

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31 D - 226

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. 30 - 233

HWY. No. _____

LOCATION PROP. CHURCH ST.
BR., TOWN OF ALLISTON

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. NONE

REMARKS: _____

RACEY, MACCALLUM AND ASSOCIATES LIMITED

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31D-226
GEOGRAPHIC No:

TORONTO DIVISION
59 CURLEW DRIVE
DON MILLS, ONT.

Our Reference: S-1486/T-1838

August 2, 1962.

Mr. P. Wm. Ainley, P.Eng.,
Consulting Engineer,
23 St. Peter Street,
COLLINGWOOD, Ontario.

RE: SOIL CONDITIONS AND FOUNDATIONS,
PROPOSED CHURCH STREET BRIDGE,
TOWN OF ALLISTON, ONTARIO.

Dear Sir:

We have completed our investigation at the above site, consisting of two boreholes and two cone penetration tests, penetrating to a maximum depth of about 24 feet below ground surface. This report presents a summary of the results of the investigation and recommendations concerning the foundation design.

FIELD WORK

The locations of the boreholes are shown on Enclosure No. 1. Drilling was carried out using a diamond drill equipped for soil sampling by means of a standard split-spoon sampler. The number of blows of a 140-pound hammer with a drop of 30 inches, required to drive the sampler down 12 inches, was recorded as the standard penetration resistance.

Adjacent to each borehole a 2" diameter, 60-degree point angle cone was driven using the same driving energy as for the split spoon sampler. This procedure provides a continuous picture of the density changes with depth.

Ground-water observation was made in borehole No. 1. Twenty-four hours after the completion of the drilling the water level in the borehole was found to be about 6 feet 4 inches below the existing ground level, i.e. at elevation 69.75. This is about the same as the water-level in the Boyne River at the time that the investigation was carried out. The average depth of water in the river is about 1.0 feet.

Our Reference: S-1486/T-3838

- 2 -

August 2, 1962.

FIELD WORK - Continued

Borehole elevations are referenced to the elevation of the road surface whose elevation is 101.50 as shown on Enclosure No. 1.

RESULTS

The results of the boreholes are shown in detail on Enclosures 2 to 5 inclusive, and are summarised below. They reveal the following subsoil conditions.

(a) A layer of loose, dark grey sand and gravel exists at the ground surface. The thickness of the stratum varies from about 2 feet at the location of borehole No. 1 to about $6\frac{1}{2}$ feet at borehole No. 3. This sand and gravel is probably alluvium deposited by the river.

(b) Immediately below the sand and gravel and down to at least elevation 54, where borehole No. 3 was terminated, there is a stratum of dense to very dense, dark grey silty glacial till with layers of light grey, fine to medium sand. Traces of fine gravel and clay were found throughout in this stratum. The density of this silty till increases from compact at the top to very dense with depth.

The boreholes and the cone penetration tests encountered practical refusal to advancement within the till stratum at depths of about 15 feet below ground surface.

DISCUSSION

It is understood that a prestressed concrete bridge of 90-foot clear span is to be constructed at this site. The bridge is to be supported on abutments located near the bottom of the existing river banks. The approach fills for the bridge are contained by the abutments and by wing walls. Preliminary plans call for the abutment foundations to be carried at elevation 73 on bearing piles.

The investigation has shown that the site is underlain at a shallow depth by a dense glacial till stratum. This is suitable for spread footing foundations at elevation 73. Based on an estimated angle of shearing resistance for the till of 40 degrees, the computed allowable bearing value for footings 15 feet in width is 7.0 kips per square foot. This bearing value assumes submergence of the soil to the underside of the footings and is based on a resultant force on the footing inclined to the vertical at an angle not exceeding 10° . The appropriate bearing values for other footing widths may be obtained from this value by direct proportion. This

Our Reference: S-1486/T-3838

- 3 -

August 2, 1962.

DISCUSSION - Continued

allowable bearing value has a factor of safety of 3 against general shear value of the soil. It should not be exceeded by the greatest edge pressure under a footing subjected to overturning forces.

Computations carried out on the preliminary abutment design with the piles omitted show that the maximum edge pressure is 9.1 kips per square foot, which exceeds the allowable value given above. However, by a slight modification involving moving the foundation base 2 feet forward relative to the stem of the abutment, the edge pressure is reduced to 6.6 kips per square foot, which is slightly less than the allowable value. Under the worst conditions of loading, the computed factor of safety against forward translation of the wall is 1.5, considering the full height of fill in place but with no bridge deck, or fill at the toe of the wall. With the bridge deck in place and full live load acting, the factor of safety against translation is increased to 2.3. For this case of forward translation a factor of safety of 2 is considered adequate. Since during construction the factor of safety will be less than this value it is necessary to ensure that backfill is placed and compacted at the toe of the wall before the approach fill is completed.

