

#65-F-(R)-61

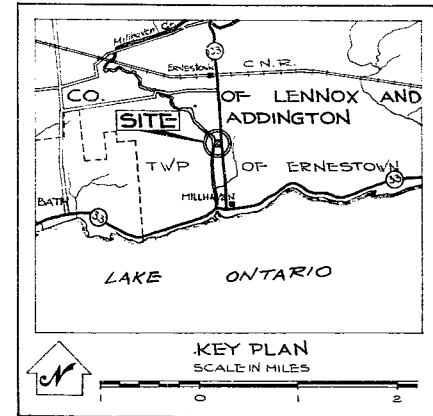
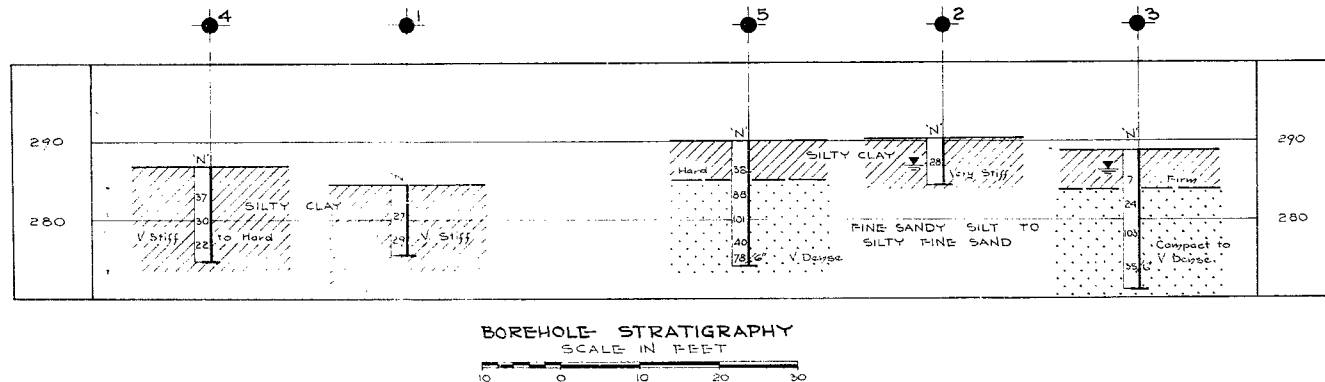
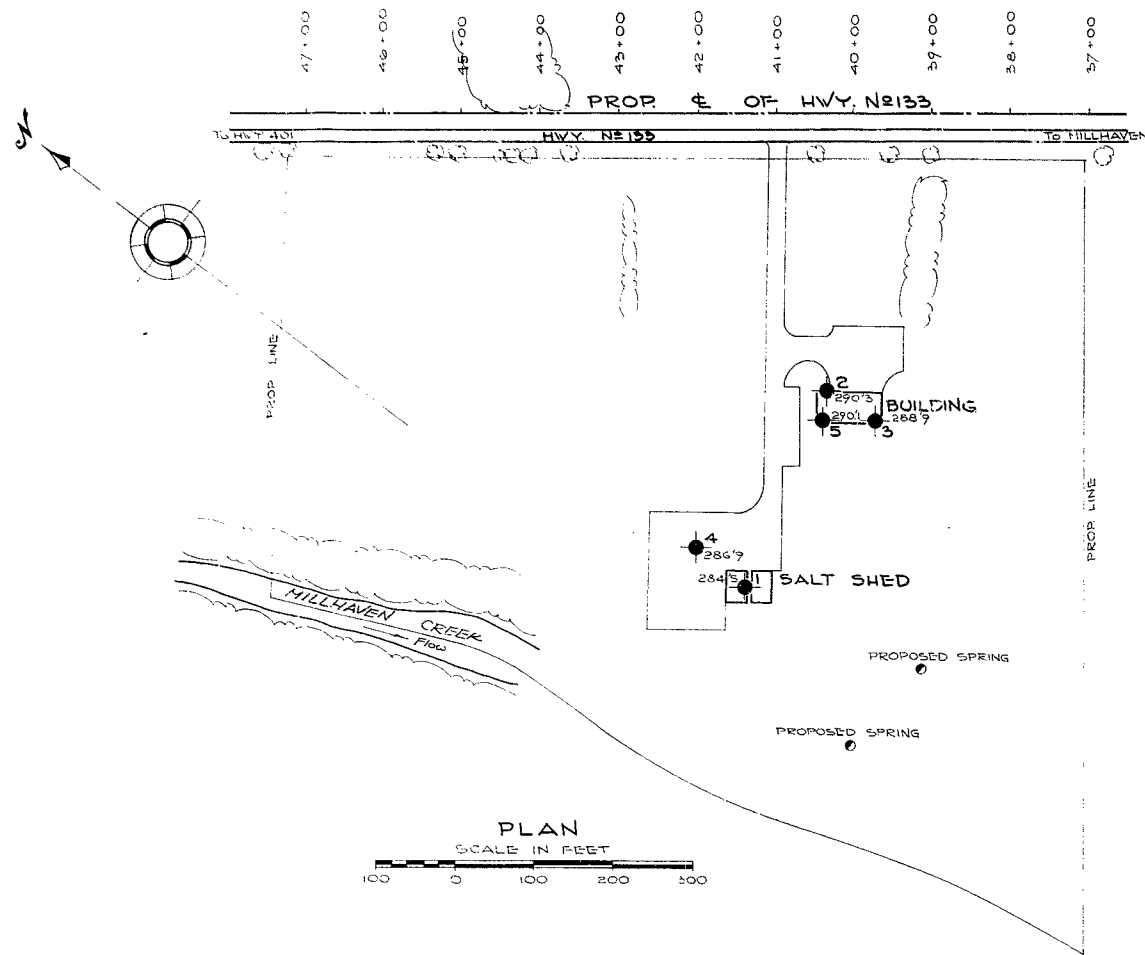
HWY. #133

