



FINAL
FOUNDATION INVESTIGATION REPORT
PROPOSED VAUGHAN-KING TOWNSHIP ROAD UNDERPASS
HIGHWAY 400 INTERIM WIDENING
VAUGHAN, ONTARIO
W.P. 192-00-00, CENTRAL REGION

Submitted to:

Ministry of Transportation
Pavements and Foundations Section
Foundations Group
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5 September 2003

TT22852D

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RECORD OF BOREHOLE SHEETS

NOTES OF BOREHOLE LOGS

RECORD OF BOREHOLE SHEETS Borehole Numbers: KV1 to KV8

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Borehole Logs extracted from report prepared by Department of Highways Ontario dated 1959
GEOCRE File No. 30M13-2

1.0 INTRODUCTION

AMEC Earth & Environmental Limited, Consulting Geotechnical, Materials Quality Control and Environmental Engineers, has been retained by the Ministry of Transportation to conduct a foundation investigation for the replacement of the existing Vaughan-King Township Road Underpass on the border of the Township of King and the City of Vaughan, Regional Municipality of York, Ontario. The site location is as shown on the Key Plan of Drawing No. 1. This project is in conjunction with the proposed interim widening of Highway 400 from Major Mackenzie Drive to South Canal Road.

The purpose of this investigation is to determine the sub-surface conditions at the site of the proposed bridge structure replacement by means of a number of boreholes, in-situ tests and laboratory tests on selected samples. The work carried out for this geotechnical investigation was completed in accordance with AMEC's proposal (ref. P-22280, dated 20 June 2002).

The plan and profile for the proposed bridge replacement and approaches were provided to us by the Ministry of Transportation.

Existing subsurface information and laboratory testing results contained in the following report was used to supplement this investigation

- Department of Highways Ontario. *Foundation Investigation Report, Subsurface Exploration at Highway 400 and Gravel Road, King City.* dated 1959 - GEOCRE File No. 30M13-2.

2.0 SITE DESCRIPTION AND PHYSIOGRAPHY

2.1 SITE DESCRIPTION

The existing Vaughan-King Road underpass structure is located about 1.5 km south of the King Road interchange on the border of the Township of King and the City of Vaughan, Regional Municipality of York, Ontario.

The original ground at the underpass structure appears to be at about Elevation 276 to 277m. The existing Highway 400 grade is at about Elevation 278.5m, while Vaughan-King Township Road grade is at Elevation 285m at the structure location. Vaughan-King Township Road has been constructed in fill with approach embankments about 7m high.

The existing underpass structure was constructed in the early 1960s under Contract 60-276. It .../...

is a single span structure supported on spread footings at the abutments.

2.2 PHYSIOGRAPHY

Based on available geologic information, the site is located in the South Slope of the Oak Ridges Moraine. Generally after the last glacial withdrawal, glacial till deposits of the Halton Till formation (clayey silt to silty clay till) were deposited over the ice contact and glacial outwash sediments (sands, silts and gravels) of the Oak Ridge Moraine (ORM). The entire interbedded sequence of tills, sands, silts and gravels of the ORM is generally in the order of about 100 m in thickness in the area of the site. Shale bedrock is generally in the order of about 150 to 200 m below existing grade. The cohesionless sands and silts in the Oak Ridges moraine is a water bearing aquifer that is used as a source of water for domestic, industrial and municipal water supply and is known to be under excessive hydrostatic pressure at greater depth.

3.0 INVESTIGATION PROCEDURES

The fieldwork for the current investigation was carried out on 9 January 2003, 8 and 22 February 2003, and 15 March 2003, and consisted of drilling and sampling eight boreholes (Boreholes KV1 to KV8, inclusive) to depths of 9.6 m to 22.0 m below the existing ground surface. Boreholes KV7 and KV8 were advanced from the Highway 400 grade, while Boreholes KV1, KV2, K4 and K6 were advanced from Vaughan-King Township Road, and Boreholes KV 3 and KV5 were advanced beyond the toe of the existing road embankment.

Also referenced in this report in Appendix A, are boreholes (Boreholes 1 to 4) advanced by the Department of Highways Ontario (DHO) in 1959 for a foundation investigation for the existing bridge (GEOCRETS No. 30M13-2, referenced in Section 1.0).

The plan locations of the boreholes advanced in the current and previous investigations, and selected stratigraphic sections are shown on Drawing Nos. 1, 2 and 3. Details of sub-surface conditions encountered at each borehole location advanced by AMEC, including the results of in-situ testing, are presented on the Record of Borehole sheets.

The boreholes for the current investigation were advanced, using hollow and solid stem continuous flight augers with track and truck-mounted power auger drill rigs (CME 75) owned and operated by Atcost Soil Drilling Inc. and Walker Drilling Inc., under the full-time supervision of experienced geotechnical personnel from AMEC Earth & Environmental Limited.

Sampling in the AMEC boreholes were carried out at regular intervals of depth (0.75 to 1.5m) by the Standard Penetration Test Method, as specified in American Standards for Testing and Materials Method Number: D-1586. This consists of freely dropping a 63.5 kilogram hammer for .../...

a vertical distance of 0.76 m to drive a 51 mm outside diameter split barrel (split-spoon) sampler into the ground. The number of blows of the hammer to drive the sampler into the relatively undisturbed ground for a vertical distance of 0.30 m is recorded as the Standard Penetration Resistance or the 'N'-values of the soil, and this gives an indication of the consistency or the relative density of the soil deposit.

The soil samples recovered by AMEC were transported to our geotechnical laboratory in Toronto (Scarborough) for further examination and classification. A laboratory testing programme, consisting of natural moisture content determinations, grain size analyses, Atterberg Limits tests and unit weight determinations, was performed on selected representative soil samples from the current investigation. The results of the laboratory tests are presented on the appropriate Record of Borehole Sheets and also on Figure Nos. 1 to 10, inclusive.

Groundwater conditions in the current investigation open boreholes were observed throughout and immediately after the drilling operations. Standpipe piezometers were installed in Boreholes KV3 and KV5 beyond the toe of the Vaughan-King Township Road embankment, to permit long term monitoring of groundwater levels at the site. All boreholes were adequately backfilled with auger cuttings on completion of the fieldwork.

The borehole locations for the current investigation were initially established in the field by our field personnel based on existing features. The borehole locations in terms of northing and easting co-ordinates, and elevations were surveyed by AMEC engineering staff. These elevations are referenced to the geodetic datum. The locations and co-ordinates of the boreholes are shown on Drawing No. 1, 2 and 3; the co-ordinates and elevations are indicated on the Record of Borehole Sheets.

The borehole northings and eastings of the 1959 investigation by DHO were estimated based on existing features from the plans obtained from MTO.

4.0 SUB-SURFACE CONDITIONS

Details of sub-surface conditions encountered at each borehole location for the current and previous investigations by others, including the results of in-situ testing, groundwater observations and laboratory test results are presented on the Record of Borehole Sheets and in Appendix A.

.../...

4.1 Fill and Topsoil

Boreholes KV7 and KV8 were advanced from the Highway 400 grade, while Boreholes KV1, KV2, K4 and K6 were advanced from Vaughan-King Township Road, and Boreholes KV 3 and KV5 were advanced beyond the toe of the existing road embankment. Boreholes advanced on Highway 400 encountered 250 to 280 mm of asphaltic concrete underlain by a pavement fill to depths of 0.9 m below existing grade. The fill consisted of a damp, brown sand to gravelly sand, with varying amounts of gravel, and trace silt.

Boreholes KV2, KV4 and KV6 advanced on Vaughan-King Township Road encountered 110 mm to 150 mm of asphaltic concrete. Underlying the asphaltic concrete in these boreholes, and at the surface of Borehole KV1, the boreholes encountered a pavement fill to depths of about 0.5 to 2.8m below existing grade. The fill consisted of a damp, brown sand to gravelly sand, with varying amounts of gravel, and trace silt.

Boreholes KV3 and KV5 were advanced beyond the toe of the existing road embankment and encountered about 330 mm to 450 mm of topsoil.

Underlying the pavement fill, Boreholes KV1, KV2, KV4, KV6, KV7 and KV8 encountered a brown clayey silt fill to depths of 2.9 m to 3.1m (Elevation 274.6m to 275.4m) in Boreholes KV7 and KV8 on Highway 400, and to depths of 5.5m to 7.8 m (Elevation 276.7m to 279.0m) below Vaughan-King Township Road in Boreholes KV1, KV2, KV4 and KV6. Underlying the topsoil in Boreholes KV3 and KV5, a brown to grey silty clay to clayey silt fill deposit was encountered to depths of about 2.1m to 2.4m (Elevation 275.0m to 275.1m). This cohesive fill contained varying amounts of sand, trace gravel, organics and rootlets. Excessive organics were encountered in Boreholes KV3 and KV5. Interbedded layers of sand/silty sand or sand and gravel were encountered within the fill in Boreholes KV2, KV4 and KV8. Measured 'N'-values range from 6 to 20 blows per 0.3m indicating a firm to very stiff consistency, but generally stiff. Measured moisture contents within the cohesive fill range from 11 to 20%.

It should be noted that the thickness of fill may vary in between and beyond the borehole locations.

4.3 Upper Clayey Silt Glacial Till

Below the fill deposits, all boreholes encountered a brown to grey clayey silt glacial till deposit. Boreholes KV1, KV2, KV4, KV6 and KV8 were terminated within the cohesive till at depths of 9.6m to 12.7m (Elevations 268.7m to 274.4m). The remaining boreholes encountered the base of the till at depths of 11.6 to 13.1 m below King-Vaughan Township Road (Elevations 264.3 to 265.6m) or 13.3m below Highway 400 (Elevation 264.4m). The glacial till is a heterogeneous .../...

mixture of silt and clay with trace to some sand and gravel. Measured 'N'-values range from 9 to greater than 50 blows per 0.3m, indicating a stiff to hard consistency, but generally hard.

Boreholes 1 to 4 advanced by DHO in 1959 encountered the clayey silt till to a depth of 11.3m to 13.7m (or Elevation 262.9m to 265.3m) below the existing ground surface in 1959. Measured 'N'-values ranged from 13 to greater than 50 blows per 0.3m indicating a stiff to hard consistency, but generally very stiff to hard consistency below a depth of about 2m.

Laboratory tests carried out on the clayey silt till are summarized on the various Record of Boreholes, in Appendix A and in Figure Nos. 1 to 5. The laboratory results are summarized below.

	<u>AMEC 2003 Investigation</u>	<u>DHO 1959 Investigation</u>
Natural Moisture Content	11 to 23%	8 to 27%
Liquid Limit	32 to 36%	23 to 30%
Plastic Limit	16 to 17%	15 to 18%
Unit Weight (kN/m ³)	20.4 to 21.3 (4 samples)	21.0(average of 18 samples)

Grain Size Distribution (4 samples)

Gravel	0 to 5%
Sand	12 to 20%
Silt	45 to 54%
Clay	26 to 38%

The above results are indicative of an overconsolidated low plasticity clay. The grain size distribution curves from the current investigation are presented on Figure Nos. 1 to 4 and the Atterberg Limits test results for the current investigation are presented on Figure No. 5.

It should be noted that cobbles and boulders may be encountered within this deposit due to its nature of formation.

4.3 Silts and Sands

Below the clayey silt till in Boreholes KV3, KV5 and KV7 a grey interlayered silt and sand deposit was encountered to depths of 17.7m to 20.4m (Elevation 256.8m to 259.7m). The deposits contain trace to some clay. Measured 'N'-values ranged from 27 to greater than 50 blows per 0.3m indicating a compact dense to very dense relative density, but generally dense. Measured moisture contents ranged from 11 to 22%.

.../...

Grain size analyses were carried out on two samples of the silt in the current investigation. The results are presented on Figure Nos. 6, 7, 8 and 9. The results are summarized below:

Grain Size Distribution

Silt (3 samples)

Gravel	0 to 1%
Sand	0 to 18%
Silt	67 to 95%
Clay	5 to 14%

Sand (1 sample)

Gravel	0%
Sand	75%
Silt	21%
Clay	4%

Below the clayey silt till in Boreholes 1 to 4 advanced in 1959 by DHO, all boreholes encountered a silty sand to sand deposit. Boreholes 2 and 4 were terminated within the cohesionless deposit at a depth of about 18.7m, or Elevation 257.0m to 257.9m. Boreholes 1 and 3 encountered the base of the stratum at a depth of about 16.8m to 17.7m (or Elevations 258.9 to 260.3m). Measured 'N'-values within this deposit ranged from 44 to greater than 100 blows per 0.3m indicating a dense to generally very dense relative density. Measured moisture contents ranged from 9 to 21%, but generally above 14%.

4.4 Lower Clayey Silt Glacial Till

Underlying the lower silts and clayey silts, a lower grey clayey silt glacial till deposit was encountered in Boreholes KV3, KV5 and KV7. This grey lower till was encountered at depths of 17.7m to 20.4m (Elevations 256.8m to 259.7 m). The boreholes were terminated within the till at a depth of 20.3m to 22.6m (Elevation 255.1m to 257.1m). The glacial till is a heterogeneous mixture of silt and clay with trace to some sand and gravel. Measured 'N'-values range from 92 to greater than 100 blows per 0.3m were obtained indicating a hard consistency. Measured natural moisture contents range from 11 to 15%.

A grain size analysis was carried out on a sample of the lower clayey silt till and the results are summarized below and in Figure No. 10.

.../...

Grain Size Distribution (1 sample)

Gravel	5%
Sand	27%
Silt	45%
Clay	23%

Boreholes 1 and 3 advanced by DHO in 1959 encountered the lower clayey silt till at a depth of about 16.8m to 17.7m (or Elevations 258.9 to 260.3m). The two boreholes were terminated within the till at a depth of 18.7m to 18.8m (or Elevations 257.9 to 258.3m). Measured 'N'-values range of 115 and 140 blows per 0.3m were obtained indicating a hard consistency. Measured natural moisture contents of 9 and 10% were obtained.

4.5 Groundwater Conditions

Groundwater levels in the open boreholes were observed during drilling and upon completion of each borehole. To permit long term monitoring of groundwater levels at the site, standpipe piezometers were installed in Boreholes KV3 and KV5 within the sands and silts.

Based on the observations in the piezometers and from tactile and visual observations of the recovered soil samples, in our opinion, the groundwater table at the site lies within the upper clayey silt till at about Elevation 271 to 272m, or about 6 to 7m below Highway 400 grade.

It should, however, be pointed out that the groundwater at the site would fluctuate seasonally and can be expected to be somewhat higher during the spring months and in response to major weather events.

