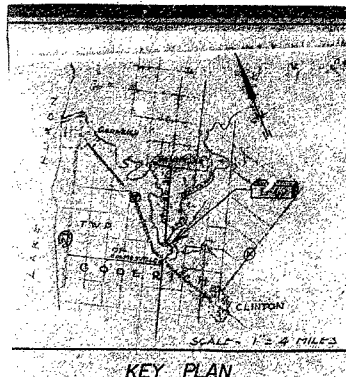
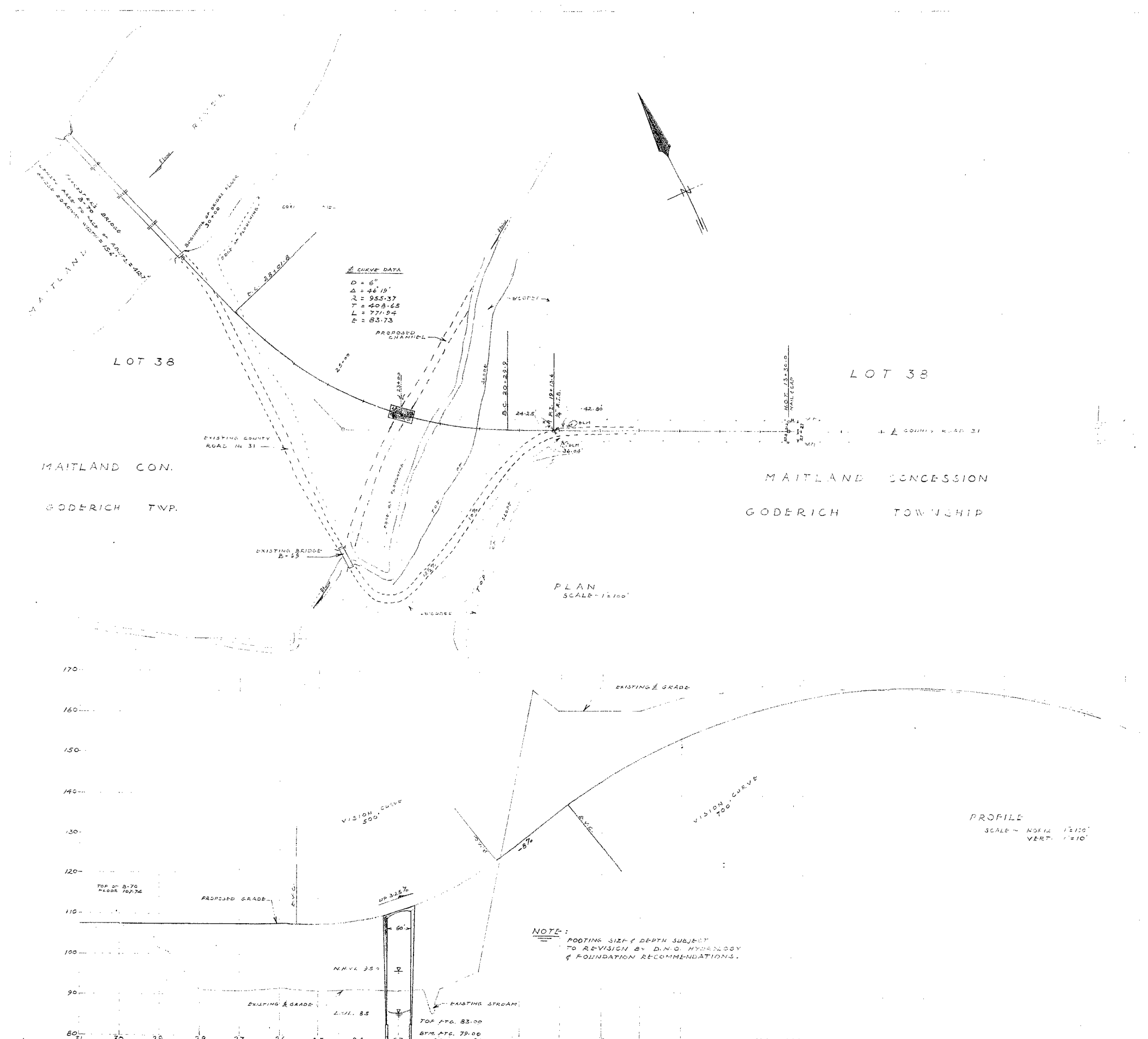


62-F-270M
HURON BRIDGE B-69
LOT 38
MAITLAND CONC.
CLINTON



PLEASE SEPARATE INSTRUCTIONS FOR PREPARATION OF BRIDGE SITE PLAN WHEN MAKING BRIDGE SURVEY.

