67 - F-285M

WIDENING

BRIDGE # 140

MATILDA TWP.

J. D. Paterson BSc. PEng.
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REPORT OF SOIL INVESTIGATION

PROPOSED BRIDGE WIDENING

BRIDGE NO. 140

MATILDA TOWNSHIP

FOR

UNITED COUNTIES OF STORMONT, DUNDAS & GLENGARRY

A. R. FERGUSON, P. ENG.

SUPERINTENDENT AND ENGINEER

REPORT NO. S620-67

NOVEMBER 20, 1967.

INTRODUCTION

At the request of Mr. A. R. Ferguson, P. Eng., Superintendent and Engineer, United Counties of Stormont, Dundas, and Glengarry, a subsurface soil investigation was conducted at the site of Bridge No. 140 which is to be widened on the east side only. Bridge No. 140 is located at Lots 30 and 31, Concession VI, Township of Matilda, where it crosses a meandering tributary of the South Branch of the South Nation River. The stream is somewhat wider at the bridge due to scour.

FIELDWORK PROCEDURE

Two full scale test holes were put down as requested east of the bridge, one on each side of the river. The approach fills limited the positioning of the holes to approximately 15 feet from each existing abutment.

At each hole location, casing was driven and the soils were sampled to depths of 43.0 feet and 57.8 feet in Holes 1 and 2, respectively. A cone probe was driven in association with Hole 1 as an aid in establishing a sampling program.

A standard drilling rig, mounted on a trailer, was used for the fieldwork. The rig was operated by a crew of two under the full time supervision and direction of a Geologist from our staff.

SAMPLING AND TESTING

Samples of the various soils were recovered at each hole by means of BX casing samples, split spoon samples and thin-walled steel tube samples.

BX casing samples consisted of driving the BX casing into the ground two feet at a time to a depth of four feet and then withdrawing the casing and knocking out the sample for classification purposes. Sampling by this method was restricted to fill overburden.

Samples of granular soils were recovered by means of a split spoon sampler. During the recovery of each split spoon sample, the Standard Penetration Test was conducted. The results of these tests are recorded as "N" values on the soil profile sheets.

Each sample was classified and retained in a plastic bag for further study in our laboratory.

Cont'd.../2

Samples of cohesive soils were recovered by means of thin-walled steel tubes. Each tube was sealed air tight in the field. Later in our laboratory, the samples were extruded from the tubes and tested for unconfined compressive strength.

OBSERVATIONS

(a) Soil Types

The soil stratigraphy is similar on both sides of the stream and consists of a 7' stratum of clay sandwiched between 7 ± 1' of miscellaneous granular fill above and a thick stratum of granular glacial till below. In Hole No. 2, the following soil profile occurs and can be considered typical of the soils stratigraphy under the site.

0	-	0.5	Brown sandy topsoil.
0.5	-	8	Medium dense, brown fine-grained sand fill with some gravel.
8	-	15	Medium dense grey (mottled brown) clayey silt merging into medium stiff grey silty clay (with pink streaks). Contains an odd pebble and minor organic material.
15	-	24	Interbanded medium dense sandy glacial till and loose clayey glacial till.
24	-	57	Medium dense grey sandy glacial till.
57	-	57.8	Very dense grey sandy glacial till.

(b) Groundwater

At the completion of the fieldwork, the groundwater levels of the holes were recorded. In Hole 1, the water level was 5.2' (el. 90.3) below ground surface and in Hole 2, the water level was 3.3' (el. 92.6) below ground level. The elevation of the stream near the bridge was 89.9 at this time. Because the holes are rather close to the stream, it is expected that the water level in the holes will stabilize at the elevation of the stream and fluctuate with the rising and falling of the stream throughout the year.

(c) Test Results

The results of the Standard Penetration tests indicate that the glacial till varies in density from loose to very dense.

Cont'd.../3

The till immediately under the clay was found to be loose for a depth of from 6' to 9' and thereafter it is medium dense except for a thin layer of very dense till at the bottom of Hole 1 where the hole was terminated at 57.8'.

CONCLUSIONS AND RECOMMENDATIONS

The interbanded medium dense and loose glacial till at and below elevation 90 is a suitable material on which to place footings for the support of the proposed addition and has an allowable bearing capacity of 2000 pounds per square foot. We are considering footings for the structure rather than piles in spite of the fairly low strength of the glacial till for the following reasons and with the following precautions.

