

61-F-254 m

12TH CONCESSION

BRIDGE, ROAD

BETWEEN

CON. XI & XII

LOT 13

Township of London

c/o R. C. Dunn & Associates Ltd.
410 Third Street
London Ontario

Report on
FOUNDATION INVESTIGATION

for

12th CONCESSION BRIDGE
ON ROAD BETWEEN CONC. XI & XII
AT LOT 13

61 F 254 M

Submitted by:

Dominion Soil Investigation Limited
88 Eglinton Avenue East
Toronto 12 Ontario

Our Reference No. 1-2-11

March, 1961

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ENCLOSURES

KEY PLAN, LOCATION OF BOREHOLES AND SUBSURFACE PROFILE Encl. #1
ENGINEERING DATA SHEETS Encls. #2-4 incl

**DOMINION SOIL INVESTIGATION
LIMITED**

Foundation Engineering - Soil Mechanics

Soil Boring & Rock Diamond Drilling

Field & Laboratory Testing

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A letter of authorization dated February 13th, 1961, was received from Messrs. R. C. Dunn and Associates Ltd., 416 Third Street, London, Ontario, to conduct a foundation investigation at the site of a proposed bridge.

The proposed project will be a 45 ft span rigid frame, made of reinforced concrete. The width will be about 30 ft.

The purpose of the investigation was to reveal the subsurface conditions and determine the necessary soil properties for the design and construction of foundations.

I. DESCRIPTION OF SITE AND GEOLOGY

The proposed bridge will carry the road between Conc. XI and XII above the realigned Medway River. It will replace an existing about 40 year old structure 175 ft east from the location of the new one.

The surrounding area is flat, gently sloping to the south and towards the river. Small groups of trees are scattered all around. The land is used for crop and dairy farming. Bryanston and Birr are the closest communities to the east and west respectively; London lies 10 miles to the south.

This area is part of the great till plain (with spillways and moraines), at the centre of which lies Stratford. Throughout the area the till is fairly uniform; the silt and clay content varies within certain limits and sand or gravel deposits are often encountered in the basic till material.

The drainage of the plain is poor, and in many places the subsoil can be dewatered by weeping tile network only.

II. FIELD AND LABORATORY WORK

Field work was carried out during the period February 16th to February 23rd, 1961, and comprised two boreholes and three 2" dia. dynamic cone penetration tests at the locations shown on enclosure No. 1.

The positions of the boreholes were located on the site with the assistance of the drawing supplied by the Client, and elevations measured relative to a cross cut in the northwest wingwall of the existing bridge, (= El. 100.00 ft).

The holes were partly drilled with a continuous flight power auger of 3 $\frac{1}{2}$ " dia. and partly wash bored and lined with (Bx) casing. Disturbed samples were obtained using a standard 2" o.d. split spoon sampler (driven with a 140 lb. hammer dropping 30 inches. The same energy was applied for driving the cones.

The field results are summarized on engineering data sheets comprising enclosures Nos. 2 to 4 incl.

All samples were checked in our laboratory and classified by visual methods and the unit weight (= bulk density) and natural water content of several selected ones was determined. The results are as follows:

<u>BH No.</u>	<u>Sa. No.</u>	<u>Elevation</u>	<u>W%</u>	<u>Unit Weight</u>	<u>Void Ratio</u>
1	1	about 93 ft.	13.2	--	--
1	2	" 90 ft.	17.8	--	--
1	3	" 86 ft.	10.2	--	--
1	4	" 84 ft.	7.95	--	--
1	5	" 81 ft.	9.15	145 p.c.f.	0.29
1	6	" 75 ft.	11.15	--	--
1	7	" 71 ft.	13.4	--	--
2	1	" 93 ft.	16.2	--	--
2	2	" 90 ft.	12.1	--	--

III. SUBSURFACE CONDITIONS

The subsoil at the site consists mainly of a very hard, damp-moist silt till, i.e. a mixture of silt and clay in various proportions (approximately 35 to 45% each), with sand and some fine angular gravel. This silt till stratum is divided by a silty sand layer, about 3 ft thick, between elevations 85 and 88 ft. Above the sand, where the till has been weathered, its colour is brown. Below the sand layer it is grey.

