Appendix B.7 Geotechnical







Hamilton Rapid Transit Preliminary Design and Feasibility Study

B-LINE

GEOTECHNICAL DESIGN BRIEF

Version: 1.0













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September 2011







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APPENDIX A: SUMMARY OF AVAILABLE BOREHOLES

APPENDIX B: RECORD OF BOREHOLE SHEETS

APPENDIX C: BOREHOLE LOCATION PLANS AND INFERRED STRATIGRAPHIC PROFILE

APPENDIX D: STATEMENT OF GENERAL CONDITIONS



1.0 Introduction

The City of Hamilton is working to implement rapid transit, with a long term vision encompassing five corridors across the City. At present, the focus is on the undertaking of the Environmental Assessment and Preliminary Design of a Light Rail Transit (LRT) system along the B-Line corridor, following Main Street, King Street and Queenston Road between McMaster University and Eastgate Square. As part of the implementation process, a preliminary review of the geotechnical conditions along the B-Line corridor has been carried out by Thurber Engineering Ltd., a sub-consultant of SNC-Lavalin Inc. SNC-Lavalin Inc. is the prime sub-consultant for the Engineering and Environmental Assessment to Steer Davies Gleave (SDG), the prime consultant to the City of Hamilton.

This report presents a summary of the anticipated geotechnical conditions along the B-Line corridor, based on published geologic data and review of existing geotechnical information obtained from the City of Hamilton. Based on the available information, preliminary recommendations regarding track bed design, platform foundations, bridge structures and other associated facilities are provided.

The evaluations and conclusions contained in this report are based on available existing information given to Thurber Engineering Ltd. The conditions of the validity of the Geotechnical Review, as well as the preliminary geotechnical recommendations for the B-Line alignment are as per the General Statement of Conditions shown in Appendix D.

2.0 Project Description

The subject section of the B-Line corridor extends from McMaster University at the west limit to Eastgate Square at the east limit, a distance of 14 km. In general, the LRT line will follow existing roadways, as follows:

Within the McMaster University campus to Main Street West (0.6 km)

Main Street West from McMaster Medical Centre to the bridge over Highway 403 (1.3 km)

The Bridge over Highway 403 (0.9 km)

King Street West from bridge over Highway 403 to James Street (1.9 km)

King Street East from James Street to Main Street East (4.1 km)

Main Street East from King Street East to Queenston Road (2.0 km)

Queenston Road from Main Street East to Eastgate Square (3.2 km)

The section of corridor within the McMaster campus is not included in this report as no geotechnical information of the campus was provided at the time of writing this assessment. The preliminary alignment is shown in Figure 2.1, and will be addressed in the next design phase.

The line required to access a maintenance and storage depot will be assessed separately once a site is chosen in the next design phase.

The LRT will cross Highway 403 and the Red Hill Valley Parkway, which are situated within valleys below the level of the adjacent table lands. Construction of an elevated guideway structure is currently being considered to carry the LRT over the Highway 403 interchange and transition between Main Street West and King Street West. The LRT will cross over the Red Hill Valley Parkway on the existing Queenston Road Bridge.



A.N. BOURNS SCIENCE BUILDING COLLEGE CRESCENT (INSTITUTE FOR APPLIED HEALTH SCIENCES (EXISTING PARKING TAKEN IS 876 m2 McMASTER MEDICAL CENTRE AND UNIVERSITY **6** INFORMATION TECHNOLOGY CENTRE TRACK CENTRES @ 3.29m WITH CATENARY POLE OUTSIDE OF TRACKS AND 3.99m WITH CATENARY POLE BETWEEN TRACKS 8 PRELIMINARY LABORATORY ENGINEERING TECHNOLOGY BUILDING HEALTH SCIENCES COMPLEX EXISTING PARKING GARAGE PROPOSED CONFIGURATION AT WEST TERMINAL ALTERNATIVE #1

Figure 2.1: Preliminary Configuration at McMaster University



At present, 18 stop platforms are proposed, at the following locations:

Table 2.1: Stop Locations

| Stop No | Designation |
|---------|-------------------------|
| 1 | McMaster University |
| 2 | McMaster Medical Centre |
| 3 | Longwood |
| 4 | Dundurn |
| 5 | Queen |
| 6 | MacNab |
| 7 | Walnut |
| 8 | First Place |
| 9 | Wentworth |
| 10 | Sherman |
| 11 | Scott Park |
| 12 | Delta |
| 13 | Ottawa |
| 14 | Kenilworth |
| 15 | Strathearne |
| 16 | Parkdale |
| 17 | Nash |
| 18 | Eastgate |

3.0 Physiographic and Geologic Setting

The proposed LRT B-Line alignment is situated on the Iroquois Plain physiographic region, bordered on the north by Lake Ontario and on the south by the Niagara Escarpment. The region consists of a lowland formerly inundated by glacial Lake Iroquois.

The near surface soils generally consist of lacustrine sands and silts deposited on the former lakebed. Locally between approximately Highway 403 and James Street, the alignment crosses a deposit of partially cemented gravel deposited as a beach along the former lake shoreline. The sand and gravel are generally underlain by silty clay to clayey silt till of the Halton Till formation. East of Ottawa Street, the sand is less prevalent and the near surface soils typically consist of the Halton Till.

Red shale bedrock of the Queenston Formation underlies the entire corridor. The shale is anticipated at depths in approximately the order of 20 to 25 m between the McMaster Medical Centre and Dundurn Street, increasing to approximately 30 m in the vicinity of Queen Street atop the gravel bar, then decreasing towards the east to less than 4 m depth between Ottawa Street and the Red Hill Valley. The depth to bedrock increases to 10 to 15 m east of the Red Hill Valley.



4.0 Summary of Geotechnical Conditions

Existing borehole data from the vicinity of the B-Line corridor was provided by the City of Hamilton to establish the geotechnical conditions pertinent to design of the LRT track bed and associated facilities. A listing of the boreholes reviewed and considered applicable to the LRT assignment is provided in Table A1, Appendix A. The borehole logs are reproduced in Appendix B.

A Borehole Plan and Stratigraphic Profile along the corridor, showing the **approximate** locations of the boreholes and the generalized soil stratigraphy derived from the existing subsurface data, is provided on Sheets 1 to 17, in Appendix C.

Based on the existing borehole data, a generalized description of the subsurface conditions along each section of the corridor is presented below. The available information is suitable only for preliminary planning purposes and is not considered adequate for detailed design of the facilities.

It should be recognized that soil conditions may vary between and beyond the borehole locations. The pavement types/thicknesses and subgrade conditions, summarized below are based on a limited number of boreholes previously drilled at selected locations during earlier geotechnical investigations. The data does not necessarily reflect the conditions along all sections of the LRT alignment, and conditions may vary both along the alignment and across the width of the roadway. Further, the current pavement structure and subgrade may differ from that encountered in the boreholes, due to subsequent utility installation and roadway reconstruction or rehabilitation carried out after drilling of the boreholes. Additional site specific investigation will be required at the next design phase to confirm and further define the current conditions along the alignment and at facility locations.

In general, the subsurface stratigraphy encountered along the corridor consists of a surficial pavement structure and/or fill layer, overlying sands, silts and clays in the western sections (McMaster Medical Centre to Highway 403), sands in the central areas, and silty clay till in the eastern sections (east of Sherman Avenue). More detailed descriptions of the individual strata are provided below.

4.1 Main Street West

4.1.1 Existing Pavement Structure

The pavement structure encountered in boreholes drilled on Main Street West between McMaster University and Highway 403) typically comprised of a composite structure with 125 to 150 mm of asphalt over 125 to 250 mm of concrete, placed directly on the subgrade or on 25 to 150 mm of sand and gravel. A flexible structure was documented in two boreholes, consisting of 250 mm of asphalt over 200 mm of sand and gravel, and 190 mm of asphalt placed directly on the subgrade.

4.1.2 Fill

Fill was encountered surficially or below the pavement structure in 14 of 21 boreholes reviewed in this section. The fill typically consisted of silty sand to sandy silt adjacent to McMaster Medical Centre and clayey silt to silty clay in the remainder of the section. The fill thickness generally ranged from 1.1 to 2.9 m with a lower boundary at depths of 1.1 to 3.1 m.

SPT N-values in the fill ranged from 1 to 17 blows/0.3 m (very loose to compact) in the cohesionless sand/silt and from 11 to 23 blows/0.3 m (stiff to very stiff) in the cohesive silt/clay. Moisture contents varied from 18 to 28%.

4.1.3 Native Soils

The native deposits underlying the pavement structure and fill in the area of Main Street West generally consist of interbedded silts, sands and clays. Locally in the central part of this section, a layer of coarse sand to sand and gravel was encountered within or below these deposits. The boreholes were terminated at depths of 2.3 to 9.6 m, 23.3 m in one borehole.



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Along the west half of this section, the upper 2 to 3 m of the silt/sand/clay was very loose to compact/firm to very stiff, with SPT N-values ranging from 3 to 21 blows/0.3 m. Towards the east end, the loose to compact conditions (N-values of 9 to 25) extended to 5.2 m depth. Where exploration was extended below this level, these deposits became compact to very dense with N-values of 26 to 66 blows/0.3 m.

In the central area, clayey silt was predominant. The clayey silt was described as soft to stiff, however SPT N-values were not recorded.

Moisture contents ranged from 3 to 30%.

4.1.4 Groundwater

Piezometers were installed in five boreholes drilled along this section of the LRT. The depth to groundwater measured in the piezometers ranged from 1.9 to 7.2 m (Elev. 92.2 to 96.6 m). In addition, the soils were described as very wet to saturated below 5.5 and 5.8 m depth (Elev. 93.8 m) in two boreholes at the west end of the section, and the clayey silt in the central area was described as wet at various depths.

4.2 Highway 403 Crossing

4.2.1 Fill

The ravine through which Highway 403 was constructed was formerly used as a city landfill, and relatively thick deposits of fill consisting of sand, ashes, cinders, domestic refuse, wood and foundry sand were encountered in nearly all boreholes drilled in this area. A clay cap appears to be present over the fill on the east side of the ravine. The fill extends to depths of 0.9 to 11.6 m (Elev. 74.8 to 85.9 m).

SPT N-values recorded in the fill ranged from 3 to 37 blows/0.3 m. Moisture contents ranged from 6 to 61%.

4.2.2 Native Soils

The native soil in the Highway 403 ravine generally consisted of alluvial deposits overlying a relatively thick layer of silty clay.

The alluvial deposits primarily consisted of silty clay with organics and occasional sand, gravel, wood and peat were encountered below the fill or surficially in eight boreholes drilled within the Highway 403 valley. These deposits were 2.1 to 10.7 m thick. SPT N-values of 1 to 10 blows/0.3 m were recorded in the alluvial material, indicating a very soft to stiff consistency. Moisture contents ranged from 21 to 45%.

At four locations on the east side of the valley, a 1.6 to 4.3 m thick layer of sand and silt was encountered surficially or below the fill. SPT N-values in this layer ranged from 4 to 17 blows/0.3 m (loose to compact), and moisture contents ranged from 7 to 21%.

The underlying silty clay layer was 5.2 to 19.8 m thick and was encountered below the fill and alluvial deposits in all but one borehole. SPT N-values in the silty clay varied widely from about 6 to 40 blows/0.3 m (firm to hard) with several values of up to 90 blows/0.3 m, possibly indicating the presence of cobbles or shale fragments. Moisture contents ranged from 12 to 32%, typically about 16 to 24%.

4.2.3 Bedrock

Shale bedrock was contacted below the silty clay at depths of 16.2 to 27.5 m in all but two boreholes. The bedrock surface generally rises towards the east, from Elevation 57.0 m at the Main Street/Highway 403 structure to Elevation 75.2 m at the King Street connection.

4.2.4 Groundwater

The depth to groundwater measured in eight boreholes ranged from 1.2 to 19.5 m. The groundwater level varied from Elevation 64.6 to 83.1 m, typically Elevation 79.8 to 81.5 m.



4.3 King Street West

4.3.1 Existing Pavement Structure

In boreholes drilled between Bay and MacNab Streets, a composite structure consisting of 430 to 550 mm of asphalt over concrete combined, placed directly over the subgrade. The component asphalt and concrete thicknesses were not defined.

4.3.2 Fill

Fill was encountered to depths of 1.5 to 4.9 m in 8 of 19 boreholes reviewed along the King Street West section. The fill typically consisted of sand. Demolition debris with sand, gravel and ashes, apparently used to backfill former building basements, was in several boreholes located between Bay and MacNab Streets.

SPT N-values recorded in the fill ranged from 2 to 25 blows/0.3 m, indicating a very loose to compact condition. Moisture contents ranged from 9 to 21%.

4.3.3 Native Soils

The pavement structure and fill in this section is underlain primarily by silty fine-grained to fine to medium-grained sand, overlying a layer of coarser sand and gravel. Towards the west end of this section (west of Strathcona Avenue), the sand is overlain or interbedded with silts and clays, similar to the stratigraphy documented to the west of Highway 403. Silty clay to silty clay/clayey silt till was encountered below the sand and gravel in several deeper boreholes drilled near the east end of this section.

The interbedded clays, sands and silts encountered near the west end of the section extended to depths of 3.9 to 6.7 m. SPT N-values in these deposits ranged from 4 to 5 blows/0.3m in the non-cohesive sands/silts, and from 7 to 15 blows/0.3 m (firm to stiff) in the cohesive clays/silts. Moisture contents of 12 to 25% were measured in the sands/silts and 19 to 29% in the clayey silts/clays.

The predominant silty fine-grained to fine to medium-grained sand layer ranged in thickness from 1.2 m to greater than 5.5 m. In general, the sand is very loose to compact (N-values of 2 to 28 blows/0.3 m) with dense to very dense zones. Moisture contents varied from 2 to 21%.

The coarser sand and gravel layer underlying the fine to medium-grained sand was typically dense to very dense with SPT N-values ranging from 31 to greater than 100 blows/0.3 m. Compact zones with N-values of 10 to 30 blows/0.3 m were also present. Moisture contents varied from 3 to 24%, with the higher values measured in samples obtained from below the groundwater level. The majority of the boreholes were terminated in the sand and gravel layer. Where defined, this layer was 3.8 to 5.6 m thick.

Silty clay to silty clay/clayey silt till was encountered below the sand and gravel at 13.7 m depth in one borehole near the west end of this section and at 9.5 to 10.1 m depth in four boreholes near the east limit. The clay/silt layer was 8.5 m thick at the west location and extended below the maximum exploration depth of 29.9 m in the east boreholes. SPT N-values varied from 8 to 90 blows/0.3 m (stiff the hard) and moisture contents ranged from 11 to 28%. Moisture contents ranged from 9 to 14%.

4.3.4 Bedrock

Shale bedrock was contacted in one borehole located near the west limit of this section. The bedrock surface was at 22.2 m depth (Elev. 76.8 m).

4.3.5 Groundwater

Groundwater was observed in three boreholes and measured in two piezometers at depths of 7.1 to 10.8 m (Elev. 88.2 to 91.2 m). This water was generally encountered within the sand and gravel above the underlying silty clay. Water was also observed at 1.6 to 2.9 m depth in two boreholes, perched in the layered clays, silts and sands at the west end of the section and within fill at the east end.



4.4 King Street East

4.4.1 Existing Pavement Structure

The existing pavement structure varied between a flexible and composite design. The flexible structure consisted of 150 to 200 mm of asphalt over 250 to 860 mm of sand and gravel. The composite structure consisted of 100 to 150 mm of asphalt over 150 to 380 mm of concrete placed directly on the subgrade or on 150 mm of sand and gravel.

4.4.2 Fill

Fill was encountered to depths of 0.8 to 3.4 m in 14 of 23 boreholes reviewed along the King Street East section. The fill typically consisted of silty sand to sandy silt. SPT N-values recorded in the fill typically ranged from 4 to 18 blows/0.3 m, indicating a loose to compact condition. Moisture contents generally ranged from 8 to 20%.

4.4.3 Native Soils

A stratum of sands, silty sands and sandy silts was encountered below the pavement structure and fill in all boreholes located along King Street East between James Street and Wentworth Street. Where defined, the thickness of this layer ranged from 1.0 to 3.7 m. SPT N-values recorded in the sand/silt typically ranged from 4 to 35 blows/0.3 m, indicating a loose to dense condition. Very dense zones were encountered locally, as evidenced by N-values of up to 90 blows/0.3 m. Moisture contents varied from 5 to 30%, typically 10 to 16%.

Sand and gravel was encountered below the sand/silt in five boreholes located between James Street and Walnut Street. This layer was 1.8 to 4.5 m thick where the lower boundary was defined. The sand and gravel was compact to very dense with N-values of 27 to 60 blows/0.3 m. Moisture contents of 9 to 21% were measured.

The thickness of the sands/silts/gravel generally decreased towards the east from 8.5 m to 2.6 m, below which depth silty clay till was encountered. East of Sherman Avenue, the silty clay/till was encountered directly below the pavement structure and fill. SPT N-values in the clay till typically ranged from 10 to 28 blows/0.3 m, indicating a stiff to very stiff consistency. Moisture contents generally varied from 15 to 21%. The boreholes were terminated in the clay till where contacted.

4.4.4 Groundwater

Groundwater was measured at depths of 3.6 to 5.5 m (Elev. 82.1 to 89.6 m, rising to the west) in five boreholes drilled along this section. Perched water was also encountered locally in the surficial fill.

4.5 Main Street East

4.5.1 Existing Pavement Structure

No data was available on the existing pavement structure along Main Street East.

4.5.2 Fill

Fill was encountered to depths of 1.5 to 2.6 m in 3 of 6 boreholes reviewed along the Main Street East section. The fill typically consisted of silty clay/clayey silt. SPT N-values recorded in the fill ranged from 6 to 12 blows/0.3 m, indicating a firm to stiff condition. Moisture contents ranged from 7 to 22%.

4.5.3 Native Soils

The native soils in the vicinity of Main Street East generally comprised silty clay till locally overlain by an approximate 1.5 m thick layer of loose sandy silt to silty sand. The clay till was stiff to hard, typically very stiff, with SPT N-values ranging from 10 to 33 blows/0.3 m. N-values in excess of 100 were recorded at one location. Moisture contents ranged from 10 to 19%.



4.5.4 Groundwater

Groundwater was observed at 1.0 m depth in one borehole; this water appears to be perched in fill overlying clay till. Groundwater was not observed in the remaining boreholes.

4.6 Queenston Road

4.6.1 Existing Pavement Structure

In boreholes drilled between Parkdale Avenue and Adair Avennue, a composite structure consisting of 75 to 100 mm of asphalt over 165 to 255 mm of concrete was encountered directly over the subgrade or up to 255 mm of sand and gravel.

4.6.2 Fill

Fill was encountered in 4 of 9 boreholes reviewed along the Queenston Road section. The fill typically consisted of silty clay to clayey silt. The fill extended to depths of 4.2 and 1.0 m in single boreholes located to the west and east of the Red Hill Valley, respectively. Two boreholes drilled from the road embankment crossing the Red Hill Valley encountered fill to depths of 10.3 and 10.8 m (Elev. 81.2 and 81.8 m).

SPT N-values recorded in the fill typically ranged from 3 to 22 blows/0.3 m, indicating a soft to very stiff condition. Moisture contents generally ranged from 15 to 23%.

4.6.3 Native Soils

Silty clay/clayey silt till was encountered in three boreholes drilled on the table lands in this section. SPT N-values in the till ranged from 9 to 58 blows/0.3 m (stiff to hard). Moisture contents ranged from 12 to 20%.

In two boreholes located east of Parkdale Avenue, shale bedrock was contacted directly below the pavement structure and fill.

In four boreholes drilled either at the base of the Red Hill Creek Valley or through embankment fill crossing the valley, creek deposits comprising clayey silt, silty sand, and sand and gravel were encountered over bedrock. These deposits were 1.1 to 2.5 m thick.

4.6.4 Bedrock

Shale bedrock was contacted at depths of 0.3 to 4.2 m (Elev. 94.9 to 99.2 m) in three boreholes drilled just east of Parkdale Avenue. Within the Red Hill Creek Valley, shale was contacted at depths of 1.4 to 11.9 m (Elev. 80.1 to 81.0 m).

4.6.5 Groundwater

At the Red Hill Creek Valley, groundwater was measured at depths of 1.1 m below the valley base to 10.4 m below the Queenston Road embankment. The groundwater elevation was 81.1 to 82.8 m. Groundwater was not observed in the boreholes drilled on the table lands.



5.0 Geotechnical Evaluation and Preliminary Recommendations

This section provides preliminary geotechnical recommendations pertinent to track bed design, platform foundations, and bridge structures required for planning of the Hamilton LRT B-Line.

The recommendations are based on the subsurface soil and groundwater conditions documented in available information provided by the City of Hamilton, and are suitable only for preliminary planning purposes. The existing data and associated recommendations are not considered adequate for detailed design of the facilities. The soil conditions may vary between and beyond the borehole locations, and accordingly additional investigation will be required to confirm and define the conditions along the alignment and at specific facility locations.

5.1 Track Bed Design

Preliminary design of the typical cross sections for the LRT indicate that the minimum track design will consist of 200 mm of reinforced concrete (second pour) over approximately 250 mm thick slab of levelling concrete (first pour), placed over a minimum of 300 mm of compacted granular fill. The portions of the guideway cross-section outside the range of the tracks (approximately 2.2 m) will be filled with compacted Granular 'A' fill (See Figure 1)

The thickness of the granular layers may be modified in the next design phase once the actual subgrade conditions are provided.

Based on the available borehole data, the native subgrade soils along the corridor, as per the sampled locations, are expected to consist predominantly of the following:

- interbedded sands, silts and clays along the western section (McMaster Medical Centre to approximate Strathcona Avenue);
- silty sand and fine to medium-grained sand in the central section (Strathcona Avenue to Sherman Avenue); and
- silty clay till along the east section (Sherman Avenue to Eastgate Square).

Throughout the alignment, fill materials are present as a result of past roadway construction, underground utility/service installation, and possible localized basement backfill. With the exception of the landfill in the Highway 403 ravine and embankment fill across the Red Hill Creek Valley, the fill encountered in the boreholes does not appear to be related to bulk filling operations for land and road development. Therefore the presence, thickness and quality of the fill can be expected to vary over short distances, and delineation of specific limits of fill over the length of the corridor is not possible from the available information.

Track bed subgrade preparation should include compaction and proofrolling of the exposed subgrade with a heavy roller and examination to identify any areas of unstable subgrade. Any soft/wet areas identified should be subexcavated and replaced with approved material within 2% of optimum moisture content and compacted to at least 98% of SPMDD.

Loose to very loose conditions were identified in the upper 1 to 2 m of the fill and native soil subgrade, primarily in the western half of the corridor. Allowance should be made for possible subexcavation and recompaction/replacement of some material below the track bed sub-ballast to improve the uniformity of support over these areas.

The silts in the interbedded deposits west of Highway 403 may be particularly susceptible to changes in moisture content, and a rolling, unstable subgrade may be encountered if construction is carried out during wet seasons or rainy periods. Subgrade preparation considerations should also include allowance for replacement of wet silts with imported granular material.

The compacted subgrade should be graded with a crossfall of 3% to promote drainage towards subdrains. Minimum 100 mm diameter perforated subdrains, placed in a clear stone trench wrapped with geotextile as per OPSD 216.021, should be installed below the edges of the track bed to provide drainage of the subballast. The subdrains should have frost free outlets draining into catchbasin structures.



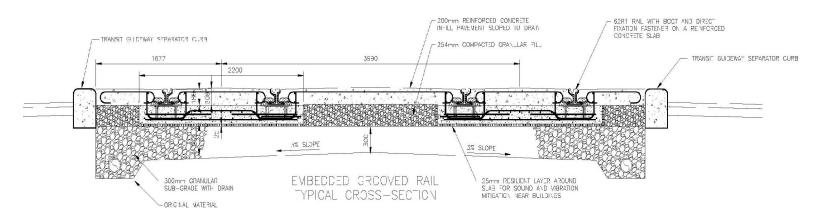
Provided the subgrade is properly prepared, the modulus of subgrade reaction recommended for preliminary design of the track slab along each section of the alignment are as follows:

Table 5.1: Track Slab Subgrade Modulus

| Stationing | Primary Subgrade Material | Modulus of Subgrade Reaction (MN/m³) |
|-----------------|---|---|
| 0+000 to 3+000 | Interbedded silts, sands and clays; loose to compact/firm to very stiff | 15 |
| 3+000 to 6+500 | Silty/fine to medium sand; very loose to compact | 25 |
| 6+500 to 13+500 | Silty clay till; stiff to hard | 35 |
| | Granular engineered fill | 50 |

The silts and silty sands at the subgrade level in some of the west and central sections of the alignment could be frost susceptible. To minimize the potential for heaving of the track slab due to frost action, it is recommended that these soils be removed from within the frost depth (1.2 m) and be replaced with non-frost susceptible granular material. It is recommended that these sections be identified during a detailed geotechnical investigation prior to the detailed design phase.

Figure 5.1: Track Bed Typical Cross-Section



5.2 Stop Foundations

Stop platforms are planned for 18 locations along the B-Line corridor. It is envisioned that the platforms will consist of prefabricated concrete slabs supported on point footings or augered caissons.

Based on the existing borehole data, it is anticipated that spread footings or shallow augered piers (essentially circular spread footings) founded on the native soils will be suitable for support of the stop platforms. However, in many cases, it may be necessary to extend the footings or caissons below the normal depth for frost protection (1.2 m) to penetrate fill and very loose soils.

The footings should be founded a minimum 1.2 m below finished grade as protection against frost action (See Figure 5.2).

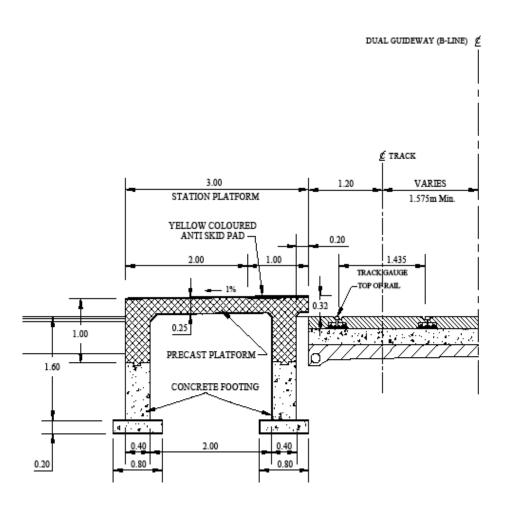


Figure 5.2: Typical Stop Platform Detail

5.3 Catenary Pole Foundations

Based on the available borehole data, it is anticipated that conventional catenary pole foundation design consisting of short augered caissons will be suitable. Lengthening of the caissons to penetrate poor quality fills or very loose deposits may be necessary locally. During augering for pole foundation installation, the potential will exist for encountering obstructions, such as demolition rubble in the fill and cobbles/boulders in the native sand/gravel and clay till.

5.4 Highway 403 Structure Foundations

Conceptual plans call for the LRT to cross the Highway 403 interchange on an elevated guideway supported on a new 11-span structure linking Main Street West with King Street West.

The subsurface stratigraphy along the structure alignment generally comprises a relatively thick fill layer and thin alluvial deposits overlying a thick stratum of very soft to very stiff silty clay, underlain by shale bedrock. The bedrock surface was contacted at depths of 16.2 to 27.5 m, rising towards the east from Elevation 57.0 m at the Main Street/Highway 403 crossing to Elevation 75.2 m at the King Street connection.

In anticipation of relatively heavy structural loads, the geotechnically preferred foundation system is augered caissons (drilled piers) socketed into shale bedrock. The information available regarding the soundness/quality of the shale at the site is limited and will need to be investigated to confirm foundation design parameters for the rock sockets.

Steel liners will be required to support the sidewalls of caissons during installation, particularly where the shafts will extend through landfill and wet alluvial deposits.

Steel H-piles driven to refusal in the shale bedrock may also be considered. For preliminary design purposes, HP 310x110 piles driven to refusal in shale should be designed using the following geotechnical resistances:

Factored Geotechnical Resistance at ULS 1,600 kN Geotechnical Resistance at SLS 1,200 kN

The pile tips should be reinforced to provide protection from damage while driving into the bedrock.

The depth of frost penetration in Hamilton is 1.2 m. The base of pile caps should be placed a minimum 1.2 m below finished grade as protection against frost action.

5.5 Relocation of Underground Utilities

We understand that underground utilities and municipal services below the track slab will be abandoned and relocated under the adjacent roadway. In constrained areas, a cast-in-place concrete utility tunnel is proposed to carry the utilities.

5.5.1 Trench Excavation

Excavation for open cut installation of underground utilities will primarily extend through the roadway pavement structure and fill layers, and into native silts/sands/clays in the west part of the corridor, sands in the central section, and silty clay till in the eastern part. Shale bedrock may be encountered along Queenston Road.

All temporary excavations must be carried out in accordance with the current Occupational Health and Safety Act (OHSA) of Ontario and local regulations. In general, the fill and native soils within the relatively shallow excavation depths anticipated for utility installations are classified as a Type 3 soil under OHSA.. Where space restrictions preclude excavation of inclined slopes, service installation may be carried out using a trench box or temporary shoring.

Where the trench depth exceeds 6 m in fill or till, the support system must be designed specifically for this project. The design of the support system should include the effects of surcharge loads such as those imposed by construction equipment, roadway traffic, adjacent buildings and other facilities.



Use of a hydraulic excavator should be suitable for trench excavation. Provision should be made for handling and removal of the pavement materials, possible obstructions in the fill, and cobbles, boulders or chunks of shale and limestone in the till soils during excavation.

Excavation in the upper 1 to 3 m of the Queenston shale formation should be possible using heavy excavation equipment and rippers, supplemented by pneumatic rock breakers where thick layers of hard material are encountered. The shale below this depth is harder and less weathered, and intensive use of pneumatic/hydraulic breakers or other methods of loosening the bedrock will likely be required. Near vertical sidewalls may be employed in shale bedrock.

Water was measured at depths of 1.2 to 19.5 m in previous boreholes drilled along the corridor. Localized zones of perched water were also encountered in the fill or seams/layers of more permeable sands within layered deposits. In general, removal of seepage entering trenches should be feasible using sumps and pumps where excavation depths are less than about 4 m and for excavations in silty clay till (east part of corridor). Where the trench depths in sands and silts exceed about 4 m, the potential increases that excavation will encounter groundwater and more extensive dewatering will be required. The impacts of groundwater in areas of deeper excavation, if planned, must be further assessed.

5.5.2 Pipe Bedding and Backfill

Pipe bedding materials, compaction and cover should follow OPSD and/or City of Hamilton specifications. In areas where a less competent subgrade is encountered, it may be necessary to increase the bedding thickness.

Trench backfill materials should be placed in loose lift thicknesses not exceeding 200 mm and compacted to at least 98% of its SPMDD. To minimize the potential for post-construction settlement of the track and roadway surface, it is recommended that OPSS Granular A or B material, or unshrinkable fill, be employed to backfill the trenches.

If reuse of the excavated materials as trench backfill is contemplated to reduce costs, the potential for settlement and the need for re-establishing the roadway surface over trenches must be accepted.

In general, the predominant sands in the central section of the corridor and the clay till in the eastern section are considered suitable for reuse, provided they meet environmental requirements, are free of organics, debris and other deleterious materials, and the placement moisture content is within about 2% of the optimum moisture content for efficient compaction. The clay till must be adequately broken down and compacted in the trench. Fill containing demolition rubble and other debris, such as that encountered in boreholes between Bay and MacNab Streets, should not be reused.

The interbedded silts, sands and clays in the west section of the corridor along the grass medians (west of Dundurn Street) appear to be typically wet of the optimum moisture content for efficient compaction. Reuse of these materials as trench backfill is not recommended. Reuse of excavated shale is not recommended.

5.6 Pavement Restoration

The existing pavement structure documented in the available boreholes is highly variable and comprises areas of both flexible and composite design. Establishing recommendations for restoration of the existing pavement thickness over backfilled trenches is therefore not practical at this stage, and generalized guidelines are presented below.

Main Street, King Street and Queenston Road are classified as major arterial roadways. The minimum pavement structure typically specified by the City of Hamilton for this type of roadway is as follows:

HL-1 Surface Course Asphalt 40 mm
HL-8 (HS) Binder Course Asphalt 120 mm
OPSS Granular A Base 150 mm
OPSS Granular B Type II Sub-base 450 mm



The required pavement thickness should be assessed during detailed design when traffic volumes and additional borehole information is available. For preliminary planning purposes, we recommend that an increased Granular B sub-base thickness of 600 mm be assumed. Further, the use of premium hot mixes (DFC, HDBC) and Superpave mix design should be considered to reduce rutting in heavily travelled sections.

Acceptance, placement and compaction of the pavement materials should be carried out in accordance with the applicable City of Hamilton or OPS specifications. The pavement granular material should be compacted to 100% of SPMDD.

5.7 Environmental Considerations

The soil descriptions provided on the borehole logs were reviewed for indications of potential environmental impact. The following potential areas of concern were identified based on this review:

- pockets of grey and black silt were documented within a sand layer in one borehole located in front of McMaster Medical Centre;
- Clayey silt fill encountered in three boreholes between Newton Avenue and Paisley Avenue were described as mottled reddish brown and black or containing black clay seams;
- Boreholes were drilled in association with underground storage tank removal at a service station located on the northwest corner of Longwood Road and Main Street West;
- Deep deposits of refuse fill are present in the Highway 403 valley;
- Ashes, cinders and demolition rubble were present within the fills between Bay Street and MacNab Street; and
- Pavement granular materials between Walnut and Wellington Streets contains slag.

Chemical analysis of soil samples was carried out during several investigations conducted along the corridor. In general, these results indicated elevated values of Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR). The EC and SAR values are believed to reflect the effects of road de-icing salt, and may impact vegetation growth if reused in applications near the ground surface. Concentrations of metals such as cadmium, beryllium and zinc exceeded anticipated background levels at isolated locations.

Due to the inherent variability of subsurface conditions, detailed investigation and testing will be required to evaluate the quality of the excess excavated soils and establish soil management procedures. The need for off-site disposal of landfill materials from the Highway 403 corridor, demolition rubble from the Bay-MacNab Street area, and other localized materials should be anticipated. Acceptance criteria stipulated by individual receivers may vary, and some receivers may not accept this material.

5.8 Recommendations for Further Investigation

A number of gaps have been identified in the existing subsurface data for which additional investigation is recommended for preliminary design. To advance in the next design phase, it is recommended that the supplementary geotechnical investigations include:



- At least one borehole at each stop platform location;
- At least three boreholes including bedrock coring within the Highway 403 valley to evaluate the
 quality of the underlying shale bedrock and assess parameters for design of caissons to support the
 guideway structure;
- In the order of 15 additional boreholes at locations between stops where existing information is not available, primarily in the section east of Victoria Avenue;
- Investigation of the foundation conditions at the proposed maintenance and storage yard to assess the presence and quality of any fill on site and determine foundation requirements for buildings and track slabs;
- Installation of piezometers to further assess the groundwater levels along the corridor; and
- Supplemental chemical testing of soil samples recovered from the boreholes.

Further geotechnical investigation will be required during the detailed design stage to provide detailed recommendations for design and construction of the proposed facilities. As a minimum, this investigation should include an additional borehole at each stop location, at least one borehole with bedrock coring at each pier and abutment of the guideway structure over Highway 403 (in accordance with MTO investigation requirements), boreholes along the track alignment conceptually at a spacing in the order of 100 m, and foundation investigation for the maintenance and storage facility.

DOCUMENT END



Disclaimer

This document contains the expression of the professional opinion of Steer Davies Gleave North America Inc. ("SDG") as to the matters set out herein, using its professional judgment and reasonable care. It is to be read in the context of the agreement (the "Agreement") between SDG and the City of Hamilton (the "Client") for the Rapid Transit Preliminary Design and Feasibility Study (reference C11-12-10), and the methodology, procedures and techniques used, SDG's assumptions, and the circumstances and constrains under which its mandate was performed. This document is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of the Client, whose remedies are limited to those set out in the Agreement. This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context.

SDG has, in preparing the Agreement outputs, followed methodology and procedures, and exercised due care consistent with the intended level of accuracy, using its professional judgment and reasonable care.

However, no warranty should be implied as to the accuracy of the Agreement outputs, forecasts and estimates. This analysis is based on data supplied by the client/collected by third parties. This has been checked whenever possible, however SDG cannot guarantee the accuracy of such data and does not take responsibility for estimates in so far as they are based on such data.

SDG disclaims any liability to the Client and to third parties in respect of the publication, reference, quoting, or distribution of this report or any of its contents to and reliance thereon by any third party.



APPENDIX A

TABLES



TABLE A1 SUMMARY OF AVAILABLE BOREHOLES

| Section | Approximate Stationing | Borehole Designations | Year Drilled | Consultant | | |
|---------------------|---------------------------|---|----------------------|--|--|--|
| | -0+110 to -0+130 | 91-5B, 6B | 1966 | E.M. Peto Associates Ltd. | | |
| | -0+080 to 0+200 | GTR_1019-1, 4, 5, 7, 8 | 2004 | Soil-Mat Engineers & Consultants Ltd. | | |
| | 0+290 to 0+450 | GTR_1153-1, 2 | 2005 | Landtek Limited | | |
| Main Street West | 0+640 | 625-1B | 1991 | Warnock Hersey Professional Services Ltd. | | |
| | 0+830 to 1+630 | 580-1, 2, 3, 4, 5, 6, 7, 8, 580A-21, | 1990 | Trow | | |
| | 1+370 to 1+400 | MW-204, 211 | 2004 | Jacques Whitford Environmental Limited | | |
| | 2+070 to 2+130 | 029-4, 5 | 1959 | Department of Highways | | |
| Highway 403 | 2+070 to 2+290 | 030-H3, H4, H5, H7, H9, H10, J12B | 1960 | Department of Highways | | |
| | 2+330 to 2+470 | 870-02, 03, 04, 05, 20, 21 | 1994 | Mountainview Geotechnical | | |
| | 2+590 | 565A-2 | 1962 | E.M. Peto Associates Ltd. | | |
| | 2+750 to 3+930 | 94A-1, 2, 3, 4, 5, 6, 7, 8, 9 | 1977 | Peto MacCallum Ltd. | | |
| King Street West | 3+380 to 3+540 | 765ORG-20, 21 | 1995 | Mountainview Geotechnical | | |
| | 4+080 to 4+230 | 500-4P, 5, 6P, 7 | 1973 | Peto Associates Ltd. | | |
| | 3+980 to 4+250 | 111A-3, 5, 6 | 1971 | Racey, MacCallum and Bluteau Ltd. | | |
| | 4+370 | 908-1 | 2001 | Trow Consulting Engineers | | |
| | 4+440 | 283A-1 | 2001 | Trow Consulting Engineers | | |
| | 4+520 | GTR1076-16 | 2004 | Shaheen and Peaker | | |
| King Street | 4+540 to 4+620 | 736-C, D | 1994 | Golder Associates | | |
| East | 4+750 | 430-5 | 1986 | Sitest Engineering | | |
| | 4+850 to 4+960 | 845-A, B | 1999 | AGRA Earth and Environmental | | |
| | 4+930 | 999-3 | 2002 Terraprobe Ltd. | | | |
| King Street | 4+960 to 5+250 | 832A-1, 2, 3 | 1998 | Trow Consulting Engineers | | |
| East | 5+280 | 749-7 | 1995 | Golder Associates | | |



TABLE A1 SUMMARY OF AVAILABLE BOREHOLES

| Section | Approximate Stationing | Borehole Designations | Year Drilled | Consultant |
|-------------|---------------------------|--|-----------------|---|
| | 5+280 | GTR1031B-6-1 | 2003 | Soil-Mat Engineers and Consultants Ltd. |
| | 5+490 | 181A-2 | 1969 | Peto Associates Ltd |
| | 5+900 | ationing Designations Drilled Consultant GTR1031B-6-1 2003 Soil-Mat Engineers and Consultants Ltd. 181A-2 1969 Peto Associates Ltd 528-3 1989 Sitest Engineering 898-1 2001 Trow Consulting Engineers to 7+520 29-1, 4, 6 1976 Peto MacCallum Ltd. to 8+250 517-1, 2, 3 1989 Sitest Engineering 993-1 2002 Peto MacCallum Ltd. GTR1059-1 2003 Terraprobe Ltd. 462-1 1987 Sitest Engineering 319A-1 1982 Trow Consulting Engineers 80-1 1986 Trow Consulting Engineers 90 675-1- 3 1992 Warnock Hersey 10 853-2 1999 Landtek Ltd. 10 562A-22 1992 E.M. Peto Associates Ltd 10 562A-22 1962 E.M. Peto Associates 10 GTR1268-Q5 1998 Peto MacCallum Ltd | | |
| | 6+150 | 898-1 | 2001 | Trow Consulting Engineers |
| | 7+050 to 7+520 | 29-1, 4, 6 | 1976 | Peto MacCallum Ltd. |
| | 7+920 to 8+250 | 517-1, 2, 3 | 1989 | Sitest Engineering |
| | 8+960 | 993-1 | 2002 | Peto MacCallum Ltd. |
| | 9+050 | GTR1059-1 | 2003 | Terraprobe Ltd. |
| Main Street | 9+130 | 462-1 | 1987 | Sitest Engineering |
| East | 9+460 | 319A-1 | 1982 | Trow Consulting Engineers |
| | 9+870 | 80-1 | 1986 | Trow Consulting Engineers |
| | 10+130 | 675-1- 3 | 1992 | Warnock Hersey |
| | 10+550 | 853-2 | 1999 | Landtek Ltd. |
| | 11+320 to 11+470 | 616-1, 2, 3 | 1991 | Mountainview Geotechnical |
| Queenston | 11+870 | 562A-22 | 1962 | E.M. Peto Associates Ltd |
| Road | 11+990 to 12+090 | 963-304, 308 | 1989 | Golder Associates |
| | 12+050 | GTR1268-Q5 | 1998 | Peto MacCallum Ltd |
| | 12+940 | 124-1 | 1970 | Peto Associates Ltd |



APPENDIX B

RECORD OF BOREHOLE SHEETS



MAIN STREET WEST



Peto MacCallum Ltd.

| LOC | UECT Watermain, Sewer and Road Reco ATION London St. N. (Dunsmure Rd. to RING METHOD Continuous Flight Solid Ste | Roxborou | gh Av | e.) | | | | ŧ | 30RIN | G DATE 2 | 200: | 2 07 2 | 0 | | ENG | PROJECT NO. 02HF051 NEER P. Cullen INICIAN M. Rapsey |
|-----------------------|--|----------|----------------------|---------|----------------------|--------------|----|-------------------------|-----------------|-----------------------------|------|--------------------|---|-------------|-------------------|--|
| DEPTH In METRES | SOIL PROFILE DESCRIPTION | LEGEND | ELEVATION | NUMBER | AMPLE | BLOWS/0.3m G | | 10K IC CON ARD PE |) 150 E PENE | 200 TRATION TION TEST | | PLAS WATE W, | E | NT TENT_ | _w. _w. _w. | GROUNO WATER OBSERVATIONS AND REMARKS |
| 1.85 | PAVEMENT STRUCTURE: 130 mm asphaltic concrete over 110 mm granular "A" crushed limestone SILT: Loose, brown, fine sandy silt, damp CLAY TILL: Very stiff, brown, silty clay, some sand and gravel, low to medium plastic_D_T_P_L. BOREHOLE TERMINATED AT 3.60 m | | 90 89 88 87 | 1 2 3 3 | \$\$ \$\$ \$\$ | 5 24 17 | 20 | | | | | 10 | | | | Upon completion of augering, no water, no cave |

BHLOG WITH PML LOGO 02HF051D.GPJ PETOMAC.GDT 2002 08 12



CLIENT: The City of Hamilton
LOCATION: Edgemont Street

LOG OF BOREHOLE 1

BORING DATE: September 24, 2003 ELEVATION DATUM: Geodetic SAMPLER HAMMER, 63.5kg; DROP, 760mm

| SOUTH PROPRIES SOUT | Γ | g | 111 | SOIL PROFILE | | | SA | MPL | EŞ | PENETRATION RESISTANCE PLOT | | | |
|--|-------|-------------|-------------|---|-------------|-------|----------|------|--------------|-----------------------------------|------------|---------|-----------------------------|
| Cital Cita | | BORING METH | DEPTH SCALI | DESCRIPTION | STRATA PLOT | DEPTH | NUMBER | TYPE | "N" VALUE | 20 40 60 80 SHEAR STRENGTH KPa | * } | %) 5 | INSTALLATION INFORMATION |
| CFILL CFIL | | | • | GROUND SURFACE | | 90.68 | | | | | | | |
| Critical | - | | 0 | 100mm Asphalt 150mm Concrete | V | 0.0 | 1 | A\$ | | 1 | 0 | | |
| 1 - (FILL) 3 S.S. 6 | ı | | | (FILL) | | 0.30 | , | SS | 11 | 4 | | | |
| Film, brown and grey; trace topsoil, some sand and gravel with places of shale 2 - Stiff to very stiff, brown and grey; stirty CLLY, trace and and coassional gravel (TilL) END OF BOREHOLE 3 - STORY STIRTY CLLY, trace and and coassional gravel (TilL) END OF BOREHOLE 7 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) | ı | | | (FILL) | \bowtie | } | | | | | | | |
| CLAYEY SILT to slity places of shale 2 | 1 | | 1 — | | \bowtie | | 3 | ss | 6 | | 0 | | |
| 2 | ı | | - | Firm, brown and gray; CLAYEY SILT to silty clay, | \bowtie | | - | | | | | | |
| SEIT to very stiff, brown and grey; SILTY CLAY, Trace sand and oceasional gravel (TILL) END OF BOREHOLE 7 | I | | - | places of shale | \bowtie | | | | _ | - | | | |
| Suff to very stiff, brown and grey; SiLTY CLAY, trace sand and ocassional gravel (TiLL) | l | | 2 | | \bowtie | | 4 | SS | 4 | | l l° | | |
| Self to very stiff, brown and grey; SiLTY CLAY, Urace sand and coassional gravel (TitL) END OF BOREHOLE 7 8 | ı | | | | \bowtie | | | | | | | | |
| Solif to very stiff, brown and grey; SILTY CLAY, trace sand and cossional gravel (TILL) 87.17 6 SS 16 END OF BOREHOLE 7 8 | ı | | - | | \bowtie | 88.08 | 5 | ss | 12 | | | 3 | |
| SOUND A SILTY CLAY, brace sand and occassional gravel (Tit.L) BOD OF BOREHOLE 3.51 END OF BOREHOLE 7 | ı | | - | | X | | - | | <u> </u> | - | | | |
| WO TO THE PRINCIPLE STATE OF S | | | 3 — | SILTY CLAY, | | | | | <u> </u> | 4 | | | |
| END OF BOREHOLE 3.51 5 - | | | - | वर्ष्य अवाव साव उर्द्य इंडाजान वृत्त्य (११८८) | | 1 | 6 | SS | 16 | | | | |
| A CUMMINGS 4 | ı | | - | END OF BOREHOLE | lki. | | <u> </u> | | | 1 | | | |
| 8 - 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | ١ | 닐 | <u>.</u> | | | | | | | | | | |
| A CUMMINGS 4 | | ٥ | • | | | | | | | | | | |
| A CUMMINGS 4 | | Š | - | | | | | | | | | | |
| 8 - 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | - | 〗 | | | | | | | | | | | |
| 8 - 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | | 22 | 5 — | | | | | | | | | | |
| 7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | - | 8 | 3 | | | | | | | | | | |
| 7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | 1 | | - | | | | | | | | | | |
| 7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | ı | | 6 | | | | | | | | | | |
| A. CUMMINGS | ı | | - | | | | | | | | | | |
| A. CUMMINGS | 1 | | - | | | | | | | | | | |
| A. CUMMINGS | 1 | | = | | | | | | | | • | | |
| | | | 7 — | | | | | | | | | | |
| | SS | | = | | | | | | | | | | |
| | N N | | - | | | | | | | | | | |
| | 2 | | 8 — | | | | | | | | | | |
| NOTES: Borehole dry upon completion of drilling. SHEET 1 OF 1 | | | • | | | | | | | | | | |
| Borlehole dry upon completion of drilling. | 8 | | - | | | | | | | | | | NOTES: |
| 9 - | 0.1-9 | | | | | | | | | | | | Borehole dry upon |
| 형] SHEET 1 OF 1 | 0122 | | 9 – | | | | | - | | | | | Confidence of Grands |
| | 703 | | : | | | | | | | | | | SHEET 1 OF 1 |

SITEST ENGINEERING DATA SHEET FOR BOREHOLE ___ DRAWING .. Project No. 8732 (Your No.) Laboratory Project PARK ROW SEWERS Matural Maieture Pleater & Liquid Limit Lecation PARK ROW STREET HAMILTON, ONTARIO Hole Location SEE DRAWING NO: 1 Date Drilled JULY 13, 1987. Hole VERTICAL Didled by HOLLOW STEM AUCER 80 mm I.D. Samely Arabas (prosume) Detum __ GEODETIC Webs: Content & Attemberg Lin 1% dry weight? retion Resistance, N. 350 ft his blows/ft. 10 20 30 40 10 20 30 Description Classification Elevation Depth metres _D91188_ ASPHALT 0.10 CONCRETE 0.25 SILTY CLAY TILL embedded sand and gravel 90 occasional cobbles brownish grey very stiff to hard 2 occasional red shale inclusions grey @ 1.8 m **b** 33 100 3 4 100 22 100 4 BOREHOLE TERMINATED 5.03 Notes 1. Borehole was moist and open to 5 metres on completion.

2. Borehole was backfilled on completion of the fieldwork.

Borehole Log



| Auger Sample ⊠ Natural Moisture x | Trow Lt |
|--|-------------------|
| SPT (N) Value OO Plastic and Liquid Limit Project Sewer Construction Dwg. No. 2 | |
| Dynamic Cone Test Undrained Triaxial at Overburden Pressure Undrained Triaxial at Overburden Undrained | |
| % Strain at Failure 10 Field Vane Test +s Penetrometer A Hamilton, Ontario Project No. H446 | 52-G |
| ab Vane Test L Hole location and datum see drawing No. 1 | |
| S N Value Natural Moisture Content (ASTM) D1586-CSA A119.1) And | Natural |
| W B Soil Description ELEV. 7 20 40 60 80 Atterberg Limits | Unit Weight |
| m Shear Strength MPA 10 20 30 | kN/m ³ |
| [304 5] HILLIAM ASPHALT | |
| F 460 mm GRANULAR BASE CRUSHER-RUN LIMESTONE | |
| FILL-silty clay, wet, firm | ı |
| F | |
| | ı |
| | l |
| 90.8 | |
| (297.9) | |
| SILTY CLAY-brownish grey, with | 00.0 |
| traces of sand and fine gravel, very stiff | 20.3 |
| \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | (120 |
| | |
| | 20.0 |
| | (127 |
| 88.8 | |
| SILTY CLAY-grey, moist, firm (291.4) | |
| John Glar grey, morse, 111m | ı |
| | |
| 87.78 | |
| (288.0)) | ı |
| NOTES: | |
| 1. Borehole put down uncased | i |
| with continuous flight auger | |
| equipment on September 28, | |
| 1982. | |
| 2. Water level at 1 m depth | |
| on completion. | |
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| | |

BOREHOLE LOG

| | H2397 |
|------|-----------|
| | |

BOREHOLE No.

DRAWING No. 2

| PROJECT. Proposed Sewer Installation. O.D. SPLIT TUBE LOCATION 3 Intersections Hamilton, Ontario PUBHED VANE TEST AND SENSITIVITY (S) SOIL DESCRIPTION SOIL DESCRIPTION ATTERSFRACE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) TERMINATED 2 1.D. SHELBY TUBE TO DESCRIPTION PROFETATION ESISTANCE SOIL DESCRIPTION PROFETATION ESISTANCE SOFT L.B. BLOWS/FT. 30 40 60 60 60 60 60 60 60 60 60 60 60 60 60 | 15 🔷 8 |
|--|-------------------------------------|
| Hamilton, Ontario PUSHED VANE TEST AND SENSITIVITY (8) SOIL DESCRIPTION SOIL DESCRIPTION ATTERERED SOURCETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) PENETRATION RESISTANCE 305 FT. Las PENETRATION RESISTANCE 305 OF 1.08 SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | 15 ⇔ 8 |
| HOLE LOCATION AND DATUM SEE DRAWING NO. I VANE TEST AND SENSITIVITY (S) +5 OVERBURDEN PRESSURE % STRAIN AT FAILURE SOIL DESCRIPTION PELEV. FEET 300 FT. LB. BLOWS/FT. ATTERBRO LIMITS 305.4 OTHER CONCRETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 OVERBURDEN PRESSURE % STRAIN AT FAILURE NATURAL MOISTURE CONTRACT ATTERBRO LIMITS % DAY WEIGHT 10 20 30 TO 299.9 TO 300.4 TO 200.4 TO 300.4 TO 3 | 15⊕5 10 |
| SOIL DESCRIPTION ATTEREREG LIMITS SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) HOLE LOCATION AND DATUM SEE DRAWING No. 1 PENETRATION RESISTANCE 330 7. 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 PENETRATION RESISTANCE 330 7. 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 PENETRATION RESISTANCE 330 7. 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 ATTEREREG LIMITS % DRAWING NO. 1 ATTEREREG LIMITS % DRAWING NO. 1 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 ATTERER STRENGTH | |
| SOIL DESCRIPTION SOIL DESCRIPTION PATA 7" CONCRETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 10 10 10 10 10 10 10 10 1 | |
| 21 ASPHALT 7" CONCRETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 299.9 | NATURAL UNIT WEIGHT P.C.F. |
| SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 | |
| SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 | ## |
| gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 299.9 | ĦM |
| SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | #1 |
| SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | $H_{\mathbf{k}}$ |
| sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | #1 |
| some silt pockets, grey, moist to very moist, (very stiff) | #1 |
| very moist, (very stiff) 10 15 4 20 | 田 |
| 15 | \mathbb{H}_{2} |
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| 20 | ₽M. |
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| | #4 |
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| TERMINATED 283 al HIII O HIII HIII HIII HIII | #4 |
| LERCHNOLEU COSS SINGLEU | |
| | # |
| NOTES: | # |
| 25 | Ħ |
| 1 Borehole advanced uncased by | # |
| continuous flight auger equip- | #1 |
| ment to termination at 21½ feet | #1 |
| depth on Sept.7/86 by S.O.I.L. | |
| | #1 |
| 2. Water Level Records: | B |
| ELAPSED DEPTH TO HOLE OPEN TIME W.L.(ft) TO (ft) | #1 |
| on dry 19.5 35 | 田 |
| completion | #1 |
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| \$ CO | AMPLE NDITIC OISTUM GOOD LOST | ON SS SPLIT SPOON ST - THIN WALLED OPEN (SHELEY) | | ACT I | PARADALE PARADALE 050319-C GEODETIC | 700-435600 RAIN SIZE ANALYSIS ET LINIT WEIGHT - BIN/m* CHSOLIDATION TESTS UNDRAINED SHEAR STRENG PRELD VANE BITACT | ROUP 3 QUEENSTON R HAMILTON ABBREVIATIONS E. P DS D O T | D. BORIN | PAGE IG DA CASIN ATTY - CY HEAR QUICE | TE | of _ ne S.A | |
|-----------------|---|---|--------|----------|-------------------------------------|--|---|-----------------|--|-----------------------|-------------------|--|
| | P. DEPTH | | SYMBOL | WATER LE | O WATER CONTENT - W DYNAMI | REMOULDED LIQUID LIQUIT - W1% C PENETRATION TEST - BLOW 0 60 | A PLASTIC LIMIT - Walk | OTHER TESTS | CONDITION | TYPE AND MUMBER | PECOVERY % | STANDARD PRINCTRATION - BLOWS/0.3m |
| 3 = 4 = 5 | | HARD RED BROWN, AND GREY SILT LAYERED TRACE SAND AND GRAVEL | | | Θ | | | SC ₄ | | SS1 SS2 SS3 | 72 83 | 71 |
| | 12.5 6.65 | END OF BOREHOLE BOREHOLE DRY UPON CO. PLETION | | | 0 | | | | X | SS5 | | 100 for 100 |

QUEENSTON ROAD



| - | TEK LIMI | | | | LOG | OF BOREHOLE NO. | 2 |
|---|----------------------------------|-------------|----------------|--|---|-----------------------------|--------|
| Project # 99075 Client: Region of | Hamilton-Wentw Watermain Cons | orth/ | | Drilling Date Drilling Method | | Drawing No. | 3 |
| | e, Hamilton | Suuction | | Contract Drilling Co. | [] hollow st [] diamond Geo-Environ | | |
| SOIL DESCRIPTI | ON LEVE | | 33 SAMPLE | STANDARD PENETR N Value = blows per 300 p | | SOIL MOISTURE PROFILE | DATA & |
| 75 mm of Asphalt over 125 25 mm of Grant LL (Halton Formation by clay, gravel sizes, bro late fragments, grey frac d-brown, moist fiff to Very Stiff) | i) own, red | 95.0 0.0 | \$\$1 \$\$2 | -2.0 -20 40 -2.0 -2.0 -2.0 -2.0 -2.0 -2.0 | 60 80 | 00 10.0 20.0 30.0 • 19.4 | |
| BOREHOLE TERM | NATED | 3.5 | | -5.0 | | | |

| Auger Sample SPT (N) Value Oynamic Cone Test Shelby Tube Field Vane Test Ab Vane Test S Natural Moisture Plastic and Liquid Limit Undrained Triaxilal at Overburden Pressure % Strain at Failure Fenetrometer | × ⊷o Pr | oje: Que | ct Proposed | l Storm Sewe | * | 1 |
|---|------------|-------------|--|--------------|---|-------------------------------------|
| Soil Description 89mm Asphalt 165mm Concrete 203 mm Sand and Gravel Fill - silty clay, gravel sizes, cobbles & Boulders Shale fragments, organic Pockets, Reddish-Brown, moist, (soft to firm) | | EPLIE O | (ASTM) D15864 20 40 Shear Strength | | Atterberg Limits % Dry Weight 10 20 30 | Unit Weight kN/m ³ |

Shale - weathered

(hard)

completion.

Notes:

changing to sound Shale at 4.9m, Siltstone layers, red

End of Borehole

1) Borehole advanced on
April 2/91 using
continuous Flight Solid
Auger Equipment

2) Borehole open to full
depth and dry on

94.1 5

MOUNTAINVIEW GEOTECHNICAL LTD.

| Auger Sample 🛛 Natural Moisture | × | |
|---|--|---|
| SPT (N) Value OO 🛛 Plastic and Liquid Lim | Proposed Storm Sewe | r Dwg. No3 |
| Dynamic Cone Test Undrained Triaxial at Overburden Pressure | us Queenston Road | Borehole No. 2 |
| Field Vane Test + s | Hamilton | |
| Lab Vane Test L | | Project No. S0145 |
| | | |
| G | N Value (ASTM) D1586-CSA A119 1) | Natural Moisture Content Natural and Natural |
| W B / Soil Description | ELEV. T 20 40 60 80 m Shear Strength MPa | Atterberg Limits Unit % Dry Weight Weight |
| | 99.5 | 10 20 30 kN/m ³ |
| 76mm Asphalt | ┍ ═┩ | |
| 230mm Concrete | 99.2 | |
| Shale - weathered to clay | | |
| consistency, gravel size, | | |
| Siltstone cobbles, moist | | |
| changing to sound Shale a | | |
| 3.4m, Red, (hard) | | |
| | | |
| | 2 | |
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| | | ###################################### |
| End of Borehole | 96.0 | |
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| | | |
| Notes: | | |
| 1) Borehole advanced on | | |
| April 2/91 using | | |
| continuous Flight Sol | d 5 | |
| Stem Auger Equipment | | |
| -2) Borehole open to full | | |
| depth and dry on completion. | | |
| - comprection. | — 6 | |
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MOUNTAINVIEW GEOTECHNICAL LTD.

| Auger Sample Natural Moisture | × | | |
|--|-------------|---|---|
| SPT (N) Value O O 🔯 Plastic and Liquid Limit | - Proje | ect Proposed Storm Sewer | Dwg. No4 |
| Dynamic Cone Test Undrained Triaxial at | A - One | eenston Road | _ |
| Shelby Tube Overburden Pressure 15 % Strain at Failure | ∰, <u>~</u> | | Borehole No 3 |
| Field Vane Test +s Penetrometer | A | Hamilton | Project No. S0145 |
| Lab Vane Test L | _ | | 110,001110 |
| | | | |
| | P | N Value N (ASTM) D1586-CSA A119 1) | latural Moisture Content Natural |
| W B / Soil Description | ELEV. | 20 40 60 80 | Atterberg Limits Unit % Dry Weight Weight |
| | 99.3 | Shear Strength MPa | мимз |
| 100mm Asphalt | 99.3 | | 10 20 30 |
| | | | |
| 255mm Concrete | | | |
| 255mm Sand & Gravel | 98.7 | | |
| _ Silty Clay Till - gravel _ | i t | | |
| Sircy Clay IIII - graver _ | 1 | | |
| Sizes, Limestone boulders, | | | |
| Red Shale and siltstone | | | |
| fragments, moist, reddish- | | | |
| brown (hard) | | | |
| - | 2 | | |
| | | | |
| - | | | |
| | | | |
| | | | |
| | 06 1 | | |
| Silt Till- occasional | 96.1 | | |
| gravel sizes, red shale - | | | |
| fragments, oxidized olive- | | | |
| brown, moist, (hard) | 95.4 | | |
| Shale - siltstone layers | 4 | | |
| red. (hard) | | | [|
| red, (hard) End of Borehole | 94.7 | | |
| | | | |
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| | | | |
| - Notes: - | | | |
| 1) Borehole advanced on | | | |
| April 2/91 using _ | 6 | | |
| continuous Flight Solid | ľ | | |
| Auger Equipment | | | |
| 2) Borehole open to full | | | |
| depth and dry on | | | |
| - completion | 7 | | |
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e. m. peto associates ltd. soil engineering service - toronto, ontario

| : | | ВО | REHOLE | LOG | | | | | |
|--|--|---|-------------------------|----------|--------------------------------|----------------|--------------------------------------|---|---|
| Job Name Redhill Creek Sew | | 61182/1 | | | | | | | 22 |
| Client City of Hamilton | | BX | | | | | | | Jan. 10 -11 , 1962 |
| Elevation 269.8 | Compi | led By J. F. C | 3 | | | | Checked | Ву | S. B. |
| SAMPLE CONDITION UNDISTURBED FAIR DISTURBED LOST | A.S. C.S. S.S. S.L. S.T. W.S. | SAMPLE T AUGER SAMPLE CASING SAMPLE 2" STANDARD S SPLIT BARREL THIN-WALLED S WASH SAMPLE ROCK CORE | YPE PLIT TUB WITH LINE | ESAMP: | LE | | V.T. C. W.L. W.T. W.T.P. | AB IN SI SOIL WATI GROU L. WET | BREVIATIONS TU VANE SHEAR TEST SHEAR STRENGTH LBS/SQ.FT. ER LEVEL IN CASING UND WATER TABLE IN SOIL FER THAN PLASTIC LIMIT R THAN PLASTIC LIMIT |
| SOIL DESCRIPTION | COLOUR | Density of Consistency | Depth Elevation | Legend | Sample No. and Candition | Sample Type | No. of Blows per Fs | Natural Motet tro Tontent | WATER LEVELS & REMARKS |
| | | 65 | | | | | | | *** |
| Citty five good | ~ 1. | GH | OUND | | | | | | |
| Sitty fine sand - organic | Red brown | <u> </u> | 1'0" | 17.7 | $\square \bowtie$ | C.S. | | | Very moist. |
| Clayer sitt fine send | Red brown | | | | 121 | C.E. | | | Very moist. |
| Clayey silt - fine sand content | Red brown | Loose to | | 1 | 3 | S.S | _2 | -27- 3- | Very moist |
| River Gravel | Dad b | Compact | 4'3' | | ļ |] | | | |
| | Red brown | | 4'9" | 2000 | 48 | | - | | Saturated. |
| Highly weathered shale | Red brown | Extremely | -6161 | | 1.5.1 | Ls.s. | 93 | 9_3 | Moist |
| | *************************************** | Dense | 7191 | | 1 | ļ | | | |
| | | | 1 9 | === | 一次, | | | | |
| Out and an abal. | | ļ | ļ | | | <u> </u> | | <u> </u> | Rust pocket at 9 feet |
| Queenston shale | Red & blue | ļ | <u> </u> | | 12 | R.C. | | | Recovery 95% |
| *************************************** | *************************************** | ļ | ļ | | | | ļ | | Odd broken seam |
| | | | 13'0" | +=== | 1 // | ļ | <u> </u> | <u></u> | |
| | | ļ | 13.0. | 1 === | <u> </u> | ; | <u> </u> | | |
| and Anti-Anti-Anti-Anti-Anti-Anti-Anti-Anti- | | <u> </u> | | | | <u> </u> | | | |
| | | ! | ļ | | | i | : | | |
| Thin gypsum seam | | l | 15'9' | * | 1 | 1 | : : | | |
| Queenston shale | Red & blue | + | | ==== | | R.C. | | ļ | Recovery 100% |
| makadid develope more district and the same security measures with a decrease series of the same security. | | | 18'0" | | | | | | |
| section that the contract of the section is a section of the secti | | | | <u> </u> | | | 1 | | |
| | | | <u></u> | ==== | | 1 | • | | |
| | | | L | -: | 1 1/ | .i | | | |
| | *************************************** | | | 1=== | | | | | |
| Fissure at 22'10" | | | 22,10 | 122 | 1_1/2 | 1 | 1 | | |
| Queenston shate | Red & blue | ļ | | | 11/2 | R.C. | ! ! | | Recovery 100% |
| | | | 1 | | 1 VZ. | 1 | - | | |
| Soft seam or fissure at 25'6" | | | 25'6': | | 1/4 | <u> </u> | | | |
| | *************************************** | | | <u> </u> | | 1 | | | |
| | | | 25'6': | | 1/2 | | ! | | |
| , | | ļ | ļ | ļ | ļ | 1 | | | |
| | | Bori | ng Terr | ninat | ed at 2 | 8:2" | | | Note: Arrows denote |
| ************************************** | | | | <u> </u> | | | | | soft seams. |
| | | | | | | | | | |
| | | | WATER | COI | VDITIO | NS. | | | |
| Date | Time | Depth | Dept | h | Depil | 1 | Rem | rks | |
| | | Casing | Hote | | Wate | | | | |
| The second secon | | | | | | | | | |
| Jan. 10/62 | 4 | 0, | 4'4 | 1 | 3'7'' | | Hote 4'3' | shoute | be at 6 ft. seepage from |
| Jan. 11/62 | 10:30 a.m. | 8, | 18' | | 6'2" | | | | owar W. I. below 6'2' by |
| | | | 1 | | | 1 | baitir | 17 | I WILLIAM D Z DY |
| | 10:31 a.m. | 8' | 18' | | 3'7" | | | - | |
| | 10:36 a.m. | 8, | 18' | | 3'7" | | | | |
| ,,,, , , , , , , , , , , , , , , , , , | 10.00 | 1 0. | 1 | 1 | † | 1 | i | | |

| B 1 144 | 1175 | N SEE FIGURE 2: R HAMMER, 83.5kg, DROP, 780mm, | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Ri | | ÖF | (D | ARG I | XTE | UGUST PENET | 29,1986 RATIO | Est | | | DA. | TUM & | EODETI | | |
|-----------------------|---------------|--|---------------------------------------|-----------------------|----------|------------------|--------------------|-----------------|--|------------------|---------------------|--------------|--|-------------------|--|----------|--|----------------------------|---------------------------------|
| CALE | METHOD | SOIL PROFILE . | PLOT | <u> </u> | SA | MPLE | | RESIST | ANCE, | ETRATE BLOWS/ |).\$m | ۲, | HYDRA | k, C | CONDUC M/SEC | TIVITY, | I | 4AL TIPPG | PIEZOMETER |
| DEPTH 3CALE METRES | BORING M | DESCRIPTION | STRATA PL | ELEV. DEPTH (M) | NUMBER | TYPE | BLOWS/0.3M | SHEAR Cu, ki | STREN | ne | it.V.= + m.V.= 6 | 0,- e U 0 | ¥A. | Wp. | ö | PERCE: | NT IO | ADDITIONAL LAB. TESTING | OR STANDPIPE INSTALLATION |
| - 0 | T | GROUND SURFACE | X | 92.00 | | | | | | | | | | | | | | | Backfill |
| | | Granular road base.FILL. | X | 91.20 | | | | | | | | | | | | | | | |
| . 1 | | | | 0.80 | 1 | 60 DO | 8 | | | | | | | | ļ | | | | - |
| | | | X | | | 50 | | | | | | | | | | | | | |
| . 2 | | | X | | 2 | 50 00 | 6 | | | | | | | | 0 | | | MH | |
| | | Firm to stift, grey slity ctay, trace to some sand and grayel, trace organics (wood and peat) | \searrow | | 3 | 60 DO | 8 | | | | | | | c | <u> </u> | H | | | |
| - 3 | | FILL. | X | | | | | | | | | | | | | | | | |
| | | | X | | 4 | BO DO | 10 | | | | | | | | | | 4 | | |
| - 4 | 2 8 | | | | 5 | 50 DO | 12 | | | | | | | 0 | - | | | | |
| omaya andire | STEM AUGERS | | \times | 87.40 | | | | | | | | | | | - | | | | |
| . 5 | OLIO STEI | Red-brown sand, some gravel. FILL. | | 4.80 | 6 | 50 DO | 8 | | | | | | | | | | | , | |
| , or stand | un DIA. SOLID | - Andrews - Andr | X | 86.70 5.30 | | | | | Address and the state of the st | | | | | | projekte překa sa | | | | |
| . 6 | Manuel | | | | | | | | | | | | | | | | | | |
| | | | | | 7 | 50 DO | 7 | | | | | | | | ٥ | | | | |
| . 7 | | Firm to stiff, brown to gray | \times | | | | | | | | | | | | | | Annual Control of the | | |
| | | clayey slit, some sand, trace gravel, some sandy slit pockets/layers, occ. organics. | \searrow | | | | | | | | | | | | | | | | |
| 8 | | FILL.Topsoll layer (about 200mm thick) at 6m depth. | | | 8 | 50 DO | 18 | | 240000000000000000000000000000000000000 | | | | | 0 | | | | | |
| | | | X | | | | | | | | | | | | | | | | - |
| | | | \times | | | | | | | | | | | | *************************************** | | | | |
| | | | \times | | 6 | 50 DO | 10 | | | | | | | | | | | | |
| | | | | 82.00 | | υO | , • | | | | | | | 0 | | | Apparator of Appar | | |
| 10 - | | CONTINUED ON SHEET 2 | | 10.00 | | | - • | | | | | · — | | _ | <u> </u> | † | | | <u> </u> |
| | | | | | | | | | | | | | | | | | And the state of t | | |
| 050 | | CALE | | | | | | 18 6 | PENCENT | AXIAL ST | RAIN AT | FAILUNE | | | | | <u> </u> | | |
| 1: | | | contempting: | intiretariamentones | onomiero | race approximate | THE REAL PROPERTY. | Go | lder | Ass | ociat | 8 | 00000000000000000000000000000000000000 | · Militari Marian | MACHINE RECORDED TO MACHINE PROPERTY AND ADMINISTRATION OF THE PARTY AND ADMINISTRATION OF THE | | | OGGEC CHECKE | RF ED ASP |

| 1142 | | | | | R | ΞC | Ö | ìD | OF | BC | REP | IOLE | 5518 +1 | 11/1/11 | | SH | EET 2 | ol 3 | | |
|-------------|---------------------------|-------------------------------|---|----------------|-----------------------|---------|--|--------------|-----------|--------|----------|---------------------------------|---|--|--|--|--|---|----------------------------|---|
| | 1111 | li:" | om see figure 2 7 Hammer, 83.5kg, drop, 780mm | | | | A Company of the Comp | 80 | XRING D | ATE . | chia tit | 29,1989 PATION | # 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | HAMME | R. 83.6 | | | 2E00E1 | o | (63) |
| <u></u> | | 8 | SOIL PROFILE | | | SA | MPLI | : S | DYNAM | UC PEN | ETRAT | он / 111111111 | tilili > | 9(Hb) | NULIC C | ONDUC | ijiriji | T | | |
| DEPTH SCALE | COME | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (M) | NUMBER | TYPE | BLOWS/0.3M | | STREN | 114 | 0.3m 11.V + m.V € | | WA. | TER CC | M/SEC | PERCE | L ENT | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
| - 1 | | ă | CONTINUED FROM SHEET 1 | STR | 82.00 | | _ | ä | | | · · | | J | * | 0 2 | 0 8 | 30 | 40 | | |
| | Ĭ | | SEE DESCRIPTION ON PREVIOUS PAGE. | X | 10.00 | | | | | | | | | | | | | | | Backfili 🔻 |
| | | | Possible boulder (inferred from auger resistance). | R | 10.80 | _ | | | | | | | | | | | | | | |
| | | | Stiff, motified brown and grey CLAYEY SILT with sand and gravel, occ. sand seams. Red-brown completely weathered | ** | 80.10 | | 50 DO | | | | | | | | | | The state of the s | | | - |
| | | | calcareous mudstone. | <u></u> | 79.68 12.42 | - | 80 DO | B2/ .6 | | | | | | | | _ | - | | | |
| - 1 | | AUGERS | FOR BEDROCK CORING INFORMATION REFER TO SHEET 3. | | | | | | | | | | | | | | | | | Water level in borehole open to 12.4m depth, at Elev. 81.3m on completion |
| 1 | ER AUGER | LOW STEM | | | | | | | | | | | | | | | | | | of overburden drilling. |
| | CME-65 POWER AUGER BORNYG | 186mm DIA. HOLLOW STEM AUGERS | | | | | | | | | | | | | | | | | | |
| | 5 5 | 1861 | | | | | | | | | | | | | | | | | | • |
| 1 | 8 | | | | | | | | | | | | | | | And the state of t | | | | - |
| - 1 | 7 | | | | | | | | | | | | | | | | | | | - |
| - 1 | В | | | | | | | | | | | | | | | | | | | |
| - 1 | | | END OF HOLE | | 79.38 18.64 | | | | | | | | | | festalentes control and contro | | - Andreas - Andr | Commence of the second | | _ |
| | | | | | | | | | | | | | | | Programme and the control of the con | Andrew Communication Communica | - | *** | | |
| - 21 | | | | | | | | | | | | | | | | No. of the last of | | | | _ |
| | | | | | | | | | | | | | | | | | | | | |
| l | EPTI | | CALE | | | Marine | | | 10 | • | | ociat | | | | | | | OGGED CHECKE | RF ED ASP |
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| KES | RECORD | • | PLOT | | No. | N RATE | PETURA | CL \$H | -FR -CL -SHE | EAI | VAG | E E | J. P. | -JO | ULT HNT XLISH | ÆD | | | SM-SMOOTH R -ROUGH ST-STEPPED | UE- | UNE | XURE VEN VY | | TRAL | (MP#) | NOTES |
|--------|------------|--|---|-----------------------|-----|--------------------|--------|-----------|--------------------|-----|-----|--------|---|---------|-----------------------------|----|----|-----|--|-----|---|---|---|--------------------|-------------------|--|
| METRES | DRILLING R | DESCRIPTION | STRATA | ELEV. DEPTH (M) | RUM | ENETRATION (M/M/W) | ¥. | R | ECO | VE | RY | | | F 10 FE | CKE ACT. DEX R OJE | 88 | DI | SCO | PL-PLANAR ONTIMUITY DATA TYPE AND SURFACE DESCRIPTION | £ 0 | HYD | RAU | LIC | DIAMETI POINT L | XEDEX | WATER LEVELS INSTRUMENTATION |
| 10 | Ī | | === | 82.00 10.00 | | _ | | H | Ħ | Ï | | Ħ | | | | | H | | | + | + | H | + | \blacksquare | $\dagger \dagger$ | |
| | | FOR SOILS INFORMATION REFER | | | | | | | | | | | | | | | | | | | | | | | | *************************************** |
| 11 | | | | | | | | | | | | | | | | | | | | | | *************************************** | | | | |
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| 12 | | Red-brown completely weathered | === | 80.10 | | | | | | | | | | | | | | | | | | | | | | |
| | RC. | calcareous mudatone. (QUEENSTON SHALE) | = | 79.58 | | | | | | | | l | | | | | | | | | | | | | | |
| | £ | | | 12.42 | 21 | Š. | ş | | | | | | | | | | | | BROKEN CORE SEALS | | | | | | | Backfill |
| 13 | NO RC | | | | 51 | 90 | 9609 | | | | | | | | | | | 11 | BROKEN CORE SEAMS | | | | *************************************** | | | |
| | 五 | | == | | | -, | * | | | | | | | | | | | | SPROKEN CORE SEAMS | | | | | | | |
| 14 | - | | == | | | | - | | H | ŀ | | | | | | | | | | | | | | | | |
| | RC | Red-brown, moderately to | - | | | | * | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | | | | | | | | | | | |
| 15 | õ | slightly weathered, fine grained, thinly bedded, | = | | 7 | 80. | 30-60 | | | | | | | | | | | | | | | | | | | |
| | DARLING | CRICATEOUS MUDITIONS. (QUEENSTON SHALE) | | | _ | | | | | | | 2 × 2 | | | | | | | BROKEN CORE SEAMS | | *************************************** | | | | | |
| 18 | | | == | | | | | | | | | | | | | | | | | | | | | | | Bentonite Seat |
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| | ROTARY | | = | | | | | | | 3. | | | | | | | | | BROKEN CORE SEAMS | | | | | | | |
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| 18 | ¥. | | ======================================= | | \$ | 6 | 30-40% | | | | | | | | | | | | BROKEN CORE SEAMS | | | | *************************************** | | | |
| | | | <u> </u> | 73.36 18.64 | | L | _ | | | | | | | | | | | | BRICKEN CORE SEAMS | | | | THE STREET, ST. | | | |
| 19 | | END OF HOLE | | 13.04 | | | | | | | | | | | | | | | | | | | | | | Water level in piezometer at Elev. 81.6m on Oct. 4,1989 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
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| | | | | ON SEE FIGURE 2 R HAMMER, 83.6kg, DROP, 780mm | | H | =0 | OF | ۲D | OF BO | ORE SEPT. | HOLI 1,1989 TRATIO | K TEST | 308 HAMM | R, 63.6 | DA kg DR | EET 1 o | EODETI mm | C | |
|----------|---------|------------|---|--|-------------------------|------------------------|-----|----------------|------------|---------------------------|--|--|------------|--|---------|-------------|---------|--------------|----------------------------|--------------------------------------|
| V. | H H | 00101 | HOD | SOIL PROFILE | 16 | | SAI | 4PLI | ES | DYNAMIC PE RESISTANCE. | BLOWS | ION > | 1 | | AULIC C | | | Ť | ي | |
| | METRES | Jan Oraco | BOHING ME | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (M) | | TYPE | BLOWS/0.3M | SHEAR STRE | | nat.V | | | Wp. | ŏ | PERCE | NT O | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
| JECT 82C | 1 | | | GROUND SURFACE Compact, grey sand and gravel (granular road base). FILL. | XXXX | 92.09 | | 60 DO | 10 | | | | | | | | | | | |
| | 2 | | | SALIFA SERVICE SALIFA | | 1.17 | 2 | 50 DO | 8 | | | | | | | > | | | МН | - |
| | 3 | | | Stiff, grey-brown silty clay, trace to some sand, trace gravel, occ. organics, topsoli seam at 2.5m depth. FiLL. | | | 3 | 50 DO | 16 | | | andersonale de la familia de la constanta de l | | ATTACA CONTRACTOR CONT | | | | | | _ |
| | ı | | *************************************** | | | 88.09 | | 50 DO | | | | | | | o | | | | | |
| | , 5 | OWER AUGES | SOLID STEM AUGERS | | | 4.00 | | 50 DO DO | 8 | | | | | | 0 | - | | | | |
| | 6 | 8 | E | Stiff to very atiff, red-brown clayer slit, some gravel, weathered shale/residual soil. | \otimes | | 7 | 50 DO | 22 | | The state of the s | | | | | | | | | - |
| | 7 | | | - Annual Control of the Control of t | | 84.59 7.50 | · | | | | | | | | | | | | | - |
| | 8 | | | Mixture of very atlff red- brown clayey ailf, trace to some sand and gravel; and dense brown ailly sand, trace clay; | | | 8 | 50 DO | 30 | | | | | | | | | | | ••• |
| | 9 10 | | - Announcement of the second | occ. organics.occ. asphalt fragments. FILL. | \times | 82.09 | 9 | 50 | 18 | | | | | | 0 | | | | | — —— |
| | | | | CONTINUED ON SHEET 2 | | 10.00 | | | - + | | | | | | | | | | | |
| - | | | | | Ш | | | | \dashv | 0 18-8-8 PERCENT 10 | AXIAL SI | AAIH AT | FAILURE | | | | | | | · |
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| | | era vili | ON SEE FIGURE 2 IR HAMMER, 83.5kg, DROP, 780mm | Could produce a common may be determined by the common may be a common may be | RI | EC | OF | | OF B | SEPT. 6. | 1989 TRATION | (TEST I | 308 HAMMER, | , 63.6kg, | DROP, 7 | GEODETI | O The second sec | |
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| | SCALE | METHOD | SOIL PROFILE | PLOT | | | MPLE | | DYNAMIC PE RESISTANCE, | NETRATION SAL | ON >. | | HYDRAU | | DUCTIVITY | <u>Y. I</u> | TING | PIEZOMETER |
| | DEPTH SCALE METRES | BORING N | DESCRIPTION | STRATA PL | ELEV. DEPTH (M) | NUMBER | TYPE | BLOWS/0.3M | SHEAR STRE | | at.V, + im.V 6 | Q e U Q | | P | ENT, PER | CENT | ADDITIONAL LAB. TESTING | OR STANDPIPE INSTALLATION |
|) | - 10 | 2100 | CONTINUED FROM SHEET 1 | Ë | 82.09 | - | | | | | | | Ť | . <u> </u> | | | | |
| Ó | Ì | BOR!N | SEE DESCRIPTION ON SHEET 1 | X | 10.00 81.79 | | | | | + = | $\vdash \vdash$ | - | | 一干 | T | | | |
| 100 | | TEM | Loose, brown SAND AND GRAVEL. | | 10.30 81.29 | | F. | | * White the state of the state | The state of the s | Ed discourse to the | | | | *************************************** | | | |
| - | - 11 | CME-65 POWER A 165mm DIA. SOLID S | Very stiff, mottled brown CLAYEY SILT, some sand, trace gravel. | 241111111111111111111111111111111111111 | 10.80 | - | 50 | 46 | 2000 | | | | | | | | | - Commence of the Commence of |
| | | CME-(| Highly weathered, red-brown | # | 80.59 11.50 | | | | | | | | | | | | | 1 |
| | | | i calcareous mudstone. | E | 80.24 | | | | | *** | | | | *************************************** | | | | |
| + | - 12 | | (QUEENSTON SHALE) | - | 11.85 | | - | | | - Constant | | | ١ | Charles Same and | difference | | | _ |
| | | | END OF HOLE | | | | | | | | VALUE SERVICES | | | ************************************** | Printed State Constitution of the Constitution | *************************************** | l L | Water level in open borehole at Elev. 82.6m |
| 1 | | | | | | | | | | | | | | *************************************** | *accommonates | 1 | | at Elev. 82.6m on completion of drilling. |
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| LO | CATION Glen Castle Drive to Barton PRING METHOD Continuous Flight | Stre | et, H | amilte | on, O | |) | BOR | ING L | DATE | Marc | h 31, | 199 | 8 <i>E</i> M | | |
|------------------------|--|--------|-----------|--------|---|-----------------------|----------------|--------|---------------------------------------|--------------|--------------|-------------------------|---------|--------------|----------------|--|
| | SOIL PROFILE | | | S | AMPLE | īs . | SHEAF | STRE | NGTH (| 2u | | | D LIMIT | | W _L | |
| DEPTH in METERS | DESCRIPTION BOREHOLE Q5 | LEGEND | ELEVATION | NUMBER | TYPE | LOWS/0.3m - VALUES | DYNAM STAND | ARD PL | NE PEN ENETRA WS/0.3 | NETRATION TO | ON x EST• | WATE: ₩ _P | P CON | TENT | W _L | GROUNDWATER OBSERVATIONS AND REMARKS |
| | GROUND ELEVATION 83.45 | | EL | ž | | 19 × | 2 | | 0 60 | | 2 | | | 0 3 | | |
| 0.30 -1.35 -2.45 | slightly plastic, W.T.P.L becoming sandy, gravefly, wet, trace of decayed organics, numerous shale particles, | | 82 | 1 | SS | 11 | • | | | | | | | • |) | |
| 2.60 | Moltled black and grey SHALE: Weathered red shale BOREHOLE TERMINATED AT 2.60m | | 80 | | | , | | | | | | | | | | Upon completion of augering, no free water, |
| | | | | | | | | | | | | | | | | no cave. |
| | BOREHOLE Q6 | | | | | | | | | | | | | | | |
| 0.30 | GROUND ELEVATION 82.03 | ~~ | | | | | | | | | | | | | | |
| 0.90 | TOPSOIL: Dark brown sandy silt, trace of clay, low organic SAND: Reddish brown silty sand, trace of clay, wet SILT: Layered grey and reddish brown sandy and clayey silts, wet | | 81 | | | | | | | | | | | | | |
| | BOREHOLE TERMINATED UPON REFUSAL TO AUGER AT 1.35m BEDROCK ASSUMED | | | | | | | | | | | | | | | Upon completion of augering, no free water, no cave. |
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PETO ASSOCIATES LTD. CONSULTING SOIL ENGINEERS RECORD OF BOREHOLE NO. 1 JOB NO. 70F154 JOB NAME Watermain - Nash Road, Hamilton, Ontario TECHNICIAN_B.P. Corporation of the City of Namilton ENGINEER GDP/PK BORING DATE Dec. 21/70 CLIENT TYPED BY V.S. GROUND ELEV. Not Recorded BOREHOLE TYPE 4" Flight Auger DYNAMIC CONE PENETRATION BLOWS/FOOT SOIL PROFILE SAMPLES LIQUID LIMIT _ STANDARD PENETRATION TEST PLASTIC LIMIT __ BLOWS/FOOT WATER CONTENT_ REMARKS DEPTH ELEV. DESCRIPTION WATER CONTENT % W SHEAR STRENGTH Cu LB/SQ.FT. FILL-Clayey, high in organic content, very moist, dark -3141 thrown
CLAYEY SILT TILL-Brown fine, moist, mainly fine gravel with occasional medium gravel þ 0 At completion BH terminated at BH open and 14'0" dry 1 hr. later same

this margin reserved for binding

| е. | m. peto associates ltd. | ng Sanga <u>ng ang Sanga</u> ina | | F | RECO |)RD | OF E | BORF | HOI-I | F NO |) | Sup. | Ç | onsult | ing so | oil engin | eers |
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| JOE | 3 NO65329 | JOB ! | NAME | | | | | | | | | J-0 | | | | VICIAN | |
| ВО | RING DATE Jan. 7/66 | CLIEN | 1T | С | orpo | ratio | n of | the C | ity o | f Ham | ilton | | | | | | |
| GRO | OUND ELEV_ 325.86 | BORE | HOL | E TYP | E | | Stand | ard R | ig | | | | MATEUR CONTRACTOR | | TYPE | D BY | HF |
| | SOIL PROFILE | | | SAMPL | | | DYNAM | C CONE | PENET | RATION | | LIQUID | LIMIT | | w, | | |
| DEPTH ELEV. | DESCRIPTION | LEGEND | NUMBER | TYPE | BLOWS/FOOT | 1 | | BLOWS/ | FOOT - | 0 5 | 0 | WATER W. | CONTE | NT | ₩. 9% | REM | ARKS |
| 0'0' | TOFSOIL | 20 | | | 60 | : | | | | | | 1 | 0 1 | 5 2 | 0 25 | | |
| | CLAY, reddish brn. fine sandy clay V. Wet | | 1 | SS | 19 | | | | | | | | | | | | |
| | COMPACT TO LOOSE | 1/ | | | | | | | | | | | | 18.9 | | 33.4 | |
| 7'0" | SAND, reddish brown | | 2 | SS | 6 | (| | Pro- ARRAMENTA E REPORTED | | | | | | 1 | | 0 | |
| | clayey fine sand Saturated | | 3 | SS | 12 | | - | - | | | | | | | | | |
| 12'0" | COMPACT | | 4 | SS | 26 | | | 1 | | | | | | | | | |
| | SAND, reddish brn. silty clayey very fine sand | | - 5 | SS | 36 | | | dente sancte « page " specifi | i | | | | 1 | 7.0. | | | |
| | Time Sand | | 6_ | SS | 36 | | <u> </u> | | | | | | - | 7.0 <u>1</u> | 7.2 | • . | · . |
| | CA TILLDA MILID | | | | | | electric constant | 1 | | | | | | | | | |
| | SATURATED | 1 | 1 | - | 1 | | | • | | | | |] | 6.9 | | 29.4 | |
| | DENSE | | 7 | SS | 38 | | | ! | i | | | | | 7 | | | |
| 23'0' | | | | | | | | | | | | | anni de la constanta de la con | | | | 11 2 A |
| | SILT, brown very fine sandy silt | 1 | | | | | | | | | | | | | 1.63 | CAMPAGE | |
| | Some sand and clay seams | [| 8 | SS | 38 | | | | | | | | | | | | *. |
| | SATURATED | | | | | | | | | | | | - produced and the second | \ | | | |
| 31'6" | DENSE | | 9 | SS | 33 | | | | /- | | | | | | | | |
| | Hole terminated at | | _ | | 1 | | , | | | * Charles Water Spirit | | | | | | | |
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| GR | OUND ELEV_ 326.86 | BORE | HOL | E TYP | E | | | lard I | | | | | | | TYPED B | | |
| | SOIL PROFILE | | 1 | SAMPLE | | DYI | NAMIC BL | CONE I | PENEIR OT FRATION | TEST | | LIQUID (| IMIT . | | - WL | | |
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| 0'6" | TOPSOIL CLAY, reddish brn. | 732 | | | | | | | | 7 | | and the second s | | Production of the Control of the Con | | | |
| | sandy clay | | 1 | SS | 9 | | | Ì | | | | | | | | | |
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| <u> </u> | clayey sand | | :- | + | " | and the same of th | 1 | +; | | | | - | | | | | |
| | Some pockets of | | 5 | SS | 55 | - | - | | T | - | >، | | | 0 | | | |
| 2.77.0 | grey and black sil | t | 1- | | - | | | | | | | | | | | | |
| 15'0 | SILT, brown fine | 111 | 6 | SS | 32 | | | | | | | | | | 6 | | |
| | sandy silt with some fine sand | | | | 1 | | ļ | | | | | | | 1 | | | |
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| 2616 | DENSE | | 8 | SS | 36 | | f: | 1 | 1 | | | (A) (A) | ासन्ति । । | ,3 | | | |
| | CLAY, brown silty | V | 7- | - | - | | | 11.000000 | | | | | | 18. | 7 | | |
| 3 T. J. A. | Clay, | | | | _ | | | | · | | | | / | 1 | | | |
| | V. STIFF | - M. | 1- | | | - | | | | | _ | - | | | - | | |
| 31-6 | | / | 1 9 | SS | 66 | | | | | | | 0 | | | | | |
| , | Hole terminated at | | | 1 | | | | | | | | | | | | | |
| | 31'6" | | - | | 4 | | | | | | | | | | | | |
| | | | - | _ | - | | | | | | | | | | | | |
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| 1 | | | | | | | | Parameter (Parameter) | | | | | | | | | |
| | · | | - | _ | 4 | | | - | | + | | + | | + | - | | |
| - 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | | | 1 | 1 | 1 | 1. 1 | | |

