cc: Foundation Section

Mr. A. Toye, August 15, 1957.

Bridge Engineer.

Materials & Research Section.

Foundation Report -
Highway No. 401 and Road Allowance,
Lot 14 - Conc. 6 - Trafalgar Twp.
W.P. 79-57 W.J. F 57-19

Attached herewith are two copies of the above mentioned Foundation Report. In view of the dense subsoil conditions at this site, spread footings will be satisfactory for the structure foundation.

F. C. Brownridge,
MATERIALS & RESEARCH ENGR.

Per:

(A. Rutka,
Principal Soils Engr.)

AR/ddeF
Attach.
cc: Messrs. H. Trezeakes
B. G. Ramsay
J. B. Wilkes

Foundation Section
File

FOUNDATION REPORT

on

Underpass Bridge at Highway 401 "line A"
crossing Road Allowance (Lot 14, Con. VI)
1.5 miles west of Lisgar.

Site plan: F-3523-B
Station: 68+23.39

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)

W.P. 74-57
W.J. F-57-19

INTRODUCTION

A subsoil investigation was carried out to determine the bearing values of layers for supporting the foundations of the proposed structure.

The location is 1.5 miles west of Lisgar, where the new highway 401 "line A" crosses the road allowance between the concessions IX and X at Halton County, Trafalgar Township, (Profile F-3523-8, Station 68/23.39).

The work started on June 22, 1957 and was completed on June 22, 1957.

PROCEDURE

The investigation was carried out by means of skid mounted coredrill machine. In the course of investigation 2 boreholes with dynamic cone penetration tests were made. Boreholes No. 1 and 4 were located at the south side and boreholes No. 2 and 3 on the north side of the proposed highway 401 centre line.

The locations of the boreholes are shown in Drawing No. F57-19A and their logs under Appendix I.

SUBSOIL FINDINGS AND ANALYSIS

The terrain is till plain. The subsoil investigations revealed the layer as very hard bouldery clay till.

The samples extracted from the boreholes were tested in the laboratory. The results of these tests show that the layer has very low plastic and liquid limits, and it is made up of inorganic clay of low plasticity. Despite the gravelly composition of the soil the unconfined compression tests showed relatively high values. The very high values obtained from the field standard penetration tests confirm the very hard nature of the layer.

Some infiltration water was detected in the boreholes but the indications are the layer is impervious.

The soil is suitable to support spread footing foundations and can provide a bearing value of 2.5 T.s.f. with a safety factor of 3.

CONCLUSIONS AND RECOMMENDATIONS

From the above discussion it will follow that:

1. The terrain is till plain. The layer is very hard bouldery clay till.

2. The layer is suitable for supporting spread footing foundations.

3. It will be convenient to support the proposed structure on spread footing foundations placed at elevation about 688 ft. Here the soil can provide a bearing value of 2.5 T.s.f. with a safety factor of 3.

4. The approach fills to the structure do not present any stability problem.

V. Korin
Foundation Engineer

APPENDIX I

TL-129 (REV. 58) H.D.R.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-2 OPERATION BORE & PENET'N JOB E-57-19 W.P. 79-57 BORING 1 STA. 68+42.6 (39' LT)

CASING BX (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 19 JUNE 1957

ABBREVIATIONS

V - INSITU VANE SHEAR TEST; M - MECHANICAL ANALYSIS; U - UNCONFINED COMPRESSION; Q_C - THIAXIAL CONSOLIDATED QUICK; Q - TRIAXIAL QUICK; S - TRIAXIAL SLOW; W.L. - WATER LEVEL IN CASING; W.T. - WATER TABLE IN SOIL; K - PERMIABILITY; C - CONSOLIDATION; CA. - CASING; γ - UNIT WEIGHT

