

63-F-266 M

BEAUDETTE

RIVER BRIDGE

STORMONT

DUNDAS &

GLENGARRY CTYS

A. W. HUFFEY

Consulting Engineer

WELLINGTON 3-2166

1118 FIFTH STREET EAST
CORNWALL, ONTARIO
CANADA

Cornwall, June 7, 1963.

Soils Report - Beaudette River Bridge,
The United Counties of Stormont,
Dundas, and Glengarry.

A D D E N D U M

For: Mr. A.R. Ferguson, P.Eng.,
County Engineer, United Counties,
Pitt Street,
Cornwall, Ontario.

ITEM I : The location of the bridge site is Lot 9,
Concessions 5 and 6, Township of Lancaster, Ontario.

ITEM II: The elevation of the water surface at the time of
the investigation is somewhat obscure due to several
feet of drifted snow, and the broken ice chunks
overlaying the water surface at the time. The probable
free water surface however can be considered as 85.5, \pm
1 foot in elevation. The water elevation as measured on
May 24, 1963 was 85.20.

ITEM III: Elevation of the river bed on May 24, 1963 was 83.00
providing a height of river bed above proposed footing
depth of 7.0 feet.

ITEM IV: The alignment of the new bridge abutments is very
close to that of the present bridge. Indeed, since
the proposed final deck elevation is to be some one
to two feet higher, it is probable that on the west side,
that the old abutment can become largely integrated
with the new abutment. A bearing capacity for design
is recommended as 8,000 pounds per square foot, for
the abutments and centre pier foundations, at
elevations 76.0 to 74.0.

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ITEM V : With reference to the degree of difficulty in dewatering; it can be determined from the results shown in borehole No. 1, that excavation below elevation 76.0 will materially increase the difficulty in maintaining a dry excavation. However, the item of concern is rather more the difficulty in excavating through the heavy boulders set in a matrix of dense sand, which is recorded in Borehole No. 3, at elevation 97.0.

A. W. HUFFEY

Consulting Engineer

WELLINGTON WE. 8-2166

1118 FIFTH STREET EAST
CORNWALL, ONTARIO
CANADA

Cornwall, March 30, 1963.

Mr. W. W. Ferguson, P. Eng.,
County Engineer, United Counties,
County Building, Pitt Street,
Cornwall, Ontario.

Dear Sir,

This report is submitted following a Soils Investigation at the proposed site of the New Bridge across the Desautelle River. The drilling crew was supplied by F. Johnson Drilling Contractor, of Ottawa. An engineering observer was supplied by this office. Survey datum was taken at assumed elevation 100.00 on the bridge deck, as shown on the drawing.

SUMMARY

Bedrock elevation was proved at an average elevation of 59 feet, with a heavy overlay of small and large boulders of glacial origin. Upper layers were of an alluvial nature comprising sands, gravels, small to medium size boulders.

2. INTRODUCTION

It was suspected that the depth of the bedrock would be variable in this area, and since the overlay soils were also unknown, a program of soils investigation was considered necessary. Drilling was commenced on March 4th, 1963, and was completed on March 15th, 1963, when sufficient data was obtained to permit the structural design of suitable foundations.

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3. METHOD OF DRILLING

- 3.1. A diamond drill was used with a casing driven to refusal at 5' to 7' below surface. Extremely hard drilling conditions were met, and boulders encountered, were drilled through, to the bedrock. Three holes were driven, one at each of the two abutments, and one close to the centre pier location as shown on the attached Plot Plan.
- 3.2. Owing to the large number of boulders, soil sampling by the conventional Split-Spoon Sampler was almost impossible. Three samples were taken in the brown sand, one in each borehole.
- 3.3. Visual classifications were made throughout the drilling program. The core samples and Split-Spoon Samples are available for inspection.

4. SOILS DESCRIPTION

- 4.1. The limestone bedrock was distinguished by drilling through the limestone boulder layers and into bedrock for sufficient distance, to prove the horizon.
- 4.2. Elevation of limestone bedrock was established in the boreholes as 58.6ft, 57.5 ft., and 60.5 ft., respectively.
- 4.3. Overlaying this is a zone comprising large limestone slabs or boulders, sizes ranging up to 6' in thickness, intermixed with boulders of red granite, white granite, sandstone and quartzite. Upper limit of the boulder zone in Borehole No. 1 is el. 76.2 ft., No. 2 is el. 73.5 ft., and No. 3 is el. 88.0 ft.
- 4.4. Surface materials are fill, loose stones, and gravel, and sand. Sampling in borehole No. 3 at el. 97.0 ft., gave a very dense brown sand intermixed with boulders.
- 4.5. Only one clay seam was recorded, that in Borehole No. 3 at el. 79.5, of less than 6" thickness.

