

60-F-3200

W.P. 687-56

Hwy. # 401

HOOPLE CREEK

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

February 16, 1960.

FOUNDATION INVESTIGATION - by  
Racey, MacCallum & Associates.

Attention: Mr. S. McCombie.

Re: Hoople (Doherty) Creek - Highway 401,  
Lots 12 & 13, Twp. of Osnabruk -  
District 9, Ottawa, Ont.

Attached hereto, is the foundation investigation report for the above noted site, prepared by Racey, MacCallum and Associates.

This report has not been studied in detail; however, we are forwarding it to you so that you may use the data contained therein, to carry out your design commitments.

If you have any questions or comments pertaining to the data or recommendations presented in this report, please contact our Office.

*L. G. Sederman*  
for

L. G. Sederman,  
PRINCIPAL SOILS & FOUNDATIONS ENGINEER

LGS/MdeF

Attach.

cc: Messrs. A. M. Toye (2)  
H. A. Tregaskes  
D. G. Ramsay  
H. J. Ford  
L. E. Walker  
J. E. Gruspier  
A. Watt

Foundations Section  
Gen. Files.

# RACEY, MacCALLUM AND ASSOCIATES LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers  
AND ASSOCIATED STAFF

MONTREAL



VANCOUVER

TORONTO

DONALD C. MACCALLUM, B.ENG., M.E.I.C., P.ENG.

H. JOHN RACEY, B.SC., Z.E.I.C., P.ENG.

GEORGE L. HOUGHTON, A.M.I.MECH.E., M.E.I.C., P.ENG.

TORONTO DIVISION  
27 CARLTON STREET

Reference: S-500/T-2062  
- Report -

9th February, 1960

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

60-F-320C

W.P. 687-56

Attention: Mr. L. G. Soderman.

RE: FOUNDATION INVESTIGATION FOR HOOPLE (DOHERTY)  
CREEK BRIDGE FOR HWY.#401, OSNABRUK, ONTARIO,  
AND DIVERSION OF HOOPLE CREEK.


Dear Sir,

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,

  
J. J. Schoustra, P.Eng.,  
Divisional Soil Engineer.

JJS/YDP

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

FOUNDATION INVESTIGATION FOR HOOPLE (DOHERTY)  
CREEK BRIDGE FOR HWY.#101, OSNABRUK, ONTARIO,  
AND DIVERSION OF HOOPLE CREEK.

Reference: S-500/T-2062  
- Report -

Racey, MacCallum and Associates  
Limited.

9th February, 1960

# RACEY, MACCALLUM AND ASSOCIATES LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers  
AND ASSOCIATED STAFF

MONTREAL



VANCOUVER

TORONTO

DONALD C. MACCALLUM, B.ENG., M.E.I.C., P.ENG

H. JOHN RACEY, B.SC., M.E.I.C., P.ENG

GEORGE L. HOUGHTON, A.M.I.MECH.E., M.E.I.C., P.ENG

TORONTO DIVISION  
27 CARLTON STREET

Reference: S-500/T-2062

- Report -

9th February, 1960

## FOUNDATION INVESTIGATION FOR HOOPLE (DOHERTY) CREEK BRIDGE FOR HWY.#401, OSNABURK, ONTARIO, AND DIVERSION OF HOOPLE CREEK:

### INTRODUCTION :

The field investigation to determine the subsoil conditions at the site was carried out from 13th to 25th January, 1960, employing two Boyles diamond drills. In addition to four originally planned boreholes, two other boreholes were sunk due to variations encountered in Boreholes No 4 and 6.

Borehole data and related sampling, with profile and plan, are indicated in Enclosures No 1 - 7.

### FIELD CONDITIONS :

The site presents a uniform top soil of about one foot in thickness, underlain by glacial till. Bedrock of the site belongs to the Trenton - Black River epoch; it is limestone and of marine origin. Subsoil is part of the Glengarry till formation, which often presents a stony appearance. This till is generally shallow and in this area the bedrock seldom lies below 100 feet from the surface: in this case it exists at 30 feet below ground level. Drumlins are common in the morphology of the area. This site appears to be subjected to minor seasonal floods.

In Boreholes No 1, 2 and 3 the topsoil is underlain by 3 - 4 feet of thick brownish silty-sand with little clay, and further by a thin one-half to one foot thick layer of brown medium size sand. This portion, however, does not appear segregated in Boreholes No 4, 5 and 6, in which the topsoil is directly underlain by grey till. The bedrock is limestone.

Reference: S-500/T-2062  
- Report - Continued.

9th February, 1960

In connection with Boreholes No 1 and 2, an artesian condition was observed when the bedrock was penetrated. This condition obviously indicates the existence of perched water trapped in the limestone formation.

A water table has been recorded in Boreholes No 2, 5 and 6, and the depth of oxidation extends to about 4.5 feet from the topsoil. Accordingly, it would be quite safe to assume that the water table reaches an elevation of 246.0 feet during the season of normal precipitation for this area. It was observed that the water in the creek was 6 inches deep, with a surface of  $1\frac{1}{2}$  inches of ice. According to local enquiries, flooding has often been experienced during the Spring season.

