

ENGINEERING MATERIALS OFFICE
SOIL MECHANICS SECTION

WP 517-64-01

DIST 4

HWY 3

STR SITE 34-103

Concrete Culvert, Village of Wainfleet

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SAMPLE DISPOSITION NOTICE		
TYPE	DISCARD AFTER	RECOMM. BY
JARS	77-09-08	1.48
TUBES	77-09-08	1.48
ROOM CORES		

FOUNDATION INVESTIGATION REPORT

For

Concrete Culvert, Village of Wainfleet
W.P. 517-64-01, Site 34-103
Highway 3, District 4, Hamilton

INTRODUCTION

This report contains the results of a foundation investigation for the above project. Fieldwork consisted of 2 boreholes advanced during the period August 9th. to 11th., 1977, utilizing a skid mounted diamond drill.

The upper 10 feet of each borehole was cased with N size casing. Below this the boreholes were advanced uncased by the use of washboring techniques. Locations and elevations of the borings, as well as an inferred subsoil stratigraphy are shown in Drawing No. 5176401-A.

SITE DESCRIPTION

The site is located in the Village of Wainfleet where Highway 3 crosses the abandoned Welland Feeder Canal. Wainfleet is a small community situated on the flat Haldimand Clay Plain which in this area is primarily engaged in the production of cash crops.

The existing structure is a 50 foot 2 span steel beam structure with a concrete deck. It was widened in 1929 with the widening being supported on timber piles. An earlier timber lift bridge was located at this site and was supported on timber piles the remains of which are visible in the water under the bridge.

SUBSOIL CONDITIONS

Subsoil at the site consists of a deep lacustrine deposit consisting of silty clay to clay which was sampled to a depth of 50 feet. The upper 5 feet forms a thin dessicated crust in which the moisture content ranges

from 20 to 30 percent. Standard Penetration 'N' values in the crust range between 5 and 18 blows per foot indicating an undrained shear strength in excess of 2000 psf.

Below the crust the undrained shear strength rapidly decreases to between 500 and 1000 psf and the moisture content increases to as high as 50 percent.

The feeder canal was constructed approximately 150 years ago and has been abandoned for in excess of 50 years. In this latter period the canal has partially filled with organically contaminated sediment. Probing from the bridge deck revealed up to 3 feet of soft material in the canal bottom except in the area immediately under the bridge where the bottom was hard and irregular suggesting the use of cobbles or other debris as riprap to prevent instability of the abutments.

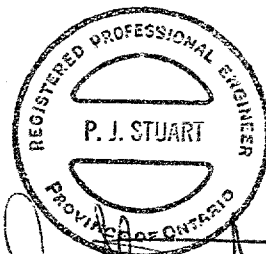
DISCUSSION AND RECOMMENDATIONS


It is proposed that the existing two span structure be replaced by a 10 foot by 8 foot box culvert. This may be accomplished by excavating the deposit of soft organically contaminated material from the bottom of the canal and replacing it with a pad of compacted granular A. In the centre of the canal the native clay soil will be reached at approximate elevation 568.

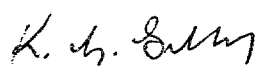
The box culvert should be placed on a granular A pad with a minimum thickness of 12 inches and may be designed with a loading of up to 1500 pounds per square foot.

The timber piles under the centre pier of the existing structure as well as any from previous structures which are located under the new culvert should be extracted or cut off at least 3 feet below the bottom of the culvert.

No dewatering problems are anticipated due to the relatively impermeable nature of the clay subsoil.




P. Stuart, P. Eng.
Project Engineer


K.G. Selby, P. Eng.
Supervising Engineer

KGS/PS/bp
August/77

RECORD OF BOREHOLE No 1

W P 517-64-01 LOCATION Sta. 361+05 o/s 50' Lt. & Hwy. 3 ORIGINATED BY PJS
 DIST 4 HWY 3 BOREHOLE TYPE Washboring & Cone Test COMPILED BY PJS
 DATUM Geodetic DATE Aug. 9 and 10, 1977 CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100							
								SHEAR STRENGTH PSF							
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE							
								400 800 1200 1600 2000							
WATER CONTENT (%)			15	30	45	PCF	GR SA SI CL								
573.8	Ground Level														
0.0	Silty clay to clay <														

