

G.I.-30 SEPT. 1975

GEOCRES No. 40P15-25DIST. 3 REGION southwestern

W.P. No. \_\_\_\_\_

CONT. No. \_\_\_\_\_

W. O. No. \_\_\_\_\_

STR. SITE No. 35-55

HWY. No. \_\_\_\_\_

LOCATION SINCLAIR BRIDGELOT 14  $\frac{1}{2}$  15 CON. 12 ARTHUR/MINTOTWP.

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. \_\_\_\_\_

REMARKS: DOCUMENTS TO BE UNFOLDEDBEFORE MICROFILM

**B.A. 1774**

**DOMINION SOIL INVESTIGATION LIMITED**  
77 CROCKFORD BOULEVARD SCARBOROUGH, ONTARIO TELEPHONE 421-2567

BRANCH  
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LONDON, ONTARIO  
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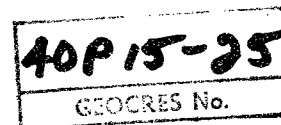


FOUNDATION ENGINEERS

P.O. BOX 933  
SAULT STE. MARIE  
ONTARIO  
TELEPHONE AL. 4-2618

Scarborough, Ontario,  
February 13th, 1964.

Mr. V. R. Astrop, P.Eng.,  
Consulting Engineer,  
4 Hughson St. South,  
Hamilton, Ontario.



Re: Sinclair Bridge in  
Minto Township  
Our Ref: 4-1-3

R E P O R T

Dear Sir:

The soil investigation for the above project was completed in accordance with your letter of authorization of January 17th, 1964. This report presents our findings and recommendations:

FIELD WORK

The borings were made on January 30th and 31st, 1964 with a skid-mounted washboring rig. The diameter of the boreholes was that of the Bx casing (2 7/8 in.) which was driven to the required sampling depths with a 300 lb. hammer and cleaned out by washing. Samples were taken at frequent intervals of depth with a 2 in. O.D. split spoon rammed into the subsoil with a constant energy (see encl. #1 - "Standard Penetration Resistance") and the dynamic cone penetration test performed adjacent to borehole #1 provided a continuous record of subsoil density

The locations of the boreholes were as close to those indicated on the site plan supplied to us as practicable under the prevailing field conditions.

The elevations of the boreholes were referred to a spike (= el.100.0) in a hydro pole about 100 ft. north of the bridge on the west side of the road.

#### SUBSURFACE CONDITIONS

Fill and loamy clay extending to elevation 90 ft. were found in both boreholes. The material is in a firm consistency and contains various amounts of organics.

FILL AND  
LOAMY CLAY

Sandy-gravelly till of buff colour was encountered between elevations 90 and 82 ft. The gravel is sharp, angular with sand and occasionally slightly plastic silt filling the voids. The parent material is limestone which was fragmented by the ice; therefore we could call the stratum a "crushed limestone till". It is in a compact to dense state and a sieve analysis was performed to obtain an idea as to the permeability of the deposit. The grain size distribution curve is presented on enclosure #4.

SANDY  
GRAVELLY  
TILL

Fragmented and decomposed shale was found between elevations 82 and 80 ft. The material is the weathered upper portion of the shale bedrock which started to disintegrate under the influence of various physical and chemical forces. Naturally, the deposit is still quite suitable as a foundation material - (note the very high standard penetration resistances!).

SHATTERED  
SHALE

The bedrock was explored in borehole #1 only. It is a grey, limey shale in a sound condition.

SHALE  
BEDROCK

The ground water level corresponded to that in the creek and at the time of the field work it was at around elevation 89 ft.

GROUND  
WATER

#### RECOMMENDATIONS

It is understood that an arch-type structure will be designed at the site and that the highest allowable foundation level is at around elevation 81 ft. The substrata at this elevation consist of the shattered shale which can safely support 10,000 psf without measurable settlements. The coefficient of friction between the underside of the concrete footing and the

DESIGN

shattered shale is 0.35 which will enable the designer to compute the horizontal resistance against sliding.