. 3/

4.6. an artesian flow of water was apparent at El. 58.6 feet, in Borehole No. 1.

5. DESIGN RECOMMENDATIONS

Owing to the depth of the bedrock and the thick layer of boulders overlaying, pile foundations would be most expensive to drive. The recommended foundation design would be a spread footing type excavated to depth, terminating on or about the boulder layers at elevation 76.0 ft.

The services of this company to provide engineering investigation and design are available to you, at this time or at any future date.

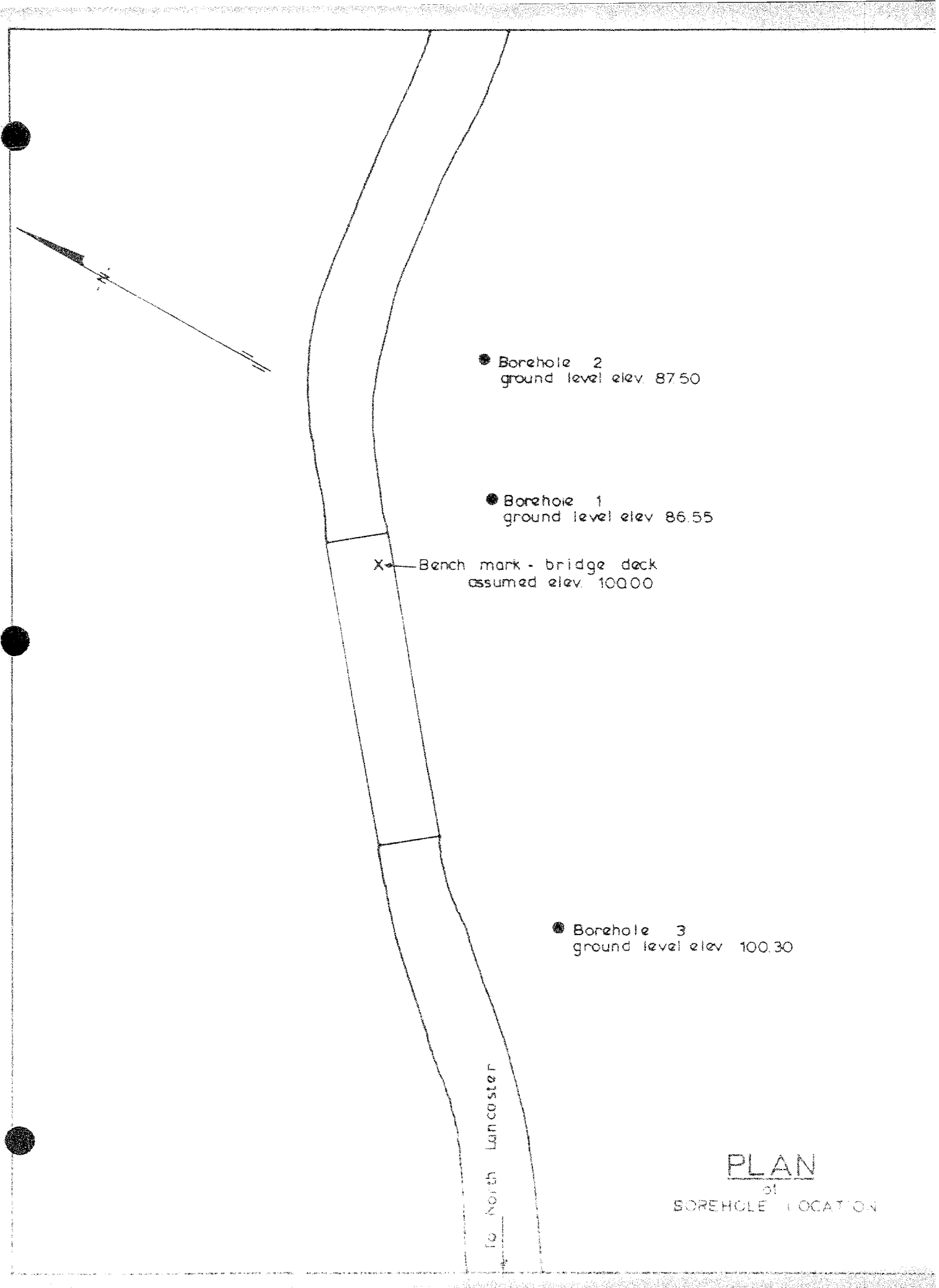
Yours very truly,

INFORMATION COPY
ORIGINAL SIGNED BY
A. W. HUFFEY

acm/mfh

A. W. Huffey, M. E., P. E.
P. Eng., M. E.





● Borehole 2
ground level elev. 87.50

● Borehole 1
ground level elev. 86.55

X ← Bench mark - bridge deck
assumed elev. 100.00

● Borehole 3
ground level elev. 100.30

To North Lancaster

PLAN
of
BOREHOLE LOCATION

A. W. HUFFEY

CONSULTING ENGINEERS

CORNWALL, ONTARIO

SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES


ELEVATION OF GROUND SURFACE (ZERO DEPTH) 86.55

HOLE NO.

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.00

1

BORINGS BY JOHNSON TESTING BY BUTTS DATE MARCH 4, 5, 7, 8 1963

Unconfined Compressive Strength	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	Ft. Depth in	ELEVATION	PENETRATION TEST				
						Lb. Hammer Inch Drop		NO CASING Inch Dia. Rod		
						Blows Per Foot				
Kips/Ft. ²			GROUND SURFACE		86.55					
				1						
				2						
			7' of fill	3						
				4						
				5						
				6						
				7	79.55					
			Loose sand and stones to 10'	8						
				9						
	150 for 4"	SS 1 	boulders at 10'-4" started coring at 10'-4"	10	76.55 76.22					
				11						
					12					
				cored to 16'-4"						
				recovery 1'-4"	13					
				14						
						% WATER CONTENT				Plate 1 of 3

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SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

BRIDGE CROSSING ON THE
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UNITED COUNTIES

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 86.55

HOLE NO.

REMARKS ASSUMED BENCH MARCH ON BRIDGE DECK ELEVATION 100.00

