

#59-F-203C

W.P. #186-59

THAMES RIVER  
CROSSING AT  
Highbury Ave.  
EXTENSION  
LONDON

28-2

# RACEY, MACCALLUM AND ASSOCIATES LIMITED

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TORONTO

TORONTO DIVISION  
27 CARLTON STREET

59-F-203C

Reference: S-500/T-1995  
- Report -

12-28-59  
8th December, 1959

Department of Highways for Ontario,  
- Materials and Research Section -  
C/o Parliament Buildings,  
TORONTO - Ontario.

Attention: Mr. L. G. Soderman.

RE: FOUNDATION INVESTIGATION FOR PROPOSED  
BRIDGE ACROSS THE THAMES RIVER AT HIGHBURY  
AVENUE EXTENSION, LONDON - ONTARIO.

VP 186-53


Dear Sirs,

The enclosed report presents the results of our  
foundation investigation at the above location.

We hope the report is satisfactory to you; if you  
have any questions about it please do not hesitate to get in  
touch with us.

Thank you for this opportunity of being of service  
to you

Yours very truly,  
RACEY, MACCALLUM AND ASSOCIATES LIMITED,

  
M. I. Beeby, P.Eng.,  
for Divisional Soil Engineer.

MIB/YDP

Department of Highways for Ontario,  
- Materials and Research Section -  
C/o Parliament Buildings,  
Toronto - Ontario.

FOUNDATION INVESTIGATION FOR PROPOSED  
BRIDGE ACROSS THE THAMES RIVER AT HIGHEURY  
AVENUE EXTENSION, LONDON, ONTARIO.

Reference: S-500/T-1995  
- Report -

Racey, MacCallum and Associates  
Limited.

8th December, 1959

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27 CARLTON STREET

Reference: S-500/T-1995

- Report -

8th December, 1959

## FOUNDATION INVESTIGATION FOR PROPOSED BRIDGE ACROSS THE THAMES RIVER AT HIGHBURY AVENUE EXTENSION, LONDON, ONTARIO.

### INTRODUCTION :

A soil investigation was carried out at the above-named bridge site located along the extension of Highbury Avenue across the Thames River in London, Ontario. A total of 7 (seven) boreholes were completed at the locations indicated on the Department of Highways Site Plan No P-3775-1, the pertinent part of which is presented to reduced scale as Enclosure No 1.

### DESCRIPTION OF SITE :

The site under investigation included the area on both sides of the Thames River, as well as the River bed itself along the extension of Highbury Avenue. The ground on the North bank is soft and marshy, whilst the South bank slopes steeply up from the river to a height of approximately 10 feet. Some distance further South of the site there is an old gravel pit working. The elevation of the excavated area does not appear to be higher than the present river water level and is lower than the highest water level, as indicated on the profile included as Enclosure No 2.

A few miles further East of the site there is a control dam which plays an important part in guarding the proposed bridge site area from the scouring effects of Spring and flash floods.

### FIELD WORK :

Field work commenced on 3rd November, 1959, and was completed on 10th November, 1959. During the working period, bad weather, rain and snow, and difficulties encountered whilst setting up on the steep banks locating the raft on the river, delayed progress to a considerable extent.

Reference: S-500/T-1995  
- Report - Continued.

8th December, 1959

Drilling was carried out using a standard diamond drill rig specially equipped for soil sampling. In each borehole soil samples were recovered in a standard 2 inch outside diameter split spoon sampler.

FOUNDATION CONDITIONS :

The subsoil transected consisted of from 0.5 to 7 feet of loose brown fine to medium sands, overlying a very dense deposit of glacial till. The latter consisted of a clayey silt packed densely with assorted sand and gravel, together with quite frequent cobbles and boulders.

The soil profiles and penetration records for each borehole are plotted on Engineering Data sheets presented as Enclosures No 3 - 9, and also compiled in cross-sectional form on Enclosure No 2.

