

#58-F-212-C

W.P.# 151-57

# HWY. 401

NORWICH RD.

OXFORD TWP.

WEST

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LIMITED



BA 690

2924 BLOOR STREET WEST · TORONTO 18, ONTARIO, CANADA

8th January, 1958.

The Ontario Department of Highways,  
280 Davenport Road,  
Toronto, Ontario.

Attention: Mr. J. C. McAllister

OXFORD WEST TOWNSHIP BRIDGE N° 3

W.P. 151-57

Gentlemen:

We forward herewith three copies of our Report in connection with the soil investigation recently carried out at the above-mentioned site and we trust that if we can provide any further information you will not hesitate to inform us.

Yours truly,  
Universal GEOTECHNIQUE Limited,

L. Baskin.

lb/sg  
Encls.

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58-F-212c

**REPORT**

**on**

**SUBSURFACE EXPLORATION**

**for proposed**

**OXFORD WEST TOWNSHIP BRIDGE N° 3**

**at**

**NORWICH ROAD & HIGHWAY 401**

**COUNTY OF OXFORD**

**ONTARIO**

**2924 Bloor Street West,  
Toronto 18, Ontario.**

REPORT

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SUBSURFACE EXPLORATION

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OXFORD WEST TOWNSHIP BRIDGE N° 3

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NORWICH ROAD & HIGHWAY 401COUNTY OF OXFORDONTARIO

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W.P. 151-57

INTRODUCTION

The Highways Department of the Province of Ontario are planning a new crossing at the intersection of Norwich Road and Highway 401 approximately four miles South of Woodstock.

In order to determine the subsurface conditions for purposes of engineering design in connection with the proposed bridge the D.H.O. authorized GEOTECHNIQUE to proceed with subsurface exploration of the proposed site in conformity with requirements of the Department as shown on drawing N° E-3315-1.

THE SITE

The site is situated approximately four miles South of Woodstock on lots 4 and 5, concession 2, Township of Oxford West in the County of Oxford and is at the present intersection of Norwich Road and Highway 401. The surrounding area exhibits the hilly topography of drumlin country.

SUBSURFACE EXPLORATION

Subsurface exploration was carried out during the period 5th to 14th of December, 1957, and comprised a total of four exploratory boreholes located in positions as shown on the plan accompanying this Report. The proposed locations of the boreholes were staked and the ground surface elevations obtained by a D.H.O. Survey Crew. Subsequently the positions of the boreholes were moved a few feet in order to facilitate operations and the plan attached hereto shows the actual positions adopted.

Soil samples were obtained generally at intervals of 2-1/2 feet to a depth of 15 feet and thereafter the spacing was increased to approximately 5 feet. Where noticeable changes of strata occurred the depths of such changes were recorded.

The state of compaction of essentially cohesionless soil and the consistency of cohesive soil were determined by standard penetration tests taken during the operation of soil sampling. (The standard penetration test, as referred to in this Report, involves the recording of the number of blows (N) of a 140 lb. hammer falling 30 inches that are required to drive a 2 inch diameter split barrel sampler 1 foot into the soil at the bottom of the borehole).

The results of visual examination of the soil samples in the field and in the laboratory and the record of standard penetration tests are given on the borehole logs which, together with borehole sections A-A' and B-B' as well as a borehole location plan, form part of this Report.

Subsurface conditions given in this Report are those indicated by material encountered in the boreholes. The accuracy of extrapolation to obtain the soil profile should be associated directly with the geological conditions and inversely with the spacing of the boreholes.

## GEOLOGICAL FEATURES

Physiographically the site is situated within the small Woodstock drumlin field and from the information derived from the exploratory boreholes the strata down to the explored depth can be divided into the following classifications:

### (a) FILL

A substantial amount of fill consisting of clay, sand and gravel and varying in thickness from about 10 to 12 feet was encountered. The consistency of the material varied generally from firm to stiff but it appears to be somewhat softer in the lower part of the stratum.

### (b) BROWN CLAY TILL

Generally light brown sandy clay with gravel was encountered in boreholes BH.2A and BH.4.

