

August 28, 2026

REPORT ON
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
1447 HIGHWAY 50
BOLTON, ONTARIO

PREPARED FOR:
OAKBANK ESTATES INC.
C/O ROYAL PINE HOMES

PREPARED BY:
DS Consultants Ltd.

DS Project No: 26-060-300
Date: August 25, 2026



DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Table of Contents

1	INTRODUCTION	1
2	BACKGROUND INFORMATION	1
3	FIELD AND LABORATORY WORK	2
4	SITE AND SUBSURFACE CONDITIONS	2
4.1	SOIL CONDITIONS	2
4.2	GROUNDWATER CONDITIONS	4
5	DISCUSSION AND RECOMMENDATIONS	5
5.1	SITE GRADING AND ENGINEERED FILL	5
5.2	ROADS	6
5.2.1	Stripping, Sub-excavation and Grading	6
5.2.2	Construction	7
5.2.3	Drainage	7
5.3	SEWERS	7
5.3.1	Trenching	7
5.3.2	Bedding	8
5.3.3	Backfilling of Trenches	8
5.4	FOUNDATION CONDITIONS	9
5.5	EARTH PRESSURES	10
5.6	FLOOR SLAB AND PERMANENT DRAINAGE	10
5.7	EARTHQUAKE CONSIDERATIONS	10
5.8	RECOMMENDATIONS FOR PROPOSED STORMWATER MANAGEMENT (SWM) PONDS	11
6	GENERAL COMMENTS AND LIMITATIONS OF REPORT	12

DRAWINGS

BOREHOLE LOCATION PLAN	1
GENERAL COMMENTS ON SAMPLE DESCRIPTIONS	1A
BOREHOLE LOGS	2 – 13
GENERALIZE SUBSURFACE PROFILES	14-15
GRADATION CURVES	16-19
ATTERBERG LIMITS	20-22
DRAINAGE & BACKFILL RECOMMENDATIONS	23

APPENDIX

APPENDIX A - ENGINEERED FILL GUIDELINES	
---	--

1 INTRODUCTION

DS Consultants Limited (DS) was retained by Oakbank Estates Inc. c/o Royal Pine Homes to undertake a geotechnical investigation for the proposed residential subdivision located at 14475 Highway 50 in Bolton, Ontario.

It is understood that the proposed subdivision will consist of low-rise residential houses serviced with a network of underground utilities and roads.

The purpose of the geotechnical investigation was to explore the site conditions and from the findings in the boreholes to make recommendations pertaining to the geotechnical design of site grading, underground utilities, roads and to comment on the foundation conditions for the building construction.

Concurrently with the geotechnical Investigation program, soil chemical analyses for the purpose of assessing future excess soil, as well as a hydrogeological investigation are carried out by DS, and the results are addressed in separate reports.

This report is provided on the basis of the terms of reference presented above and on the assumption that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Oakbank Estates Inc. c/o Royal Pine Homes and its architect and designers. Third party use of this report without DS consent is prohibited.

2 BACKGROUND INFORMATION

DS was retained by Oakbank Estates Inc. c/o Royal Pine Homes to complete a geotechnical investigation at the subject site for proposed residential subdivision development.

A total of twelve (12) boreholes (BH26-1 to BH26-12) were advanced at the site to depths ranging from 6.7 to 8.2 m below existing ground surface. The borehole logs are included as **Drawings 2 to 13** in this report. Boreholes (BH26-1 to BH26-9) were drilled for geotechnical purposes, and additional (3) boreholes (BH26-10 to BH26-12) were drilled for environmental purposes. However, geotechnical report will include all twelve (12) boreholes in this report.

3 FIELD AND LABORATORY WORK

Twelve (12) boreholes (BH26-1 to BH26-12) were drilled in 2026. The locations of boreholes are shown in **Drawing 1**. The boreholes were drilled to depths ranging from 6.7 to 8.2 m below existing ground surface.

The drilling works were completed from April 20 to 22, 2026. These boreholes were drilled with solid stem continuous flight augers equipment by a drilling sub-contractor under the direction and supervision of DS personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the DS laboratory for detailed examination by the project engineer and for laboratory testing.

In addition to visual examination in the laboratory, all soil samples from geotechnical boreholes were tested for moisture contents. Grain size analyses of sixteen (16) selected soil samples were conducted, and the results are presented in **Drawings 16 to 19**. Atterberg Limits testing of ten (10) selected soil samples was conducted, and the results were presented in **Drawings 20 and 22**.

Water level observations were made during and upon completion of drilling. A total of eight (8) monitoring wells of 50 mm diameter were installed for groundwater monitoring in Boreholes BH26-1, BH26-3, BH26-4, BH26-7, BH26-9, BH26-10, BH26-11, and BH26-12.

The elevation surveying of the borehole locations was undertaken by DS personnel, using the differential GPS unit. It should be noted that the elevations at the as-drilled borehole/well locations were not provided by a professional surveyor and should be considered approximate. Contractors performing any work referenced to the borehole elevations should confirm the borehole elevations for their work.

4 SITE AND SUBSURFACE CONDITIONS

The subject site is located at 14475 Highway 50, Bolton, Ontario.

The borehole location plans are shown in **Drawing 1**. General notes on sample description are provided in **Drawing 1A**. The subsurface conditions of the boreholes are presented in the individual borehole logs in **Drawings 2 to 13**. A generalized sub-surface profile for boreholes (BH26-1 to BH26-12) is presented on **Drawings 14 and 15**.

4.1 SOIL CONDITIONS

TOPSOIL:

A layer of topsoil, varying in thickness from 100 to 400 mm, was present at the surface of all the boreholes except two (2) boreholes (BH26-10 and BH26-12).

It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site. Shallow test pits should be carried out to explore the thickness of topsoil across the site.

FILL MATERIALS:

Below topsoil and at the surface, fill material consisting of clayey silt to silty clay was present at boreholes (BH26-1, BH26-10, BH26-11 and BH26-12), contained trace to some organics, trace rootlets and topsoil inclusions. These fill materials extended to depths ranging from 0.8 to 1.2 m below ground surface. They were found in a firm to very stiff consistency, with measured SPT 'N' values ranging from 4 to 20 blows per 300 mm penetration.

The type/quantity and extent of the existing fill layers should be explored by further test pit investigation.

CLAYEY SILT/SILTY CLAY (Weathered/Disturbed):

Below the topsoil, clayey silt/silty clay deposits were found in boreholes ((BH26-2 to BH26-9). These materials were found to be weathered/disturbed due to weathering and ploughing activities in the past. Traces of rootlets and topsoil inclusions were observed in these weathered soils. These weathered/disturbed soils extended to depths of 0.8 m below ground surface. They were found in a firm to hard consistency, with measured SPT 'N' values ranging from 4 to 17 blows per 300 mm penetration.

COHESIVE DEPOSITS OF CLAYEY SILT/SILTY CLAY:

These clayey deposits were encountered at varying depths in majority of boreholes at upper depth and lower depth. Wet layer of sand, frequent silt interbeds and layer of silty sand, sandy silt was observed within clayey silt to silty clay deposits. A layer of clayey silt to silt was embedded between cohesive deposits in BH26-10 at the depth of 2.3m. These deposits were found to have generally stiff to very stiff consistency with occasional hard layers, with measured SPT 'N' values ranging from 8 to 43 blows per 300 mm penetration.

Grain size analyses of ten silty clay/clayey silt samples (BH26-1/SS5, BH26-3/SS3/SS6, BH26-4/SS6, BH26-5/SS4, BH26-8/SS2, BH26-9/SS4/SS6, BH26-10/SS5, BH26-12/SS6) were presented in **Drawing 16 to 19** and on the individual borehole logs.

The grain size distribution analyses of all tested soil samples are summarized as follows:

Clay: 31 to 55%
Silt: 41 to 64%
Sand: 3% to 11%
Gravel: 0% to 2%

Atterberg limits tests were conducted on all above noted samples. The results are shown on the individual borehole logs and in **Drawings 20 and 22**, with the following summary:

Liquid limit (WL): 27% to 38%
Plastic limit (WP): 15% to 18%
Plasticity index (PI): 12% to 21%

COHESIONLESS DEPOSITS OF SANDY SILT TO SILT/SILTY SAND TO SANDY SILT/SILTY SAND/SILT:

Cohesionless deposits of sandy silt to silt, silty sand to sand, sandy silt, silty sand to sandy silt and silt were encountered at varying depths and extended to the termination depth in the borehole (BH26-8). These deposits were found generally in compact to dense state with occasional loose layer, with measured SPT 'N' values ranging from 7 to 41 blows per 300mm penetration.

Grain size analyses of six (6) samples (BH26-4/SS4, BH26-5/SS6, BH26-7/SS5A, BH26-8/SS7, BH26-11/SS6B, and BH26-12/SS5) and the results are presented in **Drawings 16 to 19** and on the individual borehole logs.

The grain size distribution analyses of all tested soil samples are summarized as follows:

Clay: 2 to 8%
Silt: 45 to 46%
Sand: 16 to 53%
Gravel: 0%

4.2 GROUNDWATER CONDITIONS

Eight (8) monitoring wells of 50 mm diameter were installed for groundwater monitoring in Boreholes BH26-1, BH26-3, BH26-4, BH26-7, BH26-9, BH26-10, BH26-11, and BH26-12 to monitor the long-term groundwater levels.

On May 15, 2026, groundwater levels were measured in the monitoring wells at depths ranging from -(0.1) to 1.8 m above/below existing ground surface, corresponding to Elev. 263.9 to 265.4 m. BH26-3 was found dry. **Table 1** summarizes the depth and elevation of water level readings in monitoring wells.

Table 1: Groundwater Levels Observed in Monitoring Wells

BH No.	Ground Surface Elev. (m)	Date of Drilling	Date of Observation	Depth of Groundwater (m)	Elevation of Groundwater (m)
BH26-1	264.9	April 21, 2026	May 15, 2026	0.4	264.5
BH26-3	266.3	April 21, 2026	May 15, 2026	Dry	-
BH26-4	265.0	April 21, 2026	May 15, 2026	1.6	263.4
BH26-7	263.9	April 21, 2026	May 15, 2026	-(0.1)*	264.0*
BH26-9	265.6	April 21, 2026	May 15, 2026	1.7	263.9
BH26-10	266.8	April 22, 2026	May 15, 2026	1.4	265.4
BH26-11	266.2	April 22, 2026	May 15, 2026	1.8	264.4
BH26-12	265.3	April 22, 2026	May 15, 2026	0.4	264.9

***Above Ground Surface**

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events. Further measurements of groundwater levels are recommended.

In addition, reference is made to the Hydrogeological Assessment report prepared by DS for further details on the extent and the conditions of the groundwater, as well as the recommended groundwater control.

5 DISCUSSION AND RECOMMENDATIONS

It is proposed to develop the site as a residential subdivision. The lots will therefore be serviced by a network of roads, storm and sanitary sewers and watermains.

5.1 SITE GRADING AND ENGINEERED FILL

Proposed grade raise of up to 2 m is required. Grade cutting is proposed at the site and the proposed SWM (Storm Water Management) pond areas.

Based on the soil conditions explored in the boreholes, preloading by surcharge fill to consolidate the ground is not necessary for the proposed residential subdivision if the grade raise is less than 3.0 m above the existing ground, provided a waiting period of at least 6 months is allowed after placing the engineered fill to pre-grade level, prior to the construction of settlement sensitive structures. It is assumed the pre-grade level at the site will be about 0.8 m below the final grade.

