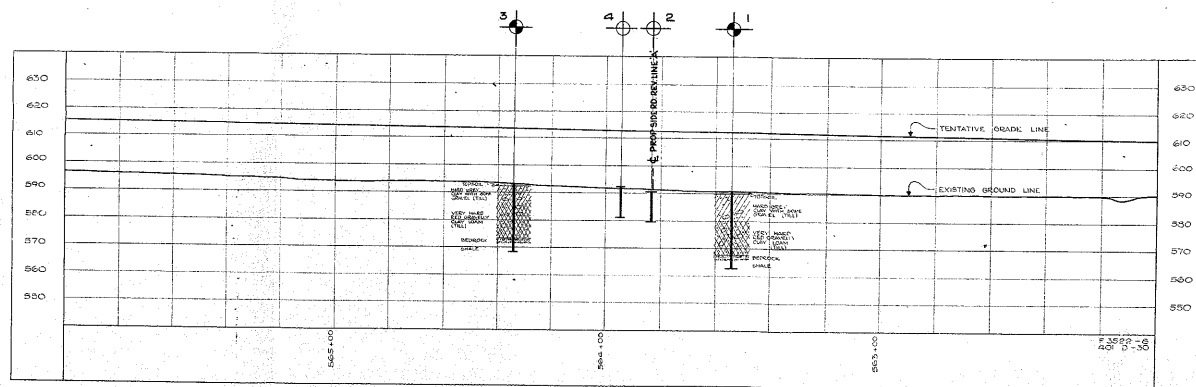
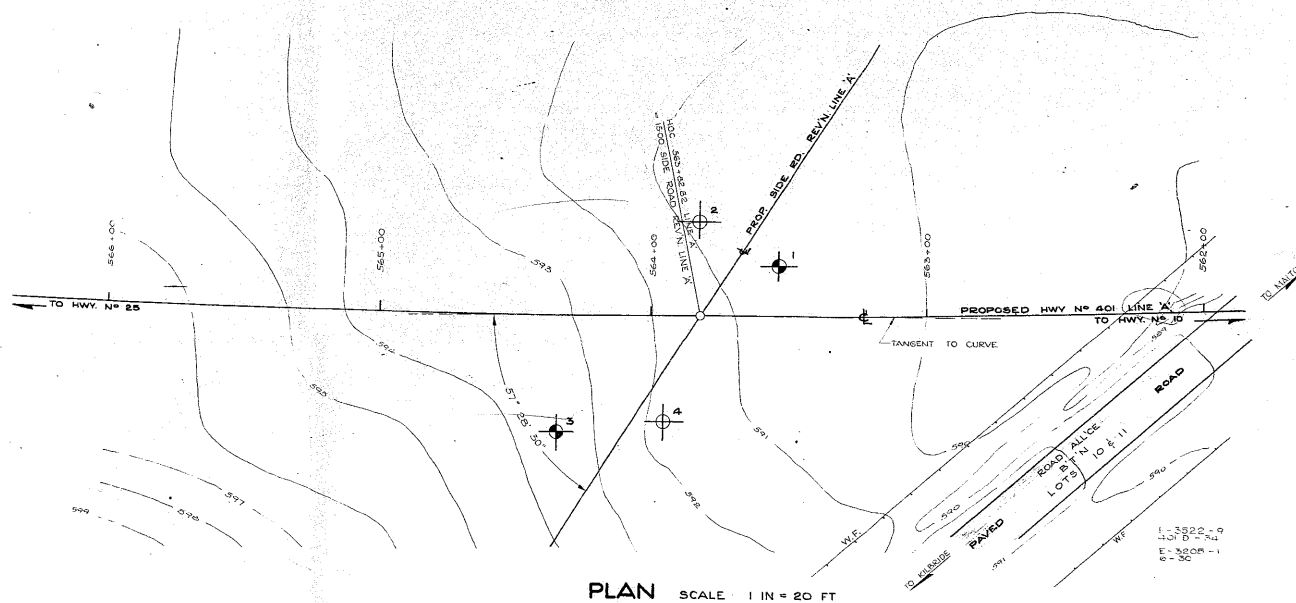
**SOIL PROFILE**

**SAMPLES**



#57-F-8  
W.P.#77-57  
Hwy.#401 (NEW)  
PROP. SIDE RD.  
3 MILES N. OF  
STREETSVILLE





LEGEND			
BORE HOLE			
PENETRATION HOLE			
BORE & PENETRATION HOLE			
NO.	ELEVATION	STATION	DISTANCE FROM NO. 1
1	590.41	563+64	18' RT
2	590.95	563+53	34' RT
3	593.2	564+54	43' LT
4	591.08	563+95	59' LT

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 - DOWNSVIEW

**SIDE ROAD REVISION  
PROPOSED CROSSING  
2 MILES N.W. OF STREETSVILLE**

THE KING'S HIGHWAY No. 401 (LINE 'A') DIV. No. 6  
CO. **PEEL**

TWP. **TORONTO** LOT **11** CON. **X WEST**

POSITION & ELEVATION OF HOLES

APPROVED

ENGINEER

CHIEF ENGINEER

REVISIONS

NO.	DATE	BY	DESCRIPTION
1			
2			
3			
4			

REFERENCE PLAN

REVISION	DATE	BY	DESCRIPTION
1			
2			
3			
4			

DATE: **JULY 9, 1957**

77-57

F-57-8A