

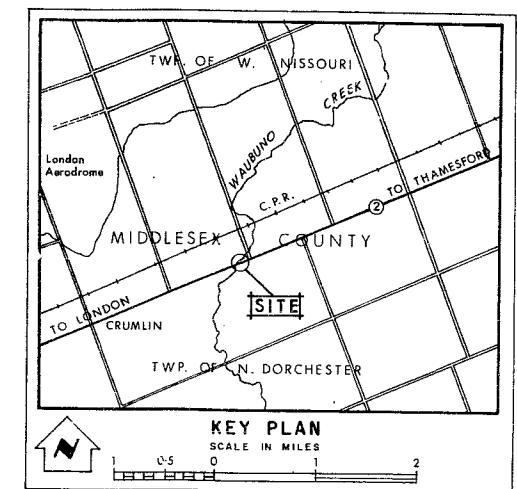
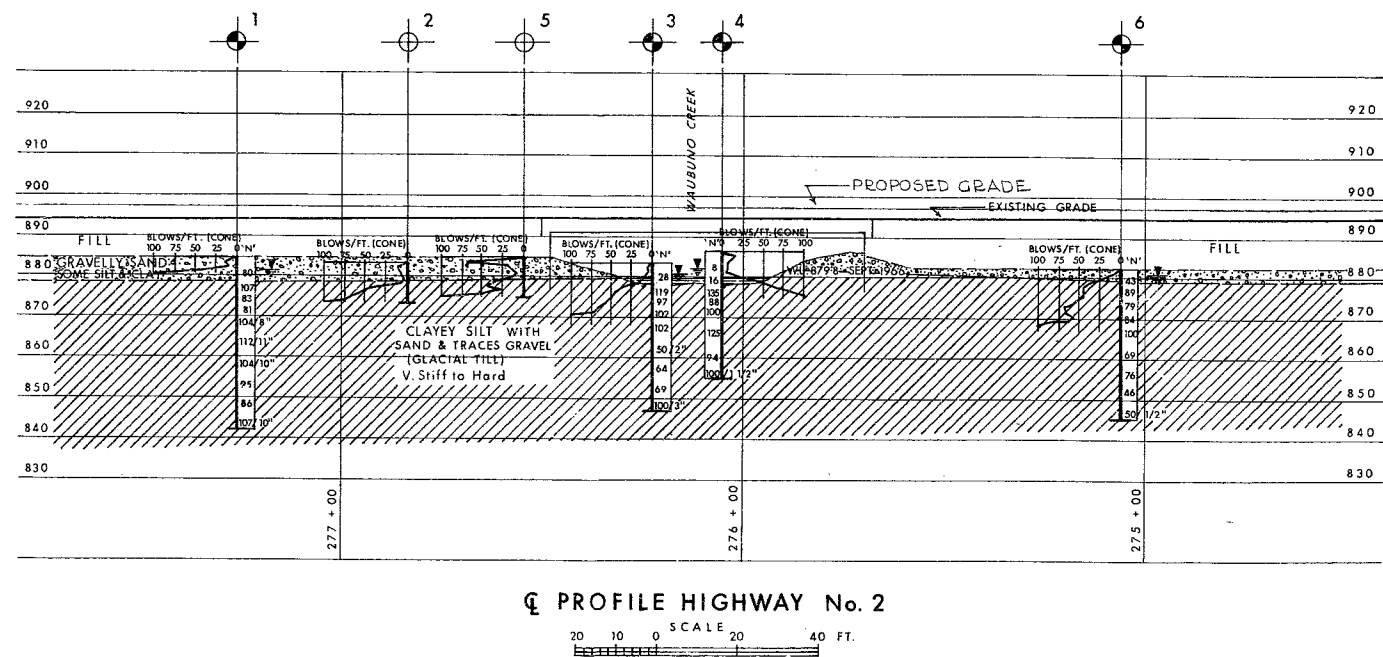
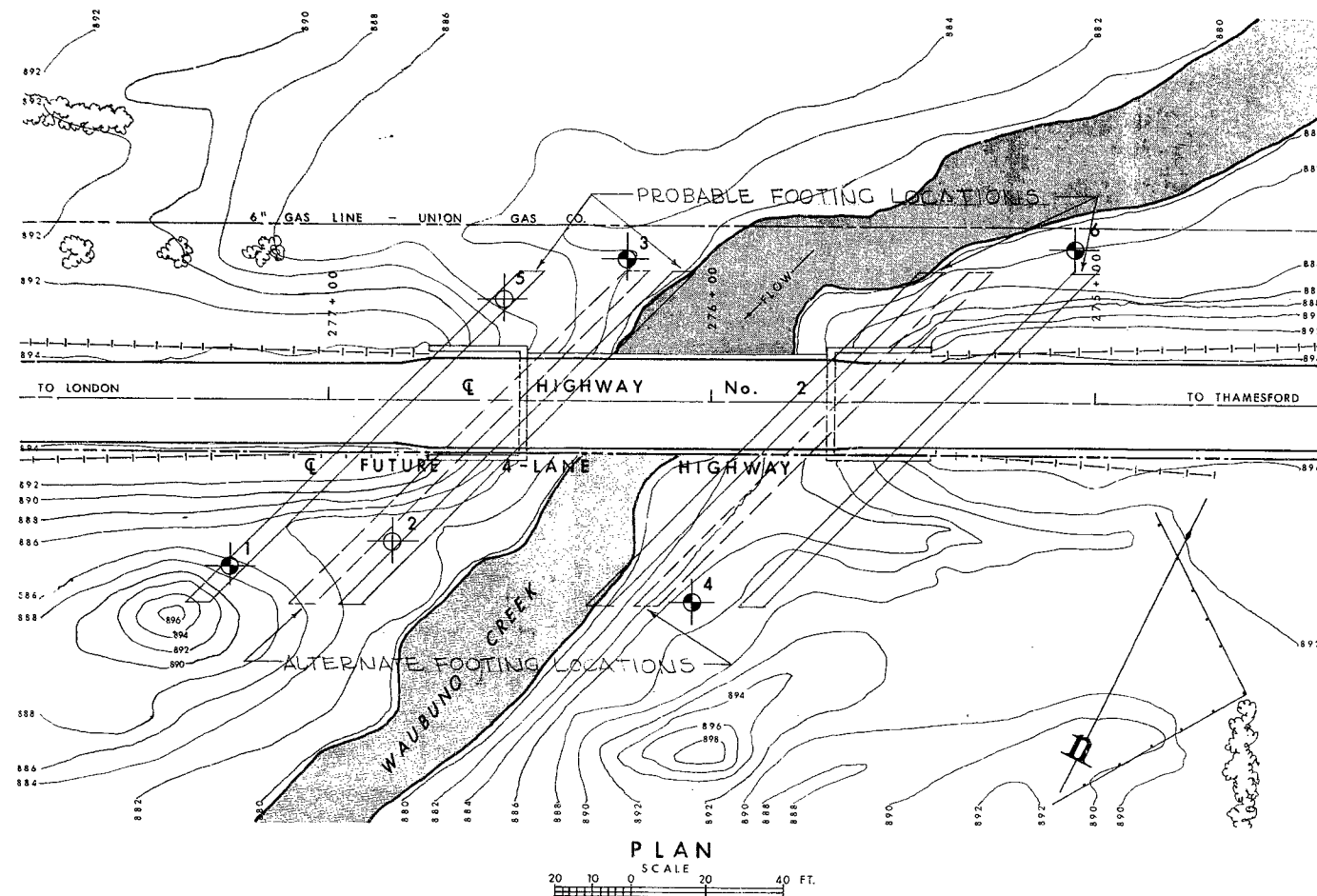
67 - F - 67