1

BORINGS BY JOHNSON

TESTING BY BUTTS

DATE MARCH 4, 7, 8, 1963

Unconfined Compressive Strength Kips/Ft. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL GROUND SURFACE	Depth in Ft.	ELEVATION	PENETRATION TEST				
						..... Lb. Hammer Inch Drop		..... NO CASING Inch Dia. Rod.		
						Blows Per Foot				
			limestone boulders							
			partings 2" to 3/4"	15						
			average 2"							
				16	70.22					
				17						
				18						
			cored from 19'	19	67.55					
			to 25'							
			recovery 1-2"	20						
			partings 2" to 1/4"	21						
			average 2"							
			boulders and sand	22						
			to 24'							
				23						
			limestone boulders	24						
			cored 25' to 28'	25	61.55					
			recovery 6"							
			boulders	26						
				27						
			artesian flow at 28'							
			(low pressure)	28	58.55	% WATER CONTENT				Plate 2 of 3
			limestone							

CORNWALL, ONTARIO

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 86 55

HOLE NO.

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.00

BORINGS BY JOHNSON TESTING BY BUTTS DATE MARCH 4 5 7 8 1963

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CORNWALL, ONTARIO

SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 87.50

HOLE NO.

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.00

2

BORINGS BY JOHNSON

TESTING BY BUTTS

DATE MARCH 8, 11, 12, 1963

Unconfined Compressive Strength	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	Ft. Depth In	ELEVATION	PENETRATION TEST			
						..... Lb. Hammer Inch Drop		..... NO CASING Inch Dia. Rod.	
Kips/Sq. Ft.			GROUND SURFACE		87.50	Blows Per Foot			
				1					
				2					
				3					
				4					
	85		gravel and broken rock (hard)	5					
		SS 1		6					
				7					
			too hard to S.S. sample	8					
			misc sand, small to large stones etc.	9					
				10					
				11					
				12					
				13					
			started coring 14'	14	73.50	% WATER CONTENT			
						Plate 1 of 3			

A. W. HUFFEY
CONSULTING ENGINEERS

CORNWALL, ONTARIO

**SOIL PROFILE AND SUMMARY
OF LABORATORY TESTS**

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 87.50

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.00

HOLE NO.

