

56-F-225C

Hwy. #17

MAGPIE RIVER

BA581

RACEY, MACCALLUM AND ASSOCIATES  
LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers  
AND ASSOCIATED STAFF

MONTREAL



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TORONTO

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TORONTO DIVISION  
20 CARLTON STREET

Reference: S-500-632/T-492

11 December 1956.

Department of Highways of Ontario,  
c/o De Leuw Cather & Company of Canada Ltd.,  
52 St. Clair Avenue East,  
TORONTO, Ontario.

Attention: Mr. H. Juhl

56-F-225C

RE: FOUNDATION INVESTIGATION FOR A  
HIGHWAY BRIDGE OVER THE MAGPIE  
RIVER, PROPOSED HIGHWAY NO. 17  
NEAR JAMESTOWN, ONTARIO.

Dear Sirs:

We have completed our foundation investigation at the above noted project, and our report on the subject, prepared by Mr. J.J. Schoustra, is attached hereto.

Reference to this report indicates that the subsoil is entirely granular in nature and the presence of large gravel in the river bed suggests that scour may have taken place at some time in the river's history. In view of the loose nature of the upper river bed deposits, and the possibility of further scour, a pile foundation would appear to be desirable.

The report contains recommended bearing values for one and two foot diameter piles, driven to a depth of approximately thirty five feet below the surface of the river.

We thank you for this opportunity to be of service to you, and shall be pleased to discuss any aspects that have not been specifically covered in this report.

Yours very truly,  
RACEY, MACCALLUM AND ASSOCIATES LIMITED

*W.A. Trow*

W.A. Trow, P. Eng.,  
Divisional Soils Engineer.

WAT/MD

In quadruplicate.

Department of Highways of Ontario  
c/o  
De Leuw Cather and Company, of  
Canada Limited.

FOUNDATION INVESTIGATION FOR A  
HIGHWAY BRIDGE OVER THE MAGPIE  
RIVER, PROPOSED HIGHWAY NO. 17  
NEAR JAMESTOWN, ONTARIO.

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11 December 1956.

FOUNDATION INVESTIGATION FOR A  
HIGHWAY BRIDGE OVER THE MAGPIE  
RIVER, PROPOSED HIGHWAY NO.17,  
NEAR JAMESTOWN, ONTARIO.

This report contains the results of the foundation investigation carried out at the above mentioned site, in order to determine the most adequate foundation for supporting a proposed bridge over this river. This work, which was begun on 1 November and completed on 19 November 1956, consisted of five borings and five cone penetration tests at the locations noted on enclosure no.1. A heavy blizzard, the necessity to build a raft for work on the river, and the sampling difficulties in the upper gravel layer, combined to delay the progress of this investigation to some extent.

DESCRIPTION OF THE SITE AND OF THE SUBSOIL CONDITIONS

The site of the proposed bridge lies between station 125.00 and station 127.00 of the proposed Highway No.17, approximately one mile south of the recently investigated site of a railway overpass on the same highway. The river is approximately two hundred feet wide at this crossing, and the surrounding land is comparatively level. The constituents of the ground surface in the surrounding area are sand and gravel.

The results of borings and penetration tests made at this site are shown in enclosures 2 to 6. At all locations the top layer consists, for the most part, of coarse sand and gravel, which extends to El.814 feet in the middle of the river bed, and approximately to El.818 feet on the river banks. Below this layer the subsoil, at all five locations tested, is predominantly fine sand with some silt.

In granular material of this nature, dynamic penetration tests are used to provide a measure of the relative density of the subsoil. Therefore, all sampling at this site was performed using a two inch O.D. split spoon sampler, and adjacent to the borings, cone penetration tests were carried out. As is clearly visible from the data sheets, the results of the standard penetration tests with the split spoon sampler, do not show a significant increase in resistance with the depth, while this increase is appreciable below a depth of about thirty feet with the dynamic cone tests. This increase of resistance on the cone is indicative of a denser state below this depth, and suggests that the results of the standard penetration tests are somewhat conservative.

