

Geocres No
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PROJECT NO: SM 97027-G

OCTOBER 3, 2000

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY 403
MOHAWK ROAD INTERCHANGE
REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH [SPO]
ANCASTER, ONTARIO
CONTRACT NO. RHW - 00 - 231 [SPO]**

PREPARED FOR:

REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH [SPO]



BY

**SOIL-MAT ENGINEERS AND CONSULTANTS LTD.
130 LANCING DRIVE
HAMILTON, ONTARIO
L8W 3A1**

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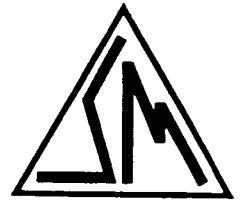
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PROJECT NO.: SM 97027-G

October 3, 2000

Regional Municipality of Hamilton-Wentworth
Special Projects Office
77 James Street North
Suite 320
Hamilton, Ontario
L8R 2K3

Attention: Mr. Gary Moore, P. Eng.

**RE: FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY 403/MOHAWK ROAD INTERCHANGE
REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH [SPO]
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 – 231 [SPO]**

Dear Mr. Moore:

We have now completed our fieldwork and laboratory testing in connection with the above noted project, and present herein our findings and recommendations.

1.0 INTRODUCTION

Soil-Mat Engineers & Consultants Ltd. were retained as geotechnical consultants by the Regional Municipality of Hamilton-Wentworth [Special Projects Office] for the Lincoln Alexander Parkway/Highway 403/Mohawk Road Interchange project. The project limits are from 0.5 kilometres west of Golf Links Road to 1.0 kilometre east of Mohawk Road, a distance of 2.5 kilometres, and on Highway 403 from chainage 23+848.638 [South Limit] to 26+324.380 [North Limit].

The work was performed under Purchase No. P.O. 78707 and in compliance with instructions received at various briefing meetings held during the course of the investigation. The structural/highway consultants for this project are Stantec Consulting Ltd.

1.1 Location

As noted above, the site for the proposed interchange is located at the west end of the Lincoln Alexander Parkway [LINC], where it connects to Highway No. 403 at Mohawk Road in Ancaster, Ontario.

1.2 Project Description

The proposed project will include the construction of five [5] structures [bridges] and three [3] culvert extensions with associated entrance/exit ramps and earth retaining structures. The various structures have been identified as follows:

| TABLE 1.1 STRUCTURE DESIGNATION AND LOCATION | | |
|--|-------------------------------|----------------------------------|
| MTO Site No. | Description | Approximate Location |
| MTO Site No.36 - 487 | Ramp E-S over Hwy. 403 03 | Ramp E-S @ Sta. 40+433 to 40+507 |
| MTO Site No.36 - 486 | Ramp N-E over Hwy. 4 | Ramp N-E @ Sta. 10+875 to 10+965 |
| MTO Site No.36 - 488 | Ramp N-E under Mohawk Road | Ramp N-E @ Sta. 10+655 to 10+675 |
| MTO Site No.36 - 489 | Ramp E-S under Mohawk Road | Ramp E-S @ Sta. 40+675 to 40+705 |
| MTO Site No.36 - 490 | Bruce Trail Pedestrian Bridge | Highway 403 @ Sta. 25 + 680 |
| Culvert No. 1 | Ramp S – E | At Station 30 + 260.85 |
| Culvert No. 2 | Ramp E – S [Tiffany Creek] | At Station 40 + 758.30 |
| Culvert No. 3 | Ramp N – E | At Station 10 + 595.84 |

This report summarises our field and laboratory work, interprets the subsurface conditions identified, and provides geotechnical engineering recommendations for the design of the proposed structures, earth cuts/fills, Highway No. 403 widenings and ramp sections.

1.3 Geology

A review of the published geological information indicates that the bedrock in the area is overlain by deposits of Halton Till [clay and/or silt till] which was apparently deposited at the time of the last glaciation, about 12,000 to 13,000 years ago. The Ministry of Natural Resources publication entitled "Limestone Industries of Ontario" indicates that the bedrock consists of dolostone of the Guelph and Lockport formations.

The exposed faces of the existing road cuts in the vicinity of the site reveal dolostone bedrock of the Guelph Formation. This rock is light brown-grey, very fine crystalline, and medium-bedded. The Guelph Formation dolostone is underlain by a medium brown, very fine crystalline, medium to thick bedded dolostone, which is the upper part of the Eramosa Member of the Lockport Formation. Thin bedded laminations and bituminous banding is common in the Eramosa Member dolostone, and vugs filled in part with gypsum, calcite or chert are common in the lower part of this member.

There is a potential for high locked-in horizontal stresses in the bedrock, and any excavations carried out in this rock can result in rock squeeze, local pop-ups, and small earthquakes. However, given the proximity of the site to the escarpment, the bedrock has likely been significantly stress relieved, and therefore, the small residual horizontal stresses remaining in the rock within the relative shallow excavation depths anticipated should not pose a problem. The dolomites forming the 'cap rock' of the Niagara Escarpment have been documented as being susceptible to the development of solution channels/cavities. Pluhar and Ford [1970].

1.4 Site Description

The site is currently covered/occupied primarily with paved roads and ramps, grassed areas and rock cuts and outcrops. There is a significant grade change from north to south as Highway No. 403 climbs the Niagara Escarpment from the Dundas Valley. There are a number of significant slopes/embankments in the project area associated with the natural topography and the existing ramps.

2.0 PROCEDURES

The fieldwork consisted of exploring the subsurface conditions at the borehole locations [with soil sampling and insitu testing], at the corehole locations [with rock core sampling], and in a number of probeholes [no sampling]. All of these types of exploratory holes will generally be referred to as boreholes in the text. Table 2.1 summarises the subsurface exploration program for the major structures. The approximate location of the boreholes is shown on the Borehole Location Plans, Drawing Nos. 1 to 14, inclusive. The boreholes were located in the field by Soil-Mat in consultation with the Structural Consultant and the Special Projects Office at ramp alignments and structure locations. The borehole locations were surveyed in by Stantec Consulting Ltd.

2.1 Drilling

The exploratory work was carried out between January 8, 1998 and June 22, 2000 using hollow-stem, continuous-flight auger equipment in the overburden and N-size rotary coring equipment in the bedrock. Proboholes were advanced to auger refusal to determine 'assumed' depths to bedrock. Auger cuttings from the probeholes were logged in the field.

2.2 Sampling

Soil samples were obtained from the boreholes at regular depth intervals using nominal 50 mm diameter split spoon sampling equipment driven in accordance with the Standard Penetration Resistance [N-value] test procedure as specified under *CSA test specification A 119.1 [ASTM test specification D 1586]*. All samples were subjected to visual and tactile classifications and

to routine moisture content testing. Selected soil samples were tested for unit weight values, and hand penetrometer testing was carried out on the cohesive soil samples.

Rock Core samples [48 millimetre diameter] were obtained in double tube diamond tipped core barrel equipment. Laboratory testing on selected core samples included Point Load Strength Testing and Uniaxial Compression Testing.

The results of the field investigation and laboratory testing are presented in the attached Appendix A - Borehole Logs and Appendix B - Laboratory Testing Results.

2.3 Surveys – Borehole, Corehole, and Probehole Locations and Elevations

Surveying to establish 'borehole' locations and ground surface elevations in the field were performed by Stantec Consulting Ltd. It is understood that the elevations have been referenced to the geodetic datum.

| TABLE 2.1 SUMMARY OF BOREHOLE INFORMATION | | | | | |
|---|--------------|---------------------|--------------------------|--------------------|--------------|
| Structure | Borehole No. | Elevation in meters | | | |
| | | Ground Surface | "Refusal" or Top of Rock | Bottom of Borehole | Ground water |
| BRIDGES | | | | | |
| 1 [Ramp E-S/403] | | | | | |
| | 1051 | 218.25 | 217.08 | 212.48 | - |
| | 4989 | 212.73 | 211.79 | 208.84 | - |
| | 4990 | 213.55 | 212.0 | 208.26 | |
| | 7015 | 213.90 | 213.0 | 212.71 | |
| | 7016 | 217.71 | 217.0 | 212.27 | |
| | 8075 | 214.85 | 0.99 | 213.86 | - |

| | Borehole No. | Ground Surface | "Refusal" or Top of Rock | Bottom of Borehole | Ground water |
|--|--------------|----------------|--------------------------|--------------------|--------------|
| 2 [Ramp N-E/403] | | | | | |
| | 5539 | 225.07 | 218.44 | 215.51 | ~220.0 |
| | 5540 | 223.51 | 218.99 | 218.99 | - |
| | 5547 | 222.52 | 218.33 | 218.33 | ~219.7 |
| | 5548 | 222.14 | 218.36 | 215.22 | - |
| | 7009 | 222.87 | 219.09 | 215.99 | - |
| | 7010 | 222.64 | 219.19 | 219.19 | - |
| | 7011 | 222.01 | 219.04 | 219.04 | - |
| | 7012 | 221.89 | 219.05 | 216.07 | - |
| 3[Ramp N-E/Mohawk] & 4[Ramp E-S/Mohawk] | | Ground Surface | "Refusal" or Top of Rock | Bottom of Borehole | Ground water |
| | 5580 | 225.83 | 218.31 | 213.56 | - |
| | 5581 | 225.71 | 218.14 | 218.14 | - |
| | 7001 | 226.17 | 217.94 | 217.94 | - |
| | 7002 | 226.22 | 218.07 | 213.38 | - |
| | 5544 | 226.88 | 217.18 | 213.98 | - |
| | 5579 | 226.71 | 217.15 | 217.15 | - |
| | 7003 | 227.11 | 217.15 | 217.15 | |
| | 7004 | 227.24 | 217.26 | 214.13 | |
| | | | | | |
| 5 Bruce Trail Pedestrian | | | | | |
| | 7078 | 200.03 | 189.82 | 186.73 | |
| | 7079 | 199.98 | 190.07 | 190.07 | |
| | 7080 | 206.17 | 189.91 | 189.91 | |
| | 7081 | 204.30 | 189.75 | 186.63 | |
| | 8057 | 204.95 | 189.74 | 189.74 | - |
| | 8058 | 204.58 | 191.83* | 191.93 | - |

* Auger refusal probably boulder

3.0 SITE AND SUBSOIL CONDITIONS

3.1 Bridge #1: Ramp E-S over Highway No. 403 [MTO Site No. 36 – 487] [Borehole Nos. 1051, 4989, 4990, 7015, 7016 and 8075]

Topsoil

A veneer of topsoil up to 230 mm thick was encountered at the borehole locations. Deeper deposits of topsoil and organic material may be encountered during the course of construction.

Sandy and Clayey SILT

A deposit of light brown sandy and clayey silt was encountered beneath the topsoil layer. In general, the sandy silt was found to be medium dense and to contain some fine gravel and rock fragments. Loose sand and rock fill was proven to overlie the Dolostone/Limestone bedrock to a depth of about 0.9 metres in Borehole No. 4989.

Bedrock

Dolostone/Limestone bedrock was proven via diamond coring techniques in Borehole Nos. 1051, 4989, 4990, 7016 and 8075. The bedrock was found to be poor several of the first core runs [probably associated with 'over-blast' during Highway 403 construction]. The bedrock recovered from the coreholes for the bridge structure investigations was found to consist of grey bedded dolostone/limestone.

Summary of Core Results

| BOREHOLE NO. | RUN NO. | RECOVERY | RQD |
|--------------|---------|----------|-----|
| 4989 | 1 | 100 | 79 |
| | 2 | 100 | 88 |
| 4990 | 1 | 100 | 35 |
| | 2 | 98 | 64 |
| | 3 | 100 | 84 |
| 7016 | 1 | 94 | 38 |
| | 2 | 100 | 40 |
| | 3 | 100 | 39 |
| 8075 | 1 | 100 | 58 |
| | 2 | 94 | 94 |

Groundwater

Free groundwater was not observed in any of these boreholes. Minor groundwater seepage should be expected during the course of construction from more permeable seams within the native soils or from the bedrock. We note that the bedrock may be 'undrained' due to the proximity of the escarpment.

**3.2 Bridge #2: Ramp N-E over Highway No. 403, [MTO Site No. 36 – 486]
 [Borehole Nos. 5539, 5540, 5547, 5548, 7009, 7010, 7011 and 7012]]**

Topsoil

A veneer of topsoil about 250 mm thick was encountered at the borehole locations. Deeper deposits of topsoil and organic material may be encountered during the course of construction, particularly in the ditch area.

Silty Sand to Fine Sandy Silt Fill

A silty fine sand to silty sand fill material was proven to underlie the topsoil in Borehole Nos. 5539 and 5540 [West Abutment], 5547 and 5548 [West Pier], 7009 and 7010 [East Pier] and 7011 and 7012 [East Abutment]. The fill material was found to depths of between 1.4 and 3.8 metres below present grade.

Fine Sandy Silt to Sand

Native fine sandy silt to sand was found to underlie the fill materials. The silty fine sand in Borehole Nos. 5539 and 5540 was found to be in a compact to very dense state. The fine sandy silt and sand found in Borehole Nos. 5547 and 5548 were noted to be in a compact state. The fine sandy silt was found to be in a compact state in Borehole No. 7009. A loose to compact fine sandy silt was found in Borehole Nos. 7011 and 7012 to underlie the fill material. A 175 millimetre boulder was encountered in Borehole No. 5539. A native very stiff clayey silt was found to underlie the granular material in Borehole Nos. 5540, 5547, 5548, 7009, 7010 and 7012.

Bedrock

Dolomitic Limestone bedrock was proven in Borehole Nos. 5539, 5548, 7009 and 7012 via diamond coring techniques.

Summary of Core Results

| BOREHOLE NO. | RUN NO. | RECOVERY | RQD |
|--------------|---------|----------|-----|
| 5539 | 1 | 97 | 83 |
| | 2 | 95 | 95 |
| 5548 | 1 | 100 | 93 |
| | 2 | 100 | 98 |
| 7009 | 1 | 98 | 93 |
| | 2 | 97 | 91 |
| 7012 | 1 | 100 | 90 |
| | 2 | 95 | 95 |

Groundwater

Free groundwater was not observed in any of these boreholes. Minor groundwater seepage should be expected during the course of construction from more permeable seams within the native soils.

3.3 Bridges 3 and 4 Ramps E-S & N-E under Mohawk Road, MTO Site Nos. 36 – 488 & 489 [Borehole Nos. 5544, 5579, 5580, 5581, 7001, 7002, 7003 and 7004]

Pavement Structure

Borehole Nos. 5580, 5581, 7001, 7002, 7003 and 7004 were advanced within the paved portion of Mohawk Road. Borehole Nos. 5544 and 5579 were advanced in the roadway shoulder area. The pavement structure was found to consist of 150 to 250 millimetres of asphaltic concrete over 300 to 840 millimetres of granular base material.

Silty Sand to Clayey Silt Fill

Fill material consisting of silty sand to clayey silt material was found, in the borings, to depths of between 6.0 and 7.3 metres at the location of the Ramp N – E structure under Mohawk Road and to depths of between 8.0 to 8.8 metres, in the borings, at the location of the Ramp E – S structure under Mohawk Road.

Fine Sandy Silt

A native, compact to dense, fine sandy silt was proven to underlie the fill material. The fine sandy silt is described as being in a moist to wet state.

Bedrock

Dolomitic Limestone bedrock was proven in Borehole Nos. 5544, 5580, 7002, and 7004 via diamond coring techniques.

Summary of Core Results

| BOREHOLE NO. | RUN NO. | RECOVERY | RQD |
|--------------|---------|----------|-----|
| 5544 | 1 | 97 | 84 |
| | 2 | 100 | 90 |
| 5580 | 1 | 100 | 36 |
| | 2 | 100 | 83 |
| | 3 | 100 | 100 |

| BOREHOLE NO. | RUN NO. | RECOVERY | RQD |
|--------------|---------|----------|-----|
| 7002 | 1 | 100 | 65 |
| | 2 | 100 | 83 |
| | 3 | 100 | 94 |
| 7004 | 1 | 100 | 88 |
| | 2 | 97 | 88 |

Groundwater

Free groundwater was not observed in any of these boreholes. Minor groundwater seepage should be expected during the course of construction from more permeable seams within the fill material and native soil.

3.4 Bruce Trail Pedestrian Bridge Structure [Borehole Nos. 7078, 7079, 8057, 8058, 7080 and 7081]

Topsoil

A surficial veneer of topsoil, approximately 150 to 200 millimetres in thickness, was proven at the borehole locations. Deeper deposits of topsoil may be encountered during the course of construction.

Fill

A fine sandy silt [probable fill] material was proven to underlie the topsoil in Borehole No. 7078 [West Abutment]. A sandy silt fill was encountered at a depth of about 4.5 metres below grade in Borehole Nos. 8057 and 8058 [Centre Pier]. A silty fine sand was proven to depths of about 2.2 and 1.4 metres in Borehole Nos. 7080 and 7081, respectively.

Silty Fine Sand to Silt

A silty fine sand and fine sandy silt was found to underlie the fill material in Borehole Nos. 7078 and 7079, respectively. A dense to very silt was found at a depth of about 2.2 and 3.0 metres at the borehole locations. The dense to very dense silt was intercepted at a depth of about 5.7 metres in Borehole Nos. 8057 and 8058. The compact to very dense was found at depths of about 4.3 and 2.2 metres in Borehole Nos. 7080 and 7081, respectively.

Bedrock

Dolomitic Limestone bedrock was proven in Borehole Nos. 7078 and 7078 via diamond coring techniques.

Summary of Core Results

| BOREHOLE NO. | RUN NO. | RECOVERY | RQD |
|--------------|---------|----------|-----|
| 7078 | 1 | 97 | 91 |
| | 2 | 100 | 93 |
| 7081 | 1 | 100 | 88 |
| | 2 | 100 | 91 |

Groundwater

No free groundwater was observed during the course of the fieldwork. Minor groundwater seepage should be expected during the course of construction from more permeable seams within the fill materials and native soils.

4.0 DESIGN CONSIDERATIONS**4.1 General**

Based on the geotechnical conditions indicated by the exploratory boreholes, the following engineering recommendations and comments are presented. It is assumed that the design will be in accordance with all applicable codes and standards. If there are any changes to the design features relevant to the geotechnical analyses, or if any queries arise regarding the geotechnical aspects, then this office must be contacted to review the design.

4.2 Foundations**4.2.1 General**

The subsurface conditions disclosed by this investigation indicated relatively good foundation conditions to support the proposed structures. The native clayey to sandy silt soils are capable of supporting conventional shallow foundations. The bedrock at the structure locations was encountered at relatively shallow depths; therefore, foundations supported on the bedrock are a practical alternative.

4.2.2 Bridge Structures**Bridge No. 1 Ramp E – S Structure over Highway No. 403, MTO Site No. 36 - 487**

The Ramp E – S bridge will consist of a two span structure from about Station 40+433 to about Station 40+507. From a review of the project general arrangement drawing [May 26, 2000], the top of footing elevations for the west abutment, centre pier and east abutment are 215.900

metres, 213.000 metres and 216.900 metres, respectively. The west abutment and centre pier footings will be 1.2 metres thick and the east abutment footing will be 0.9 metres thick.

The east abutment and centre pier may be founded in the bedrock under a design factored Ultimate Limit state [ULS] bearing capacity of 2500 kPa, founded at about Elevation 216.0 metres at the east abutment location and at about Elevation 212.00 metres at the centre pier. These values are slightly lower than normal due to some relatively low strength and RQD values. The allowable bearing stress at Serviceability Limit State [SLS] will be controlled by the structure, as the rock would have to fail before the SLS deformations would be realised which would be higher than the ULS bearing value.

The west abutment footing will be founded at Elevation 214.70 [within the abutment fill] cast on a mat of engineered fill or a manufactured 'non-shrinkage' product. The loose sand and rock fill material, would need to be removed to expose the underlying competent Dolostone/Limestone bedrock. The subexcavated material would then be replaced with an engineered fill material. The engineered fill mat would consist of an Ontario Provincial Standards Specification [OPSS] Granular 'A' material compacted to 100 per cent of its standard Proctor maximum dry density. The engineered fill material will need to be compacted in uniform, near horizontal lifts, in lift thicknesses compatible with the capacity of the compaction equipment, but not greater than 300 millimetres. The Granular 'A' material must be within +/- two per cent of its optimum moisture content during compaction operations. The engineered fill must extend laterally beyond the limits of the footings a minimum of one metre plus an additional amount to allow for a 'load spread' through the engineered fill on 1H:1V. We would recommend that all of the abutment fill be compacted to 100 per cent since the fill will support the approach slab at the back of the abutments and the concrete erosion mat on the slope in front of the abutments. The abutment footings will be 6.0 metres wide. The footings for the west abutment may be designed using a factored Ultimate Limit state [ULS] bearing capacity of 900 kPa founded at Elevation 214.70 metres. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 350 kPa [based on total and differential settlements not exceeding 25 mm]. The settlements of the abutment on the engineered fill will occur primarily during the course of construction.

Bridge No. 2 Ramp N – E Structure over Highway No. 403, MTO Site No. 36 -486

The Ramp N – E bridge will consist of a three span structure from about Station 10+875 to about Station 10+965. From a review of the project general arrangement drawing [May 29, 2000], the top of footing elevations for the west abutment, west pier, east pier and east abutment are 224.450 metres, 219.800 metres, 220.500 metres and 225.200 metres, respectively.

The elevation for the proposed underside footing at the west abutment is close to the existing ground surface level and at the east abutment are about 2 metres above the present grade. The west and east abutment footings may be founded on a mat of engineered fill or a manufactured 'non-shrinkage' product. The upper existing fill material [including topsoil] should be removed from beneath the west and east abutments. This will require the removal of up to about 2.5 metres of existing fill in the area of the west abutment and about 1.5 metres of fill material in the area of the east abutment. We would recommend that the subexcavation operation be monitored in the field by a geotechnical engineer to allow for the minimum amount of subexcavation. The exposed subgrade surface should be examined by a geotechnical engineer. The subexcavated material would then be replaced with an engineered fill material. The engineered fill should be constructed as recommended in the previous section. The abutment footings will be 5.0 metres wide. The footings for the west and east abutments may be designed using a factored Ultimate Limit state [ULS] bearing capacity of 900 kPa founded at Elevation 223.80 metres [West Abutment] and 223.20 metres [East Abutment]. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 350 kPa [based on total and differential settlements not exceeding 25 mm].

The footings for the west and east piers may be founded on the bedrock and designed using a factored Ultimate Limit state [ULS] bearing capacity of 3,000 kPa founded at Elevation 218.3 and 219.1 metres, respectively. The allowable bearing stress at Serviceability Limit State [SLS] will be controlled by the structure, as the rock would have to fail before the Service Limit deformations would be realised. We note that the bedrock level may vary between that found at the borehole locations. Therefore, the foundation excavations must be examined prior to the placement the foundation concrete. This requirement will allow for determination/need for any special site instructions regarding concrete placement due to rock levels, fissures, vugs and cavities, etc.

Bridges 3 and 4: Ramps N-E & E-S under Mohawk Road, MTO Site Nos. 36 – 488 & 489

From our review of the project arrangement drawings the Ramps E – S and N - E Structures under Mohawk Road will consist of an integral abutment design with 'Retained Soil System' Retaining Walls. The abutments may be supported on HP 310 x 110 steel piles [with shoes] driven to the underlying bedrock. The factored bearing capacity at [ULS] for H-piles on the dolostone/limestone bedrock of 75 MPa may be used for design of the H-pile foundation system based on the cross-sectional area of the pile. This pile would have a capacity [ULS] of 2000 kN. For the piles bearing on the bedrock, the Serviceability Limit State condition does not apply since more deflections would likely be tolerated in the structure than would be required to fail the rock. Ultimate Limit State will govern the design. Settlement of the piles in the loading range specified above is due to elastic compression of the piles, as settlement of the rock under these loading conditions should be small.

Negative skin friction on the steel "H" piles is considered negligible as the piles will be encased in a corrugated steel pipe sections [CSP]. As detailed on the project drawings and as specified in the Integral Abutment Manual, the piles will be located within a 600 millimetre diameter CSP section. An 800 millimetre diameter CSP section will be 'set' outside the 600 millimetre diameter CSP section, with the inner CSP section filled with loose sand around the pile.

A pile driving hammer should be specified that is capable of developing sufficient energy to drive the piles to refusal into the bedrock. Since the piles will set on the hard bedrock, a specific set for this project is not provided. It is important that the piles are not overstressed during pile driving as structural damage to the piles can occur as a result of this over-driving. Piles driven to rock reach "practical refusal" quickly, and it is important to stop the driving when rock is reached to avoid 'overdriving' and therefore damaging the piles.

Inspection and monitoring of the pile installation by a geotechnical engineer is strongly recommended to confirm that the piles have been driven to bedrock and the required bearing value.

With the limited depths of overburden soils, particularly at the Ramp E – S structure, 'socketing' of the HP 310 x 110 piles into the bedrock [with concrete] may be considered as a means of supporting the piles during construction of the 'Retained Soil System' Retaining Walls. We would recommend, for practical reasons, that the socket diameter be a minimum of 600 millimetres, with a minimum depth of one metre. Following placement of the steel H pile the socket must be backfilled with 20 MPa concrete. The H pile and the CSP sections must be properly braced until the concrete has attained its specified strength. The piles set in the concreted socket would have an ULS capacity of 2,000 kN. It is apparent that the piles could not be driven through the constructed retaining walls due to the potential for damaging/severing the retaining wall components buried in the fill. The contractor must exercise care during the construction of the retaining wall system such that the CSP sections are not damaged or put out of alignment.

Bridge No. 5 Bruce Trail Pedestrian Structure over Highway No. 403

The Bruce Trail Pedestrian Bridge structure will consist of a two span structure at about Station 26+680 [Highway No. 403].

The west abutment may be supported on conventional spread footings founded in the native, compact silt. The foundations may be designed using a factored Ultimate Limit state [ULS] bearing capacity of 750 kPa founded at about Elevation 197.7 metres [Borehole No. 7078] and 197.4 metres [Borehole No. 7079]. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 325 kPa [based on total and differential settlements not exceeding 25 mm]. The foundation excavations must be examined prior to the placement of the foundation

concrete. We would recommend the placement of a working 'mud-slab' of concrete immediately following examination of the excavation base to minimise surficial disturbance of the founding soils by 'foot' traffic of construction workers, etc. The foundations may be designed using a factored Ultimate Limit state [ULS] bearing capacity of 1000 kPa founded at Elevation 196.8 metres [Borehole Nos. 7078 and 7079]. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 600 kPa at this elevation [based on the width of the footing not exceeding 3 metres and total and differential settlements not exceeding 25 mm].

The foundations for the centre piers may be supported on caissons founded in the native, very dense silt. The caissons may be designed using a factored Ultimate Limit State [ULS] bearing capacity of 1,000 kPa founded at about Elevation 198.0 metres [Borehole No. 8057] and 198.5 metres [Borehole No. 8058]. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 750 kPa [based on total and differential settlements not exceeding 25 mm]. The caissons should be a minimum diameter of 900 millimetres and will require a steel liner to allow access for cleaning and examination of the base by a geotechnical engineer. The caissons must be minimum of one caisson diameter apart. It should be possible to 'seal' the caisson in the very dense silt from any groundwater found in the upper fill materials. The centre pier may be supported on conventional spread footings, however this option would require significant shoring systems for the foundation excavation.

We would recommend that the east abutment footings be founded on a mat of engineered fill or a manufactured 'non-shrinkage' product. The upper existing fill material [including topsoil] should be removed from beneath the west and east abutments. This will require the removal of up to about 2.5 metres of existing fill. We would recommend that the subexcavation operation be monitored in the field by a geotechnical engineer to allow for the minimum amount of subexcavation. The subexcavated material would then be replaced with an engineered fill material. The engineered fill mat must be constructed as detailed in previous sections. The settlements of the abutments on the engineered fill will occur primarily during the course of construction.

All footings exposed to the environment must be provided with a minimum of 1.2 metres of earth cover to protect against frost penetration. This frost protection depth is to be measured perpendicular to the slope.

Culvert Structures

Culvert No. 1 is located on Ramp S – E [Sta. 30 + 260.85] and has a span of about 4.9 metres and a height of about 2.25 metres. Culvert No. 2 is located on Ramp E – S [Sta. 40 + 758.30] at Tiffany Creek and has a span of 5.0 metres and a height of 2.0 metres. Culvert No. 3 is

located on Ramp N – E [Sta. 10 + 595.84] and has a span of about 4.9 metres and a height of about 1.5 metres. The footings for culverts founded on the bedrock may be designed using a factored Ultimate Limit state [ULS] bearing capacity of 2,500 kPa. The allowable bearing stress at Serviceability Limit State [SLS] will be controlled by the structure, as the rock would have to fail before the Service Limit deformations would be realised. We note that the bedrock level may vary between that found at the borehole locations. Therefore, the foundation excavations must be examined prior to the placement the foundation concrete. This requirement will allow for determination/need for any special site instructions regarding concrete placement due to rock levels, fissures, etc.

Resistance to lateral forces acting on the culvert structures may be determined using an unfactored angle of friction of 40 degrees. Further, surficial roughening of the bedrock may be required depending upon the surface conditions following excavation. Alternatively the culverts may be 'keyed' into the bedrock. Additional lateral resistance could be developed through the use of bedrock anchors. A factored rock-grout bond stress of 1.4 MPa at the ultimate limit state [resistance factor of 0.4 applied, minimum 40 MPa grout] could be used for design. A non-shrink grout [possibly with an expanding agent] should be used in the installation of the anchors. We would recommend that corrosion protection be provided for the steel anchor. For uplift design purposes, the anchor capacity should not exceed the effective weight of the bedrock contained in a right angle 'cone' with its height equal to the depth of the anchor into the bedrock. The effective unit weight of the bedrock may be taken to be 14 kN/m³. A representative number of anchors installed must be tested following the "Suggested Method for Rock Anchorage Testing" published by the International Society for Rock Mechanics, Commission on Testing Methods.

All foundation excavations should be examined prior to placement of the concrete. Footing design must conform to the requirements of the current Highway Bridge Design Code - Ontario.

4.3 Lateral Earth Pressure

4.3.1 General

Lateral pressures on retaining structures [bridge abutments and culverts] are influenced by soil properties, groundwater conditions, surcharge loading, and the lateral movement of the structure. If the retaining structure design requirements and construction sequence is such that the structure can move slightly away from the backfill [unrestrained structure] shear strength in the soil is mobilised and the 'active' pressure case may be used for determining lateral earth pressure. Passive earth pressure in front of retaining structures should not included in the top 1.0 m of the backfill soil due to the potential for adverse freeze-thaw action on this material.

For restrained structures an at-rest or 'backfill' condition should be assumed. An additional pressure due to the compaction operation should be incorporated into the lateral load calculations as indicated in the current Ontario Highway Bridge Design Code.

For an unrestrained retaining structure [less than 10 meters in effective height] the lateral loads may be determined based on the parameters [pressures per metre of wall height] detailed in Table 6 – 7.4.4 of the Ontario Highway Bridge Design Code equivalent fluid pressures as presented below:

Equivalent Fluid Pressure, Unrestrained Structures

| Backfill Type | Granular 'A' | Granular 'B' |
|----------------------------|---------------|---------------------|
| Angle of Internal Friction | More than 35° | Between 30° and 35° |
| Active Pressure | 5.9 kPa | 6.9 kPa |
| Backfill Pressure | 7.7 kPa | 8.6 kPa |

For all restrained retaining structures [less than 10 meters in effective height] the lateral loads may be determined based on the [minimum unfactored] parameters [minimum pressures per metre of wall height] detailed in Table 6 – 7.4.5 of the Ontario Highway Bridge Design Code equivalent fluid pressures as presented below.

Equivalent Fluid Pressures, Restrained Structure

| Backfill Type | Granular 'A' | Granular 'B' |
|--------------------|--------------|--------------|
| Backfill Pressure* | 10.0 kPa | 12.0 kPa |

4.3.2 Bridge Abutments

Backfill behind bridge abutments should consist of free-draining granular material [less than 5 per cent passing the 75 µm sieve], and an adequate drainage system should be provided. The granular backfill should conform to OPSS specifications for Granular 'A' or 'B' material [less than 5 per cent passing the 75 µm sieve] and be compacted to at least 100 per cent of the Standard Proctor maximum dry density. Assuming that the backfill behind abutments is compacted granular material as specified, the following parameters are recommended for determination of the lateral pressures acting on the abutment.

For stability against sliding, in the case that the bridge abutment footings are placed on original ground, the spread footings should be proportioned such that the 'driving' active forces are

balanced by the 'resisting' passive forces and frictional resistance or the adhesion between the base of the concrete footing and the bearing soil. Passive resistance should not be incorporated into the design should future excavation be required of the backfill material for maintenance or other purposes. In addition, the backfill material within the 'frost-zone' should not be considered for passive resistance due to freeze/thaw cycling. The frictional resistance may be computed by assuming a static angle of friction of 26 degrees [unfactored], or adhesion between the 'rough' footing base and the underlying cohesive soils of 100 kN/m^2 [unfactored]. The above unbalanced horizontal force can also be resisted by battered piles in the case of a pile-supported structure.

Mechanically stabilised soil systems for abutments or retaining structures, such as, Reinforced Earth, use design parameters which are proprietary in nature. These systems should be reviewed by a geotechnical engineer prior to construction. The overall basal stability for the proposed embankments and retaining structures is considered to be satisfactory.

4.5 Excavations

All excavations must comply with the current *Occupational Health and Safety Act and Regulations for Construction Projects*.

Excavations in the clayey silt to silty sand overburden materials are expected to be relatively straightforward. Temporary excavations in native cohesive soils to the nominal depths expected on slopes of one horizontal: two vertical [1H : 2V] and in the fill material on slopes of one horizontal to one vertical [1H : 1V] should remain stable for the short construction periods provided surcharge loading and/or vibrations due to construction activities are not excessive. Groundwater seepage into excavations is expected to be limited and it should be controllable using conventional 'dewatering' techniques, i.e. pumping from sumps and ditches. All surface runoff should be directed away from the excavations.

The excavation for the west pier footing for the Ramp N-E structure over Highway 403 will require roadway protection system. An earth pressure coefficient of 0.5 should be used if movements cannot be tolerated. This value may be reduced to 0.3 if small movements can be tolerated. The surcharge load from roadway traffic may be considered to have a load spread of 1 Horizontal to 1 Vertical. The unit weight of the soil above the water level may be assumed to be 20.5 kN/m^3 . The water level in Borehole Nos. 5547 and 5548 is expected to be about 2.8 to 3.0 metres below the present grade 'perched' above the clayey silt material [about Elevation 219.7 metres]. The hydrostatic pressure must be considered in the design of the shoring system.

A shoring system will be required to protect the foundations of the Hydro Towers in the area of the west abutment of the Pedestrian Bridge structure. We would recommend that an earth

pressure coefficient of 0.5 should be used for design purposes. The groundwater level is expected to be below the depth of excavation. The unit weight of the retained soil may be assumed to be 20.5 kN/m^3 .

For the support of the Detour fill material, again an earth pressure coefficient of 0.3 to 0.5, depending upon allowable movements, should be used for design of the shoring system. The shoring system may be 'socketed' into the bedrock to provide toe support. The surcharge loading from traffic must be considered in the shoring design. This portion of the detour fill embankment may be constructed as a reinforced earth structure. The friction angle for compacted earth fill may be considered to be 30° and for compacted granular fill material to be 35° . The unit weight of the retained earth fill may be assumed to be 20.5 kN/m^3 and for compacted granular backfill may be assumed to be 21.5 kN/m^3 . These values must be confirmed through laboratory testing.

Excavation into the dolostone/limestone bedrock will require the use of 'hoe-ramming' or blasting techniques. The strength of the rock determined from uniaxial compression testing and point load strength testing varies from approximately $\text{UCS} = 40$ to 150 MPa . Given the relative shallow rock excavations anticipated for this project, the excavations in the rock should stand stable indefinitely on near vertical cut slopes. Such steep slopes would also reduce the width and height of ditch required to arrest rock falls from entering the travelled portion of the road. The strike and dip of the major joint sets and bedding planes in the bedrock in this case is of secondary importance, given the limited height of rock cut required. All loose rock should, of course, be scaled back from the face of the cut. The maximum height of any cut bench will be limited to about 3.5 metres. All blasting operations must be in accordance the most recent Region of Hamilton-Wentworth Blasting Provisions.

The majority of the excavated dolostone/limestone bedrock material is considered suitable for processing for use as granular roadway base and sub-base course material.

4.6 General Backfill Considerations

The excavated native materials on this project are generally considered suitable for structural backfilling purposes. However, some moisture content conditioning may be required for efficient compaction, depending on the weather conditions at the time of construction. The upper soils are considered to be currently 'dry' of their optimum moisture contents.

These fine-grained soils are sensitive to moisture absorption and may become practically impossible to compact using conventional compaction equipment if they become excessively wet. If the soils are too wet for efficient compaction, they should be exposed to the elements to dry before being re-employed as backfill, or should be discarded or used in non-settlement

sensitive fill areas. After periods of heavy precipitation, any surface fill materials softened by excessive water should be removed and allowed to dry prior to re-use, or should be discarded.

The backfill material for roadway, berm/noise barrier acoustic wall construction should be compacted to 95 per cent standard Proctor density. The lift thickness of the fill will depend primarily on the moisture content of the backfill material and the size and type of the compaction equipment available for the project.

Any imported fill material should have its moisture content within three per cent of its optimum moisture content and meet the necessary environmental guidelines. We would recommend that a sampling/testing program of any imported material be undertaken prior to its shipment to the project site.

However, as previously noted, well-graded free-draining granular material should be used as backfill against bridge abutments, etc. The fill behind the bridge abutments must also be suitably drained to prevent the build-up of water pressure.

4.7 Approach Fills

All topsoil, organic material and frozen material must be removed from beneath the approach areas prior to placement of any fill material. The approach fill material must be compacted to project requirements at a moisture content within three per cent of its optimum moisture content. The foundation soils are capable of supporting the proposed approach fill. In the area of the maximum height [about 9 metres] of approach fill [west of west abutment for Ramp N – E bridge structure]. As the founding soils are considered to be generally granular in nature a majority of this settlement is expected during the construction. The fill material will settle, in the long term, in the order of about 1 to 1.5 per cent its height. A majority of this settlement is expected to occur during the course of construction. The lower fill material should be placed and compacted at or slightly dry of its optimum moisture content, while the upper portion of the approach fill may be at or slightly 'wet' of its optimum moisture content. The approach slopes will be constructed at one Vertical to two Horizontal.

In the area of the deeper fills along the alignment of Ramp N – W [about Station 20+050 to 20+125] a 'drainage' blanket of 300 millimetres of free draining Granular 'B' material [less than 5 per cent passing the 75 μ m sieve] should be placed directly against the 'stripped' subgrade to allow for continuation of any slope drainage patterns.

5.0 Pavement Structure Design and Roadway Construction

The final subgrade surface should be properly shaped and crowned to provide good drainage. We would recommend that the surface in the earth cut/fill sections be proofrolled with a loaded tandem truck prior to the placement of any granular sub-base course materials to delineate any soft areas that might be present in the subgrade. Any soft or "spongy" sections identified in the subgrade by this or any other means should be replaced with acceptable material and compacted to 95 per cent of its Standard Proctor maximum dry density, or the base should be stabilised by some other means such as with a granular 'ballast' material. The on-site soils, when wet, will tend to lose strength and their ability to support traffic. It is therefore recommended that construction be undertaken during the "dry" summer months. It is imperative that the subgrade soils not be exposed to the elements for an extended period of time to avoid softening of the subgrade by precipitation or accumulation of water from surface runoff. If construction is performed during unfavourable weather conditions, the weakened subgrade may necessitate the use of 50 to 100 millimetre clear stone or additional Ontario Provincial Standards Specification [OPSS] Granular 'B' sub-base course material. The subgrade transition sections should be carried out as specified by the appropriate OPSS standard.

The suggested pavement structure is based on subgrade parameters estimated on the basis of a visual and tactile examinations and laboratory testing of the on-site soils [Grain Size Analyses, Drawing Nos. A1 to A8, inclusive and B01 to B11, inclusive] and past experience in connection with the construction of the Lincoln Alexander Parkway. The ramp pavement structure will consist of 40 millimetres of dense friction course surface course asphaltic concrete, 120 millimetres of heavy duty binder course asphaltic concrete over a granular base of 150 millimetre OPSS Granular 'A' material. The granular sub-base will consist of 750 millimetres OPSS Granular 'B', Type II material [less than 5 per cent passing the 75 μ m sieve] in earth cut areas, 450 millimetres OPSS Granular 'B', Type II in earth fill areas greater than 1.5 metres. The granular base layer will be increased to 250 millimetres of OPSS Granular 'A' material in rock cut areas. The changes in the pavement structures should be 'tapered' over a distance of about 25 metres. The sub-base material should 'daylight' to the side ditches to promote drainage. In areas of rock cuts the bedrock should be 'shattered' to a minimum depth of 300 millimetres to provide roadway drainage. The asphaltic concrete materials should be compacted to 97 per cent of the laboratory Marshall density. The recommended asphaltic concrete mixes may be difficult to compact and require an experienced contractor to carry out the compaction operation. The binder course asphaltic concrete should be placed in three 40 millimetre layers. The granular base and sub-base materials should be compacted to 100 per cent standard Proctor density. The paved shoulders will consist of a 40 millimetres surface course of dense friction course asphaltic concrete and 40 millimetres heavy duty binder course asphaltic concrete over the granular base materials. A tack coat must be placed on all

pavement surfaces, in accordance with OPSS specifications, prior to placement of following pavement layer.

The AASHTO Guide for Design of Pavement Structures was utilised for design purposes for the pavement works along the Highway No. 403 right-of-way [roadway widenings]. The Highway No. 403 roadway widenings were divided into three sub-sections, namely Section No. 1 Westbound [to Brantford], west of the Mohawk Road Bridge Structure [AADT = 27,500], Section No. 2 Eastbound [to Hamilton], west of the Mohawk Road Bridge Structure [AADT = 28,908] and Section No. 3 Eastbound [to Hamilton] east of the Mohawk Road Bridge Structure [AADT = 39,712]. The approved pavement structures will consist of 40 millimetres of dense friction course asphaltic concrete and 210 millimetres of heavy duty binder course asphaltic concrete over 400 millimetres of OPSS Granular 'A' material in Section No. 1 [Truck climbing lane widening], 40 millimetres of dense friction course asphaltic concrete and 160 millimetres of heavy duty binder course asphaltic concrete over 400 millimetres of OPSS Granular 'A' material in Section No. 2 and 40 millimetres of dense friction course asphaltic concrete and 160 millimetres of heavy duty binder course asphaltic concrete over 525 millimetres of OPSS Granular 'A' material in Section No. 3. The proposed Structural Numbers [based on the proposed pavement structure design] were found to be greater than the Design Structural Numbers. In addition, the AASHTO system was used to compare the proposed ramp pavement structure design [in earth cut areas] to the Design Structural Number. The proposed Structural Number was found to be greater than the Design Structural Number.

The detours may be constructed using a pavement structure of 40 millimetres of HL 3 course surface course asphaltic concrete, 60 millimetres of HL 8 binder course asphaltic concrete over a granular base of 150 millimetre OPSS Granular 'A' material and a granular sub-base of 300 millimetres OPSS Granular 'B', Type II material. We understand that the detours will be restricted to approximately three months of service. The Performance Graded Asphalt Cement [PGAC] for both the heavy duty binder course and dense friction course asphaltic concrete should be Grade 64 – 28.

Good drainage provisions will optimise the long term performance of the pavement structure. Subdrains should be installed to intercept excess subsurface water and prevent subgrade softening. Surface water should not be allowed to pond adjacent to the outer limits of paved areas. The finished pavement surface should be free of depressions and should be sloped to direct surface runoff to the subdrainage system or side ditches.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. Further, the prepared subgrade should

be left exposed to the elements for the minimum practical time period to avoid softening due to precipitation or accumulation of surface water.

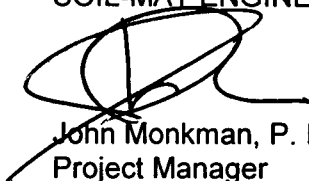
6.0 GENERAL COMMENTS

The purpose of this final geotechnical investigation report was to determine the subsurface conditions at the borehole locations and to provide our comments and recommendations from a geotechnical point-of-view. The information contained in this geotechnical investigation report in no way reflects upon the environmental aspects of the site and therefore has not been addressed in this document, as this information is beyond the formatted scope and terms of reference.

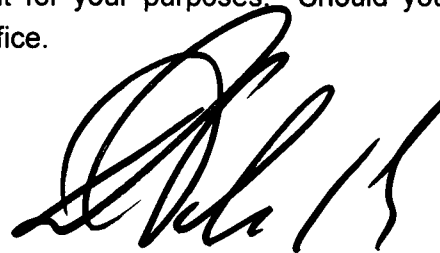
The comments provided in this document are intended only for the guidance of the design team. The borehole descriptions and logs are not to be considered descriptive of the conditions at locations other than at the borehole locations. Contractors bidding or undertaking this project should decide on their own exploration and own interpretation of the factual borehole results, so that they might decide on how the subsurface conditions will effect their operations.

We trust that this geotechnical report is sufficient for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.



John Monkman, P. Eng.
Project Manager



Danny Schebesch, M.E.Sc., P. Eng.
Review Engineer

Enclosures: Appendix A - Plan Showing Borehole and Probehole Locations, Drawing Nos. 1 to 14, inclusive

Appendix B: Borehole Logs

Appendix C: Laboratory Test Results

Distribution: Regional Municipality of Hamilton-Wentworth [2]
Stantec Consulting Ltd. [2]
Ministry of Transportation [20 reports plus 10 copies of Appendixes]

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 – 231 [SPO]**



APPENDIX A

Plan Showing Borehole and Probehole Locations

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

BH Borehole

NOTES:

- 1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G
- 2. Soil samples will be discarded after 3 months unless directed otherwise by client.
- 3. Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 1

PROJECT No. SM 97027-G
SCALE
DATE October 2000
DRAWN
CHECKED
FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)
DRAWING No. BH-1
FILE No.

SHEET No.
BH-1

HIGHWAY 403

SOUTHBOUND LANES

NORTHBOUND LANES

HIGHWAY 403

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|-------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Reed Plans : | |
| | | | | Sewer Plans : | |
| | | | | Water Plans : | |
| | | | | Regional Surveyor : | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation= | |

SCALES

DRAWING REVIEW

| | DESIGN | PLANNING | CONSTR |
|---------|--------|----------|--------|
| SEWER | | | |
| WATER | | | |
| ROADS | | | |
| MANAGER | | | |

DIRECTOR

SENIOR DIRECTOR
ROADS

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE
BOREHOLE LOCATION PLAN
MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕_{BH} Borehole

NOTES:

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CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 2

PROJECT No. SM 97027-G

SCALE

DATE October 2000

DRAWN

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FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)

DRAWING No. BH-2

FILE No.

SHEET No.

BH-2

HIGHWAY 403

GOLF LINKS ROAD

SOUTHBOUND LANES

NORTHBOUND LANES

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|-------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Road Plans: | |
| | | | | Survey Plans: | |
| | | | | Water Plans: | |
| | | | | Regional Surveyor: | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation: | |

| SCALES | DRAWING REVIEW | DIRECTOR | SENIOR DIRECTOR |
|--------|------------------------|----------|-----------------|
| | DESIGN PLANNING CONSTR | | ROADS |
| | SEWER | | |
| | WATER | | |
| | ROADS | | |
| | MANAGER | | |

| THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH | HIGHWAY 403 INTERCHANGE |
|---|--|
| TRANSPORTATION, OPERATIONS AND ENVIRONMENT DIVISION | BOREHOLE LOCATION PLAN |
| | MOHAWK ROAD AND LINCOLN M. ALEXANDER PARKWAY |

Engineers & Consultants Ltd.

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G
2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

Region of Hamilton-
Wentworth [SPO]

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

Borehole Location Plan

DRAWING 3

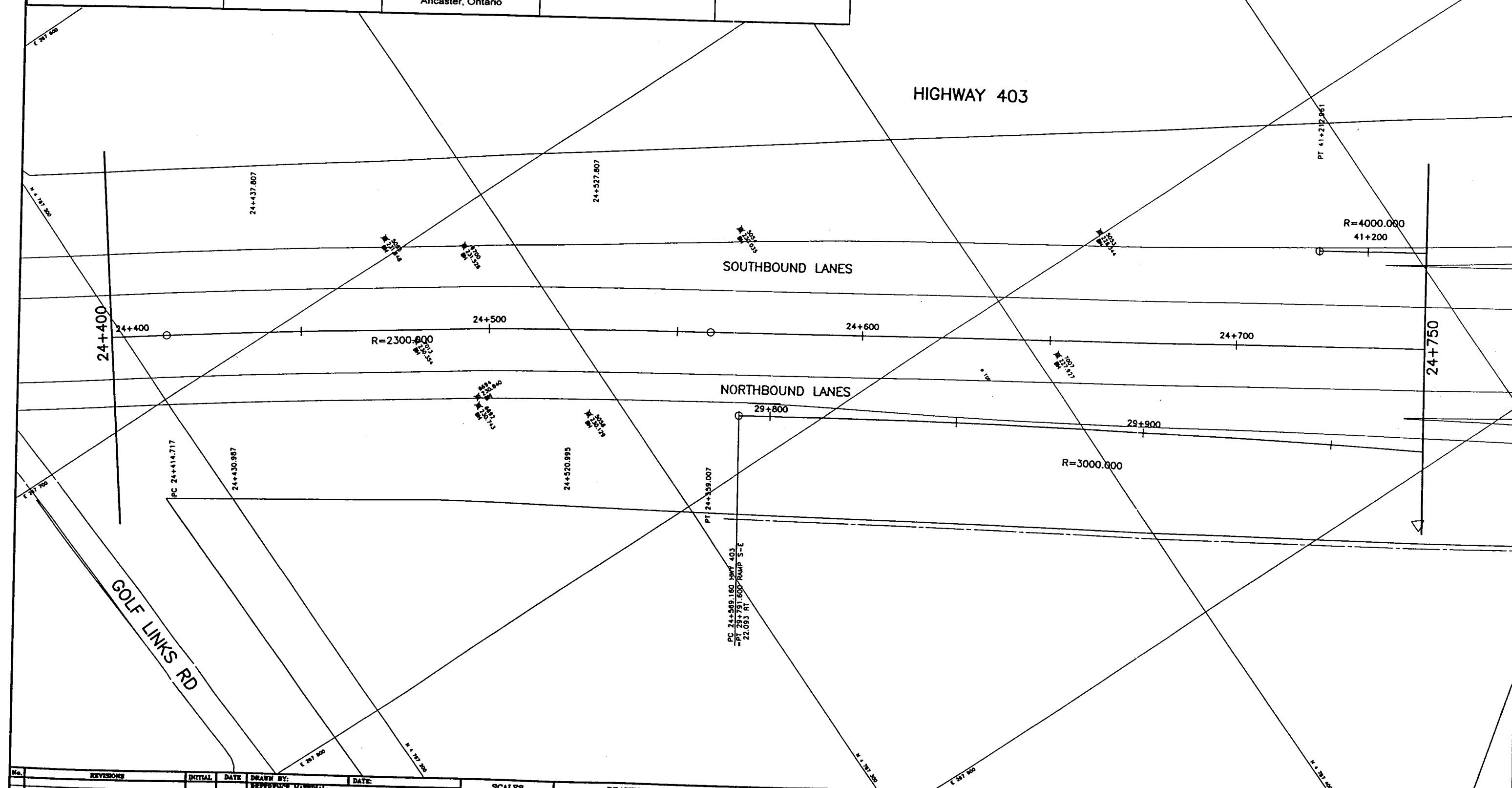
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LEGEND



DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

FILE No.

BH-3

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|--------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Road Plans : | |
| | | | | Sewer Plans : | |
| | | | | Water Plans : | |
| | | | | Regional Surveyor : | |
| | | | | Cadastral Bench Mark Index No. | |
| | | | | Elevation- | |

SCALES

| DRAWING REVIEW | | | |
|----------------|--------|----------|--------|
| | DESIGN | PLANNING | CONSTR |
| SEWER | | | |
| WATER | | | |
| ROADS | | | |
| MANAGER | | | |

DIRECTOR

**SENIOR DIRECTOR
ROADS**

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

**TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION**

HIGHWAY 403 INTERCHANGE

BOREHOLE LOCATION PLAN

MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

BH Borehole

NOTES:

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CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 4

PROJECT No. SM 97027-G

SCALE

DATE October 2000

DRAWN

CHECKED

FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)

DRAWING No. BH-4

FILE No.

SHEET No.

BH-4

HIGHWAY 403

SOUTHBOUND LANES

NORTHBOUND LANES

RAMP S-E

RAMP E-S

R=4000.000

A=130.000

A=190.000

R=420.000

A=190.000

A=130.000

R=250.000

POC 40+916.230 RAMP E-S
= POC 10+893.200 RAMP N-E

POT 25+015.720 HWY 403
= POC 10+935.116 RAMP N-E

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|-------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Soil Plans: | |
| | | | | Sever Plans: | |
| | | | | Water Plans: | |
| | | | | Regional Surveyor: | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation: | |

SCALES

DRAWING REVIEW

| DESIGN | PLANNING | CONSTR |
|---------|----------|--------|
| SEWER | | |
| WATER | | |
| ROADS | | |
| MANAGER | | |

DIRECTOR

SENIOR DIRECTOR
ROADS

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE

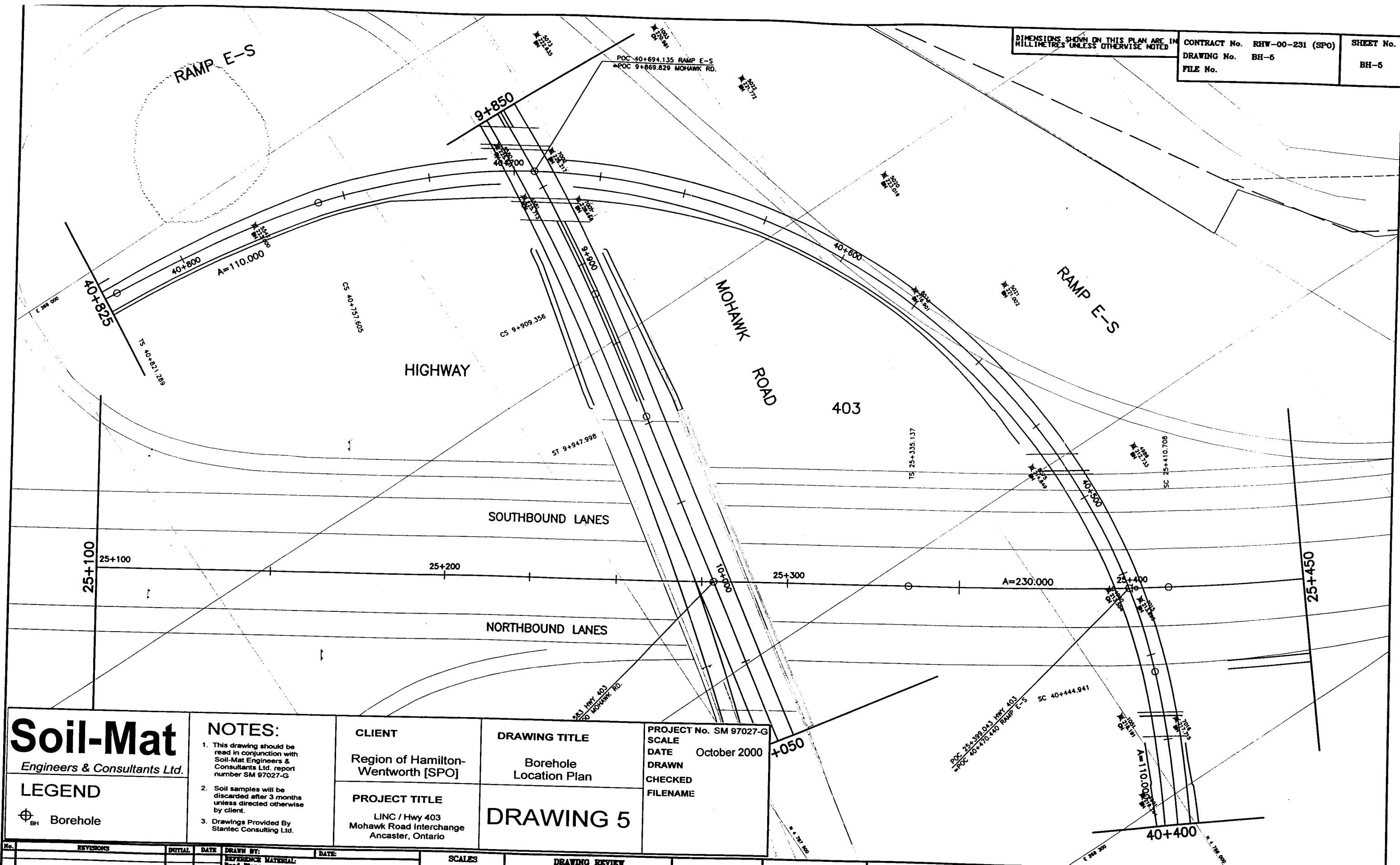
BOREHOLE LOCATION PLAN

MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)
DRAWING No. BH-5
FILE No.

SHEET No.
BH-5



Soil-Mat
Engineers & Consultants Ltd.

LEGEND
⊕ BH Borehole

NOTES:
1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G
2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

CLIENT
Region of Hamilton-Wentworth [SPO]

PROJECT TITLE
LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE
Borehole Location Plan

DRAWING 5

PROJECT No. SM 97027-G
SCALE
DATE October 2000
DRAWN
CHECKED
FILENAME

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
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REFERENCE MATERIAL:
Road Plans :
Sewer Plans :
Water Plans :

Regional Surveyor :
Geodetic Bench Mark Index No.
Elevation=

SCALES

| DRAWING REVIEW | | | |
|----------------|----------|--------|--|
| DESIGN | PLANNING | CONSTR | |
| SEWER | | | |
| WATER | | | |
| ROADS | | | |
| MANAGER | | | |

DIRECTOR

**SENIOR DIRECTOR
ROADS**

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
**TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION**

HIGHWAY 403 INTERCHANGE
BOREHOLE LOCATION PLAN
MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕_{BH} Borehole

NOTES:

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3. Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 6

PROJECT No. SM 97027-G

SCALE
DATE October 2000

DRAWN
CHECKED
FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

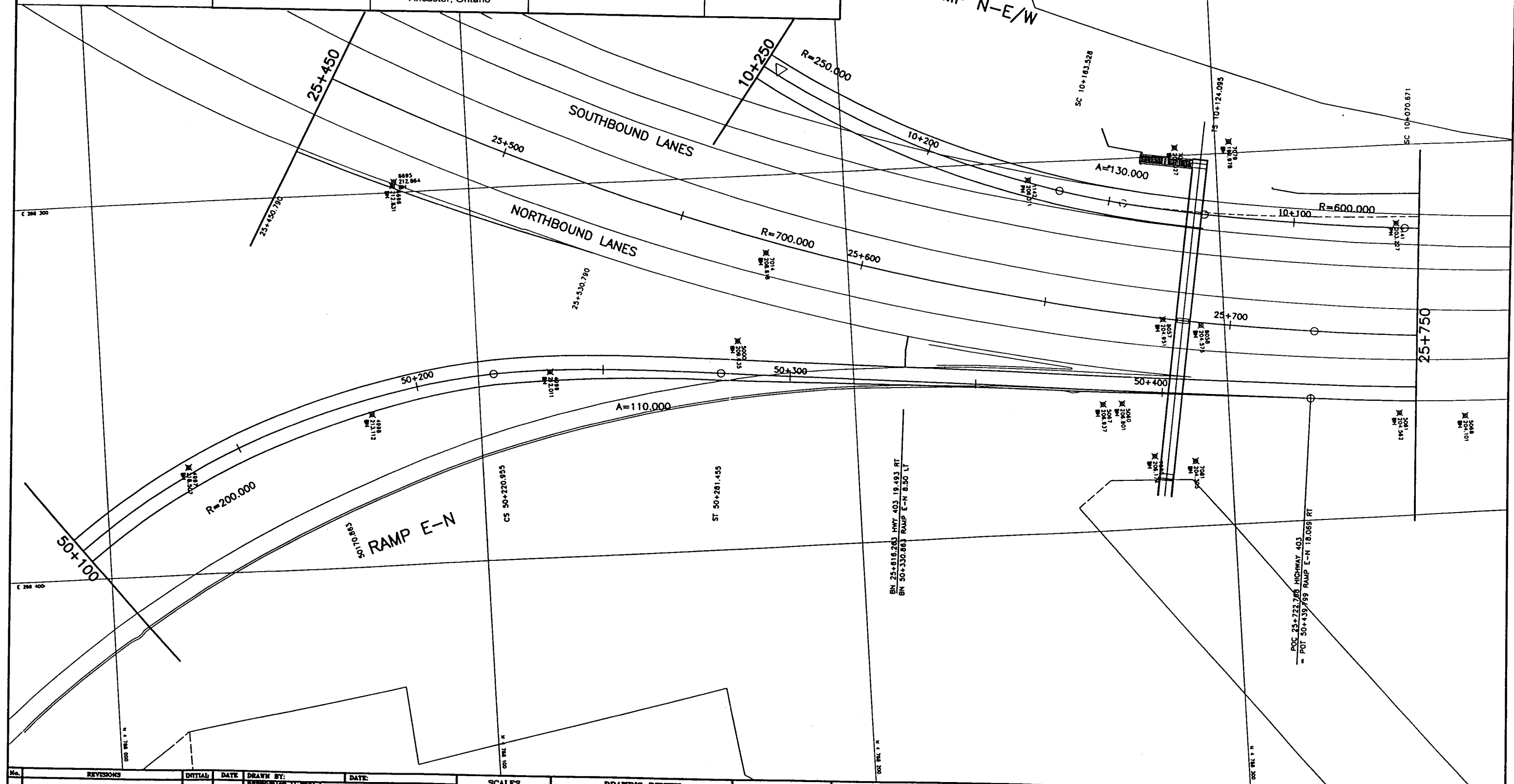
CONTRACT No. RHW-00-231 (SPO)

SHEET No.

DRAWING No. BH-6

BH-6

FILE No.



| | | | | | | | | | | | | |
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| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: | SCALES | DRAWING REVIEW | | | | THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH TRANSPORTATION, OPERATIONS AND ENVIRONMENT DIVISION | HIGHWAY 403 INTERCHANGE BOREHOLE LOCATION PLAN MOHAWK ROAD AND LINCOLN M. ALEXANDER PARKWAY |
| | | | | REFERENCE MATERIAL: | | | DESIGN | PLANNING | CONSTR | | | |
| | | | | Road Plans : | | | SEWER | | | | | |
| | | | | Survey Plans : | | | WATER | | | | | |
| | | | | Water Plans : | | | ROADS | | | | | |
| | | | | Regional Surveyor : | | | MANAGER | | | | | |
| | | | | Geodetic Bench Mark Index No. | | | | | | DIRECTOR | SENIOR DIRECTOR ROADS | |
| | | | | Elevation= | | | | | | | | |

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕_{BH} Borehole

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G
2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 7

PROJECT No. SM 97027-G

SCALE

DATE October 2000

DRAWN

CHECKED

FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)

DRAWING No. BH-7

FILE No.

SHEET No.

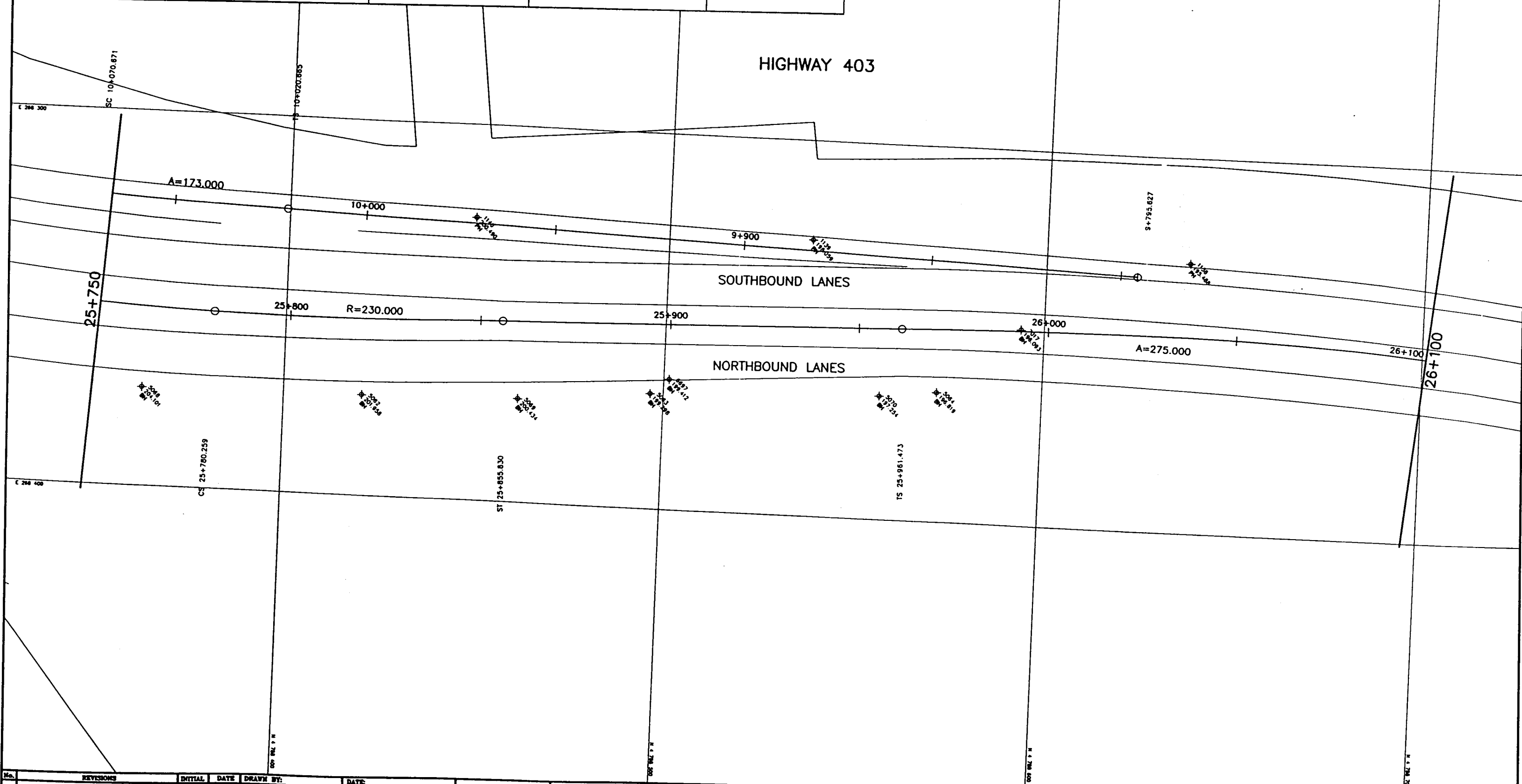
BH-7



HIGHWAY 403

SOUTHBOUND LANES

NORTHBOUND LANES



| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE | SCALES | DRAWING REVIEW | DIRECTOR | SENIOR DIRECTOR ROADS | THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH TRANSPORTATION, OPERATIONS AND ENVIRONMENT DIVISION | HIGHWAY 403 INTERCHANGE BOREHOLE LOCATION PLAN MOHAWK ROAD AND LINCOLN M. ALEXANDER PARKWAY |
|-----|-----------|---------|------|--|------|--------|------------------------------------|----------|-----------------------|---|--|
| | | | | REFERENCE MATERIAL: Road Plans: Sewer Plans: Water Plans: | | | DESIGN PLANNING CONSTR | | | | |
| | | | | Regional Surveyor: Geodetic Bench Mark Index No. Elevation: | | | SEWER WATER ROADS MANAGER | | | | |

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕_{BH} Borehole

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G
2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 8

PROJECT No. SM 97027-G

SCALE

DATE October 2000

DRAWN

CHECKED

FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)

SHEET No.