### (c) GLACIAL SANDS & GRAVELS

The generally dense brown sands and gravels are undoubtedly of glacial origin and were present in all the boreholes.

To summarize the above information the site is overlain by a thickness of fill below which there exists heterogeneous glacial deposits. The presence of drumlins and the heterogeneity of the glacial material indicates the possibility of it having been reworked by an overriding ice-sheet.

The elevation of the free water in the boreholes during the period of exploration varied from 1034.8 in borehole BH.2A to 1033.8 in borehole BH.4.

## DISCUSSION

The results of the subsurface exploration indicate that satisfactory conditions exist between elevations 1032 and 1036 for the support of normal spread footings.

Assuming that the underside of normal spread footings were to be located at elevation 1036, we would assess the allowable bearing capacity at 2-1/2 tons/sq.ft. for the North - West abutment as indicated by the results from boreholes BH.1 and 4 and 3-1/2 tons/sq.ft. for the South - East abutment as indicated by the results of boreholes BH.2A and 3. However, we do not consider it advisable to adopt these

values as at elevation 1032 the bearing capacity indicated by boreholes BH. 1 and 4 is 3-1/2 tons/sq.ft.

### CONCLUSIONS

Satisfactory soil conditions obtain at the site to allow the use of normal spread footings located at elevation 1032 but due to the apparently heterogeneous nature of the glacial deposits on which the foundations will derive support it may be considered advisable to limit the allowable bearing capacity to be used in design to a figure not exceeding 3 tons/sq.ft. especially as the ground water table is close to the foundation level.

No particular difficulties are visualized in the construction of the proposed foundations.

