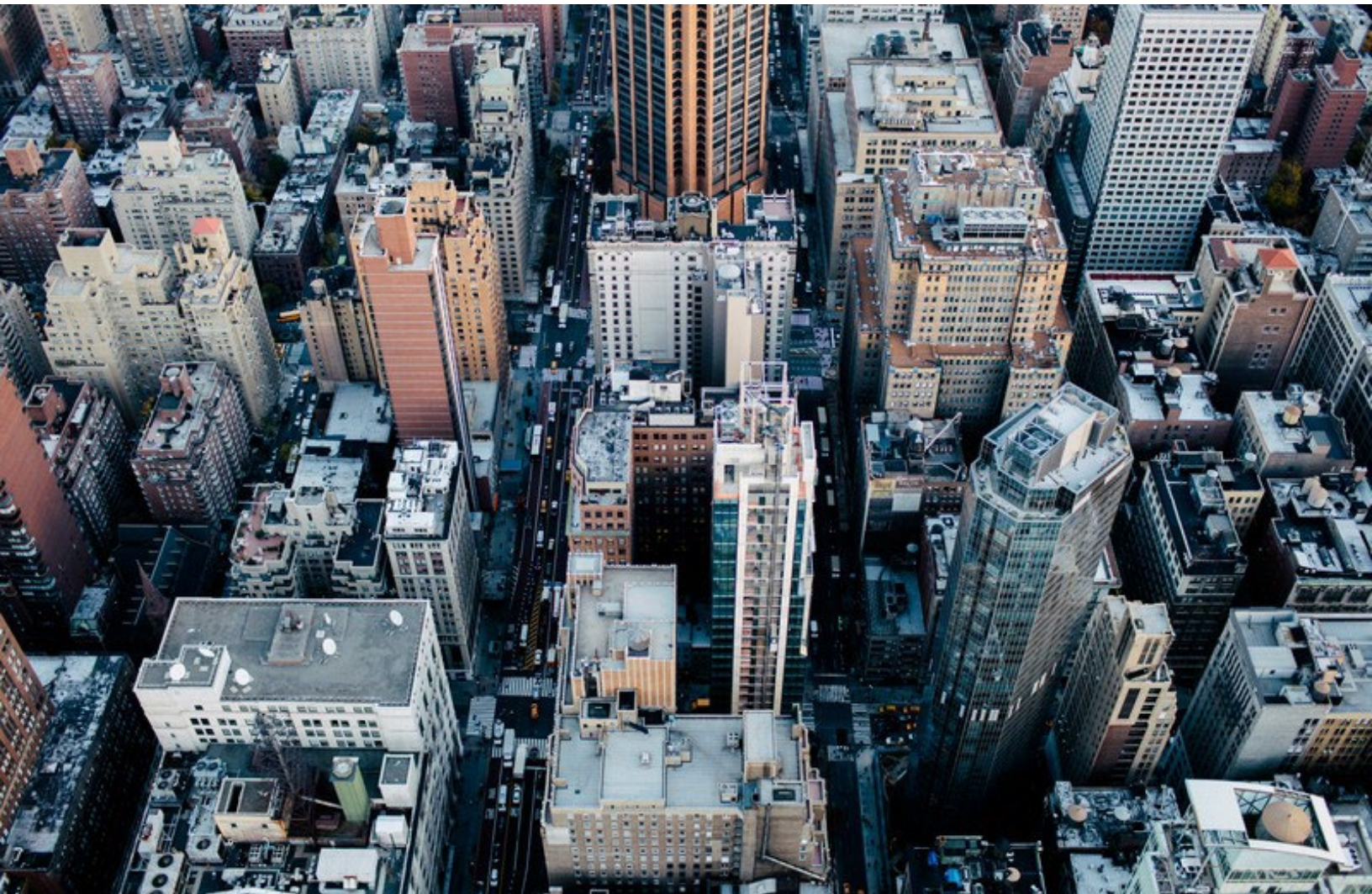
Geotechnical Investigation Report

10533 Keele Street, Vaughan, Ontario

Keele Street (10533) Ltd.

29 April 2024

→ The Power of Commitment



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Appendix A Borehole Stratigraphic Records

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1. Introduction

GHD Limited (GHD) has been retained by Keele Street (10533) Ltd. to undertake a geotechnical investigation in support of the proposed development for the proposed self-storage facility located at 10533 Keele Street, Vaughan, Ontario, (hereafter referred to as the 'Site'). A Site location plan is provided in the attached **Figure 1**.

The geotechnical investigation was carried out in accordance with the approved GHD work plan dated December 13, 2023. The purpose of the geotechnical investigation was to assess the subsurface soil and groundwater conditions within the area of the proposed development by advancing a limited number of boreholes and conducting laboratory testing on select soil samples. Engineering recommendations for the design and construction of foundations, slab-on-grade, pavements, and Site servicing are provided based on our interpretation of the factual data. Discussions regarding excavation and backfilling, seismic site classification, and groundwater control during construction (if required) are also provided.

The factual data, interpretations and 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 (Section 8)**.** The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2. Site and Project Description

The Site is currently occupied by one (1) building divided into a 1.5 storey front section (Lobby space) and a single storey rectangular section area at the back. The building is currently surrounded by asphaltic and gravel pavement parking lot area.

Based on the plans provided on April 15, 2024, it is understood that the proposed development will involve a full demolition of the rectangular section building, excluding the existing the 1.5 storey front building section. It is understood that the rectangular portion of the building will be replaced with a one-storey warehouse type structure, with a mezzanine, a driveway surrounding the proposed building, two drive-in loading areas, and no basement level.

The scope of work of the geotechnical investigation consisted of the following tasks:

– Advancement of four (4) boreholes within the area of the proposed one-storey warehouse type building.
– Completion of in-situ field testing.
– Installation of a monitoring well in each of the completed boreholes to determine the more stabilized groundwater levels and for hydrogeological purposes.
– Collection of soil samples for geotechnical laboratory testing.

3. Field and Laboratory Work Procedures

The field investigation and laboratory testing procedures, protocols, and methodologies are presented below.

3.1 Safety Planning and Utility Clearances

Upon project initiation, a Site-specific Health and Safety Plan (HASP) was prepared for implementation during the field investigation program. The HASP presented the visually observed Site conditions and identified potential physical

hazards to field personnel. Required personal protective equipment was also listed in the HASP. The HASP was reviewed by GHD's field personnel prior to undertaking field activities and a copy of the HASP was maintained at the Site for the duration of the investigative work. Health and Safety requirements in the HASP were implemented during the field investigation program.

Prior to initiating the subsurface investigation activities GHD requested public utilities to be marked by utility operators in accordance with the Ontario One Call damage prevention laws. All applicable utility companies (gas, hydro, bell, network cables, pipeline, and municipal sewers, etc.) were contacted through this process.

In addition, to mitigate the risk of damaged to underground private utilities during the drilling activities, GHD retained a private utility locating company (Landshark Locates) to demarcate the locations of the privately owned utilities within the area of the boreholes. It was also understood that the utilities at the site had been abandoned and some utilities would not be traceable.

Furthermore, GHD carried out a precondition survey to document the current condition of the ground surface, at and in the vicinity of the boreholes, also along the proposed travel pathway of the drilling equipment in order to establish a baseline condition prior to the fieldwork. The precondition survey consisted of a visual walk-through inspection of the Site and documentation using photographs. The re-inspection of the Site conditions and all required remedial work was carried out upon completion of all fieldwork. The results of the completed precondition survey are available in GHD archives for any further reference.

3.2 Borehole Advancement Activities

The drilling program for the geotechnical investigation was carried out on of March 27 and 25, 2024 and consisted of advancing a total of four (4) boreholes to a depth of 6.7 m below ground surface (BGS) (identified as MW1-24, MW2-24, MW3-24, and MW4-24). The boreholes were advanced at the locations shown on the attached Borehole Location Plan (**Figure 2**).

The drilling work was carried out utilizing a truck-mounted drill rig supplied and operated by specialty drilling subcontractor, Landshark Drilling, under the full-time supervision of a GHD technical representative.

The boreholes were advanced using hollow stem augers. Soil samples were collected at every 0.75 metres to the termination depth of the boreholes. All samplings were conducted using a 50 mm outside diameter split spoon sampler in general accordance with the specifications of the Standard Penetration Test (SPT) Method (ASTM D1586)[1]. In addition, at each borehole location, the relative density or consistency of the soil layers were measured by counting the number of SPT blows ('N' values) required to drive a conventional split-barrel soil sampler a vertical distance of 0.3 m. Soil samples were retrieved from each borehole location to verify strata boundaries and soil properties.

The GHD technical representative logged the material encountered in the boreholes and examined the samples as they were obtained. The recovered samples were sealed in clean, airtight containers and transferred to GHD's laboratory, where they were reviewed by a geotechnical engineer.

Groundwater level observations and measurements were made in the boreholes as drilling proceeded and upon completion of drilling. In addition, a monitoring well was installed in each of the completed boreholes (identified as MW1-24, MW2-24, MW3-24, and MW4-24) to facilitate groundwater level measurements. The monitoring wells were instrumented with a 50 mm (2 inch) inside diameter, No. 10 slot, Schedule 40 PVC 1.5 m screen set, and riser pipe. The borehole annulus surrounding the well screen was backfilled with sand and the remainder of the borehole was then backfilled with bentonite to or to near the ground surface The remainder of the boreholes were backfilled and sealed in accordance with Ontario Regulation 903, Wells (as amended). Details of monitoring well construction is presented on the attached borehole records (**Appendix A**). Groundwater level readings were measured on April 5, 2024.

[1] ASTM D1586-18 - Standard Test Method for Standard Penetration Test and Split-Barrel Samplings of the soil, ASTM International, West Conshohocken, PA 2015

Excess soil cuttings (spoil) encountered during the investigation were placed in labelled drums and stored on site at a location approved by the Client. Based on discussion with the client, it is GHD's understanding that these drums will be subsequently removed by the contractor during the construction.

The borehole locations and ground surface elevations were obtained using a Leica Global Navigation Satellite System (GNSS). The locations given on the Borehole Records are positioned relative to UTM Coordinates (UTM-18 NAD83) northing and easting coordinates and the ground surface elevations are referenced to Geodetic datum. A summary of the borehole locations, geographic coordinates, ground surface elevation, and drilled depths are presented in the table below.

Table 3.1 Summary of Advanced Boreholes

Borehole ID	Location – UTM Coordinate System		Ground Surface Elevation (m)	Total Borehole Depth (m)	Monitoring Well Installation Tip Depth (m)
	Northing (m)	Easting (m)			
MW1-24	4858283.7	619327.3	258.3	6.7	6.1
MW2-24	4858268.1	619325.9	257.5	6.7	6.1
MW3-24	4858290.5	619351.5	258.3	6.7	6.1
MW4-24	4858280.6	619353.3	258.0	6.7	6.1

3.3 Geotechnical Laboratory Testing

Prior to conducting geotechnical laboratory testing, the soil samples extracted from the boreholes were subjected to visual and tactile examination by an experienced GHD geotechnical engineer who confirmed the field descriptions and selected representative samples for detailed testing.

