

Golder Associates Ltd.

2180 Meadowvale Boulevard
Mississauga, Ontario, Canada L5N 5S3
Telephone (905) 567-4444
Fax (905) 567-6561



GEOCRIS # 31D-384

REPORT ON

**FOUNDATION INVESTIGATION AND DESIGN
HIGH FILL SECTION STATIONS 25+640 TO 25+780
HIGHWAY 404 EXTENSION
DAVIS DRIVE TO HERALD ROAD
REGIONAL MUNICIPALITY OF YORK
GWP: 421-98-00**

Submitted to:

McCormick Rankin Corporation
2655 North Sheridan Way
Mississauga, Ontario
L5K 2P8

DISTRIBUTION:

- 6 Copies - McCormick Rankin Corporation,
Mississauga, Ontario
- 2 Copies - Golder Associates Ltd.,
Mississauga, Ontario

January 2000

991-1162B

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
PART A - FIELD INVESTIGATION	
1.0 INTRODUCTION	1
2.0 SITE DESCRIPTION	2
3.0 INVESTIGATION PROCEDURES.....	3
4.0 GENERAL SITE GEOLOGY AND STRATIGRAPHY	4
4.1 Site Geology	4
4.2 Site Stratigraphy	4
4.2.1 Topsoil	5
4.2.2 Sandy Clayey Silt Till.....	5
4.3 Groundwater Conditions.....	5
PART B - FOUNDATION DESIGN	
5.0 ENGINEERING RECOMMENDATIONS.....	7
5.1 General.....	7
5.2 Embankment Construction	7

In Order
Following
Page No. 9

List of Abbreviations and Symbols
Record of Borehole Sheets (Boreholes 15 and 16)
Drawing
Figures 1 and 2

LIST OF DRAWINGS

Drawing 1 Borehole Location Plan - High Fill Sta. 25+630 to 25+860

LIST OF FIGURES

Figure 1 Grain Size Distribution Curve – Sandy Clayey Silt (Glacial Till)
Figure 2 Plasticity Chart - Sandy Clayey Silt (Glacial Till)

PART A – FIELD INVESTIGATION

**FOUNDATION INVESTIGATION AND DESIGN
HIGH FILL SECTION STATIONS 25+640 TO 25+780
HIGHWAY 404 EXTENSION
DAVIS DRIVE TO HERALD ROAD
REGIONAL MUNICIPALITY OF YORK
GWP: 421-98-00**

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
PART A - FIELD INVESTIGATION	
1.0 INTRODUCTION	1
2.0 SITE DESCRIPTION	2
3.0 INVESTIGATION PROCEDURES	3
4.0 GENERAL SITE GEOLOGY AND STRATIGRAPHY	4
4.1 Site Geology	4
4.2 Site Stratigraphy	4
4.2.1 Topsoil	5
4.2.2 Sandy Clayey Silt Till	5
4.3 Groundwater Conditions	5

1.0 INTRODUCTION

Golder Associates Ltd. has been retained by McCormick Rankin Corporation (McCormick Rankin) on behalf of the Ministry of Transportation, Ontario (MTO) to carry out a foundation investigation at the site of the proposed high fill sections along the Highway 404 extension in the Region of York, Ontario. The project consists of the extension of Highway 404 from Davis Drive northerly to Herald Road and includes a partial interchange with twin overpass structures at Highway 404 and Herald Road. This report addresses the high fill section along the Highway 404 extension between about Station 25+630 and Station 25+860.

860
630
230

The purpose of the foundation investigation is to determine the subsurface conditions at the site of the proposed high fill section by drilling boreholes, and carrying out in-situ tests and laboratory tests on selected samples. Based on our interpretation of the data obtained, recommendations on the foundation aspects of design of the proposed works are provided. Comments are also provided on anticipated construction problems where they may affect the design of the proposed high fill section.

The terms of reference for the scope of work are outlined in our proposal letter P91-8040, dated June 2, 1999. The work was carried out in accordance with our Quality Control Plan for Foundation Design Services, dated July 26, 1999.

2.0 SITE DESCRIPTION

The site is located approximately 1 km south of Herald Road and 1.5 km west of Woodbine Avenue, immediately north of the Town of Newmarket, in the Regional Municipality of York.