Samples from all boreholes indicate quite similar characteristics regarding the till formation. The composition of till offers an intimate mixture of silty-sand with some clay and gravel. Till is well compacted and appears to have little plasticity and some cohesion.

#### DISCUSSION :

The well compacted nature of the subsoil, together with its penetration resistance and the relative shallowness of the till over the bedrock, offer certain possibilities as to the type of foundation. The nature of the job and the width of the river may lead to a rigid frame structure with possibly a centre pier, allowing very little differential settlement. Since the bedrock is at a shallow depth and according to recommended maximum bearing capacity of the subsoil, a pile foundation may be considered suitable from both a structural and an economical point of view. Footing type foundation may be considered in connection with the training wall, as indicated in the Project W.P. 687-56, BW-337, October 1959, and referred to in the memorandum dated 21st October, 1959. In this case for the safe bearing capacity of the formation, with regard to Borehole No 2 which is situated in the immediate vicinity of the training wall, 4,000 psf can be recommended as an absolute maximum. Accordingly the expected settlement would not exceed one inch.

The proposed diversion course may not involve any difficulties, and could be carried out with normal excavation. The

Reference: S-500/1-2062  
- Report - Continued.

9th February, 1960

mechanical analyses of material from Boreholes No 3 and 6, shown on Enclosures No 8 and 9 respectively, indicate a well-graded material.

CONCLUSIONS :

The results of this investigation may be summarised as follows :

1. The site of the project offers a profile in which a grey glacial till predominates, with limestone bedrock appearing with the deepest recorded elevation of 220.9 feet. A certain artesian condition was encountered suggestive of trapped water in the bedrock, which may be seasonal.
2. The water table does not appear to be erratic, and may be expected to reach an elevation of 246.0 feet during the season of normal precipitation. Spring floods may often occur.
3. Pile foundation may be recommended. The training wall could be supported on spread footings. In this case the maximum allowable bearing capacity should not exceed 4,000 psf. Diversion canal basically involves a shallow cut of 6 feet and can be carried out with normal excavation without risk of slope failure. The results of sieve analyses for Boreholes No 3 and 6 for the shallowest samples appear in Enclosures No 8 and 9.

After diversion is accomplished, the compaction of the material to be used in connection with the fill for the creek must yield a density comparable to the till.

  
A. S. Yalcin, P.Eng.,  
Project Engineer.





**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: No 1

Project: FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD,

Location: SOUTH OF OSNABRUK, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 251.9 feet.

Field Supervisor: J.W. Prep.: A.S.Y.

Driller: M.G. Checked: Date:

**LEGEND**

Shear Strength C

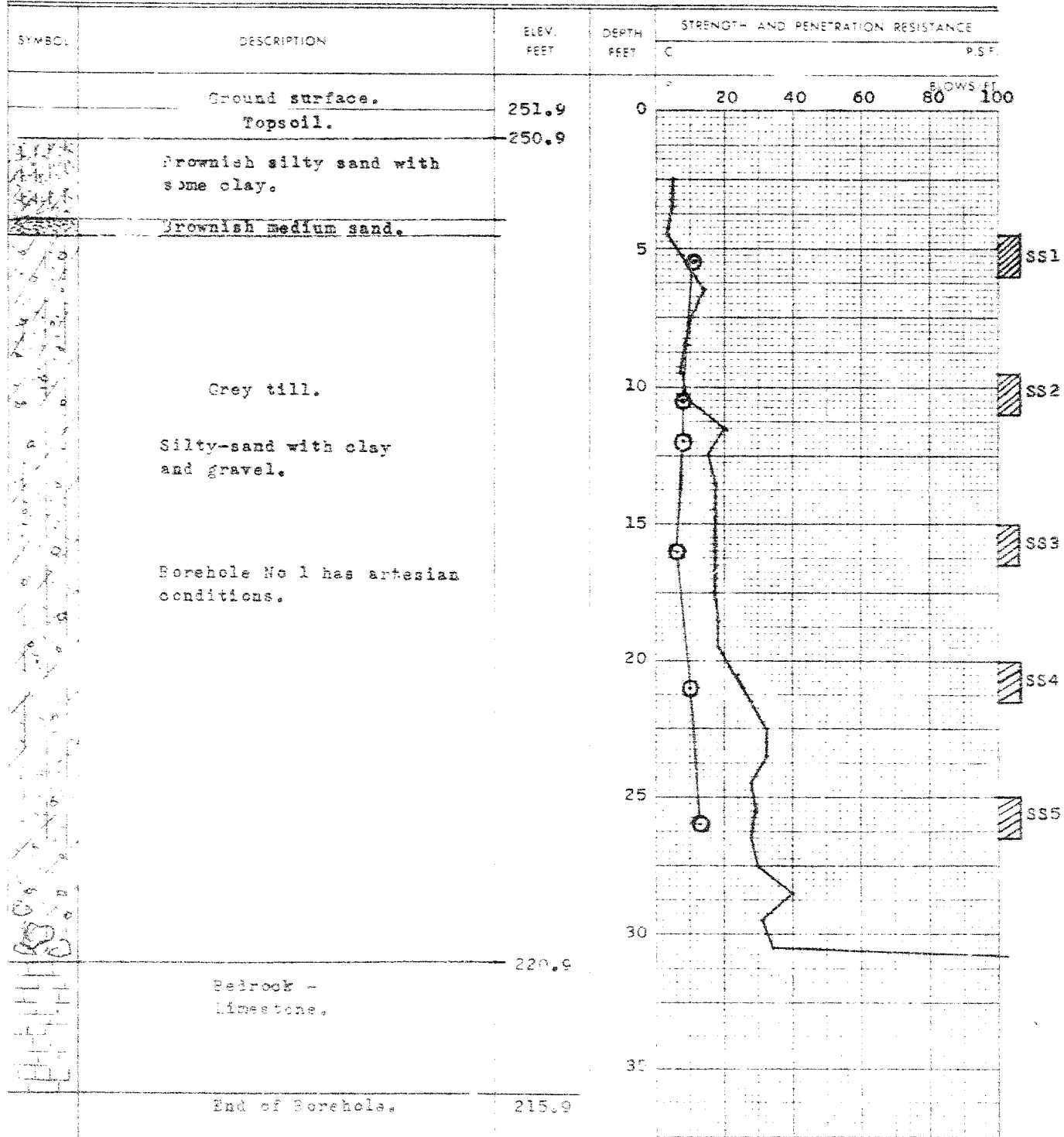
Unconfined compression  
Vane test and sensitivity S.

