

59-F-255C

W.P. 116-58

Hwy. #6

SAUGEEN RIVER

BA 9/3

# RACEY, MacCALLUM AND ASSOCIATES LIMITED

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TORONTO

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

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

A. ERIC RANKINE, B.SC., M.E.I.C., A.M.I.ELEC.E., P.ENG.

TORONTO DIVISION  
27 CARLTON STREET

Reference No. S-500/T-1530

Toronto 2, Ontario,  
8 July, 1959.

Department of Highways, Ontario,  
Bridge Office,  
280 Davenport Road,  
TORONTO, Ontario.

Attention: Mr. J. McAllister

59-F-255 C

W.P. 116-58

FOUNDATION INVESTIGATION FOR A  
PROPOSED BRIDGE OVER THE SAUGEEN RIVER  
ON HIGHWAY NO. 6 AT  
MOUNT FOREST, ONTARIO

Dear Mr. McAllister,

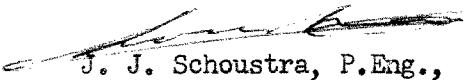
The enclosed report contains the results of borings conducted at the above mentioned location, in accordance with instructions contained in letters from the Materials and Research Section, D.H.O., dated May 28, 1959 (Ref. IGS/MdeF) and June 12, 1959 (Ref. K.P./L.G.).

Incorporated in this report are the results of the borings conducted at the same site during December 1958 and January 1959 and which were previously communicated to you.

We trust that the information contained therein is that which is required by you, but should you require any further information please do not hesitate to call us.

Yours very truly,

RACEY, MacCALLUM AND ASSOCIATES LIMITED

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

OLW/PW

Enclosure

Department of Highways of Ontario,  
Bridge Office,  
280, Davenport Road,  
Toronto - Ontario.

FOUNDATION INVESTIGATION FOR PROPOSED BRIDGE  
OVER THE SOUTH SAUGLEN RIVER ON HIGHWAY NO 6  
AT MOUNT FOREST, ONTARIO.

Reference: S-500/T-1530  
- Report -

Racey, MacCallum and Associates  
Limited.

8 July, 1959.

# RACEY, MacCALLUM AND ASSOCIATES LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

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A. ERIC RANKINE, B.SC., M.E.I.C., A.M.I.ELEC.E., P.ENG

TORONTO DIVISION  
27 CARLTON STREET

Reference: S-100/T-1530  
- Report -

Toronto 2, Ontario,  
8 July, 1959.

## FOUNDATION INVESTIGATION FOR A PROPOSED BRIDGE OVER THE SAUGEEN RIVER ON HIGHWAY NO. 6 AT MOUNT FOREST, ONTARIO

### PREVIOUS FIELDWORK:

In December 1958 and January 1959 three boreholes (Nos. 2, 3 and 6) were put down in positions indicated on the site plan (enclosure No. 1). The boring logs for these holes are shown on the data sheets (enclosures Nos. 2, 3 and 4) and the results are incorporated in the report that follows and in the preparation of the cross-section along the centre-line of the proposed bridge (enclosure No. 10).

### FIELDWORK IN JUNE 1959:

Boreholes numbered 7, 8, 9, 10 and 11 were put down in positions, as indicated on enclosure No. 1. Borings were conducted with a Longyear machine, using standard diamond drilling equipment. BX casing was run to the bottom of all holes and AX core bits and barrels were used when necessary. Split-spoon samples were taken, where possible, by driving the sampler by allowing a 140 lb. hammer to fall freely through a distance of 30 inches. The number of blows required to drive the sampler at the various sampling positions is recorded on the data sheets.

Adjacent to boreholes numbered 7 and 11, the 2" diameter cone was driven again by allowing the 140 lb. hammer to fall through 30 inches. The number of blows required to drive the cone through successive depths of one foot until refusal was reached is also recorded on appropriate data sheets.

Cores obtained, when drilling through rock, have been retained and are available for inspection if desired.

Reference Report  
S-500/T-1530 Continued

8 July, 1959.

GEOLOGY OF THE SITE:

Chapman & Putnam<sup>(1)</sup> state that "above Walkerton the several branches of the Saugeen flow in the old glacial spillways which are associated with the Horseshoe morainic system". On the accompanying map, the site investigated is shown as being in one of these spillways.

Downstream from the bridge, the valley is seen as a gravel-bottom valley with fairly steep side slopes consisting of a sandy till with a high boulder content. Pockets of sand and layers of clay rich material are distributed throughout the till.

The borings indicate that this sandy and stony till overlies a considerable thickness of dense to very dense, fine to coarse, brown-grey sands. These sands were not completely penetrated by any of the boreholes put down although, at the bottom of the deepest hole (Borehole 3) - at elevation 1250 ft. - a boulder at least 8" in diameter was drilled through.

Between the till and the sands there is a thin but variable stratum of boulders and/or grav. which runs into the rocky bottom of the river bed.

Southward from the north slope of the valley, an embankment has been constructed on the gravel bottom of the valley to carry the northern approach to the present bridge. Between this embankment and the southern slope of the valley, a concrete clad dam contains the upstream waters at a level approximately 13 feet above the water level below the dam.

SITE CONDITIONS:

(a) South Abutment - Boreholes 6, 7 and 11

It would appear that sand and gravel fill material has been used to build up the south slope of the valley to a height suitable for the southern approach to the present bridge. This fill is in a rather loose condition.

Below the fill, the layer of sandy till - from 10 to 15 feet thick - is in a dense to very dense condition. Between this till and the underlying sands a stratum of boulders or gravel was encountered in all three holes.

In two of the boreholes (Nos. 11 and 7) the top of the sand is shown to be in a firm condition but rapidly changing to a very dense condition with increase in depth. In borehole 6, ~~dense~~ to very dense values were obtained with the split-spoon as soon as the sand was encountered.

(1) Chapman, L.J. and Putnam, D.F. "The Physiography of Southern Ontario." University of Toronto Press (1951).

Reference Report  
S-500/T-1530 Continued

8 July, 1959.

SITE CONDITIONS Cont'd

(b) Midstream - Borehole 2

One borehole drilled midstream and just off the western edge of the concrete apron indicated boulders to a depth of 20 feet below water level. Depth of water at this point was four feet. The hole was abandoned at this depth with the concurrence of the Department of Highways.

(c) North Abutment - Boreholes 3, 8, 9 and 10

The northern approaches of the bridge have been built on an embankment of fill material which has been extended out from the north bank of the valley. It is probable that most material above the elevation of approximately 1316 feet is fill.

At the north abutment, this fill material consists essentially of small to large boulders and extends to below the elevation quoted above, as indicated by the presence of timber below this level. The rockfill is in contact with the gravel bottom of the valley and so the sands are not reached until an elevation of between 1302 feet and 1306 feet. Below this level the material consists of various strata of silts and fine to medium sands to a depth of at least 50 feet.

