

70-F-110	37-66-12617	HWY. 4176-HWY. 17	310-2
W.O.	W.P.	LOCATION	GEOGRES NO.

• DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO:

REMARKS

**GEOGRES** INDEXING CARD FOR REPORTS NOT MICROFILMED

G1-20 AUG. 74

SUPERIMPOSED DOCUMENT MAY  
APPEAR AS MULTIFEED OR FILM



# FIELD RECONNAISSANCE REPORT

18 00  
SEP 1968

FIELD NO. 177  
PROJECT NO. 177

DATE: 17 SEP 1968  
TIME: 10:00  
LOCATION: 177  
PROJECT NO. 177  
FACILITY: GRADE SEPARATION (2) AREA: OTHER (SPECIFY)  
ALTERNATE SCHEME (IF ANY)

## EXISTING SITE CONDITIONS

### DESCRIPTION

TOPOGRAPHY: HILL ☐ ROLLING ☐ VALLEY ☐ GULCHED ☐ FLAT ☐  
VEGETATION: TREES ☐ BUSH ☐ GRASS ☐ SWAMP ☐ FARM CROPS ☐ CLEARED ☐  
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐  
ROCK OUTCROP (SPECIFY LOCATIONS): None

### UNDERGROUND UTILITIES

UTILITY COMPANY

TELEPHONE NO. FOR DEFINITE LOCATION

- 1
- 2
- 3
- 4
- 5

### EXISTING STRUCTURE(S)

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

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

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FEATURES 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. Control Property Section, Eastern Region
- 2.
- 3.
- 4.

WHO WILL OBTAIN NECESSARY PERMISSION? Property Section, Eastern Region

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

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

IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☐ NO ☐

### IF RIVER CROSSING

WILL A RAFT BE NECESSARY? YES ☐ NO ☐ IF YES, GIVE MAX DEPTH OF WATER: FT.  
CURRENT: SWIFT ☐ MODERATE ☐ SLOW ☐

## DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN): 1.4 mi. N.W. of site

ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES: Little Riveau Cr. at Hwy. 17

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

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

## REMARKS

NEAREST AVAILABLE ACCOMMODATION: Invernessburg - Normandie Motel

DATE: 17 SEP 1968

BY: [Signature]

FOR: [Signature]



## MEMORANDUM

319-41

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

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

ATTENTION: Mr. C. McComble

DATE: February 16, 1971

OUR FILE REF.

IN REPLY TO

FEB 24 1971

## SUBJECT:

## FOUNDATION INVESTIGATION REPORT

For

Proposed Crossings of Hwy. #417  
(Eastbound and Westbound Lanes)

By Hwy. #17 S.R.L. Ramp and  
Township Road Relocation

E. Hawkesbury Twp., Prescott County  
District No. 9 (Ottawa)

A.C. 70-11116 - A.P. 37-66-12 & 17



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.

*A. G. Sternac*

ACS/MdeP  
Attach.

A. G. Sternac  
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. E. R. Davis  
E. A. Peregackes  
D. A. Parren  
C. J. Markiewicz  
J. E. Callaghan  
T. C. Kingsland (2)  
E. R. Ernesaks (2)  
J. E. Crispier  
B. J. Giroux  
B. A. Singh

Foundations Files  
Gen. Files



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FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossings of Hwy. #417  
(Eastbound and Westbound Lanes)  
By Hwy. #17 E.E.L. Ramp and  
Township Road Relocation  
E. Hawkesbury Twp., Prescott County  
District No. 9 (Ottawa)  
N.O. 70-11116 - A.P. 37-86-12 & 17

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation at the above mentioned locations. The request was contained in a memo from the Eastern Region Bridge Section (Mr. T. C. Kingsland, Regional Bridge Planning Engineer), dated November 17, 1970.

Subsequently an investigation was carried out by this Section to determine the subsoil conditions at the site. This report contains the results of the investigation, together with recommendations pertaining to the foundations of the proposed structures and the stability of the approach fills.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located about 6 miles east of Hawkesbury and some 500 ft. south of existing Hwy. #17 at Lots 24 and 25, Concession 2, Township of East Hawkesbury, County of Prescott. The surrounding area is flat to gently undulating and is used for agricultural purposes. A gravel Township road runs north and south within the vicinity of the site.

The site is within the physiographic region known as the 'Glengarry Till Plain'. The area is characterized by a bouldery glacial till plain composed of long drumlinoidal ridges as well as a few well defined drumlins. The glacial till deposit is generally less than 25 feet in depth. The overburden is underlain by limestone bedrock of the Ironton and Black River Groups, Ordovician Period.



### 3. FIELD AND LABORATORY INVESTIGATION:

Eight boreholes, 3 of which were accompanied by a dynamic cone penetration test, were carried out during the course of the field investigation. The borings were advanced by means of conventional diamond drill rigs adapted for soil sampling purposes.

Samples were obtained at required depths in a 2-inch 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 by core drilling in either AXT or BX size at 4 of the borehole locations.

The locations and elevations of the boreholes are shown on Drawings #70-11116A and #70-11116B, together with an estimated stratigraphical profile. The borehole locations were surveyed by personnel from the Eastern Region Engineering Survey Section. The elevations given in the report are referenced to geodetic datum.

The samples were visually examined in the field and subsequently in the laboratory. Following this, laboratory tests were carried out on selected representative samples to determine the following physical properties:

- 1) Grain-size Distribution
- 2) Atterberg Limits
- 3) Natural Moisture Content

The results of the field and laboratory tests are summarized on the Record of Borehole sheets, and shown on the Figures in the Appendix to the report.

### 4. SUBSOIL AND BEDROCK CONDITIONS:

#### 4.1) General:

The subsoil at the sites generally consists of a 1-foot thick layer of silty sand topsoil, followed by a compact to very



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

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

dense deposit of glacial till ranging in thickness from 18 to 20 feet. Underlying the glacial till stratum is shaley dolomite bedrock.

The subsoil is described in detail below:

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

At both sites, underlying a thin layer of topsoil - (up to 1 ft. in thickness) is the predominant stratum, which is a basically granular glacial till composed of a heterogeneous mixture of silt, sand and gravel with a trace of clay. In the boreholes in which the till deposit was fully penetrated, the depth varied from 18 to 20 feet. Occasional cohesive zones consisting of a mixture of clayey silt with sand and gravel were encountered. Generally, in the lower portion of the glacial till, boulders up to 18 inches in size were encountered. These boulders necessitated the use of diamond drilling techniques to advance the borings. Grain-size distribution tests were carried out on samples of the glacial till and these results are shown in envelope form on Figure #1 in the Appendix.

Wherever possible, Atterberg limit tests were carried out on selected samples within those zones of the glacial till which appeared to be cohesive, and the results are plotted on Figure #2 in the Appendix. The standard penetration resistance testing carried out within the glacial till deposit, is plotted on the Record of Borehole sheets. The 'N' values obtained from this testing, generally range from 10 blows per foot, near the surface, to greater than 100 blows per foot with depth, indicating that the relative density of the deposit varies from compact to very dense. In B.H. #6 the 'N' value near the surface, was 6 blows per foot, indicating a loose relative density in the upper 3 feet of the glacial till deposit.



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

4.3) Shaley Dolomite Bedrock:

Underlying the glacial till deposit across the entire site, is shaley dolomite bedrock which was proven in 4 of the boreholes by obtaining from 2 to 11 feet of AXT or BX size rock core samples. The bedrock surface was found to vary between elevations 216 and 213, or some 18 to 20 feet below ground surface.

The bedrock consists of shaley dolomite interbedded with layers and irregular seams of dolomite shale. The bedrock is generally sound except in B.H. #3, where the upper 12 inches of the bedrock is in a fractured condition. Elsewhere, within the sound bedrock, occasional fractured zones were encountered. The recovery of the rock samples ranged from 50% to 100%.

5. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out in the open boreholes during the period of the field investigation. The water levels observed were found to vary between 2 and 9 feet below ground surface - i.e., between elevations 231 and 225.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct two separate 2-span underpass structures over Hwy. #417 (E.B.L. and W.B.L.) - namely:

1) Hwy. #17 E.B.L. Ramp Structure -

This structure will be 28 ft. wide with spans of 144 ft. and 136 ft. In the vicinity of the structure, the Hwy. #17 E.B.L. Ramp will have a preliminary profile grade between elevations 250 and 254 - i.e., the approach fills will have a maximum height of approximately 20 ft.



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

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

ii) Township Road Relocation Structure -

This structure will be 34 ft. wide with spans of 116 ft. and 133 ft. The preliminary profile grade of the Township Rd. Relocation in the vicinity of the structure, will be between elevations 254 and 257 - i.e., the approach fills will have a maximum height of approximately 24 feet.

The two structures are parallel and approximately 200 feet apart.

At both structure locations the subsoil consists of a 18 to 20-ft. thick deposit of compact to very dense glacial till underlain by shaley dolomite bedrock.

Recommendations pertaining to both structures are discussed as follows:

6.2) Structure Foundations:

6.2.1) Pier Footings (Refer to E.R.'s #1, 2, and 3):

The piers may be founded on spread footings located within the upper portion of the glacial till deposit. For both structures the footings should be founded at or below elevation 228. This should provide sufficient cover for frost protection, which should be at least 4 feet of earth cover to the underside of the footings. An allowable bearing pressure of 3 t.s.f. may be used in the design of the footings. Settlement of the pier footings will be minimal and will be elastic in nature - i.e., it will take place during or immediately following construction.

The groundwater level was generally about elevation 229, or approximately 3 to 4 feet below ground level. The footing excavations will be carried out at or slightly below the prevailing groundwater level in a granular type of glacial till deposit. In



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

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

6.2.1) Pler Footings (Refer to B.H.'s #1, 2, and 5):  
-----

(cont'd.) ...

view of this, dewatering of the footing excavations may be a problem at these sites. In order to minimize the dewatering problems, it is recommended that a drainage ditch be constructed around the perimeter of each of the footing locations. The invert of this ditch should extend at least 2 feet below the proposed footing level. The water collected in this ditch should be gravity-drained to a sump from where it can be pumped away from the construction area.

6.2.2) Abutment Foundations (Refer to B.H.'s #1, 3, 4,  
and 6):  
-----

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

Alternatively, the abutments may be supported on end-bearing piles driven to the bedrock surface. However, at certain locations the piles may not penetrate to bedrock due to the presence of boulders in the lower portion of the glacial till stratum. In any case, the piles should be designed for the maximum capacity of the section chosen (e.g., a 12 BP 74 steel H-pile can be designed for a safe allowable load of 95 tons/pile).



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

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

6.2.2) Abutment Foundations (Refer to E.B.'s #1, 3, 4,  
and 6): (cont'd.) ...

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

6.3) Approach Embankments:

The approach fills for the Hwy. #17 E.B.L. Ramp structure and the Township Road Relocation structure will have a maximum height of approximately 20 and 24 feet, respectively. No stability problems are anticipated provided standard 2:1 slopes are used.

Some settlement of the glacial till subsoil will take place due to the surcharge loading of the approach fills. This settlement will be elastic in nature and negligible in magnitude.

7. MISCELLANEOUS:

The field work, performed during the period of December 11 to December 23, 1970, and January 4 to January 5, 1971, was supervised by Mr. R. A. Hendry, Student Technician (Field).

The report was prepared by Mr. W. G. Hutton, Project Foundation Engineer.

Equipment used was owned and operated by P. E. Johnston Drilling Co. Ltd. (Ottawa).

This report was reviewed by Mr. M. Devata, Supervising Foundation Engineer.

February, 1971



APPENDIX I

— APPENDIX I —



FOUNDATION SECTION

JOB W.P. 100-100 LOCATION S. 1/4, 19' x 1/4, 17 2nd, N. 1/4, 10' x 1/4 ORIGINATED BY W.P.  
 W.P. 100-100 BORING DATE October 10, 1971 COMPILED BY W.P.  
 DATUM Indefinite BOREHOLE TYPE Shallow, 1/2 Coring, Conc CHECKED BY W.P.

[illegible]



CHECKED BY *[Signature]*

[illegible]



FOUNDATION SECTION

CHECKED BY \_\_\_\_\_

SOIL PROFILE			SAMPLES		ELEV SCALE	DYNAMIC PENETRATION RESISTANCE	LIQUID LIMIT ——— $w_L$		BULK DENSITY	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE		BLOWS / FOOT	BLOWS / FOOT	PLASTIC LIMIT ——— $w_p$		
				</						



FOUNDATION SECTION

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION BLOWS / FOOT	RESISTANCE	Liquid Limit — $w_L$ Plastic Limit — $w_p$ Water Content — $w$	Bulk Density $\gamma$	REMARKS
ELEV. DEPTH	DESCRIPTION	SPLIT PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH PS.F.	WATER CONTENT % 10      20      30	P.C.F.	G.R.S.A.SI.CL.
							○ UNCONFINED * FIELD VANE ● QUICK TRIAXIAL x LAB. VANE			
232.3	Ground Level									
230.7	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till) Shoulders up to 6" in size throughout Contact to Very Dense		1	SS	28	230				
			2	SS	51					
			3	SS						
			4	SS	42	229				
			5	SS	35					
214.7	Brown to Grey		6	SS	75			OF →		
			7	SS	67					
214.3	End of Borehole Probable Bedrock					213				



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 72-1117

LOCATION Sta. 42 + 39 E. Twp. Rd. Relac. n/s of

ORIGINATED BY RH

W.P. 72-1117

BORING DATE December 14, 1970

COMPILED BY WH

DATUM Genselin

BOREHOLE TYPE Hand Drill - Washboring

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. PLT.	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE		WATER CONTENT %			
223.0	Ground Level											
222.5	Not mix. of silty sand & gravel, trace of clay		1	SC	10							
222.0	(Gravel 25%) Sandier up to 1 1/2 ft. also throughout		2	SC	20							
221.5	Consist. to Very Dense		3	SC	25							
221.0	Gravel to Grey		4	SC	30							
220.5	End of Borehole		5	SC	40							



FOUNDATION SECTION

CHECKED BY

[illegible]



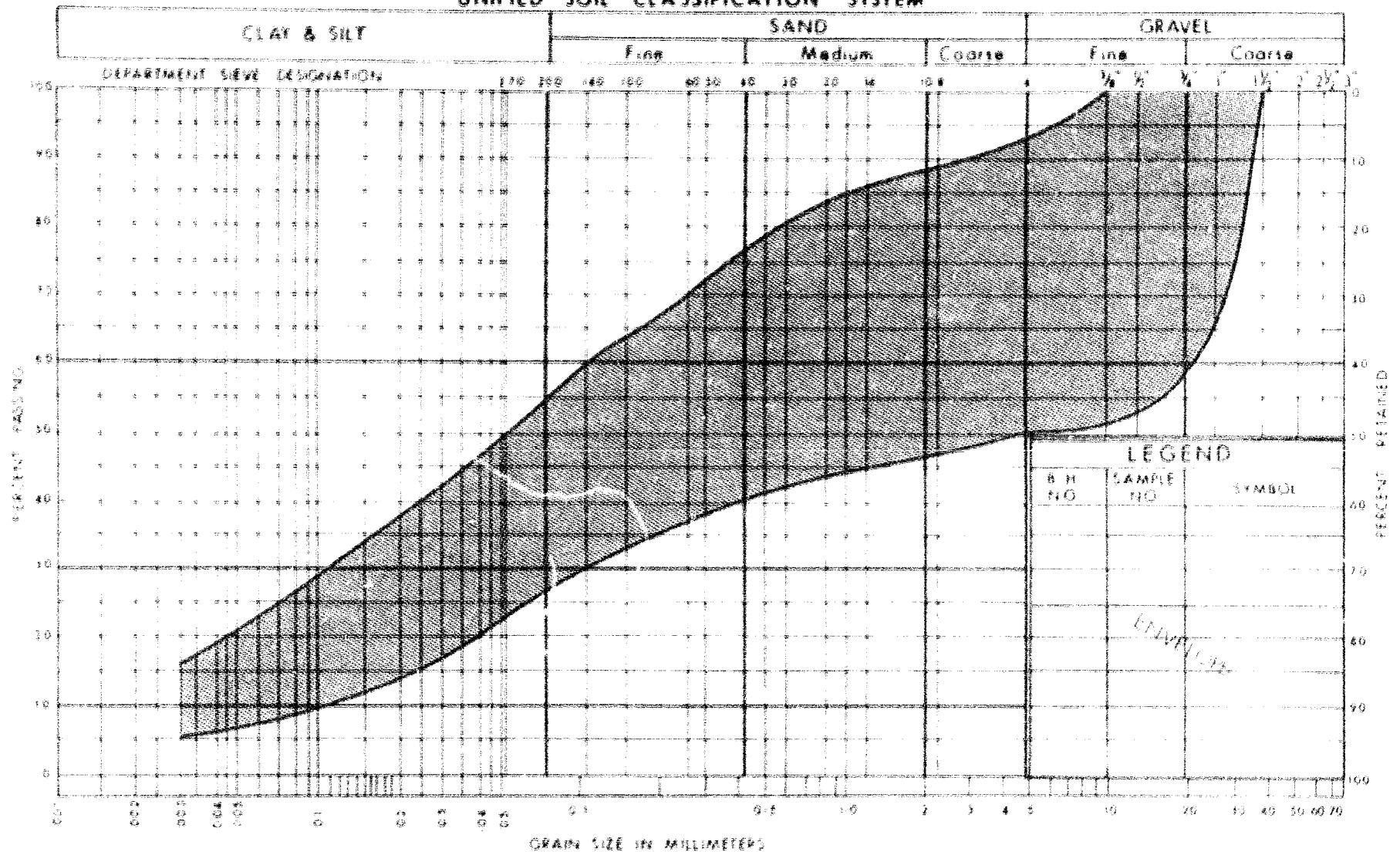








# UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

## GRAIN SIZE DISTRIBUTION GLACIAL TILL

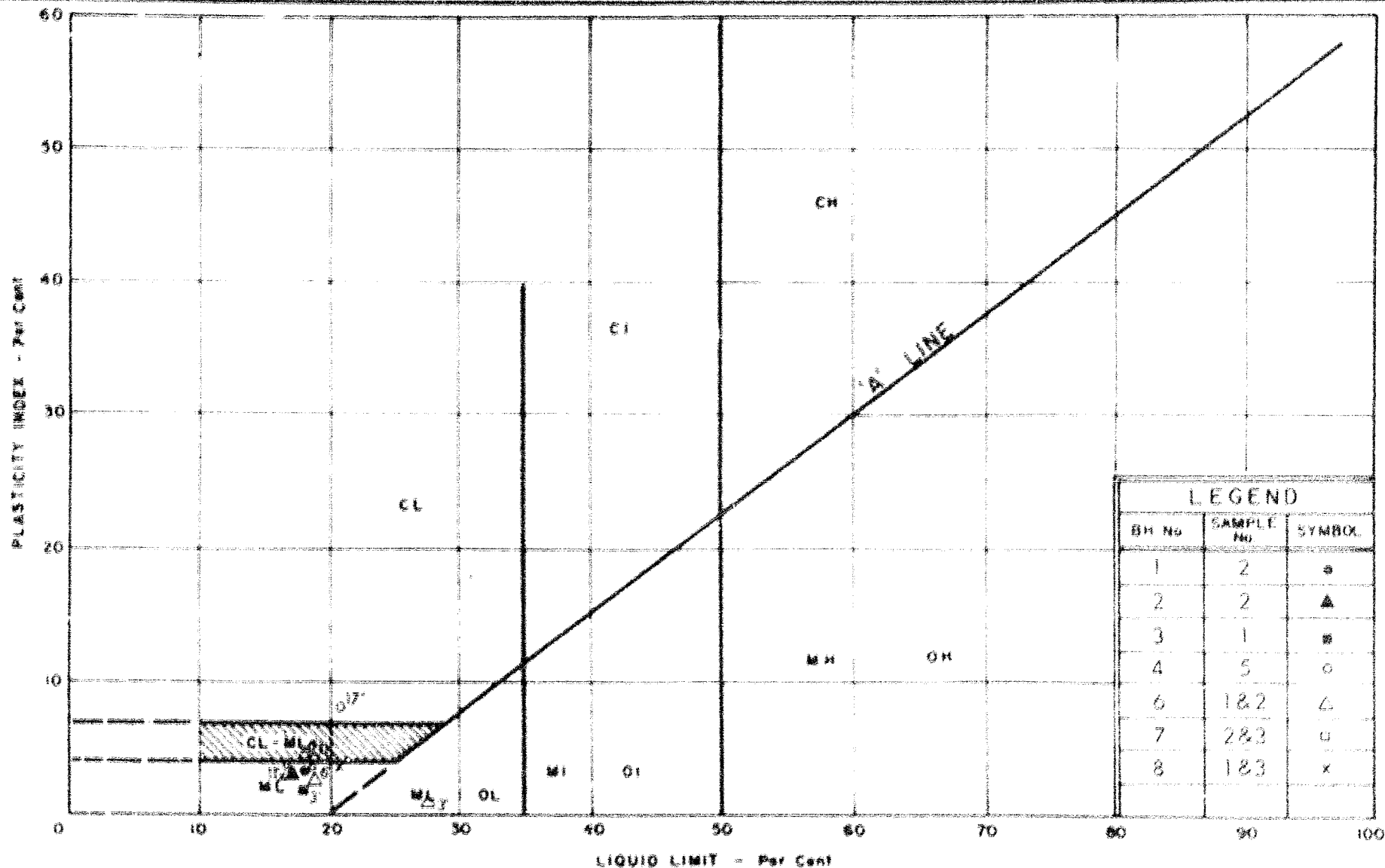
HLL MIXT. OF SILT, SAND & GRAVEL, TRACE OF CLAY

WP No. 37-45-12

JOB No. 75-1116

FIG. 1





DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

**PLASTICITY CHART**  
GLACIAL TILL  
HET. MIXT. OF SILT, SAND & GRAVEL, TRACE OF CLAY

WP No. 37-66-03

JOB No. 70-11116

FIG. 2



## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

### DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

<u>CONSISTENCY</u>	<u>'N' BLOWS/FT.</u>	<u>c LB./ SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS/ FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H.		SAMPLE ADVANCED HYDRAULICALLY
	P.M.		SAMPLE ADVANCED MANUALLY

### SOIL TESTS

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
$\tau_f$	SHEAR STRENGTH
c	EFFECTIVE COHESION
	INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

## STRESS AND STRAIN

u	PORE PRESSURE
$\sigma$	NORMAL STRESS
$\sigma'$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	COEFFICIENT OF EARTH PRESSURE AT REST

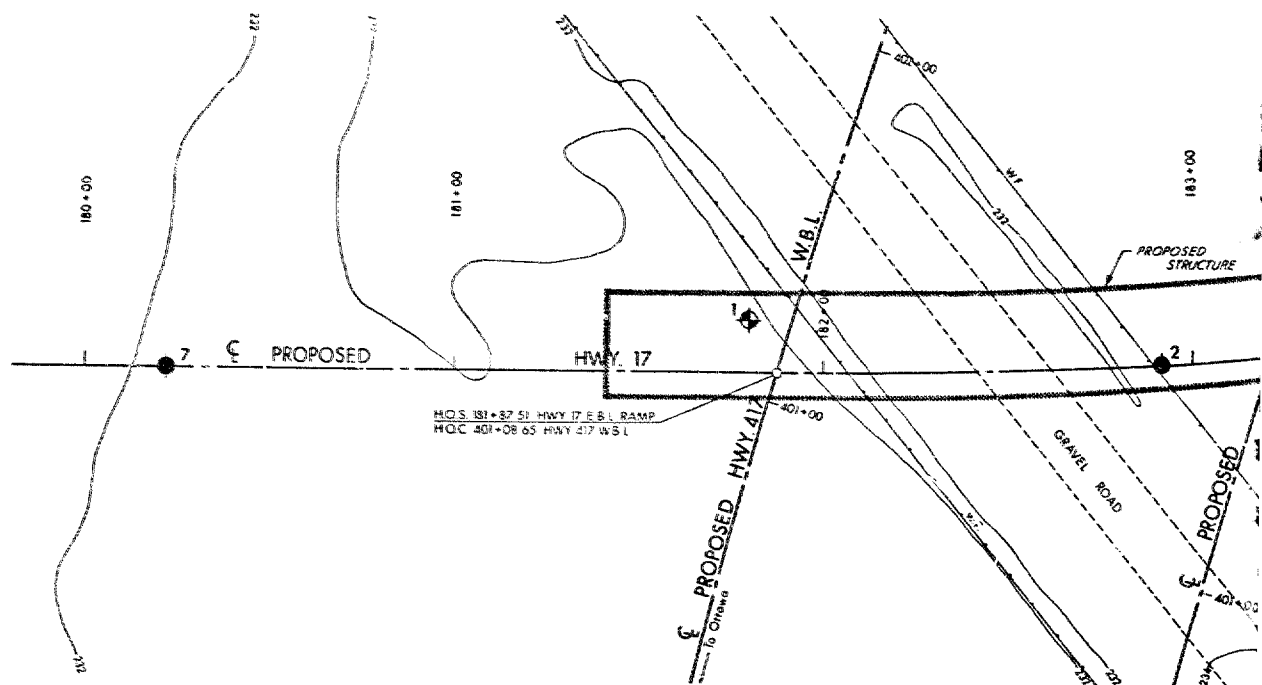
## FOUNDATIONS

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

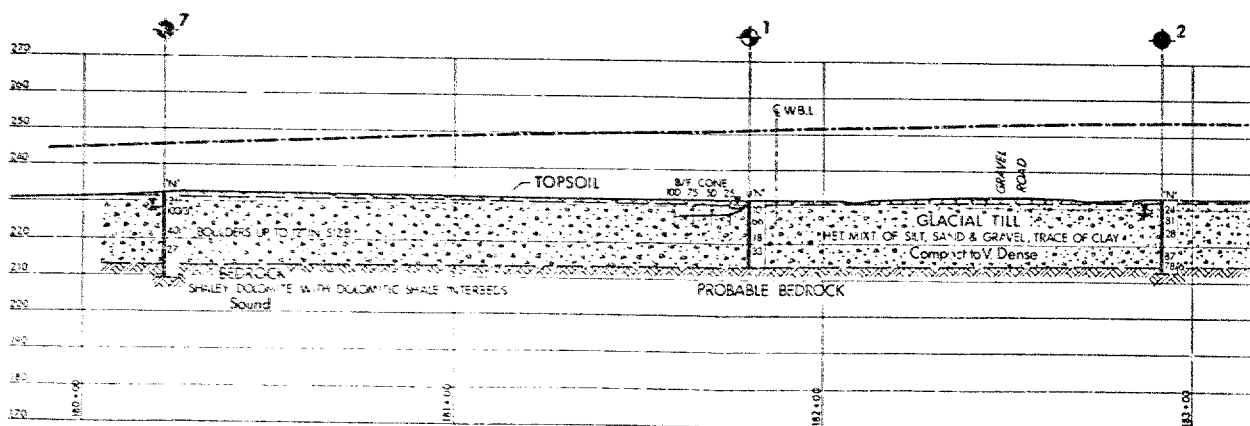
## SLOPES

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





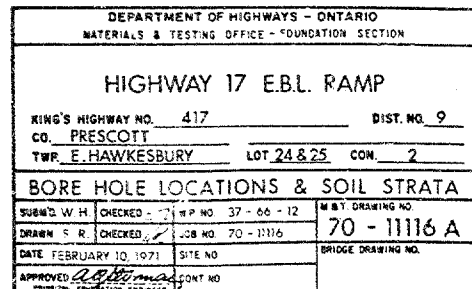
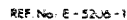
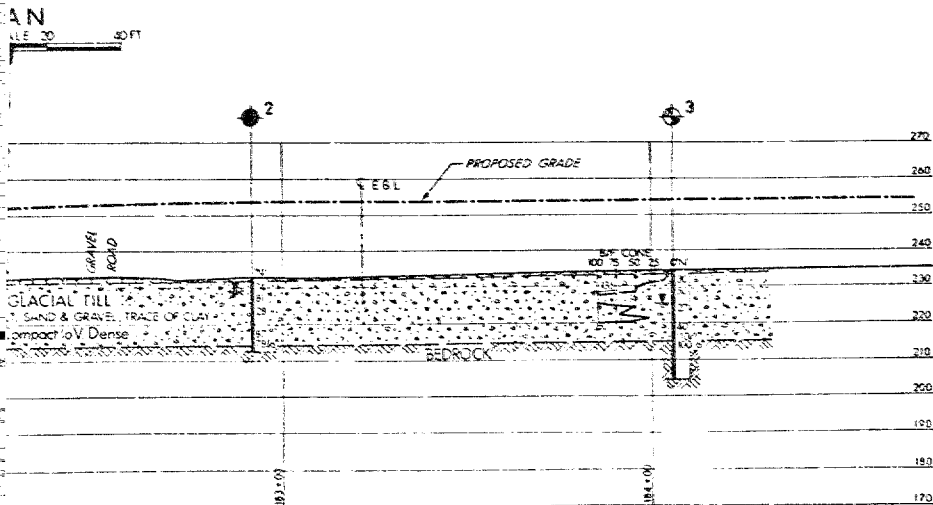
PLAN  
0 SCALE 20 40 FT



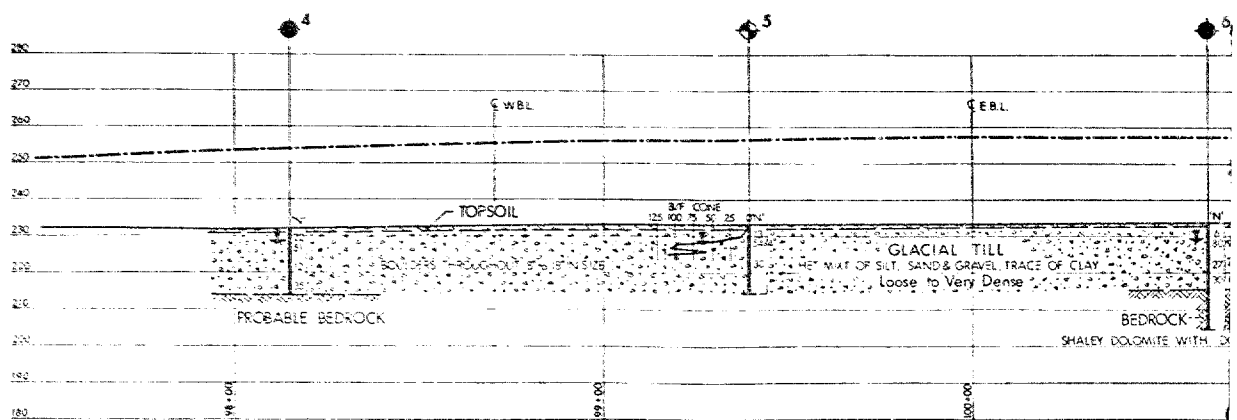
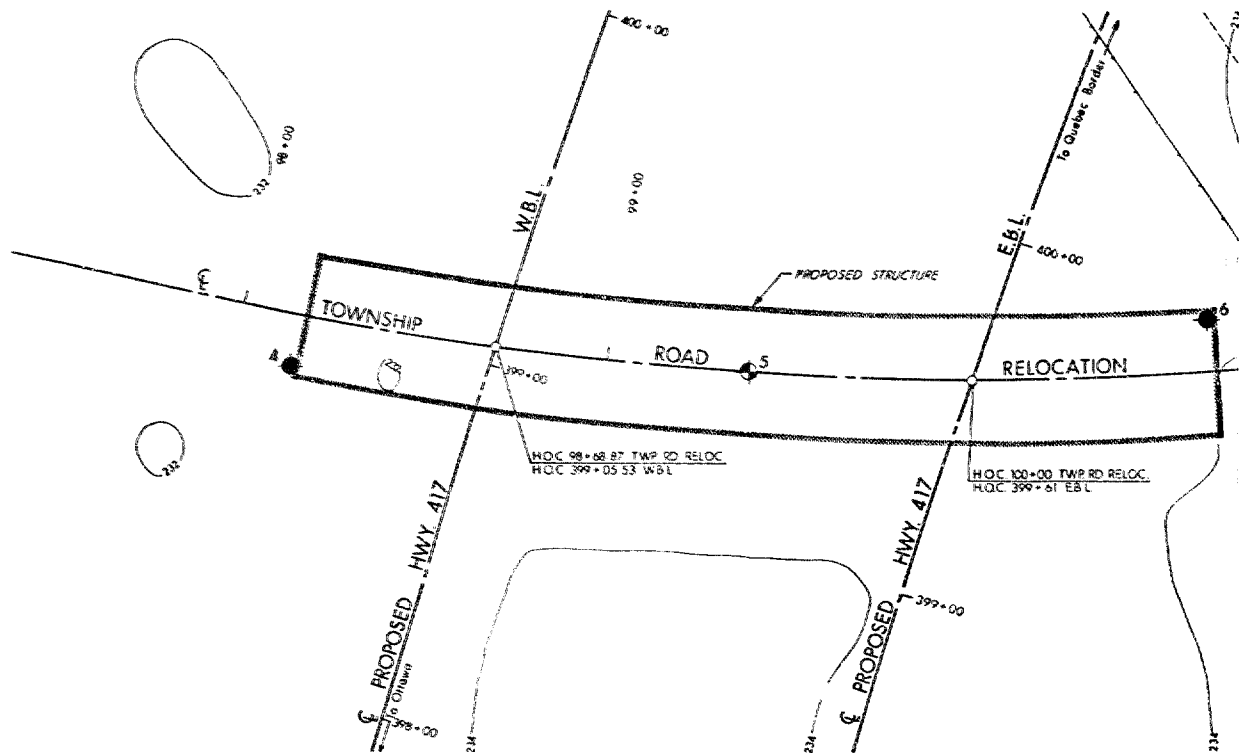
PROFILE - HWY. 17 E.B.L. RAMP  
0 SCALE 20 40 FT

PRINT RECORD  
FOR DATE

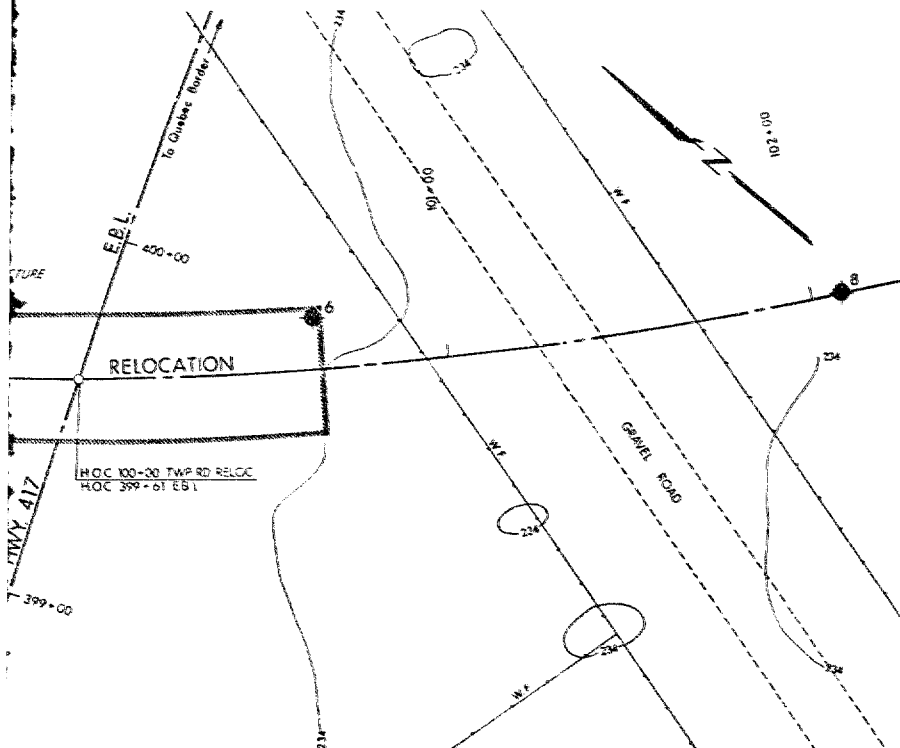




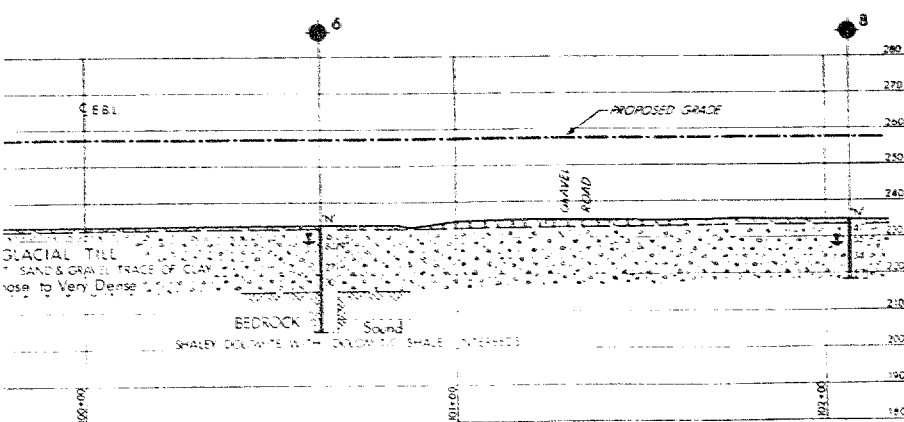




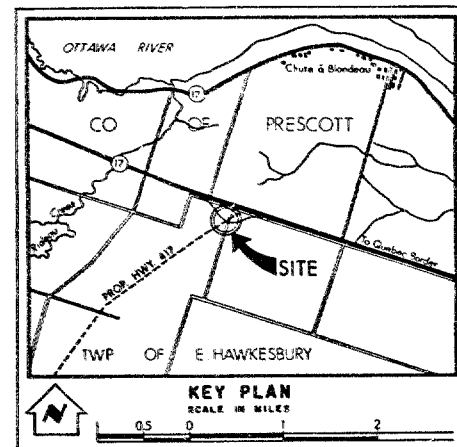




AN  
SCALE 30' 50 FT



SHIP ROAD RELOCATION  
SCALE 30' 50 FT



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation.		
	DECEMBER 1970 & JANUARY 1971.		
NO.	ELEVATION	STATION	OFFSET
4	232.3	98+15	14' RT.
5	233.0	99+39	€
6	233.7	100+64	14' LT.
8	234.0	102+08	€

- NOTE -  
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING OFFICE - FOUNDATION SECTION			
TOWNSHIP ROAD RELOCATION			
KING'S HIGHWAY NO. 417		DIST. NO. 9	
CO. PRESCOTT			
TWP. E. HAWKESBURY		LOT 25	CON. 2
BORE HOLE LOCATIONS & SOIL STRATA			
SUBMITTED BY	CHECKED BY	WP NO. 37 - 66 - 17	M.B.T. DRAWING NO.
DRAWN BY S. R.	CHECKED BY	JOB NO. 70 - 11116	70 - 11116 B
DATE FEBRUARY 11, 1971	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>ABH</i>	CONT NO.		

REF No. E-5205-1



[illegible]

Mr. T.C. Kingsland,

Bridge Office,  
Downsview

April 8, 1971

Reloc. Twp. Rd. Underpass  
0.1 Mile West of Hwy. 17  
W.P. 37-66-17, Site No. 27-224  
Highway 417, District No. 9

The estimated cost of the proposed structure is \$187,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

C.S. Grebski,  
Bridge Design Engineer

CSC:rd

Attach.

C.C. B. Davis  
A. Starnac (2)  
J. Anderson  
H. Forrest



## MEMORANDUM

2nd Comments.  
M. Devito  
Sept 29th 1971.



Department of Highways Ontario

Copy for the information of

Mr. J. Sternac

~~Mr. J. C. Simpson,~~  
Regional Bridge Planning  
Engineer,  
Eastern Region, Kingston.

Structural Office,  
West Building,  
Downsview.

November 2, 1971.

Highway #17 Interchange (L.B.I. Ramp),  
W.P. #37 66-12, Site No. 27-201,  
Highway #417, District 19.

W-11-116.5

Attached herewith are prints of the Preliminary Bridge  
Plan Drawing D-7014-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is  
\$193,000 which includes tender, materials, engineering  
and sundry construction.

Any comments or revisions you may have should be  
submitted within three weeks.

C. S. Grubski,  
Structural Design Engineer.

CSC/mh

EMH\*

cc: A. McFie,  
B. Davis,  
A. Sternac (2),  
J. Anderson,  
R. Forrest.

*from your drawing*  
It appears the alignment has been changed for the Hwy #17 EBL  
Ramp and it was necessary to carry out additional checks  
at the revised location. For preliminary design purposes our  
recommendations are still applicable.

*DB, Devola*  
Structural Design Engineer  
Nov 15th 1971



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

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

FROM: Bridge Section,  
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: November 30, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: W. P. 37-66-12, Site 27-201,  
Highway 17 Interchange (E. B. L. Ramp),  
Highway 417, District 9 - Ottawa

The alignment of the Highway 17 E. B. L. ramp has been revised and, as pointed out by you, further foundation investigations should be carried out.

We are sending you herewith two prints of Bridge Site Plan E-5215-1 on which we have shown the location of the proposed abutments and pier. We have also indicated the approximate locations of the bore holes from the previous foundation investigation.

We would be pleased if you will make arrangements for a further foundation investigation and to have your updated report.

*T. C. Kingsland*  
T. C. Kingsland  
Regional Bridge Planning Engineer

TCK/hl  
Encls.  
c.c. -  
R. Forrest  
C. S. Grebski

*Additional investigation will be required at site after New Year's. A. Tubman from Toronto Associates, Sunnyvale, Ont. has been assigned to this project. He will be in the field after New Year's. He will be in the field after New Year's.*  
*M. Devata*  
*21 30/71*



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. A. G. Stermac  
Principal Foundation Engineer  
West Building  
DOWNSVIEW

FROM: Systems Design Section  
Kingston, Ontario

ATTENTION:

DATE: December 3, 1971

OUR FILE REF.

IN REPLY TO

70-11-46

SUBJECT: W.P. 37-66-03 - Hwy 417 - From S. Road South of Vankleek Hill Easterly  
to Hwy 17 - District #9, Ottawa.

Please find enclosed one copy of Sheet 14 of the Contract drawings for the above project, showing the Berm Construction Data for the south approach fill at County Road #13.

The Regional Review meeting will be held on Tuesday, 21st December, 1971, at 10:30 a.m., in the Ottawa District Office. Representation from your office is requested.



A. E. Irving  
Sr. Project Design Engineer

AEI:am  
Enc.



## DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

## MEMORANDUM

316-4

TO: Mr. T. G. Kingsland,  
Regional Bridge Planning Engineer,  
Eastern Region,  
Kingston, Ontario.

FROM:

Foundations Office,  
Design Services Branch,  
Central Building,  
Downsview, Ontario.

ATTENTION:

DATE:

OUR FILE REF.

IN REPLY TO

February 24th, 1972.

SUBJECT:

MMB 1 172

ADDENDUM TO  
FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossing of Hwy. #417  
(Eastbound and Westbound Lanes)  
By Hwy. #17 E.B.L. Ramp  
E. Hawksbury Twp., Prescott County  
District No. 9 (Ottawa)  
W.O. 70-11116 - E.P. 37-66-12 & 17

Since the original Foundation Report (70-11116) was submitted, February 24, 1971, for the above-mentioned project, a revision in the alignment for Hwy. #17 Eastbound lane ramp has been proposed, which would in effect shift the structure location some 70 feet northerly from the previous location. As a result of this, we have carried out three additional borings to supplement our original subsoil information. This memo should be read in conjunction with our original Foundation Investigation Report (70-11116) for details of subsoil and groundwater conditions.

The subsoil conditions at the revised location is very similar to those encountered at the previous location. The



predominant stratum across the site is composed of compact to very dense, 18 to 21 feet thick, glacial till (heterogeneous mixture of silt, sand and gravel, trace of clay). Numerous boulders up to 12 inches in size were encountered throughout the deposit. Underlying the glacial till stratum is sound shaley dolomite bedrock, interbedded with layers and irregular seams of dolomite shale.

Groundwater level and observations have been carried out in the open boreholes. These observations indicate that the water level varies between elevations 225 and 230, which correspond to depths of 2 to 8 feet from existing ground surface. This pattern was interrupted at B.H. #11, where the water level was measured at elevation 220. This may be due to the fact that not sufficient time was allowed for the water level to reach its stable condition.

The gradational variation within the glacial till deposit at various borehole locations, are shown on the accompanying borehole sheets. The stratigraphical profile, shown on Drawing No. W.O. 70-11116A-2, has been inferred from this data.

The structure at the revised location will be a two-span structure (144' - 160'), having a width of 40 feet. In the vicinity of the structure the Hwy. #17 E.B.L. Ramp will have a profile grade between elevations 250 and 254 -- i.e. the approach fills will have a maximum height of approximately 20 feet.

Since the type of structure and subsoil conditions at



the revised alignment of Hwy. #17 E.B.L. Sump are very similar to those at previous location, our recommendations pertaining to structure foundations and approach embankments are still applicable. A brief resumé of the recommendations are as follows:

The pier can be supported on spread footings located within the upper portion of the glacial till deposit at or below elevation 228. An allowable bearing pressure of 3 tons/sq. ft. may be used in the design of the footing.

The abutments may be supported on end-bearing piles driven to bedrock. In some cases the piles may meet refusal within the glacial till stratum a few feet above the bedrock. In any event the piles must penetrate at least 10 feet into the parent glacial till stratum. The piles should be designed for the maximum capacity of the section chosen (e.g. a 12 HP74 steel H-pile can be designed for a safe allowable load of 95 tons/pile).

Alternatively, the abutments may be 'perched' within the approach fills. These may be supported on spread footings founded within a zone of well-compacted granular fill using a safe bearing pressure of 2 t.s.f., as suggested in our original Foundation Reports.

No stability problems are anticipated for approach embankments with standard 2:1 slopes. Settlement of the

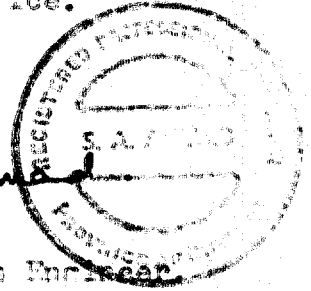


glacial till subsoil will be elastic in nature and negligible in magnitude.

If additional information is required for your design requirements, please feel free to contact this office.

*Shabeen Ahmed*

Shabeen Ahmed,  
Project Foundation Engineer.



For: M. Devate,  
Supervising Foundation Engineer.

SA/mj.

c.c. D. W. Farren  
B. R. Davis  
A. Rutke  
S. J. Markiewicz  
J. C. Callechan  
B. J. Giroux  
E. R. Saint  
G. A. Mroga  
B. A. Singh

Foundations Office  
Documents



DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS &amp; TESTING OFFICE

## RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 70-10111

LOCATION Sta. 182+47 o/s 20' I.T.

ORIGINATED BY J.S.

V.P. 37-66-12

BORING DATE Jan. 3, 1972.

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Washboring BX &amp; NX Casing

CHECKED BY S.R.

SOIL PROFILE		STRAI. NOT	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— $w_L$ PLASTIC LIMIT ——— $w_p$ WATER CONTENT ——— $w$			BULK DENSITY $\gamma$	REMARKS
ELEV.	DESCRIPTION		NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				
229.4	Ground Surface															
229.4	Bed of silt, sand and gravel, some clay					230										
229.4	Local Till		1	SS	27											
229.4			2	SS	27											
229.4			3	SS	27											
229.4	Compact to V. Dense		4	SS	27											
229.4			5	SS	27											
229.4	Brown to Grey		6	SS	27											
229.4	Pebbles up to 12" in Size		7	SS	27											
229.4			8	SS	27											
229.4	Bedrock - Shale		9	SS	27											
229.4	to silt		10	SS	27											
229.4	Bedrock		11	SS	27											
229.4																
229.4	Bed of River															



DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS &amp; TESTING OFFICE

## RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 70-11116

LOCATION Sta. 183+92 o/s 20' LT

ORIGINATED BY J.S.

W.P. 37-66-12

BORING DATE Jan. 6, 1972

COMPILED BY S.A.A.

DATUM Gerdetic

BOREHOLE TYPE Washboring - NX and BX Casing

CHECKED BY S.R.

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	SIRAT. FLOT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.		$w_p$ ——— $w$ ——— $w_L$ WATER CONTENT %		
							<input type="radio"/> UNCONFINED    + FIELD VANE <input checked="" type="radio"/> QUICK TRIAXIAL    x LAB. VANE				
233.3	Ground Surface										P.C.F. GR, SA, SI, CL
	Det. Mix of Silty, Sand and Gravel Some Clay		1	SS	53	230					
			2	SS	60						
	Det. Bands of Silty Clay		3	SS	100						
			4	SS	55						
	Quartz Till Boulders up to 12" in Size		5	SI	50	220					
			6	SS	100						
	Very Dense Clay		7	SI	240						
213.2	1-Block Shaley Siltstone Sand Clay		8	SC	25	210					
			9	SC	5						
			10	SC	5						
202.1			11	SC	100	200					
190	End of Borehole										

100/2"

▽ Elev.  
224.8  
Jan. 10, 1972



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 11

FOUNDATION SECTION

JOB 70-11116

LOCATION Sta. 185+52 o/s 20' LT.

ORIGINATED BY J.S.

V.P. 37-6-12

BORING DATE Jan. 7, 1972


COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Washboring - NX and BX Casing

CHECKED BY S.R.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS	
ELEV.	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT					SHEAR STRENGTH P.S.F.					WATER CONTENT % $w_p$ — $w$ — $w_L$
							20	40	60	80	100	$\phi$ UNCONFINED	+ FIELD VANE	$\phi$ QUICK TRIAXIAL			
213.0	Ground Surface																
213.0	Est. Mix of Silt, Sand and Gravel, Trace of Clay		1	SS	50	230											
	Glacial Till		2	SS	104												
	Dense to V. Dense		3	SS	72												
	Coarse sand		4	SS	32												
	Grinders up to 12 inches in size		5	SS	71	220											
213.5			6	SS	100												
			7	SS	75												
			8	SS	52												
			9	SS	52												
211.5	Bedrock - Shale		10	SS	58												
	Calcareous		11	SS	103	210											
210.0	Clay		12	SS	103												
209.0	End of Borehole				200												

 Elev.  
219.9  
Jan. 10, 1972



## 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 - 6	500 - 1000	COMPACT	10 - 30
STIFF	6 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

### SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY



# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
s	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
$I_C$	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
$c_v$	COEFFICIENT OF CONSOLIDATION
$C_c$	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
$T_v$	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION
$\phi'$	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



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of

Foundation Office.

~~A. Steinhilber,~~  
Principal Foundation Engineer,  
Room 107, Central Bldg.

Structural Office,  
West Bldg., Downsview.

March 14, 1972.

Re: Hwy. 17 Interchange (EBL) Ramp,  
Approx. 6 Mi. West of Quebec Boundary,  
W.P. 37-66-12, Site 27-201,  
Hwy. No. 417, District #9.

70-11-116

Attached herewith we are submitting the final  
bridge drawings which show the foundation design for this  
structure.

Kindly give us your comments at your earliest  
convenience.

C.S. Grebski,  
Structural Design Engineer.

CSG:sr  
Attach.

c.c. Foundation Office.

*no comments*  
*BTJ*  
*March 21, 1972*

*SK*  
*10 April 72*



37-66-12

70-1116

Shaheen Ahmad

BARRY T. DARCH

D. 7014-1 and 3

Foundation Design Report

Location of Bridge and Pier

Design Section Number

Two span - continuous  
Settlement Sensitive Pier's and Abutments - on end bearing  
piles to refusal in gravel till or to bedrock.

YES

1. Are sufficient field tests been done?

YES

2. Are collected pile load test data as shown correct?

YES

3. If collection of load test data is recommended,  
is this work in progress?

NOT APPLICABLE

4. Are appropriate designs in accordance with our  
reports? Check shown as well. Longest.

YES

5. Do you anticipate any construction problems?  
i.e., sequencing, sloping of temporary slopes  
or excavations.

NO

6. Summarize your comments or reference areas if  
necessary.

I talked to Mr. A. Witteki with regard to the  
possibility of founding the pier on a spread footing. He  
would require an allowable bearing value of about 5 tsf.  
(3.0 tsf quoted in report). Further, the footing would have to  
have a larger contact area than that required if a  
piled foundation is employed. Therefore, the short length  
of piling required (12') plus the smaller footing area makes  
this scheme proposed the most economical.

Design Section Number March 14, 1972

Revision March 21, 1972

Barry T. Darch



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. T.C. Kingsland,  
Regional Bridge Planning Engineer,  
Eastern Region,  
Kingston, Ontario.

FROM: Foundations Office,  
Design Services Branch,  
Central Building,  
Downsview, Ontario.

ATTENTION:

DATE: April 18, 1972.

OUR FILE REF.

IN REPLY TO

25-417-1

SUBJECT:

ADDENDUM TO  
FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossing of Hwy. # 417  
By Hwy. #17 E.B.L. Ramp  
E.Hawksbury Twp., Prescott County  
District No. 9 (Ottawa)  
W.O. 70-11116 - W.P. 37-66-12 & 17

Attached herewith we are submitting the revised borelog sheets for Boreholes #9, #10 and #11 for the above mentioned project. Please destroy the old borelog sheets and insert the revised information.

MD/ao

*M. Devata*  
M. Devata,  
Supervising Foundation Engineer.

c.c. D. W. Farren  
B. R. Davis  
A. Rutka  
S. J. Markiewicz  
J. C. Callaghan  
B. J. Giroux  
E. R. Saint  
G. A. Wrong  
B. A. Singh

Foundations Office  
Documents ✓



DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 70-11116  
W.P. 37-66-12  
DATUM Geodetic

LOCATION Sta. 182+47 o/s 20' LT.  
BORING DATE Jan. 3, 1972.  
BOREHOLE TYPE Washboring EX & NX Casing

ORIGINATED BY J.S.  
COMPILED BY S.A.A.  
CHECKED BY C.C.

25-417-1

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w <sub>L</sub> PLASTIC LIMIT ——— w <sub>p</sub> WATER CONTENT ——— w			BULK DENSITY Y P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. LOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT 20 40 60 80 100					SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w <sub>p</sub> ——— w ——— w <sub>L</sub> WATER CONTENT % 10 20 30
232.6	Ground Surface					230											
	Hot. mix of silt, sand and gravel, some clay		1	SS	27	220											
	Glacial Till		2	SS	15												
	Compact to V. Dense		3	SS	10												
	Brown to Gray Boulders up to 12" in Size		4	RG	50%												
			5	SS	30												
			6	SS	30												
			7	SS	30												
215.1						210											
17.5	Bedrock - Shaley Dolomite Sound		9	RG BX	6%												
			10	RG BX	59%												
206.6	Gray		11	RG BX	100%												
26.6	End of Bore					200											



FOUNDATION SECTION

CHECKED BY S. B.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT ——— W <sub>L</sub> PLASTIC LIMIT ——— W <sub>P</sub> WATER CONTENT ——— W			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					10 20 30				
233.3	Ground Surface															
213.9	Het. Mix of Silt, Sand and Gravel Some Clay		1	SS	53	230										
	Occ. Seams of Silty Clay		2	SS	97											
			3	SC	108											
			4	SS	54											
	Glacial Till Boulders up to 12" in Size Very Dense Grey		5	SS	59	220										
			6	SS	108											
19.4	Bedrock Shaley Dolomite Sound Grey		7	RC BX	212											
199.1			8	RC BX	257	210										
		9	RC	702												
			10	RC	882											
			11	RC BX	872	200										
34.2	End of Borehole					190										







DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. T. C. Hinesland, Regional Bridge Planning Engineer,  
Eastern Region,  
Kingston, Ontario.

FROM: Foundations Office,  
Design Services Branch,  
Central Building,  
Downsview, Ontario.

ATTENTION:

DATE: February 24th, 1972.

OUR FILE REF. IN REPLY TO

SUBJECT:

MAR 1 1972

APPENDIX TO  
FOUNDATION INVESTIGATION REPORT  
For  
Proposed Crossing of Hwy. #417  
(Eastbound and Westbound lanes)  
By Hwy. #17 E.B.L. Ramp  
E. Hawkebury Twp., Prescott County  
District No. 9 (Ottawa)  
W.O. 70-11116 - W.P. 37-66-12 & 17

Since the original Foundation Report (70-11116) was submitted, February 24, 1971, for the above-mentioned project, a revision in the alignment for Hwy. #17 Eastbound lane ramp has been proposed, which would in effect shift the structure location some 70 feet northerly from the previous location. As a result of this, we have carried out three additional borings to supplement our original subsoil information. This memo should be read in conjunction with our original Foundation Investigation Report (70-11116) for details of subsoil and groundwater conditions.

The subsoil conditions at the revised location is very similar to those encountered at the previous location. The



predominant stratum across the site is composed of compact to very dense, 18 to 21 feet thick, glacial till (heterogeneous mixture of silt, sand and gravel, trace of clay). Numerous boulders up to 12 inches in size were encountered throughout the deposit. Underlying the glacial till stratum is sound shaley dolomite bedrock, interbedded with layers and irregular seams of dolomite shale.

Groundwater level and observations have been carried out in the open boreholes. These observations indicate that the water level varies between elevations 225 and 230, which correspond to depths of 2 to 8 feet from existing ground surface. This pattern was interrupted at B.H. #11, where the water level was measured at elevation 220. This may be due to the fact that not sufficient time was allowed for the water level to reach its stable condition.

The gradational variation within the glacial till deposit at various borehole locations, are shown on the accompanying borelog sheets. The stratigraphical profile, shown on Drawing No. W.O. 70-11116A-2, has been inferred from this data.

The structure at the revised location will be a two-span structure (144' - 160'), having a width of 40 feet. In the vicinity of the structure the Hwy. #17 E.B.L. Ramp will have a profile grade between elevations 250 and 254 -- i.e. the approach fills will have a maximum height of approximately 20 feet.

Since the type of structure and subsoil conditions at



the revised alignment of Hwy. # 17 E.B.L. Ramp are very similar to those at previous location, our recommendations pertaining to structure foundations and approach embankments are still applicable. A brief resumé of the recommendations are as follows:

The pier can be supported on spread footings located within the upper portion of the glacial till deposit at or below elevation 228. An allowable bearing pressure of 3 tons/sq. ft. may be used in the design of the footing.

The abutments may be supported on end-bearing piles driven to bedrock. In some cases the piles may meet refusal within the glacial till stratum a few feet above the bedrock. In any event the piles must penetrate at least 10 feet into the parent glacial till stratum. The piles should be designed for the maximum capacity of the section chosen (e.g. a 12 HP74 steel H-pile can be designed for a safe allowable load of 95 tons/pile).

Alternatively, the abutments may be 'perched' within the approach fills. These may be supported on spread footings founded within a zone of well-compacted granular fill using a safe bearing pressure of 2 t.s.f., as suggested in our original Foundation Report.

No stability problems are anticipated for approach embankments with standard 2:1 slopes. Settlement of the

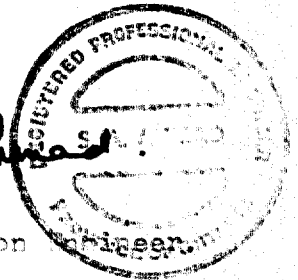


glacial till subsoil will be elastic in nature and negligible in magnitude.

If additional information is required for your design requirements, please feel free to contact this office.

*Shaheen Ahmed*

Shaheen Ahmed,  
Project Foundation Engineer.



For: H. Devats,  
Supervising Foundation Engineer.

SA/mj.

c.c. D. W. Farren  
B. E. Davis  
A. Rucka  
S. J. Markiewicz  
J. C. Callaghan  
F. J. Giroux  
H. E. Saint  
G. A. Brown  
S. A. Singh

Foundations Office  
Documents ✓



## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

### DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

### SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY



# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
s	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX $= \frac{w - w_p}{I_p}$
$I_c$	CONSISTENCY INDEX $= \frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta\sigma}$
$c_v$	COEFFICIENT OF CONSOLIDATION
$C_c$	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma}$
$T_v$	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	$\approx 3.1416$
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



FOUNDATION SECTION

CHECKED BY *S.R.*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — $w_L$		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	PLASTIC LIMIT — $w_p$	WATER CONTENT — $w$	WATER CONTENT %		
232.6	Ground Surface											
215.1	Het. mix of silt, sand and gravel, some clay Glacial Till Compact to V. Dense Brown to Grey Boulders up to 12" in Size		1 2 3 4 5 6 7 8	SS RC SS RC SS RC SS SS	27 50% 166 50% 48 75% 30 88	230 220	100/8"					
17.5	Bedrock - Shaley Dolomite Sound Grey		9 10 11	RC BX RC BX RC BX	64% 59% 100%	210						
26.0	End of Bore					200						



DEPARTMENT OF HIGHWAYS- ONTARIO

## RECORD OF BOREHOLE No. 11

FOUNDATION SECTION

MATERIALS &amp; TESTING OFFICE

JOB 70-11116

LOCATION Sta. 185+52 o/s 20' LT.

ORIGINATED BY J.S.

W.P. 37-66-12

BORING DATE Jan. 7, 1972

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Washboring - NX and BX Casing

CHECKED BY S.R.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_P$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100	$w_P$	$w$	$w_L$	
233.9	Ground Surface														
0.0	Het. Mix of Silt, Sand and Gravel, Trace of Clay		1	SS	50	230									
	Glacial Till		2	SS	106										
	Dense to V. Dense		3	RC	87%										
			4	SS	32										
			5	SS	71	220									
	Grey Boulders up to 12 Inches in Size		6	SS	60										
213.5			7	RC	87%										
			8	RC	53%										
			9	RC	83%										
20.4	Bedrock - Shaley		10	RC	58%	210									
	Dolomite Sound Grey		11	RC BX	53%										
203.9			12	RC BX	100%										
30.0	End of Borehole					200									

30 30 33 7

18 36 36 10

 Elev.  
219.9  
Jan. 10, 1972



DEPARTMENT OF HIGHWAYS- ONTARIO  
MATERIALS & TESTING OFFICE

## RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 70-11116

LOCATION Sta. 183+92 o/s 20' LT

ORIGINATED BY J.S.

W.P. 37-66-12

BORING DATE Jan. 6, 1972

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Washboring - NX and BX Casing

CHECKED BY S.R.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— $w_L$		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT.	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	RESISTANCE	PLASTIC LIMIT ——— $w_p$	WATER CONTENT ——— $w$		
233.3	Ground Surface											
213.9	Het. Mix of Silt, Sand and Gravel Some Clay  Occ. Seams of Silty Clay  Glacial Till Boulders up to 12" in Size Very Dense Grey		1	SS	53	230						
			2	SS	99							
			3	RC	10%							
			4	SS	54							
			5	SS	59	220						
			6	SS	105							
			7	RC BX	24%							
19.4	Bedrock Shaley Dolomite Sound Grey		8	RC BX	25%	210						
			9	RC	70%							
			10	RC	88%							
199.1			11	RC BX	87%	200						
34.2	End of Borehole					190						

SHEAR STRENGTH P.S.F.  
 ○ UNCONFINED + FIELD VANE  
 ● QUICK TRIAXIAL x LAB. VANE

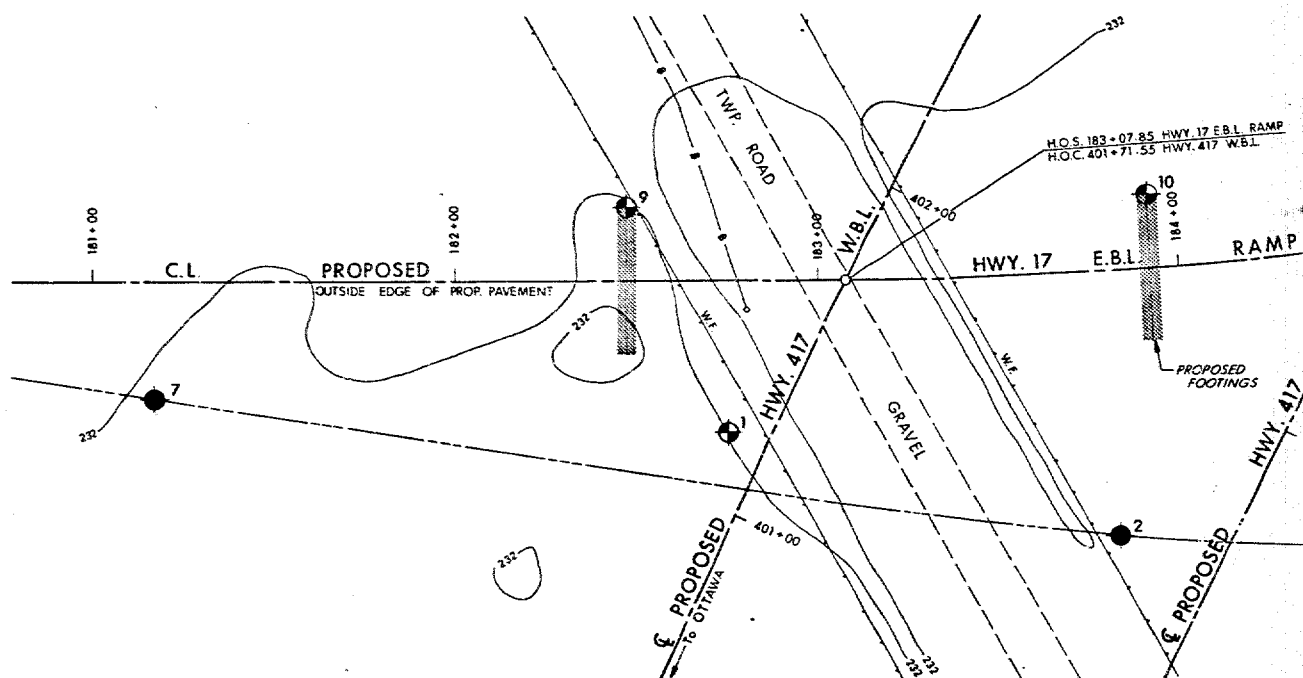
WATER CONTENT %  
 10 20 30

100/2"

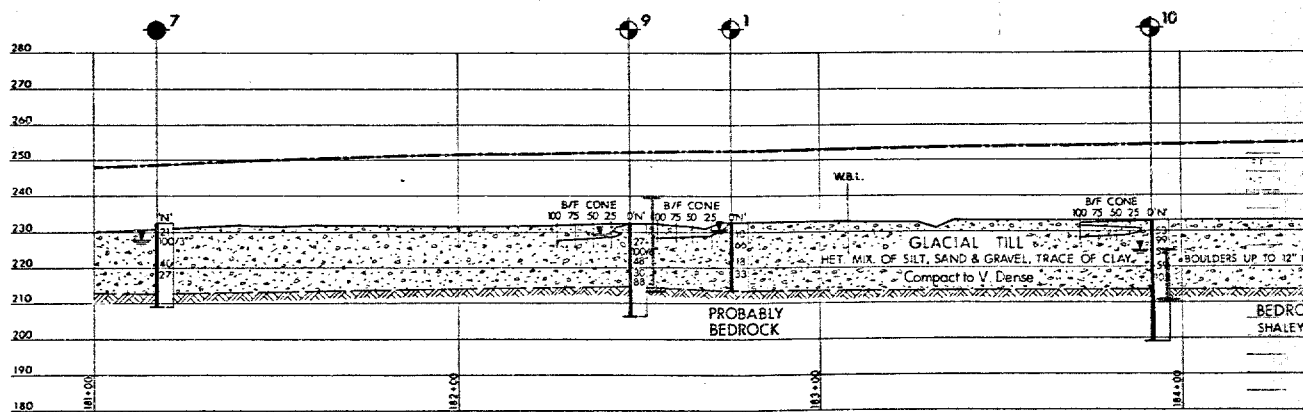
Elev. 224.8  
 Jan. 10, 1972  
 30 31 30 9

GR. SA. SI. CL.



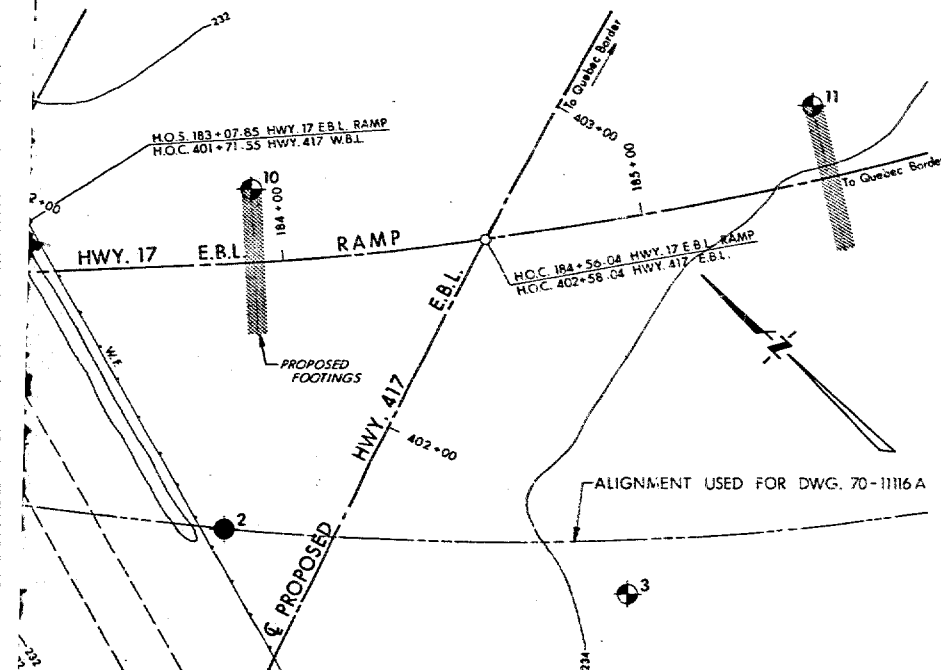


PLAN  
20 10 0 SCALE 20 40 FT.

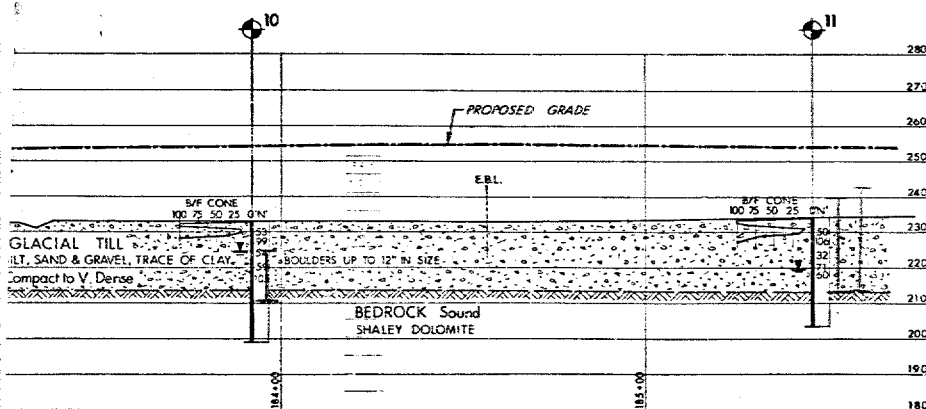


CL. PROFILE - HWY. 17 EBL RAMP  
20 10 0 SCALE 20 40 FT.





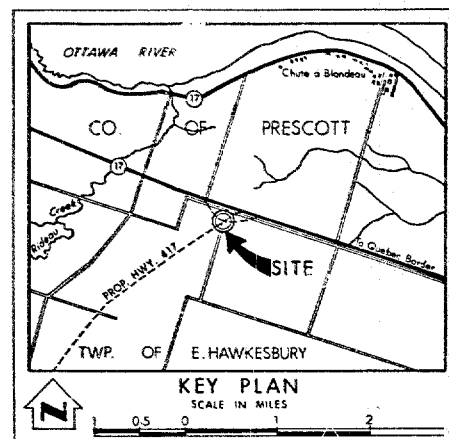
AN  
SCALE 20' 40 FT.



HWY. 17 E.B.L. RAMP  
SCALE 20' 40 FT.



REF. No. E-5215-1



### LEGEND

- Bore Hole
- ⊕ Cone Penetration Test
- ⊕ Bore Hole & Cone Test
- ⊕ Water Levels established at time of field investigation January 1972.

NO.	ELEVATION	STATION	OFFSET
9	232.6	182+47	20' LT.
10	233.3	183+92	20' LT.
11	233.9	185+52	20' LT.

### NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS  
DESIGN SERVICES BRANCH — FOUNDATION OFFICE

### HWY. 17 E.B.L. RAMP

HIGHWAY NO. 417 DIST. NO. 9

CO. PRESCOTT

TWP. E. HAWKESBURY LOT 24 & 25 CON. II.

### BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. S.A.	CHECKED	WP. NO. 37-66-12	DRAWING NO.
DRAWN S.A.	CHECKED	JOB NO. 70-11116	70-11116 A-2
DATE FEBRUARY 18, 1972	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT. NO.		



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

PROJECT <u>70-11116</u>		SITE <u>HAWKESBURY</u>		BOREHOLE No. <u>1</u>		GROUND ELEVATION <u>232.3</u>									
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	2-3.5	1/2"		100% 100% 0%	Med	Med	Small	Med	Low	Light	Med	50%	Compacted sand & gravel (Gravelly sand)	①	CL
2	5-6.5	1/2"		100% 100% 0%								50%		①	CL
3													<u>BTD</u>	①	CL
4													<u>BTD</u>		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 OFFICE  
**VISUAL CLASSIFICATION SHEET**

PROJECT 70-1116 SITE HAWES BURY BOREHOLE No. 2 GROUND ELEVATION 2325

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIAL. ANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	2-3.5	1/4"	Sub Angular	20	30	50	Med	Med	Med	Med	Med	Med	24 V. STIFF	CLAYEY SILT, SAND GRAIN (GLACIAL SILT)	CL	
2	4-6.5			20	30	50							24 HARD			
3	8-11.5			20	30	50							24 V. STIFF			
4	13-16.5			20	30	50							24 HARD			
5	18-19.5			20	30	50							24 HARD			

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

REMARKS:-



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

PROJECT 70-11116 SITE HAWKESBURY BOREHOLE No. 3 GROUND ELEVATION \_\_\_\_\_

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	2-3.5			20	40	40	Med	None	None	None	None	Med	Hard	Clayey silt, silty clay	CL	
2	5-6.5			20	35	45	Med	None	None	None	None	Med	Hard	Clayey silt, silty clay	CL	
3	10-11.5			20	20	60	Med	None	None	None	Green	Med	Very Stiff	Clayey silt, silty clay	CL	
6	14.5-20.5												—	Fractured Sandstone - Hard - brownish grey sand, silt & clay		

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

REMARKS:-



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

PROJECT 70-11116 SITE HAWKESBURY-417 BOREHOLE No. 4 GROUND ELEVATION \_\_\_\_\_

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															CLAYEY SILT with sand and gravel (GLACIAL TILL) ①	CL
2															HET. MIXT. OF SILT, sand & GRAVEL, trace to some clay (GLACIAL TILL) ②	ML
3															①	CL
4															①	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 OFFICE  
**VISUAL CLASSIFICATION SHEET**

PROJECT 70-11116 SITE HAWKESBURY BOREHOLE No. 5 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	2-3.5			15 35 50	Med		Flow	Med	Light	Red	Weak	Soft	CLAYCY SILT SAND & GRAVEL (GLACIAL Till)	CL
2	5-5.8	1"		30 15 55								Hard		

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

REMARKS:-



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

PROJECT 70-11116 SITE HAWKESBURY 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										
1	2-3.5			25	20	55	Med	Med	Small	Med	Earth	Brown	Weak	6 Firm	CLAYEY SILT, SAND & GRAVEL WITH TRACES OF ORGANICS (GLACIAL TILL)	CL
2	5-6.5			50	35	15	Med						Med	60 Hard	NO ORGANICS	CL
3	11.4-12.9			25	25	50	Med						Weak	27 Disturb		
4	15-16.5			25	25	50						Grey	"	30 Hard	NO ORGANICS	

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

REMARKS:-



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

B12

PROJECT 70-11116 SITE HAWKES BURY-417 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	2' to 3.5'														HET. MIXTURE OF SILT, SAND & GRAVEL, trace of clay (GLACIAL TILL) ①	ML
2															①	ML
3															①	ML
4															clayey silt with sand and gravel (GLACIAL TILL)	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 OFFICE  
**VISUAL CLASSIFICATION SHEET**

PROJECT <u>70-11116</u>		SITE <u>Hawkesbury</u>		BOREHOLE No. <u>8</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	2-3.5			25 30 45	Med	Med	Low	Low	Low	Brown	Weak	47	CLay, Silt, Sand & Gravel (Good in Time) Tough & Durable	CL
2	5-6.5			25 25 50	Med	"	"	Med	"	"	Med	57	CLay, Silt, Sand & Gravel (Good in Time)	CL
3	10-11.5			25 25 50	6	"	"	"	"	Grey	"	34	"	"
5	15-16.5			30 20 50	11	"	"	"	"	"	"	57	"	"

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

REMARKS:—



OVERSIZED DRAWINGS

General Layout  
Foundation "



一、人、事、物、事

[illegible]



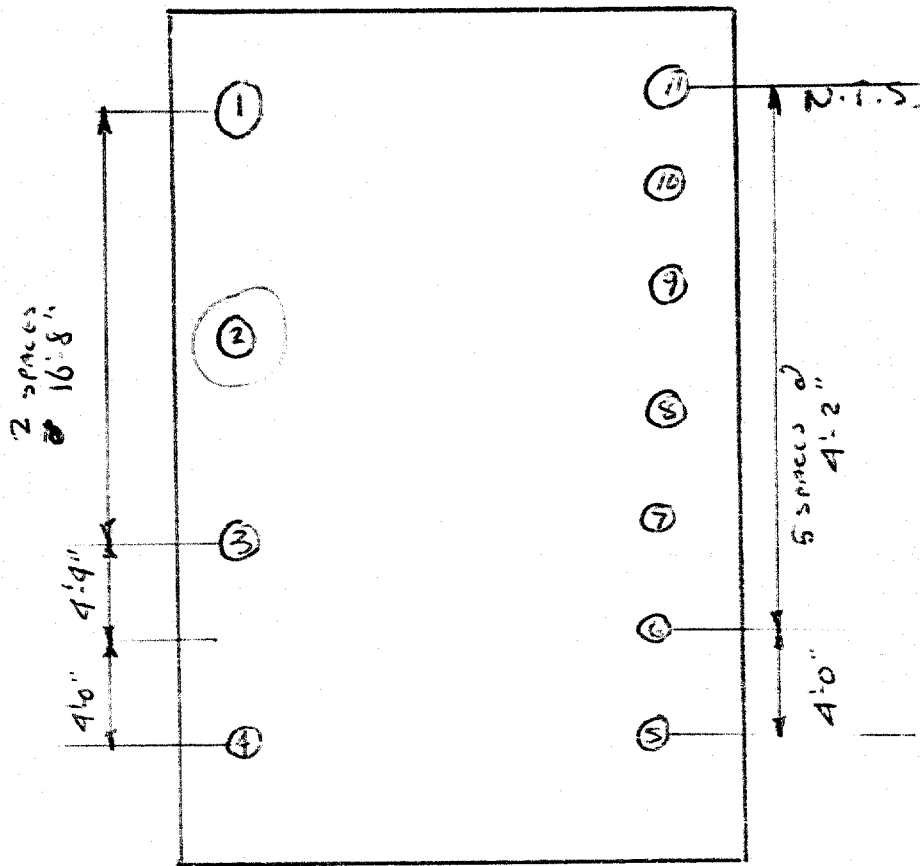
DRIVING STEEL "H" PILES (17x74)

DUFRESNE PILING LTD.

3.25 TON DROP HAMMER  
0.25 TON CAP.



WEST ABUTMENT FOOTING.



HWY #17 INTERCHANGE CPL RAMP.



# BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE Hwy 17 Interchange E.C. Ramp  
CONTRACTOR DUFFY PILING DESIGN LOAD OF PILE DRIVE TO BEDROCK  
HAMMER DETAILS: TYPE DROP WEIGHT 3-2500 HEIGHT OF FALL OR ENERGY 5-7'  
TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 25 TONS  
PILE DETAILS "H" PILES 12x74 112 BATTER  
PILE NO. 2 LOCATION WEST ADJUTMENT FTG. DATE DRIVEN NOV 29/73

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
42'3"	1	2	42'3"	26	22		51			76	
	2	2		27	Refused		52			77	
	3	2		28			53			78	
	4	2		29			54			79	
	5	2		30			55			80	
	6	3		31			56			81	
	7	2		32			57			82	
	8	2		33			58			83	
	9	5		34			59			84	
	10	7		35			60			85	
	11	8		36			61			86	
	12	8		37			62			87	
	13	8		38			63			88	
	14	11		39			64			89	
	15	13		40			65			90	
	16	14		41			66			91	
	17	14		42			67			92	
	18	14		43			68			93	
	19	14		44			69			94	
	20	16		45			70			95	
	21	16		46			71			96	
	22	16		47			72			97	
	23	17		48			73			98	
	24	17		49			74			99	
	25	17		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>26'-2"</u>	FINAL CUT OFF ELEVATION <u>240.00</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER  
DESIGN SERVICES BRANCH  
DEPARTMENT OF  
TRANSPORTATION AND  
COMMUNICATIONS  
DOWNSVIEW, ONTARIO

SIGNED A.G. Price  
NAME (PRINT) A.G. PRICE  
DATE NOV 29/73  
ATTACH SKETCH OF PILE NUMBERING SYSTEM

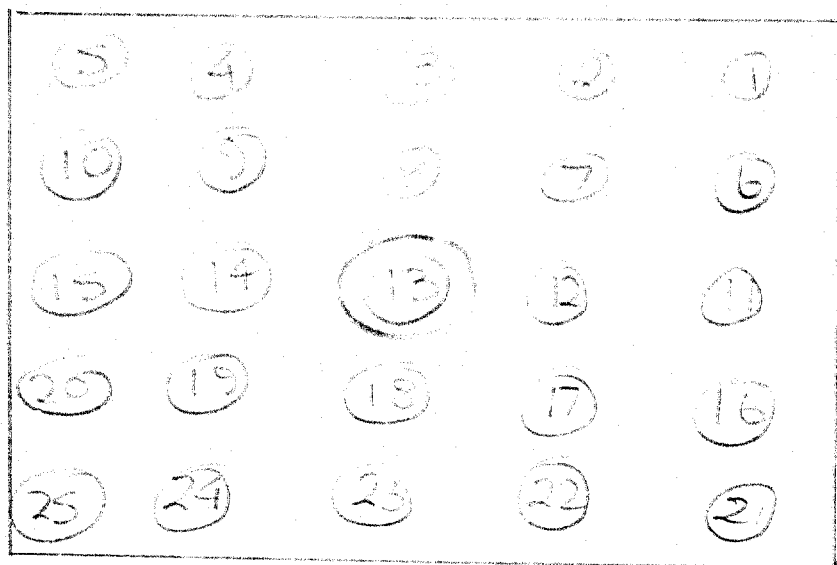


DRIVING STEEL "H" PILES (2074)

DRIVING PILING (2074)

5.25 ton 34.0 ft. pile

0.25 ton cap



N.T.S.

Pier Footing.

HWY 17 INTERCHANGE FOR FA-10

Note: Pile #13 is the only Pile which is Vertical  
(No LATER)



FOUNDATION OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE HWY #17 INTERCHANGE 432 RAMP  
CONTRACTOR DEFRISSE PILING LTD DESIGN LOAD OF PILE DRIVE TO DESIGN  
HAMMER DETAILS: TYPE PUMP WEIGHT 3.25 HEIGHT OF FALL OR ENERGY 5-7  
TYPE OF ANVIL OR CAP SIZE / TAPER TUB WEIGHT OF ANVIL OR CAP 2.5 TON  
PILE DETAILS 11" STEEL PILES 12x74 VERTICAL  
PILE NO. 13 LOCATION PIER FOOTING DATE DRIVEN Dec 5/73

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
15-9	1	2		26			51			76	
	2	2		27			52			77	
	3	2		28			53			78	
	4	6		29			54			79	
	5	6		30			55			80	
	6	5		31			56			81	
	7	7		32			57			82	
	8	7		33			58			83	
	9	10		34			59			84	
	10	12		35			60			85	
	11	17		36			61			86	
	12	17		37			62			87	
	13	20		38			63			88	
	14	23		39			64			89	
	15	Detack		40			65			90	
	16			41			66			91	
	17			42			67			92	
	18			43			68			93	
	19			44			69			94	
	20			45			70			95	
	21			46			71			96	
	22			47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>13'-3"</u>	FINAL CUT OFF ELEVATION <u>224-00</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER  
DESIGN SERVICES BRANCH  
DEPARTMENT OF  
TRANSPORTATION AND  
COMMUNICATIONS  
DOWNSVIEW, ONTARIO

SIGNED A.G. Price  
NAME (PRINT) A.G. PRICE  
DATE Dec 10/73  
ATTACH SKETCH OF PILE NUMBERING SYSTEM



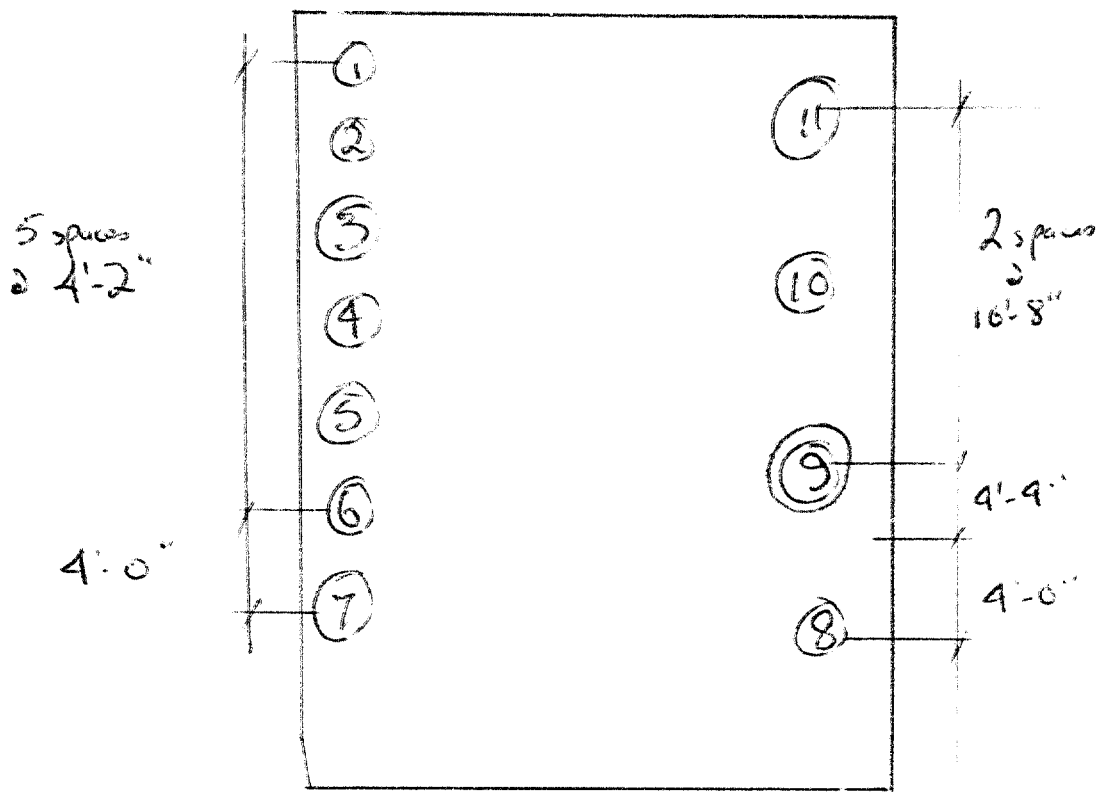
DRIVING 22 "H" PILES (12x7+)

NOV 30/73

DUFRESNE PILING LTD

3-25 12" DEEP HAMMER

N



HWT # 17 INTERCHANGE CBL RAMP.

Drive to Bridge.  
a.g. file.

EAST ABUTMENT.



BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE HWY # 17 INTERCHANGE (BL RAMP)  
CONTRACTOR DOUGLAS PINE LTD DESIGN LOAD OF PILE DRIVE TO BEDROCK  
HAMMER DETAILS: TYPE DRAY WEIGHT 325 HEIGHT OF FALL OR ENERGY 5'-7'  
TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 125  
PILE DETAILS STEEL "H" PILES (12x74) BUTTER  
PILE NO. 9 LOCATION EAST ABUTMENT DATE DRIVEN NOV 30/73

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
45'-0"	1	2		26	29		51			76	
	2	2		27	29		52			77	
	3	2		28	30 2x R		53			78	
	4	2		29			54			79	
	5	4		30			55			80	
	6	4		31			56			81	
	7	4		32			57			82	
	8	4		33			58			83	
	9	4		34			59			84	
	10	4		35			60			85	
	11	4		36			61			86	
	12	4		37			62			87	
	13	6		38			63			88	
	14	6		39			64			89	
	15	6		40			65			90	
	16	8		41			66			91	
	17	9		42			67			92	
	18	10		43			68			93	
	19	11		44			69			94	
	20	40		45			70			95	
	21	20		46			71			96	
	22	20		47			72			97	
	23	20		48			73			98	
	24	27		49			74			99	
	25	31		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>26'-5"</u>	FINAL CUT OFF ELEVATION <u>240.00</u>					

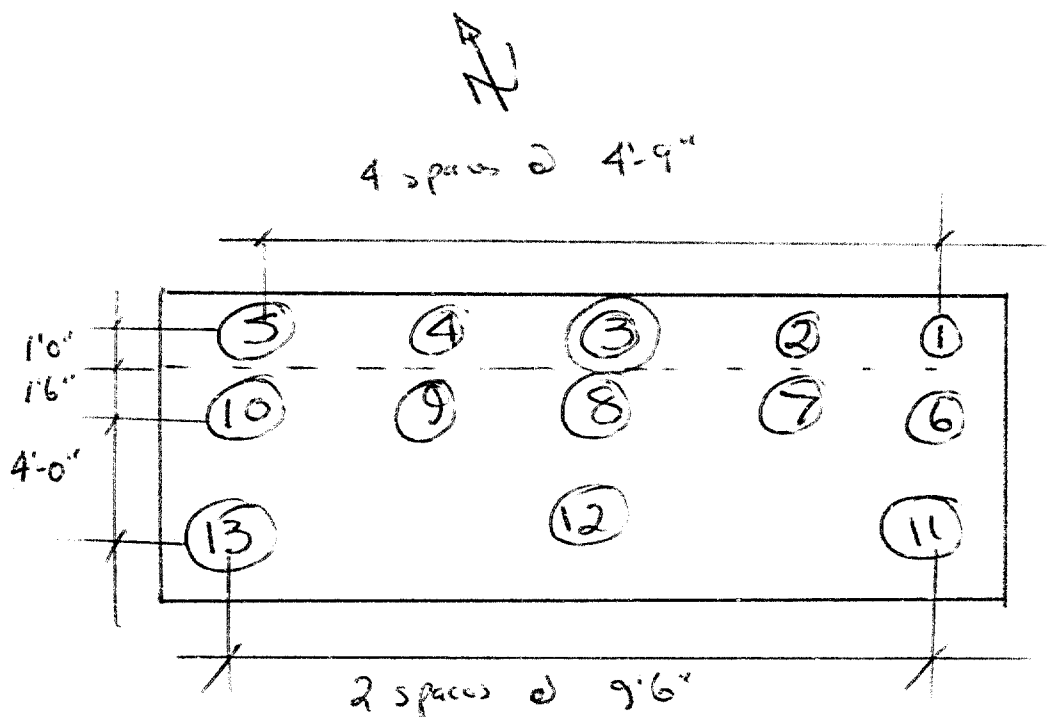
REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER  
AT 20 WE HIT A DESIGN SERVICES BRANCH  
BOULDER & MANAGED DEPARTMENT OF  
TO BREAK THROUGH IT. TRANSPORTATION AND  
COMMUNICATIONS  
DOWNSVIEW, ONTARIO

SIGNED A.G. Price  
NAME (PRINT) A.G. PRICE  
DATE DEC 5/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM



DRIVING 12" "H" PILES (12x53) DEC 4/73.  
DUFFY'S PILING CO LTD  
3.25 ton DROP HAMMER.



HWY # 17 INTERCHANGE (BL RAMP.

Drive to Bedrock.

a.g. Pile

EAST ABOUT RETAINING WALL.



# BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-34 STRUCTURE PILOT 17 INTERCHANGE (AL RAMP)  
CONTRACTOR Downsview Paving Co Ltd DESIGN LOAD OF PILE DRIVE TO BEDROCK  
HAMMER DETAILS: TYPE Drop WEIGHT 325 lb HEIGHT OF FALL OR ENERGY 5'-7"  
TYPE OF ANVIL OR CAP STEEL / TAPER TOP WEIGHT OF ANVIL OR CAP 125 lb  
PILE DETAILS STEEL "H" PILE (12x53) 115  
PILE NO. 3 LOCATION CASAB. RETAINING WALL DATE DRIVEN Dec 3/73

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
325	1	2		26	25		51			76	
	2	3		27	26		52			77	
	3	4		28	33		53			78	
	4	4		29	36		54			79	
	5	4		30	34		55			80	
	6	4		31	35		56			81	
	7	3		32	Bedrock		57			82	
	8	4		33			58			83	
	9	4		34			59			84	
	10	3		35			60			85	
	11	6		36			61			86	
	12	9		37			62			87	
	13	11		38			63			88	
	14	11		39			64			89	
	15	11		40			65			90	
	16	12		41			66			91	
	17	14		42			67			92	
	18	14		43			68			93	
	19	14		44			69			94	
	20	17		45			70			95	
	21	20		46			71			96	
	22	20		47			72			97	
	23	20		48			73			98	
	24	20		49			74			99	
	25	23		50			75			100	

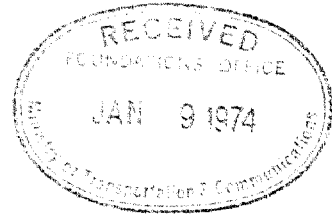
DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>30'6"</u>	FINAL CUT OFF ELEVATION <u>242.50</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER  
DESIGN SERVICES BRANCH  
DEPARTMENT OF  
TRANSPORTATION AND  
COMMUNICATIONS  
DOWNSVIEW, ONTARIO

SIGNED A.G. Price  
NAME (PRINT) A.G. PRICE  
DATE Dec 5/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM





**Notes:-**

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{3}{4}$ " x  $\frac{1}{2}$ " steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.



DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 316-4

DIST. 9 REGION EASTERN

W.P. No. 27-4612 Hwy 17

CONT. No. 73-134

W. O. No. 70-P-116

STR. SITE No. 27-201 # 27-224

HWY. No. 417

LOCATION HWY. 417 & HWY. 17

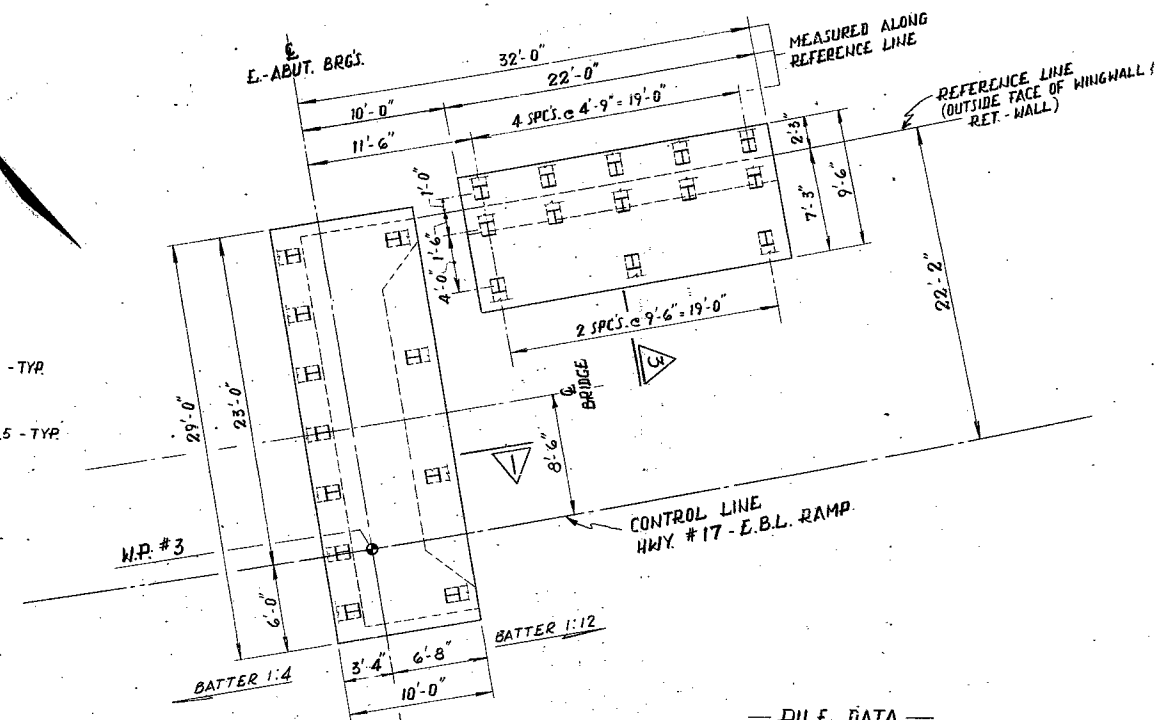
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: DOCUMENTS TO BE UNFOLDED  
BEFORE MICROFILMED

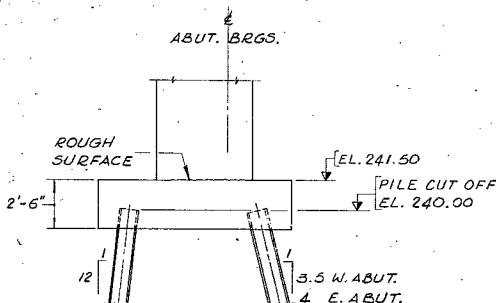








SCALE:  $\frac{3}{16}'' = 1'-0''$



N.T.S.

$\Delta$ - $59^{\circ}22'$	$\Delta s$ - $4^{\circ}30'$
$\Delta c$ - $48^{\circ}52'$	$Ls$ - $150^{\circ}00$
$D$ - $6^{\circ}00'LT.$	$Ts$ - $620^{\circ}75$
$R$ - $354^{\circ}.93$	
$Lc$ - $814^{\circ}.44$	
$Es$ - $145^{\circ}.81$	

LOCATION	BATTER	N <sup>o</sup> REQD	TYPE	LENGTH	DESIGN LOAD
W. ABUT.	1:3.5	5	HP 12 x 74	30'-0"	95 T/PILE
	1:6	1			
	1:12	5			
E. ABUT.	1:4	7	HP 12 x 74	30'-0"	95 T/PILE
	1:12	4			
RET. WALL	1:3	10	HP 12 x 53	32'-0"	70 T/PILE
	1:12	3			
PIER	VERTICAL	1	HP 12 x 74	12'-0"	95 T/PILE
	1:3.5	16			
	1:4	8			

NOTES:

- PILE SPACINGS TO BE MEASURED AT UNDERSIDE OF FOOTINGS.
- PILES TO BE DRIVEN TO BEDROCK.
- PILE LAYOUT AND FOOTING DIMENSIONS FOR BOTH ABUTMENTS ARE SIMILAR EXCEPT AS NOTED.

REVISIONS			
	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS  
ONTARIO

70-11-116

HWY. #17 INTERCH. (E.B.L. RAMP)

APPROX. 6 MI. WEST CF QUEBEC BOUNDARY

KING'S HIGHWAY No. 417 DIST. No. 9

CO. PRESCOTT

TWP. E. HAWKSURRY      LOT 24 & 25      CON. II

## FOUNDATION LAYOUT

APPROVED				SITE No. 27-201		W.P. No. 37-66-12	
STRUCTURAL ENGINEER				CONTRACT Nos.			
DESIGN	A.W.	CHECK	HKJ				
DRAWING	A.A./B.S.	CHECK	AS				
DATE	MAR. 178	LOADING	HS20-44	DRAWING No.		D-7014-3	

31G-4