

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 40P9-17

W.P. No. 109-68-08

CONT. No. 74-053

W. O. No. 72-11076

STR. SITE No. N/A

HWY. No. H-E DIST. 3

LOCATION GUELPH - From Waterloo  
Ave. N'ly to Woodlawn Rd. (Sta. 96  
to 115 for foundation investigation  
report.)

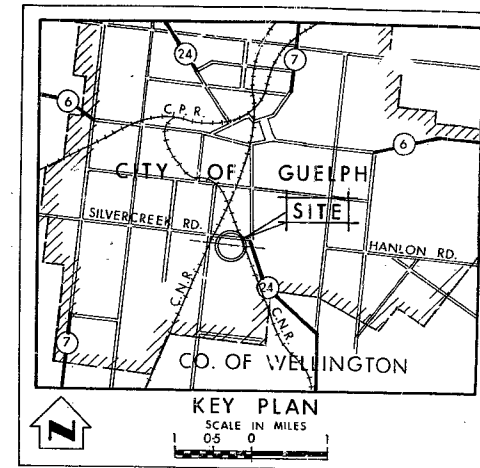
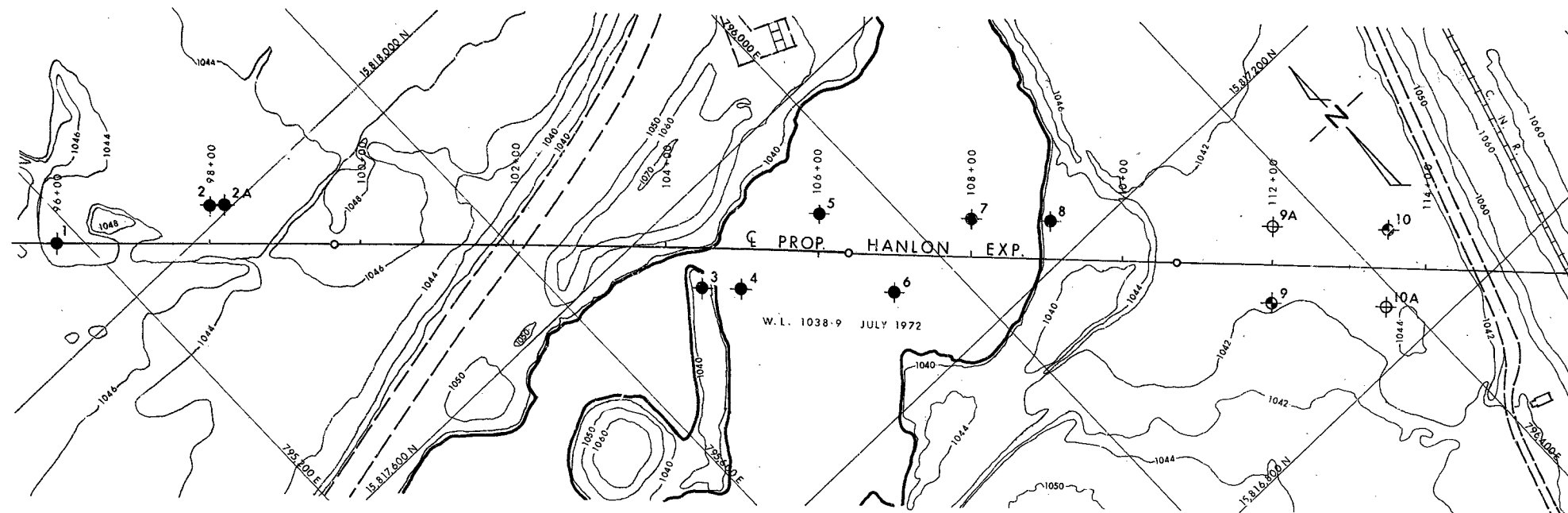
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 1

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

61-30 SEPT. 1978

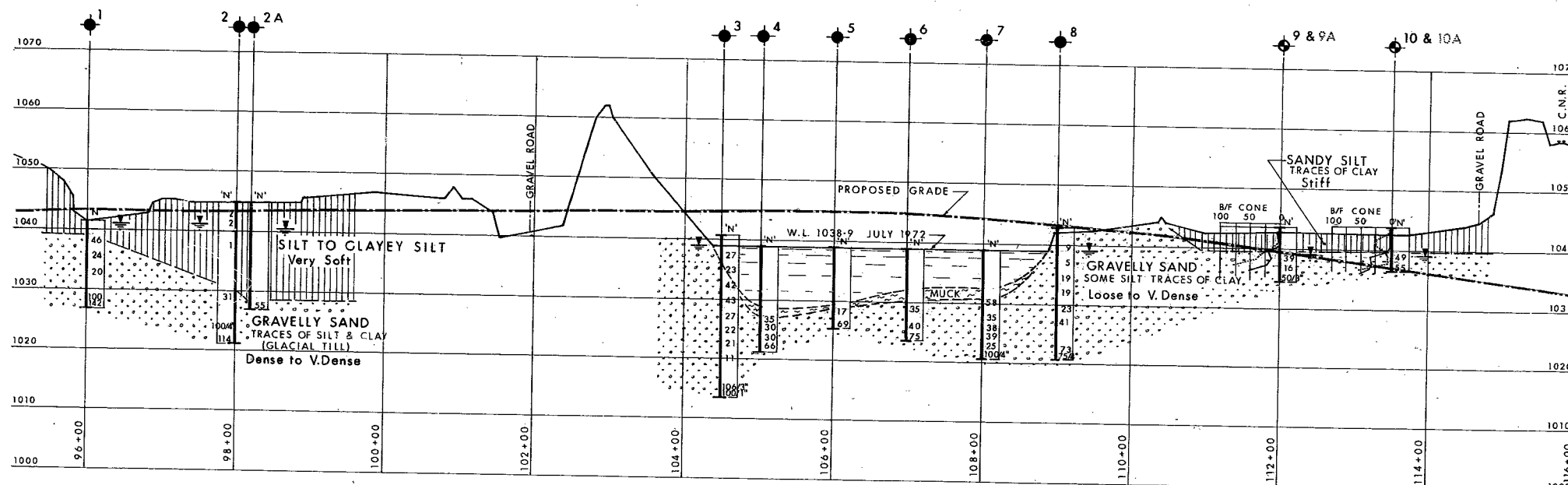


LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation, July 1972		

NO.	ELEVATION	STATION	OFFSET
1	1041.3	96+00	CL
2	1045.0	98+00	50' LT.
2A	1045.0	98+10	50' LT.
3	1040.4	104+50	50' RT.
4	1038.9	105+00	50' RT.
5	1038.9	106+00	50' LT.
6	1038.9	107+00	50' RT.
7	1038.9	108+00	50' LT.
8	1042.9	109+00	50' LT.
9	1043.5	112+00	50' RT.
9A	1044.1	112+00	50' LT.
10	1043.9	113+50	50' LT.
10A	1043.8	113+50	50' 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.



PROFILE

SCALE  
HOR. 80 40 0 80 FT.  
VERT. 10 5 0 10 FT.

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO  
DESIGN SERVICES BRANCH—FOUNDATIONS OFFICE

PROPOSED HANLON EXPRESSWAY  
BETWEEN STATION 96+00 & 115+00

HIGHWAY NO. \_\_\_\_\_ DIST. NO. 3  
CO. WELLINGTON CITY OF GUELPH  
TWP. \_\_\_\_\_ LOT \_\_\_\_\_ CON. \_\_\_\_\_

BORE HOLE LOCATIONS & SOIL STRATA

SUBMITTAL J.H. CHECKED <input checked="" type="checkbox"/>	W.P. NO. 109-68-08	DRAWING NO.
DRAWN O.L.J. CHECKED <input checked="" type="checkbox"/>	W.O. NO. 72-11076	72-11076A
DATE 12 SEPT. 1972	SITE NO.	BRIDGE DRAWING NO.
APPROVED <i>[Signature]</i>	CONT. NO.	

REF. No. B-153-22

Geoc. 40P9-17

40P9-17

72/11076

MEMORANDUM

74-53

TO: Mr. A. Stermac,  
Foundation Engineer,  
Downsview.

FROM: Materials and Testing,  
London.

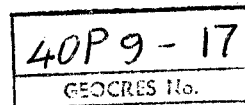
ATTENTION: Mr. A. Bursvary.

DATE: June 21, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 109-68-08, Hanlon Expressway,  
Waterloo Avenue to Woodlawn Road.



This memo is a request for the assistance of the Foundation Office to determine the nature and condition of the subsoils between Stations 96 + 00 and 109 + 00 on this project.

At our site meeting yesterday (June 20th) the locations for eight boreholes were determined. Holes Nos. 1, 2, 3, and 8 are normal dry holes for which ground elevations have been marked on the locating stakes. Holes 4, 5, 6 and 7 will be under water.

Two copies of a section of the Soils Profile and a plan are being forwarded to you separately.

It is understood that you will issue a request for Engineering Surveys.

A handwritten signature in cursive script, appearing to read "R. Mephram".

RM:hp  
c.c. - F. E. Loscombe,  
R. Mephram,  
File.

R. MEPHAM,

FOR: J. G. FORSTER,  
SENIOR SOILS ENGINEER.



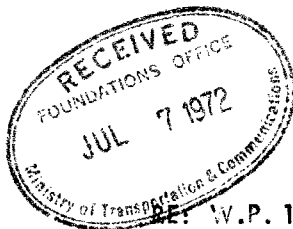
MICROFILM

Mr. F. E. Loscombe,  
Reg. Super't of Eng. Surveys,  
London Regional Office.

Mr. G. A. Baun,  
Field Supervisor,  
London Regional Office.

P. J. Rule

June 26, 1972



RE: W.P. 109-68-08, Hanlon Exp., Job 51-72  
Hanlon Expressway - investigate pond areas  
City of Guelph, County of Wellington,  
District No. 3 - Stratford  
Party Chief - G. Telford

Please be advised that the request from A. Barsvary, Senior Foundations Engineer, Foundation Section Head Office was received June 20, 1972 and has been completed and the field data is now in the Engineering Surveys Drafting Office.

The centreline of the Hanlon Expressway was staked and the elevation of same established in the pond areas under investigation. Buoys were set on the ponds indicating the station plus for the information of the engineer on the site.

The original copy of the field notes were given to the engineer on the site and a copy forwarded to the Engineering Surveys Office, London.

Information being submitted is as follows:

1 field book (copy) containing station plus and elevations in pond areas

A handwritten signature in dark ink, appearing to read "G. A. Baun". The signature is fluid and cursive, with a large loop at the beginning.

