

55-F-223C

Hwy. 401

Inoquois, Morrisburg,

Cornwall

UNIVERSAL
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55-F-223 C

REPORT

ON

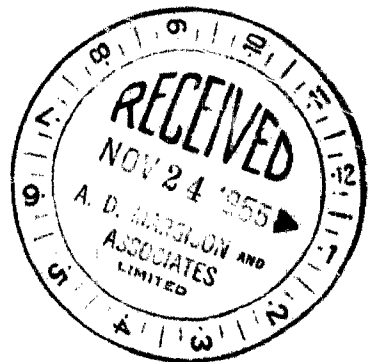
SUBSURFACE EXPLORATION

for

BRIDGE SITES ON THE HIGHWAY 401

ILLINOIS, MISSISSAUGA, CORNWALL

Ontario



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

Report
 on
Subsurface Exploration
 for
Bridge Sites on the Highway 401
Iroquois, Morrisburg, Cornwall
Ontario

Introduction

The proposed route of Highway 401 between Iroquois, Morrisburg and Cornwall intersects various secondary roads, and bridges are being planned for these intersections. Our Report No. T.123/55 gave the results of subsurface exploration carried out in August of 1955 at three of the proposed bridge sites. This report gives details of further subsurface exploration at Sites Nos. 3 to 12 inclusive.

The work was performed in accordance with instructions received from A. D. Margison & Associates Ltd. 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 sites are located to the Northwest of Highway No. 2, certain locations being on the existing County Roads, whilst others are in fields either adjacent or at some distance from the highways.

Access to Site No. 3 was particularly difficult, due to its distance from the highway and the extremely soft nature of the surface soil, which precluded transportation of the equipment by truck; to expedite removal of the drill and equipment from this site, it was necessary to use a team of horses. On other sites it was necessary to cut access to the borehole locations through undergrowth and brushwood.

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

Subsurface Exploration

The subsurface exploration described in this report was carried out between the 2nd of October and 15th November, 1955, by means of exploratory boreholes located in the positions shown on the plans accompanying this report.

-2-

The depth to which boreholes were taken was decided by the Resident Engineer as the progress of boring continued.

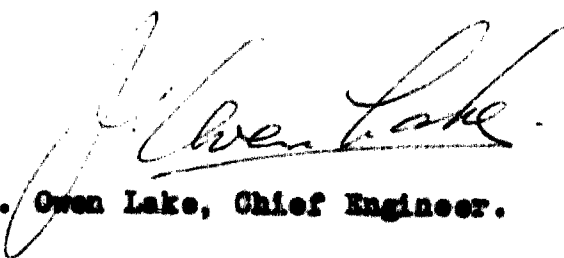
Exploration commenced at Site No.3, where previously only Boreholes 1 and 2 had been completed. Thereafter, exploration at Sites Nos.4 to 12 inclusive was carried out in numerical order.

Soil samples were obtained at approximately every five feet of depth and where noticeable changes of strata occurred, and 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" diameter, split-barrel sampler one foot into the soil at the bottom of the borehole, after an initial penetration of six inches has been obtained).

Typical glacial deposits were encountered at all sites and full details of the various strata encountered during the boring operations are given on the borehole logs forming part of this report.

Rock was encountered in Boreholes Nos.1 and 4 on Site No.10, at approximately 29 feet below ground surface and four-foot rock cores were obtained from each of these boreholes.

Universal GEOTECHNIQUE Limited,



J. Owen Lake, Chief Engineer.

JOL/ms

Report No. T.129/55

19 November, 1955.

SITE No. 3 (402 + 75)

County Road.

BH.1 BH.2
25' 25'

North
lane

100'
Main
Mall

Centre line of
New Highway 401.

South
lane

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.

Dwg. No. 1..... T129/55
DRG. NO. 3..... ORDER NO. T125/55



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SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 -- Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.3 (402+75)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See Loc. Plan

INCLINATION

BEARING

DESCRIPTION OF STRATA	ELEVATION	DEPTH	DIAMETER	REMARKS
		zero		Standard Penetration Test
Firm, partly decayed vegetation and loam		2'-6"		21
Loose to firm, reddish-brown fine SAND		2'-6"		12
Firm brown & grey silty fine SAND with fine and coarse gravel		5'-0"		19
		6'-0"		35
Stiff grey slightly sandy SILT with a little coarse gravel		5'-0"		(High figure, due to gravel content)
Hard, dry, friable mixed grey and brown organic SILT and fine SAND with pockets of PEAT		11'-0"		60 (6")
Firm, grey CLAY till with considerable coarse gravel				61 (9")
Stiff grey CLAY till				34
		28'-0"		38 End of boring.

SOIL MECHANICS LABORATORY

BOREHOLE LOG

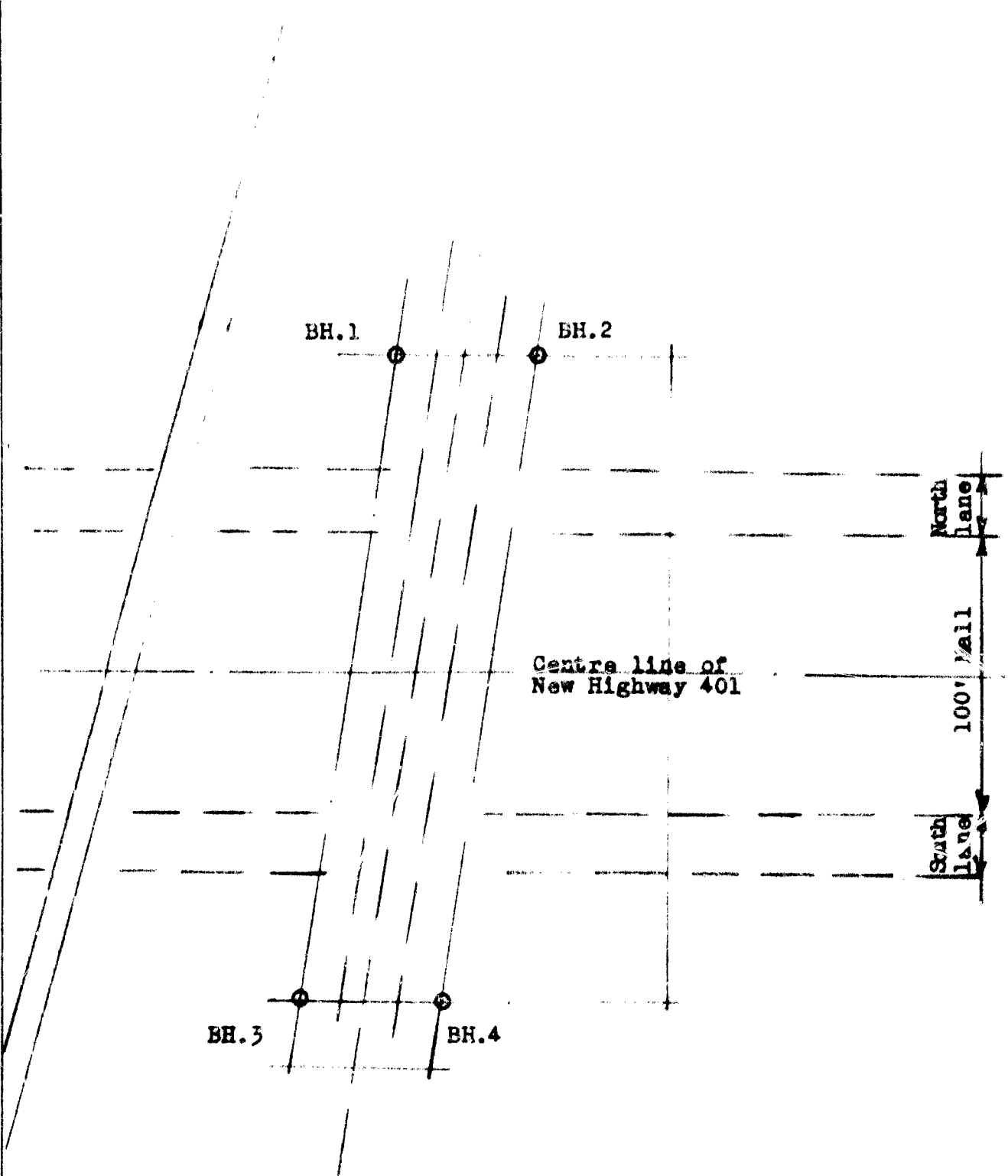
PROJECT Highway 401 - Morrisburg ORDER NO T122/55
CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)
BOREHOLE NO BH.4 (402+73) DIAMETER 2½" CASING 2½"
BOREHOLE LOCATION See log. plan INCLINATION BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	DEPTH (m)	REMARKS
Soft, partly decayed vegetation and loam	• 1	zero	Standard Penetration Test 14
		1'-6"	
Firm, light brown fine sand	• 2		16
Ditto	• 3		28
Very stiff, grey sandy CLAY till	• 4	6'-4"	62
Ditto	• 5		60
Firm, grey sandy CLAY till	• 6		58
Ditto	• 7		39
Firm to stiff grey CLAY till	• 8	26'-0"	35 End of boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

Site No. 4 (94 r 65)



Wellmark bore Tap #2

Scale 1" to 50'

Location of borwholes shown thus

PROJECT Highway 401 - Morrisburg.

