

#69-F-33

W.P. 13-68

HWY #417

SITES D, E, F, G, H AND K

## MEMORANDUM

To: Mr. M. R. Ernesaks,  
Functional Planning Engr.  
Eastern Region,  
Kingston, Ontario.

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

ATTENTION:

DATE: September 12, 1969.

OUR FILE REF.

IN REPLY TO

SEP 18 1969

SUBJECT:

PRELIMINARY FOUNDATION REPORT  
For  
Proposed Structure Sites  
Hwy. #417 (Ottawa - Extension)  
Alta Vista Drive  
Easterly to Walkely Rd.  
City of Ottawa  
District No. 9 (Ottawa)  
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Attached, we are forwarding to you our Preliminary Foundation Investigation Report pertaining to the above sites. Presented in this report are the results of the investigation, together with our general comments pertaining to the stability of the approaches and recommendations regarding structure foundations at various crossings.

We believe that the information contained therein will prove adequate for your immediate use. Should you require further data, or clarification of the report, please feel free to contact this Office.

ACS/is  
Attach.

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

cc: Messrs. M. R. Ernesaks (2)  
B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
S. J. Markiewicz  
C. R. Robertson  
I. C. Campbell  
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J. E. Gruspier  
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Foundations Files ✓  
General Files.

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PRELIMINARY FOUNDATION REPORT  
For  
Proposed Structure Sites  
Hwy. #417 (Ottawa - Extension)  
Alta Vista Drive  
Easterly to Walkely Rd.  
City of Ottawa  
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1. INTRODUCTION:

The Foundation Section was requested to provide preliminary subsoil information at the proposed structure crossings along Hwy. #417, namely between the Ottawa Queensway (at Nicholas Street) easterly to the eastern city limits of Ottawa. This portion of the proposed highway is approximately 5 1/2 miles in length. The request was contained in a memo from the Eastern Regional Functional Planning Section (Mr. M.R. Ernesaks, Regional Functional Planning Engineer), dated May 15th, 1969. An investigation was subsequently carried out by this Section to determine the subsoil conditions at various structure locations.

In this report that portion of proposed Hwy. #417, located between Alta Vista Drive easterly to Walkely Road, in the City of Ottawa, namely between Stations 57 + 00 and 175 + 00 (Hwy. #417, chainage), will be discussed. Proposed structure sites, 'D', 'E', 'F', 'G', 'H', and 'K' are located within this section.

This report presents preliminary information on the subsoil and groundwater conditions encountered at the above crossings, together with recommendations pertaining to foundation design of the structure elements, as well as the stability of the associated cut and fill sections.



1. INTRODUCTION: cont'd....

Preliminary Foundation Reports are also prepared on two other sections of Hwy. #417, namely,

- i) Ottawa Eastern City Limits westerly to Walkley Road.
- and ii) Ottawa Queensway (at Nicholas Street) easterly to Alta Vista Drive.

2. DESCRIPTION OF THE SITES AND GEOLOGY:

The portion of proposed Hwy. #417 encompassed in this report, traverses a built-up area in the eastern end of the City of Ottawa. Specifically it is located within a green belt strip, which between stations 80 + 00 to 175 + 00, is flat lying to gently undulating in relief between elevations 265 to 280. West of this area the terrain slopes gradually towards Alta Vista Drive, where the ground surface is at about elevation 215. The terrain supports light vegetation, such as grass and low lying bushes.

The eastern portion of the alignment is situated in the physiographic region known as the "Ottawa Valley Clay Plains". The predominant stratum in this area is composed of a silty clay interrupted periodically by ridges of sand or rock. The clay was deposited in the Chaplain Sea, which inundated the area during the Pleistocene Period, this marine clay is known to be sensitive. In the area under consideration the clay varies from 10 to 30 feet in thickness. The clay is underlain by a morainic glacial till deposit, which, in turn, is followed by shale and limestone bedrock of the Meaford-Dundas formation, Ordovician Period.

In the western portion of the alignment, however, the overburden is composed primarily of morainic glacially deposited soils. Often the topography shows a characteristic drumlinized relief. The glacial subsoil in this area is generally cohesive in nature; the till is directly underlain by the same bedrock type discussed above.

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### 3. FIELD AND LABORATORY WORK:

One detailed sampled borehole was put down at each of the proposed crossings, during the course of the field investigation, by a conventional diamond drill rig adapted for soil sampling purposes.

Samples of the surficial and glacial till deposits were obtained, at specified intervals, in a 2" O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for the Standard Penetration Test. The cohesive overburden was sampled with 2" I.D. Shelby tubes. In addition, field vane tests were carried out to determine the undrained shear strength of the clay stratum. Bedrock was proven in all the boreholes by obtaining either AXT or BXT rock core samples.

The groundwater level conditions across the site were determined by installing sealed piezometers in three of the boreholes. This information was supplemented by recording the water level in the open holes at the remaining boring locations, during the period of the investigation.

The locations and elevations of all the borings were surveyed in the field by personnel from the Kingston Regional Engineering Surveys Section, and are shown on Drawing #69-F-33A. The elevations given in this report are referenced to a Geodetic origin. The subsoil conditions encountered at the boring locations are shown on the Record of Borelog sheets located in Appendix I, a stratigraphic profile, along the proposed centre-line of Hwy. #417, has been inferred from this data and shown on the drawing.

The results of the laboratory testing carried out on selected samples are shown on the Borelog sheets, as well as on Figures 1 to 6, all of which are contained in the Appendix of this report.

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#### 4. SUBSOIL AND BEDROCK CONDITIONS:

##### 4.1) General:

In the eastern portion of the alignment the surficial deposits are underlain by a 10 to 11 feet stratum of very stiff to firm silty clay. Underlying this cohesive stratum, where it exists, and the surficial deposits, elsewhere, is a stiff to hard basically cohesive glacial till; the thickness of this till varies from 6 feet to 30 feet. At random locations a layer of sandy silt, between 2 and 5 feet in thickness, is sandwiched between the underlying glacial till and the overlying surficial deposits.

The glacial till stratum is directly underlain by shale bedrock.

##### 4.2) Surficial Deposits:

The surficial deposits across the area are quite variable. In the eastern portion (Sites 'D' and 'E') it is composed of a loose silty sand with a trace of clay and organic matter; this cover is approximately 3 feet thick. Grain-size distribution curves for two samples from the deposit are shown on Figure #1, in the Appendix.

At sites 'G', 'H' and 'K' between 3 and 4 feet of surficial fill was encountered. The composition of this fill varies from a loose sandy silt to a firm silty clay.

##### 4.3) Clay to Silty Clay (Sensitive)

In the eastern portion of the alignment (Sites 'D' and 'E') the surficial granular deposit is underlain by a stratum of mottled brown to grey sensitive marine clay to silty clay, with a trace of sand. The thickness of the cohesive deposit, in this area, is about 10 to 11 feet. The upper 5 to 8 feet of the stratum has been desiccated. In addition occasional sand seams, up to 1/4 inch thick, were encountered throughout the deposit. Two typical grain-size distribution curves for samples obtained from the cohesive stratum are plotted on Figure #2.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.3) Clay to Silty Clay (Sensitive) cont'd...

Atterberg limit tests were carried out on representative samples of the clay. The results of this testing, which are given on the Borelog sheets, are also summarized on the Plasticity Chart, Figure #5. The results indicate that the liquid and plastic limits vary between 28 and 58 and 15 and 30, respectively. From these values it is estimated that the stratum is inorganic with the plasticity being typically in the intermediate to high range. The natural moisture content ranges from 24 to 55 percent. In the upper desiccated portion of the stratum these values correspond to liquidity indices which range from 0 to 0.3, in the lower zone, however, the indices generally vary between 0.9 and 1.2.

The field and laboratory undrained shear strength results are plotted on the Record of Borelog sheets. This testing indicates that the undrained shear strength, of the upper desiccated zone, is in excess of 2,000 p.s.f.; in the lower portion of the stratum, however, the values range from 600 to 1,200 p.s.f. Based on these results it is estimated that the consistency of the desiccated zone is in the very stiff range, while the lower zone varies from firm to stiff.

One consolidation test was carried out on a sample obtained from the lower more normally consolidated portion of the stratum. The data obtained from this test is plotted as a Void Ratio vs. Pressure Plot on Figure #6. This test indicated that, in this zone, the clay is preconsolidated by up to 4,000 p.s.f. in excess of the existing overburden pressure. It is estimated, however, that in some areas of the lower zone the preconsolidation could be as low as 1,000 p.s.f.

cont'd./6

#### 4. SUBSOIL AND BEDROCK CONDITIONS:

##### 4.4) Glacial Till:

Sandwiched between the clay stratum and the glacial till deposit, at Sites 'D' and 'E', is a 2 to 4.5 feet thick layer of compact ('N' values 24 and 25 blows per ft.) sandy silt with a trace of clay and gravel. This same layer (5 foot thick) was encountered beneath the surficial fill at Site 'K'; at this location, however, the relative density is loose ('N' value 5 blows per ft.). Grain-size distribution curves for samples from this layer are plotted on Figure #3.

The granular layer at Sites 'D', 'E' and 'K', and the surficial deposits elsewhere, are underlain by a glacial till deposit, the overall thickness of which varies from 5.5 feet at Site 'K' to 30 feet at Site 'H'. The matrix of the deposit is generally cohesive - i.e. a clayey silt binding sand and gravel, with random zones of granular material (silt, sand and gravel). At Sites E and F the lower 13.5 to 17 feet of the glacial till is very bouldery in nature. In this zone the boulders vary from a few inches up to 2 feet in size. Shale fragments, derived from the underlying bedrock, were encountered within the lower 4.5 to 7.5 feet of the stratum at some random locations, namely at Sites 'D', 'G' and 'H'). The range in the grain-size gradation of this subsoil, other than in the bouldery zone, is indicated by the grading curves plotted on Figure #4.

Atterberg limit tests, carried out on the more cohesive portions of the glacial till, are plotted on the Borelog sheets and summarized on Figure #5. The results indicate that the subsoil is inorganic and has a plasticity in the low range. The corresponding natural moisture contents are typically 2 to 3% below the plastic limit.

Standard penetration resistance tests were carried out within this deposit, the results are plotted on the Record of Borelog sheets. This testing gave 'N' values which generally vary between 35 and 114 blows per foot. At Sites 'E' and 'H', however, values as low as 11 blows per

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#### 4. SUBSOIL AND BEDROCK CONDITIONS:

##### 4.4 Glacial Till: cont'd....

foot were recorded in the upper portion of the deposit. Based on these results it is estimated that the consistency of the basically cohesive glacial till is hard. At some locations, such as the upper zones, at Sites 'E' and 'H', the consistency may be in the stiff to very stiff range.

##### 4.5 Shale Bedrock:

Bedrock was proven at all of the boring locations by obtaining between 6 and 12 feet of either AXT or BXT rock core. On the high terrace, between Station 80 + 00 and 150 +00, the surface of the bedrock varies randomly between elevations of about 230 and 254. At Site 'K' the bedrock surface was encountered at elevation 202.

The bedrock is composed of a grey shale with interbeds of shaly limestone and limestone. In general, bedrock is sound throughout; some signs of fracturing and jointing were, however, observed in the upper 2 to 3 feet at all the boring locations.

#### 5. GROUNDWATER CONDITIONS:

Groundwater level observations have been carried out during the period of the investigation in

- i) sealed piezometers installed in some of the boreholes,
  - and ii) the open holes at the remaining boring locations.
- The observations are recorded on the Borelog sheets and summarized on Drawing No. 69-F-33A. The results of the measurements indicate that the piezometric groundwater level, within the overburden deposits, varies from 2.5 to 7.5 feet below existing ground surface, in the area under investigation.

#### 6. DISCUSSION AND RECOMMENDATIONS

##### 6.1) General

Proposed Hwy. #417, will be a 4-lane divided highway incorporating a median. The discussion presented herein is

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General: cont'd....

applicable for that portion of the proposed highway traversing between Alta Vista Drive (Station 55 + 00) easterly to Walkely Road (Station 175 + 00), within the City Limits of Ottawa. Proposed structure crossings at the following locations will be discussed.

<u>Site No.</u>	<u>Sub-Section</u>	<u>Hwy. #417 Crossing</u>
'D'	6.2)	Kilborn Avenue
'E'	6.3)	Pleasant Park Road
'F'	6.4)	Proposed Eastern Parkway
'G'	6.5)	Smyth Road
'H'	6.6)	Smyth Road & Proposed Eastern Parkway
'K'	6.7)	Alta Vista Drive

At this stage only preliminary design information is available for these crossings. This data is contained on an un-numbered profile, provided by the Eastern Region Functional Planning Section (dated August 5th, 1969.) Based on this information, however, preliminary recommendations pertaining to structure foundations, as well as the stability of the associated cuts and fills at each location, will be given in the sub-sections to follow. Special measures are deemed necessary for foundations located in close proximity to buried utilities. These comments will be contained in sub-section 6.8).

6.2) Underpass Structure - Kilborn Avenue

SITE 'D'

The span length of the proposed structure is approximately 260 feet. It is understood that the profile grade of Hwy. #417 and Kilborn Road, in the vicinity of the crossing will be at about elevations 267 and 289, respectively.

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6. DISCUSSION AND RECOMMENDATIONS:

6.2) Underpass Structure - Kilborn Avenue: cont'd.)

Hwy. #417 will therefore be in a cut, which at its deepest point extends 14 feet below the existing ground surface. This cut will extend through the stiff to very stiff silty clay stratum, into the compact sandy silty layer. The maximum height of the approaches in the longitudinal direction will be of the order of 20 feet; this will involve fills of about 6 feet in addition to the cuts mentioned previously.

The foundations recommendations for this structure are presented in the following table.



