

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 40P14-13

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. 2-312

HWY. No. _____

LOCATION BR. N° 27 NEAR
TEESWATER, CURLOSS TWP.

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

NONE

REMARKS: _____

UNIVERSAL
GEOTECHNIQUE

LIMITED



40P14-13
GEOCRES No.

STRUCTURE SITE No. 2-3/2

REPORT

on

SUBSURFACE EXPLORATION

at

BRIDGE N° 27

near Teeswater

CULROSS TOWNSHIP

COUNTY OF BRUCE

ONTARIO

REPORT

on

50P14-13
GEOCREs No.

SUBSURFACE EXPLORATION

at

BRIDGE N° 27

near Teeswater

CULROSS TOWNSHIPCOUNTY OF BRUCEONTARIOINTRODUCTION

The County Engineer of Bruce, Mr. E. G. Yundt, is proposing the construction of a new bridge over the Teeswater River about 1-1/4 miles west of the village of Teeswater in Culross Township in the location as shown on the Key Plan, drawing N° 1. The object of the new bridge is to straighten the County Road and eliminate a sharp right and left hand turn in the road. Universal GEOTECHNIQUE Limited were requested to carry out subsurface exploration to ascertain the soil conditions with regard to foundation design and this Report contains the pertinent data and recommendations.

AVAILABLE INFORMATION

It is understood that tentative designs for the new bridge envisage a structure having an overall length of about 140 feet and comprising 3 spans.

THE SITE

The exact site of the new bridge has not been determined but it will be located within the area covered by the subsurface exploration, and as shown on drawing N° 2 it will be a few hundred feet east of the existing bridge. It is understood that the river channel will be relocated to conform with the position of the new bridge.

SUBSURFACE EXPLORATION

Subsurface exploration was carried out during the period 24th to the 26th of September, 1960 and consisted of 3 exploratory boreholes in locations as shown on drawing N° 2 accompanying this Report.

The borings were staked and the ground surface elevations given by the Staff of the County Engineer, the elevations being related to the same datum as used for the plan and profiles given on the County Engineer's drawing which also indicates that the level of the existing bridge is at approximately 73 and that high water at this bridge is at elevation 70.

During the operation of soil boring soil samples were obtained at intervals of about 2-1/2 feet, and where noticeable changes of strata occurred the depths of such changes were recorded.

The state of compaction of the essentially cohesionless strata was determined by the standard penetration test taken during the operation of soil sampling. (The standard penetration test, as referred to in this Report, involves the recording of the number of blows (N) of a 140 lb. hammer falling 30 inches that are required to drive a 2" diameter split barrel sampler 1 foot into the soil at the bottom of the borehole).

Bedrock was encountered in all three of the boreholes and diamond core drilling was carried out to provide positive identification and some information concerning its condition with respect to weathering.

Visual examination and classification of all soil samples and rock cores was carried out in the laboratory: The descriptions of the strata obtained from the foregoing examination together with the results of the standard penetration tests are given on the borehole logs included with this Report. Also included is a geological section A-A', a key plan, and a borehole location plan.

Subsurface conditions given in this Report are those indicated by material encountered in the boreholes. The accuracy of extrapolation to obtain the soil profile should be associated directly with the geological conditions and inversely with the spacing of the boreholes.

GEOLOGICAL FEATURES

The site lies in the northwestern margin of the Teeswater Drumlin Field, an area which in addition to its drumlinized topography is characterized by the presence of sand hills and a complicated pattern of glacial spillways which surround the drumlins and the sand hills. The lowlying areas in this region are sometimes marshy and are often filled by the sands and gravels that were laid down along the spillways by the melt waters of the glaciers.

From the information obtained from the exploratory boreholes, it may be concluded that the strata down to the explored depths can be classified as follows:

TOP SOIL

About 1 foot of dark brown loam containing organic matter covers the site outside the river channel.

ALLUVIAL DEPOSITS

Loose to dense silts and sands containing gravel and boulders and occasional organic matter were encountered in all the boreholes, the thickness of these deposits varying from about 4 to 8 feet. Most of these deposits were laid down by the waters of Teeswater River but at lower levels they are possibly of glaciofluvial origin.

