Geotechnical Investigation

Proposed Hotel Addition 40 Elgin Park Drive, Uxbridge, Ontario

Wooden Sticks Golf Course

07 October 2022

→ **The Power of Commitment**

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1. Introduction

GHD has been retained by the Wooden Sticks Golf Course (the Client) to conduct a geotechnical investigation for the design and construction of the proposed commercial development at 40 Elgin Park Drive, Uxbridge, Ontario (the Site). The Site Location Map is presented as **Figure 1** in the attachment section of this report.

A preliminary site plan illustrating the proposed development layout was available to GHD showing the proposed 4-storey hotel building to be constructed immediately west of the existing clubhouse and expansion of the asphalt paved access and parking lot areas to the east. Further details of proposed development were not available at the time of preparation of this report.

The purpose of the geotechnical investigation was to assess the subsurface soil and groundwater conditions within the proposed development area, and to provide geotechnical engineering recommendations relevant to earthwork construction, reuse of existing soils as backfill material, lateral earth pressure parameters for retaining walls, service installation, foundations, slabs, and pavement structure for new parking lot and access areas.

The factual data, interpretations and preliminary recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. This report should be read in conjunction with the Statement of Limitations appended to this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2. GHD's Scope of Work

GHD's scope of work carried out from March to June 2021 and involved the following tasks:

– Pre-Planning activities:
  - Preparation of a Site-specific health and safety plan (HASP).
  - Completion of underground utilities locate clearance (public and private).
– Field activities:
  - Advancement of nine boreholes identified as MW-1, BH-2, MW-3(D), MW-3(S), MW-4, and BH-5 through BH-8 on **Figure 2** to depths ranging between 5.0 to 18.7 metres below ground surface (mbgs) within the proposed new hotel building and parking lots areas. Monitoring wells were installed in four (4) of the borehole locations.
  - Standard Penetration Test (SPT) and associated split spoon soil sampling in accordance with ASTM D1586.
  - Borehole locations and ground surface elevation survey using Leica RX1250X GPS unit connected to the Real-Time Kinematic (RTK) network.
– Completion of geotechnical laboratory testing on the selected soil samples.
– Preparation of geotechnical investigations report (factual data, analysis and recommendation).

3. Methodology

3.1 Safety Planning

Upon project initiation, a Site-specific Health and Safety Plan (HASP) was prepared for implementation during the field investigation program. The HASP presents the visually observed Site conditions to identify potential physical hazards to field personnel. Required personal protective equipment was also listed in the HASP. It is mandatory for all GHD personnel involved in the field program, to read the HASP and have a copy of the HASP available at the Site during the investigative work. Health and Safety requirements in the HASP were implemented during the field investigation program.

3.2 Utility Clearance

GHD completed a pre-drilling Site visit to review the Site conditions and access restrictions. Based on the limits of approach, the boreholes were positioned at appropriate locations to avoid aboveground and underground obstructions. The boreholes were placed in the field based on the proposed development plan.

Prior to initiating the subsurface investigation activities, all applicable utility companies (gas, hydro, network cables, water, waste water, etc.) were contacted, to demarcate the location of their respective underground utilities to ensure that the service lines would not be damaged during the investigative works.

GHD also retained a specialist private services locator (Utility Marx) to locate any underground private utilities that could potentially be present at the Site. The proposed boreholes and test pits were positioned at appropriate locations to avoid existing service lines.

3.3 Field Investigation

Drilling program associated with the geotechnical investigation was started on April 12th and completed on April 14th, 2021. Drilling program consisted of advancing a total of nine exploratory boreholes. Monitoring wells were installed in four (4) of the borehole locations. The borehole and monitoring well locations are presented in **Figure 2**.

GHD's safety protocol related to COVID-19 issues was implemented and all preventive measures were applied for the bringing of samples into the lab. The sample bags and core boxes were decontaminated before carrying out the sample review and laboratory testing.

3.3.1 Test Hole Advancement and Sample Collection

The boreholes were located as shown in **Figure 2**. The drilling work was carried out by a track mounted power auger drilling rig, supplied, and operated by Landshark Group under the full-time supervision of a GHD experienced technical representative. The boreholes were advanced to depths ranging between approximately 5.0 to 18.7 mbgs.

The boreholes were advanced using continuous flight solid or hollow stem augers and soil samples were collected using a 50 millimetre (mm) outside diameter split spoon sampler in general accordance with the specifications of the Standard Penetration Test Method (ASTM D1586). The relative density or consistency of the subsurface soil layers were measured using the Standard Penetration Test (SPT) method, by counting the number of blows ('N') required to drive a conventional split barrel soil sampler 300 mm depth.

Monitoring wells were installed in boreholes MW-1, MW-3(D), MW-3(S) and MW-4. The monitoring wells consist of a 50 mm diameter polyvinyl chloride (PVC) slotted well screen and completed to the ground surface using a riser pipe. A silica sand pack was placed in the annular space between the PVC screen/riser pipe and the borehole to approximately 0.3 m above the top of the screen. A bentonite seal was installed in the remaining borehole annulus above the sand pack.

The GHD technical representative logged the soil samples encountered in the boreholes and examined the samples as they were obtained. The recovered samples were transferred to the GHD Peterborough laboratory, where they were reviewed by a senior geotechnical engineer. The detailed results of the examination are recorded on the borehole logs presented in **Appendix A**.

Groundwater level observations and measurements were made in the boreholes as drilling proceeded and upon completion of drilling. The observed condition and measured groundwater levels are provided in the log of the drilled boreholes. The borehole in which monitoring wells were not installed were backfilled upon completion and sealed in accordance with Ontario Regulation 903.

3.3.2 Borehole Locations and Ground Surface Elevations

The UTM coordinates and ground surface elevation at each borehole were measured using a Leica RX1250X GPS unit connected to the RTK network. The location of each borehole is referenced to UTM (Zone 17) and is provided on the borehole records. The following table presents a summary of investigated depths, the borehole elevations, and the UTM coordinates for the borehole locations:

Table 3.1 Summary of Boreholes and Monitoring Wells

Borehole ID	Location – UTM Coordinates System		Borehole Depth (mbgs)	Ground Elevation (m)
	Northing	Easting		
MW-1	4884211.0	650271.1	18.7	294.1
BH-2	4884232.6	650284.8	12.6	294.1
MW-3D	4884209.0	650229.0	14.2	289.3
MW-3S	4884207.0	650229.0	7.6	289.3
MW-4	4884246.1	650238.7	12.6	287.4
BH-5	4884265.5	650266.5	6.6	292.5
BH-6	4884264.2	650243.0	5.0	287.1
BH-7	4884306.2	650266.7	6.6	291.5
BH-8	4884296.6	650225.5	5.0	283.8

It should be noted that the provided coordinates and elevations are approximate, and should not be used for construction purposes. The locations of the boreholes are shown on the Borehole Location Plan presented as **Figure 2**. Details of the subsurface conditions encountered are discussed in Section 4 of this report and are presented on the individual borehole logs attached to this report in **Appendix A**.

3.4 Geotechnical Laboratory Testing

All geotechnical laboratory testing was completed in accordance with the latest editions of the ASTM standards. Geotechnical laboratory testing consisted of moisture content tests on all recovered soil samples, as well as grain size distribution analysis (sieve and hydrometer) on six select soil samples.

The collected soil samples were classified/described in general accordance with the ASTM D2487 - Standard Practice for Classification of Soils for engineering purposes (Unified Soil Classification System-USCS).

The results of the moisture content, and grain size distribution analysis are recorded at their corresponding depths on the individual borehole logs, provided in **Appendix A**. The laboratory grain size distribution analysis are discussed in Section 4, and the detailed laboratory test results are provided in **Appendix B**.

4. Site Location and Description

The proposed development area is located at civic address 40 Elgin Park Drive, Uxbridge, Ontario. The Site currently supports an operational golf course with associated club house building, asphalt paved access, parking lot and pathway areas and grass surfaced playing areas. The proposed hotel addition will be constructed to the west of the existing club house and parking lot areas will be expanded to the east. The ground surface within the proposed development area generally comprised of tall grass and mature trees.

The site topography generally slopes down to the northwest with a maximum elevation difference of about 10 m observed between boreholes.

5. Regional Geology and Subsurface Conditions

5.1 Regional Geology

According to the Quaternary Geology of Ontario Map 2556 ("Quaternary Geology of Ontario-Southern Sheet", prepared by the Ministry of Northern Development and Mines (MNDM), published in 1991), the Quaternary deposits in the area of the subject Site consist of glaciofluvial ice-contact deposits comprised of gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits.

According to the Paleozoic Geology of Southern Ontario map, the bedrock in the areas consist shale, minor limestone of Blue Mountain Formation of the Upper Ordovician era. The Blue Mountain Formation consists of blue-grey, poorly fossiliferous, noncalcareous shale, fissile and is expected to be over 200 m below existing grade.

5.2 Subsurface Conditions

Subsurface conditions at the borehole locations were generally found to be consistent with the regional geology. Details of the subsurface conditions encountered in the nine boreholes drilled at Site during the GHD investigation are summarized in the following sections of the report. Detailed stratigraphy is shown on the detailed borehole logs presented in **Appendix A**. It should be noted that the subsurface conditions are only confirmed at the borehole locations and may vary between and beyond the borehole locations. The boundaries between the various strata, as shown on the borehole logs are based on non continuous sampling and drilling resistance noted and observed at the time of drilling. These boundaries represent an inferred transition between the various strata, rather than precise planes of geological change.

5.2.1 Topsoil

A layer of surficial topsoil was encountered in seven of the boreholes (all borehole except for boreholes BH-5 and BH-7). This topsoil layer ranged from 100 to 150 mm in thickness. This soil was observed to be in a damp, loose state, with a silty, highly organic content. As such, it is expected to be devoid of any structural engineering properties.

5.2.2 Asphalt

A surficial layer of asphalt was encountered in boreholes BH-5 and BH-7. The asphalt was approximately 50 mm thick in both boreholes.

5.2.3 Fill

Fill material was encountered beneath the topsoil in boreholes BH-1 and BH-2 and beneath the asphalt in borehole BH-5 and BH-7. The fill extended to depths ranging from 1.5 to 3.8 mbgs. The fill consisted of sand with variable amount of silt and gravel. The SPT 'N' values within the fill material were reported between 2 blows per 300 mm of penetration to 21 blows per 300 mm of penetration indicating a very loose to compact state of relative density.

Samples of this material were visually described to be in a moist condition. Measured moisture contents within this layer were found to be between 1 and 15 percent by weight.

The tested soil samples of fill contained 0 to 6 percent gravel, 55 to 87 percent sand, 9 to 29 percent silt, and 4 to 10 percent clay size particles. The fine content (silt and clay) of the tested samples ranged between 13 and 39 percent. The gradation analyses test results are presented in **Appendix B**.

5.2.4 Silty Sand

Native sandy deposits identified as silty sand were contacted under the surficial topsoil and fill layers in all nine boreholes and extended to their termination depths of 5.0 to 18.7 mbgs. The silty sand was brown to light brown in color, and was observed to contain trace amount of gravel and clay size particles.

The SPT 'N' values within the silty sand material were reported between 1 blows per 300 mm of penetration (near surface) to 69 blows per 300 mm of penetration and generally indicating a compact to very dense state of relative density.

Samples of this material were visually described to be in a generally moist, occasionally wet condition. Measured moisture contents within this layer were found to be between 3 and 23 percent by weight.

A total of three soil samples collected from native soils at select depths were tested for grain size distribution analysis. The laboratory test results are summarized in the following tables, and detailed test results are presented in **Appendix B**.

Table 5.1 Summary of Laboratory Test Results

Borehole No./ Sample No.	Sample Depth (m bgs)	Grain Size (%)				Wn (%)	Soil Description
		Gravel	Sand	Fines			
				Silt	Clay		
MW1/SS4	2.3 – 2.7	1	90	6	3	4	Fine Grained Sand with Silt (SM)
MW3D/SS7B	6.3 – 6.6	0	77	19	4	4	Silty Sand (SM)
MW4/SS9	9.2 – 9.8	2	52	40	6	22	Silty Sand (SM)
Wn - natural water content Soil description based on Unified Soil Classification System (ASTM D 2487)							

5.2.5 Groundwater

Groundwater observations and measurements were obtained from the open boreholes during and upon completion of drilling each borehole. Groundwater seepage was observed in three (3) of the open boreholes during drilling operations at depths ranging from 6.1 to 16.8 mbgs. Groundwater level monitoring was conducted in the installed monitoring wells on April 14th and May 5th, 2021. The recorded groundwater level readings are presented in **Table 5.2**.

