

MEMORANDUM

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

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

DATE: June 5, 1969

Our File Ref.

IN REPLY TO

JUN 13 1969

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Overhead Structure at Crossing of  
C.N.R. and Maple Avenue Revision  
Twp. of Grimsby, County of Lincoln  
District No. 4 (Hamilton)  
W.J. 69-F-11 - W.P. 369-65-2

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/MacF  
Attach.

cc: Messrs. B. R. Davis (2)  
H. A. Tregaskes  
D. W. Ferren  
G. K. Hunter (2)  
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*A. G. Stern*  
A. G. Stern  
PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT  
For  
Overhead Structure at Crossing of  
C.N.R. and Maple Avenue Revision  
Twp. of Grimsby, County of Lincoln  
District No. 4 (Hamilton)  
W.J. 69-F-11      --      W.P. 369-65-2

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation for the above crossing. The request was contained in a memo from the Bridge Office (Mr. W. S. Melinyshyn, Regional Bridge Location Engineer), dated February 18, 1969. Subsequently, an investigation was carried out by this Section at the above site in order to determine the subsoil conditions.

This report contains the results of the investigation, together with our recommendations for the design of foundations for the proposed structure and related retaining wall, as well as the stability of the approach fills.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The proposed revised crossing of Maple St. and the C.N.R. is located approximately 115 feet west of the existing overhead structure. The terrain in the area slopes in a westerly direction, with the existing crossing being situated on the high ground (max. elevation 302). The land, in the vicinity of the proposed crossing, is covered with light brush growth.

In the vicinity of the site the existing twin C.N.R. tracks are located on an earth fill embankment which is approximately 12 to 14 feet above the surrounding terrain.

The lowland bordering Lake Ontario was inundated in late Pleistocene times by a body of water, known as Lake Iroquois; the area is physiographically spoken of as the "Iroquois Plain".

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

This site is situated in the sub-section of the "Plain" known as "The Niagara Fruit Belt". In this area the overburden is primarily composed of glacial lacustrine clay derived from the underlying red shale bedrock. The shale bedrock, which underlies up to 50 feet of overburden, is of the Queenston Formation, Ordovician Period.

3. FIELD AND LABORATORY WORK:

A total of 11 cased boreholes, each accompanied by a dynamic cone penetration test, were carried out during the course of the investigation by means of a standard diamond drill rig adapted for soil sampling purposes. Soil samples were obtained, at required depths, by means of a 2" O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. Bedrock was proven in 8 of the borings by core drilling in BXL size.

Surveying was carried out by the personnel from the Central Region Engineering Surveys Section. The elevations given in this report are referenced to Geodetic datum. The locations and elevations of all the boreholes are shown on Drawing 69-P-11A, together with an estimated centre-line stratigraphical profile and strategic sections across the site.

All samples were subjected to a careful visual examination in the field and subsequently in the laboratory. Following this examination, tests were carried out on selected samples to determine the following physical properties:

Natural Moisture Contents  
Atterberg Limits  
Grain-size Distributions

The results of these tests are plotted on the Record of Borelog sheets and are summarized on Figures 1, 2 and 3, in the Appendix to this report.

#### 4. SUBSOIL CONDITIONS:

##### 4.1) General:

The predominant stratum across the site is a hard glacial till composed of clayey silt with some sand and a trace of gravel. The thickness of this stratum varies from 28 feet at the toe of the natural slope to as much as 58 feet along the high ground to the east. The glacial till is underlain by weathered to sound, reddish shale bedrock. Fill was encountered at those borings put down in the vicinity of the existing C.N.R. railway embankment; this fill is composed of basically cohesive material.

The stratigraphy encountered at the borings is plotted on the Record of Borelog sheets. A stratigraphical profile along the alignment, as well as pertinent sections, were inferred from this data and plotted on Drawing 69-F-11A. The subsoil encountered from ground surface downward, is presented in the following sub-sections.

##### 4.2) Fill Material:

Between 4 and 6.5 feet of fill was encountered at those boreholes put down in the vicinity of the C.N.R. railway embankment (B.H.'s #1, 2, 4, 5, 6 and 7). The fill is primarily composed of a brown clayey silt to silty clay with some sand and gravel; a trace of organic matter was also present throughout. A grain-size distribution curve on a typical sample obtained from the fill is plotted on Figure #1, in the Appendix.

Atterberg limit tests, carried out on samples of the fill, indicate that it is of low to intermediate plasticity. These results are summarized on the Plasticity Chart, Figure #3.

Standard penetration resistance tests were carried out within the fill. The results of these tests, which are summarized on the Record of Borelog sheets, gave 'N' values ranging from 4 blows/ft. (B.H. #7) to 37 blows/ft. (B.H. #4), being typically

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

4.2) Fill Material: (cont'd.) ...

about 20 blows/ft. Based on these results, it is estimated that the consistency of the cohesive fill varies from firm (B.H. #7) to hard (B.H. #4), being generally in the very stiff range.

4.3) Clayey Silt with some Sand and Traces of Gravel - (Glacial Till):

Underlying the fill, where it is present, and a thin cover of topsoil elsewhere, is the predominant stratum across the site. This stratum is a cohesive glacial till composed of a clayey silt with some sand and a trace of gravel. The overall thickness of this deposit ranges from 28 feet at B.H. #1, located at the toe of the natural slope (approx. elev. 265) to 58 feet at B.H. #11, located on the high ground to the east (approx. elev. 293). The stratum can be sub-divided into three distinct zones, namely: i) upper desiccated zone, ii) intermediate zone, and iii) lower zone, which contains numerous shale fragments. These will be discussed in detail in the following paragraphs.

The upper 6 to 17 feet of the glacial till is mottled brown in colour, indicating that this portion has been desiccated forming a 'crust'; this zone of desiccation is probably due to seasonal drying during periods of low precipitation. On the high ground, east of the site (refer to B.H.'s #9, 11, 12 and 13), the top 4 to 6 feet of the desiccated 'crust' has been weathered and reworked. Below the 'crust' the stratum is brown to grey-brown in colour (intermediate zone). In the lower 2 to 6 feet of the glacial till deposit, numerous reddish-brown, plate-like shale fragments are encountered; the fragments are derived from the underlying bedrock. It is inferred that this lower portion is, in fact, a transition zone between the overlying glacial till and the underlying shale bedrock.

Occasional seams and layers of sand and silt, up to 1 foot thick, are encountered within the cohesive stratum, particularly

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

4.3) Clayey Silt with some Sand and Traces of Gravel -  
(Glacial Till): (cont'd.) ...

below elevation 240. These sand and silt seams were found to be water-bearing (refer to Section 5) ). Grain-size distribution curves, carried out on samples of the glacial till deposit, are plotted on Figure #2 in the Appendix of this report.

Atterberg limit tests were carried out on representative samples of the cohesive glacial till; the results of the testing, which are given on the Borelog sheets, are also summarized on the Plasticity Chart, Figure #3. The results indicate that the liquid and plastic limits vary from 18 to 32 (average 24) and 13 to 19 (average 15), respectively. From these values it is estimated that the stratum is inorganic with the plasticity being typically in the low range. The natural moisture contents range from 7 to 17 percent; being typically about 2 to 6 percent below the plastic limit.

Standard Penetration Resistance testing was carried out within the glacial till stratum. The results gave 'N' values which vary from 26 blows/ft. to 100 blows/3", being typically between 40 and 50 blows/ft. Based on these values, it is estimated that the consistency of the deposit, throughout, is generally hard. An exception to the above pattern, however, occurs where the upper portion of the desiccated 'crust' has been reworked (B.H.'s #9, 11, 12 and 13). At these locations the 'N' values range from 12 to 24 blows/ft. It is estimated, therefore, that the consistency of this 'reworked' zone varies between stiff and very stiff.

4.4) Shale Bedrock:

Bedrock was proven at 8 of the boring locations by obtaining from 4 to 19 feet of BXL rock core. The bedrock surface, across the site, was found to vary between elevation 226 and 237.

The bedrock is composed of a horizontally bedded, reddish-brown shale with occasional grey mottlings. The upper portion of

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

4.4) Shale Bedrock: (cont'd.) ...

the shale is generally in a weathered and fractured condition. The thickness of this zone of weathering is quite variable. Based on an examination of the core recovered, during this investigation, the weathered zone was found to extend for depths of between 1.5 feet (B.H. #1) to a maximum of 9.5 feet (B.H. #5). This is not uncommon for Queenston shale, which is often characterized by such variability in the zone of weathering. Below this upper weathered zone the bedrock is comparatively sound, as indicated by the high percentage of core recovered.

5. GROUNDWATER CONDITIONS:

Groundwater level observations have been carried out, during the period of the investigation, in the open holes at the boring locations. The observations are recorded on the borelog sheets and summarized on Drawing No. 69-F-11A. The results of the measurements indicate that the piezometric groundwater level, within the glacial till stratum, varies between elevations 265 and 275 - i.e., at or slightly below ground surface at the toe of the natural slope, to as much as 24 feet below ground surface on the high ground to the east. The static piezometric elevation is, however, higher in the vicinity of the high ground, indicating that the natural surface of seepage is directed towards the lower ground. An exception to this pattern occurs at B.H. #13 where the groundwater level was recorded at about elevation 293. It is inferred that this piezometric level is indicative of a "perched" groundwater level within the upper portion of the relatively impervious subsoil.

In addition to the aforementioned observations, pumping tests were carried out, at 6 of the boring locations, following completion of all necessary sampling and bedrock coring. In all cases the boreholes pumped extended down into the underlying shale bedrock. The pumping test procedure adopted was carried out in the following sequence:



5. GROUNDWATER CONDITIONS: (cont'd.) ...

i) the static groundwater level, prior to pumping, was recorded;

ii) the groundwater in the open borehole was lowered, to as low an elevation as possible, by means of a standard suction pump; and

iii) the time-rate of recovery recharge was then periodically recorded commencing from the time pumping was terminated.

The observations recorded are summarized in tabular form below:

Borehole No.	Stabilized Water Level Elev.	P U M P I N G T E S T S		
		Pumped Level	Time For Stabilization	Re-stabilized Water Level
1	264.3	234.8	1 hr.	264.8
2	267.1	247.7	15 hrs.	267.1
4	272.8	239.8	16 hrs.	272.8
5	266.1	234.1	1/2 hr.	266.1
6	274.8	239.4	17 hrs.	269.4
9	263.4	239.4	4 hrs. 19 hrs.	263.4 268.9

These results indicate that the original static groundwater level was once again realized by recharging, within a relatively short period of time following the termination of pumping. It is inferred that the lower, more permeable zones (sand and silt seams) within the glacial till, as well as the underlying weathered portion of the shale bedrock, supplied the necessary water - i.e., were the recharge medium. It is obvious, therefore, that this lower zone is, in fact, a confined aquifer and, as such, is probably being charged with groundwater from the adjacent terrain which is at a higher elevation.

## 6. DISCUSSION AND RECOMMENDATIONS:

### 6.1) General:

It is proposed to construct an overhead structure to carry Maple Avenue (Revision) over the C.N.R. tracks; the site is located on the outskirts of Grimsby, Ontario. The present proposal calls for a 4-span structure (50'-66'-66'-50'). The proposed profile grade of Maple, in the vicinity of the structure, varies between elevation 308 (north approach) to 316 (south approach). The structure will extend into the natural slope located east of the proposed centre-line. More fill will be required, therefore, in a westerly direction to form the approaches. Beneath the centre-line the fill height will be of the order of 23 and 38 feet along the north and south approaches, respectively. The maximum height of fill, however, will be beneath the western crest of the embankment; here the fill will be about 38 feet and 46 feet along the respective approaches. The crest width of the embankment will be about 85 feet.

A toe retaining wall, approximately 240 feet long, is proposed for a location some 50 to 80 feet east of the south approach. It is understood that the maximum height of fill retained will be of the order of 10 feet.

Between 4 and 6.5 feet of clayey silt fill was encountered at those boreholes put down in the vicinity of the railway embankment. Fill, where encountered, or a surficial mantle of topsoil, is underlain by a hard glacial till composed of clayey silt with some sand and a trace of gravel; the thickness of the deposit varies from 28 feet (at the toe of the natural slope) to 58 feet (along high ground to the east). The glacial till is underlain by weathered to sound reddish shale bedrock.

### 6.2) Structure Foundations:

#### 6.2.1) Pier Foundations:

As mentioned in the previous paragraphs, the subsoil immediately below the surficial deposit of fill, is composed of a hard cohesive glacial till. Because of the competence of this

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

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

6.2.1) Pier Foundations: (cont'd.) ...

deposit, it is recommended that the three piers be founded on spread footings located in the upper desiccated zone of the glacial till, at as high an elevation as possible, taking into account that a minimum of 4 feet of earth cover should be provided for frost protection purposes. Spread footings, founded in the desiccated crust, could be designed using an allowable bearing pressure of up to 4 t.s.f.

As discussed in the previous sections, the western portion of the structure elements will be located at the toe of the natural slope, while the eastern portion will extend into the slope. This is particularly true at the proposed location of the north and centre piers. This being the case, it would be advantageous to step the footings up from the west towards the east. The estimated maximum elevation range in the stepping required at the various pier footing locations is given in tabular form below.

Pier	Approx. Footing Elevation			
	West	→ (stepping up to)	→	East
North	263	→	→	278
Centre	262	→	→	274
South	270	→	→	273

To reach foundation level, the pier footings will extend some 5 to 6 feet below existing ground surface - i.e., through the surficial fill down into the competent glacial till. Further, the western portion of these excavations (at the toe of the natural slope) will be carried out some 3 to 5 feet below the groundwater level, recorded at the time of the investigation. There are, no doubt, granular zones within the fill and upper desiccated portion

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

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

6.2.1) Pier Foundations: (cont'd.) ...

of the glacial till. Some seepage may, therefore, occur in the excavations if these water-bearing, relatively pervious granular zones are encountered. This will be of particular importance if the excavations are carried out during periods of heavy precipitation, when the groundwater level is relatively high. It is considered that such seepage could readily be controlled by ordinary pumping methods.

Settlement of the foundation subsoil will take place due to the applied footing load. For the size of footing contemplated (approximately 8 feet in width), imposing the aforementioned loading, it is estimated that the settlement will be negligible and may be of the order of 1/2 inch. The majority of this settlement will be due to recompression of the highly preconsolidated glacial till; it should, therefore, be realized during or immediately following the construction period.

6.2.2) Abutment Foundations:

The north and south abutments will be perched in the approach fills. It is recommended that they be supported on end-bearing steel H-piles driven to bedrock. For estimating purposes, the pile tip elevation can be assumed to vary somewhere between elevations 229 and 235 at the north abutment, and 226 and 232 at the south abutment. The allowable loads will be dependent on the pile section chosen - for example, 12 BF 74 steel H-piles can be designed for 90 tons/pile.

No rock or bouldery fill should be placed in areas through which piles are to be driven.

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

6.3) Approach Embankments:

As discussed in Sub-section 6.1), the maximum approach fill heights along the north and south approaches will be of the order of 38 feet and 46 feet, respectively. Because of the competent nature of the foundation subsoil, no stability problems are anticipated for embankments constructed of properly compacted fill with standard 2:1 side slopes.

Settlement of the foundation subsoil will occur due to the surcharge loading of the approach fills. Because of the highly preconsolidated nature of the glacial till, however, the settlements will be negligible and take place during or immediately following construction of the embankments (refer to Sub-section 6.2.1).

6.4) Retaining Wall Foundation:

A 240-foot long retaining wall is proposed east of the south approach slope; it is understood that this wall is to retain up to 10 feet of soil. A watermain traverses the northern portion of the proposed limits of the retaining wall. From a foundation point of view, it would be advantageous to relocate the watermain so that it is outside the influence of the retaining wall footings. If this is impractical, however, it is recommended that, where the retaining wall is within close proximity (say within 6 feet) of the watermain, it be supported on a piled foundation. Closed-end 12-3/4" O.D. tube piles could be used for this purpose. These piles should be driven at least 10 ft. into the glacial till deposit. Piles driven as above, could be designed for 20 tons/pile.

