

# 64-F-84R

Hwy. # 624

MAINTENANCE

YARD (PROP.)

## MEMORANDUM

Gen. Files

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

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

DATE: October 7, 1964.

OUR FILE REF.

IN REPLY TO

SUBJECT:

## FOUNDATION INVESTIGATION REPORT

For

Proposed D.H.O. Maintenance Yard,  
Township of Hearst, Sec. Hwy. #624,  
Dist. #14, New Liskeard.

W.J. 64-F-84R

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W.P. (Nil)

It is proposed to construct a maintenance yard on secondary Highway #624, approximately 1.5 miles from Larder Lake. A foundation investigation was requested by the Special Services Section in a memo dated August 21, 1964.

In order to determine the subsoil conditions at the site, a foundation investigation consisting of 4 sampled boreholes and 5 dynamic penetration tests was carried out by this Section. The locations and elevations of these boreholes are shown on Drawing #64-F-84A which is attached to this report.

The site is covered by 0.5 ft. to 1 ft. of topsoil, followed by a brown, oxidized, laminated silty clay, varying from 9 to 12 ft. in thickness. Underlying this brown material is a deposit of very sensitive, grey varved clay. The layers are generally 20° to the horizontal and slopes southerly.

Cont'd. /2...

October 7, 1964.

The consistency of this material ranges from soft to firm. Beneath the varved clay is bedrock which dips in a southerly direction. The approximate elevations of bedrock found in the sampled and cone holes are shown in the borehole log sheets attached in the Appendix.

Ground water levels were measured at the time of the foundation investigation and it was found that the water level was about 1 ft. below the existing ground level.

During the time of investigation, it was found that the nearest well, which supplies domestic water to the town of Larder Lake, is situated approximately 2 miles from the proposed site.

In view of the subsoil conditions, it is recommended that the garage building be supported on continuous strip footings, placed as high as frost conditions will permit. A safe bearing load of 800 lbs. per sq. ft. may be used for design purposes. The structure should be built near B.H. #1 and B.H. #2 because the soil conditions there are more favourable. A Granular working pad of 1 foot in thickness should be placed beneath and extended 1 foot on both sides of the footings. Precautions should be taken to prevent softening and disturbance of the subsoil during footing excavations.

It is recommended that concentrated loads should be avoided inside the structure so that differential settlements of the footings may be minimized.

Cont'd. /3...

October 7, 1964.

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The safe height of sand or salt piles would be about 10 feet.

No major dewatering problems are anticipated during the excavation of footings if normal construction procedures are followed.

The following recommendations regarding paving and parking areas were given by Mr. E. R. Saint, Regional Materials Engineer for the Northern Region.

(1) Prior to placing any granular base, all topsoil should be removed within 4 feet of finished grade. The average thickness of topsoil is 6 inches.

(2) On all driveways, parking areas and sand pile pads, provide for 30 inches of sand cushion and 6 inches of G.B.C. Class "A".

(3) The paving should consist of 2 inches of HL4 binder course and 1½ inches of HL4 surface course.

The field work, carried out in September, 1964 was undertaken by Mr. T. Chan, Project Foundation Engineer, who also

Cont'd. /4...

October 7, 1964.

prepared this report. The investigation was carried out under the general supervision of Mr. M. Devata, Senior Foundation Engineer, who also reviewed this report.

AGS/PB  
Attach.

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

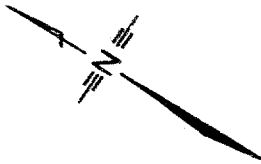
cc: C. S. Moase (4)  
E. J. Orr  
H. D. McMillan  
G. M. Sinclair  
E. R. Saint  
A. Watt

Foundations Office  
Gen. Files

APPENDIX I.

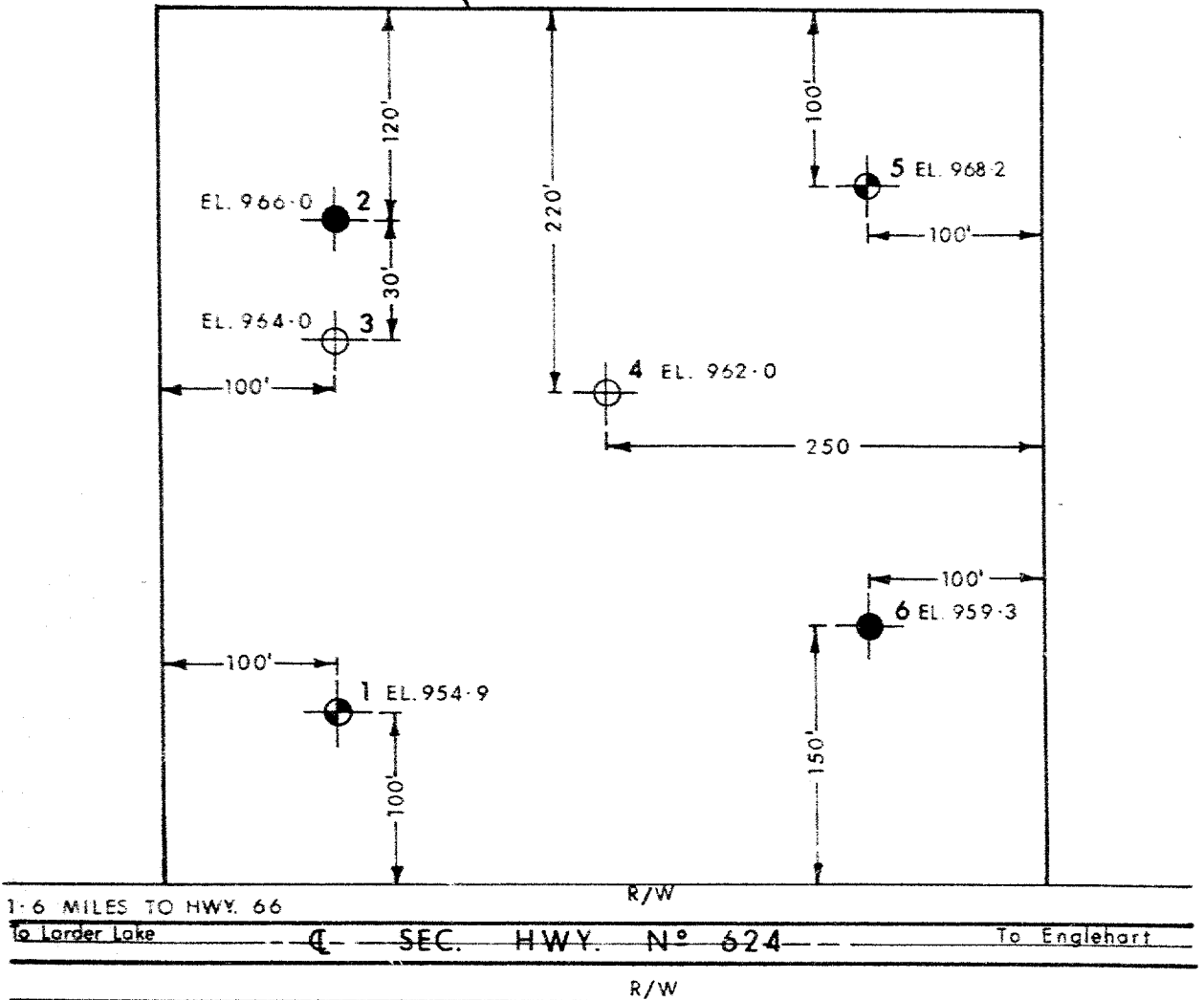
32 D 4 - missing map

NOTE - For sub-soil stratigraphy refer to bore hole logs.



TOWNSHIP OF HEARST

LIMIT OF DEVELOPMENT



PLAN SHOWING BOREHOLE LOCATIONS

LEGEND

- - BORE HOLE
- ⊙ - BORE & CONE PENETRATION HOLE
- ⊕ - CONE PENETRATION HOLE

REF. NO. 64/3615

ORIGINATED T. C.

DRAWN D. M.

CHECKED

APPROVED

DATE 14 OCT. 1964

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH SECTION

LARDER LAKE PATROL YARD

SCALE 1" = 100'

W. P. NO. \_\_\_\_\_

JOB NO. 64 - F - 84

DWG. NO. 64 - F - 84 A

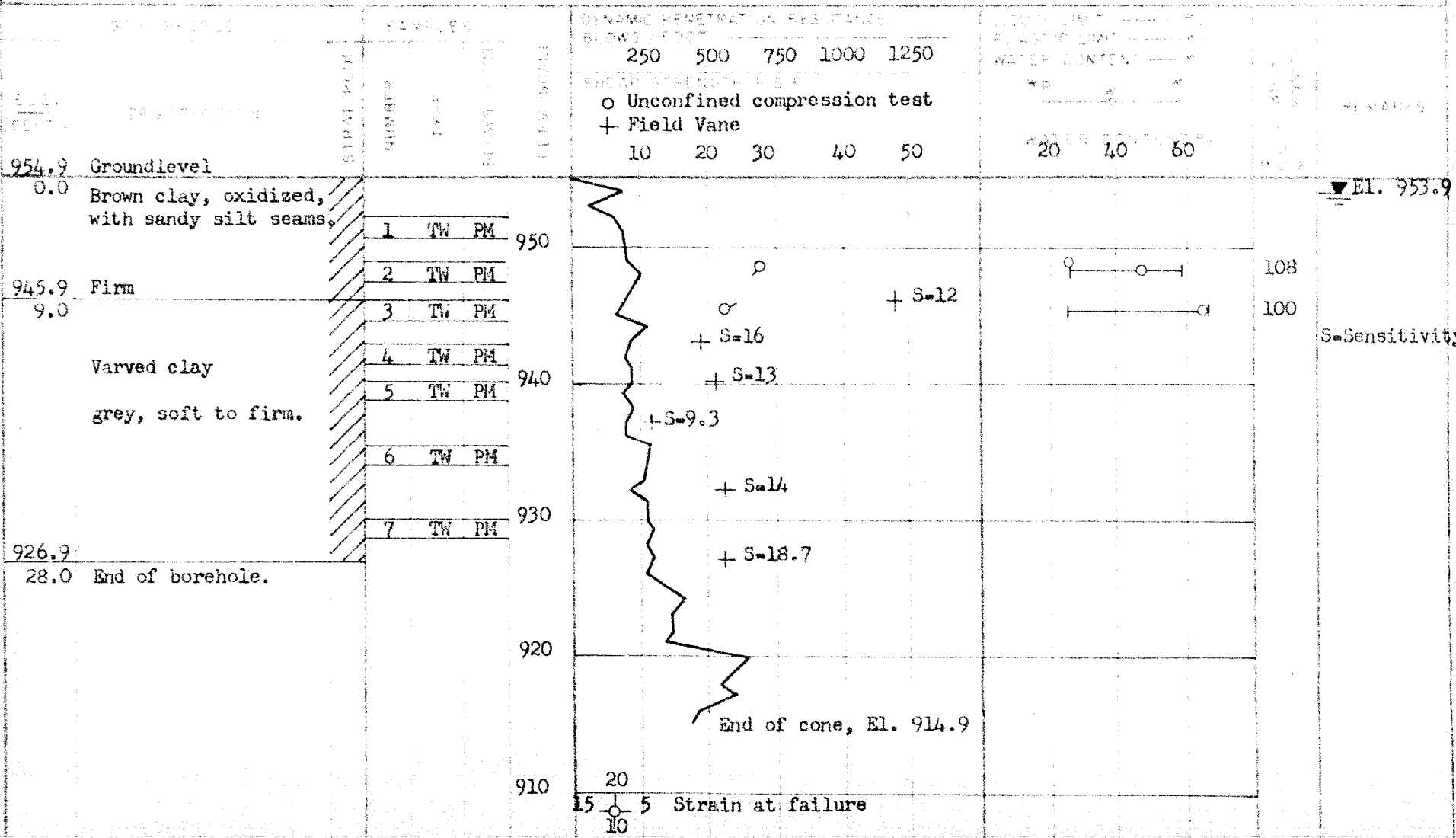
# RECORD OF BOREHOLE NO. 1

STANDARD SECTION

64-F-84  
 Nil  
 G.S.C.

