

70-F-65	37-66-08	Hwy. 417 & Co. Rd. 24	31G-68
W.O.	W.P.	LOCATION	GEOCRES NO.

● DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: Contract 73-40

REMARKS

**GEOCRES**

INDEXING CARD FOR REPORTS NOT MICROFILMED

GI-20 AUG. 74

EXPERIMENTAL DOCUMENT MAY  
APPEAR AS MULTI-FEED ON FILM

73-40

SUPER IMPOSED DOCUMENT MAY  
APPEAR AS MULTI-FEED ON FILM

FIELD RECONNAISSANCE REPORT  
REQUIRED BY FOUNDATION SECTION  
FOR

FF-69  
SEPT. 1968

W.P. NO. 37-66-08 HIGHWAY NO. 417 DISTRICT 9 SITE PLAN NO. E-4700-1 PROFILE NO. 9-FP-85  
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) None visible

UNDERGROUND UTILITIES: UTILITY COMPANY \_\_\_\_\_ TELEPHONE NO. FOR DEFINITE LOCATION \_\_\_\_\_

1 None

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

W.O. 70-11065

EXISTING STRUCTURE(S):

FOUNDATIONS: SPREAD FOUNDATIONS ☐ SIZE \_\_\_\_\_ ELEVATION(S) \_\_\_\_\_  
PILES ☐ TYPE \_\_\_\_\_ LENGTH(S) \_\_\_\_\_  
DESIGN LOAD \_\_\_\_\_ T.S.F. \_\_\_\_\_ TONS / PILE \_\_\_\_\_  
CONDITION OF STRUCTURE \_\_\_\_\_

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,  
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☐ NO ☒ IF NO,

PROPERTY OWNER(S):

NAME ADDRESS TELEPHONE NO.

1 Contact Property Section, Eastern Region

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

WHO WILL OBTAIN NECESSARY PERMISSION? Property Section, Eastern Region

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) 4.2 Mi. S of site on Cty Rd 24 - Rigaud

ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES: River Bridge north of Dalkeith

ALTERNATE SCHEME: YES ☐ NO ☐ IF YES, SPECIFY \_\_\_\_\_

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

REMARKS

NEAREST AVAILABLE ACCOMODATION: Hawkesbury - Normandie Motel

OTHER COMMENTS: \_\_\_\_\_

DATE July 13, 1970

REGIONAL BRIDGE LOCATION ENGINEER

Planning

*W. Highland*

## MEMORANDUM

To: H. A. M. Corrie,  
Principal Foundation Engineer,  
Downsview, Ontario.

From: Bridge Section,  
Kingston, Ontario.

Attention:

Date: July 13, 1970.

Our File Ref.

IN REPLY TO

SUBJECT: W.P. 37-66-08, Site 31-295,  
County Road 24 Underpass,  
(4.0 Miles East of Highway 34),  
Highway 417, District 9-Ottawa

70-11065

We are sending you herewith two prints of Bridge Site Plan E-4700-1 on which we have marked the proposed location of the above structure. Also enclosed are two copies of your Field Reconnaissance Report.

We would be pleased if you will make arrangements for the necessary foundation investigation and to have your report, the scheduled date for which is November 4, 1970.



T. C. Kingsland  
Regional Bridge Planning Engineer

TCK/bl  
Encls.

c.c. (with encl.)  
Bridge Office Files Section (Mr. S. McCombie)  
c.c. Mr. R. Forrest

MEMORANDUM

Geocres 31G-68

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: October 9, 1970

OUR FILE REF.

IN REPLY TO

OCT 21 1970

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Underpass at the Crossing of  
County Rd. #24 and Proposed Hwy. #417  
(Site 31-295)  
Township of Lochiel, Co. of Glengarry  
District No. 9 (Ottawa)  
W.O. 70-11065 -- W.P. 37-66-08

CONT. 73-40

31G-68  
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 do not hesitate 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  
S. J. Markiewicz  
J. E. Callaghan  
T. C. Kingsland (2)  
M. R. Ernesaks (2)  
J. E. Gruspier  
B. A. Singh

Foundations Files  
Gen. Files ✓

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FOUNDATION INVESTIGATION REPORT  
For  
Proposed Underpass at the Crossing of  
County Rd. #24 and Proposed Hwy. #417  
(Site 31-295)  
Township of Lochiel, Co. of Glengarry  
District No. 9 (Ottawa)  
W.O. 70-11065      --      W.P. 37-66-08

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1. INTRODUCTION:

The Foundation Section was requested to carry out an investigation at the above mentioned site in a memo from the Eastern Region Bridge Section (Mr. T. C. Kingsland, Regional Bridge Planning Engineer), dated July 13, 1970. An investigation was subsequently carried out by the Foundation Section to determine the subsoil, bedrock, and groundwater conditions at the site.

This report contains all the factual data obtained from this investigation, together with recommendations pertaining to the foundations of the proposed structure, as well as the stability and settlement of the approach embankments.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located on Glengarry County Rd. No. 24, about 400 ft. south of the boundary between Glengarry County and Prescott County and some 3 miles southeast of the Town of Vankleek Hill.

In the immediate vicinity of the site the terrain is rolling. Towards the south, County Rd. No. 24 rises in a side slope cut section about 8 ft. below the surrounding ground level on the east side of the road.

The slope of the cut section is composed of the natural subsoil of gravel and cobble-size stones. Towards the north the existing road crosses a low-lying, poorly drained area and is

2. DESCRIPTION OF THE SITE AND GEOLOGY: (cont'd.) ...

raised about 18 inches above ground level. A small, very shallow watercourse meanders along the middle of the low-lying area and a C.I.P. culvert carries it under the County Rd.

The surrounding land is bush and brush-covered with boulders up to 3 ft. in size on the ground surface. The land is used mainly for pasturing purposes.

The existing County Rd. No. 24 has two paved lanes with associated shallow ditches along both sides of the road.

The site is situated near the northern boundary of the physiographic region known as the "Glengarry Till Plains". The area is characterized by a bouldery glacial till deposit, which is underlain by limestone bedrock of the Trenton and Black River Groups, Ordovician Period.

3. FIELD AND LABORATORY WORK:

The field investigation consisted of a total of 8 sampled boreholes, 6 of which were accompanied by dynamic cone penetration tests. The borings were carried out by means of two standard diamond drill rigs adapted for soil sampling purposes.

Samples of the overburden were obtained in 2" O.D. split-spoon samplers, which were hammered into the ground in accordance with the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. In addition, in the low-lying area to the north of the site, two undisturbed samples of the cohesive stratum were obtained in 2" I.D. Shelby tubes which were manually pushed into the soil. Where practical, in situ vane tests were also carried out within the cohesive subsoil to determine the undrained shear strength and the sensitivity of the clay. In most of the boreholes put down through the very dense glacial till deposit, diamond drilling techniques were used to advance



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

the boreholes through numerous boulders and large gravel sizes. Bedrock was proven in four of the borings by obtaining either EX or AXT size rock core samples.

The groundwater conditions across the site were determined by recording the water levels in the open boreholes during the course of the investigation.

The locations and elevations of all the boreholes together with the estimated stratigraphical profile along the centre-line of the County Road, are shown on Drawing No. 70-11065A. The surveying was carried out by personnel from the Eastern Region Engineering Surveys Section. All elevations are referenced to a geodetic datum.

All the samples were subjected to a careful visual examination both in the field and in the laboratory. In addition, certain selected samples were subjected to the following laboratory tests:

Natural Moisture Content  
Grain-Size Distribution  
Atterberg Limits  
Organic Matter Contents

The results of the laboratory testing are plotted on the Record of Borehole sheets and Figures #1 and 2, all of which are contained in the Appendix of this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

A glacial till deposit (up to 23 ft. thick), underlain by limestone bedrock was encountered across most of the site. In the low-lying area, north of the proposed structure, a deposit of silty clay with sand and a trace of organic matter was encountered

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

4.1) General: (cont'd.) ...

above the glacial till. Further, in the vicinity of the proposed south abutment the glacial till is overlain by a localized pocket of silty clay which is about 5 feet thick.

The boundaries of the subsoil are shown on the accompanying Record of Borehole sheets. The stratigraphical profile, shown on Drawing No. 70-11065A, has been inferred from this borehole data.

From ground surface downwards, the various soil types are as follows:

4.2) Surficial Deposits:

4.2.1) Silty Clay with Sand and Organics, Trace of Gravel -

Some 150 ft. north of the proposed north abutment a surficial deposit of silty clay with sand and a trace of organic matter was encountered beneath a thin layer of topsoil. This deposit extends down to elevation 289 on the west side of County Rd. #24 and to elev. 281 on the east side of the County Rd. These elevations correspond to depths below ground surface of 2 and 10 feet, respectively. Within the deposit occasional granular layers up to 12 inches thick were encountered. These layers are composed of coarse sand with traces of clay and organic silt. Occasional white shells were also encountered throughout the overall deposit. Grain-size distribution curves for samples of this deposit are shown on Figure #1 in the Appendix I of this report.

The engineering properties of the cohesive subsoil, as determined by field and laboratory testing, are briefly summarized in tabular form as follows:

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

4.2) Surficial Deposits: (cont'd.) ...

4.2.1) Silty Clay with Sand and Organics, Trace of Gravel -  
(cont'd.) ...

		<u>Range</u>
Liquid Limit	(W <sub>L</sub> )	27% - 51%
Plastic Limit	(W <sub>P</sub> )	16% - 30%
Natural Moisture Content	(W)	14% - 45%
Organic Contents (Percent by Weight)		0.5% - 1.7%
Undrained Shear Strength (C <sub>u</sub> )		560 p.s.f. & 1120 p.s.f.
'N' Values		2 to 19 blows/ft.

The Atterberg limit tests, summarized in the above table, indicate that the cohesive subsoil has a plasticity which primarily, is in the intermediate range.

Based on the Standard Penetration and undrained shear strength testing carried out, it is estimated that the consistency of the deposit is generally in the soft to firm range. The consistency appears to be very stiff in certain localized zones. It is believed that the higher values recorded are due to the fact that the percentage of coarse granular sizes in such areas is quite large.

4.2.2) Silty Clay -

A 5-foot thick pocket of brown silty clay was encountered beneath a 1-foot layer of roadway fill at B.H. #7. This layer is inorganic and has a very stiff consistency. The deposit contains numerous reddish-brown clay seams which are up to 1/4" thick.

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

4.3) Heterogeneous Mixture of Silt, Sand and Gravel, Trace of Clay (Glacial Till):

The surficial deposits or the silty clay stratum where encountered, is underlain by a glacial till deposit. The glacial till is up to 23 feet thick. The deposit is composed of a heterogeneous mixture of silt, sand and gravel with a trace of clay; numerous limestone boulders up to 8" in size are present throughout. In B.H.'s #4 and 7 a 2-foot thick layer of sandy silt, containing occasional thin (1/4") seams of clayey silt was encountered at about elevation 280. Grain-size distribution curves for samples of the overall deposit are shown on Figure #2 in the Appendix.

The Standard Penetration Test carried out within the glacial till deposit, gave 'N' values ranging randomly from 23 to greater than 100 blows per ft. Based on these results, it is estimated that the relative density of the material ranges from compact to very dense, being generally very dense.

4.4) Limestone Bedrock:

The glacial till is directly underlain by bedrock which was proven in 4 boreholes, by obtaining from 7 to 13 ft. of either BXT or AXT size rock core samples. Over the site the bedrock surface varies from elevations 271 to 276. These elevations correspond to depths below ground surface of 18 to 24 feet.

The bedrock is composed of a grey limestone with irregular bituminous shale seams and interbeds. In B.H. #7 the bedrock contains a 9" layer of gypsum as well as calcite crystals. The upper 1 to 2-1/2 feet of the bedrock is generally in a fractured condition. Below this upper zone the bedrock is generally sound as evidenced by the high percentage of core recovered.

## 5. GROUNDWATER CONDITIONS:

During the period of the investigation, groundwater level observations were carried out in the open holes at most of the boring locations. B.H.'s #7 and #8 caved in immediately after the removal of casing and consequently, no water level observations were carried out at these locations.

The results obtained are plotted on the Record of Borelog sheets, as well as on Drawing No. 70-11065A.

The groundwater level in the overburden is at a depth of between 2 to 5 feet below the existing ground surface. These depths correspond to elevations between 289 and 295. The water level was at ground surface in B.H. #6. This borehole was located at the edge of the small watercourse running through the low-lying area to the north.

## 6. DISCUSSION AND RECOMMENDATIONS:

### 6.1) General:

It is proposed to construct a two-span (113'-113'), 34-foot wide underpass structure at the crossing of Hwy. #417 and County Rd. #24. In the vicinity of the structure, the county road is proposed to have a profile grade between 310 and 319.5. The associated north and south approach fills will, therefore, have a maximum height of about 24 and 19 feet, respectively.

The subsoil at the site consists of a dense to very dense glacial till deposit which, in turn, is followed by limestone bedrock, the surface of which is located some 18 to 24 ft. below ground surface. In the northern portion of the site the glacial deposit is overlain by a 2 to 10 ft. thick layer of soft to firm silty clay with sand and organics.

### 6.2) Structure Foundations:

#### 6.2.1) Centre Pier Foundation (Refer to B.H. #4) -

The pier can be founded on spread footings within the competent glacial till deposit. For frost-protection purposes,

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

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

6.2.1) Centre Pier Foundation (Refer to B.H. #4 0 -  
(cont'd.) ...)

it is recommended that at least 4 feet of earth cover be provided above the footing base. An allowable bearing pressure up to 4 t.s.f. can be used in the design of the footing.

At the time of the investigation the groundwater level at the pier location was approximately 3 feet below ground level - i.e., about elevation 295. Since the footing excavation will probably be below this elevation in a basically granular subsoil, a dewatering scheme may be necessary, in order to prevent boiling of the foundation subsoil.

6.2.2) Abutment Foundations (Refer to B.H.'s #3 and 7) -

The proposed abutments may be 'perched' within the approach fills. These may be supported on spread footings founded within a zone of well-compacted granular fill using a safe bearing pressure of 2 t.s.f. The fill material below the tops of the footings should consist of well-compacted G.B.C. Class 'A' material and should extend for a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops. This portion of the fill should be built with side slopes of 2:1. The remainder of the fill should be completed to about profile grade for a distance of about 50 ft. behind the abutments before re-excavating for the abutment footings.

Alternatively, the abutments may be supported on end-bearing steel H-piles driven to refusal within the glacial till stratum at approximate tip elev. of 291 and 284 for the north and south abutments, respectively. The allowable loads will depend on the pile section chosen (e.g., 14 BP 74 piles may be designed for 95 Tons/pile). Pile driving in the field should be controlled by the use of the Hiley formula, as per current D.H.O. Standards DD 1218 and DD 1219.

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

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

6.2.2) Abutment Foundations (Refer to B.H.'s #3 and 7) -  
(cont'd.) ...

No rock or bouldery fill should be placed within the plan limits of the piles. All pile caps should be provided with a minimum soil cover of 4 ft. for frost protection.

6.3) Approach Embankments:

The approach fills, in the vicinity of the structure, will have a maximum height of about 24 feet. No stability problems are anticipated provided standard 2:1 slopes are employed.

Settlement of the basically granular glacial till stratum will take place due to the surcharge loading of the approach fills. For the height of fills contemplated, it is estimated that the settlement will not exceed 1 inch. This settlement will be elastic in nature - i.e., take place during or immediately following the construction period.

North of the proposed structure, between Stations 97+08 and 98+33, the approach fill will be placed over a 2 to 10-foot thick surficial layer of soft to firm, compressible silty clay with organic matter. Computations were carried out to determine the stability of the fills in this area (total stress analyses -  $\phi = 0$  case). The results of these computations indicate that the fill section will be stable with respect to a deep-seated rotational type of failure.

The compressible cohesive subsoil will consolidate due to the surcharge loading. Computations were carried out to determine the magnitude of the consolidation settlement expected. It is estimated that, for the fill height contemplated in this area (24 feet maximum), the consolidation settlement induced in the foundation subsoil could be of the order of 8 to 12 inches.

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

6.3) Approach Embankments: (cont'd.) ...

The settlement will be time dependent; however, since the compressible layer is quite thin, the total amount will take place within a relatively short period of time, probably within 18 months. Fifty percent should occur within a period of 3 to 4 months.

Since the consolidation settlement will occur relatively quickly in this area, it would be advantageous to delay the paving operations for as long a period as possible, in order to minimize post-construction maintenance.

7. MISCELLANEOUS:

The field work, performed during the period of August 31 to September 4, 1970, was supervised by Mr. W. G. Hutton, Project Foundation Engineer, who also prepared this report.

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

The investigation was carried out under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who reviewed this report.

October, 1970



APPENDIX I

## FOUNDATION SECTION

CHIEFED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE	Liquid Limit — $w_L$	BULK DENSITY	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	PLASTIC LIMIT — $w_p$			WATER CONTENT — $w$	
							20 40 60 80 100					
							SHEAR STRENGTH P.S.F.					
							○ UNCONFINED + FIELD VANE	$w_p$ — $w$ — $w_L$				
							● QUICK TRIAXIAL x LAB. VANE					
								WATER CONTENT %				
								15 30 45				
293.3	Ground Elev								P.C.F.	GR. SA. SI. CL.		
0.0	Silty clay with sand & organics, trace of gravel		1A	SS	3	290				3 30 59 8		
			1	SS	19							
			2A	SS	2							
			2	SS	2							
284.8	Soft to Very Stiff											
			3A	SS	60	280				Org. 1.1% Org. 1.7% Org. 0. %		
			3	SS	89							
			4	SS	85							
			5	SS	59							
275.3	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till)					270				34 43 21 2		
	Very Dense Grey			6	SS						90/6"	
	Fractured											
19.0	Bedrock		7	BX	72%	270						
	Limestone											
267.2	Sound Grey		8	BX	90%	270						
26.1	End of Borehole					260						

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

# RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 70-11065

LOCATION Sta. 97+08 @ Co. Rd. #24 o/s 25' Lt.

ORIGINATED BY WH

W.P. 37-66-08

BORING DATE Sept. 4, 1970

COMPILED BY WH

DATUM Geodetic

BOREHOLE TYPE Diamond Drill - Washboring

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION BLOWS / FOOT	RESISTANCE		Liquid Limit ——— W <sub>L</sub> Plastic Limit ——— W <sub>P</sub> Water Content ——— W	BULK DENSITY  γ 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> WATER CONTENT % 15      30      45		
290.9	Ground Level											
0.0	Silty clay with sand & organics, trace of gravel		1	SS	7	290						
	Stiff		2	TW	PM							
			3	TW	PM							
			4	SS	13							
282.6	Brown to Grey		5	SS	9							
8.3	Het. mix. of silt, sand & gravel. Trace of Clay (Glacial Till)		6	SS	3 1/4	280						Air dried Oven dried
	Dense to very dense		7	SS	3 1/4							
			8	SS	15							
			9	SS	1 1/4							
272.2	Grey		10	SS	90 / Blt							
18.7	End of Borehole					270						

FOUNDATION SECTION

JOB 70-11065 LOCATION Sta. 99+51 @ Co. Rd. #24 o/s 25' Rt. ORIGINATED BY WH  
W.P. 37-66-08 BORING DATE August 31 - Sept. 1, 1970 COMPILED BY WH  
DATUM Geodetic BOREHOLE TYPE Diamond Drill - Washboring CHECKED BY SR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit — $w_L$ Plastic Limit — $w_p$ Water Content — $w$	BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	WATER CONTENT % 15 30 45		
295.3	Ground Level									
0.0	Clavey silt topsoil	⊗	1	SS	18	290		○   —		▼290.3 61 30 ( 9 )
1.5	Het. mix. of silt, sand & gravel. Trace of clay (Glacial Till)	•••••	2	SS	64					
		•••••	3	SS	93					
		•••••	4	SS	64					
		•••••	5	BX-RC	32%					
		•••••	6	SS	60					
	Boulders up to 6" in size throughout	•••••	7A	BX-RC	50%	280				70 26 ( 4 ) 39 40 ( 21 )
		•••••	7	SS	131					
	Very Dense	•••••	8	SS	110					
		•••••	9	BX-RC	61%					
	Grey	•••••	10	AXT	0%					
271.3		•••••	11	SS	90 1/4"					
24.0	Bedrock	▨	12	AXT	96%	270				
	Limestone	▨	13	AXT	98%					
	Sound Grey	▨	14	AXT	97%					
261.7										
33.6	End of Borehole					260				

## FOUNDATION SECTION

JOB	70-11065	LOCATION	Sta. 100+64 @ Co. Rd. #24 o/s 20' Lt.	ORIGINATED BY	WH
W.P.	37-66-08	BORING DATE	Aug. 31 - Sept. 1, 1970	COMPILED BY	W.H.
DATUM	Geodetic	BOREHOLE TYPE	Diamond Drill - Washboring	CHECKED BY	SR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— $w_L$ PLASTIC LIMIT ——— $w_p$ WATER CONTENT ——— $w$		BULK DENSITY $\gamma$ P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.						WATER CONTENT % 15 30 45	
							20 40 60 80 100							
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE							
298.3	Ground Level													
0.0	Sandy Topsoil	XX	1	SS	26									
1.0	Het. mix of silt, sand & gravel, trace of clay (Glacial Till)		2	SS	61									
			3	SS	106									
			4	SS	149 7/8"	290								
			5	SS	57									
	Very Dense		6	SS	120									
			7	SS	187	280								
	Grey		8	SS	160 3/4"									
275.0			9	SS	110 1/5"									
23.0	Fractured		10	BX	71%									
24.3	Bedrock Limestone		11	AXT	93%	270								
265.3	Sound Grey		12	AXT	100%									
33.0	End of Borehole					260								

## FOUNDATION SECTION

JOB 70-11065 LOCATION Sta. 97+65 @ Co. Rd. #24 o/s 35' Lt. ORIGINATED BY WH  
W.P. 37-66-08 BORING DATE Sept. 3, 1970 COMPILED BY WH  
DATUM Geodetic BOREHOLE TYPE Diamond Drill - Washboring CHECKED BY ML

[illegible]

DEPARTMENT OF HIGHWAYS- ONTARIO		RECORD OF BOREHOLE No. 6		FOUNDATION SECTION
MATERIALS & TESTING OFFICE				
JOB	70-11065	LOCATION	Sta. 98+33 @ Co. Rd. #24 o/s 35' Rt.	ORIGINATED BY
W.P.	37-66-08	BORING DATE	Sept. 3, 1970	COMPILED BY
DATUM	Geodetic	BOREHOLE TYPE	Diamond Drill - Washboring	CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	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.	$w_p$ ——— $w$ ——— $w_L$			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	WATER CONTENT % 15 30 45			
290.9	Ground Level										
288.6	Silty clay with organics Soft, Brown	///	1	SS	2	290					GR. SA. SILT CL.
2.3	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till)	•••••	2	SS	35					29 55 (16)	
			3	SS	39						
			4	SS	41						
			5	SS	48						
			6	SS	39						
279.4	Dense Grey	•••••	7	SS	31	280					34 52 (14)
11.5	End of Borehole										
						270					

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 70-11065 LOCATION Sta. 101+77 Co. Rd. #24 o/s 25<sup>1</sup> Rt. ORIGINATED BY WH  
 W.P. 37-66-08 BORING DATE Sept. 2-3, 1970 COMPILED BY WH  
 DATUM Geodetic BOREHOLE TYPE Diamond Drill - Washboring CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_P$ WATER CONTENT — $w$		BULK DENSITY $\gamma$ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT		WATER CONTENT %				
							20	40	60	80			100
							SHEAR STRENGTH P.S.F.						
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE						
300.0	Ground Level												
0.0	Roadway Fill	XXXX											
1.0	Silty clay, occ. clay seams up to 1/4" thick		1	SS	18								
294.0	Very Stiff. Brown		2	SS	23								
6.0	Het. mix. of silt, sand & gravel, trace of clay (glacial Till)		3	BYRC	50%	290							
			4	BYRC	71%								
			5	SS	18								
			6	SS	46								
	Boulders up to 8" in size throughout		7	BYRC	70%								
			8	SS	129								
			9	BYRC	50%								
	Compact to Very Dense Brown to Grey		10	SS	58	280							
276.2			11	SS	33								
273.8	Frac tured		12	AXT	73%								
274.0			13	AXT	65%								
26.0	Bedrock		14	AXT	96%	270							
	Limestone												
	Sound Grey		15	AXT	76%								
263.8													
36.2	End of Borehole					260							

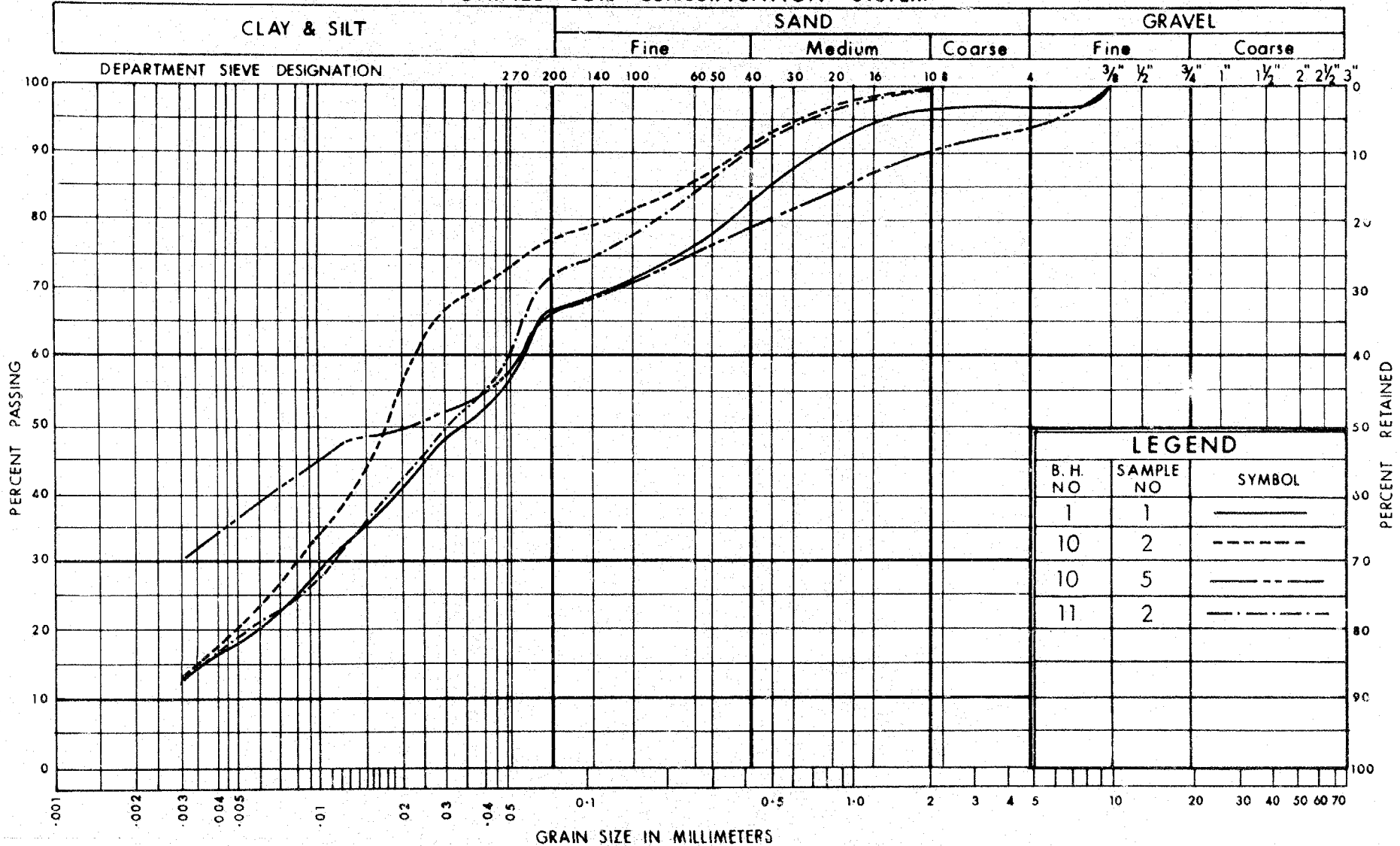


## FOUNDATION SECTION

JOB 70-11065 LOCATION Sta. 103+27 Ø Co. Rd. #24 o/s 20' Lt. ORIGINATED BY WH  
W.P. 37-66-08 BORING DATE Sept. 3 - 4, 1970 COMPILED BY WH  
DATUM Geodetic BOREHOLE TYPE Diamond Drill - Washboring CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION	RESISTANCE	LIQUID LIMIT	PLASTIC LIMIT	WATER CONTENT	BULK DENSITY $\gamma$ P.C.F.	REMARKS			
ELEV. DEPTH	DESCRIPTION	STRAT. PLT.	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100			$w_p$	$w$	$w_L$
							SHEAR STRENGTH P.S.F.							WATER CONTENT %		

# UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS  
**MATERIALS and  
TESTING  
DIVISION**

## GRAIN SIZE DISTRIBUTION

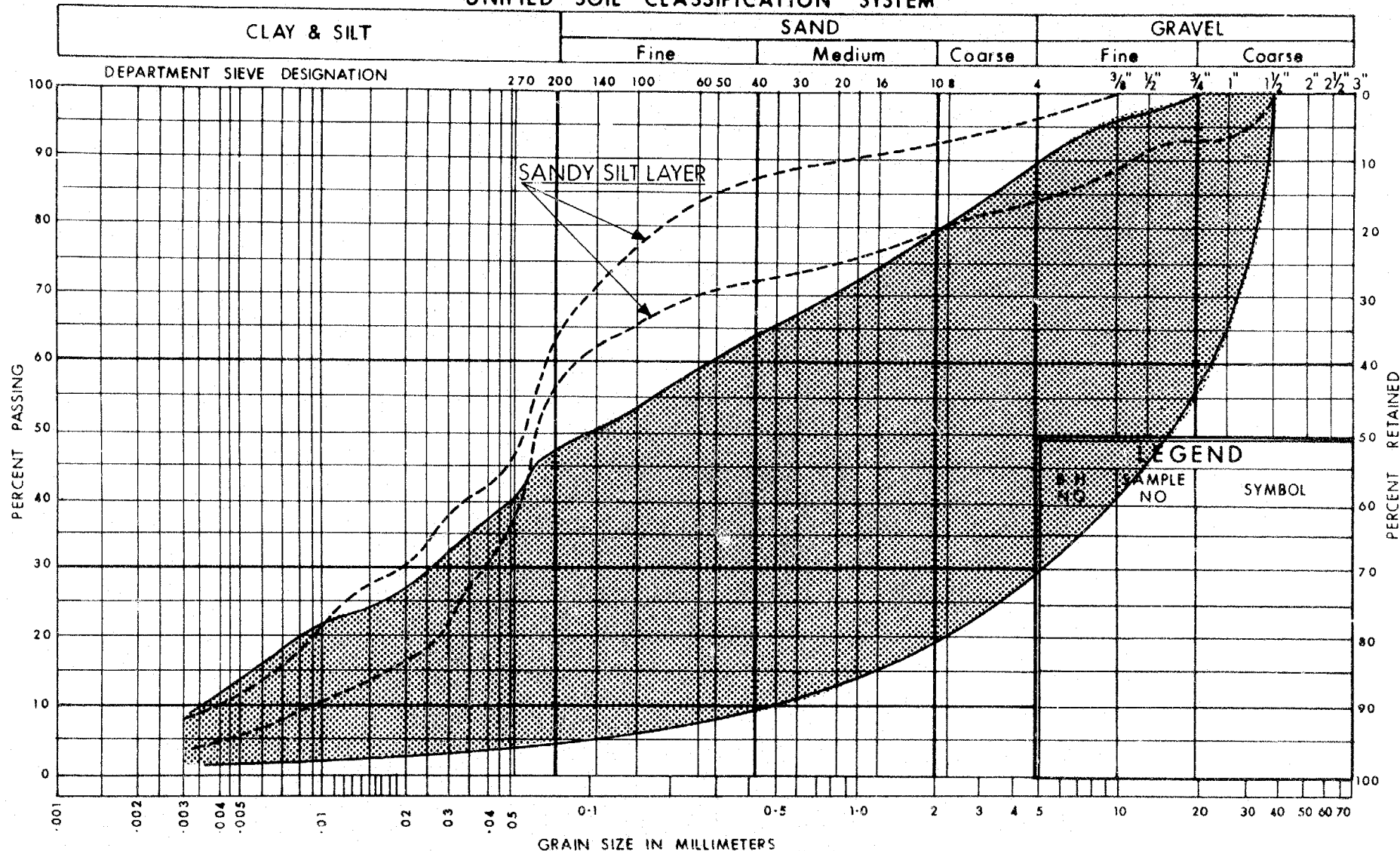
SILTY CLAY WITH ORGANICS & SAND

W.P. No. 37-66-08

JOB No. 70-11065

FIG. NO. 1

# UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS  
**MATERIALS and  
TESTING  
DIVISION**

**GRAIN SIZE DISTRIBUTION**  
**GLACIAL TILL**  
HET.-MIXTURE OF SILT, SAND & GRAVEL TRACE OF CLAY.

W.P. No. 37 - 66 - 08

JOB No. 70 - 11065

FIG. NO. 2

## 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

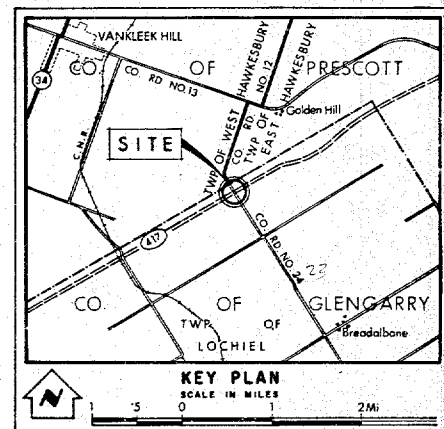
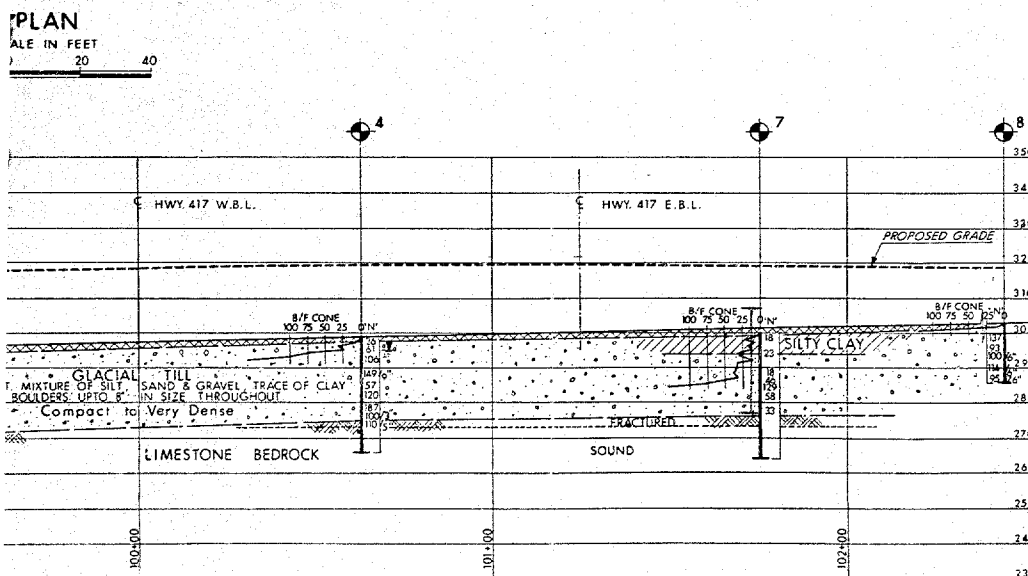
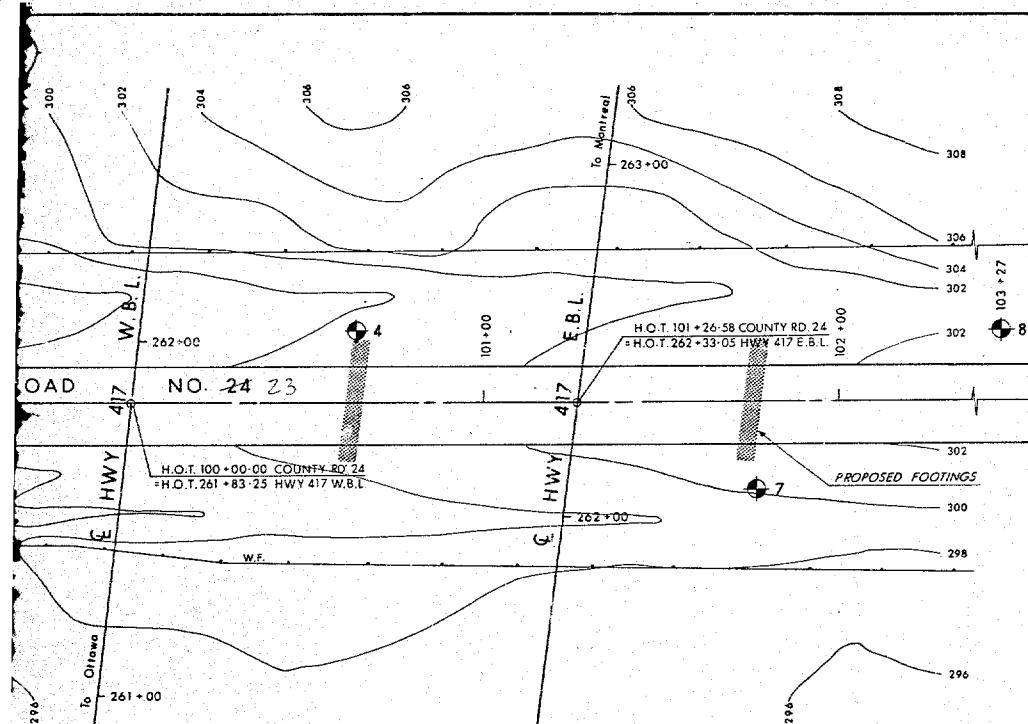
## FOUNDATIONS

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





LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation, SEPT. 1970		
	WATER LEVELS NOT ESTABLISHED IN BORE HOLES NO. 7 & 8		
NO.	ELEVATION	STATION	OFFSET
1	293.3	98+01	20' LT.
2	290.9	97+08	25' LT.
3	295.3	99+51	25' LT.
4	298.3	100+64	20' LT.
5	291.1	97+65	35' LT.
6	290.9	98+33	35' RT.
7	300.0	101+77	25' RT.
8	302.7	103+27	20' 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			
COUNTY ROAD 24 23			
KING'S HIGHWAY NO. 417		DIST. NO. 9	
CO. GLENGARRY		CON. 9	
TWP. LOCHIEL		LOT 7 & 8	
BORE HOLE LOCATIONS & SOIL STRATA			
SUBM.D. W.H.	CHECKED	W.P. NO. 37-66-08	M.B.T. DRAWING NO.
DRAWN G.G.	CHECKED	JOB NO. 70-11065	70-11065 A
DATE 14 OCT 1970	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT NO.		

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. T.C. Kingsland,~~

Reg. Bridge Planning Engineer,  
Kingston Regional Office,  
Kingston, Ontario

Bridge Office,  
Downsview

December 8, 1970

Glengarry County Rd. 24 Underpass  
4.0 Miles East of Hwy. No. 34  
W.P. 37-66-08, Site No. 31-295  
Highway 417, District No. 9

70-11065

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6927-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$156,000. 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  
R. Forrest

Dec 15/70  
no comments  
BT D



## MEMORANDUM

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

FROM: C.S. Grebski,  
Bridge Office

ATTENTION:

DATE: March 30, 1971

OUR FILE REF.

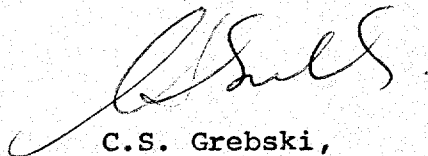
IN REPLY TO

SUBJECT: Glengarry County Rd. 24 Underpass  
4.0 Miles East of Hwy. No. 34  
W.P. 37-66-08, Site No. 31-295  
Highway 417, District No. 9

70-11-065

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

We suggest that pile lengths for the North ~~abut~~ and South abutments be changed to 31ft (including batter)

M. Devato  
March 31/71

dl  
18/1/71

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

PROJECT 70-11065 SITE Hwy 417- CoRd #24 BOREHOLE No. 1 GROUND ELEVATION 253.3

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'-6"	-	-	-	-	100	High	Shiny	None	High	Organic	Brown to Black	Med	Very Stiff	Clayey silt with organics.	CL
2	6'-0" 7'-6"	1/4"	Sub Angular	10	40	50	Med to Slight	Dull	Slow	Med to Slight	Earthy	Grey	Strong	"	Clayey silt with sand & gravel - may be some organic silt present	CL
3	9'-0" 10'-6"	1"	Sub Angular	15	70	15	Slight	Dull	Med	Slight	"	"	"	Very Dense	Sand with some gravel & trace of silt & clay	GF
4	11'-9" 13'-3"	1"	Sub Rounded	15	70	15	Slight	"	"	Slight	"	"	"	"	Sand with some gravel & trace of silt & clay	GF
5	15'-0" 16'-6"	1 1/2"	Angular Sub Angular	15	75	10	None	"	Quick	Nil	"	"	"	"	Sand with some gravel - trace of silt	SW
6	18'-0" 18'-6"	1 1/2"	Angular	100									"		Rock fragments.	

NOTES:- VISUAL CLASSIFICATION MUST BE 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 70-11065 SITE Hwy 417- CoRd. #24 BOREHOLE No. 1A GROUND ELEVATION 293.3

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	0:0 1:6	1/2"	Sub Rounded	2	23	75	High to Med	Dull	None	High to Med	Organic	Dark Brown	Strong	Soft	Clayey silt with some sand & organics - may be some organic silt	CL
2	5:0 6:0	-	-	-	10	90	High	Dull	None to Quick	High	"	Brown	"	"	Clayey silt - w/ soft silt, fine sand layers up to 1/4" thick - some organics	CL
2A	6:0 6:6	-	-	-	85	15	N.I.	Dull	Quick	Low	"	Dark Grey	"	Very Loose	Sand with organics - trace of silt small white shells (up to 1/2" in size)	SF
3	8:0 9:6	1 1/2"	Sub Angular	5	80	15	Med	Shiny	None	Med	Earthy	Grey	Med	?	silty clay with some sand & trace of gravel - trace of organics (broken with shells)	CI

NOTES:- VISUAL CLASSIFICATION MUST BE 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 70-11065 SITE Hwy 417- Co Rd #24 BOREHOLE No. 2 GROUND ELEVATION 200.9

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	0-0" 1-6	-	-	-	15	85	High	Dull	Slight	High	Earthy	Dark Brown	Med	Firm	clayey silt topsoil - semi organics - twigs & roots etc	CL
4	4-6" 6-0	3/4"	Sub Rounded	5	20	75	Med	Dull	None	Med	"	Grey	"	Very St. ff	silty clay with sand & trace of gravel - may be semi organic silt, sand	CI
5	6-0" 7-6	2 1/2"	Angular	5	20	75	High	Shiny	None	High	"	Dark Grey	"	Stiff	organic clay with some sand & trace of gravel - occ. broken pieces of shells	OH
6	8-3" 9-9	1 1/2"	Sub Angular	20	70	10	Med to slight	Dull	Med	Med to slight	"	Grey	Strong	Dense	sand & gravel with trace of silt & clay Broken G/L etc	GF
7	10-0" 11-6	1 1/2"	Sub Rounded	20	70	10	None	"	"	Nil	"	"	"	"	sand & gravel with trace of silt & clay	GF
8A	12-6" 15-0	1"	Sub Angular	5	90	5	"	"	Quick	"	Organic	Dark Grey	"	Compact	Coarse sand with trace of gravel, silt & clay	SP
9	15-0" 16-6	1 3/4"	Sub Angular	25	65	10	Slight	Dull	Med	Slight	Earthy	Grey	"	Dense	sand & gravel - trace of silt & clay	GF
10	18-0" 18-8	1 1/2"	Sub Angular	25	65	10	"	"	"	"	"	"	"	Very Dense	sand & gravel - trace of silt & clay	GF

NOTES:- VISUAL CLASSIFICATION MUST BE 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 <u>70-11065</u> SITE <u>Hwy 417- CoRd #24</u> BOREHOLE No <u>3</u> GROUND ELEVATION <u>295.3</u>																
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	0'-0" 1'-6"	1 1/2"	Sub Angular	5	10	85	Med to High	Shiny	None	Med to High	Organic	Dark Brown Black	Strong	Very Stiff	Clayey silt topsoil with some sand & gravel - some organics	CL
2	2'-6" 4'-0"	1 1/2"	Sub Angular	10	80	10	Slight	Dull	Med	Slight	Earthy	Brown	"	Very Dense	Sand with gravel - trace of silt & clay	GF
3	5'-6" 7'-0"	1 1/2"	Sub Rounded	30	40	10	Slight	Dull	Med	Low	"	Brownish Grey	"	"	Sand with gravel - trace of silt & clay	GF
4	8'-0" 9'-6"	1 3/4"	Sub Angular	30	60	10	"	"	"	"	"	"	"	"	Sand with gravel - trace of silt & clay	GF
6	11'-0" 12'-6"	1 1/2"	Sub Angular	40	50	10	Slight	"	"	Low	"	Grey	"	"	Sand and gravel - trace of silt & clay	GF
7	15'-0" 16'-6"	2 1/2"	Sub Angular	75	20	5	None	"	Quick	Nil	"	"	"	"	Gravel with coarse sand trace of silt	GP
8	18'-0" 19'-0"	1 1/2"	Sub Rounded	20	70	10	Slight	"	Med	Low	"	"	"	"	Sand with gravel trace of silt & clay	GF
11	23'-0" 23'-6"	1 3/4"	Sub Rounded	30	65	5	None	"	Quick	Nil	"	"	"	"	Sand & gravel - trace of silt & clay	GF

NOTES:— VISUAL CLASSIFICATION MUST BE 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 70-11065 SITE Hwy 417 - Co Rd #24 BOREHOLE No. 4 GROUND ELEVATION 298.3

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	0'-0" 1'-6"	1 3/4"	Sub Rounded	15	20	65	Med	Dull	Slow	Med	Earthy	Brown	Strong	Very Stiff	clayey silt with sand & gravel - some topsoil	CL
2	2'-6" 3'-7"	1 1/2"	Sub Rounded	15	30	55	Med	"	"	Med	"	"	"	Hard	Net mixture of clay silt sand & gravel	CL
3	5'-0" 6'-0"	1 1/2"	Sub Angular	15	55	30	Med to Slight	"	"	Med to Slight	"	Grey	"	Hard	Net mixture of clay silt sand & gravel	CL
4	8'-2" 8'-11"	1 1/2"	Sub Angular	15	55	30	Slight	"	"	Slight	"	Brownish Grey	"	Hard	Net mixture of clay silt sand & gravel	CL
5	11'-3" 12'-9"	1 1/2"	Sub Angular	15	65	20	Nil	"	Med to Quick	Nil	"	"	"	Very Dense	Net mixture of silt sand & gravel - trace of clay	GF
6	15'-3" 16'-9"	1 1/4"	Sub Angular	20	65	15	"	"	Quick	"	"	Grey	"	"	Silty sand with gravel - trace of clay	GF
7	18'-3" 19'-8"	1/2"	Rounded	5	50	45	Med to Nil	"	Slow to Quick	Low to Nil	"	"	"	"	Sand till with trace of gravel & clay - changing to sand, sandy silt & silt - layers of clayey silt present	SF
8	20'-3" 20'-6"	1/4"	Rounded		40	60	Nil	"	Quick	Low	"	"	"	"	Sandy silt to silt - see clayey silt pockets	SF ML
9	22'-6" 22'-11"	3/4"	Angular	25	60	15	Nil	"	"	"	"	"	"	"	Coarse sand with some gravel - trace of silt & clay - may be wash	SW

NOTES:- VISUAL CLASSIFICATION MUST BE 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 70-11065 SITE Hwy 417-Cor'd #29 BOREHOLE No. 5 GROUND ELEVATION 231.1

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			PERCENTAGE	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	GRAVEL											
1	0:6" 2:0"	-	-	-	20 80	High	Dull	None	High	Earthy	Light Brown	No Reac	Stiff	clayey silt with trace of sand - some topsoil present - also some organics in form of roots	CL
2	2:0" 3:6"	-	-	-	10 90	"	Dull	"	"	"	"	"	"	clayey silt with trace of sand - some reddish mottling - see very thin allpartings	CL
3	3:6" 5:0"	-	-	-	10 90	"	Shiny	"	"	"	"	Med Reac	Firm	silty clay with trace of sand - see black pockets of clayey silt topsoil	CI
4A	6:0" 8:0"	-	-	-	10 90	Med	"	"	Med	"	Grey	Strong	Soft	organic clay with some coarse sand	OH
5	8:0" 9:6"	-	-	-	15 85	"	"	"	"	"	"	"	Firm	organic clay with some coarse sand	OH
6	10:10" 11:4"	1 1/4"	Angular	25	60 15	Slight	Dull	Slow	Slight	"	"	"	Very Dense	Not mixture of silt sand & gravel - trace of clay	GF

NOTES:- VISUAL CLASSIFICATION MUST BE 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 T0-11065 SITE  Hwy 417 - Co Rd #24  BOREHOLE No. 6 GROUND ELEVATION 230.9

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	0'-0" 1'-6"	-	-	-	15	85	Med to High	Shiny	None	Med	Organic	Brown	No Reac	Soft	clayey silt with some organics - trace of sand & occ black matting	CL
2	2'-0" 3'-6"	13/4"	Angular	20	60	20	Med	Dull	None to Slow	Med	Organic Earthy	Grey	Med Strong	Firm Dense	top 3" - clayey silt with black organic silt rest is a wet mixture of silt sand & gravel - trace of clay	OL GF
3	3'-6" 5'-0"	1 1/2"	Sub Rounded	20	70	10	Nil	Dull	Quick	Nil	Earthy	"	Strong	Dense	sand with some gravel - trace of silt & clay	SW
4	5'-0" 6'-6"	1 1/2"	Sub Rounded	30	60	10	"	"	"	"	"	"	"	"	Gravel & sand trace of silt	GF
5	6'-6" 8'-0"	1"	Sub Angular	30	60	10	"	"	"	"	"	"	"	"	Gravel & sand trace of silt & clay	GF
6	8'-0" 9'-6"	1 1/2"	Angular	30	60	10	"	"	"	"	"	"	"	"	Gravel & sand, trace of silt & clay	GF
7	10'-0" 11'-6"	1"	"	30	60	10	"	"	"	"	"	"	"	"	Gravel & sand, trace of silt & clay	GF

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 <u>10-11065</u>		SITE <u>Hwy 417 - Co Rd #24</u>		BOREHOLE No. <u>7</u>		GROUND ELEVATION <u>300.0</u>										
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'-6"	—	—	—	10	90	High	Shiny	None	High	Earthy	Brown	No Reac	Very Stiff	clayey silt to silty clay occ reddish seams up to 1/4" trace of sand	CL CI
2	6'-0" 7'-6"	1/4"	Sub Angular	40	45	15	Med to Slight	Dull	Slow	Med to Slight	"	"	Strong	Compact	Wet mixture of clay silt sand & gravel	GF
5	10'-5" 11'-11"	1"	Sub Rounded	20	55	25	Slight	Dull	Slow	Slight	"	"	"	Very Stiff	Wet mixture of clay silt, sand & gravel	CL
6	11'-11" 13'-11"	1/4"	Sub Angular	20	40	40	"	"	"	"	"	Grey	"	Hard	Clayey silt with sand & gravel	CL
8	15'-6" 17'-0"	1 1/2"	Sub Angular	20	60	20	"	"	Slow to Quick	"	"	Greyish Brown	"	Very Dense	Sand & Gravel with trace of silt & clay	GF
10	18'-6" 20'-0"	1/2"	Angular	10	80	10	Slight to Nil	"	"	Slight to Nil	"	"	"	Very Dense	Sand with some gravel - trace of silt & clay	SP
11	21'-6" 23'-0"	1 1/2"	Sub Angular	3	80	5	"	"	Quick	"	"	Brown to Grey	"	Dense	fine sand to silty sand - trace of gravel & clay	SU

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 70-11065 SITE Hwy 417 - Co Rd #24 BOREHOLE No. 8 GROUND ELEVATION 302.7

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'-6" 4'-5"	1 1/2"	Angular	20	65	15	Slight	Dull	Slow	Slight	Earthy	Brownish Grey	Strong	Very Dense	Net mixture of silt sand & gravel - trace of clay	GF
2	6'-3" 7'-9"	3/4"	Sub Angular	20	70	10	"	"	"	"	"	Brown	"	"	Net mixture of silt sand & gravel - trace of clay	GF
3	9'-3" 9'-9"	1/2"	Sub Angular	10	60	30	Med to Slight	"	"	Med to Slight	"	Greyish Brown	"	Hard	Net mixture of clay silt, sand & gravel	CL ML
4	12'-3" 12'-10"	1 1/2"	Angular	15	55	30	Slight	"	"	Slight	"	Grey	"	"	Net mixture of clay silt, sand & gravel	CL ML
5	16'-3" 16'-9"	1 1/2"	Sub Angular	20	80		Nil	"	Quick	Nil	"	Dark Grey	"	Very Dense	Coarse sand - some gravel	SW

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

REMARKS:-

OVERSIZED DRAWINGS

General Layout  
Footings " Reinforcement

## 1633

1. *Phragmites australis* (Cav.) Trin. ex Steud.

