

## MEMORANDUM

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

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

Attention: Mr. S. McCombie

Date: August 30, 1965

Our File Ref.

In Reply To

SUBJECT

## FOUNDATION INVESTIGATION REPORT

For

Prop. Maidstone Twp. Road, Con. IX  
Underpass, Lot 18, Con. 8 & 9, Twp.  
of Maidstone, Co. of Essex, Hwy. #401,  
District #1 (Chatham)

W.J. 65-F-83 -- W.P. 310-64

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

We believe that you will find the factual data and recommendations contained therein, adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

KYL/MdeF

Attach.

cc: Messrs. B. R. Davis (2)

H. A. Tregaskes

D. W. Farren

A. Gater

F. C. Brown

J. Roy

A. Watt

Foundations Office

Gen. Files

*KYL*  
K. Y. Lo,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

D.H.Q.  
TORONTO  
RECEIVED  
OCT 5 1965  
BRIDGE  
OFFICE

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FOUNDATION INVESTIGATION REPORT  
For  
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Underpass, Lot 18, Con. 8 & 9, Twp.  
of Maidstone, Co. of Essex, Hwy. #401,  
District #1 (Chatham)  
W.J. 65-F-83    --    W.P. 310-64

1. INTRODUCTION:

A foundation investigation for the proposed underpass at Hwy. #401 and Maidstone Twp. Rd., Con. IX, was requested by Mr. G. Scott, Regional Bridge Location Engineer, in a memorandum, dated March 25, 1965.

In order to determine the subsoil conditions existing at the proposed bridge site area, and to decide on the type of foundation, a field investigation was subsequently carried out by this Section.

This report contains the results of field and laboratory tests carried out during the course of the investigation, together with a description of subsoil conditions existing at the site and our recommendations pertaining to the design of the proposed bridge foundation.

2. DESCRIPTION OF THE SITE:

The proposed bridge site (No. 6-238) is located at the intersection of Hwy. #401 and Maidstone Twp. Rd., Con. IX, County of Essex.

The surrounding area is flat, cultivated farmland. Physiographically, the site is located in the area referred to as the Essex Clay Plain, which is part of the St. Clair Plains Region.

### 3. FIELD INVESTIGATION PROCEDURE:

A total of five sampled boreholes was carried out during the course of the field investigation. Boring was achieved by means of conventional diamond drilling equipment adapted for soil sampling purposes. During the field work, disturbed and 'undisturbed' samples were obtained at various intervals.

Disturbed samples were obtained by a split-spoon sampler and the number of blows required to drive the sampler were recorded. The energy used in driving it, conformed to the requirements of the Standard Penetration Test.

'Undisturbed' samples were obtained by means of 2-inch I.D. Shelby tubes which were pushed into the soil by hand. In-situ vane tests were carried out wherever possible, at elevations 12 inches below the various sample depths.

The locations and elevations are shown on Dwg. 65-F-83A which forms part of this report.

### 4. LABORATORY TESTS:

The samples were visually examined and classified at the site as well as in the laboratory. Certain tests were carried out in the laboratory for classification and shear strength determination purposes. These tests consisted of: Natural moisture content, Atterberg limits, bulk density, grain size distribution, and unconfined shear strength determinations. The test results are shown on the Borehole Record sheets.

cont'd. /3 ...

## 5. SOIL TYPES AND SOIL CONDITIONS:

### 5.1) General:

The subsoil at the site was found to vary with depth, but remained generally uniform in lateral directions.

Detailed descriptions of the various soil types observed are shown on the borelog sheets in the Appendix. The estimated stratigraphical profile is shown on Dwg. 65-F-83A.

From ground level downward, the different deposits are as follows:

### 5.2) Clayey Silt with Sand and Traces of Gravel:

This stratum was observed in all boreholes to a maximum depth of 65 ft. (elev. 549). However, the continuity of the deposit was found to be interrupted from elev. 585 to elev. 578, and from elev. 566 to elev. 556, by layers of silty sand with some clay and gravel, and sand and gravel, respectively.

The material in the main deposit consists of clayey silt with sand and traces of gravel and also thin layers of silty clay and clay.

The extreme upper 5 ft. of the deposit is weathered and contains decayed organic materials. The consistency ranges from firm to stiff. Beneath this weathered zone, the consistency of the stratum which appears to be desiccated between elev. 606 and elev. 600, ranges from hard in the desiccated zone, to firm at about elev. 550, with some random variation. Standard Penetration Tests carried out in the hard zone gave 'N' values ranging from 23 to 48 blows per foot. Physical properties of the material as determined from field and laboratory tests, are as follows:

cont'd. /4 ...

5. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

5.2) Clayey Silt with Sand and Traces of Gravel: (cont'd.) ...

Natural Moisture Content	5 to 25 %
Liquid Limit	21 to 35 %
Plastic Limit	11 to 24 %
Bulk Density	124 to 138 p.c.f.
Unconfined Shear Strength	728 to 3,185 p.s.f.
Field Vane Shear Strength	1,120 to >2,000 p.s.f.

Typical grain size distribution curves are included in the Appendix of this report.

5.3) Silty Clay to Clay with some Sand and Traces of Gravel:

This stratum was found to underlie the clayey silt deposit at the boring locations between elev. 549 and elev. 523. The material consists mainly of clay (55%) and silt (31%), with some sand (12%) and traces of gravel (2%).

The consistency is classified as firm to stiff.

5.4) Glacial Till:

The silty clay to clay deposit is underlain by a very dense mixture of gravel, sand, silt and clay, glacial till material. The average moisture content was found to be 8%.

6. GROUND WATER CONDITIONS:

The following water levels were observed in the boreholes:

Borehole No. 1	--	11.4'	Below Ground Level
No. 2	--	12.2'	" " "
No. 5	--	5.0'	" " "

cont'd. /5 ...

7. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct an underpass at the intersection of Hwy. #401 and Maidstone Twp. Rd., Con. IX. At the present time, this is a level crossing. The traffic on the Twp. Rd. will be carried over the intersection by means of a single, four-span structure, constructed along the centre line of the Twp. Road. It was observed from the preliminary general plan, that the present grade line of the Township Road will be elevated to an approx. maximum height of 20 ft.

The investigation has revealed that the bearing capacity of the clayey silt material at about elev. 606, is adequate to provide suitable support for spread footing type foundations.

In view of the foregoing, it is recommended that the piers be founded on spread footings at or below elevation 606', where a safe bearing pressure of 2.5 t.s.f. may be assumed for design purposes. The proposed abutments may be constructed within the approach fills and supported on 12 $\frac{1}{4}$ "  $\emptyset$  steel tube piles driven through the fill about 8 feet, into original ground where a safe bearing capacity of 35 tons per pile should be achieved. These piles should not be driven below elev. 604.0 since the strength of the soil decreases rapidly with depth below this level.

No stability problems are anticipated for the proposed 20-ft. high approach fills provided standard 2:1 slopes are constructed.

The topsoil stripping should be in accordance with D.H.O. Standards.

No major dewatering problems are anticipated.

cont'd. /6 ...

8. SUMMARY:

A foundation investigation at the site of the proposed underpass at the intersection of Hwy. #401 and the Twp. Rd., Con. VII, is reported.

The material was found to consist of about 65' of hard to firm clayey silt with sand and traces of gravel, followed by about 26' of firm to stiff silty clay to clay, followed by very dense glacial till.

It is recommended that the proposed piers be founded on spread footings with an allowable pressure of 2.5 t.s.f. at or below elev. 606, and the abutments on steel tube piles with a safe load of 35 tons per pile.

For details, see Sections 5 and 7.

9. MISCELLANEOUS:

The field programme was carried out from July 28 to July 30, 1965. The equipment used was owned and operated by Dominion Soil Investigation Ltd. and Master Soil Investigation Ltd.

The field work was supervised by Mr. P. Payer, Project Foundation Engineer, who also prepared this report, under the general supervision of Mr. K. G. Selby Senior Foundation Engineer.

August 1965

*Differential Settlement ?*



APPENDIX 1.

DEPARTMENT OF HIGHWAYS - ONTARIO						RECORD OF BOREHOLE NO. 1								FOUNDATION SECTION			
MATERIALS & TESTING DIVISION																	
JOB 65-F-83						LOCATION Sta. 15+98; 22' Lt.								ORIGINATED BY P.P.			
W.P. 310-64						BORING DATE July 27, 28, 29, 1965.								COMPILED BY P.P.			
DATUM Geodetic						BOREHOLE TYPE Washbore - NX Casing.								CHECKED BY K.G.S. <i>[Signature]</i>			
SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W				BULK DENSITY P.C.F.		REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH P.S.F.				WATER CONTENT % WP      W      WL							
614.4	Groundlevel					1000          2000				10    20    30							
0.0	Clayey silt with sand and traces of gravel. Occasional traces of silty clay and clay. Soft to hard. Brown and grey.		1	SS	5	610											Gr 5% Sa 19% Si 38% Cl 38%
			2	SS	21												
			3	SS	42												
			4	SS	39	600											
			5	SS	22												
			6	TW	PM												
			7	TW	PM												
			8	TW	PM	590											
585.3	Silty sand with some clay and gravel.		9	SS	27												Gr 4% Sa 53% Si 34% Cl 9%
578.5	Compact		10	SS	17	580											
35.9	Clayey silt with sand and traces of gravel. Stiff Grey																
565.4			11	TW	PM	570											
49.0	Sand and gravel with some silt and clay. Compact.		12	SS	29												Gr 41% Sa 40% Si ) Cl) 19%
558.9			13	SS	22	560											
55.5	Clayey silt with some sand and traces of gravel. Stiff Grey		14	TW	PM												
549.3						550											
65.1	Silty clay to clay, with some sand and traces of gravel.		15	TW	PM												Gr 2% Sa 12% Si 31% Cl 55%
	Stiff					540											
	Grey		16	TW	PM												
						530											
			17	TW	PM												
	Glacial Till Very Dense					520											
516.9																	
97.5	End of borehole.																

[illegible]



DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS &amp; TESTING DIVISION

JOB 65-F-83

W.P. 310-64

DATUM Geodetic

## RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

LOCATION Sta. 14+02; 17' Rt.

BORING DATE July 29 &amp; 30, 1965.

BOREHOLE TYPE Washbore - NX &amp; BK Casings.

ORIGINATED BY P.P.

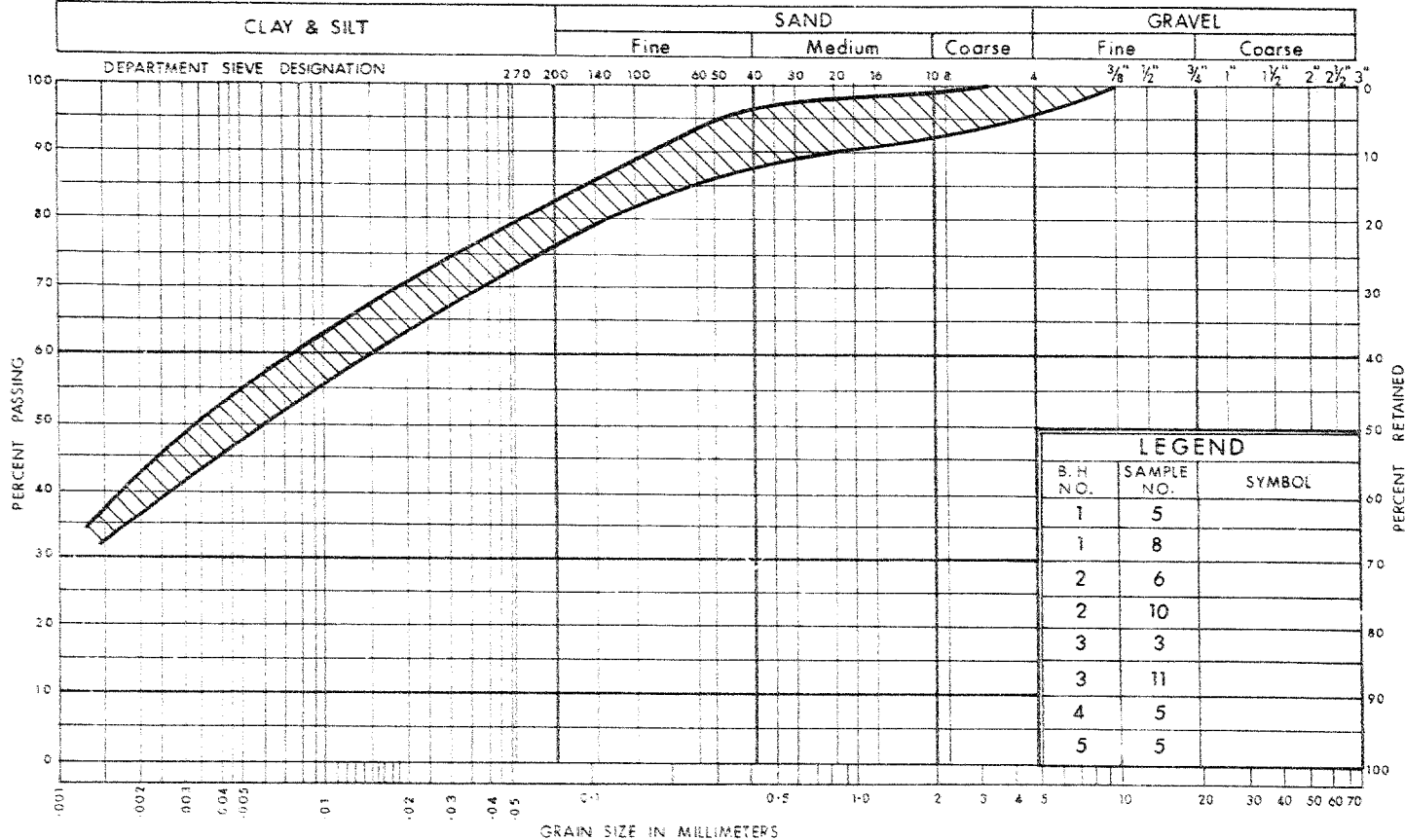
COMPILED BY P.P.

CHECKED BY K.G.S. *KL*

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — WL PLASTIC LIMIT — wp WATER CONTENT — w		BULK DENSITY P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		SHEAR STRENGTH P.S.F.		WATER CONTENT %					
614.5	Groundlevel					1000	2000	10	20	30			
0.0	Clayey silt with sand and traces of gravel.  Occasional layers of silty clay and clay.  Firm to hard.  Brown and grey.		1	SS	11	610							
			2	SS	26								
			3	SS	42								
			4	SS	37	600							
			5	SS	23								
			6	SS	20								
			7	TW	PM	590						131	Gr 0% Sa 17% Si 43% Cl 40%
			8	TW	PM							135	Gr 6% Sa 27% Si 35% Cl 32%
			9	TW	PM							129	
			10	TW	PM	570						130	
566.5	Sand and gravel with some silt and clay.  Compact.		11	SS	15	560							
556.7			12	SS	10								
57.8	Clayey silt with some sand and traces of gravel. Firm		13	SS	11	550							
549.0	Grey												
65.5	Silty clay to clay with some sand and traces of gravel.  Firm  Grey		14	TW	PM	540							
			15	TW	PM	530						118	Gr 8% Sa 68% Si 24% Cl 1
523.0	Glacial Till		16	SS	67								
91.5	End of borehole.					520							



# UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION  
CLAYEY SILT  
(ENVELOPE OF TYPICAL CURVES)



ONTARIO

DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

W.P. No. 310-64

JOB No. 65-F-83

## 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 = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
$C_r$	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
$S_r$	SENSITIVITY

IN TERMS OF  
EFFECTIVE STRESS  
 $\tau_f = c' + \sigma' \tan \phi'$

IN TERMS OF  
TOTAL STRESS  
 $\tau_f = c_u + \sigma \tan \phi$

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

## EARTH PRESSURE

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

## FOUNDATIONS

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

## SLOPES

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

DEPARTMENT OF HIGHWAYS  
MEMORANDUM

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

FROM: Bridge Division,  
Downsview, Ontario.

DATE: March 25, 1965. 61-F-83

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 310-64 - Site 6-238  
Maidstone Township Road ~~Interchange~~  
Hwy. 401 - Dist. 1 UNDERPASS

We are sending to you herewith two prints of Bridge Site Plan E-4347-1 on which we have marked in red the proposed location of the above structure.

The bridge site is readily accessible. It is 22.3 miles west of West Junction Hwy. 2 Interchange.

Please make the necessary arrangements for foundation soils investigation. We will be pleased to have your report in due course.

*N. Zoltay*

NZ/sp

N. Zoltay,  
for G. Scott,  
Regional Bridge Location Engineer.

cc. S. McCombie  
N. D. Smith  
W. Kinnear  
G. Scott

MEMORANDUM:

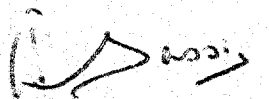
Nov 1/65

To File

RE: Proposed structures on Hwy. 401,  
located 0.6 miles to 8.9 miles  
East of Hwy. 98.  
District No. 1, Chatham.  
W.P. 127-64, 128-64, 129-64,  
131-64, 132-64, 309-64, 310-64,  
669-64 and 670-64.

At a meeting between Mr. M. Devata of Foundations Branch and K. Bassi of Bridge Division, concerning the above structures held on October 28, 1965 at the Bridge Office, it was agreed that:

1. The spread footings for all the piers can be designed for a bearing capacity of  $2\frac{1}{2}$  tons/ft.<sup>2</sup>.
2. The abutment piles for all the structures if driven in accordance with the recommendations given in the individual Foundation Reports, can be designed to carry 30 Tons/pile.
3. The structures should be designed to tolerate a maximum differential settlement between the abutments and shoulder piers in the order of 1 to  $1\frac{1}{2}$  inches.



K. G. Bassi,  
Bridge Project Engineer.

KGB/ag  
c.c. A. G. Stermac  
G. Scott

#65-F-83

W.P. #310-64

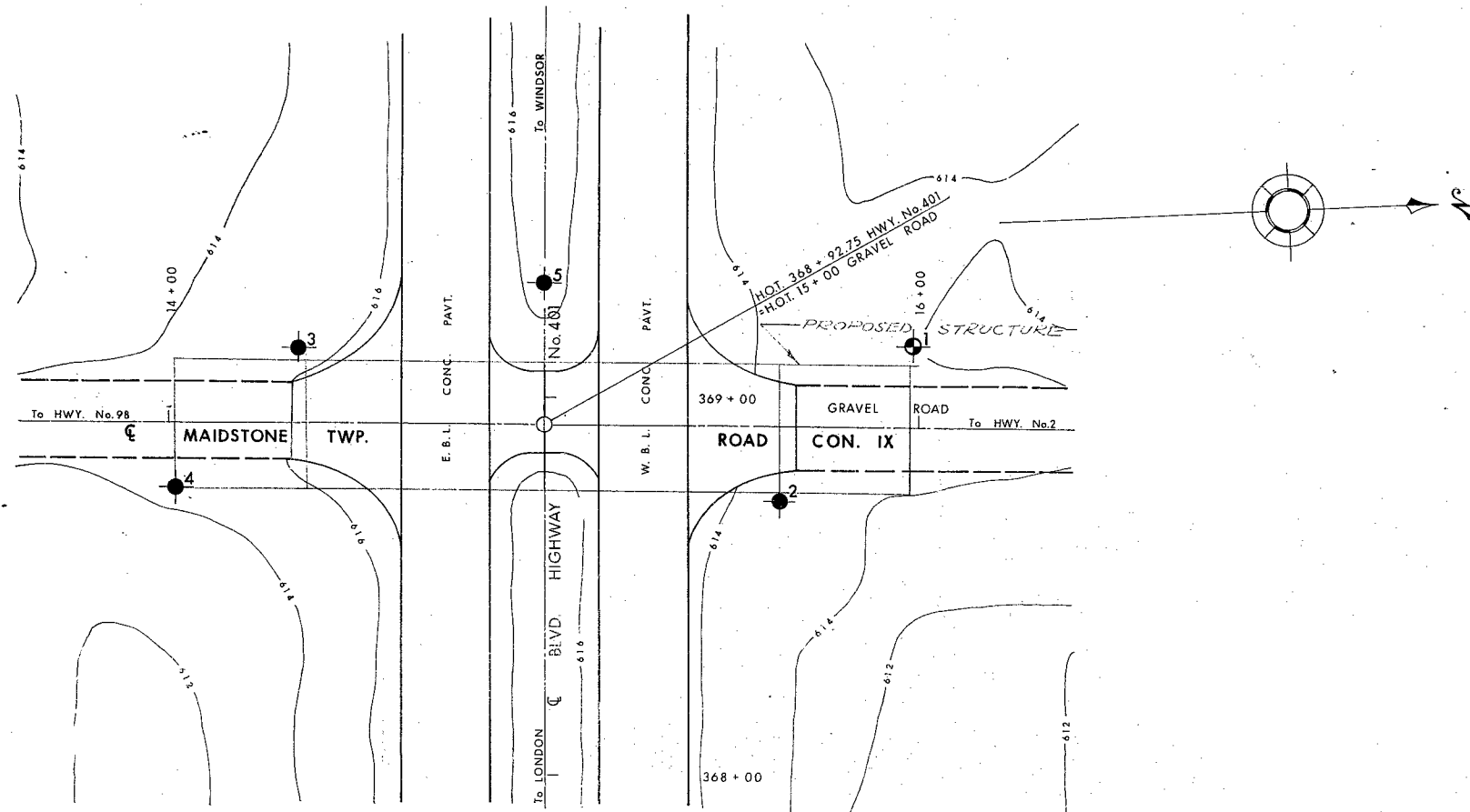
HWY. #401 &

MAIDSTONE

TWP. RD.

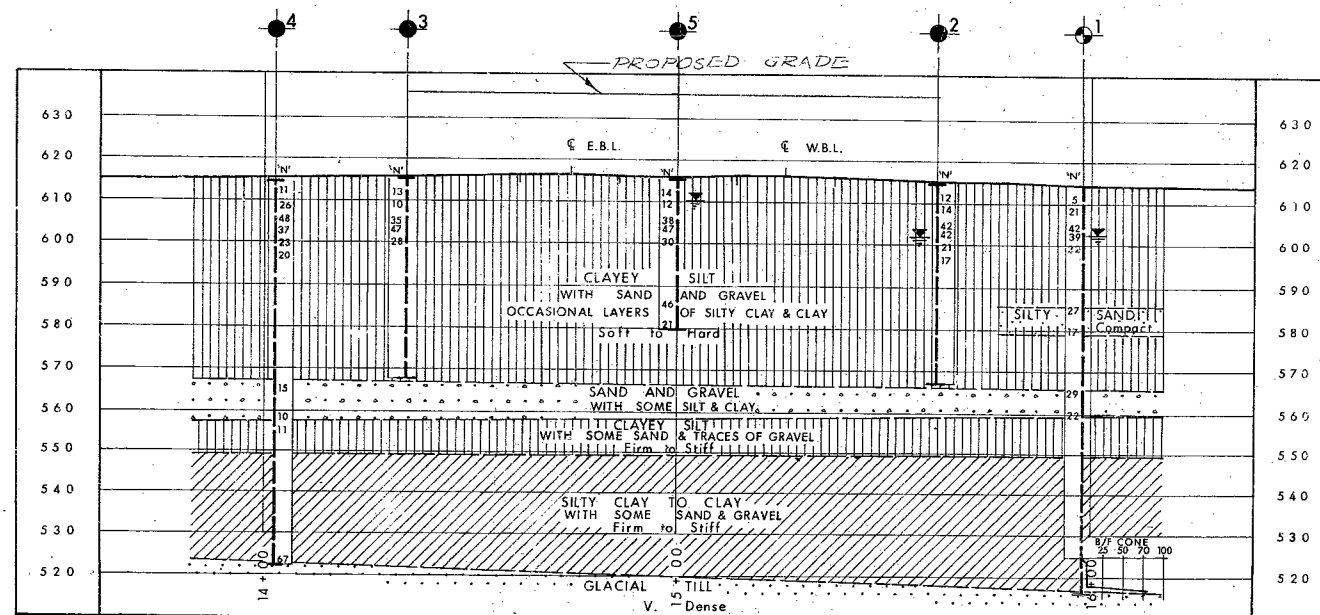
547000 E  
4977900 N

40 J 2W



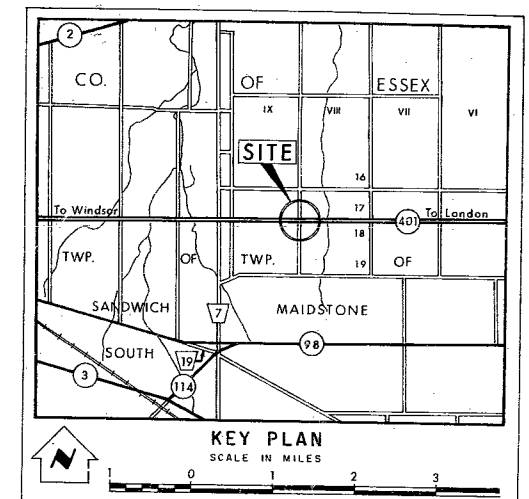
PLAN

SCALE IN FEET  
20 0 20 40 60



PROFILE MAIDSTONE TOWNSHIP ROAD

SCALE IN FEET  
20 0 20 40 60



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, July /65

NO.	ELEVATION	STATION	OFFSET
1	614.4	15 + 98	22'LT.
2	614.7	15 + 63	20'RT.
3	615.2	14 + 34	20'LT.
4	614.5	14 + 02	17'RT.
5	615.2	15 + 00	38'LT.

NOTE

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

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

MAIDSTONE TOWNSHIP ROAD  
CON. IX

KING'S HIGHWAY NO. 401 DIST. NO. 1  
CO. ESSEX  
TWP. MAIDSTONE LOT 17 & 18 CON. VII & IX

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. P.P.	CHECKED	W.P. NO. 310-64	M.B.T. DRAWING NO.
DRAWN DGH	CHECKED	JOB NO. 65-F-83	65-F-83A
DATE 2 SEPT /65	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT. NO.		

REF. No. E-4347-1

