

GEOCRES No. 40 I 15-23DIST. 2 REGION SOUTHWESTERNW.P. No. 615-71-03CONT. No. 77-117

W. O. No. \_\_\_\_\_

STR. SITE No. \_\_\_\_\_

HWY. No. 59LOCATION Norwich to east  
junction Hwy 3.

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 0REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Memorandum

40115-23

GEOSCREES No.

To: Mr. A.P. Watt  
Regional Structural Planning Eng.  
South-Western Region  
London, Ontario

Attention:

From: Soil Mechanics Section  
Geotechnical Office  
West Building  
1201 Wilson Ave.  
Downsview, Ontario

Date:

May 12, 1976

Our File Ref. W.P. 615-71-03

In Reply to your request of November 15, 1975

Subject:

CULVERT REPLACEMENT

STA: 346+25

HWY: #59, Dist. 2

W.P. 615-71-03

### 1. INTRODUCTION:

Following your request of November 15, 1975, a field investigation was carried at this location to determine the reason(s) for the excessive settlement of the existing roadway embankment in the vicinity of a culvert at station 346+25.

### 2. SUBSURFACE CONDITIONS:

The encountered subsoil conditions are as follows:

Elev. 797 - 781; Fill material; sandy silt to silt, traces of wood loose to very dense.

Elev. 781 - 774; Mixture of sand, silt and organics - very soft to firm.

Elev. 774 - 735; Sandy silt to silt, layers of clayey silt, loose to very dense (borings were terminated at elev. 735).

The observed various soil types are shown on the record of borehole sheets.

### 3. DISCUSSION AND RECOMMENDATIONS:

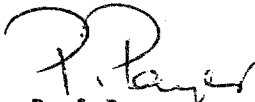
The existing culvert consists of two segments, the east or intake part is a 4.0' x 3.0' x 51' concrete box and the outlet is a 3.0' x 72' CSP. The concrete part appears to be in poor condition.

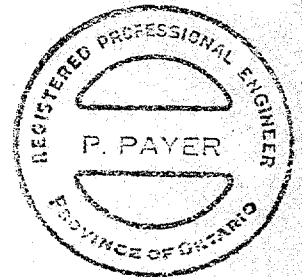
The valley floor is covered with about 1.5' thick of muck. Several active springs are visible along the valley slopes at different elevations.

In our opinion, the excessive settlement of the existing roadway embankment can be attributed to the partial displacement and settlement of the underlying organic material. In addition, the observed groundwater level which is about 5 feet above the creek water level, suggests that a spring or springs are present at the contact surface of the sloping original ground and the fill material. Seepage from these sources may be causing the partial loss of embankment material, by washing out the finer particles.

In order to remedy the overall situation it is recommended that the existing embankment be removed and the underlying organic subsoil be subexcavated to its full vertical and horizontal extent within the construction area. The bottom of the subexcavation is at approximately elev. 775-774. The backfill should consist of suitable granular material placed at least 2 feet above the observed ground water level. An approximately 18" thick granular 'A' Blanket should be constructed on the natural slopes before placing the fill for the reconstructed roadway embankment.

A circular C.S.P. culvert appears to be the best suited at this location. The construction of the culvert should be in accordance with current MTC standards.

  
Paul Payer  
Senior Engineer



For: K.G. Selby  
Supervising Engineer

PP/rm

cc: Files ✓  
Record Services  
R.S. Pillar  
C.S. Grebski  
B.J. Giroux  
G.A. Wrong  
A. Wittenberg  
J.R. Roy  
District Engineer  
R. Hore  
J. Anderson  
A. Crowley  
G. Sloan

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO  
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

WP 615-71-03 LOCATION Sta. 346 + 33 23' Rt.  
DIST 2 HWY 59 BORING DATE April 21 - 23, 1976  
DATUM Geodetic BOREHOLE TYPE Washbore - NX Casing & Cone Test  
ORIGINATED BY PP  
COMPILED BY PP  
CHECKED BY *W*

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT				LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$	
797.0	Ground Level														
0.0	Fill Material		1	SS	17										6 71 (23)
	Sandy silt to silt		2	SS	17										
	Traces of wood		3	SS	63										
			4	SS	8										10 75 (15)
780.8	Loose to very dense		5	SS	7										
16.2	Mixture of silt, sand and organics.		5A	SS	2										
	Loose		6	SS	-										
775.0			7	SS	9										5 88 (7)
22.0	Sandy silt to silt,		8	SS	19										9 25 (66)
	layers of clayey silt		9	SS	18										4 15 (81)
			10	SS	9										0 4 (96)
			11	SS	20										0 2 (98)
			11A	SS	21										
	Loose to Very Dense		12	SS	33										0 5 (95)
			13	SS	29										
			14	SS	26										0 4 (96)
			15	SS	71										
			16	SS	53										
735.5			17	SS	40										0 4 (96)
61.5	End of Borehole														

## ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

## RECORD OF BOREHOLE NO 2

WP 615-71-03 LOCATION Sta. 346 + 46 61' Rt. ORIGINATED BY PP  
 DIST 2 HWY 59 BORING DATE April 26 - 28, 1976 COMPILED BY PP  
 DATUM Geodetic BOREHOLE TYPE Washbore - NX Casing & Cone Test CHECKED BY PP

SOIL PROFILE		STRAT. PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	N VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$		
779.9	Ground Level															
0.0	Muck															
773.9	Sand and silt with organics		1	SS	2											5 90 (5)
6.0	Sandy silt to silt.		2	SS	8											9 45 (46)
			3	SS	12											
			4	SS	8											
			5	SS	9											
			6	SS	15											
			7	SS	9											0 1 (99)
	Loose to Compact		8	SS	23											
			9	SS	24											
			10	SS	19											0 0 (100)
748.9			11	SS	71											
31.0	Clayey silt, trace of sand.		12	SS	36											0 0 (100)
741.0	Hard															
38.0	Glacial Till		13	SS	33											5 13 (82)
738.4	Hard															
41.5	End of Borehole															
729.9																
50.0	End of Cone Test															



## Memorandum

To: Mr. K. G. Selby, Supvr. Eng.  
Soil Mechanics Section  
Geotechnical Office  
West Bldg., Downsview

From: Structural Planning Office  
Southwestern Region

Attention:

Date: November 5, 1975

Our File Ref.

In Reply to

Subject: W.P. 615-71-03, GD.GB.P.  
From Norwich s. lts. s'ly to e. jct. Hwy. 3  
Highway 59  
District 2, London

Within the limits of the above noted work project is an existing culvert at approximate station 345+80. The upstream (east) section of the culvert is a 4' x 3.5' concrete box, whereas the downstream (west) section is a 36"Ø C.S.P.

The Soils Design Report for this project, issued by the Materials and Testing Office of this Region, points out that considerable settlement has occurred over the fill section from sta. 342+40 to sta. 348+80, and the culvert under this fill is apparently failing. The Regional Materials and Testing Office also suggests a review of this site by your section.

Would you kindly arrange to have a field investigation conducted to find out if any subsoil investigation is required to comment on the stability of embankments. We would also like to have your comments on tunnelling versus open cut to replace the culvert. If subsoil investigation be required, please arrange to have it conducted.

Attached is a copy of ETR sheet 344-59/13-0 and a portion print of Militia sheet (Tillsonburg East Half) showing the location of the culvert.

*Dr. Tyagi*

D. Tyagi  
Structural Planning Engineer

DT:sm  
Enc.

cc J. Camilleri  
A. Crowley

Completion Date 12/5/76



Mr. A.P. Watt  
Regional Structural Planning Eng.  
South-Western Region  
London, Ontario

Soil Mechanics Section  
Geotechnical Office  
West Building  
1201 Wilson Ave.  
Downsview, Ontario

W.P. 615-71-03

May 12, 1976  
your request of November 15, 1975

#### CULVERT REPLACEMENT

STA: 346+25  
HWY: #59, Dist. 2  
W.P. 615-71-03

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Paul Payer  
Senior Engineer

For: K.G. Selby  
Supervising Engineer

PP/rm

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Record Services  
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District Engineer  
R. Hore  
J. Anderson  
A. Crowley  
G. Sloan





## Memorandum

To: Mr. C. Mircza,  
Soils Mechanics Section,  
Downsview.

From: Materials and Testing Office,  
London.

Attention: Mr. K. Selby.

Date: Aug. 23, 1976.

Our File Ref. \_\_\_\_\_

In Reply to \_\_\_\_\_

Subject: W.P. 615-71-03, Highway 59,  
Norwich South Limits Southerly,  
Culvert Location, Station 346 + 25.  
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With reference to your report on the above culvert site, your comments are requested re the design proposals shown on the accompanying print. Please return the print to our office along with your comments and contact our office if you have any questions re the proposal.

JGF:hp.  
c.c. - File.

  
J. G. FORSTER,  
SENIOR SOILS ENGINEER.



Mr. J.G. Forster  
Senior Soils Engineer  
Materials and Testing Office  
Southwestern Region, London

Soil Mechanics Section  
Geotechnical Office  
West Building, Downsview

September 8, 1976

Culvert Replacement  
Norwich South Limits Southerly  
Hwy. 59, Sta. 346+25  
W.P. 615-71-03

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We have reviewed your preliminary design proposals for this project and our comments are as follows:

1. The bedding material should consist of at least granular 'B' up to the level of springline.
2. Granular 'A' blanket should be constructed on the natural slopes (as per our memorandum of May 12, 1976). This is not shown on the preliminary plan but it is understood that our recommendations will be followed.

If you have any questions about this matter, please contact our Office.

P. Payer  
Senior Engineer

For: K.G. Selby  
Supervising Engineer

KG5/PP/gs

cc: Files ✓  
Record Services