11 December 1956.

DISCUSSION OF THE RESULTS

The presence of a top layer of loose gravel, which increases in depth towards the middle of the river, is an indication that for a footing foundation there may be the danger of scour, to a depth of approximately fifteen feet below the river bed. In view of this danger, and of the loose compressible state of the gravel, it would appear desirable to found the structure on piles.

Although the relative density of the subsoil at all five locations, as determined by the split spoon, shows very little increase with depth, the cone tests show an improvement in density below approximate El. 795.00 feet. It therefore will seem advisable to drive piles at least to this depth. The average pile length will then be approximately thirty five feet. On the basis of a generally accepted empirical relation between the results of the standard penetration tests and the ultimate bearing capacity of piles driven in similar material, the ultimate load on a one foot diameter pile, driven to El. 795 feet, will be of the order of fifty eight tons. A factor of safety of three is usually applied to this value, giving a permissible bearing load of nineteen tons per pile. This value should apply for a pile spacing in excess of three diameters.

For a two foot diameter pile of the same length, the ultimate and safe bearing load will be respectively two hundred and ten tons and seventy tons.

CONCLUSIONS

The foregoing information can be summarised as follows:-

1. Except for a five to fifteen foot top layer of loose gravel, the subsoil consists of loose to medium dense, fine to medium sand, with some silt.
2. Because of the danger of scour, a foundation on a spread footing does not seem applicable at this site.
3. For a foundation on piles, the piles should be driven at least to El. 795 feet. The permissible pile loads for a one foot and two foot diameter pile, at that depth, are of the order of nineteen tons and seventy tons respectively.

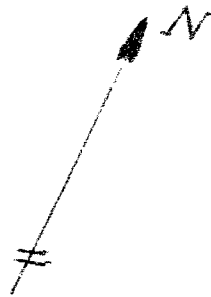
*G. T. Hall*  
for J. J. Schoustra.

JJS/MD

Prep. By J.S.

# LOCATIONS OF BOREHOLES AND CONE TESTS

SCALE 1" = 30'