DATA

SPECIAL FEATURES: WATERFALLS, DAMS, EXCEPTIONAL FLOODS, ICE, DRIFTWOOD, SWAMPY AREAS, ETC. (IF ANY, INDICATE LOCATION, CHARACTER, AND EXTENT) BY J.D. HARRIS, W.O. 346-61-123, D.W. 578

1. (A) UPSTREAM & DOWNSTREAM BRIDGES (GIVE LOCATION, LENGTH, HEIGHT ABOVE W.H.W.L., NET CROSS-SECTIONAL AREA AT HIGH WATER & ESTIMATED AGE):

(B) REASONS WHY THESE BRIDGES ARE OR ARE NOT, FAIR INDICATIONS OF SIZE OF PROPOSED BRIDGE:

2. REASONS FOR CHANGES IN HEIGHT OR LENGTH FROM THAT OF OLD BRIDGE:

3. DATA (CONT.)

4. IS DITCH, STREAM, OR RIVER LIABLE TO BE LOWERED? NO NO WICHAMING

5. NAVIGATION CLEARANCES REQUIRED? NO

6. HALFWAY CLEARANCE REQUIRED? NO

7. IF STRUCTURE IS OVER OR UNDER A RAILWAY, HAS APPROVAL BEEN OBTAINED?

(A) FROM RAILWAY: NO

(B) FROM BOARD OF TRANSPORT COMMISSIONERS: NO

8. HAS APPROVAL BEEN OBTAINED UNDER NAVIGABLE WATERS PROTECTION ACT?

9. IS A TEMPORARY DETOUR REQUIRED? NO

WHO WILL BUILD IT? NO

WHO WILL MAINTAIN IT? NO

10. INFORMATION AND EVIDENCE OF EXTREME FLOODING WAS OBTAINED FROM D.P.E. (HYDROLOGIST) AND REFLECTS HIGHEST WATER ELEVATION IN THE AREA OF THIS CONSTRUCTION TO BE 88.0 AND THE LOWEST WATER ELEVATION TO BE 83.5

11. ROAD DESIGN INFORMATION:

ESTIMATED TRAFFIC: 250 - 160

DESIGN SPEED: 20

STOPPING SIGHT DISTANCE: 150

STRUCTURE DATA

1. NET SPAN LENGTH AND TYPE OF BRIDGE: 20' GIRDER FRAME

2. ROADWAY WIDTH ON BRIDGE: 26'

3. NUMBER & WIDTH OF SIDEWALKS: TWO 2' SAFETY CURBS

4. SKEW ANGLE: NO

5. TOTAL LENGTH & TYPE OF PILING: NO

6. APPROX. VOLUME OF CONCRETE: 3.35 CUBIC YDS

7. APPROX. WEIGHT OF STEEL: 3.5 TONS

8. APPROX. WEIGHT OF REINFORCEMENT: 3.5 TONS

9. APPROX. VOLUME OF APPROACH FILL: NO

100' EACH SIDE OF STRUCTURE: 18,600 CUBIC YDS

10. DRAINAGE AREA: 20.8 ACRES

FIELD INVESTIGATION MADE MAY 19 1961

BY R.D. CARRY SURVEY ENGINEER.

OWNER HURON COUNTY MUNICIPAL ROAD NO.

CO. HURON

TWP GODERICH LOT 38

SITE PLAN.

DATE: 4/1/62 DESIGN: J.W. BRITNELL

BRIDGE NAME: JER

LOADING: NO BRIDGE NO. B-69 DWS: NO

Mr. A. M. Toye,

Bridge Engineer.

Materials & Research Division,

(Foundation Section).

Attention: Mr. K. L. Kleinsteiber,
Municipal Bridge Liaison Engr.

February 23, 1962.

REVIEW OF REPORT BY

Racey, MacCallum & Assoc., Ltd.

(Ref. BA 1359) & Preliminary
Site Plan by J. W. Britnell.

Re: Soil Investigation -
Replacement of Huron County
Bridge B-69, Clinton, Ont.
(Municipal Job)

We have reviewed the above-mentioned report and the preliminary site plan prepared by the Consultant, J. W. Britnell, and below, submit our comments for your consideration:-

The footing bottoms on the preliminary site plan are shown to be on elevation 79.0. It is our understanding that the realigned river bottom elevation will be about 84.0. Scour depth of up to 6 ft. has been observed in the present river, and there is also some information obtained from the local people that the scour depth is even greater. If it is only 6 ft., this would place the bottom of the footings one foot above this elevation, which cannot be permitted.