WEATHERED BEDROCK

Beneath the relatively limited thickness of alluvial deposits, badly weathered limestone of the Norfolk Formation was encountered at elevations varying from about 57 to 59.

LABORATORY TESTS

Visual examination of all the soil samples and rock cores was made and normal identification testing carried out in the laboratory.

DISCUSSION

Realignment of the County Road will involve a skew crossing of the existing river channel as shown on drawing N° 2, and at the moment the exact location of the proposed bridge has not been decided. Three exploratory boreholes were therefore located in the vicinity of the proposed centre line of the new road and extending to the extremities of the area within which the new bridge will be constructed.

The existing river channel flows within a spillway, and the results of the subsurface exploration disclose that beneath the riverbed and the topsoil that borders the river channel there exists only a limited thickness of alluvial deposits consisting of silts and sands containing gravel and boulders and occasional organic matter before bedrock is reached slightly below elevation 60.

Some difficulty was experienced in deducing the upper surface of the bedrock as encountered in the boreholes due to its badly weathered condition. The weathered nature of the rock is exemplified by the ability to penetrate this material for a depth of over 10 feet in borehole BH.1 by normal soil boring methods although the resistance could be classified as almost refusal conditions.

The upper surface of the weathered bedrock along the centre line of the site appears to dip slightly from east to west, but some variation in the level of the bedrock between the boreholes and on either side of the centre line of the site should be anticipated. Similarly variations in the extent of weathering will also be found.

Referring now to the foundations for the proposed bridge, it is quite clear that they should be supported directly on the bedrock and from the results of the three exploratory boreholes it is indicated that the underside of normal spread footings should be at a minimum depth of 2 feet in the bedrock.

Due to the weathered nature of the bedrock the exact elevation to which foundations should be taken must of necessity be finally determined by an examination of the rock condition as disclosed during excavation for the footings: For design purposes however the underside of normal spread footings may be assumed as follows.

POSITION	TENTATIVE ELEVATION OF FOUNDATIONS
Vicinity of BH.1	50
Vicinity of BH.2	53
Vicinity of BH.3	55

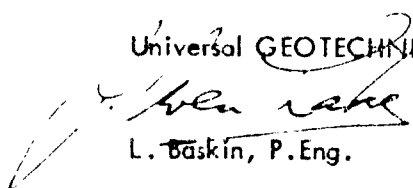
Referring to the bearing capacity of the bedrock at the elevations previously suggested, it is considered expedient to adopt an allowable bearing capacity of 4 tons/sq.ft. in view of the weathered nature of the limestone. As mentioned previously the condition of the bedrock as exposed in the excavations for the foundations should be examined to see that it accords with the conditions as deduced from the exploration, because where weathering is so prevalent it is necessary to anticipate local variations as exemplified by the presence of material classified as chalk in borehole BH.1.

CONCLUSIONS

From the subsurface exploration which was limited to the centre line of the area in which it is proposed to construct the bridge, It is disclosed that bedrock exists at a relatively shallow depth beneath the ground surface and the following conclusions may be stated.

