

62-F-263M

COUNTY RD. 21

GRAND RIVER

UNIVERSAL
GEOTECHNIQUE

LIMITED



STRUCTURE SITE No. 4-62

62-F-263M

REPORT

on



FOUNDATION INVESTIGATION

for

BRIDGE OVER GRAND RIVER

COUNTY ROAD 21

TOWNSHIP OF EAST LUTHER

COUNTY OF DUFFERIN

ONTARIO

Report N° T.506/62

100 University Avenue,
Toronto 1, Ontario.

REPORT

on

FOUNDATION INVESTIGATION

for

BRIDGE OVER GRAND RIVERCOUNTY ROAD 21TOWNSHIP OF EAST LUTHERCOUNTY OF DUFFERINONTARIOINTRODUCTION

The County Engineer of Dufferin, Mr. D. J. Corbett, is planning the replacement of a deteriorated bridge across the Grand River on County Road #21 in East Luther Township and requested Universal GEOTECHNIQUE Limited to carry out an investigation of the proposed site, and this Report contains the results of the subsurface exploration together with information relative to foundation design.

AVAILABLE INFORMATION

The Consulting Engineers for the project, McCormick & Rankin Limited of Port Credit, Ontario, showed on their drawing #B-1 the proposed location of the exploratory boreholes and drawing N°2 accompanying this Report has been reproduced therefrom and shows the actual positions of the boreholes as carried out on the site.

Two of the exploratory boreholes were located in the river but because of the relatively shallow depth of water, the use of floating craft was avoided. However, at the intended location of borehole BH.2 an excessive depth of water was encountered and the location of this borehole was accordingly moved some distance along the intended line of the pier.

The existing bridge is a 2-span structure whereas the new bridge will be a 3-span structure and an exploratory borehole has been carried out at each abutment and on the line of the river piers.

THE SITE

The site of the bridge is situated about 5 miles north of Highway 9 on County Road #21 which is a continuation of a short length of Highway 104, and is on lots 30 - 31, concession 6 in the Township of East Luther.

SUBSURFACE EXPLORATION

Subsurface exploration was carried out during the period 4th to the 9th of June, 1962 and comprised essentially 4 exploratory boreholes with 2 additional short drillholes terminated due to locations on substantially vertical fissures and joints in the bedrock.

The locations of the boreholes were staked and the ground surface elevations obtained by the Staff of GEOTECHNIQUE, all such elevations being related to the benchmark shown on the Consulting Engineers drawing and given as elevation 113.60.

Bedrock outcropped in the riverbed and was covered by a few feet of overburden consisting of sand and boulders on the riverbanks in the location of boreholes BH.1 & 4 on the intended line of the abutments to the new bridge.

Diamond core drilling was carried out in each borehole to a depth of approximately 10 feet and visual examination and classification of all rock cores was carried out in the laboratory. The descriptions of the strata obtained from the foregoing examination together with the results of core recovery are given on the borehole logs included with this Report.

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

GEOLOGICAL FEATURES

The site of the proposed bridge is situated in a region known as the Dundalk Till Plain. This region forms the watershed from which issues the headwater of the Grand River and at the site of the bridge the river flows in a shallow glacial spillway with bedrock outcropping in the riverbed. Immediately adjacent to the riverbanks the underlying bedrock is covered by a thin mantle of glacial material comprising essentially sand and boulders.

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:

OVERBURDEN

The overburden encountered in boreholes BH.1 & 4 located on the lines of the abutments to the proposed bridge consist essentially of sand containing boulders and covered by a small thickness of topsoil supporting vegetation.

BEDROCK

Beneath the overburden in boreholes BH.1 & 4 and outcropping in the riverbed at boreholes BH.2 & 3 is bedrock represented by the Guelph Formation. The rock encountered at the site is a grey dolomite in even beds from about 3" to 7" thick. The rock is described as fairly sound with minor small solution cavities in parts and a small amount of breccia limited to a few inches only at infrequent intervals.

GROUND WATER

The river level on the 9th of June, 1962 was at elevation 98.8.

DISCUSSION

The results of the subsurface exploration disclose that beneath a few feet of overburden on the river banks and outcropping in the bed of the river there exists bedrock consisting of the dolomite of the Guelph Formation. This bedrock in the vicinity of the site can be classified as fairly sound and will thus provide a satisfactory foundation for the proposed new bridge.

From visual observation at the site no particularly noticeable erosion of the bedrock to any depth has occurred and consequently no appreciable deepening of the riverbed due to this factor need be anticipated in the foreseeable future.

Normal spread footings may therefore be adopted with the underside of such footings at a minimum depth of 2' below the adjacent rock surface.

CONCLUSIONS

The results of the subsurface exploration and subsequent study indicate the following conclusions with respect to foundation design:

1. Bedrock is exposed in the river and is covered by only a few feet of overburden on the line of the proposed abutments to the new bridge. This bedrock consists of dolomite of the Guelph Formation and it exists in a fairly sound condition.
2. Normal spread footings can be adopted for the foundations to the river piers and the abutments and with the underside of such footings located at a minimum depth of 2' below the adjacent rock surface, the allowable bearing capacity can be taken as 10 tons/sq.ft.

Universal GEOTECHNIQUE Limited,

J. Owen Lake
J. Owen Lake,
President.

Report N° T.506/62

June, 1962.



Fig.1 VIEW OF RIVER VALLEY LOOKING EAST
FROM THE EXISTING BRIDGE.



Fig.1 VIEW OF RIVER VALLEY LOOKING EAST
FROM THE EXISTING BRIDGE.

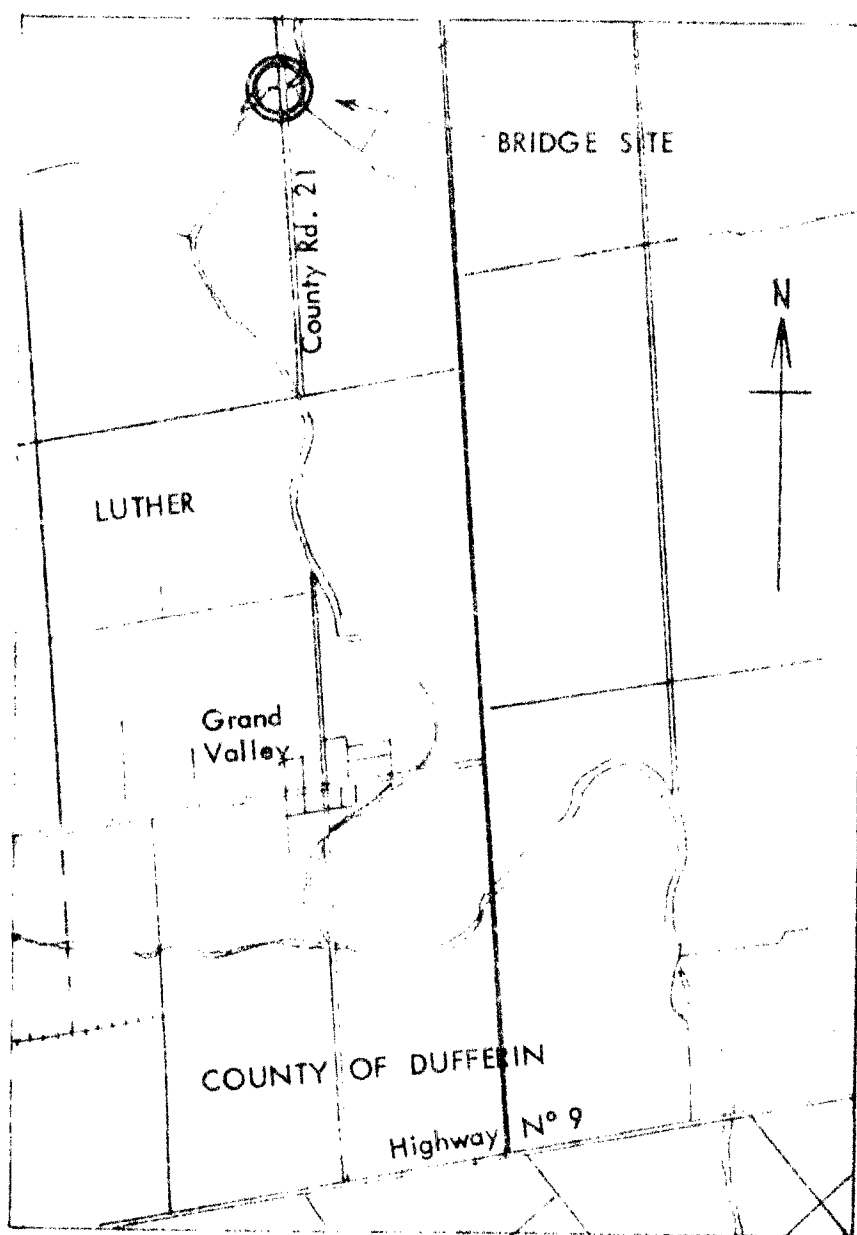


Fig.2 VIEW OF EXISTING BRIDGE FROM THE WEST.



Fig.2 VIEW OF EXISTING BRIDGE FROM THE WEST.





