

#65-F-97

HWY #11

WEIGH SCALE

SITE

MEMORANDUM

Dist. 28-14.

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

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

DATE: October 22, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

Proposed Weigh Scale Site on Hwy. #11,
District #14 (New Liskeard)

W.J. 65-F(R)-97 -- W.P. (Nil)

Attached, we are forwarding to you, our foundation investigation report on the subsoil conditions existing at the above structure site.

We believe that the factual data and recommendations contained therein, will suffice for your design requirements. Should further information be required, please feel free to contact our Office.

KYL/MdeF

Attach.

cc: Messrs. C. S. Moase (4)

E. J. Orr

D. W. Farren

G. M. Sinclair

E. R. Saint

A. Watt

Foundations Office

Gen. Files

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

FOUNDATION INVESTIGATION REPORT

For

Proposed Weigh Scale Site on Hwy. #11,
District #14 (New Liskeard)

W.J. 65-F(R)-97 -- W.P. (Nil)

A request dated August 24, 1965, to conduct a foundation investigation at the proposed site of weigh scales on Highway #11, was received from Mr. B. Gayman, Regional Special Services Inspector.

The weigh scales are proposed to be located about 4 miles north of New Liskeard on Highway #11. The site is on lot 9 of Concession 6, Township of Dymond in the District of Timiskaming, and is part of a relatively flat field presently under cultivation.

A foundation investigation was conducted by this Section at the proposed site to determine the soil conditions. Field and laboratory results as well as discussion and recommendations for the foundations, are contained herein.

Beneath the 8 inches of topsoil is a 2- to 3-foot thick crust underlain to a depth of at least 40 feet by a soft varved clay.

At the time of writing this report, details of the structures and the proposed loads, were not available. Spread footings, established below the depth of frost penetration, could be designed for an allowable load of 600 p.s.f. Some settlement is to be expected; however, without knowledge of the loading to be imposed, the amount of settlement cannot be estimated.

cont'd. /2 ...

The subsoil beneath the crust varies from sensitive to extra-sensitive; hence, during excavation, particular care should be taken to avoid disturbance at the level of the foundations. As well, a working slab should be cast immediately. Temporary shoring may be required, depending upon the depth of the excavation.

Due to the impermeability of the subsoil, the water table was not established during the investigation. The amount of seepage into the excavation should be adequately handled by low capacity pumps.

The field investigation was completed in August, 1965, using equipment owned and operated by Canadian Longyear, Ltd., under the supervision of Mr. L. Palmer, Project Foundation Engineer, who subsequently prepared this report. Mr. M. Devata, Senior Foundation Engineer, supervised the entire project, in general, and reviewed this report.

October 1965

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 65-F-97

LOCATION Hwy 11. 4 Miles N. of New Liskeard

FOUNDATION SECTION

ORIGINATED BY L.P.

W. P. _____

BORING DATE Aug. 25, 1965.

COMPILED BY L.P.

DATUM EM - 726.87'

BOREHOLE TYPE Washboring - NX Casing.

CHECKED BY M.D. [Signature]

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS						
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.		WATER CONTENT %								
							• - Unconfined Compression Test + - Field Vane Test		WP			WL					
725.5 0.0						300	600	900	1200	1500	20	40	60				
	Clay to silty clay - Very stiff to soft. Varved below 7 feet.		1	TW	PM	720					0.2645				118	21 pgs	
								+ 4.3									99
			2	TW	PM			+ 7.6									
							+ 11.0										
			3	TW	PM	710											
			4	TW	PM			+ 11.5									97
			5	TW	PM												
							+ 8.4										
			6	TW	PM	700		+ 6.6									
					+ 6.3										103		
					+ 6.0												
					+ 7.0												
					+ 6.1												
	8	TW	PM	690		+ 10.0									105		
						+ 6.8											
	9	TW	PM														
686.0 39.5	End of borehole.					+ 10.0 + 8.4											

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 65-F-97 LOCATION Hwy 11, 4 Miles N of New Liskeard ORIGINATED BY L.P.
W.P. BORING DATE Aug 26, 1965. COMPILED BY L.P.
DATUM BM-726.87 BOREHOLE TYPE Washboring - NX Casing. CHECKED BY M.D. *HL*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W			BULK DENSITY P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					Wp W WL 20 40 60						
							● - Unconfined Compression Test + - Field Vane Test					WATER CONTENT %						
725.5							300	600	900	1200	1500							
0.0	Clay to silty clay. Very stiff to soft. Varved below 7 feet.		1	TW	PM	720												
			2	TW	PM													
			3	TW	PM	710												
			4	TW	PM													
			5	TW	PM													
			6	TW	PM													
701.0						700												
24.5																		

