

# OVERSIZE DRAWING(S)

# memorandum



To: Mr. E. Shedler  
Special Services Officer  
Regional Maintenance Office  
Central Region

Date: 1980-03-11

From: Pavement & Foundation Design Section  
Room 313, Central Building  
Downsview

Re: Patrol Yard Garage  
Hwy. 404 and Regional Rd. 25  
W.P. 2723-76-03

In response to your request for a Foundation Investigation Report for the above noted project we have now completed the fieldwork portion of the foundation investigation. We are hereby forwarding to you a brief description of subsurface conditions along with recommendations for the design and construction of the patrol yard garage. A detailed foundation investigation report will be forthcoming upon completion of laboratory testing and drafting.

## Subsurface Conditions

Fieldwork at this location consisted of 4 sampled boreholes advanced by means of solid stem augers to depths of up to 11 metres below ground surface.

The fieldwork revealed the presence of uniform subsurface conditions consisting of up to 1.3 metres of fill overlying parent subsoil. The parent subsurface conditions consist of up to 6.2 metres of very stiff to hard glacial till overlying a 1.3 to 2 metre thick deposit of very dense ('N' values greater than 100 blows per 0.3 metre) sand which in turn is underlain by a very dense ('N' values greater than 100 blows per 0.3 metre) glacial till deposit. The Standard Penetration Test 'N' values in the upper 1.5 metres (EL. 213.5 to EL. 215.0) of the surficial glacial till deposit range from 8 to 28 blows per 0.3 metre being generally in the range of 15 blows per 0.3 metre. Thereafter the 'N' values in the surficial glacial till deposit increase with depth to about 50 blows per 0.3 metre.

The groundwater level was observed to be 4 metres below the ground surface which corresponds to elevation 212.5+.

## Discussion and Recommendations

It is proposed to construct a new highway patrol yard at the north west quadrant of Highway 404 and Regional Rd. 25. A patrol yard garage, including six bays and associated work rooms, some 43 metres long by 12 metres wide is required at this site. The garage is a concrete block masonry type design. Our comments for the design and construction of this building are as follows.

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The building can be founded on spread footings located in the upper glacial till deposit. Based on frost protection requirements of 1.4 metres of earth cover, the footing would be founded at elevation 215<sup>+</sup>. Spread footings founded at this elevation should be designed for an allowable load of 170 kPa (1.75 T.S.F.) in order to limit the differential settlements to less than 25 mm.

Earlier work at this location revealed the presence of parent topsoil at or slightly below this founding elevation. This topsoil should be sub-excavated beneath the plan limits of the footing and brought up by means of mass concrete or well compacted granular 'A'.

Because of the impervious subsurface conditions and the low groundwater table no dewatering problems are anticipated during excavation of the footing and any surface water running into the excavation can be removed by pumping from sumps. The founding stratum is composed of a cohesive glacial till which is subject to softening upon exposure, hence it may be necessary to place a 3 inch concrete working slab prior to construction of the footing.

If you have any further questions please do not hesitate to contact us.

*M. MacLean*

MM:MD:ea

M. MacLean  
Project Foundations Engineer

cc: P. Arkema

For:

M. Devata  
Senior Foundations Engineer



## Memorandum

To: Mr. E. Shedler  
Special Services Inspector  
Central Region

From: Regional Geotechnical Office  
Central Region

Attention:

Date: 77 05 30

Our File Ref.

In Reply to

Subject: W.P. 2723-76-01  
Patrol Yard at Richmond Hill  
Hwy. 404 at Regional Road #25  
District 6, Toronto

The site for this yard is located in the north-west quadrant of the future Hwy. 404 - Regional Road #25 interchange approximately one mile west of Woodbine Avenue.

The site was originally investigated in the spring of 1975 and a report was issued under W.P. 160-74-04-210 on May 14, 1975. Since then, the proposed yard layout was drastically changed and a new entrance way proposed. For the new layout, additional fieldwork was carried out.

The topography of the area is undulating to gently rolling. The surface runoff is westerly to a branch of the Rouge River which crosses Regional Road #25 just west of the site. The natural soils are light clay and clay loam type, derived from reworked till. They are almost stone-free with the moisture content slightly above optimum moisture but locally up to the plastic limit.