If there is any change in the design of site grading and where relatively weak soils are present and the grade is to be raised by more than 3.0 m. DS Consultants Ltd. must be contacted to provide settlement analyses and recommendations of possible preloading surcharge fill.

In the areas where earth fill is required for the site grading purposes, an engineered fill can be constructed below foundations, roads/driveways, parking lots, etc. Prior to the construction of engineered fill, any existing fill material and loose native soils should be removed. The base of the excavation should be compacted and proof rolled with heavy compactors (minimum 10,000 kg). The entire excavated area should be inspected and approved by geotechnical engineer. During proof rolling, any spongy, wet or soft/loose spots should be sub-excavated to stable subgrade and replaced with approved backfill materials, compatible with subgrade conditions, as directed by the geotechnical engineer.

The engineered fill consisting of approved inorganic material must be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) throughout. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential.

General guidelines for the placement and preparation of engineered fill are presented on **Appendix A**.

Engineered fill compacted to 100% of SPMDD will settle under its own weight approximately 0.25% to 0.75% of the fill thickness. The designer and the structural engineer must be aware of this settlement. For example, where the engineered fill is 3 m in thickness, the settlement of fill under its own weight is expected to be in the range of 15 mm on a non-yielding subgrade. The settlement of the engineered fill will occur with time. For engineered fill consisting of sandy silt to silty sand material, about 75% of the settlement is expected to occur within 2-3 months after the placement of the fill.

Engineered fill which consists of Granular B material (sand and gravel) will undergo less self-weight settlement (say about 0.25% to 0.5% of the fill thickness). In addition, the settlement of engineered Granular B fill will be completed in a shorter period of time.

For engineered fill consisting of Granular B material compacted to 98% of SPMDD, a major portion (75% or higher) of the settlement due to the self-weight is expected to be completed during the construction stage.

5.2 ROADS

The investigation has shown that the predominant subgrade soil, after stripping the topsoil and any other organic and otherwise unsuitable subsoil, will generally consist of clayey silt to silty clay fill. It is also planned to raise the grade by about 2 m within the subdivision and will consist of non-cohesive engineered fill as described in Section 5.1 above.

The recommended pavement structures provided in Table 3 below are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. The values may need to be adjusted based on Town of Bolton standards. Consequently, the recommended pavement structures should be considered for preliminary design purposes only.

Table 3: Recommended Pavement Structures

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars and Vans)	Heavy Duty Access and Internal Roads
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3 50 mm HL 8	40 mm HL 3 70 mm HL 8
OPSS Granular A Base	100% SPMDD*	150 mm	150 mm
OPSS Granular B Type I Subbase	100% SPMDD	250 mm	300 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698

The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by DS Consultants Ltd.

The site subgrade and weather conditions (i.e. if wet) at the time of construction may necessitate the placement of thicker granular subbase layer in order to facilitate the construction. Furthermore, heavy construction equipment may have to be kept off the newly constructed roads before the placement of asphalt and/or immediately thereafter, to avoid damaging the weak subgrade by heavy construction traffic.

5.2.1 Stripping, Sub-excavation and Grading

The site should be stripped of all topsoil or otherwise unsuitable soils to the full depth of the roads, both in cut and fill areas. Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proof-rolled, in the presence of the Geotechnical Engineer,

by at least several passes of a heavy compactor having a rated capacity of at least 8 tonnes. Any soft spots thus exposed should be removed and replaced by select fill material, similar to the existing subgrade soil and approved by the Geotechnical Engineer. The subgrade should then be re-compacted from the surface to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD). The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Any fill required for re-grading the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to 98%, or as per Township Standards. The compaction of the new fill should be checked by frequent field density tests.

5.2.2 Construction

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to at least 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

5.2.3 Drainage

The City of Bolton may require the installation of full-length subdrains on all roads. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

All paved surfaces should be sloped to provide satisfactory drainage towards catch-basins. As discussed in Section 5.2.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

5.3 SEWERS

As a part of the site development, a network of new storm and sanitary sewers is to be constructed. It is assumed that the trenches are generally within 4.0 to 5.0 m below the existing grade.

5.3.1 Trenching

Based on the boreholes, the trenches in most of the boreholes will be dug mainly through cohesionless deposits of silty sand, silt, sand, sandy silt, silty sand to sandy silt till and cohesive deposits of silty clay to clayey silt. On May 15, 2026, groundwater levels were measured in the monitoring wells at depths ranging from $-(0.1)$ to 1.8 m above (in BH26-7) and below existing ground surface in the remaining boreholes, corresponding to Elev. 263.9 to 26.4 m. BH26-3 was found dry.

The excavation will be dug out through these wet cohesionless deposits. Any excavation in cohesionless deposits of silty sand, silt, sand, sandy silt, silty sand to sandy silt till below groundwater table will require positive dewatering using well points/eductors and/or pumping from sumps/pumps. Otherwise, it will result in an unstable base and flowing sides.

Due to the relatively high groundwater levels, reference is made to the hydrogeology study report prepared by DS for further details on the extent and the conditions of the groundwater, as well as the recommended groundwater control.

The sides of excavations in the natural strata above groundwater level can be expected to be temporarily stable at relatively steep side slopes for short periods of time but they should be cut back at slopes no steeper than 1:1 in order to comply with the safety regulations. Where wet sand layers are encountered, flattened slopes will be required.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the fill, firm to stiff clayey silt to silty clay (till) and the cohesionless soils (silty sand, silt, sand, sandy silt, silty sand to sandy silt till) can be classified as Type 3 Soil above groundwater and Type 4 Soil below the water table. Very stiff to hard clayey silt to silty clay (till) deposits can be classified as Type 2 soil above groundwater level and as Type 3 soil below groundwater level.

5.3.2 Bedding

The sandy and clayey soils will provide adequate support for the sewer pipes and allow the use of normal Class B type bedding.

The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or in accordance with local standards or if wet or weak subgrade conditions are encountered, especially when the soil at the trench base level consists of wet, dilatant silt. The bedding material should consist of well graded granular material such as Granular 'A' or equivalent. After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the invert of the pipe, or as set out by the local Authority, should be placed.

To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the poorly graded bedding material.

5.3.3 Backfilling of Trenches

Based on visual and tactile examination, the on-site excavated inorganic native soils are considered suitable for re-use as backfill in the service trenches provided they are aerated and their moisture contents at the time of construction are lowered to within 2 percent of their optimum moisture content. Significant aeration of the wet sandy and silty soils will be required prior to their use as backfill material. This work should be carried out during favourable hot and dry weather conditions.

Selected inorganic fill and the native soils free from topsoil and organics can be used as general construction backfill where it can be compacted with sheep's foot type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm. Depending on the time of construction and weather, some excavated material may be too wet to compact and will require aeration prior to its use.

Imported granular fill, which can be compacted with hand held equipment, should be used in confined areas.

Underfloor fill should be compacted to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

The backfill should be placed in maximum 200 mm thick layers at or near ($\pm 2\%$) their optimum moisture content and each layer should be compacted to at least 95% SPMDD. In the upper 1.0 m of subgrade, underneath the road base, the compaction should be increased to 98% SPMDD. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should be compacted at the surface or be covered with tarpaulins to minimize moisture uptake.

The topsoil encountered at the site can be used for landscaping fill to raise the grades. Topsoil cannot be reused as foundation and trench backfill material.

5.4 FOUNDATION CONDITIONS

It is understood that the proposed subdivision will consist of houses with one level basement. The finish floor elevations of these proposed singles are not known to us at the time of writing this report.

The proposed houses with one level basement can be supported by spread and strip footings founded on the undisturbed native soils below weathered/disturbed soils for a bearing capacity of 150 kPa at SLS (Serviceability Limit State), and for a factored geotechnical resistance of 225 kPa at ULS (Ultimate Limit State).

Should the proposed houses be founded above the competent native soils, then the proposed houses can also be supported by spread and strip footings founded on engineered fill for and can be designed for bearing capacity of 150 kPa at the serviceability limit states (SLS) and for a factored geotechnical resistance of 225 kPa at the ultimate limit states (ULS), provided all requirements in **Section 5.1** and on **Appendix A** are adhered to.

Foundations designed to the specified bearing capacities at the serviceability limit states (SLS) are expected to settle less than 25 mm total and 19 mm differential.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

It should be noted that the recommended bearing capacities have been calculated by DS from the borehole information for the preliminary design stage only. The investigation and comments are

necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by DS to validate the information for use during the construction stage.

5.5 EARTH PRESSURES

The lateral earth pressures acting on foundation and basement walls may be calculated from the following expression:

$$p = k(\gamma h + q)$$

where, p	=	Lateral earth pressure in kPa acting at depth h
K	=	Earth pressure coefficient, assumed to be 0.40 for vertical walls and horizontal backfill for permanent construction
γ	=	Unit weight of backfill, a value of 21 kN/ m ³ may be assumed
h	=	Depth to point of interest in metres
q	=	Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build up of any hydrostatic pressure behind the wall.

5.6 FLOOR SLAB AND PERMANENT DRAINAGE

The floor slab can be supported on grade provided all organic materials/topsoil, fill and surficial softened/disturbed native soils are removed and the base thoroughly proof rolled.

The fill required to raise the grade can consist of inorganic soil, approved by this office, placed in shallow lifts and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

Where engineered fill is used to support the foundations, the floor slab can also be supported by engineered fill.

A moisture barrier consisting of at least 200 mm of 19 mm clear crushed stone should be installed under the floor slab.

A perimeter and underfloor drainage system will be required around the exterior basement walls, as shown on **Drawing 23**.

5.7 EARTHQUAKE CONSIDERATIONS

Based on the borehole information and according to Table 4.1.8.4.B of OBC 2024, the subject site for the proposed development can be classified as 'Class D' for seismic site response.

5.8 RECOMMENDATIONS FOR PROPOSED STORMWATER MANAGEMENT (SWM) POND

It is understood that a proposed SWM ponds will be constructed in the south portion of the site. It is also understood that the design of the pond is still at the design stage. Due to the variable soil conditions, high groundwater in this area and the presence of different types of soils at different depths, recommendations will be provided at later stage including the clay liner recommendations, if required, when design information are available.

Boreholes BH26-7, BH26-8, BH26-9 and BH26-12 were advanced in the area of the proposed SWM ponds. Monitoring wells were installed in Boreholes BH26-7, BH26-9, and BH26-12.

Top of pond berm, permanent pool levels and side slopes are not determined at this stage. Further recommendations will be provided when design grades and drawings are available.

Based on the borehole information, the excavated soils for the pond will mainly consist of sand, silty sand, sandy silt, silt clayey silty and silty clay materials.

Groundwater levels measured in the monitoring wells installed in boreholes BH26-7, BH26-9, and BH26-12 were at -0.1 (above ground surface), 1.7 m and 0.4 m below ground surface, corresponding Elevations of 264.0, 263.9 and 264.9m, respectively. Further groundwater levels monitoring process, using the installed monitoring wells, is recommended. However, the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

Due to the relatively high groundwater levels, reference is made to the hydrogeology study report prepared by DS for further details on the extent and the conditions of the groundwater, as well as the recommended groundwater control.

Excavation of the overburden material can be carried out with heavy hydraulic backhoe. In impermeable clayey deposits and clayey silt till, the groundwater seepage into the excavation will be low and can be controlled by conventional pumping from sumps. In boreholes wet sand, silty sand and sand and gravel were present below a depth of 1.5m below ground surface. Moreover, any excavation in sandy deposits below groundwater table will require positive dewatering using well points/eductors. Otherwise, it will result in an unstable base and flowing sides.

It should be noted that the till is a non-sorted sediment and therefore may contain boulders. Possible large obstructions such as buried concrete pieces are also anticipated in the fill material. Provisions must be made in the excavation contract for the removal of possible boulders in the till or obstructions in the fill material.

The need for clay liner and liner uplift analyses will be provided when design information such as pond final locations, depth,,,(etc.) is available.

The pond side slopes should be not steeper than 4H:1V below the pond high water level and not steeper than 3H:1V above the high-water level. The inclination of the proposed pond slopes should meet the requirements of the local municipality's standards.

Once the final pond design is available, it should be further reviewed by this office, following which additional recommendations can be provided, as required. As the groundwater levels are expected to

fluctuate, further groundwater measurements should be carried out, and the above geotechnical recommendations should be reviewed by the geotechnical engineer prior to finalizing the pond design.

6 GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Limited (DS) should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, DS will assume no responsibility for interpretation of the recommendations in the report.

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DS at the time of preparation. Unless otherwise agreed in writing by DS, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

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

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. DS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

DS CONSULTANTS LIMITED




Labib Mousa, P.Eng.




Fanyu Zhu, Ph.D., P.Eng.




Shabbir Dandukwala, M.Eng., P.Eng.

Drawings



Legend

- Site Boundary
- Approx Dev Boundary
- Borehole Location
- Borehole / Monitoring Well Location



DS CONSULTANTS LTD.

6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Client:

Royal Pine Homes

Project:

Geotechnical Investigation -
Proposed Development 14475 Highway 50, Bolton, ON.

Title:

Draft Borehole Location Map



Size:
8.5 x 11

Rev:
0

Approved By:

LM

Drawn By:

S.W

Date:

August 2026

Scale:

As Shown

Project No.:

26-060-300

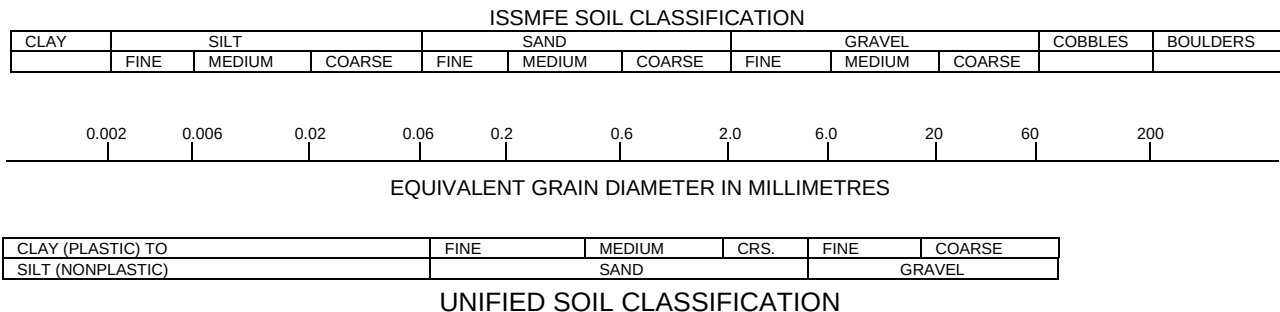
Figure No.:

1

Image/Map Source: Google Satellite Image

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DSCL also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.



2. **Fill:** Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.
3. **Till:** The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

DRILLING DATA

Method: Solid Stem Auger

Diameter: REF. NO.: 26-060-300

Date: Apr-21-2026 ENCL NO.: 2

GRAPH NOTES +3, ×3: Numbers refer to Sensitivity ○ 8=3% Strain at Failure

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861756.1 E 599452.3

DRILLING DATA
Method: Solid Stem Auger
Diameter:
Date: Apr-21-2026
REF. NO.: 26-060-300
ENCL NO.: 3

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)		W _p	W	W _L			
268.4	TOPSOIL: 150mm							20 40 60 80 100							GR SA SI CL
268.0	FILL: clayey silt to silty clay, trace rootlets, trace sand, dark brown to brown, moist, firm		1	SS	4		268				○				
267.6	SILTY CLAY: trace sand, trace gravel, brown to grey, moist, stiff to hard		2	SS	15		267				○				
			3	SS	27		266				○				
	grey below 2.3m		4	SS	31		265				○				
	wet sandy silt layer at 3.1m		5	SS	15		264				○				
			6	SS	11		263				○				
			7	SS	18		262				○				
			8	SS	25		261				○				
260.2	END OF BOREHOLE: Notes: 1) Borehole wet at the bottom upon completion.														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861765.6 E 599537.7

DRILLING DATA
Method: Solid Stem Auger
Diameter:
Date: Apr-21-2026
REF. NO.: 26-060-300
ENCL NO.: 4

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		SHEAR STRENGTH (kPa)		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			20 40 60 80 100	20 40 60 80 100	W _P	W	W _L				
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE & Sensitivity × LAB VANE	WATER CONTENT (%)						
266.3																GR SA SI CL
266.0	TOPSOIL: 150mm		1	SS	6		266									
0.2	FILL: clayey silt to silty clay, trace topsoil, trace rootlets, dark brown to brown, moist, firm															
265.5																
0.8	SILTY CLAY: trace sand, frequent silt seams, trace gravel, brown to grey, moist, stiff to very stiff wet sand layer at 1.1m		2	SS	12		265									
1																
			3	SS	23		264									0 3 50 47
2																
			4	SS	26		263									
3																
			5	SS	15		262									
4																
			6	SS	18		261									2 5 56 37
5																
			7	SS	25		260									
6																
			8	SS	19		259									
7																
8																
258.1																
8.2	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed at depth of 7.6m upon completion. 2) Water Level Readings: Date: Water Level(mbg): May 15, 2026 dry															

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861608.6 E 599600.7

DRILLING DATA
Method: Solid Stem Auger
Diameter:
Date: Apr-21-2026
REF. NO.: 26-060-300
ENCL NO.: 5

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
265.0	TOPSOIL: 150mm							20	40	60	80	100					GR SA SI CL
264.0	FILL: clayey silt to silty clay, trace topsoil, trace sand, brown, moist, firm to very stiff		1	SS	6												
263.9	SILTY SAND TO SANDY SILT: trace clay, brown, wet, compact		2	SS	17												
263.4			3	SS	19												
263.0			4	SS	22												0 39 58 3
261.7	SILTY CLAY: trace sand, trace gravel, grey, moist, very stiff		5	SS	19												
261.0			6	SS	22												1 4 61 34
259.3	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed at depth of 6.1m upon completion. 2) Water Level Readings: Date: Water Level(mbg): May 15, 2026 1.6		7	SS	20												

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27



PROJECT: Geotechnical Investigation

CLIENT: Oakbank Estate Inc.

PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario

DATUM: Geodetic

BH LOCATION: See Drawing 1 N 4861431.9 E 599513.2

DRILLING DATA

Method: Solid Stem Auger

Diameter:

Date: Apr-20-2026

REF. NO.: 26-060-300

ENCL NO.: 6

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)		
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)									WATER CONTENT (%)	
20 40 60 80 100								FIELD VANE & Sensitivity +	LAB VANE ×									
20 40 60 80 100																		
266.7																GR SA SI CL		
0.0																		
266.4			1	SS	6													
0.3																		
265.9							266											
0.8			2	SS	7													
265.4																		
1.3							265											
			3	SS	22													
							265											
			4	SS	27													
							264									0 5 64 31		
			5	SS	21													
							263											
262.1							262											
4.6			6	SS	27											0 19 74 7		
							261											
260.7																		
6.0			7	SS	30													
260.0																		
6.7							260											
	END OF BOREHOLE: Notes: 1) Water encountered at 0.8m during drilling.																	

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH
NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861243 E 599396.9

DRILLING DATA
Method: Solid Stem Auger
Diameter:
Date: Apr-21-2026
REF. NO.: 26-060-300
ENCL NO.: 7

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)			
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							WATER CONTENT (%)		
								20406080100 ○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE							W _P	W	W _L
							20406080100			102030							
266.1	TOPSOIL: 100mm FILL: clayey silt to silty clay, trace sand, trace topsoil, brown, moist, stiff		1	SS	10		266										
266.0																	
265.3																	
265.0																	
264.7																	
264.0	SILTY CLAY: trace sand, trace gravel, brown, moist, stiff to very stiff grey below 2.7m		2	SS	24		265										
263.7																	
263.0																	
262.3																	
261.6																	
261.5	SANDY SILT: trace clay, brown, wet, compact		3	SS	31		264										
261.2																	
260.5																	
260.0																	
259.7																	
259.4	CLAYEY SILT: interbedded silt, trace sand, grey, moist, very stiff		4	SS	22		263										
259.1																	
259.0	END OF BOREHOLE: Notes: 1) Water encountered at 4.6m during drilling.		5	SS	11		262										
258.7																	
258.4			6	SS	21		261										
258.1																	
257.8			7	SS	20		260										
257.5																	
257.2																	
256.9																	
256.6																	
256.3																	
256.0																	
255.7																	
255.4																	
255.1																	
254.8																	
254.5																	
254.2																	
253.9																	
253.6																	
253.3																	
253.0																	
252.7																	
252.4																	
252.1																	
251.8																	
251.5																	
251.2																	
250.9																	
250.6																	
250.3																	
250.0																	
249.7																	
249.4																	
249.1																	
248.8																	
248.5																	
248.2																	
247.9																	
247.6																	
247.3																	
247.0																	
246.7																	
246.4																	
246.1																	
245.8																	
245.5																	
245.2																	
244.9																	
244.6																	
244.3																	
244.0																	
243.7																	
243.4																	
243.1																	
242.8																	
242.5																	
242.2																	
241.9																	
241.6																	
241.3																	
241.0																	
240.7																	
240.4																	
240.1																	
239.8																	
239.5																	
239.2																	
238.9																	
238.6																	
238.3																	
238.0																	
237.7																	
237.4																	
237.1																	
236.8																	
236.5																	
236.2																	
235.9																	
235.6																	
235.3																	
235.0																	
234.7																	
234.4																	
234.1																	
233.8																	
233.5																	
233.2																	
232.9																	
232.6																	
232.3																	
232.0																	
231.7																	
231.4																	
231.1																	
230.8																	
230.5																	
230.2																	
229.9																	
229.6																	
229.3																	
229.0																	
228.7																	
228.4																	
228.1																	
227.8																	
227.5																	
227.2																	
226.9																	
226.6																	
226.3																	
226.0																	
225.7																	
225.4																	
225.1																	
224.8																	
224.5																	
224.2																	
223.9																	
223.6																	
223.3																	
223.0																	
222.7																	
222.4																	
222.1																	
221.8																	
221.5																	
221.2																	
220.9																	
220.6																	
220.3																	
220.0																	
219.7																	
219.4																	
219.1																	
218.8																	
218.5																	
218.2																	
217.9																	
217.6																	
217.3																	
217.0																	
216.7																	
216.4																	
216.1																	
215.8																	
215.5																	
215.2																	
214.9																	
214.6																	
214.3																	
214.0																	
213.7																	
213.4																	

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861405.7 E 599686.3

DRILLING DATA
Method: Solid Stem Auger
Diameter:
Date: Apr-21-2026
REF. NO.: 26-060-300
ENCL NO.: 8

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE LIQUID LIMIT			POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)		
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				WATER CONTENT (%)							
ELEV DEPTH																			
263.9							20	40	60	80	100	W _P	W	W _L		GR	SA	SI	CL
0.0																			
263.7																			
0.3			1	SS	4														
263.1																			
0.8			2	SS	8														
			3	SS	25														
			4	SS	14														
			5	SS	12														
260.4																			
3.5			5A	SS	11														
259.0			6	SS	11														
4.9																			
			7	SS	13														
257.2																			
6.7																			
	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed at depth of 4.6m upon completion. 2) Water Level Readings: Date: Water Level(mbg): May 15, 2026 -(0.1) above surface level																		

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861356.9 E 599867.3

DRILLING DATA

Method: Solid Stem Auger	
Diameter:	REF. NO.: 26-060-300
Date: Apr-21-2026	ENCL NO.: 9

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			POCKET PEN (Cu) (MPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				WATER CONTENT (%)					
ELEV DEPTH								20 40 60 80 100 ○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE				W _P	W	W _L			
266.0	TOPSOIL: 150mm FILL: clayey silt, trace sand, trace topsoil, brown, moist, stiff		1	SS	12												
265.2																	
261.1	SILTY CLAY: trace sand, trace gravel, brown, moist, very stiff to hard grey below 3.1m		2	SS	21												
			3	SS	36												
			4	SS	41												
			5	SS	31												
260.0	SILTY SAND: trace clay, grey, wet, compact to dense		6	SS	41												
259.3																	
259.3	SILTY CLAY: trace sand, brown, moist, very stiff		7	SS	15												
6.7	END OF BOREHOLE: Notes: 1) Water encountered at 4.9m during drilling.																

GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

GRAPH
NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ $\epsilon = 3\%$ Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861083.8 E 599642.9

DRILLING DATA

Method: Solid Stem Auger

Diameter: REF. NO.: 26-060-300

Date: Apr-21-2026 ENCL NO.: 10

[illegible]

GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

GRAPH
NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ $\epsilon = 3\%$ Strain at Failure

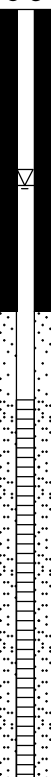
PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861156.3 E 599540.4

DRILLING DATA

Method: Solid Stem Auger

Diameter: REF. NO.: 26-060-300

Date: Apr-22-2026 ENCL NO.: 11

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)										
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)							WATER CONTENT (%)			GR	SA	SI	CL				
								20	40	60	80	100			W _P	W	W _L								
266.8 0.0	FILL: clayey silt to silty clay, trace rootlets, trace to some organics, dark brown to brown, moist, firm		1	SS	6		20 40 60 80 100	UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL x LAB VANE	20 40 60 80 100	10 20 30	10 20 30	10 20 30			1 4 58 37										
266.0 0.8			2	SS	24											266									
264.5 2.3			3	SS	27											265									
263.7 3.1			4	SS	36											264									
260.1 6.7	5	SS	22	263																					
	6	SS	27	262																					
	7	SS	22	261																					
END OF BOREHOLE: Notes: 1) Water encountered depth of at 5.8 m during drilling. 2) 50mm dia. monitoring well installed at depth of 6.1m upon completion. 3) Water Level Readings: Date: Water Level(mbgl): May 15, 2026 1.4																									

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27

GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

GRAPH
NOTES

+ 3, × 3: Numbers refer to Sensitivity

○ $\epsilon = 3\%$ Strain at Failure

PROJECT: Geotechnical Investigation
CLIENT: Oakbank Estate Inc.
PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4861197.2 E 599435.2

DRILLING DATA
Method: Solid Stem Auger
Diameter:
Date: Apr-22-2026
REF. NO.: 26-060-300
ENCL NO.: 12

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT			POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)				W _p	W	W _L			
266.2	TOPSOIL: 130mm		1	SS	4		266	20	40	60	80	100	10	20	30		GR SA SI CL
266.0	FILL: clayey silt to silty clay, trace rootlets, topsoil inclusions, dark brown to brown, moist, firm to very stiff																
265.0			2	SS	20		265										
1.2	SILTY CLAY: trace sand, trace gravel, brown to grey, moist, very stiff to hard		3	SS	22		265										
			4	SS	31		264										
			5	SS	21		263										
							262										
261.4	grey below 4.6m		6	SS	21		261										
4.8	SILTY SAND: trace clay, brown, wet, compact						260										0 49 48 3
260.1			7	SS	13		260										
6.1	SILTY CLAY: trace sand, silt seams, grey, moist, stiff																
259.5																	
6.7	END OF BOREHOLE: Notes: 1) Water encountered depth of at 5.2 m during drilling. 2) 50mm dia. monitoring well installed at depth of 6.1m upon completion. 3) Water Level Readings: Date: Water Level(mbg): May 15, 2026 1.8																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure

DS SOIL LOG-2021-FINAL 26-060-300GEO.GPJ DS.GDT 26-8-27



PROJECT: Geotechnical Investigation

CLIENT: Oakbank Estate Inc.

PROJECT LOCATION: 14475 Highway 50, Bolton, Ontario

DATUM: Geodetic

BH LOCATION: See Drawing 1 N 4861095.3 E 599555.3

DRILLING DATA

Method: Solid Stem Auger

Diameter:

Date: Apr-22-2026

REF. NO.: 26-060-300

ENCL NO.: 13

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)			
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m			SHEAR STRENGTH (kPa)									WATER CONTENT (%)		
								20 40 60 80 100	+ FIELD VANE & Sensitivity × LAB VANE								W _P — W — W _L		
265.3	0.0	FILL: clayey silt to silty clay, trace rootlets/topsoil, some organics, dark brown to brown, moist, stiff		1	SS	13										GR SA SI CL			
264.5	0.8	SILTY CLAY: trace sand, trace gravel, brown, moist, very stiff		2	SS	15													
		wet sandy silt pocket		3	SS	26													
				4	SS	28													
262.3	3.0	SILT: trace clay, some sand, grey, wet, compact		5	SS	24										0 16 76 8			
261.1	4.2	SILTY CLAY: trace sand, trace gravel, grey, moist, very stiff to hard		6	SS	26										1 8 57 34			
				7	SS	35													
				8	SS	43													
257.1	8.2	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed at depth of 6.1m upon completion. 2) Water Level Readings: Date: Water Level(mbgl): May 15, 2026 0.4																	