DESIGN  
(CONT'D)

It is obvious that most of the excavation will be under the ground water level. Therefore the dewatering of the pit should be carefully planned in advance. The water in the creek should be diverted in temporary culverts during the field work. (This measure would prevent the water from entering the excavation from above and cut off the supply through the creekbed).

CONSTRUCTION

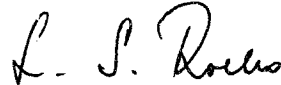
In the excavation proper, there will be water seepage through the gravelly-sandy till walls whose permeability will increase with time because as the silt and sand particles are washed out, the passages in the remaining gravel-skeleton will become larger and allow a freer flow of water. On the other hand, the amount of water entering the pit through the shattered shale is negligibly small and all seepage waters can be collected in temporary sumps cut into the proposed footing grade and removed by pumping because the proposed subgrade will not be loosened up by the seepage forces.

Finally, as soon as the proposed footing grade has been reached, a lean concrete blanket should be provided thereon to ascertain a smooth and clean working area and to prevent the drying out of the shattered shale.

We trust that the foregoing will meet with your requirements but should you have any further questions in this regard, please do not hesitate to contact us.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,



L.S. Rolko, P.Eng., A.M. ASCE.

LSR/oed

Encls.



REFERENCES

- (1) Procedures for Testing Soils, ASTM, April 1958, pp 186 to 198. (Unified Soil Classification System - by A. A. Wagner).
- (2) Terzaghi and Peck: Soil Mechanics in Engineering Practice. John Wiley and Sons, New York, 1948.
- (3) Principles of Engineering Geology and Geotechnics by D. P. Krynine and W. R. Judd. McGraw Hill Book Co. 1957.

E n c l o s u r e s

# 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
Ø > 8"	3"	3/4"	4.76mm	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	RC Rock core	TP Piston, thin walled tube sample
CS Sample from casing	% Recovery	TW Open, thin walled tube sample
ChS Chunk sample	SS Split spoon sample	WS Wash sample

SAMPLER ADVANCED BY	static weight : w	OBSERVATIONS	Steady pressure	Washwater returns Washwater lost
"	pressure : p	MADE WHILE CORING	No pressure	
"	tapping : t		Intermittent pressure	

## PENETRATION RESISTANCES.

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

**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

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

SYMBOL :



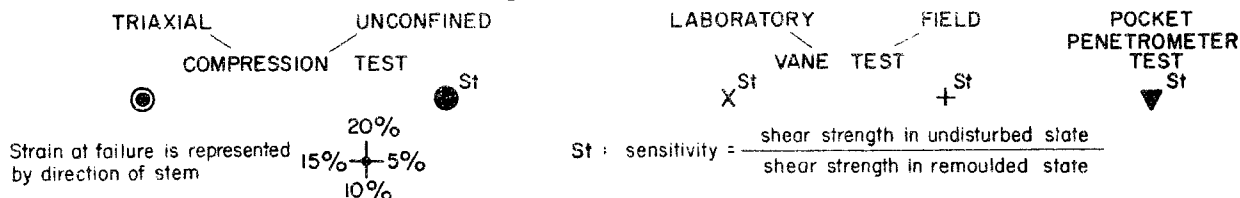
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## SOIL PROPERTIES.

W % Water content	$\gamma^s$ Natural bulk density (unit weight)	k Coeff. of permeability
LL % Liquid limit	e Void ratio	C Shear strength in terms of total stress
PL % Plastic limit	RD Relative density	$\phi$ Angle of int. friction
PI % Plasticity index	C <sub>v</sub> Coeff. of consolidation	C* Cohesion in terms of effective stress
LI Liquidity index	m <sub>v</sub> Coeff. of volume compressibility	$\phi'$ Angle of int. friction

