

Mr. M. Devata,
Foundations Office,
Materials & Testing,
Downsview

28-1
Materials & Testing,
London

July 23, 1965.

Re: Gottam Patrol Yard, County of Essex, Twp. of Godfield
Conc.V, Hwy.#3, RJ 65-PA-78.

A hand auger investigation was carried out on the above mentioned patrol yard by the undersigned on July 20, 1965.

Bore holes were placed to a 4' depth through the existing driveway and yard gravel surface and also on the proposed yard area beside the existing surface.

These bore holes indicate an average 7" crushed gravel over firm medium clay on the existing yard and driveway except on the driveway area immediately adjacent to the edge of Highway #3. Beside the gravel surface, an average 10" clay loam topsoil was found over the medium clay subsoil. The existing patrol yard surface is nearly even with adjacent ground level. Level topography of the area provides poor natural drainage.

It is recommended that provision for 18" granular (4" G.B.C. "A" and 14" sa. cu.) be made over the clay subsoil. This can be achieved either by addition of a minimum 13" granular (4" G.B.C. "A" and 9" sa. cu.) or by excavation to provide for the 18" granular depth if the proposed grades will not permit the required granular addition. If granular is added, excavation to provide for 18" granular (4" G.B.C. "A" and 14" sa. cu.) beside the existing surface is recommended.

The closest available sand cushion is situated in the area 1 to 2 miles west of Leamington at an average 7 mile haul and the closest available G.B.C. "A" is at the commercial quarry operations near Amherstburg at an average 22 mile haul.

AMS/jb
cc: F.O. Brown
A. Gater
G.A. Wrong
file

A.M. Batten
A.M. Batten
for: J.R. Roy
Regional Materials Engineer

MEMORANDUM

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

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

DATE: August 31, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

Cottam Patrol Yard, County of Essex,
Twp. of Godfield, Con. 5, Hwy. 3,
District #1 (Chatham, Ontario)
W.J. 65-F(R)-78 -- 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 the factual data and recommendations contained therein, will prove adequate for your design requirements. 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
F. C. Brown
J. Roy
A. Watt

KYL
K. Y. Lo,
SUPERVISING FOUNDATION ENGR.
For
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

Foundations Office
Gen. Files ✓

FOUNDATION INVESTIGATION REPORT
For
Cottam Patrol Yard, County of Essex,
Twp. of Godfield, Con. 5, Hwy. 3,
District #1 (Chatham, Ontario)
W.J. 65-F(R)-78 -- W.P. (Nil)

At the request of Special Services Section, in a memo dated June 15, 1965, a foundation investigation was carried out at the Cottam Patrol Yard site.

The field investigation indicates that the subsoil at this site is uniform, composed of clayey silt to silty clay with gravel and occasional seams of sand. The upper ± 13 ft. of the subsoil layer is desiccated and the consistency is very stiff to hard, while the lower grey section is firm to stiff and has the following physical properties:

Liquid Limit	:	15% - 39%
Plastic Limit	:	11.5% - 24.5%
Moisture Content	:	13% - 28%

The ground water was observed to be about 9' - 11' below the ground surface in the boreholes.

It is recommended to use 1.5 t.s.f. safe bearing pressure for design of continuous foundations. The foundations should be placed as close to the ground surface as local frost conditions will allow.

No stability problem is anticipated at the location of the sand pile.

cont'd. /2 ...

The recommendations given by Mr. J. R. Roy, Regional Materials Engineer, for grading and paving, are as follows:

"It is recommended that provision for 18" granular (4" G.B.C. "A" and 14" Sa. Cu.) be made over the clay subsoil. This can be achieved either by addition of a minimum 13" granular (4" G.B.C. "A" and 9" Sa. Cu.) or by excavation to provide for the 18" granular depth if the proposed grades will not permit the required granular addition. If granular is added, excavation to provide for 18" granular (4" G.B.C. "A" and 14" Sa. Cu.) beside the existing surface is recommended."