The upper 1 to 2 feet of the boreholes was topsoil (BH 2) or sand and gravel fill (BH 1, from the shoulder of the road).

The groundwater conditions at the site are of interest from the point of view of construction. The water table at the time of the soil investigation was around el. 94.5 ft. However, the water came up mostly from the sand layer, the brown till being practically impermeable. This sand is the main aquifer of the surrounding area, e.g. the wells of a neighbouring farm get their water supply from this stratum.

IV. DISCUSSION AND RECOMMENDATIONS

The bearing capacity of the subsoil at elevation 84.0 ft is of primary interest as indicated on a preliminary site plan provided by the Client.

The subsoil investigation revealed that the very hard grey silt till begins at around elevation 85 ft. Thus the footings will be placed in this stratum. The allowable bearing capacity of the subsoil at elevation 84 ft. is 8000 p.s.f. No measurable settlement is expected to take place under this loading.

Construction

No dewatering problem is expected until the excavation reaches about elevation 88 ft, where the aquiferous sand layer begins. Any water seepage above this level can be overcome by pumping. Difficulty may arise when the excavation gets deeper into the sand layer or below it. Two possibilities exist, depending on weather conditions and the silt and clay content of the sand layer at the border of the excavation.

If the water seepage into the excavation is not great, no special precautionary measure is required. Open cut excavation should continue, and the water should be pumped out from collecting sumps until footings and abutments are paved.

If, however, water flow into the excavation is excessive, the pit should be enclosed by short sheet piles, extending 2 to 3 feet below the bottom of the excavation.

V. SUMMARY

1. The subsoil is a silt till (silt and clay mixed with sand and fine gravel) divided by an aquiferous, 3 ft thick sand layer. The velocity of ground water movement in this sand is several orders greater than in the till.
2. The ground water table is around el. 94.5 ft.
3. The allowable bearing capacity of the subsoil at el. 84 ft is 8000 p.s.f. under which no measurable settlement is expected to take place.
4. Construction may be done with open cut excavation and water removal by pumping. If water inflow through the sand layer is excessive, short sheet pile should overcome this difficulty.



DOMINION SOIL INVESTIGATION LIMITED

L. R. Szalatkay
L. R. Szalatkay, P.Eng.
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p.p. J. Park

VI. 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. The Physiography of Southern Ontario, by Chapman and Putnam, The University of Toronto Press, 1951

Enclosures

Dominion Soil Investigation Ltd.