TITLE Borehole location plan.

DRG. NO. 2 ORDER NO. T129/55



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BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

CLIENT Dept. of Highways, Ontario

(A. D. Margison & Associates Ltd.)

BOREHOLE NO BF.1 (94+65)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See loc. plan

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	DEPTH (m)	DIAMETER (in)	DIAMETER (mm)	DEPTH (ft)	DEPTH (m)	STANDARD PENETRATION TEST	REMARKS
Soft, black PEAT	0	0	2 1/2"	63.5	zero	0	4	Ground-water Table
Firm grey organic clay CLAY	1	0.3	2 1/2"	63.5	2'-3"	0.6	9	
Firm to stiff grey CLAY till	2	0.6	2 1/2"	63.5	4'-6"	1.2	11	
Ditto	3	0.9	2 1/2"	63.5			13	
Hard, grey CLAY till	4	1.2	2 1/2"	63.5			30	
Stiff, grey CLAY till	5	1.5	2 1/2"	63.5			23	
Firm, grey sandy CLAY till becoming softer with depth	6	1.8	2 1/2"	63.5			18	
Soft to firm grey CLAY till	7	2.1	2 1/2"	63.5			14	
Soft, grey sandy CLAY till	8	2.4	2 1/2"	63.5			9	
Ditto	9	2.7	2 1/2"	63.5			7	
Ditto	10	3.0	2 1/2"	63.5			6	End of boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.2 (94-65)

DIAMETER 2 1/2"

CASIN 2 1/2"

BOREHOLE LOCATION See loc. plan

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	DEPTH (m)	TEST	REMARKS
			zero	Standard Penetration Test
Very soft, black PEAT	1	2'-6"	3	Ground-water Table
Soft, grey organic SILT	2		6	
Very stiff, dark grey, slightly organic CLAY till	3		29	
Soft ditto	4		13	
Very stiff to hard, grey CLAY till	5		33	
Very stiff, grey CLAY till	6		29	
Soft to firm, grey CLAY till	7		9	
Firm, grey CLAY till	8		12	
Soft, grey CLAY till	9		5	
Ditto	10		9	
Ditto	11		8	
Ditto	12		10	
		50'-0"		

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.2 (24+65)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (FEET)	DEPTH (METERS)	REMARKS
		50'-0"	
Soft grey sandy CLAY till	• 13		12
Soft to firm, sandy CLAY till	• 14		14
Firm to stiff, grey CLAY till	• 15		18
Ditto	• 16		21
Stiff, grey CLAY till	• 17	72'-0"	29
			End of boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - Morrisburg.ORDER NO T129/55CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)BOREHOLE NO BH.3 (94+65)DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION See loc. plan

INCLINATION _____

BEARING _____

DESCRIPTION OF STRATA	LOCATION	DEPTH (FEET)	REMARKS
Very soft, partly decayed vegetation and peat	• 1	zero	Standard Penetration Test 2
Soft to firm grey varved CLAY with sand lenses	• 2	2'-0"	Ground Water Table
Very stiff grey CLAY till	• 3	4'-6"	6
Hard grey CLAY till	• 4		28
Stiff grey CLAY till; slightly organic	• 5		42
Soft grey CLAY till; slightly organic	• 6		24
Stiff grey CLAY till	• 7		10
Firm grey sandy CLAY till	• 8		18
Ditto	• 9		11
Soft to firm grey CLAY till	• 10		24
Ditto	• 11		11
Soft grey CLAY till	• 12		12
		50'-0"	14

SCALE - 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - MorrisburgORDER NO T129/55CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)BOREHOLE NO BH.3 (94+65)DIAMETER 2 1/2"CASING 2 1/2"

BOREHOLE LOCATION

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (FEET)	INCLINATION	BEARING	REMARKS
Soft to firm grey CLAY till	013	50'-0"	26	
Soft grey CLAY till	014		17	
Soft grey CLAY till, with thin layers of gravel	015		18	
Firm grey CLAY till, with thin layers of gravel	016		26	
Firm grey sandy CLAY till with considerable gravel	017	72'-0"	36	End of boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

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BOREHOLE LOG

PROJECT Highway 401 - Morrisburg.

ORDER NO. TL29/55

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

BOREHOLE NO. BH.4 (94+65)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION

INCLINATION

BEARING

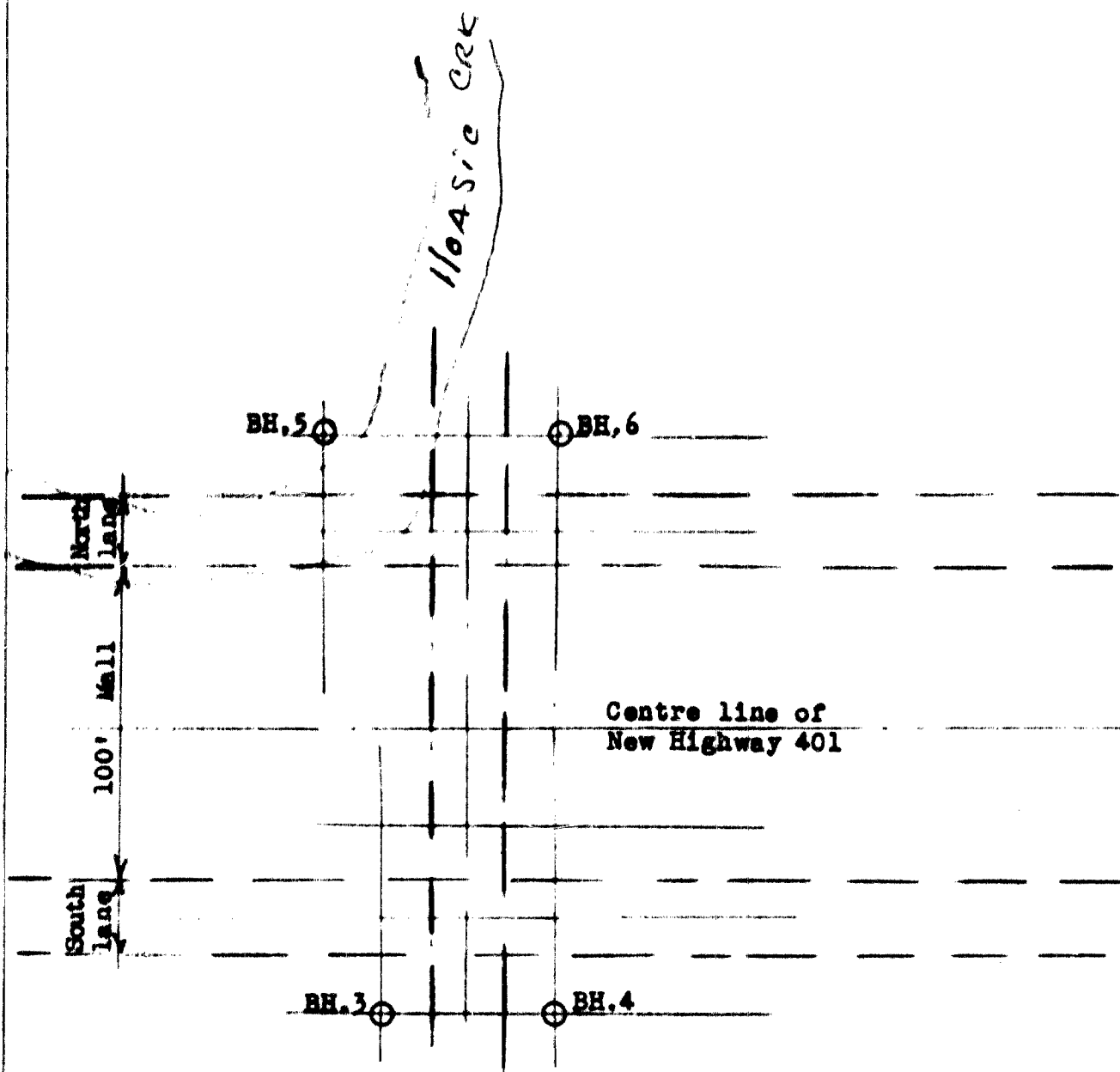
DESCRIPTION OF STRATA	DEPTH (ft)	DIAMETER (in)	REMARKS
Soft black partly decayed vegetation and loam	0	zero	Standard Penetration Test 3
	1	2'-3"	Ground-water Table
Firm grey-brown silty till	2		8
Very stiff, blue-grey CLAY till	3		26
Very stiff to hard blue-grey CLAY till, slightly organic	4		48
Firm to stiff blue-grey CLAY till	5		24
Soft grey CLAY till, slightly sandy	6		12
Soft to firm, grey CLAY till	7		21
Ditto	8		19
Ditto	9		18
Ditto	10		19
Ditto	11	42'-0"	16 End of boring.

