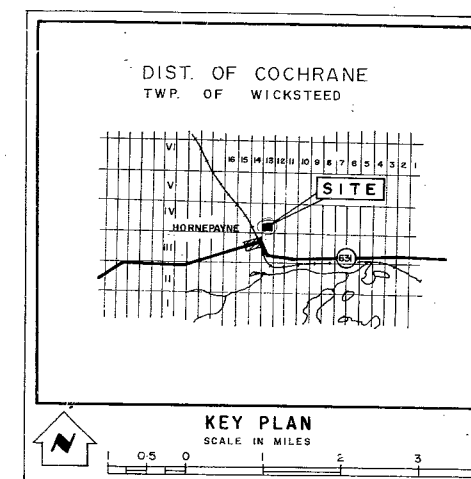
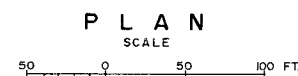
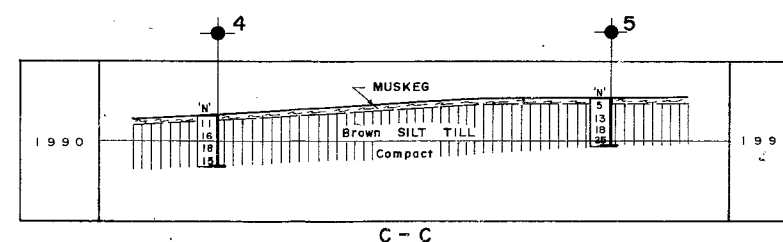
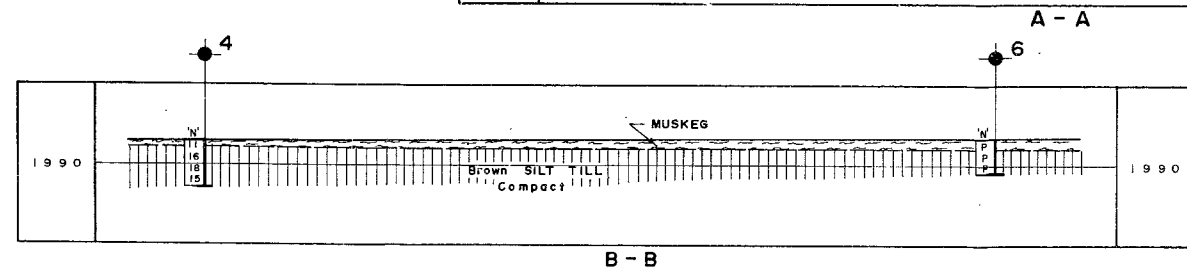
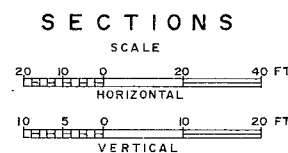
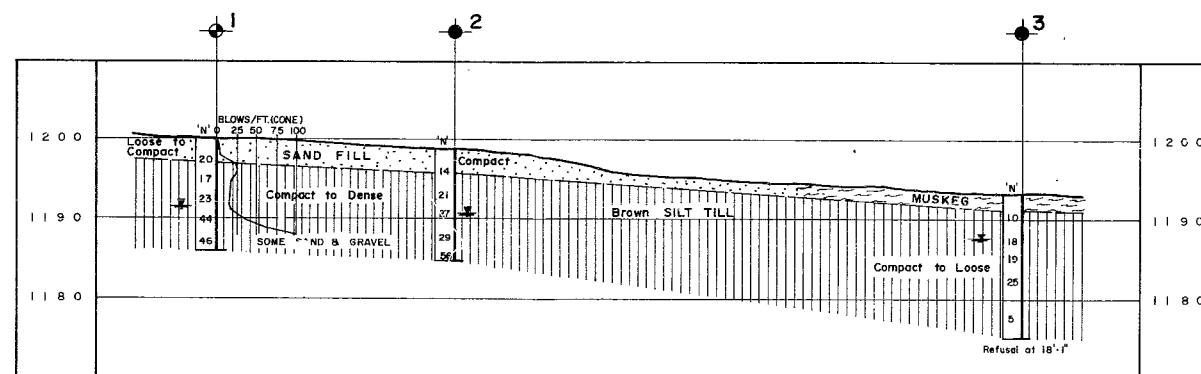


#65-F-210
HWY. #631
HORNEPAYNE
PATROL YARD
COCHRANE



- 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.

