Municipal Roads, Geotechnical Borehole Investigation Amherst Island Wind Energy Project, Amherst Island, Ontario

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Sign-off Sheet

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1.0 INTRODUCTION

Pennecon Heavy Civil Limited (PHCL) commissioned Stantec Consulting Ltd. (Stantec) to carry out a geotechnical investigation of the municipal roads on Amherst Island.

The purpose of the investigation was to confirm the existing conditions (presence, thickness and condition of asphalt and/or granular materials and soil type/condition of the underlying subgrade) and subsequently assess the use of the existing municipal roads as 'heavy haul routes' during construction of the planned project.

This report provides a summary and overview of the conditions encountered in the boreholes advanced for the investigation and the results of the laboratory testing completed on samples of the granular materials and sub-grade soils collected. This report also includes an assessment of the anticipated construction traffic on the island and an assessment of the heavy haul traffic that the municipal roads can support in the present condition.

Use of this report is subject to the Statement of General Conditions provided in **Appendix A**.

2.0 AREA OF INVESTIGATION

Given the current proposed layout of the project and the intended locations of the wind turbines, the following municipal roads were investigated:

- Front Road
- Stella 40 Foot Road
- 2nd Concession Road
- 3rd Concession Road
- South Shore Road
- Lower 40 Foot Road
- Dump Road

For reference, the portion of Front Road in the immediate area of the town core and the initial portion of Stella 40 Foot Road from Front Road to 2nd Concession were not included in the scope of the investigation.

3.0 FIELD INVESTIGATION PROGRAM

3.1 PRE-INVESTIGATION MEASURES

The locations of the boreholes were established with a general view to obtaining information along the portion of the municipal roads of interest. The specific locations of the boreholes were constrained by the locations of residences and development and availability of access for the drilling equipment.

Prior to commencing the drilling investigation, Stantec contacted Ontario One-Call to identify and confirm the potential presence of buried utilities and services in proximity to the borehole locations. Staff from Stantec accompanied the utility locate contractor during the execution of the utility locates program.

Prior to commencing the drilling investigation, Algonquin Power (developers) forwarded letters of notification to local residents requesting that any knowledge of existing infrastructure (buried water mains or electrical cables) near the proposed borehole locations be provided. In consideration of the responses to this inquiry, the locations of several boreholes were adjusted to reflect the potential presence of private buried utilities or services that were not identified through the public utility locates program.

Algonquin Power coordinated obtaining the necessary Excavation Permits and a Temporary Road Closure Permit (specific to Dump Road) with Loyalist Township.

Use of this report is subject to the Statement of General Conditions provided in **Appendix A**.

3.2 BOREHOLE LOCATIONS AND NUMBERS

The number of boreholes was established to provide general coverage of the municipal roads of interest (reference the list provided in a previous section of this report) with consideration for the general characterization of the roads based on previous visual observations.

The following table provides a summary of the type of roads (or general purpose) and number of investigation holes included in the program.

Table 1 Summary of Investigation Holes

Road Type	Number of Boreholes
Paved Roads	4
Gravel Roads	2
Poor Quality Roads	19
Proposed Road Widening	6
Existing Culverts	2 (hand dug test pits)
Proposed O/M Building	1

The road boreholes were advanced on the travelled surface of the road with due consideration for avoiding traffic disruption and consideration for appropriate traffic control and safety.

The boreholes at the locations of the two culverts were deleted from the program in lieu of hand-dug test pits to confirm the thickness of cover over the existing culverts.

The borehole for the O/M Building was included in the current municipal road investigation program for efficiency in execution. The borehole was advanced on the edge of the travelled surface of the road.

The boreholes were advanced to relatively shallow depth, consistent with penetrating the full depth of the asphalt and/or granular road structure and terminating in the underlying native soils/sub-grade. Sampling was conducted in accordance with the Standard Penetration Test as described in ASTM D1586. Samples were obtained on a continuous basis in all of the boreholes.

The locations of the boreholes are illustrated on the drawing in **Appendix B.**

3.3 DRILL EQUIPMENT

The boreholes were advanced with a truck mounted drill rig supplied and operated by Terex Drilling Solutions based in Concord, Ontario.

3.4 TRAFFIC CONTROL

Traffic control services were provided by On Track Safety Limited, based in Thornhill, Ontario, specialists in traffic management and control.

Traffic control was provided in accordance with the latest version of "Ontario Traffic Manual Book 7 Temporary Conditions" (OTM Book 7).

Based on the rural nature of the municipal roads on the island and the prevailing light traffic volume, Typical Layout Figure TL-19 was adopted for the traffic control program. This Layout Type applies to low volume roads, very short duration work.

The exception to the traffic control plan described in the preceding paragraph was Dump Road. Given the extremely narrow width of this road, the Township required a temporary closure from 2nd Concession Road to the north while maintaining access from Front Road to the south.

3.5 DRILLING PROGRAM

The field drilling program was completed in accordance with the following:

- The boreholes were advanced using solid stem augers.
- Standard Penetration Testing (SPTs) was conducted on a continuous basis in each borehole.
- Soil samples were collected from the split tubes advanced for the SPTs.
- The soil samples were placed in moisture-proof containers for storage and transport.
- The presence of groundwater seepage and/or free groundwater in the open borehole was recorded (where applicable).

Coring of the underlying bedrock (known to exist at shallow depth based on the results of previous investigation drilling and test pitting on the island) was not intended or required as a component of the investigation proposed herein. In several boreholes, augering and/or sampling was terminated on presumed bedrock.

The installation of groundwater monitoring stand-pipes or monitoring wells was not included as a component of the investigation.

The boreholes were backfilled with a low-permeability mixture of the auger spoils and granular bentonite, meeting the intent of MOE Regulation 903.

A "cold-asphalt" plug was placed at the ground surface of the boreholes advanced through existing asphaltic pavements.

Consistent with the Township's request, the drilling program included consideration for barreling, testing and disposing of excess soils generated while drilling at an approved (off-island) location. However, given the limited depth of the boreholes and the volume of the samples retained for geotechnical characterization and testing, excess soils were not generated.

Stantec's Standard Operating Procedures included consideration for identification of potential environmental contamination (e.g. via olfactory or visual observation) during the investigation. If such conditions were observed, Stantec would report the conditions to Algonquin Power for discussion and further action as may be warranted.

3.6 SURVEYING

As outlined in a previous section, the locations of the boreholes were established to provide general coverage of the municipal roads of interest (reference the list provided in a previous section of this report) with consideration for the general characterization of the roads based on previous visual observations. The specific locations of the boreholes were constrained by the locations of residences and development and availability of access for the drilling equipment.

The coordinates for the "as-drilled" locations of the boreholes were recorded in the field using hand-held GPS. The locations were referenced to the Universal Transverse Mercator (UTM) NAD 83 CSRS Zone 18N.

The ground surface elevations at the borehole locations were inferred from the available topographic information. The ground surface elevations were referenced to Canadian Geodetic Vertical Datum (CGVD) 1929/1978 adjustment.

The coordinates are shown in the table on Drawing No. 1 in **Appendix B**. The ground surface elevations are shown on the borehole (and test pit) records in **Appendix C**.

3.7 GEOTECHNICAL LABORATORY TESTING PROGRAM

The geotechnical laboratory testing program was to include the following:

- Grain size distribution tests - Representative samples of the granular surfacing.
- Grain size distribution tests – Representative samples of the underlying native sub-grade soils.
- Atterberg Limits tests - Representative samples of the underlying native sub-grade soils.
- Moisture Content Tests – Representative samples of granular surfacing and the underlying native sub-grade soils.
- Unit Weight tests – Limited number of representative samples of the underlying native sub-grade soils.
- Moisture-Density Relations – Two (2) representative samples of the underlying native sub-grade soils.

4.0 HEALTH AND SAFETY

Stantec's Safe Work Practices (SWPs) are documents designed around specific tasks and are intended to help identify hazards and applicable controls necessary to reduce our employees' exposure to health and safety risks. The following SWPs apply to all drilling field investigation activities undertaken by Stantec.

Risk Management Strategy (RMS) 1 – Prepared in advance of commencement of work.

Risk Management Strategy (RMS) 2 – Prepared in the field at the time of the work.

Safe Work Practice (SWP (416) – Supervision of Contracted Drilling Activities.

The RMS1 document was prepared at commencement of the project. The document included a description of the work, recognition of applicable hazards, an assessment of the hazards, applicable and appropriate Personal Protective Equipment (PPE), and H&S contacts, documentation, and controls.

The RMS2 (Fit for Duty) is an extension of the RMS1 and was completed by the field staff on mobilization to the Island to conduct the geotechnical investigation. The RMS2 includes a field evaluation of conditions with a view to identifying potential hazards (or changed conditions) that were not identified at the time of the RMS1. It also provides for an opportunity to discuss all potential hazards and concerns with the sub-contractors present and engaged in the work, and finally includes a requirement that the field staff acknowledge they are physically capable of carrying out the required tasks.

Stantec's SWP 416 includes a comprehensive description of the responsibilities, potential hazards, and controls associated with executing field drilling activities.

Field staff (both Stantec and the drilling sub-contractor) were required to have the following personal protective equipment (PPE):

- Hearing protection;
- Eye protection;
- Head protection;
- High-visibility vests; and,
- CSA approved work boots (with a 6" steel shank and a defined heel).

5.0 FACTUAL RESULTS OF THE INVESTIGATION

5.1 REFERENCE STANDARDS

The soils encountered in the boreholes were classified in accordance with the Unified Soil Classification System (USCS). Stantec adopts minor modifications to the USCS Standard consistent with the methods of the Ontario Ministry of Transportation (MTO) including the removal of the descriptions "lean" and "fat" with reference to clay soils, and including a "Medium" category with respect to plasticity.

It should be noted that the internal diameter (I.D.) of the split tube used in the Standard Penetration Test is 38 mm and hence the grain size test results and soil classifications may not reflect the entire gravel size fraction which extends to 75 mm diameter.

The presence of cobbles and/or boulders is similarly not reflected in the grain size distribution tests and typically described separately, when and where these materials are inferred to have been encountered in the boreholes.

5.2 SUBSURFACE CONDITIONS

5.2.1 Overview

The subsurface conditions encountered in the boreholes are provided in the table in **Appendix C**. The results of the geotechnical laboratory testing program are included in **Appendix D**.

In general, the subsurface stratigraphy encountered in the boreholes consisted of asphalt (on select roads), granular fill materials (travel surface or as base/sub-base under the asphalt pavement), and native sub-grade soils. Inferred bedrock was encountered in several boreholes based on the content of the split tube samples and/or on the progress or resistance/refusal to augering and/or sampling.

5.2.2 Asphalt Pavement

Front Road East was asphalt paved. The thickness of the asphalt in the two boreholes advanced on this road was approximately 1" (25 mm).

A portion of Front Road West (extending west from the intersection with Stella 40 Foot Road) was also asphalt paved. The two boreholes advanced along this portion of the road encountered two layers of asphalt; a surface layer that was approximately 1" (25 mm thick) and a second underlying layer (below a granular layer) that was also approximately 1" (25 mm) thick.

A portion of Stella 40 Foot Road (from the intersection with 2nd Concession Road and extending south) was also asphalt paved. The two boreholes advanced along this portion of the road encountered asphalt that was 1.5" (37.5 mm) and 2" (50 mm) thick.

5.2.3 Granular Materials

The granular material underlying the asphalt on Front Road East was 6" (150 mm) and 9" (225 mm) thick.

The granular material underlying the surface course of asphalt on Front Road West was 3" (75 mm) and 4" (100 mm). The granular material underlying the buried asphalt layer was 4" (100 mm) and 5" (125 mm) thick.

The granular material underlying the asphalt on Stella 40 Foot Road was 13" (330 mm) and 5 ½" (140 mm).