It is therefore suggested that the recommendations of the soil consultant be followed and the footings be placed on bedrock. This will necessitate excavating 15 - 20 ft. below present ground level, but it can be done, we believe, without undue trouble. The main difficulty will most probably be the dewatering of the excavation because the driving of sheet piles does not seem to be feasible due to the presence of boulders.

AGS/MdeF

cc: Foundations Office ✓
Gen. Files.

W. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER



ONTARIO

DEPARTMENT OF HIGHWAYS
Bridge Division.

Memo to Mr. A. Stermac,
Principal Foundation Eng.,
Materials & Research Section,
Room 107, Lab. Building,
From K. L. Kleinsteinber

Date February 22, 1962.
Subject County of Huron-Lot 38
Replacement of Br. B69
Goderich Twp. Maitland Conc.
Report File BA 1359

We are enclosing, herewith, a copy of the
Foundation Report, by Racey, MacCallum & Associates,
and a copy of the Preliminary Site Plan for your
comments.

KLK/ea

K. L. Kleinsteinber,
Municipal Bridge Liaison Engineer.

RACEY, MACCALLUM AND ASSOCIATES
LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers
AND ASSOCIATED STAFF

BA 1359

MONTREAL



OTTAWA

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

59 CURLEW DRIVE
DON MILLS, ONT.

Reference: S-763/T-3519

- Report -

February 1, 1962

62-F-270 M

County of Huron,
Court House,
GODERICH, Ontario.

Attention Mr. J. W. Britnell, P.Eng.,
County Engineer.

RE: SOIL INVESTIGATION,
REPLACEMENT OF HURON COUNTY BRIDGE B-69,
CLINTON, ONTARIO.

Dear Sirs:

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

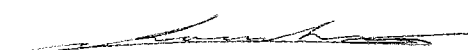
We hope the report is satisfactory to you; if you have any questions about it please do not hesitate to get in touch with us.

Thank you for this opportunity of being of service to you.

Yours very truly,

RACEY, MacCALLUM AND ASSOCIATES LIMITED

JJS/KA


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

County of Huron,
Court House,
Goderich, Ontario.

SOIL INVESTIGATION,
REPLACEMENT OF HURON COUNTY BRIDGE B-69,
CLINTON, ONTARIO.

Reference: S-763/T-3519
- Report -

Racey, MacCallum and Associates
Limited

February 1, 1962.

RACEY, MacCALLUM AND ASSOCIATES LIMITED

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MONTREAL



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

TORONTO DIVISION
~~100 BATHURST STREET~~
59 CURLEW DRIVE
DON MILLS, ONT.

Reference: S-763/T-3519

- Report -

February 1, 1962

SOIL INVESTIGATION, REPLACEMENT OF HURON COUNTY BRIDGE B-69, CLINTON, ONTARIO.

INTRODUCTION:

The purpose of the investigation was to determine soil conditions relevant to the replacement and relocation of the existing bridge to the north of the existing bridge and to the west of the present bed of the creek which the latter spans.

Two boreholes and four dynamic cone probes were put down in the probable locations of the abutments of the new bridge.

This report gives the results of the investigation and presents engineering recommendations for design and construction.

FIELD WORK:

The locations of the boreholes and cone probes are shown on the accompanying site plan (Enclosure No. 1). The two boreholes were in diagonally opposite positions at the south end of the proposed east abutment and the north end of the west abutment of the new bridge with the dynamic cone probe of the same number a few feet away from the corresponding borehole. Dynamic cone probe 1A was located at the north end of the east abutment and cone probe 2A was located at the south end of the west abutment.

The dynamic cone probes consisted of a two-inch diameter steel cone driven by a 140 lb. weight falling a distance of 30 inches. The number of blows required to drive the cone each foot provides a comparison of the densities of the soils through which the cone passes. These values are plotted on the borehole data sheets (Enclosures 2 to 5).

Reference: S-763/T-3519

- 2 -

February 1, 1962

FIELD WORK - Cont'd

The boreholes were advanced by standard wash boring methods using a skid-mounted diamond drill rig. Split spoon samples were taken at intervals of a few feet and bedrock was proved by drilling.

DISCUSSION OF RESULTS:

The stratification is similar in the two boreholes put down. Four main strata were encountered:

- (i) Sand/Gravel;
- (ii) Gravel/Boulders;
- (iii) Clayey Silt and
- (iv) Limestone Bedrock.

(i) Sand/Gravel

At the ground surface in both boreholes was approximately four feet of a brown deposit of medium and coarse sand, gravel and small boulders. The upper part of this stratum also contained some silt and clay. Most of the material is quite loose, possibly as a result of it being an alluvial deposit.