Project No: SM 041546-G

Log of Borehole No. 1

Project: Watermain Replacement

Client: Sutton & Associates

Borehole Location: See Drawing No. 1

Location: Main Street West, Hamilton

Project Manager: Ian Shaw, B. Eng., EIT



| | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|---|---|-----------|------|--------|-------------|--------------|--------------|----------|------------------|
| Depth Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content |
| oft m | Ground Surface | 0.00 | | | | | | | |
| 2- | Asphaltic Concrete Approximately 40 millimetres Granular Base Approximately 200 millimetres | -0.24 | | | | | | | |
| | Sand and Gravel Fill Brown, medium to coarse grained, compact | -1.00 | SS | 1 | 22 | | | | |
| | Silty Sand/Sandy Silt Brown, layered/stratified, loose | | SS | 2 | 9 | | | | |
| 2 8- | End of Borehole | -2.30 | ss | 3 | 7 | | | | |
| 10-1 12- 14- 14- 16- 18- | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. 3. Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |

Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Phone: (905) 318-7440 Fax: (905) 318-7455 Drill Date: Feb 11, 2004

e-mail: info@soil-mat.on.ca Hole Size: 100mm

Sheet: 1 of 1

Datum: Ground Surface Checked by: IS

Project No: SM 041546-G

Log of Borehole No. 4

Location: Main Street West, Hamilton

Project: Watermain Replacement

Borehole Location: See Drawing No. 1



| | Approximately 50 millimetres Silty Sand and Gravel Fill Brown, medium to coarse grained, compact Silty Sand/Sandy Silt Brown, layered/stratified, occasional layers of medium sand, compact to loc End of Borehole NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 medium. 2. No free groundwater present at the completion of drilling. Borehole backfille with auger cuttings. | | | | | 0.4 | BAD! F | | | | | · · · · · · · · · · · · · · · · · · · |
|--|--|---|-----------|------|---|-------------|--------------|--------------|----------|---|--------------|--|
| Depth | | | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | 1 | dard Penetra | ation Te |
| oft m | | | 0.00 | | | | | | | | | |
| 2= | | Approximately 50 millimetres Silty Sand and Gravel Fill Brown, medium to coarse grained, | -0.30 | | | | | | | | | |
| - | | Silty Sand/Sandy Silt Brown, layered/stratified, occasional | / | SS | 1 | 12 | | | | | 1 | *************************************** |
| | | layers of medium sand, compact to loose | | ss | 2 | 17 | | | | | | |
| 1 2 | | | -2.30 | AS | 3 | | | | | | | |
| 3 - - - -) - - - - - - | | NOTES: 1. Borehole advanced using solid stem | | | | | | | | | | |
| + | | completion of drilling. Borehole backfilled | | | | | | | | | | |
| 1 -4 | | Soil samples will be discarded after thre months unless otherwise directed by the client. | ее | | | | | | | | | |
| ; ; - - - | | | | | THE THE THE THE THE THE THE THE THE THE | | | | | | | Western State of the State of t |
| 3-1 | | | | | | | | | | | | |

Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Phone: (905) 318-7440 Fax: (905) 318-7455 Drill Date: Feb 11, 2004

e-mail: info@soil-mat.on.ca Hole Size: 100mm

Datum: Ground Surface

Checked by: IS Sheet: 1 of 1

Project No: SM 041546-G

Log of Borehole No. 5

Project: Watermain Replacement

Borehole Location: See Drawing No. 1

Client: Sutton & Associates

Location: Main Street West, Hamilton

Project Manager: Ian Shaw, B. Eng., EIT



| | | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|---------|--------|--|-----------|------|--------|-------------|--------------|--------------|----------|------------------|
| Depth | Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content |
| oft m | | Ground Surface | 0.00 | | | | | | | |
| 2- | | Topsoil Approximately 50 millimetres Silty Sand Fill Brown, traces of medium to coarse | | | | | | | | |
| - | | gravel, compact | -1.10 | SS | 1 | 17 | | | | |
| 4- | | Silty Sand/Sandy Silt Brown, layered/stratified, occasional | | | | | | | | |
| | | layers of medium sand, compact to loose | | SS | 2 | 12 | | | | |
| 6-2 | | | -2.30 | ss | 3 | 6 | | | | |
| 8-L | | End of Borehole NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. 3. Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |

Drill Date: Feb 11, 2004

Drill Method: Solid Stem Auger 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

Checked by: IS Sheet: 1 of 1

Datum: Ground Surface

Hole Size: 100mm

Project No: SM 041546-G

Log of Borehole No. 7

Project: Watermain Replacement

Location: Main Street West, Hamilton

Borehole Location: See Drawing No. 1

Client: Sutton & Associates

Project Manager: lan Shaw, B. Eng., EIT



| | *************************************** | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|--|---|--|-----------|------|--------|-------------|--------------|--------------|----------|--|
| Depth | Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content W% 10 20 30 40 Standard Penetration Test blows/300mm 20 40 60 80 |
| oft m | 1212 | Ground Surface | 0.00 | | | | | | | |
| 2- | | Asphaltic Concrete Approximately 40 millimetres Granular Base Approximately 300 millimetres | -0.35 | | | | | | | |
| 4- | | Silty Sand and Gravel Fill Brown, medium to coarse grained, compact | -1.10 | SS | 1 | 21 | | | | |
| 6- | | Silty Sand/Sandy Silt Brown, layered/stratified, occasional layers of medium sand, compact to loose | | SS | 2 | 10 | | | | |
| -2 | | | -2.30 | SS | 3 | 11 | | | | |
| 8- - - 10- - 12- - - - 4 14- - - 16- - - - - - - - - - - - - - - - | | End of Borehole NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. 3. Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |

Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Drill Date: Feb 11, 2004 Phone: (905) 318-7440 Fax: (905) 318-7455 e-mail: info@soil-mat.on.ca

Hole Size: 100mm

Checked by: IS

Datum: Ground Surface

Sheet: 1 of 1

Project No: SM 041546-G

Log of Borehole No. 8

Project: Watermain Replacement

Client: Sutton & Associates

Borehole Location: See Drawing No. 1

Location: Main Street West, Hamilton

Project Manager: lan Shaw, B. Eng., EIT



| | | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|------------------|--------|---|-----------|------|--------|-------------|--------------|--------------|----------|---|
| Depth | Symbol | Description | Elevation | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content w% 10 20 30 40 Standard Penetration Test blows/300mm 20 40 60 80 |
| oft m | | Ground Surface | 0.00 | | | | | | | |
| 2- | | Asphaltic Concrete Approximately 40 millimetres Sand and Gravel Fill Brown, medium to coarse grained, | | | | | | | | |
| - - - - | | compact | -1.10 | ss | 1 | 17 | | | | |
| 4- | | Silty Sand/Sandy Silt Brown, layered/stratified, occasional layers of medium sand, compact to loose | | ss | 2 | 16 | | | | |
| 62 | | | -2.30 | ss | 3 | 9 | | | | 4 |
| 8- | | End of Borehole NOTES: 1. Borehole advanced using solid stem | -2.00 | | | | | | | |
| 10- | | continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the | | | | | | | | |
| 12- | | completion of drilling. Borehole backfilled with auger cuttings. | | | | | | | | |
| 14- | | Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |
| 16- | | | | | | | | | | |
| 18- | | | | | | | | | | |
| | | | | | | | | | | |

Drill Date: Feb 11, 2004

Hole Size: 100mm

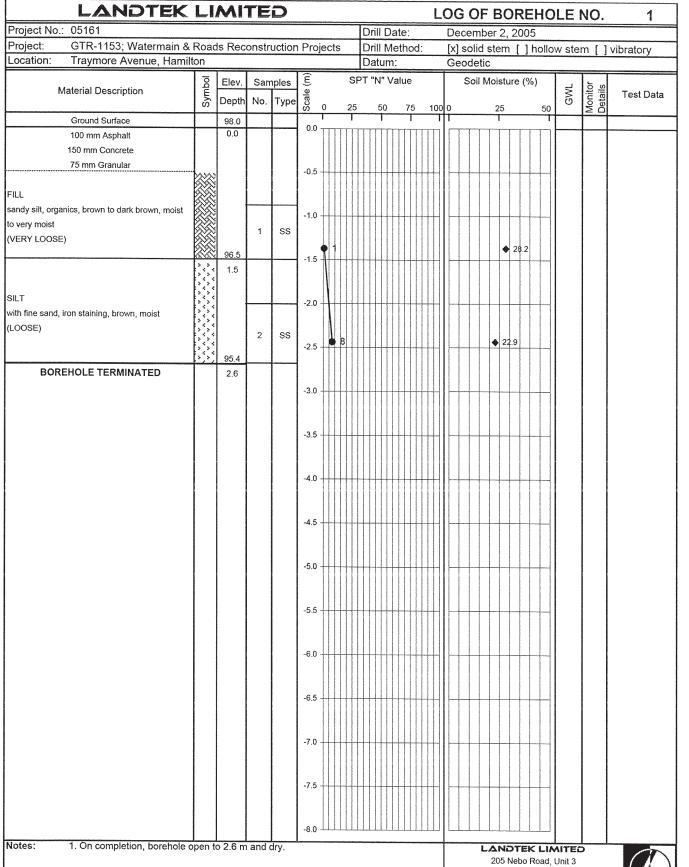
Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Phone: (905) 318-7440 Fax: (905) 318-7455

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

Datum: Ground Surface

Checked by: IS

Sheet: 1 of 1



PP = pocket penetrometer TCV = total combustible vapour BRD = bulk relative density

PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity





| LANDTEK | | | | | | | | | | | | | | | 00 | 3 (|)F | В | OF | RE | Η(|][| LE | NO. | 2 |
|--|--|---|-------|--------|-----------|---------------------------|-------------------|-------------|--------------|---|-------------|----------|---|--------------|--|----------|------------|---------------|---|----------------|----------------|--------|--------|--------------------|-----------|
| Project No.: 05161 | | | | | | | | Т | Dril | II C | ate | e: | | | | | | | 2, 2 | | | | | | |
| Project: GTR-1153; Watermain & | | ls Rec | onstr | uction | Proj | ect | 3 | T | Dril | I N | 1et | hoo | d: | | | | | | - | | | OV | v ste | m [] | vibratory |
| Location: Traymore Avenue, Hamilton | ton | | | | | | | | Dat | tun | n: | | | | | eod | | | | | | | | | <u> </u> |
| | 100 | Elev. | San | ples | Scale (m) | | (| SP | T "N | ۷" ۱ | /alı | ue | | | Π | Sc | A lic | lois | ture | e (% | o) | T | | <u>ا</u> ا | |
| Material Description | Symbol | Depth | | Туре | ale | | | | | | | | | | | | | | | | | ۱ | GWL | Monitor Details | Test Data |
| 0 10 6 | 0) | | 110. | 1,700 | Š | 0 | 2 | 25 1 | | 50 | | 75 | | 100 | 0 | | | 2 | 5 | | 50 | 1 | | ≱ది | |
| Ground Surface 50 mm Asphalt | \vdash | 98.9 0.0 | | | 0.0 | · 111 | П | TT | П | ТТ | П | • | | m | ŀ | ГТ | | | | П | | ;} | | | |
| 100 mm Concrete | | | | | | | | | | | | | | | | | | | *************************************** | | | | | | |
| 75 mm Granular | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1:2: | | | | -0.5 | Ш | \parallel | \parallel | H | \parallel | \parallel | | | П | | | \dagger | Ħ | | | 1 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | -1.0 | Ш | Ш | Ш | | Ш | | | | | | | | | | | | | | | |
| | | | 1 | ss | 1.0 | | | | | | | | | | | | | | | | | | | | |
| SILT | | | | | | | | | | | | | | | | | | | 24. | | | | | | |
| with traces of fine sand and clay, fractured, iron | | | | | -1.5 | \mathbb{H} | \mathbb{H} | H | Н | \mathbb{H} | + | \vdash | Ш | \mathbb{H} | ll | | - | H | 1 | \parallel | | | | | |
| stains, brown, moist (VERY LOOSE TO COMPACT) | | | | | | ۱ | | | | | | | | | | | | | | | | | | | |
| (VERT LOUSE TO CONIPACT) | | | | | | | | | | *************************************** | - | | | | | | | | | | | | | | |
| | | | | | -2.0 | \parallel | \parallel | \parallel | | \parallel | | | Н | \dagger | ╟ | Н | + | | - | H | + | | | | |
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| | | | 2 | SS | -2.5 | | • 1 | 15 | Ш | | | | | Ш | | | | • | 22.6 | | | | | | |
| | े्र्र | 96.3 | | | | | | | | | | - | | | | | | | | | | | | | |
| BOREHOLE TERMINATED | | 2.6 | | | | | | | | - | | | | | | | | | - | | | | | | |
| | | | | | -3.0 | Ш | \parallel | H | Н | + | ╬ | | \mathbb{H} | \parallel | l - | \vdash | + | | | | - | | | | |
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| | | | | | -3.5 | $\dagger \dagger \dagger$ | $\dagger \dagger$ | H | | \parallel | Ħ | | $\parallel \parallel$ | \parallel | 厂 | H | \dagger | H | + | Н | + | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | -4.0 | Ш | Ш | Ш | | | Ц | | Ш | Ш | | | | | | | | | | | |
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| | | | | | -4.5 | ₩ | - | ╫ | | + | H | | Н | 4 | ⊩ | H | + | $\frac{1}{1}$ | - | \mathbb{H} | - | | | | |
| | | | | | | | | | | | | | | | | | | | | | Anna Maria | | | | |
| | | | | | | | | | | | | | | Ш | | | | | | | - | | | | |
| | | | | | -5.0 | $\dagger \dagger \dagger$ | | | | $\dagger \dagger$ | \parallel | | | H | | | $^{+}$ | | + | \forall | | | | | |
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| | | | | | -6.5 | | П | | | $\dagger \dagger$ | | | | H | | | T | | | | 1 | | | | |
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| | | | | | 0.0 | | | | | | | | *************************************** | | and the same of th | | PRODUCTION | | | - | | | | | |
| Notes: 1. On completion, borehole open to 2.6 m and dry. | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| . On completion, potende o | 1. On completion, potential open to 2.6 m and ary. | | | | | | | | | | | | | | L | | | | | | ITEC Init 3 |) | | | |
| | | | · | | | | | | | | _ | | | | | Ha | milt | | | | | | a, L8V | V 2E1 | |
| PP = pocket penetrometer TCV = total combustible | e vapo | penetrometer TCV = total combustible vapour BRD = bulk relative density | | | | | | | | | | | | | F | | | | | | | | | 83-843 | 3 |

PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity



www.landteklimited.com

HARUCAL The Regional Amicipality of Flower Hamilton-Wentworth
Proposed Storm Sewers
Haddon Avenue, Hamilton, Ontario BORNE RII-B Warnock Hersey CONTRACT NO. L03784-50319-C7-424600 SORING DATE 91.02.18 BORING LOG DATUM Geodetic (Supplied) CASHG None BS - SHAT SPOON BE - THIN WALLES OFEN (SMELEY) PS - PRITCH SAMPLE WE - WASH SAMPLE BC - BOCK COSE CONDITION PRIMEARNY - sm/s SMECT SHEAR THANAL, QUICK SAMPLES STRATIGRAPHY PRILD VAME

DISPLACE

BEHOULDED A BEWORDED

A PLYCL DESCRIPTION 2 Road Surface Asphalt 75mm 98 2 Asphalt 75mm 0.30 Concrete 225mm Loose to Compact Brown Sandy Silt SS1 56 Traces of Clay, Gravel, Organics Occasional Layer Brown Silty Sand SS2 100 4 SS3 100 12 SS4 83 21 SS5 100 17 SS6 B3 17 END OF BOREHOLE Borehole Dry at Completion



Log of Borehole _____1

| Auger Sample | ፟፟፟፟፟ | Natural Moisture | X | Project Proposed Storm Sewers | . ~ |
|-------------------|---------|--|-------------------|--|----------------------|
| SPT (N) Value | 00 💹 | Plastic and Liquid Limit | | Project Proposed Storm Sewers | Dwg. No/ |
| Dynamic Cone Test | ******* | Undrained Triexial at | · | Region of Hamilton -Wentworth Main | St. at Dow St |
| Shelby Tube | | Overburden Pressure % Strein at Failure | 15 ⊕ 5 | Hamilton, Ontario. | Project No. H01760-G |
| Field Vane Test | + 8 | Penetromater | | Hote location and deturn one drawing No. 1 | Froject No |

| G | | Soll Description | ELEV. | OWA | N Value Natural Moisture Content | Natural Unit |
|----|--------|--|--------|-----|----------------------------------|-----------------|
| W | 0 | | m. | Ť | Shear Strength MPe % Dry Weight | Weight kN/m² |
| F | 27 | 250 am asphalt over | 99.55 | ٥ | 0.10 8.20 10 20 so | IDM: |
| | 11/1/2 | 200 mm granular material over FILL: claymy milt, brown, mottled | | | | |
| | 13/11 | ight and dark brown in first 0.75 m/- | | | | |
| | 14/1 | fine to medium gravel, occasional clay seams, below 1.5 m., moist, soft | | | | |
| | 12 | and angust paids (in st.) soise! sole | | | | |
| | 44 | , honor | | 1 | | |
| | 2/6 | | | | | |
| | 11/2 | | | | | |
| | 112 | | | | | |
| | 2/2 | | | ١. | <u> </u> | |
| | 1 | | | Ž | | |
| | TÜÜ | CLAYEY SILT: brown, occasional clay | 7 97,3 | | | |
| | MAS | seems, milty fine mand leyers below | | ١. | | |
| 1 | | cohesive, trace fine gravel below | | • | | |
| | | 4.6 m., so ist becoming wet below 3.8m | | ١, | | |
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| 1 | | YERMINATED | 0 1100 | | | |
| | | NOTES:- | | | | .] |
| | | (1) Borshole advanced uncased by | | • | | |
| - | | solid stam augers to termination at | | Н | | 1 |
| | | 5.5 m depth, on January 15,1990, by | | П | | |
| | | Ph Water to out months | | Ш | | |
| | | (2) Weter Level Record :- Time Depth to | | | | 1 |
| ı | | Elapsed W.L.,m | | 7 | | |
| | | 10 days 4.7 | | | | |
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| | | (3) Standpipe installed. | | | | l |
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NOTE: BOREHOLE DATA REQUIRES INTERPRÉTATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole ____2



| uger Sample PT #6 Value | ⊠ 00 ≡ | Natural Moleture Pleatic and Liquid Limit | X | Project Proposed Storm Sewers | Dwg. No., | 8 |
|----------------------------------|------------------|--|------|---|-----------|-------------|
| P1 (ng Value Anemic Cone Test | U | Undrained Trispiel at | 100 | Region of Hamilton -Wentworth, Main | St. at | Newton Ave. |
| helby Tube | • • • | Overburden Pressure 16 Strain at Failure | i5∰s | Hamilton, Ontario. | | H01760-G |
| ield: Varie Tool | + 8 | Penetrometer | A | Hole location and datum see drawing No. 1 | | |

| | | | | 1 | | ***** | | Y | | | |
|---|--------|---|--------|----|--|---|---|--------------------|------------|---|-----------------|
| G | S | Maril Maria and Article | | 6 | | N V | alus | Natural Malature C | Ontent | | Makural Unit |
| W | M B | Soil Description | ELEV. | F | Shear Stren | 40 | | Attentions Link | 1 0 | ۱ | Weight |
| L | O L | , | 99.37 | ľ. | Street Street | 0.10 | 0.20 | 10 28 | ` 🗃 📗 | | khi/m² |
| | 4/6 | 150 mm saphelt over 200 mm concrete over | 50,57 | I. | | | | | | | |
| | 6/6 | 150 mm granular material | | L | | 11811 | | | | | |
| | 1/6 | -Fill : clayey slit, graylah brown to- 0.75 m then mottled reddish brown | | I | | | | | | Ц | |
| | FIE | and black, some fine gravel, allt | | | | | | | | × | |
| | 111 | seems, clay seems, conselve, moist. | | ١, | | | | | | | |
| | 010 | | | Γ | | | | | | Ц | |
| 1 | 010 | | | ı | | | | X . | | Х | |
| | russ | CLAYEY SILT: brown, trace fine to | ~ 97.9 | l | | | | | | | |
| 1 | | medium gravel, increased clay between | | l | | #### | *** **** | | | | |
| | The f | 3.0 to 3.8 m., layered silt and clay moist, becoming wet below 3.8 m., | | l, | | 1111 | | | | | |
| | titi | fire becoming soft below 3.8 s. | | ľ | | #### | | | | × | |
| | 1414 | | | l | | 1111 1 | *** ***** | | | | |
| | un | | | L | | #### | | | | | |
| | HH | | | | | | | | | H | |
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| | 141 | | | l | | ### | | 812881818 | | Ц | |
| | THE S | · · · · · · · · · · · · · · · · · · · | | l | | | | | | × | |
| | | | | l | Π | #### | | | | | |
| | un | | | 5 | | $\mathbf{H}\mathbf{H}$ | | | | | |
| 1 | 13th | | | l | | $\Pi\Pi\Pi$ | | | | | |
| I | 171 | | | l | H | 11111 | | | | ı | |
| | 1111 | | Ì | ı | | | | | | ١ | |
| | 1927 | | | ı | | | | | | | |
| | 1111 | | 93.27 | | | | | | | × | |
| | | VERMINATED/ | 33,27 | ı | | $\mathbf{H}\mathbf{H}$ | | | | ٦ | |
| | | | | | | | | | | 1 | |
| | | NOTES:- (1) Borehole advanced uncased by | | 1 | | | | | | 1 | |
| | | solid stem augers to termination at | | | | | | | | 1 | |
| | | -6.1 m depth, on Jenuary 15,1980, by | | 7 | | | | | | 1 | |
| | | Drilltech | | | | | | | | | |
| | | | | | | | | | | - | |
| | | | | | | ### ## | | | | | |
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| | | | | 1 | | ++++ | | | ##### | 1 | |
| | | | | | HHHH | 1111 | | | #### | | |
| | | · | | 1 | HHHH | | | | #### | 1 | |
| | | | | 1 | | \mathbf{H} | | | #### | | |
| | | | | L | | HHH | | | #### | : | |
| | | · · · · · · · · · · · · · · · · · · · | | * | | | | | | | |
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| L | | | | L | | | | | | ł | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS



Log of Borehole ____3

| Auger Sample | \boxtimes | Natural Moisture | X | Proposed Storm Sewers | |
|-------------------|---|--|-------------------|--|----------------------|
| SPT (N) Value | 002 | Pleatic and Liquid Limit | O | 11000 | Dwg. No. 9 |
| Dynamic Cone Test | *************************************** | Undrained Triavial at | ġ " | Region of Hamilton - Wentworth, Main | St. at Paisley Ave. |
| Shelby Tube | e e M | Overburden Praesure % Strain at Failure | 15 ⊕ 5 | | |
| Field Vane Test | + 8 | Penetrometer | Ā | Hole Investors and deturn ass demains at a | Project No. H01760-G |

| s Š | | | D | | NY | alue | | Natural Molesure Contant | П | Natu |
|-------|--|--------|----|---|---|-------------------|--|---|-----------|------|
| V | Soil Description | ELEV. | P | 20 | 40 | 80 | 80 | and | | Uni |
| ļ | | m | Н | Shear Strengt | h n 10 | | 0.20 MPs | Atterberg Limits % Dry Weight | | Wei |
| 1-7 | 150 mm emphalt over | 99.32 | 1. | | 0.10 | | 0.20 | 10 26 50 | | KN |
| 6 A | 150 mm concrete over | 1 | - | | ++++ | HH | | | | |
| 126 | FILL : clayey silt, mottled reddish | | 1 | | + | $\Pi\Pi$ | | | П. | |
| | brown and black, fine to medium | | 1 | | 1111 | <u> </u> | | | | |
| 120 | gravel, clay seame, occasional silt | | | | | ++++ | | !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! | \forall | |
| | leyers below 0.75 m., motet. | | | | Π | \Box | | | 2 | |
| 100 | - - | l | ١, | | | шш | ! | | | |
| 01/ | | | Ι΄ | | ╅╉╁┼ | ++++ | | | | |
| 5/2 | | | | | 1111 | $\Pi\Pi$ | | | \Box | |
| 144 | 4 | ~ 97.8 | | | | | ╅┼┼╂┼┼╂┼ | | N | |
| 1 M | CLAYEY Silli raddish brown becoming brown below 3.0 m., layered silt and | | | ┠╂┼╅┽╉╂┼ | ++++ | HH | | ************* | | |
| HUI | clay, fine to medium gravel, moist, | | | | 1111 | | | | | |
| | firm, becoming stiff with - | | ١. | | 1111 | ╅╅╋ | ╃╉╃╂┼┼┼╂┩ | | | |
| 11/11 | | | 1. | | $\Pi\Pi$ | HH | | | | |
| 1 | depth | | 1 | | | ++++ | } | ╏ ┼┼┼┼╃┼┼┼┼┼┼┼ | X | |
| | <u> </u> | | | | ╫╫┼ | ┼┼╂┼ | | | | |
| 434 | ¹ | | 1 | | $\Pi\Pi$ | 1111 | | | | |
| MIN | . | | | | 1111 | | | | -1 | |
| W | } | | 1. | ┠╁╅╁╂╀ | +++ | +++ | | | XΙ | |
| | 1 | | 1 | | ### | !!! ! | | | 7 | |
| | .1 | | L | | 1111 | ╂╂╂┼ | ╏╏ ┩┩╃┼┼┼ | | | |
| IW | 1 | | ı | ┠╅╅╂╂╂╂┼ | HHH | Π | | | 1 | |
| MA | 4 | | ı | | 1111 | | | | | |
| | 1 | | 1 | | 1111 | ╅╅┪ | | | ΧĪ | |
| 1 | <u></u> | | L | | $\Pi\Pi$ | | | | 7 | |
| 4334 | 7 | | 14 | | | | | | 1 | |
| 24 | 1 | | | | ╅╉╃ | ╅╅╂╅ | | | | |
| 101 | 1 | | 1 | | $\Pi\Pi$ | Ш | | | | |
| | | | | | | | | | XI. | |
| 1 | 4 | | | ┋ | HHH | HH | | | 1 | |
| m | 1_ | | | | 1111 | | | | 1 | |
| ИН | | | 5 | | ╅╅╁ | ┋ | | | 1 | |
| am | 1 | | П | ++++++++++++++++++++++++++++++++++++ | $\Pi\Pi$ | HH | | | | |
| HU1 | | | П | | | | | | | |
| 1111 | . | | П | | ╅╉╅╅ | ╿ ╂╂┾╸ | | | | |
| 101 | | | | | $\Pi\Pi$ | | | | | |
| 144 | <u>{</u> | | П | | 1111 | | | | | |
| | | | • | | HHH | | | | ব | |
| UNI |] | | П | | $\Pi\Pi$ | | | | 7 | |
| | 1 | | П | | | | | | | |
| H(Y) | _ | | П | | ╫╫┼ | | | | 1 | |
| | | | Н | | $\Pi\Pi$ | | | | | |
| 10) | | | П | | | | | | | |
| THE | | | 7 | | | HHH | | | | |
| 11/2 | | ~ 02 n | | ++++ | $\Pi\Pi$ | 1111 | | | 1 | |
| P 4 | GRAVEL : brown, silty, some send, | ~ 92.0 |) | | | | <u> </u> | | 1 | |
| 1111 | | 91,70 | l | | | 444 | ++++ | | V | |
| | VERMINATED. | 01170 | | ++++++++++++++++++++++++++++++++++++ | | $\Pi\Pi$ | | | 1 | |
| | NOTES:- | | | 111111 | | | | | 1 | |
| | (1) Borehole advanced uncased by | | 4 | <u> </u> | ╁╉╂╂ | +++ | +++++ | | 1 | |
| | POTTO Prob aucore to termination at 1 | | | ++++++ | HH | 444 | 7111111 | | 1 | |
| | 7.5 m depth, on Jenuary 15,1990, by Drilltach | | l | | | 1111 | <u> </u> | ++++++++++ | 1 | |
| | | | ıł | <u>++++</u> | | +++ | ++++++ | | 1 | |
| | (2) Weter Level Record :- | | l | ++++++ | | 777 | 1111111 | | 1 | |
| | Time Depth to | | l | | шЫ | 1111 | | | 1 | |
| | Elepsed W.L., m | - 1 | ۱ŧ | 11111 | | +++ | +++++++ | | 1 | |
| | 14 days 7.18 | | | ++++++++++++++++++++++++++++++++++++ | HH | + | | | 1 | |
| | 14 days 7.18 | | l | | | ### | | +++++++++++ | 1 | |
| | (3) Cheelcal Analysis of ground | 1 | l | ++++ | | 1111 | 1111111 | | 1 | |
| | Water sample from borehols: | | | | | ### | <u> </u> | | 1 | |
| | pH ≈ 7.82 | | l | ****** | | 11 17 | +++++ | | | |
| | -Sulphate,504,content= 105.26 ag/1 - | | 10 | ++++++++++++++++++++++++++++++++++++ | 444 | 1111 | 1111111 | | 1 | |
| | | | | 1111111 | | 111 | <u> </u> | | 1 | |
| | (4) Standpipe installed. | ı | ŀ | ╽ ┼┼┼┼┼┼┼ | HHH | $H\Pi$ | ++++++ | | | |
| | <u> </u> | 1 | | | 1111 | 1111 | ++++++ | | I | |

NOTIE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole ____



| Auger Sample | ⊠ | Natural Moisture | X | Desirat Banasand Chann Carray | 10 |
|-------------------|-------------------------|--|--------|--|-----------------------|
| SPT (N) Value | 002 | Plastic and Liquid Limit | | Project Proposed Storm Sewers | Dwg. No 10 |
| Dynamic Cone Test | terrolitate/thetitation | Undrained Triaxial at | 15 🕀 5 | Region of Hamilton -Wentworth, Main | St. at Paisley Ave. |
| Shelby Tube | • • = | Overburden Pressure % Strain at Failure | 1900 | Hamilton, Ontario, | Project No. H01760-G |
| Field Vane Test | + 8 | Penetrometer | A | Hole location and deturn see drawing No. 1 | Project No. 1101702-B |

| $\overline{}$ | | | | _ | | | · · · · · · · · · · · · · · · · · · · | |
|---------------|---------|--|---------------|----|----------------|--|---------------------------------------|-----------------|
| G | \$ Y | 0.78 | | PE | NV | ph/so | Natural Mainture Content | Hetural Unit |
| W | M | Soil Description | ELEV. | P | 20 40 | 60 60 | Attorbusy Limits | Wangite |
| L | 0 | • | | H | Sheer Strength | MPa 6.20 | 10 20 30 | HP-Mary 1 |
| | | 150 ms sephalt over | 99.07 | ľ | | | | |
| | 7/7 | 250 mm concrete over FILL : clayey silt/ silty clay, | | ı | | | | |
| | | reddien brown becoming brown below | | l | | | | ۱ ا |
| | 10 10 | 1.5 m., fine to medium gravel, olay layers, black clay seeme in first | | l | | | | d |
| | 6.6 | 0.75 m., moist, firm. | | ١. | | | | |
| | 122 | | ~ 96.8 | ľ | | | | 2 |
| | 233 | CLAYEY SILT: brown, layered silt and play, moist, soft becoming fire below | 3010 | l | | | | |
| | 188 | -3.0 m. | | ۱ | | | | 3 |
| | thir | | | ١ | | | | 1. |
| | | | | l. | | | | 4 |
| | 124 | | | Γ | | | | |
| | ann | • | | l | | | | ╡ |
| | 1412 | | | l | | | | 1 1 |
| | LIAK. | | | ı | | | | |
| | t1978 | mediturino : senanti di managina di managi | | ١. | | | |] |
| | HH | | ° 92.7 | 1 | | | | 9 |
| | | GRAYEL I brown, silty, some sand, | 32.7 | 1 | | | | <i>l</i> 1 |
| | 7 4 | medium to course grained, solet. | | ı | | | | |
| | :: | | nu # | | | | | V 1 |
| | | TENHINATED/ | 91.45 | ١. | | | | 1 |
| | | | | ľ | | | | |
| | | NOTES:- | | ŀ | | | | |
| | | -(1) Borshols advanced uncased by solid stee sugers to termination at | | | | | | |
| | | 7.5 a depth, on January 15,1890, by | | | | | | |
| | | Drilltech | | ١, | | | | |
| | | | | | | | | 1 1 |
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NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.



Log of Borehole ____5

| Auger Sample SPT (N) Value | ⊠ © 000 | Natural Moisture Plastic and Liquid Limit | X | Project Proposed Storm Severs | Dwg. No11 |
|--------------------------------|-------------------|--|--------------|--|----------------------|
| Dynamic Cone Test | - | Undrained Triaxial at Overburden Pressure | <u>15∯</u> 5 | Region of Hamilton -Wentworth, Main | |
| Shelby Tube Field Vane Test | • • W + 8 | % Strain at Failure Penetrometer | IQ ▲ | Hamilton, Ontario. Hole location and datum see drawing No. 1 | Project No. H01760-G |

| | | | | | | | | | | ************* | |
|-------|--|-------------|-----|-----------------------|---|---------|------------------------|------------------|---|---------------|----------------|
| GŽ | Soli Description | | € | E | | (Value | | | Netural Moleture Content and | П | Natural |
| N ë | SON Description | ELEV. | P | - 1 | 20 40 | | 60 | 80 | Atterberg Limits | П | Unit Weight |
| ٠ ٢ | | | н | H Sh | eer Strength 0.10 | 0 | | 8.20 MPa | % Dry Weight 10 20 20 | П | kN/m² |
| 6/ | 125 ms saphelt over | 99.20 | ١ | | | Ш | | | | ╽┝ | |
| 120 | 125 mm concrete over 25 mm granular over | l . | | Ш | | | | | | Н | |
| 11 | FILL : elity clay, grey, fine to | | | H | ++++++ | | \mathbf{H} | | | П | |
| Tx/ | medium graval, moist. | 1 | | \mathbf{H} | | | 111 | | | П | |
| 17 | 3 | | 1 | ## | | | ## | | | | |
| 6/1 | ~ <u> </u> | | Ι. | ,Ш | | +++ | 111 | | | | |
| 414 | 성 | | T, | ' | | | \blacksquare | | | | |
| 671 | S) | l | 1 | Π | | | ## | | | | |
| 12 | <u> </u> | l | | ## | | | ш | | | X | |
| 100 | X | | ı | HH | ╎╎╏╎ ╃╃╃ | | HHH | | | П | |
| 145 | 3 | | | H | | + | +++ | | | | |
| dir. | CLAYEY SILT: light brown becoming | 97.2 | 1 2 | 2 | | ## | *** | | | | |
| 130 | Vi gravish brown between 5.6 to K.A. | | 1 | 1 | | 111 | | | | | |
| 114 | solet becoming wet with depthy firm | | | <u>H</u> | ┋┋┋┋ | +++ | +++ | +++++ | | | |
| IM | Tto soft - | | | \mathbf{H} | | \mp | | | | | |
| 1XX | N | | | H | | ## | ### | ##### | | | |
| MI | 3 | | 1 | # | | Ш | | 111111 | | V | |
| LIKE | <u> </u> | | 3 | ' | | +17 | HH | ++++++ | | Δ | • |
| MY | N | | | H | | ## | Ш | | | | |
| W | t <u>L</u> | ١ ، | | # | | ## | ### | ##### | | | |
| 144 | | | | # | | ## | | | | 1 | |
| Kil. | A l | | | | ╏┆╏╏ ┪┪┩┩╂╏ | +H+ | HH | | | | |
| | 1 | | | \mathbf{H} | | 111 | Ш | | | 1 | |
| | | | 11 | ' | | ## | ### | | | ı | |
| 121 | И | | | # | | 111 | | | | 4 | |
| | <u></u> | | П | Ш | | +++ | HH | | | XI. | |
| | | | | H | | Π | $\Pi\Pi$ | | | 4 | |
| 144 | A | | | \mathbf{H} | | ## | ### | | | | |
| 144 | ├ | | 5 | 井 | | ** | | ***** | | 1 | |
| | 1 | | П | Ш | | 111 | | | | 1 | |
| YK! | | | | HH | | Π | $\Pi\Pi$ | | | | |
| | ├ | | П | \mathbf{H} | | 111 | ## | | | | |
| 4114 | | | П | | | 111 | ш | | | 1 | |
| | | | П | 111 | | | HHH | +++++ | | 7 | |
| | · · · · · · | | 4 | HH | ┙ ┪┪┪┩┩┩ | +++ | HH | | | XI . | |
| 144 | · | | П | HH | | Π | Ш | | | 7 | |
| 7 · A | SAND - coarse with fine - | ~ 92.8 | П | \mathbf{H} | | ## | 111 | ****** | | | |
| | | | Н | $\parallel \parallel$ | | ## | H## | | | ı | |
| 7 · A | gravel and silt, moist, | | П | Ш | <u> </u> | Ш | | ╂╂┼┼┼╂ | | | |
| 1. | dense | | ١.١ | | ╫╫╫┪╂╫ | HH | HH | | | | |
| | | | ľ | HH | | Π | \blacksquare | | | | |
| 9 | | | | HH | | ## | ## | ;;;;; <u>;</u> ; | | 1 | |
| E (| <u> </u> | |]] | μц | | 11 | | <u> </u> | *************************************** | 1 | |
| | TERMINATED/ | 91.58 | l | Ш | | 111 | | | | Y | |
| | NOTES:- | | lł | Ш | <u> </u> | HT | HH | HHHH | | | |
| | (1) Borehole advenced uncount by | | H | H | ++++++ | H | HH | 111111 | | | |
| | 1 80 I Stok Bilders to termination of 1 | | | | | ### | ### | | | | |
| | / to a depth, on Jenuery 15, 1990, hu | | | ### | | ш | | ╂╅╅╂╂ | | | |
| | - Orilltech | | ΙŁ | Ш | <u> </u> | Ш | $\mathbf{H}\mathbf{f}$ | HHHH | | | |
| | (2) 50 | | l f | ШН | 1111111 | HH | 111 | HHHH | | 1 | |
| | (2)Standpipe installed. | | l F | HH | | HH | ## | | | | |
| | (3)Water Level Record: | | * | ### | ####### | ш | ## | | | | |
| | | | lŁ | Ш | | | +++ | | | | |
| | Standpipe pinched at 3.0 m, dry to 3.0 m. | | F | HH | | | 111 | | | | |
| | | | F | $\Pi\Pi$ | ++++++ | 坩坩 | ## | | | | |
| | | | | ### | ;; ;;;;; ; ; | ш | ## | | | 1 | |
| | - - | | w | Ш | | | 111 | | | | |
| | | | 7 | | | HH | 711 | | | | |
| | | | F | $\Pi\Pi$ | | 坩坩 | ## | | | 1 | |
| L | Assertance and the second seco | | | | | ┍╃╅┩ | +++ | | | I . | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE LISE BY OTHERS

Log of Borehole ___6



Auger Sample Auger Sample August Mointure X SPT (N) Value O O M Plastic and Liquid Limit Dynamic Cone Test Undrained Triaxiel at Overburden Pressure No Strain at Failure State Overburden Pressure No Strain at Failure Penetrometer No Strain at Failure No Strain

| į | S | A second | T T | To | T | b.t i | Ashan | | | | |
|--------|---------------------------|---|---------------|-------|---|---|---|---------------|---------------------------------|------------|-----------------|
| G W | M B | Soil Description | ELEV. | E | 20 | 40 | 74440 | to. | Notural Meisture Content and | | Natural Unit |
| ï | ō | | 60 | T. | Shear Str | enath | | MPa | Atterbary Limits | | Weight |
| _ | 111 | | 99.20 | | | 0.10 | | 8,20 | 10. 20 20 | | labé/m² |
| | 44 | 125 wm asphalt over 175 mm concrete over | | ı | | | | | | Ŧ | |
| | 11.6 | FILL ! Clayey silt, brown, clay | | ı | | | | | | H | 1 |
| ٠. | 116 | pockets and seams, cohesive, moist, | | | | | | | | #1 | |
| | FIE | Try an adity 4 | | | | | | | | #1 | |
| | die | · · | | ١, | | | | | | #1 | |
| | 010 | | | | | | | | | #11 | |
| | 610 | | | | | | | | | 夶 | į |
| | THU | SILTY CLAY/ CLAYEY SILT ! brown, | " 97.7 | | | | | | | Ш | İ |
| | 1111 | OCCABIONS Clay seems, silt lavers | | | | | | | | 扣 | |
| | 3314 | moist becoming wat below 3.0 m. | | ١. | | | \blacksquare | | | ΗI | |
| | 4111 | firm to stiff with depth | | 11 | | | | | | #1 | |
| - 1 | 411 | | | П | | | | | | ĦІ | |
| - 1 | un | | | П | | \blacksquare | | | | Ηl | |
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| | KUK | | | 11 | H#### | | #### | | | M | |
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| I | 1291 | - . | | l | | | | | | PAT | |
| ľ | W | | | l | | | | | | 44 | |
| ľ | सप्रध | | | lŀ | | | | | | 41 | |
| ł | HULL | _ | | ŀ | | | | ##### | | Н | |
| L | HH | 44 | | lE | | | #### | ##### | | 3 | |
| Ł | 4014 | | | lF | | | #### | ##### | | 3 | |
| I | 1881 | • | | lF | | | ##### | | | 7 | - |
| ľ | m | | | F | 11111 | | | | | H | |
| t | ma | - | | l a F | 11111 | | | | | M | |
| t | MA | | | | **** | | | | | 44 | |
| ŀ | IRK. | | | Ī | | | | | | 71 | |
| h | | SRAYEL ! brown, some send, medium | " 92.6 | ŀ | | | | | | 11 | |
| L | | grained, moist, dense. | | ŀ | | | | | | 1 | |
| ŀ | `. * `. - | | | ,t | | | | | | 4 | |
| ŀ, | | | | t | ##### | | | | | 11 | |
| ľ | • : 1 | | I | þ | | | ++++ | | | 11 | |
| Ľ | | | 91.58 | F | | | | | | M. | |
| l | | VERHI NATED/ | 31,36 | ļ | | | | | | H | |
| l | - | NOTES:- | | , : | | | | | | 11 | |
| ı | | (1) Borshole advanced uncesed by | | Ŀ | | | | | | 11 | |
| ı | | #0! Id #tom eugers to termination at [| | E | | | | | | 11 | |
| ı | Г | 7.5 m depth, on January 15, 1990, by Drilltach. | 1 | Ь | | | ++++ | | | 1 | |
| | | | I | В | | 111111 | 1111 | | | 1 | |
| 1 | - | - | 1 | .B | | | #### | | | 11 | |
| | | | I | * | | 11111 | | | | 1 | |
| | | | I | F | | | | ##### | | 1 l | |
| | F | | . | F | | $\Pi\Pi\Pi$ | #### | ##### | | <u> </u> | |
| | | | | F | | #### | *** | ****** | <u> </u> | } | |
| | <u> </u> | | | _H | +++++ | | #### | * | | 11 | |
| | - | · | ľ | ۳Ħ | H#### | | #### | ##### | | | |
| 1 | | | 1 | Ħ | 111111 | #### | ##### | ##### | | 11 | |
| * | | | [| H | | ╅╅╂╃╃ | ++++1 | 44444 | | 11 | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS



Log of Borehole ______

| Auger Sample SFT (N) Value | | Natural Moisture Plastic and Liquid Limit | X | Project Proposed Storm Severs | Dwg. No 13 |
|--------------------------------|-------|--|------|-------------------------------------|----------------------|
| Dynamic Cone Test | | Undrained Triacial at Overburden Pressure | ıs∯s | Region of Hamilton -Wentworth, Main | St. near Paradise Rd |
| Shalby Tube Field Vane Test | • • H | % Strain at Failure Penetrometer | Ψ, | Hemilton, Onterio. | Project No. H01760-G |

| s | | D N Velige National Advision of Control | | | | | | | | | |
|-----------|---|---|----|---|--------------|------------------------|---|---|---|-----|-----------------|
| SY M SO | Soil Description | ELEV. | 8 | 20 | # Ve #0 | | | Natural Moiss | | | Metural Unit |
| # B | | m | | Chan Channib | | 60 | 80 ' | Atterber | | | Weight |
| | 125 mm eaphalt over | 98,92 | Ľ | | 0.10 | | 5.20 ^{MP} * | 10 20 | | | MAN INI |
| FIA | 175 mm concrete over | | Ι. | | | | | | | lt | |
| 616 | FILL: clayey silt, mottled brown | 1 | ı | | | | | | | | |
| 116 | and reddien brown, concrete frequents— at approximately 400 mm., cohesive, | 1 | | | | | | | | П | |
| FIF | Bolst, firm. | | 1 | | | | | | | | |
| die | 4 | | ı | | ### | | | | | П | |
| 810 | 7 | 1 | 1 | | #### | #### | | | | | |
| 6/10 | A . | | | | 1111 | | | | | Н | |
| 111 | A CLAVET COLVER | ~ 97.4 | ı | | | | | | 44444 | X | |
| 1311 | CLAYEY SILT : light brown becoming greylah brown below 5.5 m., | 1 | | | | Π | | | | | |
| KUI | occasional clay seems, allt lavers | | | | Π | 1111 | | | | | |
| L H | trace fine gravel, cohesive, wet, | | 2 | | Ш | 1111 | | | | | |
| The state | soft to firm | | | | ### | #### | | | | - | |
| | i | 1 | 1 | | ### | | | | | | |
| 1214 | ų – | 1 | | | ### | | | | ++++++++ | 1 | |
| KIN | 1 | | | | 1111 | $\mathbf{H}\mathbf{H}$ | | | | 1 | |
| HRH | | | ١. | | Н | $\mathbf{H}\mathbf{H}$ | | | | XI | |
| FAR | | | ľ | | $\Pi\Pi$ | $\Pi\Pi$ | | | | 1 | |
| RH | | | | ┠╁╁╁╀╀╀┼ | $\Pi\Pi$ | $\Pi^{\dagger\dagger}$ | ;;;;; ;; | | ####### | | |
| PLP! | _ | | | | ### | ;;; ;; | 141111 | | | 1 | |
| 1821 | 1 | | l | | ### | #### | | | | 1 | |
| NAY. | | | | | ! | | | | | 1 | |
| MARI | 1 | | 4 | | | | | | | 1 | |
| um | 1 | | | | | | | | | J | |
| MA | | | Г | | HH | $\Pi\Pi$ | | | | XI. | |
| M | | | ı | | \mathbf{H} | | | | | 4 | |
| KW | · . | | | | $\Pi\Pi$ | Ш | | | | 1 | |
| THE | - | | 5 | | HH | | | | | 1 | |
| ma | | | | | $\Pi\Pi$ | | | | | 1 | |
| ma | | | | | ### | | | | | 1 | |
| uni | | | | | | | | | | | |
| M | | | | | | #### | | | | 1 | |
| | | | | | | | | | | 4 | • |
| 14/4 | | | | | | | | | | 1 | |
| LL N | | | | | | | | | | I | |
| MIN | | | | | | | | | | ı | |
| MALL | | | | | | | | | | 1 | |
| 1444 | | | , | | | | | | | 1 | |
| TANK! | | 1 | ľ | | | | | | | | |
| HEHE | | . 1 | | | H | | | | | - | |
| 1177 | | 91.30 | | | ## | 4## | | | | 1 | |
| | VERMINATED/ | 31,30 | | +++++ | ## | ### | | | +++++++ | f | |
| | NOTES: | I | | | | | | | | | |
| | NOTES: | l | • | TT | ## | ### | ##### | | | | |
| | (1) Borehole advenced uncesed by solid stem augers to termination at | Į | | ####### | ### | ### | ***** | | ++++++ | | |
| | 7.5 # depth, on Jenuary 16, 1890, humil | I | | | ## | ### | #### | | 111111111111111111111111111111111111111 | | |
| | Orilitach | | 1 | | | 1111 | | | ++++++ | | |
| | | | 1 | | ## | ### | | | | | |
| | (2)Standpipe installed. | l | 1 | | | 444 | | | | | |
| | (3) Hoton Towns D. | I | ı | | | | | | | | |
| | (3)Water Level Record: | - 1 | Ł | | +++ | \mathbf{H} | ++++++ | | | | |
| | Standpipe pinched at 2.0 m, dry | - 1 | E | | HH | 11111 | TTTT | 11111111 | ********* | | |
| | to 2.0 m. | | f | ++++ | HH | ### | 111111 | | ####### | | |
| | | - | 10 | | ### | ### | #### | | | | |
| | 1 | | F | | ### | 7717 | * | | | | |
| | | | İ | | | | | | | | |

MIDTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole _____B



| Auger Sample SPT #N Value O | ⊠ | Natural Moisture Pleatic and Liquid Limit | X | Project Proposed Storm Sewers | Dwg. No | 14 |
|--------------------------------|----------|---|-----------|--|------------|--------------|
| Dynamic Cone Test | | Undrained Triaxiel at | 140 | Region of Hamilton -Wentworth, Main | St. at | Paradise-Rd. |
| Shalby Tube Field Vane Test | • • B | Overburden Pressure 16 Strain at Fallure Penetrometer | 15∰5 ▲ | Hamilton, Ontario. Hole location and datum see drawing No. 1 | Project No | H01760-G |

| \$ Y | | | 0 | | | N Value | | | N | | inter Co | nient | П | Natur |
|------------------------|--|--------|-----|---|-----------|-------------------|--------------|---|------------------------|------------------------|------------------------|------------------------|--------------|--------------|
| М | Soll Description | ELEV. | ŀ | 20 | 40 | | i i | 86 | | | and are Limbs | | | Und Weigi |
| 0 | , | | H | Sheer Str | ength 8.1 | 10 | | 8.20 ^{56P-6} | 14 | | y Weight | | | MU |
| 1 | 125 mm aephalt over | 98,79 | ŀ | 11111111 | | 1111 | **** | 7.2.7.7.7.7 | 1 7 7 7 | , . | 30 | 30 11111 | 4 1 | |
| 918 | 175 mm concrete over | | l | | | Ш | Π | | | | | | 1 | |
| CV 6 | FILL 1 silty clay, reddish brown, | | ı | | | ### | ш | **** | | | | | 1 b | |
| 212 | fine gravel, meathered shale fragments, clay pockets and seems, | | | | | ╅╅╉╸ | ╏┼┼┼ | ╅╉┼┼┼┼ | | | | | 7 | |
| 46 | moist, firm, | | 1 | | | | Π | | | | | | 11 | |
| 22 | 1 | | | | | | | | | | ++++ | ╅╅╅╅ | 11 | |
| | 十 : 一 | | 1 | | | | +++ | | | | | | 11 | |
| | 3 | | 1 | | | | | | | | | | LL | |
| 4 | 1 | | 1 | | ++++ | ++++ | +++ | | | ╏┪┪┩┩ | b t++ | HHHHH | M | |
| JH | CLAYEY SILT I reddish brown becoming | * 97,3 | l | | | | \Box | | | | | | 14 | |
| 444 | light brown below 3.0 m., greyish | | 1 | | | | 111 | | | | | | 11 | |
| มห | brown at 5.5 m., clay seems, silt | | ı | | ++++ | ╂╂┼╂╍ | ╂╂╂ | ╅╉┼┼┼ | | | | | 7 I | |
| 112 | layers, cohesive, wet, firs | | 1 2 | | | $\Pi\Pi$ | $\Pi\Pi$ | 1111 | | | | | 1 | |
| 1/1 | 1 | | 1 | | | | | | | | ++++ | | 11 | |
| W | .] | | L | | ++++ | ╂╫╅╂╸ | ╟╫╫ | ╅╉╅╅╅ | | | | | 7 I | |
| M | - - | | ı | $\mathbf{H}\mathbf{H}$ | ++++ | \mathbf{H} | HH | 11111 | ### | \Box | 1111 | | 11 | |
| .1176 | 1 | | | | 1111 | ш | ш | | шШ | | | | 11 | |
| H | | | | | ++++ | HH | HH | ++++ | HHH | $+\Pi$ | 111 | | M | |
| 25K | - - | | 13 | 4444 | 1111 | $H^{\perp \perp}$ | ш | шш | шШ | ш | 111 | | W | |
| 41 H | | | Г | | *** | | HH | +++++ | | | | | \mathbf{I} | |
| 2111 | | | 1 | | | | | | | | 1111 | 1111 | 1 | |
| m | /- | | 1 | | | | | | | | | | 1 | |
| Mil | | | 1 | | | ++++ | | •••• | | | | | 1 | |
| \mathbf{m} | | | | | | | \mathbf{H} | | | ### | ### | | 11 | |
| \mathcal{H}^{α} |) | | L | | | | | | | | 1111 | | 11 | |
| 11U | 1 | | Г | | ++++ | | HH | | | $\mathbf{H}\mathbf{H}$ | 1111 | | 11 | |
| 27H | 1 | | ı | | | | 111 | | | ### | | | H | |
| 98H | | | l | | | | | | | | +++*4 | #### | XI. | |
| 433 | 1 | | ı | | ++++ | | HH | | | \mathbf{H} | | | 11 | |
| tut | 1 | | l | | | | 111 | | | 1111 | | | 3 | |
| W | | | ١. | | | | | | | +++ | HHH | | 11 | |
| 114 | 1 | | I. | | | | | | | $\Pi\Pi$ | +++ | | 11 | |
| 111 | 4 | | | | | | | | | | | -1111 | 11 | |
| HЯ | ├ | | l | | | | - | | | ++++ | | | 11 | |
| 111 | | | 1 | | | | 444 | | 1111 | 1111 | 7111 | | 11 | |
| W | | | 1 | | | | | | | HH | 1 | +++++ | H | |
| 1771 | <u></u> | | ١. | | ++++ | | | | | $\Pi\Pi$ | XIII | | M | |
| KH! | · | | ľ | | | | ## | | | *** | | | Н | |
| 1111 | | | | | | | | | | 1111 | **** | , ,,,,,, | 11 | |
| un | | | | | ╅╫╋┪ | | 111 | | | HH | $\mathbf{H}\mathbf{H}$ | | 11 | |
| 15 IX | | | ١. | | | | | | 1111 | #### | #### | **** | 11 | |
| HH | | | | | #### | | | | | | | ╉┼┼┼┽ | 11 | |
| 初化 | | | ١. | | ╫╫╫ | | +++ | | ++++ | Π | | | 1 | |
| <i>}}}}</i> | | | 1 | | | | | | 11111 | | ***** | | 1 1 | |
| m | | | | | #### | | | | | | | ╉╅╅╅ | U | |
| XKK | <u></u> | | | | ++++ | | ╅╉╃ | | ╂╂╃╃ | ++++ | \mathbf{H} | $\mathbf{H}\mathbf{H}$ | М | |
| PAZ | TEMINATED/ | 91,17 | | | ++++ | | 111 | | **** | ### | | | 14 | |
| | d spert (ex.) ECs. | | | | | | | | 11111 | HH | ╉╉╂┼ | ╂╂╉╂╌ | 11 | |
| | - NOTES:- | | ١. | | ╅╅╂╉┤ | | +++ | | $\Pi\Pi\Pi$ | $\Pi\Pi$ | $\Pi\Pi$ | 11111 | 11 | |
| | | | • | | | | | | | | | | | |
| | (1) Borshols advanced uncased by solid stem augers to termination at | | | | | | 111 | | | | | ++++ | | |
| | - / to m depth; on Jenuary 16, 1890, by | | | | ++++ | +++ | HH | | $\Pi\Pi$ | $\Pi\Pi$ | $\Pi\Pi$ | 7777 | | |
| | Orlitech | | | +++++ | 1111 | | ### | | #### | ### | #### | | | |
| | | | | | 11111 | | 1111 | | ╁╁╅╅┩ | 1111 | ╁╁┼┼┦ | +++ | | |
| | | | ارا | | +++17 | +++ | HH | | $\Pi\Pi$ | HH | $\Pi\Pi$ | 11111 | | |
| | | | 1 | +++++ | $\Pi\Pi$ | 7777 | ## | | ### | ш | 1111 | | | |
| | | | | | #### | | ### | | ╫╫ | HH | HHH | 11111 | | |
| | _ | | П | | HHH | 1111 | HH | 11111 | 11111 | $^{+++}$ | ### | | | |
| | . 🗝 | | П | | #### | 1111 | ## | | 11111 | | ╂╂╅╂ | HHHH | ll | |
| | | | H | | <u> </u> | +++ | +HH | ++++ | 1111 | HH | Ш | HHH | П | |
| | | | H | ++++ | 11111 | 777 | ш | | 11111 | ## | | <u> </u> | | |
| | | | 70 | | #### | 1111 | 111 | | ╅╅╅╃ | HH | HHI | ++++ | | |
| | · | | П | ╽ ┋┋┋ | ╅╅╉┩ | HH | $\Pi\Pi$ | +++++ | 1111 | Ш | $\Pi\Pi$ | 11111 | | |
| | · | | ıI | | 7 7 7 7 T | 7711 | 7 7 7 7 7 | | | - | | | 1 | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS



Log of Borehole _______

| Auger Sample SPT (N) Value | 00 | Netural Moleture Pleatic and Liquid Limit | X | Project Proposed Sanitary Sewer | Dwg. No. 2 |
|-------------------------------|--|--|-------|--|----------------------|
| Dynamic Cone Test | ###################################### | Undrained Triexial at | | Longwood Road | |
| Shelby Tube | • • # | Overburden Pressure 16 Strain at Fallure | 15005 | Hamilton, Ontario | Project No. H02273-G |
| Field Vane Test | + \$ | Penetrometer | A | Hole location and deturn see drawing No. 1 | |

| S S | | | P | | N Value | | Netural Moleture Content | Natur Unit |
|----------|--|-------------|-----|---|---|---|--------------------------|---------------|
| V M | Soil Description | ELEV. | P | 20 | 40 60 | 80 | Atterberg Limits | Weig |
| P | | " | H | Sheer Strength | | MPs | % Dry Weight 10 20 30 | KNV |
| מלעל | FILL: First red/ brown silty clay, | 98,49 | 1 | h | 0.10 | 0.20 | | } |
| 1960 | with occasional rootlets | | | | | | | |
| 1/10 | g i | | 1 | | | | | 1 |
| 1200 | <u> </u> | 1 ~ 97.3 | 1 | | | | | 19.1 |
| | Loose to compact brown, clayey silt | 1 3/.3 | 1 | | | | | l |
| 4412 | with occsesional sand layers. | | 1 | Hollin | | | | 18.4 |
| - 1111 | Becoming stiff grey slity clay below 3,35 m, | 1 | 1 2 | : | ╎╏ ┩┪╏╅┩╏ | ╺ ╅╅╉╉╏┼╉╸ | | |
| un | DE 104 3,50 M. | | 1 | | | | | 45.6 |
| ии | 13 | | 1 | | | | | 18.6 |
| 1441 | | - | 1 | | | | | |
| ии | KI | | | | | | | 19.5 |
| 17411 | И | | L | | | | | 1 |
| nki | <u> </u> | - | 14 | | | | | l |
| <i>u</i> | g . | 1 | I | | | | | i |
| thra | | 1 | 1 | | | 111111 | | |
| HAY! | · · · · · · · · · · · · · · · · · · · | 1 | 1 | | | | | 20.0 |
| 1 | Dense to vey dense grey medius | 93.3 | | | | | | |
| | . to course send, and fine to medium | | | | | | | |
| 4 | gravel. Grading into a dense | 4 | | 1 | +++++ | | | ł |
| 4.7 | medium to coerse send below 9.1 m. | | Γ | | | | | l |
| 17.11 | • | | | | | | | |
| 1.3.2 | <u>.</u> — | 4 | 1 | | | | | |
| 10.77 | proposed sewer | | 1 | | | | | |
| A 73 | | 4 | 1 | | | ++++ | | |
| 1111 | invert | 4 | | | | | **************** | 1 |
| ARA | 4. | | Г | | | | | |
| 1111 | - | | L | ┠╂┼┩╃╂╂┿ | ┩╋┢ ╃╂╂╋╉┥ | ++++ | | |
| 17.5 | - | 4 | 1 | | | | | |
| | | 1 | | | | +++++ | | l |
| 17.55 | | 1 | 1 | | }}}} | | | |
| 1:3: | | 4 | 10 | | | | | |
| 1:::: | , | | ľ | | | | | |
| 422 | | 87.8 | 1 | | | | | |
| 102 | Stiff to very stiff brownish grey silty clay interbedded with layers | 4 | 1 | | | | | 20.2 |
| 17% | of coarse sand up to 125 mm thick | | 1 | | | | | |
| VCA | | Ì | ı | ┠┼┼┼┼╂┼┼┼ | ┨╂╫┪╉┼╂┼┥ | ++++++ | | |
| 10% | / - – | - | 9 | | | | | |
| VXX | a . | 1 | П | | | | | ~ ~ |
| 1000 | N | 1 | 1 | | | ╅╃╅╂╂╃╌ | | 20.6 |
| VXX | _ _ | - | ı | | | | | |
| 100 | И | 1 | ı | | | | | |
| 120 | a | | 1 | | ╅╉╅╂╅╉┪ | ┤ ┼╂┼╂┼ | | |
| 200 | <u>/</u> - | - | и | HHHI | | | | 20.5 |
| W | X | | Г | | | | | |
| (1) | 1 | | | | <u> </u> | ++++++ | | ĺ |
| 100 | /- - | - | 1 | 11111111 | | | | |
| (1) | 4 | 1 | | | | | | |
| W | 2 | | | H-1-1-1-1-1-F | ┖┋ ╅╅╅╃╃ | ++++++ | | |
| 1// | /- – | 1 | 16 | | | | | |
| WX | a | | Ľ | | | | | |
| 12 | 1 | | | | | +++++ | | |
| 111 | Compact to dense reddish brown | * B1.7 | | HIHIA | | | | 21.1 |
| | fine to medium sand with occasions) | | | | | | * | |
| In!! | layers of grey silty clay | 1 | 1 | | ! | +++++ | | |
| 111 | | 4 | 18 | H | | | | |
| fare!! | • | | 1 | | <u> </u> | <u> </u> | | |
| 111 | 1 | | 1 | H++++## | ++++++ | ++++++++++++++++++++++++++++++++++++ | | 20.6 |
| 11,11 | - | 1 | | HHHH | | | | |
| Titl: | - | | 1 | | <u> </u> | | | |
| | 1 | | | | HHHHH | +++++ | | |
| 111; | - | ~ 78.5 | 1 | | | | | |
| 1 | Continued | /8.5 | 1 | | <u> </u> | 111111 | | |
| 1 | | | ı | | | 111111 | | |
| | | l | 1_ | | <u> </u> | ┪┩┩┩┩ | ╏╏╏╏┋┋┋┋┋┋┋ | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole 21 con't



Auger Sample S Natural Moleture X Project Proposed Sanitary Sever Dwg. No. 2A

Pleatic and Liquid Limit Undrained Trisolal at Overburden Pressure N Strein at Failure + s Penetrometer + s Penetrometer + project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

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Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

| GW | 8 M 4 8 | Soil Description | ELEV. | DWP | N Value Natural Missure Content and 20 40 60 60 Atterberg Limits | Natural Unit Weight |
|----|---------|---|-----------|-----|--|--|
| ï | Ó | 0 | 89 | H | Sheer Strength MPs 16 Dry Weight | M/Um² |
| | | Costinua | 78.49 | 20 | | 21.3 |
| | | | | | | |
| | | | | l. | | 20.5 |
| | | | | 22 | | |
| | | _ | . ** 75.2 | | | 21.3 |
| | | TERMINATED/ | 73.2 | , | | |
| | | NOTES:- (1) Borehole advanced cased by hollow | | ľ | | |
| | | matem augers to termination at 23.3 mm depth, on January 2, 1991, by Drilltach | | | | |
| | | (2) Weter Level Record :- Time Depth to | | 25 | | |
| | | Elepsed W.L., a 5 Days 1.5 | | | | |
| | | man o baya 11.0 | | | | |
| | | white white | | 28 | | |
| | | | | | | |
| | | | | | | PROBLEM STATE OF THE STATE OF T |
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| Ш | | | | | | |

MOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

| J | | | | | | | | | | | | | | Μ\ | MW204 | | |
|---|--|--|----------------|-------------|------------|------------------------------|----------|------|------------|------|--------------|---|---|-------------------|-------|--|--|
| | LIENT | Petro-Canada | | | | | | | | | | | | PROJ | ECT N | 10. <u>ONW3613</u> 6 | |
| | | ON906 Main Street West (at I | one | woo | od Dr | | | | | | | | | DAT | | Local | |
| E | ATES: | BORING December 13, 2004 | | T | 7 | WATE | R LE | /EL | D | ecem | <u>ber</u> | 17. | <u>200</u> 4 | TPC I | ELEV. | 100.115 | |
| E | NO O | | 107 | VEL | £ | | V | /APO | UR | | - | S | AMPL | .ES | | | |
| DEPTH (m) | ELEVATION (m) | STRATA DESCRIPTION | TAF | RLE | DEPTH (#) | С | ONC | ENTF | RATIO | NS | | m | ЖER | J. | | WELL | |
| 퓝 | | | STRATA PLOT | WATER LEVEL | DE | • 9 | 6LEL | | ▲ p | ρm | | TYPE | NUMBER | N-VALUE | (| CONSTRUCTION | |
| | 400.00 | | " | - | - | • 20 |) 41 | 0 4 | 60 8 | 80 | | | | thu | | | |
| 0 - | 100.29 | ASPHALT | -38 | \vdash | 0 | A 10 | 0 20 | | | 00 | 1 | 1 | | | 2 12 | | |
| - | 100.1 | Brown, SILTY CLAY (FILL), dry | R | | 1 - | | | | | | - - - | NR | | | E E | 50 mm ID solid PVC | |
| + = | | | R | | 2 - | | | | | | | | | | | pipe with bentionite | |
| 1 - | | | W | ļ | 3 - | | | :::: | 1111 | | HX | SS | 1 | 23 | 9 9 | and cement seal | |
| - | | | W | | 5 - | | | | | | | | | | | | |
| | | - brown to grey, some sand, moist | | | 6 - | | A | | | | X | SS | 2 | 11 | | 50 mm ID slotted PVC pipe with silica sand | |
| - 2 | | | |] | 7 - | | | | | | - | | | | | backfill | |
| | | - trace gravel | | | 8 - | | * | | | | 1 | SS | 3 | 19 | | | |
| 3 | 97.2 | | | | 9 - | | | | | | 1 | | *************************************** | | | No. | |
| E | | Brown, very stiff, SANDY SILT | | | 10- | | A | | | | X | SS | 4 | 11 | | | |
| | | (TILL), some clay, wet | | | 11- 12- | | | | | | - | | | | | | |
| 4 | | | | ¥ | 13- | | | | | | 7 | | \dashv | | | | |
| [] | | | | | 14- | | | | | | = | SS | 5 | 25 | | | |
| [| | | . + | | 15- | | | | | | # | | | | | | |
| 5 | l | | ľ | | 16- | À | | | | | \mathbb{K} | SS | 6 | 20 | | | |
| F 1 | ĺ | | | | 17- | | | | | | # | | | | ·[i] | | |
| | | | | | 18- 19- | A | | | | | \mathbb{R} | SS | 7 | 29 | 目 | | |
| 6 | 94.2 | PA T TO A STATE OF THE STATE OF | - 3 | | 20 | | | | | | 1 | | | | | | |
| -] | | END OF BOREHOLE at 6.1 m. | | | 21- | | | | | | | | | | | | |
| | | | | | 22- | | | | | | | | | | | | |
| 7 - | | | | | 23- | : : : : : : : : : : : : : | | | | | 1 | | | | | | |
| | | | | | 24- | | | | | |] | | | | | | |
| | *************************************** | | | | 25- | | | | | | | | | | | | |
| 8 - | | | | | 26- 27- | | | | | | $\ $ | * | | Newson the second | | | |
| | | , | | | 28- | | | | | | | *************************************** | | | | | |
| 9 - | | | | | 29- | | | | | | | | | | | | |
| [] | | | | | 30- | | | | | | | - | | | | nan-giriyyada | |
| | | | | | 31- | | | | | - | | Manufacture | | | | Programme and the second secon | |
| 10 | | | | | 32- | | | | | | | | | | | | |
| LABORATORY ANALYSES: MW204-3 submitted for BTEX and PH (F1 to F4) | | | | | | | | | | | (W) | | | | | | |
| | Groundwater submitted for BTEX and PH (F1 to F4) | | | | | | | | | | | | | | | | |

| CI LO | LIENT . | ONMENT LIMITED Petro-Canada N 906 Main Street West (at Lossoning December 14, 2004 | ong | w00 | d Dr | HOL iye), Ha | milto | on, O | ntari | io | | | | PROJECT DATE | ECT 1 | No. <u>ONW3613</u> 6 |
|---|---------------|--|----------------|-------------|----------------------|---------------------------------------|-----------------|-------|-------|-----------|-----------------|--|--------|--------------|--|---|
| *************************************** | | *************************************** | SAMPLES VAPOUR | | | | | | | | | to the second second | | | | |
| DEPTH (m) | ELEVATION (m) | STRATA DESCRIPTION | STRATA PLOT | WATER LEVEL | DEPTH (ft) | | VA NCE EL | | | | | TYPE | NUMBER | N-VALUE | | WELL |
| . 0 - | 99.94 | | | | 0 | ● 20 ▲ 100 | 40 200 | 30 | 0 4 | 80 -00 | | | | | | |
| . 1 | 99.7 | | 27 | | 1 - | | | | | | | NR | | | F | g |
| | | CONCRETE Red to brown, SILTY CLAY (FILL), trace sand, moist | | | 2 - | | | | | | - - - | | | | | 50 mm ID solid PVC pipe with bentionite and cement seal |
| 1 - | | | | | 4 - | 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | | | | | | SS | 1 | 20 | | and content sear |
| 2 | 98.3 | Brown, compact, SILTY SAND (TILL), some clay, wet | | | 6 - | | | À | | | | SS | 2 | 26 | | 50 mm ID slotted PV pipe with silica sand backfill |
| | | | | | 7 - 8 - 9 - | | A | | | | | SS | 3 | 29 | | Dackini |
| 3 | | | 1 | | 10- 11- | | | | | | | SS | 4 | 11 | | |
| : 1 | 96.1 | | 10 | | 12- | | | | | | | | | | I.B. | |
| 4 | | Brown, stiff, SANDY SILT (TILL), wet | 1 | | 13 - 14 - | | A | | | | 1 | SS | 5 | 15 | | 4 · 4 |
| 5 | | - some clay | 7. 4. 7. | I | 15- 16- 17- | | | | | | | SS | 6 | 13 | | |
| 1 | | - brown to grey | 4. 17. 14 | | 18- 19- | | | | | | | SS | 7 | 26 | | |
| 6- | 93.8 | END OF BOREHOLE at 6.1 m. | 111. | | 20 21 - 22 - | | | | | | | | | | | |
| 7 | | | | | 23 - 24 - 25 - | | | | 7 | | | | | | Market de la company de la com | |
| 8 | | | | | 26 - 27 - 28 - | | | | | | | | | | | |
| 9 | | | | | 29- 30- | | | | | | | Version of the contract of the | | | | |
| 10 | | | | | 31 - 32 - | | | | | | | or cells of the ce | | | | |

HIGHWAY 403 CROSSING



136.0 00 17 17 17 Q O4=×1 133 I/2 UNCONFINED COMPRESSION (Qu) VANE TEST(C) AND SENSITIVITY(S) NATURAL MOISTURE AND LIQUID LIMIT PLASTIC LIMIT 110 RC13 TIII T12 19 CONSTRUCT 8 LEGEND 五 4000°s.F. 10 STRENGTH AND PENETRATION RESISTANCE ends SECTION 3000 +0 2000 RESEARCH 1000 AND 09 75 90 105 120 5 45 30 DEPTH 0 MATERIALS Lt.) (w) th 252.4 244.9 79.6 189.6 ELEV. FEET 279 (19. الت COMPLED BY B.K. Penetration resistance profil shown obtained by driving a 2" dia. cone from ground level to depth noted with an energy of 350 ft. lb. per blow. N. зоше STATION_12+77 shale Š. gravel with of garbage) HOLE 8 clay clay k Queenston s vely sound. borehole 59CHECKED silty (BORE silty DESCRIPTION um brown sand and (traces Granular fill 22/ Bedrock relatively End of borel Medium grey Dec. E53-116 180-60 Silty clay 279.91 Medi DATE -> SORING ALCIA X BO 80 0.

ONTARIO

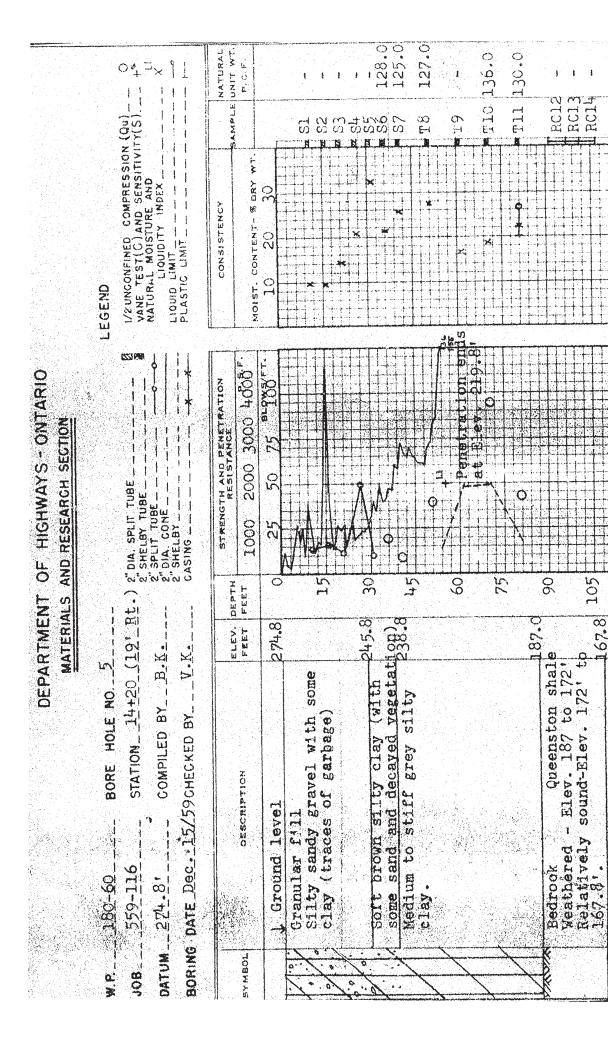
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S

HIGHWAY

OF

DEPARTMENT



105

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120

End of borehole Penetration resistance profile shown obtained by driving a 2 dia. cone from ground level to depth noted with an energy of 350 ft. 15. per blow.

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| 59.)—58:5691 OFFICE REPORT ON | |
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| 1959.)-58-5691 | A. D. |
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| IL-126 (REV. 1959.) | 10 |
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| 12.4 | |
| | - |

ONTARIO HIGHWAYS RESEARCH AND OF DEPARTMENT MATERIALS

BORE HOLE NO. 3 231-54-3

STATION 17-00 & Ramp H. 59-F-125 DATUM G.S.C.

108

o. ¥

BORING

SYMBOL

LEGEND

NATURAL UNIT WT.

| SO TOTAL STATION 17-00 & Bamp H. | ~ | 1/2 UNCONFINED COMPRESSION | (100) |
|------------------------------------|-------------------------------------|---|-------|
| G.S.C. COMPILED BY B.K. | 2" SHELBY TUBE | VANE TEST(C) AND SENSITIVITY(S) NATURAL MOISTURE AND LIQUIDITY INDEX LIQUID LIMIT — — — — — — — — — — — — — — — — — — — | |
| G DATEJan. 25/60 CHECKED BY. J.B. | CASING | PLASTIC LIMIT | |
| O () | STRENGTH AND PENETRATION RESISTANCE | COMSISTENCY | - X |
| | Ľ. | MOIST, COUTENT- %.DRY WT. | |
| Cronndlevel 2620 | 0 25 50 75 mgbbr | W | |
| W.L. | | | N . |
| | | | 5 |
| Grey-brown Slity Clay With | ** | * | 3 6 |
| decayes of games masses . | | *** | |
| | 20 6 | | 175 |
| | | | 1 35 |
| | 30 % 5 | | S6 - |
| Grey silty clay with layers 2270 | | × | S7 - |
| | | | O. O. |
| Stiff grey silty clay. | 7 | | |
| | | | |
| | | | 136 |
| | | | 810 |
| 2010 | 09 | | 211 |
| Shale, weathered at surface. 195.0 | | | 512 |
| | 70 Francisco 202.77 | | |
| Penetration resistance profile | | | |
| cone from groundlevel to depth | 08 | | |
| noted with an energy of 350 ft. | | | - |
| 1b. per blow. | | | |

6

(REY. 1959.) -- 58-5691 ML-126 FORM OB

lb. per blow

ON SOIL EXPLORATION OFFICE REPORT

HIGHWAYS - ONTARIO AND RESEARCH SECTION 9 DEPARTMENT MATERIALS

2" DIA. SPLIT TUBE 2" SHELBY TUBE 2" SPLIT TUBE 2" SPLIT TUBE 2" SHELBY CASING _____ STATION 17/50 & Bamp H. B.K. BORE HOLE NO. COMPILED BY JOB 59-F-125 231-58-3 DATUM G.S.C. o.' **≥**

JeB CHECKED BY_ BORING DATE Feb. 4/60

4000F STRENGTH AND PENETRATION RESISTANCE 1000 2000 3000 4000 10 DEPTH 0 and ashes. ELEV. DESCRIPTION Clayey mixture SYMBOL

O₀+ 1,15 20 30 04 9 70 50 Brown sandy clay with 255.0 decayed organic matter.

