#67-F-270 M

NEW BRIDGE #135

LOTS 30/31, CON. V

MATILDA TWP.

BH 2774
Site 31-135

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REPORT OF SOIL INVESTIGATION

PROPOSED NEW BRIDGE NO. 135

LOTS 30 & 31 CONC V

MATILDA TOWNSHIP

FOR

UNITED COUNTIES OF STORMONT, DUNDAS & GLENGARRY

A. R. FERGUSON, P. ENG.

SUPERINTENDENT & ENGINEER

REPORT NO. S619-67

NOVEMBER 27, 1967.

REGISTERED PROFESSIONAL ENGINEER
MINING
L. BREDESON
PROVINCE OF ONTARIO

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 Bridge No. 135 which is to be reconstructed. The existing bridge, with log crib abutments and one log crib pier, crosses the South Branch of the South Nation River on the division line between Lots 30 and 31, Concession V in Matilda Township.

When two of the three test holes recommended by Mr. Ferguson had been completed, we concluded that it was in the Counties best interests not to pursue a third hole near the centre of the stream, since there would be considerable expense in putting down the hole and little additional information resulting from the investigation.

FIELDWORK PROCEDURE

The fieldwork consists of two full scale test holes put down on diagonally opposite sides of the bridge. Hole No. 1 is located at the southeast corner and Hole No. 2 at the northwest corner of the intersection of the river and bridge.

At each hole location, casing was driven and the soils were sampled to the point of refusal of the casing to further penetration. A cone probe was driven in association with Hole No. 1 as an aid in establishing a sampling program.

A standard drilling rig, mounted on a trailer and operated by a crew of two, was used for the fieldwork. The operation was supervised and directed at all times by a Geologist from our staff.

SAMPLING AND TESTING

With two exceptions, all of the soils samples were recovered by means of a split spoon sampler. Each sample was classified and retained in a plastic bag.

During the recovery of each split spoon sample, the Standard Penetration Test was conducted and the results are recorded as "N" values on the Soil Profile sheets.

A BX casing sample of the fill overburden at Hole No. 1 was recovered by driving the casing 2 feet into the ground, withdrawing the casing and knocking out the sample. It was classified and retained in a plastic bag.

Cont d.../2

A thin-walled steel tube was used to recover a sample of the sandy clay at Hole No. 2. The tube was sealed air tight in the field. At our laboratory, the sample was extruded and tested for unconfined compressive strength by means of a hand penetrometer.

The point of refusal of the casing to further penetration is taken to be the bedrock surface, but bedrock was not confirmed by diamond drilling.

OBSERVATIONS

(a) Soil Types

The stratum of glacial till which exists at and below a possible footing level (el. 92) dominates the soil stratigraphy under the site. The till is overlain by a complex layer of loam and sandy clay, 4' to 5' thick which is contaminated near the clay/till interface with peat and wood chips. The loam is overlain by the granular approach fill.

The sandy clay merges into sandy glacial till. As a stratum, it is approximately 26 feet thick. It is not consistent in density or composition either horizontally or vertically.

In Hole No. 2, the following soil profile occurs and is indicative of the variation to be found in the density of the till and the variation of its component parts. The varved clay, and silt are considered part of the glacial till stratum.

0 - 5.5	Miscellaneous granular fill, including sand, gravel, boulders, etc.
5.5 - 7	Loose brownish grey silty loam.
7 - 9	Medium stiff greenish-grey very sandy clay.
9 - 12.5	Loose, grey, sandy (cohesive) glacial till with some peat and wood chips at 9 .
12.5 - 24	Medium dense, sandy (cohesive) glacial till grading to gravelly/sandy glacial till.
24 - 28	Varved clay. Interbanded soft clay, medium dense silt, and fine sand in seams.
28 - 34.5	Medium dense to dense, grey, silt with some fine gravel.
34.5 - 35.5	Very dense, grey silt.
35.5 -	Bedrock (inferred)

Cont'd.../3

The details of both test holes are shown on the Soil Profile sheets.

(b) Groundwater

The groundwater level of Hole No. 1 was recorded on October 26 when it was completed and again on October 27. On both occasions, the groundwater level was 3.9' (el. 93.6) below ground level. The groundwater level of Hole No. 2 on October 27 was 3.1 (el. 94.6).

However, these water levels which are within the granular fill - a porous material - are expected to correspond after a time to the river level (el. 91.1) more or less.

(c) Test Results

The result of the unconfined compressive strength test by hand penetrometer on the clay sample indicates that it is medium stiff in consistency.

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

CONCLUSIONS AND RECOMMENDATIONS

Because of the unpredictable occurrence of loose glacial till, both horizontally and vertically, it is considered to be a stratum not suitable on which to place footings for support of the proposed structure.

It is recommended, therefore, that the abutments of the proposed structure be supported by timber piles driven to refusal at the bedrock surface.

Assuming the base of the pile cap will be at elevation 85, the piles will be approximately 22 feet long after cut off.

JOHN D. PATERSON & ASSOCIATES LTD.

L. Bredeson

LB:bc

L. Bredeson, P. Eng.

JOHN D. PATERSON & ASSOCIATES LTD.

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SOIL PROFILE AND TEST DATA

Bridge 135
Lots 30 & 31, Conc. V
Township of Matilda (Geod. El. 244.16)

Datum Top of Bell Telephone post 158' S.of bridge assumed el. 100.0

Remarks Cone probe to refusal at 29' & test boring hole to refusal at 36'.

Borings By F.E. Johnston Drilling Co. Date Oct. 25 & 26, 1967.

Sheet No. 1 of 2

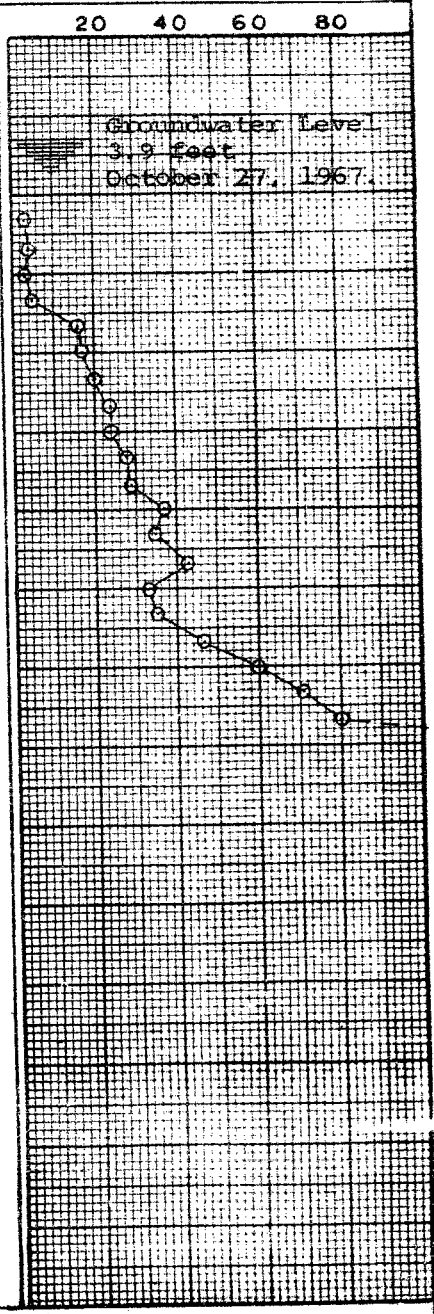
Hole No 1

SOIL DESCRIPTION	SAMPLE Type	SAMPLE No.	q_u TONS psf	N	DEPTH FEET	ELEV
Ground Surface					0	97.5
Miscellaneous granular fill, including sand, gravel, boulders, asphalt, etc.	BX	1			3	
6					6	91.5
Loose silty loam. 7	SS	2		3		
Greenish grey clay and brown loam mixed with wood chips & bark. 10					9	
Medium dense, grey, sandy (cohesive) glacial till with some gravel.	SS	3		17	12	85.5
13.5	SS	4		32		
Loose, grey, sandy/gravelly (cohesive) glacial till.	SS	5		6	15	
	SS	6		9	18	79.5
21					21	
Medium dense, grey gravelly/ sandy (cohesive) glacial till.	SS	7		17	24	73.5
26					27	
	SS	8		33		
Dense, brownish-grey saturated silt with minor mixed gravel.	SS	9		31	30	67.5
					33	
	SS	10		48		
36					36	61.5
Bedrock (inferred)						

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

20 40 60 80

Groundwater Level
3.9 feet
October 27, 1967.



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SOIL PROFILE AND TEST DATA

Bridge 135
Lots 30 & 31, Conc. V
Township of Matilda

GEOD EL. 244.16

Datum Top of Bell Telephone post 158'S. of bridge assumed ~~el. 100.0~~

Sheet No. 2 of 2

Remarks Test boring hole to refusal at 35.5'
H.P. = Hand Penetrometer

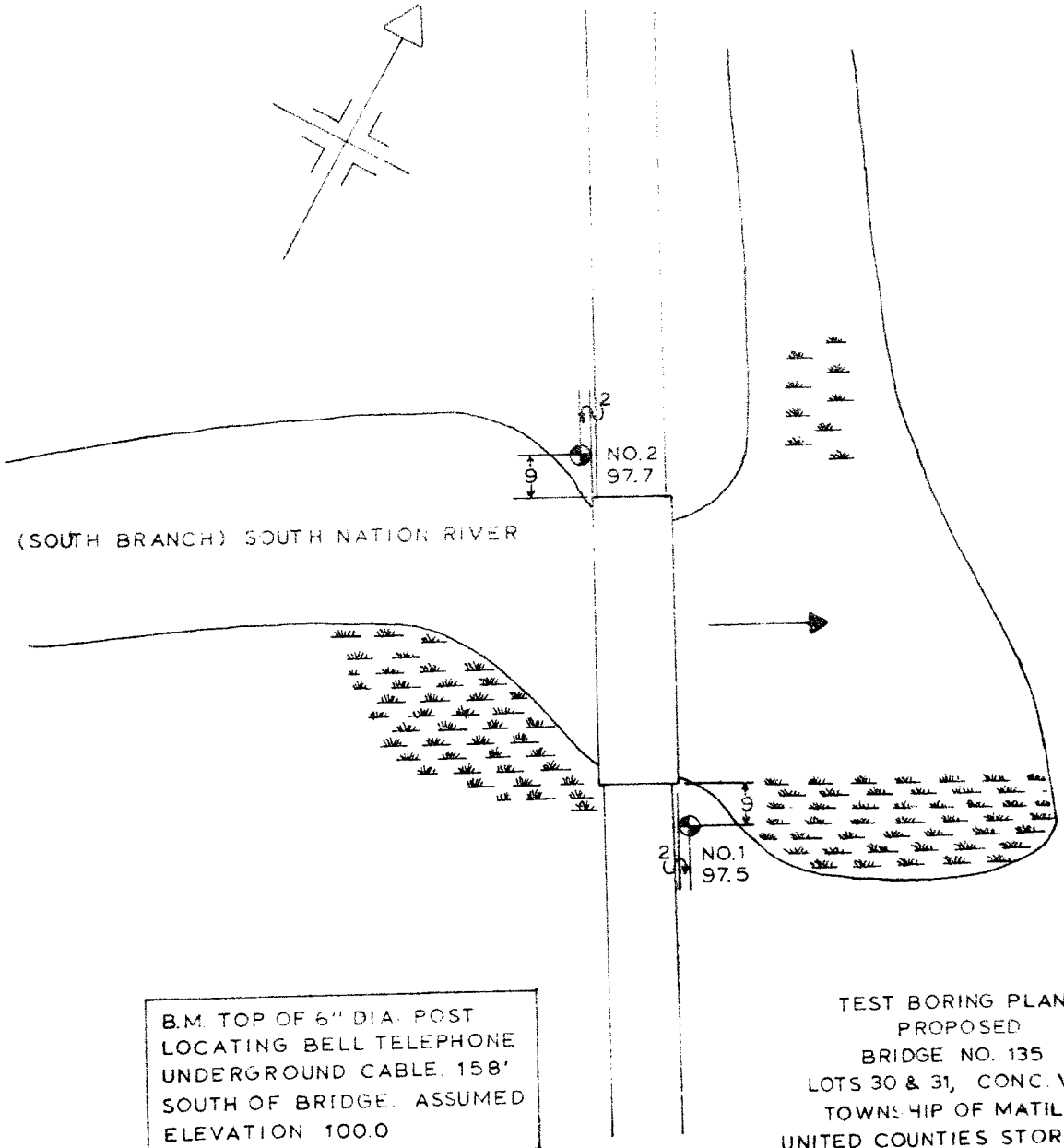
Hole No 2

Borings By F. E. Johnston Drilling Co. Date Oct. 26 & 27, 1967.

SOIL DESCRIPTION	SAMPLE Type	SAMPLE No.	q_u TONS psf	N	DEPTH FEET	ELEV
Ground Surface					0	97.7
Miscellaneous granular fill, sand, gravel, boulders, etc.					3	
5.5						
Silty loam to 7' over medium stiff greenish grey very sandy clay.	SS	11		4	6	91.7
9	TW	12	0.60	HP	9	
Loose, grey, sandy (cohesive) till with some peat & wood chips at 9'.					12	85.7
12.5	SS	13		37		
Medium dense, sandy (cohesive) glacial till grading to gravelly/sandy glacial till.	SS	14		14	15	
	SS	15	Cobble		18	79.7
	SS	16		32	21	
24					24	73.7
Varved Clay. Interbanded soft clay, medium dense silt & fine sand seams.	SS	17		11	27	
28					30	67.7
Medium dense to dense grey silt with some fine gravel.					33	
34.5						
Very dense grey silt. 35.5	SS	18		82 for 0.6'	36	61.7
Bedrock (inferred)						

Penetration Resistance Blows/Ft.
o—o 2 inch Diameter Cone
⊢●⊣ MOISTURE CONTENT IN %
20 40 60 80

Groundwater Level
3.1 feet
October 27, 1967.



B.M. TOP OF 6" DIA. POST LOCATING BELL TELEPHONE UNDERGROUND CABLE. 158' SOUTH OF BRIDGE. ASSUMED ELEVATION 100.0

NOTE : GEOD. EL. = 244.16

TEST BORING PLAN
PROPOSED
BRIDGE NO. 135
LOTS 30 & 31, CONC. V
TOWNSHIP OF MATILDA
UNITED COUNTIES STORMONT, DUNDAS & GLENGARRY.

SCALE 1" = 30'

NOV. 1967

REPORT NO. S619-67

JOHN D. PATERSON & ASSOCIATES LTD.
Consulting Engineers and Geologists
1479 LAPERRIERE AVE. OTTAWA 3, CANADA

Bridge Division,
Downsview, Ontario,
April 30th, 1968.

HYDROLOGY REPORT

RE: United Counties of Stormont,
Dundas and Glengarry,
Hainsville Bridge near the
South Nation River Tributary,
Township of Matilda,
Lot 31, Con. V,
Structure Site No. 31-135,
BW 2124.

A bridge and planning investigation has been carried out for the above mentioned site on April 9th, 1968.

The existing structure, a two span bridge with a total effective span of 47'± consisting of stone filled timber cribs for the pier and abutments and steel beams with timber decking for the superstructure, is situated on a straight section of a north-south County Road, a few hundred yards north of the Hamlet of Hainsville.. The alignment of the bridge with the road is very good, the alignment of the creek in the vicinity of the bridge needs improvements. The creek meanders over the flood plain upstream and downstream of the bridge.

The area of catchment above the crossing is approximately 32 sq. miles from which the runoff is below average. The soil within the catchment consists mainly of sandy loam with some small clay loam sections. The land is mainly used for crop and pasture with some larger forested swamps in the upper reaches of the catchment. The shape factor is 6.5±.

During larger floods water flows over the approaches giving relief to the bridge. Ice seems to be no serious problem according to local residents. The ice is usually placed at the pasture lands within the flood plain and does not block the bridge. Similar conditions exist at upstream and downstream structures.

The existing structures are some guide as to the size of bridge needed at the subject site. The second downstream bridge has an effective span of 50'±, has been constructed 1958 and has no relief over the road, but no real major floods have occurred since 1958. The second upstream bridge has an effective span of 45' and has been constructed 1967. No relief exists at that bridge. The catchment above the second upstream bridge is approximately 24 square miles.

It is proposed to replace the existing structure, thereby improving the geometrics of the site, for which we have the following comments and recommendations, based on the design of a 25 year storm.

...2

RE: United Counties of Stormont, Dundas and Glengarry.

1. Use a 50' to 55' effective span bridge at the site, measured at right angles to the abutments. Preference is given to the 55' span.

2. Skew angle of 25°, location and stream diversion as given by the designer.

3. The HWL is at El. 242±, therefore the proposed vertical clearance should be sufficient for the site.

4. The existing creek bed is at El. 233± and the new bed should not be raised. The bottom of the footings should therefore be at El. 229.0±.

5. The proposed type of footings seems to be the best for the site.

6. The bed of the creek at the new site should be covered with stones, etc. similar to the existing conditions at the existing structure site.

G.C.E. Burkhardt, P. Eng.,
Mun. Bridge Project Engineer.

GCEB/co