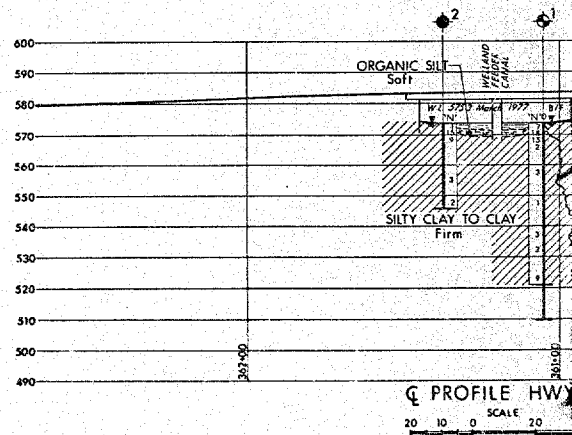
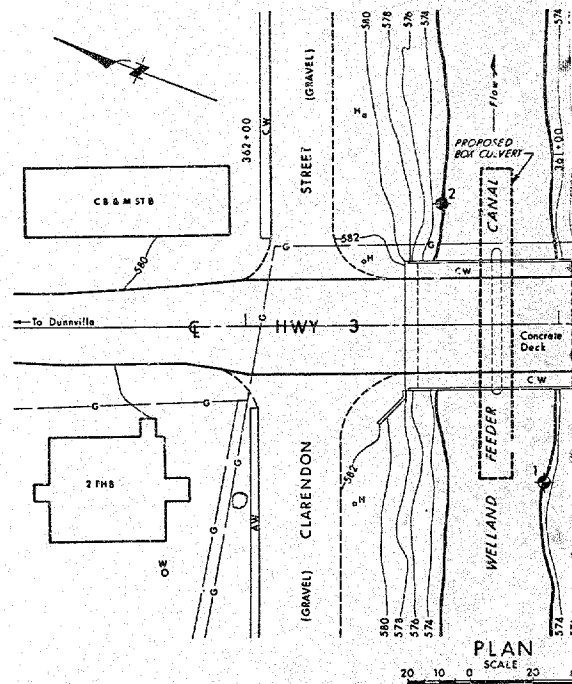
RECORD OF BOREHOLE No 2

W P 157-64-01 LOCATION Sta. 361+37 o/s 39' Rt. & Hwy. 3 ORIGINATED BY PJS
 DIST 4 HWY 3 BOREHOLE TYPE Washboring COMPILED BY PJS
 DATUM Geodetic DATE Aug. 11, 1977 CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60						80
SHEAR STRENGTH PSF								WATER CONTENT (%)								
○ UNCONFINED + FIELD VANE																
● QUICK TRIAXIAL x LAB VANE																
400 800 1200 1600 2000												15 30 45				
573.8	Ground Level		1	SS	1									Om 2.2	%	
571.8	Organic Silt Soft		2	SS	15											
2.0	Silty clay to clay		3	SS	9											
		4	TW	PM												
		5	TW	PM												
		6	SS	3												
		7	SS	2												
545.8																
28.0	End of Borehole															

+3, x5: Numbers refer to
Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10



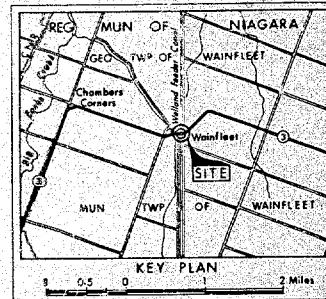
CONT No
WP No 517-64-01



WELLAND FEEDER CANAL

SHEET

BORE HOLE LOCATIONS & SOIL STRATA



LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊙ Bore Hole & Cone
- 1" Blows/ft (Std Pen Test 350 ft lbs energy)
- COME Blows/ft (60° Cone, 350 ft lbs energy)
- ↓ Wt at time of investigation Aug 1977

