

MEMORANDUM

30M4-13

To: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Office,  
Admin. Bldg.

FROM: Foundation Section,  
Materials & Testing Office,  
Room 107, Lab. Bldg.

ATTENTION: Mr. S. McCombie

DATE: March 18, 1971

OUR FILE REF.

IN REPLY TO

MAR 23 1971

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossing at Welland River  
And Highway #56  
Twp. of Binbrook, Co. of Wentworth  
District No. 4 (Hamilton)  
W.O. 71-11006 -- W.P. 69-70-02  
CONT. 75-02

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

We believe that the factual data and recommendations contained therein, will prove adequate for your design requirements. Should additional information be required, please feel free to contact our Office.

AGS/MdeF  
Attach.

cc: Messrs. B. R. Davis  
F. G. Allen  
D. W. Farren  
G. K. Hunter (2)  
C. R. Robertson  
G. C. E. Burkhardt (2)  
T. J. Kovich  
B. J. Giroux  
B. A. Singh

Foundations Files ✓  
Gen. Files

*A. G. Sternmac*  
A. G. Sternmac  
PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossing at Welland River  
And Highway #56  
Twp. of Binbrook, Co. of Wentworth  
District No. 4 (Hamilton)  
W.O. 71-11006    --    W.P. 69-70-02

1. INTRODUCTION:

A request to carry out a foundation investigation for the proposed new bridge to carry Hwy. #56 over the Welland River, was received from Mr. G. C. E. Burkhardt, Regional Bridge Planning Engineer, in a memo dated January 26, 1971.

An investigation was subsequently carried out by this Section to determine the subsoil conditions existing at the site of the proposed bridge.

This report contains the results of our field and laboratory investigation, together with our recommendations for the foundations of the new structure.

2. DESCRIPTION OF SITE:

The site of the proposed crossing is situated about 1.5 miles south of Binbrook. It is proposed to replace the existing bridge - 25 ft. clear span concrete slab arch - with a 35 ft. clear span bridge.

At this point, the river flows in a west to east direction. The topography of the surrounding area is flat to gently rolling. The land in the vicinity of the bridge is cultivated farmland.

Physiographically, the site is located in the region referred to as the Haldimand Clay Plain.

### 3. FIELD AND LABORATORY WORK:

The field work at the proposed bridge location consisted of two sampled boreholes and two dynamic cone penetration tests. All holes were advanced using conventional diamond drilling equipment adapted for soil sampling purposes. A driving energy of 350 ft.-lbs. per blow was used for the dynamic cone penetration tests.

Disturbed samples were obtained using a 2-inch O.D. split-spoon sampler driven according to the specifications for the Standard Penetration Test. Undisturbed samples were obtained by means of 2-inch I.D. Shelby tubes which were pushed into the soil manually. Bedrock samples were obtained in Boreholes 1 and 3 using AXT coring equipment. In Boreholes 2 and 4, the bedrock surface was assumed to be at elevation where refusal to cone penetration was reached.

In-situ vane tests were carried out wherever possible, at elevations 12 inches below various sample depths.

Samples were visually examined in the field and subsequently in the laboratory. The following tests were carried out on selected samples:

- 1) Grain-Size Distribution Curves
- 2) Atterberg Limits
- 3) Unconfined Compression Test
- 4) Natural Moisture Content
- 5) Bulk Density

The results of field and laboratory tests are summarized in the Record of Borehole sheets, which are contained in the Appendix to the report.

The locations and the elevations of boreholes are given on Drawing No. 71-11006A, which is also contained in the Appendix to this report.

The borehole elevations were provided by the Hamilton District Office of the D.H.O.

4. SUBSOIL CONDITIONS:

4.1) General:

Subsoil at the site consists of a deposit of silty clay overlying dolomitic limestone bedrock.

The boundaries between the different deposits are shown on the attached Record of Borehole sheets. The estimated stratigraphical profile shown on Drawing No. 71-11006A, is based upon this information.

From ground level downwards, the different deposits are described as follows:

4.2) Silty Clay:

This deposit was found in both Boreholes 1 and 3 down to approximate Elevation 596.0. The material consists of silty clay with traces of sand. In some samples, thin silt seams or pockets were observed.

The physical properties of the material are as follows, and are plotted on Fig. 1.