North of the abutment, and forming the embankment, various materials have been used for fill. This was very loose and not many samples could be retained in the split spoon. Enough was obtained to indicate the high organic content and the presence of sawdust and pieces of wood.

It is probable that the embankment material under the road pavement is of a more substantial nature, and that the organic fill, sawdust, etc., penetrated in Borehole No. 10, has been dumped over a period of time, subsequent to the building of the embankment.

RECOMMENDATIONS RE FOUNDATIONS:

1. South Abutment

Assuming the abutment foundations are to be founded at a depth of 6 feet below the level of the bed of the river as a safeguard against scour, soil pressures of up to 8000 lbs. per sq. ft. can be utilised for spread footings.

At this level (elevation 1305 ft.) the footings would be founded on the very dense fine to coarse sands which occur in depth for at least 50 feet. The upper part of these sands which in Borehole 7 are indicated as being rather less than dense, would be removed in excavating to this level.

Reference Report  
S-500/T-1530 Continued

8 July, 1959.

RECOMMENDATIONS RE FOUNDATIONS Cont'd

1. South Abutment Cont'd

In the excavating and placing of the concrete, considerable trouble must be expected with the water from the river, due to the very permeable nature of the rocky bottom and the direct connection between the riverbed and the excavation via the boulder stratum through which the excavation would have to be made.

This problem could perhaps be overcome by founding the footings at a higher elevation at say 10 feet back from the present water's edge. In such a case, scour protection could be provided by the existing abutment and retaining wall.

Any excavation should, however, be bottomed below the boulder rich stratum between the fill and the sands. The approximate position of this stratum can be seen in the centre-line section of enclosure No. 10.

The above mentioned protection against scour may not be so necessary here as in a free flowing river, as the weir, assuming that it remains in place, exerts considerable control over the flow of the water.

2. Midstream

It is to be expected that the very dense sands found in the boreholes on each side of the river would also underlie the centre of the stream. However, drilling midstream indicates that at least 10 feet of boulders overlie the sands and it is possible that up to 25 feet would have been found if drilling had continued.

Excavation of such material to such a depth would probably be too costly to warrant the use of a midstream pier.

3. North Abutment

Again, assuming that the abutment is to be founded at a depth of 6 feet below the riverbed, it would again be possible to bottom spread footings on the dense to very dense silty to fine sands. Soil pressures of up to 8000 lbs./sq. ft. could be used at an elevation of 1305 feet. This level is approximately coincident with the upper surface of these sands.

As on the site of the south abutment, bottoming the foundations at this level will introduce considerable constructional difficulties with in-flowing water. At this site - of the north abutment - the four walls of the excavation below river level will consist almost entirely of rock boulders.

Reference Report  
S-500/T-1530 Continued

8 July, 1959.

RECOMMENDATIONS RE FOUNDATIONS Cont'd

3. North Abutment Cont'd

Removal of the abutment foundations away from the present water's edge, as suggested for the south abutment, would not be of much assistance here due to the close proximity of the extra head of water behind the dam and the fact that the upper surface of the sands on which the footings would be bottomed is rising only very gradually in a northerly direction.

USE OF PILES:

Difficulties, which could be expected to occur during the construction of spread footings suggested above, would be such as to make the operation somewhat expensive.

Founding the abutments on friction piles driven into the sands would be an alternative method of construction.

Concrete or timber piles could be driven at the south abutment without much trouble. The considerable thickness of boulders through which a pile would have to be driven at the north abutment would probably necessitate the use of H-piles at this site.

However, it is likely that the vibrations produced during the driving operations would have serious effects on the condition of the dam and of the retaining wall on the west of the northern approach embankment. If it is desired to maintain the status quo of these structures, the use of piles can hardly be considered.

The driving of sheet piling is also likely to produce harmful effects on the dam and retaining wall.

CONCLUSIONS:

1. The whole bridge site is underlain by a thick deposit of dense to very dense, fine to coarse sands.
2. These sands provide adequate support for the placement of spread footings as follows:-
  - (a) South Abutment - 8000 lbs. per sq. foot at elevation 1302-1305 feet.
  - (b) North Abutment - 8000 lbs. per sq. foot at elevation 1305 feet.
3. The thickness of boulders in midstream would make the construction of a pier, in that position, very expensive.



