

#64-F-74

PROPOSED

PATROL YD.

MAPLE SIDE RD.

MEMORANDUM

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

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

DATE: August 13, 1964

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

Proposed Patrol Yard on Maple Side
Road, Lot 20, Con. VI, Township of
Vaughan, District 6, Toronto, Ont.
W.J. 64-F-74 -- W.P.(Nil)

It is proposed to erect a Patrol Yard on Lot 20, Con. VI, at Maple Side Road, in the Township of Vaughan. A foundation investigation was requested by the Special Services Section in a memo dated June 9, 1964.

In order to determine the subsoil conditions at the site and decide on the type and depth of the footings, an investigation consisting of 3 sampled boreholes and two dynamic cone penetration tests was carried out. The locations of these boreholes are shown on Drawing No. 64-F-74A, which is attached to this report.

The subsoil conditions at the site are generally uniform and favourable. Below a thin layer of topsoil, is a layer of clayey silt with traces of sand and fine gravel. The material is compact to very dense, with 'N' values (Standard Penetration Test values), ranging from a minimum of 24 blows/ft. to a maximum of 66 blows/ft.

cont'd. /2 ...

This stratum was investigated to a depth of 20 ft.-6 inches below the ground surface. No water level was encountered in any of the boreholes during the time of investigation.

It is recommended that the garage building be supported on continuous strip footings, placed as high as frost conditions will allow. A safe bearing load of 2 T.S.F. may be used for design purposes.

No stability problems are anticipated for the proposed sand pile locations.

The following recommendations, regarding gravelled roads and paved areas, were obtained from the Regional Materials Engineer, Mr. T. J. Kovich:

For all service roads, parking lots and other areas to be paved or gravelled, it is recommended that all topsoil be stripped and 24 inches of granular be used. In this particular case, it is considered that topsoil stripping will not be required for fills 3 ft. or over. The total depth of granular should consist of 6 inches G.B.C. 'A' and the remainder sand cushion.

The asphalt pavement should be 1½ inches HL-3 surface course over 2 inches HL-6 binder course.

The field work was undertaken on August 4, 1964, under the supervision of Mr. E. M. Ghadiali, Project Foundation Engineer, who also prepared this report. The equipment was owned and operated by Dominion Soil Investigation Company of Toronto.

cont'd. /3 ...

August 13, 1964

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

BMG/MdeF
Attach.

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. C. S. Moase (-)
E. J. Orr
H. D. McKillan
C. Fraser
T. J. Kovich
A. Watt

Foundations Office
Gen. Files

APPENDIX I.

DEPARTMENT OF HIGHWAYS - INTERIO
MATERIALS & RESEARCH DIVISION

JOB 64-F-74	LOCATION Patrol Yard at Maple Side Road	ORIGINATED BY B.M.G.
W.P. -	BORING DATE August 4, 1964.	COMPILED BY B.M.G.
DATA Assumed Elevation	BORING TYPE Penn. Auger.	CHECKED BY M.D.

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— WL	BULK DENSITY P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	20 40 60 80 100	PLASTIC LIMIT ——— WP		
				SHEAR STRENGTH P.S.F.	WATER CONTENT — W		
					WP ——— W ——— WL		
					WATER CONTENT %		
100.5	Gr. Surface						
0.0	Topsoil						
0.9							
	Clayey silt with trace of sand and fine gravel.	1	SS	59			
	Dense to v. dense.	2	SS	41			
	Brown changing to grey at 14' depth.	3	SS	66			
		4	SS	61			
80.0		5	SS	63			
20'-6"	End of borehole.						

DEPARTMENT OF COMMERCE
MATERIALS RESEARCH DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

100 64-8-74

LOCATION Patrol Yard at Maple Side Road

ORIGINATED BY B.M.G.

W. J. ... 199

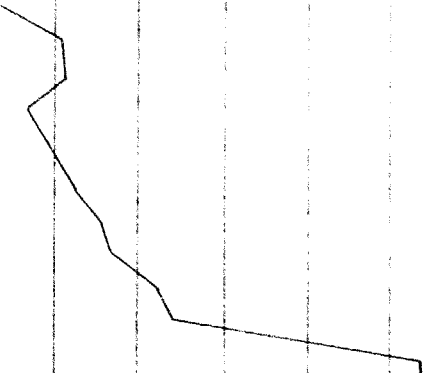
BOH L.C. DAY August 4, 1964.

COMPILED BY _____ B. M. C.

Assumed Elevation.

Dynamic Cone Test Only.

CHECKED BY M.D.

SOIL PROFILE		SAMPLES	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— % PLASTIC LIMIT ——— % WATER CONTENT ——— % ————— %	BULK DENSITY pcf	REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER TYPE	20 40 60 80 100 SHEAR STRENGTH P S F.			
100.5	Gr. Surface.					
0.0						
89.2						
11'-4"	End of cone test.					