The topography of the site area is generally level with a regional trend sloping down to the south towards Lake Ontario. The ground surface at the site varies locally from about Elevations 282 m to 293 m. Based on the available information, the proposed grade of Highway 404 within the proposed high fill section varies from Elevation 287 m to Elevation 292 m from south of north, respectively.

The lands in the vicinity of site are mainly agricultural. A drainage channel was observed within the lowest section of the proposed high fill limits (at about Station 25+775). The channel was dry at the time of site investigation.

The original MTO foundation report for the Davis Drive underpass located to the south of the site was reviewed for this report, and is referenced as:

- GEOCRE 31D-262, titled "Highway 404 Underpass at Regional Road 31 (Davis Drive)", W.P. 160-74-40, Highway 404, District 6, Toronto, dated September 1978.

Site Geology

3.0 INVESTIGATION PROCEDURES

The field work for this investigation was carried out on October 27, 1999. At this time two (2) boreholes were put down at the site. Boreholes 15 and 16 were put down within the limits of the proposed high fill section along the proposed centreline at Station 25+780 and Station 25+640, respectively.

only
two
for
a 25p
section

The investigation was carried out using a track-mounted CME-55 drill rig supplied and operated by Eastern Soil Investigations of Oshawa, Ontario. In the boreholes, samples of the overburden were obtained at regular intervals of depth using 50 mm outside diameter split-spoon samplers in accordance with the Standard Penetration Test (SPT) procedures. The boreholes were extended to depths of about 6.5 m below the existing ground surface. Groundwater conditions in the open boreholes were observed throughout the drilling operations.

sample
interval

The field work was supervised on a full-time basis by a member of our engineering staff who located the boreholes in the field, directed the drilling, sampling and in-situ testing operations, and logged the boreholes. The soil samples were identified in the field, placed in labeled containers and transported back to our laboratory in Mississauga for further examination. Index and classification tests were carried out on selected samples. The results of the testing are shown on the attached Record of Borehole sheets and on Figures 1 and 2.

A plan and profile of the proposed Highway 404 between Davis Drive and Herald Road were provided to us in digital format by McCormick Rankin. J.D. Barnes Limited, professional land surveyors, staked the proposed Highway 404 centreline in the field at 25 m intervals. The borehole locations were located in the field by Golder personnel and were referenced relative to the stations indicated on the stakes. The approximate ground surface elevations at the borehole locations were determined from the profile drawing. The stations of the boreholes are indicated on the Record of Boreholes Sheets and the location of the boreholes are shown on Drawing 1.

Elevations
not
determined
in situ

4.0 GENERAL SITE GEOLOGY AND STRATIGRAPHY

4.1 Site Geology

The site is located in the physiographic region known as the Oak Ridges Moraine, which was formed between two opposing movements of ice during the late Wisconsinan period of glaciation (Chapman and Putnam, "The Physiography of Southern Ontario", 3rd Edition, 1984). The topography of the Oak Ridges Moraine is hilly, with knob and basin relief that is typical for an end moraine. The subsoils for this region are generally comprised of sandy materials, which are underlain by glacial till. Interbeds of fine sand, silt, and clay are also common. Bedrock is generally deep below the ground surface in this region; previous investigations carried out by others in the general area found the bedrock surface is at depths between 180 m and 240 m below the ground surface.

4.2 Site Stratigraphy

The detailed subsurface soil and groundwater conditions encountered in the boreholes, together with the results of the laboratory tests carried out on selected soil samples, are given on the attached Record of Borehole sheets following the text of this report. The stratigraphic boundaries shown on the borehole sheets are inferred from non-continuous sampling and, therefore, represent transitions between soil types rather than exact planes of geological change. Subsoil conditions will vary between and beyond the borehole locations.

In summary, the subsoils at the site generally consist of a surficial layer of topsoil underlain by very stiff to hard sandy clayey silt glacial till encountered at between Elevation 282 m and 283 m. Cobbles were inferred from auger resistance / grinding within the till deposit. The sandy clayey silt till was not fully penetrated in the boreholes, but proved to a thickness of 5.8 m and 5.9 m.

The location of the borings are shown on the attached Drawing 1. A detailed description of the subsurface conditions encountered in the boreholes for this investigation is provided in the following sections.