BH "NA"  
Sta. 127+85 20' x

BH "NB"  
Sta. 127+40 20' x

BH "C"  
Sta. 126+55 20' x

BH "SB"  
x 20' Sta. 125+90

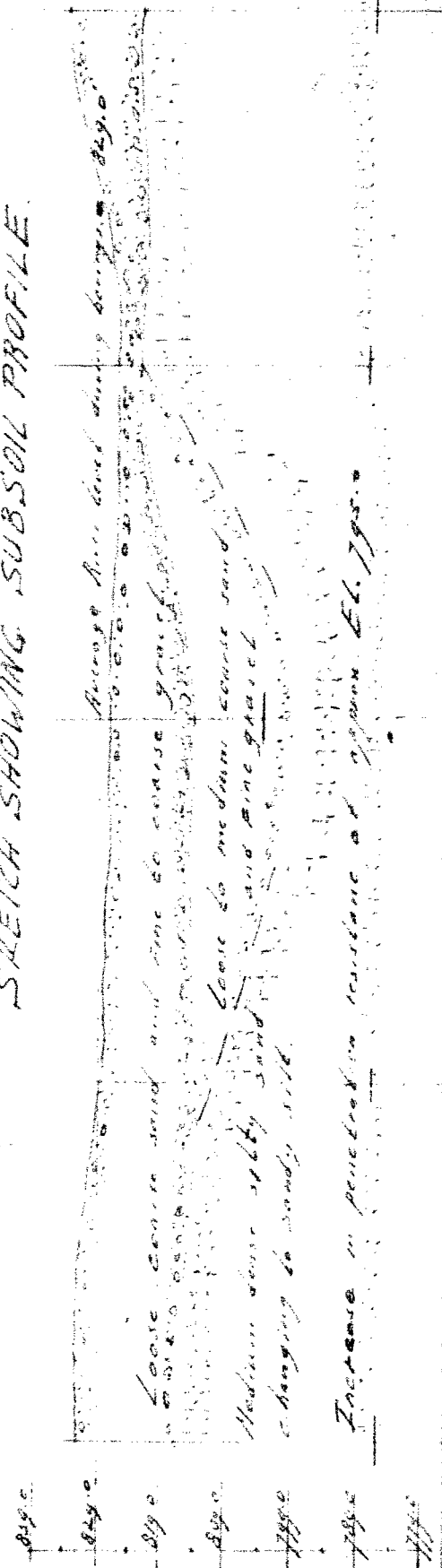
BH "SA"  
Sta. 125+15

River Bank

River Bank

Maggie River

SKETCH SHOWING SUBSOIL PROFILE



Order No. 500-14242 RACEY, MACCALLUM AND ASSOCIATES  
LIMITED