5.0 CLOSURE

Sincerely,



Andrew Drevininkas, P. Eng.
Assistant Manager
Geotechnical Services



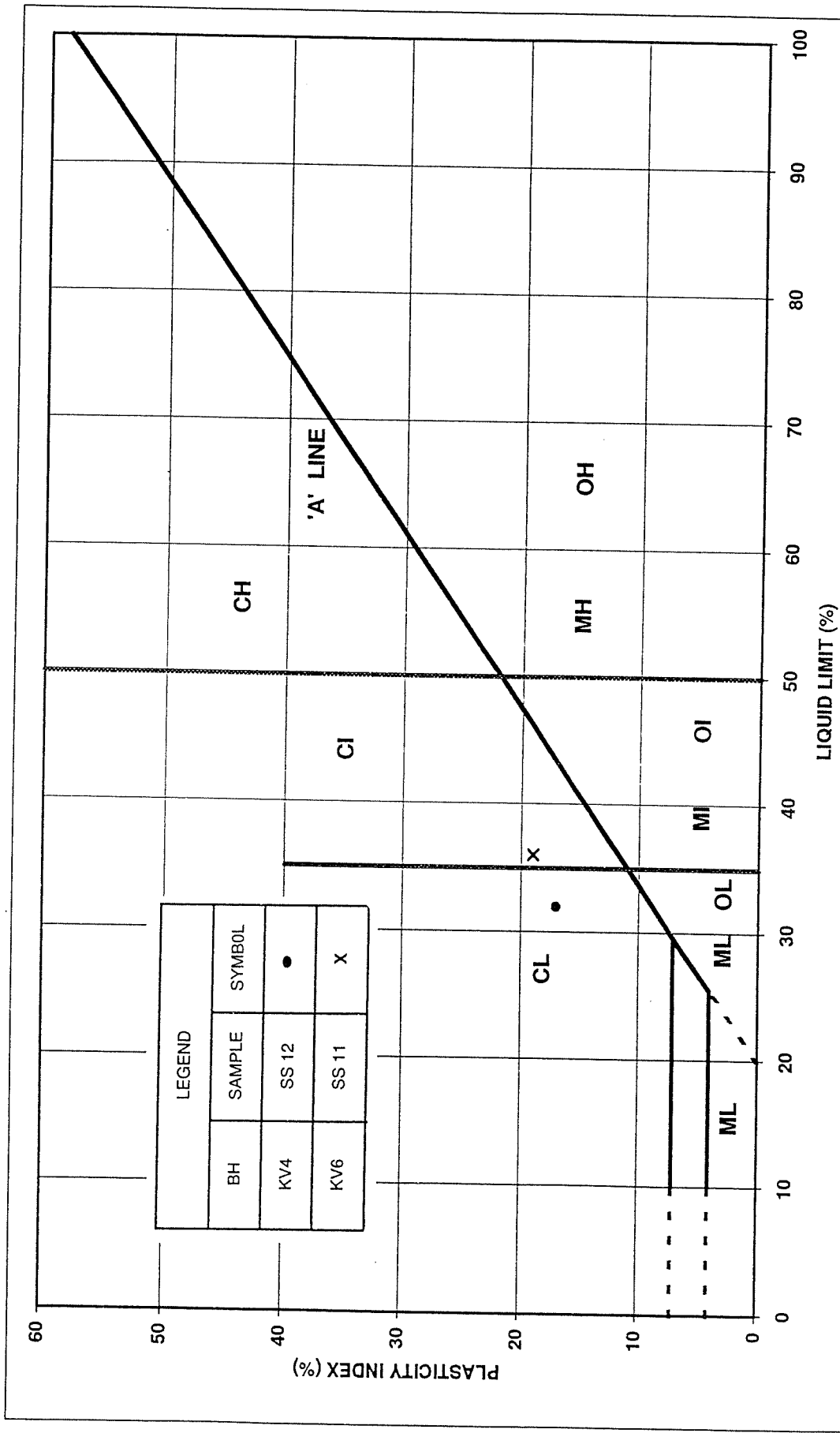
Kai-Sing Ho, Ph.D., P.Eng.
Principal Geotechnical Consultant
MTO Designated Contact



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.../...

FIGURES



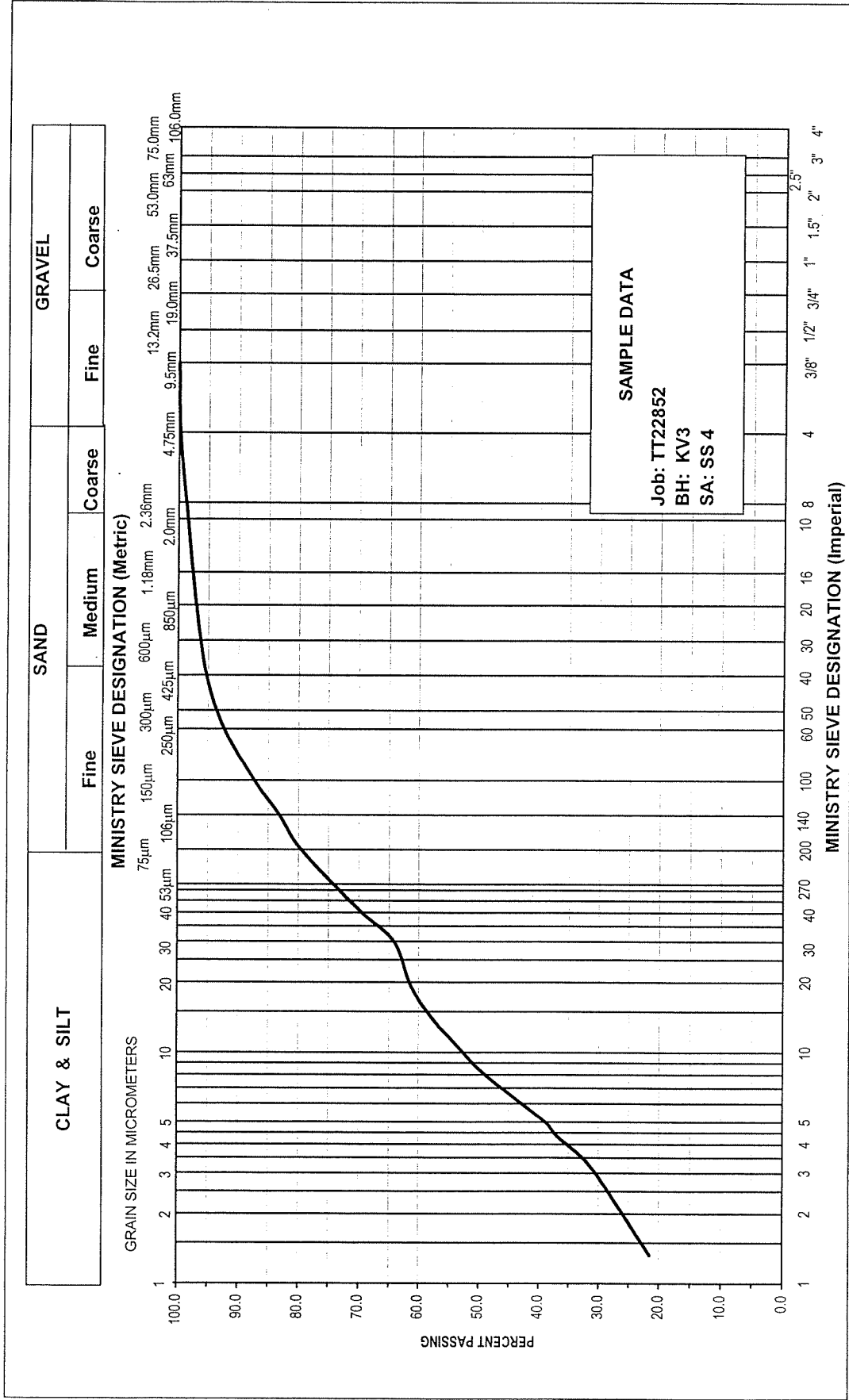
PLASTICITY CHART
CLAYEY SILT TILL

FIG No 1

W P 192-00-00

TT22852

UNIFIED SOIL CLASSIFICATION SYSTEM



AMEC Earth & Environmental Limited 104 Crockford Blvd., Scarborough, Ontario Canada, M1R 3C3 Tel +1 (416) 751 6565, Fax +1 (416) 751 7592 www.amec.com	GRAIN SIZE DISTRIBUTION	Client :- Ministry of Transportaion Ontario
	CLAYEY SILT GLACIAL TILL with Sand	Project:- Highway 400, Interim Widening
		Location:- King Vaughan Road, Vaughan, Ontario
		Depth :-
		Date :- 14 Feb 2003

Figure No. 2

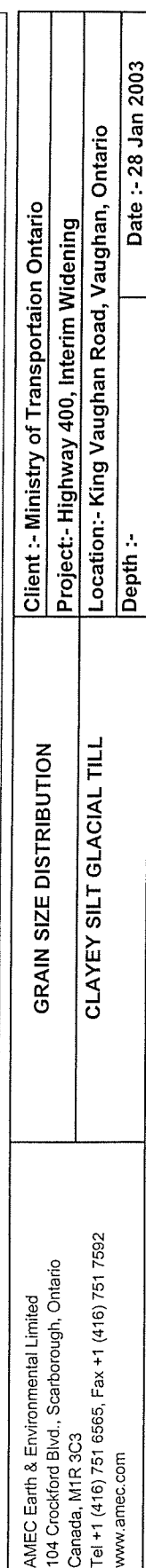
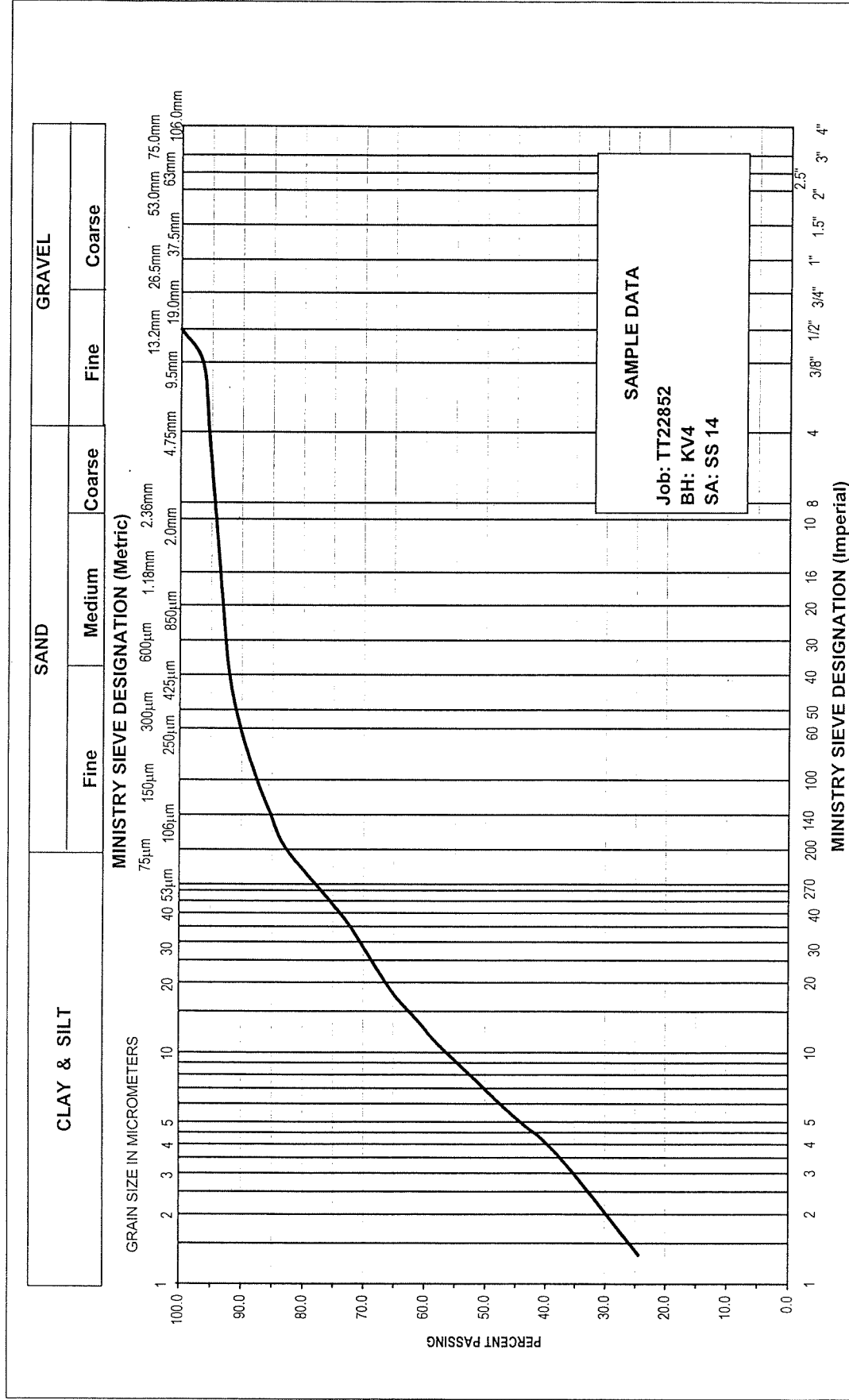


