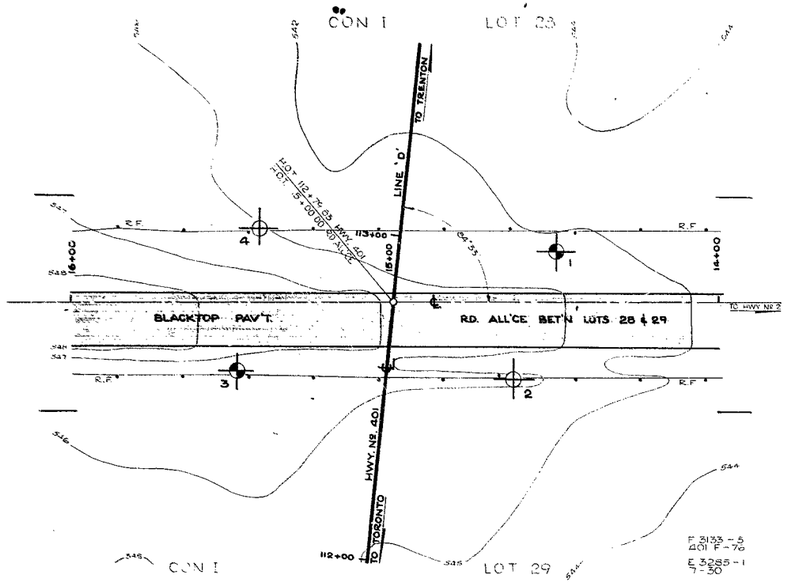
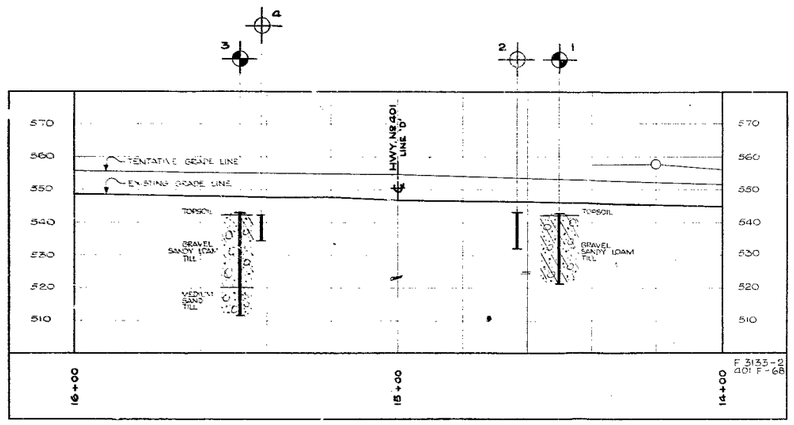
57-F-36
W.P.# 90-57
Hwy.# 401
Crossing Rd.
Con.# 1
2 miles N.W. of
Grafton



PLAN

SCALE 1 IN = 20 FT



PROFILE

SCALE HOR 1 IN = 20 FT
VER 1 IN = 20 FT

LEGEND	
BORE HOLE	
PENETRATION HOLE	
BORE & PENETRATION HOLE	

HOLE NO.	ELEVATION	STATION	DISTANCE FROM ℄
1	542·8'	113+00'	46' RT
2	543·0'	112+60'	59' RT
3	543·0'	112+54'	45' LT
4	542·5'	112+98'	43' 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

PAVED ROAD PROPOSED CROSSING 1 MILE E. OF THE GULLY

SHOWING POSITION & ELEVATION OF HOLES

HWY. NO. 401 LINE 'D' — W.P. 90 - 57 — DIV. NO. 7
CO. NORTHUMBERLAND
TWP. HALDIMAND — LOT. 28 & 29 — CON. I

SCALE. AS SHOWN	SUBMITTED BY	DATE 27 NOV. 57
DRAWN BY R.E.F.	APPROVED BY	DRAWING NO. F-57-36A

June 16, 1958.

Advised Harry Twichorne

Footings of abutments @ Elev. 535-536

Casing - 2½ to 1.5 f.

Telephone Conversation

a. Koch

Federal Imp - Bridge -

abutments

clear 535 30 x feet

4-6'

W.P. 90-57.

Topmes 542.8

Bearing 2½ - 3 Tons.

523 — P

3 span —

phone
Wa4-5777
Harry Tilsons.

c.c. Foundation Section.

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

January 14th, 1958.
Re. Foundation Report.

Re: Hwy. #401 and Road between Lots 28 & 29, Con. 1. Twp of Haldimand.
W.P. 90-57. W.J.F. 57-36

We are forwarding herewith two copies of the above mentioned Foundation Report for your use and information, which you will find self-explanatory.

F.C. Brownridge.
Materials & Research Engineer.

per: A. Rutka

A. RUTKA.
Principal Soils Engineer.

c.c. Mr. A. Toye.
Mr. H. Tregaskes.
Mr. D.G. Ramsay.
Mr. H.D. Duff.
Foundation Section.
Mr. A.W. Watt.
Mr. P. Karrow.
File.

FOUNDATION REPORT

on

New Bridge at Highway No. 401

Crossing road between lots 28 and 29

(Con. I), about two miles North West

of Grafton.

Plan No. F-3133-5

Station: 112/80

Distribution:

Mr. A. Toye Bridge Engineer	(2)
Mr. R. Tregaskes Construction Engineer	(1)
Mr. D.G. Ramsay Design Engineer	(1)
Mr. H.D. Duff Dist. Eng. Port Hope	(1)
Foundation Section	(3)
FILE	(1)

W.P. 90-57

W.J. F-57-36

INTRODUCTION

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

The location is about two miles north west of Grafton, where the new highway 401 crosses paved road between lots 28 and 29 (Con. I) Township of Haldimand (Station 112+80, Profile F 3133-2).

The job started on Sept. 16, 1957 and was completed on Sept. 24, 1957.

PROCEDURE

The subsoil investigations were carried out by means of a skid mounted coredrill machine. In the course of investigations two boreholes with dynamic cone penetration tests and two seperate dynamic cone penetration tests were made.

The locations of the boreholes are shown on drawing No. F 57-364, and their elevations on log sheets under Appendix I.

SUBSOIL FINDINGS AND ANALYSIS

The location is within the shoreline of late Iroquois lake. The terrain is till plain.

The explorations revealed the following subsoil stratification:

Under the topsoil the layer is fairly uniform hard till. The matrix is primarily sandy clay loam, and the soil contains about 12-35% gravel. The boreholes were explored down to elevation about 520 ft. and stopped.

The samples extracted from the boreholes were tested in the laboratory. From the test results the layer is made up of inorganic soil of very low plasticity. It has a plastic limit of 12%, liquid limit of 10% and natural moisture content of 6.5%.

SUBSOIL FINDINGS AND ANALYSIS (CONT'D.)

The density was found to be 147-157 p.c.f. Despite the presence of gravel some samples registered as high as 4850 p.s.f. for unconfined compression tests. However the presence of gravel and the loamy nature of the soil makes the unconfined compression test results unreliable.

The standard penetration results registered during sampling in the field show 100 or more blows per foot penetration.

CONCLUSIONS AND RECOMMENDATIONS

From the above discussion it will follow that:

1. The terrain is very hard till layer extending from under topsoil down to the end of the boreholes.

2. The approved grade line indicates a cut down to elevation about 530 ft. It will be convenient to support the structure on spread footing type foundations. These footings of necessity will be placed in the vicinity of elevation 523 ft. At this elevation or below the layer can provide a bearing value of 3 T.S.f. with sufficient safety factor.

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

V. Korlu
Foundation Engineer

APPENDIX I

TL - 129 (REV. 56)

H.D.R.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION BORE & PENET'N. JOB F-57-36 W.P. 90-57 BORING 1 STA. 113+00 (48' RT.)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT OCT. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY H.S CHECKED BY A.L DATE BORING 17 SEPT. 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

G.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	STRAT PLOT
542.8'		GROUND LEVEL	
541.8' 1.0'		TOP SOIL	
	W.L. @ ELEV. 533.3' ON SEPT. 18/57	GRAVEL SANDY LOAM TILL	
521.3' 21.5'		END OF BOREHOLE	

ELEVATION SCALE: 540, 535, 530, 525, 520

SHEAR STRENGTH IN LBS PER SQ.F.T. 1000 2000 3000 4000

WATER CONTENT W % 15 20 O - NAT. 30 □ - P.W. 40 Δ - L.W.

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

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

REFUSAL AT ELEV. 538.5' HAMMER BOUNCING ON BOULDERS

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

CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
						542.8'
3						
6						540.8'
-			S.S.	1	18	100
-						
65						
64						
154						
146						534.8'
47			S.S.	2	93	89 533.3'
338	γ 154.0 p.c.f.		S.S.	3	>100	100
57						
77						
106						
237						
376						527.8'
51	γ 158.1 p.c.f.		S.S.	4	>100	100
91						
993						
26						522.8'
1019 1566	γ 157.4 p.c.f.		S.S.	5	>100.	100

END OF CASING AT ELEV 521.3'

H.D.R.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 5+-1 OPERATION PENETRATION JOB F-57-36 W.P. 90-57 BORING 2 STA. 112+60 (39 RT.)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT OCT. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 12 INCHES COMPILED BY H.J. CHECKED BY A.L. DATE BORING 20 SEPT. 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	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. •——•——•	CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
543'		GROUND LEVEL			50 100 150 200							
3				540								
8				535								
13				530	REFUSAL AT ELEV. 532 HAMMER BOUNCING.							

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION BORE & PENETN JOB F-57-36 W.P. 90-57 BORING 3 STA. 112+54 (45' LT.)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT OCT. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 19 INCHES COMPILED BY HS CHECKED BY AL DATE BORING 20 SEPT. 1957

ABBREVIATIONS

V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q_c - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
K - PERMIABILITY
C - CONSOLIDATION
W.L. - WATER LEVEL IN CASING
W.T. - WATER TABLE IN SOIL
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	STRAT PLOT	ELEVATION SCALE
543.0'		GROUND LEVEL		
542.0' / 1.0		TOPSOIL		
3	W.L. AT EL. 539' ON SEPT 21 57	GRAVEL SANDY LOAM TILL		540
8				535
13				530
10				525
23 / 520.0' / 23.0				520
28		MEDIUM SAND TILL		515
511.5' / 31.5		END OF BOREHOLE		510
33				

SHEAR STRENGTH IN LBS. PER SQ FT: 1000, 2000, 3000, 4000

WATER CONTENT W %: 10, 20, 30, 40 — 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

CASING BLOWS (ACTUAL)

BX CASING SHOE

RETUSAL AT ELEV. 535.0' HAMMER BOUNCING

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

SAMPLES

OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
					543.0'
					538.0'
		S.S.	1	41	100
					533.0'
γ 136.7 pcf		S.S.	2	66	100
					528.0'
γ 155.7 pcf		S.S.	3	>100	100
					523.0'
γ 147.7 pcf		S.S.	4	>100	100
					518.0'
		S.S.	5	>100	100
					513.0'
		S.S.	6	>100	100

TL-129 (REV. 56)

H.D.R.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION PENETRATION JOB F-57-30 W.P. 90-57 BORING 4 STA. 112+98 (43' LT.)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT OCT. 1957

SAMPLER HAMMER, WT. 250 LBS. DROP 19 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 25 SEPT. 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

- 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. %
542.5		GROUND LEVEL									
25				540							
75				535							
4.5				530							

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

REFUSAL AT ELEV. 534.5' HAMMER BOUNCING.