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

KING'S HIGHWAY NO. 631 DIST. NO. 16
DIST. COCHRANE ALGOMA
TWP. WICKSTEED LOT 13 CON. IV

BOREHOLE LOCATION PLAN & SOIL STRATIGRAPHY

SUBM'D.	CHECKED	W.P. NO.	DRAWING NO. 5 - 7 - 28
DRAWN O.A.M.	CHECKED	JOB NO.	
DATE AUG. 11, 1965		SITE NO.	
APPROVED <i>A. P. Thomas</i>	CONT. NO.		

[illegible]

SOIL INVESTIGATION
HORNEPAYNE PATROL YARD
DISTRICT OF COCHRANE
DISTRICT #16

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD

SCARBOROUGH, ONTARIO

TELEPHONE 421-2567

BRANCH

3 QUEENS AVENUE
LONDON, ONTARIO
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

P.O. BOX 933

SAULT STE. MARIE
ONTARIO
TELEPHONE AL. 4-2615

August 25th, 1965.

OUR REF: 5-7-28

Department of Highways, Ontario,
Material & Research Division,
Downsview, Ontario.

Attention: Mr. A. Rutka, P. Eng.,
Materials & Research Engineer.

Re: Soil Investigation, Hornepayne Patrol Yard, Highway #631
Lot 13, Concession 4, Township of Wickstead, District of
Cochrane, District #16

REPORT

Gentlemen:

In accordance with your request, we have carried out a soil investigation at the site of the above project. The results of this investigation, together with our recommendations, are now presented in this report.

PROCEDURES

The work in the field was carried out on July 29th and 30th, 1965, using a standard diamond drill machine and washboring technique. A total of 6 boreholes, one with an adjacent dynamic cone penetration test, was put down at the locations indicated on the attached drawing. The overburden was sampled at 2½ ft. intervals of depth to a maximum depth of 18 feet below the ground surface. In boreholes No. 4, 5 and 6, continuous samples were recovered to a depth of 6 feet. When recovering disturbed soil samples, the number of blows of a 140 lb. hammer falling freely 30 inches required to drive the 2-inch O.D. split spoon sampler 12 inches into undisturbed ground was recorded as the Standard Penetration Resistance or "N" value.

5-7-28

-2-

All elevations are referred to a bench mark established at the top of a 1" square iron bar located at the northeast corner of the property. The elevation of this bench mark was given on the supplied drawing (Drawing No. H-5-84) as 1200 feet.

SUBSURFACE CONDITIONS

The investigation has indicated that with the exception of boreholes No. 1 and 2, where 3 feet of granular fill material was encountered, the major part of the proposed patrol yard is underlain by muskeg. The thickness of this organic deposit varies between a few inches up to 2 feet.

The unorganic, mineral soil underlying the site is a silt till, that is, a till in which the silt size is predominant. It is a granular, non-plastic, non-cohesive deposit and typical grain size distribution curves of the till are shown on Enclosure No. 2 and 3. Occasionally, the texture of the till becomes coarser, and the sand and gravel particles predominate, (Enclosure 4). The Standard Penetration Test results range between 10 and 56 blows per foot indicating a compact to dense relative density. On the average, the relative density of the till is estimated to be compact.

The position of the free water level in the boreholes, 18 to 24 hours after the holes were completed, was observed between elevations 1191.5 and 1187.6 ft.

RECOMMENDATIONS

For the purpose of frost protection, it is recommended that the footings be taken at least $5\frac{1}{2}$ feet below the finished grade. Assuming that the floor slab of the proposed extension will be at the same level as the existing floor slab is, (Elevation 1200.58 ft.) it is estimated that the

D O M I N I O N S O I L I N V E S T I G A T I O N L I M I T E D

5-7-28

-3-

finished outside grade will be at about elevation 1200 ft., and therefore the foundations will be at elevation $1194.5 \pm$ ft. Based on the estimated shear strength of the soil at this level, continuous strip footings may be designed for 3,000 lbs. per square foot soil pressure, and isolated spread footings for 2,500 lbs. per square foot. These values incorporate a safety factor of 3 against the general shear failure of the soil.

The site is considered to be suitable for slab on grade construction, but the existing loose fill material in the area of the proposed extension should be removed and replaced by a well-compacted granular fill material. This fill material should be placed in shallow lifts and compacted to at least 95% of its Standard Proctor Dry Density.

There are no problems foreseen from the stockpiling of an approximately 100 foot diameter sand pile located in the area of borehole No. 3, provided all muskeg falling below the grade is removed.

Copies of the borehole logs and soil samples from the subgrade were submitted to Mr. E. R. Saint, Regional Materials Engineer, from whom the following tentative recommendations concerning paved areas were received.

1. "All organic material should be removed from areas to be treated.
2. A minimum depth of 30" of granular material should be provided. This depth to consist of 6 inches of G.B.C., Class "A", and the remainder sand cushion.
3. Hot mix paving should consist of one, 2 inch lift of HL4 Binder Course and one, $1\frac{1}{2}$ inch layer of HL4 Surface Course."

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED,

I. P. Lieszkowszky
I. P. Lieszkowszky, P. Eng.,
Project Engineer.

IPL./jvm



E n c l o s u r e s

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND GROUND WATER CONDITIONS.

BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY	ORGANICS	BEDROCK	GROUND WATER LEVEL	DEPTH OF CAVE-IN
		COARSE	FINE	COARSE	MEDIUM	FINE						
Ø > 8"	3"	3/4"	4.76mm	2.0	0.42	0.074	0.002	>	NO SIZE LIMIT			
U.S. Standard Sieve Size:			No.4	No.10	No.40	No.200						

SAMPLE TYPES.

AS Auger sample

CS Sample from casing

ChS Chunk sample

RC Rock core

% Recovery

SS Split spoon sample

TP Piston, thin walled tube sample

TW Open, thin walled tube sample

WS Wash sample

SAMPLER ADVANCED BY static weight : w

" pressure : p

" tapping : t

OBSERVATIONS
MADE WHILE
CORING

Steady pressure

No pressure

Intermittent
pressureWashwater
returnsWashwater
lost

PENETRATION RESISTANCES.

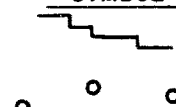
DYNAMIC PENETRATION RESISTANCE : to drive a 2" ϕ , 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

STANDARD PENETRATION RESISTANCE, -N- : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.

EXTRAPOLATED -N- VALUE

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

SYMBOL :



322

SOIL PROPERTIES.

W % Water content

LL % Liquid limit

PL % Plastic limit

PI % Plasticity index

LI Liquidity index

 γ^*

Natural bulk density (unit weight)

e

Void ratio

RD

Relative density

 C_v

Coeff. of consolidation

 m_v

Coeff. of volume compressibility

k

Coeff. of permeability

C

Shear strength

 ϕ

Angle of int. friction

 C'

Cohesion

 ϕ'

Angle of int. friction

in terms of
total stress
in terms of
effective stress

UNDRAINED SHEAR STRENGTH.

- DERIVED FROM -

TRIAXIAL

UNCONFINED

LABORATORY

FIELD

COMPRESSION

TEST

VANE TEST

POCKET
PENETROMETER
TEST

Strain at failure is represented
by direction of stem

20%
15% + 5%
10%

St : sensitivity = $\frac{\text{shear strength in undisturbed state}}{\text{shear strength in remoulded state}}$

SOIL DESCRIPTION.

COHESIONLESS SOILS :

RD :

COHESIVE SOILS :

C lbs/sq.ft.

Very loose

0 - 15 %

Loose

15 - 35 %

Compact

35 - 65 %

Dense

65 - 85 %

Very dense

85 - 100 %

Very soft

less than 250

Soft

250 - 500

Firm

500 - 1000

Stiff

1000 - 2000

Very stiff

2000 - 4000

Hard

over 4000

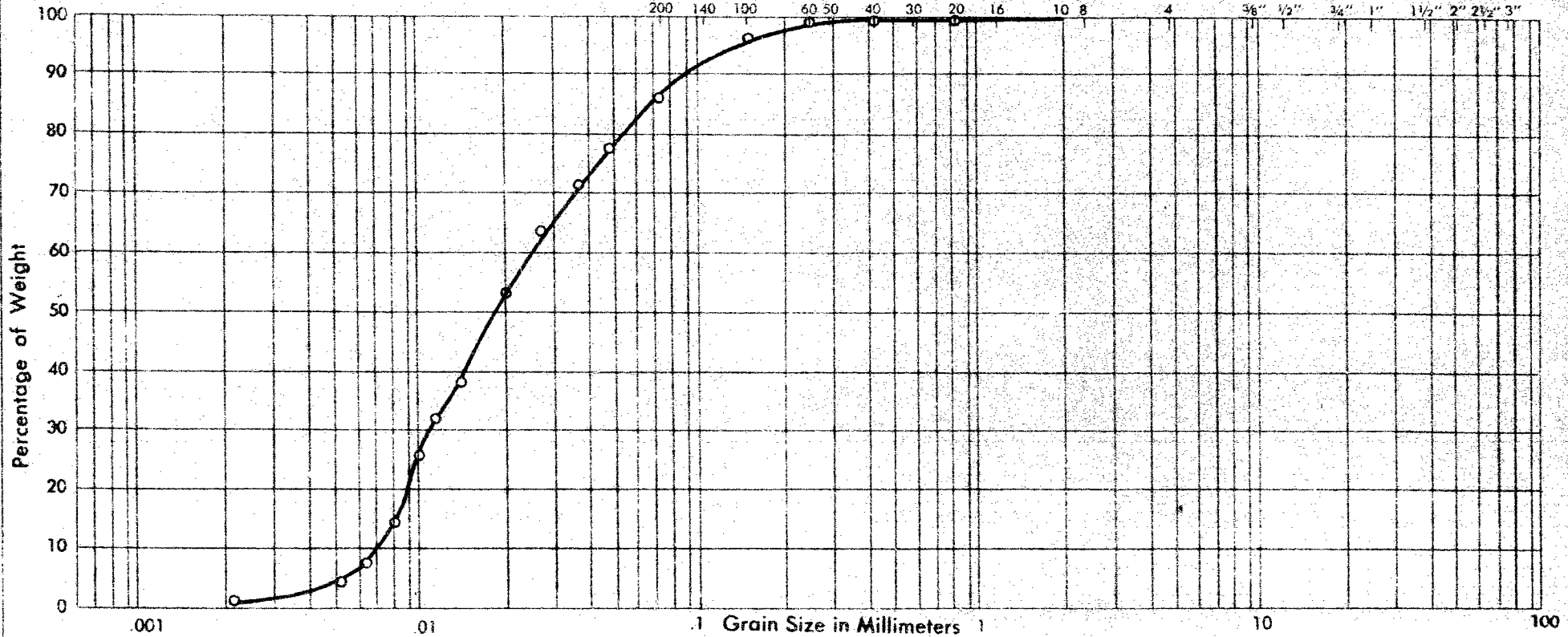
DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 5-7-28

UNIFIED SOIL CLASSIFICATION
SYSTEM

SILT AND CLAY	SAND				GRAVEL	
	FINE	MEDIUM	COARSE		FINE	COARSE



PROJECT: D.H.O. PATROL YARD
LOCATION: HORNEPAYNE
BOREHOLE NO.: 1
SAMPLE NO.: 2
DEPTH OF SAMPLE: 5'
ELEVATION OF SAMPLE: 1195'

COEFFICIENT OF UNIFORMITY: 3.6
COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

SILT with some fine sand

PLASTIC PROPERTIES:

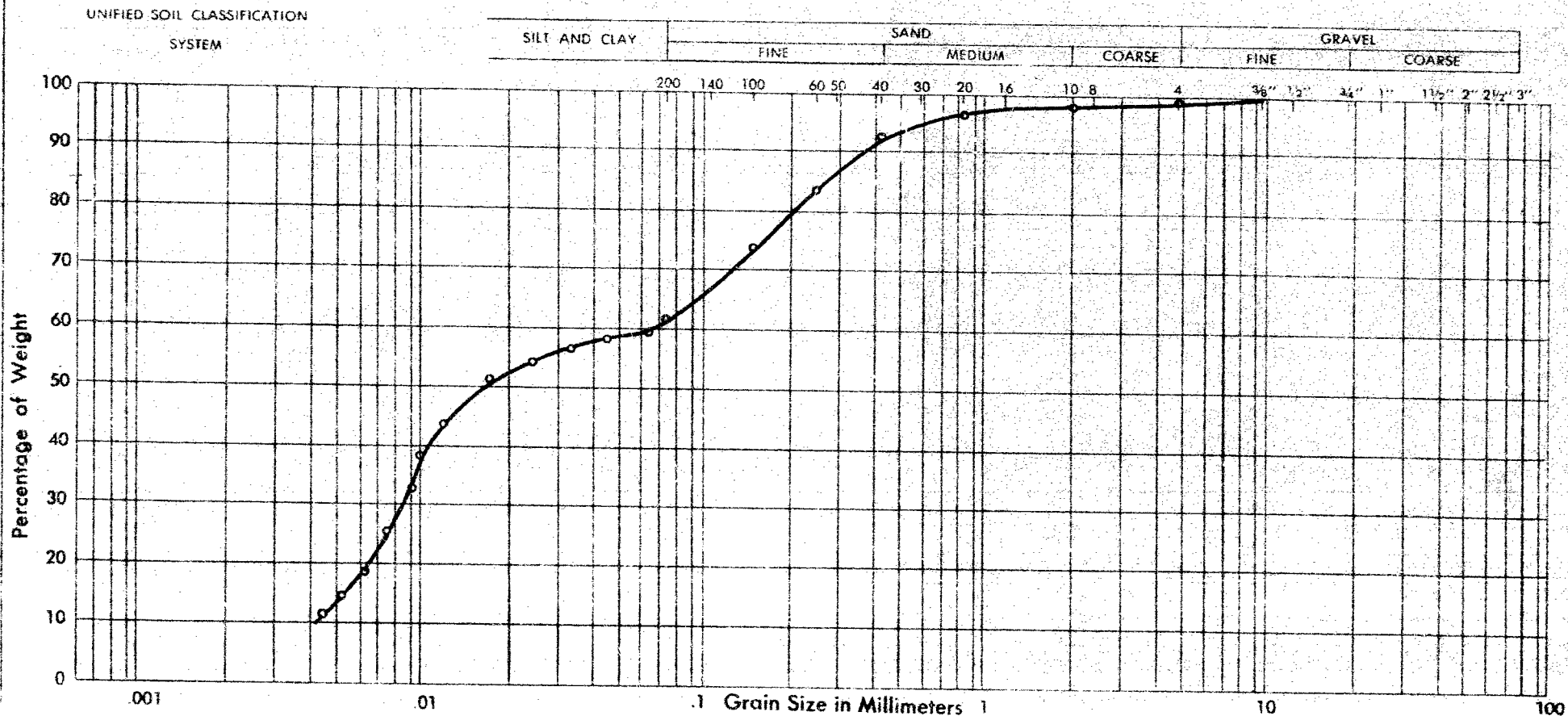
LIQUID LIMIT: % =
PLASTIC LIMIT: % =
PLASTICITY INDEX: % =
MOISTURE CONTENT: % = 17.9
ACTIVITY: % =

Enclosure No. 2

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 5-7-28



PROJECT: D.H.O. PATROL YARD

LOCATION: HORNEPAYNE

BOREHOLE NO.: 1

SAMPLE NO.: 4

DEPTH OF SAMPLE: 10'

ELEVATION OF SAMPLE: 1190'

COEFFICIENT OF UNIFORMITY 15.0

COEFFICIENT OF CURVATURE

PLASTIC PROPERTIES:

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % = 13.4

ACTIVITY =

Classification of Sample and Group Symbol:

SILT and fine sand

Enclosure No. 3

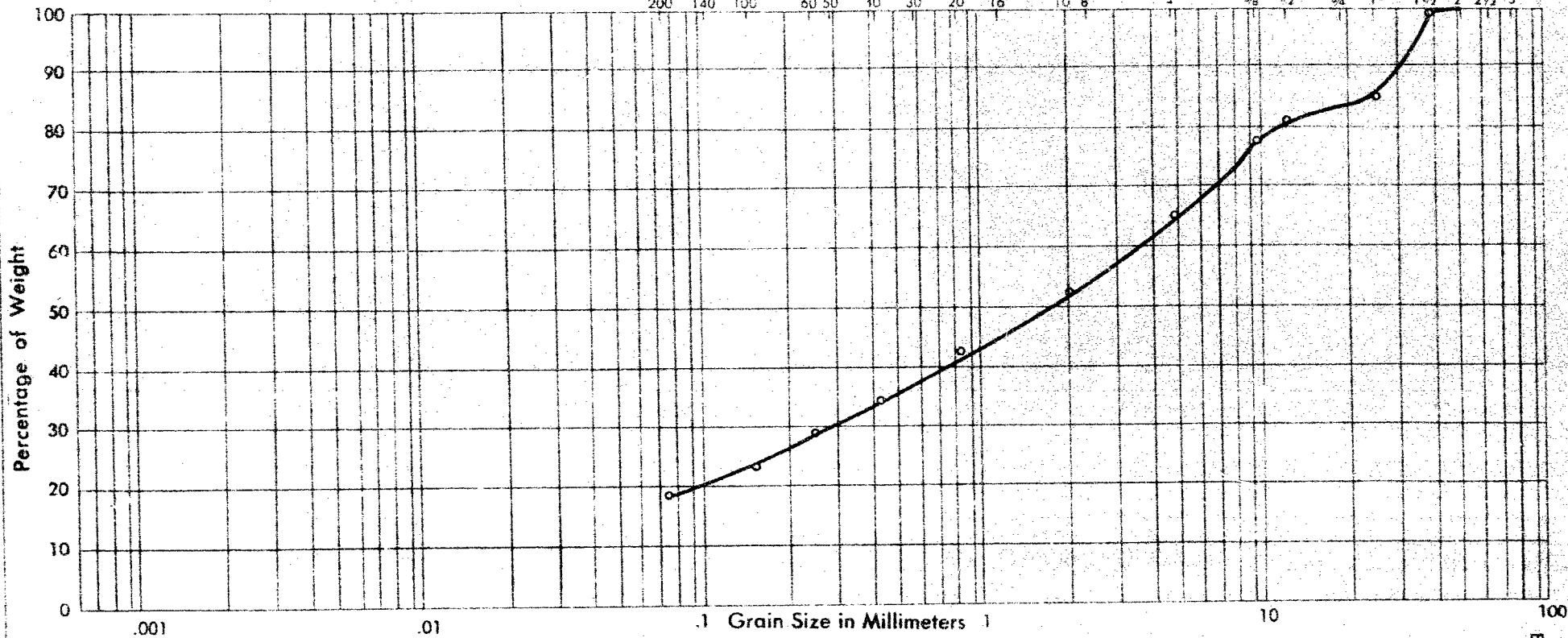
DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 5-7-28

UNIFIED SOIL CLASSIFICATION
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: D. H. O. PATROL YARD
 LOCATION: HORNEPAYNE
 BOREHOLE NO.: 1
 SAMPLE NO.: 5
 DEPTH OF SAMPLE: 12.5'
 ELEVATION OF SAMPLE: 1187'

COEFFICIENT OF UNIFORMITY
 COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:

Well graded gravelly SAND with some silt

PLASTIC PROPERTIES:

LIQUID LIMIT: % =
 PLASTIC LIMIT: % =
 PLASTICITY INDEX: % =
 MOISTURE CONTENT: % = 9.8
 ACTIVITY: =

Mr. C. S. Mease,
Manager,
Special Services Section,
Admin. Bldg.

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

August 31, 1965

FOUNDATION INVESTIGATION REPORT BY:
Dominion Soil Investigation Limited -
Hornepayne Patrol Yard, Highway #631,
District of Cochrane, District #16.

Attached, please find the above-mentioned report
submitted by the Consultant, Dominion Soil Investigation Ltd.

We have reviewed the report and believe that it
contains all the information necessary for your further work.
However, should there be any additional explanation or
information, please feel free to call on our office.

AGS/AGOP
attach.

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

S. J. Orr
T. E. Farren
J. H. Foster
S. H. Saint
A. Kall

afternoon
A. C. Stephens,
PRINCIPAL FOUNDATION ENGINEER

Foundations Office ✓
Gen. Files

D O M I N I O N S O I L I N V E S T I G A T I O N L I M I T E D

77 CROCKFORD BOULEVARD - SCARBOROUGH ONTARIO CANADA - TELEPHONE 421-2567

BRANCH
3 QUEENS AVENUE
LONDON, ONTARIO
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

ASSOCIATED COMPANY
SOIL TESTING AND ENGINEERING LTD.
34 BRENTFORD ROAD,
KINGSTON 5, JAMAICA, WEST INDIES
TELEPHONE: 68989

August 27, 1965.

OUR REF: 5-7-28

Department of Highways, Ontario,
Materials & Research Division,
DOWNSVIEW, Ontario.

Attention: Mr. A. Rutka, P.Eng.,
Materials & Research Engineer.

Re: Soil Investigation, Hornepayne Patrol
Yard, Highway #631, Lot 13, Concession
4, Township of Wickstead, District of
Cochrane, District #16

Dear Sirs:

We take pleasure in enclosing eleven copies of our report on the subsoil conditions at the above-mentioned site and will be glad to discuss any questions arising from this work.

Soil samples will be retained for a period of three months and thereafter disposed of unless otherwise instructed.

We thank you for having given us this opportunity to be of service to you.

Yours very truly,

DOMINION SOIL INVESTIGATION LTD.,

R. H. King, P.Eng.,
Director.

KHK/is
Encl.

*File with
D.S.I. report
when it arrives
ag*

Materials & Testing Division,
1301 Hammond Street,
North Bay, Ontario.

August 12, 1965.

Dominion Soils Investigation, Ltd.,
77 Crockford Blvd.,
Scarborough, Ontario.

Att: Mr. K.H. King, Chief Engineer

Re: Hornepayne Patrol Yard,
Hwy. 631, Lot 13, Con. 4,
Twp of Wickstead, District
of Cochrane. (District 16)

Dear Sir:

Copies of the log of boreholes received from your company dated July 29-30, have been reviewed. Based on the information contained in these logs, it would appear that the major part of the proposed patrol yard is covered by muskeg varying in depth from a few inches up to 2 feet. The mineral soils below the muskeg are generally silt and very fine sand.

The following treatment is recommended for all areas to be paved:

- (1) All organic material should be removed from areas to be treated.
- (2) A minimum depth of 30 inches of granular material should be provided. This depth to consist of 6 inches of G.B.C. class "A" and the remainder sand cushion.
- (3) Hot mix paving should consist of one, two inch lift of HL4 binder course and one, one and one-half inch layer of HL4 surface course.

c.c. D. Smith
A. Stermac ✓
File

Yours truly,



Keith L. Howe

for: E.R. Saint
Regional Materials Engineer

Materials and Testing Division

July 29, 1965

Dominion Soil Investigation, Ltd.,
77 Crookford Blvd.,
Scarborough, Ontario.

Attention: Mr. A. H. King, Chief Exec.

Re: Hornepayne Patrol Yard I,
Hwy. 631, Lot 13, Con. 4,
Twp. of Wicksteed, District
of Cochrane (District 16).

Dear Sir:

Please consider this your authority to carry out a foundation investigation at the Hornepayne Patrol Yard I, located on Hwy. 631, Lot 13, Con. 4, Township of Wicksteed, District of Cochrane.

The necessary plan with the suggested borehole locations was given to your representative, Mr. Ivan Liesskowski on July 28, 1965. He was also advised on the extent of the investigation and the contents and size of the final report.

It is understood that a qualified Soils Engineer will be in charge of the field work at all times. Your Engineer in charge of the investigation should submit all the borehole logs pertaining to the access roads and parking areas to Mr. E. F. Saint, Regional Materials Engineer, North Bay, who will send you the necessary recommendations concerning the design and construction of these areas. This information should be incorporated in your final report which should be submitted to this Office not later than August 31, 1965. We will require eleven (11) copies of the report.

As agreed, the mobilization charges for the drilling crew and equipment, as well as for your Engineer, will be from Timmins to the site and back to Timmins. This is due to the fact that you have a crew working in Timmins at the present time.

cont'd: 2

July 29, 1965

Because the drawings accompanying the foundation reports, showing the location of borings, the inferred subsoil conditions, etc., are to become contract drawings, you are requested to prepare them in accordance with the D.H.O. standards. To enable you to do this, we are supplying you with sample drawings with all the necessary explanations, together with linen sheets for your drawings. You are also requested to provide the D.H.O. with Cronaflex copies of the drawings.

Charges for the work performed will be in accordance with your Schedule of Rates, dated July 6, 1964, and invoice to be addressed to the attention of the undersigned.

We are attaching Purchase Order J 34790, covering the purchase of any new material required for this project, in order that you may use this as a basis for exemption from the Federal Tax for such purposes. The Exemption Certificate is printed thereon.

Yours very truly,

AGS/MdeF
Attach.

A. Rutka
A. Rutka,
MATERIALS & TESTING ENGINEER

cc: Messrs. C. S. Moase
J. D. Foster
E. R. Saint
H. Konings
N. D. Smith (2)
Foundations Office (2)
Gen. Files (2)