

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. Maldstone Twp. Road, Con. VII
Underpass, Lot 18, Con. 6 & 7, Twp.
of Maldstone, Co. of Essex, Hwy. #401,
District #1 (Chatham)
W.J. 65-F-39 -- W.P. 309-61

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 feel free 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.

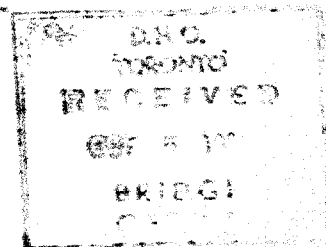


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FOUNDATION INVESTIGATION REPORT

For

Prop. Maidstone Twp. Road, Con. VII
Underpass, Lot 18, Con. 6 & 7, Twp.
of Maidstone, Co. of Essex. Hwy. #401.
District #1 (Chatham)

W.J. 65-F-39 -- W.P. 309-64

1. INTRODUCTION:

A request for a foundation investigation at the site of the proposed underpass at Hwy. #401 and Maidstone Twp. Rd., Con. VII, was received from Mr. G. Scott, Regional Bridge Location Engineer in a memo dated March 25, 1965. Following this request, a field investigation was subsequently carried out by the Foundation Section to determine the subsoil conditions.

This report contains the information resulting from the field investigations, together with recommendations pertaining to the design of the proposed bridge foundations.

2. DESCRIPTION OF THE SITE:

The proposed bridge site (No. 6-242) is located at the intersection of Hwy. #401 and Maidstone Twp. Rd., Con. VII, 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 Clay Plains Region. This very flat land east of Lake St. Clair, was submerged after the disappearance of Lake Warren, and received a deep covering of stratified clay and silt.

cont'd. /2 ...

3. FIELD INVESTIGATION PROCEDURE:

The field work consisted of five sampled boreholes. 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.

The disturbed samples were recovered by means of a standard 2-inch O.D. split-spoon sampler driven into the soil with a 140-lb. hammer falling freely a distance of 30 inches.

Undisturbed samples were obtained by means of 2-inch I.D. Shelby tubes pushed 18 inches into the soil by hand.

Field vane tests were carried out where applicable, at elevations 12" below the various sample depths.

The locations and elevations of all boreholes are shown on Dwg. 65-F-39A, which accompanies this report.

4. LABORATORY TESTS:

The samples were visually examined and classified at the site as well as in the laboratory. Tests were carried out in the laboratory for classification and shear strength determination purposes. These tests consisted of Atterberg limits, natural moisture content, 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:

Subsoil at the site consists of an extensive deposit of clayey silt with sand and traces of gravel containing occasional layers of silty clay and clay and also, occasional layers of silty sand.

This deposit is underlain by a very dense glacial till stratum which consists of a heterogeneous mixture of clay, silt, sand and gravel.

Detailed descriptions of the various soil types observed are shown on the borelog sheets contained in the Appendix. The estimated stratigraphical profile is shown on Dwg. 65-F-39A. The various soil types are described in detail, as follows:

5.2) Clayey Silt with Sand and Traces of Gravel:

This deposit was encountered in all boreholes and extended from ground level for a maximum depth of 92 ft. to elev. 520'. The material consists of clayey silt with sand and traces of gravel, and contains occasional thin layers of silty clay to clay. Between elev. 578.0 and elev. 568.0, and elev. 525.0 and elev. 522.0, the deposit also contains continuous layers of compact silty sand with traces of gravel and clay. The extreme upper portion - approx. 5 ft. - of the clayey silt deposit, is weathered and contains decayed organic materials, and has a consistency ranging from soft to very stiff. Beneath this weathered zone, the consistency of the stratum ranges from hard in the desiccated portion between elev. 605 and elev. 597, to firm at about elev. 540.0 with some random variation. Standard

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

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

Penetration Tests carried out in the hard zone, gave 'N' values ranging from 22 to 69 blows per foot.

Physical properties of the material as determined from field and laboratory tests, are as follows:

Liquid Limit	18 - 35 %
Plastic Limit	11 - 21 %
Natural Moisture Content	14 - 31 %
Bulk Density	125 - 133 p.c.f.
Unconfined Shear Strength	363 - 2,830 p.s.f.
Field Vane Shear Strength	1,120 - 2,000+ p.s.f.

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

5.3) Glacial Till:

This material underlies the clayey silt deposit and consists of a heterogeneous mixture of clay, silt, sand and gravel in the following average proportions: Gravel - 4%, Sand - 35%, Silt - 43%, Clay - 18%. The lower boundary was not determined since the borings were terminated in this layer.

The relative density is estimated to be very dense since the minimum 'N' value obtained was 50 blows for 5 inches. The natural moisture content was found to be in the order of 8%.

cont'd. /5 ...

6. GROUND WATER CONDITIONS:

The following water levels were observed in the boreholes during the course of field work:

Borehole No. 1	--	14.0'	Below Ground Level		
" No. 2	--	7.8'	"	"	"
" No. 3	--	3.5'	"	"	"
" No. 4	--	9.6'	"	"	"
" No. 5	--	3.0'	"	"	"

7. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct an underpass at the intersection of Hwy. #401 and Maidstone Twp. Rd., Con. VII. At the present time, this is a level crossing. The traffic on the Twp. Rd., Con. VII will be carried over the intersection by means of a four-span single structure, constructed along the centre line of the Twp. Rd. 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 shear strength of the clayey silt material in the upper layers is adequate to provide suitable support for spread footing type foundations.

In view of the foregoing, it is recommended that the proposed piers be founded on spread footings at or below elevation 605' in which case, 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 $12\frac{3}{4}$ " \emptyset steel tube piles driven about

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

8 feet into original ground where it is estimated that a safe bearing capacity of 35 tons per pile will be achieved. In any event, no pile should be driven below elev. 602 since the strength of the soil below this level tends to decrease with depth.

No stability problems are anticipated for the proposed 20-ft. high approach fills provided that 2:1 slopes are constructed. The topsoil stripping should be in accordance with D.H.O. Standards.

No major dewatering problems are anticipated.

8. SUMMARY:

A foundation investigation at the site of the proposed underpass at Hwy. 401 and Maidstone Twp. Road, Con. VII is reported.

Subsoil at the site consists of about 92 feet of hard to firm clayey silt with sand and traces of gravel underlain by a very dense glacial till deposit. The clayey silt layer contains occasional layers of silty clay and silty sand.

It is recommended that the proposed piers be supported on spread footings with a design load of 2.5 t.s.f. and that the proposed abutments be constructed within the approach fills and be supported on 12 $\frac{3}{4}$ " \emptyset steel tube piles with a design load of 35 tons per pile.

No stability problems are anticipated.

No major dewatering problems are anticipated.

cont'd. /7 ...

9. MISCELLANEOUS:

The field programme was carried out from July 22 to July 28, 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 wrote 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-39

LOCATION Sta. 15498; 21' Lt.

ORIGINATED BY P.P.

W.P. 309-64

BORING DATE July 27 & 28, 1965.

COMPILED BY P.P.

DATUM Geodetic

BOREHOLE TYPE Washbore - NX & BX Casings.

CHECKED BY K.G.S. *KR*

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. + Field Vane Test o Unconfined				Wp — W — WL WATER CONTENT %				
612.5	Groundlevel					1000	2000			10	20	30		
0.0	Clayey silt with sand and traces of gravel. Occasional layers of silty clay and clay. Soft to hard.		1	SS	12	610					o			Gr 0% Sa 24% Si 46% Cl 30% W.L. 595.5
			2	SS	6							o		
			3	TW	PH						o			
			4	SS	69						o			
			5	SS	34	600					o			
			6	SS	24						o			
			7	SS	20						o			
			8	TW	PH	590			o		o		128	
			9	TW	PH				o		o		129	
			10	TW	PH	580			o		o		128	
576.0	Silty sand, with some clay & traces of gravel. Loose.													Gr 1% Sa 15% Si 43% Cl 41%
36.5			11	SS	6	570					o			
571.5	Clayey silt with some sand and traces of gravel. Occasional layers of silty clay and clay. Firm to stiff. Grey.													
41.0			12	TW	PH	560			+		o			
			13	TW	PH	550			o		o		126	
			14	TW	PH	540			o		LL: 55.5% PL: 28.6%		110	
	Silty sand													Gr 1% Sa 26% Si 52% Cl 21%
87.0														
88.5	Clayey silt													
520.0	Glacial Till		15	TW	PH	530			o		o		140	
92.5	End of borehole.		16	SS	50/5"	520					o			

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 65-F-39

LOCATION Sta. 15+63; 20' Rt.

ORIGINATED BY P.P.

W.P. 309-64

BORING DATE July 23, 1965.

COMPILED BY P.P.

DATUM Geodetic

BOREHOLE TYPE Washbore - NX Casing

CHECKED BY K.G.S. *gll*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT ——— w _L PLASTIC LIMIT ——— w _p WATER CONTENT ——— w			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLAT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. + Field Vane Test o Unconfined				WATER CONTENT % w _p w w _L				
							1000	2000			10	20	30		
614.0	Groundlevel														
0.0	Clayey silt with some sand and traces of gravel. Brown and grey. Stiff to hard.		1	SS	18	610									W.L. 606.2 Gr 1% Sa 14% Si 49% Cl 36% Gr 0% Sa 16% Si 41% Cl 43%
			2	SS	16										
			3	SS	49										
			4	SS	34	600									
			5	SS	24										
			6	SS	17										
			7	Tw	PM	590									
			8	Tw	PM										
			9	Tw	PM										
578.0						580									
36.0	Silty sand with some clay														
572.5	Grey-Compact.		10	SS	11										
41.5	End of borehole.					570									

W.L.
606.2Gr 1%
Sa 14%
Si 49%
Cl 36%

129

130

128

Gr 0%
Sa 16%
Si 41%
Cl 43%

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 65-F-39

LOCATION Sta. 14+02; 17' Rt.

ORIGINATED BY P.P.

W. P. 309-64

BORING DATE July 22, 23, 26, 1965.

COMPILED BY _____ P.P.

DATUM Geodetic

BOREHOLE TYPE Washbore - NX & EX Casings.

CHECKED BY K.G.S. *AK*

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		BLOWS / FOOT	SHEAR STRENGTH P.S.F. + Field Vane Test o Unconfined	WATER CONTENT % 10 20 30			
611.7	Groundlevel										
0.0											
	Clayey silt with sand & traces of gravel.		1	SS	15	610					
			2	SS	11						
			3	SS	22						
	Occasional layers of silty clay and clay.		4	SS	61						
			5	SS	60	600					
	Firm to hard.		6	SS	27						
	Brown and grey.		7	TW	PM					128	
			8	TW	PM	590				127	
			9	TW	PM					126	
			10	TW	PM	580				125	
			11	TW	PM					129	Gr 3% Sa 17% Si 42% Cl 38%
574.7											
37.0	Silty sand with some clay & traces of gravel.					570					
566.2			12	TW	PM						Gr 5% Sa 46% Si 37% Cl 12%
45.5	Clayey silt with some sand and traces of gravel.		13	SS	19	560					
	Firm.										
	Grey.		14	TW	PM					133	
549.7						550					
62.0	Silty sand.										
545.8			15	SS	17						
65.9	Clayey silt with some sand and traces of gravel.					540					
	Occasional layers of silty clay and clay.		16	TW	PM					112	Gr 0% Sa 1% Si 29% Cl 70%
	Firm.					530					
	Grey.		17	TW	PM						
525.0			18	SS	33	520					
86.7	Silty sand										
	Clayey silt Grey										Gr 4% Sa 35% Si 43% Cl 18%
518.3	Glacial Till		19	SS	15/						
93.4	End of borehole.				1"						

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 5

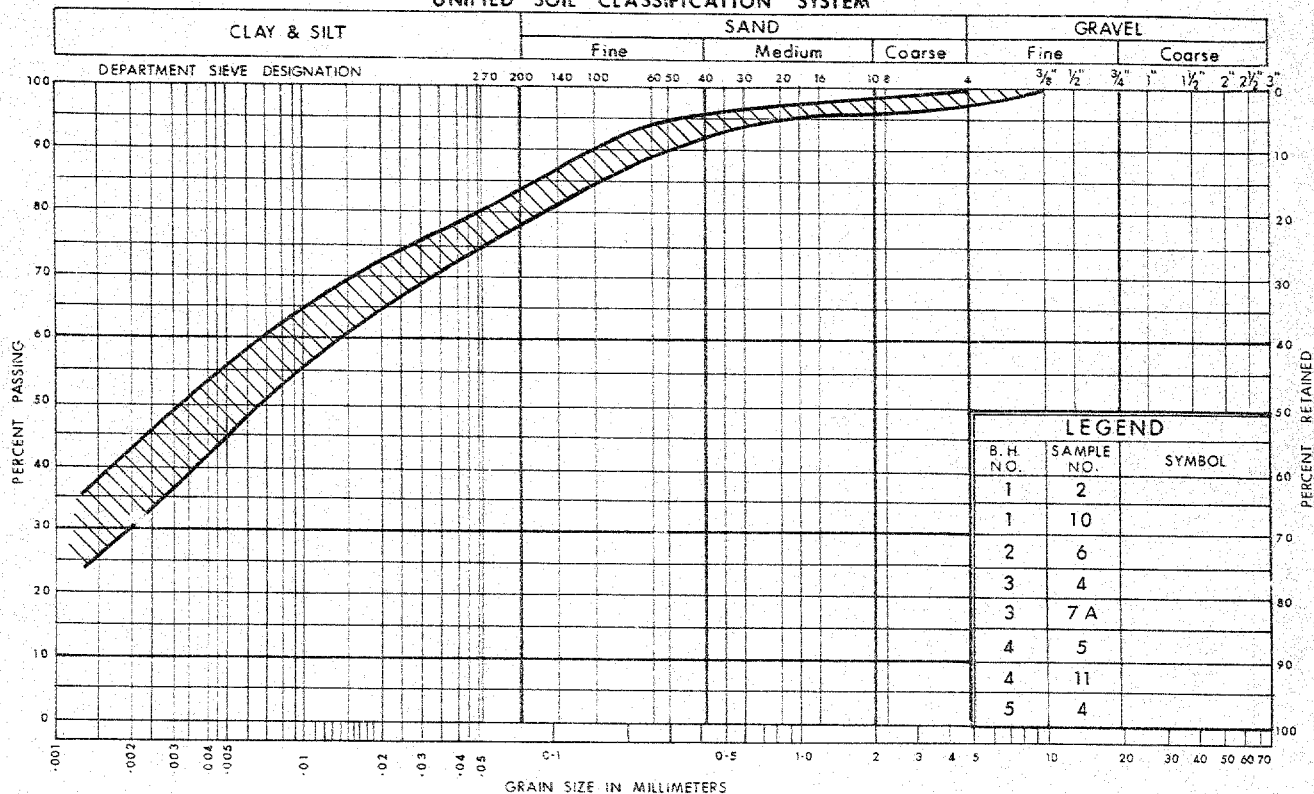
FOUNDATION SECTION

JOB 65-F-39LOCATION Sta. 15+00; 36' Lt.ORIGINATED BY P.P.W.P. 309-64BORING DATE July 26, 1965.COMPILED BY P.P.DATUM GeodeticBOREHOLE TYPE Washbore - NX Casing.CHECKED BY K.G.S. *dk*

SOIL PROFILE		STRAT. PLOT	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT <u>WL</u> PLASTIC LIMIT <u>WP</u> WATER CONTENT <u>W</u>			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION		NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WP	W	WL		
612.9	Groundlevel						1000 2000				10	20	30		
0.0	Clayey silt with some sand and traces of gravel. Brown and grey. Firm to hard.		1	SS	14	610									W.L. 610.0
			2	SS	11										
			3	SS	32										
			4	SS	47	600									
			5	SS	26										
			6	TW	PM									130	
			7	TW	PM									130	
			8	TW	PM	590								128	
			9	TW	PM									129	
581.4															
31.5	End of borehole.					580									

Gr 2%
Sa 14%
Si 43%
Cl 41%

UNIFIED SOIL CLASSIFICATION SYSTEM



ONTARIO

DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
CLAYEY SILT
(ENVELOPE OF TYPICAL CURVES)

W.P. No. 309-64

JOB No. 65-F-39

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 _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	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 INTERCEPT
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_t	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
$\bar{\sigma}$	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_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
β	ANGLE OF SLOPE TO HORIZONTAL

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: March 25, 1965.

OUR FILE REF.

IN REPLY TO

60-E-39

SUBJECT: W.P. 309-64 - Site 6-242
Maidstone Township Road ~~Interchange~~
Hwy. 401 - Dist. 1 ~~UNDERPASS~~

We are sending to you herewith two prints of Bridge Site Plan E-4345-1 on which we have marked in red the proposed location of the above structure.

The bridge site is readily accessible. It is 20.3 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. Zoltav

NZ/sp

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

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

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: March 25, 1965.

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.



NZ/sp

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

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

Dist #1

1) W.P. 120-64, Hwy 401

[Essex County Rd #7 Interchange

2.2 B mi west of Hwy #2)

Dominion

Soil

Soil - 6 fifteen boreholes

Silty Clay till N = 10 to 66 blows/ft
C = 2700 to 5200 lbf/sf

Recommendations: 1 Spread footings below E 607
2 $q_a = 2.5 \text{ to } 4.0 \text{ lbf/sf}$
3 $\Delta q (\text{differential}) = 1.25'$
4 $\Delta q (\text{differential}) = 0.5'$
5 Abutments on pile.

2) W.P. 122-64, Hwy 401

Essex County Dominion Soil

Road Underpass

Soil

0-6.0 Silty Clay

6.0-15.0 Silty Clay till N = 34 to 51

Recommendations: 1 Footing elev 608

2 Spread footings for pier $q_a = 4.5 \text{ lbf/sf}$

3 Differential settlement = 1.6'

4 Abutments on pile in the pier

3) W.P. 121-64, Hwy 401, Sandwich Twp

Dominion Soil

Soil

0-6' Silty clay

6'-18'- Clay till N = 15 to 42

Recommendations: 1 Footing elev 603.5

2 spread footings at elev 602.5 $q_a = 4.5 \text{ lbf/sf}$

3 Abutments on pile

4 $\Delta q (\text{differential}) = 1.6'$

4) W.P. 127-64, Hwy 401, County Rd

FOUNDATION SEC

V.P.

N.D.

For Interchange #4

Soil: 0-15.0 Glacial till N = 14 to 50

Recommendations: 1 Footings at elev 600 $q_a = 3.75 \text{ lbf/sf}$

2 Abutments on pile in the pier

3 Some differential settlement anticipated so abutment should be constructed 6 months prior to the construction of the footings.

5) W.P. 128-64, Hwy 401, Madeline

FOUNDATION SEC

Soil

Silty clay Till

For Rd Underpass 65-E-79

V.K.

N.D.

0-18 Hard crust N = 12 to 54

Recommendations: 1 Footings at elev 600 $q_a = 3.75 \text{ lbf/sf}$

2 Abutments on pile

3 Differential settlement anticipated - Abutment to be constructed 6 months before

6) WP 129-64, Hwy 401, Maidstone Foundation Section Soil - Clayey silt fill
Twp Rd Con 17th Underbase: 65-F-82 P.P. & K.G.S. 0-15.0 Hard fill N = 12 to 21 blows/ft

Recommendations: Footings elev 606 $q_a = 2.5 \pm$

a) Abutments on piles

b) No mention of differential settlements

7) WP 310-64, Hwy 401, Maidstone Foundation Section Soil - Clayey silt fill

Twp Rd Con 17th Underbase: 65-F-83 P.P. & K.G.S. 0-15.0 Hard fill N = 10 to 26 blows/ft

Recommendations: Footings at elev 606

$q_a = 2.5 \pm s.f.$

a) Abutments on piles

b) No mention of differential settlements

8) WP 670-64, Hwy 401, County Rd 15 Foundation Section Soil - Clayey silt fill

65-F-70 N.W.T. & K.G.S. 0-18 Hard crust N = 12 to 87 blows/ft

Recommendations: ^{spread} Footings at elev 618.0
 $q_a = 2.5 \pm s.f.$

a) Abutments on piles

b) No mention of differential settlements

9) WP 669-64, Hwy 401, 65-F-69 Foundation Section Soil - 0-80.0 Clay fill

N.W.T. & K.G.S. 0-22.0 Hard Crust N = 1 to 67

Recommendations: spread footings

at elev 608.0 $q_a = 2.5 \pm s.f.$

a) Abutments on piles

b) No mention of differential settlements

10) WP 208-64, Hwy 401, Maidstone Foundation Section Soil - clay fill

Twp Underbase 65-F-39 P.P. & K.G.S. 0-15.0 Hard crust N = 6 to 63

Recommendations: spread footings

at elev 605 $q_a = 2.5 \pm s.f.$

a) Abutments on piles

b) No mention of differential settlements

Bridge Division,
Downsview, Ontario,
November 1, 1965.

MEMORANDUM:

To File

RE: Proposed structures on Hwy. 401,
located 0.6 miles to 3.9 miles
East of Hwy. 90.
District No. 1, Chatham.
W.F. 127-64, 128-64, 129-64,
131-64, 132-64, 309-64, 310-64,
665-64 and 670-64.

At a meeting between Mr. H. Devata of Foundations Branch
and S. 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.².
2. The abutment piles for all the structures if driven in
accordance with the recommendations given in the indi-
vidual 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.

HDB/ag
c.c. A. G. Starnac /
G. Scott

H. G. Bassi,
Bridge Project Engineer.

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: December 3, 1965.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 309-64, Site 6-242,
Maidstone Twp. Rd. Concession VII,
Underpass,
7.1 miles east of Hwy. 98,
Hwy. 401, District 1.

We are sending to you herewith one print of
Preliminary Plan D 5813-P1 of the above structure.

Would you please let us have your written
comments.

NZ/ag
c.c. S. McCombie
G. Scott

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

Mr. S. McCombie,
Bridge Planning Engineer,
Bridge Division.

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

Attn: Mr. G. Scott

December 14, 1965

Preliminary Review of the Bridge Plans for the
Proposed Structures on Hwy. 401, located 0.6 miles
to 3.9 miles East of Hwy. 98, Hwy. 401, District
No. 1 (Oxathum) - W.P. 127-64, 128-64, 129-64,
309-64, 310-64, 669-64, and 670-64.

We have reviewed the preliminary bridge drawings for
the above-mentioned structures. The foundation design for each
structure appears to comply with recommendations contained in
our foundation reports.

W. W. F.

M. Levata,
SENIOR FOUNDATION ENGINEER
For:
A. G. Starnac,
PRINCIPAL FOUNDATION ENGINEER

cc: Foundations Office

Gen. Files

Mr. P. C. Brown,
District Engineer,
Chatham, Ontario.

Attn: Mr. P. Peacock.

Materials & Testing Division.

April 5, 1966.

Installation of Settlement Plates at the
Approach fill locations on Hwy. 401, Dist. #1.

Further to our telephone conversation, we are enclosing the list of various structure which are scheduled to be built in your district. We may wish to instrument some of these projects and request you to advise us at least two weeks prior to the commencement of approach fill construction of each project.

- *P127-64 County Rd. to Puce Interchange No. 4 8.9 Miles East of Hwy. 98.
- *P131-64 Sandwich S. Twp. Rd., Concession XI, Underpass 3.2 Miles East of Hwy. 98.
- *P132-64 Essex County Rd. 27 Underpass 1.5 Miles East of Hwy. 98.
- *P309-64 Maldstone Twp. Rd. Concession VII Underpass 7.1 Miles East of Hwy. 98. 65-1-39
- *P310-64 Maldstone Twp. Rd. Concession IX Underpass 5.4 Miles East of Hwy. 98.
- *P128-64 Maldstone Twp. Rd. Concession VI Underpass 3.0 Miles East of Hwy. 98.
- *P129-64 Maldstone Twp. Rd. Concession XII Underpass 6.3 Miles East of Hwy. 98.
- *P669-64 Sandwich S. Twp. Rd. Concession X Underpass 2.3 Miles East of Hwy. 98.
- *P670-64 Sandwich S. Twp. Rd. Concession XII Underpass 3.6 Miles East of Hwy. 98.

MD/tt
cc: Foundations Office
Gen. Files

M. Devata
SENIOR FOUNDATION ENGINEER

For: A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

#65-F-39

W.P.# 309-64

Hwy. # 401 E

MAIDSTONE

TWP. RD.

UNDERPASS

COUNTY OF ESSEX
TOWNSHIP OF MAIDSTONE

LOT 17

CON. VII

O.E. ENNIS

DISPOSED RM P-2950-22

300+00

250+00

TO WINDSOR

FUTURE

50

MEDIAN

25

FUTURE

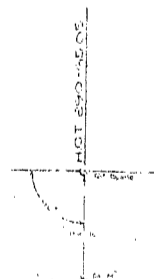
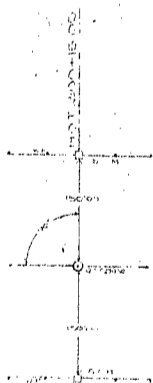
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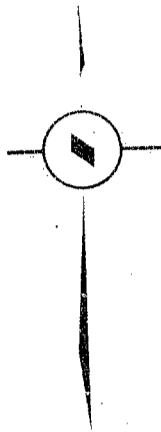
CAH. P. 2950

F.S. RENAUD

LOT 18

CON. VII





CON. VI
LOT 17

J. QUINLAN

70 MPH

LINE APPROVED MARCH, 1966

20+00

270+00

260+00

60' 450' CONC. CULV

50 MPH

TO HWY 401

TO HWY 401

TO TORONTO

F. & M. MAHON

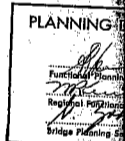
LOT 18
CON. VI

HOT 5+74 24
GRAVEL RD

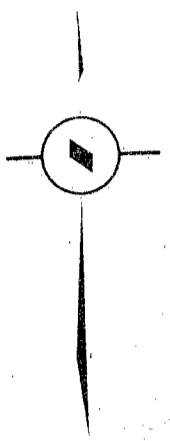
HOT 1+50 24
GRAVEL RD

HOT 270+95.05

HOT 260+95.05



DEPARTMENT OF HIGHWAYS	
FUNCTIONAL PLANNING DIVISION	
PROPOSED UNDER	
20.3 MI. WEST OF WEST J	
KING'S HIGHWAY No. 401	
TOWNSHIP MAIDSTONE	
COUNTY ESSEX	Lot 17
Scale 1" = 100' W.S. No.	
Drawn by R. W. M.	Checked by J. J. G.
C.D. 2-77	8/10/77

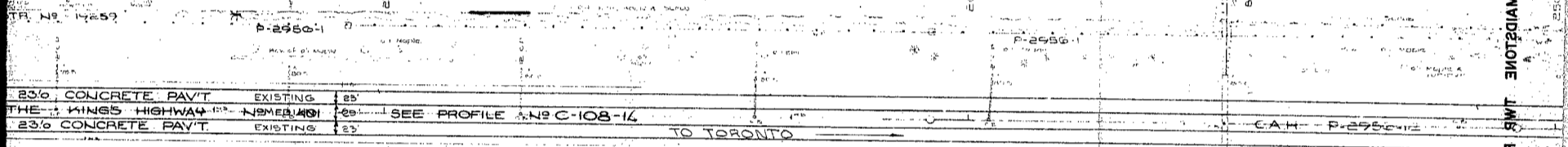


CON. VI
LOT 17

70MPH

J. QUINLAN

LINE APPROVED MARCH, 1966



23% CONCRETE PAVT	EXISTING	25'
THE KING'S HIGHWAY	EXISTING	25'
23% CONCRETE PAVT	EXISTING	25'

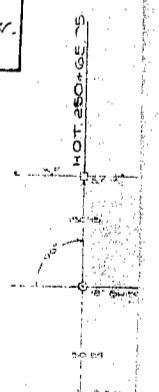
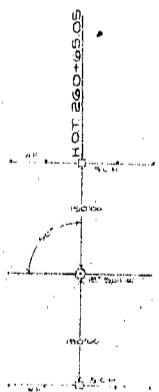
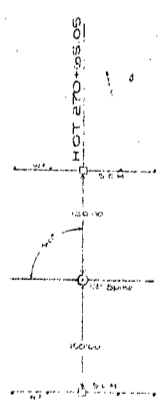
LOT 15, 50' WIDE, 1/2" = 100' GRAVEL RD.