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 64-F-74 LOCATION Patrol Yard at Maple Side Road ORIGINATED BY B.M.G.
W F - BORING DATE August 4, 1964. COMPILED BY B.M.G.
DATUM Assumed Elevation. BOREHOLE TYPE Penn. Auger. 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>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

SS	SPLIT SPOON	TW	THINWALL OPEN
WS	WASHED SAMPLE	TP	THINWALL PISTON
SB	SCRAPER BUCKET SAMPLE	OS	OESTERBERG SAMPLE
AS	AUGER SAMPLE	FS	FOIL SAMPLE
CS	CHUNK SAMPLE	RC	ROCK CORE
ST	SLOTTED TUBE SAMPLE		
	PH	SAMPLE ADVANCED HYDRAULICALLY	
	PM	SAMPLE ADVANCED MANUALLY	

SOIL TESTS

Qu	UNCONFINED COMPRESSION	LV	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	FV	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
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	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
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

615000 E

30 M 13 E

4355250 N

sic

MAPLE SIDE ROAD

To Hwy 400

LIMIT OF DEVELOPMENT

N



E 1/2 LOT 20

CON VI

VAUGHAN TWP.

EL 100.5

2

EL 100.5

3

4 BAY GARAGE

EL 100.0

SALT SHED

EL 100.0

SAND PILE

LEGEND



BORE HOLE



CONE HOLE



BORE & CONE HOLE

EL 100.0 ASSUMED AT B.H. 1

CO. YORK
TWP. VAUGHAN

ORIGINATED B.M.G.

DRAWN *LC*CHECKED *AK*APPROVED *N. [Signature]*

DATE AUG. 10, 1964

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTIONMAPLE SIDE ROAD
PATROL YARD

SCALE 1 IN = 100 FT.

W.F. NO.

JOB NO. 64-F-74

DWG NO. 64-F-74A

64-F-74

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundations Engr.

FROM: Materials & Testing Division.

Attn: Mr. B. Ghadiali.

DATE: August 10th, 1964.

OUR FILE REF.

IN REPLY TO

SUBJECT: Proposed Maple Road Patrol Yard,
- Toronto District -

A number of shallow borings to obtain the subsurface conditions for a proposed patrol yard, 1 mile west of Hwy. #400 along the south side of the Maple Side Road, were carried out.

The area is a flat cultivated field with minor differences in elevation.

The borings indicate 9" - 15" of a dark very fine sandy loam topsoil over a dense brown sandy clay loam and medium clay over a very fine sandy loam till which starts at approx. 2½' - 4' depth. At the time of the borings the soils were dry and dense.

It is recommended that the topsoil be stripped and 24" of granular be used under the paved areas. In this particular case it is considered that topsoil stripping will not be required from fills 3' or over. The total depth of granular should consist of 6" G.B.C. "A" and the remainder sand cushion.

The asphalt pavement should be 1½" HL3 surface course over 2" HL6 binder course.

PA/hd
c.c. T.J. Kovich,
Files.

P. Arkema,
For: T.J. Kovich,
Regional Materials Engineer.

AUG. 7/64

HOLE # 1

0 - 14"
14" - 18"
18" - 30"

DK BR SA LO TOPS
BR SA LO - SA CL LO. MOIST.
LT BR SI LO - V.F. SA \$ SI. DRY STONEY.

HOLE # 2

0 - 12"
12" - 18"
18" - 30"
30" - 36"

DK BR SA LO TOPS.
BR SA LO - SA CL LO. DRY.
BR M2 - H CL. DRY
LT BR SI LO - V.F. SA LO. TILL DRY

HOLE # 3

0 - 15"
15" - 40"
40" - 48"

DK BR SA CL LO TOPS. MOIST.
BR SA LO - SA CL LO. MOIST
BR SA CL LO - LT CL. MOIST FIRM.

HOLE # 4

0 - 10"
10" - 16"
16" - 36"
36" - 48"

DK BR SA LO TOPS.
BR SA CL LO. DRY.
BR M2 - H CL. DRY (SI SEAMS 22")
BR SI LO. - V.F. SA LO TILL DRY.

HOLE # 5

0 - 15"
15" - 22"
22" - 26"
26" - 36"

DK BR. SA LO TOPS
BR SA LO - SA CL LO. DRY.
BR M2 - H CL.
LT BR V.F. SA. - SI LO. TILL DRY.

HOLE # 6

0 - 6"
6" - 24"
24" -

DK BR V.F. SA LO TOPS DRY
LT BR SI LO - V.F. SA LO. DRY FAIRLY DENSE
N.F.P. STONES

HOLE # 7

0 - 7"
7" - 12"
12" - 20"
20" - 30"

DK BR V.F. SA LO TOPS.
BR SA LO - SA CL LO. DRY \$ DENSE
BR M2 - H CL. DRY
BR M2 - H CL. (SI SEAMS.) DRY \$ DENSE.

HOLE # 8

0 - 6"
6" - 16"
16" - 22"
22" - 36"
36" - 48"

DK BR SA LO TOPS DRY
BR V.F. SA LO. - SA CL LO. DRY.
BR F - V.F. SA LO. DRY
LT BR SI LO. - V.F. SA LO DRY.
BR M2 - H CL. DRY. (SI SEAMS (36" - 48"))

AUG. 7/68.

HOLE # 9
 - 8"
 - 26" +

OK. BR. SA. LO. TOPS. DRY.

BR. VF SA. # 31 - 31 LO. DRY (TILL.) FIRM.