G. A. Baun,  
Field Supervisor.

GAB:ww

c.c. Mr. A. Barsvary  
Mr. A. Crowley

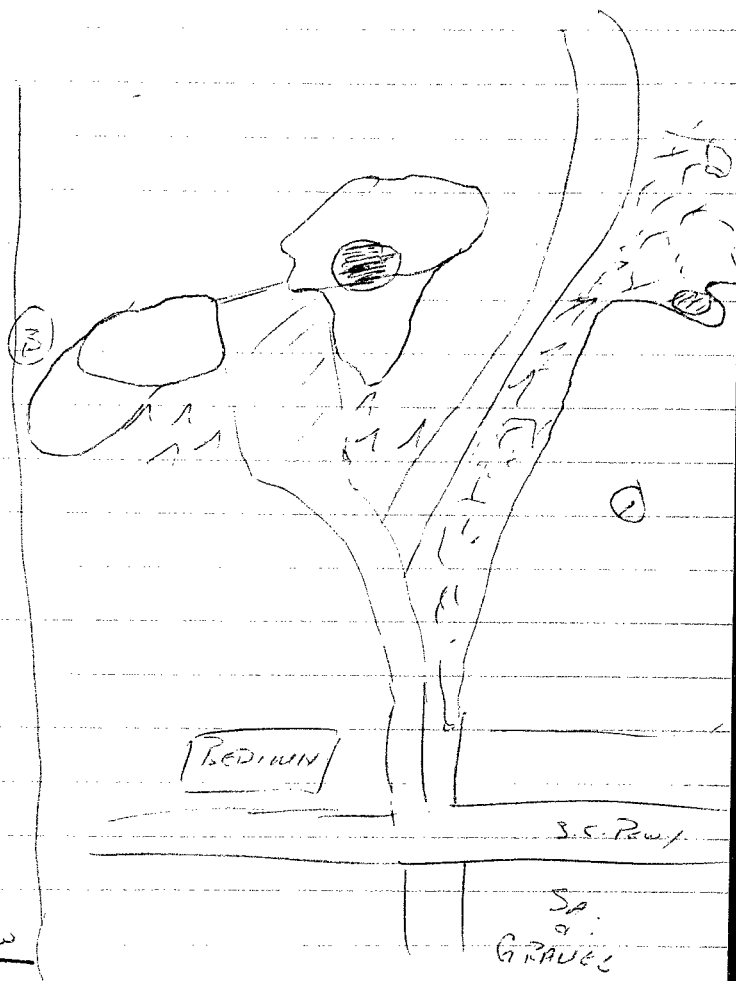
## Site History.

① Yellow Staked with started in 1948. At that time area ① had been mined to w.l. elevation which he thinks was ~~at~~ about 2' below where it is now.

In 1948 the whole of area ① was refilled with topsoil & left til 1955 when it was farmed (didn't know type of crop). In 1960-61 the topsoil was restripped & area remained on & off til 1965. In most of area mining went to about ⑤' below w.l. except around hydro poles where some pockets went to 15-16' depths.

Watt not good so area used from 65-70 as settling basin. & discontinued when fill mask mott reached pipe elevation.

Essentially same conditions should exist in area B to less depth - deepest probably ⑫' along causes high & low according to where pockets of good mott was. Watt washed through  $\frac{3}{16}$ " screens - water then goes to worn gear machine.



what has 6' settling tanks. Anger in machine  
bring out only mott in settling tanks what  
doesn't float, which is usual, rest of mott floats  
to or ~~under~~ allowed to flow out & over to  
present settling area.

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. J. G. Forster,  
Senior Soils Engineer,  
Southwestern Region,  
London, Ontario.

FROM: Foundations Office,  
Design Services Branch,  
West Bldg., Downsview.

ATTENTION:

DATE: September 1, 1972.

OUR FILE REF.

IN REPLY TO

SEP 20 1972

SUBJECT:

SOILS INVESTIGATION ALONG  
Proposed Hanlon Expressway Between  
Sta. 96+00 and 115+00  
City of Guelph, District #3, Stratford  
W.O. 72-11076 -- W.P. 109-68-08

40P9-17
GEOCRE No.

Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above-mentioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

As you can see the distribution on this report is very small, therefore, if you feel anyone else should receive a copy of it, please distribute it yourself.

AGS/ao  
Attach.

*A. G. Stermac*  
A. G. Stermac,  
PRINCIPAL FOUNDATIONS ENGINEER.

cc: G. A. Wrong

Foundations Files  
Documents ✓

## TABLE OF CONTENTS

1. INTRODUCTION.
  2. FIELD AND LABORATORY INVESTIGATIONS.
  3. SUBSOIL CONDITIONS.
    - 3.1) General.
    - 3.2) Between Stas. 96+00 and 99+00.
    - 3.3) Between Stas. #104+50 and 108+90.
    - 3.4) Between Stas. #109+00 and 114+00.
  4. CONCLUSIONS.
    - 4.1) Between Stas. #96+00 and 99+00.
    - 4.2) Between Stas. #104+50 and 108+90.
    - 4.3) Between Stas. #109+00 and 114+00.
  5. MISCELLANEOUS.
-



SOILS INVESTIGATION ALONG  
Proposed Hanlon Expressway Between  
Sta. 96+00 and 115+00  
City of Guelph, District #3, Stratford  
W.O. 72-11076 -- W.P. 109-68-08

---

1. INTRODUCTION:

The Foundations Office was requested by Mr. J. G. Forster, Senior Soils Engineer, Southwestern Region, to carry out a soils investigation between Stas. 96+00 and 115+00 of the proposed Hanlon Expressway.