Table 5.2 Summary of Groundwater Readings

Monitoring Well ID	Date: April 14th, 2021 Groundwater Depth / Elevation* (mbgs / m)	Date: May 5th, 2021 Groundwater Depth / Elevation* (mbgs / m)
MW-1	16.2 / 277.9	16.2 / 277.9
MW-3D	11.3 / 277.9	11.3 / 277.9
MW-3S	Dry	Dry
MW-4	10.2 / 277.2	10.1 / 277.3

Notes:

*The elevations provided are for the purposes of evaluating groundwater elevation and flow direction and should not be relied upon as a legal survey.

It must be noted that groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation, and temperature.

6. Discussion and Recommendations

A preliminary site plan illustrating the proposed development layout was available to GHD showing the proposed 4-storey hotel building to be constructed immediately west of the existing clubhouse and expansion of the asphalt paved access and parking lot areas to the east. Further details of proposed development were not available at the time of preparation of this report.

Based upon the above comments and on the borehole information, and assuming them to be representative of the subsoil conditions across the Site, the following comments and recommendations are offered.

6.1 Site Preparation and Grading

Based on the subsurface conditions encountered in the boreholes, the Site soil generally consist of by a surficial topsoil or asphalt layer over fill materials (encountered in boreholes BH-1, BH-2, BH-5 and BH-7) that generally extends to depths ranging between 1.5 to 3.8 mbgs. The fill materials were observed to have a variable relative density and generally contained trace of intermixed topsoil/organic and/or rootlets.

The existing earth fill and any disturbed native soils should be removed from the footprint of the proposed building area and unsuitable fill should be removed from within pavement areas prior to site grading activities. Fill materials found to contain significant amounts of topsoil/organics or rootlets should not be used as backfill. Additionally, care will be required during excavation to separate any fill materials that appears to contain significant amounts of topsoil/organics or rootlets from the clean earth fill. Further discussion regarding using engineered fill to support footings, floor slabs, and pavements are discussed in Sections 6.2, 6.4, and 6.7.

Prior to Site grading activity, the subgrade soils exposed after the removal of the earth fill within the proposed building areas and unsuitable materials within proposed pavement areas should be visually inspected, compacted if required, and proof rolled using large axially loaded equipment. Any loose, organic, or unacceptable areas should be subexcavated and removed as directed by the Engineer and replaced with suitable fill materials compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD). Clean earth fill used to raise grades in the proposed buildings and pavement areas should be placed in thin layers (200 mm thick or less) and compacted by a heavy appropriate roller to 98 percent SPMDD.

The fill (free of topsoil/organic and rootlets) and the native soils encountered at the Site are generally suitable for reuse as backfill to raise site grades (where required), or as backfill against foundation walls or as trench backfill during installation of buried services, provided they are free of organic material, and are within the optimum moisture

content. The fill soils appear to exhibit moisture content values near the laboratory optimum for compactable soil and reconditioning of these soils may be required during construction. Control of moisture content during placement and compaction will be essential for maintaining adequate compaction.

Installation of engineered fill, where required, must be continuously monitored on a full-time basis by qualified geotechnical personnel.

6.2 Foundations

The common practice for the Serviceability Limit State (SLS) design of most structure and building foundations is to limit the total and differential foundation settlements to 25 mm and 15 mm, respectively. However, other serviceability criteria for the proposed buildings may be determined by the structural engineer considering tolerable settlement that would not restrict the use or operation of the facilities.

It is expected that structural loading for the proposed 4-storey hotel building may be supported on spread and continuous strip footings for column and load bearing walls, respectively. The foundations should be placed on the compact to very dense native silty sand, or on engineered fill placed directly on the compact to very dense native silty sand. The depth at which compact to very dense native silty sand was encountered at each borehole within the proposed building is presented in the table below.

Table 6.1 Minimum Depth (mbgs) / Elevation for Footings

Borehole ID	Minimum Founding Depth (mbgs)	Maximum Founding Elevation (m)
MW-1	2.3	291.8
BH-2	4.6	289.5
MW-3D	1.2	288.1
MW-4	3.0	284.4

6.2.1 Proposed Foundation on Native Soils

Spread and strip footings placed below any existing fill on to the undisturbed compact to very dense native soil may be used for the support of the proposed buildings. Such footings can be generally designed for a geotechnical reaction at Serviceability Limit State (SLS) of 200 kPa and a factored (Ø=0.5) geotechnical resistance at Ultimate Limit State (ULS) of 300 kPa. The depths at which these bearing pressures are available for installation of shallow spread/strip conventional footings at the boreholes located within or immediately adjacent to each of the proposed building areas are shown in table 6.1, subject to on site verification during construction.

Higher ground bearing capacity values could be available locally at deeper depths, if required.

The perimeter foundations and those foundations within unheated areas should be protected from frost effects by at least 1.2 m of earth cover according to OPSD 3090.101 or equivalent insulation.

The foundation subgrade should be inspected and evaluated by the geotechnical engineer prior to placing concrete to verify that the foundations are founded on competent subgrade capable of supporting the recommended design pressure.

Adjacent footings at different elevations should be stepped at a slope not steeper than ten (10) Horizontal to seven (7) Vertical. It is recommended that the lowest footing be constructed first in order to avoid undermining the footings at higher elevations.

6.2.2 Footings on Engineered Fill

In order to avoid stepping footings down in areas with variable fill or unsuitable (loose) native soil thickness or if the Site grades are to be raised, engineered fill could be considered to support structure foundations. A maximum geotechnical bearing pressure of 225 kPa at ULS and 150 kPa at SLS could be considered for footings placed on engineered fill.

Engineered fill could be placed after stripping the ground surface cover and all existing fill materials in the area of the proposed building and laterally extending at least 2.5 m beyond the perimeter of the footprint of the proposed structure. Engineered fill would then be suitable to support the foundations, including the slab-on-grade of the structure, provided that the following criteria are strictly followed. The following placement procedure is recommended.

1. The extent of engineered fill should be controlled by proper surveying techniques to ensure that the top of the engineered fill extends a minimum of 2.5 m beyond the perimeter of the structure to be supported. Where the depth of engineered fill exceeds 1.5 m, this horizontal distance of 2.5 m beyond the perimeter of the building/structure must be increased by at least 1.0 m for each 1.0 m depth of fill.
2. The area to receive the engineered fill should be stripped of any ground surface cover and all existing fill materials. After stripping, the entire area should be inspected and approved by the geotechnical engineer. Spongy, wet or soft/loose spots should be sub-excavated to expose stable subgrade and replaced with competent approved soil, compatible with subgrade conditions, as directed by the geotechnical engineer.
3. The fill soil must be a uniform, homogeneous material, and should be placed in thin layers not exceeding 200 mm. Oversize particles (cobbles and boulders) larger than 100 mm should be discarded. The material utilized for raising grades should consist of approved earth fill materials, compacted uniformly with heavy compactors to at least 98% percent of its Standard Proctor Maximum Dry Density.
4. Full-time geotechnical inspection and quality control (by means of frequent field density and laboratory testing) are necessary for the construction of a certifiable engineered fill pad. The compaction procedure and efficiency should be controlled by the geotechnical engineer.

The engineered fill should be placed at water contents ± 2% of the optimum value for maximum compaction. The engineered fill should not be placed during winter months when freezing ambient temperatures occur persistently or intermittently.

6.3 Depth of Frost Penetration

In accordance with OPSD 3090.101 (2010), the design depth of frost penetration in the area of the Site is 1.2 m. It is recommended that the building perimeter foundations and those foundations within unheated areas should be protected from frost effects by at least 1.2 m of earth cover or equivalent insulation. All exterior footings, footings beneath unheated areas and foundations exposed to freezing temperatures should have at least such earth cover or equivalent synthetic insulation for frost protection. During winter construction exposed surfaces to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

6.4 Slab-On-Grade Construction

The slab-on-grade should be supported on compacted fill materials or on native soils. It is recommended that the existing fill and unsuitable materials that may be present below the proposed floor slab for the proposed building be removed and that grades after sub-excavation be inspected and heavily proof rolled. Any area observed to be soft should be subexcavated and replaced with engineered fill. The grade should then be raised with an acceptable earth fill material placed in thin lifts (not more than 200 mm thick) and thoroughly compacted to a minimum of 98% of the material's Standard Proctor Maximum Dry Density (SPMDD). A qualified geotechnical engineer should review the condition of the subgrade beneath the proposed slab.

A minimum of 150 mm thick layer of 19 mm clear crushed stone should be placed between the prepared subgrade and the floor slab to act as moisture barrier. For the structural design of the concrete slab-on-grade, a combined modulus of subgrade/granular base reaction coefficient (k) of 35 MPa/m can be used.

Perimeter drainage of the structure is recommended where there is pavement adjacent to the building face or finished floor level of the structure is not at least 200 mm above the prevailing exterior grade level. Surface drainage should be directed away from the building.

6.5 Seismic Site Classification

The latest Ontario Building Code (OBC) requires the assignment of a Seismic Site Class for calculations of earthquake design forces and the structural design based on a two percent probability of exceedance in 50 years. According to the latest OBC, the Seismic Site Class is a function of soil profile, and is based on the average properties of the subsoil strata to a depth of 30 m below the ground surface. The OBC provides the following three methods to obtain the average properties for the top 30 m of the subsoil strata:

– Average shear wave velocity.
– Average Standard Penetration Test (SPT) values (uncorrected for overburden).
– Average undrained shear strength.

For design purposes, based on the criteria listed in Table 4.1.8.4.A. of the OBC and the results obtained from standard penetration resistance of the underlying subsurface conditions, estimated undrained shear strength and our knowledge of the regional geology, a Seismic Site Class ‘D’ can be used for the design of the proposed building.

6.6 Site Servicing

The native soils encountered at the Site are considered suitable to support underground service lines. The suitability of the subgrade to provide adequate support for buried services must be verified and confirmed on site by qualified geotechnical personnel experienced in such works.

The subgrade soils used to support the service pipes, should be visually inspected. Wet, loose, or otherwise unsuitable fill should be sub-excavated and replaced with bedding materials or clean fills compacted to minimum of 95% SPMDD. If excavations extend below the groundwater table, then a dewatering system as discussed previously will be required to maintain the trench stability.

The bedding for trenched (open cut) services should consist of well graded materials. The bedding should have a minimum thickness of 150 mm below the pipe and 300 mm above and adjacent to the pipe and should comply with the local Standards. The bedding and cover materials should be compacted to a minimum of 95 percent SPMDD to provide support and protection to the service pipes.

Where wet conditions are encountered, the use of 'clear stone' bedding (such as 19 mm clear stone, OPSS 1004) may be considered, only in conjunction with a suitable geotextile filter. Without proper filtering, there may be entry of fines from the existing fill or native soils and trench backfill into the bedding. This loss of fine soil particles could result in loss of support to the pipes and possible surface settlements.

6.7 Pavement Design

Based on the results of this investigation, we would recommend the following procedures be implemented to prepare the proposed asphalt paved access way and parking areas for its construction:

1. Remove all asphalt, topsoil, fill, organics, organic-bearing materials and other deleterious materials from the planned pavement areas to a minimum depth to allow for the new pavement structure at which point an assessment of the exposed soils by a member of GHD will deem whether further removal and/or placement of suitable geotextile material or other treatment is required.