Figure No. 3

UNIFIED SOIL CLASSIFICATION SYSTEM

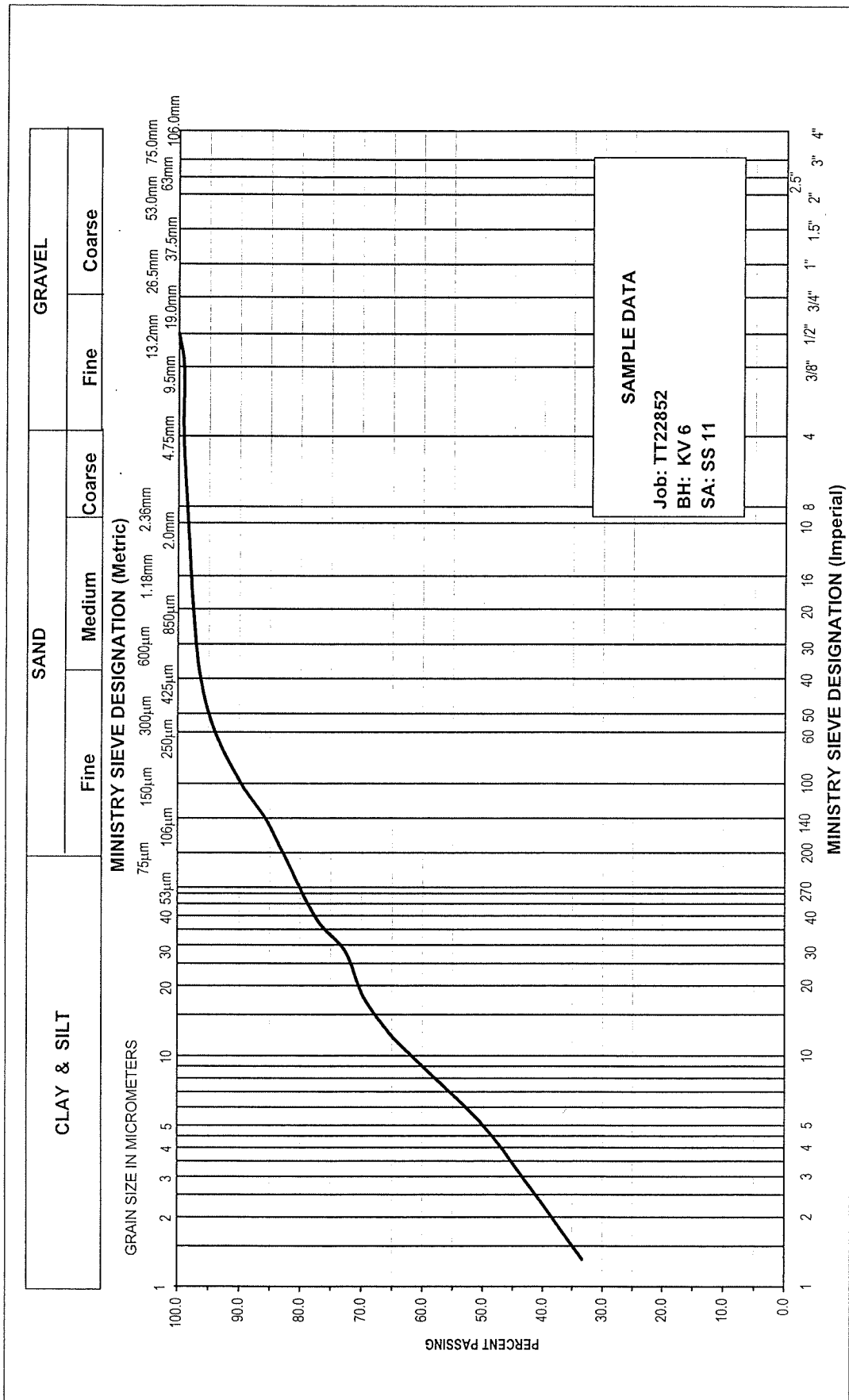


AMEC Earth & Environmental Limited 104 Crockford Blvd., Scarborough, Ontario Canada, M1R 3C3 Tel +1 (416) 751 6565, Fax +1 (416) 751 7592 www.amec.com	GRAIN SIZE DISTRIBUTION		Client :- Ministry of Transportaion Ontario
	CLAYEY SILT GLACIAL TILL		Project:- Highway 400, Interim Widening
			Location:- King Vaughan Road, Vaughan, Ontario
		Depth :-	Date :- 28 Jan 2003

FIGURE NO. 4



UNIFIED SOIL CLASSIFICATION SYSTEM

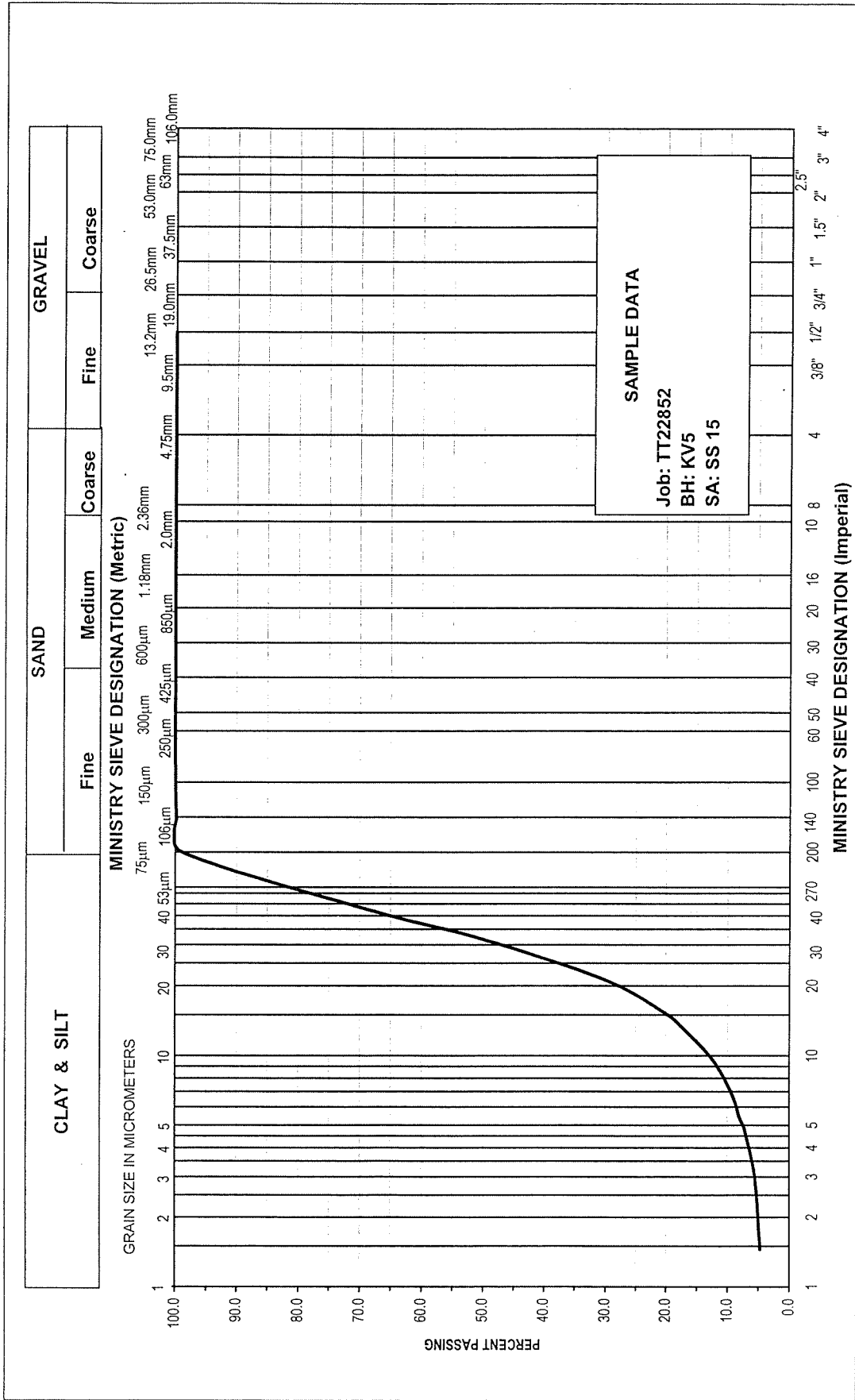


AMEC Earth & Environmental Limited 104 Crockford Blvd., Scarborough, Ontario Canada, M1R 3C3 Tel +1 (416) 751 6565, Fax +1 (416) 751 7592 www.amec.com	GRAIN SIZE DISTRIBUTION	Client :- Ministry of Transportaion Ontario	
	CLAYEY SILT GLACIAL TILL	Project:- Highway 400, Interim Widening	
		Location:- King Vaughan Road, Vaughan, Ontario	
		Depth :-	Date :- 28 Jan 2003

Figure No. 5



UNIFIED SOIL CLASSIFICATION SYSTEM

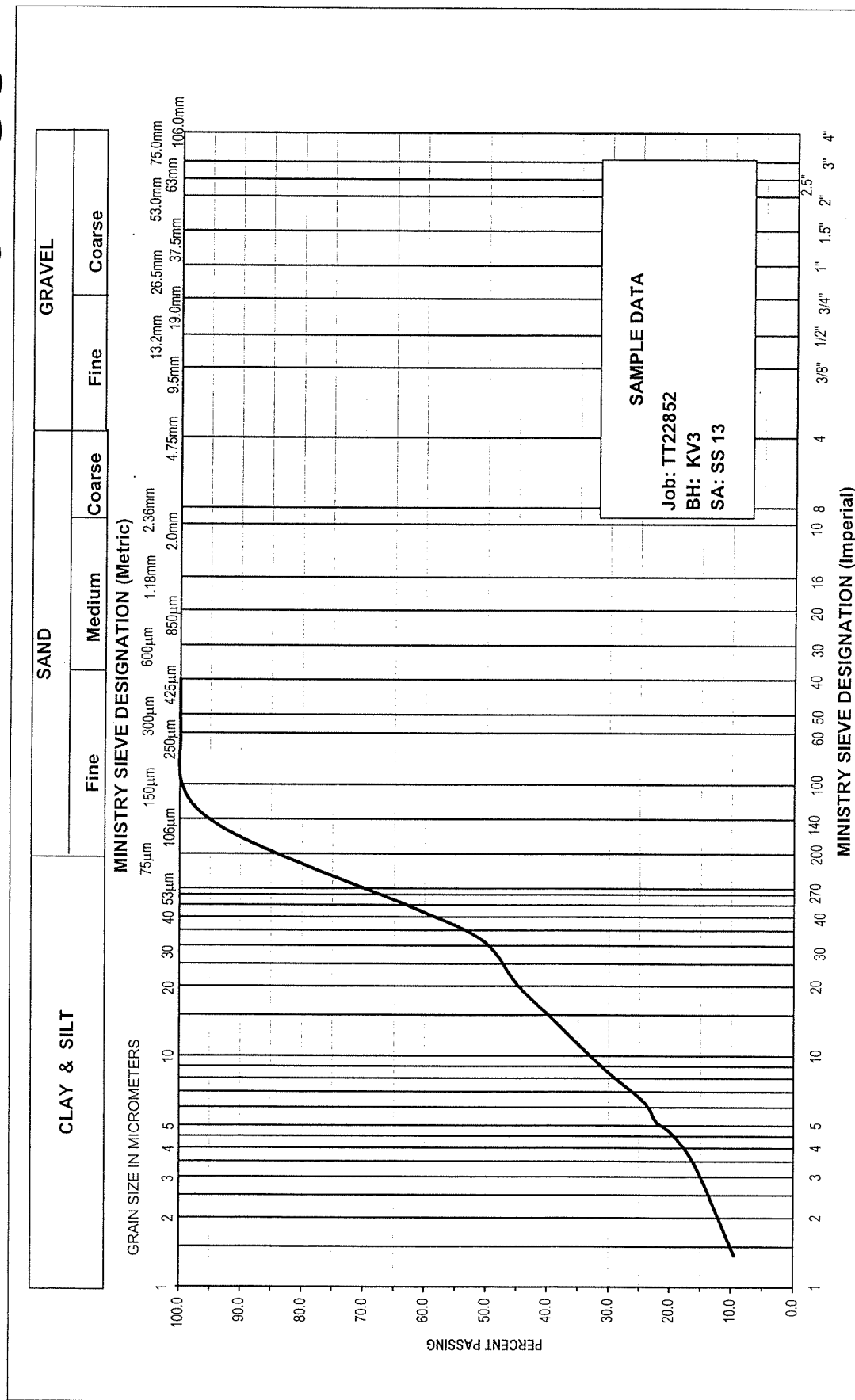


AMEC Earth & Environmental Limited 104 Crockford Blvd., Scarborough, Ontario Canada, M1R 3C3 Tel +1 (416) 751 6565, Fax +1 (416) 751 7592 www.amec.com	GRAIN SIZE DISTRIBUTION		Client :- Ministry of Transportation
	SILT trace clay and sand		Project:- Vaughan-King Township Road Underpass
		Location:- King Vaughan Road, Vaughan, Ontario	Date :- 30 Apr 2003

Figure No 6



UNIFIED SOIL CLASSIFICATION SYSTEM



AMEC Earth & Environmental Limited 104 Crockford Blvd., Scarborough, Ontario Canada, M1R 3C3 Tel +1 (416) 751 6565, Fax +1 (416) 751 7592 www.amec.com	GRAIN SIZE DISTRIBUTION		Client :- Ministry of Transportation Ontario
	SILT		Project:- Highway 400, Interim Widening
	some Sand, Clay		Location:- King Vaughan Road, Vaughan, Ontario
			Depth :- Date :- 14 Feb 2003

Figure No. 7

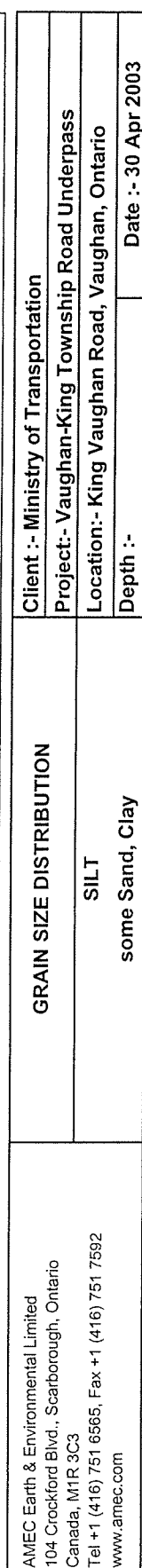


Figure No. 8

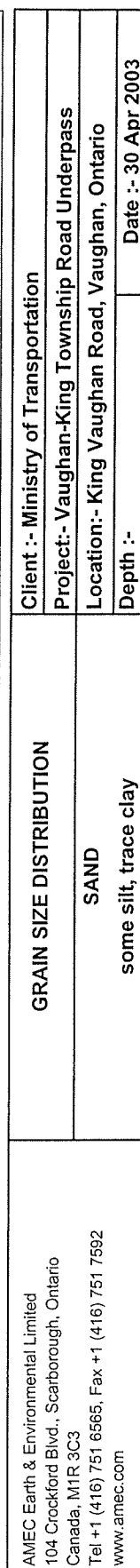
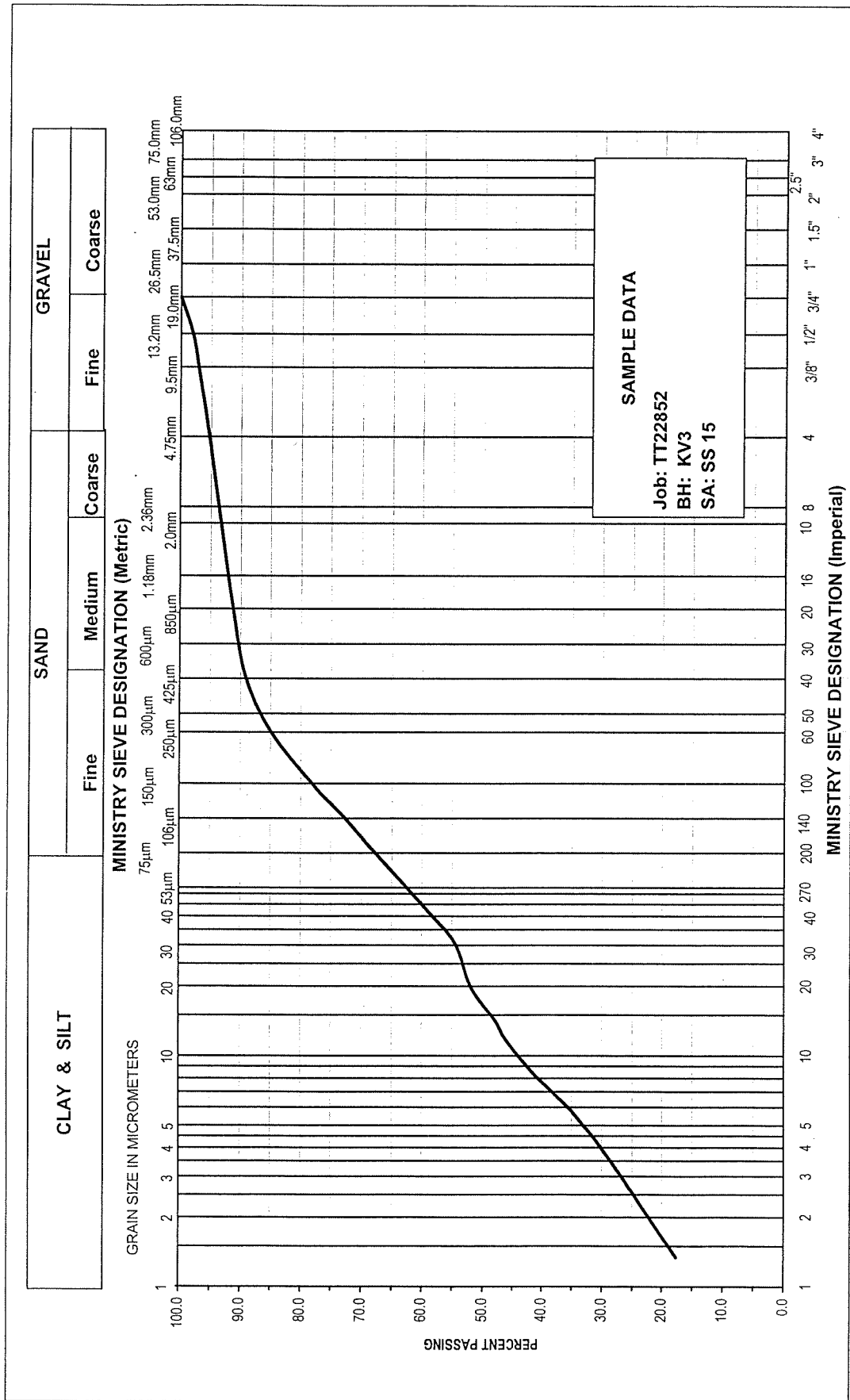


Figure No 9



UNIFIED SOIL CLASSIFICATION SYSTEM



RECORD OF BOREHOLE SHEETS

NOTES TO BOREHOLE LOGS

DRILLING DATA

Method:
 SolSt Augering - Solid Stem Augering
 HolSt Augering - Hollow Stem Augering
 WB - Washed Boring

SAMPLES

TYPE:
 SS - Split Spoon
 AS - Auger Sample
 TW - Thinwall Open
 TP - Thinwall Piston
 WS - Washed Sample
 BS - Block Sample
 RC - Rock Core
 PH - Sample Advanced Hydraulically
 PM - Sample Advanced Manually

LABORATORY DATA

WP - Plastic Limit (%)
 W - Water Content (%)
 WL - Liquid Limit (%)
 γ - Natural Unit Weight (kN/m³)
 UNDR STRNG or C_u - Undrained Shear Strength (kPa)
 Field Vane: St-sensitivity
 PP - Pocket Penetrometer
 UC - Unconfined Compression
 UU - Unconsolidated Undrained at Overburden Pressure
 CU - Consolidated Undrained
 CD - Consolidated Drained
 TOV - Total Organic Vapours

Standard Penetration Test, 'N'-values
 The Standard Penetration Test (SPT) 'N'-values are the number of blows required to cause a standard 51 millimetre o.d. split barrel sample to penetrate 0.3 metres into undisturbed ground in a borehole when driven by a hammer with a mass of 63.5 kilograms falling freely a distance of a 0.76 metres. For penetrations of less than 0.3 metres, N-values are indicated as the number of blows for the penetration achieved (e.g. 50/25: 50 blows for 25 centimetre penetration).

Dynamic Cone Penetration Test:
 Continuous penetration of a conical steel point (51 millimetre o.d. 60° cone angle) driven by 475 J impact energy on a size drill rods. The resistance to cone penetration is measured as the number of blows for each 0.3 metres advance of the conical point into the undisturbed ground.

Soils are described by their composition and consistency or compactness.

CONSISTENCY: Cohesive soils are described on the basis of their undrained shear strength (C_u) or 'N'-values as follows:

C_u (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	> 200
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD
N (blows/0.3 metres)	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	> 30

COMPACTNESS: Cohesionless soils are described on the basis of compactness as indicated by 'N'-values as follows:

N (blows/0.3 metres)	0 - 4	4 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

Rocks are described by their composition and structural features and/or strength.

TOTAL CORE RECOVERY (TCR): Sum of all recovered rock core pieces from a coring run expressed as a percent of the total length of the coring run.

SOLID CORE RECOVERY (SCR): Total length of recovered solid, full diameter rock core expressed as a percent of the length of the coring run.

FRACTURE INDEX: Number of cracks per 1.5m.

ROCK QUALITY

DESIGNATION (RQD): Sum of those intact core pieces, 100 millimetres in length expressed as a percent of the length of the coring run. Classification of a rock based on the RQD value as follows:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT



JOINTING AND BEDDING:

SPACING	50 millimetres	50 - 300 millimetres	0.3 - 1.0 millimetres	1.0 - 3.0 millimetres	> 3.0 millimetres
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

RECORD OF BOREHOLE No KV1



W.P. 192-00-00 LOCATION 4862507N 299888E 1 OF 1
 DIST _____ HWY 400 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 9 January 2003 - 9 January 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa							PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)					
284.0 0.0	Gravelly Sand (FILL) damp, brown, compact		1	SS	18													
283.1 0.9	Clayey Silt (FILL), trace sand moist, brown, very stiff		2	SS	19													
			3	SS	17													
	----- trace rootlets, grey		4	SS	15													
	----- trace topsoil seams		5	SS	10													
277.3 6.7	CLAYEY SILT (TILL), trace gravel, trace sand lenses, trace rootlets damp, grey, very stiff		6	SS	27													
	----- moist		7	SS	21													
			8	SS	31													
274.4 9.6	End of Borehole		9	SS	40													
	Water Level in Open Bore On Completion : none																	

+³, X³: Numbers refer to Sensitivity ○³% STRAIN AT FAILURE

RECORD OF BOREHOLE No KV2



W.P. 192-00-00 LOCATION 4862501N 299868E 1 OF 1
 DIST _____ HWY 400 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 9 January 2003 - 9 January 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852

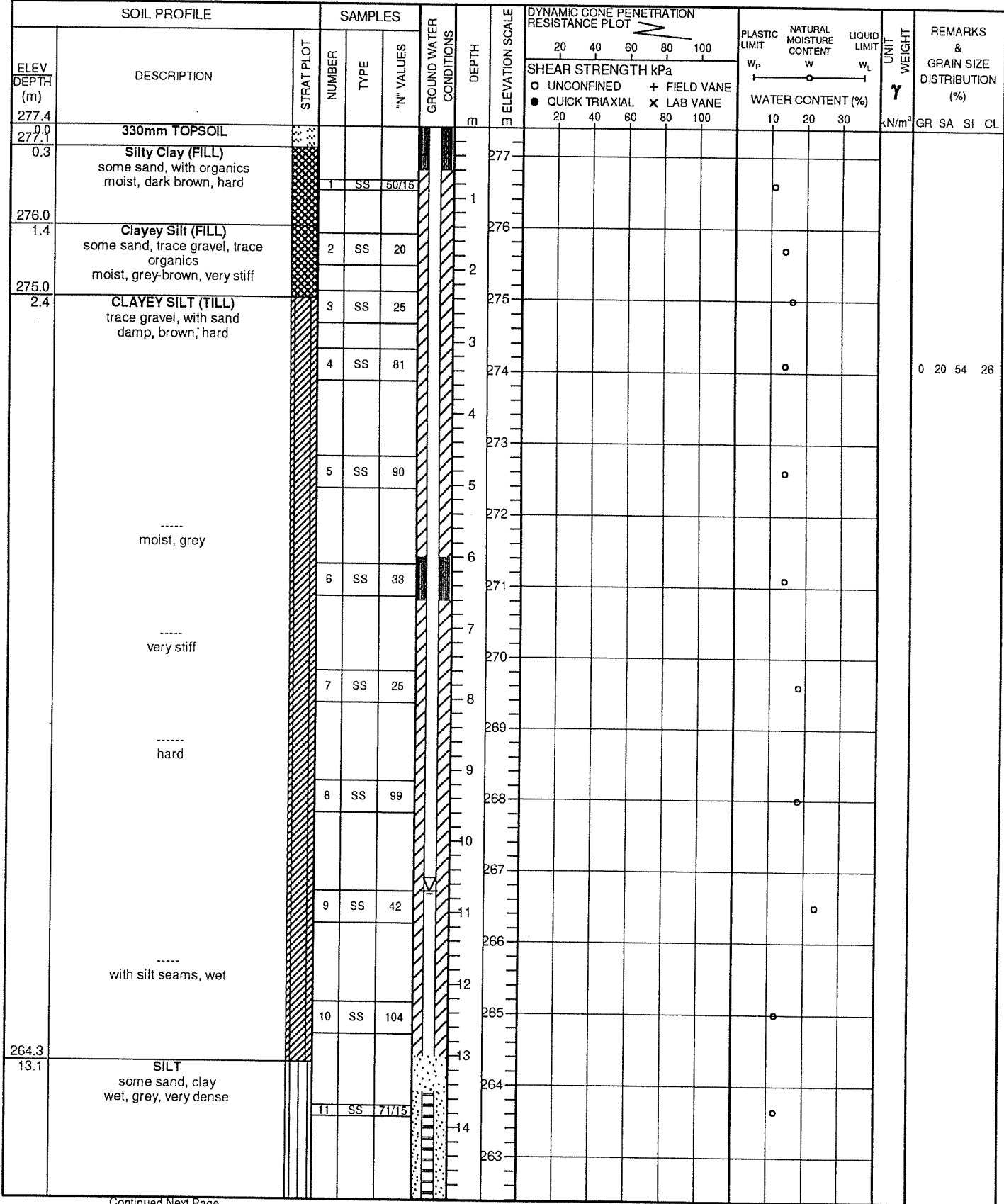
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					
284.5									20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L		
284.4	110mm ASPHALT								20 40 60 80 100	WATER CONTENT (%)				
284.4	Sand (FILL), some silt, trace gravel damp, brown, compact		1	SS	17		284			○ UNCONFINED	+ FIELD VANE			
			2	SS	28		283			● QUICK TRIAXIAL	x LAB VANE			
281.7	Clayey Silt (FILL), trace sand moist, brown, stiff		3	SS	14		282							
281.7	trace topsoil seams		4	SS	12		281							
			5	SS	10		280							
277.5	Sand (FILL), trace gravel wet, brown, dense		6	SS	31		279							
276.7	CLAYEY SILT (TILL), trace gravel, occasional sand lenses moist, brown, hard		7	SS	34		278							
			8	SS	59		277							
			9	SS	91		276							
271.8	End of Borehole		10	SS	49		275							
12.7	Water Level in Open Bore On Completion : none						274							

+³, x³: Numbers refer to Sensitivity
 ○³% STRAIN AT FAILURE

RECORD OF BOREHOLE No KV3



W.P. 192-00-00 LOCATION 4862478N 299880E 1 OF 2
 DIST HWY 400 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 8 February 2003 - 8 February 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852



Continued Next Page

+3, X3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No KV3



W.P. 192-00-00 LOCATION 4862478N 299880E 2 OF 2
 DIST HWY 400 BOREHOLE TYPE Soild Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 8 February 2003 - 8 February 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	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 (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa						
									20 40 60 80 100	20 40 60 80 100					
									○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB VANE					

+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No KV4



W.P. 192-00-00 LOCATION 4862485N 299808E 1 OF 1
 DIST HWY 400 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 9 January 2003 - 9 January 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	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 (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa								WATER CONTENT (%)
284.5	120mm ASPHALT		1	AS	-												
283.4	Sand (FILL), with gravel, trace silt damp, brown, loose		2	SS	9												
283.1	Clayey Silt (FILL) moist, brown, stiff		3	SS	37												
1.4	Sand and Gravel (FILL), trace silt damp, brown, dense																
	some silt, loose																
281.1	Clayey Silt (FILL), trace sand, moist, brown, very stiff		4	SS	16												
3.4	stiff		5	SS	13												
279.0	stiff		6	SS	14												
5.5	CLAYEY SILT (TILL), trace gravel, some sand moist, brown, very stiff		7	AS	-												
	hard		8	SS	16												
			9	SS	27												
			10	SS	23												
			11	SS	40												
			12	SS	46												
		13	AS	-													
271.8	End of Borehole	14	SS	43													
12.7	Water Level in Open Bore On Completion : none																

+3, X3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No KV5



W.P. 192-00-00 LOCATION 4862454N 299803E 1 OF 2
 DIST HWY 400 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 22 February 2003 - 22 February 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	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 (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa								
277.2 0.0	450mm TOPSOIL								20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	10 20 30				
276.8 0.5	Silty Clay (FILL) some sand, trace organics moist, grey firm		1	AS	-		1	277									
	----- trace sand, some organics dark brown		2	SS	6		2	276									
275.1 2.1	CLAYEY SILT to SILTY CLAY (TILL) trace gravel, trace sand moist, grey, stiff		3	SS	6		3	275									
	----- damp, brown, very stiff		4	SS	9		4	274									
	----- hard		5	SS	26		5	273									
	----- grey, very stiff		6	SS	45		6	272									
			7	SS	19		7	271									
			8	SS	23		8	270									
	----- trace sand lenses, hard		9	SS	41		9	269									
	----- moist to wet, very stiff		10	SS	21		10	268									
265.6 11.6	SILT occasional gravel, some sand, clay wet, grey, very dense		11	SS	68		11	267									
			12	SS	66		12	266									
262.6 14.6	SAND some silt, trace clay						13	265									
							14	264									
								263									

+³, x³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

amec

[illegible]

+³, ×³: Numbers refer to Sensitivity ○³% STRAIN AT FAILURE

RECORD OF BOREHOLE No KV6



W.P. 192-00-00 LOCATION 4862472N 299787E 1 OF 1
 DIST HWY 400 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY JF
 DATUM Geodetic DATE 9 January 2003 - 9 January 2003 COMPILED BY PPM
 PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400 CHECKED BY AD
 JOB NO. TT22852

