

G.I.-30 SEPT. 1976

GEOCRES No. 30M 4-63DIST. 4 REGION CENTRAL

W.P. No. \_\_\_\_\_

CONT. No. \_\_\_\_\_

W. O. No. \_\_\_\_\_

STR. SITE No. 9-21

HWY. No. \_\_\_\_\_

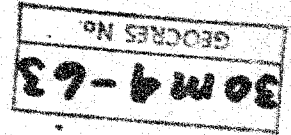
LOCATION GRAND RIVER E~~HALDIMAND CO.~~ CO. RD. 10HALDIMAND CO.

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. \_\_\_\_\_

REMARKS: \_\_\_\_\_

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\_\_\_\_\_  
\_\_\_\_\_

C.C. PARKER AND ASSOCIATES LIMITED  
795 MAIN STREET WEST  
HAMILTON, ONTARIO



PROPOSED BRIDGE REPLACEMENT  
OVER GRAND RIVER AT YORK  
COUNTY OF HALDIMAND

Project: J1944

April, 1965

William Trow Associates Limited

BAZ119  
SITE # 9-21

90 Mitran Drive  
Weston, Ontario  
749-1290

William Trow

Project: J1944

Soil Mechanics  
Consultants  
W. A. Trow  
MSc. MEIC. P. Eng.  
K. Peaker  
PhD. MEIC. P. Eng.  
D. H. Shields  
PhD. MEIC. P. Eng.



Associates Ltd.

C.C. Parker and Associates Limited,  
795 Main Street West,  
Hamilton, Ontario.

April 28, 1965

Attention: Mr. D.C. Cramm, P.Eng.,  
Bridge Department Manager

Proposed Bridge Replacement  
over Grand River at York  
County of Haldimand

Dear Sirs:

In conformance with your authorisation of April 14th, 1965, a supplementary soil investigation consisting of one borehole and two cone penetrometer tests was carried out at the above site on April 22 and 23, 1965. The purpose of this investigation was to outline the subsoil stratigraphy at the location given and to determine whether spread footings or piles will be suitable to support the new abutment. Our observations and recommendations are outlined in the following paragraphs.

1) The subsoil encountered at the location shown on Dwg. 1 is shown in detail on the borehole log, (Dwg. 2). Soft silty clay was found to a depth of about 6 feet. Limestone was found underlying the clay to a depth of 11.5 feet. This rock consists of fragments, boulders and slabs in a matrix of clay. A stratum of weathered shale approximately 12 feet thick was found underlying the limestone. This material has alternating hard and soft layers and contains frequent soft clay seams. Sound limestone bedrock was found at a depth of 23.8 feet and was proven to a depth of 28.8 feet.



2) Either spread footings or pile foundations may be considered for the abutment replacement.

#### (A) PILE FOUNDATIONS

If pile foundations are considered, it is recommended that H piles be used. Since it was possible to drive the NX casing to a depth of 23.5 feet it is expected that H piles can be driven through the weathered shale to the sound limestone bedrock at this depth. An estimate of the pile capacity can be made by assuming it to be a short column; loads in the order of 60 tons are usual for this type of pile. If H piles meet refusal in the overlying weathered shale, a pile loading test will be required to assess the safe net bearing capacity and the associated settlement.

Cylindrical piles are not recommended as it is doubtful that they can be driven through the weathered shale to sound bedrock.

#### (B) SPREAD FOOTINGS

If spread footings are used they should be founded on the shale at a depth of about 12 feet. As this rock is composed of alternate hard and soft layers and clay seams it is difficult to assess its bearing capacity. A conservative estimate of the safe net bearing capacity would be in the order of 6000 psf. Protection against scour and erosion will be necessary for footings placed on the shale at a depth of about 12 feet.



3) The water level in the borehole was the same as the river elevation. No excavation problems are anticipated because of the impervious nature of the subsoil.

4) The borehole elevation is referenced to the top of the east pier (Pier No. 1) which has an assumed elevation of 100.0 feet, (See Dwg. 1).

We trust that this brief report contains all the information that will be required for you to complete your design. Should any queries arise concerning the contents of this report we will be pleased to discuss them with you.



Yours very truly,

H.R. Krzywicki, M.Eng.

HRK/ss  
Encls.

K. Peaker, P.Eng.

PLAN  
SCALE: 1 IN. = 50 FT.

 BOREHOLE  
 CONE PENETROMETER HOLE

KING STREET (CO. RD. N9 S)

KING'S HIGHWAY No 54

GRAND RIVER.

BENCH MARK (Top of Pier assumed 100)

PROPOSED BRIDGE REPLACEMENT  
OVER GRAND RIVER

WILLIAM TROW ASSOCIATES LTD.

## SITE INVESTIGATIONS      SOIL MECHANICS CONSULTATION

PROJECT NO. 42-1-144

### LEGEND

BOREHOLE NO. 1  
PROJECT PROPOSED BRIDGE REPLACEMENT  
LOCATION TOWN OF YORK, HALDIMAND COUNTY  
HOLE LOCATION SEE DWG. 1  
HOLE ELEVATION 89.1 ft.  
DATUM SEE DWG. 1

## PENETRATION RESISTANCE

2" O.D. SPLIT TUBE      ○   ○   ○  
2" I.D. SHELBY TUBE      \*   \*   \*  
2" DIA. CONE              —————

### SHEAR STRENGTH

UNDRAINED TRIAXIAL                      ⊕  
AT OVERBURDEN PRESSURE  
UNCONFINED COMPRESSION                ⊗  
VANE TEST AND SENSITIVITY (S)        †

### NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX


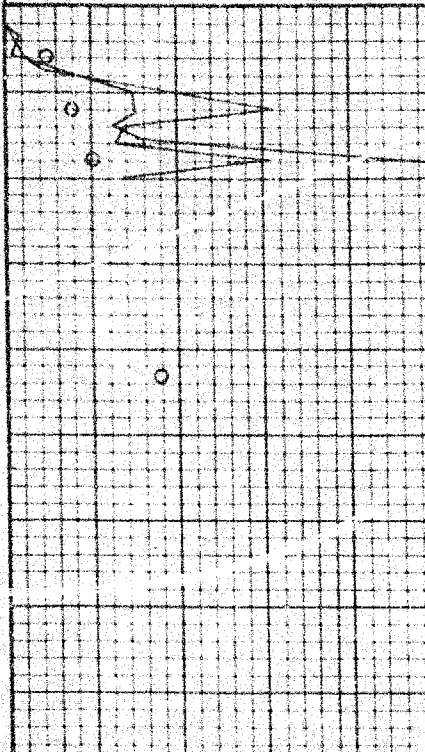



ATTERBERG LIMITS

LIQUID LIMIT

### PLASTIC LIMIT

**SAMPLE TYPE**

2" O.D. SPLIT TUBE  
2" I.D. SHELLEY TUBE  
3" O.D. SHELLEY TUBE

SYMBOL	SOIL DESCRIPTION	ELEV FEET	DEPTH FEET	PENETRATION RESISTANCE		350 FT. LB BLOWS/FT 30	NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO	NATURAL UNIT WEIGHT P.C.F.
				20	40				
	SILTY CLAY- soft, brown, contains organic, wet	89.1	0						
	LIMESTONE- flat slabs, boulders and fragments in clay matrix	83.1	10						
	SHALE- alternating soft and hard layers, some clay seams. Poor core recovery due to grinding with caved limestone fragments. 60% Recovery.	77.6	20						
	LIMESTONE- gray, fine-grained, sound 85% Recovery.	65.3	30						
	End of Bore	60.3	40						
Notes: 1) Borehole advanced using conventional wash boring and diamond drilling techniques. 2) NX casing driven to 23.5 ft. AXT core to 23.8 ft. 3) Two cone penetrometer tests at locations shown on Dwg.1. Refusal at about 10 ft. depth.									