		<u>Min.</u>	<u>Max.</u>	<u>Average</u>
Liquid Limit	(%)	31	46	38
Plastic Limit	(%)	18	25	22
Moisture Content	(%)	22	35	30
Bulk Density	(p.c.f.)	116.0	121.5	118.0

The grain-size analyses indicate the following distributions:

Gravel	(%)	0 - 1
Sand	(%)	0 - 1
Silt	(%)	43 - 53
Clay	(%)	46 - 57

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

4.2) Silty Clay: (cont'd.) ...

The shear strength, as determined from the field vane, varies from 840 p.s.f. to 1760 p.s.f. in Borehole 1, and from 1280 p.s.f. to more than 2000 p.s.f. in Borehole 2, indicating a firm to very stiff consistency. The laboratory unconfined shear strength varies from 240 p.s.f. to 970 p.s.f. It is believed that the shear strength, as determined from the field vane, is more representative of behaviour of the soil in the field.

4.3) Bedrock:

The bedrock was proven to 5 ft. in Boreholes 1 and 3 by obtaining AXT rock cores. In Boreholes 2 and 4, it was established when refusal to farther penetration by cone was met. The bedrock surface is very flat, varying from Elevation 596.0 to 596.3. The bedrock core samples indicate it to be dolomitic limestone. The core recovery was 95 - 97%, indicating sound bedrock.

5. GROUNDWATER CONDITIONS:

Artesian water was encountered upon intersecting limestone bedrock - i.e., at Elevation 596.0. The artesian water head rose to Elevation 625.2. Because of the artesian water in the boreholes, it was not possible to measure the prevailing groundwater levels in the boreholes. It may be assumed that the groundwater level in the vicinity of the river is equal to or slightly higher than the prevailing river water level.

## 6. DISCUSSION AND RECOMMENDATIONS:

### 6.1) General:

It is proposed to replace the existing bridge over Welland River with a new one. The new structure is presently proposed to be a 35-ft. single-span bridge and is located at the same place as the old one. The proposed grade is about 2 ft. higher than the existing grade, resulting in a maximum approach height of about 17 ft. above the river bed.

As described earlier, the subsoil at the site consists of firm to very stiff silty clay with traces of sand, overlying limestone bedrock at Elevation 596.0 to 596.3. The bedrock is a source of artesian water with a head to El. 625.2, which is some 8 ft. above river water level.

### 6.2) Structure Foundations:

Because the silty clay layer is unable to provide a very high bearing capacity due to its low undrained shear strength and, also, because of the probable undesirable settlements due to consolidation, a spread footing type foundation is not considered to be the most suitable. Therefore, it is recommended that the entire structure be supported by means of No. 14 treated timber piles driven to bedrock. A safe load of 25 tons/pile may be assumed for design purposes.

As an alternative, the new structure may be founded on steel H-piles driven to bedrock, using the maximum allowable design load for the particular pile section adopted.

Pile caps should be founded at sufficient depth to ensure frost protection.

Because of the impermeable nature of the subsoil, no dewatering problems are anticipated, provided excavations do not go below El. 610.0. This latter provision is necessary due to the existence of the artesian head in the bedrock.

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

6.2) Structure Foundations: (cont'd.) ...

Excavations lower than El. 610.0 would be subject to 'boiling' and possibly 'blow-outs'.

6.3) Approaches:

The proposed 2-ft. raise in grade will result in a maximum height of embankment of 17 ft. above the bottom of the creek. The shear strength of the subsoil is such that it will be able to support the approach embankments constructed with 2:1 forward and side slopes. The fill should consist of well compacted acceptable material. Care should be taken to ensure that no bouldery fill is placed within the approaches through which piles have to be driven, and it is recommended that this portion of the fill contain no larger grain sizes than 3 inches.

Based on past experience of structures with somewhat similar subsoil conditions, it is anticipated that maximum settlements of 2 inches will occur under the widened portions of the approaches.

The topsoil and any organic material should be removed in accordance with the pertinent D.H.O. standards within the construction area.

Scour protection should be provided in accordance with hydrological requirements.

7. MISCELLANEOUS:

The field work for this project was carried out during the period Feb. 1 - 8, 1971, under the supervision of Mr. H. Szymanski, Engineering Technician.

The equipment used was owned and operated by P.V.K. and Sons, Burford, Ontario.

This report was prepared by Mr. A. Prakash, Project Foundation Engineer, and Mr. Szymanski, and reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

March, 1971



APPENDIX I

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FOUNDATION SECTION

ORIGINATED BY **MS**

COMPILED BY SR

CHECKED BY *[Signature]*

[illegible]

FOUNDATION SECTION

ORIGINATED BY HS

COMPILED BY SR

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION BLOWS / FOOT	RESISTANCE	LIQUID LIMIT ——— W <sub>L</sub>	PLASTIC LIMIT ——— W <sub>P</sub>	WATER CONTENT ——— W	BULK DENSITY $\gamma$	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.	WATER CONTENT %			P.C.F.	GR. SA. SI. CL.
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	$w_p$	$w$	$w_L$		
621.3 0.0	Ground Level					620						
	Probable Silty clay, Traces of sand					610						
596.3 25.0	Probable Bedrock End of Cone Test					600						
						590	Hammer bouncing					

FOUNDATION SECTION

ORIGINATED BY AP

COMPILED BY SP

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— W <sub>L</sub> PLASTIC LIMIT ——— W <sub>P</sub> WATER CONTENT ——— W			BULK DENSITY  P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	W <sub>p</sub> W      W <sub>L</sub>				
							○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    x LAB. VANE	WATER CONTENT % 10      20      30				
619.4	Ground Level.											
0.0			1	SS	6							
			2	SS	3		+ s3.2					
	Silty clay, traces of sand.		3	TW	PM	610		+ > 2000				
	Stiff		4	SS	5		+ s6.2					
			5	TW	PM	600		+ s5.3				
596.1			6	AXT	97%							
23.3	Dolomitic Limestone Bedrock											
591.1	Sound											
28.3	End of Borehole					590						

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 71-11006

LOCATION Hwy. 56 Sta. 210 + 14.5 o/s 27.5' Rt.

ORIGINATED BY AP

W.P. 69-70-02

BORING DATE February 4, 1971

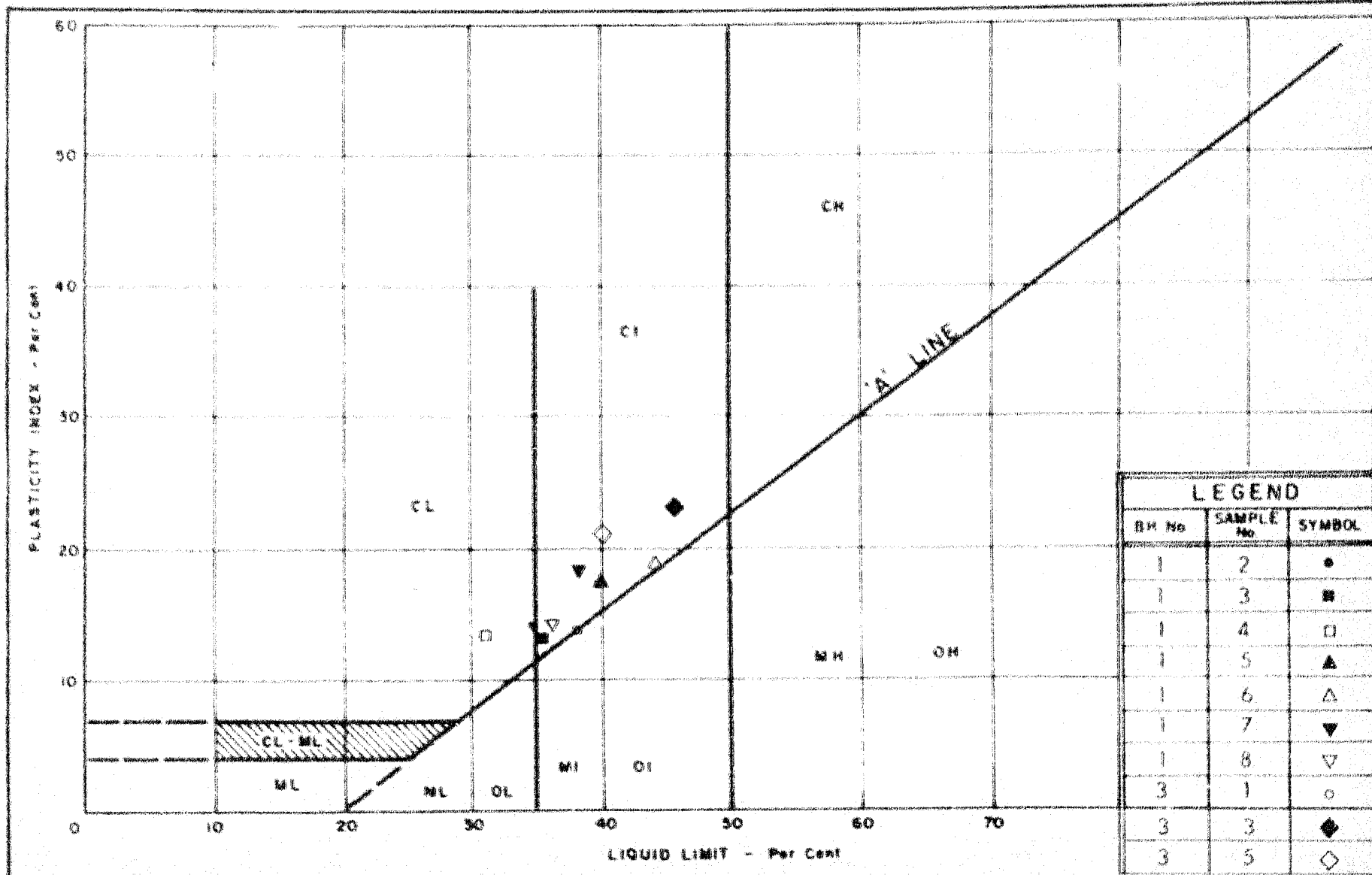
COMPILED BY SR

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Test

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— $w_L$			BULK DENSITY $\gamma$ P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	BLOWS / FOOT					PLASTIC LIMIT ——— $w_p$						
						20	40	60	80	100	WATER CONTENT ——— $w$						
						SHEAR STRENGTH P.S.F.					$w_p$ ——— $w$ ——— $w_L$ WATER CONTENT %						
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE											
622.2	Ground Level																
0.0																	
	Probable Silty Clay, Traces of Sand																
596.1																	
26.1	Probable Bedrock End of Cone Test																



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

# PLASTICITY CHART SILTY CLAY TRACES OF SAND

WP No. 69 - 70 - 02

JOB No. 71 - 11006

FIG 1

## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

### DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

### SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY



# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
s	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
$I_C$	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
$c_v$	COEFFICIENT OF CONSOLIDATION
$C_c$	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
$T_v$	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

## STRESS AND STRAIN

u	PORE PRESSURE
$\sigma$	NORMAL STRESS
$\sigma'$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	COEFFICIENT OF EARTH PRESSURE AT REST

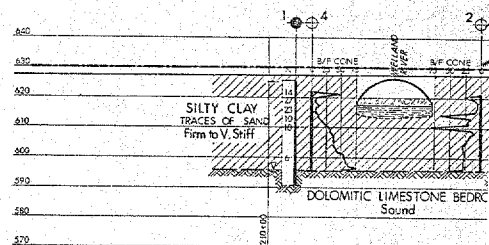
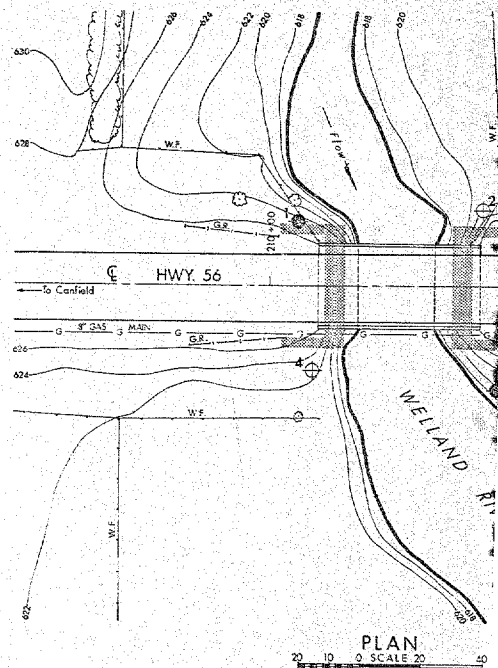
## FOUNDATIONS

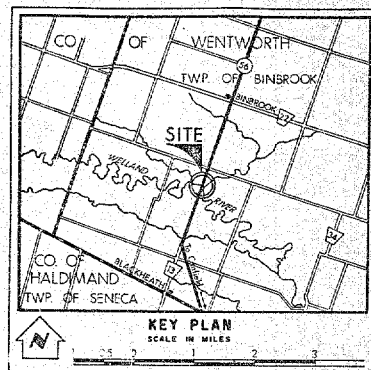
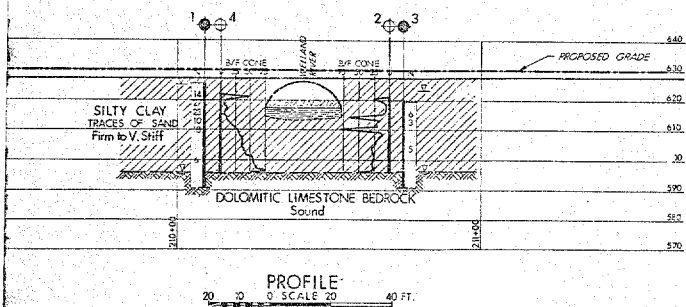
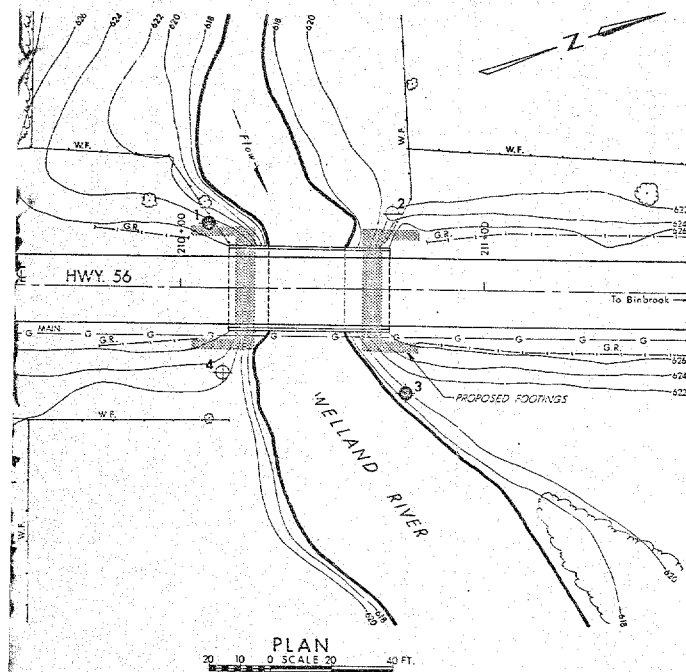
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
$k_s$	MODULUS OF SUBGRADE REACTION

## SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
$\beta$	ANGLE OF SLOPE TO HORIZONTAL



[illegible]



### LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, FEB. 1971
- Head
- Antisoon Water Levels
- Encountered

NO.	ELEVATION	STATION	OFFSET
1	625.8	210+09	21' LT.
2	621.3	210+70	25' LT.
3	619.4	210+74.5	30.3' RT.
4	622.2	210+14.5	27.5' RT.

### - 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.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE - FOUNDATION SECTION

### WELLAND RIVER

KING'S HIGHWAY NO. 56 DIST. NO. 4  
CO. WENTWORTH  
TWP. BINSBROOK LOT 22 CON. VII

### BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D H.S. (CHECKED) <input checked="" type="checkbox"/>	W.P. NO. 60-70-02	M.S.T. DRAWING NO.
DRAWN S.R. (CHECKED) <input checked="" type="checkbox"/>	JOB NO. 71-11006	71-11006 A
DATE MARCH 9, 1971	SITE NO.	BRIDGE DRAWING NO.
APPROVED  PREPARED	CONT. NO.	

## MEMORANDUM

TO: Mr. A. G. Stermac,  
Principal Foundations Engineer,  
Room 107,  
Lab. Building.

FROM: G. C. E. Burkhardt,  
Bridge Planning Section,  
Central Building.

ATTENTION:

DATE: January 26, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: Welland River Bridge,  
W.P. 69-70-02, Site 36-129,  
Highway 56, District 4.

Herewith are two prints of the Bridge Site Plan E-4998 on which we have marked in red the probable location of the structural footings.

Please arrange for a foundation investigation of sufficient scope to enable us to proceed with the design. Attached is a copy of the site reconnaissance report.

JFW:lc  
Attach.

*J. F. Walshe*  
J. F. Walshe,  
REG. BRIDGE PLANNING SUPERVISOR,  
for:  
G. C. E. Burkhardt,  
REG. BRIDGE PLANNING ENGINEER.

c.c. S. McCombie  
R. Fitzgibbon

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. G. Burkhardt

Regional Bridge Planning  
Engineer,  
CENTRAL REGION.

Bridge Office,  
Downsview.

May 28, 1971.

Welland River Bridge  
W.P. 69-70-02, Site #36-129  
Highway #54, District No. 4.

71-11006

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-7045-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$43,000.00 which includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

C. S. Grebski,  
Bridge Design Engineer.

CSG/mh

ENCL\*

cc: B. R. Davis,  
A. Stermac (2),  
J. Anderson.

June 3/71

Filed for review

as recommended

NO other comment

*Sidney*  
*11/30*

Department of Highways Ontario

Copy for the information of  
FOUNDATION OFFICE.

Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Bldg.

C. S. Grebski,  
Structural Office.

August 20, 1971.

Welland River Bridge,  
W.P. 69-70-02, Site #36-129,  
Highway #56, District #4.

71-11-006

Attached herewith we are submitting the final  
bridge drawings which show the foundation design for  
this structure.

Kindly give us your comments at your earliest  
convenience.

C. S. Grebski,  
Structural Design Engineer.

CSG/mh  
ENCL\*

cc: Foundation Office.

PILE CUT-OFF EL: 619.5

BEDROCK EL:

596.0

23.5 + BATER (1.0')

THE LISTED PILE LENGTHS (26') OF DRAWINGS D-7045-3  
TO BE IN EXCESS.

No comments

K. E. Sullivan

15 Nov 71

DOCUMENT MICROFILMING IDENTIFICATION

GEOCREs No. 3074-13

DIST. 4 REGION CENTRAL

W.P. No. 69-70-02

CONT. No. 75-02

W.O. No. 71-11006

STR. SITE No. 36-129

HWY. No. 56

LOCATION WELLING FILER

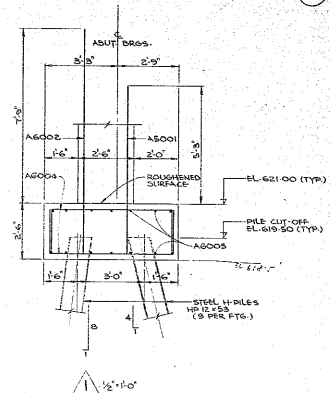
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: Documents to be included before  
microfilmed



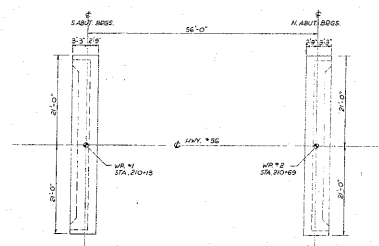
PILE LAYOUT

## REINFORCEMENT



PLAN  
SCALE:  $\frac{1}{2}" = 1'-0"$

LOCATION	NUMBER	LENGTH	TYPE
SOUTH ABUTMENT	9	26'-0"	HP12x53
NORTH ABUTMENT	9	26'-0"	HP12x53

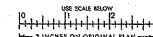


**FOOTING LAYOUT**  
SCALE 3/32" = 1'-0"


PRINT RECORD		
NO.	FOR	DATE
41	R. Kelly	1/10/01

[illegible]

FOR REDUCED PLAN

[illegible]

3074-13  
GEORGES M.

<b>DEPARTMENT OF HIGHWAYS ONTARIO</b> BRIDGE OFFICE			
<h2 style="margin: 0;">WELLAND RIVER BRIDGE</h2>			
KING'S HIGHWAY NO. <u>56</u>		DIST. NO. <u>4</u>	
<u>LOCAL MUNICIPALITY OF HAMILTON - WENTWORTH</u>			
TWP. <u>GEENBROOK</u>		LOT <u>22</u> CONC. <u>7</u>	
<h3 style="margin: 0;">FOOTING DETAILS</h3>			
APPROVED 		SHEET NO. <u>36-129</u> W.P. NO. <u>69-70</u>	
MADE BY <u>DESIGNER</u>		CONTRACT NO. _____	
DESIGN <u>D. H. H.</u>	CHECK <u>O. K.</u>	DRAWN <u>O. K.</u>	D-7045-3