Where the clear distance between the watermain and the retaining wall is 6 feet or more, the latter can be supported on spread footings located in the upper desiccated portion of the hard cohesive glacial till - i.e., at or below elevation 289. The spread footings can be designed using an allowable bearing pressure of up to 4 t.s.f.

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

6.4) Retaining Wall Foundation: (cont'd.) ...

A minimum earth cover of 4 feet should be provided along the full length of the retaining wall, for frost protection purposes.

The differential settlement between the pile-supported northern portion of the retaining wall and the spread footing-supported southern portion will be within tolerable limits.

7. MISCELLANEOUS:

The field work, performed during the period of March 17 to April 9, 1969, was supervised by Mr. V. Korlu, Project Foundation Engineer.

The preparation of this report was undertaken by Mr. B. T. Darch, Senior Foundation Engineer.

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

Equipment used was owned and operated by Dominion Soil Investigation Ltd.

June 1969

APPENDIX I.

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS &amp; TESTING OFFICE

## RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 69-F-11

LOCATION Maple Ave. Rev'm. Sta. 34 + 73 40' Rt.

ORIGINATED BY VK

W.P. 369-65-2

BORING DATE March 17, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE			SAMPLES			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	ELEV. SCALE	SHEAR STRENGTH P.S.F.			WATER CONTENT %					
264.8	Ground Level							20	40	60	80	100	$w_p$ — $w$ — $w_L$		
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE							
0.0	Clayey silt, some sand & gravel, trace of organic matter. (Fill)		1	SS	19	260									25 36 30 9
258.3	Brown. Very stiff.		2	SS	55										
6.5	Desiccated (mottled Brown)		3	SS	48										
250.8	Hard		4	SS	52	250									
14.0	Clayey silt, with some sand & gravel (Glacial Till)		5	SS	43										
	Grey Brown		6	SS	47										
	Hard		7	SS	64	240									
234.8			8	SS	52										
30.0	with shale fragments														
229.8						230									
228.3	weathered		9	BXL	80%										
36.5	Shale Bedrock														
224.8	Reddish-brown. Sound.														
40.0	End of Borehole					220									



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-F-11

LOCATION Maple Ave. Rev'n, Sta. 35 +21 40' Rt.

ORIGINATED BY VK

W.P. 369-65-2

BORING DATE March 13, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$	BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE					
267.6	Ground Level								
0.0	Clayey silt to silty clay some sand & grav. of organic matter.								
263.6	Brown. Very stiff.		1	SS	17				
4.0			2	SS	60				
	Desiccated (mottled brown)		3	SS	34				
			4	SS	35				
251.6	Hard		5	SS	50				
16.0	Clayey silt with some sand & gravel (Glacial Till)		6	SS	57				
	Grey brown		7	SS	44				2 15 54 29
	Hard		8	SS	95				23 37 31 9
232.6	with fragments of shale								
35.0	(weathered)								
37.0	Shale Bedrock		9	BXL	80%				
227.6	Reddish-brown. Sound.								
40.0	End of Borehole								

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

 JOB 69-F-11 LOCATION Maple Ave. Rev'n. Sta. 35 + 12 20' Lt.  
 W.P. 369-65-1 BORING DATE March 25, 1969  
 DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing

 ORIGINATED BY VK  
 COMPILED BY SO  
 CHECKED BY

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — $w_L$		BULK DENSITY $\gamma$	REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT	20 40 60 80 100	PLASTIC LIMIT — $w_p$	WATER CONTENT — $w$		
283.8	Ground Level								
0.0	Clayey silt, some sand & gravel, trace of organic matter (Fill)	1	SS	37					
278.8	Brown Hard	2	SS	52					
5.0	Desiccated	3	SS	83					
	(mottled grey & brown)	4	SS	65					
		5	SS	59					
	Hard	6	SS	61					
261.8	Clayey silt, some sand and gravel	7	SS	45					
22.0	(Glacial Till)	8	SS	35					
		9	SS	47					
	Brown	10	SS	39					
237.3	Hard	11	SS	49					
235.8	with shale fragments	12	SS	100/3"					
48.0	Shale Bedrock	13	BXL	No rec.					
229.8	Reddish-Brown (weathered)	14	BXL	90%					
54.0	Sound								
224.8									
59.0	End of Borehole								

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 69-F-11 LOCATION Maple Ave. Rev'n. Sta. 35 + 80 40' Rt.  
 W.P. 369-65-1 BORING DATE March 19, 1969  
 DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing

ORIGINATED BY VK  
 COMPILED BY SQ  
 CHECKED BY

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	NUMBER	TYPE						20	40	60	80	100	SHEAR STRENGTH P.S.F.			WATER CONTENT %	
268.1	Ground Level																	
0.0	Clayey silt to silty clay, some sand and gravel (Fill)	1	SS	22														266.1
261.6	Brown. Very stiff.	2	SS	39														
6.5	Desiccated	3	SS	37														
	(mottled Grey & Brown)	4	SS	38														1 21 52 26
252.1	Hard	5	SS	40														
16.0	Clayey silt, some sand & a trace of gravel (Glacial Till)	6	SS	68														
	(occ. seams of silt & sand up to 1/2" thick below elev. 235.)	7	SS	66														
		8	SS	60														
233.1	Brown Hard	9	SS	71														
231.3	with shale fragments	10	SS	100 1/4"														
36.8	Shale Bedrock (Reddish-Brown)	11	BXL	60%														
221.6	Weathered	12	BXL	40%														
46.5		13	AXT	80%														
	Sound	14	AXT	100%														
212.1																		
56.0	End of Borehole																	

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

 JOB 69-P-11 LOCATION Maple Ave. Rev'n. Sta. 35 + 81 40' Lt.  
 W.P. 369-65-2 BORING DATE March 24, 1969  
 DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing

 ORIGINATED BY VK  
 COMPILED BY SO.  
 CHECKED BY

SOIL PROFILE		STRAT. PLCT	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		NUMBER	TYPE		20	40	60	80			100
279.4	Ground Level											
270.0	Clayey silt, some sand, trace of gravel. (Fill)		1	SS	22							274.8
274.4	Brown. Very stiff.											
5.0	Desiccated (mottled grey & brown)		2	SS	65							
			3	SS	62							3 23 50 24
			4	SS	44							
262.4	Hard		5	SS	52							
17.0	Clayey silt, some sand, trace of gravel (Glacial Till)		6	SS	39							
			7	SS	32							
	Brown		8	SS	61							
			9	SS	52							
			10	SS	74							
235.9	Hard											
43.5	with shale fragments		11	SS	100/8"							
230.4												
49.0	Shale Bedrock (Reddish-Brown)		12	SS	100/2"							
226.4	Weathered											
53.0	Sound		13	BXL	100%							
224.3												
55.1	End of Borehole											

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 69-F-11

LOCATION Maple Ave. Rev'n. Sta. 36 + 55 40' Rt.

ORIGINATED BY VK

W.P. 369-65-2

BORING DATE March 31, 1965

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE		SOIL PROFILE	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT ——— $w_L$			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION		NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT ——— $w_p$		
276.2	Ground Level														
0.0	Clayey silt, some sand & gravel, tr. of organics (Fill)		1	SS	4										276.2
271.2	Brown. Firm.		2	SS	26										
5.0	Desiccated (mottled grey & brown) Hard		3	SS	73										
265.7	Clayey silt, some sand, trace of gravel (Glacial Till)		4	SS	34										
10.5			5	SS	47										
			6	SS	41										
	Brown														
244.7	Hard		7	SS	51										
31.5	End of Borehole														

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 69-F-11

LOCATION Maple Ave. Rev'n. Sta. 36 + 57 37' Lt.