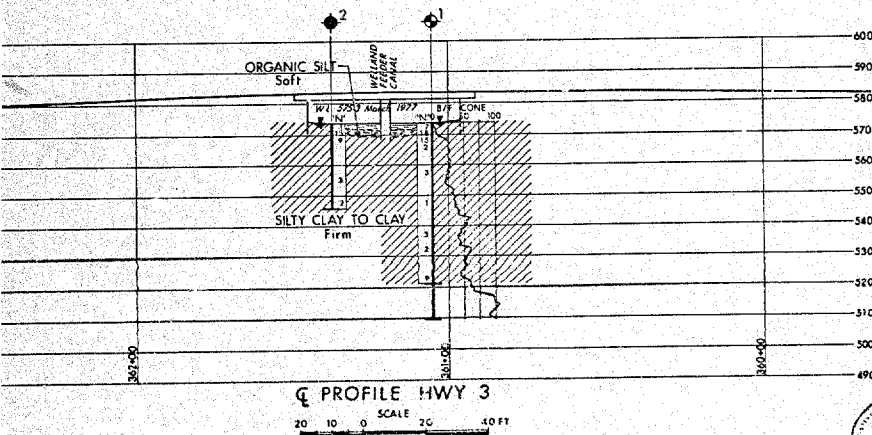
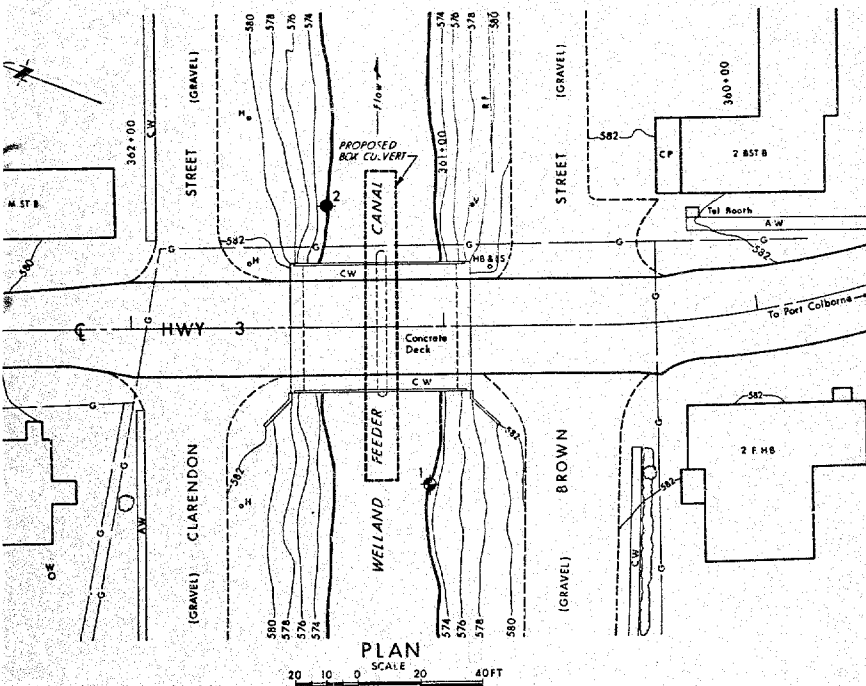
No	ELEVATION	STATION	OFFSET
1	573.8	361+05	50' LT
2	573.8	361+37	39' RT

NOTE-

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISION	DATE BY	DESCRIPTION

DRAWN BY: 3
 CHECKED: 315
 DATE: Sept 3, 1977
 SITE: 34-103
 DRAWN BY: 315
 CHECKED: 315
 DATE: Sept 3, 1977
 SITE: 34-103
 DRAWN BY: 315
 CHECKED: 315
 DATE: Sept 3, 1977
 SITE: 34-103





Memorandum

To: Mr. C. Mirza,
Head,
Soil Mechanics Section,
West Building, Downsview

From: G.C.E. Burkhardt,
Structural Section,
Central Region

Attention: Mr. K.G. Selby

Date: 1977-06-27

Our File Ref.

In Reply to

Subject: RE: Concrete Culvert, Village of Wainfleet,
Site 34-103, W.P. 517-64-01
Highway 3, District 4

1977 Engr.

The existing Wainfleet Bridge over the abandoned feeder canal has been scheduled for replacement as a result of the structural investigation of this structure, which Mr. K. Selby was involved in.

Highway 3 is now being upgraded to current standards and as part of this program, the existing structure will be demolished and replaced with a concrete box culvert (10'x8' approx.).

The culvert will be centered in the canal where the existing pier is located.

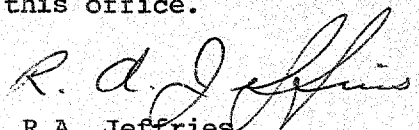
Preliminary details of the culvert are indicated on the enclosed Bridge Site Plan E-5441-1 (2 copies).

Could you please prepare a Foundation Investigation Report of sufficient scope to facilitate the design of the proposed box culvert.

This request with its tight schedule has been previously discussed with Mr. Selby whom indicated preliminary recommendations could be made available in time for the design of the culvert. The project is scheduled for completion by 1977-08-10.

Should additional clarification and/or details be required, please do not hesitate to call this office.

RJ:gj
Encl.