Reference Report  
S-500/T-1530 Continued

8 July, 1959.

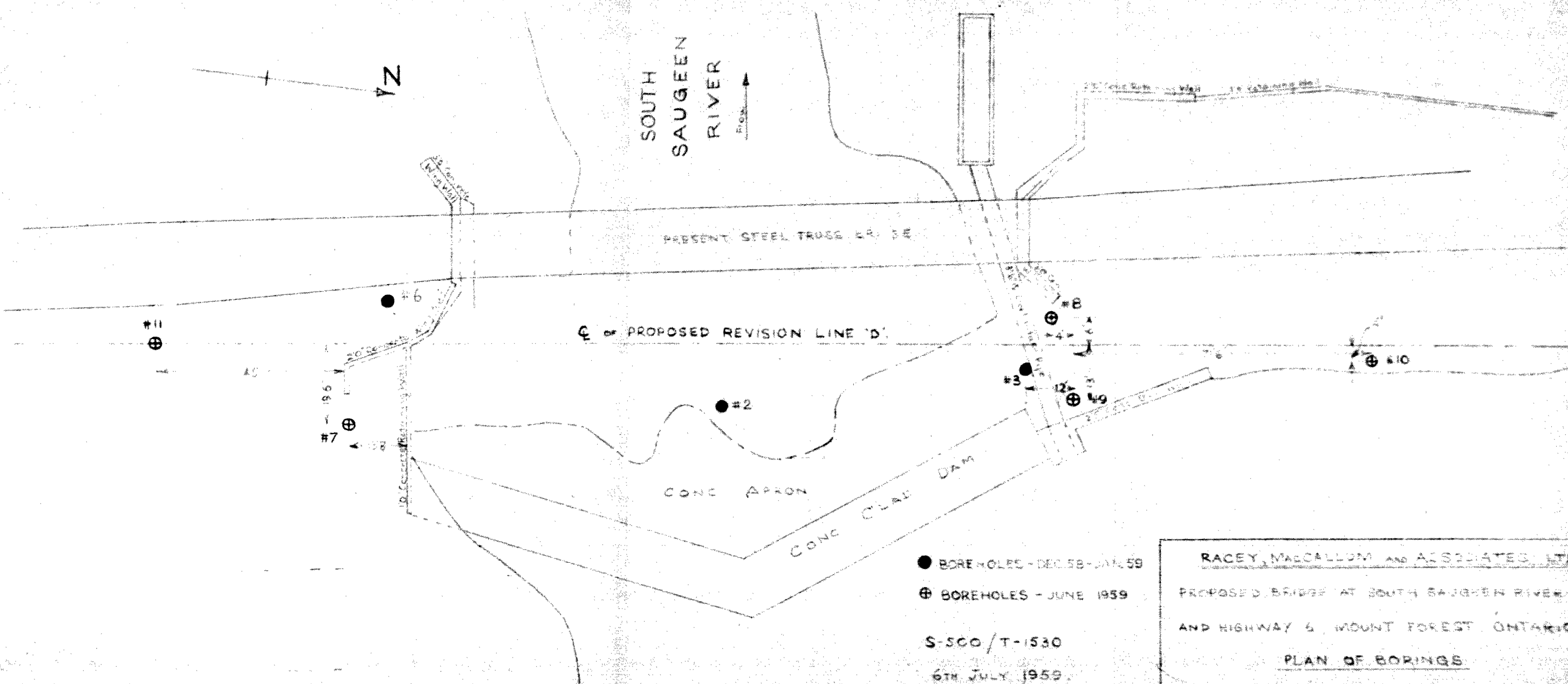
CONCLUSIONS Cont'd

4. Difficulties which are likely to be encountered in the construction of spread footings at the abutments will probably add considerably to the cost of the project.
5. Footings founded on piles would probably be cheaper and would involve fewer constructional difficulties but driving operations are likely to seriously damage two existing concrete structures.

*Owen L. White*

Owen L. White, B.Sc.,  
Project Engineer

OIW/PW



RACEY, MACCALLUM AND ASSOCIATES, LTD.

PROPOSED BRIDGE AT SOUTH SAUGEEN RIVER

AND HIGHWAY 6, MOUNT FOREST, ONTARIO

PLAN OF BORINGS

ENCLOSURE NO. 1

PREP. O.L.W.

## Foundation Engineering Division

Project: South Saugeen River Bridge,  
Location: South Saugeen River and Hwy. 6 at Mt. Forest.  
Hole Location: See Enclosure No. 1  
Hole Elevation and Datum: 1315.8 ft.  
Field Supervisor: R.H. Prep: O.L.W.  
Driller: F.B. Checked: Date: 9-14 Jan. 19

## Shear Strength Coefficient

Unconfined compression  
Vane test and sensitivity S

## Penetration Resistance P

2<sup>nd</sup> Split tube

2' Dia. Cone

### Casing

NUMBER	DESCRIPTION	ELEV FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE					
				C	P.S.F.				
				BLOWS FT.					
				0	20	40	60	80	100
	Water level.	1316	0						
	Water	1312							
	Rocks and boulders.		10						
			20						
	End of hole.	1295.5	30						

## RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 3.

Project: South Saugeen River Bridge,  
 Location: South Saugeen River & Hwy. #6, Mt. Forest.  
 Hole Location: See Enclosure No. 1.  
 Hole Elevation and Datum: 1316.5 ft.  
 Field Supervisor: R.H. Prep: O.L.W.  
 Driller: F.B. Checked:

31 Dec. 1958 &  
 Date: 5th-9th Jan/59.

## LEGEND

Shear Strength (C)

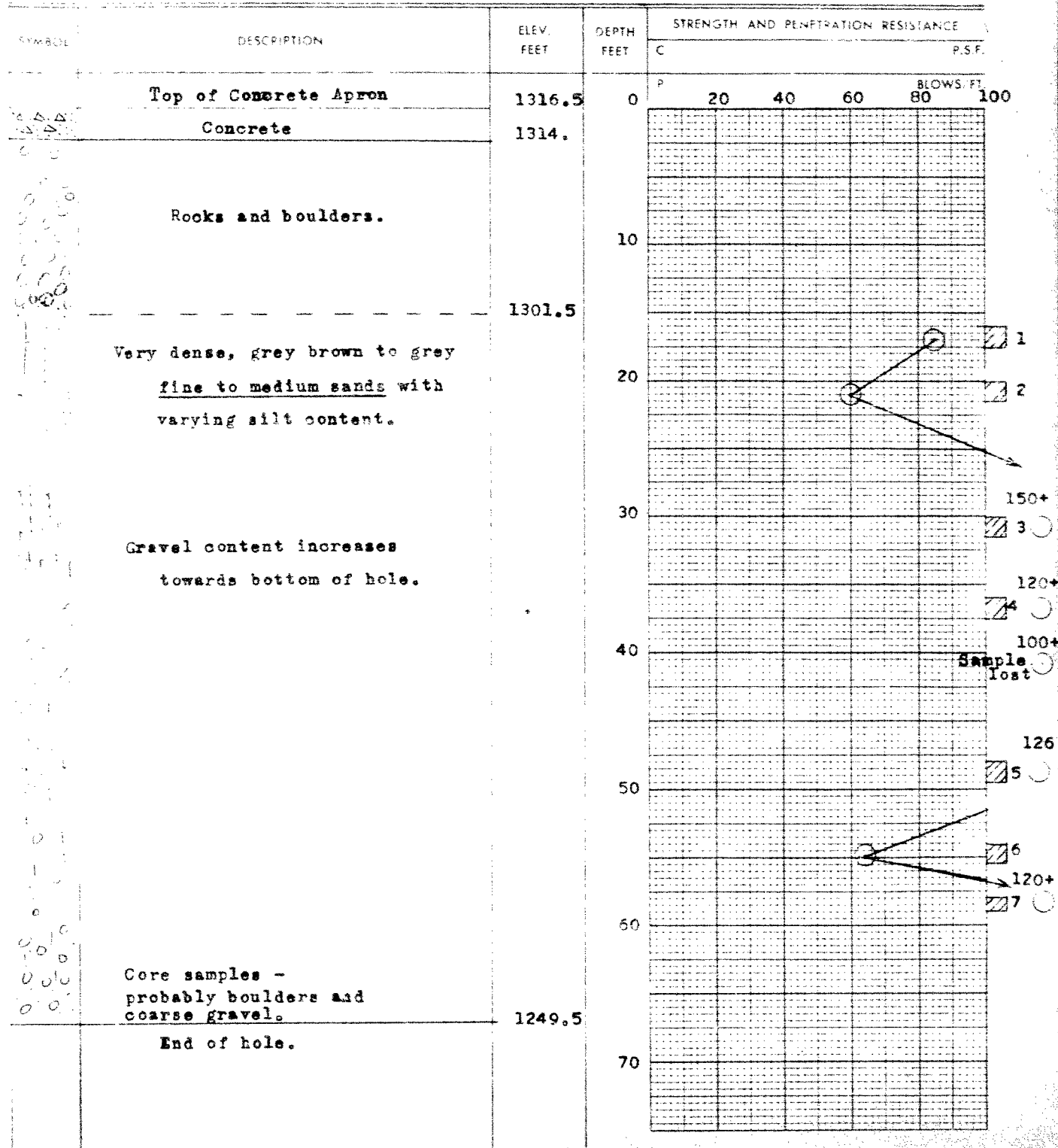
Unconfined compression  
 Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2 Dia. Cone

Casing

⊕  
+5

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: 6.