# FOUNDATION RECOMMENDATIONS

Underpass Structure at Kilborn Avenue - 'D'

Approx. Exist. Ground Level. (Hwy. #417 Grade)  (ft.)	Proposed Hwy. #417 Grade Related to Subsoil and Ground- water conditions.	R E C O M M E N D A T I O N S		REMARKS
		<u>STRUCTURE</u>	<u>APPROACHES</u>	
281 (267)	<p><u>Cut - Max. Depth 14'</u> (base of exc. is 7' below recorded ground water level)</p> <p>-excavation extends through the stiff to very stiff silty clay Stratum into the compact sandy silt layer.</p>	<p><u>Piers:</u> Spread Footings founded within glacial till stratum (i.e. at or below elev. 262), allowable bearing pressure up to 4 t. s.f.</p> <p><u>Abutments:</u> Founded on end- bearing piles driven to practical refusal within lower portion of the glacial till. -estimated tip elevation 248. -designed for max. capacity of the pile section chosen.</p>	<p><u>Stability:</u> 20' high approaches (slopes 2:1) in the longitudinal direction will be stable, provided it is properly sodded, staked and wire meshed as per D.H.O. methods.</p> <p><u>Consolidation Settlement:</u> Beneath 6' fills will be negligible.</p>	<p>It would be beneficial to carry out the Hwy. #417 excavation prior to construction of the structure foundations.</p> <p>The excavation bottom may be situated in a pervious granular layer (sandy silt). In such a case special measures will be required to lower the groundwater table well below the base elevat- ion of the excavation. This could be achieved by installing a suitable subdrain system.</p>

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

6.3) Underpass Structure - Pleasant Park Ave.

SITE 'E'

The span length of the proposed structure is approximately 380 feet. It is understood that the profile grade of Hwy. #417 and Pleasant Park Road, in the vicinity of the crossing, will be at about elevations 261 and 283, respectively. Hwy. #417 will, therefore, be in a cu., which at its deepest point extends approximately 22 feet below the existing ground surface. At this point the Hwy. #417 cut will extend through the very stiff to firm silty clay stratum and terminate within the underlying compact sandy silt layer. The maximum height of the approaches, in the longitudinal, direction will be of the order of 22 to 24 feet. This will involve fills of up to 4 feet in height, in addition to the cuts mentioned previously.

The foundation recommendations for the site are presented in the following table.:

# FOUNDATION RECOMMENDATIONS

Underpass Structure at Pleasant Park Road - Site 'E'

Approx. Exist. Ground Level (Hwy. #417 Grade) (ft.)	Proposed Hwy. #417 Grade Related to Subsoil and Ground- water conditions.	R E C O M M E N D A T I O N S		<u>REMARKS</u>
		<u>STRUCTURE</u>	<u>APPROACHES</u>	
277.5 (261)	<p><u>Cut: Max. Depth 22'</u> (base of excavation is approx. 10' below recorded groundwater level).</p> <p>-excavation extends through very stiff to firm silty clay stratum into compact sandy silt layer.</p>	<p><u>Piers:</u> Spread footings founded at or below elev. 256, within glacial Till stratum -allowable bearing pressure 2.5 t.s.f. or alternatively, the spread footings could be carried down to elev. 250 - an allowable bearing pressure up to 5 t.s.f. could be used in design.</p> <p><u>Abutments:</u> founded on end- bearing piles driven to practical refusal within the bouldery zone of the glacial till. -estimated pile tip elevation 245 to 250 designed for max. capacity of pile section chosen.</p>	<p><u>Stability:</u> 24' high approaches (slopes 2:1) in the longitudinal direction, will be stable, provided it is properly sodded, staked and wire meshed as per D.H.O. practises.</p> <p><u>Consolidation Settlement</u> Beneath 4' fills will be negligible.</p>	<p>-It would be beneficia to carry out the Hwy. #417 excavation prior to construction of the structure foundations.</p> <p>The excavation bottom may be situated in a pervious granular layer (sandy silt). In such a case, special measures will be required to lower the groundwater level well below the base elevation of the excavation. This could be achieved by installing a suitable subdrain system.</p>

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

6.4) Underpass Structure - Proposed Eastern Parkway:

SITE 'F'

The span length of the proposed structure is 420 feet. It is understood that the profile grade of Hwy. #417 and Proposed Eastern Parkway, in the vicinity of the Structure, will be at about elevation 258 and 280, respectively. Hwy. #417 will, therefore, be in a cut, which at its deepest point extends 25 feet below the existing ground surface. This cut will extend into the hard cohesive glacial till deposit. The maximum height of the approaches, in the longitudinal direction will be of the order of 25 feet. This will involve fills between 5 and 6 feet, in addition to the cuts mentioned previously.

The foundation recommendations for the proposed structure are presented in the following table.:

# FOUNDATION RECOMMENDATIONS

## Underpass Structure at Proposed Eastern Parkway - Site 'F'

Approx. Exist. Ground Level (Hwy. #417 Grade) (ft.)	Proposed Hwy. #417 Grade Related to Subsoil and Ground- water conditions.	R E C O M M E N D A T I O N S		<u>REMARKS</u>
		<u>STRUCTURE</u>	<u>APPROACHES</u>	
272 (258)	<u>Cut:</u> Max. depth 25' (base of excavation is 12' below recorded ground water level) -excavation extends into the Hard Cohesive Glacial Till.	<u>Piers &amp; Abutments:</u> Spread Footings founded within glacial till -allowable bearing pressure up to 5 t.s.f.  cont'd./ 15	<u>Stability:</u> 25' high approaches (slopes 2:1) in the longitudinal direction will be stable, provided it is properly sodded, staked and wire meshed as per D.H.O. methods.  <u>Settlement:</u> Beneath 6' of fill will be negligible.	It would be beneficial to carry out the Hwy. #417 excavation prior to construction of the structure foundations

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

6.5) Underpass Structure at Smyth Road

SITE 'G'

The span length of the proposed structure is 400 feet. It is understood that the profile grade of Hwy. #417 and Smyth Road, in the vicinity of the structure, will be at about elevation 255 and 277, respectively. Hwy. #417 will, therefore, be in a cut, which at its deepest point extends 21 feet below the existing ground surface. This cut will extend into the hard cohesive glacial till. The maximum height of the approaches, in the longitudinal direction, will be of the order of 22 to 23 feet in height. This will involve fills between 2 and 5 feet, in addition to the cuts mentioned previously.

The foundation recommendations for the proposed structure are presented in the following table.:

# FOUNDATION RECOMMENDATIONS

Underpass Structure at Smyth Road - Site 'G'

Approx. Exist. Ground Level (Hwy. #417 Grade) (ft.)	Proposed Hwy. #417 Grade Related to Subsoil and Ground- Water Conditions.	R E C O M M E N D A T I O N S		<u>REMARKS</u>
		<u>STRUCTURE</u>	<u>APPROACHES</u>	
270 (255)	<p><u>Cut:</u> Max. depth 21' (base of excavation is approx. 9' below recorded ground water level).</p> <p>- excavation extends into the Hard Cohesive Glacial Till.</p>	<p><u>Piers:</u></p> <p>Spread footings founded on sound bedrock-allowable bearing pressure up to 10 t.s.f.</p> <p><u>Abutments</u></p> <p>Spread Footings founded within the glacial till - allowable bearing pressure up to 4 t.s.f.</p> <p>cont'd./17</p>	<p><u>Stability:</u></p> <p>23' high approaches (slopes 2:1) in the longitudinal direction will be stable, provided it is properly sodded staked and wire meshed as per D.H.O. methods.</p> <p><u>Settlement:</u></p> <p>Beneath 5' of fill will be negligible.</p>	<p>It would be beneficial to carry out the Hwy. #417 excavation prior to construction of the structure foundation.</p>

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

6.6) Overpass Structure at Proposed Eastern Parkway  
- Smyth Road Crossing-

SITE 'H'

The span length of this proposed structure will be about 150 feet. It is understood that the profile grade of the Proposed Eastern Parkway and Smyth Road, in the vicinity of the structure, will be at about elevation 283 and 262, respectively. Smyth Road will, therefore, be in a 3 foot cut. The approach embankments will have a maximum height of 21 and 18 feet in the longitudinal and transverse direction, respectively.

The foundation recommendations for the proposed structure are presented in the following table.:

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# FOUNDATION RECOMMENDATIONS

Overpass Structure At Crossing Of Proposed Eastern Parkway  
And Smyth Road - Site 'H'

And Smyth Road - Site 'H'			
Approx. Exist. Ground Elev. (Hwy. #417 Grade) (ft.)	R E C O M M E N D A T I O N S		REMARKS
	<u>STRUCTURE</u>	<u>EMBANKMENTS</u> (Height of Fill Proposed ) ( Longitudinal Direction 21') ( Transverse Direction 18')	
265 (262)	<p><u>Piers:</u></p> <p>Spread Footings founded at or below elevation 257, within glacial till. -allowable bearing pressure 2.5 t.s.f., or alternatively, end-bearing piles driven to bedrock as discussed below.</p> <p><u>Abutments:</u></p> <p>Spread Footings founded on compacted granular material located within approach fills, allowable bearing pressure 2 t.s.f. or, alternatively, end-bearing piles driven to bedrock - approx. tip elevation 230 -designed for max. capacity of the pile section chosen.</p>	<p><u>Stability:</u></p> <p>Max. height of approach fills 21' (with 2:1 slopes), will be stable.</p> <p><u>Probable Settlement:</u></p> <p>Fill heights up to 18' (transverse direction) Settlement will not exceed 2" to 3"</p> <p>(Will be elastic in nature) -ie. take place during or following the construction period.</p> <p>cont'd./19</p>	

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

6.7) Underpass Structure at Alta Vista Drive

SITE 'K'

The span length of the proposed structure will be about 260 feet. It is understood that the profile grade of Hwy. #417 and Alta Vista Drive, in the vicinity of the structure, will be at about elevation 198 and 221, respectively. Hwy. #417 will, therefore, be a cut, which at its deepest point extends 20 feet below the existing ground surface. This cut will extend through the surficial deposits, hard cohesive glacial till Stratum into the shale bedrock. The maximum height of the approaches, in the longitudinal direction, will be of the order of 24 feet. This will involve fills up to 5 feet, in addition to the cuts mentioned previously.

The foundation recommendations for the proposed structure are presented in the following table.:

# FOUNDATION RECOMMENDATIONS

## Underpass Structure at Alta Vista Drive - Site 'K'

Approx. Exist. Ground Level (Hwy. #417 Grade) (ft.)	Prop. Hwy. #417 Grade Related To Subsoil and Groundwater Conditions.	R E C O M M E N D A T I O N S		<u>REMARKS</u>
		<u>STRUCTURE</u>	<u>APPROACHES</u>	
217 (198)	<u>Cut:</u> Max. depth 20'  -excavation extends through surficial deposits, hard cohesive glacial Till stratum into sound bedrock.	<u>Piers:</u> Spread footings founded on sound bedrock -allowable bearing pressure up to 10 t.s.f.  <u>Abutments:</u> Spread footings founded within glacial till (ie. at or below elev. 207) -allowable bearing pressure up to 4 t.s.f., or alternatively end- bearing piles driven to bedrock -estimated tip elev. 202. -designed for max. capacity of the pile section chosen.	<u>Stability:</u> 24' high approaches (slopes 2:1) in the longitudinal direction, will be stable.  <u>Probable Settlement:</u> Beneath 5' of fill will be negligible.	At the proposed grade of Hwy. 417, excavation of sound shale bedrock will be required. The amount of this excavation could be limited by raising the grade of Hwy. #417.

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

6.8) Foundations in Close Proximity to Buried Utilities:

The un-numbered profile provided indicates that storm and sanitary sewers may be situated in close proximity to some of the structure elements at the following structure crossings, namely:

- i) Kilborn Avenue (Site 'D') - Sub Section 6.2)
- ii) Pleasant Park Rd. (Site 'E') - Sub Section 6.3)
- and iii) Smyth Road (Site 'G') - Sub Section 6.5)

As discussed in the above sub-sections some of the structure elements can be founded on spread footings, provided such footings are located in undisturbed subsoil. If, however, the element is to be located in, or within close proximity to, disturbed subsoil special measures will be required. The pertinent recommendations will be discussed in detail in our final foundation investigation reports.

It should be stressed that this report is of a preliminary nature. A complete foundation investigation will be required at the structure sites, when design details become available.

7. MISCELLANEOUS:

The field work for this project was carried out during the periods of May 21st to 26th and June 6th to 9th, inclusive, under the immediate supervision of Messrs. K.K. Kwan and D. Phelps, Project Foundation Engineers.

This report was written by Mr. B. T. Darch, Senior Foundation Engineer. The entire project was carried out under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who reviewed this report.

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

September, 1969.

APPENDIX I.

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE SITE 'D'

FOUNDATION SECTION

JOB 69-F-33

LOCATION Hwy. 417 & Kilborn Ave.

ORIGINATED BY **XXX**

W.P. 13-68

BORING DATE **May 21, 22, 23 & 26, 1969**

COMPILED BY DP

DATUM      Geodetic

BOREHOLE TYPE Washboring-NX,BX,AX Casing; AXT Rock Core

CHECKED BY *[Signature]*

[illegible]

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE SITE 'E'

FOUNDATION SECTION

JOB 69-F-33

LOCATION Hwy. 417 &amp; Pleasant Park Rd.

ORIGINATED BY KKK

W.P. 13-68

BORING DATE May 21, 1969

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Washboring-NX,BX,AX Casing; AXT Rock Core

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 $\gamma$	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							400	800	1200	1600	2000					
275.6	Ground Level															
0.0	Silty sand, trace of clay & org. matter (Brown) Loose		1	SS	8											
272.6																
3.0	Desiccated Very stiff clay to silty clay, trace of sand (Grey)		2	SS	10	270										
262.1	Firm		3	TW	PM											
13.5	Sandy silt, trace of clay & gravel (Grey)		4	SS	24	260										
257.6	Compact		5	SS	25											
18.0	Clayey silt with sand & gravel (Glacial Till)		6	SS	11											
250.1	Stiff Grey					250										
25.5	Bouldery Zone (boulders up to 2' in size throughout)		7	AXT	35%											
			8	AXT	12.5%	240										
			9	AXT	13.5%											
232.6	Hard		10	AXT	22.5%											
43.0	fractured Shale Bedrock with interbedded shaly limestone bedrock (Grey)		11	AXT	79%	230										
			12	AXT	50%											
			13	AXT	97%											
			14	AXT	79%											
220.3	Sound		15	AXT	100%	220										
55.3	End of Borehole															

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE SITE 'F'

FOUNDATION SECTION

JOB 69MF-33 LOCATION Hwy. 417 & Eastern Parkway ORIGINATED BY BTD  
W.P. 13-68 BORING DATE June 6 & 9, 1969 COMPILED BY VK  
DATUM Geodetic BOREHOLE TYPE Washboring-NX BX, AX Casing; BXT & AXT Rock Core CHECKED BY SR

SOIL PROFILE		SAMPLES			ELEV DEPTH	DYNAMIC PENETRATION BLOWS / FOOT	LIQUID LIMIT — W <sub>L</sub> PLASTIC LIMIT — W <sub>P</sub> WATER CONTENT — W <sub>1</sub> W <sub>2</sub> — W <sub>1</sub> WATER CONTENT % 20 40 60	BULK DENSITY Y P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS/FOOT					
272.1	Ground Level								
0.0	Clayey Silt Topsoil	1	SS	7	270				269.8
1.0	Clayey silt, with sand and gravel (Glacial Till)	2	SS	114					16 44 31 9
	Grey	3	SS	40	260				28 50 17 5
256.7	Hard	4	SS	113/5"					WL in open BH
15.4	Bouldery Zone (boulders up to 6" in size)	5	BXT	32.5%					June 9/69
		6	BXT	43%					
		7	BXT	0%	250				
		8	BXT	37%					
		9	BXT	32%					
243.1	Hard	10	AXT	50%					
29.0	fractured	11	AXT	92%	240				
237.2	Shale Bedrock, interbedded shale limestone. Grey	12	AXT	100%					
34.9	End of Borehole				230				



DEPARTMENT OF HIGHWAYS - ONTARIO		<b>RECORD OF BOREHOLE SITE 'G'</b>		FOUNDATION SECTION
MATERIALS & TESTING OFFICE				
JOB <u>69-F-33</u>	LOCATION <u>Hwy. 417 &amp; Smyth Rd.</u>	ORIGINATED BY <u>KKK</u>		
W.P. <u>13-68</u>	BORING DATE <u>May 21, 1969</u>	COMPILED BY <u>VK</u>		
DATUM <u>Geodetic</u>	BOREHOLE TYPE <u>Washboring - NX, BX Casing; BKT Rock Core</u>	CHECKED BY <u>[Signature]</u>		

SOIL PROFILE			SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE	LIQUID LIMIT — %	BULK DENSITY	REMARKS	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE		BLOWS / FOOT	BLOWS / FOOT			PLASTIC LIMIT — %
							WATER CONTENT — %			
						SHEAR STRENGTH P.S.F.	W <sub>p</sub> — %			
						○ UNCONFINED      + FIELD VANE	W — %			
						● QUICK TRIAXIAL    x LAB VANE	W <sub>L</sub> — %			
							WATER CONTENT %			
							20    40    60			
269.5	Ground Level									
0.0	Silty clay, trace of sand		1	SS	5					
266.5	& org. matter (Fill) Firm									
3.0	Clayey silt, with sand		2	SS	56					
	& gravel (Glacial Till)									
	Grey-Brown Hard									
	fragments of Shale		3	SS	42					
	throughout									
253.7	Hard		4	SS	105 1/2"					
15.8	fractured		5	BXT	502					
	Shale bedrock, with		6	BXT	100%					
	interbedded shaley									
247.0	limestone (Grey) Sound		7	BXT	93%					
22.5	End of Borehole									

264.2  
11-49 33 7

26 44 21 9

WL. in open  
BH on  
May 22/69

DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE SITE 'H'

FOUNDATION SECTION

JOB 69-F-33

LOCATION

Eastern Parkway &amp; Smyth Rd.

ORIGINATED BY

KKK

W.P. 13-68

BORING DATE

May 22 &amp; 23, 1969

COMPILED BY

VK

DATUM Geodetic

BOREHOLE TYPE

Washboring-NX,BX Casing; AXT Rock Core

CHECKED BY

JR

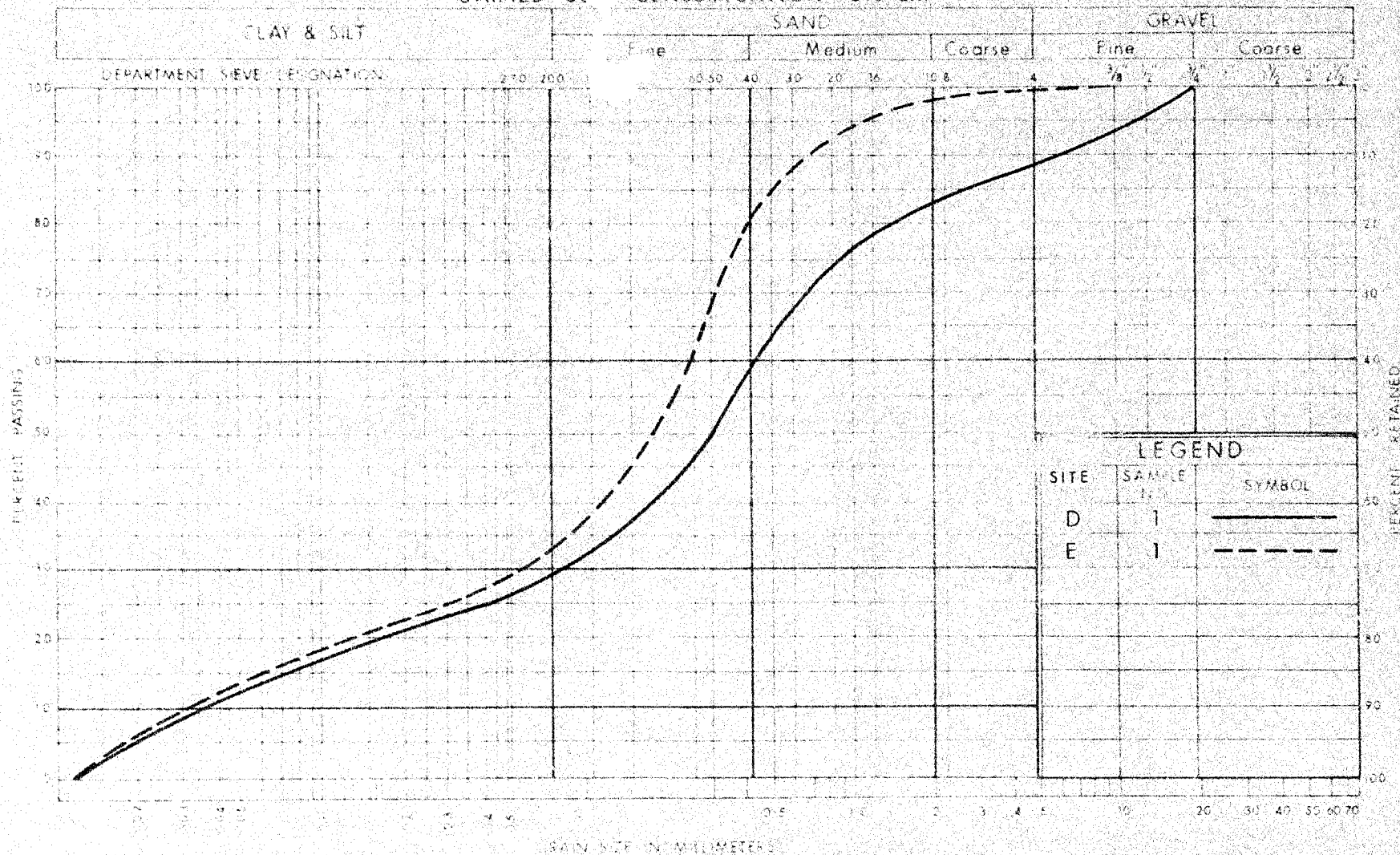
SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — — %		BULK DENSITY	REMARKS
ELEV DEPTH	DESCRIPTION	SIRAL PLOT	NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	PLASTIC LIMIT — — %		
							WATER CONTENT — — %		
							W <sub>p</sub> — — W <sub>L</sub> — —		
							WATER CONTENT %		
							20 40 60		
264.0	Ground Level								
0.0	Sandy silt, trace of gr. & organics (Fill)		1	SS	3				261.5
260.5	Loose					260			
3.5	Clayey silt with sand and gravel		2	SS	27		○ —		25 35 29 11
	(Glacial Till)		3	SS	12				
	(occ. zones where the matrix is composed of sand & gravel)		4	SS	16	250			
	Grey		5	SS	12				
	Very stiff to hard		6	SS	27	240	○ —		27 40 24 9
	Fragments of shale								
	Hard		7	SS	65				
230.3	Shale Bedrock, with interbedded shaley limestone. (grey)		8	AXT	100%	230			Piez. tip el. 231.
	Sound		9	AXT	100%				
223.2									WL in piez. on June 10/69
40.8	End of Borehole					220			

FOUNDATION SECTION

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  Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB. VANE		WATER CONTENT % 20 40 60			
216.7	Ground Level											
0.0	Silty sand, trace of gr & org. matter (Brown)		1	SS	8							
212.7	Fill Loose											
4.0	Sandy silt, trace of clay (Grey)		2	SS	5	210						0 26 63 11
207.7	Loose											
9.0	Clayey silt with sand & gravel (Glacial Till) (Grey) Hard		3	SS	40							18 18 29 5
202.4												Piez. tip el. 204.7
14.3	fractured Shale Bedrock, with interbedded shaley limestone (5" thick clayey silt seams about el. 194.5)		4	BXT	92%	200						Piez. dry on June 10
192.4	(Grey) Sand		5	BXT	100%							
24.3	End of ABorehole					190						

# UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAY  
MATERIALS AND  
TESTING  
DIVISION

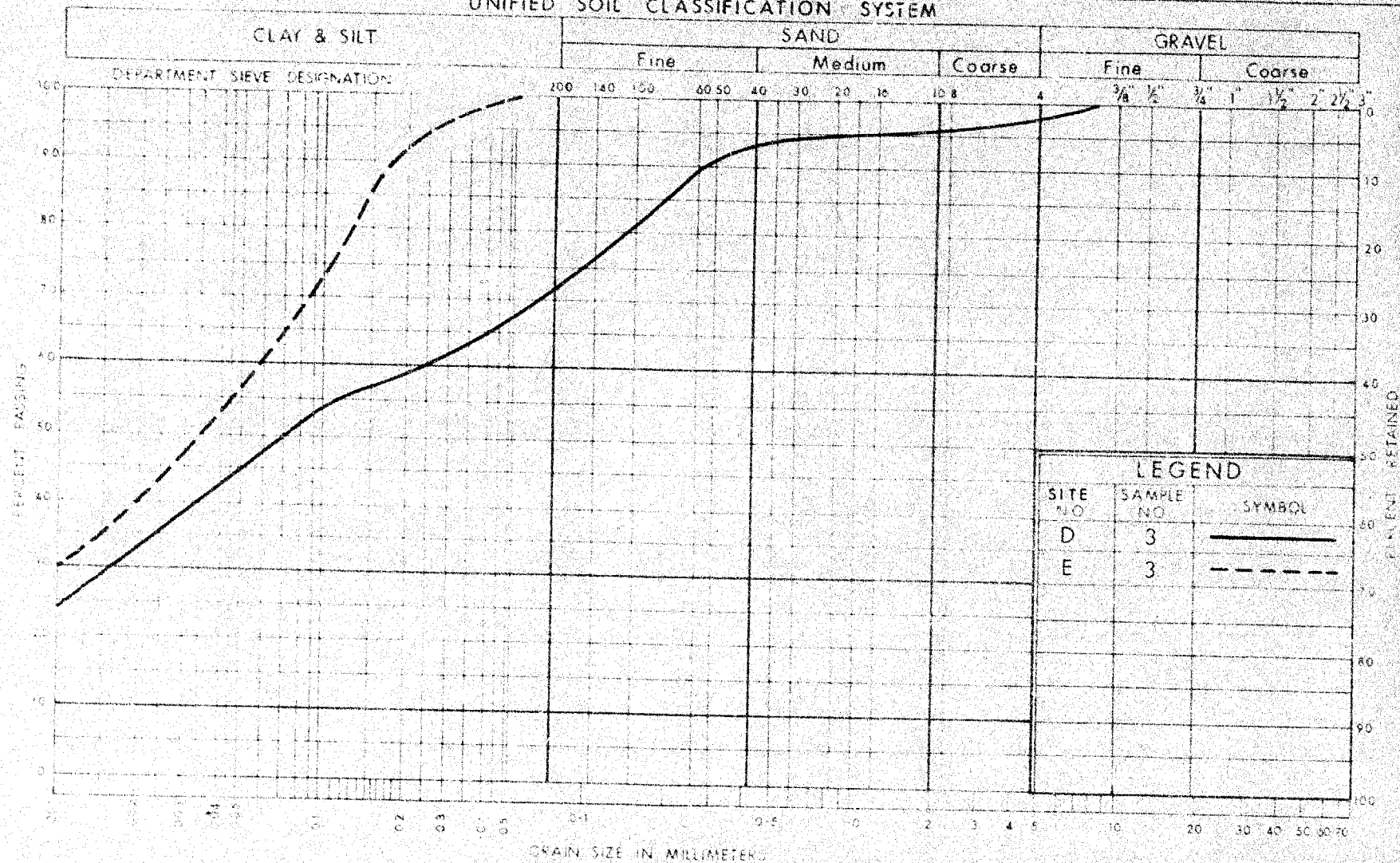
GRAIN SIZE DISTRIBUTION  
SILTY SAND  
TRACE TO SOME GRAVEL