The fine to medium sand stratum was in a loose to very loose condition requiring virtually no penetrating effort when sinking BX casing. This stratum does not constitute a good foundation medium and is not recommended as such. In contrast, however, the underlying glacial till material will provide a first class foundation. As will be noted, the standard penetration resistances in this stratum were seldom lower than 100 blows per foot. It is recommended that the bridge be placed on spread footings installed on or in this glacial till stratum, and that an allowable bearing pressure of 5 tsf be specified for structural design purposes. Such footings could be installed at or below Elevation 775 feet for both abutment piers and at or below Elevation 770 feet for the proposed central pier in mid-stream.

Artesian conditions were noted in Borehole No 1 following a full day's heavy rain. The ground water rose to 3 feet above ground, i.e. Elevation 785 feet, but after approximately one day this head had dissipated itself. It can only be concluded that the artesian stratum was a small gravel lens, the presence of which was masked during boring through the surrounding gravelly till material.

Bridges in the vicinity of the proposed structure were inspected closely for evidence of river scour. All the structures appeared undamaged in this respect. The upstream control dam will, of course, dampen the effect of heavy unusual or seasonal precipitation on the river flow at the proposed bridge site, and consequently the danger of scouring appears low.

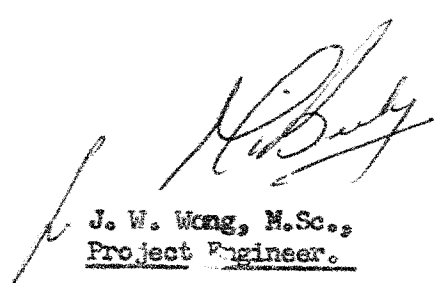
Reference: S-500/T-1995  
- Report - Continued.

8th December, 1959

Excavation for the central pier footings will almost certainly have to proceed within a sheet pile cofferdam composed of heavy section piling, in order to penetrate the bouldery gravelly till effectively for a cut off. Depending on the ground water level at the time of construction and the necessary depth of excavation, the abutment pier footings will have to be installed within either braced timber or sheet pile cofferdams.

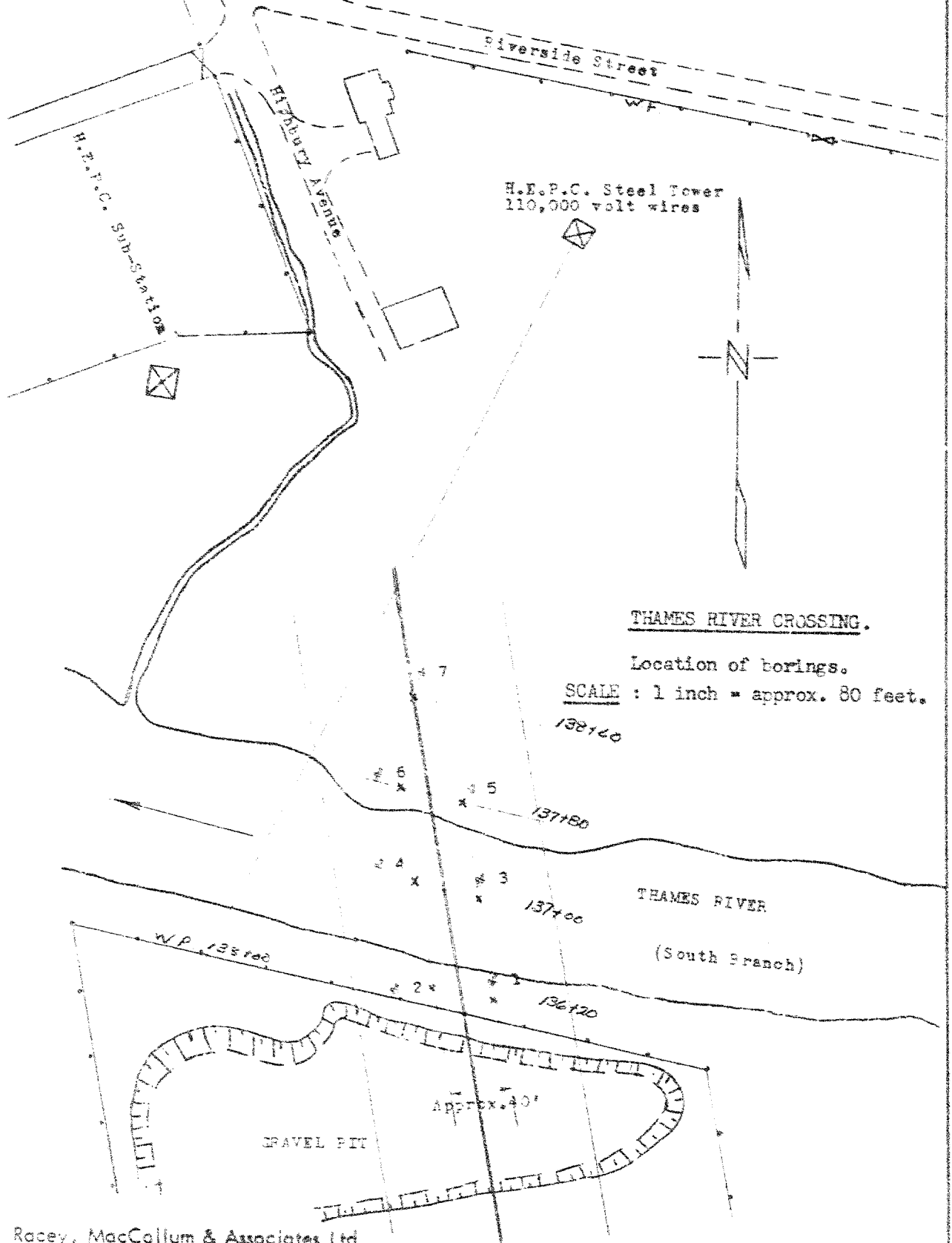
CONCLUSIONS :