Project: South Saugeen River Bridge,  
 Location: South Saugeen River & Hwy 6 at Mt. Forest.  
 Hole location: See Enclosure No 1.  
 Hole Elevation and Datum: 1342.5 ft.  
 Field Supervisor: RH & BM Prep: O.L.W.  
 Driller: RG & FB Checked:

17 - 20, 22,  
 Date: 23, 29, 30 Dec/58

**LEGEND**

Shear Strength (C)

Unconfined compression  
 Vane test and sensitivity (S)

Penetration Resistance P

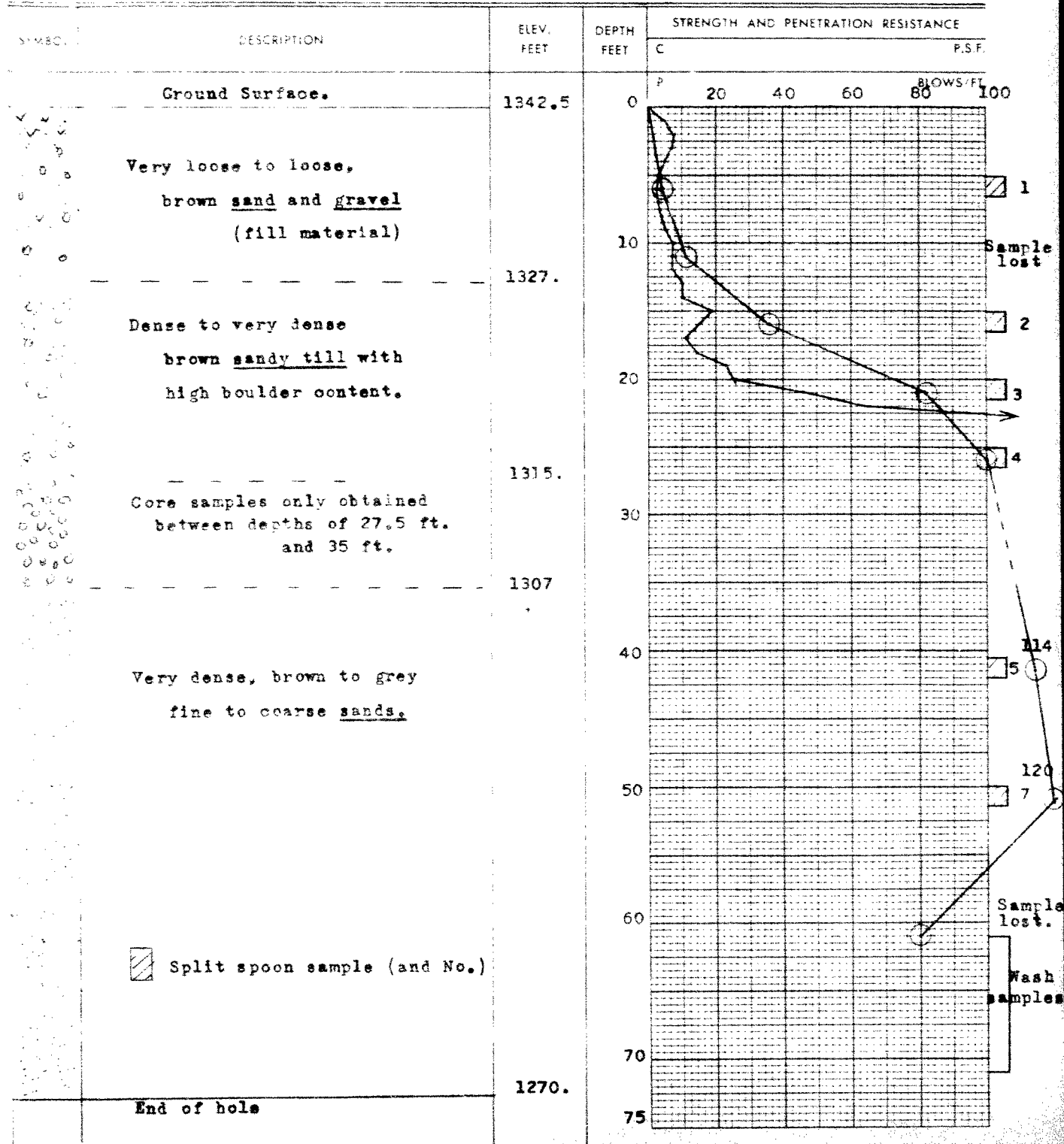
2" Split tube

2" Dia. Cone

Casing

⊕  
+5

⊕  
⊕



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: 7.

Project: South Saugeen River Bridge,  
Location: South Saugeen River and Hwy.#6 at Mt. Forest.  
Hole Location: See Enclosure No.1.  
Hole Elevation and Datum: 1337 ft.  
Field Supervisor: C.L.W. Prep: C.L.W.  
Driller: O.R. Checked: 3 - 5th and  
Date: 8th June 1960

### 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.	1337.	0		
	Loose sand and gravel fill.		10		
	<u>Weir level</u>				
	Very dense brown sandy <u>silt till.</u>		20		
	<u>Boulders.</u>	<u>River level</u> 1315	30		
	Firm to very dense, brown to brown-gray, fine to coarse (in depth) <u>sand.</u>		40		
			50		
	Very dense, grey <u>silt</u> and <u>fine sand.</u>	1287	60		
	End of hole.	1277.5			

Split spoon sample (and No.)

The graph plots strength and penetration resistance against depth. The vertical axis represents depth in feet (0 to 60). The horizontal axis represents strength in blows per foot (0 to 100). Two data series are shown: 'C' (Cohesion) and 'P.S.F.' (Penetration Resistance). The 'C' series is represented by a solid line with circular markers, and the 'P.S.F.' series is represented by a solid line with square markers. Split spoon samples are indicated by numbered boxes (1-9) along the right side of the graph.

