

#66-F-269M

SPORTSMAN'S

BRIDGE, LOT 1.

CONC. 283

NORTH DORCHESTER

TWP.

D O M I N I O N S O I L I N V E S T I G A T I O N L I M I T E D

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London
October 13, 1966

Report
6-9-L7

A. M. Spriet & Associates Ltd.,
264 Wellington Street,
LONDON, Ontario.

Gentlemen:

66-F-269M

Soil Investigation for
Sportsman's Bridge, Lot 1,
Concessions 2 & 3,
Township of North Dorchester

REPORT

We have completed this project in accordance with your verbal authorization of September 21, 1966. This report contains a record of our findings and presents our recommendations for the foundation design of the proposed structure.

FIELD WORK

The field work, consisting of one borehole was carried out on September 26, 1966, at the location shown on Enclosure 2.

Standard Penetration Tests using a 2 inch outside diameter split-spoon sampler were performed at frequent intervals of depth, using a driving force of a 140 lb. hammer falling freely through 30 inches. 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 required to drive the sampler a further 12 inches was recorded as the standard penetration resistance (or 'N' value). This test determines the relative density of granular strata and gives an indication of the consistency of cohesive strata. It also enables samples to be obtained for classification purposes.

The results of the field tests are presented on the Geotechnical Data Sheet, Enclosure 3. Elevations were referred to a spike in a telephone pole at Sta. 1+10W which was given the arbitrary value, El. 100 feet.

SUBSURFACE CONDITIONS

The borehole penetrated the existing road embankment fill which consists of an 8 foot thick layer of gravelly sand. Natural subsoil consisting of glacial sandy silty clay containing a trace of gravel was encountered at El. 92⁺ and the borehole was terminated in this stratum at El. 74.

Cont'd over....

The consistency of the clay till is described as 'hard' as indicated by 'N' values ranging from 70 to 124 blows per foot. Atterberg Limit tests carried out on a sample of the clay till gave a Liquid Limit value of 18%; Plastic Limit of 9% and Plasticity Index of 9, indicating that the soil is a clay of low plasticity and compressibility. The Liquidity Index which relates the natural moisture content of the soil to the Atterberg Limits was -0.3 confirming the 'hard' consistency obtained from visual and tactile examination.

The water level observed in the borehole was at El. 92.6 feet, while the water level in the adjacent creek was at El. 89.2 feet.

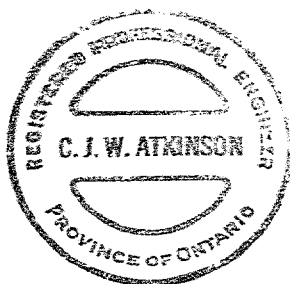
DISCUSSION

The bed of the creek extends to El. 88.9 therefore allowing 4 feet of cover for frost protection, it is recommended that footings should bear at or below El. 84.9. The footing depth should be decided after a hydrological study has been made to determine the maximum depth of scour. This level lies within the stratum of hard clay till and on the basis of the borehole results a maximum net soil pressure of 10,000 pounds per square foot is appropriate for the design of footings. 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 1/2 inch.

The hard cohesive soil will present no unusual construction problems. The volume of seepage into excavations will probably be small and should 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.,
Branch Manager

CJWA:jms

Enclosures

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND GROUND WATER CONDITIONS.

BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY	ORGANICS	BEDROCK	GROUND WATER LEVEL	DEPTH OF CAVE-IN
		COARSE	FINE	COARSE	MEDIUM	FINE						
Ø > 8"		3"	3/4"	4.75mm	2.0	0.42	0.074	0.002	>	NO SIZE LIMIT		
U.S. Standard Sieve Size :				No.4	No.10	No.40	No.200					

SAMPLE TYPES.

AS Auger sample

CS Sample from casing

ChS Chunk sample

RC Rock core

% Recovery

SS Split spoon sample

TP Piston, thin walled tube sample

TW Open, thin walled tube sample

WS Wash sample

SAMPLER ADVANCED BY static weight : w

" pressure : p

" tapping : t

OBSERVATIONS

MADE WHILE

CORING

Steady pressure

No pressure

Intermittent pressure

Washwater returns

Washwater lost

PENETRATION RESISTANCES.

DYNAMIC PENETRATION RESISTANCE : to drive a 2" ϕ , 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

SYMBOL :



STANDARD PENETRATION RESISTANCE, -N- : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.



EXTRAPOLATED -N- VALUE

322

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

SOIL PROPERTIES.

W % Water content

LL % Liquid limit

PL % Plastic limit

PI % Plasticity index

LI Liquidity index

 γ

Natural bulk density (unit weight)

e

Void ratio

RD

Relative density

C_v

Coeff. of consolidation

m_v

Coeff. of volume compressibility

k

Coeff. of permeability

C

Shear strength

 ϕ

Angle of int. friction

C'

Cohesion

 ϕ'

Angle of int. friction

UNDRAINED SHEAR STRENGTH.

