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55-F-211C

#

Hwy 401 &  
C.N.R. CROSSING  
THURLOW Twp.

F

T. O. LAZARIDES, LOUNT AND PARTNERS  
STRUCTURAL CONSULTANTS

T. O. LAZARIDES, DR. ENG. U.I. LV. P. ENG.  
A. M. LOUNT, JR., P. ENG. B.A. Sc. M.E. I.C.

HEAD OFFICE  
79 SCOLLARD STREET  
TORONTO 5, ONT.  
WALNUT 4-2166

YOUR REF.  
OUR REF.

March 25th, 1955.

The Department of Highways of Ontario,  
Queen's Park,  
TORONTO, Ontario.

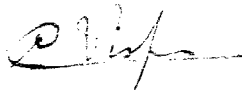
Attention: Mr. B. Davis:

Dear Sirs:

We enclose for your files one copy  
of the Foundation Investigation report of the  
Thurlow Township Bridge No. 6  
as prepared by Racey, MacCallum and Associates  
Limited.

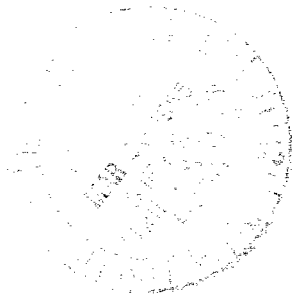
Yours sincerely,

T. O. LAZARIDES, LOUNT AND PARTNERS



C. Visser.

V:R  
enc.1



# RACEY, MACCALLUM AND ASSOCIATES LIMITED

## Directors:

ALD C. MACCALLUM, B.ENG., M.E.I.C., P.ENG.  
H. JOHN RACEY, B.SC., M.E.I.C., P.ENG.  
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J. B. CHALLIES, D.ENG., LL.D., M.E.I.C., P.ENG.

A COMPANY OWNED, DIRECTED AND OPERATED BY

## Consulting Engineers AND ASSOCIATED STAFF



MONTREAL: 4123 SHERBROOKE STREET WEST, FITZROY 5261  
TORONTO: 33 BLOOR STREET EAST, WALNUT 2-9071

## Affiliations:

THE E. B. ALLEN INSPECTION COMPANY  
ISOTOPE PRODUCTS LIMITED,  
RADIOGRAPHERS  
IRVING P. KRICK, PH.D.,  
METEOROLOGIST  
JACQUES POULIN,  
QUEBEC LAND SURVEYOR  
THE VIBRATION ENGINEERING COMPANY

REPORT NO. S-500-501/55/T-63-1

Toronto, Ontario,  
March 17th, 1955.

Ontario Department of Highways,  
c/o T. O. Lazarides, Lount and Partners,  
79 Scollard Street,  
TORONTO, Ontario.

55 F-11C

RE: FOUNDATION INVESTIGATION  
THURLOW TOWNSHIP BRIDGE NO. 6

Dear Sirs:

In accordance with your instructions we have completed the drilling of four (4) boreholes on the subject site. We now wish to report on our findings as follows.

### LOCATION OF THE SITE AND THE BOREHOLES (Enclosures Nos. 1 and 2)

The site of the proposed Thurlow Twp. Bridge No. 6 is located approximately one and one-half miles north of the town of Belleville, Ontario, at the intersection of the proposed Highway No. 401 and the C.N.R. railway track.

The boreholes were spotted by our engineer on the site according to the locations entered in client's drawing No. D3564-1. The elevations of the boreholes were determined by levelling, referring to data received from the Trenton D.H.O. Survey Department. These elevations are given on the attached Engineering Data Sheets. The following are additional elevations for your information:-

top of rails at centre line of Hwy. No. 401, being EL. 322.4  
top of rail sleeper " " " " " " , being EL. 321.9

### DRILLING WORK

The driller's equipment was brought to the site and set up on February 13th, 1955, and the drilling work was completed on February 24th, 1955. Boreholes Nos. 1 and 2 were drilled with a CARLAIR diamond core drill. 3" I.D. extra heavy duty drive pipe was driven to refusal on bed-rock with a 350 lb. drive hammer, dropped 20 inches. To keep the

Boreholes Nos. 3 and 4 were drilled with a LONGYEAR STRAITLINE diamond core drill.

REPORT NO. S-500-501/55/T-63-1 Cont'dDRILLING WORK Cont'd

fractured rock near the surface from caving, flush joint casing was drilled down several feet with a shoe bit or in other cases driven into the upper layers of rock. Core drilling was performed with AXT-size diamond bits. The core recovery ranges between 63% and 100%, higher percentages commonly being obtained with increasing depth.

The rock samples are kept in wooden boxes; they will be destroyed after one-half year from the date of this report if no instructions are received to the contrary.

DISCUSSION OF RESULTS

The attached Engineering Data Sheets give the soil profiles as revealed by the four boreholes. Only a thin layer of brown, sandy and gravel/silt, with some coarse gravel of glacial origin, from 1.0 to 2.0 feet deep respectively, is overlying bedrock.

Bedrock is composed of laminated, grey to dark grey, fossiliferous, argillaceous limestone, forming beds of up to six inches thick, alternating with thinner beds of a medium to dark grey calcareous clay-stone of slightly shaly texture. The bedding is almost horizontal. The rock is sound and, also in the claystone beds, solid. No mudseams or joints have been noticed. However, the superficial beds seem to be more fractured than those at depth.

The groundwater level in the boreholes was near to the ground surface, boreholes Nos. 1 and 2 were temporarily flooded from melting snow and precipitation.

The elevation of the rock surface is given here for reference purposes:-

Borehole No. 1	-	rock surface	at	EL. 317.8
"	"	2	-	" " EL. 318.0
"	"	3	-	" " EL. 319.1
"	"	4	-	" " EL. 318.3

CONCLUSIONS

The properties of the rock which will have to carry the load of the proposed structure, are such that no problem will arise regarding the bearing capacity. It is, however, recommended not to have the foundation resting on the surface of the rock formation, but to excavate at least two feet, preferably more, to provide a rock base that will show less fracturing and to obtain, at the same time, additional protection against shear by the lateral resistance of the rock. A stepped foundation will be advantageous if considerable lateral thrust is exerted by the structure.

REPORT NO. S-500-501/55/T-63 Cont'd

We trust that this information will be satisfactory. Please do not hesitate to get in touch with us if you deem it advisable to clarify matters.

Yours very truly,

RACEY, MacCALLUM AND ASSOCIATES LIMITED

*K. Tubbesing*

KT/PW

K. Tubbesing, P. Eng.

Enclosures

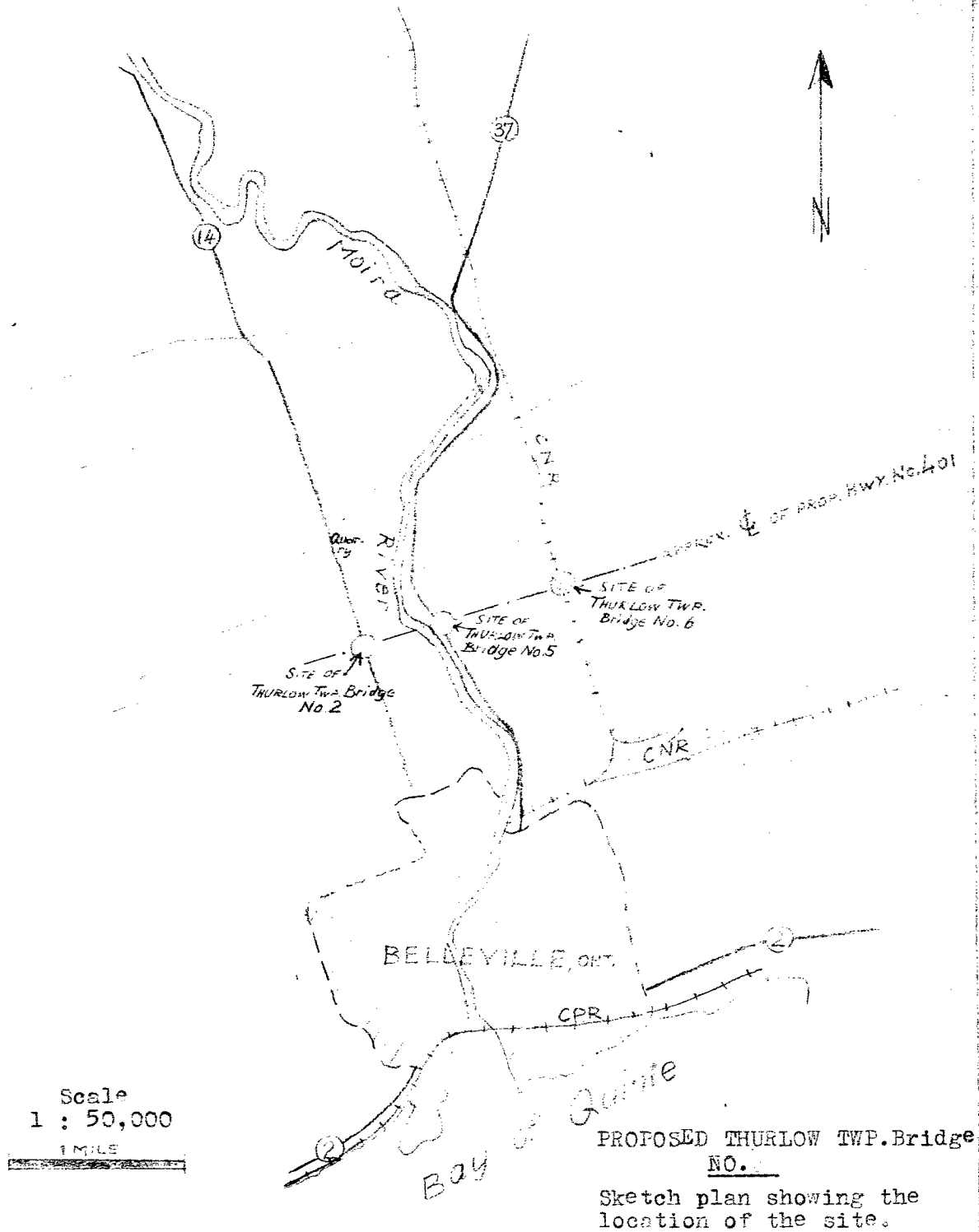
Original and  
two copies:-

Messrs. T. O. Lazarides, Mount and Partners,  
Toronto, Ontario.

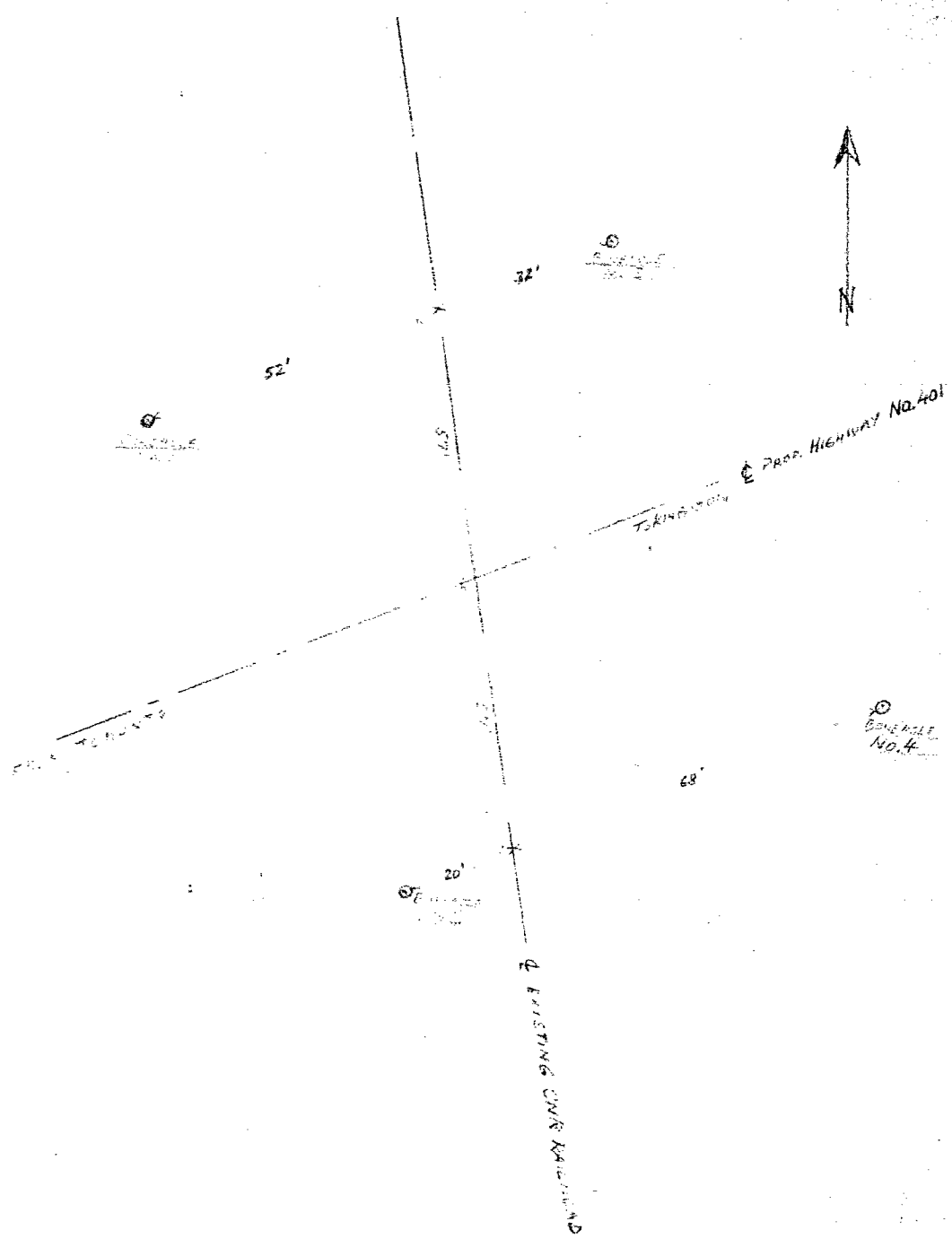
c.c.'s: 2 - Messrs. Racey, MacCallum and Associates Ltd., Montreal, P. Q.  
1 - Soils Engineer

S-500-501/55/T-61

PREP & DRAWN: K.T.



S-500-501/55/T-63



LOCATION OF BOREHOLES  
Site of  
THURLOW TWP. Bridge NO. 6

Order No.: S-500-501/55/T-63 RACEY, MacCALLUM AND ASSOCIATES

A. McCadden

Dated

Limited

Driller

Day Month Year

Foundation Engineering Division

Hole Begun 18/2/55

D. McCurdy

Hole Ended 19/2/55

Engineering Data Sheet for Borehole: 1

Helper

Job Name: THURLOW TWP. BRIDGE No. 6

K. TUBBESING

Job Located: INTERSECTION CNR TRACK AND PROP. HWY. NO. 401, ~2 MILES N OF

Checked by

Hole Located: AS SHOWN ON ATTACHED SKETCH PLAN.

BELLEVILLE, ONT.

Hole Elevation: 319.8 Datum: M.S.L.

25/2/55

Day Month Year

DEPTH	EL.	THICKNESS	W	SYMBOL	NARRATIVE	TANGENTIAL VALUES					SAMPLING
						20	40	60	80	100	
0	319.8				GROUND SURFACE	20%	40%	60%	80%	100%	100% CORE RECOVERY
-0.7'	319.1				FROZEN GROUND						
-2'	317.8				BROWN, SANDY AND GRAVELLY SILT WITH COARSE GRAVEL (GRANITE ETC.)						
					REFUSAL (BEDROCK)						CORE RECOVERY 66%
					GREY TO DARK GREY, ARGILLACEOUS AND FOSSILIFEROUS LIMESTONE, INTERBEDDED WITH MORE SHALY CALCAREOUS CLAYSTONE, DARK GREY.						CORE 66%
					BEDDING CLOSE TO THE HORIZONTAL, THICKNESS OF BEDS VARYING FROM FRACTIONS OF ONE INCH TO ~6".						LOST 75%
					SOUND AND SOLID ROCK.						93%
											100%
											78%
											98%
-14.7'	305.1				END OF BORE HOLE						
					WATER LEVEL IN PIPE AT START OF WORK (HOLE AT 8'), 19/2/55.						

## ABBREVIATIONS

W WATER, S SATURATED, M MOST, H HUMID, D DRY

S S, SPLIT, D DOH, TW TWIN WALL (SAMPLES)



Order No.: S-500-501/55/T-63 RACEY, MacCALLUM AND ASSOCIATES

Dated

Day Month Year

Role Begun 21/2/55

Hole Ended 23/2/55

Engineering Data Sheet for Borehole: 2

D. Mc CURDY

Helper

Job Name: THURLOW TWP. BRIDGE NO. 6

K. TUBBESING

Job Located: INTERSECTION CNR-TRACK AND PROP. HWY. NO. 401 ~ 2 MILES N OF

Checked by

Hole Located: AS SHOWN ON ATTACHED SKETCH PLAN

BELLEVILLE, ONT

Hole Elevation: 319.5 Datum: M.S.L.

25/2/55

Day Month Year

[illegible]

Order No. S-500-501/55/T-63 RACEY, MacCORMACK AND ASSOCIATES

F. LUSK

Dated

Limited

Driller

Day Month Year

Foundation Engineering Division

Hole Begun 23/2/55

W. LINTON

Hole Ended 24/2/55Engineering Data Sheet for Porehole: 3

Helper

Job Name: THURLOW TWP. BRIDGE NO. 6

K. TUBBESING

Job Located: INTERSECTION CNR TRACK AND PROPOSED HWY. #401, ~2 MILES N. OF

Checked by

Hole Located: AS SHOWN ON ATTACHED SKETCH PLAN

BELLEVILLE, ONT.

Hole Elevation: 320.6' Datum: M. S. L.

1/3/55

Day Month Year

DEPTH	EL.	THICKNESS	W	SIMBO.	NARRATIVE	TENSILE VALUES					SAMPLING
						20%	40%	60%	80%	100%	
0	320.6				GROUND SURFACE						BLDNGS/PT.
					TOPSOIL						CORE RECOVERY
1.5	319.1				REFUSAL (BEDROCK)						100%
					GREY TO DARK GREY,						
					ARENACEOUS, FOSSILIFEROUS						
					LIMESTONE,						100%
					INTERBEDDED WITH DARK GREY,						
					CALCAREOUS CLAYSTONE, SLIGHTLY SHALE.						
					BEDDING ALMOST HORIZONTAL.						
					THICKNESS OF BEDS VARYING FROM FRAGMENTS OF ONE INCH TO 10"						100%
11.5	309.1				END OF POREHOLE						

REMARKS

W. WATER SATURATED IN MOST PLACES

D. DRY

S.S. 10% SOON, TW. TWO WALLS (SAND)

Order No. S-504/501/55/1-23

EAGLEY, MacCALLUM AND ASSOCIATES

F. LUSK

Dated

Limited

Driller

Day Month Year

Foundation Engineering Division

Hole Begun 24/2/55

W. LINTON

Hole Ended 24/2/55

Engineering Data Sheet for Borehole: 4

Helper

Job Name: TURLLOW TWP. BRIDGE No. 6

K. TUBBESING

Job Located: INTERSECTION CNR-TRAIL AND PROV. HWY. NO. 401, ~ 2 MILES N. OF

Checked by

Hole Located: AS SHOWN ON ATTACHED SKETCH PLAN

BELLEVILLE, ONT.

Hole Elevation: 319.5 Elevation: M.S.L.

1/3/55

Day Month Year

DEPTH	EL.	LITHOLOGY	REMARKS	TENSILE VALUES					SAMPLING
				20% 20%	40% 40%	60% 60%	80% 80%	100% 100%	
-0	319.5	GROUND SURFACE	0						
-1.2'	318.3	TOPSOIL							
		REFUSAL (BEDROCK)							100%
		GREY TO DARK GREY, 2.5							63%
		ARGILLACEOUS, FOSSILIFEROUS							
		LIMESTONE,							
		INTERBEDDED WITH DARK GREY,							100%
		CALCAREOUS CLAYSTONE,							
		SLIGHTLY SHALY.							
		BEDDING ALMOST HORIZONTAL.							100%
		THICKNESS OF BEDS VARYING FROM							
		FRACTIONS OF ONE INCH TO ~6".							
-10.3'	309.2	END OF BOREHOLE.							
			12.5						

Abbreviations

W. WATER; S. SATURATED; M. MOIST; H. HUMID

D. DRY

S.S. SAND; G.O. GRAY; TW. THIN WALL SAMPLE