It is assumed that the existing structure which is to be widened is supported by footings on or close to the glacial till stratum. During any pile driving operation, there is considerable risk that the vibrations inherent in such an operation will consolidate the sandy glacial till resulting in settlement of the existing bridge.

Because sandy glacial till is subject to loss of strength when remolded, especially when extraneous water is available, considerable care is required in preparing the soil surface at the footing level. We recommend, therefore, that the last few inches of material be removed by hand shovel and an undisturbed surface be prepared and approved by our firm before concreting takes place. We suggest also that a "skim" slab of low strength concrete be placed on the prepared glacial till surface to provide a working surface.

There is little doubt that water will be a problem during construction of the foundation and every precaution must be taken to exclude it from the excavations for abutments, by means of pumps and the use of coffer dams if necessary.

If the existing bridge is founded on piles, we recommend that piles be used to support the Addition. Concrete filled steel tube piles or timber piles would be suitable driven to the very dense till horizon. Once the decision is made to use piles, a value for the frictional support could be calculated along with a value for end bearing. It is expected that adequate bearing capacity could be obtained with a pile approximately 40 feet long after cut-off.

JOHN D. PATERSON & ASSOCIATES LTD.

L. Bredeson

LB:bc

L. Bredeson, P. Eng.

JOHN D. PATERSON & ASSOCIATES LTD.

Consulting Engineers & Geologists

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SOIL PROFILE AND TEST DATA

Bridge No. 140
Lot 30 & 31, Conc. VI, Twp. of Matilda, United Counties Stormont, Dundas & Glengarry.

Datum Top of concrete guard rail, S.W. corner of bridge

Remarks Assumed elevation 100.0 (Geod. El. = 250.06)
Cone probe to refusal at 33' & test boring hole to 43'.

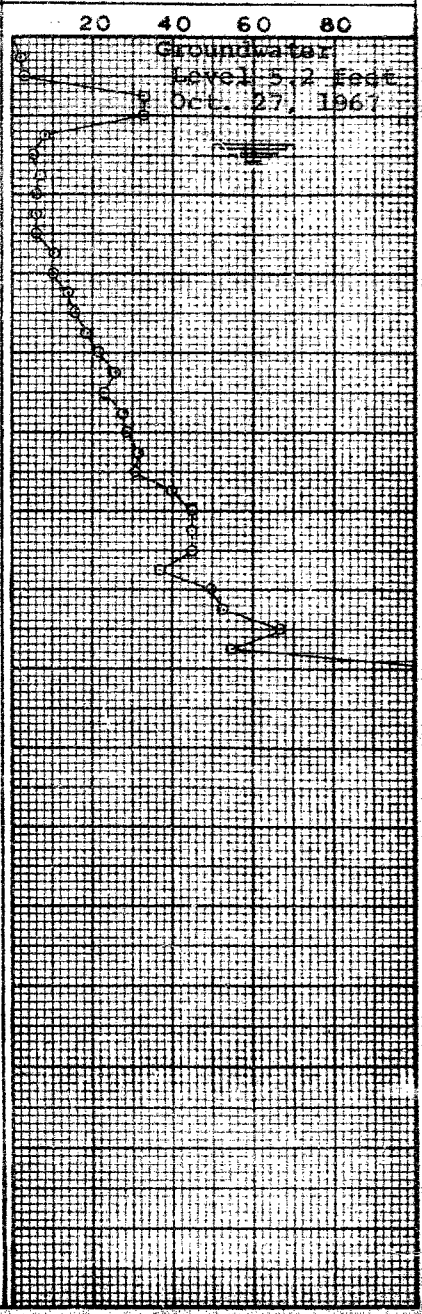
Borings By F.E. Johnston Drilling Co. Date Oct. 20 & 23, 1967.