S. 6/2/18

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
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

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_f	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_o	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

To: Mr. C.S. Moase (4)
Manager, Special Serv. Section
Administration Building
Downsview

FROM: Materials & Testing
Northern Region

DATE: November 5, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: Soils Investigation of Scale Site at
Lot 9, Con VI, Twp. of Dymond
District #14, New Liskeard

A soils investigation was carried out on the proposed roadways at the above noted site on November 2, 1965. A foundation report for this site dated October 22, 1965 is available and this memo should be attached.

The proposed site is located within the Timiskaming clay plain approximately 3 miles north of the Town of New Liskeard, adjacent to Hwy. #11.

The majority of the area involved is under cultivation and subsequently the depth of topsoil is in the order of 10 to 12 inches. The underlying soils are calcareous varved clays with poor internal drainage and high sensitivity.

Recommendations

- 1.) It is recommended that all topsoil be removed from under proposed fills up to 4 feet in height prior to the placing of granular materials.
- 2.) A minimum depth of 36 inches of granular material should be provided throughout the proposed roadways and parking areas. This depth should consist of 6 inches of G.B.C. Class "A" and the remainder sand cushion.
- 3.) In the event that sub-excavation is required to provide the above noted granular depth, care should be taken to insure that the underlying soils are not disturbed and drainage should be provided for the granular material.

continued.....2

To: Mr. C.S. Moase

November 5, 1965

- 4.) The paving should consist of 2 inches of HL4 binder course and 1 1/2 inches of HL4 surface course.



Keith L. Howe

for: E.R. Saint
Regional Materials Engineer

LLH/ef

c.c. E.J. Orr
D.W. Farren
G.M. Sinclair
A. Watt
A. Stermac ✓
File (2)

1000 MAY 17 PM 2:04

323

17/66, 150
DOWN LISK 8 MAY GUXYYN QCTPP

A G STERNAC PRINCIPAL FOUNDATION ENGINEER MATERIALS AND TESTING
RE: FOUNDATIONS FOR PROPOSED WEIGH SCALE HIGHWAY 11 NORTH OF NEW
LISKEARD YOUR REFERENCE W.J.65-F(R)-97

I HAVE OUR COPY OF YOUR FOUNDATION INVESTIGATION REPORT DATED OCTOBER
22/1965. THIS INDICATES THAT SOME PROBLEMS CAN BE ANTICIPATED IN
CONSTRUCTION OR MAINTENANCE OF THE PROPOSED SCALE. YOU HAVE
INDICATED THAT A SPREAD FOOTING SHOULD BE USED , BASED ON AN
ALLOWABLE LOAD OF 600 P.S.F.

IT WOULD BE APPRECIATED IF YOU COULD RECOMMEND SPECIFIC FOOTING
DETAILS FOR THE SCALE HOUSE, AND ALSO WHETHER OR NOT ANY SPECIAL
TREATMENT IS INDICATED FOR THE SCALE PIT.

YOUR WILL NOTE THAT THE HOUSE AND PIT ARE TIED TO-GETHER. THIS IS
LIABLE TO SET UP SOME SEVERE STRESSES IF THERE IS ANY DIFFERENTIAL
HEARING.

WE ARE PREPARING ESTIMATES FOR CONSTRUCTION NOW SO THERE IS SOME
URGENCY IN THE MATTER.

