

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: May 5, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

Sheridan Creek Diversion Structures
For C.N.R., Highway 122 & Highway 2
District 6, Toronto

W.J. 65-F-36

W.P.'s 114-65/
115-65/
116-65/

BA 2067

Two written requests, dated March 19 and April 2, 1965, to carry out a foundation investigation at the above sites, were received by this Section from Mr. J. Curtis of the Bridge Office.

Subsequently, a foundation investigation consisting of 2 boreholes at each structure location, was carried out April 5 - 8, 1965.

Subsoil at the site consisted of a thin layer of topsoil, followed by a stratum of firm to hard glacial till (clayey silt with gravel) 7 ft. to 9 ft. in thickness. Directly underlying the glacial till is shale bedrock. The bedrock was proved by obtaining from 4 ft. to 6 ft. of BXT core in the boreholes. No water was observed in any of the boreholes during the time of the investigation

cont'd. /2 ...

May 5, 1965

At all three structure locations, the proposed invert elevation of the proposed Sheridan Creek will be at or below the shale bedrock surface. In view of this, it is recommended that the proposed structures at the crossings of the Sheridan Creek diversion, be founded on shale bedrock. A safe bearing pressure of 10 t.s.f. may be used for design purposes. No cut stability problems are anticipated provided standard 2:1 side slopes are used.

The field work, together with the preparation of this report, was undertaken by Mr. V. Korlu, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. M. Devata, Senior Foundation Engineer, who also reviewed this report.

Equipment was owned and operated by Johnston Drilling Company of Ottawa.

VK/MdeF
Attach.


K. Y. Lo
SUPERVISING FOUNDATION ENGINEER

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
G. K. Hunter (2)
J. C. Thatcher
T. J. Kovich
A. Watt

Foundations Office
Gen. Files —

APPENDIX I.

FOUNDATION SECTION

CHECKED BY M.D.

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.	<div style="text-align: center;"> WP W WL $\frac{WL - WP}{100} \times W = W_p$ WATER CONTENT % </div>					
325.0	Groundlevel												
0.0	Clayey silt with gravel. (hard)		1	SS	31	320							
			2	SS	200								
9.0	Grey shale. BEDROCK		3	BXT	100% recovery	310							
14.0	End of borehole.					300							

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 65-F-36

LOCATION Sheridan Crk & Hwy 122 Sta. 7+83 32' Rt.

ORIGINATED BY V.K.

W.P. 115-65

BORING DATE April 7, 1965.

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drive BX Casing & Wash.

CHECKED BY M.D.

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.		<div style="text-align: center;"> WP ——— W ——— WL ————— WATER CONTENT % </div>			
324.0	Groundlevel											
0.0	Clayey silt with gravel. (V. stiff to hard)		1	SS	28	320						
315.5			2	SS	200							
8.5	Grey shale. BEDROCK				100%							
310.5			3	BXT	recovery	310						
13.5	End of borehole.					300						

FOUNDATION SECTION

CHECKED BY M.D.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 65-F-36

LOCATION Sheridan Crk & Hwy 2 Sta. 354+40 65' Lt.

ORIGINATED BY V.K.

W.P. 116-65

BORING DATE April 8, 1965.

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drive BX Casing & Wash.

CHECKED BY M.D.

[illegible]

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

SOIL TESTS

Q _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_C	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

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

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
$\bar{\sigma}$	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

MEMORANDUM

65-F-36

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

From: Bridge Division,
Downsview, Ontario.

Date: March 19, 1965.

Our File Ref.

IN REPLY TO

SUBJECT:

Site Investigation, Sheridan Creek,
Creek Diversion Structure under C.N.R.,
300' west of proposed Hwy 122,
Bridge Site 24-269, W.P. ~~338-63~~, 114-65 (Refer letter Apr 2 1965)
District 6, Toronto.

Enclosed is drawing E-4259-1 showing the
location of the creek diversion under the C.N.R.
and the proposed structure.

Would you please arrange to have a soil
investigation at this location.

Mr. Jeronimus, of the C.N.R., was contacted
regarding their soil investigation requirements. He
would like two test holes, each taken at least
5'-0 into bedrock.

JWC/ag

J.W. Carter,
for J.B. Curtis,
Regional Bridge Location Engineer.

MEMORANDUM

C5-F-36

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

From: Bridge Division,
Downsview, Ontario.

Attention: Mr. M. Devata

DATE: April 2, 1965.

Our File Ref.

IN REPLY TO

SUBJECT: W.P. 115-65 - Site #24-267
Sheridan Creek Under Highway 122

W.P. 116-65 - Site #24-266
Sheridan Creek under Highway 2


Township of Toronto, Peel County
District #6, Toronto

Would you please have a soil investigation carried out at the two (2) sites listed above for the purpose of structure design.

Two (2) prints, E-4706-1 and E-4705-1 showing the proposed location of the structures were forwarded earlier today.

Note: The W.P. number for the soil investigation for Sheridan Creek under the C.N.R. is 114-65. (Site #24-269)
The W.P. number given in the memo dated March 19 was W.P. 338-63, which is actually the grading W.P. number. In addition, please note that the future C.N.R. tracks will be one on each side of the two existing tracks, instead of both to the south, as indicated on print E-4259-1.

JWC/im


J. W. Carter,
for J. B. Curtis,
Regional Bridge Location Engineer.

MURTY:

65-F-36
W.P. # 114-65
W.P. # 115-65
W.P. # 116-65
Hwy. # 2 &
Hwy. # 122
SHERIDAN
CREEK
DIVERSION