## UNDRAINED SHEAR STRENGTH.

— DERIVED FROM —



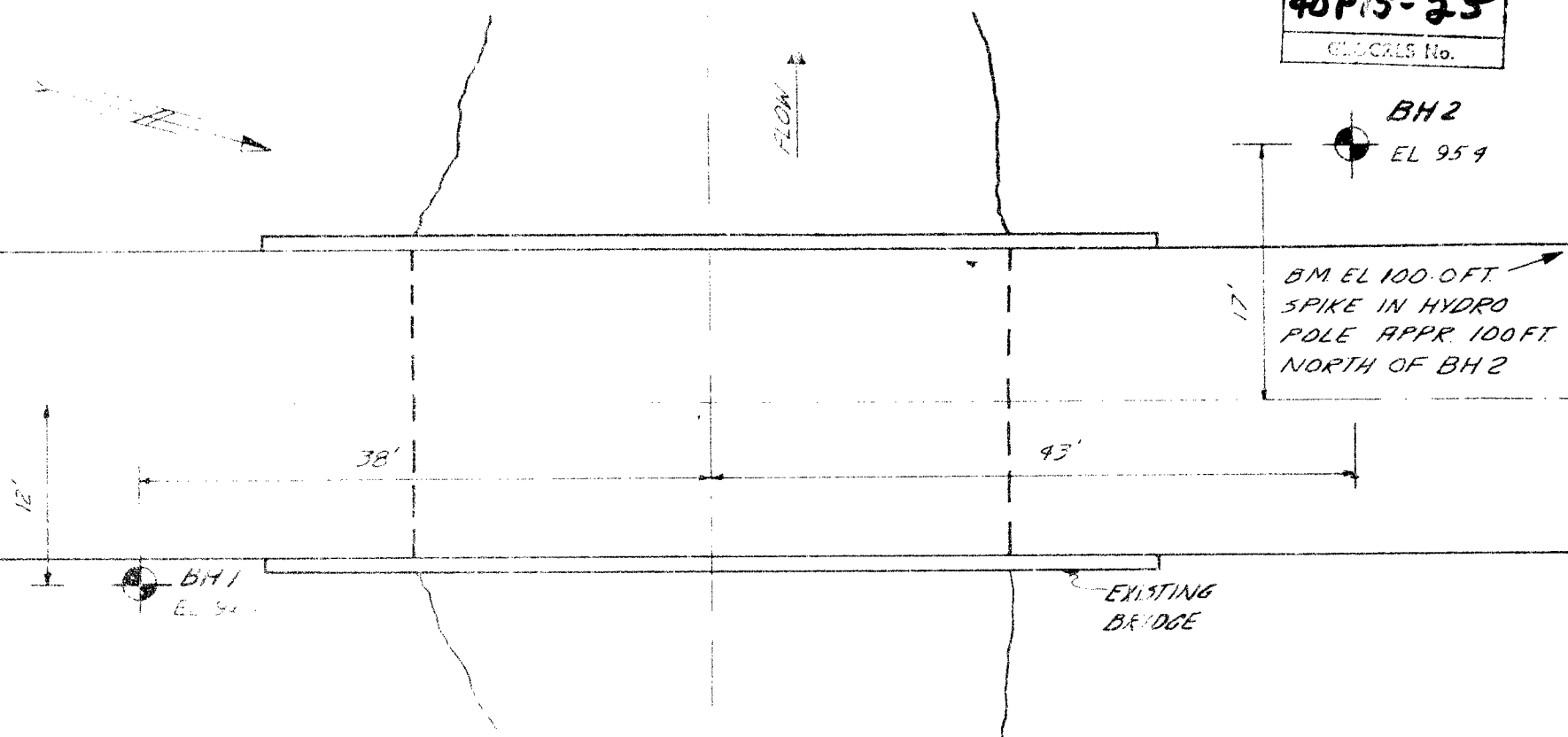
## SOIL DESCRIPTION.

COHESIONLESS SOILS :	RD :	COHESIVE SOILS :	C lbs/sq.ft.
Very loose	0 - 15 %	Very soft	less than 250
Loose	15 - 35 %	Soft	250 - 500
Compact	35 - 65 %	Firm	500 - 1000
Dense	65 - 85 %	Stiff	1000 - 2000
Very dense	85 - 100 %	Very stiff	2000 - 4000
		Hard	over 4000

40P15-25  
ENCLOSURE No.