W. P. # 127 - 65

HWY. # 2

WAUBUNO

CREEK BRIDGE



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	884.6	277+25	43' LT.
2	883.7	276+83	37' LT.
3	883.3	276+22	36' RT.
4	887.0	276+05	53' LT.
5	885.6	276+54	26' RT.
6	881.9	275+05	39' 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.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION - FOUNDATION SECTION

WAUBUNO CREEK

KING'S HIGHWAY NO. 2 DIST. NO. 2

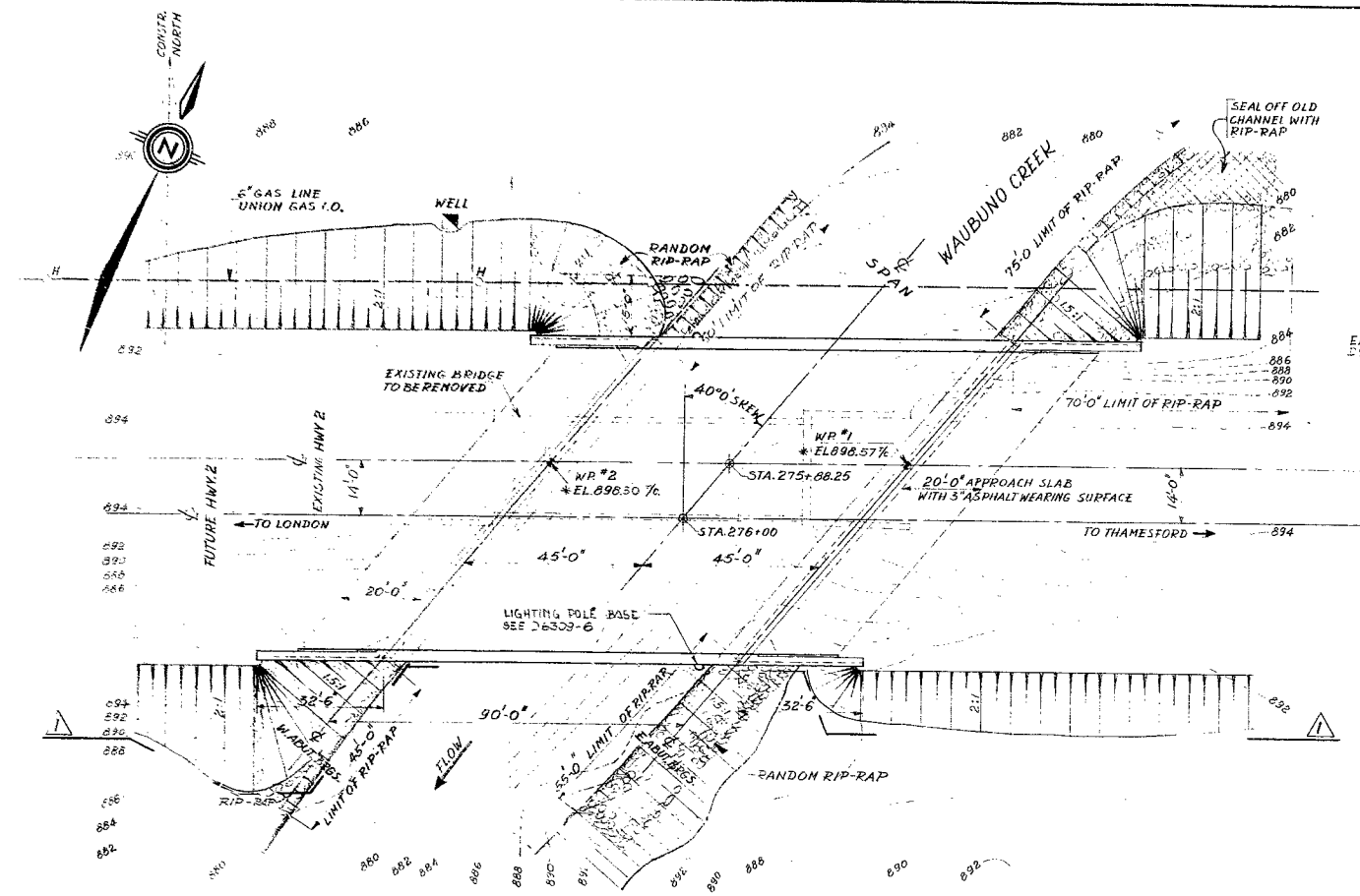
CO. MIDDLESEX

TWP. W. MISSOURI & N. DORCHESTER LOT 1&5 CON. 2 & 1

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D. D.K.	CHECKED <i>[Signature]</i>	W.P. NO. 127-65	M.B.T. DRAWING NO.
DRAWN P.G.O.	CHECKED <i>[Signature]</i>	JOB NO. 67-F-67	67-F-67A
DATE AUGUST 18, 1967	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>[Signature]</i>	PRINCIPAL, FOUNDATION SECTION	CONT. NO.	

REF. No. : E-4802-1

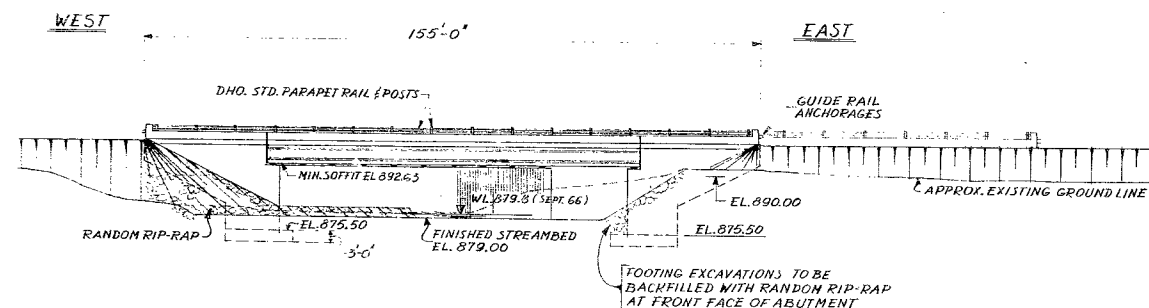


NOTE

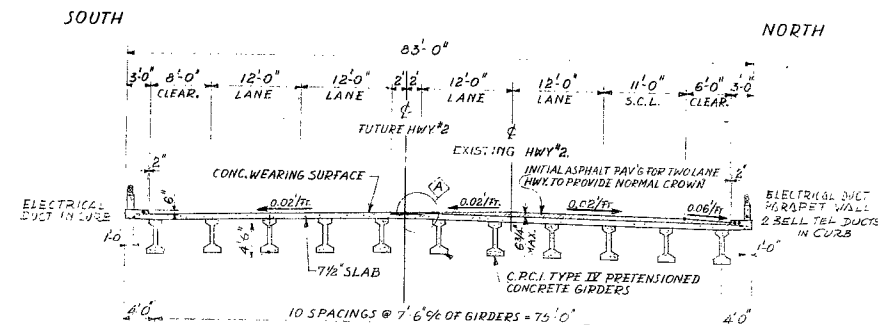
- % DENOTES ELEVATIONS ARE TO TOP OF CONCRETE DECK SLAB (NOT TOP OF ASPHALT)
- WP DENOTES WORKING POINT

40°00' SKEW
 SIN. 0.6427876
 COS. 0.7660444
 TAN. 0.8390996
 SEC. 1.3054073

PLAN
 SCALE: 1" = 20'-0"

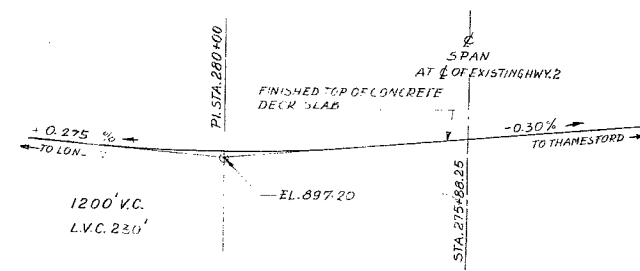


ELEVATION
 SCALE: 1" = 20'-0"

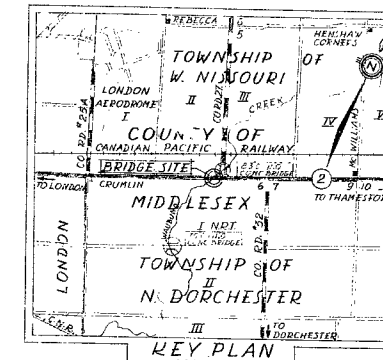
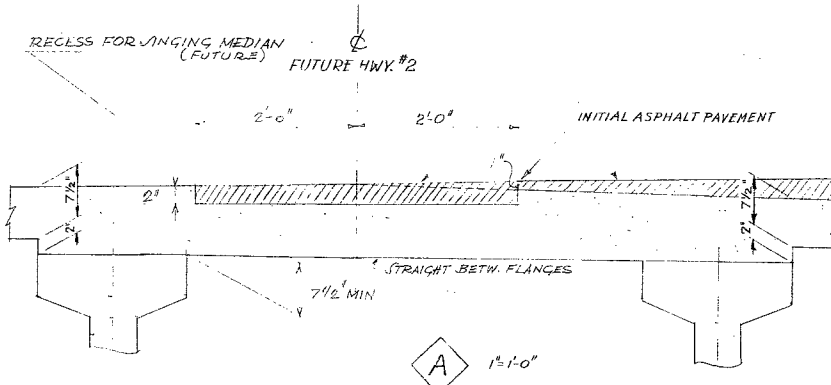


TYPICAL DECK SECTION
 SCALE: 1/32" = 1'-0"

NOTES: CROSSFALL TOP OF CONCRETE 0.02%/FT. FOR FULL WIDTH OF DECK EACH SIDE OF FUTURE HWY #2. PROVIDE PROTECTIVE MEMBRANE UNDER ASPHALT AREA



PROFILE OF HWY 2 (ALONG & EXISTING HWY 2)
 NOT TO SCALE



NOTES

- CLASS OF CONCRETE
 DECK CURBS & PARAPET WALLS 4000 PSI
 REMAINDER 3000 PSI
 PRESTRESSED GIRDERS 5000 PSI
- CLEAR COVER ON REINFORCING STEEL
 FOOTINGS ABUTMENTS DECK TOP DECK BOTTOM DIAPHRAGMS 2" 12" 2"
 CURBS PARAPET WALLS APPROX SLABS 1" 1" 2"
 GIRDERS 2" 2" SEE D6309-5
- CONSTRUCTION NOTES
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR FINISHING THE BEARING SEATS DEEP LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE TO ± 1/8". NO CONCRETE SHALL BE PLACED ABOVE THE BEARING SEATS AND NO BACKFILL BEHIND THE ABUTMENTS UNTIL THE DECK SLAB HAS BEEN POURED.

LIST OF DRAWINGS

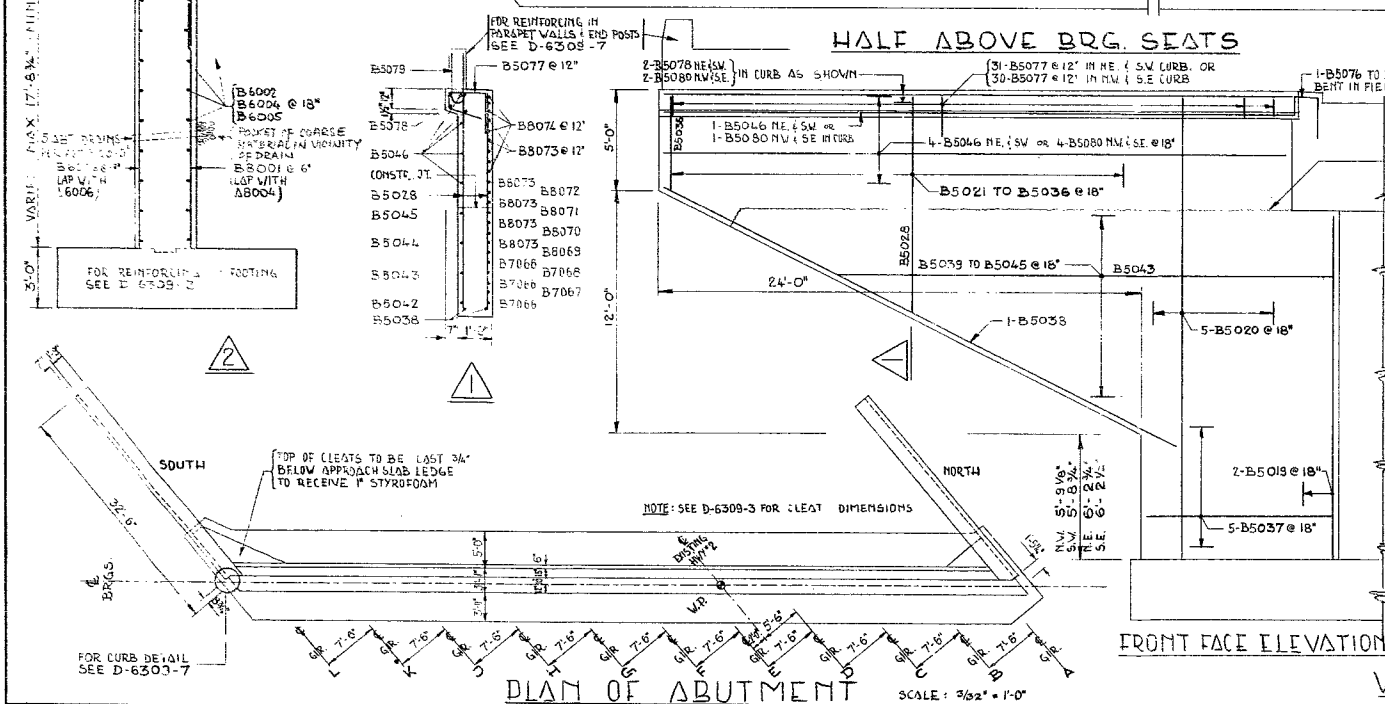
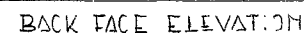
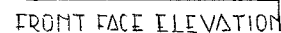
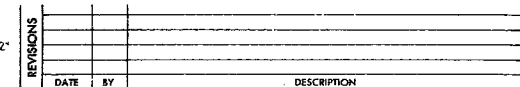
- | | |
|-----------|------------------------------------|
| D-6309-1 | GENERAL LAYOUT |
| D-6309-2 | BORE HOLE LOCATION AND SOIL STRATA |
| D-6309-3 | FOOTINGS |
| D-6309-4 | ABUTMENTS |
| D-6309-5 | PRESTRESSED GIRDERS AND BEARINGS |
| D-6309-6 | DECK DETAILS |
| D-6309-7 | PARAPET WALL DETAILS |
| D-6309-8 | APPROACH SLABS |
| D-6309-9 | STANDARD STEEL PARAPET RAIL |
| D-6309-10 | STANDARD DETAILS |
| D-6309-11 | BRIDGE ELECTRICAL DETAILS, TYPE B |
| D-6309-12 | BRIDGE ELECTRICAL DETAILS, TYPE D |

G.B.M. 233 EL. 844.752
 CNR. CONCRETE ARCH CULVERT UNDER CNR. 1 MILE WEST OF STATION AND AT MILEAGE 69.5 FROM BAYVIEW. WESTFACE OF NORTH HEADWALL 6 INCHES SOUTH OF NORTH FACE AND 2 FEET 6 INCHES BELOW TOP BOLT SET HORIZONTALLY. 'DORCHESTER'

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION	
WAUBUNO CREEK BRIDGE 7.2 MILES WEST OF HIGHWAY 19	
KING'S HIGHWAY No. 2	DIST. No. 2
CO. MIDDLESEX	
TWP. W. NISSOURI / N. DORCHESTER	LOT 1/5 CON. 2/1 N.R.T.
GENERAL LAYOUT	
APPROVED J. S. J. L. K. BRIDGE ENGINEER	SITE No. 19-302 W.P. No. 127-65-00
DESIGN J. S. J. L. K. CHECK B. D.	CONTRACT No.
DRAWING J. S. J. L. K. CHECK J. L. K.	DRAWING No. D-6309-1
DATE SEPT. 68	LOADING H520-44

BEARING SEAT
ELEVATIONS

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

WAUBUNO CREEK BRIDGE

7.2 MILES WEST OF HWY. # 19

KING'S HIGHWAY No. 2

DIST. No. 2

CO. MIDDLESEX

TWP. V. MISSOURI/M. DORCHESTER

ADU

ABUTMENTS

APPROVED

SITE No. 10-700

W.P. No. 107-65-00

100	100
-----	-----

BRIDGE ENGINEER	
DATE	

CONTRACT	
No.	

--	--	--

DESIGN	5
DRAWING	7

CHECK	
CHECK	2

No.	
1	1

0700

SCALE: $\frac{1}{4}" = 1'-0"$
OR AS NOTED

SEP

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: August 21, 1967

OUR FILE REF.

IN REPLY TO

AUG 25 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

Proposed Waubuno Creek Bridge
Highway #2

0.7 Miles West of Dorchester Rd.
District #2 (London)

W.J. 67-F-67 -- W.P. 127-65

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

We believe that 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.

AGS/Mdef
Attach.

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

H. A. Tregaskes

D. W. Farren

~~A. Cater~~ WIZONENBERG

H. C. Dernier

A. P. Watt

J. Roy

B. A. Singh

Foundations Office
Gen. Files ✓

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

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 2. DESCRIPTION OF THE SITE AND GEOLOGY.
 3. DESCRIPTION OF FIELD AND LABORATORY WORK.
 4. SUBSOIL CONDITIONS:
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 - 4.2) Gravelly Sand with Silt.
 - 4.3) Clayey Silt with some Sand and traces of Gravel (Glacial Till).
 5. GROUNDWATER.
 6. DISCUSSION AND RECOMMENDATIONS:
 - 6.1) Pier Foundations.
 - 6.2) Abutment Foundations.
 7. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
Proposed Waubuno Creek Bridge
Highway #2
0.7 Miles West of Dorchester Rd.
District #2 (London)
W.J. 67-F-67 -- W.P. 127-65

1. INTRODUCTION:

In a memo dated July 7, 1967, a request to carry out a foundation investigation at the crossing of Waubuno Creek by Hwy. #2 was received by this Section from the Regional Bridge Location Engineer (Mr. A. P. Watt).

Subsequently, an investigation was carried out at the proposed site to determine the subsoil conditions. Presented in this report are the results of field and laboratory work, together with discussion and recommendations pertaining to the design of the bridge foundations and stability of approach embankments.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is in the northern section of the physiographic region known as the Mount Elgin Ridges, and situated in the Township of North Dorchester, County of Middlesex. The terrain in the vicinity of the site is gently undulating, and the surrounding farms are predominantly developed for tobacco and corn growth.

The existing structure which is a single-span (78' clear span) bridge 25 ft. wide, carries Hwy. #2 across Waubuno Creek which flows in a southerly direction into the Thames River.

The bridge abutments were observed to be extensively weathered and cracked.

cont'd. /2 ...

3. DESCRIPTION OF FIELD AND LABORATORY WORK:

A total of four (4) sampled boreholes and six (6) dynamic cone penetration tests was carried out during the investigation. From ground level downwards, disturbed samples were recovered by means of a standard split-spoon sampler driven according to the specifications of the Standard Penetration Test.

The field work was carried out by means of a conventional diamond drill adapted for soil sampling purposes.

The samples were visually examined in the field and subsequently identified in the laboratory. Laboratory tests were carried out on selected representative samples to determine, where applicable, Atterberg limits, grain-size distribution, and natural moisture content.

Results of the laboratory and field tests, together with locations and elevations of the boreholes, are presented in the appendix of this report.

4. SUBSOIL CONDITIONS:

4.1) General:

The subsoil at the site consisted of a surficial layer 3 ft. to 6 ft. deep, of gravelly sand with silt overlying an extensive deposit of clayey silt with some sand and traces of gravel (glacial till). The various deposits, as determined in the boreholes, are shown on the accompanying borelog sheets.

The estimated stratigraphical profile shown on Drawing 67-F-67A, is based on this information. From ground level downwards, the various soil types encountered are described as follows:

4.2) Gravelly Sand with Silt:

This deposit was intersected in all boreholes and extended from ground level for 2 ft. in B.H. #6, and for a depth of 6 ft. in B.H. #1.

cont'd. /3 ...

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

4.3) Clayey Silt with some Sand and traces of Gravel - (Glacial Till):

This deposit was intersected in all boreholes and was sampled to a depth of 41.5 ft. in B.H. #1, and to 31.5 ft. in B.H. #4. The deposit consisted of a cohesive mixture of clayey silt, sand and gravel in the following average proportions: clay 26%; silt 42%; sand 22%; gravel 8%.

The 'N' values (No. of blows/ft. obtained in the Standard Penetration Test) ranged from 16 blows/ft. to greater than 100 blows/ft., indicating a very stiff to very hard consistency.

Physical properties are summarized as follows:

Liquid Limit	:	21% - 24%
Plastic Limit	:	12% - 15%
Moisture Content	:	10% - 16%

5. GROUNDWATER:

Groundwater level was observed to range between 1 ft. in B.H. #6 and 5 ft. in B.H. #4.

The observed groundwater levels are shown on the Record of Borehole sheets and on Dwg. 67-F-67A, which are included in the report appendix.

6. DISCUSSION AND RECOMMENDATIONS:

It is proposed to demolish the existing structure and construct a new bridge for the crossing of Hwy. #2 over Waubuno Creek.

Present proposals call for a three-span structure (40'-65'-40') with a width of 100 ft., and with the new grade approximately 3 ft. above the existing Hwy. #2 grade at the abutments.

cont'd. /4 ...

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

In view of the properties and conditions of the subsoil, foundations for the pier and abutment footings shall be discussed separately.

6.1) Pier Foundations:

Piers may be supported on spread footing foundations within the glacial till stratum, with a safe bearing load up to 4.0 t.s.f. Footings should be placed at or below Elev. 876.0 ft., ensuring a cover of four feet above the footing bases for frost protection.

In view of the low permeable nature of the subsoil, no major dewatering problems are anticipated for the footing excavations. In order to prevent any softening of the foundation material by surface run-off, a 12-inch thick granular pad or a concrete working slab should be placed immediately after the completion of the footing excavations.

6.2) Abutment Foundations:

The abutments may be supported on spread footings placed within the approach fills. The fill material below the tops of the footings should consist of well compacted granular material (G.B.C. Class 'A'), and should extend for a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops.

This portion of the fill should be built with side slopes 2:1. The remainder of the fill should be completed to about profile grade for a distance of about 50 ft. behind the abutments before re-excavating for the abutment footings. A design load of 2.5. t.s.f. may be used for the abutment foundations.

cont'd. /5 ...

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

6.2) Abutment Foundations: (cont'd.) ...

Alternatively, the abutments for the structure may be supported on piled foundations, driven to Elev. 865.0 in the till stratum. A safe design load of 30 tons/pile may be used for 12-3/4" O.D. steel tubular piles. During the construction of the approach fills, care should be taken to ensure that no bouldery fill is placed at the locations through which piles have to be driven.

The approach embankments will be stable provided they are constructed with standard 2:1 side slopes.

7. MISCELLANEOUS:

The field work for this project was carried out during the period August 1st to the 8th, 1967, under the supervision of Mr. D. Katauskas, Project Foundation Engineer.

The equipment used was owned and operated by Dominion Soil Investigation Ltd.

This report was written by Mr. D. Katauskas, and was reviewed by Mr. M. Devata, Supervising Foundation Engineer.

August 1967

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB _____ 67-F-67

LOCATION 276 + 83 o/b 37' Left

ORIGINATED BY DK

W.P. 127-65

BORING DATE August 2, 1967

COMPILED BY DK

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE	LIQUID LIMIT ——— w_L	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	PLASTIC LIMIT ——— w_p		
883.7	Ground Level						20 40 60 80 100	w_p ——— w ——— w_L	P.C.F.	
0.0						880				
	End of Cone Test					870				

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 67-F-67 LOCATION 276 + 22 o/s 36' Rt. ORIGINATED BY DK
W.P. 127-65 BORING DATE August 3, 1967 COMPILED BY DK
DATUM Geodetic BOREHOLE TYPE Washboring CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		BULK DENSITY γ P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — w_p	WATER CONTENT — w				
							20		40	60			80	100
													w_p	w
							WATER CONTENT %							
							20	40	60					
883.3	Ground Level													
0.0	Gravelly sand with some silt & clay.					880						880.3 3.0		
879.8	Very stiff.		1	SS	28									
3.5	Grey		2	SS	119									
	Clayey silt with some sand and traces of gravel.		3	SS	97									
			4	SS	102	870								
			5	SS	102									
	Very hard.		6	SS	50 2"									
	(Glacial Till)		7	SS	64	860								
			8	SS	69	850								
846.8			9	SS	100 3"									
36.5	End of Borehole					840								

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 67-F-67 LOCATION 276 + 05 o/s 53' Lt. ORIGINATED BY DK
W.P. 127-65 BORING DATE August 1, 1967 COMPILED BY DK
DATUM Geodetic BOREHOLE TYPE Washboring CHECKED BY LR

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 SHEAR STRENGTH P.S.F.	LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W WP — W — WL WATER CONTENT % 20 40 60	BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE					
887.0	Ground Level								
0.0	Gravelly sand with some silt and clay. Stiff		1	SS	8				
882.0			2	SS	16				
5.0	Grey Clayey silt with some sand & trace of gravel. Very stiff to very hard. (Glacial Till)		3	SS	135				
			4	SS	88				
			5	SS	100				
			6	SS	125				
			7	SS	94				
855.5			8	SS	100/125				
31.5	End of Borehole								

882.0
5.0

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-67

LOCATION 276 + 54 o/s 26' Rt.

ORIGINATED BY DK

W.P. 127-65

BORING DATE August 3, 1967

COMPILED BY DK

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration Test

CHECKED BY AK

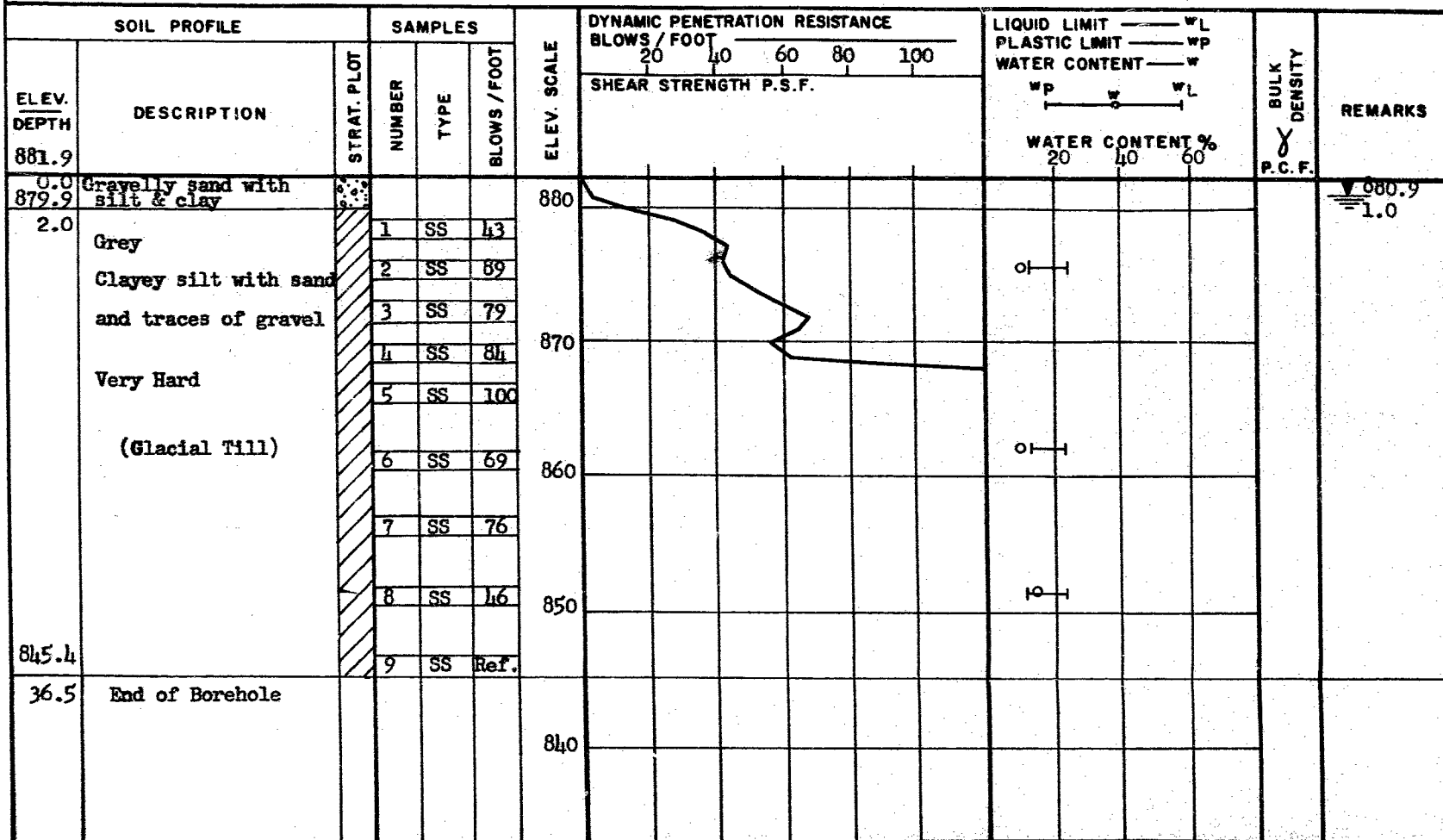
SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit ——— W _L	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20 40 60 80 100	PLASTIC LIMIT ——— W _P		
							SHEAR STRENGTH P.S.F.	WATER CONTENT ——— W		
								W _P W _L		
								WATER CONTENT %		
885.6	Ground Level									
0.0										
						880				
875.6										
10.0	End of Cone Test					870				

DEPARTMENT OF HIGHWAYS - ONTARIO

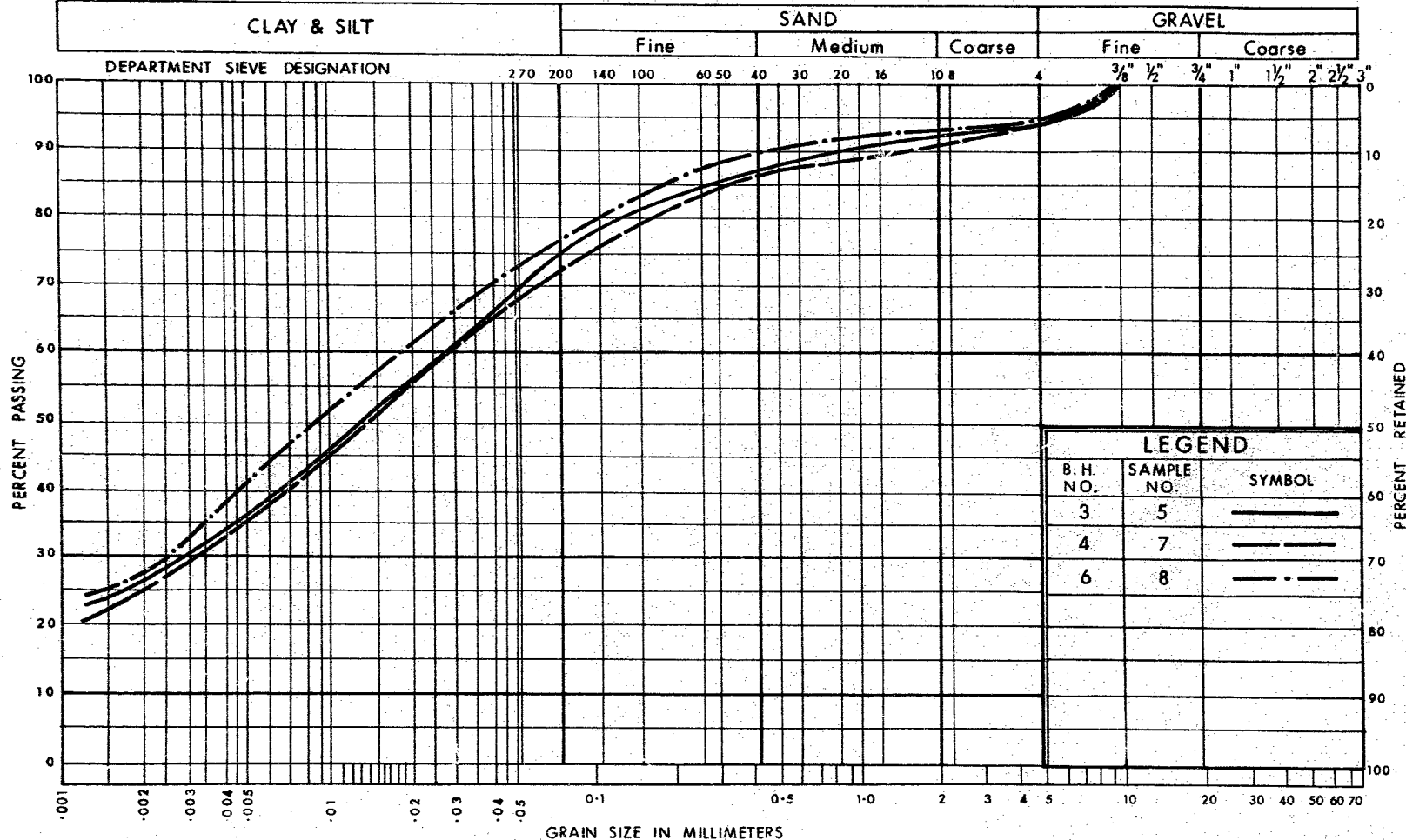
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO.6

FOUNDATION SECTION

JOB 67-F-67LOCATION 275 + 05 o/s 39' Rt.ORIGINATED BY DKW.P. 127-65BORING DATE August 4 & 8, 1967COMPILED BY DKDATUM GeodeticBOREHOLE TYPE WashboringCHECKED BY SK

UNIFIED SOIL CLASSIFICATION SYSTEM



ONTARIO

DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION

W.P. No. 127-65

JOB No. 67-F-67

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 IN 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	C.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

23-70-131

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

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

Le. Maubuno Creek Bridge

February 22, 1968

-- Maubuno Creek Bridge --
7.2 Miles West of Highway 19
Hwy. 2, District #2 (London)
W.P. 127-65 -- Site 19-302

We have reviewed the Preliminary Bridge Plan D-6309-F1 for the above mentioned structure, and submit the following comments:

Excavations for the proposed abutment footings will be carried out through the surficial granular deposit into the cohesive stratum below creek water level. Considerable amounts of seepage into the excavations can be anticipated through the pervious granular deposit. In order to prevent softening of the foundation material by the seepage water, a granular pad or a concrete working slab should be placed immediately after the completion of the footing excavations.

MD/MdeP

cc: Messrs. S. McCombie
A. P. Watt

Foundations Files
Gen. Files

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

23

401 & Keele Street
Downsview, Ontario

July 21, 1967

Dominion Soil Investigation Ltd.
77 Crockford Blvd.
Scarborough, Ontario

Dear Sirs:

This is to confirm our request of July 20, 1967 for the supply of a Diamond Drill together with all necessary equipment, as specified under the terms of our Contract Agreement, at Melbourne, Ontario (Jct. of Hwy. 2 & County Rd. #9) on July 26, 1967.

These projects bear Job Numbers 67-F-66, and 67-F-67.

Yours truly,

M. Devata

MD:mt

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

cc: H. Konings
Foundation Files ✓ 119
General File

MEMORANDUM

To: Mr. A. G. Sternac
Principal Foundation Engineer
Lab Building
D O W N S V I E W

From: A. P. Watt

Date: July 7, 1967

Our File Ref.

In Reply To

SUBJECT:

W.P. 127-65, Bridge Site 19-302,
Waubuno Creek Bridge,
7.2 miles west of Hwy. 19,
Highway 2,
District 2, London.

67-F-67

Would you please arrange to have a foundation investigation conducted at the above location.

I have enclosed two copies of the site plan number E-4802-1, with the probable footing locations for the three span structure marked in red, and those for the single span structure in blue.

Attached please find a copy of the preliminary structure site report for your use.

Accommodations may be obtained in London.

A. P. Watt

A. P. WATT
REGIONAL BRIDGE LOCATION ENGINEER

APW:gf
ATT'D

c.c. Mr. S. McCombie
Mr. A. Crowley
Mr. R. Forrest

1267 JUL 20 PM 3:50

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LOND DOWN 11 JULY 20/67 3.38 P

H C DERNIER DIST ENGR

ATT R A SHANNON MICE ENGR

CC TO JOHN ROY REG MATLS ENGR

RE NO. 1 WP-126-65 BRIDGE SITE 19-401 WJ-67-F-66 GENTLEMAN

CREEK BRIDGE 12.1 MILES WEST OF HWY 31 HWY 2 DIST 2 LONDON

NO. 2 WP-127-65 BRIDGE SITE 19-302 (WJ-67-F-67) WAUBUNO

CREEK BRIDGE 7.2 MILES WEST OF HWY 19 HWY 2 DIST 2 LONDON

THE FIELD WORK FOR THE ABOVE MENTIONED PROJECTS WILL COMMENCE
ON JULY 26/67 THIS IS FOR YOUR INFORMATION.

M DEVATA SUPRVSG FOUNDATION ENGR FOR A G STERMACK PRINCIPAL
FOUNDATION ENGR MATLS AND TESTG DIV

RB

Department of Highways Ontario

Copy for the information of
Mr. A. Stermac

~~Mr. A. Watt,~~
Reg. Bridge Location Engineer,
London Regional Office

Bridge Division,
Downsview, Ontario

February 15, 1968

Waubesa Creek Bridge
7.2 Miles West of Highway 19
H.P. 127-65, Site 19-302
Highway 2, District No. 2

07-F-67

Attached herewith are prints of the Preliminary Bridge Plan
Drawing B-6309-F1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$157,000.
This cost includes tender, materials, engineering and sundry
construction. The estimated cost of the removal of the existing
structure is \$8,000.

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

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

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

als

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

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

February 22, 1968

-- Maubuno Creek Bridge --
7.2 Miles West of Highway 19
Hwy. 2, District #2 (London)
W.P. 127-65 -- Site 19-302

67-F-67

We have reviewed the Preliminary Bridge Plan
D-6309-P1 for the above mentioned structure, and submit
the following comments:

Excavations for the proposed abutment footings
will be carried out through the surficial granular deposit
into the cohesive stratum below creek water level.
Considerable amounts of seepage into the excavations can
be anticipated through the pervious granular deposit.
In order to prevent softening of the foundation material
by the seepage water, a granular pad or a concrete working
slab should be placed immediately after the completion of
the footing excavations.

MD/MdeF

cc: Messrs. S. McCombie
A. P. Watt
Foundations Files ✓
Gen. Files

M. Devata

M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. A. Watt,
Dep. Bridge Location Engineer,
London Regional Office,
London, Ontario.

Bridge Division,
Downsview, Ontario.

March 26, 1968.

Mauburn Creek Bridge
7.2 miles west of Hwy. 12
M.P. 127-65-03, Site 19-302
Hwy. 2, Dist. 2

67-F-67

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-6309-P2 for the above mentioned structure.

The estimated cost of the proposed structure is \$165,000.
This cost includes tender, materials, engineering and sundry
construction.

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

CSB:ts
Attach.

C.E. Griebaki,
Bridge Design Engineer.

C.C. S. McFarlane
A. Stermac (2)
J. Anderson

No comment other than what we have
mentioned on Feb 22/68

M. Devata
28th March 68

Department of Highways Ontario

Copy for the information of

Foundation Section

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

Bridge Division,
Downsview, Ontario

September 24, 1968

Waubuno Creek Bridge
7.2 Miles West of Hwy. 19
W.P. 127-65-00, Site 19-302
Highway 2, District No. 2

67-F-87

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

No Comment.

M. Duvada