SCALE - 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

Site No.5 (189+40)

Williamsburg
#4.



Scale - 1" to 50'

Location of boreholes shown thus ○

Williamsburg, Va. #4

PROJECT Highway 401 - Morrisburg.

TITLE Borehole location plan.

DRG. NO. 3 ORDER NO. T.129/55



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BOREHOLE LOGWilliamsburg
#4

PROJECT Highway 401 - Morrisburg.

ORDER NO T129/55

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

BOREHOLE NO BH. 3 (132+40)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See loc: plan.

INCLINATION Vertical.

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	TEST	REMARKS
		zero.	Standard Penetration Test.
Soft dark brown topsoil.	1	1'-6"	4
Very soft plastic grey CLAY.	2		3
do. do.	3		5
do. do.	4	11'-6"	4
do. do.	5		6
		13'-0"	
Soft grey sandy-TILL	6		4
do. do.	7		7
		24'-0"	
Soft to firm do. do.	8		12
Soft to firm grey TILL	9		14
do. do.	10		16
Very stiff grey gravelly TILL.	11	37'-0"	59
Hard grey TILL.	12	41'-0"	60(8")
			End of Boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

Williamsburg
#4

PROJECT Highway 401 - Morrisburg.

ORDER NO. T127/55

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

BOREHOLE NO BH.4 (189+40)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See loc: plan.

INCLINATION Vertical

BEARING

DESCRIPTION OF STRATA	DEPTH	THICKNESS	REMARKS
Soft organic topsoil & brown peat.	zero		Standard Penetration Test.
Loose grey fine SAND with thin layers of soft grey CLAY.	2'-0"	2'-0"	5
Soft grey sandy CLAY	2'-0"	2'-8"	6
	4'-8"		7
Soft to firm grey sandy-CLAY changing to soft grey sandy TILL.			9
			7
Soft grey sandy- TILL.			8
do. do.			8
		32'-4"	
do. do.			11
Soft to firm grey sandy-TILL			14
do. do.			18
Very stiff gravelly TILL.	37'-0"		55
do. do.			60(6")
	40'-0"		
			End of Boring.

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SOIL MECHANICS LABORATORY

BOREHOLE LOG*Williamsburg
#4*PROJECT Highway 401 - Morrisburg.ORDER NO T129/55CLIENT Dept. of Highways, Ontario. (A.D. Margison & Associates Ltd.)BOREHOLE NO BH.5(189+40)DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION See loc. plan.INCLINATION Vertical.

BEARING

DESCRIPTION OF STRATA	ELEVATION	DEPTH	DEPTH	DEPTH	REMARKS
			zero		Standard Penetration Test.
Soft brown LOAM - topsoil		• 1	2'-6"	5	Groundwater table;
Soft grey SILT with a little fine sand.		• 2	2'-6"	7	
		• 3	4'-7"	3	
Soft grey plastic CLAY with thin silt layers, changing to soft grey sandy clay TILL.		• 4		7	
		• 5		3	
Soft grey sandy clay TILL.		• 6		6	
Firm grey sandy clay TILL.		• 7		17	Slight trace of artesian pressure at lower levels.
			29'-11"		
Soft to firm grey sandy clay TILL with increasing gravel content.		• 8		11	
do. do.		• 9		11	
Firm to dense grey silty fine SAND.		• 10	34'-6"	41	Boulder.
		• 11	36'-4"	60 (9")	
Hard grey sandy TILL.			7'-8"		
			44'-0"		
Very dense dark grey fine SAND.		• 12		60 (6")	
			50'-0"		

SCALE - 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

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SOIL MECHANICS LABORATORY

BOREHOLE LOG*Williamsburg #4*PROJECT Highway 401 - Morrisburg.ORDER NO T129/55CLIENT Dept. of Highways, Ontario. (A.D. Margison & Associates Ltd.)BOREHOLE NO BH.5 (189+40)DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION See loc. plan.INCLINATION Vertical.

BEARING

DESCRIPTION OF STRATA	LOCATION	DEPTH	REMARKS
		50'-0"	
Dense grey silty fine SAND with traces of organic matter.	x el3		60 (8")
Dense dark grey to black medium SAND.	el4		60
Dense black fine to medium SAND.	el5		60 (11"Ø)
do. do.	el6	67'-0"	60 (Wash sample) End of Boring.

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

Williamsburg
#4

PROJECT Highway 401 - Morrisburg.

ORDER NO. T129/55

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

BOREHOLE NO. BH. 6 (189+40)

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION See loc. plan.

INCLINATION Vertical.

