

#

61-F-115-

HUMBER R

&

HICKMAN ST.

BOLTON

Mr. A. M. Toye,

Bridge Engineer.

Materials & Research Division,

(Foundation Section)

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

January 25, 1962.

D.H.O. FOUNDATION INVESTIGATION  
REPORT

W.J. 61-F-115 -- W.P. (Nil).

(Municipal Job)

Re: Hickman Street and Humber River,  
Bolton, Ontario, District No. 6.

Attached, we are forwarding to you, our detailed report on the subsoil conditions existing at the above structure site.

We believe the factual data and recommendations contained therein, should prove adequate for your future design work. Should further assistance be required with respect to this project, please do not hesitate to contact our Office.

AGS/MdeF  
Attach.

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

cc: Messrs. A. M. Toye (2)  
J. V. Ludgate  
J. G. Tillcock  
T. J. Kovich

Foundations Office  
Gen. Files.

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# FOUNDATION INVESTIGATION

At

Hickman Street and Humber River,  
Bolton, Ontario, District No. 6,  
W.J. 61-F-115 -- W.P. (Nil).  
(Municipal Job)

## 1. INTRODUCTION:

It is proposed to construct a bridge where Hickman St. crosses the Humber River in Bolton. The proposed structure will replace the existing 70-ft. long single-span structure.

On receipt of a request by the Village of Bolton, the Foundation Section of the Ontario Department of Highways, carried out a soil investigation to determine the subsoil conditions existing at the proposed structure location.

Results and the discussions of the field investigation, together with conclusions and recommendations, are presented in this report.

## 2. DESCRIPTION OF SITE & GEOLOGY:

The site is located in the Village of Bolton which, itself, is in a valley bounded by hills. The immediate surrounding area at the site is flat and is crossed by the Humber River. At the bridge, the river is shallow and about 50 ft. wide.

The site is in the Oak Ridges physiographic region which consists of an interlobate moraine. This moraine is hilly and its material is mainly sand and gravel.

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### 3. FIELD INVESTIGATION:

At the site, two sampled boreholes with dynamic cone penetration tests adjacent to each, were carried out. Samples were recovered at required depths by means of a 2" O.D. split-spoon sampler. The denseness of the cohesionless material was measured by means of the Standard Penetration Test.

Ground water levels were observed during the investigation.

The locations and elevations of the boreholes and the estimated subsoil stratigraphy are shown on Drawing No. 61-F-115A.

### 4. LABORATORY INVESTIGATION:

Samples were visually examined and classified at the site as well as in the laboratory.

Laboratory tests were carried out on various representative samples to determine:-

- (a) Natural Moisture Content.
- (b) Atterberg Limits.
- (c) Grain Size Distribution.

Laboratory and field test results are summarized and included under Appendix I of this report.

### 5. SUBSOIL CONDITIONS:

#### 5.1) General:

The stratigraphy of the soil at the site was found to be generally uniform. Detailed descriptions of the strata encountered are shown in Appendix I. The estimated stratigraphical

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.1) General: (cont'd.) ...

profile of Drawing No. 61-F-115A is based on this information.

The subsoil consists of the following strata:-

- (i) Sandy Fill Material.
- (ii) Silt to Clayey Silt.

5.2) Sandy Fill Material:

This material was found in both boreholes and it extends for about 12 ft. to elevation 88 ft. The sandy fill forms the embankment of Hickman St. The material is an oxidized brown sand with clayey silt, rounded gravel and organic material. It is in a compact state with an average 'N' value of 15 blows/ft.

5.3) Silt to Clayey Silt:

This stratum underlies the sandy fill and extends to the maximum depths tested: 61.5 ft. and 51.5 ft. in Borehole No's. 1 & 2, respectively. This layer is mainly silt, with traces of clay in the upper 12 ft. No clearly defined stratification of material was observed. The relative density may be described as compact, becoming dense with depth. 'N' values varied from 15 to 42 blows/ft.

6. GROUND WATER CONDITIONS:

Ground water observations carried out during the investigation, indicate that the ground water level is approx. 10 ft. below the Centre Line of the existing road, at elevation 90.0 ft. (Assumed elevation of Bridge grade = 100.0 ft.) This level corresponds to the river water level.

