

#58-F-312 m

SUBSURFACE

EXPLORATION
FOR

GREENSVILLE

ARCH

WENTWORTH

COUNTY

B.A. 2 337.

175-100-72

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REPORT

ON

SUBSURFACE EXPLORATION

for

GREENSVILLE ARCH

COUNTY OF WENTWORTH

ONTARIO

2924 Bloor Street West,
Toronto 18, Ontario.

REPORT

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COUNTY OF WENTWORTH

ONTARIO

INTRODUCTION

The County of Wentworth intend to replace the existing Greensville Arch Culvert and make some relocation of the County Road to designs being prepared by C. C. Parker & Associates Limited, Consulting Engineers of Hamilton, Ontario.

In order to obtain the necessary information to design the foundations for the new bridge Universal GEOTECHNIQUE Limited were requested by the Consulting Engineers to carry out subsurface exploration and this Report contains the results of this investigation.

THE SITE

The site of the existing culvert and the proposed bridge is located in a deep valley having the characteristics of a gorge. The two existing culverts at the present crossing have divided the waters of the creek into two channels thereby creating an island on the downstream side of the structure. The Southern channel carries the normal flow of the creek and only a limited amount of water was running in the Northern channel during the period of exploration.

The bottom of the valley is covered by soft alluvial deposits with gravel and fallen trees, etc. in evidence.

SUBSURFACE EXPLORATION

Subsurface exploration comprised a total of 7 exploratory boreholes carried out during the period 14th to the 31st of March, 1958. Boreholes BH. 1, 2, 4 and 5 were located in their originally designated positions but BH. 3, 6 and 8 were relocated by the Consulting Engineers in order to facilitate the exploration and likewise BH. 7 was cancelled.

Access to the site of the drilling operations was difficult and to avoid considerable expenditure of time in winching the drill into position and transporting all equipment from the road into the valley by hand, a mobile crane was used to lower the drilling rig from the road into the valley

and similarly this mobile crane was used to move the equipment across the river and also to transfer it to the other side of the bridge. Moving between boreholes on either side of the bridge and either side of the creek was effected by winching.

Soil samples were obtained wherever possible in the overburden and bedrock which was found to be a relatively short distance below the surface was proved by diamond core drilling.

The state of compaction and consistency of the overburden was determined during the operation of soil sampling by means of standard penetration tests. (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 inch diameter split barrel sampler 1 foot into the soil at the bottom of the borehole).

Details of the strata encountered in the boreholes together with the results of the standard penetration tests are given on the borehole logs which, together with borehole sections A-A' and B-B' and a location plan, form part of 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 profile should be associated directly with the geological conditions and inversely with the spacing of the boreholes.

GEOLOGICAL FEATURES

The deep valley now occupied by the creek is an erosional feature in the glacial strata to be observed on both banks. The Northern bank is much higher and steeper than the opposite bank and is probably following the original bedrock topography of the Niagara Scarp area.

Numerous large boulders in the vicinity of the present structure are quarried material which was left in the valley after construction of the existing arch.

Upstream of the arch the bottom of the valley exhibits a very narrow Flood Plain covered by alluvial clays and sands containing considerable organic matter.

A widening of the Flood Plain is to be observed downstream of the arch with the Southeastern bank showing a gentle grade towards the creek.

From the information obtained from the boreholes the material down to the explored depths can be classified as follows:

(a) ALLUVIAL DEPOSITS

The alluvial material can be separated into soft organic clays and sands with lenses of sands, gravels and boulders. These deposits are of recent origin and are liable to regrouping and movement during the next flood.

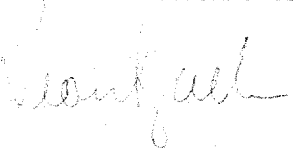
(b) TILL

A thin veneer of hard reddish-brown glacial sandy clay with gravel was encountered in borehole BH.4.

(c) BEDROCK

Bedrock is represented by a generally grey dolomite containing numerous dark layers of argillaceous and bituminous material: it exhibits occasional jointing and some horizons with small solution cavities but little weathering was observed and the rock is considered to be sound.