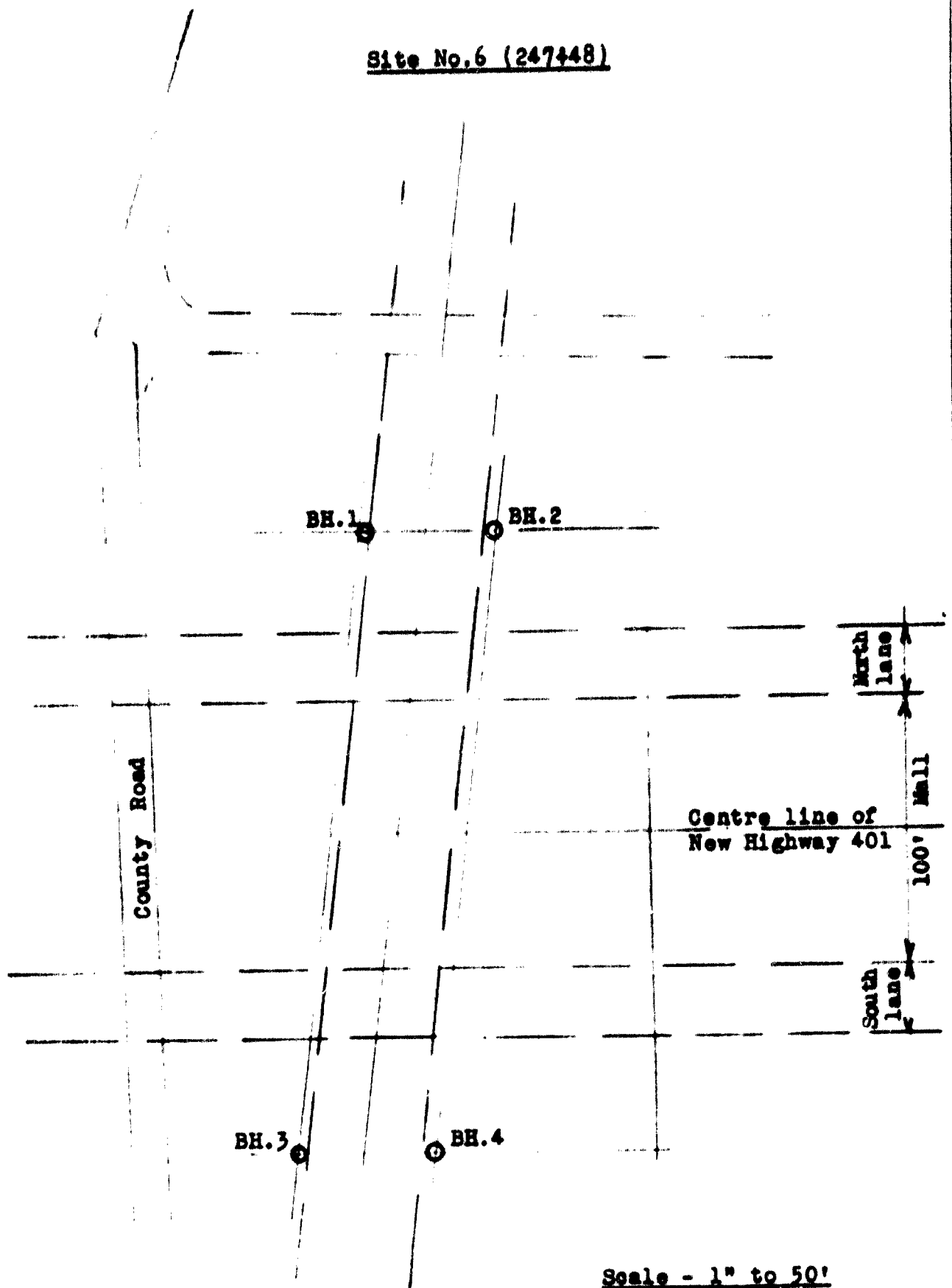
BEARING

DESCRIPTION OF STRATA	DEPTH (feet)	STANDARD PENETRATION TEST (blows per foot)	REMARKS
Soft dark brown LOAM.	0 - 1	zero	Standard Penetration Test. Groundwater table;
Soft grey plastic silty-CLAY changing to soft grey sandy CLAY TILL	1 - 2	3'-6"	
Soft grey sandy-clay TILL.	2 - 3	4	
Firm to stiff grey clay TILL	3 - 4	26	Slight trace of artesian pressure at lower levels.
Soft to firm grey clay TILL.	4 - 5	19	
Soft grey sandy clay TILL	5 - 6	11	
do. do.	6 - 7	11	End of boring.
Firm grey very gravelly TILL with soft clay matrix.	7 - 8	41	
Very dense grey silty fine to medium SAND.	8 - 9	60 (7")	
	9 - 38	38'-0"	

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

Site No. 6 (247448)



Location of boreholes shown thus ○

PROJECT Highway 401 - Morrisburg.

TITLE Borehole location plan.

DRG. NO. 4 ORDER NO. T.129/55



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BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T129/55

CLIENT Dept. of Highways, Ontario

(A. D. Margison & Associates Ltd.)

BOREHOLE NO BH.1 and BH.2

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (247+48)

INCLINATION

BEARING

DISTURBED SAMPLE		UNDISTURBED SAMPLE	
BH.1		Standard Penetration Test	
Dark brown topsoil Firm, light brown TILL	• 1	zero	11
	• 2	1'-0"	21
Hard, light brown sandy TILL	• 3	3'-0"	65
	• 4	5'-6"	60 (3")
	• 5		65 (3")
		End boring.	
BH.2			
Dark brown topsoil Very stiff light brown TILL, becoming hard with considerable rock fragments	• 1	zero	13
	• 2	1'-0"	36
Very dense dark brown silty SAND with broken rock, becoming very dense grey fine SAND with medium to coarse gravel	• 3		68
	• 4	6'-0"	60 (4")
	• 5		49 (5")
	• 6	14'-6"	34 (6")
		Drilling between 6'-0" and 14'-0" End of boring.	

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

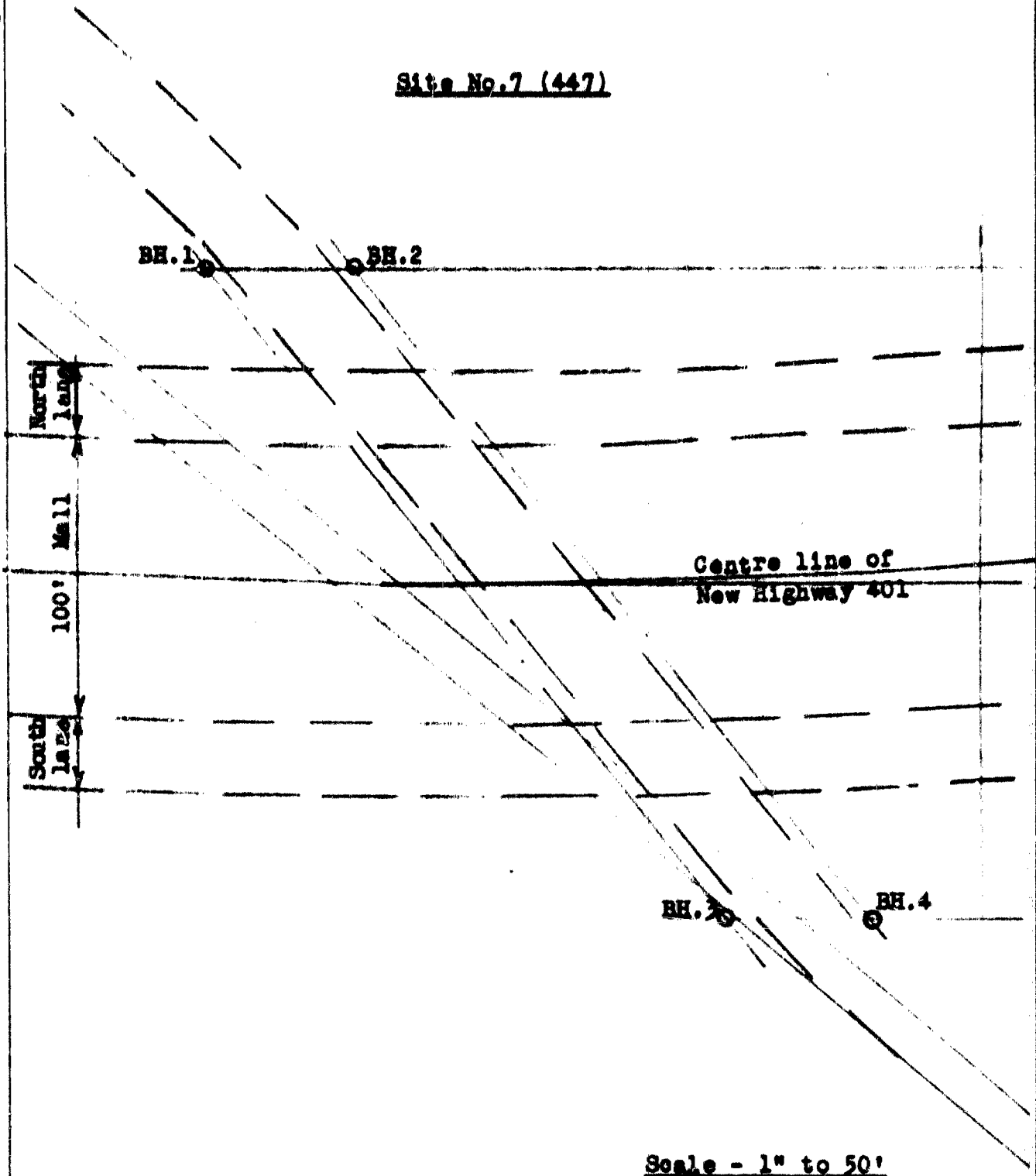
SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg ORDER NO. T129/55
 CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)
 BOREHOLE NO BH.3 and BH.4 DIAMETER 2 1/2" CASING 2 1/2"
 BOREHOLE LOCATION (247+48) INCLINATION _____ BEARING _____

DESCRIPTION OF STRATA	LOCATION	TIME	AMPL.	DEPTH	REMARKS	TEST	REMARKS
BH.3 Dark brown organic topsoil			• 1	zero	2'-0"	7	Standard Penetration Test
				2'-0"			Ground-water Table
Hard, light-grey silty TILL, Changing to soft to firm light brown silty TILL, with considerable rock fragments; changing to			• 2			48	
			• 3			60 (4")	
dark brown, fine to medium silty SAND			• 4	14'-3"		30 (3")	End of boring.
BH.4							
Dark brown, silty LOAM -- topsoil			• 1	zero	1'-9"	9	Ground-water Table
				1'-9"			
Firm light brown TILL, becoming hard			• 2			46	
			• 3	5'-2"		21 (3")	End of boring.

Site No. 7 (447)



Location of boreholes shown thus ○

Williamsburg Twp #9.

PROJECT Highway 401 - Morrisburg.

TITLE Borehole location plan.