ORIGINATED BY VK

W.P. 369-65-2

BORING DATE April 1, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION BLOWS / FOOT 20 40 60 80 100	RESISTANCE SHEAR STRENGTH PSF ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — % WATER CONTENT % 10 20 30	BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE						
279.7	Ground Level									
3.0	Clayey silt topsoil									
1.5	Desiccated (mottled grey & brown)		1	SS	30					
			2	SS	88					
			3	SS	63					
267.2	Hard		4	SS	38					
12.5	Clayey silt, some sand, trace of gravel. (Glacial Till)		5	SS	35					
			6	SS	36					
	(Brown)		7	SS	51					
			8	SS	60					
			9	SS	56					
240.7	Hard									
39.0	with shale fragments		10	SS	99					
236.7	Shale bedrock		11	SS	100/3"					
43.0	weathered									
233.7	(Reddish-brown)		12	BXL	100%					
46.0	sound									
230.7										
49.0	End of Borehole									

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 69-P-11 LOCATION Maple Ave. Rev'n. Sta. 37 + 00 40' Rt. ORIGINATED BY VK  
 W.P. 369-65-2 BORING DATE March 28, 1969 COMPILED BY SO  
 DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing CHECKED BY *AK*

SOIL PROFILE		STRAT. PLT.	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		NUMBER	TYPE		20	40	60	80	100	$w_p$ — $w_L$	WATER CONTENT % 10 20 30		
269.4	Ground Level													
0.0	(weathered & reworked)													$\gamma = 267.9$
264.4	Very stiff		1	SS	21									
5.0	Desiccated (mottled grey & brown)		2	SS	31									
259.4	Hard		3	SS	60									
10.0	Clayey silt, some sand, trace of gravel (Glacial Till)		4	SS	44									
	(occ. sand & silt seams and partings up to 3" thick below el. 234)		5	SS	36									
			6	SS	42									
			7	SS	62									
	(mottled grey & brown)		8	SS	60									12 17 44 27
			9	SS	56									
229.4	Hard		9A	SS	44									
40.5	with shale fragments		10	SS	51									
226.4														
43.0	Shale Bedrock													
222.4	(Reddish-brown) Sound.		11	BXL	100%									
47.0	End of Borehole													

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 11

FOUNDATION SECTION

JOB 69-F-11

LOCATION Maple Ave. Rev'n. Sta. 37 + 00 66' Lt.

ORIGINATED BY VK

W.P. 369-65-2

BORING DATE April 2, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT			LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY Y P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	SHEAR STRENGTH PSF ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE			WATER CONTENT % 10 20 30			
292.7	Ground Level												
0.0	Reworked & weathered					290							
289.2	Desiccated		1	SS	35								
3.5	(Mottled grey & brown)		2	SS	62								
283.2	Hard		3	SS	35								
9.5	Clayey silt, some sand, trace of gravel (Glacial Till)		4	SS	34	280							
	(layers of sand & silt up to 1' thick below elev. 237)		5	SS	34								
	Brown		6	SS	44	270							▼ 269.7
			7	SS	42								
			8	SS	48	260							
			9	SS	57								
	Hard		10	SS	62	250							
			11	SS	66								
			12	SS	60	240							
234.7			13	SS	145								1 8 75 16
58.0	with shale fragments		14	SS	132								
231.2	Bedrock weathered		15	SS	100/8"	230							
61.5	(reddish brown)		16	SSL	100%								
227.7	sound												
65.0	End of Borehole					220							



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 69-F-11

LOCATION Maple Ave. Rev'n. Sta. 38 + 23 65' Lt.

ORIGINATED BY VK

W.P. 369-65-2

BORING DATE April 8, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — W <sub>L</sub> PLASTIC LIMIT — W <sub>P</sub> WATER CONTENT — W			BULK DENSITY γ <sub>s</sub>	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	20	40	60	80	100	W <sub>p</sub>			W <sub>L</sub>
295.1	Ground Level														
0.0	Reworked & weathered		1	SS	12										
289.1	stiff		2	SS	45										
6.0	Desiccated & fissured (mottled brown)		3	SS	68										
281.1	Hard		4	SS	60										
14.0	Clayey silt, some sand & a trace of gravel (Glacial Till)		5	SS	33										
	(occ. silt & sand seams up to 6" thick below elev. 241).		6	SS	33										
	(Brown)		7	SS	61										
			8	SS	62										
			9	SS	46										
238.6	Hard		10	SS	91										
56.5	End of Borehole														