SAMPLE TYPES

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

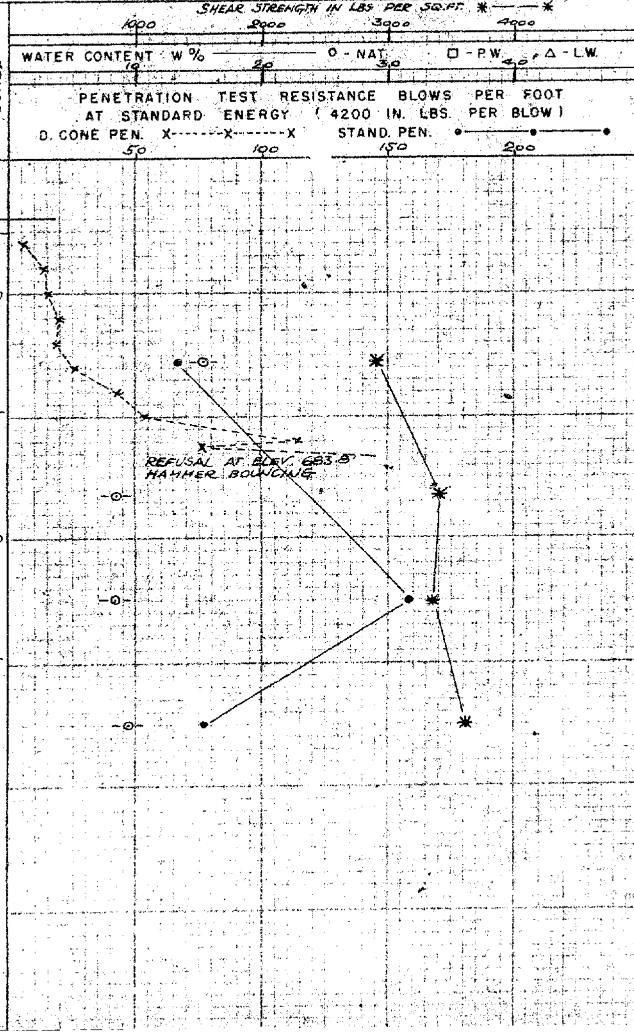
SAMPLE CONDITION

- DISTURBED
- FAIR
- GOOD
- LOST

SOIL PROFILE

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION
693.0'		GROUND LEVEL
692.5' 0.5'	W.L. AT ELEV. 691.4' ON JUNE 20/57	TOPSOIL
		GREY BROWN CLAY TILL
672.0 21.0'		END OF BOREHOLES

Depth scale: 3, 8, 13, 18, 23



CASING BLOWS (ACTUAL): 9, 16, 22, 44, 82, 30, 39, 97, 183, 75, 215, 200

END OF CASING AT ELEV. 681.5'

SAMPLES

OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
					693.0
γ-122.7 p.c.f.	Disturbed	D.O.	1	46	688.0 / 100
γ-133.6 p.c.f.	Disturbed	D.O.	2	>100	682.0 / 100
γ-129.8 p.c.f.	Disturbed	D.O.	3	>100	678.0 / 100
γ-133.4 p.c.f.	Disturbed	D.O.	4	77	673.0 / 100

Depth scale: 3, 8, 13, 18, 23

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-2 OPERATION PENETRATION JOB F-57-19 W.P. 79-57 BORING 2 STA. 68+37.6 (29' RT

CASING BX (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 20 JUNE 1957

ABBREVIATIONS

V - INSITU VANE SHEAR TEST; Q - TRIAXIAL QUICK; K - PERMIABILITY
M - MECHANICAL ANALYSIS; S - TRIAXIAL SLOW; C - CONSOLIDATION
U - UNCONFINED COMPRESSION; W.L. - WATER LEVEL IN CASING; CA. - CASING
Q_C - TRIAXIAL CONSOLIDATED QUICK; W.T. - WATER TABLE IN SOIL; γ - UNIT WEIGHT

SAMPLE TYPES

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

SAMPLE CONDITION

- DISTURBED
- FAIR
- GOOD
- LOST

SOIL PROFILE						SAMPLES					
ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
694.7'		GROUND LEVEL									
4.5				690							
9.5				685							
14.5				680							

WATER CONTENT W% — ○ - NAT. □ - P.W. △ - L.W.

PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS. PER BLOW)

D. CONE PEN. X-------X-------X STAND. PEN. •——•——•

50 100 150 200

REFUSAL AT ELEV. 685.9'

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-2 OPERATION BORE & PENETN JOB F-57-19 W.P. 79-57 BORING 3 STA. 68+05(40' RT)

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 21 JUNE 1957

ABBREVIATIONS

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

SAMPLE TYPES

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

SAMPLE CONDITION

D - DISTURBED; F - FAIR; G - GOOD; L - LOST

SOIL PROFILE

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT
694.4'		GROUND LEVEL	
693.9' 0.5'		TOPSOIL	
4.5	W.L.		
	W.L. AT ELEV. 688.7' ON JUNE 22/57	BROWN CLAY TILL	
9.5			
14.5			
19.5			
674.4' 20.0'		END OF BOREHOLE	
24.5			

ELEVATION SCALE: 690, 685, 680, 675, 670

SHEAR STRENGTH IN LBS. PER SQ.FT. * — * (1000, 2000, 3000, 4000)

WATER CONTENT W % — 0 - NAT. □ - P.W. Δ - L.W. (10, 20, 30, 40)

PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS. PER BLOW)

D. CONE PEN. X------X------X STAND. PEN. •——•——• (50, 100, 150, 200)

END OF CASING AT ELEV. 686.8'

REFUSAL AT ELEV. 686.2'

SAMPLES

CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
						694.4
7 9 17 26 43						689.4 9.5
51 45 160	γ=122.0 p.c.f.	X	D.O.	1	39	100
						684.9 9.5
	γ=132.1 p.c.f.	X	D.O.	2	7/100	100
			DRILLED			679.4 14.5
	γ=147.0 p.c.f.	X	D.O.	3	7/100	100
			DRILLED			674.4 19.5
			SAMPLER REFUSED AT ELEV. 674.4			

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-2 OPERATION PENETRATION JOB F-57-19 W.P. 79-57 BORING 4 STA. 68+11.6 (39.6 LT.)

CASING BX (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 22 JUNE 1957

ABBREVIATIONS

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

SAMPLE TYPES

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

SAMPLE CONDITION

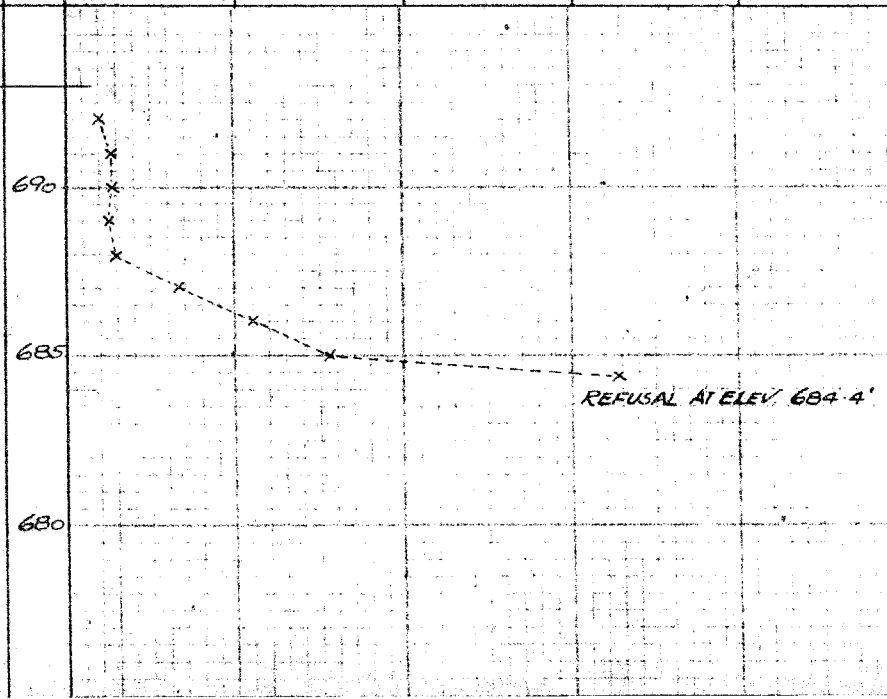
- DISTURBED
- FAIR
- GOOD
- LOST

SOIL PROFILE						SAMPLES					
ELEVATION / DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. / RECOV. %
693.0'		GROUND LEVEL									