Geotechnical laboratory testing was conducted in accordance with the American Society for Testing and Materials (ASTM) and Canadian Council of Independent Laboratories (CCIL) applicable standards. Laboratory testing consisted of moisture content tests on all recovered soil samples, grain size distribution analyses (sieve and hydrometer testing) on three (3) select soil samples and Atterberg limits testing on the same soil samples that exhibited plasticity to assess soil plasticity index properties.

The results of water content, grain size distribution and Atterberg Limits tests are reported on the boreholes records presented in **Appendix A**. The associated laboratory test results are provided in **Appendix B**.

The soil testing program and soil classification conformed to the latest edition of the following standards:

ASTM D6913 - Standard Test Method for Particle Size Distribution (Gradation) of Soils using Sieve Analysis
MTO LS-702 - Standard Test Method for Particle Size Analysis of Soils (Hydrometer Analysis)
ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D2487 - Standard Practice for Classification of Soils for engineering purposes (Unified Soil Classification System-USCS)

4. Site Geology and Subsurface Conditions

4.1 Site Topography and Regional Geology

In reference to the ground surface elevation measured at the borehole locations advanced during this investigation, the Site is generally flat. The elevations at the drilled borehole locations vary between 258.5 m and 257.5 m.

Surficial geology mapping from the Ontario Geological Survey indicates that the Study Area in within two surficial geological units of the Till Plains physiographic region of southern Ontario (Chapman and Putnam 1984). Typical soils in these units are comprised of modern alluvial deposits of clay, silt, sand, and gravel, or glaciolacustrine deposits of clay to silt-textured till.

According to the Physiography of Southern Ontario (Chapman and Putnam, 1984), the bedrock in this area consists of sedimentary shale, limestone, dolostone and siltstone of Georgian Bay Formation. The upper portion of the Georgian Bay Formation is commonly weathered and within this weathered zone, hard limestone layers or lenses are common. In the sound bedrock, the limestone, sandstone, dolostone are generally hard to very hard[2].

4.2 Subsurface Conditions

The detailed subsurface soil and groundwater conditions as encountered in the boreholes advanced during the geotechnical investigation and the results of the laboratory tests carried out on selected soil samples are presented on the borehole records provided in **Appendix A**. The results of the geotechnical laboratory testing are presented in **Appendix B**. The results of in-situ field tests (i.e., SPT "N" values and in-situ vane shear tests), as presented on the borehole records and summarized in this report are uncorrected. The *Notes on Borehole and Test Pit Reports* are also included in **Appendix A** to assist in the interpretation of the borehole records.

The stratigraphic boundaries shown on the borehole records are inferred from non-continuous sampling, observations of drilling process and the results of Standard Penetration Tests. These boundaries, therefore, represent transitions between soil types rather than exact planes of geological change. Furthermore, subsurface conditions will vary between and beyond the borehole locations.

In summary, the boreholes generally encountered a surficial layer of asphalt or gravel underlain by granular fill over silty sand and silty clay fill materials, overlying a native sandy silty clay and sandy silty clay till deposits.

Detailed descriptions of subsurface conditions are provided in the following sections of this report. The subsurface conditions are described in accordance with the Unified Soil Classification System and the Canadian Foundation Engineering Manual, (CFEM 2006).

4.2.1 Asphalt

Borehole MW2-24 was advanced south of the existing building through the existing paved area and encountered a layer of asphalt with a thickness of 100 mm at the ground surface.

4.2.2 Gravel and Interlock Tiles

At Boreholes MW3-24 and MW4-24, advanced east of the existing building, a gravel layer was encountered at the ground surface with a thickness of 125 mm and 150 mm, respectively.

Borehole MW1-24 was advanced north of the existing building and encountered a layer of interlock tiles with a thickness of 75 mm.

4.2.3 Fill Material

A granular base layer consisting of sand and gravel (mixed with silty sand fill material) was encountered beneath the asphalt and gravel surfaces and extended to a depth ranging between 0.3 to 1.5 m BGS.

A clayey silt to silty clay fill material was encountered in all boreholes immediately below the silty sand and extended to depth of ranging between 0.8 to 3.0 m BGS, except for Borehole MW4-24, where native soils were encountered at a depth of 1.5 mBGS. The fill layer also contained traces of rootlets, asphalt fragments, brick, and glasses pieces.

[2] Chapman, L. J., and Putnam, D. F., (1984): The Physiography of Southern Ontario

The SPT ‘N’ values recorded within the clayey silt to silty clay fill layer ranged from 0 blows to 10 blows per 0.3 m of penetration, indicating a very soft to stiff consistency. The SPT ‘N’ value recorded within the granular base and silty sand material was between 4 blows and 52 blows per 0.3 metres of penetration, indicating a loose to very dense state of compactness.

The water content measured within the fill material ranged between 5 and 24 percent.

4.2.4 Native Sandy Silty Clay/Silty Clay

A cohesive sandy silty clay to silty clay deposit containing traces of gravel was encountered in all the boreholes, except at MW1-24. This deposit was found underlying the fill material and extended from an approximate depths of 1.5 to 3.0 m below existing ground surface.

Grain size distribution testing was carried out on one (1) sample in the native sandy silty clay/silty clay material and the results are provided in **Appendix B** of this report and are summarized in the following table:

Table 4.1 Grain Size Distribution Summary for Native Material

Borehole ID	Sample ID	Sample Depth (m)	Particle Size Distribution (ASTM D422 and ASTM D421)			
			Gravel %	Sand %	Silt %	Clay %
MW2-24	SS4	2.3 – 3.9	0	32	54	14

Atterberg limits test was performed on one (1) cohesive sample for which the grain size testing was conducted. The results of this testing are provided in **Appendix B** and graphically represented on the borehole records in **Appendix A**. The results are also summarized in the table below:

Table 4.2 Atterberg Test Summary for Cohesive Native Material

Borehole ID / Sample ID	Sample Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Soils Description (USCS Symbol)
MW2-24/ SS4	2.3 – 3.9	10.4	17	13	4	Sandy Silty Clay (CL-ML)

4.2.5 Native Sandy Silty Clay/Silty Clay with Sand Till

A native sandy silty clay/silty clay with sand deposits containing traces of gravel were encountered in all boreholes, exhibiting a till like structure. This till deposit was found underlying the native silty clay material at boreholes MW1-24, MW2-24, MW3-24 and underlying the fill material at MW4-24. This till deposit was encountered at a depth of 3.0 mBGS and extended to the termination depth in all the boreholes, except at MW3-24, where it extended to a depth of 6.1 mBGS.

The SPT ‘N’ values recorded within the sandy silty clay/silty clay with sand till deposit ranged from 16 blows per 0.3 m of penetration to 89 blows per 0.254 m of penetration, indicating a very stiff to hard consistency.

The water content measured within the sandy silty clay/silty clay with sand till deposit ranged from about 7 to 17 percent.

Grain size distribution testing was carried out on two (2) samples of the silty clay till deposit and the results are provided in **Appendix B** of this report and are tabulated in the following table.

Table 4.3 Grain Size Distribution Summary for Sandy Silty Clay/Silty Clay with Sand Till

Borehole ID	Sample ID	Sample Depth (m)	Particle Size Distribution (ASTM D422 and ASTM D421)			
			Gravel %	Sand %	Silt %	Clay %
MW3-24	SS5	3.1 – 3.7	0	26	56	18
MW4-24	SS8	5.3 – 5.9	0	37	49	14

Atterberg tests were performed on two (2) of the cohesive samples for which grain size testing was conducted. The results of these tests are provided in **Appendix B** and graphically represented on the borehole records in **Appendix A**. The results are also summarized in the table below:

Table 4.4 Atterberg Test Summary for Cohesive Native Deposit

Borehole ID / Sample ID	Sample Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Soils Description (USCS Symbol)
MW3-24/ SS5	3.1 – 3.7	10.0	19	14	5	Sandy Silty Clay (CL-ML)
MW4-24 / SS8	5.3 – 5.9	8.1	17	13	4	Sandy Silt Clay (CL-ML)

4.2.6 Sandy Silt Till

A non-cohesive sandy silt till layer with traces of gravel and clay was encountered in borehole MW3-24 and found at a depth between 6.1 mBGS the termination depth of the boreholes (6.7 mBGS).

The SPT ‘N’ values recorded within the sandy silt till layer was 69 blows per 0.3 m of penetration, indicating a very dense consistency. The water content measured within the sandy silt layer was 8 percent.

4.3 Groundwater Conditions

The groundwater level in the open boreholes was recorded upon completion of drilling and the results are presented on the borehole records in **Appendix A**. A monitoring well was installed in each of the completed boreholes (identified as MW1-24, MW2-24, MW3-24, and MW4-24) to facilitate groundwater level measurements. Water level measurement was conducted in the monitoring well on April 5, 2024, to obtain a more stabilized groundwater reading. The measured water levels recorded during the Site visit are also presented in the borehole records. The observed/inferred groundwater conditions at the borehole locations during the site investigation, as well as the recorded groundwater levels obtained in the monitoring wells during the follow up visit are tabulated below:

Table 4.5 Summary of Groundwater Observations During Drilling / Follow-up Well Measurements

Borehole ID	Borehole Depth (m)	Ground Surface Elevation (m)	Monitoring Well Installation Tip Depth (m)	Groundwater Depth (mBGS) / Elevation (m)	
				Upon Completion of Overburden Borehole	April 5, 2024
MW1-24	6.7	258.3	6.1	5.2 / 253.1	2.51 / 255.8
MW2-24	6.7	257.5	6.1	Dry	1.90 / 255.6
MW3-24	6.7	258.3	6.1	Dry	1.04 / 257.3
MW4-24	6.7	258.0	6.1	2.6 / 255.4	2.50 / 255.5

The measured water level in the monitoring wells following the drilling is ranging between 1.04 m and 2.51 m below grade. It should be noted that the groundwater level is subject to seasonal fluctuations and precipitation events and

should be expected to be higher during wet periods of the year. Perched water table condition could develop in the shallower soils and fill materials after heavy precipitation and/or during spring thaw.

5. Engineering Discussion and Recommendations

Based on discussions with the client and a review of the site plans provided to GHD, it is our understanding that the proposed development will involve a full demolition of the rectangular section building, excluding the existing the 1.5 storey front building section. It is understood that the rectangular portion of the building will be replaced with a one-storey warehouse type structure, with a mezzanine, a driveway surrounding the proposed building, two drive-in loading areas, and no basement level.

The purpose of the geotechnical investigation was to obtain information on the ground subsurface soil and groundwater conditions within the area of the proposed development to determine the ground suitability to support the proposed development of the Site.

It should be noted that the recommendations provided herein are intended for use by the designers only. Contractors bidding on or undertaking any work at the site should examine the factual results of the assessment, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of the factual data given above as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and other related issues. Where comments are made on construction, they are provided to highlight those aspects that could affect the design of the project. Comments, techniques, or recommendations pertaining to construction should not be considered as instructions to the contractor. On-going liaison with GHD during the final design and construction phase of the project is recommended to ensure that the recommendations in this report are applicable and/or correctly interpreted and implemented.