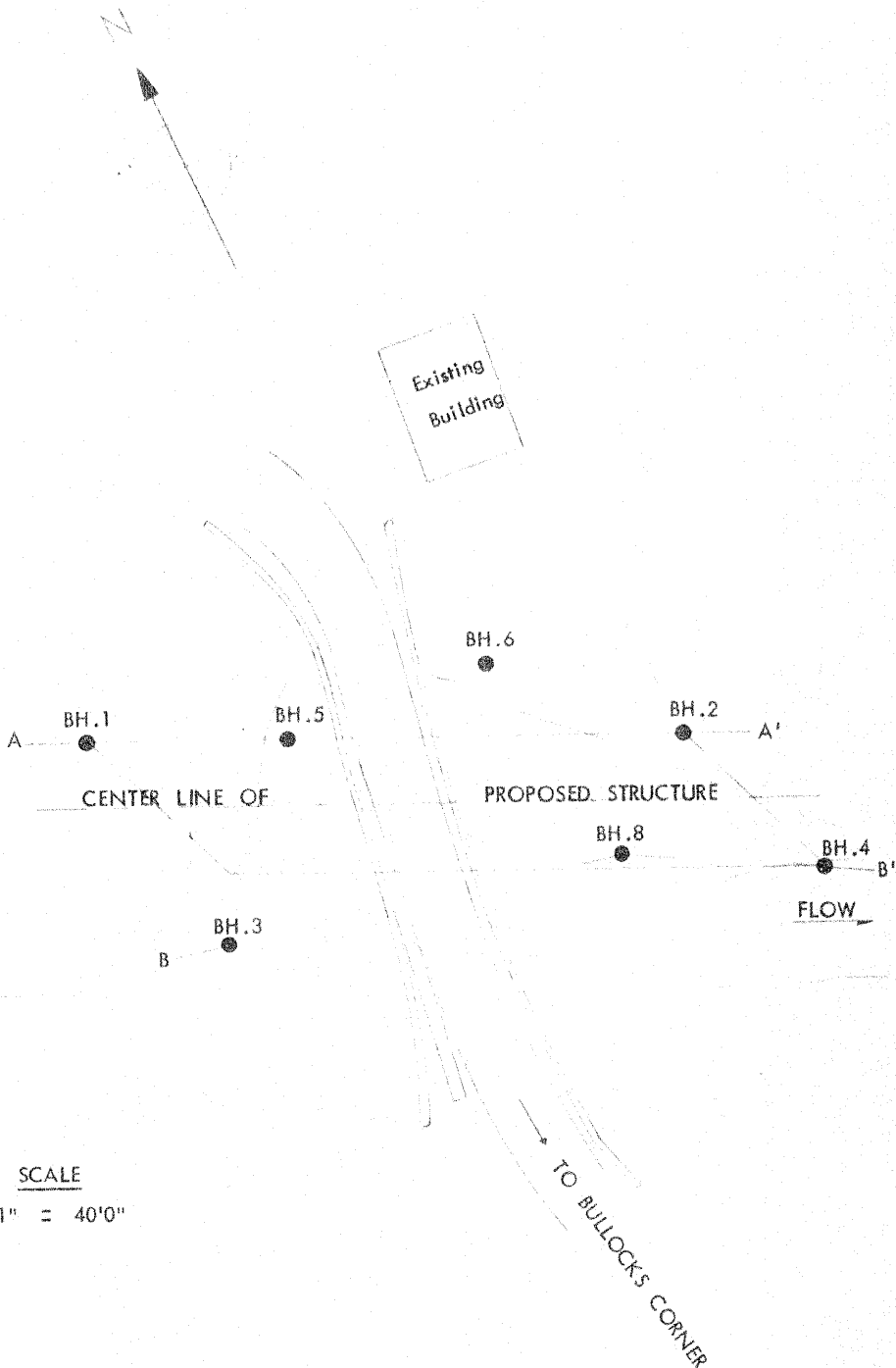
Universal GEOTECHNIQUE Limited,



L. Boskin, P. Eng.
Engineering Geologist.

Report N° T.300/58

April, 1958.



SCALE

1" = 40'0"

PROJECT Greensville Arch, County of Wentworth,

Ontario.