Penetration Resistance P

2" Split tube

2" Dia. Cone

Casing

⊕  
+5

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: No 2

Project: **FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD,** **LEGEND**Location: **SOUTH OF OSWABRUK, ONTARIO.**

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: **251.2 feet.**Field Supervisor: **J.W.** Prep.: **A.S.Y.**Driller: **M.G.** Checked: Date:

Shear Strength (C)

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance (P)

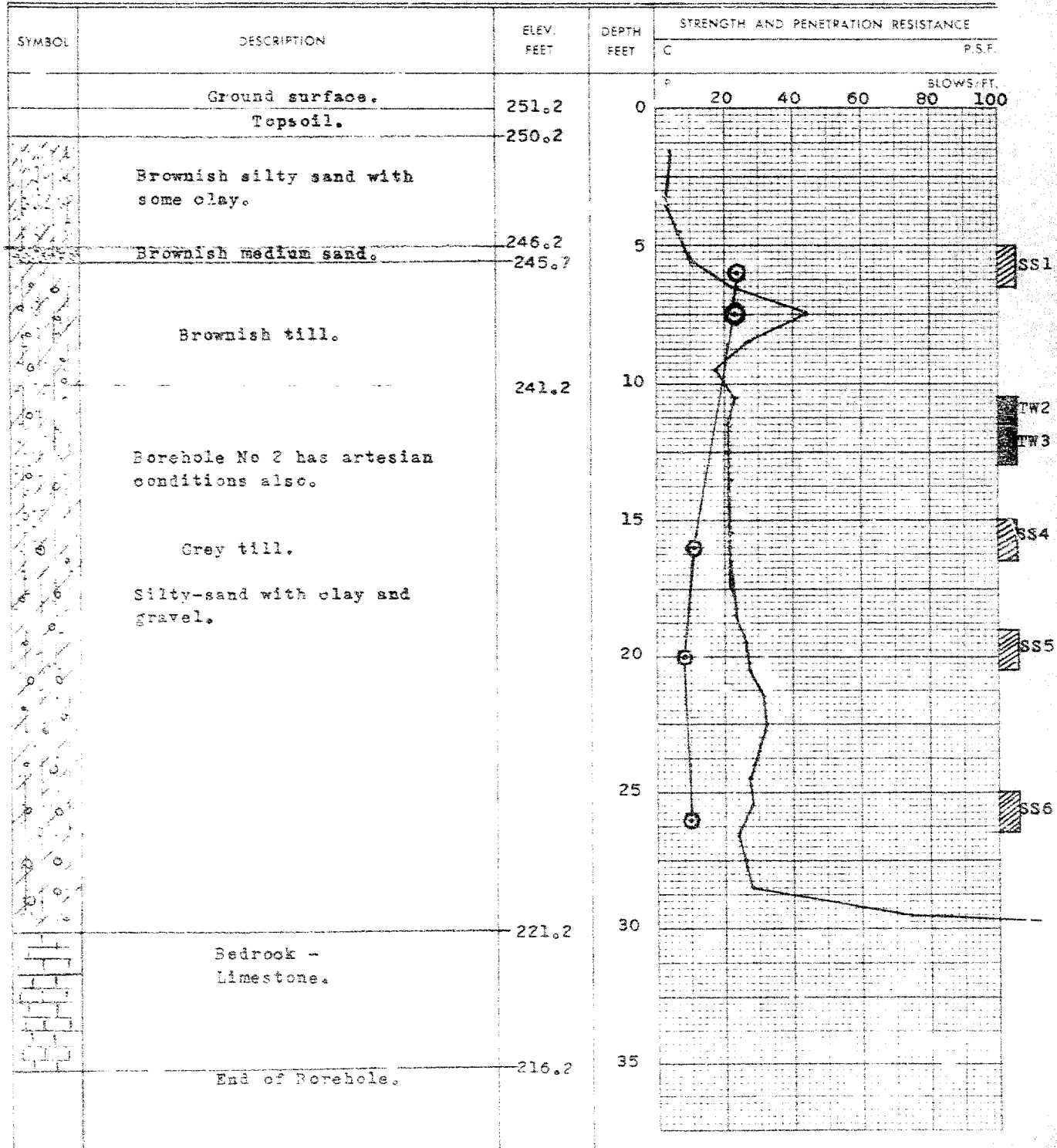
2" Split tube

2" Dia. Cone

Casing

⊕  
+5

⊕ ⊕



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: No 3

Project: FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD,

Location: SOUTH OF OSNABRUK, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 251.2 feet.