Hole Begun \_\_\_\_\_ Foundation Engineering Division

Hole Ended \_\_\_\_\_ Engineering Data Sheet for Borehole: N.A.

Job Name: Highway 17 Bridge over Magpie River

Job Located: Approx. 1 1/2 mi. South James River Crib.

Hole Located: See enclosure No. 1.

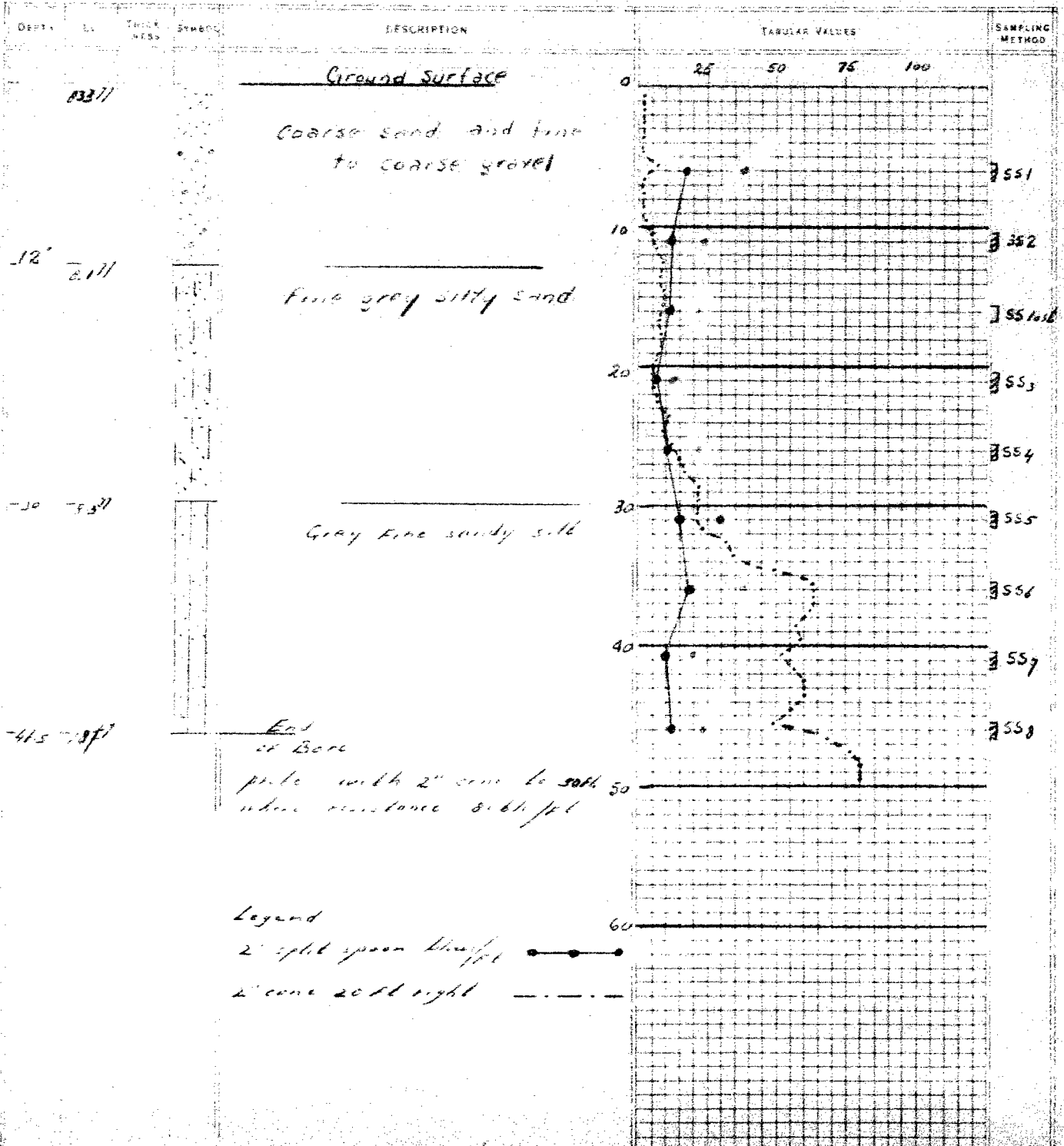
Hole Elevation: 833.77 Datum: At. ft. De Louis Collier & Co.