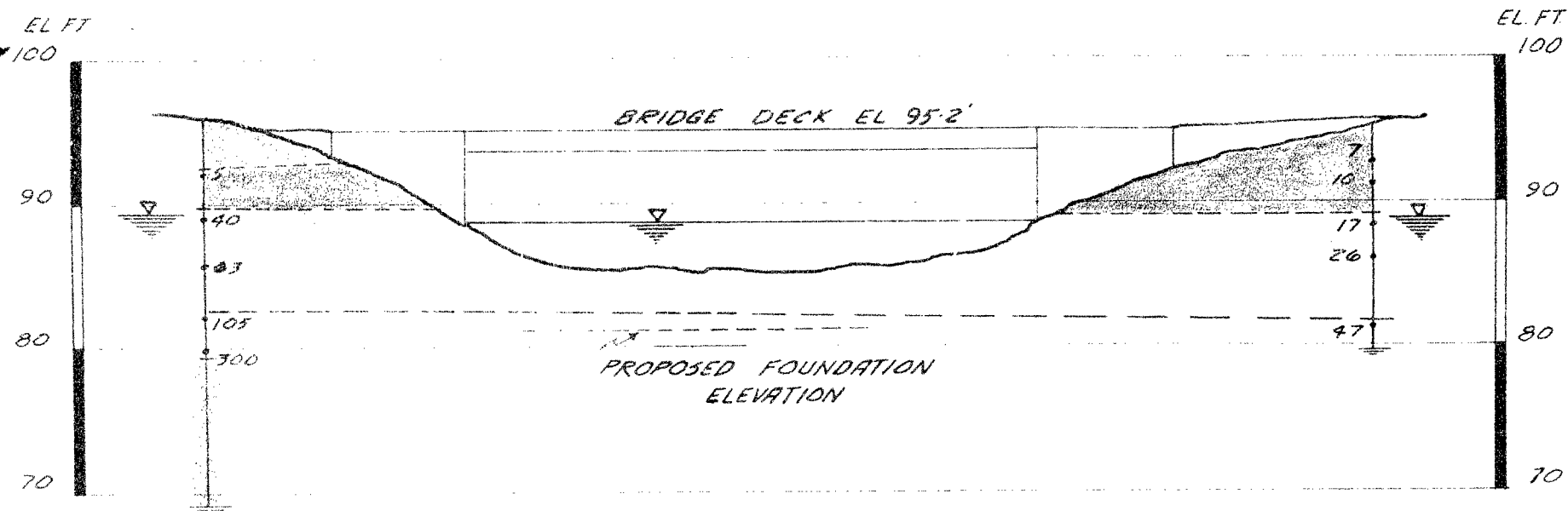
BH2  
EL 95.4

BM EL 100.0 FT.  
SPIKE IN HYDRO  
POLE APPR. 100 FT.  
NORTH OF BH2



# LOCATION OF BOREHOLES

SCALE 1" TO 10'



# SUBSURFACE PROFILE

VERT. SCALE: 1" TO 10'

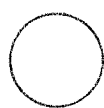
## LEGEND



FILL



LOAMY  
CLAY



SANDY GRAVEL  
WITH SILT



SHATTERED  
SHALE



SHALE  
BEDROCK

• STANDARD  
PENETRATION  
RESISTANCES



**GEOCRES No.**

MR V.P. ASTROF CONSULTING ENGINEER WASHBORO  
SINCLAIR BRIDGE 278"  
WELLINGTON COUNTY, ONT. BH1 JAN. 30, 1969  
SPIKE IN HYDRO POLE: EL 100.0 FT BH2 JAN. 31, 1969.

