

55-222C

Hwy. 401

IROQUOIS-MORRISBURG

UNIVERSAL  
**GEOTECHNIQUE**  
LIMITED



55-F-222C

**REPORT**  
on  
**SUBSURFACE EXPLORATION**  
for  
**BRIDGE SITES**  
on  
**HIGHWAY 401**  
**ILLINOIS - KERRISBURG.**

REPORT  
on  
SUBSURFACE EXPLORATION  
for  
BRIDGE SITES  
on  
HIGHWAY 401  
IROQUOIS - MORRISBURG.

Introduction

The proposed route of Highway 401 between Iroquois and Morrisburg intersects various secondary roads, and bridges are being planned for these intersections. This report describes the results of subsurface exploration carried out at three of the proposed bridge sites on the route of Highway 401 at stations 172 + 79, 250 + 71, and 402 + 75.

The work was performed in accordance with instructions received from Messrs. A.D. Margison and Associates Limited of Toronto acting on behalf of the Department of Highways, Province of Ontario, and liaison was maintained throughout the progress of the work with Mr. P.H. Davies, Resident Engineer.

The Sites

The three sites are located to the north-west of Highway No.2, sites No.1 and 2 being on existing county roads whilst site No.3 is on a diversion of an existing road.

Access to the sites numbered 1 and 2 presented no difficulties, but the location of only two boreholes could be reached on site No.3 due to dense bush.

Water supply for drilling and boring operations was obtained by carting from creeks in the surrounding district.

Subsurface Exploration

Subsurface exploration was carried out between the 14th. and 30th. August 1955 by means of exploratory boreholes located in the positions shown on the plans accompanying this report.

Originally six boreholes were tentatively scheduled for each site, the number to be actually carried out being dependent on the subsurface conditions as disclosed by the initial borings numbered 1,2,3, and 4 on each site.

Generally boreholes were to be taken to a depth of 25 feet unless rock was encountered at a lesser depth. If the soil was soft at 25 feet the borehole was to be taken to a greater depth in accordance with the requirements of the Resident Engineer.

Exploration commenced at Site No.1 (station 179 + 79) and rock was encountered at about 14 feet; core samples were obtained from the rock in each borehole by diamond drilling.

At Site No.2 (station 250 + 71) softer material was encountered and two of the boreholes were carried to a depth of 40 feet without reaching rock.

On Site No.3 (402 + 75) it was only possible to reach the vicinity of boreholes No. 1 and 2: Dense bush prevented access to the desirable locations for boreholes No.3,4,5, and 6. Borehole No.2 penetrated to 33 feet whilst borehole No.1 was taken to a depth of 26 feet.

Soil samples were obtained at approximately every 5 feet of depth and where noticeable changes of strata occurred, and the state of compaction and consistency was determined by the standard penetration test. (The standard penetration test as referred to in this report involves the recording of the number of blows 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 after an initial penetration of 6 inches has been obtained.)

### The Soil Profile

The soil profile deduced from the results of the exploratory boring indicates that the overburden down to the explored depths generally consists of an upper stratum of very stiff to hard brown sandy-clay containing a varying gravel content, overlying grey clay containing some sand and gravel with indications of sand and gravel layers a few inches thick. The consistency of this lower stratum varied from soft to very stiff as shown on the boring logs forming part of this report.

The underlying grey clay in borehole No. BH.3 and 4 on site No.2 was noticeably softer between 20 and 30 feet.

Rock was encountered beneath Site No.1 within approximately 14 feet of the surface.

A standing water-level was observed in all boreholes, and the water-levels were recorded 24 hours after completion of each boring. The water-table indicated by these observations is relatively high, varying from about 4 feet to 7 feet below the ground surface.

Universal GEOTECHNIQUE Limited

  
J. Owen Lake.  
Chief Engineer.

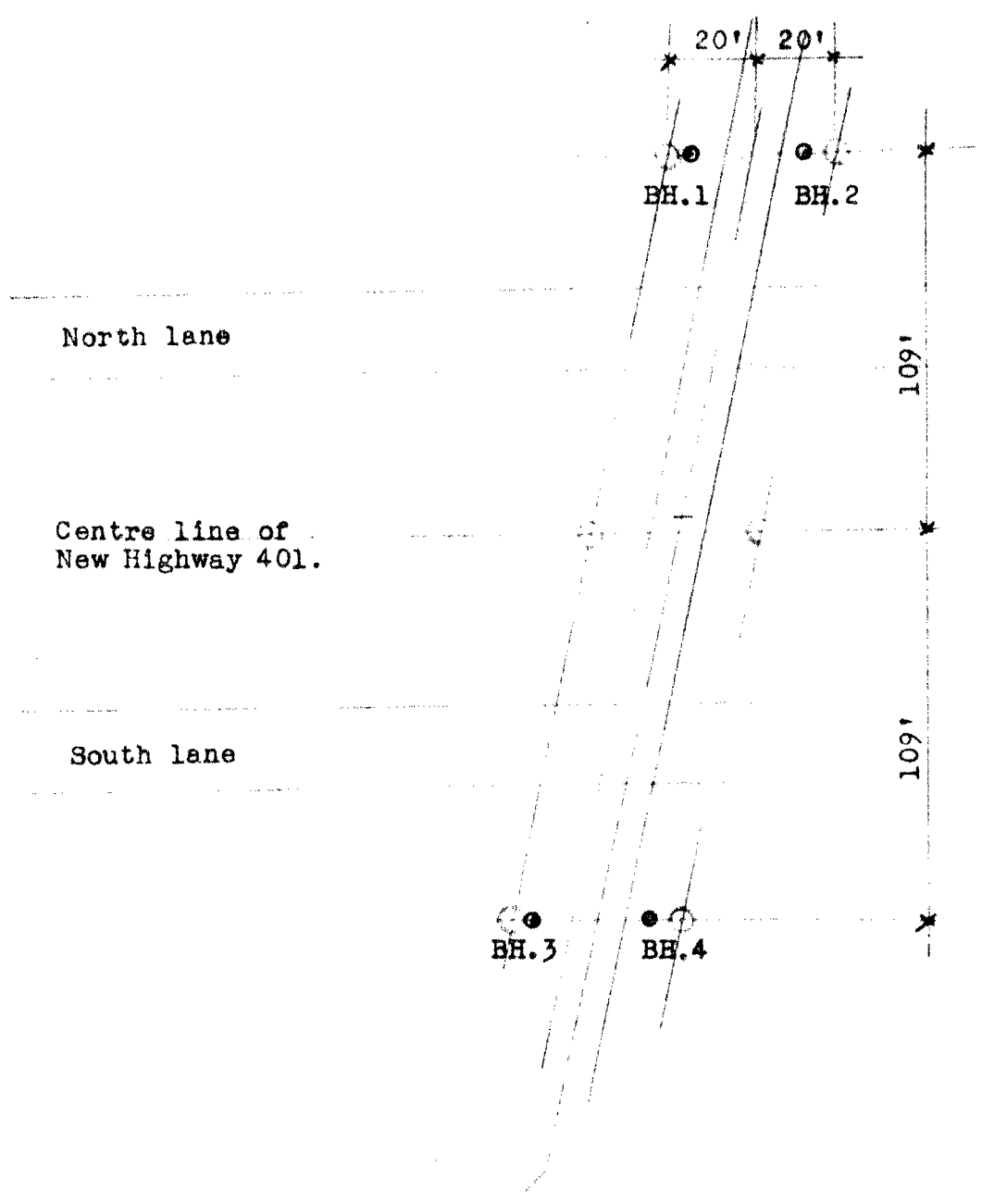
Report No. TL25/55

September, 1955.

730-56 ✓

FORM G-3 500-6-54  
(IN THE STATES OF)

SITE No. 1 (172 + 79)



Proposed location of boreholes shown thus ○  
Actual location of boreholes shown thus ●

Scale 1" to 50'

MARILDA Timp. Bc #2  
WP 730-56.

PROJECT Highway 401 - Morrisburg.  
TITLE Borehole location plan.  
DRG. No. 1 ORDER NO T125/55



UNIVERSAL  
**GEOTECHNIQUE**  
LIMITED

SOIL MECHANICS LABORATORY

BOREHOLE LOG


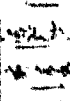



PROJECT Highway 401 - Morrisburg to Iroquois. ORDER NO. T125/55

CLIENT Dept. of Highways, Ontario. (A.D. Margison & Associates Ltd)

BOREHOLE NO. BH.1 (172+79) DIAMETER 2 1/2" CASING 2 1/2"

BOREHOLE LOCATION See loc:plan INCLINATION Vertical BEARING

FORM G-1A 500-6-54  
UNIVERSAL GEOTECHNIQUE

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	REMARKS
Firm clayey SAND & Gravel.				zero	3'-0"	Standard Penetration Test.
				3'-0"		
Firm brown sandy-CLAY with layers of fine sand.			• 1		15	 Water-table
Very stiff brown SANDY-CLAY with fine to coarse gravel.			• 2		24	
				13'-5"		
Limestone rock.			3 core	16'-9"		

OP 730-56

## SOIL MECHANICS LABORATORY

## BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T125/55

CLIENT Dept. of Highways Ontario. (A.D. Margison &amp; Associates Ltd.)