4.2.1 Topsoil

A surficial layer of topsoil was encountered in the boreholes. The topsoil was measured at about 680 mm and 600 mm in thickness in Boreholes 15 and 16, respectively.

4.2.2 Sandy Clayey Silt Till

Below the topsoil exists a deposit of sandy clayey silt glacial till, where the surface of the deposit was encountered at about Elevation 282 m and Elevation 283 m in Boreholes 15 and 16, respectively. A trace to some gravel, and occasional cobbles inferred from auger resistance / grinding were noted within the till deposit. A grain size distribution curve for a selected sample of the sandy clayey silt till is shown on Figure 1. Standard Penetration Testing (SPT) carried out within the till deposit gave "N" values of 20 blows to greater than 50 blows per 0.3 m of penetration, indicating a very stiff to hard consistency. In general, the till is hard.

Not to
470
Standard

Atterberg limits testing carried out on two selected samples of the sandy clayey silt till gave a liquid limit of about 15 percent and 22 percent, and a plasticity index of about 3 percent and 7 percent, respectively. This classifies the till as inorganic and of low plasticity. The results of the Atterberg limits testing are shown on Figure 2. The natural water content for selected samples of the till ranged from about 7 percent to 17 percent, with an average of about 11 percent. The water contents were generally less than the plastic limit.

4.3 Groundwater Conditions

Water levels were noted in the open boreholes during and upon completion of the drilling operation. The boreholes were both dry upon completion of drilling. The groundwater level is inferred to be within 4.4 m depth based on the change in colour of the glacial till subsoil at this depth.


Seasonal Fluctuation



It should be noted that groundwater levels are expected to fluctuate seasonally and are expected to be higher during wet periods of the year.

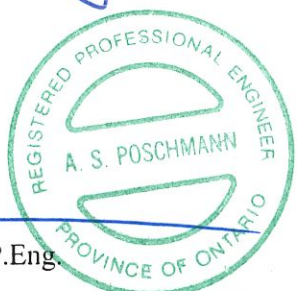
GOLDER ASSOCIATES LTD.


Dan K. Breeze, B.S.c,


Anne S. Poschmann, P.Eng.
Principal


Fintan J. Heffernan, P.Eng.
Designated MTO Contact

DKB/AMP/ASP/FJH/ic/clg
WORD S/FINAL/DAT/1100/991-1162/2000/1162BAR1



PART B – FOUNDATION DESIGN

**FOUNDATION INVESTIGATION AND DESIGN
HIGH FILL SECTION STATIONS 25+640 TO 25+780
HIGHWAY 404 EXTENSION
DAVIS DRIVE TO HERALD ROAD
REGIONAL MUNICIPALITY OF YORK
GWP: 421-98-00**

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
PART B - FOUNDATION DESIGN	
5.0 ENGINEERING RECOMMENDATIONS	7
5.1 General	7
5.2 Embankment Construction	7

5.0 ENGINEERING RECOMMENDATIONS

5.1 General

This section of the report provides our recommendations on the geotechnical aspects of design of proposed high fill section between about Station 25+630 and Station 25+860 based on our interpretation of the factual information obtained during the investigation. It should be noted that the interpretation and recommendations are intended for use only by the design engineer. Where comments are made on construction they are provided only in order to highlight those aspects which could affect the design of the project. Those requiring information on aspects of construction should make their own interpretation of the factual information provided as it may affect equipment selection, proposed construction method and scheduling.

It is understood that Highway 404 will be extended from Davis Drive northerly to Herald Road, a distance of about 2.4 km. This extension will entail the conversion of the existing partial interchange at Davis Drive to a full interchange and the construction of a new partial interchange at Herald Road, including twin overpass structures. The project also involves the widening of the Herald Road / Woodbine Avenue intersection. The works described in this report are associated with the proposed high fill section between about Station 25+630 and Station 25+860 along the proposed Highway 404 extension. Due to ongoing negotiations between MTO and the adjacent landowners, the high fill section located between about Station 25+160 and Station 25+280 could not be investigated. In addition, the locations of the two proposed steel ground mounted signs were not known at the time of this investigation. We will address the remaining high fill section and the signs as an addendum to this report after authorization to proceed with the investigation program is given.