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					
283.8	150mm ASPHALT								20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
283.7	Sand and Gravel(FILL), with silt		1	AS	-				20 40 60 80 100	WATER CONTENT (%)				
283.4	damp, brown		2	SS	15		1	283						
0.5	Clayey Silt (FILL), trace sand													
	moist, brown, stiff		3	SS	7		2	282						
	firm													
	very stiff		4	SS	16		3	281						
	stiff		5	SS	9		4	280						
278.3	CLAYEY SILT (TILL), trace gravel,						5	279						
5.5	some sand		6	SS	16		6	278						
	moist, brown, very stiff													
	stiff		7	SS	13		7	277						
	very stiff		8	SS	16		8	276						
	hard		9	SS	19		9	275						
274.2	End of Borehole		10	AS	-									
9.6	Water Level in Open Bore		11	SS	36									
	On Completion : none													

+³, x³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

amec

ORIGINATED BY JF

COMPILED BY IH

- CHECKED BY AD

JOB NO. TT22852

JOB NO. _____

Continued Next Page

$+^3, \times^3$: Numbers refer to Sensitivity $\bigcirc^3\%$ STRAIN AT FAILURE

amec

ORIGINATED BY JF

W.P. 192-00-00

LOCATION 4862479N 299836E

DIST HWY 400

BOREHOLE TYPE Hollow Stem Augering

COMPILED BY IH

DATUM Geodetic

DATE 15 March 2003 - 15 March 2003

— CHECKED BY AD

PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400

JOB NO. TT22852

+³, ×³: Numbers refer to Sensitivity ○^{3%} STRAIN AT FAILURE

RECORD OF BOREHOLE No KV8



W.P. 192-00-00	LOCATION 4862499N 299833E	1 OF 1	ORIGINATED BY JF
DIST _____ HWY 400	BOREHOLE TYPE Solid Stem Augering	COMPILED BY IH	
DATUM Geodetic	DATE 15 March 2003 - 15 March 2003	CHECKED BY AD	
PROJECT Vaughan-King Township, Road Underpass Widening, HWY 400		JOB NO.	TT22852

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	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 (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE						20	40	60
278.3	250mm ASPHALT																			
278.0	Sand and Gravel (FILL), trace silt damp, brown		1	AS	-			278												
277.4	Silty Sand (FILL), trace Clay damp, brown							1												
276.8	dark brown Clayey Silt (FILL), trace sand, organics damp, brown, stiff		2	SS	9			2												
275.4	brown CLAYEY SILT (TILL), some sand, trace gravel damp, brown, very stiff to hard		3	SS	33			3												
275.0								4												
274.0			4	SS	29			5												
273.0								6												
272.0			5	SS	20			7												
271.0								8												
270.0			6	SS	16			9												
269.0																				
268.7	End of Borehole		7	SS	16															
9.6	Water Level in Open Bore On Completion : none																			

+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

APPENDIX 'A'

**Borehole Logs extracted from report prepared by Department of Highways Ontario
dated 1959
GEOCRES File No. 30M13-2**

DEPARTMENT OF HIGHWAYS - ONTARIO **MATERIALS AND RESEARCH SECTION**

S.P. --- 267-59 --- BORE HOLE NO. --- 1 ---

LOG --- 259-57 --- STATION QED 641 BT

DATUM 509.0' --- COMPILED BY --- J.L.

DURING DATE June 5/59. CHECKED BY --- M.D.

LEGEND

1/2 UNCONFINED COMPRESSION (CU) ---

WATER TEST (C) AND SENSITIVITY (S) ---

NATURAL MOISTURE AND ---

LIQUIDITY INDEX ---

PLASTIC LIMIT ---

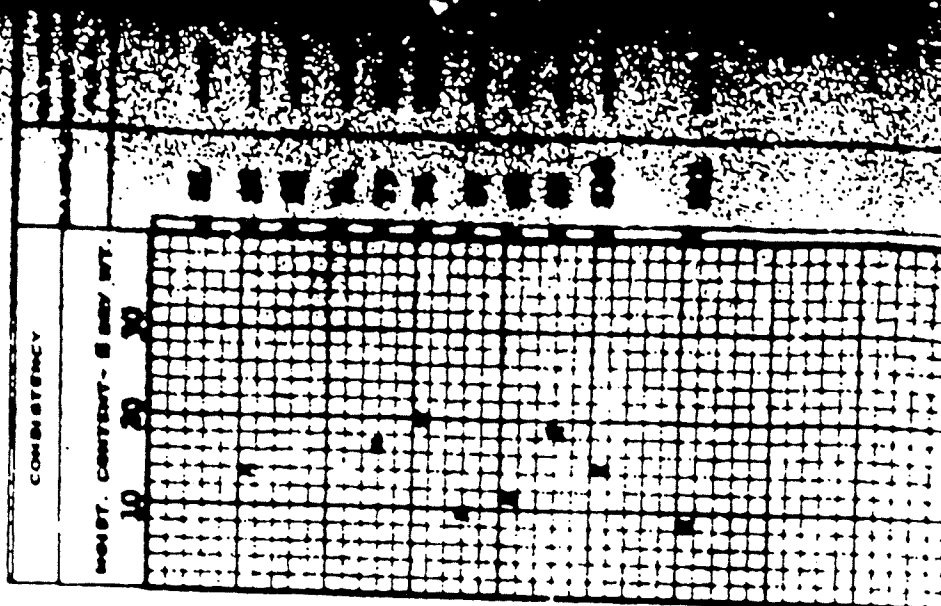
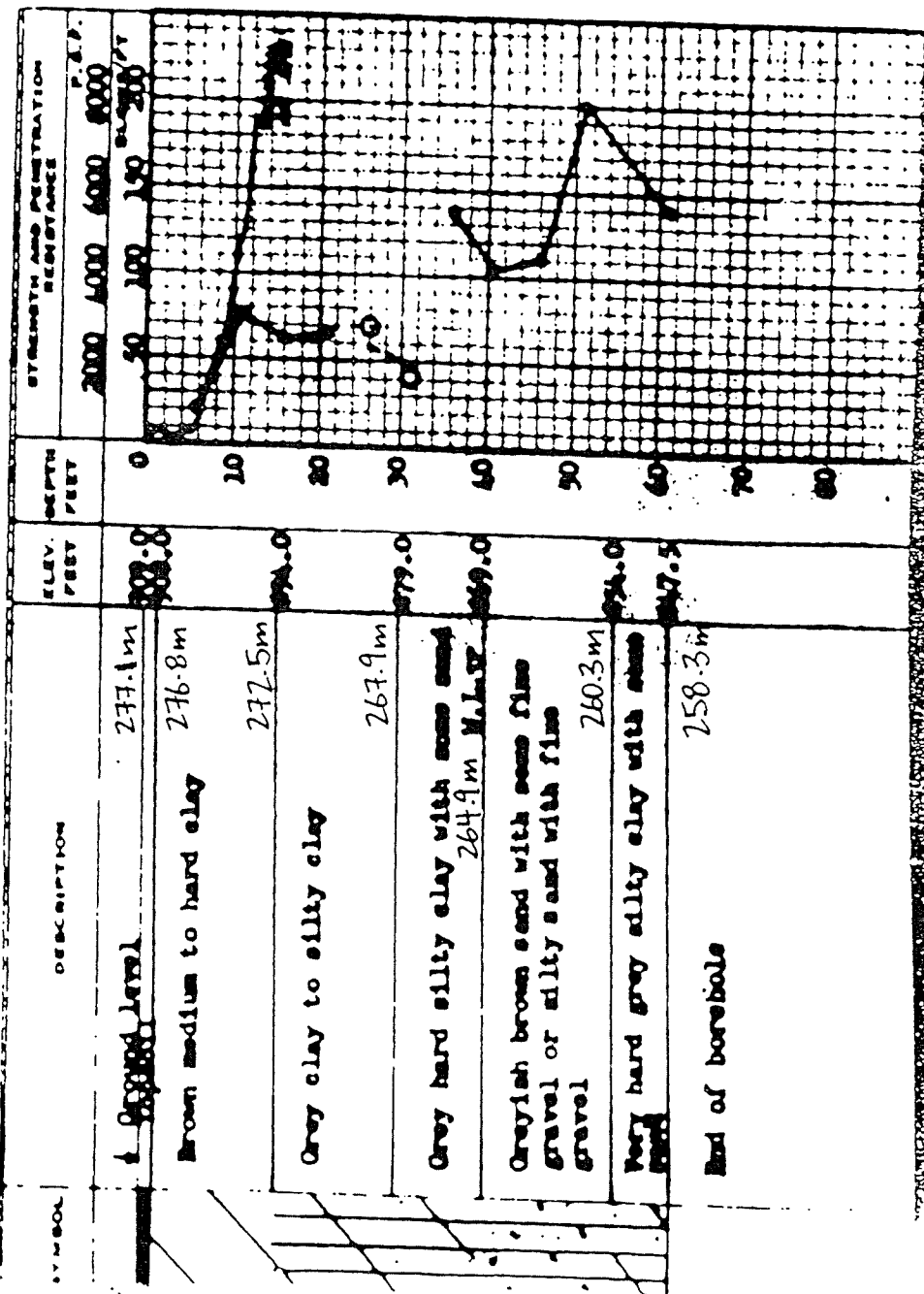
1/2 UNCONFINED COMPRESSION (CU) ---

WATER TEST (C) AND SENSITIVITY (S) ---

NATURAL MOISTURE AND ---

LIQUIDITY INDEX ---

PLASTIC LIMIT ---



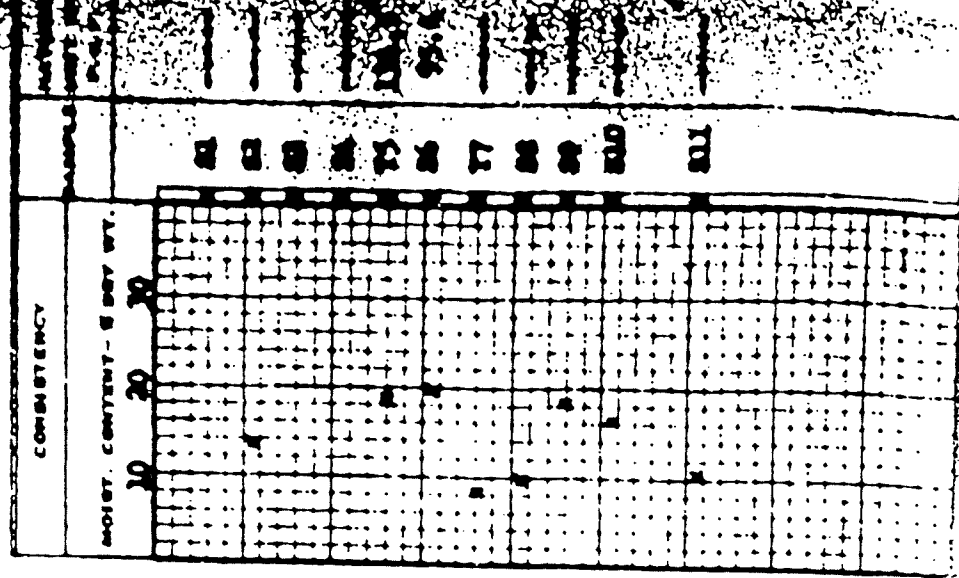
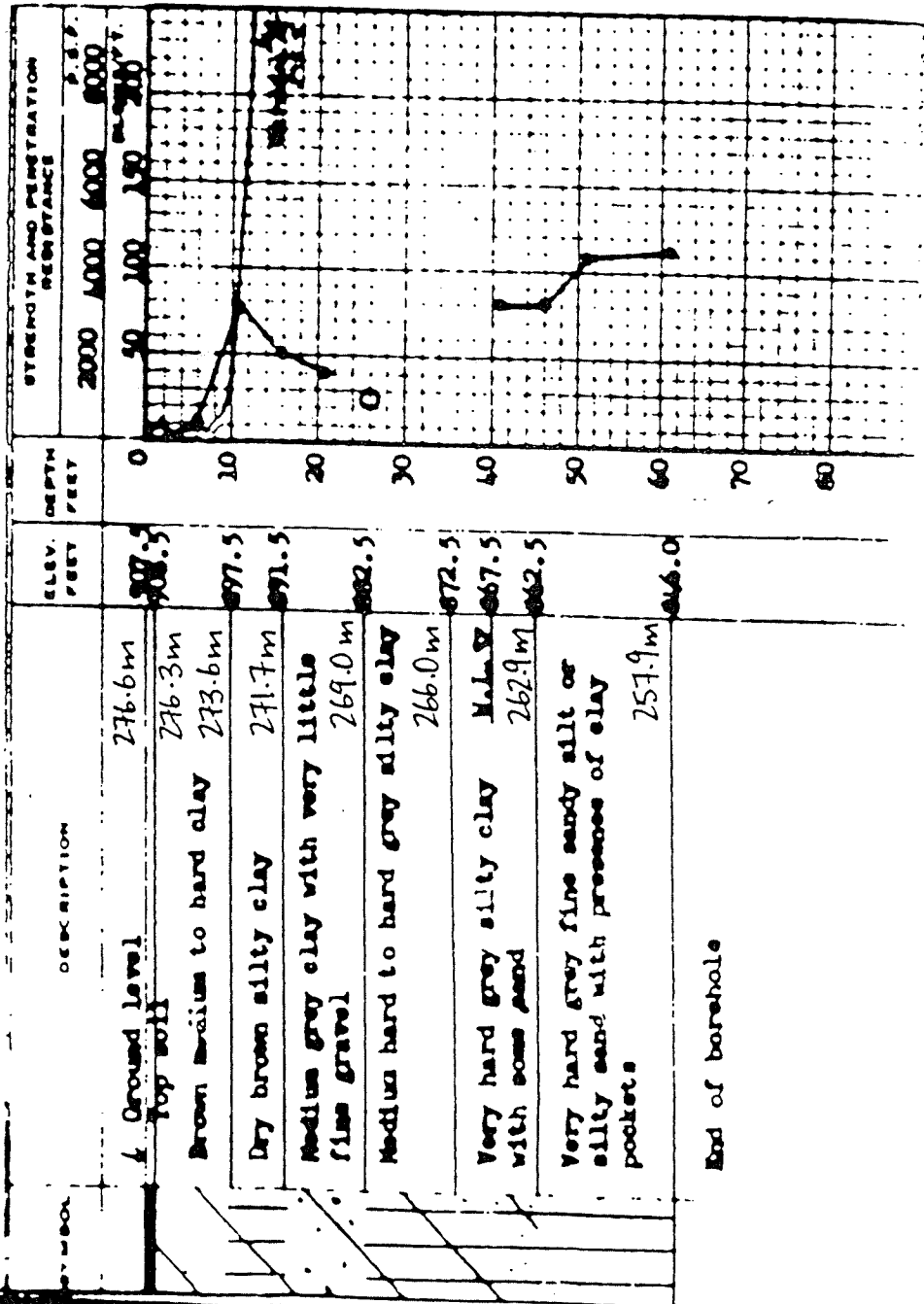
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 267 - 59 BORE HOLE NO. 2
JOB 759 - 57 STATION 46+16 (67' RT.)
DATUM 807.5' COMPILED BY B.J.
BORING DATE JAN. 8/59 CHECKED BY M.D.