BOREHOLE NO. BH.2 (172 + 79)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See loc: plan.

INCLINATION Vertical.

BEARING

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	REMARKS
Brown sandy LOAM-organic.				zero		Standard Penetration Test.
			• 1		3'-0"	22
Stiff mottled brown sandy-CLAY with a little fine gravel.			• 2	3'-0"		23
			• 3	5'-0"	2'-0"	19
Stiff light grey CLAY with lenses of fine brown sand & thin layers of silt.					5'-6"	
			• 4	10'-6"		14
Firm to stiff grey sandy-CLAY with fine to coarse gravel.				14'-0"	3'-6"	
Broken rock.				15'-2"	1'-2"	
Rock.			• 5	17'-0"		

W 730-56

UNIVERSAL

**GEOTECHNIQUE**

LIMITED

## SOIL MECHANICS LABORATORY

**BOREHOLE LOG**

PROJECT Highway 401 - Morrisburg.

ORDER NO. T125/55

CLIENT Dept. of Highways, Ontario. (A.D. Margison &amp; Associates Ltd.)

BOREHOLE NO. BH. 3 (172 + 79)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See loc: plan.

INCLINATION Vertical

BEARING

DESCRIPTION OF STRATA	DEPTH	THICKNESS	REMARKS
Firm clayey SAND & gravel.	zero		Standard Penetration Test.
	2'-6"	2'-6"	
Firm dark brown LOAM with organic content.	• 1	6	
Stiff to very stiff mottled grey-brown CLAY with thin sand layers at 7'	• 2	24	
Brown very silty sandy CLAY with fine to medium gravel.	• 3		Water-table 18th. Aug: 1955
	9'-6"	42	
Firm to very stiff grey sandy-CLAY with fine to coarse gravel.	• 4		
	• 5	3'-6"	
	• 6	44	
	13'-0"	60	
Rock.	7	4'-0"	
	core		
	17'-0"		

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

WP 730-56



## SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - Morrisburg.ORDER NO. T125/55CLIENT Dept. of Highways, Ontario. (A.D. Margison & Associates Ltd.)BOREHOLE NO. BH.4 (172 + 79)DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION See loc: plan.INCLINATION Vertical

BEARING \_\_\_\_\_

FORM G-1A 500-6-54  
UNIVERSAL

DESCRIPTION OF STRATA	ELEVATION	LOG	SAMPLE	DEPTH	THICKNESS	REMARKS
Firm clayey SAND & gravel.				zero		Standard Penetration Test.
				3'-0"	3'-0"	
Very stiff brown sandy-CLAY with fine to coarse gravel.			• 1		8'-0"	24
			• 2	11'-0"		28
			• 3		3'-2"	30
Very stiff grey sandy-CLAY with fine to coarse gravel.				14'-2"		
Limestone rock.			4 core		5'-4"	
				19'-6"		

Water-table  
18th. Aug.  
1955

WP 730-56

SITE No. 2. (250 + 71)

North lane

Centre line of  
 New Highway 401.

South lane

20' 20'

BH.1

BH.2

109'

109'

BH.3

BH.4

Scale 1" to 50'

Proposed location of boreholes shown thus ○

Actual location of boreholes shown thus ●

PROJECT Highway 401 - Morrisburg.

TITLE Borehole location plan.

DRG. No. 2 ORDER NO. T125/55



UNIVERSAL  
**GEOTECHNIQUE**  
 LIMITED

## SOIL MECHANICS LABORATORY

## BOREHOLE LOG

PROJECT Highway 401 - Morrisburg. ORDER NO. T125/55CLIENT Dept. of Highways, Ontario. (A.D. Margison & Associates Ltd.)BOREHOLE NO. BH. 1 (250 + 71) DIAMETER 2 1/2" CASING 2 1/2"BOREHOLE LOCATION See loc: plan. INCLINATION Vertical BEARING \_\_\_\_\_

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	REMARKS
Firm clayey sand & gravel.				zero	2'-6"	Standard Penetration Test.
			• 1	2'-6"	9	
Very stiff brown sandy-CLAY with fine & medium gravel; becoming harder.			• 2		28	Water-table 24th. Aug: 1955.
			• 3		52	
Hard brown sandy-CLAY with fine to medium gravel.			• 4		52	
			• 5	12'-0"	54	
Very stiff changing to firm grey CLAY with sand lenses & fine to coarse gravel.			• 6		32	
				15'-0"		
				3'-6"		Drilled through rock; probably boulder.
				18'-6"		
Firm grey silty-CLAY with fine gravel.			• 7		21	
Soft grey silty-CLAY with fine gravel.			• 8		9	
Soft to firm grey silty-CLAY with fine gravel			• 9		11	
Firm do. do.			• 10		14	
Stiff do. do.			• 11		24	
				42'-0"		End of Boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

## SOIL MECHANICS LABORATORY

## BOREHOLE LOG

PROJECT Highway 401 - Morrisburg.

