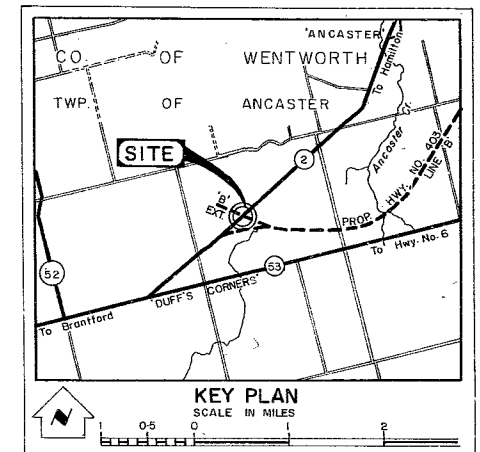
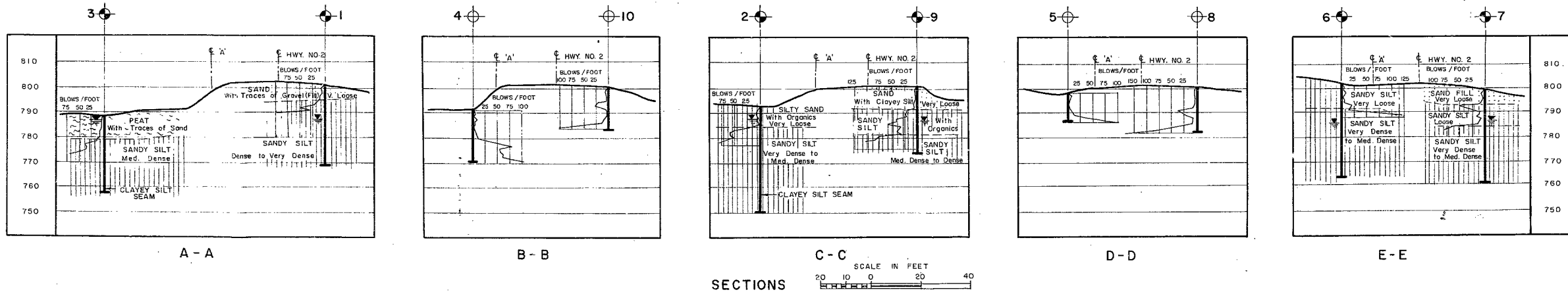
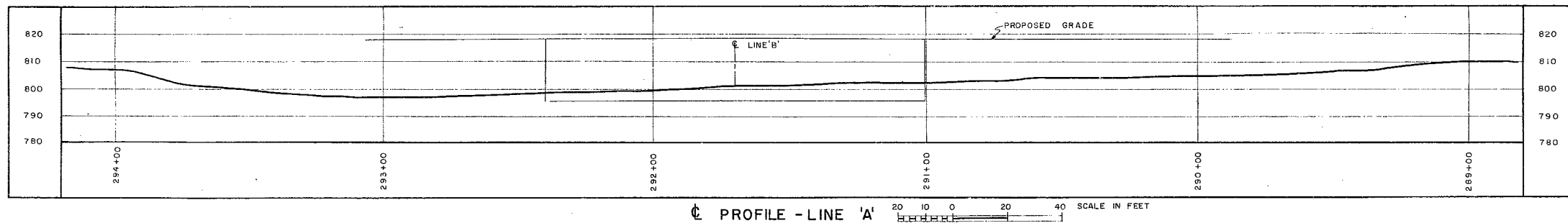
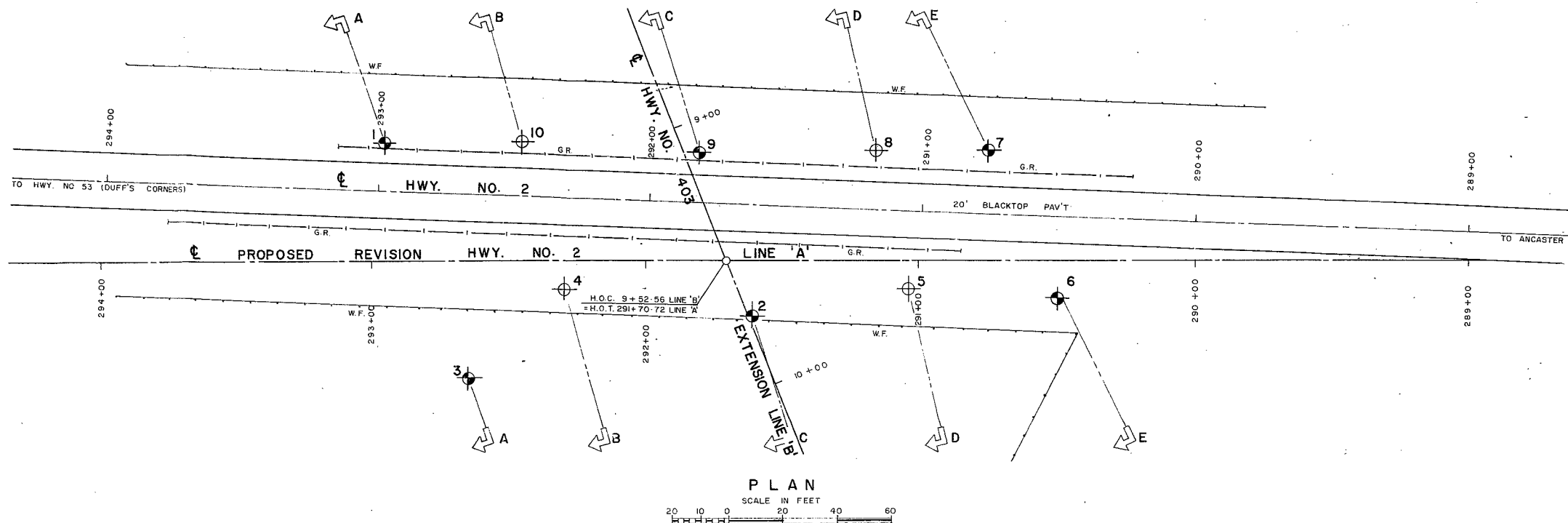


62-F-100

W.P. # 194-61

Hwy. # 2 E

Hwy. # 403



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, Aug. 15, 1962

NO.	ELEVATION	LINE 'A' STATION	OFFSET
1	801.0	292+95	43' RT.
2	793.0	291+60	20' LT.
3	789.0	292+65	43' LT.
4	791.0	292+30	10' LT.
5	799.0	291+03	10' LT.
6	803.0	290+50	15' LT.
7	800.0	290+75	40' RT.
8	801.0	291+15	40' RT.
9	801.0	291+80	40' RT.
10	800.5	292+45	43' RT.

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.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION

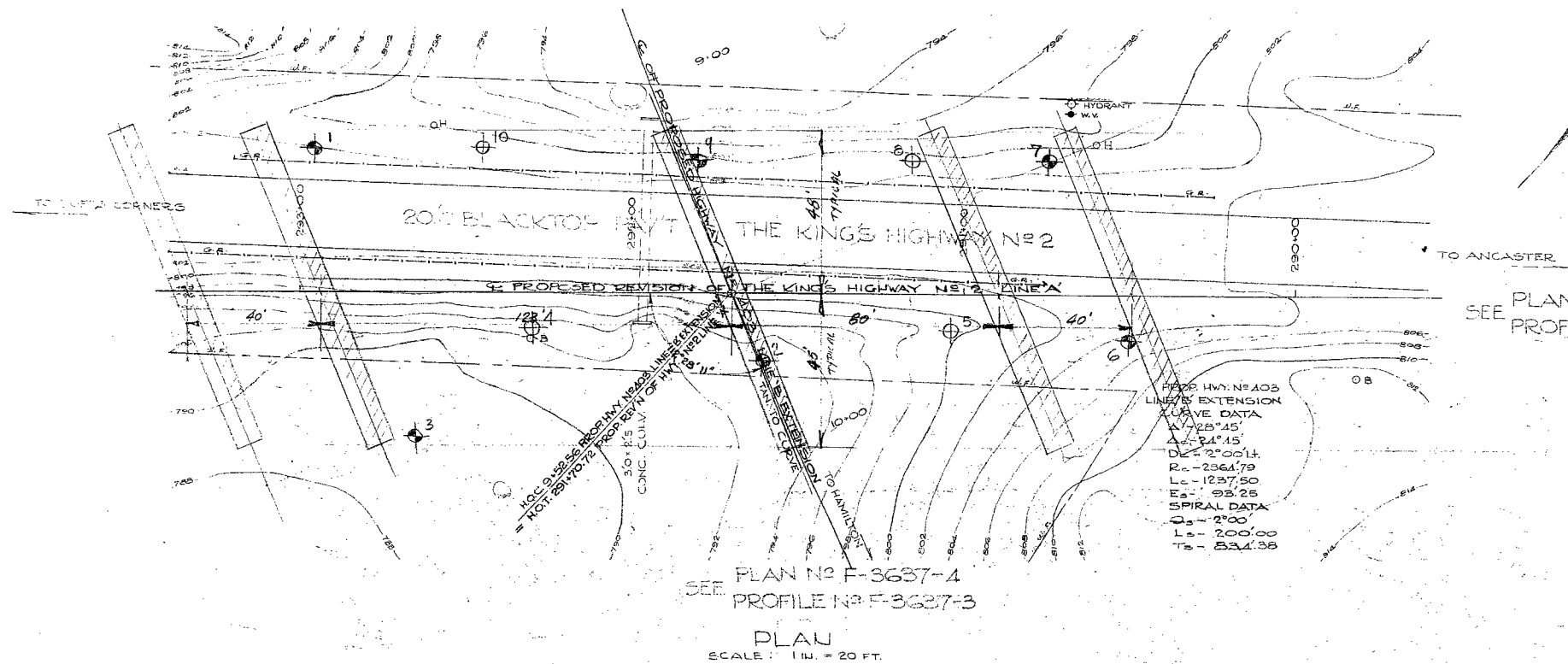
**HIGHWAY NO. 2 LINE 'A' REVISION
AND
HIGHWAY NO. 403 LINE 'B' EXTENSION**
1 MILE EAST OF DUFF'S CORNERS

ORIGINATED G. MIERZYNSKI	DISTRICT NO. 4	DATE, SEPT. 13, 1962
DRAWN E. CLARK	W.P. NO. 194-61	JOB NO. 62-F-100
CHECKED <i>[Signature]</i>	CORR. NO.	DRAWING NO.
APPROVED <i>[Signature]</i>		62-F-100A

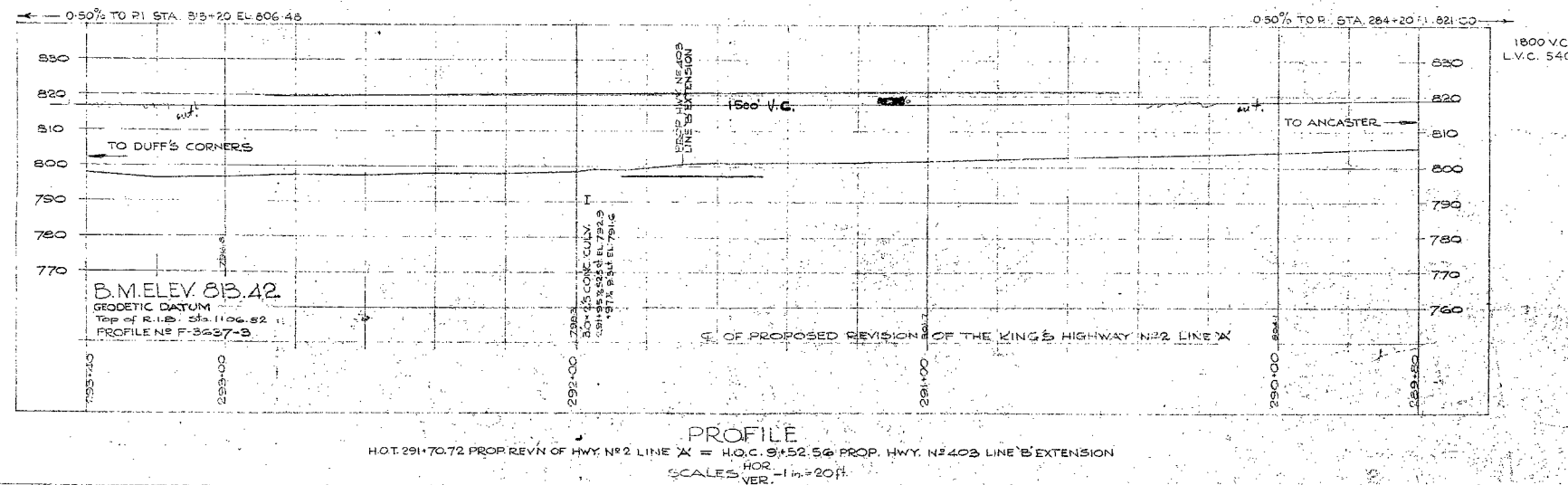
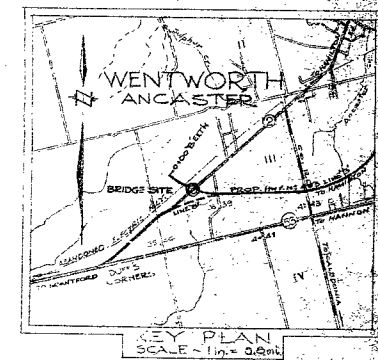
E-3873-3

E-3873-3

COUNTY of WENTWORTH
TOWNSHIP of ANCASTER
CON. III
LOT 38



SEE PLAN N° 15-B-35
PROFILE N° C-871-1



62-F-100

W.P. 194-61

36-101

DEPARTMENT OF HIGHWAYS - ONTARIO
PLANNING & DESIGN BRANCH
DISTRICT N° 4

PROPOSED CROSSING
AT THE
PROPOSED REVISION OF HIGHWAY NO. 2
LINE X
AND THE
PROPOSED KINGS HIGHWAY NO. 403
LINE B EXTENSION
LOT 38
TOWNSHIP OF ANCASTER COUNTY OF WENTWORTH