5.2 Embankment Construction

The subsoils at relatively shallow depth consists of generally hard sandy clayey silt till. The till deposit contains cobbles which were inferred from auger resistance / grinding. The groundwater table was not observed in the open boreholes within the investigated depth of about 6.5 m. The groundwater level is inferred to be within 4.4 m of the ground surface in the area of the high fill section based on the change in colour of the till deposit. A shallow drainage channel about 0.3 m

deep was observed within the lowest portion of the high fill limits. The channel was dry at the time of site investigation.


The profile drawing of the proposed grade of Highway 404 is shown at about Elevation 293 m to 287 m from the north to south within the high fill section. This indicates the embankment will be up to 8 m in height.

Topsoil and fill deposits should be stripped from below the fill embankment areas and all subgrade soils should be proof-rolled prior to fill placement. Construction of the embankment above the prepared subgrade may be carried out using clean earth fill meeting specifications OPSS 212 or Select Subgrade Material meeting specifications with OPSS 1010, depending on material availability. All embankment fill should be placed in regular lifts with loose thickness not exceeding 300 mm, and be compacted to at least 95 percent of the material's Standard Proctor maximum dry density. The final lift prior to placement of the granular subbase or base course should be compacted to 100 percent of the Standard Proctor maximum dry density. Inspection and field density testing should be carried out by qualified geotechnical personnel during all fill placement operations to ensure that appropriate materials are used and that adequate levels of compaction have been achieved. The permanent soil slopes of the embankment should be maintained not steeper than 2 horizontal to 1 vertical (2H:1V). A 2 m wide bench should be provided for all embankment slopes higher than 8 m. Vegetation cover should be established on all soil slopes to protect embankment fill against surficial erosion, as per OPSS 572.

The embankment subgrade soil consists of generally hard sandy clayey silt till. In-situ vane testing was not possible within the hard till, however, the undrained shear strength of the till is conservatively estimated at 100 kPa. Providing that the embankment subgrade is properly prepared with side slopes maintained at 2 horizontal to 1 vertical, the calculated factor of safety for the highest (i.e. 8 m) embankment section will be greater than 2.0, which indicates the embankment is stable. Settlement of the embankment fills, properly placed and compacted, and of the underlying generally hard sandy clayey silt till is estimated to be less than 25 mm.

GOLDER ASSOCIATES LTD.


Dan K. Breeze, B.Sc.


Anne S. Poschmann, P.Eng.
Principal


Fintan J. Heffernan, P.Eng.
Designated MTO Contact

DKB/AMP/ASP/FJH/ic/clg
WORD S/FINALDAT/1100/991-1162/2000/1162BAR1



LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I	SAMPLE TYPE	III	SOIL DESCRIPTION	
AS	Auger sample	(a)	Cohesionless Soils	
BS	Block sample		Density Index (Relative Density)	N Blows/300 mm or Blows/ft.
CS	Chunk sample			
DO	Drive open			
DS	Denison type sample			
FS	Foil sample			
RC	Rock core	Very loose		
SC	Soil core	Loose	4 to 10	
ST	Slotted tube	Compact	10 to 30	
TO	Thin-walled, open	Dense	30 to 50	
TP	Thin-walled, piston	Very dense	over 50	
WS	Wash sample			
II	PENETRATION RESISTANCE		(b)	Cohesive Soils
Standard Penetration Resistance (SPT), N: The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 300 mm (12 in.).			Consistency	c _u , s _u kPa psf
Dynamic Penetration Resistance; N _d : The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).				
PH:	Sampler advanced by hydraulic pressure	IV.	SOIL TESTS	
PM:	Sampler advanced by manual pressure	w	water content	
WH:	Sampler advanced by static weight of hammer	w _p	plastic limit	
WR:	Sampler advanced by weight of sampler and rod	w _l	liquid limit	
		C	consolidation (oedometer) test	
		CHEM	chemical analysis (refer to text)	
		CID	consolidated isotropically drained triaxial test ¹	
		CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement ¹	
		D _R	relative density (specific gravity, G _s)	
		DS	direct shear test	
		M	sieve analysis for particle size	
		MH	combined sieve and hydrometer (H) analysis	
		MPC	Modified Proctor compaction test	
		SPC	Standard Proctor compaction test	
		OC	organic content test	
		SO ₄	concentration of water-soluble sulphates	
		UC	unconfined compression test	
		UU	unconsolidated undrained triaxial test	
		V	field vane test (LV-laboratory vane test)	
		γ	unit weight	
Piezo-Cone Penetration Test (CPT): An electronic cone penetrometer with a 60° conical tip and a projected end area of 10 cm ² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q _t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.				