Depth (Feet)	C (Blows/ft)	P.S.F. (Blows/ft)	Sample No.
0	0	0	
10	~10	~10	1
20	~20	~20	2
30	~30	~30	3
40	~40	~40	4
50	~50	~50	5
60	~60	~60	6
70	~70	~70	7
80	~80	~80	8
90	~90	~90	9

## RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 8

Project: South Saugeen River Bridge,  
 Location: South Saugeen River & Hwy. #6, Mt. Forest.  
 Hole Location: See Enclosure No. 1.  
 Hole Elevation and Datum: 1325 ft.  
 Field Supervisor: O.L.W. Prep.: O.L.W.  
 Driller: O.R. Checked: Date: 12, 15 & 16th  
 June, 1959

## LEGEND

Shear Strength (C)

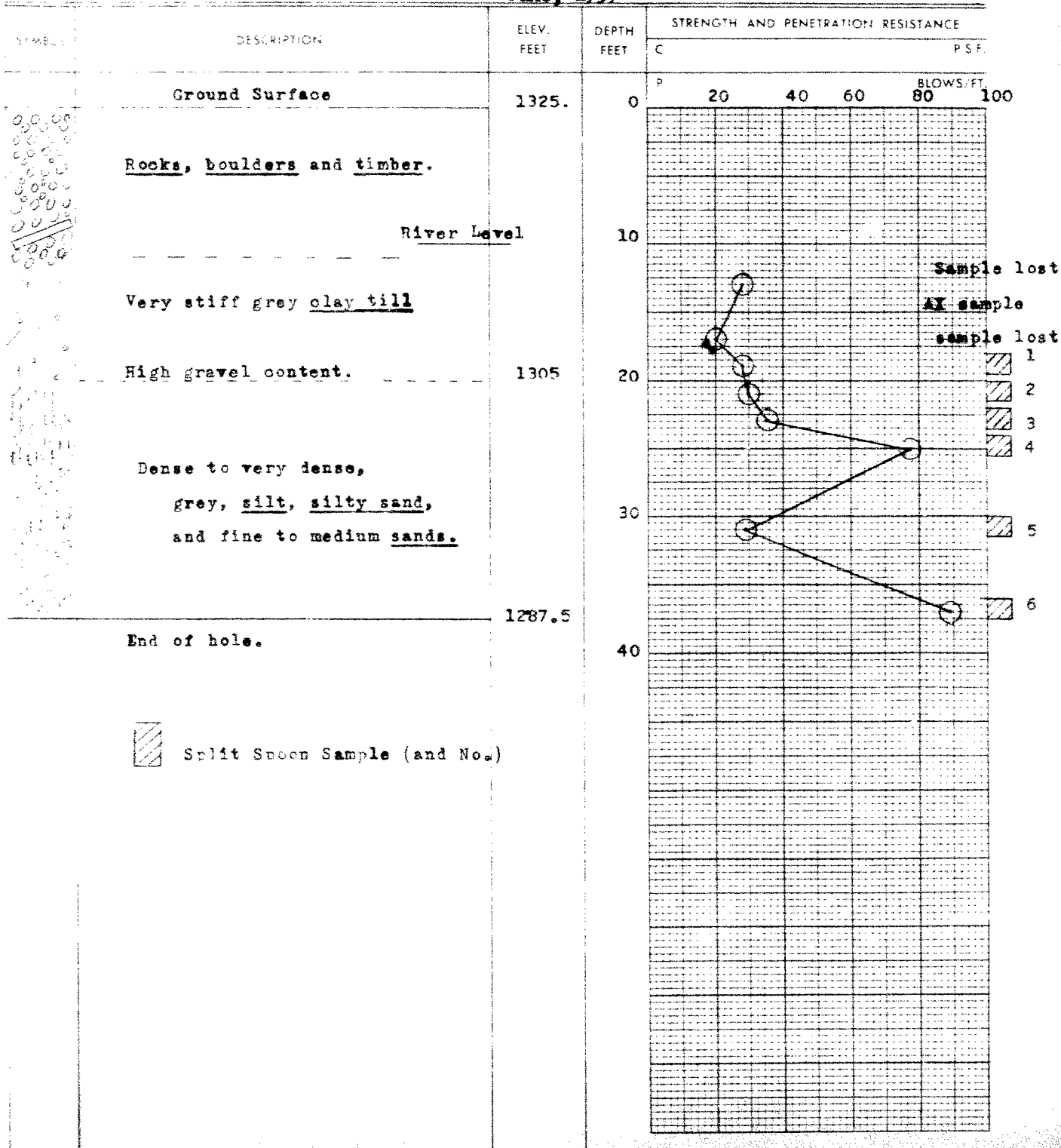
Unconfined compression  
 Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕  
4'⊕  
⊕

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: 9.

Project: South Saugeen River Bridge,  
 Location: South Saugeen River & Hwy. #6, Mt. Forest.  
 Hole Location: See Enclosure No. 1.  
 Hole Elevation and Datum: 1323 ft.  
 Field Supervisor: C.L.W. Prep: C.L.W.  
 Driller: C.E. Checked: Date: 9-11th June/59

**LEGEND**

Shear Strength (C)

 Unconfined compression  
 Vane test and sensitivity (S)