8" DIA. SPLIT TUBE
8" SHELBY TUBE
8" SPLIT TUBE
8" DIA. CONE
8" SHELBY
CASING

LEGEND

1/2 UNCOMPACTED COMPRESSION (QU)
WANE TEST (C) AND SENSITIVITY (S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT



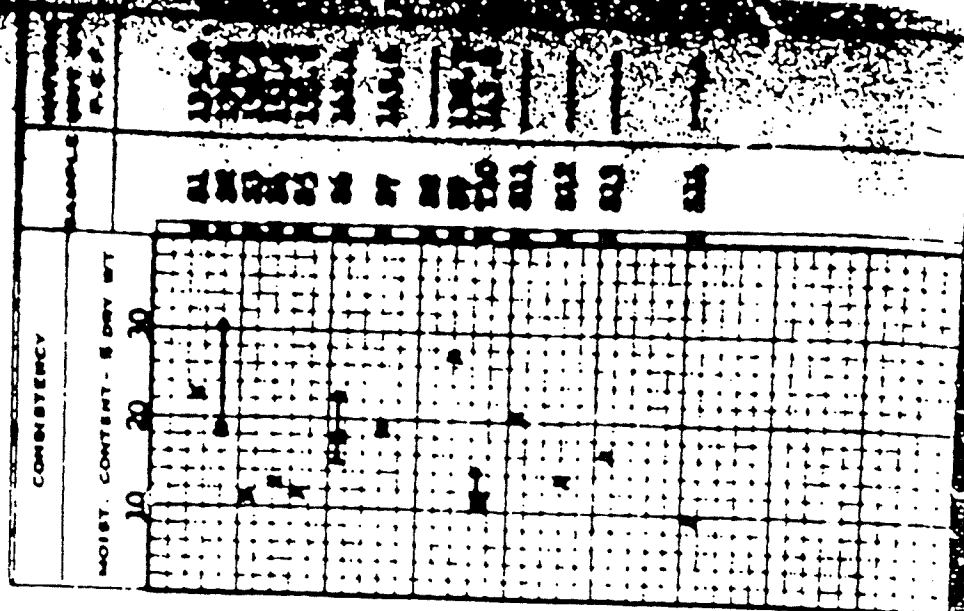
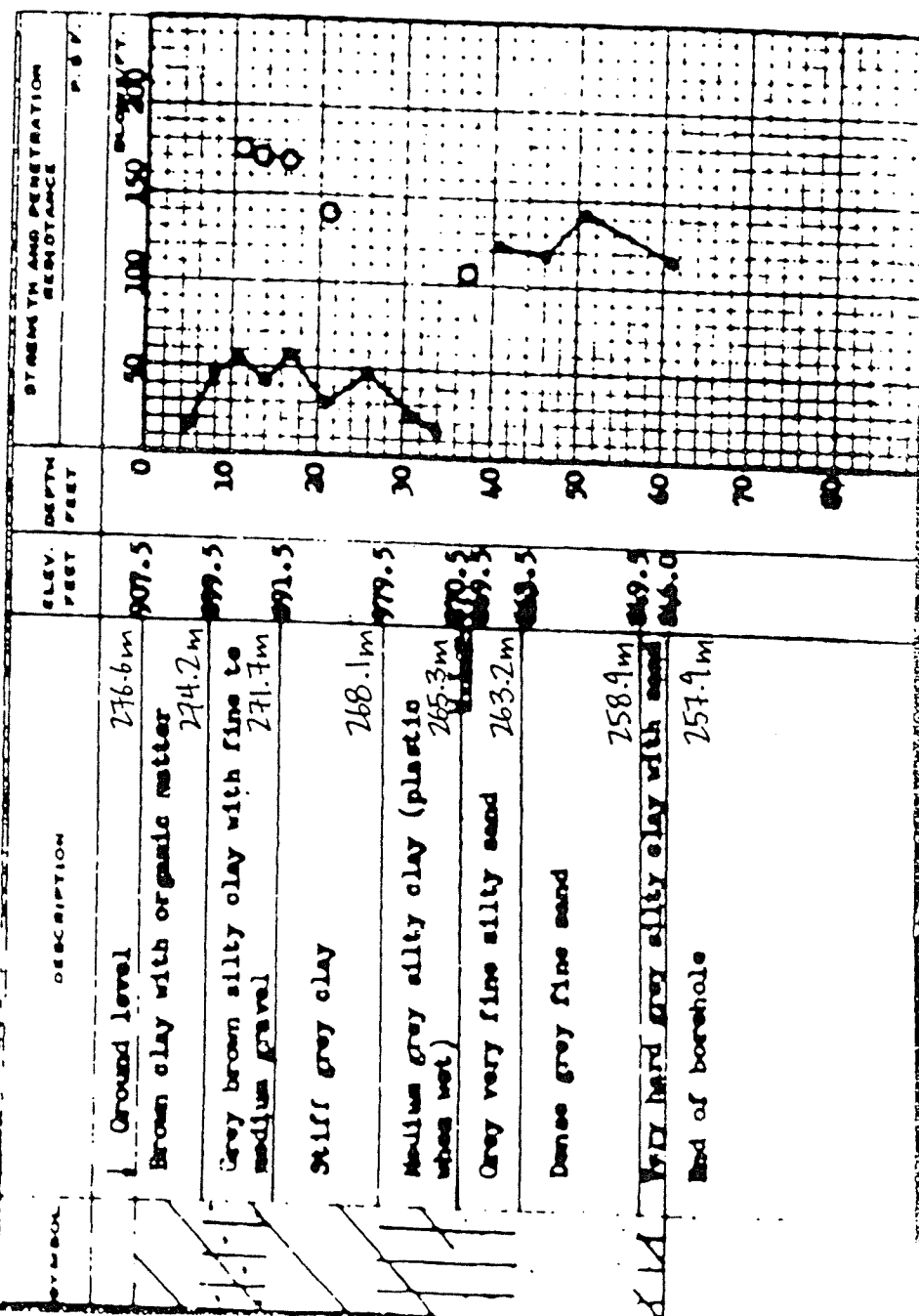
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. - 267 - 59 BORE HOLE NO. 1
JOB - 759 - 57 STATION 46+00 (65' DE)
DATUM 907.5' COMPILED BY B.J.L.
BORING DATE JUN 9/59 CHECKED BY B.L.D.

2" DIA SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CORE
2" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu)
VANE TEST (C) AND SENSITIVITY (S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT



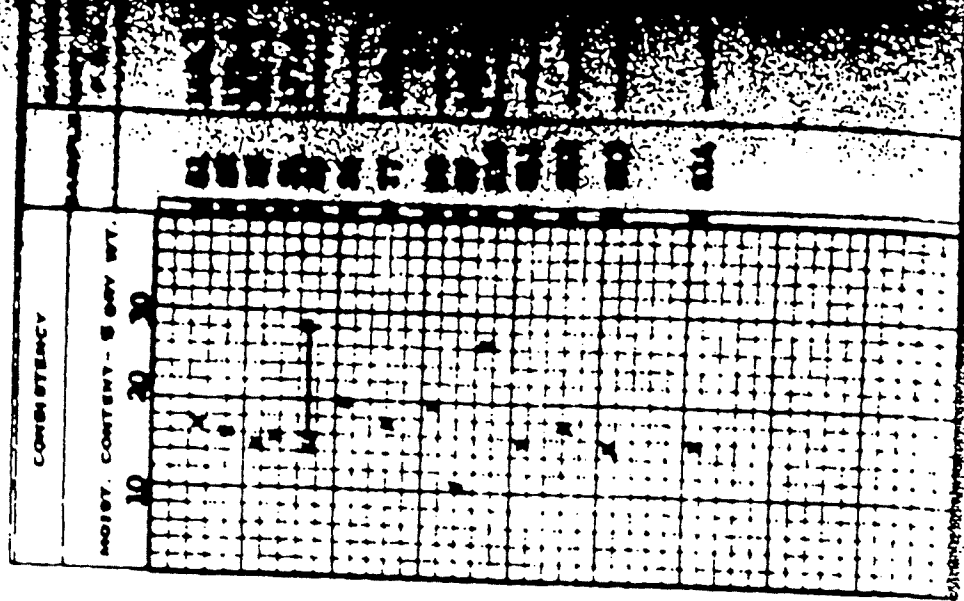
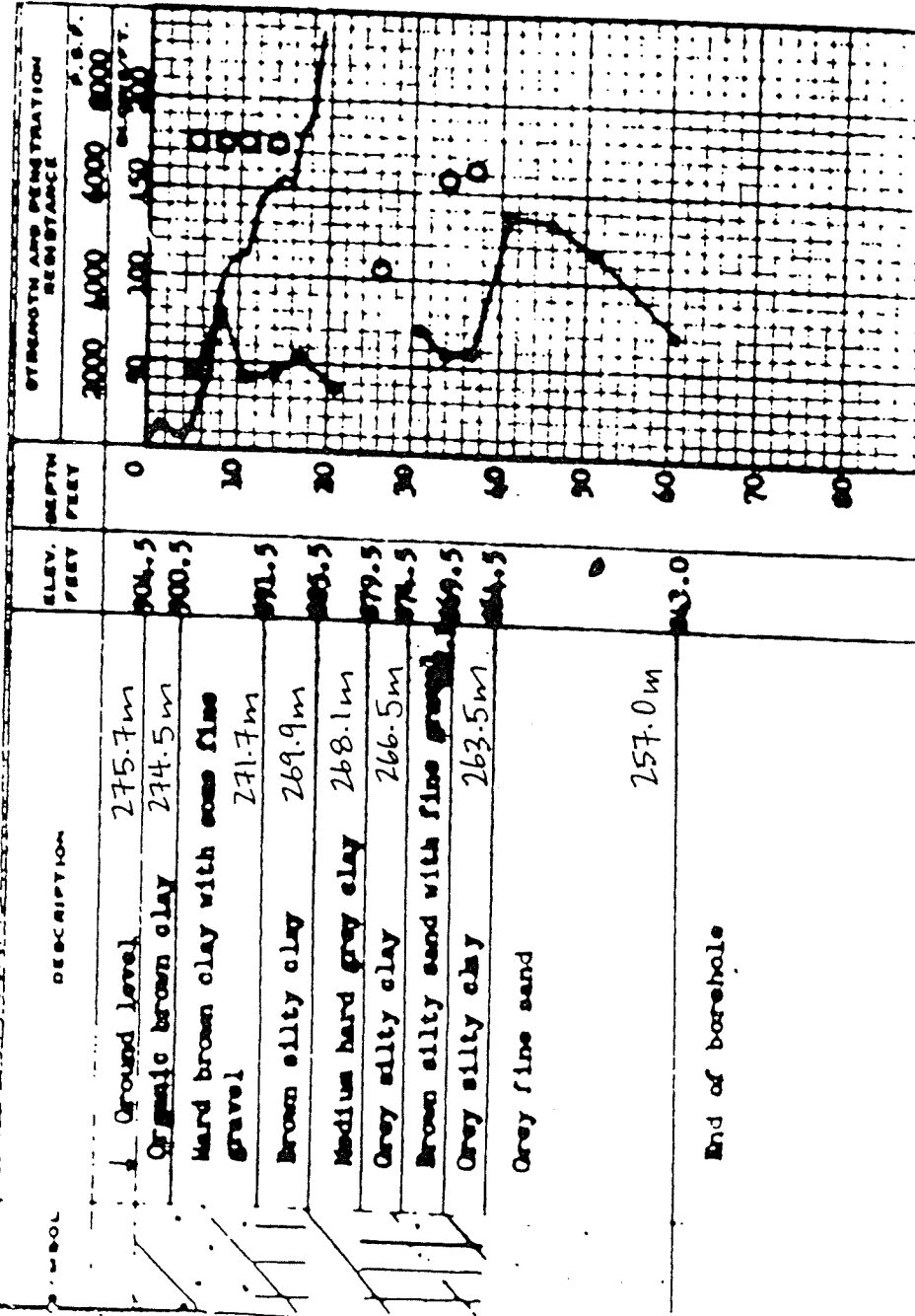
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. - 267 - 59 --- BORE HOLE NO. - A
JOB - 758 - 57 --- STATION 0+00 (62' RR)
DATUM 904.5' --- COMPILED BY - J.L.
BORING DATE June 9/59 --- CHECKED BY - J.L.

1" DIA. SPLIT TUBE
1" SHELBY TUBE
1" SPLIT TUBE
1" DIA. CORE
1" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSIVE STRENGTH (QU)
WATER TEST (C) AND DEFORMABILITY
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT



SUMMARY OF FIELD & LABORATORY TESTS

JOB 159 - 57

WP 267 - 59

MOLE NO	TEST NO	DEPTH (FT)	NATURAL DESCRIPTION	PERMIT PENET (BLOWS/FT)	MOIST. CONT. (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	SHEAR STRENGTH (PSF)	UNIT WEIGHT (PCF)	REMARKS
1	31	5' - 6.5'	Brown medium to hard clay	20	--	--	--	--	--	
	32	10' - 11.5'	Brown medium to hard clay	75	13.5	--	--	--	--	
	33	15' - 16.5'	Brown medium to hard clay	62	--	--	--	--	--	
	34	20' - 21.5'	Grey clay to silty clay	65	--	--	--	--	--	
	35	25' - 26.5'	Grey clay to silty clay	59	16.6	--	--	2750	136.0	
	36	30' - 31.5'	Grey hard silty clay with some sand	49	19.9	--	--	1650	134.1	
	37	35' - 36.5'	Grey hard silty clay with some sand	136	9.4	--	--	--	--	
	38	40' - 41.5'	Greyish brown sand with some gravel or silty sand with fine gravel	>100	11.1	--	--	--	--	
	39	45' - 46.5'	Greyish brown sand with some gravel or silty sand with fine gravel	110	18.7	--	--	--	--	
	310	50' - 51.5'	Greyish brown sand with some gravel or silty sand with fine gravel	200	14.5	--	--	--	--	
	311	60' - 61.5'	Very hard grey silty clay with some sand	140	8.6	--	--	--	--	
2	31	5' - 6.5'	Brown medium to hard clay	13	--	--	--	--	--	
	32	10' - 11.5'	Dry brown silty clay	76	13.4	--	--	--	--	
	33	15' - 16.5'	Dry brown silty clay	50	--	--	--	--	--	
	34	20' - 21.5'	Medium grey clay with very little fine	40	--	--	--	--	--	
	35	25' - 26.5'	Medium hard to hard grey silty clay	25	18.6	--	--	1070	131.5	
	36	30' - 31.5'	Medium hard to hard grey silty clay	41	19.5	--	--	--	95.4	
	37	35' - 36.5'	Very hard grey silty clay with some sand	68	8.2	--	--	--	--	
	38	40' - 41.5'	Very hard grey silty clay with some sand	80	9.6	--	--	--	--	
	39	45' - 46.5'	Very hard grey fine sandy silt or silty sand with presence of clay pockets	80	18.3	--	--	--	--	
	310	50' - 51.5'	Very hard grey fine sandy silt or silty sand with presence of clay pockets	108	16.2	--	--	--	--	
	311	60' - 61.5'	Very hard grey fine sandy silt or silty sand with presence of clay	112	10.4	--	--	--	--	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 159 - 57