2. Inspect and proof roll the subgrade for the purpose of detecting possible zones of overly wet or soft subgrade. Any deleterious areas thus delineated should be replaced with approved granular material compacted to a minimum of 98 % of its SPMDD.
3. If further stabilization of the pavement subgrade is deemed necessary, either subexcavate to suitable soils and backfill with approved granular material compacted to 98% SPMDD, or place woven geotextile such as Terrafix 200W or Mirafi HP270 on the exposed pavement subgrade surface, after its approval and prior to placement of any subsequent fill.
4. Contour the subgrade surface to prevent ponding of water during the construction and to promote rapid drainage of the sub-base and base course materials.
5. To maximize drainage potential, 150 mm diameter perforated pipe subdrains should be installed radiating in each direction from catchbasins in the parking lot and below any curb lines for roads. The pipe should be encased in filter fabric and surrounded by clear stone aggregate. It is recommended that the subdrains discharge to a suitable, frost-free outlet.
6. Construct transitions between varying depths of granular base materials at a rate of 1:25 minimum.

The subgrade materials in the Site consisted of fill or native silty sand soils. The frost susceptibility of these soils is assessed as being generally moderate to high. In this regard, the following minimum flexible pavement structures are recommended for the construction of the new access and parking areas.

Table 6.2 Asphalt Pavement Structure

Profile	Material	Thickness (mm)		In Conformance with OPSS Form
		Light Duty	Heavy Duty	
Asphalt Surface	H.L.3	40	40	1150
Asphalt Base	H.L.8	50	90	
Granular Base	Granular “A”	150	150	1010
Granular Subbase	Granular “B”	200	350	

The following steps are recommended for optimum construction of paved areas:

1. The Granular “A” and “B” courses should be compacted to a minimum 100 percent of their respective SPMDD’s.
2. All asphaltic concrete courses should be placed, spread and compacted conforming to OPSS 310 or equivalent. All asphaltic concrete should be compacted to a minimum 92.0 percent of their respective laboratory Maximum Relative Densities (MRD’s).
3. Adequate drainage should be provided to ensure satisfactory pavement performance.

It is recommended that all fill material be placed in uniform lifts not exceeding 200 mm in thickness before compaction. It is suggested that all granular material used as fill should have an in-situ moisture content within 2 percent of their optimum moisture content. All granular materials should be compacted to 100 percent SPMDD. Granular materials should consist of Granular “A” and “B” conforming to the requirements of OPSS 1010 or equivalent.

The performance of the 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 as much as practically possible. It is noted that the above recommended pavement structures are for the end use of the project. The most severe loading conditions on pavement areas and the subgrade may occur during construction. As such, during construction of the project, the recommended granular depths may not be sufficient to support loadings encountered. Consequently, special provisions such as restricted lanes, half-loads during paving, etc. may be required, especially if construction is carried out during unfavorable weather.

It is recommended that new embankment or retaining wall structure to be constructed to the west of new parking lot areas be checked for global stability once design details are available.

6.8 Excavation and Temporary Shoring

The Occupational Health and Safety Act (OHSA) regulations require that if workmen must enter an excavation deeper than 1.2 m, the excavation must be suitably sloped and/or braced in accordance with the OHSA requirements. OHSA specifies maximum slope of the excavations for four broad soil types as summarized in the following table:

Soil Type	Base of Slope	Maximum Slope Inclination
1	Within 1.2 metres of bottom	1 horizontal to 1 vertical
2	Within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	From bottom of excavation	1 horizontal to 1 vertical
4	From bottom of excavation	3 horizontal to 1 vertical

OHSA Section 226 defines the four soil types as follows

Type 1 soil:

a. hard, very dense and only able to be penetrated with difficulty by a small sharp object;
b. has a low natural moisture content and a high degree of internal strength;
c. has no signs of water seepage; and
d. can be excavated only by mechanical equipment.

Type 2 soil:

a. very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
b. has a low to medium natural moisture content and a medium degree of internal strength; and
c. has a damp appearance after it is excavated.

Type 3 soil:

a. stiff to firm and compact to loose in consistency or is previously excavated soil;
b. exhibits signs of surface cracking;
c. exhibits signs of water seepage;
d. if it is dry, may run easily into a well-defined conical pile; and
e. has a low degree of internal strength.

Type 4 soil:

a. soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
b. runs easily or flows, unless it is completely supported before excavating procedures;
c. has almost no internal strength;
d. wet or muddy; and
e. exerts substantial fluid pressure on its supporting system. Ontario Regulation 213/91, s. 226 (5).

The earth fill and native soils underlying the Site are considered Type 3 soils above groundwater level, and Type 4 below groundwater table. If the above recommended excavation side slopes cannot be maintained due to lack of space or any other reason, the excavation side slopes must be supported by an engineered shoring system. The shoring system should be designed in accordance with Canadian Engineering Foundation Manual (4th Edition) and the OHSA Regulations for Construction Projects.

It is anticipated that excavation for foundation and utility installations can be made with conventional equipment.

6.9 Lateral Earth Pressure

Structures subject to unbalanced earth pressures such as foundation walls, shoring system, retaining walls and other similar structures should be designed to resist the lateral earth pressures. The following table below summarizes the recommended soil parameters to be used for lateral earth pressure calculations.

Table 6.3 Soil Parameters and Earth Pressure Coefficients

Soil	φ	γ (kN/m^3)	K_a	K_o	K_p
OPSS Granular A or B compacted	34	20	0.28	0.44	3.54
Existing Fill	25	19	0.40	0.58	2.46
Native Silty Sand	32	18	0.31	0.47	3.25

Surcharge and hydrostatic pressures should be considered as appropriate. The above earth pressure coefficients apply to horizontal surfaces behind the walls/supports only.

If movement sensitive services exist close to the shoring, the lateral pressure should be computed using the coefficient of earth pressure at rest, Ko.

It is noted that large deformations will be required for the full mobilization of soil passive earth pressure.

6.10 Temporary Dewatering Requirements

The measured groundwater levels in the installed monitoring wells ranged between 10.1 and 16.2 mbgs, at elevations ranging between 277.3 and 277.9 m. Also, groundwater seepage was observed in three (3) of the boreholes during drilling operations at depths ranging from 6.1 to 16.8 mbgs. In the long term, seasonal fluctuations of the groundwater level are expected. A perched water table condition could develop in the fill or shallow sandy layer deposit after heavy precipitation and/or during spring thaw.

The amount of seepage into excavations will depend on the depth of excavation relative to the groundwater level at the time of construction. No major groundwater control requirements are expected for the construction of the foundations and utilities based on measured groundwater levels. Minor seepage into the excavations should be controllable with perimeter ditches and pumping from filtered sumps. It is recommended that pumping equipment should be available on site to remove any groundwater and inflowing surface water from the excavation, particularly during wet weather periods.

Below the water table, unsupported excavations advanced into the granular deposits cannot safely proceed until such time the groundwater table is lowered to a minimum depth of 1 m below the base of the excavation. In the sandy materials and where required, it should be possible to lower the water table by pumping from sealed, closely spaced eductor points. The eductors could be installed after the excavation has been carried out down to just above the groundwater level. The eductor points should be surrounded with a graded granular filter to prevent the removal of fine soil particles during pumping.

It is recommended that prior to commencing the construction, consideration be given to the excavation of a series of trial excavations to determine more accurately the soil behavior and whether or not any significant dewatering works will be required.

6.11 Construction Monitoring

The foundation installations and Engineered Fill placement must be closely monitored and inspected by qualified personnel to ensure consistency with the design bearing. The on-site review of the condition of the foundation soil as the foundations are constructed is an integral part of the geotechnical design function and is required by Section 4.2.2.2 of the Ontario Building Code 2012.

Qualified Geotechnical personnel should inspect and test all stages of the proposed development. Specifically, they should ensure that the materials and conditions comply with this geotechnical assessment report. In addition, qualified geotechnical personnel should provide material testing services prior to and during backfilling and grade raising operation. Should soil conditions be encountered that vary from those described in this report, our office should be informed immediately such that the proper measures are undertaken.

7. Limitations of the Investigation

This report is intended solely for Wooden Sticks Golf Course and their designers and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevation and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

By issuing this report, GHD is the geotechnical engineer of record. It is recommended that GHD be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the test locations only. The subsurface conditions confirmed at the test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on site (e.g., excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

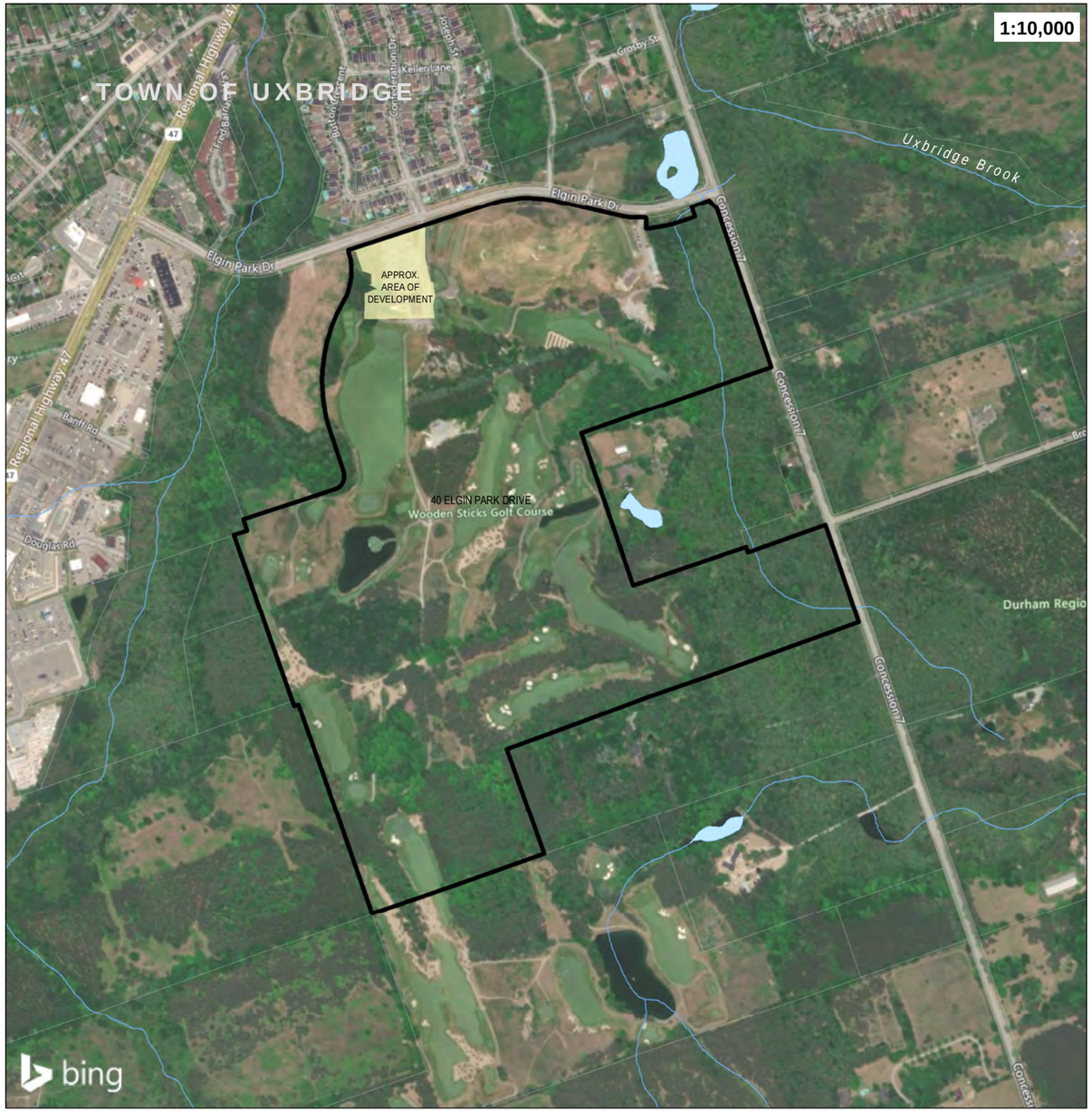
All of Which is Respectfully Submitted,

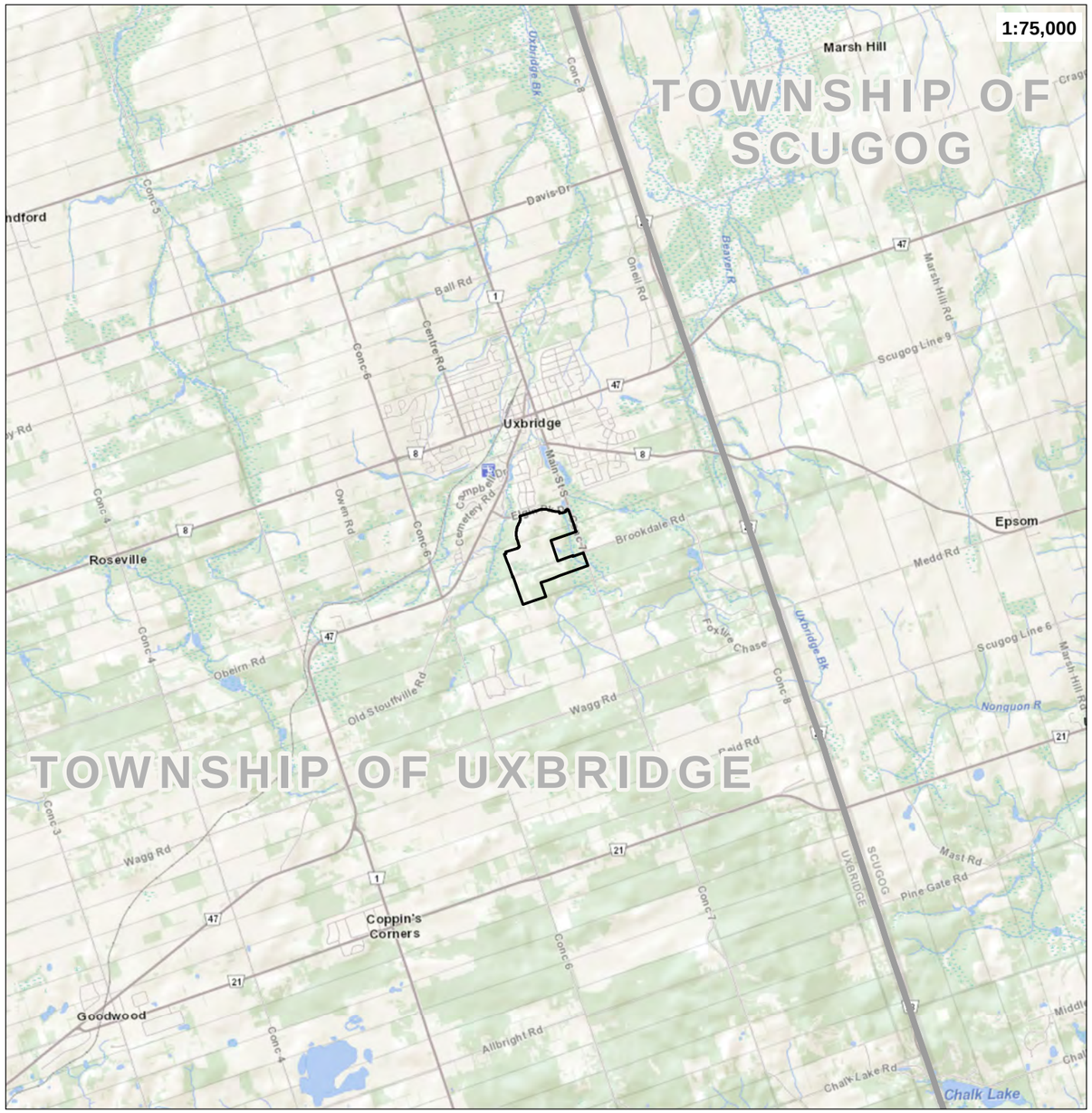
GHD

Leandro Ramos, P.Eng.

Andy Fawcett, P. Eng.

Figures





LEGEND

Administrative

- Property Limit
- Municipality, Lower Tier
- Approximated Parcel Fabric Boundary
- Approximated Area of Development

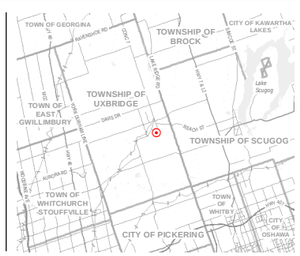
Hydrology

Ontario Hydrographic Network, 2021.

- Watercourse/Drainage
- Waterbody / River / Drainage

CITATIONS

- Ministry of Natural Resources & Forestry. Ontario Hydrographic Network (OHN). Open Data. 2021.
- Ministry of Natural Resources & Forestry. Topographic Basemap Service. Web Map. Open Data. 2021.
- Service Layer Credits: © 2021 Microsoft Corporation © 2021 Maxar ©CNES (2021) Distribution Airbus DS © 2021 TomTom



REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2021-06-02	Initial map creation.	L.R.

GHD

DATA DISCLAIMERS

- Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© Queen's Printer for Ontario, 2021(2020).

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

MAIN SCALE
1 cm : 100 meters

0 50 100 150 200
Meters

WOODEN STICKS GOLF COURSE
40 Elgin Park Drive, Uxbridge, ON
Pt Lot 27, Con 6 Geo. Township of Uxbridge
Town of Uxbridge, Region of Durham

GEOTECHNICAL INVESTIGATION
SITE PLAN LOCATION

Project No. 11225419
Revision No.
Date May 2021

N

FIGURE 1

Document Path: Q:\gis2\GIS\PROJECTS\11225000s\11225419\Layouts\202106_RPT001\11225419_202106_RPT001_GIS001 - Site Plan Location.mxd
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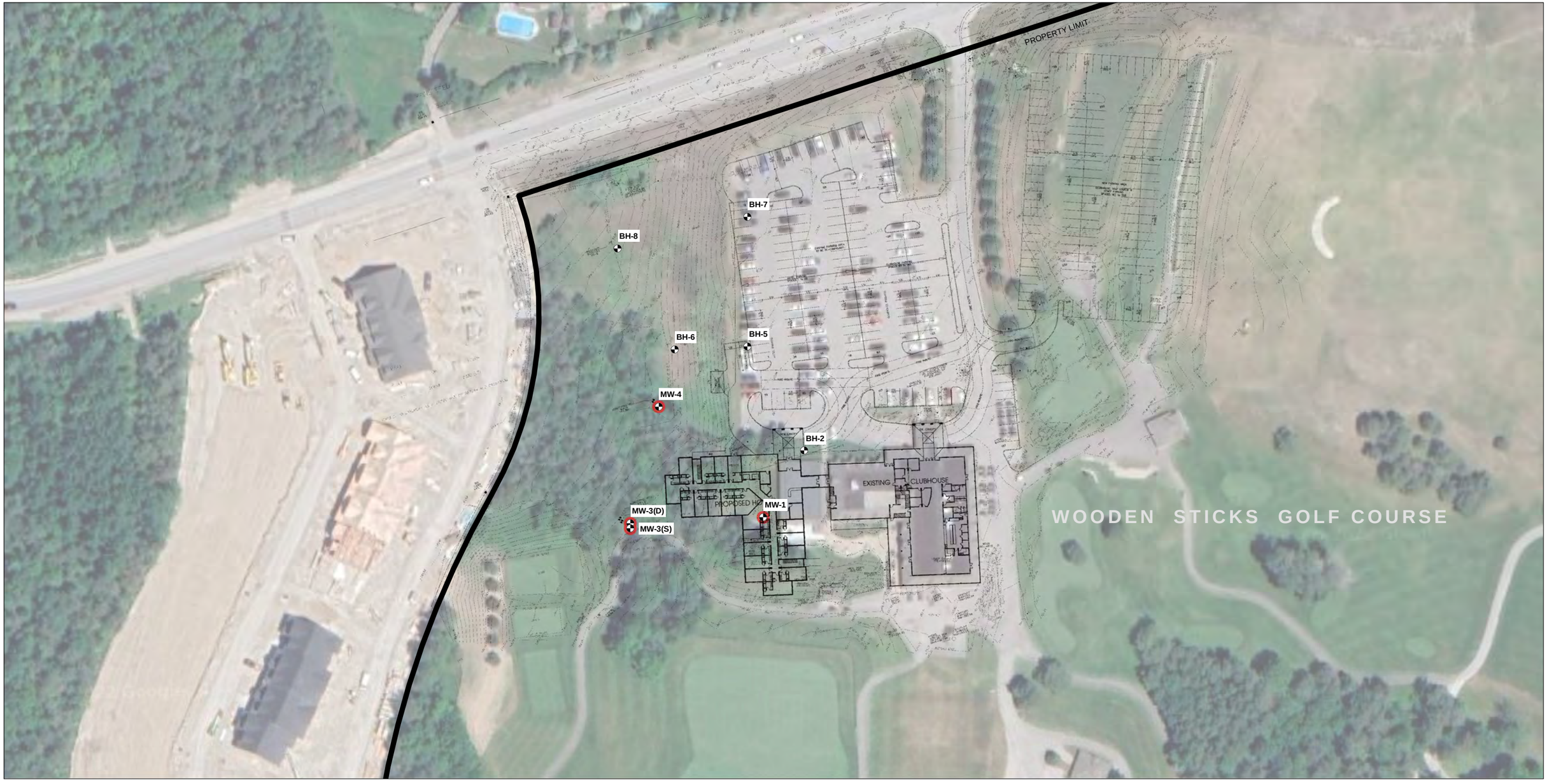


LEGEND

Administrative

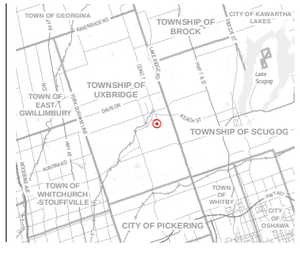
- Property Limit
- Approximate Parcel Boundary

Test Holes

- Borehole Location
- Monitoring Well Location

CITATIONS

- Imagery obtained via Google, 2021 (Imagery Date Not Verified)
- CAD drawing. No Source.



REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2021-06-02	Initial map creation.	L.R.
1	W.P.	2021-06-03	Amendments to boreholes and monitoring wells.	L.R.
2	W.P.	2022-10-04	New CAD plan.	L.R.

DATA DISCLAIMERS

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

SCALE
1 cm : 12 meters

0 7 14 21 28
Meters

WOODEN STICKS GOLF COURSE
40 Elgin Park Drive, Uxbridge, ON
Pt Lot 27, Con 6 Geo. Township of Uxbridge
Town of Uxbridge, Region of Durham

GEOTECHNICAL INVESTIGATION

BOREHOLE LOCATION PLAN

Project No.	11225419
Revision No.	02
Date	Oct 2022

N

FIGURE 2

Document Path: Q:\GIS\PROJECTS\11225000s\11225419\Layouts\202106_RPT001\11225419_202106_RPT001_GIS002 - Borehole Location Plan.mxd
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Appendices

Appendix A

Borehole Logs and Soil Classification Notes

REFERENCE No.: 11225419 ENCLOSURE No.: 1

BOREHOLE No.: MW-1
ELEVATION: 294.08 m

BOREHOLE REPORT

Page: 1 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 13 April 2021 DATE (FINISH): 13 April 2021

NORTHING: 4884211 EASTING: 650271.13

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth (Feet / Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
Feet / Metres	294.08		GROUND SURFACE						
0	293.98		**TOPSOIL** (100mm)						
1			**FILL**: SILTY SAND, fine grained, loose, light brown, moist		SS-1	63	12	0-3-2-3	5
2									
3 / 1.0					SS-2	100	13	2-2-1	3
4									
5	292.41		Brown		SS-3a	100	14	3-3-6	9
6			**NATIVE**:		SS-3b		3	--	--
7 / 2.0			SM - SILTY SAND, fine grained, poorly graded, loose, light brown, moist						
8			Medium grained, compact		SS-4	100	4	6-7-9	16
9			Gravel: 1%, Sand: 90%, Silt: 6%, Clay: 3%						
10 / 3.0			Brown to light brown, fine grainded		SS-5	100	3	10-10-18	28
11									
12									
13 / 4.0									
14									
15			Trace Gravel, dense		SS-6	100	3	18-22-22	44
16			Laminated						
17 / 5.0									
18									
19									
20 / 6.0					SS-7	100	4	13-18-25	43
21									
22									
23 / 7.0									
24									
25			Very dense		SS-8	100	4	18-24-36	60
26 / 8.0									
27									
28									
29 / 9.0									
30			Medium grained, dense		SS-9	100	4	9-15-23	38
31			Fine grained						
32									
33 / 10.0									
34									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