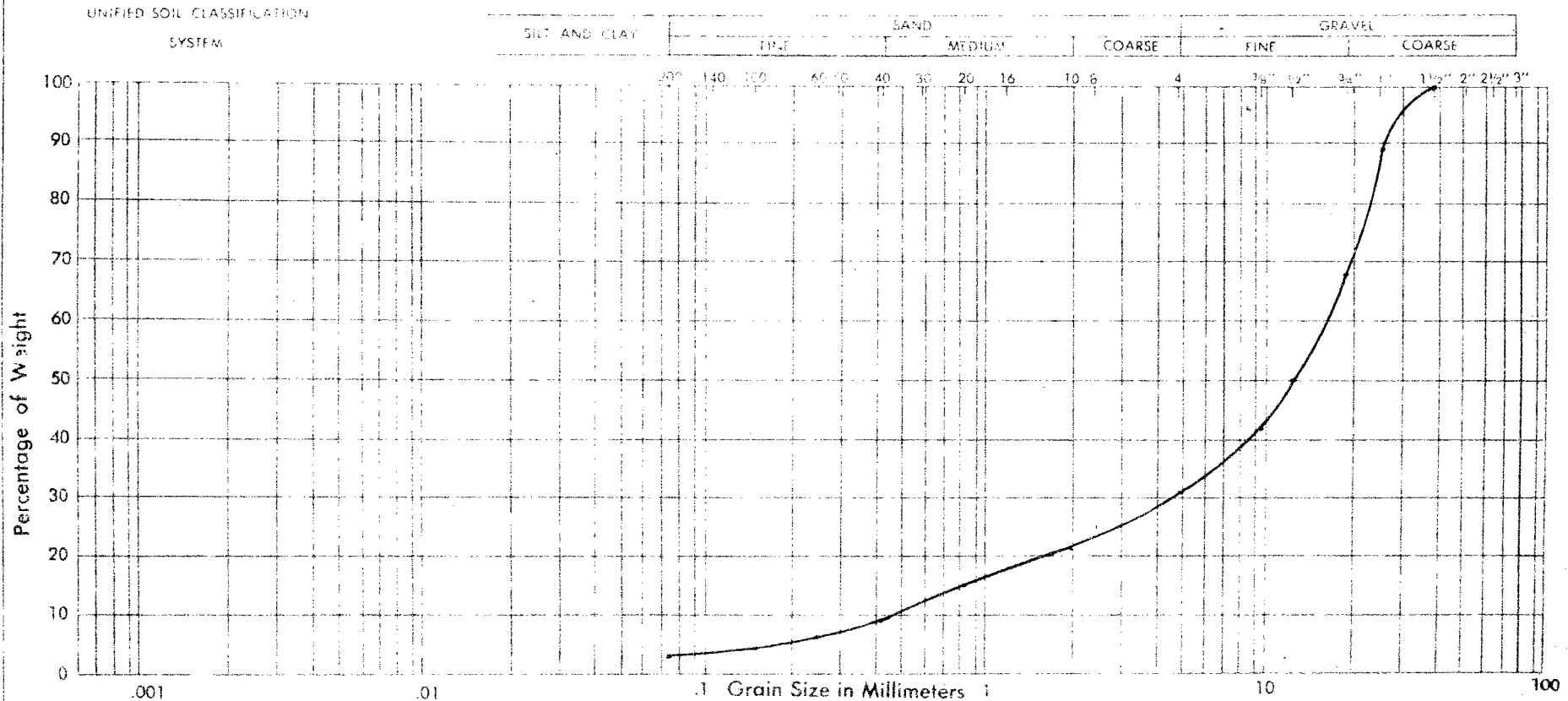
1911年12月3日



# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. **4-1-3**



PROJECT: **SINCLAIR BRIDGE**  
 LOCATION: **WELLINGTON COUNTY, ONT.**  
 BOREHOLE NO.: **1**  
 SAMPLE NO.: **4**  
 DEPTH OF SAMPLE: **10.7 FT.**  
 ELEVATION OF SAMPLE: **85.9 FT.**

COEFFICIENT OF UNIFORMITY: **4.5**  
 COEFFICIENT OF CURVATURE: **2.8**

Classification of Sample and Group Symbol:  
**SANDY GRAVEL**

**GW-65**

PLASTIC PROPERTIES

LIQUID LIMIT	%	LL
PLASTIC LIMIT	%	PL
PLASTICITY INDEX	%	PI
MOISTURE CONTENT	%	MC
ACTIVITY		

Enclosure No. 4