Note:

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I GENERAL

π	= 3.1416
$\ln x$,	natural logarithm of x
$\log_{10} x$ or $\log x$,	logarithm of x to base 10
g	acceleration due to gravity
t	time
F	factor of safety
V	volume
W	weight

II STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta \sigma$
ϵ	linear strain
ϵ_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stresses (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress = $(\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation
*	Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density \times acceleration due to gravity)

(a) Index Properties (con't.)

w	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity Index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(c) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(d) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (overconsolidated range)
C_s	swelling index
C_α	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation pressure
OCR	Overconsolidation ratio = σ'_p / σ'_{vo}

(e) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = $\tan \delta$
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1. $\tau = c' + \sigma' \tan \phi'$
2. Shear strength = (Compressive strength)/2

PROJECT 991-1162

RECORD OF BOREHOLE No 15

1 OF 1

METRIC

W.P. 421-98-00

LOCATION STA. 25+780 Centreline

ORIGINATED BY SB

DIST 6 HWY 404

BOREHOLE TYPE 114mm SOLID STEM AUGERS

COMPILED BY DKB

DATUM GEODETIC

DATE 27.10.99

CHECKED BY ASP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40						60	80
282.70	0.00	Topsoil	1	50 DO	7											
282.02	0.68	Sandy Clayey Silt, trace to some gravel, occasional cobbles Hard Brown becoming grey at 4.4m depth Moist (Glacial Till)	2	50 DO	42											
	3		50 DO	57												
	4		50 DO	64												
	5		50 DO	65/15												
	6		50 DO	36												
	7		50 DO	58												
	8		50 DO	31												
276.24	6.46	END OF BOREHOLE														
		Note: 1. Open Borehole dry upon completion of drilling.														

ON MOT 991-1162.GPJ ON MOT.GDT 7/1/00

PROJECT 991-1162		RECORD OF BOREHOLE No 16				1 OF 1		METRIC							
W.P. 421-98-00		LOCATION STA. 25+640 Centreline				ORIGINATED BY SB									
DIST 6 HWY 404		BOREHOLE TYPE 114mm SOLID STEM AUGERS				COMPILED BY DKB									
DATUM GEODETIC		DATE 27.10.99				CHECKED BY ASP									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
283.60	0.00	Topsoil	1	50 DO	5										
283.00	0.60	Sandy Clayey Silt, trace to some gravel, occasional cobbles Very stiff to hard Brown becoming grey at 4.4m depth Moist (Glacial Till)	2	50 DO	20										
	3		50 DO	37											
	4		50 DO	45											
	5		50 DO	68											
	6		50 DO	50/15											
	7		50 DO	66											
	8		50 DO	58											
277.14	6.46		END OF BOREHOLE												
Note: 1. Open Borehole dry upon completion of drilling.															

ON MOT 991-1162.GPJ ON MOT.GDT 7/1/00

DIST No. 6 HWY 404
CONT No.
WP No. 421-98-00

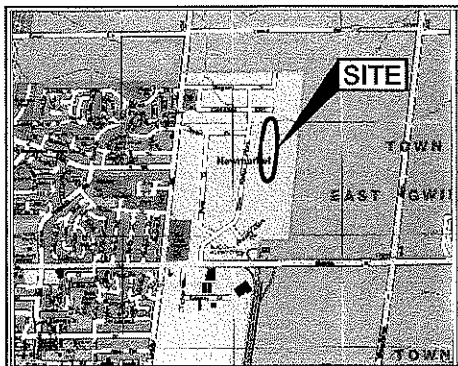


HIGHWAY 404
HIGH FILL STA. 25+630 TO 25+860
BOREHOLE LOCATION PLAN

SHEET



Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA



KEY PLAN

LEGEND



Borehole

No.	ELEVATION	STATION	OFFSET
BH15	282.7	25+780	CL MEDIAN
BH16	283.6	25+640	CL MEDIAN

* ELEVATION INFERRED FROM PROFILE

NOTES

The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

REFERENCE

This drawing was created from digital file's "S300-RA1.dwg 300-RA2.DWG, AND HWY404PROFILE.DWG, provided by McCormick Rankin Corp.

