GEOTECHNICAL INVESTIGATION

PROPOSED RESIDENTIAL DEVELOPMENT

2256 MAYFIELD ROAD

TOWN OF CALEDON, ONTARIO

Prepared for:

GUGLIETTI BROTHERS INVESTMENTS LIMITED

Prepared by:

AME Materials Engineering

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PROJECT NO. 40367.201

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1.0 INTRODUCTION

On behalf of Guglietti Brothers Investments Limited, Mr. Fabio J. Mazzocco authorized AME Materials Engineering (**AME**) to carry out a geotechnical investigation for a proposed residential development located on 2256 Mayfield Road in the Town of Caledon, Ontario. A Site Location Plan is provided as Figure No. 1-1 in Appendix 1.

The purpose of this investigation was to characterize the underlying soil and groundwater conditions, to determine the relevant geotechnical properties of encountered soils, and to provide recommendations on the geotechnical aspects for the design and construction of municipal services, roads and residential houses.

The locations of the boreholes were determined by **AME** to provide general site coverage. Additional boreholes may be required at a later stage when the proposed development scheme is available in order to confirm that the subsoil conditions revealed in the limited number of boreholes drilled at the site are consistent.

This report presents the results of the investigation performed in accordance with the general terms of reference outlined above and is intended for the guidance of the owner and the design architects or engineers only. It is assumed that the design will be in accordance with the applicable building codes and standards.

2.0 SITE DESCRIPTION

The property for the development is located on the north side of Mayfield Road, approximately mid-distance between McLaughan Road and Chinguacousy Road in the Town of Caledon. It is bounded by open farm fields to the east and to the west, and by a dense forest to the north.

The development site has the legal description as "Part of E1/2 Lot 18, Concession 2 W.H.S. (Chinguacousy), Town of Caledon, Regional Municipality of Peel".

For the purpose of this report, Mayfield Road is considered oriented in an east-west direction.

The subject property is rectangular in shape. It consists of open farm fields with two ponds situated in the central and southwest sections of the site.

A dwelling and a workshop structure are present in the southwest corner of the property. Several trees are located along the southwest corner of the property, as well as surrounding the two structures.

The ground surface topography at the site is not level. It is rough and has a slight rolling topography with an overall slope grading down from the west to the east, and from the north to the south.

3.0 FIELD WORK

The fieldwork for this investigation was carried out on October 25 and 26, 2011, and consisted of ten (10) exploratory boreholes advanced to depths ranging from 6.4 m to 8.1 m below existing grade. The locations of the boreholes are shown on the attached Borehole Location Plan, Figure No. 1-2 in Appendix 1.

The ground surface elevations at the borehole locations were referenced to the existing road level at the centre line of Mayfield Road immediately south of the centre of the driveway to the property. The temporary benchmark was assigned an assumed elevation of 100.0 m. Its location is also shown on Figure No. 1-2.

The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers. Standard Penetration Tests (SPT) were carried out at frequent intervals of depth and representative samples were recovered using split spoon samplers. The results of the Standard Penetration Tests in terms of 'N' values have been used to infer the consistency of cohesive soils or the relative density of non-cohesive soils encountered in the boreholes.

All soil samples were examined in the field and carefully preserved for further examination in the laboratory. Groundwater level observations were made in all boreholes upon completion of drilling operations. In addition, three (3) standpipe piezometers were installed in boreholes BH1, BH7 and BH10 for future monitoring of the groundwater level.

The fieldwork was performed under the full-time supervision of experienced geotechnical personnel from **AME**.

4.0 LABORATORY WORK

The soil samples recovered from the boreholes were transported to our laboratory for detailed examination, soil classification and laboratory testing. The laboratory tests included natural moisture contents, and determination of particle size including sieve and hydrometer analyses on selected samples. Moisture contents of the subsoil are shown on the attached borehole logs and the results of grain size analyses are presented in the form of grain size distribution curves in Appendix 3.

Two clayey soil samples (BH1/ S4 and BH3/ S6) were subjected to sieve and hydrometer analyses, as well as determination of Atterberg Limits. One sandy soil sample from BH9/ S5 was subjected to sieve and hydrometer analysis. The laboratory test results are presented in Appendix 3 as Figures 3-1 to 3-4 inclusive, and are discussed in the following sections.

Two (2) selected soil samples (BH1/ S3 and BH7/ S4) were submitted to an analytical laboratory for pH, Sulphide, Redox Potential and Resistivity tests in order to identify the potential corrosion problems with regard to underground utilities, as well as determination of water-soluble sulphate content in the subsoil.

Four (4) surface soil samples designated as samples A, B, C and D, retained from the vicinity of Boreholes numbered 3, 7, 6, and 2 respectively, were submitted to AGAT Laboratories for chemical analyses for metals & inorganics parameters, and for organochlorinated pesticides and polychlorinated biphenyls.

In addition, a sample of the soil recovered from the borehole advanced adjacent to the underground heating oil storage tank (BH1) near the base of the tank, at a depth of 1.5 m below grade was submitted for petroleum hydrocarbon analysis.

Subsequently, 10 additional surface soil samples were retained from the property and submitted for chemical analyses.

The samples were submitted to AGAT Laboratories for comparison to the MOE "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act of Ontario" dated April 2011.

The results of the chemical testing are presented in Sections 6.7, 6.8 and 6.9 of this report. Certificates of analyses from the laboratory are contained in Appendix 3.

5.0 SUBSOIL AND GROUNDWATER CONDITIONS

Details of the subsurface conditions encountered are given on the individual borehole logs, as Figure Nos. 2-1 to 2-10 in Appendix 2. A brief description of the subsoil units and groundwater conditions are given in the following subsections.

It should be noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design, and therefore, should not be construed as exact planes of geological change.

The subsurface stratigraphy as revealed in the boreholes generally comprises a surficial layer of topsoil, followed by disturbed native soil, overlying glacial till deposits. A brief description of these materials is presented below.

5.1 Topsoil

Topsoil was encountered in all the boreholes. The thickness of the topsoil at the boreholes varied between approximately 250 mm and 400 mm with an average of 320 mm. It should be noted that the topsoil thickness will vary between boreholes. Thicker topsoil than that found in the boreholes may occur in places. This renders it difficult to estimate the quantity of topsoil to be stripped. In order to prevent over-stripping, diligent control of the stripping operation will be required. A more detailed analysis (involving test pits) should be carried out to more accurately quantify the amount of topsoil to be removed for development.

5.2 Earth Fill

A veneer of earth fill was encountered below the topsoil in boreholes BH1 and BH4. The earth fill consists of brown, firm, moist to wet, clayey silt and extends to an approximate depth of 0.9 m at BH1 and 0.8 m at BH2.

Standard Penetration Resistance in the earth fill was variable with "N" values ranging from 5 to 6 blows per 300 mm of penetration, indicating that the fill possesses a firm consistency. The moisture content of the earth fill samples ranged from 16% to 33% by weight.

5.3 Disturbed Native Soil

With the exception of BH4, disturbed native soil was encountered below the surface earth fill / topsoil. The native soil consisted predominantly of clayey silt with trace of gravel, and of sandy silt / silty sand (at BH9). The upper portion of the deposit contained some organics and rootlets. The disturbed condition of this surface layer is likely due to previous crop cultivation and / or weathering due to repeated seasonal freeze-thaw cycles. The composition of the soil is similar to that of the underlying undisturbed, native glacial till but contains trace of organics within the upper portion. The disturbed native soil was mainly brown to greyish brown and moist to wet.

The disturbed native soil extended to depths ranging from approximately 0.5 m to 1.1 m below existing grade, with an average thickness of ~ 300 mm. Standard Penetration Resistance in the disturbed native soil had 'N'-values ranging from 4 to 9 blows per 300 mm penetration, indicating a firm to stiff consistency / loose relative density. The moisture content of samples of the disturbed native soil ranged from 15% to 33% by weight.

5.4 Silty Clay / Clayey Silt Till

Underlying the disturbed native soil / earth fill, each of the boreholes encountered undisturbed glacial till deposits. The glacial till consisted predominantly of silty clay / clayey silt with some sand and trace of gravel. The glacial till deposits were layered, fissured and had occasional oxidized lenses. Cobbles and boulders are probably present but would not be representatively sampled with the equipment used in this investigation. The silty clay / clayey silt till was moist to wet, generally brown and grey in color at shallow depth, becoming brown with an increasing depth.

The silty clay / clayey silt till further changes to grey at approximate depths of 3.2 m (BH3) to 5.5 m (BH4 and BH9) below grade.

The Standard Penetration Resistance in the brown silty clay / clayey silt till had "N" values ranging from 11 to 52 blows per 300 mm penetration, indicating a stiff to hard consistency. The grey till that is situated at greater depths also possesses a stiff to hard consistency with N values ranging from 15 to 35. The undrained shear strength of the silty clay / clayey silt till was estimated in the field using a pocket penetrometer and the strength values are shown on the borehole logs.

The moisture content of samples of the silty clay / clayey silt till ranged from 10% to 18%, and averaged 14%.

Sieve and hydrometer analyses were carried out on two (2) representative samples of the silty clay / clayey silt till obtained from BH1/ S4 and BH3/ S6. The analyses revealed that the silty clay / clayey silt till consisted of approximately 2% to 5% gravel, 20% to 22% sand, 31% to 36% silt and 41% to 42% clay. The particle size distribution curves determined from the above tested samples are presented on Figures 3-1 and 3-2 in Appendix 3.

Atterberg Limits tests performed on the above two samples revealed that the Plasticity Index of the silty clay / clayey silt till ranges from 11 to 14. The Liquid and Plastic Limits test results are shown on Figure 3-4 in Appendix 3.

The Coefficient of Permeability (k) of the silty clay / clayey silt till is estimated to be in the range 10^{-7} cm/ sec to 10^{-8} cm/ sec.

5.5 Sandy Silt Till

Boreholes BH1, BH7 and BH10 revealed that the silty clay / clayey silt till are underlain by sandy silt till. At BH9, the sandy till is interspersed between the brown and the grey clayey till. The sandy silt till at this site has a matrix consisting predominantly of silt and fine to medium sand.

As is typical of glacial till, the soil particle components are distributed throughout the grain size spectrum. The soil matrix also contains clay and embedded gravel and cobbles. The sandy silt

till was moist to wet, brown (at shallow depth), turning grey as well as brownish grey at greater depths (as at BH7 and BH10).

Standard Penetration Resistance in the sandy silt till had "N" values ranging from 17 to greater than 50 blows per 300 mm of penetration, indicating a compact to very dense relative density. The moisture content of three samples of the sandy silt till ranged from 11% to 12% by weight. Sieve and hydrometer analyses carried out on one (1) representative sample of the sandy silt till obtained from BH9/ S5 revealed that the till consisted of approximately 3% gravel, 28% sand, 50% silt and 19% clay. The particle size distribution curve determined from the above tested sample is presented on Figures 3-3 in Appendix 3.

The Coefficient of Permeability (k) of the sandy silt till is estimated to be in the range of 10^{-4} cm/sec to 10^{-6} cm/ sec.

5.6 Silt Till

At BH6, an approximate 1 m thick silt stratum was embedded within the silty clay / clayey silt till at a depth of 3 m below grade. The silt till is brown, moist and dense with N value of 35.

5.7 Groundwater Conditions

Observations for groundwater were made during and upon completion of drilling of boreholes and subsequently in the installed piezometers. The groundwater measurements made in the open boreholes as well as in the monitoring wells are summarized in the table below and also shown on the individual borehole logs.

Table 1: GROUNDWATER DEPTHS AT BOREHOLES

Groundwater Levels Measurements (depth below existing grade)			
Borehole No.	Upon Completion	24 hours Monitoring	96 hours Monitoring
BH1*	Dry	1.58	1.18
BH2	Dry	-	-
BH3	Dry	-	-
BH4	Dry	-	-
BH5	Dry	-	-
BH6	6.7 m	-	-
BH7*	Dry	Dry	2.4

BH8	Dry	Dry	-
BH9	Dry	-	-
BH10*	Dry	2.58	2.05

* borehole developed as monitoring well

Based on our field observations, the indications are that the groundwater is emanating from the wet sand seams embedded in the till as well as from the wet sandy silt till at greater depths.

It should be noted that groundwater levels are subject to seasonal fluctuations.

6.0 DISCUSSIONS AND RECOMMENDATIONS

The following discussions and preliminary recommendations are based on the factual data obtained from this investigation and are intended for use by the client's design engineers only.

Contractors bidding on this project or conducting work associated with this project should make their own interpretation of the factual data and / or carry out their own investigations.

This investigation has revealed that the site is covered by surficial layer of topsoil, locally by earth fill, followed by disturbed native soil which in turn is underlain by thick deposits of glacial till. On the basis of our fieldwork, laboratory tests and other pertinent information supplied by the client, the following comments and recommendations are made.

6.1 Pavement Design

Based on the existing topography of the subject site, assumed proposed grades and the data collected during the field investigation, it is anticipated that the subgrade material for the subdivision roads will generally comprise native glacial till or similar engineered fill soil. Given the frost susceptibility and drainage characteristics of the subgrade soils, and the Town of Caledon's minimum requirements for residential roads, following pavement structure designs are recommended for the subdivision roads:

Table 2: RECOMMENDED PAVEMENT STRUCTURE

Pavement Layer	Compaction Requirements	Minor Local Road (17 m / 20 m Right of Way)	Minor Collector Road (23 m Right of Way)	Driveways
Asphaltic Concrete				
Surface Course	as per OPSS 310	40 mm OPSS HL3	40 mm OPSS HL3	25 mm OPSS HL3A
Binder Course	as per OPSS 310	80 mm OPSS HL8	100 mm OPSS HL8	50 mm OPSS HL8
Granulars				
Granular Base	100% SPMDD*	130 mm of 20 mm Crusher-run Limestone or 150 mm Granular 'A'	130 mm of 20 mm Crusher-run Limestone or 150 mm Granular 'A'	150 mm of 20 mm Crusher-run Limestone
Granular Sub Base	100% SPMDD*	225 mm of 50 mm Crusher-run Limestone or 300 mm Granular 'B'	Crusher-run Limestone or 380 mm Granular 'B'	------

* On local roadways designated as bus routes, the binder course asphalt thickness must be increased by 50 mm.

** Denotes Standard Proctor Maximum Dry Density, ASTM-D698

This pavement structure design meets the minimum requirements of The Town of Caledon. Other road types, (other Right of Way distances, parking lots, etc.) should be constructed in accordance with the Town of Caledon Series Drawings.

The subgrade must be compacted to at least 98% of Standard Proctor Maximum Dry Density (SPMDD) for the upper 1 m and 95% below this level. The granular pavement structure materials should be placed in lifts not exceeding 150 mm thick and be compacted to a minimum of 100% SPMDD. Asphaltic concrete materials should be rolled and compacted as per OPSS 310. The granular and asphaltic concrete pavement materials and their placement should conform to OPSS 310, 501, 1010 and 150, and the pertinent Municipality specifications. Furthermore, it is recommended that the Municipality's specifications should be referred to for use of higher grades of asphalt cement for asphaltic concrete where applicable, particularly in the areas of expected heavy truck traffic.

The gradation and physical properties of HL-3 and HL-8 hot mix asphalts, Granular 'A' and 'B' shall conform to the OPSS standards.

The long-term performance of the proposed pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be crowned and sloped (at a crossfall of 2% for the pavement surface and 3% for the subgrade) to provide effective drainage. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Sub-drains or drainage ditches must be provided to facilitate effective and assured drainage of the pavement structures as required to intercept excess subsurface moisture and minimize subgrade softening. The invert of sub-drains and ditches should be maintained at least 0.3 m and 0.5 m respectively below subgrade level.

Additional comments on the construction of pavement areas are as follows:

- As part of the subgrade preparation, proposed pavement areas should be stripped of topsoil and other obvious objectionable material. Fill required to raise the grades to design elevations should be free of organic material and at a moisture content which will permit compaction to the specified densities. The subgrade should be properly shaped, crowned, and then proof-rolled. Soft or spongy subgrade areas should be sub-excavated and properly replaced with suitable approved backfill compacted to 98% SPMDD.

- The most severe loading conditions on pavement areas and the subgrade may occur during construction during wet and un-drained conditions. Consequently, special provisions such as restricted lanes, half-loads during paving etc., may be required, especially if construction is carried out during unfavorable weather conditions.

- For fine-grained soils, as encountered at the site, the degree of compaction specification alone cannot ensure distress free subgrade. Proof-rolling must be carried out and witnessed by **AME** personnel for final recommendations of sub-base thicknesses.

6.2 Excavation and Groundwater Control

Based on the field results, temporary excavations for sewers, trenches, house basements and utilities are not expected to pose any difficulty. Excavation of the soils at this site can be carried out with heavy hydraulic backhoes.

All excavations must be carried out in accordance with Occupational Health and Safety Act (OHSA). With respect to OHSA, the undisturbed native hard silty clay / clayey silt and very dense sandy silt till, can be classified as Type 1 soil; the dense silt / sandy silt till, and stiff to very stiff silty clay / clayey silt till can be classified as Type 2 soils; and the compact sandy silt till, the existing disturbed native soil and any previously excavated soil (fill) can be classified as Type 3 soils.

Temporary excavation for slopes in Type 3 soil should not exceed 1.0 horizontal to 1.0 vertical. Excavations in Type 2 soil may be cut with vertical side-walls within the lower 1.2 m height of excavation and 1.0 horizontal to 1.0 vertical above this height. For excavations through multiple soil types, the side slope geometry is governed by the soil with the highest number designation. Locally, where loose or soft soil is encountered at shallow depths or within zones of persistent seepage, it will be necessary to flatten the side slopes to achieve stable conditions. Any excavated side slopes should not be unduly left exposed to inclement weather.

Where workers must enter excavations extending deeper than 1.2 m below grade, the excavation side-walls must be suitably sloped and / or braced in accordance with the Occupational Health and Safety Act and Regulation for Construction Projects.

The silty clay / clayey silt and sandy silt till soil possess a low hydraulic conductivity. The groundwater yield from the till deposit is expected to be small. Unless excavations are extended into saturated gravel and sand layers that may be present in the till, it is anticipated that adequate control of groundwater seepage can be achieved by pumping from properly filtered sumps in the base of the excavations. Excavations in native sandy soils below the groundwater level may require a more positive system of dewatering such as well points to depress the groundwater level below the excavation bases. The groundwater level should be lowered below the excavation base prior to excavating for the site services.

It should be noted that the till is non-sorted sediment and therefore may contain boulders. Provisions must be made in the excavation contract for the removal of possible boulders.

6.3 Bedding for Sewers and Watermains

The undisturbed natural soils at the site are suitable for supporting watermains, sewer pipes, manholes, catchbasins and other related structures. Based on the anticipated site grades, sewer pipes and watermains will probably be supported on the undisturbed very stiff to hard silty clay / clayey silt or compact sandy silt till.

The type of bedding depends mainly on the quality of the subgrade immediately below the invert levels and particularly on the shear strength of the subgrade.

Normal Class 'B' bedding is recommended for underground utilities. Granular 'A' or 19 mm crusher-run limestone can be used as bedding material. The bedding material should be compacted to a minimum of 95% Standard Proctor Maximum Dry Density. Bedding details should follow the applicable governing design detail (i.e. Town of Caledon, OPSD). Trenches dug for these purposes should not be unduly left exposed to inclement weather.

Pipe bedding and backfill for flexible pipes should be undertaken in accordance with OPSD 802.010, 802.013, 802.014, 802.020, 802.023 and 802.024. Pipe embedment and cover for rigid pipes should be undertaken in accordance with OPSD 802.030, 802.031, 802.032, 802.033, 802.034, 802.050, 802.051, 802.052, 802.053 and 802.054.

If unsuitable bedding conditions occur, careful preparation and strengthening of the trench bases prior to sewer installation will be required. The subgrade may be strengthened by placing a thick mat consisting of 50 mm crusher-run limestone. Field conditions will determine the depth of stone required. Geotextiles and / or geogrids may be helpful and these options should be reviewed by **AME** on a case by case basis.

Sand cover material should be placed as backfill to at least 300 mm above the top of pipes. Placement of additional granular material (thickness dictated by the type of compaction equipment) as required or use of smaller compaction equipment for the first few lifts of native material above the pipe will probably be necessary to prevent damage to the pipe during the trench backfill compaction.

6.4 Reuse of On-site Excavated Soil as a Compacted Backfill

6.4.1 Disturbed Native Soil

The existing disturbed native soils typically contain trace amounts of organics and possibly include topsoil, and have high in-situ moisture content. Consequently, these materials may not be favorable for re-use as engineered fill or backfill in settlement sensitive areas, such as trench backfill beneath floor slabs and pavement structures. Therefore, it is recommended that the selection of and sorting of the existing disturbed native soils be supervised by the geotechnical engineer. Alternatively, these materials may be placed in the rear yards, landscaped areas and outside the building envelopes, provided it is placed a minimum of 0.5 m above the footing elevation.

6.4.2 Native Till

The on-site excavated native silty clay / clayey silt and sandy silt till are considered suitable for reuse as trench backfill or engineered fill material, provided any topsoil, organic or otherwise unsuitable materials are excluded from the backfill, the moisture content is controlled to within

2% of its optimum water content as determined by Standard Proctor test, and the materials are effectively compacted with heavy vibratory pad-type rollers. The compactors must be of sufficient size and energy to break down the lumps and to knead the soil into a homogeneous mass as water and compaction effort is applied. If the equipment does not have sufficient energy to break down the lumps, there is a tendency to bridging and post construction settlements. In situ testing may fail to identify this type of deficiency adequately because the zones of influence of testing equipment is small enough that the density of the lumps can be erroneously measured instead of the fill mass density.

Measured in-situ moisture contents within the silty clay / clayey silt till ranged from approximately 10% to 18%, and averaged approximately 14%, which is close to and locally on the wet side of the material's optimum moisture content. Spreading the material in a wide area and air drying may be required to achieve the specified compaction of the native clayey material. However, thorough vertical mixing of the excavated till soils will be required to provide a material that can be adequately compacted throughout. During warm weather, drying of the till soils may become acute; therefore, the lift thickness for compaction and the moisture content of the soils must be properly controlled during the backfilling.

6.4.3 General

If on-site excavated soils become excessively wetter than optimum moisture contents, the soils should be dried sufficiently in order to achieve the specified degree of compaction. If construction is carried out in inclement weather, there is a likelihood that some amount of road sub-base supplement will be required (i.e. some sub-excavation followed by granular replacement).

It is recommended that service trenches be backfilled with native on-site materials such that at least 95% of Standard Proctor Maximum Dry Density (SPMDD) is obtained in the lower zone of the trench and 98% of SPMDD for the upper 1000 mm. However, prior to building the roads, the subgrade should be thoroughly proof-rolled and re-compacted to 98% of SPMDD to ensure uniformity in subgrade strength and support. This phase of the work should be scheduled for warmer, drier months. Lift thicknesses shall not exceed 200 mm in a loose state unless approved by **AME** and the excavated site material should be compacted using heavy, vibratory pad-type rollers.

As an alternative, if suitable on-site native material is not available, the upper part of the subgrade could be improved by placing imported granular material.

In areas of narrow trenches or confined spaces such as around manholes, catchbasins, etc., imported sand or OPSS Granular 'B' should be used and compacted to the specified amount.

The soils bulking factor for the excavated native glacial till soils is approximately 1.3 and the shrinkage factor when compacted is approximately 1.0. It should be noted that the type of excavation processes may greatly affect the bulking and shrinkage factors of the material.

6.5 General Site Re-grading

Based on the anticipated proposed grades and the existing topography at the subject site, it is anticipated that some cut and fill operation will be required for general site re-grading. Due to the variation in the composition of the on-site native materials, it is recommended that sufficient Standard Proctor Density tests be performed when construction work begins and the ground is broken. **AME** should be contacted in order to verify and evaluate the proposed soil types for general site re-grading.

Materials cut from the site, except for the soils containing excessive organic matter, could be re-used to raise grade levels, provided the materials are placed in large areas where they can be effectively compacted with heavy, sheepsfoot type rollers, and the moisture content is controlled to within optimum or 2 % greater than the material's optimum moisture content.

6.6 Engineered Fill

The on-site soils may be used to raise grades of the proposed lands to the desired elevations. The following recommendations regarding construction of engineered fill should be adhered to during construction:

- All topsoil, organic materials, highly disturbed and weathered soils must be removed, and the exposed subgrade soils proof-rolled in conjunction with an inspection by the geotechnical engineer prior to any fill placement. Portions of the existing earth fill / disturbed native soil may be suitable for support of the engineered fill, however, inspection by the geotechnical engineer is required to determine the in-place competency of the material.

- Engineered fill operations should be monitored and compaction tests should be performed on a full-time basis by a qualified engineering technician supervised by the project engineer.

- The boundaries of the engineered fill must be clearly and accurately laid out in the field by qualified surveyors prior to the commencement of engineered fill construction. The top of the engineered fill should extend a minimum of 2.5 m beyond the building envelope. Where the depth of engineered fill exceeds 1.5 m, this horizontal distance of 2.5 m beyond the perimeter of the building should be increased by at least 1.0 m for each 1.0 m depth of fill. The edges of the engineered fill should be sloped at a maximum of 3H: 1V in order to avoid weakening of the engineered fill edges due to slope movement.

- Due to the potential detrimental effects of differential settlement between the engineered fill and the native soils, any lots where footings are to be placed partly on engineered fill and partly on native soils should include reinforcing steel bars placed within the top and bottom of the foundation walls. The foundation walls of house foundations supported entirely on engineered fill should also be reinforced to bridge localized soft spots and zones of non-uniform compaction, and to minimize structural distress due to differential

settlement of the engineered fill. The reinforcing steel should typically consist of two 15 M bars placed in the top portion of the walls. The bars should be placed as close to the top and bottom of the walls as possible allowing for at least 50 mm of concrete cover. Corner bars should have proper factory bends and all tied steel should have at least 600 mm of overlap. At window locations, two 10 M bars should be placed in the foundation wall as close to the sill as possible (allowing for a minimum 50 mm of concrete cover). The bars should extend laterally at least 600 mm beyond the edge of the window opening. The actual steel reinforcement design should be confirmed / designed by the home builder's structural engineer.

- Soils used as engineered fill should be free of organic and/or other unsuitable material. The engineered fill must be placed in lifts not exceeding 200 mm in thickness and compacted to 98% Standard Proctor Maximum Dry Density.

- Imported fill must not be used unless documentation is produced verifying that the material is suitable for residential/ parkland usage (as per MOE document "Guideline for use at contaminated sites in Ontario, 2009).

- If fill is required adjacent to sloped banks (> 3:1, horizontal to vertical), it is imperative that the fill is placed in stepped planes in order to avoid a plane weakness.

- The engineered fill should be placed at least 0.6 m above the elevation of the proposed underside of footing.

- The engineered fill operation should take place in favorable climatic conditions. If the work is carried out in months where freezing temperatures may occur, all frost affected material must be removed prior to the placement of frost-free fill.

- When engineered fill is left over the winter, a minimum of 1.2 m of earth cover must be provided as frost protection.

- If unusual soil conditions become apparent during construction, due to subsurface groundwater influences, our office should be contacted in order to assess the conditions and recommend appropriate remedial measures.

- The footing and underground services subgrade must be inspected by the Geotechnical Engineer that supervised the engineered fill construction. This is to ensure that the

foundations are placed within the engineered fill envelope, and the integrity of the fill has not been compromised by interim construction, environmental degradation and / or disturbance by the footing excavation. Extended footings and / or steel reinforcement may be required based on the footing inspection.

6.7 Soil Corrosivity

Two selected soil samples (BH1/ S3 and BH7/ S4) were submitted for pH, Sulphide, Redox Potential and Resistivity tests in order to determine their corrosive characteristics. The test results are summarized in Table 3 below and the Certificate of Analysis from AGAT laboratories is contained in Appendix 3:

Table 3: SOIL CORROSIVITY TESTING RESULTS

SOIL CHARACTERISTICS	BH1/ sample 3	BH7/ sample 4
pH	8.41	8.75
Resistivity (ohm.cm)	5850	5240
Redox Potential (mV)	202	205
Sulphide	< 0.01	< 0.01
Moisture Content (%)	15.6	18.2

The above tests are considered in evaluating the corrosivity of the soil. For each of these tests, results are categorized and points are assigned according to their contribution to corrosivity as shown in Table 4 below:

Table 4: ANSI - AWWA RATING FOR CORROSIVITY

SOIL CHARACTERISTICS	BH1/ sample 3	BH7/ sample 4
pH	0	3
Resistivity (ohm.cm)	0	0
Redox Potential (mV)	0	0
Sulphide	0	0
Moisture Content (%)	1	1
TOTAL POINTS	**1***	**4 ***

* a value less than 10 is considered non-corrosive

Based on the ANSI – AWWA rating system, it is concluded that the soils would be considered non-corrosive for the subject site. The criteria for the soils test evaluation is presented in Appendix 4. This data should be reviewed by the pipe manufacturer to ensure proper construction methodology and appropriate protection. All watermain construction and material specifications should follow the standards and regulations as per OPSS and The Town of Caledon specifications.

6.8 Sulphate Content of Subsoil

Two soil samples which were also selected from BH1/ S3 and BH7/ S4 were submitted to AGAT Laboratories for the determination of water-soluble sulphate content and its potential of attacking the subsurface concrete.

The test results revealed that the water-soluble sulphate content of the subsoil is 0.049% at BH1/ S3 and 0.037% at BH7/ S4. These concentrations are below the CSA Standard of 0.1% water-soluble sulphate (Table 12 of CSA A23.1, Requirements for Concrete Subjected to Sulphate Attack). Special concrete mixes against sulphate attack is therefore not required for the sub-surface concrete of the proposed re-development. The Certificate of Analysis provided by the analytical chemical testing laboratory is contained in Appendix 3.

6.9 Environmental Considerations

Four (4) surface soil samples designated as samples A, B, C and D, retained from the vicinity of Boreholes numbered 3, 7, 6, and 2 respectively, were submitted to AGAT Laboratories for chemical analyses for metals & inorganics parameters, and for organochlorinated pesticides and polychlorinated biphenyls.

In addition, a sample of the soil recovered from the borehole advanced adjacent to the underground heating oil storage tank (BH1) near the base of the tank, at a depth of 1.5 m below grade was submitted for petroleum hydrocarbon analysis.

AGAT is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for the determination of general and inorganic parameters for comparison to the "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act of

Ontario" dated April 15, 2011. The Certificate of Analysis provided by AGAT Laboratories is also contained in Appendix 3.

Land use at the properties is proposed to be residential. For the purpose of this assessment, the results of the chemical testing were compared to Table 1: Full Depth Background Site Condition Standards of the "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act of Ontario" dated April 15, 2011.

The chemical test results indicated that with the exception of marginal ecceedance of a single sample for cyanide, the concentrations of all of the selected general and inorganic parameters tested for met the MOE Table 1 criteria. The cyanide concentration for Sample; D 0.056ppm (average of 2 tests) exceeded the MOE criterion of 0.05 ppm.

The test results of additional 10 surface soil samples collected from the area of Sample D, including 2 from the same location as Sample D, revealed that the cyanide concentrations of all 10 samples were below the MOE criterion of 0.05 ppm.

6.10 House Foundation Design

The existing disturbed native soil is considered to be unsuitable for supporting the building foundations. The underlying undisturbed silty clay /clayey silt till as well as the sandy silt till (all below the disturbed native soils) throughout the site are considered suitable for the support of house foundation on conventional spread and wall footings. Conventional spread and wall footings founded in the undisturbed, native till soil or on certified engineered fill may be designed using a net geotechnical bearing resistance at Serviceability Limit States (SLS) of 150 kPa and a factored geotechnical bearing resistance at Ultimate Limit States (ULS) of 225 kPa (vertical, centric).

The geotechnical bearing resistance values stated above are for vertical loads (no inclination) and no eccentricity. The minimum footing widths to be used in conjunction with the above recommended soil bearing pressure should be 0.5 m for continuous wall footings and 0.9 m for individual spread footings. The total and differential settlements of spread footing foundations designed in accordance with the above recommendations should not exceed tolerable limits of 25 mm and 19 mm, respectively.

The soil bearing resistance of the founding soils for all footings should be verified by the geotechnical engineer prior to the placing the foundation concrete.

All exterior footings and footings in unheated areas should be provided by at least 1.2 m of soil cover or equivalent artificial thermal insulation for frost protection purposes. Exposed foundation subgrade soils should be protected against freezing and surface water should be kept away from the foundation subgrade areas to prevent softening. If unstable subgrade conditions develop, **AME** should be contacted in order to assess the conditions and make appropriate recommendations.

Prior to pouring concrete for footings, the footing bases should be cleaned of all, deleterious materials such as topsoil, non engineered fill, softened or disturbed materials as well as any standing water. It is recommended that the foundations be inspected by **AME** in order to confirm the exposed soil conditions and recommended bearing capacities.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the footing bases and concrete must be provided.
The native site soils are primarily not considered free draining. Therefore, perimeter drainage measures for house basements as per the current Ontario Building Code should be implemented.

6.11 Concrete Slab-on-Grade and Basement Floors

Conventional lightly loaded concrete slab-on-grade floors can be placed on the undisturbed, native soil subgrade or on certified engineered fill, below all deleterious materials. A moisture barrier (drainage blanket) consisting of a minimum of 150 mm thickness of 19 mm clear stone (OPSS Form 1010) compacted by a vibratory plate tamper to a dense state should be placed directly below the slab.

To assist in maintaining basements dry from seepage, it is recommended that exterior grades around the house be sloped away at minimum 5% gradient for a distance of at least 1.5 m, and at a 2% gradient or more beyond this distance.

Perimeter foundation drains should be provided, consisting of perforated pipe surrounded by a granular filter (minimum 150 mm thick) and freely outletting. The granular filter should consist of 19 mm clear stone.

The perimeter drains must be properly filtered to prevent any in-wash of soil fines. The basement wall backfill for a minimum lateral distance of 0.6 m out from the wall should consist of free-draining granular material such as OPSS Granular "B" Type I, or provided with a suitable alternative drainage cellular media. Damp-proofing must be applied to the exterior basement walls. The perimeter foundation and sub-floor drains must be connected to a positive frost free outlet from which the water can be removed, or connected to a sump located in the lowest level of the basement. The water from the sump must be pumped out to a suitable discharge point. The installation of the perimeter and sub-floor drains as well as the outlet must conform to the applicable plumbing code requirements.

Basement floor levels should be kept at least 0.3 m above the seasonally high water level.

6.12 Lateral Earth Pressure

The parameters used in the determination of earth pressure acting on retaining walls, basement walls or bracings are defined below.

Parameter	Definition	Units
Φ'	internal angle of friction	degrees
γ	bulk unit weight of soil	kN/ m^3
K_a	active earth pressure coefficient (Rankin)	dimensionless
K_o	at-rest earth pressure coefficient (Rankin)	dimensionless
K_p	passive earth pressure coefficient (Rankin)	dimensionless

The appropriate unfactored values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows:

Soil	Φ'	γ	K_a	K_p	K_o
Compact Granular Fill [(1)] - Granular 'A' (OPSS 1010)	35°	23.0	0.27	3.7	0.43
Compact Granular Fill [(1)] - Granular 'B' (OPSS 1010)	32°	21.0	0.31	3.25	0.47
Disturbed Native Soil	27°	19.5	0.36	2.78	0.53
Silty Clay / Clayey Silt Till	30°	21.0	0.33	3.0	0.50
Sandy Silt Till	32°	21.0	0.31	3.25	0.47
Silt / Silty Sand	30°	20.0	0.33	3.0	0.5

Notes:

1. Compacted to a minimum of 95% Standard Proctor Maximum Dry Density.
2. Passive and sliding resistance within the zone subject to frost action (i.e. within 1.2 m below finished grade) should be disregarded in the lateral resistance computations.
3. In the case of a structure below the groundwater table, the use of submerged soil weight should be considered along with the appropriate hydrostatic pressures.
4. Temporary and/or permanent surcharges at the ground surface should be considered in accordance with the applicable soil mechanics methods.

The design earth pressures in compacted backfill should be augmented with the dynamic effects of the compaction efforts, which typically are taken as a uniform 12 kPa pressure over the entire depth below grade where the calculated earth pressure based on the above earth pressure factors is less than 12 kPa. However, this dynamic effect should be ignored when calculating the passive resistance for thrust blocks, or other instances where the general stability of the structure relies on the passive resistance.

The basement walls of the house structures should be designed to withstand lateral earth pressure, P, acting against the wall. On the basis of effective drainage of the basement wall backfill, the following equation can be used to estimate lateral earth pressure at any depth:

$$P = K(\gamma h + q)$$

where
K = Coefficient of Earth Pressure, assume 0.5
γ = Unit Weight of Soil
h = Height at any point along the wall in metres
q = Any surcharge load in kPa

This equation assumes that free-draining backfill and positive drainage is provided to ensure that there is no hydrostatic pressure acting in conjunction with the earth pressure.

Consideration must be given to the possible effect of frost on retaining earth structures. Pressures induced by freezing in frost-susceptible soils at this site exert pressures that are effectively irresistible.

Resistance to sliding of earth retaining structures is developed by friction between the base of the footing and the soil. This friction (**R**) depends on the normal load on the soil contact (**N**) and the frictional resistance of the soil (**tan Φ'**) expressed as: **R = N tan Φ'**. This is an ultimate resistance value and does not contain a factor of safety.

7.0 GENERAL COMMENTS

During construction, frequent inspections by geotechnical personnel from **AME** should be carried out, to examine and approve fill material, granular base course and asphaltic concrete for pavements, to examine foundation grades for houses and sewers, and to verify the placement of fill, compaction of subgrade, base/sub-base course and asphalt concrete by insitu density testing, using nuclear gauges.

Finally, it is essential that construction be regarded as an extension of the design phase in the sense that design assumptions are confirmed or revised to conform to actual field conditions as revealed by excavation.

8.0 LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the test hole locations. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that **AME** be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the test holes.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

9.0 CLOSURE

We trust this report provides sufficient information for your present requirements in accordance with our Terms of Reference.

Yours truly,

AME MATERIALS ENGINEERING

Michael Lam, B.Eng. (Civil)
Senior Geotechnical Inspector

Vic Nersesian, P. Eng.
Senior Geotechnical / Environmental Engineer

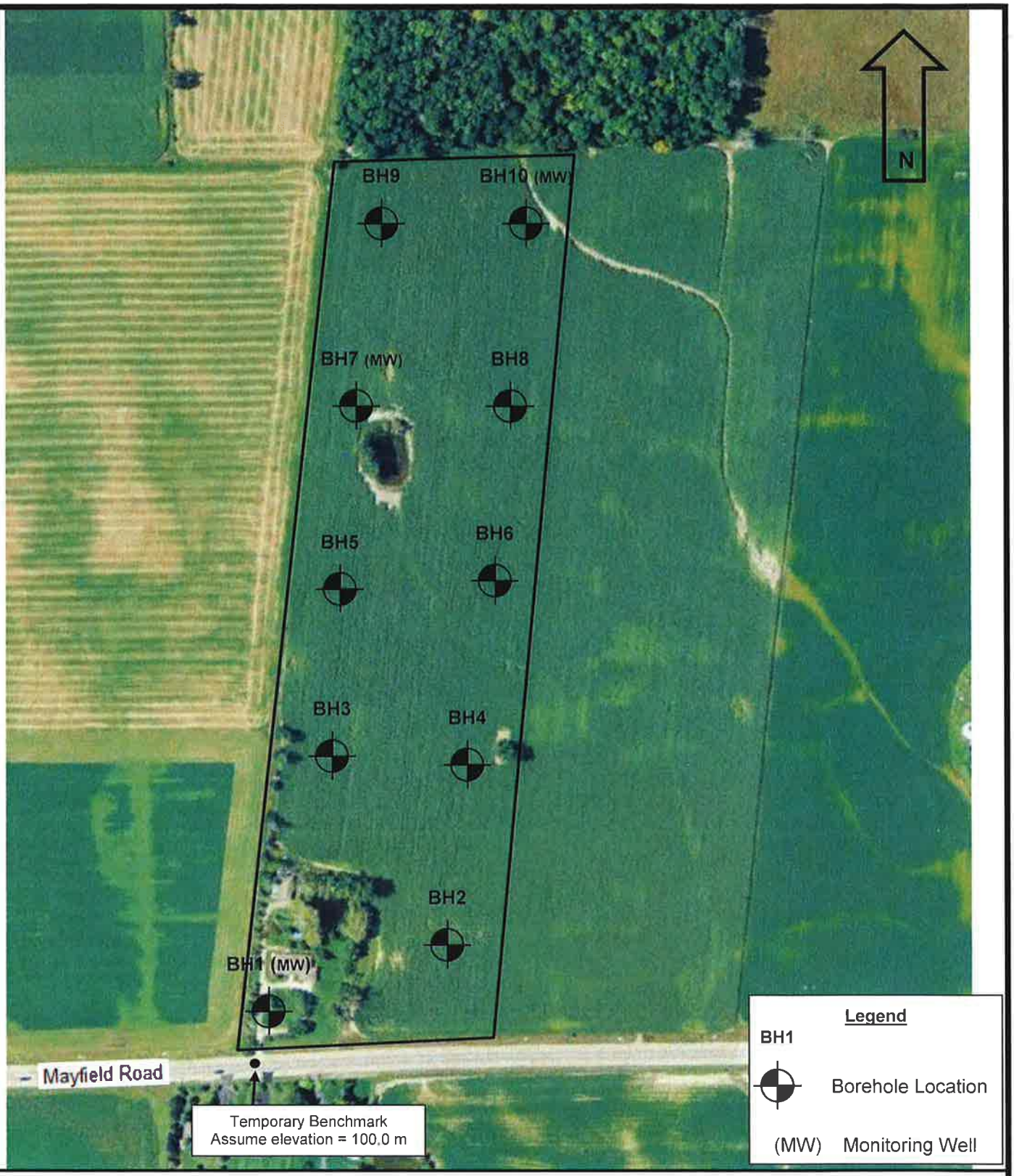
Appendix 1

Figure No. 1-1	**Site Location Plan**
Figure No. 1-2	**Borehole Location Plan**

AME – Materials Engineering
117 Ringwood Drive, Unit # 6
Stouffville, Ontario, L4A 8C1
Tel: (905) 640 7772 Fax: (905) 640 8512

SITE LOCATION PLAN
2256 Mayfield Road
Guglietti Brothers Investments Limited
Caledon Ontario

Project No.:	40367.201
Scale:	NTS
Date:	October, 2011
Figure No.:	1-1



AME Materials Engineering
117 Ringwood Drive, Unit # 6, Stouffville, Ontario, L4A 8C1
Tel: (905) 640-7772 Fax: (905) 640-8512

BOREHOLE LOCATION PLAN

2256 Mayfield Road
Guglietti Brothers Investments Limited

Caledon **Ontario**

Project No.:	40367.201
Scale:	N.T.S.
Date:	October 2011
Figure No.:	1-2

Appendix 2

Figure Nos. 2-1 to 2-10 Log of Boreholes

Log of Borehole 1

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-1

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Topsoil (approx. 300 mm in thickness)	100.87	0
		FILL: Brown, moist to wet, firm, CLAYEY SILT	100.57	
		Native Soil: Greyish brown, moist, firm, CLAYEY SILT	99.97	1
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Stiff to very stiff	99.77 99.69	
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff to hard - With some sand	98.67	2
		SANDY SILT TILL - Grey - Moist to wet - Compact - With silt layer	95.37	3
		End of borehole at 6.55 m	94.32	4

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

6 11 24 26 27 37 17

LOG OF BOREHOLE OLD 40367.201 - 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	6.00	No cave-in
24 hours	1.58	-
Oct 29, 11	1.18	-

Sheet No. 1 of 1

Log of Borehole 2

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-2

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/26/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Topsoil (approx. 350 mm in thickness)	100.86	0
		Native Soil: Brownish grey, moist, soft to firm, CLAYEY SILT	100.51	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Stiff to very stiff	100.06	1
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff	98.66	2
		..... brownish grey	97.56	3
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist to wet - Very stiff to hard		4
		..... wet silt seam ~ 4.5 m to 6.5 m depth		5
		..... greyish brown to grey	92.78	6
		End of borehole at 8.08 m		7 8

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

4 11 20 20 24 20 22 30

LOG OF BOREHOLE OLD 40367 201- 2256 MAYFIELD ROAD GPJ AME_ON GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in

Sheet No. 1 of 1

Log of Borehole 3

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-3

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Topsoil (approx. 300 mm in thickness)	101.78	0
		Native Soil: Greyish brown, moist, firm, CLAYEY SILT	101.48	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Very stiff	101.23	
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff to hard ..... brownish grey	99.98	2
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist - Very stiff - With sand layers .....wet	98.58	3
		..... moist	93.70	8
		End of borehole at 8.08 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT values: 6 (0 m), 29 (1 m), 25 (2 m), 30 (3 m), 34 (4 m), 18 (5 m), 18 (6 m), 28 (8 m)

LOG OF BOREHOLE OLD 40367.201- 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in

Sheet No. 1 of 1

Log of Borehole 4

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-4

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/26/11

Drill Type:

Datum: Assumed

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Topsoil (approx. 400 mm in thickness)	101.68	0
		FILL: Brown, wet, firm, CLAYEY SILT	101.28	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Stiff to very stiff	100.88	1
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff	99.48	2
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist - Very stiff	96.18	5
		End of borehole at 6.55 m	95.13	6

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLING

Natural Unit Weight kN/m³

N values: 5, 16, 15, 22, 29, 23, 27

LOG OF BOREHOLE OLD 40367.201 - 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in

Sheet No. 1 of 1

Log of Borehole 5

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-5

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample	▨	Combustible Vapour Reading	□
Auger Sample	⊠	Natural Moisture Content	×
SPT (N) Value	●	Atterberg Limits	⊢⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	✚ S		

GWL	SYMBOL	SOIL DESCRIPTION	ELEV m	DEPTH
		Topsoil (approx. 300 mm in thickness)	101.96	0
		Native Soil: Brown, wet, firm, CLAYEY SILT	101.66	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Very stiff to hard	101.41	
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Hard - With silty sand seam	99.76	
		..... brownish grey, wet	97.96	
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist to wet - Very stiff	95.41	
		End of borehole at 6.55 m		

Standard Penetration Test N Value: 20 40 60 80

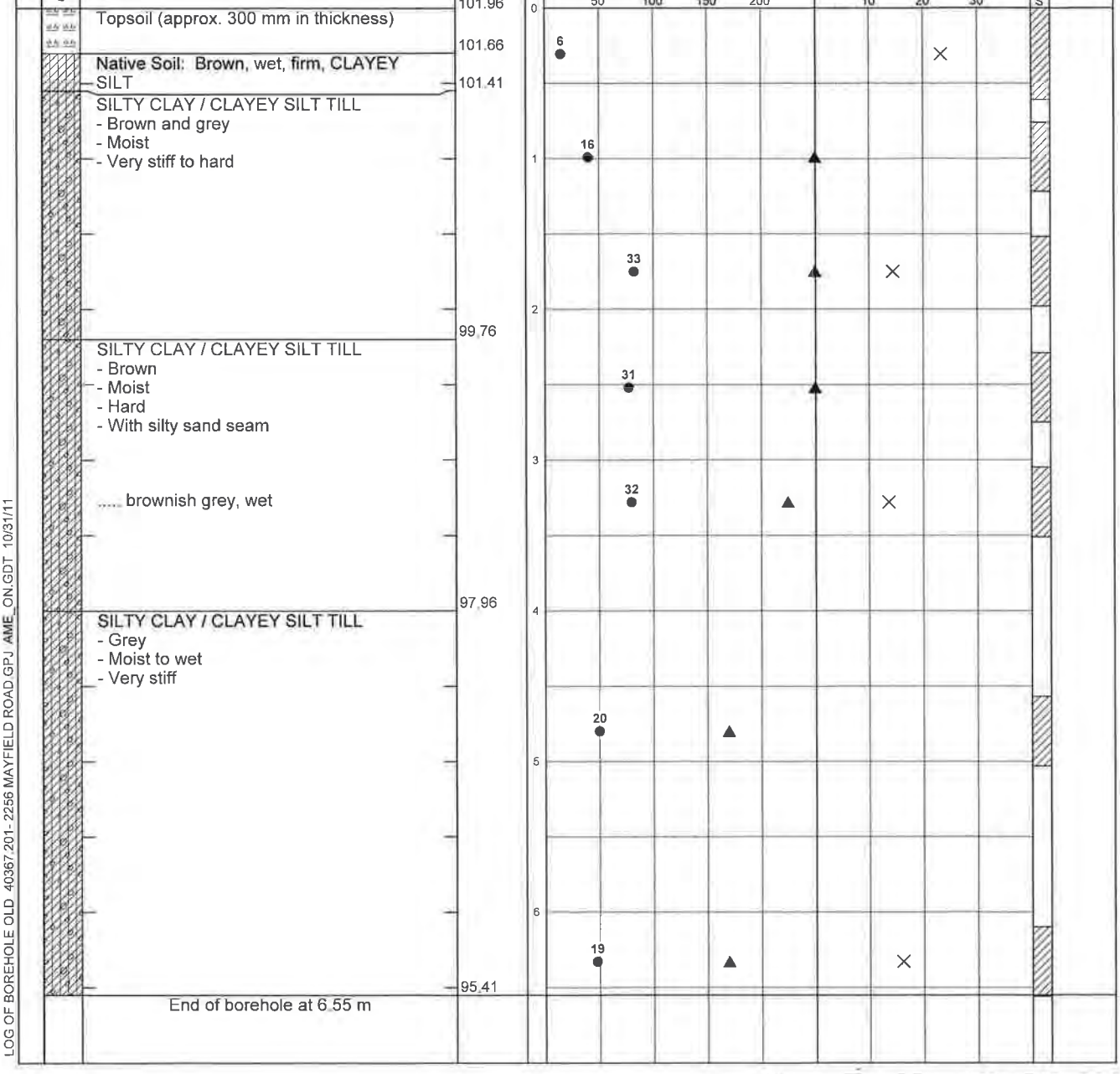
Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³



LOG OF BOREHOLE OLD 40367.201- 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in

Sheet No. 1 of 1

Log of Borehole 6

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-6

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/26/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Topsoil (approx. 300 mm in thickness)	101.32	0
		Native Soil: Greyish brown, moist, firm, CLAYEY SILT	101.02	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Very stiff	100.57	1
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff	99.12	2
		SILT TILL - Brown, changes to grey at 3.3 m depth - Moist - Dense	98.32	3
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist - Very stiff	97.32	4
		End of borehole at 8.08 m	93.24	8

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

6 | 19 | 25 | 25 | 35 | 27 | 27 | 27

LOG OF BOREHOLE OLD 40367.201 - 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in

Log of Borehole 7

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-7

Location: 2256 Mayfield Road, Caledon

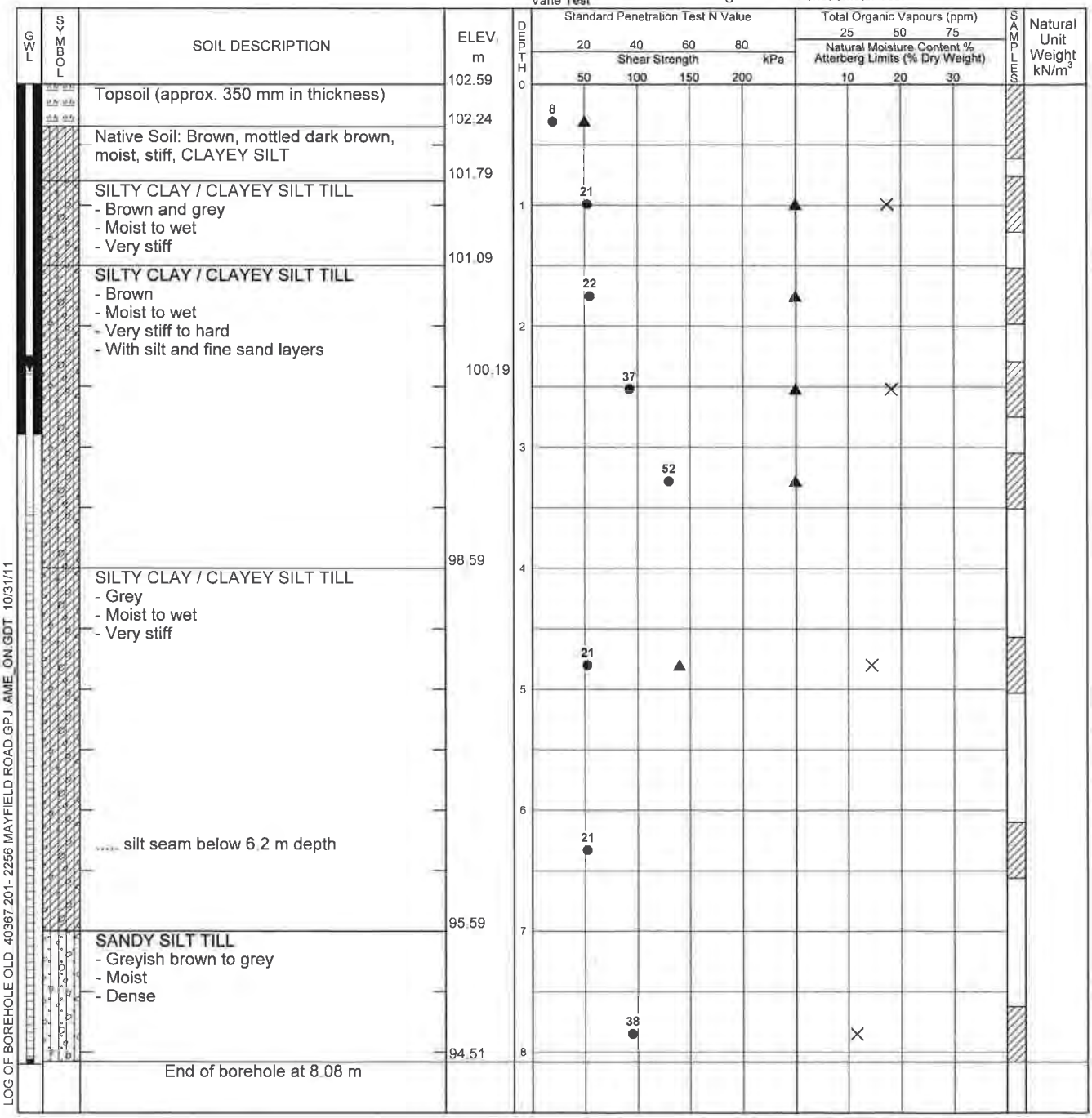
Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test



LOG OF BOREHOLE OLD 40367.201- 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes: Borehole caved to 5.5 m depth upon completion of drillig, and re-augered to 8 m for installation of monitoring well.

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	5.50
24 hours	Dry	-
Oct. 29, 11	2.40	-

Sheet No. 1 of 1

Log of Borehole 8

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-8

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV m	DEPTH
		Topsoil (approx. 350 mm in thickness)	101.93	0
			101.58	
		Native Soil: Greyish brown, moist to wet, soft to firm, CLAYEY SILT	101.43	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Very stiff		1
			100.13	2
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff		
		..... brownish grey	97.93	3
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist - Very stiff		4
				5
				6
		End of borehole at 6.55 m	95.38	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

SPT N values: 4, 21, 20, 24, 27, 17, 24

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in

Sheet No. 1 of 1

LOG OF BOREHOLE OLD 40367.201- 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Log of Borehole 9

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-9

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Topsoil (approx. 250 mm in thickness)	103.11	0
		Native Soil: Brown, wet, loose, SANDY SILT / SILTY SAND	102.86	
		SILTY CLAY / CLAYEY SILT TILL - Brown and grey - Moist - Stiff to very stiff	102.61	
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Hard	101.41	2
		SANDY SILT TILL - Brown - Moist to wet - Compact	100.11	3
		..... brownish grey		5
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist - Stiff to very stiff - With silt seams	97.61	6
		End of borehole at 6.55 m	96.56	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

6 | 26 | 30 | 26 | 27 | 19 | 15

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	5.00

Sheet No. 1 of 1

LOG OF BOREHOLE OLD 40367 201 - 2256 MAYFIELD ROAD GPJ AME_ON GDT 10/31/11

Log of Borehole 10

AME Materials Engineering

Project No.: 40367.201

Project Name: Geotechnical Investigation

Figure No. 2-10

Location: 2256 Mayfield Road, Caledon

Date Drilled: 10/25/11

Drill Type:

Datum: Assumed

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV m	DEPTH
		Topsoil (approx. 300 mm in thickness)	102.57	0
		Native Soil: Brown, wet, stiff, CLAYEY SILT	102.27	
		CLAYEY SILT TILL - Brown and grey - Moist to wet - Very stiff	102.02	
W			100.52	2
		SILTY CLAY / CLAYEY SILT TILL - Brown - Moist - Very stiff to hard	100.37	
		..... brownish grey	99.17	3
		SILTY CLAY / CLAYEY SILT TILL - Grey - Moist to wet - Very stiff to hard		4
		..... wet sand seam at approx. 4.7 m depth		5
			95.57	7
		SANDY SILT TILL - Grey to brownish grey - Moist to wet - Very dense		
			94.65	
		End of borehole at 7.92 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

9 | 21 | 25 | 36 | 27 | 24 | 35 | 50/ 150 mm

LOG OF BOREHOLE OLD 40367.201- 2256 MAYFIELD ROAD.GPJ AME_ON.GDT 10/31/11

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
Upon completion	Dry	No cave-in
24 hours	2.58	
Oct. 29, 11	2.05	-

Appendix 3

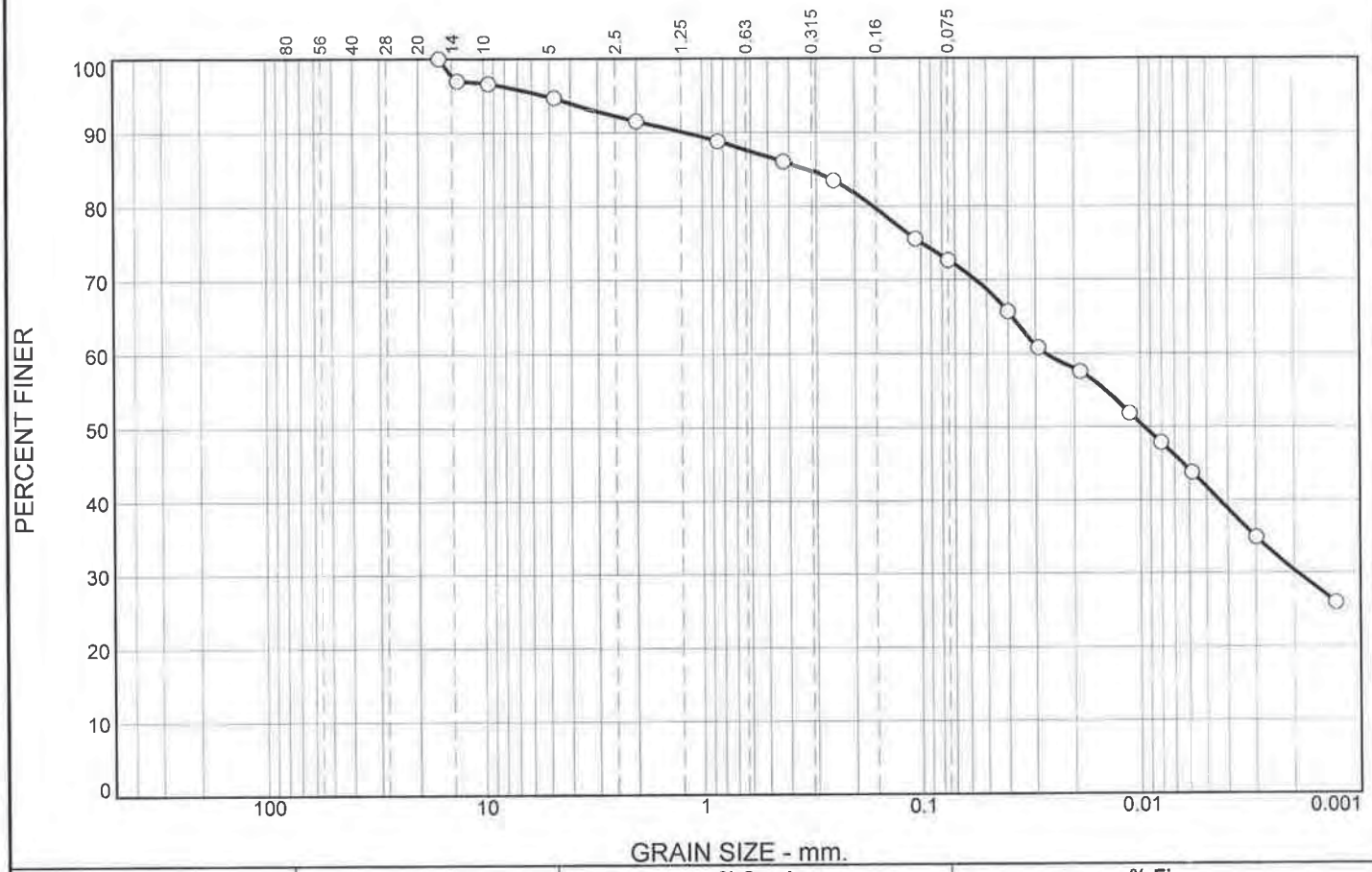
Figures 3-1 to 3-3 **Particle Size Distribution Curves**

Figure 3-4 **Liquid and Plastic Limits Test Report**

Certificate of Analysis for Soil Corrosivity and Water Soluble Sulphate Content

Certificate of Analysis for O. Reg. 153 (Metals and Inorganics in Soil, OC Pesticides + PCBs in Soil, Petroleum Hydrocarbons in Soil)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.3	3.1	5.5	13.5	30.8	41.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
16 mm	100.0		
13.2 mm	97.0		
9.5 mm	96.7		
4.75 mm	94.7		
2.00 mm	91.6		
0.850 mm	88.8		
0.425 mm	86.1		
0.250 mm	83.6		
0.106 mm	75.6		
0.075 mm	72.6		
0.0402 mm.	65.7		
0.0292 mm.	60.8		
0.0188 mm.	57.6		
0.0112 mm.	51.9		
0.0081 mm.	47.8		
0.0058 mm.	43.8		
0.0030 mm.	34.9		
0.0013 mm.	25.9		

* (no specification provided)

Soil Description

Brown silty clay with some sand & trace of gravel.

Atterberg Limits

PL= 16 LL= 30 PI= 14

Coefficients

D_{90}= 1.1998 D_{85}= 0.3239 D_{60}= 0.0270
D_{50}= 0.0096 D_{30}= 0.0019 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

Sampled by G.S. on Oct 25, 2011

Location: BH1, S4
Sample Number: E7712

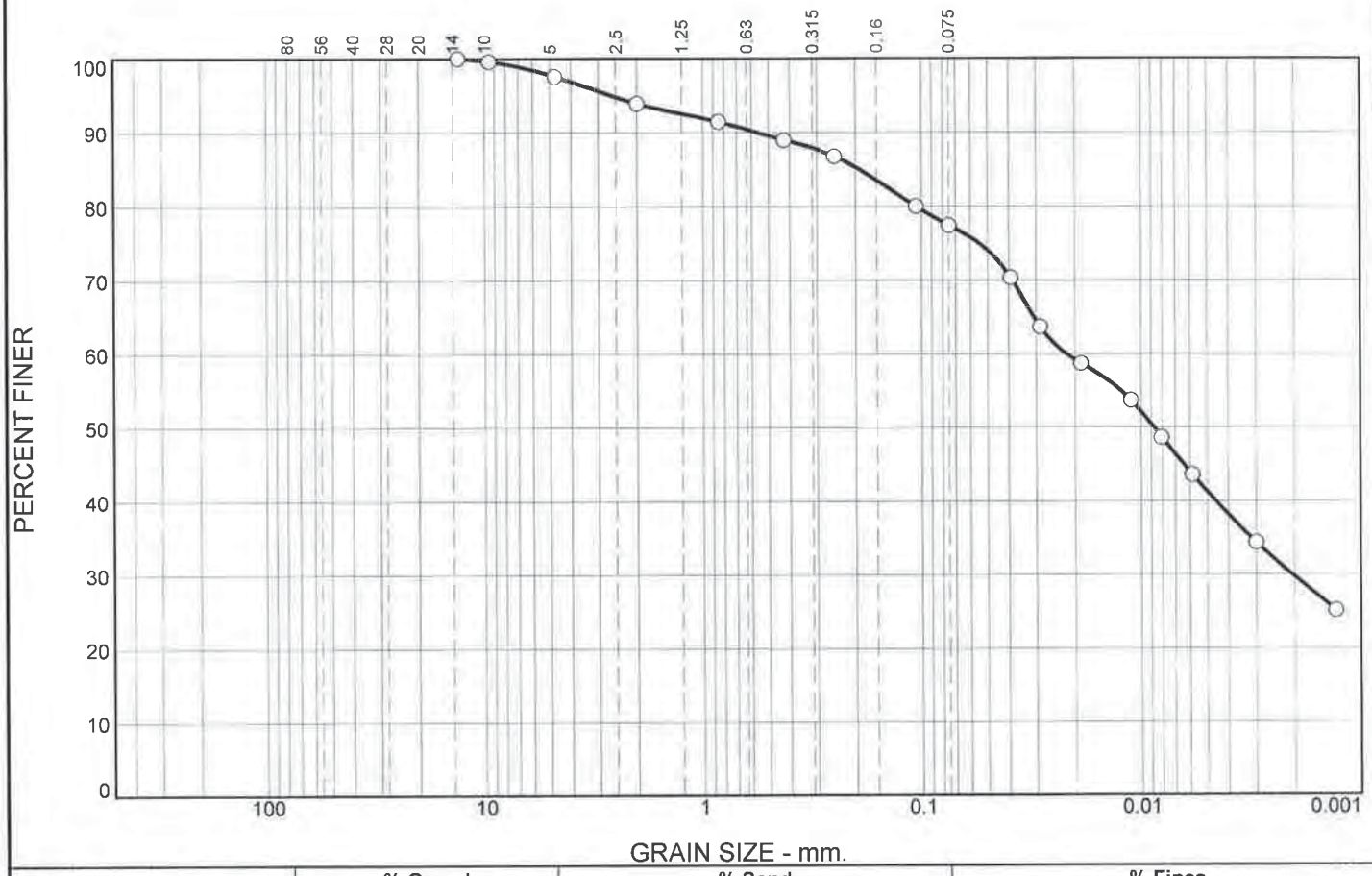
Date:

AME Materials Engineering

Client: Guglietti Brothers Investments Ltd.
Project: Prop. Residential Development 2256 Mayfield Road,Caledon.

Project No: 40367.201 **Figure** 3 - 1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	3.7	4.9	11.5	36.2	41.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
13.2 mm	100.0		
9.5 mm	99.6		
4.75 mm	97.6		
2.00 mm	93.9		
0.850 mm	91.5		
0.425 mm	89.0		
0.250 mm	86.8		
0.106 mm	80.0		
0.075 mm	77.5		
0.0392 mm.	70.4		
0.0288 mm.	63.7		
0.0187 mm.	58.7		
0.0111 mm.	53.6		
0.0081 mm.	48.6		
0.0058 mm.	43.6		
0.0030 mm.	34.4		
0.0013 mm.	25.1		

* (no specification provided)

Soil Description

Grey silty clay with some sand and trace of gravel.

Atterberg Limits

PL= 14 LL= 25 PI= 11

Coefficients

D_{90}= 0.5605 D_{85}= 0.1914 D_{60}= 0.0219
D_{50}= 0.0088 D_{30}= 0.0021 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

Sampled by G.S. on Oct 25, 2011

Location: BH3,S6
Sample Number: E7712

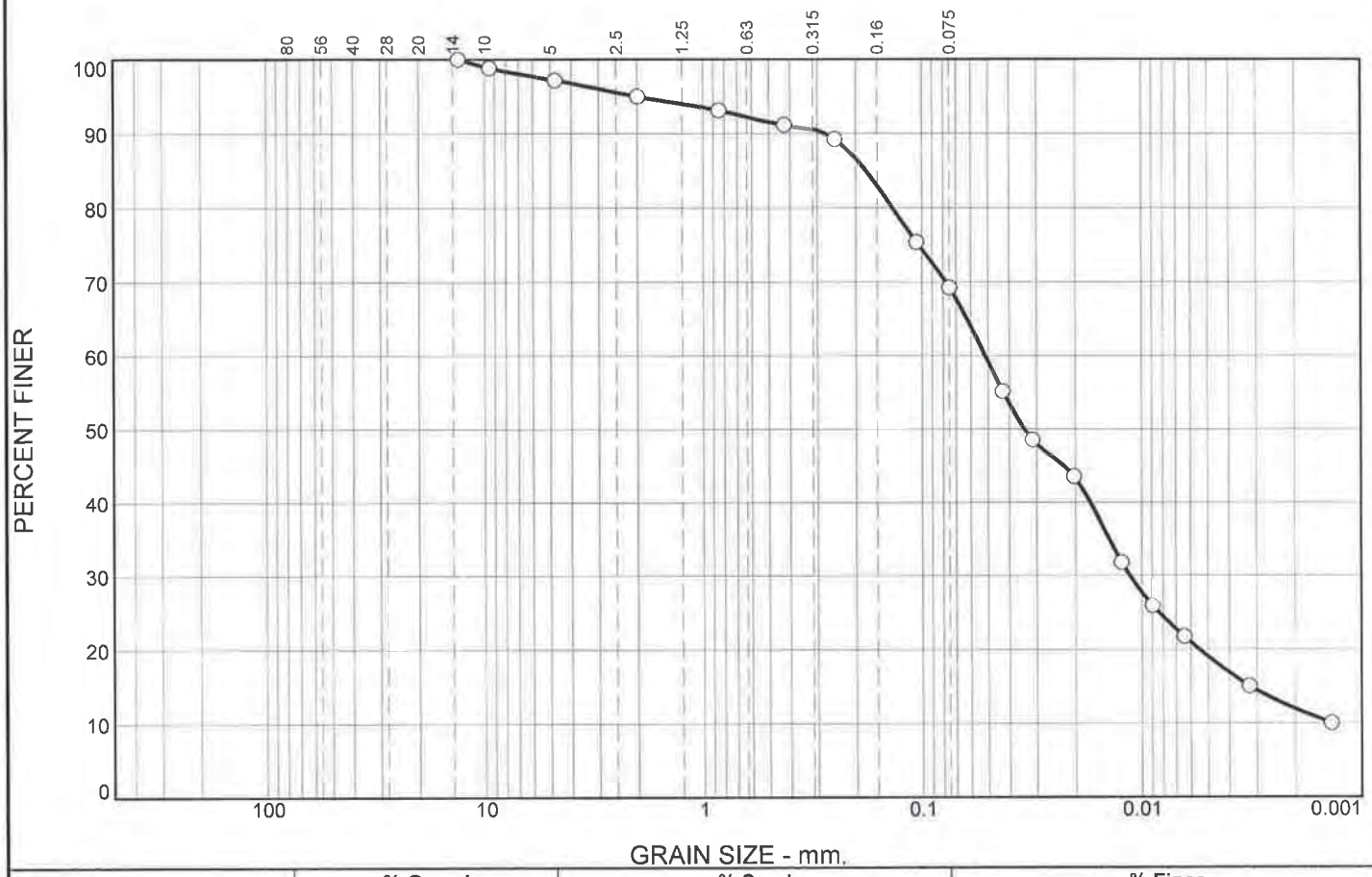
Date:

AME Materials Engineering

Client: Guglietti Brothers Investments Ltd.
Project: Prop. Residential Development 2256 Mayfield Road,Caledon.

Project No: 40367.201 **Figure** 3 - 2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.8	2.2	3.8	21.9	50.3	19.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
13.2 mm	100.0		
9.5 mm	98.8		
4.75 mm	97.2		
2.00 mm	95.0		
0.850 mm	93.1		
0.425 mm	91.2		
0.250 mm	89.3		
0.106 mm	75.4		
0.075 mm	69.3		
0.0430 mm.	55.2		
0.0314 mm.	48.5		
0.0203 mm.	43.5		
0.0124 mm.	31.8		
0.0089 mm.	25.9		
0.0064 mm.	21.8		
0.0032 mm.	15.1		
0.0014 mm.	10.0		

* (no specification provided)

Soil Description

Brown sandy silt with some clay and trace of gravel.

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2761 D_{85}= 0.1800 D_{60}= 0.0515
D_{50}= 0.0342 D_{30}= 0.0114 D_{15}= 0.0032
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sampled by G.S. on Oct 25, 2011

Location: BH9, S5
Sample Number: E7712

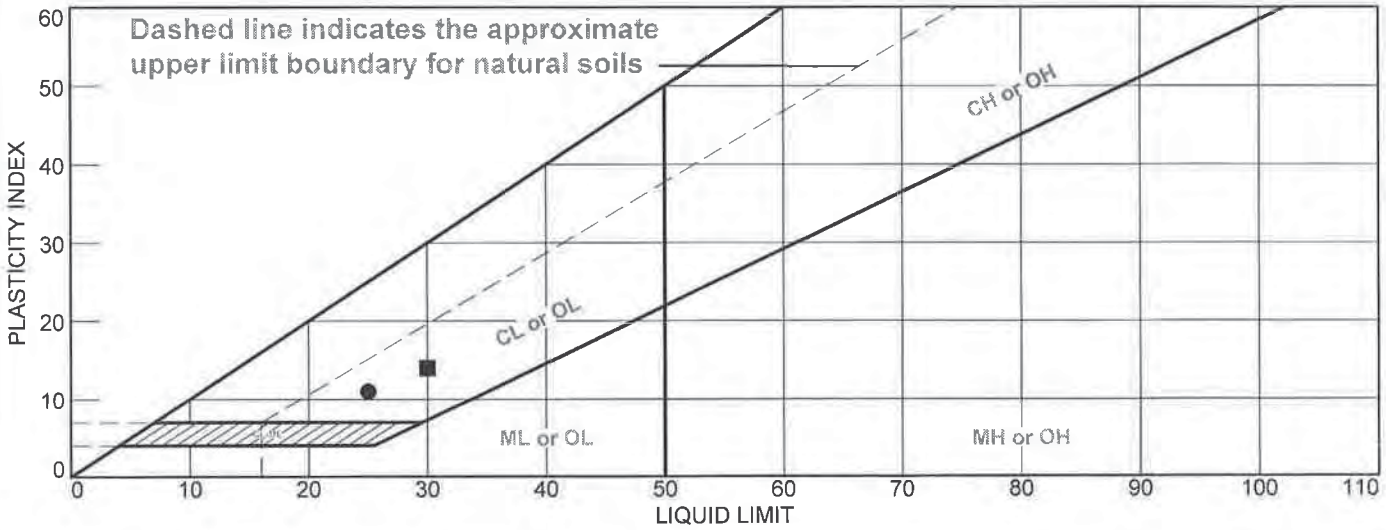
Date:

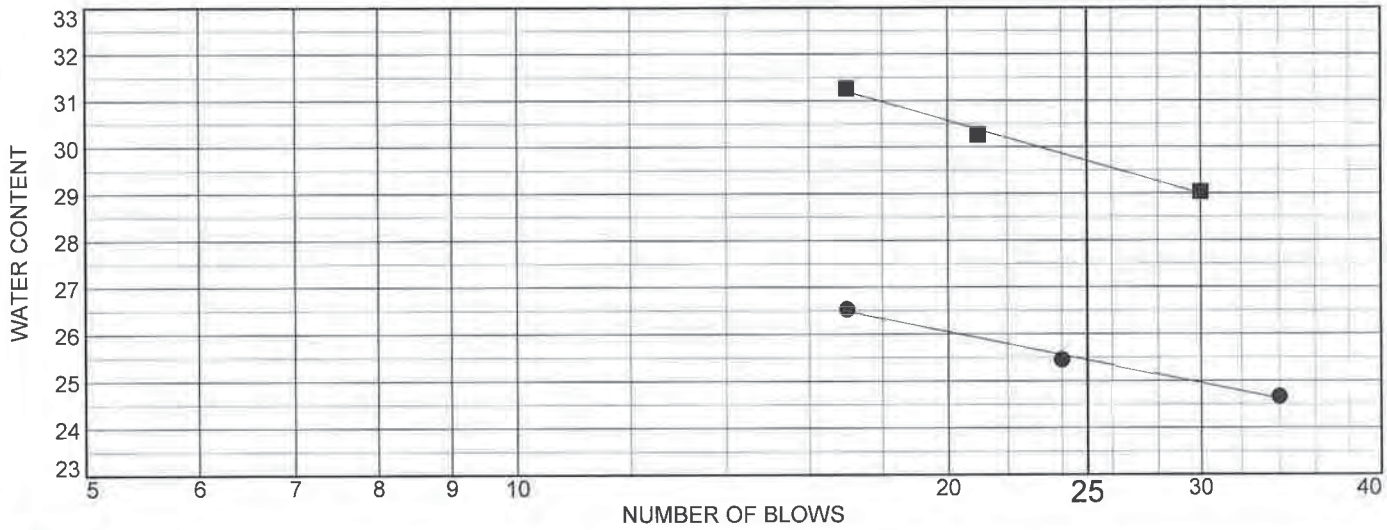
AME Materials Engineering

Client: Guglietti Brothers Investments Ltd.
Project: Prop. Residential Development 2256 Mayfield Road,Caledon.

Project No: 40367.201 **Figure** 3 - 3

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grey silty clay with some sand and trace of gravel.	25	14	11	89.0	77.5	CL
■	Brown silty clay with some sand & trace of gravel.	30	16	14	86.1	72.6	CL

Project No. 40367.201 **Client:** Guglietti Brothers Investments Ltd.

Project: Prop. Residential Development 2256 Mayfield Road,Caledon.

● **Location:** BH3,S6 **Sample Number:** E7712

■ **Location:** BH1, S4 **Sample Number:** E7712

Remarks:

AME
Materials Engineering

Figure 3 - 4

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: AME MATERIALS ENGINEERING
117 RINGWOOD DRIVE UNIT 6
STOUFFVILLE, ON L4A8C1

ATTENTION TO: Sebastian Nicholas

PROJECT NO: 40367.201

AGAT WORK ORDER: 11T542775

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

DATE REPORTED: Oct 31, 2011

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T542775

PROJECT NO: 40367.201

CLIENT NAME: AME MATERIALS ENGINEERING

ATTENTION TO: Sebastian Nicholas

Corrosivity Package

DATE SAMPLED: Oct 25, 2011 | **DATE RECEIVED: Oct 26, 2011** | **DATE REPORTED: Oct 31, 2011** | **SAMPLE TYPE: Soil**

Parameter	Unit	G / S	RDL	BH1 -S3 2842147	BH7 -S4 2842151
Sulphide*	%		0.01	<0.01	<0.01
Chloride (2:1)	µg/g		2	9	5
Sulphate (2:1)	µg/g		2	49	37
pH (2:1)	pH Units		N/A	8.41	8.75
Electrical Conductivity (2:1)	mS/cm	0.57	0.002	0.171	0.191
Resistivity (2:1)	ohm.cm		1	5850	5240
Redox Potential (2:1)	mV		5	202	205

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

2842147-2842151 * Analysis was performed at AGAT's Mining Division.

EC,pH,Chloride,Redox Potential and Sulphate were determined on the extract obtained from the 2:1 extraction procedure (2 parts DI water: 1 part soil).

Certified By: Tony Nash

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T542775

PROJECT NO: 40367.201

CLIENT NAME: AME MATERIALS ENGINEERING

ATTENTION TO: Sebastian Nicholas

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE SAMPLED: Oct 25, 2011 | **DATE RECEIVED: Oct 26, 2011** | **DATE REPORTED: Oct 31, 2011** | **SAMPLE TYPE: Soil**

Parameter	Unit	G / S	RDL	BH1 -S3 2842147
Benzene	µg/g	0.02	0.02	<0.02
Toluene	µg/g	0.2	0.08	<0.08
Ethylbenzene	µg/g	0.05	0.05	<0.05
Xylene Mixture	µg/g	0.05	0.05	<0.05
F1 (C6 to C10)	µg/g		5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5
F2 (C10 to C16)	µg/g	10	10	<10
F3 (C16 to C34)	µg/g	240	50	<50
F4 (C34 to C50)	µg/g	120	50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	13.0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

2842147
Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX contributions.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Certified By: Jordy Takeuchi

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Quality Assurance

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T542775

PROJECT NO: 40367.201

ATTENTION TO: Sebastian Nicholas

Soil Analysis

RPT Date: Oct 31, 2011			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Corrosivity Package															
Sulphide*	1	2842147	< 0.01	<0.01		< 0.01	98%	90%	110%						
Chloride (2:1)	1		7	10		< 2	100%	90%	110%	97%	80%	120%	107%	70%	130%
Sulphate (2:1)	1		143	141	1.4%	< 2	103%	90%	110%	97%	80%	120%	114%	70%	130%
pH (2:1)	1	2842147	8.41	8.51	1.2%	N/A	95%	90%	110%						
Electrical Conductivity (2:1)	1		0.254	0.249	2.0%	< 0.002	108%	90%	110%						
Redox Potential (2:1)	1		207	210	1.4%	< 5	110%	70%	130%						

Certified By: Tony Iyaah

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Quality Assurance

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T542775

PROJECT NO: 40367.201

ATTENTION TO: Sebastian Nicholas

Trace Organics Analysis

RPT Date: Oct 31, 2011			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (Soil)															
Benzene	1		< 0.02	< 0.02	0.0%	< 0.02	118%	50%	140%	118%	60%	130%	101%	50%	140%
Toluene	1		< 0.08	< 0.08	0.0%	< 0.08	117%	50%	140%	112%	60%	130%	103%	50%	140%
Ethylbenzene	1		< 0.05	< 0.05	0.0%	< 0.05	118%	50%	140%	117%	60%	130%	110%	50%	140%
Xylene Mixture	1		< 0.05	< 0.05	0.0%	< 0.05	109%	50%	140%	116%	60%	130%	115%	50%	140%
F1 (C6 to C10)	1		< 5	< 5	0.0%	< 5	125%	60%	140%	102%	80%	120%	98%	60%	140%
F2 (C10 to C16)	1		< 10	< 10	0.0%	< 10	101%	60%	140%	105%	80%	120%	96%	60%	140%
F3 (C16 to C34)	1		< 50	< 50	0.0%	< 50	104%	60%	140%	109%	80%	120%	100%	60%	140%
F4 (C34 to C50)	1		< 50	< 50	0.0%	< 50	105%	60%	140%	98%	80%	120%	108%	60%	140%

Certified By: Jacky Takeuchi

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Method Summary

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T542775

PROJECT NO: 40367.201

ATTENTION TO: Sebastian Nicholas

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Sulphide*	MIN-200-12000	ASTM E1915-07a	LECO C_S
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Electrical Conductivity (2:1)	INOR 1036	McKeague 4.12, SM 2510 B	EC METER
Resistivity (2:1)	INOR 1036		CALCULATION
Redox Potential (2:1)		SM 2510 B	REDOX POTENTIAL ELECTRODE
Trace Organics Analysis			
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	Balance

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http://webearth.agatlabs.com - www.agatlabs.com

Chain of Custody

10/26/11

Laboratory use Only
Arrival Condition: Good ☐ Poor ☐ (Complete 'notes')
Arrival Temperature: 9.4
AGAT job number: 11T542775

Notes: Complete the Notes

Client Information:
Company: AME Materials Engineering
Contact Address: 117 Ringwood Drive, Unit 6, Stouffville, ON, L4A 8C1
Phone: 905-640-7772 PO#: E 7712 AGAT Quotation #:
Fax: 905-640-8512 Client Project #: 40367.201

Report Information:
Name: Sebastian Nicholas
e-mail: sebastiann@amecorp.ca
Name: Vic Nersesian
e-mail: vicn@amecorp.ca

Invoice To: Same Yes ☑ No ☐
Company:
Contact Address:
Phone: PO#
Fax:

Report Format:
Single sample per page ☐
Multiple Samples per page ☑
Results by Fax ☐

Turnaround Time Required (TAT)
Regular TAT 5 to 7 working days ☐
Rush TAT 3 to 5 working days ☑
Rush surcharges may apply: 48 to 72 hours ☐; 24 to 48 hours ☐
Date Required: 10/31/11 MM DD YY

Regulatory Guidelines Requirements (Check):
Reg 153 Table: Ind./Com ☐ Res./Park ☑ Agricultural ☐ Med./Fine ☐ Coarse ☐ Region
Sewer Use: Sanitary ☐ Storm ☐ PWQO ☐ Reg 558 ☐ CCME ☐ Other ☐

Is this a drinking water sample (potable water intended for human consumption)? Yes ☐ No ☑
If "Yes" please use the Drinking Water Chain of Custody Record

Sample Identification	Date / Time Sample	Sample Matrix	Comments / Special Instructions / Sample Info / Sample Containment	Number of Containers	Metals and Inorganics	Metals Scan (Incl. Hg, B, Cr)	CCME Fractions 1 to 4	VOCs	PAHs	PCBs	Storm Sewer Use	Sanitary Sewer Use	TCLP Metals and Inorganics	TCLP	Other 1	Other 2	Other 3	Other 4	Other 5
BH1 - S3	10/25/2011 MM DD YY 00:00pm	Sed./Soil	Bottle and vial	3			✓								✓				
BH7 - S4	10/25/2011 MM DD YY 00:00pm	Sed./Soil	Bottle	1											✓				
	MM DD YY 00:00pm	Sed./Soil																	
	MM DD YY 00:00pm	Sed./Soil																	
	MM DD YY 00:00pm	Sed./Soil																	
	MM DD YY 00:00pm	Sed./Soil																	
	MM DD YY 00:00pm	Sed./Soil																	
			TOTAL # OF CONTAINERS	4															

* Samples received after 2:00 PM will be logged in for the next business day. TAT is exclusive of weekends and statutory holidays

* Please describe "Other" and/or following fields
Other 1: Corrosivity Package | Other 2: | Other 3:
Other 4: | Other 5: | Other 6:

Sample Relinquished By:
Selim Lutfur — Date 10/26/11
Print Name / Sign Name / MM DD YY

Sample Received By:
Print Name / Sign Name / Date 10/26/11 MM DD YY 10:30

Special Instructions

Page 1 of 1

RESET SUBMIT

AGAT Laboratories

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TEL (905)712-5100
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http://www.agatlabs.com

CLIENT NAME: AME MATERIALS ENGINEERING
117 RINGWOOD DRIVE UNIT 6
STOUFFVILLE, ON L4A8C1

ATTENTION TO: Vic Nersesian

PROJECT NO: 40367.201

AGAT WORK ORDER: 11T541641

SOIL ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory Manager

DATE REPORTED: Oct 28, 2011

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

CLIENT NAME: AME MATERIALS ENGINEERING

ATTENTION TO: Vic Nersesian

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE SAMPLED: Oct 21, 2011 | DATE RECEIVED: Oct 21, 2011 | DATE REPORTED: Oct 28, 2011 | SAMPLE TYPE: Soil

Parameter	Unit	G / S	RDL	A 2828028	B 2828042	C 2828043	D 2828045
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	4	4	5	4
Barium	µg/g	220	2	72	71	81	62
Beryllium	µg/g	2.5	0.5	1.0	0.9	1.0	0.7
Boron	µg/g	36	5	8	8	7	5
Boron (Hot Water Soluble)	µg/g		0.10	0.93	0.93	0.91	0.71
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	2	24	23	22	20
Cobalt	µg/g	21	0.5	9.4	8.9	8.8	7.1
Copper	µg/g	92	1	22	21	22	19
Lead	µg/g	120	1	15	13	14	13
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	18	18	17	14
Selenium	µg/g	1.5	0.4	<0.4	0.4	<0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4	<0.4
Uranium	ug/g	2.5	0.5	0.6	0.7	1.1	0.7
Vanadium	µg/g	86	1	33	30	31	26
Zinc	µg/g	290	5	77	79	71	66
Chromium VI	µg/g	0.66	0.2	<0.2	<0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.05	<0.05	<0.05	0.05	0.06
Mercury	µg/g	0.27	0.01	0.03	0.03	0.04	0.03
Electrical Conductivity	mS/cm	0.57	0.002	0.176	0.249	0.150	0.139
Sodium Adsorption Ratio	N/A	2.4	N/A	0.394	0.402	0.442	0.349
pH, 2:1 CaCl2 Extraction	pH Units			7.06	7.25	6.69	6.28

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

2828028-2828045 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

CLIENT NAME: AME MATERIALS ENGINEERING

ATTENTION TO: Vic Nersesian

O. Reg. 153(511) - OC Pesticides + PCBs (Soil)

DATE SAMPLED: Oct 21, 2011 | DATE RECEIVED: Oct 21, 2011 | DATE REPORTED: Oct 28, 2011 | SAMPLE TYPE: Soil

Parameter	Unit	G / S	RDL	A 2828028	B 2828042	C 2828043	D 2828045
Gamma-Hexachlorocyclohexane	µg/g	0.01	0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor Epoxide	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan	µg/g	0.04	0.005	<0.005	<0.005	<0.005	<0.005
Chlordane	µg/g	0.05	0.007	<0.007	<0.007	<0.007	<0.007
DDD	µg/g	0.05	0.007	<0.007	<0.007	<0.007	<0.007
DDE	µg/g	0.05	0.007	<0.007	<0.007	<0.007	0.008
DDT	µg/g	1.4	0.007	<0.007	<0.007	<0.007	0.014
Dieldrin	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005
Endrin	µg/g	0.04	0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	µg/g	0.05	0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	µg/g	0.01	0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobutadiene	µg/g	0.01	0.01	<0.01	<0.01	<0.01	<0.01
Hexachloroethane	µg/g	0.01	0.01	<0.01	<0.01	<0.01	<0.01
Aroclor 1242	µg/g		0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1248	µg/g		0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1254	µg/g		0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1260	µg/g		0.10	<0.10	<0.10	<0.10	<0.10
Polychlorinated Biphenyls	µg/g	0.3	0.10	<0.10	<0.10	<0.10	<0.10
Moisture Content	%		0.1	22.7	23.5	20.6	20.9
Surrogate	**Unit**	**Acceptable Limits**					
TCMX	%	50-140		64	69	77	71
Decachlorobiphenyl	%	60-140		94	105	106	92

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

2828028-2828045 Results are based on the dry weight of the soil.
Note: DDT applies to the total of op'DDT and pp'DDT, DDD applies to the total of op'DDD and pp'DDD and DDE applies to the total of op'DDE and pp'DDE. Endosulfan applies to the total of Endosulfan I and Endosulfan II.
Chlordane applies to the total of Alpha-Chlordane and Gamma-Chlordane.

Certified By: Jacky Takeuchi

AGAT Laboratories

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Guideline Violation

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

CLIENT NAME: AME MATERIALS ENGINEERING

ATTENTION TO: Vic Nersesian

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
2828045	D	T1(ALL) - Current	O. Reg. 153(511) - Metals & Inorganics (Soil)	Cyanide	0.051	0.06

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Quality Assurance

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

ATTENTION TO: Vic Nersesian

Soil Analysis

RPT Date: Oct 28, 2011			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	1		< 0.8	< 0.8	0.0%	< 0.8	110%	70%	130%	86%	80%	120%	89%	70%	130%
Arsenic	1		2	2	0.0%	< 1	111%	70%	130%	101%	80%	120%	110%	70%	130%
Barium	1		56	54	3.6%	< 2	99%	70%	130%	94%	80%	120%	98%	70%	130%
Beryllium	1		< 0.5	< 0.5	0.0%	< 0.5	125%	70%	130%	113%	80%	120%	129%	70%	130%
Boron	1		7	7	0.0%	< 5	83%	70%	130%	108%	80%	120%	113%	70%	130%
Boron (Hot Water Soluble)	1	2828028	0.93	0.98	5.2%	< 0.10	106%	60%	140%	108%	70%	130%	108%	60%	140%
Cadmium	1		< 0.5	< 0.5	0.0%	< 0.5	99%	70%	130%	103%	80%	120%	97%	70%	130%
Chromium	1		24	25	4.1%	< 2	100%	70%	130%	99%	80%	120%	105%	70%	130%
Cobalt	1		3.9	3.8	2.6%	< 0.5	101%	70%	130%	93%	80%	120%	97%	70%	130%
Copper	1		19	18	5.4%	< 1	102%	70%	130%	99%	80%	120%	98%	70%	130%
Lead	1		31	28	10.2%	< 1	102%	70%	130%	95%	80%	120%	96%	70%	130%
Molybdenum	1		< 0.5	< 0.5	0.0%	< 0.5	100%	70%	130%	98%	80%	120%	105%	70%	130%
Nickel	1		7	7	0.0%	< 1	101%	70%	130%	92%	80%	120%	93%	70%	130%
Selenium	1		< 0.4	< 0.4	0.0%	< 0.4	106%	70%	130%	90%	80%	120%	99%	70%	130%
Silver	1		< 0.2	< 0.2	0.0%	< 0.2	108%	70%	130%	118%	80%	120%	121%	70%	130%
Thallium	1		< 0.4	< 0.4	0.0%	< 0.4	95%	70%	130%	96%	80%	120%	97%	70%	130%
Uranium	1		< 0.5	< 0.5	0.0%	< 0.5	102%	70%	130%	93%	80%	120%	97%	70%	130%
Vanadium	1		20	19	5.1%	< 1	98%	70%	130%	92%	80%	120%	98%	70%	130%
Zinc	1		102	97	5.0%	< 5	102%	70%	130%	99%	80%	120%	98%	70%	130%
Chromium VI	1	2828045	< 0.2	< 0.2	0.0%	< 0.2	93%	70%	130%	98%	80%	120%	95%	70%	130%
Cyanide	1		< 0.05	< 0.05	0.0%	< 0.05	100%	70%	130%	109%	80%	120%	108%	70%	130%
Mercury	1		0.15	0.15	0.0%	< 0.01	94%	70%	130%	105%	80%	120%	113%	70%	130%
Electrical Conductivity	1		0.329	0.351	6.5%	< 0.002	96%	90%	110%						
Sodium Adsorption Ratio	1		2.29	2.36	3.0%	N/A									
pH, 2:1 CaCl2 Extraction	1		7.19	7.28	1.2%	<	102%	90%	110%						

Certified By:

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Quality Assurance

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

ATTENTION TO: Vic Nersesian

Trace Organics Analysis

RPT Date: Oct 28, 2011			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - OC Pesticides + PCBs (Soil)															
Gamma-Hexachlorocyclohexane	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	103%	50%	140%	112%	50%	140%	120%	50%	140%
Heptachlor	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	93%	50%	140%	120%	50%	140%	114%	50%	140%
Aldrin	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	111%	50%	140%	114%	50%	140%	120%	50%	140%
Heptachlor Epoxide	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	96%	50%	140%	102%	50%	140%	119%	50%	140%
Endosulfan	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	103%	50%	140%	104%	50%	140%	118%	50%	140%
Chlordane	1	2828045	< 0.007	< 0.007	0.0%	< 0.007	107%	50%	140%	102%	50%	140%	89%	50%	140%
DDD	1	2828045	< 0.007	< 0.007	0.0%	< 0.007	120%	50%	140%	98%	50%	140%	112%	50%	140%
DDE	1	2828045	0.008	0.008	0.0%	< 0.007	109%	50%	140%	104%	50%	140%	87%	50%	140%
DDT	1	2828045	0.014	0.014	0.0%	< 0.007	120%	50%	140%	96%	50%	140%	113%	50%	140%
Dieldrin	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	106%	50%	140%	90%	50%	140%	90%	50%	140%
Endrin	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	120%	50%	140%	91%	50%	140%	87%	50%	140%
Methoxychlor	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	120%	50%	140%	92%	50%	140%	87%	50%	140%
Hexachlorobenzene	1	2828045	< 0.005	< 0.005	0.0%	< 0.005	103%	50%	140%	93%	50%	140%	90%	50%	140%
Hexachlorobutadiene	1	2828045	< 0.01	< 0.01	0.0%	< 0.01	96%	50%	140%	104%	50%	140%	112%	50%	140%
Hexachloroethane	1	2828045	< 0.01	< 0.01	0.0%	< 0.01	84%	50%	140%	102%	50%	140%	114%	50%	140%
Polychlorinated Biphenyls	1	2828045	< 0.10	< 0.10	0.0%	< 0.10	120%	60%	140%	90%	60%	140%	96%	60%	140%

Certified By: Jacky Takeuchi

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Method Summary

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

ATTENTION TO: Vic Nersesian

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6101	EPA SW 846 7471A 245.5	CVAAS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

