

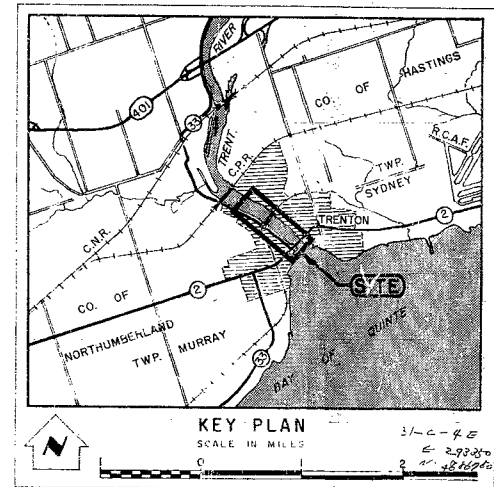
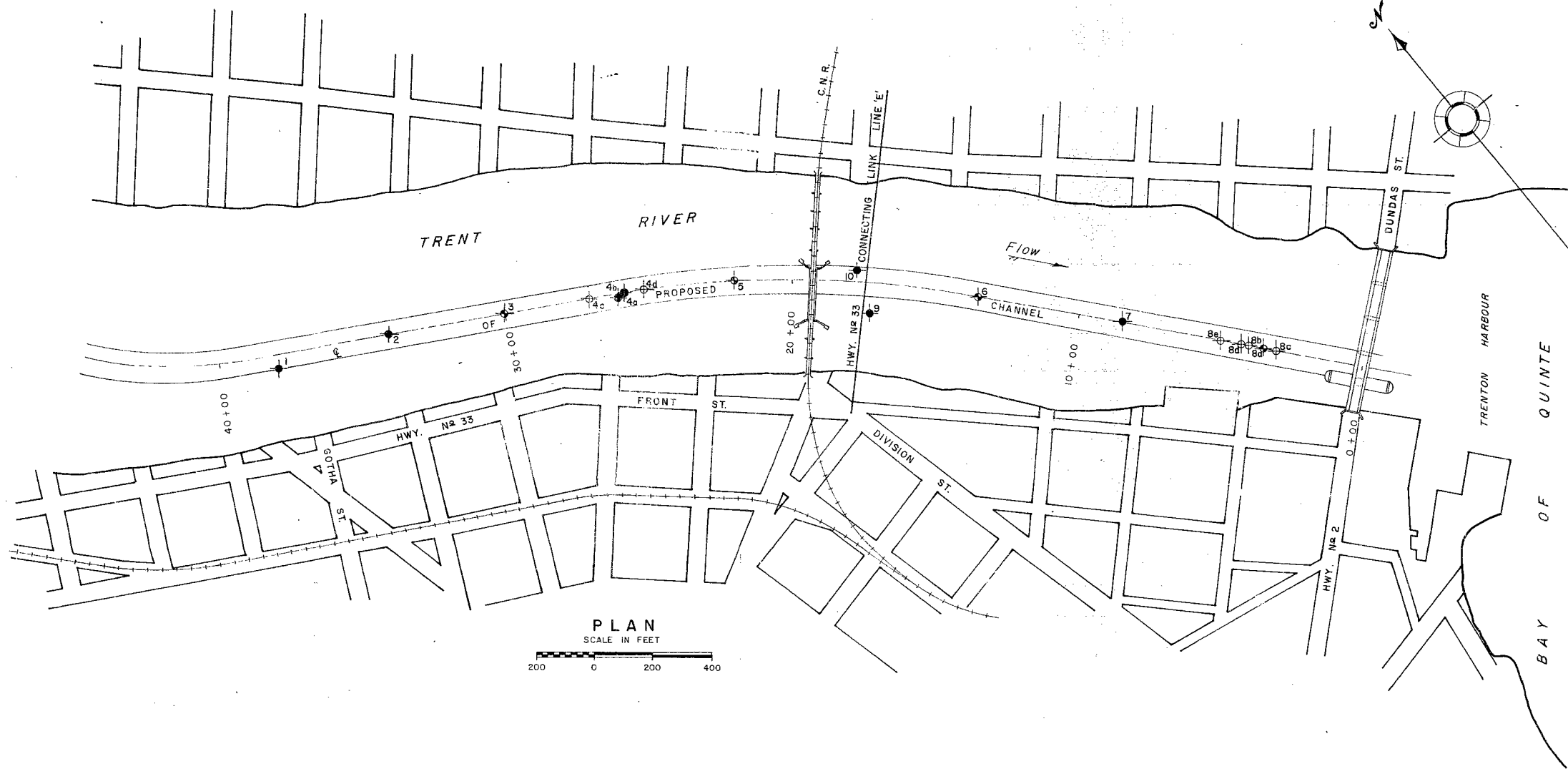
#65-F-24

W.P. #87-64

TRENT CANAL

IN TRENT R.

TRENTON



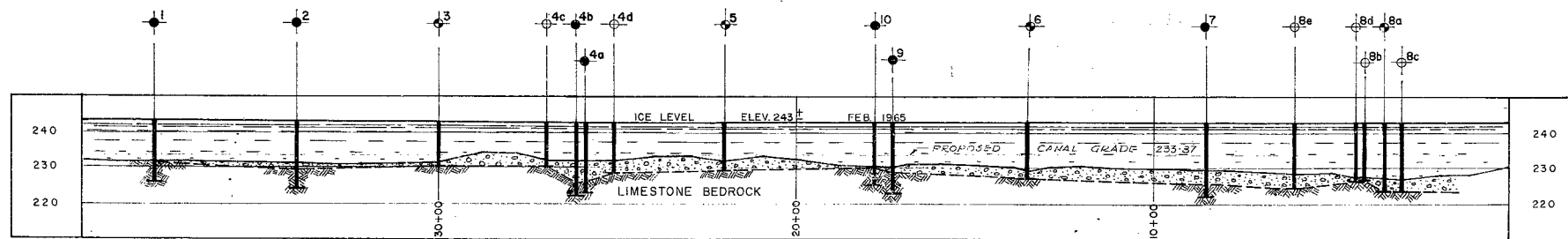
LEGEND

- Bore Hole
- ⊕ Conf. Penetration Hole
- ⊕ Bore & Cone Penetration Hole
- Water Levels established at time of field investigation.

Bore Holes 9 & 10 on this drawing refer to Bore Holes 6 & 7 in Report N^o 64-F-23

NO	BEDROCK ELEVATION	STATION	OFFSET
1	232.2	38+00	45' LT.
2	229.4	34+00	—
3	230.6	30+00	—
4a	226.3	28+90	—
4b	225.4	28+15	15' LT.
4c	230.8	27+00	—
4d	228.4	25+10	—
5	229.6	22+00	—
6	227.7	13+50	—
7	225.1	8+50	—
8a	223.6	3+50	—
8b	226.8	4+00	—
8c	223.3	3+00	—
8d	226.8	4+25	—
8e	224.6	5+00	—
9	228.8	17+30	105' LT.
10	230.2	17+80	35' 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.



PROFILE PROPOSED CHANNEL
VERTICAL SCALE: 20 FT. (0 to 40)
HORIZONTAL SCALE: 200 FT. (0 to 400)

PRINT RECORD

NO	FOR	DATE

REVISIONS

NO	DATE	BY	DESCRIPTION

TRENTON - SUB. CONTRACT FOR STR. AT TRENT RIVER & TRENT HARBOUR
CONNECTIONS LINE

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

PROPOSED TRENT RIVER CHANNEL

KING'S HIGHWAY NO. TRENT RIVER DIST. NO. 7
CO. TOWN OF TRENTON
TWP. LOT CON.

BORE HOLE LOCATIONS & SOILS STRATA

SUBM'D. T.C. CHECKED <i>[initials]</i>	W.P. NO. 87-64	M.B.R. DRAWING NO.
DRAWN DGH. CHECKED <i>[initials]</i>	JOB NO. 65-F-24	65-F-24A
DATE 4 MARCH 1965	SITE NO.	BRIDGE DRAWING NO.
APPROVED <i>[signature]</i>	CONT. NO.	

CONTRACT NO. 85-314

MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: February 19, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

The Relocation of Trent Canal in
Trent River at Trenton, Ontario,
District No. 7, Port Hope, Ont.
W.J. 65-F-24 -- W.P. 87-64

A verbal request from Mr. J. B. Curtis, Bridge Location Engineer, for a foundation investigation for the relocation of the Trent Canal in the Trent River (Canal Sta. 0+00 to Sta. 40+00) at Trenton, was received by this Section on January 29, 1965. Subsequently, a foundation investigation consisting of 8 sampled boreholes and 10 cone penetration tests was carried out at the site.

The site is underlain by a thin (1 to 8 ft.) surface layer of sand and gravel, overlying bedrock containing interbedded layers of shaley limestone and clayey shale. The locations and elevations of the boreholes, together with the inferred subsoil stratigraphy, are shown on the attached Drawing No. 65-F-24A.

The field work, performed in February, 1965, together with the preparation of this report, was undertaken by Mr. T. Chan, Project Foundation Engineer. The investigation was carried out under the

cont'd. /2 ...

Mr. A. M. Towe,
Attn: Mr. S. McCombie

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February 19, 1965

general supervision of Mr. M. Devata, Senior Foundation Engineer, who also reviewed this report.

The equipment, a diamond drill rig adapted for soil sampling, was owned and operated by Dominion Soil Ltd. of Toronto.

We believe the information contained in the report will suffice for your design work. However, should further information be required, please do not hesitate to contact our Office.

TC/MdeF
Attach.


A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. A. M. Towe (2)
H. A. Tregaskes
H. D. McMillan
G. K. Hunter (2)
F. B. Whiteley
T. J. Kovich
A. Watt

Foundations Office
Gen. Files

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

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_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
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