On June 20, 1972, the undersigned accompanied by Mr. R. Mephram of the Southwestern Region visited the site, in order to assess the scope of the field work. The area in question is occupied by a quarry and a ready mix concrete plant. Roughly between Stas. 96+00 and 99+00 the centre-line of the proposed expressway crosses an area which had been mined on and off down to some 9 - 16 ft. below ground level. During the period 1965-1970 the pit was used as a settling basin, and as such it has been backfilled by sedimentation up to general ground level.

Between proposed Stas. 104+50 and 108+90 there is an open pit, filled with water to elevation 1039.5 ft. This pond is being used as a settling basin at the present time.

The area between Stas. 109+00 and 114+00 had also been strip-mined, although to a lesser degree, and later was refilled with wash material.

It has been decided to investigate above areas and determine whether the subsoil is acceptable or not under the proposed expressway.

## 2. FIELD AND LABORATORY INVESTIGATIONS:

Some ten sampled boreholes and four dynamic cone penetration tests were carried out during the field work. On dry land a continuous hollow stem auger was used to advance the borings. Boreholes on water were carried out on a portable raft, by using a conventional diamond drill, adapted for soil sampling purposes. Soil samples were recovered by means of split spoon and Shelby tube samplers. Standard Penetration 'N' values (blows/ft.) were recorded with each split spoon sample. Field vane undrained shear strengths were measured when possible.

All the soil samples were visually examined and classified. Laboratory tests of natural moisture contents, Atterberg Limits, grain size analyses and unconfined compression were carried out on representative samples. The results of all the tests are compiled on the accompanying borelog sheets. The locations and elevations of the boreholes are shown on Drawing #72-11076A, together with the estimated soil stratigraphy, projected to the centre-line of the expressway.

## 3. SUBSOIL CONDITIONS:

### 3.1) General:

The original overburden was identified to be gravelly sand to sandy gravel with some silt and traces of clay. The washed material was classified to be silt and clayey silt. Some organic muck was observed at the bottom of the pond. A brief description of the soils is as follows.

### 3.2) Between Stas. 96+00 and 99+00:

Within this area the surficial soil is a uniform silt and clayey silt, having been deposited in water during the washing process. In B.H. #1, at the north end, the thickness of the wash material was 2 ft., while in B.H.'s #2 and 2A near Sta. 98+00 it extended to 15-16 ft. below ground level. The consistency of this very recent stratum is very soft, corresponding to Standard

Penetration 'N' values of 1-2 blows/ft. Field and laboratory undrained shear tests resulted in values ranging from 60 p.s.f. to 400 p.s.f., averaging approximately 100 p.s.f. The cohesive portion of the deposit exhibited slight plasticity and very high moisture content, the latter being well above the liquid limit. The quoted physical properties indicate that the deposit is not yet fully consolidated, and will further settle under the existing overburden pressure.

Underlying the washed material the original gravelly sands and sandy gravels were found. This deposit is a typical glacial till, containing some silt and traces of clay. Since the relative density of the till is dense to very dense, it is considered to be a competent load bearing stratum.

The groundwater level was established around elevation 1042 ft. some 3 ft. below ground surface.

3.3) Between Stas. #104+50 and 108+90:

This is the area occupied by the pond, the depth of water varies between 6 ft. and 10 ft. The bottom of the pond is covered by very soft organic muck of some 1-2 ft. thickness. Immediately below the muck the gravelly sand with some silt and traces of clay was observed, extending to the bottom of holes. The relative density of this deposit again was measured to be dense to very dense, reaching 'N' values of 50 blows/ft. and over beneath a depth of 5-6 ft.

3.4) Between Stas. #109+00 and 114+00:

Within this area the surficial deposit was found to be sandy silt, clayey silt and silt, extending roughly to some 4 ft. below ground level. This layer is considered to be the recent deposit, sedimented in wash water. The consolidation process of this stratum was found to be somewhat more advanced than the sediments between Stas. #96+00 and 99+00. Undrained shear strength values between 275 p.s.f. up to 1000 p.s.f. were measured in the field and in the laboratory, indicating soft to stiff consistencies. Underlying the shallow recent deposit the gravelly sand, glacial till was found around elevation 1039.5 ft. Since the depth of the strip mining was rather irregular, variations of the depth of the washed silts are suspected.

#### 4. CONCLUSIONS:

##### 4.1) Between Stas. #96+00 and 99+00:

The grade of the proposed highway is designed to be around existing ground level within this length. The uppermost recent deposit of silt and clayey silt is not as yet fully consolidated material, and as such will not support any additional load without experiencing detrimental deformations. It is also anticipated that the stratum will further consolidate; i.e., subside under the existing overburden pressure. On account of the long term settlements, cracking of the pavement will most certainly occur. To remedy the existing unfavourable conditions it is suggested that the very soft silts and clayey silts be removed from below the proposed expressway and replaced by acceptable granular material. The depth of the material to be replaced will vary, but it is believed that it will not exceed 16 ft. below ground level. Excavation of the very soft soil should extend horizontally to the outer edge of the shoulder, with side slopes as steep as possible. It is to be pointed out that the excavation will partially be below groundwater level; consequently, appropriate excavation methods should be used. Upon completion of the backfill a surcharge load, consisting of some 4 ft. of fill should be placed above ground level to facilitate compaction and consolidation of the granular backfill. The surcharge should be kept in place for a minimum period of one month. A sketch of the suggested remedy is presented in Figure #1.

It is likely that the proposed southbound lanes will be outside the area, underlain by the recent fill, hence no remedial measures will be necessary under these lanes.