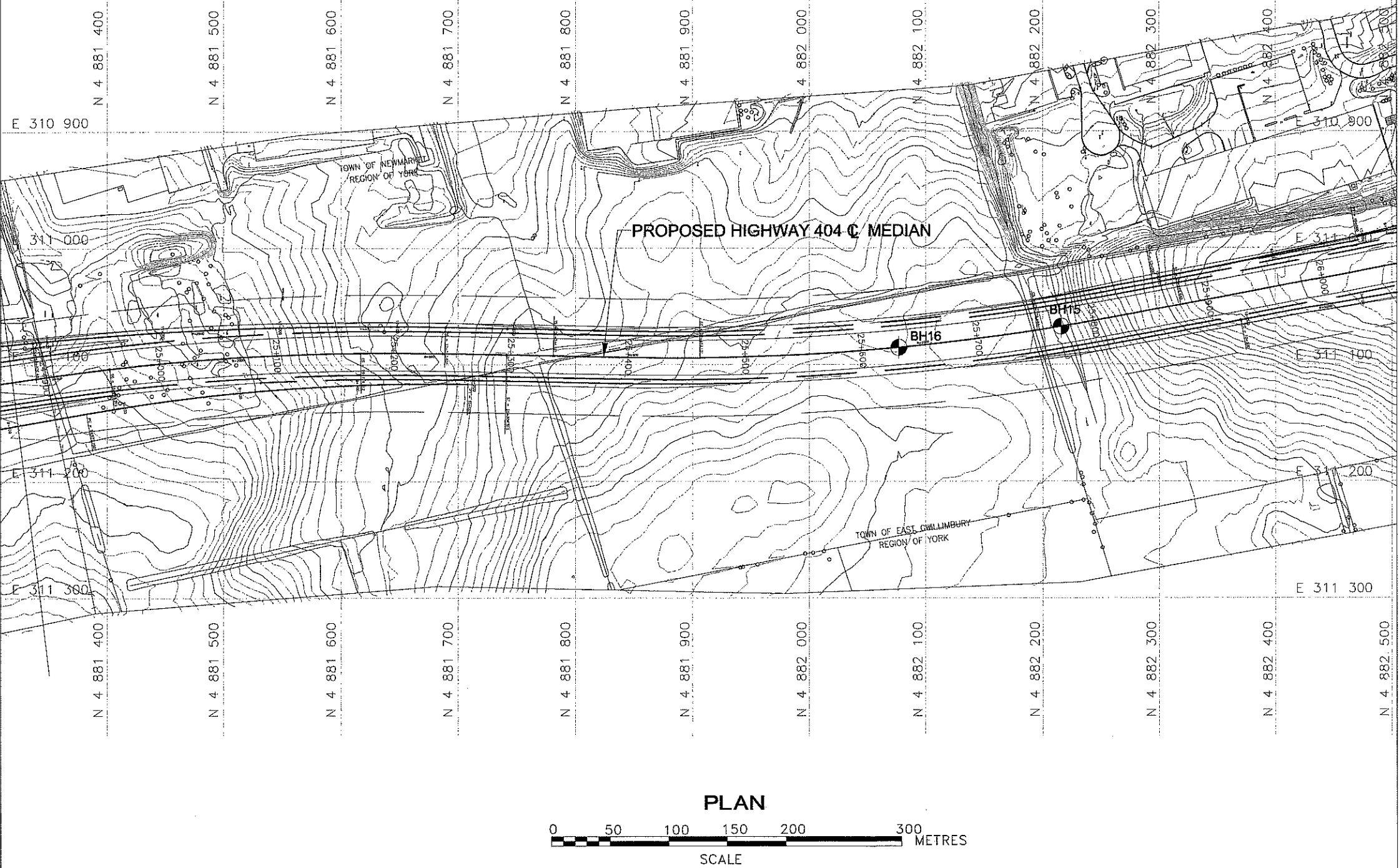
2	00/01/19	ASP	FINAL
1	00/01/11	ASP	REVIEW
NO.	DATE	BY	REVISION

Geocres No.

HWY 404	PROJECT NO.:	991-11628	DIST. 6
SUBM'D. DKB	CHKD: AMP	DATE: 1999 12 16	SITE
DRAWN: JFC	CHKD: ASP	APPD.	DWG. 1

METRIC

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN



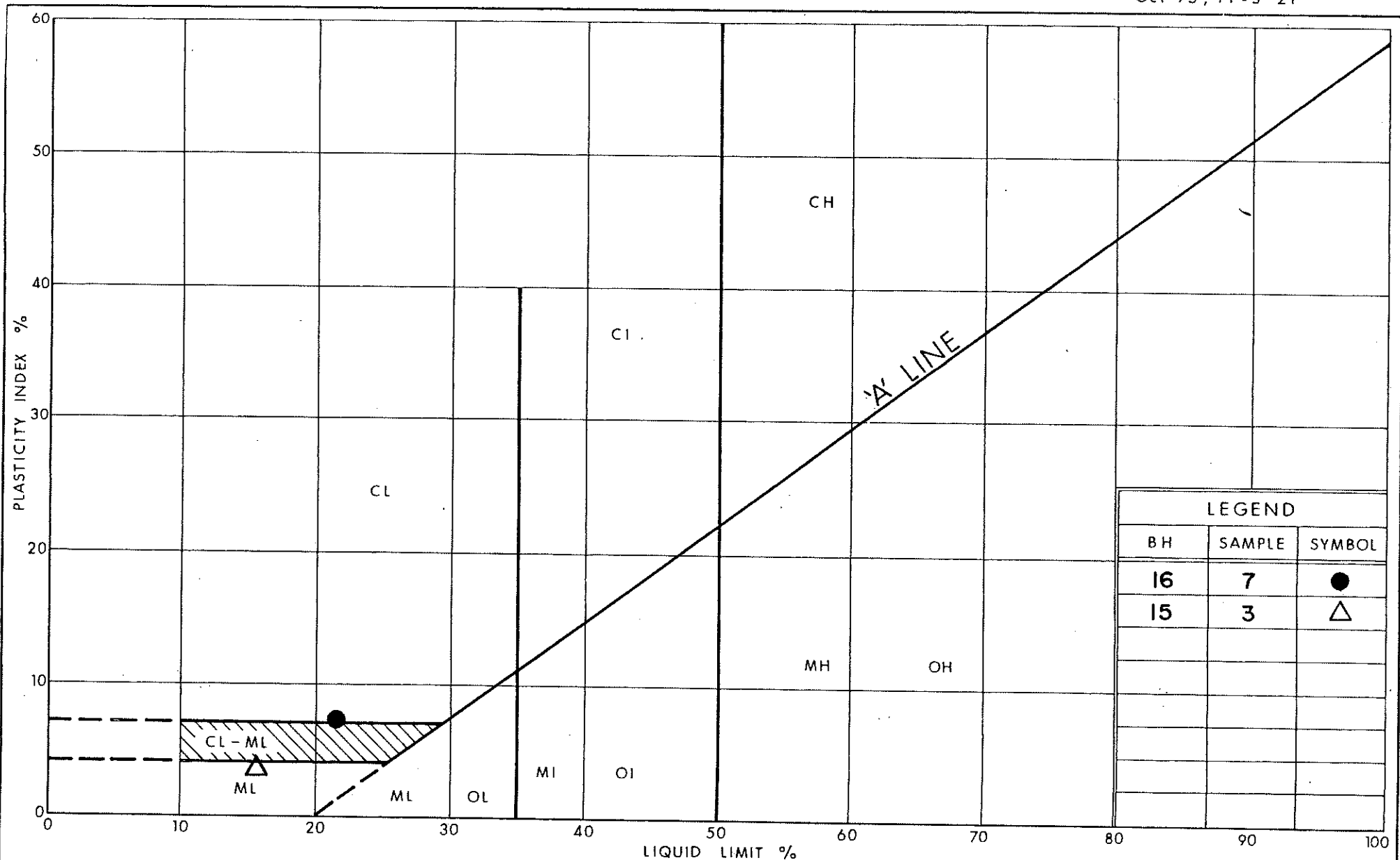
PLAN

0 50 100 150 200 300 METRES
SCALE

FIGURE 1



●	15	3	280.9
---	----	---	-------



Ministry of
Transportation
Ontario

PLASTICITY CHART SANDY CLAYEY SILT (GLACIAL TILL)

FIG No 2
W P 421-98-00