TITLE Borehole Location Plan

DRG NO. 1 ORDER NO. T.300/58



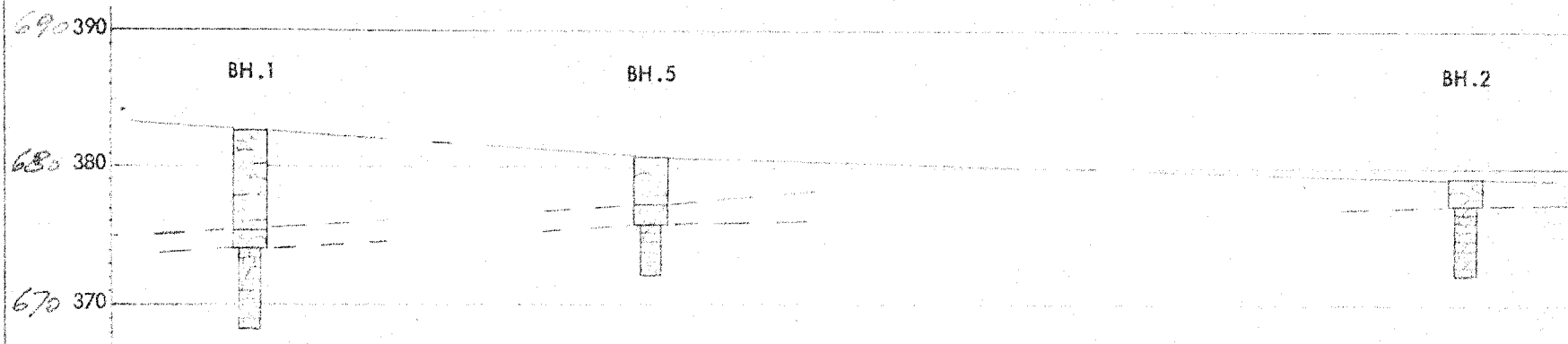
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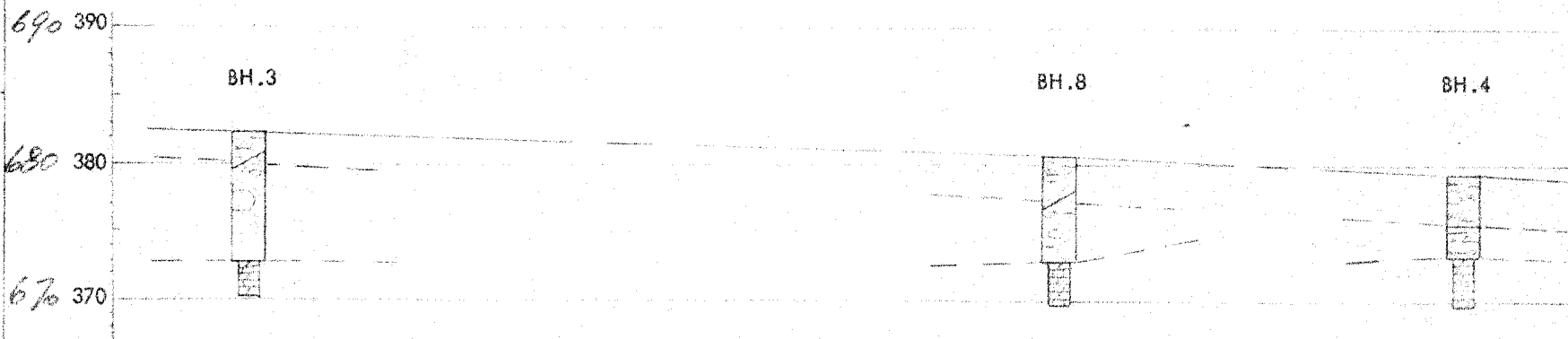
PROJECT Greenville Arch, County of Wentworth,
TITLE Borehole Section
DRG. NO. 2 ORDER NO. T.300/58



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SECTION A - A'



SECTION B - B'

LEGEND



ORGANIC CLAYS
& SANDS



SANDS, GRAVELS
& BOULDERS

Alluvial
Deposits



TILL



BEDROCK (Dolomite)

SCALE

Horizontal 1" = 20'0"

Vertical 1" = 10'0"

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Greensville Arch, County of Wentworth, Ontario. ORDER NO. T.300/58CLIENT C.C. Parker & Associates, Consulting Engineers, Hamilton, Ontario.BOREHOLE NO. BH. 1 & BH. 2 DIAMETER 2-1/2" CASING 2-1/2"BOREHOLE LOCATION See plan INCLINATION Vertical BEARING ---

DESCRIPTION OF STRATA	ELEVATION	LOG NO.	SAMPLE	DEPTH	REMARKS	REMARKS
BH.1						
Soft brown silty CLAY with organic matter and fine gravel.	682.87			Zero		
			• 1		2	Wet.
Soft brown to black organic CLAY.			• 2		3	Wet.
Sand, gravel, boulders and organic matter.				7'7"		
				8'8"		
Light grey to grey dolomite with joints perpendicular to 30° to core length and dark bituminous layers. Probably upper lockport formation. Sound rock.						8'8" to 14'6" core recovery 100%
				14'6"		
				End of Borehole		
BH.2						
Sand, gravel and boulders.	679.49			Zero	15	Wet.
Grey slightly weathered dolomite with dark bituminous layers.			• 1	2'0"		2'0" to 4'0" core recovery 96%
Light grey to grey dolomite with joints perpendicular to parallel to core length and dark bituminous layers. Horizons of small solution cavities. Probably upper lockport formation. Sound rock.				7'2"		4'0" to 7'2" core recovery 96%
				End of Borehole		

SCALE: 1" = 5'0"

• DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

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SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Greensville Arch, County of Wentworth, Ontario.