Sheet No. 1 of 2

Hole No 1

SOIL DESCRIPTION	SAMPLE Type	SAMPLE No.	q_u TONS psf	N	DEPTH FEET	ELEV
Ground Surface					0	95.5
0.5' of brown sandy topsoil over medium dense fine grained sand fill with some gravel & mixed in places with clay. 5.5	BX	1				
	BX	2			4	91.5
Stratified sand clay with organic. 7	SS	3		6		
Dark grey sandy clay containing considerable organic matter (twigs, wood chips, etc.) 14	TW	4	0.33		8	87.5
					12	83.5
Loose to medium dense grey clayey to sandy glacial till.	SS	5		16	16	79.5
	SS	6		5		
	SS	7		14	20	75.5
20	SS	8		17		
					24	71.5
Medium dense grey sandy glacial till.	SS	9		13		
					28	67.5
	SS	10		14	32	63.5
					36	59.5
	SS	11		21		
					40	55.5
43.0	SS	12		27		
					44	51.5

Penetration Resistance Blows/Ft
o—o 2 Inch Diameter Cone
⊢o⊣ MOISTURE CONTENT IN %



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SOIL PROFILE AND TEST DATA

Bridge No. 140
Lot 30 & 31, Conc. VI, Twp. of Matilda,
United Counties Stormont, Dundas & Glengarry

Datum Top of concrete guard rail - S.W. corner of bridge (Geod. El. = 250.06)

Remarks Assumed elevation 100.0
Test boring hole to 52' & cone probe from 52' to 57.8'

Borings By F.E. Johnston Drilling Co. Date October 24, 1967.