SCALE: 1: 50,000

PROJECT Bridge, County Rd.21, Dufferin County

TITLE Key Plan

DRG. NO 1 ORDER NO T.506/62

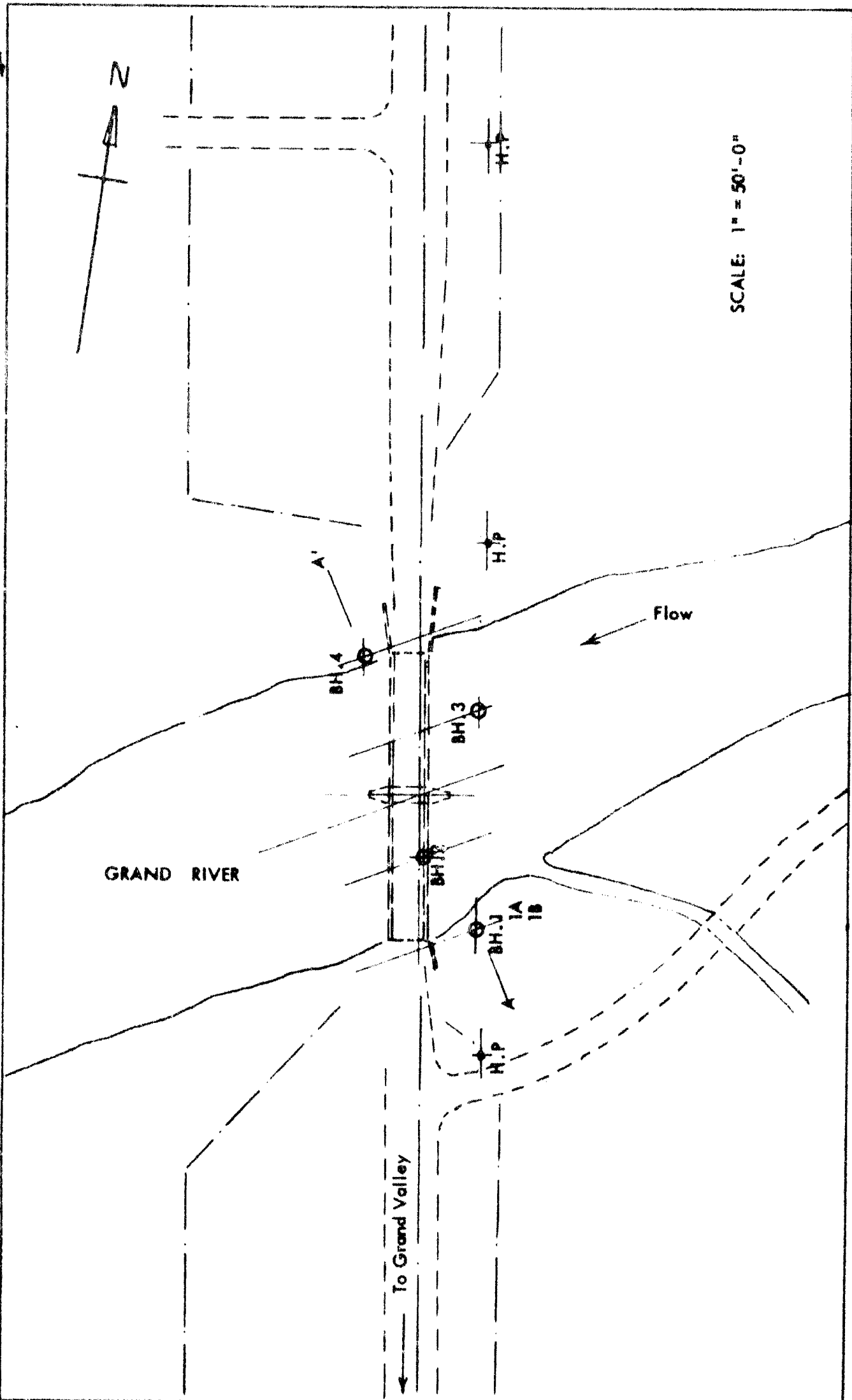


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Bench Mark 113.60



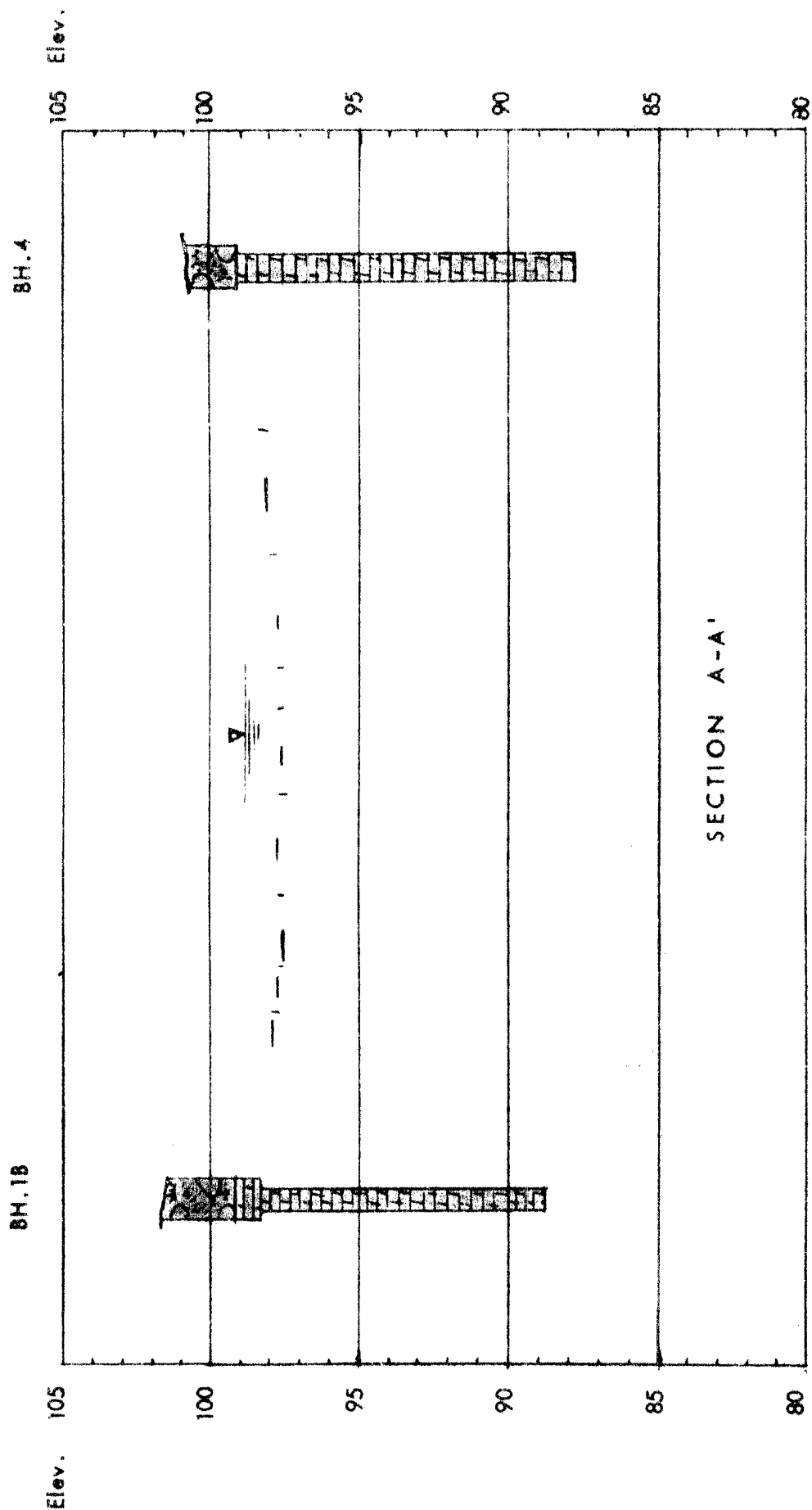
FORM G-1 REV.
UNIVERSAL GEOTECHNIQUE LTD.



PROJECT Bridge, County Rd. 21, County of Dufferin
TITLE Borehole Location Plan
DRG. NO. 2 ORDER NO. T.506/62



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LEGEND

 GLACIAL SANDS & BOULDERS

 BEDROCK (Guelph Dolomite)


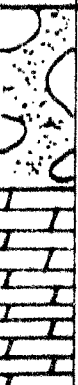
PROJECT Bridge, County Rd. 21, County of Dufferin
 TITLE Geological Section
 DRG. NO. 3 ORDER NO. T.506/62



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GEOTECHNIQUE
 LIMITED

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Bridge over Grand River, Dufferin County, Ontario. ORDER NO. I.506/62CLIENT County of Dufferin, Ontario.BOREHOLE NO. BH.1 & 1A DIAMETER BX & AXT CASING BXBOREHOLE LOCATION See Plan INCLINATION Vertical BEARING _____