The field work, performed during the period July 13 to July 15, 1965, 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.

Equipment used was owned and operated by Johnston Drilling Drilling Co.

August 1965

APPENDIX 1.

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
WS	WASHED SAMPLE	T.P	THINWALL PISTON
S.B	SCRAPER BUCKET SAMPLE	O.S	CESTERBERG 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
q	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	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-78

To: Mr. M. Devata,
Foundations Office,
Materials & Testing,
Downsview

FROM: Materials & Testing,
London

DATE: July 23, 1965.

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AMB/jb
cc: F.C. Brown
A. Gater
G.A. Wrong
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A.M. Batten
A.M. Batten
for: J.R. Roy
Regional Materials Engineer

2176

REQUISITION NO. 1882

TO BE SHOWN ON ALL BILLINGS

DISTRICT: n - Chatham.

DATE June 15, 1965

PLEASE INDICATE WHICH OF THE THREE FOLLOWING CATEGORIES APPLY

CATEGORY 2

CATEGORY 3

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.

MAJOR PROJECTS (NON-EMERGENCY -
EXCEEDING \$200.00)
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 #1 - Graham.

SIGNED _____
DISTRICT ENGINEER

REQUESTED BY _____

SIGNED _____
REGIONAL SPECIAL SERVICES UNIT

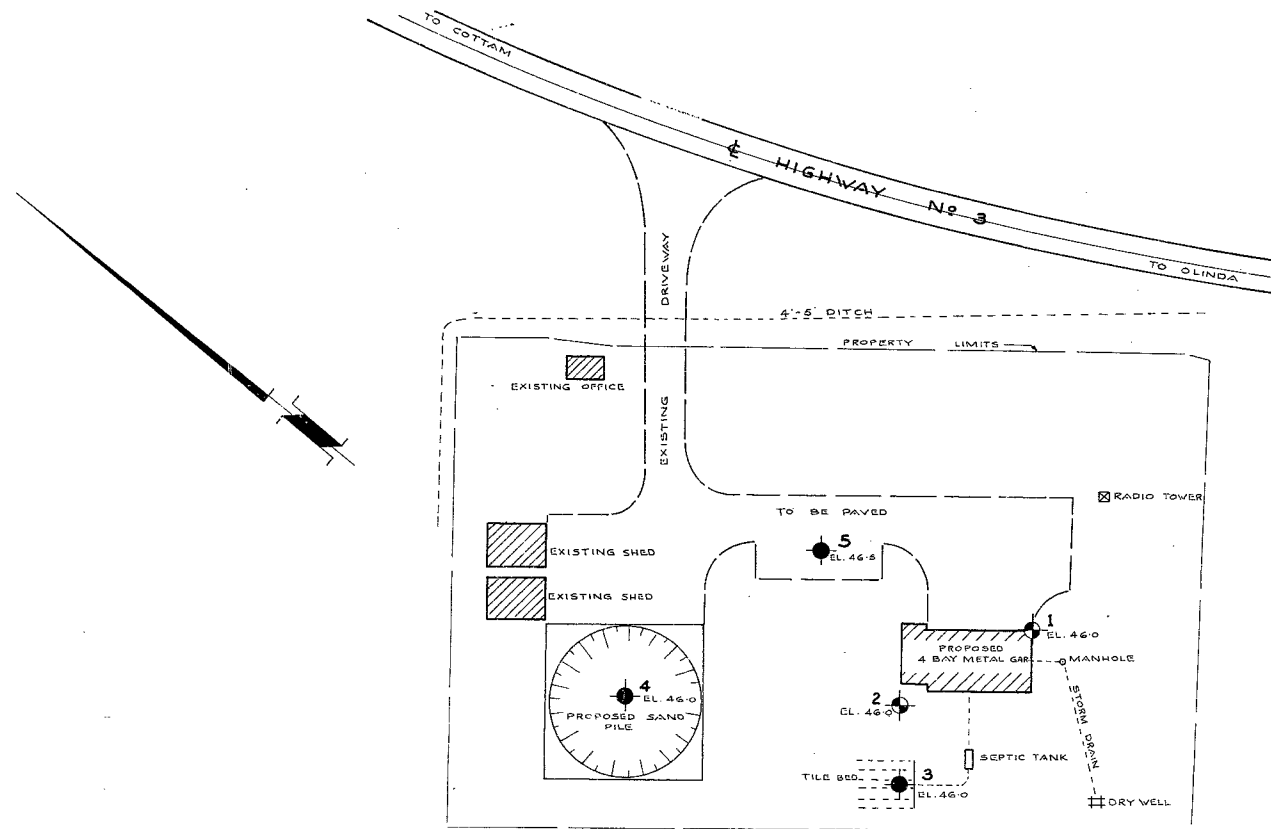
DISTRICT ENGINEER

#65-F(R)-78

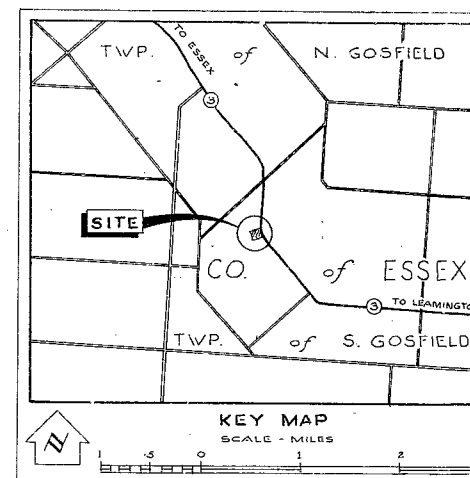
HWY. #3

COTTAM

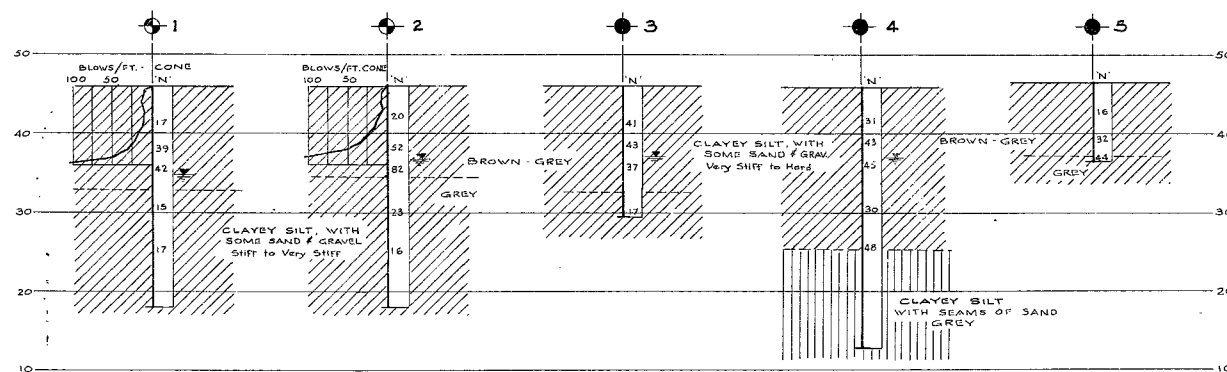
PATROL YARD



PLAN
1 IN. = 50 FT.



- BORE HOLE
- ⊙ BORE & CONE PENETRATION HOLE



BORE HOLE DETAILS
1 IN. = 10 FT.

- 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			
PROPOSED			
COTTAM PATROL YARD			
SHOWING POSITIONS & ELEVATIONS OF HOLES			
HWY. 3	DISTRICT 1	COUNTY ESSEX	
TOWNSHIP SOUTH GOSFIELD	LOT 262	CON. V.	
LOCATION 2.7 MILES SOUTH OF COTTAM			
DRAWN BY: JC	CHECKED BY:	W.P.	
DATE AUG. 4, 1965	APPROVED BY:		
SCALE AS SHOWN			DRAWING NO. 65(R)F-78A