

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31 F-80

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. 3-21

HWY. No. _____

LOCATION PROP. DUNROBIN BR.
LOT 27, CON. 5, MARCH TWP.

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. NONE

REMARKS: _____

B.P. 2310
STRUCTURE SITE No. 3-21

31 F-80

GEOCRE No.

REPORT ON SUBSURFACE INVESTIGATION

PROPOSED DUNROBIN BRIDGE

LOT 27, CONCESSION 5

MARCH TOWNSHIP, ONTARIO

TO

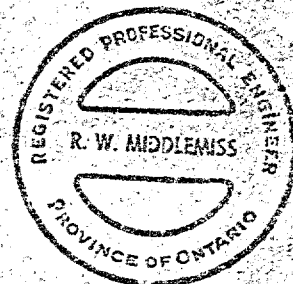
COUNTY OF CARLETON

AND

M.M. DILLON LIMITED, CONSULTING ENGINEERS

Report No. SF-987

May 4, 1966



McROSTIE SETO GENEST

& ASSOCIATES LTD. - CONSULTING ENGINEERS

& ASSOCIÉS LTÉE - INGÉNIEURS CONSEILS

OTTAWA

CANADA

B.H. 2346

McROSTIE SETO GENEST

& ASSOCIATES LTD. - CONSULTING ENGINEERS - 393 BELL ST., OTTAWA, ONTARIO
& ASSOCIÉS LTÉE - INGÉNIEURS CONSEILS - 393, RUE BELL - TEL. 232-5334

31F-80

GEOCRES No.

3-21

1. TERMS OF REFERENCE

We were requested by Mr. J.H. Kearney, P. Eng., Ottawa Manager, M.M. Dillon Limited, Consulting Engineers, on behalf of the County of Carleton, to carry out a subsurface investigation at the site of the proposed new Dunrobin Bridge in Lot 27, Concession 5, Township of March.

The new bridge would be located in approximately the same location as the present bridge but would be approximately 30 feet wide.

2. CONCLUSIONS & RECOMMENDATIONS

2.1 Foundation Type

A foundation supported on timber friction piles is recommended to support the proposed structure at this site. Timber friction pile foundations are not too common in this area, however at this site the nature of the subsoil (deep clay layer) combined with the fact that the proposed structure is light renders this type of pile feasible and economical. Their use as foundation support is based on sound principles and their successful applications have been reported in many published technical papers.

A foundation supported on end bearing piles to rock was considered, but because of the increased length of pile, it was not found economical.

Similarly a footing foundation bearing on the stiff clay at a depth of about 18 feet was considered, and found uneconomical.

2.2 Soil Strength

Since soils are not recommended for support of a footing type foundation for the proposed structure, detailed bearing values are not given here. It can be stated, however, that the underlying clay soils can provide an allowable shear strength of 2,000 POUNDS PER SQUARE FOOT. The recommended working load per pile based on an allowable shear strength of 2,000 Pounds per Square Foot, assuming a size 12 timber pile embedded 30 feet in the underlying clay is 25 TONS. Included in this working load are safety factors of 2 to 4 against the shearing failure of the soil in the case of both a single pile and a pile group. However, the safety factor of the

timber pile as a structural unit should be checked independently.

Negative friction on the piles caused by the consolidation of the organic layer was considered. However, the additional load transferred to the pile was not found to be significant.

We would recommend that the piles not be loaded before 2 weeks after driving, in order to allow the clay to regain the strength loss during the pile driving operation.

2.3 Pile Type

Timber friction piles size 12 and at least 45 feet long are the most likely economical type of pile for the proposed structure at this site. Preservative treatment of the piles by a suitable pressure process, to retard or prevent the operation of wood-destroying agencies will be required. The required retention of preservative should be in accordance with approved specifications.

2.4 Approach Fills

Although our terms of reference do not include a study of the embankment foundations, we would like to point out that the stability and settlement of the embankment foundation will need to recognize the layer of weak organic material which is 5 to 6 feet in thickness at the site.

2.5 Construction Precautions

The piling contractor would need to recognize the problem of support for piling equipment, in areas where fill is not present.

In addition the piling contractor should recognize that it may be necessary to hold down the piles for a certain period of time after driving.

An allowance in the amount of \$300.00 to \$400.00 should be provided in the contract for our limited inspection of site at early stage of construction. This inspection would be to ascertain if the design concepts can and are being carried out in the field.

The piling contractor should recognize that it may be necessary to auger holes through the existing fill layer at this site since the fill layer contains boulders which could damage the piles during driving.

Finally, if significant variations in subsurface conditions between boreholes are encountered at the time of construction, they should be reported to the Supervising Authority for suitable action.

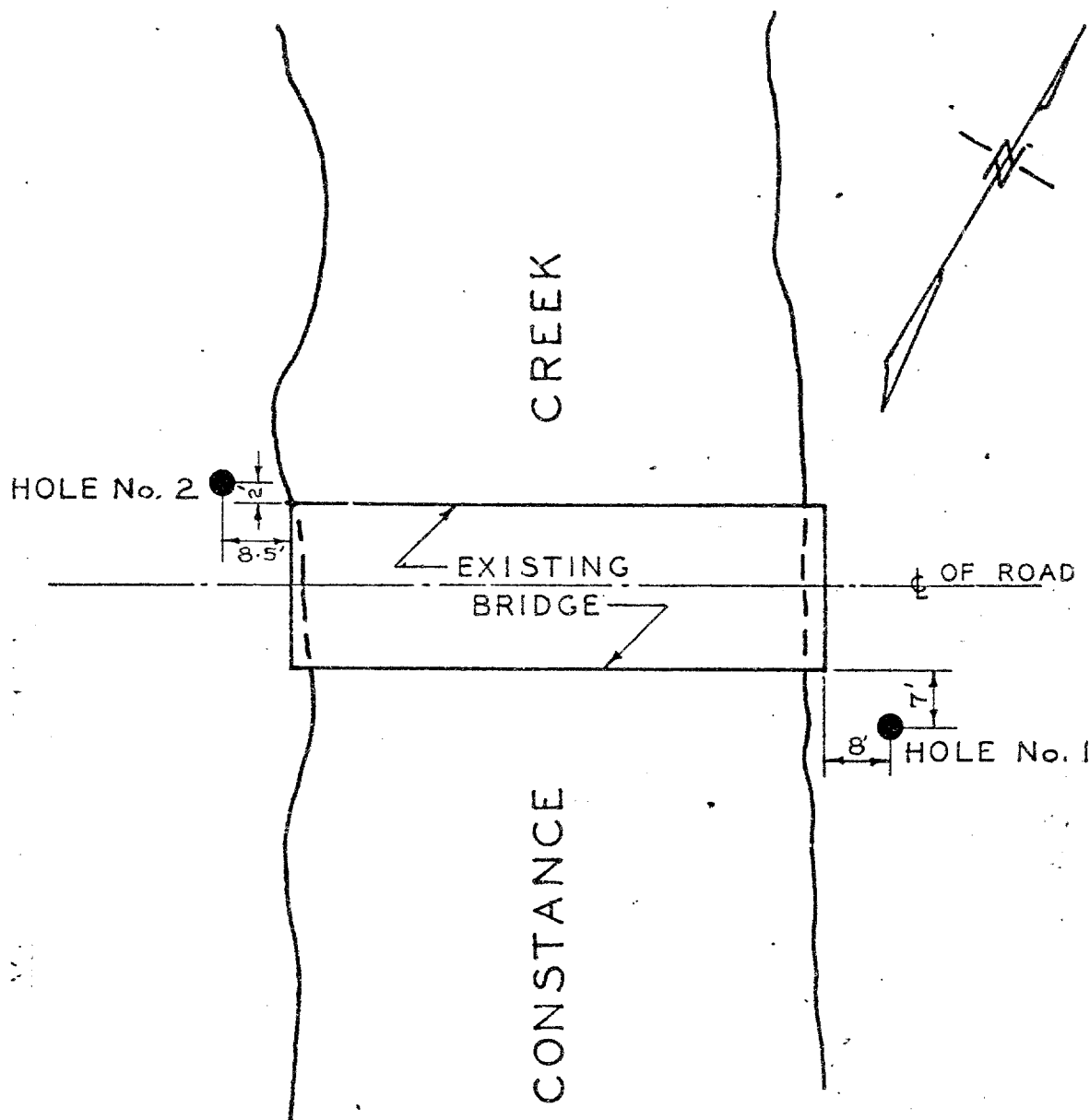
3. SITE INVESTIGATION

Two boreholes were made at the site with our test drilling equipment in the locations shown on Plate No. 1. Split barrel samples were retrieved from the granular overburden and 2" tube samples were taken in the cohesive soil layer. Split barrel samples were retrieved every 2 1/2 feet and standard penetration resistance tests were made in conjunction with the split barrel sampling. Tube samples were taken every 5 feet, with borehole vane tests taken in between tube samples. Rock beneath the site was diamond drilled in borehole No. 1 and cores were recovered for inspection and logging. A probing to refusal was made in borehole No. 2 from a depth of 34 feet below surface down to about 63 feet. Groundwater levels were observed during the drilling program.

All samples were visually classified and water content determinations made on all samples. The rock cores were logged to estimate the structural properties of the rock formation.

The soils and rock encountered in the boreholes are shown in detail on the accompanying Plates No. 2 to No. 3. The sub-soil can be generalized as consisting of a layer of fill 10 to 12 feet thick overlying a layer of soft and compressible organic material (commonly called peat or muck) 5 to 8 feet thick. Below the organic material is a layer of stiff clay about 30 feet thick, which is underlain by loose to medium dense sand mixtures and overlying bedrock. Bedrock encountered consists of an upper layer of sandstone of the Rockcliffe formation containing some shaly layers, underlain by a limey dolomite of the Oxford formation.

Groundwater was observed to be near elevation 97.0 and can be expected to be higher in wetter seasons of the year.



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BOREHOLE LOCATIONS - POSITIONS DES FORAGES

DUNROBIN BRIDGE

SCALE
ÉCHELLE 1" = 20'

PLATE
PLAQUE 1

OTTAWA CANADA

DUNROBIN BRIDGE

HOLE FORAGE	No.
1	1
2	2
3	3
4	4
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99	99
100	100

OF NORTH ABUTMENT.

OF NORTH ABUTMENT.												
Compressive Strength K.S.F. Résistance à la Compression K/Pd.2	Small Scale Penetrometer K.S.F. Petit Pénétrètre K/Pd.2	Essai-Standard Penetration Blows/ft.-Coups/pd	No. Sample Échantillon	DESCRIPTION OF SOIL DU SOL	Depth in Feet Profondeur--Pied	Elevation Niveau	PROBING OR VANE TEST		SONDAGE OU ESSAI AU MOULINET			
							MARTEAU---HAMMER CHUTE LIBRE---DROP		NO CASING SANS TUBAGE BARRE----DIA. ROD			
							BLOWS/FOOT OR SHEAR STRENGTH K.S.F. COUPS/PIED OU CISAILLEMENT		RÉSISTANCE AU, K/PD.2			
				Ground Surface -- Niveau du Sol			0	1.5	3.0	4.5	6.0	7.5
					0'	96.6'	← OVER-NIGHT WATER LEVEL 96.6'					
		24	1-1	FILL FINE SAND WITH A LITTLE GRAVEL	2.5'							
		4	1-2	FILL FIBROUS ORGANIC MATERIAL WITH SOME GRAVEL & A LITTLE SAND	5'	91.6'						
		2	1-3	FILL SAND WITH SOME GRAVEL, CINDERS, CONCRETE & A TRACE OF WOOD	7.5'							
		64	1-4	FILL GRAVELLY SAND								
		20	1-5A		11'	85.6'						215.4
		2076	1-5B									
		2	1-6	GELATINOUS ORGANIC MATERIAL								368.7
		1	1-7		17.5'	79.1'						292.0
		36, 1, 0.4, 2	2	1-8								
		3.2, 3.0, 3.0 3.0, 3.0, 3.0 3.0, 2.8, 2.6 2.0, 2.2, 2.0 R-0.4		1-9								
		3.0, 3.2, 3.4 4.0, 4.2, 4.5 3.6, 3.2, 3.2 2.4, 2.0, 3.4 R-0.4		1-10	STIFF SILTY GRAY CLAY WITH A FEW FISSURES							
		25, 2.5, 2.6										
HOLE 1 CONTINUED.												

2

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CONSULTING ENGINEERS - INGÉNIEURS CONSEILS
OTTAWA CANADA

SOIL PROFILE & TEST SUMMARIES

PROFIL SOUTERRAIN ET RÉSUMÉ DES ESSAIS

DUNROBIN BRIDGE

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 99.2'
NIVEAU DU SOL (PROFONDEUR ZERO)
NOTES SEE PLATE No. 2

DATE MAR. 23, 1966

HOLE	No.
FORAGE	

2

Compressive Strength K.S.F. Résistance à la Compression K/Pd. ²	Small Scale Penetrometer K.S.F. Péit. Pénétrmètre K/Pd. ²	Essai-Standard Penetration Blows/ft-Coups/pd	Sample No. Echantillon	DESCRIPTION OF SOIL DU SOL	Depth in Feet Profondeur-Pied	Elevation Niveau	PROBING OR VANE TEST		SONDAGE OU ESSAI AU MOULINET			
							140 LB. MARTEAU-HAMMER 30" CHUTE LIBRE-DROP	NO CASING SANS TUBAGE 1.3" BARREL-DIA. ROD	BLOWS/FOOT OR SHEAR STRENGTH K.S.F. COUPS/PIED OU RÉSISTANCE AU, K/PD. ² CISAILLEMENT			
				Ground Surface / Niveau du Sol	0'	99.2'	0	1.5	3.0	4.5	6.0	7.5
				FILL BOULDERS IN SAND & GRAVEL			← WATER LEVEL AFTER 1 1/2 HRS. 97.0					
		10	2.1	FILL FINE SAND WITH SOME GRAVEL	10'	99.2'						
		3	2.2	FIBROUS ORGANIC MATERIAL	12.5'	86.7'						400.3
		2	2.3	GELATINOUS ORGANIC MATERIAL	15'							313.0
		2	2.4									352.2
		1	2.5A	VERY LOOSE CLAYEY SILT	20.5'	78.7'						140
			2.5B		22'							
				STIFF SILTY GRAY CLAY								
2.8	3.0	3.0										
3.6	4.0	4.4										
2.4	2.4	2.4										
2.0	1.8	2.5										
R	0.4											
			2.6	Hole 2 CONTINUED								

Hole No 2

2.8 3.0 3.0
2.3 6.4 0.4 4
2.0 2.2 4.2 4.4
7.1 0.8 4.2 4.4
5.4

2.6

SOIL
WITH LOW
PENETRATION
RESISTANCE

SOIL
WITH HIGH
PENETRATION
RESISTANCE

BOTTOM OF HOLE

REMOLDED

UNDISTURBED

BLOWS PER FOOT

PROBING

REFUSAL AT 36.5'

0 20 40 60 80 100

WATER CONTENT
% TENEUR EN EAU

NATURAL
NATURELLE

LIQUID LIMIT
LIMITE DE LIQUIDITE

PLASTIC LIMIT
LIMITE DE PLASTICITE

Plate No.
Plaque

3

R = Remoulded - Remanie
CR = Core Recovery
Carotte Recuperee