Brown sandy clay with decayed organic matter & some ash.

Brown to grey silty clay with 12.20 layers of sand & gravel 20002 sandy clay, Stiff grey silty near bedrock. End of borehole

LEGEND

I/2 UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIG LIMIT X30 MATURAL BAMPLE UNIT WT. 52 S 33 S 376 138 15 35 89 MOIST. CONTENT- # DRY CONSISTENCY

\$10

80

SOIL EXPLORATION

FORM OB-M

ONTARIO S HIGHWAY RESEARCH AND OF DEPARTMENT MATERIALS

BORE HOLE NO. 5. STATION 18-200 & Rand H. J.B. COMPILED BY B.K. CHECKED BY_ 28/60 DATE Jan. 231-58-3 59-F-125 G.S.C. BORING DATUM 30B

2" SHELBY TUBE 2" SHELBY TUBE 2" SPLIT TUBE 2" SPLIT TUBE 2" SHELBY CONE 2" SHELBY CASING 2" SHELBY SHELBY 2" SHELBY

I/Z UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S).

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC LIMIT LEGEND

04=×11

NATURAL UNIT WT. P.C.F.

SAMPLE

| ov Od. ř. | | | | | | 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | | |
|---|--|---|----------------------------|---|-----|---|-----------------|---|
| STRENGTH AND PENETRATION 000 2000 3000 4000°F. | 50 75 ^{B-} 9 | | | | | eleva 204-51 | | |
| | 0 \$ 25 | 01 | \$# / 20 20 | | 07 | 60 Penetral | 70 | \$0 |
| ELEV. DEPTH FEET FEET | 260.0 | 251.0 | 239.d , | | | | 193.7 | |
| DESCRIPTION | V Groundleyel Heterogeneous mixture W.L. | or ashes, gravel & sand. Brown sandy clay | Well praded sand & pravel. | Stiff grey silty clay with scattered shale fragments. | | | End of borehole | Penetration resustance profile shown obtained by driving a 2 ^m dia. cone from groundleyel to depth noted with an energy of 350 ft. lb. per blow. |
| SYMBOL | 13. | 30 | 60 | | T E | W K | | |

1 1 1 1 1

89

SX

57

\$3 \$5 \$5 \$6

52

SI

8

EXPLORATION SOIL REPORT OFFICE

HIGHWAYS - ONTARIO AND RESEARCH SECTION OF DEPARTMENT MATERIALS

BORE HOLE NO. 2 COMPILED BY B.K. 59-F-125 DATUM G.S.C. ď. ₩ 108

J.B.

BY_

CHECKED

11/60

DATEFeb.

BORING

VANE TEST(C) AND SENSITIVITY(S)

VANE TEST(C) AND SENSITIVITY(S)

NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC LIMIT

LEGEND

222 mg

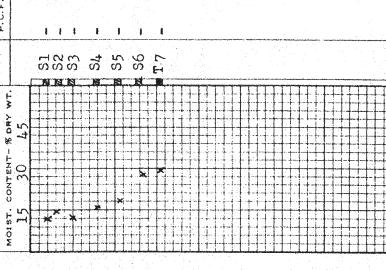
CONSISTENCY

400B 3.F. STRENGTH AND PENETRATION RESISTANCE 2000 3000 1000 0 2740 DESCRIPTION ↓ Groundlevel
Brown clay with

10 30 8 50.8 0.17 sand, gravel & rubble. wood with Black peaty sand with Soft brown sandy clay decayed vegetation. gravelly of borehole Well graded rubble. End 10.00 0 ø

AMPLE \$3 \$3 \$4 \$5 \$5 \$7 MO18T. 50 047 70 9

80



OFFICE REPORT ON SOIL EXPLORATION

ONTARIO S HIGHWAY: AND OF DEPARTMENT

Ħ Ramp BORE HOLSCHOOTS BE STATION & Chedoke E E J.B. COMPLED BY CHECKED BY_ STATION DATE Dec. 3/59 F 59-125 231-58-3 G.S.C. BORING DATUM JOB_ o.:

2" DIA, SPLIT TUBE.
2" SHELBY TUBE.
2" SPLIT TUBE.
2" DIA, CONE.
2" SHELBY.

1/2 UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT 222 (28)

LEGEND

04=×11

| | | | | | | | | | - 1 | | 37.25 | | | | | | | | | | |
|-------------|--|-----|----------|------|-----|---|----------------|---|----------------|-----|-------|---|----|-------|----|------|----|------|------|------|---|
| 5 | S C C | | | 1 | ı | ı | | • | 127.5 | | 110 | • | (| 119.3 | | 1 | | ı | | | |
| | SAMPLE | | | s sı | \$2 | S | t _S | S | 9E | | 47 | , | (| N FI | - | 19 T | u= | RC10 | | | |
| CONSISTENCY | Additional and the second of t | (4) | 30 | | | | | | | | | | | | | | | | | | |
| | ı. | |)- - | | | | \prod | | \blacksquare | II. | | | 11 | Ti | 12 | П | H | Π | | | Π |

OB-ML-126

SOIL EXPLORATION REPORT OFFICE



- ONTARIO SECTION HIGHWAYS AND RESEARCH P DEPARTMENT MATERIALS

....

Кашр BORE HOLE NO 10 TO RE. STATION & Chedoke. V.K. COMPILED BY_B.K. BORING DATE NOV- 28/59 CHECKED BY 231-58-3 F59-125 DATUM 258.01 o.: 108

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

LEGEND

042 > 11 1/2 UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT ...14 1 111 SISTENCY

| SYMBOL | ELEV. DEPTH | \bot | CONSI |
|------------------------------------|--------------|--|-------------|
| | | 1000 5000 3000 #000 | MOIST. CONT |
| ↓ Groundlevel | 258.0 | n 25 50 75 and 66 T. | |
| www. Loose sandy mixture of rubble | | | |
| Soft brown clay | A | 10 % | |
| Uncertain. organic matter, sand, | | | |
| | 20 | | |
| Grey silty clay | 200 | | * |
| | ት | | |
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| | 1 | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | |
| | | | |
| | 50 | | |
| | | | |
| | ζ, | | |
| | 194.7 | | * |
| Redrock (shale) | | Penetration ends at- | |
| | 70 | | |
| | 184.7 | | |
| | | | |
| Penetration resistance profile | ď | | |
| Shown obtained by driving a 2" | 5 | | |
| depth noted with an energy of | | | |
| 250 ft. 1b. per bios. | | | |
| | | | |

NATURAL UNIT WT. AMPLE 9 T8 19 S 73 S4 F 77 E S 30 hg

OFFICE REPORT ON SOIL EXPLORATION

RM OB-ML-126 (REV. 1959.)—58-369

| | ICEND 1/2 UNCONFINED COMPRESSION (Qu) VANE TEST(C) AND SENSITIVITY(S) NATURAL MOISTURE AND LIQUIDIT INDEX LIQUID LIMIT PLASTIC LIMIT | MOIST. CONTENT. \$ DRY WT. | 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 5. F. S. S. S. S. S. S. S. S. S. S. S. S. S. |
|---|--|---|---|--|
| ARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION | 2" DIA. SPLIT TUBE | ELEV. DEPTH SIRENCE FEET 1000 2000 3000 4000 MC 272.0 0 25 50 75 BLOWS/FT 267.5 100 255 50 75 BLOWS/FT 258.0 10 | 239.0 30 239.0 40 40 40 40 40 40 40 40 40 40 40 40 40 | 207.0 203.5 70 |
| DEPAR MAT | W.P. 231-58-3 JOB 59-F-125 DATUM G. S. C. COMPILED BY B. K. BORING DATE Jan. 18/60 CHECKED BY J. B. | | Grey silty clay with occasional layers of clayey silt and sand. | Weathered pink shale. |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

DWG NO.4

| | | | | | DWG_NO.4 |
|----------------------------|-----------------------------|----------|-------|----------------|----------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: | MAY 10, 1994 | |
| CLIENT: REGIONAL MUNICIPAL | ITY OF HAMILTON-WENTWORTH | DRILLING | [] so | LID STEM CONTI | INUOUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: | [X] H | OLLOW STEM | |
| LOCATION: CATHEDRAL PARK, | MAIN ST @ HWY 403, HAMILTON | | [] DL | AMOND DRILL; | [] NX or [] BX |
| | | | | | |

| ELEV. | DATUM: GEODETIC | | | DRILL | ER | | | | | | () | | |
|---|--|-----|----------|------------|--|--------|-------|--|-------|------|--|---|--------------|
| ss splr | rspoon; Tw. Thin wall shelby tube; aug auger sample; cl | UND | RAINED S | HEARSTI | REN | GTH; } | WC M | DISTL | RECO | TENT | PL PLA | STIC | CLIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | | ST | D PE | NEI | RAT | ОИ | TEST | | M/C (%) |
| (m) | | | TYPE | DEPTH | | BLC | WS PE | 3R 3 | 00 mm | (NV | ALUE) | | CU / UNIT WI |
| 85.7 | Grass and surficial vegetation | | | 0.0 | | 0 | 0 20 | 0 4 | 0 60 | 80 | 100 1 | 20 | |
| | FILL | | | | | | | | | | *************************************** | | |
| | silty clay with silt and sand, dark brown to brown, | | | | | | | | | | | | |
| 84.8 | rootlets and organics, moist | | | 0.9 | | | | | | | | | |
| | FILL | 3 | SS | 1.1 | | | 3 | | | | | | 23.4 % |
| | ash, cinders, sand, organics, decayed plant fibres | 3 | SS | 1.8 | | | | | | 1 | | | 46.9 % |
| | and wood, pieces of porcelain and glass, generally grey to black, moist to very moist, | | | | | -2 | | | | | | | |
| | (VERY LOOSE) | 4 | SS | 2.6 | | | | | | | | | 14.9 % |
| 82.7 | - red brick pieces | | | 3.0 | | | | | | | | | |
| | SAND AND SILT | 5 | SS | 3.4 | | | | | | | | *************************************** | 14.5 % |
| | fine sand sizes, slightly clayey, greyish brown below 4.7 m, very moist, | 4 | SS | 4.1 | | -4 | | | | | | | 16.9 % |
| 80.4 | (LOOSE TO COMPACT) | 12 | SS | 4.9 5.3 | | | | | | | | | 16.6 % |
| | ************************************** | 23 | SS | 5.6 | 1 | | Y | Ĺ | | 1 | | | 19.0 % |
| | | | | | | | | | | - 1 | | | cu>0.21 MPa |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace of gravel, oxidized brown to unoxidized grey below 10.9 m, moist to | 26 | SS | 6.4 | *************************************** | -6 | | | | | | | 18.6 % |
| | very moist, (VERY STIFF TO STIFF) - dessicated and oxidized grey-brown becoming | 22 | SS | 7.9 | | -8 | | | | | | | 21.7 % |
| • | unoxidized grey below 10.9 m | 20 | SS | 9.4 | Principal designation of the second s | | | | | | and the state of t | | 19.0 % |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | *************************************** | -10 | 0 | 0 | 10 | 80 | 100 | _' 120 | |
| | | | | | | | | | | | | | , , , , |
| NO DESCRIPTION AND AND AND AND AND AND AND AND AND AN | | | 1 | | 1 | | | No. of the last of | | 80 | ORELOG. | FRM | May-94 |

LOG OF BOREHOLE NO. 2 (CONT'D)

DWG NO.5 S0520 MGL PROJECT NO.: DRILLING DATE: MAY 10, 1994

| | ROJECT NO.: GOJEG | | | | JING | | | | | | | |
|------------------|--|----------------|--------------|--------------------------|---|---|-------------------|-------|-----------------|---------|--|-------------|
| | T: REGIONAL MUNICIPALITY OF HAMILTON-WENT | WOR' | TH | DRILL | JNG | [] S | OLII | D ST | EM C | ILLMC | NUOUSF | LIGHT |
| | CT NAME: PROPOSED CSO TANK | | | METH | IOD: | [X] | HOL | TO | V STE | M | | |
| LOCAT | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | [] [| DIAN | ION | D DRI | LL; | [] NX o | r[] BX |
| ELEV. | DATUM: GEODETIC | Vale transport | | DRILL | LER: K | C. & S | S DE | ULL: | ING | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CO | J UND | RAINED S | HEAR ST | RENGTH | i; M/ | с мо | วเราบ | RECON | TENT; | PL PLAST | TOLIMIT |
| ELEV. | SOIL DESCRIPTION | Predomporation | SAMPLE | Assessment of the second | The second second | | | | RATI | | | M/C (%) |
| (m) | | | TYPE | DEPTH | | | | | | | ALUE) | CU / UNIT W |
| | | | | | 1 | 0 | | | | | 100 120 | |
| 75.7 | Continued from previous page | | | 10.0 | | - | | • | | 00 | 100 120 | |
| | | | | 20.0 | 1 - | 10 r | | | | | | |
| | | | | | | 1 | | | | | | |
| | | | ł | | | - 1 | | | | | | |
| | | 9 | 00 | 11 | | | | | | | | 01.0 |
| | OTT TISE OF A SE | צן | SS | 11 | | | | | | | | 21.4 % |
| | SILTY CLAY | | 1 | 1 | | | | | | | . | |
| | layered with silt and sand seams, vertical fissures, | | | | | | | | | l | | |
| | red shale fragments, trace of gravel, oxidized | | 1 | | - | 12 | $\dagger \dagger$ | | | + | _ | |
| | brown to unoxidized grey below 10.9 m, moist to | | | | | | | | | | | |
| | very moist, | 8 | SS | 12.5 | | | 1 | | | | | 18.3 % |
| | (VERY STIFF TO STIFF) | | | | | | | | | | | |
| | · | | | | | | | | | | | |
| | - dessicated and oxidized grey-brown becoming | | | | | | | | | | | |
| | unoxidized grey below 10.9 m | | | - | | | | | | | | |
| | and the state of t | 6 | SS | 14 | - | 14 | \Box | | | \perp | | 23.8 % |
| | | ١ | UU | 7.4 | | - 1 | | | | | | 43.0 70 |
| | | | | | İ | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | \parallel | | | | | |
| | | 1 | | | | | Y | | | | | |
| | | 21 | SS | 15.5 | | | | ! | | | | 19.9 % |
| | | | | | | | | | | | | |
| | | | | | - | 16 | 乛 | | | | | |
| | | | | | | | | | | | | |
| 68.7 | SHALE (Queenston Formation) | 1 | | | | l | - // | | | | | |
| | layered with grey siltstone seams, weathered, red, | 80+ | SS | 17.0 | 1 | - | | *** | | | | |
| 68 < | moist, (HARD) | Γ. | | 17.2 | | | * | /80 | m m | | | 19.5 % |
| w | BOREHOLE TERMINATED | | | 11.2 | - | | | | | | | 13.0 70 |
| | _ BONDHOLE TERMINATED | | | | | ***** | | | | | Annual an | |
| | | | | | - | 18 | | | $\vdash \vdash$ | | - | |
| | · | | | | | | | | | | | |
| • | | | | | | ļ | | | | | | |
| | • | | | | | | | | | | | |
| | | | | | 777744 | ļ | | | | | | |
| | | | | | - | į | | | | | | |
| | | | | | *************************************** | | | | | | | |
| | | | | | l _ | 20 | | | $oxed{L}$ | | | |
| | | | | | | 20 | 1 | 4 | 0 | 80 | 120 | |
| | NOTES: | | | | | | 2 | | 60 | | 100 | |
| | 1. BOREHOLE OPEN TO 163 m ON COMPLETION. | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | 2. WATER LEVEL AT 5.2 m ON COMPLETION. | | | | | | | | | | | |
| Marian Statement | | | | 1 | | and a decision of the later of | | | | BO | RELOG.FRA | 1 May-9 |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

DWG NO.6

| | | | JWG NO.0 |
|-----------------------------|-----------------------------|---------------------------------|-------------|
| MGL PROJECT NO.: | S0520 | DRILLING DATE: MAY 10, 1994 | |
| CLIENT: REGIONAL MUNICIPAL | TY OF HAMILTON-WENTWORTH | DRILLING [] SOLID STEM CONTINUO | OUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: [X] HOLLOW STEM | |
| LOCATION: CATHEDRAL PARK, N | AAIN ST @ HWY 403, HAMILTON | [] DIAMOND DRILL; [] | NX or [] BX |
| FLEV DATUM: GEODETIC | | DRILLER: K & S DRILLING | |

| ELEV. | DATUM: GEODETIC | | | DRILL | LER: K. & S DRILLING |
|----------|---|----------|---|----------|---|
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, CL | סאט נ | RAINED S | HEAR ST | RENGTH; MC MOISTURE CONTENT; FL PLASTIC LIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STD PENETRATION TEST MC (%) |
| (m) | | | TYPE | DEPTH | BLOWS PER 300 mm (N VALUE) CU / UNITY |
| | | | | | 0 20 40 60 80 100 120 |
| 87.2 | Grass and surficial vegetation | | | 0.0 | 0, |
| | FILL | | | | |
| 86.4 | silty clay with silt and sand, dark brown to brown, | | | 0.8 | |
| · | rootlets and organics, moist | | | | |
| | FILL | 5 | SS | 1.1 | 18.2 % |
| 85.9 | ash, cinders, sand, organics, decayed plant fibres | | | 1.5 | |
| | and wood, pieces of porcelain and glass, generally | 15 | SS | 1.8 | 11.6 % |
| | grey to black | | | | -2 |
| | (LOOSE TO VERY LOOSE) | | 1 | | |
| | | 14 | SS | 2.6 | 16.1 % |
| | | | | | |
| | SAND AND SILT | | | - | |
| | fine sand sizes, slightly clayey, oxidized brown, | 10 | SS | 3.4 | 20.9 % |
| | clay seams @ 4.0 m | 10 | 00 | 3.4 | |
| | (COMPACT) | 17 | SS | 4.1 | 7.4 % |
| - | (COMPACT) | 1.7 | 33 | 4.1 | 1.4 70 |
| t * | | | | | |
| en 0 | | 10 | 66 | 4.0 | 11.5 % |
| 82.3 | | 16 | SS | 4.9 | 113% |
| | OVERTICAL AND | | | | |
| | SILTY CLAY | 23 | SS | 5.6 | 15.9 % |
| a 1 | layered with silt and sand seams, vertical fissures, | | | | -6 |
| | red shale fragments, trace of gravel, oxidized | | | | |
| | brown to unoxidized grey below 6.1 m, moist to | 28 | SS | 6.4 | 15.8 % |
| | very moist | | | | |
| | (FIRM TO STIFF) | | *************************************** | | |
| | | | | | |
| | A) | | | | |
| | | 15 | SS | 7.9 | _ ₈ 15.3 % |
| | | | | | |
| - | | | | | |
| | • | | | | |
| | | | | | |
| | | 13 | SS | 9.4 | 20.7 % |
| | | 1 | | | |
| | | 1 | | | -10 |
| | | | | | 0 40 80 120 |
| | | | Austria | | 20 60 100 |
| | | | | | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | |
| | | | | | poper oc my |
| - | | <u> </u> | L | <u> </u> | BORELOG,FRM Jun-9 |

LOG OF BOREHOLE NO. 3 (CONT'D)

DWG NO.7

S0520 MGL PROJECT NO.: DRILLING DATE: MAY 10, 1994 CLIENT: REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH DRILLING [] SOLID STEM CONTINUOUS FLIGHT

| | I: REGIONAL MUNICIPALITY OF HAMILION—WENT | TOIC. | | | ING [] SOLID STEM CONTINUOUS FLIGHT | |
|----------|--|--|--|--------|-------------------------------------|--|
| | CT NAME: PROPOSED CSO TANK | | | METH | • • | |
| | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | [] DIAMOND DRILL; [] NX or [] BX | |
| | DATUM: GEODETIC | | | | ER: K. & S DRILLING | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE; AUG AUGER SAMPLE; CL | | T TOTAL TOTA | | · | on the state of th |
| ELEV. | SOIL DESCRIPTION | N | Sample | STRATA | STD PENETRATION TEST MC | |
| (m) | | | TYPE | DEPTH | BLOWS PER 300 mm (N VALUE) CU / Ut | TW TIP |
| | | | | | 0 20 40 60 80 100 120 | |
| 77.2 | Continued from previous page | | | 10.0 | -10 | |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace of gravel, oxidized brown to unoxidized grey below 6.1 m, moist | 7 | SS | 11 | 14.9 | % |
| | to very moist (FIRM TO STIFF) | 12 | SS | 12.5 | -12 | e% |
| | | 12 | 33 | 12.3 | | 70 |
| | | 10 | ss | 14 | 21.3 | % |
| | | | Andrew de la companya de la companya de la companya de la companya de la companya de la companya de la company | | -16 | |
| | | 15 | SS | 17.1 | 20.9 | % |
| | | THE RESIDENCE OF THE PARTY OF T | | | -18 | |
| | SHALE (Queenston Formation) | | | | | |
| | layered with grey siltstone seams, weathered, red, | - | + | 20.4 | 0 40 80 120 | |
| - | moist (HARD) | - | + | 20.4 | 20 60 100 | |
| 67.2 | NOTES: | | *************************************** | 20.3 | | |
| | b) BOREHOLE OPEN TO 20.5 m ON COMPLETION. | | | | nonmod only M | ay-94 |
| L | b) BOREHOLE WAS DRY UPON COMPLETION. | | | | BORELOG.FRM M. | ay - 74 |

MOUNTAINVIEW GEOTECHNICAL LTD. **CONSULTING ENGINEERS**

LOG OF BOREHOLE NO. 4

DWG NO.8

| | | | 2 110.0 |
|----------------------------|-----------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 10, 1994 |
| CLIENT: REGIONAL MUNICIPAL | MY OF HAMILTON-WENTWORTH | DRILLING | [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED C | SOTANK | METHOD: | [] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, | MAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | I | |

ELEV. DATUM: GEODETIC DRILLER: K. & S DRILLING SS SPLIT SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, CU UNDRAINED SHEAR STRENGTH; MC MOISTURE CONTENT; PL PLASTIC LIMIT SOIL DESCRIPTION N SAMPLE STRATA STD PENETRATION TEST M/C (%) TYPE DEPTH BLOWS PER 300 mm (N VALUE) CU / UNIT WI 20 40 60 80 100 120 88.2 Grass and surficial vegetation 0.0 FILL silty clay with silt and sand, dark brown to brown, 87.5 rootlets and organics, moist 0.7 SS 1.1 33.0 % 7 SS 1.8 31.2 % 5 SS 2.6 30.4 % ash, cinders, sand, organics, decayed plant fibres and wood, pieces of porcelain and glass, generally 4 SS 3.4 29.0 % grey to black, possible asphalt shingles @ 5m, black cemented foundry sand @ 6 m, wet below SS 4.1 37.6 % (LOOSE TO VERY LOOSE) 8 SS 4.9 33.7 % 4 5.6 SS 34.4 % 15 SS 6.4 19.5 % 5 61.2 % SS 7.9 5 SS 9.4 16.6 % SILTY CLAY layered with silt and sand seams, vertical fissures, 40 80 78.1 red shale fragments, trace of gravel, oxidized 10.1 60 100 brown, moist to very moist (HARD) BOREHOLE CONTINUED ON NEXT PAGE BOR ELOG.FRM

BOREHOLETERMINATED ON

PRACTICAL AUGER REFUSAL

LOG OF BOREHOLE NO. 4 (CONT'D)

DWG NO.9

BORELOG, FRM May-94

| | | | D 110.7 |
|----------------------------|------------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 10, 1994 |
| CLIENT: REGIONAL MUNICIPAL | TY OF HAMILTON-WENTWORTH | DRILLING | [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: | [] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, | MAIN ST. @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | | |

| | | | | | | | - | 01 2111 | | | 2.0 |
|----------|--|---------------|--|--------------------------|--|-----------------------|--|--|--|--|--------------|
| | CT NAME: PROPOSED CSO TANK | | | METH | IOD: | [] | HOLLO | W STEM | | | |
| LOCA | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | | | ND DRII | L; [| J NX or | [] BX |
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: | K. & | S DRII | LING | | | |
| SS SPLIT | TSPOON; TW THIN WALL SHELBY TUBE; AUG AUGER SAMPLE; CI | december 1990 | de la constante de la constant | N. A. Toronto and Marian | RENC | Same and the party of | AND ADDRESS OF THE PARTY OF THE | And the State of t | THE RESERVE OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TO THE PERSON NA | A CONTRACTOR OF THE PARTY OF TH | CLIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | _ | STI | PENI | ETRATIO | DN TI | 3ST | M/C (%) |
| (m) | | | TYPE | DEPTH | Ш | BLO | WSPER | 300 mm (| N VAL | JUE) | CU / UNIT WI |
| | | | | | | (| 0 20 | 40 60 | 80 1 | 100 120 | |
| 78.2 | Continued from previous page | | | 10.0 | | -10 | | | -γ- | | |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace gravel, oxidized brown, unoxidized grey below 11.6 m, moist to very moist (HARD) | 24 | SS | 11 | | -12 | | | | | 19.5 % |
| | | 12 | SS | 14 | | -14 | | | | | 18.1 % |
| | | | | | | -16 | | | | | |
| | 4 | 7 | SS | 17.1 | | | | | | | 24.2 % |
| - | | 7 | SS | 18.6 | uthebriorierthichte ist erkieft actionisterier met en een een een de state | -18 | | | | | 23.1 % |
| 65.0 | SHALE (Queenston Formation) layered with grey siltstone seams, weathered, red, | | | 23.2 | | -20 | 0 20 | 40 60 | 80 | 120 100 | |
| | moist (HARD) | 1 | | | | | | | | | |
| | MODE (HAND) | | and the second | | | | | | | | |

24.4

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

DWG NO. 10

| | | | DWG 140, 10 |
|-----------------------------|----------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 16, 1994 |
| CLIENT: REGIONAL MUNICIPALT | Y OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSO | TANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, M | AIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | | |

| | DATUM: GEODETIC | | | DRILL | ED. | | | | | | | () NX 0 | . () - | |
|-------|--|---|----------|----------|----------|-----|---------------------------------------|----------|----|----------|----------|----------|---|------------------------------|
| | | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | |
| | SPOON; TW THIN WALL SHELBY TUBE, AUG. AUGER SAMPLE, CL. | | 7 | | ENG | - | | | | _ | | | | and the second second second |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | i i | - | | | | | | | TEST | MA | C (%) |
| (10) | | | TYPE | DEPTH | | | | | | | | ALUE) | | UNIT WT |
| | | | | | | | 0 | 20 | 40 | 60 | 80 | 100 120 | | |
| 89.8 | Grass and surficial vegetation | | <u> </u> | 0.0 | | 0 | - | | | | | | - | 1 |
| | FILL | | | | | | | | | | | | *********** | |
| | silty clay with silt and sand, dark brown to brown, | | | | | | N | | | | | | | |
| | rootlets and organics, moist | | | 0.6 | | | | | | | | | *************************************** | |
| | The state of the s | 4 | SS | 1.1 | | | | | | | | | 30 | .5 % |
| | | • | | *** | | | \parallel | | | | | | | 10 |
| | | 2 | SS | 1.8 | | | - | | | | | , | 45 | .6 % |
| | | L | 33 | 1.0 | | • | ħ | | | | | | 43 | .0 % |
| | | | | | | -2 | 1 | | | | | | | |
| | | _ | | | | | \prod | | | ı | | | | |
| | | 6 | SS | 2.6 | | | 1 | | | | | | 36 | 5 % |
| | | | | | | | | | i | | 1 | | | di |
| | | | | | | | | | | | 1 | | | |
| | | 7 | SS | 3.4 | | | 1 | | | | | | 34 | .6 % |
| | FILL | | | | | | П | | | | | | | |
| | ash, cinders, sand, organics, decayed plant fibres | | İ | | | -4 | + | + | - | \dashv | \dashv | | | l |
| | and wood, pieces of porcelain and glass, generally | | | | | | | | | | | | | |
| | grey to black, wet below 9.4 m | | | | | | 11 | | | | | | | 1 |
| | grey to black, wet below 3.4 In | 4 | SS | 4.9 | | | II. | | | | | | 21 | .2 % |
| | | 4 | 33 | 4.9 | | | | | | | | | 21 | .2 70 |
| | | | | | | | 1 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | -6 | L | | | | | | | |
| | | | | | | 0 | | | | | | | | |
| | | 17 | SS | 6.4 | | | | H | | | | | 45 | 5.5 % |
| | | | | | | | | 11 | | ı | | | | |
| | | | | | | | | II | | | | | | |
| | | | | | | | | Π | | | | | | |
| | | | | | | | | | | | | | | |
| | ** | | 1 | | | | | П | | | | | | |
| | | | | | | -8 | Н | \vdash | | -+ | - | - | 1 | |
| | , | | | | | | | | | | | | | |
| · | | | | | | | | | | | 1 | | | |
| | · | | | | | | - 1 / | | | | 1 | | *************************************** | |
| | | | | | | | | | | | | | | 2 |
| | | 4 | SS | 9.4 | | | H | | | | | | 26 | 5.8 % |
| | | | | | | | | | | | | | | : |
| | | | | | | -10 | П | | 丄 | \bot | | | | |
| | | | | | | 70 | 0 | | 40 | | 80 | 12 | 0 | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | | | | 20 | | 60 |) | 100 | | |
| | DOLLARD COLLECTION OF THE TROP | *************************************** | | 1 | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | _ | | | |
| | | <u> </u> | <u> </u> | . | <u> </u> | | | | | aniones. | BC | RELOG.FR | 4 | May-94 |

LOG OF BOREHOLE NO. 5 (CONT'D)

DWG NO.11

| MGL PROJECT NO.: S0520 | DRILLING | DATE: MAY 16, 1994 |
|--|----------|----------------------------------|
| CLIENT: REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSO TANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |

| | | | | DIVILLE | 2110 | D/11 | | ATER | 10, 17. | / 7 | | |
|-----------------|--|--|--|---------|------|----------------------|---------------|---|---------|--|--|---------------|
| CLIEN | T: REGIONAL MUNICIPALITY OF HAMILTON-WENT | WOR | TH | DRILL | ING | [] | SOLI | D ST | EM CC | IITNO | NUOUS FI | JGHT |
| PROJE | ECT NAME: PROPOSED CSO TANK | | | METH | OD: | [X] | НО | LOV | V STE | M | | |
| LOCA' | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | [] | DIAN | ION | DRI | L; | [] NX or | [] BX |
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: | | | | | ····· | | |
| | rspoon; Tw Thin wall shelby tube, aug auger sample, co | םאט נ | RAINED : | | | | | | | TENT: | PL PLASTI | CLIMIT |
| ELEV. | SOIL DESCRIPTION | Service and Servic | American marketine | STRATA | | Secure Contract Con- | ugistominuo): | No. 20. 10. 10. 10. 10. 10. 10. 10. 10. 10. 1 | RATI | the street of th | educationals proteins - a recold principalists | M/C (%) |
| (m) | | | TYPE | DEPTH | | | | | | | LUE) | CU / UNIT W |
| \- / | | | | 1 | | 0 | | | | • | 100 120 | 100,01111 |
| 79.8 | Continued from previous page | | | 10.0 | | | | 0 4 | | 00 | 100 120 | |
| | FILL | | | 12000 | | -10 | | | | | | |
| | ash, cinders, sand, organics, decayed plant fibres | | | | | | | | | | | |
| | and wood, pieces of porcelain and glass, generally | | | | | | | | | | | |
| 78.2 | | | | 11.6 | | | | | | | | |
| 10.4 | (LOOSE TO VERY LOOSE) | | | 12.0 | | | | | | | | |
| | (LOCOL TO VERT ECOSE) | 1 | | | | | | | | | 1 1 | |
| | | | | | | -12 | | | | | | |
| | SILTY CLAY | | | | | 12 | | | | T | | |
| | layered with silt and sand seams, vertical fissures, | 11 | SS | 12.5 | | | | | | | | 19.8 % |
| | red shale fragments, trace of gravel, oxidized | 11 | 33 | 12.3 | | | | | | | | 19.0 % |
| | | | | | | | | | | | | |
| | brown to grey, beamy unoxidized grey below 17 m | Ì | | | | | | | | | | |
| | moist to very moist | | | | | | | | | | | |
| | (FIRM TO STIFF) | | | | | -14 | | | | | | |
| | | | | | | - 14 | | | | | | |
| | | | | | | | | 1 | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | 29 | SS | 15.9 | | | | , | | | | 14.0 % |
| | | | | | | . 16 | | | | | | |
| | | | | ļ | | -16 | | | | | | - |
| | | | | | | | | | | | İ | *** |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | ŀ | | | | | | | | | | |
| | ~ | į | | | | 4.0 | | | | | | |
| | · | l | | | | -18 | | | | | | |
| | | | | | | | | | | İ | | Andrew Andrew |
| | , | | | | | | | | | | | |
| | | | | | 1 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | SHALE (Queenston Formation) | 1 | | | | 00 | | | | | | |
| 66.2 | layered with grey siltstone seams, weathered, red, | | | 23.5 | | -20 | 0 | | 0 | 80 | 120 | *** |
| 00.3 | | - | + | | 1 | | • | 0. | 60 | | 100 | |
| | moist (HARD) | - | | 23.8 | 4 | | | | | | | |
| | BOREHOLE TERMINATED ON AUGER REFUSAL | | | | | | | | | | | |
| | NOTES: | | | | | | | | | | | _ |
| | 1) WET CAVE TO 8.2 m. WATER LEVEL @ 6.7 m. | | 1 | 1 | 1 | | | | | BO | RELOG.FRM | Jun-9 |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 20

DWG NO. 40

| | | | DWG NO. 40 |
|----------------------------|-----------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 12, 13, 1994 |
| CLIENT: REGIONAL MUNICIPAL | LITY OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED C | SOTANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK | MAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | | |

| ELEV. | DATUM: GEODETIC | | DRILL | | | | | | | |
|---------|---|-------|----------|---------|-------------------|----------------|---------|---------|------------|--------------|
| SS SPLT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CL | סאט ו | RAINED S | HEARSTR | ENGTH; M/C | MOIS | TUREO | ONTENT: | PL PLASTIC | CUMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STD | PENI | STRAT | CION ' | TEST | M/C (%) |
| (m) | | | TYPE | DEPTH | BLOW | SPER | . 300 m | m(NV | ALUE) | CU / UNIT WE |
| 84.1 | Grass and surficial vegetation | | | 0.0 | 0 0 1 - | 20 | 40 6 | 50 80 | 100 120 | |
| | FILL | | | | 1 | | | | | |
| 83.2 | | | | 0.9 | 1 | \ | | | | |
| | rootlets and organics, moist | | | | | $\backslash $ | | | | |
| | SILTY CLAY | 14 | SS | 1.1 | | | | | | 19.0 % |
| | layered with silt and sand seams, vertical fissures, | 15 | SS | 1.8 | | | | | | 19.1 % |
| | red shale fragments, trace of gravel, dessicated | | | | -2 - | + | | ╂╍╌┼╴ | | |
| | and oxidized brown becoming unoxidized grey | | | | | П | | | | |
| | below 2.4 m | 14 | SS | 2.6 | | • | | | | 17.3 % |
| i e | (STIFF TO FIRM) | | | | | | | | | |
| | | | | | | \prod | | | | |
| | | 9 | SS | 3.4 | | I | | | | 21.5 % |
| | | | | | -4 | | | | | |
| | | | | | • | | | | | |
| | | | | | | | | | | |
| | | 7 | SS | 4.9 | | | | | | 242.07 |
| | | / | 22 | 4.9 | | I | | | | 24.2 % |
| | | | | | | | | 1 | | |
| | | | | | | | | | | |
| | | | | | -6 | - | | ╂╼╌┼╴ | | 8 |
| | | 6 | SS | 6.4 | | | | | | 31.6 % |
| | | 0 | 35 | 0.4 | | | | | | 31.0 % |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | ** | | | | | | | | | |
| | , | | | | -8 | | 1 | 1 | | |
| | | | | | | | | | | |
| | • | | | | | | | | | |
| | | | | | | | | | | |
| | | 6 | SS | 9.4 | | | | | | 17.5 % |
| | | | | | | | | | | |
| | | | | | ₋₁₀ L | | | | | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | 0 | • | 40 | 80 | | |
| | | | | | | 20 | • | 60 | 100 | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | ВС | RELOG.FRM | May-94 |

LOG OF BOREHOLE NO. 20 (CONT'D)

| | DWG NO. 41 |
|---|--|
| MGL PROJECT NO.: S0520 | DRILLING DATE: MAY 13, 1994 |
| CLIENT: REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH | DRILLING [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSO TANK | METHOD: [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAMILTON | [] DIAMOND DRILL; [] NX or [] BX |
| THE PLANTS AND ADDRESS OF THE PROPERTY OF THE | |

| CLIEN | T: REGIONAL MUNICIPALITY OF HAMILTON-WENT | WOR | ГH | DRILL | ING | [] \$ | SOLI | D ST | EM C | CONT | INUO | USFL | ıght |
|----------|--|--|---|--|---------|--------|------|-------|-------|--------|--------|-------|--------------|
| PROJE | CT NAME: PROPOSED CSO TANK | | | METHOD: [X] HOLLOW STEM [] DIAMOND DRILL; [] NX or [] BX | | | | | | | | | |
| LOCAT | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | [] | MAIC | MON | D DR | RILL; | [] N | Х ог | [] BX |
| ELEV. | DATUM: GEODEFIC | | | DRILL | ER: | K. & | S DI | RILL | ING | | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CO | וסאט נ | RAINED S | HEAR STE | LENG | ΠH; Μ/ | СМ | oistu | RECO | NTENT | ; PL F | LASTI | CLIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | | STD | PE | NET | RAT | HOL | TEST | ? | M/C (%) |
| (m) | | | TYPB | DEPTH | | BLOV | VS P | ER 3 | 00 mr | n (N V | 'ALUE | 3) | CU / UNIT WT |
| | | | | | | 0 | 2 | 0 4 | 0 6 | 0 80 | 100 | 120 | |
| 74.1 | Continued from previous page | | | 10.0 | | -10 r | · | r | , | · | | | |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace of gravel, desiccated and oxidized brown becoming unoxidized grey below 2.4 m, (STIFF TO FIRM) | 6 | SS | 12.5 | | -12 | | | | | | , | 12.1 % |
| | | 12 | SS | 15.5 | | -16 | | | | | | | 23.4 % |
| | • | | Andreas and the second | | | -18 | | | \ | | | | |
| | SHALE (Queenston Formation) | | 6.0 | 00.5 | | -20 | | | | | | | |
| 63.4 | layered with grey siltstone seams, weathered, red | μ00+ | SS | 20.7 | | | | | | / 30 | ատկ | | |
| | NOTES: | MATERIAL PROPERTY AND ADDRESS OF THE PARTY ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY AND ADD | | | | -22 |) 2 | 20 | 40 | 84 | 0 100 | 120 | |
| | 1) BOREHOLE OPEN TO 20.1 m ON COMPLETION | | | | l | | | | | | | | |
| | 2) WATER LEVEL AT 19.5 m ON COMPLETION | <u></u> | 1 | <u></u> | <u></u> | | | | | B | ORELO | G.FRM | May 94 |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

DYNAMIC CONE PENETRATION **TEST NEAR BOREHOLE NO. 20**

DWG NO.41A

| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 12, 13, 1994 |
|-----------------------------|-----------------------------|----------|----------------------------------|
| CLIENT: REGIONAL MUNICIPALI | TY OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSG | TANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, N | iain st @ HWY 403, Hamilton | | [] DIAMOND DRILL; [] NX or [] BX |
| PLETT DAMENT OF OPPORTS | | DDILLED. | V A C DOUTING |

| LOCAT | TION: CATHEDRAL PARK, MAIN ST @ HWY 403, HAMII | T @ HWY 403, HAMILTON | | | | | | [] DIAMOND DRILL; [] NX or [] BX DRILLER: K. & S DRILLING | | | | | | | | |
|----------|---|-----------------------|-----------------------|--------|------|------|----------|---|--------|-------|-------|-----|---|-----|--|--|
| | DATUM: GEODETIC | | | | | | | | | | | | 4 | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE: AUG AUGER SAMPLE: CL | - | Security Section 1997 | - | LENG | | | | | | | | T | | | |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | - | | | | ****** | ION . | | | M/C (%) | _ | | |
| (m) | | | TYPE | DEPTH | Щ | BLO' | WS PI | | | (NV | | | CU / UNIT | VΓ | | |
| | | | | | | 0 | 2 | 0 40 | 60 | 80 | 100 | 120 | | | | |
| 84.1 | Grass and surficial vegetation | | | 0.0 | | 0 | | | Т | Т | Т | | | | | |
| | FILL | | | | | | | | | 4 | | | | | | |
| 83.2 | silty clay with silt and sand, dark brown to brown, | | | 0.9 | | | | | | | | | | | | |
| | rootlets and organics, moist | | | | | | / | | l | | | | | | | |
| | ATT 0000 A TE | | | | | | { | | | | | | | | | |
| | SILTY CLAY | | | | 1 | | 1 | | | | | 1 | | | | |
| | layered with silt and sand seams, vertical fissures, | | | | | ^ | 1 | | | l | | | | 1 | | |
| | red shale fragments, trace of gravel, dessicated | | | | | -2 | | | | | | | | | | |
| | and oxidized brown becoming unoxidized grey | | | | | | | | | | | | | | | |
| | below 2.4 m | | | | | | | • | | | | | *** | | | |
| | (STIFF TO FIRM) | | | | | | | ş | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | -4 | | | | | _ | | | | | |
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| | | - | | | | | | | | | | | | | | |
| | | | | | | -6 | <u> </u> | | | | | | | 4.0 | | |
| | | | | | | | - | | | | | | | | | |
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| | •4 | | | | | | | | | | | | | | | |
| | | | | | | -8 | - | | | | | _ | | 9 | | |
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| | , | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |
| | | | | | | -10 | 0 | 4 | | 80 |) | 120 | | | | |
| | · | | | | | | | 20 | 6 | | 10 | 0 | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

LOG OF BOREHOLE NO. 21

DWG NO. 42

| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 12, 1994 |
|----------------------------|-----------------------------|----------|----------------------------------|
| CLIENT: REGIONAL MUNICIPAL | TY OF HAMILTON-WENTWORTH | DRILLING | [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: | [] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, | MAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| ELECT DIMENT OF OPPOSITO | | | ** * * * * **** |

| PROJE | CT NAME: PROPOSED CSO TANK | | | метн | OD: [] HOLLOW STEM | | | | | | | |
|--|---|-----------------|-------------------|----------------------------------|---|--|--|--|--|--|--|--|
| LOCAT | TION: CATHEDRAL PARK, MAIN ST @ HWY 403, HAMII | TON | | [] DIAMOND DRILL; [] NX or [] BX | | | | | | | | |
| ELEV. | DATUM: GEODETIC | hillomentaliina | Sicon'i no esta e | DRILL | ER: K. & S DRILLING | | | | | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE: CL | וסאט נ | RAINED S | HEARST | RENGTH; MC MOISTURB CONTENT; PL PLASTIC LIMIT | | | | | | | |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STD PENETRATION TEST M/C (%) | | | | | | | |
| (m) | | | TYPE | DEPTH | BLOWS PER 300 mm (N VALUE) CU / UNIT WI | | | | | | | |
| | | | | | 0 20 40 60 80 100 120 | | | | | | | |
| 91.4 | Grass and surficial vegetation | | | 0.0 | 0 1 1 1 1 | | | | | | | |
| · | FILL | | | | | | | | | | | |
| 90.9 | silty clay with silt and sand, dark brown to brown, | | ļ | 0.5 | | | | | | | | |
| | rootlets and organics, moist | | | | | | | | | | | |
| | | 27 | SS | 1.1 | 14.3 % | | | | | | | |
| | FILL | | | | | | | | | | | |
| | ash, cinders, sand @ 12 m, foundry sand @ 6 m, | 4 | SS | 1.8 | 34.3 % | | | | | | | |
| | organics, decayed plant fibres and wood, pieces | | | | -2 | | | | | | | |
| | of porcelain and glass, generally grey to black, wet | } | l | | | | | | | | | |
| | @ 6 m | 4 | SS | 2.6 | 28.0 % | | | | | | | |
| | (LOOSE TO VERY LOOSE) | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | 4 | SS | 3.4 | 34.5 % | | | | | | | |
| | | | | | _4 _ | | | | | | | |
| e R | | | | | | | | | | | | |
| 4c | | | | | | | | | | | | |
| | | 4 | SS | 4.9 | 42.6 % | | | | | | | |
| | | * | 33 | 4.7 | 42.0 76 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| .6 | | | | | -6 | | | | | | | |
| | | 11 | SS | 6.4 | 5.9 % | | | | | | | |
| | | 11 | 33 | 0.4 | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
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| | • | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 82.0 | | 5 | SS | 9.4 | 20.0 % | | | | | | | |
| | SAND AND SILT | | | 1 |] | | | | | | | |
| | fine sand sizes, slightly clayey, greyish brown, | | | | | | | | | | | |
| | decayed plant fibres, gravel sizes, very moist | - | | | 0 40 80 120 | | | | | | | |
| | (LOOSE TO COMPACT) | | | | 20 60 100 | | | | | | | |
| The state of the s | • | | | | | | | | | | | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | | | | | | | | |
| | | | | <u> </u> | BORELOG, FRM May-94 | | | | | | | |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 21

| | CONSULTING ENGINEERS | | | | | (CC | ONTE |)) | 2000 |), o 43 |
|--------|--|------|--|-----------|------------|--|--------|--------|---|--------------|
| | ROJECT NO.: S0520 | | | I DDU I I | ING DATI | 7. N/AS | 212 10 | 204 | DWG | NO. 43 |
| | | VAD | rij | DRILLI | | | | | NUOUS F | IGHT |
| | T: REGIONAL MUNICIPALITY OF HAMILTON-WENTY | WUK | ın | METHO | | OLLOV | | | 100031 | |
| | CT NAME: PROPOSED CSO TANK TON: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | UTO | N | MEIN | | | | |] NX or | ri BX |
| | DATUM: GEODETIC | 1610 | | DRULI | ER: K. & S | | | 100, [| 1 | |
| | SPOON: TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, CL. | IIND | DAINED | | | | | NTENT: | PL PLASTIC | LIMIT |
| ELEV. | SOIL DESCRIPTION | - | SAMPLE | ****** | | PENE | | | | M/C (%) |
| (m) | | | TYPE | DEPTH | | /SPER 3 | | | *************************************** | CU / UNIT WT |
| (III) | | | | | 0 | | | | 100 120 | |
| 81.4 | Continued from previous page | | | 10.0 | -10 r | | | | | |
| - O2.1 | SAND AND SILT | | | | 10 | | | | | |
| | fine sand sizes, slightly clayey, greyish brown, | | } | | | | | | | |
| 80.4 | decayed plant fibres, gravel sizes, very moist | | | 11.0 | | | | | | |
| | (LOOSE TO COMPACT) | | | | | | | | | |
| | (LOGOL TO COMPTCE) | | | | | | | | | |
| | SILTY CLAY | | | | | | | | | |
| | layered with silt and sand seams, vertical fissures, | | | | -12 | <u> </u> | 1 | | | |
| | red shale fragments, trace of gravel, unoxidized | | | | | | | | | - |
| | grey, moist to very moist | 6 | SS | 12.5 | | 1 | | | | 29.2 % |
| | (FIRM TO STIFF) | | | | | \ | | | | |
| | (* ******) | | | | | \ | | | | |
| | | | | | | \ | | | | |
| | | | | | | V | | | | |
| | | | | | -14 | | _ | | | |
| | | | | | 1 | - 1\ | | . | | |
| | | | | | | | | | | |
| | | | | | | \ | | | | |
| | | | | | | ' | \ | | | |
| | | 39 | SS | 15.5 | | | V I | | | 17.3 % |
| | | 33 | 33 | 13.3 | | | | | | 1,25 % |
| | | | | 16.2 | -16 | | - | | + | |
| 75.2 | | ┼─ | | 10.2 | - | | | | | |
| | CITALE (Ouganston Enemation) | | | | | | | | | |
| l | SHALE (Queenston Formation) | | | | | | | | | |
| | layered with grey siltstone seams, weathered, red, | | | | | | | | | |
| | moist | 1 | | | | | | | | |
| | " (HARD) | | | | | | | | | |
| | | | | | -18 | | + | | + | |
| | · | | | | | | | | | |
| 1 | | 1 | | | | | | | | |
| | , | | | | | | | | | |
| | | | | *** | | | | | | |
| | | | | | | | | | | |
| | | | | 000 | | | | | | |
| 71.4 | | 4 | | 20.0 | -20 | l l | 40 | 80 | 120 | |
| | BOREHOLE TERMINATED ON | | | | 1 | 20 | | 50 | 100 | |
| | PRACTICAL AUGER REFUSAL | | and the same of th | | | | | | | |
| | NOTES: | | u _{an} anananananananananananananananananan | | | | | | | |
| | 1) BOREHOLE OPEN TO 192 m ON COMPLETION | | | - | | | | | | |
| | 2) WATER LEVEL AT 11.6 m ON COMPLETION | | | | | eta de la companya de la companya de la companya de la companya de la companya de la companya de la companya d | | BO | RELOG.FRM | Jun-94 |

KING STREET WEST



e. m. peto associates ltd. soil engineering service - toronto, ontario

| | | 8 | OREHOLE LOG | |
|----------|-------------------|-----------|-------------|---|
| Joh Name | Interceptor Trunk | 62220 | | 2 |

| | | 8 | OREHOLE | LOG | | | | | |
|---|----------------|-----------------------------|----------------|------------------|-------------------------------|-------------|---------------------------|----------------|--|
| Interceptor Trunk Job Name Sanitary Sewer | Job N | 62220 | | | | | D . 1 | | 2 |
| Client of Hamilton | he City Cosin | Auger 4 | -1/2" a | nd 6 | 4 | | Buring | ole No. | Dec. 27, 1962 - Jan. 11/63 |
| Elevation Geodetic 324.9 | Campi | led By A. A. M | <u></u> | | | | | ed By | |
| SAMPLE CONDITION | | SAMPLE | TYPE | | | | | | BREVIATIONS |
| UNDISTURBED . | . A.S. | AUGER SAMPLE | E | | | | v. T. | | ITU YANE SHEAR TEST |
| FAIR | \$.\$. | 2" STANDARD SPLIT BARREL | SPLIT TUE | ESAM | | M. W.L. | ER LEVEL IN CASING | | |
| DISTURBED | S.T. | THIN-WALLED | SHELBY T | UBE S | WPLE | | W.T. | P.L. WET | UND WATER TABLE IN SOIL TER THAN PLASTIC LIMIT |
| LOST | #.3. R.C. | WASH SAMPLE ROCK CORE | | | | | D.T.I A.P.L | P.L. DRIE | ER THAN PLASTIC LIMIT DUT PLASTIC LIMIT |
| SOIL DESCRIPTION | CIALUUR | Dennis of Consistency | Depth. | Lagen | Sample No and Condition | Samuel | No. 14 Birms per Fi | Mediane: | WATER LEVELS & REMARKS |
| Ground surface | | | | here | Condition | | I pro Fi | 3 11 6 41 | |
| Top soil to 12" | Black & Brown | | 0'0" | ~~ | | | | | |
| Silty, sandy loam | Yellowish brow | | - | 1.1.1 | - | <u> </u> | - | - | |
| Silty, sandy clay; sandy | Reddish brown | Stiff to | | | IZ | SS | 1.7. | 27.0 | D. T. P. L. and moist. |
| Med. to fine sand & silty | Brownish red | very stiff | 4'6" | [:] _/ | | | Ţ | 1 | D. L. and moist |
| clay interlayered | Brownish rea | Loose to | 610" | 1 | 12- | SS | 9 | 28.5 | Wet and W. T. P. L. |
| Silty clay, some grits and pebbles sandy silt seams | Brownish grey | Compact_ | | | 3.80 | | 1 | 100.0 | W. T. P. L. |
| peobles sandy sitt seams | | <u> </u> | | 14 |] | <u> </u> | ļ | - | |
| | <u> </u> | | | X | | | | - | Slight water seepage at 9' |
| Silty clay, some g, & p. | Reddish brown | | | 1 | 4 | \$\$ | 1.5 | 25.0 | |
| layers, of sandy silt | | very stiff | ļ | 1 | | | · — | | |
| | | | 14'0" | 1/2 | | j | + | | |
| Silty clay, some g. & p. | | - | | 1/ | 1 | | | | |
| say cray, some g. & p. | Grey with red | Firm | 1 | 44 | 1 5 W | <u>ss</u> _ | | 26.3 | <u>W. T. P. L.</u> |
| Sandy silty clay, grits and | Yellawish_brow | n.Verv | 18'0" | | 6.77 | 2"5 | -l 5. L. | - - | |
| pebbles | | Hard | 19101 | | CZZZ | - | 48/6 | Ā | A STATE OF THE STA |
| Coarse to fine gravel. | | Extremely | ! | 6.0 | 7 | SS | 100/3 | 71 | |
| boulder pieces, some sand | | dense | T | 6.0 | <u> </u> | | 100/3 | 2.7 | .Dry |
| Layer of coarse to med. | Grey & brown | | 23.8. | 1 | - | | | Ţ | |
| | | | | 0.0 | <u> </u> | | | | |
| Coarse to fine gravel, some | | Ditto | | 0.0 | 8 🖂 | SS | 100/6 | 1 2.6 | Dry |
| sano | | | ļ | 0.0 | - | | | | |
| Coarse to medium and | Light brown | | † | 0.0 | 9 X | cs | - | - | Slightly moi st. |
| some fine gravel Coarse to fine gravel and | | | | 00 | | | | | |
| 'sand | Grey and brown | Ditto | 32'0" | 00 | 10 | SS | 100/3 | 1 | Dry |
| | | | 32.0 | 000 | | | | - | |
| | | | | | | | 1 | | |
| Coarse to fine sand | Brown | Dense | | 12.50 | 11 | SS | 39 | 14.7 | 9: |
| | | | 37 16 | | \vdash 1 \times | | 1 27 | 14.7 | Wet |
| | | | 31.6 | 11. | | | | | |
| | | | 40'0" | H: - | | | | 22.8 | Water sample #1 (38'-40') Sand backing up into casin |
| Sandy silt pockets of fine sand | Brown | Very dens | ė | 1. | 12 | SS | 63 | | Q vet. |
| | | | | | | | ļ | 14.7 | |
| | | | | | | | | | |
| Clayey silt with pockets | Grey-brown | Hard | 45'0" | 1./ | 1 | | | | |
| of silty fine sand | orey-ordwit | - Mary | | 4 | 11 | _ss | 37 | 19.9 | D.T.P.L. |
| | | | | | | | | | |
| | | | | | | | L | | |
| Silty clay, with pockets | Grey-brown | Very stiff | | 1 | 145 | SS | 18 | 23.0 | W, T, P. L. |
| of reddish-brown sand | | | -51-3 | <i>7, 7</i> . | X | | | | |
| | | | | 4% | | | ļ | | |
| | | | 55'0" | 1/2 | | | | | |
| Silty clay with grits and pebbles | Grey | Very stiff to hard | | 4% | 15 | SS | 31 | 18.4 | D. T. P. L. |
| *** | | to nard | 57'6" | 14 | | | | | Started using wash water |
| Fine to medium sand | | | | G-1-0-2 | 16 | W, S | | il | Layer of fine to medium |
| pebbles, Silty clay, grats and pebble | Chau | Firm to | 59'6" | 717 | K Z | | - | i | sand; pebbles (57 6 - 59 6- |
| fragments of shale | | Stiff | | 12 | ''X | SS | 8 | 24 ! | M, W T. P. L. |
| | | | | XZ | | | | | |
| | | | | 47 | | | | | |
| As above | As above | Very hard | <u>,</u> | # | 18/2/2 | SS | 56 | 17.2 | D, T, P, L, |
| | changing to | | | XX. | 1 8/77 | | | | Cetting less plastic |
| | grey-brown | | | 45 | | - | | — — | (increasing silt content |
| | | | | 1 | | | | | with depth). |
| Clayey silt, fragments of shale | Grey-brown | Very hard | | LZ. | 20 | SS | 50 | 20. 1 | Slightly plastic |
| | | | 72'10' | Íb | - | | | | |
| | | | | | | | | | Water seepage at 73'6" |
| Weathered shale | Red-brown | Very hard | | | 2112 | | 14111 | 10 | Water sample #2 73'-75' |
| (Queenston shale) | | -cry nard | 77'0" | | 21 | 55 | 144/9 | 10.8 | Slightly moist. Refusal at 77'0" |
| | | | | | | | | | wented at 11.0. |
| | | Test | Hole Te | rmii | nated a | 1 77'0 | ". | | |

4 PETO MACCALLIMITE

LOC OF BORFHOLE No. 1 ca.

| ВО | KING METHOD 4" \$ Solid Steam, | Con | | | Flig | | Auge | | | | LIQU | D LINI | т | | INEER J.F.W. |
|-------|---|--|--|---|--|--|-------|---------|--|-------|-------|--------|------|-----------------|---|
| PETH | DESCRIPTION Borehole No. 1 GROUND ELEVATION: 327.5 | LEGEND | ELEVATION | NUMBER | TYPI. | BLOWS FOOT N - VALUES | DYNAL | HIC CON | IF PENE | TRATE | WATE | | TENT | _₩p _₩ ₩L | GROUNDWATER OBSERVATIONS AND REMARKS |
| 18.0- | Borehole No. 1 CROUNDELEVATION: 327.5 SAND: Compact to loose reddish brown silty fine sand. With clayey silt layers. Becoming brown. Becoming dense reddish brown silty fine sand. Borehole terminated at 18'0". Borehole terminated at 18'0". Borehole No. 2 Ground Elevation: 329.9 CONCRETE SAND: Compact reddish brown silty fine sand with gravel sizes. Becoming very loose. Becoming brown fine to medium sand. Becoming compact reddish brown. Becoming silty with gravel sizes. Becoming silty with gravel sizes. Becoming very dense and dark brown. | | 325 320 315 310 | 1 2 3 3 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 | \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ | 11 6 14 19 10 51/1 222 4 3 18 16 | 2 | | PENETRA MASIFOOD OF THE PENETRA PARAMETERS AND A PENETRA PARAMETERS AND | | ₩p ₩A | | | | Upon completion of augering no water no cave. |
| | | terrentering in the control of the c | THE THE PARTY OF T | | | | | | | | | | | | |

| | 3 | PETO MACCALLUM | M L' | TD. | | *************************************** | 904999********************************* | besitthescottedscottone | | | | LC | og (| OF : | BOI | REH | OLE No. 3 6 4 |
|----|-------|---|-----------|-------------------|----------------------------|---|---|-------------------------|---------|-------|-------------------------|-----|---------------------------------------|---------|--------------|---------------|---|
| | | NAME PROPOSED SEWER C | RUCT | ION | | | | | , | | | | · · · · · · · · · · · · · · · · · · · | JOB | 1 No 77 F 25 | | |
| | | ATION King Street, Ham HING METHOD 4" \$ Solid Stem, | n tinu | ous | Flic | ght A | Auger | :s | BOR | NG DA | TE .F | eb. | 17, | 197 | ENC | CINEER J.P.W. | |
| | | SOIL PROPULE | | | | SAMPL. | S | | R STREE | | | | LIQU | ID LIMI | T | WL | |
| | DEPTH | Borehole No. 3 GROUND ELEVATION: 340.2 | LEGEND | ELEVATION | NUMBER | TYPL | BLOWS FOOT N - VALUES | | | WS/FO | ETRATE STION T OT | | WATE | R CON | | | GROUNDWATER OBSERVATIONS AND REMARKS |
| 10 | 18'0" | SAND: Compact brown silty fine sand. Becoming loose. Becoming dense reddish brown silty fine to medium sand. Becoming compact. Borehole terminated at 18'0". | | 335 | 1 2 3 4 5 7 | SS AS SS SS SS | 28 - 8 8 37 66 | | | | > | | 0 0 0 0 | | D | | Upon completion of augering no water no cave. |
| | ì | Borehole No. 4 Ground Elevation: 361.6 | | | | | | | | | | | | | | | |
| 45 | 9*6*1 | CONCRETE SAND: Compact brown silty fine to coarse sand and gravel. Becoming very loose dark brown silty fine to toarse sand. Becoming compact. SAND AND GRAVEL: Very dense brown fine to coarse sand and gravel. Borehole terminated at 17'5". | | 355 350 345 | 2 3 | \$\$ \$\$ \$\$ \$\$ \$\$ | 17 2 17 68 96 | 11" | | | | | 0 | | | | Upon completion of augering no water no cave. |
| | NOTES | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | | | | |
| | | · | | | | | | | | | | | | | | | CHECKED BY: |

MEMBER OF THE ASSOCIATION OF CONSULTING ENGINEERS OF CANADA

| PETO MACCALLUM LTD. CONSULTING GEOTECHNICAL ENGINEERS LOG OF BOREHOLE No. 5 & 6 | | | | | | | | | | | | | | | | |
|---|--|---------|-----------|--------------|----------|--------------------------|--------------|-----------|------------------|-------------------|--|--|--------------------|--|----------------|--------------------------------------|
| 3 | PETO MACCALLUI CONSULTING GEOTECHNICAL | TD. | , | | | | L |)G | OF | BOF | ŒН | OLE No. 5 & 6 | | | | |
| . 101 | NAME PROPOSED SEWER C | NUCT: | ION | | | | | | | | | | 1/1- | 77 F 25 | | |
| 1 | CATION King Street, Ham | | *** | | | | ~~~ | | BOR | ING DA | TE F | eb. | 17, | 1977 | JUE ENC | GINEER J.P.W. |
| 1 | RING ΜΕΠΙΩD 4" φ Solid Ste . | | | | | | | | | | | | | | | PHNICIAN P.W. |
| <u> </u> | SOIL PROFILE | | | lacksquare | SAMPL | | SHEA | R STRE | NGTH C | 'n | • | | ID LIMI TIC LIN | | W _L | |
| | DESCRIPTION | 8 | LLEVATION | RH | TYPE | BLOWS FOOT N - VALUES | DYNA | MIC CO | NE PEN | ETRATI ATION 1 | ON # | | R CON | TENT | | GROUNDWATER OBSERVATIONS AND REMARKS |
| DIFTH | Borehole No. 5 | LECEND | LE V | NI MBER | È | SWO. | STAN | | enetr. Dws/fo | | fži. • | , | | | | AND REMARKS |
| | GROUND ELEVATION: 355.0 | 630 | | | | az | 2 | () 4 | | 3 N | 0 | | 11 | ONTENT 0 3 |) ^T | |
| | SAND: Loose light brown fine sand. | | | | | | | | | | | | | | | |
| | line sand. | | | H | SS | 6 | | | | | | 0 | | | | |
| | | | 350 | 2 | AS | - | L | | | | | 7 | | | | |
| 6.6. | | 37.16 | l | _3 | SS | 5 | 1 | | | | | \ | | | | |
| | SAND AND GRAVEL: Dense to very dense dark brown | 300 | | 4 | SS | 31 | ` | | | | | | | | | |
| | coarse sand with gravel sizes. | | | | 33 | 1 | | | | | | | 2 | | | |
| | | 9 0 | | 5 | SS | 35 | | 1 | | | | 8 | | | | |
| | sizes. Secoming silty fine to Secoming silty fine Seco | | | | | | | | | | | | | | | |
| <u> </u> | Becoming slity fine to coarse sand with gravel sizes. 7 SS 65 8 SS 40 | | | | | | | | | | | | | | | |
| | a.z.c.a.i | | 247 | 二 | | | | | 1 | | | | | | | |
| 18'0" | Less silty. | 0.0 | | 8 | SS | 40 | | | | | | | | | | Upon completion |
| | Borehole terminated at 18'0". | | | | | | | | | | | " | | | | of augering no water |
| | | | | | | } | - | | | | | | | | | no cave. |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| <u> </u> | | | | \vdash | - | - | - | | | | | _ | | - | | |
| | | | | | | 1 | | | | | | | | | | |
| | Ground Elevation: 352.6 | | | \vdash | \vdash | 1 | | | | | | | | | | |
| d | Glound Sievacion: 332.0 | FE 13/2 | | | | 1 | | ļ | | | | | | | | |
| | SAND: Loose light brown silty fine sand. | | 1 | | | 1 | | | | | | | | | | |
| <u></u> | | | 350 | 1 | SS | 5 | | | | | | | | | | |
| | | | | 2 | AS | 1 - | 1 | | | | | 0 | _ | | | |
| | | | | 3 | SS | 7 | 1 | | | | | | | 0 | | |
| 8*0* | | ¥ 60 a | 345 | 4 | SS | 52 | | | | | | | | | | |
| | SAND AND GRAVEL: Very | | | | 33 |]" | | | | | | | | | |] |
| | dense brown silty fine to coarse sand and | | | 5 | SS | 106 | | | | | | þ | | | | |
| | gravel. | 0.4 | 340 | 6 | AS |] - | | | | | | \mathbb{I} | | | | |
| J | Becoming dark brown fine to medium sand and | 4.0 | | 7 | SS | 85 | | | | ١, | 1 | 9 | | | | |
| 1 | gravel. | 4.0 | | | | 1 | | | | 1 | Ī | | | | | |
| 18'0" | | 3.4 | 335 | - 8 | SS | 60 | | | | V | | 0 | - | | | Upon completion |
| | Borehole terminated at | | | | - | - | | | | | | | | | | of augering no water |
| 1 | 18'0". | | | | | 1 | | † | 1 | 1 | | | | 1 | | no cave. |
| | | | | - | ╂ | - | | | | | | | | | | |
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| - | | | | - | 1 | 1 | - | - | - | - | | + | | - | 1 | 1 |
| | | | | F | | 7 | | | | | | | | | | |
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| | | | <u></u> | 上 | | 1 | <u></u> | <u>L.</u> | <u></u> | 1 | <u></u> | <u></u> | <u></u> | | | 1 |
| MOTES | MOTES: | | | | | | | | | | | | | | | |
| | • | ٠. | | | | | | | | | | | | | | |
| - | | | | | | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | | | CHECKED BY: KK |
| PM1 /50 | u ∰ MEMBER G | E TH | E AS | soc | IATI | ON C | F CC | NSU | LTIN | IG EN | GIN | EER! | OF | CAN | ADA | |

| ******** | | edition in the second | al Production of the Control | DATE OF THE PERSON NAMED IN | | Оср. жиринанов | obsupentatio | | en en en en en en en en en en en en en e | POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY AND ADDRESS OF THE POPER PROPERTY ADDRESS OF THE POPER PROPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPER PROPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY ADDRESS OF THE POPERTY | ×nd-theresesses | poddynnipriery | | CONTRACTOR OF THE PERSON | reministration of the | Control of the second s |
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| = | PETO MACCALLUN CONSULTING GEOTECHNICAL E | M L ENGIN | TD. | | | | | | | | LC |)G | OF I | вон | REH | OLE No. 7 & 8 |
| 108 | NAME PROPOSED SEWER CO | ONSTI | RUCTI | ON | | | | | | | | | ٠. | | 1OB | No. 77 F 25 |
| 1.00 | ATION King Street, Ham | iltor | 1 | | | | | | BORE | NG DA | TE 1 | 7 Fe | b. 1 | | | INEER J.F.W. |
| BOI | ting METHOD 4" o Solid Stem, | Cont | inuc | 2 4 \$. | Flig | ht.A | uger | 8 | | | | | | | | TINICIAN P.W. |
| | SOIL PROFILE | | | | SÄMPL | ES . | SHEA | R STRE | WGTH C | ı | ٠ | | ID LIMI | | | |
| | DESCRIPTION | 0. | ĕ | * | | igg: | | | | | | | ER CON | TENT_ | | GROUNDWATER |
| DEPTH | Borehole No. 7 | LEGEND | ELEVATION | NUMBER | TYPE | BLONS FOOT N - VALUES | STAN | MIC CO DARD P | HE PENI | TION Y | EST + | M.b. | | W | ₩L | OBSERVATIONS AND REMARKS |
| | GROUND FLEVATION: 346.5 | 1 - | 3 | ž | | N. | ١ : | 184.0 20 4 | 3 WS/FO (| OT 8 | 0 | W | TER CC | NTEN | T % | |
| 013" | CONCRETE | 1 | 245 | | | | | | | | | | | | | |
| | SAND: Compact reddish | | 345 | | | | | | | | | | | | | • |
| | brown silty fine sand. | | | 1 | SS | 83 | | | | | | O | | | | |
| | | | | 2 | AS | - | | | | | | L | | · | | |
| | Becoming brown fine to medium sand. | 183 | 340 | 3. | SS | 20 | | | | | | 0 | · | | | |
| | | | | 一 | | | | | | | | | | | | |
| | • | | | 4 | SS | 25 | | l, | | | | O | | | | |
| | | 1XX | | 5 | ss | 26 | | H- | | | | + | | ļ | - | ' |
| | | 13.5 | 335 | Ľ | 22 | 20 | ľ | 17 | | | | 0 | ' | | | |
| | | 5.3 | | 6 | AS | - | | | | | | | | | | |
| | | | | 7 | SS | 23 | | | | | | b | | | | |
| | | | 330 | | | | | | | | | \top | | | | |
| L8'0" | ı | | J | 8 | SS | 20 | | | | | | | | | | tinon samalasta |
| | Borehole terminated at | T | | Ľ | 23 | - | | | | | | | | | | Upon completion of augering |
| | 18*0". | | | | | | <u> </u> | ļ | | | | | | | | no water no cave. |
| | | | | \vdash | | 1 | | | | | | | | | | |
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| | | | | - | ├ | | · | | | | | | | | | |
| | · | | | | | | <u> </u> | $\dagger -$ | | | | | <u> </u> | | | |
| | Borehole No. 8 | | | | ļ | | | | | | | | ļ | | | |
| | Ground Elevation: 336.8 | | | - | | 1 | | . | | | | | | | | |
| | | 4., | | | | 1 | <u> </u> | <u> </u> | | | | | | | | |
| | CLAYEY SILT: Stiff | И | 335 | - | | 1 | | | | | | | | | | |
| | reddish brown clayey silt. | MII | | | | 1 | | | | | | | - | | | |
| | : | | 1 | 1 | SS | 9. | 1 | | | | | | 1 | þ. | | |
| *0"± | | | | 3 | AS SS | 5 | /- | ┼── | | | | - | 1 | - | - | |
| | SAND: Loose brown silty fine to medium sand. | | 330 | 匚 | | 1 | | | | | | | 1 | | | |
| | Time to medium sand. | | | - | SS | 4 | | | | | | | 8 | | | |
| | Becoming dark brown | | | | | 1 | | <u> </u> | | | | | Ц | | | * |
| | fine to medium sand. | | 325 | 5 | SS | 4 | 1 | | | | | | Q | | | Naga paramanananananananananananananananananan |
| | | | | \vdash | 1 | 1 | | 1 | | | | | 1 | | | |
| | • | | | 6 | SS | 5 | 1 | | | | | | ` | φ | | |
| 5'6"1 | | 188 | 1 | - | | 1 | 1 | +- | | | - | - | | # | | |
| | CLAYEY SILT: Hard brown | | 320 | ٦ | | 1 | ` | X | | | | | | | | |
| | clayey silt. | | | 7 | SS | 30 | | 1 | | | | | 5 | 1 | | |
| | | - | ł | | | <u></u> | | | | | <u></u> | L | | | | |
| | • • | W | 315 | | | 1 | | | | 1 | | | 17 | | | |
| 2'0"± | SAND: Very dense brown | ₩₩ | ¥ | 1 | + | 1 | | | | | | 1 | X | | | |
| **** | medium to coarse sand. | | | | |]. | | | | | | / | 1 | | | |
| 4.2. | Borehole terminated at | 1 | 1 | 8 | SS | 79/ | 11" | + | - | - | - | Ø | +- | - | | Upon completion of augering |
| | 24'5". | | | | | 1 | | | *************************************** | | | | | | | no water cave at 21'6". |
| | | | | - | - | - | | | | | | | | | | Lave at Al. 5". |
| | | | | - | 1 | 1 | | | | | | | | <u></u> | | |
| | | | | E | |] | ľ | | | | | | | | | |
| MOTES | | 1 | 1 | | 1 | | <u> </u> | | | L | 1 | | <u> </u> | 4 | | |
| -MJ1ES | • | | | | | | | | | | | | | | | |
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| MEE./50 | MEMBER O | FTH | E A 5 | soc | ITAI | 0 N O | FC | DNSU | LTIN | G EN | GIN | EERS | OF | CAN | ADA | |

| 2 | PETO MACCALLUN CONSULTING GEOTECHNICAL I | | | | | | и |)G | OF. | BOI | ₹EH | OLE No. 9 | | | | | |
|--------------|--|-----------------------|--------------|----------|--------------|---------------|-----------------|----------|-------------------|--------|---|--------------|-------------------|---|------------|-----------------------------|----------|
| 101 | PROPOSED SPWER CO | | | | | | | | | | | 77 F 25 | | | | | |
| 1.00 | ATION King Street, Hami | lton | | | | | | | 2/12/12 | NC DA | or Pe | eb. | 17. | 1977 | | INO | - [|
| BOI | UNG METHOD 4" & Solid Stem, | Cont | inuq | STE | Flig | ht A | uger | В | B6384 | NG HA | \$ \$ \$ 1 mm | | | | | THNICIAN P.W. | - [|
| | ŞOR PROPUL | | | - | SAMPL | | SHEA | K STRE | 101H C | , | A | | ID LIMI | | _WL | | 7 |
| | | l e | Š | ~ | | 15 <u>S</u> 2 | | | | | | PLAS WATE | TIC LIM ER COM | TENT. | We | GROUNDWATER | |
| рыртн | DEZZIELKW | TEGEND | PLEVATION | NUMBER | 34.5. | N VALUES | DYNA | HIC CO | NE PENI PAETRA | TRATI | ON E | Wp | | W | ₩L | OBSERVATIONS AND REMARKS | - |
| | GROUND FLEVATION: 328.8 | 1 = | ana. | ž | · | BLO | , | 0 #4 | J#S/FO |)T | n | 36.4 | TER C | NTENT | <u>,</u> % | | |
| | | 190 | | | | - | | | • | | ř | | | ı i | · - | | \dashv |
| | SAND: Leose brown fine sandy silt to silty | | | | | | | | | | | | | | | | - 1 |
| | fine sand. | | 325 | T | SS | 4 | | | | | | | | 0 | | | |
| 772 | | 111 | - | 2 | AS | - | | | | | | | | | | | |
| | GLAYBY SILT: Stiff reddish brown silty | SS | 15 | 1 | | | | | | | 3 | | | | | | |
| | clay to clayey silt, | $\ \ _{\mathcal{F}}$ | | - | | | | | | | | | | \setminus | | | |
| | becoming brown slayey fine sandy silt. | \mathcal{U} | 320 | 4 | 55 | 13 | | | | | | | | 8 | | | |
| | Tine bands wards | $\ \ _{\ell}$ | | | | | -/- | | | | | | | 1 | | | |
| 12187 | | И | | 5 | -88 | 11 | 1 | | | | | | | فرا | | • | |
| 4.0" | SAND AND GRAVEL: COMPAST | 1 | | | | | . / | | | | | | -/ | | | | |
| | brown soarse sand with | | 315 | 6 | 88 | 18 | } | | | | | Ø | | | | | |
| | fine gravel sizes. | 4.0 | | | | | $\vdash \vdash$ | | | | | | | _ | | | . |
| | | 0.0 | | | | | / | | | | | | \ | | | · | |
| | • | , | | 7 | 88 | 10 | 1 | | | | | | 6 | | | | 1 |
| | | | 376 | - | | | | | | | | | / | | | | |
| | Besoming dense silty fine to searse sand | 0.5 | | | | | - | 7 | | | | | | | | | |
| | and gravel. | 247 | | | | | | | | | | / | | | | | |
| | | 3.10 | 305 | - | | | | \ | | | | / | | | | | |
| 2516# | | | | F | 88 | 47 | | | | | | 6 | | | | Upon completion | |
| | Borehole terminated at | | | | | | | | | | | | | | | of augering no water | |
| | \$5' U". | | Ì | - | | | | | | | | | | | | cave at 19'6". | ٠ |
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| NOTES | | 4 | 1 | + | 1,,,,,,, | dewa | .t | - | * | | *************************************** | A. | 4 | *************************************** | | | 一 |
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| | | | - | | | | | | | · · | | | | | - | CHECKED BY: TE | _ |
| PM1/59: | MEMRER OF | THI | 6 4 5 | an | IATI | an o | F CO | URN | HIFF | GEN | GIN | EERS | OF | CAN | ADA | | |

LOG OF BOREHOLE NO. 20

DWG_NO. 21

| MGL PROJECT NO.: S0858 | DRILLING DATE: OCTOBER 25, 1995 |
|---|---|
| CLIENT: THE REGION OF HAMILTON-WENTWORTH | DRILLING [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED WATERMAIN & SEWER INSTALLATION | METHOD: [] HOLLOW STEM |
| LOCATION: MARKET STREET, HAMILTON | [] DIAMOND DRILL; [] NX or [] BX |
| ELEV. DATUM: GEODETIC | DRILLER: K. & S DRILLING |

| | CT NAME: PROPOSED WATERMAIN & SEWER INSTA | NOL | METH | OD: [] | HOL | LOW | STE | M | | | | |
|----------|--|----------|---|-----------|--|---|-----------------|--------------|--------|---------|----------|--------------|
| LOCAT | TION: MARKET STREET, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX DRILLER: K. & S DRILLING | | | | | | | | | |
| ELEV. | DATUM: GEODETIC | yy. | | DRILL | ER: K. & | S D | RILL | NG | | | , | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE; AUG AUGER SAMPLE; C | RAINED S | HEARSTE | RENGTH; N | A/C M | oistu | RECO | NTEN | T; PL | PLASTIC | CLIMIT | |
| ELEV. | SOIL DESCRIPTION | SAMPLE | STRATA | STI |) PE | NET | RAT | ION | TES | Т | M/C (%) | |
| (m) | | | TYPE | DEPTH | BLO | WSP | ER 30 |)0 mn | ı (N V | VALU | E) | CU / UNIT WT |
| | | | | | | | | | | 100 | | |
| 108.5 | | | | 0.0 | 0 | | | | | | | |
| | 75 mm Asphalt over 150 mm crushed limestone | | | | ľ | | | | | | | |
| | | 1 | | | | l\ | | | | | | |
| | FILL | | | | | | | | | | | |
| | sand with some silt, medium to coarse grained, | 5 | SS | 1.0 | | 11 | | | | | | 14.0 % |
| | clayey, brown, moist, | - | | | | | | | | | | 2110 /0 |
| | (LOOSE) | 7 | SS | 1.8 | | | | | | | | 19.2 % |
| 106.5 | (2002) | ` | | 2.0 | -2 | 1 | | | | | | 13.12 /0 |
| 1 | SAND AND GRAVEL | † | | 2.0 | | \ | | | | | | |
| | medium to coarse grained sand, meduim gravel | | | | *************************************** | | | | | | | |
| | sizes, brown, moist, | | | | A STATE OF THE STA | *************************************** | \ | | | | | |
| | (DENSE) | | | | | | \ | (| | | | |
| 105.0 | (DERSE) | >50 | cc | 3.4 | | | | 1 | 140 | m m | | 5.0 % |
| 103.0 | | 230 | 33 | | | | | | | | | 3.U % |
| | BOREHOLE TERMINATED | | | 3.5 | -4 | | | | | | | |
| 8 | | | | | • | | | | | | | 2 |
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| | | | | | -8 | | | | | | | |
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| | | | | | _10 | | | | | | | |
| | | | | | -10 | 0 | 4 | 10 | 8 | 30 | 120 | |
| | NOTES: | | | | | - | 20 | | 50 | 10 | | |
| | 1. BOREHOLE OPEN TO 2.9 m ON COMPLETION. | | | | | | | | | | | |
| | 2. BOREHOLE WAS DRY ON COMPLETION. | | | | | | | | | | | |
| | 2. BURLIOLE WAS DRI ON COMPLETION. | | | | | | | | | | | VI |
| L. | | | | J | | | and the same of | was a second | | GBO D | ISK # 25 | Nov-95. |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 21

DWG NO. 22

| MGL PROJECT NO.: S0858 | DRILLING DATE: OCTOBER 25, 1995 |
|---|---|
| CLIENT: THE REGION OF HAMILTON-WENTWORTH | DRILLING [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED WATERMAIN & SEWER INSTALLA | TION METHOD: [] HOLLOW STEM |
| LOCATION: MARKET STREET, HAMILTON | [] DIAMOND DRILL; [] NX or [] BX |
| ELEV. DATUM: GEODETIC | DRILLER: K. & S DRILLING |

| LOCA | TION: MARKET STREET, HAMILTON | | | [] | DIAN | ION | D DR | ILL; | [] NX | or |] BX | |
|----------|--|----------|----------|----------|-------|-------------------|---|-------|-----------------|---------|---------|--------------|
| ELEV. | DATUM: GEODETIC | | DRILL | ER: K. & | S DF | RILLI | NG | | | utinan | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, C | RAINED S | HEAR STR | ENGTH; M | KC WK | DISTU | RE CO | NTENT | PL PLAS | STIC | LIMIT | |
| ELEV. | SOIL DESCRIPTION | SAMPLE | STRATA | STI |) PE | NET | RAT | ЮN | TEST | | M/C (%) | |
| (m) | | | TYPE | DEPTH | BLO | WS PI | ER 30 | 00 mm | (NV | ALUE) | | CU / UNIT WI |
| | | | | | (| | | 0 60 | | 100 12 | 90 | |
| 103.0 | | | | 0.0 | 0 | | | | | | . | |
| | 100 mm Asphalt over 175 mm crushed limestone | 1 | 1 | | Ů | | | | | | | |
| | | 1 | | | | | | | ı | | | |
| | FILL | | | | | | | | - 1 | | | |
| | sand with some silt, medium to coarse grained, | 3 | SS | 1.0 | | + | | | | . | | 11.9 % |
| | | 3 | 33 | 1.0 | | $ \setminus $ | | | - | | | 11.9 % |
| | clayey, brown, moist, | | - | | | | | | 1 | | | *** |
| 101.2 | (LOOSE) | 9 | SS | 1.8 | | 4 | | | | | | 15.2 % |
| | | | | | -2 | 1 | | | $\neg \uparrow$ | | 1 1 | |
| | SAND AND GRAVEL | | | | | \ | | | | | | |
| | medium to coarse grained sand, meduim gravel | | | | | 1 | | • | | | | |
| | sizes, brown, moist, | | | | | ' | | | | | | |
| | (COMPACT) | | | | | | \ | | | | | |
| 99.5 | · | 26 | SS | 3.4 | | | à. | | - | - 1 | | 6.0 % |
| | BOREHOLE TERMINATED | | | 3.5 | | | | | | | | |
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| 0 | | | | | | | | | | | | |
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| | | | | | -10 | | | | | | | |
| | | | | | -10 | 0 | | 10 | 84 | 0 1 | 20 | |
| | NOTES: | | | | | | 20 | | 0 | 100 | | |
| | | | | | | | | | | | | |
| | 11. BOREHOLE OPEN TO 2.7 m ON COMPLETION. | | | | | | | | | | | |
| | 2. BOREHOLE WAS DRY ON COMPLETION. | | | | | | | | | | | |
| L | | | | | | wire and the same | *************************************** | | (| BO DISK | ¥ 25 | Nov-95 |

PETO ASBUCIATES LTD. RECORD OF BOREHOLE NO. 4P JOB NO. 73 F 48 JOB NAME Parking Garage - Main Street, Hamilton TECHNICIAN W.J. BORING DATE Mar. 13/73 CLIENT Corporation of the City of Hamilton ENGINEER GDP/APJ BORENOLE TYPE HOLLOW Stem Augus

SAMPLES DYNAMIC CORE PERKETRATION
STANDARD PERFERATION TEST
BLOKEFOOT
BLOKEFOOT TYPED BY jnc GROUND ELEV. 324.3 SOIL. PROFILE DEPTH ELEV 10 20 30 40 50 DESCRIPTION WATER CONTENT % SHEAR STRENGTH C., LB/SQ.FT. A 1000 2000 3000 4000 5000 1 55 1'0" CINDER FILL #4A augered brown sandy silt fill, some gravel. 10' north of 14. Fill to 16'. Boulde Mainly loose sandy fill. 3 55 Ashes and bracks Moist. SAND: Brown fine to medium sand with gravel and boulders. Dense. 309.8 4 SS 4 After sample #4, hole dry. SANDY TILL: Hard dry. 5 SS SAND: Fine to coarse sand, wet below 25' t. compact to dense saturated. Becoming grey brown, pockets of sandy till. After sample 9 SS 32 10 SS 19 SILTY CLAY Grey silty clay. W.T.P.L. Odd pebble, till like, stiff. Reddish brown 13 SS 32 P4 F. = 50 bars PL = 12 bars Firm to stiff clayey silt/silty clay. Mainly silty clay. 18 SS E = 48 bars PL = 10.5 bars Interbedded clayey silt and sandy silt layers CLAYEY SILT TILL: Reddish brown to grey silt till. Hard. A.P.L. Variable gravel content. 87'0":
237.3 SILTY CLAY: Grey clayey silt to silty clay.
W.T.P.L. Silt pockets and seams red and grey.
Stiff. P7 E = 139 bars PL = not de-termined Hollow auger at 95'. W.L. - 25'1" Pulled auger Borehole termina-ted at 97'0" W.L. - 25' s Cave - 35' Installed piezometer

100 F 11 5 W

PAL/504

CONSULTING SOIL ENGINEERS PETO ASSOCIATES LTD. RECORD OF BOREHOLE NO. 5 JOB NAME Parking Garage - Main Street, Hamilton JOB NO.___ 73 F 48 TECHNICIAN W.J. BORING DATE Mar. 9/73 CLIENT corporation of the City of Hamilton ENGINEER GDP/APJ GROUND ELEV. 322.8± BOREHOLE TYPE Hollow Stem Augers TYPED BY jnc SOIL PROFILE DYMANUS COME PENETRATION SAMPLES LIQUID LIMIT STANDARD PENETRATION TEST PLASTIC LIMIT ___ BLOWS/FOOT -WATER CONTENT_ TYPE DEPTH ELEV. REMARKS 20 30 4.0 50 DESCRIPTION WATER CONTENT % SHEAR STRENGTH Cu LB/SQ.FT. 1000 2000 3000 4000 5000 CRUSHED STONE AND FINES. 1 '6" 321. MIXED FILL: Ø 1 88 13 Mixed sand and gravel fill. Bricks, concrete 2 SS 10 slabs, etc. 3 SS 15 CONCRETE SLAB Clayey sandy silt 312.8 4 55 12'0' tfill, wet. 310.8 SAND: Brown fine 5⁻ SS to medium sand, moist, loose. SANDY TILL: Brown 6: SS 39 306.3 SAND: Brown fine to coarse sand, gravel layers. Boulders. 0 7 SS 37 Very moist, Hole dry to compact. 221. W.L. 23'8" الحي. Becoming dark Hole at 25' 8 SS 19 6 0 water - 23'8 brown fine to 0 medium sand. Fine to coarse 9 SS 62 Hole at 30' sand. Saturated, water - 24' tdense. 289.8 SILTY CLAY: Grey silty clay, stiff, A.P.L. 10 SS 32 Stiff, grit content, till like. Silt seams and 11 SS 26 3590 PSF 7 10 pockets. Becoming W.T.P.L. 12 SS 24 After pulling augers, cave - 9' Seams of sandy 13 **8**5 1470 PSF silt. 271.3 Borehole terminated at 51'6" 1

PAL/504

PETO ASSOCIATES LTD. RECORD OF BOREHOLE NO. 6P JOB NO. 73 F 48 JOB NAME Parking Garage - Main Street, Hamilton TECHNICIAN N.J. BORING DATE Mar. 9/73 CLIENT Corporation of the City of Hamilton ENGINEER GDP/APD BORING DATE Mar. 9/73
GROUND ELEV. 322.51
SOIL PROFILE
SAMPLES
STANDARD STANDARD TO TEST
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STANDARD STANDARD TO TEST
STANDARD STANDARD STANDARD TO TEST
STANDARD TYPED BY jnc REMARKS DEPTH ELEV. DESCRIPTION 100p 2000 30Q0 4000 50p0 Hole #6A augered 10' East. After 16 feet of drilling, W.L. - 13'1" MIXED FILL: Sandy fill to 2 feet below. Mixed sand and gravel fill. Bricks, wood, concrete slabs.
Very moist.
Odd boulder. 2 85 After 5 mins. 13'1" cave - 15'1" <u> 185</u> 18 After 22 feet W.L. - 22 5 SS 33

5 SS 35

6 SS SS 35 After 5 mins. 21'8" On pulling augers, W.L. and cave 9'6". 304 SANDY TILL: Clayey 20'0' sandy till, brown 0 Water running \$02.6 SAND: Brown fine to coarse sand. Wet. Hole #6B augered 5' East of #6. After 25' Boulders. After 25' augering, moist at bottom.