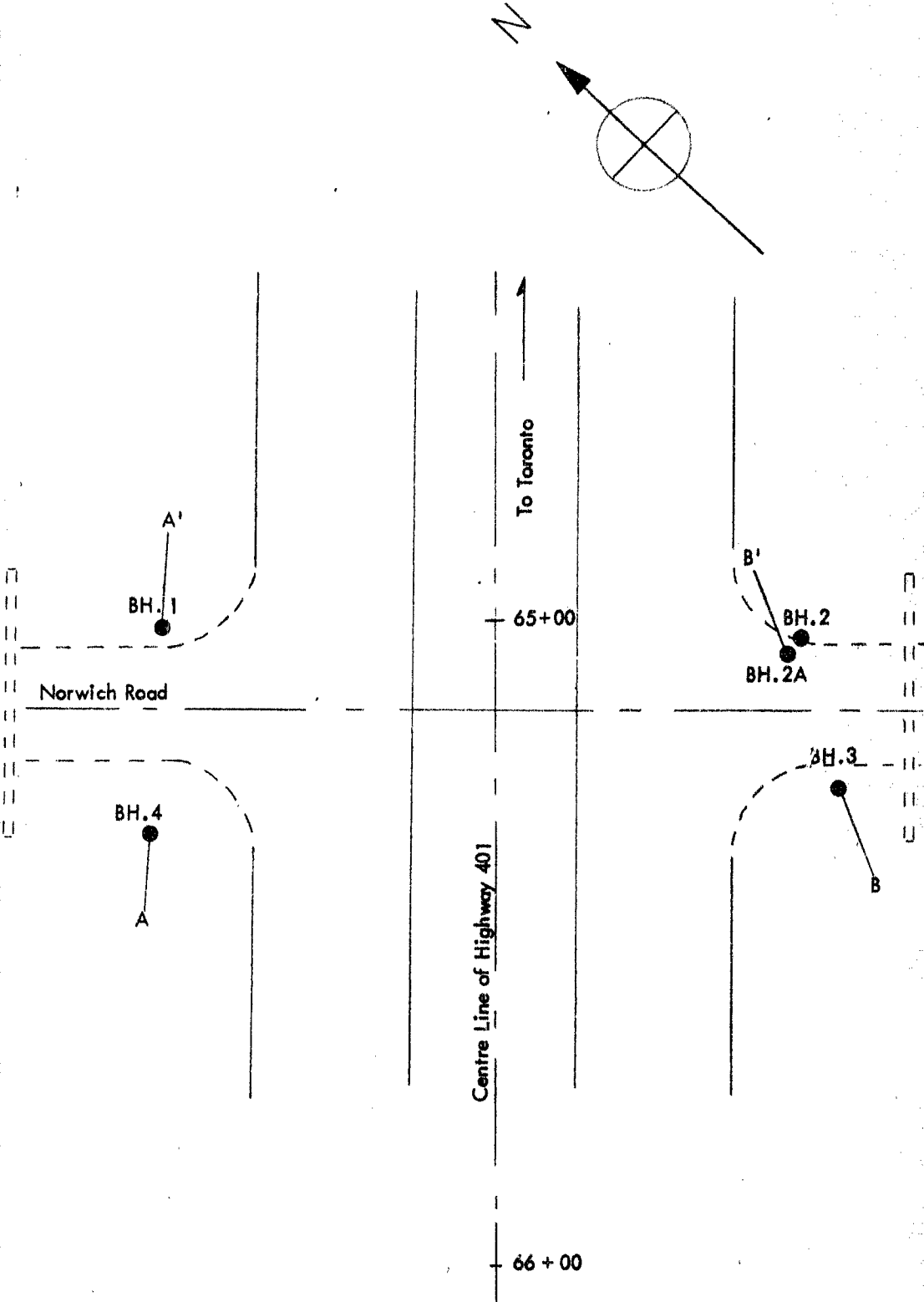
Universal GEOTECHNIQUE Limited,


L. Baskin, P.Eng.  
Engineering Geologist.

Report N° T.273/57

January, 1958.



SCALE

1" = 20'-0"

This sketch is a copy of section of plan E-3315-1, W.P. 151.57 supplied by D.H.O.