DRG. NO. 2 ORDER NO. T.129/55



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BOREHOLE OG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.1 and BH.2

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (447)

INCLINATION

BEARING

DESCRIPTION OF STRATA	ELEVATION	DEPTH	AMOUNT	DEPTH	REMARKS
BH.1					Standard Penetration Test
Dark brown LOAM-topsoil		• 1	zero	7	Ground-water Table
		• 2	2'-6"	24	
Firm, brown silty TILL, becoming hard		• 3		60	
		• 4		37(3")	
Hard brown very sandy clay TILL, changing to dense, dark brown clayey medium SAND with coarse gravel		• 5	14'-6"	34	End of boring
BH.2					
Dark brown LOAM		• 1	zero	6	Ground-water Table
Firm to stiff brownish-grey CLAY with silt and fine SAND, becoming hard, grey silty clay TILL		• 2	1'-2"	27	
		• 3		29	
		• 4	5'-6"	41(4")	End boring

SCALE 1" = 3' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T129/55

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

BOREHOLE NO. BH.3 and BH.4


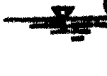
DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (447)

INCLINATION

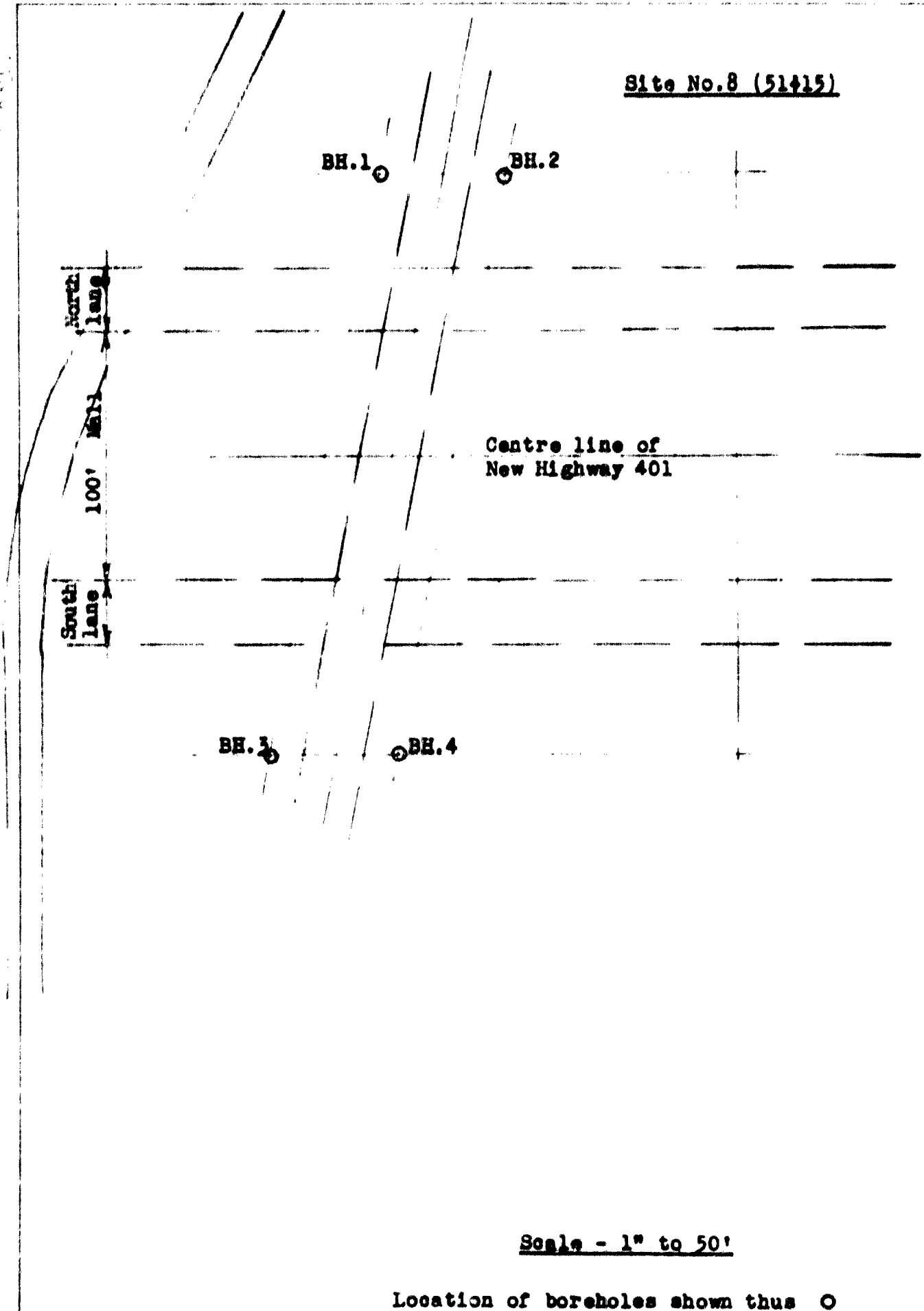
BEARING

DESCRIPTION OF STRATA		TESTS		REMARKS	
BH.3				Standard Penetration Test	
Dark Brown LOAM Soft, light brown silty sandy TILL, becoming firmer	• 1	zero	12	 Ground-water Table	
	• 2	1'-2"	29		
	• 3		60		
Stiff mixed grey and brown sandy TILL	• 4		36(6")		
Dense, light brown clayey sand & gravel	• 5	15'-0"	60	End of boring	
BH.4					
Brown LOAM - topsoil Stiff, brown sandy TILL, changing to	• 1	zero	13	 Ground-water Table	
	• 2	1'-0"	31		
wet, grey-brown sandy TILL	• 3	6'-0"	60	End of boring	

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

Site No.8 (51415)



PROJECT Highway 401 - Morrisburg

TITLE Borehole location plan

DRG No 6

ORDER No T.129/55



UNIVERSAL
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SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - MorrisburgORDER NO T129/55CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates, Ltd.)BOREHOLE NO BH.1 and BH.2DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION (51+15)

INCLINATION _____

BEARING _____

DESCRIPTION OF STRATA	DEPTH (ft)	DEPTH (m)	REMARKS
BH.1			Standard Penetration Test
Dark brown topsoil	• 1	zero	12
		1'-0"	
Light brown, silty Till, becoming stiff	• 2		38
	• 3	5'-0"	49(6")
			End of boring
BH.2			
Dark brown topsoil	• 1	zero	9
		1'-5"	
Firm, light brown silty TILL, becoming hard	• 2		36
	• 3		46(6")
Hard, light brown silty TILL, with considerable broken rock	• 4		41(6")
Ditto	• 5	15'-6"	39(6")
			End of boring

SCALE : 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T129/55

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

BOREHOLE NO BH.3 and BH.4

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (51+15)