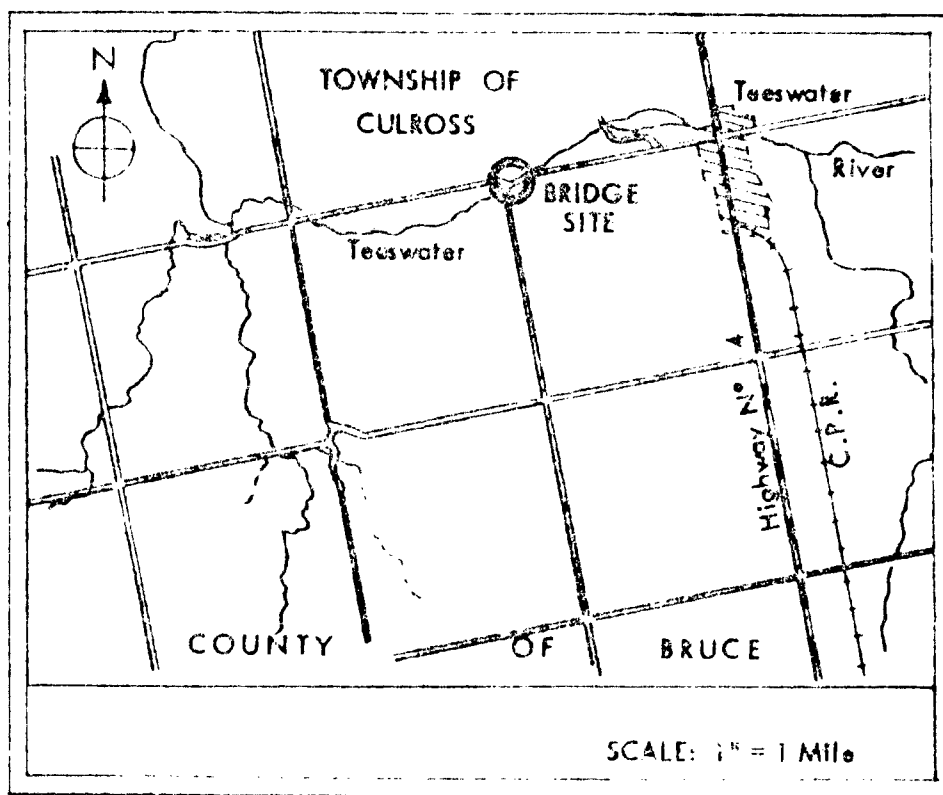
- (1) The foundations to the proposed bridge may be normal spread footings tentatively located a few feet below the surface of the bedrock at elevations varying from about 50 to 55.
- (2) The allowable bearing capacity of the bedrock for normal spread footings may be assumed as 4.0 tons/sq.ft. for purposes of design.
- (3) Due to the weathered nature of the bedrock It is necessary to anticipate local variations in level and allow for the possible necessity to excavate slightly deeper for certain footings and possibly modify the size of the footings to accord with actual site conditions as disclosed during excavation. It is not however anticipated that the rock would be so deteriorated that the allowable bearing capacity would have to be reduced by any substantial amount.

Universal GEOTECHNIQUE Limited,


L. Baskin, P.Eng.

Report N° T.453/60

November, 1960.