DRAWING No. BH-8

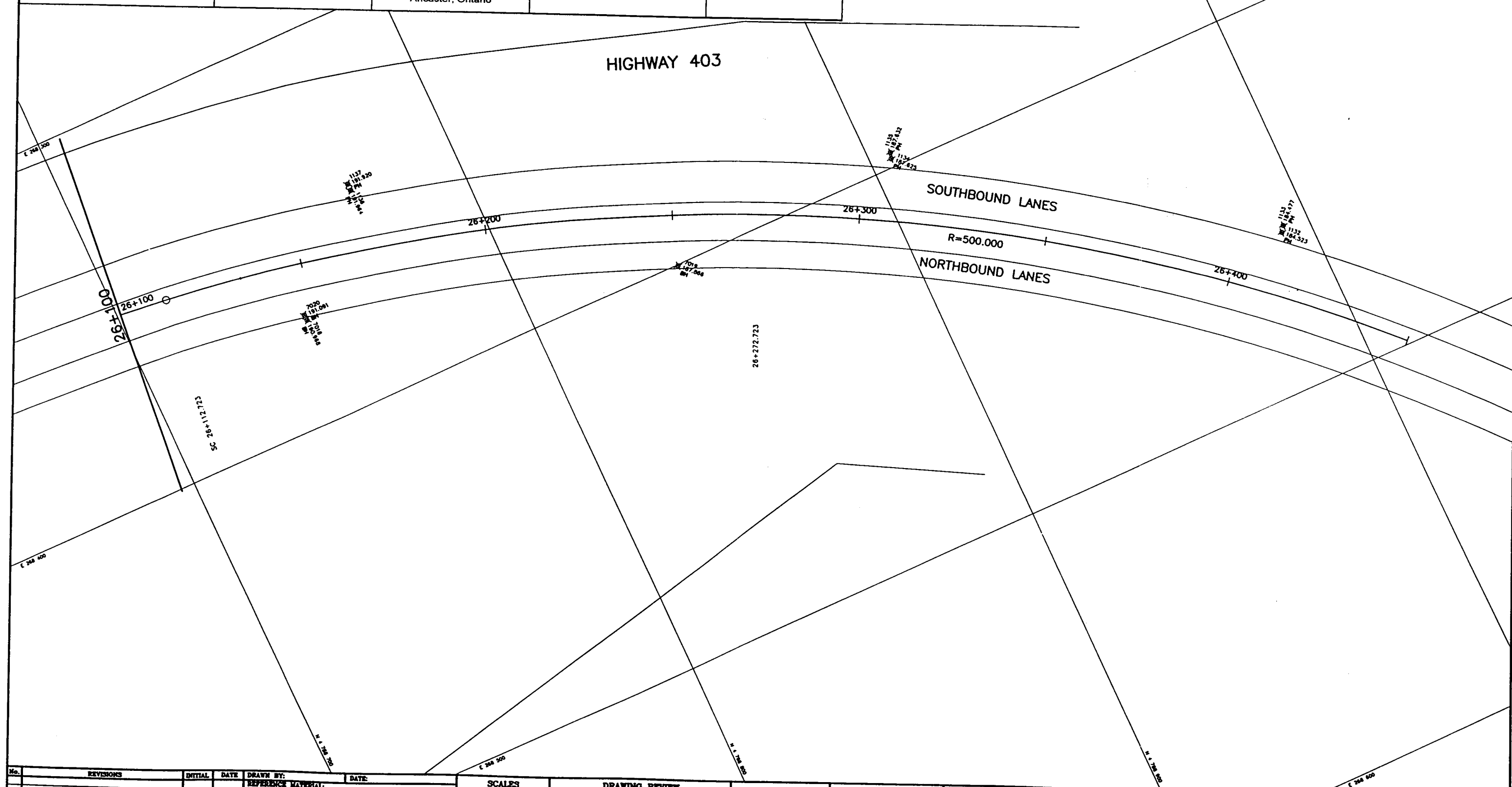
BH-8

FILE No.

HIGHWAY 403

SOUTHBOUND LANES

R=500.000
NORTHBOUND LANES



| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE |
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SCALES

DRAWING REVIEW

| DESIGN | PLANNING | CONSTR |
|---------|----------|--------|
| SEWER | | |
| WATER | | |
| ROADS | | |
| MANAGER | | |

DIRECTOR

SENIOR DIRECTOR
ROADS

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE
BOREHOLE LOCATION PLAN
MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕_{BH} Borehole

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G
2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 9

PROJECT No. SM 97027-G

SCALE

DATE October 2000

DRAWN

CHECKED

FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)

DRAWING No. BH-9

FILE No.

SHEET No.

BH-9

MOHAWK ROAD

FILMAN ROAD

ALGONQUIN AVE.

ONEIDA BLVD.

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|-------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Road Plans: | |
| | | | | Sewer Plans: | |
| | | | | Water Plans: | |
| | | | | Regional Survey: | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation: | |

SCALES

DRAWING REVIEW

| | DESIGN | PLANNING | CONSTR |
|---------|--------|----------|--------|
| SEWER | | | |
| WATER | | | |
| ROADS | | | |
| MANAGER | | | |

DIRECTOR

SENIOR DIRECTOR
ROADS

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE
BOREHOLE LOCATION PLAN
MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

Engineers & Consultants Ltd.

 Borehole

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 97027-G

2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

Region of Hamilton-
Wentworth [SPO]

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

Borehole Location Plan

DRAWING 10

SCALE
DATE October 2000

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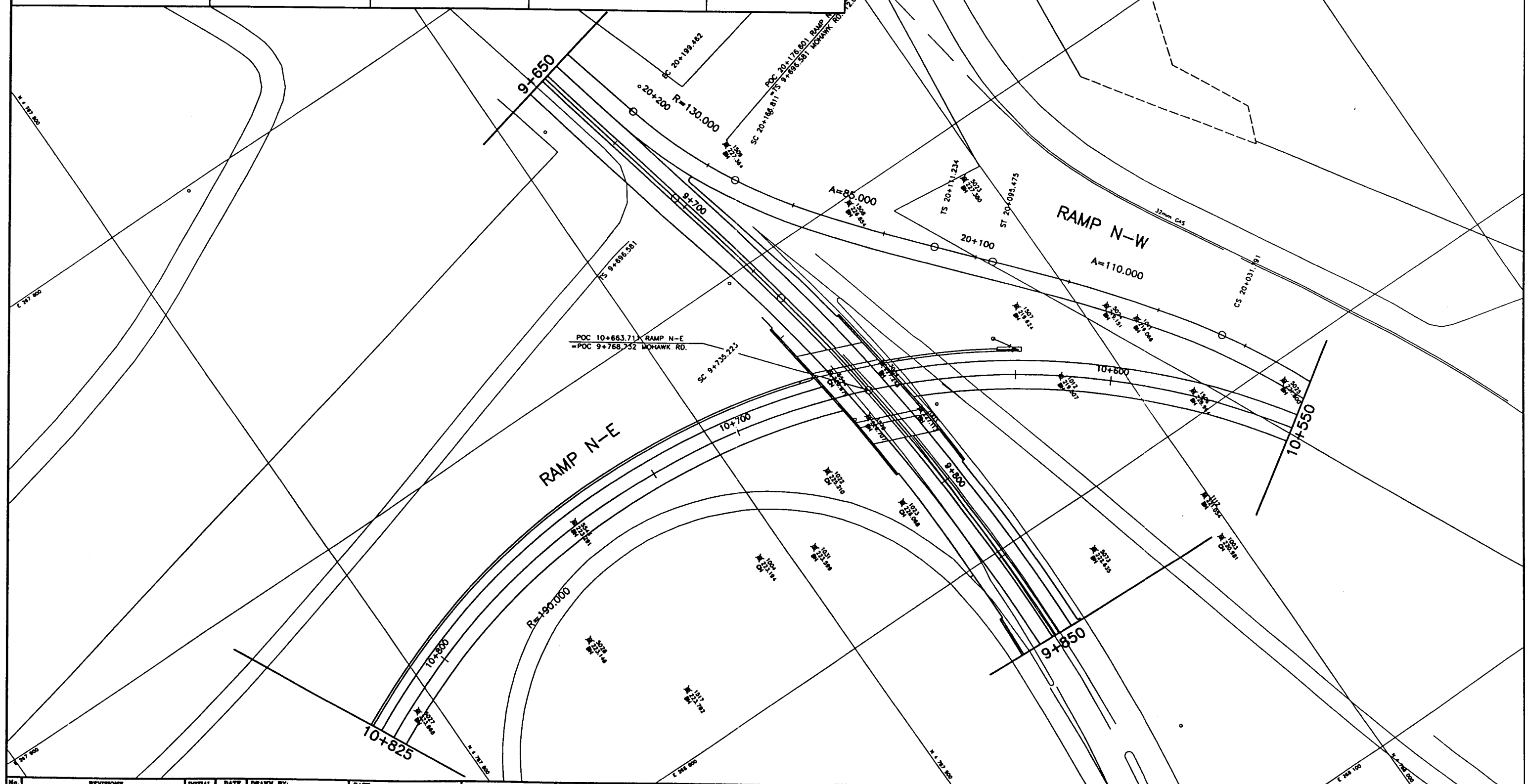
DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

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| IN CONTRACT No. RHW-00-231 (SP0) |
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DRAWING No. BH-10

FILE No.

SHEET No.

BH-10

| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|-------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Road Plans : | |
| | | | | Sewer Plans : | |
| | | | | Water Plans : | |
| | | | | Regional Survey : | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation = | |

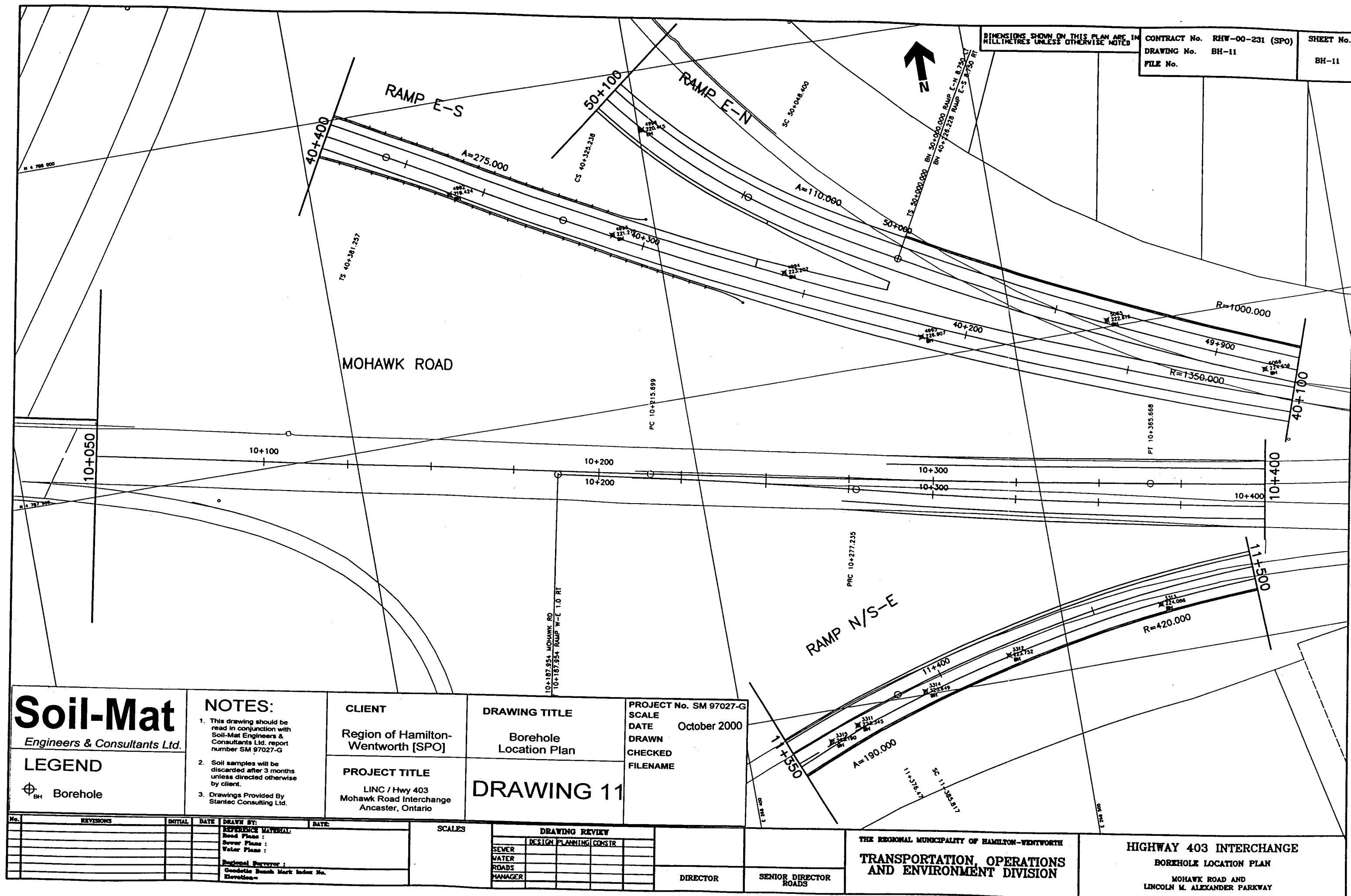
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| SCALES | DRAWING REVIEW | | | | | |
| | SEWER | DESIGN | PLANNING | CONSTR | | |
| | WATER | | | | | |
| | ROADS | | | | | |
| | MANAGER | | | | | |
| | DIRECTOR | | | | SENIOR DIRECTOR | BOSS |

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE

BOREHOLE LOCATION PLAN

MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY



Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕_{BH} Borehole

NOTES:

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3. Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 12

PROJECT No. SM 97027-G

SCALE

DATE October 2000

DRAWN

CHECKED

FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

CONTRACT No. RHW-00-231 (SPO)

DRAWING No. BH-12

FILE No.

SHEET No.

BH-12

LINCOLN M. ALEXANDER PARKWAY

RAMP E-S

MOHAWK ROAD

RAMP N/S-E

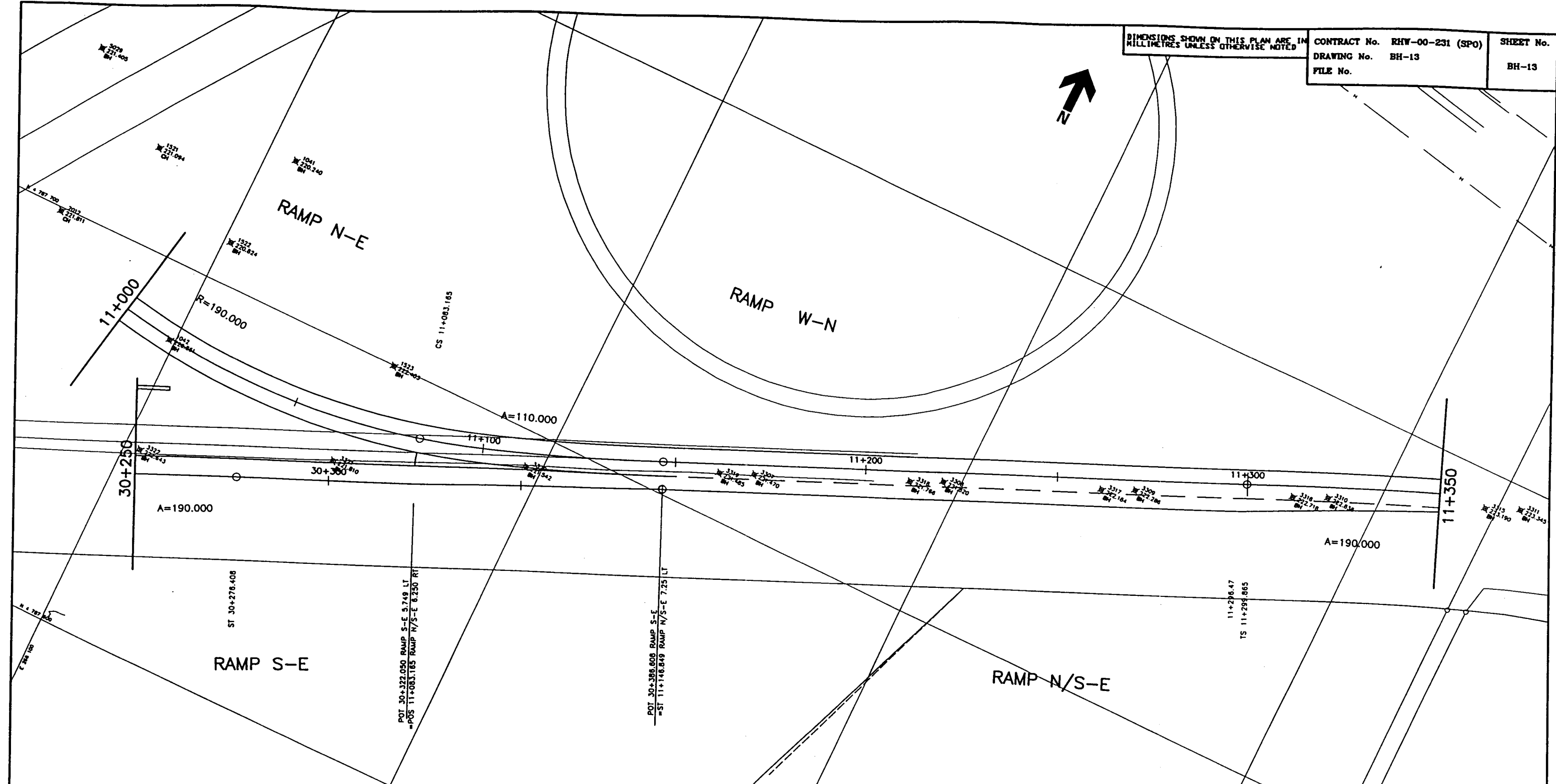
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| | | | | REFERENCE MATERIAL: | |
| | | | | Road Plans: | |
| | | | | Sever Plans: | |
| | | | | Water Plans: | |
| | | | | Regional Surveyor: | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation: | |

| SCALES | DRAWING REVIEW | DIRECTOR | SENIOR DIRECTOR |
|--------|------------------------|----------|-----------------|
| | DESIGN PLANNING CONSTR | | ROADS |
| | SEWER | | |
| | WATER | | |
| | ROADS | | |
| | MANAGER | | |

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| THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH | HIGHWAY 403 INTERCHANGE |
| TRANSPORTATION, OPERATIONS AND ENVIRONMENT DIVISION | BOREHOLE LOCATION PLAN |
| | MOHAWK ROAD AND LINCOLN M. ALEXANDER PARKWAY |

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

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| DRAWING No. BH-13 | BH-13 |
| FILE No. | |



Soil-Mat

Engineers & Consultants Ltd.

LEGEND

⊕ BH Borehole

NOTES:

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- Soil samples will be discarded after 3 months unless directed otherwise by client.
- Drawings Provided By Stantec Consulting Ltd.

CLIENT

Region of Hamilton-Wentworth [SPO]

PROJECT TITLE

LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario

DRAWING TITLE

Borehole
Location Plan

DRAWING 13

PROJECT No. SM 97027-G
SCALE
DATE October 2000
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FILENAME

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| SCALES | DRAWING REVIEW |
|--------|------------------------|
| | DESIGN PLANNING CONSTR |
| | SEWER |
| | WATER |
| | ROADS |
| | MANAGER |

| DIRECTOR | SENIOR DIRECTOR ROADS |
|----------|--------------------------|
| | |

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

TRANSPORTATION, OPERATIONS AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE

BOREHOLE LOCATION PLAN

MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

Engineers & Consultants Ltd.

LEGEND



Borehole

NOTES:

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2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Drawings Provided By Stantec Consulting Ltd.

CLIENTRegion of Hamilton-
Wentworth [SPO]

PROJECT TITLE

**LINC / Hwy 403
Mohawk Road Interchange
Ancaster, Ontario**

DRAWING TITLE

Borehole Location Plan

DRAWING 14

PROJECT No. SM 97027-G

SCALE

October 2000

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FILENAME

DIMENSIONS SHOWN ON THIS PLAN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

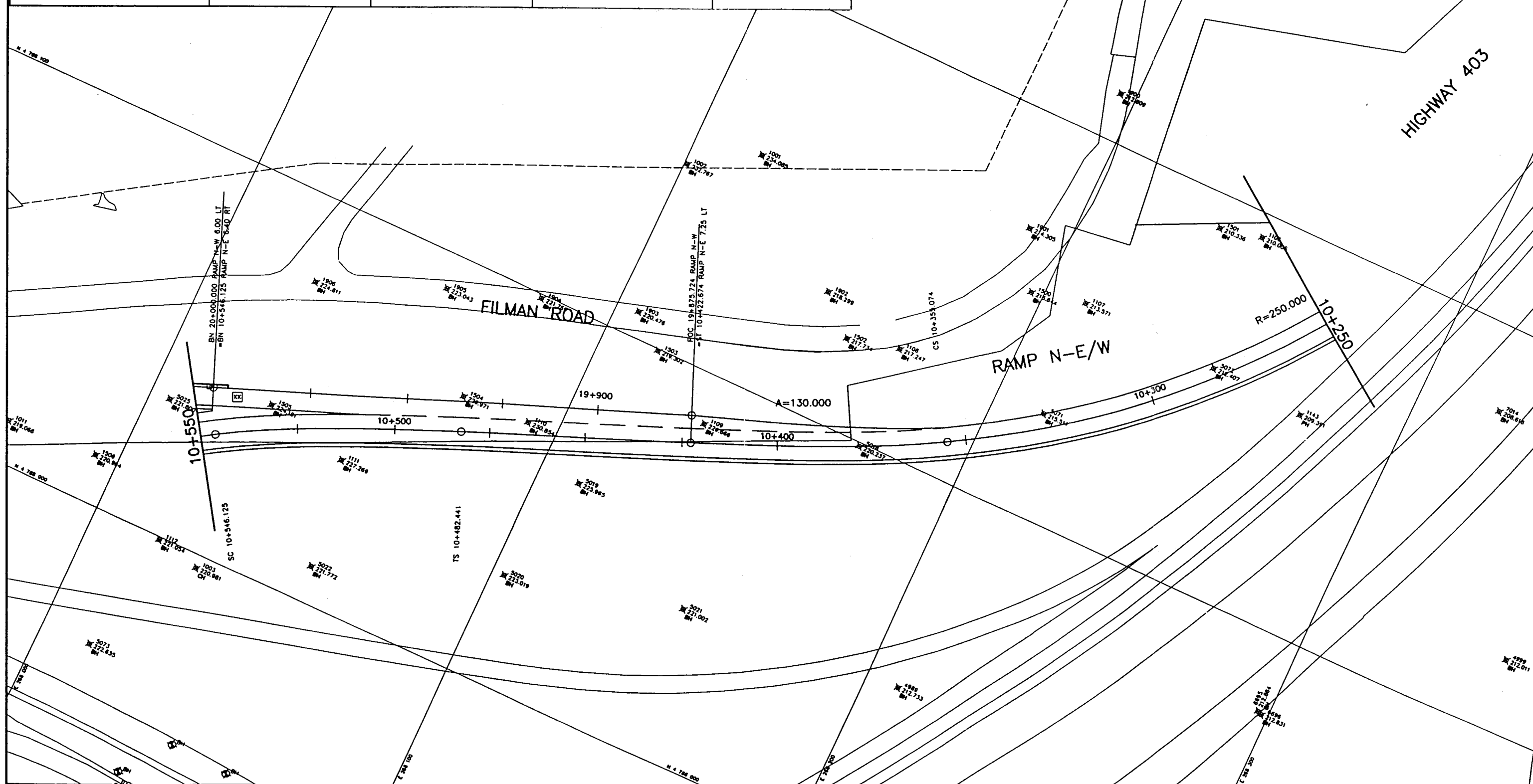
CONTRACT No. RHW-00-231 (SPO)

DRAWING No. BH-14

FILE No.

SHEET No.

BH-14



| No. | REVISIONS | INITIAL | DATE | DRAWN BY: | DATE: |
|-----|-----------|---------|------|-------------------------------|-------|
| | | | | REFERENCE MATERIAL: | |
| | | | | Road Plans : | |
| | | | | Sewer Plans : | |
| | | | | Water Plans : | |
| | | | | Regional Surveyor : | |
| | | | | Geodetic Bench Mark Index No. | |
| | | | | Elevation = | |

SCALES

DRAWING REVIEW

| | DESIGN | PLANNING | CONSTR | |
|---------|--------|----------|--------|--|
| SEVER | | | | |
| WATER | | | | |
| ROADS | | | | |
| MANAGER | | | | |

DIRECTOR

**SENIOR DIRECTOR
ROADS**

THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
TRANSPORTATION, OPERATIONS
AND ENVIRONMENT DIVISION

HIGHWAY 403 INTERCHANGE

BORRHOLE LOCATION PLAN

MOHAWK ROAD AND
LINCOLN M. ALEXANDER PARKWAY

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 – 231 [SPO]**



APPENDIX B

Borehole Logs

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 –231 [SPO]**



RAMP E – S STRUCTURE OVER HIGHWAY 403 BOREHOLES

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 8075 [SM No. 23]

Borehole Location: Ramp E - S

Sta. 40+515.805, Offset -8.15

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Sand Fill | 214.85 | | | | | | |
| 2 | | Brown, medium to coarse in gradation, some gravel, dry, | 0.99 | SS | 1 | 99 | | | |
| 4 | | Bedrock | 213.86 | | | | | | |
| 6 | | Dolomitic Limestone, Lockport Formation [Eramosa Member], grey to brown, thinly bedded, fine grained, occasional chert nodules and vugs, core water loss at 1.22 metre depth, Grade R4 -strong [strength], fair to good quality, 75 millimetres of Run No. 2 left in borehole. | | CB | 2 | | | | |
| 10 | | Run No. 1 Length: 1.52 metres, Recovery: 100 per cent, RQD: 58 per cent | | | | | | | |
| 12 | | Run No. 2 Length: 1.37 metres, Recovery: 94 per cent, RQD: 94 per cent | 3.88 | CB | 3 | | | | |
| 14 | | End of Borehole | 210.97 | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 | | | | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |

Notes:

1. Borehole advanced using hollow stem auger equipment to auger refusal and using diamond coring techniques between a depth of 0.99 to 3.88 metres on May 16, 2000.
2. Borehole backfilled on completion.
3. Soil samples will be discarded after three months unless directed otherwise by client.

Drill Method: Hollow Stem Auger

Drill Date: May 16, 2000

Hole Size: 150 mm

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

130 Lancing Drive, Hamilton, ON L8W 3A1

Phone: (905) 318-7440 Fax: (905) 318-7455

e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: JM

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ramp S-E Structure over Hwy 403

Client: Region of Hamilton-Wentworth [SPO]

Corehole # 1051
(SM Corehole No.: D)

Corehole Location: Sta.: 40+433.899

Offset: -12.562

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery |
| 0 m | | Ground Surface | 0 | | | | | | |
| 2 | | Clayey Silt | 1.17 | | | | | | |
| 4 | | Dolostone/Limestone Bedrock | 217.08 | | | | | | |
| 6 | | Thin-bedded to massive, Dark to light brown-grey, fine crystalline, with vug-filled mineralization and some chert nodules and lenses. | | Core | 1 | | | | |
| 8 | | | | Core | 2 | | | | |
| 10 | | | | Core | 3 | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 | | End of Corehole | 212.48 | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |
| 40 | | | | | | | | | |
| 42 | | | | | | | | | |
| 44 | | | | | | | | | |
| 46 | | | | | | | | | |
| 48 | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous flight auger to a depth of 1.17m and cored to a depth of 5.77 m on February 6, 1998.
2. Terminated dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem

Drill Date: February 6, 1998

Hole Size: 200mm

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ramp E-S Structure over Hwy 403

Client: Region of Hamilton/Wentworth [SPO]

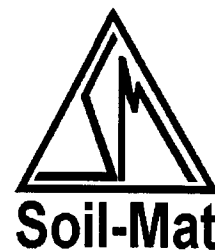
Corehole # 4989

(SM Corehole No.: E)

Corehole Location: Sta.: 40+505.227

Offset: 19.908

Project Manager: John Monkman



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|---------------------|----------------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | Moisture Content w% | Std. Penetration 'N' |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 2 | | FILL sand loose rock | 0.94 | | | | | | | | |
| 4 | | Bedrock Thin-bedded to massive, Dark to light brown-grey, fine crystalline, with vug-filled mineralization and some chert nodules and lenses. Core 1: RQD=79; Recovery=100% | 211.79 | Core | 1 | | | | | | |
| 10 | | | | Core | 2 | | | | | | |
| 12 | | | 3.89 | | | | | | | | |
| 14 | | Core 2: RQD=88; Recovery=100% | 208.84 | | | | | | | | |
| 16 | | End of Corehole | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 22 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
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| 34 | | | | | | | | | | | |
| 36 | | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 40 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 0.94 m and cored to a depth of 3.89 m on June 18, 1998.
2. Terminated dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem

Drill Date: June 19, 1998

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM-97027-G

Borehole # 4990

Project: LINC/Hwy 403/Mohawk Road Interchange

Borehole Location: Sta.: 40+472.177

Location: Ramp E-S Structure over Hwy 403

Offset: -5.712

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery |
| 0 m | | Ground Surface | 0 | | | | | | |
| 2 | | Dolostone/Limestone Bedrock Highly fractured, loose to depth of 1.53 m. Thin-bedded to massive, Dark to light brown-grey, fine crystalline, with vug-filled mineralization and some chert nodules and lenses. | 213.55 | | | | | | |
| 2 | | Core Run #1: RQD=35, Recovery=100% | | CB | 1 | | | | |
| 4 | | Core Run #2: RQD=64, Recovery=98% | | CB | 2 | | | | |
| 4 | | Core Run #3: RQD=84, Recovery=100% | | CB | 3 | | | | |
| 5.29 | | End of Borehole | 208.26 | | | | | | |
| 6 | | | | | | | | | |
| 8 | | | | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
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| 36 | | | | | | | | | |
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| 44 | | | | | | | | | |
| 46 | | | | | | | | | |
| 48 | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.53m and cored with a diamond tipped core barrel to a depth of 5.29m on May 27, 1999.
2. Terminated dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: HSA/Core Barrel

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Datum: Geodetic

Drill Date: May 27, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Hole Size: 200 mm

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e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ramp E-S Structure over Hwy 403

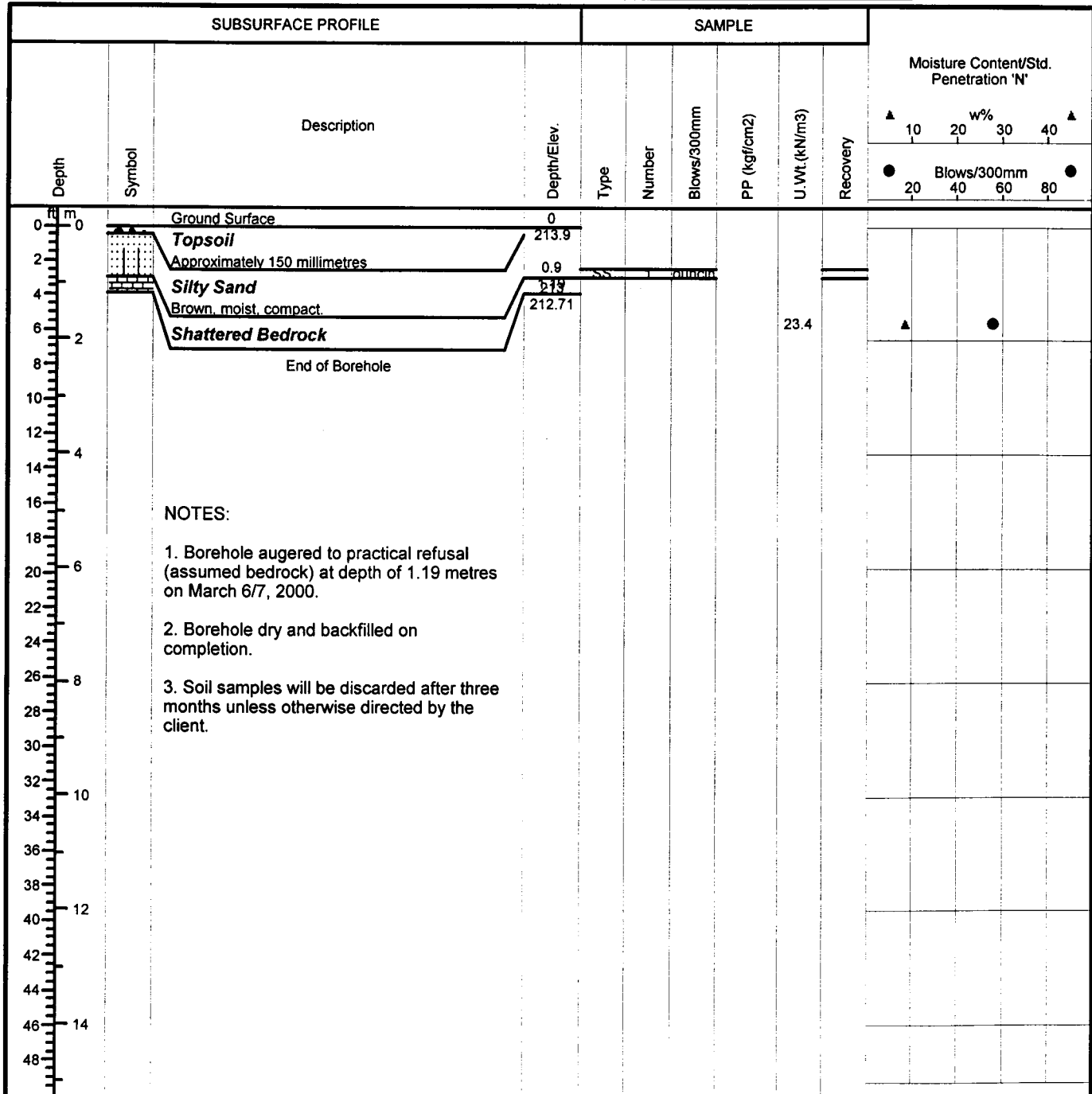
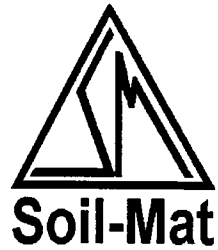
Client: Region of Hamilton/Wentworth [SPO]

Borehole # 7015 [SM No. 24]
(SM Borehole No. 60)

Borehole Location: Sta.: 40+466.131

Offset: 1.943

Project Manager: John Monkman



Drill Method: Hollow Stem

Drill Date: March 6/7, 2000

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ramp E-S Structure over Hwy 403

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 7016 [SM No. 25]
(SM Borehole No. 60)

Borehole Location: Sta.: 40+430.335

Offset: 3.424

Project Manager: John Monkman



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Sand Silt | 217.71 | | | | | | | |
| 2 | | Brown, trace of clay, moist, compact. | | | | | | | | |
| 4 | | Bedrock | | Core | 1 | | | | | |
| 6 | | Dolomitic Limestone, grey to brown, thinly bedded to massive, fine crystalline, with vug-filled mineralization and some chert, nodules and lenses, Grade R-4 [strength], poor quality | | | | | | | | |
| 10 | | Run No. 1, Length: 1.65 metres, Recovery: 94 per cent, RQD: 38 per cent | | Core | 2 | | | | | |
| 12 | | Run No. 2, Length: 1.52 metres, Recovery: 100 per cent, RQD: 40 per cent | | | | | | | | |
| 14 | | Run No. 3, Length: 1.55 metres, Recovery: 100 per cent, RQD: 39 per cent | | Core | 3 | | | | | |
| 16 | | | 5.44 | | | | | | | |
| 18 | | End of Borehole | 212.27 | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
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| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem auger equipment to auger refusal at depth of 0.71 metres and to a depth of 5.44 metres using diamond coring techniques on March 14, 2000.
2. Borehole backfilled on completion.
3. Soil samples will be discarded after three months unless otherwise directed by the client.

Drill Method: Hollow Stem

Drill Date: March 14, 2000

Hole Size: 200 mm

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Sheet: 1 of 1

PROJECT NO.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



RAMP N – E STRUCTURE OVER HIGHWAY 403 BOREHOLES

Project No: SM 97027-G

Borehole # 5539 [SM No. 3]

Project: LINC/Hwy 403/Mohawk Road Interchange

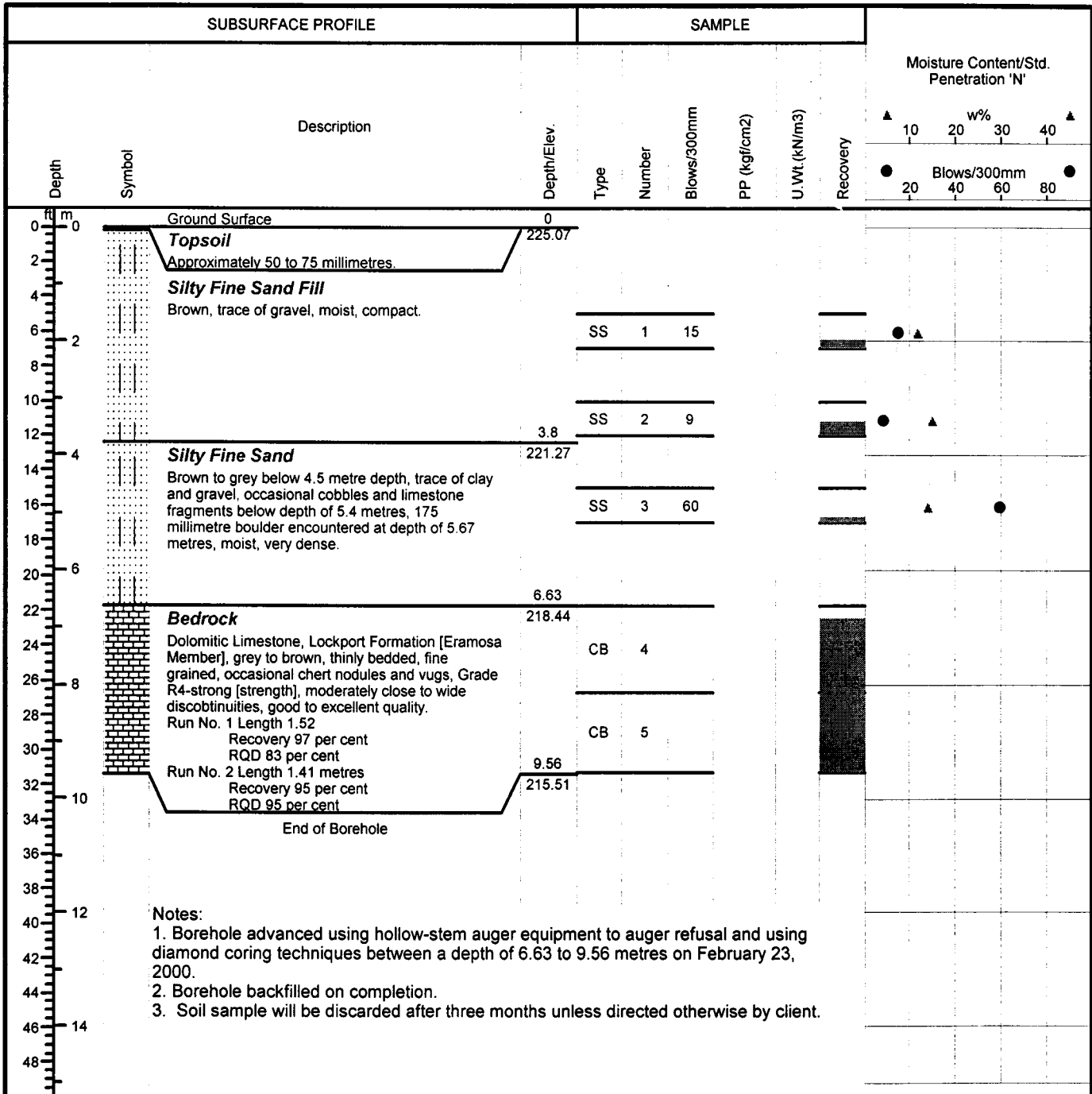
Borehole Location: See Borehole Location Plan

Location: Ancaster, Ontario

Structure: Ramp N-E [West Abutment]

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

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Datum: Geodetic

Drill Date: February 23, 2000

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: JM

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

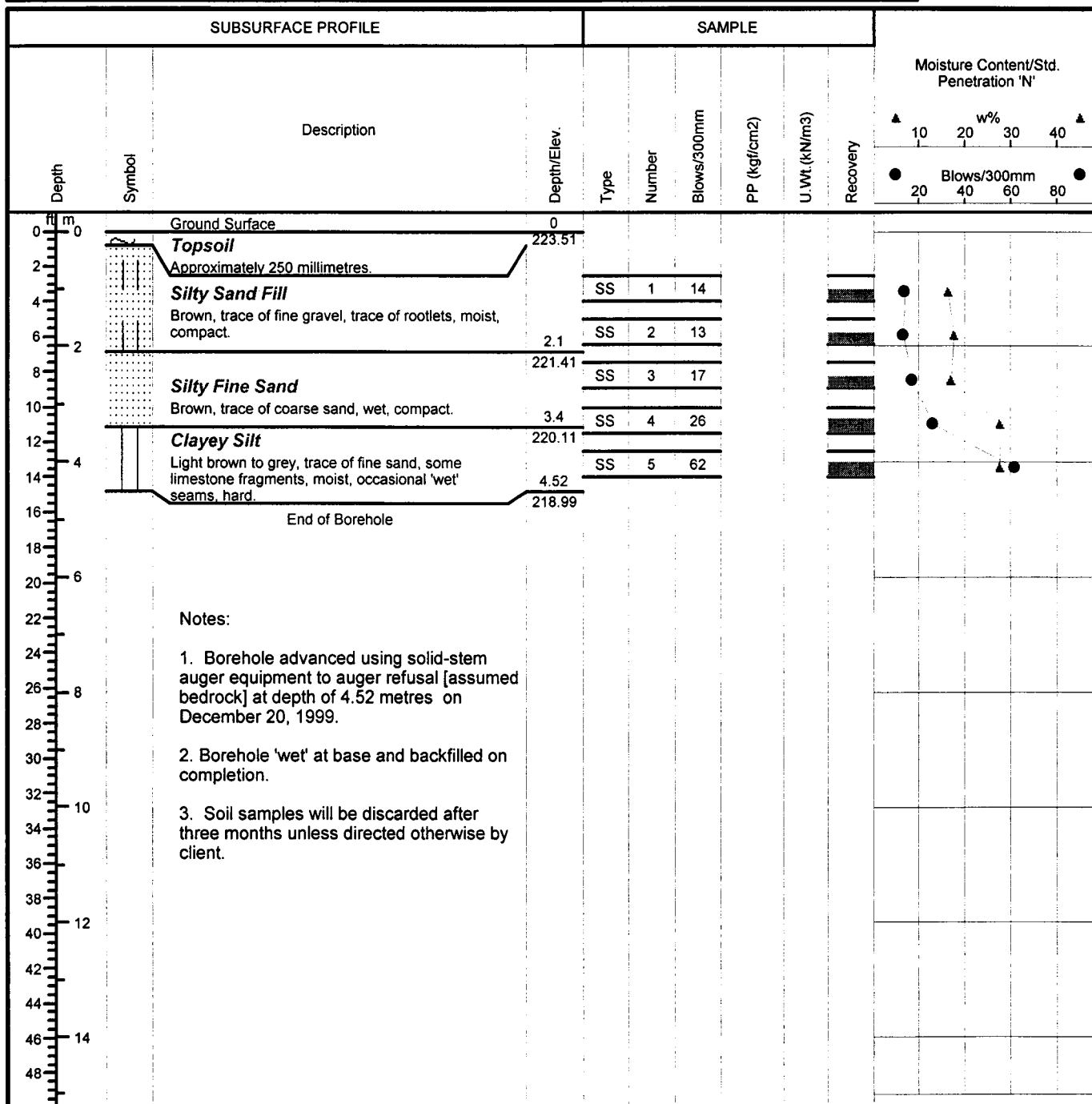
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5540 [SM No. 10]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E [West Abutment]

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: December 20, 1999

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

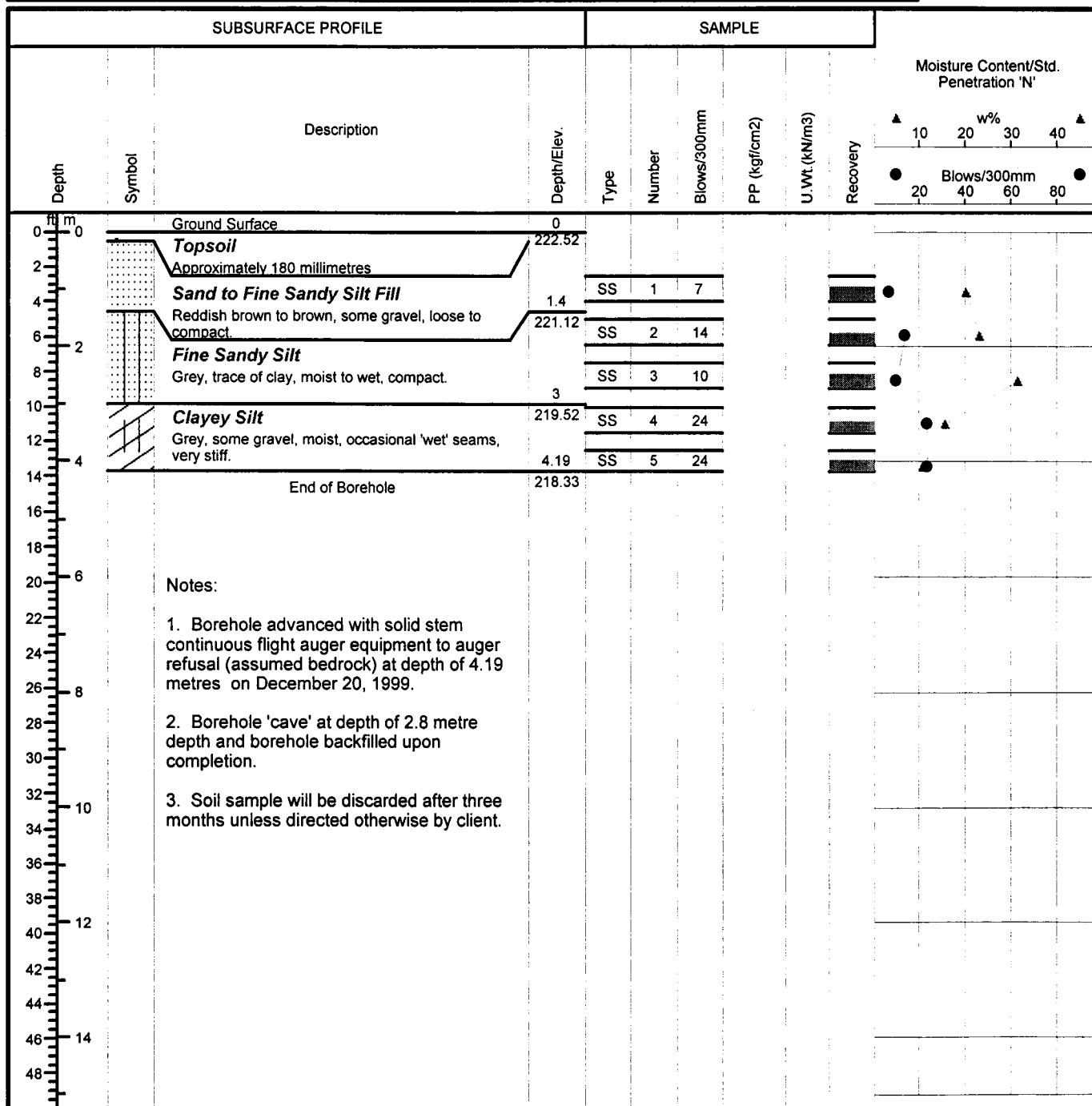
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5547 [SM No. 4]

Borehole Location: See Borehole Location Plan

Structure Ramp N-E [West Pier]

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: December 20, 1999

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

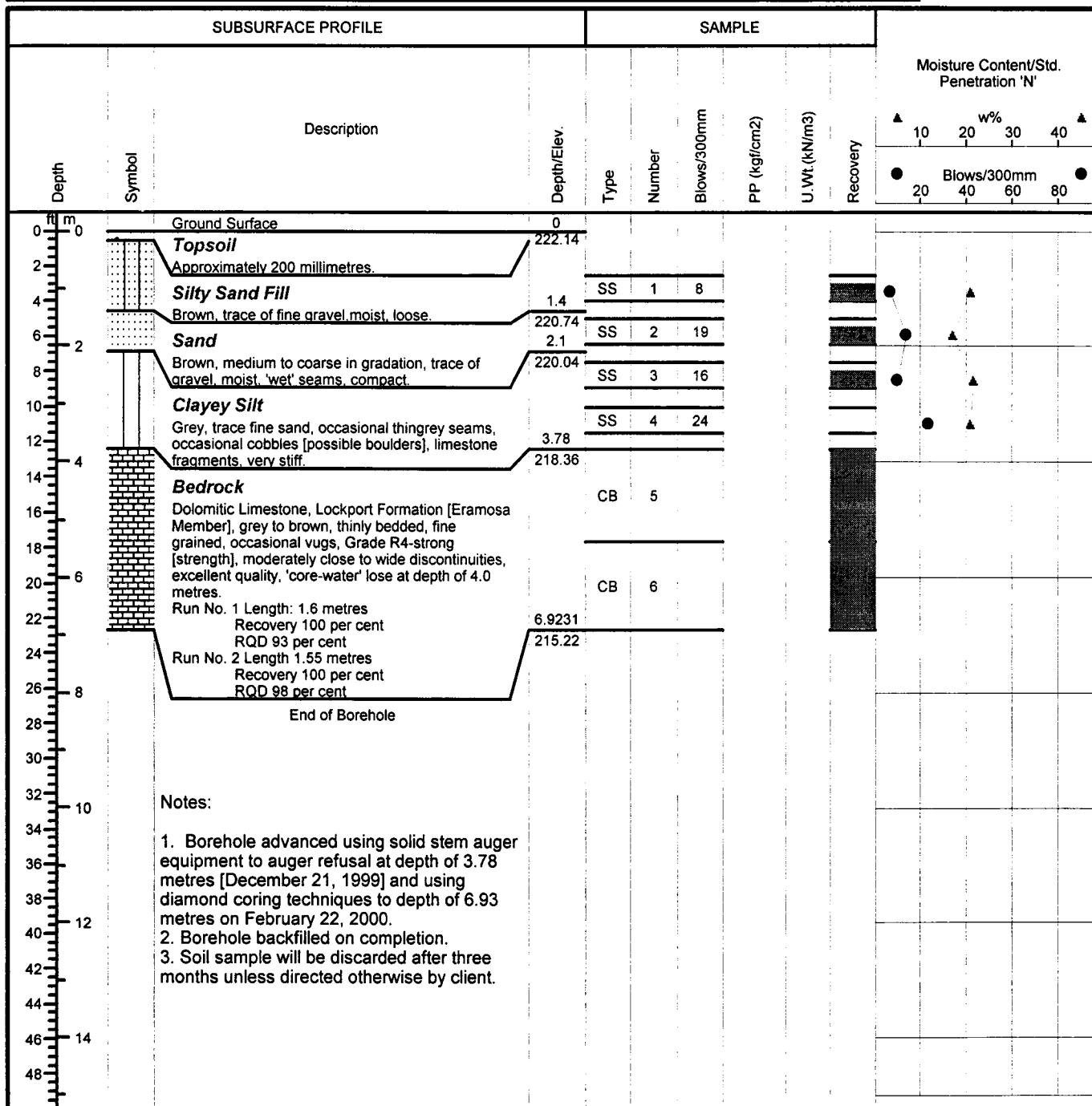
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5548 [SM No. 9]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E [West Pier]

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: Dec 21 1999, Feb 22 2000

Hole Size: 200 mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

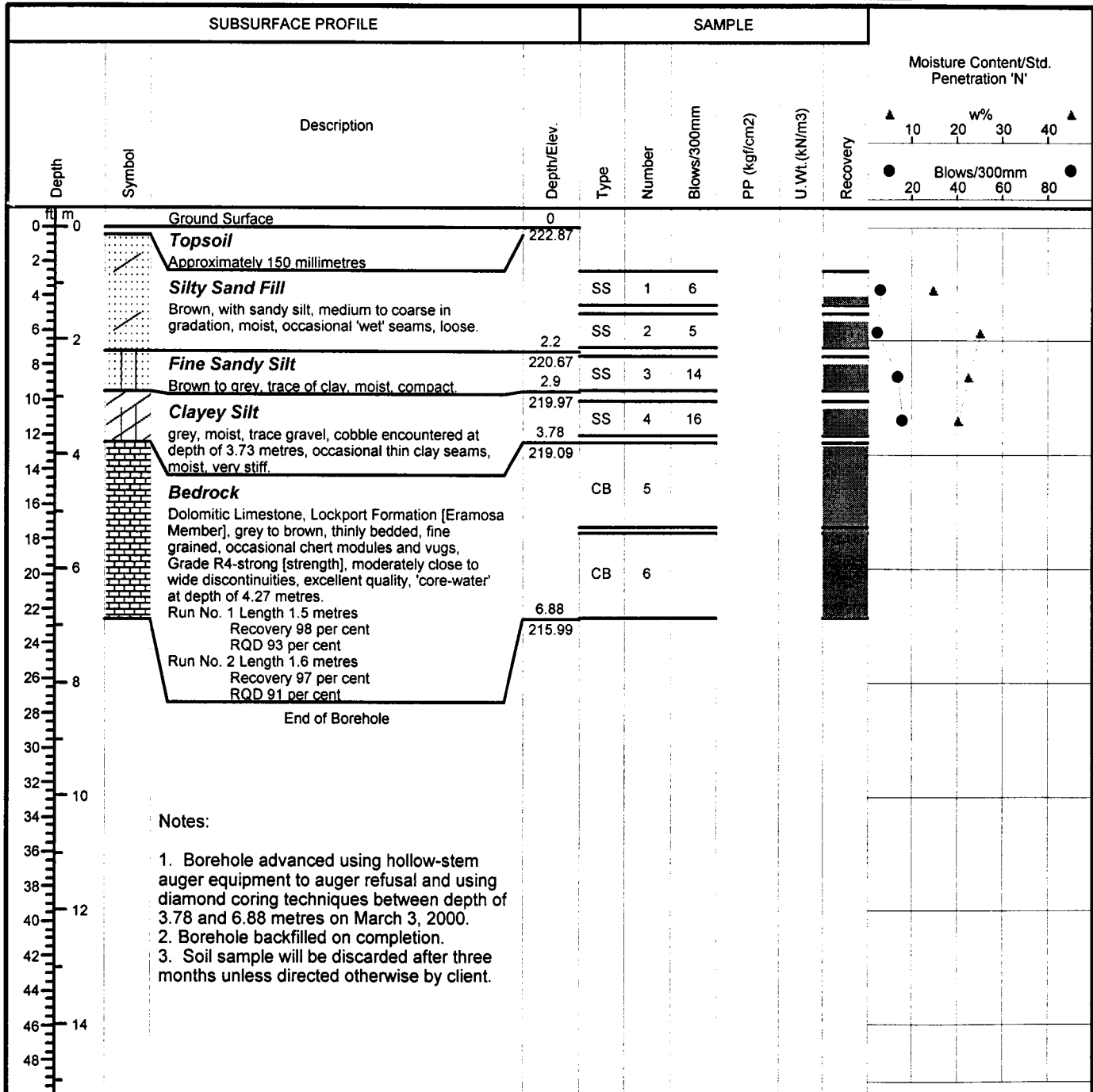
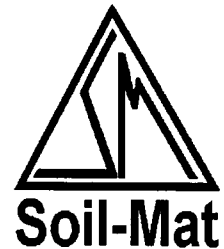
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7009 [SM No. 5]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E [East Pier]

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 3, 2000

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

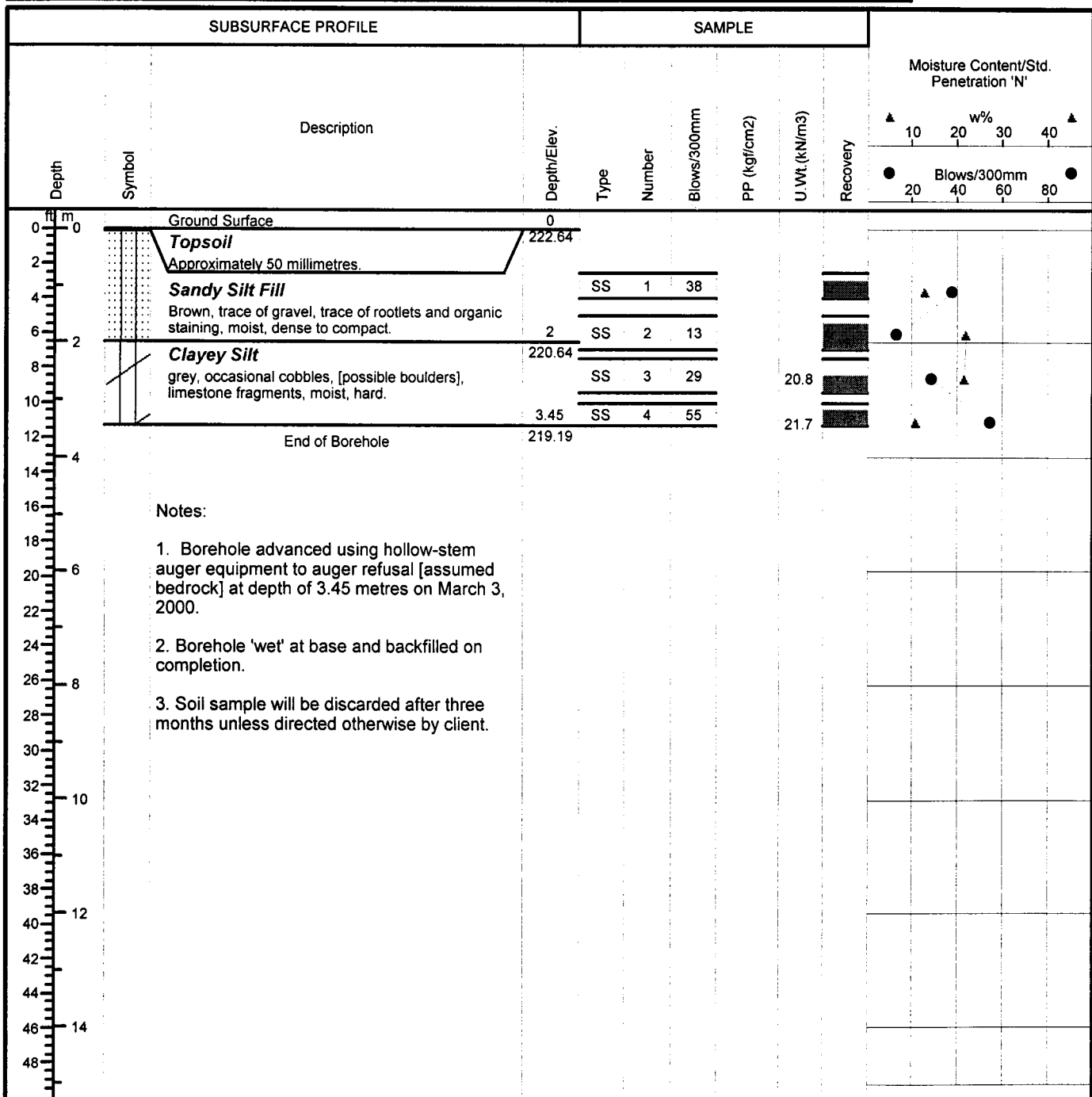
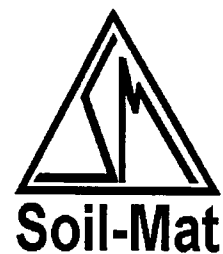
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7010 [SM No. 8]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E [East Pier]

Project Manager: John Monkman P.Eng.