133' from E. of Hwy 624, 100' from North Limit of the proposed site.  
 Sept. 14, 1964.  
 Washboring using NI Casings.

ORGANIZED BY H.T.C.  
 COMPILED BY H.T.C.  
 CHECKED BY M.D.





DEPARTMENT OF HIGHWAYS - CANADA  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

64-F-84

LOCATION 413' from E. of Hwy 624, 100' from N. Limit of the proposed site.

ORIGINATED BY H.T.C.

Nil

BOILING DATE Sept. 15, 1964.

COMPILED BY H.T.C.

WATSON G.S.C.

Washboring using NX Casing.

CHECKED BY \_\_\_\_\_ M.D.

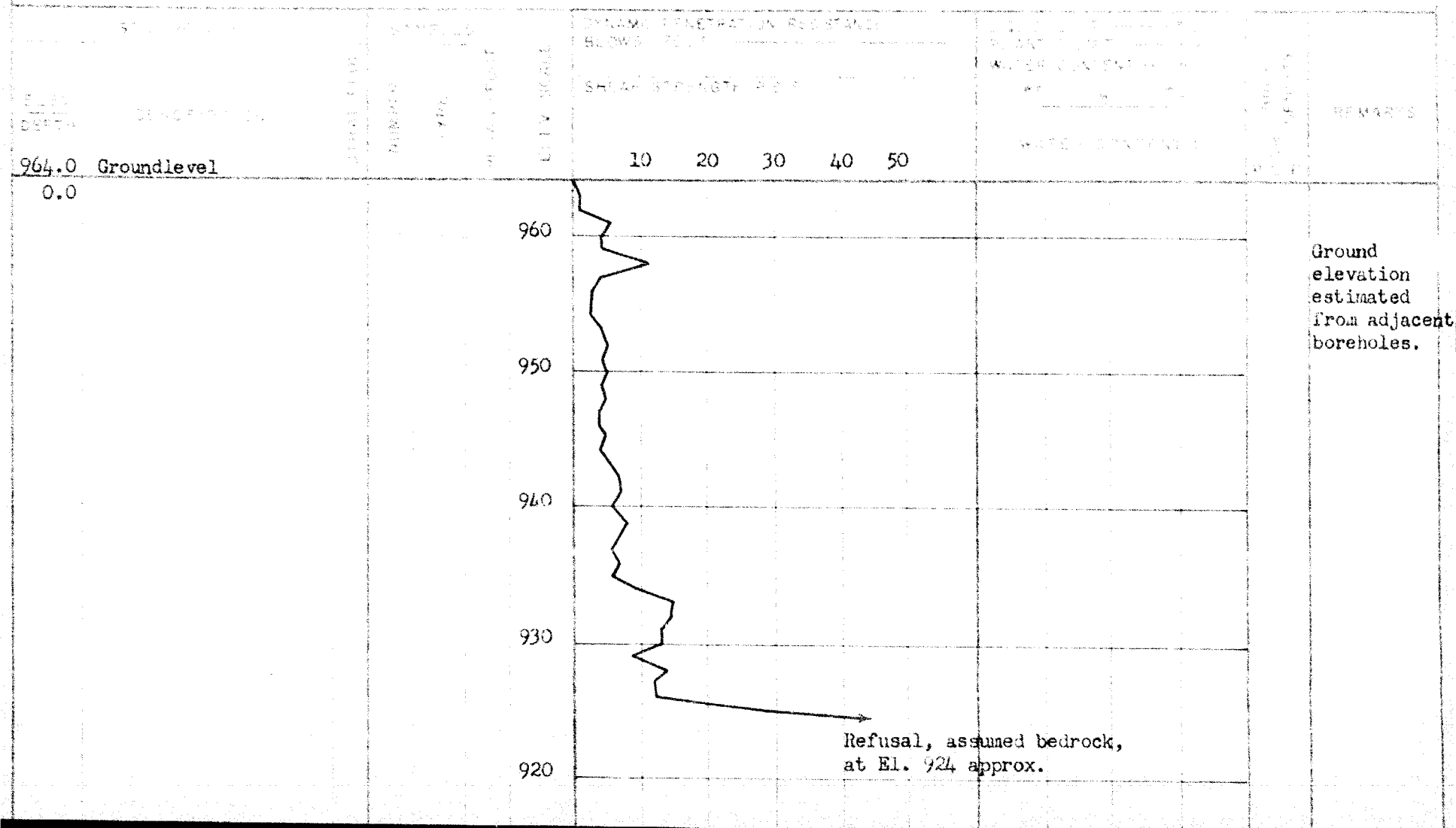
[illegible]