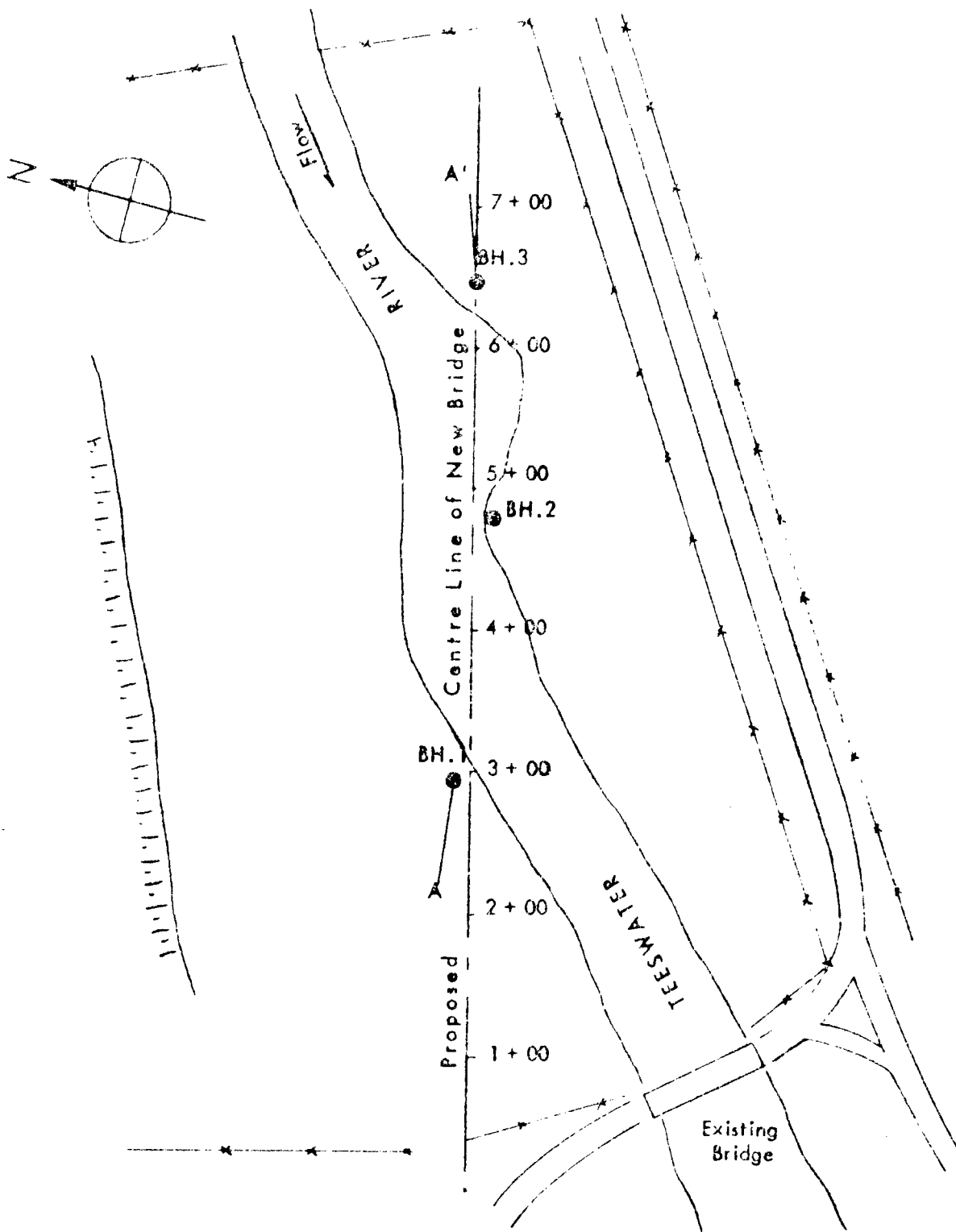
PROJECT Bruce County Bridge No 27, Ontario.

TITLE Key Plan

DRG. NO. 1 ORDER NO. T.453/60



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SCALE: 1" = 100 ft.

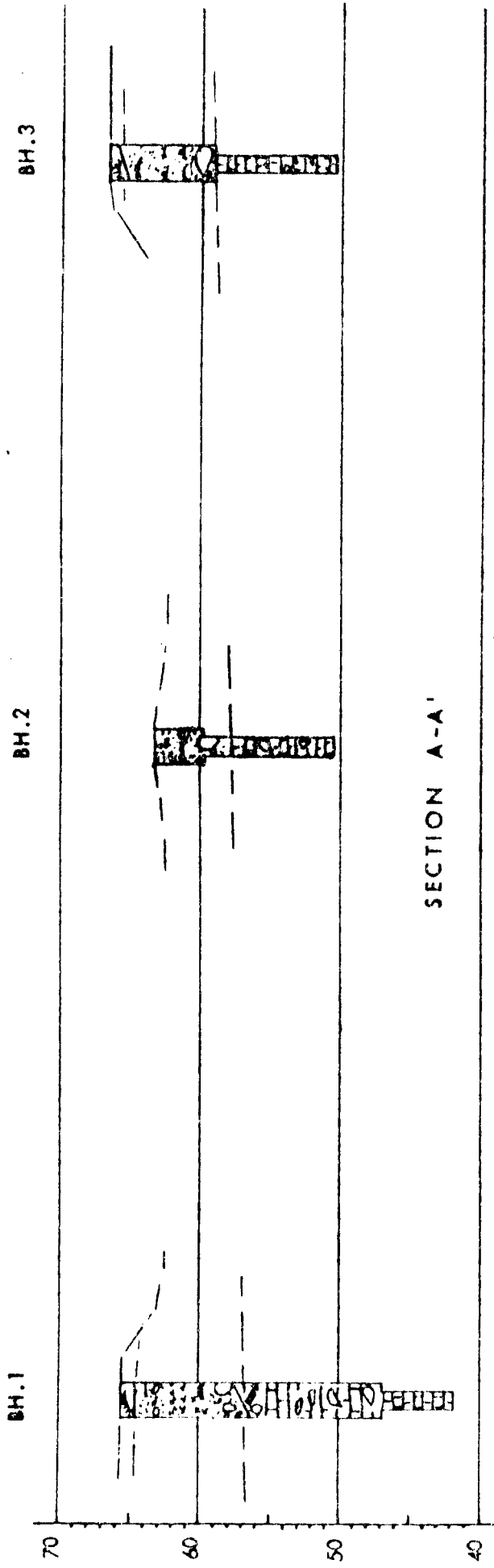
PROJECT Bruce County Bridge No. 27, Ontario.