5=287 bars | W.L. - 24'8" | Becoming saturated Layers of gravel. 7 SS 23 8 SS 22 9 SS 26 33'0"+ 289 6 SILTY CLAY: Grey silty clay. Stiff. Grits and pebbles. Till BH.#6P 2300 PSF like. W.T.P.L. 10 SS 2 1'0" P2 E = 66 bars PL = 13 bars 11 SS 35 12 SS 2: 13 SS 32 F3 E = 78 bars PL = 12 bars Gravel sizes ▲ 1550 TSF present. 14 SS 15 SS Soft mainly silty clay. Clayey silt/ silty clay. Reddish brown silty sand seams. Interbedded Silty clay F = 71 bars PL = 12 bars 66'6 ± 256. CLAYEY SILT TILL: 17 SS 4 Reddish brown to grey clayey silt till. Hard. Silt seams and pockets. 18 SS Variable gravel content. Te6 Ph = 127 bar 1,9 SS 245 SILTY CLAY: Grey clayey silt to silty clay.
W.T.P.L. Silt pockets and seams. Red and grey. Stiff. 22 SS 23 SS 31 P7 P7 E = 58 bars PL = 17 bars 224 Borehole termina-ted at 98'0" PAL/504

PETO ASSOCIATES LTD. CONSULTING SOIL ENGINEERS RECORD OF BOREHOLE NO. 7 Parking Garage - Main Street, Hamilton JOB NO. 73 F 48 JOB NAME TECHNICIAN W.J. BORING DATE Mar. 19/73 CLIENT Corporation of the City of Hamilton ENGINEER GDP/APJ GROUND ELEV 321.8± BOREHOLE TYPE Hollow Stem Augers TYPED BY jnc DYNAMIC CONE PENETRATION BLOWS/FOOT SOIL PROFILE SAMPLES LIQUID LIMIT STANDARD PENETRATION TEST BLOWS/FOOT PLASTIC LIMIT ___ TYPE WATER CONTENT___ OEPTH ELEV. REMARKS DESCRIPTION 20 30 4.0 SHEAR STRENGTH Cu LB/SQ.FT. WATER CONTENT % MIXED FILL: Mixed sand, silt, bricks, etc., loose, moist to wet. Sandy fill. 1 SS 5 9'8" 10'4' + OLD BASEMENT FLOOR 2 55 SAND: Brown, fine to medium sand. Compact to dense, odd pebble. Moist. _3 SS 62 No free water to 24'. Hole at 25' 21'0'± 300.8 SAND: Grey brown W.L. @ 23'8" 4 SS 57 Hole at 31' fine to coarse W.L. @ 23'8" sand, vet. Y. Tock water Compact to dense. sample. Saturated. 5 SS 35 pH = 6.8 $S0_3 = 480 \text{ ppm}$ Mililly acg-🕅 ressive. 6 SS 47 3112 31 . 6 . 18 Hole at 31' 290.4 SILTY CLAY: augers at Grey brown to Sand backed grey silty clay. to 281. A.P.L. Very stiff. 7 ss 24 Bailed to 26'10". 2 mins. later 26'2". 6 mins. later Odd pebble. 8 SS 21 25'3". Becoming W.T.P.L. 10 mins.later 24'8". Stopped Reddish grey. 9 TW checking. Push Sandy silt to On completion silty sand layers. installed 10 SS piecometer 29' to 31' W.L.-23'3" Borehole terminated at 50'0" initially. May 16/73: W.L. 23'4"

PAL/504

| | 1.1 | • |
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RACEY, MACCALLUM & BLUTEAU LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: (3) King St.W.

Project: Proposed Sanitary & Storm Sewers LEGEND Split spoon

Location: King St.W., Hamilton, Ont. Hole Location: See Drawing No. 1

Hole Elevation and Datum: 320.8

Shear Strength (C)

Wash sample Shelby Tube

Unconfined compression Vane test and sensitivity (5) Penetration Resistance (P) 2" Split tube 2" Dia. Cone

Start Date: March 11/71 Prep .: P.H.

M Care sample

| Symbol | DESCRIPTION | ELEV. | 1 | STRENGTH AND | PENETRATION | | Somple |
|------------|--|-------|---|--------------|---|---|---------|
| | | FEET | FEET | С | | P.S.F. | No. |
| | | 320.8 | 0 - | 20 | 40 60 | BLOWS/FT. | |
| 25.48 | Asphalt & Concr.Base | 319 | - | | | | |
| 2. *** * . | · · | | | | | | |
| | Sand-dense to very | | | | | | |
| | dense; silty; fine to medium; reddish | } | | | | | SSI |
| | brown to grey; moist | 1 | | | | | Ħ |
| | becoming wet below | 1 | | | | | |
| | approx. 24 ft.depth. | | 10- | | | | 552 |
| | | | | | | | 4332 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | 583 |
| | | | | | ::::::::::::::::::::/\$ | | |
| | | | 1 | | | | |
| | Conglomorate layer at approx. 20 ft. | | 20- | | | | 554 |
| | denthx | | | | | | |
| | w | 297 | | | | | |
| | W.L= | 1 | | | | | SSS |
| | | | | | | | P |
| | | | | | | | |
| | | | 30. | | | | |
| 12.000 | End of Borehole | 289.3 | | | $\mathbb{H}\mathbb{H}\mathbb{H}^{2}\mathbb{Q}$ | | SSE |
| | Notes: | | | | | | |
| | l. Borehole advance | | | | | | |
| | using flight | 1 | | | | |] |
| | auger equipment. | · · | | | | | |
| | 2. On completion, | D-05 | | | | | 1 |
| | hole open to | | | | | | |
| | approx. 23 ft. | | | | | | |
| | depth. | | 1 | | | | |
| | 3.*Layer of conglom | 4 | 1 | | | | |
| | orate gravel | | | | | | de a de |
| | encountered at | | *************************************** | | | | |
| | 20 ft. depth; | | | | | | |
| | difficult to | | | | | |] |
| | penetrate by | | | | | | |
| | auger. | | 1 | | | | |
| | | | | | | | |
| | , | | | | | | 1 |
| | | 1 | 1 | | | *************************************** | 11 |

Order No. .\$3831/H551

Enclosure No.

RACEY, MACCALLUM & BLUTEAU LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: (5) King St.W.

Project: Proposed Sanitary & Storm Sewers LEGEND

Location: King St.W., Hamilton, Ont. Split spoon Hole Location: See Drawing No. 1

Hole Elevation and Datum: 323.4

Stort Date: March 12/71 Prep.: P.H.

Wash sample Shelby Tube

Unconfined compression Vane test and sensitivity (5) Penetration Resistance (P)

2" Split tube 2" Dia, Cone

Shear Strength (C)

| d Date | e: 11 11 Checked: D | , D , | | Core sample | Casing | | ~ |
|--------|---|------------------------|---------------|--------------------|--------------------|---------------|--|
| ymbol | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENET | P.S.F. | Sample No. | Recover |
| | | 323.4 | 0 . | P 20 40 | BLOWS/FT. 60 80 | | |
| | Asphalt & Concr.Base | | | | | | |
| | Sand-loose, fine to medium; reddish | , | | | | 75 S 1 | |
| | brown; moist; (probably fill to | | | | | | |
| | approx. 16 ft.depth) | | 1,0 - | | | 552 | |
| | | | | | | | |
| | | | | | | 583 | |
| | | 304. | 20 . | | | | |
| | Refusal on conglom- orate layer of sand | | | | | | |
| | and gravel. | | | | | | |
| | | | | | | | |
| | Notes: | | 30 - | | | | |
| | Borehole advanced to 19'6" using flight auger | | ٠ | | | | |
| | equipment. | | | | | | |
| | 2. Refusal to auger- ing encountered | | | | | | |
| | at approx. 19'6" depth. | | | | | | |
| | | | | | | | |
| | | Annual Printed Printed | | | | | |
| | | | | | | 1 | - Andread Angle - Angl |
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| Order | No | S | 38 | 3 | 1 / | Ή. | 5 | 5 | ì |
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| | | | | | | | | | |

Enclosure No.8

RACEY, MACCALLUM & BLUTEAU LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 6 King St.W.

| Project: Proposed Sanitary & Storm | Sewers | LEGEND | | |
|--------------------------------------|--------|----------|--|---------|
| Location: King St.W., Hamilton, Ont. | Spli | t spoon | Shear Strength (C) | • |
| Hole Location: See Drawing No. 1 | ⊠ Was | h sample | Unconfined compression Vane test and sensitivity (\$) | +* ⊕ |
| Hole Elevation and Datum: 325.4 | 573 CL | · · · | Penetration Resistance (P) | |
| Start Date: March 15/71 Prep.: P.H. | ☐ She | lby Tube | 2" Split tube | -0-0 |

| ymbol | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENETRATION RESISTANCE Sample P.S.F. No. | Recover |
|-------|---|--|---------------|---|--|
| | Asphalt & Concr.Base Sand-loose; fine to | 325.4 324 | 0 _ | P BLOWS/FT. 20 40 60 80 | |
| | medium; reddish brown; moist (probably fill). | 317 | 10. | S\$2 | |
| R. | Layer of conglomor- ate sand and gravel; approx. 9" thick at 17 ft. depth; under- lain by sand & grave End of Borehole | | 20_ | Refuse! ss4 | |
| t | Notes: 1. Borehole advanced to 17 ft. depth using flight auger equipment | | 30_ | | Proprior and a state of the sta |
| | together with conventional wash boring technique for breaking through the conglomorate layer. | | | | side Passellität niegella, nieder in seillemmidden unfolkte, mellet den de dergeste Auflete |
| | On completion, hole dry and open to 21 ft. depth. | | | | Agen, illen de Adel service service de competent de la Adel affrés de Adel a |
| | | lar-to-cho-ch delay-protectives in the | | | |

KING STREET WEST



Log of Borehole 1

| Project No. | HAGE-0060496-A | | | | | | | | | | | | | | | | | | E | Эrа | wir | 19 1 | lo. | | | 4 | |
|--|--|---------------|-------|--|--|--|--|---|--|--|---|---|--|--|--|--|---|--|--|--|--|--|--|--|---------|--|--|
| Project: | Geotechnical Investigation - F | Propose | ed_ | Se | w | er | ar | nd | W | ate | em | na | in | Co | ns | tru | cti | or | | | | | | | | | |
| Location: | James Street (King Street to | | | | | | | | | | | | | | | | | | | | | | | - | | | |
| Date Drilled: Drill Type: Datum: | May 12, 2001 Truck Mount | 2170-4540-464 | _ | SP Dy Sh | T (N nam elby | i) V ic C Tui | nple alue cone be e Tes | Tes | a | | - | | | | | Na Pl Ur % | itura astic | Man an ned in a | oistu d Lk I Tria t Fa | ine quid axia iliun | l Lim | | ling | | - | | |
| SY M 80- | Soil Description | ELEV. | DepTH | | Shea | 20 vr St | rengi | | N V | /aius | 603 | | BO | ME | `a | c | - 1 | 250 | | 50 | 30 | eadin ? Contex Ory W | 50 | | SAMPLES | N. | aturat Unit 'eight |
| ASP | PHALT: - 290 mm thick | 96.14 | 0 | + | H | H | H | 0 | 1 | -+-} | 1-1 | 1-1- | 0.2 | H | | H | 11 | 10 | 11 | 7 | 0 | | 30 | H | 5 | k | N/m³ |
| FILL V150 FILL | : Sand and gravel, brown, moist, ~ mm thick :: Sitty sand, reddish brown, fine ned, some day, moist, very loose to | 95.85 | 1 | | 5 | | | | | | | | | | | | | × | × | | | | | | | | de en en en en en en en en en en en en en |
| | D: Light brown, fine grained, layered, sand seams, moist, compact to dense | 93.84 | 3 | | | | | | | | | | | | | | * | | | | | | | | | | |
| | BOREHOLE TERMINATED | | - | | | | - | 4 | | | | | | | | | | | | | | | | | | - | |
| 2. U wate | orehole was advanced by solid stem er equipment to a termination depth of m on May 12, 2001. pon completion of drilling, no cave, no er. | | | | A VERTANDEN FOR THE CONTRACT OF A CONTRACT OF THE PART OF THE PART OF THE CONTRACT OF THE CONT | *************************************** | epaktup felk kelikus diseberakan kepaktuan kemin disebak kelikus kelikus kelikus disebak dan denak kelifik Kelikus capatan opian disebah disebak disebakan penak opian kelikus disebah kelikus disebah penak penak penak | | | e de comita de la compansa de como de | 4. 90.0 (11).003.40.000 (1,000.0000 0000 0000 0000 0000 0000 0000 | a de estreta de 11 em hadra de tras de el arrado en las explosivos de la restra de desente de la composición d La composición de la compositión de la composición de desente de desente de la composición de la composición d | CONTRACTOR DESIGNATION AND ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY | manden de la companya de la companya de la companya de la companya de la companya de la companya de la companya | ede facilitate enables to be the Control and government of the Control of the Con | | esse per e recommençar perspera menera mejerme perspera menegam oppjæra i remacepper en mess A meneral delesión ha consecuención deletá escar delega un excesa constanta del persona del mesma l'emmana de | | e francisco de la companio del la companio de la companio de la companio del la companio del la companio de la companio de la companio del l | والمعارضة والمارضة والمراجعة والمعارضة والمناولة والمناولة والمناولة والمناولة والمناولة والمناولة | Consideration of Consideration of the consideration of the constitution of the constit | A COMMENT MATERIAL CONTRACTOR CON | Andread State of the Company of the | | | | *************************************** |
| 4. U in.) 6 3.5 i dept | hole methane reading using MSA osimeter: 0% methane. pon completion of drilling, 19 mm (3/4 fiameter P.V.C. standpipe installed to m depth, screened portion 2.6 to 3.5 m h, bentonite seal 0.2 to 1.1 m depth asphalt patch from 0 to 0.2 m depth. | | | والمرابعة والمرا | en de la composition della composition della com | end migration and become surrent and conference and and an analysis of the surrent and an analysis and an anal | n in ein in der der dem der dem dem dem dem dem dem dem dem dem dem | | | THE THE THE THE THE THE THE THE THE THE | entre de la compression della compression della compression della compression della compression della compression della | AMERIKAN MENERATUKAN M | AND THE PARTY OF THE THE THE PARTY OF THE PARTY OF THE THE PARTY OF THE PARTY OF THE THE PARTY OF THE PARTY O | ontales ancientales les exposes en consentantes en la consentante en la consentante de la composition de la co La copies entres el consentante en consente en la consente de la consentante de la consentante de la consentante | en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de | en eine van eine eine eine eine eine eine eine ei | am de de de la company | AND THE PROPERTY OF THE PROPER | en er en en er en en en en en en en en en en en en en | (44) 1444 1484 1484 1497 1497 1497 1497 1497 1497 1497 149 | e den er de de de de de de de de de de de de de | e desent en en en en en en en en en en en en en | ara kara ara marana da kara tahunga bila bahan bila bahan kanan da kara ta da da da ta ta ta da da ta da da ta | A STATE OF THE STA | | We consider the construction of the constructi | AMERICAN PARTIES AND AND AND AND AND AND AND AND AND AND |
| | | | | And the state of t | ner manmann servan servan servan en cercara manta servana a sala servana a servan esta esta esta esta esta est | elymanistrature procured rights are according to the control of th | the state of the s | manamental de la compresa de la compresa de la compresa de la compresa de la compresa de la compresa de la comp | A COMPANY OF THE COMP | e de mente de la company de deserva de la company de la company de des de deserva de de de la company de la compan | Consequent (as a beginning of the bar on the bar date from a retain of about the con- | and the strategy of the depth states and the states of the party of the states of the | The second section of the second section is a second section of the second section of the second section secti | And were as with a second-second states as were the | the administration draw is a selection to the second | eriorina directionario della colori di colori di colori della della della della della di colori di colori di c | THE THE PERSON OF THE PERSON PROPERTY OF THE | | | MAN OR OF THE PARTY OF THE PART | and the state of t | Annual terretario de la companya della companya del | marries estimated commercial or or commence of the commercial or other commercial or o | | | | |



Trow Consulting Engineers Ltd.
428 Millen Road
Stoney Creek, Ontario, L8E 3N9
Telephone: 905-664-3300
Fax: 905-662-4144
E-Mail: hamilton@trow.com

| Time | Water Level (m) | Depth to Cave (m) |
|--------------|-----------------------|-------------------------|
| June 1, 2001 | 3.50 | |

Borehole Log

Auger Sample

SPT (N) Value

Natural Moisture



| b Vane Tes | Penetrometer | A | Hole | Hamilton, Ontario Project No. H4596 | G |
|---------------------------------------|---|----------------|-------|-------------------------------------|--------------------------------|
| ' · ; | Soil Description 0.3 m TOPSOIL SAND-reddish brown to brown, stratified frequently silty | ELEV. 99.83 | - Im | | Natur Unit Weigl KN/m |
| | occ. wet seams, loose | | 1 2 3 | | |
| · · · · · · · · · · · · · · · · · · · | SAND & GRAVEL-brown, very | 95.8 | 4 | | |
| D | - - - | | 5 | | |
| 0 | | | 7 | | |
| t | TLTY CLAY TILL-grey,with races of sand & gravel, ery stiff | 91.3 | 8 | | |
| | TERMINATED c | 90.2 | 10 | | |

Log of Rorehole RH16

| Sheet No. 1 of Hughson St. N., King St. E. to King William St., City of Hamilton, Ontario Apper Sample Sept. 2, 2004 Sept. 2, 2004 Sept. 2, 2004 Sept. 3, 2004 Sept. 4, 2005 Sept. 2, 2004 Sept. 2, 2004 Sept. 3, 2005 Sept. 4, 2005 Sept. 2, 2004 Sept. | roject No. | SPB481-3 | /5 U | | | | | - Janes | | nannokuoma. | Dra | wing N | lo. | | 3 | |
|--|--|---|-------------------------|--|--|----------------------------------|------------|----------|----------|--------------------------------------|---|------------------------|---------------------------|------------|------------------------|--|
| Hughson St. N., King St. E. to King William St., City of Hamilton, Ontario Auger Sample SPT (N) Value O S | roject | Geo-environmental Inves | tigation | | *********** | manusiusi suu | | | | | | | | | | |
| Sept. 2, 2004 Sept. 2, 2004 Dynamic Cone Sept. Nature Moditure X Pastic and Ended Linkt Cone Sept. Showly Tube Pastic and Ended Linkt Cone Sept. Showly Tube Pastic and Ended Linkt Cone Sept. Showly Tube Pastic and Ended Linkt Cone Sept. Showly Tube Pastic and Ended Linkt Cone Sept. Showly Tube Pastic and Ended Linkt Cone Sept. Showly Tube Pastic and Ended Linkt Cone Sept. Soft Description ELEV Sept. 20 | ocation: | Hughson St. N., King St. | E. to Kin | g W | lliar | n St | , Cit | y of H | amilto | on, Or | | | | | | |
| Sol Description ELEV M Sol De | ete Drilled: rill Type: stum: | Hollow Stem Augers | | SP _ Dyn SA - Fen See | T (N) Serie Sery Ti Series Series | /akue Come Ti de e Tost | | 0: | | Natura Pastic Undrai W Stra | i Moestun and Liqu red Tries in at Fak | t Hd Llmit Incat | ding | × | | |
| Soft Description Soft Description ASPHALTIC CONCRETE: 150 mm CONCRETE 200 mm GRANULAR BASE: 50 mm, crusher run limestone FILL: silty sand to sandy silt, brown, moist, compact SAND: coarse to medium grained, some silt seams, brown, moist, very dense | I | | and a magazine how here | F*#3 | toriel | ist Wes | | | | | | etionis on Law Society | adrianiya Quinda Sani | ,,,,,,,,,, | | |
| ASPHALTIC CONCRETE: 150 mm CONCRETE: 200 mm GRANULAR BASE: 50 mm, crusher run limestone FILL: silty sand to sandy silt, brown, moist, compact SAND: coarse to medium grained, some silt seams, brown, moist, very dense | 27 2 2. 2. 3. 3. 3. 3. 3. 3. 3. 3 | Sof Description | m | | Zi Salay S | ewgle | Ø | 59 | A,50.748 | Nat | SO S | O0 7 Ura Canta | 50 N % | | Natur Urail Weig | |
| run limestone FILL silty sand to sandy silt, brown, moist, compact SAND: coarse to medium grained, some silt seams, brown, moist, very dense | XX ASP | CRETE: 200 mm | 96.16 | | | | | | | | | 2 | 50. 1931 1931 | Ž. | Krev | |
| SAND: coarse to medium grained, some silt seams, brown, moist, very dense | ∰ run l FILL | mestone silty sand to sandy silt, brown, | | | 0 | | | | | | X | | | | | |
| SAND: coarse to medium grained, some silt seams, brown, moist, very dense | | | | | | | nervis.com | | | | | | | | | |
| some silt seams, brown, moist, very dense | X | | 93.86 | A A STATE OF THE S | S. Commission | nga daga kapa sang s | | | | | × | | | N | | |
| 사용 그들은 그는 그는 그는 그는 그는 그는 그는 그들은 그는 그들은 그는 그들은 그는 그들은 그는 그들은 그는 그들은 그는 그들은 그는 그를 그는 그를 그를 그 때문에 모든 그를 다시다. | some | sill seams, brown, moist, very | | de la companya de la | and the second s | | | o | | × | | | | | | |
| | | | 2:55 | | | | | 0 | | × | | | | K | | |
| | | | | | | | | | | | | | | | | |

Borehole BH16

| Time | Water Level (m) | Depth to Cave (m) |
|---|-----------------------|-------------------------|
| on completion | dry | 3.0 |
| *************************************** | | |
| | | : |

| <u> </u> | ĝ | SOIL PROFILE | | | s | AMP | LES | | GA | CENT: ppm | ration } | ₩ ⊕ | HYD | RAULI | C COND | UCTIVIT T | 1 | |
|-----------------------|---|---|---|---|---|----------------------|------------|--------------|----|--------------|-------------|-----|-----|-------|--------|--------------|---|------------------|
| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | RI OWS/D 3m | RECOVERY % | LAB. TESTING | ×u | 1 | <u> </u> | | WAT | ER CC | | PERCEN | เห | STALLATIONS 2 |
| - 0 - 1 | CME 55. TRUCKMOUNTED AUGER 114mm HOLLOW STEM AUGERS | GROUND SURFACE 80mm PAVING STONE. SAND and GRAVEL. (FILL) Dense, brown, SANDY SILT; trace brick fragments, cinders. (FILL) Loose, brown, SILTY SAND; trace topsoil, occasional gravel. (possibly FILL) Loose, reddish-brown, SANDY SILT; trace clay with sand layers. Compact, brown, fine to medium SAND; trace silt, occasional gravel. Compact, brown, SAND and GRAVEL. | 9.09.05.05.05 (1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1. | 95.74 0.60 94.19 2.15 92.69 3.65 | 2 S C S C S C S C S C S C S C S C S C S | 00 00 00 00 | | | | | | | | | | | NOTE: Borehole dry during drilling. | |
| . 7 | | GRAVEL. END OF BOREHOLE | ପଟ୍ଟପଟ ୨୫୧୫ | 90.55 | 5 C | 0 O | | | | | | | | | | | | |

| | | ION: SEE PLAN FIGURE 1 DIP: | | | | | | 80 | ORI | NG D | ATE: | 10/27 | /94 S | IAMPI | LER HJ | AMMER | | SHEET 1 OF DATUM: LO .5.kg: DROP, 760 in | CAL . | |
|---|--------------------------|---|-------------|-----------------------|-----------|---|------------|--------------|-----|------|-------|---------|----------|-------|--------|----------|------|--|----------------|----|
| METRES METROD | | SOIL PROFILE DESCRIPTION | STRATA PLOT | ELEV. OEPTH (m) | NUMBER | | BLOWS/0.3m | PECOVERY % Ø | 4 | | (ppm | TRATION | 0 | WATE | R CONT | ENT, PER | CENT | INS 1 | TALLATION 2 | 1S |
| TO I I O CARE SS TRUCKMOUNTED ALUGER CARE SS TRUCKMOUNTED ALUGER CARE SS TRUCKMOUNTED ALUGER A 2 2 2 2 3 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 114mm HOLLOW STEM AUGERS | Compact, brown, fine to medium SAND; trace sllt, occasional gravel. | | 90.97 | 3 3 5 7 8 | \$\frac{1}{2}\$ \$\ | 10 | | | | | | | | | | | NOTE: Borehole dry during and following drilling. | | |
| DEPTH | | SCALE (ALONG HOLE) | <u></u> | <u></u> | | | | | T | | | Ass | | | | | | | LOGGE | |

| Pinjer Prnjec Locatii Piole | ST ENGINEERING MPROPOSED SEWERS | NORTH VERTI | CAL | 2° D' Balti Yube 2° 3° I O Bhothy Tube Refery Core Bample Auger or Weeh Sample 2° Dre Cone Field Vane Freecure Matter Description of Compression Understand Triaval at Overburden Pressure Semple: Pushed (greecure) P() Brein al Failte | the control of the co |
|--|--|----------------------------------|--------------|--|--|
| Symbol | Description Classification | Elevation | Depth | Paracration Reseasance N. 350 ft be blooms/11 Nortical Photo: Content & Attendary Lends 10 20 30 40 Reseasance 10 4 40 Sample Type & Number Record | / |
| | FILL, sandy gravel SAND, some silt | 94.47 94.17 | 0.10 | | |
| The second secon | loose, reddish-brown, wet occasional coarse sand se | ams | 1 | | |
| | | | 2 | 1 100 | |
| And the state of t | | | 3 | 2 100 | |
| | GRAVELLY SAND, some silt cobbles and boulders very dense | 90 . 46 89 . 57 | 4.11 5.00 | 62/275mm 3 100 | |
| | SILTY SAND, layered, wet brown, very dense | 88.63 | 5.94 | 53 4 100 | |
| | BOREHOLE TERMINATED | 88.02 | 6.55 | | |
| | Noise ¹ . Free water encount | ered 0 6. | 5m. Lev | vel observed @ 5.0 m on completion. | |
| ٠ | 2. Borehole was back | filled or | complet | tion of the fieldwork. | |

-

Borehole #: A

Project No: TB99002G

Project: Storm Sewer Construction

Client: Reg. Mun. of Hamilton-Wentworth

Location: King & Wainut St., Hamilton

Prepared By: M. Lettch

| Depth (m) | Symbol | Description | Elevation (m) | Number | Туре | Blows/30 cm | Stand | Blow | V6/30 | | ٠ | | oisture 8 21 | | | |
|-----------|--------|--|---------------|--------|------|-------------|-------|------|-------|---|---|---|-----------------|---|---|---|
| 0- | | Ground Surface | 94,9 | | | | | T | | | | | | | T | |
| 2- | | PAVEMENT STRUCTURE 13 cm of Asphalt, over 38 cm of Concrete. | 94.4 | | | | | | | | | | | | | |
| 1 | | | | 1 | \$S | 7 | 7 | | | | | 1 | | | | |
| | | SILTY SAND FILL Brown, organic seams 1 to 5 | | 2 | SS | 4 | | | | | | | 1 | | | |
| 2. | | mm thick, possibly native from 2.3 m (±), most, loose. | | | | | | | | | | | | | | |
| | | | | 3 | SS | 4 | • | | | | | | 1 | | | |
| 3. | | | 91.5 | 4 | 88 | 5 | | | | | | | 4 | | | |
| | | SAND | | | | | | | | | | | | | | |
| | = | Brown, fine to medium sand, traces of gravel, moist, spoon wet at 4.6 m, loose to compact. | | | | | | | | | | | | | | |
| | | | 89.8 | 5 | ss | 22 | | \\ | | | | _ | <u> </u> | | | |
| | | Borehole Terminated | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | |
| | 1111 | | | | | | | | | | | | | | | |
| 7 | 1 | Version of the second s | | | | | | | | | | | | | | |
| | 3 | | 1 | | | 1 | 2 | | 1 | 1 | 1 | | 1 | 1 | 1 | 1 |

Drilled by: Elite Orilling

Drill Method: Solid Stem Augers

Upon Completion: Caved and wet at 4.9 m.

AGRA Earth and Environmental 505 Woodward Avenue Hamilton, Ontario L8H 6N6

Hole Size: 150 mm Datum: Geodetic Drill Date: 99 02 04

Borehole #: B

Project No: TB99002G

Project: Storm Sewer Construction

Location: King & Wainut St., Hamilton

Client: Reg. Mun. of Hamilton-Wentworth

Prepared By: M. Leltch

| Depth (m) | Symbol | Description | Elevation (m) | Number | Туре | Blaws/30 cm | Stand | Blav | vs/30 : | cm | esi | A | | e Conte | | Á |
|-----------|------------|--|---------------|--------|------|-------------|-------|----------|---------|----------|-----|-----------|-------------------------|----------|----------|----------|
| 0- | | Ground Surface | 83.9 | | | | | | | | | - | | | | - |
| 1- | | PAVEMENT STRUCTURE 20 cm of Asphak, over 86 cm of Cruehed Limestone. | | | | | | | | | | | | | | |
| 1- | | | 92.9 | 1 | SS | 5 | 4 | | | | | | 1 | | | |
| | \times | | | | | | | | | | | | <u> </u> | | _ | \dashv |
| 200 | | SANDY SILT FILL Brown, traces of crushed | - | 2 | SS | 7 | • | | | | | | 1 | | | |
| | - <i>₽</i> | Emestone, wet to moist, loose. | | | | | 4 1 | | | | | | | | | |
| | | , | | 3 | SS | 5 | 1 | | | | | T | 1 | | | |
| | | | 90.9 | | | | | _ | | | | | //_ | <u> </u> | | |
| 3- | | SAND Brown,some silt, traces of | | 4 | ss | 30 | | | | | | 4 | | | | |
| | | gravel moist, dense. | 89,9 | | | | | | | | | <u> </u> | 1 | | | |
| * | | | | | | | | | | | | | $\downarrow \downarrow$ | | | |
| 5. | | SAND AND GRAVEL | | 5 | ss | 33 | | | | • | | _ | | | | |
| | | Brown, wet, dense to compact. | | | | | | | | <u> </u> | | | | <u> </u> | | |
| | | | 87.8 87.8 | 6 | es | 27 | | | | | | | | | | |
| 6. | | CLAYEY SILT | 1 | † | 1 | 1 | 1 | | | | | | | Į. | | |
| 7 | 3 | Brown, dtpl, very stiff. Borehole Terminated | | | | | | | | - | + | \dagger | 1 | | | |
| 7. | 4 | | | | | | - | | - | ╁ | + | - | _ | + | _ | |
| | 3 | | | | | | | | | | | | | | | |
| | 3 | | | | | | | † | 1 | + | 1 | | 1 | | 1 | |
| <u> </u> | | , I | -J | | | | | | | | | | | | | - |

Drilled by: Elite Drilling
Drill Method: Solid Stem Augers

Upon Completion: Caved and wet at 4,4 m.

AGRA Earth and Environmental 505 Woodward Avenue Hamilton, Ontario L8H 6N6

Hole Size: 150 mm Datum: Geodetic Oril Date: 99 02 04



Terraprobe

PROJECT No: 7-02-0137-2 CLIENT: City of Hamilton

LOCATION: Walnut St. Hamilton, Ontario

LOG OF BOREHOLE 3

BORING DATE: November 26, 2002 **ELEVATION DATUM: Geodetic**

SAMPLER HAMMER, 63.5kg; DROP, 760mm

| <u>ы</u> | SOIL PROFILE | | ······································ | SA | MPLI | E\$ | PENETE RESIST | RATIO | ON E PLO | or N | | 34/- | TED | CONT | ENT | |
|--------------------------|---|--|--|--------|---|-----------|------------------|-------|-------------|---|---|------|---|--|-----|---|
| DEPTH SCALE IN METRES | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | "N" VALUE | | 40 | 60 ENGT | 80 H kPa | | wp | . | 6) 5 3 | | INSTALLATION INFORMATION |
| 0 - | GROUND SURFACE 125mm Asphait CONCRETE (FILL) Granular Base/Subbase | , ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; | 94.87 0.0 0.13 0.33 0.48 | | | | | | | e . | • | • | , | - | | |
| 1 - | Firm, reddish brown; CLAYEY SILT | | 93.87 1.00 | 1 | \$\$ | 8 | | - | | | | | 0 | essessessible that the utransfer control to the | | |
| 2 - | Lacon to compare | | | 2 | SS | 9 | | | | | | | 0 | | | |
| | Loose to compact, reddish brown; SANDY SILT, with seams and layers of line sand | | | 3 | ss | 16 | | | | *************************************** | | | þ | | | |
| 3 - | | | 91,36 | 4 | SS | 21 | - | | | | | · | o | | | |
| 4 - | END OF BOREHOLE | | 3.51 | | | | | | | The second control of the second control of | | | | | | |
| 5 - | | | | | | | | | | *************************************** | | | | | | |
| 6 - | | | | | | | | | | | | | | | | |
| 7 - | | The second secon | | | | | | | | | | | | Name of the last o | | |
| 8 - | | | | | Andreas and the second | | | | | | | | | | | NOTES: |
| 9 - | | Page-100-100-100-100-100-100-100-100-100-10 | AND THE PROPERTY OF THE PROPER | | | | | | | | | | *************************************** | | | Borehole dry upon completion of drilling. SHEET 1 OF 1 |

LOG OF BOREHOLE 1



| Auger Sample | \boxtimes | |
|--------------------------|---------------|----------------------|
| SPT(N) Value | 00 | Project: Geotech |
| Dynamic Cone Test | - | Propose King Stre |
| Shelby Tube | • • II | to Well |
| Field Vane Test | + s | Hamilton |
| Natural Moisture | Χ | |
| Plastic and Liquid Limit | | |
| Penetrometer | A | Borehole location |

hnical Investigation ed Watermain Construction reet East (Mary Street ellington Street) on, Ontario

Ground Elevation: m

Project No: H0 4362-A/G

Dwg. No: 3

Borehole location and datum see Drawing No. 2

| Water Level | Elev. Scale (m) | Soil Description | Der Sca | | N Value | | 20 | 40 | alue 60 | 80 | | Nati | ıral M % C | olsture Iry Wei | Content ght | Sample | Unit Weight |
|----------------|-----------------------|--|------------------|------------|---------|-----|--|---|--|--|--|------|--|--|--|--|----------------|
| آڍ≳ | 93.70 | | m | ft | z | She | ear S | treng 100 | jth' | 200 | 'a | 1 | 0 | 20 | 30 | Sa | (Krvm³ |
| | | Asphaltic Concrete - 200 mm thick | | | | | | - | | | | | | | | | |
| | | | <u>0</u> .5 | <u> </u> | | | CANAL IN THE PERSONAL PROPERTY. | | W89800000000000000000000000000000000000 | eren - cape - philippe bassand salaradassan | | X | | | | | |
| | 92.9 | - silty sand, reddish brown, trace of gravel, occasional concrete fragments, moist | 1 | _ | 40 | | | • | 0 | | | | × | | | | |
| | 92.3 | SILTY SAND: Reddish brown, trace of | - 1.5 | <u>4</u> | | | ereiten ich in der der ber bereiten ber | | | | | | ratioathibuseachtrasson/restitities serfer | | | | |
| | | clay and gravel, moist, loose to dense | - 2 | 6 | 9 | 0 | erie. Gel inteligärin sparinsa ammer martinismiss | • | | | | | x | | | | |
| | | | - <u>2</u> .5 | 8 | 31 | | C | : | | essily y out-concerning visible of payment require waterful makes | elitability esses essesses essesses essesses essess | | x | | | | |
| | 90.2 | - becoming brown from 3.3 to 3.5m depth BOREHOLE TERMINATED | - <u>3</u> .5 | | 24 | | 0 | | The second secon | ALL MALLON PARK WHICH AND ADDRESS AND ADDR | | | × | Address Missister and the second seco | | | |
| | | BOREHOLE TERMINATED | 4 | 12 | | | CONTRACTOR OF PRINCIPLES OF THE PRINCIPLES OF TH | *************************************** | - | A GARLES A. | | | | renness commercement in the land of the filter of the filt | Additional control of the control of | | |
| | | | - <u>4</u> .5 | 14 | | | | | | a cha confessor after early see an eggs on manage | | | | | | Heren des des des des la constante des la constante des la constante des la constante de la c | |
| | | | 5 | <u>1</u> 6 | | | | | | At the second of | <u> Paristininininan kanadahan kanada k</u> | | | | | | |
| | | | <u>6</u> .5 | <u>1</u> 8 | | | | | | | | | | | | | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

- 1. Borehole advanced by solid stem augers to a termination depth of 3.5 m on March 16, 1998 by Landtest Drilling Ltd.
- 2. Upon completion of drilling, no cave, no free water.
- 3. Borehole backfilled and patched upon completion of drilling.

LOG OF BOREHOLE 2



| Auger Sample | \boxtimes |
|--------------------------|---|
| SPT(N) Value | 00 |
| Dynamic Cone Test | *************************************** |
| Shelby Tube | • • 🖫 |
| Field Vane Test | + \$ |
| Natural Moisture | Χ |
| Plastic and Liquid Limit | |
| Penetrometer | A |

Project: Geotechnical Investigation Proposed Watermain Construction King Street East (Mary Street to Wellington Street) Hamilton, Ontario

Dwg. No: 4

Project No: H0 4362-A/G Ground Elevation: m

Borehole location and datum see Drawing No. 2

| Water Level | Elev. Scale (m) | Soil Description | Der Sc | | N Value | N Valu 20 40 6 | 0 80 | Natural N | foisture Content Dry Weight | Sample | Unit |
|---|-----------------------|---|------------------|-----------------|---------|--|--|-----------|--------------------------------|--|-------|
| S _ | 92.53 | | m | ft | z | Shear Strength 100 | kPa 200 | 10 | 20 30 | Sa | (Kn/m |
| | 24.7 | Asphaltic Concrete - 150 mm thick FILL: Sand and gravel, some slag, grey, moist | - <u>0</u> .5 | 2 | 22 | θ | | x | | | |
| | 91.7 | SILTY SAND: Reddish brown, trace of clay and gravel, moist, compact to dense | 1 | _ 4 | 35 | 0 | | × | | | |
| | | | 1.5 - 2 | 6 | 24 | 0 | | x | | | |
| | | | - <u>2</u> .5 | 8 | 18 | 0 | | × | | | |
| | 89.0 | - becoming brown from 3.2 to 3.5m depth BOREHOLE TERMINATED | - <u>3</u> .5 | 10 12 | 35 | 0 | | x | | | |
| ali i i i i i i i i i i i i i i i i i i | | | 4 | _ 14 | | es e composition de la composition della composi | | | | MANAGAMAA MAAA MAAA MAAA MAAA MAAA MAAA | |
| anne per per per per per per per per per pe | | | <u>4</u> .5 | _ <u>1</u> 6 | | | | | | | |
| | | | 5 - 6,5 | _ | | | and the state of t | | | REPORTER ATTENDATION AND ANALYSIS ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND A | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS,

- 1. Borehole advanced by solid stem augers to a termination depth of 3.5 m on March 16, 1998 by Landiest Drilling Ltd.
- 2. Upon completion of drilling, no cave, no free water,
- 3. Borehole backfilled and patched upon completion of drilling.

LOG OF BOREHOLE 3



Auger Sample 00 SPT(N) Value **Dynamic Cone Test** Shelby Tube Field Vane Test + 5 X Natural Moisture Plastic and Liquid Limit Penetrometer

Project: Geotechnical Investigation
Proposed Watermain Construction
King Street East (Mary Street
to Wellington Street)
Hamilton, Ontario

Dwg. No: 5

Project No: H0 4362-A/G Ground Elevation : m

Borehole location and datum see Drawing No. 2

| Water Level | Elev. Scale (m) | Soil Description | Der Sca | oth ele ft | N Value | N Valu 20 40 6 Shear Strength 100 | 0 80 | | % Dry | sture Content Weight | Sample | Unit Weight |
|----------------|-----------------------|--|--------------------|------------------|---------|--|------|---|-------|-------------------------|-----------------|----------------|
| | 91.67 | Asphaltic Concrete - 200mm thick | | | _ | 100 | 200 | 1 | 0 20 | 30 | S | (Kr/m² |
| | | FILL: Sand and gravel, some slag, brown, damp | <u>0</u> .5 | 2 | 20 | () | | x | | | | |
| - | 90.8 | SILTY SAND: Reddish Brown, trace of clay and gravel, moist, compact to dense | 1 | <u>4</u> | 12 | 0 | | | x | | | |
| | | - with trace rootlets from 1.5 to 2.0m depth | 1.5 | _6 | 14 | 0 | | | × | | | |
| | | , | <u>2</u> .5 | 8 | 12 | 0 | | | х | | Wild Acceptance | |
| , | 88.2 | - brown cemented sand seams from 3.4 to 3.5 m depth BOREHOLE TERMINATED | 3.5 | <u>1</u> 0 | 35 | 0 | | x | | | | |
| | | | - 4 - 4.5 | 14 | | | | | | | | |
| | | | - _5 _ | 16 | | | | | | | | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

- 1. Borehole advanced by solid stem augers to a termination depth of 3.5 m on March 18, 1998 by Landtest Drilling Ltd.
- 2. Upon completion of drilling, no caving, no free water.
- 3. Standpipe monitoring well installed to a 3.0 m depth (slotted from 0.3 to 3.0 m depth), March 25, 1995 Water Level: Dry.
- 4. Borehole backfilled, sealed and patched upon completion of drilling.

| Q | T | SOIL PROFILE | | | SA | MPL | ES | DYNAMIC PENETRATION HYDRA RESISTANCE, BLOWS/0.3m | LC CONDUCTIVITY, T | 4g F | PIEZOMETER |
|------------------------------|---------------|--|-------------|--|----------|----------|------------|---|----------------------------------|----------------------------|--|
| BORING METHOD | | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | BLOWS/0.3m | SHEAR STRENGTH net.V - + Q - • WA Cu, KPa. rem.V - • U - O W 10 | TER CONTENT, PERCENT W 20 30 40 | ADDITIONAL LAB. TESTING | OR STANDPIPE INSTALLATION |
| | † | GROUND SURFACE ASPHALT CONCRETE SAND and GBAVEL: (FILL) | 122 | 91.37 91.27 91.09 90.99 0.38 | <u> </u> | 50 DO | 4 | 0 | | | |
| CME 75 TRUCKMOUNTED DRILLRIG | D STEM AUGERS | Loose, brown, SILTY SAND to SANDY SILT; occasional gravel. (FILL) | | 69.22 2.15 | | 50 DO | | | 0 | | |
| CME 75 TRUCKA | 140mm BOLIC | Very loose, brown, fine to medium, SAND; with silt layers. | | 88.3 | 4 | 500 | 2 | | 0 | | GROUND WATER ENCOUNTERED DURING DRILLING AT ELEVIN 87.721 |
| | | Compact, brown, fine to medium, SAND. *Loose, brown, SILT. END OF BOREHOLE | | 87.2 | 5 | 1 | | | | | <u>▽</u> 06/05/95 |
| 3 7 8 | | | | | | | | | | | |

Project No: SM 031428-G

Log of Borehole No. 6-1

Project: Proposed Road Reconstruction - Phase II

Borehole Location: Wellington St. N, N of King St. E

Location: Hamilton, Ontario

: 14m N, 2m W of wood hydro pole #8396

Client: Sutton & Associates

Project Manager: Ian Shaw, B.Eng., E.I.T.



| | | SUBSURFACE PROFILE | | | | SAI | MPLE | | | |
|---------|--------|---|--|------|--------|-------------|--------------|--------------|----------|--|
| Depth | Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content # |
| oft m | | Ground Surface | 91.29 | | | | | | | |
| 1 | V.T. | Asphaltic Concrete Approximately 75mm | 91.02 | | | | · | | | |
| 2- | | Portland Cement Concrete Approximately 200mm | | SS | 1 | 18 | | | | |
| 4- | 111111 | Granular Base Approximately 150mm | 89.89 | ss | 2. | 10 | | | | |
| 6-1-2 | | Silty Sand Fill Brown, trace of fine gravel, moist, compact. | ************************************** | SS | 3 | 17 | | | i i | - }{- - - - - - - - - - - - - - - - - - - |
| 8-1 | | Sand Brown, medium to fine grained, trace of | | ss | 4 | 7 | | | | 1 |
| 10-} | | to some silt, occasional thin layering, moist, compact. | | | | \vdash | 1 | | | |
| 12- | | motor compact. | | ss | 5 | 21 | - | | 2011/20 | |
| 14- | H | Silty Clay Grey, trace fine gravel, moist, very stiff. | 87.29 | | | | | | _ | |
| 16- | | | 86.0 | ss | 6 | 27 | 4.0-4. | 5 | | 7,7 |
| 18- | | End of Borehole | | | | | | 1 | | |
| 20 - 6 | | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on October 23, 2003 to a depth of 5.2 metres. | | | | | | | | |
| 22- | | No free groundwater present at completion. Borehole backfilled with auger cuttings and topped with portland cement | | | | | | | | |
| 24- | | concrete. | | | | | | | | |
| 26 - 8 | | Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |
| 28- | | | | | | | | | | |
| <u></u> | | | | | | Ц. | | | | |

Drill Method: Solid Stem Auger 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

Hole Size: 150mm

Datum: Geodetic

Checked by: IS

Sheet: 1 of 1

PETO ASSOCIATES LTD. CONSULTING SOIL ENGINEERS RECORD OF BOREHOLE NO. 2 JOB NAME West Avenue Storm Sewer
Corporation of the City of Hamilton,
CLIENT c/o Proctor and Redfern Ltd. JOB NO. 69F66 TECHNICIAN_BG BORING DATE Mar. 18/69 TYPED BY JC GROUND ELEV. 300.± BOREHOLE TYPE DYNAMIC CONE PENETRATION BLOWS/FOOT SOIL PROFILE SAMPLES LIQUID LIMIT _ STANDARD PENETRATION TEST PLASTIC LIMIT _ BLOWS/FOOT WATER CONTENT_ REMARKS DEPTH ELEV 30 20 DESCRIPTION SHEAR STRENGTH Cu LB/SQ.FT. WATER CONTENT % 1'0" EAXEMENT & CRUSHEL FILL. Dark brown sandy silt fill 1 SS moist 612" 2 88 Loose SILT/SAND. Brown interbedded sandy 3 SS 11 and silty sand, moist compact 11'0 4 SS 12 SAND. Grey fine to medium sand, Ó 5 SS 15 wet 6. SS 21 Compact TILL. Grey clayey silt till 7 SS 21 8 SS 18 Wet 9 SS 15 10 TW Push 11 SS _11 Compact Terminated at 36'6"

this margin reserved for binding

DATA SHEET FOR BOREHOLE 3 DRAWING 4 . SITEST ENGINEERING LASCRATORY TESTS Project No: 8916 FIELD TESTS 50 mm O.D. Split Tite Natural Moisture Project: Proposed Sewers 50 ma I.D. Shelty Tate Plastic & Liquid Limits |-Location: Steven Street Auger Sample Lab Vare Test Hamilton, Ontario Core Sample Torvers Hole Location: See Drawing No: 1 Data Orilled: July 5, 1989 Cone Test Penetropeter Vane Test Unconfired Compression Orilled By: Solid Stem Auger (125 mg O.D.) Datua: Geodetic Borehole Elevation 88.598 M Water Level WATER CONTENT % SAMPLE REC DEPTH PENETRATION RESISTANCE 'N'blows/30013 SYMBOL DESCRIPTION/CLASSIFICATION ELEV 10 20 30 Type No: 7, 10 20 30 40 50 60 70 Ħ 88.51 0.09 ASPHALT 88.42 0.18 CONCRETE SILTY SAND, trace of gravel, brown, loose to compact, moist, layered 10. . . ! 100 .0 ! 85.00 2.50 /b!/. 2 100 .:/: / SILTY CLAY TILL, trace of embedded sand /01/1 and gravel, grey, soist, very stiff .1/a / sand and gravel decreasing with depth 11:71 /.1/61 17: 22 1/01/1 100 3 1/1 /.1 .17. / some large gravel 5 11 /1 -- 83.11 5.49 BOREHOLE TERMINATED 6 1. Sorehole was moist and open to 4.1 metres on completion.

2. Borehole was backfilled on completion of the fieldwork.

| | | | Log | of | В | | r | e | h | lc | e | 1 | | | | | | | | | |
|--|---------------------|--------------|---|----------------|---|----|-----------------|---------|-------------------|-----|---------|---|------------|-------|-------------------|---------|--|-----------------------------|---|---------------|----------------|
| Pi | oje | at N | lo. HAGE-0060494-A | | | | | | | | | | | | | | Drav | wing N | lo | | 4 |
| P | roje | ct: | Geotechnical Investigation - F | ropose | ed : | Se | we | 1 8 | nd | Wa | ate | rmai | n C | ons | tructi | on | S | heet N | lo | 1 , | of 1 |
| Lo | cat | ion | Wentworth Street (King Stree | t to Bar | tor | 1 | Stre | et |), H | am | ilto | n, O | nta | rio | | | | | | | |
| | | | | | _ | | | | | | | | | | Combo | istible | Vapo | aur Read | ing | | |
| D | ate ! | Dril | led: April 29, 2001 | | | | ger Sa T (N) | | | | | 0 | UL) [2] | | Natura Plastic | | | 1 imit | | X | |
| D | T Nin | уре | : Truck Mount | | | Dy | namic | Co | ve Te | st | | | | | Undra | ned T | naxial | at | - | е | , |
| D | atur | n: | | | | | elby T Id Va | | | | | | ••• ••• | | % Stra Penet | | | • | | Ā | |
| Г | T s | Т | | I | Ī., | _ | | | | NV | alue | | | | Comb | ustible | Vepor | ur Readin | g (ppm) | ş | Natural |
| GW L | N N | | Soil Description | ELEV. | T-40mc | L | S/Ne.ar | 20 | | 10 | 5 | 0 | 80 | Moa | N | | | o 7 ns Conte (% Dry V | | 34Mp. Lus | Unit Weight |
| L | 5 | 2 | ACDIM To OO was Aliab | 88.33 | H | Ļ | OH MICHEL | 71 | ngui C | 1.1 | | , - | 0.2 | - | 740 | 10 | 2(|) | 30 | E S | kN/m³ |
| | 0 | | ASPHALT: ~90 mm thick CONCRETE (possible slag): ~190 mm | 88.24 88.05 | | | H | - | 1. [.]. 4-[.]. | 1 | | | | | | | | .: [.] .:- | | 1. | |
| | $\overline{\times}$ | 21 | thick FILL: Silty sand, brown, fine grained, | 00.00 | | Ė | H | t | | ļ, | +++ | | | | 11 | # | | iiij | HE | | |
| | \searrow | ð | -moist, compact - | | | | | | | | | 1 | Ш | 1 1 | 111 | H | # | 444 | 111. | ΞX | |
| | \triangleright | (1 | -reddish brown from 0.6 to 1.2 m | | | | | 1 | | | | | | | | H | 1 | | | $+$ \wedge | |
| | \triangleright | (1 | _ | | ١, | L | 7 | | | 1 : | | | Ш | | | | | | | | |
| ž | | 1 | | | ľ | - | J | H | 4 | : : | - - | | | | | | | -44 | | | |
| 70 PAGE 10 PAG | \triangleright | (| | | | 1 | | | H | - | | | | | | | | 14.1 | | | |
| | \triangleright | J | ··· | - | | - | | 1 | # | 1 | 1 | | 1 | * 1 . | | | -11 | | H | | |
| 1 | > | (| | | | 1 | | | # | | | 1. . . | | | | | | - - | 111: | | |
| | \triangleright | \mathbb{Q} | | | | - | | | 44 | | | | | ÷144 | | Ħ | | - 1 | Ш | | |
| | \triangleright | $\langle $ | - | 1 | 2 | H | 1 | | ļ. ļ.i. | : | 1 | 11. | | | | | ::: | | 11. | 7 | |
| ŀ | :[> | J | | | | ŀ | | - 1 - 1 | 117 | - | 1 | | | | | | | | | | |
| | H | 1 | SILTY SAND: Light brown to dark brown, | 85.93 | | L | | | <u> </u> | | <u></u> | | | | +++ | | | | ╟╫ | | |
| ŀ | | | oxidized stains, damp to moist, dense | | | F | - | - | | | | 7 | - | · | | ^ | | | | | |
| | | | | | | | | | | | | | + | + 1 + | | | | | | | |
| į | | | <u>-</u> - | - | 3 | 1 | H | | 11. | | 1 | | | | 7 | | Щ | | | | |
| | | | | | | 4 | 11 | 7 | 5 | - 1 | į | | # | | | | | | | | |
| | | | CU TV OLAV TILL. Commende | 84.93 | | - | -1-4 | | | | | | | | - 1 - 1 - 3 1 | | X | | 1 | | |
| 1 | 100 | | SILTY CLAY TILL: Grey, moist BOREHOLE TERMINATED | 84,83 | + | H | | + | | 1 | ; ; | 1 1 1 | 1 | . 1 | | 11 | + + | | | - 1/2 | |
| | | | Notes: | | | | | | | | | | | | | 2 1 | | | | : | |
| | | | Borehole advanced by solid stem auger | | | | | | 11. | 411 | | | | | | | | . | | | |
| | | | equipment to a termination depth of 3.5 m on April 29, 2001. | | | | | | | | | | | | ::: | | | | | - | |
| | | | Upon completion of drilling, cave at 3.4 m depth, no water. | | | | | | | | 1 : | | | | | | | | **** | | |
| | | | In hole methane reading using MSA explosimeter: 0% methane. | | | | 11.00 | | | | : } | | | | | | | | | | |
| | | | 4. Upon completion of drilling, 19 mm (3/4 in.) diameter P.V.C. standpipe installed to 3.4 m depth, screened portion 2.1 to 3.4 m depth, bentonite seal 0.2 to 1.1 m depth and asphalt patch from 0 to 0.2 m depth. | | *************************************** | | | | | | | THE RESERVE AND ADDRESS OF THE PARTY OF THE | | | | | THE REAL PROPERTY AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AD | | | | |



Trow Consulting Engineers Ltd.
428 Millen Road
Stoney Creek, Ontario, L8E 3N9
Telephone: 905-664-3300
Fax: 905-662-4144
E-Mail: hamilton@trow.com

| Water Level (m) | Depth to Cave (m) |
|-----------------------|-------------------------|
| 3.30 | 3.4 |
| | Level (m) |

| DORNOM BERIED _ 45 _ August _ (soli) | . KH | NAME Proposed Sanitary Sewe | es.: | · Vir | iela | ınd a | nđ V | icin | | | | | | | | _ 108 | No. 76 P 153 |
|--|------|---|-----------------|----------|----------------|---------|---|----------|---------|--------|--|------|------|---------|--------|----------|--|
| DETRI DESCRIPTION | | | | | | ~~~~ | | · · | | BORI | NG DA | TE | July | 9/7 | | | |
| DESTRIPTION DESCRIPTION 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | | | | | | SAMPLE | | SHEAT | A STREA | IGTH C | 1 | 4 | | | T | WL | |
| ## ASPHAIN 7' CRUSHED STOKE SILTY SAND: gravely fill, greeddish brown, compact, grey brown, vety stiff, w.k.T., some multicoloured silt pockets 1 SS 15 220 1 SS 15 221 221 232 24 3 SS 15 25 265 270 285 285 29 270 285 285 29 270 285 270 285 270 285 270 285 270 285 270 285 270 285 270 285 270 285 270 286 287, P.L. 286 287, P.L. 287 288 298 298 298 298 298 298 298 | | | LEGEND | LEVATION | NUMBER | 7.7.9.E | OWS FOOT | DYNAI | | | | ON K | WATE | R CON | ENT. | WL. | GROUNDWATER OBSERVATIONS AND REMARKS |
| SILTY SAND: gravelly fill, reddish brown, compact, 215 185 milrors, were milrors, and milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, and milrors, were milrors, were milrors, and milrors, were milrors, and milrors, were milrors, and milrors, were milrors, and | 019* | 2" ASPHALT 7" CRUSHED STONE | $\Delta \Delta$ | | \blacksquare | | EZ. | 2: | | | ŏ z | a | T î |) ER C | n ieni | c* | |
| N. L. some multicoloured 2 2 5 22 2 3 5 22 3 3 5 5 3 5 3 5 5 5 | 3100 | SILTY SAND: gravelly fill, reddish brown, compact, uniform, wet | | 275 | 1 | SS | 15 | | | - | | | | 0 | | | and open at |
| 12'0 i 3 SS 15 265 | | grey brown, very stiff, N.F.L., some multicoloured | 2 | | 2 | ss | 22 | | | | | | | $-\int$ | | | |
| 12/10 to be coming grey, stiff, W.T.P.L. 16/10 Borehole terminated at 16/10 to 16/1 | | atte powers | 0 | 270 | | | | | | - | | | | | | | |
| Borehole terminated at 16'0" A SS 11 | 12'0 | haroming grov stiff | | 200 | | ss | 15 | 7 | | | | | | | ō. | | |
| Borehole terminated at 16 °0 s | | W.T.P.L. | | 403 | | | | | | | | | | | | | |
| | 16'0 | Borehole terminated at 16'0" | K - A | | | SS | 11 | | | | | | | | 0 | | |
| | | | | | | | | - | | | | | | | | | |
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| | 'ATION_Hamilton, Ontario RING METIKID45" flight augo | | | | | | | | BORI | NG DA | ATE_ | July | 13/ | 76 | _ ENC | TINICIAN T.R. |
|------|--|---------|-----------|--------|--------|--------------------------|----------|---|---|----------|---|------|------------------------------|----------|----------|--|
| | SOIL PROFILE | ٩ | ğ | - | SAMPLI | | | | NGTH C | | • | PLAS | ID LIMI TIC LIM IR CON | IT | | GROUNDWATER |
| РІН | DESCRIPTION GROUND FLEVATION: 286.4 | LEGEND | FLEVATION | NUMBER | TYPE | BLOWS FOOT N - VALUES | 1 | | NE PEN ENETR/ DWS/FO () 6 | | | J | TER CO | 3 | | OBSERVATIONS AND REMARKS |
| 8= | 2" ASPHALT, 6" CONCRETE BASE SILTY SAND: fill, probably roadbase material, loose | | 285 | | | | | | | | | | 0 2 | | <u> </u> | |
| | to compact, saturated | | | 1 | SS | 9 | 1 | | | | | | | 9 | | |
| 3.11 | | | 280 | 2 | SS | 12 | | | | | | | Ģ | | | |
| | SILTY CLAY (TILL): grey, stiff to very stiff in siltier zones, W.T.P.L., | 1 | 275 | 3 | ss | 13 | | | | | | | | | | |
| | quite gritty | | | 4 | SS | 16 | | | . : | 4 | | | 9 | | | After Sa4 cave Twater 6'8" (perched in sand |
| 6 | | | 270 | 5 | ss | 12 | | | | | | | |) | | fill) Cave 14'6" |
| | Borehole terminated at 16'6" | | | | | | | | , | | | | . < | | | Water 11'6" (mostly saturat sands) |
| | | | | | | | | | | | | | | | | |
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| | | | | E | | | | | | | *************************************** | | | | | |
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| | | | | | | | | | B24 - 100 - | | | | | | | |
| | | | | E | | | | | | | | | : | | | Note: Borehole moved 60' west anticipated location due to |
| | | | | | | 1 | | | | | | | | | | parked cars. |
| | | | | | | | | | | | | | ٠ | | | |
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| TES: | | <u></u> | | F | | <u> </u> | | | | <u> </u> | L | | | | | |

| 쑿 | PETO MACCALLUM LTD. CONSULTING GEOTECHNICAL ENGINEERS |
|---|---|
| | |

| LO | BNAME Proposed Sanitary Sew CATION Hamilton, Ontario RING METHOD 44" flight auger | | | ······································ | | | | | . BOR | ING DA | TE_ | luly. | .13/3 | 16 | _ EN | CINICIAN T.R. |
|---------|---|-----------------|-----------|--|----------|--------------------------|----------|----|--|----------|-----------|-------|------------------------------|------------|------|--|
| l'av.i | SOIL PROPILE DESCRIPTION | LFGFND | NOT | | SAMPLI | | | | NGTH C | ETRATI | A ON_x | PLAS | ID LINI TIC LIM ER CON | IT TENT | W | GROUNDWATER OBSERVATIONS AND REMARKS |
| 1:PTH | GROUND FLEVATION: 283.2 | LFG | ELEVATION | NUMBER | È | BLOWS FOOT N - VALLES | | | enetr. Ows/Fo | | 4.4 | - | TER ('C | | | AND RIMARKS |
| 2 0 0 " | Z"ASPHALT 6" CONCRETE BASE CRUSHED STONE: SILTY SAND: fill SILTY CLAY (TILL): brown to grey brown very stiff. | ※ ≥1 | 280. | 1 | ss | 22 | | 1 | The state of the s | | | | 0 | | | Upon completion hole open and d |
| | D.T.P.L., quite gritty, numerous multicoloured silt seams and pockets. | | 275 | 2 | SS | 28 | | } | | | | , | 0 | | | |
| 1:4: | t | | 270 | 3 | SS SS | 11 11 | | | | | | | (| • | | |
| 5168 | Borehole terminated at 16'6" | | 265 | | SS | 10 | | | | | | | 7 | · · · | | |
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| | | | | | | | | | | <u> </u> | | | | | | Note: Borehole |
| | | | | | | | | | | | | | | | | of anticipated location due d overhead wires |
| | | | | | | | | | | | | | | | | |
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MEMBER OF THE ASSOCIATION OF CONSULTING ENGINEERS OF CANADA

DRAWING ___ SITEST ENGINEERING DATA SHEET FOR BOREHOLE (BHEET OF 8903 PROPOSED SEVERS KING STREET @ GAGE HAMILTON, ONTARIO Hate Lecenter SEE DRAVING NO: 1 Date Drilled APR 07. 1989 Hele VERTICAL Diffed by SOLID STEM AUGER (165 MM O.D.) GEODETIC 87.564 METRES tion Beauticome, N. 250 H.Bra. biomes/R. 10 20 30 40 20 30 Dopth Description Classification 100 180 200 manufacture ... 87.38 0.18 BRUNCEL BUB-BARRE 87.13 0.43 FILL, SILT SOME FINE BAND & BRAVEL COMPACT/VERY STIFF BROWN TO GREY, MOIST 75 17 85.89 1.67 SILTY CLAY EMBEDDED BAND & GRAVEL VERY STIFF, GREY HOTTLED, MOIST 3 d 10 100 4 3 100 82.23 5.33 82.06 54 100 SANDY GRAVEL 5.50 SOME SILT & CLAY NUMEROUS COBBLES 100 ઇ DENSE, DARK GREY, MET 5 100 (DABOLINE BATURATED) 6.40 81.16 SILTY CLAY TILL 7 EMBEDDED BAND & BRAVEL STIFF TO HARD BREY, MOIST 6 20 39 8.08 BOREHOLE TERMINATED 79.48

1. WATER LEVEL OBSERVED AT 5.5 METRES 1/2 HOUR AFTER COMPLETION OF BOREHOLE.

2. BOREHOLE WAS BACKFILLED ON COMPLETION.

3. BOREHLOE WAS RELOCATED TO THE SOUTHEAST CORNER OF KING/GAGE.

4. ACTUAL ELEVATIONS ARE SLIGHTLY LOWER THAN SHOWN.

| Present Lacation Hole La Date Di | No. 8903 | 1 | | S O.D. S S'. S' i.D Retory : Auger or S' Dia. (Field W Presidents | Book Tubo Bhallay T Care Same Hough Ba Cama Isna Mater Pushed (p Table I defin | Field ide ide ince ince ince ince ince ince ince inc | | Icocyral bhovetur Plantic & Lither Lab Vanc Tool Torronne Unconfined Cor Understand Trio Overhunden Pr Berein at For Banaftrolby | nd Loovel Importantation and St Importantation (bump | × ◇◆⊕ • • • • • • • • • • • • • • • • • • • |
|----------------------------------|---|----------------|-------------------|--|---|--|---|--|---|---|
| Symbol | Description Closeification | Elevation | Double - Marine - | Personal Property Pro | 20 | kPa. | 4 | losse Curdent & Attention (% dry uneight) 10 20 | 30 Sample |) |
| | SILT BONE BAND AND CLAY MOTTLED BROWN/BREY MULTI-COLOURED, REDDIEM BR | 89.28 89.08 | 0.15 0.35 | | • | | | | | |
| | COMPACT, MOIST | | 2 | | | F | | x 1 1 1 1 1 1 1 1 1 | 1 | 100 |
| | SILTY CLAY TILL EMBEDDED SAND & BRAVEL THIN WET BILT SEAMS BTIFF, BREY, MOIST | 86.23 | 3 3.20 4 | | 0 1 | 4 | | * I | 2 | * |
| | | | 5 | | 0 | 4 | | X | 3 | 10 |
| 10 | | | 6 | | 0 | 4 | | × | 4 | 10 |
| | BOREHOLE TERMINATED | 82.88 | 6.55 | | | | | | | |

SITEST ENGINEERING

DATA BHEET FOR BOREHOLE _____ DRAWING_____

Project No. 8903

Project No. 8903

Project PROPOSED SEVERS

Location KING STREET @ GLENDALE

HAMILTON, ONTARIO

Hode Location SEE DRAVING NO: 1

Date Drilled APR 07, 1989

Hode VERTICAL

Drilled by SOLID STEM AUGER (165 MM 0.D.)

Detum GEODETIC 90.078 METRES

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| Symbol | Description | Elovetian | Depth | 10 1 | 0 3 | | <u>'</u> | | EArrocking Louis mought! 10 30 | [s. | mple | Una wanging |
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| | Classification | _20016 | - professor | Shoor Signath 10 | 0 150 | 200 | | padd wity | | 7400 | | Recovery 1 |
| a .a. | ASPHALT CONCRETE | 89.98 89.83 | 0.10 0.25 | | | | | | | Ш | | |
| | SILTY CLAY HOTTLED BROWN/GREY STIFF, MOIST | 88.68 | 1 | 012 | | | | × | | | 1 | 100 |
| | SILTY CLAY TILL EMBEDDED BAND & GRAVEL THIN WET BILT BEAMS | | 2 | |) ² | 6 | | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | | | 2 | 75 |
| | SREY | and the state of t | 3 | | | | | | | | | |
| 0 | ; | | ŧ | | 5 | | | | | | 3 | 100 |
| | · | 85.13 | 4.95 | | 5 | | | | | | 4 | 100 |
| 1000° | BOREHOLE TERMINATED | 85.05 | 5.03 | | | | | | | + | | |
| | | | | · . | | | | | | | | |
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| · | | | | | | | | | | | | |

Nete

- 1. BOREHOLE WAS MOIST AND OPEN TO 4.5 METRES ON COMPLETION OF BOREHOLE.
- 2. BOREHOLE WAS BACKFILLED ON COMPLETION.
- 3. BOREHLOE WAS RELOCATED TO THE SOUTHWEST CORNER OF KING/GLENDALE.
- 4. ACTUAL ELEVATIONS ARE SLIGHTLY LOWER THAN SHOWN

MAIN STREET EAST



APPENDIX B

RECORD OF BOREHOLE SHEETS



MAIN STREET WEST



Peto MacCallum Ltd.

| LOC | UECT Watermain, Sewer and Road Reco ATION London St. N. (Dunsmure Rd. to RING METHOD Continuous Flight Solid Ste | | | ŧ | 30RIN | G DATE 2 | 200 | 0 | | ENG | R PROJECT NO. 02HF051 GINEER P. Cullen CHNICIAN M. Rapsey | | | | | |
|-----------------------|--|--------|----------------------|---------|----------------------|--------------|-----|-------------------------|-----------------|-----------------------------|---|--------------------|---|-------------|-------------------|--|
| DEPTH In METRES | SOIL PROFILE DESCRIPTION | LEGEND | ELEVATION | NUMBER | AMPLE | BLOWS/0.3m G | | 10K IC CON ARD PE |) 150 E PENE | 200 TRATION TION TEST | | PLAS WATE W, | E | NT TENT_ | _w. _w. _w. | GROUNO WATER OBSERVATIONS AND REMARKS |
| 1.85 | PAVEMENT STRUCTURE: 130 mm asphaltic concrete over 110 mm granular "A" crushed limestone SILT: Loose, brown, fine sandy silt, damp CLAY TILL: Very stiff, brown, silty clay, some sand and gravel, low to medium plastic_D_T_P_L. BOREHOLE TERMINATED AT 3.60 m | | 90 89 88 87 | 1 2 3 3 | \$\$ \$\$ \$\$ | 5 24 17 | 20 | | | | | 10 | | | | Upon completion of augering, no water, no cave |

BHLOG WITH PML LOGO 02HF051D.GPJ PETOMAC.GDT 2002 08 12



CLIENT: The City of Hamilton
LOCATION: Edgemont Street

LOG OF BOREHOLE 1

BORING DATE: September 24, 2003 ELEVATION DATUM: Geodetic SAMPLER HAMMER, 63.5kg; DROP, 760mm

| SOUTH PROPRIES SOUT | Γ | g | 111 | SOIL PROFILE | | | SA | MPL | EŞ | PENETRATION RESISTANCE PLOT | | | |
|--|-------|-------------|-------------|---|-------------|-------|----------|------|-----------|-----------------------------------|------------|---------|-----------------------------|
| Cital Cita | | BORING METH | DEPTH SCALI | DESCRIPTION | STRATA PLOT | DEPTH | NUMBER | TYPE | "N" VALUE | 20 40 60 80 SHEAR STRENGTH KPa | * } | %) 5 | INSTALLATION INFORMATION |
| CFILL CFIL | | | • | GROUND SURFACE | | 90.68 | | | | | | | |
| Critical | - | | 0 | 100mm Asphalt 150num Concrete | V | 0.0 | 1 | A\$ | | 1 | 0 | | |
| 1 - (FILL) 3 S.S. 6 | ı | | | (FILL) | | 0.30 | , | SS | 11 | 4 | | | |
| Film, brown and grey; trace topsoil, some sand and gravel with places of shale 2 - Stiff to very stiff, brown and grey; stirty CLLY, trace and and coassional gravel (TilL) END OF BOREHOLE 3 - STORY STIRTY CLLY, trace and and coassional gravel (TilL) END OF BOREHOLE 7 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 8 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) 9 - STIRTY CLLY, trace and and coassional gravel (TilL) | ı | | | (FILL) | \bowtie | } | | | | | | | |
| CLAYEY SILT to slity places of shale 2 | 1 | | 1 — | | \bowtie | | 3 | ss | 6 | | 0 | | |
| 2 | ı | | - | Firm, brown and gray; CLAYEY SILT to silty clay, | \bowtie | | - | | | | | | |
| SEIT to very stiff, brown and grey; SILTY CLAY, Trace sand and oceasional gravel (TILL) END OF BOREHOLE 7 | I | | - | places of shale | \bowtie | | | | _ | - | | | |
| Suff to very stiff, brown and grey; SiLTY CLAY, trace sand and ocassional gravel (TiLL) | l | | 2 | | \bowtie | | 4 | SS | 4 | | l l° | | |
| Self to very stiff, brown and grey; SiLTY CLAY, Urace sand and coassional gravel (TitL) END OF BOREHOLE 7 8 | l | | | | \bowtie | | | | | | | | |
| Solif to very stiff, brown and grey; SILTY CLAY, trace sand and cossional gravel (TILL) 87.17 6 SS 16 END OF BOREHOLE 7 8 | ı | | - | | \bowtie | 88.08 | 5 | ss | 12 | | | 3 | |
| SOUND A SILTY CLAY, brace sand and occassional gravel (Tit.L) BOD OF BOREHOLE 3.51 END OF BOREHOLE 7 | ı | | - | | X | | - | | <u> </u> | - | | | |
| WO TO THE PRINCIPLE STATE OF S | | | 3 — | SILTY CLAY, | | | | | <u> </u> | 4 | | | |
| END OF BOREHOLE 3.51 5 - | | | - | वर्ष्य अवाव साव उर्द्य ५५०० विश्व (११८८) | | | 6 | SS | 16 | | | | |
| A CUMMINGS 4 | ı | | - | END OF BOREHOLE | lki. | | <u> </u> | | <u> </u> | 1 | | | |
| 8 - 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | ١ | 닐 | <u>.</u> | | | | | | | | | | |
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| A CUMMINGS 4 | | Š | - | | | | | | | | | | |
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| 8 - 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | | 22 | 5 — | | | | | | | | | | |
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| | SS | | = | | | | | | | | | | |
| | N N | | - | | | | | | | | | | |
| | 2 | | 8 — | | | | | | | | | | |
| NOTES: Borehole dry upon completion of drilling. SHEET 1 OF 1 | | | • | | | | | | | | | | |
| Borlehole dry upon completion of drilling. | 8 | | - | | | | | | | | | | NOTES: |
| 9 - | 0.1-9 | | | | | | | | | | | | Borehole dry upon |
| 형] SHEET 1 OF 1 | 0122 | | 9 – | | | | | - | | | | | Confidence of Grands |
| | 703 | | : | | | | | | | | | | SHEET 1 OF 1 |

SITEST ENGINEERING DATA SHEET FOR BOREHOLE ___ DRAWING .. Project No. 8732 (Your No.) Laboratory Project PARK ROW SEWERS Matural Maieture Pleater & Liquid Limit Lecation PARK ROW STREET HAMILTON, ONTARIO Hole Location SEE DRAWING NO: 1 Date Drilled JULY 13, 1987. Hole VERTICAL Didled by HOLLOW STEM AUCER 80 mm I.D. Samely Arabas (prosume) Detum __ GEODETIC Webs: Content & Attemberg Lin 1% dry weight? retion Resistance, N. 350 ft his blows/ft. 10 20 30 40 10 20 30 Description Classification Elevation Depth metres _D91188_ ASPHALT 0.10 CONCRETE 0.25 SILTY CLAY TILL embedded sand and gravel 90 occasional cobbles brownish grey very stiff to hard 2 occasional red shale inclusions grey @ 1.8 m **b** 33 100 3 4 100 22 100 4 BOREHOLE TERMINATED 5.03 Notes 1. Borehole was moist and open to 5 metres on completion.

2. Borehole was backfilled on completion of the fieldwork.

Borehole Log



| Auger Sample ⊠ Natural Moisture x | Trow Lt |
|--|-------------------|
| SPT (N) Value OO Plastic and Liquid Limit Project Sewer Construction Dwg. No. 2 | |
| Dynamic Cone Test Undrained Triaxial at Overburden Pressure Undrained Triaxial at Overburden Undrained Triaxial at Overburden Undrained Triaxial at Overburden Undrained Triaxial at Overburden Undrained Triaxial at Overburden Undrained U | |
| % Strain at Failure 10 Field Vane Test +s Penetrometer A Hamilton, Ontario Project No. H446 | 52-G |
| ab Vane Test L Hole location and datum see drawing No. 1 | |
| S N Value Natural Moisture Content (ASTM) D1586-CSA A119.1) And | Natural |
| W B Soil Description ELEV. 7 20 40 60 80 Atterberg Limits | Unit Weight |
| m Shear Strength MPa 10 20 30 | kN/m ³ |
| [304 5] HILLIAM ASPHALT | |
| F 460 mm GRANULAR BASE CRUSHER-RUN LIMESTONE | |
| FILL-silty clay, wet, firm | ı |
| F | |
| | ı |
| | l |
| 90.8 | |
| (297.9) | |
| SILTY CLAY-brownish grey, with | 00.0 |
| traces of sand and fine gravel, very stiff | 20.3 |
| \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | (120 |
| | |
| | 20.0 |
| | (127 |
| 88.8 | |
| SILTY CLAY-grey, moist, firm (291.4) | |
| John Glar grey, morse, 111m | ı |
| | |
| 87.78 | |
| (288.0)) | ı |
| NOTES: | |
| 1. Borehole put down uncased | i |
| with continuous flight auger | |
| equipment on September 28, | |
| 1982. | |
| 2. Water level at 1 m depth | |
| on completion. | |
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BOREHOLE LOG

| | H2397 |
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BOREHOLE No.

DRAWING No. 2

| PROJECT. Proposed Sewer Installation. O.D. SPLIT TUBE LOCATION 3 Intersections Hamilton, Ontario PUBHED VANE TEST AND SENSITIVITY (S) SOIL DESCRIPTION SOIL DESCRIPTION ATTERSFRACE TO ACC BOOM SON STRAIN AT FAILURE SAND: fine to med., silty, occ. Saved sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) TERMINATED 283.9 NATURAL MOISTURE PLABTIC AND LIQUID LIM PRESTAND SENSITIVITY (S) TERMINATED NATURAL MOISTURE PLABTIC AND LIQUID LIM AVAILABLE MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE NATURAL MOISTURE PLABTIC AND LIQUID LIM OVERBURDEN PRESSURE STRAIN AT FAILURE 10 20 30 11 20 40 60 60 60 60 60 60 60 60 60 60 60 60 60 | 15 🔷 8 |
|--|-------------------------------------|
| Hamilton, Ontario PUSHED VANE TEST AND SENSITIVITY (8) SOIL DESCRIPTION SOIL DESCRIPTION ATTEREST AND SENSITIVITY (8) SOIL DESCRIPTION ATTEREST AND SENSITIVITY (8) SOIL DESCRIPTION FIFT TO AO SOURCETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) PENETRATION RESISTANCE 305 FT. Las PENETRATION RESISTANCE 305 OF 1. Co. SILTY CLAY TILL: SAND ATTEREST AND SENSITIVITY (8) PENETRATION RESISTANCE 350 FT. Las SOURCE AND ATTERESC LIMITS WE DEVELOP ATTERESC LIMITS SHEAR STRENGTH 10 20 30 TO AD ATTERESC LIMITS WE DEVELOP ATTERESC LIMITS ATTERESC LIMITS WE DEVELOP ATTERESC LIMITS WE DEVELOP ATTERESC LIMITS WE DEVELOP ATTERESC LIMITS WE DEVELOP ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS ATTERESC LIMITS AT | 15 ⇔ 8 |
| HOLE LOCATION AND DATUM SEE DRAWING NO. I VANE TEST AND SENSITIVITY (S) +5 OVERBURDEN PRESSURE % STRAIN AT FAILURE SOIL DESCRIPTION PELEV. FEET 300 FT. LB. BLOWS/FT. ATTERBRO LIMITS 305.4 OTHER CONCRETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 OVERBURDEN PRESSURE % STRAIN AT FAILURE NATURAL MOISTURE CONTRACT ATTERBRO LIMITS % DAY WEIGHT 10 20 30 TO 299.9 TO 300.4 TO 200.4 TO 3 | 15⊕5 10 |
| SOIL DESCRIPTION ATTEREREG LIMITS SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) HOLE LOCATION AND DATUM SEE DRAWING No. 1 PENETRATION RESISTANCE 330 7. 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 PENETRATION RESISTANCE 330 7. 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 PENETRATION RESISTANCE 330 7. 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 ATTEREREG LIMITS % DRAWING NO. 1 ATTEREREG LIMITS % DRAWING NO. 1 10. 20. 30 ATTEREREG LIMITS % DRAWING NO. 1 ATTERER STRENGTH | |
| SOIL DESCRIPTION SOIL DESCRIPTION PATA 7" CONCRETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 10 10 10 10 10 10 10 10 1 | |
| 21 ASPHALT 7" CONCRETE SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 299.9 | NATURAL UNIT WEIGHT P.C.F. |
| SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 | |
| SAND: fine to med., silty, occ. gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 | ## |
| gravel sizes, red-brown to brown, wet to moist, (compact) SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) 10 15 299.9 | ĦM |
| SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | #1 |
| SILTY CLAY TILL: sand and gravel sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | $H_{\mathbf{k}}$ |
| sizes, horizontally layered, some silt pockets, grey, moist to very moist, (very stiff) | #1 |
| some silt pockets, grey, moist to very moist, (very stiff) | #1 |
| very moist, (very stiff) 10 15 4 20 | 田 |
| 15 | $\mathbb{H}_{\mathbf{J}}$ |
| 20 | 扭 |
| 20 | ₽M. |
| 20 | |
| | #4 |
| | |
| | ĦI - |
| | 丑 |
| TERMINATED 283 al HIII OHIII HIII HIII WIII HIII | #4 |
| LERCHNOLEU COSS SINGLEU | |
| | # |
| NOTES: | # |
| 25 | Ħ |
| 1 Borehole advanced uncased by | # |
| continuous flight auger equip- | #1 |
| ment to termination at 21½ feet | #1 |
| depth on Sept.7/86 by S.O.I.L. | |
| | #1 |
| 2. Water Level Records: | B |
| ELAPSED DEPTH TO HOLE OPEN TIME W.L.(ft) TO (ft) | #1 |
| on dry 19.5 35 | 田 |
| completion | #1 |
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| | #1 |
| William Trow | |

| \$ CO | AMPLE NDITIC OISTUM GOOD LOST | ON SS SPLIT SPOON ST - THIN WALLED OPEN (SHELEY) | | ACT I | PARADALE PARADALE 050319-C GEODETIC | 700-435600 RAIN SIZE ANALYSIS ET LINIT WEIGHT - BIN/m* CHSOLIDATION TESTS UNDRAINED SHEAR STRENG PRELD VANE BITACT | ROUP 3 QUEENSTON R HAMILTON ABBREVIATIONS E. P DS D O T | D. BORIN | PAGE IG DA CASIN ATTY - CY HEAR QUICE | TE | of _ ne S.A | |
|-----------------|---|---|--------|----------|-------------------------------------|--|---|-----------------|--|-----------------------|-------------------|--|
| | P. DEPTH | | SYMBOL | WATER LE | O WATER CONTENT - W DYNAMI | REMOULDED LIQUID LIQUIT - W1% C PENETRATION TEST - BLOW 0 60 | A PLASTIC LIMIT - Walk | OTHER TESTS | CONDITION | TYPE AND MUMBER | PECOVERY % | STANDARD PRINCTRATION - BLOWS/0.3m |
| 3 = 4 = 5 | | HARD RED BROWN, AND GREY SILT LAYERED TRACE SAND AND GRAVEL | | | Θ | | | SC ₄ | | SS1 SS2 SS3 | 72 83 | 71 |
| | 12.5 6.65 | END OF BOREHOLE BOREHOLE DRY UPON CO. PLETION | | | 0 | | | | X | SS5 | | 100 for 100 |

QUEENSTON ROAD



| - | TEK LIMI | | | | LOG | OF BOREHOLE NO. | 2 |
|---|----------------------------------|----------|----------------|--|---|-----------------------------|--------|
| Project # 99075 Client: Region of | Hamilton-Wentw Watermain Cons | orth/ | | Drilling Date Drilling Method | | Drawing No. | 3 |
| | e, Hamilton | Suuction | | Contract Drilling Co. | [] hollow st [] diamond Geo-Environ | | |
| SOIL DESCRIPTI | ON LEVE | | 33 SAMPLE | STANDARD PENETR N Value = blows per 300 p | | SOIL MOISTURE PROFILE | DATA & |
| 75 mm of Asphalt over 125 25 mm of Grant LL (Halton Formation by clay, gravel sizes, bro late fragments, grey frac d-brown, moist fiff to Very Stiff) | i) own, red | 95.0 | \$\$1 \$\$2 | -2.0 -20 40 -2.0 -2.0 -2.0 -2.0 -2.0 -2.0 | 60 80 | 00 10.0 20.0 30.0 • 19.4 | |
| BOREHOLE TERM | NATED | 3.5 | | -5.0 | | | |

| Auger Sample SPT (N) Value Oynamic Cone Test Shelby Tube Field Vane Test Ab Vane Test S Natural Moisture Plastic and Liquid Limit Undrained Triaxilal at Overburden Pressure % Strain at Failure Fenetrometer | × ⊷o Pr | oje Que | ct Proposed | l Storm Sewe | * | 1 |
|--|------------|------------|--|--------------|---|-------------------------------------|
| Soil Description 89mm Asphalt 165mm Concrete 203 mm Sand and Gravel Fill - silty clay, gravel sizes, cobbles & Boulders Shale fragments, organic Pockets, Reddish-Brown, moist, (soft to firm) | | EPLIE O | (ASTM) D15864 20 40 Shear Strength | | Atterberg Limits % Dry Weight 10 20 30 | Unit Weight kN/m ³ |

Shale - weathered

(hard)

completion.

Notes:

changing to sound Shale at 4.9m, Siltstone layers, red

End of Borehole

1) Borehole advanced on
April 2/91 using
continuous Flight Solid
Auger Equipment

2) Borehole open to full
depth and dry on

94.1 5

MOUNTAINVIEW GEOTECHNICAL LTD.

| Auger Sample 🛛 Natural Moisture | × | |
|---|---|---|
| SPT (N) Value OO 🛛 Plastic and Liquid Lim | Proposed Storm Sewe | r Dwg. No3 |
| Dynamic Cone Test Undrained Triaxial at Overburden Pressure | us Queenston Road | Borehole No. 2 |
| Field Vane Test + s | Hamilton | |
| Lab Vane Test L | | Project No. S0145 |
| | | |
| G | N Value (ASTM) D1586-CSA A119 1) | Natural Moisture Content Natural and Natural |
| W B / Soil Description | ELEV. T 20 40 60 80 m Shear Strength MPa | Atterberg Limits Unit % Dry Weight Weight |
| | 99.5 | 10 20 30 kN/m ³ |
| 76mm Asphalt | ┍ ═┩╸╸╸╻ [╸] ┠╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫ | |
| 230mm Concrete | 99.2 | |
| Shale - weathered to clay | | |
| consistency, gravel size, | | |
| Siltstone cobbles, moist | | |
| changing to sound Shale a | | |
| 3.4m, Red, (hard) | | |
| | | |
| | 2 | |
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| - | | |
| | | ###################################### |
| End of Borehole | 96.0 | |
| | | |
| | | |
| | | |
| Notes: | | |
| 1) Borehole advanced on | | |
| April 2/91 using | | |
| continuous Flight Sol | d 5 | |
| Stem Auger Equipment | | |
| -2) Borehole open to full | | |
| depth and dry on completion. | | |
| - comprection. | — 6 | |
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MOUNTAINVIEW GEOTECHNICAL LTD.

| Auger Sample Natural Moisture | × | | |
|--|-------------|---|---|
| SPT (N) Value O O 🔯 Plastic and Liquid Limit | - Proje | ect Proposed Storm Sewer | Dwg. No4 |
| Dynamic Cone Test Undrained Triaxial at | A - One | eenston Road | _ |
| Shelby Tube Overburden Pressure 15 % Strain at Failure | ∰, <u>~</u> | | Borehole No 3 |
| Field Vane Test +s Penetrometer | A | Hamilton | Project No. S0145 |
| Lab Vane Test L | _ | | |
| | | | |
| | P | N Value N (ASTM) D1586-CSA A119 1) | latural Moisture Content Natural |
| W B / Soil Description | ELEV. | 20 40 60 80 | Atterberg Limits Unit % Dry Weight Weight |
| | 99.3 | Shear Strength MPa | мимз |
| 100mm Asphalt | 99.3 | | 10 20 30 |
| | | | |
| 255mm Concrete | | | |
| 255mm Sand & Gravel | 98.7 | | |
| _ Silty Clay Till - gravel _ | i t | | |
| Sircy Clay IIII - graver _ | 1 | | |
| Sizes, Limestone boulders, | | | |
| Red Shale and siltstone | | | |
| fragments, moist, reddish- | | | |
| brown (hard) | | | |
| - | 2 | | |
| | | | |
| - | | | |
| | | | |
| | | | |
| | 06 1 3 | | |
| Silt Till- occasional | 96.1 | | |
| gravel sizes, red shale - | | | |
| fragments, oxidized olive- | | | |
| brown, moist, (hard) | 95.4 | | |
| Shale - siltstone layers | 4 | | |
| red. (hard) | | | [|
| red, (hard) End of Borehole | 94.7 | | |
| | | | |
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| | ٦ | | |
| | | | |
| - Notes: - | | | |
| 1) Borehole advanced on | | | |
| April 2/91 using _ | 6 | | |
| continuous Flight Solid | ľ | | |
| Auger Equipment | | | |
| 2) Borehole open to full | | | |
| depth and dry on | | | |
| - completion | 7 | | |
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e. m. peto associates ltd. soil engineering service - toronto, ontario

| : | | ВО | REHOLE | LOG | | | | | |
|--|--|---|-------------------------|----------|--------------------------------|----------------|--------------------------------------|---|---|
| Job Name Redhill Creek Sew | | 61182/1 | | | | | | | 22 |
| Client City of Hamilton | | BX | | | | | | | Jan. 10 -11 , 1962 |
| Elevation 269.8 | Compi | led By J. F. C | 3 | | | | Checked | Ву | S. B. |
| SAMPLE CONDITION UNDISTURBED FAIR DISTURBED LOST | A.S. C.S. S.S. S.L. S.T. W.S. | SAMPLE T AUGER SAMPLE CASING SAMPLE 2" STANDARD S SPLIT BARREL THIN-WALLED S WASH SAMPLE ROCK CORE | YPE PLIT TUB WITH LINE | ESAMP: | LE | | V.T. C. W.L. W.T. W.T.P. | AB IN SI SOIL WATI GROU L. WET | BREVIATIONS TU VANE SHEAR TEST SHEAR STRENGTH LBS/SQ.FT. ER LEVEL IN CASING UND WATER TABLE IN SOIL FER THAN PLASTIC LIMIT R THAN PLASTIC LIMIT |
| SOIL DESCRIPTION | COLOUR | Density of Consistency | Depth Elevation | Legend | Sample No. and Candition | Sample Type | No. of Blows per Fs | Natural Motet tro Tontent | WATER LEVELS & REMARKS |
| | | 65 | | | | | | | *** |
| Citty five good | ~ 1. | GH | OUND | | | | | | |
| Sitty fine sand - organic | Red brown | <u> </u> | 1'0" | 17.7 | $\perp \downarrow >$ | C.S. | | | Very moist. |
| Clayer sitt fine send | Red brown | | | | 121 | C.E. | | | Very moist. |
| Clayey silt - fine sand content | Red brown | Loose to | | 1 | 3 | S.S | _2 | -27- 3- | Very moist |
| River Gravel | Dad b | Compact | 4'3' | | ļ |] | | | |
| | Red brown | | 4'9" | 2000 | 48 | | - | | Saturated. |
| Highly weathered shale | Red brown | Extremely | -6161 | | 1.5.1 | Ls.s. | 93 | 9_3 | Moist |
| | *************************************** | Dense | 7191 | | 1 | ļ | | | |
| | | | 1 9 | === | 一次, | | | | |
| Out and an abal. | | ļ | ļ | | | <u> </u> | | <u> </u> | Rust pocket at 9 feet |
| Queenston shale | Red & blue | ļ | <u> </u> | | 1 12 | R.C. | | | Recovery 95% |
| *************************************** | *************************************** | ļ | ļ | | | | ļ | | Odd broken seam |
| | | | 13'0" | +=== | 1 // | ļ | <u> </u> | <u></u> | |
| | | ļ | 13.0. | 1 === | <u> </u> | ; | <u> </u> | | |
| and Anti-Anti-Anti-Anti-Anti-Anti-Anti-Anti- | | <u> </u> | | | | <u> </u> | | | |
| | | ! | ļ | | | i | : | | |
| Thin gypsum seam | | l | 15'9" | * | 1 | 1 | : : | | |
| Queenston shale | Red & blue | + | | | | R.C. | | ļ | Recovery 100% |
| makadid develope more district and the same security measures with a decrease series of an extra security | | | 18'0" | | | | | | |
| section of the contract of the | | | | <u> </u> | | | 1 | | |
| | | | <u></u> | ==== | | 1 | • | | |
| | | | L | -: | 1 1/ | .i | | | |
| | *************************************** | | | 1=== | | | | | |
| Fissure at 22'10" | | | 22,10 | 122 | 1_1/2 | 1 | 1 | | |
| Queenston shate | Red & blue | ļ | | | 11/2 | R.C. | ! ! | | Recovery 100% |
| | | | 1 | | 1 VZ. | 1 | - | | |
| Soft seam or fissure at 25'6" | | | 25'6': | | 1/4 | <u> </u> | | | |
| | *************************************** | | | <u> </u> | | 1 | | | |
| | | | 25'6': | | 1/2 | | ! | | |
| , | | ļ | ļ | ļ | ļ | 1 | | | |
| | | Bori | ng Terr | ninat | ed at 2 | 8:2" | | | Note: Arrows denote |
| ************************************** | | | | <u> </u> | | | | | soft seams. |
| | | | | | | | | | |
| | | | WATER | COI | VDITIO | NS. | | | |
| Date | Time | Depth | Dept | h | Depil | 1 | Rem | rks | |
| | | Casing | Hote | | Wate | | | | |
| The second secon | | | | | | | | | |
| Jan. 10/62 | 4 | 0, | 4'4 | 1 | 3'7'' | | Hote 4'3' | shoute | be at 6 ft. seepage from |
| Jan. 11/62 | 10:30 a.m. | 8, | 18' | | 6'2" | | | | owar W. I. below 6'2' by |
| | | | 1 | | | 1 | baitir | 17 | I WILLIAM D Z DY |
| | 10:31 a.m. | 81 | 18' | | 3'7" | | | - | |
| | 10:36 a.m. | 8, | 18' | | 3'7" | | | | |
| ,,,, , , , , , , , , , , , , , , , , , | 10.00 | 1 0. | 1 | 1 | † | 1 | i | | |

| B 1 144 | 1175 | N SEE FIGURE 2: R HAMMER, 83.5kg, DROP, 780mm, | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Ri | | ÖF | (D | ARG I | XTE | UGUST PENET | 29,1986 RATIO | Est | | | DA. | TUM & | EODETI | | |
|-----------------------|---------------|--|---------------------------------------|-----------------------|-----------|------------------|--------------------|-----------------|--|------------------|---------------------|--------------|--|-------------------|--|----------|--|----------------------------|---------------------------------|
| CALE | METHOD | SOIL PROFILE . | PLOT | <u> </u> | SA | MPLE | | RESIST | ANCE, | ETRATE BLOWS/ |).5m | ٧ | HYDRA | k, C | CONDUC M/SEC | TIVITY, | I | 4AL TIPPG | PIEZOMETER |
| DEPTH 3CALE METRES | BORING M | DESCRIPTION | STRATA PL | ELEV. DEPTH (M) | NUMBER | TYPE | BLOWS/0.3M | SHEAR Cu, ki | STREN | ne | it.V.= + m.V.= 6 | 0,- e U 0 | ¥A. | Wp. | ö | PERCE: | NT IO | ADDITIONAL LAB. TESTING | OR STANDPIPE INSTALLATION |
| - 0 | T | GROUND SURFACE | X | 92.00 | | | | | | | | | | | | | | | Backfill |
| | | Granular road base.FILL. | X | 91.20 | | | | | | | | | | | | | | | |
| . 1 | | | | 0.80 | 1 | 60 DO | 8 | | | | | | | | ļ | | | | - |
| | | | X | | | 50 | | | | | | | | | | | | | |
| . 2 | | | X | | 2 | 50 00 | 6 | | | | | | | | 0 | | | МН | |
| | | Firm to stift, grey slity ctay, trace to some sand and grayel, trace organics (wood and peat) | \searrow | | 3 | 60 DO | 8 | | | | | | | c | <u> </u> | H | | | |
| - 3 | | FILL. | X | | | | | | | | | | | | | | | | |
| | | | X | | 4 | BO DO | 10 | | | | | | | | | | 4 | | |
| - 4 | 2 8 | | | | 5 | 50 DO | 12 | | | | | | | 0 | - | | | | |
| omaya andire | STEM AUGERS | | \times | 87.40 | | | | | | | | | | | - | | | | |
| . 5 | OLIO STEI | Red-brown sand, some gravel. FILL. | | 4.80 | 6 | 50 DO | 8 | | | | | | | | | | | , | |
| , od sa zavi | un DIA. SOLID | - Andrews - Andr | X | 86.70 5.30 | | | | | Address and the state of the st | | | | | | projekte překa sa sa sa sa sa sa sa sa sa sa sa sa sa | | | | |
| . 6 | Manuel | | | | | | | | | | | | | | | | | | |
| | | | | | 7 | 50 DO | 7 | | | | | | | | ٥ | | | | |
| . 7 | | Firm to stiff, brown to gray | \times | | | | | | | | | | | | | | Annual Control of the | | |
| | | clayey slit, some sand, trace gravel, some sandy slit pockets/layers, occ. organics. | \searrow | | | | | | | | | | | | | | | | |
| 8 | | FILL.Topsoll layer (about 200mm thick) at 6m depth. | | | 8 | 50 DO | 18 | | 240000000000000000000000000000000000000 | | | | | 0 | | | | | |
| | | | X | | | | | | | | | | | | | | | | - |
| | | | \times | | | | | | | | | | | | *************************************** | | | | |
| | | | \times | | 6 | 50 DO | 10 | | | | | | | | | | | | |
| | | | | 82.00 | | υO | , • | | | | | | | 0 | | | Apparator of Appar | | |
| 10 - | | CONTINUED ON SHEET 2 | | 10.00 | | | | | | | | · — | | _ | <u> </u> | † | | | <u> </u> |
| | | | | | | | | | | | | | | | | | And the state of t | | |
| 050 | | CALE | | | | | | 18 6 | PENCENT | AXIAL ST | RAIN AT | FAILUNE | | | | | <u> </u> | | |
| 1: | | | contemporary (contemporary) | intiretariamentones | onomiene. | race approximate | THE REAL PROPERTY. | Go | lder | Ass | ociat | 8 | 00000000000000000000000000000000000000 | · Militari Marian | MACHINE RECORDED TO MACHINE PROPERTY AND ADMINISTRATION OF THE PARTY AND ADMINISTRATION OF THE | | | OGGEC CHECKE | RF ED ASP |

| 1142 | | | | | R | ΞC | Ö | ìD | OF | BC | REP | IOLE | 5518 | 11/1/11 | | SH | EET 2 | ol 3 | | |
|-------------|---------------------------|-------------------------------|---|----------------|-----------------------|---------|--|-------------|-----------------|--------|----------|---------------------------------|---|--|--|--|--|---|----------------------------|---|
| | 1111 | li:" | om see figure 2 7 Hammer, 83.5kg, drop, 780mm | | | | A Company of the Comp | 80 | XRING D | ATE . | chia tit | 29,1989 PATION | # 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | HAMME | R. 83.6 | | | 2E00E1 | o | (63) |
| <u></u> | | 8 | SOIL PROFILE | | | SA | MPLI | : S | DYNAM | UC PEN | ETRAT | он / 111111111 | tilili > | 9(Hb) | NULIC C | ONDUC | ijiriji | T | | |
| DEPTH SCALE | COME | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (M) | NUMBER | TYPE | BLOWS/0.3M | | STREN | 114 | 0.3m 11.V + m.V € | | WA. | TER CC | M/SEC | PERCE | L ENT | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
| - 1 | | ă | CONTINUED FROM SHEET 1 | STR | 82.00 | | _ | ä | | | · · | | J | * | 0 2 | 0 8 | 30 | 40 | | |
| | Ĭ | | SEE DESCRIPTION ON PREVIOUS PAGE. | X | 10.00 | | | | | | | | | | | | | | | Backfili ——————————————————————————————————— |
| | | | Possible boulder (inferred from auger resistance). | R | 10.80 | _ | | | | | | | | | | | | | | |
| | | | Stiff, motified brown and grey CLAYEY SILT with sand and gravel, occ. sand seams. Red-brown completely weathered | ** | 80.10 | | 50 DO | | | | | | | | | | The state of the s | | | - |
| | | | calcareous mudstone. | <u></u> | 79.68 12.42 | - | 50 DO | B2/ .6 | | | | | | | | _ | - | | | |
| - 1 | | AUGERS | FOR BEDROCK CORING INFORMATION REFER TO SHEET 3. | | | | | | | | | | | | | | | | | Water level in borehole open to 12.4m depth, at Elev. 81.3m on completion |
| 1 | ER AUGER | LOW STEM | | | | | | | | | | | | | | | | | | of overburden drilling. |
| | CME-65 POWER AUGER BORNYG | 186mm DIA. HOLLOW STEM AUGERS | | | | | | | | | | | | | | | | | | |
| | 5 5 | 1861 | | | | | | | | | | | | | | | | | | • |
| 1 | 8 | | | | | | | | | | | | | | | And the state of t | | | | - |
| - 1 | 7 | | | | | | | | | | | | | | | | | | | - |
| - 1 | В | | | | | | | | | | | | | | | | | | | |
| - 1 | | | END OF HOLE | | 79.38 18.64 | | | | | | | | | | festalentes control and contro | | - Andreas - Andr | Commence of the second | | _ |
| | | | | | | | | | | | | | | | Programme and the control of the con | Andrew Communication Communica | - | *** | | |
| - 21 | | | | | | | | | | | | | | | | No. of the last of | | | | _ |
| | | | | | | | | | | | | | | | | | | | | |
| l | EPTI | | CALE | | | Marine | | | 10 | • | | ociat | | | | | | | OGGED CHECKE | RF ED ASP |
| | MINISTER SE | | | destination of | Sedonic sensorman | rabumma | | *********** | كالثالث المالية | | | | - | Confession Contraction of the Co | | - | - | - | | |

| ÆS. | RECORD | • | PLOT | | No. | N RATE | PETURA | CL \$H | -FR -CL -SHE | EAI | VAG | E E | J. P. | -JO | ULT HNT XLISH | ÆD | | | SM-SMOOTH R -ROUGH ST-STEPPED | UE- | UNE | XURE VEN VY | | TRAL | (MP#) | NOTES |
|--------|------------|--|---|-----------------------|-----|--------------------|--------|-----------|--------------------|-----|-----|--------|---|---------|-----------------------------|----|----|-----|--|-----|---|---|---|--------------------|-------------------|--|
| METRES | DRILLING R | DESCRIPTION | STRATA | ELEV. DEPTH (M) | RUM | ENETRATION (M/M/W) | ¥. | R | ECO | VE | RY | | | F 10 FE | CKE ACT. DEX R OJE | 88 | DI | SCO | PL-PLANAR ONTIMUITY DATA TYPE AND SURFACE DESCRIPTION | £ 0 | HYD | RAU | LIC | DIAMETI POINT L | XEDEX | WATER LEVELS INSTRUMENTATION |
| 10 | Ī | | === | 82.00 10.00 | | _ | | H | Ħ | Ï | | Ħ | | | | | H | | | + | + | H | + | \blacksquare | $\dagger \dagger$ | |
| | | FOR SOILS INFORMATION REFER | | | | | | | | | | | | | | | | | | | | | | | | *************************************** |
| 11 | | | | | | | | | | | | | | | | | | | | | | *************************************** | | | | |
| | | | ======================================= | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | Red-brown completely weathered | === | 80.10 | | | | | | | | | | | | | | | | | | | | | | |
| | RC. | calcareous mudatone. (QUEENSTON SHALE) | = | 79.58 | | | | | | | | l | | | | | | | | | | | | | | |
| | £ | | | 12.42 | 21 | Š. | ş | | | | | | | | | | | | BROKEN CORE SEALS | | | | | | | Backfill |
| 13 | NO RC | | | | 51 | 90 | 9609 | | | | | | | | | | | 11 | BROKEN CORE SEAMS | | | | *************************************** | | | |
| | 五 | | == | | | -, | * | | | | | | | | | | | | SPROKEN CORE SEAMS | | | | | | | |
| 14 | - | | == | | | | - | | H | ŀ | | | | | | | | | | | | | | | | |
| | RC | Red-brown, moderately to | - | | | | * | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | | | | | | | | | | | |
| 15 | õ | slightly weathered, fine grained, thinly bedded, | = | | 7 | 80. | 30-60 | | | | | | | | | | | | | | | | | | | |
| | DARLING | CRICATEOUS MUDITIONS. (QUEENSTON SHALE) | | | _ | | | | | | | 2 × 2 | | | | | | | BROKEN CORE SEAMS | | *************************************** | | | | | |
| 18 | | | == | | | | | | | | | | | | | | | | | | | | | | | Bentonite Seat |
| | NO RC | | ======================================= | | \$ | | | | | | | | | | | | | | DOUNTS CADE | | | | | | | Granular Filter |
| | ROTARY | | = | | | | | | | 3. | | | | | | | | | BROKEN CORE SEAMS | | | | | | | |
| 17 | | | == | | _ | - | | | | ł | | | | - | | | | | | | *************************************** | | | | | |
| | NO RC | | = | | | | * | | | | | | | | | | | | | | | | 1 | | | |
| 18 | ¥. | | ======================================= | | \$ | 6 | 30-40% | | | | | | | | | | | | BROKEN CORE SEAMS | | | | *************************************** | | | |
| | | | <u> </u> | 73.36 18.64 | | L | _ | | | | | | | | | | | | BRICKEN CORE SEAMS | | | | THE STREET, ST. | | | |
| 19 | | END OF HOLE | | 13.04 | | | | | | - | | | | | | | | | | | | | | | | Water level in piezometer at Elev. 81.6m on Oct. 4,1989 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| żο | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | LO SAI | UPLE | ON SEE FIGURE 2 R HAMMER, 83.6kg, PROP. 780mm | | | | Management (1975) | В | OF B | SEPT. I | 1989 TRATION T | (EST | HAMMER, | 63.5kg. | GEODET JOMM | IC | |
|-------------|-------------------------|---------------|--|------------------|-----------------------|---|-------------------|------------|----------------------------------|--|---|------|--|--|--|----------------------------|---|
| DEPTH SCALE | METRES | BORING METHOD | SOIL PROFILE DESCRIPTION | STRATA PLOT | ELEV. DEPTH (M) | _ | TYPE | BLOWS/0.3M | DYNAMIC PERESISTANCE, SHEAR STRE | BLOWS | 10N /0.3m /at.V + Q. em,V,+ & U. | | | k, CM/SE | | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
| JECT 82C | 1 | | GROUND SURFACE Compact, grey sand and gravel (granular road base). Fill. | XXXXX | 92.09 | 1 | 60 DO | 10 | | | | | | | | | |
| | 2 | | Stiff.grey-brown allty clay, | | 1.17 | | 50 DO | 9 | | | | | | • | | МН | |
| | 3 | | irace to some sand, trace gravel, occ. organics, topsoli seam at 2.5m depth. FiLL. | XXXXX | | | 50 DO 50 | 16 | | | | | | 0 | No. 7 only wandows of a second | | - |
| , | 4 Outcook Bayers Gamers | SOUD | Stiff to very atlff, red-brown | | 88.09 4.00 | | 50 DO DO | 8 | | | | | | 0 F | | | |
| | 6 | | ciayey siit.some gravei, weathered shale/residual soil FiLL. | KX | | 7 | 50 DO | 22 | | | | | AND THE PROPERTY OF THE PROPER | | A DESCRIPTION OF THE PROPERTY | | - |
| | 8 | | Mixture of very atlff red- brown clayey ailt, trace to | \otimes | 84.59 7.50 | 8 | 50 DO | 30 | | | | | | | Market and the second of the s | | - |
| | | | some sand and gravel; and dense brown silly sand, trace clay; occ. organics.occ. asphalt fragments. FILL. | | 82.09 | 9 | 500 | 18 | | The state of the s | | | | 0 | | | <u>-</u> ↓ |
| - 11 | • | | CONTINUED ON SHEET 2 | | 10.00 | A contract of the contract of | | - | O PENCENT | AXIAL ** | AAIN AT FAN | UNG | | Value of the state | | | |
| 1 | | H SC 50 | ALE | TOTAL CONTRACTOR | | | | | Golder | | | | 5 | | | OGGED | |

| | 111. | 11 J. M. | ON: SEE FIGURE 2 R HAMMER, 83.5kg, DROP, 780mm | The state of the s | R | =C | OF | | OFING DAT | E SEPT. (| | | | | DA | 1i: ii: | EOOETI | Ğ | |
|-------------|--|--|--|--|--|-----------|---|--|--|--|--|--|---|--|--|------------|--|---------------------------------------|---|
| + | | 11[2] | SOIL PROFILE | 14({}) | 5400 | S.4 | MPLE | :: s | DYNAMIC | PENETRAT | TION > | | | 300 | | 片州田 | | | |
| DEPTH SCALE | METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (M) | NUMBER 5 | 1 3 | BLOWS/0.3M | RESISTANG | CE, BLOWS | nat.V + | - O e | WAT | k, Ch | M/SEC | PERCE | T NT | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
| - ' | 10 | <u> </u> | CONTINUED FROM SHEET 1 | | 62.09 10.00 | - | 口 | - | | | - | | | | | | | | |
| | | AUGER BORING STEM AUGERS | SEE DESCRIPTION ON SHEET 1 Loose, brown SAND AND GRAYEL. | K | 10.00 81.79 10.30 | 1 | | | | | | | | | | | | | |
| | 11 | DIA. SOLID | | 22121201100112 | 81.29 10.80 80.59 | 10 | 50 DO | 46 | | | | | | | | | | | - |
| | - | 195mm | Highly weathered, red-brown calcareous mudstone. [CUEENSTON SHALE] | | 11.50 80.24 11.85 | | | | | | | | | The state of the s | *************************************** | | | | |
| | And in contrast of the least of | - Andrews - Andr | END OF HOLE | | | | | | | | La constitución de la constituci | | | | | | | l L | water level in open borehole at Elev. 82.6m |
| - | 13 | | | | | | | | | | | | | | | | The second secon | | at Elev. 82.6m on completion of drilling. |
| | | | | | | | | | | | | | | | | | | | |
| 1 | 14 | | | | ************************************** | | | | | | | | | | | | | | |
| , z | | | | | | | | | | | | | 1 | | | | | | |
| - : | 15 | | | | | | | | | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | | | | | |
| • | 18 | | | | * Annual paparate | | | | A THE STATE OF THE | Care transmission of the Control of | 1 | | | | | | | | _ |
| ļ., | 7 | | | | Y | | | | | | | | | | | | | | |
| | | | | | | | *************************************** | | | | | A A A A A A A A A A A A A A A A A A A | | | | | P+1 department of the second | | |
| | 8 | | | | | | | | | And the state of t | | | | e e e e e e e e e e e e e e e e e e e | | | | | 1 |
| - 1 | 9 | | | | | | *************************************** | The state of the s | | And the second s | | - Per | | | | | | | |
| | *************************************** | ************************************** | | | | | | | | Habitation communicated and the second | | | | ORDER DE LE CONTROL MANAGEMENT | | | | a. particular property and the second | 4 |
| - 21 | ð | Mineral Company | | | | | | | | DATE OF THE PARTY | | | 717 | | | | | 7 | _ |
| | • | | | | | | | | · | Account of the second of the s | | | | - | THE PERSON NAMED AND ADDRESS OF THE PERSON NAMED AND ADDRESS O | of and day | | | |
| | | | <u> </u> | | | | | _ | 0 18-0-6 PERCE | I I SALVA THE | DAIN 4" | FAILUE- | _ | | | | | | |
| | | TH SC | PALE | | | | | ٦ | | ert axial si | | | | | | | | OGGED HECKE | i i |
| Γ | | | | *********** | - | | anideonosia. | migraphics. | CONTRACTOR CONTRACTOR | Herefore Assessment Complete parts | - | - Commission of the Commission | THE PROPERTY AND PROPERTY OF THE PERSON NAMED IN COLUMN 1 | and the contract of the contra | bAnnosulminussi. | | | | 1 |



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ంగా ఎక్కువారి. ఎక్కుబారులో ఈ సమోజియాగువేస్తాను 10 ఎ.1.

| LO | CATION Glen Castle Drive to Barton PRING METHOD Continuous Flight | Stre | et, H | amilte | on, O | |) | BOR | ING L | DATE | Marc | h 31, | 199 | 8 <i>E</i> M | | |
|------------------------|--|--------|-----------|--------|---|-----------------------|----------------|--------|---------------------------------------|--------------|--------------|-------------------------|---------|--------------|----------------|--|
| | SOIL PROFILE | | | S | AMPLE | īs . | SHEAF | STRE | NGTH (| 2u | | | D LIMIT | | W _L | |
| DEPTH in METERS | DESCRIPTION BOREHOLE Q5 | LEGEND | ELEVATION | NUMBER | TYPE | LOWS/0.3m - VALUES | DYNAM STAND | ARD PL | NE PEN ENETRA WS/0.3 | NETRATION TO | ON x EST• | WATE: ₩ _P | P CON | TENT | W _L | GROUNDWATER OBSERVATIONS AND REMARKS |
| | GROUND ELEVATION 83.45 | | EL | ž | | 19 × | 2 | | 0 60 | | 2 | | | 0 3 | | |
| 0.30 -1.35 -2.45 | slightly plastic, W.T.P.L becoming sandy, gravefly, wet, trace of decayed organics, numerous shale particles, | | 82 | 1 | SS | 11 | • | | | | | | | • |) | |
| 2.60 | Moltled black and grey SHALE: Weathered red shale BOREHOLE TERMINATED AT 2.60m | | 80 | | | , | | | | | | | | | | Upon completion of augering, no free water, |
| | | | | | | | | | | | | | | | | no cave. |
| | BOREHOLE Q6 | | | | | | | | | | | | | | | |
| 0.30 | GROUND ELEVATION 82.03 | ~~ | | | | | | | | | | | | | | |
| 0.90 | TOPSOIL: Dark brown sandy silt, trace of clay, low organic SAND: Reddish brown silty sand, trace of clay, wet SILT: Layered grey and reddish brown sandy and clayey silts, wet | | 81 | | | | | | | | | | | | | |
| | BOREHOLE TERMINATED UPON REFUSAL TO AUGER AT 1.35m BEDROCK ASSUMED | | | | | | | | | | | | | | | Upon completion of augering, no free water, no cave. |
| | | | | | | | | | | | | | | | | |
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| | | | | | *************************************** | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | |

PETO ASSOCIATES LTD. CONSULTING SOIL ENGINEERS RECORD OF BOREHOLE NO. 1 JOB NO. 70F154 JOB NAME Watermain - Nash Road, Hamilton, Ontario TECHNICIAN_B.P. Corporation of the City of Namilton ENGINEER GDP/PK BORING DATE Dec. 21/70 CLIENT TYPED BY V.S. GROUND ELEV. Not Recorded BOREHOLE TYPE 4" Flight Auger DYNAMIC CONE PENETRATION BLOWS/FOOT SOIL PROFILE SAMPLES LIQUID LIMIT _ STANDARD PENETRATION TEST PLASTIC LIMIT __ BLOWS/FOOT WATER CONTENT_ REMARKS DEPTH ELEV. DESCRIPTION WATER CONTENT % W SHEAR STRENGTH Cu LB/SQ.FT. FILL-Clayey, high in organic content, very moist, dark -3141 thrown
CLAYEY SILT TILL-Brown fine, moist, mainly fine gravel with occasional medium gravel þ 0 At completion BH terminated at BH open and 14'0" dry 1 hr. later same

this margin reserved for binding

| е. | m. peto associates ltd. | ng Sanga <u>ng ang S</u> angahan | | F | RECO |)RD | OF E | BORF | HOI-I | F NO |) | Sup. | Ç | onsult | ing so | oil engin | eers |
|----------------|--|----------------------------------|--------|----------------|------------|----------|-------------------|--|--|------------------------|----------|--|--|----------------|------------------------------|-----------|---------------------------------------|
| JOE | 3 NO65329 | JOB ! | NAME | | | | | | | | | J-0 | | | | VICIAN | |
| ВО | RING DATE Jan. 7/66 | CLIEN | ۱T | С | orpo | ratio | n of | the C | ity o | f Ham | ilton | | | | | | |
| GRO | OUND ELEV_ 325.86 | BORE | HOL | E TYP | E | | Stand | ard R | ig | | | | MATEUR CONTRACTOR | | TYPE | D BY | HF |
| | SOIL PROFILE | | | SAMPL | | | DYNAM | C CONE | PENET | RATION | | LIQUID | LIMIT | | w, | | |
| DEPTH ELEV. | DESCRIPTION | LEGEND | NUMBER | TYPE | BLOWS/FOOT | 1 | | BLOWS/ | FOOT - | 0 5 | 0 | WATER W. | CONTE | NT | ₩. 9% | REM | ARKS |
| 0'0' | TOFSOIL | 20 | | | 60 | : | | | | | | 1 | 0 1 | 5 2 | 0 25 | | |
| | CLAY, reddish brn. fine sandy clay V. Wet | | 1 | SS | 19 | | | | | | | | | | | | |
| | COMPACT TO LOOSE | 1/ | | | | | | | | | | | | 18.9 | | 33.4 | |
| 7'0" | SAND, reddish brown | | 2 | SS | 6 | | | Pro- ARRAMENTA E REPORTED | | | | | | 1 | | 0 | |
| | clayey fine sand Saturated | | 3 | SS | 12 | | - | - | | | | | | | | | |
| 12'0" | COMPACT | | 4 | SS | 26 | | | 1 | | | | | | | | | |
| | SAND, reddish brn. silty clayey very fine sand | | - 5 | SS | 36 | | | dente sancte « page " page" | i | | | | 1 | 7.0. | | | |
| | Time Sand | | 6_ | SS | 36 | | <u> </u> | | | | | | - | 7.0 <u>1</u> | 7.2 | • . | · . |
| | CA TILLDA MILID | | | | | | electric constant | 1 | | | | | | | | | |
| | SATURATED | 1 | 1 | - | 1 | | | • | | | | |] | 6.9 | | 29.4 | |
| | DENSE | | 7 | SS | 38 | | | ! | i | | | | | 7 | | | |
| 23'0' | | | | | | | | | | | | | anni de la constanta de la con | | | | 11 2 A |
| | SILT, brown very fine sandy silt | 1 | | | | | | | | | | | | | 1.63 | CAMPAGE | |
| | Some sand and clay seams | [| 8 | SS | 38 | | | | | | | | | | | | *. |
| | SATURATED | | | | | | | | | | | | - produced and the second | \ | | | |
| 31'6" | DENSE | | 9 | SS | 33 | | | | /- | | | | | | | | |
| | Hole terminated at | | _ | | 1 | | , | | | * Charles Water Spirit | | | | | | | |
| | 31'6" | | | | 1 | | | The state of the s | and the second | - | | | | water comments | | | |
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| e. | m. peto associates Itd. | | | _ | | ~~ ~! | - 50 | יחרו | | NIO. | _ | | Co | nsultii | ng soil | | |
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| 43.5 | | | | | | RD OI | | | | | 6 | -B | | | | | |
| 1 | B NO. 65329 | | | | | treet | | | | | | | | | TECHNIC | | |
| | RING DATE Jan. 10/66 | | | | | ation | | | | Hamil | ton | | | | ENGINEE | | - |
| GR | OUND ELEV_ 326.86 | BORE | HOL | E TYP | E | | | lard I | | | | | | | TYPED B | | |
| | SOIL PROFILE | | 1 | SAMPLE | | DYI | NAMIC BL | CONE I | PENEIR OT FRATION | TEST | | LIQUID (| IMIT . | | - WL | | |
| | | 9 | 25 | ш | BLOWS/FOOT | | | PENET OWS/FO | | 5,0 | | PLASTIC WATER | CONTEN | T | _ w | REM | A |
| DEPTH ELEV | DESCRIPTION | LEGEND | NUMBER | TYPE | WS/I | | | | | /SQ.FT. | \dashv | Wp | W | A | <u>,</u> L | | |
| 0'0" | |]] | Z | , | BLO | | | | | | | 10 | TER CO | NTENT % | <u> </u> | 7-12-4 | witte |
| 0'6" | TOPSOIL CLAY, reddish brn. | 732 | | | | | | | | 7 | | and the second s | | Production of the Control of the Con | | | |
| | sandy clay | | 1 | SS | 9 | | | Ì | | | | | | | | | |
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| | | 1/ | | | | | | | | | | | | $\overline{}$ | | | |
| | V. WET TO MOIST | | 12 | SS | 9 | !_ | - | | | | | | | | 2 | | |
| | - | | 13 | SS | 31 | 1 | 1 | | | | | | ~ | | | | |
| | LOOSE TO DENSE | | | |] | | * | 1 | | 1 | | | 3 | ĺ | | | |
| 10,0 | SAND, reddish brown | 5 H/ | 4 | SS | 28 | | | -/ | | | | | -) | | | | |
| <u> </u> | clayey sand | | :- | + | " | and the same of th | 1 | +; | | | | - | | | | | |
| | Some pockets of | | 5 | SS | 55 | - | - | | T | - | >، | | | 0 | | | |
| 2.77.0 | grey and black sil | t | 1- | | - | | | | | | | | | | | | |
| 15'0 | SILT, brown fine | 111 | 6 | SS | 32 | | | | | | | | | | 6 | | |
| | sandy silt with some fine sand | | | | 1 | | ļ | | | | | | | 1 | | | |
| | seams | | | | - | | 1 | Ì | | 1 | | | | | | | |
| | VERY WET | | - | + | 1 | | | | | | | | | · | | | |
| | VERI WEI | | 17 | SS | 31 | | i | | | | | | | | 0 | | |
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| | | | | | 1 | | | | | | | ļ | 14.2 | 1 | 0.0 | 713.44 | |
| 2616 | DENSE | | 8 | SS | 36 | | f: | 1 | 1 | | | (A) (A) | ा अस्ति । इ.स.च्या | ,3 | | | |
| | CLAY, brown silty | V | 7- | - | - | | | 11.000000 | | | | | | 18. | 7 | | |
| 3 T. J. A. | Clay, | | | | _ | | | | · | | | | / | 1 | | | |
| | V. STIFF | - M. | 1- | | | - | | | | | _ | - | | | - | | |
| 31-6 | | 11/ | 1 9 | SS | 66 | | | | | | | 0 | | | | | |
| , | Hole terminated at | | | 1 | | | | | | | | | | | | | |
| | 31'6" | | - | | 4 | | | | | | | | | | | | |
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| - 1 | 1 | 1 | 1 | 1 | 1 | 1 | | • | 1 | | | 1 | 1 | 1 | 1. 1 | | |

Project No: SM 041546-G

Log of Borehole No. 1

Project: Watermain Replacement

Client: Sutton & Associates

Borehole Location: See Drawing No. 1

Location: Main Street West, Hamilton

Project Manager: Ian Shaw, B. Eng., EIT



| | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|---|---|-----------|------|--------|-------------|--------------|--------------|----------|------------------|
| Depth Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content |
| oft m | Ground Surface | 0.00 | | | | | | | |
| 2- | Asphaltic Concrete Approximately 40 millimetres Granular Base Approximately 200 millimetres | -0.24 | | | | | | | |
| | Sand and Gravel Fill Brown, medium to coarse grained, compact | -1.00 | SS | 1 | 22 | | | | |
| | Silty Sand/Sandy Silt Brown, layered/stratified, loose | | SS | 2 | 9 | | | | |
| 2 8- | End of Borehole | -2.30 | ss | 3 | 7 | | | | |
| 10-1 12- 14- 14- 16- 18- | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. 3. Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |

Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Phone: (905) 318-7440 Fax: (905) 318-7455 Drill Date: Feb 11, 2004

e-mail: info@soil-mat.on.ca Hole Size: 100mm

Sheet: 1 of 1

Datum: Ground Surface Checked by: IS

Project No: SM 041546-G

Log of Borehole No. 4

Location: Main Street West, Hamilton

Project: Watermain Replacement

Borehole Location: See Drawing No. 1



| | | SIIDSIIDEACE BROFII F | | | | 0.4 | BAD! F | | | | | · · · · · · · · · · · · · · · · · · · |
|---|--------|--|-----------|------|---|-------------|--------------|--------------|----------|---|--------------|--|
| Depth | Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | 1 | dard Penetra | ation Te |
| oft m | | Ground Surface | 0.00 | | | | | | | | | |
| 2= | | Approximately 50 millimetres Silty Sand and Gravel Fill Brown, medium to coarse grained, | -0.30 | | | | | | | | | |
| - | | compact Silty Sand/Sandy Silt Brown, layered/stratified, occasional | / | SS | 1 | 12 | | | | | 1 | *************************************** |
| | | layers of medium sand, compact to loose | | ss | 2 | 17 | | | | | | |
| 1 2 | | | -2.30 | AS | 3 | | | | | | | |
| 3 - - - -) - - - - - | | End of Borehole NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres | | | | | | | | | | |
| + | | 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. | | | | | | | | | | |
| 1 -4 | | Soil samples will be discarded after thre months unless otherwise directed by the client. | ее | | | | | | | | | |
| ; ; - - - | | | | | THE THE THE THE THE THE THE THE THE THE | | | | | | | Western State of the State of t |
| 3-1 | | | | | | | | | | | | |

Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Phone: (905) 318-7440 Fax: (905) 318-7455 Drill Date: Feb 11, 2004

e-mail: info@soil-mat.on.ca Hole Size: 100mm

Datum: Ground Surface

Checked by: IS Sheet: 1 of 1

Project No: SM 041546-G

Log of Borehole No. 5

Project: Watermain Replacement

Borehole Location: See Drawing No. 1

Location: Main Street West, Hamilton

Client: Sutton & Associates

Project Manager: Ian Shaw, B. Eng., EIT



| | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|--------------------------------------|--|-----------|------|--------|-------------|--------------|--------------|----------|------------------|
| Depth | Description | Elevation | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content |
| oft m | Ground Surface | 0.00 | | | | | | | |
| 2- | Topsoil Approximately 50 millimetres Silty Sand Fill Brown, traces of medium to coarse | | | | | | | | |
| - 第4 - 第4 - 3 版 - 3 版 | gravel, compact | -1.10 | ss | 1 | 17 | | | | |
| 4- | Silty Sand/Sandy Silt Brown, layered/stratified, occasional layers of medium sand, compact to loose | | SS | 2 | 12 | | | | |
| 6 2 - | | -2.30 | SS | 3 | 6 | | | | |
| 10 1 12 4 14 1 16 1 18 1 | End of Borehole NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. 3. Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |

Drill Date: Feb 11, 2004

Hole Size: 100mm

Drill Method: Solid Stem Auger 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: Ground Surface

Checked by: IS

Sheet: 1 of 1

Project No: SM 041546-G

Log of Borehole No. 7

Location: Main Street West, Hamilton

Project: Watermain Replacement

Borehole Location: See Drawing No. 1

Client: Sutton & Associates Project Manager: lan Shaw, B. Eng., EIT



| | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|---|--|----------------|---|--------|-------------|--------------|--------------|----------|--|
| Depth | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content W% 10 20 30 40 Standard Penetration Test blows/300mm 20 40 60 80 |
| 6- 2 8 10 12- 16- 4 18 | Ground Surface Asphaltic Concrete Approximately 40 millimetres Granular Base Approximately 300 millimetres Silty Sand and Gravel Fill Brown, medium to coarse grained, compact Silty Sand/Sandy Silt Brown, layered/stratified, occasional layers of medium sand, compact to loose End of Borehole NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the completion of drilling. Borehole backfilled with auger cuttings. 3. Soil samples will be discarded after three months unless otherwise directed by the client. | -1.10 -2.30 | SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS | 3 | 21 10 11 | | | | |

Drill Method: Solid Stem Auger SOIL-MAT ENGINEERS & CONSULTANTS LTD. 130 Lancing Drive, Hamilton, ON L8W 3A1 Drill Date: Feb 11, 2004

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

Sheet: 1 of 1

Datum: Ground Surface

Checked by: IS

Hole Size: 100mm

Project No: SM 041546-G

Log of Borehole No. 8

Project: Watermain Replacement

Client: Sutton & Associates

Borehole Location: See Drawing No. 1

Location: Main Street West, Hamilton

Project Manager: Ian Shaw, B. Eng., EIT



| | | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|------------------|--------|---|-----------|------|--------|-------------|--------------|--------------|----------|------------------|
| Depth | Symbol | Description | Elevation | Type | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content |
| oft m | | Ground Surface | 0.00 | | | | | | | |
| 2- | | Asphaltic Concrete Approximately 40 millimetres Sand and Gravel Fill Brown, medium to coarse grained, | | | | | | | | |
| - - - - | | compact | -1.10 | ss | 1 | 17 | | | | |
| 4- | | Silty Sand/Sandy Silt Brown, layered/stratified, occasional layers of medium sand, compact to loose | | ss | 2 | 16 | | | | |
| 62 | | | -2.30 | ss | 3 | 9 | | | | 4 |
| 8- | | End of Borehole NOTES: 1. Borehole advanced using solid stem | -2.00 | | | | | | | |
| 10- | | continuous flight auger equipment on February 11, 2004 to a depth of 2.3 metres. 2. No free groundwater present at the | | | | | | | | |
| 12- | | completion of drilling. Borehole backfilled with auger cuttings. | | | | | | | | |
| 14- | | Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |
| 16- | | | | | | | | | | |
| 18- | | | | | | | | | | |
| | | | | | | | | | | |

Drill Date: Feb 11, 2004

Hole Size: 100mm

Drill Method: Solid Stem Auger 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: Ground Surface Checked by: IS

Sheet: 1 of 1

| raiget No : 05161 | | | | | | | | 16 : | | | | | | | | | | | NO. | 1 |
|---|----------|--------|-------------|--|-----------|--|------|---------|------|--------------|-----|-----|-------------------------|--------------|--|-------|-------|-------|--------------------|---|
| roject No.: 05161 | D - | 1- 5 | | | | | | _ | | ate: | | | | | | , 200 | | | | *************************************** |
| roject: GTR-1153; Watermain & ocation: Traymore Avenue, Hamil | roac | is Kec | onstr | uction | 1 Proj | ects | | | | etho | od: | | | | | n [] | hollo | w ste | m [] | vibratory |
| occion. Traymore Avenue, Harrin | | 1 | | - | | | | Da | | | | | Geo | | | | | r | , , , | |
| Material Description | Symbol | Elev. | San | nples | Scale (m) | | SI | PT "N | ۷" V | 'alue | ; | | : | Soil N | ∕loist | ure (| %) | 7 | tor Is | T . 15 |
| Waterial Description | Syn | Depth | No. | Туре | calc | 0 | 25 | | 50 | 7 | 6 | 100 | _ | | 05 | | 50 | GWL | Monitor Details | Test Data |
| Ground Surface | +- | 98.0 | | | () | T | 7 | | 50 | 7 | 1 | 100 | Ť | | 25 1 | | 50 | | | |
| 100 mm Asphalt | \vdash | 0.0 | | | 0.0 | П | П | ПП | П | ПП | | П | Г | П | ТТ | ТТ | | | + | |
| 150 mm Concrete | | | | | | | | | | | | | | | | | | | | |
| 75 mm Granular | | | | 1 | | | | | | | | | | | | | | | | |
| | tee | | | | -0.5 | $\dagger \dagger \dagger$ | | | ++ | | | H | | $\forall t$ | ++ | ++ | +++ | | | |
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| andy silt, organics, brown to dark brown, moist | | | | | 1 | | | | | | | | | | | | | | | |
| very moist | | | | | -1.0 | HI | | HH | +++ | H | | H | | + | + | ++ | +++ | | | |
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| 2 20002, | | 96.5 | | | | • 1 | | | | | | | | | | 28.2 | 2 | | | |
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| | R | ' | | | -2.0 | H | HH | Ш | + | | ++ | H | $\parallel + \parallel$ | ++ | + | + | ++- | | | |
| th fine sand, iron staining, brown, moist | | | | | | | | | | | | | | | | | | | | |
| OOSE) | 133 | | 2 | ss | | | 8 | | | | | | | | 4 2 | 22.0 | | | | |
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| BOREHOLE TERMINATED | | 2.6 | | | | | | | | | | | | | | | | | | |
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PP = pocket penetrometer TCV = total combustible vapour BRD = bulk relative density

PL = plastic limit LL = liquid limit Pl = plasticity index FV = field vane LV = lab vane VS = vane sensitivity

Hamilton, Ontario, Canada, L8W 2E1

Ph: (905) 383-3733 Fax: (905) 383-8433

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| LANDTEK | LI | <u>M</u> I' | TE | <u> </u> | | | | | | | | | | L | 00 | 3 (|)F | В | OR | E | НС | LE | NO | | 2 |
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| Project No.: 05161 | | | | | | | | - | | II D | | | | | | | | | , 20 | | | | | | |
| Project: GTR-1153; Watermain & | | ds Rec | onstr | uctior | Pro | ject | s | | | II M | | hoc | 1: | | | | | | n [|] h | ollo | w ste | em [|] v | ribratory |
| ocation: Traymore Avenue, Hami | | T | | | <u> </u> | | | _ | | tun | | | | | Ge | od | | | | | | , | | | |
| Material Description | Symbol | Elev. | San | ples | Scale (m) | | 5 | SP' | 1" T | ۷" <i>ا</i> | /alı | ıe | | | | So | il M | loist | ure | (%) | | 1 7 | jo. | ္တ | |
| Waterial Description | Syn | Depth | No. | Туре | scale | 0 | 2 | 5 | | 50 | | 75 | | 100 | 0 | | | O.F. | | | 50 | GWL | Monitor | era | Test Data |
| Ground Surface | T | 98.9 | | | | Ť | | Ī | | 1 | | Ť | | T | Ť | | | 25 | | | 50 | | 12 (| ╬ | |
| 50 mm Asphalt | 1 | 0.0 | | | 0.0 | П | | П | П | П | П | | П | n | П | T | T | | П | T | П | - | +- | + | |
| 100 mm Concrete | | | | | | | | | | | | | | | | | | | | | | | | | |
| 75 mm Granular | | | | | -0.5 | | | | | | | | | | | | | | | | | | | | |
| | 13:55 | | | | 0.0 | | | | | | | | | | | | | | | | | | | | |
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| ith traces of fine sand and clay, fractured, iron | 133 | | | | | • | 3 | | | | | | | | | - | | • | 24.9 | | | | | | |
| tains, brown, moist | | | | | -1.5 | + | | | Н | + | H | $\parallel \parallel$ | † | \top | $\ \cdot\ $ | | | | ++ | + | H | | | | |
| VERY LOOSE TO COMPACT) | | | | | | ۱ | | | | | - | | | | | on a second | | | | | | | | | |
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| | | | | | -8.0 | | | Ш | Ш | Ш. | | Ш | | Ш | Ш | | | | | | Ш | | | | |
| otes: 1. On completion, borehole | open t | o 2.6 m | and o | dry. | | | | | | | | | | \dashv | | | L | ΔΝ | οTI | EK | LIA | AITE | D T | | |
| | | | | | | | | | | | | | | | | | | 205 | Neb | o Ro | oad, | Unit 3 | | | |
| = pocket penetrometer TCV = total combustib | le vanc | our BRD | = bulk | relativ | e den | sity | | | | | | | | _ | | | | | | | | da, L8¹ (905) : | | | |

PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity



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The Regional Amicipality of Flower Hamilton-Wentworth
Proposed Storm Sewers
Haddon Avenue, Hamilton, Ontario BORNE RII-B Whmock Hersey CONTRACT NO. L03784-50319-C7-424600 SORING DATE 91.02.18 BORING LOG DATUM Geodetic (Supplied) CASHG None BS - SHAT SPOON BE - THIN WALLES OFEN (SMELEY) PS - PRITON EAMPLE WE - WASH EAMPLE BC - BOOK COSE CONDITION PRIMEARNY - sm/s SMECT SHEAR THARMAL, QUICK SAMPLES STRATIGRAPHY PRILD VAME

DISPLACE

BEHOULDED A BEWORDED

A PLYCL DESCRIPTION 2 Road Surface Asphalt 75mm 98 2 Asphalt 75mm 0.30 Concrete 225mm Loose to Compact Brown Sandy Silt SS1 56 Traces of Clay, Gravel, Organics Occasional Layer Brown Silty Sand SS2 100 4 SS3 100 12 SS4 83 21 SS5 100 17 SS6 B3 17 END OF BOREHOLE Borehole Dry at Completion

HARUCAL



Log of Borehole _____1

| Auger Sample | ፟፟፟፟፟ | Natural Moisture | X | Project Proposed Storm Sewers | . ~ |
|-------------------|---------|--|-------------------|--|----------------------|
| SPT (N) Value | 00 💹 | Plastic and Liquid Limit | L | Project Proposed Storm Sewers | Dwg. No/ |
| Dynamic Cone Test | ******* | Undrained Triexial at | · | Region of Hamilton -Wentworth Main | St. at Dow St |
| Shelby Tube | | Overburden Pressure % Strein at Failure | 15 ⊕ 5 | Hamilton, Ontario. | Project No. H01760-G |
| Field Vane Test | + 8 | Penetromater | | Hote location and deturn one drawing No. 1 | Froject No |

| G | | Soll Description | ELEV. | OWA | N Value Natural Moisture Content | Natural Unit |
|----|--------|--|--------|-----|----------------------------------|-----------------|
| W | 0 | | m. | Ť | Shear Strength MPe % Dry Weight | Weight kN/m² |
| F | 27 | 250 am asphalt over | 99.55 | ٥ | 0.10 8.20 10 20 so | IDM: |
| | 11/1/2 | 200 mm granular material over FILL: claymy milt, brown, mottled | | | | |
| | 13/11 | ight and dark brown in first 0.75 m/- | | | | |
| | 14/1 | fine to medium gravel, occasional clay seams, below 1.5 m., moist, soft | | | | |
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| | 2/6 | | | | | |
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| | TÜÜ | CLAYEY SILT: brown, occasional clay | 7 97,3 | | | |
| | MAS | seems, milty fine mand leyers below | | ١. | | |
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| | | 4.6 m., so ist becoming wet below 3.8m | | ١, | | |
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| 1 | | YERMINATED | 0 1100 | | | |
| | | NOTES:- | | | | .] |
| | | (1) Borshole advanced uncased by | | • | | |
| - | | solid stam augers to termination at | | Н | | 1 |
| | | 5.5 m depth, on January 15,1990, by | | П | | |
| | | Ph Water to out months | | Ш | | |
| | | (2) Weter Level Record :- Time Depth to | | | | 1 |
| ı | | Elapsed W.L.,m | | 7 | | |
| | | 10 days 4.7 | | | | |
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| | | (3) Standpipe installed. | | | | l |
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MOTE: BOREHOLE DATA REQUIRES INTERPRÉTATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole ____2



| uger Sample PT #6 Value | ⊠ 00 ≡ | Natural Moleture Pleatic and Liquid Limit | X | Project Proposed Storm Sewers | Dwg. No., | 8 |
|----------------------------------|------------------|--|------|---|-----------|-------------|
| P1 (ng Value Anemic Cone Test | U | Undrained Trispiel at | 100 | Region of Hamilton -Wentworth, Main | St. at | Newton Ave. |
| helby Tube | • • • | Overburden Pressure 16 Strain at Failure | i5∰s | Hamilton, Ontario. | | H01760-G |
| ield: Varie Tool | + 8 | Penetrometer | A | Hole location and datum see drawing No. 1 | | |

| | | | | 1 | 7 | ***** | | Y | | | |
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| G | S | Maril Maria and Article | | 6 | | N V | alus | Natural Malature C | Ontent | | Makural Unit |
| W | M B | Soil Description | ELEV. | F | Shear Stren | 40 | | Attentions Link | 1 0 | ۱ | Weight |
| L | O L | , | 99.37 | ľ. | Street Street | 0.10 | 0.20 | 10 28 | ` 🗃 📗 | | khi/m² |
| | 4/6 | 150 mm saphelt over 200 mm concrete over | 50,57 | I. | | | | | | | |
| | 6/6 | 150 mm granular material | | L | | 11811 | | | | | |
| | 1/6 | -Fill : clayey slit, graylah brown to- 0.75 m then mottled reddish brown | | I | | | | | | Ц | |
| | FIE | and black, some fine gravel, allt | | | | | | | | × | |
| | 111 | seems, clay seems, conselve, moist. | | ١, | | | | | | | |
| | 010 | | | Γ | | | | | | Ц | |
| 1 | 010 | | | ı | | | | X . | | Х | |
| | russ | CLAYEY SILT: brown, trace fine to | ~ 97.9 | l | | | | | | | |
| 1 | | medium gravel, increased clay between | | l | | #### | *** **** | | | | |
| | The f | 3.0 to 3.8 m., layered silt and clay moist, becoming wet below 3.8 m., | | l, | | 1111 | | | | | |
| | i kirk | fire becoming soft below 3.8 s. | | ľ | | | | | | × | |
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| | 1927 | | | ı | | | | | | | |
| | 1111 | | 93.27 | | | | | | | × | |
| | | VERMINATED/ | 33,27 | ı | | $\mathbf{H}\mathbf{H}$ | | | | ٦ | |
| | | | | | | | | | | 1 | |
| | | NOTES:- (1) Borehole advanced uncased by | | 1 | | | | | | - | |
| | | solid stem augers to termination at | | | | | | | | 1 | |
| | | -6.1 m depth, on Jenuary 15,1980, by | | 7 | | | | | | 1 | |
| | | Drilltech | | | | | | | | | |
| | | | | | | | | | | - | |
| | | | | | | ### ## | | | | | |
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| | | | | | | ### | ;;;; ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;; | | | ı | |
| | | | | | | ;;; ;;; | ;;;; ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;; | | #### | | |
| 1 | | | | | | ;;; ;;; | ;;;;; ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;; | | шш | | |
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| | | | | | | ### | [| | #### | | |
| | | | | 1 | | ++++ | | | ##### | 1 | |
| | | | | | HHHH | 1111 | | | #### | | |
| | | · | | 1 | HHHH | | | | #### | 1 | |
| | | | | 1 | | \mathbf{H} | | | #### | | |
| | | | | L | | HHH | | | #### | : | |
| | | · · · · · · · · · · · · · · · · · · · | | * | | | | | | | |
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| L | | | | L | | | | | | ł | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS



Log of Borehole ____3

| Auger Sample | \boxtimes | Natural Moisture | X | Proposed Storm Sewers | |
|-------------------|---|--|-------------------|--|----------------------|
| SPT (N) Value | 002 | Pleatic and Liquid Limit | O | 11000 | Dwg. No. 9 |
| Dynamic Cone Test | *************************************** | Undrained Triavial at | ġ " | Region of Hamilton - Wentworth, Main | St. at Paisley Ave. |
| Shelby Tube | e e M | Overburden Praesure % Strain at Failure | 15 ⊕ 5 | | |
| Field Vane Test | + 8 | Penetrometer | Ā | Hole Investors and deturn ass demains at a | Project No. H01760-G |

| s Š | | | D | | NY | alue | | Natural Molesure Contant | П | Natu |
|-------|--|--------|----|---|---|-------------------|--|----------------------------------|-----------|------|
| V | Soil Description | ELEV. | P | 20 | 40 | 80 | 80 | and | | Uni |
| ļ | | m | Н | Shear Strengt | h n 10 | | 0.20 MPs | Atterberg Limits % Dry Weight | | Wei |
| 1-7 | 150 mm emphalt over | 99.32 | 1. | | 0.10 | | 0.20 | 10 26 50 | | KN |
| 6× A | 150 mm concrete over | 1 | - | | ++++ | HH | | | | |
| 126 | FILL : clayey silt, mottled reddish | | 1 | | + | $\Pi\Pi$ | | | П. | |
| | brown and black, fine to medium | | 1 | | 1111 | <u> </u> | | | | |
| 120 | gravel, clay seame, occasional silt | | | | | ++++ | | | \forall | |
| | leyers below 0.75 m., motet. | | | | Π | \Box | | | 2 | |
| 100 | - - | l | ١, | | | шш | ! | | | |
| 01/ | | | Ι΄ | | ╅╉╁┼ | ++++ | | | | |
| 5/2 | | | | | 1111 | $\Pi\Pi$ | | | \Box | |
| 144 | 4 | ~ 97.8 | | | | | ╅┼╅╂╅┪╉╇ | | N | |
| 1 M | CLAYEY Silli raddish brown becoming brown below 3.0 m., layered silt and | | | ┠╂┼╅┽╉╂┼ | ++++ | HH | | ************* | | |
| HUI | clay, fine to medium gravel, moist, | | | | 1111 | | | | | |
| | firm, becoming stiff with - | | ١. | | 1111 | ╅╅╋ | ╃╉╃╂┼┼┼╂┩ | | | |
| 11/11 | | | 1. | | $\Pi\Pi$ | HH | | | | |
| 1 | depth | | 1 | | | ++++ | } | | X | |
| | <u> </u> | | | | ╫╫┼ | ┼┼╂┼ | | | | |
| 434 | ¹ | | 1 | | $\Pi\Pi$ | 1111 | | | | |
| MIN | . | | | | 1111 | | | | -1 | |
| W | } | | 1. | ┠╁╅╁╂╀ | +++ | +++ | | | XΙ | |
| | 1 | | 1 | | ### | !!! ! | | | 7 | |
| | .1 | | L | | 1111 | ╂╂╂┼ | ╏╏ ┩┩╃┼┼┼ | | | |
| IW | 1 | | ı | ┠╅╅╂╂╂╂┼ | HHH | Π | | | 1 | |
| MA | 4 | | ı | | 1111 | | | | | |
| | 1 | | 1 | | 1111 | ╅╅╅ | | | ΧĪ | |
| 1 | <u></u> | | L | | $\Pi\Pi$ | | | | 7 | |
| 4334 | 7 | | 14 | | | | | | 1 | |
| 24 | 1 | | | | ╅╉╃ | ╅╅╂╅ | | | | |
| 101 | 1 | | 1 | | $\Pi\Pi$ | Ш | | | | |
| | | | | | | | | | XI. | |
| 1 | 4 | | | ┋ | HHH | HH | | | 1 | |
| m | 1_ | | | | 1111 | | | | 1 | |
| ИН | | | 5 | | ╅╅╁ | ┋ | | | | |
| am | 1 | | П | ++++++++++++++++++++++++++++++++++++ | $\Pi\Pi$ | HH | | | | |
| HU1 | | | П | | | | | | | |
| 1111 | . | | П | | ╅╉╅╅ | ╿ ╂╂┾╸ | | | | |
| 101 | | | П | | $\Pi\Pi$ | | | | | |
| 144 | <u>{</u> | | П | | 1111 | | | | | |
| | | | • | | HHH | | | | ব | |
| UNI |] | | П | | $\Pi\Pi$ | | | | 7 | |
| | 1 | | П | | | | | | | |
| H(Y) | _ | | П | | ╫╫┼ | | | | 1 | |
| | | | Н | | $\Pi\Pi$ | | | | | |
| 10) | | | П | | | | | | | |
| THE | | | 7 | | | HHH | | | | |
| 11/2 | | ~ 02 n | | ++++ | $\Pi\Pi$ | 1111 | | | 1 | |
| P 4 | GRAVEL : brown, silty, some send, | ~ 92.0 |) | | | | <u> </u> | | 7 | |
| 1111 | | 91,70 | l | | | 444 | ++++ | | V | |
| | VERMINATED. | 01170 | | ++++++++++++++++++++++++++++++++++++ | | $\Pi\Pi$ | | | 1 | |
| | NOTES:- | | | 111111 | | | | | 1 | |
| | (1) Borehole advanced uncased by | | 4 | <u> </u> | ╁╉╂╂ | +++ | +++++ | | 1 | |
| | POTTO Prob aucore to termination at 1 | | | ++++++ | HH | 444 | 7111111 | | 1 | |
| | 7.5 m depth, on Jenuary 15,1990, by Drilltach | | l | | | 1111 | <u> </u> | ++++++++++ | 1 | |
| | | | ıł | <u>++++</u> | | +++ | ++++++ | | 1 | |
| | (2) Weter Level Record :- | | l | ++++++ | | 777 | 1111111 | | 1 | |
| | Time Depth to | | l | | шЫ | 1111 | | | 1 | |
| | Elepsed W.L., m | - 1 | ۱ŧ | 11111 | | +++ | +++++++ | | 1 | |
| | 14 days 7.18 | | | ++++++++++++++++++++++++++++++++++++ | HH | + | | | 1 | |
| | 14 days 7.18 | | l | | | ### | | +++++++++++ | 1 | |
| | (3) Cheelcal Analysis of ground | 1 | l | ++++ | | 1111 | 1111111 | | 1 | |
| | Water sample from borehols: | | | | | ### | <u> </u> | | 1 | |
| | pH ≈ 7.82 | | l | ****** | | 11 17 | +++++ | | | |
| | -Sulphate,504,content= 105.26 ag/1 - | | 10 | ++++++++++++++++++++++++++++++++++++ | 444 | 1111 | 1111111 | | 1 | |
| | | | | 1111111 | | 111 | <u> </u> | | 1 | |
| | (4) Standpipe installed. | ı | ŀ | ╽ ┼┼┼┼┼┼┼ | HHH | $H\Pi$ | ++++++ | | | |
| | <u> </u> | 1 | | | 1111 | 1111 | ++++++ | | I | |

NOTIE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole ____



| Auger Sample | ⊠ | Natural Moisture | X | Desirat Banasand Chann Carray | 10 |
|-------------------|-------------------------|--|--------|--|-----------------------|
| SPT (N) Value | 002 | Plastic and Liquid Limit | | Project Proposed Storm Sewers | Dwg. No 10 |
| Dynamic Cone Test | terrolitate/thetatatata | Undrained Triaxial at | 15 🕀 5 | Region of Hamilton -Wentworth, Main | St. at Paisley Ave. |
| Shelby Tube | • • = | Overburden Pressure % Strain at Failure | 1900 | Hamilton, Ontario, | Project No. H01760-G |
| Field Vane Test | + 8 | Penetrometer | A | Hole location and deturn see drawing No. 1 | Project No. 1101702-B |

| $\overline{}$ | | | | _ | | | · · · · · · · · · · · · · · · · · · · | |
|---------------|---------|--|---------------|----|----------------|--|---------------------------------------|--------------------|
| G | \$ Y | 0.78 | | PE | NV | ph/so | Natural Mainture Content | Hetural Unit |
| W | M | Soil Description | ELEV. | P | 20 40 | 60 60 | Attorbusy Limits | Wangite |
| L | 0 | • | | H | Sheer Strength | MPa 6.20 | 10 20 30 | HP4Mm ² |
| | | 150 ms sephalt over | 99.07 | ľ | | | | |
| | 7/7 | 250 mm concrete over FILL : clayey silt/ silty clay, | | ı | | | | |
| | | reddien brown becoming brown below | | l | | | | ۱ ا |
| | 10 10 | 1.5 m., fine to medius gravel, olay layers, black clay sesse in first | | l | | | | d |
| | 6.6 | 0.75 m., moist, firm. | | ١. | | | | |
| | 122 | | ~ 96.8 | ľ | | | | 2 |
| | 233 | CLAYEY SILT: brown, layered silt and play, moist, soft becoming fire below | 3010 | l | | | | |
| | 188 | -3.0 m. | | ۱ | | | | 3 |
| | thir | | | ١ | | | | 1. |
| | | | | l. | | | | 4 |
| | 124 | | | Γ | | | | |
| | ann | • | | l | | | | ╡ |
| | 1412 | | | l | | | | 1 1 |
| | LIAK. | | | ı | | | | |
| | t1978 | mediturino : senanti di managina di managi | | ١. | | | |] |
| | HH | | ° 92.7 | 1 | | | | 9 |
| | | GRAYEL I brown, silty, some sand, | 32.7 | 1 | | | | <i>l</i> 1 |
| | 7 4 | medium to course grained, solet. | | ı | | | | |
| | :: | | nu # | | | | | V 1 |
| | | TEMMINATED/ | 91.45 | ١. | | | | 1 |
| | | | | ľ | | | | |
| | | NOTES:- | | ŀ | | | | |
| | | -(1) Borshols advanced uncased by | | | | | | |
| | | 7.5 a depth, on January 15,1890, by | | | | | | |
| | | Drilltech | | ١, | | | | |
| | | | | | | | | 1 1 |
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| | | | | 12 | | | | 1 |
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| | | | | 14 | | | | 1 |
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| | | - | | 18 | | | | |
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| | | makanan makanan makanan makanan makanan makanan makanan makanan makanan makanan makanan makanan makanan makanan | | 20 | | | | |
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| Ш | | | | L | <u> </u> | | | |
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NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.



Log of Borehole ____5

| Auger Sample SPT (N) Value | ⊠ © 000 | Natural Moisture Plastic and Liquid Limit | X | Project Proposed Storm Severs | Dwg. No11 |
|--------------------------------|-------------------|--|--------------|--|----------------------|
| Dynamic Cone Test | - | Undrained Triaxial at Overburden Pressure | <u>15∯</u> 5 | Region of Hamilton -Wentworth, Main | |
| Shelby Tube Field Vane Test | • • W + 8 | % Strain at Failure Penetrometer | IQ ▲ | Hamilton, Ontario. Hole location and datum see drawing No. 1 | Project No. H01760-G |

| s | | T | T. | | | 4.45-4 | | | 444 | | ************ |
|-------|---|-------------|-----|--------------|---|----------------|------------------------|------------------|---------------------------------|------|----------------|
| GŽ | Soli Description | | € | E | | (Value | | | Netural Moleture Content and | П | Natural |
| N ë | SON Description | ELEV. | P | <u> </u> | 20 40 | | 60 | 80 | Atterberg Limits | П | Unit Weight |
| ٠ ٢ | | | н | H Sh | eer Strength 0.10 | 0 | | 8.20 MPa | % Dry Weight 10 20 30 | П | kN/m² |
| 6/ | 125 ms saphelt over | 99.20 | ١ | | | Ш | | | | ╽┝ | |
| 120 | 125 mm concrete over 25 mm granular over | l . | | Ш | | | | | | Н | |
| 11 | FILL : elity clay, grey, fine to | | | H | ++++++ | | \mathbf{H} | | | П | |
| Tx/ | medium graval, moist. | 1 | | \mathbf{H} | | | 111 | | | П | |
| 17 | 3 | | 1 | ## | | | ## | | | | |
| 6/1 | ~ <u> </u> | | 1. | ,Ш | | +++ | 111 | | | | |
| 414 | 성 | | T, | ' | | | \blacksquare | | | | |
| 671 | S) | l | 1 | Π | | | ## | | | | |
| 12% | <u> </u> | l | | ## | | | ш | | | X | |
| 100 | X | | ı | HH | ╎╎╏╎ ╃╃╃ | | HHH | | | П | |
| 145 | 3 | | ı | H | | + | +++ | | | | |
| dir. | CLAYEY SILT: light brown becoming | 97.2 | 1 2 | 2 | | ## | *** | | | | |
| 130 | Vi gravish brown between 5.6 to K.A. | | 1 | 1 | | 111 | | | | | |
| 114 | solet becoming wet with depthy firm | | | <u>H</u> | ┋┋┋┋ | +++ | +++ | +++++ | | | |
| IM | Tto soft - | | | \mathbf{H} | | \mp | | | | | |
| 1XX | N | | | H | | ## | ### | ##### | | | |
| MI | 3 | | 1 | # | | Ш | | 111111 | | V | |
| LIKE | <u> </u> | | 3 | ' | | +17 | HH | ++++++ | | Δ | • |
| MY | N | | | H | | ## | Ш | | | | |
| W | t <u>L</u> | ١ ، | | # | | ## | ### | ##### | | | |
| 144 | | | | # | | ## | | | | 1 | |
| Kil. | A l | | | | ╏┆╏╏ ┪┪┩┩╂╏ | +H+ | HH | | | | |
| | 1 | | | \mathbf{H} | | 111 | Ш | | | 1 | |
| | | | 11 | ' | | ## | ### | | | 1 | |
| 121 | И | | | # | | 111 | | | | 4 | |
| | <u></u> | | П | Ш | | +++ | HH | | | XI. | |
| | | | | H | | Π | $\Pi\Pi$ | | | 4 | |
| 144 | A | | | \mathbf{H} | | ## | ### | | | | |
| 144 | ├ | | 5 | 井 | | ** | | ***** | | 1 | |
| | 1 | | П | Ш | | 111 | | | | 1 | |
| YK! | | | П | HH | | Π | $\Pi\Pi$ | | | | |
| | ├ | | П | \mathbf{H} | | 111 | ## | | | | |
| 4114 | | | П | | | 111 | ш | | | 1 | |
| | | | П | 111 | | | HHH | +++++ | | 7 | |
| | · · · · · · | | 4 | HH | ┙ ┩┪┪┩┩┩ | +++ | HH | | | XI . | |
| 144 | · | | П | HH | | Π | Ш | | | 7 | |
| 7 · A | SAND - coarse with fine - | ~ 92.8 | П | \mathbf{H} | | ## | 111 | ****** | | | |
| | | | Н | \Box | | ## | H## | | | ı | |
| 7 · A | gravel and silt, moist, | | П | Ш | <u> </u> | Ш | | ╂╂┼┼┼╂ | | | |
| 1. | dense | | ١.١ | | ╫╫╫╫ | HH | HH | | | | |
| | | | ľ | HH | | Π | \blacksquare | | | | |
| 9 | | | | HH | | ## | ## | ;;;;; <u>;</u> ; | | 1 | |
| E (. | <u> </u> | |]] | μц | | 11 | | <u> </u> | * | 1 | |
| | TERMINATED/ | 91.58 | l | Ш | | 111 | | | | Y | |
| | NOTES:- | | lł | Ш | <u> </u> | HT | HH | HHHH | | | |
| | (1) Borehole advenced uncount by | | H | H | ++++++ | H | HH | 111111 | | | |
| | 1 80 I Stok Bilders to termination of 1 | | | | | ### | ### | | | | |
| | / to a depth, on Jenuery 15, 1990, hu | | | ### | | ш | | ╂╅╅╂╂ | | | |
| | On ill tech | | ΙŁ | Ш | <u> </u> | Ш | $\mathbf{H}\mathbf{f}$ | HHHH | | | |
| | (2) 50 | | l f | ШН | 1111111 | HH | 111 | HHHH | | 1 | |
| | (2)Standpipe installed. | | l F | HH | | HH | ## | | | | |
| | (3)Water Level Record: | | * | ### | ####### | ш | ## | | | | |
| | | | lŁ | Ш | | | +++ | | | | |
| | Standpipe pinched at 3.0 m, dry to 3.0 m. | | F | HH | | | 111 | | | | |
| | | | F | $\Pi\Pi$ | ++++++ | 坩坩 | ## | | | | |
| | | | | ### | ;; ;;;;; ; ; | ш | ## | | | 1 | |
| | - - | | w | Ш | | | 111 | | | | |
| | | | 7 | | | HH | 711 | | | | |
| | | | F | $\Pi\Pi$ | | 坩坩 | ## | | | 1 | |
| L | Assessment | | | | | ┍╃╅┩ | +++ | | | I . | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE LISE BY OTHERS

Log of Borehole ___6



Auger Sample Auger Sample August Mointure X SPT (N) Value O O M Plastic and Liquid Limit Dynamic Cone Test Undrained Triaxiel at Overburden Pressure No Strain at Failure State Overburden Pressure No Strain at Failure Penetrometer No Strain at Failure No Strain

| į | S | A second | T T | To | T | b.t i | Ashan | | | | |
|--------|---------------------------|---|---------------|-------|---|---|---|---------------|---------------------------------|------------|-----------------|
| G W | M B | Soil Description | ELEV. | E | 20 | 40 | 74H40 | to. | Notural Mointure Content and | | Natural Unit |
| ï | ō | | 60 | T. | Shear Str | enath | | MPa | Atterbary Limits | | Weight |
| _ | 111 | | 99.20 | | | 0.10 | | 8,20 | 10. 20 20 | | labé/m² |
| | 44 | 125 wm asphalt over 175 mm concrete over | | ı | | | | | | Ŧ | |
| | 11.6 | FILL ! Clayey silt, brown, clay | | ı | | | | | | H | 1 |
| ٠. | 116 | pockets and seams, cohesive, moist, | | | | | | | | #1 | |
| | FIE | Try an adity 4 | | | | | | | | #1 | |
| | die | · · | | ١, | | | | | | #1 | |
| | 010 | | | | | | | | | #11 | |
| | 610 | | | | | | | | | 夶 | į |
| | THU | SILTY CLAY/ CLAYEY SILT ! brown, | " 97.7 | | | | | | | Ш | İ |
| | 1111 | OCCABIONS Clay seems, silt lavers | | | | | | | | 扣 | |
| | 3314 | moist becoming wat below 3.0 m. | | ١. | | | \blacksquare | | | ΗI | |
| | 4111 | firm to stiff with depth | | 11 | | | | | | #1 | |
| - 1 | 411 | | | П | | | | | | ĦІ | |
| - 1 | un | | | П | | \blacksquare | | | | Ηl | |
| | MM | | | | | | | | | H I | |
| | HH | | | | | | #### | ###### | | Hd | |
| | KUK | | | 11 | H#### | | #### | | | M | |
| | 1141 | | | H | H### | ##### | #### | ******* | | Ηl | |
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| ł | RH | | | | | | | | | # I | |
| I | 1291 | - . | | l | | | | | | PAT | |
| ľ | W | | | l | | | | | | 44 | |
| ľ | सप्रध | | | lŀ | | | | 111111 | | 41 | |
| ł | HULL | _ | | ŀ | | | | ##### | | Н | |
| L | HH | 44 | | lE | | | #### | ##### | | 3 | |
| Ł | 4014 | | | lF | | | #### | ##### | | 3 | |
| I | 1881 | • | | lF | | | ##### | | | 7 | - |
| ľ | m | | | F | 11111 | | | | | H | |
| t | ma | - | | l a F | 11111 | | | | | M | |
| t | MA | | | | **** | | | | | 44 | |
| ŀ | IRK. | | | Ī | | | | | | 71 | |
| h | | SRAYEL ! brown, some send, medium | " 92.6 | ŀ | | | | | | 11 | |
| L | | grained, moist, dense. | | ŀ | | | | | | 1 | |
| ŀ | `. * `. - | | | ,t | | | | | | 41 | |
| ŀ, | | | | t | ##### | | | | | 11 | |
| ľ | • : 1 | | I | þ | | | ++++ | | | 11 | |
| Ľ | | | 91.58 | F | | | | | | M. | |
| l | | VERHI NATED/ | 31,36 | ļ | | | | | | H | |
| l | - | NOTES:- | | , : | | | | | | 11 | |
| ı | | (1) Borshole advanced uncesed by | | Ė | | | | | | 11 | |
| ı | | #0! Id #tom eugers to termination at [| | E | | | | | | 11 | |
| ı | Г | 7.5 m depth, on January 15, 1990, by Drilltach. | 1 | Ь | | | ++++ | | | 1 | |
| | | | I | В | | 111111 | 1111 | | | 1 | |
| 1 | - | - | 1 | .B | | | #### | | | 11 | |
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| | | | | F | | #### | 11111 | ****** | <u> </u> | } | |
| | <u> </u> | | | _H | +++++ | | #### | * | | 11 | |
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| * | | | [| H | | ╅╅╂╃╃ | ++++1 | 44444 | | 11 | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS



Log of Borehole ______

| Auger Sample SFT (N) Value | | Natural Moisture Plastic and Liquid Limit | X | Project Proposed Storm Severs | Dwg. No 13 |
|--------------------------------|-------|--|------|-------------------------------------|----------------------|
| Dynamic Cone Test | | Undrained Triacial at Overburden Pressure | ıs∯s | Region of Hamilton -Wentworth, Main | St. near Paradise Rd |
| Shalby Tube Field Vane Test | • • H | % Strain at Failure Penetrometer | Ψ, | Hemilton, Onterio. | Project No. H01760-G |

| s | S D N Velue National Model to Consul | | | | | | | | | | |
|-----------|---|--------|----|---|--------------|------------------------|---|---|---|-----|-----------------|
| SY M SO | Soil Description | ELEV. | 8 | 20 | # Ye #0 | | | Natural Moiss | | | Metural Unit |
| # B | | m | | Chan Channib | | 60 | 80 | Atterber | | | Weight |
| | 125 mm eaphalt over | 98,92 | Ľ | | 0.10 | | 5.20 ^{MP} * | 10 20 | | | MAN INI |
| FIA | 175 mm concrete over | | Ι. | | | | | | | lt | |
| 616 | FILL: clayey silt, mottled brown | 1 | ı | | | | | | | | |
| 116 | and reddien brown, concrete frequents— at approximately 400 mm., cohesive, | 1 | | | | | | | | | |
| FIF | Bolst, firm. | | 1 | | | | | | | | |
| die | 4 | | ı | | ### | | | | | П | |
| 810 | 7 | 1 | ľ | | #### | #### | | | | | |
| 6/10 | A . | | | | 1111 | | | | | Н | |
| 111 | A CLAVET COLVER | ~ 97.4 | ı | | | | | | 44444 | X | |
| 1311 | CLAYEY SILT : light brown becoming greylah brown below 5.5 m., | 1 | | | | Π | | | | | |
| KUI | occasional clay seems, allt lavers | | | | Π | 1111 | | | | | |
| L H | trace fine gravel, cohesive, wet, | | 2 | | Ш | 1111 | | | | | |
| The state | soft to firm | | | | ### | #### | | | | - | |
| | i | 1 | 1 | | ### | | | | | | |
| 1214 | ų – | 1 | | | ### | | | | ++++++++ | 1 | |
| KIN | 1 | | | | 1111 | $\mathbf{H}\mathbf{H}$ | | | | 1 | |
| HRH | | | ١. | | Н | $\mathbf{H}\mathbf{H}$ | | | | XI | |
| FAR | | | ľ | | $\Pi\Pi$ | $\Pi\Pi$ | | | | 1 | |
| RH | | | | ┠╁╁╁╀╀╀┼ | $\Pi\Pi$ | $\Pi^{\dagger\dagger}$ | ;;;;; ;; | | ####### | | |
| PUR | _ | | | | ### | ;;; ;; | 141111 | | | 1 | |
| 1821 | 1 | | l | | ### | #### | | | | 1 | |
| MAN | | | | | ! | | | | | 1 | |
| MARI | 1 | | 4 | | | | | | | 1 | |
| um | 1 | | | | | | | | | J | |
| MA | | | Г | | HH | $\Pi\Pi$ | | | | XI. | |
| M | | | ı | | \mathbf{H} | | | | | 4 | |
| KW | · . | | | | $\Pi\Pi$ | Ш | | | | 1 | |
| THE | - | | 5 | | HH | | | | | 1 | |
| ma | | | | | $\Pi\Pi$ | | | | | 1 | |
| ma | | | | | ### | | | | | 1 | |
| uni | | | | | | | | | | | |
| M | | | | | | #### | | | | 1 | |
| | | | | | | | | | | 4 | • |
| 14/4 | | | | | | | | | | 1 | |
| LL N | | | | | | | | | | I | |
| MIN | | | | | | | | | | ı | |
| MALL | | | | | | | | | | 1 | |
| 1444 | | | , | | | | | | | 1 | |
| TANK! | | 1 | ľ | | | | | | | | |
| HEHE | | . 1 | | | HH | | | | | - | |
| 1177 | | 91.30 | | | ## | 4## | | | | 1 | |
| | VERMINATED/ | 31,30 | | +++++ | ## | ### | | | +++++++ | f | |
| | NOTES: | I | | | | | | | | | |
| | NOTES: | l | • | TT | ## | ### | ##### | | | | |
| | (1) Borehole advenced uncesed by solid stem augers to termination at | Į | | ####### | ### | ### | ***** | | ++++++ | | |
| | 7.5 # depth, on Jenuary 16, 1890, humil | I | | | ## | ### | #### | | 111111111111111111111111111111111111111 | | |
| | Orilitach | | 1 | | | 1111 | | | ++++++ | | |
| | | | 1 | | ## | ### | | | | | |
| | (2)Standpipe installed. | l | 1 | | | 444 | | | | | |
| | (3) Hoton Towns D. | I | ı | | | | | | | | |
| | (3)Water Level Record: | - 1 | Ł | | +++ | \mathbf{H} | ++++++ | | | | |
| | Standpipe pinched at 2.0 m, dry | - 1 | E | | HH | 11111 | TTTT | 11111111 | ********* | | |
| | to 2.0 m. | | f | ++++ | HH | ### | 111111 | | ####### | | |
| | | Į, | 10 | | ### | ### | #### | | | | |
| | 1 | | F | | ### | 7717 | * | | | | |
| | | | ļ | | | | | | | | |

MIDTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole _____B



| Auger Sample SPT #N Value O | ⊠ | Natural Moisture Pleatic and Liquid Limit | X | Project Proposed Storm Sewers | Dwg. No | 14 |
|--------------------------------|----------|---|-----------|--|------------|--------------|
| Dynamic Cone Test | | Undrained Triaxiel at | 140 | Region of Hamilton -Wentworth, Main | St. at | Paradise-Rd. |
| Shalby Tube Field Vane Test | • • B | Overburden Pressure 16 Strain at Fallure Penetrometer | 15∰5 ▲ | Hamilton, Ontario. Hole location and datum see drawing No. 1 | Project No | H01760-G |

| \$ Y | | | 0 | | | N Value | | | N | | inter Co | nient | П | Natur |
|------------------------|--|--------|------|---|-------------------|-------------------|--------------|---|------------------|------------------------|------------------------|------------------------|--------------|---------------|
| М | Soll Description | ELEV. | ŀ | 20 | 40 | | i i | 86 | | | and are Limbs | | | Unit Weigl |
| 0 | , | | Й | Sheer Str | ength 8. | 10 | | 8.20 ^{56P-6} | ۱. | | y Weight | | | MU |
| 1 | 125 mm aephalt over | 98,79 | | | 7. | 1111 | **** | 111711 | 14 | , . | 30 | 30 717777 | 4 1 | |
| 918 | 175 mm concrete over | | l | | | Ш | Π | | | | | | 1 | |
| CV 6 | FILL 1 silty clay, reddish brown, | | ı | | | ### | ш | *** | | | | | lt | |
| 212 | fine gravel, meathered shale fragments, clay pockets and seems, | | 1 | | | ╅╅╉╸ | ╏┼┼┼ | ╅╉┼┼┼┼ | | | | | 7 | |
| 46 | moist, firm, | | 1 | | | | Π | | | | | | 11 | |
| 22 | 4 | | | | | | | | | | ++++ | ╅╅╅╅ | 11 | |
| | 十 : 一 | | 1 | | | | +++ | | | | | | 11 | |
| | 3 | | 1 | | | | | | | | | | Lt | |
| 4 | 1 | | 1 | | | ++++ | +++ | | | ╏┪┪┩┩ | b t++ | HHHHH | M | |
| JH | CLAYEY SILT I reddish brown becoming | * 97,3 | l | | | | \Box | | | | | | 14 | |
| 444 | light brown below 3.0 m., greyish | | | | | | 111 | | | | | | 1 | |
| มห | brown at 5.5 m., clay seems, silt | | ı | | ++++ | ╂╂┼╂╍ | ╂╂╂ | ╅╉┼┼┼ | | | | | 7 | |
| 112 | layers, cohesive, wet, firs | | 2 | | | $\Pi\Pi$ | $\Pi\Pi$ | 1111 | | | | | 1 | |
| \mathcal{H} | 1 | | 1 | | | | | | | | | | 1 1 | |
| W | .] | | П | | ++++ | ╂╫╅╂╸ | ╟╫╫ | ++++ | | | | | 1 F | |
| MI | - | | П | $\mathbf{H}\mathbf{H}\mathbf{H}$ | ++++ | \mathbf{H} | Щ | | | | | | 1 | |
| .1176 | 1 | | | | ### | ш | ш | | шШ | | | | 11 | |
| H | | | | | ++++ | HH | HH | ++++ | HHH | $+\Pi$ | 111 | | M | |
| 25K | - - | | 13 | 4444 | 1111 | $H^{\perp \perp}$ | ш | шш | шШ | ш | 111 | | M | |
| 41 H | | | 1 | | 1111 | | HH | +++++ | | | | | \mathbf{I} | |
| 2 <i>1</i> 112 | | | 1 | | | | | | | | 1111 | 1111 | 1 | |
| m | /- | | 1 | | | | | | | | | | 1 l | |
| Mil | | | 1 | | | ++++ | | •••• | | | | | 11 | |
| \mathbf{m} | | | | | 1111 | | \mathbf{H} | | | ### | ### | | 11 | |
| \mathcal{H}^{α} |) | | 1. | | | | | | | | 1111 | | 11 | |
| 11U | 1 | | 1 | | ++++ | | HH | | | $\mathbf{H}\mathbf{H}$ | 1111 | | 11 | |
| 27H | 1 | | 1 | | | | 111 | | | ### | | | н | |
| 98H | | | l | | | | | | | | +++*4 | #### | XI. | |
| 433 | 1 | | ı | | ++++ | | HH | | | \mathbf{H} | | | Ħ | |
| tut | 1 | | l | | 1111 | | 111 | | | 1111 | | | 3 | |
| W | | | ١. | | | | | | | +++ | HHH | | 11 | |
| 114 | 1 | | ľ | | ++++ | | | | | $\Pi\Pi$ | ### | | 1 | |
| 111 | 4 | | | | | | | | | | | -1111 | 11 | |
| HЯ | ├ | | | | | | - | | | ++++ | | | 11 | |
| 111 | | | | | ++++ | | 444 | | 1111 | 1111 | 7111 | | 11 | |
| W | | | 1 | | | | | | | HH | 1 | +++++ | H | |
| 1771 | <u></u> | | | | ++++ | | | | | $\Pi\Pi$ | XIII | | M | |
| KH! | · | | ľ | | | | ## | | | *** | | | H | |
| 1111 | | | | | **** | | | | | 1111 | **** | - | Н | |
| un | | | | | ╅╂╉╸ | | 111 | | | HH | $\mathbf{H}\mathbf{H}$ | | 11 | |
| 15 IX | | | | | | | | | 1111 | #### | #### | **** | 11 | |
| HH | | | | | ### | | | | | | | ╉┼┼┼┽ | 11 | |
| 初化 | | | | | ++++ | | +++ | | ++++ | Π | | | 1 | |
| <i>}}}}</i> | | | 1 | | | | | | 11111 | 1111 | ***** | | 11 | |
| m | | | | | **** | | | | | | | ╉╅╅╅ | U | |
| XKK | <u></u> | | | | +++4- | | ╅╉╃ | | ╂╂╃╃ | ++++ | \mathbf{H} | $\mathbf{H}\mathbf{H}$ | М | |
| PAZ | TEMINATED/ | 91,17 | | | | | 111 | | **** | ### | | | 14 | |
| | d spert (ex.) ECs. | | П | | | | | | 11111 | HH | ╉╉╂┼ | ╂╂╉╂╌ | | |
| | - NOTES:- | | ١. ا | | ++++ | | +++ | | $\Pi\Pi\Pi$ | $\Pi\Pi$ | $\Pi\Pi$ | 11111 | | |
| | | | ١. | | | | | | | | | | | |
| | (1) Borshols advanced uncased by solid stem augers to termination at | | | | | | | | | ╂╂╂╂ | ╂╂┼╂┨ | | П | |
| | - / to m depth; on Jenuary 16, 1890, by | | | | +++ | +++ | HH | | $\Pi\Pi$ | $\Pi\Pi$ | $\Pi\Pi$ | 7777 | Н | |
| | Orlitech | | | +++++ | ### | 444 | ### | | #### | ### | #### | | | |
| | | | П | | 1111 | | 1111 | | ╁╁╅╅┩ | 1111 | ╂╂╂╂ | +++ | Н | |
| | | | ارا | | HHH | +++ | HH | | $\Pi\Pi$ | HH | $\Pi\Pi$ | 11111 | H | |
| | | | 1 | +++++ | $\Pi\Pi$ | 7777 | ## | | ### | ш | 1111 | | | |
| | | | H | | $\pm\pm\pm\pm\pm$ | | ### | | ╫╫ | HH | HHH | 11111 | | |
| | _ | | П | | HH | 1111 | HH | 11111 | 11111 | $^{+++}$ | ### | | | |
| | . 🗝 | | П | | ### | 1111 | ## | | 11111 | | ╂╂╅╂ | HHHH | 11 | |
| | | | П | | 1111 7 | +++ | +HH | ++++ | 1111 | HH | $\mathbf{H}\mathbf{H}$ | HHH | | |
| | | | Н | ++++ | HH | 444 | ш | | 11111 | ## | | <u> </u> | | |
| | | | 70 | | ### | 1111 | 111 | | ╅╅╅╃ | HH | HHI | ++++ | | |
| | · | | П | ╽ ┋┋┋ | +++∓7 | HH | $\Pi\Pi$ | +++++ | 1111 | Ш | $\Pi\Pi$ | 11111 | | |
| | · | | ı | | 1111 | 7711 | 7 7 7 7 7 | | | - | | | 1 8 | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS



Log of Borehole _______

| Auger Sample SPT (N) Value | 00 | Netural Moleture Pleatic and Liquid Limit | X | Project Proposed Sanitary Sewer | Dwg. No. 2 |
|-------------------------------|--|--|-------|--|----------------------|
| Dynamic Cone Test | ###################################### | Undrained Triexial at | | Longwood Road | |
| Shelby Tube | • • • | Overburden Pressure 16 Strain at Fallure | 15005 | Hamilton, Ontario | Project No. H02273-G |
| Field Vane Test | + \$ | Penetrometer | A | Hole location and deturn see drawing No. 1 | |

| 3 Š | | | P | | N Value | Natural Moleture Content | Natur Unit |
|----------|--|-------------|----|---|---|--|---------------|
| V M | Soil Description | ELEV. | P | 20 | 40 60 60 | Atterberg Limits | Weig |
| Ģ | | l " | H | Sheer Strength | MPs | % Dry Weight 10 20 30 | KNV |
| הלע | FILL: Fire red/ brown milty clay, | 98,49 | 1 | | 0.10 0.20 | | } |
| 194 | with occasional rootlets | | | | | | |
| 1/1 | | | 1 | | | | 1 |
| 120 | | 7 97.3 | 1 | 1101111 | | | 19.1 |
| -M | Loose to compact brown, clayey silt | 3/.3 | ı | | | | l |
| 444 | with occsesional sand layers. | | L | Hotti | | | 18.4 |
| -lui | Becoming stiff gray slity clay | 1 | 2 | | | | |
| W |) Datum 3,30 m. | | ı | | | | 45.6 |
| un | 41 | | 1 | | | | 18.6 |
| 114 | ⅓ ├─ — | 1 | 1 | | | | |
| ии | X1 | | ١. | | | | 19.5 |
| 114 | 19 | | ı | | | | 1 |
| 174 | () - | 1 | 14 | | | | l |
| ии | Ø | ł | l | | | | i |
| thi | ય | 1 | 1 | | | | |
| μ | · | | 1 | 111111111111111111111111111111111111111 | | | 20.0 |
| 1 | Dense to vey dense grey medius | 93.3 | 1 | | | | |
| % | to coerse send, and fine to medium | | - | | | | |
| 4 | " gravel, Grading into a dense | 4 | 1 | | | | ł |
| 4.7 | medium to coarse send below 9.1 m. | | ľ | | | | l |
| 100 | | | ı | | | *************************************** | |
| 2.9 | <u>:</u> | 4 | 1 | | | | • |
| 1000 | proposed sewer | | 1 | | | | |
| AF | | 4 | 1 | | ┆┋┋┋┋ ┇┋ | | |
| - 1 | invert | 4 | | | | *************************************** | 1 |
| AX | ' | | Г | | | | |
| 1111 | | | ı | ╏╏╏ ┪╅╃╃┿╍ | ┊ ╅┼┼┼┼╂╃┩╫╃╃╃╃┼┼ | | |
| 17. | | 4 | 1 | | | | |
| 4.5 | | | 1 | | | | |
| 17.5 | | | ı | HHHHHY | | | 1 |
| 1:3 | <u>.</u> — — | 4 | 10 | | | | |
| 1::: | *: | | 1 | | | 1 111111111111 | |
| 47 | 7 St. 166 to 160 | e7.8 | - | ╏┤┤┤╏╏ ┼┼┼ | | | |
| W. | Stiff to very stiff brownish grey slity clay interbedded with layers | 4 | 1 | | | | 20.2 |
| 122 | of coarse sand up to 125 mm thick | | 1 | | | | |
| W | | 1 | | ╏┤┪ ╅╉╅╅╅ | ╃╉ ┩╃╃╃┼╃╂┼╃╂┼ | | |
| 100 | % - – | 4 | 10 | | | | |
| 100 | A | | Г | | | | ~ ~ |
| 100 | И | 1 | | | ┞╃╄╂╫╫ ╂╫╃╅┼╃╁┼╉ ╟╏ ╃ | 4 | 20.6 |
| 100 | 4 - | 1 | L | | | | |
| 11/4 | 21 | | l | | | | |
| VX | 29 | | 1 | | ╏┩┩┢┪┩┩┩┩╇┩ ┩╃┩ | * *********************************** | |
| W | 21 | 1 | u | HHH | | | 20.5 |
| VX | <i>K</i> J | | Г | | | | |
| 10 | 21 | | | | | ▊▍▍ ▍▍▍▍▍▍▍▋▍▋▍▋▍▍ | ĺ |
| W | % - | 1 | 1 | 1111111 | | | |
| (1) | 21 | 1 | | | | | |
| W | A . | | | 1111111 | | | |
| 10 | 2 1 - - | 1 | * | | | | |
| W | 7 3 | | Ľ | | | | |
| 122 | 74 | | | | | ▋ ᡮ╘╋┪┩┫┩┩ | |
| 111. | Compact to dense reddish brown | ~ B1.7 | | HITTHAI | | | 21.1 |
| | Il fine to sedium send with occasionel To layers of grey slity clay | | | | | * | |
| III; | 11 select of Real siteh CIMA | 1 | | | | ▊┡┊ ┼╅╉╃╅╂╂╂╂┼┼┼┼┼┼┼┼┼┼┼ | |
| 111; | - | • | 18 | | | | |
| 1330 | "] T | 1 | Г | | | | |
| 111; | 11 | | 1 | <u> </u> | | | 20.6 |
| 111 | i - - | - | | | | | |
| Litt. | 7 | | 1 | | | | |
| | il | | | ┠┼┼┼╂╂╂┼┼ | | | |
| 111 | Ţ | ~ 78.5 | 2 | | | | |
| ı | Continued | /0.5 | ľ. | | | | |
| 1 | | | 1 | | | | |
| | | I | 1 | | <u> </u> | ▋▋▋▋▆ ▋▜ | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

Log of Borehole 21 con't



Auger Sample S Natural Moleture X Project Proposed Sanitary Sever Dwg. No. 2A

Pleatic and Liquid Limit Undrained Trisolal at Overburden Pressure N Strein at Failure + s Penetrometer + s Penetrometer + project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

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Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

Project Proposed Sanitary Sever Dwg. No. 2A

| GW | 8 M 4 8 | Soil Description | ELEV. | DWP | N Value Natural Molature Content 20 40 60 60 Atterberg Limits | Natural Unit Weight |
|----|---------|---|-----------|-----|---|---------------------------|
| ï | Ó | 0 | 89 | H | Shear Strength MPs 46 Dry Weight | MANN2 |
| | | Costinua | 78.49 | 20 | | 21.3 |
| | | | | | | 1 |
| | | | | l. | | 20.5 |
| | | | | 22 | | |
| | | _ | . ** 75.2 | | | 21.3 |
| | | TERMINATED/ | 73.2 | , | | |
| | | NOTES:- (1) Borehole advanced cased by hollow | | ľ | | |
| | | matem augers to termination at 23.3 mm depth, on January 2, 1991, by Drilltach | | | | |
| | | (2) Weter Level Record :- Time Depth to | | 25 | | |
| | | Elepsed W.L., a 5 Days 1.5 | | | | |
| | | man o baya 11.0 | | | | |
| | | white white | | 28 | | |
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MOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

| J | ACQU ENVIR | ES WHITFORD ONMENT LIMITED | | BO | RE | HOI | Œ | RE | CO | RD | | ONCLUSION PERSONAL AND CONTRACTORS | richambride ngleocessas | Μ\ | W20 | 4 |
|-----------|---|--|---------------|-------------|------------|------------------------------|--------|-------|------------|------|--------------|------------------------------------|---|----------|-------|--|
| | LIENT | Petro-Canada | | | | | | | | | | | | PROJ | ECT N | 10. <u>ONW3613</u> 6 |
| | | ON906 Main Street West (at I | one | woo | xd Dr | ive). H | amil | ton, | | | | | | DAT | | Local |
| E | ATES: | BORING December 13, 2004 | | T | 7 | WATE | R LEV | /EL | D | ecem | <u>ber</u> | 17. | <u>200</u> 4 | TPC I | ELEV. | 100.115 |
| E | S | | 107 | VEL | £ | | \ | /APO | UR | | - | S/ | AMPL | .ES | | |
| DEPTH (m) | ELEVATION (m) | STRATA DESCRIPTION | TAF | RLE | DEPTH (#) | С | ONC | ENTF | RATIO | NS | | m | ЖER | J. | | WELL |
| 퓝 | 3 | | STRATA PLOT | WATER LEVEL | DE | • 9 | 6LEL | | ▲ p | ρm | | TYPE | NUMBER | N-VALUE | (| CONSTRUCTION |
| | | | +" | - | - | • 20 |) 4 | 0 4 | 60 8 | 80 | | | | thu | | |
| 0 - | 100.29 | ASPHALT | -38 | \vdash | 0 | A 10 | 0 20 | | | 00 | 1 | 1 | | | 2 12 | |
| - | 100,1 | Brown, SILTY CLAY (FILL), dry | R | | 1 - | | | | | | -c | NR | | | E E | 50 mm ID solid PVC |
| + = | | | R | | 2 - | | | | | | | | | | | pipe with bentionite |
| 1 - | | | W | ļ | 3 - | | | :::: | 1111 | | HX | SS | 1 | 23 | 9 9 | and cement seal |
| - | | | W | | 5 - | | | | | | | | | | | |
| | | - brown to grey, some sand, moist | | | 6 - | | A | | | | X | SS | 2 | 11 | | 50 mm ID slotted PVC pipe with silica sand |
| | | | |] | 7 - | | | | | | - | | | | | backfill |
| | | - trace gravel | | | 8 - | | * | | | | 1 | SS | 3 | 19 | | |
| 3 | 97.2 | | | | 9 - | | | | | | 1 | | *************************************** | | | No. |
| E | | Brown, very stiff, SANDY SILT | | | 10- | | A | | | | X | SS | 4 | 11 | | |
| | | (TILL), some clay, wet | | | 11- 12- | | | | | | - | | | | | |
| 4 | | | | ¥ | 13- | | | | | | 7 | | \dashv | | | |
| [] | | | | | 14- | | | | | | = | SS | 5 | 25 | | |
| [| | | . + | | 15- | | | | | | # | | | | | |
| 5 | l | | ľ | | 16- | À | | | | | \mathbb{K} | SS | 6 | 20 | | |
| F 1 | | | | | 17- | | | | | | # | | | | ·[i] | |
| E | | | | | 18- 19- | A | | | | | \mathbb{R} | SS | 7 | 29 | 目 | |
| 6 | 94.2 | PA T TO A STATE OF THE STATE OF | - 3 | | 20 | | | | | | 1 | | | | | |
| - 1 | | END OF BOREHOLE at 6.1 m. | | | 21- | | | | | | 1 | | | | | |
| | | | | | 22- | | | | | | | | | | | |
| 7 - | | | | | 23- | : : : : : : : : : : : : : | | | | | 1 | | | | | |
| | | | | | 24- | | | | | |] | | | | | |
| | *************************************** | | | | 25- | | | | | | | | | | | |
| 8 - | | | | | 26- 27- | | | | | | $\ $ | | | Personne | | |
| | | , | | | 28- | | | | | | | | | | | |
| - 9 - | | | | | 29- | | | | | | | | | | | |
| [] | | | | | 30- | | | | | | | | | | | nan-giriyyada |
| | | | | | 31- | | | | | | | | | | | Prince of the Control |
| 10 | | | | | 32- | | | | | | | | | | | |
| L | ABORA | ATORY ANALYSES: MW204-3 : Groundwate | subn er su | nitte | for l | STEX a | nd PF | I (F1 | to F4) | F4) | | L | | | | (WA) |
| | | | . •• | | | a 2.12 | - 4414 | (| | · ¬) | | | | | | |

| CI LO | LIENT . | ONMENT LIMITED Petro-Canada N 906 Main Street West (at Losoring December 14, 2004 | ong | w00 | d Dr | HOLE RE | | | | PROJE DATU | ECT 1 | No. <u>ONW3613</u> 6 |
|---|---------------|---|-------------|-------------|----------------------|--|-----------------|--|--------|---------------|-------|--|
| *************************************** | | *************************************** | Γ. | ١. | Π | Y ************************************ | | | MPL | - | | |
| DEPTH (m) | ELEVATION (m) | STRATA DESCRIPTION | STRATA PLOT | WATER LEVEL | DEPTH (ft) | VAPO CONCENTE | | TYPE | NUMBER | N-VALUE | | WELL |
| . 0 - | 99.94 | | | | 0 | | 60 80 00 400 | | | | | |
| . 1 | 99.7 | | 77 | | 1 - | | E | NR | | | Ġ. | |
| | | CONCRETE Red to brown, SILTY CLAY (FILL), trace sand, moist | | | 2 - | | | | | | | 50 mm ID solid PVC pipe with bentionite and cement seal |
| 1 - | | | | | 4 - | | - | SS | 1 | 20 | | and content scar |
| 2 | 98.3 | Brown, compact, SILTY SAND (TILL), some clay, wet | | | 6 - | <u> </u> | | ss | 2 | 26 | | 50 mm ID slotted PV pipe with silica sand backfill |
| | | | | | 7 - 8 - 9 - | | | SS | 3 | 29 | | |
| 3 | | | | | 10- 11- | | | SS | 4 | 11 | | |
| : 1 | 96.1 | | 10 | | 12- | | | | | | · 目· | |
| 4 | | Brown, stiff, SANDY SILT (TILL), wet | | | 13 - 14 - | | | ss | 5 | 15 | | the state of the s |
| 5 | | - some clay | 75 | I | 15- 16- 17- | A | | SS | 6 | 13 | | |
| 1 | | - brown to grey | 4.75.6 | | 18- 19- | | | ss | 7 | 26 | | |
| 6- | 93.8 | END OF BOREHOLE at 6.1 m. | 111. | | 20 21 - 22 - | | | | | | : E | |
| 7 | | | | | 23 - 24 - 25 - | | | | | | | |
| 8 | | | | | 26 - 27 - 28 - | | | | | | | |
| 9 | | | | | 29- 30- | | | | | | | |
| 10 | | | | | 31 - 32 - | | | of the complete desired from the control of the con | | | | |

HIGHWAY 403 CROSSING



136.0 00 17 17 17 Q O4=×1 133 I/2 UNCONFINED COMPRESSION (Qu) VANE TEST(C) AND SENSITIVITY(S) NATURAL MOISTURE AND LIQUID LIMIT PLASTIC LIMIT 110 RC13 TIII T12 19 CONSTRUCT 8 LEGEND 五 4000°s.F. 10 STRENGTH AND PENETRATION RESISTANCE ends SECTION 3000 +0 2000 RESEARCH 1000 AND 09 75 90 105 120 5 45 30 DEPTH 0 MATERIALS Lt.) (w) th 252.4 244.9 79.6 189.6 ELEV. 279 (19. الت COMPLED BY B.K. Penetration resistance profil shown obtained by driving a 2" dia. cone from ground level to depth noted with an energy of 350 ft. lb. per blow. N. зоше STATION_12+77 shale Š. gravel with of garbage) HOLE 8 clay clay k Queenston s vely sound. borehole 59CHECKED silty (BORE silty DESCRIPTION um brown sand and (traces Granular fill 22/ Bedrock relatively End of borel Medium grey Dec. E53-116 180-60 Silty clay 279.91 Medi DATE -> SORING ALCIA X BO 80 0.

ONTARIO

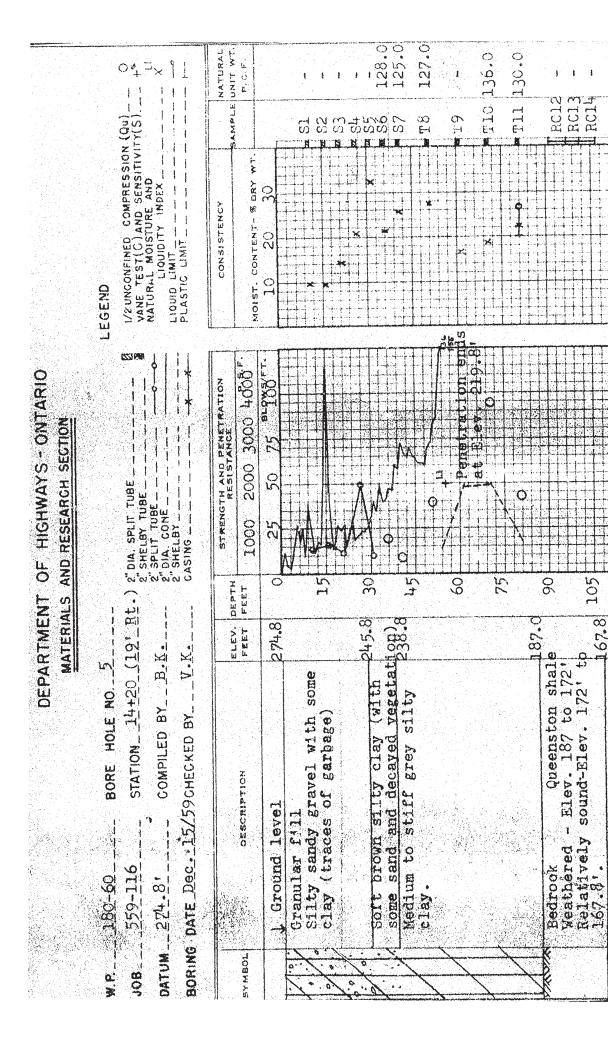
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HIGHWAY

OF

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105

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120

End of borehole Penetration resistance profile shown obtained by driving a 2 dia. cone from ground level to depth noted with an energy of 350 ft. 15. per blow.

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ONTARIO HIGHWAYS RESEARCH AND OF DEPARTMENT MATERIALS

BORE HOLE NO. 3 231-54-3

STATION 17-00 & Ramp H. 59-F-125 DATUM G.S.C.

108

o. ¥

BORING

SYMBOL

LEGEND

NATURAL UNIT WT.

| SO TOTAL STATION 17-00 & Bamp H. | *∾ | 1/2 UNCONFINED COMPRESSION | (100) |
|------------------------------------|--|---|-----------------------|
| G.S.C. COMPLED BY B.K. | 2" SHELBY TUBE | VANE TEST(U) AND SENSITIVITY(S) NATURAL MOISTURE AND LIQUIDITY INDEX. | |
| G DATEJan 25/60 CHECKED BY | CASING | | |
| | STRENGTH AND PENETRATION RESISTANCE | CONSISTENCY | F X Z |
| | FEET 1000 2000 3000 4000 ^{5.F.} | MOIST. COUTENT- %.DRY WT. | |
| 7 Ground Jave 1 | n 25 50 75 m 100 m | M | |
| W.L. | | | \ \ \ \ \ |
| | | | 5 |
| Grey-brown Silty Clay With | ** | * | 7 66 |
| | | * | |
| | 20 % | | 1 75 |
| | | | SS 1 |
| | 30 % 5 | | S6 - |
| Grey silty clay with layers 2270 | | × | S7 - |
| | | | O. O. |
| Stiff grey silty clay. | 7 | | |
| | | | |
| | | | 136 |
| | | | 810 |
| 2010 | 09 | 7,4 | 211 |
| Shale, weathered at surface. 195.0 | | | 512 |
| | 70 Francisco 202.77 | | |
| Penetration resistance profile | | | |
| cone from groundlevel to depth | 08 | | |
| noted with an energy of 350 ft. | | | |
| 1b. per blow. | | | |

6

(REY. 1959.) -- 58-5691 ML-126 FORM OB

lb. per blow

ON SOIL EXPLORATION OFFICE REPORT

HIGHWAYS - ONTARIO AND RESEARCH SECTION 9 DEPARTMENT MATERIALS

2" DIA. SPLIT TUBE 2" SHELBY TUBE 2" SPLIT TUBE 2" SPLIT TUBE 2" SHELBY CASING _____ STATION 17/50 & Bamp H. B.K. BORE HOLE NO. COMPILED BY JOB 59-F-125 231-58-3 DATUM G.S.C. o.' **≥**

JeB CHECKED BY_ BORING DATE Feb. 4/60

4000F STRENGTH AND PENETRATION RESISTANCE 1000 2000 3000 4000 10 DEPTH 0 and ashes. ELEV. DESCRIPTION Clayey mixture SYMBOL

O₀+ 1,15 20 30 04 9 70 50 Brown sandy clay with 255.0 decayed organic matter.

Brown sandy clay with decayed organic matter & some ash.

Brown to grey silty clay with 12.20 layers of sand & gravel 20002 sandy clay, Stiff grey silty near bedrock. End of borehole

LEGEND

I/2 UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIG LIMIT X30 MATURAL BAMPLE UNIT WT. 52 S 33 SI 376 138 15 35 89 MOIST. CONTENT- # DRY CONSISTENCY

\$10

80

SOIL EXPLORATION

FORM OB-M

ONTARIO S HIGHWAY RESEARCH AND OF DEPARTMENT MATERIALS

BORE HOLE NO. 5. STATION 18-20 & Rand H. J.B. COMPILED BY B.K. CHECKED BY_ 28/60 DATE Jan. 231-58-3 59-F-125 G.S.C. BORING DATUM 30B

2" SHELBY TUBE 2" SHELBY TUBE 2" SPLIT TUBE 2" SPLIT TUBE 2" SHELBY CONE 2" SHELBY CASING 2" SHELBY SHELBY 2" SHELBY

I/Z UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S).

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC LIMIT LEGEND

04=×11

NATURAL UNIT WT. P.C.F.

SAMPLE

| ov Od. ř. | | | | | | 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | | |
|---|--|---|----------------------------|---|-----|---|-----------------|---|
| STRENGTH AND PENETRATION 000 2000 3000 4000°F. | 50 75 ^{B-} 9 | | | | | eleva 204-51 | | |
| | 0 | 01 | \$# / 20 20 | | 07 | 60 Penetral | 70 | \$0 |
| ELEV. DEPTH FEET FEET | 260.0 | 251.0 | 239.d , | | | | 193.7 | |
| DESCRIPTION | V Groundleyel Heterogeneous mixture W.L. | or ashes, gravel & sand. Brown sandy clay | Well praded sand & pravel. | Stiff grey silty clay with scattered shale fragments. | | | End of borehole | Penetration resustance profile shown obtained by driving a 2 ^m dia. cone from groundleyel to depth noted with an energy of 350 ft. lb. per blow. |
| SYMBOL | 13. | 30 | 60 | | T E | W K | | |

1 1 1 1 1

89

SX

57

\$3 \$5 \$5 \$6

52

SI

8

EXPLORATION SOIL REPORT OFFICE

HIGHWAYS - ONTARIO AND RESEARCH SECTION OF DEPARTMENT MATERIALS

BORE HOLE NO. 2 COMPILED BY B.K. 59-F-125 DATUM G.S.C. ď. ₩ 108

J.B.

BY_

CHECKED

11/60

DATEFeb.

BORING

VANE TEST(C) AND SENSITIVITY(S)

VANE TEST(C) AND SENSITIVITY(S)

NATURAL MOISTURE AND

LIQUIDITY INDEX

LIQUID LIMIT

PLASTIC LIMIT

LEGEND

222 mg

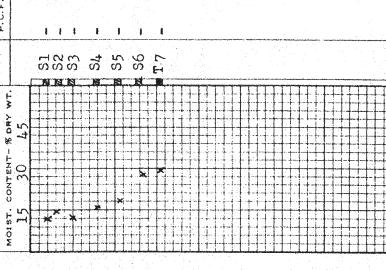
CONSISTENCY

400B 3.F. STRENGTH AND PENETRATION RESISTANCE 2000 3000 1000 0 2740 DESCRIPTION ↓ Groundlevel
Brown clay with

10 30 8 50.8 0.17 sand, gravel & rubble. wood with Black peaty sand with Soft brown sandy clay decayed vegetation. gravelly of borehole Well graded rubble. End 10.00 0 ø

AMPLE \$3 \$3 \$4 \$5 \$5 \$7 MO18T. 50 047 70 9

80



OFFICE REPORT ON SOIL EXPLORATION

ONTARIO S HIGHWAY: AND OF DEPARTMENT

Ħ Ramp BORE HOLSCHOOTS BE STATION & Chedoke E E J.B. COMPLED BY CHECKED BY_ STATION DATE Dec. 3/59 F 59-125 231-58-3 G.S.C. BORING DATUM JOB_ o.:

2" DIA, SPLIT TUBE.
2" SHELBY TUBE.
2" SPLIT TUBE.
2" DIA, CONE.
2" SHELBY.

1/2 UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT 222 (28)

LEGEND

04=×11

| | | | | | | | | | 1.1 | | 37.25 | | | | | | | | | | |
|-------------|--|-----|----------------|------|-----|---|----------------|---|----------------|-----|-------|---|----|-------|----|------|----|------|------|------|---|
| 5 | S C C | | | 1 | ı | ı | | • | 127.5 | | 110 | • | (| 119.3 | | 1 | | ı | | | |
| | SAMPLE | | | s sı | \$2 | S | t _S | S | 9E | | 47 | , | (| N FI | - | 19 T | u= | RC10 | | | |
| CONSISTENCY | Additional and the second of t | (4) | 30 | | | | | | | | | | | | | | | | | | |
| | ı. | |) . | | | | \prod | | \blacksquare | II. | | | 11 | Ti | 12 | П | H | Π | | | Π |

OB-ML-126

SOIL EXPLORATION REPORT OFFICE



- ONTARIO SECTION HIGHWAYS AND RESEARCH P DEPARTMENT MATERIALS

....

Кашр BORE HOLE NO 10 TO RE. STATION & Chedoke. V.K. COMPILED BY_B.K. BORING DATE NOV- 28/59 CHECKED BY 231-58-3 F59-125 DATUM 258.01 o.: 108

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

LEGEND

042 > 11 1/2 UNCONFINED COMPRESSION (Qu)
VANE TEST(G) AND SENSITIVITY(S)
NATURAL MOISTURE AND
LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT ...14 1 111 SISTENCY

| SYMBOL | ELEV. DEPTH | \bot | CONSI |
|------------------------------------|--------------|--|-------------|
| | | 1000 5000 3000 #000 | MOIST. CONT |
| ↓ Groundlevel | 258.0 | n 25 50 75 and 66 T. | |
| www. Loose sandy mixture of rubble | | | |
| Soft brown clay | A | 10 % | |
| Uncertain. organic matter, sand, | | | |
| | 20 | | |
| Grey silty clay | 200 | | * |
| | ት | | |
| | | | |
| | 1 | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | |
| | | | |
| | 50 | | |
| | | | |
| | ζ, | | |
| | 194.7 | | * |
| Redrock (shale) | | Penetration ends at- | |
| | 70 | | |
| | 184.7 | | |
| | | | |
| Penetration resistance profile | ď | | |
| Shown obtained by driving a 2" | 5 | | |
| depth noted with an energy of | | | |
| 250 ft. 1b. per bios. | | | |
| | | | |

NATURAL UNIT WT. AMPLE 9 T8 19 S 73 S4 F 77 E S 30 hg

OFFICE REPORT ON SOIL EXPLORATION

RM OB-ML-126 (REV. 1959.)—58-369

| | ICEND 1/2 UNCONFINED COMPRESSION (Qu) VANE TEST(C) AND SENSITIVITY(S) NATURAL MOISTURE AND LIQUIDIT INDEX LIQUID LIMIT PLASTIC LIMIT | MOIST. CONTENT. \$ DRY WT. | 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 5. F. S. S. S. S. S. S. S. S. S. S. S. S. S. |
|---|--|---|---|--|
| ARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION | 2" DIA. SPLIT TUBE | ELEV. DEPTH SIRENCE FEET 1000 2000 3000 4000 MC 272.0 0 25 50 75 BLOWS/FT 267.5 100 255 50 75 BLOWS/FT 258.0 10 | 239.0 30 239.0 40 40 40 40 40 40 40 40 40 40 40 40 40 | 207.0 203.5 70 |
| DEPAR MAT | W.P. 231-58-3 JOB 59-F-125 DATUM G. S. C. COMPILED BY B. K. BORING DATE Jan. 18/60 CHECKED BY J. B. | | Grey silty clay with occasional layers of clayey silt and sand. | Weathered pink shale. |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

DWG NO.4

| | | | | | DWG_NO.4 |
|----------------------------|-----------------------------|----------|-------|----------------|----------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: | MAY 10, 1994 | |
| CLIENT: REGIONAL MUNICIPAL | ITY OF HAMILTON-WENTWORTH | DRILLING | [] so | LID STEM CONTI | INUOUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: | [X] H | OLLOW STEM | |
| LOCATION: CATHEDRAL PARK, | MAIN ST @ HWY 403, HAMILTON | | [] DL | AMOND DRILL; | [] NX or [] BX |
| | | | | | |

| ELEV. | DATUM: GEODETIC | | | DRILL | ER | | | | | | () | | |
|---|--|-----|----------|------------|--|--------|-------|--|-------|------|--|---|--------------|
| ss splr | rspoon; Tw. Thin wall shelby tube; aug auger sample; cl | UND | RAINED S | HEARSTI | REN | GTH; } | WC M | DISTL | RECO | TENT | PL PLA | STIC | CLIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | | ST | D PE | NEI | RAT | ОИ | TEST | | M/C (%) |
| (m) | | | TYPE | DEPTH | | BLC | WS PE | 3R 3 | 00 mm | (NV | ALUE) | | CU / UNIT WI |
| 85.7 | Grass and surficial vegetation | | | 0.0 | | 0 | 0 20 | 0 4 | 0 60 | 80 | 100 1 | 20 | |
| | FILL | | | | | | | | | | *************************************** | | |
| | silty clay with silt and sand, dark brown to brown, | | | | | | | | | | | | |
| 84.8 | rootlets and organics, moist | | | 0.9 | | | | | | | | | |
| | FILL | 3 | SS | 1.1 | | | 3 | | | | | | 23.4 % |
| | ash, cinders, sand, organics, decayed plant fibres | 3 | SS | 1.8 | | | | | | 1 | | | 46.9 % |
| | and wood, pieces of porcelain and glass, generally grey to black, moist to very moist, | | | | | -2 | | | | | | | |
| | (VERY LOOSE) | 4 | SS | 2.6 | | | | | | | | | 14.9 % |
| 82.7 | - red brick pieces | | | 3.0 | | | | | | | | | |
| | SAND AND SILT | 5 | SS | 3.4 | | | | | | | | *************************************** | 14.5 % |
| | fine sand sizes, slightly clayey, greyish brown below 4.7 m, very moist, | 4 | SS | 4.1 | | -4 | | | | | | | 16.9 % |
| 80.4 | (LOOSE TO COMPACT) | 12 | SS | 4.9 5.3 | | | | | | | | | 16.6 % |
| | ************************************** | 23 | SS | 5.6 | 1 | | Y | Ĺ | | 1 | | | 19.0 % |
| | | | | | | | | | | - 1 | | | cu>0.21 MPa |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace of gravel, oxidized brown to unoxidized grey below 10.9 m, moist to | 26 | SS | 6.4 | *************************************** | -6 | | | | | | | 18.6 % |
| | very moist, (VERY STIFF TO STIFF) - dessicated and oxidized grey-brown becoming | 22 | SS | 7.9 | | -8 | | | | | | | 21.7 % |
| • | unoxidized grey below 10.9 m | 20 | SS | 9.4 | Principal designation of the second s | | | | | | and the second s | | 19.0 % |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | *************************************** | -10 | 0 | 0 | 10 | 80 | 100 | _' 120 | |
| | | | | | | | | | | | | | , , , , |
| NO DESCRIPTION AND AND AND AND AND AND AND AND AND AN | | | | | 1 | | | No. of the last of | | 80 | ORELOG. | FRM | May-94 |

LOG OF BOREHOLE NO. 2 (CONT'D)

DWG NO.5 S0520 MGL PROJECT NO.: DRILLING DATE: MAY 10, 1994

| | ROJECT NO.: GOJZO | | | | JING | | | | | | | | |
|---|--|----------------|--------------|----------------------------------|---|---|-------------------|-------|-----------------|---------|--|-------------|--|
| CLIENT: REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH | | | | | | DRILLING [] SOLID STEM CONTINUOUS FLIGHT | | | | | | | |
| | CT NAME: PROPOSED CSO TANK | | | METHOD: [X] HOLLOW STEM | | | | | | | | | |
| LOCAT | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | [] DIAMOND DRILL; [] NX or [] BX | | | | | | | | | |
| ELEV. | DATUM: GEODETIC | Vale Vale | | DRILL | LER: K | . & : | S DE | ULL: | ING | | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CO | J UND | RAINED S | HEAR ST | RENGTH | i; M/ | с мо | วเราบ | RECON | TENT; | PL PLAST | TOLIMIT | |
| ELEV. | SOIL DESCRIPTION | Predominanthin | SAMPLE | Assessment of the same | The second second | | | | RATI | | | M/C (%) | |
| (m) | | | TYPE | DEPTH | | | | | | | ALUE) | CU / UNIT W | |
| | | | | | 1 | 0 | | | | | 100 120 | | |
| 75.7 | Continued from previous page | | | 10.0 | | - | | • | | 00 | 100 120 | | |
| | | | | 20.0 | 1 - | 10 r | | | | | | | |
| | | | | | | - 1 | | | | | | | |
| | | | ł | | | - 1 | | | | | | | |
| | | 9 | 00 | 11 | | | | | | | | 01.0 | |
| | OTT TISE OF A SE | צן | SS | 11 | | | | | | | | 21.4 % | |
| | SILTY CLAY | | 1 | 1 | | | | | | | . | | |
| | layered with silt and sand seams, vertical fissures, | | | | | | | | | l | | | |
| | red shale fragments, trace of gravel, oxidized | | 1 | | - | 12 | $\dagger \dagger$ | | | + | _ | | |
| | brown to unoxidized grey below 10.9 m, moist to | | | | | | | | | | | | |
| | very moist, | 8 | SS | 12.5 | | | 1 | | | | | 18.3 % | |
| | (VERY STIFF TO STIFF) | | | | | | | | | | | | |
| | · | | | | | | | | | | | | |
| | - dessicated and oxidized grey-brown becoming | | | | | | | | | | | | |
| | unoxidized grey below 10.9 m | | | - | | | | | | | | | |
| | and the state of t | 6 | SS | 14 | - | 14 | \Box | | | \perp | | 23.8 % | |
| | | ١ | UU | 7.4 | | - 1 | | | | | | 43.0 70 | |
| | | | | | İ | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | \parallel | | | | | | |
| | | 1 | | | | | Y | | | | | | |
| | | 21 | SS | 15.5 | | | | ! | | | | 19.9 % | |
| | | | | | | | | | | | | | |
| | | | | | - | 16 | 乛 | | | | | | |
| | | | | | | | | | | | | | |
| 68.7 | SHALE (Queenston Formation) | 1 | | | | l | - // | | | | | | |
| | layered with grey siltstone seams, weathered, red, | 80+ | SS | 17.0 | 1 | - | | *** | | | | | |
| 68 < | moist, (HARD) | Γ. | | 17.2 | | | * | /80 | mm | | | 19.5 % | |
| w | BOREHOLE TERMINATED | | | 11.2 | - | | | | | | | 13.0 70 | |
| | _ BONDHOLE TERMINATED | | | | | **** | | | | | Annual an | | |
| | | | | | - | 18 | | | $\vdash \vdash$ | | - | | |
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| | | | | | 777744 | ļ | | | | | | | |
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| | | | | | *************************************** | | | | | | | | |
| | | | | | l _ | 20 | | | oxdot | | | | |
| | | | | | | 20 | 1 | 4 | 0 | 80 | 120 | | |
| | NOTES: | | | | | | 2 | | 60 | | 100 | | |
| | 1. BOREHOLE OPEN TO 163 m ON COMPLETION. | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | 2. WATER LEVEL AT 5.2 m ON COMPLETION. | | | | | | | | | | | | |
| Marian Statement | | | | 1 | | and a decision of the later of | | | | BO | RELOG.FRA | 1 May-9 | |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

DWG NO.6

| | | | JWG NO.0 |
|-----------------------------|-----------------------------|---------------------------------|-------------|
| MGL PROJECT NO.: | S0520 | DRILLING DATE: MAY 10, 1994 | |
| CLIENT: REGIONAL MUNICIPAL | TY OF HAMILTON-WENTWORTH | DRILLING [] SOLID STEM CONTINUO | OUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: [X] HOLLOW STEM | |
| LOCATION: CATHEDRAL PARK, N | AAIN ST @ HWY 403, HAMILTON | [] DIAMOND DRILL; [] | NX or [] BX |
| FLEV DATUM: GEODETIC | | DRILLER: K & S DRILLING | |

| ELEV. | DATUM: GEODETIC | | | DRILL | LER: K. & S DRILLING |
|----------|---|----------|---|----------|---|
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, CL | סאט נ | RAINED S | HEAR ST | RENGTH; MC MOISTURE CONTENT; FL PLASTIC LIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STD PENETRATION TEST MC (%) |
| (m) | | | TYPE | DEPTH | BLOWS PER 300 mm (N VALUE) CU / UNITY |
| | | | | | 0 20 40 60 80 100 120 |
| 87.2 | Grass and surficial vegetation | | | 0.0 | 0, |
| | FILL | | | | |
| 86.4 | silty clay with silt and sand, dark brown to brown, | | | 0.8 | |
| · | rootlets and organics, moist | | | | |
| | FILL | 5 | SS | 1.1 | 18.2 % |
| 85.9 | ash, cinders, sand, organics, decayed plant fibres | | | 1.5 | |
| | and wood, pieces of porcelain and glass, generally | 15 | SS | 1.8 | 11.6 % |
| | grey to black | | | | -2 |
| | (LOOSE TO VERY LOOSE) | | 1 | | |
| | | 14 | SS | 2.6 | 16.1 % |
| | | | | | |
| | SAND AND SILT | | | - | |
| | fine sand sizes, slightly clayey, oxidized brown, | 10 | SS | 3.4 | 20.9 % |
| | clay seams @ 4.0 m | 10 | 00 | 3.4 | |
| | (COMPACT) | 17 | SS | 4.1 | 7.4 % |
| - | (COMPACT) | 1.7 | 33 | 4.1 | 1.4 70 |
| t * | | | | | |
| en 0 | | 10 | 66 | 4.0 | 11.5 % |
| 82.3 | | 16 | SS | 4.9 | 113% |
| | OVERTICAL AND | | | | |
| | SILTY CLAY | 23 | SS | 5.6 | 15.9 % |
| a 1 | layered with silt and sand seams, vertical fissures, | | | | -6 |
| | red shale fragments, trace of gravel, oxidized | | | | |
| | brown to unoxidized grey below 6.1 m, moist to | 28 | SS | 6.4 | 15.8 % |
| | very moist | | | | |
| | (FIRM TO STIFF) | | *************************************** | | |
| | | | | | |
| | A) | | | | |
| | | 15 | SS | 7.9 | _ ₈ 15.3 % |
| | | | | | |
| - | | | | | |
| | • | | | | |
| | | | | | |
| | | 13 | SS | 9.4 | 20.7 % |
| | | 1 | | | |
| | | 1 | | | -10 |
| | | | | | 0 40 80 120 |
| | | | Austria | | 20 60 100 |
| | | | | | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | |
| | | | | | pont of this |
| - | | <u> </u> | L | <u> </u> | BORELOG,FRM Jun-9 |

LOG OF BOREHOLE NO. 3 (CONT'D)

DWG NO.7

S0520 MGL PROJECT NO.: DRILLING DATE: MAY 10, 1994 CLIENT: REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH DRILLING [] SOLID STEM CONTINUOUS FLIGHT

| | 1: REGIONAL MUNICIPALITY OF HAMILION—WENT | TOIC. | | | ING [] SOLID STEM CONTINUOUS FLIGHT | | | | | | |
|----------|--|--|--|---|---------------------------------------|--|--|--|--|--|--|
| | CT NAME: PROPOSED CSO TANK | | | METHOD: [X] HOLLOW STEM | | | | | | | |
| | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | [] DIAMOND DRILL; [] NX or [] BX | | | | | | | |
| | DATUM: GEODETIC | | | DRILLER: K. & S DRILLING SHEAR STRENGTH: MC MOISTURE CONTENT: PL PLASTICLIMIT | | | | | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE; AUG AUGER SAMPLE; CL | | T TOTAL TOTA | | · · · · · · · · · · · · · · · · · · · | on the state of th | | | | | |
| ELEV. | SOIL DESCRIPTION | N | Sample | STRATA | STD PENETRATION TEST MC | | | | | | |
| (m) | | | TYPE | DEPTH | BLOWS PER 300 mm (N VALUE) CU / Ut | TW TIP | | | | | |
| | | | | | 0 20 40 60 80 100 120 | | | | | | |
| 77.2 | Continued from previous page | | | 10.0 | -10 | | | | | | |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace of gravel, oxidized brown to unoxidized grey below 6.1 m, moist | 7 | SS | 11 | 14.9 | % | | | | | |
| | to very moist (FIRM TO STIFF) | 12 | SS | 12.5 | -12 | e% | | | | | |
| | | 12 | 33 | 12.3 | | 70 | | | | | |
| | | 10 | ss | 14 | 21.3 | % | | | | | |
| | | | Andrew de la companya de la companya de la companya de la companya de la companya de la companya de la company | | -16 | | | | | | |
| | | 15 | SS | 17.1 | 20.9 | % | | | | | |
| | | THE RESIDENCE OF THE PARTY OF T | | | -18 | | | | | | |
| | SHALE (Queenston Formation) | | | | | | | | | | |
| | layered with grey siltstone seams, weathered, red, | - | + | 20.4 | 0 40 80 120 | | | | | | |
| - | moist (HARD) | - | + | 20.4 | 20 60 100 | | | | | | |
| 67.2 | NOTES: | | *************************************** | 20.3 | | | | | | | |
| | b) BOREHOLE OPEN TO 20.5 m ON COMPLETION. | | | | nonmod only M | ay-94 | | | | | |
| L | b) BOREHOLE WAS DRY UPON COMPLETION. | | | | BORELOG.FRM M. | ay - 74 | | | | | |

MOUNTAINVIEW GEOTECHNICAL LTD. **CONSULTING ENGINEERS**

LOG OF BOREHOLE NO. 4

DWG NO.8

| | | | 2 110.0 |
|----------------------------|-----------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 10, 1994 |
| CLIENT: REGIONAL MUNICIPAL | MY OF HAMILTON-WENTWORTH | DRILLING | [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED C | SOTANK | METHOD: | [] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, | MAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | I | |

ELEV. DATUM: GEODETIC DRILLER: K. & S DRILLING SS SPLIT SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, CU UNDRAINED SHEAR STRENGTH; MC MOISTURE CONTENT; PL PLASTIC LIMIT SOIL DESCRIPTION N SAMPLE STRATA STD PENETRATION TEST M/C (%) TYPE DEPTH BLOWS PER 300 mm (N VALUE) CU / UNIT WI 20 40 60 80 100 120 88.2 Grass and surficial vegetation 0.0 FILL silty clay with silt and sand, dark brown to brown, 87.5 rootlets and organics, moist 0.7 SS 1.1 33.0 % 7 SS 1.8 31.2 % 5 SS 2.6 30.4 % ash, cinders, sand, organics, decayed plant fibres and wood, pieces of porcelain and glass, generally 4 SS 3.4 29.0 % grey to black, possible asphalt shingles @ 5m, black cemented foundry sand @ 6 m, wet below SS 4.1 37.6 % (LOOSE TO VERY LOOSE) 8 SS 4.9 33.7 % 4 5.6 SS 34.4 % 15 SS 6.4 19.5 % 5 61.2 % SS 7.9 5 SS 9.4 16.6 % SILTY CLAY layered with silt and sand seams, vertical fissures, 40 80 78.1 red shale fragments, trace of gravel, oxidized 10.1 60 100 brown, moist to very moist (HARD) BOREHOLE CONTINUED ON NEXT PAGE BOR ELOG.FRM

BOREHOLETERMINATED ON

PRACTICAL AUGER REFUSAL

LOG OF BOREHOLE NO. 4 (CONT'D)

DWG NO.9

BORELOG, FRM May-94

| | | | D 110.7 |
|----------------------------|------------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 10, 1994 |
| CLIENT: REGIONAL MUNICIPAL | TY OF HAMILTON-WENTWORTH | DRILLING | [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: | [] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, | MAIN ST. @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | | |

| | | | | | | | - | 01 2111 | | | 2.0 |
|----------|--|---------------|--|--------------------------|--|-------------------|--|--|--|--|--------------|
| | CT NAME: PROPOSED CSO TANK | | | METH | IOD: | [] | HOLLO | W STEM | | | |
| LOCA | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | | | ND DRII | L; [| J NX or | [] BX |
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: | K. & | S DRII | LING | | | |
| SS SPLIT | TSPOON; TW THIN WALL SHELBY TUBE; AUG AUGER SAMPLE; CI | december 1990 | de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina de | N. A. Toronto and Marian | RENC | Zanasia paragraph | AND ADDRESS OF THE PARTY OF THE | And the State of t | TO SECURE A PROPERTY OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TO SECURE A PERSON NA | A CONTRACTOR OF THE PARTY OF TH | CLIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | _ | STI | PENI | ETRATIO | DN TI | 3ST | M/C (%) |
| (m) | | | TYPE | DEPTH | Ш | BLO | WSPER | 300 mm (| N VAL | JUE) | CU / UNIT WI |
| | | | | | | (| 0 20 | 40 60 | 80 1 | 100 120 | |
| 78.2 | Continued from previous page | | | 10.0 | | -10 | | | -γ- | | |
| | SILTY CLAY layered with silt and sand seams, vertical fissures, red shale fragments, trace gravel, oxidized brown, unoxidized grey below 11.6 m, moist to very moist (HARD) | 24 | SS | 11 | | -12 | | | | | 19.5 % |
| | | 12 | SS | 14 | | -14 | | | | | 18.1 % |
| | | | | | | -16 | | | | | |
| | 4 | 7 | SS | 17.1 | | | | | | | 24.2 % |
| - | | 7 | SS | 18.6 | uthebrioriser this bit is the evil efter a calculater of the common and a second an | -18 | | | | | 23.1 % |
| 65.0 | SHALE (Queenston Formation) layered with grey siltstone seams, weathered, red, | | | 23.2 | | -20 | 0 20 | 40 60 | 80 | 120 100 | |
| | moist (HARD) | 1 | | | | | | | | | |
| | MODE (HAND) | | and the second | | | | | | | | |

24.4

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

DWG NO. 10

| | | | DWG 140, 10 |
|-----------------------------|----------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 16, 1994 |
| CLIENT: REGIONAL MUNICIPALT | Y OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSO | TANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, M | AIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | | |

| | DATUM: GEODETIC | | | DRILL | ED. | | | | | | | () NX 0 | . () - | |
|-------|--|---|----------|----------|----------|-----|---------------------------------------|----------|----|----------|----------|----------|---|------------------------------|
| | | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | |
| | SPOON; TW THIN WALL SHELBY TUBE, AUG. AUGER SAMPLE, CL. | | 7 | | ENG | - | | | | _ | | | | and the second second second |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | i i | - | | | | | | | TEST | M/ | C (%) |
| (10) | | | TYPE | DEPTH | | | | | | | | ALUE) | | UNIT WT |
| | | | | | | | 0 | 20 | 40 | 60 | 80 | 100 120 | | |
| 89.8 | Grass and surficial vegetation | | | 0.0 | | 0 | - | | | | | | | 1 |
| | FILL | | | | | | | | | | | | ************* | |
| | silty clay with silt and sand, dark brown to brown, | | | | | | N | | | | | | | |
| | rootlets and organics, moist | | | 0.6 | | | | | | | | | *************************************** | |
| | The state of the s | 4 | SS | 1.1 | | | | | | | | | 30 | .5 % |
| | | • | | *** | | | \parallel | | | | | | | // |
| | | 2 | SS | 1.8 | | | - | | | | | , | 45 | .6 % |
| | | L | 33 | 1.0 | | • | ħ | | | | | | 43 | .0 % |
| | | | | | | -2 | 1 | | | | | | | |
| | | _ | | | | | \prod | | | ı | | | | |
| | | 6 | SS | 2.6 | | | 1 | | | | | | 36 | 5 % |
| | | | | | | | | | i | | 1 | | | di |
| | | | | | | | | | | | 1 | | | |
| | | 7 | SS | 3.4 | | | 1 | | | | | | 34 | .6 % |
| | FILL | | | | | | П | | | | | | | |
| | ash, cinders, sand, organics, decayed plant fibres | | İ | | | -4 | H | + | - | \dashv | \dashv | | | l |
| | and wood, pieces of porcelain and glass, generally | | | | | | | | | | | | | |
| | grey to black, wet below 9.4 m | | | | | | 11 | | | | | | | 1 |
| | grey to black, wet below 3.4 In | 4 | SS | 4.9 | | | II. | | | | | | 21 | .2 % |
| | | 4 | 33 | 4.9 | | | | | | | | | 21 | .2 70 |
| | | | | | | | 1 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | -6 | L | | | | | | | |
| | | | | | | 0 | | | | | | | | |
| | | 17 | SS | 6.4 | | | | H | | | | | 45 | 5.5 % |
| | | | | | | | | 11 | | ı | | | | |
| | | | | | | | | II | | | | | | |
| | | | | | | | | Π | | | | | | |
| | | | | | | | | | | | | | | |
| | ** | | 1 | | | | | П | | | | | | |
| | | | | | | -8 | Н | \vdash | | -+ | - | - | 1 | |
| | , | | | | | | | | | | | | | |
| · | | | | | | | | | | | 1 | | | |
| | · | | | | | | - 1 / | | | | 1 | | *************************************** | |
| | | | | | | | | | | | | | | 2 |
| | | 4 | SS | 9.4 | | | H | | | | | | 26 | 5.8 % |
| | | | | | | | | | | | | | | : |
| | | | | | | -10 | П | | 丄 | \bot | | | | |
| | | | | | | 70 | 0 | | 40 | | 80 | 12 | 0 | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | | | | 20 | | 60 |) | 100 | | |
| | DOLLARD COLLECTION OF THE TROP | *************************************** | | 1 | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | _ | | | |
| | | <u> </u> | <u> </u> | . | <u> </u> | | | | | aniones. | BC | RELOG.FR | 4 | May-94 |

LOG OF BOREHOLE NO. 5 (CONT'D)

DWG NO.11

| MGL PROJECT NO.: S0520 | DRILLING | DATE: MAY 16, 1994 |
|--|----------|----------------------------------|
| CLIENT: REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSO TANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |

| | | | | DIVILLE | 2110 | D/11 | | ATER | 10, 17. | / 7 | | |
|-----------------|--|--|--|---------|------|----------------------|---------------|---|---------|--|--|---------------|
| CLIEN | T: REGIONAL MUNICIPALITY OF HAMILTON-WENT | WOR | TH | DRILL | ING | [] | SOLI | D ST | EM CC | IITNO | NUOUS FI | JGHT |
| PROJE | ECT NAME: PROPOSED CSO TANK | | | METH | OD: | [X] | но | LOV | V STE | M | | |
| LOCA' | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | [] | DIAN | ION | DRI | L; | [] NX or | [] BX |
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: | | | | | ····· | | |
| | rspoon; tw thin wall shelby tube, aug auger sample, co | םאט נ | RAINED : | | | | | | | TENT: | PL PLASTI | CLIMIT |
| ELEV. | SOIL DESCRIPTION | Service and Servic | American marketine | STRATA | | Secure Contract Con- | ugistominuo): | No. 20. 10. 10. 10. 10. 10. 10. 10. 10. 10. 1 | RATI | the street of th | educationals proteins - a recold printing also | M/C (%) |
| (m) | | | TYPE | DEPTH | | | | | | | LUE) | CU / UNIT W |
| \- / | | | | 1 | | 0 | | | | • | 100 120 | 100,01111 |
| 79.8 | Continued from previous page | | | 10.0 | | | | 0 4 | | 00 | 100 120 | |
| | FILL | | | 12000 | | -10 | | | | | | |
| | ash, cinders, sand, organics, decayed plant fibres | | | | | | | | | | | |
| | and wood, pieces of porcelain and glass, generally | | | | | | | | | | | |
| 78.2 | | | | 11.6 | | | | | | | | |
| 10.4 | (LOOSE TO VERY LOOSE) | | | 12.0 | | | | | | | | |
| | (LOCOL TO VERT ECOSE) | 1 | | | | | | | | | 1 1 | |
| | | | | | | -12 | | | | | | |
| | SILTY CLAY | | | | | 12 | | | | T | | |
| | layered with silt and sand seams, vertical fissures, | 11 | SS | 12.5 | | | | | | | | 19.8 % |
| | red shale fragments, trace of gravel, oxidized | 11 | 33 | 12.3 | | | | | | | | 19.0 % |
| | | | | | | | | | | | | |
| | brown to grey, beamy unoxidized grey below 17 m | Ì | | | | | | | | | | |
| | moist to very moist | | | | | | | | | | | |
| | (FIRM TO STIFF) | | | | | -14 | | | | | | |
| | | | | | | - 14 | | | | | | |
| | | | | | | | | 1 | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | 29 | SS | 15.9 | | | | , | | | | 14.0 % |
| | | | | | | . 16 | | | | | | |
| | | | | ļ | | -16 | | | | | | - |
| | | | | | | | | | | | İ | **** |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | ŀ | | | | | | | | | | |
| | ~ | į | | | | 4.0 | | | | | | |
| | · | l | | | | -18 | | | | | | |
| | | | | | | | | | | İ | | Andrew Andrew |
| | , | | | | | | | | | | | |
| | | | | | 1 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | SHALE (Queenston Formation) | 1 | | | | 00 | | | | | | |
| 66.2 | layered with grey siltstone seams, weathered, red, | | | 23.5 | | -20 | 0 | | 0 | 80 | 120 | *** |
| 00.3 | | - | + | | 1 | | • | 0. | 60 | | 100 | |
| | moist (HARD) | - | | 23.8 | 4 | | | | | | | |
| | BOREHOLE TERMINATED ON AUGER REFUSAL | | | | | | | | | | | |
| | NOTES: | | | | | | | | | | | _ |
| | 1) WET CAVE TO 8.2 m. WATER LEVEL @ 6.7 m. | | 1 | 1 | 1 | | | | | BO | RELOG.FRM | Jun-9 |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 20

DWG NO. 40

| | | | DWG NO. 40 |
|----------------------------|-----------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 12, 13, 1994 |
| CLIENT: REGIONAL MUNICIPAL | LITY OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED C | SOTANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK | MAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | | |

| ELEV. | DATUM: GEODETIC | DRILL | ER: K. & S | DRIL | LING | | | | | |
|---------|---|-------|------------|---------|-------------------|----------------|---------|---------|------------|--------------|
| SS SPLT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CL | סאט ו | RAINED S | HEARSTR | ENGTH; M/C | MOIS | TUREO | ONTENT: | PL PLASTIC | CUMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STD | PENI | STRAT | CION ' | TEST | M/C (%) |
| (m) | | | TYPE | DEPTH | BLOW | SPER | . 300 m | m(NV | ALUE) | CU / UNIT WT |
| 84.1 | Grass and surficial vegetation | | | 0.0 | 0 0 1 - | 20 | 40 6 | 50 80 | 100 120 | |
| | FILL | | | | 1 | | | | | |
| 83.2 | | | | 0.9 | 1 | \ | | | | |
| | rootlets and organics, moist | | | | | $\backslash $ | | | | |
| | SILTY CLAY | 14 | SS | 1.1 | | | | | | 19.0 % |
| | layered with silt and sand seams, vertical fissures, | 15 | SS | 1.8 | | | | | | 19.1 % |
| | red shale fragments, trace of gravel, dessicated | | | | -2 - | + | | ╂╍╌┼╴ | | |
| | and oxidized brown becoming unoxidized grey | | | | | П | | | | |
| | below 2.4 m | 14 | SS | 2.6 | | • | | | | 17.3 % |
| i e | (STIFF TO FIRM) | | | | | | | | | |
| | | | | | | \prod | | | | |
| | | 9 | SS | 3.4 | | I | | | | 21.5 % |
| | | | | | -4 | | | | | |
| | | | | | • | | | | | |
| | | | | | | | | | | |
| | | 7 | SS | 4.9 | | | | | | 242.07 |
| | | / | 22 | 4.9 | | I | | | | 24.2 % |
| | | | | | | | | 1 | | |
| | | | | | | | | | | |
| | | | | | -6 | - | | ╂╼╌┼╴ | | 8 |
| | | 6 | SS | 6.4 | | | | | | 31.6 % |
| | | 0 | 35 | 0.4 | | | | | | 31.0 % |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | ** | | | | | | | | | |
| | , | | | | -8 | | 1 | 1 | | |
| | | | | | | | | | | |
| | • | | | | | | | | | |
| | | | | | | | | | | |
| | | 6 | SS | 9.4 | | | | | | 17.5 % |
| | | | | | | | | | | |
| | | | | | ₋₁₀ L | | | | | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | 0 | • | 40 | 80 | | |
| | | | | | | 20 | • | 60 | 100 | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | ВС | RELOG.FRM | May-94 |

LOG OF BOREHOLE NO. 20 (CONT'D)

| | | | DWG NO. 41 |
|---------------------------------|---------------------------|----------|----------------------------------|
| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 13, 1994 |
| CLIENT: REGIONAL MUNICIPALITY C | F HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSO TA | NK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, MAI | N ST. @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| ELEV DATUM: GEODETIC | | Den rep. | V & S TOPILLING |

| | T: REGIONAL MUNICIPALITY OF HAMILTON-WENT | WOR' | TH | DRILLING [] SOLID STEM CONTINUOUS FLIGHT | | | | | | | | |
|---------------------------|---|---------------|--|--|----------|--|---|--|-------------------------------------|----------------------|---|--------------|
| | CT NAME: PROPOSED CSO TANK | | | метн | OD: | [X] | і ногт | ow SI | EM | | | |
| LOCA | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | | [] | DIAMO | ND D | RILL; | [] NX | or | [] BX |
| ELEV. | DATUM: GEODETIC | - | | DRILL | ER: | K. & | S DRII | LING | | | | |
| 1 September 1 September 1 | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CI | Sanstronning. | entrante de la companya de la companya de la companya de la companya de la companya de la companya de la compa | ~~~~~ | RENG | and the same of the same | And the second second | | The same of the same of the same of | Province Courselling | astk | 1 |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | \Vdash | | PENI | | | | | M/C (%) |
| (m) | | ļ | TYPB | DEPTH | Щ | | WS PER | | | | | CU / UNIT WI |
| | | | | | | (| 20 | 40 | 60 80 | 100 1 | 20 | |
| 74.1 | Continued from previous page | ļ | ļ | 10.0 | | -10 | | | T | | ٦ | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| i. | SILTY CLAY | | | | | | | | | | | |
| | layered with silt and sand seams, vertical fissures, | | | | | -12 | | _ | ļļ | | 1 | - |
| | red shale fragments, trace of gravel, desiccated | 6 | SS | 12.5 | | | | | | | | 12.1 % |
| | and oxidized brown becoming unoxidized grey | - | | | | | | | | | | |
| | below 2.4 m, | | | | | | | | | | | |
| | (STIFF TO FIRM) | | | | | | | | | | | |
| | , | | | | | | | ******* | | | | |
| | | | | | | -14 | | 1 | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | - | | | | |
| | | | | | | | | and the same of th | | | | |
| | | 12 | SS | 15.5 | | | | | | | | 23.4 % |
| | | | | | | -16 | 1 | + | | | + | |
| | | | | | | | | | | | | |
| | | | | | | | ' | \ | | | | |
| | | | | | | | | V | | | *************************************** | |
| | | | | | | | | 1 | | | | |
| | | | | National Property Control | | -18 | | $\perp \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$ | | | | |
| | | | | | | 10 | | 1. | $\backslash $ | | | |
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| | * | | | and the second | | | | | | | | |
| | | | | | | | | | \ | | | |
| | | | | | | -20 | \Box | + | + | \top | - | |
| | SHALE (Queenston Formation) | 1 | } | | | | | | | | | |
| 63.4 | layered with grey siltstone seams, weathered, red | 100+ | SS | 20.7 | 1 | | | | / 30 | \ | | |
| | BOREHOLE TERMINATED | Î | | | 1 | | | | , 30 | M T | | |
| | | | | | | | | | | | | |
| | | | | | | -22 | Ш | | | | | |
| | | | | Biologopopopopopopopopopopopopopopopopopop | | | 0 20 | 40 | 60 8 | 0 100 | 120 | |
| | | | | | | | 2.0 | | | *** | | |
| | NOTES: | | | | | | | | | | | |
| | 1) BOREHOLE OPEN TO 20.1 m ON COMPLETION | | | | | | | | | | | |
| L | 2) WATER LEVEL AT 19.5 m ON COMPLETION | 1 | 1 | | | Maria Caraca Car | | | | ORELOG. | FRM | May-94 |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

DYNAMIC CONE PENETRATION **TEST NEAR BOREHOLE NO. 20**

DWG NO.41A

| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 12, 13, 1994 |
|-----------------------------|-----------------------------|----------|----------------------------------|
| CLIENT: REGIONAL MUNICIPALI | TY OF HAMILTON-WENTWORTH | DRILLING | [] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CSC |) TANK | METHOD: | [X] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, N | AAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| | | DDW/FD. | V A C DDW I INC |

| LVOIE | CI NAME: PROPOSED GO TAIN | | | MICIA | OD. | [4] | HOL | 2011 | O E ESE | 47 | | |
|-------|---|---|----------|---------|------|--|--------------|-------|---------|-----------------|----------|--------------|
| LOCAT | TION: CATHEDRAL PARK, MAIN ST @ HWY 403, HAMI | LTON | | | | []] | DIAM | OND | DRI | L; | [] NX or | [] BX |
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: | K. & | S DR | ILLII | NG_ | | | |
| | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, CO | שאט נ | RAINED S | HEARSTR | LENG | TH; M | C MO | ISTUR | ŒCON | Tent; | PL PLAST | TCLIMIT |
| ELEV. | SOIL DESCRIPTION | instantistic contracts | SAMPLE | | | Commence of the Commence of th | | | | Caral and Allen | rest | M/C (%) |
| (m) | | | TYPE | DEPTH | | BLO | VS PE | R 30 | 0 mm | N V | ALUE) | CU / UNIT WI |
| | | | | | | 0 | | | | | 100 120 | |
| 84.1 | Grass and surficial vegetation | | | 0.0 | | 0 • | | | | | | |
| | FILL | | | | | | | | | - | | |
| 83.2 | silty clay with silt and sand, dark brown to brown, | | | 0.9 | | | V | - 1 | 1 | | | |
| 00111 | rootlets and organics, moist | | | | | | Ĭ | | l | | | |
| | | | | | | | | | | | | |
| | SILTY CLAY | | | | | | 1 | | | 1 | | |
| | layered with silt and sand seams, vertical fissures, | | | | | | 11 | | | | 11 | |
| | red shale fragments, trace of gravel, dessicated | | | | | -2 | 1 | | | | | |
| | and oxidized brown becoming unoxidized grey | | | | | L | 1 | | | | | |
| | below 2.4 m | | | | | | | 1 | | | | |
| | | | | | | | | | | | | |
| | (STIFF TO FIRM) | | | | | | | 7 | | | | |
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| | | | - | | | -4 | | | | | | |
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| | •4 | | | | | | | | | | | |
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| | | Y. | | | | | | | 1 | | | |
| | | *************************************** | | | | | | | | | | *** |
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| | | | | | | | 2 | | 60 | | 100 | Y |
| | | | | | | | 2 | - | ** | | | |
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| i i | 1 | 1 | 1 | 1 | 1 | | | | | BC. | RELOGERI | u Tun-94 |

LOG OF BOREHOLE NO. 21

DWG NO. 42

| MGL PROJECT NO.: | S0520 | DRILLING | DATE: MAY 12, 1994 |
|----------------------------|-----------------------------|----------|----------------------------------|
| CLIENT: REGIONAL MUNICIPAL | TY OF HAMILTON-WENTWORTH | DRILLING | [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED CS | OTANK | METHOD: | [] HOLLOW STEM |
| LOCATION: CATHEDRAL PARK, | MAIN ST @ HWY 403, HAMILTON | | [] DIAMOND DRILL; [] NX or [] BX |
| ELECT DIMENT OF OPPOSITO | | | ** * * * * **** |

| | CT NAME: PROPOSED CSO TANK | | | метн | OD: [|] H | DLLC | W ST | 'EM | | | | |
|----------|---|--------|----------|----------------------------------|------------------------------|--|---|------------|----------------|---|--------------|--|--|
| LOCAT | TION: CATHEDRAL PARK, MAIN ST @ HWY 403, HAMII | MOT | | [] DIAMOND DRILL; [] NX or [] BX | | | | | | | | | |
| ELEV. | DATUM: GEODETIC | | Min | DRILL | ER: K. | & S | DRII | LING | 3 | *************************************** | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE; CL | וסאט נ | RAINED S | HEARST | and the second second second | partie April and Spirit | THE PERSON NAMED IN | ********** | and the second | Your execute every entre to be of the William | TCLIMIT | | |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | S | rd 1 | PENI | ETRA | MOITA | TEST | M/C (%) | | |
| (m) | | | TYPE | DEPTH | BL | OWS | *************************************** | | | VALUE) | CU / UNIT WT | | |
| | | | | | | 0 | 20 | 40 | 60 80 | 100 120 | | | |
| 91.4 | Grass and surficial vegetation | | | 0.0 | | 0 1 | | | | | | | |
| | FILL | | | | | | | | | | | | |
| 90.9 | silty clay with silt and sand, dark brown to brown, | | | 0.5 | | | \setminus | | | | | | |
| | rootlets and organics, moist | | | | | | 1 | | | | | | |
| | - | 27 | SS | 1.1 | | | 1 | | | | 14.3 % | | |
| | FILL | ١. | | | | all and the same of the same o | Λ | | | | | | |
| | ash, cinders, sand @ 12 m, foundry sand @ 6 m, | 4 | SS | 1.8 | | . K | | | | | 34.3 % | | |
| | organics, decayed plant fibres and wood, pieces | | | | - | | \top | _ | | | | | |
| | of porcelain and glass, generally grey to black, wet | 1 | | | | | | | ļ | | | | |
| | @ 6 m | 4 | SS | 2.6 | | | | | | | 28.0 % | | |
| | (LOOSE TO VERY LOOSE) | | | | | | | 1 | | | | | |
| | | | | | | | *************************************** | | | | 0.00 | | |
| | | 4 | SS | 3.4 | | | | | | | 34.5 % | | |
| | | | | | _ | a | | | | | | | |
| | | | | | | " | | | | | | | |
| | | İ | | | | | | | | | | | |
| | | 4 | SS | 4.9 | | | | | | | 42.6 % | | |
| | | 4 | 33 | 4.9 | | - } | l | | | | 42.0 % | | |
| | | | | | | - \ | | | | | | | |
| 1 | | | | | | - \ | | | | | | | |
| | | | | | - | 6 | | | | | | | |
| 1 | | 11 | SS | 6.4 | | | | | | | 5.9 % | | |
| | | 11 | 33 | 0.4 | | | П | | | | 3.9 70 | | |
| 1 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | - | - | | | | | | | | | |
| 1 | • | | | | | | | | | | | | |
| | | | | | | | | | *** | | | | |
| 82.0 | | 5 | SS | 9.4 | | | | | | | 20.0 % | | |
| | SAND AND SILT | ٦ | 1 | † | 1 | II | | | | | | | |
| | fine sand sizes, slightly clayey, greyish brown, | | | | -1 | ۵ Ц | | | | | | | |
| | decayed plant fibres, gravel sizes, very moist | - | | | 1 | 0 | | 40 | | 30 12 | | | |
| | (LOOSE TO COMPACT) | | | | | | 20 | | 60 | 100 | | | |
| | , | | | | | | | | | | | | |
| | BOREHOLE CONTINUED ON NEXT PAGE | | | | | | | | | | | | |
| | | | | | 1 | | | | | BORELOG.FRI | 4 May-94 | | |

MOUNTAINVIEW GEOTECHNICAL LTD.