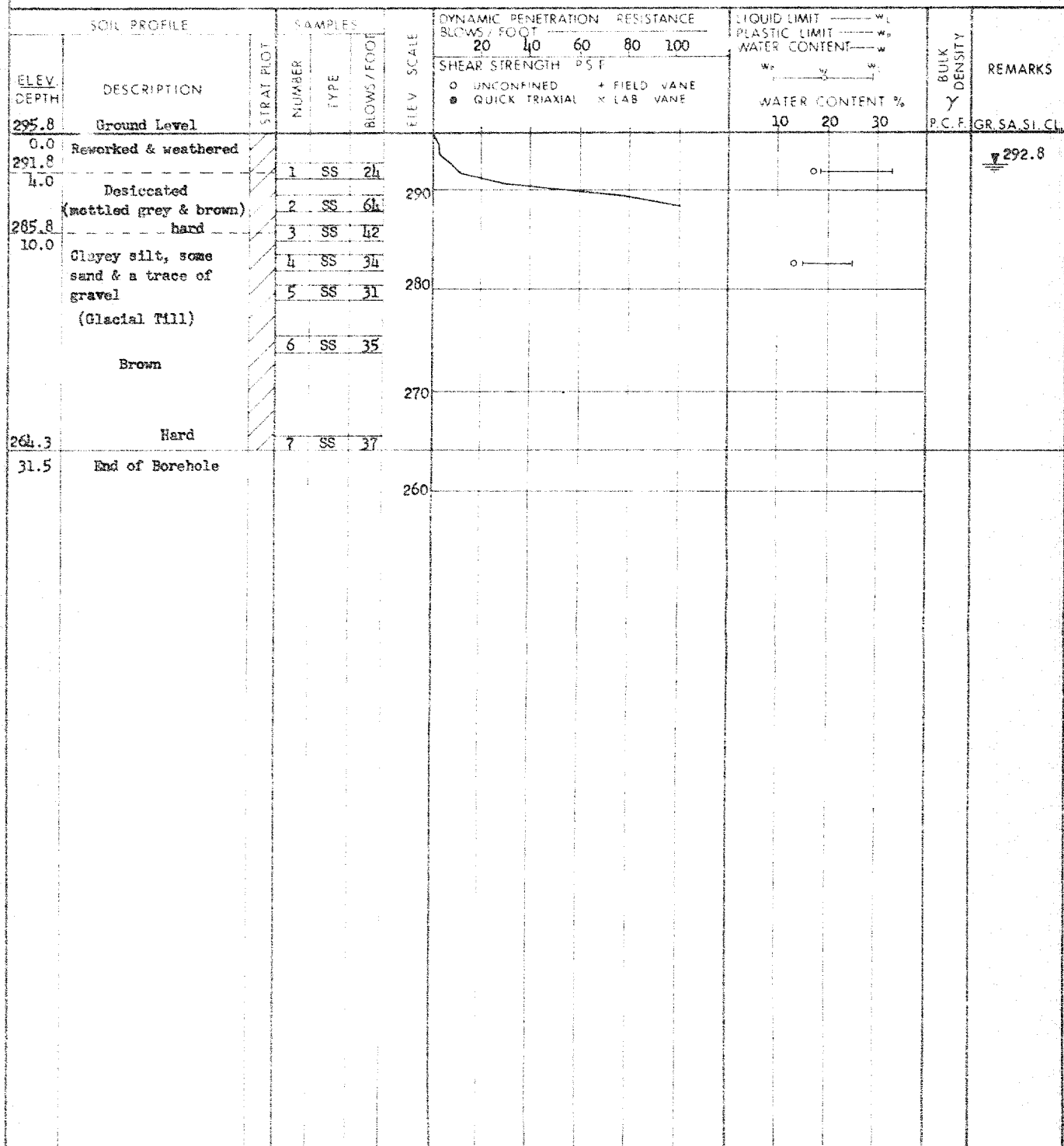
271.1

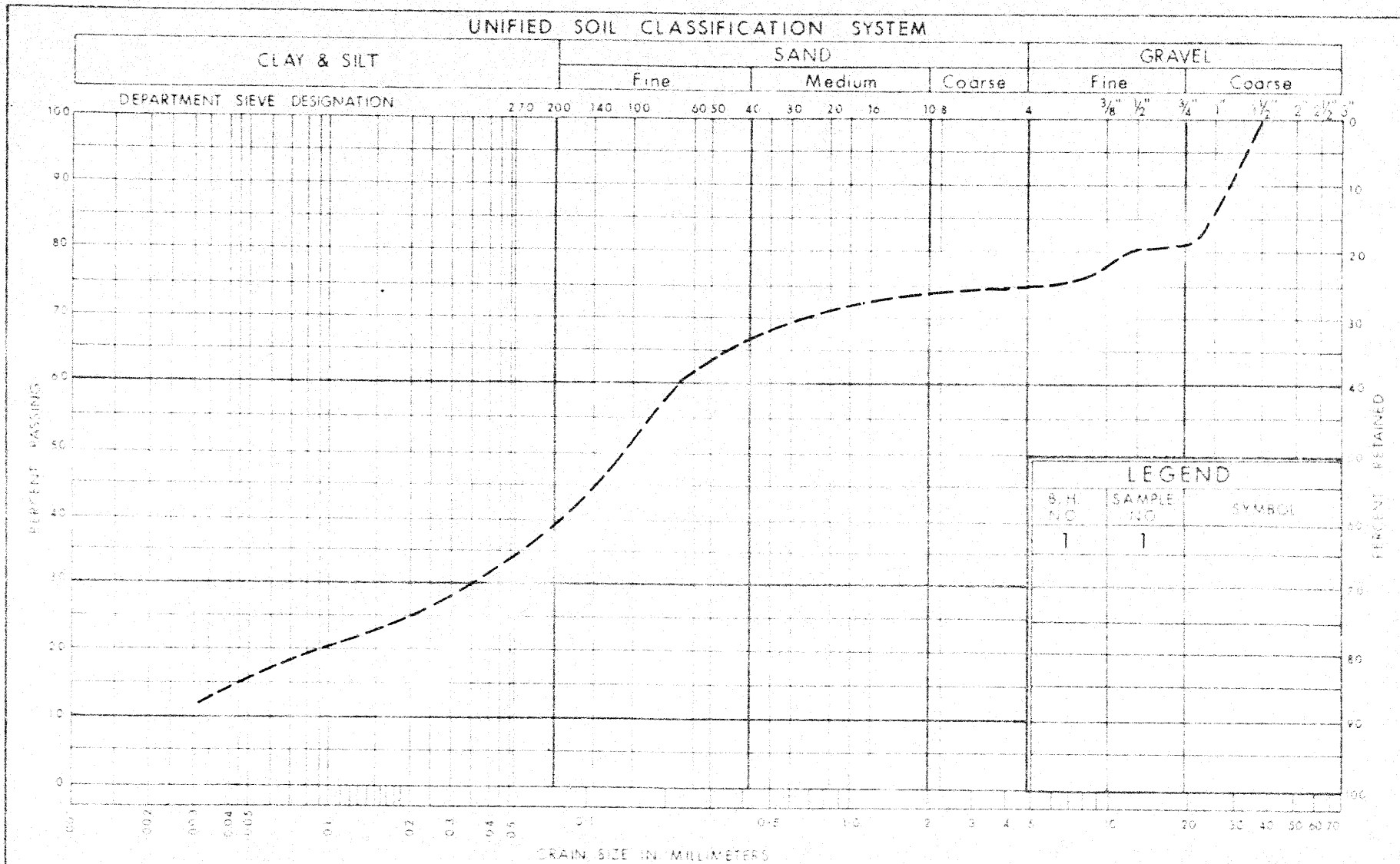
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 13

FOUNDATION SECTION

 JOB 69-F-11 LOCATION Maple Ave. Rev'n. Sta. 39 ± 68 45' Lt.  
 W.P. 369-65-2 BORING DATE April 9, 1969  
 DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing

 ORIGINATED BY VK  
 COMPILED BY SO  
 CHECKED BY *AK*




DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

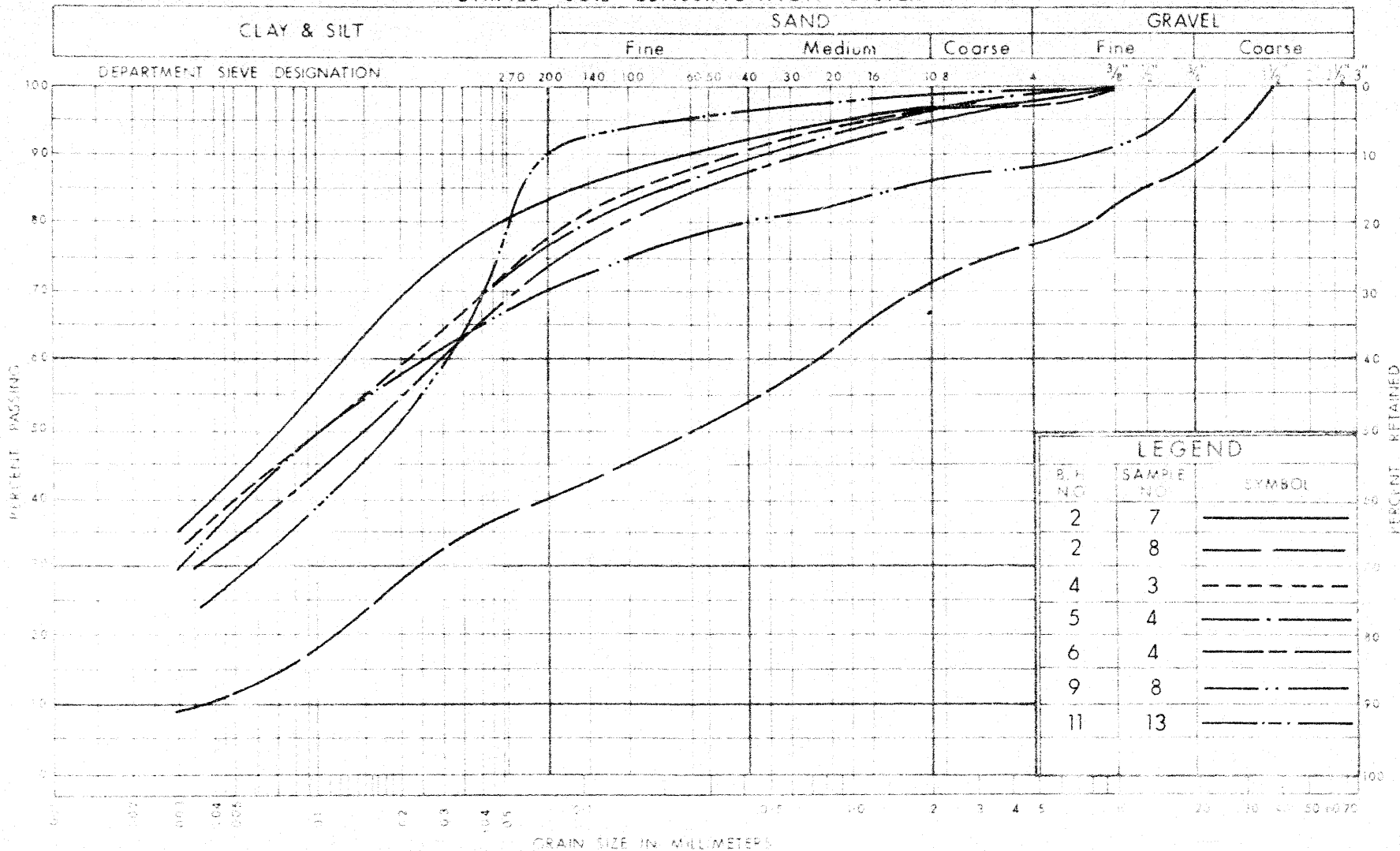
GRAIN SIZE DISTRIBUTION  
CLAYEY SILT  
SOME SAND & GRAVEL (FILL)