INCLINATION

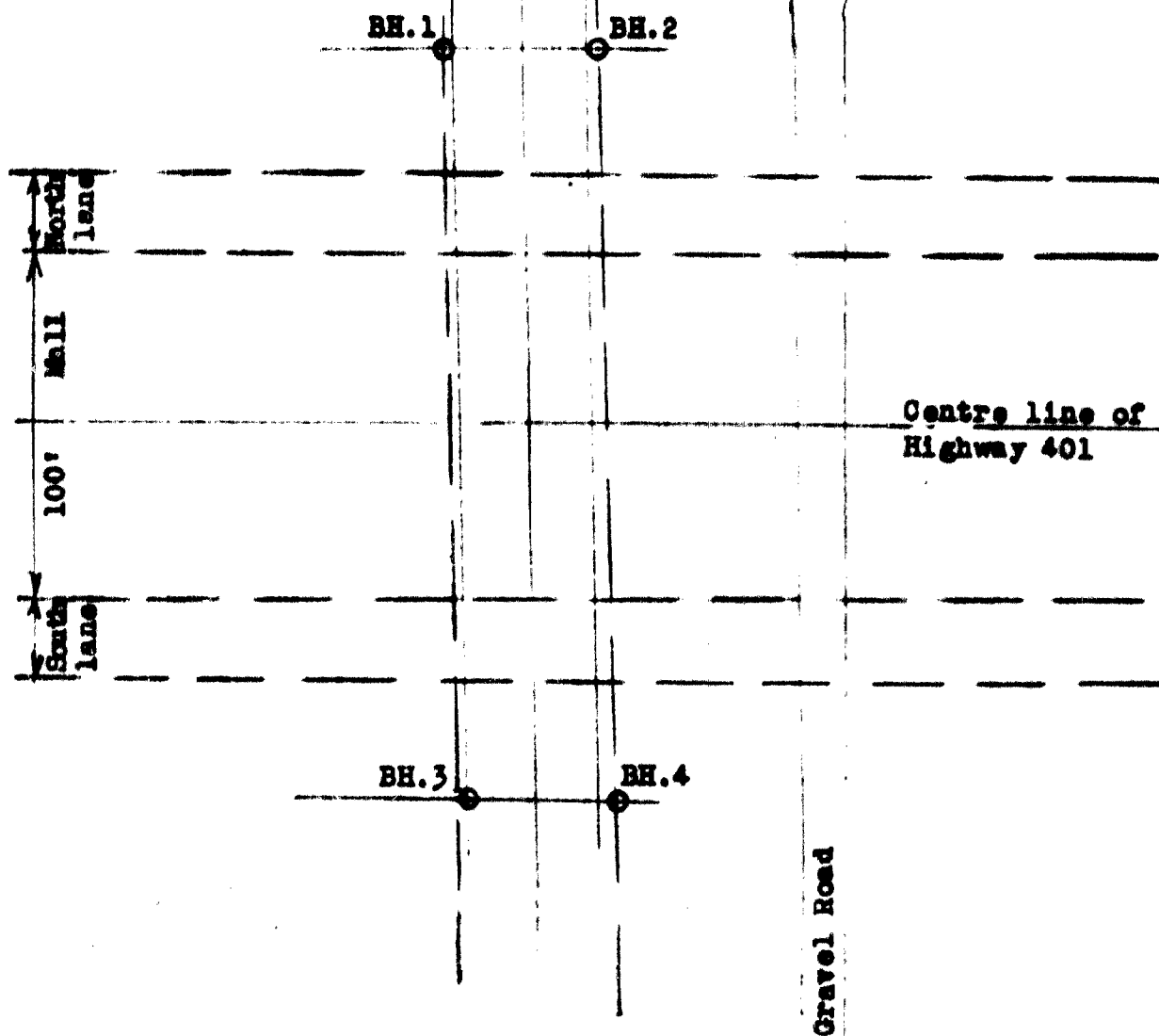
BEARING

DESCRIPTION OF STRATA	DEPTH (FEET)	DEPTH (METERS)	REMARKS
BH.3			Standard Penetration Test
Dark brown topsoil	• 1	zero	9
Firm, light brown silty clay TILL, becoming silty light brown TILL	• 2	1'-4"	49
	• 3		60(7")
Hard, light brown TILL	• 4		33(4")
Hard, light brown TILL with considerable rock fragments	• 5	15'-5"	31(5")
			End boring
BH.4			
Dark brown topsoil	• 1	zero	11
Firm, light brown silty CLAY, becoming hard, grey-brown sandy TILL	• 2		31
	• 3	5'-0"	45(7")
			End boring

SCALE 1" to 3' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

Site No.9 (162+84)



Scale - 1" to 50'

Location of boreholes shown thus ○

PROJECT Highway 401 - Morrisburg
TITLE Borehole location plan
DRG. NO. 7 ORDER NO. T.129/55



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SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - MorrisburgORDER NO T129/55CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)BOREHOLE NO BH.1 and BH.2

DIAMETER

CASING

BOREHOLE LOCATION (162484)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (FEET)	DEPTH (METERS)	STANDARD PENETRATION TEST (SPT)	REMARKS
BH.1				
Dark brown topsoil	0 - 1	0 - 0.3	36	Standard Penetration Test
Hard, light brown silty TILL	1 - 3	0.3 - 0.9	58	Ground-water Table
Ditto	3 - 6	0.9 - 1.8	65	End of boring
BH.2				
Dark brown topsoil	0 - 1	0 - 0.3	7	
Firm, gray-brown TILL, becoming very stiff, light brown clay TILL	1 - 3	0.3 - 0.9	33	Ground-water Table
Hard, light brown clay TILL	3 - 4	0.9 - 1.2	60	
Ditto	4 - 15	1.2 - 4.6	41(5")	
	15 - 15.3	4.6 - 4.7	31(3")	End of boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morristburg

ORDER NO T129/55

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

BOREHOLE NO BH.3 and BH.4

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (162484)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	AMOUNT	TEST	REMARKS
BH.3				Standard Penetration Test
Dark brown topsoil	0/2	• 1	zero 1'-0"	6
Soft to firm grey CLAY, changing to hard, light grey-brown TILL		• 2		31
		• 3		60
Very stiff to hard, light brown silty TILL		• 4		36(5")
Ditto		• 5	15'-8"	39(8") End of boring
BH.4				
Dark brown topsoil	0/2	• 1	zero 1'-2"	8
Stiff, light grey CLAY, changing to very stiff, light brown silty TILL		• 2		29
		• 3		65
		• 4	6'-0"	50(6") End boring

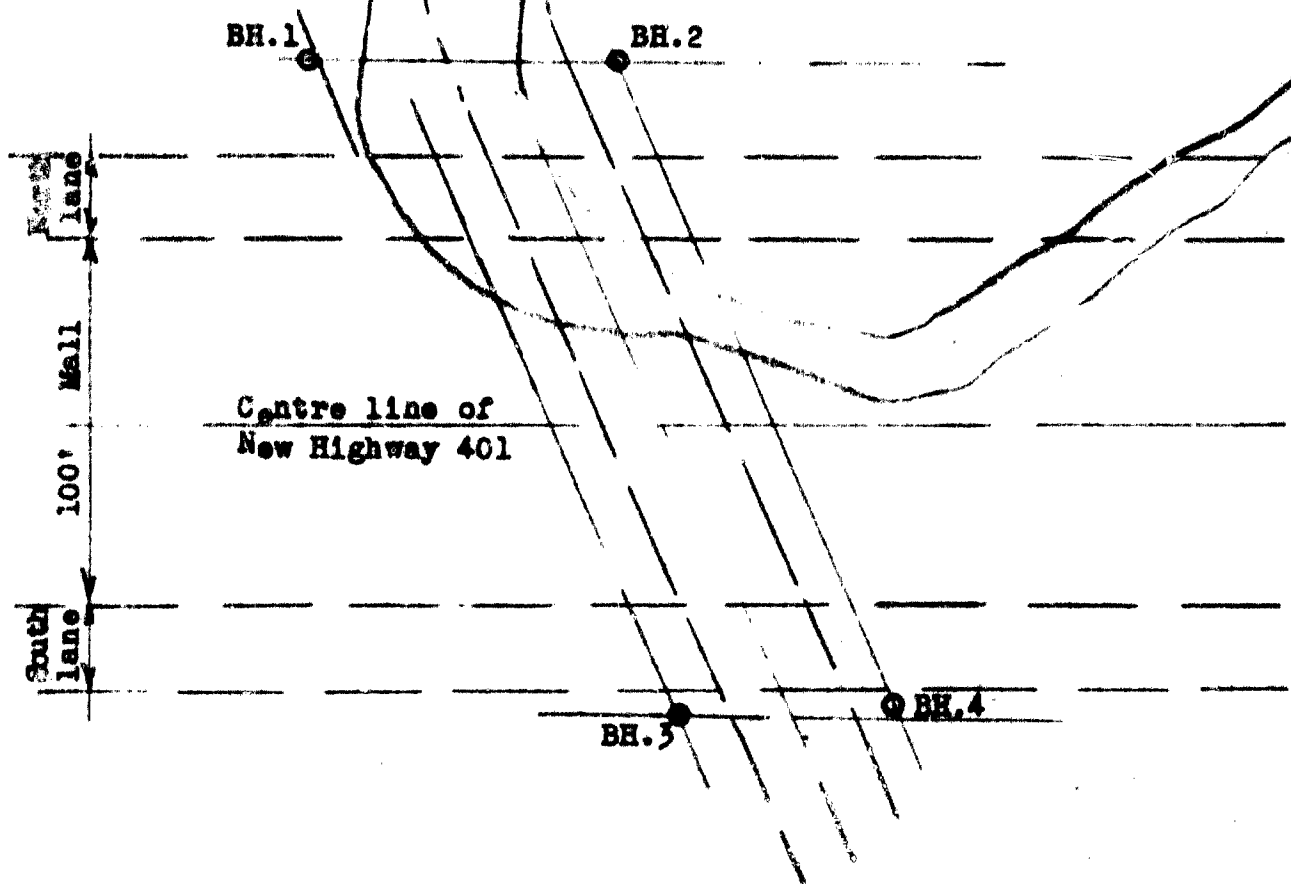
SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

Site No.10 (232+95)

Doherty Creek

Gravel road



Scale - 1" to 50'

Location of boreholes shown thus ○

Doherty Cr. Hooke Cr.

Opposite Top #4

PA-978-A.

PROJECT Highway 401 - Morrisburg

TITLE Borehole location plan

DWG. No. 8

ORDER NO. T.129



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SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER No T129/55

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

BOREHOLE NO BH.1

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (232+95)

INCLINATION

BEARING

DESCRIPTION OF MATERIAL	DEPTH (FEET)	DIAMETER (FEET)	STANDARD PENETRATION TEST (SPT) (BLows)	REMARKS
Dark brown topsoil	0	zero	6	Ground-water Table
Clayey SAND with gravel	2'-0"	2'-0"	16	
Firm, grey clay TILL	2'-7"	0'-7"	19	
Firm to stiff, grey clay TILL				
Soft, grey sandy clay TILL			14	
Firm, grey sandy clay TILL with large pieces of broken rock			39	
Soft to firm, grey sandy clay TILL			15	
Soft grey plastic CLAY with a trace of sand		26'-0"	8	Artesian pressure at this level, causing a free flow, rising 1 foot above ground surface
		29'-0"		
		33'-4"		
Rock core				

See BA 978A.