The thickness of the existing granular surfacing encountered in the boreholes varied considerably. The following table provides a summary of the range in thicknesses recorded for the boreholes advanced on the respective roads (locations where asphalt was present are discussed in the preceding paragraphs and not included in the table).

Table 2 Summary of the Granular Surface Thickness

Road	Number of Boreholes	Granular Surface Thickness (Inches/mm)
Front Road East	3	7.5/190 – 10/250
Lower 40 Foot Road	3	7.5/190 – 8/200
South Shore Road	4	4/100 – 10/250
Stella 40 Foot Road	1	7/190
2nd Concession Road	7	6/150 – 8/200
3rd Concession Road	6	7/180 – 12/300
Dump Road	2	No Granular Surface

For additional reference, the hand-dug test pit at the location of the existing culvert on Stella 40 Foot Road encountered 10" (250 mm) of granular cover and the hand-dug test pit at the location of the existing culvert on Marshall 40 Foot Road encountered 7" (180 mm) of granular cover.

The existing granular surfacing consists of well-graded sand and gravel with a varying fines content.

Moisture content tests were conducted on 17 samples of the granular surfacing material. The tests yielded results in a narrow range, from 2.1% to 3.9%.

A total of 17 grain size analysis tests were conducted on samples of the granular surfacing. The tests yielded a fines content (combined percentage of silt and clay size particles) ranging from 9% to 24% and the average of the samples tested was 18.5%. For reference, this percentage of fines exceeds the maximum fines percentage for OPSS Granular A base material (e.g. 8%).

The results of the grain size analysis tests are shown on the grain size analysis tests curves in Figures 1 to 4 in **Appendix E**.

5.2.4 Subgrade

The subgrade encountered underlying the asphalt and granular materials consisted of sandy clay, clay with sand, and silty clayey sand.

For reference, the hand-dug test pit at the location of the existing culvert on Stella 40 Foot Road encountered 5" (130 mm) of topsoil and fill material underlying the granular material noted in the preceding section; combined the granular material and fill material provided 15" (380 mm) of cover over the top of the culvert. The hand-dug test pit at the location of the existing culvert on Marshall 40 Foot Road encountered 2" (50 mm) of topsoil and fill material underlying the granular material noted in the preceding section; combined the granular material and fill material provided 9" (230 mm) of cover over the top of the culvert.

Moisture content tests were conducted on seven samples of the native subgrade soils. The results were typically in two ranges; a lower range with two results of 6.5% and 7.5% and a higher range of 16.6% to 30%. The lower range is representative of the samples described as silty clayey sand soil and the higher range is representative of the samples described as sandy clay and clay with sand.

The results of grain size analysis tests completed on seven samples of the native subgrade soils are shown on Figures 5 and 6 in **Appendix D**.

The results of Atterberg Limits tests completed on the seven samples are illustrated on the Plasticity Chart included as Figure 7 in **Appendix D**.

The test results indicate that these soils contain varying proportions of sand, silt, and clay, with very limited gravel (e.g. typically 5% or less). The varying percentage of sand, silt and clay size particles also reflect the varying plasticity index test results; the soils range from low to high plasticity.

As indicated above and in accordance with the Unified Soil Classification System, the soil samples tested can be characterized as sandy clay (CL), clay with sand (CH) and silty clayey sand (SC-SM).

Four samples of the native subgrade were submitted for unit weight tests. The tests yielded unit weights of 18.8 kN/m^3, 17.6 kN/m^3, 21.0 kN/m^3 and 19.2 kN/m^3.

Moisture-density relations tests were completed on 2 samples of the native sub-grade soil. The tests yielded results of 1995 kg/m^3 and 1900 kg/m^3 at optimum moisture contents of 10.7% and 13.0% respectively.

A single sample of the silty clayey sand (SC-SM) was selected for California Bearing Ratio (CBR) testing. The result yielded a CBR of 4.99 (un-soaked) for a penetration of 2.5 mm and a CBR of 5.39 (soaked) for a penetration of 2.5 mm. A single sample of the clay with sand (CH) was selected for CBR testing. The result yielded a CBR of 1.30 (un-soaked) for a penetration of 2.5 mm and a CBR of 1.67 (soaked) for a penetration of 2.5 mm.

5.2.5 Bedrock

The inferred depth to bedrock is indicated on the borehole summary table in **Appendix C**. The depth is indicated as "inferred" given that coring of the rock was not included as a component of the investigation. The contact surface with the bedrock was inferred based on refusal of the augers and/or sampler.

As indicated, the majority of the boreholes encountered the inferred surface of the bedrock at depths ranging from 0.33 m to 3.51 m. Several boreholes were terminated at depths of 3.66 m below grade without encountering the inferred contact with the underlying bedrock.

5.2.6 Groundwater

Free groundwater was not observed in any of the open boreholes at the time of drilling.

6.0 MUNICIPAL ROAD ASSESSMENT

6.1 ASSESSMENT METHODOLOGY

Two methods were used to assess the suitability of the existing and proposed roads to handle the anticipated heavy haul traffic.

For the majority of the roads, the 1993 AASHTO Guide of Design of Pavement Structure methodology for aggregate-surface roads was used. This approach considers two serviceability limits mechanisms as follows:

- Loss of Pavement Serviceability Index (PSI) which indicates a general decline in the road surface. For the assessment completed, an allowable decrease in serviceability of 2.0 was set as the maximum allowable.

- Surface wheel path rutting which allows for a specific depth of ruts. For the assessment completed, a rut depth of 50 mm was permitted.

For the new road required from the new island dock to 2nd Concession Road and for Dump Road, the assessment was undertaken using a geotextile methodology by DuPont Typar titled Designing Aggregate Bases.

6.2 EXISTING CONDITIONS

6.2.1 Road Granular

As discussed above in Section 5.0, the existing roadway granular surfacing consists of a well-graded sand and gravel with a percentage of silt/clay (e.g. fines) that exceeds the OPSS specification for typical granular base materials.

As a result of the high silt/clay content, the existing granular surfacing is prone to softening and rutting in wet conditions and the surface can become muddy. Under the heavy haul traffic anticipated, this condition will be compounded.

6.2.2 Subgrade

As discussed above in Section 5.0, the predominant subgrade type underlying the existing roadways (and encountered in the majority of the boreholes advanced on the island to date) consists of sandy clay, clay with sand, and silty clayey sand. For convenience, these soil strata are referred to in subsequent sections as sandy clay.

The soil types described above are generally characterized as providing poor to very poor support, impervious drainage, and a high frost potential in the context of subgrade for roads.

In consideration of the soil types described, the results of the drilling investigation, and the results of the geotechnical laboratory testing program, a subgrade modulus of 28 MPa was selected for the native sub-grade and subsequently used in this assessment.

6.2.3 Drainage

Most of the municipal roads on the island do not have adequate drainage.

The lack of drainage will result in deterioration of the existing roads under the heavy haul traffic.

6.3 FORECASTED CONSTRUCTION TRAFFIC

The loading and truck configuration for each turbine component including the transformers was reviewed, and the Equivalent Single Axle Loadings (ESALs) for construction deliveries, including concrete and aggregates, were estimated.

The total traffic loadings were estimated and the traffic was subsequently proportioned based on the number of turbine sites accessed via the specific municipal road being assessed.

6.4 ROAD DESCRIPTION & TRAFFIC ASSESSMENT

6.4.1 Front Road

It is understood that the portion of Front Road from the new island dock to the access road for Turbine S30 will be used for the transport of turbine components for four Turbines (S13, S18, S26 and S30). It is not intended for use by other heavy vehicle loads which will use an alternative route.

The road has an asphalt surface on approximately 25% of the length, a chip seal surface on approximately 50% of the length and a gravel surface on approximately 25% of the length (this last may in fact have been a former chip seal surface that has deteriorated to the current state).

Comments regarding this road are as follows:

- Construction traffic was estimated to be 1,000 ESALs.
- The existing structure is either chip seal asphalt with 140 mm to 225 mm of granular or 180 mm to 250 mm of granular, over sandy clay subgrade.
- The assessment indicated that the existing road structure is suitable for 1,000 ESALs; and,
- Based on the results of the assessment no improvements are anticipated to be required for this road.

6.4.2 Stella 40 Foot Road

Stella 40 Foot Road was reviewed with consideration for the initial portion of the road from 2nd Concession Road to 3rd Concession Road and from just beyond 3rd Concession Road to the access entrance road to Turbine S37. Comments are as follows:

- The construction traffic on the north end of the road between 2nd Concession Road and 3rd Concession Road was estimated to be 15,000 ESALs. The construction traffic on the south end of the road from beyond 3rd Concession Road was estimated to be 13,000 ESALs.
- The existing structure has:
  - 40 mm to 50 mm of asphalt for approximately 60% of the road length (The asphalt is severely distressed, likely due to the lack of roadside drainage); and,
  - 200 mm granular over sandy clay subgrade for approximately 40% of the road length.
- The assessment indicated that the existing road structure is suitable for 2,000 ESALs based on the rutting criteria.
- Based on the results of the assessment, the improvements specified in Section 6.5.1 and Section 6.5.2 below are recommended for the respective gravel surface and asphalt surface segments of this road.

6.4.3 2nd Concession Road

The portion of 2nd Concession Road from the intended access to the layover area extending east to the access entrance road to Turbine S01 was reviewed. Comments are as follows:

- The construction traffic at the east end of the road was estimated to be 9,000 ESALs. The construction traffic beyond the access road to Turbine S22 to the west was estimated to be 4,000 ESALs.
- The existing structure consists of 150 mm granular material over the sandy clay subgrade.
- The assessment indicated that the existing road structure is suitable for less than 1,000 ESALs based on the rutting criteria.
- Based on the results of the assessment, the improvements specified in Section 6.5.1 below are recommended for this road.

6.4.4 3rd Concession Road

The section of 3rd Concession Road from Stella 40 Foot Road to the construction access to Turbine S11 was reviewed. Comments are as follows:

- Construction traffic was estimated to be 3,500 ESALs.
- The existing structure consists of 180 mm granular material over sandy clay subgrade.
- The assessment indicated that the existing road structure is suitable for 1,000 ESALs based on the rutting criteria.
- Based on the results of the assessment, the improvements specified in Section 6.5.1 below are recommended for this road.

6.4.5 South Shore Road

This section of South Shore Road extends from the access road to Turbine S02 to the access road to Turbine S33. Comments regarding this section are as follows:

- The construction traffic at the west end of this road segment was estimated to be 8,000 ESALs. The construction traffic towards the east beyond the access road to Turbine S14 was estimated to be 6,000 ESALs.
- The existing structure consists of 150 mm granular material over sandy clay subgrade.
- The assessment indicated that the existing road structure is suitable for less than 2,500 ESALs based on the PSI and rutting criteria.
- Based on the results of the assessment, the improvements specified in Section 6.5.1 below are recommended for this road.

6.4.6 Lower 40 Foot Road

This section of road includes the portion of South Shore Road from the access to Turbine S33 to the corner with Lower 40 Foot Road, the entire length of Lower 40 Foot Road, and the portion of Front Road from the corner with Lower 40 Foot Road to the access to Turbine S30 on Front Road. It is noted that construction traffic along this road will consist of aggregate trucks, miscellaneous

materials/service trucks and concrete trucks but that the turbine delivery trucks will not use this route. Comments regarding this section are as follows:

- Construction traffic was estimated to be 3,500 ESALs.
- The existing pavement is 200mm granular over sandy clay subgrade.
- The assessment indicated that the existing road structure is suitable for less than 1,300 ESALs based on the rutting criteria.
- Based on the results of the assessment, the improvements specified in Section 6.5.1 below are recommended for this road.

6.5 UPGRADES TO EXISTING ROADS

6.5.1 Gravel Surface Roads

As a component of the pre-construction activity the roads with gravel surfaces will be upgraded through the following:

- Sub-excavate the upper 200 mm of existing road base materials;
- Place a Terrafix Combigrid 30/30 or equivalent; and,
- Place and compact 200 mm of OPSS Granular A.

The Combigrid will extend from one road edge to within 0.5 m of the opposite road edge. The 0.5 m gap will provide open access for the placement of the collection circuit within the road platform without the need to cut the geogrid. The side of the road accommodating the gap will vary in accordance with the collection system installation drawings, as trenching location will vary across the project.

To reiterate from a preceding section, it is understood that the portion of Front Road from the project docks to the access road for Turbine S30 will be used for the transport of turbine components for four Turbines (S13, S18, S26 and S30). It is not intended for use by other heavy vehicle loads. The assessment indicates that due to the limited traffic loading, no improvements are anticipated to be required to the gravel surface segment of this road.

As a component of the pre-construction activity, the gravel roads will be provided with a proper center crown meeting the municipal standards and a minimum functional road width of 6.0 m. Where the current granular surface is less than 6.0 m in width the existing “shoulder” material will be sub-excavated to a depth of 100 mm and replaced with compacted Granular A. The sub-excavation and replacement with 100 mm of Granular A where applied will strengthen the existing shoulder and provide for temporary passing of vehicles if and as required.

Two exceptions to the 6.0 m functional road width will occur on South Shore Road where restoration will occur within the existing widths except where temporary widening takes place in specific areas and Dump Road where the planned width is 5.0 m.

The gravel roads will be monitored and maintained/restored as necessary throughout the construction period to support the construction traffic. This approach is consistent with the current general practice for maintenance of aggregate-surface municipal roads during construction traffic loading.

6.5.2 Asphalt Surface Roads

As stated in a preceding section, approximately 60% of the length of Stella 40 Foot Road has a severely distressed asphalt travel-surface. The recommended treatment specific to this road segment would be either of the following:

- Undertake continual monitoring, maintenance, repairs, and upgrades, as necessary throughout the construction period to maintain the road in a suitable condition for the support of the heavy construction traffic; or,
- Upgrade by:
    - Removing the upper 200 mm of asphalt and granular materials;
    - Placing a Terrafix Combigrid 30/30 or equivalent; and,
    - Placing and compacting 200 mm of OPSS Granular A.

To reiterate from a preceding section, it is understood that the portion of Front Road from the project docks to the access road for Turbine S30 will be used for the transport of turbine components for four Turbines (S13, S18, S26 and S30). It is not intended for use by other heavy vehicle loads. The assessment indicates that due to the limited traffic loading, no improvements are anticipated to be required to the asphalt segment of this road.

6.5.3 Seasonal Effects of Construction Traffic

It is noted that: heavy loads hauled when the roads are frozen will have little impact on the road condition; heavy loads hauled in the spring thaw period will have a significant impact on the road condition; and, heavy loads hauled in the summer and fall period (when dryer conditions are presumed to prevail) will have less impact on the road condition but will deteriorate the road surface with cumulative passes.

6.5.4 Upgraded Road Drainage

As noted, most of the municipal roads on the island do not have adequate drainage in their current state. The predominant subgrade type underlying the existing roadways consists of sandy clay, clay with sand and silty clayey sand. These soil types are generally characterized as providing limited permeability but will permit longer-term infiltration suitable for the purposes of this project.

The provision of a defined crown or transverse slope and a properly compacted Granular A surface as a component of the upgrades to the existing roads will increase the surface runoff relative to the existing conditions, reduce percolation through the granular surface and in this respect, improve overall drainage. The provision of a crown or transverse slope at subgrade elevation will direct any percolation that does occur to the edges of the roadway, further improving overall drainage of the road system.

During pre-construction activity where the exposed subgrade and road geometry will likely limit subgrade drainage, improvements can be made by installing occasional minor drainage

channels to provide a positive outlet to any existing ditches. The channels would be filled with granular material as a component of the road upgrade.

6.6 CONSTRUCTION OF NEW ROADS

6.6.1 Dump Road

Based on visual observations and the conditions encountered in the boreholes, Dump Road does not have an existing granular structure or travel surface, although minor gravel was present at the intersection with 2nd Concession Road. There may also have been placement of granular material at low spots in the roadway or where standing water accumulated, though these areas were most certainly localized.

The assessment of Dump Road considered construction extending from 2nd Concession to the location of Turbine S31. Comments regarding this road are as follows:

- Construction traffic was estimated to be 1,000 ESALs.
- The existing roadway has no granular surface of any significance.
- The subgrade consists of sandy clay.

In the absence of an existing road structure, this road is not considered suitable to support heavy construction traffic. It is therefore recommended that Dump Road be upgraded as follows:

- Compact and proof-roll the exposed subgrade/road surface.
- Place Terrafix Combigrid 30/30 or approved equivalent.
- Place and compact 300 mm of OPSS Granular A.

6.6.2 Temporary Turning Alignments at Existing Intersections

It is understood that there are two locations on the municipal roads where temporary turning alignments will be required to permit turning for 'longer' delivery vehicles.

Construction of these turning alignments should be as follows. Any existing vegetation and organics (including topsoil) should be stripped and stockpiled for reinstatement on completion of the construction of the overall project. The turning alignments can be constructed by placing a Terrafix Combigrid 30/30 or equivalent and placing OPSS Granular A material to the design grades. The thickness of the required granular material will be dependent on the specific topography and grades at the turning location and the thickness of any existing vegetation and organics (including topsoil). It is recommended that the thickness of the granular be not less than 300 mm in any case. The granular material should be placed in loose lifts having a maximum thickness of 200 mm and each lift uniformly compacted to achieve 100% of the material's Standard Proctor Maximum Dry Density.

7.0 CLOSURE

We trust that this is satisfactory for your present purposes. If you have any questions, please contact the undersigned at your convenience.

STANTEC CONSULTING LTD.

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APPENDICES

Appendix A

A.1 STATEMENT OF GENERAL CONDITIONS

STATEMENT OF GENERAL CONDITIONS

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec Consulting Ltd. and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Stantec Consulting Ltd.'s present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec Consulting Ltd. is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec Consulting Ltd. at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec Consulting Ltd. must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec Consulting Ltd. will not be responsible to any party for damages incurred as a result of failing to notify Stantec Consulting Ltd. that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec Consulting Ltd., sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec Consulting Ltd. cannot be responsible for site work carried out without being present.

Appendix B

B.1 BOREHOLE LOCATION PLAN

Borehole ID	Easting	Northing
BH16-01	363584	4891992
BH16-03	364801	4890764
BH16-04	364991	4892705
BH16-05	365557	4893017
BH16-06	366577	4893258
BH16-07	365275	4890012
BH16-08	366766	4893377
BH16-10	368273	4894009
BH16-11	364325	4891151
BH16-12	363380	4890714
BH16-13	364532	4890157
BH16-14	364075	4889348
BH16-15	363353	4888535
BH16-16	363061	4888219
BH16-17	369249	4893832
BH16-18	369591	4893250
BH16-19	369925	4892730
BH16-20	369461	4892031
BH16-21	368700	4891574
BH16-22	367572	4890726
BH16-23	362534	4890279
BH16-24	361528	4889772
BH16-25	360291	4889151
BH16-26	362718	4890675
BH16-27	362502	4891030
BH16-28	359675	4888873
BH16-29	361975	4886754
BH16-30	363194	4891908
BH16-31	364094	4891040
BH16-32	364948	4890415
BH16-34	370025	4892444
BH16-35	365446	4889758
BH16-36	367131	4893279
BH16-38	364597	4891118

Stantec

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Guelph ON Canada
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Notes

Legend

WTG Number

Borehole Locations

- Paved Roads (4) [BH16-01, BH16-03 - BH16-05]
- Gravel Roads (2) [BH16-06 & BH16-07]
- Poorer Quality Roads (19) [BH16-08 & BH16-10 – BH16-27]
- Randomly Selected Locations at Required Road Widenings (6) [BH16-28 – BH16-32 & BH16-34]
- Existing Culverts (2) [BH16-35 & BH16-36] (Conducted as hand-dug test pits)
- Proposed O/M Building (1) [BH16-38]

* BH16-02, BH16-09, BH16-33 and BH16-37 were deleted from the investigation program and are not shown on this plan.

Revision	By	Appd.	YY.MM.DD.

Issued	By	Appd.	YY.MM.DD.

File Name:

Dwn.	Chkd.	Dsgn.	YY.MM.DD.

Permit-Seal

Client/Project

Windlectric Inc.
AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title
BOREHOLE LOCATION PLAN
MUNICIPAL ROADS INVESTIGATION PROGRAM

Project No.	Scale	
133560104	1:50,000	0 500 1,000 m

Drawing No.	Sheet	Revision
1	1 of 1	A

\\Cd1220-f02\01609\active\60960595\drawing\MXD\Geotech Report_Figures\133560104_Geotech_Fig01_Borehole_Location_Plan.mxd
Revised: 2017-05-09 By: pwarsell

bing

Appendix C

C.1 BOREHOLE SUMMARY

Stantec

BOREHOLE RECORD

N: 4 891 992 E: 363 584

16-01

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Front Road West, Amherst Island, ON DATUM

DATES: BORING November 15, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Paved Road**			0				
		25 mm ASPHALT							
		75 mm SAND and GRAVEL							
		25 mm ASPHALT			1	SS	1	410/610	10
		125 mm SAND and GRAVEL							
		Stiff to hard, brown sandy CLAY (CL) - trace gravel - moist to wet			2				
1					3	SS	2	380/460	50/89
					4				
		BOREHOLE TERMINATED on inferred bedrock approximately 1.4 m below existing grade. Borehole open and dry on completion of drilling.			5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
					13				
4					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

39 45 16

7 43 29 21

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 764 E: 364 801

16-03

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Stella 40 Foot Road, Amherst Island, ON DATUM

DATES: BORING November 15, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Paved Road**			0				
		50 mm ASPHALT							
		140 mm SAND and GRAVEL							
		Stiff to very stiff, brown to grey CLAY (CH) with sand - trace gravel (decreasing with depth) - moist - increased moisture at bottom of hole			1	SS	1	410/610	13
					2				
1					3	SS	2	460/610	12
					4				
					5				
					6	SS	3	560/610	24
2					7				
		BOREHOLE TERMINATED on inferred bedrock approximately 2.1 m below existing grade. Borehole caved to 0.7 m below grade on completion of drilling. Borehole dry on completion of drilling			8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
41	46		13

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 892 705 E: 364 991

16-04

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Front Road East, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Paved Road**			0				
		25 mm ASPHALT							
		150 mm SAND and GRAVEL - geotextile at 0.1 m			1	SS	1	410/610	12
		Stiff to hard, brown sandy CLAY (CL) - trace gravel - moist			2				
1					3	SS	2	410/460	50/130
					4				
		BOREHOLE TERMINATED on inferred bedrock approximately 1.4 m below existing grade. Borehole open and dry on completion of drilling.			5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
36	55		9

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 893 017 E: 365 557

16-05

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Front Road East, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Paved Road**			0				
		25 mm ASPHALT							
		225 mm Silty SAND with gravel - geotextile at 0.01 m			1	SS	1	410/610	10
		Stiff, brown sandy CLAY (CL) - trace gravel - moist			2				
1		BOREHOLE TERMINATED on inferred bedrock approximately 0.8 m below existing grade. Borehole open and dry on completion of drilling.			3				
					4				
					5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 893 258 E: 366 577

16-06

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Front Road East, Amherst Island, ON — DATUM

DATES: BORING November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0					
		190 mm Silty SAND with gravel								
		Dense, brown silty, clayey SAND (SC-SM) - trace gravel - moist			1	SS	1	510/610	46	25 51 24
					2					
1		BOREHOLE TERMINATED on inferred bedrock approximately 0.8 m below existing grade. Borehole open and dry on completion of drilling.			3					
					4					
					5					
2					6					
					7					
					8					
					9					
3					10					
					11					
					12					
4					13					
					14					
					15					
5					16					

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 012 E: 365 275

16-07

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Stella 40 Foot Road, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	DEPTH (ft)	TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
		Gravel Road					
0		180 mm Silty SAND with gravel	0				
		Stiff to very stiff, brown CLAY (CH) with sand - trace gravel - moist	1	SS	1	280/610	13
			2				
			3	SS	2	510/610	17
1			4				
			5				
			6	SS	3	610/610	23
2			7				
		- wet 6" sand seam at 2.4 m	8	SS	4	530/610	20
		Stiff, brown sandy CLAY (CL) - trace gravel - moist to wet	9				
3			10				
		Stiff to hard, brown CLAY (CH) with sand - trace gravel - moist	11	SS	5	380/460	50/130
		BOREHOLE TERMINATED on inferred bedrock approximately 3.5 m below existing grade. Borehole open to 2.9 m on completion of drilling, Borehole dry on completion of drilling.	12				
4			13				
			14				
			15				
5			16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m

STANDARD PENETRATION TEST, BLOWS/0.3m

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
32	47		21
2	19	33	46

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 893 377 E: 366 766

16-08

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Front Road East, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	UNDRAINED SHEAR STRENGTH (kPa) 50 100 150 200 / WATER CONTENT & ATTERBERG LIMITS (W_P W W_L) / DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m / STANDARD PENETRATION TEST, BLOWS/0.3m	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0						
		250 mm Silty SAND with gravel									37 44 19
		Dense to very dense, brown silty, clayey SAND (SC-SM) - trace gravel - dry to moist			1	SS	1	530/610	20		
		- light brown			2						
1					3	SS	2	610/610	66		5 49 32 14
					4						
					5	SS	3	100/91	50/100		
		BOREHOLE TERMINATED on inferred bedrock approximately 1.6 m below existing grade.			6						
2					7						
		Borehole open and dry on completion of drilling.			8						
					9						
3					10						
					11						
					12						
4					13						
					14						
					15						
5					16						

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 894 009 E: 368 273

16-10

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Front Road East, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0					
		200 mm Silty SAND with gravel								29 48 23
		Dense to very dense, light brown silty, clayey SAND (SC-SM) - trace gravel - dry - increasing silt with depth			1	SS	1	200/610	24	
					2					
1					3	SS	2	610/610	42	5 55 26 14
					4					
					5	SS	3	200/200	50/51	
		BOREHOLE TERMINATED on inferred bedrock approximately 1.7 m below existing grade. Borehole open and dry on completion of drilling.			6					
2					7					
					8					
					9					
3					10					
					11					
					12					
4					13					
					14					
					15					
5					16					

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 891 151 E: 364 325

16-11

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**	0				
		150 mm SAND and GRAVEL					
		Stiff, brown sandy CLAY (CL) - trace gravel - dry to moist	1	SS	1	480/610	15
			2				
1		Compact to dense, brown clayey SAND (SC) - trace gravel - moist to wet (increasing moisture with depth)	3	SS	2	530/610	15
			4				
			5				
		- gravel seam (3")	6	SS	3	300/610	39
2			7				
			8	SS	4	250/610	21
			9				
3			10				
			11	SS	5	410/610	27
		BOREHOLE TERMINATED at approximately 3.7 m below grade. Borehole open and dry on completion.	12				
4			13				
			14				
			15				
5			16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 714 E: 363 380

16-12

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		150 mm Silty SAND with gravel							
		Firm to very stiff, brown sandy CLAY (CL) - trace gravel - moist			1	SS	1	410/610	10
					2				
1					3	SS	2	560/610	20
					4				
					5				
		Compact to very dense, brown to grey clayey SAND (SC) - trace gravel - moist to wet			6	SS	3	560/610	23
2		- auger grinding			7				
					8	SS	4	360/610	64
		- auger grinding (corresponds to rock in spoon)			9				
3					10				
		BOREHOLE TERMINATED on inferred bedrock approximately 3.1 m below grade. Borehole caved to approximately 2.9 m below grade. Borehole dry on completion of drilling.			11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

29 49 22

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 157 E: 364 532

16-13

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION 3rd Concession Road, Amherst Island, ON — DATUM

DATES: BORING November 16, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	DEPTH (ft)	TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
		Gravel Road					
0		250 mm Silty SAND with gravel	0				
		Dense, grey to brown silty, clayey SAND (SC-SM) - trace gravel - dry to moist	1	SS	1	480/610	31
			2				
1		Stiff to very stiff, brown CLAY (CH) with sand - trace gravel - moist	3	SS	2	460/610	13
			4				
			5				
			6	SS	3	530/610	18
2		Dense, grey to brown silty, clayey SAND (SC-SM) - trace gravel - moist	7				
		- auger grinding (minimal recovery in spoon)	8	SS	4	51/610	50/51
			9				
3		Dense, grey clayey SAND (SC) - trace gravel - wet	10				
		Dense, grey to brown silty, clayey SAND (SC-SM) - trace gravel - dry - possible bedrock fragment	11	SS	5	560/610	47
			12				
4		BOREHOLE TERMINATED at approximately 3.7 m below existing grade. Borehole open and dry on completion of drilling.	13				
			14				
			15				
5			16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR	SA	SI	CL
39	39		22

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 889 348 E: 364 075

16-14

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 3rd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		280 mm Silty SAND with gravel							
		Stiff to hard, brown CLAY (CH) with sand - trace gravel - moist to wet (increasing moisture with depth)			1	SS	1	430/610	46
					2				
1					3	SS	2	410/610	14
					4				
					5				
					6	SS	3	510/610	10
2					7				
		- grey							
		Very dense, brown to grey clayey SAND (SC) - trace to some gravel - dry to slightly moist			8				
					9	SS	4	560/610	89
					10				
3						SS	5	230/300	50/130
		BOREHOLE TERMINATED on inferred bedrock at approximately 3.4 m below existing grade. Borehole open and dry on completion of drilling.			11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

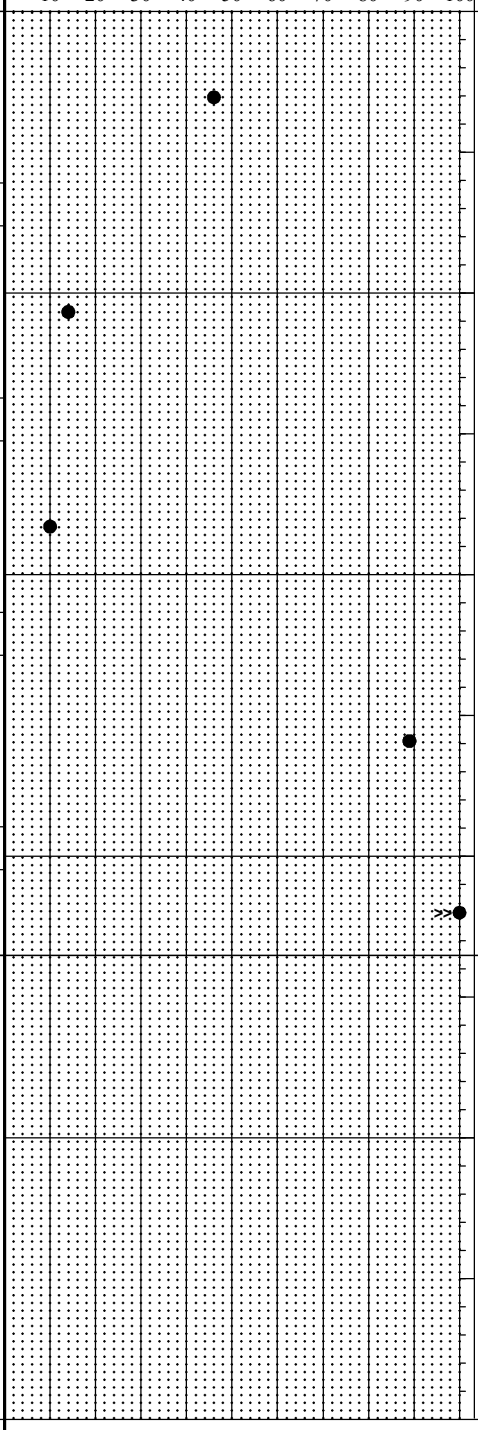
DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL



□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 888 535 E: 363 353

16-15

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 3rd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		250 mm SAND and GRAVEL							
		Stiff to hard, brown to grey CLAY (CH) with sand - trace gravel - moist to wet			1	SS	1	250/610	20
					2				
1					3	SS	2	510/610	13
					4				
		- 300 m wet layer			5				
		- 25 mm gravel seam			6	SS	3	460/610	26
2					7				
		Very dense, grey silty, clayey SAND (SC-SM) - trace to some gravel - dry to slightly moist			8				
					9	SS	4	560/610	73
3					10				
					11	SS	5	430/460	50/150
		BOREHOLE TERMINATED on inferred bedrock at approximately 3.5 m below existing grade. Borehole open and dry on completion of drilling.			12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 888 219 E: 363 061

16-16

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 3rd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	DEPTH (ft)	TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**	0				
		300 mm Silty SAND with gravel					
		Compact, bown silty, clayey SAND (SC) - trace gravel - dry	1	SS	1	360/610	25
1		Stiff to very stiff, brown CLAY (CH) with sand - trace gravel - moist to wet	3	SS	2	510/610	20
		- 50 mm - 75 mm sand seam	6	SS	3	480/610	13
2		- grey	8	SS	4	610/610	14
3		Compact, brown to grey clayey SAND (SC) - trace gravel - moist to wet	11	SS	5	610/610	12
		BOREHOLE TERMINATED at approximately 3.7 m below existing grade. Borehole open and dry on completion of drilling.	12				
4			13				
			14				
			15				
5			16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	28	48		24
	2	26	38	34

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 893 832 E: 369 249

16-17

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Lower 40 Foot Road, Amherst Island, ON — DATUM

DATES: BORING November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		200 mm Silty SAND with gravel							
		Compact, brown clayey SAND (SC) - trace gravel - moist to dry			1	SS	1	250/610	12
					2				
1		BOREHOLE TERMINATED on inferred bedrock approximately 0.8 m below existing grade. Borehole caved to 0.7 m below grade on completion of drilling. Borehole dry on completion of drilling			3				
					4				
					5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
					13				
4					14				
					15				
					16				
5									

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 893 250 E: 369 591

16-18

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Lower 40 Foot Road, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		190 mm Silty SAND with gravel							
		Compact to very dense, brown to grey clayey SAND (SC) - trace gravel - moist			1	SS	1	380/610	10
					2				
					3	SS	2	130/200	50/51
1		BOREHOLE TERMINATED on inferred bedrock approximately 0.9 m below existing grade. Borehole caved to 0.7 m below grade on completion of drilling. Borehole dry on completion of drilling			4				
					5				
					6				
2					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100 GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 892 730 E: 369 925

16-19

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Lower 40 Foot Road, Amherst Island, ON — DATUM

DATES: BORING November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		190 mm Silty SAND with gravel							
		Compact, brown clayey SAND (SC) - trace gravel (decreasing content with depth) - moist			1	SS	1	250/610	11
					2				
1					3	SS	2	510/610	23
					4				
		BOREHOLE TERMINATED on inferred bedrock approximately 1.5 m below existing grade. Borehole open and dry on completion of drilling.			5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
					13				
4					14				
					15				
					16				
5									

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

25 55 20

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 892 031 E: 369 461

16-20

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION South Shore Road, Amherst Island, ON — DATUM

DATES: BORING November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	UNDRAINED SHEAR STRENGTH (kPa) / WATER CONTENT & ATTERBERG LIMITS / DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m / STANDARD PENETRATION TEST, BLOWS/0.3m	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0						
		150 mm Silty SAND with gravel									
		Hard, brown CLAY (CH) with sand - trace gravel - slightly moist to moist			1	SS	1	430/610	49	●	
		BOREHOLE TERMINATED on inferred bedrock approximately 0.6 m below existing grade. Borehole caved to 0.5 m below grade on completion of drilling. Borehole dry upon completion of drilling			2						
1					3						
					4						
					5						
2					6						
					7						
					8						
					9						
3					10						
					11						
					12						
4					13						
					14						
					15						
5					16						

UNDRAINED SHEAR STRENGTH (kPa): 50 100 150 200

WATER CONTENT & ATTERBERG LIMITS: W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 891 574 E: 368 700

16-21

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION South Shore Road, Amherst Island, ON DATUM

DATES: BORING November 17, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0					
		250 mm Silty SAND with gravel								
		Very stiff to hard, brown clayey SAND (SC) - trace gravel - moist to wet (increasing moisture content with depth)			1	SS	1	360/610	19	
					2					
1					3	SS	2	180/460	50/150	2 53 21 24
		BOREHOLE TERMINATED on inferred bedrock approximately 1.2 m below existing grade. Borehole caved to 0.8 m below grade on completion of drilling. Borehole dry on completion of drilling			4					
					5					
2					6					
					7					
					8					
					9					
3					10					
					11					
					12					
4					13					
					14					
					15					
5					16					

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 726 E: 367 572

16-22

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION South Shore Road, Amherst Island, ON — DATUM

DATES: BORING November 16, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	UNDRAINED SHEAR STRENGTH (kPa) 50 100 150 200 / WATER CONTENT & ATTERBERG LIMITS (W_P W W_L) / DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼ / STANDARD PENETRATION TEST, BLOWS/0.3m ● 10 20 30 40 50 60 70 80 90 100	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0						
		100 mm SAND and GRAVEL									
		Very stiff, brown CLAY (CH) with sand - trace gravel - dry to moist			1	SS	1	380/610	16	●	32 45 23
		- rock fragments at 0.5 m			2						
1		BOREHOLE TERMINATED on inferred bedrock approximately 0.6 m below existing grade. Borehole caved to 0.5 m below grade on completion of drilling. Borehole dry upon completion of drilling			3						
					4						
					5						
2					6						
					7						
					8						
					9						
3					10						
					11						
					12						
4					13						
					14						
					15						
5					16						

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 279 E: 362 534

16-23

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		190 mm SAND and GRAVEL							
		Firm to very stiff, brown sandy CLAY (CL) - trace gravel - dry to moist			1	SS	1	380/610	8
					2				
1					3	SS	2	130/240	50/100
		BOREHOLE TERMINATED on inferred bedrock approximately 1.0 m below grade. Borehole open and dry on completion of drilling.			4				
					5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100 GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 889 772 E: 361 528

16-24

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		180 mm Silty SAND with gravel							
		Stiff, brown to black sandy CLAY (CL) - trace gravel - moist			1	SS	1	410/610	10
					2				
1		- light brown to grey - moist to wet			3	SS	2	280/460	10
		BOREHOLE TERMINATED on inferred bedrock approximately 1.2 m below grade. Borehole open and dry on completion of drilling.			4				
					5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 889 151 E: 360 291

16-25

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		200 mm Silty SAND with gravel							
		Compact, brown silty, clayey SAND (SC-SM) - trace gravel - moist			1	SS	1	380/610	15
					2				
		Stiff, brown sandy CLAY (CL) - trace gravel - moist			3	SS	2	480/610	13
1					4				
		BOREHOLE TERMINATED on inferred bedrock approximately 1.4 m below grade. Borehole caved to approximately 1.2 m below grade on completion. Borehole dry on completion.			5				
					6				
2					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 675 E: 362 718

16-26

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Dump Road, Amherst Island, ON — DATUM

DATES: BORING November 15, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		Compact to very dense, brown sandy CLAY (CL) - trace gravel - gravel content increases below 0.8 m - dry to moist			1	SS	1	410/610	13
					2	SS	2	100/91	50/130
1		BOREHOLE TERMINATED on inferred bedrock approximately 0.9 m below existing grade. Borehole open and dry on completion of drilling.			3				
					4				
					5				
2					6				
					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100 GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 891 030 E: 362 502

16-27

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Dump Road, Amherst Island, ON DATUM

DATES: BORING November 15, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	UNDRAINED SHEAR STRENGTH (kPa) 50 100 150 200 / WATER CONTENT & ATTERBERG LIMITS (W_P W W_L) / DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m / STANDARD PENETRATION TEST, BLOWS/0.3m	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0						
		150 mm Silty SAND with gravel									
		Compact to very dense, brown sandy CLAY (CL) - trace gravel - moist			1	SS	1	330/610	13		42 41 17
					2						
		BOREHOLE TERMINATED on inferred bedrock at approximately 0.8 m below existing grade. Borehole open and dry on completion of drilling.			2.5	SS	2	25/30	50/25		
1					3						
					4						
					5						
2					6						
					7						
					8						
					9						
3					10						
					11						
					12						
4					13						
					14						
					15						
5					16						

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 888 873 E: 359 675

16-28

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON — DATUM

DATES: BORING November 16, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	DEPTH (ft)	TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
		Gravel Road					
0		200 mm Silty SAND with gravel	0				
		Firm to stiff, brown sandy CLAY (CL) - trace gravel - moist to wet	1	SS	1	380/610	17
			2				
1		- 300 m wet layer	3	SS	2	460/610	8
			4				
		- 100 mm gravel seam	5				
			6	SS	3	510/610	17
2			7				
		Very dense, brown silty, clayey SAND (SC-SM) - trace gravel - dry to moist	8	SS	4	380/380	50/76
		BOREHOLE TERMINATED on inferred bedrock approximately 2.6 m below existing grade. Borehole open and dry on completion of drilling.	9				
3			10				
			11				
			12				
4			13				
			14				
			15				
5			16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

35 43 22

2 35 33 30

>>

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 886 754 E: 361 975

16-29

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 3rd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 15, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**	0				
		180 mm Silty SAND with gravel					
		Stiff to hard, brown to grey CLAY (CH) with sand - trace gravel - moist - possible fill to 0.8 m - decreasing clay content with depth below 2.7 m	1	SS	1	410/610	14
1			2				
			3	SS	2	510/610	24
		- auger grinding	4				
			5				
			6	SS	3	610/610	22
2			7				
			8	SS	4	610/610	45
			9				
3		Very dense, grey silty, clayey SAND (SC-SM) - trace gravel - dry to slightly moist	10	SS	5	280/300	50/130
		BOREHOLE TERMINATED on inferred bedrock at approximately 3.4 m below existing grade. Borehole open and dry on completion of drilling.	11				
			12				
4			13				
			14				
			15				
			16				
5							

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

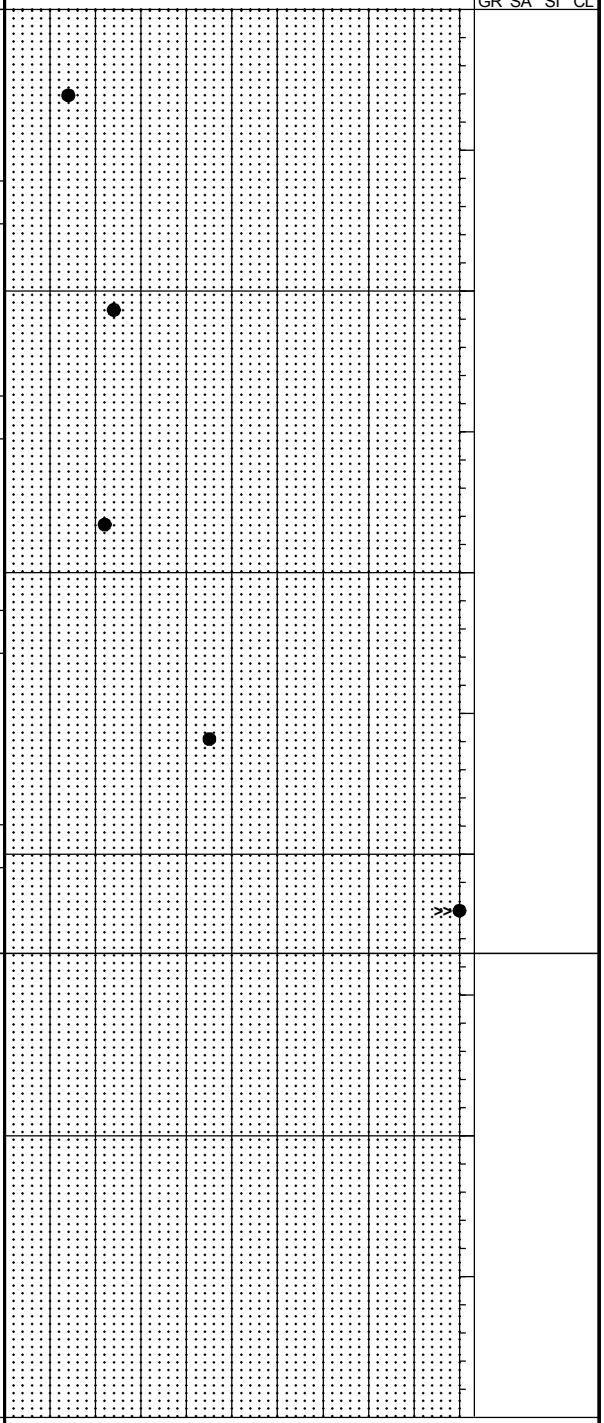
DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m

STANDARD PENETRATION TEST, BLOWS/0.3m

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL



- □ Field Vane Test, kPa
- ■ Remoulded Vane Test, kPa
- △ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 891 908 E: 363 194

16-30

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Front Road West, Amherst Island, ON — DATUM

DATES: BORING November 15, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Paved Road**			0				
		25 mm ASPHALT							
		75 mm SAND and GRAVEL							
		25 mm ASPHALT							
		100 mm SAND and GRAVEL							
		Stiff, brown sandy CLAY (CL) - trace gravel - moist			1	SS	1	360/610	8
1					2				
					3	SS	2	300/610	9
					4				
					5	SS	3	130/150	50/1300
2		BOREHOLE TERMINATED on inferred bedrock approximately 1.7 m below existing grade. Borehole open and dry on completion of drilling.			6				
					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 891 040 E: 364 094

16-31

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 2nd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 16, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		180 mm Silty SAND with gravel							
		Stiff to very stiff, brown sandy CLAY (CL) - trace gravel - moist			1	SS	1	280/610	13
					2				
1					3	SS	2	360/610	13
					4				
					5				
					6	SS	3	510/610	26
2					7				
		Very dense, brown clayey SAND (SC) - trace gravel - moist to wet			8	SS	4	230/230	50/76
		BOREHOLE TERMINATED on inferred bedrock approximately 2.6 m below grade. Borehole open and dry upon completion.			9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

REMARKS & GRAIN SIZE DISTRIBUTION (%)

GR SA SI CL

28 51 21

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 890 415 E: 364 948

16-32

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION 3rd Concession Road, Amherst Island, ON DATUM

DATES: BORING November 15, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	NUMBER	RECOVERY (mm) TCR(%) / SCR(%)	N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		270 mm SAND and GRAVEL							
		Stiff to very stiff, brown CLAY (CH) with sand - trace gravel			1	SS	1	460/610	31
					2				
1					3	SS	2	250/610	10
					4				
					5				
					6	SS	3	610/610	20
2					7				
		Compact to very dense silty, clayey SAND (SC-SM) - trace gravel			8	SS	4	330/610	20
					9				
3					10				
					11	SS	5	580/610	67
		BOREHOLE TERMINATED at approximately 3.7 m below existing grade. Borehole open and dry on completion of drilling.			12				
4					13				
					14				
					15				
					16				
5									

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 892 444 E: 370 025

16-34

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION South Shore Road, Amherst Island, ON — DATUM

DATES: BORING November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		240 mm SAND and GRAVEL				SS	1	200/340	50/51
		Very dense, grey weathered bedrock fragments			1				
		BOREHOLE TERMINATED on inferred bedrock approximately 0.3 m below existing grade.			2				
1		Borehole open and dry on completion of drilling.			3				
					4				
					5				
					6				
2					7				
					8				
					9				
3					10				
					11				
					12				
4					13				
					14				
					15				
5					16				

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100 GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

BOREHOLE RECORD

N: 4 891 118 E: 364 597

16-38

CLIENT Pennecon Heavy Civil Limited PROJECT No. 133560104

LOCATION Stella 40 Foot Road, Amherst Island, ON DATUM

DATES: BORING November 15, 2016 WATER LEVEL TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Paved Road**			0					
		38 mm ASPHALT								
		330 mm SAND and GRAVEL			1	SS	1	460/610	28	43 41 16
		Firm to very stiff, grey to brown CLAY (CH) with sand - trace gravel - moist			2					
1					3	SS	2	300/610	7	
					4					
		BOREHOLE TERMINATED on inferred bedrock approximately 1.4 m below existing grade. Borehole open and dry on completion of drilling.			5					
2					6					
					7					
					8					
					9					
3					10					
					11					
					12					
					13					
4					14					
					15					
					16					
5										

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90 100

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

TEST PIT RECORD

N: 4 889 758 E: 365 446

16-35

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Stella 40 Foot Road, Amherst Island, ON — DATUM

EXCAVATION DATE: November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES: N-VALUE OR RQD(%)
0		**Gravel Road**			0				
		250 mm SAND and GRAVEL - some organic inclusions (at road edge)							
		Brown CLAY (CL) with sand - topsoil inclusions - moist			1				
		TEST HOLE TERMINATED on existing CSP culvert at approximately 0.4 m below existing grade. Note: Test hole was excavated by hand.			2				
1					3				
					4				
					5				
					6				
2									

UNDRAINED SHEAR STRENGTH (kPa)

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m ▼

STANDARD PENETRATION TEST, BLOWS/0.3m ●

REMARKS & GRAIN SIZE DISTRIBUTION (%)

10 20 30 40 50 60 70 80 90 100

GR SA SI CL

□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Stantec

TEST PIT RECORD

N: 4 893 279 E: 367 131

16-36

CLIENT Pennecon Heavy Civil Limited — PROJECT No. 133560104

LOCATION Marshall 40 Foot Road, Amherst Island, ON — DATUM

EXCAVATION DATE: November 17, 2016 — WATER LEVEL — TPC ELEVATION

DEPTH (m)	ELEVATION (m)	STRATA DESCRIPTION	STRATA PLOT	WATER LEVEL	DEPTH (ft)	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) TCR(%) / SCR(%)	SAMPLES N-VALUE OR RQD(%)	UNDRAINED SHEAR STRENGTH (kPa) 50 100 150 200 / WATER CONTENT & ATTERBERG LIMITS (W_P W W_L) / DYNAMIC CONE PENETRATION TEST, BLOWS/0.3m / STANDARD PENETRATION TEST, BLOWS/0.3m	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0		**Gravel Road**			0						
		180 mm Silty SAND with gravel - some organic inclusions (at road edge)									
		Brown CLAY (CL) with sand - topsoil inclusions - moist			1						
		TEST HOLE TERMINATED on existing CSP culvert at approximately 0.2 m below existing grade. Note: Test hole was excavated by hand.			2						
1					3						
					4						
					5						
					6						
2											

10 20 30 40 50 60 70 80 90 100

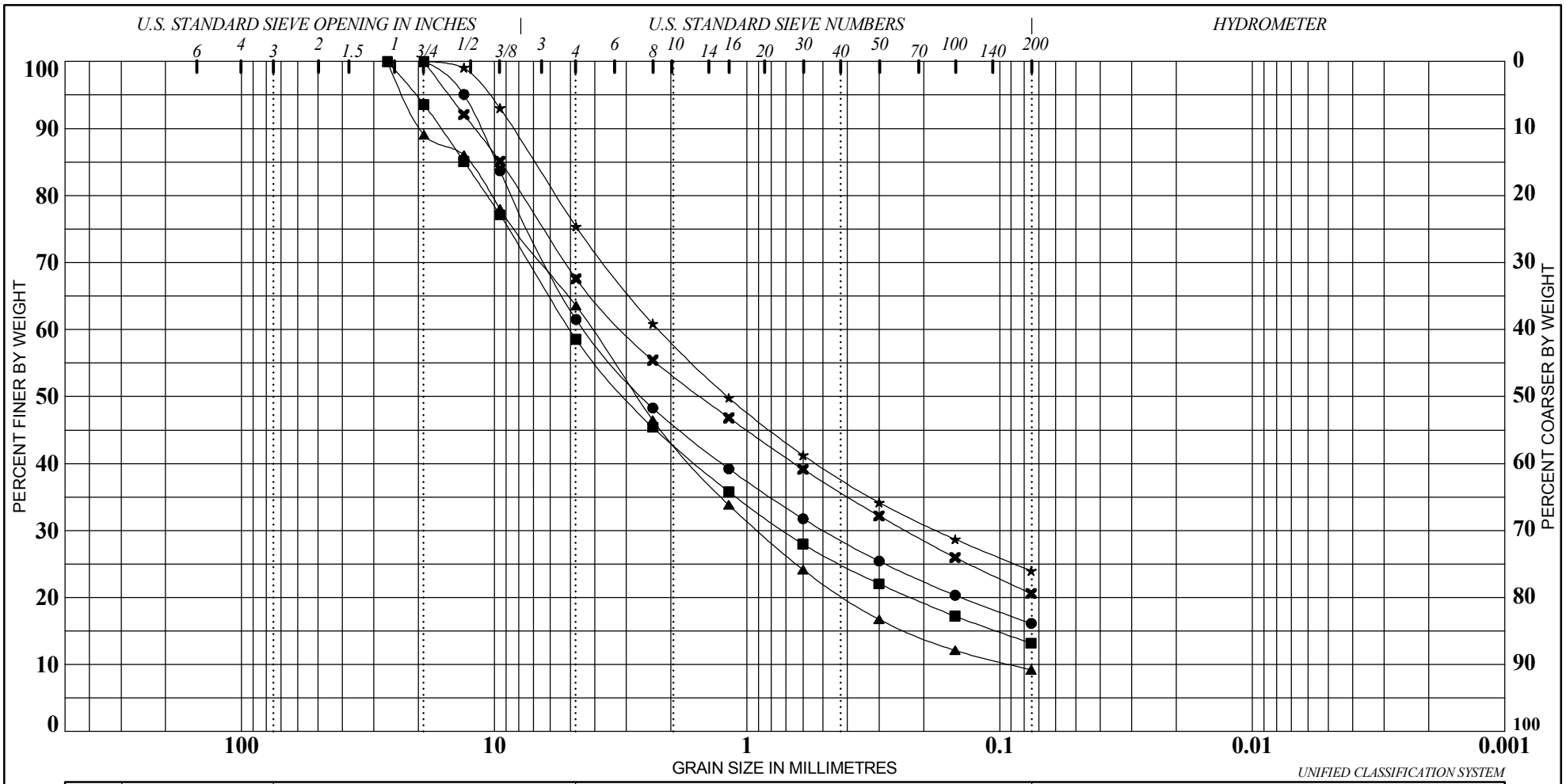
□ Field Vane Test, kPa

■ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

Appendix D

D.1 GEOTECHNICAL LABORATORY TESTING RESULTS



UNIFIED CLASSIFICATION SYSTEM

BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample	Depth (m)	Description	W%	W_L	W_P	I_P	%Gravel	%Sand	%Silt	%Clay
● 16-01	0.2	SAND and GRAVEL	4				39	45	16	
■ 16-03	0.1	SAND and GRAVEL	4				41	46	13	
▲ 16-04	0.1	SAND and GRAVEL	3				36	55	9	
★ 16-06	0.1	SILTY SAND with GRAVEL	3				25	51	24	
✖ 16-07	0.1	SILTY SAND with GRAVEL	3				32	47	21	

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

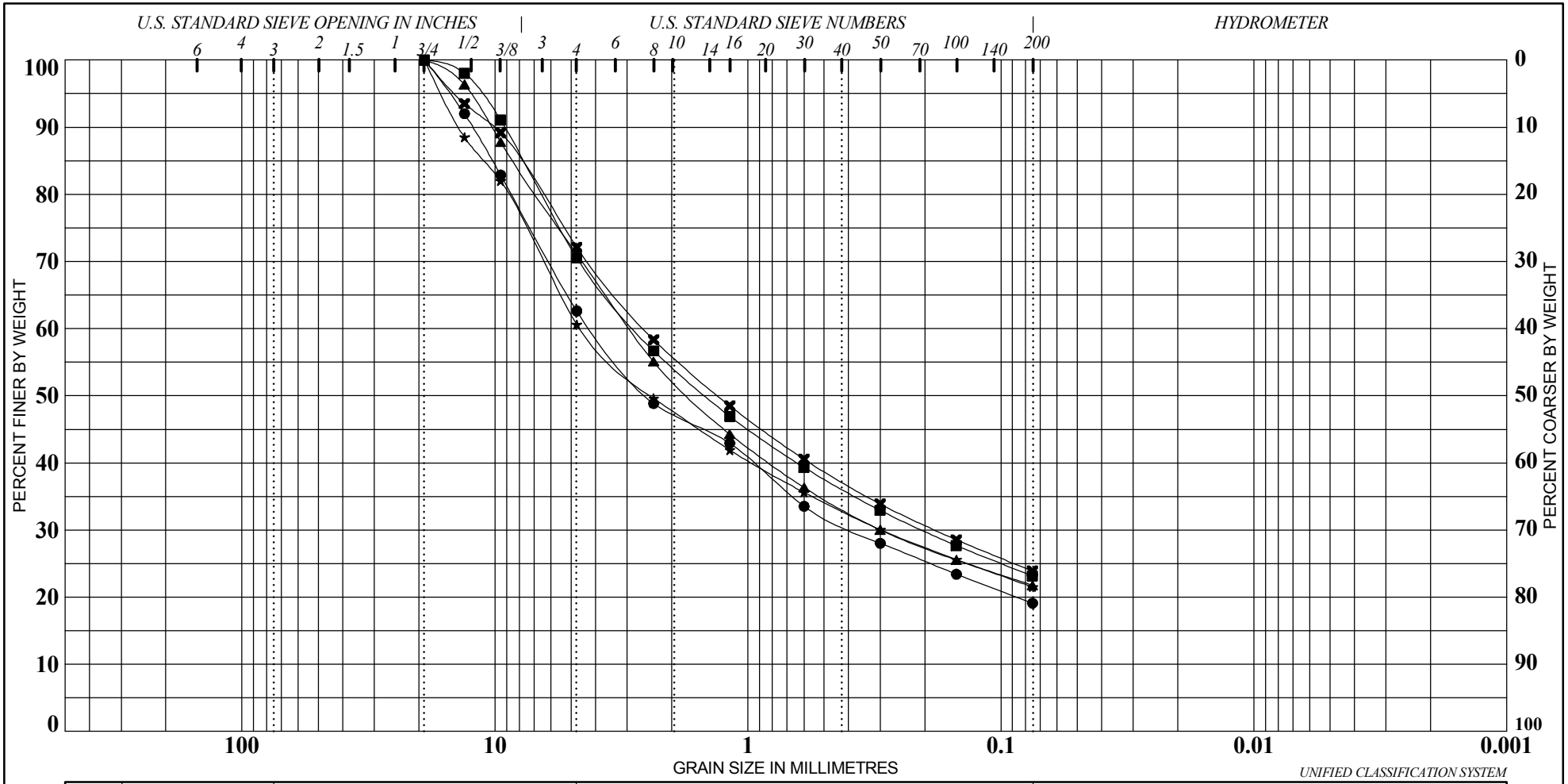
Location: Amherst Island, ON

Project No.: 133560104

GRADATION CURVE (ASTM D422)

Figure: 1

Remarks:



UNIFIED CLASSIFICATION SYSTEM

BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample		Depth (m)	Description	W%	W_L	W_P	I_P	%Gravel	%Sand	%Silt	%Clay
●	16-08	0.1	SILTY SAND with GRAVEL	3				37	44	19	
■	16-10	0.1	SILTY SAND with GRAVEL	3				29	48	23	
▲	16-12	0.1	SILTY SAND with GRAVEL	3				29	49	22	
★	16-13	0.1	SILTY SAND with GRAVEL	3				39	39	22	
✖	16-16	0.2	SILTY SAND with GRAVEL	3				28	48	24	

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

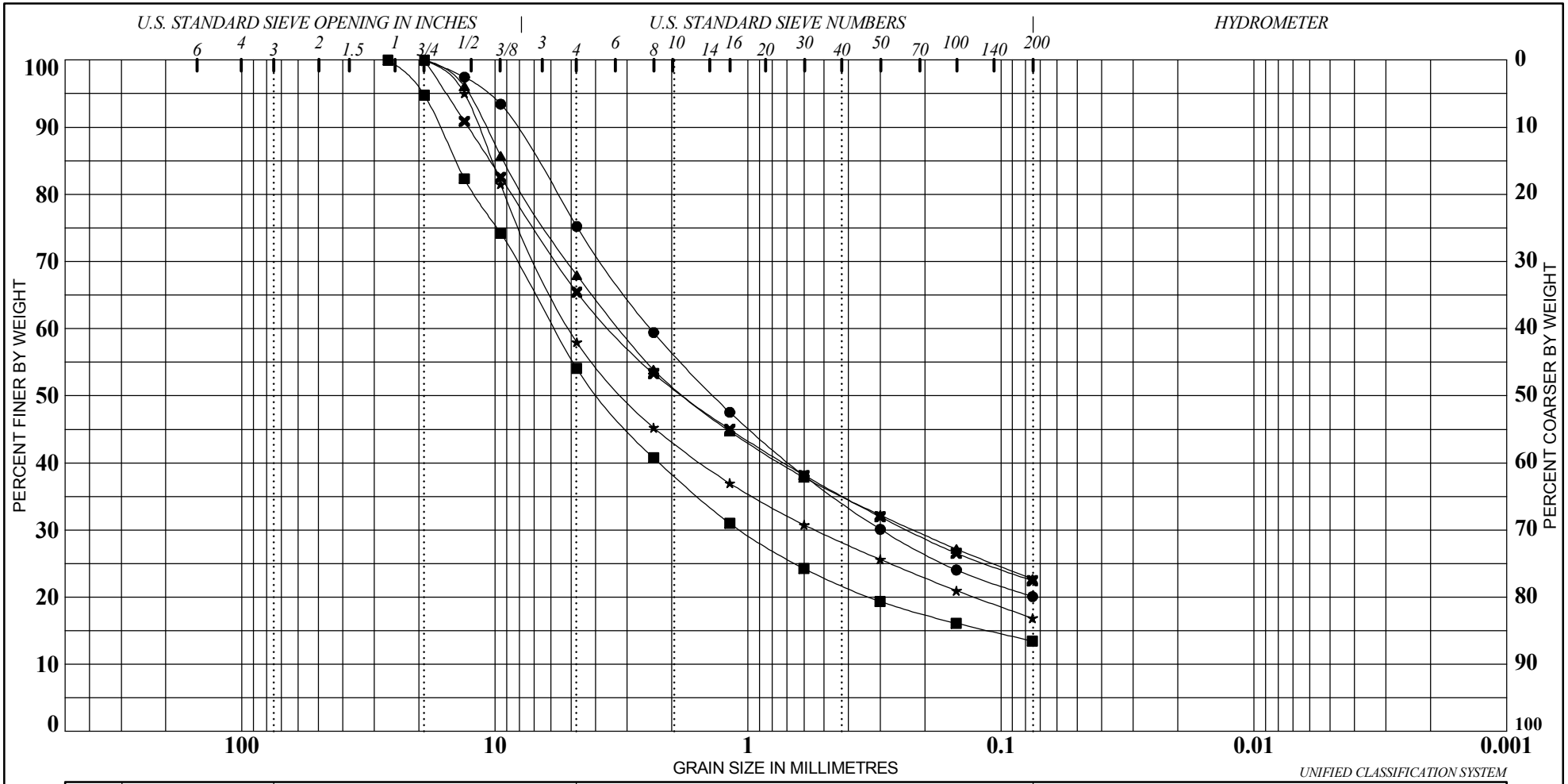
Location: Amherst Island, ON

Project No.: 133560104

GRADATION CURVE (ASTM D422)

Figure: 2

Remarks:



UNIFIED CLASSIFICATION SYSTEM

BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample	Depth (m)	Description	W%	W_L	W_P	I_P	%Gravel	%Sand	%Silt	%Clay
● 16-19	0.1	SILTY SAND with GRAVEL	3				25	55	20	
■ 16-21	0.1	SILTY SAND with GRAVEL	2				46	41	13	
▲ 16-22	0.0	SAND and GRAVEL	3				32	45	23	
★ 16-27	0.1	SILTY SAND with GRAVEL	3				42	41	17	
✖ 16-28	0.1	SILTY SAND with GRAVEL	3				35	43	22	

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

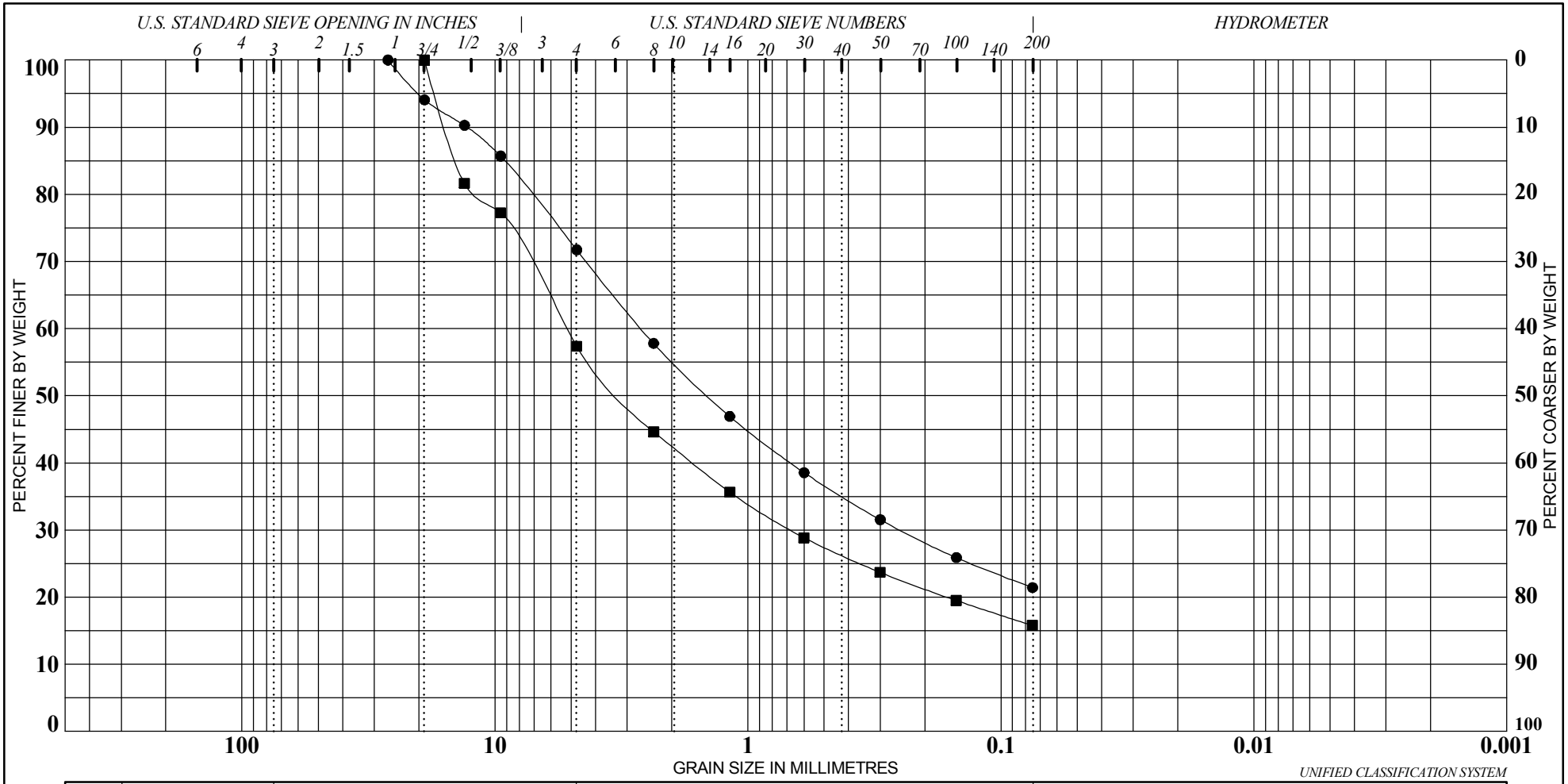
Location: Amherst Island, ON

Project No.: 133560104

GRADATION CURVE (ASTM D422)

Figure: 3

Remarks:



UNIFIED CLASSIFICATION SYSTEM

BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample	Depth (m)	Description	W%	W_L	W_P	I_P	%Gravel	%Sand	%Silt	%Clay
● 16-31	0.1	SILTY SAND with GRAVEL	3				28	51	21	
■ 16-38	0.2	SAND with GRAVEL	4				43	41	16	

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

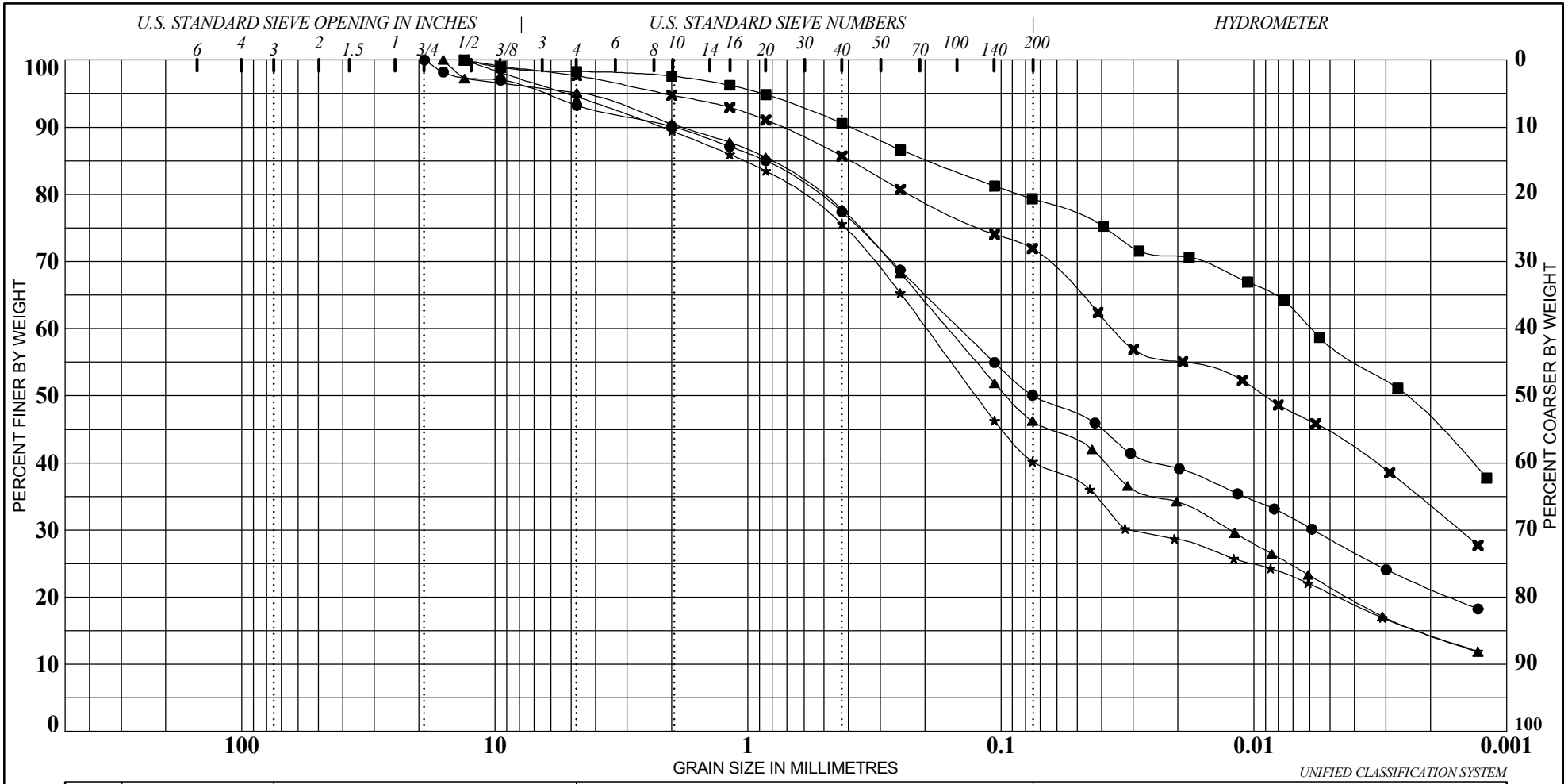
Location: Amherst Island, ON

Project No.: 133560104

GRADATION CURVE (ASTM D422)

Figure: 4

Remarks:



UNIFIED CLASSIFICATION SYSTEM

BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample	Depth (m)	Description	W%	W_L	W_P	I_P	%Gravel	%Sand	%Silt	%Clay
● 16-01	0.5	SANDY CLAY (CL)	17	28	17	11	7	43	29	21
■ 16-07	1.1	CLAY with SAND (CH)	30	53	27	26	2	19	33	46
▲ 16-08	1.1	SILTY, CLAYEY SAND (SC-SM)	8	18	13	5	5	49	32	14
★ 16-10	1.1	SILTY, CLAYEY SAND (SC-SM)	7	15	11	4	5	55	26	14
✖ 16-16	1.1	CLAY with SAND (CH)	29	55	29	26	2	26	38	34

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

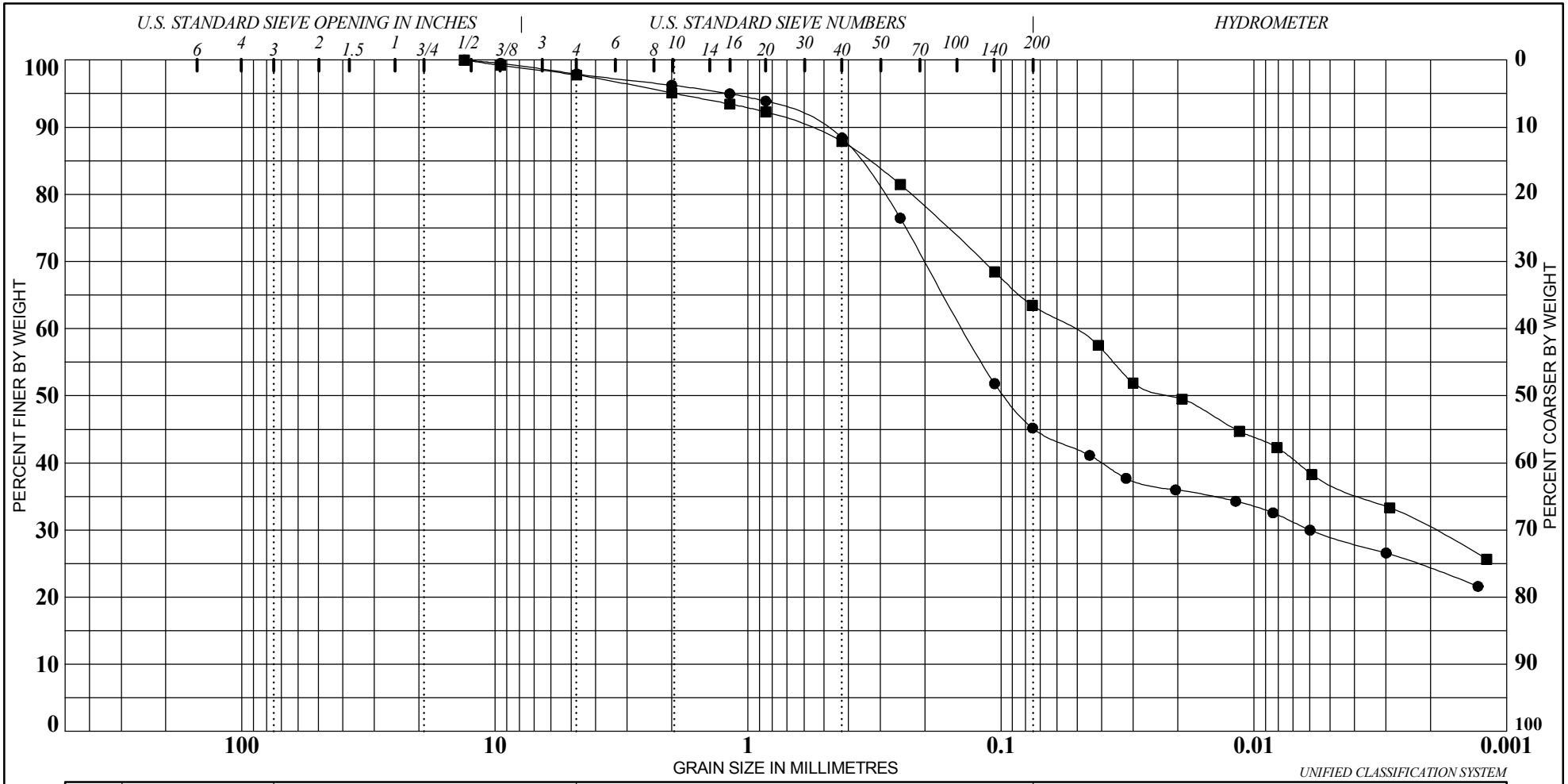
Location: Amherst Island, ON

Project No.: 133560104

GRADATION CURVE (ASTM D422)

Figure: 5

Remarks:



UNIFIED CLASSIFICATION SYSTEM

BLDs	COBBLES	GRAVEL		SAND			SILT & CLAY	
		coarse	fine	coarse	medium	fine	SILT	CLAY

Sample	Depth (m)	Description	W%	W_L	W_P	I_P	%Gravel	%Sand	%Silt	%Clay
● 16-21	1.0	CLAYEY SAND (SC)	22	24	15	9	2	53	21	24
■ 16-28	1.1	SANDY CLAY (CL)	21	37	16	21	2	35	33	30

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

Location: Amherst Island, ON

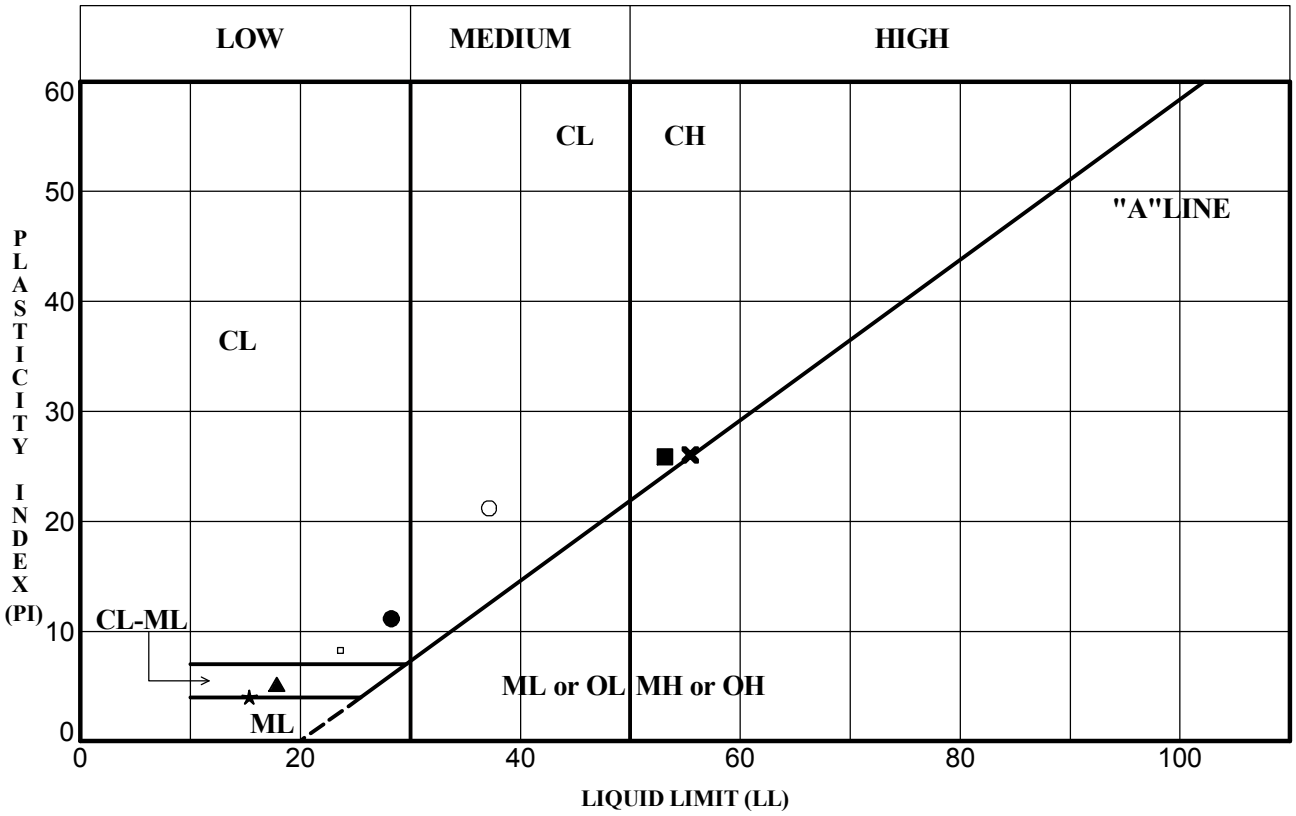
Project No.: 133560104

GRADATION CURVE (ASTM D422)

Figure: 6

Remarks:

PLASTICITY CHART



	Specimen	Depth (m)	LL	PL	PI	Fines	W%	Classification
●	16-01	0.5	28	17	11	50	17	SANDY CLAY (CL)
■	16-07	1.1	53	27	26	79	30	CLAY with SAND (CH)
▲	16-08	1.1	18	13	5	46	8	SILTY, CLAYEY SAND (SC-SM)
★	16-10	1.1	15	11	4	40	7	SILTY, CLAYEY SAND (SC-SM)
✖	16-16	1.1	55	29	26	72	29	CLAY with SAND (CH)
▫	16-21	1.0	24	15	9	45	22	CLAYEY SAND (SC)
○	16-28	1.1	37	16	21	63	21	SANDY CLAY (CL)

Stantec

Project: Amherst Island Wind Farm - Municipal Roads Investigation

Location: Amherst Island, ON

Project No.: 133560104

ATTERBERG LIMITS
(ASTM D4318)

Figure: 7

Remarks:

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