Drill Method: Hollow Stem Auger

Drill Date: March 3, 2000

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/ Mohawk Road Interchange

Location: Ancaster, Ontario

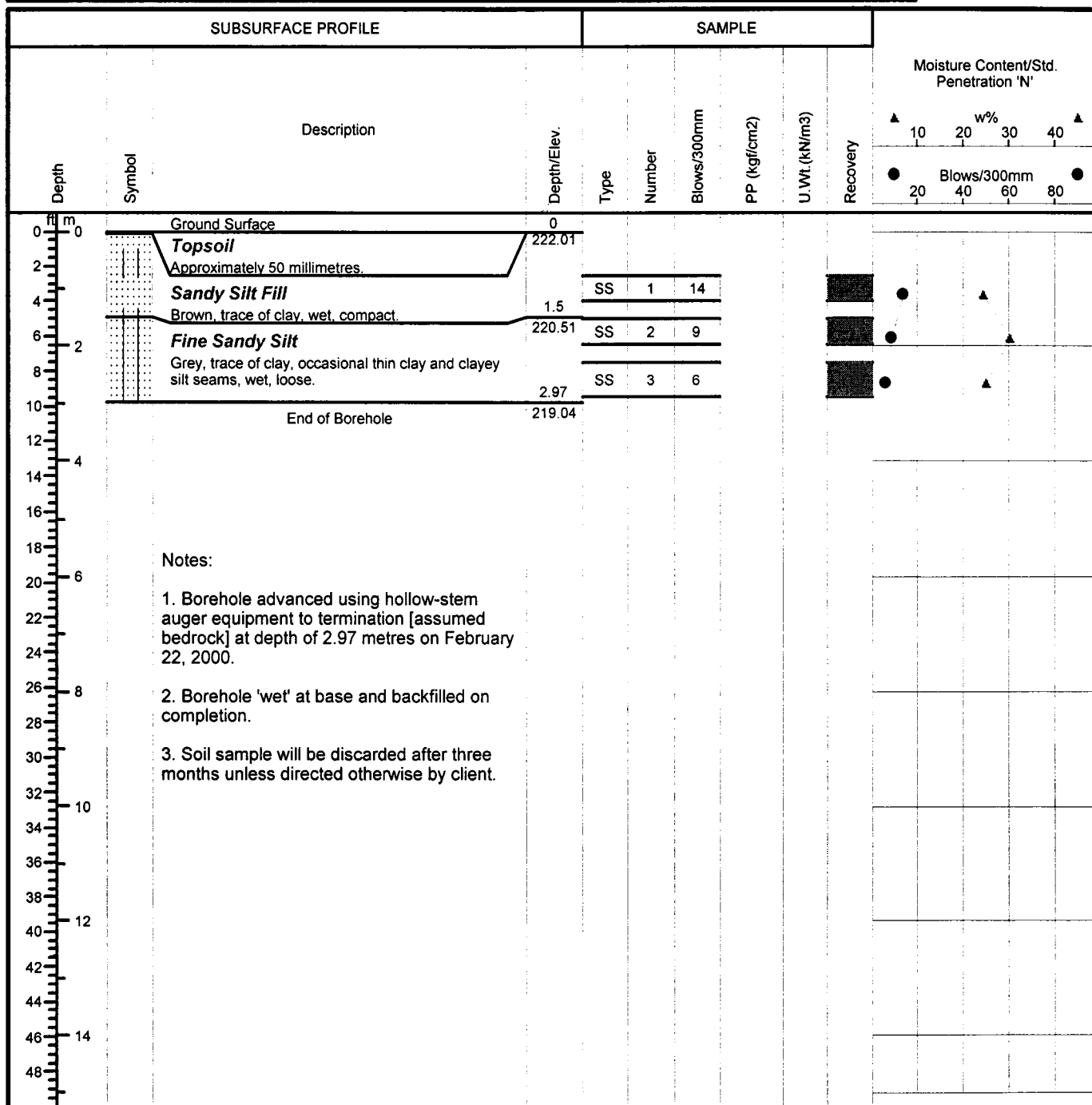
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7011 [SM No. 6]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E [East Abutment]

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: February 22, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

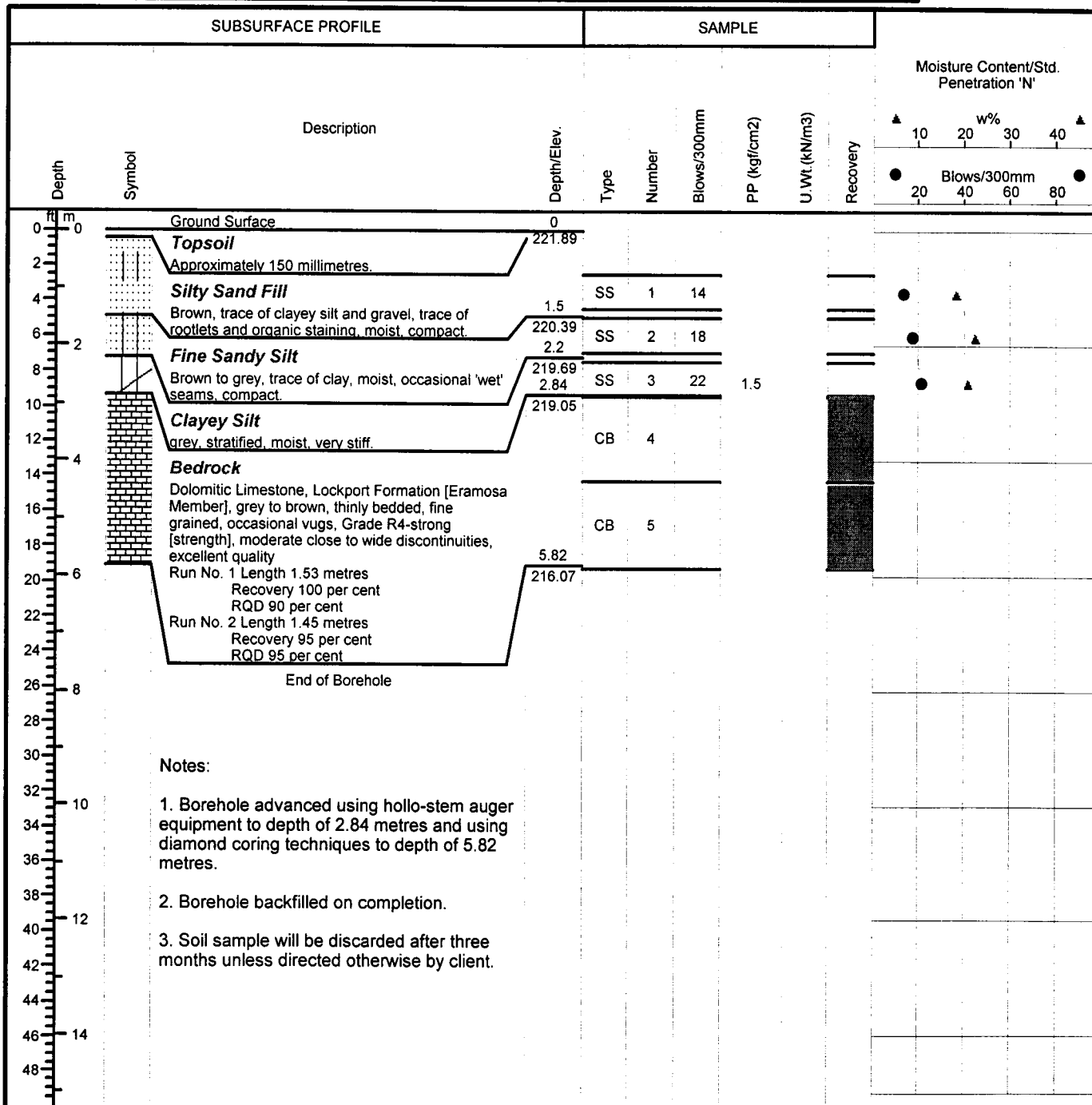
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7012 [SM No. 7]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E [East Abutment]

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: February 21, 2000

Hole Size: 200mm

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PROJECT NO.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



RAMPS E – S AND N – E STRUCTURES UNDER MOHAWK ROAD BOREHOLES

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

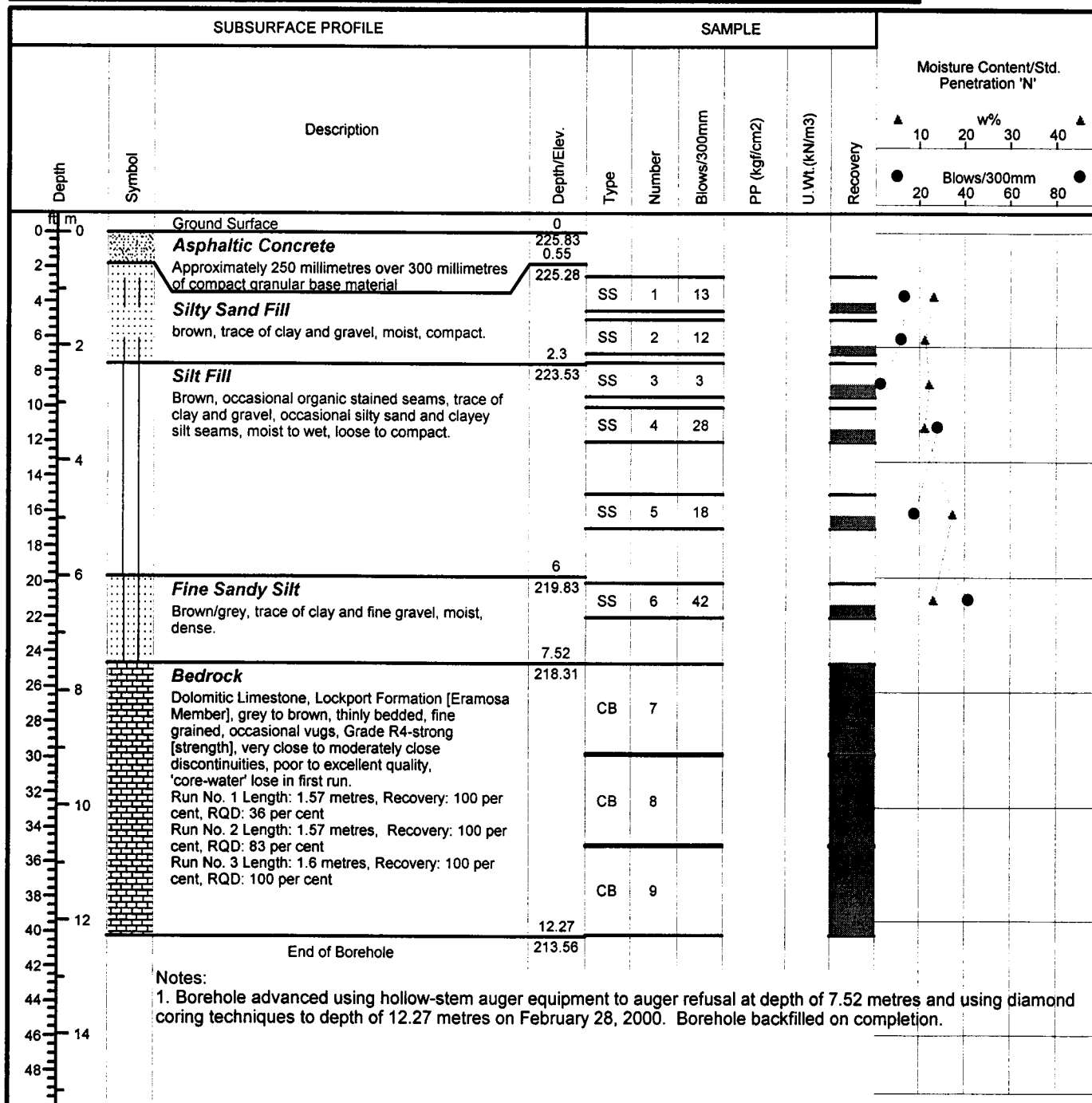
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5580 [SM No. 14]

Borehole Location: See Borehole Location Plan

Structure: Ramp E-S under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: February 28, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5581 [SM No. 15]

Project: LINC/Hwy 403/Mohawk Road Interchange

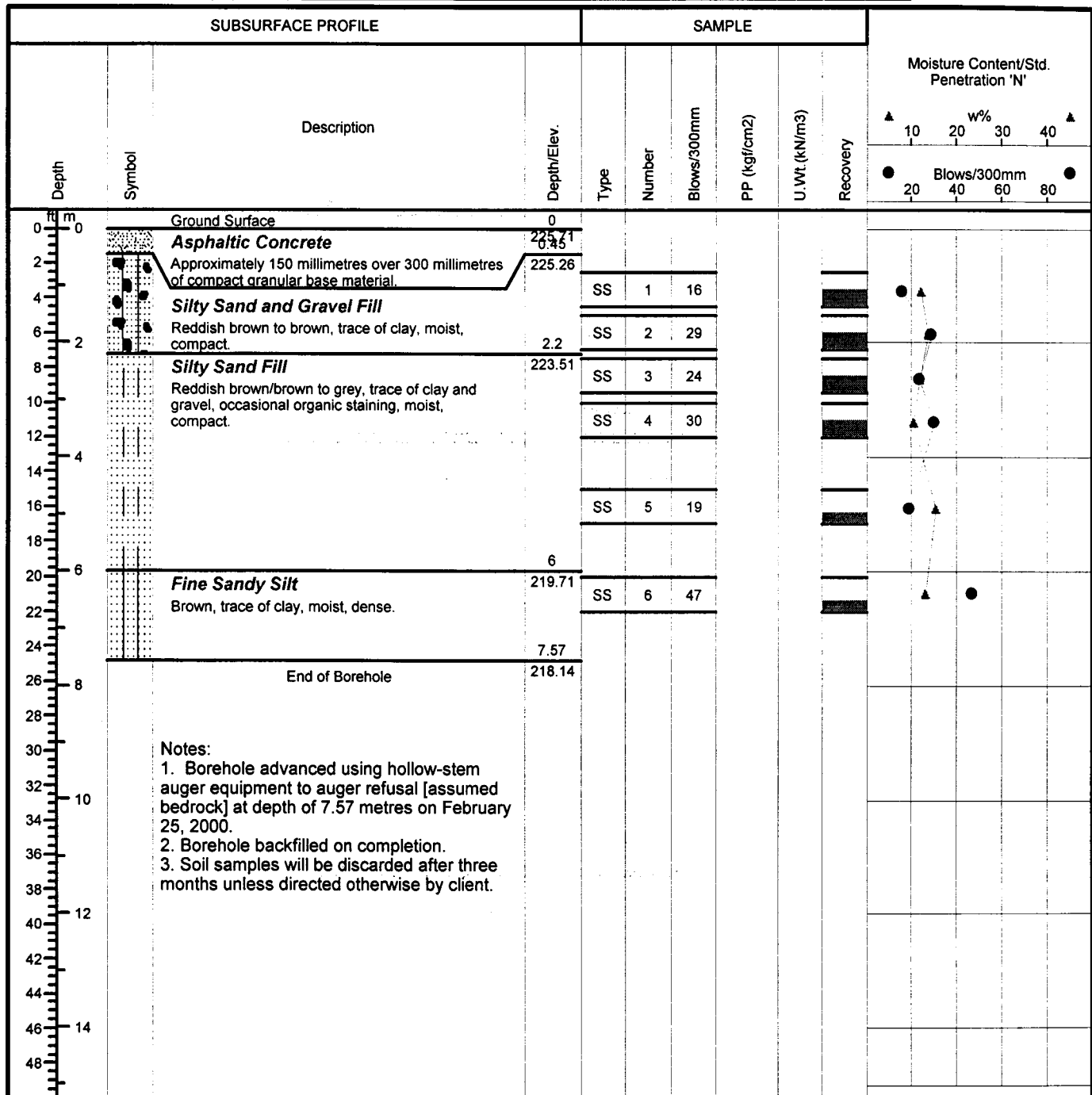
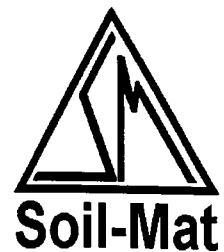
Borehole Location: See Borehole Location Plan

Location: Ancaster, Ontario

Structure: Ramp E-S under Mohawk Road

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: February 25, 2000

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Checked by: JB

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

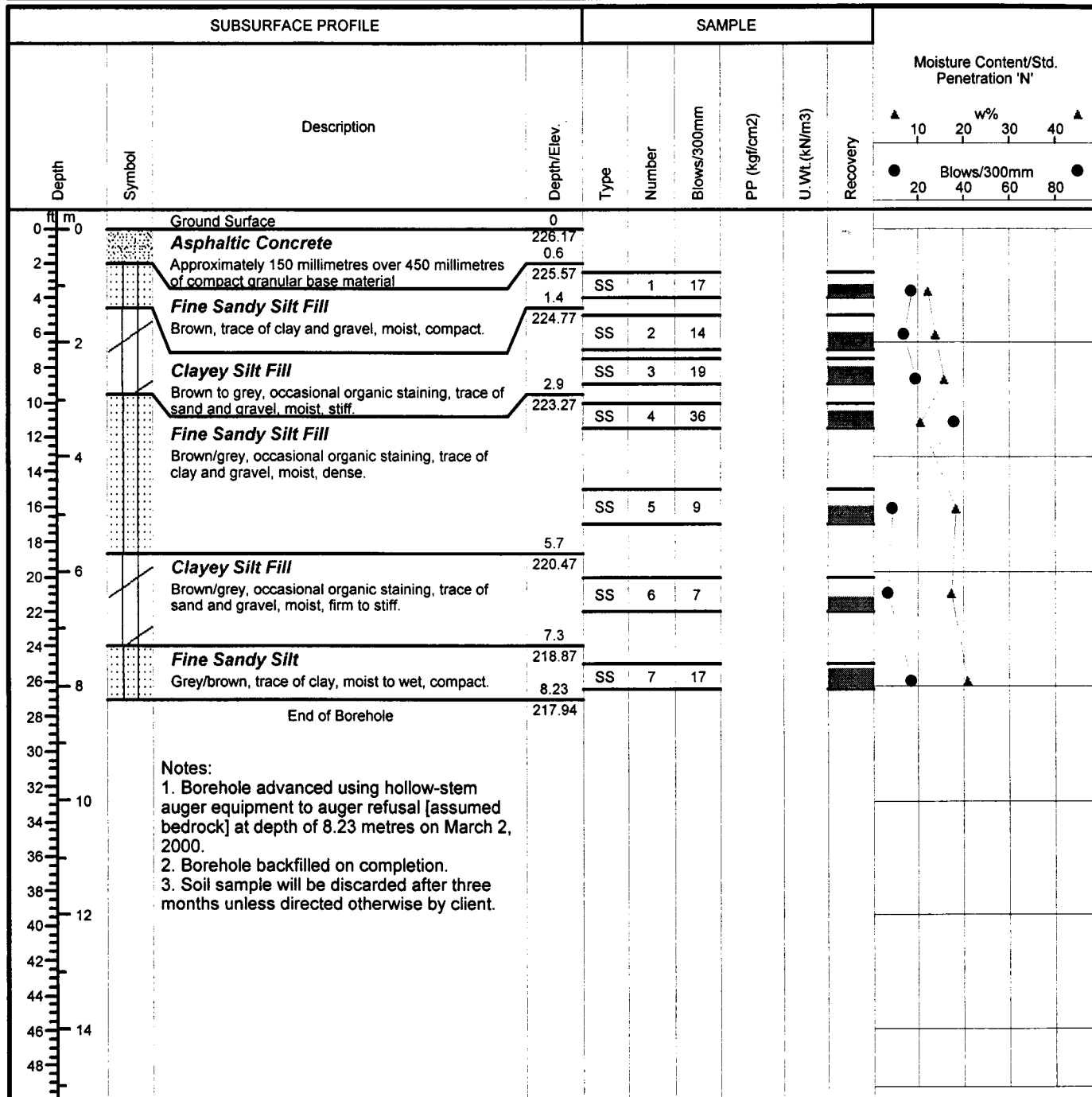
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7001 [SM No. 17]

Borehole Location: See Borehole Location Plan

Structure: Ramp E-S under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 2, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

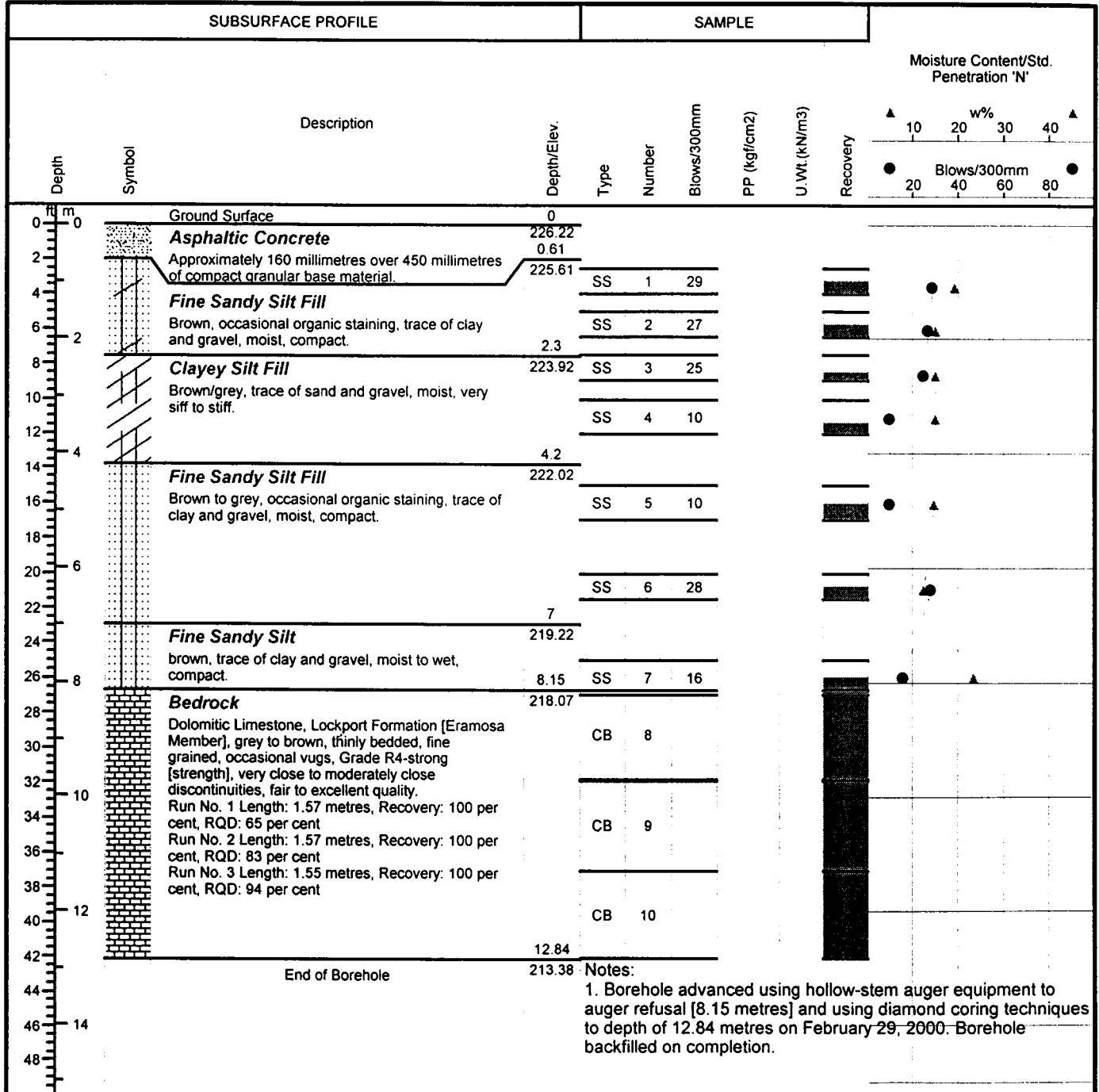
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7002 [SM No. 16]

Borehole Location: See Borehole Location Plan

Structure: Ramp E-S under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: February 29, 2000

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

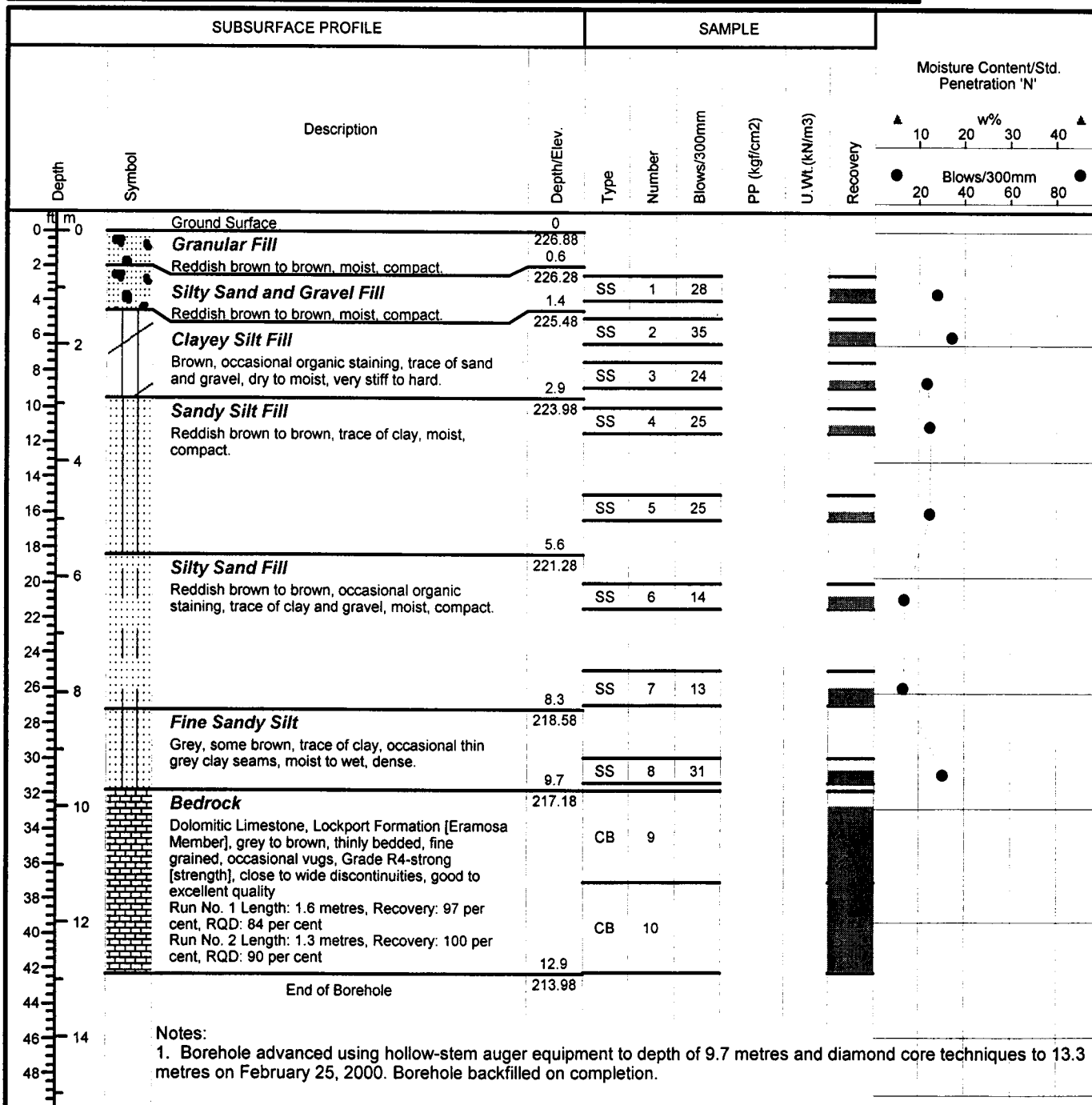
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5544 [SM No. 19]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: February 24, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

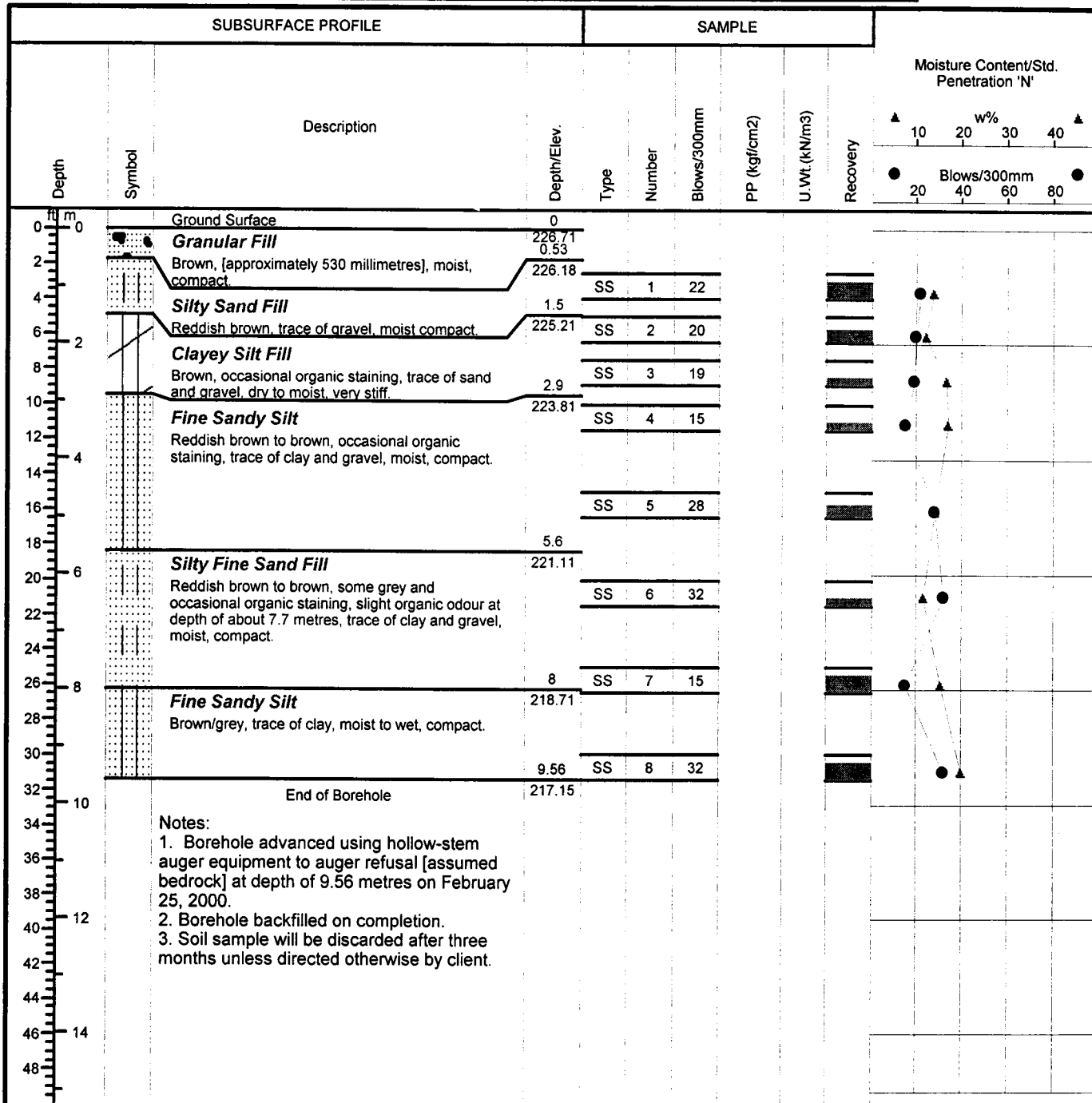
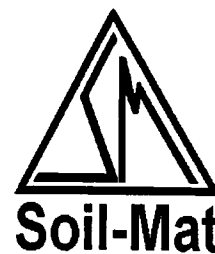
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5579 [SM No. 18]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: February 25, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

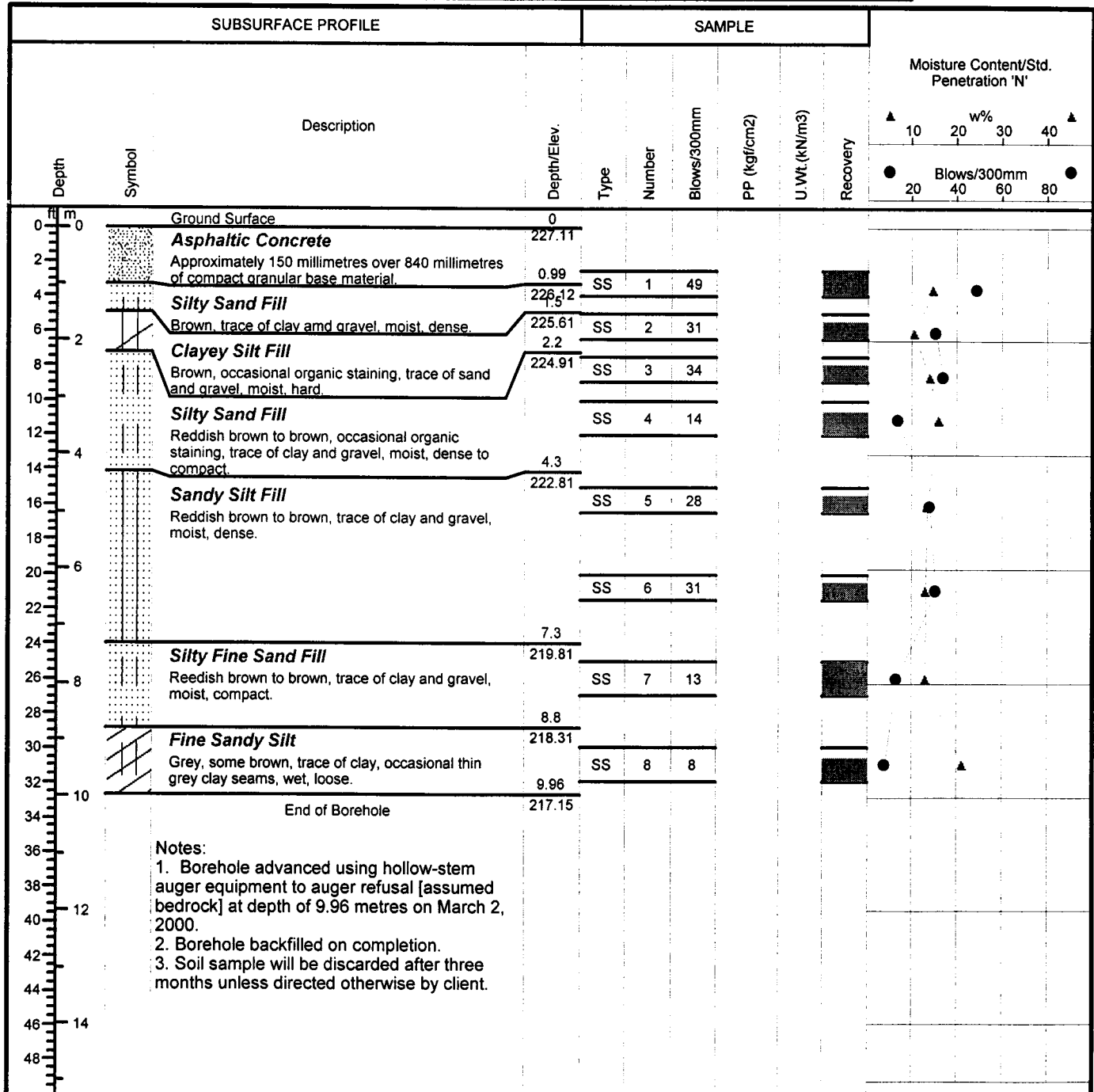
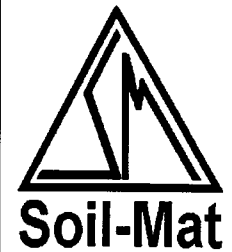
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7003 [SM No. 21]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 2, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

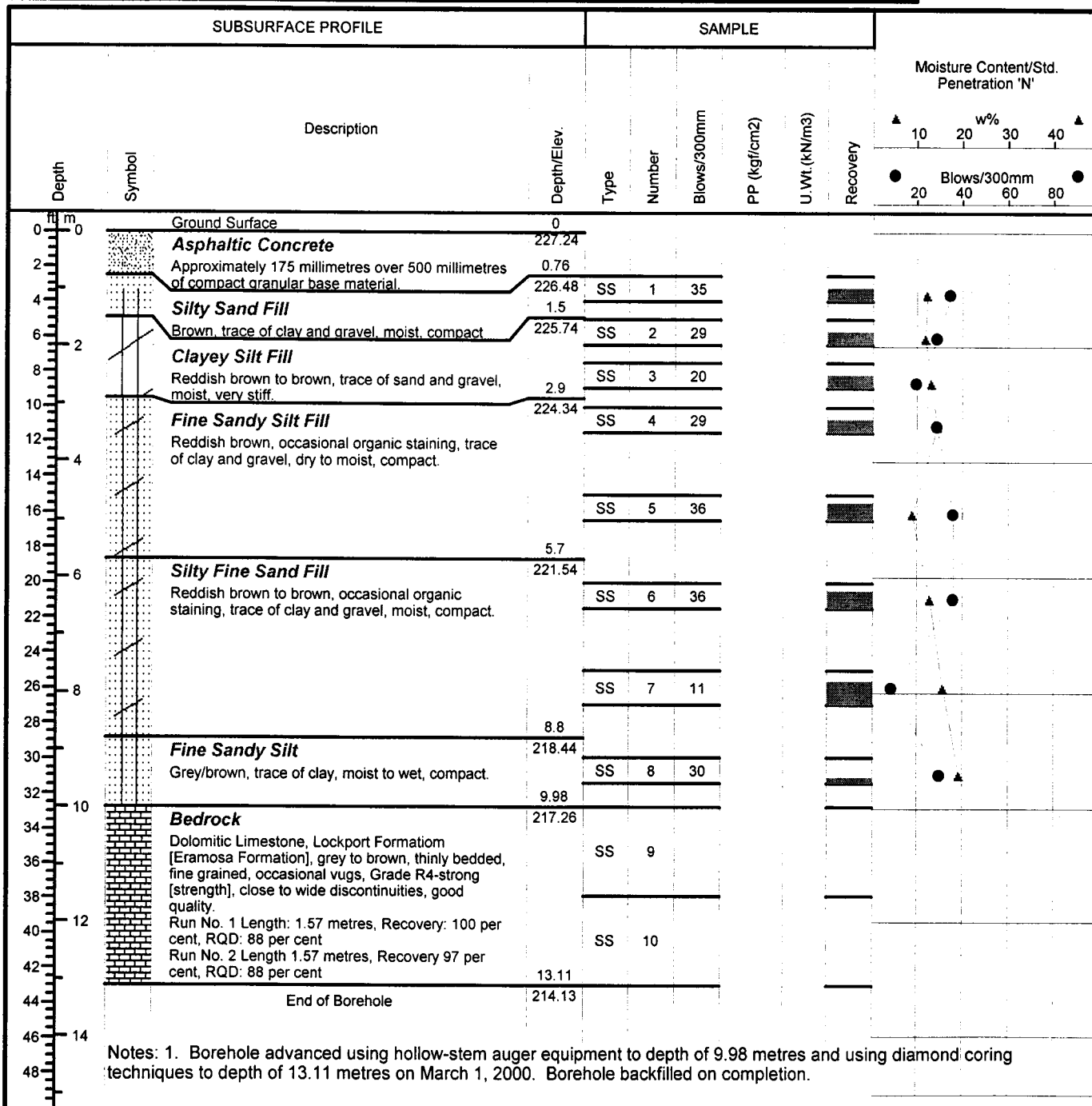
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7004 [SM No. 20]

Borehole Location: See Borehole Location Plan

Structure: Ramp N-E under Mohawk Road

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 1, 2000

Hole Size: 200mm

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
 130 Lancing Drive, Hamilton, ON L8W 3A1
 Phone: (905) 318-7440 Fax: (905) 318-7455
 e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: JB

Sheet: 1 of 1

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



BRUCE TRAIL PEDESTRIAN STRUCTURE OVER HIGHWAY 403 BOREHOLES

Project No: SM 97027-G

Borehole # 7078 [SM No. 28]

Project: LINC/Hwy 403/Mohawk Road Interchange

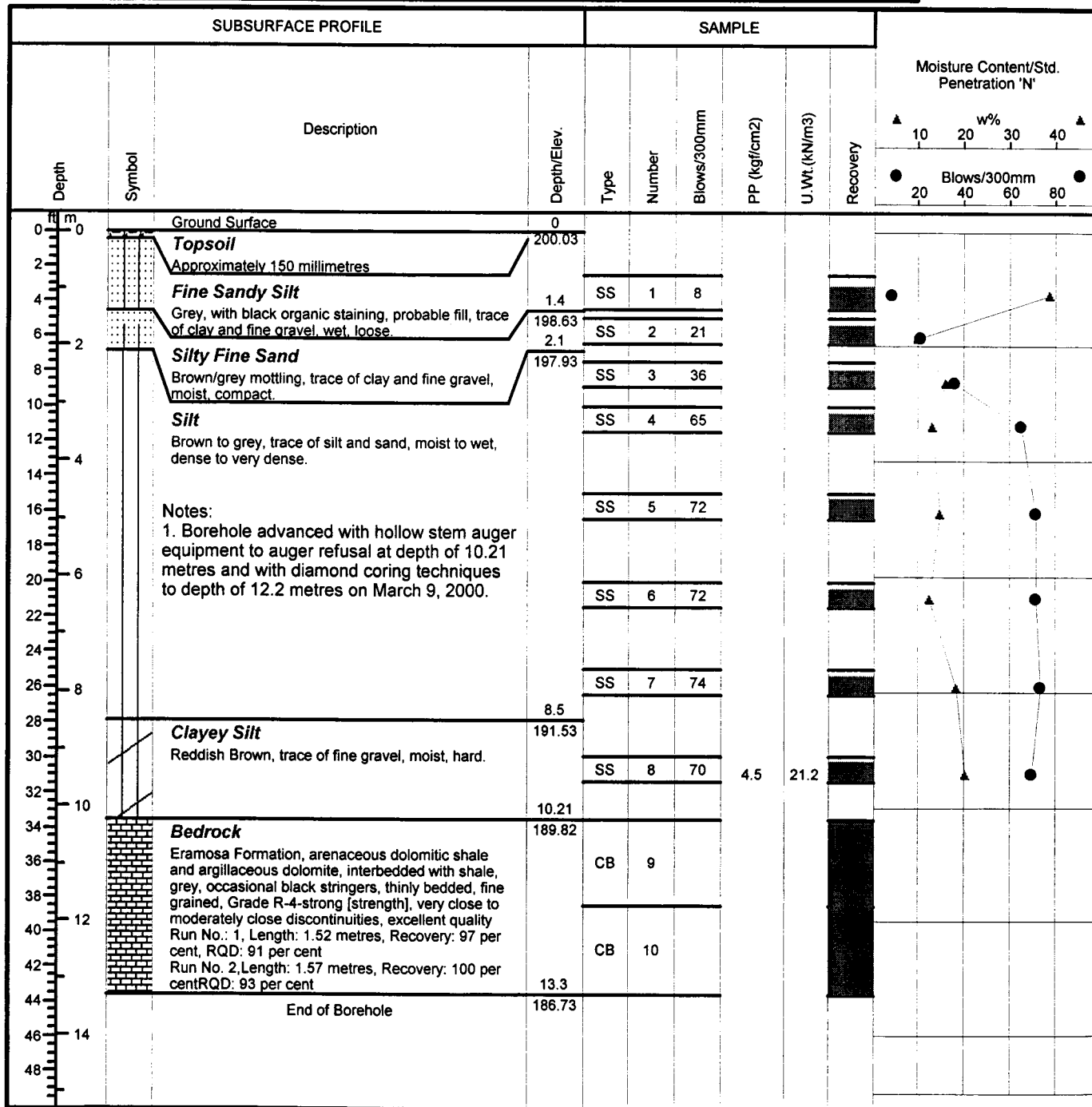
Borehole Location: Bruce Trail Structure

Location: Ancaster, Ontario

Sta. 10+134.435, Offset 16.862

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: March 9, 2000

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: JB

Hole Size: 200mm

Phone: (905) 318-7440 Fax: (905) 318-7455

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

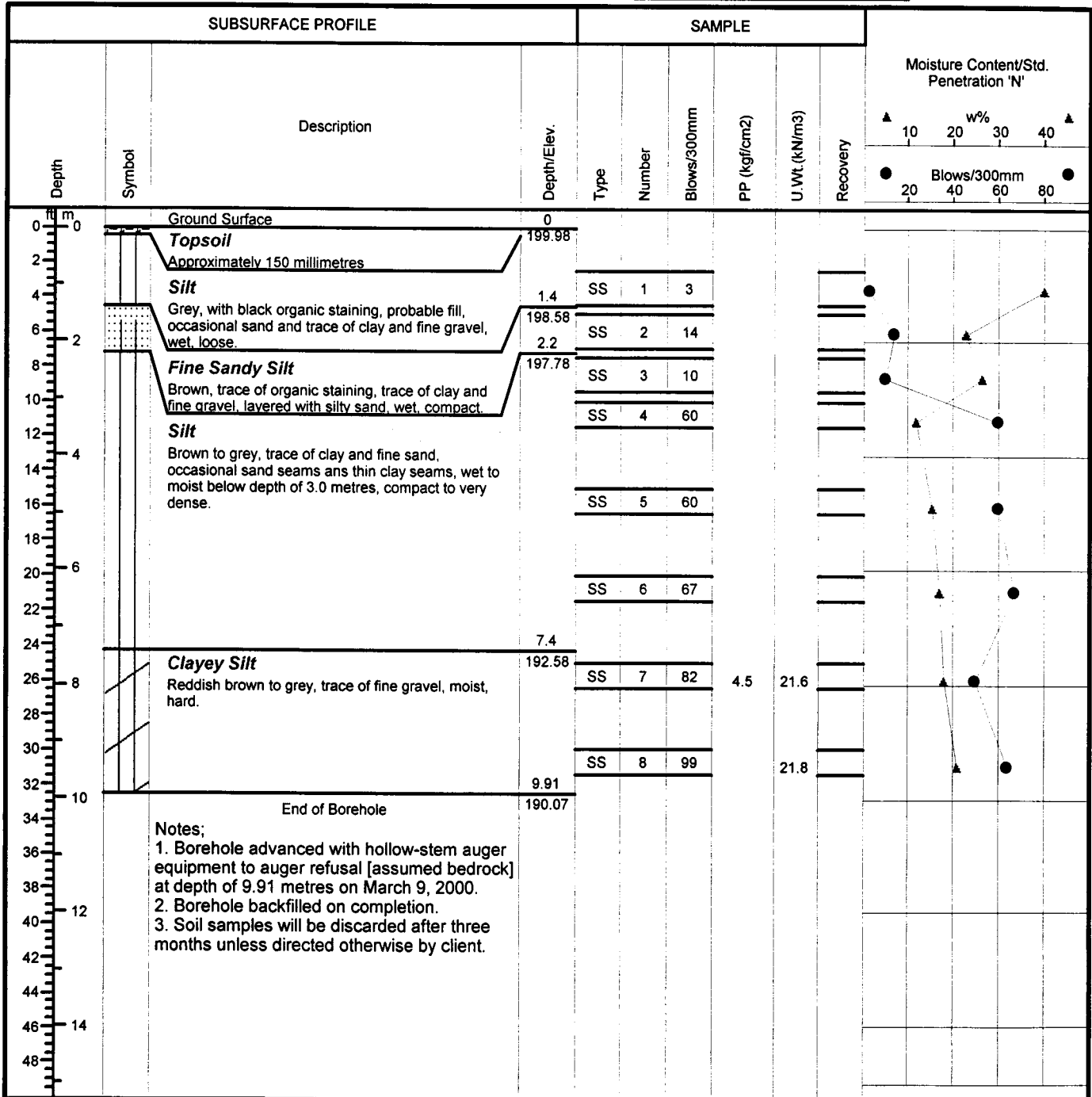
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7079 [SM No. 29]

Borehole Location: Bruce Trail Structure

Sta. 10+119.935, Offset 20.229

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 9, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

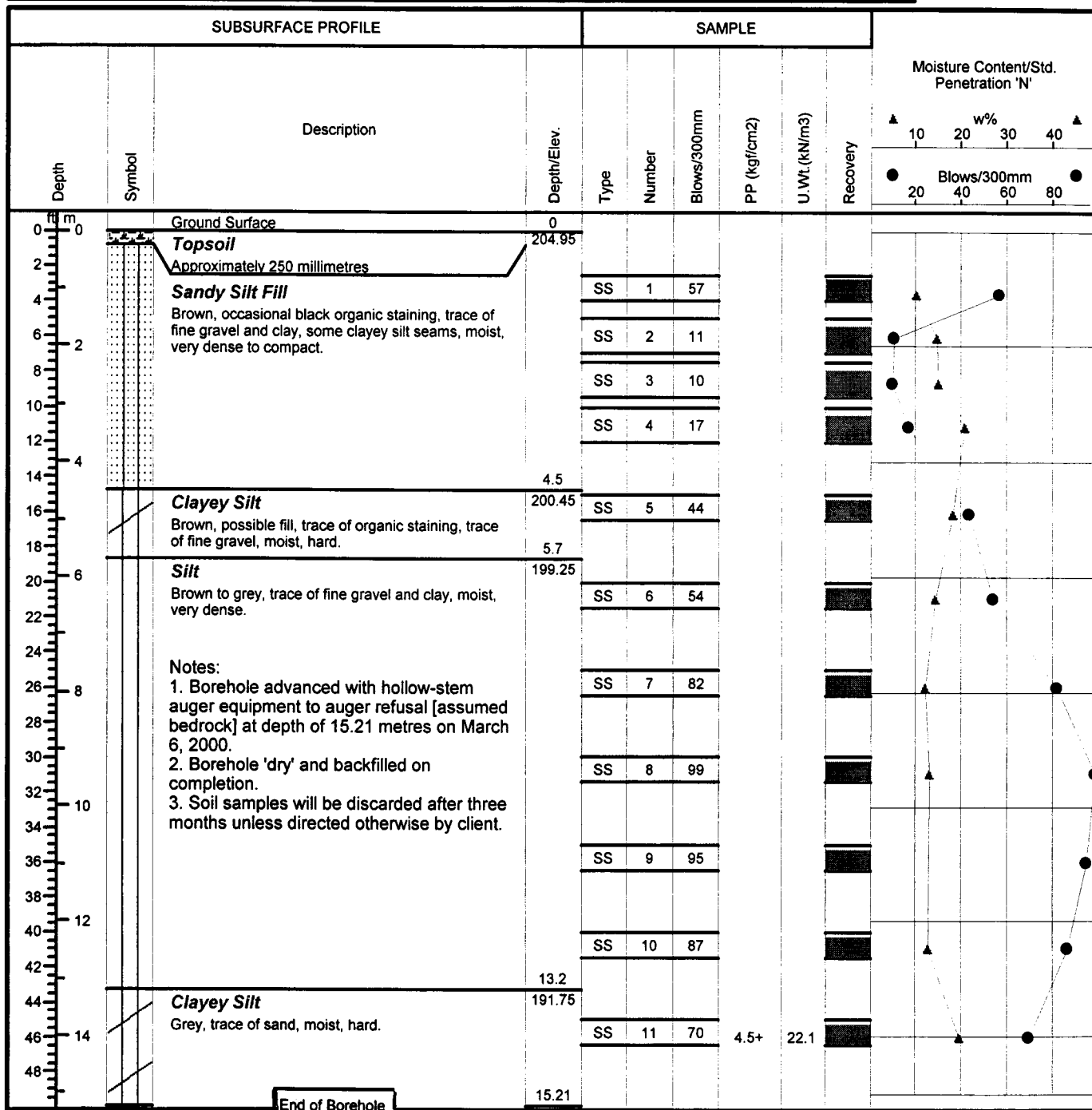
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 8057 [SM No. 30]

Borehole Location: Bruce Trail Structure

Sta. 25+682.088, Offset 0.215

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 6, 2000

Hole Size: 200mm

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Sheet: 1 of 2

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

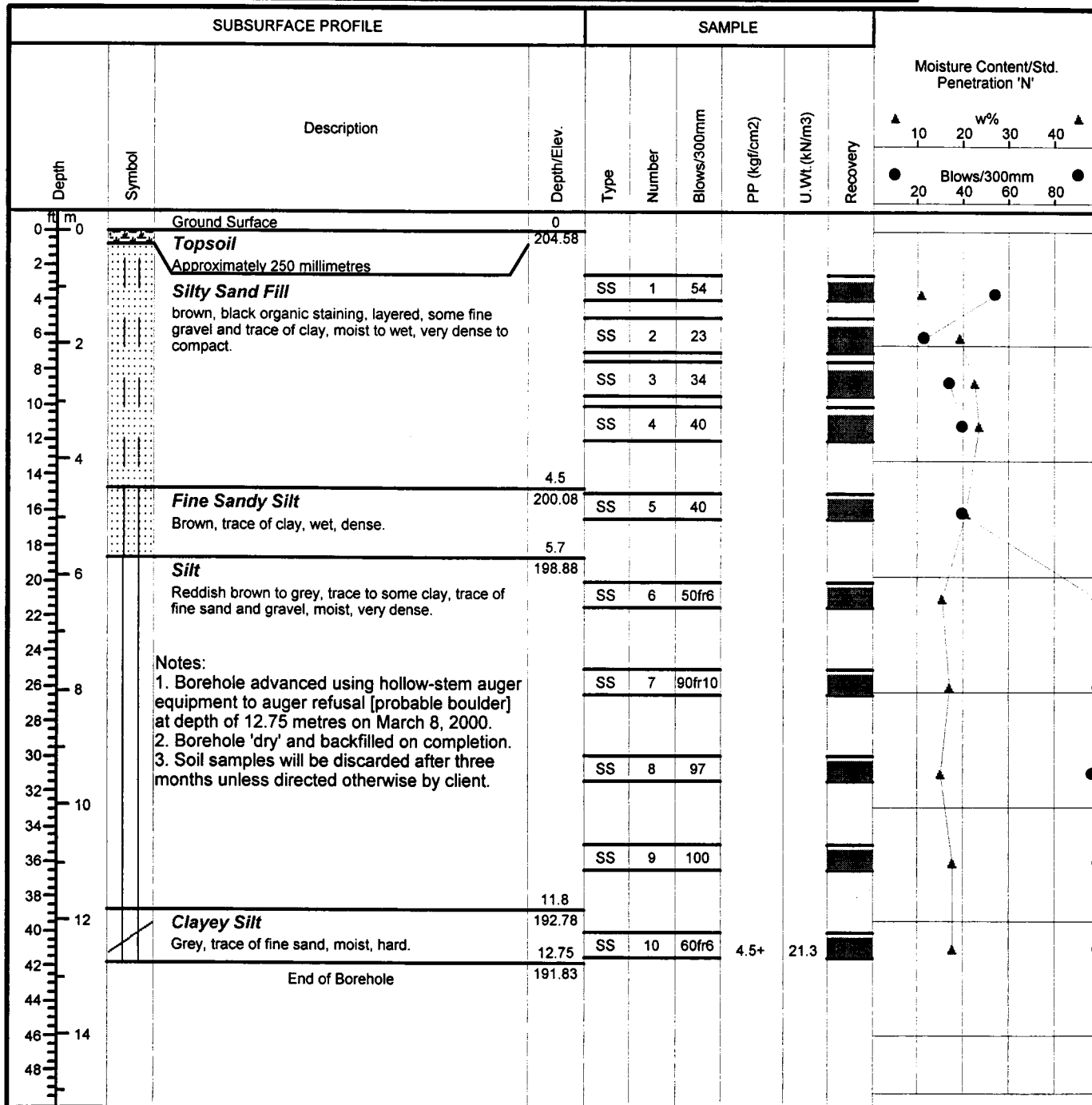
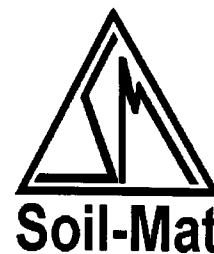
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 8058 [SM No. 31]

Borehole Location: Bruce Trail Structure

Sta. 25+692.347, Offset 0.739

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 8, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

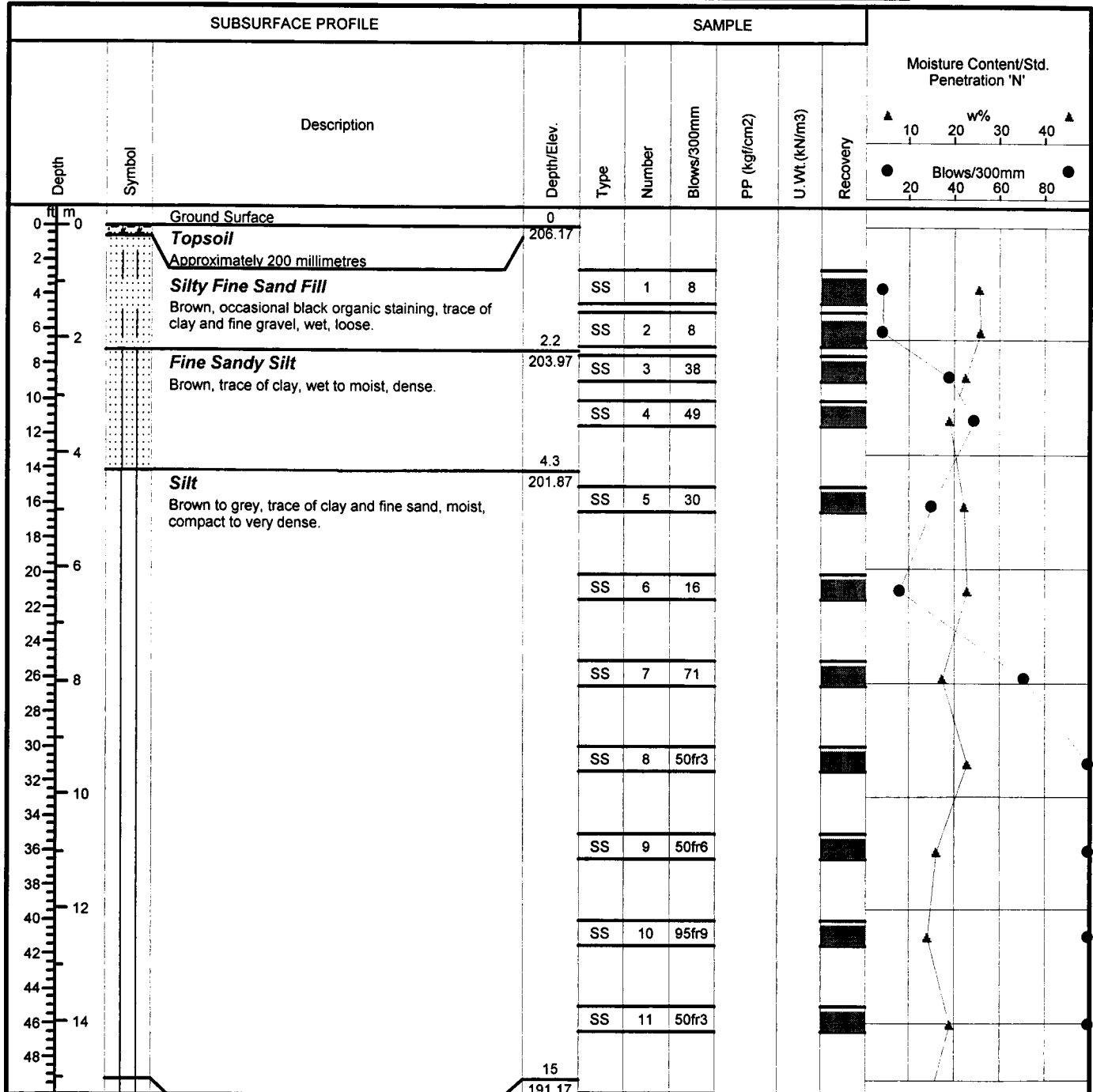
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7080 [SM No.32]

Borehole Location: Bruce Trail Structure

Sta. 50+398.688, Offset 17.204

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 10, 2000

Hole Size: 200mm

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Sheet: 1 of 2

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7080 [SM No.32]

Borehole Location: Bruce Trail Structure

Sta. 50+398.688, Offset 17.204

Project Manager: John Monkman P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------|--------------|----------|---------------------------------------|-----------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | |
| | | | | | | | | | | ▲ 10 20 w% 30 40 ▲ | ● 20 40 60 80 ● |
| 51 | | Silt | | SS | 12 | 50fr4 | | | | | |
| 53 | | Brown to grey, trace of clay and fine sand, moist, compact to very dense. | 16.26 | | | | | | | ▲ | |
| 55 | | End of Borehole | 189.91 | | | | | | | | |
| 57 | 17 | | | | | | | | | | |
| 59 | | | | | | | | | | | |
| 61 | | | | | | | | | | | |
| 63 | 19 | | | | | | | | | | |
| 65 | | Notes: | | | | | | | | | |
| 67 | | 1. Borehole advanced using hollow-stem auger equipment to auger refusal [assumed bedrock] at depth of 16.26 metres on March 10, 2000. | | | | | | | | | |
| 69 | 21 | 2. Borehole 'dry' and backfilled on completion. | | | | | | | | | |
| 71 | | 3. Soil samples will be discarded after three months unless directed otherwise by client. | | | | | | | | | |
| 73 | | | | | | | | | | | |
| 75 | 23 | | | | | | | | | | |
| 77 | | | | | | | | | | | |
| 79 | | | | | | | | | | | |
| 81 | | | | | | | | | | | |
| 83 | 25 | | | | | | | | | | |
| 85 | | | | | | | | | | | |
| 87 | | | | | | | | | | | |
| 89 | 27 | | | | | | | | | | |
| 91 | | | | | | | | | | | |
| 93 | | | | | | | | | | | |
| 95 | 29 | | | | | | | | | | |
| 97 | | | | | | | | | | | |
| 99 | | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: March 10, 2000

Hole Size: 200mm

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Sheet: 2 of 2

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

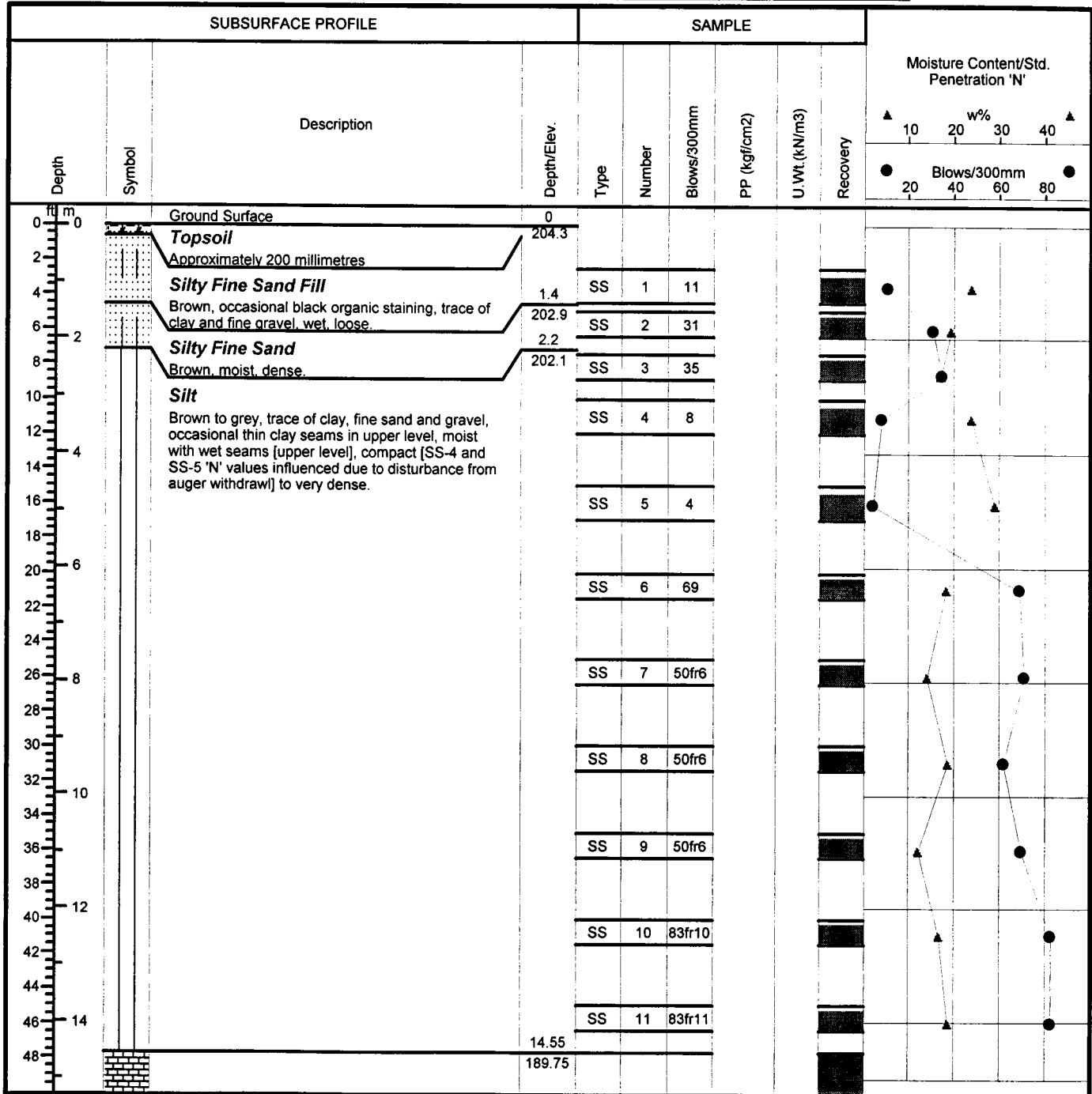
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7081 [SM No. 33]

Borehole Location: Bruce Trail Structure

Sta. 50+409.666, Offset 18.051

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 13, 2000

Hole Size: 200mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

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Sheet: 1 of 2

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7081 [SM No. 33]

Borehole Location: Bruce Trail Structure

Sta. 50+409.666, Offset 18.051

Project Manager: John Monkman P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery |
| 51 | | Bedrock | | CB | 12 | | | | |
| 53 | | Eramosa Formation, arenaceous dolomitic shale and argillaceous dolomite, interbedded with shale, grey, occasional black stringers, thinly bedded, fine grained, Grade R-4 [strong], good to excellent quality | | | | | | | |
| 55 | | Run No. 1, Length: 1.57 metres, Recovery: 100 per cent, RQD: 88 per cent | | CB | 13 | | | | |
| 57 | | Run No. 2, Length: 1.55 metres, Recovery: 100 per cent, RQD: 91 per cent | 17.67 | | | | | | |
| 59 | | End of Borehole | 186.63 | | | | | | |
| 61 | | | | | | | | | |
| 63 | 19 | | | | | | | | |
| 65 | | | | | | | | | |
| 67 | | Notes: | | | | | | | |
| 69 | 21 | 1. Borehole advanced using hollow-stem auger equipment to depth of 14.55 metres and with diamond coring techniques to depth of 17.67 metres on March 13, 2000. | | | | | | | |
| 71 | | 2. Borehole backfilled on completion. | | | | | | | |
| 73 | | 3. Soil samples will be discarded after three months unless directed otherwise by client. | | | | | | | |
| 75 | 23 | | | | | | | | |
| 77 | | | | | | | | | |
| 79 | | | | | | | | | |
| 81 | | | | | | | | | |
| 83 | 25 | | | | | | | | |
| 85 | | | | | | | | | |
| 87 | | | | | | | | | |
| 89 | 27 | | | | | | | | |
| 91 | | | | | | | | | |
| 93 | | | | | | | | | |
| 95 | 29 | | | | | | | | |
| 97 | | | | | | | | | |
| 99 | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: March 13, 2000

Hole Size: 200mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: JB

Sheet: 2 of 2

PROJECT NO.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



RAMP E - N BOREHOLES

Project No: SM 97027-G

Borehole # 5066

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta.: 49+884.716

Location: Ramp E - N

Offset: -1.779

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|-----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U. Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 2 | | Fill | 224.26 | | | | | | | |
| | | Gravel and sand with silt | 1.2 | | | | | | | |
| 4 | | Fill | 223.06 | | | | | | | |
| 6 | | brown to grey - mottled, with trace of organics | 3 | SS | 1 | 37 | | | | |
| 10 | | Sandy Silt | 221.26 | SS | 2 | 32 | | | | |
| 12 | | grey to brown with some clay, dense to loose. | | | | | | | | |
| 16 | | | 5.03 | SS | 3 | 7 | | | | |
| 18 | | End of Borehole | 219.23 | | | | | | | |
| 20 | | NOTES: | | | | | | | | |
| 22 | | 1. Borehole advanced with solid-stem | | | | | | | | |
| 24 | | continuous-flight auger to a depth of 5.03 m | | | | | | | | |
| 26 | | on August 13, 1999. | | | | | | | | |
| 28 | | 2. Water level observed at 3.23 m, and | | | | | | | | |
| 30 | | borehole backfilled on completion. | | | | | | | | |
| 32 | | 3. Samples will be kept for 3 months unless | | | | | | | | |
| 34 | | otherwise directed by the client. | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

Drill Method: Solid Stem Auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: August 13, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 150mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5065

Project: LINC/Hwy403/Mohawk Road Interchange

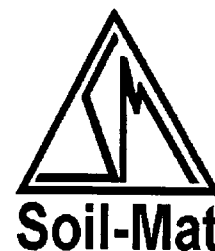
Borehole Location: Sta.: 49+934.364

Location: Ramp E - N

Offset: 0.911

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|---------------------------------------|----|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | w% | | | |
| | | | | | | | | | | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Fill | 222.62 | | | | | | | | | | |
| 2 | | Gravel and sand with silt | 1 | | | | | | | | | | |
| 4 | | Silty Clay to Clayey Silt | 221.62 | | | | | | | | | | |
| 6 | | grey, hard, possible fill in upper level. | | SS | 1 | 50 | | | | | | | |
| 8 | | | 3.05 | | | | | | | | | | |
| 10 | | Sandy Silt | 219.57 | SS | 2 | 10 | | | | | | | |
| 12 | | grey, with gravel, loose to compact | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | 5.03 | SS | 3 | 42 | | | | | | | |
| 18 | | End of Borehole | 217.59 | | | | | | | | | | |
| 20 | | NOTES: | | | | | | | | | | | |
| 22 | | 1. Borehole advanced with hollow-stem | | | | | | | | | | | |
| 24 | | continuous-flight auger to a depth of 5.03 m | | | | | | | | | | | |
| 26 | | on August 13, 1999. | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | 2. No water, caving at 3.20 m, and borehole | | | | | | | | | | | |
| 32 | | backfilled on completion. | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | 3. Samples will be kept for 3 months unless | | | | | | | | | | | |
| 38 | | otherwise directed by the client. | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Solid Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: August 13, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 150mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-N

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 4996

(SM Borehole No. 5)

Borehole Location: Sta: 50+085.905

Offset: -0.371

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|---|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' |
| | | | | | | | | | | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> |
| 0 | | Ground Surface | 0 | | | | | | | |
| 2 | | Topsoil | 220.48 | | | | | | | |
| 2 | | Approximately 150 mm | | | | | | | | |
| 4 | | Fill | 1.4 | SS | SS-1 | 13 | | | | |
| 4 | | silt and clay, stiff | | | | | | | | |
| 6 | | Clayey Silt to Silt | 219.08 | SS | SS-2 | 8 | | | | |
| 6 | | Brown, with fine sand, firm to very stiff | | | | | | | | |
| 8 | | | | SS | SS-3 | 17 | | | | |
| 10 | | | | | | | | | | |
| 10 | | | 3.46 | SS | SS-4 | 30 | | | | |
| 12 | | End of Borehole | 217.02 | | | | | | | |
| 14 | | NOTES: | | | | | | | | |
| 16 | | 1. Borehole advanced using solid stem | | | | | | | | |
| 18 | | continuous flight auger equipment to auger | | | | | | | | |
| 20 | | refusal (assumed bedrock) at a depth of 3.46 | | | | | | | | |
| 20 | | m on May 28, 1999. | | | | | | | | |
| 22 | | 2. Borehole dry and backfilled on completion. | | | | | | | | |
| 24 | | 3. Soil samples will be kept for 3 months | | | | | | | | |
| 26 | | unless otherwise directed by the client. | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-N

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 4997

(SM Borehole No. 4)

Borehole Location: Sta: 50+135.906

Offset: -1.778

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | | |
| 0 | | Topsoil | 218.51 | | | | | | | | | | | |
| 2 | | Approximately 150 mm | 0.998 | | | | | | | | | | | |
| 4 | | Fill | 217.51 | | | | | | | | | | | |
| 4 | | Brown, silty sand with gravel | | | | | | | | | | | | |
| 6 | | End of Borehole | | | | | | | | | | | | |
| 8 | | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 0.998 m on May 28, 1999. 2. Borehole dry and backfilled on completion. 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

130 Lancing Drive, Hamilton, ON L8W 3A1

Phone: (905) 318-7440 Fax: (905) 318-7455

e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-N

Client: Region of Hamilton-Wentworth [SPO]

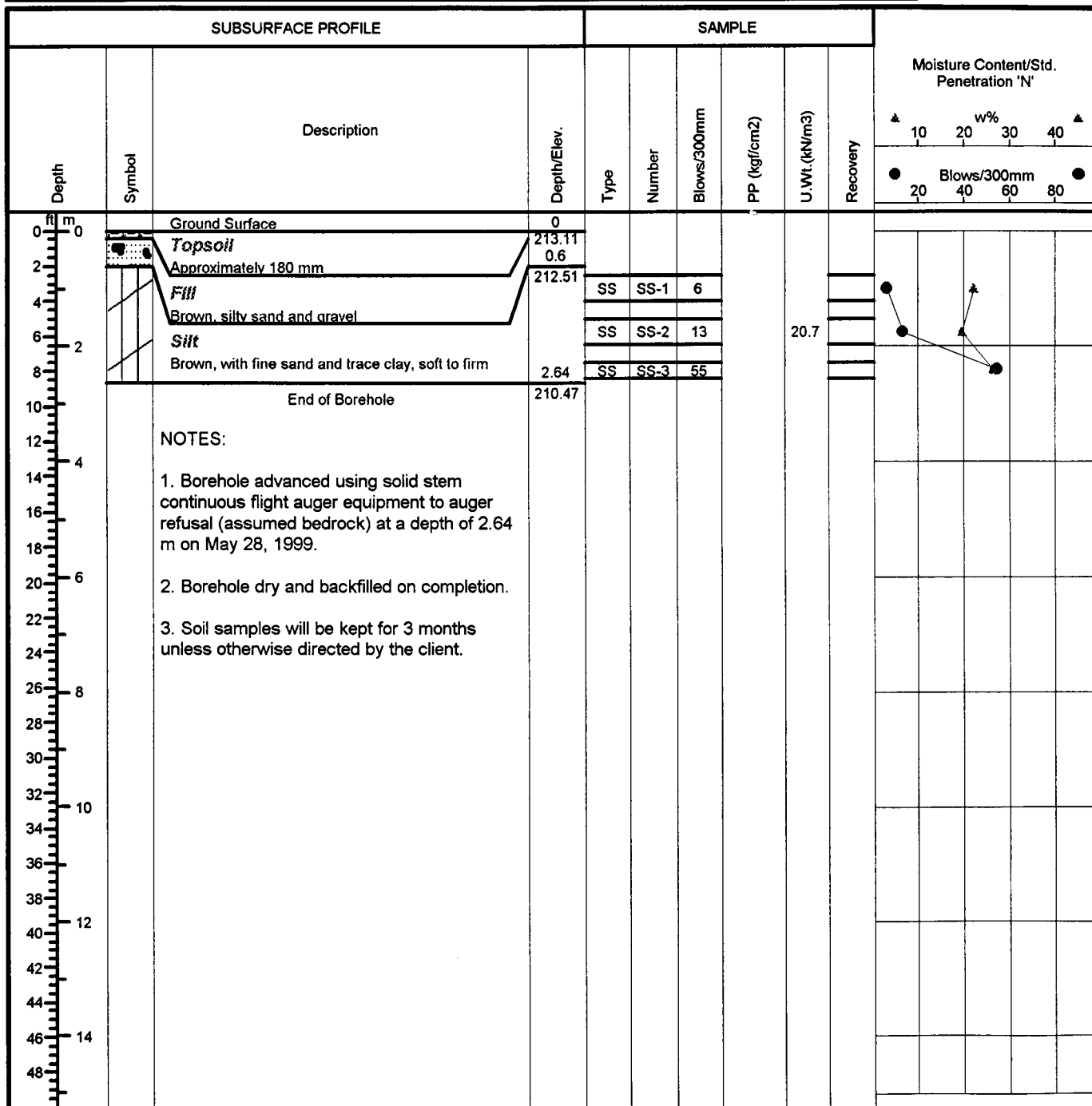
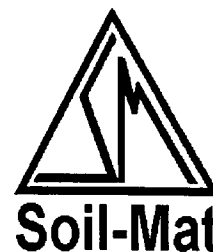
Borehole # 4998

(SM Borehole No. 3)

Borehole Location: Sta: 50+186.302

Offset: 4.178

Project Manager: John Monkman, P.Eng.



Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-N

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 4999

(SM Borehole No. 2)

Borehole Location: Sta: 50+235.861

Offset: 0.44

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 212.01 | | | | | | | | | | |
| 2 | | Approximately 150 mm | 0.6 | | | | | | | | | | |
| 4 | | Fill | 211.041 | | | | | | | | | | |
| 4 | | Brown silt, sand and gravel | 211 | SS | 1 | 24 | | | | | | | |
| 6 | | Clayey Silt Till | | | | | | | | | | | |
| 6 | | Brown, some sand and gravel | | | | | | | | | | | |
| 8 | | End of Borehole | | | | | | | | | | | |
| 10 | | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.01 m on May 28, 1999. 2. Borehole dry and backfilled on completion. 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
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| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-N

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5000

(SM Borehole No. 1)

Borehole Location: Sta: 50+285.597

Offset: -8.853

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| 0 | | Ground Surface | 0 | | | | | | | 20 40 60 80 | | | |
| 0 | | Topsoil | 209.63 | | | | | | | | | | |
| 2 | | Approximately 150 mm | 0.78 | | | | | | | | | | |
| 4 | | Sandy Fill | 208.85 | | | | | | | | | | |
| 6 | | Brown, with gravel, some silt | | | | | | | | | | | |
| 2 | | End of Borehole | | | | | | | | | | | |
| 8 | | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 0.78 m on May 28, 1999. 2. Borehole dry and backfilled on completion. 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 50 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E - N

Client: Region of Hamilton-Wentworth [SPO]

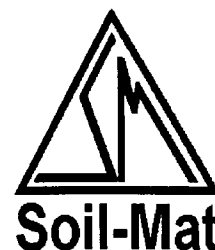
Borehole # 5067

(SM Borehole No. Z)

Borehole Location: Sta.: 50+384.161

Offset: 3.819

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Fill | 206.94 | | | | | | | |
| 2 | | Gravel and sand with silt | 0.75 | | | | | | | |
| 4 | | Fill | 206.19 | | | | | | | |
| 6 | | silt, clay and sand, trace of organics, moist, dense to loose. | | SS | 1 | 36 | | | | |
| 10 | | | | | | | | | | |
| 12 | | | 3.51 | SS | 2 | 9 | | | | |
| 14 | | End of Borehole | 203.43 | | | | | | | |
| NOTES: 1. Borehole advanced with solid-stem continuous-flight auger to a depth of 3.51 m on August 13, 1999. 2. Borehole dry and backfilled on completion 3. Samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | |
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| | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: August 13, 1999

Hole Size: 150mm

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Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-N

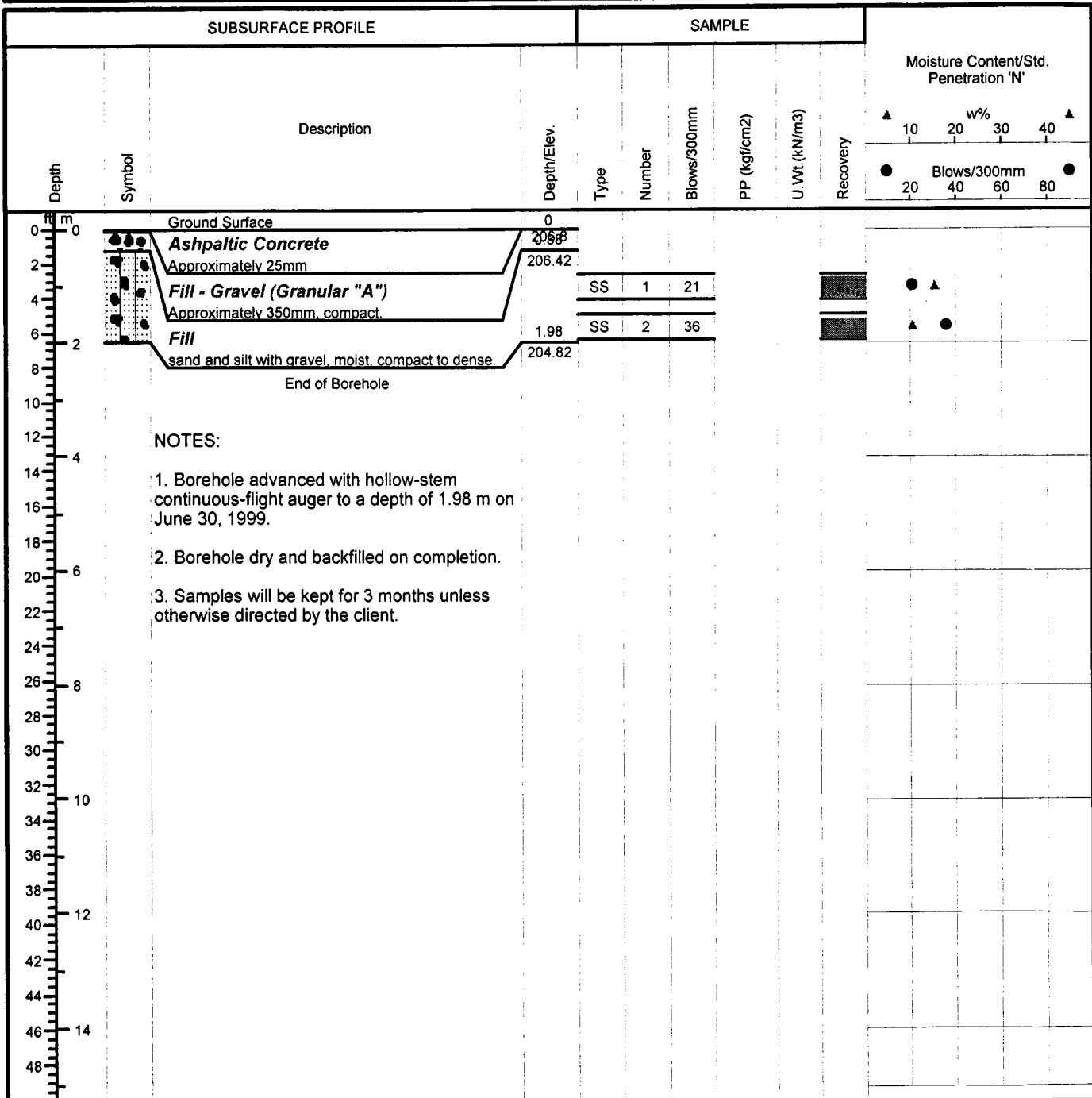
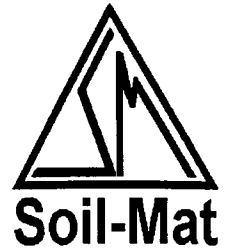
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5060
(SM Borehole No. MM)

Borehole Location: Sta.: 50+389.291

Offset: 3.407

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

PROJECT NO.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



RAMP N - W BOREHOLES

Project No: SM 97027-G

Borehole # 5025

Project: LINC/Hwy403/Mohawk Road Interchange

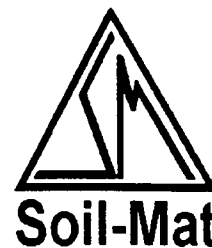
Borehole Location: Sta: 20+011.471

Location: Ramp N-W

Offset: -3.36

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|---------------------------------------|---|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | w% Moisture Content/Std. Penetration 'N' | | | |
| | | | | | | | | | | 10 | 20 | 30 | 40 |
| | | | | | | | | | | Blows/300mm | | | |
| | | | | | | | | | | 20 | 40 | 60 | 80 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 221.8 | | | | | | | | | | |
| 2 | | Approximately 150 mm | 1 | | | | | | | | | | |
| 4 | | Gravel Fill | 220.8 | | | | | | | | | | |
| 6 | | Grey, trace of wood fragments, black organic stained | | SS | 1 | 6 | | | | | | | |
| 8 | | Sandy Silt | 2.54 | | | | | | | | | | |
| 8 | | brown, trace of gravel, loose | 219.26 | | | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | | | | |
| 12 | | NOTES: | | | | | | | | | | | |
| 14 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.54m on May 26, 1999. | | | | | | | | | | | |
| 16 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | | |
| 18 | | 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: May 26, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-W (Culvert #1)

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1011

(SM Borehole No.: C1-1)

Borehole Location: Sta.: 20+054.790

Offset: -4.072

Project Manager: John Monkman, P.Eng.



Soil-Mat

| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|---------------------------------------|----------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| | | | | | | | | | | Blows/300mm 20 40 60 80 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Fill | 219.07 | | | | | | | | | | |
| 2 | | Approximately 760mm Topsoil, sandy silt, gravel and rock, moist. | 0.76 | | | | | | | | | | |
| 4 | | Sandy Silt | 218.31 | | | | | | | | | | |
| 6 | | Grey, fine, compact, non-cohesive, and moist. Native material. Fractured rock encountered at 1.52 m. | 2.19 | | | | | | | | | | |
| 8 | | End of Borehole | 216.88 | | | | | | | | | | |
| 10 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.2m on January 8, 1998. 2. Water level observed at a depth of 1.19m, and borehole backfilled on completion. 4. No samples taken. | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5024

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta: 20+063.677

Location: Ramp N-W

Offset: -3.338

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|--------------|---------------------------------------|-----------------|-----------------|-------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt (kN/m3) | Recovery | w% | | Blows/300mm | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ | ● 20 40 60 80 ● | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | ▲ | Topsoil | 219.15 | | | | | | | | | | |
| 2 | ● | Approximately 225 mm | 0.75 | | | | | | | | | | |
| 2 | ▲ | Fill | 218.4 | SS | 1 | 15 | | | | | | | |
| 4 | ▲ | silt with sand organics | 1.83 | SS | 2 | 6 | | | | | | | |
| 6 | ● | Sandy Silt | 217.32 | | | | | | | | | | |
| 8 | | Light brown, some clay, trace of gravel, compact | | | | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.83 m on May 26, 1999.

2. Borehole dry and backfilled on completion.

3. Soil samples will be kept for 3 months unless otherwise directed by the client.

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.83 m on May 26, 1999.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem

Drill Date: May 26, 1999

Hole Size: 200 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403Mohawk Road Interchange

Location: Ramp N-W

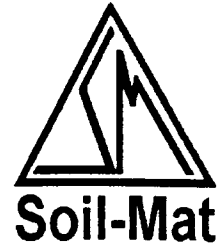
Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1507
(SM Borehole No.: 507)

Borehole Location: Sta.: 20+086.511

Offset: -9.928

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U Wt. (kN/m ³) | | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | |
| 0 | | Topsoil | 219.62 | | | | | | | | | |
| 2 | | Approximately 200 mm | | | | | | | | | | |
| 4 | | Sandy, Clayey Silt | | SS | 1 | 9 | | 19.3 | | | | |
| 6 | | Light brown, fine, oxidized, non-cohesive, and moist. Changing to till with dense qualities at 1.52 m and to grey with silty clay layers. Grinding and rock fragments encountered at 2.85 m. | | SS | 2 | 40 | | 20.2 | | | | |
| 8 | | | | SS | 3 | 21 | | 20.5 | | | | |
| 10 | | | 3.15 | | | | | | | | | |
| 12 | | End of Borehole | 216.47 | | | | | | | | | |
| 14 | | NOTES: | | | | | | | | | | |
| 16 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.15m on January 8, 1998. | | | | | | | | | | |
| 18 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | |
| 20 | | 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | |
| 22 | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | |
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| 48 | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5023

Project: LINC/Hwy403/Mohawk Road Interchange

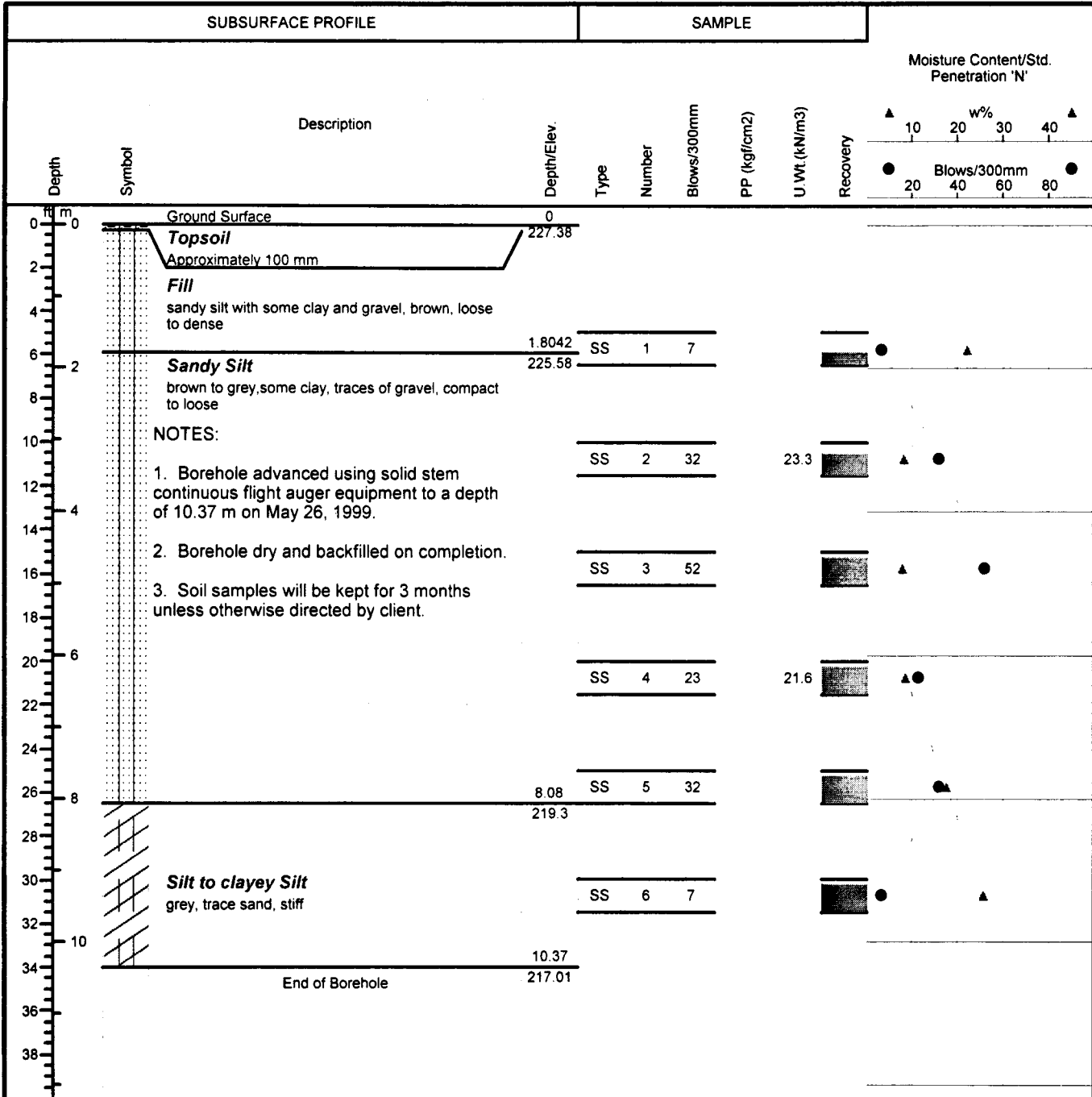
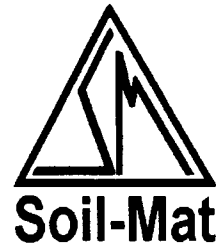
Borehole Location: Sta: 20+108.048

Location: Ramp N-W

Offset: 19.539

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



Drill Method: Solid Stem auger

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Datum: Geodetic

Drill Date: May 26, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-W

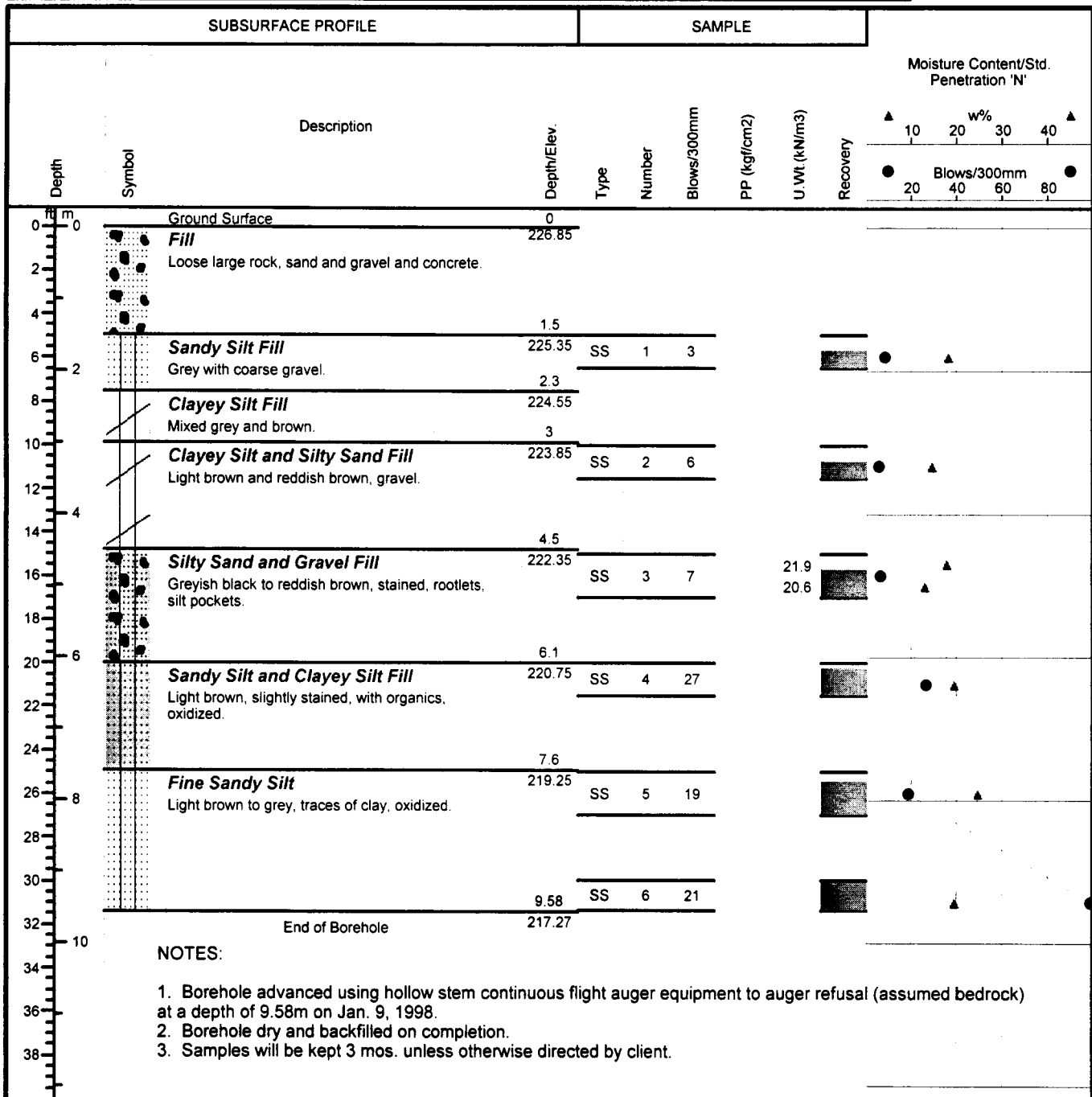
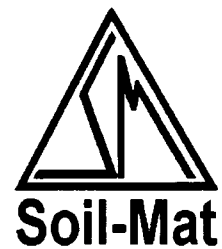
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1508
(SM Borehole No.: 508)

Borehole Location: Sta.: 20+136.107

Offset: 5.266

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem

Drill Date: January 9, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-W

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1509

(SM Borehole No.: 509)

Borehole Location: Sta.: 20+173.52

Offset: 7.222

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Fill | 227.36 | | | | | | | |
| 2 | | Reddish brown sand and gravel, some silt. | | | | | | | | |
| 4 | | | 1.5 | | | | | | | |
| 6 | | Clayey Silt (Fill) | 225.86 | SS | 1 | 27 | | | 22.0 | |
| 8 | | Greyish and reddish brown, with sand and gravel and traces of clay, rootlets, oxidized. | | | | | | | | |
| 10 | | | 3 | | | | | | | |
| 12 | | Fine Sandy to Clayey Silt | 224.36 | SS | 2 | 15 | | | 20.5 | |
| 14 | | Light brown to grey, traces of clay, oxidized. | | | | | | | | |
| 16 | | | | SS | 3 | 18 | | | | |
| 18 | | | | | | | | | | |
| 20 | | | 6.55 | SS | 4 | 48 | | | | |
| 22 | | End of Borehole | 220.81 | | | | | | | |
| 24 | | NOTES: | | | | | | | | |
| 26 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to a depth of 6.55m on January 13, 1998. | | | | | | | | |
| 28 | | 2. Borehole dry and backfilled on completion. | | | | | | | | |
| 30 | | 3. Soil samples will be kept for 3 months unless otherwise directed by client. | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: January 13, 1998

Hole Size: 200mm

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Sheet: 1 of 1

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 –231 [SPO]**



RAMP S - E BOREHOLES

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp S-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3325

(SM Borehole No. 70)

Borehole Location: Sta.: 30+102.592

Offset: -2.851

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|---|--------|--|-------------|--------|--------|-------------|--------------|--------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.WI (kN/m3) | Recovery | w% ▲ 10 20 30 40 ▲ | | | |
| | | | | | | | | | | ● Blows/300mm ● 20 40 60 80 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 223.87 | | | | | | | | | | |
| 2 | | Approximately 100mm | 0.75 | | | | | | | | | | |
| 4 | | Fill | 223.12 | | | | | | | | | | |
| 4 | | Silty clay to sandy silt. | 222.67 | | | | | | | | | | |
| 6 | | Silty Sand Fill | | SS | 1 | 5 | | | | | | | |
| 8 | | Clayey Silt | | | | | | | | | | | |
| 10 | | Grey, soft, with trace of organics and rootlets, probable fill in upper level, firm. | | | | | | | | | | | |
| 12 | | | 3.71 | SS | 2 | 5 | | | | | | | |
| 14 | | End of Borehole | 220.16 | | | | | | | | | | |
| NOTES: | | | | | | | | | | | | | |
| 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.71m on June 15, 1998. | | | | | | | | | | | | | |
| 2. Borehole dry and backfilled on completion. | | | | | | | | | | | | | |
| 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: June 15, 1998.

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp S-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3324

(SM Borehole No. 71)

Borehole Location: Sta.: 30+151.796

Offset: -4.692

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | 10 | 20 | 30 | 40 |
| 0 m | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Topsoil | 222.89 | | | | | | | | | | |
| | | Approximately 100mm | | | | | | | | | | | |
| 4 | | Fill | 1.22 | | | | | | | | | | |
| 6 | | Brown, sand and gravel, silty. | 221.67 | SS | 1 | 5 | | | | | | | |
| 8 | | Silt | 2.64 | | | | | | | | | | |
| | | Grey, with trace of fine sand and clay, probable fill in upper level, loose. | | | | | | | | | | | |
| 10 | | End of Borehole | 220.25 | | | | | | | | | | |
| 12 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.64m on June 15, 1998. 2. Borehole dry and backfilled on completion. 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
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| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: June 15, 1998.

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp S-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3323

(SM Borehole No. 72)

Borehole Location: Sta.: 30+201.862

Offset: -3.277

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Topsoil | 222.02 | | | | | | | | | | |
| | | Approximately 150mm | 1 | | | | | | | | | | |
| 4 | | Fill | 221.02 | | | | | | | | | | |
| 6 | | Brown, sand and gravel, silty. | | SS | 1 | 7 | | | | | | | |
| 8 | | Silt | | | | | | | | | | | |
| | | Grey, loose, with clay. | | | | | | | | | | | |
| 10 | | End of Borehole | 219.02 | | | | | | | | | | |
| 12 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.00m on June 16, 1998. 2. Borehole dry and backfilled on completion. 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
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| 24 | | | | | | | | | | | | | |
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| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp S-E

Client: Region of Hamilton/Wentworth [SPO]

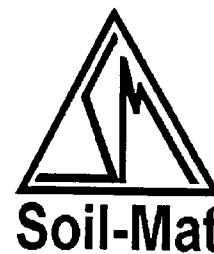
Borehole # 3322

(SM Borehole No. 73)

Borehole Location: Sta.: 30+251.094

Offset: -6.275

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 2 | | Topsoil | 222.64 | | | | | | | |
| 4 | | Approximately 150mm | | | | | | | | |
| 6 | | Fill | 1.5 | | | | | | | |
| 8 | | Brown, silty clay with trace gravel. | 221.14 | SS | 1 | 23 | | | | |
| 10 | | Silt | 2.97 | | | | | | | |
| 12 | | Light brown, compact, with trace of sand and gravel and clay. | | | | | | | | |
| 14 | | End of Borehole | 219.67 | | | | | | | |
| 16 | | NOTES: | | | | | | | | |
| 18 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.97m on June 16, 1998. | | | | | | | | |
| 20 | | 2. Borehole dry and backfilled. | | | | | | | | |
| 22 | | 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
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| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp S-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3321

(SM Borehole No. 74)

Borehole Location: Sta.: 30+300.991

Offset: -5.275

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|------|---------------|-----------------------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | ▲ 10 | w% 20 30 40 ▲ | ● Blows/300mm 20 40 60 80 ● |
| 0 m | | Ground Surface | 0 | | | | | | | | | |
| 2 | | Granular "A" Fill | 221.81 | | | | | | | | | |
| | | Approximately 300mm, compact. | | | | | | | | | | |
| 4 | | Fill | 1.5 | | | | | | | | | |
| 6 | | Brown sand and gravel, silty, compact. | 220.31 | SS | 1 | 10 | | | | | | |
| 8 | | Clayey Silt | 2.69 | | | | | | | | | |
| | | Light brown, with trace sand, moist, stiff. | | | | | | | | | | |
| 10 | | End of Borehole | 219.12 | | | | | | | | | |
| 12 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.69m on June 16, 1998. 2. borehole dry and backfilled on completion 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | |
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| 26 | | | | | | | | | | | | |
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| 38 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 200 mm

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Sheet: 1 of 1

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



RAMP E - S BOREHOLES

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

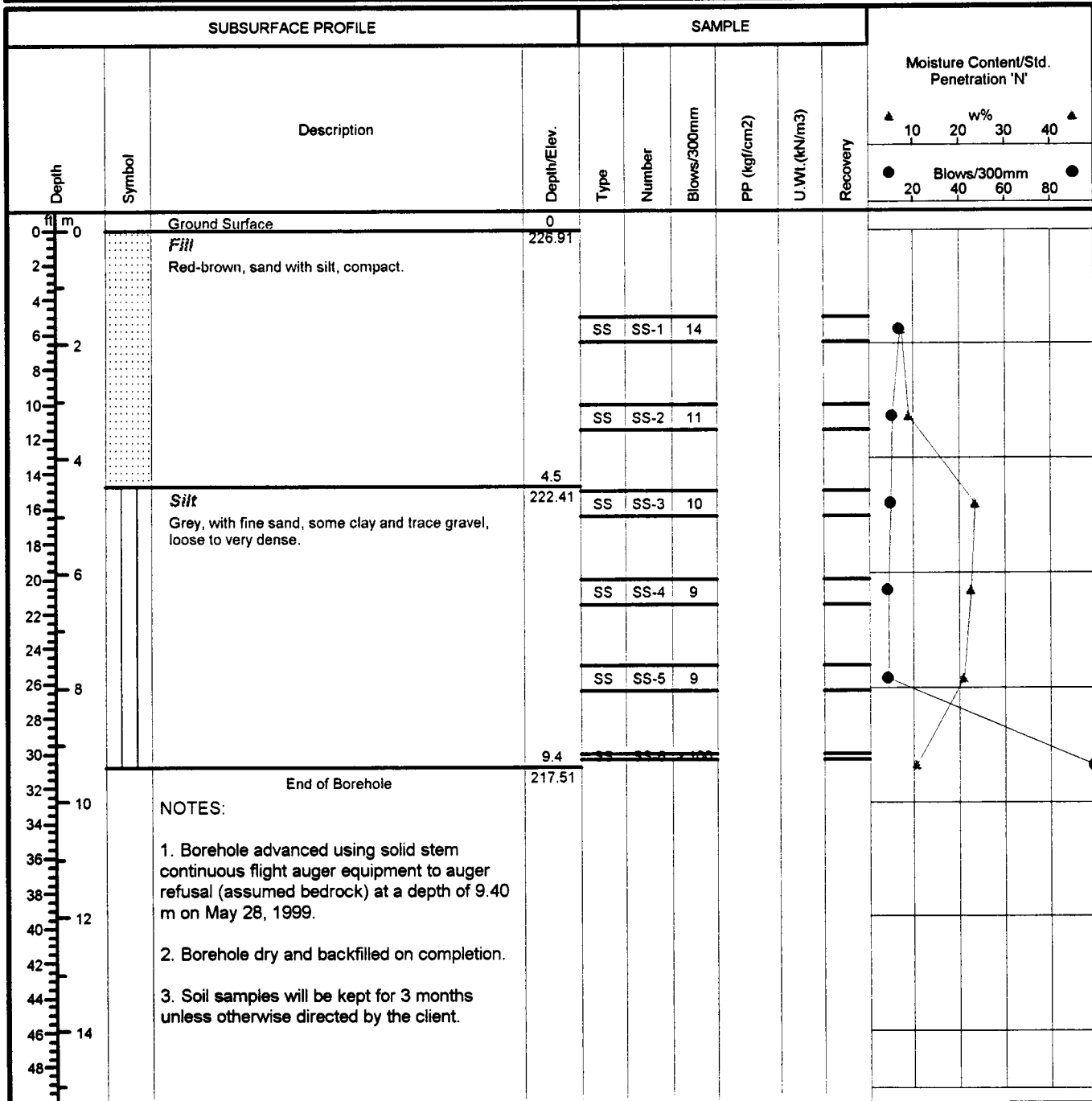
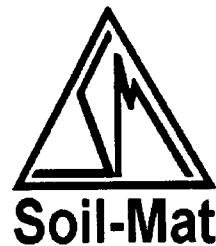
Borehole # 4995

(SM Borehole No. 7)

Borehole Location: Sta: 40+212.862

Offset: -3.698

Project Manager: John Monkman, P.Eng.



Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

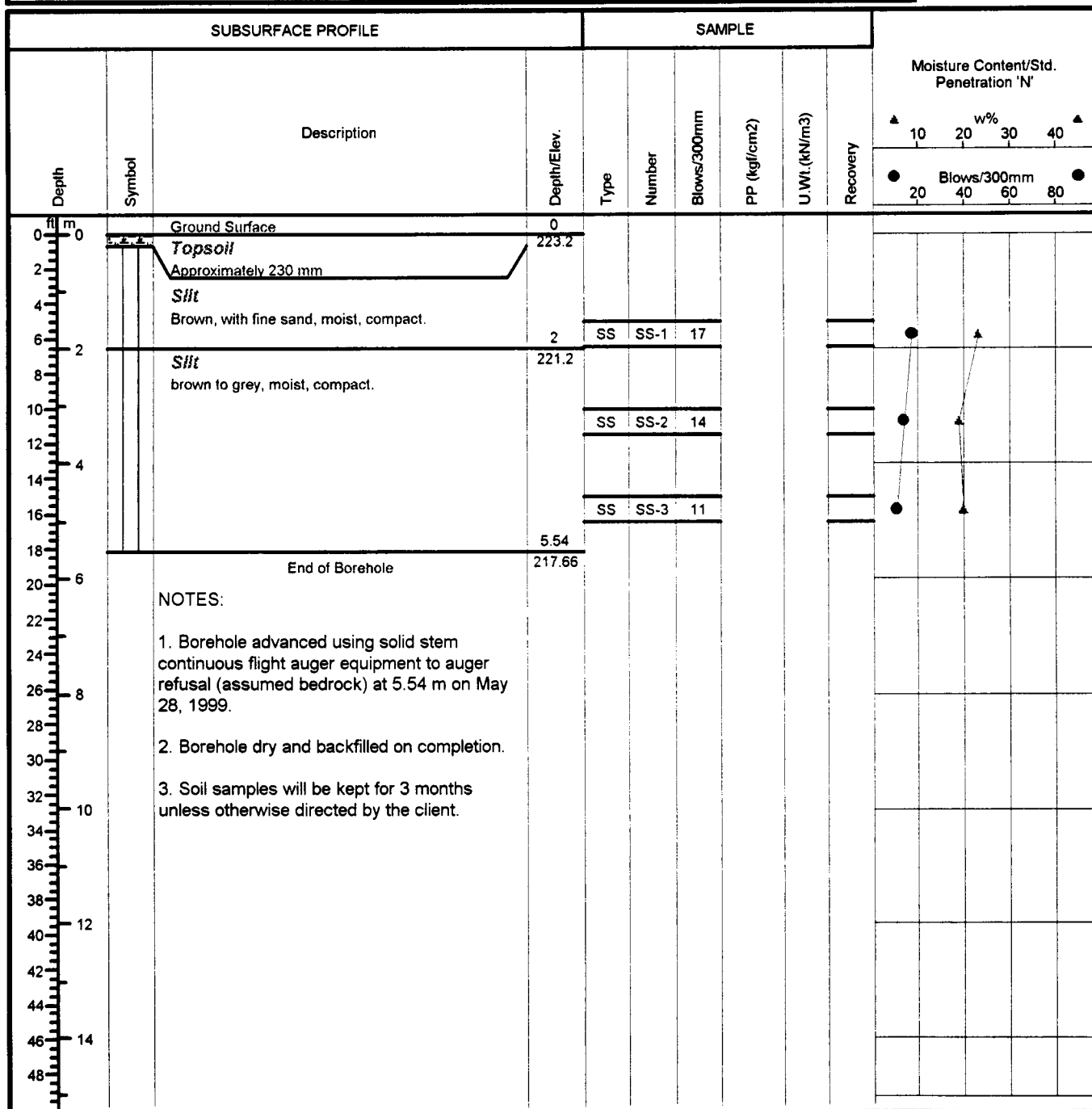
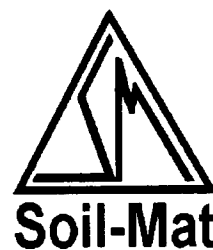
Borehole # 4994

(SM Borehole No. 6)

Borehole Location: Sta: 40+257.337

Offset: 4.453

Project Manager: John Monkman, P.Eng.



Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 4993

(SM Borehole No. 8)

Borehole Location: Sta: 40+309.893

Offset: 0.433

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|---------------------------|---------------------------------------|---------------------|-------------|----------------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.WI (kN/m ³) | Recovery | Moisture Content w% | Blows/300mm | Std. Penetration 'N' |
| 0 | | Ground Surface | 0 | | | | | | | | | |
| 0 | | Topsoil | 221.28 | | | | | | | | | |
| 2 | | Approximately 180 mm | | | | | | | | | | |
| 4 | | Fill | | | | | | | | | | |
| 6 | | brown, silt, sand, and some clay, compact. | 2 | SS | SS-1 | 10 | | | | | | |
| 8 | | Silt | 219.28 | | | | | | | | | |
| 10 | | brown, with fine sand and trace clay, moist, compact. | 3.2 | | | | | | | | | |
| 12 | | End of Borehole | 218.08 | | | | | | | | | |
| 14 | | NOTES: | | | | | | | | | | |
| 16 | | 1. Borehole advanced using solid stem | | | | | | | | | | |
| 18 | | continuous flight auger equipment to 3.20 m | | | | | | | | | | |
| 20 | | on May 28, 1999. | | | | | | | | | | |
| 22 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | |
| 24 | | 3. Soil samples will be kept for 3 months | | | | | | | | | | |
| 26 | | unless otherwise directed by the client. | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 4992

(SM Borehole No. 9)

Borehole Location: Sta: 40+359.547

Offset: -4.195

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Topsoil | 219.42 | | | | | | | |
| 2 | | Approximately 150 mm | 1 | | | | | | | |
| 4 | | Fill | 218.42 | SS | SS-1 | 6 | | | | |
| 6 | | Brown and grey silt fine sand and clay | 1.9 | SS | SS-2 | >50 | | | | |
| 8 | | Silt | 217.52 | | | | | | | |
| | | brown, with fine sand and some clay (very thin layering present) | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | |
| 12 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.90 m on May 28, 1999.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 200 mm

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e-mail: info@soil-mat.on.ca

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 4991

(SM Borehole No. 10)

Borehole Location: Sta: 40+409.598

Offset: -9.515

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | | |
|--|--------|---|-------------|--------|--------|-------------|--------------|---------------|---------------------------------------|---------------------------------------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | | | | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ ● 20 40 60 80 ● | | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | | |
| 0 | | Topsoil | 219.24 | | | | | | | | | | | |
| 2 | | Silty Clay to Clayey Silt Brown, moist, compact, possible fill in upper level. | | | | | | | | | | | | |
| 4 | | | | SS | SS-1 | 8 | | 21.1 | | | | | | |
| 6 | | | | SS | SS-2 | 2-30 | | | | | | | | |
| 6 | | End of Borehole | 217.56 | | | | | | | | | | | |
| NOTES: | | | | | | | | | | | | | | |
| 1. Borehole advanced using solid stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.68 m on May 28, 1999. | | | | | | | | | | | | | | |
| 2. Borehole dry and backfilled on completion. | | | | | | | | | | | | | | |
| 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | | | | |

Drill Method: Solid Stem auger

Drill Date: May 28, 1999

Hole Size: 150 mm

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Project No: SM 97027-G

Borehole # 5021

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta: 40+559.520

Location: Ramp E-S

Offset: 21.666

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|---------------------------------------|--|----------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | | | Recovery | |
| 0 | | Ground Surface | 0 | | | | | | | | | |
| 0 | | Topsoil | 221 | | | | | | | | | |
| 2 | | Approximately 200 mm | | | | | | | | | | |
| 4 | | Fill Mix | 1.5 | | | | | | | | | |
| 6 | | Reddish brown, some clay, some sandy silt, some gravel, compact. | 219.5 | SS | 1 | 5 | | | | | | |
| 8 | | Sandy Silt | | | | | | | | | | |
| 10 | | Light brown, loose, -becomes grey and trace of clay with depth | 3.2 | | | | | | | | | |
| 12 | | End of Borehole | 217.8 | | | | | | | | | |
| 14 | | <div>NOTES:</div> <div>1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.20m on May 26, 1999.</div> <div>2. Borehole dry and backfilled on completion.</div> <div>3. Soil samples will be kept for 3 months unless otherwise directed by the client.</div> | | | | | | | | | | |
| 16 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: May 26, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5020

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta: 40+601.201

Location: Ramp E-S

Offset: 26.986

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Topsoil | 223.08 | | | | | | | |
| 2 | | Approximately 200 mm | 0.81 | | | | | | | |
| 4 | | Fill | 222.27 | | | | | | | |
| 6 | | clay with some gravel, red-brown | | | | | | | | |
| 6 | | Sandy Silt to Silty Fine Sand | | SS | 1 | 12 | | | | |
| 8 | | grey, stained greyish black between 2.3 and 2.6 m depth, probable fill in the upper 3.0 m, compact. | | | | | | | | |
| 10 | | | | SS | 2 | 24 | | | | |
| 12 | | | | | | | | | | |
| 14 | | | 4.65 | | | | | | | |
| 16 | | End of Borehole | 218.43 | | | | | | | |
| 18 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 4.65 m on May 26, 1999. 2. Borehole dry and backfilled on completion. 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: May 26, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Hole Size: 200 mm

Phone: (905) 318-7440 Fax: (905) 318-7455

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hay 403/Mohawk Road Interchange

Location: Ancaster, Ontario

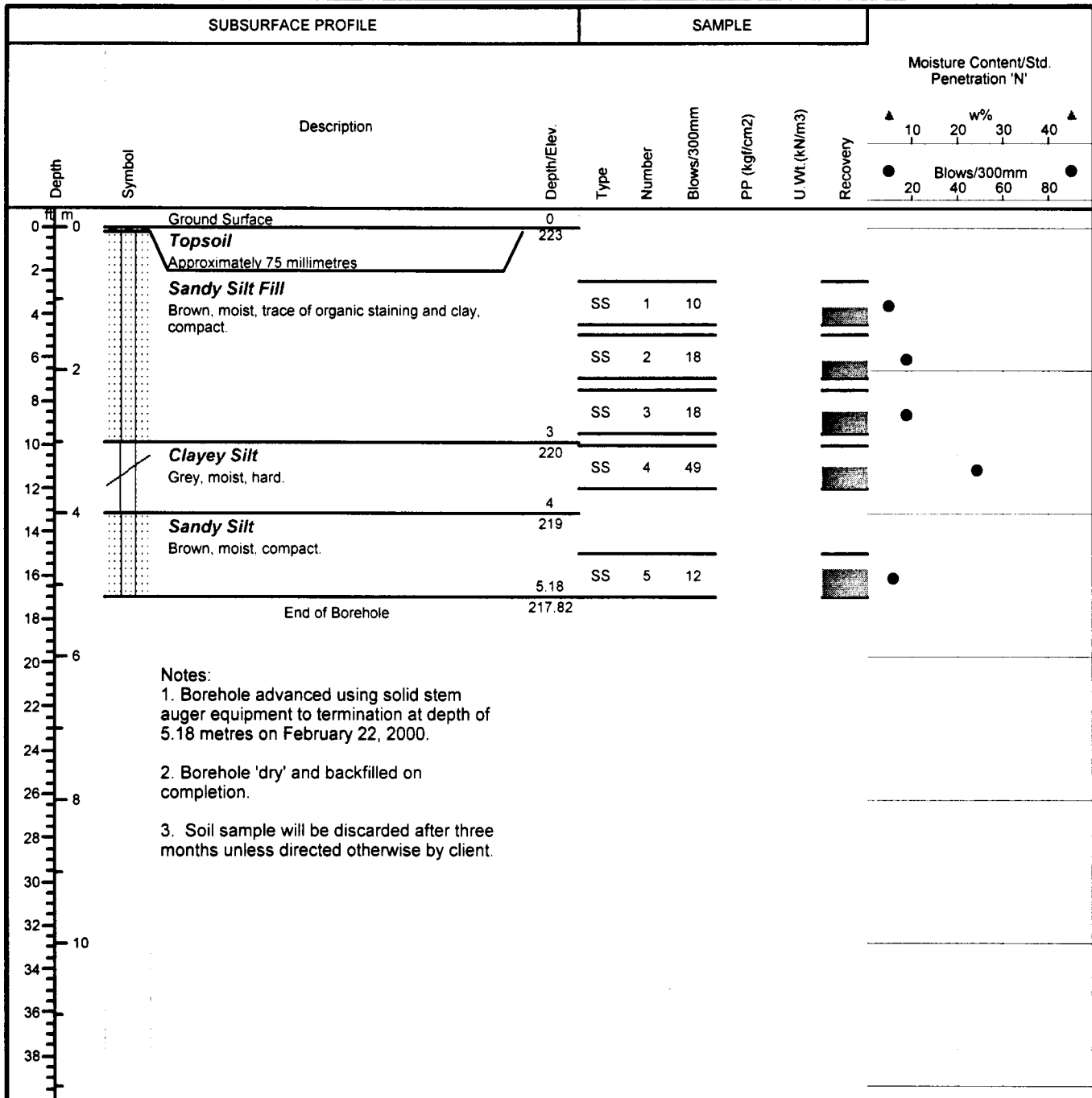
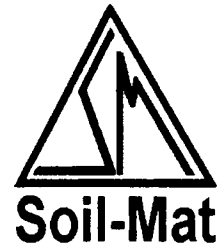
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5542 [SM No.: 12]

Borehole Location: Ramp E-S

Sta.: 40+777.001, Offset: 0.096

Project Manager: John Monkman P.Eng.



Drill Method: Hollow Stem Auger

Drill Date: February 22, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

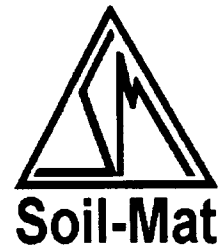
Borehole # 1518

(SM Borehole No.: 518)

Borehole Location: Sta.: 40+835.006

Offset: 9.95

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.W. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Fill | 222.12 | | | | | | | |
| 0.6 | | | 0.6 | | | | | | | |
| 2 | | Clayey Silt Fill | 221.52 | | | | | | | |
| 4 | | Brown | 1.5 | | | | | | | |
| 6 | | Sandy Silt Fill | 220.62 | SS | 1 | 26 | | | | |
| 8 | | Light brown | | | | | | | | |
| 10 | | Silt (Fill) | 3 | | | | | | | |
| 10 | | Greyish, with coarse sand and gravel | | | | | | | | |
| 12 | | Fine Sandy Silt | 219.12 | SS | 2 | 17 | | | | |
| 14 | | Light brown, with clay and gravel, compact. | | | | | | | | |
| 16 | | | 4.47 | | | | | | | |
| 16 | | End of Borehole | 217.65 | | | | | | | |
| NOTES: | | | | | | | | | | |
| 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 4.47m on January 22, 1998. | | | | | | | | | | |
| 2. Water level observed at 2.14m, caved at 3.91m, and borehole backfilled on completion. | | | | | | | | | | |
| 4. Soil samples will be kept for 3 months unless otherwise directed by client. | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: January 22, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

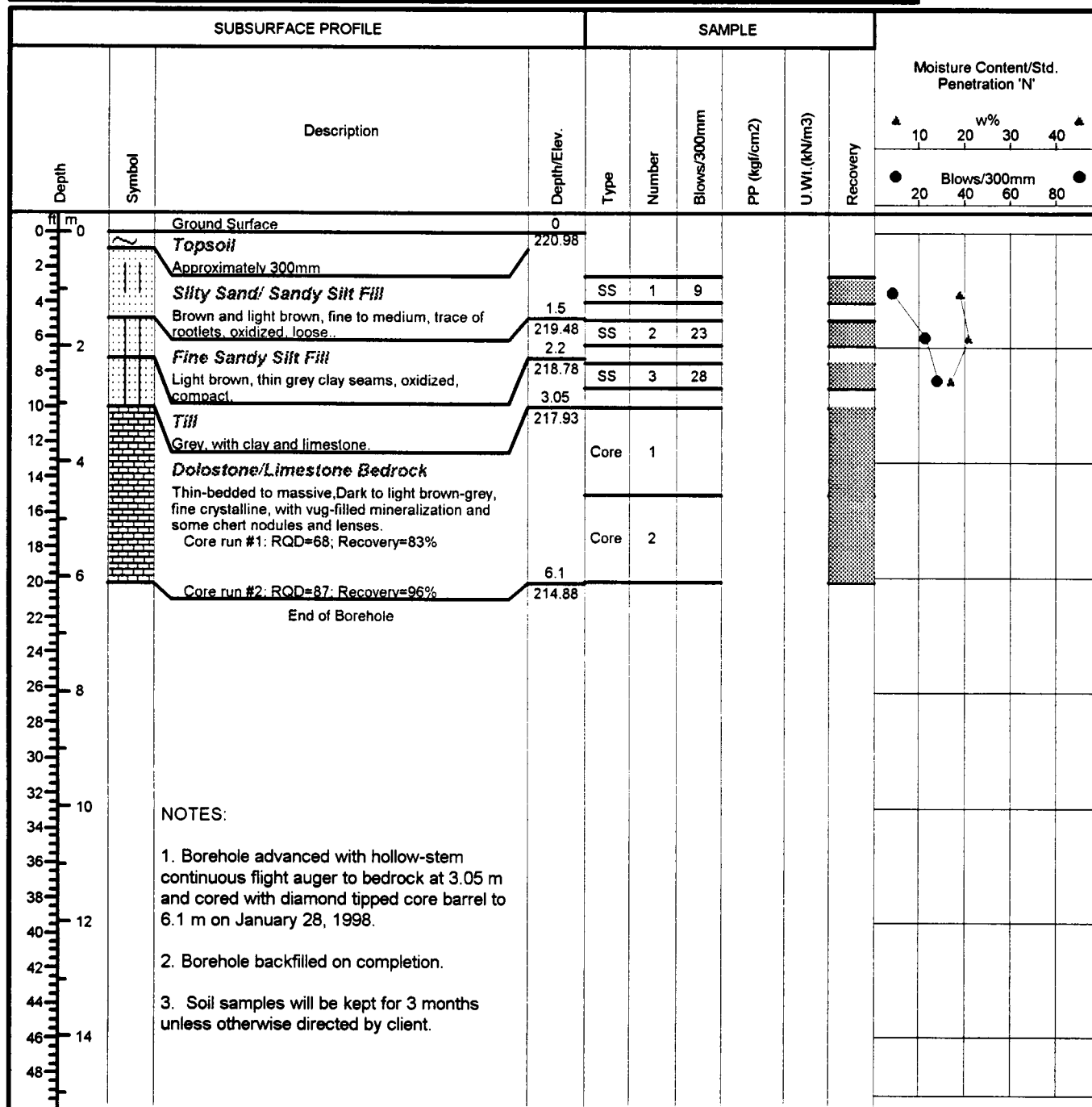
Borehole # 1519

(SM Corehole No.: 519)

Borehole Location: Sta.: 40+872.791

Offset: -21.393

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem

Drill Date: January 28, 1998

Hole Size: 200mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

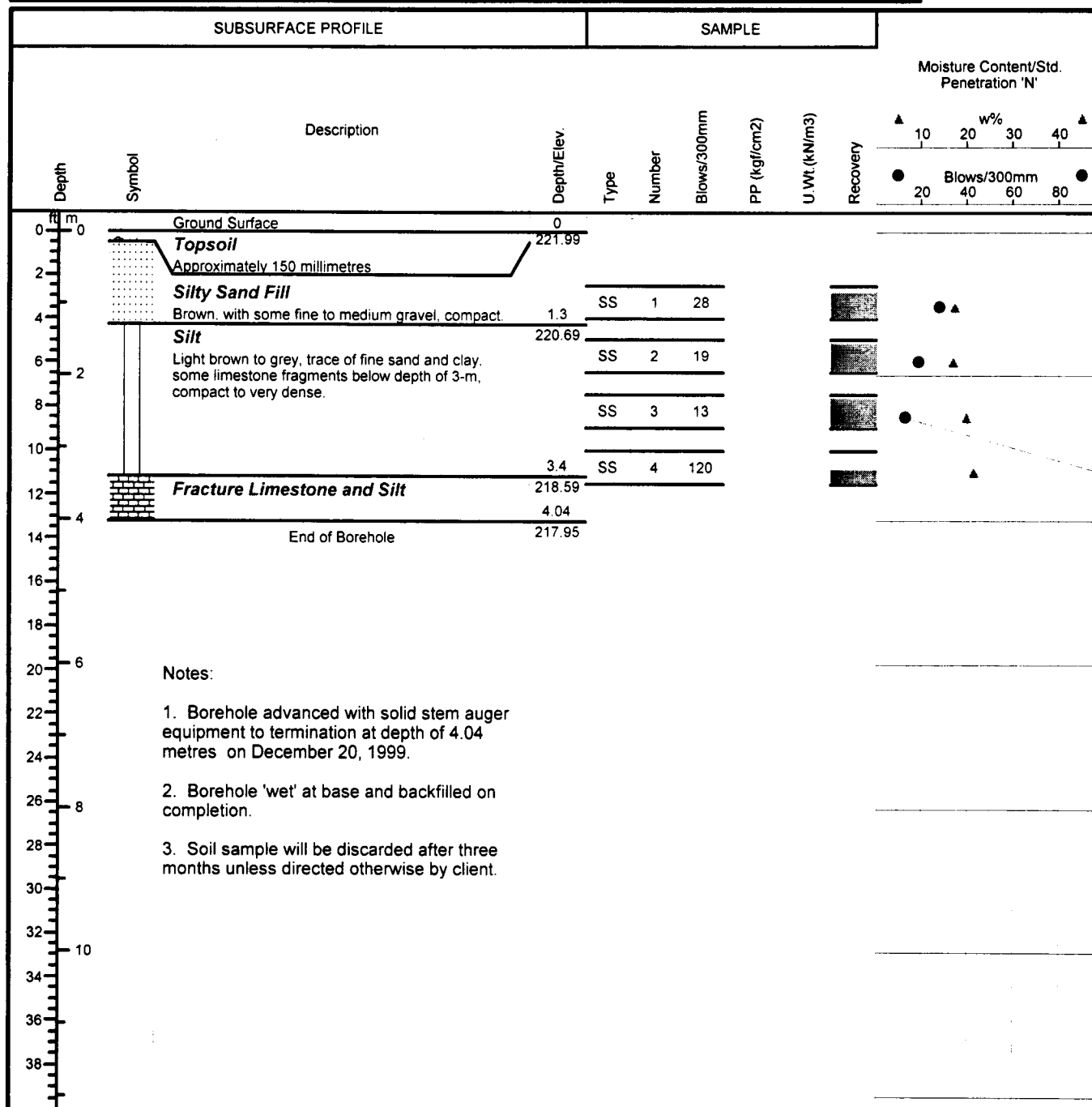
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5541 [SM No.: 11]

Borehole Location: Ramp E-S

Sta.: 40+878.136, Offset: 1.491

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: December 20, 1999

Hole Size: 150 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5048

(SM Borehole No. AA)

Borehole Location: Sta.: 40+976.231

Offset: 41.062

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--|--------|---------------------------------------|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 2 | | Fill - Gravel (Granular "A") | 224.85 | | | | | | | |
| | | Approximately 225mm, compact. | | | | | | | | |
| 4 | | Fill | 1.53 | SS | 1 | 26 | | | | |
| 6 | | Silty to clayey Sand, brown, compact. | 223.32 | SS | 2 | 24 | | | | |
| 8 | | Silty Sand to Sandy Silt | 2.75 | SS | 3 | 14 | | | | |
| | | Brown, fine, moist, compact. | | | | | | | | |
| 10 | | End of Borehole | 222.1 | | | | | | | |
| NOTES: 1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 2.75 m on June 30, 1999. 2. Borehole dry and backfilled on completion. 3. Samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

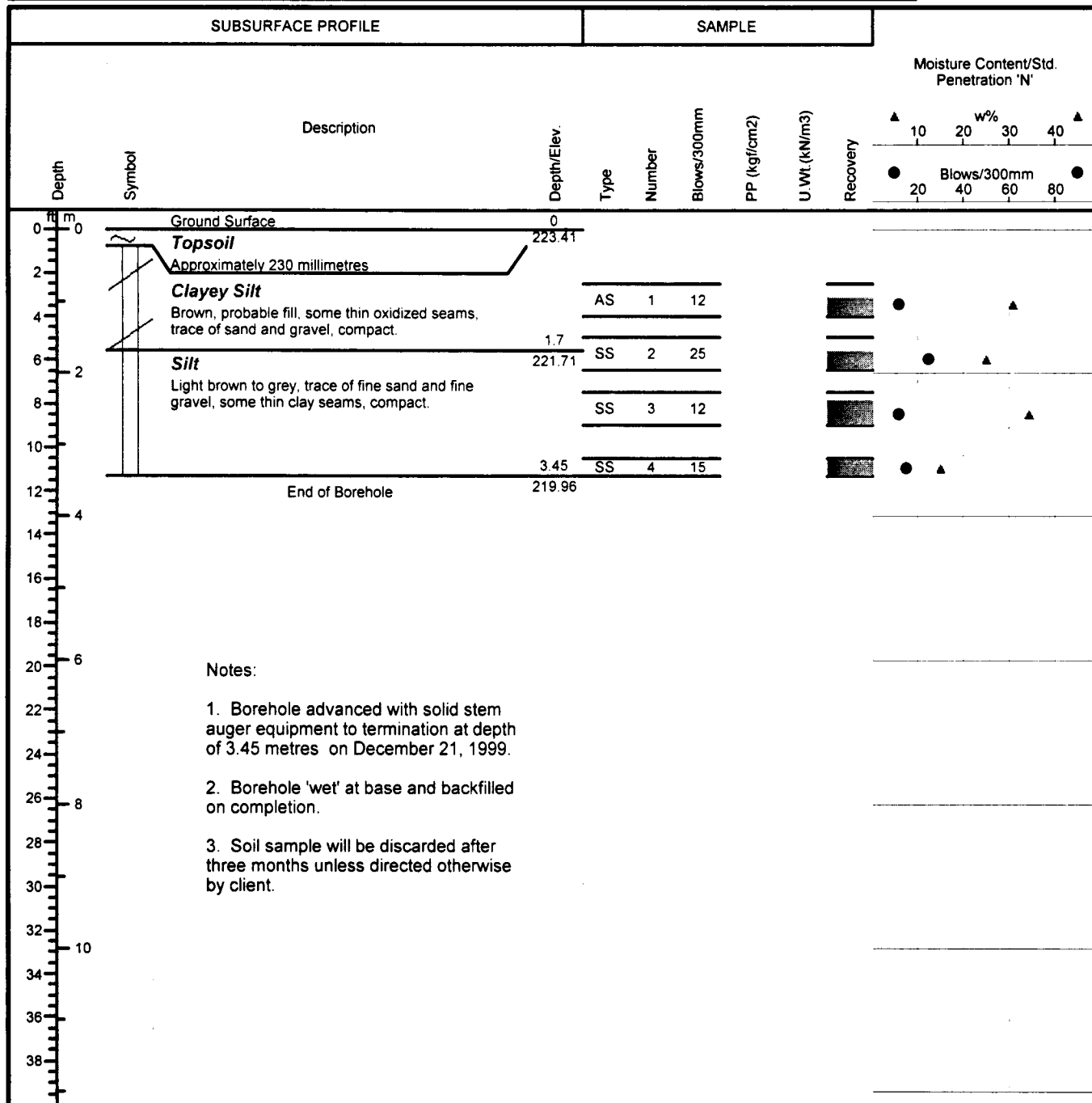
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5546 [SM No.: 2]

Borehole Location: Ramp E-S

Sta.: 40+977.843, Offset: 0.041

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: December 21, 1999

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

Client: Region of Hamilton-Wentworth [SPO]

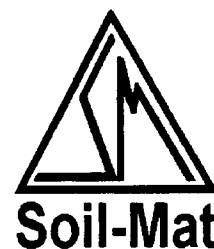
Borehole # 5050

(SM Borehole No. CC)

Borehole Location: Sta: 41+075.096

Offset: 10.147

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--|--------|-----------------------------------|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0.75 | | Fill - Gravel (Granular "A") | 225.28 | | | | | | | |
| 2 | | | 0.75 | | | | | | | |
| 4 | | Sand and SiltFill | 224.53 | SS | 1 | 18 | | | | |
| 4 | | brown, moist, compact. | | | | | | | | |
| 6 | | | 1.8 | SS | 2 | 37 | | | | |
| 6 | | Silt | 223.48 | | | | | | | |
| 8 | | brown, with sand lenses, compact. | 2.75 | SS | 3 | 18 | | | | |
| 10 | | End of Borehole | 222.53 | | | | | | | |
| NOTES: 1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 2.75 m on June 30, 1999. 2. Borehole dry and backfilled on completion. 3. Samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp E-S

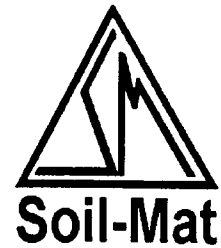
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5051
(SM Borehole No. DD)

Borehole Location: Sta: 41+124.186

Offset: 6.18

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | | |
|--|--------|---|----------------|--------|--------|-------------|--------------|----------------|---------------------------------------|---------------------------------------|----|-------------|------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U. Wt. (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | | | | |
| | | | | | | | | | | w% | | Blows/300mm | | |
| | | | | | | | | | | ▲ 10 | 20 | 30 | 40 ▲ | |
| | | | | | | | | | | ● 20 | 40 | 60 | 80 ● | |
| 0 | | Ground Surface | 0 | | | | | | | | | | | |
| 2 | | Asphaltic Concrete Approximately 150mm | 226.09 0.76 | | | | | | | | | | | |
| 4 | | Fill - Gravel (Granular "A") Approximately 600mm | 225.33 | SS | 1 | 15 | | 18.9 | | | | | | |
| 6 | | Sand and Silt Fill brown, with organic inclusions, moist, compact. | 2.3 | SS | 2 | 11 | | 18.5 | | | | | | |
| 8 | | Fine Sand brown, with gravel, moist, compact | 223.39 | SS | 3 | 13 | | | | | | | | |
| 10 | | End of Borehole | 223.34 | | | | | | | | | | | |
| NOTES: | | | | | | | | | | | | | | |
| 1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 2.75 m on June 30, 1999. | | | | | | | | | | | | | | |
| 2. Borehole dry and backfilled on completion. | | | | | | | | | | | | | | |
| 3. Samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 –231 [SPO]**



RAMP N – E BOREHOLES

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1141
(SM Probehole No.: 141)

Probehole Location: Sta.: 10+073.038

Offset: 1.226

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | <i>Granular Fill</i> | 203.23 | | | | | | | | | | |
| 2 | | Approximately 900mm of 25mm Minus Crusher Run Limestone, compact. | 0.9 | | | | | | | | | | |
| 4 | | <i>Clayey Silt</i> | 202.33 | | | | | | | | | | |
| 6 | | Light brown to grey, traces of gravel and fine sand, wood fragments, slight organic staining, stiff. | 2.13 | | | | | | | | | | |
| 8 | | End of Probehole | 201.1 | | | | | | | | | | |
| 10 | | NOTES: | | | | | | | | | | | |
| 12 | | 1. Probehole augered to termination at 2.13m on February 4, 1998. | | | | | | | | | | | |
| 14 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | | |
| 16 | | 3. No samples taken. | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1142

(SM probehole No.: 142)

Probehole Location: Sta.: 10+172.468

Offset: 0.627

Project Manager: John Monkman, P. Eng.



Soil-Mat

| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 205.31 | | | | | | | | | | |
| 2 | | Approximately 1050mm of 25mm Minus Crusher Run Limestone, compact. | 1.05 | | | | | | | | | | |
| 4 | | Sandy Silt | 205.26 | | | | | | | | | | |
| 6 | | Light brown, fine, trace of gravel, compact. | 2.13 | | | | | | | | | | |
| 8 | | End of Probehole | 204.18 | | | | | | | | | | |
| 10 | | NOTES: 1. Probehole augered to termination at 2.13m on February 4, 1998. 2. Borehole dry and backfilled on completion. 3. No samples taken. | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027 G

Borehole # 1106 [SM No. 106]

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta.: 10+254.194

Location: Ramp N-E

Offset: 28.192

Client: Region of Hamilton/Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|--------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt (kN/m3) | | |
| 0 m | | Ground Surface | 0 | | | | | | | |
| 2 | | Fill/Shattered Rock Limestone, fine sandy silt, moist, grinding at 1.15 (shattered rock and silt, loose) | 210.01 | | | | | | | |
| 4 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 2 | | End of Borehole | 208.39 | | | | | | | |
| 8 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.62m on January 5, 1998. 2. Borehole dry and backfilled on completion. 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: January 5, 1998

130 Lancing Drive, Hamilton, ON L8W 3A1
 Phone: (905) 318-7440 Fax: (905) 318-7455

Checked by: RGH

Hole Size: 150 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1501

(SM Borehole No.: 501)

Borehole Location: Sta.: 10+264.056

Offset: 35.449

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|----|----|----|----|---|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U Wt. (kN/m3) | Recovery | w% Blows/300mm | | | | | |
| 0 | | Ground Surface | 0 | | | | | | | ▲ | 10 | 20 | 30 | 40 | ▲ |
| 0 | | Topsoil | 210.34 | | | | | | | ● | 20 | 40 | 60 | 80 | ● |
| 2 | | Approximately 150 mm | | | | | | | | | | | | | |
| 4 | | Sandy Silt/ Silty Sand | 1.39 | SS | 1 | 51 | | | | | | | | | |
| 6 | | Various gravel sizes, limestone fragments in tip of spoon, non-cohesive, very dense and moist. | 208.95 | | | | | | | | | | | | |
| 8 | | End of Borehole | | | | | | | | | | | | | |
| 10 | | NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.39m on January 5, 1998. 2. Borehole dry and backfilled on completion. 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 5, 1998

Hole Size: 150 mm

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Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1143

(SM Probehole No.: 143)

Probehole Location: Sta.: 10+266.709

Offset: -17.994

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| | | | | | | | | | | <div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 209.39 | | | | | | | | | | |
| 2 | | Approximately 900mm of 25mm Minus Crusher Run Limestone, compact. | 0.9 | | | | | | | | | | |
| 4 | | Sandy Silt | 208.49 | | | | | | | | | | |
| 4 | | Brownish grey, traces of clay, compact. | 1.3 | | | | | | | | | | |
| 6 | | Rock | 208.09 | | | | | | | | | | |
| 6 | | Fractured. | 2.13 | | | | | | | | | | |
| 8 | | End of Probehole | 207.26 | | | | | | | | | | |
| 10 | | NOTES: 1. Probehole augered to termination at a depth of 2.13m on February 4, 1998. 2. Borehole dry and backfilled on completion. 3. No samples taken. | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027

Borehole # 5072

Project: LINC/Hwy 403/Mohawk Road Interchange

Borehole Location: Ramp N-E

Location: Ancaster, Ontario

Sta. 10+282.039, Offset: 2.374

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|---------------------------------------|----------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U Wt. (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' | |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 0 | | Topsoil | 212.41 | | | | | | | | |
| | | Approximately 175 millimetres | | | | | | | | | |
| 2 | | Sandy Silt | | | | | | | | | |
| | | Brown, trace of clay and fine gravel, possible fill in upper level, compact. | | | | | | | | | |
| 6 | | | | SS | 1 | 13 | | | | | |
| 8 | | | 2.62 | | | | | | | | |
| | | End of Borehole | 209.79 | | | | | | | | |
| 10 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 22 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 32 | | | | | | | | | | | |

Notes:

1. Borehole advanced with hollow stem auger equipment to auger refusal [assumed bedrock] at depth of 2.62 metres on June 4, 1999.
2. Borehole 'dry' and backfilled on completion.
3. Soil samples will be discarded after three months unless directed otherwise by client.

Drill Method: Hollow Stem

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Datum: Geodetic

Drill Date: June 4, 1999

Checked by: JM

Hole Size: 200mm

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

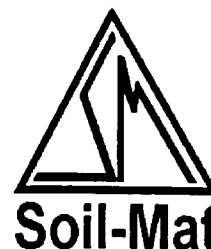
Borehole # 1900

(SM Borehole No.: 900)

Borehole Location: Sta.: 10+275.511

Offset: 78.694

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-----------------|--------|--------|-------------|-------------|---------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm2) | U.Wt. (kN/m3) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 2 | | Asphaltic Concrete Approximately 70 mm | 212.75 0.795 | | | | | | | |
| 4 | | Granular "A" Approximately 125 mm, crusher run limestone, compact. | 211.95 | | | | | | | |
| 6 | | Granular "B" Approximately 600 mm, crusher run sand and gravel, compact. | 2.74 | SS | 1 | 10 | | | | |
| 10 | | Clayey Silt (Fill) Grey, slightly stained, some fine to medium sand and gravel, cohesive, moist, compact. | 210.01 | | | | | | | |
| 12 | | Fill (Sandy Silt) Brown, with gravel. | 4.09 | SS | 2 | 14 | | | | |
| 14 | | End of Borehole | 208.66 | | | | | | | |
| 16 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
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| 30 | | | | | | | | | | |
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| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal at a depth of 4.09m on January 5, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 5, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

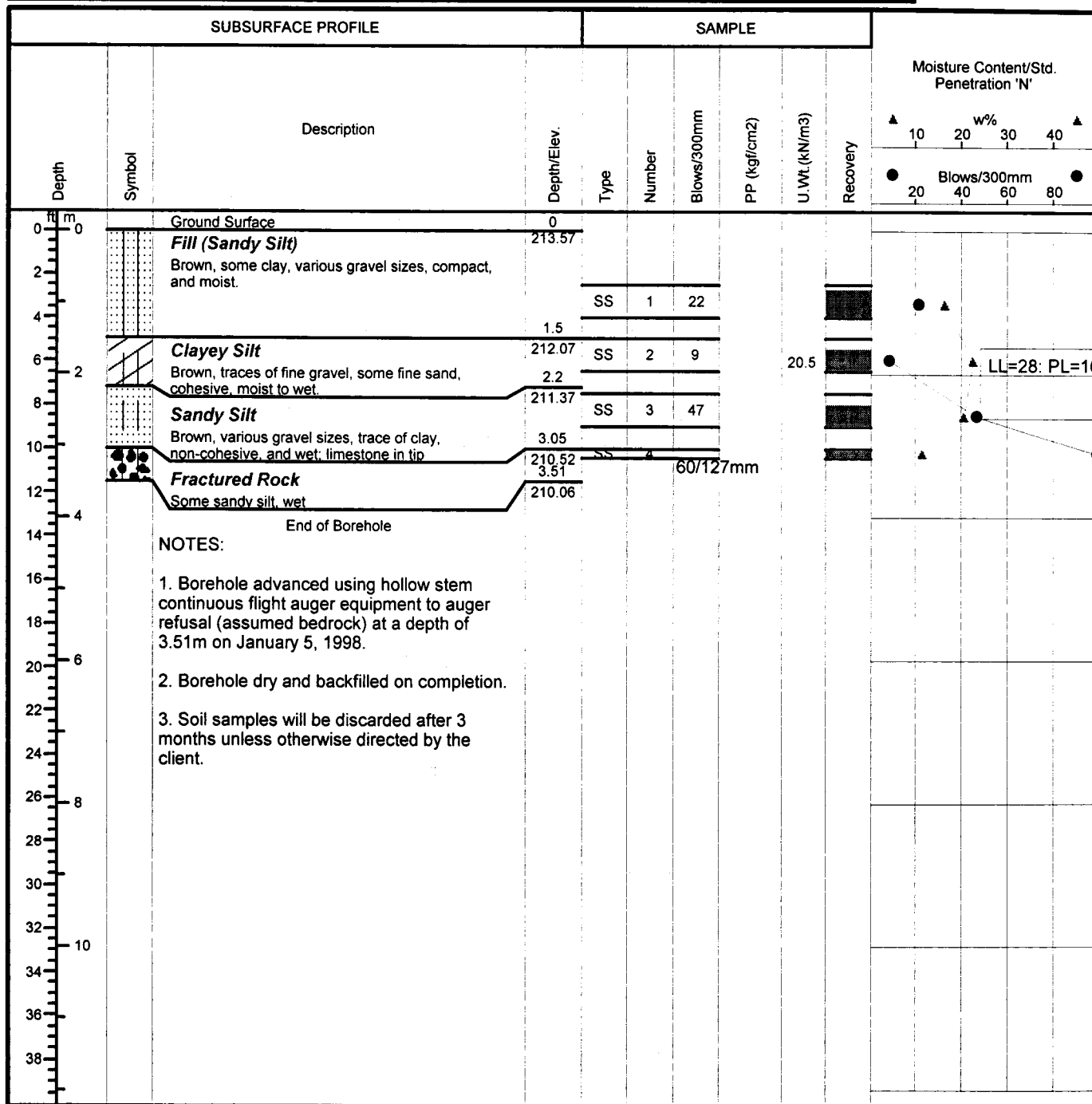
Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1107 [SM No.: 107]

Borehole Location: Sta.: 10+310.285

Offset: 29.421

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 5, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

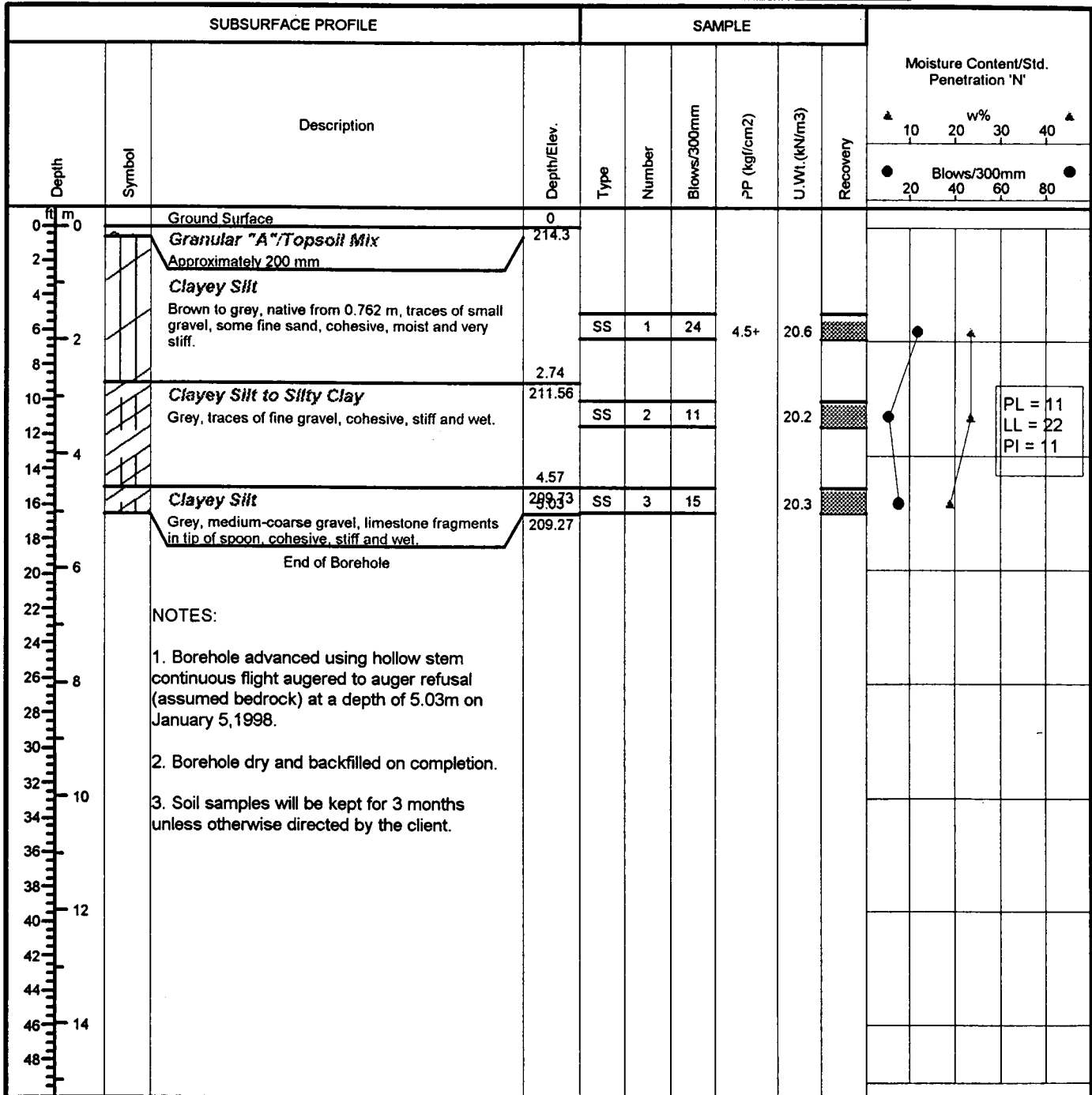
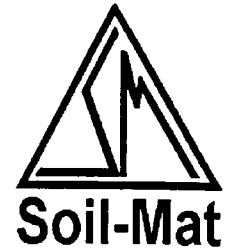
Client: Region of Hamilton/Wentworth[SPO]

Borehole # 1901
(SM Borehole No.: 901)

Borehole Location: Sta.: 10+321.220

Offset: 52.135

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 5, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

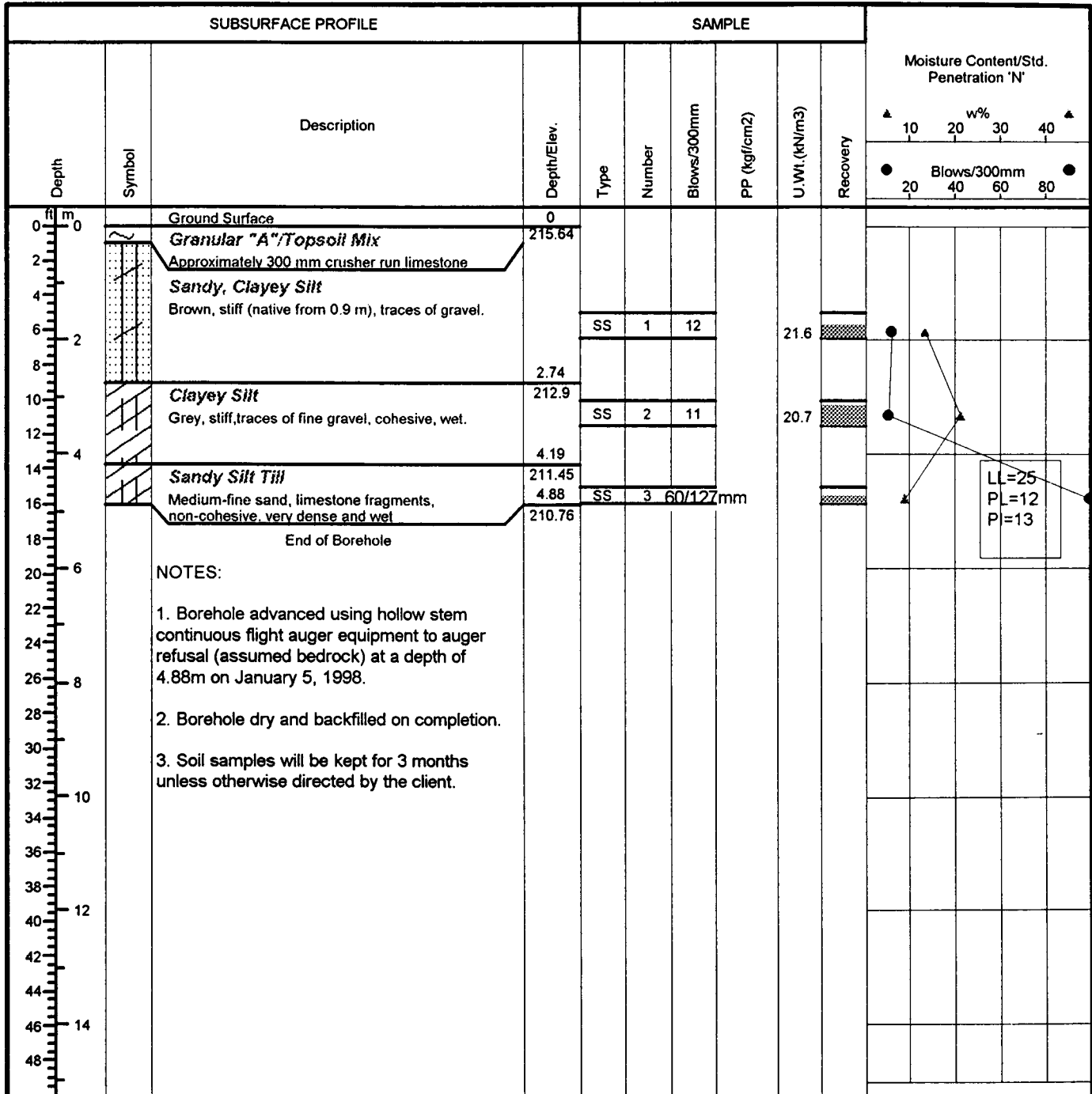
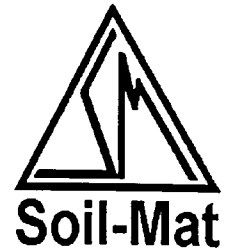
Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1500
(SM Borehole No.: 500)

Borehole Location: Sta.: 10+325.295

Offset: 35.621

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 5, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027

Borehole # 5071

Project: LINC/Hwy 403/Mohawk Road Interchange

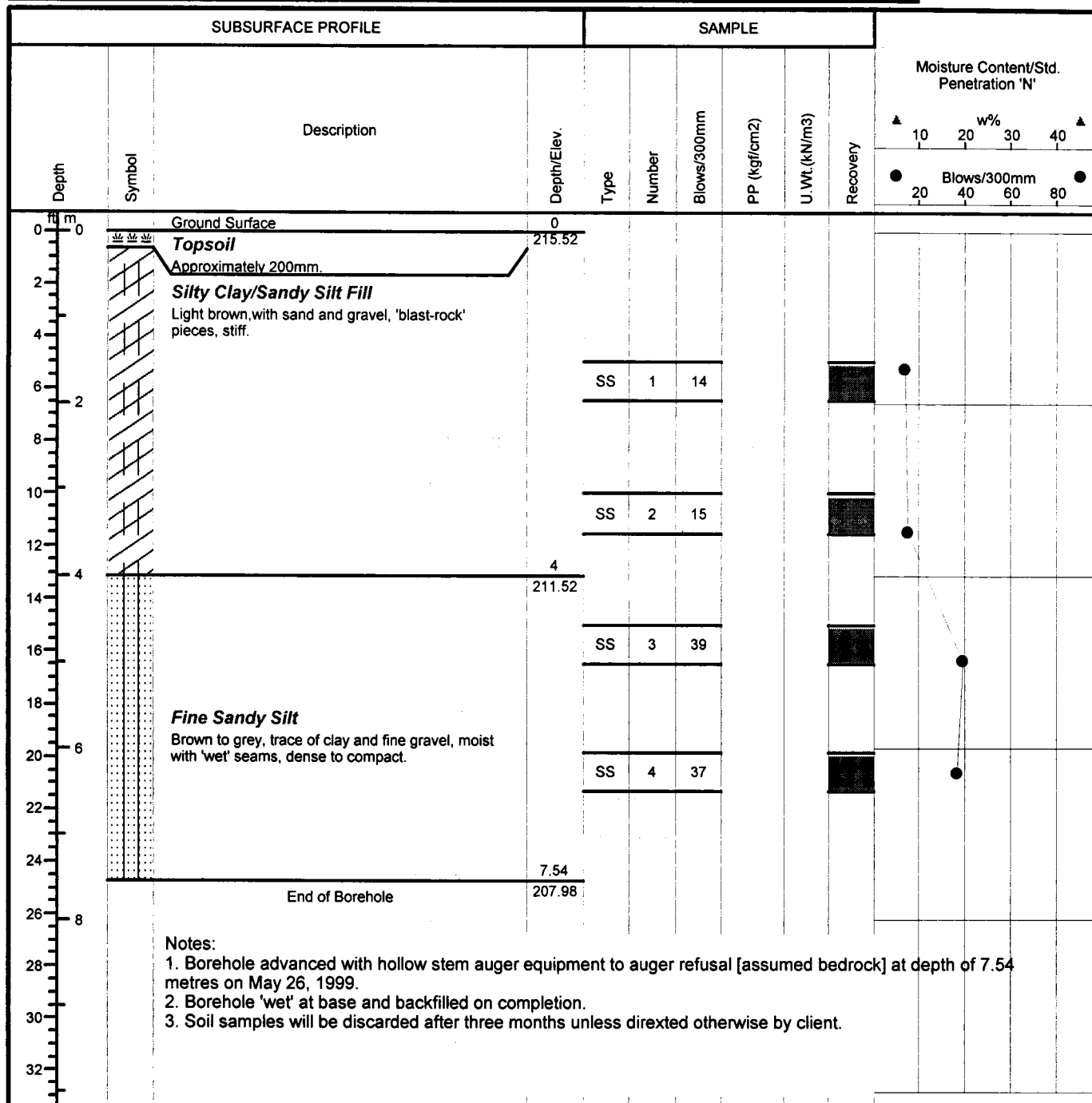
Borehole Location: Ramp N-E

Location: Ancaster, Ontario

Sta. 10+329.029, Offset: 3.792

Client: Region of hamilton-Wentworth [SPO]

Project Manager: John Monkman, P. Eng.



Drill Method: Hollow Stem

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: May 26, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455

Checked by: JM

Hole Size: 200mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

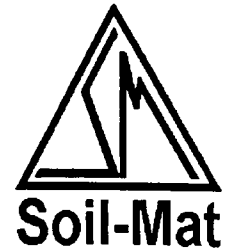
Borehole # 1108

(SM Borehole No.: 108)

Borehole Location: Sta.: 10+366.375

Offset: 25.21

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|---|--------|---|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | | | | |
| | | | | | | | | | | | | | |
| 0 m | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Topsoil Granular "A" Mix | 217.25 | | | | | | | | | | |
| 4 | | Approximately 200 mm (shoulder of road) | | | | | | | | | | | |
| 4 | | Gran "A" - Crusher Run Limestone | 1.24 | AS | 1 | | | | | | | | |
| 6 | | Silt | 216.01 | | | | | | | | | | |
| 6 | | Brown, coarse sand and gravel, wet. Grey just above rock, Native at 0.600 m | | | | | | | | | | | |
| 8 | | End of Borehole | | | | | | | | | | | |
| NOTES: | | | | | | | | | | | | | |
| 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.24m on January 6, 1998. | | | | | | | | | | | | | |
| 2. Borehole dry and backfilled on completion. | | | | | | | | | | | | | |
| 3. Moved hole 3 times, reached auger refusal at 1.17m, 1.19m, and 1.24m. | | | | | | | | | | | | | |
| 4. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 6, 1998

Hole Size: 150 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5018

Project: LINC/Hwy403/Mohawk Road Interchange

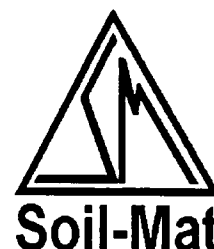
Borehole Location: Sta: 10+378.509

Location: Ramp N-E

Offset: 0.03

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | | |
|--|--------|-----------------------|-------------|--------|--------|-------------|--------------|---------------|---------------------------------------|--|------------------------------------|--|----------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | | | | | Recovery | |
| | | | | | | | | | | | | | | |
| 0 ft 0 m | | Ground Surface | 0 | | | | | | | | ▲ 10 20 30 40 ▲ ● 20 40 60 80 ● | | | |
| 0.24 | | Topsoil | 220.24 | | | | | | | | | | | |
| 0.67 | | Approximately 150 mm | 0.67 | AS | 1 | 20 | | | | | | | | |
| 2.19 | | Fill | 219.57 | | | | | | | | | | | |
| | | Sandy Silt and Gravel | | | | | | | | | | | | |
| 2 | | End of Borehole | | | | | | | | | | | | |
| NOTES: | | | | | | | | | | | | | | |
| 1. Borehole advanced using hpollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 0.67 m on June 4, 1999. | | | | | | | | | | | | | | |
| 2. Borehole dry and backfilled on completion. | | | | | | | | | | | | | | |
| 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: June 4, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-W

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1502

(SM Borehole No.: 502)

Borehole Location: Sta.: 10+381.384

Offset: 28.396

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | w% ▲ 10 20 30 40 ▲ ● 20 40 60 80 ● | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0.46 | | Granular "A" | 217.23 | | | | | | | | | | |
| 2 | | Approximately 150 mm crusher run limestone. | 217.27 | | | | | | | | | | |
| 4 | | Granular "B" | 1.52 | SS | 1 | 62 | | | | | | | |
| 6 | | Approximately 300 mm sand and gravel | 216.21 | | | | | | | | | | |
| 8 | | Sandy Silt to Silty Sand | | | | | | | | | | | |
| 10 | | Brown, very dense, medium coarse sand and gravel, non-cohesive, and moist. | | | | | | | | | | | |
| 12 | | End of Borehole | | | | | | | | | | | |
| NOTES: 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.52m on January 6, 1998. 2. Borehole dry and backfilled on completion. 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 6, 1998

Hole Size: 150 mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1902

(SM Borehole No.: 902)

Borehole Location: Sta.: 10+385.599

Offset: 40.62

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Topsoil | 218.3 | | | | | | |
| 2 | | Approximately 75 mm | | | | | | | |
| 4 | | Sandy Silt | | | | | | | |
| 4 | | Fine, grey, traces of fine gravel, non-cohesive, compact to very dense and moist to wet | 1.37 | SS | 1 | 30 | | | |
| 6 | | Sandy Silt | 216.93 | SS | 2 | 50/102mm | | | |
| 6 | | Grey, traces of clay, coarse gravel and shale fragments in tip of spoon, non-cohesive, very dense and moist | 2.26 | | | | | | |
| 8 | | End of Borehole | 216.04 | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
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| 24 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |

NOTES:

- Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.26m on January 6, 1998.
- Borehole dry and backfilled on completion.
- Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 6, 1998

Hole Size: 150 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

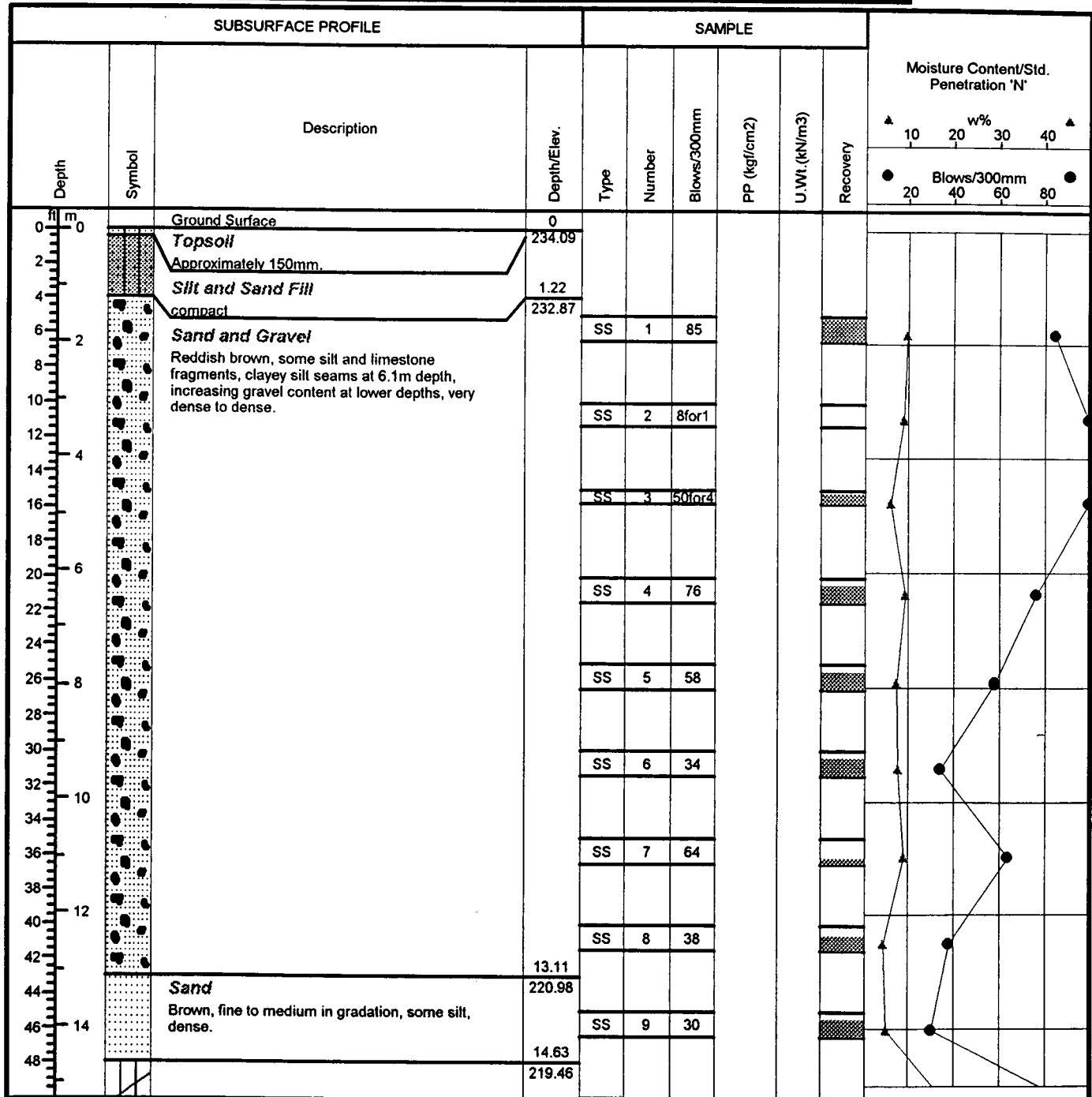
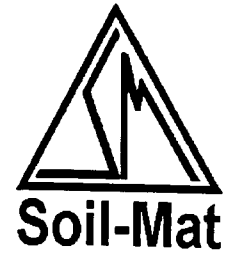
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1001
(SM Borehole No.: W1-1)

Borehole Location: Sta.: 10+406.458

Offset: 76.296

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 14, 1998

Hole Size: 200mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: RGH

Sheet: 1 of 2

Project No: SM 97027-G

Borehole # 1001

Project: LINC/Hwy403/Mohawk Road Interchange

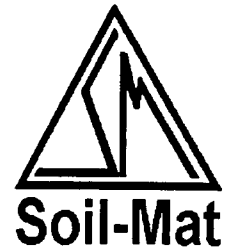
Borehole Location: Sta.: 10+406.458

Location: Ramp N-E

Offset: 76.296

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | | |
| 51 | | Clayey Silt Till Light brown, with some sand, trace limestone fragments, oxidized zones, very dense. | | SS | 10 | 55for6 | | 20.4 | | |
| 53 | | | 16.15 | | | | | | | |
| 55 | | | 217.94 | | | | | | | |
| 57 | 17 | Fine Sandy Silt Till Grey, trace clay, compact. | | SS | 11 | 27 | | | | |
| 59 | | | | | | | | | | |
| 61 | | End of Borehole | 18.16 | | | | | | | |
| 63 | 19 | | 215.93 | | | | | | | |
| 65 | | | | | | | | | | |
| 67 | | | | | | | | | | |
| 69 | 21 | | | | | | | | | |
| 71 | | | | | | | | | | |
| 73 | | | | | | | | | | |
| 75 | 23 | | | | | | | | | |
| 77 | | | | | | | | | | |
| 79 | | | | | | | | | | |
| 81 | 25 | | | | | | | | | |
| 83 | | | | | | | | | | |
| 85 | | | | | | | | | | |
| 87 | | | | | | | | | | |
| 89 | 27 | | | | | | | | | |
| 91 | | | | | | | | | | |
| 93 | | | | | | | | | | |
| 95 | 29 | | | | | | | | | |
| 97 | | | | | | | | | | |
| 99 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 18.16m on January 14, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: January 14, 1998

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200mm

e-mail: info@soil-mat.on.ca

Sheet: 2 of 2

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1109

(SM Borehole No.: 109)

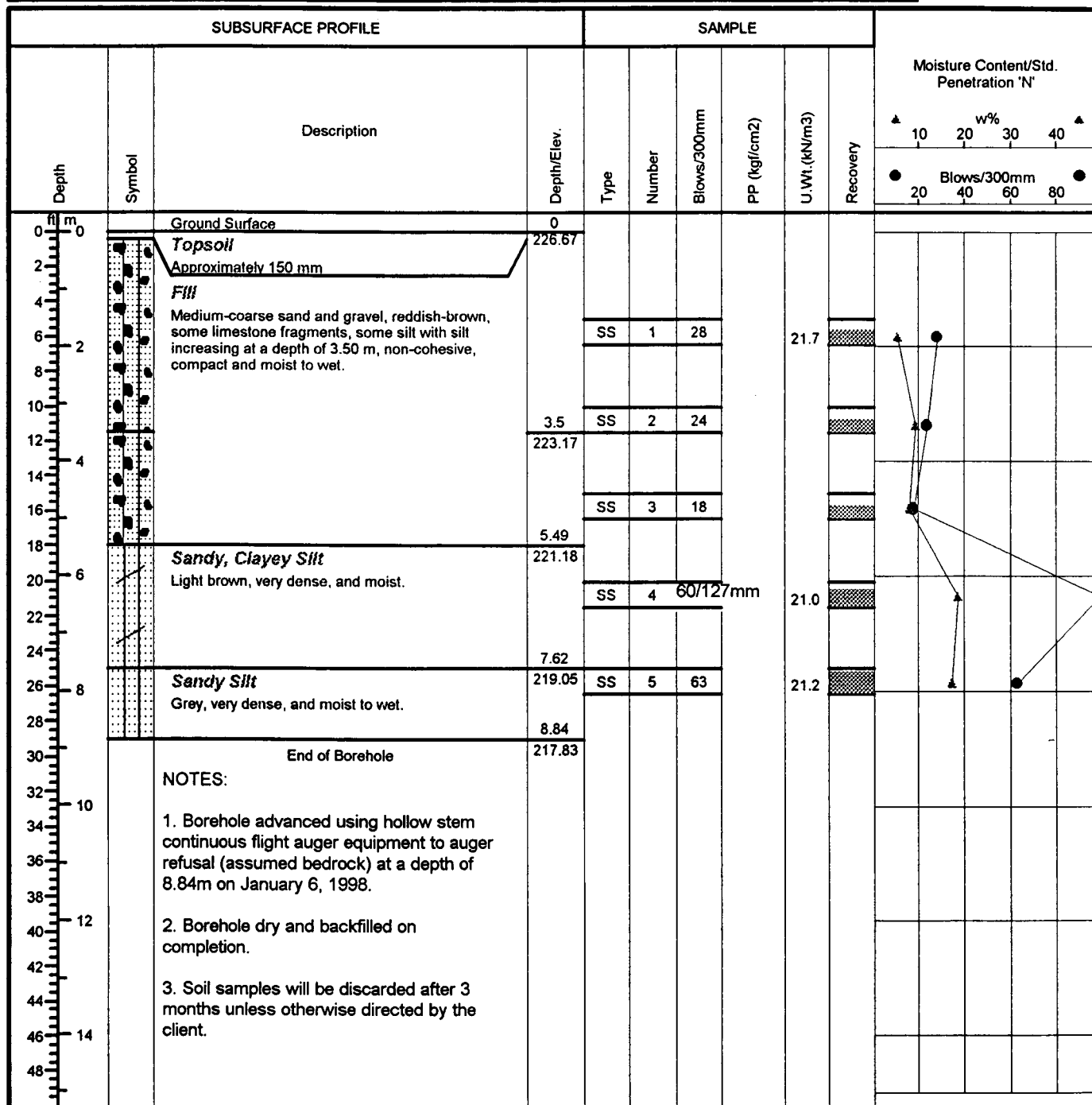
Borehole Location: Sta.: 10+419.289

Offset: 5.079

Project Manager: John Monkman, P.Eng.



Soil-Mat



Drill Method: Hollow Stem auger

Drill Date: January 6, 1998

Hole Size: 150 mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97-027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-W

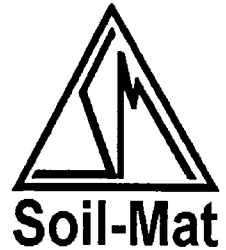
Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1503
(SM Borehole No.: 503)

Borehole Location: Sta.: 10+432.198

Offset: 23.735

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---------------------------------------|--|-----------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U Wt. (kN/m ³) | Recovery | w% | | Blows/300mm | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ | | ● 20 40 60 80 ● | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 219.3 | | | | | | | | | | |
| 2 | | Approximately 250 mm | | | | | | | | | | | |
| 4 | | Sandy Silt Till | 1.17 | SS | 1 | 74/229mm | | 21.2 | | | | | |
| 6 | | Fine, brown, coarse gravel, limestone fragments in tip non-cohesive, very dense, and moist to wet. | 218.13 | | | | | | | | | | |
| 8 | | End of Borehole | | | | | | | | | | | |
| 10 | | NOTES: | | | | | | | | | | | |
| 12 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.17m on January 6, 1998. | | | | | | | | | | | |
| 14 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | | |
| 16 | | 3. Close proximity to ditch with standing water. | | | | | | | | | | | |
| 18 | | 4. Soil sample will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
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| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 6, 1998

Hole Size: 150 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

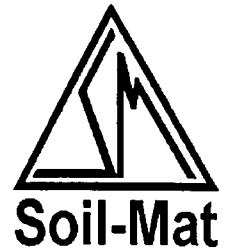
Borehole # 1903

(SM Borehole No.: 903)

Borehole Location: Sta.: 10+437.567

Offset: 33.717

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0.6 | | Asphaltic Concrete | 220.43 | | | | | | | | | | |
| 2 | | 75 mm | 219.83 | | | | | | | | | | |
| 4 | | Granular "A" | | SS | 1 | 30 | | | | | | | |
| 6 | | Approximately 150 mm Crusher Run Limestone, compact. | | SS | 2 | 21 | | 20.3 | | | | | |
| 8 | | Granular "B" | 2.29 | | | | | | | | | | |
| 10 | | Approximately 380 mm Crusher Run Sand and Gravel, compact. | 218.14 | | | | | | | | | | |
| 12 | | Clayey Silt to Silty Clay | | | | | | | | | | | |
| 14 | | Grey, non-cohesive, compact and moist - wel. | | | | | | | | | | | |
| 16 | | End of Borehole | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
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| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.29m on January 8, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

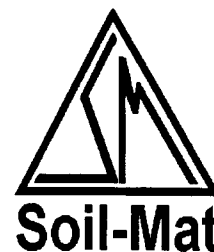
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5019

Borehole Location: Sta: 10+431.156

Offset: -12.097

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Topsoil | 225.96 | | | | | | |
| 2 | | Approximately 150 mm | | | | | | | |
| 4 | | Fill Mix | | | | | | | |
| 6 | | Light and reddish brown, some staining some clay, some gravel, some sandy silt, moist, compact | | | | | | | |
| 6 | | | | SS | 1 | 20 | | | |
| 8 | | | | | | | | | |
| 10 | | | 3.01 | | | | | | |
| 10 | | Fine Sandy Silt | 222.96 | | | | | | |
| 12 | | Grey, some clay, trace of rootlets, moist, compact | | SS | 2 | 27 | | | |
| 12 | | | 3.81 | | | | | | |
| 14 | | End of Borehole | 222.15 | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 | | | | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
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| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (probable boulder) at a depth of 3.81m on May 26, 1999.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: May 26, 1999

Hole Size: 200 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

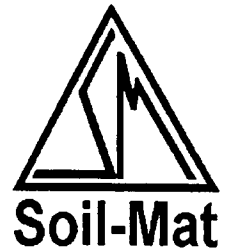
Borehole # 1904

(SM Probehole No.: 904)

Borehole Location: Sta.: 10+462.829

Offset: 25.93

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|-------------|---------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm2) | U.Wt. (kN/m3) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| | | | | | | | | | | <div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0.48 | | Asphaltic Concrete | 221.77 | | | | | | | | | | |
| 2 | | 75 mm | 221.30 | | | | | | | | | | |
| 4 | | Granular "A" | | | | | | | | | | | |
| 6 | | Approximately 380 mm Crusher Run Limestone, compact. | | | | | | | | | | | |
| 8 | | Granular "B" | | | | | | | | | | | |
| 10 | | Approximately 225 mm Crusher Run Sand and Gravel, compact. | 2.8 | | | | | | | | | | |
| 12 | | Sandy Silt | 218.97 | | | | | | | | | | |
| 14 | | Grey, very fine, traces of clay, non-cohesive, compact, native, moist to wet with wet layers starting at 1.85 m | | | | | | | | | | | |
| 16 | | End of Borehole | | | | | | | | | | | |
| 18 | | NOTES: | | | | | | | | | | | |
| 20 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.80m on January 8, 1998. | | | | | | | | | | | |
| 22 | | 2. Probehole dry and backfilled on completion. | | | | | | | | | | | |
| 24 | | 3. No samples taken. | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
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| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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130 Lancing Drive, Hamilton, ON L8W 3A1
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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

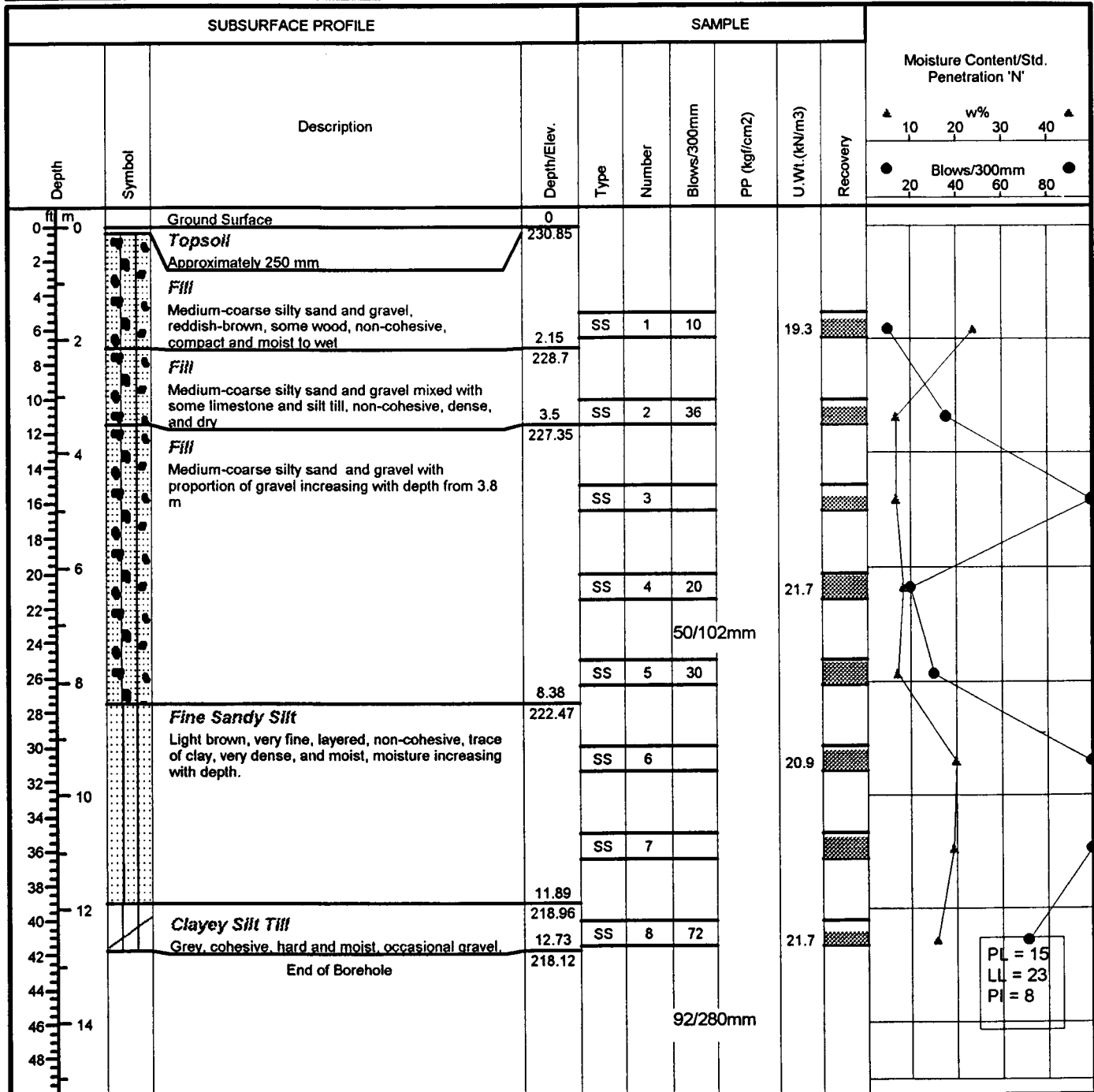
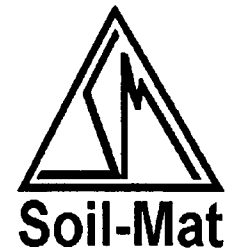
Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1110
(SM Borehole No.: 110)

Borehole Location: Sta.: 10+464.971

Offset: 3.271

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 6, 1998

Hole Size: 150 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-W

Client: Region of Hamilton/Wentworth [SPO]

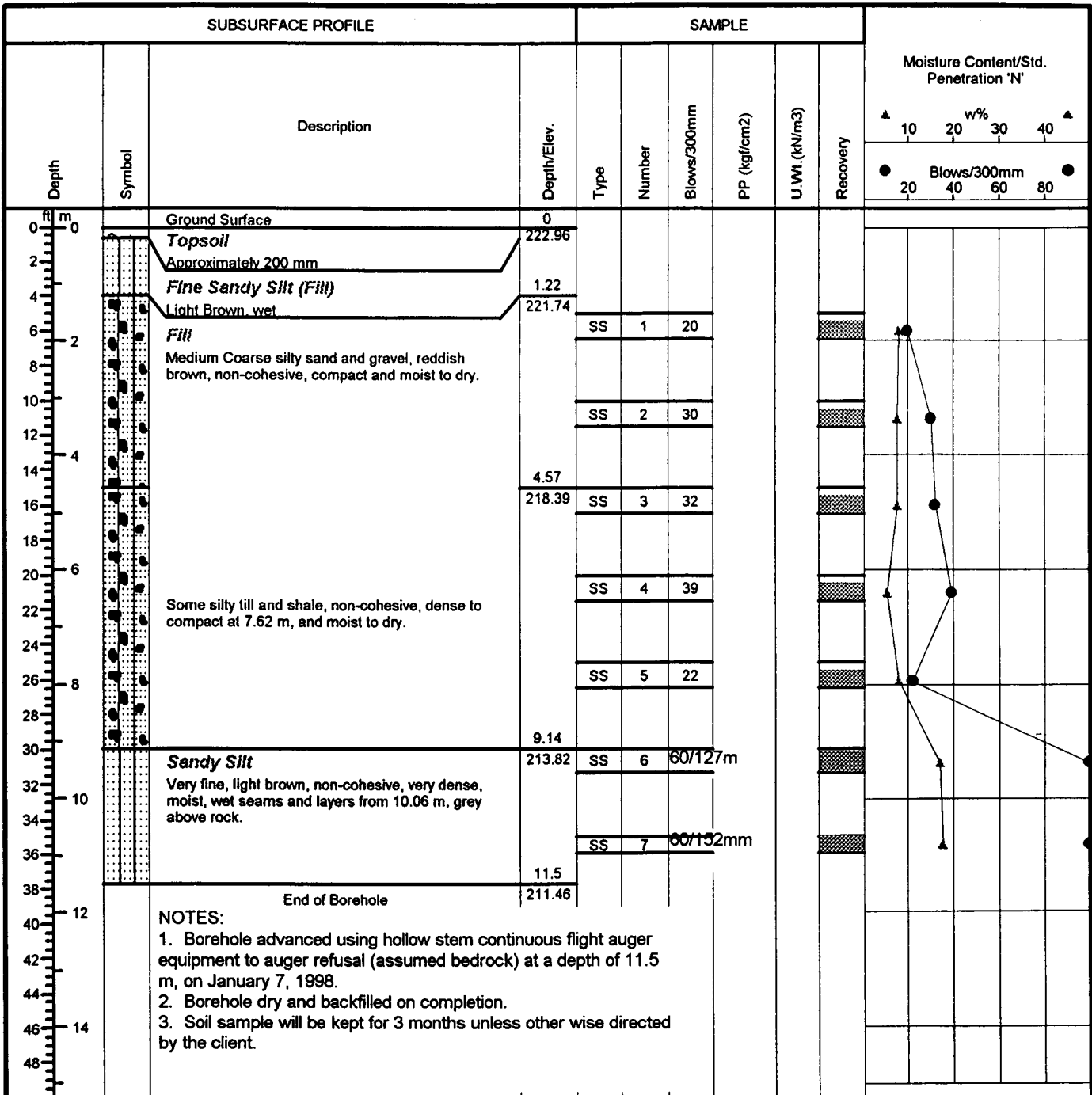
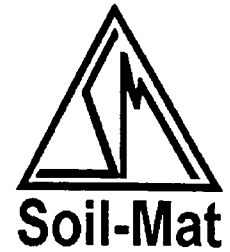
Borehole # 1504

(SM Borehole No.: 504)

Borehole Location: Sta.: 10+482.174

Offset: 9.279

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 7, 1998

Hole Size: 150 mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1905

(SM Borehole No.: 905)

Borehole Location: Sta.: 10+487.635

Offset: 37.37

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0.58 | | Asphaltic Concrete | 222.96 | | | | | | | |
| 2 | | Approximately 75 mm | 222.38 | | | | | | | |
| 4 | | Granular "A" | | | | | | | | |
| 6 | | Approximately 230 mm Crusher Run Limestone, compact. | | SS | 1 | 75 | | | | |
| 8 | | Granular "B" | | | | | | | | |
| 10 | | Approximately 360 mm Crusher Run Sand and Gravel, compact. | | | | | | | | |
| 12 | | Sandy Silt | 3.23 | | | | | | | |
| 14 | | Light brown, very fine, traces of clay, non-cohesive, very dense and moist. wet layers, grey at 3.0 m with limestone in tip. | 219.73 | | | | | | | |
| 16 | | End of Borehole | | | | | | | | |
| 18 | | | | | | 60/25mm | | | | |
| 20 | | NOTES: | | | | | | | | |
| 22 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.23m on January 8, 1998. | | | | | | | | |
| 24 | | 2. Borehole dry and backfilled on completion. | | | | | | | | |
| 26 | | 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
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| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

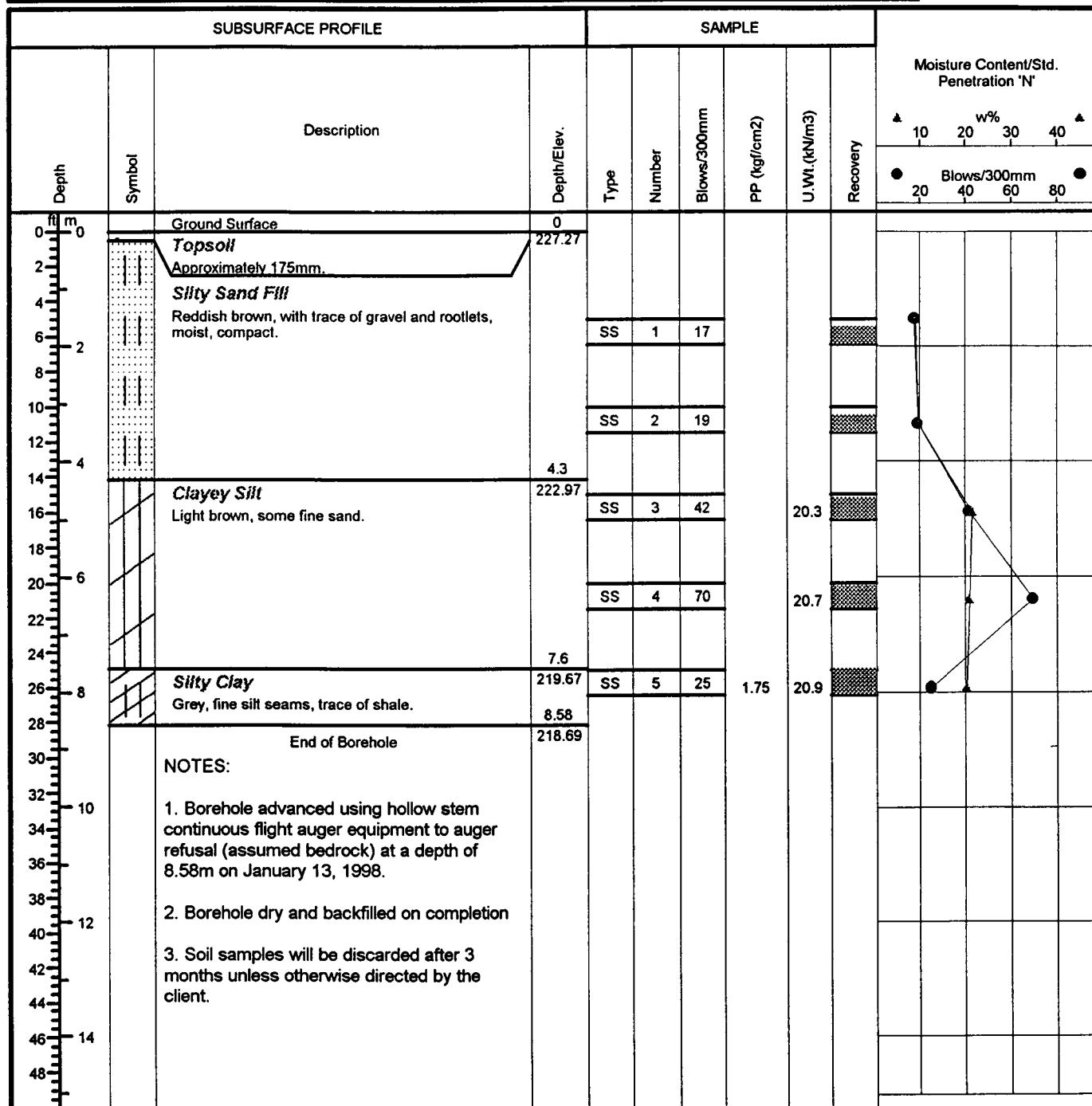
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1111
(SM Borehole No.: 111)

Borehole Location: Sta.: 10+513.69

Offset: -8.313

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 13, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 1906

(SM Borehole No.: 906)

Borehole Location: Sta.: 10+519.603

Offset: 38.423

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Asphaltic Concrete | 224.81 | | | | | | | |
| 2 | | Approximately 75 mm | 0.562 | | | | | | | |
| 2 | | Granular "A" | 224.25 | | | | | | | |
| 4 | | Approximately 125 mm Crusher Run Limestone, compact. | 1.8 | SS | 1 | 26 | | | | |
| 6 | | Granular "B" | 223.01 | | | | | | | |
| 8 | | Approximately 360 mm Crusher Run Sand and Gravel. | 3 | | | | | | | |
| 10 | | Fill | 221.81 | SS | 2 | 66 | | 21.3 | | |
| 12 | | Reddish Brown, medium coarse silty sand and gravel, compact, non-cohesive, moist. | | | | | | | | |
| 14 | | Clayey Silt | | | | | | | | |
| 16 | | Light brown, fine sand, non-cohesive, compact and moist. | | | | | | | | |
| 18 | | Sandy, Clayey Silt (Till) | 5.54 | | | | | | | |
| 20 | | Light brown, very fine, oxidized, very dense, moist. Encountered grey at 3.96 m, non-cohesive and compact. | 219.27 | | | | | | | |
| 22 | | End of Borehole | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
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| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 5.54m on January 8, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5022

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta: 10+522.440

Location: Ramp N-E

Offset: -36.247

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | UWt. (kN/m ³) | Recovery | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 221.77 | | | | | | | | | | |
| 2 | | Approximately 150 mm | | | | | | | | | | | |
| 4 | | Fill Mix | | | | | | | | | | | |
| 6 | | Reddish brown, some clay, some gravel, some limestone sand, dense | 2.4 | SS | 1 | 34 | | | | | | | |
| 8 | | | 219.37 | | | | | | | | | | |
| 10 | | Clayey Silt | 3.45 | SS | 2 | 22 | > 4.5 | 21.8 | | | | | |
| 12 | | Grey, very stiff, trace of gravel, trace of limestone. | 218.32 | | | | | | | | | | |
| 14 | | End of Borehole | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
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| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
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| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.45 m on May 26, 1999.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: May 26, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

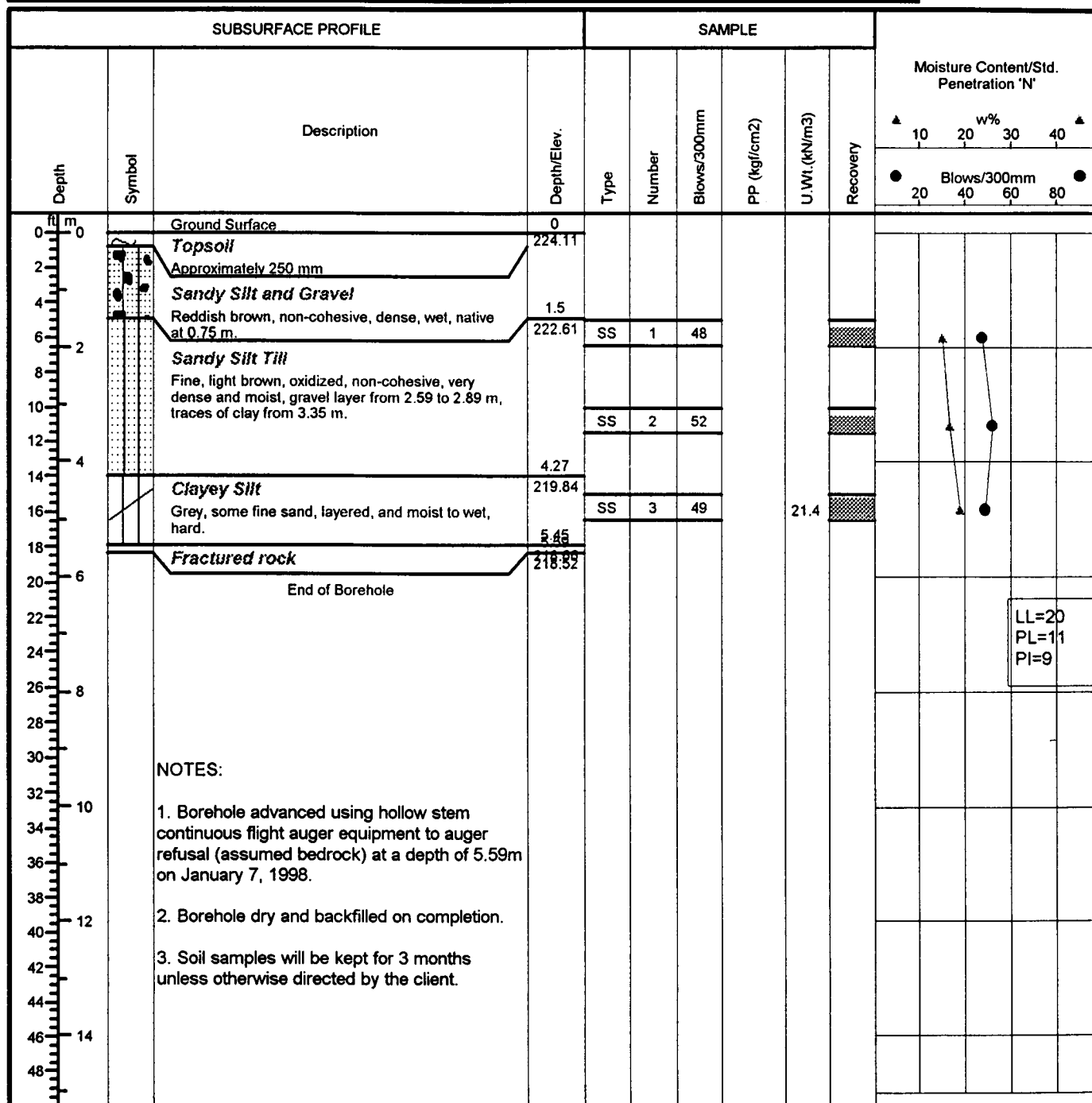
Borehole # 1505

(SM Borehole No.: 505)

Borehole Location: Sta.: 10+531.297

Offset: 6.519

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 7, 1998

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1003

(SM Corehole No.: A)

Borehole Location: Sta.: 10+557.751

Offset: -33.919

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U Wt. (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | | | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ | | | |
| | | | | | | | | | | ● 20 40 60 80 ● | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 220.98 | | | | | | | | | | |
| 2 | | Approximately 150mm. | | | | | | | | | | | |
| 4 | | Fine Sandy Silt | | | | | | | | | | | |
| 6 | | Light brown, compact. | | SS | 1 | 23 | | | | | | | |
| 8 | | | 2.77 | | | | | | | | | | |
| 10 | | Dolostone/Limestone Bedrock | 218.21 | | | | | | | | | | |
| 12 | | Thin-bedded to massive, Dark to light brown-grey, fine crystalline, with vug-filled mineralization and some chert nodules and lenses. | | Core | 1 | | | | | | | | |
| 14 | | Core run #1: RQD=62, Recovery=91% | | | | | | | | | | | |
| 16 | | | | Core | 2 | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | Core run #2: RQD=28, Recovery=100% | 5.79 | | | | | | | | | | |
| 22 | | End of Borehole | 215.19 | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | NOTES: | | | | | | | | | | | |
| 34 | | 1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 2.77m and cored with a diamond tipped core barrel to a depth of 5.79m on January 20, 1998. | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | 3. Samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 20, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1112

(SM Borehole No.: 112)

Borehole Location: Sta.: 10+566.981

Offset: -24.68

Project Manager: John Monkman, P.Eng.



Soil-Mat

| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 220.96 | | | | | | | | | | |
| 2 | | Approximately 150mm. | | | | | | | | | | | |
| 4 | | Fine Sandy Silt | | | | | | | | | | | |
| 6 | | Light brown to grey, trace of clay, oxidized. | | | | | | | | | | | |
| 6 | | | 2.87 | SS | 1 | 35 | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 10 | | End of Borehole | 218.09 | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
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| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.87m on January 21, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by client.

Drill Method: Hollow Stem auger

Drill Date: January 13, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

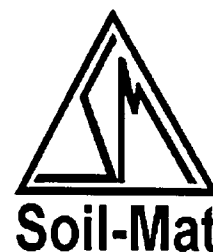
Borehole # 1506

(SM Borehole No.: 506)

Borehole Location: Sta.: 10+577.806

Offset: 1.24

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|-------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | 10 20 30 40 | 20 40 60 80 |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 0 | | Fill | 220.96 | | | | | | | | |
| 2 | | Silty sand and gravel, medium coarse, slightly stained, some clay, non-cohesive, moist. Increasing clayey silt and shale mixture toward intersection of native at 2.15 m. | | | | | | | | | |
| 2 | | | 2.15 | SS | 1 | 6 | | | | | |
| 2 | | Sandy Silt | 218.81 | | | | | | | | |
| 3 | | Light brown, fine, some clay, non-cohesive, compact and moist. | 3 | | | | | | | | |
| 3 | | | 217.96 | | | | | | | | |
| 4 | | End of Borehole | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
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| 48 | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.00m on January 8, 1998.

2. Water level was observed at 2.29m and cave at 2.47m, and borehole dry and backfilled on completion.

3. Soil sample will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027

Borehole # 5073

Project: LINC/Hwy 403/Mohawk Road Interchange

Borehole Location: Ramp N-E

Location: Ancaster, Ontario

Sta. 10+598.852, Offset: -45.124

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U Wt (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Topsoil | 222.64 | | | | | | |
| | | Approximately 150 millimetres | | | | | | | |
| 2 | | Sandy Silt | | | | | | | |
| | | Brown, trace of clay and fine gravel, fill in upper level, compact to dense. | | | | | | | |
| 4 | | | | | | | | | |
| 6 | | | | | | | | | |
| 8 | | | | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 14 | | End of Borehole | 218.35 | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 | | | | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |

Notes:

1. Borehole advanced with hollow stem auger equipment to auger refusal [assumed bedrock] at depth of 4.29 metres on June 18, 1999.
2. Borehole 'dry' and backfilled on completion.
3. No sampling of subsoil.