If it is felt that the above treatment is not justified economically, considerations may be given to expediate consolidation of the silts and clayey silts by using surcharge only. It is understood that material for such a surcharge is readily available near the site. In adopting this latter method the surficial layer

should first be stripped down to the bottom of the design subbase. The applied surcharge fill should not be higher than 6 ft. above the subgrade. To be effective the surcharge ought to be constructed at least six months, preferably one full year ahead of the construction of the expressway. Regardless of the method adopted, the consolidation of the soils should be checked by instrumenting the site. The Foundations Office would assist in implementing the instrumentation, if so desired.

4.2) Between Stas. #104+50 and 108+90:

At the location of the pond the grade of the proposed expressway will be at elevation 1044-1045 ft., some 14-15 ft. above the pond bed. As mentioned earlier the bottom of the pond is covered by a 1-2 ft. thick layer of very soft organic muck. Since this muck has no appreciable strength it will be replaced by the proposed fill. The underlying glacial till is a competent load bearing stratum, thus it will safely support the approximately 15 ft. high embankment, provided that standard 2 horizontal to 1 vertical slopes are constructed. The embankment should be built at least up to 3 ft. above water level by acceptable granular material. If the fill is constructed by end dumping, the squeezed out muck should be removed frequently in front of the dumping, so that no soft organic material remains beneath the fill.

4.3) Between Stas. #109+00 and 114+00:

Within this length the expressway will be constructed in a cut of 2 ft. to 9 ft. depth. It is believed that the surficial silt deposit will entirely be excavated during the construction of the cut. On account of the relative density of the underlying gravelly sands, no problems due to subsoil conditions are anticipated during or after constructions.

5. MISCELLANEOUS:

The field work was carried out during June 22 - July 7, 1972, under the supervision of Mr. L. J. Hodge, Engineering Student.

The equipment used was owned and operated by P.V.K. Drilling Company, Burford, Ontario.

This report was written by Mr. A. K. Barsvary, Senior Foundations Engineer.

*A. K. Barsvary*

AKB/ao

A. K. Barsvary, P. Eng.

Aug. 24, 1972.

APPENDIX I

DESIGN SERVICES BRANCH

FOUNDATION OFFICE

## RECORD OF BOREHOLE NO 1

JOB 72-11076

LOCATION Sta. 96 + 00 @ Hanlon Exp. Guelph

ORIGINATED BY JTH

W.P. 108-68-08

BORING DATE June 22, 1972

COMPILED BY JTH

DATUM Geopdetic

BOREHOLE TYPE HoInw Stem Auger

CHECKED BY JTH

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — W <sub>L</sub> PLASTIC LIMIT — W <sub>P</sub> WATER CONTENT — W			BULK DENSITY Y	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W <sub>P</sub>	W	W <sub>L</sub>		
1041.3	Ground Level															
1039.3	Silt to clayey silt. Very Soft. Brown		1	FM	FM	1040										
2.0	Gravelly sand with some silt, traces of clay.		2	SS	46											
			3	SS	21											33 42 22 3
			4	SS	20											
	Glacial Till Compact to Very Dense		5	SS	102	1030										
1026.8	Brown to White		5A, 6	SS	112											37 42 19 2
14.5	End of Borehole															




DESIGN SERVICES BRANCH

FOUNDATION OFFICE

## RECORD OF BOREHOLE NO 2

JOB 72-11076 LOCATION Sta. 98 + 00 50' Lt. of Hanlon Exp. Guelph  
 W.P. 108-68-08 BORING DATE June 22, 1972  
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger

ORIGINATED BY LJH  
 COMPILED BY LJH  
 CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT % $w_p$ $w$ $w_L$				
1045.0	Ground Level															
0.0	Silt becoming clayey silt.		1	SS	2	1040									122	 0 0 76 24
			2	SS	2											
			3	TW	PM											
	Very Soft		4	SS	1		+									
			5	TW	PM											
	Brown						+			+					118	
1030.0						1030										
15.0	Gravelly sand to sandy gravel, traces of silt and clay. (Till)		6	SS	31											
			7	SS	100/1"											
1021.0	Dense to Very Dense		8	SS	111											55 36 7 2
24.0	End of Borehole															


DESIGN SERVICES BRANCH

FOUNDATION OFFICE

## RECORD OF BOREHOLE NO 2A

JOB 72-11076 LOCATION Sta. 98 + 10 50' Lt. of Hanlon Exp. Guelph  
 W.P. 108-68-08 BORING DATE July 6, 1972  
 DATUM Geodetic BOREHOLE TYPE Washbore - NX Casing

ORIGINATED BY LJH  
 COMPILED BY LJH  
 CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					$w_p$ — $w$ — $w_L$				
						100	200	300	400	500	10	20	30	P.C.F.	GR.SA.SI.CL.	
1045.0	Ground Surface															
0.0	Silt, seams of clayey silt, traces of fine sand.		1A	TW	PM									120	0 2 82 16	
	Very Soft					1040	+							125		
	Brown		2	TW	PM			+						111		
			3	TP	PM									116.5		
			4	TP	PM									116		
1028.5			5	TP	PM	1030								105		
1027.0	Gravelly sand. V. Dense		6	SS	55			+							0 1 22 77	
18.0	End of Borehole															

