

DOCUMENT MICROFILMING IDENTIFICATION

G.I-30 SEPT. 1976

GEOCRES No. 40I16-17

DIST. 2 REGION SOUTHWESTERN

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. _____

HWY. No. _____

LOCATION PROP. CULVERT, NORFOLK CO.,
MIDDLETON TWP, CON 2 & 3, LOT 43

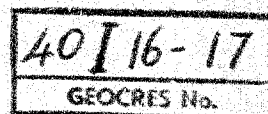
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: DOCUMENT TO BE UNFOLDED

BEFORE MICROFILMED

DOMINION SOIL INVESTIGATION LIMITED
CONSULTING SOIL & FOUNDATION ENGINEERS
104 CROCKFORD BLVD., SCARBOROUGH, ONT. (416) 751-4565 TELEX 02-21210 CABLES: DOMSOIL

CYRIL J. DEMEYERE LTD.
CONSULTING ENGINEERS
TILLSONBURG, ONTARIO



Report on
SOIL INVESTIGATION
for
PROPOSED PIPE CULVERT
LOT 43, CONCESSIONS 2 & 3
TOWNSHIP OF MIDDLETON.

by

DOMINION SOIL INVESTIGATION LIMITED
1220 Trafalgar Street,
LONDON 41, ONTARIO

Our Reference: 76-7-L1
July 16th, 1970.

Si

C O N T E N T S

	<u>PAGE</u>
I INTRODUCTION.....	I
II FIELD WORK.....	II
III SUBSURFACE CONDITIONS.....	III
IV GROUNDWATER CONDITIONS.....	IV
V DISCUSSION AND RECOMMENDATIONS.....	IV & V
APPENDIX 'A': The Standard Penetration Test	

E N C L O S U R E S

	<u>NO.</u>
LOCATION OF BOREHOLES & SUBSURFACE PROFILE...	1
BOREHOLE LOGS.....	2

S

I INTRODUCTION

In accordance with instructions from Cyril J. Demeyere Limited, Consulting Engineers, a soil investigation has been carried out in the Township of Middleton, where it is proposed to replace an existing bridge with a new structure.

The existing structure is located at Lot 43, Concessions 2 and 3 of the Township, where the road crosses a small creek. It is understood that the proposed structure is a pipe culvert, and that the new centre line will be about 30 feet south of the centre line of the existing structure.

The purpose of the investigation was to reveal the sub-surface conditions at the site, and to determine the relevant soil properties for the design and construction of the foundations.

II FIELD WORK

The field work, consisting of two boreholes and two dynamic cone penetration tests, was carried out on July 8 and 9, 1970, at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by washboring methods, and were lined with Bx size casing.

Standard penetration tests were performed at frequent intervals of depth, as detailed in Appendix 'A', and the results are recorded on the borehole logs as 'N' values.

The dynamic cone penetration tests were performed adjacent to the borehole locations to obtain an indication of soil density and strata changes with depth.

The field work was supervised by a soils engineer, who also determined the ground surface elevations. These were referred to the top of a steel post at the south east corner of the existing bridge, which was taken as El. 100 feet.



III SUBSURFACE CONDITIONS

Detailed descriptions of the strata which were encountered in each borehole are given on the borehole logs, comprising Enclosure 2, and a general picture of the soil stratigraphy is presented in the form of a Subsurface Profile on Enclosure 1. The following notes are intended only to amplify this data:-

Borehole 1 was put down in the field on the west side of the road and borehole 2 was located on the east shoulder of the road. Borehole 1 encountered a surface layer of topsoil and borehole 2 penetrated a 5 foot thick layer of sand and gravel fill which is associated with the construction of the approaches to the existing bridge. The natural subsoil consists of generally fine grained material ranging in gradation from silt to fine sand. A 1.5 foot thick layer of cohesive material was encountered in boreholes 1 and 2 at El. 86.6 and El. 83.8 respectively.

The relative density of the granular material ranges from 'compact' to 'very dense' as estimated from 'N' values ranging from 18 blows per foot to 100 blows for a 6-inch penetration of the sampler, and the consistency of the cohesive material based on visual and tactile examination is classified as 'firm' to 'stiff'.

IV GROUNDWATER CONDITIONS

The water level in borehole 1 reached equilibrium at El. 87.6 which was about the same level as the water in the adjacent creek. Insufficient time was available to observe the equilibrium water level in borehole 2.

V DISCUSSION AND RECOMMENDATIONS

The natural subsoil consists of generally 'compact' to 'very dense' fine grained granular deposits which are suitable for the support of a pipe culvert. The construction of a pipe culvert requires a shallow excavation in comparison to construction of the standard concrete type of culvert, therefore under the existing soil conditions this will greatly reduce the problems entailed with control of groundwater in the granular strata.

Pipe culverts are less susceptible to differential settlement, however it is recommended that the pipe be placed on a 12-inch thick mat of well-graded granular fill to provide a uniform support for the pipe. The granular fill should be compacted to at least 100% of the maximum standard Proctor dry density for the particular material used.

It is anticipated that seepage into the excavation will be controlled by pumping from sumps dug below the base of the excavation.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED



C.J.W. Atkinson
C.J.W. Atkinson, M.Sc., P.Eng.,
Branch Manager

CJWA/jmc

APPENDIX 'A'.