W.P. No. 13-68

JOB No. 69-F-33

FIG. No. 1

## UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

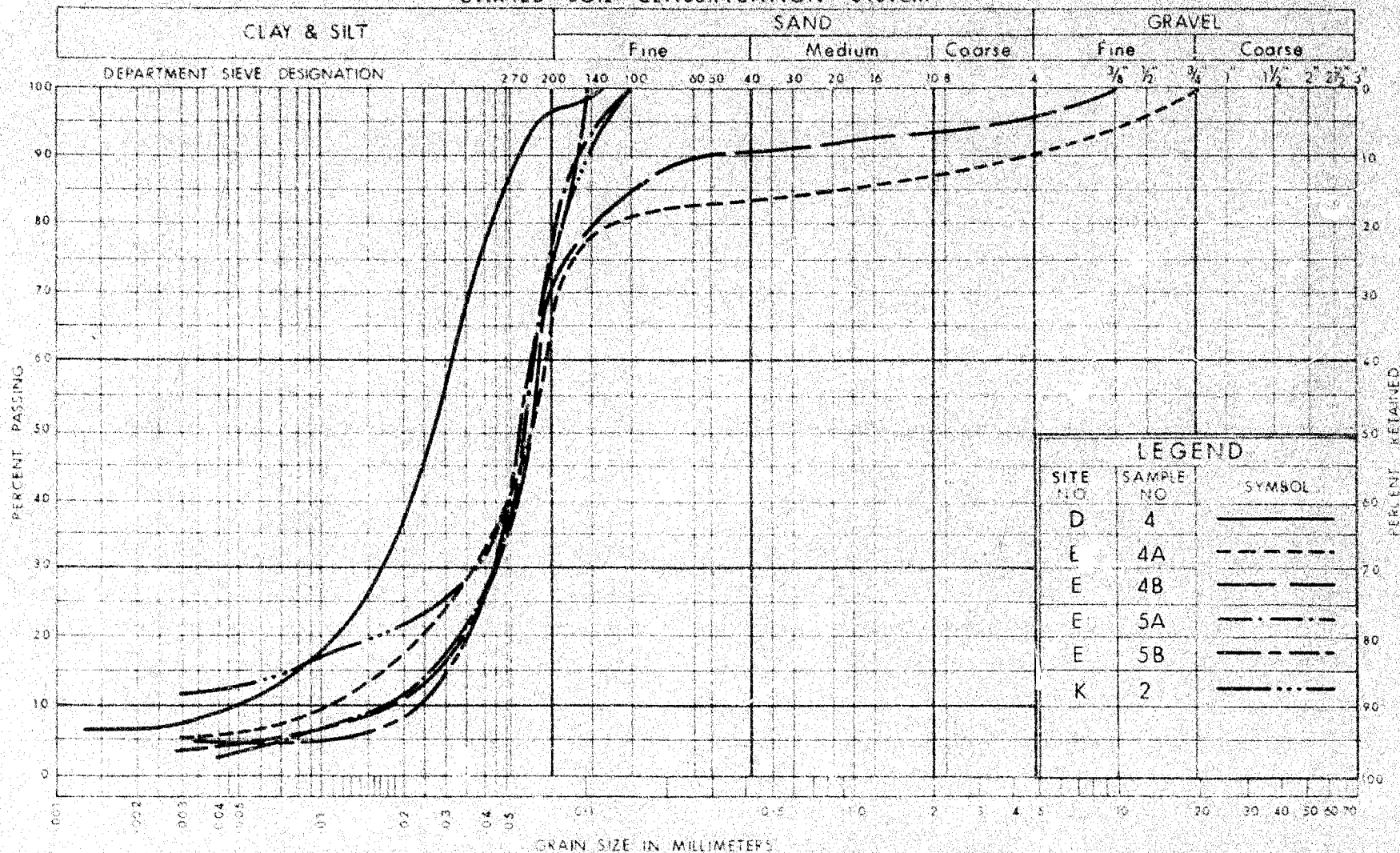
GRAIN SIZE DISTRIBUTION  
CLAY TO SILTY CLAY  
SENSITIVE

WP No. 13-68

JOB No. 69-F-33

FIG. No. 2

# UNIFIED SOIL CLASSIFICATION SYSTEM



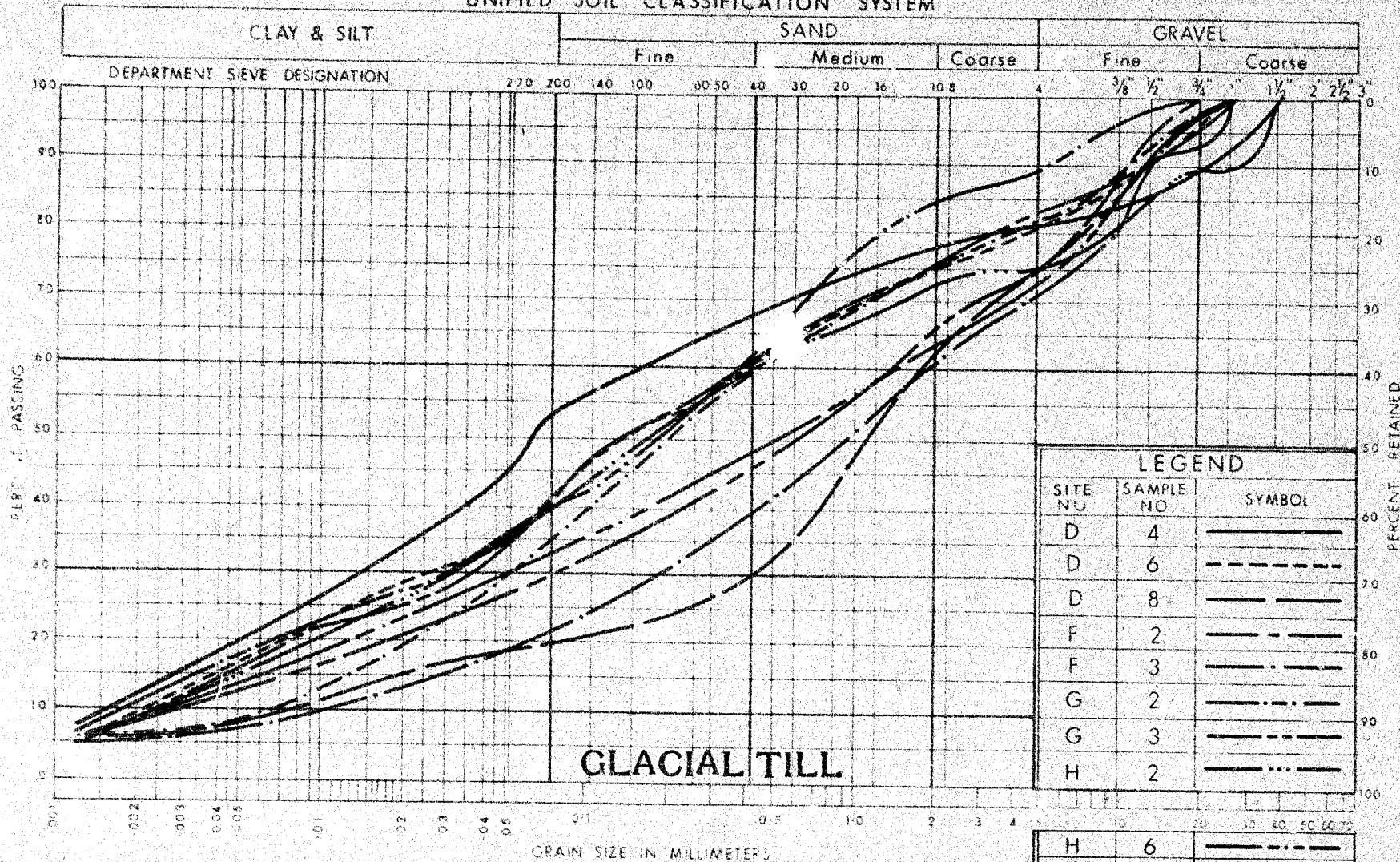
DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

GRAIN SIZE DISTRIBUTION  
SANDY SILT  
TRACE OF CLAY & GRAVEL

W.P. No. 13-68  
JOB No. 69-F-33  
FIG No. 3



# UNIFIED SOIL CLASSIFICATION SYSTEM



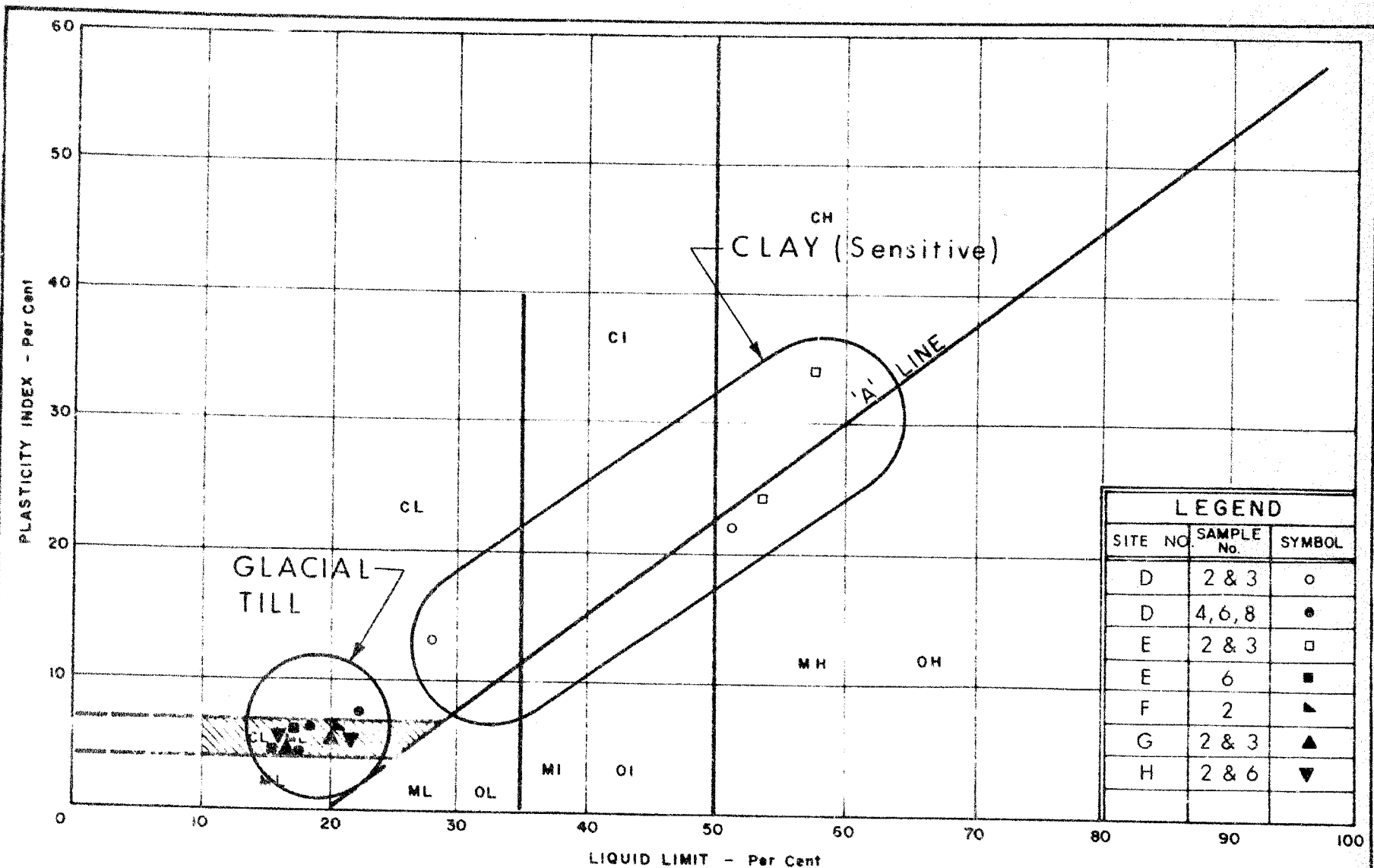
DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

