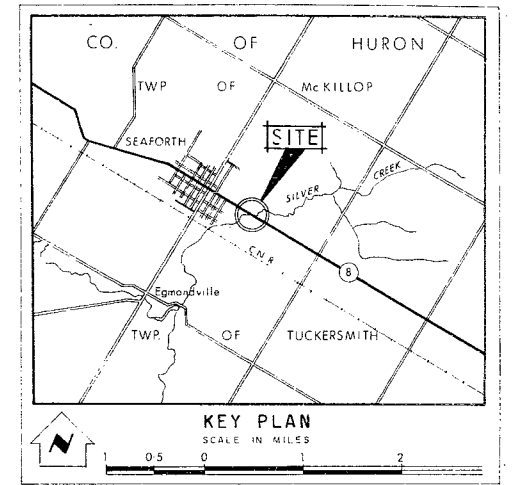
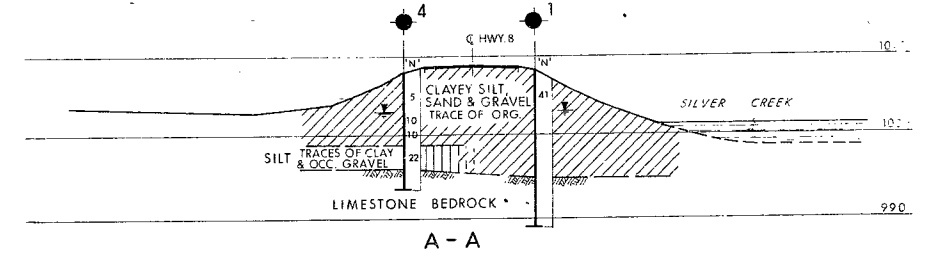
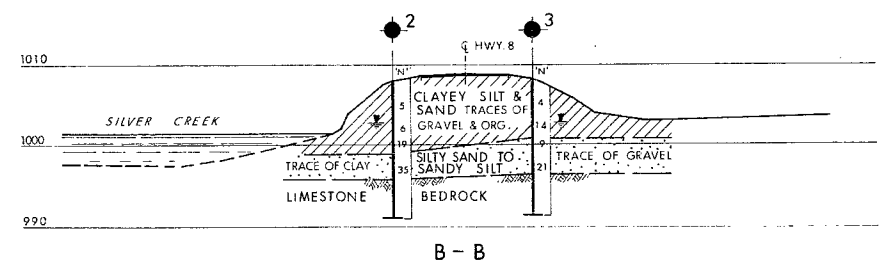
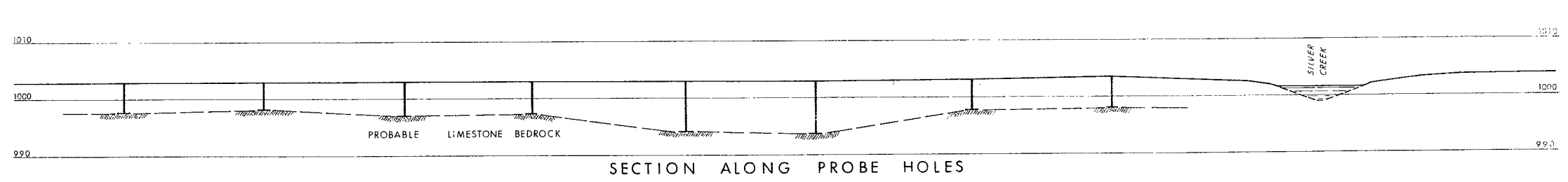
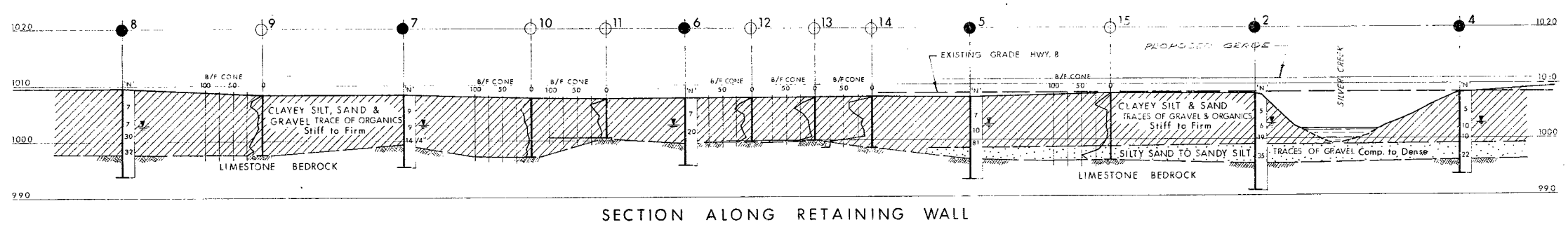
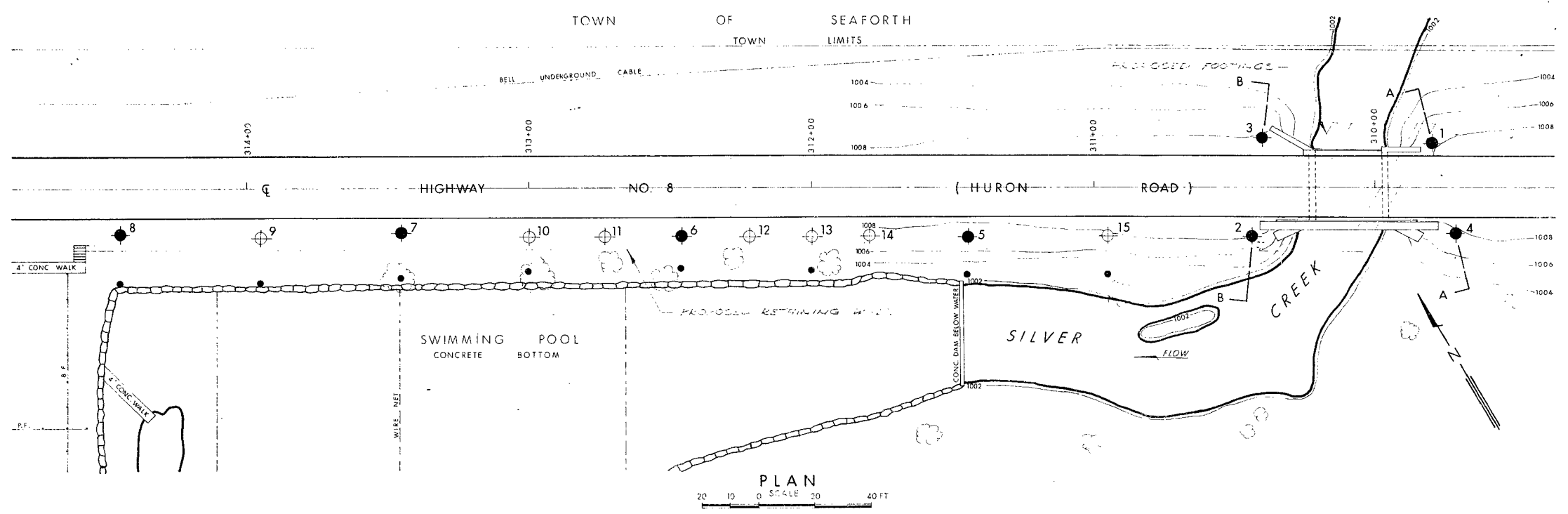


# 67-F-1

W.P. # 131-66

Hwy # 8

SILVER  
CREEK.



**LEGEND**

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, JAN 1967
- Probe Holes

NO.	ELEVATION	STATION	OFFSET
1	1008.3	309+79	15' RT.
2	1007.9	310+44	18' LT.
3	1008.3	310+43	17' RT.
4	1008.0	309+79	17' LT.
5	1007.5	311+45	18' LT.
6	1007.4	311+45	18' LT.
7	1008.1	311+45	18' LT.
8	1009.5	314+45	16' LT.
9	1008.2	313+95	18' LT.
10	1007.6	313+03	18' LT.
11	1007.5	312+73	18' LT.
12	1007.6	312+22	18' LT.
13	1007.7	312+00	18' LT.
14	1007.8	311+80	18' LT.
15	1008.0	310+95	18' LT.

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

REVISIONS	DATE	BY	DESCRIPTION

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

**SILVER CREEK**

KING'S HIGHWAY NO. 8 DIST NO. 3  
CO. HURON  
TWP. Mc KILLOP & TUCKERSMITH LOT CON.

**BORE HOLE LOCATIONS & SOIL STRATA**

SUBM'D A.S.	CHECKED <i>[Signature]</i>	W.P. NO. 131-66	AT&T, DRAWING NO.
DRAWN S.O.	CHECKED <i>[Signature]</i>	JOB NO. 67-F-1	<b>67-F-1A</b>
DATE 22 FEB. 67	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>[Signature]</i>	CONT NO.		

**PRINT RECORD**

NO.	FOR	DATE

REF NO. E-4392-1

23-69-46

MEMORANDUM

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

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

DATE: February 22, 1967

OUR FILE REF.

IN REPLY TO:

FEB 27 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Silver Creek Bridge & Retaining Wall  
Hwy. No. 8 - District #3 (Stratford)  
W.J. 67-F-1 -- W.P. 131-66-

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 you require additional information, please feel free to contact our Office.

AGS/MdeP  
Attach.

cc: Messrs. B. R. Davis (2)  
H. A. Tregaskes  
D. W. Farren  
A. Gater  
J. G. Tillcock  
A. P. Watt  
J. Roy  
B. A. Singh

Foundations Files  
Gen. Files ✓

*Alf Sternac*  
A. G. Sternac  
PRINCIPAL FOUNDATION ENGINEER

## TABLE OF CONTENTS

1. INTRODUCTION.
  2. SITE DESCRIPTION.
  3. SUBSOIL CONDITIONS.
  4. RECOMMENDATIONS.
  5. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT  
For  
Silver Creek Bridge & Retaining Wall  
Hwy. No. 8 - District #3 (Stratford)  
W.J. 67-F-1    --    W.P. 131-66

1. INTRODUCTION:

A request for a foundation investigation at the site of the proposed Silver Creek Bridge at Seaforth, Ontario, was contained in a memo dated December 13, 1966, from Mr. A. P. Watt, Regional Bridge Location Engineer. An additional request for an investigation at the site of a proposed retaining wall adjacent to the bridge structure was contained in a memo, also from Mr. Watt, dated January 20, 1967. A field investigation was subsequently carried out by this Section to determine the subsoil conditions at the site. Presented in this report are the results of the field investigation, together with our recommendations pertaining to the foundations for the proposed new bridge and retaining wall.

2. SITE DESCRIPTION:

The site is located at the limits of the town of Seaforth at the existing crossing of Hwy. <sup>402</sup>/<sub>82</sub> and Silver Creek. At this location, the creek flows in a generally south direction under the bridge, then flows parallel to the highway in a westerly direction for about 400 feet. This section of the creek running parallel to the highway, has been dammed up and made into a swimming pool, and is owned by the Seaforth Lions Club. The proposed retaining wall will extend from the structure to the west end of the swimming pool and will retain the earth fill for the highway reconstruction since, otherwise, it would extend up to the edge of the swimming pool. The existing bridge on the highway is a 23.5 ft. single span steel and concrete structure. The area in the vicinity of the crossing is farmland, the topography of which may be described as gently undulating, sloping downwards to the banks of the creek.

### 3. SUBSOIL CONDITIONS:

A total of 8 boreholes, 7 dynamic cone penetration tests and 8 probes was carried out during the course of the field work. Subsoil was found to consist of about 8 feet of fill material overlying up to about 6 feet of alluvial deposits followed by limestone bedrock. The fill material generally consists of a heterogeneous mixture of clayey silt, sand and gravel, and contains traces of organics. The alluvial deposits consist of silty sand to sandy silt with occasional gravel and boulders. The limestone bedrock appears to be slightly weathered down to at least 5 feet from the surface.

Groundwater in the boreholes was found to be at approximately the same level as the creek.

The locations and elevations of all borings are shown on the attached Drawing #67-F-1A, together with the inferred soil stratigraphy at the bridge and retaining wall. Detailed descriptions of the soil types and the various boundaries are shown on the Record of Borelog sheets contained in the Appendix.

Survey work in the field was performed by D.H.O. personnel from Stratford District.

### 4. RECOMMENDATIONS:

Since bedrock at this site is relatively shallow, it is recommended that the proposed structure and retaining wall be supported by spread footings placed directly onto the bedrock surface. Safe pressures of up to 15 tons per square foot may be assumed for design purposes. Sufficient information is given on Drawing #67-F-1A to enable the bedrock elevation to be determined or interpolated over the entire area of the proposed wall and bridge construction.