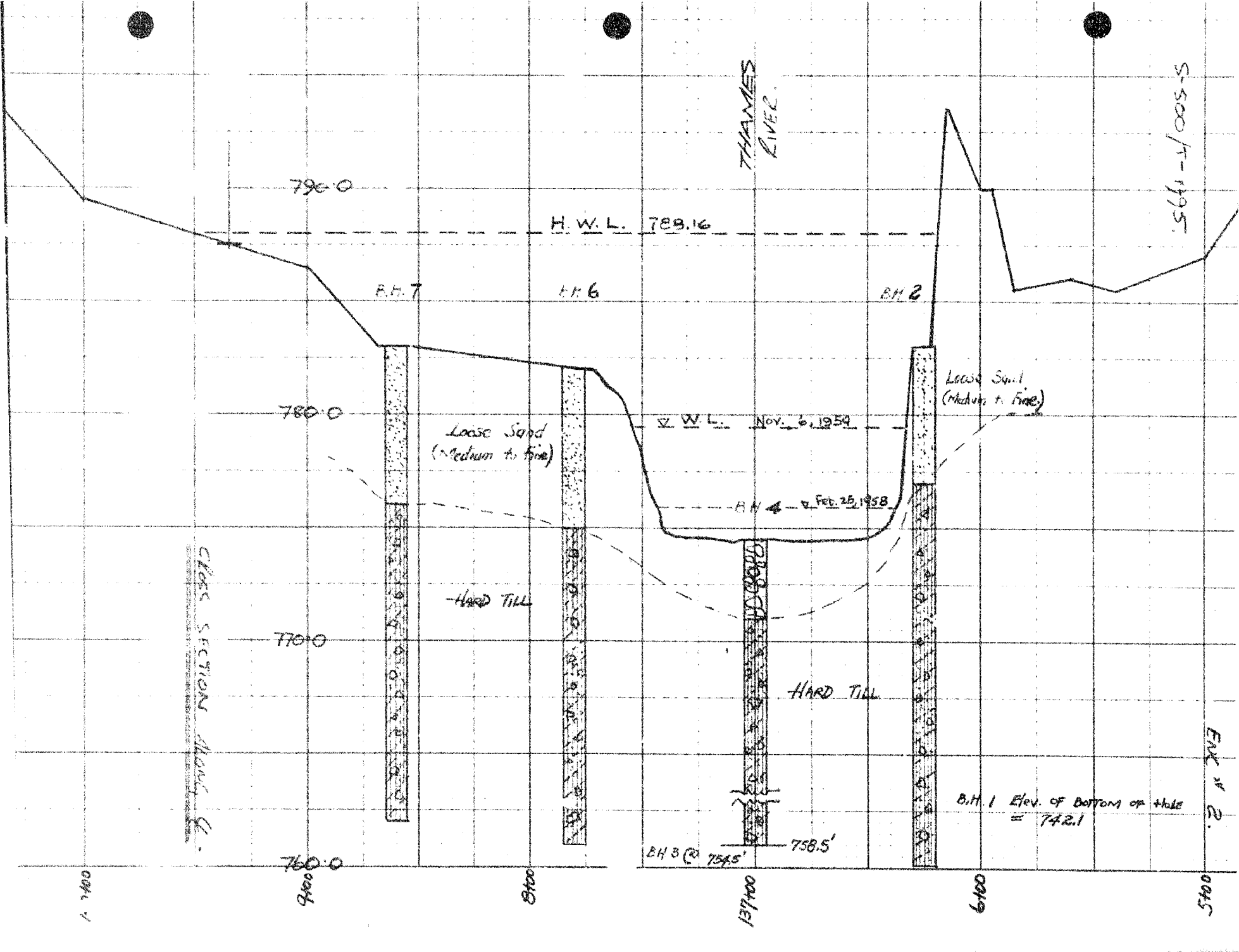
1. The subsoil consists of loose brown fine to medium sands overlaying to depth of 0.5 to 7.0 feet a very dense deposit of clayey silt glacial till.
2. It is recommended that the bridge be founded on spread footings the structural design of which should be based on an allowable bearing pressure of 5 tsf.
3. The abutment pier footings may be placed at or below Elevation 775 feet, whilst the upper elevational limit for the central pier footing is slightly lower at 770 feet.

  
J. W. Wong, M.Sc.,  
Project Engineer.

MIB/IDF

Prep. By J.W.







## RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: No 1

Project: THAMES RIVER CROSSING AT HIGHBURY AVENUE

Location: LONDON, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 782.1 feet.

Field Supervisor: J.W. Prep.: J.W.

Driller: J.L. Checked:

Date:

## LEGEND

Shear Strength C

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance p

2" Split tube

2" Dia. Cone

Casing

S  
4.5

— ⊕ — ⊕ —

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SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE				
				C	P.S.F.			
					BLOWS/FT			
					20	40	60	80 100
	Ground surface.	782.1	0					
	Organic Topsoil.	781.1						
	Brown fine to medium sand	780.6						
			5					S-1
			10					SS-2
			15					SS-3
			20					SS-4
			25					SS-5
			30					SS-6
			35					SS-7
			40					SS-8
			45					SS-9
	End of Borehole.	741.1						

Very dense clayey silt  
packed with assorted sands  
and gravel.

GLACIAL TILL MATERIAL.

W.L.

Wash sample - S-1

Split Spoon Sample - SS-2

## RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

## Engineering Data Sheet for Borehole No 2

Project: THAMES RIVER CROSSING AT HIGHBURY AVENUE

Location: LONDON, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 732.8 feet.

Field Supervisor: L.W. Prep.: L.W.

Driller: J.L. Checked: Date:

## LEGEND

Shear Strength C

Unconfined compression  
Vane test and sensitivity, S

Penetration Resistance P

2" Split tube

2" Dia. Cone

Casing

±

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE				
				C	P.S.F.			
	Ground surface.	782.8	0		20	40	60	BLOWS/FT 80 100
	Topsoil	781.8	1					
	Loose brown fine to medium sand with a trace of fine gravel.	775.8	5					SS-1
	Very dense clayey silt packed with sand and some assorted gravel.		10					SS-2
	GLACIAL TILL MATERIAL.		15					SS-3
			20					SS-4
	End of Borehole.	759.3	25					SS-5
			30					
			35					
			40					

## LEGEND :

Split spoon sample



SS-1

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: **No 3**Project: **THAMES RIVER CROSSING AT HIGHBURY AVENUE**Location: **LONDON, ONTARIO.**Hole Location: **See Enclosure No 1.**Hole Elevation and Datum: **774.5 feet.**Field Supervisor: **L.W.** Prep.: **L.W.**Driller: **J.L.** Checked:

Date:

**LEGEND**

Shear Strength (C)

Unconfined compression

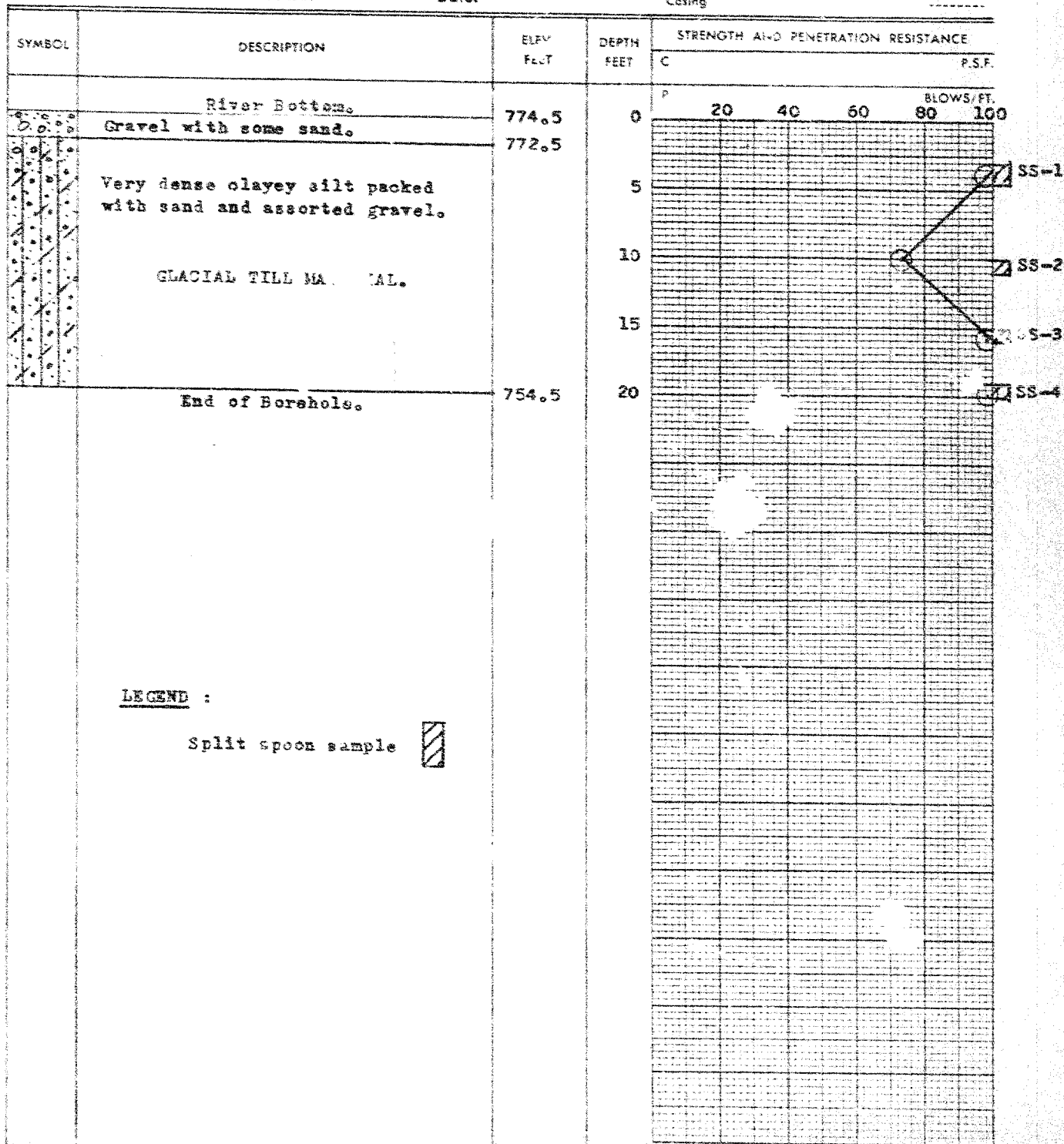
Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕  
+<sup>s</sup>

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: **No 4**Project: **THAMES RIVER CROSSING AT HIGHBURY AVENUE**Location: **LONDON, ONTARIO.**Hole Location: **See Enclosure No 1.**Hole Elevation and Datum: **774.5 feet.**Field Supervisor: **L.W.** Prep.: **L.W.**Driller: **J.L.** Checked:

Date:

LEGEND

Shear Strength (C)

Unconfined compression  
Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

EXTENSION.

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE				
				C	P.S.F.			
	River Bottom.							
	Gravel with some assorted sand.	774.5	0					
		772.5						
	Very dense clayey silt packed with sand and some occasional gravel.		5					SS-1
	GLACIAL TILL MATERIAL.		10					SS-2
			15					SS-3
	End of Borehole.	758.0	20					

LEGEND :

Split spoon sample



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: **No 5**Project: **THAMES RIVER CROSSING AT HIGHBURY AVENUE**Location: **LONDON, ONTARIO.**Hole Location: **See Enclosure No 1.**Hole Elevation and Datum: **784.9 feet.**Field Supervisor: **L.W.** Prep.: **L.W.**Driller: **J.L.** Checked:

Date:

**LEGEND**

Shear Strength (C)

Unconfined compression

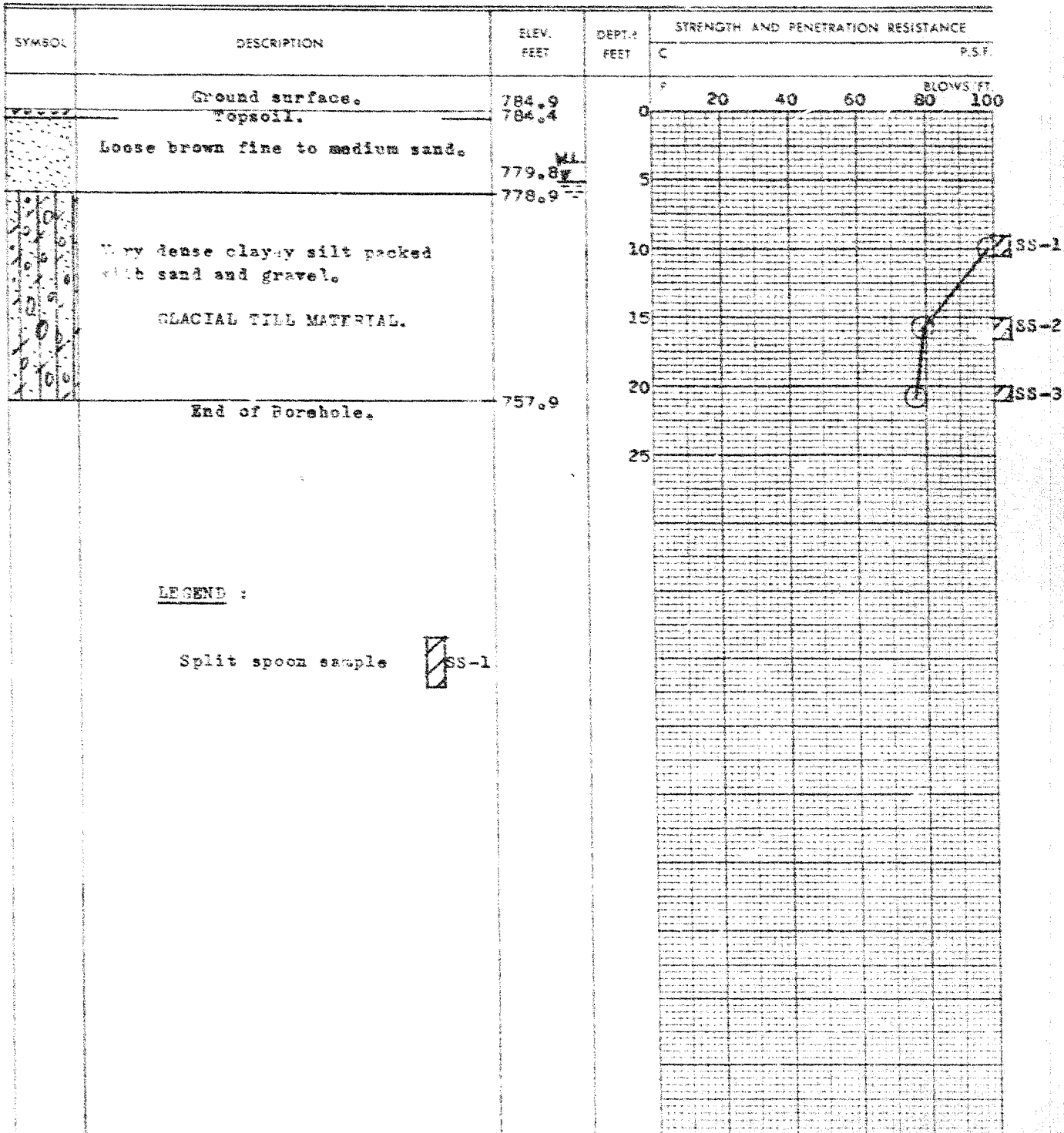
Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕  
45

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: **No 6**Project: **THAMES RIVER CROSSING AT HIGHBURY AVENUE**Location: **LONDON, ONTARIO.****EXTENSION.**Hole Location: **See Enclosure No 1.**Hole Elevation and Datum: **782.0 feet.**Field Supervisor: **L.W.** Prep.: **L.W.**Driller: **J.L.** Checked:

Date:

**LEGEND**

Shear strength (C)

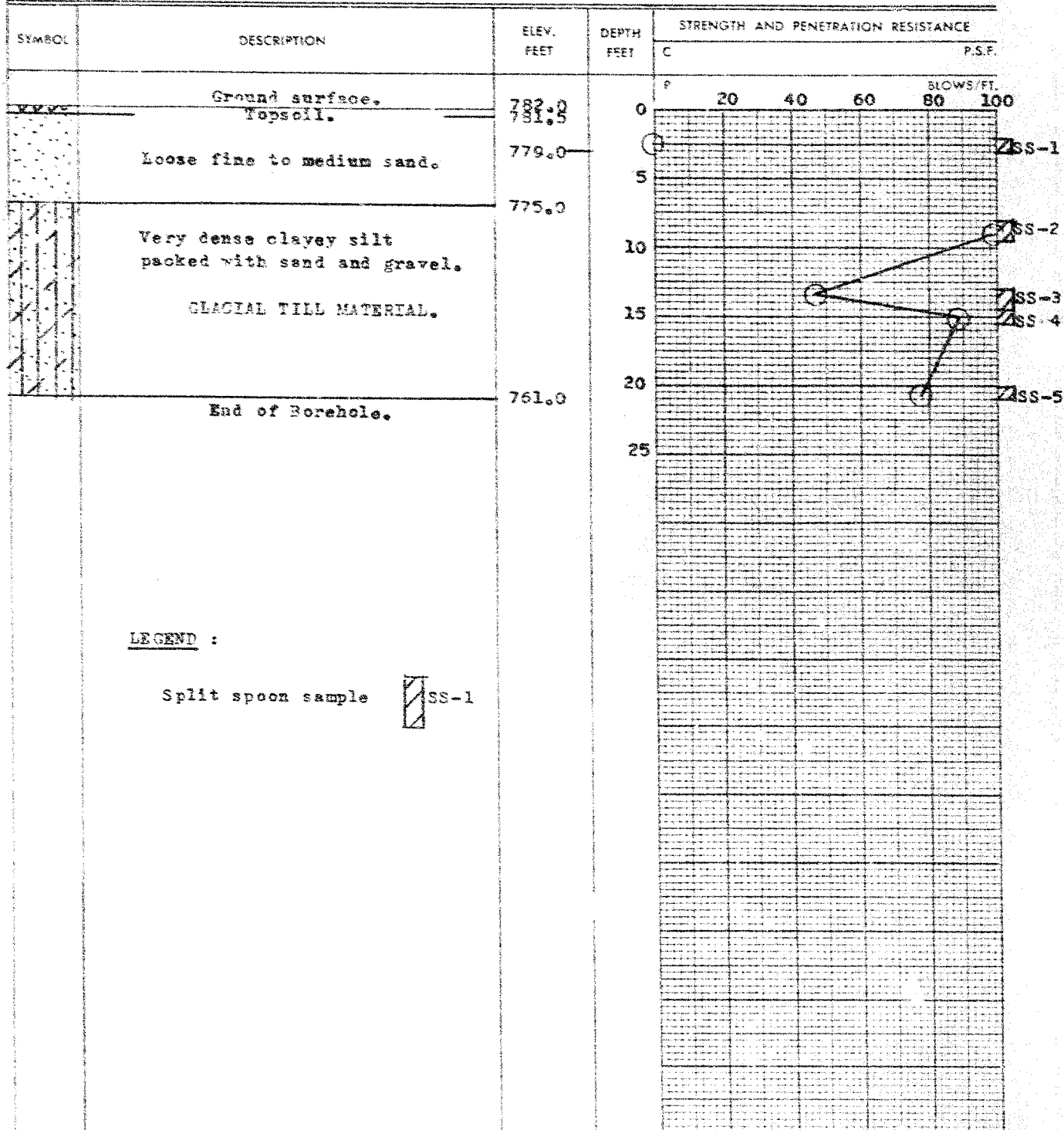
unified compression  
vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕  
+3⊕  
⊕  
⊕

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: No. 7

Project: THAMES RIVER CROSSING AT Highbury Avenue

Location: LONDON, ONTARIO.

Hole Location: See Enclosure No 1.

Hol. Elevation and Datum: 783.0 feet.

Field Supervisor: L.H. Rep.: L.H.

Driller: J. L. Checked:

Date: \_\_\_\_\_

### LEGEND

Shear Strength (C)

\* Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance : 2

2<sup>nd</sup> Soil tube

2" Dia. Cone


## Casing

## EXTENSION

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				C	P.S.F.
	Ground surface.	783.0	0		
	Topsoil.	782.5			
	Loose brown fine to medium sand.		5		
		776.0	10		
	Very dense clayey silt packed with sand and gravel.		15		
	GLACIAL TILL MATERIAL.		20		
	End of Borehole.	762.5	25		

**LEGEND :**

Split spoon sample  SS-1

Mr. A. M. Toye,  
Bridge Engineer.  
Materials & Research Section.

December 11, 1959.

FOUNDATION REPORT - by  
Eacey, MacCallum & Associates,  
Ltd.

Attention: Mr. S. McInnis.

Re: Foundation Investigation for Proposed  
Bridge across Thames River at Highbury  
Avenue Extension, London, Ont. - Dist. #2.

The Foundation Report, submitted by Eacey, MacCallum and Associates, Ltd., accompanying this memo, has been reviewed by this Section, and we concur with the conclusions of the Consultants in regard to this investigation.

However, should there be any queries with respect to the contents of this report, please do not hesitate to call our office.

LGS/HoeF  
Encl.

*L. G. Soderman*  
L. G. Soderman,  
PRINCIPAL SOILS & FOUNDATIONS ENGINEER

cc: Messrs. A. M. Toye (2)  
H. A. Tregaskes  
D. G. Ramsay  
A. Gater  
W. L. Fraser  
J. Roy  
A. Watt

Foundation Section  
Gen. Files.