

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

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

Attention: Mr. S. McCombie

DATE: April 8, 1968

OUR FILE REF.

IN REPLY TO

APR 10 1968

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed C.P.R. Overhead
For New Highway 31, Line 'A'
Townships of Winchester-Mountain
County of Dundas
District No. 9 (Ottawa)
W.J. 68-P-13-1 -- W.P. 335-65

Attached, we are forwarding to you, our detailed foundation investigation report on the subsoil conditions existing at the above structure site.

We believe that the factual data and recommendations contained therein, will prove adequate for your design requirements. Should additional information be required, please feel free to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
J. J. Markiewicz
C. R. Robertson
G. Scott
J. E. Gruspier
B. A. Singh
Foundations Files
Gen. Files

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

TABLE OF CONTENTS

1. INTRODUCTION.
 2. SUBSOIL CONDITIONS:
 - 2.1) General.
 - 2.2) Silty Sand with Gravel, Trace of Clay;
occasional Boulders (Glacial Till).
 3. GROUNDWATER.
 4. DISCUSSION AND RECOMMENDATIONS.
 5. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
Proposed C.P.R. Overhead
For New Highway 31, Line 'A'
Townships of Winchester-Mountain
County of Dundas
District No. 9 (Ottawa)
W.J. 68-P-13 -- W.P. 335-65

1. INTRODUCTION:

The Foundation Section was requested to carry out an investigation for a proposed overhead to carry Highway 31 across existing C.P.R. tracks just west of the Town of Winchester. The request was contained in a memo dated January 26, 1968, from the Bridge Location Section (Mr. G. Scott, Regional Bridge Location Engineer). An investigation was subsequently carried out by this Section to determine the subsoil conditions at the site. This report contains the results of the investigation, together with our recommendations.

The site is located about a mile south of the junction at which Highways 31 and 43 diverge respectively north towards Ottawa and west towards Kemptville, about 1 mile west of the Town of Winchester. The site is elevated 5 to 10 feet above the surrounding ground surface which slopes gently upwards towards the north. Some 200 feet east of the proposed structure location, the double track railroad is carried on an embankment of 7 to 10 feet in height. At the site of the crossing, the railroad has been cut 3 to 5 feet below the adjacent ground level. The area is situated in the "Winchester Clay Plain" physiographic region, which is known to be covered with such glacial features as drumlins, etc.

cont'd. /2 ...

2. SUBSOIL CONDITIONS:

2.1) General:

A total of 4 sampled boreholes, each accompanied by a cone penetration test, was carried out at the site. Samples were obtained either by hammering a split-spoon sampler into the soil in accordance with the specifications for a Standard Penetration Test, or by core drilling in BXL and AXT sizes. These borings revealed that, to the depths investigated, the subsoil consists of a very dense deposit of silty sand with gravel and a trace of clay and occasional boulders (glacial till).

2.2) Silty Sand with Gravel, Trace of Clay; occasional Boulders (Glacial Till):

This deposit was encountered immediately below a surficial stratum of topsoil or granular road fill between elevations 252.6 and 260.0 and was sampled to depths of between 11 and 27 feet. The colour of the deposit varied from a mottled-brown near the surface to grey below about 10 feet. The upper 10 feet of the deposit was noted to contain a larger percentage of gravel than the soil below. At the location of Borehole 3 the soil was found to be a clayey silt with sand and gravel. The physical properties of the deposit as determined from field and laboratory tests, are shown below:

		<u>Range</u>	<u>Average</u>
Moisture Content - %	:	7 - 15	10
Bulk Density - PCF	:	137 - 148	143
Grain-Size Distribution			
(exclusive of Boulder sizes) -			
Gravel - %	:	15 - 38	30
Sand - %	:	33 - 60	40
Silt and Clay %	:	21 - 45	30
'N' Values - Blows/Foot	:	53 - 170	140 ±

cont'd. /3 ...

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

2.2) Silty Sand with Gravel, Trace of Clay; occasional Boulders (Glacial Till): (cont'd.) ...

In addition to the above, the results of Atterberg limit tests carried out on the cohesive portions of the deposit are shown on the Plasticity Chart in the Appendix and indicate generally low plasticity. The grain-size distribution curves are also shown in the Appendix. Several boulders, up to 12 inches in size, were core drilled in all the boreholes; these were encountered generally below depths of about 5 to 7 feet.

3. GROUNDWATER:

Water level observations in the completed open boreholes during the course of the investigation, indicate a groundwater level about 7.5 feet below the ground surface.

4. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct an overhead three-span (35'-39'-35') structure to carry the new Highway 31 (Revision Line 'A') over the existing C.P.R. tracks. Maximum approach fill heights of about 30 feet are proposed.

In view of the very dense glacial till encountered at the site, it is recommended that the piers be supported on spread footings designed with a safe net bearing pressure of up to 5 t.s.f. The footings should be located at a depth compatible with the frost protection requirements of the area.

No major dewatering problems are anticipated during construction of the footings.

The abutments should be founded within the approach fill on well-compacted G.B.C. Class 'A' material at a design bearing pressure of 2.0 t.s.f. The fill should extend for a horizontal distance of at least 10 feet from the footing edges in the plane of the footing tops. This portion of the fill should be constructed with side slopes of 2:1. The remainder of the fill should be

cont'd. /4 ...

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

completed to about profile grade for a distance of about 50 feet behind the abutments before re-excavating for the footings.

Settlements of the abutments and piers, designed as recommended above, are expected to be minimal.

No stability problems are anticipated for approach embankments constructed with standard 2:1 side slopes.

5. MISCELLANEOUS:

The field work, performed during the period February 19 - 27, 1968, together with the preparation of this report, was undertaken by Mr. C. Mirza, Project Foundation Engineer.

Equipment used was owned and operated by Master Drilling Co. Ltd.

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

April, 1968.

$$\frac{1}{2} \left(\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \right)^2 = \frac{1}{2} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$$

1. The matrix $\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$ is a unitary matrix.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 68-F-13LOCATION Sta. 252 + 63 @ Line 'A' o/s 22' Rt.ORIGINATED BY CMW. P. 335-65BORING DATE V February 27, 1968COMPILED BY CMDATUM GeodeticBOREHOLE TYPE Diamond Drill - NYCHECKED BY SL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT			WATER CONTENT %					
							20	40	60	80	100	10 20 30			
							SHEAR STRENGTH P.S.F.								
255.0	Ground Level														
0.0 254.0	Topsoil														
1.0	Clayey silt with sand and gravel, occasional boulders up to 12".		1	SS	135	10"									
	Hard						250								
	Mottled Brown to Grey		2	SS	100	5"									
			3	BX RC	20%										
	(Glacial Till)		4	SS	75										
			4A	BX RC	0%										
242.5			5	SS	115	6"									
12.5	End of Borehole						240								

DEPARTMENT OF HIGHWAYS - ONTARIO

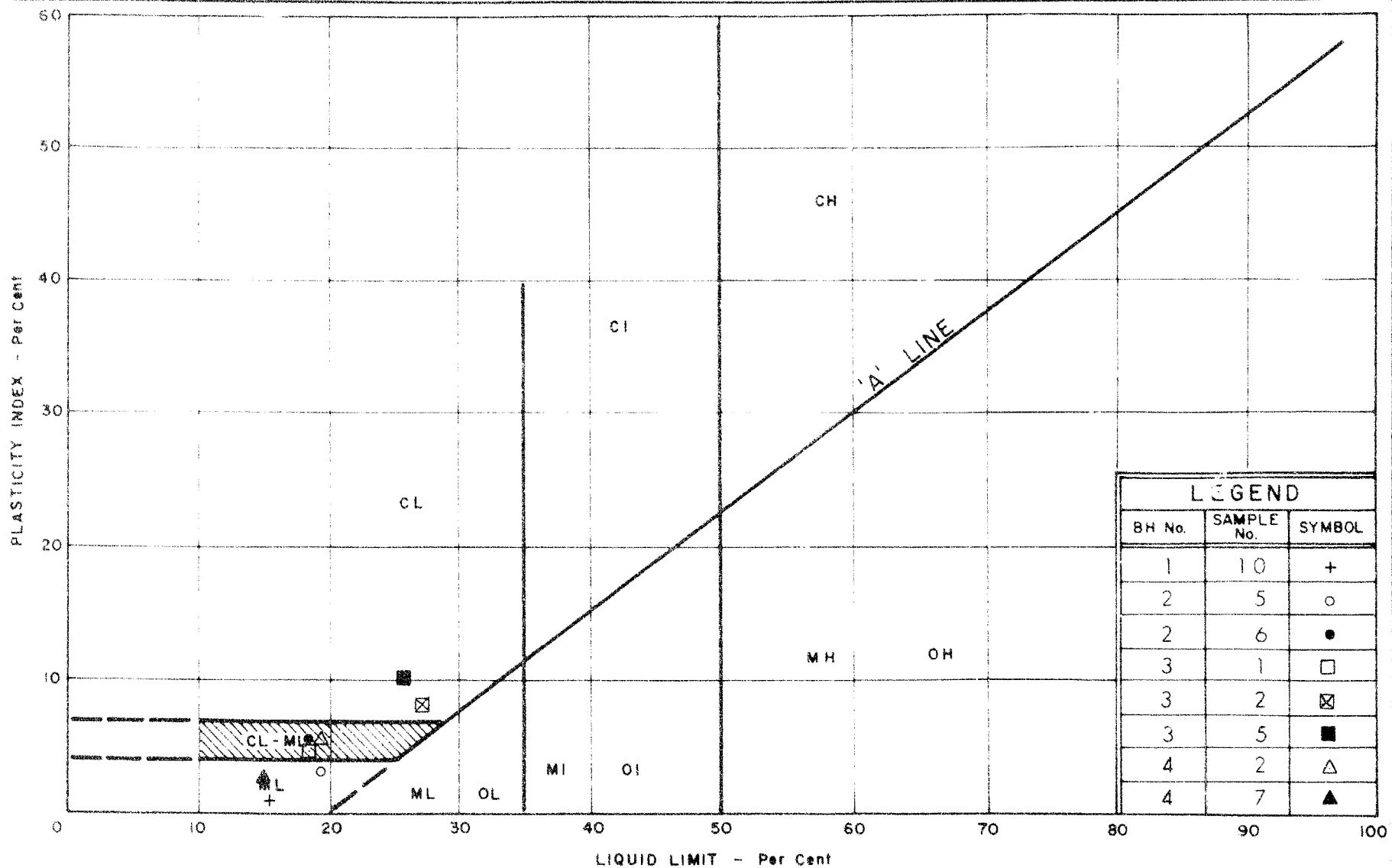
MATERIALS & TESTS DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 68-F-13 LOCATION Sta. 253 + 24 1/2 Line 'A' o/s 39' Lt. ORIGINATED BY CM
W. P. 335-65 BORING DATE February 23-26, 1968 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Diamond Drill - NX CHECKED BY LL

[illegible]



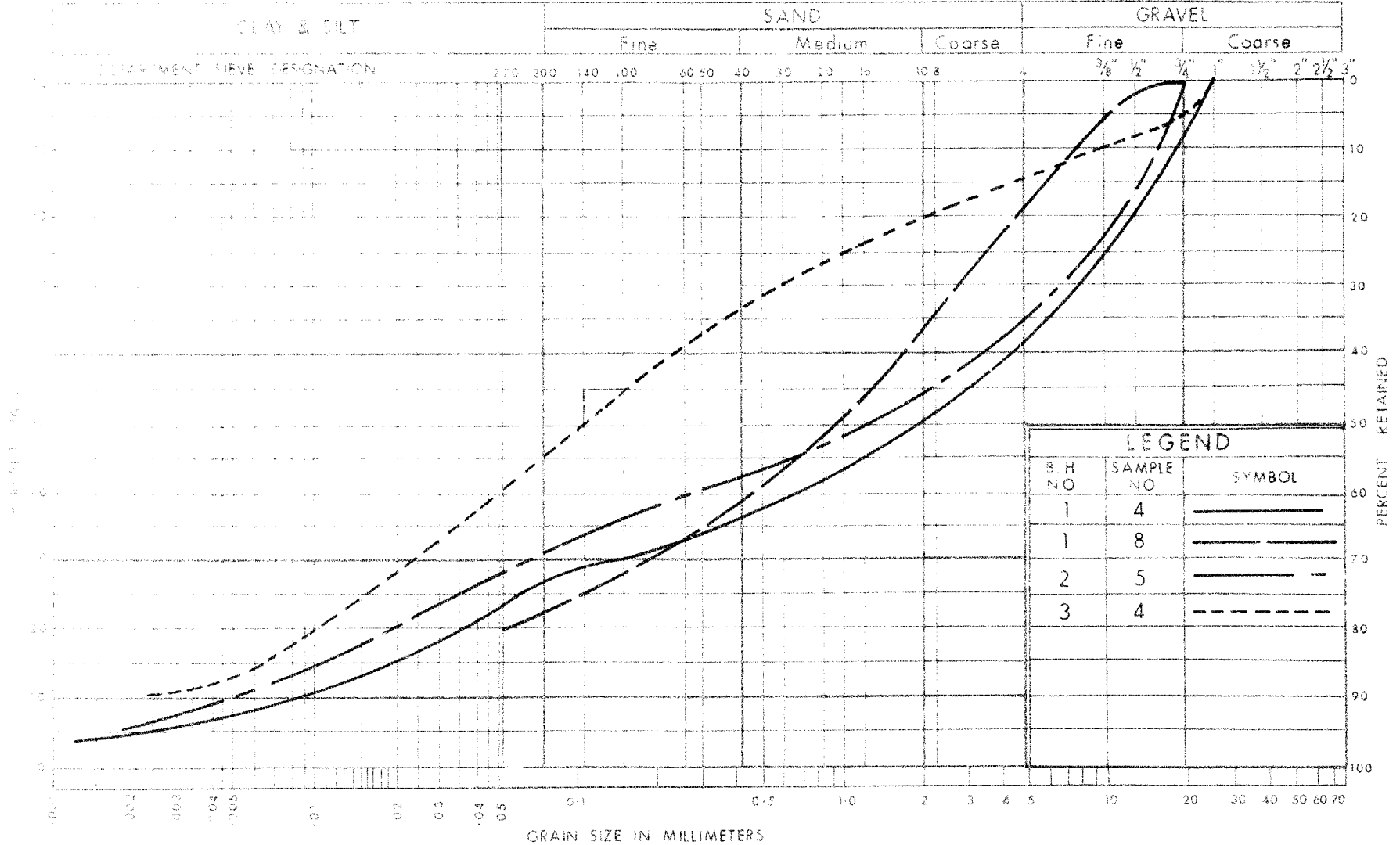
DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART GLACIAL TILL

WP. No. 335 - 65

JOB No. 68 - F - 13

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION GLACIAL TILL

W.P. No. 335 - 65

JOB No. 68 - F - 13

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

SS	SPLIT SPOON	T W	THINWALL OPEN
WS	WASHED SAMPLE	T P	THINWALL PISTON
SB	SCRAPER BUCKET SAMPLE	OS	OESTERBERG SAMPLE
AS	AUGER SAMPLE	FS	FOIL SAMPLE
CS	CHUNK SAMPLE	RC	ROCK CORE
ST	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

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

GENERAL

π	= 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
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_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
β	ANGLE OF SLOPE TO HORIZONTAL

MEMORANDUM

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

FROM:

Foundations Office,
Design Services Branch,
West Bldg., Downsview.

ATTENTION:

DATE:

April 4, 1973.

OUR FILE REF

IN REPLY TO

APR 10 1973

SUBJECT: Proposed Overhead Structure at the Crossing
of Hwy. #31-43 (Line 'A') and the C.P.R.
(Winchester By-Pass), Townships of Winchester-
Mountain, County of Dundas, District No. 9 (Ottawa)
W.J. 68-F-13 and 13-2 -- W.P. 335-65

31G-97

GEOCREs No.

31G-78

1. Introduction:

The original investigations for the aforementioned structure were carried out in 1968. The investigations have indicated that the predominant stratum across the site is composed of a competent glacial till stratum. An exception to this pattern, however, occurs along the south approach (south of Station 251+00) here up to 21 feet of very stiff to firm silty clay to clayey silt overlies the glacial till. A stratigraphical profile across the site is shown on Drawing No. 68-F-13-2A. One of the primary considerations is to ensure that this cohesive stratum is not overstressed by the loading of the approach fill. The results of these investigations were presented in the following reports.

<u>Report No.</u>	<u>Dated</u>	<u>Subject Matter</u>
W.J. 68-F-13	April 8/68	Foundation Support - Piers and Abutments
W.J. 68-F-13-2	Sept. 23/68	Stability and Settlement Considerations South Approach Embankment

After submission of the aforementioned reports the Foundations Office was requested to carry out a preliminary investigation for two additional alternate alignments for Hwy. #31-43, designated Lines 'D' and 'E'. This investigation was carried out in June 1972.

Following the completion of the investigation for Lines 'D' and 'E' (W.O. No. 72-11072), but prior to submission of the detailed foundation report, Line 'A' was chosen as the finalized alignment.

This letter summarizes our recommendations pertaining to the design of the foundations and the related considerations associated with the approach fills, assuming Line 'A' has been adopted. A report will not be submitted for Lines 'D' and 'E' at this time.

2. Structure Foundations:

a) Piers (Refer to B.H.'s #2 and 3):

The two piers can be founded on spread footings located in the upper portion of the competent glacial till. Four feet of earth cover should be provided to the underside of the footings for frost protection purposes. Footings so founded could be designed using an allowable bearing value of 5.0 t.s.f.

The footing foundations will probably be located above the prevailing groundwater level in the area. No major dewatering problems are, therefore, anticipated. Any groundwater seepage or surface runoff into the excavations could be handled using conventional techniques, such as pumping from sumps.

b) Abutments:

The abutments will be "perched" within the approach fills. They can be supported on spread footings founded within a zone composed of granular 'A' material, as discussed in detail on pages 3 and 4 of report W.J. 68-F-13. Such footings can be designed using an allowable bearing value of 2.0 t.s.f.

As an alternative the abutments can be supported on end-bearing piles driven to practical refusal within the competent glacial till. The pile driving should be controlled in the field by using the Hiley Dynamic Pile Driving Formula (Standard BD 82-7). In order to facilitate the driving of the

piles in the dense bouldery till it is recommended that they be fitted with reinforced tips. For estimating purposes the pile tip elevations can be assumed as follows:

<u>Abutment</u>	<u>Estimated Pile Tip Elev.</u>	<u>Refer to</u>
North	250 to 252	B.H. #4
South	244 to 246	B.H. #1

The piles can be designed for the ultimate capacity of the pile section chosen; e.g., 12BP 74 steel H-piles can be designed for 95 tons per pile.

The differential settlement between the abutments and adjacent piers will be negligible.

3. Approach Embankments:


The proposed profile of Hwy. 31-43 (Line 'A') is shown on Drawing No. W.J. 68-F-13-2A. At this grade the north and south approach fills will have a maximum height of 26 and 35 feet, respectively. It is understood that a glacial till will be used as fill at this site; according to personnel from the Eastern Region Materials Section the compacted in-place bulk unit weight of the fill will be of the order of 145 p.c.f.

The north approach till will be underlain by competent glacial till. No stability problems are, therefore, envisaged provided standard 2:1 slopes are employed. The glacial till will consolidate due to the applied fill loading. Since the till is highly preconsolidated this settlement will be negligible in magnitude.

Portions of the south approach fill will be underlain by the very stiff to firm silty clay stratum. Stability analyses have been carried out; these have indicated that the south embankment will be inherently stable with respect to a deep-seated rotational type of failure within the cohesive foundation subsoil, provided standard 2:1 slopes are employed. The silty clay will consolidate due to the imposed fill loading. The stress increase will, however, remain within the preconsolidation

range for this particular deposit. The settlement will, therefore, be of a recompressive nature and should be of the order of 4 to 6 inches. The total amount of the settlement should be realized within a period of 2 to 2-1/2 years, with approximately 50 percent occurring in 6 to 8 months.


We trust that the comments presented in this letter are sufficient for your immediate needs. If we can be of any further assistance to you on this project, please contact this Office.



M. Devata,
SUPERVISING FOUNDATIONS ENGINEER.

BTD/ao

cc: E. J. Orr
B. R. Davis
A. Rutka
A. J. Percy
J. E. Callaghan
B. J. Giroux
E. R. Saint
G. A. Wrong
B. A. Singh

Foundations Files 
Documents

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

68-F-13
68-F-13-2

TO: A. G. Stermac,
Principal Foundation Engineer,
Room 107, West Building.

FROM: Structural Office,
West Building.

ATTENTION:

DATE: April 17th, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT: C.P.R. Overhead,
1.5 Miles SW of Winchester,
W.P.#335-65, Site #31-277,
Hwy's. 31 & 43, District #9.

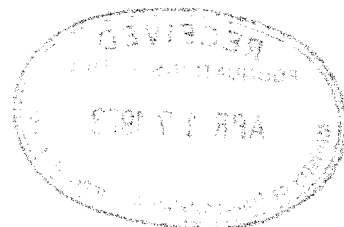
Attached herewith are Drawings D-6478-1 & -3 on the above-mentioned structure for your perusal.

Kindly give us your comments at your earliest convenience.

dp
Attach.

K. G. Bassi

K. G. Bassi,
Reg. Structural Design Engineer.



MEMORANDUM

TO: MEMO TO FILE
W.O. 72-11072 (A Report Not
Required)

FROM: B. T. Darch,
Foundations Office,
Design Services Branch.

ATTENTION:

DATE: March 30, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT: Alternate Alignments, Proposed Overhead
Structure at the Crossing of Hwy. #31-43
(Winchester Bypass) and the C.P.R.,
Lines 'D' and 'E', District No. 9 (Ottawa)
W.O. 72-11072 -- W.P. 335-65

Hwy. #31-43 Line 'A' was investigated in 1968 (refer to reports W.O. 68-F-13 and 13-2). Following submission of this report this Office was requested to investigate Lines 'D' and 'E'; this was done in June, 1972. Prior to submitting the report for these lines, however, Line 'A' was adopted as the finalized alignment. This being the case a report is not required for Lines 'D' and 'E'.

The following are appended to this letter.

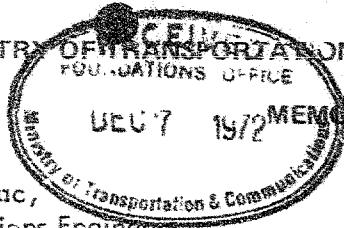
- a) Record of Borelog Sheets 1 to 9
- b) Figures #1 and 2
- c) A draft copy of a partially completed report for Lines 'D' and 'E'.

A drawing (W.O. 72-11072A) has been completed for Lines 'D' and 'E'. H. D. Reed has the drawing.

BTD/ao
Atch.

A. Dechur
for B. T. Larch,
SENIOR FOUNDATIONS ENGINEER.

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO
FOUNDATIONS OFFICE



W.O. 72-11072

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

FROM: Materials and Testing Office,
KINGSTON, Ontario.

ATTENTION: Mr. B. Darch

DATE: December 6th, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT: W. P. 335-65, Hwy. 31, Winchester By-Pass, District # 9, Ottawa

You will find enclosed a print of final plan, profile and x-sections for the south approach fill to the C.P. R. tracks. You will note, a 4' ditch located east of the proposed south approach fill.

As discussed previously, the anticipated fill material is glacial till with a unit weight of 145 lb./ cu. ft.

It is requested that you indicate the factor of safety for the stability analysis based on this unit weight (145 lb./ cu. ft.) in your Foundation Investigation Report.

H. A. Meyer
H. A. Meyer,
For: A. M. Batten,
Senior Soils Supervisor

HAM/AMB/sgp

c. c. - A. J. Percy
- J. E. Colloghan
- G. A. Wrong

Encl.

#68-F-13-1

W.P. #335-65

HWY #31 & #43

LINE 'A'

C.P.R. OVERHEAD