PLANS ARE AVAILABLE THROUGH MR MOASEN

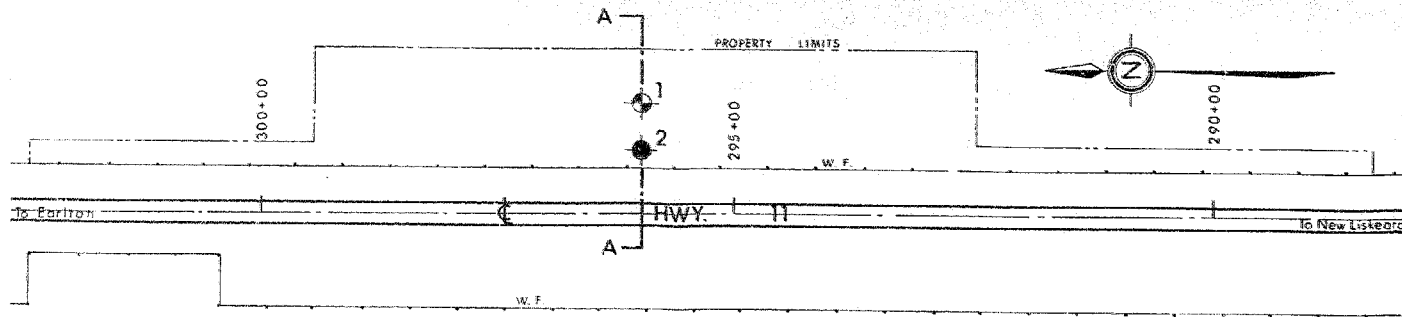
G M SINCLAIR

FT

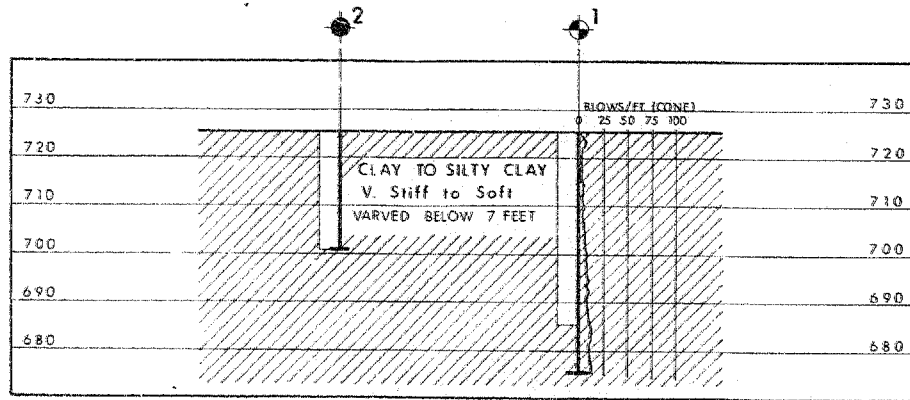
1) Construction problems:- Since the subsoil is sensitive
saturated clay, care should be taken to avoid disturbance
at the level of ~~the~~ foundations during excavation. This
may be achieved by temporary shoring ~~operations~~ during
excavation operations and also providing a lean concrete
slab or granular below the base of the footings.

2) Maintenance problem:- If the weigh scales are
fixed to the building, they may settle.
An expansion joint may be required between weigh
scale pit and the house foundation. ~~This will enable~~
~~the two units to settle independently.~~ ^{This will enable} This problem
has been already discussed with Mr. McMurray of the
Special Services section and he is in full agreement
with the above factor.

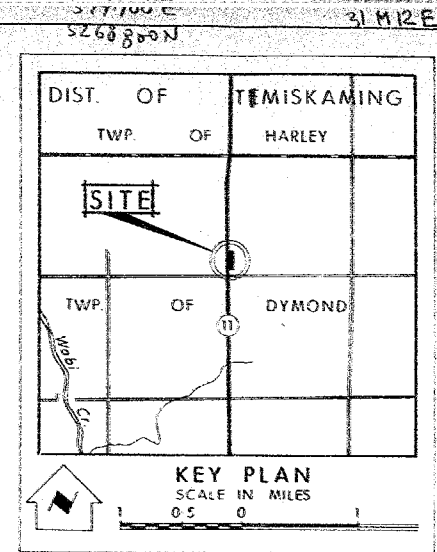
3) Regarding the size of the footings, it is up to the
designer to calculate the required dimension using
a safe bearing pressure of 800 p.s.f. as recommended
in the foundation report.



PLAN
SCALE 100 0 200 FT.



SECTION A-A
SCALE 20 10 0 20 40 FT.



LEGEND

- Bore Hole
- ⊗ Bore & Cone Penetration Hole



DATE 6 OCT. 1965

HWY. 11 - NORTH OF NEW LISKEARD
PROPOSED WEIGH SCALE SITE

APPROVED

DRAWING NO. 65-F-97A