(ii) Gravel/Boulders

Drilling progress was impeded by the presence of many boulders in a zone extending down from just below the stratum mentioned above to a depth of ten feet in Borehole No. 1 and fifteen feet in Borehole No. 2. Sand and gravel were also present, the gravel being mainly limestone fragments.

(iii) Clayey Silt

Immediately below the boulders was a stratum of gray clayey silt which offered a high resistance to the split spoon sampler. This property would normally have been indicative of a glacial "till" created by ice erosion except for the absence of rounded pebbles which are a common feature of tills. It was therefore assumed that the clayey silt - which turned to silty clay near its lower boundary - is a lacustrine deposit which had been compressed but not formed by glaciers.

(iv) Limestone Bedrock

Beneath the clayey silt stratum, true bedrock was reached. In Borehole No. 1, the top 2'-3" were quite sound but the succeeding 18" were seamy and porous, reverting to sound material lower down. All the recovery in Borehole No. 2 was sound. Bedrock was reached at depths of 16 and 20 feet in Boreholes 1 and 2 respectively.

Reference: S-763/T-3519

- 3 -

February 1, 1962

DISCUSSION OF RESULTS - Cont'd

It will be observed that the dynamic cone probes 1 and 2 attained refusal within the hard clayey silt stratum, a few feet above limestone bedrock. As the dynamic cone probes 1A and 2A refuse at approximately the same elevations at 1 and 2 respectively, this refusal depth cannot be interpreted as being the depth of bedrock.

RECOMMENDATIONS:

Since the creek is to be diverted by dredging a new channel, it is likely that the bed of the new channel may be only a few feet above bedrock and in erodible material. The construction of the abutment foundations directly on the limestone bedrock therefore seems to be a practical approach. As observed above, the bedrock in Borehole No. 1 was not in completely sound condition for a depth of 3 ft. 9 ins. into the rock. A permissible bearing stress of 20,000 lb./sq.ft. may be used for foundations on the surface of the bedrock. If a higher stress is desired, 40,000 lb./sq.ft. may be attained by removing the less sound rock. For example, it would be necessary to remove 3 ft. 9 ins. at the east side of the bridge near Borehole No. 1. It is not likely that the elevation of the surface of the bedrock on each side of the bridge will vary more than two feet from the level indicated in the corresponding borehole.

The clayey silt above bedrock also has a potentially high bearing capacity but it is also a material which is likely to be eroded easily if exposed to even a slow velocity of water without protection. Accordingly it is recommended that the foundations should be located on bedrock as described above. The likelihood of erosion is endorsed by a letter (December 13th, 1961) of the County of Huron Highways Department stating that the Ontario Department of Highways Hydrology Section had suggested that the structure should be founded on bedrock if possible.

It is understood that a rigid frame span structure is contemplated. This is in accord with the almost negligible settlements to be expected as a result of constructing the foundations on bedrock.

The proposed road profile indicates that a height of about twenty feet of fill will be required above existing grade. Coarse-granular materials such as sand, gravel and boulders would be suitable for this purpose if they can be found locally. In calculating quantities of fill, allowance should be made for compression of the uppermost soft stratum which may be from 6 to 12 inches in the centre of the embankment.

Reference: S-763/T-3519

- 4 -

February 1, 1962.

CONCLUSIONS:

The main results of the investigation may be summarised as follows:

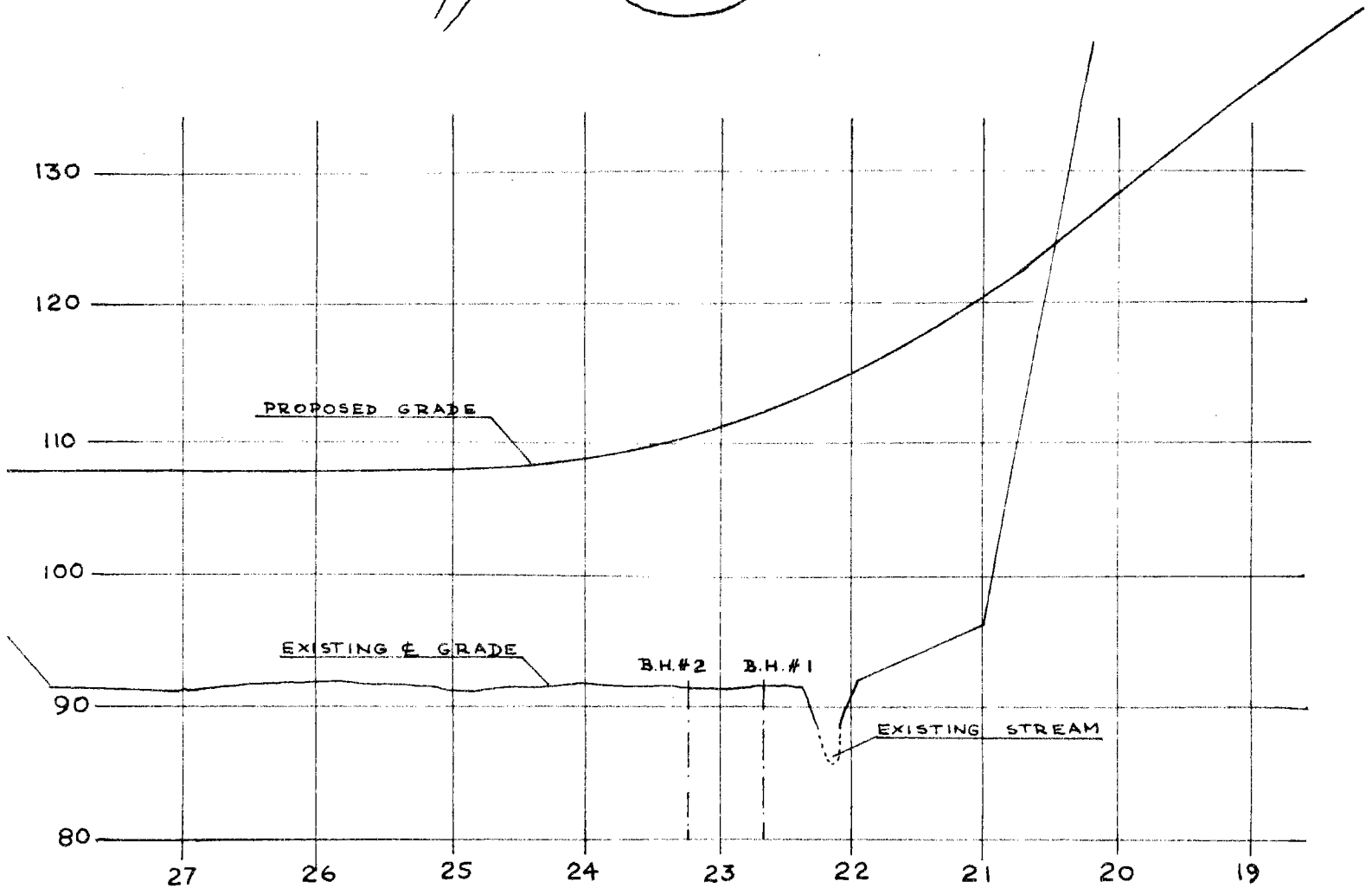
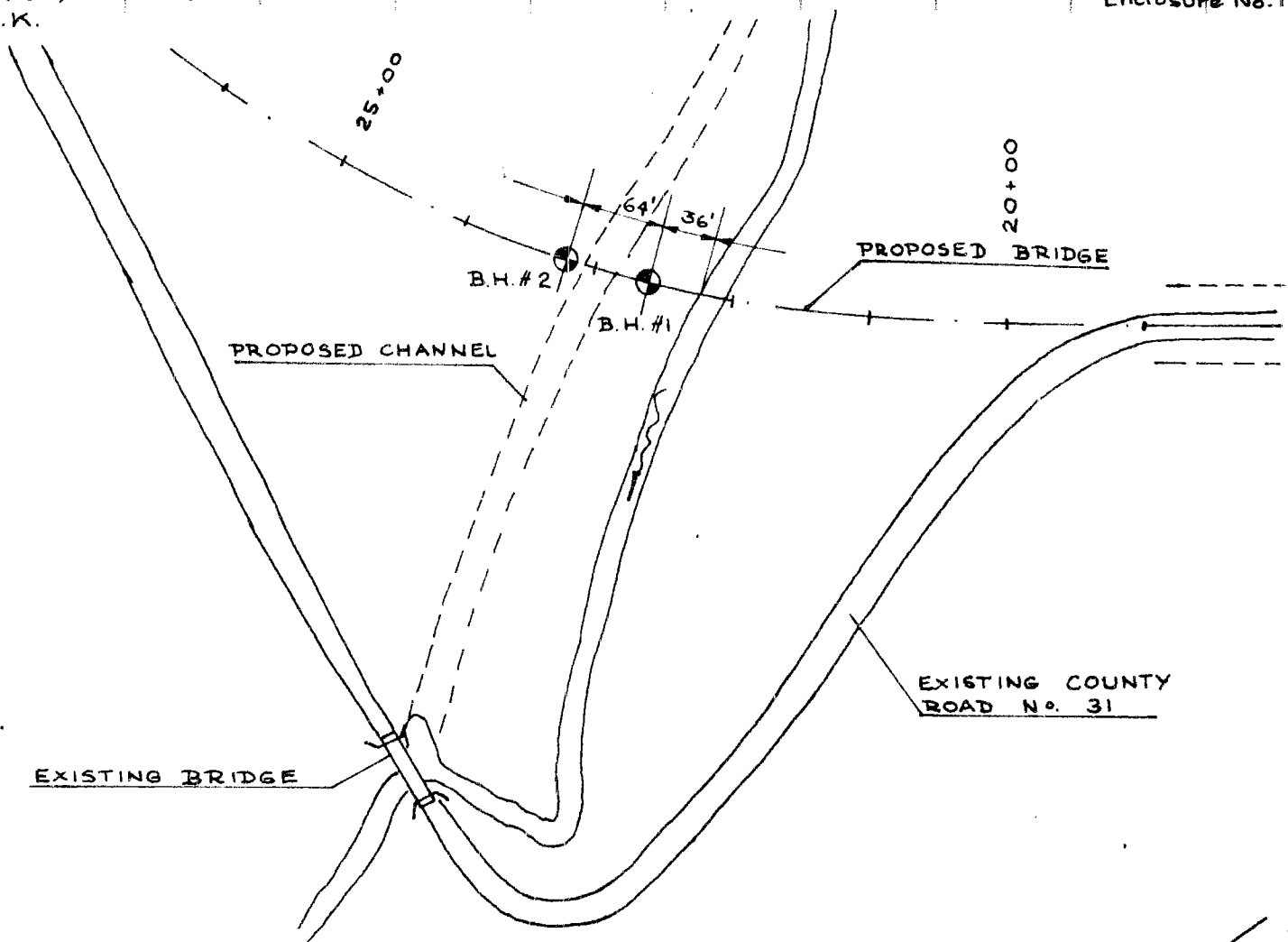
1. Limestone bedrock is found at depths of 16 and 20 feet below the ground surface, overlain by 5 to 6 feet of hard clayey silt which, in turn, is beneath coarse material such as sand, gravel and boulders.
2. The clayey silt is susceptible to erosion if exposed to a current and the foundations should therefore be located on bedrock with a maximum permissible bearing stress of 20,000 lbs./sq.ft. This stress may be increased to 40,000 lbs./sq.ft. if the less sound rock is excavated.
3. There is not likely to be undue trouble with ground water in the excavations for foundations.
4. Settlements of the structure will be negligible.