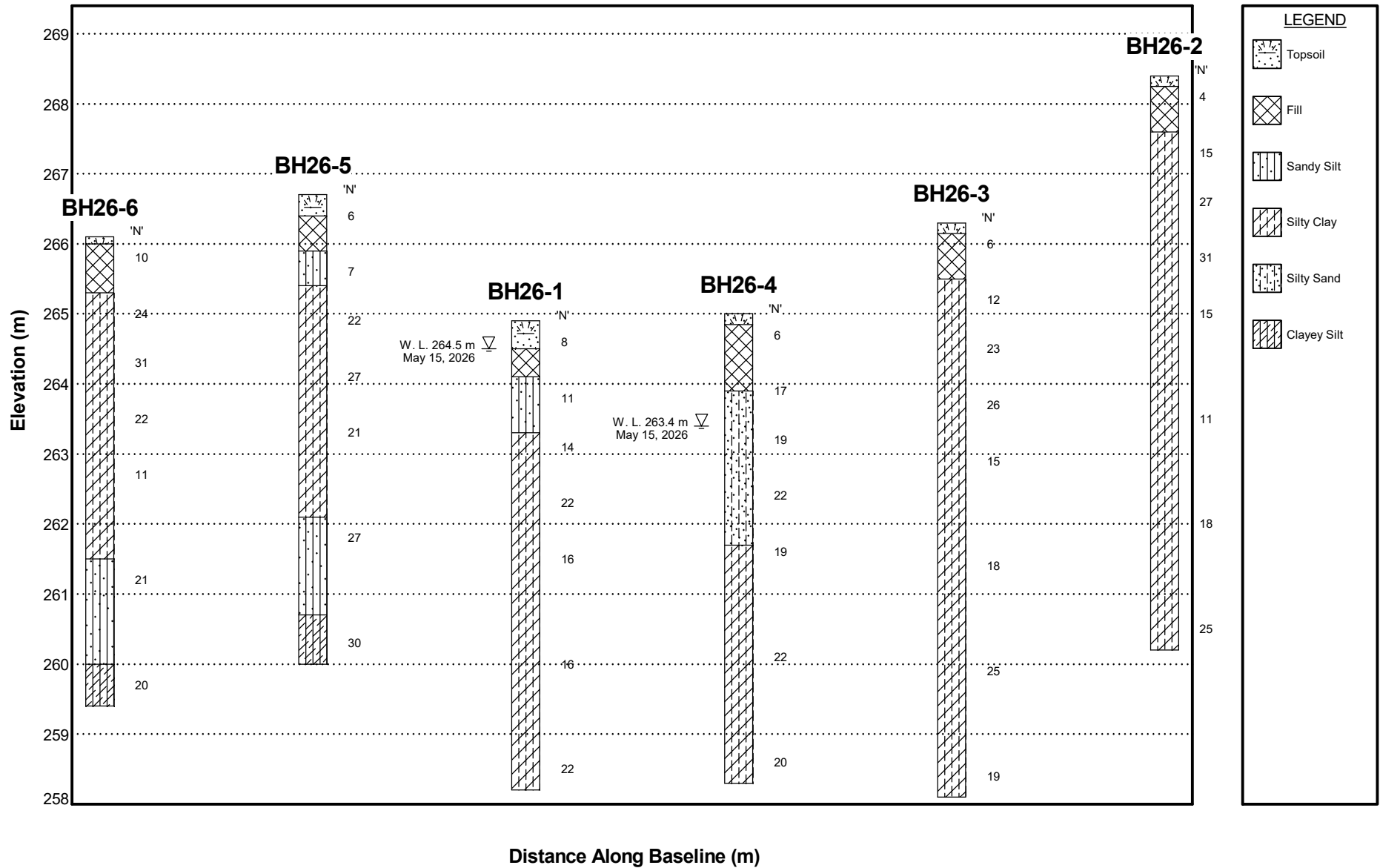
GROUNDWATER ELEVATIONS

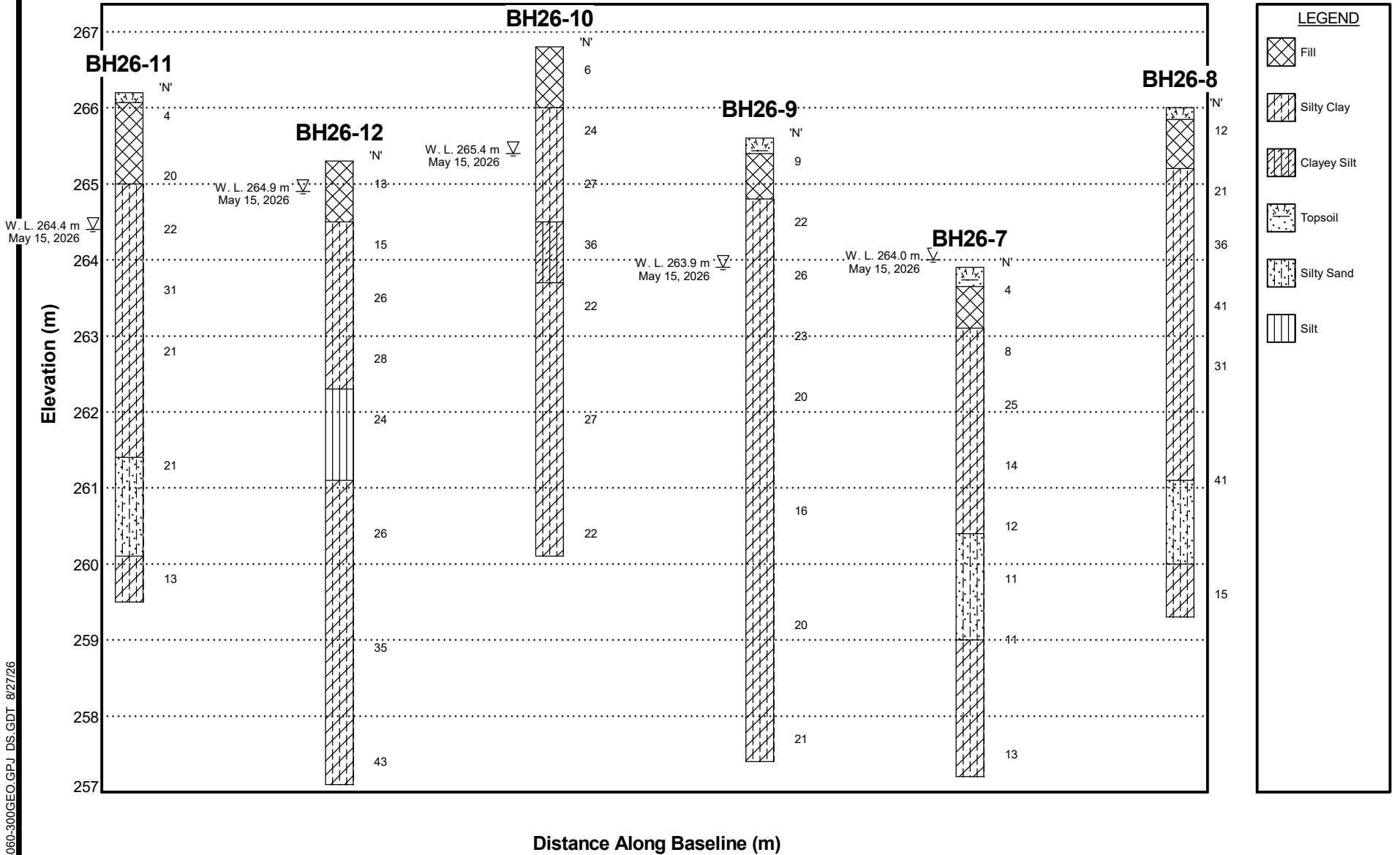
Measurement 1st 2nd 3rd 4th

GRAPH
NOTES

+ 3 , × 3 : Numbers refer to Sensitivity

○ = 3% Strain at Failure





Generalized Sub-surface Profile (NTS)

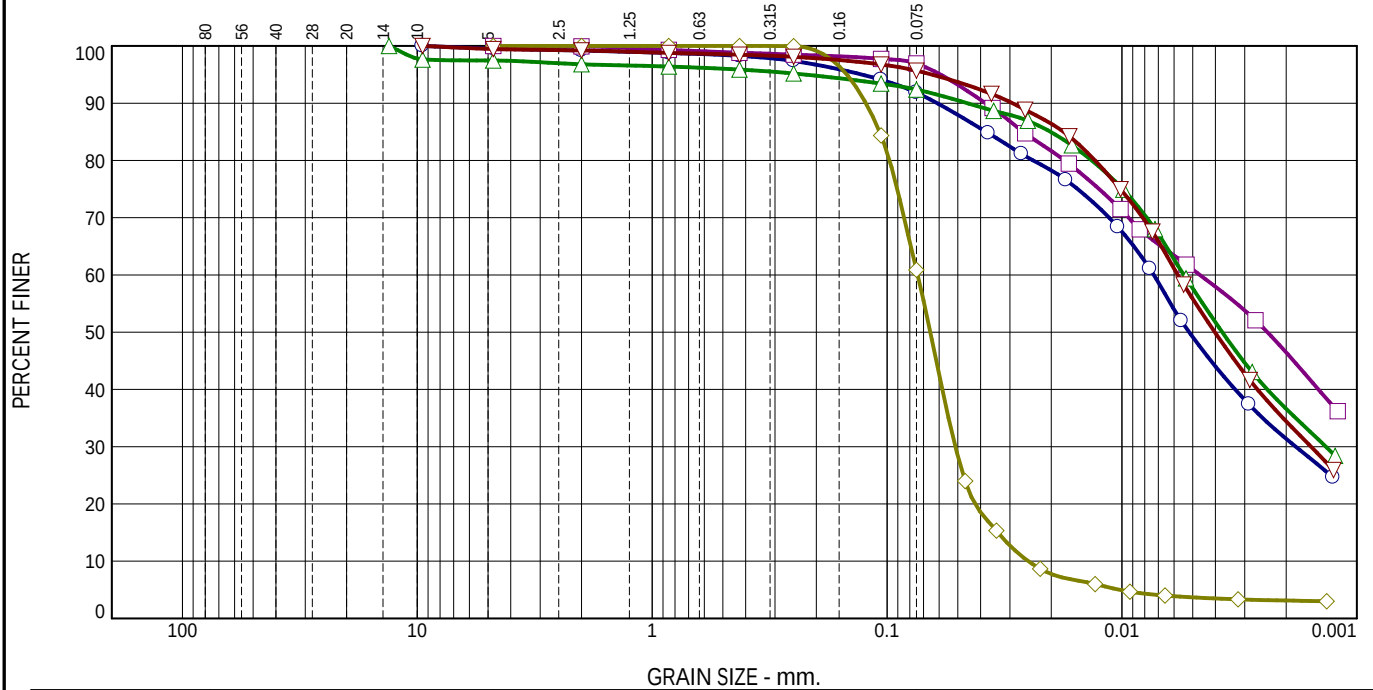


DS CONSULTANTS LTD.
Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology

DRAWING NO.	15
JOB NO.	26-060-300
DATE	August, 2026

Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	0.5	0.3	0.9	6.5	60.4		31.4
□	0.0		0.0	0.0	0.1	1.1	1.9	50.4		46.5
△	0.0		0.0	2.5	0.7	0.9	3.5	55.8		36.6
◇	0.0		0.0	0.0	0.0	0.0	39.1	57.8		3.1
▽	0.0		0.0	0.5	0.3	0.7	2.8	61.3		34.4
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	27	15	0.0378	0.0073	0.0052	0.0018				
□	34	17	0.0263	0.0047	0.0024					
△	30	16	0.0201	0.0055	0.0037	0.0014				
◇			0.1076	0.0741	0.0654	0.0512	0.0337	0.0250	1.41	2.96
▽	29	15	0.0177	0.0058	0.0040	0.0016				

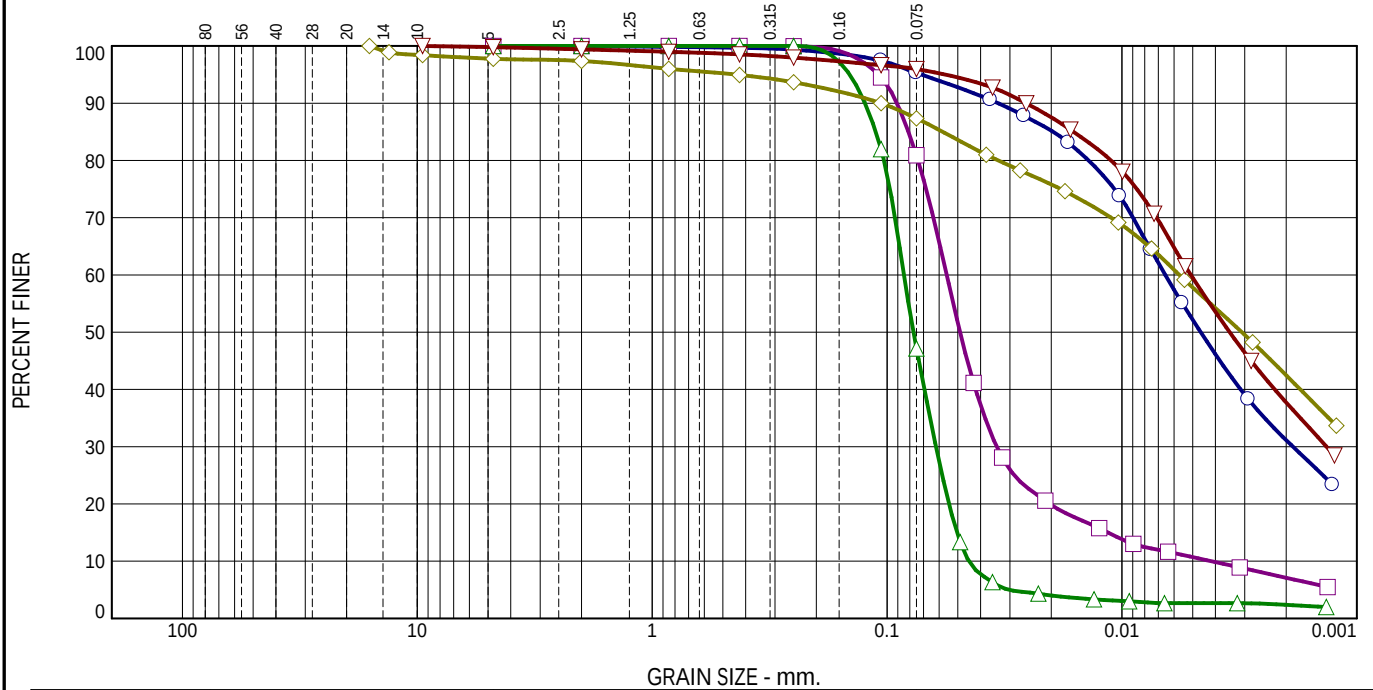
Material Description							USCS	AASHTO
○ Silty clay, trace sand, trace gravel							CL	A-6(9)
□ Silty clay, trace sand							CL	A-6(16)
△ Silty clay, trace sand, trace gravel							CL	A-6(12)
◇ Sandy silt, trace clay								
▽ Silty clay, trace sand, trace gravel							CL	A-6(12)

Project No. 26-060-300	Client: Oak Bank Estate Inc.	Remarks: ○ F.M.=0.10 □ F.M.=0.05 △ F.M.=0.26 ◇ F.M.=0.05 ▽ F.M.=0.08
Project: 14475 Highway 50, Bolton, Ontario		
○ Location: BH26-1 SS5	Sample Number: VM-7616	
□ Location: BH26-3 SS3	Sample Number: VM-7616	
△ Location: BH26-3 SS6	Sample Number: VM-7616	
◇ Location: BH26-4 SS4	Sample Number: VM-7616	
▽ Location: BH26-4 SS6	Sample Number: VM-7616	
 DS CONSULTANTS LTD. Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology 		Figure 16

Tested By: ○ Helen/Nisha □ Helen/Nisha △ Helen/Nisha ◇ Helen/Nisha ▽ Helen/Disha Checked By: Kirupa

Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	0.0	0.1	0.2	4.4	64.1		31.2
□	0.0		0.0	0.0	0.0	0.0	19.1	73.8		7.1
△	0.0		0.0	0.0	0.0	0.0	52.9	44.7		2.4
◇	0.0		0.0	2.2	0.4	2.5	7.6	44.8		42.5
▽	0.0		0.0	0.2	0.4	0.9	2.5	58.3		37.7
×	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
○	32	18	0.0196	0.0065	0.0046	0.0019				
□			0.0811	0.0557	0.0489	0.0342	0.0115	0.0042	5.02	13.38
△			0.1117	0.0847	0.0773	0.0619	0.0504	0.0449	1.01	1.89
◇	38	18	0.0579	0.0057	0.0031					
▽	31	16	0.0161	0.0051	0.0035	0.0013				

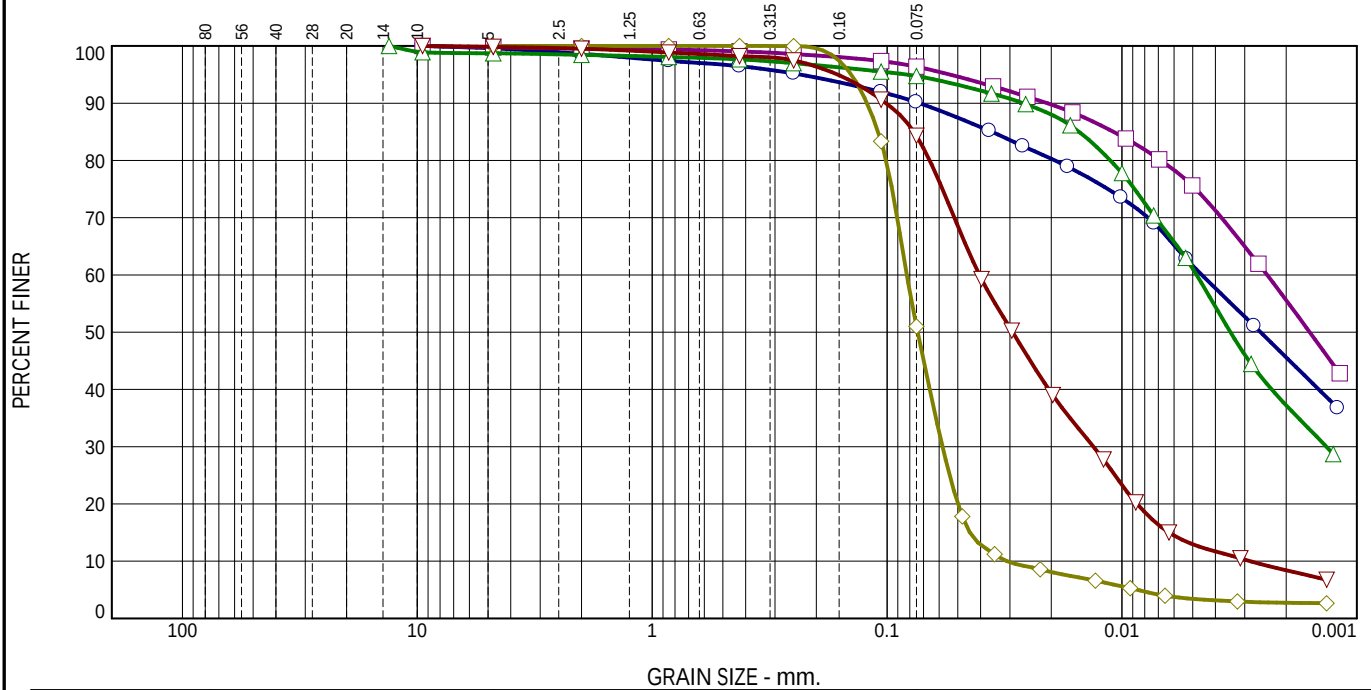
Material Description							USCS	AASHTO
○ Silty clay, trace sand							CL	A-6(13)
□ Silt, trace clay, some sand								
△ Silty sand, trace clay								
◇ Silty sand, some sand, trace gravel							CL	A-6(17)
▽ Silty clay, trace sand							CL	A-6(14)

Project No. 26-060-300	Client: Oak Bank Estate Inc.	Remarks: ○ F.M.=0.02 □ F.M.=0.01 △ F.M.=0.04 ◇ F.M.=0.28 ▽ F.M.=0.07
Project: 14475 Highway 50, Bolton, Ontario		
○ Location: BH26-5 SS4	Sample Number: VM-7616	
□ Location: BH26-5 SS6	Sample Number: VM-7616	
△ Location: BH26-7 SS5A	Sample Number: VM-7616	
◇ Location: BH26-8 SS2	Sample Number: VM-7616	
▽ Location: BH26-8 SS7	Sample Number: VM-7616/7643	
 DS CONSULTANTS LTD. Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology 		Figure 17

Tested By: Helen/Disha Checked By: Kirupa

Particle Size Distribution Report

ASTM D422



	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
○	0.0		0.0	0.4	1.0	2.1	6.3	44.6		45.6
□	0.0		0.0	0.3	0.2	0.5	2.6	40.8		55.6
△	0.0		0.0	1.3	0.3	0.7	2.9	57.6		37.2
◇	0.0		0.0	0.0	0.0	0.0	49.0	48.3		2.7
▽	0.0		0.0	0.2	0.3	1.3	13.9	75.9		8.4
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○	38	18	0.0358	0.0046	0.0026					
□	39	18	0.0109	0.0024	0.0016					
△	31	16	0.0152	0.0048	0.0035	0.0013				
◇			0.1093	0.0824	0.0741	0.0581	0.0444	0.0309	1.33	2.67
▽			0.0769	0.0404	0.0292	0.0132	0.0063	0.0028	1.52	14.22

Material Description	USCS	AASHTO
○ Silty clay, trace sand, trace gravel	CL	A-6(18)
□ Silty clay, trace sand, trace gravel	CL	A-6(21)
△ Silty clay, trace sand, trace gravel	CL	A-6(13)
◇ Silty sand, trace clay		
▽ Silt, trace clay, some sand, trace gravel		

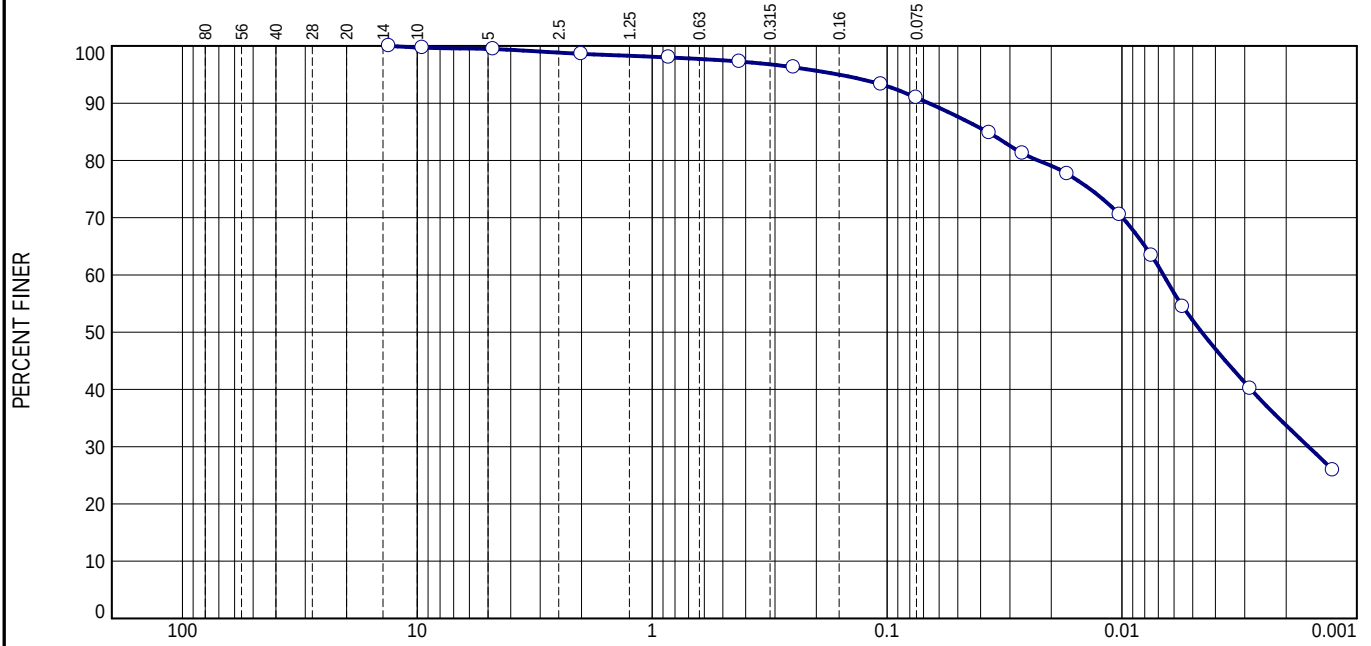
Project No. 26-060-300 Client: Oak Bank Estate Inc. Project: 14475 Highway 50, Bolton, Ontario ○ Location: BH26-9 SS4 Sample Number: VM-7616 □ Location: BH26-9 SS6 Sample Number: VM-7616 △ Location: BH26-10 SS6 Sample Number: VM-7616 ◇ Location: BH26-11 SS6B Sample Number: VM-7616 ▽ Location: BH26-12 SS5 Sample Number: VM-7616	Remarks: ○ F.M.=0.18 □ F.M.=0.05 △ F.M.=0.14 ◇ F.M.=0.04 ▽ F.M.=0.11
 DS CONSULTANTS LTD. Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology 	

Figure 18

Tested By: ○ Helen/Disha □ Helen/Disha / Helen/Nisha △ Helen/Nisha ◇ Helen/Disha ▽ Helen/Nisha Checked By: Kirupa

Particle Size Distribution Report

ASTM D422



GRAIN SIZE - mm.

	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt		Clay	
○	0.0	0.0	0.6	0.8	1.3	6.3	57.3		33.7	
×	LL	PL	D85	D60	D50	D30	D15	D10	C _c	C _u
○	28	15	0.0375	0.0067	0.0046	0.0016				