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.2

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (232+95)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	DIAMETER (ft)	INCLINATION (deg)	BEARING (deg)	Standard Penetration Test		REMARKS
					Blows	Feet	
Brown topsoil	0 - 1	2 1/2"	zero	2'-0"	6		Ground-water Table
Firm, brown silty fine SAND	1 - 2	2 1/2"		2'-2"	15		
Firm, grey TILL	2 - 3	2 1/2"		4'-2"	13		
Ditto	3 - 4	2 1/2"			15		
Ditto	4 - 5	2 1/2"			21		
Soft grey silty sandy TILL	5 - 6	2 1/2"			11		
Ditto	6 - 7	2 1/2"			10		
Ditto	7 - 8	2 1/2"			7		Artesian pressure at 27'-6"
	8 - 29' 4"	2 1/2"					Refusal condition

See BA 978 A.

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - MorrisburgORDER NO T129/55CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)BOREHOLE NO BH.3DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION (232495)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	AMOUNT	DEPTH (ft)	STANDARD PENETRATION TEST	REMARKS
			zero		
Brown, silty topsoil	1		2'-6"	11	Ground-water Table
Hard, light brown clay TILL	2		2'-6"	34	
Ditto	3			45	
Soft, grey silty clay TILL	4		10'-6"	13	
Soft, grey sandy clay TILL	5			31	
Stiff, grey sandy clay TILL	6			18	
Soft, plastic grey CLAY	7		28'-6"	11	Artesian pressure at this level--- similar to BH.1. Refusal condition at 28'-6"



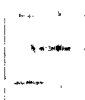

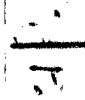




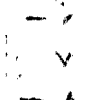

See BA 978 A.

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - MarrisburgORDER NO T129/55CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)BOREHOLE NO BH.4DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION (232495)

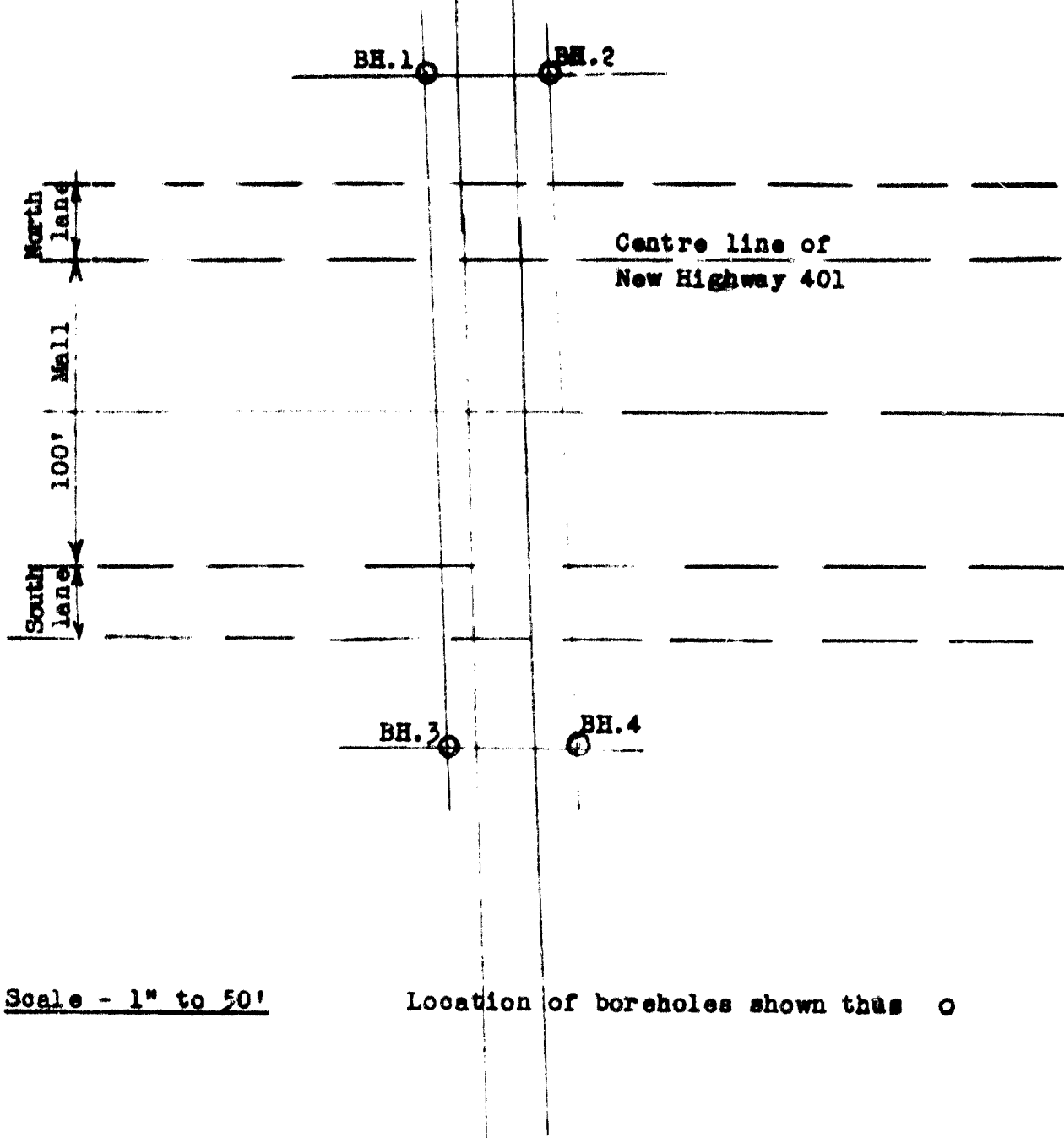
INCLINATION

BEARING

DESCRIPTION OF STRATA	ELEVATION	DEPTH	THICKNESS	REMARKS
		zero		Standard Penetration Test
Brown clay LOAM		2'-0"	11	 Ground-water Table
Hard, brown silty sandy TILL		2'-0"	36	
Ditto			40(6")	
Hard, brown silty sandy TILL -- organic in parts		9'-0"	38(6")	
Soft, grey sandy clay TILL			13	
Ditto			9	
Soft to very soft, grey silty TILL			11	
Ditto			8	
Rock core		29'-3"		
		33'-9"		

See BA 978A.

Site No.11 (401+17.29)



PROJECT Highway 401 - Morrisburg

TITLE Borehole location plan

DRG No. 9 ORDER No. T.129/55



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SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.1

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (401-17.29)

DECLINATION

BEARING

DESCRIPTION OF STRATA		TEST NO.	TEST	DEPTH	TEST	DEPTH	REMARKS
							Standard Penetration Test
Topsoil		• 1	zero	1'-0"	6		Ground-water Table
Firm, brown sandy TILL		• 2	1'-0"	1'-0"	24		
Dense, brown sandy TILL		• 3			45		
Dense, brown very sandy TILL becoming very dense		• 4			59		
		• 5			65		
			13'-0"				
Dense, grey sandy TILL		• 6			38		
Firm to dense, grey sandy TILL		• 7		20'-0"	31		End of boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T129/55

CLIENT Dept. of Highways, Ontario

(A. D. Margison & Associates Ltd.)

BOREHOLE NO. BH.2

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (401+17.29)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	DIAMETER (in)	TEST	REMARKS
			zero	Standard Penetration Test
Dark brown topsoil	1	2 1/2"	2'-6"	9
Firm, light brown sandy	2	2 1/2"	2'-6"	18
CLAY, with pockets of				
brown fine sand & silt	3		11'-8"	65
Hard, grey-brown silty	4			51
clay TILL	5			45
Hard, light brown sandy			14'-2"	
TILL with increasing rock	6			31
fragments				
Stiff, grey sandy clay	7			28
TILL	8			31
Firm, grey sandy clay TILL				
Very stiff ditto	9		25'-0"	35
Ditto				End of boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.3

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (401+17.29)

ELEVATION

BEARING

DESCRIPTION OF LOG DATA		Standard Penetration		Ground-water Table
		Test		
Topsoil	• 1	26		
Firm, brown very sandy	• 2	55		
TILL, becoming dense				
			10'-11"	
Dense, very sandy TILL	• 3	51		
Stiff, grey, very sandy	• 4	48		
TILL	• 5	29	11'-3"	
Stiff, grey sandy TILL	• 6	23		
Grey silty fine to medium	• 7	32		
SAND with a trace of				
coarse sand				
Very stiff, grey sandy	• 8			
TILL			25'-0"	
				End of boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T129/55

CLIENT Dept. of Highways, Ontario

(A. D. Margison & Associates Ltd.)

