

#58-F-228-C
HOLLAND AVE.
E OTTAWA,
QUEENSWAY,
BRIDGE No[#] 10.

BA 847

58 F 228

Toronto 5,
December 4, 1958.

MEMORANDUM TO:

Mr. A. Rutka,
Acting Materials and Research Engineer,
Department of Highways,
Room 103,
Downsview, Ontario.

RE: BA 847 . Holland Avenue,
Ottawa Queensway,
District #9.

Attached please find Soil Report BA 847 for
your file.

JCMc:CP
Attach.

J.C. McAllister,
for S. McCombie,
Bridge Planning Engineer.

BA 847

DE LEUW, CATHER & COMPANY
OF CANADA LIMITED
CONSULTING ENGINEERS
TORONTO OTTAWA

226 SPARKS STREET
OTTAWA 4, ONTARIO
CENTRAL 3-9663

December 2nd, 1958.

Mr. F.I. Hewson,
Consultant Liaison Engineer,
Bridge Design Office,
Department of Highways,
280 Davenport Road,
Toronto 5, Ontario.

Dear Mr. Hewson:

Re: Bridge No. 10 at Holland Ave.
Queensway Ottawa - District 9

We enclose herewith 3 copies of McRostie and Associates soils foundation report No. SF-389 for the above structure.

Yours very truly,

DE LEUW, CATHER & CO. OF CANADA LIMITED,

Leon J. Marshall

Leon J. Marshall, P.Eng.,
Senior Structural Engineer.

LJM/PM
Encls.

MCROSTIE & ASSOCIATES

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OTTAWA 1
CANADA

393 BELL STREET
TELEPHONE CE. 2-5334

FOUNDATION INVESTIGATION - HOLLAND AVE.

1. TERMS OF REFERENCE

We were asked by the Ottawa Office of De Leuw Cather & Company of Canada to carry out a foundation investigation and report on conditions at the site of Bridge No. 10 of the Ottawa Queensway. A structure is proposed which would carry the Queensway over Holland Avenue and likely elevations of roadways and foundations were discussed during the progress of the work.

2. RECOMMENDATIONS

2.1 Soil Strengths

Bearing capacities can be assigned to the soils on the basis of the findings from the site investigation. The areas of minimum capacity have controlled the recommendation for each abutment, however further subdivision of each abutment could be made. The most suitable foundation elevation was decided to be elevation 217 but fill or regraded soils were encountered, possibly due to the construction of the previous structure, at elevations below 217 and new structure foundations would need to be taken below this to the depths indicated.

(1) EAST ABUTMENT.

(Foundations at or below elevation 213)

- 4000 POUNDS PER SQUARE FOOT
Groundwater control required.

(2) WEST ABUTMENT.

(Foundation at or below elevation 214)

- 4000 POUNDS PER SQUARE FOOT
Groundwater control required.

Wing walls or other elements of the structure at the southerly end of the abutments could be considered at higher elevations if the structural relationships permit.

2.2 Soil Compressibility

The soils are basically granular material and hence react under load as a reasonably elastic type of

material. Long term settlements due to consolidation of the soils will not occur here.

2.3 Foundation Type

With soils of medium bearing capacity at reasonable depths it would appear that spread footings could be considered as the most likely type of suitable foundations for a structure. Since long term settlements due to the load of either structure or approach fills are not a factor, a type of structure which is sensitive to movement should not present unusual problems at this site.

2.4 Construction Precautions

The depth of foundation required to reach undisturbed ground below the existing Bridge will bring construction excavation below the normal groundwater table. It is essential to the success of a foundation support on soil that the ground water does not flow upward through the bottom of the excavation thereby destroying the density of the soils required for bearing. The use of well points is likely to be successful due to the permeability of the soils. Attempts to utilize open pumped sumps within the foundation excavation should be regarded with caution as there is danger of causing flow in the fine granular soils.

Some evidence was observed of variation in soil conditions encountered in the bore holes and a careful watch should be kept during construction for soil variation between the bore hole locations. Any unusual occurrences should be reported for consideration and suitable action during construction.

3. SITE INVESTIGATION

3.1 Field Work

Six bore holes were made at the site with our drilling rig and one bore hole (No. 2) was repeated to obtain a confirmation of the upper rock surface. Two-inch split barrel samples were recovered for visual inspection and the standard penetration test was performed in all holes. Rock beneath the site was Diamond drilled and $\frac{3}{4}$ inch cores were recovered. A careful watch was kept for drops and loss of drill water during the Diamond drilling operation. Groundwater levels were recorded during the field program.

3.2 Laboratory Testing

Moisture contents were determined on all samples to supply an indication of the porosity of the samples and hence the suitability of the construction dewatering methods. Samples were also given a

laboratory check of the field identification.

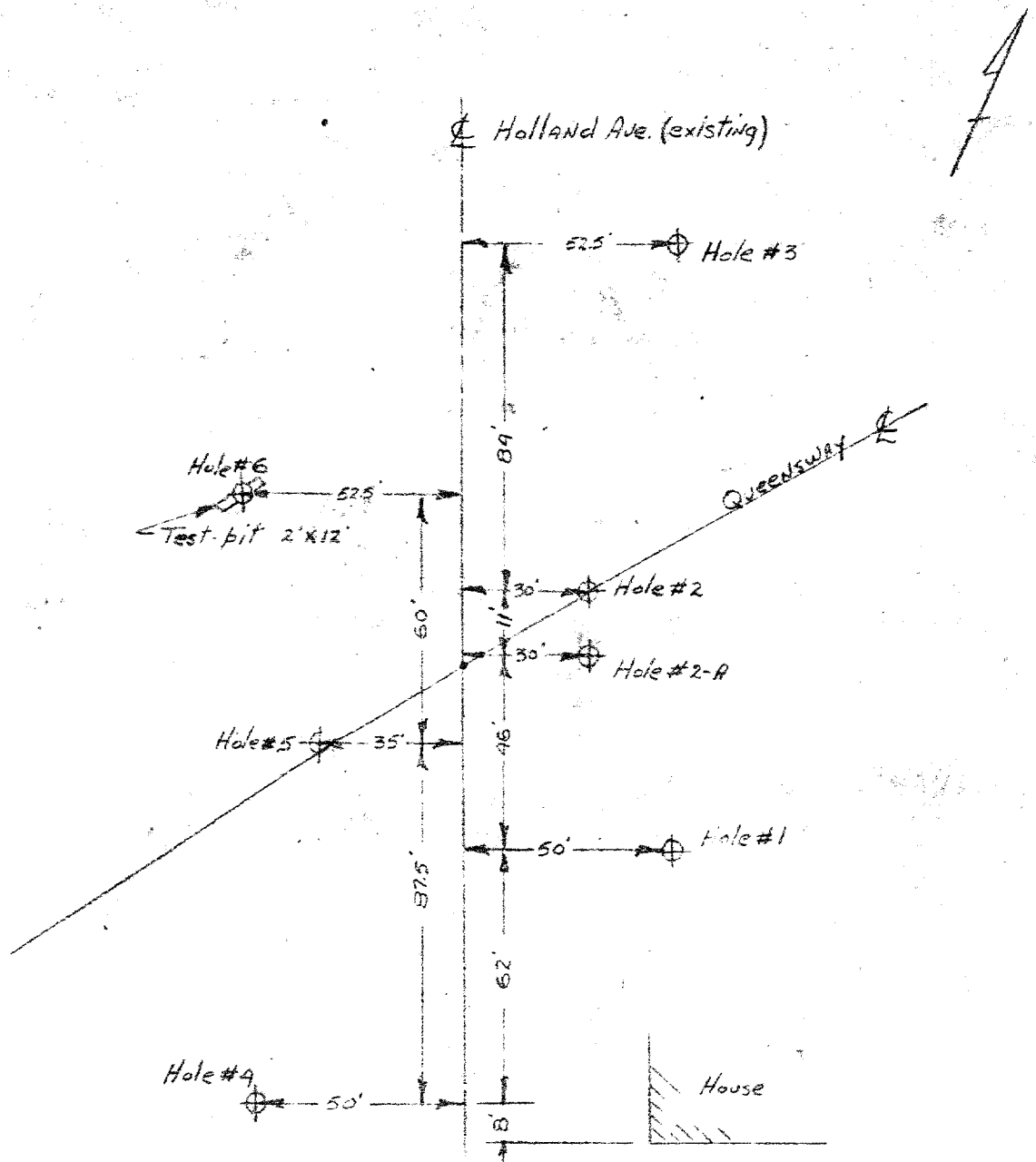
3.3 Observations

Soil conditions at the site can be generalized as being 14 to 19 feet of sand beneath the surface with the upper eight feet being fill or disturbed material in the proximity of the existing bridge abutments. At the north-west corner of the site a concentration of boulders was encountered in the upper nine feet. A test pit was dug to examine the boulder frequency and to permit penetration of the bore hole. The boulders were found to be a compact layer with very little space remaining between the individual boulders which varied in size from 6" to 3' in diameter. Beneath the sand deposits is shaly limestone rock of the Ottawa formation. Several drops were observed in the drilling which indicate that the upper rock surface is weathered and may contain seams of unconsolidated material. The regraded natural soils above the sands in the westerly area of the site have been classified as fill. Unknowns in the uniformity and the recompacted properties of this material prevent its being considered for foundation support at this time.

Groundwater levels were observed to be approximately eight feet below the surface and this can be considered to be midway between the seasonal high and the seasonal low variation. The levels can be expected to vary by a few feet higher or lower depending upon the season and the rainfall history.

4. COORDINATION

We would be glad to discuss any points arising out of the report should the need arise.



Sherwood Drive

McROSTIE & ASSOCIATES
CONSULTING ENGINEERS

BOREHOLE LOCATIONS
QWY & HOLLAND AVE.

SCALE 1" = 40'

PLATE 1

McROSTIE & ASSOCIATES

CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

QWY / HOLLAND AVE.

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 225.1'

DATE Oct. 27/50

HOLE NO. 1

REMARKS City B.M. at Holland & Tyndall, el. 220.7' Geodetic Datum

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST					
							LB. HAMMER		NO CASING			
							INCH DROP		INCH DIA. ROD			
							BLOWS PER FOOT OR		SHEAR STRENGTH IN KIPS PER FT. ²			
				GROUND SURFACE	0'	225.1'						
				Fill								
62	11	1-1		Very Stiff Sandy BROWNISH GRAY CLAY	25'			○				
	4	1-2		Loose Till	6.5'			○				
35		1-3		Dense FINE SAND with MEDIUM SAND	8.5'							
	38	1-4		Dense FINE SAND with some	10'	215.1'		○				
	35	1-5		MEDIUM / COARSE SAND / BOULDERS				○				
	36	1-6			18.5'			○				
84		1-7		Dense Sandy Till	19.2'			○				
		1" drops		Shaley Limestone CORE RECOVERY - 28%	20.2'	205.1'						
		1" drop		Shaley Limestone CORE RECOVERY - 80%								
		1" drop			25.8'	199.3'						
				Bottom of Hole								
							0	2.0	4.0	6.0	8.0	10.0
							% WATER CONTENT					PLATE 2
							NATURAL ○					
							LIQUID LIMIT □					
							PLASTIC LIMIT △					

McROSTIE & ASSOCIATES
CONSULTING ENGINEERS
OTTAWA CANADA

SOIL PROFILE AND SUMMARY
 OF FIELD AND LABORATORY TESTS

QWY, HOLLAND AVE.

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 220.7'

DATE Oct. 29/56

HOLE NO.

2

REMARKS See: plate #2

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST	
							LB. HAMMER	NO CASING
							INCH DROP	INCH DIA. ROD
							BLOWS PER FOOT OR	SHEAR STRENGTH IN KIPS PER FT. ²
				GROUND SURFACE	0'	220.7'		
		2	2-1	Fill				
		2	2-2					
		21	2-3	Medium Dense Fine Sand with some Medium Sand A few pebbles	25'			
		21	2-4	Medium Dense Silty Fine Sand to Medium Dense Medium Sand Dense Silty Fine Sand with pebbles	10'	210.7'		
				Rock or Boulder				
				CORE RECOVERY - 99%				
				2" Drop				
				Shale Limestone				
				CORE RECOVERY - 76%				
				Bottom of Hole	183'	202.4'		

0 20 40 60 80 100

% WATER CONTENT
 NATURAL ○
 LIQUID LIMIT □
 PLASTIC LIMIT △

PLATE
 3

McROSTIE & ASSOCIATES
CONSULTING ENGINEERS
OTTAWA CANADA

SOIL PROFILE AND SUMMARY
OF FIELD AND LABORATORY TESTS

QWY / HOLLAND AVE

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 222.2'

DATE Oct. 29/58

HOLE NO.

REMARKS See Plate #2

3

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST					
						LB. HAMMER	NO CASING				
						INCH DROPINCH DIA. ROD				
							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²					
				GROUND SURFACE								
				Topsoil	0	222.2						
		48	3-1	Dense Fine Sand with pebbles			○					
			3-2	Dense Fine Sand			○					
		46	3-3	with some Medium f Coarse Sand & Boulders			○					
		22	3-4	Medium Dense Fine Sand with some Medium f Coarse Sand & Boulders	10	212.2	○					
		15	3-5	Dense Fine Sand with some Medium f Coarse Sand & Boulders			○					
		28	3-6	Shaley Limestone			○					
			2' drop	CORE RECOVERY - 72%	20	202.2						
			1' drop									
			2' drop									
			1' drop									
				Shaley Limestone								
				CORE RECOVERY - 86%								
				Shaley Limestone								
				CORE RECOVERY - 96%	20	195.2						
				Bottom of Hole								
							0	20	40	60	80	
							% WATER CONTENT					PLATE 5
							NATURAL ○					
							LIQUID LIMIT □					
							PLASTIC LIMIT △					

0	20	40	60	80	100
% WATER CONTENT					
NATURAL					
LIQUID LIMIT					
PLASTIC LIMIT					
					PLATE
					5

QWY, HOLLAND AVE.

HOLE NO.

5