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Method Summary

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T541641

PROJECT NO: 40367.201

ATTENTION TO: Vic Nersesian

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Gamma-Hexachlorocyclohexane	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Heptachlor	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Aldrin	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Heptachlor Epoxide	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Endosulfan	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Chlordane	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
DDD	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
DDE	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
DDT	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Dieldrin	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Endrin	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Methoxychlor	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Hexachlorobenzene	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Hexachlorobutadiene	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Hexachloroethane	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Aroclor 1242	ORG-91-5113	EPA SW-846 3541, 3620 & 8082	GC/ECD
Aroclor 1248	ORG-91-5113	EPA SW-846 3541, 3620 & 8082	GC/ECD
Aroclor 1254	ORG-91-5113	EPA SW-846 3541, 3620 & 8082	GC/ECD
Aroclor 1260	ORG-91-5113	EPA SW-846 3541, 3620 & 8082	GC/ECD
Polychlorinated Biphenyls	ORG-91-5113	EPA SW-846 3541, 3620 & 8082	GC/ECD
TCMX	ORG-91-5112	EPA SW-846 3541, 3620,8081	GC/ECD
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541, 3620,8081	GC/ECD
Moisture Content		MOE E3139	BALANCE

sm due cooler

AGAT Laboratories

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http://webearth.agatlabs.com - www.agatlabs.com

Chain of Custody

10/21/11

Laboratory use Only
Arrival Condition: Good ☑ Poor ☐ (Complete 'notes')
Arrival Temperature: 3.6 C
AGAT job number: 11T541641

Notes:

Client Information:
Company: AME Materials Engineering
Contact Address: 117 Ringwood Drive, Unit 6, Stouffville, ON, L4A 8C1
Phone: 905-640-7772 PO#: _____ AGAT Quotation #: AME Rate
Fax: 905-640-8512 Client Project #: 40367.201

Report Information:
Name: Vic Nersesian
e-mail: vicn@amecorp.ca
Name: Sebastian Nicholas
e-mail: sebastiann@amecorp.ca

Invoice To: Same Yes ☑ No ☐
Company:
Contact Address:
Phone: _____ PO# _____
Fax: _____

Report Format:
Single sample per page ☐
Multiple Samples per page ☑
Results by Fax ☐

Turnaround Time Required (TAT)
Regular TAT 5 to 7 working days ☑
Rush TAT 3 to 5 working days ☐
Rush surcharges may apply: 48 to 72 hours ☐; 24 to 48 hours ☐
Date Required: 10/28/11 MM DD YY

Regulatory Guidelines Requirements (Check):
Reg 153 Table #1
Ind./Com ☐ Med./Fine ☐ Region Reg. 511/09
Res./Park ☐ Coarse ☐
Agricultural ☐
Sewer Use
Sanitary ☐ Reg 558 ☐
Storm ☐ CCME ☐
PWQO ☐ Other ☐ _____

Is this a drinking water sample (potable water intended for human consumption)? Yes ☐ No ☑
If "Yes" please use the Drinking Water Chain of Custody Record

Sample Identification	Date/Time Sample	Sample Matrix	Comments: Site/Sample Info Sample Containment	Number of Containers	Metals and Inorganics	Metals Scan (Incl. Hg & Cr6)	CCME Fractions F1-F4	VOCs	PAHs	PCBs	Storm Sewer Use	Sanitary Sewer Use	TCLP Metals/Inorganics	TCLP	Other 1*	Other 2*	Other 3*	Other 4*	Other 5*
A	Oct 21, 2011 MM DD YY 00:00pm	Sed./Soil	Bottle	1	✓										✓				
B	Oct 21, 2011 MM DD YY 00:00pm	Sed./Soil	Bottle	1	✓										✓				
C	Oct 21, 2011 MM DD YY 00:00pm	Sed./Soil	Bottle	1	✓										✓				
D	Oct 21, 2011 MM DD YY 00:00pm	Sed./Soil	Bottle	1	✓										✓				
	Oct 21, 2011 MM DD YY 00:00pm	Sed./Soil	Bottle	1	✓										✓				
	MM DD YY 00:00pm	Sed./Soil																	
	MM DD YY 00:00pm	Sed./Soil																	
	MM DD YY 00:00pm	Sed./Soil																	
			TOTAL # OF CONTAINERS	4															

* Samples received after 2:00 PM will be logged in for the next business day. TAT is exclusive of weekends and statutory holidays

* Please describe "Other" in the following fields:
Other 1: OC Pesticides / PCBs | Other 2: | Other 3:
Other 4: | Other 5: | Other 6:

Sample Relinquished By:
Vic Nersesian — Date 10/21/11 (MM DD YY)
Print Name / Sign Name / MM DD YY

Sample Received By:
Greg Sauks — Date 10/21/11 (MM DD YY) 14:00hrs
Print Name / Sign Name / MM DD YY

Special Instructions

Page 1 of 1

RESET SUBMIT

AGAT Laboratories

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CLIENT NAME: AME MATERIALS ENGINEERING
117 RINGWOOD DRIVE UNIT 6
STOUFFVILLE, ON L4A8C1

ATTENTION TO: Vic Nersesian

PROJECT NO: 40367.101

AGAT WORK ORDER: 11T546430

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Nov 07, 2011

PAGES (INCLUDING COVER): 4

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 11T546430

PROJECT NO: 40367.101

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O. Reg. 153(511) - ORPs (Soil)

DATE SAMPLED: Nov 04, 2011 | DATE RECEIVED: Nov 04, 2011 | DATE REPORTED: Nov 07, 2011 | SAMPLE TYPE: Soil

Parameter	Unit	G / S	RDL	1 2875797	2 2875798	3 2875799	4 2875800	5 2875801	6 2875802	7 2875803	8 2875804
Cyanide	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Parameter	Unit	G / S	RDL	9 2875805	10 2875806
Cyanide	µg/g		0.05	<0.05	<0.05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

2875797-2875806 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.
FOC - Samples were analyzed and are reported in triplicate. FOC was calculated from the Total Organic Matter, which was determined using the Loss on Ignition procedure.

Certified By: Tony Gaath

AGAT Laboratories

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Quality Assurance

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T546430

PROJECT NO: 40367.101

ATTENTION TO: Vic Nersesian

Soil Analysis

RPT Date: Nov 07, 2011			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - ORPs (Soil)															
Cyanide	1		< 0.05	< 0.05	0.0%	< 0.05	90%	70%	130%	102%	80%	120%	93%	70%	130%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: AME MATERIALS ENGINEERING

AGAT WORK ORDER: 11T546430

PROJECT NO: 40367.101

ATTENTION TO: Vic Nersesian

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER

AGAT Laboratories

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Ph.: 905.712.5100 · Fax: 905.712.5122 · Toll Free: 800.856.6261

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 4.3°C
AGAT WO #:
Lab Temperature:
Notes:

Client Information:

Company: AME-MATERIALS ENG.
Contact: VIC NERSESIAN
Address: 172 RINGWOOD AVE. STOUFFVILLE ON
Phone: 905 640-7772 Fax:
Project: 40367.101 PO:
AGAT Quotation #:

Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:

- [x] Regulation 153/09 (reg. 511 Amend.) — Table ____ (Indicate one) — [ ] Ind/Com [x] Res/Park [ ] Agriculture — Soil Texture (check one): [x] Coarse [ ] Fine
- [ ] Sewer Use — Region ____ (Indicate one) — [ ] Sanitary [ ] Storm
- [ ] Regulation 558
- [ ] CCME
- [ ] Other (specify) ____
- [ ] Prov. Water Quality Objectives (PWQO)
- [ ] None

Turnaround Time Required (TAT) Required*

Regular TAT
[ ] 5 to 7 Working Days

Rush TAT (please provide prior notification)
Rush Surcharges Apply
[ ] 3 Working Days
[ ] 2 Working Days
[x] 1 Working Day

OR
Date Required (Rush surcharges may apply): NOV. 7, 2011

*TAT is exclusive of weekends and statutory holidays

Invoice To:

Same: Yes [x] No [ ]
Company: AME
Contact: VIC NERSESIAN
Address:

Is this a drinking water sample? (potable water intended for human consumption) [ ] Yes [ ] No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition?** [ ] Yes [ ] No

Legend Matrix

GW	Ground Water	**O**	Oil
SW	Surface Water	**P**	Paint
SD	Sediment	**S**	Soil

Report Information – reports to be sent to:

1. Name: VIC NERSESIAN
   Email:
2. Name:
   Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ NO_3/NO_2 ☐ N-Total ☐ Hg ☐ pH	Nutients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_3	VOC: ☐ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	CYANIDE FREE
1	4/11/11	3:30pm	SOIL	1																		✓
2	↓	↓	↓	1																		✓
3				1																		✓
4				1																		✓
5				1																		✓
6				1																		✓
7				1																		✓
8				1																		✓
9				1																		✓
10	↓	↓	↓	1																		✓

Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time
VIC N.	4:33pm		Nov 4
Samples Relinquished by (print name & sign):	Date/Time	Samples Received by (Print name & sign):	Date/Time
			4:33

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page 1 of 1
NO: 165735

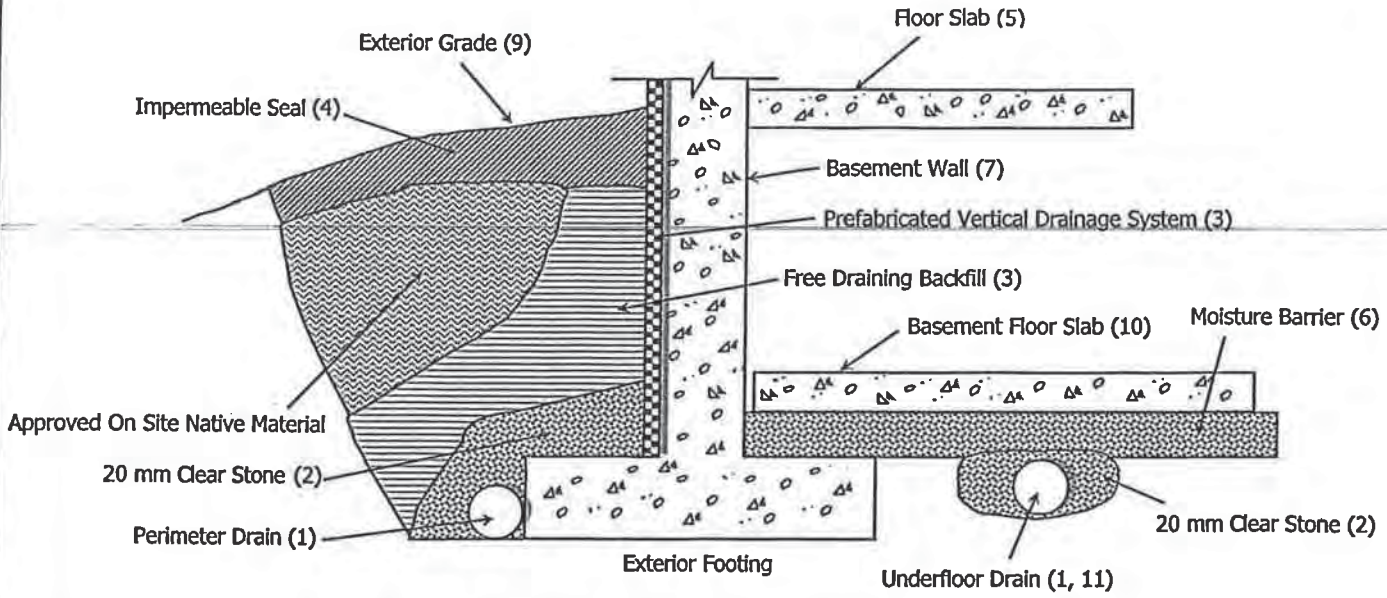
Document ID: DIV-78-1511.006
Date Issued: July 20, 2011

Appendix 4

Perimeter Drain Details

ANSI – AWWA Corrosivity Ratings System

Drainage and Backfill Details



Notes

1. Perimeter and underfloor drains (if required) shall consist of 100mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150mm (6") below underside of floor slab. Perimeter floor drains are not required for dwellings without basements.

2. 20 mm Clear Stone – 150mm (6") top and side of drain, surrounded by approved filter fabric (Terrafix 270R or equivalent). If drain is not on footing, place 100mm (4 inches) of clear stone below the drain. Filter fabric around the clear stone may be omitted if the drain pipe is wrapped with approved filter fabric.

3. Free Draining backfill – OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450mm (18") of the wall. Use hand controlled light compaction equipment within 1.8m (6') of wall. Free draining backfill is not required if a prefabricated vertical drainage system (such as Miradrain 6000) is installed on the exterior of the basement wall.

4. Impermeable backfill seal (min. 600 mm) – relatively impervious compacted clay, silty clay or equivalent. If on-site native backfill is free draining, seal may be omitted.

5. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.

6. Moisture barrier to be at least 200mm (8") of compacted 20mm (3/4") clear stone or equivalent free draining material.

7. Basement wall to be damp-proofed.

9. Exterior grade to slope away from building.

10. Basement floor slab should not be structurally connected to the wall or footing.

11. Underfloor drain invert to be at least 300mm (12") below underside of floor slab. Drainage tile placed in parallel rows at 1.83 m center to centre one way. Place drain on 100mm (4") of 20 mm (3/4") clear stone with 150mm (6") of clear stone on top and sides. Do not connect the underfloor drains to perimeter drains. Underfloor drains shall be connected to the sanitary sewer system.

DRAINAGE AND BACKFILL RECOMMENDATIONS
(Not to Scale)

SOIL-TEST EVALUATION

ANSI / AWWA Corrosivity Rating System

	Soil Characteristics	Points
1	**Resistivity (ohm-cm)**	
	<700	10
	700 to 1000	8
	1000 to 1200	5
	1200 to 1500	2
	1500 to 2000	1
	>2000	0
2	**pH**	
	0 to 2	5
	2 to 4	3
	4 to 6.5	0
	6.5 to 7.5	0+
	7.5 to 8.5	0
	>8.5	3
3	**Redox Potential**	
	> + 100 mV	0
	+ 50 to + 100 mV	3.5
	0 to + 50 mV	4
	Negative	5
4	**Sulphides**	
	Positive	3.5
	Trace	2
	Negative	0
5	**Moisture**	
	Poor Drainage, continuously wet	2
	Fair Drainage, generally moist	1
	Good Drainage, generally dry	0

* Ten points = corrosive to gray or ductile cast iron pipe; protection is indicated

+ If sulphides are present and low or negative redox potential results are obtained, three points shall be given for this range.