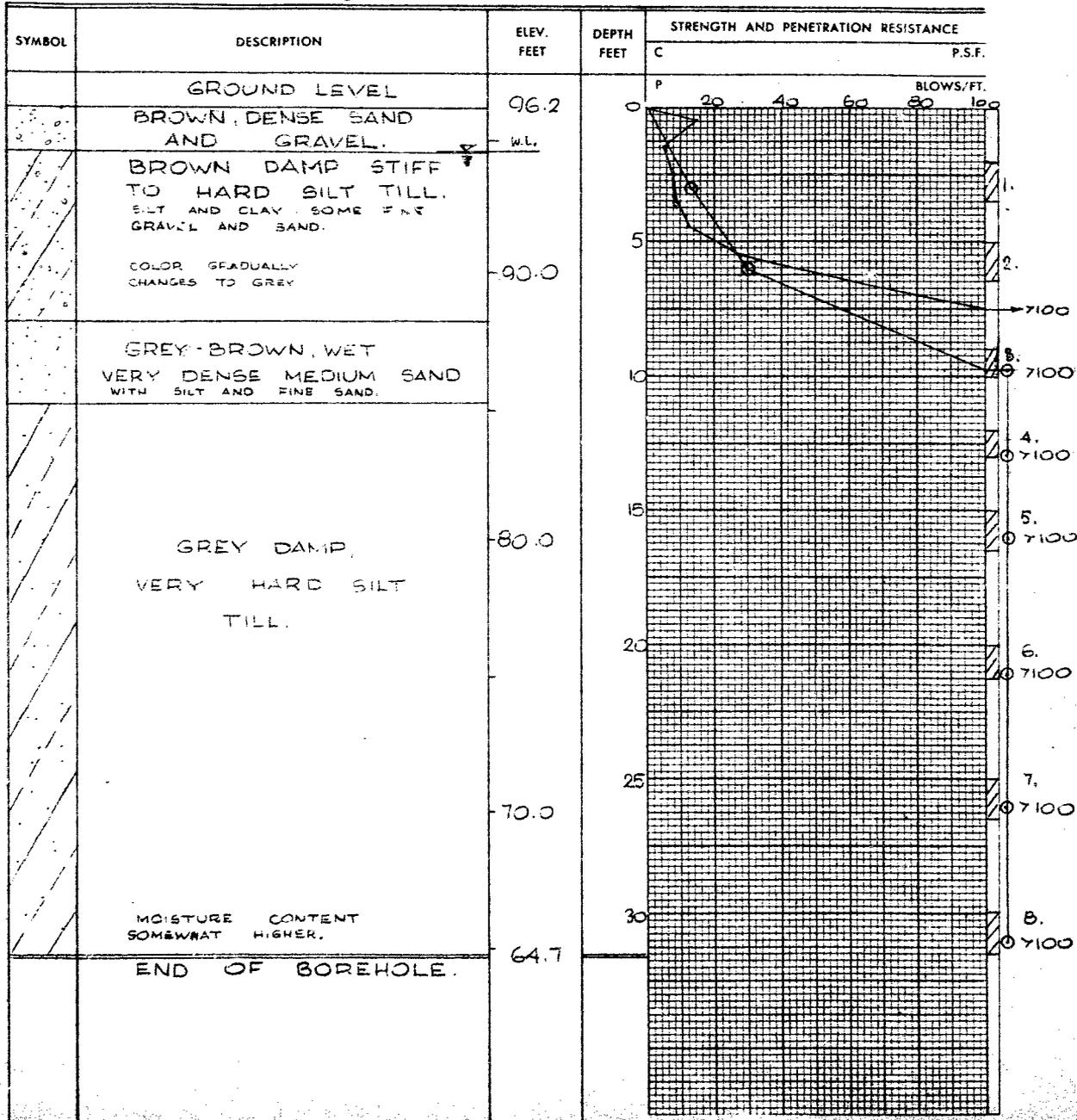
Engineering Data Sheet for Borehole: |

Date: JAN. 16 - 20, 1961.

Project: LONDON TOWNSHIP BRIDGE
 Location: BETWEEN CONC. XI. - XII.
 Hole Location: SEE ENC. NO. 1.
 Hole Elevation and Datum: 96.2
 Field Supervisor: H. O'D. Prep.: E.L.
 Driller: J. MCD. Checked:

LEGEND
 Shear Strength (C) \oplus
 Unconfined compression \oplus
 Vane test and sensitivity (S) \oplus
 Penetration Resistance (P) \ominus
 2" Split tube \ominus
 2" Dia. Cone \ominus
 Casing $---$

Sampling Method
 2" Dia. split tube
 2" Shelby tube



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Engineering Data Sheet for Borehole: 2.

Date: FEB. 20-23 1961.

Project: LONDON TOWNSHIP BRIDGE
 Location: BETWEEN CONC. VI - XII.
 Hole Location: SEE ENC. NO. 1.
 Hole Elevation and Datum: 95.6
 Field Supervisor: H.O.D. Prep.: E.L.
 Driller: J.M.D. Checked: *S*

LEGEND

Shear Strength (C)