File: G:\11225419\WORKSHARE\DESIGN\GINT\11225419 - GINT BOREHOLE LOGS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 4/6/21

REFERENCE No.: 11225419 ENCLOSURE No.: 1

BOREHOLE REPORT

BOREHOLE No.: MW-1
ELEVATION: 294.08 m
Page: 2 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 13 April 2021 DATE (FINISH): 13 April 2021

LEGEND
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

NORTHING: 4884211 EASTING: 650271.13

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		294.08		GROUND SURFACE				%		
36	11.0					SS-10	100	2	24-25-29	54
37										
38										
39	12.0									
40						SS-11a	100	7	16-21-26	47
41				Moist to wet		SS-11b		16	--	--
42										
43	13.0									
44										
45				Moist						
46	14.0					SS-12	100	6	19-27-42	69
47										
48										
49	15.0									
50				Medium grained						
51						SS-13	100	4	17-21-26	47
52										
53	16.0									
54										
55				Wet						
56	17.0					SS-14	100	18	4-16-31	52
57										
58										
59	18.0									
60										
61						SS-15	100	16	14-26-39	65
		275.34								
62	19.0			**END OF BOREHOLE :**						
63										
64				**NOTE :**						
65				- End of Borehole at 18.7 m bgs						
66	20.0			- Borehole open upon completion of drilling						
67				- Water level in borehole upon completion 16.1 m bgs						
68				- Water level at 16.22 m bgs on 2021/04/14						
69	21.0			- Water level at 16.22 m bgs on 2021/05/05						
				- bgs denotes 'below ground surface'						

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

16.15 m
16.76 m
18.29 m

File: G:\11225419\WORKSHARE\DESIGN\GINT\11225419 - GINT BOREHOLE LOGS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 4/6/21

REFERENCE No.: 11225419 ENCLOSURE No.: 2

GHD

BOREHOLE No.: BH-2

ELEVATION: 294.10 m

BOREHOLE REPORT

Page: 1 of 2

CLIENT: Wooden Sticks Golf Course

PROJECT: Geotechnical Investigation

LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario

DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos

DATE (START): 12 April 2021 DATE (FINISH): 12 April 2021

NORTHING: 4884232.62 EASTING: 650284.76

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		294.10		GROUND SURFACE				%		
0		293.95		**TOPSOIL** (150mm)						
1				**FILL**: SILTY SAND with gravel, fine grained, compact, light brown, moist		SS-1	83	15	6-8-12-10	20
2										
3	1.0			Gravel: 6%, Sand: 55%, Silt: 29%, Clay: 10%		SS-2	100	8	4-13-8	21
4										
5		292.57		**NATIVE**: SM - SILTY SAND, fine to medium grained, poorly graded, loose, light brown, moist		SS-3	100	8	4-3-3	6
6										
7	2.0			Trace gravel, compact		SS-4	100	8	6-4-8-4	12
8										
9										
10	3.0			Stratified layers, loose		SS-5	94	14	3-3-3	6
11				Brown						
12										
13	4.0									
14										
15				Medium grained, Compact light brown		SS-6	100	5	3-2-14	16
16										
17	5.0									
18										
19										
20	6.0			Fine to medium grained, Dense		SS-7	100	5	12-20-30	50
21										
22										
23	7.0									
24										
25				Very dense		SS-8	100	4	19-28-32	60
26	8.0									
27										
28										
29	9.0									
30				Fine grained, dense		SS-9	100	4	14-16-22	38
31										
32										
33	10.0									
34										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

REFERENCE No.: 11225419 ENCLOSURE No.: 2

BOREHOLE No.: BH-2
ELEVATION: 294.10 m

BOREHOLE REPORT

Page: 2 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 12 April 2021 DATE (FINISH): 12 April 2021

NORTHING: 4884232.62 EASTING: 650284.76

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		294.10		GROUND SURFACE				%		
36	11.0					SS-10	100	5	15-22-26	48
39	12.0			Very dense		SS-11	100	5	16-26-30	56
		281.45		**END OF BOREHOLE :**						
43	13.0			**NOTE :** - End of Borehole at 12.6 m bgs - Borehole caving to 11.2 m bgs - No water accumulated in borehole upon completion - bgs denotes 'below ground surface'						
46	14.0									
49	15.0									
52	16.0									
56	17.0									
59	18.0									
62	19.0									
66	20.0									
69	21.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

REFERENCE No.: 11225419 ENCLOSURE No.: 3

BOREHOLE No.: MW-3(D)
ELEVATION: 289.26 m

BOREHOLE REPORT

Page: 1 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 12 April 2021 DATE (FINISH): 12 April 2021

NORTHING: 4884209 EASTING: 650229

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
0		289.26		GROUND SURFACE						
1		289.01		**TOPSOIL** (100mm)						
				NATIVE: SM - SILTY SAND, very loose, brown, moist		SS-1	79	11	0-0-1-2	1
3	1.0			Fine grained, poorly graded, compact, light brown Compact		SS-2	100	10	6-8-10	18
5				Moist to wet Moist		SS-3	100	14	7-9-12	21
7	2.0			Dense		SS-4	100	9	12-14-20	34
10	3.0					SS-5	100	6	13-18-19	37
13	4.0									
15						SS-6	100	5	7-9-19	28
17	5.0									
19	6.0									
20				Wet		SS-7a	100	15	14-18-30	48
21				Moist Gravel: 0%, Sand: 77%, Silt: 19%, Clay: 4%		SS-7b		4	--	--
23	7.0									
25						SS-8	100	6	14-16-20	36
26	8.0									
29	9.0									
30						SS-9	100	6	13-17-26	43
33	10.0									
34										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

m
m

REFERENCE No.: 11225419 ENCLOSURE No.: 3

BOREHOLE No.: MW-3(D)
ELEVATION: 289.26 m

BOREHOLE REPORT

Page: 2 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 12 April 2021 DATE (FINISH): 12 April 2021

NORTHING: 4884209 EASTING: 650229

LEGEND

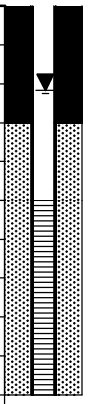
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		289.26		GROUND SURFACE				%		
36	11.0			Very dense		SS-10	100	5	26-28-32	60
40	12.0			Dense, wet		SS-11	100	22	17-23-21	44
45	13.0			Compact		SS-12	100	23	12-11-14	25
46	14.0	275.09		**END OF BOREHOLE :**						
49	15.0			**NOTE :** - End of Borehole at 14.2 m bgs - Borehole caving to 12.8 m bgs - Water level at 11.33 m bgs on 2021/04/14 - Water level at 11.33 m bgs on 2021/05/05 - bgs denotes 'below ground surface'						
52	16.0									
56	17.0									
59	18.0									
62	19.0									
66	20.0									
69	21.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

11.58 m
12.19 m
13.72 m



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REFERENCE No.: 11225419 ENCLOSURE No.: 4

BOREHOLE REPORT

BOREHOLE No.: MW-3(S)
ELEVATION: 289.26 m
Page: 1 of 1

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 12 April 2021 DATE (FINISH): 12 April 2021

NORTHING: 4884207 EASTING: 650229

LEGEND
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
0		289.26		GROUND SURFACE						
1		289.01		**TOPSOIL** (100mm)						
2				**NATIVE**: SM - SILTY SAND, very loose, brown, moist						
3	1.0			Fine grained, poorly graded, compact, light brown						
4				Compact						
5				Moist to wet						
6				Moist						
7	2.0									
8				Dense						
9										
10	3.0									
11										
12										
13	4.0									
14										
15										
16	5.0									
17										
18										
19										
20	6.0			Wet						
21				Moist						
22										
23	7.0									
24										
25		281.64		**END OF BOREHOLE :**						
26	8.0			**NOTE :**						
27				- End of Borehole at 7.6 m bgs						
28				- Monitoring well measured to be dry on 2021/04/14						
29	9.0			- Monitoring well measured to be dry on 2021/05/05						
30				- bgs denotes 'below ground surface'						
31										
32										
33	10.0									
34										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

m
m
m
5.49 m
6.10 m
7.62 m

File: G:\11225419\WORKSHARE\DESIGN\GINT\11225419 - GINT BOREHOLE LOGS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 4/6/21

REFERENCE No.: 11225419 ENCLOSURE No.: 5

BOREHOLE No.: MW-4
ELEVATION: 287.40 m

BOREHOLE REPORT

Page: 1 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 13 April 2021 DATE (FINISH): 13 April 2021

NORTHING: 4884246.14 EASTING: 650238.66

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		287.40		GROUND SURFACE				%		
0		287.30		**TOPSOIL** (100mm)						
1				**NATIVE**: SM - SILTY SAND, trace organics, very loose, dark brown, moist		SS-1	92	21	0-1-1-1	2
3	1.0			Reddish brown Compact, light brown		SS-2	92	12	1-1-1-1	2
5				Loose, reddish brown		SS-3	100	12	2-2-5	7
7	2.0			Fine grained, poorly graded, compact, light brown		SS-4	100	8	4-5-7	12
10	3.0					SS-5	100	4	8-11-12	23
13	4.0			Medium grained, dense		SS-6	100	7	11-18-24	46
17	5.0									
20	6.0			Compact		SS-7	100	5	10-12-14	26
23	7.0									
26	8.0					SS-8	100	5	9-11-15	26
29	9.0									
30				Gravel: 2%, Sand: 52%, Silt: 46%, Clay: 6% Brown, wet		SS-9	100	22	10-12-18	30
33	10.0									

Shear test (Cu) △ Field □ Lab
Sensitivity (S)
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

m
8.69 m
9.30 m

File: G:\11225419\WORKSHARE\DESIGN\GINT\11225419 - GINT BOREHOLE LOGS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 4/6/21

REFERENCE No.: 11225419 ENCLOSURE No.: 5

BOREHOLE No.: MW-4
ELEVATION: 287.40 m

BOREHOLE REPORT

Page: 2 of 2

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 13 April 2021 DATE (FINISH): 13 April 2021

NORTHING: 4884246.14 EASTING: 650238.66

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		287.40		GROUND SURFACE				%		
36	11.0					SS-10	100	20	3-5-15	20
39	12.0			Dense		SS-11	100	17	6-16-27	43
		274.75		**END OF BOREHOLE :**						
43	13.0			**NOTE :** - End of Borehole at 12.6 m bgs - Borehole caving to 10.2 m bgs - Water level in borehole upon completion 10.1 m bgs - Water level at 9.88 m bgs on 2021/04/14 - Water level at 9.85 m bgs on 2021/05/05 - bgs denotes 'below ground surface'						
46	14.0									
49	15.0									
52	16.0									
56	17.0									
59	18.0									
62	19.0									
66	20.0									
69	21.0									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

10.82 m

File: G:\11225419\WORKSHARE\DESIGN\GINT\11225419 - GINT BOREHOLE LOGS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 4/6/21

REFERENCE No.: 11225419 ENCLOSURE No.: 6

BOREHOLE No.: BH-5
ELEVATION: 292.51 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 14 April 2021 DATE (FINISH): 14 April 2021

NORTHING: 4884265.52 EASTING: 650266.65

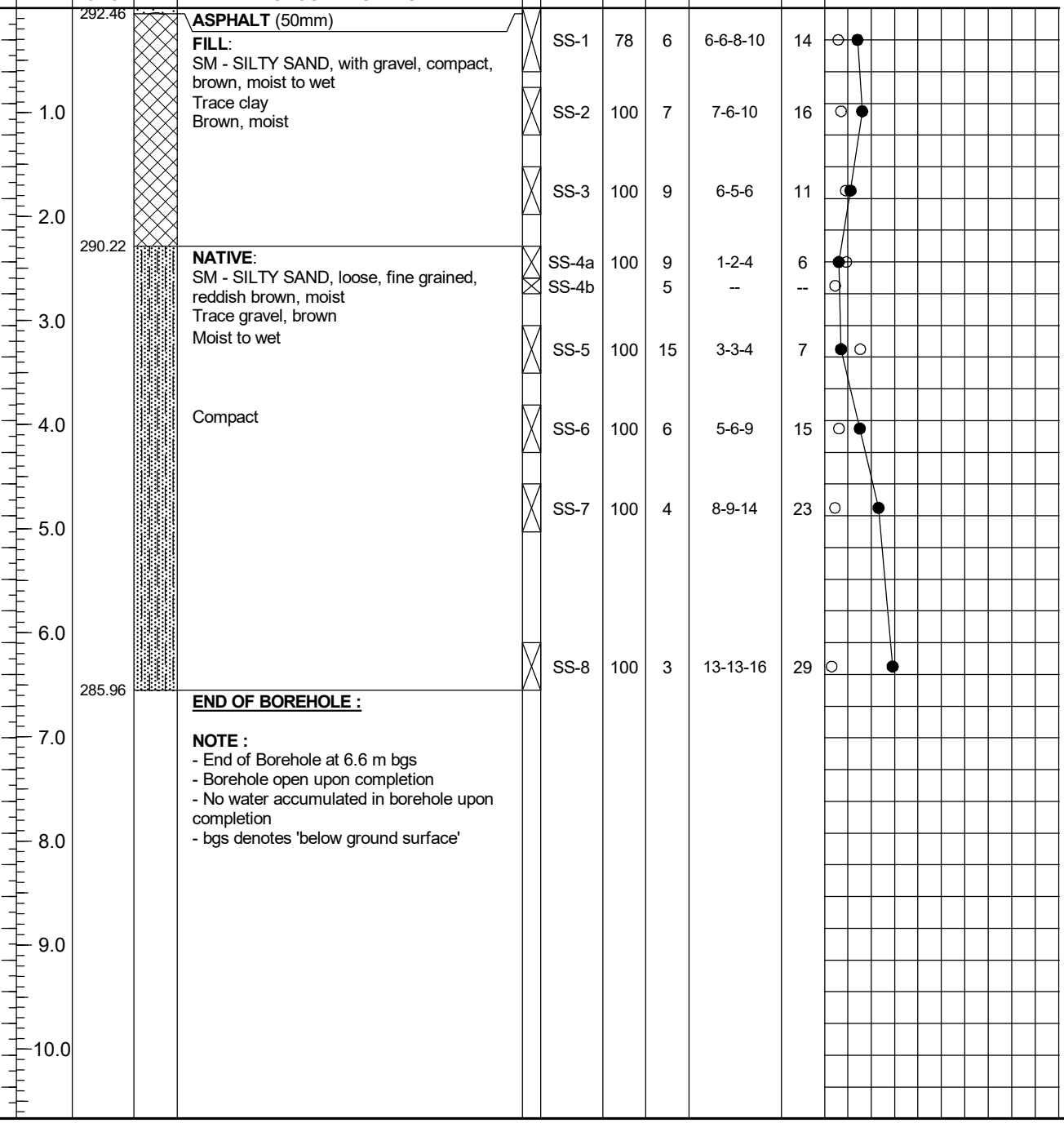
LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth (Feet / Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
0	292.51		GROUND SURFACE						
0	292.46		**ASPHALT** (50mm)						
1			**FILL**: SM - SILTY SAND, with gravel, compact, brown, moist to wet		SS-1	78	6	6-6-8-10	14
2									
3	1.0		Trace clay Brown, moist		SS-2	100	7	7-6-10	16
4									
5					SS-3	100	9	6-5-6	11
6	2.0								
7									
8	290.22		**NATIVE**: SM - SILTY SAND, loose, fine grained, reddish brown, moist		SS-4a	100	9	1-2-4	6
9			Trace gravel, brown		SS-4b		5	--	--
10	3.0		Moist to wet		SS-5	100	15	3-3-4	7
11									
12									
13	4.0		Compact		SS-6	100	6	5-6-9	15
14									
15					SS-7	100	4	8-9-14	23
16	5.0								
17									
18									
19									
20	6.0				SS-8	100	3	13-13-16	29
21									
22	285.96		**END OF BOREHOLE :**						
23	7.0		**NOTE :** - End of Borehole at 6.6 m bgs - Borehole open upon completion - No water accumulated in borehole upon completion - bgs denotes 'below ground surface'						
24									
25									
26	8.0								
27									
28									
29	9.0								
30									
31									
32									
33	10.0								
34									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90



File: G:\11225419\WORKSHARE\DESIGN\GINT\11225419 - GINT BOREHOLE LOGS.GPJ Library File: GHD_GEOTECH_V05.GLB Report: SOIL LOG WITH GRAPH+WELL Date: 4/6/21

REFERENCE No.: 11225419 ENCLOSURE No.: 7

BOREHOLE No.: BH-6
ELEVATION: 287.14 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 14 April 2021 DATE (FINISH): 14 April 2021

NORTHING: 4884264.21 EASTING: 650243.01

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth (Feet)	Depth (Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		287.14		GROUND SURFACE						
0		287.09		**TOPSOIL** (100mm)		SS-1a	92	4	0-3-2-4	5
1				**NATIVE**:		SS-1b		9	--	--
2				SM - SILTY SAND, trace gravel, loose, brown, moist						
3	1.0			Fine grained, poorly graded, light brown Compact		SS-2	94	4	7-8-10	18
4										
5						SS-3	100	4	7-8-11	19
6	2.0									
7										
8						SS-4	100	5	9-12-14	26
9										
10	3.0					SS-5	100	3	9-11-17	28
11										
12										
13	4.0									
14										
15				Dense, moist to wet						
16						SS-6	100	6	12-15-17	32
17	5.0	282.11		**END OF BOREHOLE :**						
18										
19				**NOTE :**						
20	6.0			- End of Borehole at 5.0 m bgs						
21				- Borehole open upon completion						
22				- No water accumulated in borehole upon completion						
23	7.0			- bgs denotes 'below ground surface'						
24										
25										
26	8.0									
27										
28										
29	9.0									
30										
31										
32										
33	10.0									
34										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

REFERENCE No.: 11225419 ENCLOSURE No.: 8

BOREHOLE No.: BH-7
ELEVATION: 291.50 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 14 April 2021 DATE (FINISH): 14 April 2021

NORTHING: 4884306.25 EASTING: 650266.7

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth (Feet / Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
	291.50		GROUND SURFACE				%		
0	291.45		**ASPHALT** (50mm)		SS-1a	92	1	8-7-7-5	14
1			**FILL**: GRAVELLY SAND, compact, light brown, moist		SS-1b		6	--	--
2			Silty Sand, medium grained, trace gravel, brown		SS-2	100	5	2-3-5	8
3	1.0		Trace clay Loose, brown, moist						
4			Compact		SS-3	100	7	5-6-6	12
5									
6	2.0								
7			Very Loose		SS-4	89	10	2-1-1-2	2
8									
9									
10	3.0		Gravel: 0%, Sand 87%, Silt 9%, Clay 4%		SS-5	100	10	1-1-1	2
11									
12									
13	4.0		**NATIVE**: SM - SILTY SAND, very loose, dark brown, moist to wet		SS-6	100	16	0-1-1	2
14									
15			Organics (roots)						
16			Brown		SS-7	100	11	0-0-1-0	1
17	5.0								
18			Compact		SS-8	100	6	7-11-15	26
19									
20	6.0								
21			Trace gravel Light brown, moist		SS-9	100	3	10-14-16	30
22	284.95		**END OF BOREHOLE :**						
23	7.0		**NOTE :** - End of Borehole at 6.6 m bgs - Borehole open upon completion - No water accumulated in borehole upon completion - bgs denotes 'below ground surface'						
24									
25									
26	8.0								
27									
28									
29									
30	9.0								
31									
32									
33	10.0								
34									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

REFERENCE No.: 11225419 ENCLOSURE No.: 9

BOREHOLE No.: BH-8
ELEVATION: 283.81 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Wooden Sticks Golf Course
PROJECT: Geotechnical Investigation
LOCATION: 40 Elgin Park Drive, Uxbridge, Ontario
DESCRIBED BY: J. McEachern CHECKED BY: L. Ramos
DATE (START): 14 April 2021 DATE (FINISH): 14 April 2021

NORTHING: 4884296.63 EASTING: 650225.52

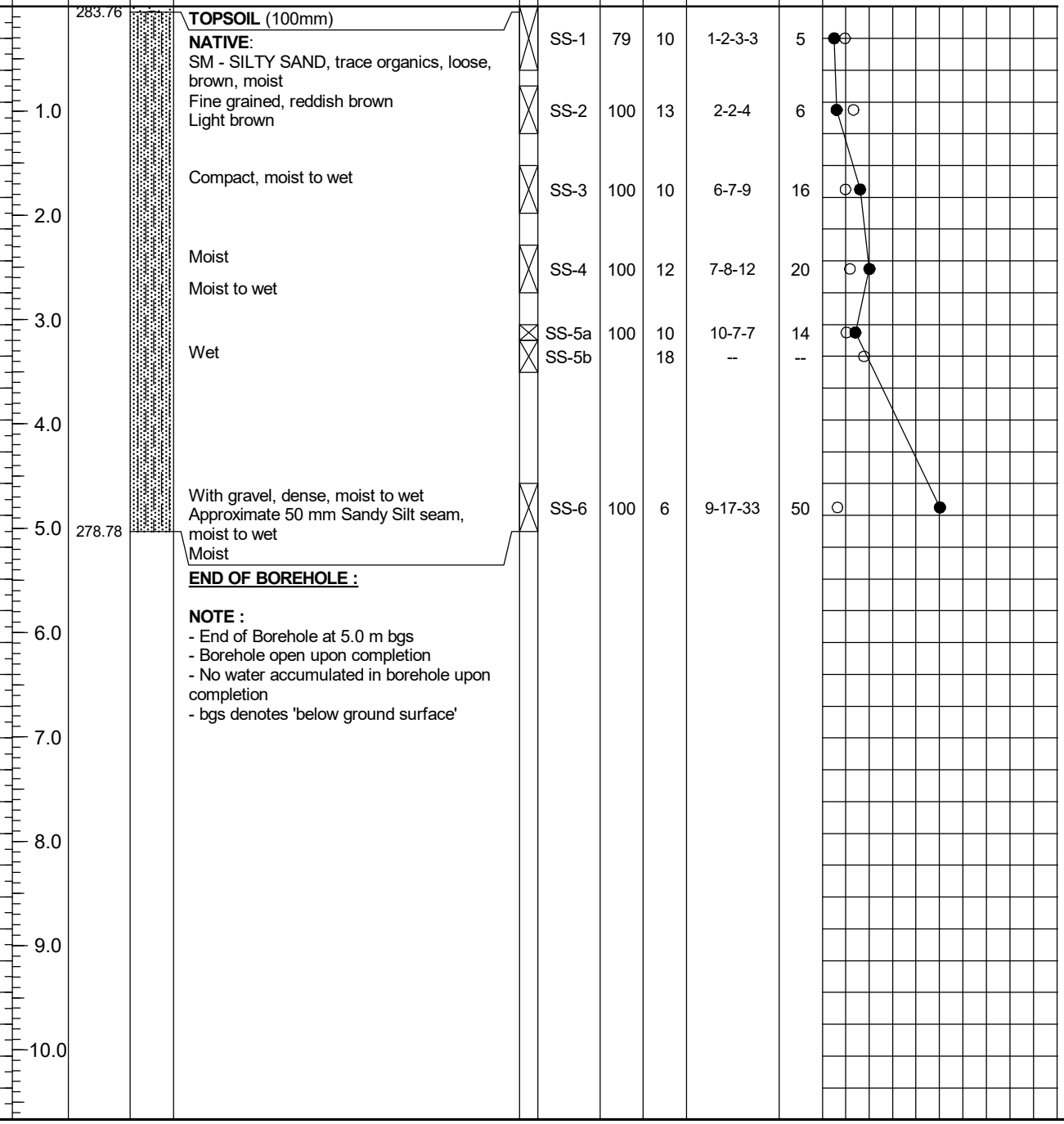
LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth (Feet / Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
0	283.81		GROUND SURFACE						
0	283.76		**TOPSOIL** (100mm)						
1			**NATIVE**: SM - SILTY SAND, trace organics, loose, brown, moist		SS-1	79	10	1-2-3-3	5
2									
3	1.0		Fine grained, reddish brown		SS-2	100	13	2-2-4	6
4			Light brown						
5			Compact, moist to wet		SS-3	100	10	6-7-9	16
6	2.0								
7									
8			Moist		SS-4	100	12	7-8-12	20
9			Moist to wet						
10	3.0				SS-5a	100	10	10-7-7	14
11			Wet		SS-5b		18	--	--
12									
13	4.0								
14									
15			With gravel, dense, moist to wet		SS-6	100	6	9-17-33	50
16	5.0		Approximate 50 mm Sandy Silt seam, moist to wet						
16	278.78		Moist						
17			**END OF BOREHOLE :**						
18									
19			**NOTE :**						
20	6.0		- End of Borehole at 5.0 m bgs						
21			- Borehole open upon completion						
22			- No water accumulated in borehole upon completion						
23	7.0		- bgs denotes 'below ground surface'						
24									
25									
26	8.0								
27									
28									
29	9.0								
30									
31									
32									
33	10.0								
34									

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90



Notes on Borehole and Test Pit Reports

Soil description :

Each subsurface stratum is described using the following terminology. The relative density of granular soils is determined by the Standard Penetration Index ("N" value), while the consistency of clayey sols is measured by the value of undrained shear strength (Cu).