Drill Method: Hollow Stem

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: June 18, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: JM

Hole Size: 200mm

Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: RAMP N-E (Culvert #1)

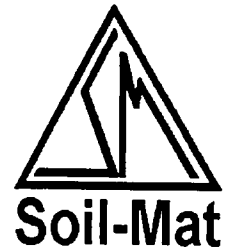
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1012
(SM Borehole No.: C1-2)

Borehole Location: Sta.: 10+613.136

Offset: -0.117

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Fill | 219.51 | | | | | | | | | | |
| 4 | | Silty clay and sandy silt mix, brown and moist. Topsoil in tip, stained, sandy, blackish, non-cohesive and compact. | | SS | 1 | 11 | | | | | | | |
| 6 | | | 1.83 | SS | 2 | 9 | | | | | | | |
| 8 | | Sandy Silt | 217.68 | | | | | | | | | | |
| 10 | | Light brown, fine, compact, non-cohesive, and moist. Changing to grey with greater depth. | 2.92 | SS | 3 | 30 | | | | | | | |
| 12 | | End of Borehole | 216.59 | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.92m on January 8, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 8, 1998

Hole Size: 150 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

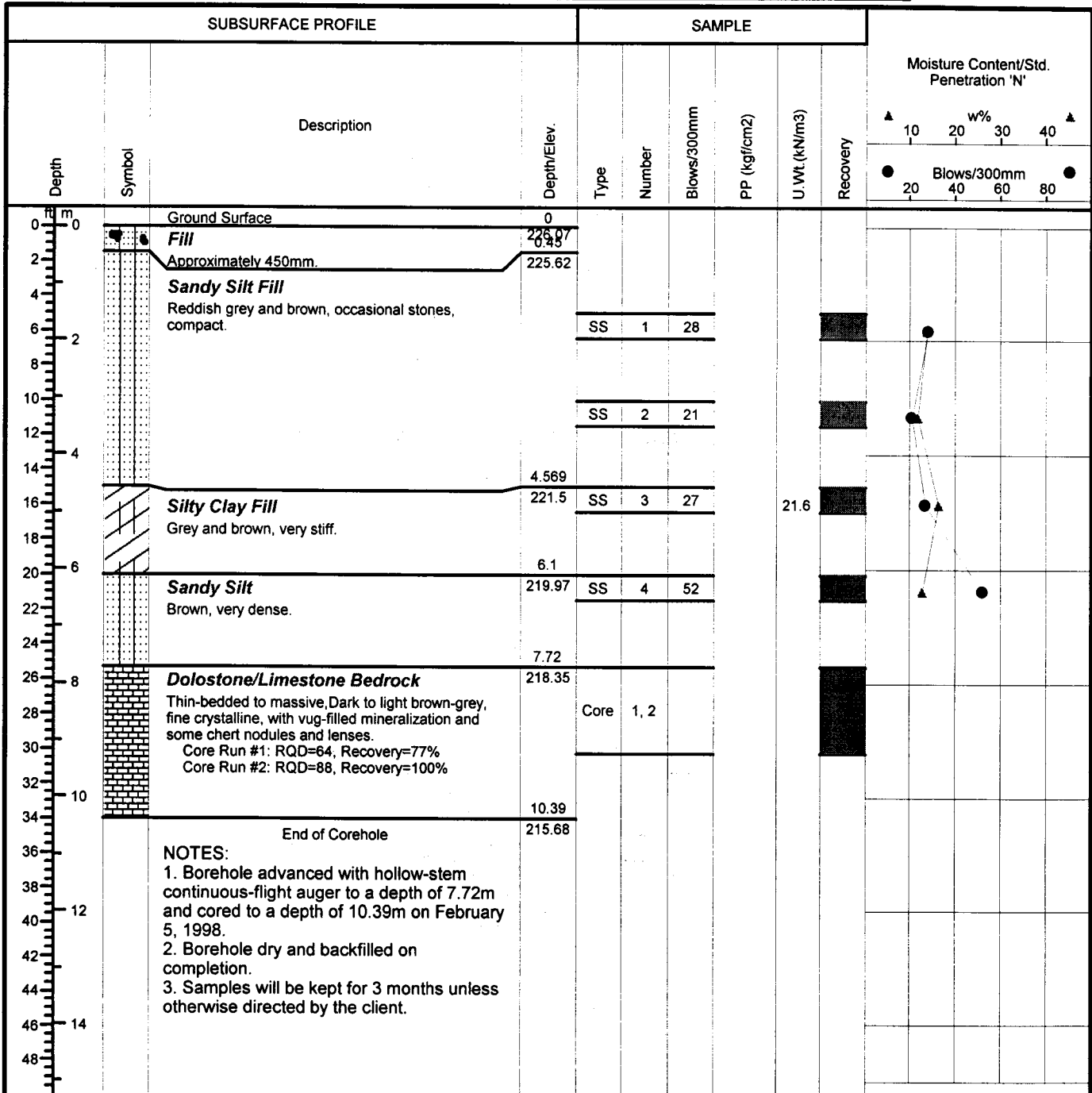
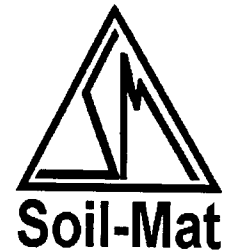
Corehole # 1023

(SM Corehole No.: C)

Corehole Location: Sta.: 10+660.971

Offset: -31.088

Project Manager: John Monkman, P.Eng



Drill Method: Hollow Stem auger

Drill Date: February 5, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

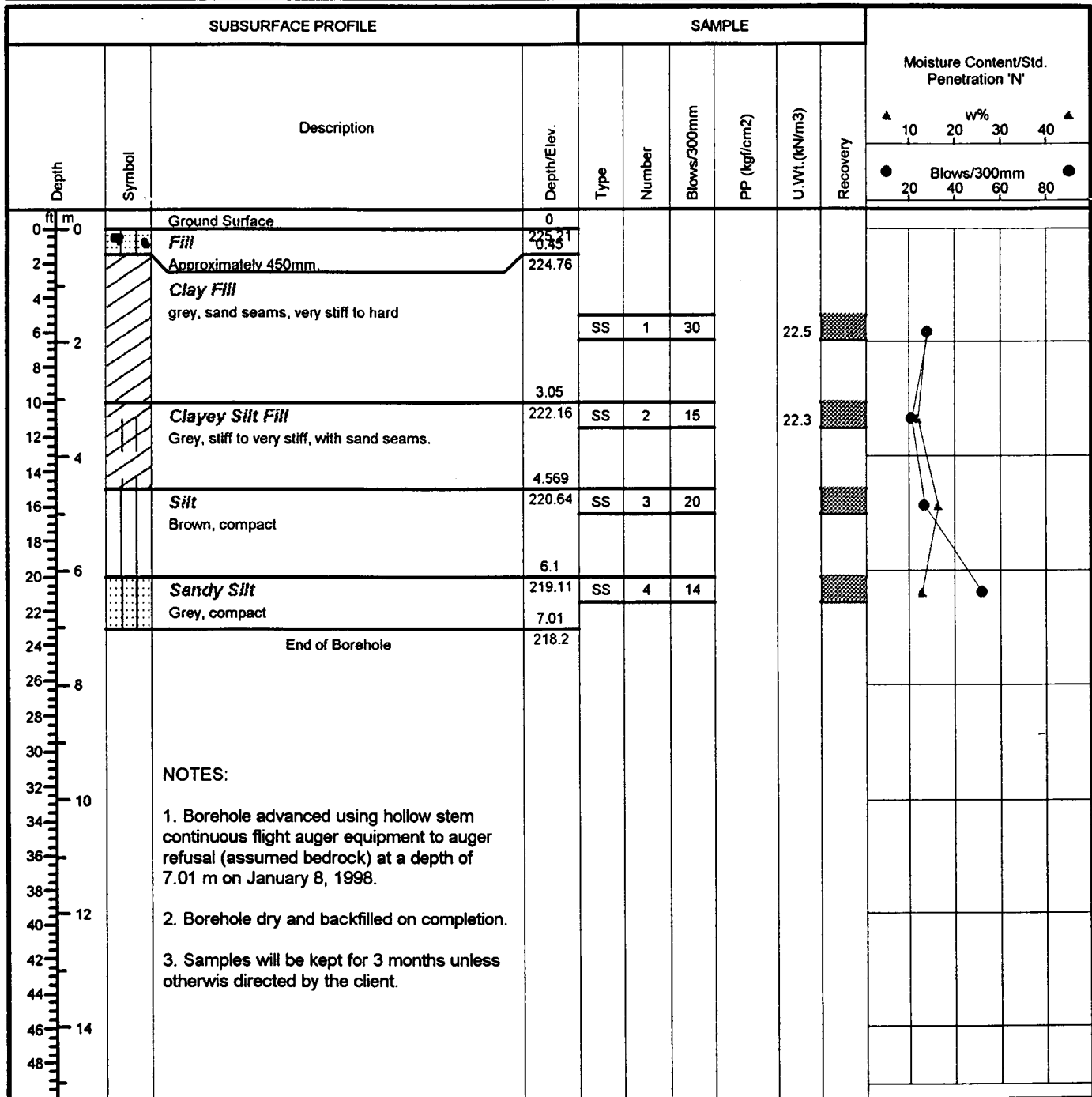
Borehole # 1022

(SM Borehole No.: C2-2)

Borehole Location: Sta.: 10+680.477

Offset: -18.068

Project Manager: John Monkman, .Eng.



Drill Method: Hollow Stem auger

Drill Date: February 5, 1998

Hole Size: 200mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

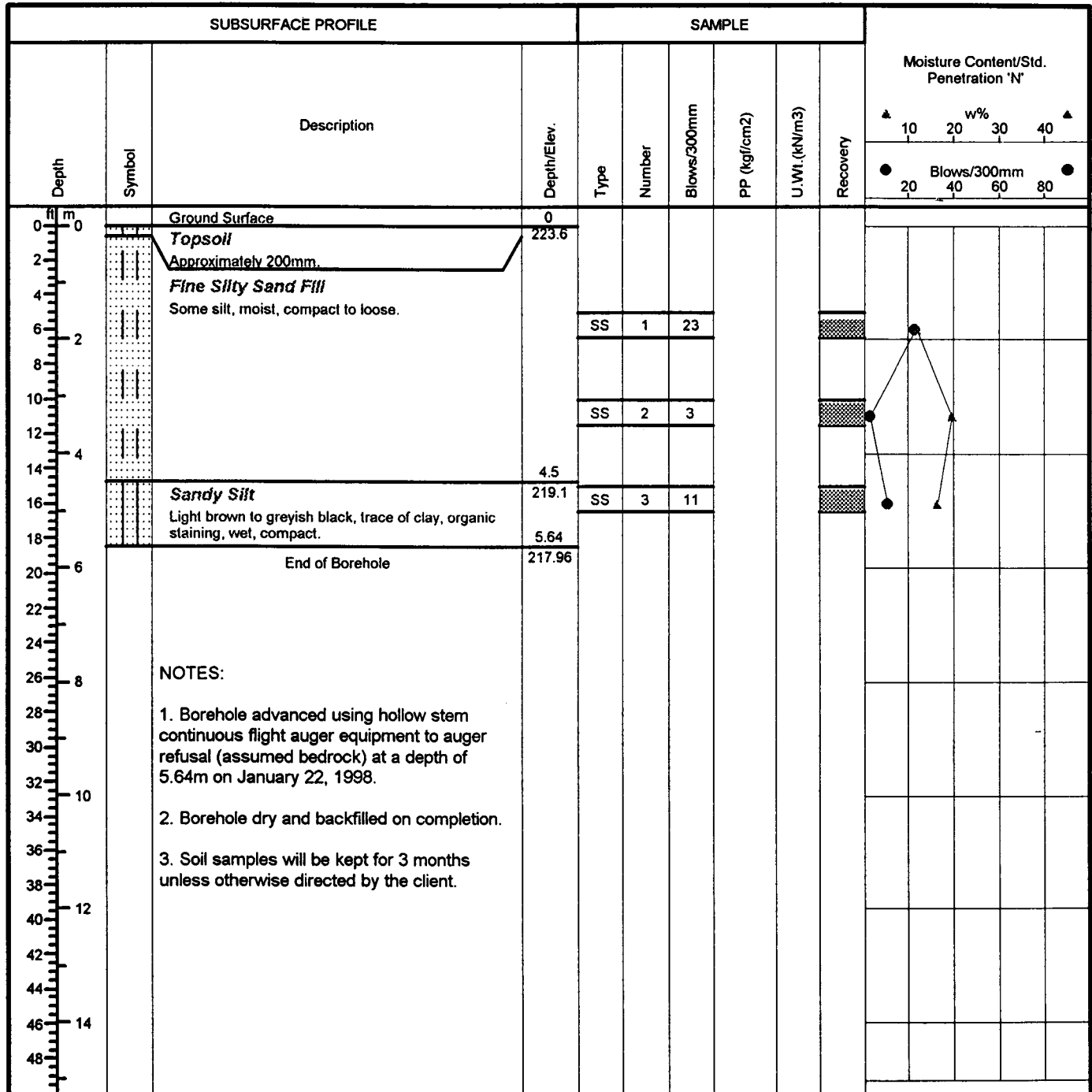
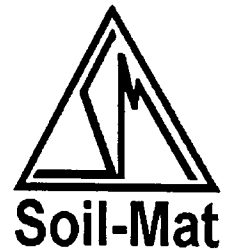
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1031
(SM Borehole No.: C3-1)

Borehole Location: Sta.: 10+692.022

Offset: -36.095

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 22, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1032
(SM Borehole No.: C3-2)

Borehole Location: Sta.: 10+700.312

Offset: -61.701

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | | | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ w% ● 20 40 60 80 ● Blows/300mm | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Topsoil | 220.27 | | | | | | | | | | |
| | | Approximately 225mm. | | | | | | | | | | | |
| 4 | | Clayey Silt / Sandy Silt | | | | | | | | | | | |
| 6 | | Brownish grey to light brown, trace of organic material, probable fill in upper level, moist. | | SS | 1 | 7 | | | | | | | |
| 8 | | | 2.72 | | | | | | | | | | |
| 10 | | End of Borehole | 217.55 | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | NOTES: | | | | | | | | | | | |
| 22 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.72m on January 22, 1998. | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 22, 1998

Hole Size: 200mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

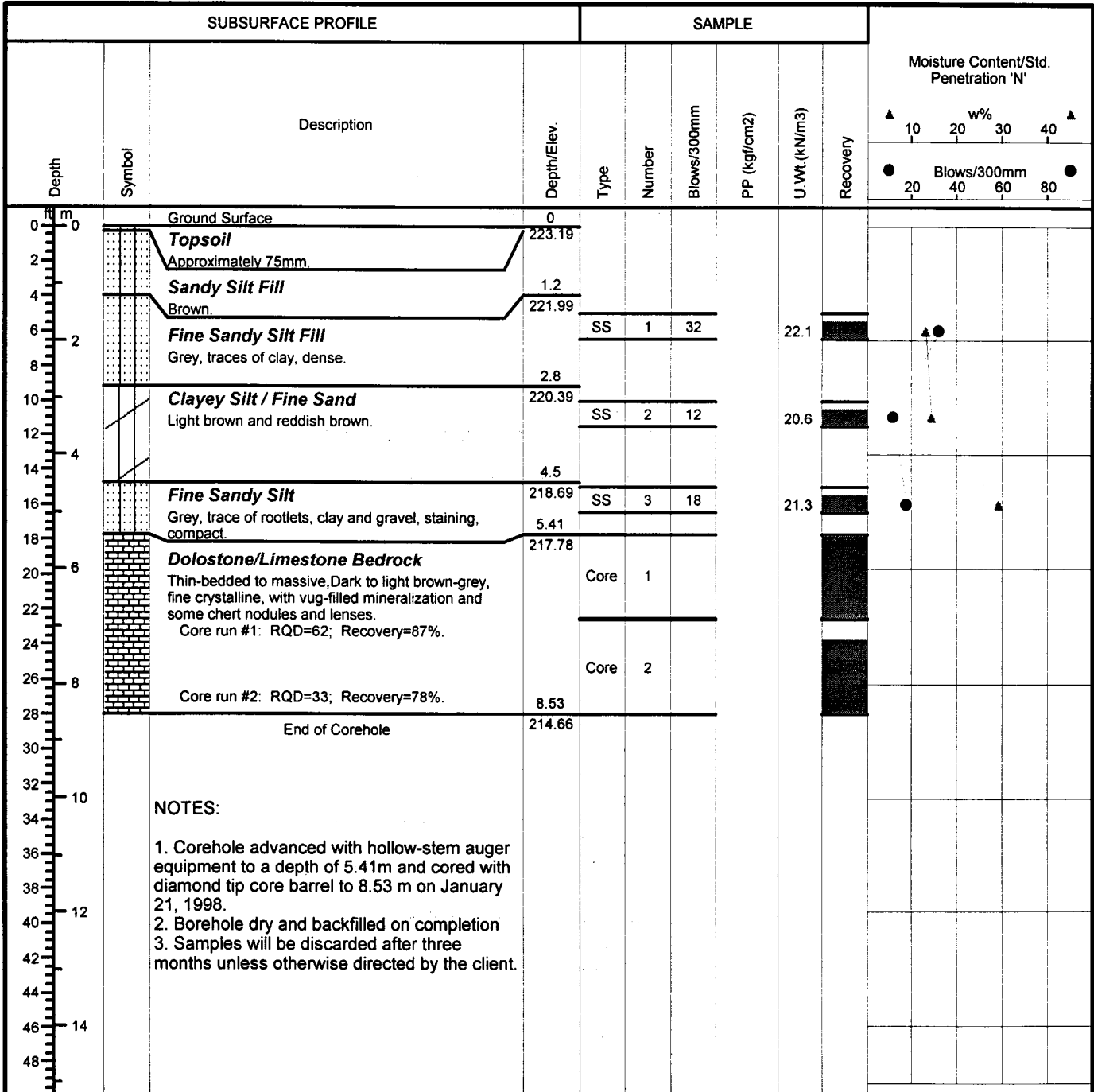
Client: Region of Hamilton-Wentworth [SPO]

Corehole # 1004
(SM Corehole No.: B)

Corehole Location: Sta.: 10+709.578

Offset: -33.041

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: January 21, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hay 403/Mohawk Road Interchange

Location: Ancaster, Ontario

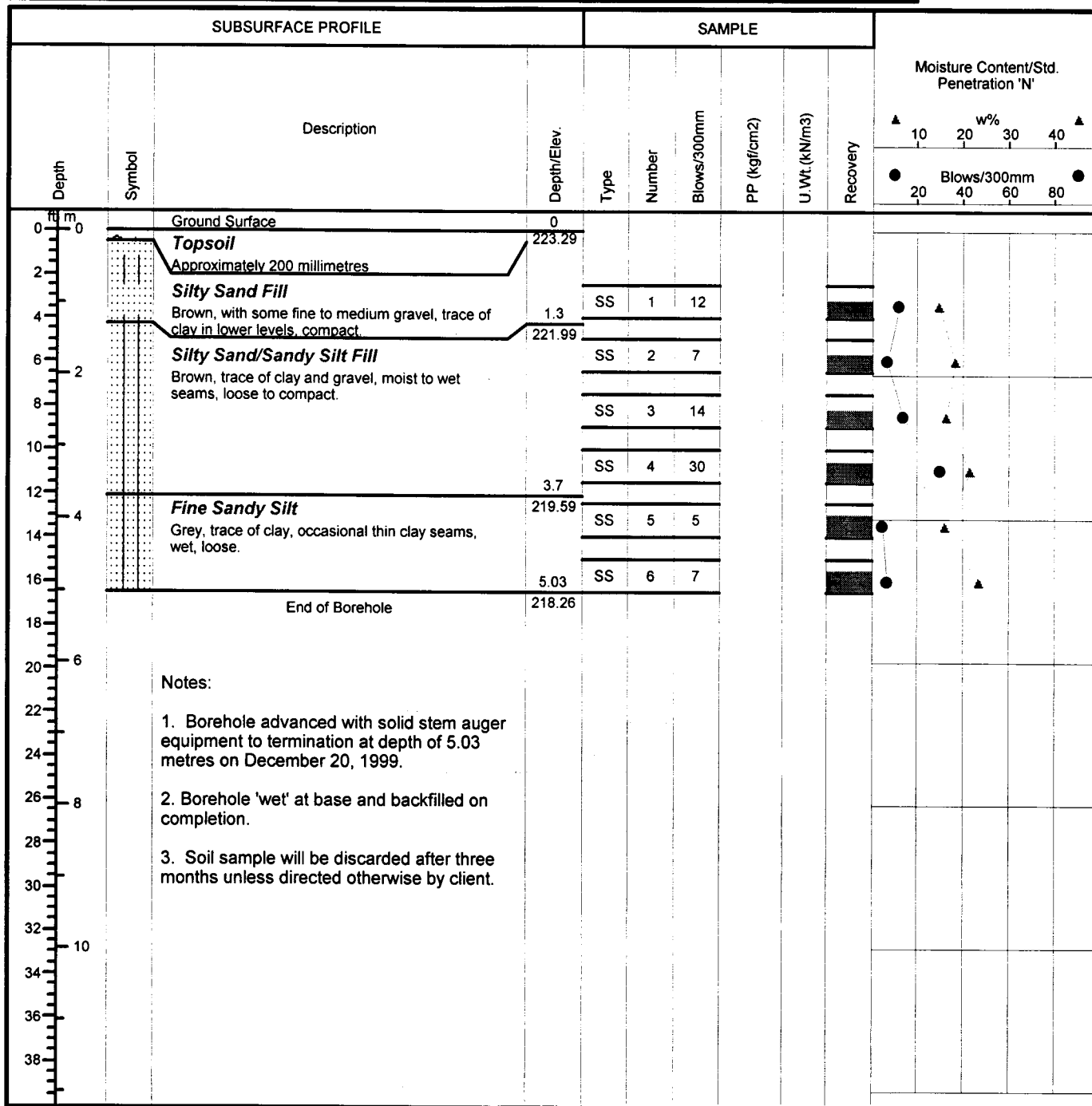
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5543 [SM No.: 13]

Borehole Location: Ramp N-E

Sta. 10+749.580, Offset: 0.775

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: December 20, 1999

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

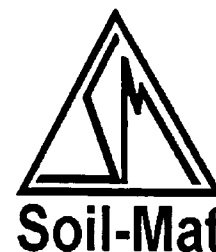
Borehole # 1517

(SM Borehole No.: 517)

Borehole Location: Sta.: 10+755.074

Offset: -52.214

Project Manager: John Monkman, P.Eng



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|--------------|----------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt (kN/m3) | Recovery | | |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 2 | | Sand and Gravel Fill moist, compact. | 223.78 | | | | | | | | |
| 4 | | | 1.5 | | | | | | | | |
| 6 | | Fine Sandy Silt Brown to grey, oxidized, probable fill in upper level, moist, compact. | 222.28 | SS | 1 | 15 | | | | | |
| 8 | | | 3 | | | | | | | | |
| 10 | | Clayey Silt Greyish brown, some fine sand, traces of gravel. | 220.78 | SS | 2 | 18 | | | | | |
| 12 | | | 4.5 | | | | | | | | |
| 14 | | Fine Sandy Silt Light brown, oxidized. | 219.28 | SS | 3 | 27 | | | | | |
| 16 | | | 5.03 | | | | | | | | |
| 18 | | End of Borehole | 218.75 | | | | | | | | |
| 20 | | | | | | | | | | | |
| 22 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 32 | | | | | | | | | | | |
| 34 | | | | | | | | | | | |
| 36 | | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 40 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 5.03m on January 21, 1998.

2. Water level observed at 3.46m, cave at 4.04m, and borehole backfilled on completion.

3. Soil samples will be kept for 3 months unless otherwise directed by client.

Moisture Content/Std. Penetration 'N'

10 20 30 40

20 40 60 80

Blows/300mm

w%

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 5.03m on January 21, 1998.
2. Water level observed at 3.46m, cave at 4.04m, and borehole backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by client.

Drill Method: Hollow Stem auger

Drill Date: January 21, 1998

Hole Size: 200mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Borehole # 5028

Project: LINC/Hwy403/Mohawk Road Interchange

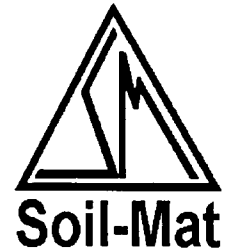
Borehole Location: Sta: 10+768.274

Location: Ramp N-E

Offset: -25.401

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|-------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | 10 20 30 40 | 20 40 60 80 |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 2 | | Fill | 223.15 | | | | | | | | |
| 4 | | brown to grey, sandy silt to silty sand, with organics, moist, compact. | | | | | | | | | |
| 6 | | | | SS | 1 | 16 | | | | | |
| 8 | | | | SS | 2 | 18 | | | | | |
| 10 | | | 3.4 | SS | 3 | 11 | | | | | |
| 12 | | Silt to Clayey silt | 219.75 | | | | | | | | |
| 14 | | Grey, moist, soft to firm. | | | | | | | | | |
| 16 | | | | SS | 4 | 7 | | | | | |
| 18 | | | 5.92 | | | | | | | | |
| 20 | | End of Borehole | 217.23 | | | | | | | | |
| 22 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 32 | | NOTES: | | | | | | | | | |
| 34 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 5.92 m on June 4, 1999. | | | | | | | | | |
| 36 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | |
| 38 | | 3. Soil samples will be kept for 3 months unless otherwise directed by the client. | | | | | | | | | |
| 40 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: June 4, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5027

Borehole Location: Sta: 10+815.643

Offset: -1.934

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U Wt (kN/m ³) | | |
| 0 m | | Ground Surface | 0 | | | | | | | |
| 2 | | Fill | 223.87 | | | | | | | |
| 4 | | Brown to reddish brown, sandy silt to silty sand with some gravel, moist, loose to compact. | | | | | | | | |
| 6 | | | | SS | 1 | 5 | | | | |
| 8 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | SS | 2 | 13 | | | | |
| 14 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 18 | | Silt | 218.87 | | | | | | | |
| 20 | | Grey, with fine sand, moist to wet, loose to compact. | | | | | | | | |
| 22 | | | 6.2 | | | | | | | |
| 24 | | End of Borehole | 217.67 | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 42 | | | | | | | | | | |
| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 6.20 m on June 4, 1999.
2. Borehole dry and backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 4, 1999

Hole Size: 200 mm

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Datum: Geodetic

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Sheet: 1 of 1

Borehole # 5026

Project: LINC/Hwy403/Mohawk Road Interchange

Borehole Location: Sta: 10+851.575

Location: Ramp N-E

Offset: 28.801

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.

[illegible]

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: June 4, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455

Checked by: RGH

Hole Size: 200 mm

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: Expressway/ 403 Interchange

Location: Ramp N-E (Bridge # 2)

Client: Reg. Municipality of Hamilton-Wentworth

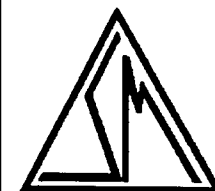
Borehole # 1521

(SM Corehole No.: 521)

Borehole Location: Sta.: 10+816.5

Offset: -0.3

Project Manager: John Monkman



Soil-Mat

| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U Wt. (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' | | | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ ● 20 40 60 80 ● | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Topsoil | 221.05 | | | | | | | | | | |
| 2 | | Approximately 200mm. | | | | | | | | | | | |
| 4 | | Fine Sandy Silt | 1.63 | SS | 1 | 10 | | | | | | | |
| 6 | | Light brown, limestone pieces, trace of rootlets, oxidized, loose to compact | 219.42 | | | | | | | | | | |
| 8 | | Dolostone/Limestone Bedrock | | Core | 1 | | | | | | | | |
| 10 | | Thin-bedded to massive, Dark to light brown-grey, fine crystalline, with vug-filled mineralization and some chert nodules and lenses. | | | | | | | | | | | |
| 12 | | Core run #1: RQD=42; Recovery=100% | | | | | | | | | | | |
| 14 | | | | Core | 2 | | | | | | | | |
| 16 | | Core run #2: RQD=11; Recovery=97% | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | Core run #3: RQD=14; Recovery=97% | 6.1 | Core | 3 | | | | | | | | |
| 22 | | End of Borehole | 214.95 | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous flight auger to bedrock at 1.63 m and cored with diamond tipped core barrel to 6.1 m on January 30, 1998.

2. Borehole backfilled on completion.

3. Soil samples will be kept for 3 months unless otherwise directed by client.

NOTES:

1. Borehole advanced with hollow-stem continuous flight auger to bedrock at 1.63 m and cored with diamond tipped core barrel to 6.1 m on January 30, 1998.
2. Borehole backfilled on completion.
3. Soil samples will be kept for 3 months unless otherwise directed by client.

Drill Method: Hollow Stem

Drill Date: January 30, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1522

(SM Borehole No.: 522)

Borehole Location: Sta.: 11+013.145

Offset: -29.675

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Sid. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---------------------------------------|-----------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | ▲ 10 20 30 40 ▲ | ● 20 40 60 80 ● |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 2 | | Sandy Silt | 220.82 | | | | | | | | |
| 4 | | Light brown, traces of clay, gravel and rootlets, oxidized. | 1.37 | SS | 1 | 11 | | | | | |
| 6 | | End of Borehole | 219.45 | | | | | | | | |
| 8 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 12 | | NOTES: | | | | | | | | | |
| 14 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.37m on January 29, 1998. | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 20 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | |
| 22 | | | | | | | | | | | |
| 24 | | 3. Soil sample will be kept for 3 months unless otherwise directed by client. | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 32 | | | | | | | | | | | |
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| 40 | | | | | | | | | | | |
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| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 29, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1042
(SM Borehole No.: C4-2)

Borehole Location: Sta.: 11+013.592

Offset: 0.447

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | | | | |
| 0 m | | Ground Surface | 0 | | | | | | ▲ 10 20 w% 30 40 ▲ | | | |
| 2 | | Topsoil | 220.85 | | | | | | ● 20 Blows/300mm 40 60 80 ● | | | |
| | | Approximately 300mm. | | | | | | | | | | |
| 4 | | Fine Sandy Silt | | SS | 1 | 10 | | | | | | |
| | | Brown, slightly stained, oxidized, wet, compact. | 1.52 | | | | | | | | | |
| 6 | | End of Borehole | 219.33 | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
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| 24 | | | | | | | | | | | | |
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| 28 | | | | | | | | | | | | |
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| 38 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.52m on January 29, 1998.
2. Borehole dry and backfilled on completion.
3. Soil sample will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: January 29, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 1041

(SM Borehole No.: C4-1)

Borehole Location: Sta.: 11+016.700

Offset: -56.764

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--|--------|---|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---------------------------------------|--|-------------|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' | | | | |
| | | | | | | | | | | w% | | Blows/300mm | | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ | | | | |
| | | | | | | | | | | ● 20 40 60 80 ● | | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | | |
| 0 | | Topsoil | 220.24 | | | | | | | | | | | |
| 2 | | Approximately 300mm. | 0.56 | | | | | | | | | | | |
| 2 | | Fine Sandy Silt | 219.68 | | | | | | | | | | | |
| 2 | | Light brown, slightly stained, compact. | | | | | | | | | | | | |
| 2 | | End of Borehole | | | | | | | | | | | | |
| NOTES: | | | | | | | | | | | | | | |
| 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 0.56m on January 29, 1998. | | | | | | | | | | | | | | |
| 2. Borehole dry and backfilled on completion. | | | | | | | | | | | | | | |
| 3. No samples taken. | | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 0.56m on January 29, 1998.
2. Borehole dry and backfilled on completion.
3. No samples taken.

Drill Method: Hollow Stem auger

Drill Date: January 29, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

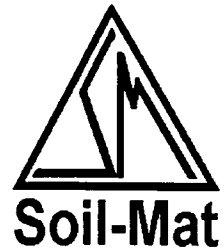
Borehole # 1523

(SM Borehole No.: 523)

Borehole Location: Sta.: 11+9071.716

Offset: -16.982

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' | |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 2 | | Fine Sandy Silt | 222.4 | | | | | | | | |
| | | Light brown, silty grey clay layers, oxidized, wet, loose to compact. | | | | | | | | | |
| 6 | | | | SS | 1 | 6 | | | | | |
| 8 | | | | SS | 2 | 11 | | | | | |
| 10 | | Sandy Clayey Silt | 220.11 | | | | | | | | |
| | | Grey, traces of fine sand and gravel, moist, very stiff. | 2.89 | | | | | | | | |
| 12 | | | 219.51 | SS | 3 | 13 | | | | | |
| 14 | | End of Borehole | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 22 | | NOTES: | | | | | | | | | |
| 24 | | 1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.89m on January 29, 1998. | | | | | | | | | |
| 26 | | 2. Borehole dry and backfilled on completion. | | | | | | | | | |
| 28 | | 3. Soil samples will be kept for 3 months unless otherwise directed by client. | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 32 | | | | | | | | | | | |
| 34 | | | | | | | | | | | |
| 36 | | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 40 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: January 29, 1998

Hole Size: 200mm

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Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3320

(SM Borehole No. 75)

Borehole Location: Sta.: 11+111.615

Offset: 3.479

Project Manager: John Monkman, P.Eng.



Soil-Mat

| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0.48 | | Granular Fill | 221.54 | | | | | | | | | | |
| 2 | | Approximately 460mm, crusher run limestone. | 221.08 | | | | | | | | | | |
| 1.2 | | Fill | 220.34 | | | | | | | | | | |
| 2 | | Brown, Sand and gravel, silty. | 220.34 | | | | | | | | | | |
| 2.18 | | Clayey Silt | 219.36 | SS | 1 | 57 | | 22.5 | | | | | |
| | | Grey-brown, dense, with trace clay and fine gravel. | 219.36 | | | | | | | | | | |
| | | End of Borehole | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
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| 16 | | | | | | | | | | | | | |
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| 20 | | | | | | | | | | | | | |
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| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
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| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

- Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.18m on June 16, 1998.
- Borehole dry and backfilled on completion.
- Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 200 mm

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Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

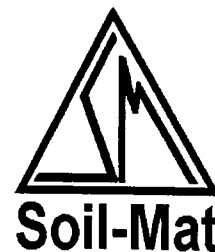
Borehole # 3319

(SM Borehole No. 76)

Borehole Location: Sta.: 11+161.564

Offset: 2.37

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | P.P (kg/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0.41 | | Granular Fill | 221.49 | | | | | | | |
| 2 | | Approximately 410mm, crusher run limestone, compact. | 221.07 | | | | | | | |
| 1 | | Fill | 220.49 | | | | | | | |
| 4 | | Brown sand and gravel, silty, compact. | 220.49 | | | | | | | |
| 6 | | Silt | 1.83 | SS | 1 | 25 | | | | |
| 2 | | Grey-brown, compact, with clay and trace fine gravel, moist, compact. | 219.65 | | | | | | | |
| 8 | | End of Borehole | | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 14 | | | | | | | | | | |
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| 10 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.83m on June 16, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 200 mm

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Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3307

(SM Borehole No. 60)

Borehole Location: Sta.: 11+170.885

Offset: 2.431

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 m | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Granular Fill | 221.47 | | | | | | | | | | |
| | | Approximately 280mm, crusher run limestone, compact. | | | | | | | | | | | |
| 4 | | Fill | 1.5 | | | | | | | | | | |
| 6 | | Brown, silty sand and gravel, moist. | 219.87 | SS | 1 | 56 | | | | | | | |
| 8 | | Silt | 219.59 | | | | | | | | | | |
| | | Brown to grey, very dense, with sand and trace gravel. | | | | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
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| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 1.88m on June 16, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 150mm

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Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

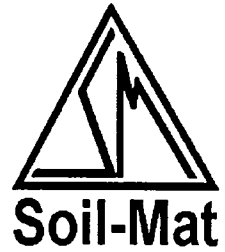
Borehole # 3318

(SM Borehole No. 77)

Borehole Location: Sta.: 11+211.769

Offset: 2.668

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|--|---|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | w% ▲ 10 20 30 40 ▲ | | | |
| | | | | | | | | | | ● Blows/300mm ● 20 40 60 80 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 28.47 | | | | | | | | | | |
| 2 | | Approximately 410mm. crusher run limestone. | 221.36 | | | | | | | | | | |
| | | (Fill) | 220.85 | | | | | | | | | | |
| 4 | | Brown sand and gravel, silty, moist, compact. | | | | | | | | | | | |
| 6 | | Clayey Silt | 2.13 | SS | 1 | 84 | | 22.9 | | ▲ | | ● | |
| 8 | | Red-brown, hard, with trace sand, moist, hard. | 219.64 | | | | | | | | | | |
| | | End of Borehole | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
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| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.13m on June 16, 1998.

2. Borehole dry and backfilled on completion.

3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.13m on June 16, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 200 mm

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Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

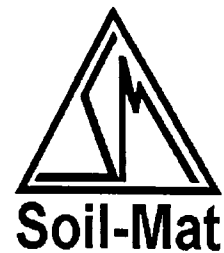
Borehole # 3308

(SM Borehole No. 61)

Borehole Location: Sta.: 11+220.498

Offset: 2.434

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|----|-------------|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | w% | | Blows/300mm | |
| | | | | | | | | | | 10 | 20 | 30 | 40 |
| | | | | | | | | | | 20 | 40 | 60 | 80 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 221.43 | | | | | | | | | | |
| 2 | | Approximately 380mm. crusher run limestone. | 221.43 | | | | | | | | | | |
| 4 | | Fill | 1.5 | | | | | | | | | | |
| 6 | | Brown, silty sand and gravel, moist, compact. | 220.31 | | | | | | | | | | |
| 6 | | Silt | 2.13 | SS | 1 | 52 | | 22.5 | | | | | |
| 8 | | Brown to grey, mottled, very dense, with trace of sand and gravel, moist, very dense. | 219.68 | | | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.13m on June 16, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 150mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3317

(SM Borehole No. 78)

Borehole Location: Sta.: 11+261.440

Offset: 2.808

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 222.18 | | | | | | | | | | |
| 2 | | Approximately 330mm, crusher run limestone. | 0.8 | | | | | | | | | | |
| 4 | | Fill | 221.38 | | | | | | | | | | |
| 6 | | Brown, sand and gravel, silty. | | | | | | | | | | | |
| 6 | | Silt | | SS | 1 | 26 | | | | | | | |
| 8 | | Grey, compact, with trace of clay and fine gravel, moist, compact. | 2.41 | | | | | | | | | | |
| 8 | | End of Borehole | 219.77 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.41m on June 16, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 200 mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3309

(SM Borehole No. 62)

Borehole Location: Sta.: 11+270.347

Offset: 2.643

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 221.89 | | | | | | | | | | |
| 2 | | Approximately 380mm, crusher run limestone, compact. | 221.91 | | | | | | | | | | |
| 4 | | Fill | 1.5 | | | | | | | | | | |
| 6 | | Brown, silty sand and gravel, moist, compact. | 220.79 | SS | 1 | 47 | | | | | | | |
| 8 | | Silt | 2.46 | | | | | | | | | | |
| 8 | | Grey, very dense, trace sand, moist. | 219.83 | | | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 2.46m on June 16, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 16, 1998.

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

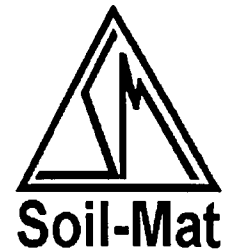
Borehole # 3316

(SM Borehole No. 79)

Borehole Location: Sta.: 11+311.594

Offset: 2.925

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| | | | | | | | | | | <div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 28.472 | | | | | | | | | | |
| 2 | | Approximately 410mm. crusher run limestone. | 222.31 | | | | | | | | | | |
| 4 | | Fill | 221.92 | | | | | | | | | | |
| 6 | | Brown sand and gravel, silty. | | | | | | | | | | | |
| 6 | | Clayey Silt | | SS | 1 | 25 | | | | | | | |
| 8 | | Grey, hard, trace of sand and some thin layers of fine silty sand (wet). | | | | | | | | | | | |
| 10 | | End of Borehole | 219.72 | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.00m on June 17, 1998.

2. Borehole dry and backfilled on completion.

3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 17, 1998.

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3310

(SM Borehole No. 63)

Borehole Location: Sta.: 11+320.724

Offset: 2.811

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| | | | | | | | | | | <div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 222.44 | | | | | | | | | | |
| 2 | | Approximately 410mm. crusher run limestone, compact. | 222.43 | | | | | | | | | | |
| 4 | | Fill | 222.04 | | | | | | | | | | |
| 6 | | Brown, silty sand and gravel. | | SS | 1 | 18 | | | | | | | |
| 8 | | Silt | | | | | | | | | | | |
| 8 | | Grey, very dense, trace sand. | | | | | | | | | | | |
| 10 | | | 3.18 | | | | | | | | | | |
| 10 | | End of Borehole | 219.66 | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to auger refusal (assumed bedrock) at a depth of 3.18m on June 17, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 17, 1998.

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

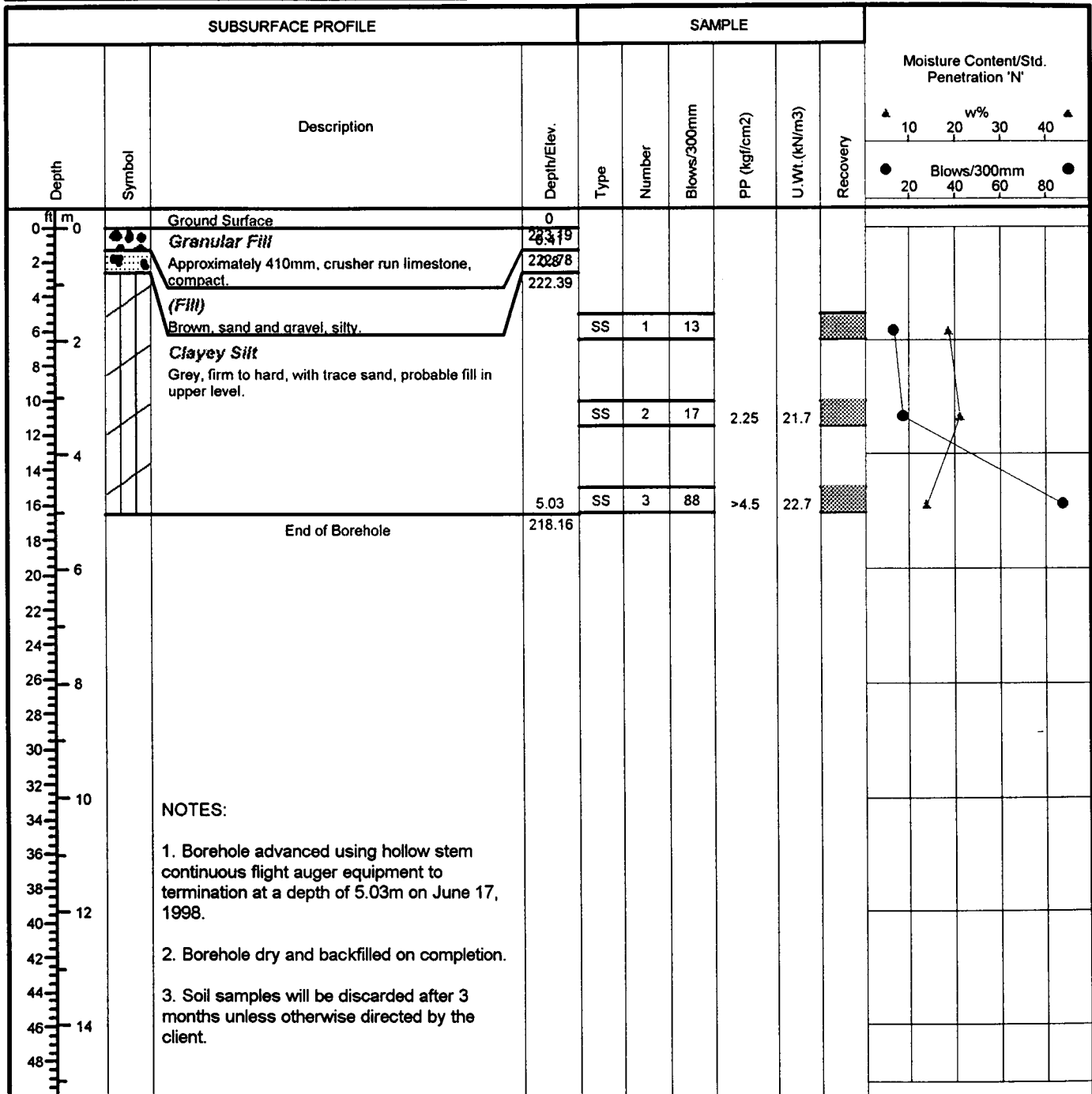
Borehole # 3315

(SM Borehole No. 80)

Borehole Location: Sta.: 11+361.909

Offset: 2.947

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 17, 1998.

Hole Size: 200 mm

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Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Probehole # 3311

(SM Probehole No. 64)

Probehole Location: Sta.: 11+371.045

Offset: 2.574

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U. Wt (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Granular Fill | 223.35 | | | | | | | |
| | | Approximately 460mm, crusher run limestone, compact. | 0.46 | | | | | | | |
| 2 | | | 222.88 | | | | | | | |
| | | Fill | 222.54 | | | | | | | |
| | | Brown, silty sand and gravel. | | | | | | | | |
| 4 | | Silt | | | | | | | | |
| | | Grey, with clay and trace sand, moist, compact, possible fill in upper level. | | | | | | | | |
| 6 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | | | 5 | | | | | | | |
| 18 | | End of Probehole | 218.35 | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 5.00m on June 17, 1998.
2. Borehole dry and backfilled on completion.
3. No soil samples taken.

Drill Method: Hollow Stem auger

Drill Date: June 17, 1998

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

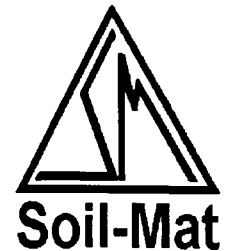
Borehole # 3314

(SM Probehole No. 81)

Borehole Location: Sta.: 11+393.723

Offset: 2.934

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> </div> | | | |
| | | | | | | | | | | <div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular fill | 223.65 | | | | | | | | | | |
| 2 | | Approximately 815mm, crusher run limestone, compact. | 0.815 | | | | | | | | | | |
| 4 | | Clayey Silt to Silt | 222.83 | | | | | | | | | | |
| 6 | | Brown to grey, trace gravel, possible fill in upper level. | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | 5.03 | | | | | | | | | | |
| 18 | | End of Borehole | 218.62 | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 5.03m on June 17, 1998.
2. Borehole dry and backfilled on completion.
3. No soil samples taken.

Drill Method: Hollow Stem auger

Drill Date: June 17, 1998.

Hole Size: 200 mm

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Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3312

(SM Borehole No. 65)

Borehole Location: Sta.: 11+421.317

Offset: 3.492

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|---|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U Wt (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 2 | | Granular Fill Approximately 840mm, crusher run limestone, compact. | 223.74 | | | | | | |
| 4 | | Fill Brown, silty sand and gravel. | 222.9 | | | | | | |
| 6 | | Silt Light brown, with trace clay and sand, moist, compact, possible fill in upper level. | 222.54 | SS | 1 | 26 | | | |
| 10 | | Sandy Silt grey, trace gravel, loose to compact. | 220.74 | SS | 2 | 8 | | | |
| 16 | | | 5.03 | SS | 3 | 13 | | | |
| 18 | | End of Borehole | 218.71 | | | | | | |
| <p>NOTES:</p> <ol style="list-style-type: none"> 1. Borehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 5.03m on June 17, 1998. 2. Borehole dry and backfilled on completion. 3. Soil samples will be discarded after 3 months unless otherwise directed by the client. | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: June 17, 1998.

Hole Size: 150mm

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Datum: Datum

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027 G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton/Wentworth [SPO]

Borehole # 3313

(SM Borehole No. 66)

Borehole Location: Sta.: 11+470.552

Offset: 4.358

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | J.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Granular Fill | 224.09 | | | | | | | |
| 2 | | Approximately 815mm, crusher run limestone. | 0.8 | | | | | | | |
| 4 | | Silt | 223.29 | | | | | | | |
| 6 | | Grey, with thin layers of wet sand, loose to compact, possible fill in upper level. | | SS | 1 | 10 | | | | |
| 8 | | | | | | | | | | |
| 10 | | | | SS | 2 | 5 | | | | |
| 12 | | | | | | | | | | |
| 14 | | | 4.57 | | | | | | | |
| 16 | | Sand | 219.52 | SS | 3 | 10 | | | | |
| 18 | | Grey, fine, moist, with some silt, loose. | 5.1224 | | | | | | | |
| 20 | | End of Borehole | 218.96 | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
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| 40 | | | | | | | | | | |
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| 44 | | | | | | | | | | |
| 46 | | | | | | | | | | |
| 48 | | | | | | | | | | |

NOTES:

1. Borehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 5.18m on June 17, 1998.
2. Borehole dry and backfilled on completion.
3. Soil samples will be discarded after 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 17, 1998.

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1138

(SM Probehole No.: 138)

Probehole Location: Sta.: 26+036.850

Offset -19.727

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|--|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | Recovery | w% ▲ 10 20 30 40 ▲ ● 20 40 60 80 ● | | | |
| 0 m | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Asphaltic Concrete | 195.49 | | | | | | | | | | |
| | | Approximately 200mm. | | | | | | | | | | | |
| 2 | | Granular Fill | 0.8 | | | | | | | | | | |
| | | Approximately 600mm of 25mm Minus Crusher Run Limestone, compact | 194.69 | | | | | | | | | | |
| 4 | | Clayey Silt | 1.5 | | | | | | | | | | |
| | | Brown, traces of gravel, possible fill. | 193.99 | | | | | | | | | | |
| 6 | | Sandy Silt | 2.13 | | | | | | | | | | |
| | | Light brown, fine. | 193.36 | | | | | | | | | | |
| 8 | | End of Probehole | | | | | | | | | | | |
| 10 | | NOTES: | | | | | | | | | | | |
| 12 | | 1. Probehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 2.13m on February 4, 1998. | | | | | | | | | | | |
| 14 | | 2. Probehole dry and backfilled on completion. | | | | | | | | | | | |
| 16 | | 3. No samples taken. | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: February 4, 1998

Hole Size: 200mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1139

(SM Probehole No.: 139)

Probehole Location: Sta.: 9+881.914

Offset: 2.859

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|---------------------------|----------|---------------------------------------|--|-----------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt (kN/m ³) | Recovery | w% | | Blows/300mm | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ | | ● 20 40 60 80 ● | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Asphaltic Concrete | 198.06 | | | | | | | | | | |
| | | Approximately 200mm. | | | | | | | | | | | |
| 2 | | Granular Fill | 0.75 | | | | | | | | | | |
| | | Approximately 550mm of 25mm Minus Crusher Run Limestone, compact. | 197.31 | | | | | | | | | | |
| 4 | | Clayey Silt | | | | | | | | | | | |
| | | Light brown, some fine sand, traces of gravel, stiff. | | | | | | | | | | | |
| 6 | | | 2.13 | | | | | | | | | | |
| 2 | | End of Probehole | 195.93 | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 4 | | NOTES: | | | | | | | | | | | |
| 14 | | 1. Probehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 2.13m on February 4, 1998. | | | | | | | | | | | |
| 16 | | 2. Probehole dry and backfilled on completion. | | | | | | | | | | | |
| 18 | | 3. No samples taken. | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: February 4, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Ramp N-E

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1140

(SM Probehole No.: 140)

Probehole Location: Sta.: 9+971.027

Offset: +1.565

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------------------|----------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U Wt. (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' | | | |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ | | | |
| | | | | | | | | | | ● 20 40 60 80 ● | | | |
| 0 m | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 200.49 | | | | | | | | | | |
| 2 | | Approximately 700mm of 25mm Minus Crusher Run Limestone, compact. | 0.7 | | | | | | | | | | |
| | | Clayey Silt | 199.79 | | | | | | | | | | |
| 4 | | Light brown to grey, traces of gravel and fine sand, wood fragments, slight organic staining, stiff. | | | | | | | | | | | |
| 6 | | | 2.13 | | | | | | | | | | |
| 2 | | End of Probehole | 198.36 | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
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| 24 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 2.13m on February 4, 1998.

2. Probehole dry and backfilled on completion.

3. No samples taken.

Drill Method: Hollow Stem auger

Drill Date: February 4, 1998

Hole Size: 200mm

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PROJECT NO.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 –231 [SPO]**



HIGHWAY 403 BOREHOLES

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

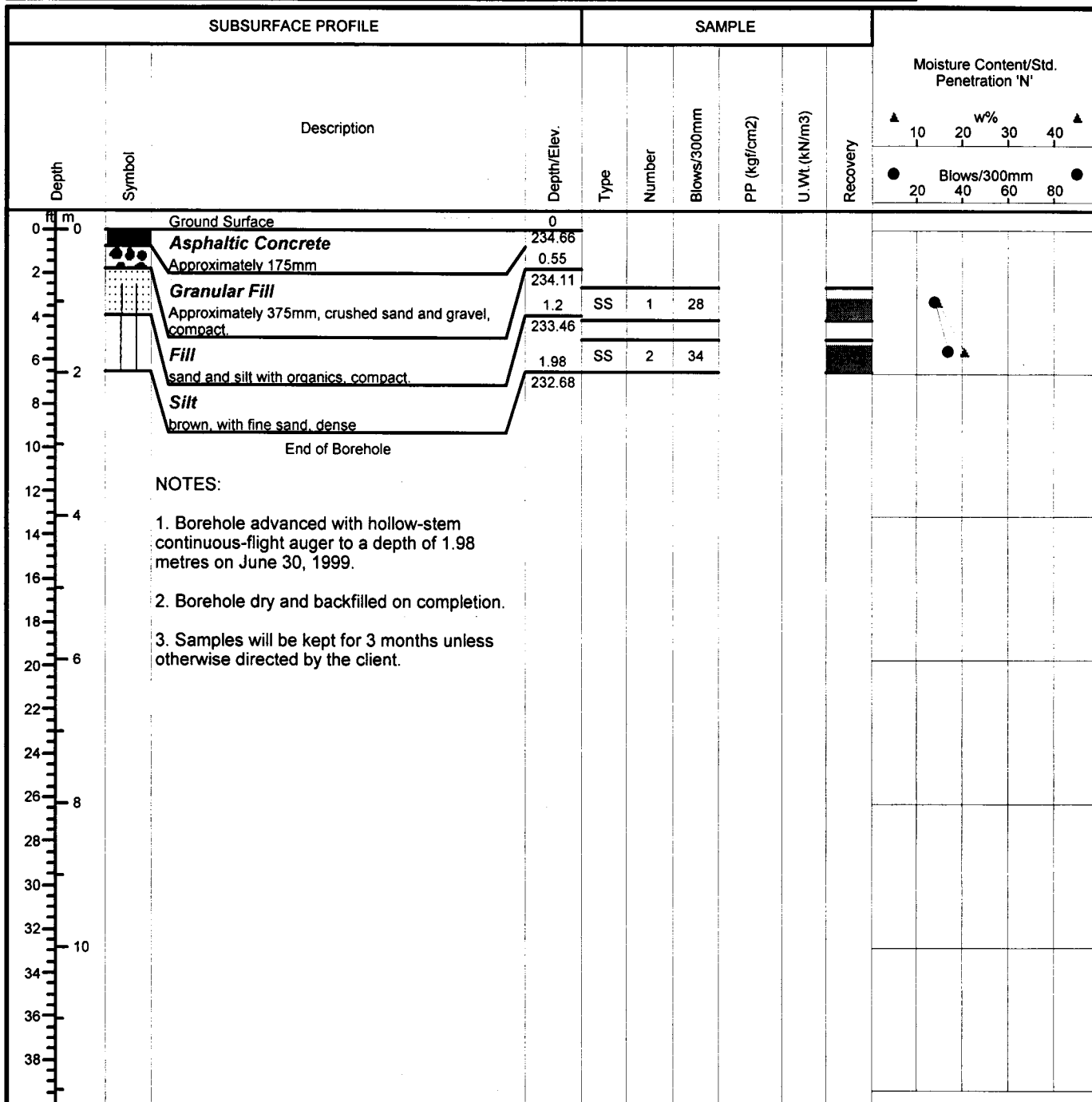
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5057
(SM Borehole No. II)

Borehole Location: Sta.: 23+861.257

Offset: -21.481

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

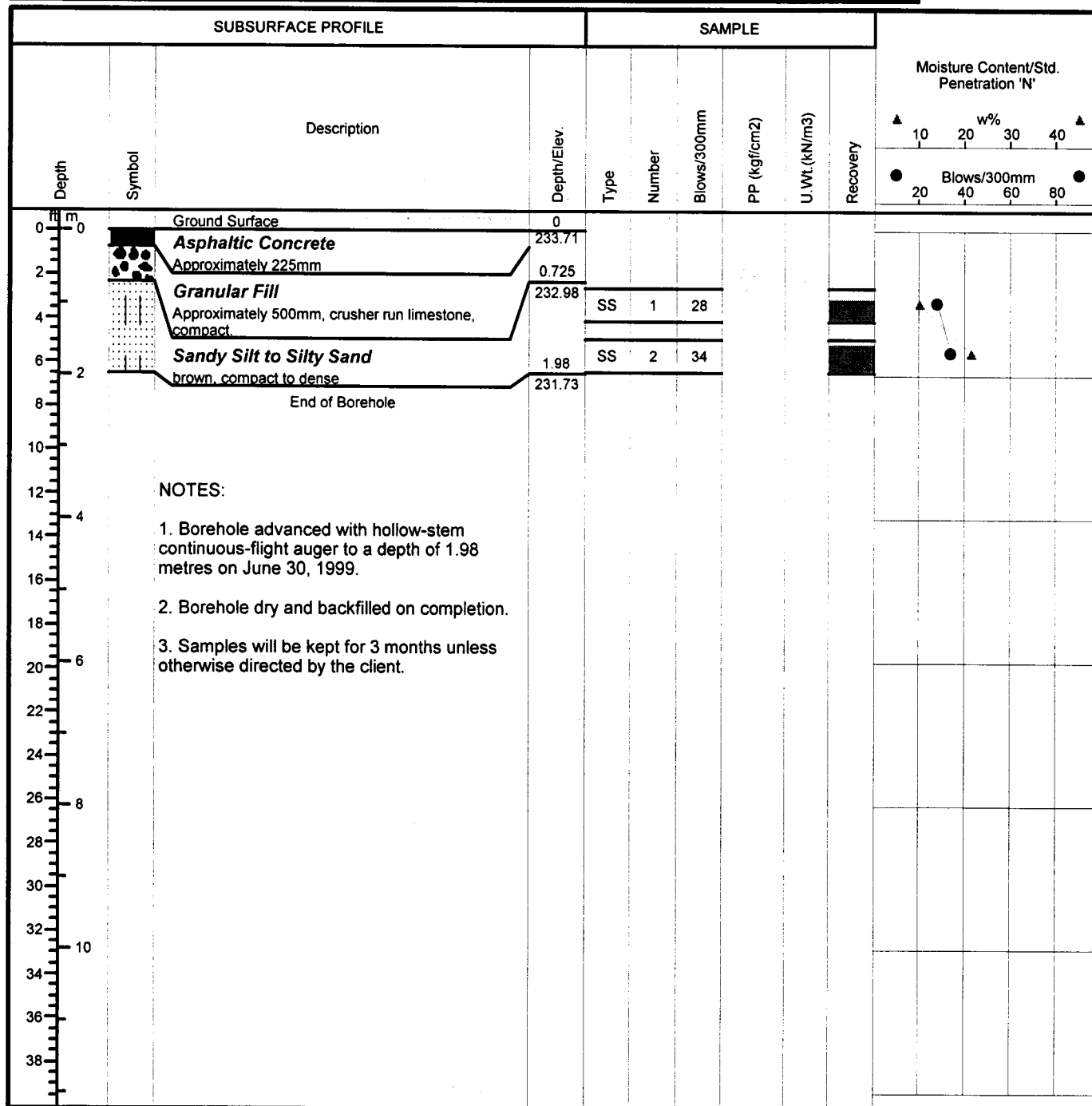
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5056
(SM Borehole No. II)

Borehole Location: Sta.: 24+164.494

Offset: -24.825

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5055
(SM Borehole No. HH)

Borehole Location: Sta.: 24+472.393

Offset: -24.586

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U. Wt. (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Asphaltic Concrete | 231.65 | | | | | | |
| 2 | | Approximately 165mm | 0.67 | | | | | | |
| 4 | | Granular Fill | 230.98 | SS | 1 | 18 | | | |
| 4 | | Approximately 500mm, crusher run limestone, compact | | | | | | | |
| 6 | | Fill | 1.98 | SS | 2 | 36 | | 20.0 | |
| 6 | | silt with sand and gravel, moist, compact to dense | 229.67 | | | | | | |
| 8 | | End of Borehole | | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
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| 32 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

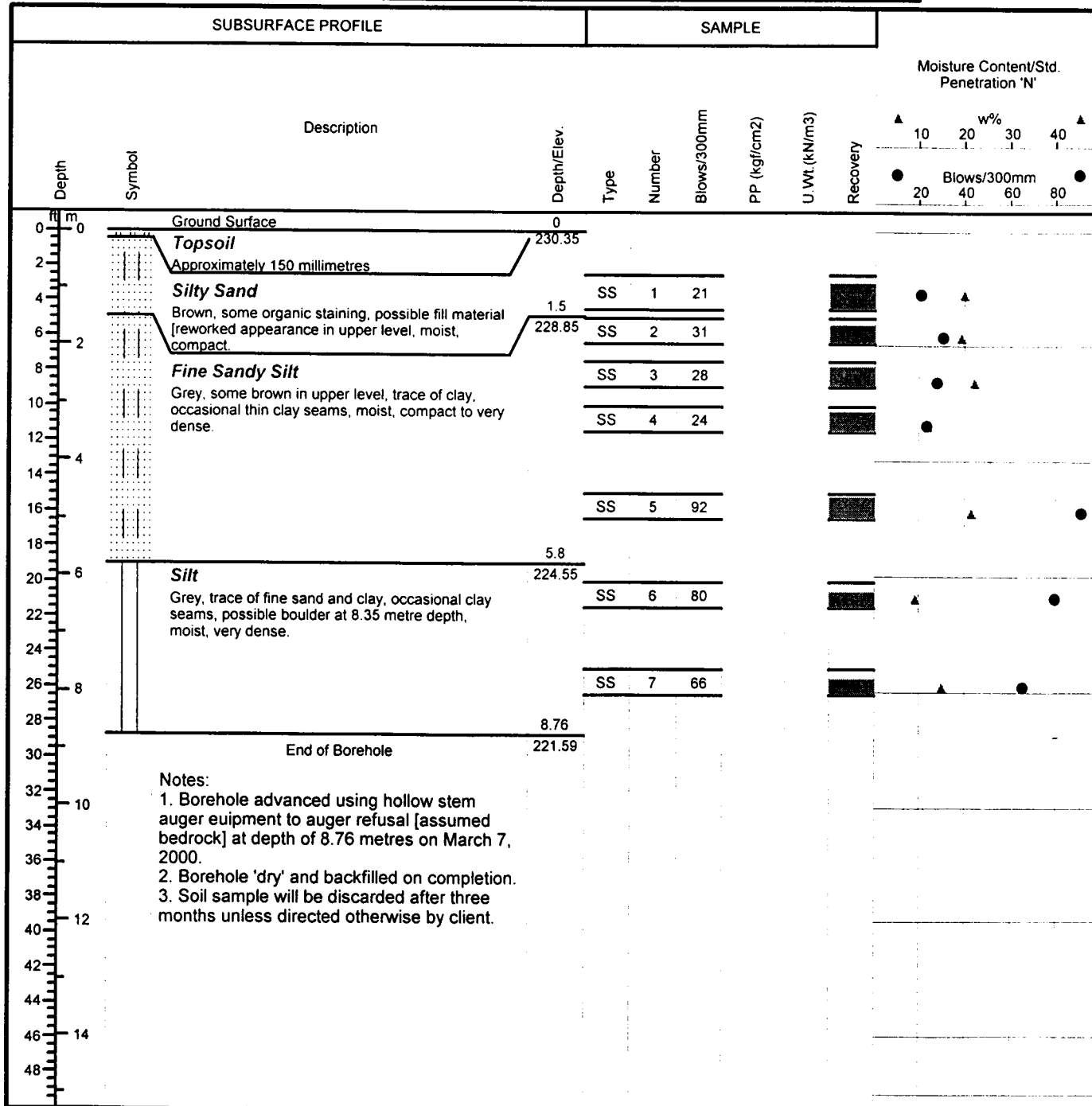
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7013 [SM No. P 1]

Borehole Location: High Mast Pole No. 1

Sta. 24+480.295, Offset 3.014

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 7, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

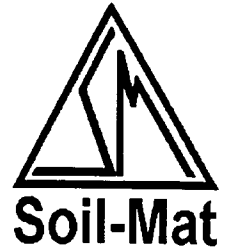
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5058
(SM Borehole No. KK)

Borehole Location: Sta.: 24+526.698

Offset: 22.492

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| 0 | | Ground Surface | 0 | | | | | | | Blows/300mm 20 40 60 80 | | | |
| 0 | ●●● | Granular Fill | 230.13 | | | | | | | | | | |
| 2 | | Approximately 325mm. crusher run limestone, sand and gravel, compact. | | | | | | | | | | | |
| 4 | | Silt | | SS | 1 | 33 | | 18.7 | | | | | |
| 6 | | brown, with fine sand; becomes less dense and grey with depth, possible fill in upper level, dense to compact. | 2 | SS | 2 | 27 | | | | | | | |
| 8 | | End of Borehole | 228.13 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
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| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

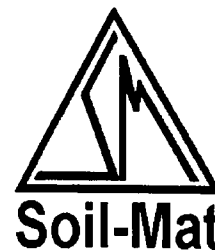
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5054
(SM Borehole No. GG)

Borehole Location: Sta.: 24+566.695

Offset: -27.789

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| | | | | | | | | | | Blows/300mm 20 40 60 80 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Granular Fill Approximately 200mm of crusher run limestone over 25mm of asphaltic concrete, over 100mm of crusher run limestone. | 230.04 | | | | | | | | | | |
| 4 | | | | SS | 1 | 21 | | 18.8 | | | | | |
| 6 | | Silt brown, with fine sand, compact to dense, possible fill in upper level. | 1.98 | SS | 2 | 44 | | 18.2 | | | | | |
| 8 | | | 228.06 | | | | | | | | | | |
| 10 | | End of Borehole | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
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| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

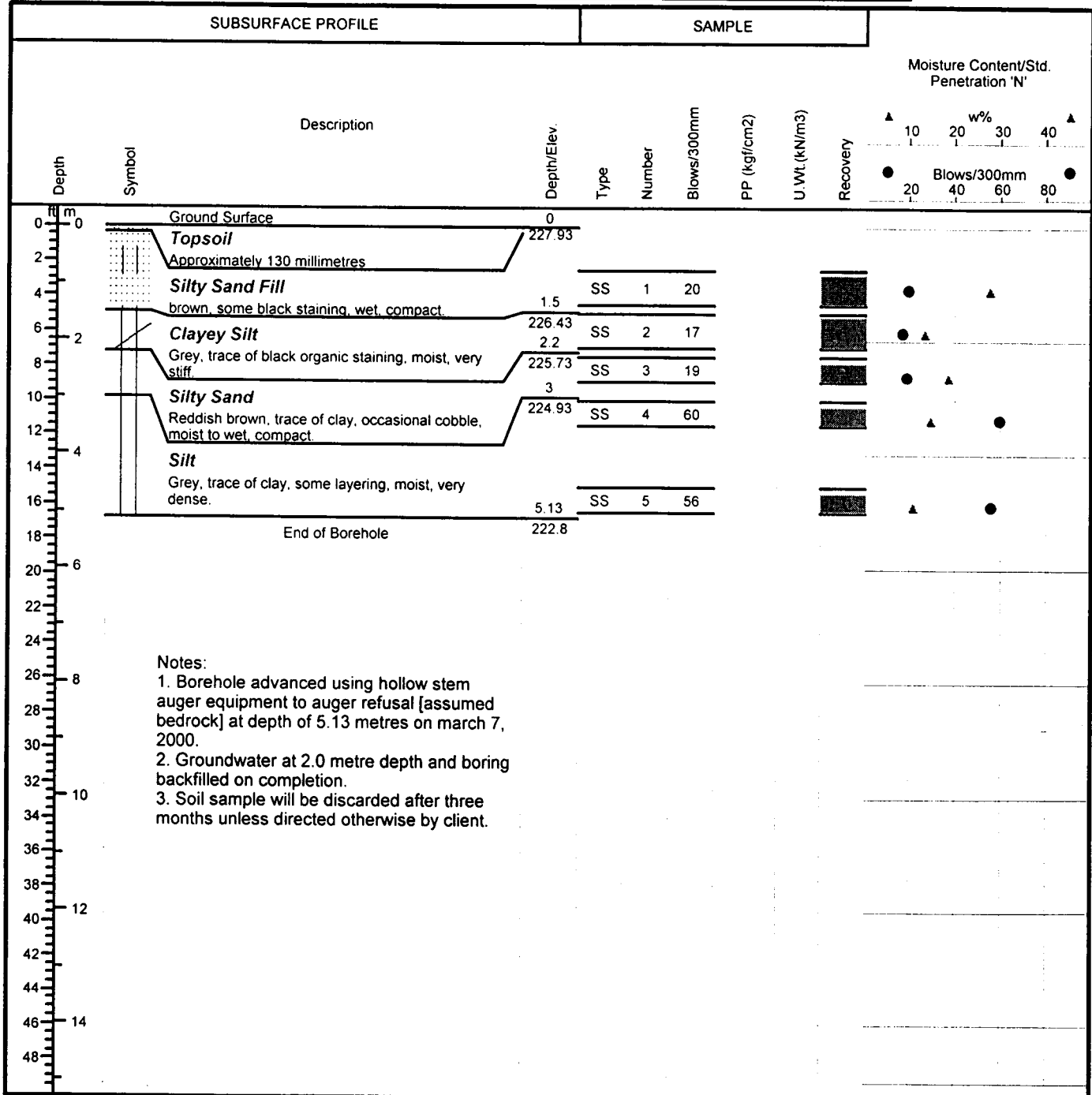
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7007 [SM No. P 2]

Borehole Location: High Mast Pole No. 2

Sta. 24+652.028 Offset 3.818

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 7, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

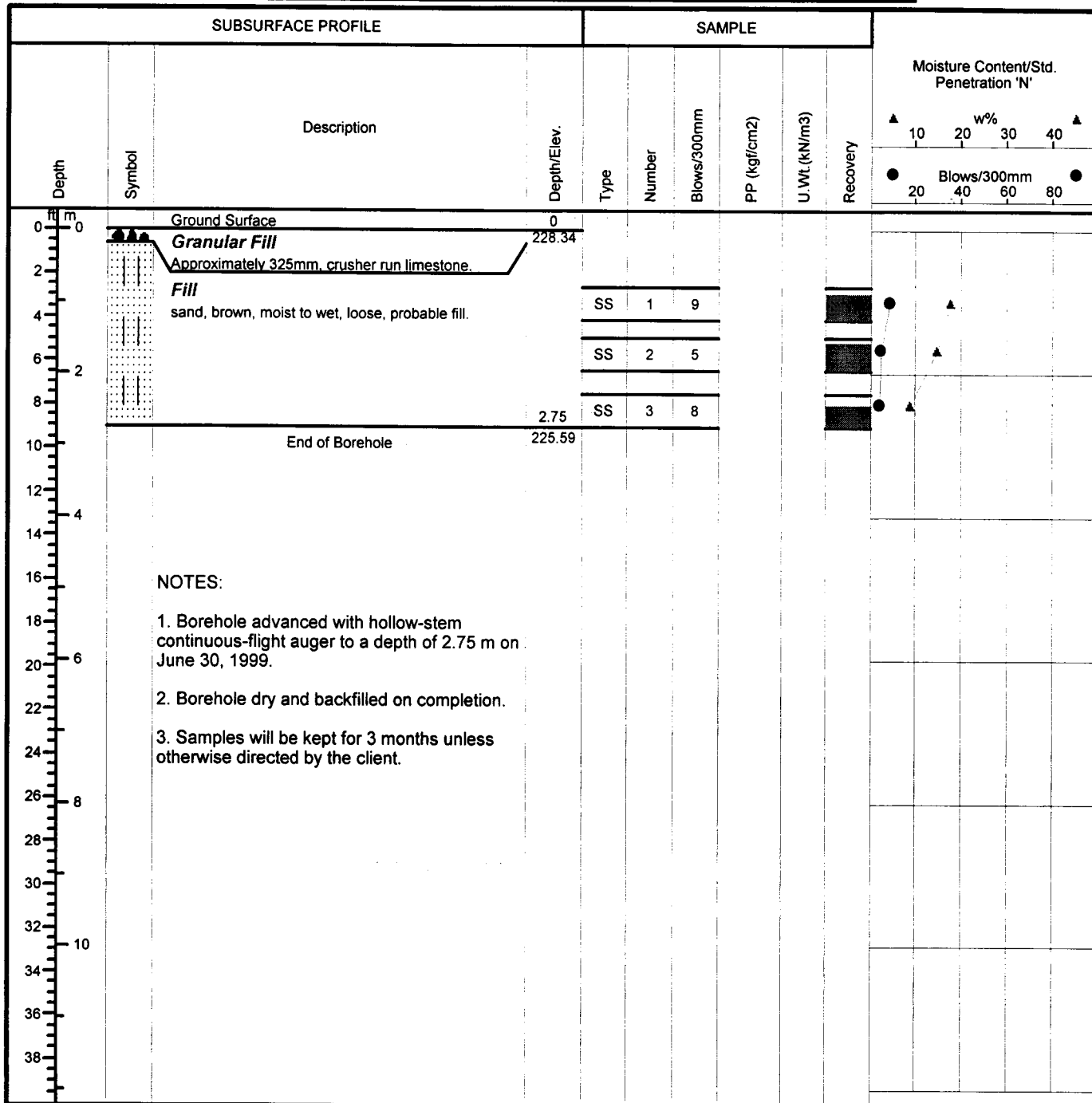
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5053
(SM Borehole No. FF)

Borehole Location: Sta.: 24+662.745

Offset: -29.537

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

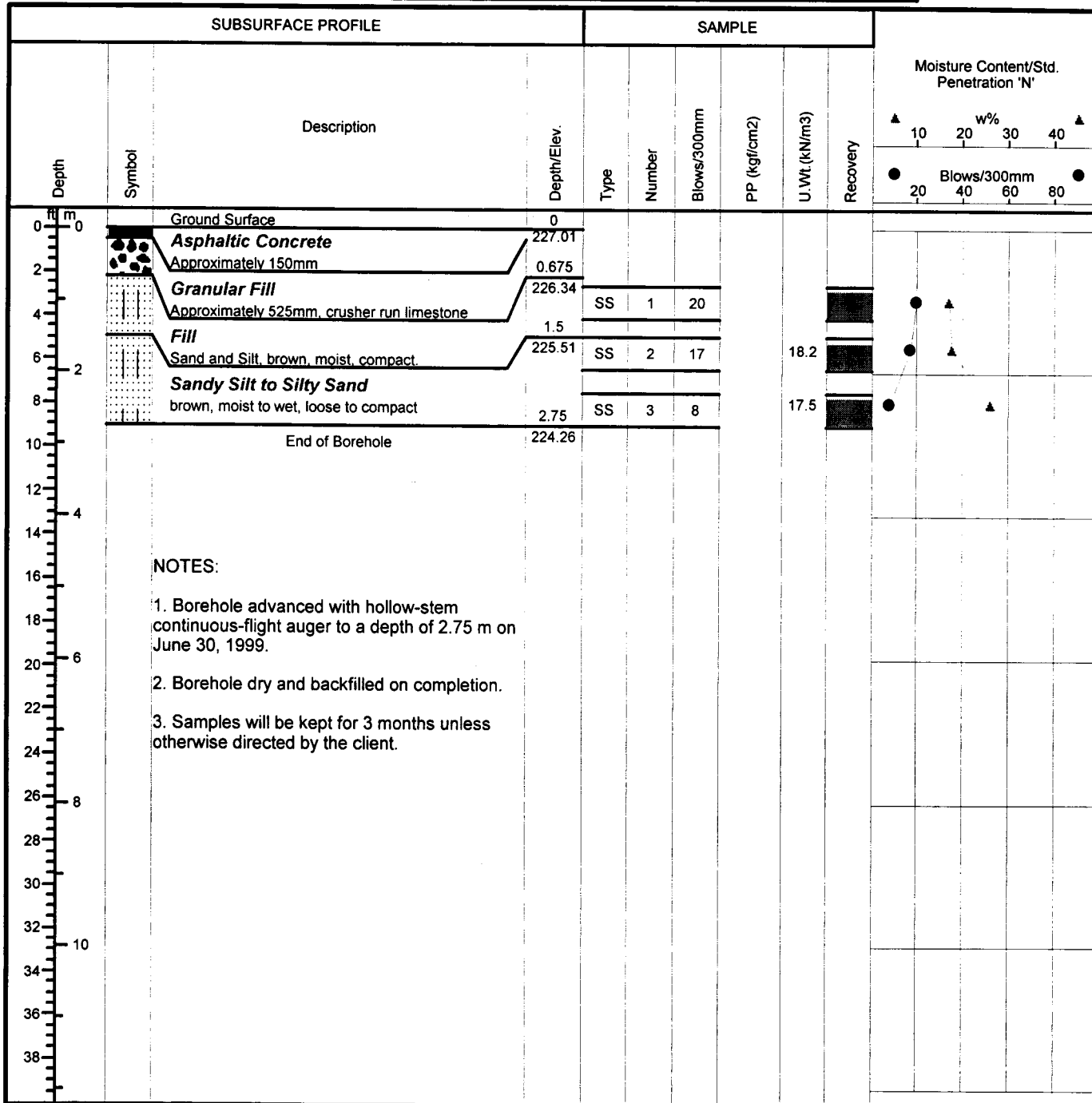
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5052
(SM Borehole No. EE)

Borehole Location: Sta: 24+758.478

Offset: -29.6137

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

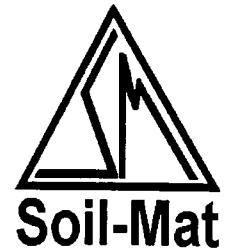
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5059
(SM Borehole No. LL)

Borehole Location: Sta.: 24+758.873

Offset: 26.9306

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Asphaltic Concrete | 227.05 | | | | | | |
| 2 | | Approximately 125mm | 0.575 | | | | | | |
| 2 | | Granular Fill | 226.47 | | | | | | |
| 4 | | Approximately 450mm, crusher run limestone | | SS | 1 | 13 | | | |
| 6 | | Silty fine Sand Fill | | | | | | | |
| 6 | | brown, with some clay, moist to wet, compact to loose | 1.98 | SS | 2 | 9 | | | |
| 8 | | End of Borehole | 225.07 | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
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| 32 | | | | | | | | | |
| 34 | | | | | | | | | |
| 36 | | | | | | | | | |
| 38 | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

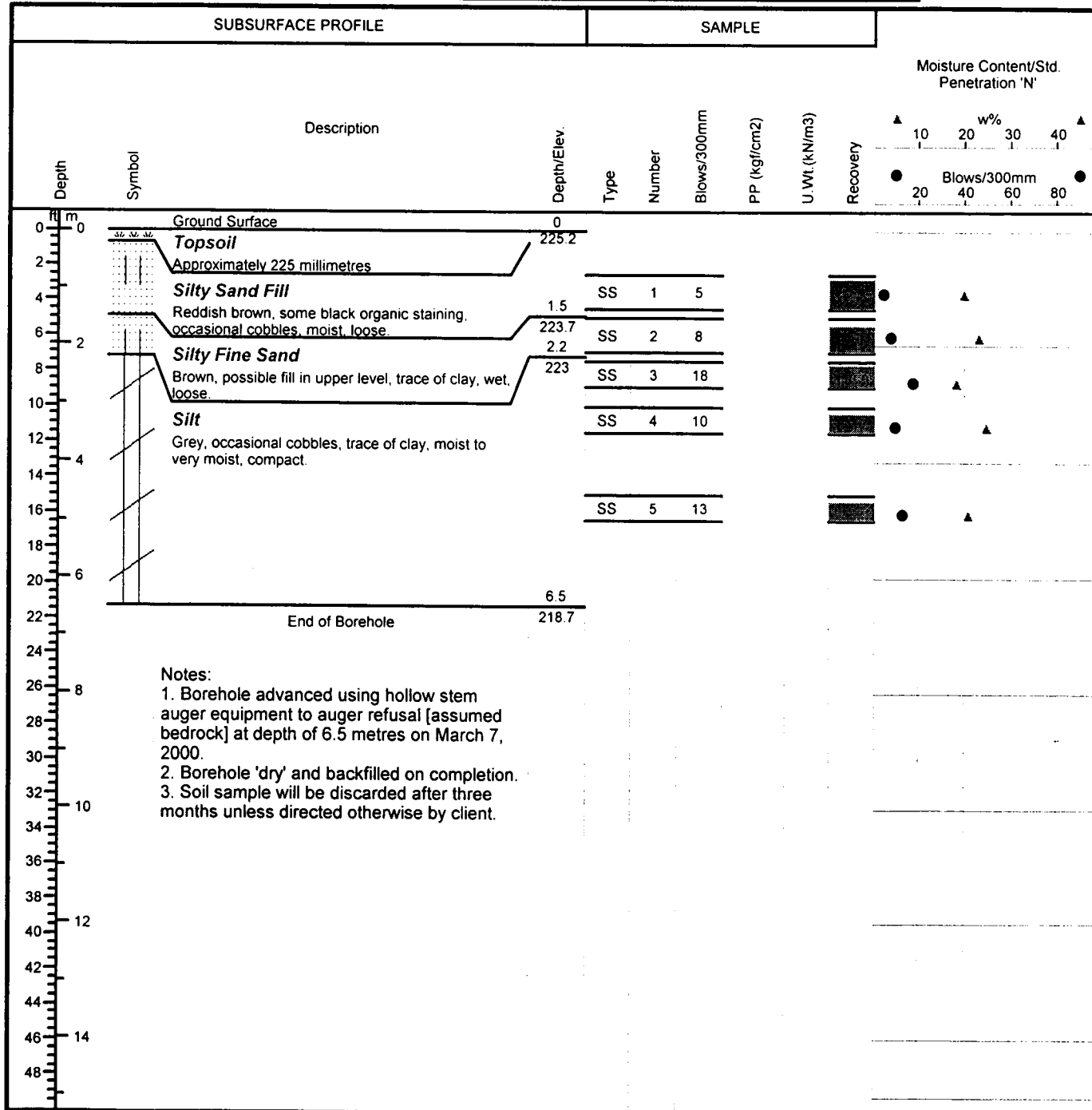
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7008 [SM No. P 3]

Borehole Location: High Mast Pole No. 3

Sta. 24+840.179, Offset 4.212

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 7, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

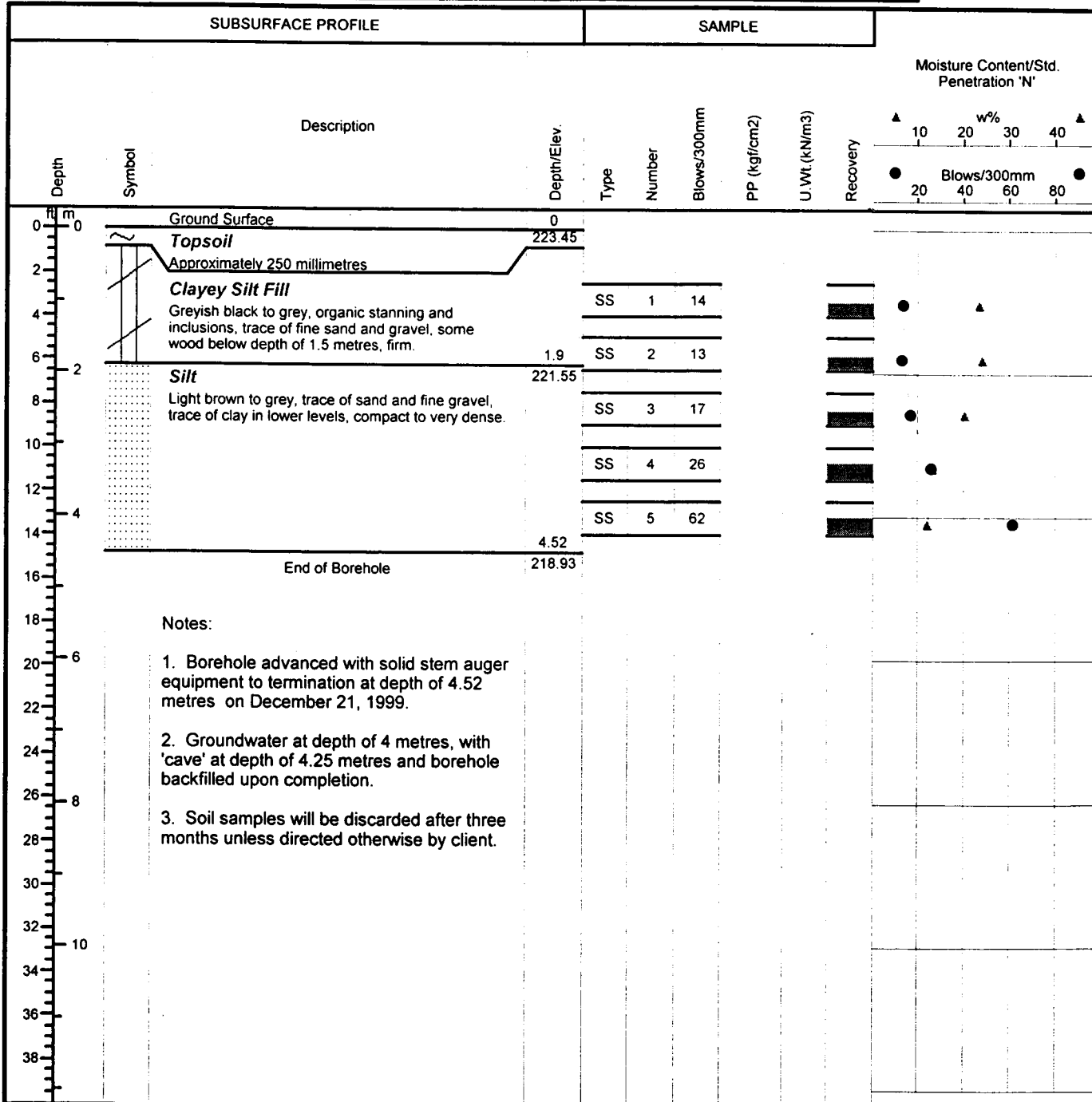
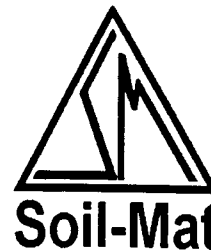
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5545 [SM No.: 1]

Borehole Location: Highway 403

Sta.: 24+907.262, Offset: -33.3264

Project Manager: John Monkman P. Eng.



Drill Method: Solid Stem

Drill Date: December 20, 1999

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

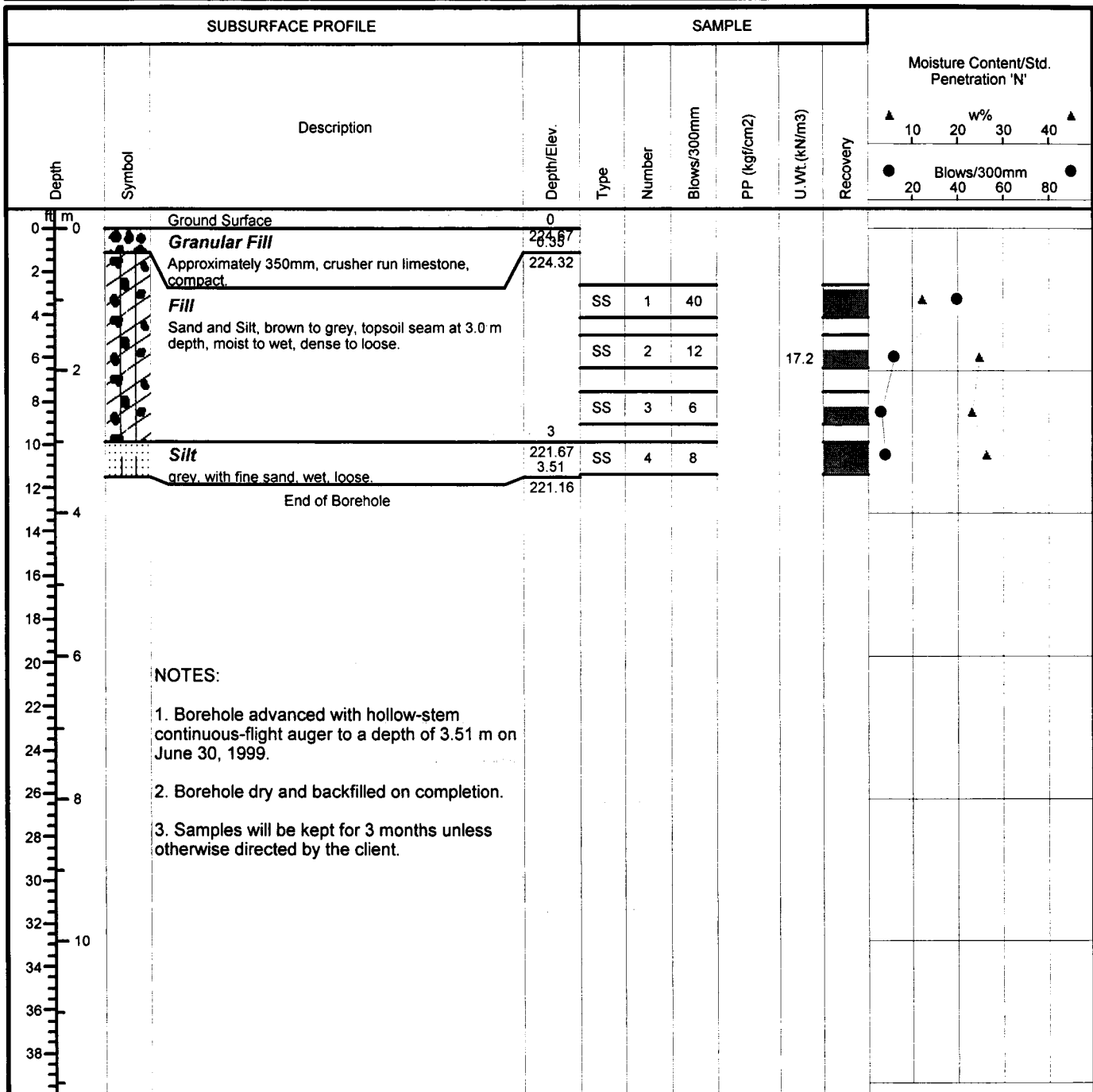
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5049
(SM Borehole No. BB)

Borehole Location: Sta: 24+908.014

Offset: -54.6532

Project Manager: John Monkman, P.Eng.



Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM-97027-G

Corehole # 5029

Project: LINC/Hwy403/Mohawk Road Interchange

Corehole Location: Sta.: 25+059.304

Location: Highway 403

Offset: -0.136

Client: Region of Hamilton-Wentworth [SPO]

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|---------------------|-------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | Moisture Content w% | Blows/300mm |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 0 | | Topsoil | 221.4 | | | | | | | | |
| 2 | | Approximately 75mm | 0.75 | | | | | | | | |
| 4 | | Clayey Silt | 220.65 | | | | | | | | |
| 6 | | brown, with some sand, probable fill in upper level, firm | | | | | | | | | |
| 8 | | | 2.64 | | | | | | | | |
| 10 | | Dolostone/Limestone Bedrock | 218.76 | | | | | | | | |
| 12 | | Thin-bedded to massive, Dark to light brown-grey, fine crystalline, with vug-filled mineralization and some chert nodules and lenses. | | CB | 1 | | | | | | |
| 14 | | Core Run #1: RQD=35, Recovery=92% | | | | | | | | | |
| 16 | | | | CB | 2 | | | | | | |
| 18 | | Core Run #2: RQD=81, Recovery=100% | | | | | | | | | |
| 20 | | End of Corehole | 215.74 | | | | | | | | |
| 22 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
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| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.53m and cored with a diamond tipped core barrel to a depth of 5.29m on May 27, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Datum: Geodetic

Drill Date: May 27, 1999

130 Lancing Drive, Hamilton, ON L8W 3A1

Checked by: RGH

Phone: (905) 318-7440 Fax: (905) 318-7455

Hole Size: 200 mm/N

e-mail: info@soil-mat.on.ca

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

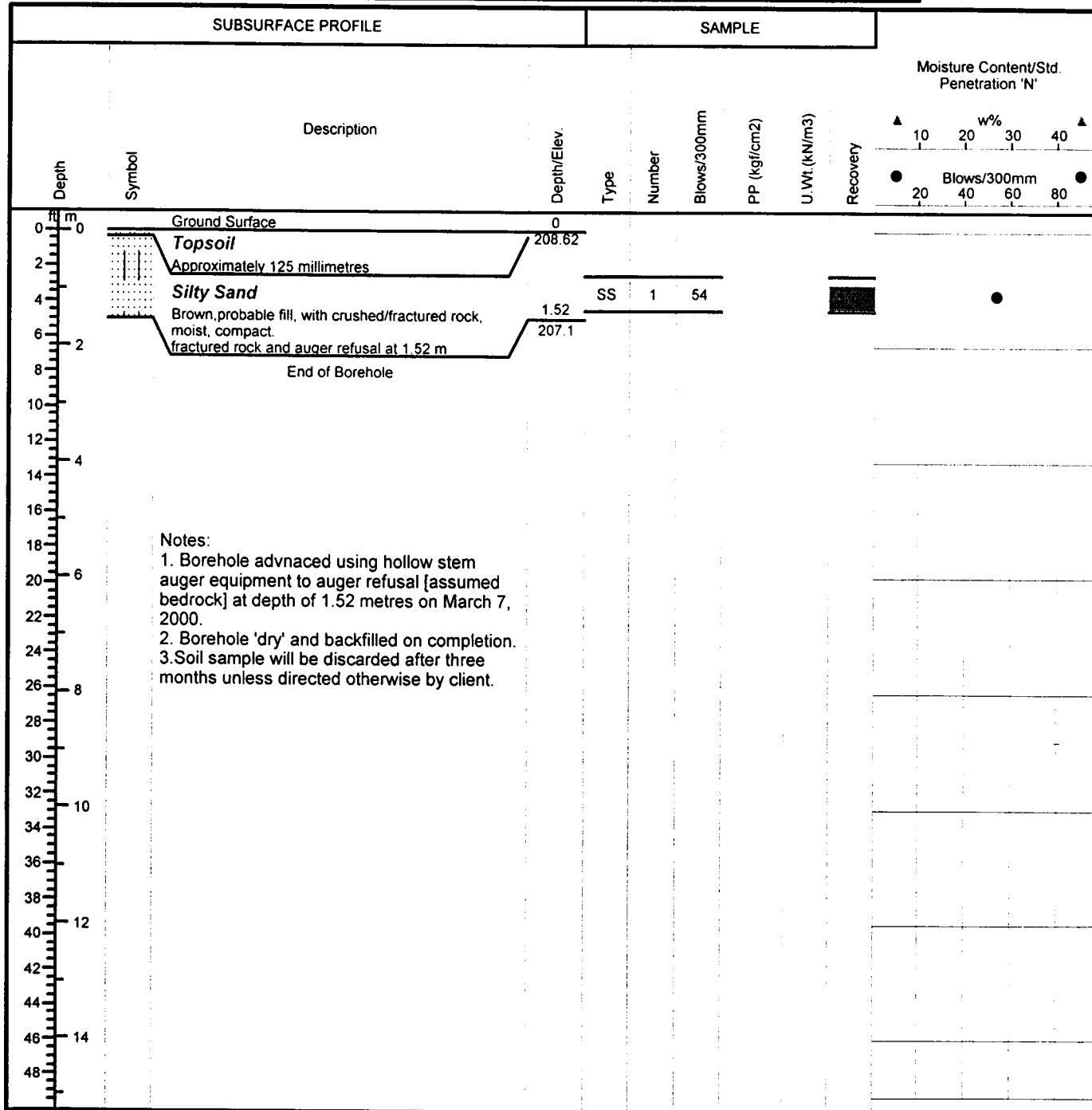
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7014 [SM No. P 14]

Borehole Location: High Mast Pole 14

Sta. 25+574.239, Offset 3.19

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 7, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

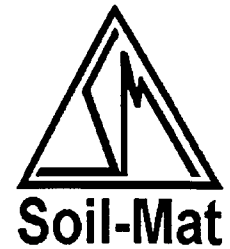
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5061
(SM Borehole No. NN)

Borehole Location: Sta.: 25+745.710

Offset: 20.962

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | UWt. (kN/m ³) | Recovery | w% 10 20 30 40 | | | |
| | | | | | | | | | | Blows/300mm 20 40 60 80 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Fill - Gravel | 204.56 | | | | | | | | | | |
| 2 | | Approximately 175mm. crusher run limestone | | | | | | | | | | | |
| 4 | | Fill | 1.1 | SS | 1 | 18 | | 19.5 | | | | | |
| 6 | | gravel, grey staining | 203.46 | | | | | | | | | | |
| 8 | | Sand and Silt Fill | 1.98 | SS | 2 | 32 | | 18.1 | | | | | |
| 10 | | brown, moist, dense | 202.58 | | | | | | | | | | |
| 12 | | End of Borehole | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
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| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 0m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

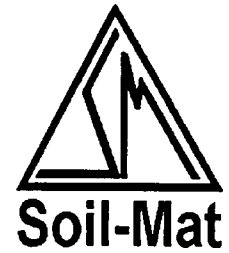
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5068
(SM Borehole No. ZZ)

Borehole Location: Sta.: 25+762.895

Offset: 21.561

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---------------------------------------|---------------|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | ▲ 10 20 30 40 ▲ | w% | | |
| | | | | | | | | | | | Blows/300mm | | |
| | | | | | | | | | | | 20 40 60 80 ● | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | ● | Granular Fill | 204.15 | | | | | | | | | | |
| 2 | | Approximately 450mm. crusher run limestone, some organic staining, compact. | 203.7 | | | | | | | | | | |
| 4 | ~ | Silty Sand Fill | | | | | | | | | | | |
| 6 | | brown, trace of clay and fine gravel, moist, compact. | | SS | 1 | 29 | | 21.9 | | | | | |
| 8 | | | | | | | | | | | | | |
| 10 | | | 3 | | | | | | | | | | |
| 12 | ~ | Sandy Silt | 201.16 | SS | 2 | 40 | | 21.3 | | | | | |
| 14 | | brown (weathered), dense with gravel | 200.65 | | | | | | | | | | |
| 16 | | End of Borehole | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with solid-stem continuous-flight auger to a depth of 3.51 m on August 13, 1999.
2. Borehole dry and backfilled on completion
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Solid Stem auger

Drill Date: August 13, 1999

Hole Size: 150mm

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Project No: SM 97037-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5062

(SM Borehole No. 00)

Borehole Location: Sta.: 25+818.935

Offset: 20.185

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|----|----|----|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U Wt. (kN/m3) | Recovery | w% | | | |
| | | | | | | | | | | 10 | 20 | 30 | 40 |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Granular Fill | 201.96 | | | | | | | | | | |
| 2 | | Approximately 250mm | | | | | | | | | | | |
| 4 | | Sand and Silt Fill | | SS | 1 | 8 | | | | | | | |
| 6 | | Brown, with gravel, moist to wet, compact to loose. | | | | | | | | | | | |
| 6 | | | 1.98 | SS | 2 | 15 | | | | | | | |
| 8 | | End of Borehole | 199.98 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
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| 42 | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.

2. Borehole dry and backfilled on completion.

3. Samples will be kept for 3 months unless otherwise directed by the client.

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5069

(SM Borehole No. Y)

Borehole Location: Sta.: 25+859.925

Offset: 20.45

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|----------------------------|----------|---|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | <div> <div>▲ 10 20 30 40 ▲</div> <div>w%</div> <div>● 20 40 60 80 ●</div> <div>Blows/300mm</div> </div> | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 0 | | Sand and Gravel Fill | 200.43 | | | | | | | | | | |
| 2 | | Brown, with silt, compact. | 0.75 | | | | | | | | | | |
| 4 | | Clayey Silt Fill | 199.68 | | | | | | | | | | |
| 6 | | Brown, trace of sand, trace of organics, moist, firm. | | SS | 1 | 9 | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | 3.51 | SS | 2 | 10 | | | | | | | |
| 12 | | End of Borehole | 196.92 | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with solid-stem continuous-flight auger to a depth of 3.51 m on August 13, 1999.
2. Borehole dry and backfilled on completion
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Solid Stem auger

Drill Date: August 13, 1999

Hole Size: 150mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

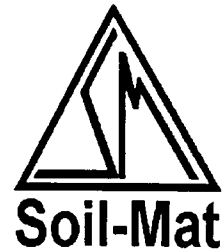
Borehole # 5063

(SM Borehole No. PP)

Borehole Location: Sta.: 25.894.820

Offset: 18.355

Project Manager: John Monkman, P. Eng



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | | | | |
|--------------------|--------|--|-------------|--------|--------|-------------|--------------|---------------|---------------------------------------|---------------------------------------|--|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | | | |
| | | | | | | | | | | w% 10 20 30 40 | | | |
| | | | | | | | | | | Blows/300mm 20 40 60 80 | | | |
| 0 | | Ground Surface | 0 | | | | | | | | | | |
| 2 | | Granular Fill | 199.3 | | | | | | | | | | |
| | | Approximately 250mm, crusher run limestone, compact. | | | | | | | | | | | |
| 4 | | Clayey Silt | 198.1 | SS | 1 | 9 | | | | | | | |
| 6 | | brown, very stiff, probable fill | 1.98 | SS | 2 | 16 | | | | | | | |
| 8 | | End of Borehole | 197.32 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | |
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| 44 | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.

2. Borehole dry and backfilled on completion.

3. Samples will be kept for 3 months unless otherwise directed by the client.

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Datum: Geodetic

Checked by: RGH

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Borehole # 5070
(SM Borehole No. YY)

Borehole Location: Sta.: 25+955.549

Offset: 17.848

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------|----------|---------------------------------------|-------------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery | 10 20 30 40 | 20 40 60 80 |
| 0 | | Ground Surface | 0 | | | | | | | | |
| 0 | | Granular Fill | 197.25 | | | | | | | | |
| 2 | | Crusher run limestone, compact. | 0.75 | | | | | | | | |
| 4 | | Fill | 196.5 | | | | | | | | |
| 6 | | Brown, trace of organics in upper level, lenses of sand and silt, moist, very stiff to firm. | | SS | 1 | 22 | | | | | |
| 8 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 12 | | | 3.51 | SS | 2 | 8 | | | | | |
| 12 | | End of Borehole | 193.74 | | | | | | | | |
| 14 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
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| 44 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |

NOTES:

1. Borehole advanced with solid-stem continuous-flight auger to a depth of 3.51 m on August 13, 1999.
2. Borehole dry and backfilled on completion
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Solid Stem auger

Drill Date: August 13, 1999

Hole Size: 150mm

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Datum: Geodetic

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

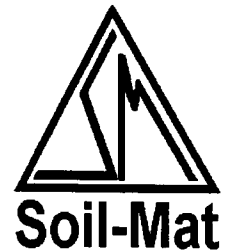
Borehole # 5064

(SM Borehole No. QQ)

Borehole Location: Sta.: 25+970.893

Offset: 16.715

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|-------------|---------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm2) | U Wt. (kN/m3) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Granular Fill | 196.82 | | | | | | | |
| 2 | | Approximately 750mm, crusher run limestone, compact | 0.75 | | | | | | | |
| 4 | | Sand and Gravel Fill | 196.07 | SS | 1 | 18 | | | | |
| 4 | | Brown, moist, compact | 1.5 | | | | | | | |
| 6 | | Clayey Silt Fill | 195.32 | SS | 2 | 20 | | | | |
| 6 | | Brown, mottled, very stiff | 1.98 | | | | | | | |
| 8 | | End of Borehole | 194.84 | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | | | | | | | | | | |
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| 34 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 38 | | | | | | | | | | |

NOTES:

1. Borehole advanced with hollow-stem continuous-flight auger to a depth of 1.98 m on June 30, 1999.
2. Borehole dry and backfilled on completion.
3. Samples will be kept for 3 months unless otherwise directed by the client.

Drill Method: Hollow Stem auger

Drill Date: June 30, 1999

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Ancaster, Ontario

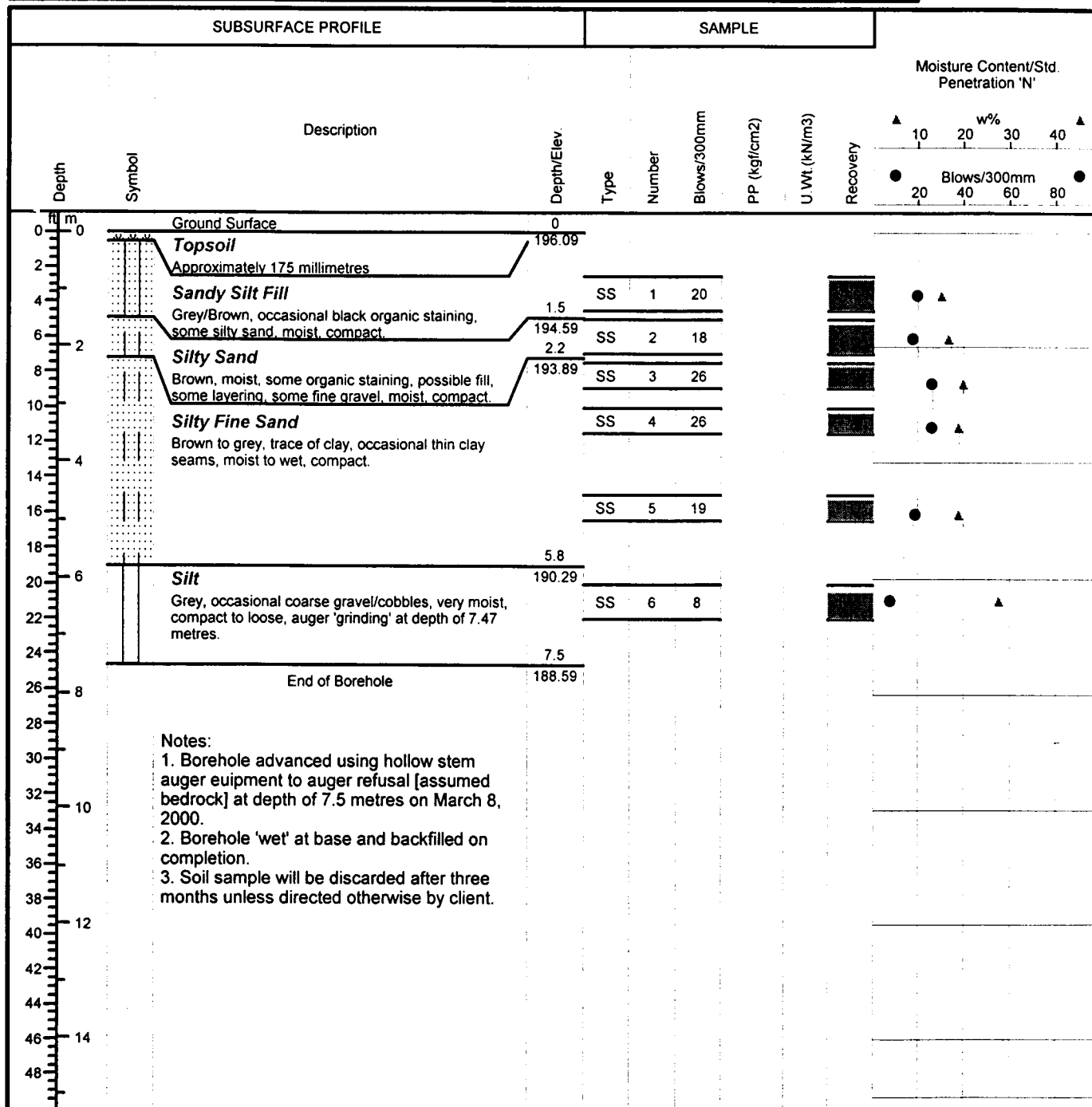
Client: Region of Hamilton-Wentworth [SPO]

Borehole # 7017 [SM No. P 16]

Borehole Location: High Mast Pole 16

Offset 25+992.834, Offset -0412

Project Manager: John Monkman P. Eng.



Drill Method: Hollow Stem

Drill Date: March 8, 2000

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1138

(SM Probehole No.: 138)

Probehole Location: Sta.: 26+036.850

Offset -19.727

Project Manager: John Monkman, P.Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | | Moisture Content/Std. Penetration 'N' | | | | | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------|---------------|----------|---------------------------------------|----|----|----|----|---|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt. (kN/m3) | Recovery | Moisture Content/Std. Penetration 'N' | | | | | |
| | | | | | | | | | | w% Blows/300mm | | | | | |
| | | | | | | | | | | ▲ | 10 | 20 | 30 | 40 | ▲ |
| | | | | | | | | | | ● | 20 | 40 | 60 | 80 | ● |
| 0 | | Ground Surface | 0 | | | | | | | | | | | | |
| 0 | | Asphaltic Concrete | 195.49 | | | | | | | | | | | | |
| | | Approximately 200mm. | | | | | | | | | | | | | |
| 2 | | Granular Fill | 0.8 | | | | | | | | | | | | |
| | | Approximately 600mm of 25mm Minus Crusher Run Limestone, compact | 194.69 | | | | | | | | | | | | |
| 4 | | Clayey Silt | 1.5 | | | | | | | | | | | | |
| | | Brown, traces of gravel, possible fill. | 193.99 | | | | | | | | | | | | |
| 6 | | Sandy Silt | 2.13 | | | | | | | | | | | | |
| | | Light brown, fine. | 193.36 | | | | | | | | | | | | |
| 8 | | End of Probehole | | | | | | | | | | | | | |
| 10 | | NOTES: | | | | | | | | | | | | | |
| 12 | | 1. Probehole advanced using hollow stem continuous flight auger equipment to termination at a depth of 2.13m on February 4, 1998. | | | | | | | | | | | | | |
| 14 | | 2. Probehole dry and backfilled on completion. | | | | | | | | | | | | | |
| 16 | | 3. No samples taken. | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | |
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| 28 | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | |

Drill Method: Hollow Stem auger

Drill Date: February 4, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth

Probehole # 1137
(SM Probehole No.: 137)

Probehole Location: Sta.: 26+166.181

Offset: -18.293

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|--------------------------|----------------------------|---------------------------------------|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kg/cm ²) | U.Wt. (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Topsoil and Sand With gravel | 191.92 | | | | | | | |
| 2 | | Granular Fill | 0.75 | | | | | | | |
| 4 | | Approximately 550mm of 25mm Minus Crusher Run Limestone compact. | 191.17 | | | | | | | |
| 6 | | Clayey Sandy Silt Light brown. | | | | | | | | |
| 2 | | | 2.13 | | | | | | | |
| 8 | | End of Probehole | 189.79 | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
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| 8 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 2.13 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth

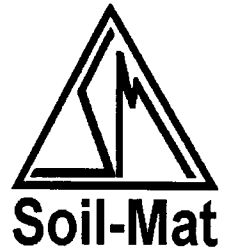
Probehole # 1136

(SM Probehole No.: 136)

Probehole Location: Sta.: 26+166.569

Offset: -16.494

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Asphaltic Concrete | 191.96 | | | | | | |
| 2 | | Approximately 225mm. | 191.73 | | | | | | |
| 2 | | Granular Fill | 0.7 | | | | | | |
| 4 | | Approximately 475mm of 25mm Minus Crusher Run Limestone | 191.26 | | | | | | |
| 4 | | Clayey Silt | 1.2 | | | | | | |
| 6 | | Brown, some fine sand with traces of gravel. | 190.76 | | | | | | |
| 2 | | Sandy Silt | 2.13 | | | | | | |
| 8 | | Light brown. | 189.83 | | | | | | |
| | | End of Probehole | | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
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| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 2.13 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

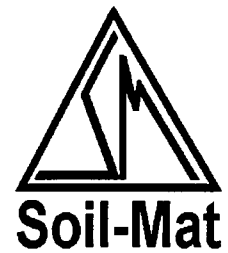
Probehole # 1135

(SM Probehole No.: 135)

Probehole Location: Sta.: 26+306.726

Offset: -18.479

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|--|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U Wt (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Topsoil and Sand | 187.63 | | | | | | |
| 2 | | Approximately 100mm. Black, stained. | 0.5 | | | | | | |
| 2 | | Granular Fill | 187.13 | | | | | | |
| 4 | | Approximately 400mm of 25mm Minus Crusher Run Limestone, compact. | 1.2 | | | | | | |
| 4 | | Clayey Silt | 186.43 | | | | | | |
| 6 | | Greyish brown, with gravel and fine sand. | 2.13 | | | | | | |
| 6 | | Rock | 185.5 | | | | | | |
| 8 | | Fractured, loose | | | | | | | |
| 10 | | End of Probehole | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
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| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 2.13 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth

Probehole # 1134

(SM Probehole No.: 134)

Probehole Location: Sta.: 26+307.035

Offset: -16.821

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt (kN/m ³) | Recovery |
| 0 m | | Ground Surface | 0 | | | | | | |
| 0 | | Asphaltic Concrete | 187.63 | | | | | | |
| 2 | | Approximately 190mm. | 0.69 | | | | | | |
| 2 | | Granular Fill | 186.94 | | | | | | |
| 4 | | Approximately 500mm of 25mm Minus Crusher Run Limestone, compact. | 1.2 | | | | | | |
| 4 | | Sandy Silt | 186.43 | | | | | | |
| 6 | | Brown, dry. | | | | | | | |
| 2 | | Silty Clay | | | | | | | |
| 8 | | Grey, trace of gravel. | 2.29 | | | | | | |
| 8 | | End of Probehole | 185.34 | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 4 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
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| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 2.29 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No Samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1133
(SM Probehole No.: 133)

Probehole Location: Station 26+409.679

Offset: -18.593

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U. Wt (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Granular Fill | 184.48 | | | | | | |
| 2 | | Approximately 550mm of 25mm Minus Crusher Run Limestone, compact. | 0.55 | | | | | | |
| 2 | | Topsoil and sand | 183.93 | | | | | | |
| 4 | | Black, stained in upper level, clean in lower level. | | | | | | | |
| 4 | | Rock | 1.52 | | | | | | |
| 6 | | Shattered or Fractured | 182.96 | | | | | | |
| 6 | | End of Probehole | | | | | | | |
| 8 | | | | | | | | | |
| 10 | | | | | | | | | |
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| 30 | | | | | | | | | |
| 32 | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 2.29 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No Samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

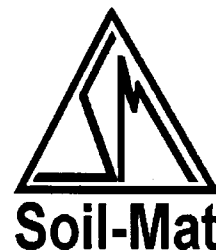
Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1132
(SM ProbeholeNo.: 132)

Probehole Location: Station 26+409.851

Offset: -16.692

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|-------------|--------|--------|-------------|---------------------------|---------------------------------------|----------|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U. Wt. (kN/m ³) | Recovery |
| 0 | | Ground Surface | 0 | | | | | | |
| 0 | | Asphaltic Concrete | 184.52 | | | | | | |
| 2 | | Approximately 175mm | 0.6 | | | | | | |
| 2 | | Granular Fill | 183.92 | | | | | | |
| 4 | | Approximately 425mm of 25mm Minus Crusher Run Limestone, compact. | | | | | | | |
| 4 | | Rock | 1.52 | | | | | | |
| 6 | | Shattered or Fractured | 183 | | | | | | |
| 6 | | End of Probehole | | | | | | | |
| 8 | | | | | | | | | |
| 10 | | | | | | | | | |
| 12 | | | | | | | | | |
| 14 | | | | | | | | | |
| 16 | | | | | | | | | |
| 18 | | | | | | | | | |
| 20 | | | | | | | | | |
| 22 | | | | | | | | | |
| 24 | | | | | | | | | |
| 26 | | | | | | | | | |
| 28 | | | | | | | | | |
| 30 | | | | | | | | | |
| 32 | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 1.52 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No Samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: JM

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/Mohawk Road Interchange

Location: Highway 403

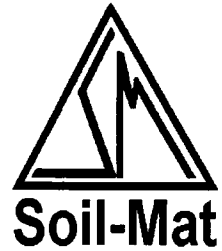
Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1131 [SM No. 131]

Probehole Location: Station 26+508.198

Offset: -17.891

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | SAMPLE | | | | | Moisture Content/Std. Penetration 'N' | |
|--------------------|--------|---|----------------|--------|--------|-------------|---------------------------|---------------------------|--|--|
| Depth | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U Wt (kN/m ³) | | |
| 0 | | Ground Surface | 0 | | | | | | | |
| 0 | | Asphaltic Concrete Approximately 62.5mm. | 181.47 | | | | | | | |
| 2 | | Granular Fill Approximately 600mm of 25mm Minus Crusher Run Limestone, compact. Greyish black in upper level, clean in lower level. | 0.66 180.81 | | | | | | | |
| 4 | | Rock Shattered or Fractured | 1.52 179.95 | | | | | | | |
| 6 | | End of Probehole | | | | | | | | |
| 8 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 1.52 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No Samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: JM

Sheet: 1 of 1

Project No: SM 97027-G

Project: LINC/Hwy 403/ Mohawk Road Interchange

Location: Highway 403

Client: Region of Hamilton-Wentworth [SPO]

Probehole # 1130
(SM Probehole No.: 130)

Probehole Location: Station 26+508.270

Offset: -16.587

Project Manager: John Monkman, P. Eng.



| SUBSURFACE PROFILE | | | | | SAMPLE | | | | | |
|--------------------|--------|---|-------------|------|--------|-------------|---------------------------|----------------------------|----------|--|
| Depth ft m | Symbol | Description | Depth/Elev. | Type | Number | Blows/300mm | PP (kgf/cm ²) | U.Wt. (kN/m ³) | Recovery | Moisture Content/Std. Penetration 'N' |
| | | | | | | | | | | ▲ 10 20 30 40 ▲ ● 20 40 60 80 ● |
| 0 | | Ground Surface | 0 | | | | | | | |
| | | Asphaltic Concrete | 181.52 | | | | | | | |
| | | Approximately 150mm. | | | | | | | | |
| 2 | | Granular Fill | 0.65 | | | | | | | |
| | | Approximately 500mm of 25mm Minus Crusher | 180.87 | | | | | | | |
| | | Run Limestone compact. | | | | | | | | |
| 4 | | Rock | 1.52 | | | | | | | |
| | | Shattered or Fractured | 180 | | | | | | | |
| 6 | | End of Probehole | | | | | | | | |
| 2 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 26 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 32 | | | | | | | | | | |

NOTES:

1. Probehole advanced using hollow-stem auger equipment to termination at depth of 1.52 metres on February 4, 1998.
2. Probehole dry and backfilled on completion.
3. No Samples taken.

Drill Method: Hollow Stem

Drill Date: February 4, 1998

Hole Size: 200mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic

Checked by: JM

Sheet: 1 of 1

PROJECT No.: SM 97027-G BOREHOLES ADVANCED ON HIGHWAY 403 AND MOHAWK ROAD

| BOREHOLE NO. | ASPHALTIC CONCRETE [MM] | GRANULAR BASE MATERIAL [MM] | SUBGRADE SOIL DESCRIPTION [MOISTURE CONTENT %] |
|---------------------|------------------------------------|--|---|
| 6697 [Hwy 403 NB] | 250 | 370 | Grey Clayey Silt [24.2] |
| 7020 [Hwy 403 NB] | 250 | 430 | Brown Sandy Silt [7.9] |
| 7018 [Hwy 403NB] | 150 | 450 | Auger Refusal [assumed bedrock] |
| 7019 [Hwy 403 NB] | 240 | 475 | Brown Sandy Silt and Gravel [3.5] |
| 7006 [Mohawk Rd] | 150 | 375 | Brown Silty Sand and Gravel, some clay [11.0] |
| 7005 [Mohawk Rd] | 150 | 430 | Brown Silty Sand, some gravel and clay [8.7] |
| 6702 [Hwy 403 SB] | 225 | 200 | Brown Sandy Silt, trace of gravel [12.9] |
| 6701 [Hwy 403SB] | 100 | 300 | Brown Sandy Silt, trace of gravel [14.7] |
| 6691 [Hwy 403 SB] | 250 | 250 | Brown Sandy Silt, trace of gravel [11.6] |
| 6700 [Hwy 403 SB] | 250 | 330 | Brown Sandy Silt, trace of clay [14.6] |
| 6694 [Hwy 403 NB] | 250 | 175 | Brown/grey Silty Fine Sand [11.9] |
| 6692 [Hwy 403NB] | 115 | 265 | Brown/grey Silty Fine Sand [12.6] |
| 6693 [Hwy 403 SB] | 250 | 225 | Brown Silty Fine Sand [12.6] |
| 6698 [Hwy 403 NB] | 240 | 265 | Brown Silty Sand, with gravel [11.7] |
| 6699 [Hwy 403NB] | 175 | 430 | Brown Silty Sand, with gravel [13.2] |
| 6695 [Hwy 403 NB] | 280 | 380 | Brown Sandy Silt, some gravel [4.1] |
| 6696 [Hwy 403NB] | 140 | 315 | Brown Sandy Silt, some gravel [3.3] |

Boreholes advanced March 14/15, 2000

PROJECT No.: SM 97027-G

**FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 – 231 [SPO]**



APPENDIX C

Laboratory Test Results

UNCONFINED [UNIAXIAL] COMPRESSION TEST

Unconfined [Uniaxial] Compression testing of rock may be used to determine the strength and deformation behaviour of intact rock specimens. The compressive strength values obtained may also be used to provide an approximate index of drilling and excavating properties of the rock mass.

The rock samples, obtained from the core drilling, were tested at the McMaster University Geotechnical Laboratory. The specimens were approximately 46.5 mm in diameter and 105 mm in length, with a length/diameter ratio, L/D of approximately 2.2. The test results are summarised in Table B1, and the load-displacement curves are presented in Figures B1 to B9.

Table B1. Uniaxial Compression Test - Summary

| Borehole | | Sample | | | | |
|----------|------------------|--------|------------------|-------------------------------------|--------------|---------------------------|
| No. | Elevation [m] | No. | Elevation [m] | Unit Weight [kN/m ³] | UCS [MPa] | E _{s50} [MPa] |
| 1003 | 220.90 | A-1 | 217.53 | 26.4 | 156 | 54,160 |
| 1003 | 220.90 | A-2 | 216.25 | 24.92 | 107 | 35,151 |
| 1004 | 223.11 | B-1 | 217.31 | 26.7 | 130 | 32,480 |
| 1004 | 223.11 | B-2 | 215.16 | 26.0 | 94 | 22,661 |
| 1023 | 226.13 | C-1 | 218.43 | 26.3 | 101 | 26,198 |
| 1023 | 226.13 | C-2 | 216.63 | 25.9 | 115 | 32,849 |
| 1051 | 218.25 | G-2 | 214.45 | 26.3 | 136 | 44,455 |
| F | | F-1 | | 25.9 | 111 | 35,892 |
| F | | F-2 | | 25.4 | 93 | 41,607 |

POINT LOAD TESTS

The Point Load Test is an index test, which can be used to test irregular size and shape rock specimens. The load required to split the rock, compressed between two conical steel points and the specimen size determine the Point Load Index, I_p . The Unconfined [Uniaxial] Compressive Strength of the rock may be estimated from the Point Load Index using empirical relationships.

Point Load Tests were carried out on numerous rock specimens obtained from the core drilling. The results of these tests are summarised in Table B2.

| Table B2. Point Load Test Results | | | |
|-----------------------------------|---------------|---------------------|--------------------|
| Borehole | | Point Load Index | Estimated Strength |
| No. | Elev. [m] | $I_s = P/D^2$ [MPa] | UCS [MPa] |
| 1003 | 220.90 | | |
| | 215.90 | 4.25 | 90 |
| | 216.15 | 2.96 | 65 |
| | 216.45 | 3.29 | 70 |
| | 216.45 | 3.30 | 70 |
| | 217.00 | 3.22 | 70 |
| | 217.00 | 3.29 | 70 |
| | 217.30 | 2.08 | 45 |
| | 217.30 | 4.15 | 90 |
| | 217.67 | 2.93 | 65 |
| | 217.67 | 4.29 | 95 |
| 1004 | 223.11 | | |
| | 214.91 | 2.29 | 50 |
| | 214.91 | 1.80 | 40 |
| | 215.91 | 1.92 | 40 |
| | 215.91 | 2.06 | 45 |
| | 216.61 | 2.88 | 60 |
| | 216.61 | 1.48 | 30 |
| | 216.91 | 2.64 | 60 |
| | 216.91 | 1.83 | 40 |
| | 217.61 | 5.58 | 115 |
| | 217.61 | 3.69 | 80 |

PROJECT No.: SM 97027-G

FINAL GEOTECHNICAL INVESTIGATION REPORT
LINCOLN ALEXANDER PARKWAY/HIGHWAY
403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT No. RHW – 00 – 231 [SPO]



| | | | |
|------|--------|------|-----|
| 1023 | 226.13 | | |
| | 216.83 | 4.39 | 95 |
| | 216.83 | 2.32 | 50 |
| | 217.23 | 4.10 | 90 |
| | 217.23 | 3.00 | 65 |
| | 218.13 | 3.57 | 75 |
| | 218.13 | 2.88 | 65 |
| | 218.58 | 2.65 | 55 |
| | 218.58 | 2.72 | 60 |
| 4989 | 212.80 | | |
| | 213.99 | 1.59 | 35 |
| | 214.25 | 3.47 | 75 |
| | 214.53 | 6.90 | 155 |
| | 214.60 | 5.42 | 120 |
| | 216.60 | 4.28 | 110 |
| | 216.60 | 6.02 | 145 |
| F | ?? | | |
| | -6.90 | 3.61 | 80 |
| | -6.90 | 3.34 | 70 |
| | -6.80 | 4.85 | 110 |
| | -6.80 | 3.72 | 85 |
| | -6.80 | 2.02 | 45 |
| | -6.80 | 3.01 | 70 |
| | -6.40 | 3.66 | 75 |
| | -6.40 | 2.72 | 60 |
| | -6.10 | 2.72 | 60 |
| | -6.10 | 3.09 | 65 |
| | -5.79 | 4.25 | 95 |
| | -5.79 | 4.88 | 110 |
| | -5.00 | 4.01 | 90 |
| 1519 | 220.90 | | |
| | 215.10 | 2.89 | 65 |
| | 215.10 | 2.36 | 50 |
| | 215.60 | 3.28 | 70 |
| | 215.60 | 2.08 | 45 |
| | 216.15 | 2.17 | 45 |
| | 216.15 | 1.16 | 25 |
| | 217.10 | 3.37 | 75 |
| | 217.10 | 3.98 | 85 |
| | 217.60 | 2.20 | 50 |
| 1521 | 221.05 | | |
| | 215.25 | 4.81 | 105 |
| | 215.25 | 2.72 | 60 |

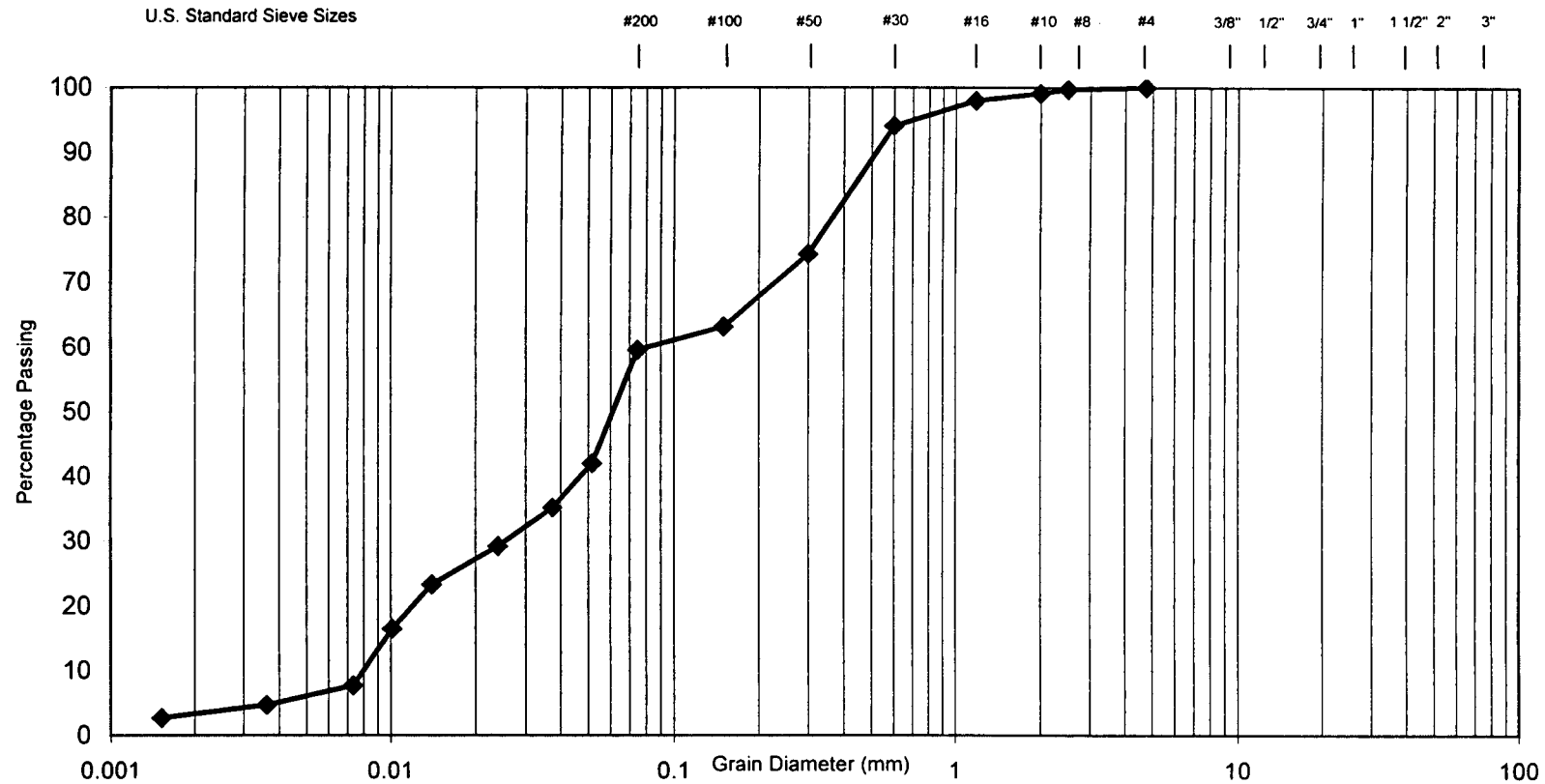
PROJECT NO.: SM 97027-G

FINAL GEOTECHNICAL INVESTIGATION REPORT
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403/MOHAWK ROAD INTERCHANGE
ANCASTER, ONTARIO
CONTRACT NO. RHW – 00 – 231 [SPO]



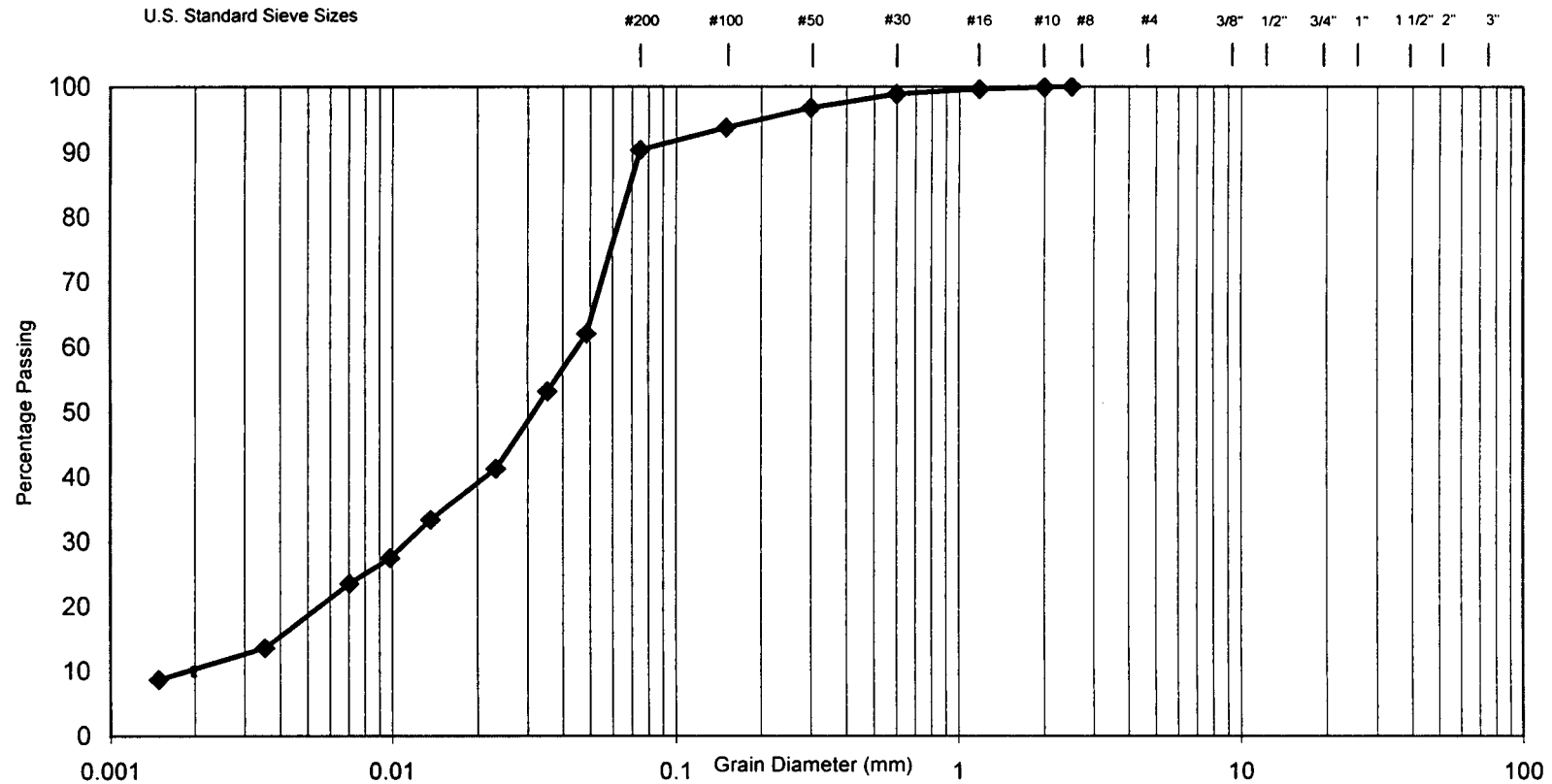
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|--|--------|------|-----|
| | 216.95 | 3.15 | 70 |
| | 216.95 | 2.44 | 55 |
| | 218.65 | 4.64 | 100 |
| | 218.65 | 2.64 | 60 |
| | 219.42 | 3.02 | 65 |
| | 219.42 | 2.88 | 65 |

Mechanical Analysis



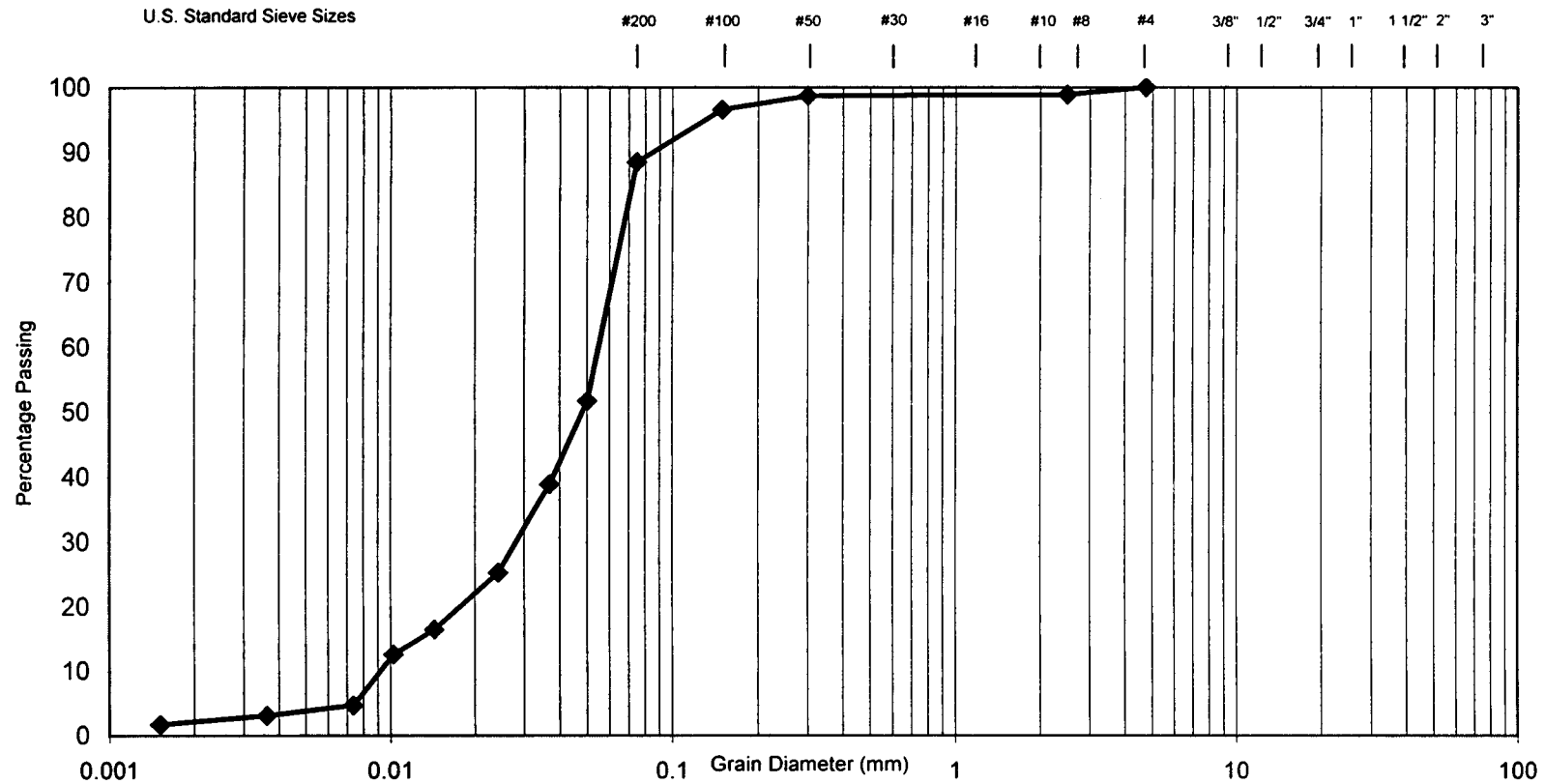
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|--|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Sandy Silt, Trace of Clay Borehole No. 5545, Depth 0.7 to 1.2 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario | | | | |
| | | | | | | Project No.: SM 97027-G Drawing No.: A1 | | | | |