W.P. No. 369-65-2

JOB No. 69-F-11

FIG. 1

# UNIFIED SOIL CLASSIFICATION SYSTEM

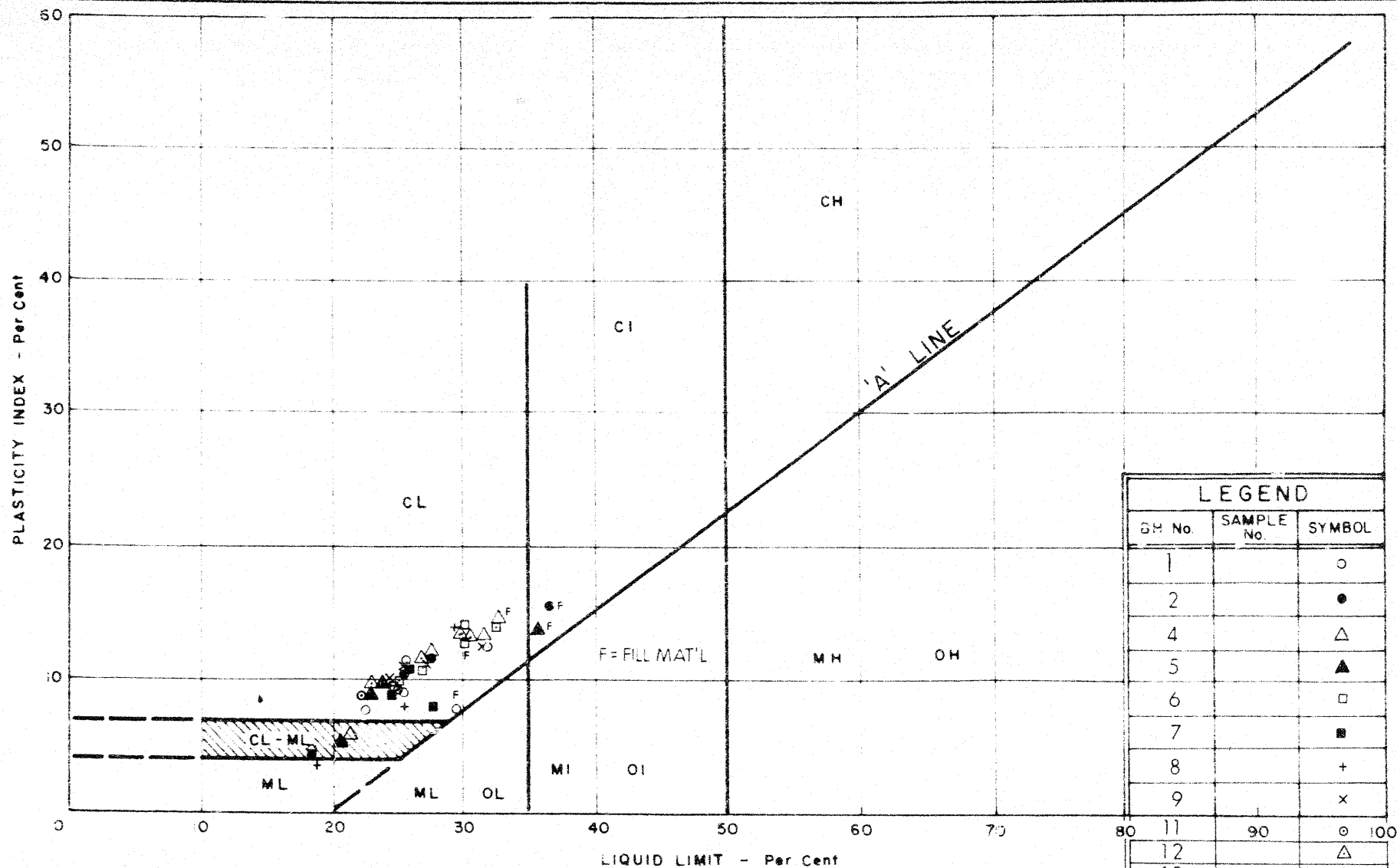


DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

GRAIN SIZE DISTRIBUTION  
CLAYEY SILT  
SOME SAND, TRACE OF GRAVEL (GLACIAL TILL)

W.P. No. 369-65-2  
JOB No. 69-F-11

FIG. 2



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

# PLASTICITY CHART GLACIAL TILL

WP No. 369-65-2

JOB No. 69-F-11

FIG. No. 3

## 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 <sub>u</sub>	UNCONFINED COMPRESSION	L.V	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V	FIELD VANE
Q <sub>cu</sub>	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q <sub>d</sub>	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
$\tau$	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





FIELD RECONNAISSANCE REPORT  
REQUIRED BY FOUNDATION SECTION  
FOR

69-F-11  
7F-69  
SEPT. 1968  
MAPLE AVE / C.N.R.

W.P. NO. 369-65-2 HIGHWAY NO. \_\_\_\_\_ DISTRICT 4 SITE PLAN NO. E 4919-1 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) NONE OBSERVED

UNDERGROUND UTILITIES:

UTILITY COMPANY

TELEPHONE NO. FOR DEFINITE LOCATION

- 1 SEWER - RUNNING EAST - WEST, SOUTH OF TRACKS (250')
- 2 WATER MAIN - RUNNING NORTH - SOUTH 11" WITH EXISTING MAPLE
- 3 ON THE WEST SIDE (SEE EXPOSED PIPE &
- 4 SHUT-OFF VALVE).

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	<u>H. FERRIS</u>	<u>65 MAPLE AVE</u>	
2	<u>-</u>	<u>63 MAPLE AVE</u>	
3	<u>C.N.R.</u>	<u>-</u>	
4			

WHO WILL OBTAIN NECESSARY PERMISSION? FOUNDATION SECTION.

HAS SITE BEEN SURVEYED & STAKED? YES ☒ NO ☐ IF YES, DATE OF MOST RECENT SURVEY SEPT 1967

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

IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☒ NO ☐ SEE NOTE

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) 150' OFF N.E. CORNER OF MAPLE AVE  
ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES: Q.E.W. BRIDGE.

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

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

REMARKS

NEAREST AVAILABLE ACCOMODATION: GRIMSBY.

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

DATE 13<sup>TH</sup> FEB 1969

REGIONAL BRIDGE LOCATION SUPERVISOR. J. Robertson

- 1) SITE ACCESSIBLE THROUGH H. FERRIS PROPERTY VIA CLARKE ST FOR THE NORTH PORTION AND THROUGH ORCHARD ON THE ~~WEST~~ EAST SIDE OF MAPLE AVE FOR THE SOUTH PORTION. THERE ARE LOW HANGING TELEGRAPH WIRES ON THE SOUTH PORTION BUT SHOULD BE NO PROBLEM IF CARE IS EXERCISED.

# VISUAL CLASSIFICATION SHEET

PROJECT 69F11 SITE \_\_\_\_\_ BOREHOLE No. 13 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	3-4.5	10" sub angular		5	15	80	med dull	slow to none	med organic	red brown	med		clayey silt - some sand - traces gravel	CL
2	6-7.5	" "	" "	" "	" "	" "	" "	" "	earthy	" "	strong		" " " " " "	"
3	7-10.5	2" sub angular		9	15	76	" "	" "	" "	brown	" "		" " " " " "	"
4	12-13.5	" "	" "	5	15	80	" "	" "	" "	grey	" "		" " " " " "	"
5	15-16.5	2" sub angular		" "	" "	" "	" "	" "	" "	" "	" "		" " " " " "	"
6	20-21.5	1" sub med		" "	" "	" "	" "	" "	" "	" "	" "		" " " " " "	"
7	22-23.5	4" "		1	15	85	" "	" "	" "	" "	" "		clayey silt - some sand	CL

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

REMARKS:-

# VISUAL CLASSIFICATION SHEET

PROJECT 69-F 11 SITE                      BOREHOLE No. 11 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	3-4.5	$\frac{3}{8}$	Sub Angular	5	10	85	Med	Dull	Nil to Slow	Med	Earthy	Brown	Weak		Clayey Silt - Traces Sand & Gravel	CL
2	6-7.5	$\frac{1}{2}$	Sub Angular	10	10	80	"	"	"	"	"	"	"		" " " " " "	CL
3	9-10.5	$\frac{1}{2}$	"	5	15	80	"	"	"	"	"	Grey	"		" " " " " "	CL
4	12-13.5	$\frac{3}{4}$	Angular	10	10	80	"	"	"	"	"	"	"		" " " " " "	CL
5	15-16.5	$\frac{3}{8}$	Sub Round	5	10	85	"	"	"	"	"	"	"		" " " " " "	CL
6	20-21.5	$\frac{3}{8}$	Angular	"	"	"	"	"	"	"	"	"	"		" " " " " "	CL
7	25-26.5	$\frac{1}{4}$	Sub Angular	25	10	65						"	"		" " " " Some Gravel	CL
8	30-31.5	$\frac{3}{4}$	"	10	"	80	"	"	"	"	"	"	"		" " " " & Gravel	CL
9	35-36.5	$\frac{1}{4}$			15	85	"	"	"	"	"	"	"		" " Some Sand	CL

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

REMARKS:-

# VISUAL CLASSIFICATION SHEET

PROJECT <u>69-F11</u>		SITE _____		BOREHOLE No. <u>11</u>		GROUND ELEVATION _____										
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL		
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL											SAND	SILT & CLAY
10	40-41.5	5/4			15	85	Med	Dull	N.I. to slow	Med	Earthy Grey	Strong	Clayey Silty Sand	CL		
11	45-46.5	5/2	Sub Round		5	10	85	"	"	"	"	"	"	Trace sand & gravel	CL	
12	50-51.5	"	"	"	4	11	11	"	"	"	"	"	"	"	CL	
13	55-56.5				10	90	"	"	"	"	"	"	"	"	CL	
					5	95	Low	None	Quick	Low	"	"	"	sandy silt	ML	
14	60-61.5	1	Angular		25	10	65	Med	Dull	N.I. to slow	Med	Earthy Red Brown	"	Shale	Clayey Silty (Shale)	CL
15	61-62.5	1"	"	"	15	60	"	"	"	"	"	"	"	"	CL	

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 DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT 69F11 SITE  BOREHOLE No. 12 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										
1	3-4.5	1/4"	sub rnd-d.	5 20 75	med dull		slow to	low	organic	brown	weak		clayey silt - some sand - traces gravel	CL
2	6-7.5	1/2"	sub angular	5 10 85	"	"	"	med	earthy	"	strong		" " " " " "	"
3	9-10.5	1/2"	"	"	"	"	"	"	"	"	"		" " " " " "	"
4	12-13.5	3/4"	"	"	"	"	"	"	"	"	"		" " " " " "	"
5	15-16.5	"	"	"	"	"	"	"	"	grey	"		" " " " " "	"
6	20-21.5	"	"	"	"	"	"	"	"	"	"		" " " " " "	"
7	25-26.5	1 1/2"	angular	35 15 50	"	"	"	"	"	"	"		" " with gravel - traces sand	CL
8	30-34.5	3/8"	sub angular	5 10 85	"	"	"	"	"	"	"		clayey silt - some sand - traces gravel	CL
9	45-46.5	3/8"	"	5 10 85	"	"	"	"	"	"	"		" " " " " "	"

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

REMARKS:-

10 50-51.5 " " 5 15 80 " " " " " " " " " " " "

DEPARTMENT OF HIGHWAYS — ONTARIO  
MATERIALS AND TESTING DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT C.R.P. 11 SITE                      BORE 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	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE										
				GRAVEL	SAND	SILT & CLAY								
1	3'-45"	10	Angular	25	20	55	Med	Brit	Slow	Low	Organic	Brown	None	CL
2	6'-45"	3/8	Sub Round	5	10	85	"	"	Nil to Slow	Med	Earthy	"	Strong	CL
3	9'-45"	1/8	Sub Round	5	10	85	"	"	"	"	"	"	"	CL
4	12'-45"	1/2	Angular	40	10	50	"	"	"	"	"	"	"	CL
5	15'-45"	1/2	Sub Round	5	10	85	"	"	"	"	"	"	"	CL
6	20'-45"	"	"	5	10	85	"	"	"	"	"	"	"	CL
7	25'-45"	1 1/4	Angular	15	10	75	"	"	"	"	"	"	"	CL
8	30'-45"	1"	Sub Round	15	20	65	"	"	Slow to Quick	"	"	Red Brown	"	CL

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

REMARKS:—

# VISUAL CLASSIFICATION SHEET

PROJECT <u>69-F11</u>		SITE _____		BOREHOLE No. <u>2</u>		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	3-4.5	1/4"	Angular	20	15	65	Med	Silt to clay	Med	Organic	Brown	None			Clayey Silt to Silty Clay Some Sand & Gravel Organic ML	CL
2	6-7.5	3/4"	Sub Angular	5	10	85	"	"	"	"	Earthy	"	Strong		Clayey Silt - Traces of sand & gravel	CL
3	9-10.5	3/4"	Angular	10	10	80	"	"	"	"	"	"	"		" " " " " "	CL
4	12-13.5	3/4"	Sub Angular	"	"	"	"	"	"	"	"	"	"		" " " " " "	CL
5	15-16.5	3/4"	"	"	"	"	"	"	"	"	"	"	"		" " " " " "	CL
6	20-21.5	1/2"	"	"	"	"	"	"	"	"	"	"	"		" " " " " "	CL
7	23-24.5	1"	Sub Round	"	"	"	"	"	"	"	"	"	"		" " " " " "	CL
8	30-31.5	1"	"	15	20	65	"	Dull	Slow break	"	"	Red Brown	"	Payne's	Silt to " " Some Sand & Gravel	ML CL

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

REMARKS:-



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MATERIALS AND TESTING DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT 69-F11 SITE                      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	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5	1"	Angular	15	10	75	Med	Dull	Med	Earthy	Brown	Strong			Clayey Silty Trace Sand - Some Gravel	CL
2	6-18	"4	Sub Angular	5	10	85	"	"	"	"	"	"			" " " " " "	CL
3	9-10.5	"4	"	"	"	"	"	"	"	"	"	"			" " " " " "	CL
4	11-18.5	1/2"	Sub Round	10	10	80	"	"	"	"	"	"			" " " " " " Traces Gravel	CL
5	15-20.5	1/2"	"	5	10	85	"	"	"	"	"	"			" " " " " " " "	CL
6	20-25.5	1/2"	Angular	10	10	80	"	"	"	"	"	"			" " " " " " " "	CL
7	25-26.5	3/8"	Sub Angular	"	"	"	"	"	"	"	"	"			" " " " " " " "	CL
8	30-31.5	1/4"	Sub Angular	"	"	"	"	"	"	"	"	"			" " " " " " " "	CL
9	35-36.5	1"	Sub Round	10	"	"	"	"	"	"	"	"			" " " " " " " "	CL

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

REMARKS:-

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MATERIALS AND TESTING DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT <u>69-F11</u>		SITE _____		BOREHOLE No. <u>4</u>		GROUND ELEVATION _____										
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
10	40-41.5	2	Sub Round	5	10		Med	Dull	Nil to slow	Med	Earthy	Brown	Yelow		Clayey Silty Tracey Sand Fine gravel	SL
11	45-46.5	1	Sub Round	10	10	80	"	"	"	"	"	"	"		" " " " " " " "	CL
12	50-51.5			60	5	35							"	↑ ↓ Shale	Shale	