DESIGN SERVICES BRANCH

FOUNDATION OFFICE

## RECORD OF BOREHOLE NO 3

JOB 72-11076

LOCATION Sta. 104 + 50 50' Rt. of Hanlon Exp. Guelph

ORIGINATED BY LJH

W.P. 108-68-08

BORING DATE June 23, 1972

COMPILED BY LJH

DATUM Geodetic

BOREHOLE TYPE Hollow Stem Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$ $w_p$ — $w$ — $w_L$ WATER CONTENT % 10 20 30				BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE									
1040.4	Ground Level					1040										
0.0	Gravelly sand, occ. seams of well graded sand, some silt and trace clay.	A B C D E F G H I J	1	SS	27											22 55 21 2
			2	SS	23											
			3A	SS												
			3	SS	42											
			4	SS	43											
	Compact to Very Dense		5	SS	27											
			6	SS	22											
	Brown to White		7	SS	21											
			8	SS	11											
1013.3			9	SS	106 3"											12 51 28 9
			10	SS	100 1"											
27.1	End of Borehole															

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 4

JOB 72-11076

LOCATION Sta. 105 + 00 Rt. 6 Hanlon Exp. Guelph

ORIGINATED BY LJH

W.P. 108-68-08

BORING DATE June 27, 1972

COMPILED BY LJH

DATUM Geodetic

BOREHOLE TYPE Washbore, BX Casing

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.				$w_p$	$w$	$w_L$		
1038.9	Water Surface						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				WATER CONTENT % 10 20 30				
1028.9	Water					1030									
10.0	Muck. V. Soft. Brown		1A	SS	PM										
11.5	Well graded gravelly sand, some silt, trace clay. Compact to V. Dense. Brown-White.		1	SS	35										52 41 ( 7 )
			2	SS	30										
1021.1			3	SS	30										35 38 22 5
			4	SS	66										
17.8	End of Borehole														

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

# RECORD OF BOREHOLE NO 5

JOB 72-11076 LOCATION Sta. 106 + 00 50' Lt. Ø Hanlon Exp. Guelph  
 W.P. 108-68-08 BORING DATE July 4, 1972  
 DATUM Geodetic BOREHOLE TYPE Washbore, BX Casing

ORIGINATED BY LJH  
 COMPILED BY LJH  
 CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				$w_p$ — $w$ — $w_L$ WATER CONTENT % 10 20 30				
1038.9	Water Surface														GR.SA.SI.CL.
	Water					1035									
1029.6	Muck					1030									
9.3	Gravelly sand		1	SS	17							○			
1025.1	Compact to Very Dense		2	SS	69							○ ○			
13.8	End of Borehole														

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 6

JOB 72-11076

LOCATION Sta. 107 + 00 50' Rt. &amp; Hanlon Exp. Guelph

ORIGINATED BY L.J.H.

W.P. 108-68-08

BORING DATE July 3, 1972

COMPILED BY L.J.H.

DATUM Geodetic

BOREHOLE TYPE Washbore, BX Casing

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$ $w_p$ — $w$ — $w_L$ WATER CONTENT % 10 20 30			BULK DENSITY $\gamma$ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE									
1038.9	Water Surface															
0.0	Water															
1032.2																
1030.2	Muck. Very Soft		1	SS	0	1030										
8.7	Sandy gravel to gravelly sand, traces of silt & clay.		1A	SS	35											
	Dense to Very Dense		2	SS	40											
1023.5	Brown to White		3	SS	73										75 22 ( 3 )	
15.4	End of Borehole															

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 7

JOB 72-11076

LOCATION Sta. 108 + 00 50' Lt. of Hanlon Exp. Guelph

ORIGINATED BY L.J.H.

W.P. 108-68-08

BORING DATE July 5, 1972

COMPILED BY L.J.H.

DATUM Geodetic

BOREHOLE TYPE Washbore, BX Casing

 CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — $w_L$			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — $w_p$	WATER CONTENT — $w$	WATER CONTENT %		
1038.9	Water Surface												
0.0	Water												
1032.6													
1030.8	Muck. Very Soft		1	SS	PM	1030							
8.1	Sandy gravel to gravelly sand, traces of silt & clay.		2	SS	58								
			3	SS	35								
			4A	SS	38								
	Compact to Very Dense		4	SS	39								
1020.7	Brown		5	SS	25								
			6	SS	100/4"								
18.2	End of Borehole												

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 8

JOB 72-11076

LOCATION Sta. 109 + 00 50' Lt. Ø Hanlon Exp., Guelph

ORIGINATED BY LJH

W.P. 108-68-08

BORING DATE June 26, 1972

COMPILED BY LJH

DATUM Geodetic

BOREHOLE TYPE Hollow Stem Auger

CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — W <sub>L</sub>			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — W <sub>P</sub>	WATER CONTENT — W	WATER CONTENT %		
1042.9	Ground Surface												
0.0	Gravelly sand, some silt, traces of clay.		1	SS	9	1010							21 75 (4)
			2	SS	5								
			3	SS	19								
	Loose to Very Dense		4	SS	19								18 50 28 4
			5	SS		1030							
	Brown		5A	SS	23								
			6	SS	41								
1020.1			7	SS	73								26 55 16 3
			8	SS	75 1/4"								
22.8	End of Borehole												



DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 9

JOB 72-11076 LOCATION Sta. 112 + 00 50' Rt. & Hanlon Exp., Quelph  
 W.P. 108-68-08 BORING DATE July 7, 10, 1972  
 DATUM Geodetic BOREHOLE TYPE Washbore, NX Casing

ORIGINATED BY LJH  
 COMPILED BY LJH  
 CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	$w_p$	$w$	$w_L$		
1043.5	Ground Surface		1	TP	PM	104									120	0 23 75 2
0.0	Sandy silt, traces of clay.		2	TP	PM	104									127	0 35 61 4
1039.5			3	SS	39										116	8 56 27 9
4.0	Gravelly sand to sandy gravel, trace of silt and clay.		4	SS	16											53 41 (6)
1034.7			5	SS	50/3											
8.8	End of Borehole					1030										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 9A

JOB 72-11076

LOCATION Sta. 112 + 00 50' Lt. of Hanlon Exp., Guelph

ORIGINATED BY L.J.H.