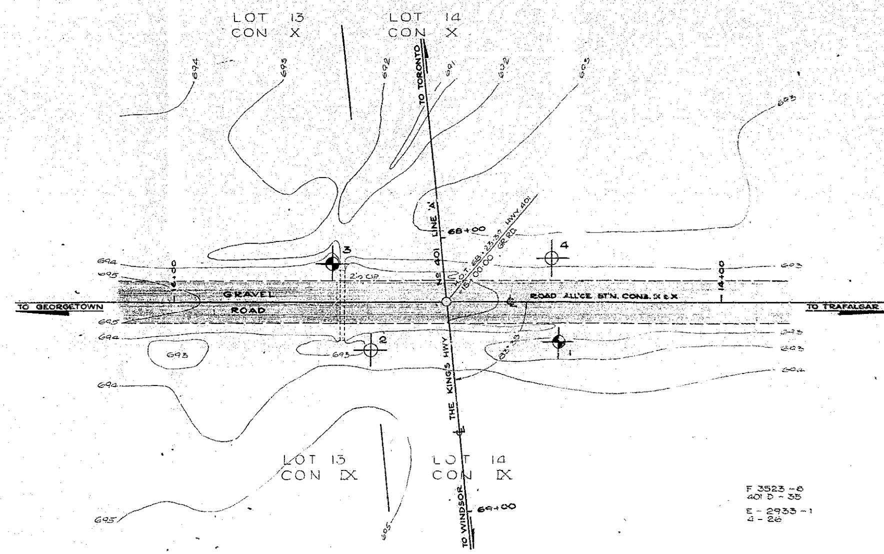
WATER CONTENT W % — O - NAT. □ - P.W. Δ - L.W.

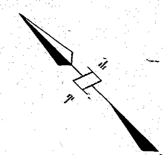
PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS. PER BLOW)

D. CONE PEN. X-------X-------X STAND. PEN. •——•——• 50 100 150 200

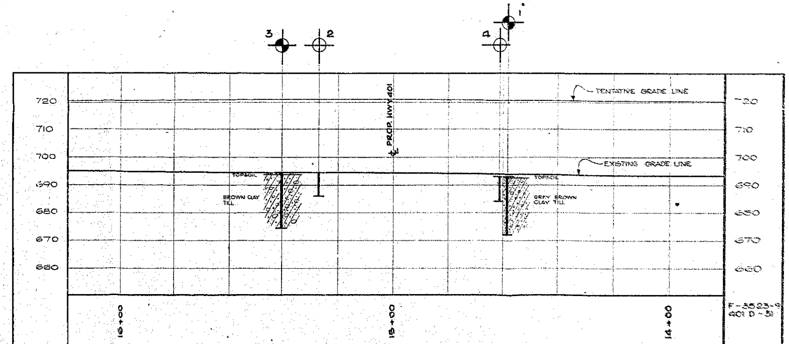


57-F-19
W.P. # 79-57
Hwy. # 401
UNDERPASS BR.
LOT 14, CON. 6
1.5 MILES W. OF
LISGAR





PLAN SCALE 1 IN = 20 FT



PROFILE SCALE HOR VER 1 IN = 20 FT

LEGEND

- BORE HOLES
- PENETRATION HOLE
- BORE & PENETRATION HOLE

HOLE NO	ELEVATION	STATION	DISTANCE FROM 401 ℄
1	693.0'	68+42.6'	39' LT.
2	694.7'	68+37.6'	29' RT.
3	694.4'	68+05'	40' RT.
4	693.0'	68+11.6'	59.6' 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

GRAVEL ROAD PROPOSED CROSSING 1.5 MILES W. OF LISGAR STA.

THE KING'S HIGHWAY No. 401 (LINE 'A') DIV. No. 4
CO. HALTON
TWP. TRAFALGAR LOT 14 & 15 CON. IX & X

POSITION & ELEVATION OF HOLES

APPROVED

ENGINEER CHIEF ENGINEER

DESIGN		CHECK		CONTRACT NUMBERS	W.P. 79-57
DRAWING	D.F.	CHECK			
TRACING		CHECK		LOADING	DRAWING NUMBER F-57-19A
DATE	JULY 16, 1957				

REVISIONS: DATE BY DESCRIPTION

REFERENCE PLANS