I. G. Bowie, P.Eng.,
Project Engineer.



ICB/KA



REPLACEMENT OF BRIDGE No. B-69
COUNTY OF HURON
LOCATIONS OF TEST BORINGS

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 1

Project: REPLACEMENT OF BRIDGE B-69

Location: COUNTY OF HURON,

Hole Location: See Enclosure No. 1

Hole Elevation and Datum: 91.5

Field Supervisor: J. McG. Prep.: I.G.B.

Driller: R.R. Checked: J.J.S. Date: 15-1-'62.

LEGEND

Shear Strength (C)

Unconfined compression

Vane test and sensitivity S

Penetration Resistance P

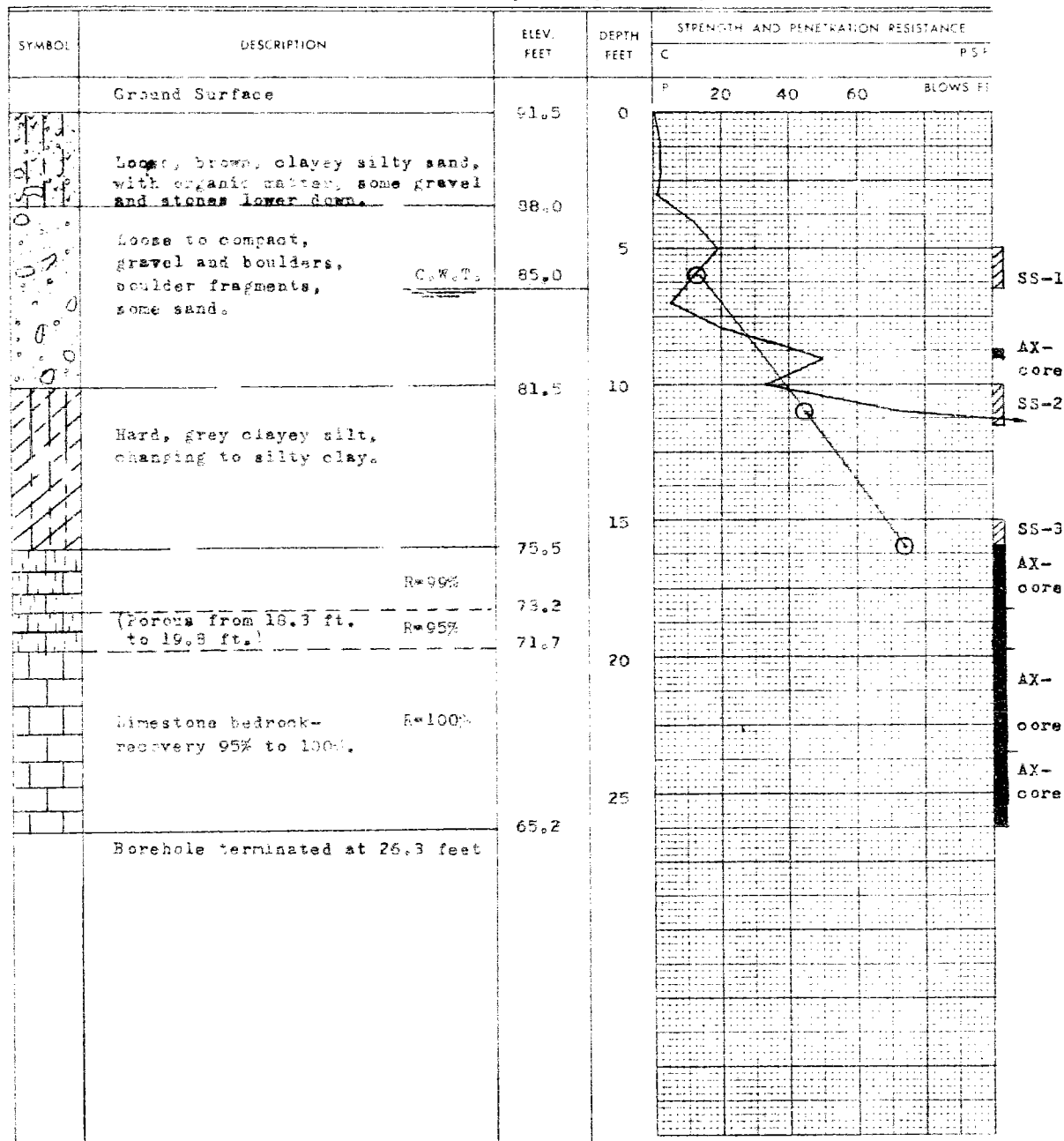
2" Split tube

2 Dia. Cone

Caving

⊕
+3

⊕ ⊕



RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division:

Engineering Data Sheet for Borehole: **1A**

Project: REPLACEMENT OF BRIDGE B-69.

Location: COUNTY OF HURON,

Hole Location: See Enclosure No. 1

Hole Elevation and Datum: 91.5

Field Supervisor: J. McG. Prep.: I.G.B.

Driller: R.R. Checked: J.J.S. Date: 15-1-'62.

LEGEND

Shear Strength C

Unconfined compression

Value test and sensitivity 5

Penetration Resistance \bar{P}

2 Split tube

2 Dia. Cone

ငါ့အတွက်

SYMBOL	DESCRIPTION	ELEV FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				C	PSF
	Ground Surface	91.5	0		
			5		
		81.5	10		
	Cone probe terminated at 10.5 ft.				

The graph displays the relationship between depth and penetration resistance. The vertical axis represents depth in feet, ranging from 0 to 10.5. The horizontal axis represents penetration resistance in pounds per square foot (PSF), with major grid lines every 20 units from 0 to 60. The curve shows a sharp initial increase in resistance near the surface, followed by a period of relative stability and then a gradual increase as depth increases.

Depth (feet)	Penetration Resistance (PSF)
0.0	0
0.5	100
1.0	20
2.0	30
3.0	40
4.0	50
5.0	60
6.0	70
7.0	80
8.0	90
9.0	100
10.5	100

CREEK BOTTOM ELEVATION
(DIVERSION - REALIGNMENT)