Classification (Unified system)

Clay	< 0.002 mm		
Silt	0.002 to 0.075 mm		
Sand	0.075 to 4.75 mm	fine	0.075 to 0.425 mm
		medium	0.425 to 2.0 mm
		coarse	2.0 to 4.75 mm
Gravel	4.75 to 75 mm	fine	4.75 to 19 mm
		coarse	19 to 75 mm
Cobbles	75 to 300 mm		
Boulders	>300 mm		

Terminology

"trace"	1-10%
"some"	10-20%
adjective (silty, sandy)	20-35%
"and"	35-50%

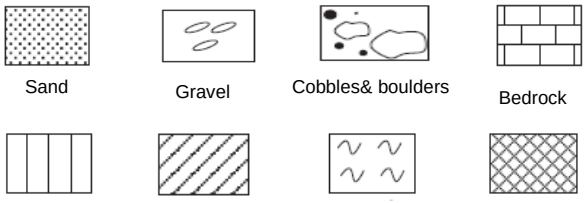
Relative density of granular soils	Standard penetration index "N" value (BLOWS/ft – 300 mm)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Consistency of cohesive soils	Undrained shear strength (Cu) (P.S.F)	(kPa)
Very soft	<250	<12
Soft	250-500	12-25
Firm	500-1000	25-50
Stiff	1000-2000	50-100
Very stiff	2000-4000	100-200
Hard	>4000	>200

Rock quality designation

"RQD" (%) Value	Quality
<25	Very poor
25-50	Poor
50-75	Fair
75-90	Good
>90	Excellent

STRATIGRAPHIC LEGEND



Samples:

Type and Number

The type of sample recovered is shown on the log by the abbreviation listed hereafter. The numbering of samples is sequential for each type of sample.

SS: Split spoon
SSE, GSE, AGE: Environmental sampling
ST: Shelby tube
PS: Piston sample (Osterberg)
AG: Auger
RC: Rock core
GS: Grab sample

Recovery

The recovery, shown as a percentage, is the ratio of length of the sample obtained to the distance the sampler was driven/pushed into the soil

RQD

The "Rock Quality Designation" or "RQD" value, expressed as percentage, is the ratio of the total length of all core fragments of 4 inches (10 cm) or more to the total length of the run.

IN-SITU TESTS:

N: Standard penetration index
R: Refusal to penetration
N_c: Dynamic cone penetration index
Cu: Undrained shear strength
Pr: Pressure meter
k: Permeability
ABS: Absorption (Packer test)

LABORATORY TESTS:

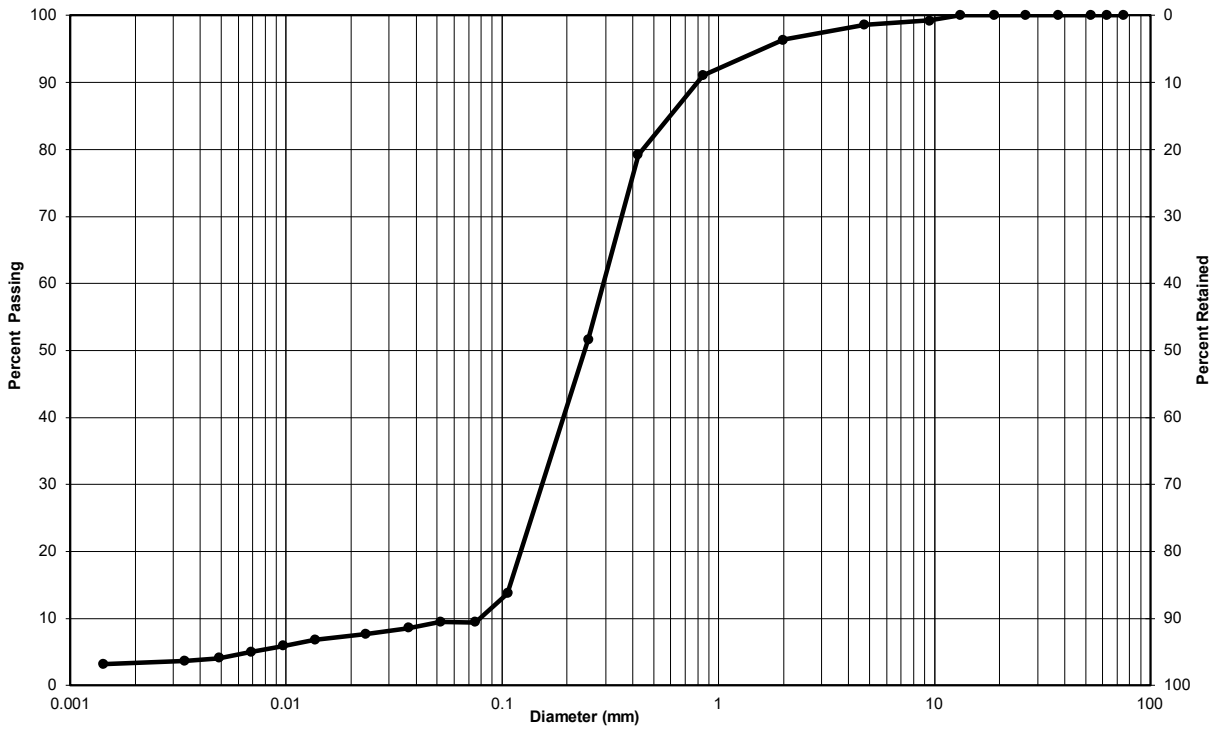
I_p: Plasticity index
W_l: Liquid limit
Wp: Plastic limit
H: Hydrometer analysis
GSA: Grain size analysis
A: Atterberg limits
w: Water content
γ: Unit weight
C: Consolidation
CS: Swedish fall cone
CHEM: Chemical analysis
O.V.: Organic vapor

Appendix B

Geotechnical Laboratory Test Results

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Wooden Sticks Golf Course	**Lab No.:**	SS-21-31
Project/Site:	40 Elgin Street, Uxbridge	**Project No.:**	11225419-01
Borehole no.:	BH1	Sample no.:	SS4
Depth:	2.3 to 2.7m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

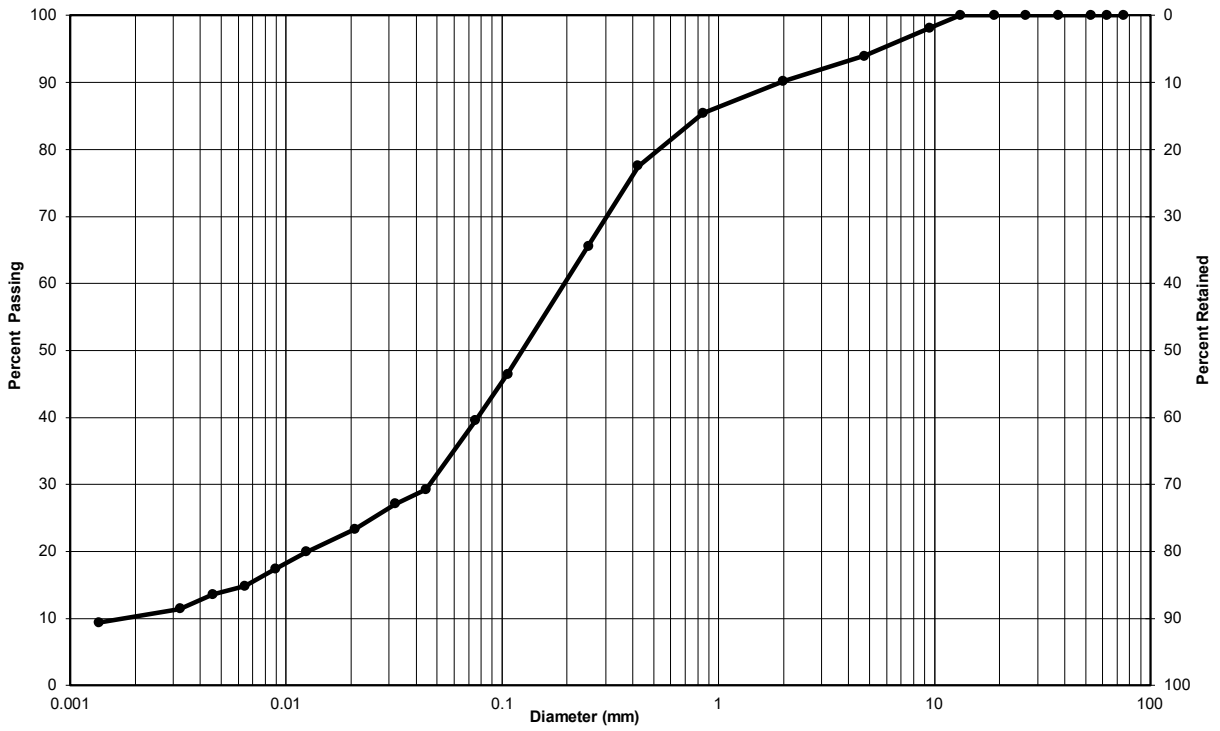
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sand with Silt	1	90	9
Silt-size particles (%):	6		
Clay-size particles (%) (<0.002mm):	3		

Remarks:

Performed by:	Alex Fawcett	**Date:**	May 5, 2021
Verified by:	Joe Sullivan	**Date:**	May 5, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Wooden Sticks Golf Course	**Lab No.:**	SS-21-31
Project/Site:	40 Elgin Street, Uxbridge	**Project No.:**	11225419-01
Borehole no.:	BH2	Sample no.:	SS2
Depth:	0.8 to 1.2m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

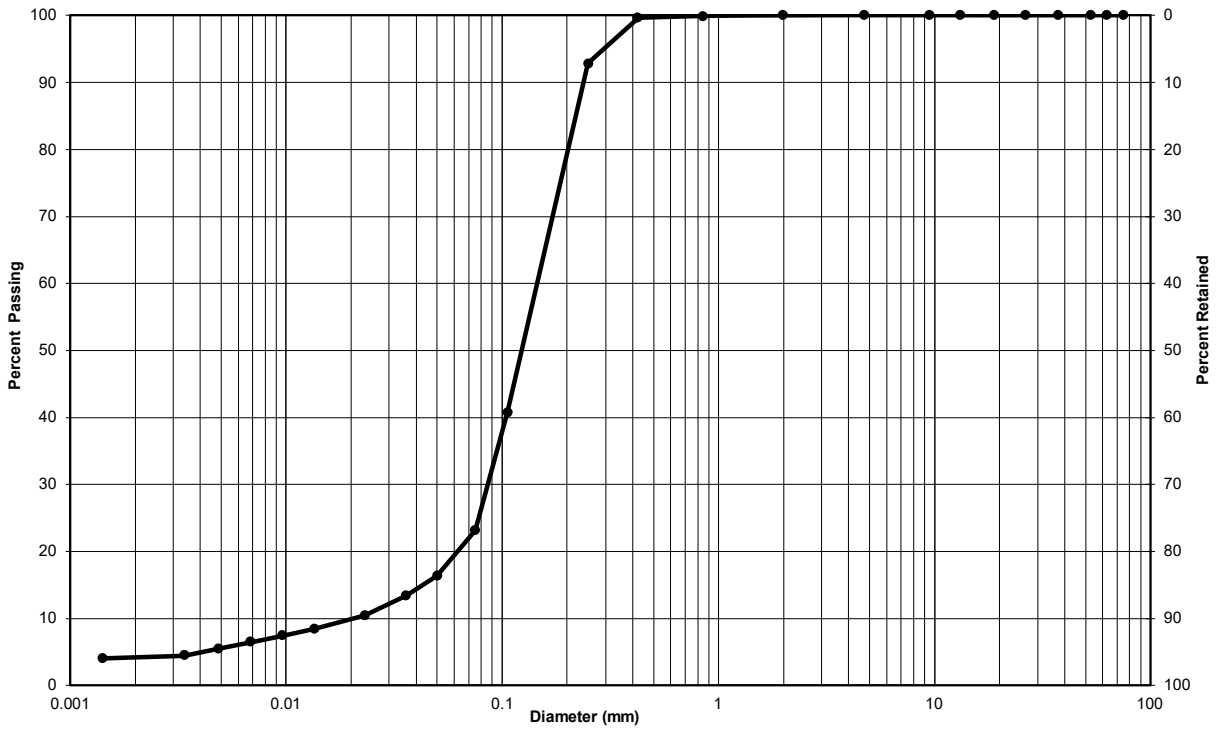
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty Sand Fill	6	55	39
Silt-size particles (%):	29		
Clay-size particles (%) (<0.002mm):	10		