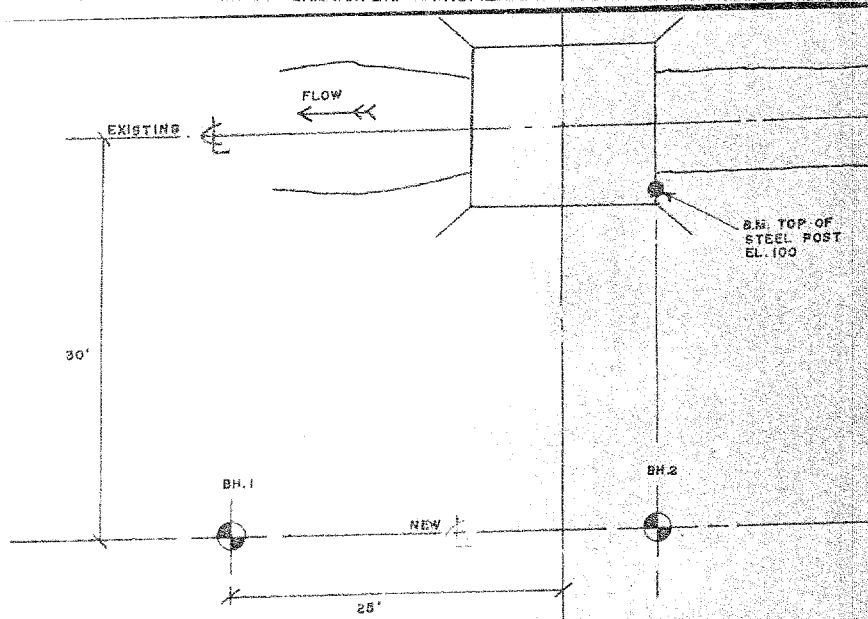
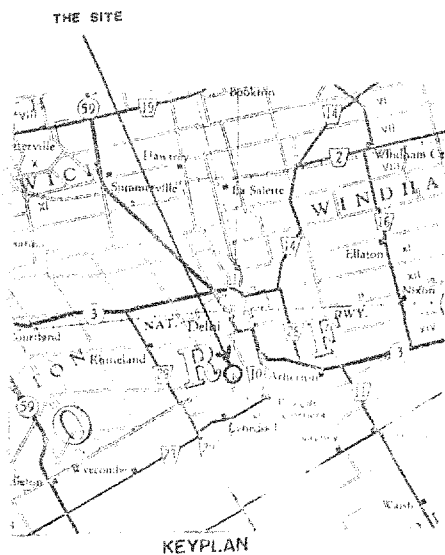
THE STANDARD PENETRATION TEST.

In order to determine the relative density of non-cohesive soils, such as sands and gravels, the standard penetration test has been adopted. The test also gives an indication of the consistency of cohesive soils.

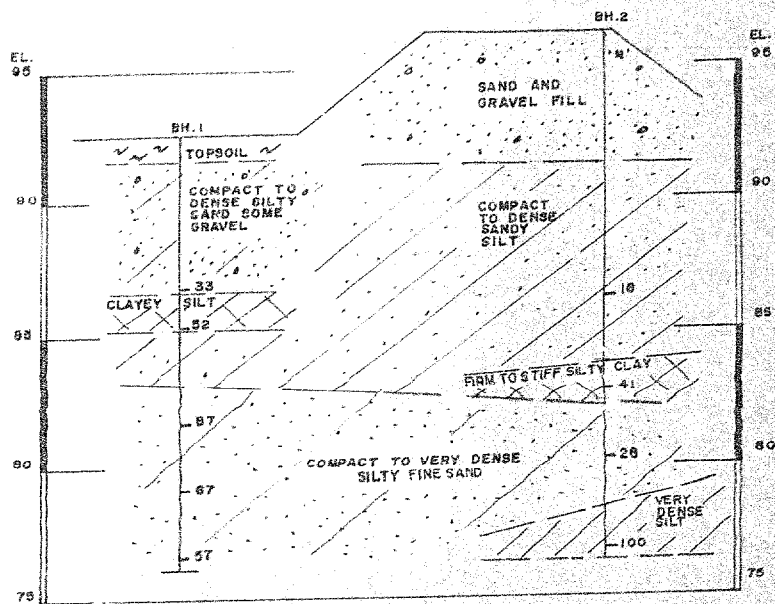
A two inch external diameter thick-walled sample tube is driven into the ground at the bottom of the borehole by means of a 140 lb. hammer falling freely through 30-ins. The tube is first driven an initial 6-inches to allow for the presence of disturbed material at the bottom of the borehole. The number of standard blows (N) required to drive the sampler a further 12-in. is recorded. The sample tube is one originally developed by Raymond Concrete Pile Company in the United States, where a sufficient number of tests have been made in conjunction with field investigations to show that the results, although essentially empirical, may be applied to foundation design.

For Sands:-

Values of 'N'.	Density.
Less than 10	Loose
Between 10 and 30	Compact
Between 30 and 50	Dense
Greater than 50	Very dense.



LOCATION OF BOREHOLES
SCALE 1" = 10'



SUBSURFACE PROFILE
VERT. SCALE 1" = 5'

