

57-F-225C

TREMBLAY ROAD

CROSSING

OTTAWA

QUEENSWAY

## MCROSTIE &amp; ASSOCIATES

CONSULTING ENGINEERS AND SURVEYORS

OTTAWA 1  
CANADA

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(C O P Y)

Foundation Investigation Tremblay Road at Queensway1. FIELD WORK

Six boreholes were made at locations shown on attached Plate 1, with depths up to 38 feet. Shale rock was encountered in all holes and diamond drilling averaged 15 feet per hole. Groundwater levels were observed during field operations.

2. SAMPLE TESTING

Standard penetration tests were made in the boreholes and samples were visually classified.

Cores recovered from diamond drilling were examined in detail for the slope, and thickness of bedding planes since non-uniform slope of planes indicates a broken condition. In each case the core percentage of the drilled shale was determined.

3. OBSERVATIONS

One foot of top soil overlays the site. Below this is 1 to 7 feet of loose sand silt or till, either interbedded with or above 8 to 17 feet of medium dense to dense till. Shale was encountered at elevation 183 at the Easterly borehole sloping downward 5 to 6 feet at the Westerly boreholes. At some boreholes the upper few feet of the shale was either weathered or broken. The dip of the bedding planes of the shale deposit was uniform at 10 to 20 degrees, with the exception of Holes #4 and 3 where the dip increased to 40 degrees. This sudden slope suggested that the advice of a geologist would be advisable and hence Dr. V.K. Prest of the Geological Survey of Canada was consulted.

Groundwater levels were at or within a few feet of the surface during the investigation and can be expected to remain high throughout the seasons unless storm drainage is provided in the area.

#### 4. DESIGN RECOMMENDATIONS

##### 4.1 Geological Background

Discussions with Dr. Prest and study of the cores leads to the conclusion that the site lies within a zone of minor faults, and lies across or at the edge of one or more of the faults. These faults may be due to shifting of bedrock when relieved of the weight of ice at the time of the last retreat of the glaciers. The significance of the existence of the faults is threefold. Firstly, in the zones where faulting has crushed the soft shale rock, the normal increase in strength with depth of excavation is not to be expected. Secondly, if small ended piles were to be considered, these might penetrate considerable distances into the faulted shale. Thirdly, any future seismic movements would be more damaging to structures lying across a fault than otherwise. This is probably a risk which has to be accepted and many important buildings in the Ottawa Area are presently built across or on fault zones.

##### 4.2 Bearing Capacities

Owing to the variations in elevation at which the different materials are found, the recommendations have been separated into three sections, one for each of the East, West, and centre piers. Three basic bearing layers have also been identified and elevations at which each can be assumed are given below.

###### Bearing Layers

- a. Dense and some medium dense till - bearing capacity  
4000 pounds per  
sq.ft. but ground-  
water control re-  
quired to prevent  
loss of strength  
during construction.
- b. Weathered and broken shale - bearing capacity  
5000 pounds per sq. ft.  
and groundwater not a  
factor.

c. Sound Shale -            Bearing capacity  
                             15000 pounds per sq. ft.

Elevations of Bearing Layers

East Abutment:

Dense & medium dense till - El. 185  
Weathered shale                    El. 182  
Sound shale                        El. 180 North end  
                                     170 South end

Centre Pier:

Dense & medium dense till - El. 183  
Weathered shale                    El. 179  
Sound shale                        El. 179 North end  
                                     174 South end

West Abutment:

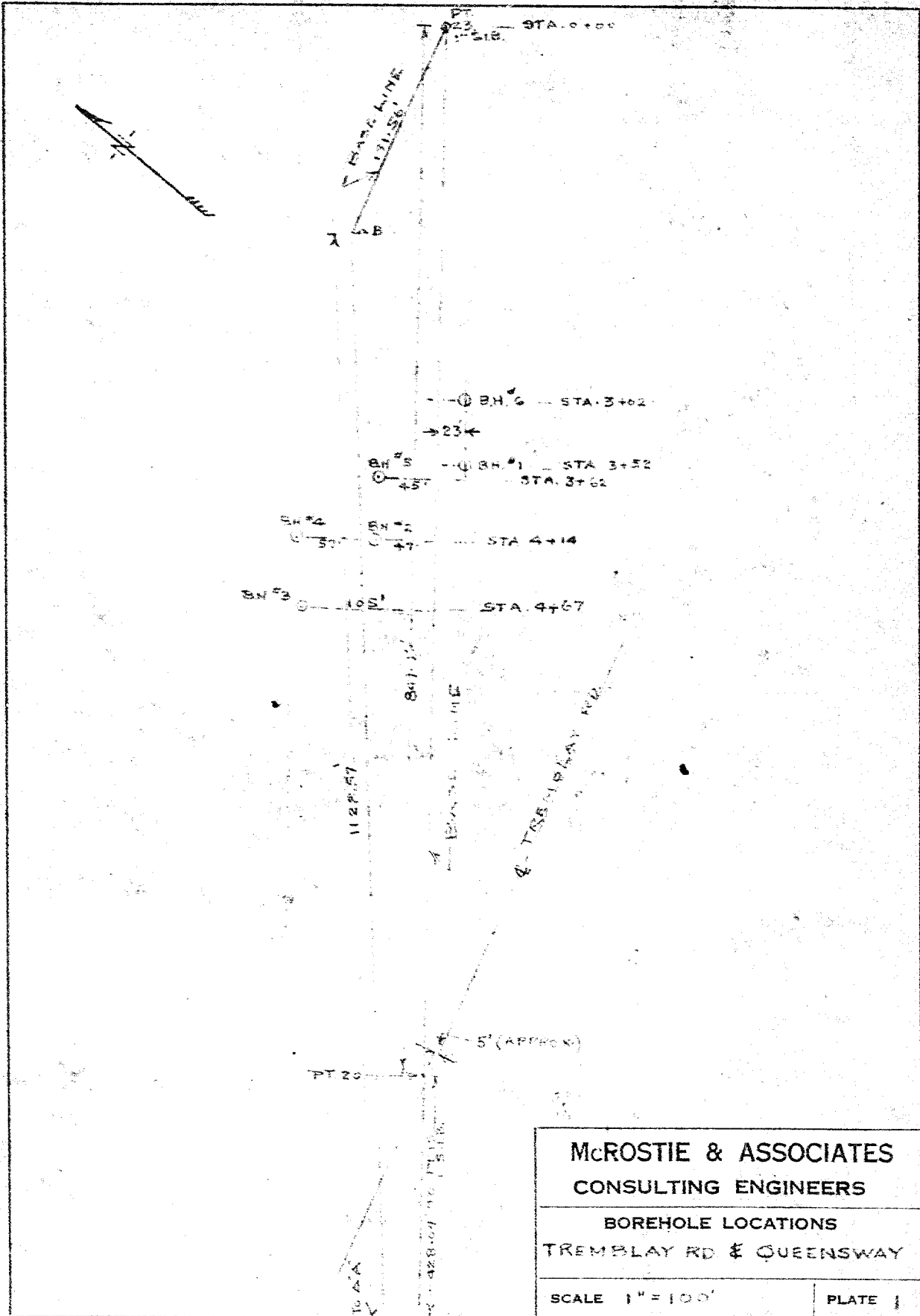
Dense & medium dense till - El. 185  
Weathered shale                    El. 177  
Sound shale                        El. 169 North end  
                                     177 South end

5. CONSTRUCTION PRECAUTIONS

The pockets of silty soil will tend to "flow" when an excavation is made below groundwater level and an excavation area may well have to be increased and drainage provided during construction. The till soils are also sufficiently permeable that groundwater pressure will tend to 'soften' them and reduce bearing capacities unless the groundwater levels are lowered below excavation level during construction. A considerable flow of water is to be expected from the weathered shale surface but this can usually be controlled with sufficient pumping from pits or trenches in the shale.

6. CO-ORDINATION

We should be glad to discuss any points arising from the report and provide any further information that is available.



**McROSTIE & ASSOCIATES**  
**CONSULTING ENGINEERS**

**BOREHOLE LOCATIONS**  
**TREMBLAY RD & QUEENSWAY**

SCALE 1" = 100'

PLATE 1

# McROSTIE & ASSOCIATES

## CONSULTING ENGINEERS

### OTTAWA CANADA

#### SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

TREMBLAY RD. &amp; QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 191.0

HOLE NO.

REMARKS GEODETIC DATUM - EL. 192.63 - GROUND SURFACE AT STA. 50+00

DATE JUNE 28 TO  
JULY 3, 1957

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. <sup>2</sup>	SMALL SCALE PENETROMETER KIPS/FT. <sup>2</sup>	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PENETRATION TEST	
							LB. HAMMER	NO CASING
							INCH DROP	INCH DIA. ROD
GROUND SURFACE							BLOWS PER FOOT	
				TOP SOIL	0	191.0 190.0	← OVERNIGHT WATER LEVEL 0-3'	
			1-1	MEDIUM DENSE TILL	3			
			1-2	TOPE TILL	5.0 5.3	186.0 185.0		
				MEDIUM DENSE TILL	6			
			1-3	DENSE TILL	8.5	182.5 182.0		
				WEATHERED SHALE ROCK	9			
				(DRILLED-CORE RECOVERY) 64%	12			
				WEATHERED SHALE ROCK	15			
				(DRILLED-CORE RECOVERY) 64%	17.1			
				WEATHERED & BROKEN SHALE	19			
				(DRILLED-CORE RECOVERY) 51%	20.8			
				LIMEY-SHALE ROCK	21	176.2		
				(DRILLED-CORE RECOVERY) 91%	24.7	166.3		
				SHALE ROCK	27			
				(DRILLED-CORE RECOVERY) 93%	30.3	166.7		
				BOTTOM OF HOLE	33			
					36			
					39			
							% WATER CONTENT	
							PLATE	
							2	

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#### SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

TREMBLAY RD &amp; QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 193.7

REMARKS SEE PLATE 2

HOLE NO.

DATE JULY 5-9 1957

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. <sup>2</sup>	SMALL SCALE PENETROMETER KIPS/FT. <sup>2</sup>	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PENETRATION TEST	
							LB. HAMMER INCH DROP	NO CASING INCH DIA. ROD
				GROUND SURFACE			BLOWS PER FOOT	
				TOP SOIL	0	193.7		
					1	192.7	← OVERNIGHT WATER LEVEL 15	
				MEDIUM DENSE TILL	2.5			
				LOOSE TILL	5.0	190.2		
					6	188.7		
				MEDIUM DENSE TILL	9			
					12	182.7		
				DENSE TILL	15	179.0		
				WEATHERED, BROKEN SHALE (DRILLED-CORE RECOVERY 42%)	18			
					19.5	174.2		
				SHALE ROCK	21			
				DRILLED-CORE RECOVERY (93%)	24	168.6		
				SHALE ROCK	27			
				DRILLED-CORE RECOVERY 77% DIP OF STRATA 20°	30	163.8		
				— BOTTOM OF HOLE				
							% WATER CONTENT	PLATE

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SOIL PROFILE AND SUMMARY  
OF LABORATORY TESTS

TREMBLAY RD. & QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 193.5

REMARKS SEE PLATE 2

HOLE NO.

DATE JULY 9-10, 1957

3

UNCONFIRMED COMPRESSIVE STRENGTH KIPS/FT. <sup>2</sup>	SMALL SCALE PENETROMETER KIPS/FT. <sup>2</sup>	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PENETRATION TEST	
							LB. HAMMER INCH DROP	NO CASING INCH DIA. ROD
				GROUND SURFACE			BLOWS PER FOOT	
				TOP SOIL	0	193.5	← OVERNIGHT WATER LEVEL	
				LOOSE FINE SAND	1.0			0.0
				LOOSE CLAYEY SILT	2.0			
			7	WITH SOME FINE SAND	3.0			
				LOOSE TILL	4.0	191.5		LOOSE WELL GRADED SAND
				MEDIUM DENSE TILL	5.0			
			23		6.0	188.0		
			16 for 1"	DENSE TILL	7.0			
			96		8.0			
			50 for 1"		9.0			
				SHALE ROCK-DIP CASTRATA 48°	10.0	179.0		
				(DRILLED-CORE RECOVERY)	11.0	177.0		
				SHALE ROCK	12.0			
				(DRILLED-CORE RECOVERY)	13.0			
				SHALE ROCK	14.0	171.6		
				(DRILLED-CORE RECOVERY)	15.0			
				SHALE ROCK	16.0			
				(DRILLED-CORE RECOVERY)	17.0	168.3		
				← BOTTOM OF HOLE	18.0			

% WATER CONTENT

PLATE

4



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#### SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

TREMBLAY RD & QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 125.4

REMARKS SEE PLATE 2

HOLE NO.

4

DATE JULY 3-5, 1957

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. <sup>2</sup>	SMALL SCALE PENETROMETER KIPS/FT. <sup>2</sup>	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PENETRATION TEST	
							LB. HAMMER INCH DROP	NO CASING INCH DIA. ROD BLOWS PER FOOT
				GROUND SURFACE Z	0	125.4		
				TOP SOIL	0	125.4		
				MEDIUM DENSE TILL	3			← OVERNIGHT WATER LEVEL 20'
74.5		4.2		LOOSE TILL	5.5	188.9		
				DENSE TILL (BOULDER CHY)	9			
284.5		4.2		MEDIUM DENSE TILL	10.5	184.9		
195.5		4.5			12			
100.5		4.6		DENSE TILL	15			
73.5		4.7			18.5	176.9		
				WEATHERED & BROKEN SHALE ROCK (DRILLED - CORE RECOVERY) 52% 223	21			
				WEATHERED & BROKEN SHALE ROCK (DRILLED - CORE RECOVERY) 52% 263	24	169.1		
				SHALE ROCK (DRILLED - CORE RECOVERY) 71%	30	163.3		
				LIMEY-SHALE ROCK (DRILLED - CORE RECOVERY) 90%	36	157.3		
				← BOTTOM OF HOLE	37			

% WATER CONTENT

PLATE

5

TREMBLAY RD. & QUEENSWAY

51

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## SOIL PROFILE AND SUMMARY OF LABORATORY TESTS

TREMBLAY RD. & QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 193.3

REMARKS SEE PLATE 2

HOLE NO.

6

DATE JULY 11-12 1957

UNCONFIED COMPRESSIVE STRENGTH Kips/Ft. <sup>2</sup>	SMALL SCALE PENETROMETER KIPS/FT. <sup>2</sup>	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PENETRATION TEST	
							LB. HAMMER INCH DROP	NO CASING INCH DIA. ROD BLOWS PER FOOT
				GROUND SURFACE	0	-193.3		
				TOP SOIL	0	-193.3		
				BASE SITE FINE SAND	0	-193.3		
			6-1	MEDIUM DENSE TILL	3	-190.8		
				MEDIUM DENSE TILL	3	-190.8		
			6-2	MEDIUM DENSE TILL	6	-189.3		
				MEDIUM DENSE TILL	6	-189.3		
			6-3	MEDIUM DENSE TILL	9	-186.8		
				MEDIUM DENSE TILL	9	-186.8		
				LIMEY-SHALE ROCK	12	-183.6		
				(DRILLED-CORE RECOVERY) 84%	15	-178.2		
				LIMEY-SHALE ROCK	18	-172.0		
				(DRILLED-CORE RECOVERY) 88%	21	-172.0		
				EXTENSION OF HOLE				