

MEMORANDUM

W.P. 162-64-1

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: October 17, 1967

OUR FILE REF.

IN REPLY TO

OCT 25 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed Overpass at the Crossing of
Thompson Rd. Revision and Q.E.W.
District No. 4 (Hamilton)
W.J. 67-P-76 -- W.P. 162-64-01

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/MdeP
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Parren
C. K. Hunter (2)
H. Greenland
W. S. Melinshyn
T. J. Kovich
B. A. Singh

Foundations Files
Gen. Files

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

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FOUNDATION INVESTIGATION REPORT
For
Proposed Overpass at the Crossing of
Thompson Rd. Revision and Q.E.W.
District No. 4 (Hamilton)
W.J. 67-F-76 -- W.P. 162-64-01

1. INTRODUCTION:

The Foundation Section was requested to carry out an investigation at the proposed crossing of the Queen Elizabeth Way and Thompson Rd. Revision in the Twp. of Bertie, County of Welland, Ontario. The request was contained in a memo from the Bridge Location Section (Mr. W. S. Melinyshyn, Regional Bridge Location Engineer), dated August 8, 1967. An investigation was subsequently carried out by this Section to determine the subsoil conditions existing at the site.

This report contains the results of the investigation, together with recommendations pertaining to the foundations of the new structure and the stability of the approaches.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located about 1 mile west of the west limits of the town of Fort Erie. At this location, the Queen Elizabeth Highway grade is some 4 ft. above the surrounding ground surface elevation. The highway itself, consists of four paved lanes with median strip and associated gravel shoulders. Along each side of the highway, there is a drainage ditch which is about 10 ft. wide and some 2 ft. below the surrounding ground surface elevation. The grade of the existing cross road (Thompson Rd.) is about the surrounding ground elevation. The immediate area east of Thompson Rd. is generally flat and clear. The immediate area west of Thompson Rd. is light to heavily wooded and generally flat.

cont'd. /2 ...

2. DESCRIPTION OF THE SITE AND GEOLOGY: (cont'd.) ...

Physiographically, the site is situated in the "Haldimand Clay Plain". Based on available geological information, it is known that the overburden of this region consists of lacustrine clay deposited in glacial Lake Warren, formed during the retreat of the last continental glacier.

3. FIELD AND LABORATORY WORK:

Eight boreholes and six dynamic cone penetration tests were carried out during the course of the recent field work. In addition, two boreholes and one dynamic cone penetration test were carried out on August 18 - 22, 1966, by H. Q. Golder and Associates, for preliminary investigation purposes. Also, one borehole and one dynamic cone penetration test, under W.J. 67-F-79, are included in this report.

Boring was achieved by means of a conventional diamond drill adapted for soil sampling purposes, and a continuous flight auger. Samples were recovered at required depths in 2-inch O.D. split-spoon samplers which were hammered into the soil, or in 2-inch I.D. Shelby tubes which were pushed either manually or hydraulically into the soil. The method of driving the split-spoon samplers conformed to the requirements of the Standard Penetration Test. The same method was used to advance the cone in the dynamic cone penetration tests. Where possible, field vane tests were carried out at various depth intervals in order to determine the undrained shear strength of the cohesive strata. Bedrock was proven in four boreholes by obtaining AXT size rock core samples. In seven borings, bedrock was assumed to be the level at which the Penn. Drill auger met refusal. During sampling and drilling operations, detailed logs of the borings were made which described drilling and sampling techniques, soil types encountered, and groundwater observations.

cont'd. /3 ...

3. FIELD AND LABORATORY WORK: (cont'd.) ...

The locations and elevations of all borings were surveyed in the field by personnel from the Foundation Section, and are shown on Dwg. #67-F-76A, together with the estimated stratigraphical profile.

All samples were subjected to a careful visual inspection in the laboratory prior to any tests being carried out. Following this inspection, tests were carried out on certain samples to determine the following physical properties of the various soil types:

- Natural Moisture Contents
- Bulk Densities
- Grain-Size Distributions
- Consolidation Characteristics
- Atterberg Limits
- Undrained Shear Strengths

The results of these tests are summarized and plotted on the Record of Borelog sheets contained in the Appendix of the report.

On completion of laboratory testing, the various soil samples were classified as to type and consistency, or relative density, in general, according to the Unified Soil Classification System (Oct. 1963).

4. SOIL TYPES AND SOIL CONDITIONS:

4.1) General:

Subsoil at the site consists of 20 to 30 ft. of stiff to hard clayey silt with traces of sand and gravel, followed by a thin layer (6" to 24" thick) of till-like deposit overlying dolomitic limestone bedrock. The boundaries between the various soil strata are shown on the Record of Borelog sheets contained in the Appendix of the report. The estimated stratigraphical profiles shown on Dwg. #67-F-76A, are based on this information. From ground level downwards, the different soil types are described in detail as follows:

cont'd. /4 ...

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

4.2) Clayey Silt with Traces of Sand and Gravel:

This deposit was encountered in all the boreholes immediately below the ground surface and extends for a total thickness of 25 to 30 ft. This material is essentially cohesive in nature, consisting of clayey silt with traces of sand and gravel. In certain areas, the upper 2 to 7 ft. of this deposit consists of a stiff to hard, mottled and desiccated clayey silt crust with traces of sand, gravel and organics. In this portion the 'N' values range from 13 to 35 blows/ft.

Physical properties of the overall deposit as determined from field and laboratory tests, are summarized below:

Bulk Density	.....	128	-	144 p.c.f.
Liquid Limit	.....	16%	-	35%
Plastic Limit	.....	11%	-	24%
Moisture Content	.....	11%	-	26%
Undrained Shear Strength		850	-	2755 p.s.f.
'N' Values	.....	9	-	50 blows/ft.

Based on standard penetration test results together with the undrained shear strength measurements, the consistency of the upper desiccated portion of the clayey silt ranges from stiff to hard, decreasing to very stiff below elev. 620, and stiff below elev. 610.

Underlying the clayey silt in all boreholes except B.H.'s 6 and 10, a thin layer of till-like deposit 6" to 24" thick, was encountered. This till-like deposit mainly consists of a heterogeneous mixture of clay, silt, sand and gravel.

4.3) Dolomitic Limestone Bedrock:

Bedrock was established by drilling 8 to 10 ft. of AXT core in B.H.'s 2, 4, 5, 6 and 9. In B.H.'s 1, 3, 7, 8, 10 and 11,

cont'd. /5 ...

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

4.3) Dolomitic Limestone Bedrock: (cont'd.) ...

the bedrock contact was established by drilling with a Penn. auger to refusal. The depth at which bedrock was encountered ranged from elev. 606.1 to elev. 602.3, or some 25 to 30 ft. below the existing ground surface. Rock core samples obtained, show the rock to be generally sound dolomitic limestone intermixed with argillaceous dolomite right from the surface, with recovery ranging from 73% to 100%.

5. GROUNDWATER CONDITIONS:

Observations carried out during the time of the field investigation, indicate that the water level in general, ranged from elev. 626 to elev. 630, which is some 3 to 5 ft. below ground surface. The exact water levels observed during the time of the field investigation, are shown on the enclosed drawing as well as on the borehole logs (Appendix I).

6. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct an overpass structure to carry the Queen Elizabeth Way over Thompson Rd. Present proposals call for twin three-span (55'-72'-55') structures with approach cuts having a maximum height of about 22 ft. below the revised Q.E.W. grade.

Subsoil at the site consists generally, of a deposit of hard to stiff clayey silt with sand and occasional gravel, followed by dolomitic limestone bedrock at a depth of 25 to 30 ft. below the existing ground surface.

6.1) Structure Foundations:

The proposed abutments may be constructed within the approach cuts in the hard clayey silt stratum. Spread footings placed at or below elev. 624.0, can be designed for an allowable bearing pressure of 3.0 t.s.f.

cont'd. /6 ...

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

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

The proposed grade of Thompson Rd. will be at elev. 614 \pm . For frost protection, the pier footings should be located at least 4 ft. below the proposed grade of Thompson Rd. At this elevation the clayey silt deposit is mainly stiff to very stiff, and the bedrock surface ranges from elev. 602.5 to elev. 605.0. For the pier foundations, one of the following two proposals is recommended.

In order to avoid differential settlements, the piers can be founded on the sound bedrock with a safe bearing pressure of up to 15 t.s.f.

As an alternative, the piers can be founded on strip footings placed in the stiff clayey silt stratum at elev. 610.0, with an allowable bearing pressure of 1.5 t.s.f. Settlement of pier footings designed for a bearing pressure of 1.5 t.s.f., is estimated to be about 1 inch.

In the computation of sliding resistance between a rough concrete footing and the undisturbed clayey silt subsoil, a cohesion value of about 1500 p.s.f. which is a limiting value, may be used in design.

Due to the relatively impermeable nature of the subsoil, no dewatering problems are anticipated for any excavations for the footings.

There should be no overall stability problems for the proposed 22-ft. approach cuts, provided cut slopes of standard 2 horizontal to 1 vertical are used.

7. SUMMARY:

The results of a foundation investigation for the proposed overpass at the crossing of Thompson Rd. and the Q.E.W., are presented.

cont'd. /7 ...