- DERIVED FROM -

TRIAXIAL

UNCONFINED

LABORATORY

FIELD

COMPRESSION TEST

VANE TEST

POCKET PENETROMETER TEST



Strain at failure is represented by direction of stem

20%
15% + 5%
10%

St : sensitivity = $\frac{\text{shear strength in undisturbed state}}{\text{shear strength in remoulded state}}$

SOIL DESCRIPTION.

COHESIONLESS SOILS :

RD :

COHESIVE SOILS :

C lbs/sq.ft.

Very loose

0 - 15 %

Loose

15 - 35 %

Compact

35 - 65 %

Dense

65 - 85 %

Very dense

85 - 100 %

Very soft

less than 250

Soft

250 - 500

Firm

500 - 1000

Stiff

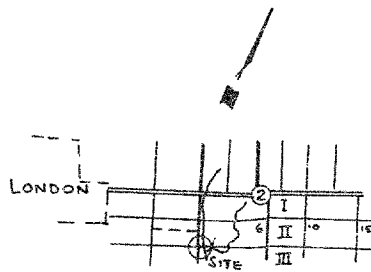
1000 - 2000

Very stiff

2000 - 4000

Hard

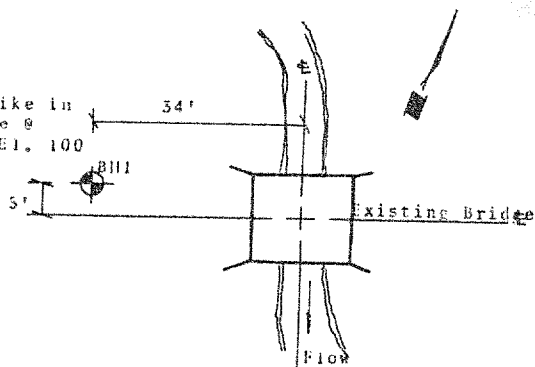
over 4000



KEYPLAN

TWO
OF
N. DORCHESTER

B.M. Spike in
Tel. Pole @
1+10W. E1. 100
feet.



LOCATIONS OF BOREHOLES

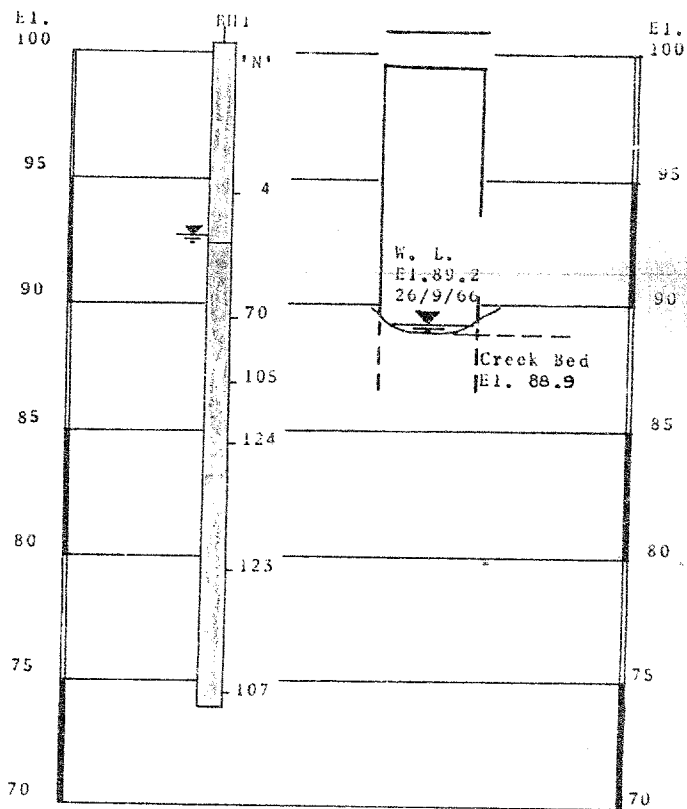
Scale 1-inch to 20 feet

LEGEND

Very loose
Sandy Fill



Hard
Sandy Silty Clay,
Till.



SUBSURFACE PROFILE

Vert. Scale 1-inch to 5 feet

OUR REFERENCE NO 6-9-L7

GEOTECHNICAL DATA SHEET FOR BOREHOLE . . . 1 . . .

CLIENT: A.M. Spry & Associates

METHOD OF BORING Washboring

ENCLOSURE NO 3

PROJECT: Proposed Bridge

DIAMETER OF BOREHOLE 8x (3-inch)

LOCATION Lot 1, Conc. 2 & 3, Twp. of N. Dorchester

DATE September 26, 1966

DATUM ELEVATION: El. 100 feet (See Enclosure 2)

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	IN- or Advance- ment of Sampler	20	40	60	80	100	PI	W	LI		
100.3	0.0	Ground Surface														
		Very loose														
		Brown														
95		sandy gravelly		1	SS	4										
	8.0	Fill.														
90		Hard Sandy		2	SS	70										
		silty brown		3	SS	105										
85		clay, grey		4	SS	124										
		traces														
80		of		5	SS	123										
		gravel.														
75		(Glacial Till)		6	SS	107										
26.5		End of Borehole														
70																

W. L.
El. 92.6
September
27, 1966.