W.P. 267 - 52

MOLE NO	SAMP NO	SAMPLE DEPTH FEET	MATERIAL DESCRIPTION	PERCENT PLASTIC BLOW/FT	MOIST CONT %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH PSI	UNIT WEIGHT PCF	REMARKS
3	31	4' - 5.5'	Brown clay with organic matter	15	22.4	--	--	--	135.0	
	32	7' - 8.5'	Grey brown silty clay with fine to medium gravel	45	16.8	18.1	30.4	--	139.6	
	33	10' - 11.5'	Grey brown silty clay with fine to medium gravel	55	11.1	--	--	7000+	150.0	
	34	13' - 14.5'	Grey brown silty clay with fine to medium gravel	42	12.6	--	--	6900	151.9	
	35	16' - 17.5'	Stiff grey clay	57	11.6	--	--	6850	153.8	
	36	20' - 21.5'	Stiff grey clay	30	17.6	15.0	22.6	9750	142.4	
	37	25' - 26.5'	Stiff grey clay	47	19.0	--	--	--	145.6	
	38	30' - 31.5'	Medium grey silty clay (plastic when wet)	23	--	--	--	--	--	
	39	33' - 34.5'	Medium grey silty clay (plastic when wet)	15	27.1	--	--	--	138.7	
	T10	36' - 37.5'	Grey very fine silty sand	44	10.2	11.9	14.3	4280	143.6	
	311	40' - 41.5'	Grey very fine silty sand	122	20.6	--	--	--	--	
	312	45' - 46.5'	Dense very fine silty sand	118	13.5	--	--	--	--	
	313	50' - 51.5'	Dense very fine silty sand	142	16.6	--	--	--	--	
	314	60' - 61.5'	Very hard grey silty clay with sand	115	9.6	--	--	--	--	
4	31	4.0' - 5.5'	Hard brown clay with some fine gravel	44	17.0	--	--	7000+	142.1	
	32	7.0' - 8.5'	Hard brown clay with some fine gravel	78	16.0	--	--	7000+	137.6	
	33	10' - 11.5'	Hard brown clay with some fine gravel	42	15.0	--	--	7000+	147.5	
	34	13' - 14.5'	Brown silty clay	44	15.5	--	--	7000+	137.4	
	35	16' - 17.5'	Brown silty clay	54	14.3	15.1	28.1	--	--	
	36	20' - 21.5'	Medium hard grey clay	36	19.5	--	--	--	--	
	37	25' - 26.5'	Grey silty clay	58	17.2	--	--	4100	136.9	
	38	30' - 31.5'	Brown silty sand with fine gravel	72	18.8	--	--	--	--	
	39	33' - 34.5'	Brown silty sand with fine gravel	57	10.2	--	--	--	--	
	310	36' - 37.5'	Grey silty clay	58	26.4	--	--	6150	144.8	
	311	40' - 41.5'	Grey fine sand	137	15.3	--	--	6570	--	
	312	45' - 46.5'	Grey fine sand	133	17.3	--	--	--	--	
	313	50' - 51.5'	Grey fine sand	116	15.0	--	--	--	--	
	314	60' - 61.5'	Grey fine sand	70	15.8	--	--	--	--	

S Denotes split spoon sample

T Denotes thin wall Shelby tube

DRAWINGS

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES - METRES.

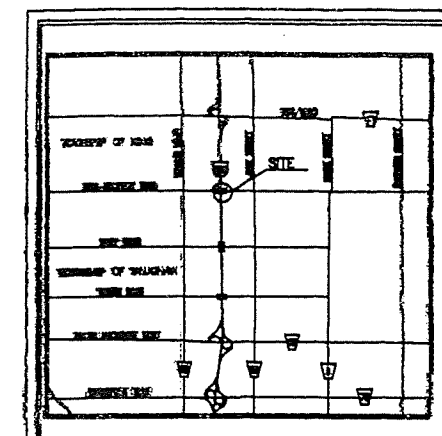
W.P. No. 192-00-00



BOREHOLE LOCATIONS
CROSSING AT KING - VAUGHAN ROAD

SHEET

AMEC Earth & Environmental Limited



KEY PLAN
N.T.S.

LEGEND

- Borehole (AMEC 2003)
- Borehole (DHO 1959)
- 'x' Blows/0.3m (Std Pen Test, 475 J/blow)
- cone Blows/0.3m (60' Cone, 475 J/blow)
- ↓ WL at time of investigation
- ↓ WL in Piezometer
- Piezometer
- └ End of Borehole

No	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
BH 1	277.1	4 862 503	299 555
BH 2	276.5	4 862 485	299 858
BH 3	276.6	4 862 474	299 820
BH 4	275.7	4 862 492	299 817
BH KV1	284.0	4 862 507	299 888
BH KV2	284.5	4 862 501	299 868
BH KV3	277.4	4 862 478	299 880
BH KV4	284.5	4 862 485	299 808
BH KV5	277.2	4 862 454	299 803
BH KV6	283.8	4 862 472	299 787
BH KV7	277.7	4 862 479	299 836
BH KV8	276.3	4 862 499	299 833

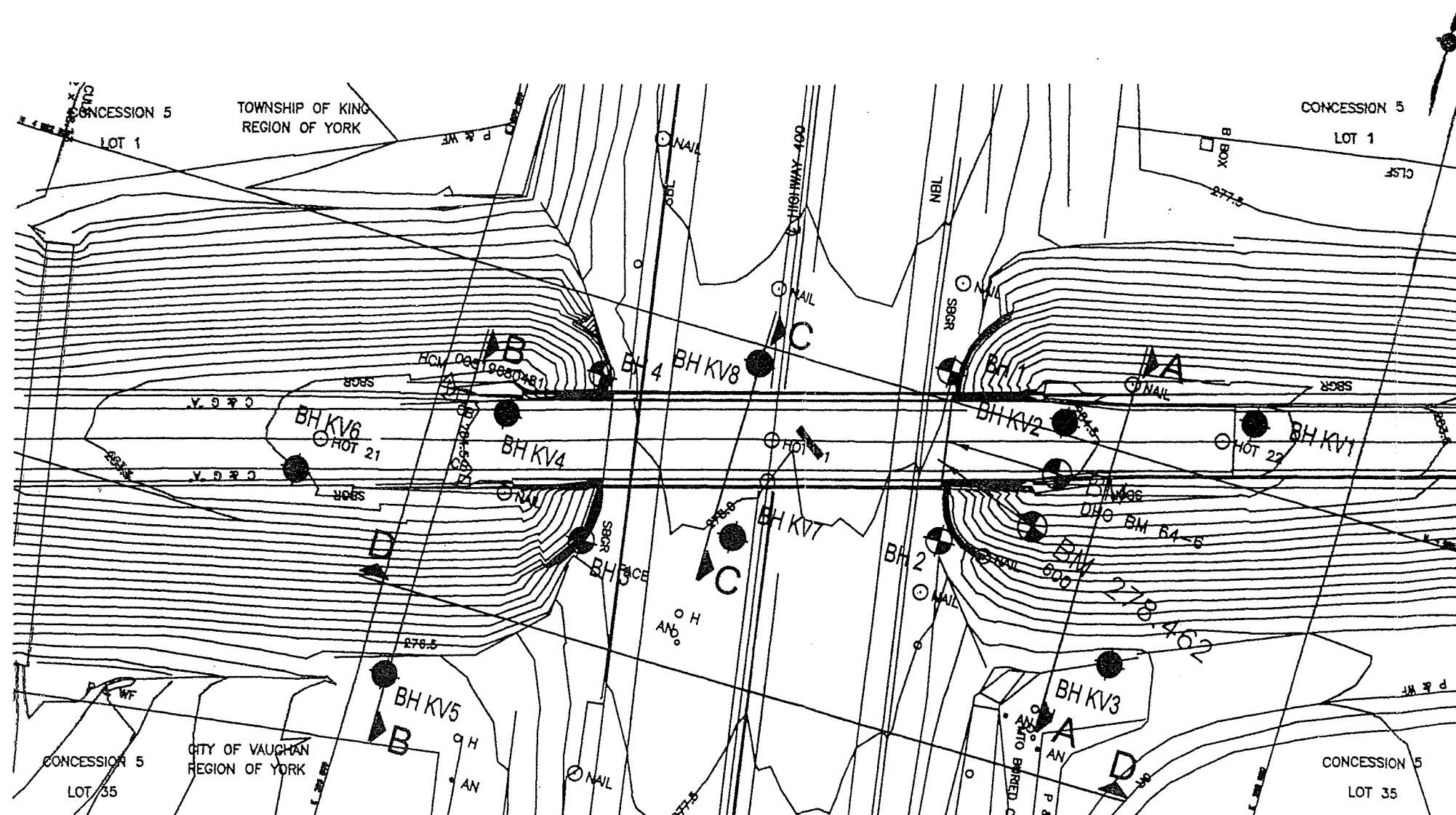
—NOTE—

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

NOTE: The complete foundation investigation and design report for this project and other related documents may be maintained at the Engineering Institute Office. Drawings, information contained in this report and related documents is specifically excluded in accordance with the conditions of Section OC E.01 of OPE Gen. Cond.

DATE	BY	DESCRIPTION

VAUGHAN AND KING ROAD UNDERPASS	DIST. 8-TORONTO
SUBCD AD	CHECKED KH
DATE APRIL 2003	SITE
DRAWN HS	CHECKED
APPROVED	DWG 1



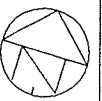
BOREHOLE LOCATION PLAN



FILE: C:\GED-TRANSPORT\PROJECTS\1122652\KING-VAUGHAN ROAD\DRAWINGS

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES UNLESS
OTHERWISE SHOWN STATIONS
IN KILOMETRES - METRES

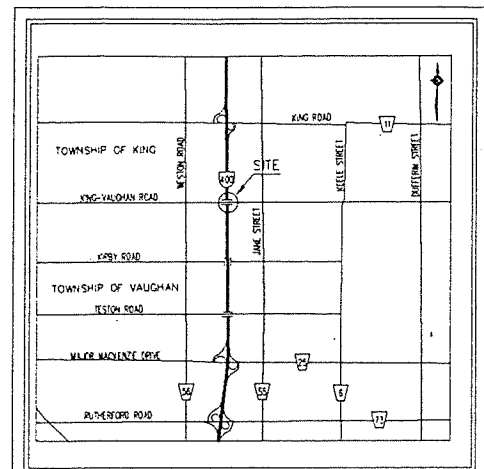
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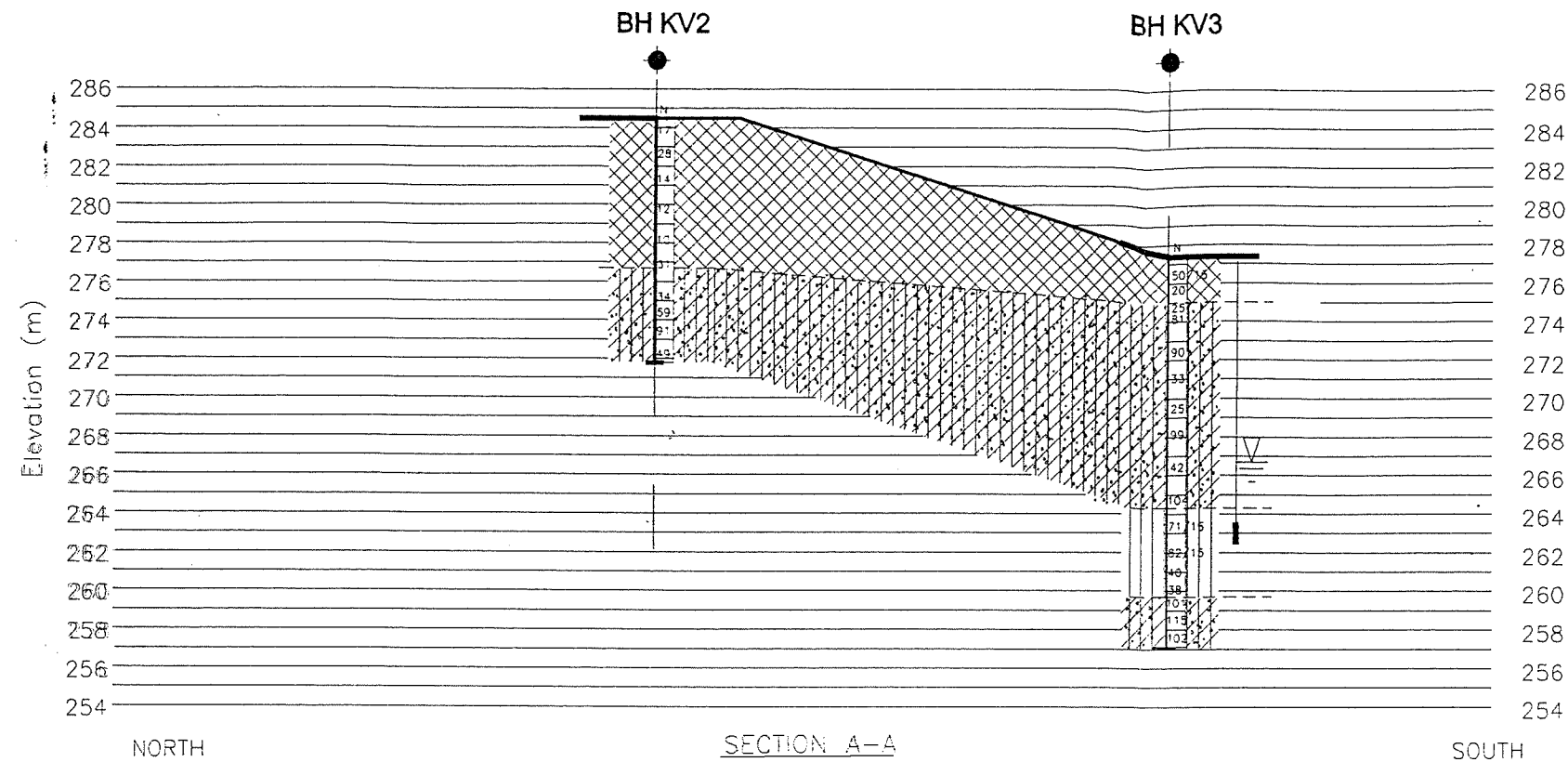
SECTION A-A & SECTION B-B
CROSSING AT KING-VAUGHAN ROAD