Field Supervisor: J.W. Prep.: A.S.Y.

Driller: M.C. Checked:

Date:

**LEGEND**

Shear Strength (C)

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance - P

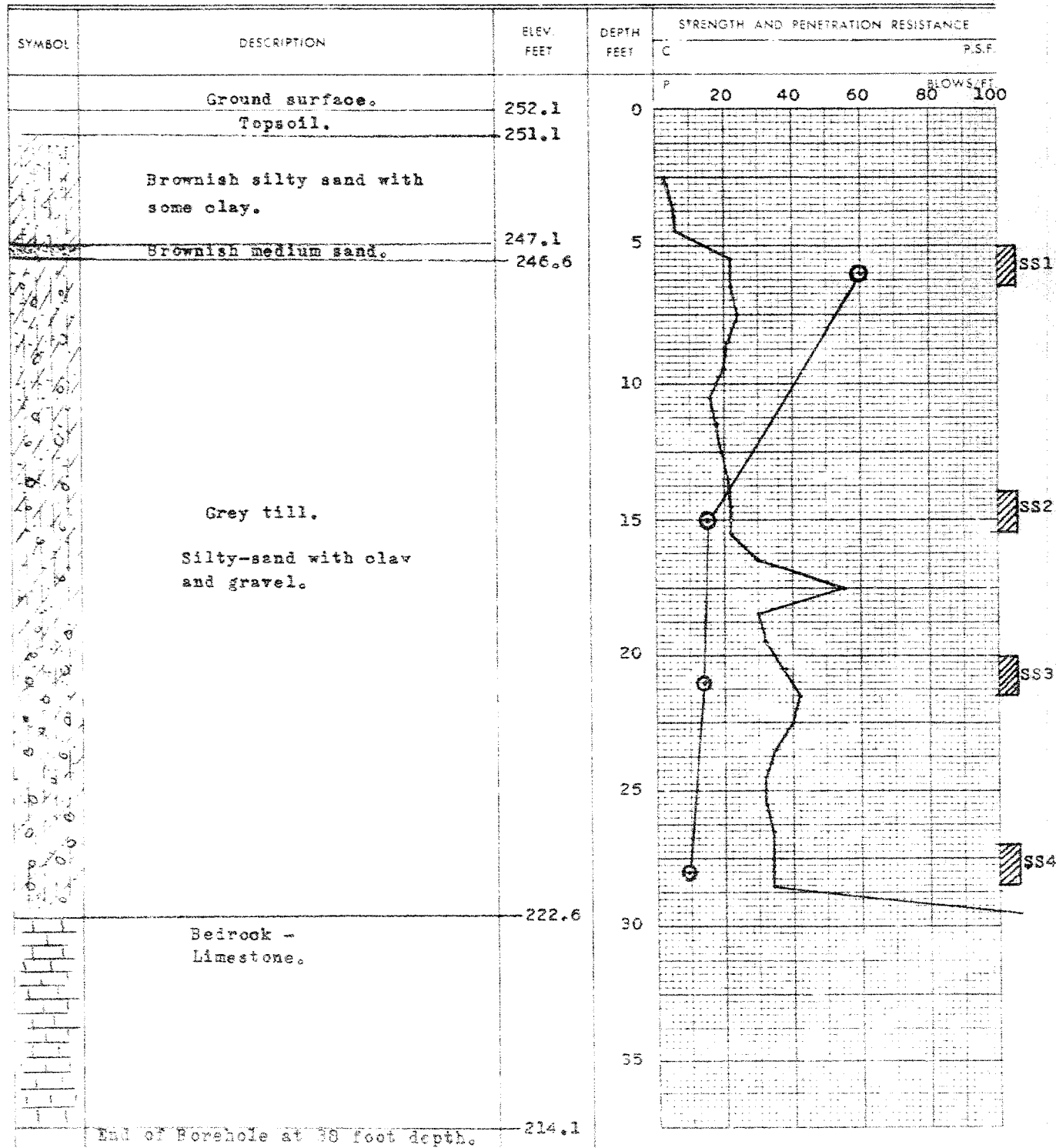
2" Split tube

2" Dia. Cone

Casing

⊕  
+S

⊕ ⊕



## RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: No 4

Project: FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD,

Location: SOUTH OF OSNABURK, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 252.1 feet.

Field Supervisor: J.W. Prep.: A.S.V.