2

BORINGS BY JOHNSON

TESTING BY BUTTS

DATE MARCH 8, 11, 12, 1963

Unconfined Compressive Strength		STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	Depth in Ft.	ELEVATION	PENETRATION TEST			
Kips/Ft. ²							Lb. Hammer		NO CASING	
							Inch Drop		Inch Dia. Rod.	
				GROUND SURFACE			Blows Per Foot			
				core barrel blocked at 16' in boulders	15					
				recovery 6" average parting 2"	16	71.50				
				cored 16' to 20'						
				recovery 12"	17					
				core barrel blocked again	18					
				average parting 2"	19					
				limestone boulders	20	67.50				
				cored to 23'						
				recovery 1'-2"	21					
				average parting 2"	22					
				limestone boulders	23	64.50				
				cored to 27'						
				recovery 10"	24					
				8' parting	25					
				limestone boulders and red granite	26					
				cored to 31'	27	60.50				
				recovery 1'-4"	28		% WATER CONTENT			Plate 2 of 3

CORNWALL, ONTARIO

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES.

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.0

HOLE NO.

2

BORINGS BY JOHNSON TESTING BY BUTTS DATE MARCH 8.11.12.1963

[illegible]

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CORNWALL, ONTARIO

SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES.

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 102.99

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.00

HOLE NO.

3

BORINGS BY JOHNSON

TESTING BY BUTTS

DATE MARCH 13, 14, 15, 1963

Unconfined Compressive Strength	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	Ft. Depth In	ELEVATION	PENETRATION TEST				
					 Lb. Hammer NO CASING			
Kips/Ft. ²			GROUND SURFACE		 Inch Drop Inch Dia. Rod	Blows Per Foot		
				1						
				2						
				3						
				4						
				5						
	15			6						
	34	SS. 1	very dense m. to f. light brown sand with boulders	7						
	43			8						
				9						
			too hard to sample with s.s. boulders, m. to s. stones and m. to f. sand	10						
				11						
				12						
				13						
				14						
				15						
				16						
				17						
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				99						
				100						

WATER CONTENT

Field

100.0

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ELEVATION OF GROUND SURFACE (ZERO DEPTH) 102.99

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.0

HOLE NO.

3

BORINGS BY JOHNSON TESTING BY BUTTS DATE MARCH 13, 14, 15, 1963

Unclassified Compressive Strength	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	Depth in Ft.	ELEVATION	PENETRATION TEST				
						..... Lb. Hammer Inch Drop		..... NO CASING Inch Dia. Rod.		
Kips/Ft. ²			GROUND SURFACE			Blows Per Foot				
			cored from 15'-19'	15	87.99					
			recovery 1'-10"							
			limestone boulders	16						
			partings 5" to 1"	17						
			average 1"	18						
				19	83.99					
			cored from 19' to 24'							
			recovery 1'-2"	20						
			limestone boulders	21						
			partings 2" to 1"	22						
			average 1"	23						
				24	78.99					
			clay seam at 23'-6"							
			cored 24' to 35'	25						
			recovery 8"	26						
			limestone boulders	27						
				28						
						% WATER CONTENT				Plate 2 of 4

A. W. HUFFEY

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HOLE NO.

3

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Unclassified Compressive Strength	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	Depth in Ft.	ELEVATION	PENETRATION TEST				
						..... Lb. Hammer	..... NO CASING	.....	.....	.....
Kips/Ft. ²			GROUND SURFACE			Inch Drop	Inch Dia. Rod			
						Blows Per Foot				
				29						
			average parting 2"	30						
			boulders and	31						
			m. gray sand, rock							
			grinding away	32						
			(reason for the long							
			coring run)	33						
				34						
				35	67.99					
			cored from 35'							
			to 40'	36						
			no recovery	37						
				38						
			rock probably							
			ground away	39						
				40	62.99					
			cored from 40'							
			to 42'-6"	41						
			hit bedrock at 42'-6"	42						
						% WATER CONTENT				Plate 3 of 4

CORNWALL, ONTARIO

BRIDGE CROSSING ON THE
BEAUDETTE RIVER FOR THE
UNITED COUNTIES

REMARKS ASSUMED BENCH MARK ON BRIDGE DECK - ELEVATION 100.00

HOLE NO.

3

DATE MARCH 13, 14, 15, 1963

[illegible]

5. WATER CONTENT

Plate

4 Q 4