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

REMARKS:-

# VISUAL CLASSIFICATION SHEET

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALTANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5	2 1/2"	sub angular	20	30	50	mod	none	slow to	mod	organic	brown	none		clayey silt some sand & gravel	CL
2	6-7.5	3/4"	"	5	10	85	"	dull	"	"	earthy	"	strong		clayey silt traces sand & gravel	CL
3	9-10.5	1"	"	20	10	70	"	"	"	"	"	"	"		" " " " some gravel	CL
4	12-13.5	1"	"	-	15	85	"	"	"	"	"	"	"		" " some sand	CL
5	15-16.5	"	"	"	"	"	"	"	"	"	"	"	"		" " " "	"
6	20-21.5	"	"	"	"	"	"	"	"	"	"	"	"		" " " "	"
7	25-26.5	3/4"	sub rnd'd	5	10	85	"	"	"	"	"	"	"		clayey silt traces sand & gravel	"
8	30-31.5	1/2"	sub angular	10	10	80	"	"	"	"	"	"	"	shale	" " " " " "	"
9	35-36.5	"	"	5	20	75	"	"	slow to quick	"	"	red brown	"	frag. clayey silt with sand traces gravel	CL	

[illegible]

# VISUAL CLASSIFICATION SHEET

PROJECT <u>69F-11</u> SITE _____ BOREHOLE No. <u>6</u> GROUND ELEVATION _____																
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5	2	sub angular	10	20	70	med	dull	slow to none	med	organic	brown	weak		clayey silt + some sand - traces gravel	CL
2	6-7.5	"	"	5	15	80	"	"	"	"	earthy	"	strong		" " " " " "	"
3	9-10.5	3/4	"	"	"	"	"	"	"	"	"	"	"		" " " " " "	"
4	12-13.5	#4	"	-	15	85	"	"	"	"	"	"	"		" " " " " "	"
5	15-16.5	1/2	"	20	10	70	"	"	"	"	"	grey brown	"		clayey silt - traces sand - with gravel	"
6	20-21.5	1/4	"	15	10	75	"	"	"	"	"	"	"		" " " " - some gravel	"
7	25-26.5	3/4	"	"	"	"	"	"	"	"	"	"	"		" " " " " "	"
8	30-31.5	#4	"	-	15	85	"	"	"	"	"	"	"		" " - some sand	"
9	35-36.5	"	"	"	"	"	"	"	"	"	"	"	"		" " " " " "	"

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 DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT 69F11 SITE \_\_\_\_\_ BOREHOLE No. 6 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								
10	40-41.5	4	sub ang	—	15	85	med dull	slow to none	med earthy	grey brown	strong		clayey silt - some sand	CL
11	45-46.5	3/4	"	15	15	70	"	"	"	red brown	"	fragments of shale	" " " " and gravel	CL
12	50-51.5	"	"	"	"	"	"	"	"	"	"		N.B. 11 & 12 may be weathered shale	"

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 DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT 69-E-11 SITE \_\_\_\_\_ BOREHOLE No. 7 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	3-4.5	#4	Sub Angular		30	70	Low	Dull	Slow	Low	Organic	Bluish-brown	Strong	Fill	Clayey silt - some sand	CL
		#4			10	90	"	"	"	"	Earthy	Brown	"		" " Traces sand	CL
2	6-7.5	1"	Sub Angular	25	20	55	Med	"	N.I. +0 Slow	Med	Earthy	Reddish Brown	"		" " Some sand & Gravel	CL
3	9-10.5	1/2	"	10	15	75	"	"	"	"	"	"	"		" " " " Traces Gravel	CL
4	12-13.5	1/2	"	5	10	85	"	"	"	"	"	"	"		" " Traces sand & Gravel	CL
5	15-16.5	3/8	"	"	15	80	"	"	"	"	"	"	"		" " " " Gravel Some sand	CL
6	20-21.5	1/2	"	"	11	11	"	"	"	"	"	"	"	TILL	" " " " " "	CL
7	30-31.5	3/8	"	"	11	11	"	"	"	"	"	"	"	↑	" " " " " "	CL

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 DIVISION

# VISUAL CLASSIFICATION SHEET

PROJECT 69-E11 SITE \_\_\_\_\_ BOREHOLE No. 8 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	3-4.5	$\frac{3}{8}$	Sub Angular	5	15	80	Med	Dull	N.I TO Slow	Med	Earthy	Brown	Strong		Clayey S.H - Traces Gravel Some Sand	CL
2	6-7.5	$\frac{3}{4}$	"	10	10	80	"	"	"	"	"	"	"		" " " " & Sand	"
3	9-10.5	$\frac{3}{4}$	Sub Round	10	10	"	"	"	"	"	"	"	"		" " " " " "	"
4	12-13.5	1	"	10	10	"	"	"	"	"	"	"	"		" " " " " "	"
5	15-16.5	1	Sub Angular	10	10	"	"	"	"	"	"	"	"		" " " " " "	"
6	20-21.5	$\frac{1}{2}$	"	5	15	80	"	"	"	"	"	"	"		" " " " Some Sand	"
7	25-26.5	$\frac{1}{2}$	"	5	10	85	"	"	"	"	"	"	"		" " " " & Sand	"
8	30-31.5	"	"	5	15	80	"	"	"	"	"	"	"		" " " " Some Sand	CL
9	35-36.5	$\frac{1}{2}$	"	5	15	80	"	"	"	"	"	"	"	TILL ↑	" " " " " "	CL

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

REMARKS:-

↑  
fragments shale

DEPARTMENT OF HIGHWAYS — ONTARIO  
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# VISUAL CLASSIFICATION SHEET

PROJECT <u>69-F11</u>		SITE _____		BOREHOLE No. <u>9</u>		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										
10	40'-41.5'	3/4"	Sub Round	15	15	70	Med	Dull	Nil to slow	Med	Earthy Brown	Strong	Clayey silt - some sand & gravel	CL
11	41'-42.5'	1"	Angular	25	25	50	"	"	"	"	"	"	Clayey silt to silty clay with sand & gravel SHALEY	CL M

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  
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# VISUAL CLASSIFICATION SHEET

PROJECT 69-F11 SITE                      BOREHOLE No. 9 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	3-4.5	1 1/4	Sub Round	40	10	50	Med	Dull	Nil to slow	Med	Earthy	Brown	Strong		Clayey Silt - Traces Sand And Gravel	CL
2	6-7.5	1/2	Sub Angular	10	10	80	"	"	"	"	"	"	"		" " " " & Gravel	CL
3	9-10.5	1/2	"	5	10	85	"	"	"	"	"	"	"		" " " " " "	CL
4	12-13.5	1/2	Sub Angular	25	10	65	"	"	"	"	"	"	"		" " Traces Sand With Gravel	CL
5	15-16.5	3/8	"	5	10	85	"	"	"	"	"	"	"		" " " " & Gravel	CL
6	20-21.5	3/4	"	5	10	85	"	"	"	"	"	"	"		" " " " " "	CL
7	23-24.5	3/4	"	5	10	85	"	"	"	"	"	"	"		" " " " " "	CL
8	30-31.5	3/4	Angular	10	10	80	"	"	"	"	"	"	"		" " " " " "	CL
9	35-36.5	3/4	Sub Angular	15	10	75	"	"	"	"	"	"	"		" " " " Some Gravel	CL

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

REMARKS:-

# VISUAL CLASSIFICATION SHEET

PROJECT <u>69-111</u> SITE _____ BOREHOLE No. <u>9</u> 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										
9	37.5-39	3/4	Sub Round	10	50	40	Red	Quil	Med	Earth	Brown	Strong	Stiff	Clayey Silt Traces Sand	CL	
														Silty Sand Traces Gravel		
10	40-41.5	3/4	Sub Angular	60	10	70	"	"	Slow to Quick	"	Red Brown	"	Stale	Silt + Clayey Silt Shale	CL ML	

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

REMARKS:-

#69-F-11

W.P. 369-65-2

Q.E.W.

C.NR. AND

MAPLE AVE. REV'N

OVERHEAD STRUCTURE