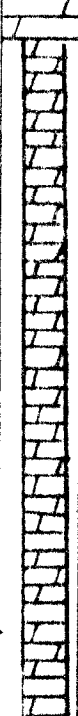

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
BH.1 Fairly sound grey dolomite with open joint nearly parallel with core; broken rock adjacent to bedding planes.	101.6 100 99.1			Zero 2'-5" 5'-0" End of Borehole			drilled AXT 2'-5" to 3'-8" core recovery 67% 3'-8" to 5'-0" core recovery 81% drilling terminated in vertical fissure.
BH.1A SAND & BOULDERS Fairly sound grey dolomite with joint intersecting core close to 4'-3".	101.6 100 99.1			Zero 2'-5" 4'-3" 5'-2" Borehole terminated in fissure			Drilled with BX casing 2'-5" to 4'-3" core recovery 87% 4'-3" to 5'-2" no recovery.

SCALE: 1" = 2'-6" • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Bridge over Grand River, Dufferin County, Ontario. ORDER NO. I.506/62CLIENT County of Dufferin, Ontario.BOREHOLE NO. BH. 1B DIAMETER BX & AXT CASING BXBOREHOLE LOCATION See Plan INCLINATION Vertical BEARING _____

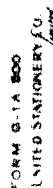
DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
SAND & BOULDERS Grey dolomite, generally crystalline and in about 3" to 8" horizontal beds; minor small solution cavities in parts; occasional few inches of broken core near some bedding planes and joints. Fairly sound bedrock but with minor solution cavities and occasional porous zones in broken rock. do do	101.6			Zero			
	100						
	99.1			2'-5"			Drilled BX casing
				3'-3"			2'-5" to 3'-3" core recovery 85%
							Drilled AXT 3'-3" to 4'-9" core recovery 80%.
							4'-9" to 5'-2" recovery 100%
							5'-2" to 9'-7" core recovery 67%
							9'-7" to 11'-2" core recovery 61%
	90			12'-8"			11'-2" to 12'-8" core recovery 88%
		End of Borehole					

SCALE: 1' = 2'-6" • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

BOREHOLE LOG

BOREHOLE LOCATION See Plan INCLINATION Vertical BEARING _____



■ UNDISTURBED SAMPLE

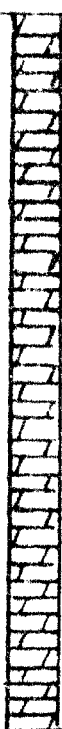
SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Bridge over Grand River, Dufferin County, Ontario.ORDER NO. T.506/62CLIENT County of Dufferin, Ontario.BOREHOLE NO. BH.3DIAMETER AXT

CASING

BOREHOLE LOCATION See PlanINCLINATION Vertical

BEARING

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
Grey dolomite in generally 3" to 5" horizontal beds; minor small solution cavities in parts. Generally sound bedrock with occasional broken core. do	98.2			Zero			Drilled AXT zero to 1' - 10-1/2" core recovery 92% 1'-10-1/2" to 3'-3-1/2" core recovery 92% 3'-3-1/2" to 4'-7" core recovery 55% 4'-7" to 7'-11" core recovery 100%
do	90			9'-9" End of Borehole			7'-11" to 9'-9" core recovery 75%

FORM G-1A BOC
UNIVERSAL STATIONERS LTD.

SCALE: 1" = 2'-6" • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Bridge over Grand River, Dufferin County, Ontario. ORDER NO. T.506/62CLIENT County of Dufferin, Ontario.BOREHOLE NO. BH.4 DIAMETER BX & AXT CASING BXBOREHOLE LOCATION See Plan INCLINATION Vertical BEARING _____FORM G-1A 800
UNITED STATES GEOLOGICAL SURVEY

DESCRIPTION OF STRATA	ELEVATION	LEGEND	SAMPLE	DEPTH	THICKNESS	N	REMARKS
SAND & BOULDERS	101.0			Zero			
	100						
	99.2			1'-10"			Drilled BX casing 1'-10" to 2'-7" core recovery 90% Drilled AXT 2'-7" to 4'-7" core recovery 94%
Grey dolomite in generally 3" to 5" horizontal beds; minor small solution cavities in parts and vertical fissure from 6'-3" to 8' - 10"							4'-7" to 8'-4" core recovery 100% Loss of drilling water at approximately 10'-0"
Generally sound bedrock.							
do							8'-4" to 9'-9-1/2" core recovery 100%
do	90						9'-9-1/2" to 10'-7" core recovery 100%
				12'-10"			10'-7" to 11'-10" core recovery 97%
				End of Borehole			11'-10" to 12'-10" core recovery 88%

SCALE: 1" = 2'-6" • DISTURBED SAMPLE

■ UNDISTURBED SAMPLE