SHEET

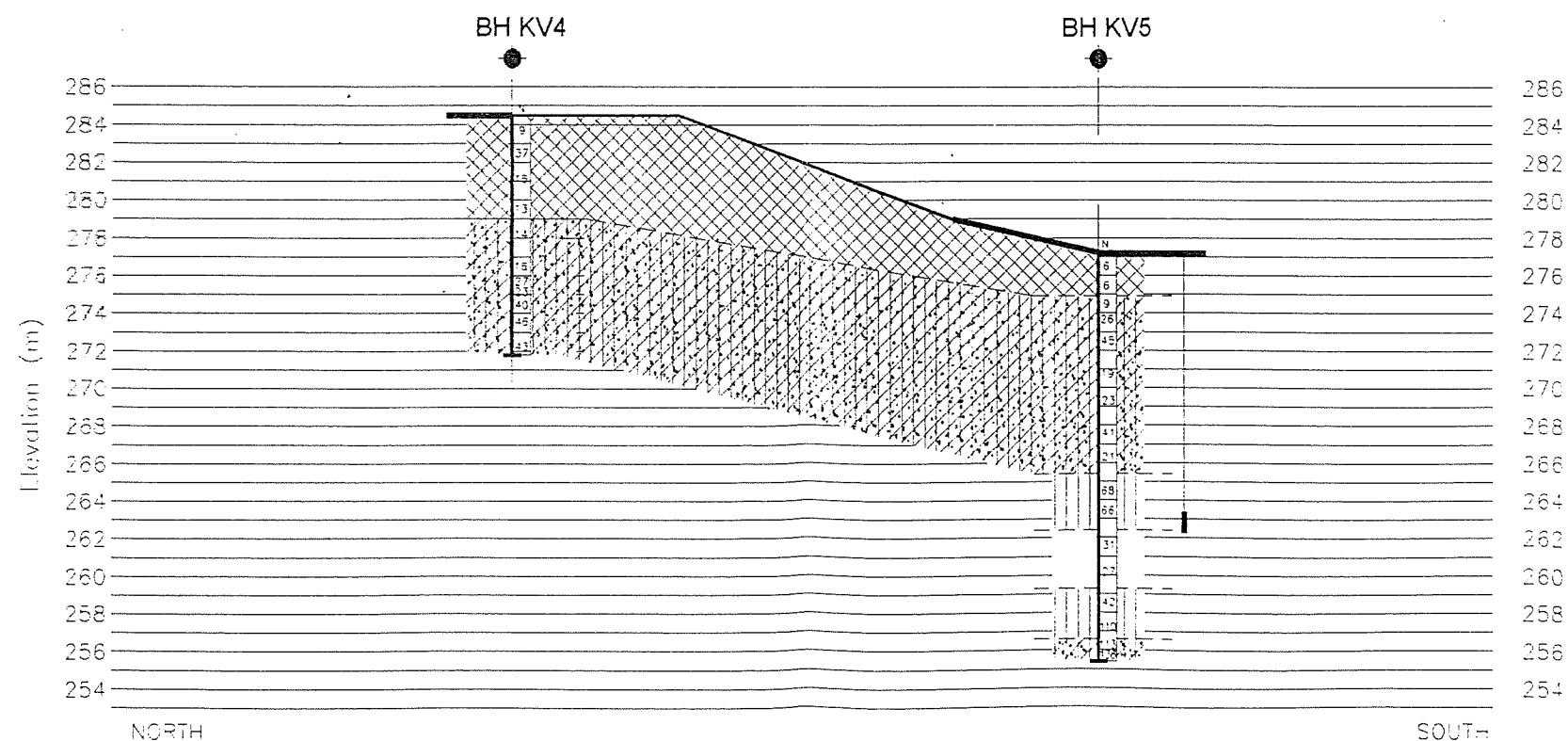
AMEC Earth & Environmental Limited



KEY PLAN
N.T.S.



SECTION A-A



SECTION B-B



LEGEND:

- FILL Sand to Clayey Silt
compact to dense/stiff to
very stiff
- SILT
very dense
- SAND to SILTY SAND
dense to very dense
- SILTY CLAY to
CLAYEY SILT TILL
stiff to hard

LEGEND

- Borehole (AMEC 2003)
- Borehole (DHO 1959)
- Blows/0.3m (Std Pen Test, 475 J/blow)
- Blows/0.3m (60° Cone, 475 J/blow)
- WL at time of investigation
- WL in Piezometer
- Piezometer
- End of Borehole

No	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
BH 1	277.1	4 862 503	299 555
BH 2	276.5	4 862 485	299 858
BH 3	276.6	4 862 474	299 820
BH 4	275.7	4 862 492	299 817
BH KV1	284.0	4 862 507	299 888
BH KV2	284.5	4 862 501	299 888
BH KV3	277.4	4 862 478	299 880
BH KV4	284.5	4 862 485	299 808
BH KV5	277.2	4 862 454	299 803
BH KV6	283.8	4 862 472	299 787
BH KV7	277.7	4 862 479	299 836
BH KV8	278.3	4 862 499	299 833

NOTE

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

NOTE: The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions of Section 2.01 of OPS Gen.Cand.

DATE	BY	DESCRIPTION
VAUGHAN - KING ROAD UNDERPASS		DIST 6-TORONTO
SUBM'D AD CHECKED KSH	DATE FEB. 2003	SITE
DRAWN NS	CHECKED	APPROVED
		DWG 2

FILE: O:\GLO-TRANSFORM\PROJECTS\1122852\CROSSING AT KING ROAD-VAUGHAN ROAD\DRAWINGS

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES - METRES.

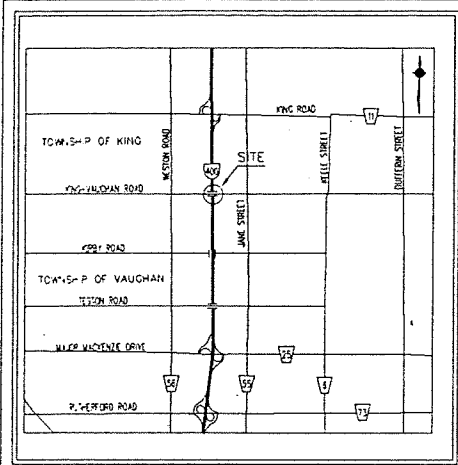
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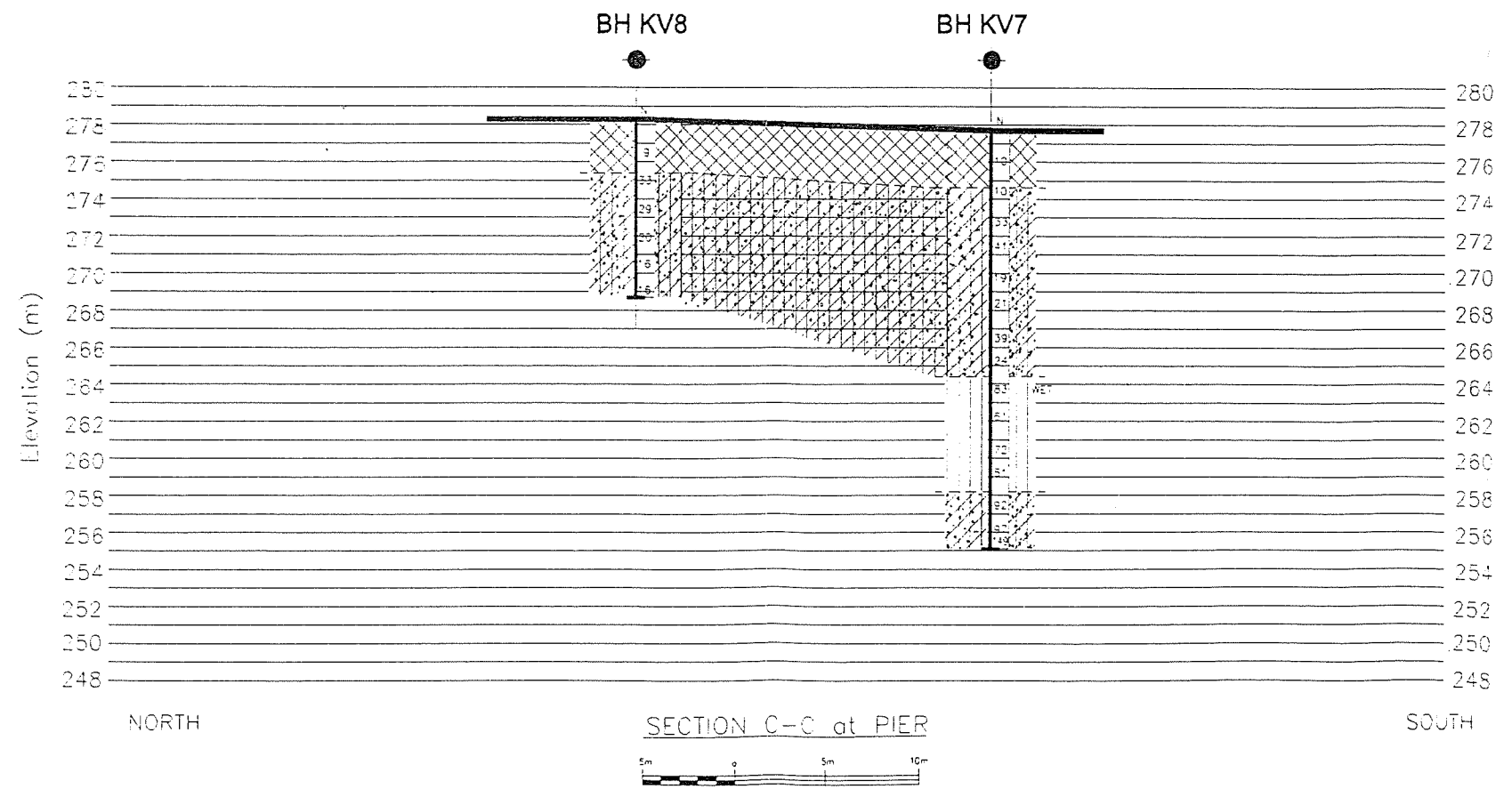
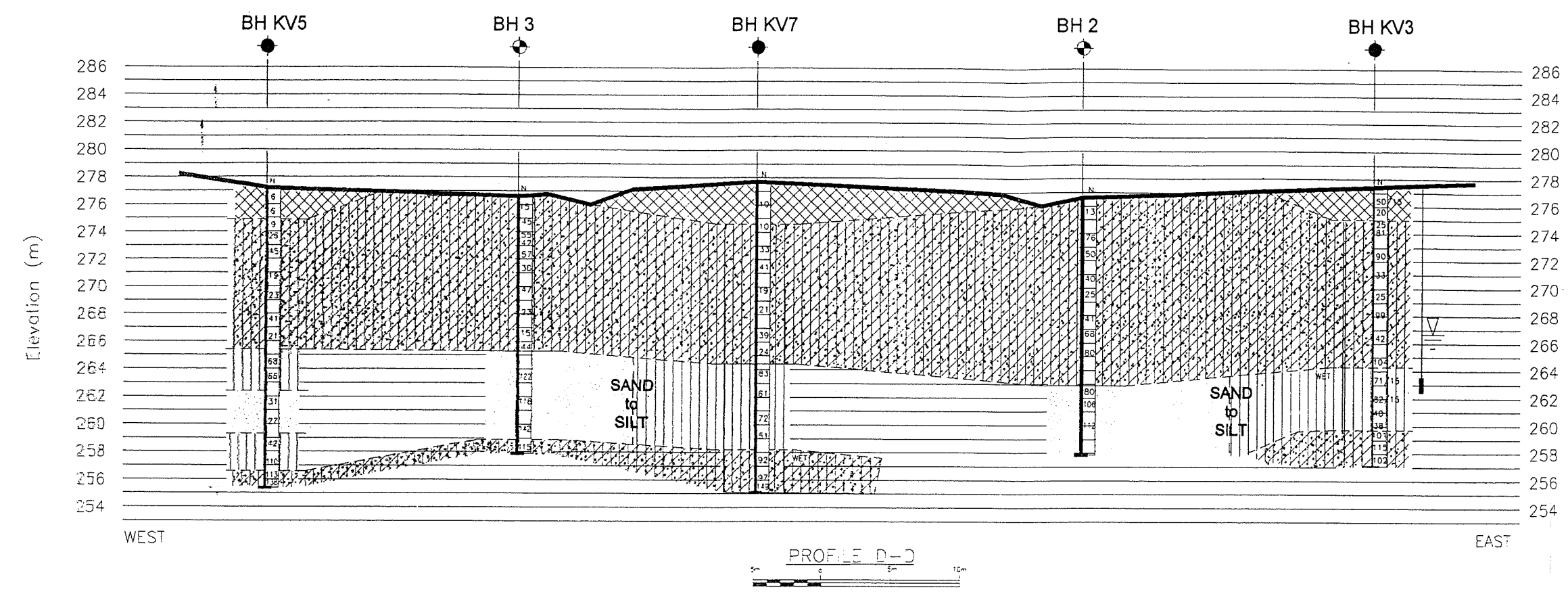
SECTION C-C & PROFILE D-D
CROSSING AT KING-VAUGHAN ROAD

SHEET

AMEC Earth & Environmental Limited



KEY PLAN
N.T.S.



LEGEND:

- FILL Sand to Clayey Silt compact to dense/stiff to very stiff
- SILT very dense
- SAND to SILTY SAND dense to very dense
- SILTY CLAY to CLAYEY SILT TILL stiff to hard

- LEGEND
- Borehole (AMEC 2003)
 - Borehole (DHO 1959)
 - Blows/0.3m (Std Pen Test, 475 J/blow)
 - Blows/0.3m (60' Cons, 475 J/blow)
 - WL at time of investigation
 - WL in Piezometer
 - Piezometer
 - End of Borehole

No	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
B-1	277.1	4 862 503	299 555
B-2	276.5	4 862 485	299 858
B-3	276.6	4 862 474	299 820
B-4	275.7	4 862 492	299 817
B-KV1	284.0	4 862 507	299 888
B-KV2	284.5	4 862 501	299 868
B-KV3	277.4	4 862 478	299 880
B-KV4	284.5	4 862 485	299 808
B-KV5	277.2	4 862 454	299 803
B-KV6	283.8	4 862 472	299 787
B-KV7	277.7	4 862 479	299 836
B-KV8	278.3	4 862 499	299 833

-NOTE-

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REV.	DATE	BY	DESCRIPTION
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VAUGHAN AND KING ROAD UNDERPASS	DIST 6-TORONTO
DESIGNED BY CHECKED KSH DATE FEB. 2003	SITE
DRAWN NS CHECKED APPROVED	DWG 3

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