The following sections provide comments and recommendations for the proposed development. These recommendations are based on the geotechnical engineering findings at the time of this report.

5.1 Site Preparation and Grading

The general stratigraphy at the borehole locations consists of a surficial layer of asphalt or gravel underlain by granular material mixed with silty sand material, and silty clay earth fill materials mostly extending to approximately 3.0 mBGS followed by native cohesive sandy silty clay and sandy silty clay till deposits. At borehole MW3-24, a non-cohesive sandy silt till layer was encountered near the termination depth.

It is understood that the existing 1.5 storey building will remain in place and converted into a lobby space for future use with the existing cellar basement level to be backfilled and compacted with granular materials. The subgrade of the cellar level should be assessed prior to backfilling by a geotechnical professional to ensure all soft or otherwise deleterious materials have been removed. All other below grade structures should be removed and excavations should be backfilled with engineered fill materials as described below following an inspection of the subgrade soils by a geotechnical professional.

All existing buried utilities expected not to be in conflict with any proposed structures may be left in place provided abandoned pipes are adequately grouted to avoid collapse and soil loss that may undermine new pavements. Any existing pipes that are not adequately decommissioned or are damaged may act as a conduit for water and soils creating the potential for sinkholes to be formed due to soil migration into the pipes. It is recommended that any utilities proposed to be left in place be inspected using CCTV and confirmed to be free of any deficiencies and indicate a low potential for future corrosive damages based on pipe materials. All utilities below settlement sensitive areas such as building foundations, slabs or parking areas should be removed and backfilled appropriately under the supervision of a geotechnical professional.

The existing fill material containing organics should be removed from settlement sensitive areas such as proposed building footprints or pavement areas prior to site grading activities and should not be used as backfill. The subgrade soils exposed after the removal of the unsuitable fill material is expected to consist of stiff to very stiff native silty clay soils followed by hard sandy silty clay till material. Prior to Site grading activity and earth filling, the exposed subgrade soils should be visually inspected, compacted, and proof rolled using large axially loaded equipment. Any soft, organic, or unacceptable areas should be 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 (engineered) earth fill used to raise grades in the proposed building and pavement areas should be placed in thin layers (200 mm thick or less) and compacted by to 98 percent SPMDD.

The native soil encountered at the Site, free of organics, rootlets, and debris, are generally suitable for reuse as backfill to raise site grades, where required, or to be used to 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. Due to the high percentage of silt within the native deposit at this Site, the soils are sensitive to small changes in moisture content and thus may be difficult to compact. Therefore, the reuse of these fine-grained materials as structural fill should be avoided.

If imported materials are required to raise Site grades to design levels, then potential source Sites should be evaluated for geotechnical and environmental quality prior to acceptance. It is recommended that any proposed fill considered for reuse on the Site comprise of granular fill materials or clean earth material, free of topsoil and building rubble, and is at a moisture content ±2% of the laboratory optimum to achieve 98 percent SPMDD compaction.

5.2 Foundations

The existing fill materials that overly the native deposits at the Site are unsuitable to support structural foundations. Prior to the construction of footings, all of fill and other deleterious materials (where present) must be removed to expose the undisturbed native soils. The exposed subgrade is to be inspected by qualified geotechnical personnel to verify that the subgrade consists of undisturbed native soil. The proposed structures at the Site can be constructed on footings placed on the undisturbed native deposits, below the depth of frost penetration.

Footings placed on undisturbed soils can be designed for a net Serviceability Limit State (SLS) and factored (Ø=0.5) geotechnical resistance at Ultimate Limit State (ULS) as indicated in the tables below. The table provides the minimum founding depth below existing grade and maximum ground elevation at each borehole location positioned within proposed building area are shown in the table below (subject to on site verification during construction).

Table 5.1 Ground Geotechnical Bearing Capacity at the Location of Boreholes / Monitoring wells

Borehole ID	Minimum Founding Depth (mBGS/ Maximum Elevation (mAMSL)	Geotechnical Bearing Capacity	
		SLS (kPa)	Factored ULS (kPa)
MW1-24	3.0 / 255.2	160	200
MW2-24	1.5 / 256.0		
MW3-24	2.3 / 256.0		
MW4-24	1.5 / 256.4		
Notes: mBGS: metres below ground surface mAMSL: metres Above Mean Sea Level			

The above-noted SLS soil bearing resistance value has been recommended to limit the differential and total settlements to within 19 and 25 mm, respectively. The recommended bearing capacities are for a minimum footing width 0.6 m and maximum width equal to or less than 3.0 m. The recommended values are contingent on an

engineering inspection and approval by qualified geotechnical engineer for all bearing surfaces. If larger footing dimensions are required, the geotechnical engineer should be consulted.

5.2.1 Preparation for Footings on Engineered Fill

Following approval of the fill material to be used as backfill by a geotechnical engineer, the fill is to be placed in accordance with the following recommended procedure:

1. Engineered fill should be placed after stripping the ground surface cover (topsoil), fill material, native non-cohesive deposits found to contain significant amounts of topsoil/organics or rootlets from the footprint of the proposed structure. The sub-excavation should extend laterally at least 2 m beyond the perimeter of the footprint of the proposed structure.
2. The area to receive the engineered fill should be inspected, compacted, and approved by the geotechnical engineer. Spongy, wet or soft to firm/ 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 to exceed approximately 200 mm when loose. Oversized particles (cobbles and boulders) larger than 120 mm should be discarded. The material for backfilling the excavation and raising the grades should consist of approved earth fill materials. For engineered fill below foundations, each fill layer should be uniformly compacted with heavy compactors, suitable for the type of fill used to 98% of its SPMDD. The engineered fill should be placed at water contents within ± 2% of the optimum value for maximum compaction.
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.

Foundations placed on the engineered fill prepared as noted above can be designed for a SLS value of 150 kPa and ULS value of 200 kPa.

The engineered fill should not be placed during winter months when freezing ambient temperatures occur persistently or intermittently.

5.3 Slab-On-Grade

The proposed building to be constructed at the Site are anticipated to be a slab-on-grade structure. The exact finished slab-on-grade elevation for the proposed buildings was not available at the time of preparation of this report. Based on the borehole data obtained in the proposed building area and depending on the finished floor elevation, the subsurface conditions beneath the floor slab within the investigated area may comprise of existing fill materials. These materials are generally deemed to be unsuitable to support the slab loads and will need to be removed down to the underlying native silty clay materials. Engineered fill may be placed and compacted to achieve design grades.

The prepared subgrade surface for the floor slab should comprise of competent native soils or approved engineered fill cleared of all existing fill / deleterious material (i.e., disturbed soil, organic material, debris, and free water). The exposed finished subgrade soils should be visually inspected, compacted, and proof rolled using large axially loaded equipment. Any soft, organic, or unacceptable areas should be removed and replaced with suitable fill materials compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD).

A minimum of 200 mm thick layer of 20 mm clear crusher run stone should be placed between the prepared subgrade and the floor slab to act as moisture barrier and to support the slab.

For the design of a floor slab constructed on an engineered fill pad and native soils, a modulus of subgrade reaction (Ks) of 22 MPa/m (for a one-foot square plate) can be used assuming a granular pad of approximately 200 mm is placed below . Higher values may be achievable by conducting field plate load tests.

Where the underside of the finished floor slab is greater than 1.0 above the highest seasonal groundwater level, no subfloor drainage will be required.

5.4 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.

5.5 Lateral Earth Pressures

Any soil retaining structures must be designed to resist lateral earth pressure. Structures subject to unbalanced earth pressures such as shoring systems and other similar structures must be designed to resist a pressure that can be calculated based on the following equation:

$P = K [\gamma(h-h_w) + \gamma' h_w + q] + \gamma_w.h_w$

where:

- P = the horizontal pressure at depth, h (m)
- K = the earth pressure coefficient,
- γ = the bulk unit weight of soil, (kN/m^3)
- γ' = the submerged unit weight of soil, (kN/m^3)
- γ_w = the unit weight of water, (kN/m^3)
- h_w = the depth below the groundwater level (m)
- q = the complete surcharge loading (kPa)

Where elevated groundwater level is not anticipated to be present or that a perimeter drainage system is used to eliminate hydrostatic pressures on the soil retaining structure, the above noted expression will be simplified as follows:

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

If required and depending on the type of shoring used during construction, the temporary shoring system for excavation support can be designed for the lateral earth pressures given in Sections 26.8, 26.9, and 26.10 of the Canadian Foundation Engineering Manual (CFEM) - 4th Edition. Surcharge loads and hydrostatic pressures should be considered as appropriate. The recommended soil parameters to be used for lateral earth pressure calculations at this Site are summarized in the following table.

Table 5.2 ***Coefficient of Horizontal Earth Pressure***

Soil Type	Bulk Unit Weight	Effective Angle of Internal Friction (º)	Coefficient of Lateral Earth Pressure		
	γ (kN/m^3)	ϕ'	K_a	K_o	K_p
Granular B Type Fill	20	33°	0.29	0.46	3.39
Earth Fill	19	27°	0.38	0.55	2.66
Stiff to Very Stiff Native Sandy Silty Clay / Silty Clay	21	29°	0.35	0.52	2.88
Hard Native Sandy Silty Clay / Silty Clay with Sand Till	21	30°	0.33	0.50	3.00

It is to be noted that large deformation will be required prior to the full mobilization of passive earth pressure and mobilization of full active or passive resistance requires a measurable and significant movement of soil retaining structure or its rotation. Therefore, unless the structural element can tolerate these deflections, the at-rest earth pressure (K_o) should be used in design. Where movement sensitive services exist close to the shoring, the lateral pressure should also be computed using the coefficient of earth pressure at rest, K_0.

5.6 Seismic Site Classification

The 2012 Ontario Building Code (OBC2012) 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 2012 OBC, the Seismic Site Class is a function of soil profile and is based on the average properties of the subsurface strata to a depth of 30 m below the ground surface. The 2012 OBC provides the following three methods to obtain the average properties for the top 30 m of the ground strata:

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

Based on the results of the conducted geotechnical investigation with consideration of the ground geotechnical condition and the boreholes that have been advanced to a maximum depth of 6.7 mBGS, a Site Class 'D' (Stiff Soil) is recommended for seismic site response.

6. Pavement Design

The following sections provides pavement design recommendations for the design of potential driveways, parking areas, and access roads.

6.1 Subgrade Preparation

The existing earth fill at the Site ranged between approximately 1.5 mBGS and 3.0 mBGS. After stripping of asphalt or fill material with organics and debris, the exposed soil subgrade in the proposed pavement area, should be heavily proof rolled in conjunction with inspection by qualified geotechnical personnel. Loose or soft areas and presence of any organics and debris identified by proof rolling should be sub-excavated and replaced with approved earth fill materials and compacted to provide a stable uniform subgrade to meet the requirements of OPSS.MUNI 501 (November 2014). After proof rolling, Site grades should be adjusted (cut/fill) to the design subgrade profile with appropriate crossfall.

Fill placed to raise Site grades should be compacted to a minimum of 98 percent SPMDD. Where new fill is required to raise the grade, selected on-site earth materials could be used, provided it is free of any organic material. The fill should be placed in large areas where it can be compacted by a heavy roller. Any fill placed to increase or level the grade must be compacted to a minimum 98 percent SPMDD in lifts not exceeding 150 mm.

In-situ density testing to monitor the effectiveness of the compaction equipment in achieving the required densities Is also recommended. The most severe loading conditions on pavement areas and the subgrade may occur during construction. Consequently, special provisions such as end dumping and forward spreading of subbase fills, restricted construction lanes, and half-loads during paving may be required, especially if construction is carried out during inclement weather conditions.

6.2 Pavement Structure

The following table summarizes the minimum pavement structures recommended for the design of the potential driveways, parking areas, and access roads. The pavement designs include a Heavy Duty for access roads / driveways and a Light Duty for passenger car parking areas.

Table 6.1 Flexible Pavement Structure

Pavement Layer	Compaction Requirements	Light Duty Pavement Design	Heavy Duty Pavement Design
Surface Course Asphaltic Concrete HL3 (OPSS 1150)	91% to 96.5% Maximum Relative Density (OPSS 310)	40 mm	40 mm
Base Course Asphaltic Concrete HL8 (OPSS 1150)	92% to 97.5% Maximum Relative Density (OPSS 310)	50 mm	80 mm
Base Course: Granular 'A' or 19mm Crusher Run (OPSS1010)	100% Standard Proctor Maximum Dry Density	150 mm	150 mm
Sub-base Course: Granular B or 50mm Crusher Run (OPSS1010)	98% Standard Proctor Maximum Dry Density	250 mm	350 mm

If pavement construction occurs in wet inclement weather, it may be necessary to provide additional subgrade support for construction traffic by increasing the thickness of the granular sub-base.

6.3 Drainage

To maintain the integrity of the pavement at the Site, subdrains should be installed at all catch basins (3 m stubs in the upgradient direction) and along the perimeter of the parking lot. The invert of the subdrains should be at least 300 mm below the bottom of the subbase and should be sloped to drain to adjacent catch basins. The subdrains should be installed in a 300 mm by 300 mm trench lined by suitable geotextile and consist of a 150 mm diameter perforated pipe wrapped in a suitable geotextile and surrounded with a minimum thickness of 50 mm of free draining sand such as clear stone or concrete sand.

Grading adjacent to pavement areas should be designed so that water is not allowed to pond adjacent to the outside edges of the pavement. Also, the pavement subgrade should be free of depressions and sloped (preferably at a minimum grade of two percent) to provide effective drainage toward the edge of pavement and toward catch basins.

7. Construction Considerations

7.1 Excavation and Temporary Shoring

Excavations must be carried out in accordance with the Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects. Where workers must enter an excavation carried deeper than 1.2 m, the excavation must be suitably sloped and/or braced in accordance with the OHSA regulation requirements Section 20.77. OHSA specifies maximum slope of the excavations for four broad soil types as summarized in the following table:

Table 7.1 Maximum Site Slope Inclination for Excavations

Soil Type	Base of Slope	Maximum Slope Inclination
1	Within 1.2 metre of bottom	1 horizontal to 1 vertical
2	Within 1.2 metre 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

Minimum support system requirements for steeper excavations are stipulated in Sections 235 through 238 and 241 of the Act and Regulations and include provisions for timbering, shoring and moveable trench boxes.

Based on the results of the geotechnical Investigation, the earth fill and the stiff to very stiff native silty clay material are classified as Type 3, and the hard sandy silty clay till deposits are classified as Type 2 soils above the water table. However, in areas where these soils are present and become affected by water (surface water or ground water), they are to be classified as Type 3 soils for the till materials and type 4 soils for the fill materials. The highest number soil type identified in an excavation must govern the excavation slopes from top to bottom of the excavation. The type 2 soil is considered as soils that are within a very stiff/dense state, has low to medium natural moisture content, and a medium degree of internal strength. Type 3 soil is considered as soils that have a stiff to firm consistency and can exhibits signs of surface cracking and water seepage. Such soil if dry, may run easily into a well-defined conical pile; has low internal strength. Type 4 soil is considered as soils that have a firm consistency, are sensitive and upon disturbance their natural strengths will be significantly reduced. Such soil can run easily or flow, unless it is completely supported before excavating procedures; has almost no internal strength; is wet or muddy; and exerts substantial fluid pressure on its supporting system.

If the above recommended excavation side slopes cannot be maintained due to lack of space or any other reason, the excavation sides must be supported by an engineered shoring system. The shoring system should be designed in accordance with the latest edition of Canadian Foundation Engineering Manual (CFEM) and the OHSA Regulations for Construction Projects.

It is anticipated that shallow foundation and utility excavations can be made with conventional excavation equipment. However, based on the depth of the excavation and presence of cobbles and boulders that could potentially be present within the earth fill and native soils, installation of service lines at deeper excavation depths could locally be difficult.

7.2 Temporary Ground Water Control

Based on the water levels recorded in the open boreholes after completion of drilling and in the monitoring well after installation, the ground water elevations were at levels ranging between approximately 1.04 and 2.51 m below grade (elevations 257.3 m to 255.8 m).

The amount of seepage into excavations will depend on the depth of excavation relative to the groundwater level at the time of construction and the hydraulic conductivity of the excavated soils. The general permeability of the native silty clay soils is relatively low however the native soils have varying composition of sand that can result in higher seepage rates in localized areas. It is expected that for shallow excavations extending a maximum depth of 0.6 m into the groundwater table, the minor groundwater ingress can readily be handled by installation of sumps and pumps at strategic locations at the base of excavation. For deeper excavations groundwater control measures such as well points should be considered.

In the long term, seasonal fluctuations of the groundwater level are expected. Additionally, perched water table condition could develop in the shallower granular soils after heavy precipitation and/or during spring thaw.

It is recommended that test pits be dug during the tendering stage of the project in order that prospective contractors may familiarize themselves with the soil and groundwater conditions to be contacted at the site, particularly due to the varying quantity of sand withing the native silty clay strata.

7.3 Site Servicing

The native soils encountered at the Site are considered suitable to support proposed Site services. 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, soft, or otherwise unsuitable fills should be sub-excavated and replaced with additional bedding materials or clean earth fill compacted to minimum of 95% SPMDD.

The bedding for trenched (open cut) services should consist of well graded materials meeting OPSS requirements. The bedding should have a minimum thickness of 150 mm below the pipe and 300 mm above the pipe. 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 and the subgrade consists of silty/clayey soils, 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.

7.4 Construction Monitoring

The foundation installations must be closely monitored and inspected by qualified personnel to ensure that the founding achieved is consistent with the design bearing intended by the design engineer. The on-site review of the condition of the foundation as they 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.

Preparation of the subgrade and the compaction of all materials should be monitored at the time of construction to confirm material quality and thickness and to ensure adequate compaction. All backfilling should be supervised to ensure that proper materials are employed, and that adequate compaction is achieved. Strict quality control guidelines should be followed during the placement of fill materials.

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

8. Limitations of the Investigation

This report is intended solely for Keele Street (10533) Ltd. (Client) and is prohibited for use by others without GHD’s prior written consent. 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 elevations 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.

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 (i.e., excavation, dewatering and drainage, 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 or any changes to the development plans that were provided to GHD at the time of this report, we request that we be notified immediately in order to permit a reassessment of our recommendations.

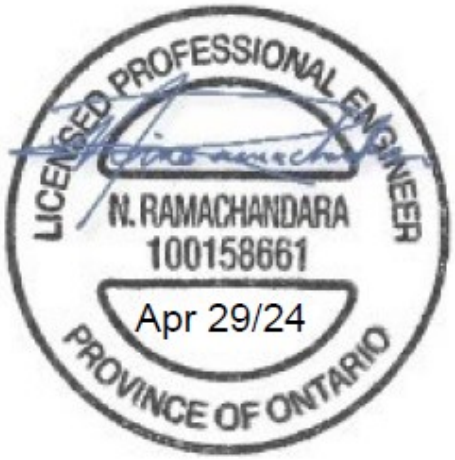
All of Which is Respectfully Submitted,

GHD



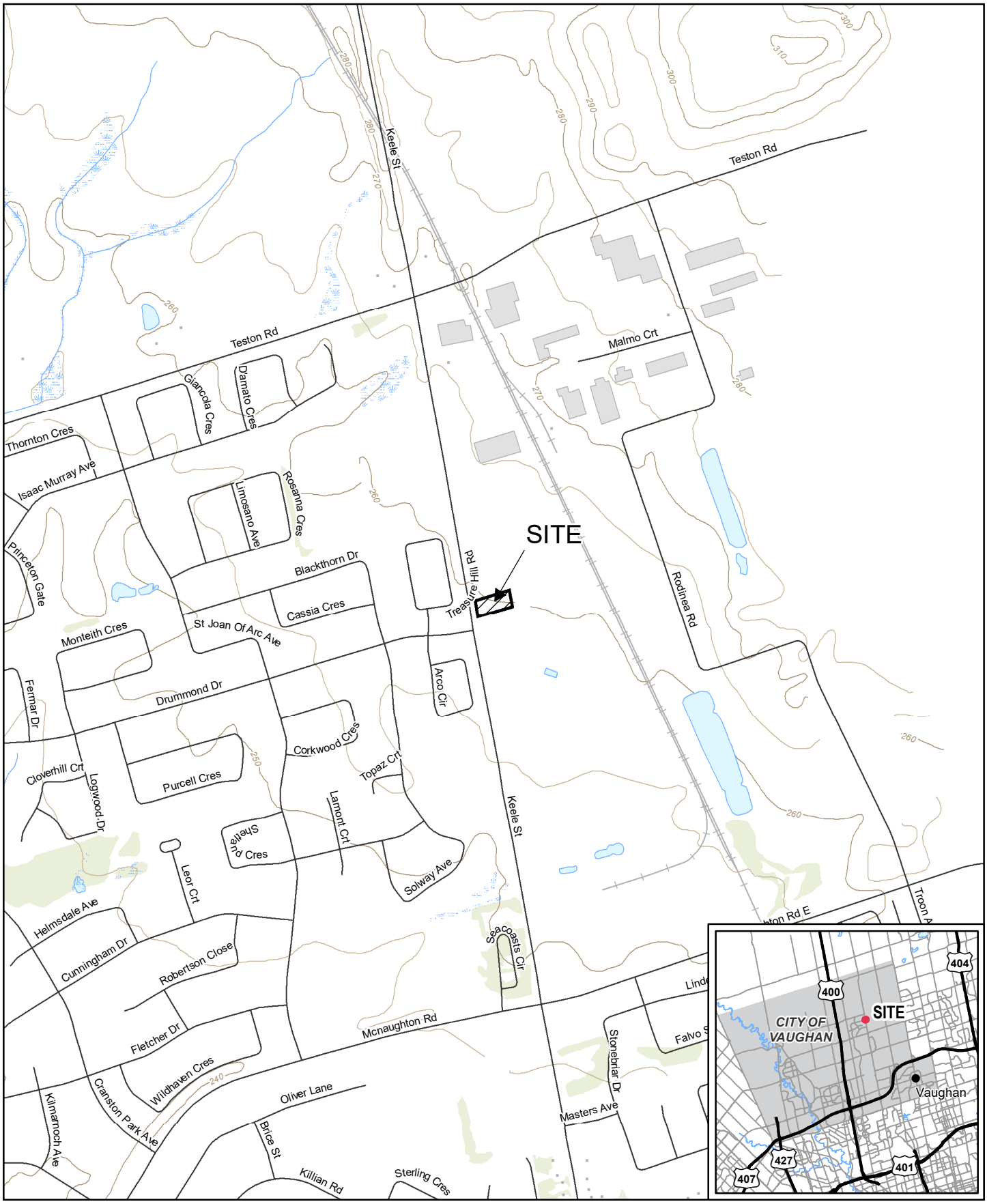
Omar Badaoui, BASc.





Niro Ramachandara, P.Eng.

Figures



Paper Size ANSI A

0 100 200 300

Metres

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

N

GHD

KEELE STREET (10533) LTD.
10533 KEELE STREET, VAUGHAN, ONTARIO
GEOTECHNICAL INVESTIGATION -
PROPOSED DEVELOPMENT

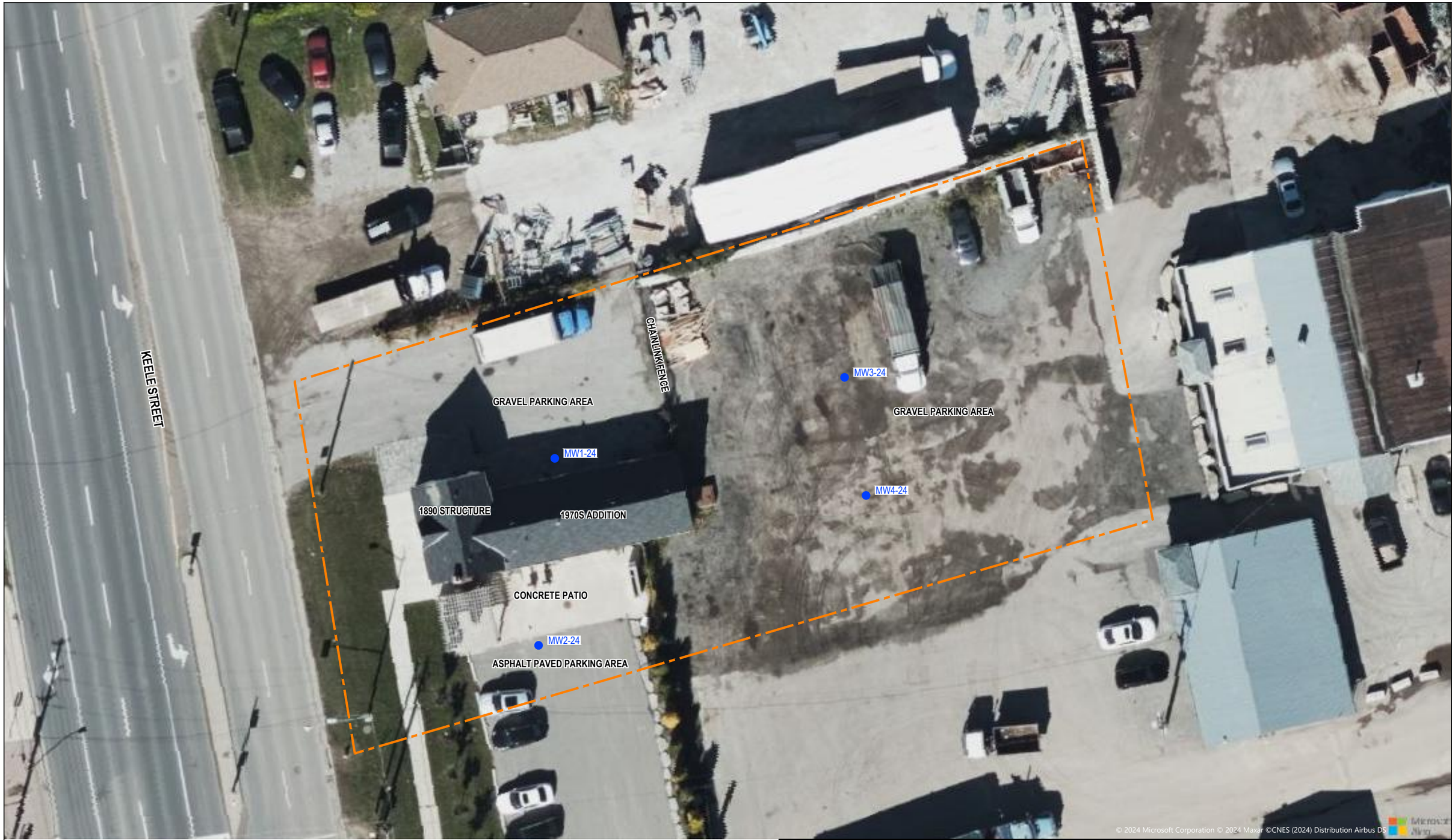
SITE LOCATION MAP

Project No. **12636323**
Revision No. **-**
Date **Apr 18, 2024**

FIGURE 1

O:\GIS\PROJECTS\12636000s\12636323\GIS\Maps\Deliverables\RPT-Geotech001\12636323-001-SiteLocationMap.mxd
Print date: 18 Apr 2024 - 12:27

Data source: MNRF NRVIS, 2018. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer 2024.



LEGEND

PROPERTY BOUNDARY

MONITORING WELL LOCATION

0 3 6 9m

1:300

Coordinate System: UTM83-17

N

GHD

KEELE STREET (10533) LTD.
10533 KEELE STREET, VAUGHAN, ONTARIO
GEOTECHNICAL INVESTIGATION - PROPOSED DEVELOPMENT

MONITORING WELL LOCATION PLAN

Project No. **12636323**
Date **April 2024**

FIGURE 2

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Appendices

Appendix A

Borehole Stratigraphic Records

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 soils 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 4.25 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%

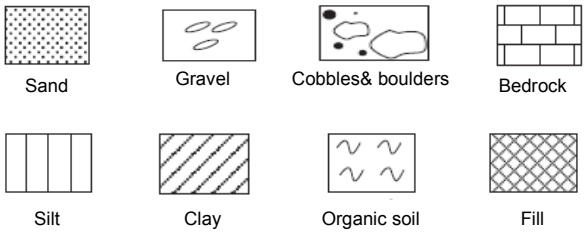
Relative density of granular soils	Standard penetration index "N" value (BLOWS/ft – 300 mm)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

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

REFERENCE No.: 12636323

BOREHOLE REPORT

Page 1 of 1

BOREHOLE No.: MW1-24

ELEVATION: 258.3 m

CLIENT: Keele Street (10533) Ltd.

PROJECT: Geotechnical Investigation - Proposed Development

LOCATION: 10533 Keele Street, Vaughan, Ontario

DESCRIBED BY: Reza Bay CHECKED BY: Omar Badaoui

DATE (START): 28 March 2024 DATE (FINISH): 28 March 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- RC - CORE SAMPLE
- ▼ - WATER LEVEL (MEASURED)
- ▽ - WATER LEVEL (OBSERVED)

NORTHING: 4858283.7 EASTING: 619327.3 DRILLING TYPE: DRILLING METHOD: Hollow Stem Augers

Depth Feet	Depth Metres	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry) KN/m³	LAB Testing Moisture Content %	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	COMMENTS
0		258.3		GROUND SURFACE			%		%	%			
	0.1	258.2		TILE (75 mm)		SS1A			7	100	4-3-1-2	4	Concrete 0.3 m
1	0.3	258.0		FILL: SILTY SAND, light grey, very moist, very loose		SS1B			24	100	--	--	
2	0.8	257.5		CLAYEY SILT, trace sand, rootlets, dark brown, very moist, soft									
3	1.0			SILTY CLAY, rootlets, brown, very moist, very soft		SS2			17	25	0-0-0-1	0	Bentonite
4													
5				some sand, trace gravel, oxidized, firm		SS3			13	100	3-3-3-4	6	
6	2.0												
7				very moist, very soft, ashphalt fragments		SS4			17	100	0-0-2-7	2	2.4 m
8													4/5/2024
9													
10	3.0	255.2		NATIVE: SANDY SILTY CLAY TILL, some sand, trace gravel, brown, oxidized, moist to very moist, very stiff		SS5			12	100	4-7-9-13	16	3.0 m
11													
12				VANE SHEAR TEST Refusal at 3.0 m bgs moist, hard		SS6			11	100	50/25mm	50/25 mm	
13	4.0												
14													
15				rock fragments (could be boulder)		SS7			9	22.2	38-50/76 mm	50/76 mm	Screen with sand
16	5.0												
17													
18				oxidized, hard		SS8			10	75	16-46-30-39	76	3/28/2024
19													
20	6.0			brown to grey									6.1 m
21						SS9			7	100	14-23-34-32	57	
22	6.7	251.6		END OF BOREHOLE									6.7 m
23	7.0												
24													
25													
26	8.0												
27													
28													
29	9.0												
30													
31													
32													

Undisturbed Vane Value (kPa)
Remoulded Field Vane Value (kPa)
Number refer to Sensitivity
Water content (%)
Atterberg limits (%) w_p w_l
"N" Value (blows/12 in.-30 cm)
"DCPT" Value (blows/12 in.-30 cm)

10 20 30 40 50 60 70 80 90

PIEZOMETER/ STANDPIPE INSTALLATION

NOTES:
- End of borehole at 6.7 m bgs
- Groundwater at 5.2 m bgs upon completion of drilling.
- 'bgs' denotes 'below ground surface'
- Water Level Reading:

Date	W. L Depth (m bgs)	Elevation (m)
04/05/2024	2.5	255.8

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Report: 12636323 SOIL LOG Date: 18/4/24

REFERENCE No.: 12636323

BOREHOLE REPORT

Page 1 of 1

BOREHOLE No.: MW2-24

ELEVATION: 257.5 m

CLIENT: Keele Street (10533) Ltd.

PROJECT: Geotechnical Investigation - Proposed Development

LOCATION: 10533 Keele Street, Vaughan, Ontario

DESCRIBED BY: Reza Bay CHECKED BY: Omar Badaoui

DATE (START): 27 March 2024 DATE (FINISH): 28 March 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- RC - CORE SAMPLE
- ▼ - WATER LEVEL (MEASURED)
- ▽ - WATER LEVEL (OBSERVED)

NORTHING: 4858268.1 EASTING: 619325.9 DRILLING TYPE: DRILLING METHOD: Hollow Stem Augers

Depth (Feet)	Depth (Metres)	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay) %	LAB Testing Unit Weight (Dry) KN/m³	LAB Testing Moisture Content %	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	COMMENTS
0		257.5		GROUND SURFACE			%	KN/m³	%	%			
	0.1	257.4		ASPHALT (100 mm)									Concrete 0.3 m
1				FILL: SILTY SAND, some gravel, black, moist, compact		SS1			21	54.2	5-9-4-3	13	
2	0.8	256.7		SILTY CLAY, some sand, trace gravel, dark brown, moist to very moist, stiff									
3	1.0					SS2			13	79.2	1-3-6-5	9	
4													Bentonite
5	1.5	256.0		NATIVE: SANDY SILTY CLAY, some gravel, brown, oxidized, very moist, stiff		SS3			16	100	3-5-6-10	11	
6	2.0												4/5/2024
7				trace gravel, oxidized, very moist to moist, very stiff		SS4	0-32-54-14		10	100	3-7-9-11	16	2.4 m
8													
9													
10	3.0	3.0	254.5	SANDY SILTY CLAY TILL, trace gravel, brown, oxidized, moist to very moist, hard									3.0 m
11						SS5			9	100	7-15-18-17	33	
12													
13	4.0			moist augers grinding from 4.0 m bgs to 4.3 m bgs		SS6			12	75	12-50/51 mm	50/51 mm	
14													
15													Screen with sand
16	5.0					SS7			13	100	7-16-17-23	33	
17													
18				oxidized, moist to very moist		SS8			8	100	6-15-26-33	41	
19													
20	6.0			brown to grey, oxidized									6.1 m
21						SS9			7	100	14-22-25-29	47	
22	6.7	250.8		END OF BOREHOLE									6.7 m
23	7.0												
24													
25													
26	8.0												
27													
28													
29	9.0												
30													
31													
32													

Undisturbed Vane Value (kPa)
Remoulded Field Vane Value (kPa)
Number refer to Sensitivity
Water content (%)
Atterberg limits (%) w_p w_l
"N" Value (blows/12 in.-30 cm)
"DCPT" Value (blows/12 in.-30 cm)

10 20 30 40 50 60 70 80 90

COMMENTS: PIEZOMETER/ STANDPIPE INSTALLATION

NOTES:
- End of borehole at 6.7 m bgs.
- Borehole open and dry upon completion of drilling.
- 'bgs' denotes 'below ground surface'.
- Water Level Reading:

Date	W. L Depth (m bgs)	Elevation (m)
04/05/2024	1.9	255.6

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Report: 12636323 SOIL LOG Date: 18/4/24

REFERENCE No.: 12636323

BOREHOLE REPORT

Page 1 of 1

BOREHOLE No.: MW3-24

ELEVATION: 258.3 m

CLIENT: Keele Street (10533) Ltd.

PROJECT: Geotechnical Investigation - Proposed Development

LOCATION: 10533 Keele Street, Vaughan, Ontario

DESCRIBED BY: Reza Bay CHECKED BY: Omar Badaoui

DATE (START): 27 March 2024 DATE (FINISH): 27 March 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- RC - CORE SAMPLE
- ▼ - WATER LEVEL (MEASURED)
- ▽ - WATER LEVEL (OBSERVED)

NORTHING: 4858290.5 EASTING: 619351.5 DRILLING TYPE: DRILLING METHOD: Hollow Stem Augers

Depth Feet	Depth Metres	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry)	LAB Testing Moisture Content	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	COMMENTS
		258.3		GROUND SURFACE			%	KN/m³	%	%			
0				FILL: SILTY SAND, some gravel, dark brown, moist, dense (Granular Base)		SS1			9	95.8	15-16-22-40	38	Concrete 0.3 m
	0.8	257.6		SILTY CLAY, some sand, trace gravel, fragments (brick, metals, glass), rootlets, black, oxidized, moist, stiff		SS2			21	100	3-5-5-5	10	Bentonite
				very moist, green to grey, soft, odour		SS3			21	66.7	1-2-1-1	3	
	2.3	256.0		NATIVE: SILTY CLAY, some sand, trace gravel, brown, moist to very moist, stiff		SS4			13	100	0-5-6-8	11	2.4 m
	3.0	255.3		SILTY CLAY TILL, with sand, trace gravel, brown, moist to very moist, hard		SS5	0-26-56-18		10	95.8	3-18-12-19	30	3.0 m
						SS6			17	100	50/102mm	50/102 mm	
				rock fragments (could be boulder/cobble), grey, moist		SS7			9	14.3	50-50/25 mm	50/25 mm	Screen with sand
				trace gravel		SS8			11	28.6	10-50/25mm	50/25 mm	
	6.1	252.2		SANDY SILT TILL, trace clay, trace gravel, grey, moist, very dense		SS9			8	95.8	13-34-35-39	69	6.1 m
	6.7	251.6		END OF BOREHOLE									6.7 m

NOTES:
- End of borehole at 6.7 m bgs.
- Borehole open and dry upon completion of drilling.
- 'bgs' denotes 'below ground surface'.
- Water Level Reading:

Date	W. L Depth (m bgs)	Elevation (m)
04/05/2024	1.0	257.3

4/5/2024

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Report: 12636323 SOIL LOG Date: 18/4/24

REFERENCE No.: 12636323

BOREHOLE REPORT

Page 1 of 1

BOREHOLE No.: MW4-24

ELEVATION: 258.0 m

CLIENT: Keele Street (10533) Ltd.

PROJECT: Geotechnical Investigation - Proposed Development

LOCATION: 10533 Keele Street, Vaughan, Ontario

DESCRIBED BY: Reza Bay CHECKED BY: Omar Badaoui

DATE (START): 27 March 2024 DATE (FINISH): 27 March 2024

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- VA - VANE SHEAR
- AU - AUGER PROBE
- RC - CORE SAMPLE
- ▼ - WATER LEVEL (MEASURED)
- ▽ - WATER LEVEL (OBSERVED)

NORTHING: 4858280.6 EASTING: 619353.3 DRILLING TYPE: DRILLING METHOD: Hollow Stem Augers

Depth Feet	Depth Metres	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL	SAMPLES State	SAMPLES Type and Number	LAB Testing Comments (Gravel Sand Silt Clay)	LAB Testing Unit Weight (Dry) KN/m³	LAB Testing Moisture Content %	Recovery/ TCR(%)	Blows per/15cm/ RQD(%)	'N' Value SCR(%)	Undisturbed Vane Value (kPa) / Remoulded Field Vane Value (kPa) / Number refer to Sensitivity / Water content (%) / Atterberg limits (%) / "N" Value (blows/12 in.-30 cm) / "DCPT" Value (blows/12 in.-30 cm)	COMMENTS PIEZOMETER/ STANDPIPE INSTALLATION
		258.0		GROUND SURFACE			%	KN/m³	%	%			10 20 30 40 50 60 70 80 90	
0				FILL: SILTY SAND, some gravel, fragments (brick, glass), rootlets, black, moist, very dense (Granular Base)		SS1			5	100	20-29-23-13	52		Concrete 0.3 m
1														
2														
3	1.0					SS2			8	100	2-8-11-12	19		Bentonite
4														
5	1.5	256.4		NATIVE: SILTY CLAY, some sand, trace gravel, brown, moist, stiff		SS3			12	100	3-6-6-7	12		
6														
7	2.0													
8						SS4			14	12.5	4-7-8-11	15		2.4 m ▼ 4/5/2024 3/27/2024
9														
10	3.0	3.0	254.9	SANDY SILTY CLAY TILL, trace gravel, brown, extreme oxidized, moist, hard		SS5			9	100	6-25-39-41	64		3.0 m
11														
12				some gravel, extreme oxidized										
13	4.0					SS6			8	100	17-37-36-39	73		
14														
15														Screen with sand
16	5.0					SS7			7	100	22-42-41-50/102mm	83		
17														
18				oxidized		SS8	0-37-49-14		8	100	13-39-50/102mm	89/254 mm	13 17 H	
19														
20	6.0			grey, sandy silt seam										6.1 m
21						SS9			9	100	7-18-30-39	48		
22	6.7	251.3		END OF BOREHOLE										6.7 m
23	7.0													
24														
25														
26	8.0													
27														
28														
29	9.0													
30														
31														
32														

NOTES:
- End of borehole at 6.7 m bgs
- Groundwater at 2.6 m bgs upon completion of drilling.
- 'bgs' denotes 'below ground surface'.
- Water Level Reading:

Date	W. L Depth (m bgs)	Elevation (m)
04/05/2024	2.5	255.5

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Report: 12636323 SOIL LOG Date: 18/4/24

Appendix B

Geotechnical Laboratory Test Results

Moisture Content of Soils
(ASTM D 2216)

Client: Keele Street (10533) Ltd.

Project no.: 12636323 **Sample no.:** GS#23

Apparatus Used for Testing

Oven no.: 1 Scale no.: 2

Sample No.	MW1-24 SS1A	SS1B	SS2	SS3	SS4	SS5	SS6	SS7
Container no.	D7	A14	E11	D18	D17	E12	D2	B11
Mass of container + wet soil (g)	33.4	32.5	37.2	41.3	34.7	34.5	40.1	43.3
Mass of container + dry soil (g)	31.8	27.9	33.0	37.5	30.8	31.6	36.9	40.3
Mass of container (g)	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Mass of dry soil (g)	23.5	19.6	24.7	29.2	22.5	23.3	28.6	32.0
Mass of water (g)	1.6	4.6	4.2	3.8	3.9	2.9	3.2	3.0
Moisture content (%)	6.8	23.5	17.0	13.0	17.3	12.4	11.2	9.4

Sample No.	SS8	SS9	MW2-24 SS1	SS2	SS3	SS4	SS5	SS6
Container no.	C10	D5	D13	D19	C14	E6	C3	C4
Mass of container + wet soil (g)	44.1	37.4	31.8	42.6	27.3	42.4	35.7	34.3
Mass of container + dry soil (g)	41.0	35.5	27.7	38.8	24.7	39.2	33.5	31.5
Mass of container (g)	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Mass of dry soil (g)	32.7	27.2	19.4	30.5	16.4	30.9	25.2	23.2
Mass of water (g)	3.1	1.9	4.1	3.8	2.6	3.2	2.2	2.8
Moisture content (%)	9.5	7.0	21.1	12.5	15.9	10.4	8.7	12.1

Remarks:

Analysed by: R.W. **Date:** 4/8/24

Verified by : R.K. **Date:** 4/10/24

Moisture Content of Soils
(ASTM D 2216)

Client: Keele Street (10533) Ltd.