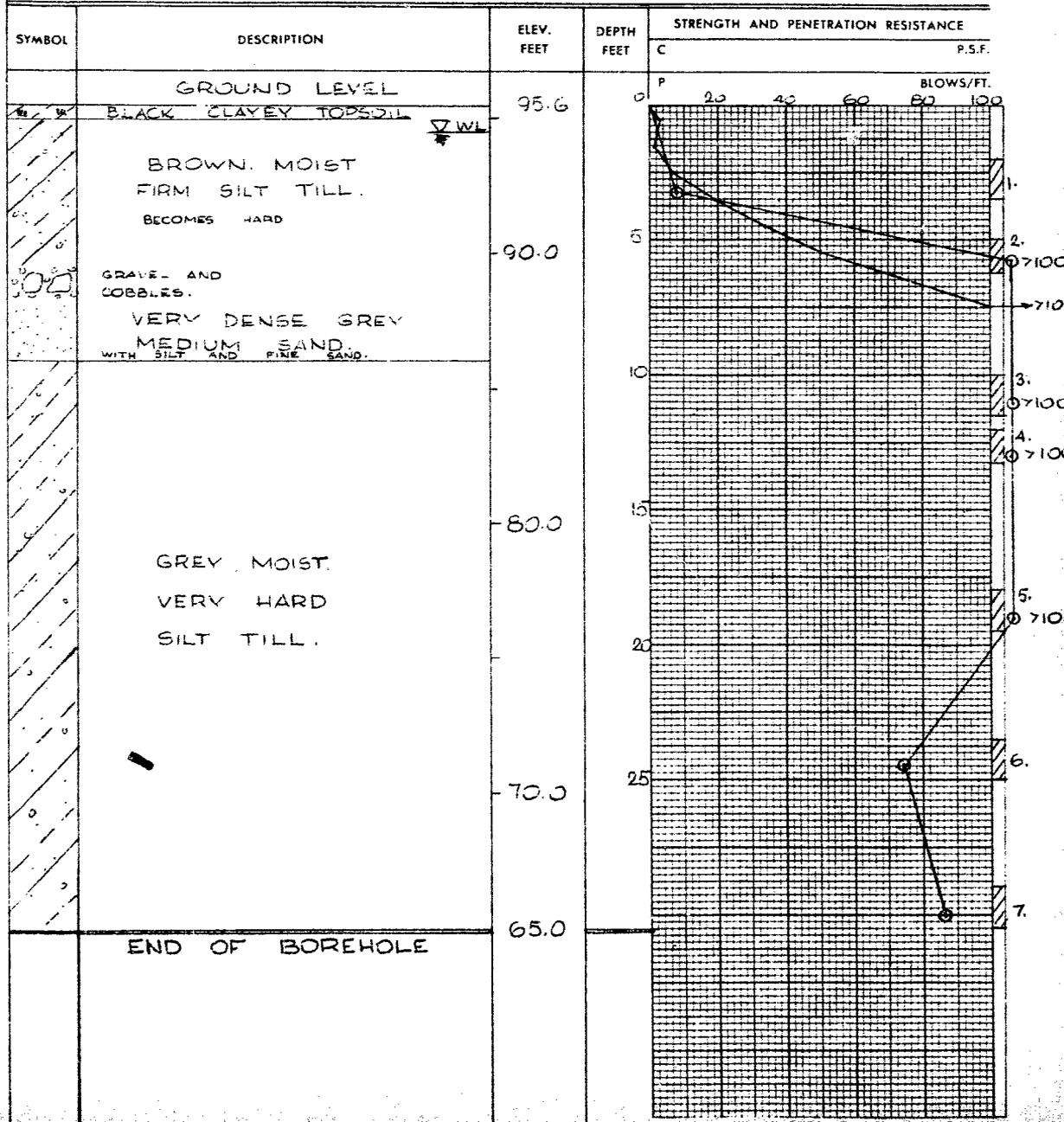
Unconfined compression \oplus
 Vane test and sensitivity (S) \oplus^s

Penetration Resistance (P)

2" Split tube \ominus
 2" Dia. Cone \ominus
 Casing ---

Sampling Method

2" Dia. split tube ▨
 2" Shelby tube ■



Dominion Soil Investigation Ltd.

Engineering Data Sheet for ^{CONE} ~~Soils~~ 3

Date: FEB. 20, 1961.

Project: LONDON TOWNSHIP BRIDGE

Location: BETWEEN CONC. XI - XII.

Hole Location: SEE ENCL. NO. 1.

Hole Elevation and Datum: 95.9

Field Supervisor: H.O.D. Prep.: E.L.

Driller: J.M.C. Checked: *[Signature]*

LEGEND

Shear Strength (C)

Unconfined compression
Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube
2" Dia. Cone
Casing



Sampling Method

3" Dia. split tube

2" Shelby tube