LOG OF BOREHOLE NO. 21

| | CONSULTING ENGINEERS | | | | | (C | ONT | D) | | |
|----------|---|-------|------------|--------|-----------|-----------------|----------------|----------|-------------|--------------|
| | | | DWG NO. 43 | | | | | | | |
| MGL P | ROJECT NO.: S0520 | | | DRILL | ING DAT | E: MA | Y 12, 1 | 994 | | |
| CLIEN | T: REGIONAL MUNICIPALITY OF HAMILTON-WENT | wor | ГН | DRILL | ING [X] | SOLID | STEM | CONTIN | UOUS FI | LIGHT |
| PROJE | CT NAME: PROPOSED CSO TANK | | | метн | OD: [] 1 | HOLLO | W STE | М | | į |
| LOCAT | TION: CATHEDRAL PARK, MAIN ST. @ HWY 403, HAM | ILTO | N | | [] [| DIAMO | ND DR | ILL; [| NX or | [] BX |
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: K.& | S DRIL | LING | | | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE: AUG AUGER SAMPLE; CL | סאט נ | RAINED S | HEARST | RENGTH; M | C MOIS | TURECO | NTENT; | L PLASTIC | LIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STD | PENE | TRAT | ION TH | 3ST | M/C (%) |
| (m) | | | TYPE | DEPTH | BLO | WSPER | 300 mn | n (N VAL | .UE) | CU / UNIT WT |
| | | | | | 0 | 20 | 40 6 | 0 80 1 | 00 120 | |
| 81.4 | Continued from previous page | | | 10.0 | -10 | П Т | | | | |
| | SAND AND SILT | | | | | | | | 1. | |
| | fine sand sizes, slightly clayey, greyish brown, | | | | | | | | | |
| 80.4 | decayed plant fibres, gravel sizes, very moist | | | 11.0 | | | | | | |
| | (LOOSE TO COMPACT) | | | | | | | | | |
| | | | | - | - | | | | | |
| | SILTY CLAY | | | | | | | | | · |
| | layered with silt and sand seams, vertical fissures, | | | | -12 | | | | | |
| | red shale fragments, trace of gravel, unoxidized | | | | | | | | | ÷ |
| | grey, moist to very moist | 6 | SS | 12.5 | | • | | | | 29.2 % |
| | (FIRM TO STIFF) | | | | | | | | | |
| | (| | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | \ | | | | |
| | | | | | -14 | $\vdash \vdash$ | | | | |
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| 1 | | | | | | | $\backslash $ | | | |
| | | 39 | 00 | 15.5 | | | V | | | 17.3 % |
| l | | 39 | SS | 13.3 | | | | | | 17.570 |
| | | | | 160 | -16 | | | | | |
| 75.2 | | ┼─ | - | 16.2 | - | | | | | |
| | | | | | | | | | | |
| | SHALE (Queenston Formation) | | | | | | 1 | | | |
| | layered with grey siltstone seams, weathered, red, | | | | | | | | | |
| | moist | | | | | | | | | |
| | " (HARD) | | | | | | | | | |
| | | | | | -18 | | | | | |
| | • | | l | | | | | | | |
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| | , | | *** | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | 1 | | | |
| | | | | | | | | | | |
| 71.4 | | | | 20.0 | -20 | | | | | |
| | BOREHOLE TERMINATED ON | | 1 | | | 0 | 40 | 80 | 120 | |
| | PRACTICAL AUGER REFUSAL | | | No. | | 20 | | 60 | 100 | |
| | NOTES: | | | | - | | | | | |
| | 1) BOREHOLE OPEN TO 192 m ON COMPLETION | | | | | | | | | |
| | 2) WATER LEVEL AT 11.6 m ON COMPLETION | | | | 1 | | | BOR | ELOG.FRM | Jun-94 |
| I | PUMPLEMENT TRANSPORCHMENTER TON | | | | | | | | | |

KING STREET WEST



e. m. peto associates ltd. soil engineering service - toronto, ontario

| | | 8 | OREHOLE LOG | |
|----------|-------------------|-----------|-------------|---|
| Joh Name | Interceptor Trunk | 62220 | | 2 |

| | | 8 | OREHOLE | LOG | | | | | |
|---|----------------|-----------------------------|--------------|------------------|-------------------------------|-------------|---------------------------|----------------|--|
| Interceptor Trunk Job Name Sanitary Sewer | Job N | 62220 | | | | | D . 1 | | 2 |
| Client of Hamilton | he City Cosin | Auger 4 | -1/2" a | nd 6 | 4 | | Buring | ole No. | Dec. 27, 1962 - Jan. 11/63 |
| Elevation Geodetic 324.9 | Campi | led By A. A. M | <u></u> | | | | | ed By | |
| SAMPLE CONDITION | | SAMPLE | TYPE | | | | | | BREVIATIONS |
| UNDISTURBED . | . A.S. | AUGER SAMPLE | E | | | | v. T. | IN S | ITU YANE SHEAR TEST |
| FAIR | \$.\$. | 2" STANDARD SPLIT BARREL | SPLIT TUE | ESAM | PLE | | M. W.L. | WAT | ER LEVEL IN CASING |
| DISTURBED | S.T. | THIN-WALLED | SHELBY T | UBE S | WPLE | | W.T. | P.L. WET | UND WATER TABLE IN SOIL TER THAN PLASTIC LIMIT |
| LOST | #.3. R.C. | WASH SAMPLE ROCK CORE | | | | | D.T.I A.P.L | P.L. DRIE | ER THAN PLASTIC LIMIT DUT PLASTIC LIMIT |
| SOIL DESCRIPTION | CIALUUR | Dennis of Consistency | Depth. | Lagen | Sample No and Condition | Samuel | No. 1d Birms per Fi | Mediane: | WATER LEVELS & REMARKS |
| Ground surface | | | | here | Condition | | I pro Fi | 3 11 6 4 1 | |
| Top soil to 12" | Black & Brown | | 0'0" | ~~ | | | | | |
| Silty, sandy loam | Yellowish brow | | | 1.1.1 | - | <u> </u> | - | - | |
| Silty, sandy clay; sandy | Reddish brown | Stiff to | | | IIX | SS | 1.7. | 27.0 | D. T. P. L. and moist. |
| Med. to fine sand & silty | Brownish red | very stiff | 4'6" | [:] _/ | | | Ţ | 1 | D. L. and moist |
| clay interlayered | Brownish rea | Loose to | 610" | 1 | 12- | SS | 9 | 28.5 | Wet and W. T. P. L. |
| Silty clay, some grits and pebbles sandy silt seams | Brownish grey | Compact_ | | | 3.80 | | 1 | 100.0 | W. T. P. L. |
| peobles sandy sitt seams | | <u> </u> | | 14 |] | <u> </u> | ļ | - | |
| | <u> </u> | | | X | | | | - | Slight water seepage at 9' |
| Silty clay, some g, & p. | Reddish brown | | | 1 | 4 | \$\$ | 1.5 | 25.0 | |
| layers, of sandy silt | | very stiff | ļ | 1 | | | · — | | |
| | | | 14'0" | 1/2 | | j | + | | |
| Silty clay, some g. & p. | | - | | 1/ | 1 | | | | |
| say cray, some g. & p. | Grey with red | Firm | 1 | 44 | 1 5 W | <u>ss</u> _ | | 26.3 | <u>W. T. P. L.</u> |
| Sandy silty clay, grits and | Yellawish_brow | n.Verv | 18'0" | | 6.77 | 2"5 | -l 5. L. | ÷- ·- | |
| pebbles | | Hard | 19101 | | CZZZ | - | 48/6 | Ā | A STATE OF THE STA |
| Coarse to fine gravel. | | Extremely | ! | 6.0 | 7 | SS | 100/3 | 71 | |
| boulder pieces, some sand | | dense | T | 6.0 | <u> </u> | | 100/3 | 2.7 | .Dry |
| Layer of coarse to med. | Grey & brown | | 23.8. | 1 | - | | | Ţ | |
| | | | | 0.0 | <u> </u> | | | | |
| Coarse to fine gravel, some | | Ditto | | 0.0 | 8 🖂 | SS | 100/6 | 1 2.6 | Dry |
| sano | | | ļ | 0.0 | - | | | | |
| Coarse to medium and | Light brown | | † | 0.0 | 9 X | cs | - | - | Slightly moi st. |
| some fine gravel Coarse to fine gravel and | | | | 00 | | | | | |
| 'sand | Grey and brown | Ditto | 32'0" | 00 | 10 | SS | 100/3 | 1 | Dry |
| | | | 32.0 | 000 | | | | - | |
| | | | | | | | 1 | | |
| Coarse to fine sand | Brown | Dense | | 12.50 | 11 | SS | 39 | 14.7 | 9: |
| | | | 37 16 | | \vdash 1 \times | | 1 27 | 14.7 | Wet |
| | | | 31.6 | 11. | | | | | |
| | | | 40'0" | H: - | | | | 22.8 | Water sample #1 (38'-40') Sand backing up into casin |
| Sandy silt pockets of fine sand | Brown | Very dens | ė | 1. | 12 | SS | 63 | | Q vet. |
| | | | | | | | ļ | 14.7 | |
| | | | | | | | | | |
| Clayey silt with pockets | Grey-brown | Hard | 45'0" | 1./ | 1 | | | | |
| of silty fine sand | orey ordwir | - Mary | | 4 | 11 | _ss | 37 | 19.9 | D.T.P.L. |
| | | | | | | | | | |
| | | | | | | | L | | |
| Silty clay, with pockets | Grey-brown | Very stiff | | 1 | 145 | SS | 18 | 23.0 | W, T, P. L. |
| of reddish-brown sand | | | -51-3 | <i>7, 7</i> . | X | | | | |
| | | | | 4% | | | ļ | | |
| | | | 55'0" | 1/2 | | | | | |
| Silty clay with grits and pebbles | Grey | Very stiff to hard | | 4% | 15 | SS | 31 | 18.4 | D. T. P. L. |
| *** | | to nard | 57'6" | 14 | | | | | Started using wash water |
| Fine to medium sand | | | | G-1-0-2 | 16 | W, S | | il | Layer of fine to medium |
| pebbles, Silty clay, grats and pebble | Chau | Firm to | 59'6" | 717 | K Z | | - | i | sand; pebbles (57 6 - 59 6- |
| fragments of shale | | Stiff | | 12 | ''X | SS | 8 | 24 ! | M, W T. P. L. |
| | | | | XZ | | | | | |
| | | | | 47 | | | | | |
| As above | As above | Very hard | <u>,</u> | # | 18/2/2 | SS | 56 | 17.2 | D, T, P, L, |
| | changing to | | | XX. | 1 8/77 | | | | Getting less plastic |
| | grey-brown | | | 15 | | - | | — — | (increasing silt content |
| | | | | 1 | | | | | with depth). |
| Clayey silt, fragments of shale | Grey-brown | Very hard | | I.Z | 20 | SS | 50 | 20. 1 | Slightly plastic |
| | | | 72'10' | Íb | - | | | | |
| | | | | | | | | | Water seepage at 73'6" |
| Weathered shale | Red-brown | Very hard | | | 2112 | | 14111 | 10 | Water sample #2 73'-75' |
| (Queenston shale) | | -cry nard | 77'0" | | 21 | 55 | 144/9 | 10.8 | Slightly moist. Refusal at 77'0" |
| | | | | | | | | | wented at 11.0. |
| | | Test | Hole Te | rmii | nated a | 1 77'0 | ". | | |

4 PETO MACCALLIMITE

LOC OF BORFHOLE No. 1 ca.

| ВО | KING METHOD 4" \$ Solid Steam, | Con | | | Flig | | Auge | | | | LIQU | D LINI | т | | INEER J.F.W. |
|-------|---|--|--|---|--|--|-------|---------|--|-------|-------|--------|------|-----------------|---|
| PETH | DESCRIPTION Borehole No. 1 GROUND ELEVATION: 327.5 | LEGEND | ELEVATION | NUMBER | TYPI. | BLOWS FOOT N - VALUES | DYNAL | HIC CON | IF PENE | TRATE | WATE | | TENT | _₩p _₩ ₩L | GROUNDWATER OBSERVATIONS AND REMARKS |
| 18.0- | Borehole No. 1 CROUNDELEVATION: 327.5 SAND: Compact to loose reddish brown silty fine sand. With clayey silt layers. Becoming brown. Becoming dense reddish brown silty fine sand. Borehole terminated at 18'0". Borehole terminated at 18'0". Borehole No. 2 Ground Elevation: 329.9 CONCRETE SAND: Compact reddish brown silty fine sand with gravel sizes. Becoming very loose. Becoming brown fine to medium sand. Becoming compact reddish brown. Becoming silty with gravel sizes. Becoming silty with gravel sizes. Becoming very dense and dark brown. | | 325 320 315 310 | 1 2 3 3 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 | \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ | 11 6 14 19 10 51/1 222 4 3 18 16 | 2 | | PENETRA MASIFOOD OF THE PENETRA PARAMETERS AND A PENETRA PARAMETERS AND | | ₩p ₩A | | | | Upon completion of augering no water no cave. |
| | | terrentering in the control of the c | THE THE PARTY OF T | | | | | | | | | | | | |

| | 3 | PETO MACCALLUM | M L' | TD. | | *************************************** | 900-600 mm-co-co-co-co-co-co-co-co-co-co-co-co-co- | besitthescottedscottone | | | | LC | og (| OF : | BOI | REH | OLE No. 3 6 4 |
|----|-------|---|--------|-------------------|----------------------------|---|--|-------------------------|---------|-------|-------------------------|-------|---------|---------|---------------------------------------|-----|---|
| | | NAME PROPOSED SEWER C | ONST | RUCT | ION | | | | | | , | | | | · · · · · · · · · · · · · · · · · · · | JOB | 1 No 77 F 25 |
| | | ATION King Street, Ham HING METHOD 4" \$ Solid Stem, | | n tinu | ous | Flic | ght A | Auger | :s | BORI | NG DA | TE .F | eb. | 17, | 197 | ENC | CINEER J.P.W. |
| | | SOIL PROPULE | | | | SAMPL. | S | | R STREE | | | | LIQU | ID LIMI | T | WL | |
| | DEPTH | Borehole No. 3 GROUND ELEVATION: 340.2 | LEGEND | ELEVATION | NUMBER | TYPL | BLOWS FOOT N - VALUES | | | WS/FO | ETRATE STION T OT | | WATE | R CON | | | GROUNDWATER OBSERVATIONS AND REMARKS |
| 10 | 18'0" | SAND: Compact brown silty fine sand. Becoming loose. Becoming dense reddish brown silty fine to medium sand. Becoming compact. Borehole terminated at 18'0". | | 335 | 1 2 3 4 5 7 | SS AS SS SS SS | 28 - 8 8 37 66 | | | | > | | 0 0 0 0 | | b | | Upon completion of augering no water no cave. |
| | ì | Borehole No. 4 Ground Elevation: 361.6 | | | | | | | | | | | | | | | |
| 45 | 9*6*1 | CONCRETE SAND: Compact brown silty fine to coarse sand and gravel. Becoming very loose dark brown silty fine to toarse sand. Becoming compact. SAND AND GRAVEL: Very dense brown fine to coarse sand and gravel. Borehole terminated at 17'5". | | 355 350 345 | 2 3 | \$\$ \$\$ \$\$ \$\$ \$\$ | 17 2 17 68 96 | 11" | | | | | 0 | | | | Upon completion of augering no water no cave. |
| | NOTES | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | | | | |
| | | · | | | | | | | | | | | | | | | CHECKED BY: |

MEMBER OF THE ASSOCIATION OF CONSULTING ENGINEERS OF CANADA

| | | | *************************************** | | | | | *********** | maswaneow | | - | - | | *************************************** | - | |
|----------|---|---------|---|------------|----------|--------------------------|--------------|-------------|------------------|-------------------|--|--|--------------------|--|----------------|--------------------------------------|
| 3 | PETO MACCALLUI CONSULTING GEOTECHNICAL | M L' | TD. | , | | | | | | | L |)G | OF | BOF | ŒН | OLE No. 5 & 6 |
| . 101 | NAME PROPOSED SEWER C | ONSTE | NUCT: | ION | | | | | | | | | | | 1/1- | 77 F 25 |
| 1 | CATION King Street, Ham | | *** | | | | ~~~ | | BOR | ING DA | TE F | eb. | 17, | 1977 | JUE ENC | GINEER J.P.W. |
| 1 | RING ΜΕΠΙΩD 4" φ Solid Ste . | | | | | | | | | | | | | | | PHNICIAN P.W. |
| <u> </u> | SOIL PROFILE | | | lacksquare | SAMPL | | SHEA | R STRE | NGTH C | 'n | • | | ID LIMI TIC LIN | | W _L | |
| | DESCRIPTION | 8 | LLEVATION | RH | TYPE. | BLOWS FOOT N - VALUES | DYNA | MIC CO | NE PEN | ETRATI ATION 1 | ON # | | R CON | TENT | | GROUNDWATER OBSERVATIONS AND REMARKS |
| DIFTH | Borehole No. 5 | LECEND | LE V | NI MBER | È | SWO. | STAN | | enetr. Dws/fo | | FZT • | , | | | | AND REMARKS |
| | GROUND ELEVATION: 355.0 | 630 | | ├ | | az | 2 | () 4 | | 3 N | 0 | | 11 | ONTENT 0 3 |) ^T | |
| | SAND: Loose light brown fine sand. | | | | | | | | | | | | | | | |
| | line sand. | | | <u> </u> | SS | 6 | | | | | | 0 | | | | |
| | | | 350 | 2 | AS | - | L | | | | | 7 | | | | |
| 6.6. | | 37.16 | l | _3 | SS | 5 | 1 | | | | | \ | | | | |
| | SAND AND GRAVEL: Dense to very dense dark brown | 300 | | 4 | SS | 31 | ` | | | | | | | | | |
| | coarse sand with gravel sizes. | | | | 33 | 1 | | | | | | | 2 | | | |
| | | 9 0 | | 5 | SS | 35 | | 1 | | | | 8 | | | | |
| | Becoming silty fine to | 2000 | | 6 | AS | - | | | | ` | | | | | | |
| <u> </u> | coarse sand with gravel sizes. | 0.09 | 240 | 1- | SS | 65 | | | | 7 | | 0 | | | | |
| | a.z.c.a.i | | 247 | 二 | | | | | 1 | | | | | | | |
| 18'0" | coarse sand with gravel sizes. 7 SS 65 0 0 Upon completion of augering | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | " | | | | of augering no water |
| | | | | | | } | - | | | | | | | | | no cave. |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| <u> </u> | | | | \vdash | - | - | - | | | | | _ | | - | | |
| | | | | | | 1 | | | | | | | | | | |
| | Ground Elevation: 352.6 | | | \vdash | \vdash | 1 | | | | | | | | | | |
| d | Glound Sievacion: 332.0 | FE 13/2 | | | | 1 | | ļ | | | | | | | | |
| | SAND: Loose light brown silty fine sand. | | 1 | | | 1 | | | | | | | | | | |
| <u></u> | | | 350 | 1 | SS | 5 | | | | | | | | | | |
| | | | | 2 | AS | 1 - | 1 | | | | | 0 | _ | | | |
| | | | | 3 | SS | 7 | 1 | | | | | | | 0 | | |
| 8*0* | | ¥ 60 a | 345 | 4 | SS | 52 | | | | | | | | | | |
| | SAND AND GRAVEL: Very | | | | 33 |]" | | | | | | | | | |] |
| | dense brown silty fine to coarse sand and | | | 5 | SS | 106 | | | | | | þ | | | | |
| | gravel. | 0.4 | 340 | 6 | AS |] - | | | | | | \mathbb{I} | | | | |
| J | Becoming dark brown fine to medium sand and | 4.0 | | 7 | SS | 85 | | | | ١, | 1 | 9 | | | | |
| 1 | gravel. | 4.0 | | | | 1 | | | | 1 | Ī | | | | | |
| 18'0" | | 3.4 | 335 | - 8 | SS | 60 | | | | V | | 0 | - | | | Upon completion |
| | Borehole terminated at | | | | - | - | | | | | | | | | | of augering no water |
| 1 | 18'0". | | | | | 1 | | † | 1 | 1 | | | | 1 | | no cave. |
| | | | | - | ╂ | - | | | | | | | | | | |
| | | | | | | 1 | | | | | | | | | | |
| - | | | | - | 1 | 1 | - | - | - | - | | + | | - | 1 | 1 |
| | | | | F | | 7 | | | | | | | | | | |
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| | | | <u></u> | 上 | | 1 | <u></u> | <u>L.</u> | <u> </u> | 1 | <u></u> | <u></u> | <u></u> | | | 1 |
| MOTES | ş: • | | | | | | | | | | | | | | | • |
| | • | ٠. | | | | | | | | | | | | | | |
| - | | | | | | | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | | | CHECKED BY: KK |
| PM1 /50 | u ∰ MEMBER G | E TH | E AS | soc | IATI | ON C | F CC | NSU | LTIN | IG EN | GIN | EER! | OF | CAN | ADA | |

| ********* | | edillioni insuration | al Production of the Control | DATE OF THE PERSON NAMED IN | | Оср. жиринанов | obsupentalia | | en en en en en en en en en en en en en e | POST TO SERVICE AND ADDRESS OF THE POST OF | ×nd-theresesses | poddynnipriery | | CONTRACTOR OF THE PERSON | reministration of the | Control of the second s |
|-----------|--|----------------------|------------------------------|-----------------------------|--|--------------------------|-------------------------|------------------|--|--|-----------------|----------------|--|--------------------------|-----------------------|--|
| = | PETO MACCALLUN CONSULTING GEOTECHNICAL E | M L ENGIN | TD. | | | | | | | | LC |)G | OF I | вон | REH | OLE No. 7 & 8 |
| 108 | NAME PROPOSED SEWER CO | ONSTI | RUCTI | ON | | | | | | | | | ٠. | | 1OB | No. 77 F 25 |
| 1.00 | ATION King Street, Ham | iltor | 1 | | | | | | BORE | NG DA | TE 1 | 7 Fe | b. 1 | | | INEER J.F.W. |
| BOI | ting METHOD 4" o Solid Stem, | Cont | inuc | 2 4 \$. | Flig | ht.A | uger | 8 | | | | | | | | TINICIAN P.W. |
| | SOIL PROFILE | | | | SÄMPL | ES . | SHEA | R STRE | WGTH C | ı | ٠ | | ID LIMI | | | |
| | DESCRIPTION | 0. | ĕ | * | | igg: | | | | | | | ER CON | TENT_ | | GROUNDWATER |
| DEPTH | Borehole No. 7 | LEGEND | ELEVATION | NUMBER | TYPE | BLONS FOOT N - VALUES | STAN | MIC CO DARD P | HE PENI | TION Y | EST + | M.b. | | W | ₩L | OBSERVATIONS AND REMARKS |
| | GROUND FLEVATION: 346.5 | 1 - | 3 | ž | | N. | | 184.0 20 4 | 3 WS/FO (| OT 8 | 0 | W | TER CC | NTEN | T % | |
| 013" | CONCRETE | 1 | 245 | | | | | | | | | | | | | |
| | SAND: Compact reddish | | 345 | | | | | | | | | | | | | • |
| | brown silty fine sand. | | | 1 | SS | 83 | | | | | | 0 | | | | |
| | | | | 2 | AS | - | | | | | | L | | · | | |
| | Becoming brown fine to medium sand. | 183 | 340 | 3 | SS | 20 | | | | | | 0 | · | | | |
| | | | | 一 | | | | | | | | | | | | |
| | • | | | 4 | SS | 25 | | l, | | | | O | | | | |
| | | 1XX | | 5 | ss | 26 | | H- | | | | + | | ļ | - | ' |
| | | 13.5 | 335 | Ľ | 22 | 20 | ľ | 17 | | | | 0 | ' | | | |
| | | 5.3 | | 6 | AS | - | | | | | | | | | | |
| | | | | 7 | SS | 23 | | | | | | b | | | | |
| | | | 330 | | | | | | | | | \top | | | | |
| L8'0" | ı | | J | 8 | SS | 20 | | | | | | | | | | tinon samalasta |
| | Borehole terminated at | T | | Ľ | 23 | - | | | | | | | | | | Upon completion of augering |
| | 18*0". | | | | | | <u> </u> | ļ | | | | | | | | no water no cave. |
| | | | | \vdash | | 1 | | | | | | | | | | |
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| | · | | | | | | <u> </u> | $\dagger -$ | | | | | <u> </u> | | | |
| | Borehole No. 8 | | | | ļ | | | | | | | | | | | |
| | Ground Elevation: 336.8 | | | - | | 1 | | . | | | | | | | | |
| | | 4., | | | | 1 | <u> </u> | <u> </u> | | | | | | | | |
| | CLAYEY SILT: Stiff | И | 335 | - | | 1 | | | | | | | | | | |
| | reddish brown clayey silt. | MII | | | | 1 | | | | | | | - | | | |
| | : | | 1 | 1 | SS | 9. | 1 | | | | | | 1 | þ. | | |
| *0"± | | | | 3 | AS SS | 5 | /- | ┼── | | | | - | 1 | - | - | |
| | SAND: Loose brown silty fine to medium sand. | | 330 | 匚 | | 1 | | | | | | | 1 | | | |
| | Time to medium sand. | | | - | SS | 4 | | | | | | | 8 | | | |
| | Becoming dark brown | | | | | 1 | | <u> </u> | | | | | Ц | | | * |
| | fine to medium sand. | | 325 | 5 | SS | 4 | 1 | | | | | | Q | | | Naga paramanananananananananananananananananan |
| | | | | \vdash | 1 | 1 | | 1 | | | | | \ | | | |
| | • | | | 6 | SS | 5 | 4 | | | | | | ` | φ | | |
| 5'6"1 | | 188 | 1 | - | | 1 | 1 | +- | | | - | - | | # | | |
| | CLAYEY SILT: Hard brown | | 320 | ٦ | | 1 | ` | X | | | | | | | | |
| | clayey silt. | | | 7 | SS | 30 | | 1 | | | | | 5 | 1 | | |
| | | - | ł | | | <u></u> | | | | | <u></u> | L | | | | |
| | • • | W | 315 | | | 1 | | | | 1 | | | 17 | | | |
| 2'0"± | SAND: Very dense brown | ## | ¥ | 1 | + | 1 | | | | | | 1 | X | | | |
| **** | medium to coarse sand. | | | | |]. | | | | | | / | 1 | | | |
| 4.2. | Borehole terminated at | 1 | 1 | 8 | SS | 79/ | 11" | + | - | - | - | Ø | +- | - | | Upon completion of augering |
| | 24'5". | | | | | 1 | | | *************************************** | | | | | | | no water cave at 21'6". |
| | | | | - | - | - | | | | | | | | | | Lave at 41.5". |
| | | | | - | 1 | 1 | | | | | | | | <u></u> | | |
| | | | | E | |] | ľ | | | | | | | | | |
| MOTES | | 1 | 1 | | 1 | | <u> </u> | | | L | 1 | | <u> </u> | 4 | | |
| -MJ1ES | • | | | | | | | | | | | | | | | |
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| | | | | | | | | | , . | | | | | | | CHECKED BY LE |
| MEE./50 | MEMBER O | FTH | E A 5 | soc | ITAI | 0 N O | FC | DNSU | LTIN | G EN | GIN | EERS | OF | CAN | ADA | |

| 2 | PETO MACCALLUM LTD. LOG OF BOREHOLE No. 9 | | | | | | | | | | | | | | | | |
|--------------|--|-----------------------|--------------|----------|--------------|---------------|-----------------|----------|-------------------|--------|---------------|--------------|-------------------|-------------|------------|-----------------------------|-----|
| 101 | PROPOSED SPWER CO | | | | | | | | | | | | | | | 77 F 25 | |
| 1.00 | ATION King Street, Hami | lton | | | | | | | 2/12/12 | NC DA | or Pe | eb. | 17. | 1977 | | INO | - [|
| BOI | UNG METHOD 4" & Solid Stem, | Cont | inuq | STE | Flig | ht A | uger | В | B6384 | NG HA | \$ \$ \$ 1 mm | | | | | THNICIAN P.W. | - [|
| | ŞOR PROPUL | | | - | SAMPL | | SHEA | K STRE | 101H C | , | A | | ID LIMI | | _WL | | 7 |
| | | l e | Š | ~ | | 15 <u>S</u> 2 | | | | | | PLAS WATE | TIC LIM ER COM | TENT. | We | GROUNDWATER | |
| рыртн | DEZZIELKW | TEGEND | PLEVATION | NUMBER | 34.5. | N VALUES | DYNA | HIC CO | NE PENI PAETRA | TRATI | ON E | Wp | | W | ₩L | OBSERVATIONS AND REMARKS | - |
| | GROUND FLEVATION: 328.8 | 1 = | ana. | ž | · | BLO | , | 0 #4 | J#S/FO |)T | n | 36.4 | TER C | NTENT | <u>,</u> % | | |
| | | 190 | | | | - | | | • | | ř | | | ı i | · - | | - |
| | SAND: Leose brown fine sandy silt to silty | | | | | | | | | | | | | | | | - 1 |
| | fine sand. | | 325 | T | SS | 4 | | | | | | | | 0 | | | |
| 772 | | 111 | - | 2 | AS | - | | | | | | | | | | | |
| | GLAYBY SILT: Stiff reddish brown silty | Ш | | 3 | SS | 15 | 1 | | | | | | | 3 | | | |
| | clay to clayey silt, | $\ \ _{\mathcal{F}}$ | | - | | | | | | | | | | \setminus | | | |
| | becoming brown slayey fine sandy silt. | \mathcal{U} | 320 | 4 | 55 | 13 | | | | | | | | 8 | | | |
| | Tine bands wards | $\ \ _{\ell}$ | | | | | -/- | | | | | | | 1 | | | |
| 12187 | | И | | 5 | -88 | 11 | 1 | | | | | | | فرا | | • | |
| 4.0" | SAND AND GRAVEL: COMPast | 1 | | | | | . / | | | | | | -/ | | | | |
| | brown soarse sand with | | 315 | 6 | 88 | 18 | } | | | | | Ø | | | | | |
| | fine gravel sizes. | 4.0 | | | | | $\vdash \vdash$ | | | | | | | | | | . |
| | | | | | | | | | | | | | | | | | |
| | Becoming dense silty fine to searse sand and gravel. | | | | | | | | | | | | | | | | |
| | Becoming debne silty | | | | | | | | | | | | | | | | |
| | Besoming dense silty fine to searse sand | 0.5 | | | | | - | 7 | | | | | | | | | |
| | and gravel. | 247 | | | | | | | | | | / | | | | | |
| | | 3.10 | 305 | - | | | | \ | | | | / | | | | | |
| 251 BF | | | | F | 88 | 47 | | | | | | 6 | | | | Upon completion | |
| | Borehole terminated at | | | | | | | | | | | | | | | of augering no water | |
| | \$5' U". | | Ì | - | | | | | | | | | | | | cave at 19'6". | ٠ |
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| NOTES | RIFA: | | | | | | | | | | | | | | | | |
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| PM1/59: | MEMRER OF | THI | 6 4 5 | an | IATI | an o | F CO | URN | HIFF | GEN | GIN | EERS | OF | CAN | ADA | | |

LOG OF BOREHOLE NO. 20

DWG_NO. 21

| MGL PROJECT NO.: S0858 | DRILLING DATE: OCTOBER 25, 1995 |
|---|---|
| CLIENT: THE REGION OF HAMILTON-WENTWORTH | DRILLING [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED WATERMAIN & SEWER INSTALLATION | METHOD: [] HOLLOW STEM |
| LOCATION: MARKET STREET, HAMILTON | [] DIAMOND DRILL; [] NX or [] BX |
| ELEV. DATUM: GEODETIC | DRILLER: K. & S DRILLING |

| | CT NAME: PROPOSED WATERMAIN & SEWER INSTA | NOL | METH | OD: [] | HOL | LOW | STE | M | | | | |
|----------|--|--------|----------|---------|--|---|-----------------|--------------|--------|-------|----------|--------------|
| LOCAT | TION: MARKET STREET, HAMILTON | | | [] | DIA | MON | D DR | ILL; | []] | VX or | [] BX | |
| ELEV. | DATUM: GEODETIC | yy. | | DRILL | ER: K. & | S D | RILL | NG | | | , | |
| SS SPLIT | SPOON; TW THIN WALL SHELBY TUBE; AUG AUGER SAMPLE; C | U UNDI | RAINED S | HEARSTE | RENGTH; N | A/C M | oistu | RECO | NTEN | T; PL | PLASTIC | CLIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STI |) PE | NET | RAT | ION | TES | Т | M/C (%) |
| (m) | | | TYPE | DEPTH | BLO | WSP | ER 30 |)0 mn | ı (N V | VALU | E) | CU / UNIT WT |
| | | | | | | | | | | 100 | | |
| 108.5 | | | | 0.0 | 0 | | | | | | | |
| | 75 mm Asphalt over 150 mm crushed limestone | | | | ľ | | | | | | | |
| | | 1 | | | | l\ | | | | | | |
| | FILL | | | | | | | | | | | |
| | sand with some silt, medium to coarse grained, | 5 | SS | 1.0 | | 11 | | | | | | 14.0 % |
| | clayey, brown, moist, | - | | | | | | | | | | 2110 /0 |
| | (LOOSE) | 7 | SS | 1.8 | | | | | | | | 19.2 % |
| 106.5 | (2002) | ` | | 2.0 | -2 | 1 | | | | | | 13.12 /0 |
| 1 | SAND AND GRAVEL | † | | 2.0 | | \ | | | | | | |
| | medium to coarse grained sand, meduim gravel | | | | *************************************** | | | | | | | |
| | sizes, brown, moist, | | | | A STATE OF THE STA | *************************************** | \ | | | | | |
| | (DENSE) | | | | | | \ | (| | | | |
| 105.0 | (DERSE) | >50 | cc | 3.4 | | | | 1 | 140 | m m | | 5.0 % |
| 103.0 | | 230 | 33 | | | | | | | | | 3.U % |
| | BOREHOLE TERMINATED | | | 3.5 | -4 | | | | | | | |
| 8 | | | | | • | | | | | | | 2 |
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| | | | | | _10 | | | | | | | |
| | | | | | -10 | 0 | 4 | 10 | 8 | 30 | 120 | |
| | NOTES: | | | | | - | 20 | | 50 | 10 | | |
| | 1. BOREHOLE OPEN TO 2.9 m ON COMPLETION. | | | | | | | | | | | |
| | 2. BOREHOLE WAS DRY ON COMPLETION. | | | | | | | | | | | |
| | 2. BURLIOLE WAS DRI ON COMPLETION. | | | | | | | | | | | VI |
| L. | | | <u></u> | J | | | and the same of | was a second | | GBO D | ISK # 25 | Nov-95. |

MOUNTAINVIEW GEOTECHNICAL LTD. CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 21

DWG NO. 22

| MGL PROJECT NO.: S0858 | DRILLING DATE: OCTOBER 25, 1995 |
|---|---|
| CLIENT: THE REGION OF HAMILTON-WENTWORTH | DRILLING [X] SOLID STEM CONTINUOUS FLIGHT |
| PROJECT NAME: PROPOSED WATERMAIN & SEWER INSTALLA | TION METHOD: [] HOLLOW STEM |
| LOCATION: MARKET STREET, HAMILTON | [] DIAMOND DRILL; [] NX or [] BX |
| ELEV. DATUM: GEODETIC | DRILLER: K. & S DRILLING |

| LOCA | TION: MARKET STREET, HAMILTON | | | | [] | DIAN | ION | D DR | ILL; | [] NX | or |] BX |
|---------|--|-------|----------|----------|----------|-------------------|---|-------|-----------------|---------|--------|--------------|
| ELEV. | DATUM: GEODETIC | | | DRILL | ER: K. & | S DF | RILLI | NG | | | utinan | |
| SS SPLM | SPOON; TW THIN WALL SHELBY TUBE, AUG AUGER SAMPLE, C | ט טאט | RAINED S | HEAR STR | ENGTH; M | KC WK | DISTU | RE CO | NTENT | PL PLAS | STIC | LIMIT |
| ELEV. | SOIL DESCRIPTION | N | SAMPLE | STRATA | STI |) PE | NET | RAT | ЮN | TEST | | M/C (%) |
| (m) | | | TYPE | DEPTH | BLO | WS PI | ER 30 | 00 mm | (NV | ALUE) | | CU / UNIT WI |
| | | | | | (| | | 0 60 | | 100 12 | 90 | |
| 103.0 | | | | 0.0 | 0 | | | | | | . | |
| | 100 mm Asphalt over 175 mm crushed limestone | 1 | 1 | | Ů | | | | | | | |
| | | 1 | | | | | | | ı | | | |
| | FILL | | | | | | | | - 1 | | | |
| | sand with some silt, medium to coarse grained, | 3 | SS | 1.0 | | + | | | | . | | 11.9 % |
| | | 3 | 33 | 1.0 | | $ \setminus $ | | | - | | | 11.9 % |
| | clayey, brown, moist, | | - | 4.0 | | | | | 1 | | | *** |
| 101.2 | (LOOSE) | 9 | SS | 1.8 | | 4 | | | | | | 15.2 % |
| | | | | | -2 | 1 | | | $\neg \uparrow$ | | 1 1 | |
| | SAND AND GRAVEL | | | | | \ | | | | | | |
| | medium to coarse grained sand, meduim gravel | | | | | 1 | | • | | | | |
| | sizes, brown, moist, | | | | | ' | | | | | | |
| | (COMPACT) | | | | | | \ | | | | | |
| 99.5 | · | 26 | SS | 3.4 | | | à. | | ana ana | - 1 | | 6.0 % |
| | BOREHOLE TERMINATED | | | 3.5 | | | | | | | | |
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| | | | | | -10 | | | | | | | |
| | | | | | -10 | 0 | | 10 | 84 |) 1 | 20 | |
| | NOTES: | | | | | | 20 | | 0 | 100 | | |
| | | | | | | | | | | | | |
| | 11. BOREHOLE OPEN TO 2.7 m ON COMPLETION. | | | | | | | | | | | |
| | 2. BOREHOLE WAS DRY ON COMPLETION. | | | | | | | | | | | |
| L | | | | | | wire and the same | *************************************** | | (| BO DISK | ¥ 25 | Nov-95 |

PETO ASBOCIATES LTD. RECORD OF BOREHOLE NO. 4P JOB NO. 73 F 48 JOB NAME Parking Garage - Main Street, Hamilton TECHNICIAN W.J. BORING DATE Mar. 13/73 CLIENT Corporation of the City of Hamilton ENGINEER GDP/APJ BORENOLE TYPE HOLLOW Stem Augus

SAMPLES DYNAMIC CORE PERKETRATION
STANDARD PERFERATION TEST
BLOKEFOOT
BLOKEFOOT TYPED BY jnc GROUND ELEV. 324.3 SOIL. PROFILE DEPTH ELEV 10 20 30 40 50 DESCRIPTION WATER CONTENT % SHEAR STRENGTH C., LB/SQ.FT. A 1000 2000 3000 4000 5000 1 55 1'0" CINDER FILL #4A augered brown sandy silt fill, some gravel. 10' north of 14. Fill to 16'. Boulde Mainly loose sandy fill. 3 55 Ashes and bracks Moist. SAND: Brown fine to medium sand with gravel and boulders. Dense. 309.8 4 SS 4 After sample #4, hole dry. SANDY TILL: Hard dry. 5 SS SAND: Fine to coarse sand, wet below 25' t. compact to dense saturated. Becoming grey brown, pockets of sandy till. After sample 9 SS 32 10 SS 19 SILTY CLAY Grey silty clay. W.T.P.L. Odd pebble, till like, stiff. Reddish brown 13 SS 32 P4 F. = 50 bars PL = 12 bars Firm to stiff clayey silt/silty clay. Mainly silty clay. 18 SS E = 48 bars PL = 10.5 bars Interbedded clayey silt and sandy silt layers CLAYEY SILT TILL: Reddish brown to grey silt till. Hard. A.P.L. Variable gravel content. 87'0":
237.3 SILTY CLAY: Grey clayey silt to silty clay.
W.T.P.L. Silt pockets and seams red and grey.
Stiff. P7 E = 139 bars PL = not de-termined Hollow auger at 95'. W.L. - 25'1" Pulled auger Borehole termina-ted at 97'0" W.L. - 25' 1 Cave - 35' Installed piezometer

703F23 4

PAL/504

CONSULTING SOIL ENGINEERS PETO ASSOCIATES LTD. RECORD OF BOREHOLE NO. 5 JOB NAME Parking Garage - Main Street, Hamilton JOB NO.___ 73 F 48 TECHNICIAN W.J. BORING DATE Mar. 9/73 CLIENT corporation of the City of Hamilton ENGINEER GDP/APJ GROUND ELEV. 322.8± BOREHOLE TYPE Hollow Stem Augers TYPED BY jnc SOIL PROFILE DYMANUS COME PENETRATION SAMPLES LIQUID LIMIT STANDARD PENETRATION TEST PLASTIC LIMIT ___ BLOWS/FOOT -WATER CONTENT_ TYPE DEPTH ELEV. REMARKS 20 30 4.0 50 DESCRIPTION WATER CONTENT % SHEAR STRENGTH Cu LB/SQ.FT. 1000 2000 3000 4000 5000 CRUSHED STONE AND FINES. 1 '6" 321. MIXED FILL: Ø 1 88 13 Mixed sand and gravel fill. Bricks, concrete 2 SS 10 slabs, etc. 3 SS 15 CONCRETE SLAB Clayey sandy silt 312.8 4 55 12'0' tfill, wet. 310.8 SAND: Brown fine 5⁻ SS to medium sand, moist, loose. SANDY TILL: Brown 6: SS 39 306.3 SAND: Brown fine to coarse sand, gravel layers. Boulders. 0 7 SS 37 Very moist, Hole dry to compact. 221. W.L. 23'8" الحي. Becoming dark Hole at 25' 8 SS 19 6 0 water - 23'8 brown fine to 0 medium sand. Fine to coarse 9 SS 62 Hole at 30' sand. Saturated, water - 24' tdense. 289.8 SILTY CLAY: Grey silty clay, stiff, A.P.L. 10 SS 32 Stiff, grit content, till like. Silt seams and 11 SS 26 3590 PSF 7 10 pockets. Becoming W.T.P.L. 12 SS 24 After pulling augers, cave - 9' Seams of sandy 13 **8**5 1470 PSF silt. 271.3 Borehole terminated at 51'6" 1

PAL/504

PETO ASSOCIATES LTD. RECORD OF BOREHOLE NO. 6P JOB NO. 73 F 48 JOB NAME Parking Garage - Main Street, Hamilton TECHNICIAN N.J. BORING DATE Mar. 9/73 CLIENT Corporation of the City of Hamilton ENGINEER GDP/APD BORING DATE Mar. 9/73
GROUND ELEV. 322.51
SOIL PROFILE
SAMPLES
STANDARD STANDARD TO TEST
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STANDARD STANDARD TO TEST
STANDARD STANDARD STANDARD TO TEST
STANDARD TYPED BY jnc REMARKS DEPTH ELEV. DESCRIPTION 100p 2000 30Q0 4000 50p0 Hole #6A augered 10' East. After 16 feet of drilling, W.L. - 13'1" MIXED FILL: Sandy fill to 2 feet below. Mixed sand and gravel fill. Bricks, wood, concrete slabs.
Very moist.
Odd boulder. 2 85 After 5 mins. 13'1" cave - 15'1" <u> 185</u> 18 After 22 feet W.L. - 22 5 SS 33
5 SS 35
6 SS SS 35 After 5 mins. 21'8" On pulling augers, W.L. and cave 9'6". 304 SANDY TILL: Clayey 20'0' sandy till, brown 0 Water running into hole. \$02.6 SAND: Brown fine to coarse sand. Wet. Hole #6B augered 5' East of #6. After 25' Boulders. After 25' augering, moist at bottom.

5=287 bars | W.L. - 24'8" | Becoming saturated Layers of gravel. 7 SS 23 8 SS 22 9 SS 26 33'0"+ 289 6 SILTY CLAY: Grey silty clay. Stiff. Grits and pebbles. Till BH.#6P 2300 PSF like. W.T.P.L. 10 SS 2 1'0" P2 E = 66 bars PL = 13 bars 11 SS 35 12 SS 2: 13 SS 32 F3 E = 78 bars PL = 12 bars Gravel sizes ▲ 1550 TSF present. 14 SS 15 SS Soft mainly silty clay. Clayey silt/ silty clay. Reddish brown silty sand seams. Interbedded Silty clay F = 71 bars PL = 12 bars 66'6 ± 256. CLAYEY SILT TILL: 17 SS 4 Reddish brown to grey clayey silt till. Hard. Silt seams and pockets. 18 SS Variable gravel content. Te6 Ph = 127 bar 1,9 SS 245 SILTY CLAY: Grey clayey silt to silty clay.

W.T.P.L. Silt pockets and seams. Red and grey. Stiff. 22 SS 23 SS 31 P7 P7 E = 58 bars PL = 17 bars 224 Borehole termina-ted at 98'0" PAL/504

PETO ASSOCIATES LTD. CONSULTING SOIL ENGINEERS RECORD OF BOREHOLE NO. 7 Parking Garage - Main Street, Hamilton JOB NO. 73 F 48 JOB NAME TECHNICIAN W.J. BORING DATE Mar. 19/73 CLIENT Corporation of the City of Hamilton ENGINEER GDP/APJ GROUND ELEV 321.8± BOREHOLE TYPE Hollow Stem Augers TYPED BY jnc DYNAMIC CONE PENETRATION BLOWS/FOOT SOIL PROFILE SAMPLES LIQUID LIMIT STANDARD PENETRATION TEST BLOWS/FOOT PLASTIC LIMIT ___ TYPE WATER CONTENT___ OEPTH ELEV. REMARKS DESCRIPTION 20 30 4.0 SHEAR STRENGTH Cu LB/SQ.FT. WATER CONTENT % MIXED FILL: Mixed sand, silt, bricks, etc., loose, moist to wet. Sandy fill. 1 SS 5 9'8" 10'4' + OLD BASEMENT FLOOR 2 55 SAND: Brown, fine to medium sand. Compact to dense, odd pebble. Moist. _3 SS 62 No free water to 24'. Hole at 25' 21'0'± 300.8 SAND: Grey brown W.L. @ 23'8" 4 SS 57 Hole at 31' fine to coarse W.L. @ 23'8" sand, vet. Y. Tock water Compact to dense. sample. Saturated. 5 SS 35 pH = 6.8 $S0_3 = 480 \text{ ppm}$ Mililly acg-🕅 ressive. 6 SS 47 3112 31 . 6 . 18 Hole at 31' 290.4 SILTY CLAY: augers at Grey brown to Sand backed grey silty clay. to 281. A.P.L. Very stiff. 7 ss 24 Bailed to 26'10". 2 mins. later 26'2". 6 mins. later Odd pebble. 8 SS 21 25'3". Becoming W.T.P.L. 10 mins.later 24'8". Stopped Reddish grey. 9 TW checking. Push Sandy silt to On completion silty sand layers. installed 10 SS piecometer 29' to 31' W.L.-23'3" Borehole terminated at 50'0" initially. May 16/73: W.L. 23'4"

PAL/504

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RACEY, MACCALLUM & BLUTEAU LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: (3) King St.W.

Project: Proposed Sanitary & Storm Sewers LEGEND Split spoon

Location: King St.W., Hamilton, Ont. Hole Location: See Drawing No. 1

Hole Elevation and Datum: 320.8

Shear Strength (C)

Wash sample Shelby Tube

Unconfined compression Vane test and sensitivity (5) Penetration Resistance (P) 2" Split tube 2" Dia. Cone

Start Date: March 11/71 Prep .: P.H.

M Care sample

| Symbol | DESCRIPTION | ELEV. | 1 | STRENGTH AND | PENETRATION | | Somple |
|------------|--|-------|---|--------------|---|---|---------|
| | | FEET | FEET | С | | P.S.F. | No. |
| | | 320.8 | 0 - | 20 | 40 60 | BLOWS/FT. | |
| 25.48 | Asphalt & Concr.Base | 319 | - | | | | |
| 2. *** * . | ' ' | | | | | | |
| | Sand-dense to very | | | | | | |
| | dense; silty; fine to medium; reddish | } | | | | | SSI |
| | brown to grey; moist | 1 | | | | | Ħ |
| | becoming wet below | 1 | | | | | |
| | approx. 24 ft.depth. | | 10- | | | | 552 |
| | | | | | | | 4332 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | 583 |
| | | | | | ::::::::::::::::::::/\$ | | |
| | | | 1 | | | | |
| | Conglomorate layer at approx. 20 ft. | | 20- | | | | 554 |
| | denthx | | | | | | |
| | w | 297 | | | | | |
| | W.L= | 1 | | | | | SSS |
| | | | | | | | P |
| | | | | | | | |
| | | | 30. | | | | |
| 12.000 | End of Borehole | 289.3 | | | $\mathbb{H}\mathbb{H}\mathbb{H}^{2}\mathbb{Q}$ | | SSE |
| | Notes: | | | | | | |
| | l. Borehole advance | | | | | | |
| | using flight | 1 | | | | |] |
| | auger equipment. | · · | | | | | |
| | 2. On completion, | D-05 | | | | | 1 |
| | hole open to | | | | | | |
| | approx. 23 ft. | | | | | | |
| | depth. | | 1 | | | | |
| | 3.*Layer of conglom | 4 | 1 | | | | |
| | orate gravel | | | | | | de a de |
| | encountered at | | *************************************** | | | | |
| | 20 ft. depth; | | | | | | |
| | difficult to | | | | | |] |
| | penetrate by | | | | | | |
| | auger. | | 1 | | | | |
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| | , | | | | | | 1 |
| | | 1 | 1 | | | *************************************** | 11 |

Order No. .\$3831/H551

Enclosure No.

RACEY, MACCALLUM & BLUTEAU LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: (5) King St.W.

Project: Proposed Sanitary & Storm Sewers LEGEND

Location: King St.W., Hamilton, Ont. Split spoon Hole Location: See Drawing No. 1

Hole Elevation and Datum: 323.4

Stort Date: March 12/71 Prep.: P.H.

Wash sample Shelby Tube

Unconfined compression Vane test and sensitivity (5) Penetration Resistance (P)

2" Split tube 2" Dia, Cone

Shear Strength (C)

| d Date | e: 11 11 Checked: D | , D , | | Core sample | Casing | | ~ |
|--------|---|------------------------|---------------|--------------------|--------------------|---------------|--|
| ymbol | DESCRIPTION | ELEV. FEET | DEPTH FEET | STRENGTH AND PENET | P.S.F. | Sample No. | Recover |
| | | 323.4 | 0 . | P 20 40 | BLOWS/FT. 60 80 | | |
| | Asphalt & Concr.Base | | | | | | |
| | Sand-loose, fine to medium; reddish | , | | | | 75 S 1 | |
| 1 | brown; moist; (probably fill to | | | | | | |
| | approx. 16 ft.depth) | | 1,0 - | | | 552 | |
| | | | | | | | |
| | | | | | | \$83 | |
| | | 304. | 20 . | | | | |
| | Refusal on conglom- orate layer of sand | | | | | | |
| | and gravel. | | | | | | |
| | | | | | | | |
| | Notes: | | 30 - | | | | |
| | Borehole advanced to 19'6" using flight auger | | ٠ | | | | |
| | equipment. | | | | | | |
| | 2. Refusal to auger- ing encountered | | | | | | |
| | at approx. 19'6" depth. | | | | | | |
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| | | Annual Printed Printed | | | | | |
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| Order | No | S | 38 | 3 | 1 / | Ή. | 5 | 5 | ì |
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| | | | | | | | | | |

Enclosure No.8

RACEY, MACCALLUM & BLUTEAU LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 6 King St.W.

| Project: Proposed Sanitary & Storm | Sewers | LEGEND | | |
|--------------------------------------|--------|----------|--|---------|
| Location: King St.W., Hamilton, Ont. | Spli | t spoon | Shear Strength (C) | • |
| Hole Location: See Drawing No. 1 | ⊠ Was | h sample | Unconfined compression Vane test and sensitivity (\$) | +* ⊕ |
| Hole Elevation and Datum: 325.4 | 573 CL | · · · | Penetration Resistance (P) | |
| Start Date: March 15/71 Prep.: P.H. | ☐ She | lby Tube | 2" Split tube 2" Dia Cone | -0-0 |

| iymbol | DESCRIPTION | ELEY. FEET | DEPTH FEET | | mple No. | Recover |
|--------|---|---------------|---------------|-------------------------|-------------|--|
| | Asphalt & Concr.Base | 325.4 324 | 0. | P BLOWS/FT. 20 40 60 80 | | |
| | Sand-loose; fine to medium; reddish brown; moist (probably fill). Sand-dense; fine to medium; reddish brown; moist | 317 | 10. | | \$\$1 | |
| R. | Layer of conglomor- ate sand and gravel; approx. 9" thick at 17 ft. depth; under- lain by sand & grave End of Borehole | | 20_ | Refusa | ss3 ss4 | |
| t | Notes: 1. Borehole advanced to 17 ft. depth using flight auger equipment | | 30_ | | | entrite, also me de distriction de la companya del companya de la companya de la companya del companya de la companya del la companya de la c |
| | together with conventional wash boring technique for breaking through the conglomorate layer. | | | | | die Geran geleiste sollen der der der der der der der der der der |
| | On completion, hole dry and open to 21 ft. depth. | | | | | multiplicabilitismus assussessus arrangements assussed in Principle Landschild Commission of the Commi |
| | | n . | | | | Application of the second seco |

KING STREET WEST



Log of Borehole 1

| Project No. | HAGE-0060496-A | | | | | | | | | | | | | | | | | | | Dra | wi | 19 1 | lo. | | - | 4 | | |
|--|--|----------------|-------|--|--|--|--|---|--|---|---|--|--|--|--|--|--|--|-----------------------------------|--|--|--|---|---|---|--------------|---|--|
| Project: | Geotechnical Investigation - F | Propose | ed_ | Se | w | er | ar | nd | W | ate | em | na | in | Co | ns | tπ | ıct | ior | | | | | | | | | | |
| Location: | James Street (King Street to | | | | | | | | | | | | | | | | | _ | | | | | | | | | | _ |
| Date Drilled: Drill Type: Datum: | May 12, 2001 Truck Mount | | _ | SP Dy Sh | T (N nam elby | i) V ic C Tui | nple alue cone be e Tes | Tes | a | | - | | | | | Na Pi Uk | atura astic | M M an inex sin a | ioist id Li id Tri at Fa | une quid axida sii un | ! Lin | | ling | f | > | ⊒ ≺ € | | |
| SY M 80- | Soil Description | ELEV. | DepTH | | Shea | 20 vr St | rengi | | N \ 0 | /aius | 603 | | BO | ME | `a | C | : | 250 | | 50 | 90 | eadin Conte | 750 | | SALE | 1 | latural Unit Veight | · |
| ASP | PHALT: - 290 mm thick | 96.14 | 0 | + | H | H | H | 0 | 1 | -+-} | 1-1 | 1-1- | 0.2 | H | | Ŧi | 11 | 10 | 1- | 2 | 0 | -1-1 | 30 | | 5 | + | kN/m³ | + |
| FILL V150 FILL | : Sand and gravel, brown, moist, ~ mm thick :: Sitty sand, reddish brown, fine ned, some day, moist, very loose to | 95.85 95.70 | 1 | | 5 | | | | | | | | | | | | | ************************************** | - X | ************************************** | | | | | | | | |
| | D: Light brown, fine grained, layered, sand seams, moist, compact to dense | 93.84 | 3 | | | | | | | | | | | | | | > | | | | | | | | | | ······································· | *************************************** |
| | BOREHOLE TERMINATED | | - | | | | - | 4 | *************************************** | | | | | | | - | | | | | | | 1 | | | - | | |
| 2. U wate | orehole was advanced by solid stem er equipment to a termination depth of m on May 12, 2001. pon completion of drilling, no cave, no er. | | | | A VERTANDEN FOR THE CONTRACT OF A CONTRACT OF THE PART OF THE PART OF THE CONTRACT OF THE CONT | *************************************** | epaktup find ki dhu mpinal kapinal kapina kumu mpinak kafind indam al gamana Amada ki jija Ki pina censan epak di namu namu namu kapina ki pina (saku kapin) ki kani namu ki katin geni ki ki kapin dan k | | to the test of the second commence of the second se | e de comita de la compansa de como de | | a de estreta de 11 embasado de tras de el arrador e de arquestrande dando en anos de esta de seu del Paracolo A cada de decada de armeno del acono los estanos de deseños de deseños de entre de el foren anos de entre de e | CONTRACTOR DESIGNATION AND ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY AND ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY ADDRESS OF THE PARTY | manden de la companya de la companya de la companya de la companya de la companya de la companya de la companya | ede facilitate enables to be the Control and government of the Control of the Con | and the specification of the sections of the speciments and the section of the se | | | | | thinked in the department of the say that is the same | A COMMINE MARKET THE REAL PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A STATE OF THE PROPERTY AND A S | | delengante de l'anni de l'anni de l'anni de l'anni de l'anni de l'anni de l'anni de l'anni de l'anni de l'anni | An desir chart manifes in a company of the company | | | |
| 4. U in.) 6 3.5 i dept | hole methane reading using MSA osimeter: 0% methane. pon completion of drilling, 19 mm (3/4 fiameter P.V.C. standpipe installed to m depth, screened portion 2.6 to 3.5 m h, bentonite seal 0.2 to 1.1 m depth asphalt patch from 0 to 0.2 m depth. | | | والمرابعة والمرا | and in the contraction of the co | end migration and become surrent and conference and and analysis and analysis and part and part of the part of the same of the following the same of t | n in ein in der der dem der dem dem dem dem dem dem dem dem dem dem | | | THE THE THE THE THE THE THE THE THE THE | entre de la compression della compression della compression della compression della compression della compression della | AMERIKAN MENERATUR | AND THE PARTY OF THE THE THE PARTY OF THE PARTY OF THE THE PARTY OF TH | ontales ancientales les exposes en constituites en la constituit en més des l'entrouses par des des la constituit en en constituit de la constituit en la const | en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de | egyelen. A kirinden is hallande ende endem en en endem ende en angele an negement en en en en en en en en en e En en en en en en ende elektrische dem en en en en en en en en en en en en en | meneral and the second | | | | t dan de de colonidad de la co | | | A MARIANA KATANINA MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN M MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN MANAMATAN M | | | | sengert overserft ein det de telebrasska senast besettenssenssenssenssenssenst deseft kansessensa flessenssens |
| | | | | And the state of t | ner manmann servan servan servan en cercara manta servana a sala servana a servan esta esta esta esta esta est | elymanistrature procured rights are according to the control of th | the state of the s | manamental de la companya de la companya de la companya de la companya de la companya de la companya de la comp | | e de mente de la company de deserva de la company de la company de des de deserva de de deserva de la company La company de la company de deserva de la company de la comp | Consequent (as a beginning of the bar on the bar date from a retain of about the con- | and the strategy of the depth states and the states of the party of the states of the | The second section of the second section is a second section of the second section sec | And were as with a second-more field of the second | the administration draw is a selection to the second | entervierente de entervierente entervierente entervierente entervierente entervierente entervierente entervier | | | | | ARREST CONTRACTOR METALE RECORDED AND ARREST AND ARREST AR | | AND THE REPORT AND THE PERSON OF THE PERSON | | | | | *************************************** |



Trow Consulting Engineers Ltd.
428 Millen Road
Stoney Creek, Ontario, L8E 3N9
Telephone: 905-664-3300
Fax: 905-662-4144
E-Mail: hamilton@trow.com

| Time | Water Level (m) | Depth to Cave (m) |
|--------------|-----------------------|-------------------------|
| June 1, 2001 | 3.50 | |

Borehole Log

Auger Sample

SPT (N) Value

Natural Moisture



| b Vane Test | + s Penetrometer | A | Hole | Hamilton, Ontario Project No. H4596- ole location and datum see drawing No. 1 | G |
|-------------|---|---|------|--|--------------------------------|
| · SA | Soil Description 3 m TOPSOIL AND-reddish brown to brown ratified frequently silty | 99.83 | ļπ | N Value | Natur Unit Weigl kN/m |
| | cc. wet seams, loose | / • · · · · · · · · · · · · · · · · · · | 1 2 | | |
| o SA | ND & GRAVEL-brown, very | 95.8 | 4 | 4 | |
| D | - - - - | | 5 | | |
| 0 | | | 7 | 7 | |
| tra | TY CLAY TILL-grey, with aces of sand & gravel, | 91.3 | 8 | | |
| | TERMINATED — ES: e attached sheet — | 90.2 | 10 | X X | |

Log of Rorehole RH16

| Sept. 2, 2004 William St. City of Hamilton, Ontario Sept. 2, 2004 Sept. 2, 2004 Sept. 2, 2004 Sept. 3, 2004 Sept. 3, 2004 Sept. 4, 2005 Sept. 5, 2004 Sept. 6, 2005 Sept. 6, 2005 Sept. 6, 2005 Sept. 7, 2006 Sept. 7, 2006 Sept. 8, 2006 Sept. 9, 200 | roject No. | SPB481-3 | /6 U | | | | | and the second | *************************************** | omeriuma. | Dra | wing N | lo. | | 3 |
|--|---|---|-----------|--------------------------------------|--|---------------------------------|------------|----------------|---|---------------------------------------|--|--|------------------|-----|-----------------------|
| Hughson St. N., King St. E. to King William St., City of Hamilton, Ontario Auger Sample SPT (N) Value O ST Chorbustible Vapour Reading Author Meeting SPT (N) Value O ST Chorbustible Vapour Reading Author Meeting Natural Meeting X Spring Varies Field Varie Tost Sensitivity Fraccinetic Water Levis Sensitivity Fraccinetic Water Levis Self Description Self Description Self Description ELEV. In Self Description ELEV. In Self Description ASPHALTIC CONCRETE 150 mm CONCRETE: 200 mm GRANULAR BASE: 50 mm, crusher run limestone FILL: sitly sand to sandy silf, brown, moist, compact SAND: coarse to medium grained, some silf seams, brown, moist, very dense | roject | Geo-environmental Inves | tigation | ė-rės | ********** | | | | | | | | | | |
| Sept 12, 2004 Sept 22, 2004 Sept 23, 2004 Sept 24, 2004 Sept 25, 2004 Sept 2 | ocation: | Hughson St. N., King St. | E. to Kin | g Wi | lliar | n St | , Cit | y of H | amilto | ın, Oı | | | - | | |
| Sol Description Sol Description ELEV M Sol Description ELEV M Sol Description ELEV M Sol Description ELEV M Sol Description ELEV M Sol Description ELEV M Sol Description ELEV M Sol Description ELEV M Sol Description ASPHALTIC CONCRETE: 150 mm CONCRETE: 200 mm CONCRETE: 200 mm GRANULAR BASE: 50 mm, crusher run limestone FILL: silty sand to sandy silt, brown, moist, compact SAND: coarse to medium grained, some silt seams, brown, moist, very dense | ete Drilled: rill Type: stum: | Hollow Stem Augers | | - SP - Dyr She - Fee Swr | F (N) V service stoy To d Vary service | iaka Cone Ti Se e Tost | | 0.5 | | Nature Pastic Cindral % Stra | i Mostun and Liqu red Tries in at Fak | Hol Lloreit Int set | ding | × | |
| Soft Description Soft Description Soft Description ELEV BI JO 40 60 80 Notice Monthly Length V Share Receipt V Share Receip | T = 1 | | | F*#S | torneli | sc Was | | - | | portigerensis status | ciclosopolojeves | والمنافئة المستوارة والمتاقات | onesoposionina. | | · |
| ASPHALTIC CONCRETE: 150 mm CONCRETE: 200 mm GRANULAR BASE: 50 mm, crusher run limestone FILL: silty sand to sandy silt, brown, moist, compact SAND: coarse to medium grained, some silt seams, brown, moist, very dense | XXXX | Sol Description | m | 24442 | and the | ewyte | Ø | 9 | A,50 7at | Nat | O 5 | oo 7 are Cente | 50 N % | | Natur Unit Weig |
| FILL: sity sand to sandy silt, brown, moist, compact SAND: coarse to medium grained, some silt seams, brown, moist, very dense | XX ASP | CRETE: 200 mm | | 400 mm | | www.enden.en | | | | | | • | (0) | 100 | F13/11 |
| SAND: coarse to medium grained, some silt seams, brown, moist, very dense | CO TUD I | mestone silty sand to sandy silt, brown, | | - | 9 9 | | | | | | | Acceptance of the Control of the Con | | | |
| SAND: coarse to medium grained, some silt seams, brown, moist, very dense | | | | | | | nieris aus | | | | | | | | |
| SAND: coarse to medium grained, some silt seams, brown, moist, very dense | | | ····· | |) | | | | | | × | | | | |
| 사용 보고 있는 것이 되었다면 보고 있는데 보고 있는데 보고 있다면 | some | e silt seams, brown, moist, very | | | ************************************** | | | 0 | | × | | | and treatment of | | |
| End of Borehole | *************************************** | | 2,46 | * | | | | 0 | | 19 V0 M | | | | | |
| ・ 1 第一・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ | | | | | in der der der der der der der der der der | | | | | | | | | | |

Borehole BH16

| Time | Water Level (m) | Depth to Cave (m) |
|---|-----------------------|-------------------------|
| on completion | dry | 3.0 |
| *************************************** | | |
| | | : |

| <u>u</u> | 8 | SOIL PROFILE | | ar i koʻligʻili | S | AMPI | ES | 660 | GAS | ENTRA | TION | • | HYDR | AULK | CONDU k, on/s | CTIVITY T | | |
|-----------------------|--|---|--|---|---|------------|------------|--------------|------|-------|------|---|------|------|------------------|--------------|---|------------------|
| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | BLOWS/0.3m | RECOVERY % | LAB. TESTING | % UE | | | | WATE | | HTENT, P | ERCENT WI | | STALLATIONS 2 |
| - 0 - 1 | CME 55 TRUCKMOUNTED AUGER 114mm HOLLOW STEM AUGERS | GROUND SURFACE SOMM PAVING STONE. SAND and GRAVEL. (FILL) Dense, brown, SANDY SILT; trace brick fragments, cinders. (FILL) Loose, brown, SILTY SAND; trace topsoil, occasional gravel. (possibly FILL) Loose, reddish-brown, SANDY SILT; trace clay with sand layers. Compact, brown, fine to medium SAND; trace silt, occasional gravel. Compact, brown, SAND and GRAVEL. | 90908080 (17.11.11.11.11.11.11.11.11.11.11.11.11.1 | 95.74 0.60 94.19 2.15 92.69 3.65 | 2 S C S C S C S C S C S C S C S C S C S | 24 | | | | | | | | | | | NOTE: Borehole dry during drilling. | |
| 7 | | GHAVEL. END OF BOREHOLE | 2506 2506 | 90.55 5.79 | 8 | 0 27 | | | | | | | | | | | | |

| | | | | | IAM | PLES | | GAS | CONCEN ppr | etration m) | ₩ ⊕ | HYDR | AUUC C | ONDUCTIVIT | ' | |
|---|--|-------------|-----------------------|---------------|------|--------------------------|--------------|------|---------------|-----------------|--------|------|--------------|-------------|--|-----------------|
| BOHING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | 4 31 | TYPE | BLOWS/0.3m RECOVERY % | LAB. TESTING | % LE | | | - - | ٧ | ф <u>—</u> (| ENT, PERCEN | 1 | INSTALLATIONS 2 |
| CME BS TRUCKMOUNTED ALIGER 114mm HOLLOW STEM AUGERS | GROUND SURFACE 80mm PAVING STONE. Sand and Gravel. (FILL) Dense, brown, sandy silt. (FILL) Loose to compact, brown, SILTY SAND; some gravel. (possibly FILL) Loose, reddish brown, SANDY SILT; with sand seams and layers. Loose, brown, fine to medium SILTY SAND. Compact, brown, fine to medium SAND; trace silt, occasional gravel. Dense, brown, SAND and GRAVEL. END OF BOREHOLE | | 90.97 | 3 3 5 7 7 8 8 | 50° | 7 | | | | | | 0 | | | NOTE: Borehole dry during and following drilling. | |

| MPROPOSED SEWERS | VORTH | CAL | 2° 0 Bestit Tube — Macural Measure 2° 2° 2° Placic & Liquid Limit P Retery Core Benetic Macural Services Lib Vene Tect Library Core Benetic Macural Macural Library Core Benetic Macural Macur |
|---|------------------|------------------|--|
| Description Classification | Elevation metris | Depth _metres | Pencerotion Recotance N. 380 ft los bleeve / ft 10 20 30 40 Norural Water Content & Atterberg Limits 10 20 30 40 Sample Shear Bireagth Benefit vity |
| - PAVEMENT FILL, sandy gravel SAND, some silt | 94.47 94.17 | 0.10 | |
| loose, reddish-brown, wet | ams | 1 | |
| | | 2 | |
| | | 3 | 2 |
| GRAVELLY SAND, some silt | 90.46 | 4.11 | |
| very dense | 89.57 | 5.00 | 62.6275 mm 3 |
| SILTY SAND, layered, wet brown, very dense | 88.63 | 5.94 | 53 |
| BOREHOLE TERMINATED | 88.02 | 6.55 | |
| | | | |
| | | | vel observed @ 5.0 m on completion. |

•

Borehole #: A

Project No: TB99002G

Project: Storm Sewer Construction

Client: Reg. Mun. of Hamilton-Wentworth

Location: King & Wainut St., Hamilton

Prepared By: M. Lettch

| Depth (m) | Symbol | Description | Elevation (m) | Number | Type | Blows/30 cm | | dard P Blow | vs/30 | cm | • | M A | | | ant (%) | |
|-----------|------------|--|---------------|--------|------|-------------|----|----------------|-------|----|---|--------|----|----------|------------------|---|
| | | 0 | 94,9 | | | | | <u> </u> | | | | | | L | <u> استوست م</u> | |
| 0- | | Ground Surface PAVEMENT STRUCTURE 13 cm of Asphalt, over 38 cm of Concrete. | 94.4 | | | | | | | | | | | | | |
| 1- | \Diamond | | | 1 | ss | 7 | 1 | | | | | 1 | | | | |
| | K | SILTY SAND FILL. Brown, organic seams 1 to 5 mm thick, possibly native from | | 2 | ss | 4 | 1 | | | | | | 1 | | | |
| 2- | | 2.3 m (±), moist, loose. | | 3 | SS | 4 | - | | | | | | | | | |
| 3- | | | | - | 1 | | 11 | | | | | | | | | |
| | | | 91.5 | 4 | 88 | 5 | I | | | | | | 4 | | | |
| 4.3 | | SAND Brown, fine to medium sand, | | | | | _ | 1 | | | | | | | | |
| | | traces of gravel, moist, spoon wet at 4.6 m, loose to compact. | | | | | | \Box | | | | | Ц_ | | | |
| 5. | | | 89.8 | 5 | SS | 22 | | ļ` | • | | | | | ļ | | |
| | | Borehole Terminated | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 5. | | | | | | | | | | | | | | | <u> </u> | |
| 7. | | | · | | | | | | | | | | | <u> </u> | | |
| | = | | | | | | | | | | | | | | | |
| | 3 | | 1 | | | 1 | | | 1 | | | | | | | 1 |

Drilled by: Elite Orilling

Drill Method: Solid Stem Augers

Upon Completion: Caved and wet at 4.9 m.

AGRA Earth and Environmental 505 Woodward Avenue Hamilton, Ontario L8H 6N6

Hole Size: 150 mm Datum: Geodetic Drill Date: 99 02 04

Borehole #: B

Project No: TB99002G

Project: Storm Sewer Construction

Location: King & Wainut St., Hamilton

Client: Reg. Mun. of Hamilton-Wentworth

Prepared By: M. Lettch

| Depth (m) | Symbol | Description | Elevation (m) | Number | Type | Blaws/30 cm | Stance | Blav | enetro ws/30 | cm | est o | A | | e Conte | ernt (%) | 4 |
|-----------|----------|---|---------------|----------|------|-------------|-------------|------|-----------------|-------------|----------|-----------|----------|--|----------|--|
| 0- | | Ground Surface | 83.9 | | | | | | | | | - | ··· | | | |
| 1 | | PAVEMENT STRUCTURE 20 cm of Asphalt, over 86 cm of Cruehed Limestone. | | | | _ | | | | | | | | | | |
| 1= | | | 92.9 | 1 | SS | 5 | 9 | | | | | | 1 | | | |
| | X | | | | | | | | | | | | <u> </u> | | | |
| 2- | | SANDY SILT FILL Brown, traces of crushed | | 2 | SS | 7 | è | | المراج المسم | | | | 4 | | | |
| | $K \geq$ | Emestone, wet to moist, loose. | | | | | 4 / 1 | | | | | | | | | |
| | X | , | | 3 | SS | 5 | | | | | - | † | 1 | | | |
| 3- | • • | | 90.9 | | | | 1 | | | | | | 1/_ | <u> </u> | | |
| 3- | | SAND Brown,some silt, traces of | | 4 | ss | 30 | | | | | | 4 | | | | |
| | | gravel moist, dense. | 89,9 | | | | | | | | | | 1 | - | | |
| | | | | | | | | | | - | | _ | 4 | _ | | |
| 5 | | SAND AND GRAVEL | | 5 | ss | 33 | | | | <u> </u> | <u> </u> | _ | <u> </u> | | | |
| 3 | | Brown, wet, dense to compact. | | | | | | | <u> </u> | <u> </u> | | | | | | |
| 6- | | | 87.8 | 6 | es | 27 | 1 | | | 1_ | | _ | | | | |
| _ | | CLAYEY SILT | 1 | † | | | 1 | | | | | | | 1 | | |
| 7- | | Brown, dtpl, very stiff. Borehole Terminated | | | | | - | | + | +- | | \dagger | | | - | |
| 7. | Ē | | | | | | - | - | - | ╁ | - | - | - | + | - | - |
| | 3 | | | | | | | | | | | | | | | |
| | 3 | | 1 | | | | - | + | +- | - | +- | | +- | | + | |
| <u></u> | <u> </u> | | <u> </u> | | | | | | | | | سياب | | | | |

Drilled by: Elite Drilling

Drill Method: Solid Stem Augers

Upon Completion: Caved and wet at 4,4 m.

AGRA Earth and Environmental 505 Woodward Avenue Hamilton, Ontario L8H 6N6

Hole Size: 150 mm Datum: Geodetic Drill Date: 99 02 04



Terraprobe

PROJECT No: 7-02-0137-2 CLIENT: City of Hamilton

LOCATION: Walnut St. Hamilton, Ontario

LOG OF BOREHOLE 3

BORING DATE: November 26, 2002 **ELEVATION DATUM: Geodetic**

SAMPLER HAMMER, 63.5kg; DROP, 760mm

| <u>ы</u> | SOIL PROFILE | | ······································ | SA | MPLI | E\$ | PENETE RESIST | RATIO | ON E PLO | or N | | 34/- | TED | CONT | ENT | |
|--------------------------|---|--|--|--------|--|-----------|------------------|-------|-------------|---|---|------|---|--|-----|---|
| DEPTH SCALE IN METRES | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | "N" VALUE | | 40 | 60 ENGT | 80 H kPa | | wp | . | 6) 5 3 | | INSTALLATION INFORMATION |
| 0 - | GROUND SURFACE 125mm Asphait CONCRETE (FILL) Granular Base/Subbase | , ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; | 94.87 0.0 0.13 0.33 0.48 | | | | | | | e . | • | • | , | - | | |
| 1 - | Firm, reddish brown; CLAYEY SILT | | 93.87 1.00 | 1 | \$\$ | 8 | | - | | | | | 0 | essessessible that the utransfer control to the | | |
| 2 - | Lacon to compare | | | 2 | SS | 9 | | | | | | | 0 | | | |
| | Loose to compact, reddish brown; SANDY SILT, with seams and layers of line sand | | | 3 | ss | 16 | | | | *************************************** | | | þ | | | |
| 3 - | | | 91,36 | 4 | SS | 21 | - | | | | | · | o | | | |
| 4 - | END OF BOREHOLE | | 3.51 | | | | | | | The second control of the second control of | | | | | | |
| 5 - | | | | | | | | | | *************************************** | | | | | | |
| 6 - | | | | | | | | | | | | | | | | |
| 7 - | | The second secon | | | | | | | | | | | | Name of the last o | | |
| 8 - | | | | | Andreas and the second section of the second | | | | | | | | | | | NOTES: |
| 9 - | | Politica de la companya della companya della companya de la companya de la companya della compan | AND THE PROPERTY OF THE PROPER | | | | | | | | | | *************************************** | | | Borehole dry upon completion of drilling. SHEET 1 OF 1 |

LOG OF BOREHOLE 1



| Auger Sample | \boxtimes | |
|--------------------------|---------------|----------------------|
| SPT(N) Value | 00 | Project: Geotech |
| Dynamic Cone Test | - | Propose King Stre |
| Shelby Tube | • • II | to Well |
| Field Vane Test | + s | Hamilton |
| Natural Moisture | Χ | |
| Plastic and Liquid Limit | | |
| Penetrometer | A | Borehole location |

hnical Investigation ed Watermain Construction reet East (Mary Street ellington Street) on, Ontario

Ground Elevation: m

Project No: H0 4362-A/G

Dwg. No: 3

Borehole location and datum see Drawing No. 2

| Water Level | Elev. Scale (m) | Soil Description | Der Sca | | N Value | | 20 | 40 | alue 60 | 80 | | Nati | ıral M % C | olsture Iry Wei | Content ght | Sample | Unit Weight |
|----------------|-----------------------|--|------------------|------------|---------|-----|--|---|--|--|--|------|--|--|--|--|----------------|
| آڍ≳ | 93.70 | | m | ft | z | She | ear S | treng 100 | jth' | 200 | 'a | 1 | 0 | 20 | 30 | Sa | (Krvm³ |
| | | Asphaltic Concrete - 200 mm thick | | | | | | - | | | | | | | | | |
| | | | <u>0</u> .5 | <u> </u> | | | CANAL IN THE PERSONAL PROPERTY. | | W89800000000000000000000000000000000000 | eren - cape - philippe bassand bassandas | | X | | | | | |
| | 92.9 | - silty sand, reddish brown, trace of gravel, occasional concrete fragments, moist | 1 | _ | 40 | | | • | 0 | | | | × | | | | |
| | 92.3 | SILTY SAND: Reddish brown, trace of | - 1.5 | <u>4</u> | | | ereiten ich in der der ber bereiten ber | | | | | | ratioathibuseachtrasson/restitities method | | | | |
| | | clay and gravel, moist, loose to dense | - 2 | 6 | 9 | 0 | eris. Gel inteligérity spériology promot in principal series | • | | | | | x | | | | |
| | | | - <u>2</u> .5 | 8 | 31 | | C | : | | essily y out-concerning visible of payment require waterful makes | elitateliko esse eta essenta anterioria de la composição de la composição de la composição de la composição de | | x | | | | |
| | 90.2 | - becoming brown from 3.3 to 3.5m depth BOREHOLE TERMINATED | - <u>3</u> .5 | | 24 | | 0 | | The second secon | ALL MALLON PARK WHICH AND ADDRESS AND ADDR | | | × | Address Missisterine and descriptions of the second | | | |
| | | BOREHOLE TERMINATED | 4 | 12 | | | CALIFORNIA COME DESIGNATIONS CONTRACTOR OF THE C | *************************************** | - | A GARLES A. | | | | renness commercement in the land of the filter of the filt | Additional control of the control of | | |
| | | | - <u>4</u> .5 | 14 | | | | | | a cha confessor after early see an eggs on manage | | | | | | Heren derden son server der der der der der der der der der d | |
| | | | 5 | <u>1</u> 6 | | | | | | At the second of | <u> Parintanian anakakan kanakan manakan kanakan</u> | | | | | | |
| | | | <u>6</u> .5 | <u>1</u> 8 | | | | | | | | | | | | | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

- 1. Borehole advanced by solid stem augers to a termination depth of 3.5 m on March 16, 1998 by Landtest Drilling Ltd.
- 2. Upon completion of drilling, no cave, no free water.
- 3. Borehole backfilled and patched upon completion of drilling.

LOG OF BOREHOLE 2



| Auger Sample | \boxtimes |
|--------------------------|---|
| SPT(N) Value | 00 |
| Dynamic Cone Test | *************************************** |
| Shelby Tube | • • 🖫 |
| Field Vane Test | + \$ |
| Natural Moisture | Χ |
| Plastic and Liquid Limit | |
| Penetrometer | A |

Project: Geotechnical Investigation Proposed Watermain Construction King Street East (Mary Street to Wellington Street) Hamilton, Ontario

Dwg. No: 4

Project No: H0 4362-A/G Ground Elevation: m

Borehole location and datum see Drawing No. 2

| Water Level | Elev. Scale (m) | Soil Description | Der Sc | | N Value | N Valu 20 40 6 | 0 80 | Natural N | foisture Content Dry Weight | Sample | Unit |
|---|-----------------------|---|------------------|-----------------|---------|--|--|-----------|--------------------------------|--|-------|
| S _ | 92.53 | | m | ft | z | Shear Strength 100 | kPa 200 | 10 | 20 30 | Sa | (Kn/m |
| | 24.7 | Asphaltic Concrete - 150 mm thick FILL: Sand and gravel, some slag, grey, moist | - <u>0</u> .5 | 2 | 22 | θ | | x | | | |
| | 91.7 | SILTY SAND: Reddish brown, trace of clay and gravel, moist, compact to dense | 1 | _ 4 | 35 | 0 | | × | | | |
| | | | 1.5 - 2 | 6 | 24 | 0 | | x | | | |
| | | | - <u>2</u> .5 | 8 | 18 | 0 | | × | | | |
| | 89.0 | - becoming brown from 3.2 to 3.5m depth BOREHOLE TERMINATED | - <u>3</u> .5 | 10 12 | 35 | 0 | | x | | | |
| ali i i i i i i i i i i i i i i i i i i | | | 4 | _ 14 | | es e composition de la composition della composi | | | | MANAGAMAA MAAA MAAA MAAA MAAA MAAA MAAA | |
| anne per per per per per per per per per pe | | | <u>4</u> .5 | _ <u>1</u> 6 | | | | | | | |
| | | | 5 - 6.5 | _ | | | and the state of t | | | REPORTER ATTENDATION AND ANALYSIS ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND ANALYSIS AND A | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

- 1. Borehole advanced by solid stem augers to a termination depth of 3.5 m on March 16, 1998 by Landiest Drilling Ltd.
- 2. Upon completion of drilling, no cave, no free water,
- 3. Borehole backfilled and patched upon completion of drilling.

LOG OF BOREHOLE 3



Auger Sample 00 SPT(N) Value **Dynamic Cone Test** Shelby Tube Field Vane Test + 5 X Natural Moisture Plastic and Liquid Limit Penetrometer

Project: Geotechnical Investigation
Proposed Watermain Construction
King Street East (Mary Street
to Wellington Street)
Hamilton, Ontario

Dwg. No: 5

Project No: H0 4362-A/G Ground Elevation : m

Borehole location and datum see Drawing No. 2

| Water Level | Elev. Scale (m) | Soil Description | Der Sca | oth ele ft | N Value | N Valu 20 40 6 Shear Strength 100 | 0 80 | | % Dry | sture Content Weight | Sample | Unit Weight |
|----------------|-----------------------|--|--------------------|------------------|---------|--|------|---|-------|-------------------------|-----------------|----------------|
| | 91.67 | Asphaltic Concrete - 200mm thick | | | _ | 100 | 200 | 1 | 0 20 | 30 | S | (Kr/m² |
| | | FILL: Sand and gravel, some slag, brown, damp | <u>0</u> .5 | 2 | 20 | () | | x | | | | |
| | 90.8 | SILTY SAND: Reddish Brown, trace of clay and gravel, moist, compact to dense | 1 | <u>4</u> | 12 | 0 | | | x | | | |
| | | - with trace rootlets from 1.5 to 2.0m depth | 1.5 | _6 | 14 | 0 | | | × | | | |
| | | , | <u>2</u> .5 | 8 | 12 | 0 | | | х | | Wild Acceptance | |
| , | 88.2 | - brown cemented sand seams from 3.4 to 3.5 m depth BOREHOLE TERMINATED | 3.5 | <u>1</u> 0 | 35 | 0 | | x | | | | |
| | | | - 4 - 4.5 | 14 | | | | | | | | |
| | | | - _5 _ | 16 | | | | | | | | |

NOTE: BOREHOLE DATA REQUIRES INTERPRETATION ASSISTANCE FROM TROW BEFORE USE BY OTHERS.

- 1. Borehole advanced by solid stem augers to a termination depth of 3.5 m on March 18, 1998 by Landtest Drilling Ltd.
- 2. Upon completion of drilling, no caving, no free water.
- 3. Standpipe monitoring well installed to a 3.0 m depth (slotted from 0.3 to 3.0 m depth), March 25, 1995 Water Level: Dry.
- 4. Borehole backfilled, sealed and patched upon completion of drilling.

| COH | | SOIL PROFILE | | | SAI | MPL | | DYNAMIC PENETRATION RESISTANCE, BLOWS/0. | | HYDRAUUC CONDUCTIVITY, T. k, cm/s | IAL NG | PIEZOMETER |
|------------------------------|-------------------------|---|-------------|--|--------|----------------------|------------|---|---------|--|----------------------------|--|
| RORING METHOD | | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | BLOWS/0.3m | | V-+ q.• | WATER CONTENT, PERCENT Wp OW W 10 20 30 40 | ADDITIONAL LAB. TESTING | OR STANDPIPE INSTALLATION |
| | 1 | GROUND SURFACE ASPHALT CONCRETE SAND and GBAVEL: (FILL) | | 91.37 91.27 81.09 90.99 0.38 | * | 50 DO | 4 | | | 0 | | |
| CME 75 TRUCKMOUNTED DRILLRIG | 140mm BOLID STEM AUGERS | Loose, brown, SILTY SAND to SANDY SILT; occasional gravel. (FILL) | | 89.22 | | 50 00 50 00 | | | | 0 | | |
| CME 75 TRUCKM | 140mm BOLID | Very loose, brown, fine to medium, SAND; with sitt layers. | | 2.15 88.32 3.05 | 4 | 50 | 2 | | | 0 | | GROUND WATER ENCOUNTERED DURING DRILLIN AT ELEVIN 87.72 |
| | | Compact, brown, fine to medium, SAND. | | 87,20 | 5 | 50 50 50 50 | | | | | | 06\02\82 \ |
| | | END OF BOREHOLE | | 4.27 | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Project No: SM 031428-G

Log of Borehole No. 6-1

Project: Proposed Road Reconstruction - Phase II

Borehole Location: Wellington St. N, N of King St. E

Location: Hamilton, Ontario

: 14m N, 2m W of wood hydro pole #8396

Client: Sutton & Associates

Project Manager: Ian Shaw, B.Eng., E.I.T.



| W. Succession Supplementary of the Control of the C | | SUBSURFACE PROFILE | | | | SA | MPLE | | | |
|--|--------|---|-----------|------|--------------|-------------|--------------|--------------|------------------------|--|
| Depth | Symbol | Description | Elevation | Туре | Number | Blows/300mm | PP (kgf/cm2) | U.Wt.(kN/m3) | Recovery | Moisture Content |
| oft m | | Ground Surface | 91.29 | | | | | | | |
| 2-1 | | Asphaltic Concrete Approximately 75mm | 91.02 | | | | | | | |
| | | Portland Cement Concrete Approximately 200mm | | SS | 1 | 18 | | | | |
| 4-1 | | Granular Base Approximately 150mm | 89.89 | SS | 2 | 10 | 1 | | | |
| 6-1-2 | | Silty Sand Fill Brown, trace of fine gravel, moist, compact. | | ss | 3 | 17 | | | nalan. | |
| 8-1_ | | Sand Brown, medium to fine grained, trace of | | SS | 4 | 7 | | | | $\{\langle 1 \rangle \mid 1 \mid 1 \mid 1 \}$ |
| 10- | | to some silt, occasional thin layering, moist, compact. | | ss | 5 | 21 | | | | |
| 12- | | | 87.29 | | | - | - | | 2-1-1-2-1 2-1-1-2-1 | |
| 14- | H | Silty Clay Grey, trace fine gravel, moist, very stiff. | | | | | | | | |
| 16- | H | | 86.09 | SS | 6 | 27 | 4.0-4. | 5 | | |
| 18- | | End of Borehole | | 1 | | | .] | 1 | Γ | |
| 20 - 6 | | NOTES: 1. Borehole advanced using solid stem continuous flight auger equipment on October 23, 2003 to a depth of 5.2 metres. | | | | | | | | |
| 22- | | No free groundwater present at completion. Borehole backfilled with auger | | | · | | | | | |
| 24- | | cuttings and topped with portland cement concrete. | | | | | | | | |
| 26 - 8 | | Soil samples will be discarded after three months unless otherwise directed by the client. | | | | | | | | |
| 28 | | en en en en en en en en en en en en en e | | | | | | | | |
| | | | | | | | | | | |

Drill Method: Solid Stem Auger 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

Hole Size: 150mm

Datum: Geodetic

Checked by: IS

Sheet: 1 of 1

PETO ASSOCIATES LTD. CONSULTING SOIL ENGINEERS RECORD OF BOREHOLE NO. 2 JOB NAME West Avenue Storm Sewer
Corporation of the City of Hamilton,
CLIENT c/o Proctor and Redfern Ltd. JOB NO. 69F66 TECHNICIAN_BG BORING DATE Mar. 18/69 TYPED BY JC GROUND ELEV. 300.± BOREHOLE TYPE DYNAMIC CONE PENETRATION BLOWS/FOOT SOIL PROFILE SAMPLES LIQUID LIMIT _ STANDARD PENETRATION TEST PLASTIC LIMIT _ BLOWS/FOOT WATER CONTENT_ REMARKS DEPTH ELEV 30 20 DESCRIPTION SHEAR STRENGTH Cu LB/SQ.FT. WATER CONTENT % 1'0" EAXEMENT & CRUSHEL FILL. Dark brown sandy silt fill 1 SS moist 612" 2 88 Loose SILT/SAND. Brown interbedded sandy 3 SS 11 and silty sand, moist compact 11'0 4 SS 12 SAND. Grey fine to medium sand, Ó 5 SS 15 wet 6. SS 21 Compact TILL. Grey clayey silt till 7 SS 21 8 SS 18 Wet 9 SS 15 10 TW Push 11 SS _11 Compact Terminated at 36'6"

this margin reserved for binding

DATA SHEET FOR BOREHOLE 3 DRAWING 4 . SITEST ENGINEERING LASCPATORY TESTS Project No: 8916 FIELD TESTS 50 mm O.D. Split Tite Natural Moisture Project: Proposed Sewers 50 ma I.D. Shelty Tate Plastic & Liquid Limits |-Location: Steven Street Auger Sample Lab Vare Test Hamilton, Ontario Core Sample Torvers Hole Location: See Drawing No: 1 Data Orilled: July 5, 1989 Cone Test Penetropeter Vane Test Unconfired Compression Orilled By: Solid Stem Auger (125 mg O.D.) Datua: Geodetic Borehole Elevation 88.598 M Water Level WATER CONTENT % SAMPLE REC DEPTH PENETRATION RESISTANCE 'N'blows/30013 SYMBOL DESCRIPTION/CLASSIFICATION ELEV 10 20 30 Type No: 7, 10 20 30 40 50 60 70 Ħ 88.51 0.09 ASPHALT 88.42 0.18 CONCRETE SILTY SAND, trace of gravel, brown, loose to compact, moist, layered 10. . . ! 100 .0 ! 85.00 2.50 /b!/. 2 100 .:/: / SILTY CLAY TILL, trace of embedded sand /01/1 and gravel, grey, soist, very stiff .1/a / sand and gravel decreasing with depth 11:71 /.1/61 17: 22 1/01/1 100 3 1/1 /.1 .17. / some large gravel 5 11 /1 -- 83.11 5.49 BOREHOLE TERMINATED 6 1. Sorehole was moist and open to 4.1 metres on completion.