DEPARTMENT OF HIGHWAYS  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 3

ALBANY, N.Y.

JOB 64-F-84 LOCATION 413' from E. of Hwy 624, 100' from North Limit of the DISTRICT H.T.C.  
 A.P. Nil DATE Sept. 16, 1964. PROJECT H.T.C.  
 SATELITE G.S.C. TEST TYPE Dynamic Penetration Test FIELD NO. M.D.



## RECORD OF BOREHOLE NO. 4

313' from E of Hwy 624, 250' from North Limit of the proposed site.

H.T.C.

Sept. 16, 1964.

H.T.C.

### Dynamic Penetration Test

A.C.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

JOE 64-F-84

LOCATION 433' from E of Hwy 624, 400' from North Limit of  
the proposed site.

ORIGINATED BY H.T.C.

W.P. Nil

BORING DATE Sept. 16, 1964.

COMPILED BY H.T.C.

DATE G.S.C.

BORING TYPE Washboring using NX Casing.

CHECKED BY M.D.

SOIL SAMPLE	STATION POINT	SAMPLES		ELEV. (FOOT)	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					REMARKS
		NUMBER	TYPE		200	400	600	800	1000	
ELEV. DEPTH	DESCRIPTION				FIELD STRENGTH - PCF					
					○ Unconfined compression test					
					+ Field Vane					
					5	10	15	20	25	
968.2	Groundlevel									
0.0	Topsoil about 1 ft. Oxidized, clay brown, with sand seams and pockets soft	1	TW PM	960						115 El. 967.2
958.2		2	TW PM							111
10.0		3	TW PM	950						
	Varved clay grey, soft.	4	TW PM							
945.2										
23.0	End of borehole.									
				940	Cone test started at the bottom of the sampled hole					
				930	62/10"					
					Refusal (assumed bedrock) El. 931 approx.					
				920	Strain at failure					



## 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

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

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	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
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	= 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
$\sigma$	NORMAL STRESS
$\sigma'$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	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
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

64-5-84 R

8-30 AM (Thur.)  
See Mr. Evans

## DEPARTMENT OF HIGHWAYS, ONTARIO

## MEMORANDUM

P. O. Box 410, North Bay, Ontario

To: Mr. A. Rutka,  
Materials & Research Engineer,  
NOTTSTOWN.

FROM:

R. H. Moran

Date:

August 21, 1964

See File Ref.

Subject:

Property at New Yard  
Highway 103, L 33703 Subdivided  
Highway 103  
D 1031

Attached please find Property Acquisition Form 64-3615, as well as  
Purchase Order 64-61936.