Sheet No 2 of 2

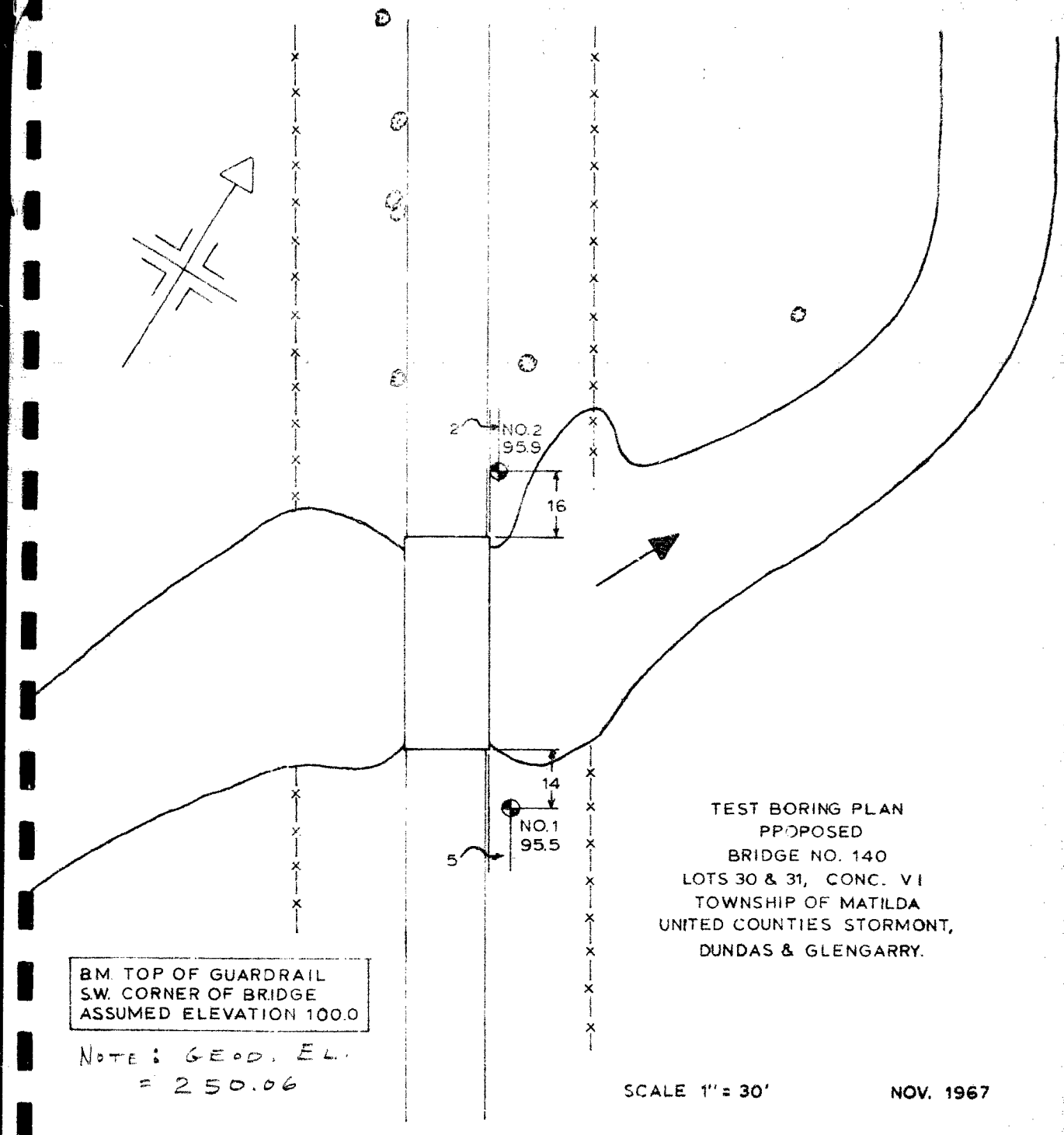
Hole No 2

SOIL DESCRIPTION	SAMPLE Type	SAMPLE No.	q_u TONS psf	N	DEPTH FEET	ELEV
Ground Surface					0	95.9
0.5'of brown sandy topsoil over medium dense, brown, fine grained sand fill with some gravel.	BX	13				
	BX	14			4	91.9
	SS	15		18		
8					8	87.9
Medium dense grey(mottled brown) clayey silt merging into medium stiff grey silty clay. Contains an odd pebble & minor organic material.	TW	16	extruded			
	TW	17	0.85		12	83.9
15	TW	18	0.60			
Interbanded medium dense sandy glacial till and loose clayey glacial till.	SS	19		13	16	79.9
					20	75.9
24	SS	20		9	24	71.9
	SS	21		14	28	67.9
					32	63.9
Medium dense grey sandy glacial till.					36	59.9
	SS	22		19		
					40	55.9
					44	51.9
					48	47.9
	SS	23		16	52	43.9
57	SS	24		27	56	39.9
Very dense glacial till. 57.8	SS	25	for 0.5'	60	60	35.9

Penetration Resistance Blows/Ft
o—o 2 inch Diameter Cone
⊢⊖⊣ MOISTURE CONTENT IN %

20 40 60 80

Ground Water Level
3.3 feet
Oct. 27, 1967.



TEST BORING PLAN
PROPOSED
BRIDGE NO. 140
LOTS 30 & 31, CONC. VI
TOWNSHIP OF MATILDA
UNITED COUNTIES STORMONT,
DUNDAS & GLENGARRY.

B.M. TOP OF GUARDRAIL
S.W. CORNER OF BRIDGE
ASSUMED ELEVATION 100.0

NOTE: GEOD. EL. = 250.06

SCALE 1" = 30'

NOV. 1967

REPORT NO. S620-67

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REPORT OF SOIL INVESTIGATION

PROPOSED BRIDGE WIDENING

BRIDGE NO. 140

MATILDA TOWNSHIP

FOR

UNITED COUNTIES OF STORMONT, DUNDAS & GLENGARRY

A. R. FERGUSON, P. ENG.

SUPERINTENDENT AND ENGINEER

REPORT NO. 8620-67

NOVEMBER 20, 1967.

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FIELDWORK PROCEDURE

Two full scale test holes were put down as requested east of the bridge, one on each side of the river. The approach fills limited the positioning of the holes to approximately 15 feet from each existing abutment.

At each hole location, casing was driven and the soils were sampled to depths of 43.0 feet and 57.8 feet in Holes 1 and 2, respectively. A cone probe was driven in association with Hole 1 as an aid in establishing a sampling program.

A standard drilling rig, mounted on a trailer, was used for the fieldwork. The rig was operated by a crew of two under the full time supervision and direction of a Geologist from our staff.

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Samples of the various soils were recovered at each hole by means of BX casing samples, split spoon samples and thin-walled steel tube samples.

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Cont'd.../2

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L. Bredeson

L. Bredeson, P. Eng.

LB:bc

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SOIL PROFILE AND TEST DATA

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Datum Top of concrete guard rail, S.W. corner of bridge

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Cone probe to refusal at 33' & test boring hole to 43'.

Borings By F.E. Johnston Drilling Co. Date Oct. 20 & 23, 1967.