2. Borehole was backfilled on completion of the fieldwork.

| | | | Log | of | В | | r | e | h | lc | e | 1 | | | | | | | | | |
|--|---------------------|--------------|---|----------------|---|----|-----------------|---------|-------------------|-----|---------|---|-------------|-----------------|-------------------|---------|--|-----------------------------|---|---------------|----------------|
| Pi | oje | at N | lo. <u>HAGE-0060494-A</u> | | | | | | | | | | | | | | Drav | wing N | lo | | 4 |
| P | roje | ct: | Geotechnical Investigation - F | ropose | ed : | Se | we | 1 8 | nd | Wa | ate | rmai | n C | ons | tructi | on | S | heet N | lo | 1 , | of 1 |
| Lo | cat | ion | Wentworth Street (King Stree | t to Bar | tor | 1 | Stre | et |), H | am | ilto | n, O | nta | rio | | | | | | | |
| | | | | | _ | | | | | | | | | | Combo | istible | Vapo | aur Read | ing | | |
| D | ate ! | Dril | led: April 29, 2001 | | | | ger Sa T (N) | | | | | 0 | III) [2] | | Natura Plastic | | | 1 imit | | X | |
| D | T Nin | уре | : Truck Mount | | | Dy | namic | Co | ve Te | st | | | | | Undra | ned T | naxial | at | - | е | , |
| D | atur | n: | | | | | elby T Id Va | | | | | | ••• ••• | | % Stra Penet | | | • | | Ā | |
| Г | T s | Т | | I | Ī., | _ | | | | NV | alue | | | | Comb | ustible | Vepor | ur Readin | g (ppm) | ş | Natural |
| GW L | N N | | Soil Description | ELEV. | T-40mc | L | S/Ne.ar | 20 | | 10 | 5 | 0 | 80 | MO ₂ | N | | | o 7 ns Conte (% Dry V | | 34Mp. Lus | Unit Weight |
| L | 5 | 2 | ACDIM To OO was Aliab | 88.33 | H | Ļ | OH MICHEL | 71 | ngui C | 1.1 | | , - | 0.2 | - | 740 | 10 | 2(|) | 30 | E S | kN/m³ |
| | D | | ASPHALT: ~90 mm thick CONCRETE (possible slag): ~190 mm | 88.24 88.05 | | | H | - | 1. [.]. 4-[.]. | 1 | | | | | | | | .: [.] .:- | | 1. | |
| | $\overline{\times}$ | 21 | thick FILL: Silty sand, brown, fine grained, | 00.00 | | Ė | H | t | | ļ, | +++ | | | | 11 | # | | iiij | HE | | |
| | \searrow | ð | -moist, compact - | | | | | | | | | 1 | Ш | 1 1 | 11.1 | H | # | 444 | 111. | ΞX | |
| | \triangleright | (1 | -reddish brown from 0.6 to 1.2 m | | | | | 1 | | | | | | | | H | 1 | | | $+$ \wedge | |
| | \triangleright | (1 | _ | | ١, | | 7 | | | 1 : | | | Ш | | | | | | | | |
| ž | | 1 | | | ľ | - | J | H | 4 | : : | - - | | | | | | | -44 | | | |
| 70 PAGE 10 PAG | \triangleright | (| | | | 1 | | | H | - | | | | | | | | 14.1 | | | |
| | \triangleright | J | ··· | - | | - | | 1 | # | 1 | 1 | | 1 | * 1 . | | | -11 | | H | | |
| 1 | > | (| | | | 1 | | | # | | | 1. . . | | | | | | - - | 111: | | |
| | \triangleright | \mathbb{Q} | | | | - | | | 44 | | | | | ÷144 | | Ħ | | - 1 | Ш | | |
| | \triangleright | $\langle $ | - | 1 | 2 | H | 1 | | ļ. ļ.i. | : | 1 | 11. | | | | | ::: | | 11. | 7 | |
| ŀ | :[> | J | | | | ŀ | | - 1 - 1 | 117 | - | 1 | | | | | | | | | | |
| | H | 1 | SILTY SAND: Light brown to dark brown, | 85.93 | | L | | | 1 | | <u></u> | | | | +++ | | | | - | | |
| ŀ | | | oxidized stains, damp to moist, dense | | | F | - | - | | | | 7 | - | · | | ^ | | | | | |
| | | | | | | | | | | | | | + | + 1 + | | | IJ | | | | |
| į | | | <u>-</u> - | - | 3 | 1 | H | | 111 | | 1 | | | | 7 | | Щ | | | | |
| | | | | | | 4 | 11 | 7 | 5 | - 1 | į | | # | . | | | | | | | |
| | | | CU TV OLAV TILL. Commende | 84.93 | | - | -1-4 | | | | | | | | - 1 - 1 - 3 1 | | X | | 1 | | |
| 1 | 100 | | SILTY CLAY TILL: Grey, moist BOREHOLE TERMINATED | 84,83 | + | H | | + | | 1 | ; ; | 1 1 1 | 1 | . 1 | | 11 | + + | | | - 1/2 | |
| | | | Notes: | | | | | | | | | | | | | 2 1 | | | | : | |
| | | | Borehole advanced by solid stem auger | | | | | | 11. | 411 | | | | | | | | . | | | |
| | | | equipment to a termination depth of 3.5 m on April 29, 2001. | | | | | | | | | | | | ::: | | | | | - | |
| | | | Upon completion of drilling, cave at 3.4 m depth, no water. | | | | | | | | 1 : | | | | | | | | **** | | |
| | | | In hole methane reading using MSA explosimeter: 0% methane. | | | | 11.00 | | | | : } | | | | | | | | | | |
| | | | 4. Upon completion of drilling, 19 mm (3/4 in.) diameter P.V.C. standpipe installed to 3.4 m depth, screened portion 2.1 to 3.4 m depth, bentonite seal 0.2 to 1.1 m depth and asphalt patch from 0 to 0.2 m depth. | | *************************************** | | | | | | | THE RESERVE AND ADDRESS OF THE PARTY OF THE | | | | | THE REAL PROPERTY AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON ADDRES | | | | |



Trow Consulting Engineers Ltd.
428 Millen Road
Stoney Creek, Ontario, L8E 3N9
Telephone: 905-664-3300
Fax: 905-662-4144
E-Mail: hamilton@trow.com

| Water Level (m) | Depth to Cave (m) |
|-----------------------|-------------------------|
| 3.30 | 3.4 |
| | Level (m) |

| DORNOM BERIED _ 45 _ August _ (soli) | . KH | NAME Proposed Sanitary Sewe | es.: | · Vir | iela | ınd a | nđ V | icin | | | | | | | | _ 108 | No. 76 P 153 |
|--|------|---|-----------------|----------|----------------|---------|--|----------|---------|--------|--|------|------|---------|--------|----------|--|
| DETRI DESCRIPTION | | | | | | ~~~~ | | · · | | BORI | NG DA | TE | July | 9/7 | | | |
| DESTRIPTION DESCRIPTION 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | | | | | | SAMPLE | | SHEAT | A STREA | IGTH C | 1 | ٨ | | | T | WL | |
| ## ASPHAIN 7' CRUSHED STOKE SILTY SAND: gravely fill, greeddish brown, compact, grey brown, vety stiff, w.k.T., some multicoloured silt pockets 1 SS 15 220 1 SS 15 221 220 3 SS 15 220 3 SS 15 221 3 SS 15 3 SS 15 3 SS 15 3 SS 15 3 SS 15 3 SS 15 3 SS 15 4 SS 11 | | | LEGEND | LEVATION | NUMBER | 7.7.9.E | OWS FOOT | DYNAI | | | | ON K | WATE | R CON | ENT. | WL. | GROUNDWATER OBSERVATIONS AND REMARKS |
| SILTY SAND: gravelly fill, reddish brown, compact, 215 185 milrors, were milrors, and milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, were milrors, and milrors, were milrors, were milrors, and milrors, were milrors, were milrors, and milrors, were milrors, and milrors, were milrors, and milrors, were milrors, and milrors, were milrors, and milror | 019* | 2" ASPHALT 7" CRUSHED STONE | $\Delta \Delta$ | | \blacksquare | | EZ. | 2: | | | ŏ z | a | T î |) ER C | n ieni | c* | |
| N. L. some multicoloured 2 2 5 22 2 3 5 22 3 3 5 5 3 5 3 5 5 5 | 3100 | SILTY SAND: gravelly fill, reddish brown, compact, uniform, wet | | 275 | 1 | SS | 15 | | | - | | | | 0 | | | and open at |
| 12'0 i 3 SS 15 265 | | grey brown, very stiff, N.F.L., some multicoloured | 2 | | 2 | ss | 22 | | | | | | | $-\int$ | | | |
| 12/10 to be coming grey, stiff, W.T.P.L. 16/10 Borehole terminated at 16/10 to 16/1 | | atte powers | 0 | 270 | | | | | | - | | | | | | | |
| Borehole terminated at 16'0" A SS 11 | 12'0 | harming gray stiff | | 200 | | ss | 15 | 7 | | | | | | | ō. | | |
| Borehole terminated at 16 °0 s | | W.T.P.L. | | 403 | | | | | | | | | | | | | |
| | 16'0 | Borehole terminated at 16'0" | K - A | | | SS | 11 | | | | | | | | 0 | | |
| | | | | | | | | - | | | | | | | | | |
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| | 'ATION_Hamilton, Ontario RING METIKID45" flight augo | | | | | | | | BORI | NG DA | ATE_ | July | 13/ | 76 | _ ENC | TINICIAN T.R. |
|------|--|---------|-----------|--------|--------|--------------------------|----------|---|---|----------|---|------|------------------------------|----------|----------|--|
| | SOIL PROFILE | ٩ | ğ | - | SAMPLI | | | | NGTH C | | • | PLAS | ID LIMI TIC LIM IR CON | IT | | GROUNDWATER |
| РІН | DESCRIPTION GROUND FLEVATION: 286.4 | LEGEND | FLEVATION | NUMBER | TYPE | BLOWS FOOT N - VALUES | 1 | | NE PEN ENETR/ DWS/FO () 6 | | | J | TER CO | 3 | | OBSERVATIONS AND REMARKS |
| 8= | 2" ASPHALT, 6" CONCRETE BASE SILTY SAND: fill, probably roadbase material, loose | | 285 | | | | | | | | | | 0 2 | | <u> </u> | |
| | to compact, saturated | | | 1 | SS | 9 | 1 | | | | | | | 9 | | |
| 3.11 | | | 280 | 2 | SS | 12 | | | | | | | Ģ | | | |
| | SILTY CLAY (TILL): grey, stiff to very stiff in siltier zones, W.T.P.L., | 1 | 275 | 3 | ss | 13 | | | | | | | | | | |
| | quite gritty | | | 4 | SS | 16 | | | . : | 4 | | | 9 | | | After Sa4 cave Twater 6'8" (perched in sand |
| 6 | | | 270 | 5 | ss | 12 | | | | | | | |) | | fill) Cave 14'6" |
| | Borehole terminated at 16'6" | | | | | | | | , | | | | . < | | | Water 11'6" (mostly saturat sands) |
| | | | | | | | | | | | | | | | | |
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| | | | | E | | | | | | | *************************************** | | | | | |
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| | | | | | | | | | B24 - 100 - | | | | | | | |
| | | | | E | | | | | | | | | : | | | Note: Borehole moved 60' west anticipated location due to |
| | | | | | | | | | | | | | | | | parked cars. |
| | | | | | | | | | | | | | ٠. | | | |
| | | | | | | | <u>.</u> | - | | | | | | | | |
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| TES: | was a second second second second second second second second second second second second second second second | <u></u> | | F | | <u> </u> | | | | <u> </u> | L | | | | | |

| 쑿 | PETO MACCALLUM LTD. CONSULTING GEOTECHNICAL ENGINEERS |
|---|---|
| | |

| LO | BNAME Proposed Sanitary Sew CATION Hamilton, Ontario RING METHOD 44" flight auger | | | ······································ | | | | | . BOR | ING DA | TE_ | luly. | .13/3 | 16 | _ EN | CINICIAN T.R. |
|---------|---|-----------------|-----------|--|----------|--------------------------|----------|----|--|----------|-----------|-------|------------------------------|------------|------|--|
| l'av.i | SOIL PROPILE DESCRIPTION | LFGFND | NOT | | SAMPLI | | | | NGTH C | ETRATI | A ON_x | PLAS | ID LINI TIC LIM ER CON | IT TENT | W | GROUNDWATER OBSERVATIONS AND REMARKS |
| 121H | GROUND FLEVATION: 283.2 | LFG | ELEVATION | NUMBER | È | BLOWS FOOT N - VALLES | | | enetr. Ows/Fo | | 4.4 | - | TER ('C | | | AND RIMARKS |
| 2 0 0 " | Z"ASPHALT 6" CONCRETE BASE CRUSHED STONE: SILTY SAND: fill SILTY CLAY (TILL): brown to grey brown very stiff. | ※ ≥1 | 280. | 1 | ss | 22 | | 1 | The state of the s | | | | 0 | | | Upon completion hole open and d |
| | D.T.P.L., quite gritty, numerous multicoloured silt seams and pockets. | | 275 | 2 | SS | 28 | | } | | | | , | 0 | | | |
| 1:4: | t | | 270 | 3 | SS SS | 11 11 | | | | | | | (| • | | |
| 5168 | Borehole terminated at 16'6" | | 265 | | SS | 10 | | | | | | | 7 | · · · | | |
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| | | | | | | | | | | <u> </u> | | | | | | Note: Borehole |
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MEMBER OF THE ASSOCIATION OF CONSULTING ENGINEERS OF CANADA

DRAWING___ SITEST ENGINEERING DATA SHEET FOR BOREHOLE (BHEET OF 8903 PROPOSED SEVERS KING STREET @ GAGE HAMILTON, ONTARIO Hate Lecenter SEE DRAVING NO: 1 Date Drilled APR 07. 1989 Hate VERTICAL Diffed by SOLID STEM AUGER (165 MM O.D.) GEODETIC 87.564 METRES tion Beauticome, N. 250 H.Bra. biomes/R. 10 20 30 40 10 20 30 Dopth Description Classification 100 180 200 manifest ... 87.38 0.18 BRUNCEL BUB-BARRE 87.13 0.43 FILL, SILT SOME FINE BAND & BRAVEL COMPACT/VERY STIFF BROWN TO GREY, MOIST 75 17 85.89 1.67 SILTY CLAY EMBEDDED BAND & GRAVEL VERY STIFF, GREY HOTTLED, MOIST 3 d 10 100 4 3 100 82.23 5.33 82.06 54 100 SANDY GRAVEL 5.50 SOME SILT & CLAY NUMEROUS COBBLES 100 ઇ DENSE, DARK GREY, MET 5 100 016 (DABOLINE BATURATED) 6.40 81.16 SILTY CLAY TILL 7 EMBEDDED BAND & BRAVEL STIFF TO HARD BREY, MOIST 6 20 39 8.08 BOREHOLE TERMINATED 79.48

- 1. WATER LEVEL OBSERVED AT 5.5 METRES 1/2 HOUR AFTER COMPLETION OF BOREHOLE.
- 2. BOREHOLE WAS BACKFILLED ON COMPLETION.
- 3. BOREHLOE WAS RELOCATED TO THE SOUTHEAST CORNER OF KING/GAGE.
- 4. ACTUAL ELEVATIONS ARE SLIGHTLY LOWER THAN SHOWN.

| Location Hale L Date D Driffed | | 1 | CAL | S C.D. Spin S. S L.D. S Super or V S Dia. Con Proble Vone Probles Sumpler N | t Tubo Nelby Tub re Somele Nech Som to Mater rehed gree te Edefinite | nde en | ······································ | ** +c: (+ | Lab Vans 1 Terusno Uncertinad Underland 1 Overburden Berois at Senditivity | opiere squed Leoni loot Compression proded at Pressure Fectors **** | | , we we |
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| | SILT SOME BAND AND CLAY | 89.28 89.08 | 0.15 0.35 | | | | | | | | | |
| | MOTTLED BROWN/SREV MULTI-COLOURED, REDDISH BR COMPACT, MOIST | PARN | 2 | | 7 4 | | , | | × | | 1 | 10 |
| | SILTY CLAY TILL EMBEDDED SAND & GRAVEL | 80,23 | 3 3.20 | | 4 | | | | * | | 2 | |
| , | THIN WET BILT SEAMS | | 5 | | 6 4 | | | • | X | • | 3 | 10 |
| | | | ·. 6 | | 0 4 | | | | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | And a second second second second second second second second second second second second second second second | 4 | 10 |
| 7. | BOREHOLE TERMINATED | 82.88 | 6,55 | | | | | | | | | - |

SITEST ENGINEERING

DATA BHEET FOR BOREHOLE _____ DRAWING_____

Project No. 8903

Project No. 8903

Project PROPOSED SEVERS

Location KING STREET @ GLENDALE

HAMILTON, ONTARIO

Hode Location SEE DRAVING NO: 1

Date Drilled APR 07, 1989

Hode VERTICAL

Drilled by SOLID STEM AUGER (165 MM 0.D.)

Detum GEODETIC 90.078 METRES

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| | SILTY CLAY HOTTLED BROWN/GREY STIFF, MOIST | 88.68 | 1 | 012 | | | | × | | | 1 | 100 |
| | SILTY CLAY TILL EMBEDDED BAND & GRAVEL THIN WET BILT BEAMS | | 2 | |) ² | 6 | | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | | | 2 | 75 |
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| 0 | ; | | ŧ | | 5 | | | | | | 3 | 100 |
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| 1000° | BOREHOLE TERMINATED | 85.05 | 5.03 | | | | | | | + | | |
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Nete

- 1. BOREHOLE WAS MOIST AND OPEN TO 4.5 METRES ON COMPLETION OF BOREHOLE.
- 2. BOREHOLE WAS BACKFILLED ON COMPLETION.
- 3. BOREHLOE WAS RELOCATED TO THE SOUTHWEST CORNER OF KING/GLENDALE.
- 4. ACTUAL ELEVATIONS ARE SLIGHTLY LOWER THAN SHOWN

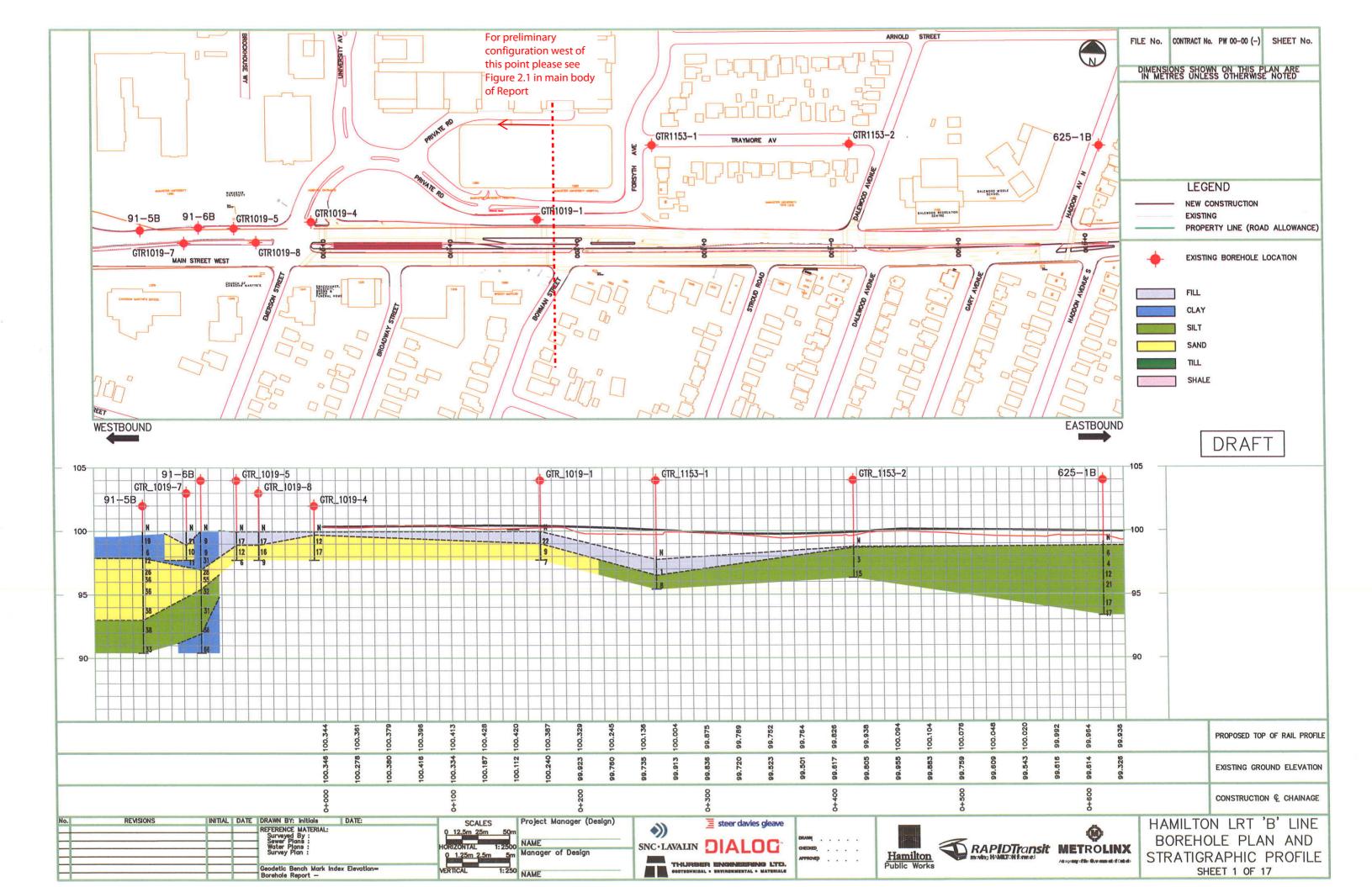
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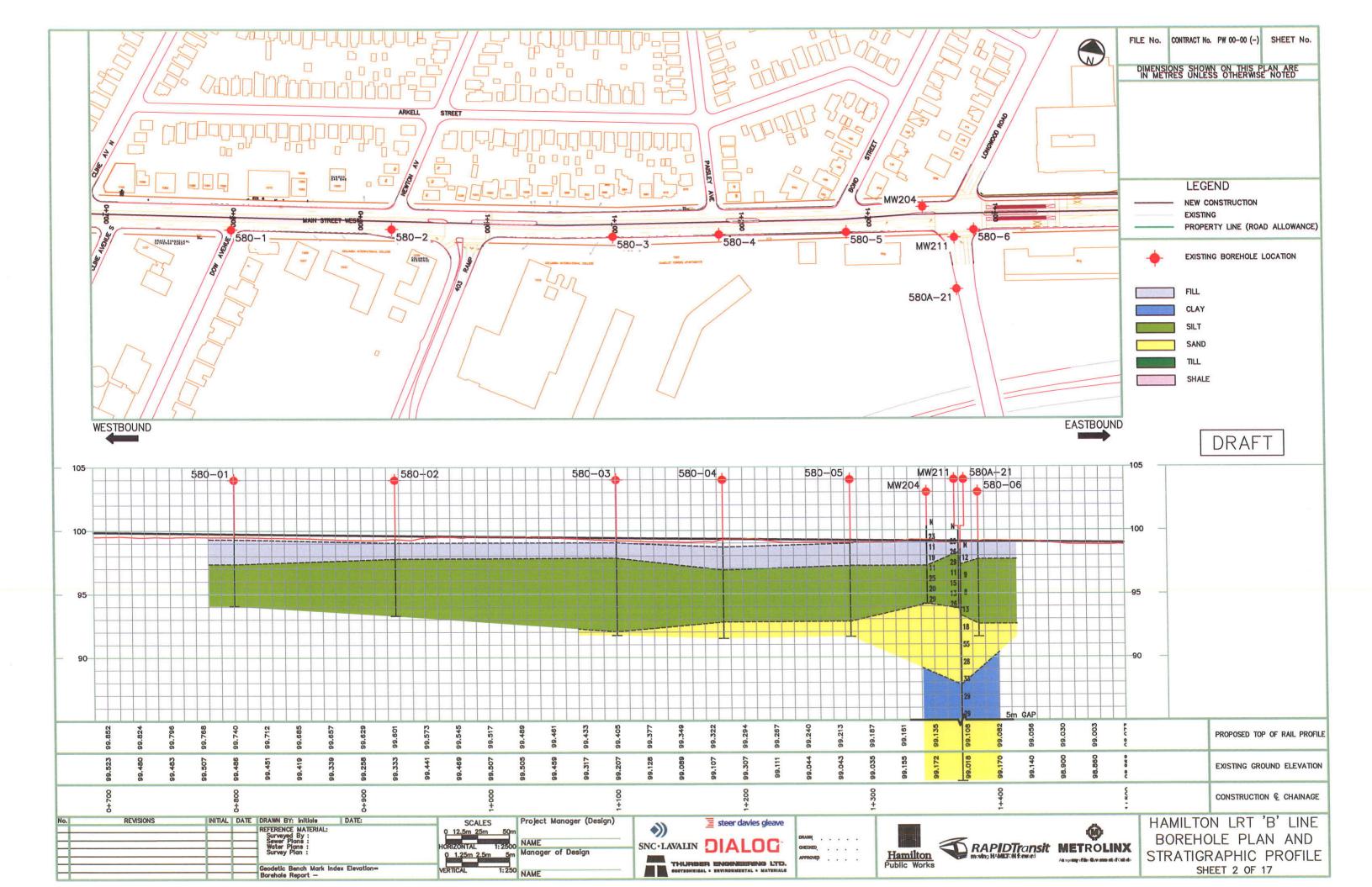


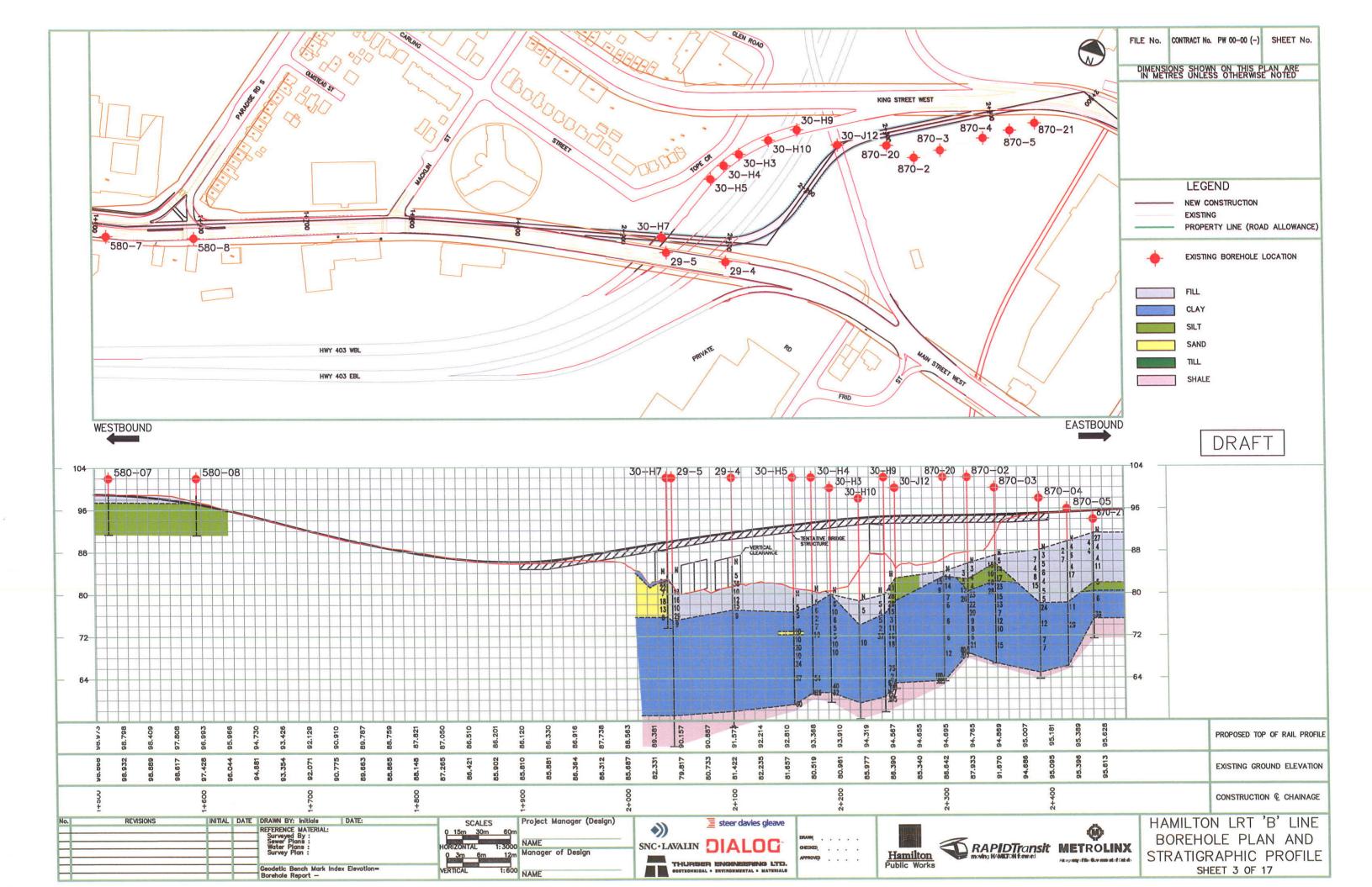
APPENDIX C

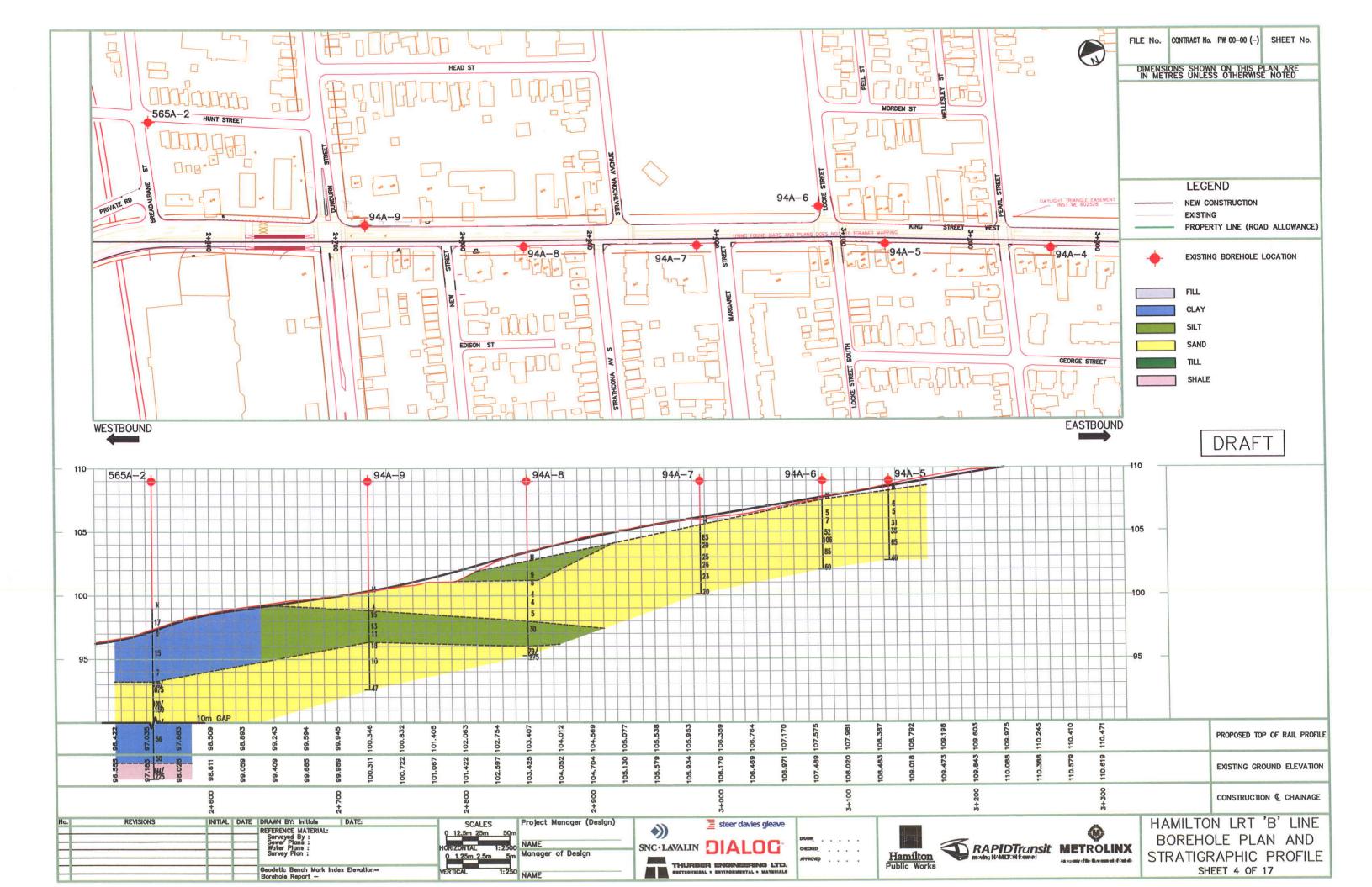
BOREHOLE LOCATION PLANS AND INFERRED STRATIGRAPHIC PROFILE

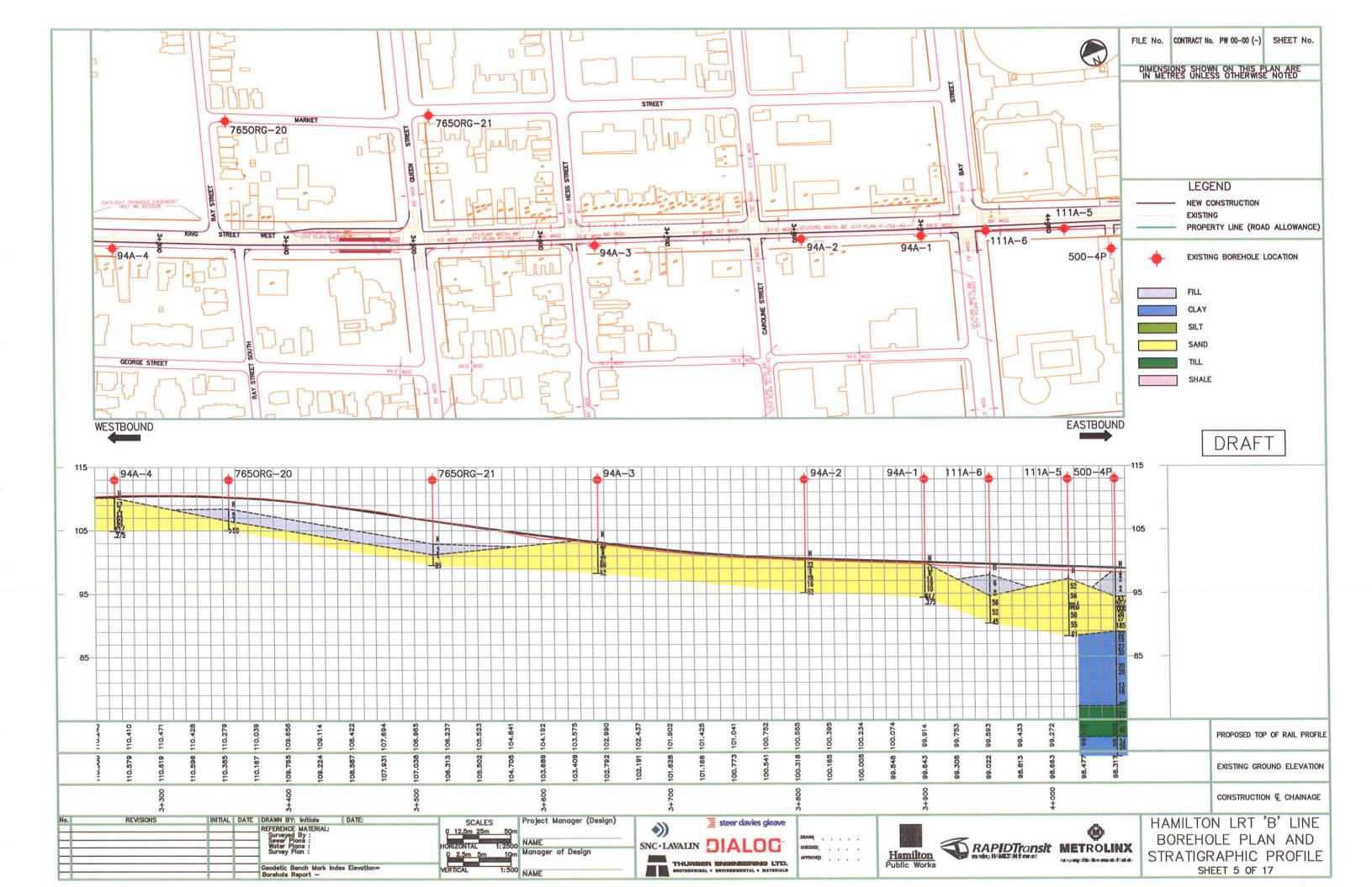


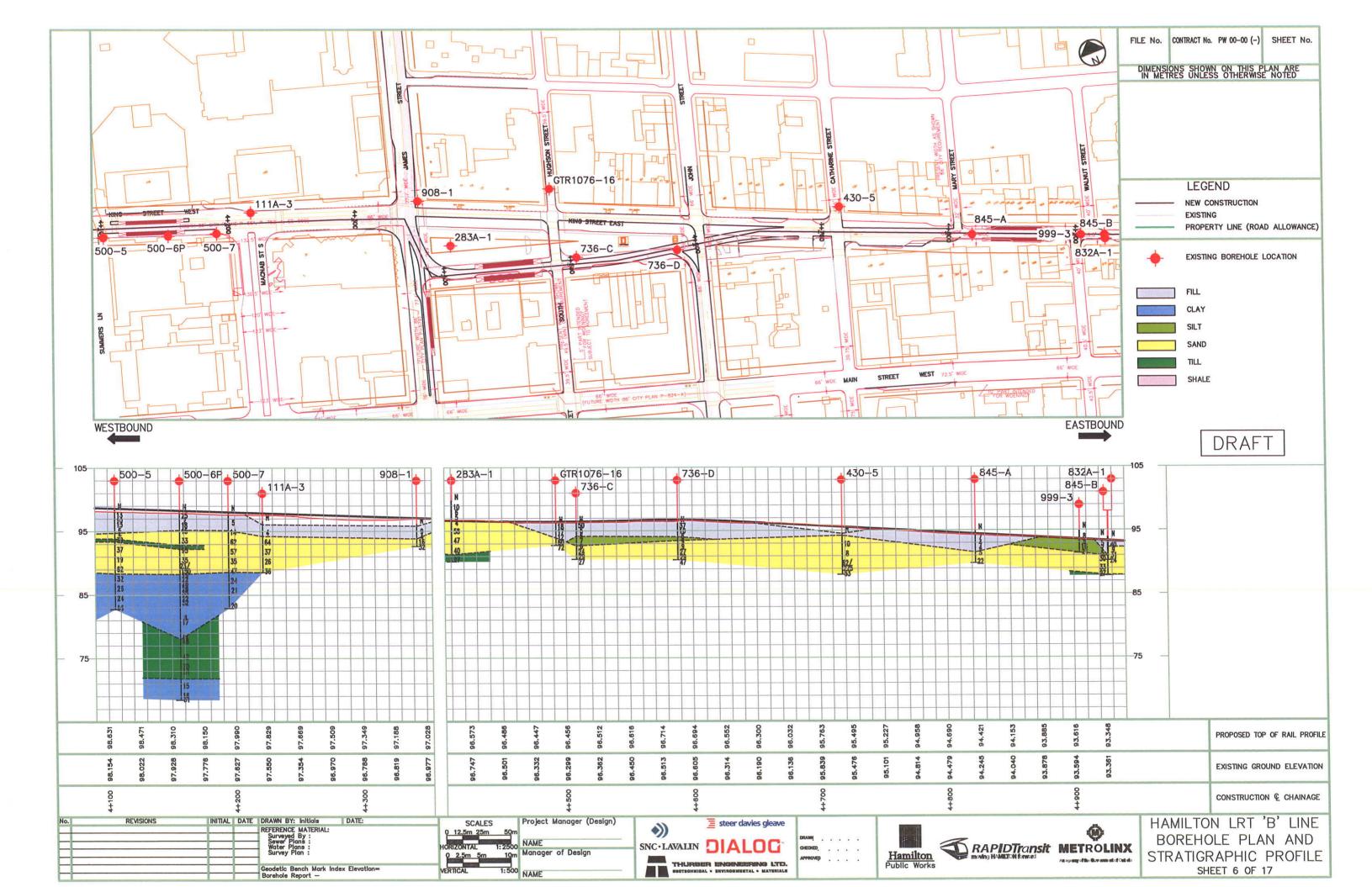


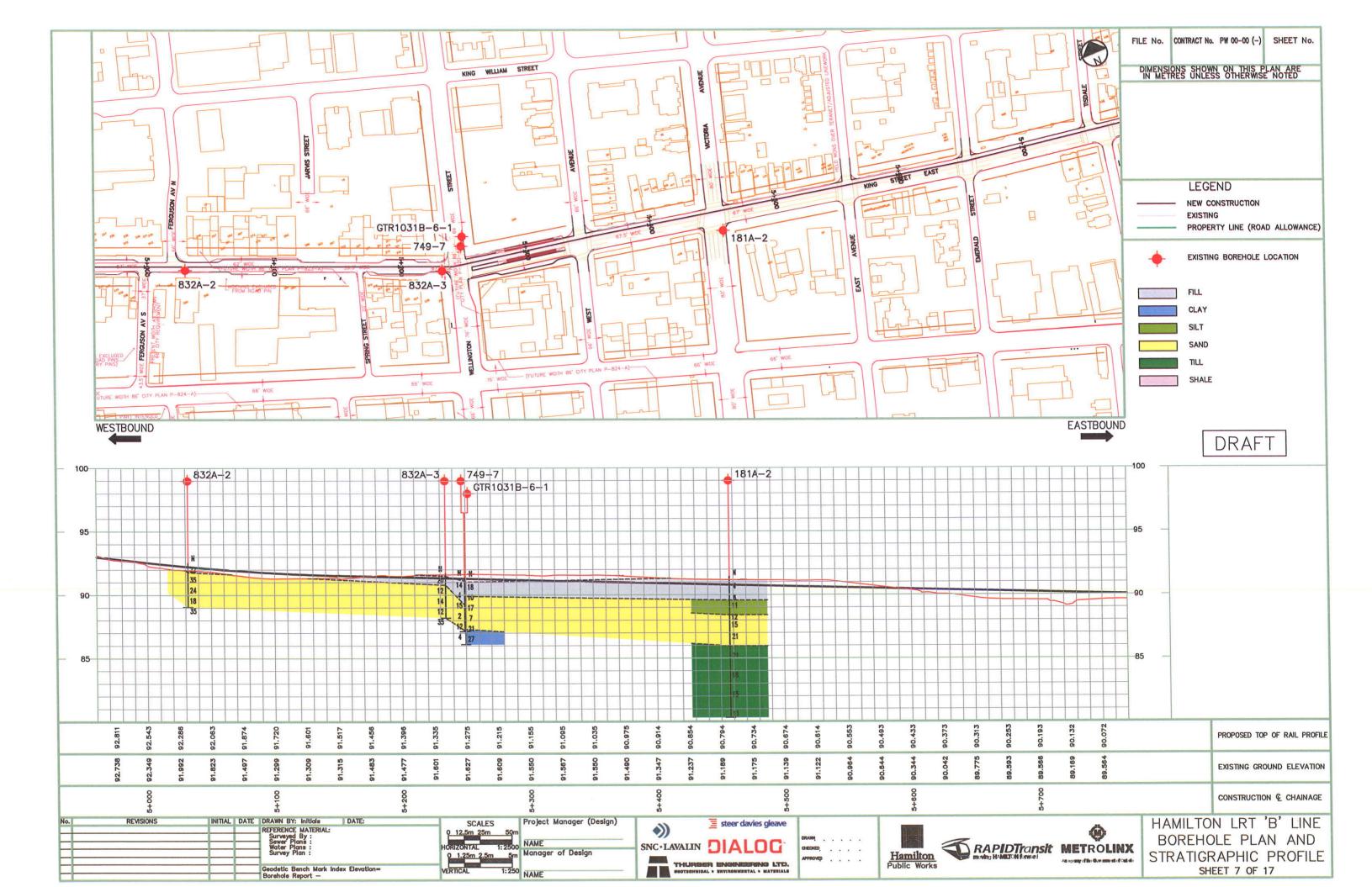


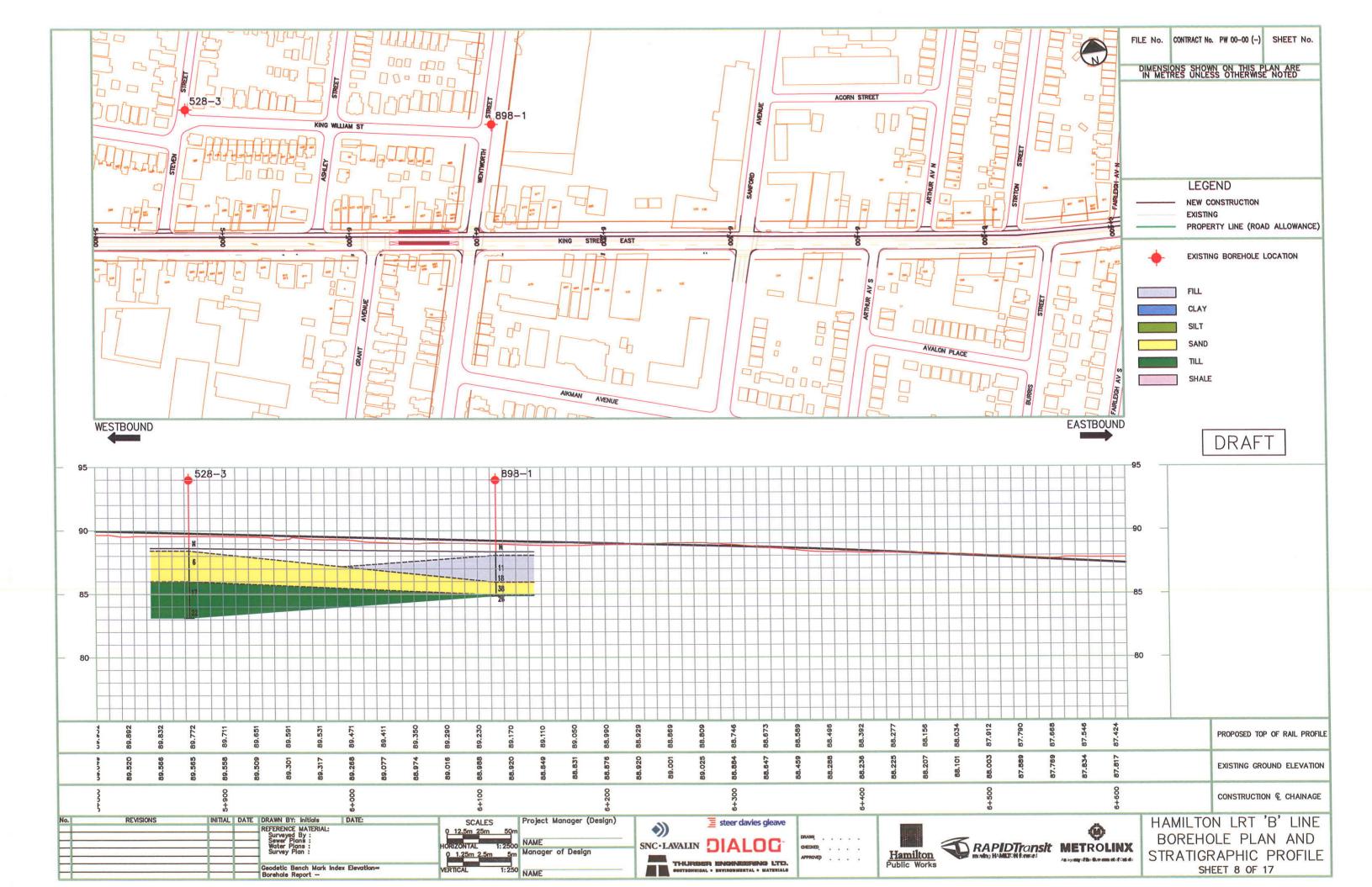


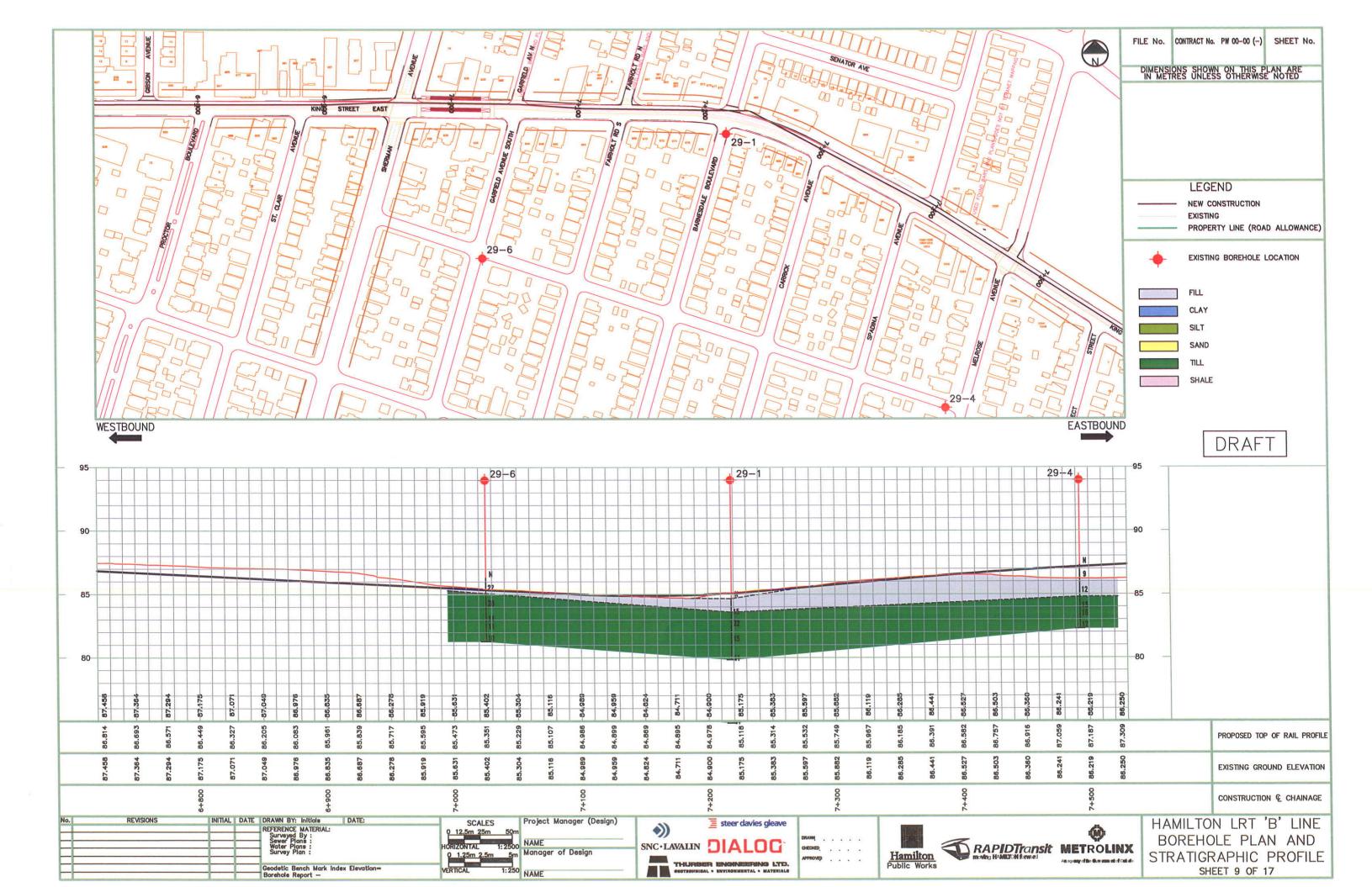


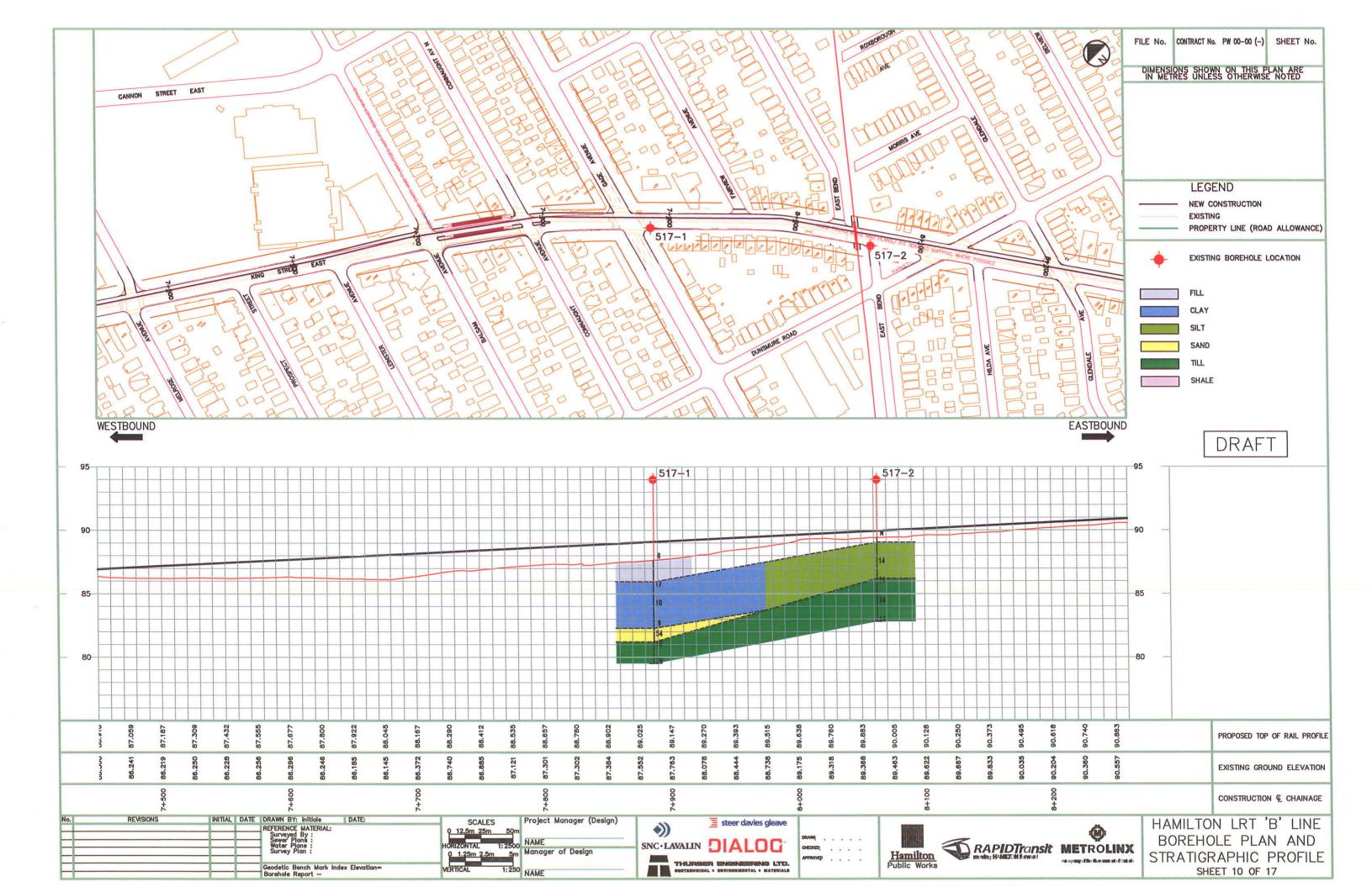


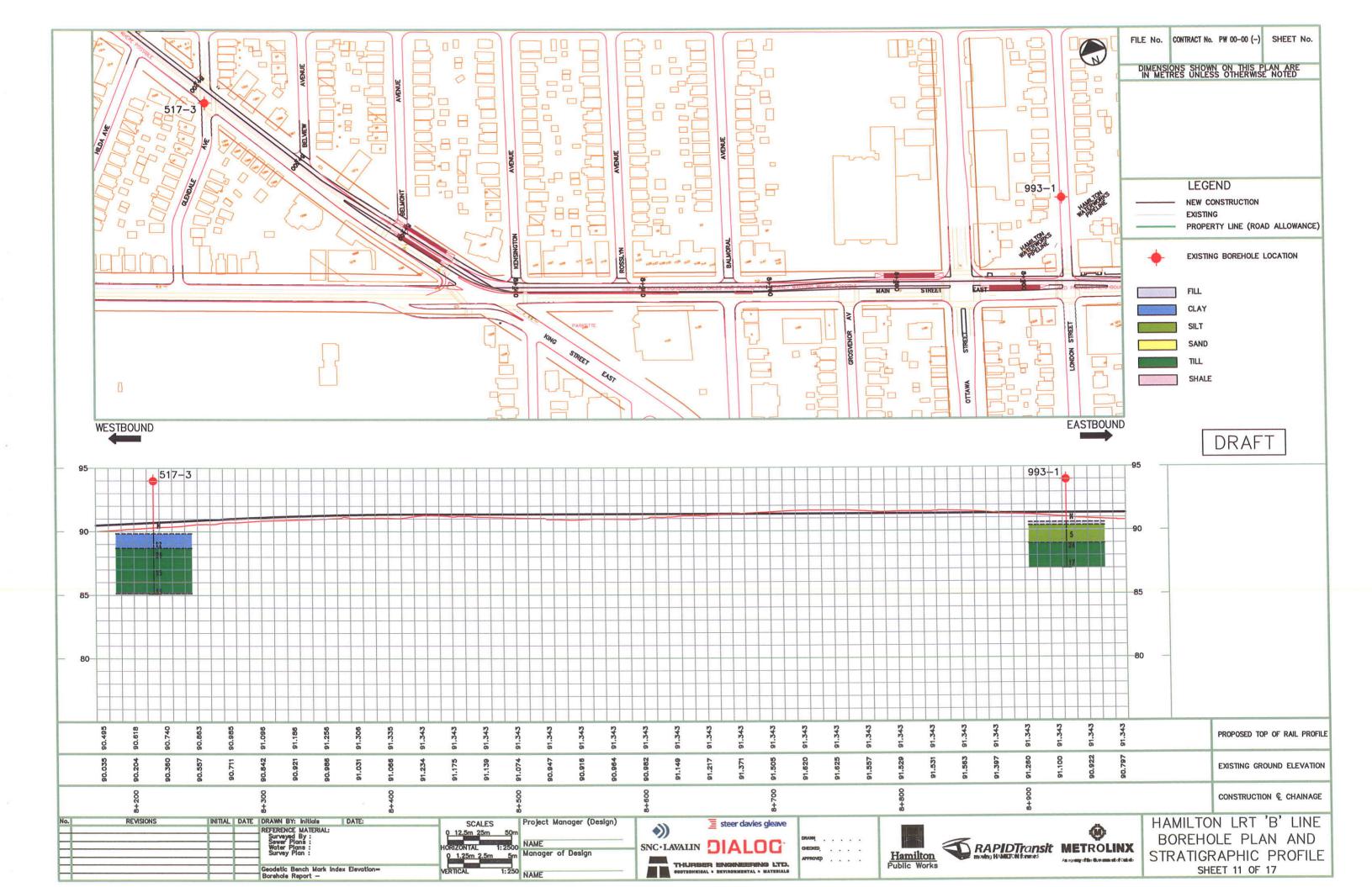


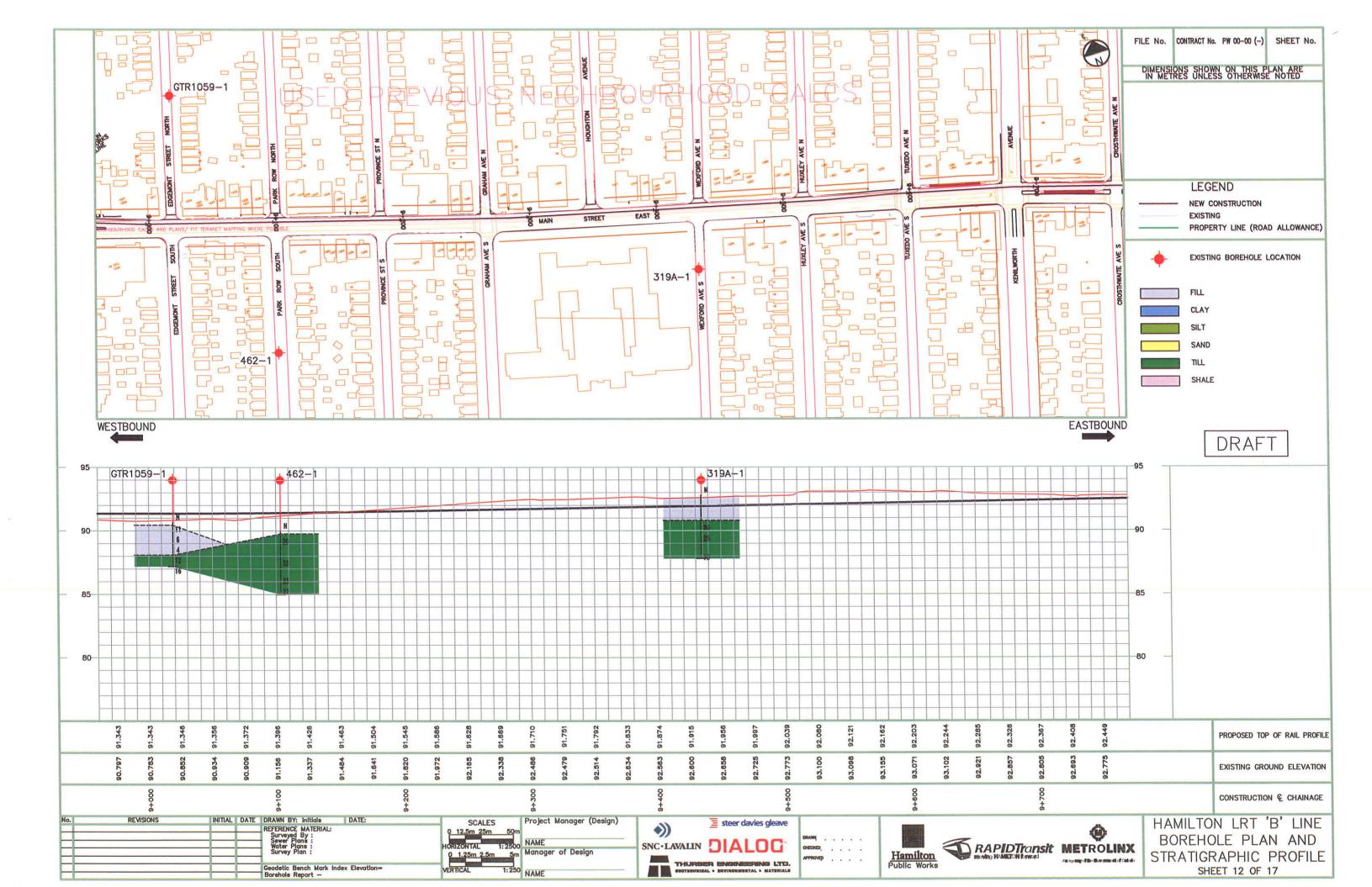


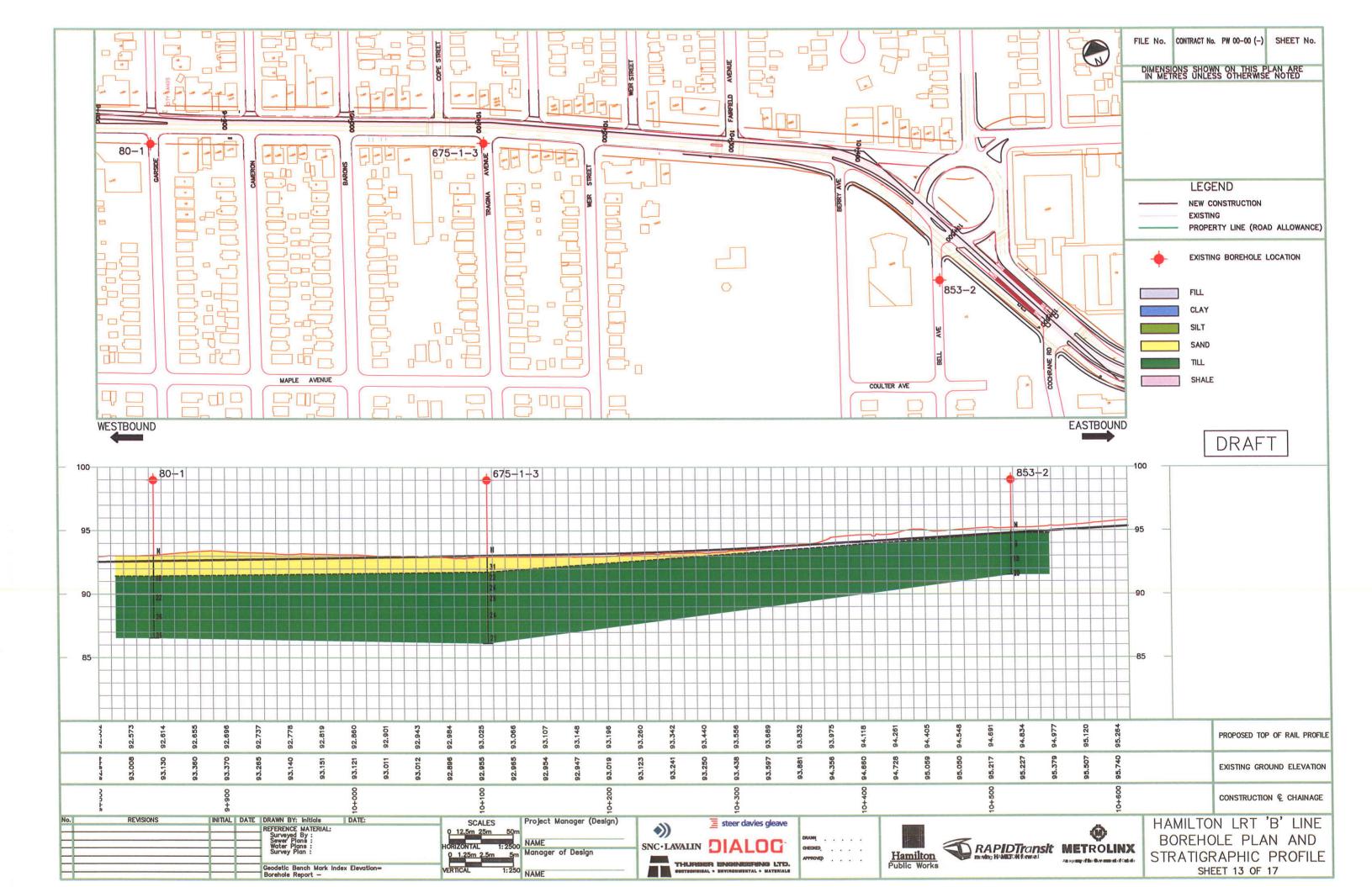


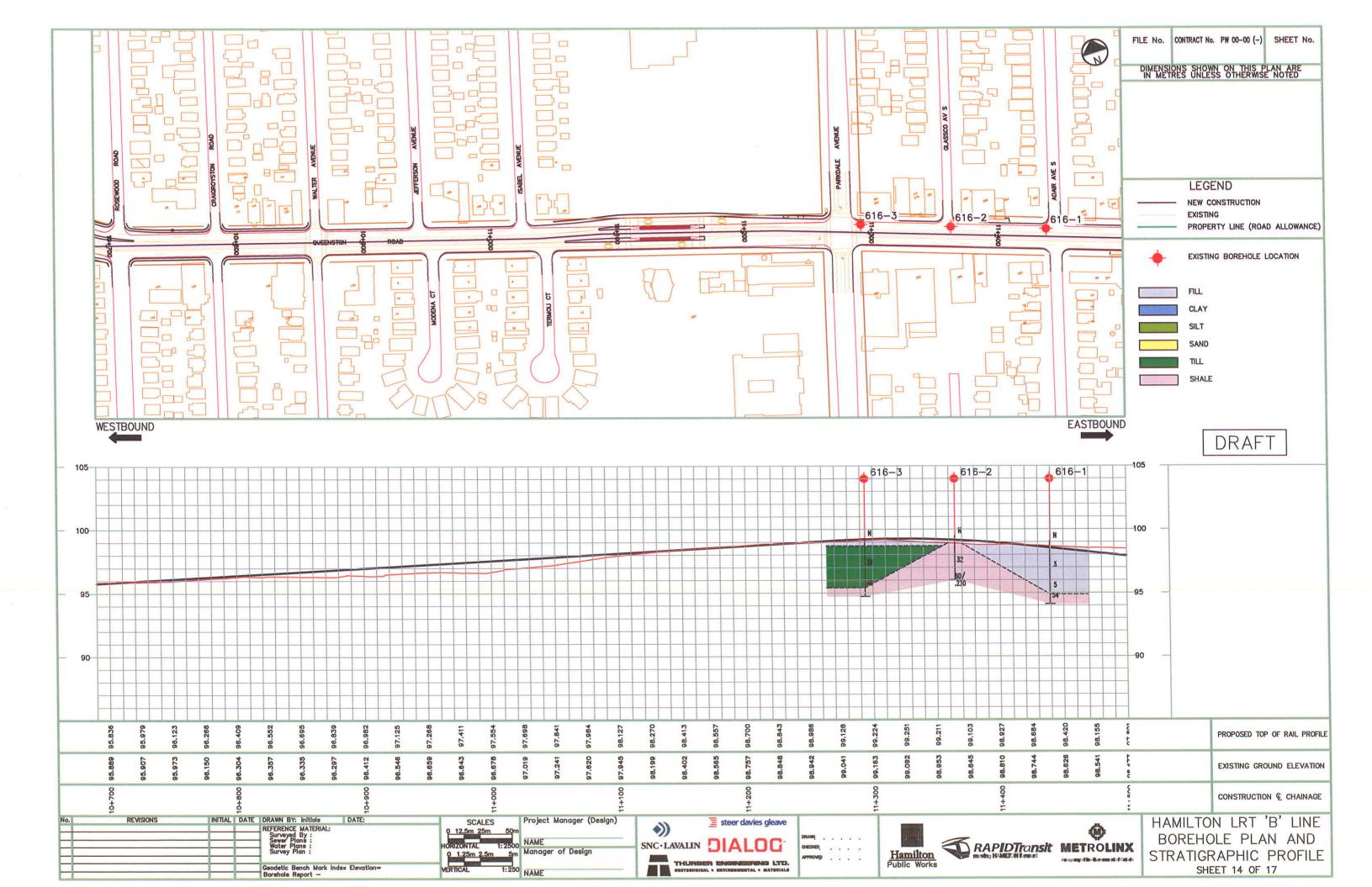


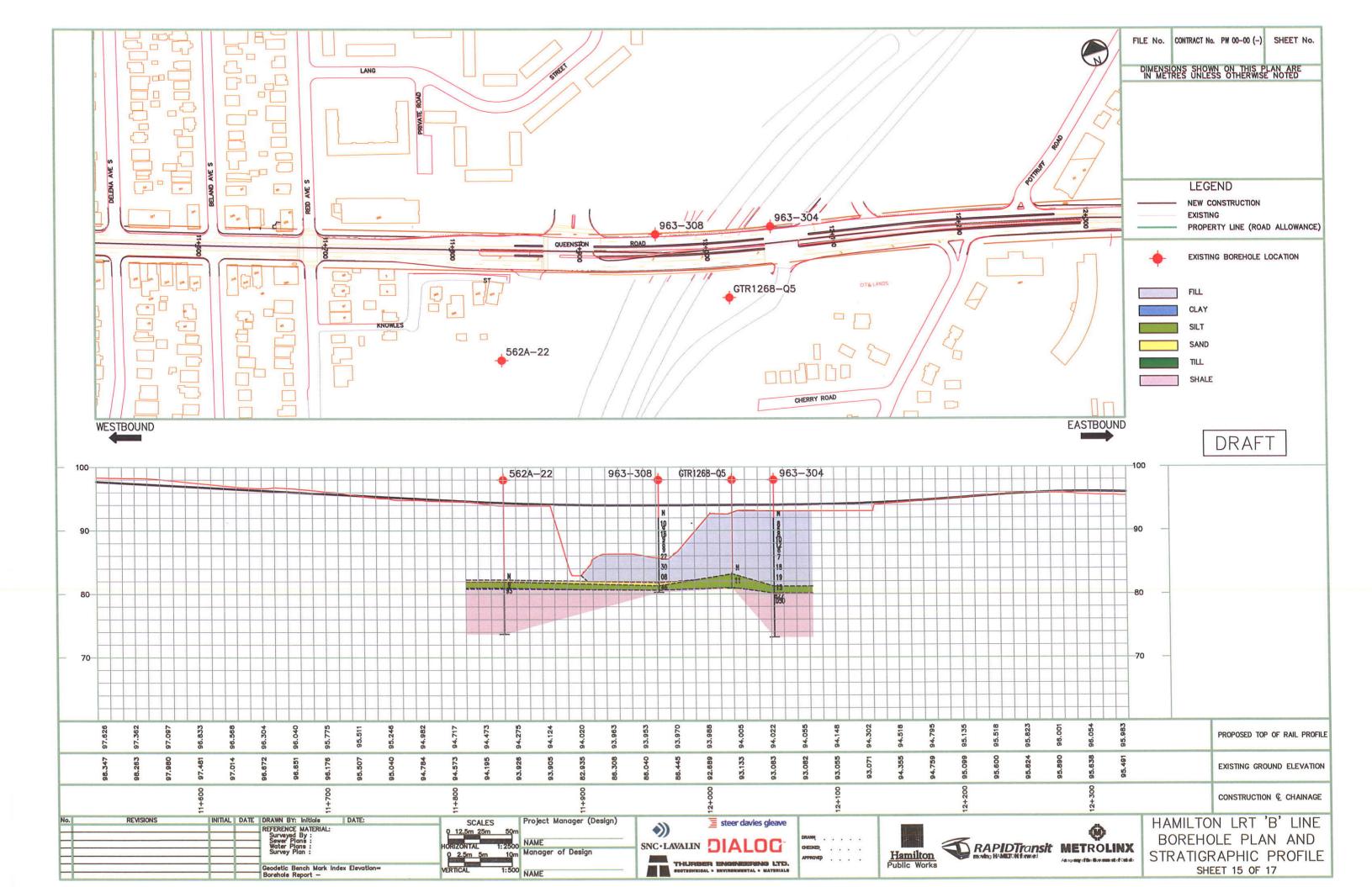


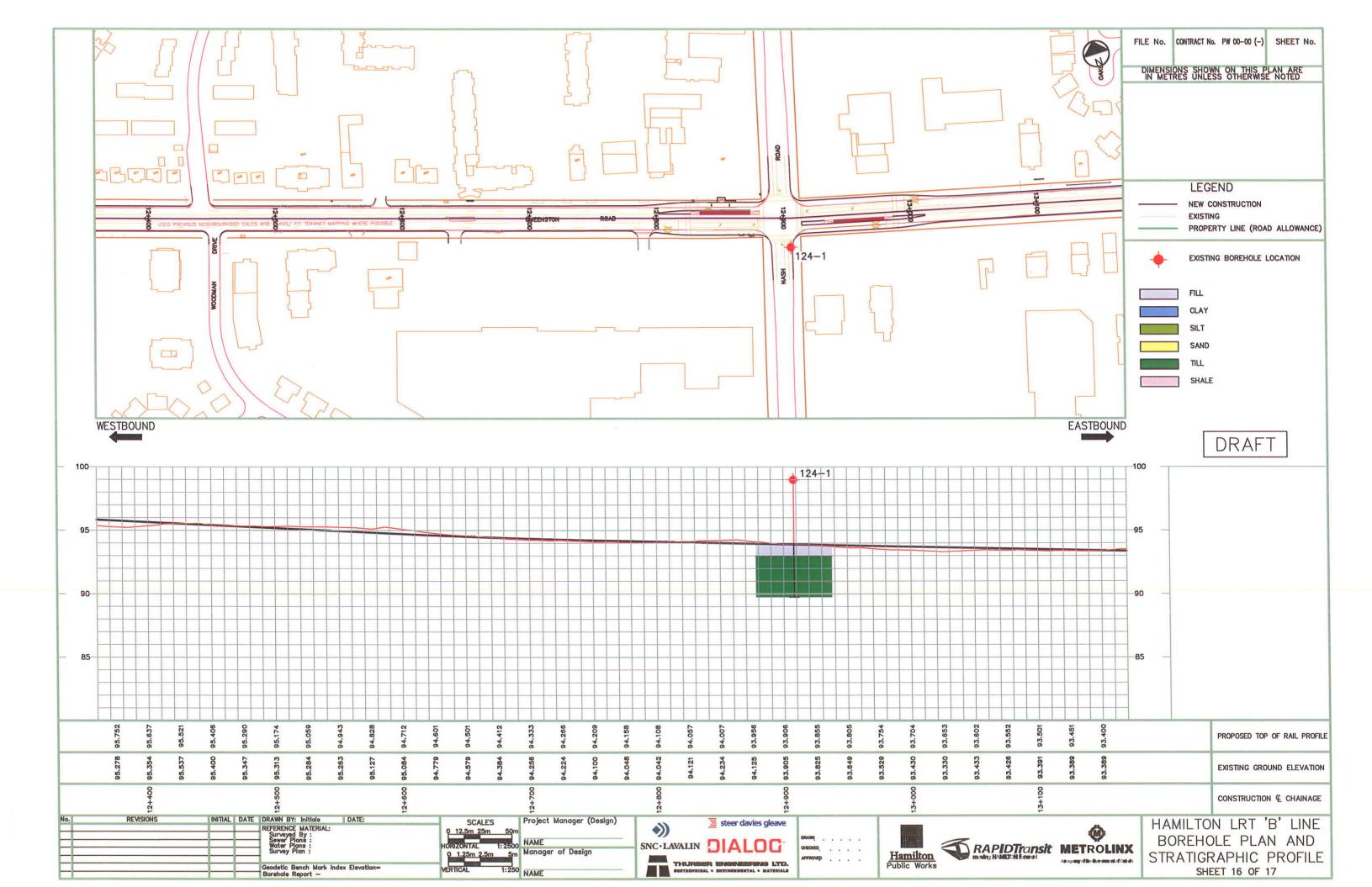


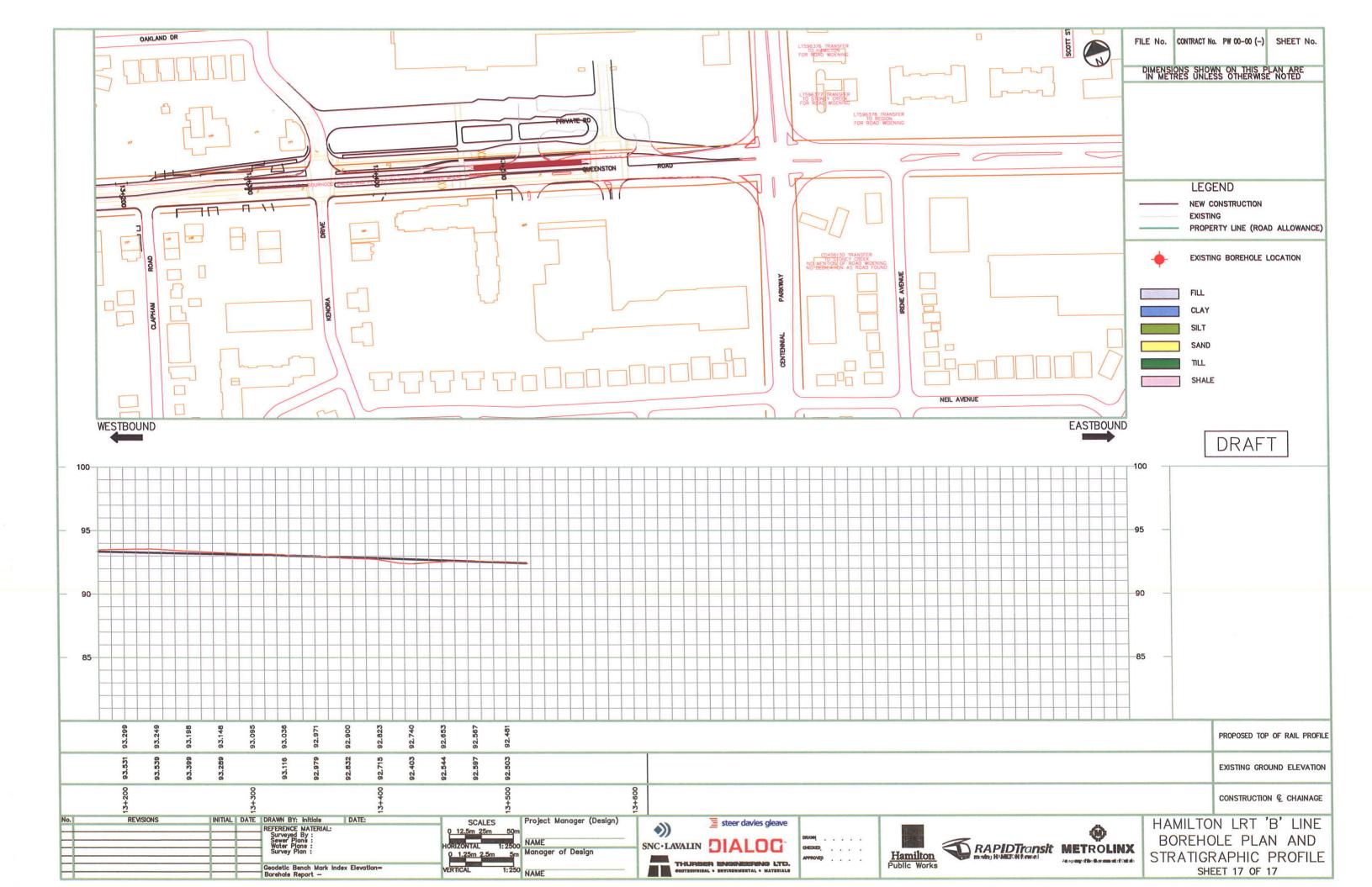












APPENDIX D

STATEMENT OF GENERAL CONDITIONS





STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

INTERPRETATION OF THE REPORT (continued)

- c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.
- d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.