R.A. Jeffries,
Structural Supervisor,
for:
G.C.E. Burkhardt,
Head, Structural Section

c.c. J. Anderson
R. Fitzgibbon



PROJECT DATA INFORMATION

GEOCRES No. 3014-32

DIST 4 REGION CENTRAL

W.P. No. 517-64-01

CONT. No. 72-14

W. O. No. _____

STR. SITE No. 34-103

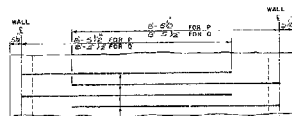
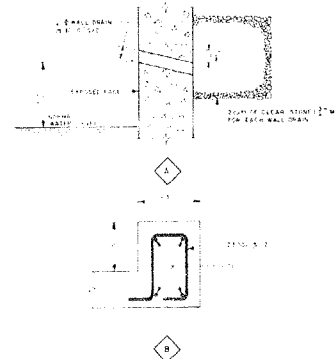
HWY. No. 3

LOCATION CONCRETE CULVERT

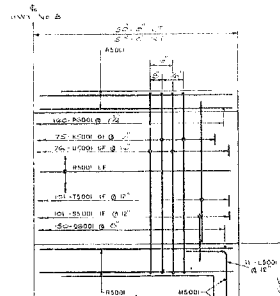
VILLAGE OF KATIPLET

ORIGINAL EMPLOYMENT RELATIONSHIP NO. 2

REMARKS _____



NOTE
INVERT EL 570.00

[illegible]

GENERAL NOTES

- CLASS OF CONCRETE 3000 PSI
- COVER GIVEN TO REINFORCING STEEL IS EXCEPT AS NOTED
- ALL EXPOSED JOINTS TO BE CHAMFERED 1/4"
- ALL JOINTS TO BE REINFORCED WITH 1" X 18" STEEL L-PLATE
- THE DEPTH OF THE EXCAVATION AND CHARACTER OF THE FOUNDATION MATERIAL HAVE BEEN APPROVED BY THE ENGINEER
- ALL STEEL TO BE PLACED AT BOTH SIDES OF COLUMN
- SUTURE/STAPLE
- TIE BARS AND RETAIN WALLS AND ARE REINFORCING SHALL BE BUILT UP WITH CONCRETE WITH REINFORCING STEEL
- REINFORCING STEEL SHALL BE MILD GRADE
- STEEL FOR EACH COLUMN INCLUDING REINFORCING WALLS SHALL BE IDENTIFIED WITH A SINGLED SERIAL NUMBER AND MARKED AT EACH JOINT WITH A SERIAL NUMBER
- ALL DIMENSIONS GIVEN TO FORMS SHALL CONFORM WITH MATERIALS
- VERTICAL LOCATION OF WALL CORNS SHALL BE DETERMINED BY
- 1. 2" X 4" STUDS
- 2. PLANTERS INSIDE SPACE
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DRAWING NOT TO SCALE



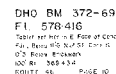
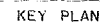
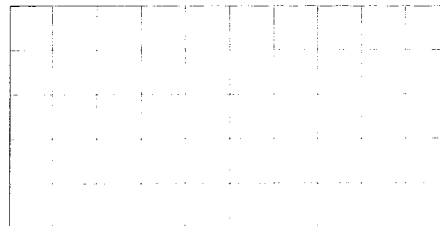
QUANTITIES			
ITEM	WALLS & SLABS	RETAINING WALL	TOTAL
W/OF REINF STEEL TONS	9.50	---	9.50
VOL OF CONCRETE	49.50	---	129.00

43

STD RIGID FRAME BOX CULVERT
AT STATION 361+20...

SPAN 6'-0" HEIGHT 5'-0" LENGTH 30'-0" FILL HEIGHT 2'-0"

CO REG. NO. OF NIAGARA			
TWP. HAMILTON			
LOT 10		CON. 5	
Hwy. 4		DIST. 4. HAMILTON	
DWG. NO. C-34-21			
DESIGN	DRAWN	CHECK	DATE
W. A. W.	W. A. W.	W. A. W.	9/77

[illegible]

PROFILE OF HWY

DATE _____ REVISOR & REVISIONS _____

KANSAS DEPARTMENT OF TRANSPORTATION
ENGINEERING DESIGN'S DEPT.
1400 W. 15TH AVENUE, SUITE 200
DENVER, COLORADO 80202

BRIDGE SITE PLAN

30-44-39

CROSSING

AT
WELLAND FEEDER CANAL

AND
KING'S HIGHWAY 3

LOT 18
MUN. TR. ROAD/LEET

SCALE _____ DISTRICT _____ REGION _____
AS SHOWN 4 - HAMILTON CENTRAL
STATION PLAN _____

ETR 131 - 3

DATE OF SURVEY _____ BY _____
REV. 017-06-01 _____

PLAN E-5441-I