Mechanical Analysis



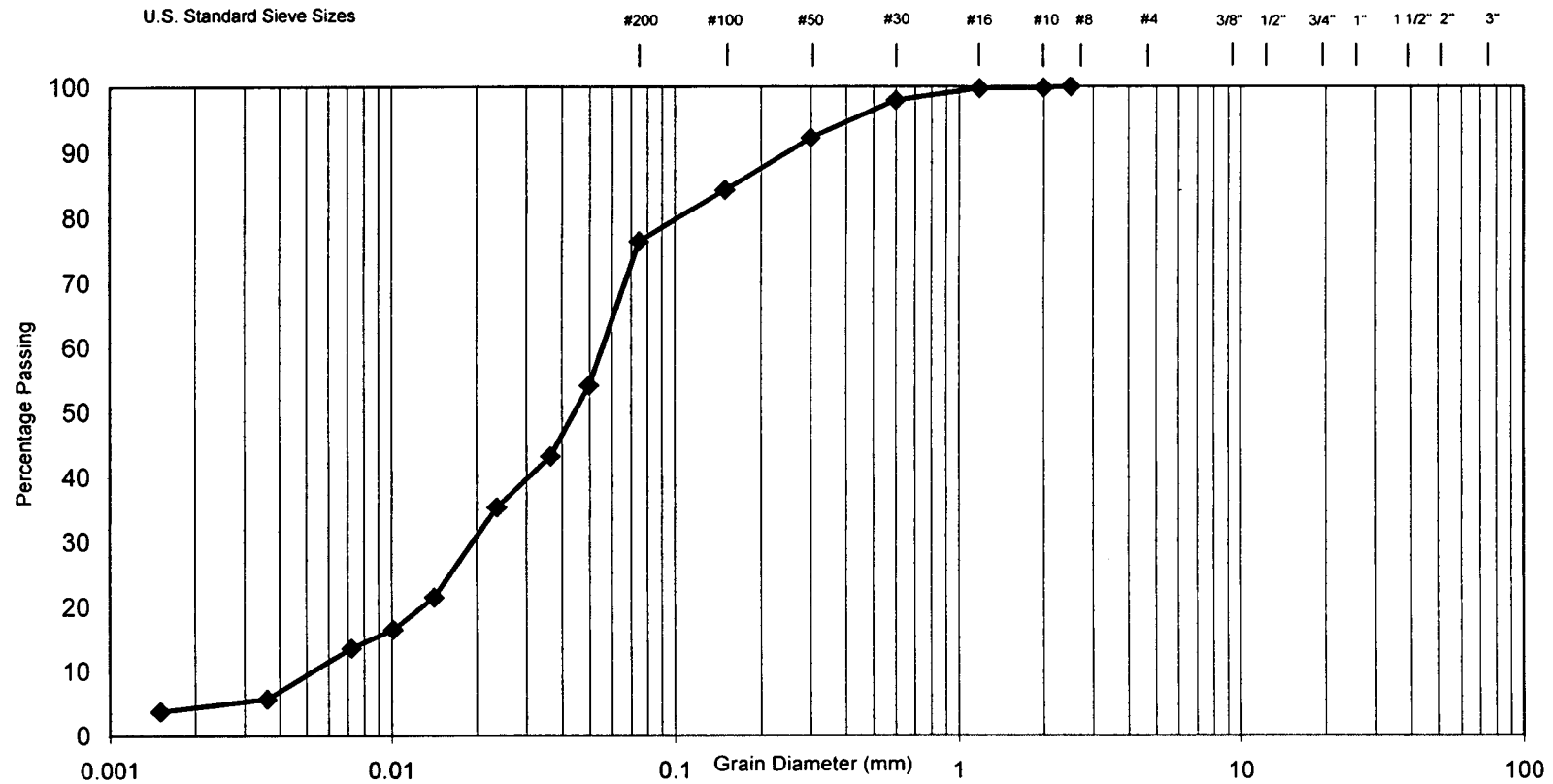
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|--|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Silt Some Sand and Clay Borehole No. 5546, Depth 0.7 to 1.2 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario | | | | |
| - | | | | | | Project No.: SM 97027-G Drawing No.: A2 | | | | |

Mechanical Analysis



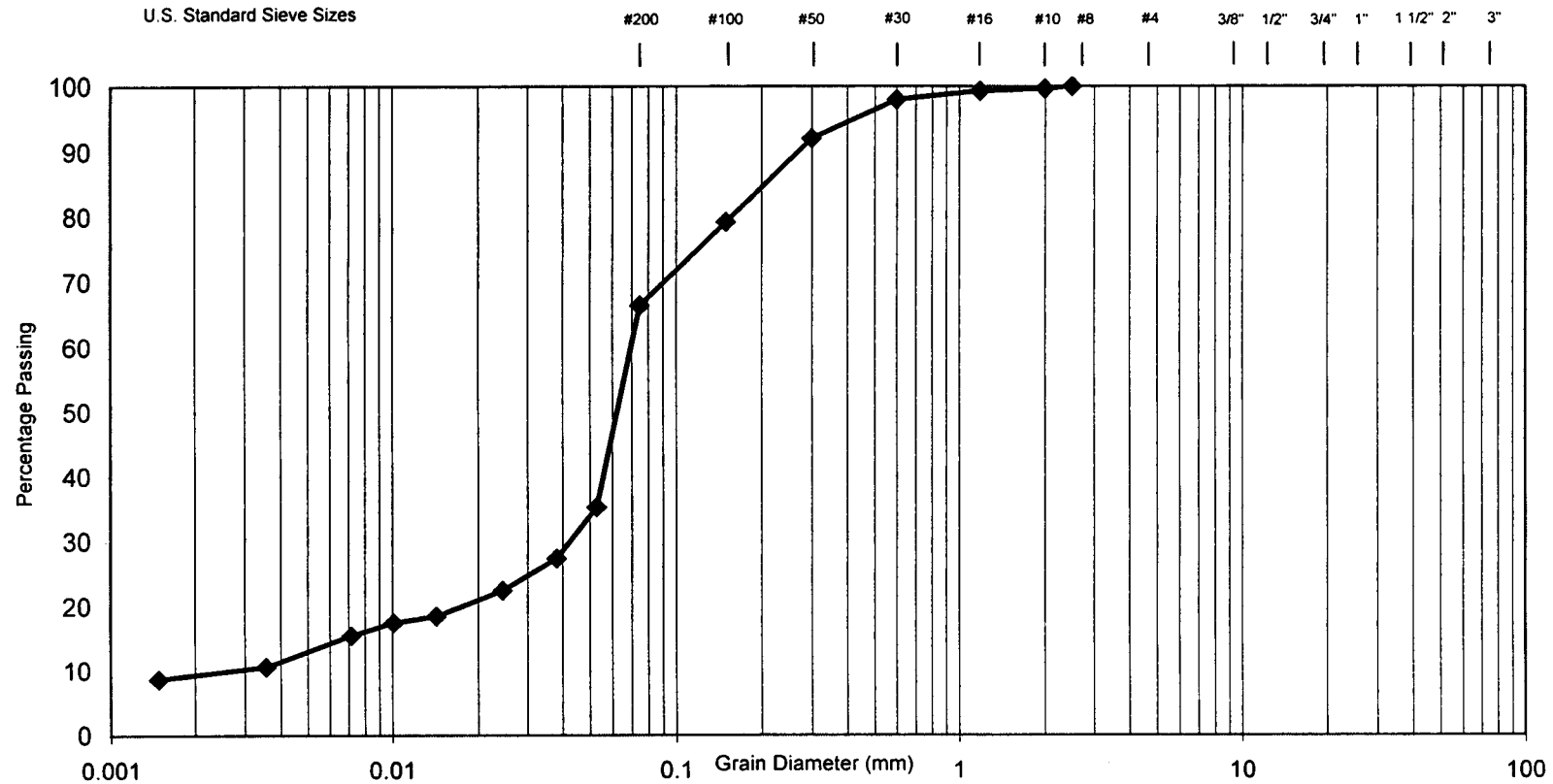
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|--|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Silt Some Sand, Trace of Clay Borehole No. 5539, Depth 1.5 to 2.1 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario | | | | |
| | | | | | | Project No.: SM 97027-G Drawing No.: A3 | | | | |

Mechanical Analysis



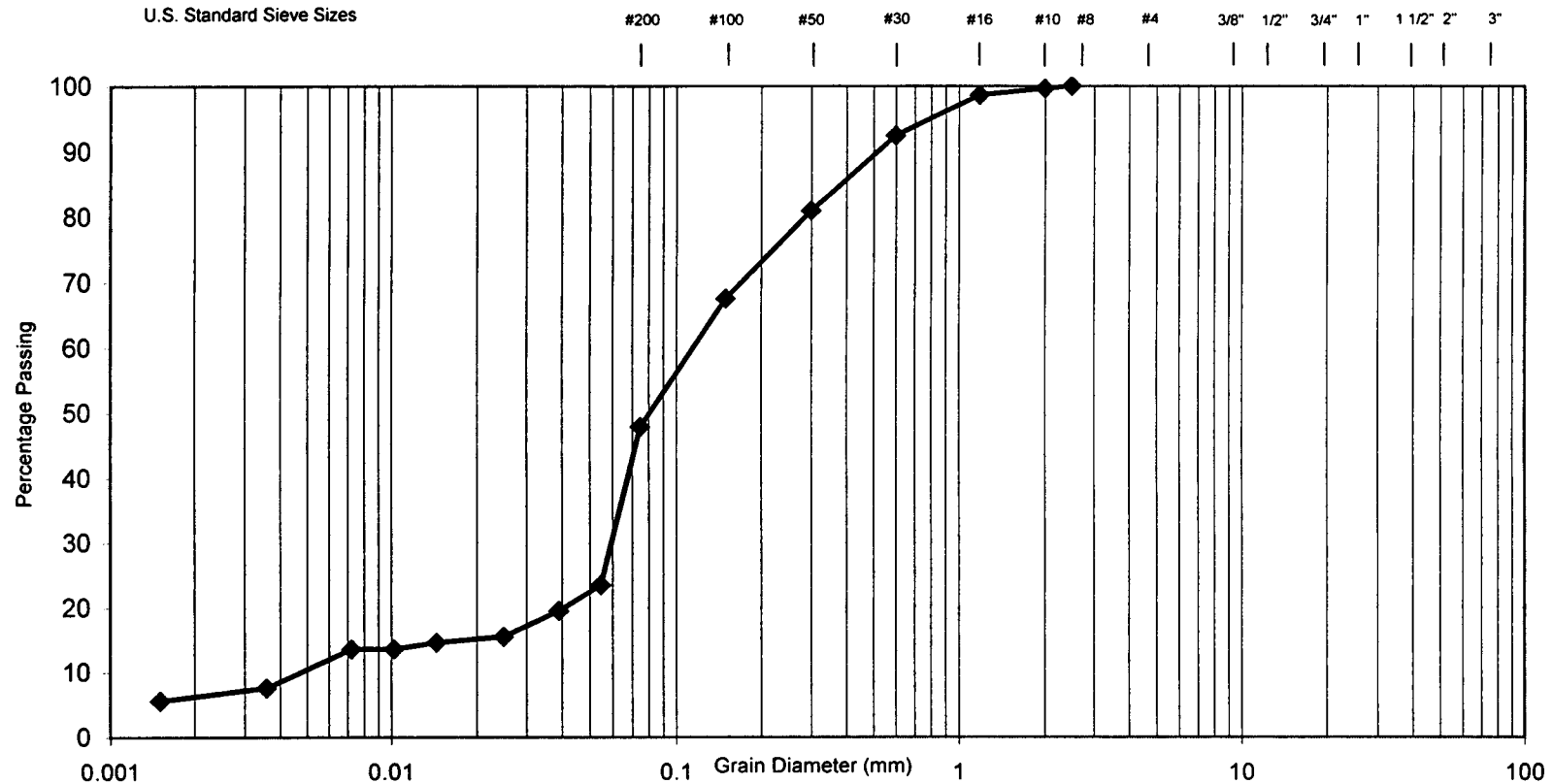
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|--|------|--------|--------|------|--|--------|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | | |
| Brown Sandy Silt, Trace of Clay Borehole No. 7011, Depth 0.7 to 1.3 m | | | | | Highway 403 & Mohawk Hamilton, Ontario | | | | | |
| | | | | | Project No.: SM 97027-G Drawing No.: A4 | | | | | |

Mechanical Analysis



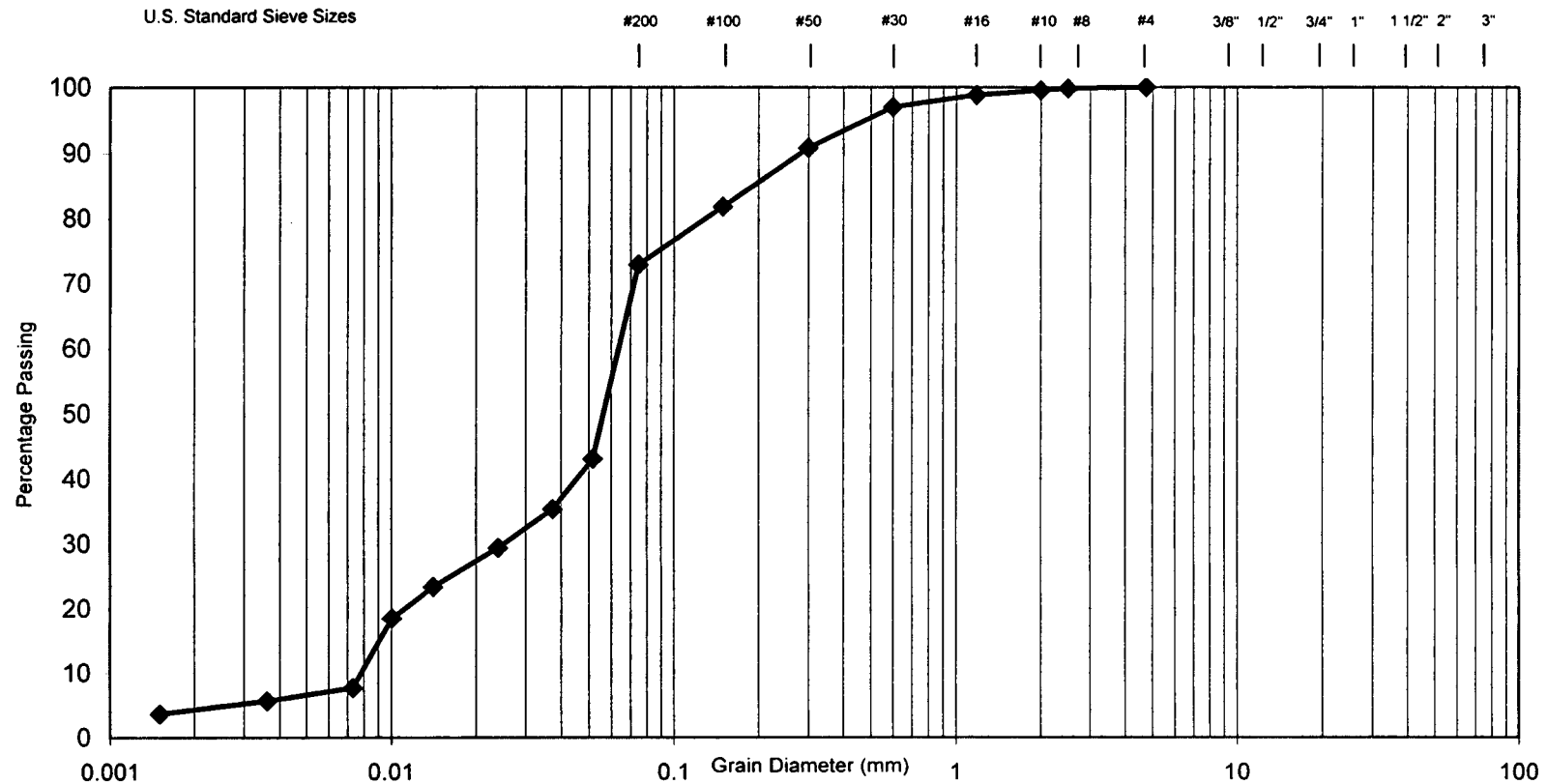
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|--|------|--------|--------|------|--------|---|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Sandy Silt, Trace of Clay Borehole No. 7012, Depth 0.7 to 1.3 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario Project No.: SM 97027-G Drawing No.: A5 | | | | |

Mechanical Analysis



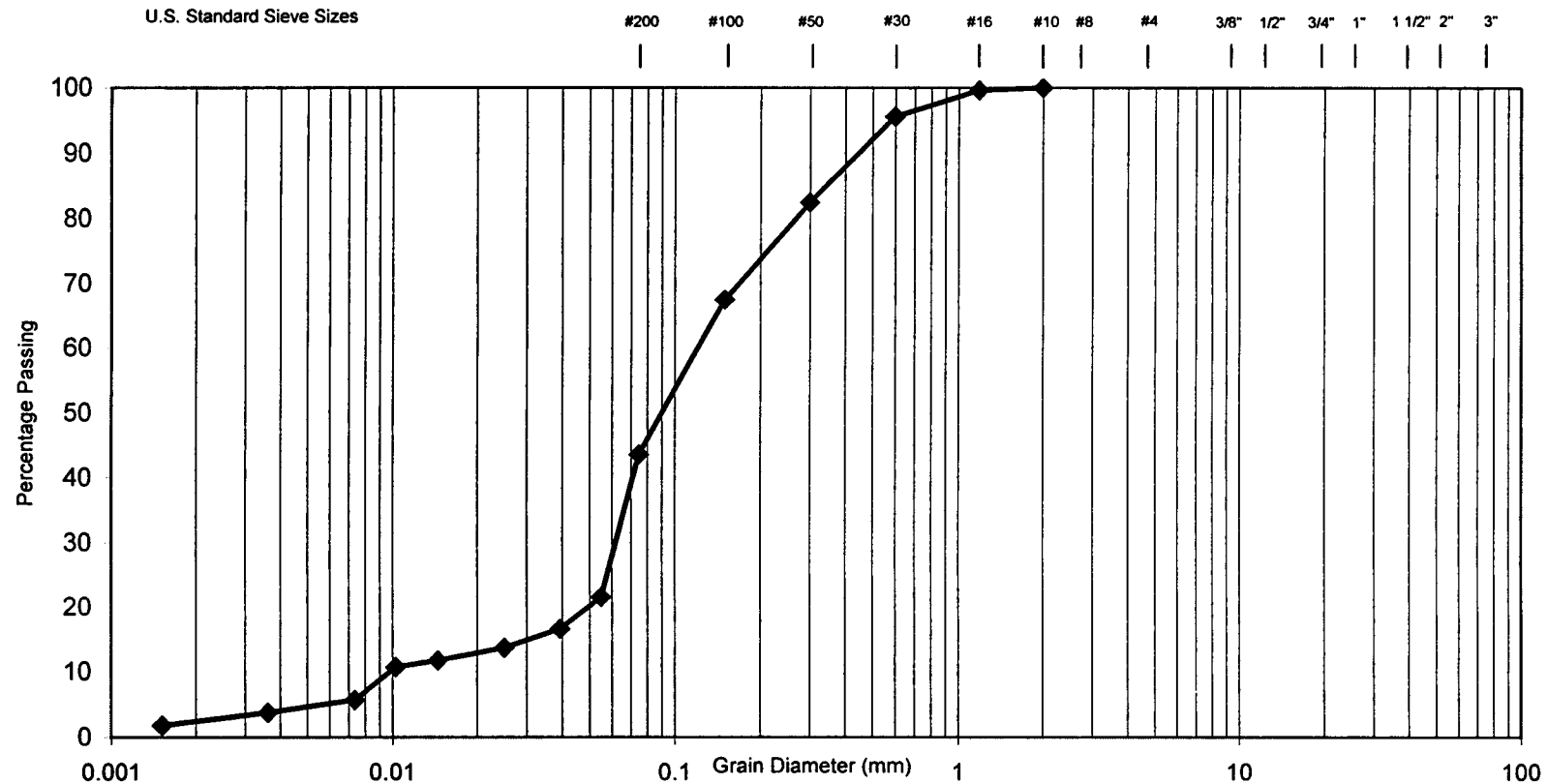
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|--|------|--------|--------|------|--------|---|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Silty Sand, Trace of Clay Borehole No. 5540, Depth 0.7 to 1.2 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario Project No.: SM 97027-G Drawing No.: A6 | | | | |

Mechanical Analysis



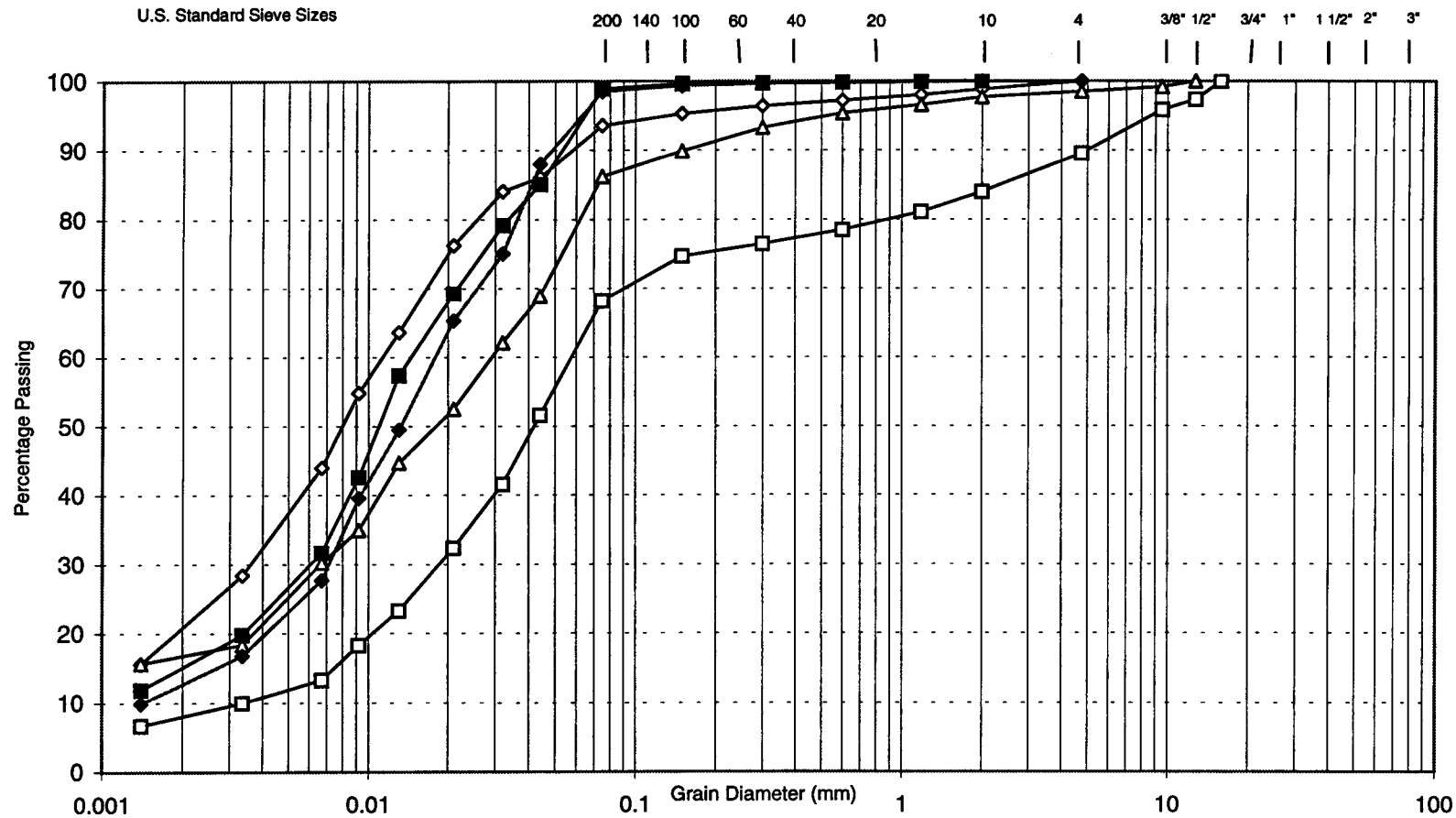
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|--|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Sandy Silt, Trace of Clay Borehole No. 5546, Depth 0.7 to 1.2 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario | | | | |
| | | | | | | Project No.: SM 97027-G Drawing No.: A7 | | | | |

Mechanical Analysis



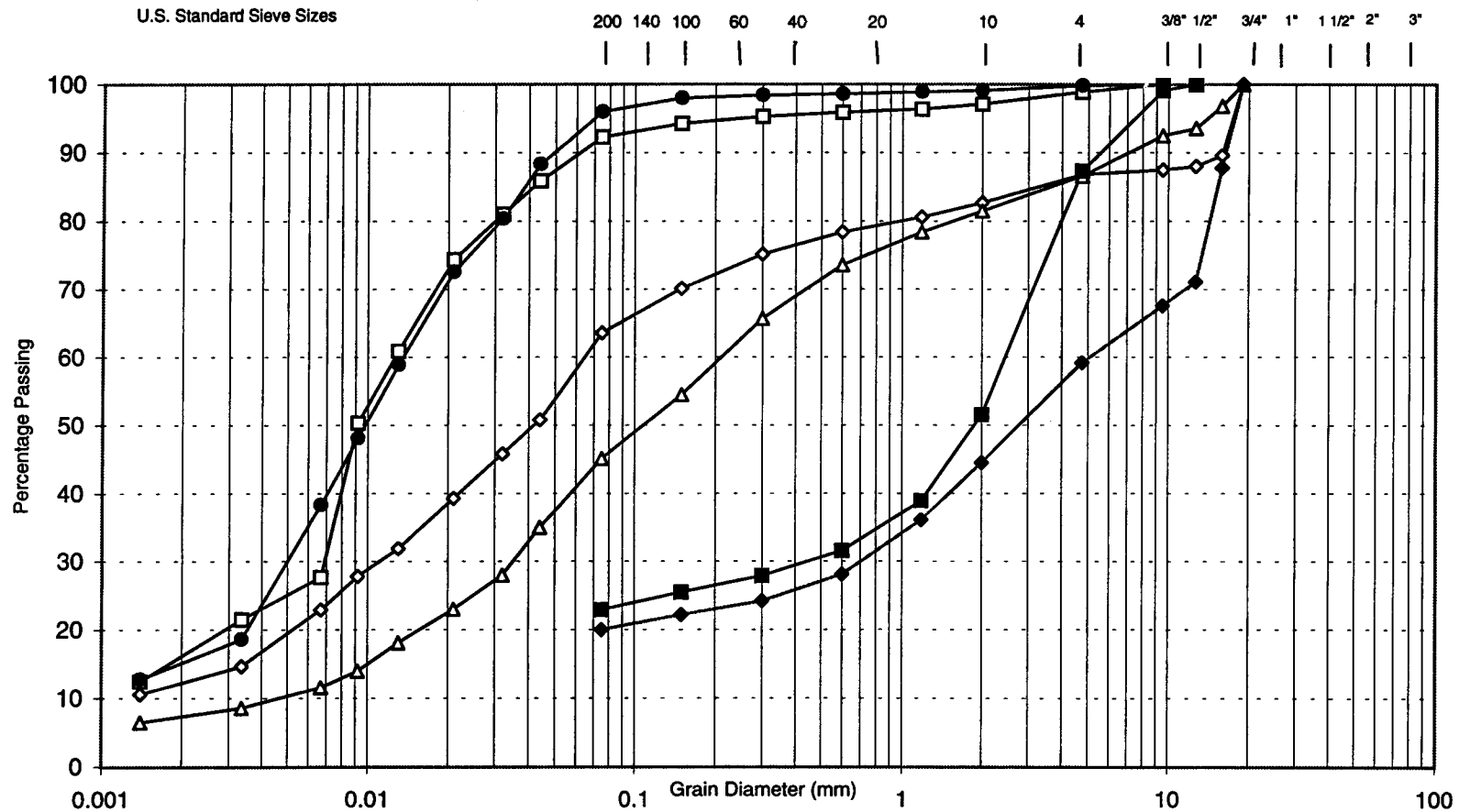
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|--|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL-MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| Brown Silty Sand, Trace of Clay Borehole No. 5543, Depth 0.7 to 1.2 m | | | | | | Highway 403 & Mohawk Hamilton, Ontario | | | | |
| | | | | | | Project No.: SM 97027-G Drawing No.: A8 | | | | |

Mechanical Analysis



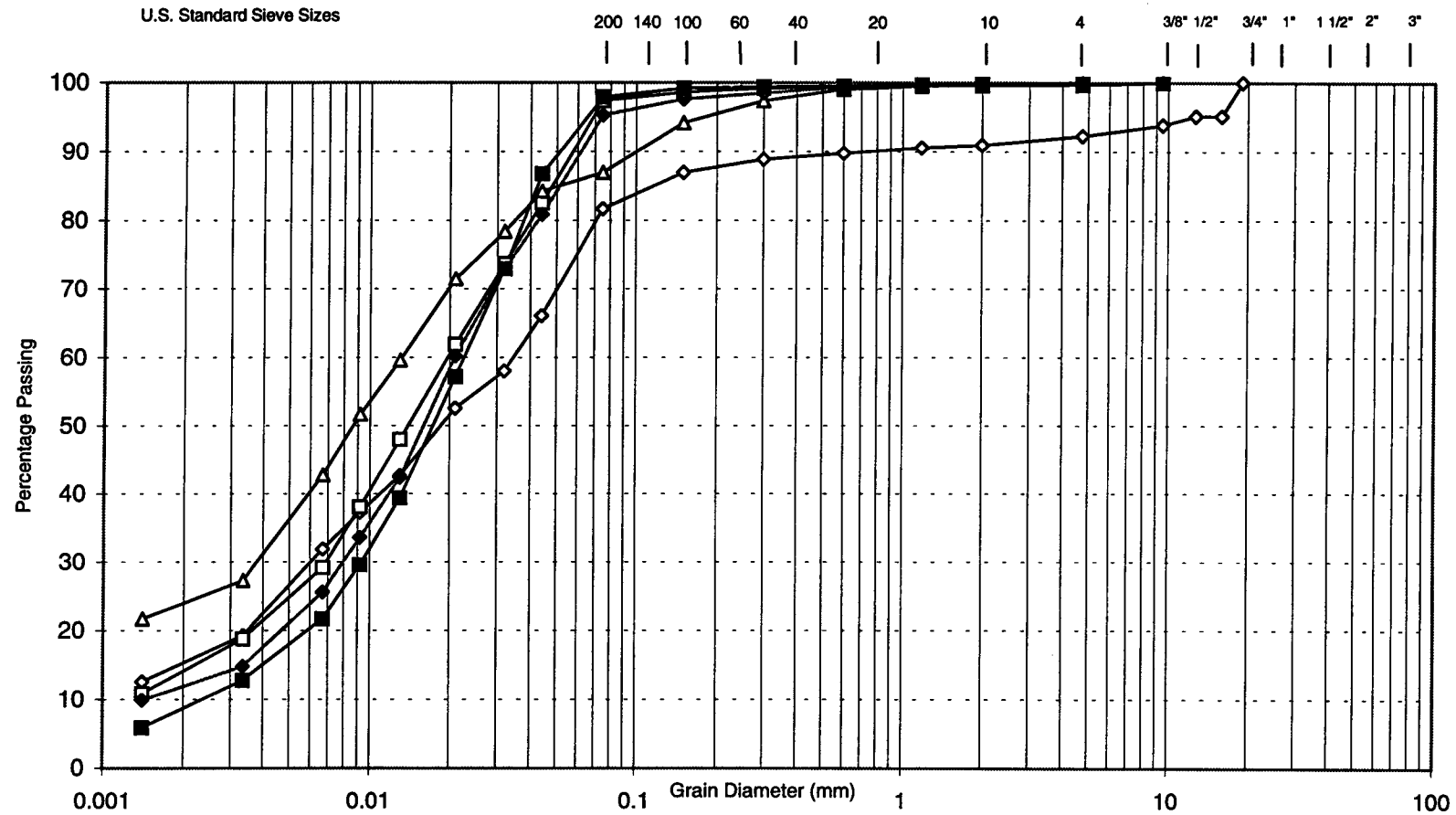
| | | | | | | | | | | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div>—◇— BH-1107, SS-2</div><div>—▲— BH-1109, SS-4</div><div>—■— BH-1110, SS-6</div></div> <div><div>—□— BH-1107, SS-3</div><div>—◆— BH-1109, SS-5</div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster</div> <div>Project No.: SM 97027-G Drawing No.: B 01</div> | | | | |

Mechanical Analysis



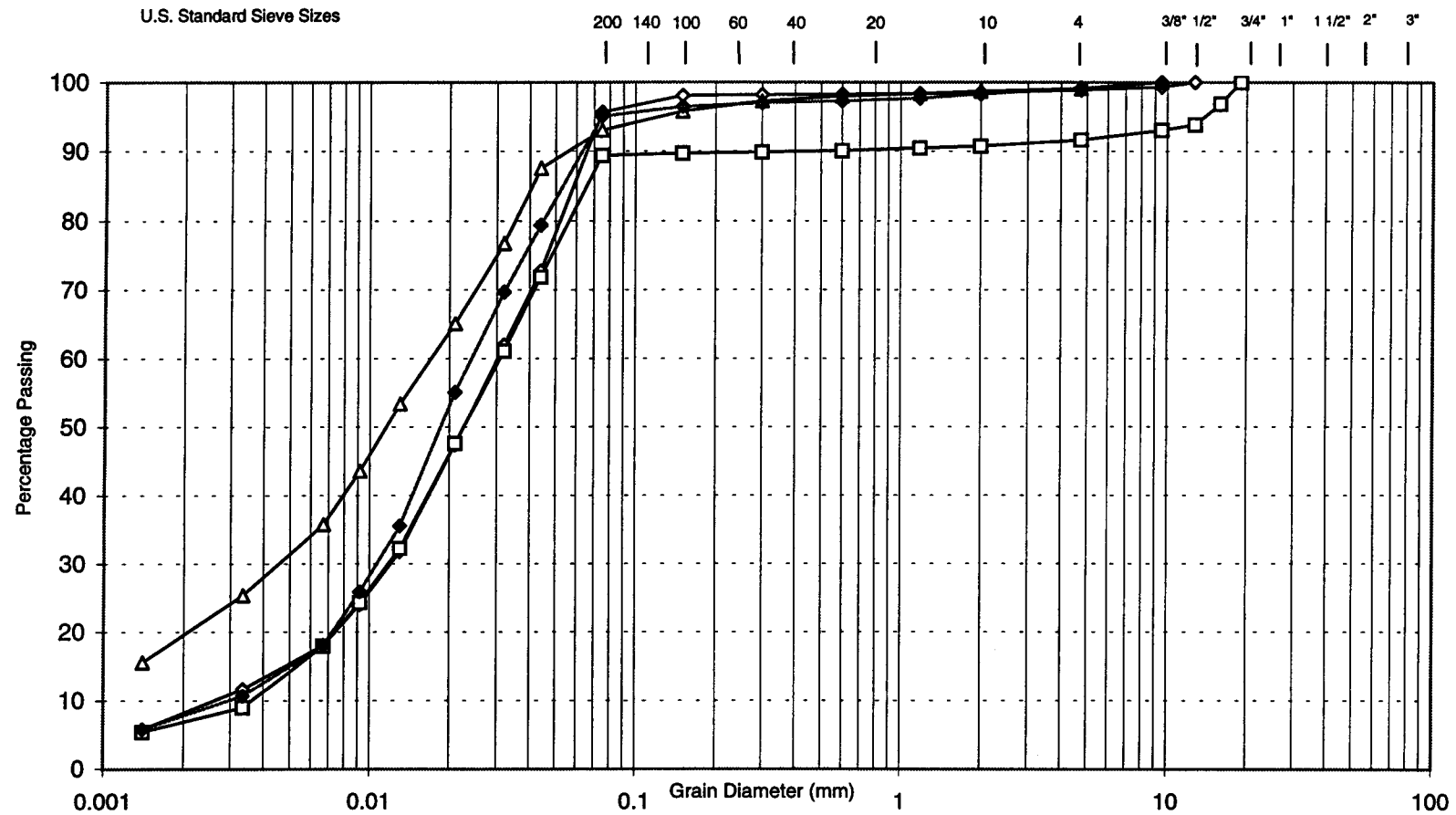
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div><div>—◇— BH-1500, SS-1</div><div>—△— BH-1502, SS-1</div><div>—■— BH-1504, SS-4</div></div><div><div>—□— BH-1500, SS-2</div><div>—◆— BH-1504, SS-2</div><div>—●— BH-1504, SS-7</div></div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster</div> <div>Project No.: SM 97027-G Drawing No.: B 02</div> | | | | |

Mechanical Analysis



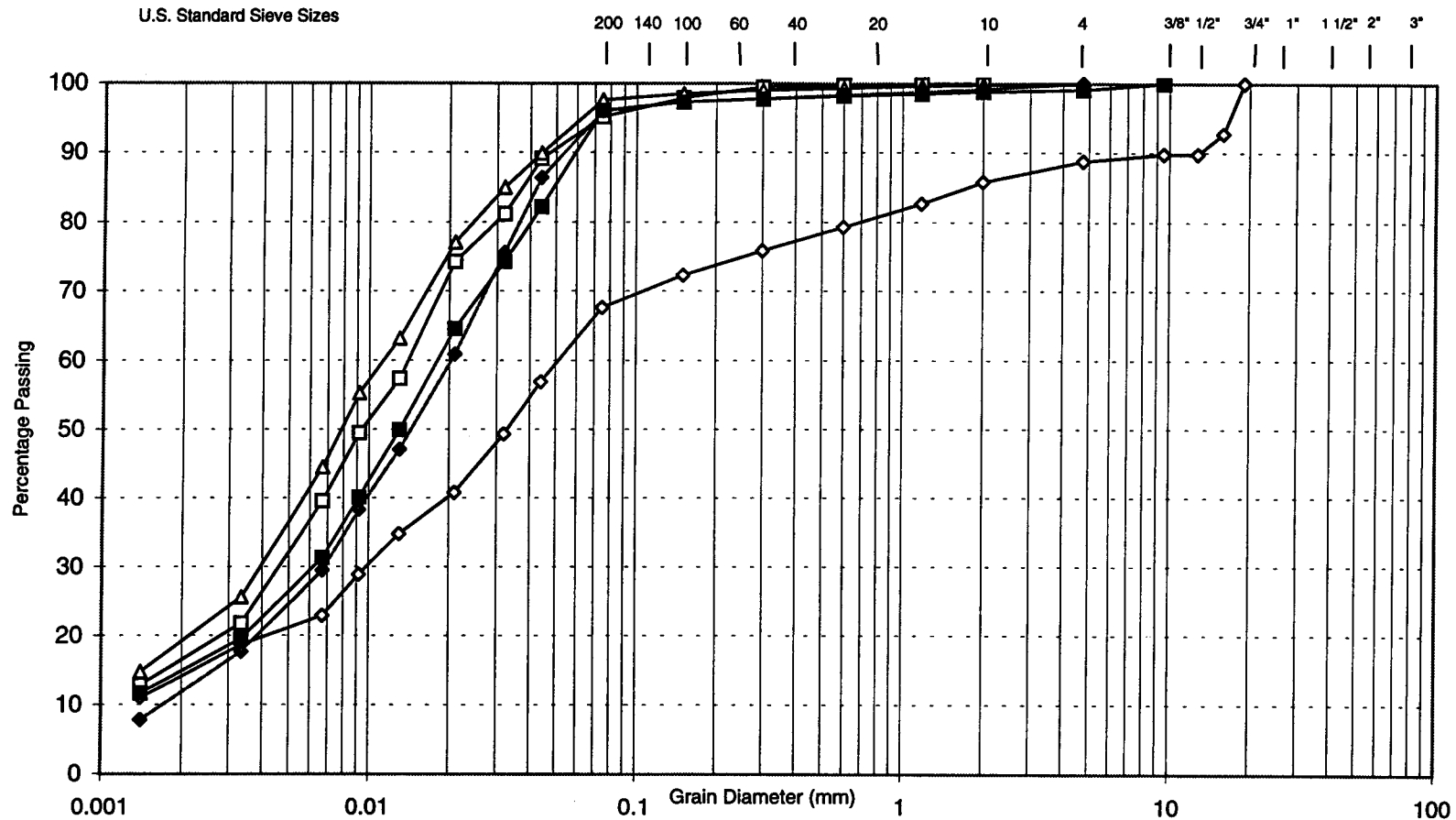
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div>—◇— BH-1505, SS-2</div><div>—△— BH-1507, SS-2</div><div>—■— BH-1509, SS-3</div></div> <div><div>—□— BH-1505, SS-3</div><div>—◆— BH-1507, SS-3</div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster</div> <div>Project No.: SM 97027-G Drawing No.: B 03</div> | | | | |

Mechanical Analysis



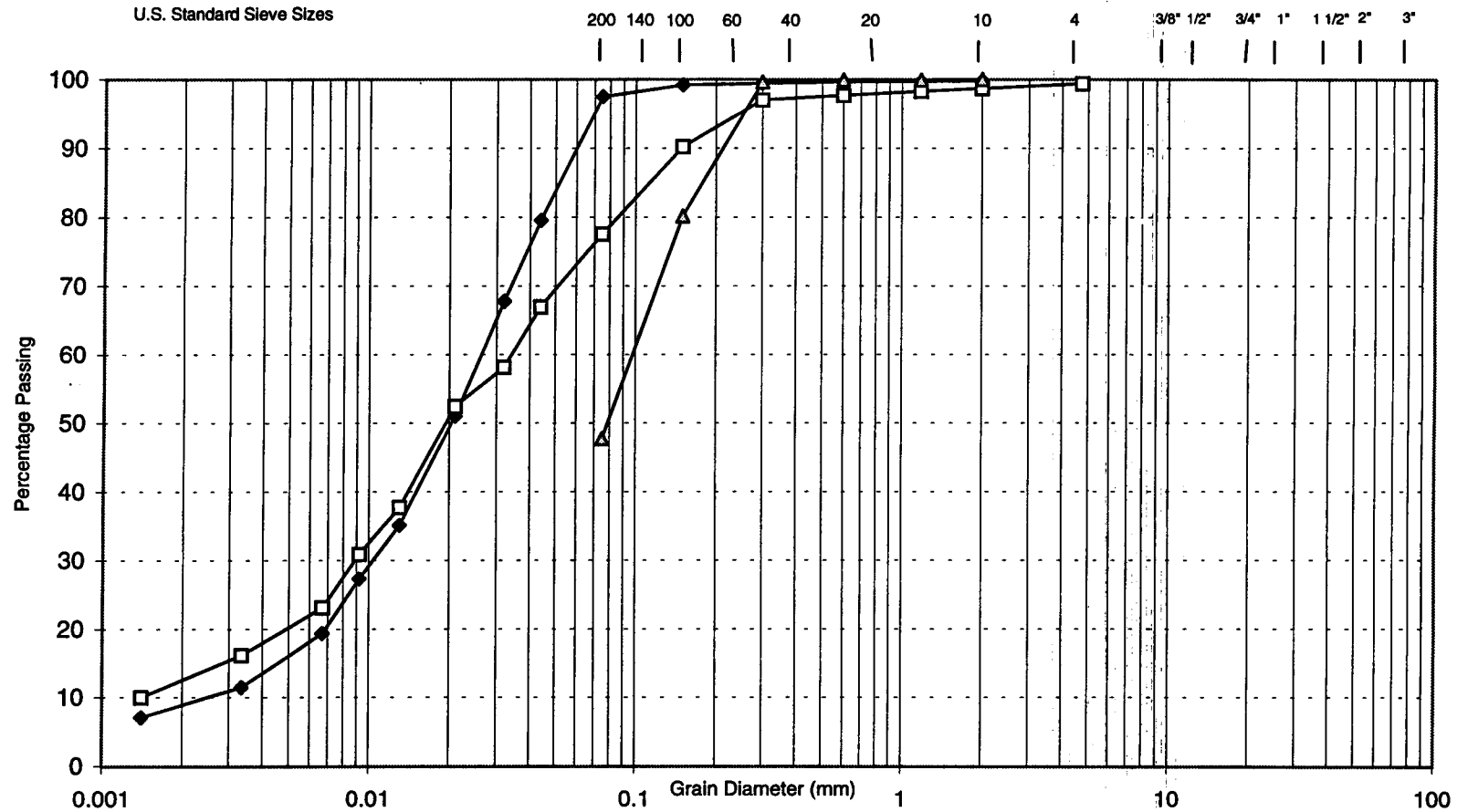
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
|---|------|--------|--------|------|--------|---|--------|--------|--------|--|
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div>—◇— BH-1517, SS-3 —□— BH-1518, SS-2</div> <div>—△— BH-1523, SS-2 —◆— BH-1523, SS-3</div> | | | | | | Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster | | | | |
| | | | | | | Project No.: SM 97027-G Drawing No.: B 04 | | | | |

Mechanical Analysis



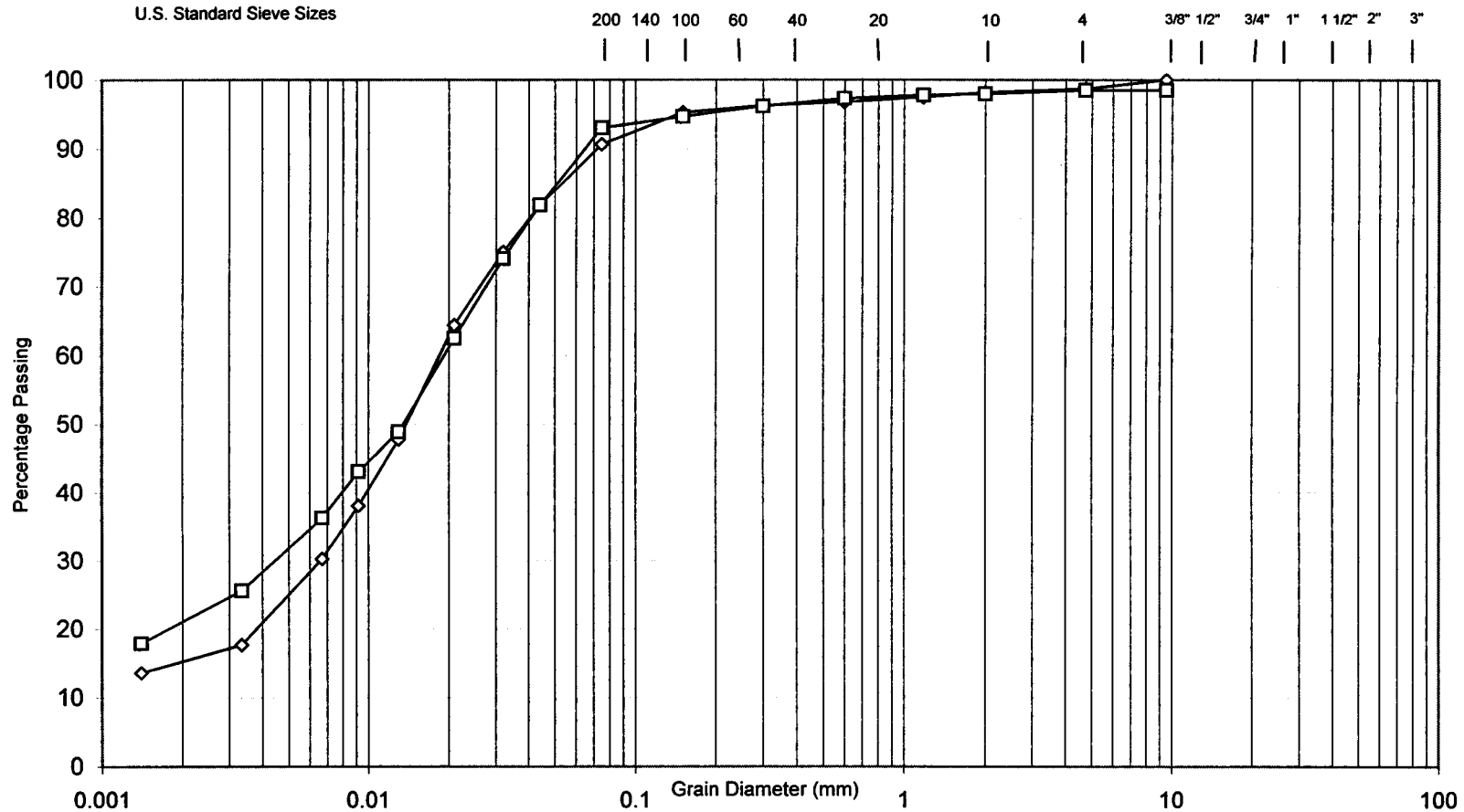
| | | | | | | | | | | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div>—◇— BH-1900, SS-2</div><div>—▲— BH-1903, SS-2</div><div>—■— BH-1906, SS-2</div><div>—□— BH-1901, SS-2</div><div>—◆— BH-1905, SS-1</div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster Project No.: SM 97027-G Drawing No.: B 05</div> | | | | |

Mechanical Analysis



| | | | | | | | | | | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div>◆ BH-3309, SS-1</div><div>▲ BH-3313, SS-3</div></div> <div><div>□ BH-3312, SS-2</div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster</div> <div>Project No.: SM 97027-G Drawing No.: B 06</div> | | | | |

Mechanical Analysis



| | | | | | | | | | | |
|------|------|--------|--------|------|--------|--------|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |

MODIFIED M.I.T. CLASSIFICATION

—◇— BH-3315, SS-1

—□— BH-3315, SS-2

SOIL - MAT ENGINEERS & CONSULTANTS LTD.

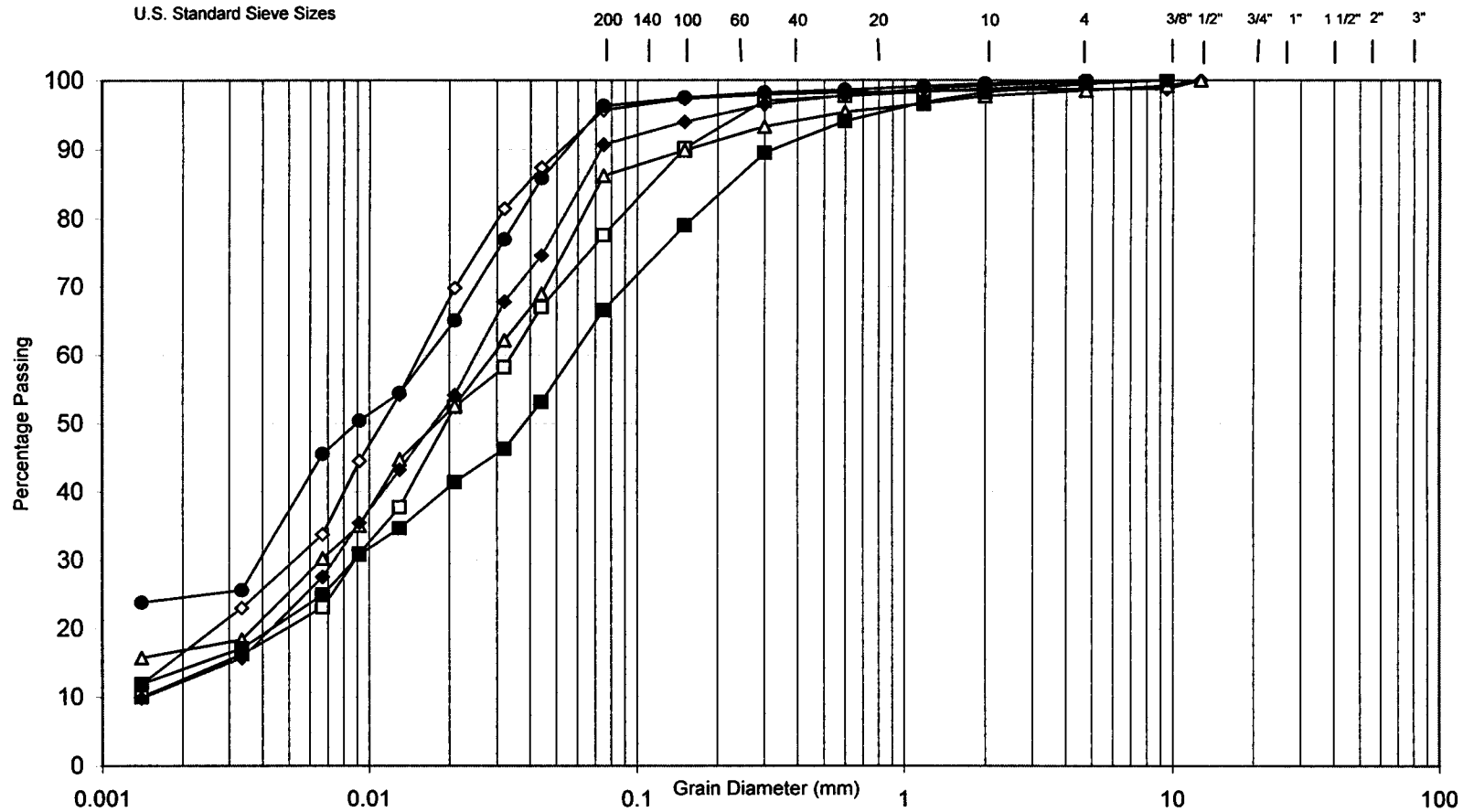
Regional Municipality of Hamilton-Wentworth
Highway 403 at Mohawk Road / Lincoln Alexander

Town of Ancaster

Project No.: SM 97027-G

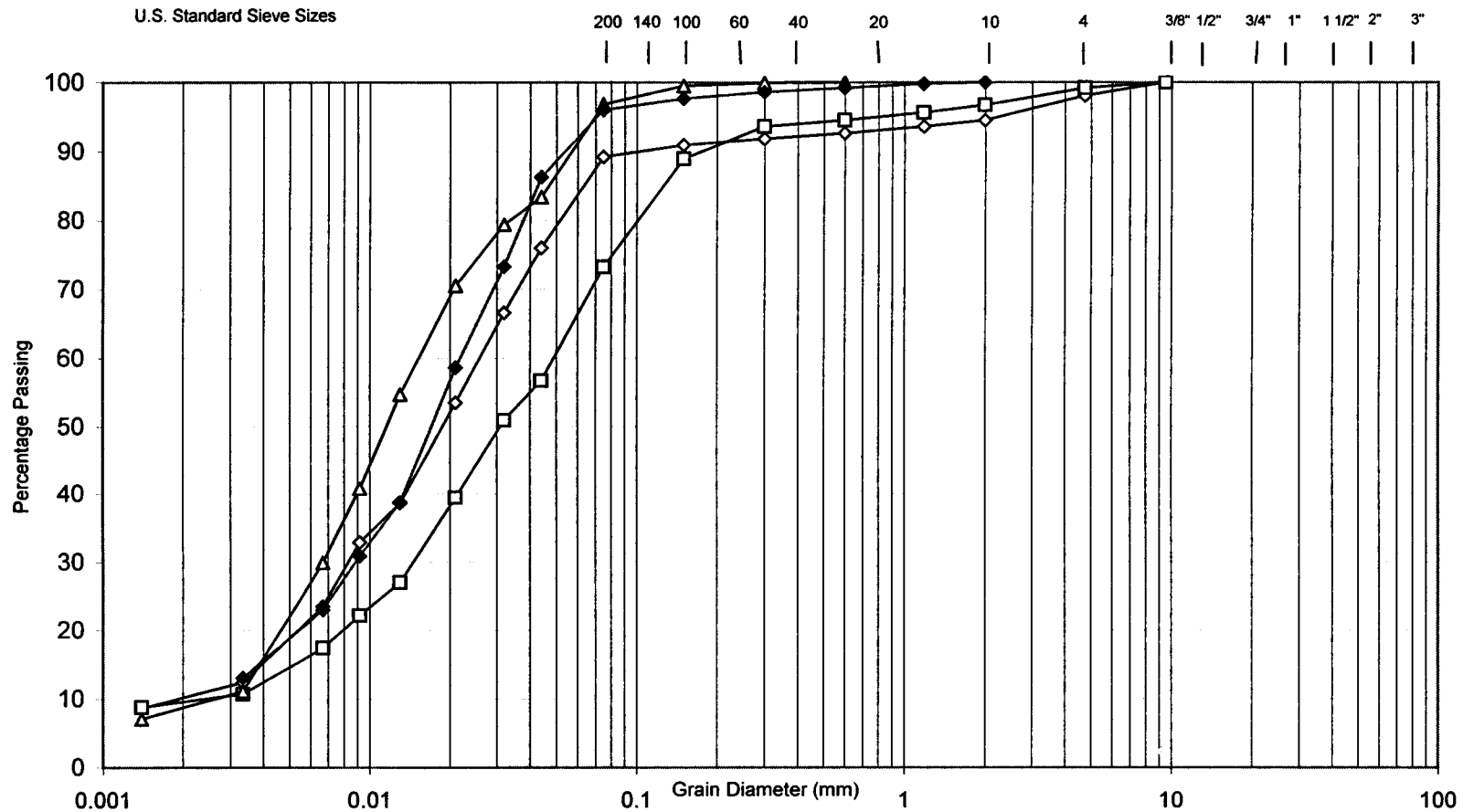
Drawing No.: B 07

Mechanical Analysis



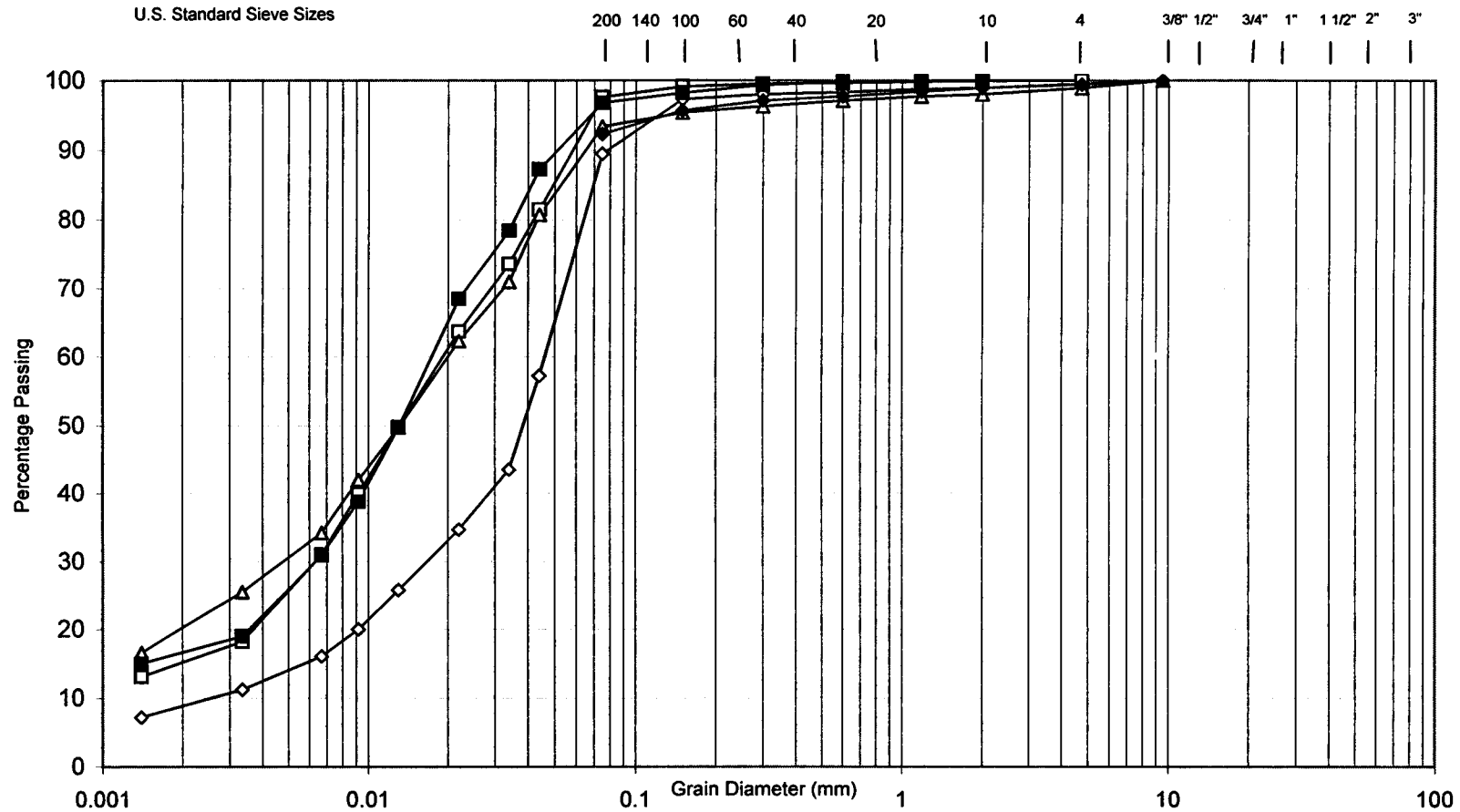
| | | | | | | | | | | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div>—◇— BH-3325, SS-1</div> <div>—△— BH-3321, SS-1</div> <div>—■— BH-3318, SS-1</div> <div>—□— BH-3324, SS-1</div> <div>—◆— BH-3319, SS-1</div> <div>—●— BH-3316, SS-1</div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster</div> <div>Project No.: SM 97027-G Drawing No.: B 08</div> | | | | |

Mechanical Analysis



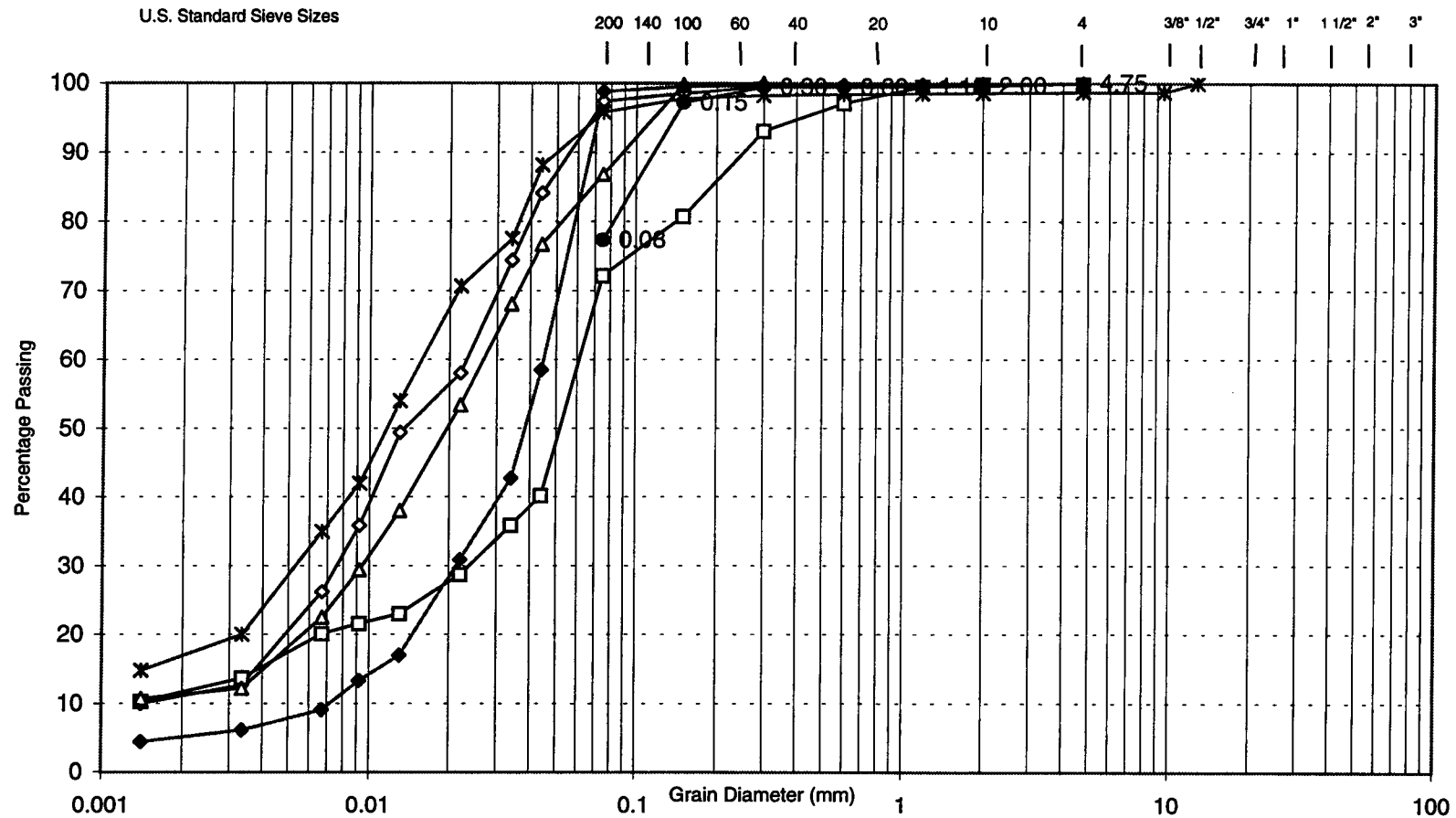
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
|---|------|--------|--------|------|--------|---|--------|--------|--------|--|
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div><div>—◇— BH-4994, SS-3</div><div>—□— BH-4995, SS-5</div></div><div><div>—△— BH-4996, SS-3</div><div>—◆— BH-4998, SS-2</div></div></div> | | | | | | Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster | | | | |
| | | | | | | Project No.: SM 97027-G Drawing No.: B 09 | | | | |

Mechanical Analysis



| | | | | | | | | | | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div><div>—◇— BH-5020, SS-2</div><div>—△— BH-5023, SS-7</div><div>—■— BH-5028, SS-4</div></div><div><div>—□— BH-5023, SS-6</div><div>—◆— BH-5025, SS-1</div></div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster Project No.: SM 97027-G Drawing No.: B 10</div> | | | | |

Mechanical Analysis



| Clay | Fine | Medium | Coarse | Fine | Medium | Coarse | Fine | Medium | Coarse | |
|---|------|--------|--------|------|--------|--|--------|--------|--------|--|
| | Silt | | | Sand | | | Gravel | | | |
| MODIFIED M.I.T. CLASSIFICATION | | | | | | SOIL - MAT ENGINEERS & CONSULTANTS LTD. | | | | |
| <div><div>—◇— BH-5049, SS-4</div><div>—△— BH-5056, SS-2</div><div>—✱— BH-5071, SS-3</div><div>—□— BH-5052, SS-3</div><div>—◆— BH-5058, SS-2</div><div>—●— BH-5071, SS-4</div></div> | | | | | | <div>Regional Municipality of Hamilton-Wentworth Highway 403 at Mohawk Road / Lincoln Alexander Town of Ancaster</div> <div>Project No.: SM 97027-G Drawing No.: B 11</div> | | | | |