DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30M16-9

DIST. 7 REGION CENTRAL

W.P. No. 134-6504

CONT. No. 74-166

W. O. No. 70-F-55

STR. SITE No. 21-326

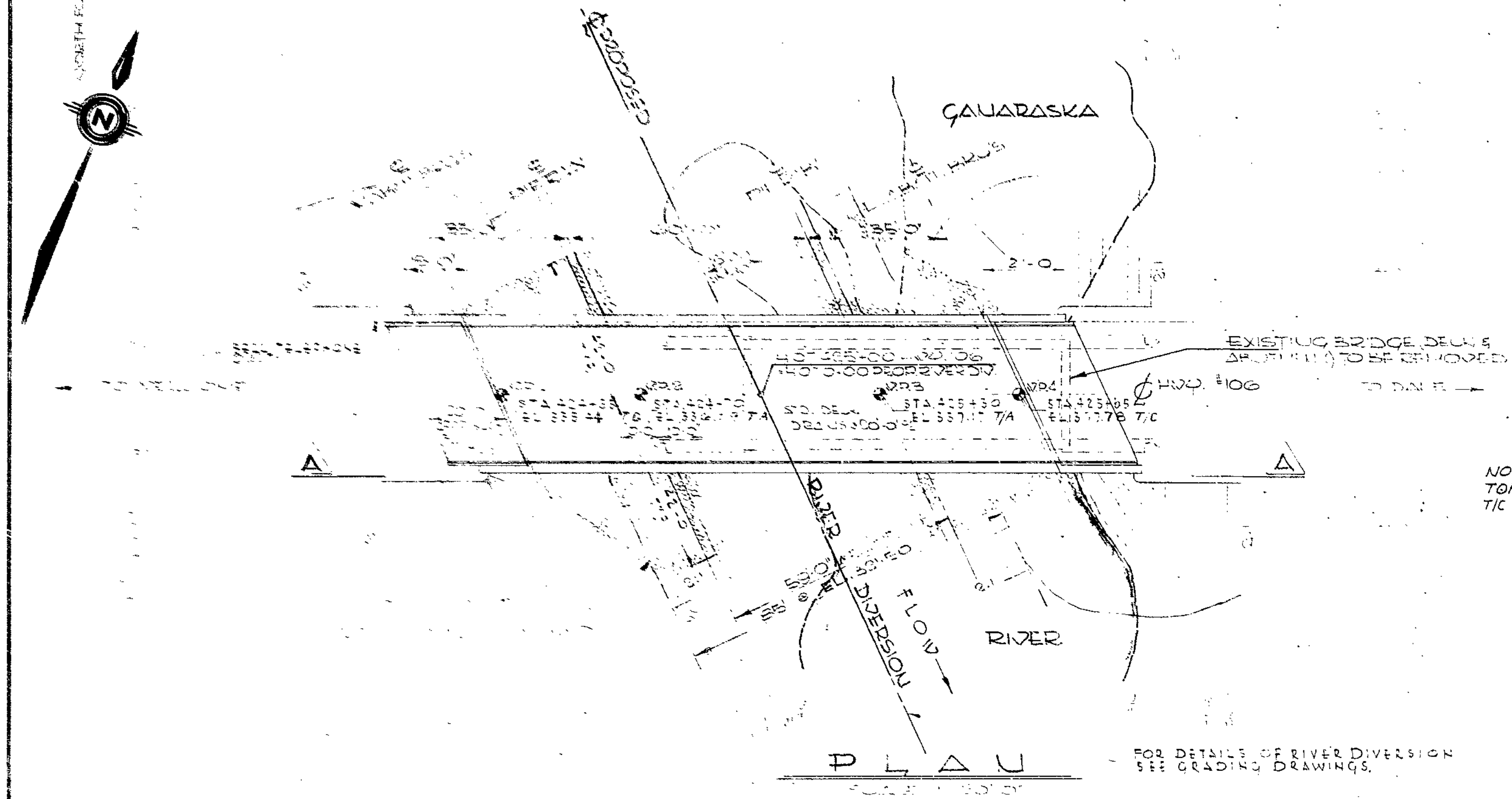
HWY. No. 106

LOCATION HWY. 106 & GANARASKA RIVER

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: DOCUMENTS TO BE UNFOLDED BEFORE MICROFILMED.

G.I-30 SEPT. 1976



PLAN

FOR DETAILS OF RIVER DIVERSION SEE GRADING DRAWINGS.

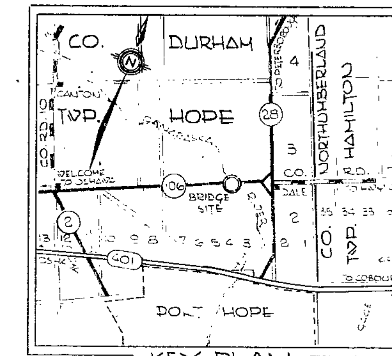
NOTE: T/A DENOTES TOP OF ASPHALT
T/C DENOTES TOP OF CONCRETE

SKEW 25°00"

SIN = 0.422618
COS. = 0.906308
TAN. = 0.466308
SEC. = 1.103378

LIST OF DRAWINGS

D-6943-1 GENERAL PLAN
2 BORE HOLE LOCATION & SOIL STRATA
3 FOOTING LAYOUT
4 EAST ABUTMENT
5 WEST ABUTMENT
6 PIERS
7 PRESTRESSED BOX GIRDERS
8 DECK
9 APPROACH SLABS
10 PARAPET WALL DETAILS
11 STD. PARAPET RAIL
12 STD. DETAILS - I
13 STD. DETAILS - II



KEY PLAN
SCALE: 1IN=1MI.

GENERAL NOTES

CLASS OF CONCRETE

PRESTRESSED BOX GIRDERS	5000
DECK & DIAPHRAGMS	4000
CURBS & CONCRETE ABOVE CURBS	4000
PIERS	3000
REMAINDER	3000

CLEAR COVER ON REINF. STEEL

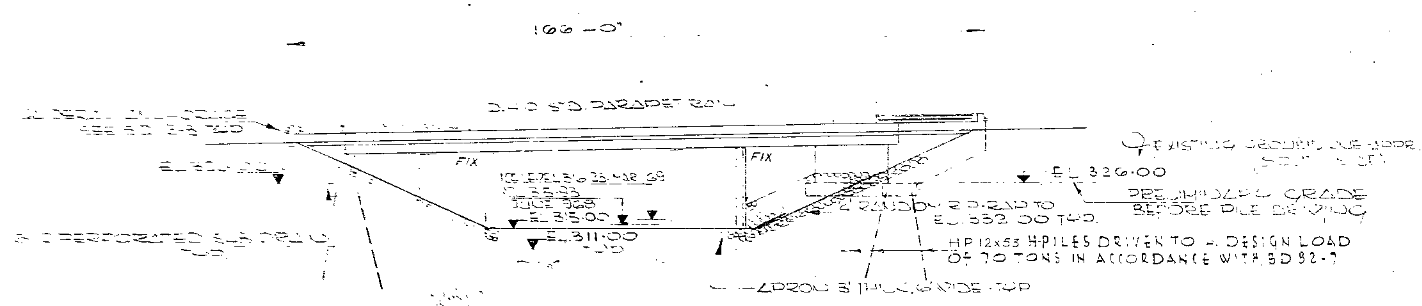
FOOTINGS - ABUTS - PIERS - DECK: 3" - 3" - 3" - 1½" TOP, 1" BOTT.

CURBS - APPR. SLABS: 2" - 2"

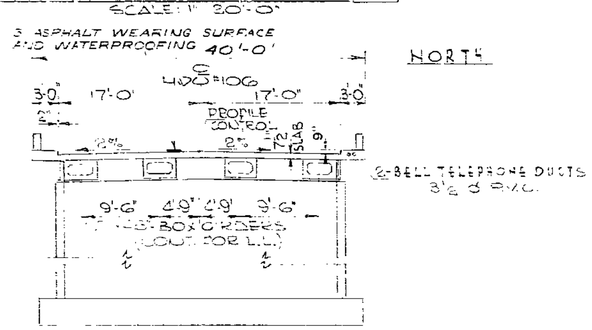
PARAPET WALLS - ENDPOSTS: 1½" - 1½"

CONSTRUCTION NOTES

- CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEV. WITH A TOLERANCE OF ±⅛
- NO CONCRETE SHALL BE PLACED ABOVE THE BEARING SEATS UNTIL CONCRETE IN DECK HAS BEEN PLACED.
- NO BACKFILL TO ABUTMENT SHALL BE PLACED FOR 2'-0" BELOW BEARING SEATS UNTIL BEAMS HAVE BEEN ERECTED.



ELEVATION A
SCALE: 1"=20'-0"

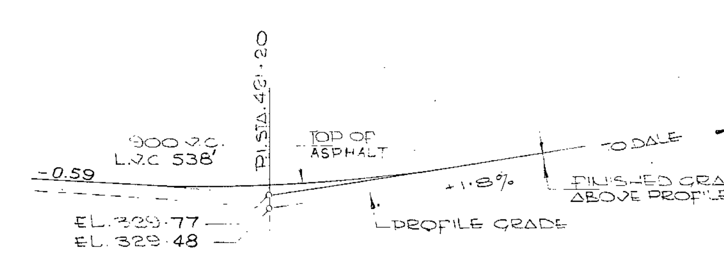


DECK CROSS SECTION
SCALE: 1"=10'-0"

CONCRETE QUANTITIES

CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONCRETE TENDER ITEMS.

(A) PLACE CONCRETE IN PIERS, ABUTMENTS & WINGWALLS.	246 C.Y.
(B) PLACE CONCRETE IN DECK AND DIAPHRAGMS.	154 C.Y.
(C) PLACE CONCRETE IN PARAPET WALLS.	21 C.Y.
(D) PLACE CONCRETE IN APPROACH SLABS.	45 C.Y.



PROFILE OF HWY. #106

30M16-9
GEOCRES No.

"WELCOME"

G.B.M. Nº 67-U-051 EL. 447.917

DEEP BENCH MARK IN MANHOLE AT MAIN INTER-SECTION 74 FEET S.E. OF CENTRE LINE OF HIGHWAY 106, 77 FEET N.E. OF CENTRE LINE OF HIGHWAY 2, 7 FEET EAST OF HARRY MARTYN MONUMENT, 33 FEET EAST OF POWER POLE Nº 175, 23 FEET N.E. OF A MAPLE TREE, 41 FEET S.E. OF A TELEPHONE POLE.

QUAD. 43078 LINE 6

REVISIONS DATE	BY	DESCRIPTION

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE OFFICE

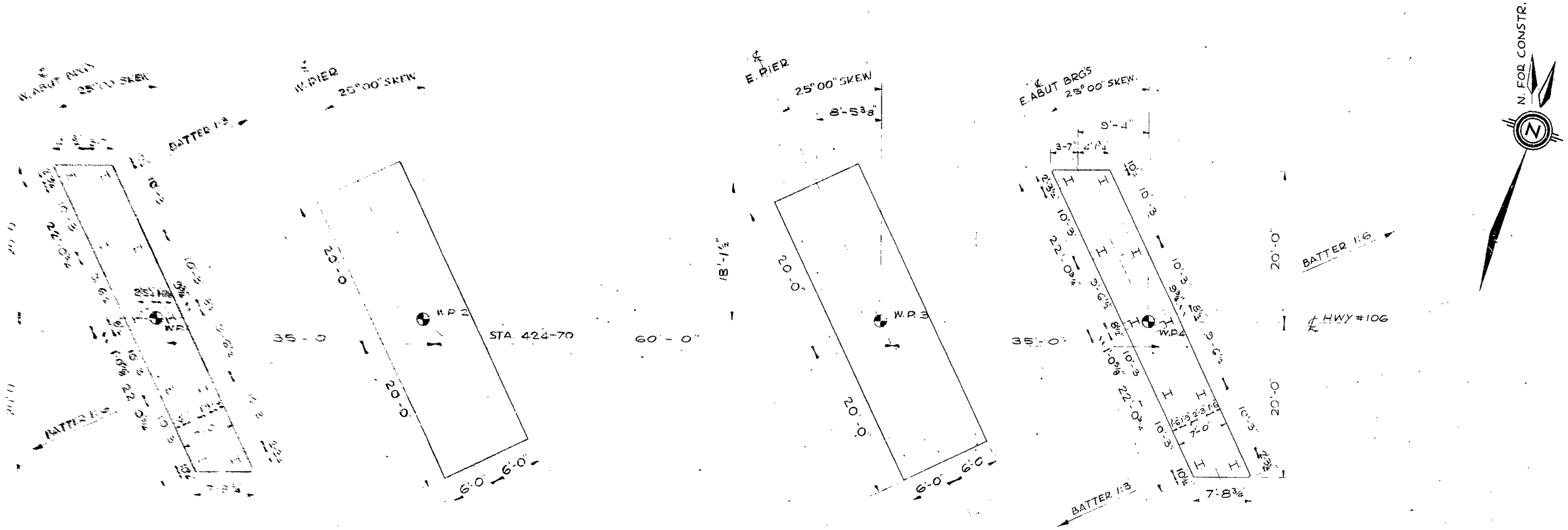
GANARASKA RIVER BRIDGE

0.4 MI. WEST OF HWY. #28

KING'S HIGHWAY No. 106 DIST. No. 7
CO. DURHAM
TWP. HOPE LOT 4 CON. III

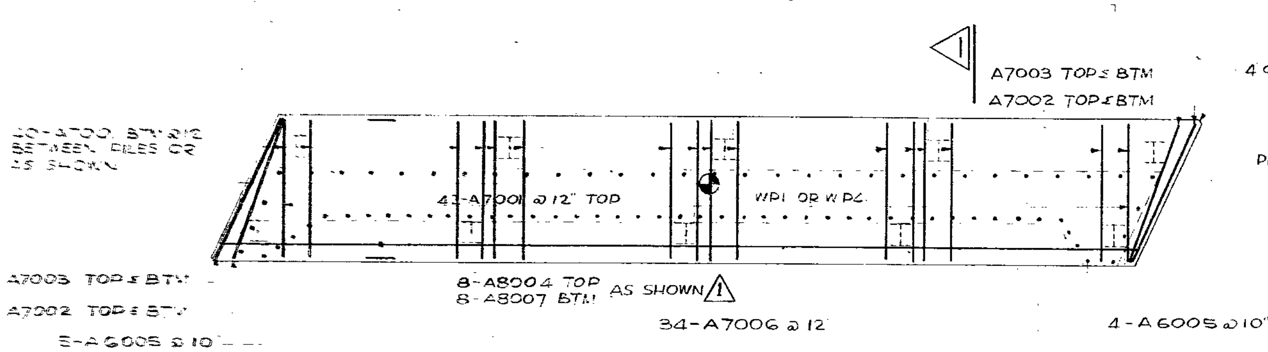
GENERAL PLAN

APPROVED (BRIDGE ENGINEER)		SITE No. 21-326	W.P. No. 134-63-04
DESIGN	CHECK R.E.H	CONTRACT Nos.	
DRAWING E.A	CHECK	DRAWING No.	D-6943-1
DATE JUNE '71	LOADING HS20-44		



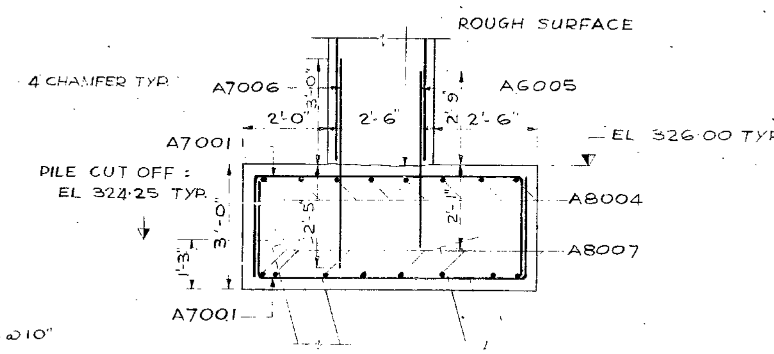
FOOTING LAYOUT

SCALE: 1/8" = 1'-0"



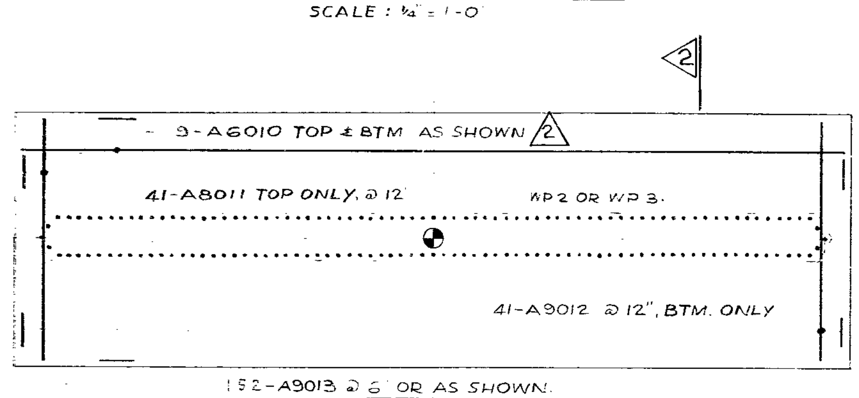
PLAN OF ABUTMENT FOOTINGS

SCALE: 1/4" = 1'-0"



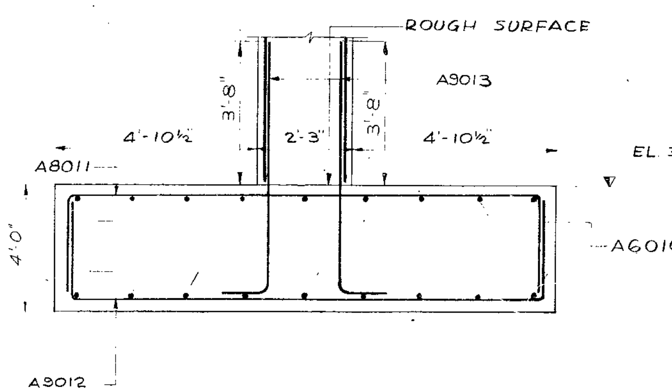
1

SCALE: 1/2" = 1'-0"



PLAN OF PIER FOOTINGS

SCALE: 1/4" = 1'-0"



2

SCALE: 1/2" = 1'-0"

PILES SUPPLIED

LOCATION	W. ABUT.		E. ABUT.	
BATTER	1:3	1:6	1:3	1:6
NO.	8	2	8	2
LENGTH (FT)	27	27	27	27
TYPE	HP 12 x 53 STEEL H-PILES			

NOTE: SPACING OF PILES MEASURED AT UNDERSIDE OF FOOTING.

30 M16-9
GEOCRES No.

REVISIONS	DATE	BY	DESCRIPTION

PRINT RECORD

No.	FOR	DATE

R. E. HAIN — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE OFFICE

GANARASKA RIVER BRIDGE
0.4 MI. WEST OF HWY #28

KING'S HIGHWAY No. 106 DIST. No. 7
CO. DURHAM
TWP. HOPE LOT 4 CON. III

FOOTING LAYOUT

APPROVED — BRIDGE ENGINEER

SITE No.	W.P. No.
21-326	134-65-04

DESIGN	R.E.H	CHECK	
DRAWING	MJY	CHECK	E.A.
DATE	JUNE/71	LOADING	H.S.20-44

CONTRACT Nos.

DRAWING No. D-6943-3

70-F-55	134-65-04	HWY. 106 & GANARASKA RIVER	30M16-9
W.O.	W.P.	LOCATION	GEOCRES NO.

● DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: W.P. FILE

REMARKS

GEOCRES INDEXING CARD FOR REPORTS NOT MICROFILMED

GI-20 AUG. 74

70-11055

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM Telephone: 248-3[illegible]

To: Mr. A.O. Stermac, Principal Foundation Engineer, Room 107, Lab. Building.

From: W.S. Melinyshyn, Bridge Office, Central Building.

Attention:

Date: April 23rd, 1970.

Our File Ref.

In reply to

Subject: W.P. 134-65-4, Site 21-326, Ganaraska River Bridge, Hwy. 10b, District 7.

Please find enclosed two copies of Plan S-4923-1 on which we have marked the location of the proposed bridge. A Field Reconnaissance Report is also attached.

Would you please arrange for a foundation investigation of sufficient scope to enable us to proceed with the design.

Your report should be completed by October 21st, 1970.

N. Zoltay,
BRIDGE LOCATION ENGINEER,
for:
W.S. Melinyshyn,
REG. BRIDGE PLANNING ENGINEER.

NZ/ccw
Encl.
cc R. Fitzgibbon

Oct. 21st 1970

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

30M16-9

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: August 12, 1970

Our File Ref.

In reply to AUG 17 1970

Subject:

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at the
Crossing of the Ganaraska River
and Hwy. #106
Township of Hope - County of Durham
District No. 7 - Port Hope, Ont.
W.O. 70-11055 - W.P. 134-65-4

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.

A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.
cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
D. P. Collins
W. S. Melinyshyn (2)
T. J. Kovich
B. A. Singh

Foundations Files
Gen. Files

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6.2) Structure Foundations

Spread Footings
'H' Piles

7. MISCELLANEOUS

FOUNDATION INVESTIGATION
For
Proposed New Structure at the
Crossing of the Ganaraska River
and Hwy. #106
Township of Hope-County of Durham
District #7 ---- Port Hope
W.O. 70-11055 --- W.P. 134-65-4

---

1. INTRODUCTION:

The Foundation Section was requested to carry out an investigation at the above mentioned site. The request was contained in a memo from Mr. W. S. Melnishin, Regional Bridge Planning Engineer, dated April 23, 1970. An investigation was subsequently carried out by this section to determine the subsoil conditions at the site.

This report contains the factual results obtained from this investigation together with recommendations pertaining to the foundations of the proposed structure.

2. DESCRIPTION OF THE SITE:

The site is located on Hwy. #106 approximately ½ mile west of Hwy. #28. The surrounding area is flat to undulating and consists of farmland, mainly pasture.

The existing bridge carries Hwy. #106 over the Ganaraska River. It is of concrete and steel truss construction and has a single span of 80 ft.

The river has a maximum depth of some 4 ft. and the bed lies 18 feet below the approach fills and some 5 to 8 ft. below the surrounding ground.

..... 2

3. FIELD AND LABORATORY WORK:

Two sampled boreholes accompanied by dynamic cone penetration tests were undertaken during the course of the field investigation. In addition two other dynamic cone penetration tests were performed. Both boreholes were continued until practical refusal was reached and bedrock was proved in one borehole by obtaining an AXT size core sample.

The borings were advanced by means of a conventional diamond drill rig adapted for soil sampling purposes.

Disturbed samples were retrieved using a 2" O.D. split spoon sampler driven into the soil in accordance with the specification for the Standard Penetration Test.

No undisturbed samples were obtained and no field vane tests undertaken, the subsoil being a non-cohesive very dense material.

The locations and elevations of the borings were surveyed in the field by personnel from the Toronto Regional Engineering Surveys Section and are shown on Dwg. No. W.J. 70-11055A which accompanies this report.

All the samples were subjected to a careful visual examination in the field and subsequently in the laboratory. In addition, laboratory tests were performed on selected samples to determine the engineering properties of the various soil types, namely:

Natural Moisture Contents
Grain Size Distribution
Atterberg Limits

..... 3

3. FIELD AND LABORATORY WORK: (cont'd.)...

The results of these tests are plotted on the Record of Borelog sheets contained in the appendix.

4. SUBSOIL CONDITIONS:

4.1) General:

The predominant overburden stratum across the site is composed of a heterogeneous mixture of gravel, sand and silt with traces of clay (glacial till); this material is very dense and varies in thickness from 36 to 42 feet. The till is underlain by limestone bedrock.

Borehole #1 was undertaken through the existing Highway fill and showed 13 feet of a mixture of clayey silt, sand and gravel (firm) overlying 2½ feet of organic silt, this inturn overlying the glacial till. Borehole #2 was undertaken through a sandbank in the river and showed 5 feet of sand and gravel overlying the glacial till.

4.2) Fill Material:

The existing highway fill consists of a firm to compact mixture of clayey silt, sand and gravel. Moisture contents range from 10% to 24%.

4.3) Organic Silt:

This material underlying the highway fill is 2½ feet in depth and is most probably the original topsoil.

..... 4

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

4.4) Sand and Gravel:

This deposit some 5 ft. in thickness was found in borehole #3 only as the surficial layer, overlying the glacial till. It is estimated to have a 'loose' denseness.

A grain size analysis gave the following result:

Gra. 46% Sa. 40% Si. 1% Cl. 3%

The only moisture content determination gave a value of 8%.

Occasional boulders were observed on the river bed.

4.5) Heterogeneous Mixture of Gravel, Sand & Silt with Traces of Clay (Glacial Till):

As mentioned earlier in the report this deposit was found in both boreholes, underlying the organic silt in borehole #1 and the sand and gravel in borehole #3. The deposit contained seams of silt and clayey silt between elevations 287.0'and 298.0'.

'N' values as determined by the standard penetration test ranged between 42 blows/ft. to over 100 blows/ft. though generally over 100 indicating a very dense material.

The grain size distribution of the deposit varied as follows:

Gra.%4-35 Sa. %21-52 Si. %10-57 Cl. %3-18
Typical grain size distribution curves are shown in Fig. #1 in the appendix.

Tests performed on the seams of clayey silt found within the main deposit as mentioned above gave a moisture content of 17% and plastic and liquid limits of 16% and 22% respectively.

..... 5

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

4.6) Limestone Bedrock:

Sound limestone bedrock was proved in borehole #1 at elev. 272.6' overlain by some 6" of boulders. Practical refusal was taken to be the bedrock surface in borehole #3 which was attained at elev. 275.0'.

5. GROUNDWATER CONDITIONS:

Groundwater levels as observed in the boreholes at the close of field operations were as follows:

borehole #1 316.1 ft.

borehole #3 315.7 ft.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to replace the existing bridge carrying Hwy. #106 over Ganaraska River with a new structure: this will involve a slight river diversion to the west of some 40 ft. and a raise in grade of the existing fill from 5 feet in the west to a maximum of 7 feet in the east. It is anticipated the new structure will have a single span of 80 ft.

The subsoil at the site consists mainly of a very heterogeneous mixture of gravel, sand, silt and traces of clay (non-cohesive glacial till) overlying sound limestone bedrock; this deposit is overlain by the highway fill and in the river bed a shallow layer of sand and gravel with occasional boulders.

..... 6

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

6.2) Structure Foundations:

Two possible schemes for the abutment footings are given below:

Spread Footings: Should a closed-type abutment be required then the glacial till deposit is suitable for a spread footing type of foundation. The footings should be located at least 4 feet below the river bed for frost protection purposes. The exact location will be determined once the depth of scour has been ascertained by the hydrology section. A safe bearing capacity of 5 t.s.f. may be used for design purposes.

As the excavation for the footings will be carried out below the river water level a boiling condition may develop at the base of the excavation due to the nature of the subsoil and the unbalanced hydrostatic head. Hence a dewatering scheme will be required.

'H' Piles: If a spill-through type of abutment is adopted then the abutment footings can be placed within the approach fills and supported on 'H' piles driven down into the glacial till. The maximum load for the piles can be assumed for design purposes and it is estimated that this will be reached between elev. 300.0 and 305.0; this will apply to both footings.

..... 7

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

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

'H' Piles: (cont'd.)...

Should a multispan structure be decided upon the pier or piers should consist of a single row of 'H' piles forming a pile bent. Again the maximum design load will be reached between elevations 300.0 to 305.0. These piles may be encased in concrete to a suitable depth below the river bed for appearance or other purposes. To prevent scouring out and hence los of lateral support around the piles, it is recommended that suitable sized rip rap be placed around the bents to a distance about 10 ft. each side and at the ends of each pier bent.

The proposed approach fill lies on the same line and as mentioned earlier will have a maximum raise in grade of 8 ft. No stability problems are anticipated provided 2:1 side slopes are adopted. All organic material within the plan limits of the approach fills should be removed as per D.H.O. standards.

7. MISCELLANEOUS:

The field work, performed during the period of June 1970 to July , 1970 was supervised by Mr. G. Allen, who also wrote this report

The equipment used was owned and operated by F. E. Johnston Drilling Co. Ltd., Toronto.

The report was reviewed by Mr. K. G. Selby.

APPENDIX

	Firm - Compact	3	SS	7		
316.6						
13.0	Organic Silt	4	SS	6		
314.1						
15.5	Glacial Till	5	SS	42		
	Het.mix.of gravel, sand, silt, traces of clay.	6	SS	118		
		7	SS	100/3"		
		8	SS	96/6"		
	Very Dense					
		9	SS	100		
296.6						
33.0	Seams of silt & clayey silt	10	SS	95		
		11	SS	89		
286.9						
47.7	Glacial Till	12	SS	75		
	Het. mix. of gravel, sand, silt with traces of clay.	13	SS	100/4"		
	Very Dense					
273.1	Boulders?	14	SS	100/1½"		
56 5	Sound Limestone Bedrock	15	RC	80%		
267.9						
61.7	End of Borehole					

320
310
300
290
280
270

s2.7

End of cone test

▼316.1

17 44 31 8

0 0 73 27

20
15 5 % STRAIN AT FAILURE
10

FORM OB-MT-126 (REV. 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 70-11055 LOCATION Sta. 424 + 44 o/s 18.5' Lt. ORIGINATED BY GA
W.P 134-65-4 BORING DATE June 29 & 30, 1970 COMPILED BY GA
DATUM Geodetic BOREHOLE TYPE Washboring, NX, BX Casing CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE
329.6	Ground Level					
0.0	Fill Mixture of clayey silt, sand & gravel Firm - Compact		1	SS	6	
			2	SS	8	
			3	SS	7	320
316.6			4	SS	6	
13.0	Organic Silt					
314.1						
15.5	Glacial Till Het.mix.of gravel, sand, silt, traces of clay. Very Dense		5	SS	42	
			6	SS	118	
			7	SS	100/3"	310
			8	SS	96/6"	
			9	SS	100	300
296.6						
33.0	Seams of silt & clayey silt		10	SS	95	
			11	SS	89	290
286.9						
47.7	Glacial Till Het. mix. of gravel, sand, silt with traces of clay. Very Dense		12	SS	75	
			13	SS	100/4"	280
273.1	Boulders?		14	SS	100/1½"	
56.5	Sound Bedrock		15	RC	80%	270

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
1000 2000

s2.7
End of cone test

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_p
WATER CONTENT —— w
w_p w w_L
WATER CONTENT % 10 20 30

BULK DENSITY γ P.C.F

REMARKS

▼ 316.1

GR. SA. SI. CL.
17 44 31 8
0 0 73 27

FORM OB-MT-126 (REV. 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 70-11055 LOCATION Sta. 424 + 65 o/s 18.5 Rt. ORIGINATED BY GA

W.P. 134-65-04 BORING DATE July 1, 1970 COMPILED BY GA

DATUM Geodetic BOREHOLE TYPE Cone Penetration Test CHECKED BY

SOIL PROFILE ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB. VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w / w_P w w_L WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
330.5	Ground Level									
0.0						320				
313.5										
17.0	End of Cone Test					310				

FORM OB-MT-126 (REV. 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 70-11055 LOCATION Sta. 425 + 35 o/s 18.5' Rt. ORIGINATED BY GA
W.P. 134-65-04 BORING DATE July 1, 2 & 3, 1970 COMPILED BY GA
DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing CHECKED BY

SOIL PROFILE ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT
316.2	Ground Level				
0.0	Sand & gravel with occasional boulders.		1	SS	bounce
311.2	Loose		2	SS	92/6"
5.0	Glacial Till		3	SS	100/3"
	Het.mix. of gravel, sand, silt with traces of clay.		4	SS	184
			5	SS	155
	Very Dense		6	SS	100/5"
298.2			7	RC	20%
18.0	Boulders		8	RC	20%
293.7			9	RC	-
22.5	Sand & gravel seams		10	SS	106
287.2					
29.0	Glacial Till Het.mix.of gravel, sand, silt with traces of clay.		11	SS	137
			12	SS	158
	Very Dense				
275.0	Washbit bouncing		13	SS	100/4"
41.2	End of Borehole Probably Bedrock				

ELEV. SCALE: 310, 300, 290, 280

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT — 20 40 60 80 100
SHEAR STRENGTH P.S.F. — ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE — 1000 2000
End of Cone Test

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_p
WATER CONTENT —— w
WATER CONTENT % — 10 20 30

BULK DENSITY γ P.C.F.

REMARKS

GR. SA. SI. CL.

315.7
46 40 11 3
35 52 10 3
4 21 57 18

FORM OB-MT-126 (REV. 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

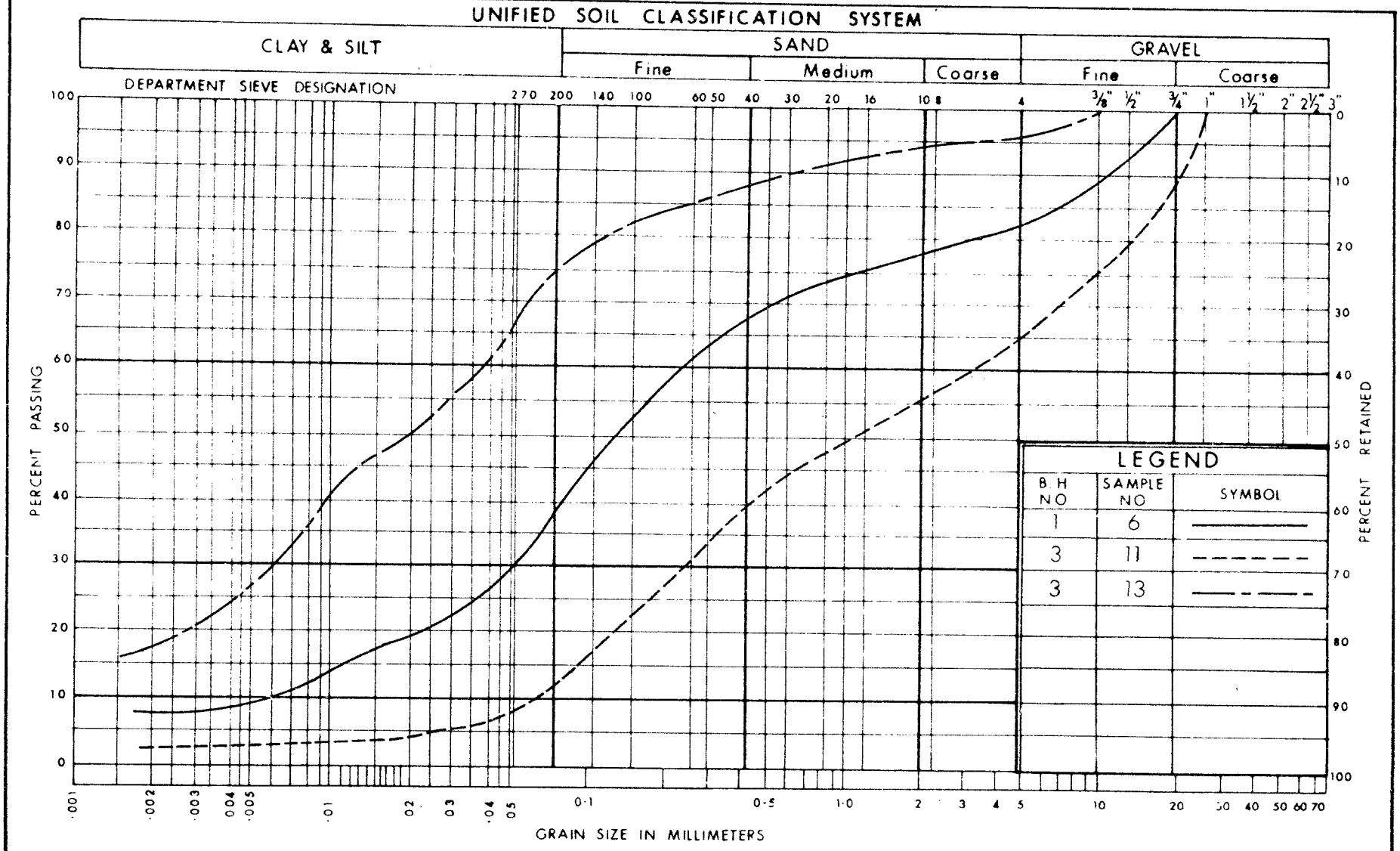
RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 70-11055 LOCATION * Sta. 425 + 22 o/s 18.5' Lt. ORIGINATED BY GA
W.P. 134-65-04 BORING DATE July 1, 1970 COMPILED BY GA
DATUM Geodetic BOREHOLE TYPE Cone Penetration Test CHECKED BY

SOIL PROFILE			SAMPLES				DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F. o UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB. VANE	WATER CONTENT %	P.C.F.	GR. SA. SI. CL.
316.0	Ground Level									
0.0										
310.4						310				
5.6	End of Cone Test									

FORM OB MT - 17
REV. APR. 196



DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

GRAIN SIZE DISTRIBUTION

HET. MIXTURE OF GRAVEL, SAND AND SILT WITH TRACES OF CLAY

W.P No. 134 - 65 - 04

JOB No. 70 - 11055

FIG. No. 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 :-

CONSISTENCY	'N' BLOWS / FT.	c LB. / SQ. FT.	DENSENESS	'N' BLOWS / FT.
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

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	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
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 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
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ε	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNGS MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

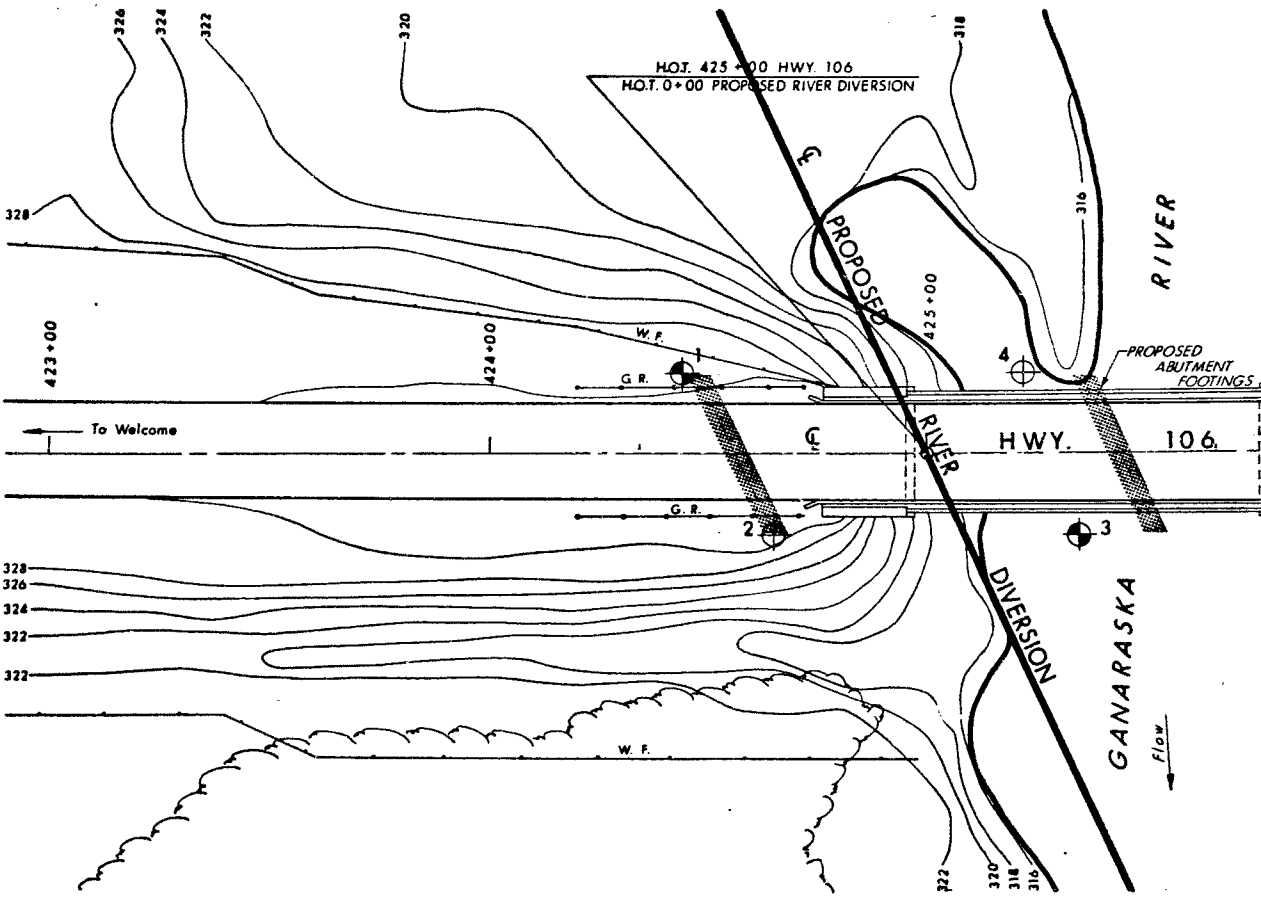
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

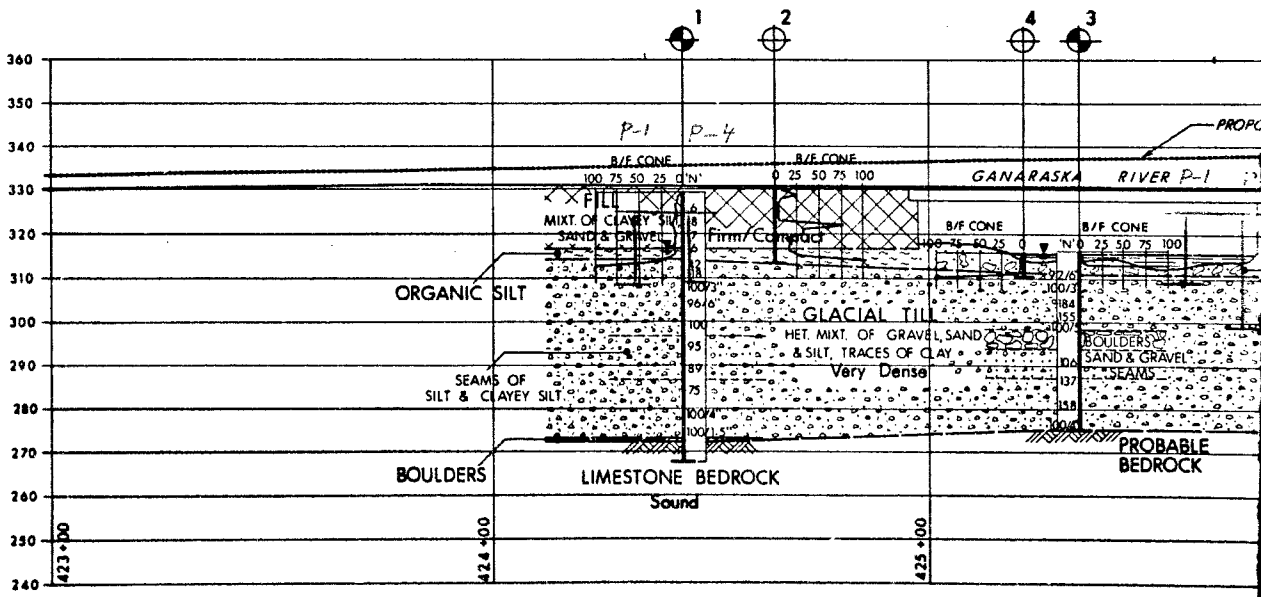
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

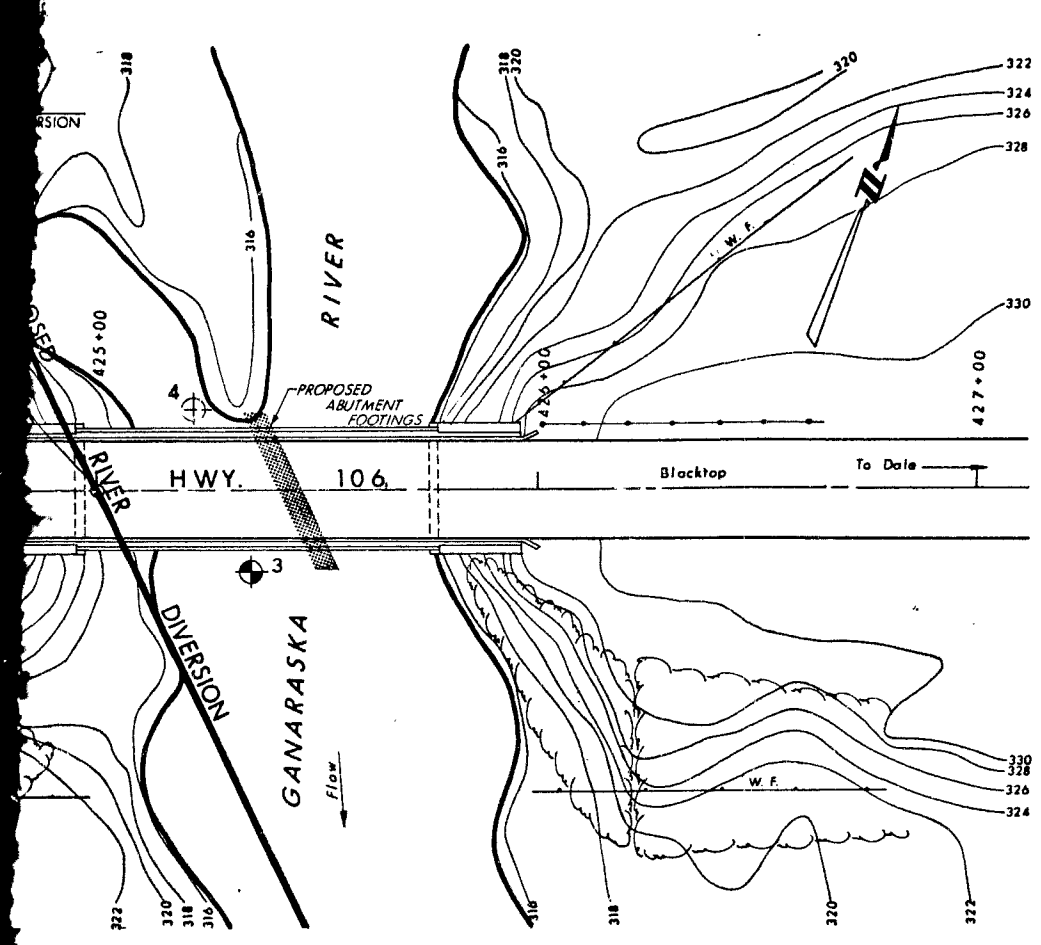


PLAN
SCALE
20 10 0 20 40 FT.

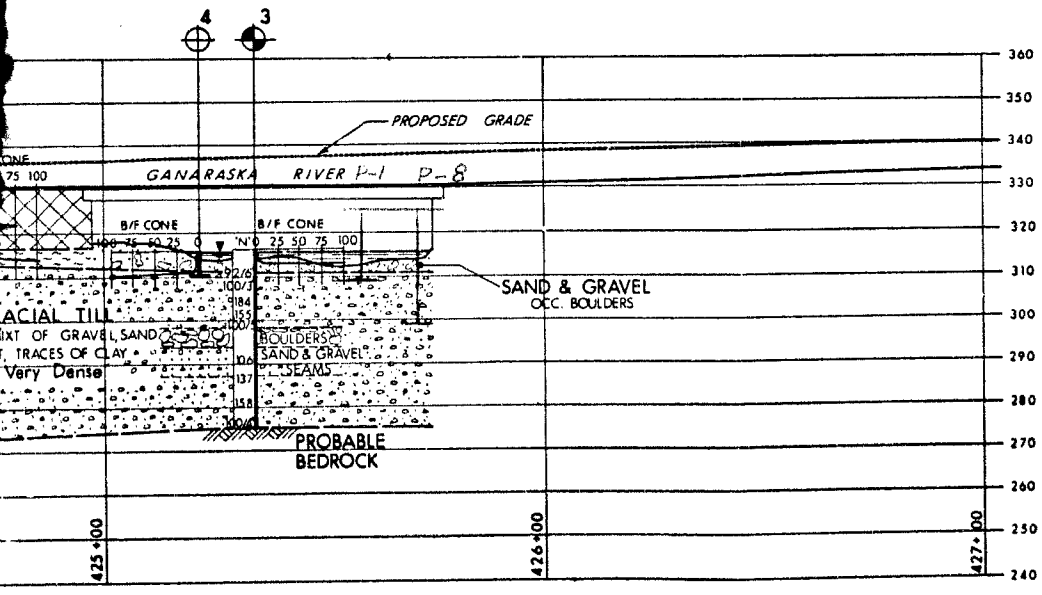


PROFILE
SCALE
20 10 0 20 40 FT.

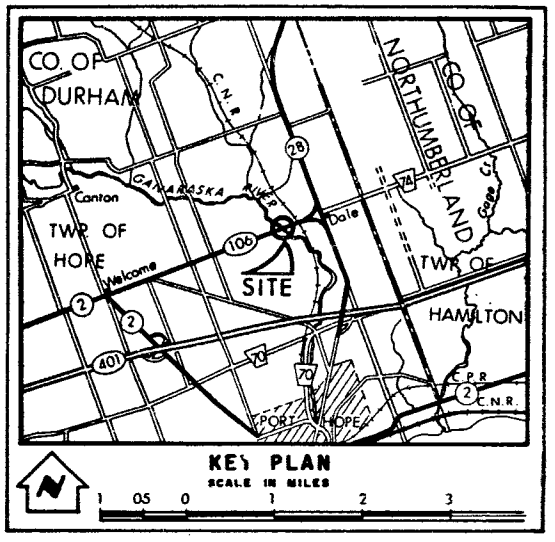
PRINT RECORD		
NO.	FOR	DATE



PLAN
SCALE
10 0 20 40 FT.



PROFILE
SCALE
10 0 20 40 FT.



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. JUNE & JULY 1970

NO.	ELEVATION	STATION	OFFSET
1	329.6	424+44	18.5' LT.
2	330.5	424+65	18.5' RT.
3	316.2	425+35	18.5' RT.
4	316.0	425+22	18.5' LT.

— 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

GANARASKA RIVER

KING'S HIGHWAY NO. 106 DIST. NO. 7
CO. DURHAM
TWP. HOPE LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D G. A.	CHECKED	W.P. NO. 134 - 65 - 04	M.&T. DRAWING NO. 70 - 11055 A
DRAWN E. D	CHECKED	JOB NO. 70 - 11055	
DATE AUGUST 7, 1970		SITE NO.	BRIDGE DRAWING NO.
APPROVED (PRINCIPAL FOUNDATION ENGINEER)		CONT. NO.	

REF. No. E - 4923 - 1

ENG K Selby.

JOB TITLE Ganaraska River Bridge

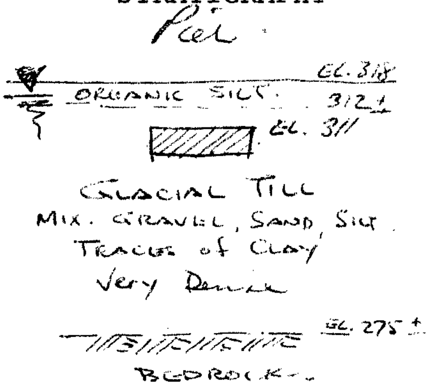
GEOCRES NO. 30M16-9 CONT. 74-166 SITE 21-326

W.P. 134-65-04 W.O. 70-11055 HWY NO. 106 DIST. 7

TYPE OF STRUCTURE 3 span (35, 60, 35)

TYPE OF FOOTINGS Abutments supported on steel 'H' Piles piers ~~footings~~ supported by spread footings.

STRATIGRAPHY



SUBSOIL DESCRIPTION

2½' Organic Silt

over

5'± Sand & Gravel (B.H. #3 Only)

40'± of Glacial Till

(Het. Mix of Gravel, Sand & Silt)

over

Limestone Bedrock.

GROUNDWATER CONDITIONS At elevations 315.7 and 316.1 approx 1 & 2' below original ground.

FINAL BRIDGE GENERAL & FOUND. PLAN Yes in back of Report in Cont. file.

WERE DEWATERING PROBLEMS FORESEEN ? RECOMMENDATIONS Yes a dewatering scheme will be required [illegible]

QUESTIONS TO BE INVESTIGATED Was a dewa[illegible] used?

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE

VISUAL CLASSIFICATION SHEET

PROJECT 70-1035 SITE Port Hope BOREHOLE No. 1 (I) GROUND ELEVATION

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3.0 4.5	1½"	Sub Round	5	20	75	High	Dull	None	Slight	Earthy	Light Brown	Strong	6	Clayey Silt with Sand, traces Gravel slight trace of Organics (FILL)	CL
2	6.0 7.5													8	Very little recovery but appears as above	CL
3	9.0 10.5	¾"	Round	60	20	10	—	—	Slow	—	Earthy	Dark Brown	"	7	Gravel with Sand, traces of Silt & Clay	
4	12.0 13.0	⅜"	Round	"	"	"	—	—	"		"	"	"	6	as above with pieces wood	
4A	13.0 13.5	⅜"							Slow		Org.	"	"		Organic Silt with some Sand & Gravel	
5	15.5 17.0	1"	Sub Round	30	30	40	Med	—	Med	Low	Earthy	Grey	"	42	Gravel, Sand & Silt traces of Clay	
6	18.0 19.5													118	as above	
7	21.0 21.8	½"	Sub R	10	50	40		—	Med	Low	Earthy	Grey		100/3"	" "	
8	25.0 26.0													96/6"	" thin seams of Clayey Silt	

NOTES:— VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE

VISUAL CLASSIFICATION SHEET

PROJECT 70-1055 SITE Port Hope BOREHOLE No. 1 (T) GROUND ELEVATION

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT & CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
9	30.0 31.5	1/4"	Sub R	10	40	50	Low	—	Slow	Weak	Earthy	Grey	Strong	100	Gravel/Sand/Silt traces of Clay	
10	35.0 36.5	1/8"	Sub R	10	20	70	None	—	Slow	Weak	"	Grey	"	95	Silt with traces of Clay & Sand *	
11	40.0 41.5	#100					Med	Dull	Slow	Weak	Earthy	Grey	Strong	89	Clayey Silt - Silt	CL-ML
12	45.0 46.5	1/2"	Sub R	15	40	45						"	"	75	Gravel/Sand/Silt traces of Clay	
13	50.0 50.5	3/4"		12	40	48								100/4"	as above	
14	55.0 56.5	Bldr												100/1½"	as above	

NOTES:— VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE

J. A.

VISUAL CLASSIFICATION SHEET

PROJECT 70-1055 SITE Port Hope BOREHOLE No. 3 GROUND ELEVATION

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT & CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	3'0 3'5	3/4"	Sub Rnd	60	35	5	[redacted]	—			Earthy	L Brown	Strong	bounce	Gravel with Sand	
2	5.0 6.0	1½"	Sub Round	30	30	40	Low	—	Slow	None	"	Grey	"	9216"	Gravel Sa/Silt traces of clay (TILL)	
3	8.0 8'3	1½"	Round	20	35	45	"	—	Slow	"	"	"	"	100/3"	" " " " "	
4	11.0 12.5	3/4"	"	25	35	40								184		
5	14.0 15.5	3/4"	"	10	40	50								155		
6	17.0 17.4	1½"		15	40	45								100/5"		
10	24'7 26.2	1"	Round	40	50	10	—	—	Quick	—	Earthy	Grey		106	Sand & Gravel	
11	29.0 30.5	¼"		10	50	40	Low		Slow	Low	"	"	"	137	Sa & Silt w some Gravel (TILL)	
12	35.0 36.5	¼"		5	25	70								158	Sandy Silt traces Gravel	
13	39.3 39.6	3/8"		3	30	52								100/4"	Sa & Silt w some Gravel	

NOTES:— VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

Department of Highways Ontario
Copy for the information of
Mr. A. Stermac
Mr. G. Burkhardt,
Reg. Bridge Planning Engineer,
Central Region,
Central Building

C.S. Grebski,
Bridge Office

January 11, 1971

Ganaraska River Bridge
0.4 Mi. West of Hwy. #28
W.P. 134-65-04, Site No. 21-326
Highway 106, District No. 7

70-11 0.5 5

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6943-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is $94,000. This cost 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:rd

Attach.

c.c. B. Davis
A. Stermac (2)
J. Anderson

A-M. JAN 71

NO COMMENTS

A.K.B.

K.L.D.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

From: C.S. Grebski,
Bridge Office

Attention:

Date: June 25, 1971.

Our File Ref.

In reply to

Subject:

Ganaraska River Bridge
0.4 mi. W. of Hwy. #28
W.P. #134-65-04 Site #21-326
Hwy. No. 106 District #7

70-11-055

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,
Bridge Design Engineer

CSG:s

Attach.

c.c. Foundation Office

SUMMARY OF PILE DRIVING RECORDS

W.O. 70-11055 W.P. 134-65-4 CONT. 74-166 DIST. 7

SITE GANARASKA RIVER AND HWY # 106

DATE DRIVEN 19 JUNE - 24 JUNE/75 WEIGHT OF ANVIL 800 lb

HAMMER TYPE D-12 WEIGHT 1.375 T ENERGY 22500 Ft/lb

LOCATION OF PILES	PILE TYPE	NO.	LENGTH (ft.)	TIP EL. (ft.)	ESTIMATED TIP EL. (ft.)	DIFFERENCE Longer(+) Shorter(-) Than Estimated (ft.)	REMARKS
EAST ABUT.	HP 12x53	1	16.3	308.77	✓	- 3.8	
" "	"	2	15.4	309.65		- 4.7	
" "	"	3	15.3	309.25		- 4.3	
" "	"	4	14.9	310.85	✓	- 5.9	
" "	"	5	13.7	310.30		-5.3	
" "	"	6	14.4	310.48		-5.5	
" "	"	7	15.0	310.04	305.0	-5.0	
" "	"	8	14.4	310.57		-5.6	
" "	"	9	14.8	309.75		- 4.8	
" "	"	10	15.4	309.03		- 4.0	
WEST ABUT	HP 12x53	1	26.0	299.51	✓	+ 0.45	
" "	"	2	14.3	310.68		- 5.7	
" "	"	3	25.5	300.05		—	
" "	"	4	23.3	302.10		—	
" "	"	5	18.0	307.05		- 2.1	
" "	"	6	21.3	304.05		—	
" "	"	7	23.0	302.45		—	
" "	"	8	15.5	309.55	✓	- 4.6	
" "	"	9	15.5	308.95		- 4.0	
" "	"	10	17.0	307.49		- 2.5	

300.0 EL. BETWEEN

OVERSIZED DRAWINGS

General Plan

Footing Layout