[illegible]



10-5-68

68

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H

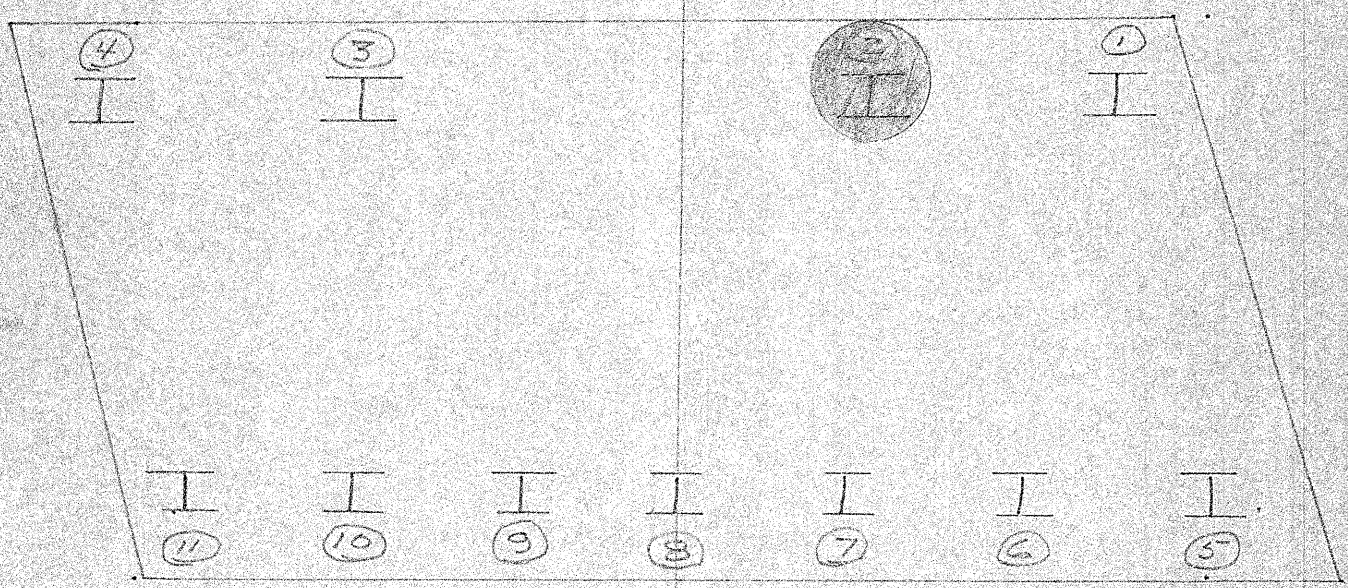
0+00

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CO. RD. 23

NORTH ABUTMENT

1:8

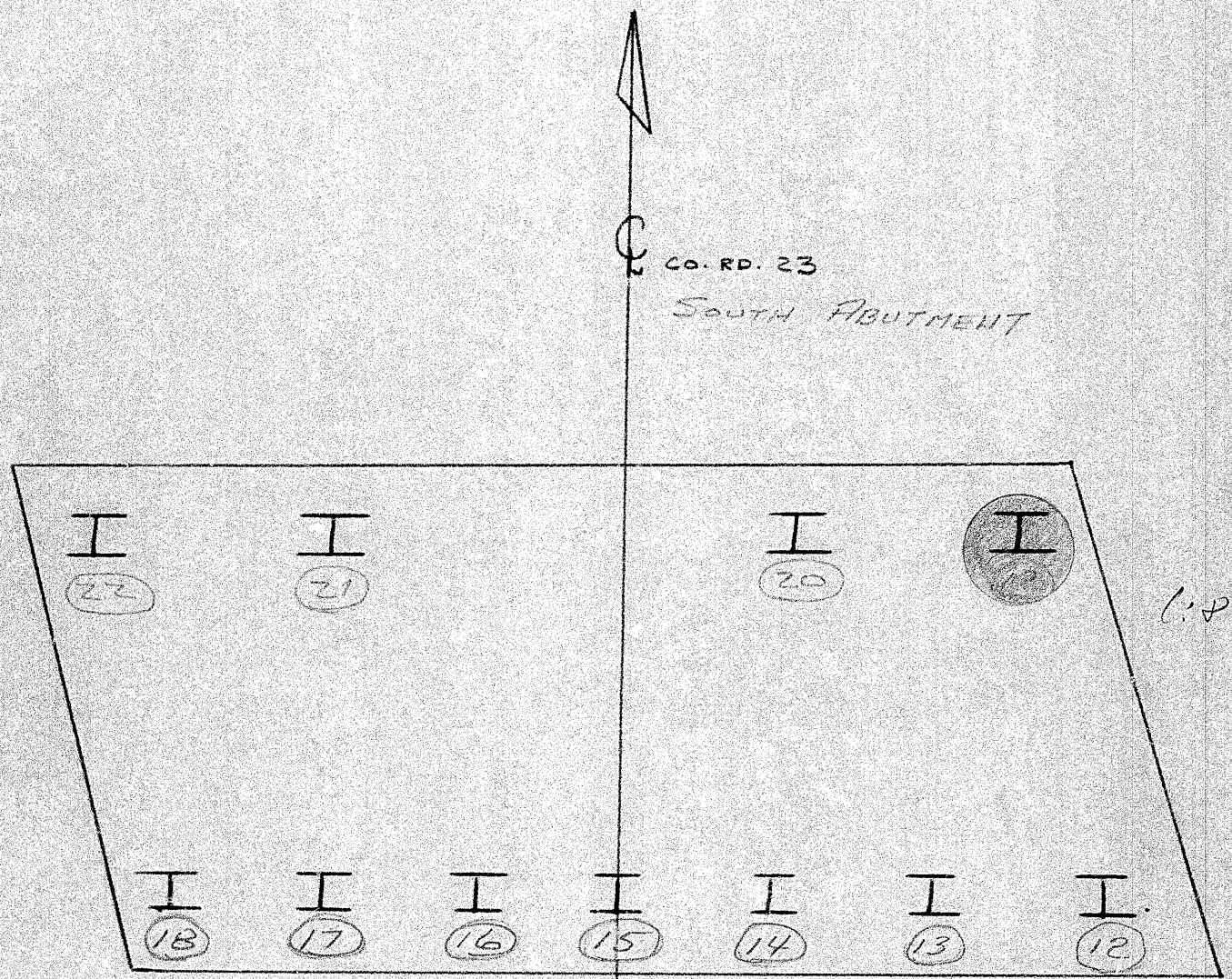


GLENGARRY Co. RD. No 23

UNDERPASS

HWY. 417





GLENGARRY Co. Rd 23

UNDERPASS

HWY. 417

0+00

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31-6-68

DIST. 9 REGION EASTERN

W.P. No. 37-66-08

CONT. No. 73-40

W. O. No. 70-E-65

STR. SITE No. 31-295

HWY. No. 417

LOCATION HWY. 417 AND CO. RD.

24

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: Documents to be unfolded

BEFORE MICROFILMED

G.I.F. 30 SEPT. 1976







