

* 64-F-278m

SCHAUM BRIDGE

@ CAMERON SIDE

ROAD CON. XII

LONDON

Twp.

BA 1939

STRUCTURE SITE No. 19-141

REPORT

TO

R. C. DUNN AND ASSOCIATES LTD.

ON

SITE INVESTIGATION

SCHAUM BRIDGE, CAMERON SIDE ROAD

CONCESSION XII, LONDON TOWNSHIP

MIDDLESEX COUNTY, ONTARIO

64-F-278M

Distribution:

6 copies - R. C. Dunn and Associates Ltd.,
London, Ontario

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September, 1964

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GOLDER & ASSOCIATES

H. Q. GOLDER & ASSOCIATES LTD.

CONSULTING CIVIL ENGINEERS

H. Q. GOLDER
V. MILLIGAN
L. G. SODERMAN

2444 BLOOR STREET WEST
TORONTO 9, ONTARIO
767-9201
763-4103

September 23, 1964

R. C. Dunn and Associates Ltd.,
Consulting Engineers,
747 Hyde Park Side Road,
London, Ontario.

Attention: Mr. N. Warner, P. Eng.

RE: SITE INVESTIGATION
SCHAUM BRIDGE, CAMERON SIDE ROAD
CONCESSION XII, LONDON TOWNSHIP
MIDDLESEX COUNTY

Dear Sirs:

In accordance with your authorization we have carried out two sampled boreholes at the above proposed structure location. Details of the soil types encountered and the groundwater observations made are presented on the Records of Boreholes enclosed with this letter. As per your instructions, no laboratory testing was carried out; samples will be kept at our laboratory for your future reference for a period of one year from today's date.

The borehole locations were established by our field engineer who continuously supervised the boring and sampling. Elevations were provided by your office.

If we can be of assistance in your choice of foundations for this structure, please contact our office.

Yours faithfully,

H. Q. GOLDER & ASSOCIATES LTD.



L. G. Soderman, P. Eng.

LGS:IMB
64112

LIST OF ABBREVIATIONS

The abbreviations commonly employed on each "Record of Borehole," on the figures and in the text of the report, are as follows:

I. SAMPLE TYPES

<i>AS</i>	auger sample
<i>CS</i>	chunk sample
<i>DO</i>	drive open
<i>DS</i>	Denison type sample
<i>FS</i>	foil sample
<i>RC</i>	rock core
<i>ST</i>	slotted tube
<i>TO</i>	thin-walled, open
<i>TP</i>	thin-walled, piston
<i>WS</i>	wash sample

II. PENETRATION RESISTANCES

Dynamic Penetration Resistance: The number of blows by a 140-pound hammer dropped 30 inches required to drive a 2-inch diameter, 60 degree cone one foot, where the cone is attached to 'A' size drill rods and casing is not used.

Standard Penetration Resistance, *N*: The number of blows by a 140-pound hammer dropped 30 inches required to drive a 2-inch drive open sampler one foot.

<i>WH</i>	sampler advanced by static weight—weight, hammer
<i>PH</i>	sampler advanced by pressure—pressure, hydraulic
<i>PM</i>	sampler advanced by pressure—pressure, manual

III. SOIL DESCRIPTION

(a) *Cohesionless Soils*

<i>Relative Density</i>	<i>N, blows/ft.</i>
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) *Cohesive Soils*

<i>Consistency</i>	<i>c_u, lb./sq. ft.</i>
Very soft	Less than 250
Soft	250 to 500
Firm	500 to 1,000
Stiff	1,000 to 2,000
Very stiff	2,000 to 4,000
Hard	over 4,000

IV. SOIL TESTS

<i>C</i>	consolidation test
<i>H</i>	hydrometer analysis
<i>M</i>	sieve analysis
<i>MH</i>	combined analysis, sieve and hydrometer ¹
<i>Q</i>	undrained triaxial ²
<i>R</i>	consolidated undrained triaxial ²
<i>S</i>	drained triaxial
<i>U</i>	unconfined compression
<i>V</i>	field vane test

NOTES:

¹Combined analyses when 5 to 95 per cent of the material passes the No. 200 sieve.

²Undrained triaxial² tests in which pore pressures are measured are shown as \bar{Q} or \bar{R} .

LIST OF SYMBOLS

I. GENERAL

π	= 3.1416
e	= base of natural logarithms 2.7183
$\log_e a$ or $\ln a$	natural logarithm of a
$\log_{10} a$ or $\log a$	logarithm of a to base 10
t	time
g	acceleration due to gravity
V	volume
W	weight
M	moment
F	factor of safety

II. STRESS AND STRAIN

u	pore pressure
σ	normal stress
σ'	normal effective stress ($\bar{\sigma}$ is also used)
τ	shear stress
ϵ	linear strain
ϵ_{xy}	shear strain
ν	Poisson's ratio (μ is also used)
E	modulus of linear deformation (Young's modulus)
G	modulus of shear deformation
K	modulus of compressibility
η	coefficient of viscosity

III. SOIL PROPERTIES

(a) Unit weight

γ	unit weight of soil (bulk density)
γ_s	unit weight of solid particles
γ_w	unit weight of water
γ_d	unit dry weight of soil (dry density)
γ'	unit weight of submerged soil
G_s	specific gravity of solid particles $G_s = \gamma_s / \gamma_w$
e	void ratio
n	porosity
w	water content
S_r	degree of saturation

(b) Consistency

w_L	liquid limit
w_P	plastic limit
I_P	plasticity index
w_s	shrinkage limit
I_L	liquidity index = $(w - w_P) / I_P$
I_C	consistency index = $(w_L - w) / I_P$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
D_r	relative density = $(e_{max} - e) / (e_{max} - e_{min})$

(c) Permeability

h	hydraulic head or potential
q	rate of discharge
v	velocity of flow
i	hydraulic gradient
k	coefficient of permeability
j	seepage force per unit volume

(d) Consolidation (one-dimensional)

m_v	coefficient of volume change = $-\Delta e / (1+e) \Delta \sigma'$
C_c	compression index = $-\Delta e / \Delta \log_{10} \sigma'$
c_r	coefficient of consolidation
T_v	time factor = $c_v t / d^2$ (d , drainage path)
U	degree of consolidation

(e) Shear strength

τ_f	shear strength
c'	effective cohesion
ϕ'	effective angle of shearing resistance, or friction
c_u	apparent cohesion*
ϕ_u	apparent angle of shearing resistance, or friction
μ	coefficient of friction
S_t	sensitivity

*For the case of a saturated cohesive soil, $\phi_u = 0$ and the undrained shear strength $\tau_f = c_u$ is taken as half the undrained compressive strength.

RECORD OF BOREHOLE 1 4 2

LOCATION

See Figure 1

BORING DATE

CEH 15 x 16, 1964

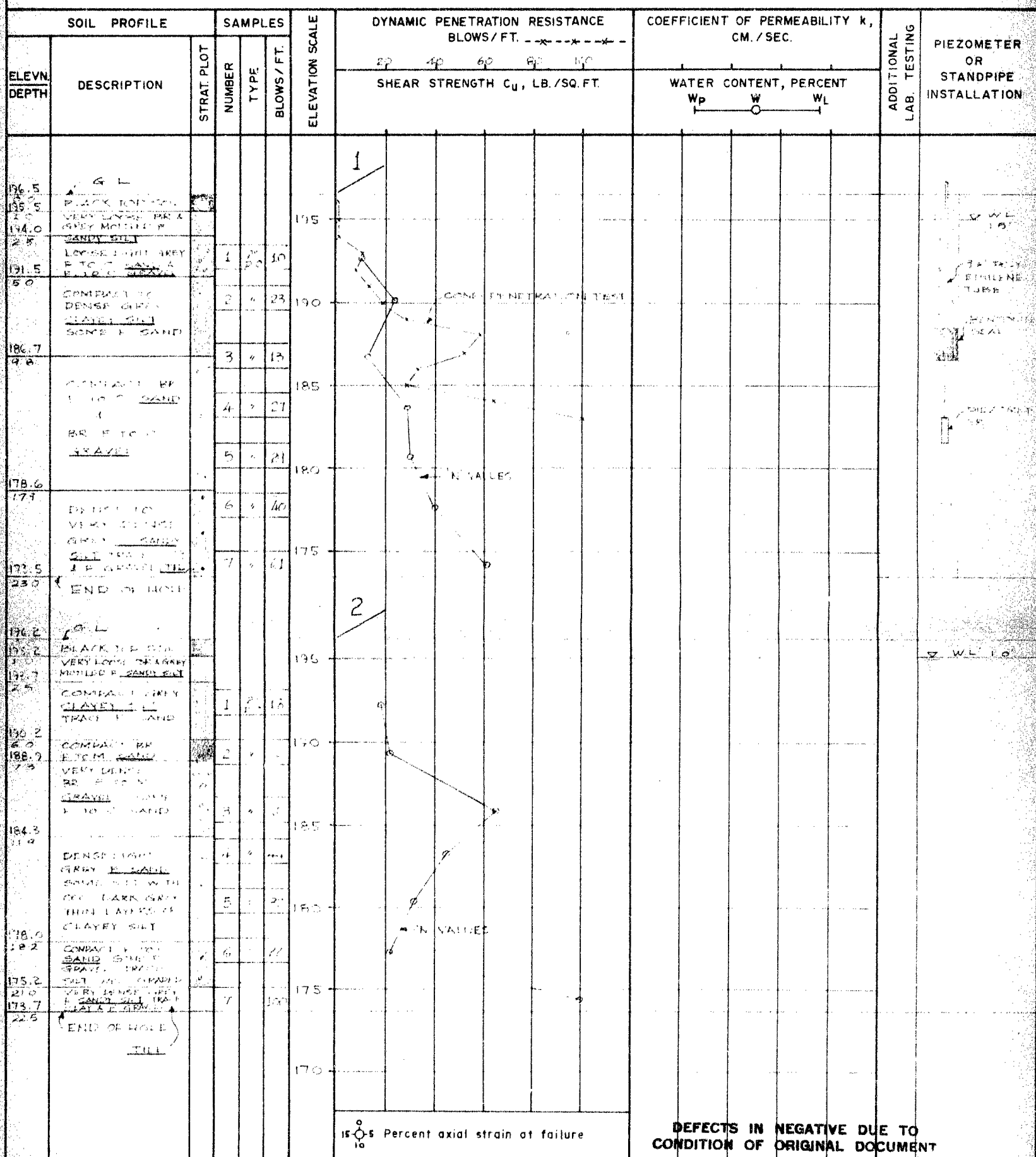
DATUM 6/10/2010

BOREHOLE TYPE DIAMOND DRILL

BOREHOLE DIAMETER

SAMPLER HAMMER WEIGHT 14.0 LB. DROP 30 INCHES

PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES



VERTICAL SCALE

1 INCH TO


GOLDER & ASSOCIATES

DRAWN

CHECKED

PROJECT No. 50

FIGURE 1



BL-1

CONE PENETRATION
TEST

BU-2 ●

ROADSIDE CAMERON

HWY # 4

LIBERTON

GOLDER & ASSOCIATES

Made
Chkd
Appd