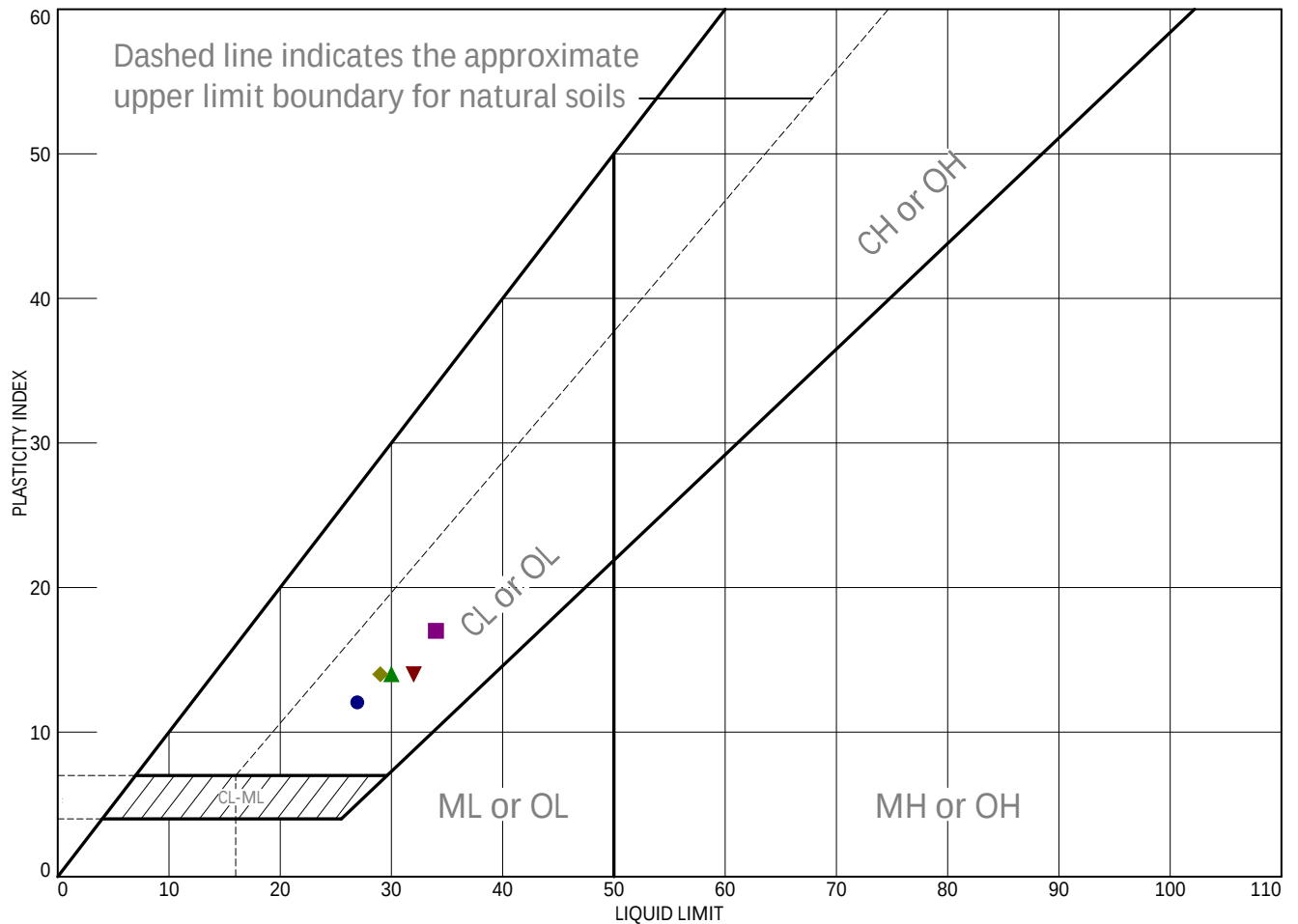
Material Description	USCS	AASHTO
○ Silty clay, trace sand, trace gravel	CL	A-6(10)

Project No. 26-060-300 Client: Oak Bank Estate Inc. Project: 14475 Highway 50, Bolton, Ontario Location: BH26-12 SS6 Sample Number: VM-7616	Remarks: ○ F.M.=0.15
 DS CONSULTANTS LTD. Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology 	

Figure 19

Tested By: Helen/Nisha Checked By: Kirupa

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty clay, trace sand, trace gravel	27	15	12	98.3	91.8	CL
■	Silty clay, trace sand	34	17	17	98.8	96.9	CL
▲	Silty clay, trace sand, trace gravel	30	16	14	95.9	92.4	CL
◆	Silty clay, trace sand, trace gravel	29	15	14	98.5	95.7	CL
▼	Silty clay, trace sand	32	18	14	99.7	95.3	CL

Project No. 26-060-300 Client: Oak Bank Estate Inc.

Project: 14475 Highway 50, Bolton, Ontario

● Location: BH26-1 SS5 Sample Number: VM-7616
 ■ Location: BH26-3 SS3 Sample Number: VM-7616
 ▲ Location: BH26-3 SS6 Sample Number: VM-7616
 ◆ Location: BH26-4 SS6 Sample Number: VM-7616
 ▼ Location: BH26-5 SS4 Sample Number: VM-7616



DS CONSULTANTS LTD.

Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology
 CCIL

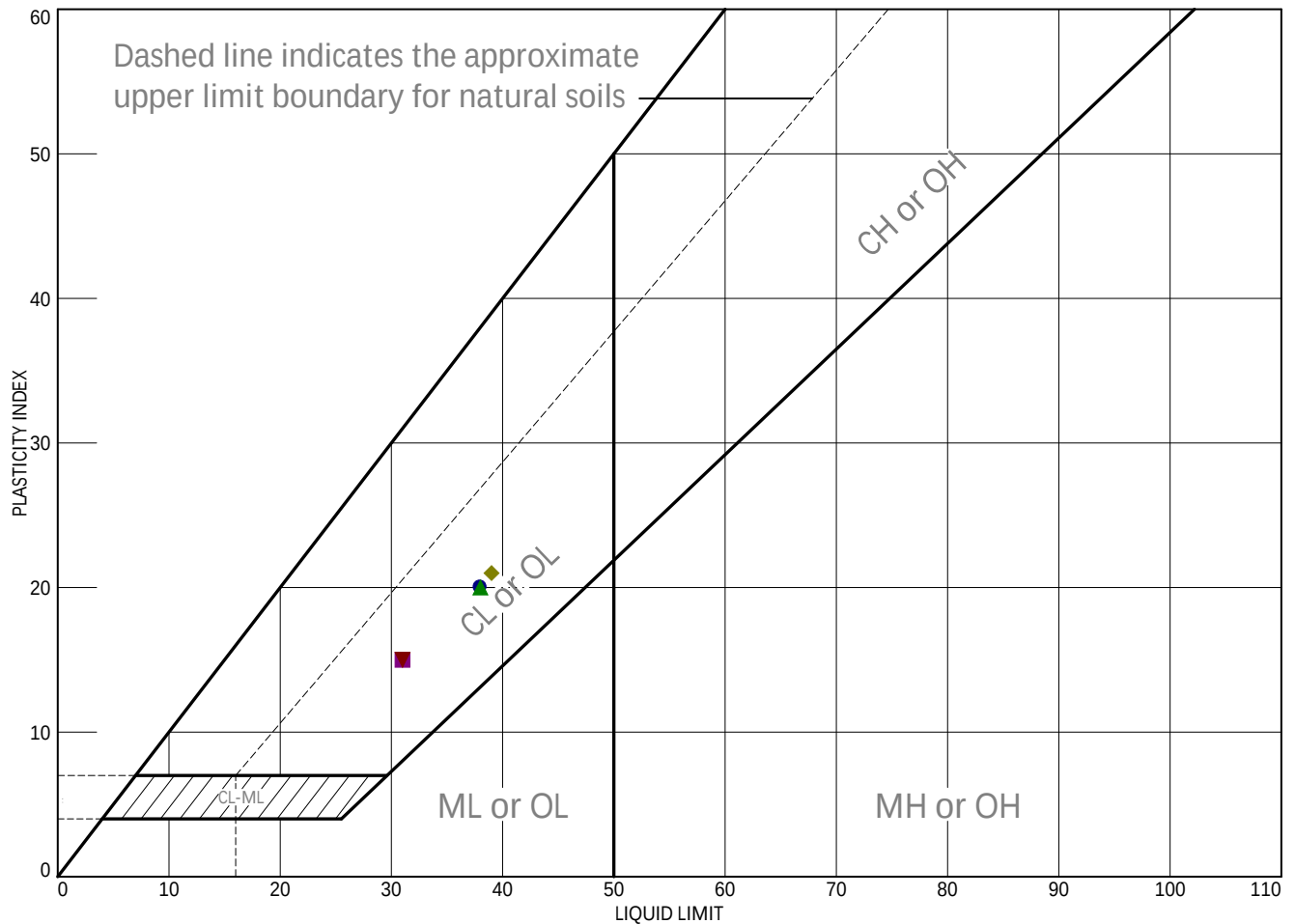
Remarks:

● Sampled on April 21, 2026
 ■ Sampled on April 21, 2026
 ▲ Sampled on April 21, 2026
 ◆ Sampled on April 21, 2026
 ▼ Sampled on April 20, 2026

Figure 20

Tested By: ○ Disha □ Nisha △ Nisha ◇ Disha ▼ Disha Checked By: Kirupa

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty sand, some sand, trace gravel	38	18	20	94.9	87.3	CL
■	Silty clay, trace sand	31	16	15	98.5	96.0	CL
▲	Silty clay, trace sand, trace gravel	38	18	20	96.5	90.2	CL
◆	Silty clay, trace sand, trace gravel	39	18	21	99.0	96.4	CL
▼	Silty clay, trace sand, trace gravel	31	16	15	97.7	94.8	CL

Project No. 26-060-300 Client: Oak Bank Estate Inc.

Project: 14475 Highway 50, Bolton, Ontario

● Location: BH26-8 SS2 Sample Number: VM-7616
 ■ Location: BH26-8 SS7 Sample Number: VM-7616/7643
 ▲ Location: BH26-9 SS4 Sample Number: VM-7616
 ◆ Location: BH26-9 SS6 Sample Number: VM-7616
 ▼ Location: BH26-10 SS6 Sample Number: VM-7616



DS CONSULTANTS LTD.

Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology



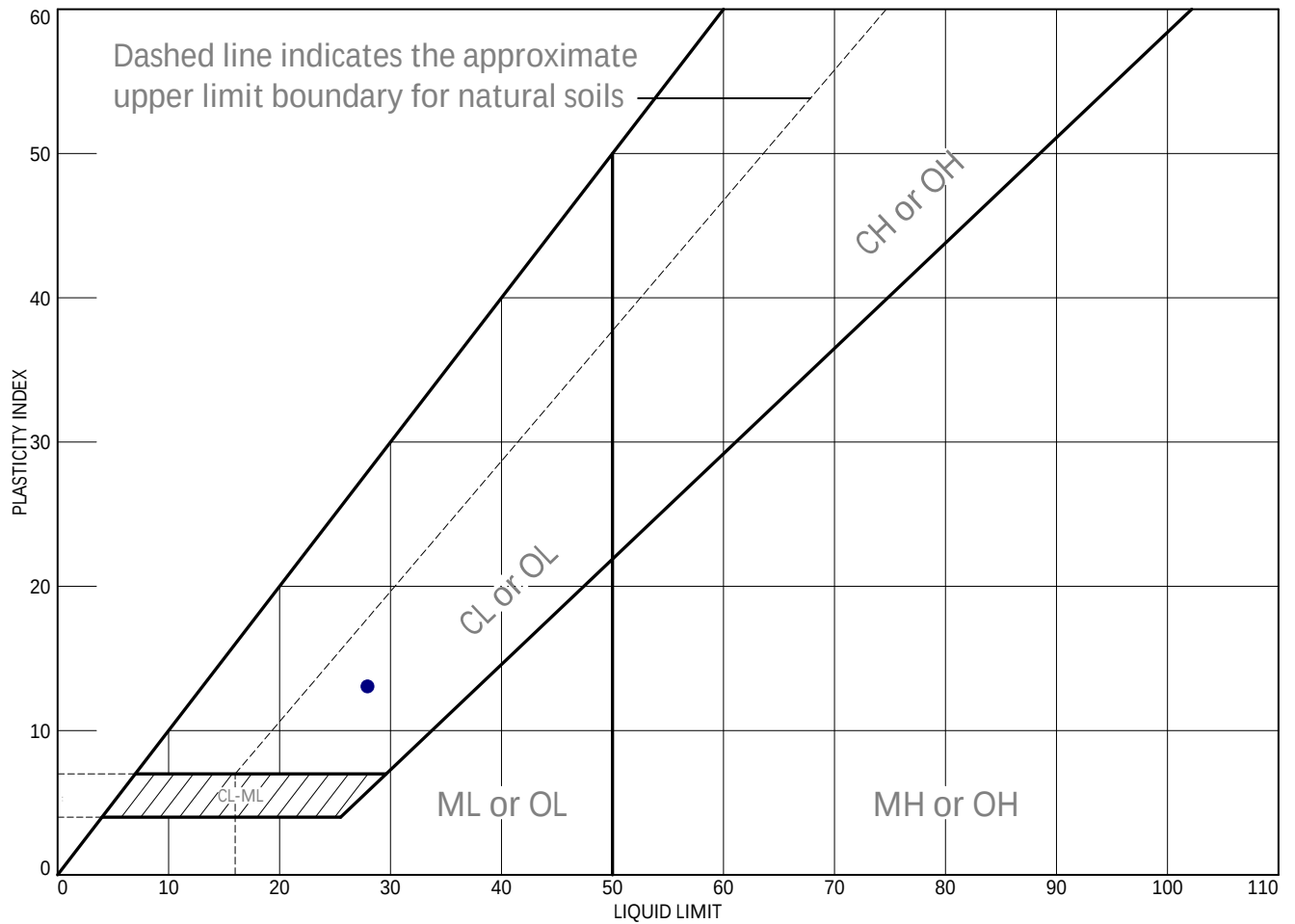
Remarks:

- Sampled on April 21, 2026
- Sampled on April 21, 2026
- ▲ Sampled on April 21, 2026
- ◆ Sampled on April 21, 2026
- ▼ Sampled on April 22, 2026

Figure 21

Tested By: ● Disha ■ Disha ▲ Disha ◆ Nisha ▼ Nisha Checked By: Kirupa

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty clay, trace sand, trace gravel	28	15	13	97.3	91.0	CL

Project No. 26-060-300 Client: Oak Bank Estate Inc.

Project: 14475 Highway 50, Bolton, Ontario

● Location: BH26-12 SS6 Sample Number: VM-7616

Remarks:

● Sampled on April 22, 2026



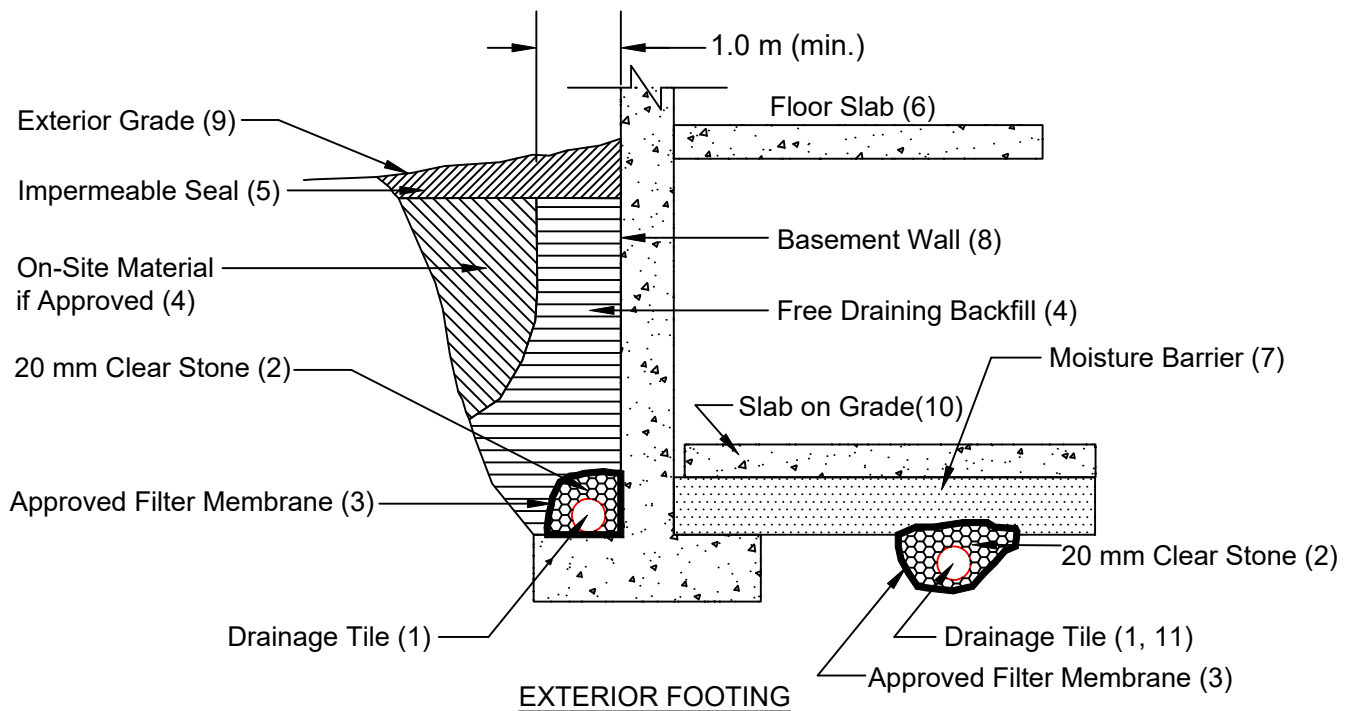
DS CONSULTANTS LTD.

Geotechnical ♦ Environmental ♦ Materials ♦ Hydrogeology



Figure 22

Tested By: Nisha Checked By: Kirupa



Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place 100 mm (4 inches) of stone below drain.
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed /water proofed.
9. Exterior grade to slope away from building.
10. Slab on grade should not be structurally connected to the wall or footing.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Review the geotechnical report for specific details.

DRAINAGE AND BACKFILL RECOMMENDATIONS

Basement with Underfloor Drainage

(not to scale)

Appendix A

Engineered Fill Guidelines

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, we recommend use of OPSS Granular 'B' sand and gravel fill material.

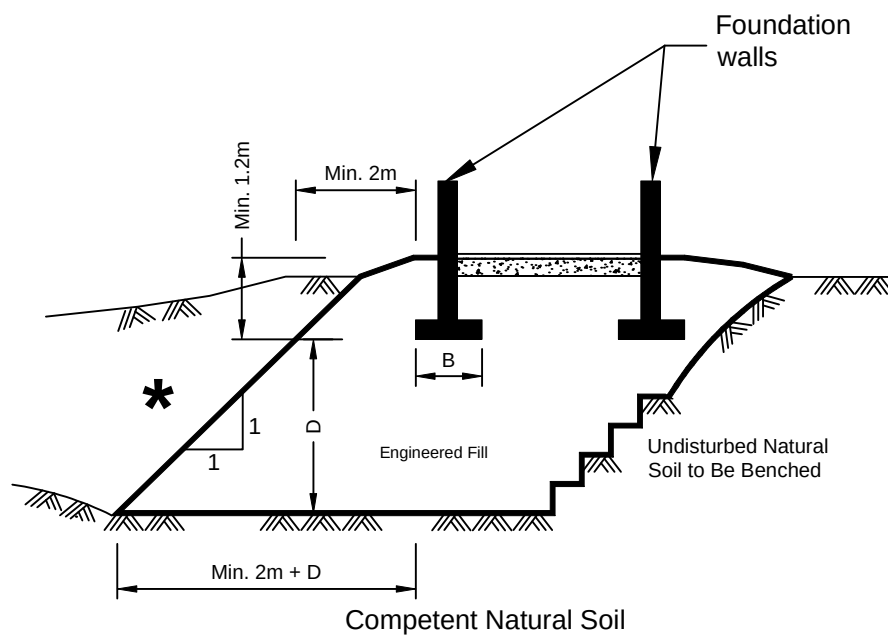
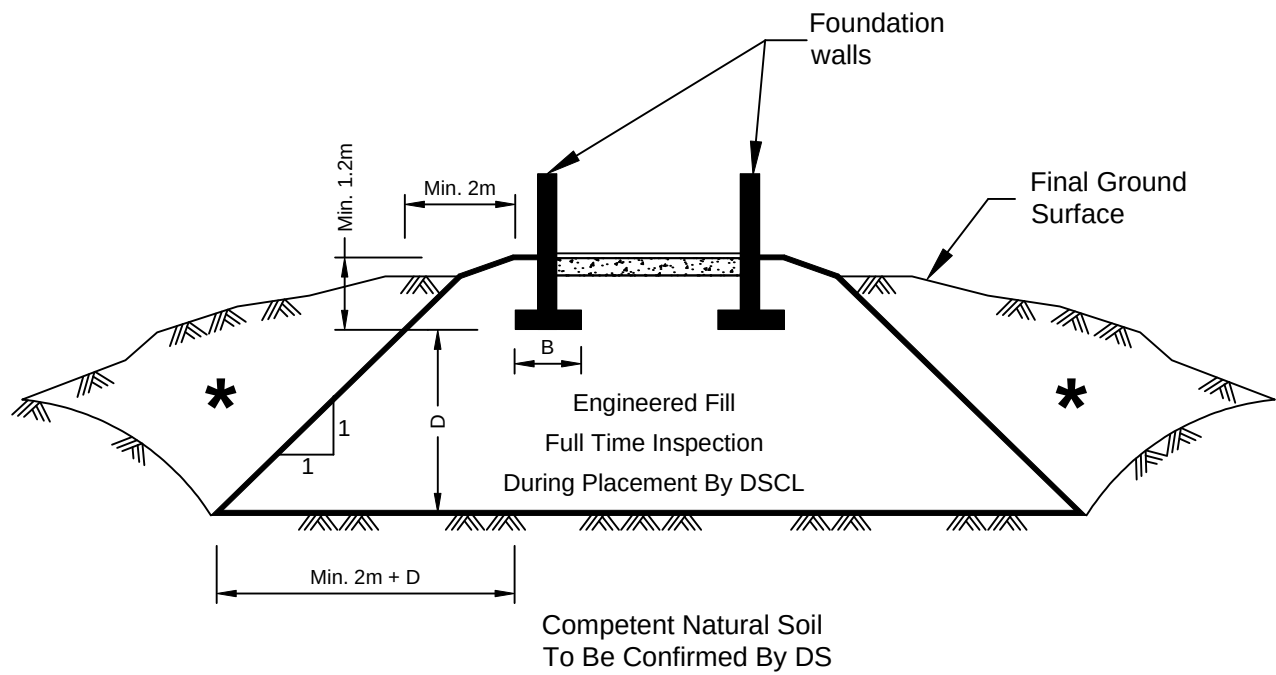
Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill cannot be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year.

The location of the foundations on the engineered fill pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Excavations within the engineered fill pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows; however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained from and samples must be provided to the geotechnical engineer for review, and approval before filling begins.
2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.
3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and DS Consultants Ltd (DS). Without this confirmation no responsibility for the performance of the structure can be accepted by DS. Survey drawing of the pre and post fill location and elevations will also be required.
4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof-rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by a DS engineer prior to placement of fill.

5. The approved engineered fill material must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Engineered fill should not be placed during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.
6. Full-time geotechnical inspection by DS during placement of engineered fill is required. Work cannot commence or continue without the presence of the DS representative.
7. The fill must be placed such that the specified geometry is achieved. Refer to the attached sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.
8. A bearing capacity of 150 kPa at SLS (225 kPa at ULS) can be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.
9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.
10. After completion of the engineered fill pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from DS prior to footing concrete placements. All excavations must be backfilled under full time supervision by DS to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of DS.
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.
12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.
13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.
14. These guidelines are to be read in conjunction with DS Consultants Ltd report attached.



* Backfill in this area to be as per the DS report.