Driller: M.G. Checked: Date:

## LEGEND

Shear Strength C

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance P

2" Split tube

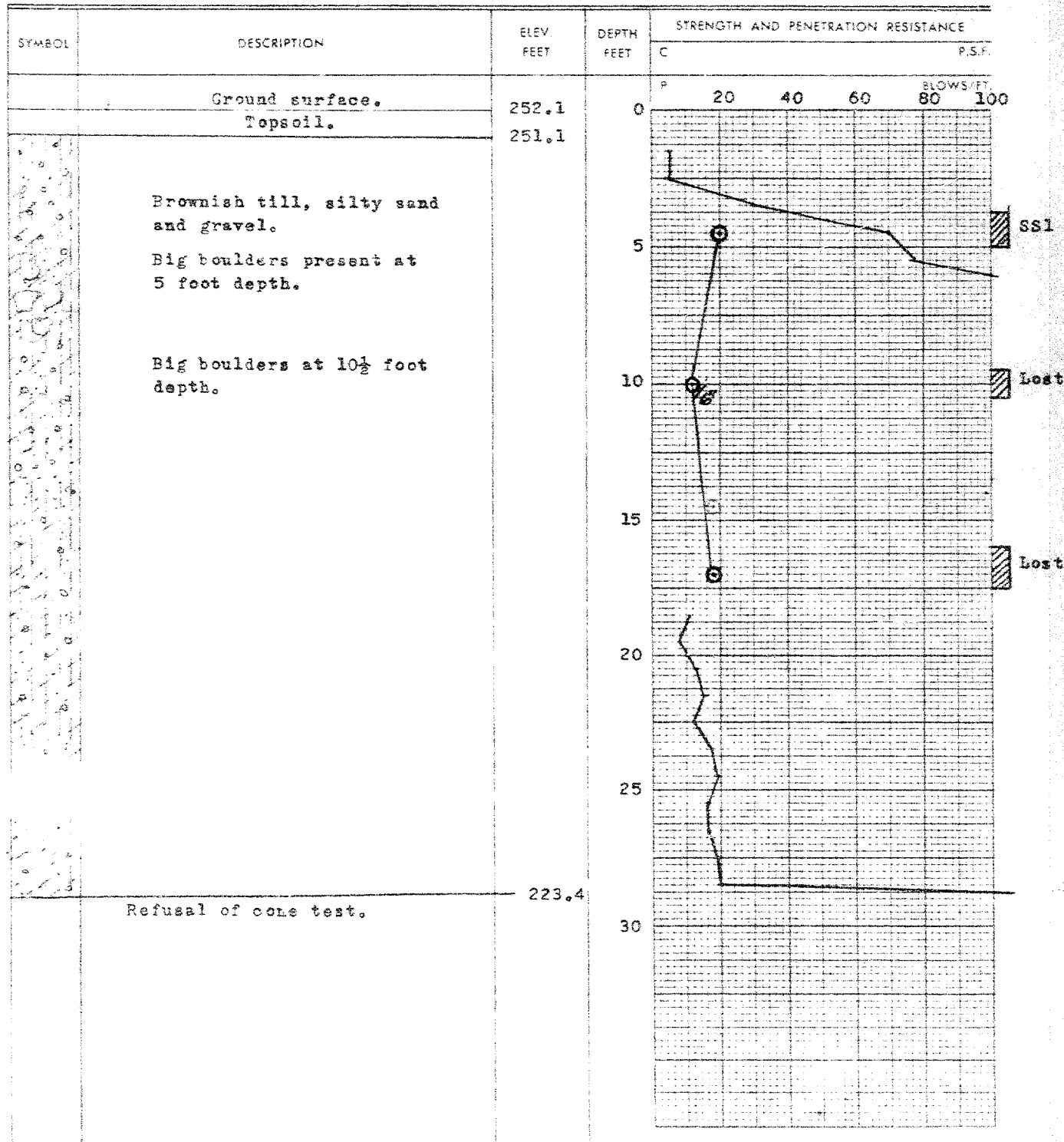
2" Dia. Cone

Casing

⊕  
+S

⊕ ⊕ ⊕

-----



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: **No 5**Project: **FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD,**Location: **SOUTH OF OSNABRUK, ONTARIO.**Hole Location: **See Enclosure No 1.**Hole Elevation and Datum: **251.8 feet.**Field Supervisor: **J.W.** Prep.: **A.S.Y.**Driller: **M.G.** Checked: \_\_\_\_\_ Date: \_\_\_\_\_**LEGEND**

Shear Strength (C)