TITLE Borehole Location Plan

DRG NO. 2 ORDER NO. T.450/60



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SECTION A-A'

LEGEND

- TOP SOIL
- ALLUVIAL DEPOSITS
- WEATHERED BEDROCK

SCALE
Horizontal 1" = 40'-0"
Vertical 1" = 10'-0"

PROJECT Bruce County Bridge No 27, Ontario.
TITLE Geological Section
DRG. NO. 3 ORDER NO. T.453/60



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SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Bruce County Bridge N° 27, Ontario.

ORDER NO. T.453/60

CLIENT Mr. E. G. Yundt, County Engineer, Walkerton, Ontario.

BOREHOLE NO. BH.1

DIAMETER BX & AX






































CASING BX & AX

BOREHOLE LOCATION See Plan

INCLINATION Vertical

BEARING

FORM G-1A 800
(UNITED STATES OF AMERICA)

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
Black loam with organic matter. Loose brown iron-stained clayey silty SAND with gravel.	65.7		• 1	Zero 1'-0"		9	Damp. Medium dry strength.
Firm brawnish grey sandy SILT, iron stained.			• 2	3'-0"		18	Moist. Medium dry strength.
Dark grey sandy SILT with some organic matter.	60		• 3	4'-9"		18	Wet. Medium dry strength.
Firm grey silty SAND with fine to coarse gravel.			• 4			65	Wet. Low dry strength.
Light brown sand and rock fragments, probably badly weathered bedrock.			• 5			67	
Fragments of light buff limestone, silt & sand, probably badly weathered bedrock.			• 6			28 (6")	
Fragments of light buff limestone embedded in chalk. Badly weathered bedrock.	50		• 7			56	
			• 8			46	
			• 9			100 (9")	
Light buff broken limestone, badly weathered bedrock.							18'-9" to 23'-9" core recovery 20%
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							

23'-9"
End of Borehole

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Bruce County Bridge N° 27, Ontario.ORDER NO. T.453/60CLIENT Mr. E. G. Yundt, County Engineer, Walkerton, Ontario.BOREHOLE NO. BH.2 & BH.3DIAMETER BX & AXCASING BX & AXBOREHOLE LOCATION See PlanINCLINATION VerticalBEARING

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
BH.2							
Brown loam with organic matter.	63.2			Zero			
Firm brown iron stained SAND with gravel.			• 1			28	Moist. Low to medium dry strength.
Firm to dense brown SAND with gravel and boulders, iron-stained.	60		• 2	3'-6"		86	(10") 3'-6" to 5'-6" core recovery 40%.
do				5'-6"			
Badly weathered light buff limestone occasional bituminous partings.							5'-6" to 10'-3" core recovery 20%.
do							10'-3" to 13'-0" core recovery 35%.
	50			13'-0"			
				End of Borehole			
BH.3							
Brown loam with organic matter. Firm brown silty somewhat cemented fine SAND, dark organic layers.	66.7			Zero			
Dense do			• 1			28	Dry. Medium dry strength.
Traces of bedding			• 2			39	Damp. Medium dry strength.
Dense brown SAND, GRAVEL & BOULDERS.	60		• 3			34	(6") Wet. No dry strength.
Light buff badly weathered limestone.			• 4	7'-9"		74	(6") 7'-9" to 9'-0" no recovery.
do							9'-0" to 11'-0" core recovery 60%.
do							11'-0" to 15'-0" core recovery 25%.
	50			16'-6"			
				End of Borehole			15'-0" to 16'-6" core recovery 70%.

SCALE: 1" = 5'-0" • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE