

MEMORANDUM

Telephone: 245-3

TO: Mr. A.C. Dymally,
 Technical Foundation Engineer,
 Room 117,
 Lab. Building.

FROM: W.B. Melnychuk,
 Bridge Office,
 Central Region,

ATTENTION:

DATE: November 25th, 1961.

OUR FILE REF.

IN REPLY TO

SUBJECT: P. 131-05-02, Site 13-112,
 Little Creek Structure,
 1.1 Mi. South of Hwy. 3,
 Map. 2 New District 4.

30M5-85
 GEOGRAPHIC No.

Herewith are two prints of the unfinished 15" x 40" photogrammetric plan, on which the proposed 24' x 18' box culvert is shown in red.

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

J.F. Wallace

J.F./ccw
 Encl.
 cc M. Cross

J.F. Wallace,
 BRIDGE LOCATION SUPERVISOR
 FOR:
 W.B. Melnychuk,
 REGIONAL BRIDGE PLANNING ENGINEER.

Mar. 4.

Feb. 4, 1970

FIELD RECONNAISSANCE REPORT
REQUIRED BY FOUNDATION SECTION
FOR

FF-69
SEPT. 1968

W.P. NO. 131-65-02 HIGHWAY NO. 25 N. DISTRICT 4 SITE PLAN NO. PROFILE NO.
RIVER CROSSING ☒ GRADE SEPERATION ☐ R.R.X. ☐ OTHER (SPECIFY)
ALTERNATE SCHEME (IF ANY)

EXISTING SITE CONDITIONS

DESCRIPTION:

TOPOGRAPHY: HILLY ☐ ROLLING ☒ VALLEY ☐ GULLIED ☐ FLAT ☐
VEGETATION: TREES ☒ BRUSH ☐ GRASS ☒ SWAMP ☐ FARM CROPS ☐ CLEARED ☐
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐
ROCK OUTCROP (SPECIFY LOCATIONS)

UNDERGROUND UTILITIES:

UTILITY COMPANY

TELEPHONE NO. FOR DEFINITE LOCATION

NONE 1
2
3
4
5
Overhead Bell on West
" Hydro on East
(27,000 V)

EXISTING STRUCTURE(S): No Dwg's Available. Masonary Abutts. with conc. training walls steel beams & Railway Rail

FOUNDATIONS: SPREAD FOUNDATIONS ☒ with conc rock SIZE ELEVATION(S)
PILES ☐ TYPE LENGTH(S)
DESIGN LOAD T.S.F. TONS / PILE
CONDITION OF STRUCTURE Good

APPROACHES: CUT ☐ FILL ☐ SIDE SLOPES
BERMS YES ☐ NO ☐

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FAILURES IN AREA, PAST PERFORMANCE OF EXISTING APPROACHES & STRUCTURE, ETC.)

ACCESSIBILITY

IS STRUCTURE LOCATED ON D.H.O. RIGHT OF WAY? YES ☒ NO ☒ IF NO, Town of Oakville.
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☐ NO ☐ IF NO,
PROPERTY OWNER(S):

NAME

ADDRESS

TELEPHONE NO.

1
2
3
4

WHO WILL OBTAIN NECESSARY PERMISSION?

HAS SITE BEEN SURVEYED & STAKED? YES ☐ NO ☒ IF YES, DATE OF MOST RECENT SURVEY

WILL CLEARING BE NECESSARY TO ENTER SITE AREA? YES ☐ NO ☒

IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☒ NO ☐

IF RIVER CROSSING:

WILL A RAFT BE NECESSARY? YES ☐ NO ☒ IF YES, GIVE MAX. DEPTH OF WATER FT.

CURRENT: SWIFT ☐ MODERATE ☐ SLOW ☒

DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN) Creek

ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES:

ALTERNATE SCHEME: YES ☐ NO ☐ IF YES, SPECIFY

HYDROLOGIC REASONS: YES ☐ NO ☐ IF YES, SPECIFY (SCOUR, ETC.)

REMARKS

NEAREST AVAILABLE ACCOMODATION: Oakville - Burlington - Milton

OTHER COMMENTS:

DATE Nov. 25 / 69

REGIONAL BRIDGE LOCATION ENGINEER K.S. Subasingh & J.J. Meehan

MEMORANDUM

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 5, 1970

OUR FILE REF.

IN REPLY TO

MAR 10 1970

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed 14 Mile Creek Structure
1.1 Miles South of Hwy. #5
Hwy. #25 (New)
District No. 4 (Hamilton)
W.J. 70-F-5 -- W.P. 131-65-02 ✓

30 M5 -85
GEOCRES No.

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.

A. G. Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. G. Allen
W. S. Melinyshyn (2)
T. J. Kovich
E. A. Singh
Foundations Files
Gen. Files ✓

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FOUNDATION INVESTIGATION REPORT
For
Proposed 14 Mile Creek Structure
1.1 Miles South of Hwy. #5
Hwy. #25 (New)
District No. 4. (Hamilton)
W.J. 70-F-5 - W.P. 131-65-02

1. INTRODUCTION:

A request for a foundation investigation for the proposed crossing of 14 Mile Creek by Hwy. 25 (New) was received from Mr. J.F. Walshe, Regional Bridge Location Supervisor, in a memo dated November 25, 1969.

A field investigation was subsequently carried out by this Section to determine the subsoil conditions existing at the site. This report contains the results of this investigation and our recommendations pertaining to the design of the proposed structure foundations.

2. DESCRIPTION OF THE SITE:

The site is located 1.1 miles south of Hwy 5. on Hwy 25 (New) in the town of Oakville. The existing structure is a single span bridge of length 21 ft. and width 19 ft. It has a superstructure of steel rail beams, closed type abutments and may be described as in poor condition.

The old structure is located in a small valley, with a meandering creek on the valley floor. The creek was entirely frozen over with the only free water being underneath the ice in a small pond to the northeast of the structure. The approximate elevations and depths of the stream are 404.0 ft. and 3.0 ft. on the northeast or downstream side of the bridge and 406.5 ft. and 1.0 ft. on the southwest or upstream side of the bridge. Underneath the bridge the river bed was a concrete slab and at the downstream edge of the slab, there is a slight step of about 2.0 to 2.5 ft. The approach embankments are approximately 15 ft. high with 2:1 slopes and there are no apparent signs of failure, however, this was difficult to discern due to snow cover. The terrain around the site is

grass covered, sparsely populated, and slightly undulating.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURES:

A total of three boreholes and two dynamic cone penetration tests was carried out during the course of the field investigation. Boring was carried out by means of conventional diamond drilling equipment adapted for soil sampling purposes. During the field work, disturbed samples were obtained by means of a standard split spoon sampler, and the energy used in driving it conformed to the requirements of the Standard Penetration Test. Dynamic cone penetration tests were carried out adjacent to Boreholes #3 and #4. A driving energy of 350 ft.- lbs. per blow was used for the dynamic cone penetration tests. Undisturbed samples were obtained by means of 2-inch I.D. Shelby tubes which were pushed into the soil manually.

Samples were visually examined and classified at the site as well as in the laboratory. Certain tests were carried out in the laboratory for classification purposes. These tests consisted of Atterberg Limits, natural moisture content, and grain-size distribution. The results of the field and laboratory tests are shown in the Appendix of this report. The locations and elevations of borings, together with the estimated stratigraphical profile, are given on Drawing # 70-F-5A and contained in the Appendix of this report.

4. SUBSOIL CONDITIONS:

4.1) General:

In general, the subsoil below the stream bed consists of a thin alluvial deposit followed by a layer of hard glacial till at least 15 ft. deep. There is also a highway fill of about 15 ft. in height consisting of clayey silt with sand and gravel traversing the area.

The boundaries between the various soil types are shown on the attached Record of Borehole sheets. The estimated

stratigraphical profile shown on the Drawing No. 70-F-5A, is based upon this information.

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

4.2) Clayey silt, sand, gravel (Fill Material):

This material was found in Borehole #3 which was put down beside the existing roadway. The thickness of the fill material varies from 5.0 to 20.0 feet in height and consists mainly of clayey silt with sand and gravel. The 'N' values indicate a consistency of stiff to very stiff. The laboratory tests indicated the following physical properties:

	<u>Range</u>
Natural Moisture Content %	20 - 21
Liquid Limit %	30 - 53
Plastic Limit %	18

4.3) Gravel, Sand and Silt (Alluvium):

This deposit was found in boreholes #1 and 4, which were put down in or beside the creek. The thickness of the deposit is 1 to 2 feet. It consists of gravel, sand and silt. The 'N' values indicate, in general, a loose denseness. Grain-size analysis gave the following distribution and is plotted on Fig. #1 of the Appendix:

Gravel	-	34%
Sand	-	58%
Silt and clay	-	8%

4.4) Clayey silt, sand, and some gravel (Glacial Till):

This deposit was found in all boreholes at approximately the same elevation. The thickness of the layer is no less than 15 feet. The 'N' values indicate that this layer is very dense, with all 'N' values being well over 100 blows per foot. It consists of clayey silt with sand and some gravel.

5. GROUNDWATER CONDITIONS:

The ice level in the stream above the bridge was observed at an elevation of 406.5 feet and below the bridge at 404.0 feet. The depth upstream from the bridge is

approximately 1 foot, and downstream, it is approximately 3.0 feet. The soil caved-in in borehole #3 on top of the highway fill at an elevation of 403.6 ft., which is roughly the same height as the ice level in the downstream side of the bridge. Thus, groundwater levels correspond with the prevailing stream levels.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to replace the existing bridge over 14 Mile Creek with a new structure. A 24 X 12 ft. box culvert has been suggested on the same centre-line as the existing road. Other types of structure may, of course, be considered.

The proposed finished grade will be at El. 430[±] and the elevation of the stream bed will be at El. 404[±]. The height of the south approach fill, adjacent to the proposed structure, will be about 26 ft. and the north approach fill also about 26 ft.

The subsoil at the site consists of alluvial deposits in or around the creek bed, and glacial till below that. There are approach embankments on either side of the existing structure at a height of 15 to 20 ft. adjacent to the structure.

6.2) Structure Foundations:

Since either a bridge or culvert may be constructed at this site, recommendations are given below for both cases.

In the event of a bridge or concrete culvert structure being built, adequate foundation support may be obtained from spread footings placed at or below el. 400.00, utilising a net safe pressure of 4.0 t.s.f. Perched abutments may be supported on steel 'H' piles driven to approximate elevation 390.0. The maximum allowable load for the particular steel section used may be assumed for design purposes. (i.e. for 12 B.P. @ 53 - 70 tons/pile). It may be of advantage in the case of a three span structure to support the deck on pile bents. Steel 'H' piles are deemed to be the most suitable for this method of construction and it is estimated that the maximum allowable load for the piles will be achieved by driving to el. 388.0. For appearance or

other purposes the 'H' piles may be encased in concrete above el. 400.00.

In the case of a concrete box type culvert a granular pad of not less than 12 inches thickness should be constructed to support the floor slab. This pad should be placed in the dry and compacted according to the current D.H.O. method.

As an alternative, a pipe arch culvert may be constructed. In this case the width of the excavation base should not be less than the span of the arch plus 4 ft. each side. A granular pad of not less than 12 inches in thickness should be constructed for the full width of this excavation. The sides of the excavation should be sloped back at 1 horizontal to 1 vertical. For the 12 inch granular pad minimal compaction only is required. The remainder of the backfill should consist of G.B.C. Class 'A' material up to an elevation at least 12 inches higher than the arch crown. This material must be compacted fully to 100% of the current D.H.O. method. This is particularly important in the zone below the pipe haunches.

Unwatering of excavations:

Above el. 400.00 the subsoil within the stream bed consists of granular type material which will permit free flow of water. Below el. 400.00 the subsoil consists of hard clayey silt which is relatively impermeable. The stream level during the field investigation was approximately el. 404 - 405. Because of these facts it is not anticipated that dewatering of excavations will present any major problems. Protection for the sides of the excavation within the alluvial granular deposits may be necessary.

Depth of excavations:

For spread footings or pile caps, the depth is governed by frost penetration. A minimum of 4 ft. protective cover is recommended. The depth of spread footings and piles is subject to hydrological considerations and should be checked accordingly.

6.3) Structure Approaches:

No stability problems are foreseen for the proposed approach embankments, provided they are built with 2 horizontal to 1 vertical slopes. Protection against scour should be provided up to H.W.L.

7. MISCELLANEOUS:

The field work was carried out during the period January 14 - January 23, 1970 under the supervision of Mr. R.A. Hendry. Equipment used was owned and operated by Canadian Longyear Ltd., North Bay.

This report was written by Mr. R. A. Hendry and reviewed by Mr. K.G. Seiby, Supervising Foundation Engineer.

March, 1970

APPENDIX I

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB	70-F-5	LOCATION	Co-ords. 778,130 N; 930,684 E.	ORIGINATED BY	RAH
W.P.	131-65-02	BORING DATE	Jan. 20, 21 & 22, 1970	COMPILED BY	RAH
DATUM	Geodetic	BOREHOLE TYPE	Wabhboring, BX Casing	CHECKED BY	

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.		WATER CONTENT % 20 40 60				
							○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE x LAB. VANE					
07.6	Ground Level												
0.0	Gravel, sand & silt some clay (Alluvium)												
03.1	Loose to compact												
4.5	Clayey silt, sand and gravel (Glacial Till)		1	SS	100/8"	400							51 26 (23)
			2	SS	80/6"								18 60 (22)
395.6	Hard												
12.0	End of Borehole					390							

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 70-F-5

LOCATION Co-ords. 778,162 N; 930,738 E.

ORIGINATED BY RAH

W.P. 131-65-02

BORING DATE Jan. 14, 15 & 16, 1970

COMPILED BY RAH

DATUM Geodetic

BOREHOLE TYPE Washboring, BX Casing

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w _L PLASTIC LIMIT ——— w _P WATER CONTENT ——— w			BULK DENSITY Y	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLAT	NUMBER	TYPE		20	40	60	80	100	w _p	w	w _L		
424.6	Ground Level														
0.0	frozen														
	Clayey silt, sand and gravel														
	(fill material)		1	SS	10										
	Firm to very stiff														
413.6			2	TW	PM										
11.0															
	Clayey silt, sand and gravel		3	SS	170/4"										
	(Glacial Till)														
	Hard		4	SS	100/2"										
			5	SS	100/3.5										
394.1			6	SS	120/6"										
30.5	End of Borehole														

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

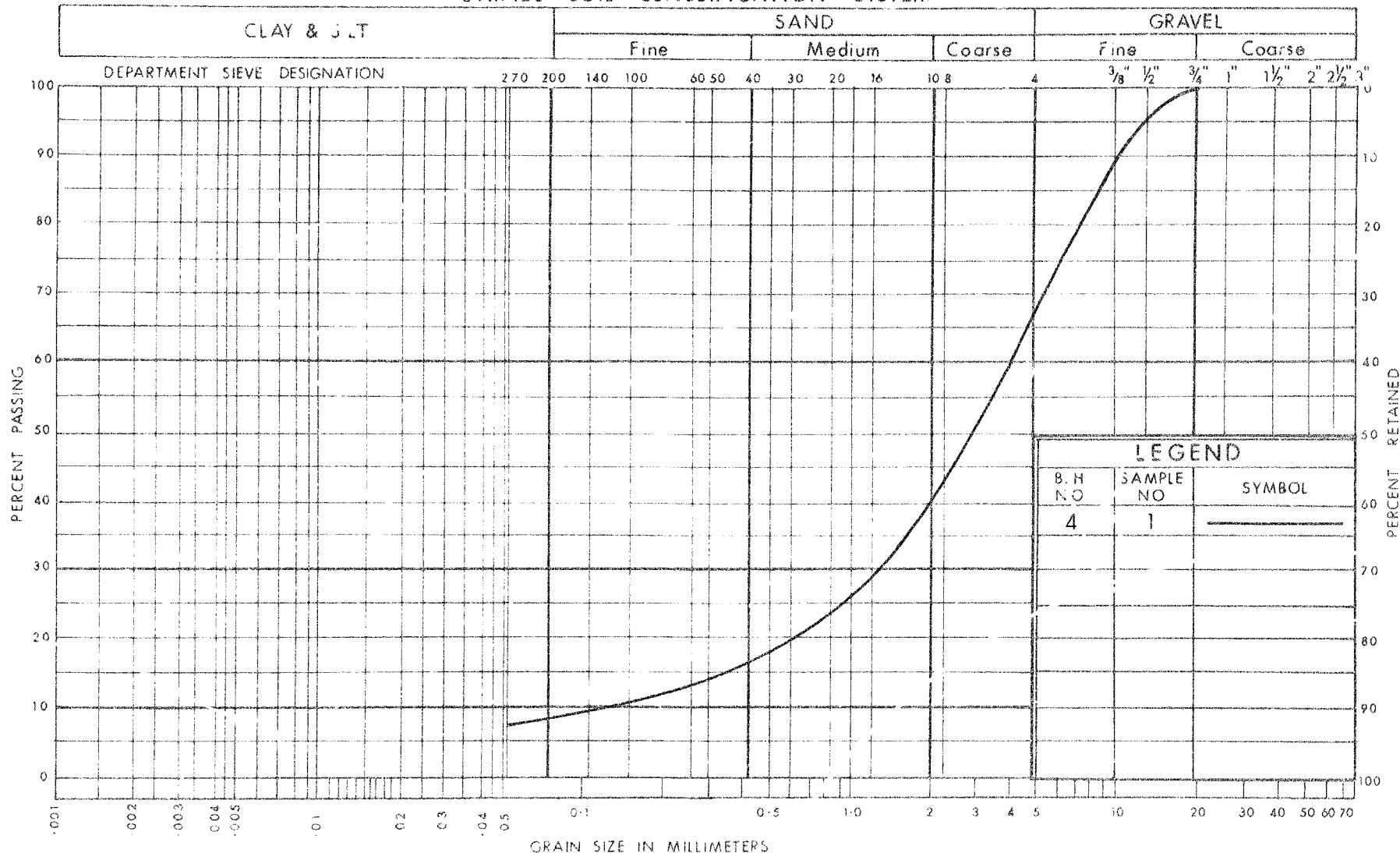
RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB	70-F-5	LOCATION	Co-ords. 778,197 N; 930,726 E.	ORIGINATED BY	RAH
W.P.	131-65-02	BORING DATE	January 19 & 20, 1970	COMPILED BY	RAH
DATUM	Geodetic	BOREHOLE TYPE	Washboring, BX casing	CHECKED BY	

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION	RESISTANCE	LIQUID LIMIT	PLASTIC LIMIT	WATER CONTENT	BULK DENSITY Y P.C.F.	REMARKS			
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100			W _p	W	W _L
							SHEAR STRENGTH P.S.F.							WATER CONTENT %		
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE									
404.0	Ice Level															
403.0	Ground Level															
1.0	Gravel, sand & silt (Alluvium)															
400.0	Loose to compact		1	SS	108	400							34 58 (8)			
4.0	Clayey silt, sand & gravel (Glacial Till)		2	SS	100/3"											
	Hard		3	SS	122	390										
			4	SS	100/6"											
386.0																
18.0	End of Borehole															

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION GRAVEL, SAND & SILT

W.P. No. 131-65-02

JOB No. 70-F-5

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

Q _u	UNCONFINED COMPRESSION	L.V	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	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
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

IN TERMS OF
EFFECTIVE STRESS
 $\tau_f = c' + \sigma' \tan \phi'$

IN TERMS OF
TOTAL STRESS
 $\tau_f = c_u + \sigma \tan \phi$

GENERAL

π	= 3.1415
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
$\bar{\sigma}$	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 (YOUNG'S 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_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
β	ANGLE OF SLOPE TO HORIZONTAL

MEMORANDUM

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

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: January 21, 1971

OUR FILE REF.


IN REPLY TO

SUBJECT: Fourteen Mile Creek Structure
1.1 Miles South of Hwy. 5
W.P. 131-65-02, Site No. 10-112
Highway 25, District No. 4

70-F-5

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:rd

Attach.

c.c. Foundation Office

Re comments

K.C.S. 4

Jan. 27th 1971

HR 9 Feb 71

FIELD BORING LOG

DRILLING CO. CANADIAN LONG YEAR DATUM ELEV. _____ B.H. NO. 1
 DRILLER HANK ROSEN GROUND ELEV. 407.6 JOB NO. 70-F-5
 ENGINEER P. HENDRY CASING SIZE BX DATE JAN 20 / 70
 SITE LOCATION BRONTE RD & 14 MILE CREEK
 HOLE LOCATION CREEK BED
 REMARKS NEW DRILLER - AL VAUGHN ON JAN 22 WATER LEVEL 6"

[illegible]

FIELD BORING LOG

DRILLING CO. CANADIAN LONGYEAR DATUM ELEV. _____ B.H. NO. 3
 DRILLER HANK ROSEN GROUND ELEV. 424.6 JOB NO. 70-F-5
 ENGINEER R. HENDRY CASING SIZE BX DATE JAN 14 / 70
 SITE LOCATION BRONTE SIDEROAD & 14 MILE CREEK
 HOLE LOCATION _____
 REMARKS CAVED IN AT 21.0'

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
		DYNAMIC CONE PENETRATION		
0	10	86 40 14 6 4 6 6 6 9 14		
11	20	42 100 1/4"		
0	5.0	DRIVE BY CASING & PULL OUT.		(10)
5.0	6.5	Sp. Sp - CLAYEY SILT - BROWN - STIFF	SS-1; 13"	4-5-5
5.0	10.0	DRIVE BY CASING & PULL OUT		
10.0	11.5	T.W.	10-2; 6"	P.M.
10.0	15.0	DRIVE BY CASING & WASH OUT.		
→	12.0	MUCH HARDER		
15.0	15.5	Sp. Sp. - CLAYEY SILT WITH GRAVEL - BROWN - HARD - GLACIAL TILL	SS-3; 6"	170/4"
15.0	20.0	DRILL WITH PYCONE BIT		
20.0	20.7	Sp Sp - SANDY SILT WITH GRAVEL - BROWN - HARD	SS-4; 8"	80-100 1/2"
20.0	25.0	DRILL WITH PYCONE BIT		
→	23.5	CAVED IN		
15.0	25.0	DRIVE BY CASING & WASH OUT		
25.0	25.3	Sp. Sp. - GRAVEL - GREY - VERY DENSE	SS-5; 3 1/2"	100/3 1/2"
→	25.0	GRAVEL		
25.0	30.0	DRILL WITH PYCONE BIT, DRIVE BY CASING & WASH OUT		
30.0	30.5	Sp. Sp. - GRAVEL WITH SOME SILT - GREY - VERY DENSE	SS-6; 6"	120/6"
END OF BOREHOLE AT 30.5'			JAN 16 / 70	

FIELD BORING LOG

DRILLING CO. CANADIAN LONGYEAR DATUM ELEV. 404.1 B.H. NO. 4
DRILLER HANK ROSEN GROUND ELEV. 404.0 JOB NO. 70-F-5
ENGINEER R HENDRY CASING SIZE BX DATE JAN 19 1970
SITE LOCATION BRONTE RD & 14 MILE CREEK
HOLE LOCATION _____
REMARKS BOREHOLE LOCATED IN CREEK

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0	10	DYNAMIC CONE PENETRATION 11 46 22 120 100/3"		
0	3.0	DRIVE BX CASING & PULL OUT.		(108)
3.0	4.5	Sp.Sp. - GRAVEL & SILT - BROWN - VERY DENSE	SS-1; 12"	9-8-100
→	4.0'	MUCH HARDER		
3.0	5.5	DRIVE BX CASING & WASH OUT		
5.5	5.8	Sp.Sp.	SS-2; 0	100/3"
5.5	10.0	DRILL WITH BYCONE BIT, DRIVE BY CASING & WASH OUT.		(122)
10.0	11.5	Sp.Sp. - SANDY SILT WITH GRAVEL - BROWN - VERY DENSE	SS-3; 14"	57-50-72
10.0	15.0	DRILL WITH BYCONE BIT, DRIVE BY CASING & WASH OUT.		
15.0	15.5	Sp.Sp. - A FEW PIECES OF GRAVEL OR BROKEN ROCK FELL OUT OF THE SPLIT SPOON AS IT WAS WITHDRAWN	SS-4; 0	100/6"
15.0	18.0	DRILL WITH BYCONE BIT - RAN OUT OF WATER AT 18.0' MATERIAL CAVED IN TO BOTTOM OF CASING - VERY HARD		
		END OF BOREHOLE AT 18.0'	JAN 20/70	

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-F-5 SITE BRONTE RD @ 14 MI. CRE BOREHOLE No. 1 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
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE											
				GRAVEL	SAND	SILT & CLAY									
1	5.5-6.1	1"	SUB ROUND	35	35	30	LOW	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	VERY DENSE	SILTY SAND WITH GRAVEL
2	9.0-9.5	3/4"	SUB ROUND	30	50	20	NIL	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	VERY DENSE	GRAVELLY SAND WITH CLAY

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

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

SITE BRONTE RD 1/4 M. GLEN BOREHOLE No. 1 GROUND ELEVATION 407.6

DISTRIBUTION			DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
PERCENTAGE												
GRAVEL	SAND	SILT & CLAY										
55	35	30	LOW	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	VERY DENSE	SILTY SAND WITH GRAVEL	GF
30	50	20	NIL	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	VERY DENSE	GRAVELLY SAND WITH CLAY	GF

TESTING MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-F-5 SITE BROWN P.O. #14 M. Creek BOREHOLE No. 3 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
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE											
				GRAVEL	SAND	SILT & CLAY									
1	50-6.5	1"	SUB ANGULAR	10	10	80	MED-HIGH	NIL	NONE	LOW	EARTHY	BROWN	WEAK	STIFF	CLAYEY SILT WITH SOME SAND
3	15.0-5.5	1"	SUB ROUND	20	20	60	MED-HIGH	NIL	"	LOW	EARTHY	GREY BROWN	STRONG	HARD	CLAYEY SILT WITH SOME SAND
4	20.0-20.7	1 1/2"	SUB ROUND	35	25	40	LOW	NIL	SLOW	NIL	"	"	"	"	SANDY SILT AND GRAVEL
5	25.0-25.3	1"	SUB ANGULAR	100			NIL	NIL	NONE	NIL	-	DARK GREY	STRONG	VERY DENSE	GRAVEL
6	30.0-30.5	3/4"	SUB ANGULAR	70	30		"	"	"	"	-	"	"	VERY DENSE	GRAVEL WITH SAND

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

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

SITE BROOK & R. #14 MI. CREEK BOREHOLE No. 3 GROUND ELEVATION 424.6

ITION		CENTAGE	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
SAND	SILT & CLAY											
10	80	MED-HIGH	NIL	NONE	LOW	EARTHY	BROWN	WEAK	STIFF	CLAYEY SILT WITH SOME SAND & GRAVEL	CL	
20	60	MED-HIGH	NIL	"	LOW	EARTHY	GREY BROWN	STRONG	HARD	CLAYEY SILT WITH SOME SAND & GRAVEL	CL	
25	40	LOW	NIL	SLOW	NIL	"	"	"	"	SANDY SILT AND GRAVEL	GF	
		NIL	NIL	NONE	NIL	-	DARK GREY	STRONG	VERY DENSE	GRAVEL	GW	
30		"	"	"	"	-	"	"	VERY DENSE	GRAVEL WITH SAND	GF	

TESTING MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-F-5 SITE BRONTE RD & 14th CREEK BOREHOLE No. 4 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
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE											
				GRAVEL	SAND	SILT & CLAY									
1	3.0 - 4.5	1"	SUB ANGULAR	50	40	10	LOW	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	VERY DENSE	SANDY GRAVEL WITH TRACES
3	10.0 - 11.5	1/2"	SUB ROUND	30	60	10	NIL	NIL	"	"	"	"	"	"	GRAVELLY SAND

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

REMARKS:—

note 4

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

SITE BRONTE Rd & 14 Mi. Creek BOREHOLE No. 4 GROUND ELEVATION ± 404.0

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ION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

DOCUMENT MICROFILMING IDENTIFICATION

GEOCREs No. 30MS-85

W.P. No. 131-65-02

CONT. No. 73-047

W. O. No. 70-11005

STR. SITE No. 10-112

HWY. No. 25N DIST. 4

LOCATION S.D. CLV. FOURTEEN
MILE CREEK Str. 1.1 mi S. of HWY 5

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT 2

REMARKS:

30M5-85