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

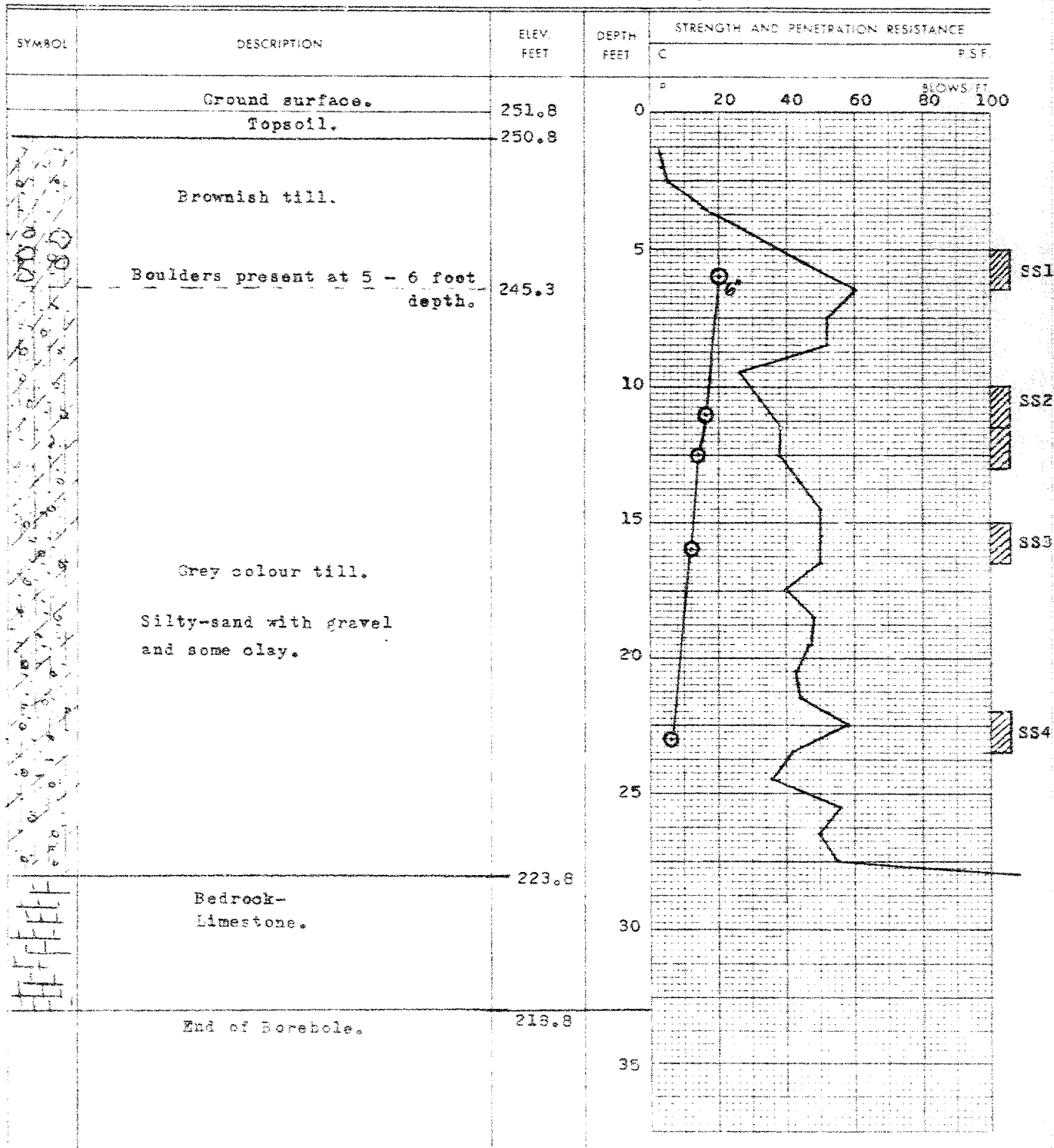
2" Dia. Cone

Casing

⊕  
+S

⊕ ⊕

-----



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: No 6

Project: FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD,

Location: SOUTH OF OSNABRUK, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 251.7 feet.

Field Supervisor: J.W. Prep.: A.S.Y.

Driller: M.G. Checked: Date:

**LEGEND**

Shear Strength (C)

Unconfined compression

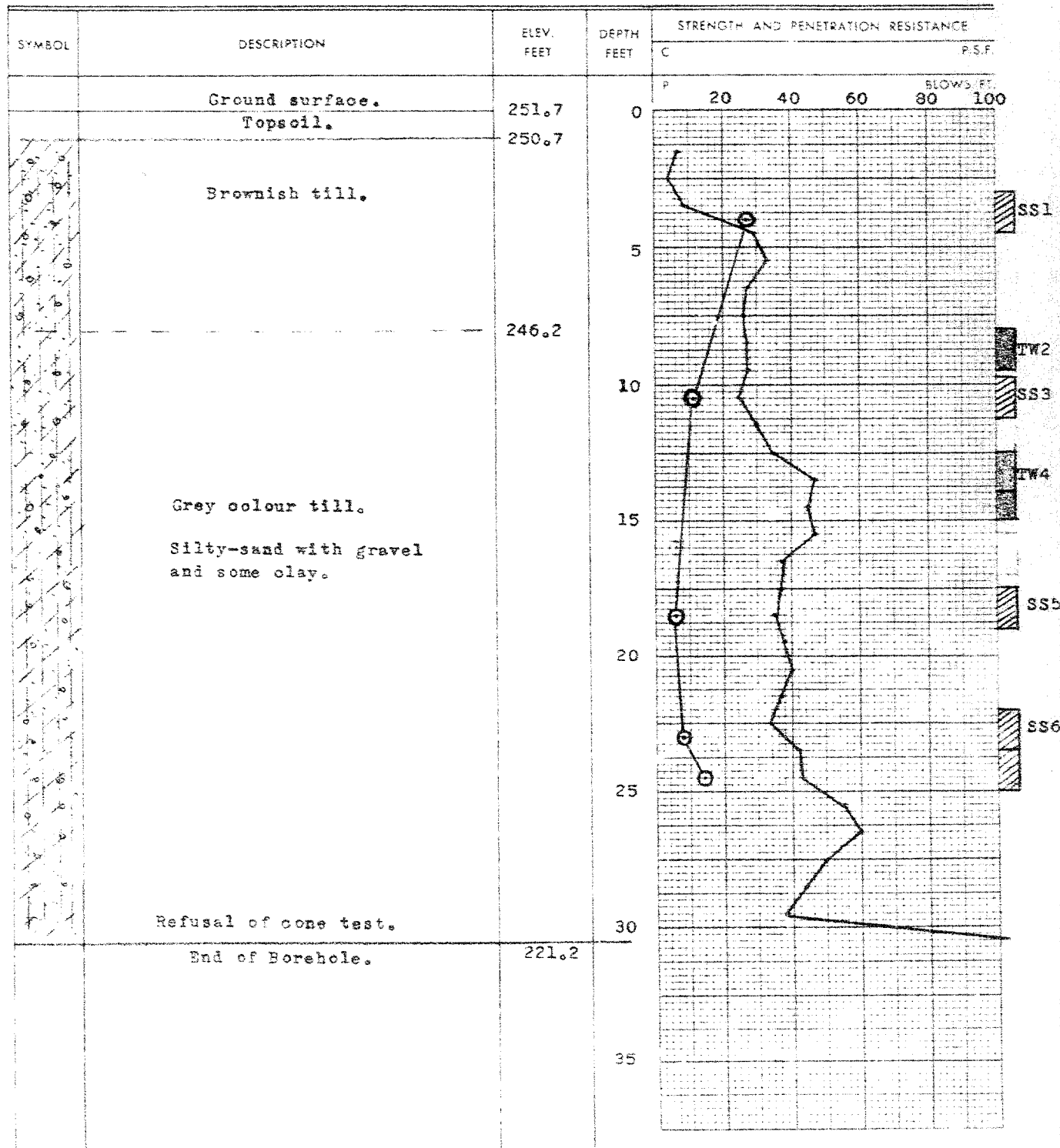
Vane test and sensitivity (S)