7. SUMMARY: (cont'd.) ...

The subsoil at the site generally consists of some 25 to 30 ft. of stiff to hard clayey silt with sand and occasional gravel underlain by sound dolomitic limestone bedrock.

The proposed abutment and pier footings can be founded within the clayey silt stratum at or below elev. 624.0 and elev. 610.0, with a safe bearing pressure of 3.0 t.s.f. and 1.5 t.s.f. respectively. Alternatively, the piers can also be founded on the sound bedrock with an allowable bearing pressure of 15 t.s.f.

No dewatering or stability problems are anticipated.

8. MISCELLANEOUS:

The field work, performed during August 21 to 28, 1967, was carried out under the supervision of Mr. W. Hutton, Project Foundation Engineer, who also prepared this report.

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

The investigation was under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who also reviewed the report.

October 18, 1967

APPENDIX I

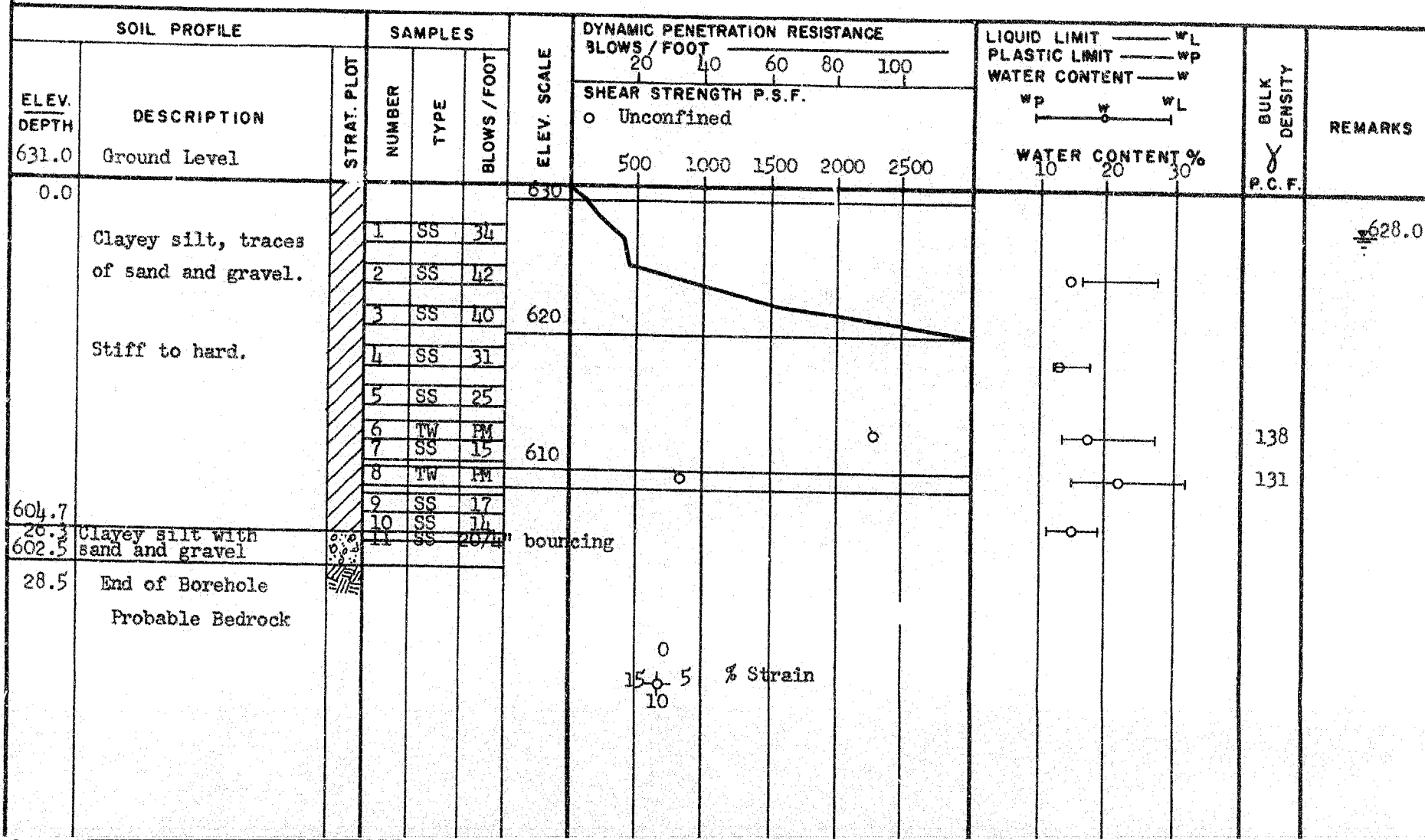
DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 67-F-76 LOCATION Sta. 298 + 40 @ Q.E.W. 61' o/s Rt. ORIGINATED BY WGH
W.P. 162-64-01 BORING DATE August 21 & 22, 1967 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY [Signature]



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 67-F-76 LOCATION Sta. 299 + 18 @ Q.E.W. 3' o/s Lt.

ORIGINATED BY WGH

W.P. 162-64-01 BORING DATE August 22, 1967

COMPILED BY AMS

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger

CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit ——— WL	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	PLASTIC LIMIT ——— WP		
								WP ——— W ——— WL		
633.6	Ground Level									
0.0	Mottled clayey silt trace of sand.					630				
626.6	Stiff		1	SS	9					
7.0	Clayey silt, traces of sand and gravel.		2	SS	41/11"					
			3	SS	45	620				
	Stiff to Hard		4	SS	35					
			5	SS	27					
			6	SS	19	610				
604.1	Hot clayey silt,		7	TW	PH					
602.9	sand and gravel.		8	TW	PH					
30.7	Dolomite		9	SS	34/8" bouncing					
	Bedrock		10	AXT	Rec					
595.2				RC	92%					
			11	AXT	RC 110%					
38.4	End of Borehole		12	AXT	RC 110%					

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO.5

FOUNDATION SECTION

JOB 67-F-76 LOCATION Sta. 299 + 19 @ Q.E.W. and 70' o/s Rt. ORIGINATED BY WCH
W.P. 126-64-01 BORING DATE August 23, 1967 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Core Drill CHECKED BY [Signature]

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		20	40	60	80	100	WP	W	WL		
632.3	Ground Level						500	1000	1500	2000	2500	10	20	30		
0.0	Mottled clayey silt, trace of sand.					630										
625.3	Very stiff.		1	SS	30											
7.0	Clayey silt, traces of sand and gravel.		2	SS	44											
			3	SS	39	620										
			4	SS	35											
	Very stiff to hard.		5	SS	21											
			6	TW	14	610										
			7	SS	22											
606.3	Clayey silt with sand and occasional gravel.		8	TW	14											
26.0			9	SS	17	" bounding										
27.0	Dolomite Bedrock		10	AX Rec RC 97%		600										
			11, 12	AX Rec RC 86%												
			13, 14	AX Rec RC 100%												
595.0																
37.3	End of Borehole															

0
15.5
10 % Strain

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 67-F-76

LOCATION Sta. 298 + 21 @ Q.E.W. 64' o/s to Lt.

ORIGINATED BY WGH

W.P. 162-64-01

BORING DATE August 23, 24, 1967

COMPILED BY AMS

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger & Core Drill

CHECKED BY *AMS*

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. o Unconfined					WATER CONTENT %				
633.9	Ground Level						500	1000	1500	2000	2500					
0.0	Mottled clayey silt, silt seams, trace of organics.		1	SS	18	630										628.9
626.9	Very stiff.		2	SS	14											
7.0	Clayey silt, traces of sand and gravel.		3	SS	44	620										
	Very stiff to hard.		4	SS	31											
			5/6	SS	28											
			7	SS	19	610										
			8	TW	PH											
			9	SS	22											
604.9			10	TW	PH											
			11	SS	17											
			12	AXT	83%	bouncing										
29.0	Dolomite Bedrock		13	AXT RC	Rec 97%	600										
595.9			14	AXT RC	Rec 92%											
38.0	End of Borehole															

0
15-0-5 % Strain
10

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 8

FOUNDATION SECTION

JOB 67-F-76 LOCATION Sta. 297 + 68 @ Q.E.W. 53' o/s to Lt. ORIGINATED BY WGH
W.P. 162-64-01 BORING DATE August 24 & 25, 1967 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY W.L.

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	SHEAR STRENGTH P.S.F. o Unconfined	WATER CONTENT %				
634.3	Ground Level						500 1000 1500 2000 2500						
0.0	Mottled clayey silt with traces of sand and organics. Stiff.		1	SS	13	630							629.3
628.3			2	SS	19								
6.0	Clayey silt, traces of sand and gravel.		3	SS	31								
			4	SS	26	620							
	Stiff to hard.		5	SS	22								
			6	TW	PH								
			7	SS	21								
			8	TW	PH	610							
			9	SS	18								
604.6	Het. clayey silt.		10	TW	PH								
604.1	Sand and gravel.		11	SS	17								
30.2	Probable Bedrock End of Borehole												

15 0 5 10 % Strain

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-76

LOCATION Sta. 298 + 99 @ Q.E.W. 107' o/s Lt.

RECORD OF BOREHOLE NO.10 (Formerly BH #12 Golder) FOUNDATION SECTION

ORIGINATED BY JBD

W.P. 162-64-01

BORING DATE August 19 & 22, 1966

COMPILED BY MW

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-76

LOCATION Sta. 297 + 57 @ E.W. and 76' o/s to Rt.

ORIGINATED BY Z.O.

W. P. 162-64-3

BORING DATE August 25, 28 & 29, 1967

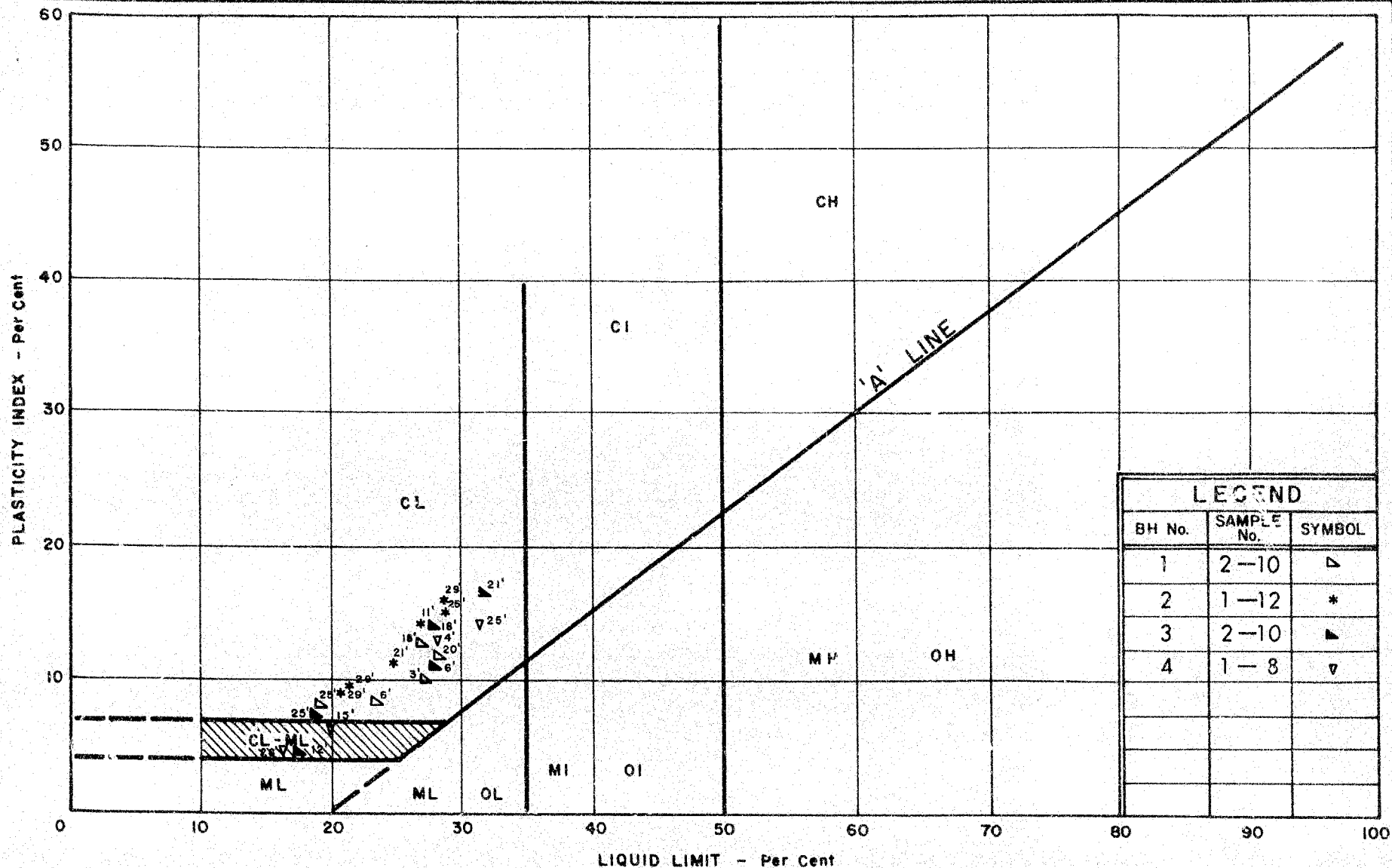
COMPILED BY A.M.S.

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	PLASTIC LIMIT ——— WP	WATER CONTENT ——— W		
627.9	Ground Level										
0.0	Clayey silt with traces of sand and gravel (desicated).		1	SS	32	720					
			2	SS	35						
618.4	Hard.		3	SS	37						
9.5	Clayey silt, traces of sand and gravel.		4	SS	22	710					
	Stiff to Har d.		5	TW	PH						
			6	SS	34						
			7	TW	PH						
			8	SS	13						
605.8	Het. Clayey si., sa. & gr.		9	TW	PH						
22.6	Probable Bedrock End of Borehole		10	SS	17						

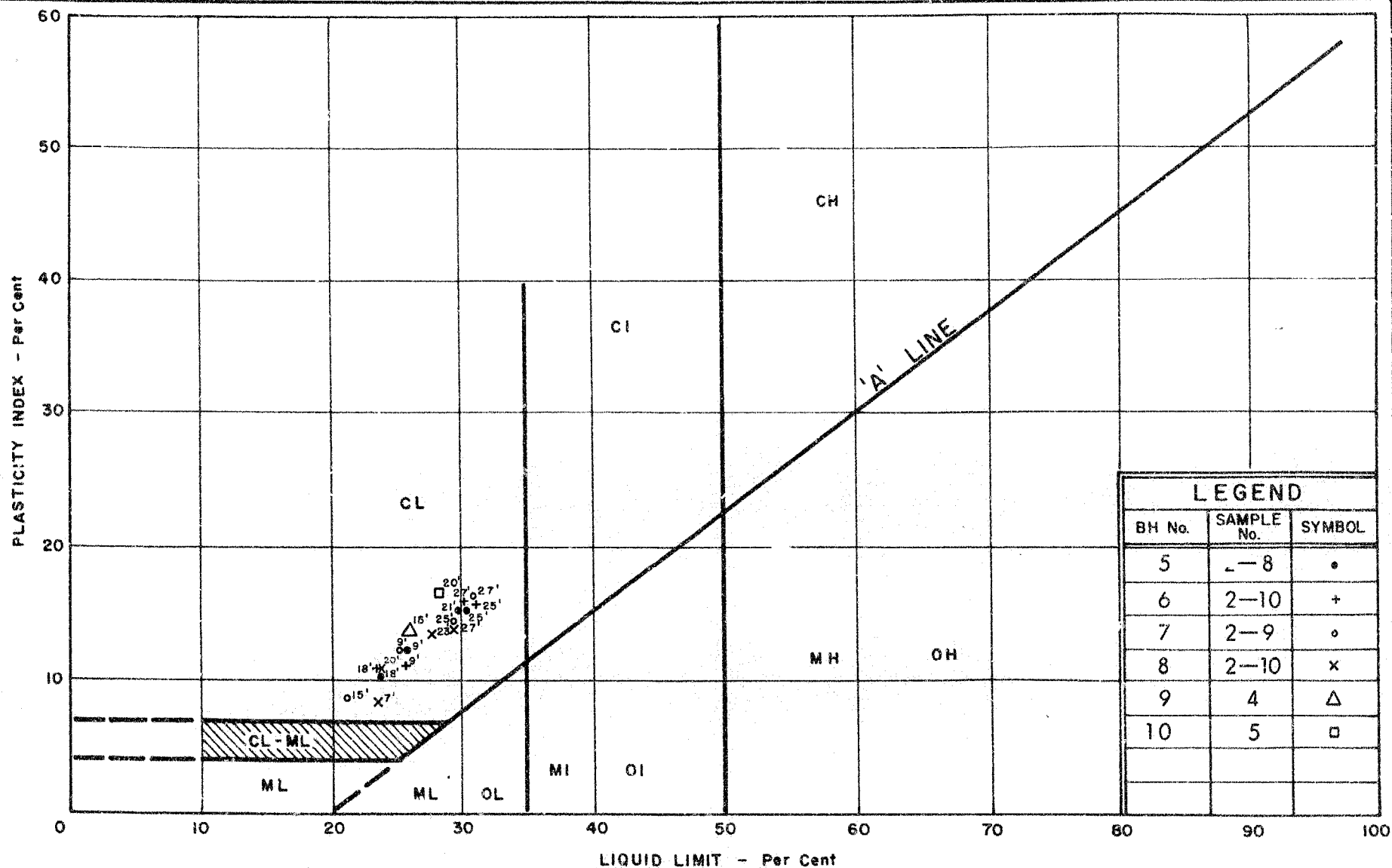


DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

W.P. No. 162-64-01

JOB No. 67-F-76



ONTARIO

DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

W.P. No. 162-64-01

JOB No. 67-F-76

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

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
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_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

67-F-76

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

From: Bridge Division,
Downsview, Ontario.

Date: August 8, 1967.

Our File Ref.

In Reply To

Subject: Thompson Road Overpass,
W.P. 162-64-1, Site 34-205,
Q.E.W., District 4.

Herewith are two prints of the bridge site plan E-4781-1 on which the probable location of footings have been marked in red.

Please arrange for a foundation investigation of sufficient scope to enable us to proceed with the design.

Also attached is the preliminary structure site investigation report.

JFW/md
Attach.
cc. R. Forrest
A. Crowley.

Joseph J. Walshe
J. F. Walshe,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

ASSIGNED DATE
COMPLETION DATE

AUG 30/67
OCT 23/67

401 & Keele St.
Downsview, Ontario

August 17, 1967

Johnston Drilling Co. Ltd.
377 Munster Ave.
Toronto, Ontario

Dear Sirs:

This is to confirm our request of August 15, 1967 for the supply of a Penn Drill and a Diamond Drill together with all necessary equipment, as specified under the terms of our Contract Agreement at Thomson Rd. & Q.E.W. near Port Erie, after the completion of our present job 67-P-70.

This project bears job number 67-P-76.

Yours truly,

M. Devata

MD:mt

M. Devata
Supervising Foundation Engineer
for: A. G. Sternac
Principal Foundation Engineer

cc: R. Konings
Foundation Files 110
General File

M. Devata

Telephone: 248-3446

Mr. W. Wigle,
Program Engineer,
Administration Bldg.

E.J. McCabe,
Toronto Regional Road Design.

March 13, 1968.

Re: Queen Elizabeth Way from
Highway 405 to Fort Erie,
District 4, Hamilton.

Your letter of February 12, 1968 requesting a program for placement of early fills as recommended by the Foundation Section has been passed on to me for comment.

This afternoon Mr. Devata, Foundations Section, Mr. Melnyshyn, Bridge Planning Section, and the writer met to consider our needs for early fill placement. It was determined that early fill would be placed:

- 1) If required for bridge construction.
- 2) If required for grading purposes. A 6' settlement or more was used as a basis to determine the need for early fill placement for grading purposes.

The following is a summary of our conclusions:

- 1) Mountain Road Interchange - W.P. 154-64.

Bridge Office to decide in one month whether early fill placement required for bridge purposes.

- 2) Thorold Stone Road - W.P. 155-64-03.

No early fill placement required.

- 3) McLeod Road - W.P. 156-64.
- 4) Northbound West Service Road - W.P. 157-64-2.

Both bridges will be on piles. An 8½' settlement is predicted. We propose delaying the final paving of the fill areas from one to two years.

March 13, 1968.

Mr. W. Wigle - Re: Queen Elizabeth Way.

- 5) Lyons Creek - W.P. 158-64-01.
- 6) Beck Road - W.P. 442-65.
- 7) Bossert Road - W.P. 443-65.
- 8) Sodom Road - W.P. 159-64.
- 9) Baker Road - W.P. 445-65.
- 10) Townline Road, Black Creek, Service Road - W.P. 167-64.
- 11) Ridgemount Road - W.P. 165-64.
- 12) Bowen Road
- 13) Sunset Drive - W.P. 447-65.
- 14) Gilmore Road - W.P. 448-65.

Considerable settlement can be anticipated for the above structure sites and approach thereto. We propose that early fill placement be considered two years in advance of the current construction program year.

- 15) West-North and South Ramp - W.P. 162-64-2.
- 16) Thompson Road - W.P. 162-64-1 67-6-76
- 17) - W.P. 162-64-3.
- 18) C.N.R. Widening - W.P. 162-64-05.
- 19) Concession Road (Erie St.) - W.P. 161-64.
- 20) North Street Revision - W.P. 160-64.

No early fill placement required at these sites.

E.J. McCabe

E.J. McCabe
Expressway Consultant Control Engineer
For:
C.K. Hunter
Regional Road Design Engineer

EJM/GB

c.c. H. Devata
W. Melinyshyn
A.J. Fletcher
E.A. Fletcher

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. W. Melnyshyn,
Reg. Bridge Location Engineer,
Central Region,
Admin. Building

Bridge Office,
Downsview

January 21, 1969

Thompson Rd. & Q.E.W. Overpass
W.P. 162-64-1, Site 34-205
Q.E.W., District No. 4

67-F-76

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6361-F1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$209,000. This cost includes tender, materials, engineering and sundry construction.

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

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. S. McConbie
A. Stermac (2)
J. Anderson

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office,
Admin. Bldg.

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

January 29, 1969

Thompson Road and Q.E.W. Overpass
W.P. 162-64-1, Site 34-205, W.J. 67-P-76
Q.E.W., District No. 4 (Hamilton)

We have reviewed the Preliminary Bridge Plan Drawing D-6381-P1 for the above mentioned structure and submit the following comments:

The foundation investigation was carried out with the assumption that a three-span structure was contemplated at this site. For such a scheme, we have recommended that the proposed piers be founded on spread footings at elev. 610.0 with a safe bearing pressure of 1.5 tsf.

The Preliminary Bridge Plan indicates a single-span structure with closed type abutments founded on spread footings located at approximate elev. 613.0 at this crossing. During the time of the preliminary review of the drawings, the designer enquired whether it would be possible to use bearing pressures higher than 1.5 tsf, since the new footings will be located at elev. 613.0. We have reviewed the subsoil conditions, taking into account the revised scheme and elevations. The footings for the abutments of the single-span structure can be designed with a net allowable pressure of 2.0 tsf at elev. 613.0. It is estimated that, for such footings, the total net settlements at each abutment location will be in the order of 1.5 to 2.0 inches.

ND/NdeP

cc: Messrs. S. McCombie
W. S. Melnyshyn

Foundations Files
Gen. Files

M. Devata
M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. C. Sternac,
PRINCIPAL FOUNDATION ENGR.

Mr. A. Sternac,
Principal Foundation Engineer,
Room 107, Lab. Building

C.S. Grebski,
Bridge Office

June 9, 1969

Thompson Rd. & Q.E.W. Overpass
W.P. 162-64-1, Site 34-205
Q.E.W., District No. 4

67-F-76

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.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

✓ c.c. Foundation Section

200 Unmonent.

M. Lavate

June 17/69



ONTARIO

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MINISTER: HONOURABLE CHARLES MACNAUGHTON

DEPUTY MINISTER: A. T. C. McNAB

Box 279, Burlington
November 8, 1971

MEMORANDUM TO:

C. R. Robertson
District Engineer
District #4-Hamilton

Subject: W.P. 163-64-04, 162-64-01, 02, 03, 05
Thompson Road - Q.E.W. Overpass
Bertie Ramp Overpass
Thompson Ramp Underpass
C.N.R. Overhead
Grading, Drainage, Granular Base, Hot Mix Pavement
Security Fence, Illumination, Structures
Location:- Q.E.W. from 0.5 miles east of Gilmore Road
Easterly 1.34 miles (C.N.R.)

Attending:

G. Pearce	Regional Systems Design
R. Vokes	Regional Systems Design
R. Newell	Survey - District #4
W. Kelly	Program Office (Critical Path)
W. Kmet	District #4 (Engineer I)
J. O. Elliott	McCormick, Rankin & Associates Ltd.
R. C. McCormick	McCormick, Rankin & Associates Ltd.
W. H. Roters	Regional Systems Design
P. Kinnear	Regional Systems Design
N. D. Smith	Regional Systems Design
J. V. Buckle	Central Region Engineering Audit
D. A. Waller	District #4 D.T.C.
L. D. Fisher	District #4 D.T.C.
F. Walsh	Bridge Planning Office - Central Region
C. R. Robertson	District Engineer
A. Camilatti	Project Supervisor - District #4
J. Regan	Construction Supervisor - District #4
P. Penev	Regional Materials & Testing
C. S. Pellerin	Patrolman
W. Friedman	Systems Design - Central Region

Sheet 1 - Update title sheet to Department of Transportation and Communications - Systems Design.

- Note earth fill area on key plan.
- Surplus material from this W.P. may be taken in part to Gilmore Road.

~~There is an unknown quantity of loose material on Thompson Road North. Soils Branch states this material as unsatisfactory for fills.~~

J. Regan

- Partial fills are built on Thompson Road South - Materials & Testing claims fills not consolidated sufficiently. Fills and grade to be reassessed prior to construction.

- Meeting agreed that condition of Thompson Road fill south should be assessed by Materials & Testing now. If acceptable fill could be completed under 71-56.

All info to be in hands of R. McCormick no later than December 1/71.

J. Regan

Soils should have information to District no later than November 12/71.

- It is noted that revised staging completes all structures in summer and completely removes all winter work. District questions whether it might not be advisable to follow original staging which creates winter work - Policy decision required!

Sheet 2 - Due to revised staging a thorough check must be made to assure no problem with 1972 or 1973 Fort Erie Jockey Club race meetings.

R. McCormick

Sheet 3 - Include sheet for Area 8.

Sheet 4 - District requests that a construction signing layout be provided for each stage.

Traffic
Road Design

- Include drawings showing temporary illumination at Detour 411-B or any other location where temporary illumination.

- Road Design to check re need for temporary or permanent signals.

Alignment Drawings - alignment drawings will have to be revised to meet latest D.T.C. standards - at present designed to Barnetts not Pryors - needs revision to make compound curves work - Road Design to issue addendum or arrange for D.T.C. to make revision.

R. McCormick
Systems
Design

- R. McCormick to send letter to Systems Design requesting addendum.
- Revised alignment required as soon as possible by District.

Sheet 14 - Systems Design to check out that property has been obtained - some local owners have stated that they have not been contacted yet.

R. Vokes

Sheet 15 - Reclaimed roadbed material - staging requires that asphalt has to be removed at several intervals. This makes higher cost to move equipment in and out. This matter to be discussed with M & T. District recommend treat as pavement removal and excavate and use granular existing base courses.

Systems
Design
M & T

Sheet 21 - H.L. 5 is to be changed to H.L. 6 on driving lanes and H.L.5 to H.L. 3 on shoulders. P. Penev advises this is Head Office decision. Consultant to make change to legend, typicals, breakdown sheets, D-4 and any other place where noted. M & T to forward letter to R. Vokes outlining change.

Sheet 22 - Dimensions to chain link fence to be shown where not on R/W.

Sheet 24 - Include std. for turning basin.

Sheet 26 - Add detail for pier protection at Br. #2.

Sheet 27 - Give more detail at end of fence north side at R/R/

Sheet 29 - Systems Design to assure that agreement has been reached including all terms with Jockey Club (see note re gran. removed by others). Systems Design

- Temporary easement should be temporary limited interest.

Sheet 30 - Note location of sub-stn. "B".

Sheet 31 - Sta. 37+00 include legend for private entrances.

Sheet 32 - Check pavement design of Helena Street against soils recommendation.

Note:- it is expected that a problem may occur with septic tank affluent.

Sheet 36 - adjust line now shown to top of footing - conflicts
& 37 with SD-4-79.

Sheet 56 - Show line across top of subdrain excav.

- Include S.P. that gran. "A" backfill is part of road gran. item - R. Vokes to supply S.P. to R. McCormick.

Sheet 57 - Denote stn's rather than rural.

Sheet 58 - Cross Sect. E. Thompson - no sheet number given - include sheet or std. number whichever applicable.

Sheet 61 - Include S.P. to indicate that pav. burning shown on std. is included in items for hot mix pavement or alternately include item and quantities etc. District prefers option number one.

Sheet 62 - Timber median - revise item to have contractor supply, install, maintain and remove.

Sheet 63 - Opening to be left or arranged for to give access from detour 401 to detour 403 through timber median.

Sheet 80 - DD415 conflicts with SD-4-79 (P. 82) check.

Sheet 82 - SD-4-75.

Sheet 85 - Check re updating 808A etc. to latest standard.

- District requests that backfill to sewers crossing roads be all granular due to difficulty in compaction native material in area. This request was generally agreed upon.

- Meeting generally agreed that bedding should be changed to B-1.

- Std. should be DD823.

- Note:- relocation of utilities appears to be a problem - negotiation with utilities to be expedited.

9CC

.../4

Breakdown Sheets:-

Page 147 - all cut material not be made available - approx. 14,000 c.yd. difference between curbs and material available. Check to assure why difference. Most probably due to loss in stripping.

Page 156- M.H. 130 - error in depth - should be 11' not 12'.

D-4

- Show recoverables on sheet 1 of D-4.
- Road Design to check on status of board order for railroad crossing.
- Item 7 - add spec. 405 - adjust quantity.
 - 10 - see previous minutes.
 - 11
- 24 - revise S.P. as per previous minute (8607)
- 51A - include S.P. - R. Vokes to provide to R. McCormick.
- 62 - SD-7-26 - Base up to 12' not covered possible 62A item.
- 70 - to be supply and place - see previous minutes.
- 79, 80, 82 - round tender item off - delete decimal places.
- 85 - unit to be square feet.

Sundry

- delete timber median.
- District to check whether to salvage handrail at C.M.R.
- Plan required for temporary lighting at Thompson Road.

L. Fisher

R. Vokes

- S.P.** - Include sign contractors in other contractors or adjacent contracts
- Delete 8402
- Delete 8405
- Delete 8607 - include as non standard S.P.

Meeting adjourned 4:45 p.m.

Meeting reconvened 9:00 a.m. November 4, 1971.

Attending:

A. Camilletti	D.T.C. District #4
J. Regan	D.T.C. District #4
H. Knet	D.T.C. District #4
J. F. Walsh	Bridge Planning Office
G. Pearce	Systems Design Central Region
R. Vokes	Systems Design Central Region
W. Kelly	Foundations Section
R. Newell	D.T.C. District #4
J. Elliott	McCormick, Rankin & Associates
R. McCormick	McCormick, Rankin & Associates
G. E. Smallwood	McCormick, Rankin & Associates
P. Kinnear	Regional Systems Design
H. D. Smith	Regional Systems Design
S. Pernick	D.T.C. District #4
V. R. Barkis	D.T.C. Downview
J. V. Buckle	Reg. Engineering Audit
D. A. Waller	D.T.C. District #4
W. Hutton	Foundations
C.C.E. Burkhardt	D.T.C. Reg. Bridge Planning

Special Provisions

- Critical Path Scheduling - R. Vokes to query wording of special re inclusion in tender package.
- Operational Restraints -
Mondays and Tuesdays there is normally no racing therefore restraint not required. Restriction should be on 7:00 a.m.-9:00 a.m. and 4:00-6:30 p.m.
- District recommends that 7:00 a.m.-9:00 a.m. be deleted from Monday to Friday from Labour Day to Dominion Day with exception of Spring race meets.
- see previous note re reclaiming of materials.
- Rental of tractor bulldozer -
"as detailed in contract drawings" - delete this statement, include "as constructed by others."
- Item 70 revises to supply by contractor.
- "Single rail steel beam.." check to see if required - possibly now incorporated into specification - assure necessary stds. included.

Utilities - it appears that Bell may not be removed prior to contract award - this is critical - Estimated Bell cost \$300,000.00 + D.T.C. share \$50,000.00.
McCormick, Rankin to contact Bell re progress of their approval of their design.

- Niagara Power - Prov. Gas - Fort Erie
Water - plans not finalized - consult. to contact again and expedite.

Electrical

- Sheet 191 - revise std. to latest for embedded conduit.
assure that sufficient clearance allowed between poles and Hydro lines.
- Sheet 192 - show symbol for pipe under C.N.R.
- Sheet 193 - detail power to flashers wherever flashers to be placed - also supply service to signal control boxes.
- Note - consultant to include bases for signal poles.
- Sheet 199 - give additional detail or notes as to dimensions to get frangible base etc. at proper grade, consultant to review.
 - include S.P. re connecting drains to electrical manhole sumps delete word by others.
 - assure that all stds. are latest.
 - assure that embedded items can be placed without interference to re. steel, tensioning, etc.
- Sheet 213 - Electrical Section to check re use of gaskets or field painting where surface mounted aluminum housing are attached to concrete. V.Bertis

- D4 - include items for traffic signal bases etc. as per previous minutes.
- include allowance for flashers - \$1800.00.

Structures

- Bertie Street Ramp Overpass
D-6h11-3 - File table -
west should read east
2 east's should read west
show pile lengths as even feet not feet and inches.
delete design load since piles are driven to bedrock.

D-5411-5 & 7 - specify stressing seq.

-5

- Show a second set of transverse cables.
- Parapet walls - include new stds. for all bridges.

D-6411-12 - Std. BD33-1 delete

- clarify backfill to retaining walls - should be written to be included with lump sum structure backfill - assure that above quantity is included - note on plans which backfill std. applies.
- delete pile driving stds.

Thompson Road Structure

D-6381 - review location of roadway protection line - should be offset further north so first stage can be constructed.

D-6381-5 - show as P.B.R. or equivalent.

D-6381-7 - curb depth should be 9" not 6".

BD33-1 - delete

D-6381-3 - show abutment drainage through wall as per grading drawings.

D-6412 - Thompson Road Underpass.

D-6412-1 - delete design load.

- when designing transverse stressing assure that there is no conflict between embedded electrical and stressing locations.
- District recommends that embedded electrical be always in parapet rail whenever possible.
- 3 Pile Type revised - remove inches dimension from length of piles.
- review void sizes to keep same sizes where possible (e.g. 43"-44")
- delete pile driving std.
- include double tie down std.
- check whether bearings are supplied by D.T.C. as drawings indicate supplied by D.T.C.
- drawings show splicing standard, however, no item shown for splicing.

Note:- It is noted that a scheme for track protection is shown whereas no scheme for roadway protection is provided. It is generally agreed that design should be consistent.

C.N.R. Structure

- D-6600-1 - show details of subdrain on footing drawings as per grading drawings.
- D-6600-3 - track protection detail not complete as to dimensions and depths of sheet pile.

C.N.R. Overhead

- Item 177 - correct to take into account amount of excav. replaced by removal of existing east pier footing.
 - do not delete granular backfill item.
- Item 168 - spelling of beams.
- Item 169 - be more specific - east or west? elevation?
- assure that specifications clearly spell out that tracks must be protected during removal of existing structure.
- use latest spec. re compaction of backfill.

General Notes:-

- (1) There is outstanding property.
- (2) Speed zoning approved.
- (3) Damage to local roads is expected.
- (4) 15 sets of book plans required by district.
- (5) 6 sets of tender information and S.P.'s required by district.
- (6) working days to be by critical path.
- (7) There will be recoverables from other agencies.
- (8) Bridge decks have voids. - H. Potts.