Soil borings for the new building sites and the proposed paved areas were made on May 24, 1977. The site plan at one inch equals one hundred feet (1" = 100'), shows the new layout and the bore hole locations. A sheet with the bore hole logs is also attached.

Some previous work was undertaken at this site. There is a gravel entrance roadway, a gravel apron approximately 120' X 150' and a concrete foundation for a small salt shed. The borings show a topsoil depth between 6" and 18" over a clay loam till. At several locations the upper stratum of the clay loam till has been modified into a light to medium clay. The present gravel area has from 12" to 18" of gravel. There is a topsoil stockpile at the sand dome area. The topsoil pile is up to 10' in height and contains approximately 2500 cubic yards of topsoil.

Judging from the new layout and the superimposed contours on our site plan, the sand dome area will be mainly in cut, the contractor area and the garage building are on shallow fill sections. The entrance roadway is at grassroot grade.

continued .... 2.

The drainage from the future paved areas will be towards the south.

Our observations and recommendations are:

1. Topsoil

Topsoil depth varies from 6" to 18". As only shallow cuts and fills are involved, topsoil should be stripped from all construction areas. The average depth of topsoil for design purposes should be taken at 12". There is an additional estimated 2500 cubic yards of topsoil in the stockpile at the future dome site.

2. Granular depth and H.L. Pavement

The paved area will be used by heavy trucks. Granular depth should be 18" (6" Granular "A" over 12" Granular "B"). The H.L. pavement depth should be 3 1/4" (1 1/2" H.L.3 over 1 3/4" H.L. 6).

3. Soil Type and Condition

The soils are chiefly grey/brown clay loams to clay tills, slightly above optimum moisture.

4. Sand Dome Area

There are no stability problems.

5. Contractor Building

For this relatively small building, a slab-type foundation is recommended.

6. Garage Building

For the garage building a spread footing foundation is recommended. It is preferable to have a uniform foundation depth for the building, for which we suggest elevation 706.50. Under the west portion of the building, 12" of Granular "A" should be placed under the footings so that all topsoil traces will be removed from there. Bearing pressures up to two tons per square foot can be used. For frost protection the footings should have a minimum of 4 1/2' of cover.

continued .... 3.

7. Granular Materials

The present granular apron will be under from 2' to 5' of fill in the new design. Approximately 1250 tons of granular suitable for Granular "B" could possibly be salvaged from the 120' X 150' area. The haul distance for granular material from the Stouffville area is approximately 10 miles.

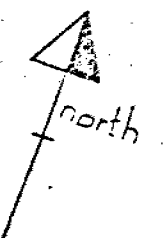
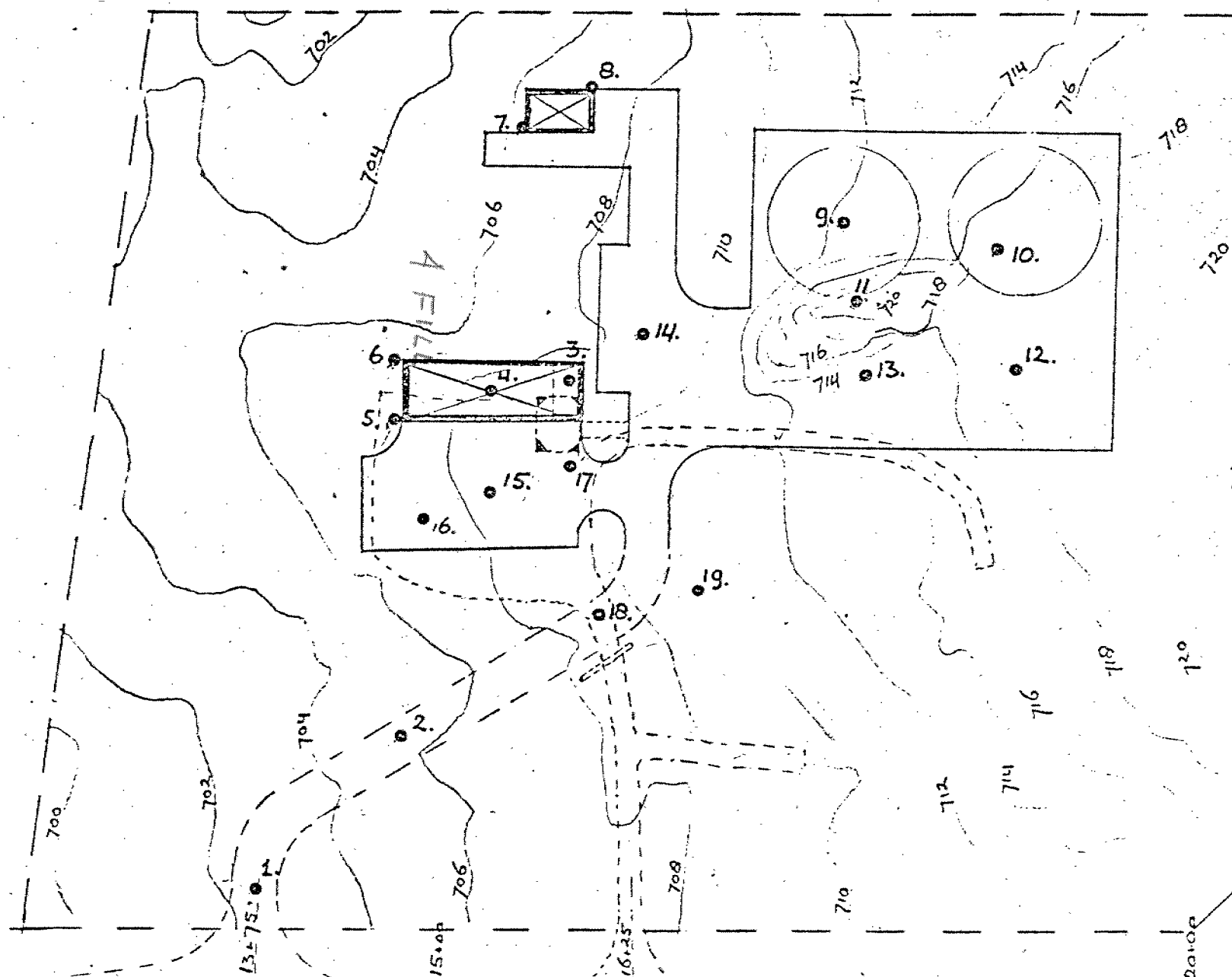


P. Arkema P. Eng.

PA/RDG:saw

c.c. N.J. McQueen  
E. Shedler  
H. Greenland  
R. Fitzgibbon  
G.A. Wrong

For: R.D. Gunter  
Head, Geotechnical Section



Boring locations,  
New lay-out,  
and contours.  
May 26/77.

W.P. 2723-76-01.  
Hwy 404 (V.R. 160-THE)  
Patrol Yard.  
Regional Rd #25.  
Region of York.  
1" = 100'

to Leslie Street  
and Richmond Hill

Reg. Rd #25  
to Woodbine

## B.H. #1

0	-	11"	dk.br.cl.lo.tps.
11"	-	4'	br.lt.-m.cl.(moist)
4'	-	5'	br.lt.cl. till sl(wet)

## B.H. #2

0	-	7"	dk.br.cl.lo.tps.
7"	-	5'	br.lt.cl. till(moist)

## B.H. #3

0	-	16"	dk.br.cl.lo.tps.
16"	-	3'	br.cl.lo.-lt.cl.
3'	-	6'	br.lt.cl. till(moist - 5'
			5'+ moist-wet and sl.)

## B.H. #4

0	-	14"	dirty gr.
14"	-	4'	br.cl.lo.-lt.cl.
4'	-	6'	br.lt.cl. till
6'	-	7'	br.sa.cl.-lt.cl. till

## B.H. #5

0	-	18"	br.sa.gr.
18"	-	8'	br.lt.cl. till(moist - sl. wet)
8'	-	10'	br.sa.cl.-lt.cl. till moist

## B.H. #6

0	-	9"	dk.br.cl.lo.tps.
	-	10'	br.sa.cl.-lt.cl. till(moist m. dense)

## B.H. #7

0	-	7"	dk.br.cl.lo.tps.
7"	-	5'	br.lt.cl. till(moist-sl. wet)
5'	-	6½'	br.sa.cl.-lt.cl. till(moist-wet)
6½'	-	8'	br.sa.cl. till(moist)

## B.H. #8

0	-	7"	dk.br.cl.lo.tps.
7"	-	3'	br.cl.lo.-lt.cl.(moist-wet)
3'	-	6'	br.sa.cl.lo.-lt.cl.(wet)
6'	-	7'	br.sa.cl.-lt.cl. till(moist)

## B.H. #9

0	-	11"	dk.br.cl.lo.tps.
11"	-	30"	br.cl.lo.-lt.cl.
30"	-	8'	br.lt.cl. till(moist)

## B.H. #10

0	-	12"	dk.br.cl.lo.tps.
12"	-	2'	br.lt.-m.cl.(moist)
2'	-	8'	br.sa.cl.-lt.cl. till(moist)

## B.H. #11 (Stockpile)

0	-	10'	dk.br.cl.lo.tps.
10'	-	11'	br.lt.-m.cl.(moist)

## B.H. #12

0	-	9"	dk.br.cl.lo.tps.
9"	-	19"	br.lt.-m.cl.
19"	-	8'	br.sa.cl.-lt.cl. till(moist)

## B.H. #13

0	-	7"	dk.br.cl.lo.tps.
7"	-	2'	br.lt.-m.cl.
2'	-	8'	br.sa.cl.-lt.cl. till(moist)

## B.H. #14

0	-	8"	dk.br.cl.lo.tps.
8"	-	27"	br.lt.-m.cl.
27"	-	5'	br.sa.cl.-lt.cl. till(moist)

## B.H. #15

0	-	17"	br.sa.gr.
17"	-	5'	br.lt.cl. till(moist-wet)

## B.H. #16

0	-	18"	br.sa.gr.
18"	-	10'	br.cl. till(moist)

## B.H. #17

0	-	17"	br.sa.gr.
17"	-	8'	br.lt.cl. till(moist)

## B.H. #18

0	-	12"	br.sa.gr.
12"	-	5'	br.lt.cl. till(moist)

## B.H. #19

0	-	2"	dk.br.cl.lo.tps.
2"	-	22"	br.cl.lo.-lt.cl.
22"	-	10'	br.lt.cl. till(moist)

W.P. 2723-76-01  
Borehole logs Patrol Yard  
Richmond Hill  
B-104 of Reg Red 25.  
May 26/77



## MEMORANDUM

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

FROM: Mr. A. G. Stermac,  
Principal Foundation Engr.,  
Foundation Section,  
Materials & Research Division.  
DATE: Aug. 30, 1963.

OUR FILE REF.

IN REPLY TO

SUBJECT:

## FOUNDATION INVESTIGATION REPORT

For

"Gormley" Patrol Yard, near New Hwy. #404,  
on Lot 21, Conc. III, Twp. of Markham.  
W.J. 63-F-84 -- W.P. (Nil)  
District #6.

It is proposed to construct a patrol yard in  
Twp. of Markham, Lot 21, Conc. III, near New Hwy. #404,  
District #6.

A foundation investigation was requested by the  
Special Services Section in a memo dated July 12, 1963.

This report contains the field investigation results  
together with recommendations for foundations.

The field investigation consisted of three sampled  
borings with three adjacent dynamic cone penetration tests.  
The locations and elevations of the boreholes together with  
the inferred stratigraphy profile are shown on the  
attached drawing #63-F-84A. Subsoil at the site was found  
to consist of a thin layer of topsoil followed by very dense  
glacial till (clayey silt with gravel and traces of fine  
sand). This layer was investigated to a maximum depth

cont'd. /2 ...

Mr. C. S. Moase, Mgr.,  
Special Services Section.

August 30, 1963

of 21.0 ft. No water was observed in any of the boreholes during the time of investigation.

It is recommended that the garage buildings be supported on spread footings founded in the dense glacial till stratum.

A safe bearing pressure of 3 t.s.f. may be used for design purposes. The foundation for the buildings should be placed at a sufficient depth for frost protection, which would be about 5.0' below finished ground level. No stability problems are anticipated at the proposed sand pile location.

For all service, parking and other areas to be paved or gravelled, the topsoil should be stripped and replaced with 15" of 3.C. "B" topped with 6" of G.B.C. "A" material. For paved areas a 2" thickness of HL-6 as base course topped with 1½" thickness of HL-3 as a wearing surface is recommended. Recommendation pertaining to construction of roadways, gravel areas and surfacing materials were given by Regional Materials Engineer.

Attention is drawn to the existence of some shallow wells in a low lying area to the west of the proposed garage site. The nearest well is about 600 ft. away and some 25 ft. deep. In view of this it is recommended that adequate measures be taken to prevent any possible water contamination by surface run off from the salt pile location.

cont'd. /3 ...

Mr. C. S. Moase, Mgr.,  
Special Services Section.

August 30, 1963

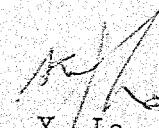
The field work was carried out under the supervision of Mr. V. Korlu during Aug. 8 to Aug. 9, 1963, who also wrote this report. The report was reviewed by Mr. M. Devata.

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.

VK/tt  
Attach.

cc: Messrs. C. S. Moase (4)  
E. J. Orr  
H. D. McMillan  
C. Fraser  
T. J. Kovich  
A. Watt

Foundations Office  
Gen. Files

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

APPENDIX I.