The above considerations show that, from the point of view of soil bearing, spread footings at elevation 73 are feasible. However, the final design elevation and location of the footings may be governed by other considerations such as scour.

Because some forward movement and tilting of the abutments and wing-walls are inevitable in this form of construction, it is recommended that placing of the bridge deck and approach slabs be omitted until after the approach fill has been placed and compacted to its full height. In order to prevent the build-up of hydrostatic pressures within the fill retained by the abutment and wing-walls it is recommended that a layer of free-draining granular material be provided immediately behind the walls and connected to a permanent drainage outlet.

The approach fills should be placed in shallow lifts and compacted uniformly to a high density. During this operation special care should be taken to ensure that excessive lateral pressures do not develop against the retaining walls. For this purpose the walls should be surveyed during the filling operation to detect any excessive deformations.

Our Reference: S-1486/T-1838

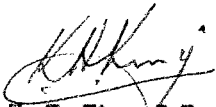
- 4 -

August 2, 1962.

We trust that this letter report contains all the information that you require. We are pleased to have been of service to you on this project.

Yours very truly,

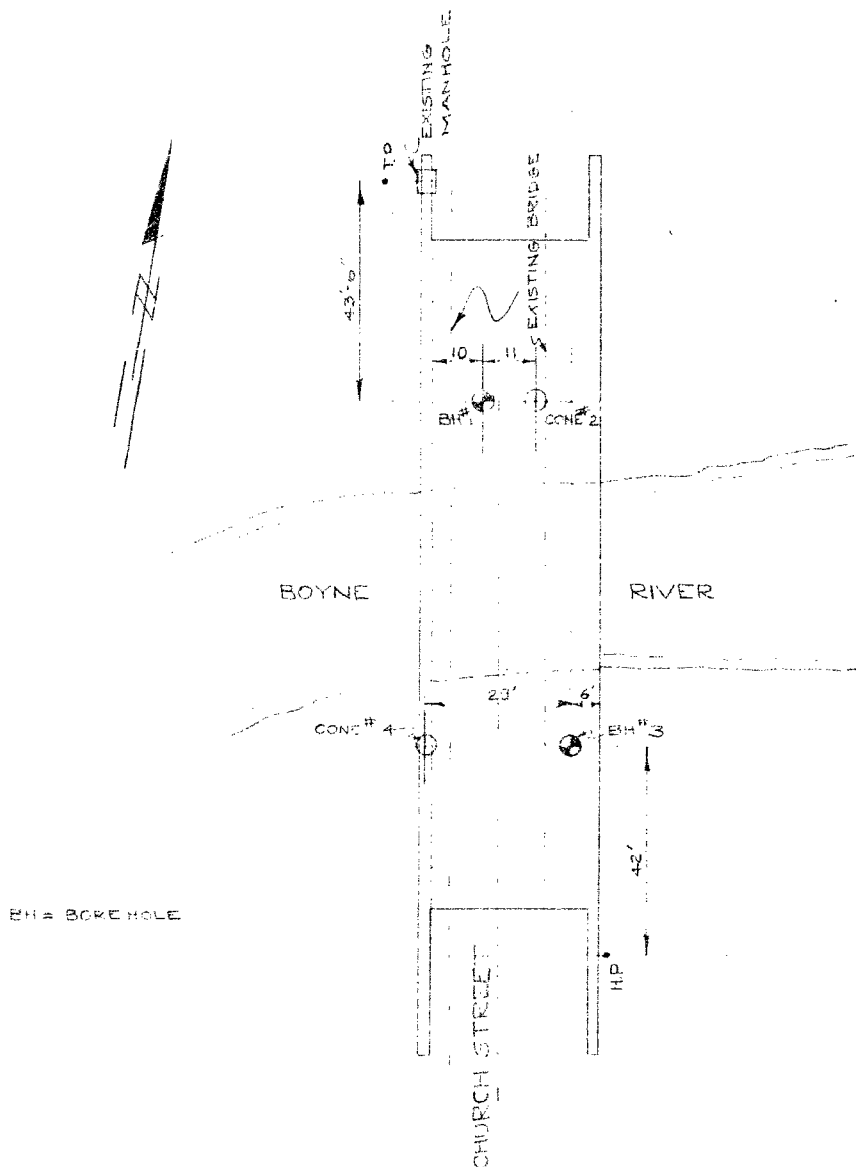
RACEY, MACCALLUM AND ASSOCIATES LIMITED


K. H. King, P. Eng.,
Divisional Soils Engineer



KHK/KA

Prep. By H.B.