Penetration Resistance (P)

2" Spill tube

2" Dia. Cone

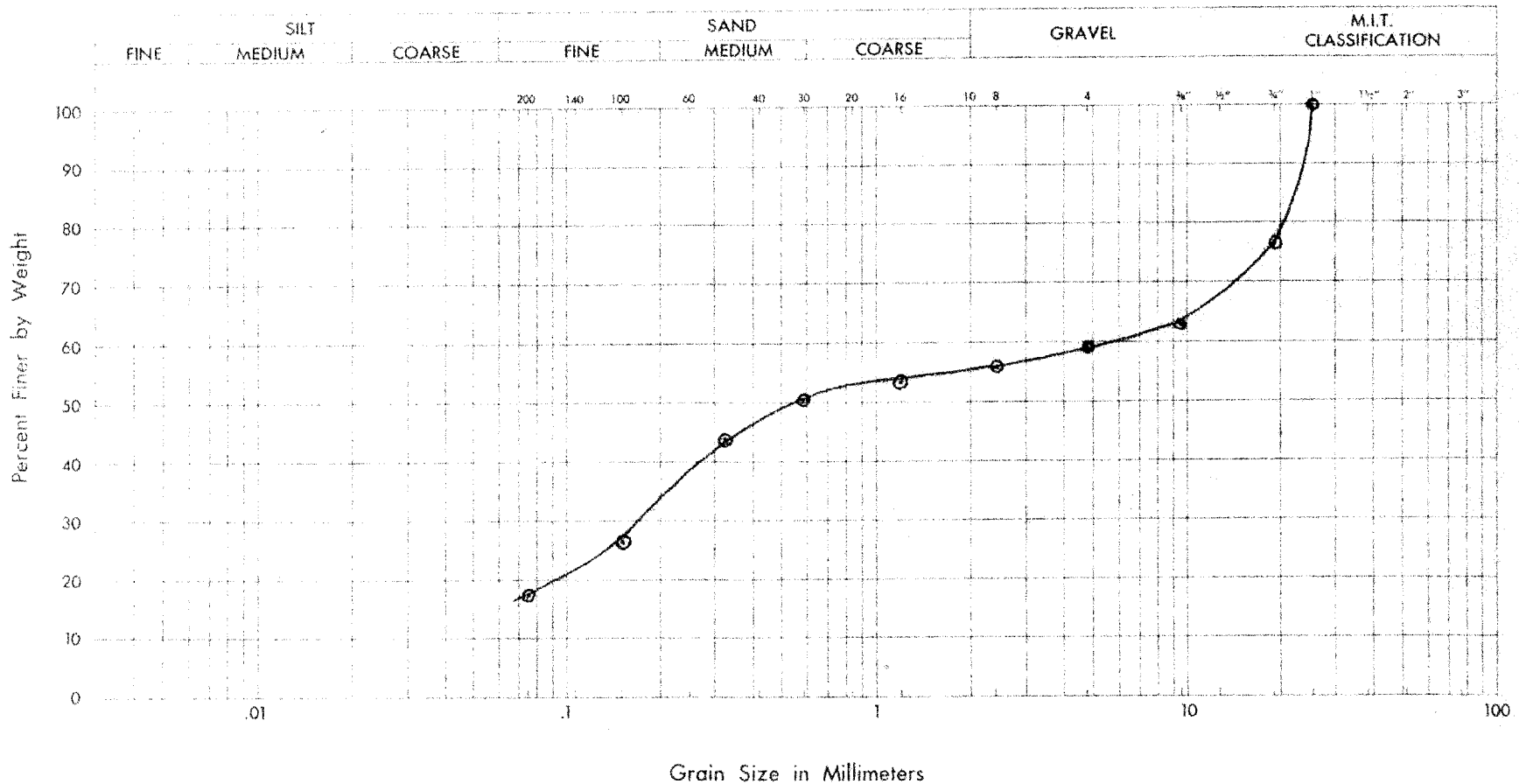
Casing

⊕  
4.5⊕  
⊕⊕  
⊕⊕  
⊕

# RACEY MacCALLUM AND ASSOCIATES LTD.

## GRAIN SIZE DISTRIBUTION

4th February, 1960



Project: FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD, SOUTH OF OSNABRUK, ONTARIO.