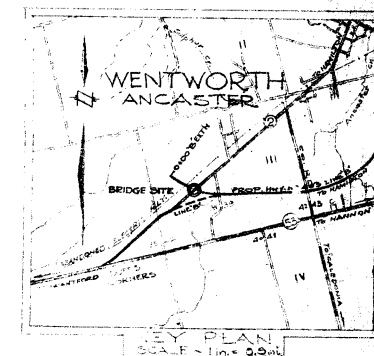
BRIDGE SITE

SURVEY BY Chief of Party Supervisor	D. LOWMAN K. BROWN	APPROVED DATE OF APPROVAL
DRAWN BY	W. LUBIN J. UNDERDOWN	SCALE - AS SHOWN
CHECKED BY	W. LUBIN G. BROWN	DATE OF SURVEY: MAY 1960 DATE OF PLAN: JULY 1960 W.O. N° 34-60-61 FILE N° 2-1
		PLAN - E-3877-1

E-3873-1

E-3877-1

E-3877-

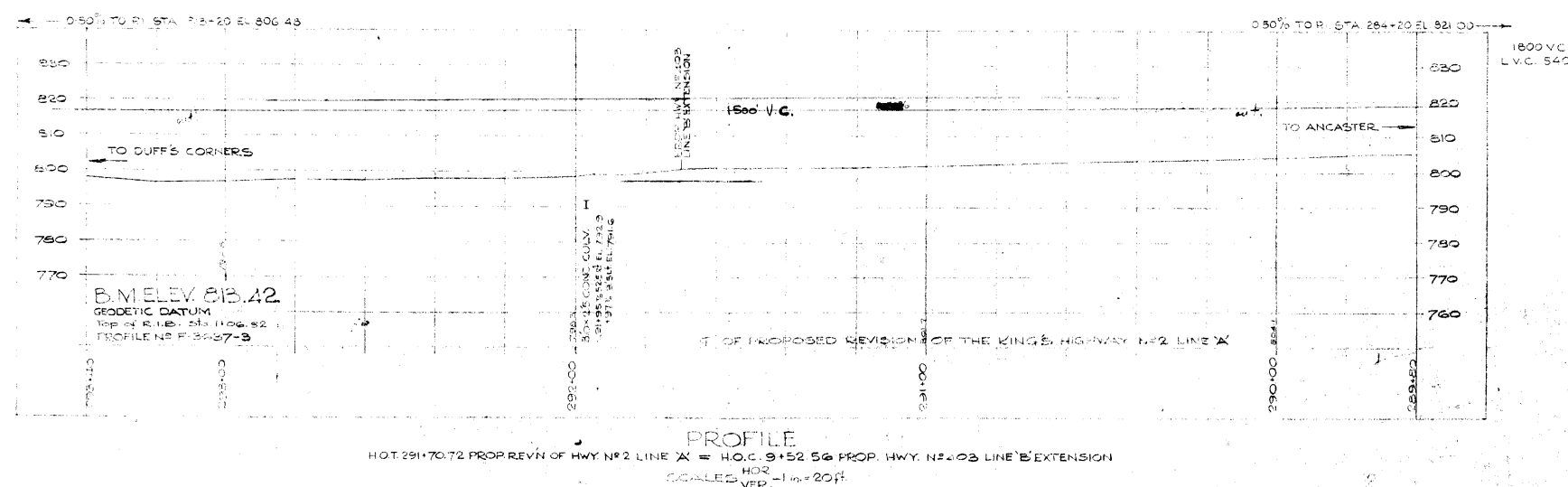


SEE PLAN N° 15-5423
PROFILE N° 1-374

PLAN NO F-3637-4
PROFILE NO F-3637-3

PLAN

SCALE: 1 IN. = 20 FT



62-F-100

W.F 194-61

36-10.

DEPARTMENT OF HIGHWAYS - ONTARIO
PLANNING & DESIGN BRANCH

DISTRICT No 4

PROPOSED CROSSING
AT THE
PROPOSED REVISION OF HIGHWAY #2
LINE 'A'
AND THE
PROPOSED KING'S HIGHWAY #403
LINE 'B' EXTENSION