TOWN OF ALLISTON
CHURCH STREET BRIDGE

SCALE - 1" = 30'-0"

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Foundation Engineering Division

Engineering Data Sheet for Borehole NO.1

Project **SOIL INVESTIGATION, PROPOSED BRIDGE**Location **TOWN OF ALLISTON, ONTARIO**Hole Location **SEE ENCLOSURE NO.1**Hole Elevation and Datum: **76.00**Field Supervisor: **K.F** Prep: **K.F**Driller: Checked: **K.F**Date: **19.7.1962**

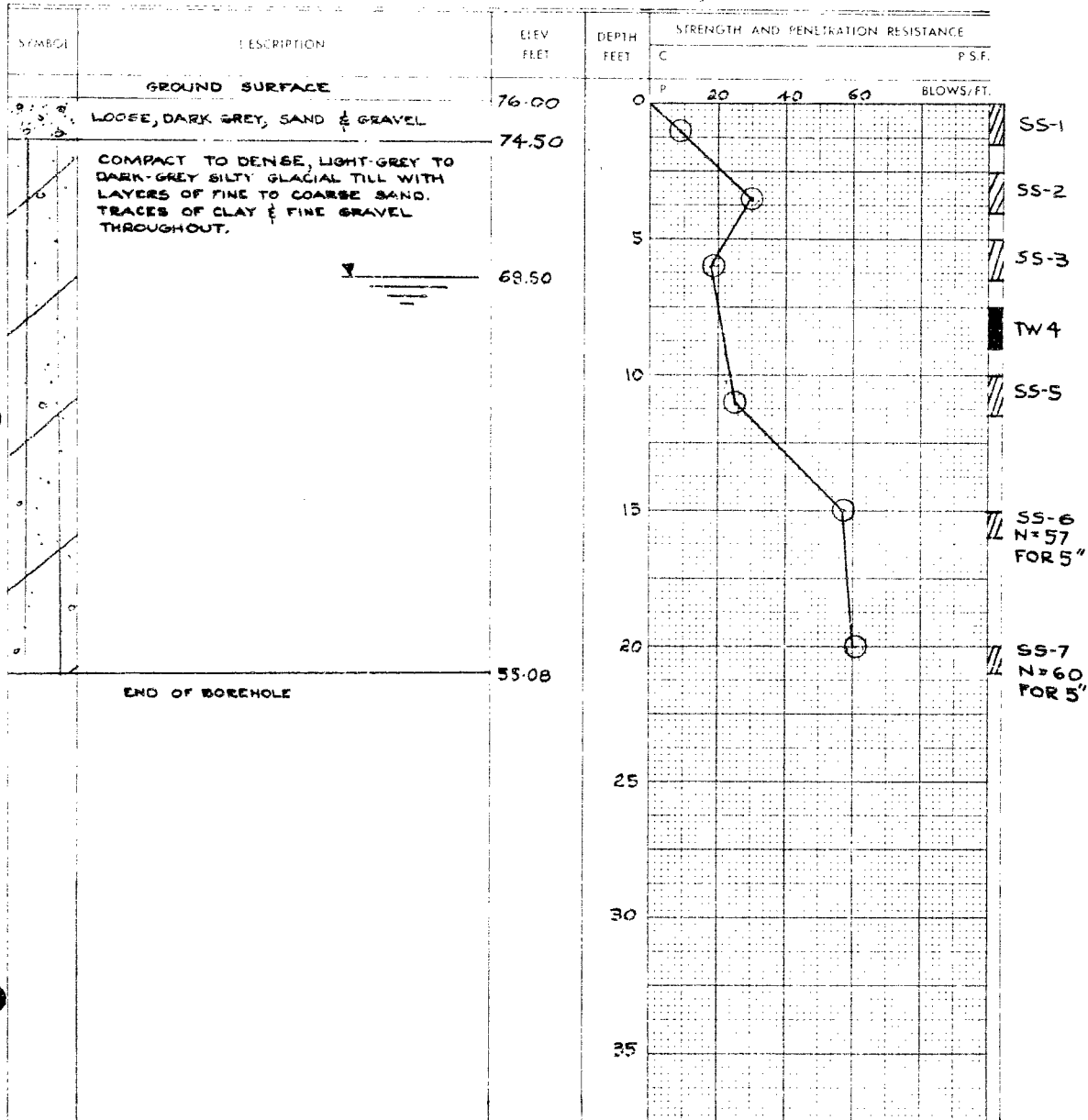
LEGEND

Shear Strength: **C**Unconfined compression
Van. test and sensitivity: **S**Penetration Resistance: **P**

2" Split tube

2 Ton. Cone

Casing



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Engineering Data Sheet for ~~Sheet 1~~ CONE 2

Project: SOIL INVESTIGATION, PROPOSED BRIDGE

Location: TOWN OF ALLISTON, ONTARIO

Hole Location: SEE ENCLOSURE NO. 1

Hole Elevation and Datum: 76.75

Field Supervisor: K.F. Prep: K.F.

Driller: Checked: K.F.

Date: 18. 7. 1962

LEGEND

Shear Strength C

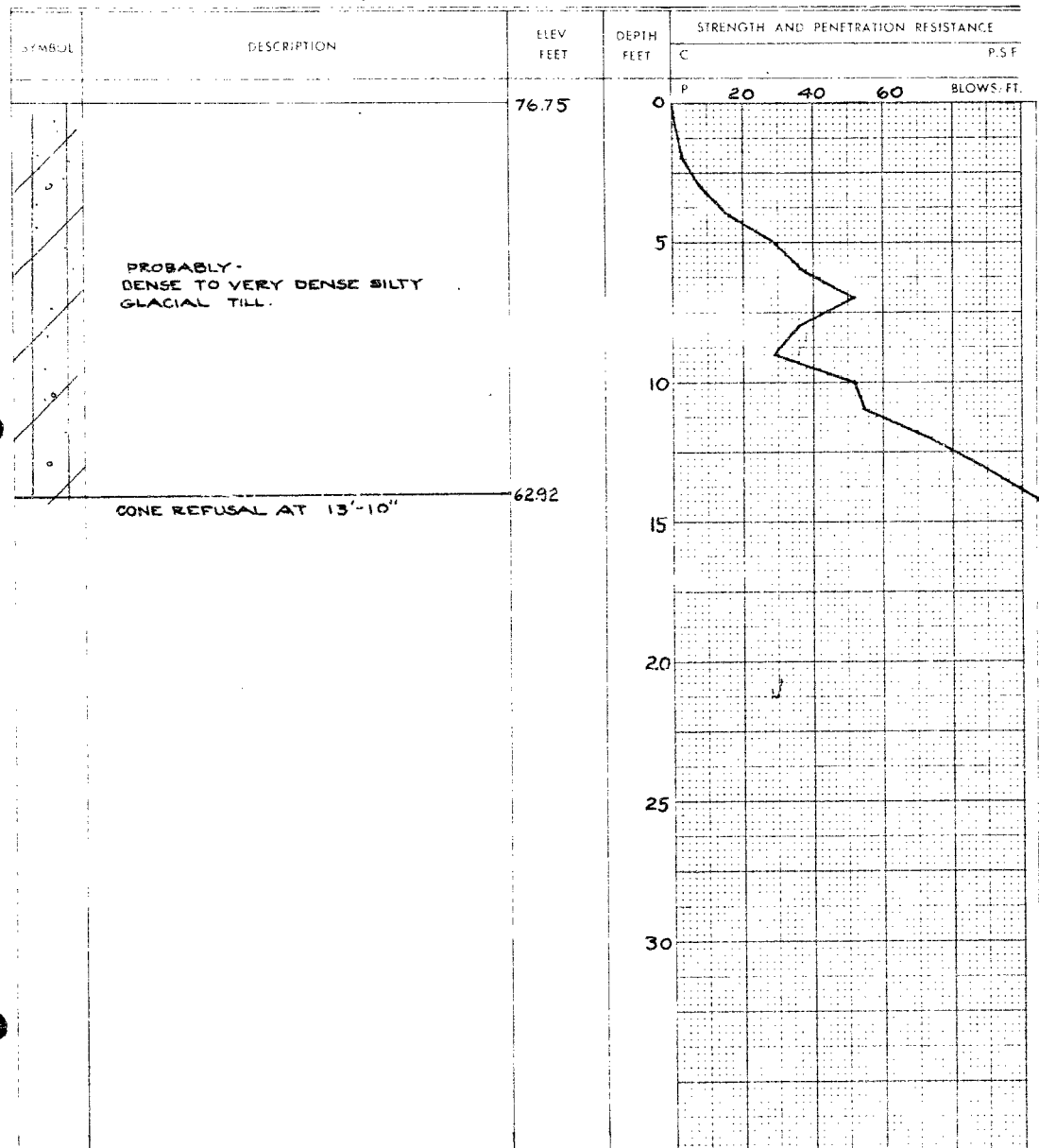
Unconfined compression
Vane test and sensitivity S