BATH PATROL

YARD,

ERNESTOWN

TWP.



LEGEND

- BORE HOLE
- ▽ WATER LEVEL AT TIME OF FIELD INVESTIGATION 16/6/65

- 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		
BATH PROPOSED PATROL YARD		
SHOWING POSITIONS & ELEVATIONS OF HOLES		
HWY. 133	DISTRICT 8	COUNTY LENNOX & ADD'N
TOWNSHIP BENDSTOWN	LOT 15	CON. I
LOCATION 3/4 MILE NORTH OF MILLHAVEN		
DRAWN BY: D.G.H.	CHECKED BY:	W.P.
DATE 13 JULY/65	APPROVED BY:	DRAWING NO. 65-R(F)-61
SCALE		

Dist. 28-8.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. C. S. Moase,
Manager,
Special Services Section,
Admin. Bldg.

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

DATE: July 9, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed Bath Patrol Yard
Township of Ernestown, Hwy. #133,
District #8 (Kingston)
W.J. 65-F(R)-61 -- W.P. (Nil)

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

KYL/MdeF
Attach.
cc: Messrs. C. S. Moase (4)
E. J. Orr
D. W. Farren
E. A. Cash
J. E. Gruspier
A. Watt

KYL
K. Y. Lo,
SUPERVISING FOUNDATION ENGINEER

Foundations Office
Gen. Files ✓

FOUNDATION INVESTIGATION REPORT

For

Proposed Bath Patrol Yard
Township of Ernestown, Hwy. #133,
District #8 (Kingston)
W.J. 65-F(R)-61 -- W.P. (Nil)

It is proposed to construct a patrol yard approximately one mile north of Millhaven. A foundation investigation was requested by the Special Services Section in a memo dated April 6, 1965.

In order to determine the subsoil conditions at the site, a foundation investigation consisting of 5 sampled boreholes was carried out by this Section. The locations and elevations of these boreholes are shown on Drawing #65-F(R)-61A, which is attached to this report.

The site is located between Hwy. #133 and Millhaven Creek and physiographically, it is in the region known as the "Napanee Plain". In general, the site is sloping down towards the creek and is covered partly by grass and partly by trees.