Sheet No. 1 of 2

Hole No 1

SOIL DESCRIPTION	SAMPLE Type	SAMPLE No.	q_u TONS psf	N	DEPTH FEET	ELEV
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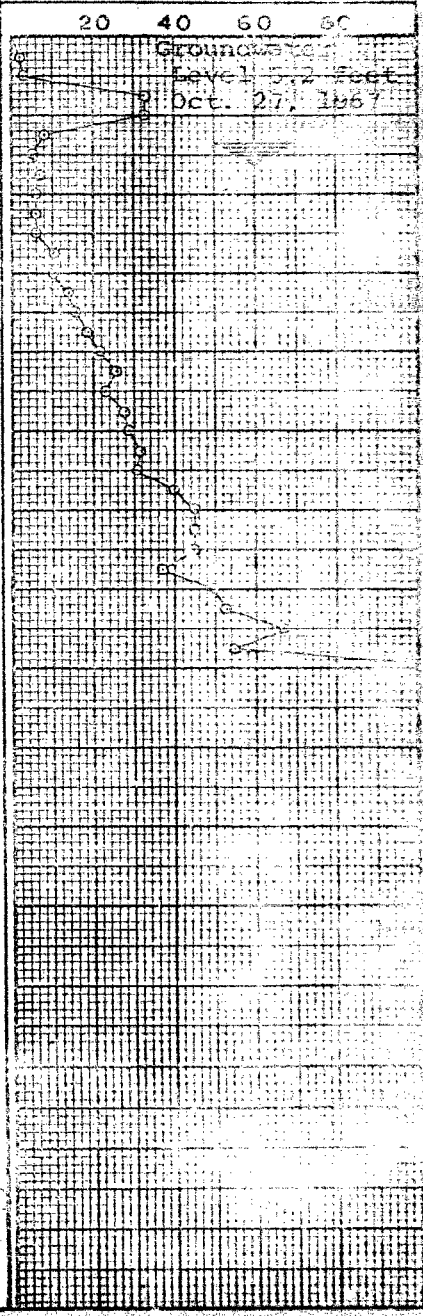
Dark grey sandy clay containing considerable organic matter (twigs, wood chips, etc.) 14	TW	4	0.33		8	87.5
					12	83.5
Loose to medium dense grey clayey to sandy glacial till.	SS	5		16	16	79.5
	SS	6		5		
20	SS	7		14	20	75.5
	SS	8		17		
					24	71.5
Medium dense grey sandy glacial till.	SS	9		13		
					28	67.5
	SS	10		14	32	63.5
					36	59.5
	SS	11		21		
					40	55.5
43.0	SS	12		27		
					44	51.5

Penetration Resistance Blows/Ft
o—o 2 Inch Diameter Cone
⊢o⊣ MOISTURE CONTENT IN %

20 40 60 80

Groundwater Level 5.2 feet @ Oct. 27, 1967



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Bridge No. 140
Lot 30 & 31, Conc. VI, Twp. of Matilda,
United Counties Stormont, Dundas & Glengarry

Datum Top of concrete guard rail - S.W. corner of bridge

Remarks Assumed elevation 100.0 (GEOD. EL. = 250.06)
Test boring hole to 52' & cone probe from 52' to 57.8'

Sheet No 2 of 2

Hole No 2

Borings By F.E. Johnston Drilling Co. Date October 24, 1967.