W.P. 108-68-08

BORING DATE July 7, 1972

COMPILED BY L.J.H.

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Test

CHECKED BY *[Signature]*

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F. GR. SA. SI. CL.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		20	40	60	80	100	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				
1044.1	Ground Level														
0.0															
1037.1															
7.0	End of Cone Test														

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 10

JOB 72-11076 LOCATION Sta. 113 + 50 50' Lt. & Hanlon Exp., Guelph  
 W.P. 108-78-08 BORING DATE July 7, 1972  
 DATUM Geodetic BOREHOLE TYPE Washbore, BX Casing; Cone Test

ORIGINATED BY LJH  
 COMPILED BY LJH  
 CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— $w_L$			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT ——— $w_p$				
							20	40	60	80	100	WATER CONTENT ——— $w$				
SHEAR STRENGTH P.S.F.							$w_p$ ——— $w$ ——— $w_L$			WATER CONTENT %						
○ UNCONFINED + FIELD VANE																
● QUICK TRIAXIAL × LAB VANE																
300 600 900 1200 1500							10 20 30			P.C.F. GR. SA. SI. CL.						
1043.9	Ground Level															
0.0	Clayey silt & silt		1	TP	PM									122.5		
1039.9	Stiff Brown													125		
4.0	Sand to gravelly sand		2	SS	49	1040										
1036.4	Very Dense. Brown		3	SS	55											
7.5	End of Borehole															

DESIGN SERVICES BRANCH

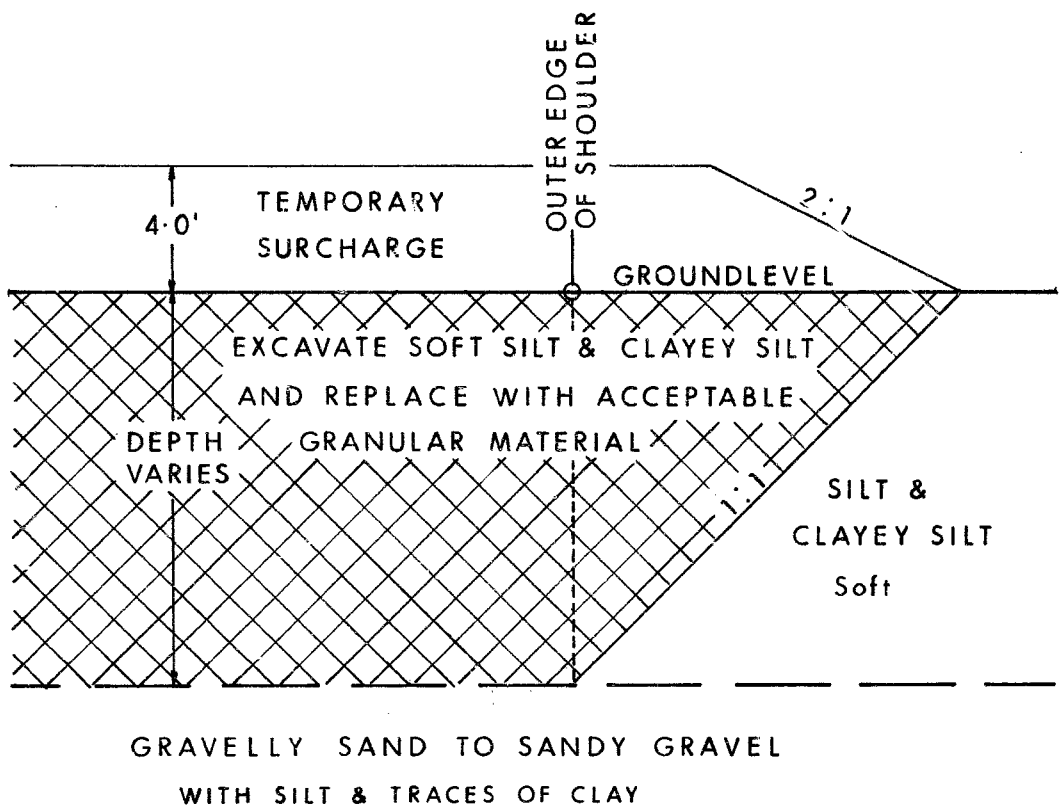
FOUNDATION OFFICE

# RECORD OF BOREHOLE NO 10A

JOB 72-11076 LOCATION Sta. 113 + 50 50' Rt. of Hanlon Exp., Guelph  
 W.P. 108-68-08 BORING DATE July 7, 1972  
 DATUM Geodetic BOREHOLE TYPE Dynamic Cone Test

ORIGINATED BY LJH  
 COMPILED BY LJH  
 CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — $W_L$			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT 20 40 60 80 100					PLASTIC LIMIT — $W_P$ WATER CONTENT — $W$ $W_P$ — $W$ — $W_L$				
1043.8	Ground Level															
0.0																
1037.1																
6.7	End of Cone Test															



**RECOMMENDED TREATMENT  
BETWEEN STA. 96+00 & 99+00**

## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

### DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

### SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

## ABBREVIATIONS USED IN THIS REPORT

### SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
s	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
$I_C$	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
$C_v$	COEFFICIENT OF CONSOLIDATION
$C_c$	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
$T_v$	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

### GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

### STRESS AND STRAIN

u	PORE PRESSURE
$\sigma$	NORMAL STRESS
$\bar{\sigma}$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

### EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	COEFFICIENT OF EARTH PRESSURE AT REST

### FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
$k_s$	MODULUS OF SUBGRADE REACTION

### SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

AD OFFICE REVIEW REPORT

BOARDROOMS: E-1 and E-2,  
DOWNSVIEW, ONTARIO.

DATE: July 5, 1974

W.P.: 109-68-08

CONTRACT: 74-53

HIGHWAY: HE

TYPE OF WORK: Grading, Drainage, Granular Base, Hot Mix Paving and structure.

LOCATION: Guelph - from Waterloo Avenue northerly to Woodlawn Road 2.3 miles  
including Imperial Road underpass.

DISTRICT: 3

ADVERTISING DATE: July 24, 1974

ATTENDANCE:

A. McConnell	R. A. Verscheure	D. Hopper
E. J. Orr	G. Wrong	A. Prakash
J. R. Wear	E. Pritchard	S. Edwards
E. J. Willis	W. Bennett	D. Michm
D. Murray	J. Crannie	J. Keen
H. Martens	H. Chyc	

POINTS OF DISCUSSION:

- 1) Discussion on necessity for signals - would not appear to be warrented (Mr. J. Wilkes). However will be proceeded with.
- 2) Top soil- Better assessment of availability required. It could well be that top soil, as originally calculated, is now covered by spoil from sewer excavation. Maybe top soil should be made a District responsibility.
- 3) Padding quantities are to be detailed - presently indicated as "Total" only.
- 4) Gasline Relocation - check with District to determine if gas is in fact a problem. Utility qualifications submitted by H. Chyc for inclusion in contract (special provision).
- 5) Waterproofing - Speed River Bridge - desire by operations to have work included either in nearby resurfacing project or with this contract. Program section (Mr. Chyc) identified that no W.P. number has been allotted for this work (a requirement as it lies outside projected work limits). Furthermore, structure is classified as a No. 3 priority and management have decreed that no Number 3 priority structure is to be programed until the outcome of a review of waterproofing requirements is made known.
- 6) Rock item to be deleted and work covered in sundry.





continued....

- 7) Region are to obtain depth of cover on watermain from District.
- 8) Structural Drawings - remove word "proposed", special to be compiled to qualify installation of utility during construction (indicated on structural drawings).
- 9) Special Provisions were read and isions and/or deletions will be effected by this office.
- 10) J. Keen suggested 10' drain be tied-in to new structure and information shown on structure drawings. Soil Mechanics Office and Regional Design to liaise with District to ascertain affect of new structure construction on adjacent 10' sewer.
- 11) Earth Excavation Item - special detailed, as part of work, that dumped concrete etc. be removed. Committee said delete this requirement and add to item # 53 "Removal of existing concrete".



EJW/jc

c.c. J. H. Blevins  
A. Wittenberg  
J. G. Forester  
F. C. Brown  
G. A. Sutherland  
W. Melinyshyn  
G. Wrong  
R. A. Verscheure  
B. Giroux  
J. Crannie  
E. J. Willis  
M. Stoyanoff  
C. Grebski  
W. R. Bennett  
C. Mirza  
G. Martens

E. J. Willis  
Project Review Supervisor

for:  
J. R. Wear  
Project Review Engineer

File

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. C. Mirza,  
Soil Mechanics Section,  
Geotechnical Office,  
Downsview.

FROM: Materials & Testing,  
Southwestern Region,  
London.

ATTENTION:

DATE: October 30, 1974.

OUR FILE REF.

IN REPLY TO

SUBJECT:

RE: Contract 74-53, Hanlon Expressway - Guelph,  
From Waterloo Ave. N'ly to Woodlawn Rd.

-----

Would you please refer to W.P. 109-68-08 and your W.O. 72-11076, dated Sept. 1, 1972, particularly your comments and recommendation for a surcharge to the backfill. This contract is now under way and the removal of the silt is almost completed. Due to the construction, since your investigation, of a drainage channel just west of our right-of-way, the water table elevation has drastically changed. The need for the surcharge now could be changed too and we ask you to visit the site as soon as possible and reconsider this aspect. I shall be pleased to meet you on the site to discuss the matter if you wish.

#6

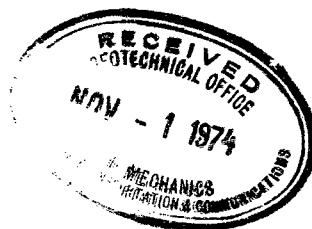
The Project Supervisor is Bill Hube (519-824-0850), and the field office is located in the house at the east R.O.W. limit of Paisley Road.

*R. Mephram*

R. Mephram,  
Project Soils Supvr.,  
For:  
J.G. Forster,  
Sr. Soils Engineer,  
Southwestern Region.

RM/1j

c.c. F.C. Brown - Dist. Engineer  
W. Hube - Proj. Supvr.  
G. Wrong - Geotechnical Office  
R. Mephram



*District already decided to eliminate the surcharge on their own initiative*

*K. L. G. B. L.*

*Spoke to Bill Hube by phone Nov. 22 - no need for site visit.*