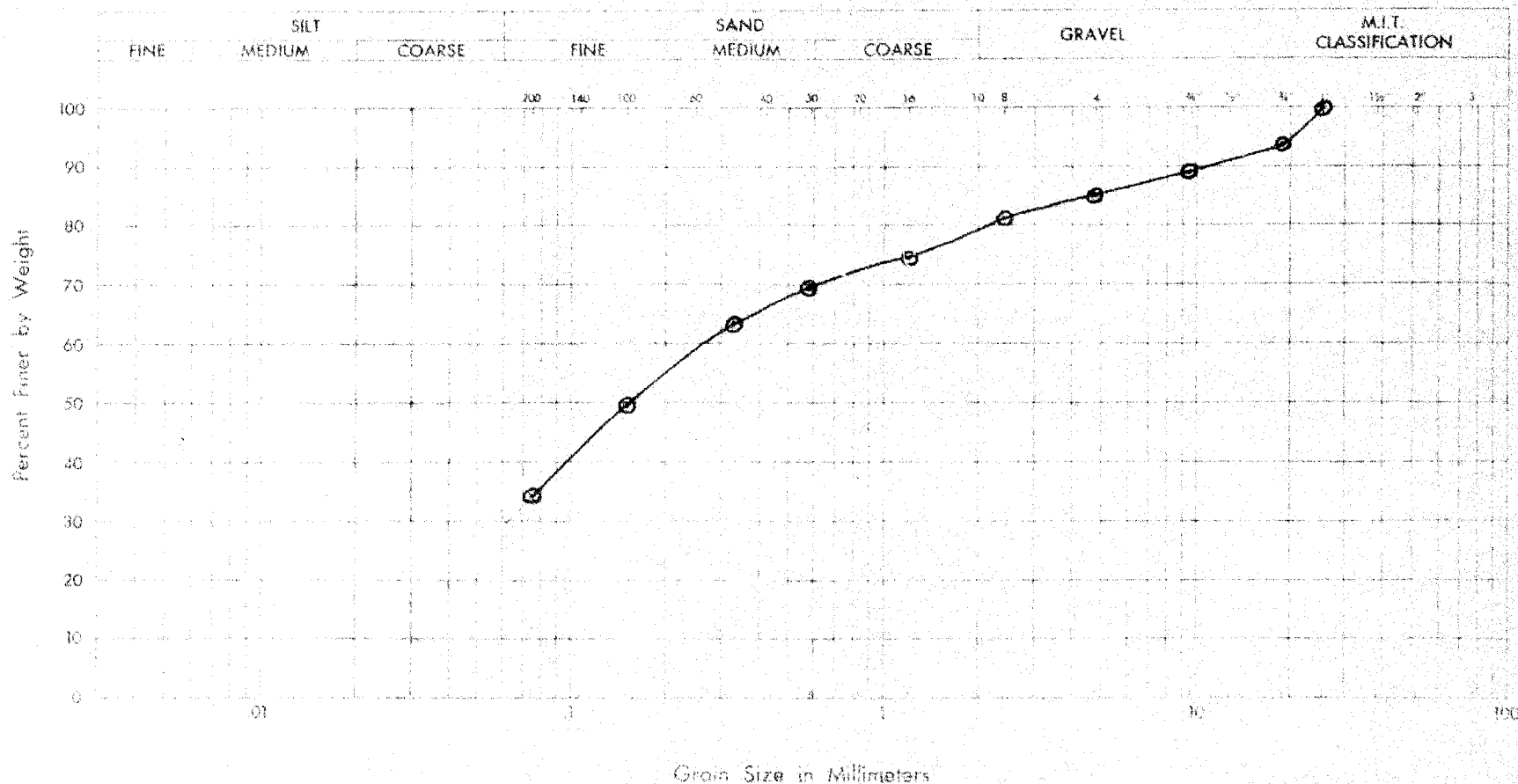
Order No. S-500/T-2062

Legend: Borehole No 3, Sample No 1.

# RACEY MacCALLUM AND ASSOCIATES LTD.

## GRAIN SIZE DISTRIBUTION

4th February, 1960



Project FOUNDN. INVEST. FOR BRIDGE SITE OVER COUNTY ROAD, SOUTH OF OSNABRUK, ONTARIO.

Order No S-500/T-2062

Log: d

Borehole No 6, Sample No 1.