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## 7. DISCUSSION AND RECOMMENDATIONS:

A single-span structure is proposed for this location. It is understood that the steel truss from the Hwy. #50, Humber River Bridge is to be utilized here. Two new abutments are required as the existing ones are inadequate. It is understood that hydrological conditions are such that footings should be placed about 7.0' below the existing stream bed. The elevation of the stream bed is approximately El. 88.0. Hence, it will be necessary to found the structure at or below El. 81.0. A safe bearing capacity of 2 t.s.f. can be achieved at this elevation, based on a maximum anticipated settlement of 2". This settlement will occur as construction proceeds and should therefore, not be detrimental to the finished structure.

A dewatering scheme will be necessary as excavations for the footings will be about 10.0' below the water level. The grain size distribution of the silty subsoil is such that a well-point dewatering scheme is not feasible. This type of material is likely to become 'quick' under an unbalanced hydrostatic head. In view of these facts, a sound engineering solution to the problems would be to carry out the excavations inside a cofferdam of interlocking sheet piling driven to about El. 71.0, and using normal pumping procedures. It should be pointed out that two other structures in Bolton have been constructed without the use of sheet piling, and as far as is known, no dewatering problems were encountered. At these locations, however, conditions were

cont'd. /5 ...

7. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

slightly more favourable. Nevertheless, it might be economically more advantageous to provide in the contract for "sheet piling, if required", and proceed to excavate without it. If, at any time, it becomes evident that 'quick' conditions are developing, the excavation can be flooded, and sheeting driven to the required depth. It is pointed out that if sheet piling is not used, protection will still be required if the sides of the excavations are too steep.

No stability problems are anticipated with regard to the bridge approaches.

8. SUMMARY:

The subsoil at the site is generally uniform and consists of 10' of sandy fill material, followed by at least 50' of silt to clayey silt.

Spread footings with a safe load of 2 t.s.f. are recommended. These should be placed at or below El. 81.0.

At the time of the investigation, the ground water was at elevation 90.0', which was the same as the river water level. A dewatering scheme is described in 7. above.

No stability problems in the approach fills are anticipated.

cont'd. /6 ...



9. MISCELLANEOUS:

The field work was carried out from November 26 to November 29, 1961, by F. E. Johnston Drilling Co., Ltd., and the work was supervised by I. Holubec for the Ontario Department of Highways.

January 1962

REPORT PREPARED BY:

*I. Holubec*  
.....  
I. Holubec,  
PROJECT FOUNDATION ENGINEER

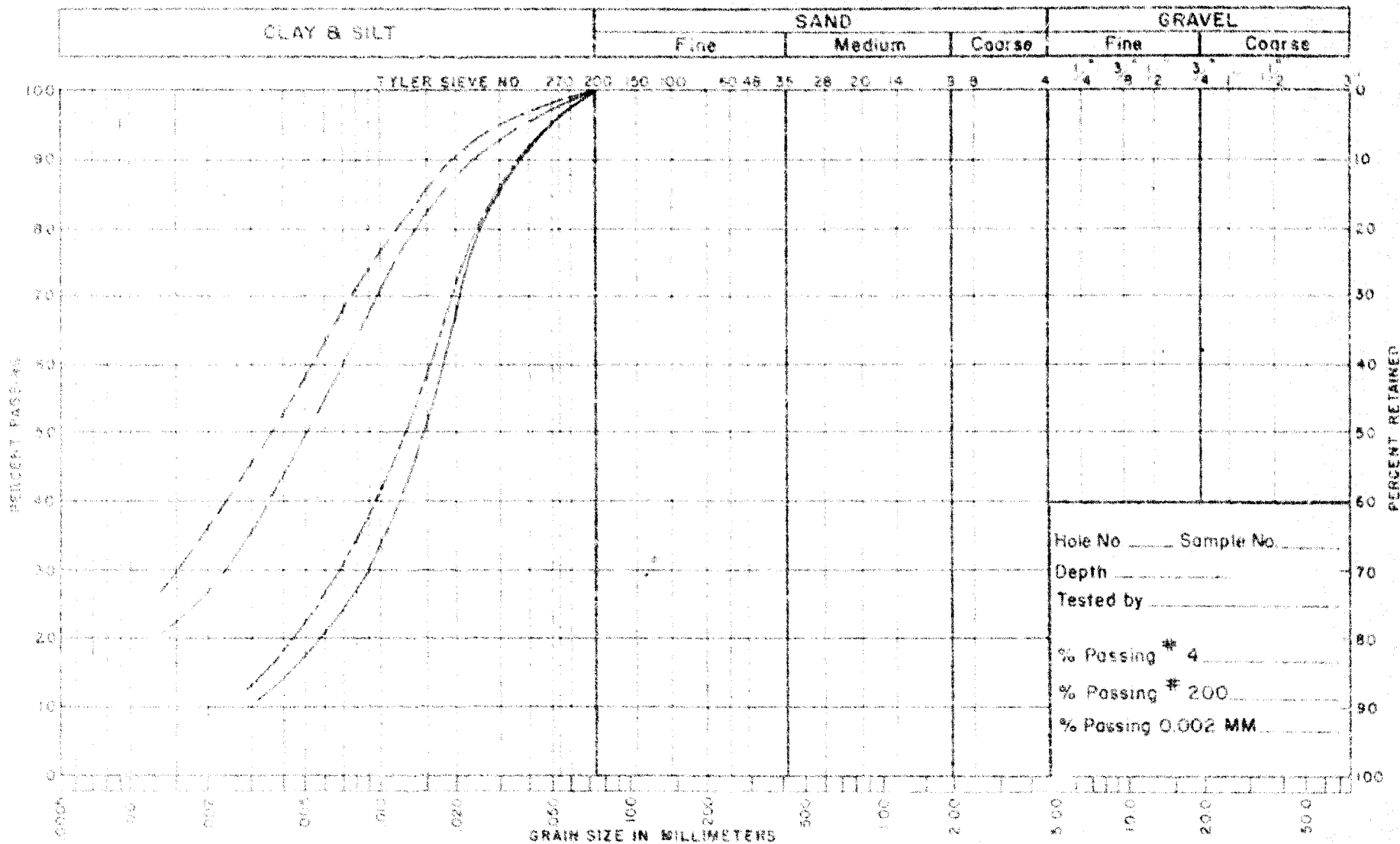
REPORT APPROVED BY:

*K. G. Selby*  
.....  
K. G. Selby,  
SR. PROJECT FOUNDATION ENGINEER





# UNIFIED SOIL CLASSIFICATION SYSTEM



NOTES

BORE HOLE - 1 SAMPLE - 5 \_\_\_\_\_

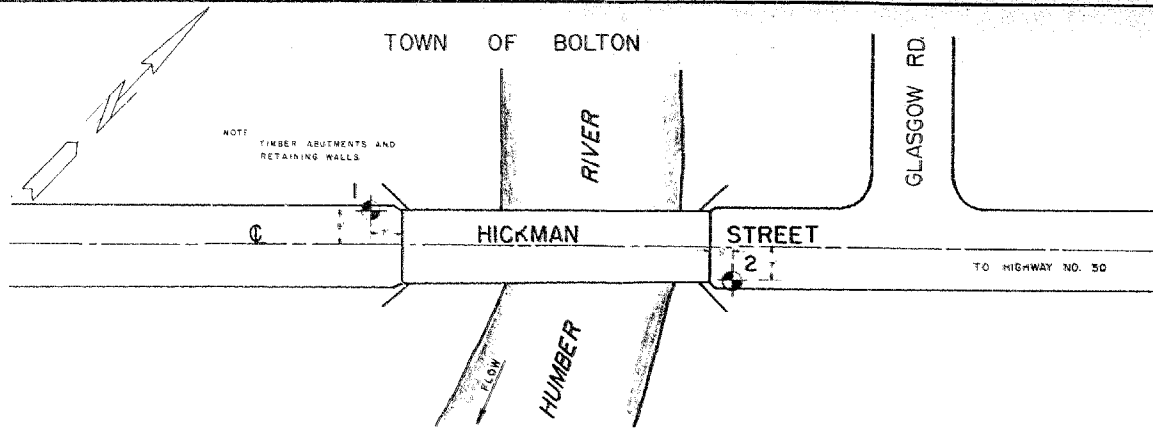
BORE HOLE - 1 SAMPLE - 7 \_\_\_\_\_

BORE HOLE - 1 SAMPLE - 3 \_\_\_\_\_

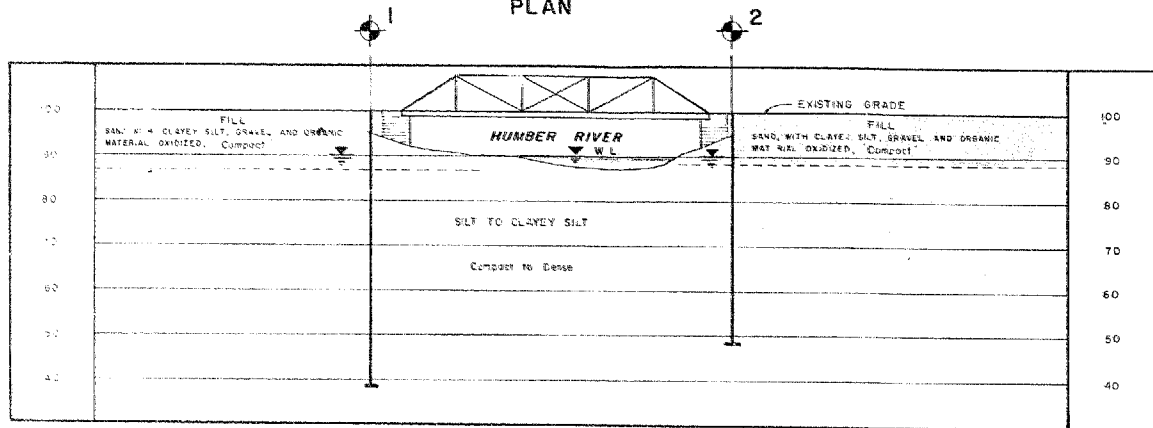
BORE HOLE - 2 SAMPLE - 4 \_\_\_\_\_

DEPARTMENT OF HIGHWAYS - ONTARIO  
 MATERIALS & RESEARCH SECTION  
**GRAIN SIZE DISTRIBUTION**

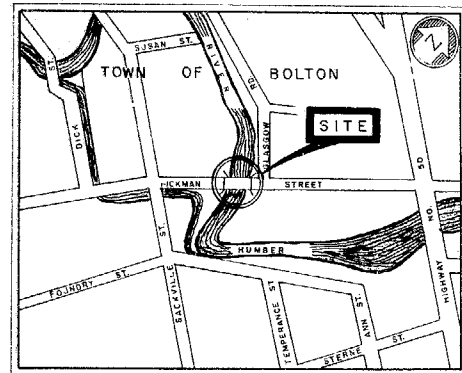
Job No. 61-F-115 W.P. No. \_\_\_\_\_  
 Location HICKMAN STREET, BOLTON



PLAN



PROFILE



KEY PLAN

SCALE: 1 IN. = 100 YARDS  
APPROX.

601000  
4859300  
30M13E  
17



BORE & PENETRATION HOLE

ELEVATION ASSUMED AS 100 AT  
BRIDGE GRADE

WATER LEVELS IN BORE HOLES  
(ELEVATION SAME AS IN RIVER)

— NOTE —

THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN  
ESTABLISHED ONLY AT BORE HOLE LOCATIONS.  
BETWEEN BORE HOLES THE BOUNDARIES ARE ASSUMED  
FROM GEOLOGICAL EVIDENCE AND MAY BE SUBJECT  
TO CONSIDERABLE ERROR.

ORIGINATED: J. HOLUBEC	DEPARTMENT OF HIGHWAYS - ONTARIO	SCALE: 1" = 20'
DRAWN: A. SHODOFF	MATERIALS & RESEARCH-SECTION	W.P. NO.
CHECKED: <i>sh</i>	HUMBER RIVER	JOB NO. 61-F-115
APPROVED: <i>sh</i>	AND	DWG NO. 61-F-115A
DATE: 8 DEC. 1961	HICKMAN STREET - BOLTON	