BOREHOLE NO. BH.4

DIAMETER 2½"

CASING 2½"

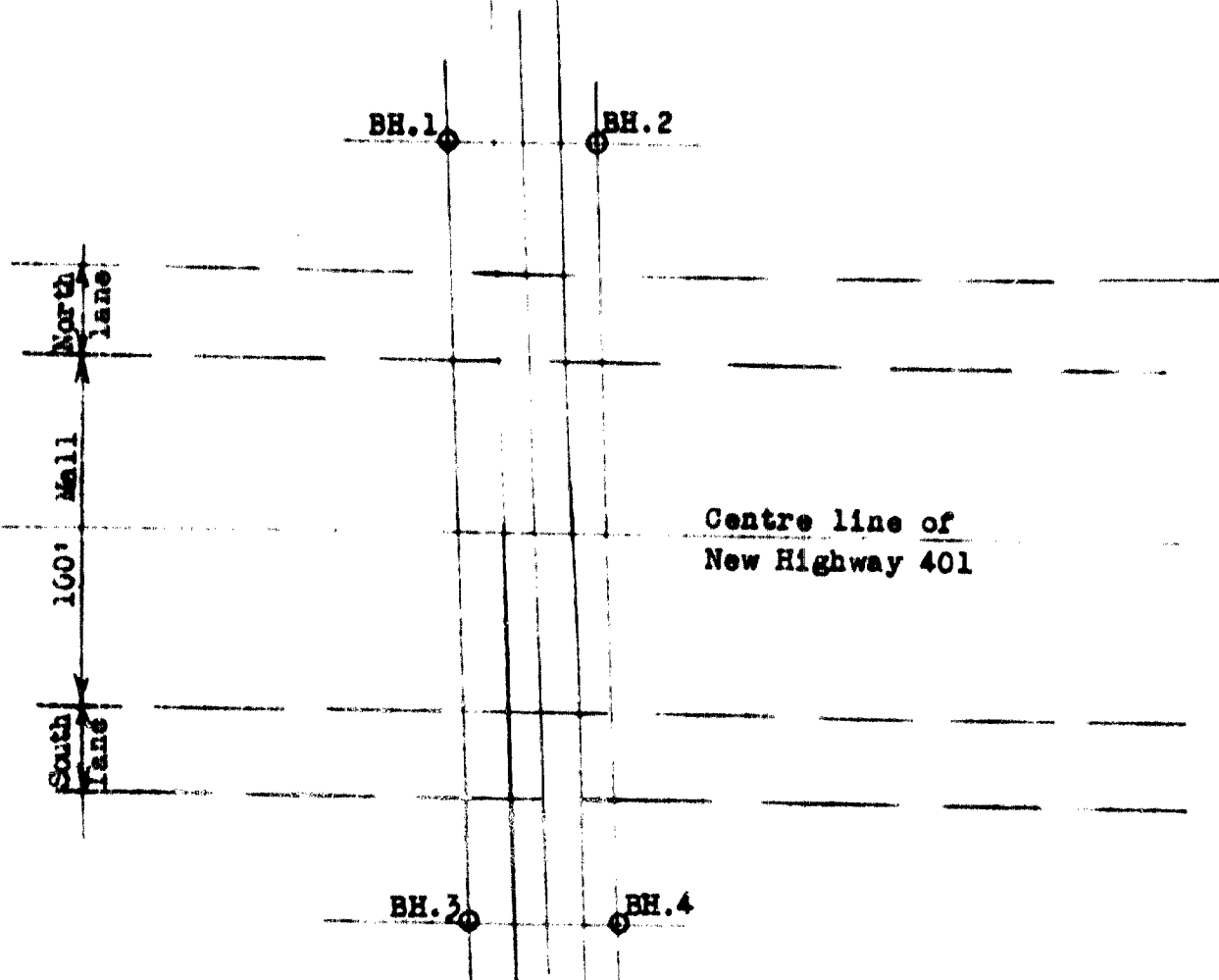
BOREHOLE LOCATION (401+17.29)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	DIAMETER (in)	STANDARD PENETRATION TEST (blows/ft)	REMARKS
Dark brown, silty organic topsoil	0	zero	1'-0"	Standard Penetration Test
Firm, fine brown sandy TILL	1	1'-0"	22	Ground-water Table
	2			
	3		51	
Hard, fine brown sandy TILL	4		65	
DITTO	5	14'-4"	64	
DITTO	6		60	
DITTO	7	15'-4"	38	
Stiff, grey sandy TILL	8		32	
Ditto	20'-0"			End of boring.

Site No.12 (101+95.00)



Scale - 1" to 50'

Location of boreholes shown thus ○

PROJECT Highway 401 - Morrisburg

TITLE Borehole location plan

DRG. NO. 10 ORDER NO. T.129/55



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SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 40L - Morrisburg

ORDER NO T129/55

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

BOREHOLE NO BH.1

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (101495.00)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (FEET)	TEST	STANDARD PENETRATION	REMARKS
Brown peaty topsoil	0	1	zero	Standard Penetration Test
	2'-0"			Ground-water Table
Firm, brown clayey fine to medium SAND, with gravel.	2'-0"	2	45	
Stiff brown sandy TILL	4'-0"	3	43	
	10'-6"			
Soft, grey-brown, very sandy TILL		4	42	
	14'-6"			
Firm, fine silty SAND, with fine to medium gravel		5	41	
Ditto		6	43	
Firm, grey silty fine SAND, with fine gravel		7	47	End of boring
	26'-0"			

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg

ORDER NO. T129/55

CLIENT Dept. of Highways, Ontario

(A. D. Margison & Associates Ltd.)

BOREHOLE NO. BH.2

DIAMETER 2 1/2"

CASING 2 1/2"

BOREHOLE LOCATION (107+95.00)

INCLINATION

BEARING

DESCRIPTION OF STRATA	DEPTH (ft)	TEST	STANDARD PENETRATION TEST	REMARKS
Black, clayey PEAT	0 - 1	zero	1'-6"	
Firm, fine to coarse gravel with fine to coarse brown silty sand, changing to Firm, brown slightly sandy CLAY with gravel	1 - 2		45	
	2 - 3		38	
Stiff, dark grey, very sandy TILL	3 - 4	7'-2"	29	
Firm, fine, grey silty SAND, with fine gravel	4 - 5	10'-7"	32	
Di. to	5 - 6		45	
	6 - 7		48	
Firm to dense, grey silty SAND, with fine gravel & a trace of clay, changing to soft, grey clay TILL, with considerable gravel	7 - 8	25'-0"	60	End of boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Highway 401 - Morrisburg ORDER NO T129/55
 CLIENT Dept. of Highways, Ontario (A. D. Margison & Associates Ltd.)

BOREHOLE NO BH.3 DIAMETER 2 1/2" CASING 2 1/2"

BOREHOLE LOCATION (101+95.00) INCLINATION _____ BEARING _____

DESCRIPTION OF STRATA	ELEVATION	DEPTH	DEPTH	DEPTH	DEPTH	REMARKS
Black, clayey PEAT		• 1	zero	1'-8"	5	Standard Penetration Test
Very stiff, dark grey CLAY		• 2	1'-8"		31	Ground-water table
Stiff, grey CLAY with some sand, changing to		• 3		11'-6"	29	
Firm, clay TILL, with coarse gravel		• 4			33	
			13'-2"			
Firm, fine grey silty SAND, with fine to medium gravel		• 5			44	
Firm, fine grey silty SAND, with fine gravel		• 6			49	
Dense, fine grey silty SAND, with fine to coarse gravel		• 7		26'-0"	52	End of boring

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Highway 401 - MorrisburgORDER NO YL29/55CLIENT Dept. of Highways, Ontario

(A. D. Margison & Associates Ltd.)

BOREHOLE NO BH.4DIAMETER 2 1/2"CASING 2 1/2"BOREHOLE LOCATION (101+95.00)

INCLINATION

BEARING

DEPT. OF HIGHWAYS	DATE	TIME	BY	REMARKS
				Standard Penetration Test
Dark brown clayey PEAT	• 1	zero	1'-6"	5
Firm, dark brown peaty CLAY	• 2	1'-6"	2'-0"	21
		3'-6"		
Stiff, grey, very sandy TILL	• 3			29
Stiff, grey, sandy silty TILL, with medium gravel	• 4			31
Very stiff grey clay TILL	• 5			33
Stiff grey sandy TILL	• 6			42
Ditto	• 7			48
Stiff grey sandy TILL, with medium gravel, becoming very sandy with coarse gravel	• 8			46
	• 9	25'-0"		48
				End of boring

SCALE 1" to 5' • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

FOR REPORT

SEE GEOCREES

31-G-115