ORDER NO. T125/55

CLIENT Dept. of Highways, Ontario. (A.D. Margison &amp; Associates Ltd.)

BOREHOLE NO. BH. 2 (250 + 71)

DIAMETER 2½"

CASING 2½"

BOREHOLE LOCATION See loc. plan.

INCLINATION Vertical.

BEARING

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	REMARKS
Topsoil - LOAM; organic.			• 1	zero.		Standard Penetration Test.
Very stiff brown sandy-CLAY with a little fine gravel.			• 2	2'-6"	2'-6"	11
Hard do. do.			• 3		9'-6"	24
Hard brown sandy-CLAY with fine to coarse gravel; becoming stiff to firm at bottom of stratum.			• 4			58
Very stiff grey silty-CLAY with fine gravel; becoming softer.			• 5	12'-0"		55
			• 6			36
			• 7			28
Stiff grey silty-CLAY with fine gravel.			• 8			21
do. do.			• 9			20
			• 10			22
Firm to stiff grey silty-CLAY with fine gravel.			• 11			18
Very stiff do. do.			• 12			25
Very stiff grey silty-CLAY with fine to coarse gravel.				41'-0"		28

Water-table  
25th. Aug.  
1955

End of Boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

## SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - Morrisburg ORDER NO. T125/55CLIENT Dept. of Highways Ontario. (A.D. Margison & Associates Ltd.)BOREHOLE NO. BH. 3 (250 + 71) DIAMETER 2½" CASING 2½"BOREHOLE LOCATION See loc. plan. INCLINATION Vertical BEARING \_\_\_\_\_

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	REMARKS
Firm clayey-SAND & gravel.				zero		Standard Penetration Test.
Firm LOAM with organic content changing to stiff to very stiff brown sandy-CLAY with a little fine gravel-slightly organic.			● 1 ● 2 ● 3	2'-6"	2'-6"	10 18 24
Hard brown sandy-CLAY with gravel			● 4	10'-0"		
Loose to firm clayey fine brown SAND with fine & medium gravel.			● 5 ● 6	12'-0"	2'-0"	44 4
Firm grey CLAY with fine to medium gravel			● 7	13'-6"	1'-6"	28
Soft to firm grey CLAY with fine to medium gravel; occasional thin layers of gravel.			● 8	16'-0"	2'-6"	21
Soft grey CLAY with fine gravel; occasional thin layers of gravel.			● 9			7 (no recovery)
Soft to firm grey CLAY with fine gravel, becoming sandy with depth.			● 10		21'-0"	11
Firm grey sandy-CLAY with fine & medium gravel.			● 11 ● 12	37'-0"		9
				41'-0"		21
						End of Boring.

FORM G-1A 500-6-54  
UNIVERSAL TESTING

## SOIL MECHANICS LABORATORY

**BOREHOLE LOG**PROJECT Highway 401 - Morrisburg.ORDER NO. T125/55CLIENT Dept. of Highways, Ontario. (A.D. Margison & Associates Ltd.)BOREHOLE NO. BH. 4 (250 + 71) DIAMETER 2 1/2" CASING 2 1/2"BOREHOLE LOCATION See loc: plan. INCLINATION Vertical. BEARING \_\_\_\_\_FORM G.T.A. 500-6-54  
UNIVERSAL GEOTECHNIQUE LTD.

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	REMARKS
Topsoil - LOAM; organic				zero		Standard Penetration Test.
Stiff mottled grey CLAY with pockets of brown clayey-sand			• 1	2'-6"	2'-6"	11
Very stiff mottled grey-brown sandy-CLAY with a little fine gravel.			• 2			21
			• 3			49
Very stiff to hard brown sandy-CLAY with fine to coarse gravel			• 4		8'-6"	35
Very stiff grey silty-CLAY with fine to coarse gravel.			• 5	11'-0"		28
Firm grey silty-CLAY with occasional pockets or thin layers of grey coarse sand & fine to medium gravel containing a matrix of softer grey clay.			• 6			16
do. do.			• 7			9 (no recovery)
Stiff grey silty-CLAY with a little fine gravel.			• 8			18
Firm grey CLAY with fine & medium gravel.			• 9	37'-0"		26
						End of Boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE