

#68 - F-236 M

EDWARDS BRIDGE

DEVELOPMENT RD. 912

HALIBURTON CTV.

614 3002
sites 40-10 & 40-C

TOTTEN SIMS HUBICKI & ASSOCIATES LTD.

519 DUNDAS ST. E.

WHITBY, ONTARIO

SOILS REPORT - EDWARDS BRIDGE

DEVELOPMENT ROAD 912

COUNTY OF HALIBURTON

JOB 68-12

MARCH 1968

SOILS REPORT - EDWARDS BRIDGE

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(1)

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INTRODUCTION

A stream intersecting the centreline of Development Road 912 at station 102+50 will have to be spanned. There are several local meanders in the existing stream bed and some diversion work is contemplated. A tentative proposal for the bridge location and stream diversion by the Consulting Engineers for the project, Totten, Sims, Hubicki and Associates is indicated on the site plan of Figure (1).

Depending on soil conditions, the following types of structures may be considered for the crossing -

- (a) Bridge - 30-foot span
- (b) Concrete culvert
- (c) Multi-plate structure

The soils investigation was authorized by the Consultants on February 23rd, 1968 and the field work was subsequently carried out on February 26th.

The location of the site, site plan and an inferred soil stratigraphy are outlined on Figure (1) at the end of this report. Figures 2 to 5 contain individual borehole summaries and an explanation of the symbols and terminology used in the report will be found in Appendix "A".

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FIELD WORK

Four borings were advanced, as shown on Figure (1), at the following locations -

- BH #1 - station 102+27 (5' left)
- BH #2 - station 101+94 (2' left)
- BH #3 - station 102+00 (37' left)
- BH #6 - station 101+76 (26' right)

Borings #4 and #5 were made along the centreline to the east of the bridge site in connection with the development road itself and are not considered as part of this investigation (although the results of BH #5 have been included on the inferred soil stratigraphy in figure (1)).

A Penn-drill augering rig was used for the borings and split-spoon samples were obtained at intervals. Standard penetration resistances were recorded and a dynamic cone probe was carried out in BH #3.

Elevations were referenced to the same datum used for the development road survey.

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SOIL CONDITIONS

The site is located at the edge of a glacial outwash plain through which the present stream meanders. The materials encountered in this outwash deposit, typically consist of granular soils varying from medium sand to gravel with bouldery lenses.

As shown on figure (1), a thin layer of topsoil covers the sand and gravel deposit. The granular material extends from the surface to the maximum depth investigated of 26 1/2 feet at BH #3.

A Coarse bouldery zone was encountered near elevation 1000 feet in BH #1 and BH #2. This bouldery zone apparently dips steeply from north to south since it was encountered at elevation 1007 feet in BH #6 and at elevation 987 feet in BH #3.

The gravelly sand above the boulder zone is relatively loose with standard penetration resistances varying from 6 to 11 blows/foot.

The ground water level at the site is controlled by the stream level which, at the time of the investigation, was close to elevation 1011.5 feet.

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FOUNDATION CONSIDERATIONS

Type - The existence of a relatively loose deposit of sand below normal foundation levels precludes the use of conventional spread footings at this site. Some foundation preparation involving densification of the underlying sand would be required before placing footings. This could be accomplished by driving short displacement-type piles (such as creosoted timber piles) in the abutment areas. It would be difficult, however, to drive such piles through the bouldery zone mentioned earlier.

The site would be suitable for a culvert-type structure which provides uniform load distribution over a relatively large area. A multi-plate structure able to withstand some differential movement is considered preferable to a rigid concrete box culvert.

The foundation for a multi-plate structure should be prepared by compacting the underlying sand to a depth of at least 2 feet. A sheet pile cut-off wall around the lower perimeter of each end of the culvert should be provided for to a depth of at least 3 feet below the invert level in order to reduce seepage and internal erosion.

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FOUNDATION CONSIDERATIONS (cont.)

Bearing Capacity - To prevent undue settlement under the proposed structure, an allowable bearing capacity of 2000 lbs/sq ft should not be exceeded by the total of estimated live and dead loads.

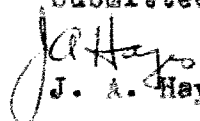
EXCAVATION CONSIDERATIONS

Dewatering of the excavation will be required at this site but since the excavation is not likely to be more than about 3 feet below stream level, it is anticipated that conventional pumping procedures will be used. Deeper excavations may require the use of well points in order to control sloughing of side slopes and/or "piping" at the base of the excavation.

EROSION PROTECTION

Both the upstream and downstream banks of the proposed stream diversion will require good protection to prevent erosion and undercutting in the sandy materials. The approach fill slopes will also require protection on the upstream side. Suitable rip-rap material should be available from rock cuts to the east.

Submitted by:


J. A. Hayes, P. Eng.

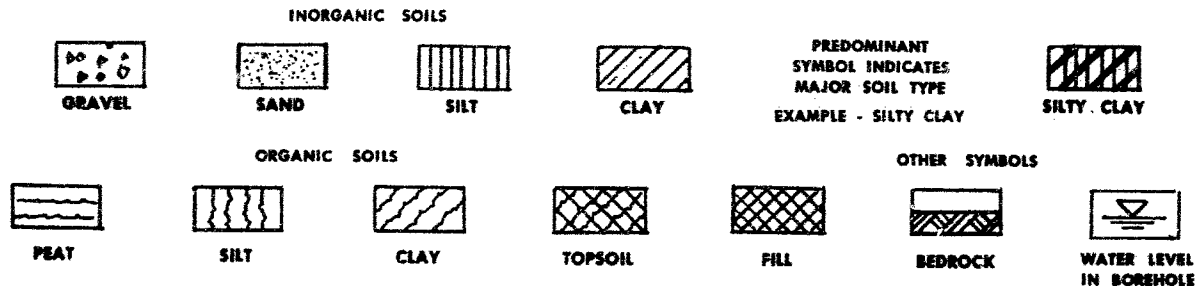
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EXPLANATION OF SYMBOLS AND TERMINOLOGY

SOIL DESCRIPTION

A description of visible characteristics of the soil as determined in the field and altered, if necessary, on the basis of laboratory classification tests. The soil profile applies only to the borehole location and may be different at other locations on the site.

A soil symbol is usually found opposite each soil type as follows:



SAMPLES

Condition:



RELATIVELY
UNDISTURBED



DISTURBED



NOT
RECOVERED

Type:

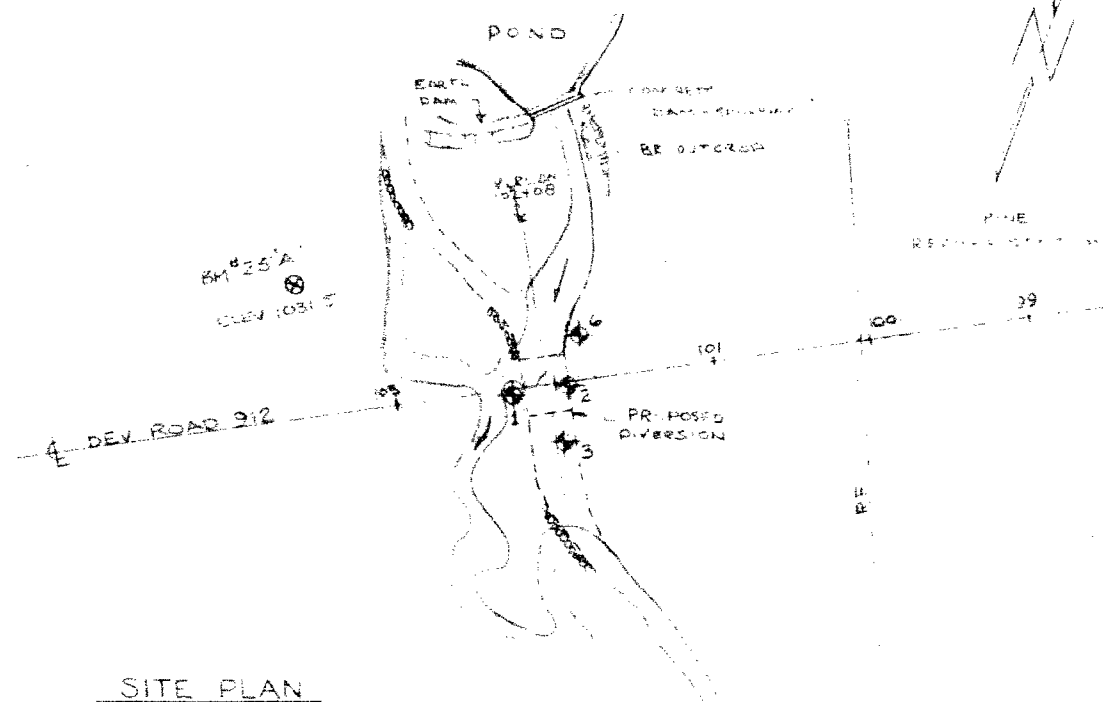
D.S. - 1 3/8" ID Drive Sample
 A.S. - Auger Sample
 U - Thin-walled Tube Sample
 J - Small Jar Sample
 B - Bag Sample

Penetration Resistance: (N) Indicates number of blows, of a 140-lb. hammer falling 30 inches, required to drive a 2" OD Drive Sampler a distance of 1 foot into the soil. This resistance is used to assess the relative density of cohesionless soils and the relative consistency of cohesive soils.

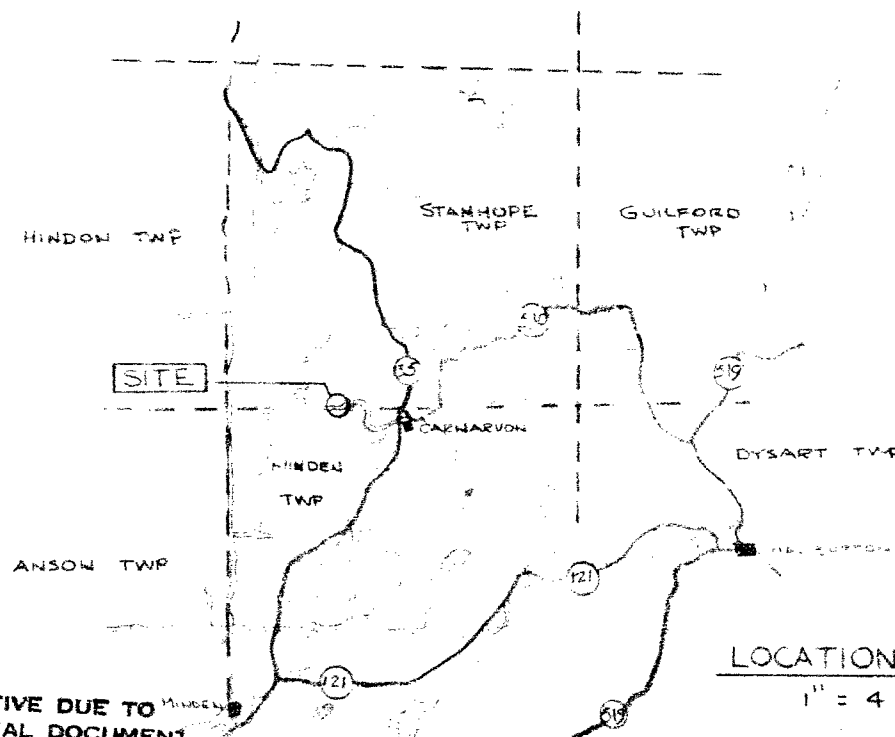
OTHER TESTS

- M - Grain size analysis using sieves or hydrometer or both - plotted graphically on a separate sheet.
- q_u - unconfined compressive strength.
- γ_f - field vane tests.
- γ_l - laboratory vane tests.
- γ_d - dry unit weight.
- C - consolidation test - results on a separate sheet.
- T - triaxial compression test - results on a separate sheet.

STANHOPE TWP.
LOT 9 CONC 1

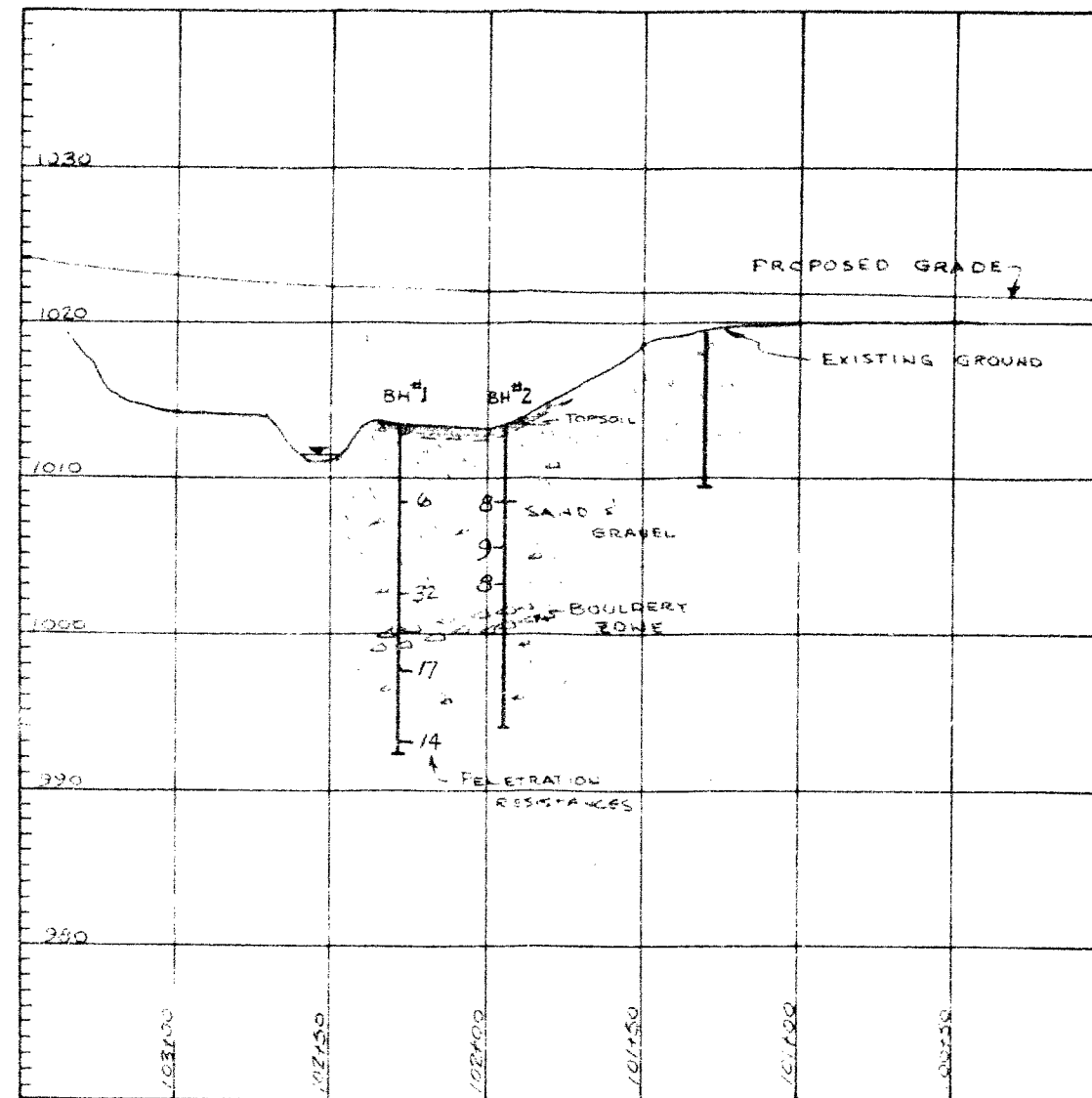


SITE PLAN
1" = 100'



LOCATION PLAN
1" = 4 Mi.

INFERRED SOIL STRATIGRAPHY



NOTE - SOILS DATA APPLIES ONLY TO THE ACTUAL BOREHOLE LOCATION. CONDITIONS MAY BE DIFFERENT AT OTHER PARTS OF THE SITE.

SITE INVESTIGATION SERVICES LIMITED

EDWARDS BRIDGE
DEVELOPMENT ROAD 912
COUNTY OF HALIBURTON

SCALE AS SHOWN

DWN. BY A.H.

DATE MARCH '68

FIGURE

1

BOREHOLE DATA and TEST SUMMARY

SITE INVESTIGATION SERVICES Ltd. JOB No 68-12 BOREHOLE No: 1 FIGURE No: 2	Project - <u>EDWARDS BRIDGE</u> Location - <u>COUNTY OF HALIBURTON</u> Hole Location - <u>102+27 (5' LEFT)</u>	Date - <u>26 FEB 1968</u> Elevation Datum - <u>BM #25A=1031.5</u> Type of Drill - <u>PENNDRILL</u>	<div style="display: flex; justify-content: space-between;"> <div> PENETRATION TESTS 2" O.D. Split Spoon — ○ — In-Situ 2" O.D. Cone — ● — Liquid Limit Plastic Limit </div> <div> LEGEND Moisture Contents ———— (See Appendix "A" for Other Symbols) </div> </div>				
	SOIL DESCRIPTION	SOIL SYMBOL	ELEVATION IN FEET	DEPTH IN FEET	MOISTURE CONTENT and ATTERBERG LIMITS (%)	SAMPLE TYPE AND NUMBER	PENETRATION RESISTANCE (Blows/Ft) 10 20 30 40 50 60 SHEAR STRENGTH (Kips/Ft ²)
	ORGANIC TOPSOIL						
	SAND & GRAVEL						
- Coarse sand and fine gravel interbedded - rusty brown to 3', greyish black from 3' to 11 1/2', rusty brown from 11 1/2' to 13' - bouldery at 13' - loose to medium dense							
SAND							
- fine grey sand - medium dense							
END OF HOLE (Caving in at 12')							

BOREHOLE DATA and TEST SUMMARY

SITE INVESTIGATION SERVICES Ltd. JOB No 68-12 BOREHOLE No: 2 FIGURE No: 3	Project - <u>EDWARDS BRIDGE</u> Location - <u>COUNTY OF HALIBURTON</u> Hole Location - <u>101+94 (2' LEFT)</u>	Date - <u>26 FEB 1968</u> Elevation Datum - <u>BM #25A=1031.5</u> Type of Drill - <u>PENNDRILL</u>	LEGEND Penetration Tests 2" O.D. Split Spoon —○— In-Situ ○ 2" O.D. Cone —●— Liquid Limit — Plastic Limit — (See Appendix "A" for Other Symbols)						
	SOIL DESCRIPTION	SOIL SYMBOL	ELEVATION IN FEET	DEPTH IN FEET	MOISTURE CONTENT and ATTERBERG LIMITS (%)	SAMPLE TYPE AND NUMBER	PENETRATION RESISTANCE (Blows/Ft) 10 20 30 40 50 60 SHEAR STRENGTH (Kips/Ft ²)		
	ORGANIC SANDY TOPSOIL						1031.5		
SAND - brown medium to coarse sand with some gravel - very bouldery below 12'						5 10 15 20 25	1 2 3	0 0 0	NFB NFB NFB
END OF HOLE (Unable to sample below Boulders at 12'-13') Augered in sand to 19 1/2'						994.0	20		

BOREHOLE DATA and TEST SUMMARY

SITE INVESTIGATION SERVICES LTD. JOB No 68-12 BOREHOLE No: 3 FIGURE No: 4	Project - <u>EDWARDS BRIDGE</u>		Date - <u>27 FEB 1968</u>		LEGEND Penetration Tests 2" O.D. Split Spoon —○—○— In-Situ ○ 2" O.D. Cone —●—●—●— Liquid Limit — — Plastic Limit — — (See Appendix "A" for Other Symbols)		
	Location - <u>COUNTY OF HALIBURTON</u>		Elevation Datum - <u>BM #25A=1031.5</u>				
	Hole Location - <u>102+00 (37' LEFT)</u>		Type of Drill - <u>PENNDRILL</u>		PENETRATION RESISTANCE (Blows/Ft) 10 20 30 40 50 60 SHEAR STRENGTH (Kips/ft²)		
	SOIL DESCRIPTION	SOIL SYMBOL	ELEVATION IN FEET	DEPTH IN FEET			MOISTURE CONTENT and ATTERBERG LIMITS (%)
SILTY SAND - rusty brown - frozen		1013.0 1011.5	0 1				
SAND - light brown medium sand with some gravel - grey sand below 6' - gravelly at 10 1/2'			5 10 15 20 25				
END OF HOLE —*— (Refusal to cone penetration)			25.5				REFUSAL —*—

BOREHOLE DATA and TEST SUMMARY

SITE INVESTIGATION SERVICES Ltd. JOB No: 68-12 BOREHOLE No: 6 FIGURE No: 5	Project - EDWARDS BRIDGE		Date - 27 FEB 1968		LEGEND Penetration Tests Moisture Contents 2" O.D. Split Spoon —○— In-Situ ○ 2" O.D. Cone —●— Liquid Limit — — Plastic Limit — — (See Appendix "A" for Other Symbols)	
	Location - COUNTY OF HALIBURTON		Elevation Datum - BM #25A=1031.5			
	Hole Location - 101+76 (26' RIGHT)		Type of Drill - PENNDRILL			
	SOIL DESCRIPTION	SOIL SYMBOL	ELEVATION IN FEET	DEPTH IN FEET	MOISTURE CONTENT and ATTERBERG LIMITS (%)	SAMPLE TYPE AND NUMBER
	ORGANIC SANDY SILT TOPSOIL	SY 1	1015.5			
	SAND - slightly silty rusty brown sand to 4' - coarse brown sand and gravel below 4' - dense, bouldery layer at 6'	SY 2	1008.5	5		D.S.
END OF HOLE (in dense boulder strata)			10			
			15			