

67 - F - 249 M

BRIDGE # 32

LOT 19 , CONS. 11 / 12

LOBO TWP.



DOMINION SOIL INVESTIGATION LIMITED
CONSULTING SOIL & FOUNDATION ENGINEERS

BA. 2778
site 19-184

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CONSULTING ENGINEERS
LONDON ONTARIO

Report on
SOIL INVESTIGATION
for
BRIDGE NO. 32
LOT 19 CONCESSIONS 11&12
TOWNSHIP OF LOBO

67 F - 249M

by

DOMINION SOIL INVESTIGATION LIMITED
369 Queens Avenue
LONDON ONTARIO

Reference No. 7-11-L4
November 17th, 1967



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Location of Borehole and Subsurface Profile	1.
Borehole Log2.

1. INTRODUCTION.

Verbal authorization was received from A.M. Spriet and Associates, Consulting Engineers, to carry out a soil investigation in the Township of Lobo where it is proposed to replace an existing bridge with a new structure.

The existing 28 foot span steel beam structure is located on Lot 19, Concession 11 & 12 of the Township where the road crosses a small tributary of the Ausable River. It is understood that the proposed structure will have the same longitudinal and transverse centre lines as the existing bridge.

The purpose of the investigation was to reveal the subsurface conditions at the site and to determine the relevant soil properties for the design and construction of the new foundations.

11. FIELD WORK.

The field work, consisting of one borehole and two dynamic cone penetration tests was carried out on November 15, 1967, at the locations shown on Enclosure 1. The borehole was advanced to the sampling depths by washboring methods and was lined with Bx size casing.

Standard penetration tests were carried out 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 to compare relative

Si

properties of the soil at each location. The same source of energy was used to drive the cone as was used for the standard penetration test.

Elevations were referred to a nail in a hydro pole at the location indicated on Enclosure 1. The benchmark was given the assumed El.100 feet.

111. SUBSURFACE CONDITIONS.

Detailed descriptions of the strata encountered in the borehole are given on the borehole log, comprising Enclosure 2.

The borehole penetrated silty clay fill material which extends down to about the creek bed elevation. Below this level natural subsoil was encountered which consists of glacial silty clay. No sand or gravel size particles were encountered in the clay till.

The borehole was terminated in the till stratum at a depth of 12 feet below the creek bed.

The consistency of the clay is described as 'hard' as indicated by 'N' values ranging from 48 blows per foot to 100 blows for a 3-inch penetration of the sampler.

Atterberg Limit and moisture content tests were performed on one sample of the silty clay till as means of classification and as a guide to the probable behaviour of the soil. These gave values of Liquid Limit of 29%; Plastic Limit of 15% and Plasticity Index of 14, indicating that the soil is a clay of low plasticity and compressibility. The Liquidity Index which relates the natural moisture content to



the Atterberg Limits was 0.1. confirming the hard consistency obtained from visual and tactile examination.

1V GROUNDWATER CONDITIONS.

The groundwater in the borehole was observed at El.94.8, which was about 7-inches below the level in the adjacent creek.

V DISCUSSION AND RECOMMENDATIONS.

The natural subsoil consists of hard silty clay till which will be suitable for the support of normal spread footing foundations.

The bed of the creek extends down to El.92.9 therefore, allowing 4 feet of cover for frost protection, the footing grade will be established at about El.89. On the basis of the borehole results a maximum net soil pressure of 10,000 p.s.f. is appropriate for the design of footings at or below this level. Furthermore the footings will have a factor of safety of at least 3 against shear failure of the underlying soil.

It is estimated that total settlement of footings mobilizing the above soil pressure will not exceed 1-inch.

The adhesion between the footings and the clay till may be taken as 2000 p.s.f. and the factor of safety against horizontal sliding of the abutments should be at least 1.5.

The hard cohesive till will present no unusual construction problems. The volume of seepage into excavations will be very small and should

Si

be collected in sumps dug below the footing grade and removed by pumping.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED



C. J. W. Atkinson

C. J. W. Atkinson, M.Sc., P.Eng.,
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CJWA/jb

APPENDIX A

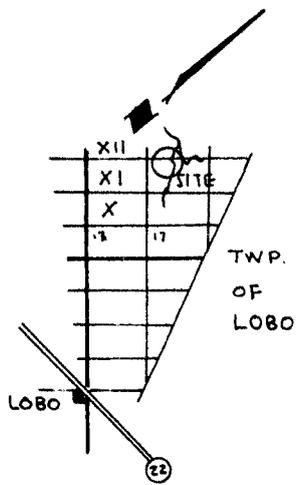
STANDARD PENETRATION TESTS

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.

