

#62-F-234C

McGILLIVRAY

BRIDGE OVER

RAISIN RIVER



ONTARIO

DEPARTMENT OF HIGHWAYS

Bridge Division

Memo to Mr. A. Stermac Date May 17, 1962
Principal Foundation Engineer
Room 107, Lab. Bldg.
From G. C. E. Burkhardt Subject United Counties of Stormont,
Dundas and Glengarry
McGillivray Br. over Raisin Rv.
Lots 13/14 & 38/39
Con. SRR & NRR
Twp. of Charlottenburg

Attached please find one copy of the Foundation Report, by McRosfie and Associates Limited, for your comments.

The new structure is a three span (50-50-50) simply supported prestressed beam bridge. The two piers have steel "H" Piles. The two abutments are founded on spread footings in the river banks.

We hope to approve the preliminary design before May 25, 1962, and would appreciate it very much if we could have your comments by May 24, 1962.

GCE/m

G. C. E. Burkhardt
G. C. E. Burkhardt,
for K. L. Kleinsteinber
Municipal Bridge Liaison Engineer

Mr. A. M. Tove,

May 23, 1962.

Bridge Engineer.

REVIEW OF PRELIMINARY DESIGN

Materials & Research Division,

(Dwg. by De Leuw, Cather & Co.)

(Foundation Section)

and REPORT BY McROSTIE & ASSOC.
CONSULTING ENGRS., OTTAWA.

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

Re: United Counties of Stormont,
Dundas and Glengarry,
McGillivray Br. over Raisin River,
Lots 13/14 & 38/39, Con. SRR & NRR,
Twp. of Charlottenburg. Dist. #9.

The report on the soils investigation of the above site, has been reviewed and we recommend the abutments to be supported on steel H-piles as for the piers.

It appears from the report that the recommendation made therein, of using footing foundations for the abutments is based on using shear strength values determined from pocket penetrometer which, at best, can serve no more than a rough guide. Furthermore, the water content of the clay layers in Hole 1, are as high as 70% and settlements contributed from this layer will be appreciable, apart from bearing capacity consideration. Since a dense till stratum exists at approximately 25' depth, we would suggest that all piers and abutments be founded on piles bearing on this stratum. Driving, of course, should be continued until adequate resistance is obtained and a minimum depth of penetration of piles for piers should be governed by scour conditions.

We believe the above comments will provide the needed information. If further assistance is required, please feel free to contact our Office.

KYL/MdeF

Attach.

cc: Foundations Office

Gen. Files.

P.S. -- We are returning herewith,
your drawing pertaining to
this project.

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR
Per:


(K. Y. Lo,
SUPERVISING FOUNDATION
ENGINEER)

MCROSTIE & ASSOCIATES LTD.

CONSULTING ENGINEERS

OTTAWA 1

CANADA

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W. J. MACLEAN, B.A., D.L.S., O.L.S.
R. W. MIDDLEMISS, B. ENG., P. ENG., J.E.I.C.

393 BELL STREET
TELEPHONE CE. 2-5334

1. SCOPE OF INVESTIGATION

We were requested by Mr. Marshall to carry out an investigation for the foundations of the bridge over the Raisin River. The bridge type had not been confirmed at the time of the investigation so information was gathered at both abutments and central pier locations in case the piers might be required.

2. RECOMMENDATIONS

2.1 North Abutment

Since the findings and recommendations are different for each of the abutments and piers, it is necessary to consider each one separately. The north abutment recommendations are based on the findings in borehole No. 1 and from these it can be recommended that the abutment achieve its support on the clay soils approximately 10 feet below the surface. A soil bearing capacity of 3000 POUNDS PER SQUARE FOOT can be recommended for pier bases at elevation 91 to elevation 93 in the vicinity of the borehole.

2.2 South Abutment

The recommendations for this abutment are based on the findings in borehole No. 4 and from these it can be recommended that the pier be supported on the soils approximately 10 feet below the surface. A bearing capacity of 3000 POUNDS PER SQUARE FOOT can again be recommended for pier bases at elevations between 91 and 93 at the borehole location.

2.3 Centre Piers

If these piers are required, their support can be chosen on the information obtained from boreholes No. 2 and 3. Two possible means of support for these piers can be recommended. The first method of support would be to use the dense till soils approximately 8 feet below the present stream bed and a bearing capacity of 5000 pounds per square foot can be recommended for bases at about elevation 78 to elevation 76. This bearing capacity recommendation is based on our judgment of how much density might remain in the soil after construction operations had been carefully carried out.

A second method of support would be to place the piers on piles driven to and bearing on rock which is approximately 24 feet below the present stream bottom. If piles meet adequate resistance in the dense till soil layers and if they are, at that time, of sufficient length to provide protection against scour, there would then be no need to attempt to drive the piles to rock.

The choice between these two types of support for centre piers might best be decided after considering the type of superstructure which would rest on them. If the superstructure consists of simply supported spans, the soil supported footings could be considered. Some construction stage loosening of the till base is certain to occur but if one or two inches of total settlement can be tolerated by the structure, this type of foundation is feasible. If the superstructure consists of a rigid frame or continuous spans, the piers would likely need to be supported on piles since the superstructure is much more sensitive to foundation movements.

2.4 Construction Precautions

If piers are required in the river bed and if the till soils are to be used for support of the piers, the loosening effects of seepage forces at the bottom of the excavation for pier bases must be recognized. One of the most effective methods of retarding the seepage is to leave a few feet of material unexcavated in the bottom of the pier base until a few hours before concrete can be placed in the pier. After the concrete is in position, the seepage forces are then resisted by the weight of the pier itself.

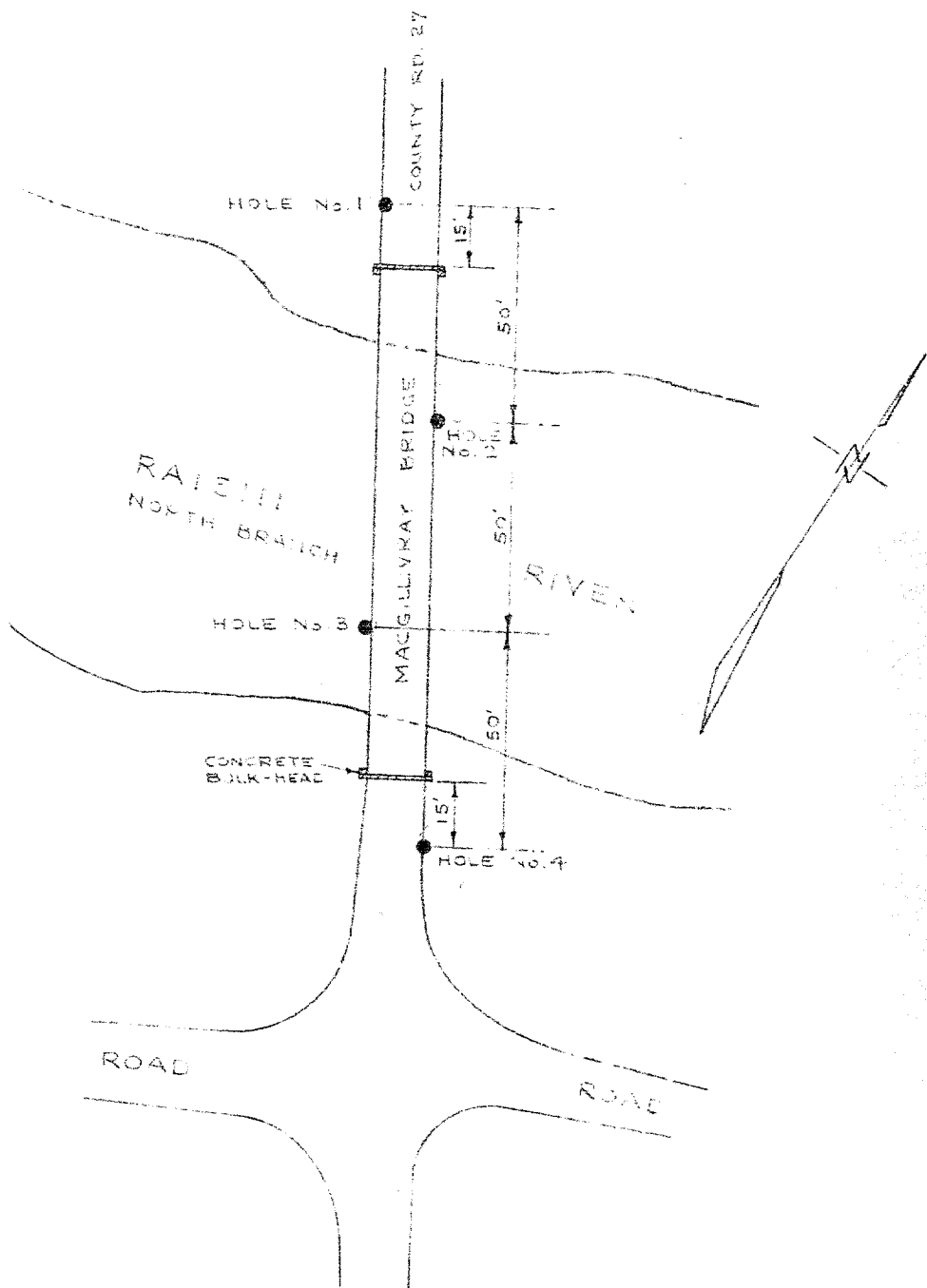
Finally a watch should be kept during construction for variations in soil conditions between the locations tested by borings. Any significant variations that are observed during construction should be reported to the supervising engineer for appropriate action.

3. SITE INVESTIGATION

Four boreholes were made at the site with our test drilling equipment in the locations shown on Plate 1. Two-inch split barrel samples were taken in the non-cohesive soil deposits and the standard penetration test performed in the borehole. Two-inch thin wall tube samples were taken in the cohesive soil layers and the tubes returned to our laboratory for more detailed testing. Rock beneath the site was diamond drilled and cores recovered for examination and logging except in borehole No. 4 where, in the interest of economy, a probing was made to refusal of the drill rods after suitable soil layers had been confirmed in the borehole.

All samples were visually reclassified at our laboratory and water content tests performed to aid in our judgment of the construction behaviour of the materials. In the thin wall tube samples a group of small scale penetrometer readings were obtained to aid in our estimation of the shear strength of these materials and our estimation of the variation of this strength within the sample.

Soil and rock conditions are shown in detail on Plates 2 to 5 and are difficult to generalize since they vary from hole to hole. However it can be said that soil layers exist in the sequence of silt above clay above till and that limestone rock of the Ottawa formation is found approximately 24 feet below the existing river bottom. At the time of the investigation river levels were only a few feet above the river bottom but these will of course rise by several feet during the flood season and construction planning must recognize this possible variation.



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BOREHOLE LOCATIONS
RAISIN RIVER
McGILLIVRAY BRIDGE

SCALE 1" = 40'

PLATE I

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SOIL PROFILE AND SUMMARY
OF FIELD AND LABORATORY TESTS

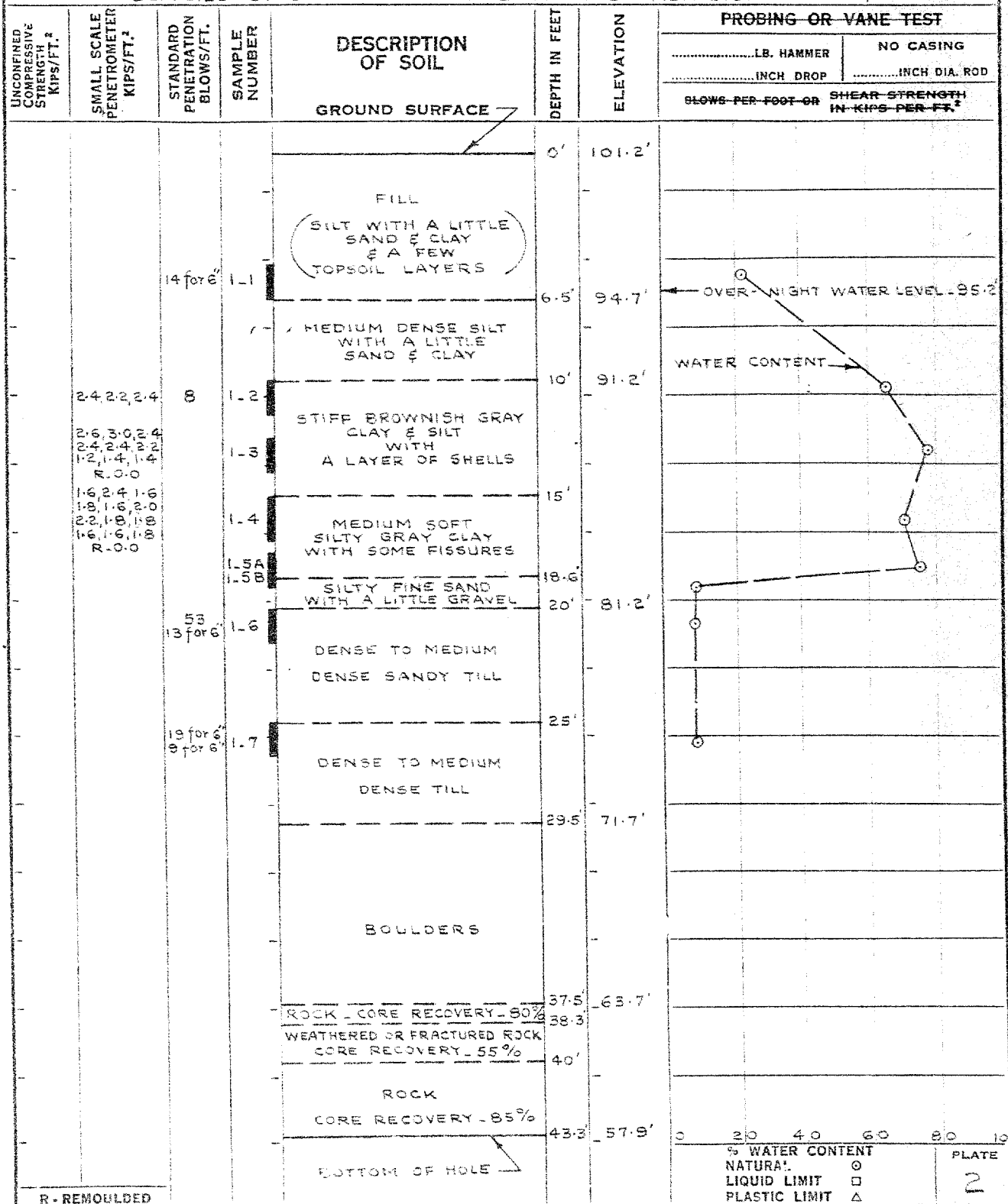
RAISIN RIVER
 MCGILLIVRAY BRIDGE

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 101.2' DATE MAR. 13, 1962

HOLE NO. 1

REMARKS B.M. (EL. 102.5) TOP OF DECK OF EXISTING BRIDGE ELEVATION

SUPPLIED BY DELEUW CATHER & CO. OF CANADA LTD.



McROSTIE & ASSOCIATES LTD.
CONSULTING ENGINEERS
OTTAWA CANADA

SOIL PROFILE AND SUMMARY
OF FIELD AND LABORATORY TESTS

RAISIN RIVER
 MCGILLIVRAY BRIDGE

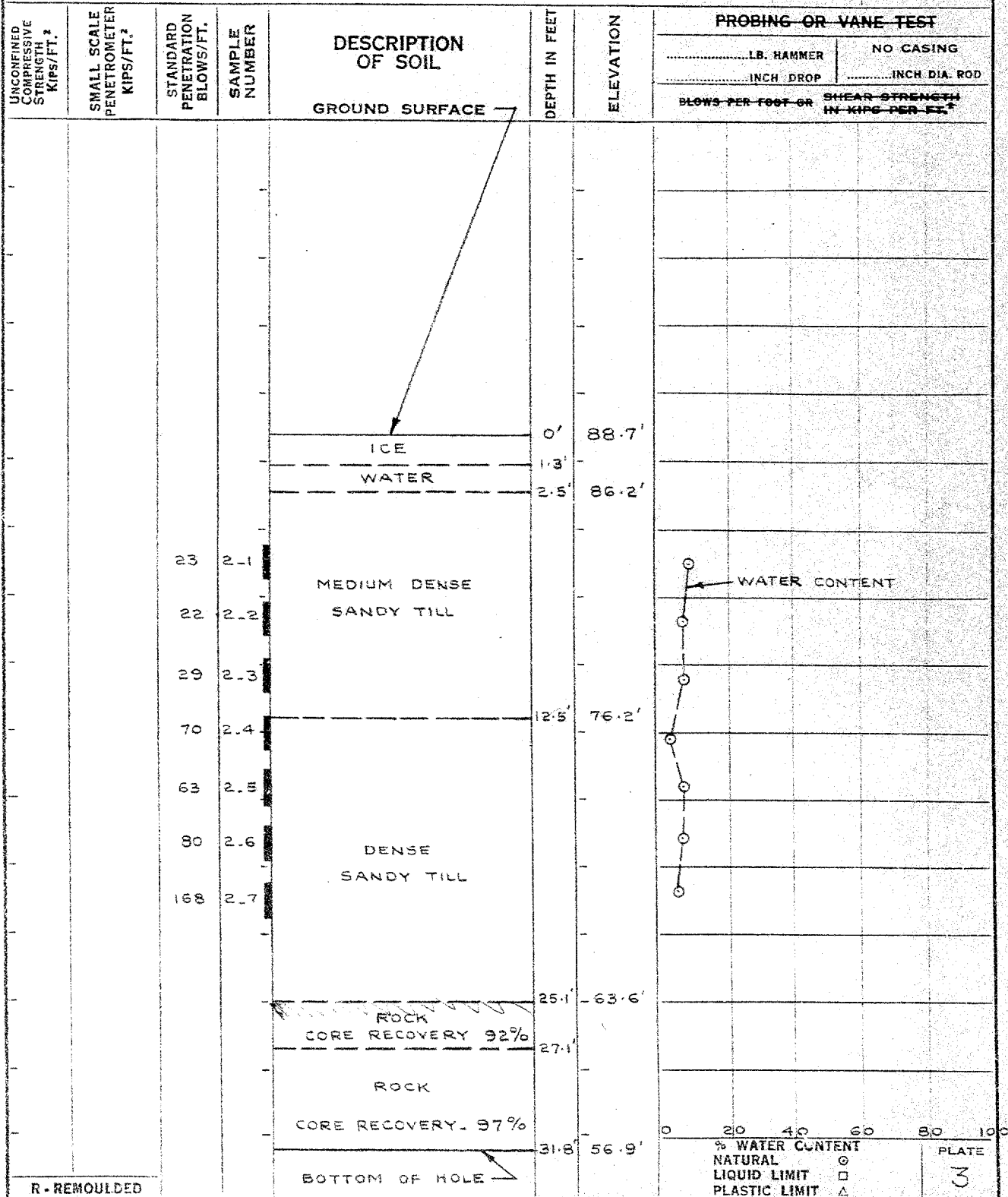
ELEVATION OF GROUND SURFACE (ZERO DEPTH) 88.7'

DATE MAR. 16, 1962

HOLE NO.

REMARKS SEE PLATE No. 2

2



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SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

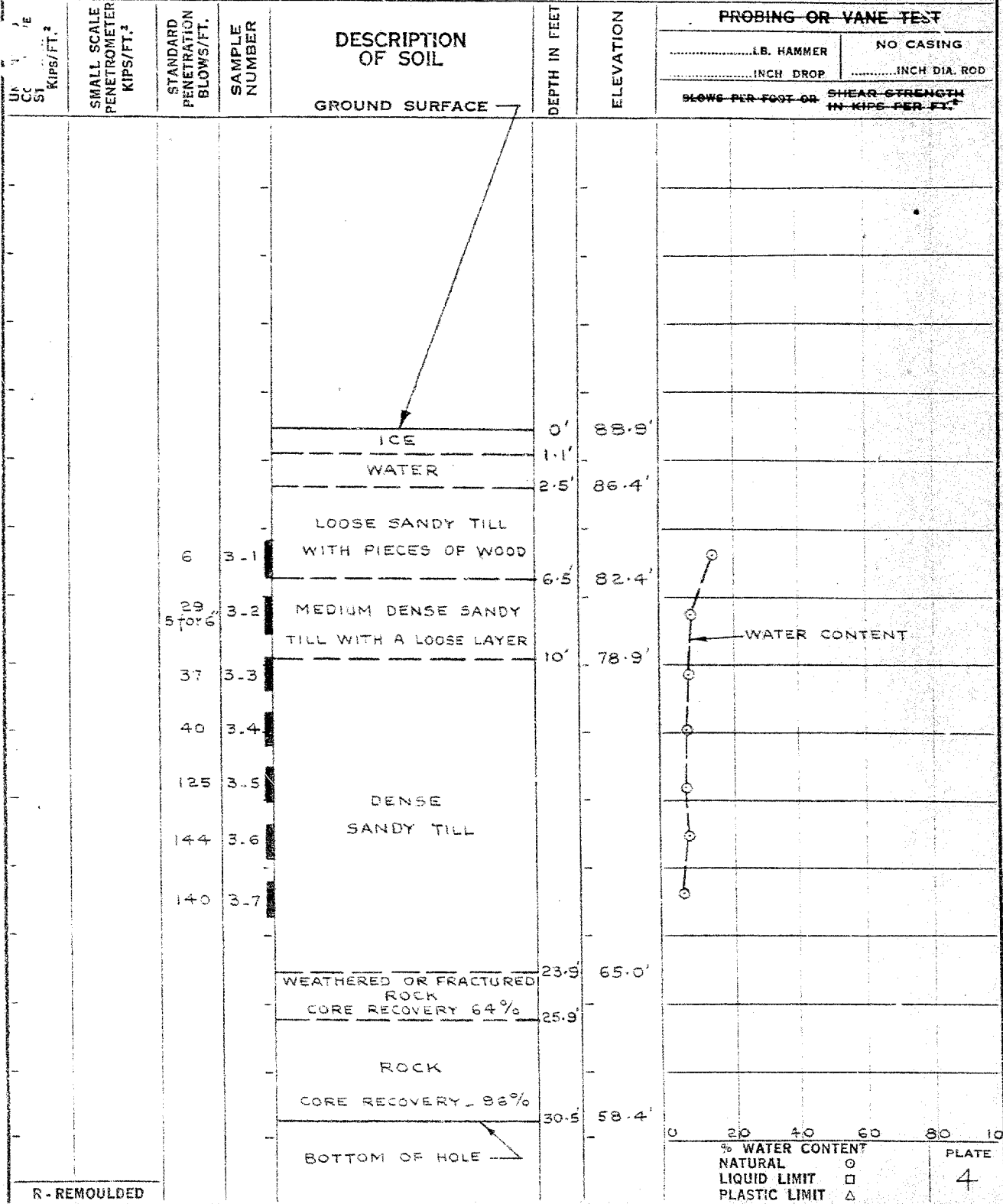
RAISIN RIVER
MCGILLIVRAY BRIDGE

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 88.9'

DATE MAR. 17, 1962

HOLE NO. 3

REMARKS SEE PLATE No. 2



R - REMOULDED

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SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

RAISIN RIVER
McGILLIVRAY BRIDGE

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 101.9'

DATE MAR. 17, 1962

HOLE NO.

REMARKS SEE PLATE No. 2

4