Penetration Resistance P

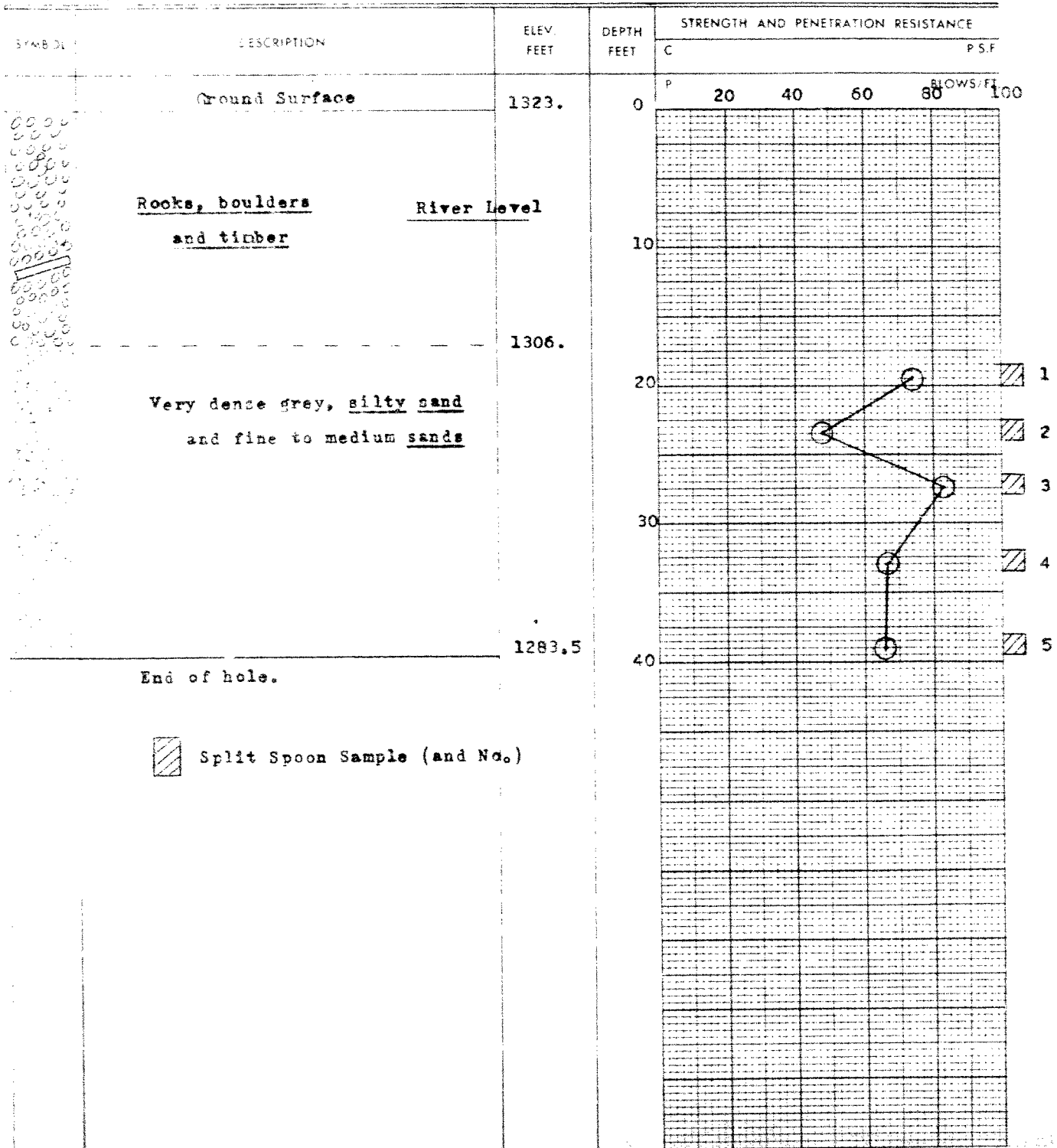
2" Split tube

2" Dia. Cone

Casing

⊕  
45

⊕ ⊕





## RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 10.

Project: South Saugeen River Bridge,  
 Location: South Saugeen River & Hwy. #6, Mt. Forest.  
 Hole location: See Enclosure No. 1.  
 Hole Elevation and Datum: 1329 ft.  
 Field Supervisor: O.L.W. Prep: O.L.W.  
 Driller: O.R. Checked: Date: 17-18 June/59

## LEGEND

Shear Strength C

 Unconfined compression  
 Vane test and sensitivity (S)

Penetration Resistance (P)

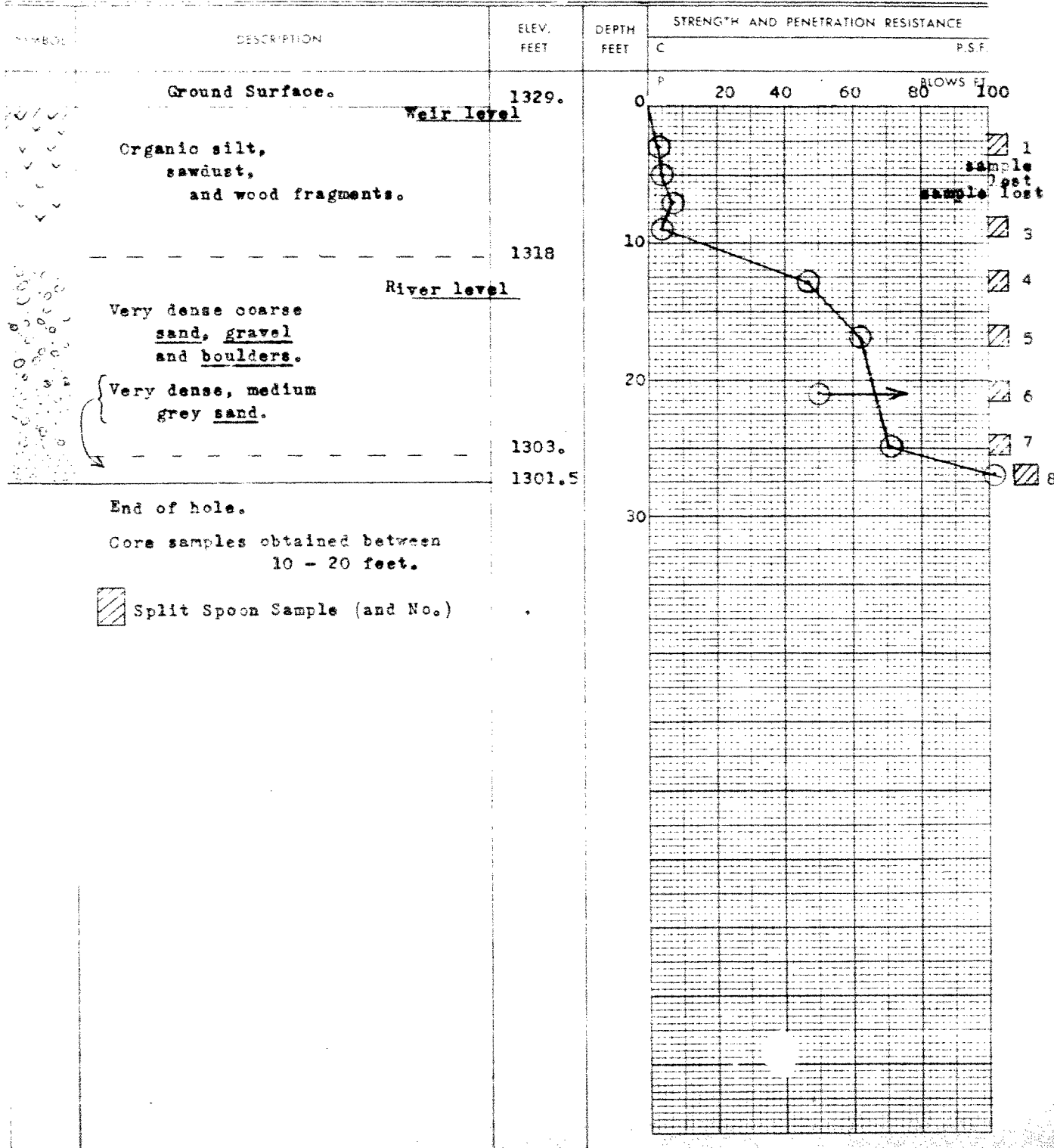
2" Split tube

2" Dia. Cone

Casing

⊕  
+5

⊕ ⊕



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: 11.

Project: South Sauguen River Bridge,

Location: South Sauguen River and Hwy. 6, Mt. Forest.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 1350 ft.

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

Driller: C.R.