6 FT OF SCOUR USE MORE ON OLD STREAM

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 2

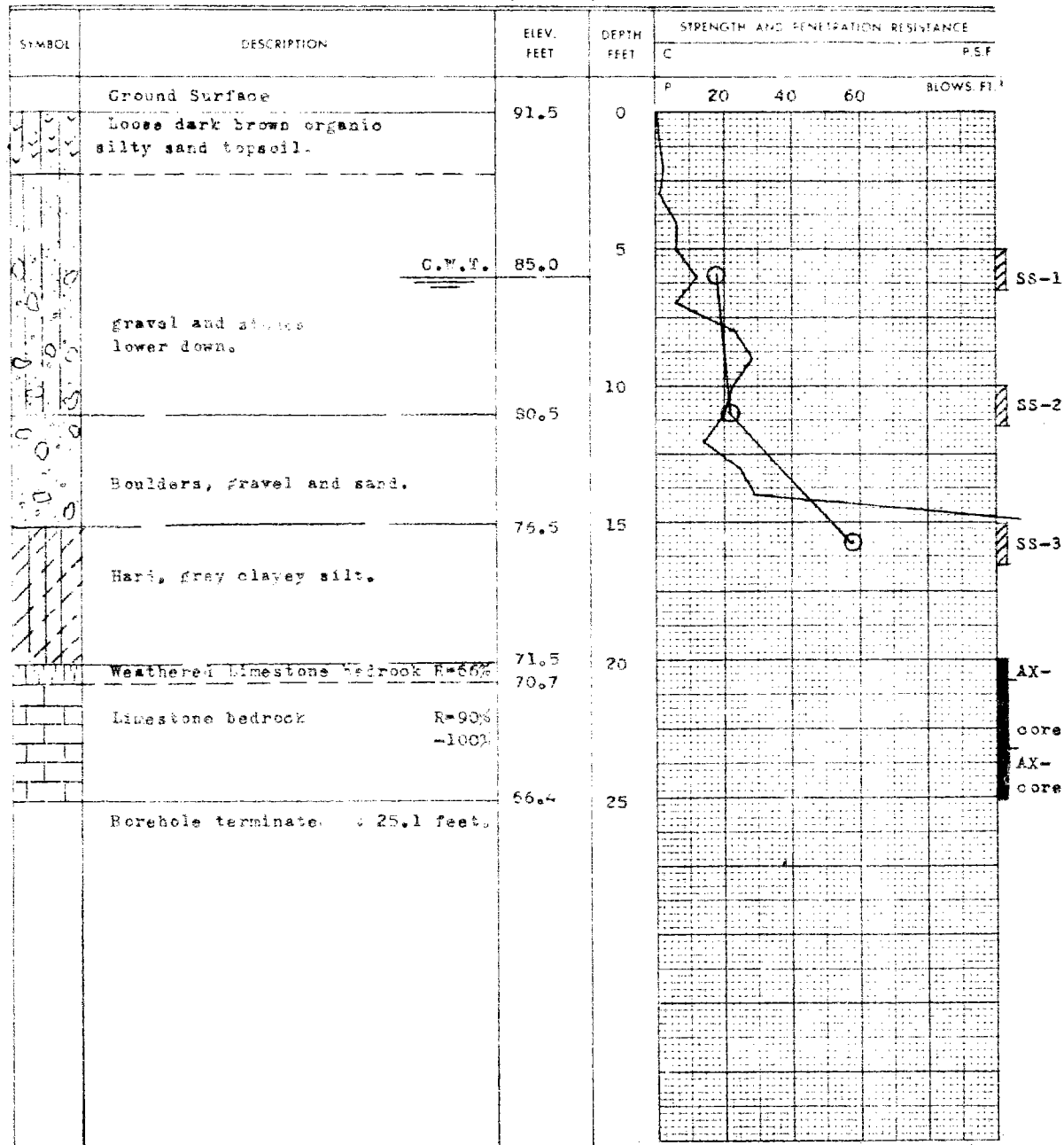
Project: REPLACEMENT OF BRIDGE B-69,
 Location: COUNTY OF HURON,
 Hole location: See Enclosure No. 1
 Hole Elevation and Datum: 91.5
 Field Supervisor: J. McG. Prep: I.G.B.
 Driller: R.R. Checked: J.J.S. Date: 17-1-'62.

LEGENDShear Strength c Unconfined compression
Vane test and sensitivity k Penetration Resistance P

2" Split tube

2" Dia. Cone

Casing



RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 2A

Project: REPLACEMENT OF BRIDGE B-69

Location: COUNTY OF HURON,

Hole Location: See Enclosure No. 1

Hole Elevation and Datum: 91.5

Field Supervisor: J. McG. Prep.: I.G.B.

Driller: R.R. Checked: J.J.S. Date: 18-1-'62.

LEGEND

Shear Strength (C)

Unconfined compression

Vane test and sensitivity (S)

Penetration Resistance (P)

2" Split tube

2" Dia. Cone

Casing

⊕
+5

⊕ ⊕