F. & M. MAHON

LOT 18
CON. VI

HOT 5+751.25
GRAVEL RD.

HOT 1+500.00
GRAVEL RD.



PLANNING DATA FOR BRIDGE DESIGN

APPROVED BY _____ DATE April 2/66

Function _____ DATE 23-V-66

Regional Highway Planning Engineer _____ DATE Apr. 23. 66

Bridge Planning Section

DEPARTMENT OF HIGHWAYS - ONTARIO

CONCEPTUAL PLANNING DIVISION PLANNING BRANCH

PROPOSED UNDERPASS

20.3 MI. WEST OF WEST JCT. HWY. NO. 2.

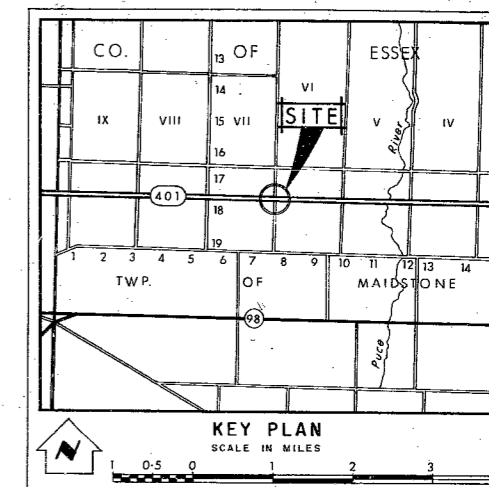
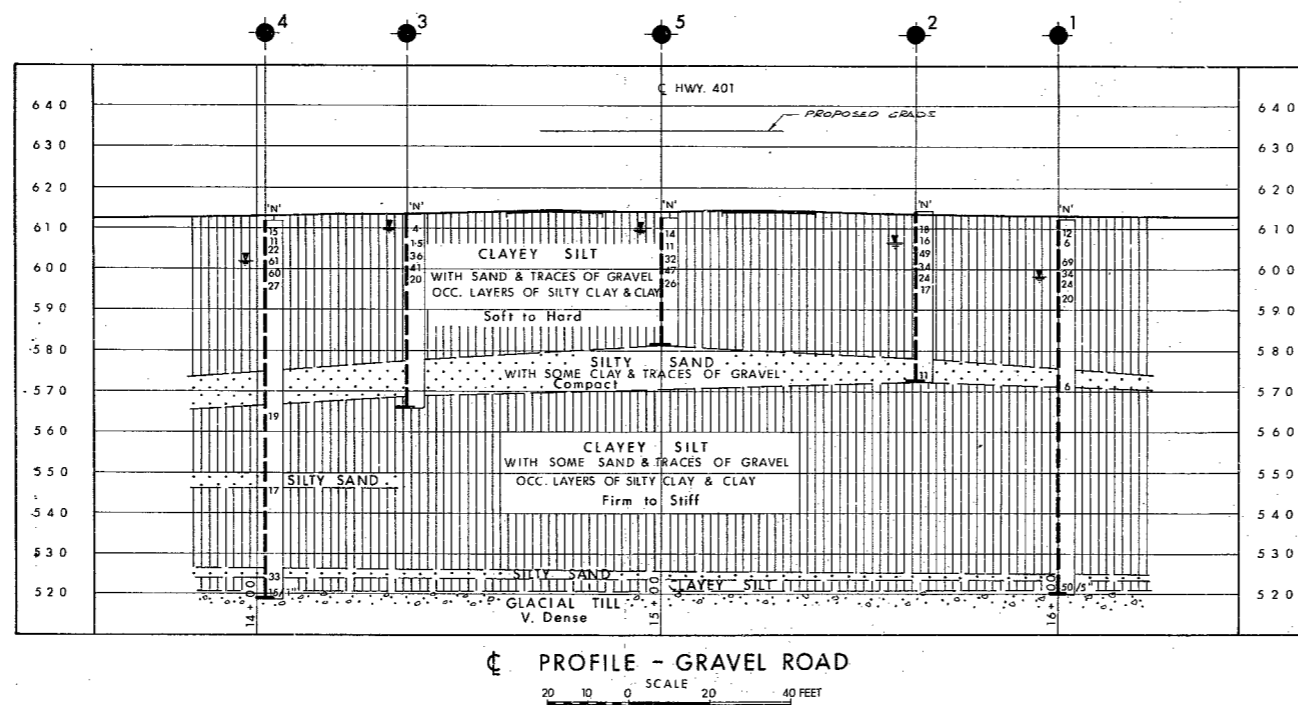
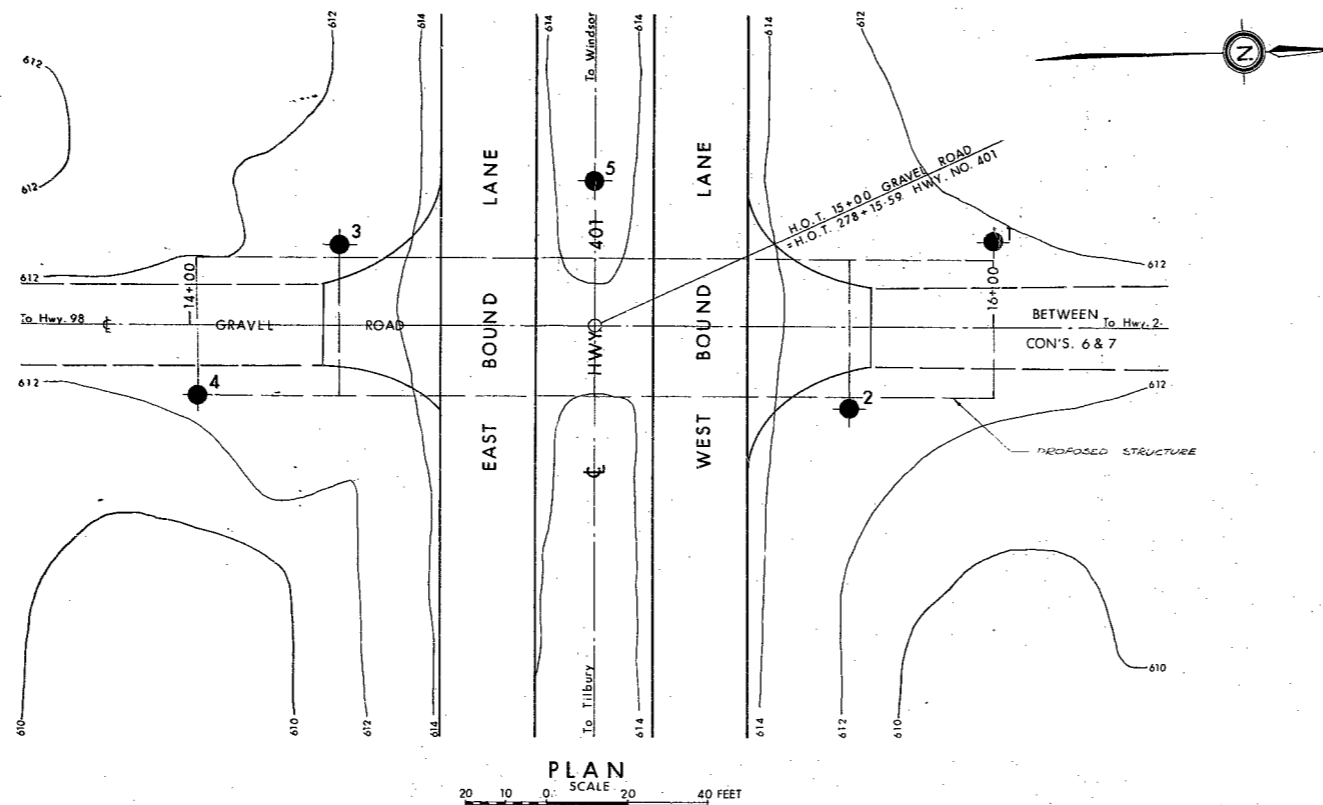
KING'S HIGHWAY No. 401 DIST. No. 1, CHATHAM

TOWNSHIP **MAIDSTONE**

COUNTY **ESSEX** LOT **17 & 18** CON. **6 & 7**

Scale 1" = 100' H.P. No. **309-64**

DESIGNED BY **SAH 24/66** DATE **SAH 24/66**



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation. (JULY 1965)		

NO.	ELEVATION	STATION	OFFSET
1	612.5	15+98	21' LT.
2	614.0	15+63	20' RT.
3	613.8	14+37	20' LT.
4	611.7	14+02	17' RT.
5	612.9	15+00	36' 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 TWP. RD. - CON. VII

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

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D. P.P.	CHECKED <u>WJS</u>	W.P. NO. 309-64	M.B.T. DRAWING NO.
DRAWN S.O.	CHECKED <u>HR</u>	JOB NO. 65-F-39	65-F-39 A
DATE <u>1 SEPT. 1965</u>	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <u>W. J. S. Macdonald</u>	CONT. NO.		

PRINT RECORD	NO.	FOR	DATE

REF. NO. E-4345-1