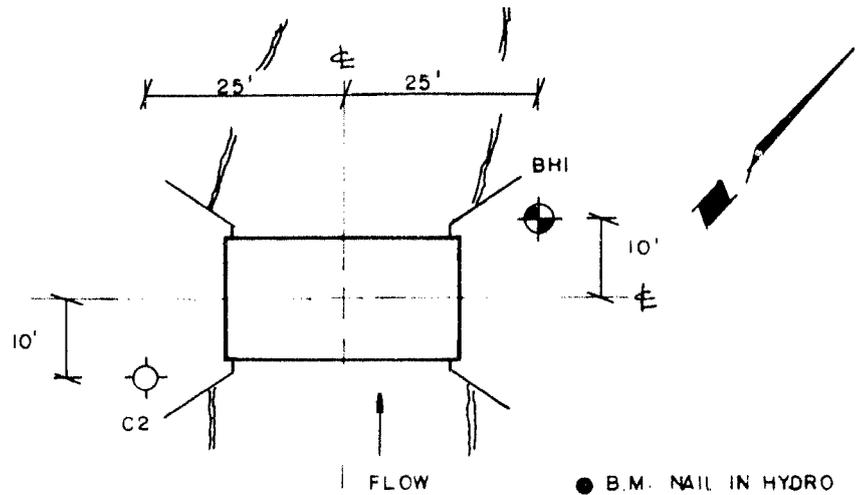
A two-inch external diameter thick-walled sample tube is driven into the ground at the bottom of the borehole by means of a 140 lb. hammer falling freely through 30 in. The tube is first driven an initial 6 in. to allow for the presence of disturbed material at the bottom of the borehole. The number of standard blows (N) required to drive the sampler a further 12 in. is recorded. The sample tube used is one originally developed by the 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



KEY PLAN



LOCATION OF BOREHOLE
SCALE 1" = 20'

● B.M. NAIL IN HYDRO
POLE ABOUT 30'E
AND 24'S OF THE
CENTRE OF EXISTING
BRIDGE EL. 100'

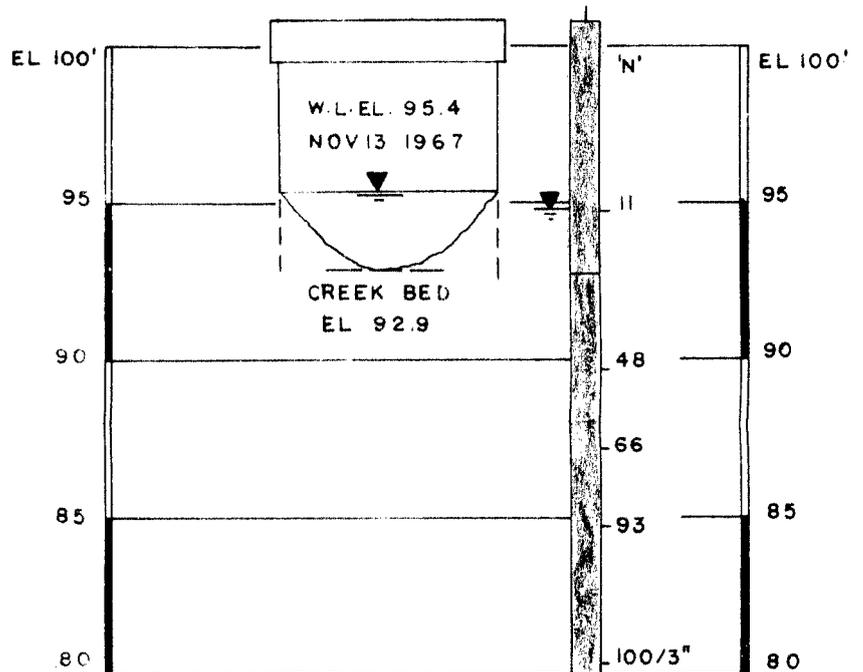
LEGEND



SILTY CLAY, FILL



HARD SILTY CLAY, TILL



SUBSURFACE PROFILE
VERT SCALE 1" = 5'

LOG OF BOREHOLE 1 AND CONES C1 & C2

Our Reference No 7-11-64

Enclosure No. 2

CLIENT: A M Sport & Assoc Ltd.
 PROJECT: Bridge No 32.
 LOCATION: Lot 19 Concessions 11312 Top of Lobo
 DATUM ELEVATION: 100 feet Nail in hydro pole.

DRILLING DATA

Method: Washboring
 Diameter: 8x (3-inch)
 Date: November 13, 1967

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS	
ELEVATION FT.	DEPTH FT.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	"N" Blows / Foot	20	40	60	80	100	PLASTIC LIMIT	NATURAL		LIQUID LIMIT
								UNDRAINED SHEAR STRENGTH (lbs/sq. ft.)					W _p	W		W _L
								+ FIELD VANE TEST • COMPRESSION TEST								
100.8.00		Ground Surface														
		SILTY CLAY (FILL)	X	▲	1	SS 11										
95	80															
		HARD SILTY CLAY (GLACIAL TILL)	T		2	SS 48										
90		brown area			3	SS 66										
85					4	SS 93										
80	20.8				5	SS 100/3										
100.9.00		Ground Surface														
		(FILL)														
95																
90																
85																
80																

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE:

CHECKED: