

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31G-31

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. 3-207

HWY. No. _____

LOCATION BRIDGE CROS. E.
CASTOR RIV. TRIBUTARY,
NEAR MARVELVILLE,

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

NONE

REMARKS: _____

L.H. 1174
3507

31G-31

GEOCRE5 No.

REPORT ON SUBSURFACE INVESTIGATION

FOR

BRIDGE CROSSING EAST CASTOR RIVER TRIBUTARY

ON

TOWN LINE BETWEEN RUSSELL AND OSGOODE TOWNSHIPS

NEAR MARVELVILLE, ONTARIO

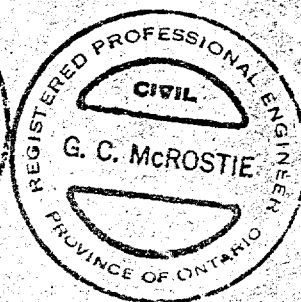
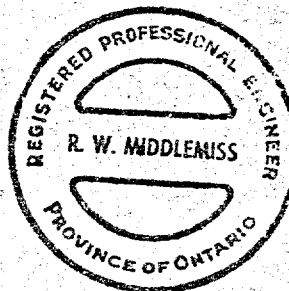
TO

M. M. DILLON AND COMPANY LIMITED

CONSULTING ENGINEERS

Report No. SF-734

March 12, 1964.



McROSTIE & ASSOCIATES LTD.
CONSULTING ENGINEERS
OTTAWA CANADA

MCROSTIE & ASSOCIATES LTD.

CONSULTING ENGINEERS

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31G-31

GEOCREs No.

3-207

1. TERMS OF REFERENCE

We were requested by Mr. Kearney of M. M. Dillon and Company Limited to carry out a subsurface investigation at the site of a bridge structure crossing a tributary of the East Castor River. Preliminary planning indicated that a box culvert or small concrete structure would be desirable at this site.

The soil investigation was to determine whether the bearing capacity was sufficient for spread footings or whether a slab was required in the bottom of the structure.

Preliminary studies by M. M. Dillon and Company Limited indicated also that the road elevation would be about 10 feet above the stream bottom.

The investigation was also to consider if applicable, any stability problems that might arise in the approach fills.

2. RECOMMENDATIONS

2.1 Foundation Type

We recommend that the structure be supported on footings resting on rock at elevations between 79 and 80. No special preparation of the rock should be required since conservative bearing values will need to be assumed due to the presence of seams in the upper rock layers.

2.2 Rock and Soil Bearing Capacities

A bearing capacity of 20,000 pounds per square foot can be recommended for rock where encountered at about elevation 79 to 80 beneath the site. This conservative value must be

2.2 Soil and Rock Bearing Capacities

recommended due to the presence of seams and if higher bearing values would result in significant economies in the structure, a program of grouting could be considered.

The soils at elevation 82 would permit a bearing capacity of about 1500 pounds per square foot but are not recommended since the much higher bearing values can be achieved on the rock only a few feet lower and a more economical structure should therefore be possible using the rock.

2.3 Slope Stabilities

If the abutments are taken to rock, no failure of the approach fills in the longitudinal direction beneath the abutments is possible. The abutments would merely act as retaining walls resting on rock. Lateral failure of the embankments can be avoided by a choice of suitable side slopes on the approach fills. Without analysis we can suggest that a side slope of two on one for a vertical height of ten feet can be considered safe on the clay soils encountered. The organic soils encountered in test hole No. 1 would need to be removed before placing any new portions of approach fills.

2.4 Construction Precautions

Some flow of groundwater is to be expected at the upper rock surface. Fortunately pumping from the excavation can be permitted since the groundwater flow will not damage the bearing strata.

The excavation for abutments can likely be made using normal temporary cut slopes through the clay soils. The thin silty layer just above rock will likely however require flat slopes across the depth of the layer and the excavation may therefore

2.4 Construction Precautions

be slightly enlarged due to sloughing of this layer.

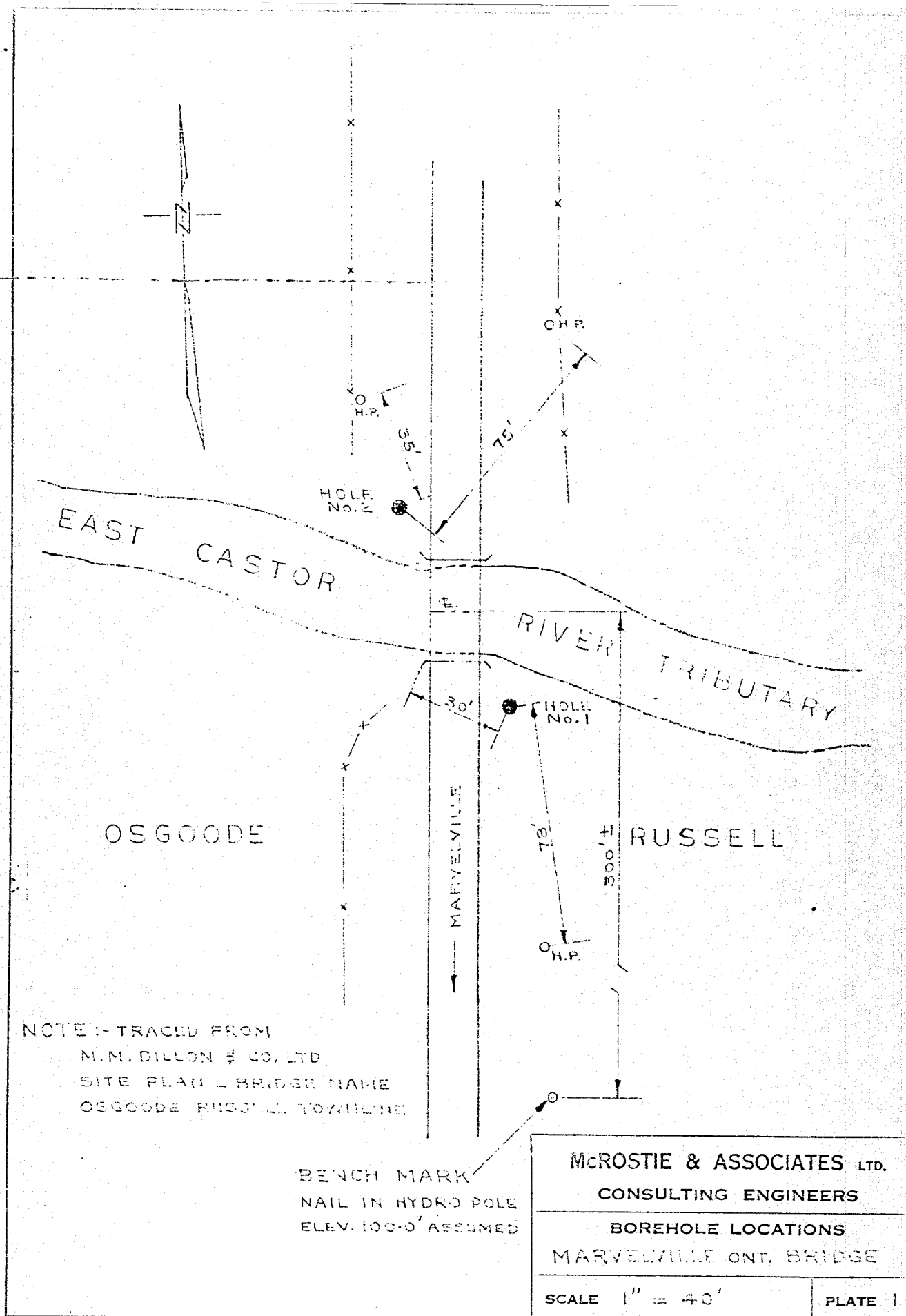
During construction a watch should be kept for the possibility of variations in rock elevation or other subsurface conditions from the findings at the borehole locations. If any significant differences are observed, these will need to be reported for appropriate action.

3. LATE INVA. REGION

Two boraholes were made at the site in the river bank locations shown on plate 1. Two inch thin walled tube samples were recovered from the cohesive soil layers and rock beneath the site was diamond drilled with cores recovered for inspection and logging by a geotechnical engineer. Groundwater elevations were observed during the field program but these became identical with surface water elevations since the site was temporarily flooded during the investigation.

All samples were visually reclassified at our laboratory, water content tests were performed to aid in classification and estimating the construction behaviour of the soils. A group of small scale penetrometer tests was made on each tube sample both as received and as remoulded state so that shear strengths of the cohesive soils could be estimated. These values were compared with borahole vane tests done during the field operation.

Details of the soils encountered are shown on plates 2 and three but can be generalized as consisting of a layer of organic material underlain by stiff clay to about a depth of 8 feet. The next layers are medium soft clays changing to silts or tills and then rock at about the 10 foot depth. The rock is a weathered dolomite with shaly interbeddings of the Oxford Formation and it contains discontinuous seams in the upper few feet of the deposit. A faint flow of water from the upper rock layers was detected during the test drilling operation and this fact plus the appearance of seams indicates the likelihood of the upper rock surface being water bearing during construction.



MARVELVILLE, ONTARIO
BRIDGE

HOLE N

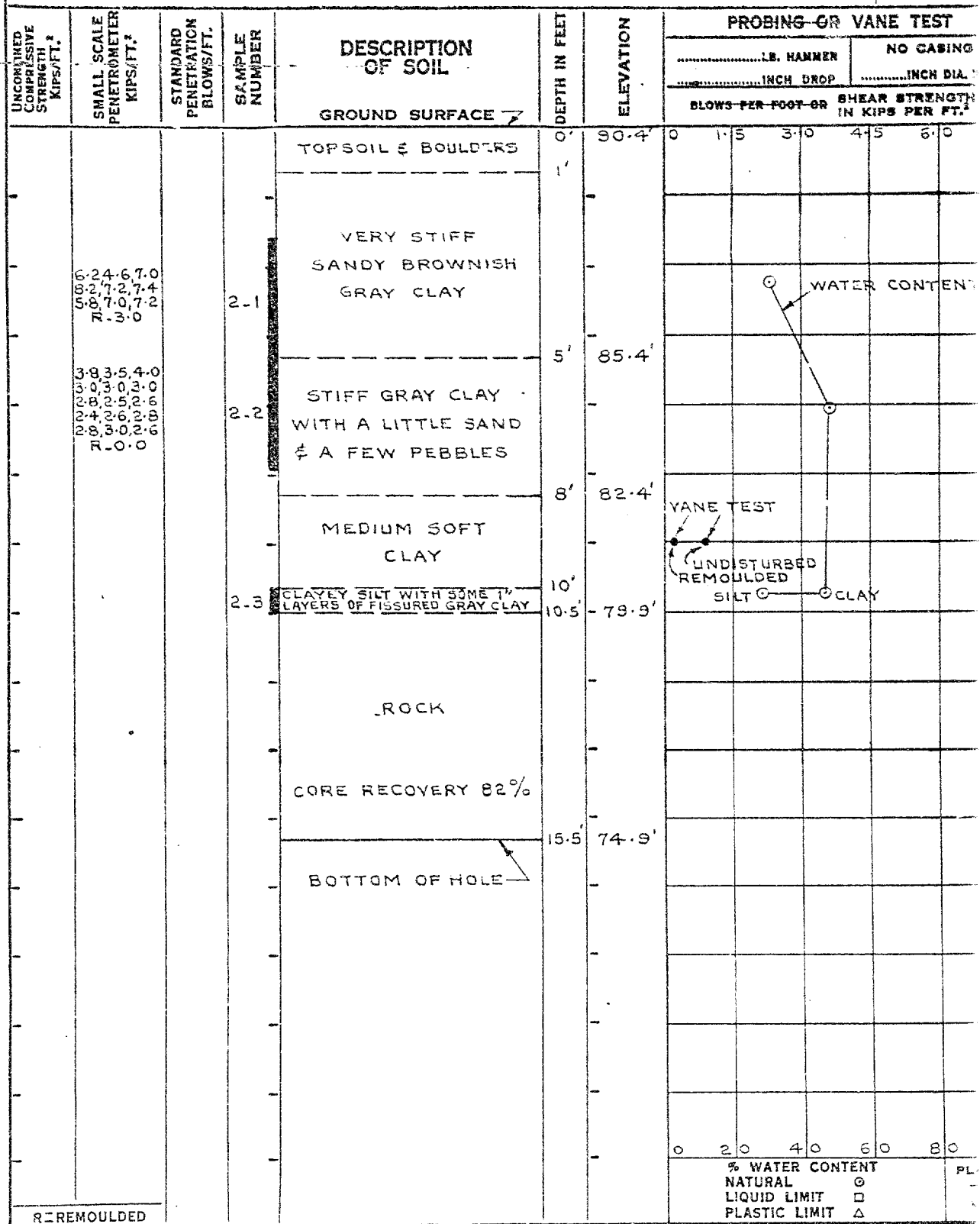
Abstract

L. M. CO.

MARVELVILLE, ONTARIO
BRIDGE

HOLE N.

2



SITE N^o 3-207

31 G-31
GEOCRES No.

ENGINEERING REPORT

for

OSGOODE-RUSSELL BRIDGE

for

COUNTY OF CARLETON

M. M. DILLON & COMPANY LIMITED

LONDON OTTAWA TORONTO WINDSOR

ENGINEERING REPORT
for
OSGOODE-RUSSEL BRIDGE
for
COUNTY OF CARLETON

A. SCOPE

This report outlines the general design features of The Osgoode-Russell Bridge to be constructed by the County of Carleton. Preliminary plans and an estimate of the cost of this project are included as part of this report.

B. OWNER

The County of Carleton assumes responsibility for this bridge due to its location on a road which forms the boundary between two townships.

C. LOCATION

The bridge is located on the townline between Osgoode and Russell Townships and carries traffic using the road over a tributary of the East Castor River. Exact location is described as Lot 35, Concession 11, Township of Osgoode.

D. GENERAL DESIGN DATA

1. Hydrology

The total land area drained by the watercourse to this bridge site is estimated to be approximately 10 square miles. The existing bridge has an estimated waterway area to high water level of 180 square feet. The first bridge upstream, a few hundred yards away, is approximately the same size, though the roadway is very much lower and annual flooding of this occurs. Further upstream, an existing 20 foot box culvert, having a drainage area of about 7 square miles and an estimated waterway area to high water level of 100 square feet, accommodates flood. The first bridge downstream is a 25 foot box culvert providing approximately 200 square feet of

D. GENERAL DESIGN DATA (continued)

waterway area and draining a land area of approximately 13 square miles. The structure accommodates normal flooding without road overtopping.

2. Soil Conditions

A soil investigation of the site was performed by McRostie and Associates Limited, Consulting Engineers of Ottawa.

This has revealed that rock exists about 12 feet below the normal ground level. The rock is overlain by clay layers varying from stiff just below the top soil to medium soft immediately above the rock. Due to its proximity to the surface, it is recommended that foundations be set on the rock and an allowable bearing capacity of 20,000 lbs. per square foot be used.

Copies of this soil report are attached to this report.

3. Skew Angle

Though the existing structure is placed normal to the roadway, it is considered that a skew angle of approximately 11 1/2 degrees would improve flow characteristics through the new structure.

4. Geometric Standards

A design volume of 200 to 400 vehicles per day has been recommended for the site. The bridge will have a roadway of 28 feet between curbs, with 3 foot safety curbs on each side. The new grade line proposed for the roadway in the vicinity of the structure has been designed on the basis of a 50 mile per hour roadway design speed.

E. EXISTING BRIDGE

The existing bridge is a 28 foot clear span concrete T-beam with solid abutments. It is in very bad condition, with a very large shear crack in one of the beams at the abutment. This has opened up at least one-half an inch. There is also a section of the slab that collapsed last year and was repaired by the County.

F. PROPOSED BRIDGE

In view of the size of the downstream bridge and its efficiency, it is considered that the existing structure could be reduced to a 25 foot span when replaced. A rigid frame type structure is proposed with footings founded on the rock. The resultant structure will provide a waterway area of approximately 190 square feet, and for the estimated 25 year design flow of 1,000 cubic feet per second, velocities should be such that no scour would occur.

The underside of the new structure will be raised approximately $2\frac{1}{2}$ feet above the existing underside. This will provide more than 1 foot clearance during high water level and place the underside at approximately the low spot of the road profile proposed, which will act as a relief should very excessive flooding occur.

Because of the relatively low height of the structure, cantilevered wing-walls are proposed to retain the approach road.

G. ESTIMATED COST OF PROJECT

With the roadwork proposed, having a granular surface as now exists, it is estimated the project will cost approximately \$23,000.00.

This report is respectfully submitted.

J. H. Kearney
J. H. Kearney, P. Eng.,
Project Manager.

Ma 24/68

M. M. DILLON & COMPANY LIMITED

OTTAWA