

#62-F-215-C

HWY. #21

PATROL GARAGE

AT

THAMESVILLE,

CHATHAM

Materials and Research Division

October 1, 1962.

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

Attention: Mr. A. Bence.

Re: D.H.C. Patrol Garage at Thamesville,
Hwy. #21, District #1, Chatham.

Dear Sir:-

Please consider this your authority to carry out a foundation investigation at the above site. Site Plan No. 5-36 was provided to your representative.

It is understood that a qualified Soils Engineer will be in charge of the field work at all times.

Fourteen copies of the completed foundation report, plus one additional copy of the subsoil profile, should be submitted to the Foundation Section as soon as possible.

Charges for the work performed will be in accordance with your Schedule of Rates, dated February 17, 1959, and invoice to be addressed to the attention of the undersigned.

Note:- As London is the nearest recognized mobilization point, payment for mobilization will be from there, as discussed with your representative.

RSC/RSR

Yours very truly,

cc: Messrs. S. McCombie
A. Cater
C. V. Howell
J. Roy
M. B. Smith (2)

Mrs. T. Tate
Foundations Office ✓
Gen. Files (2)

A. J. Smith
For: Ruths,
MATERIALS & RESEARCH ENGINEERS

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



FOUNDATION ENGINEERS

P.O. BOX 933
SAULT STE. MARIE
ONTARIO
TELEPHONE AL. 4-2615

London, 25 October 1962.

2-10-L2

Mr. M. Devata,
Ontario Department of Highways,
Materials and Research Division,
Foundation Section,
Downsview, Ontario.

Soil Investigation for Patrol Yard,
Thamesville

Dear Murty:

As discussed with you on the telephone I should be glad if you would let me know whether references to pavement construction and topsoil stripping should be made in this report and, if so, details of the information that should be included.

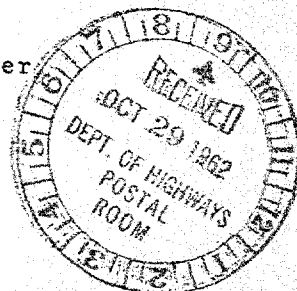
Also, on drawing 5-34 which was supplied to us, the location of a benchmark at Station 675 + 75 is marked on Highway 21. The elevation, however, is not given. We can interpolate the borehole elevations from the contours but if greater accuracy is desired we should know the elevation of the benchmark.

Yours sincerely,

DOMINION SOIL INVESTIGATION LIMITED

JP/mc

James Park, P.Eng.
London Branch Manager



Mr. F. E. Cavell,
Superintendent,
Special Services Section.

Mr. A. G. Sternac,
Principal Foundation Engr.,
Foundation Section,
Materials and Research Division.
November 13, 1962.

FOUNDATION REPORT BY DOMINION SOIL INVESTIGATION, LTD.,
FOR PATROL YARD, THAMESVILLE, DISTRICT #1, CHATHAM, ONT.

Attached, we are forwarding to you the foundation investigation report for the above structure site, submitted by Dominion Soil Investigation, Ltd.

We have reviewed the report, and on the basis of the presented factual data and information, we agree with the conclusions and recommendations contained therein.

We believe that the given recommendations will prove adequate for your future design work. Should there be any queries concerning this project, please do not hesitate to contact our Office.

AGS/MGEF
Attach.

A. G. Sternac
A. G. Sternac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. F. E. Cavell (4)
H. A. Tregaskas
H. D. McMillan
C. U. Howell

Foundations Office
Gen. Files.

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



FOUNDATION ENGINEERS

P.O. BOX 933
SAULT STE. MARIE
ONTARIO
TELEPHONE AL. 4-2615

London, 2 November 1962.

2-10-L2

Ontario Department of Highways,
Materials and Research Division,
Foundation Section,
Downsview, Ontario.

Attention: Mr. A. Rutka
Materials and Research Engineer

Soil Investigation for Patrol Yard
Thamesville, Ontario

Gentlemen:

In accordance with your letter of 3rd October 1962 we have completed our work on the above project. This report is a record of our findings and conclusions.

Field Work

Two shallow borings were made at the site of the proposed garage building and one deeper hole at the sand-pile location (see enclosure 2). The holes were advanced by a combination of augering and dry-boring techniques. The field tests consisted of Standard Penetration tests in all strata, and insitu vane shear tests in a clay stratum in borehole 3. The test results are presented on enclosures 3 and 4.

Subsurface Conditions

The strata consist of a layer of compact to dense fine to medium sand overlying a very stiff grey silty clay. The organic sandy topsoil is approximately 12 inches deep. The clay stratum was reached only in borehole 3 where the depth of sand was 15'6". Groundwater was encountered at 11'0" in borehole 3.

Bearing Capacity and Settlement

(a) Garage Foundation

The sand layer is capable of carrying spread footings at any

- 2 -

level below the organic topsoil. At or below 2'0", footings designed for soil pressures up to 4000 p.s.f. will experience negligible settlement. We understand that the loads from the proposed structure will be substantially less than this figure.

(b) Sand Pile

The stability of the proposed sand pile has been considered by treating the assumed conical load (100 feet in diameter and 50 feet high) as an equivalent cylindrical load. The pressure applied to the soil at the surface of the sand layer and at the surface of the clay layer has been estimated for cylinders of 50 feet and 80 feet diameter. The clay is assumed to have a shear strength of 2000 p.s.f. Although the strata have been explored for only 30 feet and stresses of appreciable magnitude will occur below this depth, the calculations based on the foregoing assumptions show a factor of safety of 4 or more. This is taken as adequate proof that the sand pile will be stable.

Paved Areas

For road beds and parking areas the construction should consist of at least 18 inches of granular material, the top 6 inches of which should be CBC class A. Paved areas should consist of a 2-inch base course of HL 6 and a 1-1/2 inch wearing course of HL 3.


Topsoil stripping should be carried out in accordance with D.H.O. standards.

We are very glad to have had this opportunity to be of service to you and trust that the information in this report will be sufficient for your requirements.

Kindly advise us if you have any special instruction for disposal of soil samples, otherwise they are normally stored for a period of 3 months from the date of issue of the report and thereafter destroyed.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED



James Park, M.Sc., P.Eng.
London Branch Manager

Encl.
JP/mc




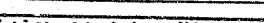

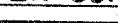






References

1. Procedures for Testing Soils, ASTM, April 1958, pp. 186 to 198 (Unified Soil Classification System, by A.A. Wagner) London.
2. Proceedings of the 4th International Conference on Soil Mechanics and Foundation Engineering (Research on Determining the Density of Sands by Spoon Penetration Testing, by H.J. Gibbs and W.G. Holtz of the United States Bureau of Reclamation).
3. Terzaghi and Peck: Soil Mechanics in Engineering Practice, John Wiley and Sons, New York, 1948.
4. The Application of Theories of Elasticity and Plasticity to Foundation Problems. Leo Jurgenson, Sc.D., Boston Society of Civil Engineers, May, 1934.
5. The Ultimate Bearing Capacity of Foundations by G.G. Meyerhof Geotechnique, Vol. II, 1950 & 1951.

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	RC Rock core	TP Piston, thin walled tube sample
CS Sample from casing	% Recovery	TW Open, thin walled tube sample
ChS Chunk sample	SS Split spoon sample	WS Wash sample

SAMPLER ADVANCED BY static weight : w
 " pressure : p
 " tapping : t

OBSERVATIONS MADE WHILE CORING
 Steady pressure
 No pressure
 Intermittent pressure

Washwater returns
 Washwater 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.

SYMBOL :



322

EXTRAPOLATED -N- VALUE

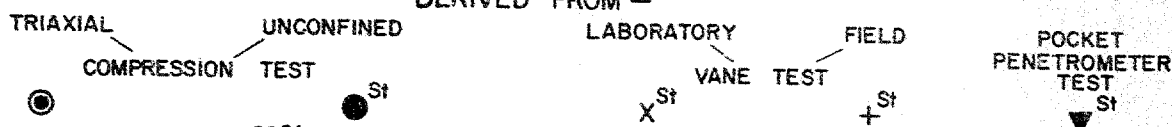
The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

SOIL PROPERTIES.

W % Water content	γ Natural bulk density (unit weight)	k Coeff. of permeability
LL % Liquid limit	e Void ratio	C Shear strength in terms of total stress
PL % Plastic limit	RD Relative density	ϕ Angle of int. friction in terms of effective stress
PI % Plasticity index	C_v Coeff. of consolidation	C' Cohesion
LI Liquidity index	m_v Coeff. of volume compressibility	ϕ' Angle of int. friction

UNDRAINED SHEAR STRENGTH.

— DERIVED FROM —



Strain at failure is represented by direction of stem

20%
15% + 5%
10%

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

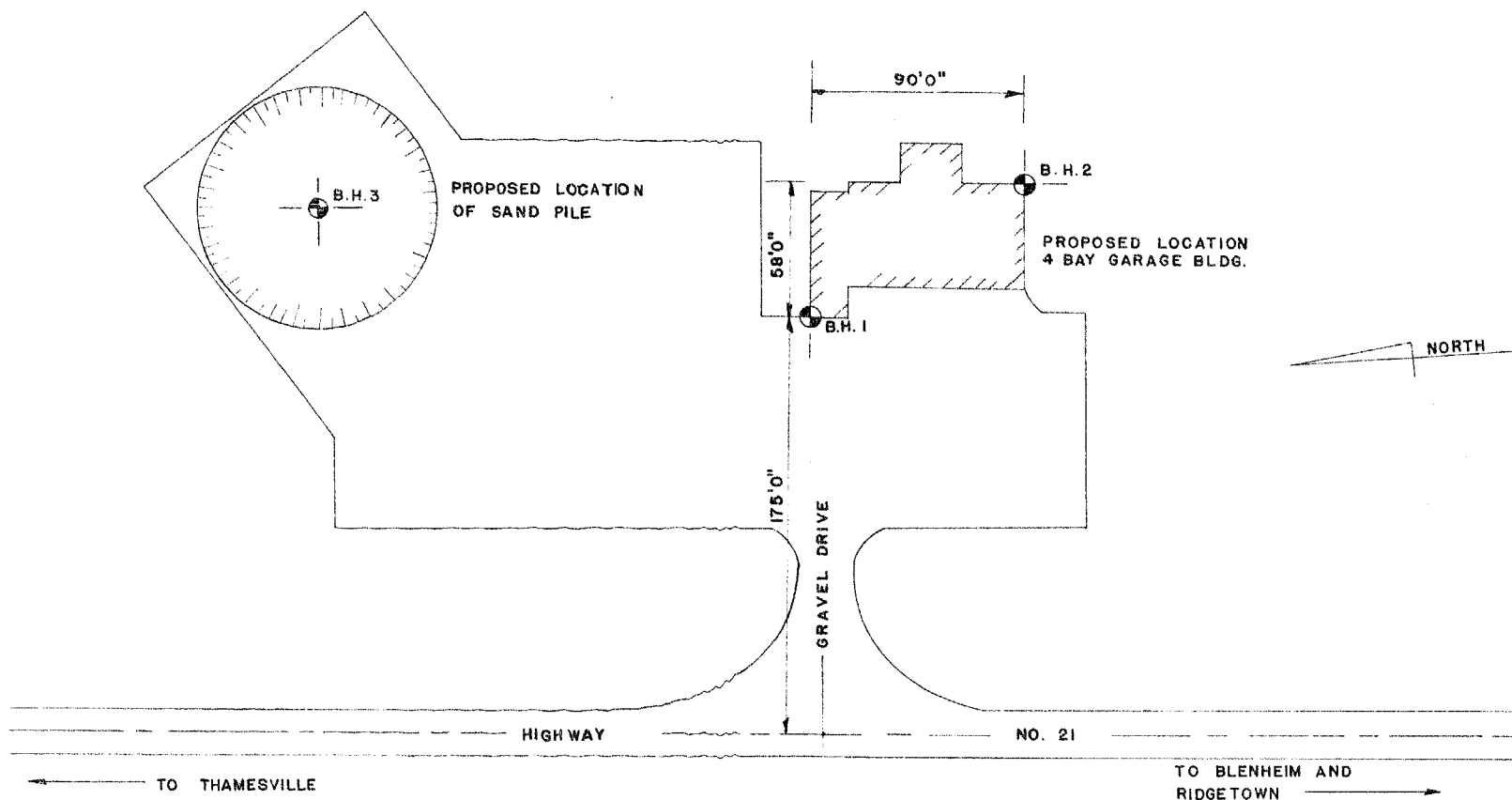
SOIL DESCRIPTION.

COHESIONLESS SOILS :	RD :	COHESIVE SOILS :	C lbs./sq.ft.
Very loose	0 - 15 %	Very soft	less than 250
Loose	15 - 35 %	Soft	250 - 500
Compact	35 - 65 %	Firm	500 - 1000
Dense	65 - 85 %	Stiff	1000 - 2000
Very dense	85 - 100 %	Very stiff	2000 - 4000
		Hard	over 4000

JOB NO. 2-10-L2

PREP. BY M.C.

ENCLOSURE 2



LOCATION OF BOREHOLES
SCALE - 1 INCH TO 50 FEET

OUR REFERENCE NO. 2-10-12

GEOTECHNICAL DATA SHEET FOR BOREHOLE 1 and 2

CLIENT: Ontario Department of Highways
 PROJECT: Patrol Yard
 LOCATION: See enclosure 2
 DATUM ELEVATION:

METHOD OF BORING: 2-1/2" dia. power auger
 DIAMETER OF BOREHOLE
 DATE: 9 October 1962
 ENCLOSURE NO. 3

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	No. of Advancement of Sampler	20	40	60	80	100	PL	W	LI	
8.0	0	Ground surface													Borehole 1
		Organics													
		oxidised		1	SS	18									
	5	Brown sand (damp-dry)		2	SS	39									
		fine medium		3	SS	50									
8.0	10	End of borehole		4	SS	25									
20.0	0	Ground surface													Borehole 2
		Gravel and sand													
		oxidised		1	SS	25									
	5	Fine pale brown sand (damp-dry)		2	SS	39									
				3	SS	51									
10.5	10	End of borehole		4	SS	52									

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: MC CHD: TP

GEOTECHNICAL DATA SHEET FOR BOREHOLE ...3...

OUR REFERENCE NO. 2-10-12

CLIENT: Ontario Department of Highways
PROJECT: Patrol Yard
LOCATION: See enclosure 2
DATUM ELEVATION:

METHOD OF BORING: 2-1/2" dia. power auger
DIAMETER OF BOREHOLE: ENCLOSURE NO. 4
DATE: 9 and 10 October 1962

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N- Advance of Sampler	20	40	60	80	100	PL	W	LI	
							SHEAR STRENGTH lbs/sq ft								
							1000	2000	3000	4000	5000				
17.6	0	Ground surface													
		organics													
	5	Fine pale brown sand (dry)		1	SS	30									
	10			2	SS	27									
6.0		Medium to coarse grey-brown silty sand (wet)		3	SS	8									
1.0					vane										
	20	Grey silty clay with many fine silt seams (firm to very stiff)		4	SS	6									
					vane										
	25				vane										
					vane										
-13.50	30	End of borehole			vane										

10 Oct 62
F1. 6.0