Checked:

Date: 19th June, 1959

**LEGEND**Shear Strength,  $C$ :

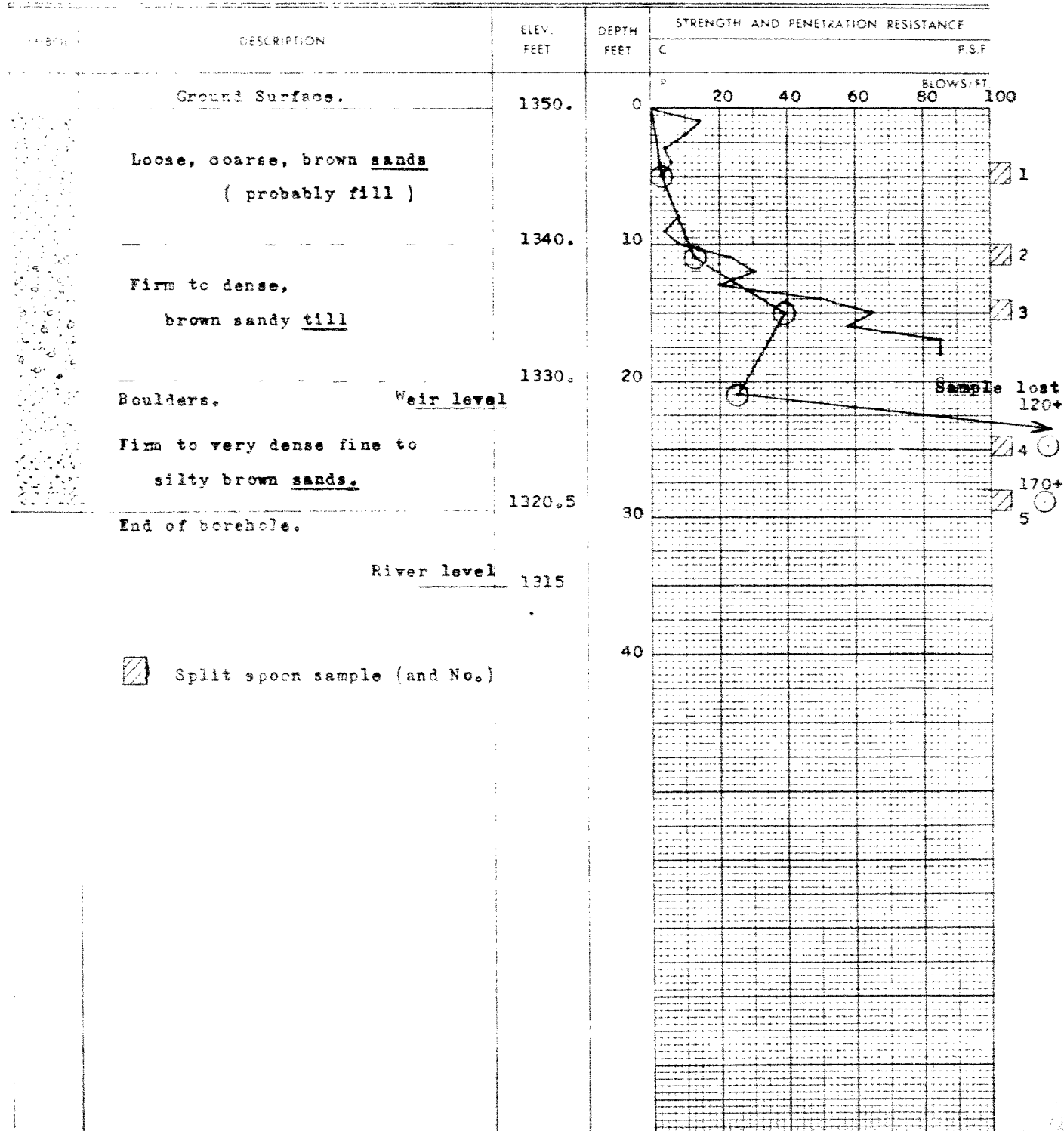
Unconfined compression

Vane test and sensitivity  $1.5$ Penetration Resistance,  $P$ 

2" Split tube

2" Dia. Cone

Casing

⊕  
45⊕  
⊕

Elevation (ft.) BH

11

B.H. BH  
7 6

Living Wall

SOUTH SAUGEEN RIVER

→ TO MOUNT FOREST

B.H. BH BH  
8 8 9

B.H.  
10

SCALE: HORIZONTAL 1 IN = 20 FT

VERTICAL 1 IN = 20 FT

LEGEND



FILL - Sawdust, gravel, boulders or organic material.

TILL - Sand, silt.

BOULDERS, GRAVEL (Natural Deposits)

SILT, FINE TO COARSE SANDS

RACEY, MACCALLUM AND ASSOCIATES LTD.

PROPOSED BRIDGE AT SOUTH SAUGEEN RIVER  
AND HIGHWAY 6, MOUNT FOREST, ONTARIO.

GEOLOGICAL SECTION ALONG CENTRE LINE

OF PROPOSED REVISION LINE "D"

ENCLOSURE NO. 10 PREP. O.L.W.



ONTARIO  
DEPARTMENT OF HIGHWAYS

BA 913

**Memo to** Mr. S. Mc Combie, **Date** July 15, 1959.  
Bridge Planning Engineer. **Subject** Re: W.P. 116-58, Saugeen River  
Materials & Research Section. At Mt. Forest,  
Hwy. #6, District #5.

As requested by the Bridge Office, the report by Racey, Mac Callum and Associates has been reviewed by the Foundation Section.

Reference to the contents of this report shows that a layer of loose sand and gravel fill overlies dense till and boulders. A review of the comments made by the consultant results in the following recommendations:

1. Since pile driving operations are likely to cause damage to the existing concrete structures, spread footings are recommended for both abutments.
2. Allowable loads of 6,000 lb./sq. ft. may be used at elevation 1317 or lower for the north abutment, and elevation 1337 or lower for the south abutment.
3. The water level on the upstream side of the dam is given in the consultant's report as elevation 1328 this will present no construction problem at the south abutment. At the north abutment short steel sheet piles may be used to cut off seeping water. These piles should be driven no deeper than elevation 1309. A system of dewatering well points may be considered as an alternative to the sheet piling.
4. The organic silt sawdust and wood fragments in the vicinity of B.H. 10 should be removed prior to the placing of the fill.

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

per:

*K. Peaker*

KP/sc

(K. Peaker,  
Supervising Foundation Field Engr.)

cc: Foundation Office  
Gen. Files.

BA 913

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

H. JOHN RACEY, P.S.C., 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  
Toronto 2.

Reference: S-500/T-1530

10 June, 1959

Department of Highways of Ontario,  
280, Davenport Road,  
TORONTO - Ontario.

Attention: Mr. Peter McWatt.

RE: FOUNDATION INVESTIGATION FOR PROPOSED  
NEW BRIDGE, SAUGEEN RIVER AT HIGHWAY NO 6,  
DISTRICT # 5, ONTARIO.

Dear Sir,

Following our telephone conversation with Mr. D. Hamlin of Messrs. Margison and Keith, we enclose herewith a copy of our site plan and engineering data sheets referring to the above project.

Our field crew is at the site now to carry out the additional borings requested by the Foundation Section of the Department of Highways.

Yours very truly,  
RACEY, MacCALLUM AND ASSOCIATES LIMITED.

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

JJS:YDP

Toronto 2.

Reference: S-500/T-1530.

27 January, 1959.

Messrs. Margison and Keith -  
Consulting Engineers,  
22h, Merton Street,  
TORONTO - Ontario.

Attention: Mr. D. L. B. Hamlin.

RE: FOUNDATION INVESTIGATION FOR  
PROPOSED NEW BRIDGE, SARPLEN RIVER  
AT HMT #6, DISTRICT #5 - ONTARIO.

Dear Sir,

Enclosed herewith are the results of our borings at the above site, together with a site plan showing the borehole locations.

From the above results it may be concluded that adequate support for the abutment foundations can be found at approximate Elevation 1320 feet at the South abutment, and Elevation 1300 feet at the North abutment. It may be quite possible, of course, that the dense layer of glacial till will be found at a somewhat higher elevation on the north-west side of the proposed bridge. This side unfortunately was inaccessible for a drilling rig.

For the centre of the river, Borehole No 6 was taken, revealing at least 20 feet of hard rock fill. Construction at this location would seem to be impractical.

We would like to receive your opinion on the above information. If required, we will endeavour to carry out more borings at locations indicated by you.

Yours very truly,  
RACEY, MACCALLUM AND ASSOCIATES LIMITED,

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

JJS:YDF

Prep. By L.P.W.

Hwy. 6

36"  $\phi$  Steel Intake Pipe

#3

Concrete Clad Dam

Concrete Apron

C of Proposed Revision Line 'D'

Present Steel Truss Bridge

Saugeen River

#2

#6

PROPOSED SAUGEEN RIVER BRIDGE

Location of borings

Scale: 1 inch = 20 ft.

Foundation Engineering Division

Engineering Data Sheet for Borehole: # 2

Driller: **F.B.** Checked: \_\_\_\_\_ Date: \_\_\_\_\_

### LEGEND

Shear Strength (C)

- Unconfined compression  
Vane test and sensitivity (S)

Penetration Resistance (P)

## 2.1 Split tube

2" Dia. Cone

### Casing

[illegible]



**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: **# 3**Project: **SAUGEEN RIVER BRIDGE**Location: **HWY. # 6, DISTRICT # 5, MOUNT FOREST, ONTARIO**Hole Location: **See Enclosure No 1.**Hole Elevation and Datum: **1316.5 Feet.**Field Supervisor: **R.H.** Prep.: **L.P.W.**Driller: **F.B.** Checked:

Date:

**LEGEND**

Shear Strength (C)

Unconfined compression

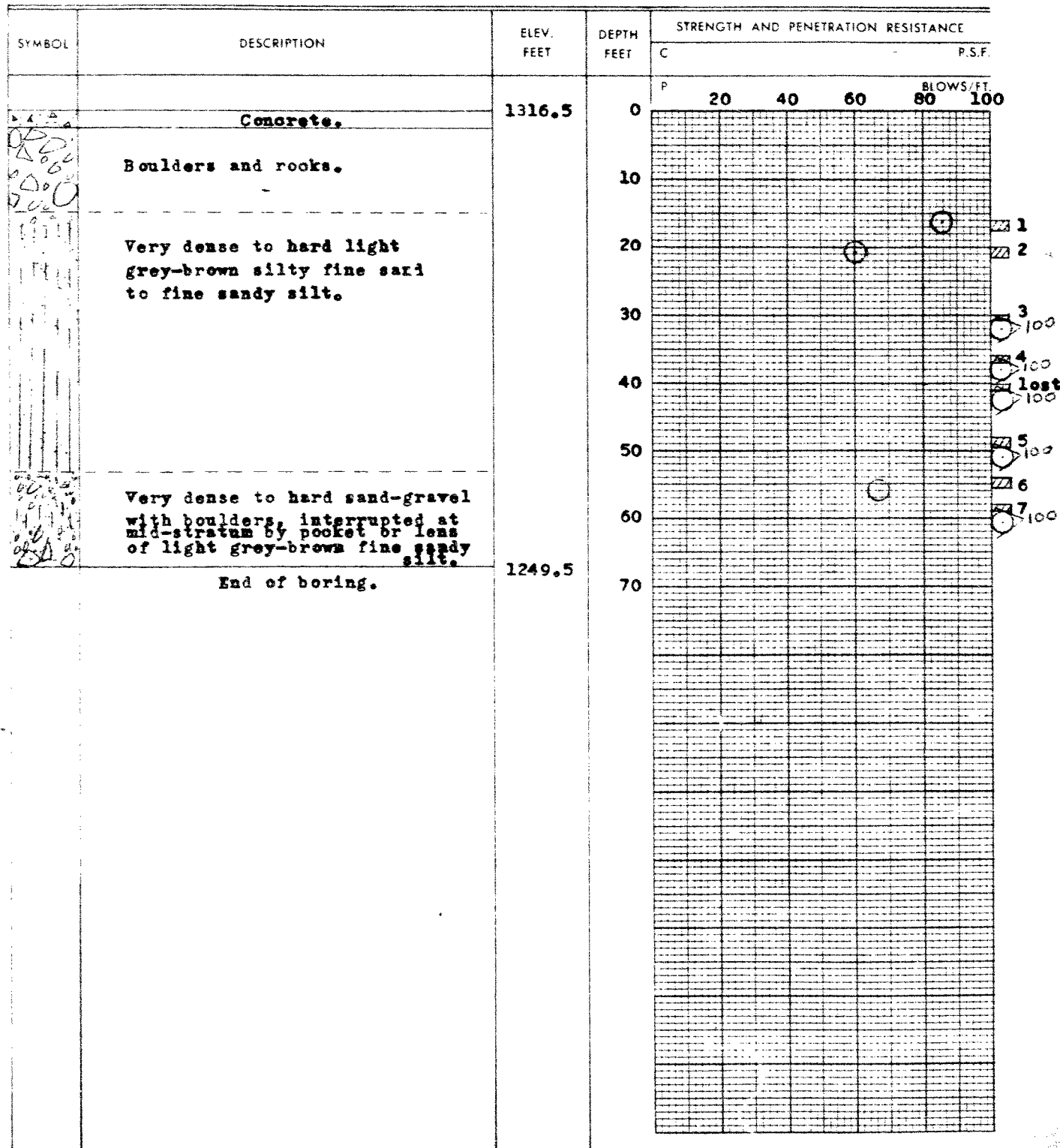
Vane test and sensitivity (S)

Penetration Resistance P

2" Split tube

2" Dia. Cone

Casing

⊕  
+<sup>1</sup>⊕  
⊕

**RACEY MacCALLUM AND ASSOCIATES LTD.**

Foundation Engineering Division

Engineering Data Sheet for Borehole: # 6

Project: SAUGEEN RIVER BRIDGE

Location: HWY. # 6, DISTRICT # 5, MOUNT FOREST, ONTARIO.

Hole Location: See Enclosure No 1.

Hole Elevation and Datum: 1342.5 Feet.

Field Supervisor: R.H. Prep.: L.P.W.

Driller: F.B. Checked: Date:

LEGEND

Shear Strength (C)

Unconfined compression  
Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕  
4.5

⊕ ⊕