Remarks:

Performed by:	Alex Fawcett	**Date:**	May 5, 2021
Verified by:	Joe Sullivan	**Date:**	May 5, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Wooden Sticks Golf Course	**Lab No.:**	SS-21-31
Project/Site:	40 Elgin Street, Uxbridge	**Project No.:**	11225419-01
Borehole no.:	BH3	Sample no.:	SS7B
Depth:	6.3 to 6.6m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty Sand	0	77	23
Silt-size particles (%):	19		
Clay-size particles (%) (<0.002mm):	4		

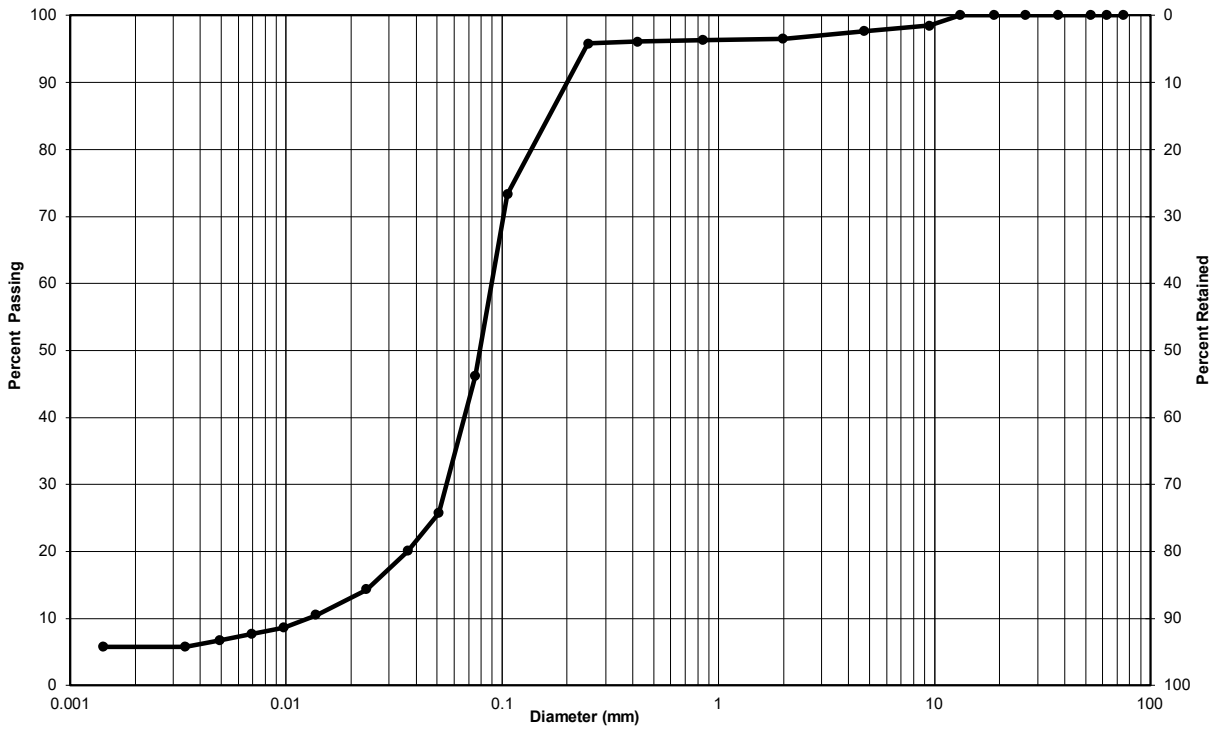
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 5, 2021
Verified by:	Joe Sullivan	**Date:**	May 5, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Wooden Sticks Golf Course	**Lab No.:**	SS-21-31
Project/Site:	40 Elgin Street, Uxbridge	**Project No.:**	11225419-01

Borehole no.:	BH4	Sample no.:	SS9
Depth:	9.2 to 9.8m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty Sand	2	52	46
Silt-size particles (%):	40		
Clay-size particles (%) (<0.002mm):	6		

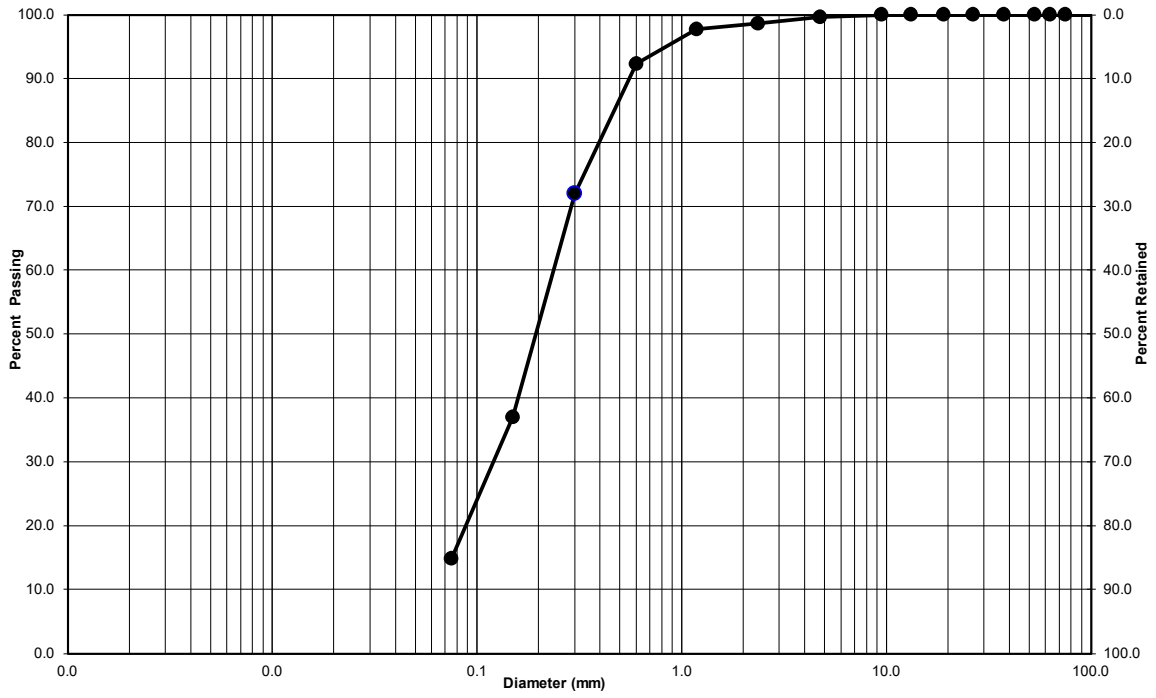
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 5, 2021
Verified by:	Joe Sullivan	**Date:**	May 5, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Wooden Sticks Golf Course	**Lab No.:**	SS-21-31
Project/Site:	40 Elgin St, Uxbridge	**Project No.:**	11225419-01

Soil Type:	Native Soil	Sample Source:	BH7 SS1B
Type of Material:	Native Soil	Sample Location:	N/A
Proposed Use:	N/A	Depth:	0.13 to 0.6m
Sampled By:	N/A	Sample Date:	16-Apr-21
Sample Location Remarks:	N/A		



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sand with Silt Fill	0	85	15

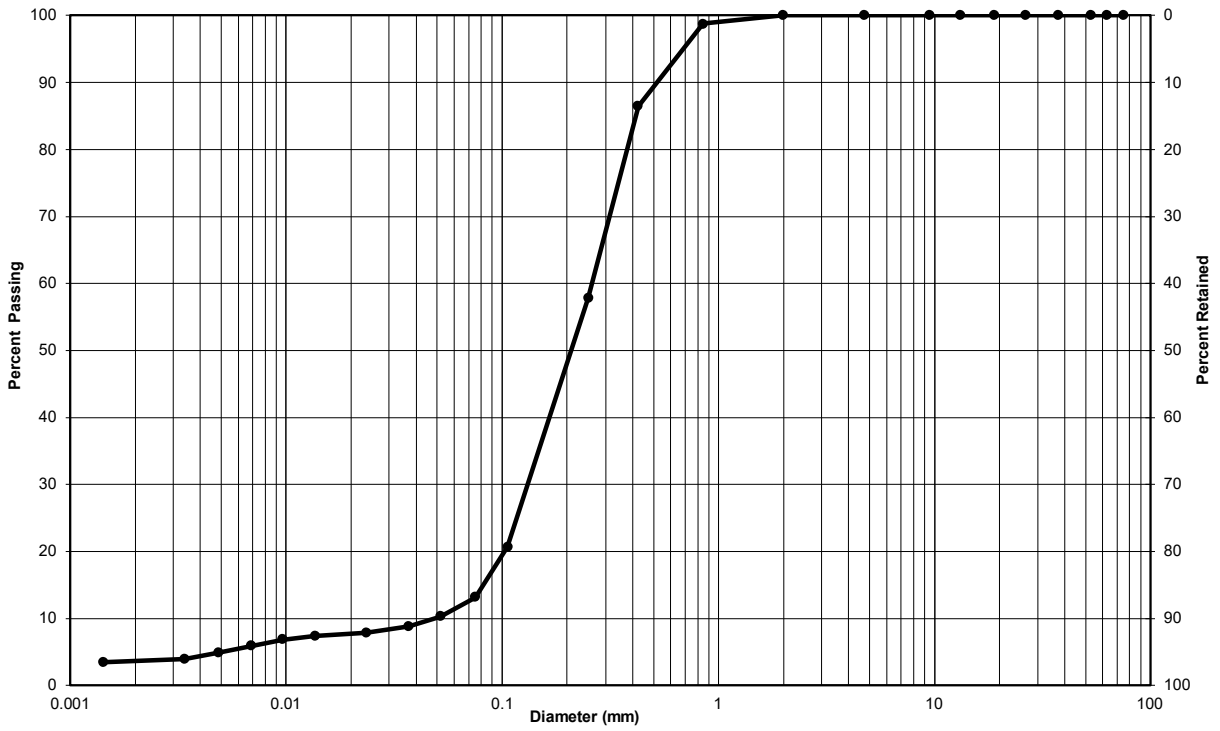
Remarks:

Performed by:	Alex Fawcett	**Date:**	May 3, 2021
Verified by:	Joe Sullivan	**Date:**	May 5, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	Wooden Sticks Gold Inc.	**Lab No.:**	SS-21-31
Project/Site:	40 Elgin Street, Uxbridge	**Project No.:**	11225419-01

Borehole no.:	BH7	Sample no.:	SS5
Depth:	3.0 to 3.5m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sand with Silt Fill	0	87	13
Silt-size particles (%):	9		
Clay-size particles (%) (<0.002mm):	4		

Remarks:

Performed by:	Alex Fawcett	**Date:**	May 5, 2021
Verified by:	Joe Sullivan	**Date:**	May 5, 2021