ORDER NO. T.300/58

CLIENT C.C. Parker & Associates, Consulting Engineers, Hamilton, Ontario.

BOREHOLE NO. BH. 3 & BH. 4

DIAMETER 2-1/2"

CASING 2-1/2"

BOREHOLE LOCATION ... See plan

INCLINATION Vertical

BLARING

DESCRIPTION OF STRATA	DEPTH (FEET)	SAMPLE	TEST	WATER	REMARKS
BH.3					
Firm brown sandy silty CLAY with organic matter.	682.21	1	Zero	9	Wet
Sand, gravel and boulders with organic matter					
Brown fine to coarse SAND.			5'10"		
Light grey to grey dolomite somewhat weathered with joints from 30° to 60° to core length. Some solution cavities. Probably upper lockport formation. Fairly sound rock.			9'7"		9'7" to 12'3" core recovery 90%
			12'3"		
			End of Borehole		
BH.4					
Soft brown clayey SAND with organic matter and gravel.	679.51	1	Zero	18	Wet.
Hard reddish brown sandy CLAY with fine to large gravel.			3'9"		High N due to gravel.
Light grey to grey dolomite with occasional horizontal joints and dark bituminous layers. Some horizons of small solution cavities. Probably upper lockport formation. Sound rock.			6'0"		6'0" to 6'8" core recovery 100%
			9'6"		6'8" to 9'6" core recovery 97%
			End of Borehole		

SCALE: 1" = 5'0" * DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

SOIL MECHANICS LABORATORY

BOREHOLE LOG

PROJECT Greensville Arch, County of Wentworth, Ontario.ORDER NO. T.300/58CLIENT C.C. Parker & Associates, Consulting Engineers, Hamilton, Ontario.BOREHOLE NO. BH. 5 & BH. 6DIAMETER 2-1/2"CASING 2-1/2"BOREHOLE LOCATION See planINCLINATION VerticalBEARING ---

DESCRIPTION OF STRATA	ELEVATION	TIME	DEPTH	TEMPERATURE	WET	REMARKS
BH. 5						
Brown to dark brown SAND with organic matter.	681.94		Zero			
		• 1			16	Wet
Sand, gravel and boulders.			3'8"			
			5'1"			
Light grey to grey dolomite with occasional jointing parallel to core length and some dark bituminous layers. Probably upper lockport formation. Sound rock			8'10"			5'1" to 8'10" core recovery 100%
			End of Borehole			
BH. 6						
Sand, gravel and boulders.	680.83		Zero			
			1'10"			1'10" to 3'6" core recovery 100%
Grey dolomite with extensive dark bituminous layers.						
Light grey to grey dolomite with some dark bituminous layers and occasional joints. Horizons of very small solution cavities. Probably upper lockport formation. Sound rock.			8'6"			3'6" to 8'6" core recovery 95%
			End of Borehole			

SCALE: 1" = 5'0"

• DISTURBED SAMPLE

■ UNDISTURBED SAMPLE

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SOIL MECHANICS LABORATORY

BOREHOLE LOGPROJECT Greenville Arch, County of Wentworth, Ontario.ORDER NO. T.300/58CLIENT C.C. Parker & Associates, Consulting Engineers, Hamilton, Ontario.BOREHOLE NO. BH. 8DIAMETER 2-1/2"CASING 2-1/2"BOREHOLE LOCATION See planINCLINATION VerticalBEARING ---

DESCRIPTION OF STRATA	ELEVATION	TESTED SAMPLE	DEPTH	THICKNESS	N	REMARKS
Firm reddish brown sandy CLAY with gravel.	680.64	• 1	Zero		22	Wet. High N due to gravel
Clay, sand, gravel and boulders.						
Light grey to grey dolomite with some jointing from 30° to parallel to core length. Dark bituminous layers and horizons of small solution cavities. Probably upper lockport formation. Sound rock.			7'9"			7'9" to 10'9" core recovery 95%
			10'9"			
			End of Borehole			

SCALE: 1" = 5'0" • DISTURBED SAMPLE
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