LDF:lc

L. D. Fisher
Engineering Office Supervisor

c.c. D. Barr
F. G. Allen
B. Giroux
D. Farren (2)
B. Wear
H. Potts
R. Reid

Ontario
Department of Transportation and Communications
XXXXXXXXXXXXXXXXXXXX

67-F-76

Mr. M. Devata,
Supervising Foundation Engineer,
Foundation Office,
Downsview, Ontario.

Foundations Office,
Design Services Branch,
Downsview, Ontario.

November 9, 1971.

Contract Review Meeting - W.P. 163-64-04
Q.E.W. Port Erie
Gilmore Road to C.N.R.
District 4, Hamilton.

The meeting was held at the 'Estaminet' Restaurant, 2084 Lakeshore, Burlington on November 3 and 4, 1971. The structures were discussed on November 4, 1971.

Thompson Rd. & Bertie St. Ramp - The Pile Table was changed
67-F-80 to read West Abutment where
it showed East Abutment and
vice versa.

Thompson Rd. & Q.E.W. - It was suggested to G. Burkhardt
✓ 67-F-76 that a working slab be shown
under the spread footings.

E.S. Ramp to Thompson Rd. - No Comments
67-F-79

C.N.R. Widening - No Comments
67-F-77

In both structures on piles 67-F-80 & 67-F-79 it was decided to show the pile lengths to the nearest foot + and delete the inches. Also the charts for the Hiley Formula were deleted from both contract drawings.

WH/ao

cc: Foundations Files
Documents

W. G. Hutton

W. Hutton,
Project Foundation Engineer.



MEMORANDUM

TO: Mr. A. G. Stermac,
Principal Foundations Engineer,
West Building.

FROM: G. C. E. Burkhardt,
Bridge Planning Office,
90 Floral Parkway.

ATTENTION: W. Hutton

DATE: November 24, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 163-64-04,
Thompson Road Overpass,
W.P. 162-64-01, Site 34-205,
Q.E.W., District 4.

67-F-76

At the recent review for the above structure you remarked on the advisability of providing a working slab under the spread footings for this structure. We have made this recommendation to the Structural Office. However they are most reluctant to do this without specific direction from the Foundation Office, since it was not contained in the original report.

You will remember that this structure is being built in two stages. The first stage will be in a "hole" which will have no drainage outlet except by pumping.

Would you please confirm the need for a 'working slab' with the Structural Office as soon as possible. All revisions must be completed before November 30, 1971.

JFW:lc

J. F. Walshe

J. F. Walshe,
REG. BRIDGE PLANNING SUPERVISOR,
for:
G. C. E. Burkhardt,
REG. BRIDGE PLANNING ENGINEER.

c.c. C. S. Grebski

Department of Transportation and Communications
XXXXXXXXXXXXXXXXXXXX

Mr. G. C. E. Burkhardt,
Bridge Planning Engineer,
Central Region,
90 Floral Parkway, Downsview.

J. P. Walsh

M. Devata,
Supervising Foundation Eng.,
Design Services Branch,
Central Bldg., Downsview.

November 25, 1971.

W.P. 163-64-04, W.O. 67-F-76
Thompson Road Overpass
W.P. 162-64-01, Site 34-205
G.E.W., District No. 4.

Further to your memo of November 24, 1971, with regards to a working slab at the Thompson Road overpass structure our comments are as follows.

The subsoil at the abutment footing foundation level is a cohesive deposit consisting of clayey silt with traces of sand and gravel. Such a material may be softened when exposed to surface runoff water or groundwater seepage. In view of this, it is our recommendation that a thin concrete working slab should be placed immediately after the completion of the footing excavation.

WGH/so

cc: C. S. Grebski

Foundations Files ✓
Documents

For:

W. G. Hutton
W. G. Hutton,
Project Foundation Engineer,
M. Devata,
Supervising Foundation Engineer

67-F-76

HEAD OFFICE REVIEW REPORT

BOARDROOMS: E-1 and E-2,
DOWNSVIEW, ONTARIO.

DATE: April 7, 1972.

163-64-04
162-64-01
162-64-02
162-64-03
W.P.: 162-64-05

CONTRACT: 72-56

HIGHWAY: Q.E.W.

TYPE OF WORK:

LOCATION: Q.E.W. from 0.59 Miles East of Gilmore Rd., Easterly 1.34 Miles
(C.N.R.) including Thompson Rd., Interchange and Associated Work.

DISTRICT: 4

ADVERTISING DATE: April 26, 1972 (was May 3rd)

ATTENDANCE:

B. Wilkes	L. R. Eadie	B. Giroux	L. Francis
D. W. Farren	F. G. Allen	W. Bennett	D. Hopper
J. R. Wear	R. Beaudro	T. C. Muir	K. Livingston
E. J. Willis	G. Wrong	A. Leach	McCormack & Rankin
W. Birkis	M. Monette	D. Barr	R. Vokes
		D. Smith	H. Bawcutt

POINTS OF DISCUSSION:

1. Utilities - Completion - Utility drawings are being updated giving latest known information.
2. Staging - Mr. Giroux opined that Thompson Road Ramp Bridge (B²) need not necessarily be built under stage I - in fact might be a saving if built under stage III. This was reviewed by the Consultant prior to the Review and he felt that the staging should remain as designed.
3. Lighting Thompson Road - Thompson Road was originally scheduled to be part of Highway 3, but is now to be a regional road and lighting should be a Municipal responsibility. Regional Representative is to obtain agreement and report back to Head Office.
4. Piles - How to be driven (to Bed Rock). Note on bridge drawings to be so written.
5. Working Slab - Should not generally be required as an item. - Form 9 covers. This Project has items, which are to be deleted, because of a Structural Office misinterpretation of the Foundation Report wording.

The Committee directed that the text be "cleaned up" and that the subject be discussed at the next Design Criteria Committee Meeting.

N.B. Roger Verscheure to add to agenda.

cont'd...

6. Track Protection. - The text of the Special was resolved with Mr. Beaudro. - Payment shall be made for the approved scheme.

Roadway and track protection is to be discussed by Design Committee. - Mr. Verscheure to note.

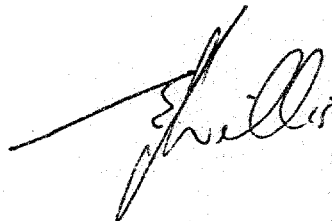
7. Granular backfill to structure (C.N.R.) - Designed as lump sum payment. - Now to be the ton.
8. Burning off of existing pavement. - Submitted as a special applied to the asphalt item. - In future this operation will be by separate items.

Mr. Verscheure to include on agenda for Design Criteria Committee.

9. Pipe Sub-Drains. - Submitted detailing backfill as part of road bed material, - changed by Head Office, to be included in linear foot price.

Mr. Verscheure to include on agenda for Design Criteria Committee.

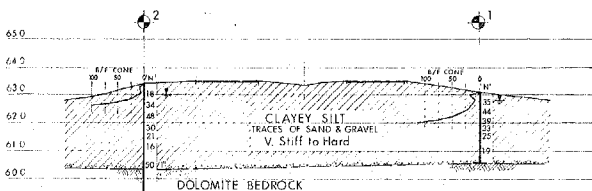
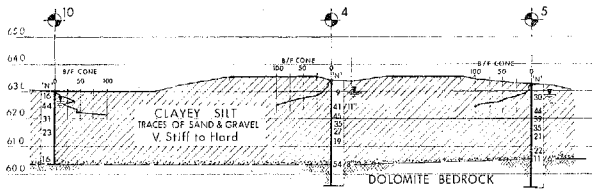
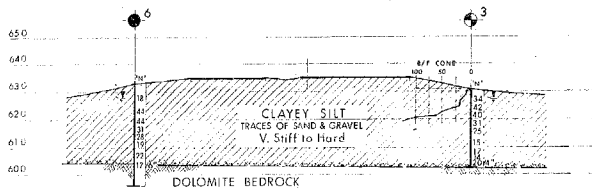
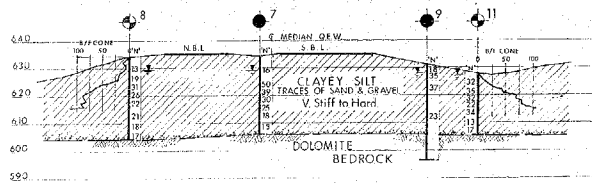
10. Special Provisions. - Revised by Head Office and Consultant as directed by the Committee.



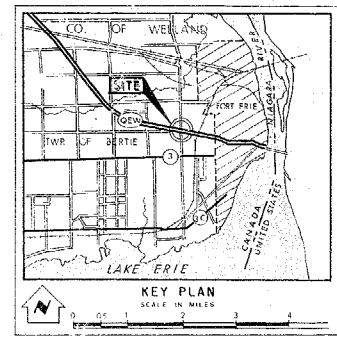
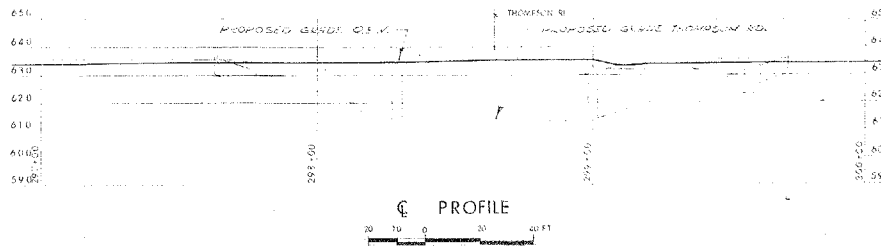
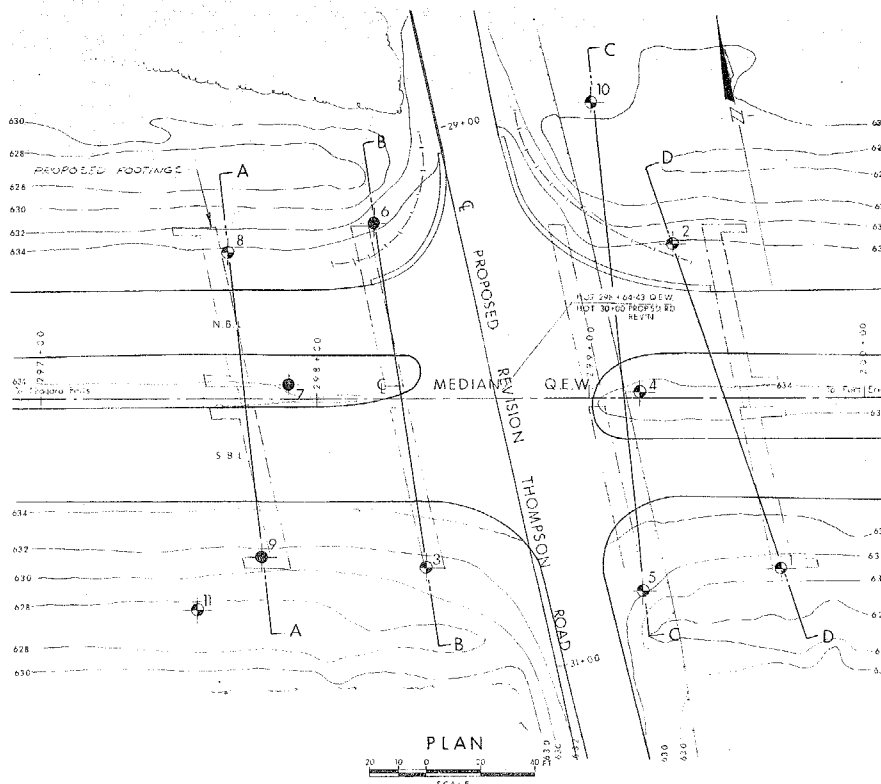
E. J. Willis,
PROJECT REVIEW SUPERVISOR

EJW/lis
c.c.

Mr. G. K. Hunter
Mr. C. R. Robertson
McCormack & Rankin Assoc.
Mr. R. C. Minaker
Mr. D. Barr
Mr. G. Wrong
Mr. R. Beaudro
Mr. B. Giroux
Mr. A. Stermak ✓
Mr. D. Hopper
Mr. E. J. Willis
Mr. M. Stoyanoff
Mr. R. Verscheure



SECTIONS
10 0 30 40 FT
SCALE



- LEGEND
- Bore Hole
 - Cone Penetration Hole
 - Bore & Cone Penetration Hole
 - Water Levels established at time of field investigation: August 1967

NO.	ELEVATION	STATION	OFFSET
1	621.1	298+09	62'4"
2	624.7	298+41	55'1"
3	611.5	298+20	61'3"
4	631.6	299+18	37'1"
5	637.3	299+19	76'3"
6	632.9	298+21	64'1"
7	634.1	297+00	53'1"
8	634.3	297+08	52'4"
9	631.3	297+01	52'8"
10	630.1	298+09	102'1"
11	627.9	297+57	28'3"

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.

DATE	DESCRIPTION

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

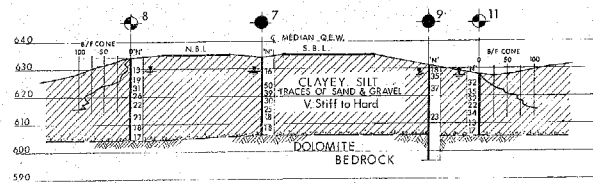
THOMPSON ROAD

KING'S HIGHWAY NO. Q.E.W. DIST. NO. 4
CO. WELLAND TWP. BERTIE LOT 1 CON. 218.111

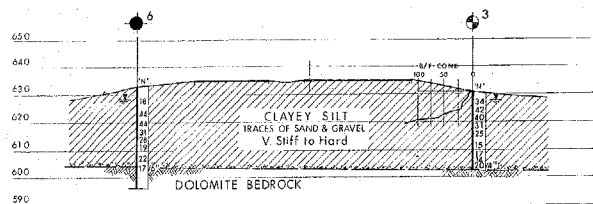
BORE HOLE LOCATIONS & SOIL STRATA

SUBNO. WH. CHECKED W.P. NO. 167-64-01 M.B.T. DRAWING NO.
DRAWN M.J.D. CHECKED J.C. JOB NO. 67-7-76 67-F-76A
DATE 24 JUL 1967 SHEET NO. BRIDGE DRAWING NO.

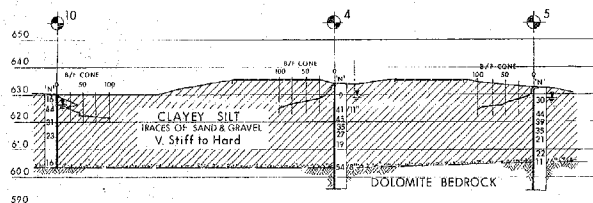
APPROVED: *[Signature]* DATE NO.



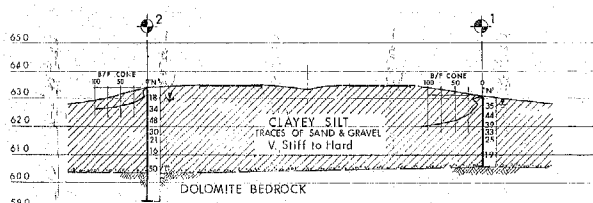
A - A



B - B

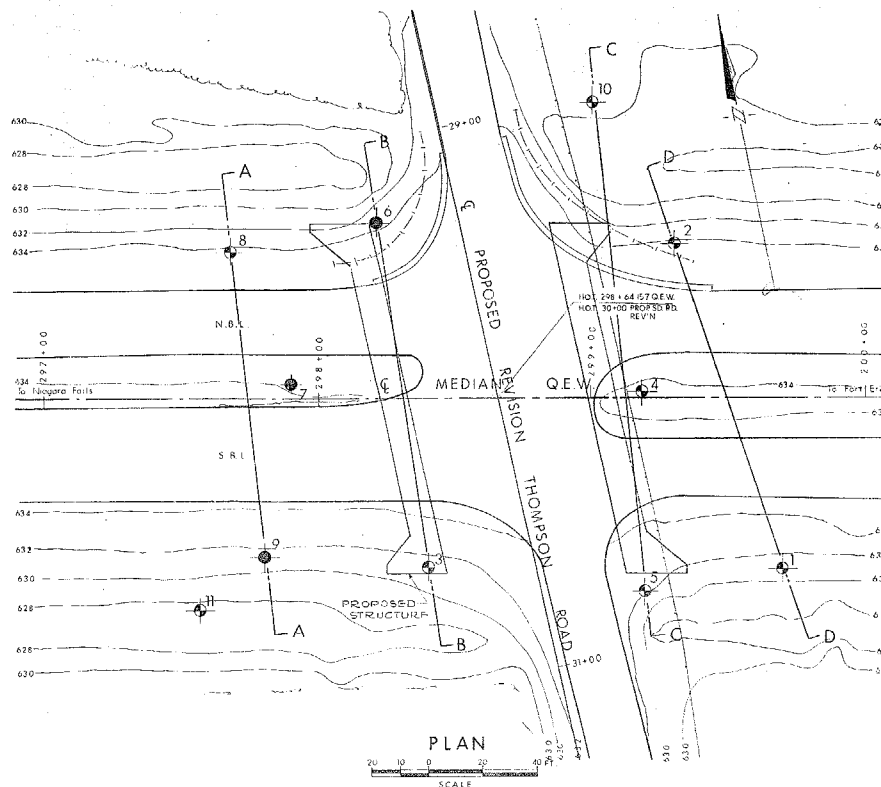


C - C

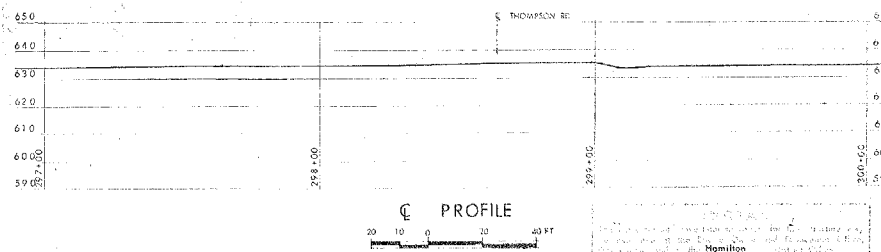


D - D

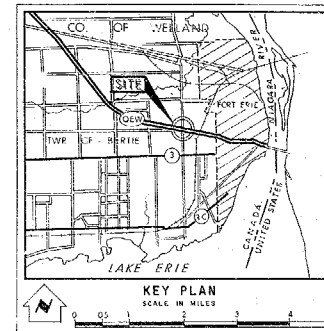
SECTIONS
SCALE 1" = 40 FT.



PLAN



PROFILE



LEGEND

- Bore Hole
- ⊕ Cone Penetration Hole
- ⊙ Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, August 1967

NO.	ELEVATION	STATION	OFFSET
1	621.1	295+59	62' RT
2	634.0	295+21	56' LT
3	631.0	298+10	61' RT
4	633.6	299+18	51' LT
5	637.3	299+19	70' RT
6	623.9	298+21	62' LT
7	634.1	297+90	55' E
8	634.3	297+06	52' LT
9	631.3	297+81	57' RT
10	630.3	298+99	107' LT
11	627.9	297+57	74' RT

NOTE

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

DATE	BY	DESCRIPTION

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

THOMPSON ROAD & Q.E.W. OVERPASS

KING'S HIGHWAY NO. Q.E.W. DIST. NO. 4
CO. WELLAND
TWP. BERTIE LOT 2 CON. 21 & 22

BORE HOLE LOCATIONS & SOIL STRATA

SUBMIT. W.H. CHECKED: W.P. NO. 162-64-01 M.B.T. DRAWING NO.
DRAWN M.J.D. CHECKED: J.B. NO. 67-F-76
DATE 24 OCT. 1967 SITE NO. 34-205 BRIDGE DRAWING NO. 67-F-76A

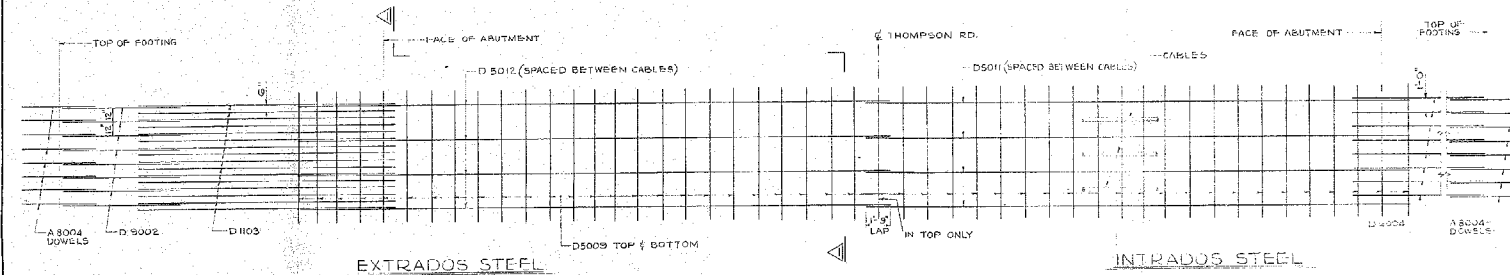
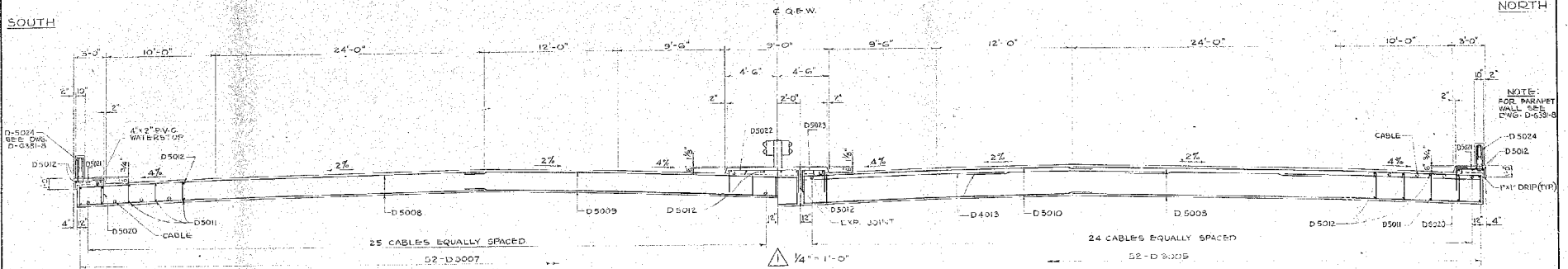
APPROVED: *[Signature]* DATE 24 OCT. 1967
PROJECT: *[Signature]* DATE 24 OCT. 1967

REF. NO. E-3781-1

D-6381-2

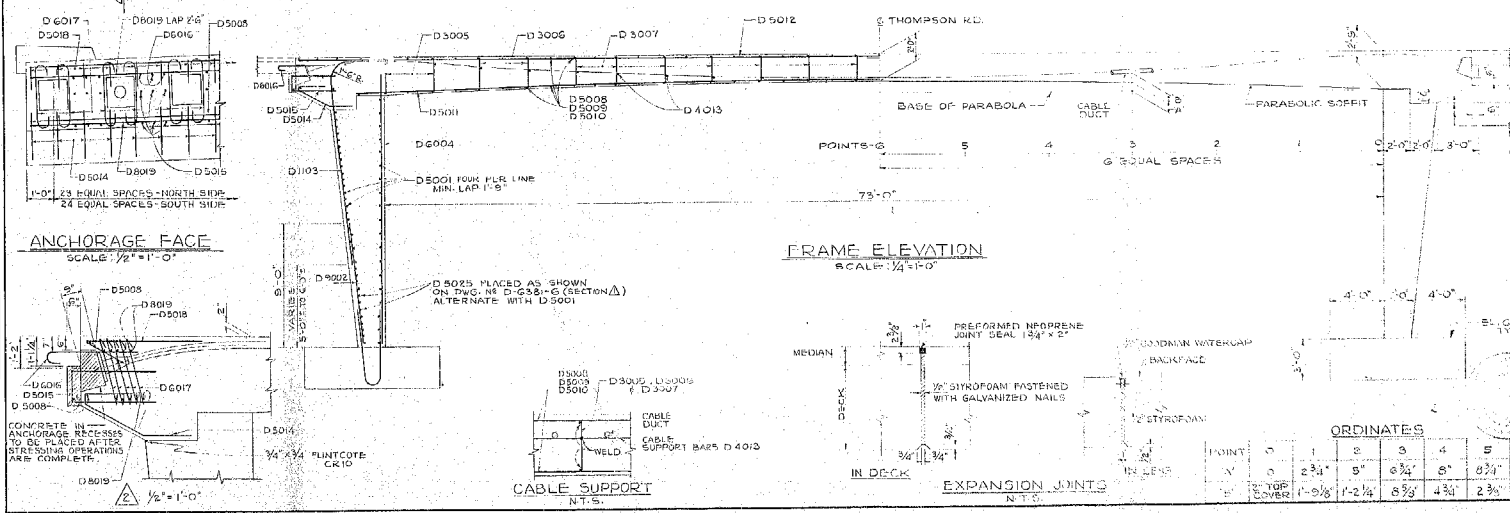
SOUTH

NORTH



REINFORCING BAR LIST

MARK	REQ'D	SPACING	LOCATION	REMARKS
D5001	750	1'-0"	IN LEGS-HORIZ.	MIN. LAP 1'-0"
D5002	260	1'-0"	DO - VERT.	
D5003	250	6"	DO - DO	
D5004	260	1'-0"	DO - DO	
D5005	108	SEE FRAME	VERT. CABLE SUPPORT	
D5006	204	DO	DO	
D5007	723	DO	DO	
D5008	252	SEE FRAME	TRANSV. SUPP. 1/8" AT ANCHORAGE	
D5009	101	DO	DO	
D5010	101	DO	DO	
D5011	104	SEE FRAME	LONGIT.-BOTT. DECK	SPACED BETWEEN CABLES
D5012	101	DO	DO - TOP DECK	DO
D5013	28	DO	DO - TOP CURB	
D5014	122	SEE FRAME	TRANSV. CABLE SUPPORT	
D5015	254	DO	UNDER ANCHORAGE	
D5016	182	SEE FRAME	TRANSV. SUPP. 1/8" AT ANCHORAGE	
D5017	252	DO	DO	
D5018	340	5"	SPACE OF CABLES AT ANCHORAGES	
D5019	254	1'-0"	ADJAC. ANCHORAGE	
D5020	80	3"	TRANSV. AT ANCHORAGES	
D5021	110	18"	TIES INTO CURB	
D5022	110	DO	IN N.S. CURBS	
D5023	58	DO	IN MEDIAN CURB	SOUTH SIDE
D5024	58	DO	DO	NORTH SIDE
D5025	170	1'-0"	DOWEL INTO PARAPET WALL	
D5026	72	1'-0"	IN LEGS-HORIZ. ALT. WITH D5001	



EXTENSIONS		DISCUSSION	
DATE	BY		
DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
67-F-76			
THOMPSON RD. Q.E.W. OVERPASS			
KNO'S HIGHWAY No. Q.E.W.		DIST. No. 4	
CO. WELLAND		CON. II (III)	
TWP. BARTIE		LOT 2	
FRAME DIMENSIONS & REINFORCING			
APPROVED		REVISION	
DESIGN	CHECK	CONTRACT	NO.
DRAWING	CHECK	DATE	NO.
DATE	APR. 1955	LOANED	15-20-44
D-638-1-4			