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕
+5⊕
⊕

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Engineering Data Sheet for Borehole: NO. 3

Project: SOIL INVESTIGATION, PROPOSED BRIDGE

Location: TOWN OF ALLISTON, ONTARIO

Hole Location: SEE ENCLOSURE NO. 1

Hole Elevation and Datum: 77.30

Field Supervisor: K.F. Prep: K.F.

Driller: Checked: K.F. Date: 20. 7. 1962

LEGEND

Shear Strength
 Unconfined compression
 Vane test and laboratory

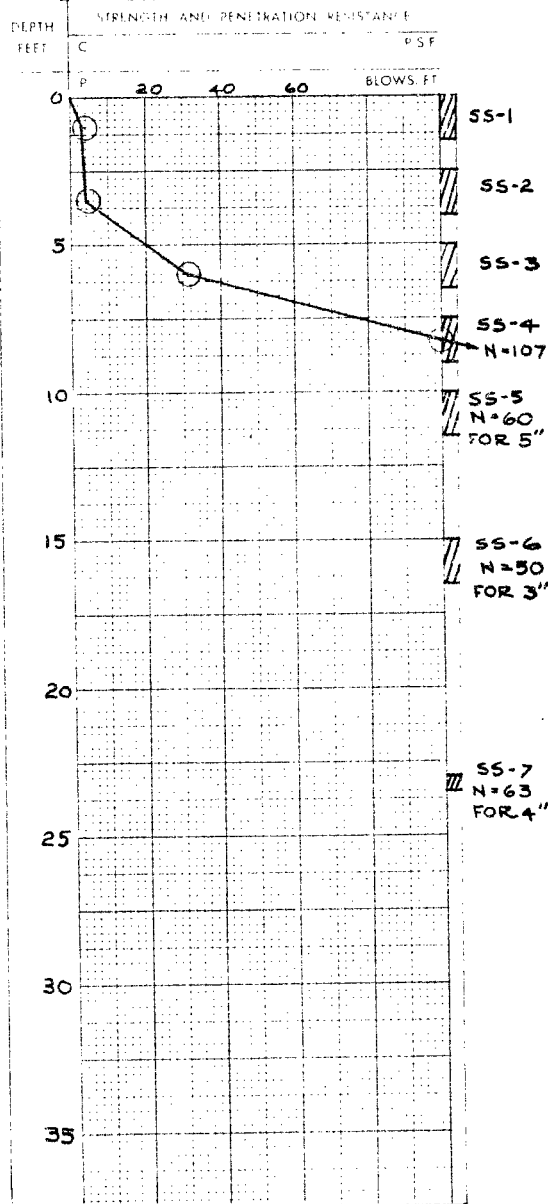
Penetration Resistance (P)

2" Split tube

2" Gas Cone

Cone

SYMBOL	DESCRIPTION	ELEV. FEET
	GROUND SURFACE	77.30
	VERY LOOSE, LIGHT GREY TO DARK BROWN SAND TRACE OF DENSE ORGANIC MATTER AT BOTTOM.	
		70.80
	VERY DENSE, LIGHT-GRAY TO DARK-GRAY, SILTY GLACIAL TILL WITH LAYERS OF FINE TO COARSE SAND. TRACES OF FINE GRAVEL & CLAY THROUGHOUT.	
		53.97
	END OF BOREHOLE	



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Engineering Data Sheet for ~~Borehole~~ **CONE NO. 4**Project: **SOIL INVESTIGATION, PROPOSED BRIDGE**Location: **TOWN OF ALLISTON, ONTARIO**Hole Location: **SEE ENCLOSURE NO. 1**Hole Elevation and Datum: **77.80**Field Supervisor: **K.F.** Prep: **K.F.**Driller: **K.F.** Checked: **K.F.**Date: **19. 7. 1962****LEGEND**

Shear Strength (C)

Unconfined compression

Vane test and sensitivity (S)

Resistance (P)

2" Split tube

2" Dia. Cone

Coring