Project no.: 12636323 **Sample no.:** GS#23

Apparatus Used for Testing

Oven no.: 1 Scale no.: 2

Sample No.	MW2-24 SS7	SS8	SS9	MW3-24 SS1	SS2	SS3	SS4	SS5
Container no.	B5	A17	C11	C16	E4	E5	C12	E3
Mass of container + wet soil (g)	34.0	38.2	35.1	30.1	38.9	39.3	35.6	32.4
Mass of container + dry soil (g)	31.1	36.1	33.4	28.3	33.6	34.0	32.5	30.2
Mass of container (g)	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Mass of dry soil (g)	22.8	27.8	25.1	20.0	25.3	25.7	24.2	21.9
Mass of water (g)	2.9	2.1	1.7	1.8	5.3	5.3	3.1	2.2
Moisture content (%)	12.7	7.6	6.8	9.0	20.9	20.6	12.8	10.0

Sample No.	SS6	SS7	SS8	SS9	MW4-24 SS1	SS2	SS3	SS4
Container no.	C18	D12	E7	C19	D16	B8	E16	D15
Mass of container + wet soil (g)	32.1	26.1	33.7	39.6	37.7	25.2	40.0	35.6
Mass of container + dry soil (g)	28.7	24.7	31.2	37.2	36.4	23.9	36.7	32.2
Mass of container (g)	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Mass of dry soil (g)	20.4	16.4	22.9	28.9	28.1	15.6	28.4	23.9
Mass of water (g)	3.4	1.4	2.5	2.4	1.3	1.3	3.3	3.4
Moisture content (%)	16.7	8.5	10.9	8.3	4.6	8.3	11.6	14.2

Remarks:

Analysed by: R.W. **Date:** 4/8/24

Verified by : R.K. **Date:** 4/10/24

Moisture Content of Soils
(ASTM D 2216)

Client: Keele Street (10533) Ltd.

Project no.: 12636323 **Sample no.:** GS#23

Apparatus Used for Testing

Oven no.: 1 Scale no.: 2

Sample No.	MW4-24 SS5	SS6	SS7	SS8	SS9			
Container no.	A16	C9	D14	C5	E18			
Mass of container + wet soil (g)	38.6	37.7	42.7	49.6	41.3			
Mass of container + dry soil (g)	36.2	35.6	40.4	46.5	38.6			
Mass of container (g)	8.3	8.3	8.3	8.3	8.3			
Mass of dry soil (g)	27.9	27.3	32.1	38.2	30.3			
Mass of water (g)	2.4	2.1	2.3	3.1	2.7			
Moisture content (%)	8.6	7.7	7.2	8.1	8.9			
Sample No.								
Container no.								
Mass of container + wet soil (g)								
Mass of container + dry soil (g)								
Mass of container (g)								
Mass of dry soil (g)								
Mass of water (g)								
Moisture content (%)								

Remarks:

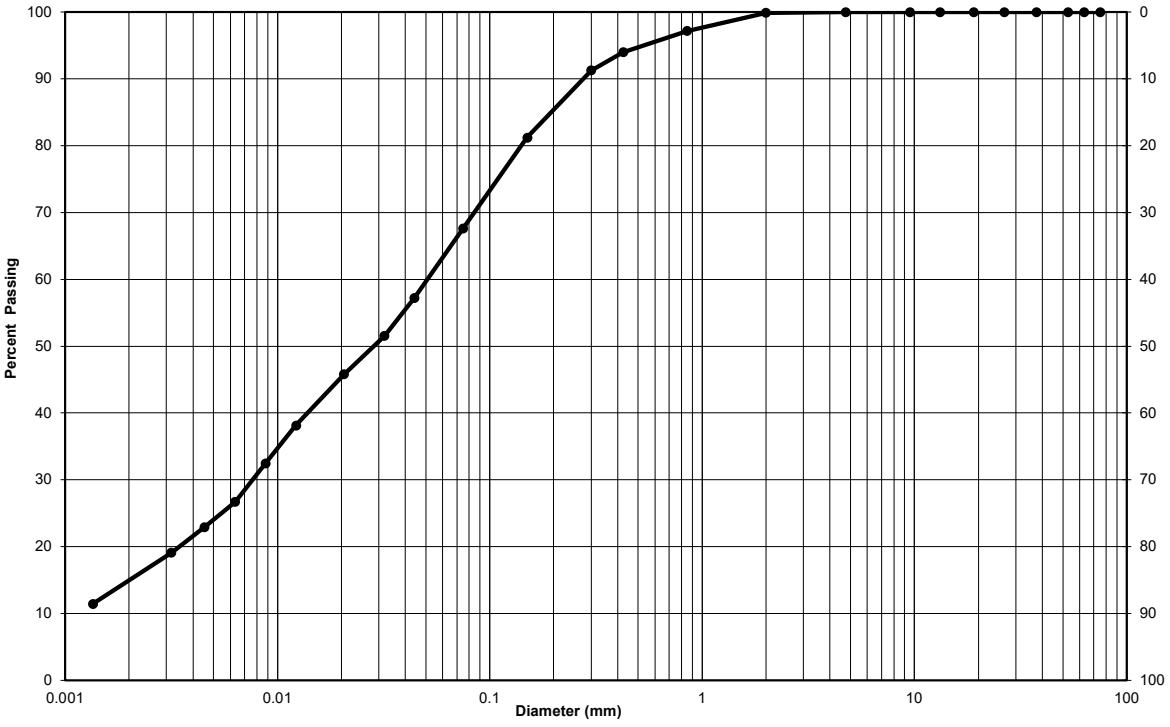
Analysed by: R.W. **Date:** 4/8/24

Verified by : R.K. **Date:** 4/10/24

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

Client:	Keele Street (10533) Ltd.	**Lab No.:**	GS23
Project/Site:	10533 Keele Street. Vaughan, Ontario	**Project No.:**	12636323

Borehole no.:	MW2-24	Sample no.:	SS4
Depth:	2.3m - 2.9m	Enclosure:	



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

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	0	32	68
Silt-size particles (%):	54		
Clay-size particles (%) (<0.002mm):	14		

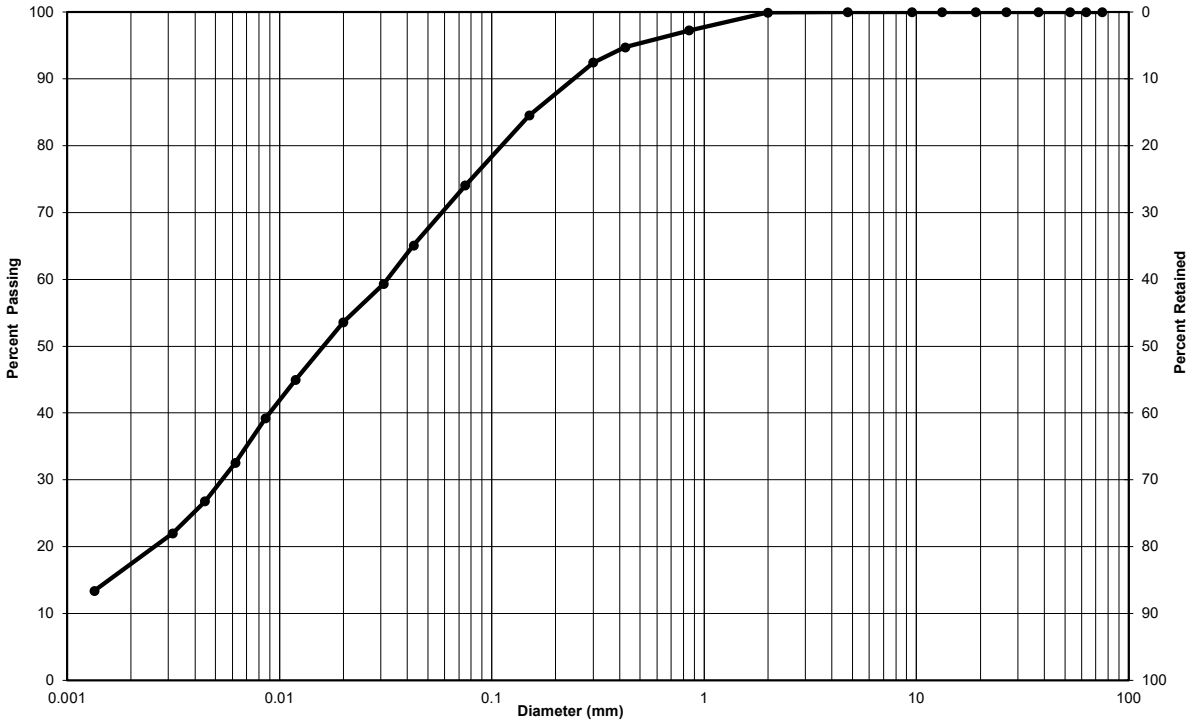
Remarks:

Performed by:	Riddhi Wilson / Malek S.	**Date:**	April 8, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	April 11, 2024

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

Client:	Keele Street (10533) Ltd.	**Lab No.:**	GS23
Project/Site:	10533 Keele Street. Vaughan, Ontario	**Project No.:**	12636323

Borehole no.:	MW3-24	Sample no.:	SS5
Depth:	3.1m - 3.7m	Enclosure:	



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

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	0	26	74
Silt-size particles (%):	56		
Clay-size particles (%) (<0.002mm):	18		

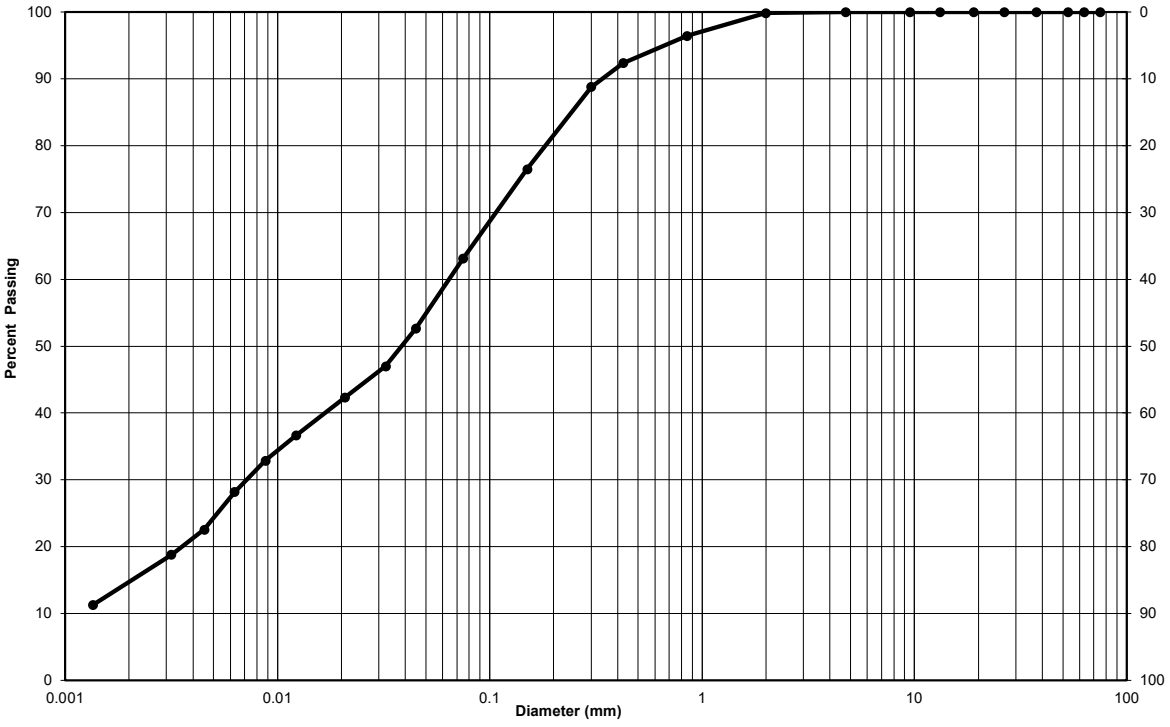
Remarks:

Performed by:	Riddhi Wilson / Malek S.	**Date:**	April 8, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	April 11, 2024

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

Client:	Keele Street (10533) Ltd.	**Lab No.:**	GS23
Project/Site:	10533 Keele Street. Vaughan, Ontario	**Project No.:**	12636323

Borehole no.:	MW4-24	Sample no.:	SS8
Depth:	5.3m - 5.9m	Enclosure:	



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

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
	0	37	63
Silt-size particles (%):	49		
Clay-size particles (%) (<0.002mm):	14		

Remarks:

Performed by:	Riddhi Wilson / Malek S.	**Date:**	April 8, 2024
Verified by:	Raj Kadia C.E.T	**Date:**	April 11, 2024

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Keele Street (10533) Ltd.	**Lab no.:**	GS23
Project/Site:	10533 Keele Street. Vaughan, Ontario	**Project no.:**	12636323

Borehole no.:	MW2-24	Sample no.:	SS-4	Sample Depth:	7.5 ft - 9.5 ft (2.3 m - 2.9 m)
Soil Description:				Date sampled:	March 27, 2024

Apparatus:	Hand Crank	Balance no.:	1	Porcelain bowl no.:	1
Liquid limit device no.:	1	Oven no.:	1	Spatula no.:	1
Sieve no.:	40	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	34	30	25
Water Content:			
Tare no.	A23	A18	A7
Wet soil+tare, g	32.41	26.92	29.75
Dry soil+tare, g	29.73	24.98	27.33
Mass of water, g	2.68	1.94	2.42
Tare, g	13.58	13.55	13.34
Mass of soil, g	16.15	11.43	13.99
Water content %	16.6%	17.0%	17.3%

Plastic Limit (PL) - Water Content:

Tare no.	A30	A19
Wet soil+tare, g	23.46	23.40
Dry soil+tare, g	22.33	22.23
Mass of water, g	1.13	1.17
Tare, g	13.55	13.27
Mass of soil, g	8.78	8.96
Water content %	12.9%	13.1%
Average water content %	13.0%	

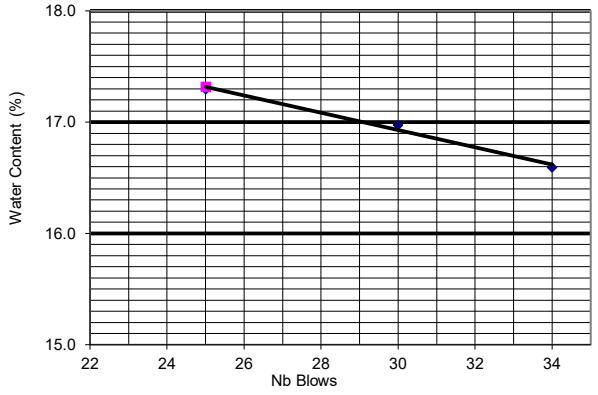
Natural Water Content (W^n):

Tare no.	E6	
Wet soil+tare, g	42.40	
Dry soil+tare, g	39.20	
Mass of water, g	3.20	
Tare, g	8.30	
Mass of soil, g	30.90	
Water content %	10.4%	

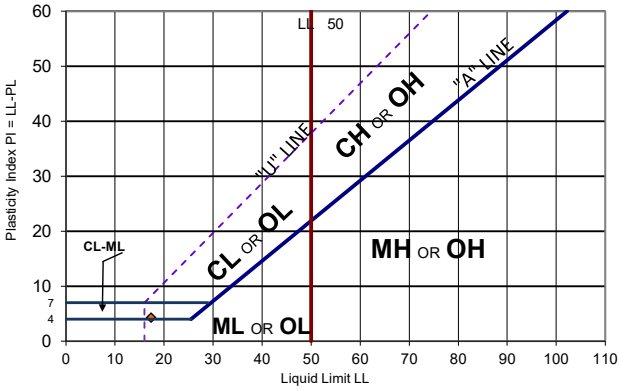
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
17	13	4	10.4

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Riddhi Wilson	**Date:**	April 9, 2024
Reviewed by:	Raj Kadia C.E.T	**Date:**	April 11, 2024
Laboratory Location:	GHD Ltd. - 5582 Tomken Rd., Mississauga, ON		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Keele Street (10533) Ltd.	**Lab no.:**	GS23
Project/Site:	10533 Keele Street. Vaughan, Ontario	**Project no.:**	12636323

Borehole no.:	MW4-24	Sample no.:	SS-8	Sample Depth:	17.5 ft - 19.5 ft (5.3 m - 5.9 m)
Soil Description:				Date sampled:	March 27, 2024

Apparatus:	Hand Crank	Balance no.:	1	Porcelain bowl no.:	3
Liquid limit device no.:	1	Oven no.:	1	Spatula no.:	1
Sieve no.:	40	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	27	21	16
Water Content:			
Tare no.	A24	A13	A9
Wet soil+tare, g	24.65	27.09	24.14
Dry soil+tare, g	23.05	25.11	22.56
Mass of water, g	1.60	1.98	1.58
Tare, g	13.34	13.31	13.32
Mass of soil, g	9.71	11.80	9.24
Water content %	16.5%	16.8%	17.1%

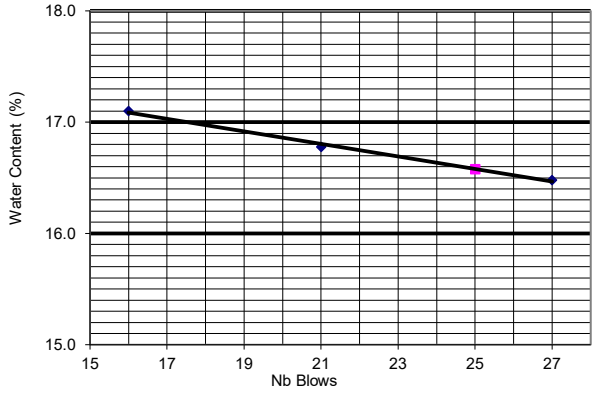
Plastic Limit (PL) - Water Content:		
Tare no.	A10	A20
Wet soil+tare, g	20.72	23.62
Dry soil+tare, g	19.94	22.47
Mass of water, g	0.78	1.15
Tare, g	13.60	13.47
Mass of soil, g	6.34	9.00
Water content %	12.3%	12.8%
Average water content %	12.5%	

Natural Water Content (W^n):		
Tare no.	C5	
Wet soil+tare, g	49.60	
Dry soil+tare, g	46.50	
Mass of water, g	3.10	
Tare, g	8.30	
Mass of soil, g	38.20	
Water content %	8.1%	

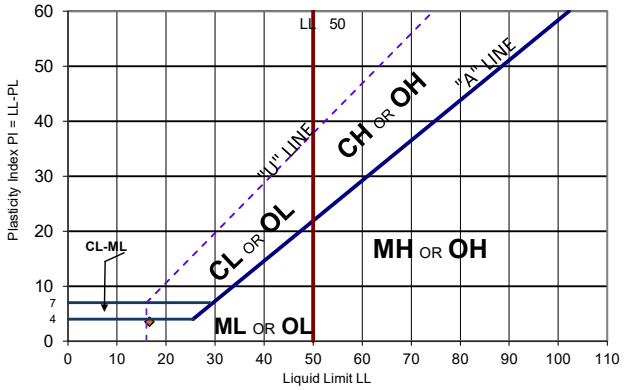
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
17	13	4	8.1

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Riddhi Wilson	**Date:**	April 9, 2024
Reviewed by:	Raj Kadia C.E.T	**Date:**	April 11, 2024
Laboratory Location:	GHD Ltd. - 5582 Tomken Rd., Mississauga, ON		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Keele Street (10533) Ltd.	**Lab no.:**	GS23
Project/Site:	10533 Keele Street. Vaughan, Ontario	**Project no.:**	12636323

Borehole no.:	MW3-24	Sample no.:	SS-5	Sample Depth:	10 ft - 12 ft (3.1 m - 3.7 m)
Soil Description:				Date sampled:	March 27, 2024

Apparatus:	Hand Crank	Balance no.:	1	Porcelain bowl no.:	2
Liquid limit device no.:	1	Oven no.:	1	Spatula no.:	1
Sieve no.:	40	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	35	28	25
Water Content:			
Tare no.	A17	A28	A16
Wet soil+tare, g	27.37	28.38	27.57
Dry soil+tare, g	25.20	26.02	25.30
Mass of water, g	2.17	2.36	2.27
Tare, g	13.31	13.53	13.40
Mass of soil, g	11.89	12.49	11.90
Water content %	18.3%	18.9%	19.1%

Plastic Limit (PL) - Water Content:

Tare no.	A6	A8
Wet soil+tare, g	26.95	25.23
Dry soil+tare, g	25.28	23.76
Mass of water, g	1.67	1.47
Tare, g	13.60	13.36
Mass of soil, g	11.68	10.40
Water content %	14.3%	14.1%
Average water content %	14.2%	

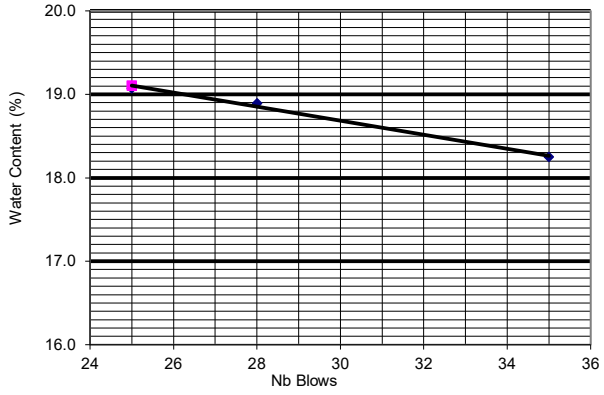
Natural Water Content (W^n):

Tare no.	E3	
Wet soil+tare, g	32.40	
Dry soil+tare, g	30.20	
Mass of water, g	2.20	
Tare, g	8.30	
Mass of soil, g	21.90	
Water content %	10.0%	

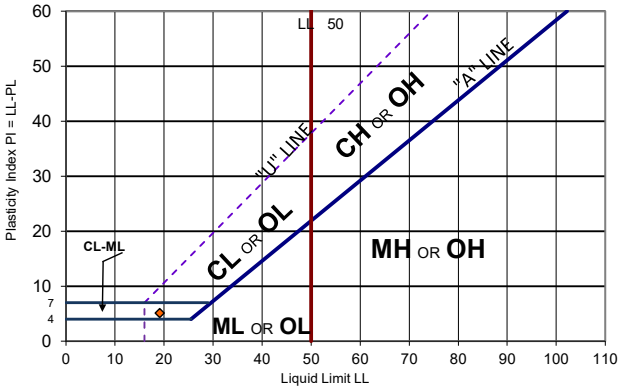
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
19	14	5	10.0

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Riddhi Wilson	**Date:**	April 9, 2024
Reviewed by:	Raj Kadia C.E.T	**Date:**	April 11, 2024
Laboratory Location:	GHD Ltd. - 5582 Tomken Rd., Mississauga, ON		