The proposed site is generally covered with a surface layer of firm to hard brown silty clay. The thickness of this stratum was found to be approximately 5 to 12 ft. Underlying the cohesive deposit, a layer of compact to very dense fine sandy silt to silty fine sand, some 10 to 11 ft. in thickness, was found in B.H. #3 and #5. Limestone bedrock was found beneath the granular deposit in B.H. #3.

cont'd. /2 ...

It is recommended that the garage building be supported on continuous strip footings, placed in the clay stratum, approximately at elev. 285. A safe net bearing pressure of 1 ton per square foot may be used for design purposes. Adequate frost protection should be provided for the footings. Care should be taken to prevent softening of the subsoil at footing levels during excavation by surface run-off.

As regard to the height of the sand and salt piles, no stability problems are anticipated.

No serious dewatering problems are anticipated during excavation of the footings because of the relatively impermeable nature of the subsoil.

It was found at the time of the investigation, that the nearest wells were approximately 2,000 ft. from both the north and south sides of the proposed site and that the site is generally sloping down towards the creek. Precautions should be taken to prevent contamination of the nearby wells and the creek by salt piles.

The following recommendations regarding paving of roadways and parking areas were given by Mr. J. E. Gruspier, Regional Materials Engineer for the Eastern Region.

(1) Type of Granular Materials

Since material acceptable for use as sand cushion is very scarce in this area, it is recommended that the granular materials consist of G.B.C. Class 'A' only.

cont'd. /3 ...

(2) Depth and Width of Granular Materials

The granular material should consist of 18" of G.B.C. Class 'A' over acceptable and borderline earth cuts and fills and 30" over unacceptable earth cuts. It is recommended that the granular materials be placed full width 5' beyond the edge of the pavement along the entrance road and throughout the yard.

(3) Pavement

It is recommended that the pavement consist of the following:

Binder Course	-	2"	H.L. 6
Wearing Course	-	1½"	H.L. 3

(4) Drainage

It is recommended that drainage be provided to a minimum depth of 3' below the finished grade around the perimeter of the entrance and yard.

The foundation investigation, carried out in June 1965, was undertaken by Mr. T. Chan, Project Foundation Engineer, who also prepared this report. The investigation was carried out under the general supervision of Mr. M. Devata, Senior Foundation Engineer, who also reviewed this report.

July 1965

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
Cd	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

Ag 65

65-F-61

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SECRET

DATE **April 6, 1963**

NOTE: THIS FORM MUST BE USED FOR ALL PROJECTS FOR WHICH SPECIAL SERVICES ARE RESPONSIBLE.

PLEASE INDICATE WHICH OF THE THREE FOLLOWING CATEGORIES APPLY

CATEGORY 1

AN EMERGENCY PROJECT
ALL PROJECTS OF THIS NATURE MAY
BE UNDERTAKEN AT THE DISCRETION
OF THE DISTRICT IN WHICH CASE THIS
FORM WILL BE USED AS A CONFIRM-
ING DOCUMENT ONLY.

CATEGORY 2

NORMAL MAINTENANCE
ALL PROJECTS OF THIS NATURE MAY BE UNDERTAKEN AT THE DISCRETION OF THE DISTRICT BUT EACH ITEM MUST NOT EXCEED AN ESTIMATED COST OF \$200.00 IN WHICH CASE THIS FORM WILL BE USED AS A CONFIRMING DOCUMENT ONLY.

CATEGORY 3

MAJOR PROJECTS (NON-EMERGENCY -
EXCEEDING \$2M.00)
ALL PROJECTS OF THIS NATURE MUST
BE APPROVED BY THE REGIONAL
SPECIAL SERVICES INSPECTOR BE-
FORE UNDERTAKEN.

MULTIPLE PROJECTS MAY BE INCLUDED ON ONE FORM PROVIDED THEY ARE CONCENTRATED AT ONE SITE

REQUIRED FOR District #8, Kingston

SIGNED [Signature]
DISTRICT ENGINEER

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

REQUESTED BY Services Branch

SIGNED _____
REGIONAL SPECIAL SERVICES INSP

DISTRICT OFFICE SUPERVISOR

11360

TO BE SHOWN ON ALL BILLINGS

DISTRICT OFFICE SUPERVISOR