PROJECT Oxford W. Twp., Bridge N° 3, County of

TITLE Borehole Location Plan

DRG. NO. 1 ORDER NO. T.273/57

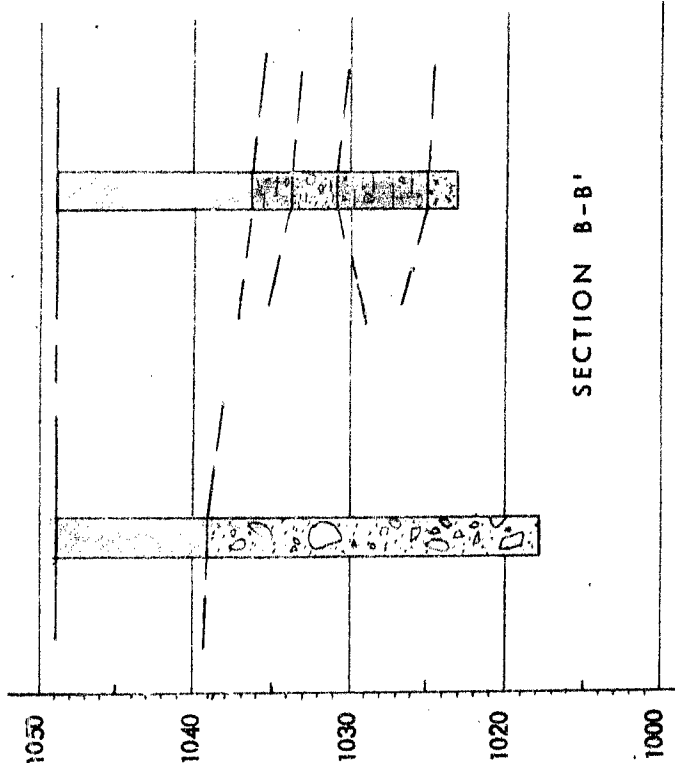


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BH.2A

BH.3

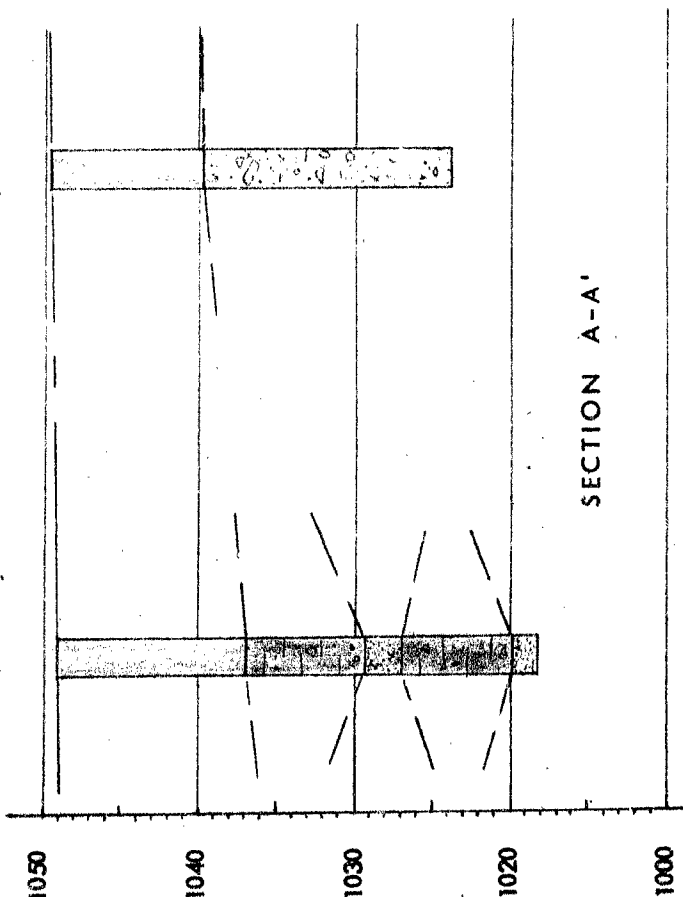
SECTION B-B'



BH.1

BH.4

SECTION A-A'



LEGEND



FILL



BROWN CLAY TILL



GLACIAL SANDS & GRAVELS

SCALE

1" = 10'-0"

PROJECT Oxford W. Twp., Bridge N° 3, County of  
Oxford, Ontario.

TITLE Borehole Sections

DRG. NO. 2 ORDER NO. T.273/57

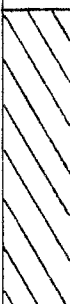

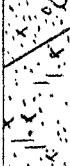



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




## SOIL MECHANICS LABORATORY

**BOREHOLE LOG**PROJECT Oxford West Township, Bridge N° 3, County of Oxford, Ontario ORDER NO. I.273/57CLIENT Department of Highways, Ontario.BOREHOLE NO. BH.1 DIAMETER 2-1/2" CASING 2-1/2"BOREHOLE LOCATION See Plan INCLINATION Vertical BEARING \_\_\_\_\_

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
Sandy clay, sand and broken gravel. FILL.	1049.7			Zero			
Firm do			• 1			54	Damp. High N due to large gravel.
Firm reddish brown clay with gravel, traces of ashes and small brick fragments. FILL.			• 2			13	Damp
do			• 3			5	do
Without ashes or brick fragments.				9'-9"			
Firm light brown generally fine silty SAND with fine to large gravel.			• 4			14	Moist. Medium dry strength
do			• 5	Free Water		27	do
Dense brown fine clayey silty SAND with generally fine subangular gravel.			• 6			76	Damp. Medium to high dry strength.
Dense brown fine silty SAND.			• 7	19'-9" 21'-0"		48 (9")	Wet Low dry strength.
Very dense light brown silty fine SAND with occasional fine gravel.			• 8	25'-9"		68 (9")	Moist Medium dry strength.
			End of Borehole				

## SOIL MECHANICS LABORATORY

**BOREHOLE LOG**PROJECT Oxford West Township, Bridge N° 3, County of Oxford, Ontario ORDER NO. T.273/57CLIENT Department of Highways, Ontario.BOREHOLE NO. BH.2 & BH.2A DIAMETER 2-1/2" CASING 2-1/2"BOREHOLE LOCATION See Plan INCLINATION Vertical BEARING       

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
<b>BH.2</b> Brown clay, sand and gravel. Firm dark brown sandy loam with some organic matter. Probably FILL. Stiff reddish brown very sandy clay with occasional gravel. Probably FILL. do	1048.8		• 1 • 2 • 3	Zero 4'-9" 9'-0" End of Borehole		18 15 10	Damp Damp. Medium to high dry strength. do Refusal Conditions Presumed boulder.
<b>BH.2A</b>  Same as BH.2	+ 1048.8			Zero			
Dense light brown clay, sand and broken gravel. Probably FILL.  Hard light brown sandy CLAY with fine subangular gravel. Dense light brown somewhat clayey SAND and fine to medium subangular GRAVEL.  Hard light brown very sandy CLAY with fine to medium subangular gravel. do Very dense light brown fine silty SAND with some generally fine gravel and clayey concentrations.		     	• 1 • 2 • 3 • 4 • 5 • 6	9'-0" 12'-6" 15'-0" 18'-0" 23'-9" 25'-9" End of Borehole	Free Water	33 (9") 30 (9") 34 33 (9") 35 (9") 67 (9")	Wet Damp High dry strength. Moist Medium to high dry strength. Damp High dry strength. do Damp Low dry strength.


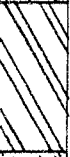
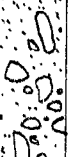

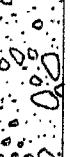
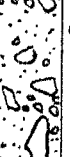
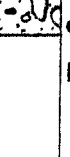



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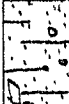
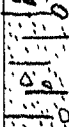

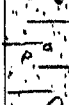
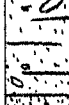
## SOIL MECHANICS LABORATORY

**BOREHOLE LOG**PROJECT Oxford West Township, Bridge N° 3, County of Oxford, Ontario ORDER NO. T.273/57CLIENT Department of Highways, Ontario.BOREHOLE NO. BH.3 DIAMETER 2-1/2" CASING 2-1/2"BOREHOLE LOCATION See Plan INCLINATION Vertical BEARING       

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
Clay, sand & gravel. FILL.	1048.8			Zero			
Dense do			• 1			35	No recovery
Stiff reddish brown clay with sand and some gravel. Probably FILL.			• 2	5'-0"		21	Damp
Firm brown clay with sand, gravel and traces of slag. FILL.			• 3			7	do
Dense brown fine to medium SAND and fine to large GRAVEL, generally subangular.			• 4	9'-9"		78	Damp. No dry strength
Very dense do			• 5	Free Water		78 (6")	Wet do
do			• 6			60 (9")	Wet
do			• 7			61	No dry strength.
Dense do			• 8			36	do
do			• 9	31'-0"		38	do
			End of Borehole				

## SOIL MECHANICS LABORATORY

**BOREHOLE LOG**PROJECT Oxford West Township, Bridge N° 3, County of Oxford, Ontario ORDER NO. T.273/57CLIENT Department of Highways, Ontario.BOREHOLE NO. BH.4 DIAMETER 2-1/2" CASING 2-1/2"BOREHOLE LOCATION See Plan INCLINATION Vertical BEARING —

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
Light brown clayey sand and fine to medium gravel. Traces of ashes. FILL.	1049.1			Zero			
Stiff brown to dark brown sandy clay with traces of organic matter. Probably FILL.			• 1			14	Damp
Stiff reddish brown sandy clay with traces of organic matter. Probably FILL.			• 2			14	Damp. High dry strength.
Firm do With some gravel.			• 3			7	dc
Firm clay, sand and generally broken gravel. Probably FILL.			• 4	9'-6"		10	Moist.
Very stiff to hard brown very sandy CLAY with fine to medium subangular gravel.			• 5	12'-0"		18	Damp. High dry strength.
Hard do			• 6	Free Water ▼		49	do
Very dense light brown silty fine SAND.			• 7	19'-9"		69 (9")	Wet Low dry strength.
Hard light brown very sandy CLAY with fine to medium subangular gravel.			• 8	22'-0"		80 (9")	Damp High dry strength.
Very dense brown fine to coarse SAND.			• 9	29'-0"		40 (6")	wet No dry strength.
				30'-6"			
				End of Borehole			