For earth pressure behind the retaining wall founded on rock, it is recommended that a coefficient of 0.5 be assumed for design, since it is believed that the  $K_0$  condition would apply.

cont'd. /3 ...

4. RECOMMENDATIONS: (cont'd.) ...

No stability problems are anticipated for the proposed embankments.

5. MISCELLANEOUS:

Field work for this project was carried out during the period January 9 to January 26, 1967, by Wimpey Canada Ltd., and was supervised by Mr. A. Seppala, Project Foundation Engineer. This report was prepared by Mr. K. G. Selby, Supervising Foundation Engineer.

February 1967

APPENDIX I.



**CHECKED BY**

[illegible]

**MATERIALS & TESTING DIVISION**

# RECORD OF BOREHOLE NO. 2

**FOUNDATION SECTION**

JOB 67-F-1

LOCATION Sta. 310 + 44, 18' Lt. E

ORIGINATED BY AMS

W.P. 131-66




BORING DATE January 12, 1967

COMPILED BY            MT

DATUM Geodetic

BOREHOLE TYPE Washboring, BX Casing

**CHECKED BY**

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT _____ w <sub>L</sub> PLASTIC LIMIT _____ w <sub>P</sub> WATER CONTENT _____ w				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				w <sub>P</sub> w      w <sub>L</sub> WATER CONTENT %					
1007.99	GROUND LEVEL					1000										
	Clayey Silt, Sand & Traces of Gravel & Organics. (Fill)		1	SS	5											
			2	SS	6											
998.99			3	SS	19											
9.0	Silty Fine Sand to Sandy Silt & traces of Gravel		4	SS	35											
995.69																
12.3	Bedrock (Limestone)		5	RC	100% Rec											
990.99			6	RC	100% Rec											
17.0	End of Borehole					990										

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS & TESTING DIVISION

JOB 67-F-1

LOCATION Sta. 310 + 40 17' Rt. C

ORIGINATED BY AMS

W.P. \_\_\_\_\_ 131-66

BORING DATE January 16, 1967

COMPILED BY \_\_\_\_\_ HS

DATUM Geodetic

BOREHOLE TYPE Washboring

**CHECKED BY**

# RECORD OF BOREHOLE NO. 3

### FOUNDATION SECTION

[illegible]

## DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS & TESTING DIVISION

JOB 67-F-1

LOCATION Sta. 309 + 70 17' Lt. E

ORIGINATED BY AMS

W.P. \_\_\_\_\_ 131-66

BORING DATE January 18, 1967

COMPILED BY HS




DATUM \_\_\_\_\_ Geodetic

BOREHOLE TYPE Washboring

**CHECKED BY**

# RECORD OF BOREHOLE NO. 4

**FOUNDATION SECTION**

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT ——— $w_L$ PLASTIC LIMIT ——— $w_p$ WATER CONTENT ——— $w$		BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.		WATER CONTENT %			
1008.05	Ground Level											
	Clayey Silt, Sand & traces of Gravel & Organics		1	SS	5	1000						
			2	SS	10							
999.05			3	SS	10							
9.0	Silt with traces of clay & occ. gravel.		4	SS	22							
996.05												
12.0	Bedrock		5	RC	100% Rec.							
993.75	Limestone											
14.3	End of Borehole					990						

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS &amp; TESTING DIVISION

## RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

JOB 67-F-1 LOCATION Sta. 311 + 45 18' Lt. E ORIGINATED BY AMS  
W.P. 131-66 BORING DATE January 20, 1967 COMPILED BY MT  
DATUM Geodetic BOREHOLE TYPE Washboring, BX Casing 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	PLASTIC LIMIT — WP	WATER CONTENT — W	WATER CONTENT %		
1007.52	GROUND LEVEL											
	Clayey silt with traces of gravel and organics		1	SS	7							
			2	SS	10							
998.52			3	SS	81	1000						
9.0	Silty sand to sandy silt and gravel		4	SS								
996.52			5	RC	67% Rec							
11.0	Bedrock Limestone		6	RC	67% Rec							
993.02												
14.5	End of Borehole					990						

## MATERIALS & TESTING DIVISION

# RECORD OF BOREHOLE NO.6

**FOUNDATION SECTION**

LOCATION Sta. 312 / 46 18' Lt. Ø

ORIGINATED BY AMS

BORING DATE January 23, 1967

COMPILED BY HS

BOREHOLE TYPE Washboring

**CHECKED BY**

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit ——— w <sub>L</sub> Plastic Limit ——— w <sub>p</sub> Water Content ——— w	BULK DENSITY  P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	w <sub>p</sub> w <sub>L</sub> ————— WATER CONTENT %		
1007.47	GROUND LEVEL									
999.67	Clayey Silt, Sand, Gravel & traces of Organics		1	SS	7	1000				
			2	SS	20					
			3	SS						
7.8	Bedrock									
995.67	Limestone		4	RC	100% Rec.					
11.8	End of Borehole					990				

## MATERIALS &amp; TESTING DIVISION

JOB 67-F-1

LOCATION Sta. 313 / 45; 16' Lt. of

## FOUNDATION SECTION

W.P. 131-66

BORING DATE January 23 & 24, 1967

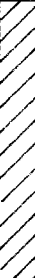

ORIGINATED BY AMS

DATUM Geodetic

BOREHOLE TYPE Washboring

COMPILED BY MT

**CHECKED BY**

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — $w_L$		BULK DENSITY 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 — $w$		
1008.71	GROUND LEVEL											
999.31	Clayey Silt, Sand, Gravel & Organics (Fill)		1	SS	9							
999.31 8.8	Bedrock Limestone		3	SS	144"	1000						
995.31			4	RC	100% Rec							
12.8	End of Borehole		5	RC	100% Rec							
						990						

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS &amp; TESTING DIVISION

67-F-1

JOB 67-F-1 LOCATION Sta. 314 + 45 16' Lt. 2

W.P. 131-66

W.P. 131-00 BORING DATE January 24, 1967

**DATUM** Geodetic

DATUM 00000010 BOREHOLE TYPE Washboring

FOUNDATION SECTION

ORIGINATED BY AMS

COMPILED BY \_\_\_\_\_ HS

CHECKED BY \_\_\_\_\_

[illegible]



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 ——— $w_p$		
1008.25	Ground Level						SHEAR STRENGTH P.S.F.	WATER CONTENT % <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;"><math>w_p</math></div> <div style="margin-right: 10px;"><math>w</math></div> <div><math>w_L</math></div> </div>	<div style="text-align: center;"> <math>\gamma</math> P.C.F. </div>	
997.65						1000				
10.6	End of cone test					990				

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS &amp; TESTING DIVISION

## RECORD OF BOREHOLE NO. 11

FOUNDATION SECTION

JOB 67-F-1LOCATION Sta. 312 + 73; 18' Lt. EORIGINATED BY AMSW.P. 131-66BORING DATE January 25, 1967COMPILED BY MTDATUM GeodeticBOREHOLE TYPE Dynamic Cone Penetration

CHECKED BY \_\_\_\_\_

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 _____ WL WATER CONTENT %	BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT						
1007.52	GROUND LEVEL										
1000.52											
7.0	End of cone test					1000					
						990					

**MATERIALS & TESTING DIVISION**

## FOUNDATION SECTION

JOB 67-F-1

LOCATION Sta. 312 / 22; 18' Lt. C

ORIGINATED BY AMS

W.P. 131-66

BORING DATE January 25, 1967

COMPILED BY            MT

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration

CHECKED BY \_\_\_\_\_

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 SHEAR STRENGTH P.S.F.	LIQUID LIMIT ——— $w_L$ PLASTIC LIMIT ——— $w_p$ WATER CONTENT ——— $w$ $w_p$ ——— $w$ ——— $w_L$ WATER CONTENT %	BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT					
1007.6	GROUND LEVEL									
999.7						1000				
7.9	End of Cone Test									
						990				

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS &amp; TESTING DIVISION

# RECORD OF BOREHOLE NO. 13

### FOUNDATION SECTION

JOB 67-F-1

LOCATION Sta. 312 / 00: 18' Lt. C

ORIGINATED BY AMS

W.P. 131-66

BORING DATE January 25, 1967

COMPILED BY                      <sup>MT</sup>

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration

**CHECKED BY**

[illegible]

## OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS &amp; TESTING DIVISION

## RECORD OF BOREHOLE NO. 14

FOUNDATION SECTION

JOB 67-F-1LOCATION Sta. 311 / 80; 18' Lt. EORIGINATED BY AMSW.P. 131-66BORING DATE January 25, 1967COMPILED BY MTDATUM GeodeticBOREHOLE TYPE Dynanic Cone Penetration

CHECKED BY \_\_\_\_\_

## SOIL PROFILE

## SAMPLES

## DYNAMIC PENETRATION RESISTANCE

BLOWS / FOOT

20 40 60 80 100

SHEAR STRENGTH P.S.F.

LIQUID LIMIT WLPLASTIC LIMIT WPWATER CONTENT W

WP WL

WATER CONTENT %

BULK  
DENSITY

P.C.F.

REMARKS

ELEV.  
DEPTH

DESCRIPTION

STRAT. PLT

NUMBER

TYPE

BLOWS / FOOT

ELEV. SCALE

1000

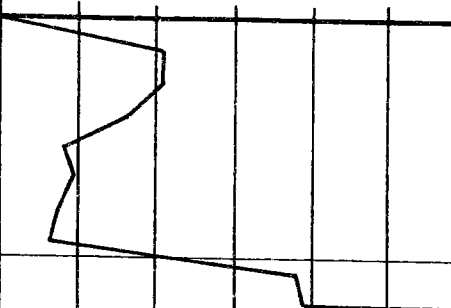
990

1007.87

GROUND LEVEL

998.87

9.0 End of Cone Test



DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS & TESTING DIVISION

## RECORD OF BOREHOLE NO. 15

## FOUNDATION SECTION

JOB 67-F-1

LOCATION Sta. 310 / 95 18' Lt. 0

ORIGINATED BY AMS

W.P. 131-66

BORING DATE January 25, 1967

COMPILED BY            MT

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration

CHECKED BY \_\_\_\_\_

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit ——— w <sub>L</sub>	BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20    40    60    80    100	PLASTIC LIMIT ——— w <sub>p</sub>		
							SHEAR STRENGTH P.S.F.	w <sub>p</sub> ——— w ——— w <sub>L</sub>		
1008.08	GROUND LEVEL								WATER CONTENT %	
997.08						1000				
11.0	End of Cone Test					990				

## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

### DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

### SOIL TESTS

Q <sub>u</sub>	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q <sub>cu</sub>	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q <sub>d</sub>	DRAINED TRIAXIAL	S	SENSITIVITY



# ABBREVIATIONS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
s	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
$I_C$	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
$c_v$	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
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e \sigma$ OR $\ln \sigma$	NATURAL LOGARITHM OF $\sigma$
$\log_{10} \sigma$ OR $\log \sigma$	LOGARITHM OF $\sigma$ TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

## STRESS AND STRAIN

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

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	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
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

67-F-1

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

FROM: A. P. Watt

DATE: January 20, 1967

Our File Ref.

IN REPLY TO

SUBJECT: W.P. 131-66, Bridge Site 12-206,  
Silver Creek Bridge,  
At Seaforth,  
Highway 8,  
District 3, Stratford.  
-----

Further to the foundation request dated December 13, 1966, this will confirm the telephone conversation with Mr. K. G. Selby, Supervising Foundation Engineer, requesting additional foundation information for retaining walls on the south side of Highway 8 running west from the proposed new bridge as shown in blue on the attached portion plan 4-B-169.

The Chairman of the Seaforth Lions Club Park Committee with the approval of the Township of Tuckersmith have requested that the protective wall to retain the roadway fill from the creek be made in two stages. The first stage or retaining wall to be at the waters edge and the second stage or retaining wall to be as far north as possible, and still allow for the new roadway cross section. Therefore, it is suggested that the foundation report comment on the retaining walls in both locations and possibly with reference to standard retaining walls and dry walls.

*A. P. Watt*

A. P. WATT  
REGIONAL BRIDGE LOCATION ENGINEER

APW:gf

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

cc: Foundations Office (Rt. 110)

Hwy. 401 & Keele St.  
Downsview, Ontario.

Materials and Testing Division

January 9, 1967

George Wimpey Canada Ltd.,  
General Contractors,  
P.O. Box 10,  
Station "U",  
Toronto 18, Ontario.

Attention: Mr. Woolley

Dear Sir:

This is to confirm our request of January 5, 1967,  
for the supply of one Diamond Drill, together with all  
necessary equipment, as specified under the terms of our  
Contract Agreement, at Seaforth, Ontario, on Monday,  
January 9, 1967.

This project bears Job Number 67-F-1. and includes 67-F-2

Yours truly,

*K. G. Selby*

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

KGS/ndef

cc: Messrs. H. Konings  
H. Szymanski ✓

Foundations Office  
Gen. Files

## MEMORANDUM

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

FROM: A. I. Watt

DATE: December 13, 1966

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 131-66, Bridge Site 12-206,  
Silver Creek Bridge,  
At Seaforth,  
Highway 8,  
District 3, Stratford.

67-F-1

Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed two copies of the site plan number E-4392-1 with the probable footing locations marked in red.

I have also enclosed the preliminary structure site report for your use.

A. I. WATT  
REGIONAL BRIDGE LOCATION ENGINEER

AM:gf  
encl.

c.c. Mr. A. Browley  
Mr. A. Forrest  
Mr. S. McCombie

ASSIGNMENT DATE DEC. 28, 1966  
COMPLETION DATE FEB. 22, 1967

Department of Highways Ontario

Copy for the information of

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

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

Bridge Division,  
Downsview, Ontario

June 28, 1967

Silver Creek Bridge  
9.7 Miles East of Hwy. 4  
W.P. 131-66, Site No. 12-206  
Highway 8, District No. 3

Attached herewith are prints of the Preliminary Bridge  
Plan Drawing D-6186-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$55,000.  
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. Grehski,  
Bridge Design Engineer

Attach.

c.c. S. McCombie  
A. Stermac  
R. Forrest  
E. Cross

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

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

July 11, 1967

Silver Creek Bridge --  
9.7 Miles East of Hwy. #4,  
W.P. 131-66 -- W.J. 67-F-1,  
Site #12-206, Hwy. #8,  
District #3 (Stratford).

---

We have reviewed Preliminary Plan D-6186-P1  
for the above mentioned structure. We have no comments  
regarding the bridge structure.

Prior to constructing the Gabion type retaining  
wall, the topsoil should be removed.

KGS/MdeF

*A. G. Selby*  
A. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

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

Foundations Files  
Gen. Files

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

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

August 22, 1967

-- Silver Creek Bridge --  
9.7 Miles East of Hwy. 4  
W.P. 131-66, Site No. 12-206  
Hwy. 8 - District 3 (Stratford)

67-P-1

We have reviewed Preliminary Bridge Plan  
Drawing D-6186-P2 for the above mentioned structure.

We have no comments.

MD/MdeF

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

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

Department of Highways Ontario

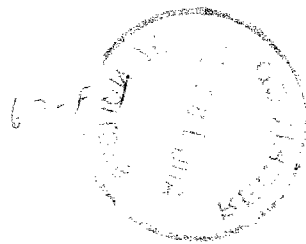
Copy for the information of  
Mr. A. Stermac, Principal Foundation Engineer,  
Room 197, Lab. Building

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

Bridge Division,  
Downsview, Ontario

August 17, 1967

Silver Creek Bridge  
9.7 Miles East of Hwy. 4  
W.P. 131-66, Site No. 12-206  
Highway 8, District No. 3



Attached herewith are prints of the revised Preliminary  
Bridge Plan Drawing D-6186-P2 for the above-mentioned structure.

The cost will be the same as submitted previously.

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. McCombie  
A. Stermac  
R. Forrest  
E. Cross



*L. Silver Creek Bridge*

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

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

August 22, 1967

-- Silver Creek Bridge --  
9.7 Miles East of Hwy. 4  
W.P. 131-66, Site No. 12-206  
Hwy. 8 - District 3 (Stratford)

We have reviewed Preliminary Bridge Plan  
Drawing D-6186-P2 for the above mentioned structure.

We have no comments.

MD/MdeP

*M. Devata*

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

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

*to Silver Creek  
Bridge.*

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

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

July 11, 1967

Silver Creek Bridge --  
9.7 Miles East of Hwy. #4,  
W.P. 131-66 -- W.J. 67-P-1,  
Site #12-206, Hwy. #8,  
District #3 (Stratford).

---

We have reviewed Preliminary Plan D-6186-P1  
for the above mentioned structure. We have no comments  
regarding the bridge structure.

Prior to constructing the Gabion type retaining  
wall, the topsoil should be removed.

*K. G. Selby*

KGS/wdeP

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

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

Foundations Files  
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