LOT 38
TOWNSHIP OF ANCASTER
CON. REG. 51
COUNTY OF WENTWORTH

BRIDGE SITE

SURVEY BY
Chief of Party: D. J. G. MA

APPROVED

DRAWN BY

SCALE - AS SHOWN

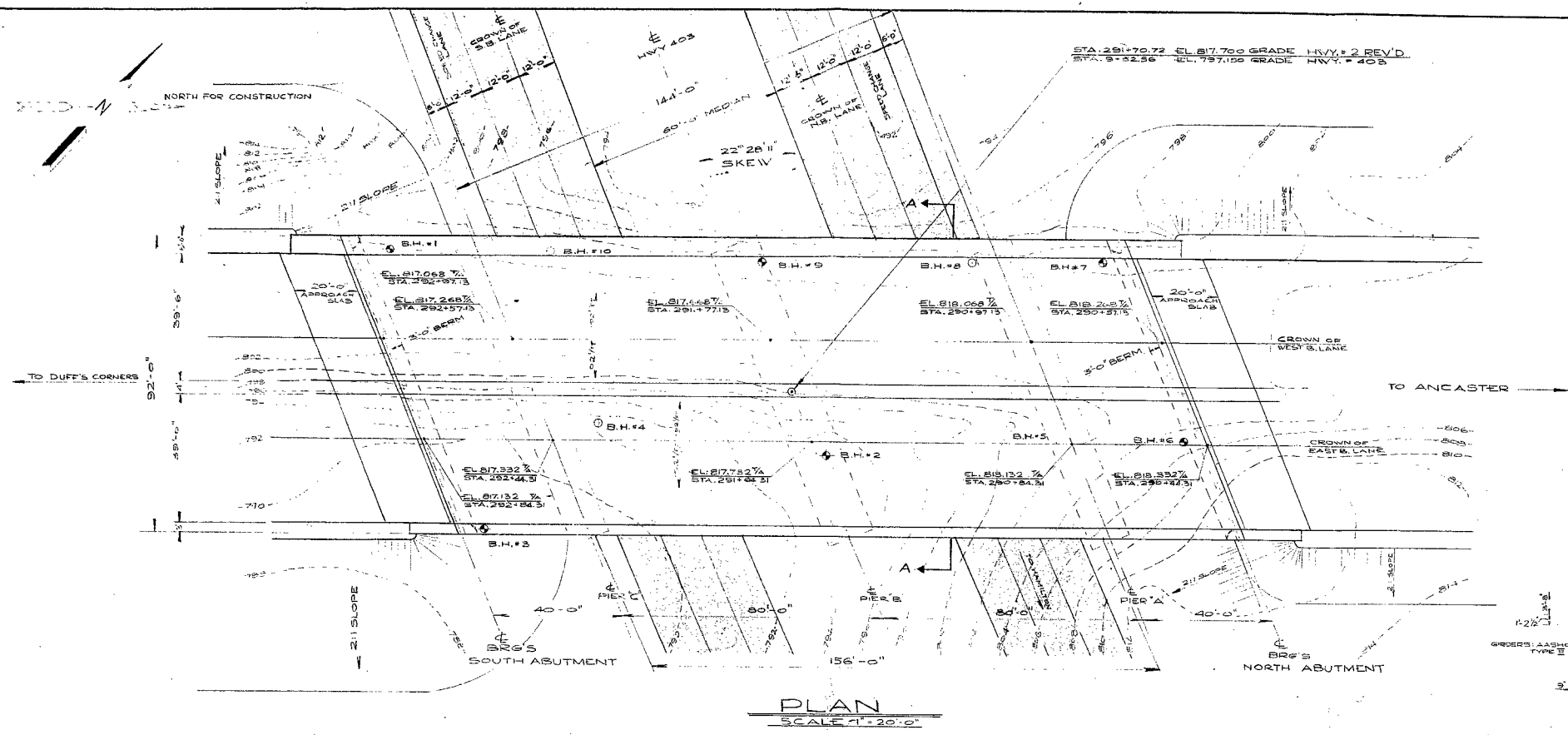
Draftsman
Supervisor

DATE OF SURVEY: JUNE 1960
DATE OF PLAN: JULY 1960

CHECKED BY
Draftsman W. LUBIW

W.O. N#34-60-64 FILE N#2-1
PLAN - E-3877A1

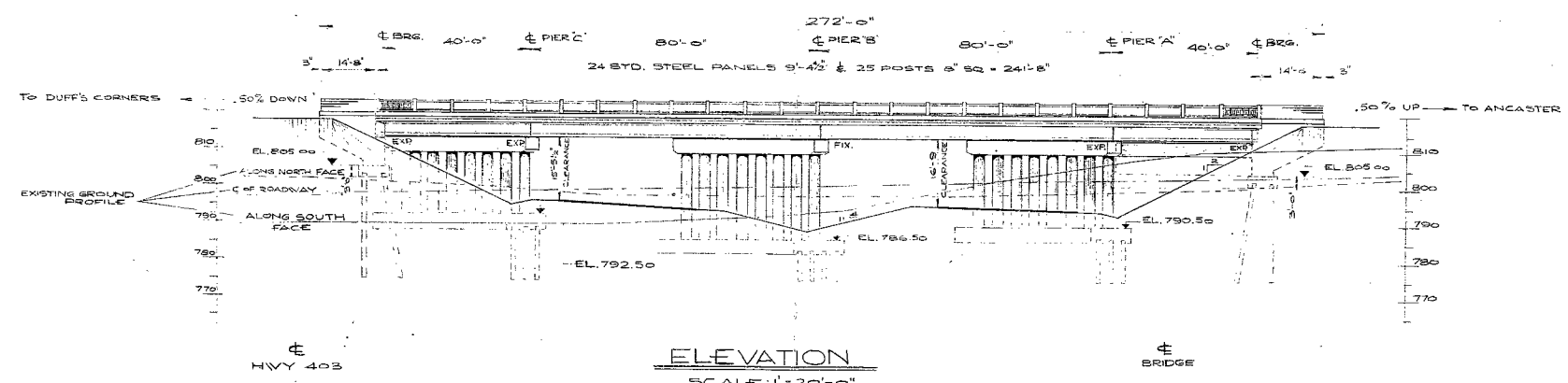
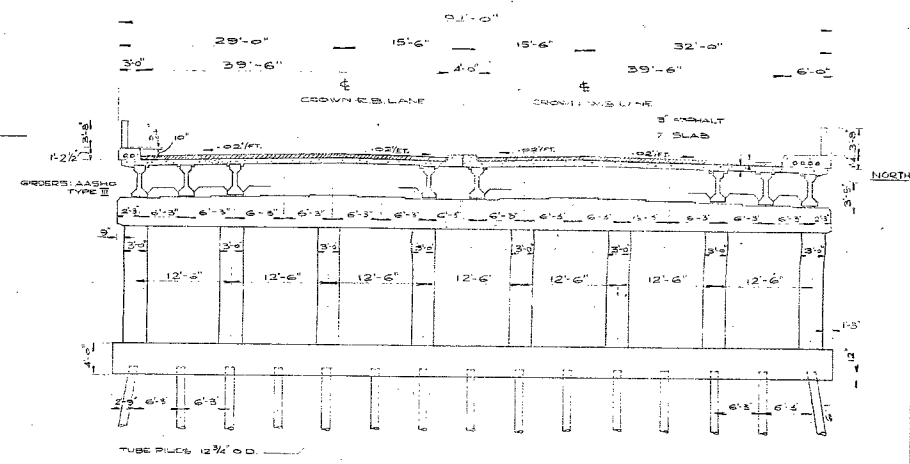
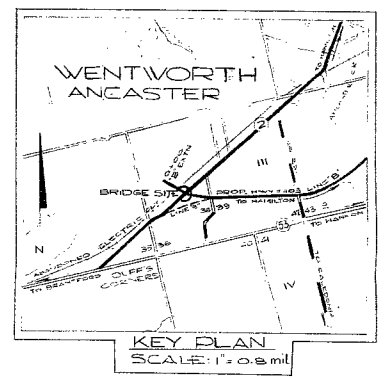
PLAN - E-3872-1



SKEW 22° 28' 11"
 S.P. 3821952
 C.O.S. 924086
 T.A.N. 4135946

**PROP. HWY. #403
 LINE B' EXTENSION**

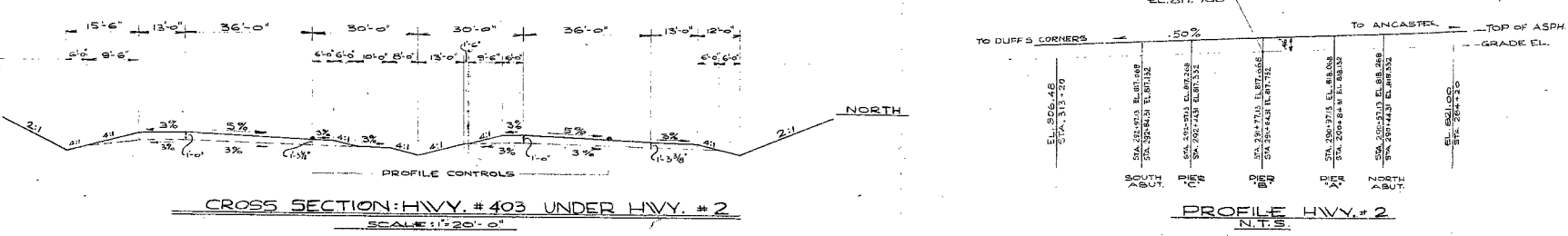
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 A = 28° 45'
 D = 14° 45'
 R = 24 00' LT.
 E = 236+79'
 B = 1237.50'
 S = 95.25'



SECTION A-A
 SCALE 1"=10'-0"

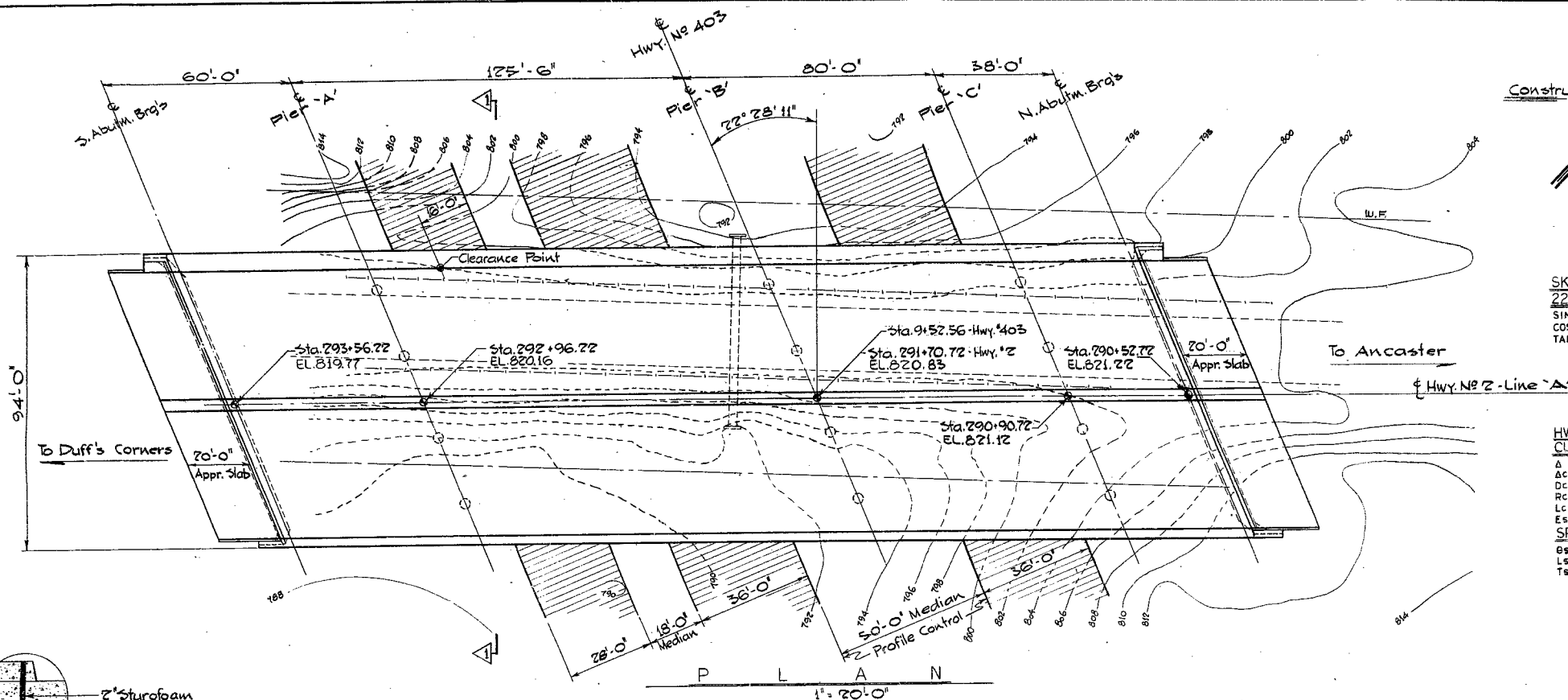
B.M. ELEV. 813.42
 GEODETIC DATUM
 TOP OF 2 I.B. STA. 1+06.82
 PROFILE NO. F-3637-B

PRINT RECORD		
No.	FOR	DATE



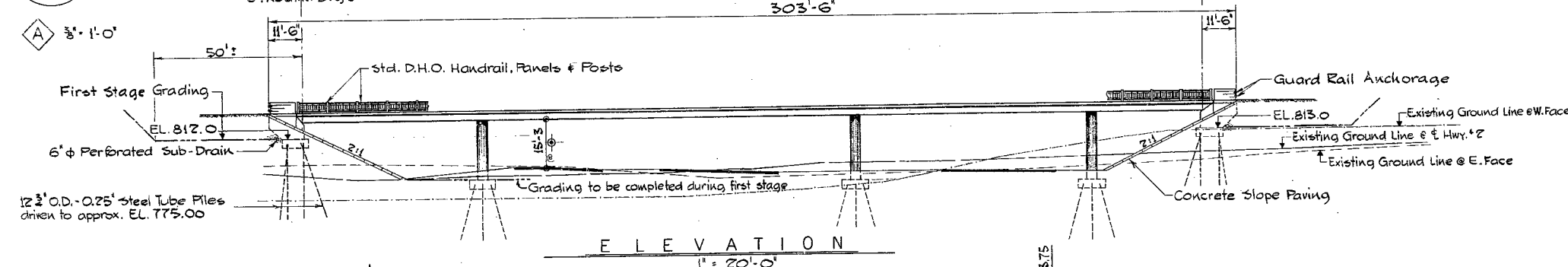
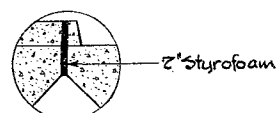
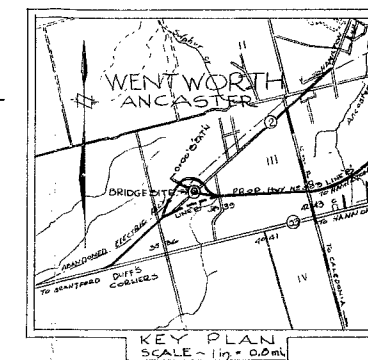
DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
HIGHWAY # 2 UNDERPASS 1 MILE EAST OF DUFF'S CORNERS			
KING'S HIGHWAY No. 2 E 403		DIST. No. 4	
CO. WENTWORTH		TWP. ANCASTER LOT 38 CON. III	
PRELIMINARY PLAN			
APPROVED _____ BRIDGE ENGINEER		SITE No. _____ W.P. No. 194-61	
DESIGN A.R.B. DRAWING S.M. DATE NOV 62	CHECK H.H. CHECK H.H. LOADING H-20 5-16	CONTRACT No. _____ DRAWING No. D-5149-P1	_____

REFERENCE PLANS
 SITE PLAN E-3877-1
 SURVEY PLAN IS-B-65
 PROFILE HWY #403 F-3637-B
 HWY #2 C-871-1
 INTERSECTION DESIGN DM-4388-4
 SOILS BA-1508



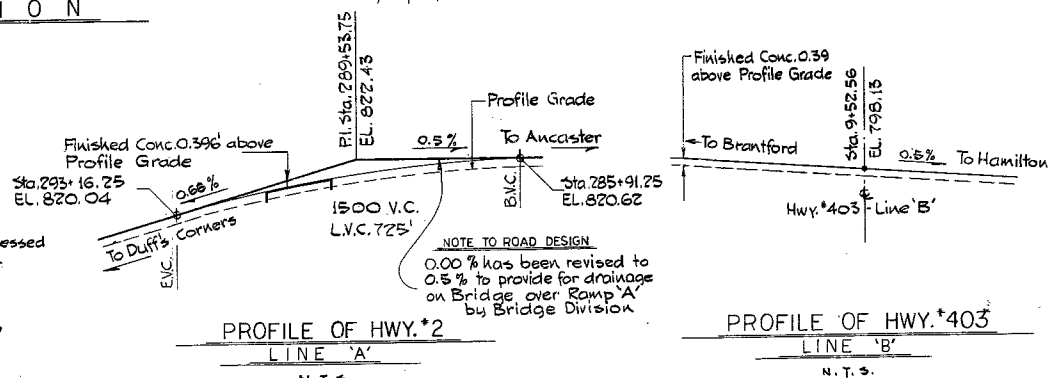
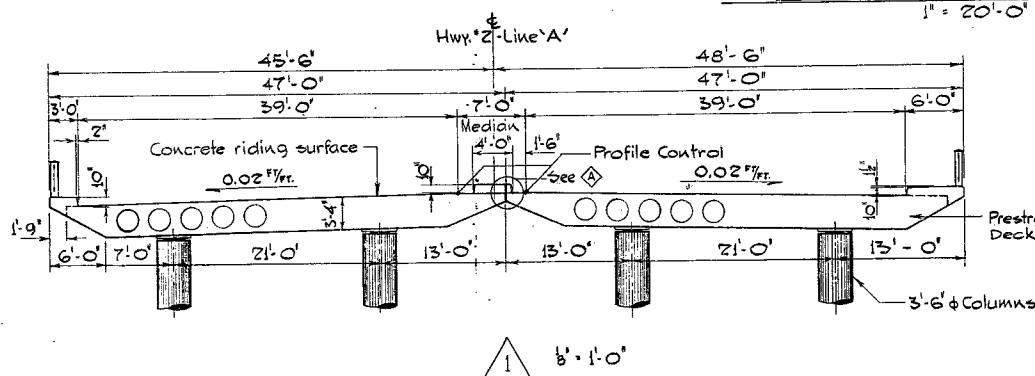
SKREW DATA
 22° 28' 11"
 SIN .3821952
 COS .9240816
 TAN .4135946

HWY. #403 CURVE DATA
 Δ - 28° 45'
 ΔC - 24° 45'
 DC - 2' 00" LT.
 RC - 2864.79
 LC - 1237.50
 ES - 93.25
SPIRAL DATA
 SS - 2' 00"
 LS - 200.00
 TS - 854.38



BM. ELEV. 813.42
 GEODETIC DATUM
 TOP OF R.I.B. STA. 1+06.82

REVISIONS	DATE	BY	DESCRIPTION



DEPARTMENT OF HIGHWAYS ONTARIO
 BRIDGE DIVISION

HIGHWAY #2 UNDERPASS
1 MI. EAST OF DUFF'S CORNERS

KING'S HIGHWAY No. 403 DIST. No. 4
 CO. WENTWORTH
 TWP. ANCASTER LOT CON.

PRELIMINARY

APPROVED _____ SITE No. 36-101 W.P. No. 194-61

DESIGN A.R. CHECK _____ CONTRACT No. _____
 DRAWING T.T.B. CHECK _____ DRAWING No. D-5771-P1
 DATE Sept. '65 LOADING H20-S16

Mr. A. M. Teye,
Bridge Engineer,
Bridge Division.

W.P. 194-61
Foundation Section,
Materials & Research Division.

Attention: Mr. S. McCombie

September 27, 1962

Foundation Report No. 62-F-100
Hwy. No. 2, Lin: A & Hwy. No. 403
Line 'B' Ext. W.P. 194-61
District No. 4, Hamilton.

The field work for the above mentioned foundation report was carried out recently upon receipt of a request from the Bridge Office dated July 20, 1962. It has now been discovered that an investigation for the same project, 60-F-53, was carried out under a different Work Project Number 203-58 in June 1960.

The factual data in the two reports agree closely, although in the later report more borings were carried out. In the first report a spread footing type foundation was recommended for the then proposed two-span structure. In the later report a four-span structure was investigated and for economic and other reasons, it was decided that an alternative solution utilizing piled foundations should be recommended. We suggest that you follow the recommendations contained in our later report 62-F-100.

If you have any further queries in connection with this matter please contact this office.

AGS:am

A. G. Stermac
A. G. Stermac
Principal Foundation Engineer

c.c. to Foundation File
General File

AG

23-67-76
WR 194-61.

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Division,
(Foundation Section)

September 6, 1962.

D.H.O. FOUNDATION INVESTIGATION
REPORT
W.J. 62-F-100 -- W.P. 194-61.

Attention: Mr. S. McCombie.

Re: Hwy. #2 Interchange 1 Mile East
of Duff's Corners, Hwy. #403,
District #4.

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

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

AGS/MdeF
Attach.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
G. K. Hunter
J. C. Thatcher
T. J. Kovich
J. Roy
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt
Foundations Office
Gen. Files.

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

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 2. DESCRIPTION OF SITE.
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 4. SUBSOIL CONDITIONS.
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 - (3) Sand and Organic Matter.
 - (4) Sandy-Silt.
 5. GROUNDWATER CONDITIONS.
 6. DISCUSSION AND RECOMMENDATIONS.
 7. SUMMARY.
 8. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION

For

Hwy. #2 Interchange 1 Mile East of
Duff's Corners - Hwy. 403.
W.P. 194-61 -- W.J. 62-F-100
District #4.

1. INTRODUCTION:

A memorandum dated July 20/62 requesting a foundation investigation at the site of the proposed interchange at Hwys. #2 & #403 was received from the Bridge Office on August 1962.

The requested investigation was carried out by this Section, and presented in this report are all the field and laboratory results, their interpretation and discussion, as well as the necessary recommendations for the foundations of the proposed new structure.

2. DESCRIPTION OF SITE:

The proposed interchange is located in a shallow valley in what is generally a flat terrain. The north side of the valley is under cultivation, whereas the south side consists of a poorly drained flat swamp with considerably scrub and fallen trees.

A small concrete culvert, presently drains the swamp under the roadway fill. No water was observed in the swamp at the time of this investigation.

cont'd. /2 ...

3. FIELD & LABORATORY PROCEDURE:

A total of 10 borings was carried out at the site, utilizing a conventional diamond drill rig. Disturbed samples were recovered using a 2-inch O.D. split-spoon sampler driven into the soil with an energy of 350 ft. lbs. per blow. Dynamic cone penetration tests were performed at each borehole; the penetration values thus obtained are plotted on the attached borehole logs.

At boreholes 4, 5, 8 and 10, dynamic cone penetration tests only, were performed.

The locations and elevations of all boreholes are shown on the attached drawing No. 62-F-100A and were established by a D.H.O. survey crew.

Each sample of the subsoil was visually classified in the field before transportation to the laboratory where a further classification was performed.

In addition, moisture content and grain size distribution analyses were carried out on certain representative samples. The results of these tests appear in the appendix of this report.

4. SUBSOIL CONDITIONS:

(1) General:

The subsoil conditions at the site were found to

cont'd. /3 ...

4. SUBSOIL CONDITIONS: (Cont'd.) ...

(1) General:

be generally uniform. The whole area is underlain by sandy-silt of considerably varying relative density.

Above the sandy-silt and from groundlevel downwards, the conditions were as follows:

(2) Sand Fill:

This material was found in boreholes 1, 7, 8, 9 and 10 to the following depths: 6', 6', 8', 9' and 6' respectively. It is generally a loose to very loose brown sandy fill, with traces of gravel and organic matter in places and forms part of the present Hwy. #2 embankment. No detailed sampling was attempted in this stratum and the relative density is based on the cone penetration values ranging from 1 to 14 blows per foot.

(3) Sand and Organic Matter:

In boreholes 2, 3 and 4, a very loose predominantly organic deposit was found to depths of 8', 9' and 12' respectively. These boreholes are located in the swamp previously described. In borehole #3 almost pure peat was found.

Both the dynamic cone and the standard penetration values ranged from 2 to 9 blows per foot.

cont'd. /4 ...

4. SUBSOIL CONDITIONS: (Cont'd.) ...

(4) Sandy-Silt:

Underlying the above deposits and from groundlevel in boreholes #5 & #6, a very loose to very dense, brown and grey, sandy-silt deposit was found in all boreholes.

In boreholes 4, 5, 8 and 10, where only a cone test was performed, the surface of this deposit was estimated by correlating the penetration values with the penetration results obtained in surrounding boreholes where both a cone test and sampling was performed.

Standard penetration values vary considerably in this deposit with a range of 13 to over 100 blows per foot and generally decrease with depth below elevation 770_±.

The average moisture content was found to be 20%, and grain size distribution tests yielded, the following results: sand 25%, silt 70%, clay 5%.

5. GROUNDWATER CONDITIONS:

Water table observations were carried out for several days in all boreholes, and a constant water table of 787.0 was established at all locations, with the exception of boreholes #2 & #7, where a water level of 788.0 was found.

In all instances, the water elevations noted became stabilized and did not vary during the period of observation.

cont'd. /5 ...

6. DISCUSSION AND RECOMMENDATIONS:

A four-span interchange is proposed at the site, to carry Hwy. #2 over Hwy. #403.

The subsoil at the site consists of varying depths of fill, sand and organic matter, underlain by sandy-silt of variable relative density.

Adequate bearing capacity for a spread footing foundation cannot be found at the site above elevation 780₊ which is some 15 to 20 feet below present groundlevel and seven feet below the groundwater level. Excavations to this depth would involve an expensive dewatering scheme and hence spread footings are not considered as an economical solution.

In view of the wide variation in relative density of the deposit of silt and sand encountered in all the borings at the site, it is recommended that footings be supported on large displacement friction piles. Either timber, Class "A" piles, or steel tube piles may be used.

For wooden piles, with 12" butt, and approximate pile tip elevation of 775.0, a design load of 25 tons per pile may be used. If 12 $\frac{3}{4}$ " steel tube piles are used, with an approximate tip elevation of 775.0 a design load of 40 tons/pile may be assumed.

In all cases, pile driving should be controlled in the field by use of the Hiley Formula as per D.H.O. Standards DD 1218 and DD 1219.

cont'd. /6 ...

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

No stability problems are anticipated with regard to the approach fills. The present highway #2 fill is stable, however, any widening of the future fill as well as the fill placed for the interchange ramps, will necessitate removal of the organic peat found in the swamp area.

7. SUMMARY:

Subsoil at the site consists of varying depths of fill, sand and organic matter, followed by loose to very dense sandy-silt.

Footings supported on large displacement piles, with an approximate pile tip elevation of 775.0 are recommended.

For wooden piles with 12" butt, a safe design load of 25 tons per pile may be used. For steel piles, 12 $\frac{3}{4}$ " diameter steel tubes can carry a load of 40 tons each.

No embankment stability problems are expected.

8. MISCELLANEOUS:

The foundation investigation together with preparation of this report were performed by G. Mierzynski under the supervision of Mr. K. G. Selby of the Foundation Section.

September 1962.

APPENDIX I.

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_i	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

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 62-F-100 LOCATION 20' Lt. of Sta. 291+60 ORIGINATED BY G.M.
W.P. 194-61 BORING DATE Aug. 15 & 16, 1962. COMPILED BY _____
DATUM G.B.M. BOREHOLE TYPE Washboring - BX Casing. CHECKED BY _____

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		SHEAR STRENGTH P.S.F.		WATER CONTENT %						
						20	40	60	80	100	10	20	30		
793.0	Groundlevel														
0.0	Silty-sand mixed with organic matter, roots etc.														
	Very loose-brown.		1	SS	9										
			2	SS	2										
785.0			3	SS	54										
8.0															
	Sandy-silt.		4	SS	50										
	Very dense to medium dense.														
	Brown change to grey at 16.0'.														
	Thin seam of grey clayey-silt at 35.0'.		5	SS	18										
			6	SS	35										
			7	SS	45										
			8	SS	14										
750.0			9	SS	23										
43.0	End of borehole.														

W.L. from observation in borehole
wl = 788.0
5.0

Sand = 9%
Silt = 89%
Clay = 2%

FOUNDATION SECTION

JOB 62-F-100 LOCATION 43' Lt. of Sta. 292465 ORIGINATED BY G.M.
W.P. 194-61 BORING DATE Aug. 16, 1962. COMPILED BY _____
DATUM G.B.M. BOREHOLE TYPE Washboring - BX Casing. CHECKED BY _____

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	ELEV SCALE	SHEAR STRENGTH P.S.F.			WATER CONTENT % 10 20 30				
							20	40	60	80				
789.0 0.0	Groundlevel					790								
	Peat with chunks of wood and traces of sand.		1	SS	2									
779.5 9.5	Sandy-silt. Medium dense -Brown and grey.		2	SS	12	780								
			3	SS	23									
			4	SS	32									
			5	SS	13	770								
757.5 31.5	Thin seam of grey clayey-silt at 31.0'. End of borehole.		6	SS	18	760								

FOUNDATION SECTION

ORIGINATED BY G.A.
COMPILED BY _____
CHECKED BY _____

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	ELEV. SCALE	SHEAR STRENGTH P.S.F.	WATER CONTENT %			
							20 40 60 80 100				
791.0 0.0	Groundlevel					790					
	Probably sand mixed with peat and other organics -Very dense.										
779.0 12.0	Probably sand-silt Dense to very dense.					780					
770.0 21.0	End of cone penetration.					770					

FOUNDATION SECTION

ORIGINATED BY G.M.

COMPILED BY

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT ——— WP	WATER CONTENT ——— W		
							20 40 60 80 100					
799.0	Groundlevel					800						
0.0	Probably sandy-silt Very loose.											
790.0	Probably sandy-silt					790						
9.0	Dense to very dense.											
787.0	End of cone penetration											
12.0												
						780						

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 62-F-100 LOCATION 15' Lt. of Sta. 290+50 ORIGINATED BY G.M.
W.P. 194-61 BORING DATE AUG. 17, 1962. COMPILED BY _____
DATUM G.B.M. BOREHOLE TYPE Washboring - BX Casing. CHECKED BY _____

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.					WATER CONTENT %				
							20	40	60	80	100		10	20	30	
803.0 0.0	Groundlevel															
	Sandy-silt					800										
	Very loose		1	SS	7											
	-brown.															
793.0 10.0			2	SS	>100	790										
	Sandy-silt															
	Very dense to medium		3	SS	71											
	dense															
	-Brown to grey.		4	SS	>100	780										
			5	SS	38	770										
			6	SS	16											
765.0 38.0			7	SS	33											
	End of borehole.					760										

W.L. from observation in borehole

W.L. 787.9

16.0

W.L. from
observation
in borehole
W.L.
787.0
16.0

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

JOB 62-F-100 LOCATION 40' Rt. of Sta. 290+75 ORIGINATED BY G.M.
W.P. 194-61 BORING DATE Aug. 20, 1962. COMPILED BY _____
DATUM G.B.M. BOREHOLE TYPE Washboring - BX Casing. CHECKED BY _____

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.					wp	w	WL		
							20	40	60	80	100					
800.0 0.0	Groundlevel Sand with traces of gravel and organics (Fill) Very loose-Brown.					800										
794.0 6.0	Sandy-silt with seams of clayey-silt and organic traces.		1	SS	20											
			2	SS	10	790										
			3	SS	6											
785.5 14.5	Loose-Brown.		4	SS	20											
			5	SS	97											
	Sandy-silt Very dense to medium dense Brown to grey.		6	SS	55	780										
			7	SS	15	770										
763.5 36.5	End of borehole.		8	SS	25											
						760										

W.L. from observation in borehole
w.l.
788.0
12.0
Sand = 30%
Silt = 67%
Clay = 3%

W.L. from observation in borehole
w.l.
788.0
12.0
Sand = 30%
Silt = 67%
Clay = 3%

FOUNDATION SECTION

JOB 62-F-100 LOCATION 40' Rt. of Sta. 291+15 ORIGINATED BY G.H.
W.P. 194-61 BORING DATE Aug. 20, 1962. COMPILED BY _____
DATUM G.B.M. BOREHOLE TYPE Dynamic Cone Penetration. CHECKED BY _____

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	ELEV. SCALE	SHEAR STRENGTH P.S.F.	WATER CONTENT %			
							20 40 60 80 100				
801.0 0.0	Groundlevel Probably sand with organics. (Fill) Very loose.					800					
793.0 8.0	Probably sandy-silt with organics and chunks of wood. Very loose.					790					
787.0 14.0	Probably sandy-silt.										
783.0 18.0	Very dense. End of cone penetration.					780					

FOUNDATION SECTION

ORIGINATED BY G.M.

COMPILED BY

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— w_L		BULK DENSITY γ P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	SHEAR STRENGTH P.S.F.		PLASTIC LIMIT ——— w_p				
									WATER CONTENT ——— w				
							20	40	60	80	100	WATER CONTENT % $w_p \quad w \quad w_L$	
800.5 0.0	Groundlevel					800							
	Probably sand with organics. (Fill)												
794.5 6.0	Very loose.												
	Probably sandy-silt with organics and chunks of wood to 10.0' - then peat.					790							
785.5 15.0 784.4	Probably sandy-silt Very dense.												
16.1	End of cone penetration.					780							

Mr. B. R. Davis,
Bridge Design Engr.,
Bridge Division.

Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.

Attention: Mr. C. Grebski

May 31, 1963

Hwy. #2 Underpass, 1 Mile East of
Duff's Corners, Hwy. #403, Dist. #4.
W.P. 194-61 -- W.J. 62-F-100

We have received your memo dated May 29, 1963, concerning the above-mentioned structure; also, the Preliminary Plan #D 5149-1. We have noted your comments regarding the pile lengths at the pier locations, and wish to advise you of the following:

The Foundation Report (62-F-100) recommends that pile driving be controlled in the field by means of the Hiley Formula and estimates that a design load of 40 tons/pile will be achieved at or about el. 775.0 if 12 $\frac{1}{2}$ " O.D. steel tubes are used. In view of the fact that the pier foundations for the structure will be located in a cut, the exact depth of which was not known at the time of preparation of the report, it is our further recommendation that piles be driven to at least 15' below the footing bases, even if the dynamic formula indicates that the required capacity has been attained at a higher elevation.

If you have any further queries in connection with this matter, please contact this Office.

KGS/MdeF

cc: Foundations Office ✓
Gen. Files

K. G. Selby
K. G. Selby,
SENIOR FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundations Eng.,
Room 107 Lab. Bldg.,
Downsview, Ontario.

FROM: C. Grebski

DATE: May 29, 1963.

OUR FILE REF.

IN REPLY TO

SUBJECT: Highway #2 Underpass
1 Mi. E. of Duffs Corners
Hwy. #403 Dist. #4

We are sending attached one print D 5149-1 for your review.

The designer is using 12" diameter tube piles carrying 40 tons and driven to tip elevation of 775 as per soil report recommendation. Since Hwy. 403 is in a cut here this leaves piles at the piers with a length of only nine feet. If the piles are a combination of friction and end bearing they may not be able to develop this load in such a short length.

Kindly review this project and let us have your recommendations.

CG:go
c.c. B. Davis



C. Grebski,
Sr. Bridge Project Engineer.

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: November 22, 1965.

Our File Ref.


IN REPLY TO

SUBJECT: ✓ Hwy. #2 Underpass W.P. 194-61, - 65 F-100
Hwy. #2 Bridge over Ramp "A" W.P. 499-64, - 65 F-29
Mohawk Road Underpass W.P. 100-57, - 65 F-30
Hwy. 403 - Dist. 4.

Enclosed please find prints of the Preliminary Bridge Plans for the above proposed structures.

Would you please review our plans and inform us of your comments and/or approval.

WM/sp


W. S. Melinyshyn,
Regional Bridge Location Engineer.

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

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

Attn: Mr. W. S. Melnyshyn

December 13, 1965

W.P. 194-61 - Hwy. #2 Underpass.
W.P. 499-64 - Bridge over Ramp 'A'.
W.P. 100-57 - Mohawk Rd. Underpass.
- Hwy. 403, District #4, Hamilton -

We have reviewed the preliminary bridge plans for the above-mentioned projects and submit the following comments:

Hwy. #2 Underpass - W.P. 194-61 -

The piles for the pier footings should be driven at least 15 ft. below the footing bases, even if the dynamic formula indicates that the required capacity has been attained at a higher elevation. This information should be given on the Contract drawings.

Hwy. #2 Structure over Ramp 'A' - W.P. 499-64 -

The estimated pile tip elevation for the abutments was not shown on the drawings. It should also be noted that the pile driving during construction, should be controlled by the use of the Hiley formula as per current D.H.O. standards DD 1218 and DD 1219.

Mohawk Rd. Underpass - W.P. 100-57 -

We have no comments pertaining to structure foundations.

MD/MdeP

cc: Foundations Office ✓

Gen. Files

M. Devata

M. Devata,
SENIOR FOUNDATION ENGR.

For:

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Mr. B. R. Davis,
Bridge Design Engr.,
Bridge Division.

Attention: Mr. C. Grebski

Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.

May 31, 1963

Hwy. #2 Underpass, 1 Mile East of
Duff's Corners, Hwy. #403, Dist. #4.
W.P. 194-61 -- W.J. 62-F-100

We have received your memo dated May 29, 1963, concerning the above-mentioned structure; also, the Preliminary Plan #D 5149-1. We have noted your comments regarding the pile lengths at the pier locations, and wish to advise you of the following:

The Foundation Report (62-F-100) recommends that pile driving be controlled in the field by means of the Hilley Formula and estimates that a design load of 40 tons/pile will be achieved at or about el. 775.0 if 12 $\frac{1}{2}$ " O.D. steel tubes are used. In view of the fact that the pier foundations for the structure will be located in a cut, the exact depth of which was not known at the time of preparation of the report, it is our further recommendation that piles be driven to at least 15' below the footing bases, even if the dynamic formula indicates that the required capacity has been attained at a higher elevation.

If you have any further queries in connection with this matter, please contact this Office.

KGS/MdeF

cc: Foundations Office
Gen. Files ✓

K. G. Selby
K. G. Selby,
SENIOR FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.