SOIL DESCRIPTION	SAMPLE Type	SAMPLE No.	q_u TONS psf	N	DEPTH FEET	ELEV
Ground Surface					0	95.9
0.5' of brown sandy topsoil over medium dense, brown, fine grained sand fill with some gravel.	BX	13				
	BX	14			4	91.9
	SS	15		18		
8					8	87.9
Medium dense grey (mottled brown) clayey silt merging into medium stiff grey silty clay. Contains an odd pebble & minor organic material.	TW	16	extruded			
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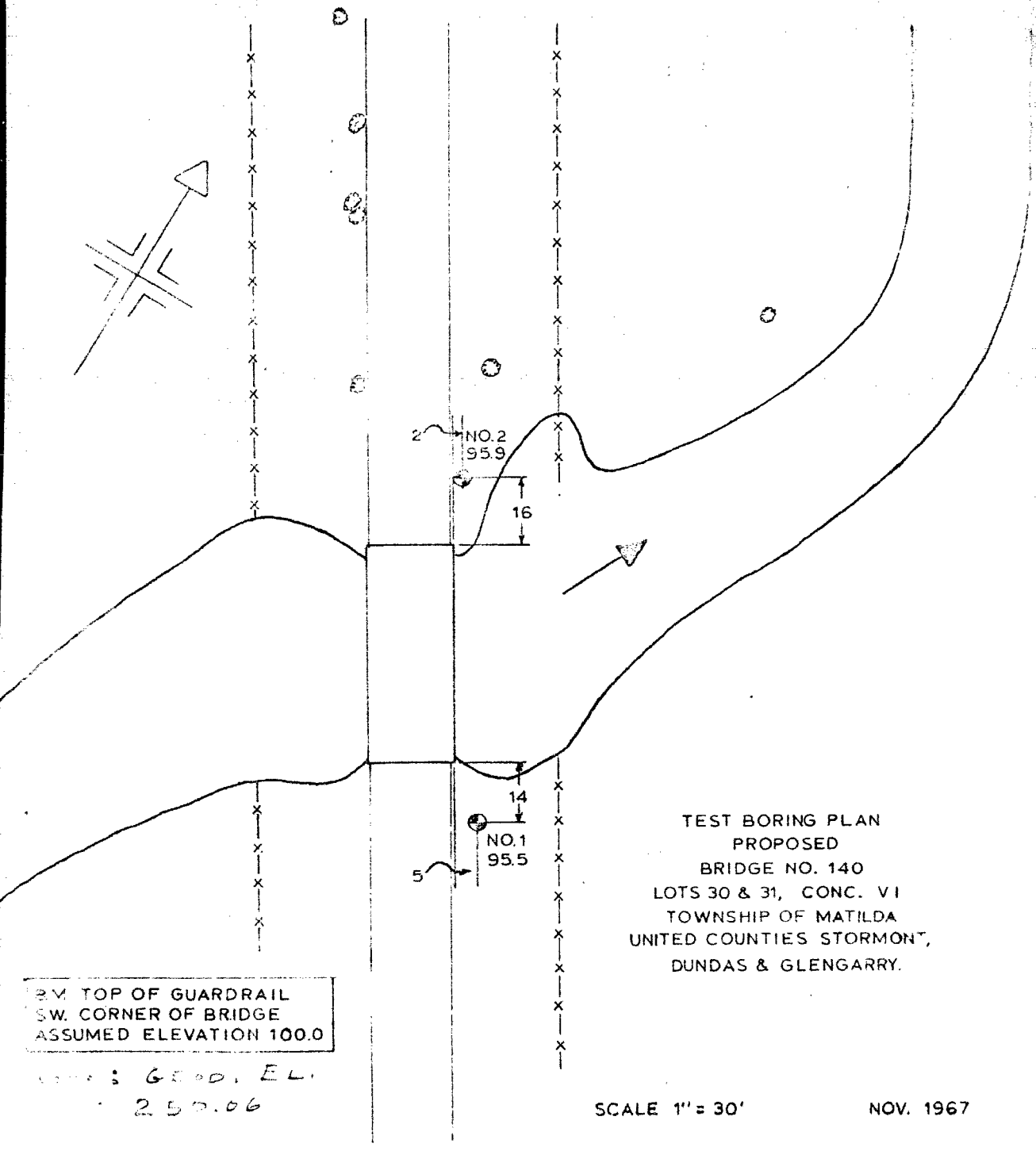
16	TW	18	0.60			
Interbanded medium dense sandy glacial till and loose clayey glacial till.	SS	19		13	16	79.9
					20	75.9
24	SS	20		9	24	71.9
	SS	21		14	28	67.9
					32	63.9
Medium dense grey sandy glacial till.					36	59.9
	SS	22		19		
					40	55.9
					44	51.9
					48	47.9
	SS	23		16	52	43.9
57	SS	24		27	56	39.9
Very dense glacial till. 57.8	SS	25	for 0.5'	60	60	35.9

Penetration Resistance Blows/ft.
o—o 2 Inch Diameter Cone
⊢o⊣ MOISTURE CONTENT IN %

20 40 60 80

Ground Water Level
9.8 feet
Oct. 27, 1967.



TEST BORING PLAN
PROPOSED
BRIDGE NO. 140
LOTS 30 & 31, CONC. VI
TOWNSHIP OF MATILDA
UNITED COUNTIES STORMONT,
DUNDAS & GLENGARRY.

B.M. TOP OF GUARDRAIL
S.W. CORNER OF BRIDGE
ASSUMED ELEVATION 100.0

NOTE: GEOD. EL.
252.06

SCALE 1" = 30'

NOV. 1967

REPORT NO. S620-67

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