Please arrange to have soils tests made on the above property  
to ascertain if suitable for future location of a standard D.H.O.  
patrol garage.

Due to the agreement having been forwarded by airtel to the  
District Office on of July 11th, 1964, and having been received  
by this office on of August 20th, 1964, forty days of the required  
120 days have elapsed, thus leaving only 80 days in which to complete  
tests. Therefore, it would be appreciated if every effort could be  
made on your part to complete these tests before the expiry date.

Thank you.

RHM/rac  
Atch.

cc - D. E. Carr

R. H. Moran  
181 Main St. E.  
North Bay

Area Code 705, 472-7900



# OVER

SEND INVOICE IN TRIPLICATE  
AS INDICATED BELOW AND SHOW  
THIS NUMBER

000000

Material e Instrumental Contido - Documento Data: 09.02/14

DEPARTMENT OF HIGHWAYS, ONTARIO

SEND INVOICE IN TRIPPLICATE TO:  
DEPARTMENT OF HIGHWAYS, OTTAWA

cc PS Mander - [unclear] Samuel S. [unclear]

22.11.1911 Donnerstag

~~THE INFORMATION~~ ~~IS~~ ~~CODE~~ ~~VIA~~

REQUIRED FOR Dist. Ct. #1

W.O. NUMBER

RECOMMENDED BY

GOODS AT THE RISK OF SELLER UNTIL INSPECTED AND  
APPROVED BY THE DEPARTMENT AT THE ABOVE SITE.

I CERTIFY THAT THE GOODS BEING PURCHASED/IMPORTED BY  
DEPARTMENT OF HIGHWAYS, ONTARIO

ALL BEING PURCHASED WITH CROWN FUNDS, AND ARE FOR A PURPOSE OTHER THAN FOR RESALE, FOR USE IN CONNECTION WITH THE MANUFACTURE OR PRODUCTION OF GOODS OR TO BE USED FOR OTHER COMMERCIAL OR MERCANTILE PURPOSES AND THEREFORE NOT SUBJECT TO FEDERAL SALES OR EXCISE TAX, ONTARIO RETAIL SALES TAX TO BE ADDED.

## DISCUSSION

ENCLOSURE ON AUTHORITY

THIS COPY IS FOR *SPECIAL AGENT*

DEFECTS IN NEGATIVE DUE TO  
CONDITION OF ORIGINAL DOCUMENT

J. H. Eves.  
(Jim Eves)

See Maintenance Engineer at  
New Liskeard.  
~~or Mr Sutton~~

W. E. = 93  
158  
5

Dept. of Highways.  
P.O. Box 390

Phone: MI 7-6761 (No Area Code).

Permission OK.

MEMORANDUM

To: Mr. A.G. Stermac  
Principal Foundation Engineer  
Downsview

FROM: Materials & Testing  
North Bay, Ontario

DATE: September 16, 1964

OUR FILE REF.

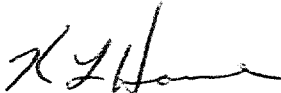
IN REPLY TO

SUBJECT: Re: Soils Investigation on Proposed Maintenance  
Yard, Mining Claims L 29718, L 33708  
Unsubdivided Township of Hearst, Hwy. #624,  
New Liskeard District

A soils investigation was carried out on the above noted Patrol Yard in September 1964 using hand equipment. The proposed yard is situated on a lacustrine deposit of varved silt and clay which slopes gently in a southerly direction.

RECOMMENDATIONS

- 1.) Prior to placing any granular base, all topsoil should be removed within 4 feet of finished grade. The average thickness of topsoil is 6 inches.
- 2.) On all driveways, parking areas and sand pile pads, provide for 30 inches of sand cushion and 6 inches of G.B.C. Class "A".
- 3.) The paving should consist of 2 inches of HL4 binder course and 1½ inches of HL4 surface course.



K.L. Howe

for: E.R. Saint  
Regional Materials Engineer

KLH/ef  
c.c. File (2)