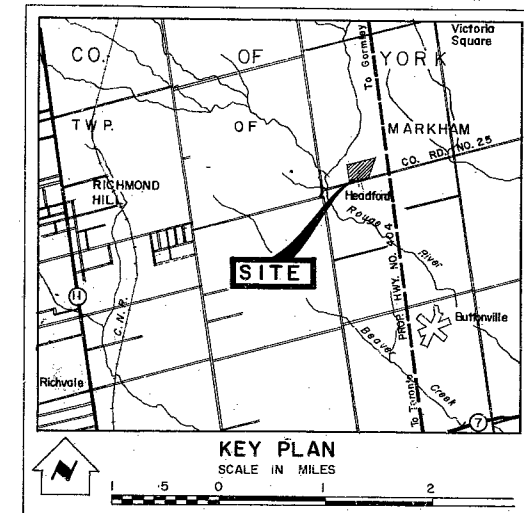
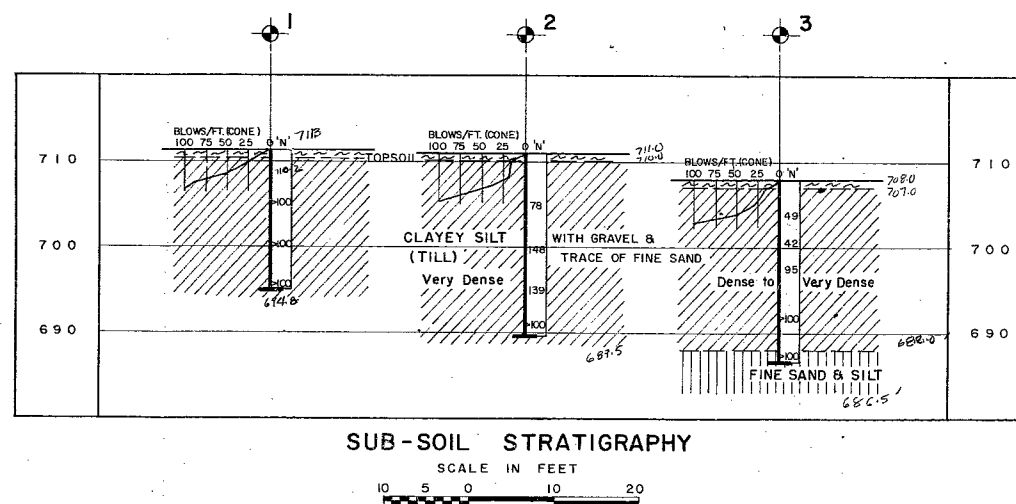
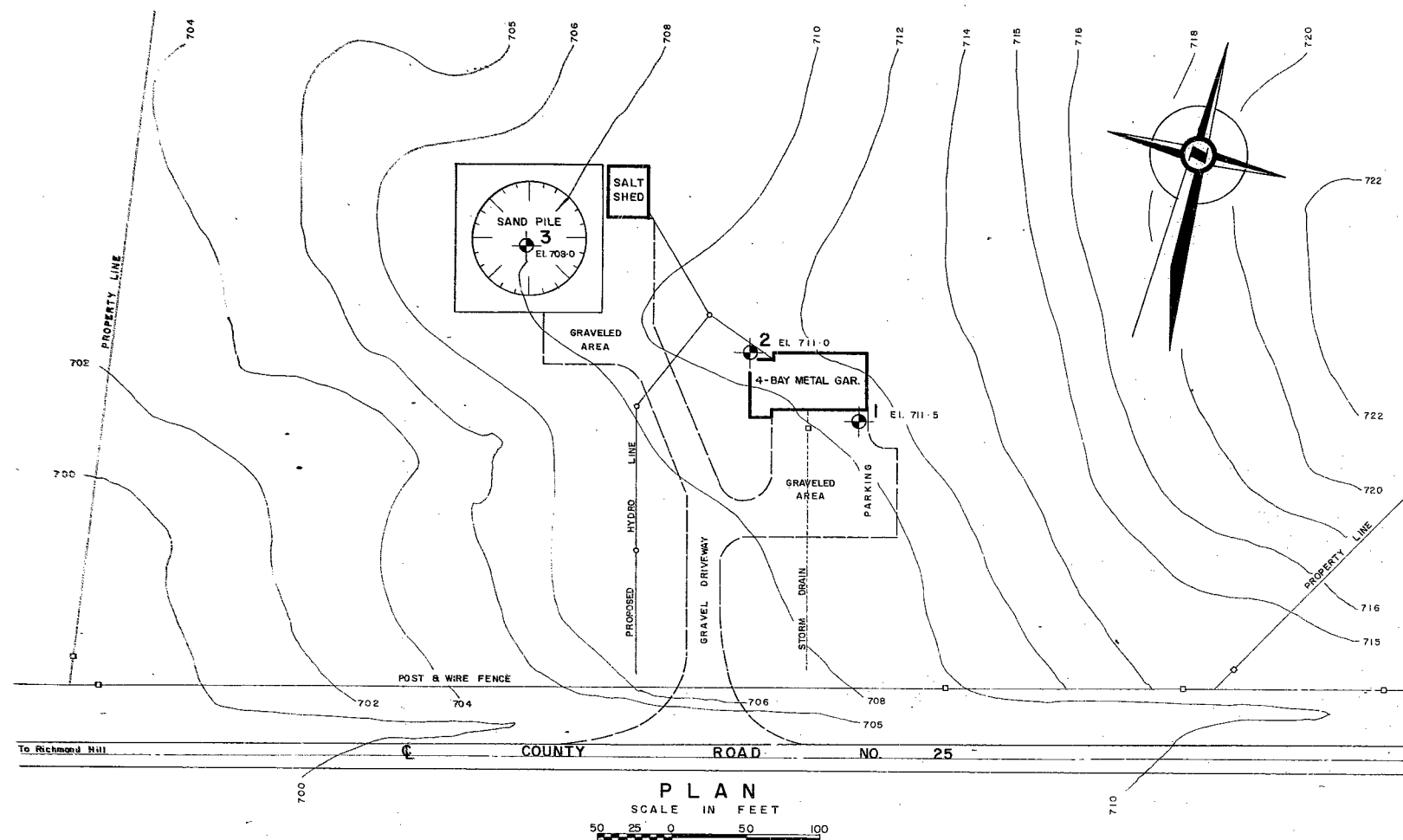
#63-A-84

HWY. #404

GORMLEY PATROL

YARD, MARKHAM

TWP.



#### LEGEND

● BORE & CONE PENETRATION HOLE

**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.

DEPARTMENT OF HIGHWAYS - ONTARIO		
MATERIALS & RESEARCH SECTION		
<b>GORMLEY PATROL YARD</b>		
ORIGINATED V. KORLU	DISTRICT NO. 6	DATE 19 AUG. 1963
DRAWN D. MUMFORD	W.P. NO.	JOB NO. 63-F-84
CHECKED <i>HR</i>	SCALE	DRAWING NO.
APPROVED <i>Alphamac</i>	AS SHOWN	<b>63-F-84 A</b>