GRAIN SIZE DISTRIBUTION  
CLAYEY SILT  
WITH SAND AND GRAVEL

WP No. 13-68

JOB No. 69-F-33

FIG. No. 4



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

## PLASTICITY CHART

W.P. No. 13 - 68

JOB No. 69-F-33



# VOID RATIO VS PRESSURE

$W_L = 27.9$   
 $W_P = 14.8$   
 $W = 31.1\%$   
 $C_c = .39$

SITE 'D'  
 SAMPLE 3  
 DEPTH 11' - 8"  
 ELEV. 269.5

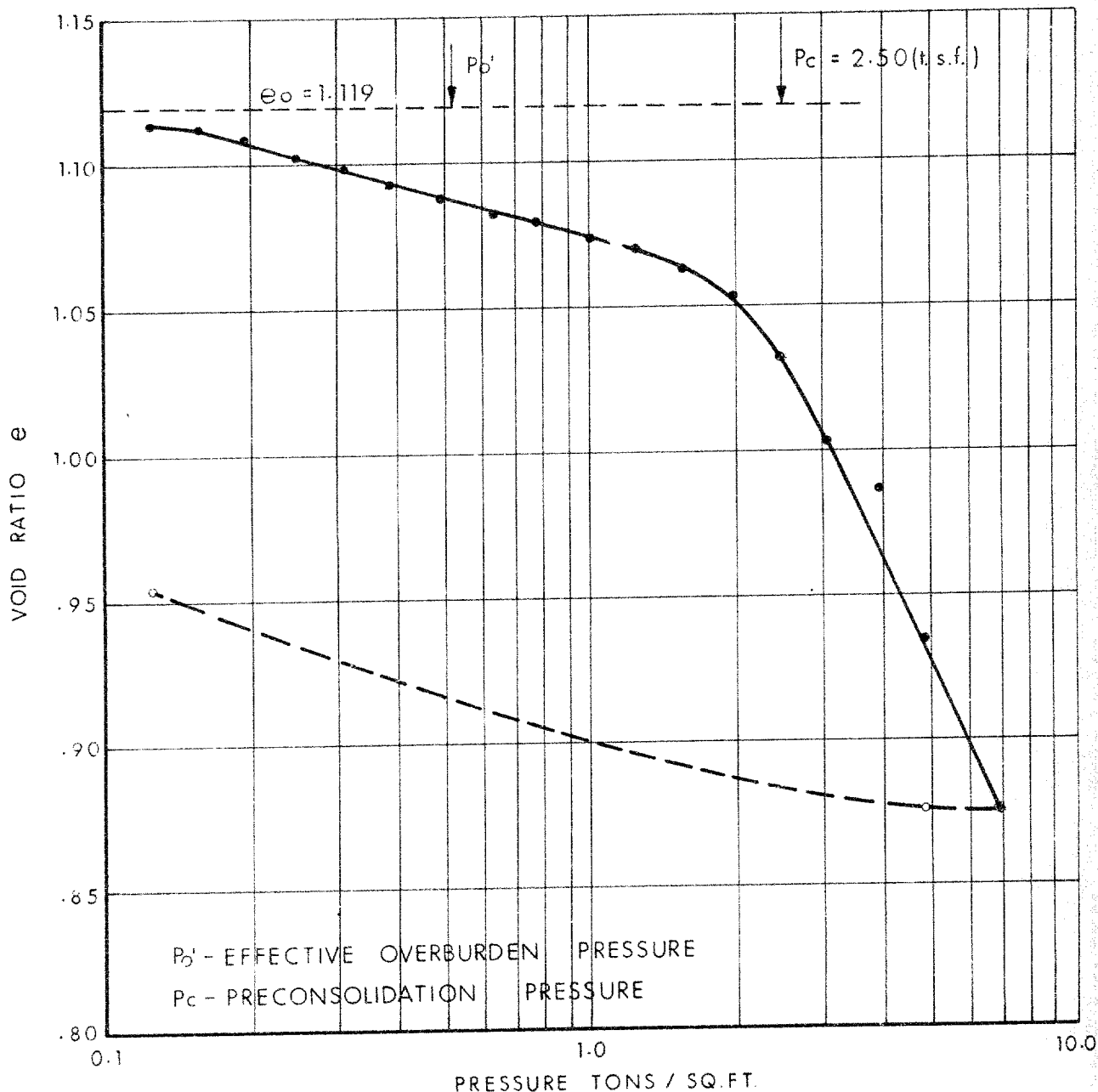


FIG. 6

## 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
$T_f$	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

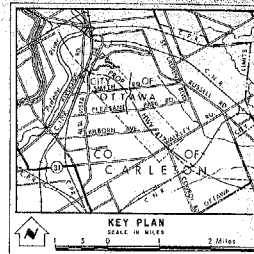
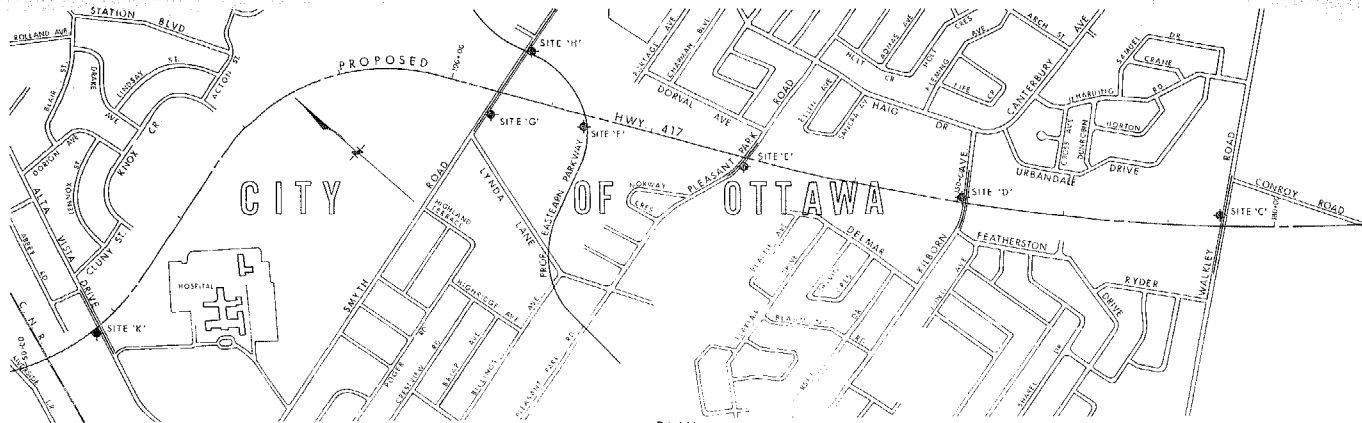
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_o$	COEFFICIENT OF EARTH PRESSURE AT REST

## FOUNDATIONS

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

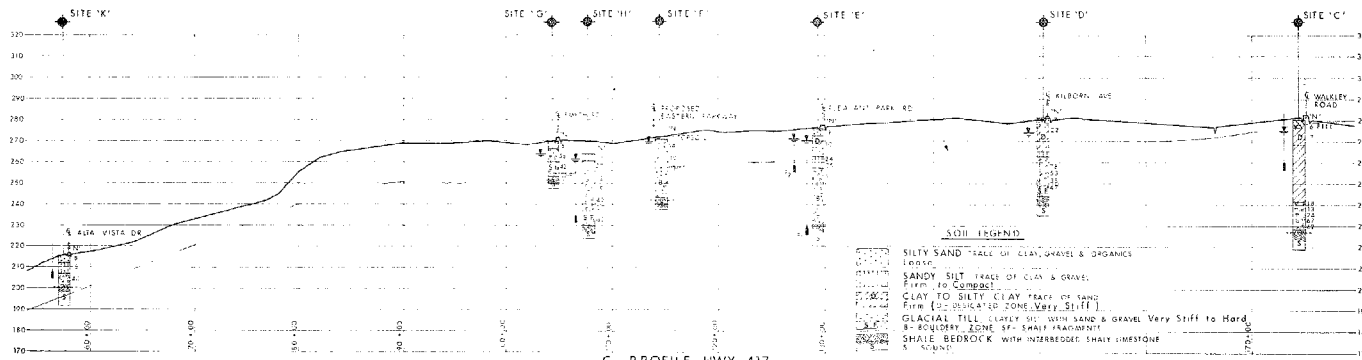
## SLOPES

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



LEGEND				
	Bore Hole			
	Cone Penetration Hole			
	Water Levels established at time of field investigation May & June 1969			
	Pierometer			
SITE	ELEVATION	STATION	OFFSET	
D	281.3	05	shown	
E	272.6	"	"	
F	272.1	"	"	
G	269.5	"	"	
H	264.0	"	"	
K	216.7	"	"	

**NOTE**  
The boundaries between soil strata have been established only of Bore Hole locations. Between bore holes the boundaries are assumed from geologic evidence and may be subject to considerable error.



**SOIL LEGEND**

- SILTY SAND - trace of clay, gravel & organics
- Loose
- SANDY SILT - trace of clay & gravel
- firm to compact
- CLAY TO SILTY CLAY - trace of sand
- firm to compact
- GLACIAL TILL - curdy silt with sand & gravel Very Stiff to Hard
- B - Boulder zone silt - shale fragment
- SHALE BEDROCK with interbedded shale limestone
- CLAY

**PROFILE HWY. 417**  
SCALE  
HORIZ. 1" = 200' 0 400 600 800 1000' APPR  
VERT. 1" = 20' 0 20 40 60 80 100'

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

**SITES D, E, F, G, H & K - OTTAWA**

KIND OF HIGHWAY NO. 417 DIST. NO. 2  
CD. CARLETON CITY OF OTTAWA  
TWP. LOT CON.

**BORE HOLE LOCATIONS & SOIL STRATA**

SURVEYED BY: D. E. DICKER	REP. NO. 13 - 68	TEST. DRAWING NO.
DRAWN BY: G. E. DICKER	REP. NO. 30 - F-23	69-F-33A
DATE: June 10, 1969	DATE: June 10, 1969	DESIGN DRAWING NO.
APPROVED: [Signature]	DATE: June 10, 1969	

MEMORANDUM

*a. Stearns*  
WJ 69-F-33

To: Mr. M. R. Ernesaks  
Regional Functional Planning Engr.,  
Functional Planning, Office  
Kingston

FROM: Materials and Testing Office  
Kingston

ATTENTION:

DATE: July 8, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: Hwy. 417, W.P. 13-68 and 10-69,  
From Ramsayville to the Ottawa  
Queensway.  
District 9, Ottawa

Further to Mr. Percy's memorandum dated May 20, 1970, and our memoranda to your section dated March 31, 1970, and May 1, 1970, we have now completed a preliminary soils investigation on the proposed section of depressed expressway between Walkley Road and Alta Vista Drive.

Borings were placed by power auger approximately 500' apart. The borings generally penetrated 4' to 5' below profile grade from Station 100 to Station 150 and 2' to 4' below ground level between Station 150 and Station 217 where refusal was met due to the bouldery nature of the subsoil. A seismic survey was carried out along centreline from Station 154 to Station 217. All the data from this investigation plus borehole data from preliminary foundation borings has been plotted on the profile print which is forwarded for your use in determining the functional plan for this section. Please return the print when you have obtained sufficient information.

Generally the yellow colour indicates unacceptable marine clay material and the blue colour on the profile indicates acceptable stiff to very hard bouldery till. The unacceptable clay material was mainly encountered between Station 100 (Walkley Road) and Station 149 and the till material was encountered from Station 149 to Station 217 (Railway between Alta Vista Drive and Riverside Drive). The brown line indicates shale bedrock which was encountered above the depressed gradeline from Station 166 to Station 175 and from Station 180 to Station 212.

The following design considerations are recommended for Planning purposes.

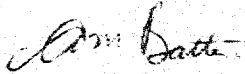
Continued /2

1. All of the earth cut shown on the profile may be excavated with 2:1 slopes. Deep stability problems are not anticipated with this procedure. From Station 115 to Station 149, cut slopes higher than 6' should be blanketed with an 18" depth of previous stable granular (G.B.C. Class 'A' or 'B') in order to control surface erosion.
2. From Station 100 to Station 149, the cut material is not suitable for use as fill and will have to be wasted off the job or placed outside 1:1 slopes on the section south of Walkley Road.
3. From Station 100 to Station 149, a 24" depth of G.B.C. Class 'B' should be estimated below 6" G.B.C. 'A' and 12" asphalt. On the remainder of the section the pavement structure should be estimated as 12" asphalt over 9" G.B.C. Class 'A'.
4. It will be necessary to place granular full width or to place 6" subdrains below the granular base and subbase in order that positive drainage of the base will be constructed.
5. Where the land form drains toward the proposed cut section, an intercepting ditch should be constructed with inlets to the storm sewer system in order to minimize erosion of the proposed cut slopes.
6. In order to reduce the amount of excavation through the wet clay portion of the cut between Station 100 and Station 149, it may be advantageous to construct retaining walls on cuts with slopes higher than 8 feet.

Retaining walls would be constructed on spread footings founded in the till stratum below the wet clay or on bearing piles driven into the till to bedrock. Generally, retaining walls could be founded on spread footings from Station 123 to Station 149. From Station 113 to Station 123, construction on spread footings may not be feasible due to the depth of clay. A detailed foundation investigation will be carried out for any proposed retaining walls.
7. It may be possible to reduce the required granular depth through the clay cut portion of the alignment by lime stabilization of the top 6" to 12" of clay material pending further experience with this procedure. However, for planning purposes, the conventional construction previously outlined, should be estimated.
8. Construction on the alternative (higher) gradeline generally would consist of stripping an average 8" depth of topsoil and construction of subgrade with acceptable sandy till or fine sand borrow material. Obtaining borrow has been discussed in memorandum dated May 1, 1970. Pavement construction would probably consist of a 12" depth of hot

mix over 9" G.B.C. Class 'A' over the borrow fill material.

9. Grading and drainage should be carried out 1 year in advance of granular base and paving for either gradeline. Granular blanket construction on cut slopes would be included with the grading project.
10. No adverse affects on the surrounding land and buildings are anticipated due to construction of a depressed expressway.

  
A. M. Batten

for: J. E. Gruspier  
Regional Materials Engineer

AMB:mgm

cc: J. E. Callaghan  
G. A. Wrong  
A. Stermac ✓  
S. J. Markiewicz  
H. Aron

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 31605-073

DIST. 9 REGION Eastern

W.P. No. 13-68-01

CONT. No. 73-192

W. O. No. \_\_\_\_\_

STR. SITE No. 3-244

HWY. No. 417

LOCATION Ottawa Queensway

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. \_\_\_\_\_

REMARKS: documents to be unfolded  
before microfilming



Design Services Branch,  
1201 Wilson Avenue,  
Downsview, Ontario.  
M3M 1J8

December 7th, 1973.

F. E. Johnston Drilling Co. Ltd.,  
P.O. Box 4134,  
Postal Station 'E',  
Ottawa, Ontario.  
K1S 5B2

Dear Sirs:

This letter confirms our request of December 4th, 1973 for the supply of C.M.E. with Hollow Stem Auger & Bombardier together with all necessary equipment as specified under the terms of our Contract Agreement, at Cyrville Road & Queensway on December 10th, 1973.

Mobilisation will be from Ottawa.

Our Project Number is W.O. 73-11096. ✓

Yours truly,

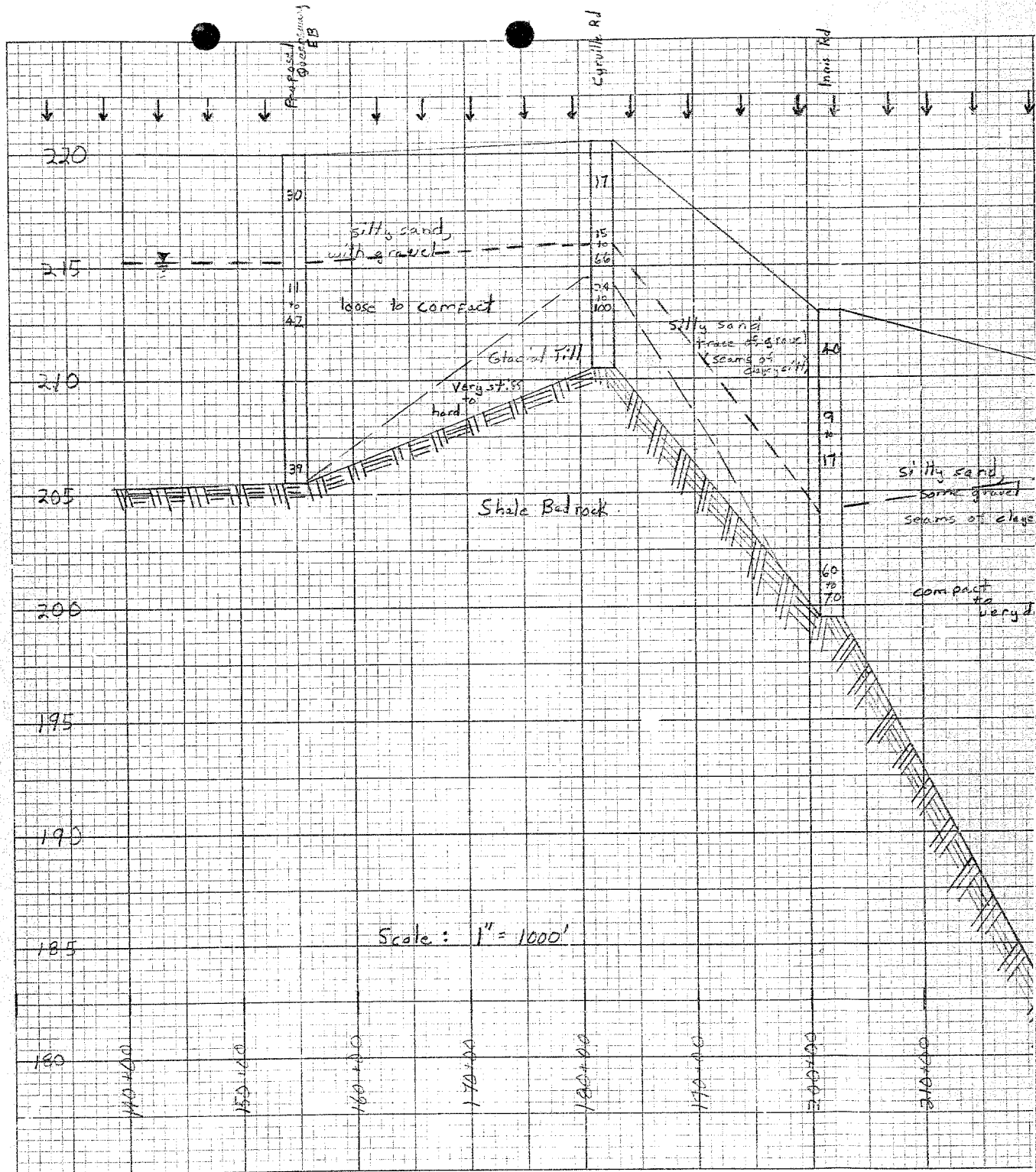
ORIGINAL SIGNED BY  
A. G. STERMAC

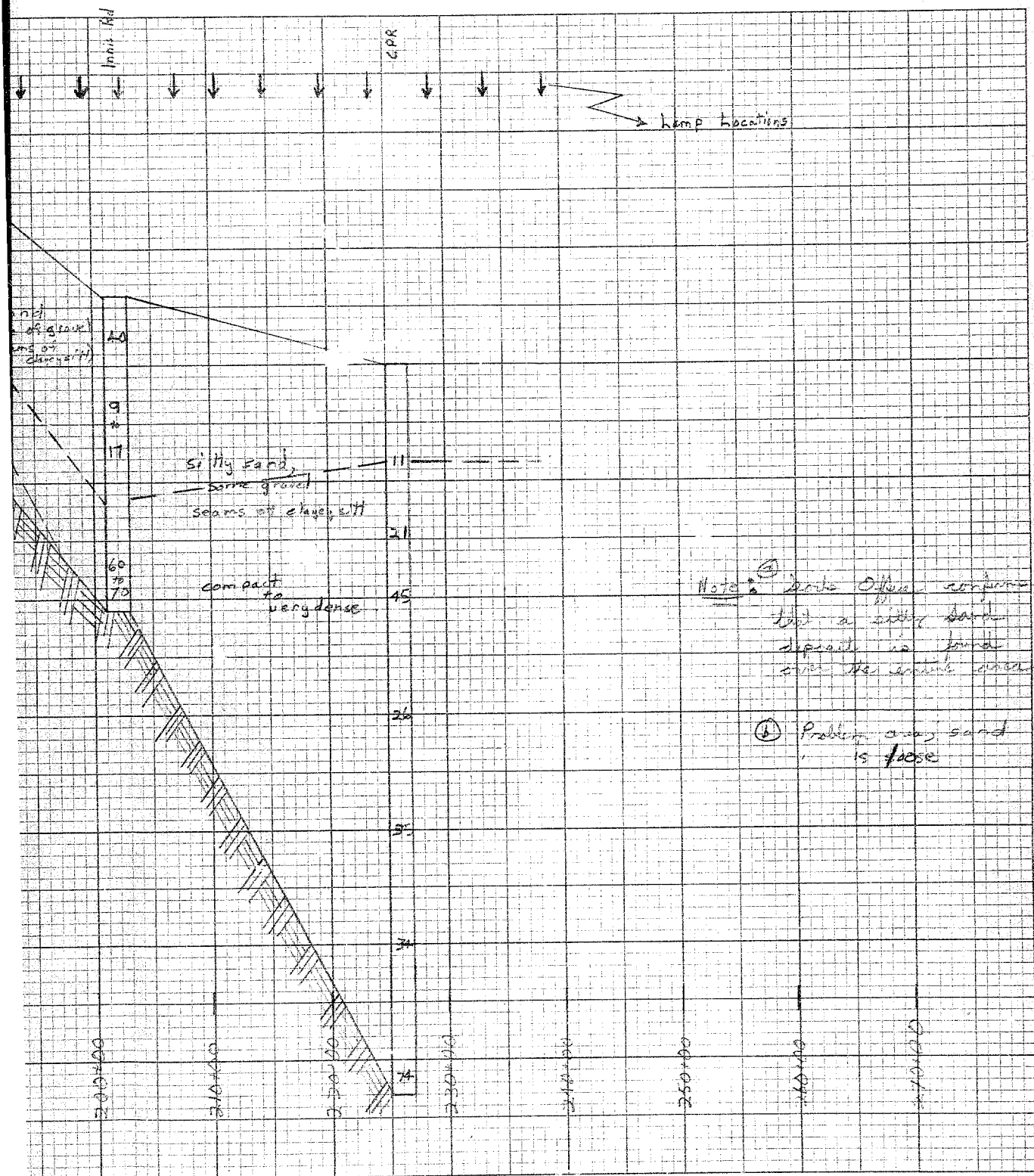
MD/j1

c.c. W. W. Fry  
(Attn: Mrs. M. Porter)

A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER.

Foundations Files  
Documents





# FIELD BORING LOG

FF-95

DRILLING CO. Johnston Ltd. DATUM ELEV. \_\_\_\_\_ B.H. NO. 1  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Ramas CASING SIZE \_\_\_\_\_ DATE Dec 18/73  
 SITE LOCATION Ottawa  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger granular material (Fill) Queensway Embankment		(16)
2.5	4.0	Split Spoon; Wet mixture of clay with sand & gravel, black, very stiff	SS#1, 15"	3-7-9
2.5	3.0	Auger as above		(29)
3.0	6.5	Split Spoon; Wet mixture of clay with sand & gravel (Fill) black, very stiff	SS#2, 18"	7-10-19
3.0	7.5	Auger as above		(15)
7.5	9.0	Split Spoon; as above (fill) with pieces of weathered shale in bottom of spoon, black, firm	SS#3	9-6-9
7.5	10.0	Auger; as above to 9.5' then change to weathered shale		(36)
10.0	11.5	Split Spoon; weathered shale, gray to black, firm	SS#4, 8"	12-18-18



## FF-95

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## FF-95

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger; clay, silt, sand & gravel		
2.5	4.0	Split Spoon; bit mixture of clay with sand & gravel (Till), <del>some</del> <sup>5 ft</sup>	SS #1, 12"	(14) 5-6-8
2.5	5.0	Auger; sand & gravel		
5.0	6.5	Split Spoon; fine sand (Till) <sup>1 inch</sup>	SS #2, 18"	(33) 10-16-17
5.0	7.5	Auger; sand & gravel to 7.95 ft then change to weathered shale		
7.5	8.1	Split Spoon; sand & gravel till to 7.95 ft then change to weathered shale;	SS #3, 5"	20-50/2" hammer sounding
		End of Borehole @ 8.15 ft		



FIELD BORING LOG

FF-95

DRILLING CO. <u>Johnston Ltd.</u>	DATUM ELEV. _____	B.H. NO. <u>2</u>
DRILLER <u>Larry</u>	GROUND ELEV. _____	JOB NO. <u>73-11096</u>
ENGINEER <u>J. Bangs</u>	CASING SIZE _____	DATE <u>Dec 10/73</u>
SITE LOCATION <u>Ottawa</u>		
HOLE LOCATION _____		
REMARKS _____		

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger; clay, silt, sand & gravel		
2.5	4.0	Split Spoon; wet mixture of clay, silt, sand & gravel (Till), green to black, silty	SS #1, 12"	5-6-8 (17)
2.5	5.0	Auger; clay, silt, sand & gravel		
5.0	6.5	Split Spoon; green clay (Till) hard	SS #2, 18"	10-16-17 (33)
5.0	7.5	Auger; as above to 7.95 ft then change to weathered shale		
7.5	9.1	Split Spoon; silty till to 7.95 ft then change to weathered shale	SS #3, 5"	20-50/2" hammer boring
		End of Borehole @ 9.15 ft		

FIELD BORING LOG

DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. 4  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Bains CASING SIZE \_\_\_\_\_ DATE Dec 11/63  
 SITE LOCATION Station 166+40 W.R.L. (North)  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger; top soil - organic material loose		
2.5	4.0	Split Spoon; organic material, soft loose, soft	SS#1, 6"	1-30/1" boulder
		Due to boulder encountered @ 3.0', moved about 3 ft. and pushed down to 5.0 ft.		
0.0	5.0	Auger; 3-5.0 sand & gravel, coarse		
5.0	6.5	Split Spoon; 5.0-5.8 sand & gravel, coarse, then change @ 5.8' to glacial till with pieces of shale very, very stiff	SS#2, 12"	(17) 8-6-11
5.0	7.5	Auger; glacial till		
7.5	9.0	Split Spoon; glacial till mixed with weathered shale, also weathered shale more predominant @ bottom of spoon very, hard	SS#3, 12"	(51) 5-23-28



## FF - 95

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# FIELD BORING LOG

DRILLING CO. Johnston Ltd DATED ELEV. \_\_\_\_\_ B.H. NO. 5  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-1096  
 ENGINEER J. Bangs CASING SIZE \_\_\_\_\_ DATE Dec 11/73  
 SITE LOCATION Admission  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger - silty sand to sandy silt, brown		
2.5	4.0	Split Spoon, silty sand, brown, loose	SS#1, 15"	(4) 1-1-3
4.0	6.5	Auger as above		
6.5	8.0	Split Spoon, silty sand, brown, compact	SS#2, 15"	(10) 3-5-5
8.0	9.0	Auger as above		
9.0	10.0	Split Spoon, silty sand, trace of gravel, brown, base	SS#3, 15"	(9) 4-4-5
10.0	10.5	Auger as above		
10.5	11.0	Split Spoon, silty sand, trace of gravel @ 10.5 ft	SS#4, 3"	7 - hammer blow
11.0	12.0	Auger, gravel @ 10.5 ft to 11.0 ft		
12.0		Portable Bedrock		
		Sand of Kumbhole @ 12.0 ft		
		W.L. @ 8.5 ft		



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[illegible]

# FIELD BORING LOG

DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. 7  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-1096  
 ENGINEER J. Farnie CASING SIZE \_\_\_\_\_ DATE Dec 11/73  
 SITE LOCATION O. Hara  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger clayey-silt, sand & gravelly spec.		(6)
2.5	4.0	5 pit spoon. Het. mix of clay, silt sand & gravel (Glacial till) - grey fine	S#1, 12'	1-3-3
2.5	5.0	Auger; as above		
5.0	6.5	5 pit spoon; Glacial till changing to silty sand in bottom of spoon; grey, very stiff.	S#2, 12'	(18) 5-11-7
5.0	7.5	Auger; becoming hard to auger - at 7.3 ft, auger would not penetrate beyond 7.5 ft - whole weight of machine on auger		
7.5		Probable B rock		
		End of Borehole		

FIELD BORING LOG

DRILLING CO. Lebanon Ltd. DATUM ELEV. \_\_\_\_\_ B.H. NO. 8  
 DRILLER L. B. Lane GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11076  
 ENGINEER J. B. Lane CASING SIZE \_\_\_\_\_ DATE Dec 11/73  
 SITE LOCATION 0.100  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger - clay, silt, sand & gravel (P.U.)		
2.5	4.0	Split Spoon - Hard M. clay & silt, all sand & gravel (6.0' to 4.0' till) over / near till phased to clay	SS <sup>1</sup> 1, 18"	(16) 4-7-9
2.5	5.0	Auger - no record		
5.0	6.5	Split Spoon; 6.0' to 5.0' till to 6.2 ft then changes the weathered shale, gray, hard	SS <sup>2</sup> 2, 15"	(34) 9-12-22
5.0	7.0	Auger - more gravel out probably beyond 7.0 ft.		
7.0		Probable bedrock		
		Sand off Borehole @ 7.05 ft		
		No water level in hole		

PF-95



# FIELD BORING LOG

DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. 9  
 DRILLER Loose GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. P. [unclear] CASING SIZE \_\_\_\_\_ DATE Dec 11/73  
 SITE LOCATION C2 [unclear]  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

V.L. @ 4.5 ft.

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger silty sand		
2.5	4.0	Split Spoon; silty sand, trace of gravel & clay, brown compact	SS#1, 15'	(10) 4-5-5
4.0	5.0	Auger as above		
5.0	6.5	Split Spoon; silty sand to sand, trace of gravelly silt, very loose; Note: sand 1.0 ft up in auger	SS#2, 10'	(2) 1-1-1
6.5	7.5	Auger silty sand		
7.5	9.0	Split Spoon; silty sand, gray, loose; Note: sand up in auger	SS#3, 15'	(7) 1-3-4
9.0	10.0	Auger as above		
10.0	11.5	Split Spoon; could not take sample because sand was 6 ft up in hollow stem auger; took sample in auger		

# FIELD BORING LOG

DRILLING CO. \_\_\_\_\_ DATUM ELEV. \_\_\_\_\_ B.H. NO. 9  
 DRILLER \_\_\_\_\_ GROUND ELEV. \_\_\_\_\_ JOB NO. 7371096  
 ENGINEER J. Bangs CASING SIZE \_\_\_\_\_ DATE Dec 12/73  
 SITE LOCATION \_\_\_\_\_  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
		Sample in hollow bitum = rather sand to sand, grey, loose	AS <sup>#</sup> 4	
		Due to sand coming up inside of casing, it is impossible to take samples unless we look water due to location of bitum the would be difficult to stand a auger ahead.		
10.0	15.0	Auger very easy to auger, probably rather sand.		
15.0	20.0	Auger very easy to auger, probably rather sand, very loose.		
		End of Borehole @ 20.0 ft		
		initial W.L. @ 4.5 ft. @ 9:30 AM		
		Final reading 0.5 ft. @ 11:30 AM		

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# FIELD BORING LOG

DRILLING CO. Johnston Ltd. DATUM ELEV. \_\_\_\_\_ B.H. NO. 10  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER L. Borge CASING SIZE \_\_\_\_\_ DATE Dec 12/73  
 SITE LOCATION Ottawa  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger silty sand, light brown,		
2.5	4.0	Split Spoon, silty sand to sandy, silty, brown, loose,	SS#1, 15"	⑥ 3-4-2
2.5	5.0	Auger no change to 4.5 ft then change to deeper soil		
5.0	6.5	Split Spoon, clayey silt with some of silt, grey, very soft	SS#2,	① 1/2-1/2-1
6.5	8.0	Vane test		
		Undist (34 + 34) × 1 × 20 = 1360 psf		
		Remould (16 + 16) × 1/2 × 20 = 320 psf	SS#4, 2	
8.0	9.0	Vane test		
		Undist (40 + 40) × 1 × 20 = 1600 psf		
		Remould (20 + 20) × 1/2 × 20 = 400 psf	S = 4.0	
5.0	10.0	Auger		
10.0	11.5	Shelly, fine, fine sand, silt to silty, grey, soft & loose	TS#3, put in for	



FIELD BORING LOG

FF-95

DRILLING CO. \_\_\_\_\_ DATUM ELEV. \_\_\_\_\_ B.H. NO. 10  
 DRILLER \_\_\_\_\_ GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Benge CASING SIZE \_\_\_\_\_ DATE Dec 12/73  
 SITE LOCATION \_\_\_\_\_  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
10.0	15.0	Assigned to 15.0' because @ 12.3' when we added the plug, and coming up the casing, so assigned to 15.0'		
15.0	16.5	5 pft Spoon; silt and sand, green changing to glacial till at bottom of spoon.	4" 12"	(6) 1-3-3
		Change to till @ 16.5'		
15.0	20.0	Auger - change @ 16.5 to sand. Note: could not take sample @ 20' because auger sand came up 11.5 ft into hollow stem auger.		
20.0		Pressure Sampler; (take inside casing) coarse sand, with silt, green.	AS 5	
20.0	30.0	Auger; very easy augering, probably silty sand, loose.		
		End of Borehole @ 30.0 ft.		
		W.L. @ 1.5 ft		

FIELD BORING LOG

DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. 11  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Bange CASING SIZE \_\_\_\_\_ DATE Dec 12/73  
 SITE LOCATION 0.5' above  
 HOLE LOCATION 2/5 45' = would not do hole where located because of  
 REMARKS water / swamp = 1/2 mile (and) = new hole, 4' to 12' below then  
the more significant hole was

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger silty sand to sandy silt, brown		
2.5	4.0	5 plit spoon; silty sand to sandy silt, brown, loose	55#1; 12"	(7) 2-3-4
4.0	5.0	Auger as above to 4.5' then change to silt with some of clay		
5.0	6.5	5 plit spoon; silt with some of silty clay, grey, firm	55#2; 18"	(5) 1-3-2
6.5	7.5	Auger as above to 7.0' then change to sandy silt		
7.5	9.0	5 plit spoon; fine sandy silt to silt, grey, compact	55#3; 15"	(19) 1-8-11
9.0	10.0	Auger as above		
10.0	11.5	5 plit spoon; sandy silt to silty sand, grey, compact	55#4; 15"	(22) 7-11-11
11.5	12.5	Auger as above		

DRILLING CO. _____	DATUM ELEV. _____	B.H. NO. <u>11</u>
DRILLER _____	GROUND ELEV. _____	JOB NO. <u>73-11096</u>
ENGINEER <u>J. Barron</u>	CASING SIZE _____	DATE <u>Dec 12/73</u>
SITE LOCATION _____		
HOLE LOCATION _____		
REMARKS _____		

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
				(21)
12.3	14.0	S. pit 5 ft. deep; sandy, silt to silty sand; green, compact	S#5, 18'	5-9-12
12.5	15.0	Run as above		
				(19)
15.0	16.5	S. pit 2 ft. deep; silty sand to sandy silt; brownish, compact	S#6,	4-8-11
		End of Borehole @ 16.5 ft.		
		W.L. @ 9.5 ft.		



FIELD BORING LOG

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DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. 12  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. R. Rags CASING SIZE \_\_\_\_\_ DATE Dec 10/73  
 SITE LOCATION Q44a wa  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger clean silty sand & gravel		
2.5	4.0	Split Spoon 1st Min. clayey silt sand & gravel black, firm	#1, 1'	2-2-4 (6)
2.5	5.0	Auger as above		
5.0	6.5	Split Spoon 1st Min. till above grey to black very silty	#2, 15"	7-12-16 (28)
5.0	7.5	Auger as above		
7.5	8.1	Split Spoon as above to 8.0' then change to shale block (weathered)	#3, 6"	12-4-11 hangs down
7.5	8.6	Auger auger would not penetrate passed 8.6 ft		
		End of Batchok @ 8.6 ft		
		No established water level		

# FIELD BORING LOG

DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. (2) - 13  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Bangs CASING SIZE \_\_\_\_\_ DATE Dec 10/73  
 SITE LOCATION Ottawa  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger		(14)
2.5	4.0	Split Spoon; Het mixture of sand, gravel & clayey silt, black, compact	SS #1; 12"	5-9-7-7
2.5	5.0	Auger; as above		(12)
5.0	6.5	Split Spoon; Het mixture of sand, gravel & clayey silt, traces of shale in bottom of spoon, compact black	SS #2; 8"	10-10-7
5.0	7.5	Auger as above		(14)
7.5	9.0	Split Spoon; as above, black	SS #3; 9"	6-6-8
7.5	10.0	Auger as above		(7)
10.0	11.5	Split Spoon; Het mixture of clayey silt, sand & gravel (clayey silt), black, firm	SS #4; 4"	4-3-4

EE-95

DRILLING CO. \_\_\_\_\_ DATUM ELEV. \_\_\_\_\_ B.H. NO. (X) 13  
 DRILLER \_\_\_\_\_ GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Briggs CASING SIZE \_\_\_\_\_ DATE Dec 10 / 73  
 SITE LOCATION \_\_\_\_\_  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	MET. OR BLO. DISTANCE
FROM	TO			
10.0	12.5	Auger as above		
12.5	13.4	Split Spoon, Hel mixture of clay-silt, sand & gravel, black and pieces of shale, hard.	55 <sup>th</sup> 9	7-39/4" Hammer
12.5	14.0	Auger - could not pierce passed 14.05'		
14.0		Probable Bedrock		
		End of Borehole @ 14.05'		
		W.L. @ 5.0'		



FIELD BORING LOG

DRILLING CO. Johnston Ltd DATUM ELEV. \_\_\_\_\_ B.H. NO. 14  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Bangs CAT VG SIZE \_\_\_\_\_ DATE Dec 13/73  
 SITE LOCATION Ottawa  
 HOLE LOCATION STA 199+20 WBL 9/0 62  
 REMARKS Elev 5.0 Lower than 343

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger silty sand with gravel		(15)
2.5	4.0	5' split spoon, silty sand and gravel, brown, compact	SS 1/12	5-8-7
4.0	5.0	Auger as above		(19)
5.0	6.5	5' split spoon, silty sand with gravel, brown, compact	SS 2/15	7-9-9
6.5	7.5	Auger as above to 7 ft. to change to silty sand		(5)
7.5	9.0	5' split spoon, silty sand to sandy, silty, brown, loose	SS 3/12	1-2-3
9.0	10.0	Auger as above		(7)
10.0	11.5	5' split spoon, silty sand to sandy, silty, brown, loose	SS 4/	3-3-4
10.0		Auger; Note sand, 5 ft. up in hollow then auger, can not remove		

FF-95

TF-95

FF-95

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# FIELD BORING LOG

DRILLING CO. Johnston Ltd. DATUM ELEV. \_\_\_\_\_ B.H. NO. 15  
 DRILLER Larry GROUND ELEV. \_\_\_\_\_ JOB NO. 73-11096  
 ENGINEER J. Bump CASING SIZE \_\_\_\_\_ DATE Dec 18/73  
 SITE LOCATION St. John's  
 HOLE LOCATION \_\_\_\_\_  
 REMARKS \_\_\_\_\_

DEPTH FROM	FEET TO	DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
0.0	2.5	Auger clayey-silt, sand gravel		
2.5	4.0	Split Spoon Ht. Mix of clay-silt sand & gravel. (Till) very to black, very stiff	SS#1 12"	(17) 2-12-5
2.5	3.0	Auger as above		
5.0	5.7	Split Spoon; Ground till to 5.3 ft then change to weathered shale, dark to grey hard	SS#2;	12-3 1/2" hammer blow no penetration by spoon
		End of hole @ 5.7 ft.		
		No water level.		
		Notes: Did not auger into shale because of dark mass.		

FIELD BORING LOG

DRILLING CO. Laboston Ltd. DATUM ELEV.            B.H. NO. 16  
 DRILLER Karr GROUND ELEV.            JOB NO. B-1096  
 ENGINEER J. B. King CASING SIZE            DATE Dec 13/73  
 SITE LOCATION             
 HOLE LOCATION Elevation 20 ft. Lower than P.H. #3  
 REMARKS STA 103+90 (Innis Rd) 107' offset

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger silty sand		
2.5	4.0	Split Spoon silty sand with gravel changing to glacial till in bottom of spoon. brown to grey, loose	SS #1, 10"	2-2-4 (6)
2.5	5.0	Auger glacial till grey		
5.0	6.5	Split Spoon glacial till to 5.5 ft then changes to silty sand, brown, loose	SS #2, 12"	4-4-3 (7)
5.0	7.5	Auger silty sand to 7.0 ft then changes to glacial till		
7.5	9.0	Split Spoon glacial till, grey to white, silty	SS #3, 12"	1-6-6 (12)
7.5	10.0	Auger as above		
10.0	11.5	Split Spoon, glacial till, brown, shale in bottom of spoon	SS #4	2-6-6 2-6-6
10.5		Probable Bedrock with @ 4.5 ft		

PL-95

## F-95

2.5' higher than ZH 6

[illegible]



FF-95

DRILLING CO. <u>Johnston Ltd</u>	DATUM ELEV. _____	B.H. NO. <u>13</u>
DRILLER <u>Larry</u>	GROUND ELEV. _____	JOB NO. <u>73-10916</u>
ENGINEER <u>J. Bunge</u>	CASING SIZE _____	DATE <u>Dec 13/71</u>
SITE LOCATION _____		
HOLE LOCATION <u>STA 170+70</u> <u>9/4 95'</u> <u>would not be hole</u>		
REMARKS <u>@ 102' because of break</u> <u>Elevation 122.1' higher than R. #</u>		

DEPTH FEET		DESCRIPTION	SAMPLE TYPE, NO. & RECOVERY	METHOD OR BLOWS & DISTANCE
FROM	TO			
0.0	2.5	Auger - down, cut, sand & gravel		(23)
2.5	4.0	Split Spoon, sandy, silty till, fine silty shale, black to brown, compact.	S <sup>t</sup> 1, 12"	7-10-13
2.5	5.0	Auger as above		(34)
5.0	6.5	Split Spoon, silty till with pieces of weathered shale, gray, hard.	S <sup>t</sup> 2, 12"	10-14-20
5.0	7.4	Auger, very hard to run from 6.5 ft. down, probably weathered shale.		
7.4		Auger running 7.4 ft. Probable B shale.		
		End of Borehole @ 7.4 ft.		
		No established water level		

# De Leuw Cather

CONSULTING ENGINEERS AND PLANNERS

November 30, 1973

73-11096

Mr. M. Devata  
Regional Materials Engineer  
Materials & Testing Office  
3501 Dufferin Street  
Ministry of Transportation & Communications  
Downsview, Ontario

Dear Sir:

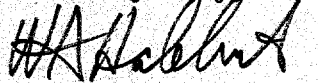
Re: Highway 417 - High Mast Illumination  
W.P. 13-68-01 and -12

Enclosed is a 1" = 100' plan showing the proposed locations of poles for the high mast lighting installation on Highway 417. Due to the variations in soils through the area, we feel that a soils boring is required at each of the 46 pole locations shown.

For your information, we have also enclosed a drawing of a pole similar to what might be used for this project as well as drawings showing preliminary designs for a spread foundation and a piled foundation. Another possibility being considered, which is not shown, is a caisson type foundation.

As you may know, our schedule for completion of the design is very tight and we would appreciate receiving the results of the soils investigation as soon as they are available.

Yours very truly,



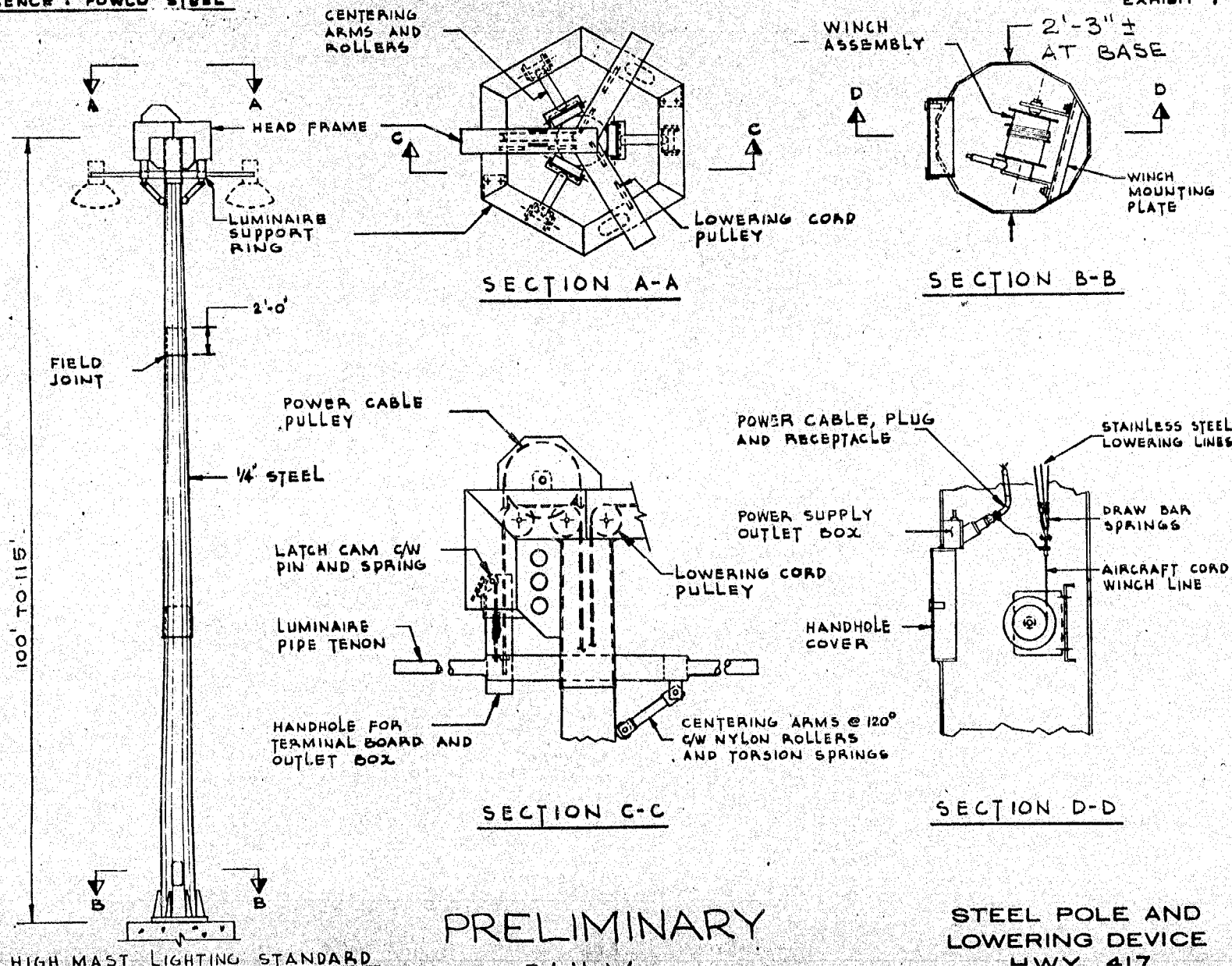
W. A. Habkirk  
Project Manager

WAH/wh  
Enclosure

c.c. V. McCullough - Toronto  
S. Markiewicz - Kingston  
E. J. Orr (J. Wear) - Toronto  
T. Kingsland - Kingston

REFERENCE : POWCO STEEL

EXHIBIT 7



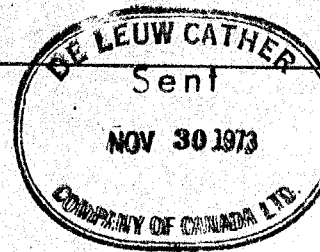
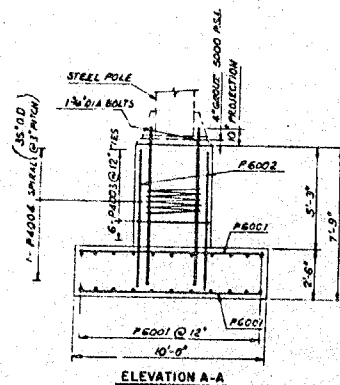
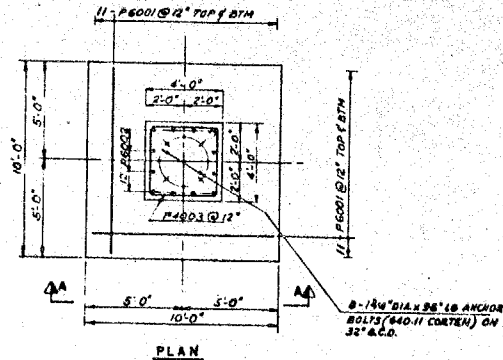


EXHIBIT 5



REINFORCING STEEL SCHEDULE			
MARK	NO.	LENGTH	DETAIL
P6001	44	9'-6"	STRAIGHT
P6002	12	7'-5"	STRAIGHT
P4003	8	14'-9"	3/4" DIA 45° HOOK
P4004	1	6'-9"	SPIRAL @ 3" PITCH 35° O.D.

NOTE: FIRST DIGIT INDICATES BAR SIZE

PRELIMINARY

GENERAL NOTES

- CLASS OF CONCRETE 3000 PSI AFTER 28 DAYS EXCEPT AS NOTED
- REQUIRED SOIL PRESSURE 3 K.S.F.
- CLEAR COVER TO REINFORCING STEEL 3"
- REINFORCING STEEL SHALL BE HARD GRADE, EXCEPT SPIRALS SHALL BE CLASS 5.
- DESIGN FOR 100' HIGH STEEL POLE ON SPREAD FTG.

HIGH MAST LIGHTING  
STEEL POLE  
SPREAD FOUNDATION

## MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

## M MORANDUM

TO: Mr. A. G. Stermac,  
Principal Foundations Engineer,  
Downsview, Ontario.

FROM: Structural Planning Office,  
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: 27 November 1973.

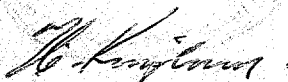
OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 13-68, Highway 417  
From Ottawa Queensway to South of Innes Road  
District 9 - Ottawa  
High Mast Lighting

Further to our telephone discussion yesterday, I confirm my verbal request for a foundation investigation to be carried out at the above location.

The purpose of the investigation is to determine the foundation requirements for the high mast lighting to be located on Highway 417 between the Ottawa Queensway and the C.N.R. overhead structures. I have arranged with Mr. W. Habkirk of De Leuw Cather that he will forward to you a 100':1" site plan showing the locations of the masts and also foundation alternatives for the masts and other relevant information. Copies of the above information will also be sent to this office.



T. C. Kingsland  
Regional Structural Planning Engineer

TCK/hl

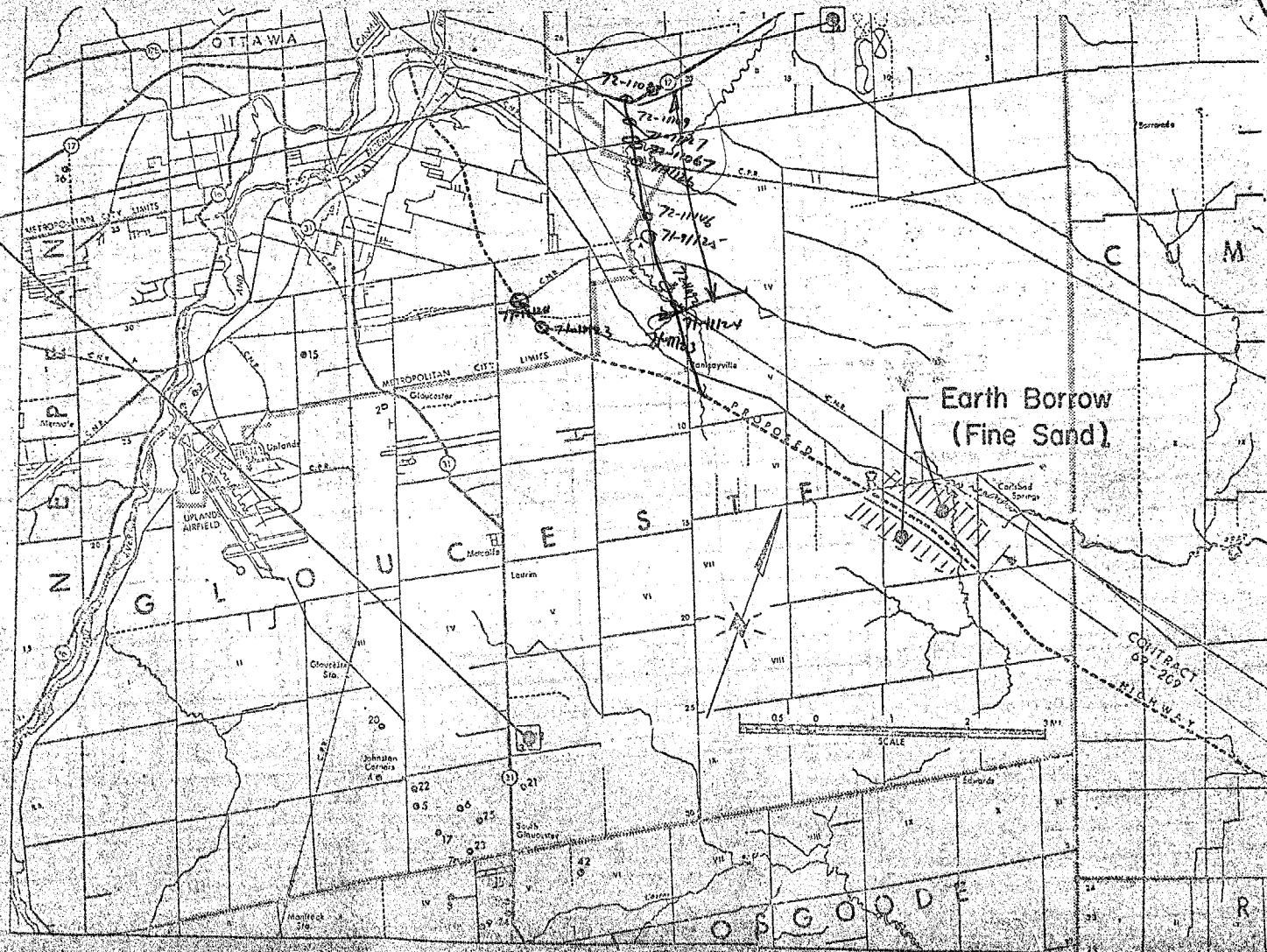
c.c. P. D. Billings  
A. J. Percy  
J. M. Childs  
V. McCullough  
C. S. Grebski - Att. K. Bassi

FEB. 29/

M.D.D. FEB. 29/74

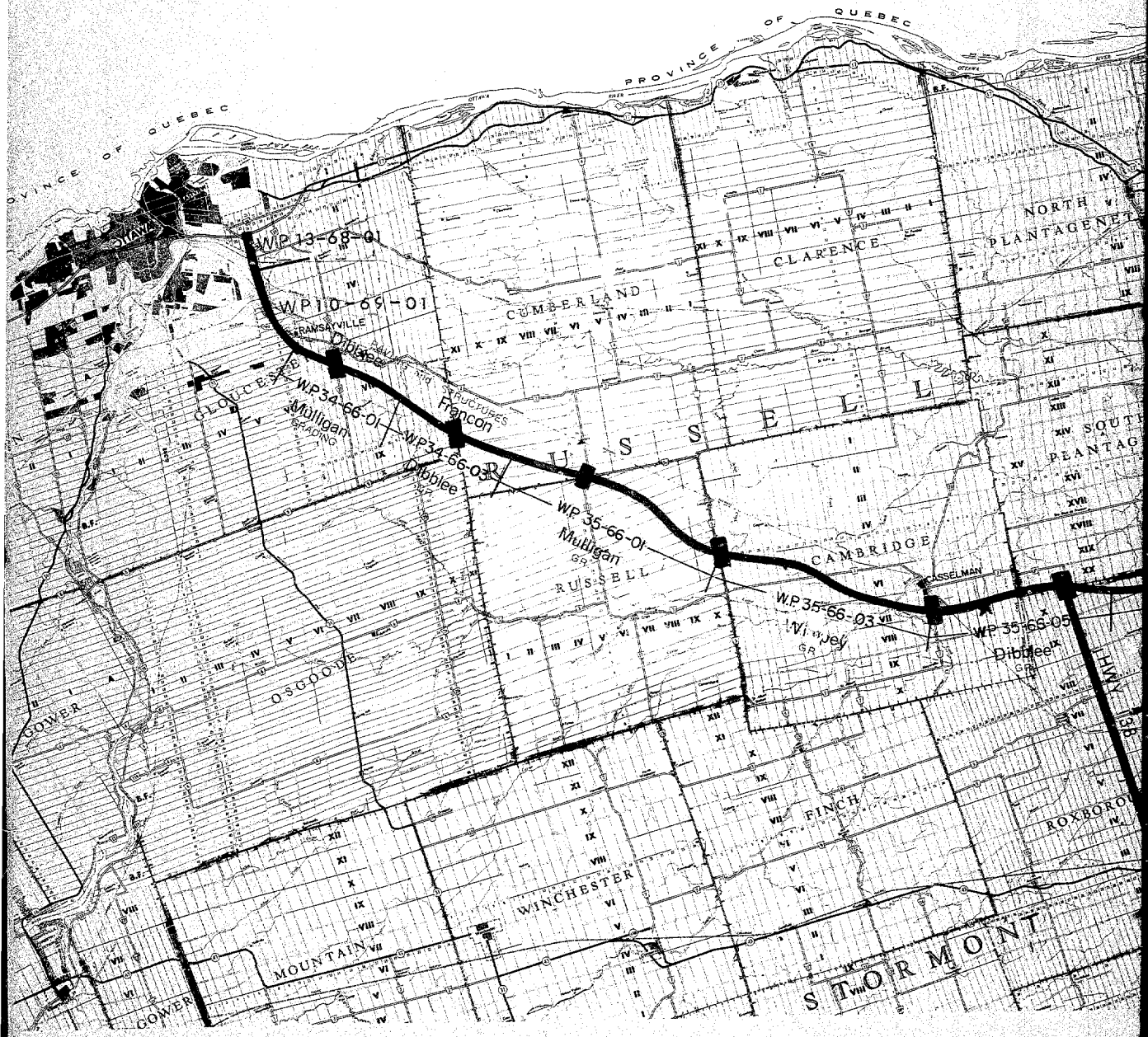


ular 'A' and —  
Salt Aggregates.  
(Commercial Quarries)



# ROUTE OF HIGHWAY 1

SCALE 1" = 4 Miles



OF HIGHWAY No 417

SCALE 1" = 4 Miles