Driller \_\_\_\_\_

Helper \_\_\_\_\_

Checked by \_\_\_\_\_

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_





Order No. See Encl. No. 3 RACEY, MACCALLUM AND ASSOCIATES  
LIMITED

Hole Begun \_\_\_\_\_ Foundation Engineering Division

Hole Ended \_\_\_\_\_ Engineering Data Sheet for Borehole: N.B.

Job Name: Highway 17 Bridge over Magpie River

Job Located: Approx. 1 1/2 mi. South Jamesburg, Ont.

Hole Located: See enclosure No. 1

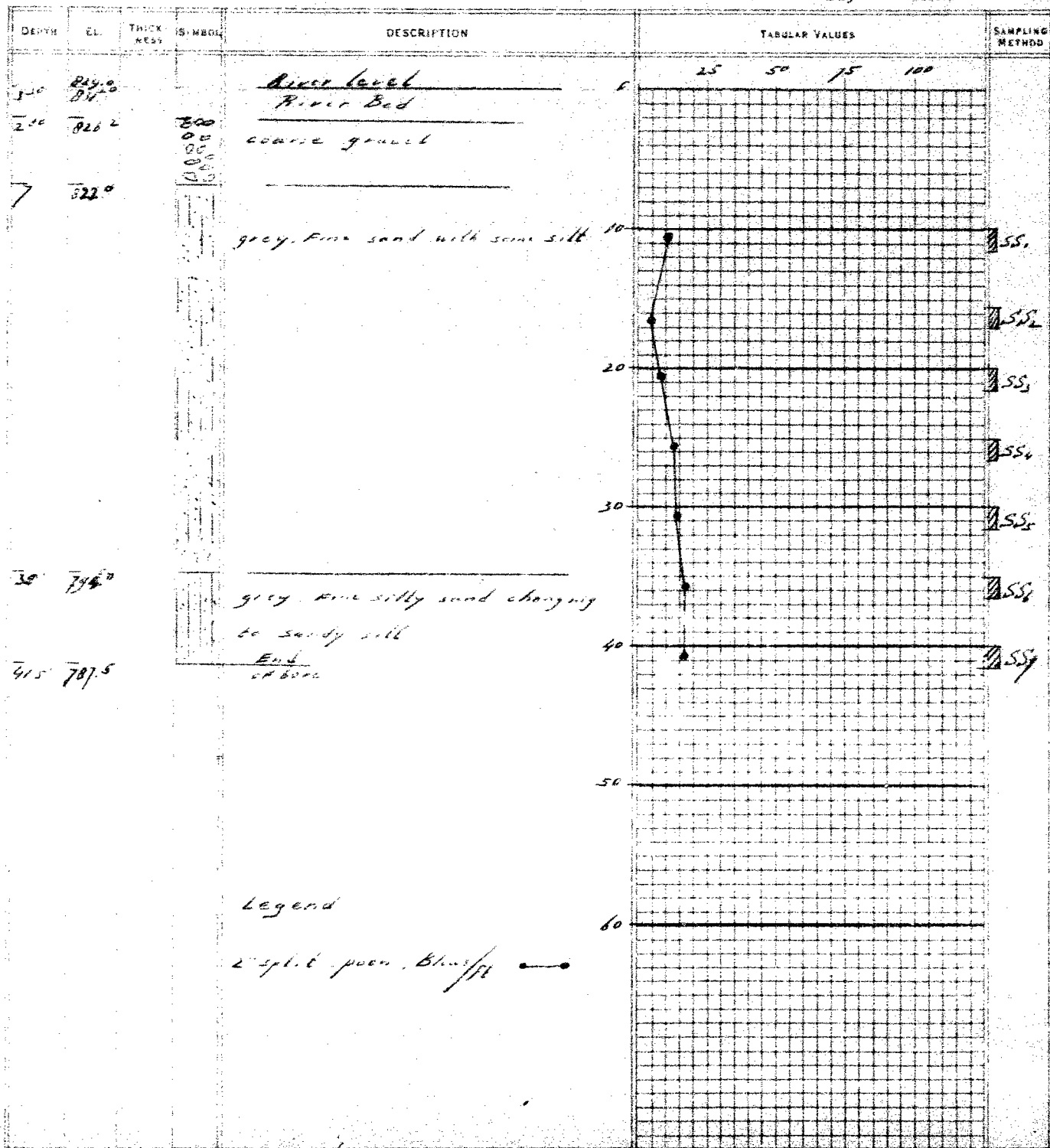
Hole Elevation: 829.50 Datum: As per De Lenn, Cables 2 Co

Driller \_\_\_\_\_

Helper \_\_\_\_\_

Checked by \_\_\_\_\_

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_



Order No.: *5500-42-100* RACEY, MACCALLUM AND ASSOCIATES

LIMITED

Hole Begun

Foundation Engineering Division

Driller

Hole Ended

Engineering Data Sheet for Borehole: *C.*

Helper

Job Name: *Highway 17 Bridge over Maggie River*

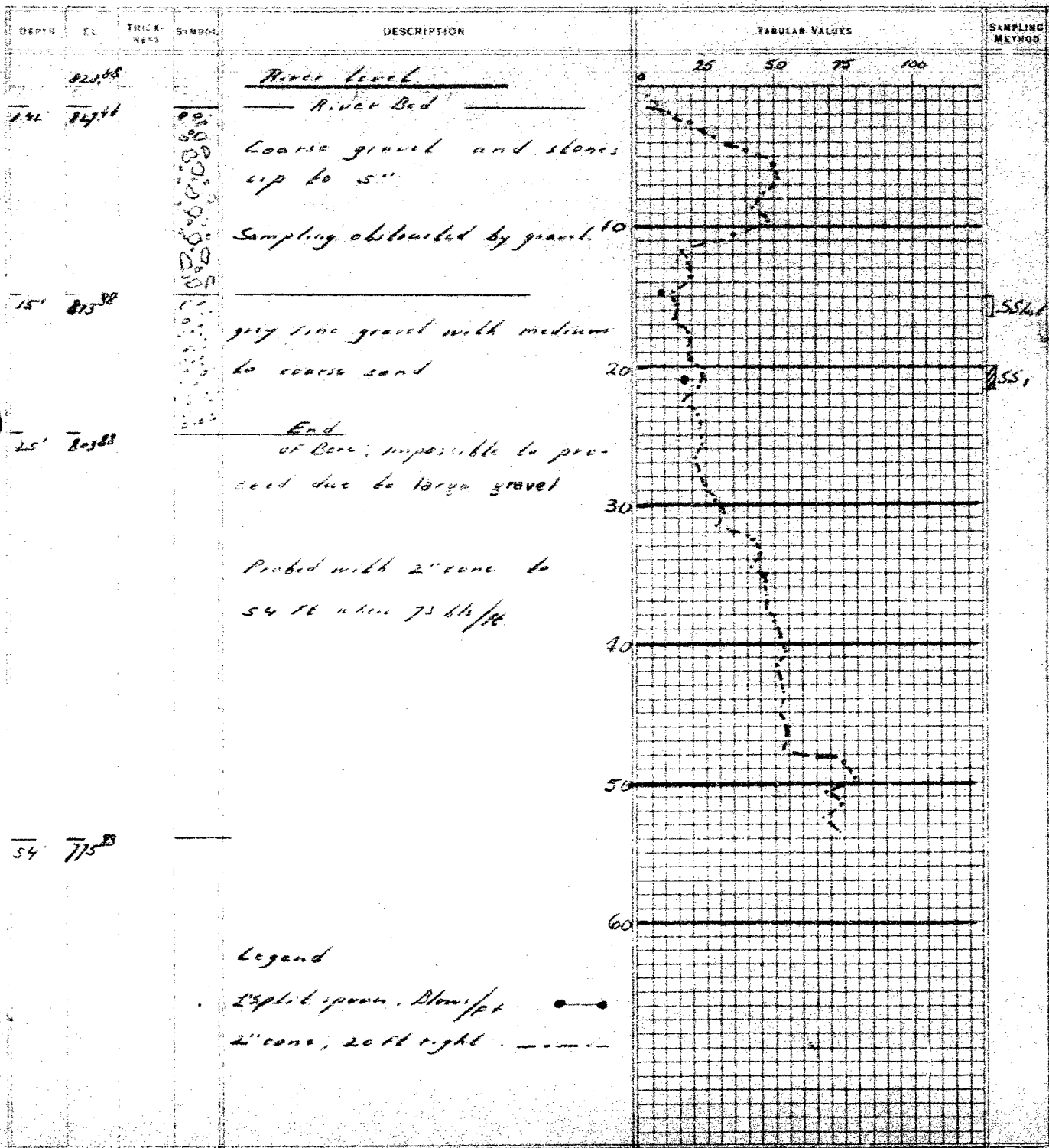
Job Located: *Approx. 1 1/2 mi. South Jamestown, Neb.*

Hole Located: *See enclosure No. 1.*

Hole Elevation: *229.11* Datum: *As per Dr. Leam, Cathie & Co.*

Checked by

Day Month Year



Order No. S-500-62/42 RACEY, MACCALLUM AND ASSOCIATES

Encl. No. 5

LIMITED

Hole Begun \_\_\_\_\_

Foundation Engineering Division

Driller \_\_\_\_\_

Hole Ended \_\_\_\_\_

Engineering Data Sheet for Borehole: S.B.

Helper \_\_\_\_\_

Job Name: Highway 17 Bridge over Maypie River

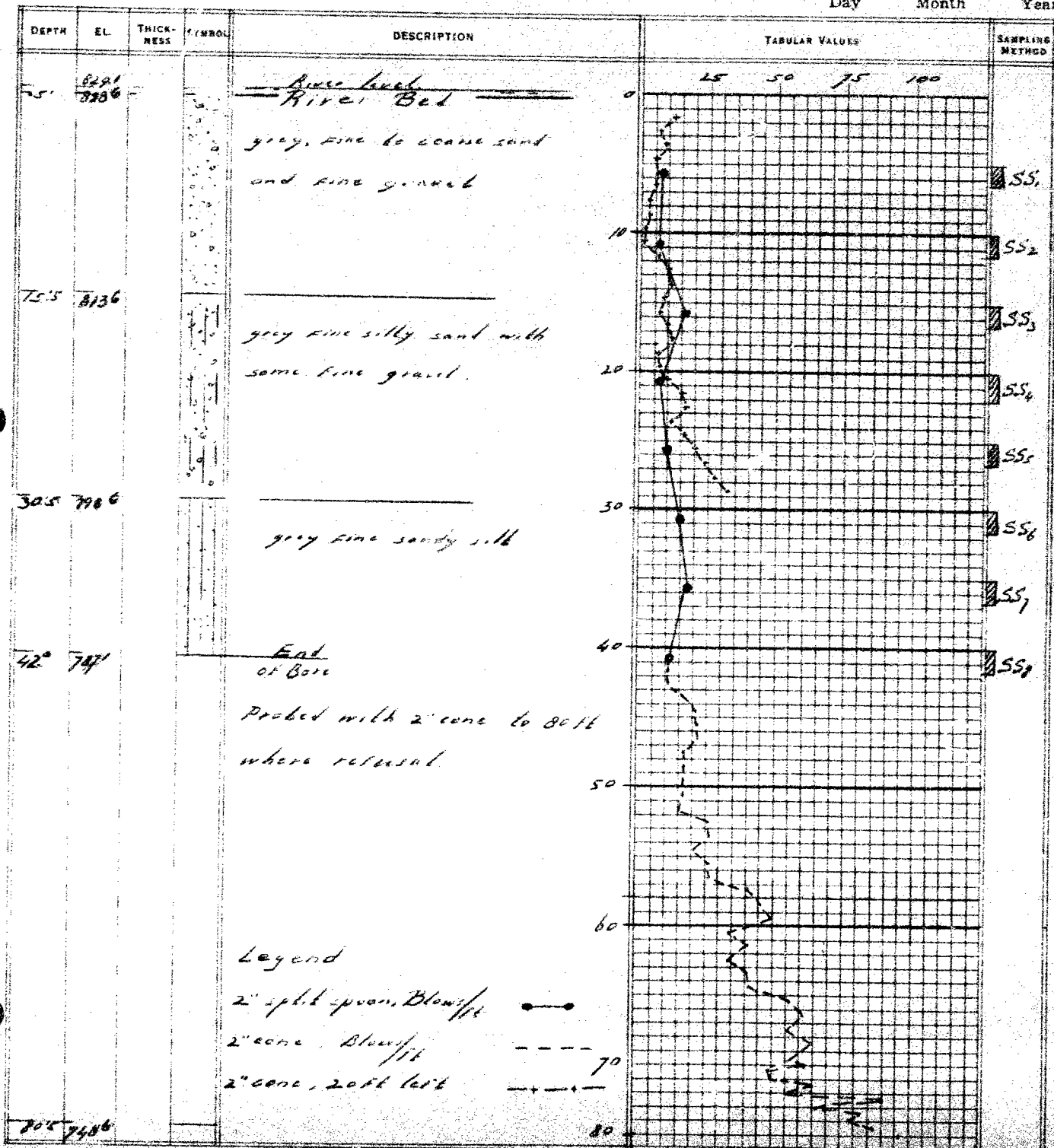
Job Located: Approx. 1 1/2 mi. South Jamestown, Ont.

Hole Located: See enclosure No. 1

Checked by \_\_\_\_\_

Hole Elevation: 819.1 Datum: As per De laun, Cathar 760

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_



Order No. S-500-610 RACEY, MACCALLUM AND ASSOCIATES

LIMITED

Hole Begun \_\_\_\_\_

Foundation Engineering Division

Driller \_\_\_\_\_

Hole Ended \_\_\_\_\_

Engineering Data Sheet for Borehole: S.A.

Helper \_\_\_\_\_

Job Name: Highway 17 Bridge over Magpie River

Job Located: Approx. 1 1/2 mi. South James River, Dak.

Checked by \_\_\_\_\_

Hole Located: See enclosure No. 1

Hole Elevation: 832.20 Datum: As per De laun Caltree 196

Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_

