Report on
Preliminary Geotechnical Investigation
Proposed Residential Development
12192 Chinguacousy Road
Caledon, Ontario

Prepared For:
ARGO Mayfield West V Limited

Project No: 24-371-600
Date: January 16, 2025

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

Table of Contents

1. INTRODUCTION

DS Consultants Ltd. (DS) was retained by ARGO Mayfield West V Limited to undertake a preliminary geotechnical investigation for the proposed development located at 12192 Chinguacousy Road, in the Town of Caledon, Ontario.

It is understood that the proposed development will consist of low-rise residential house units. A network of underground utilities and roads will be constructed for the proposed development. No design details of the proposed development were available when preparing this report.

DS is currently carrying out Phase One and Phase Two Environmental Site Assessments (ESAs) at the subject site. The Phase One and Two ESA reports will be documented under separate covers.

The purpose of this preliminary geotechnical investigation was to obtain information about the subsurface conditions at six (6) borehole locations and from the findings in the boreholes to provide preliminary recommendations pertaining to the geotechnical design of underground utilities, subdivision roads, and to comment on the foundation conditions for general house construction.

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. 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 ARGO Mayfield West V Limited and its architect and designers, as well as Review Agencies. Third party use of this report without DS consent is prohibited.

2. FIELD AND LABORATORY WORK

A total of six (6) boreholes (BH24-1 to BH24-6, see **Drawing 1** for borehole locations) were drilled to depths ranging from 6.7 to 7.0 m below existing grade.

The 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 were tested for water contents. Five (5) selected soil samples were subjected to grain size analyses and four (4) samples were submitted for Atterberg Limits testing. The results of lab testing are provided on the respective borehole logs and presented on **Drawings 8** and **9**.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Monitoring wells were installed in three (3) boreholes for the long-term groundwater level monitoring.

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 to be approximate. Contractors performing any work referenced to the borehole elevations should confirm the borehole elevations for their work.

3. SUBSURFACE CONDITIONS

The site is a parcel of land situated within a mixed residential and agricultural neighbourhood in the Town of Caledon, Ontario. It is located at the northwest quadrant of Mayfield Road and Chinguacousy Road. A portion of the site near Chinguacousy Road is occupied by a horse farm and a house used for residential and agricultural purposes. The remainder of the site is a vacant agricultural land.

The borehole location plan is shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes are presented in the individual borehole logs presented on **Drawings 2 to 7**.

The following is a summarized account of the subsurface conditions encountered in the boreholes, followed by more detailed descriptions of the major soil strata and the groundwater conditions encountered in the boreholes drilled at the site.

3.1 SOIL CONDITIONS

In summary, underlying the topsoil and granular fill (BH24-3), weathered/disturbed clayey silt to silty clay and/or fill materials consisting clayey silt to silt clay or sand and gravel were encountered in all boreholes and extended to depths of about 0.8 to 2.3 m below existing ground surface. The native soils encountered at the site consisted mainly of clayey silt to silty clay (till) underlain or interrupted by sandy silt (till) in some borehole locations.

Topsoil:

A surficial topsoil layer, ranging in thickness from 150 to 250 mm was encountered at all borehole locations except BH24-3.

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, closely spaced, should be carried out to further explore the topsoil conditions.

Granular Fill Materials:

At BH24-3, al 180 mm thick layer of granular fill material consisting of sand and gravel mixed with asphalt was encountered at the ground surface.

Fill and Weathered/Disturbed Soils :

Below the surficial topsoil in BH24-2 and BH24-3, clayey silt to silty clay (BH24-2) and sand and gravel (BH24-3) fill materials were encountered and extended to a depth of 1.5 and 0.6 m below existing ground surface, respectively. Inclusions of rootlets/organics were observed in the fill in BH24-2. Below the fill in BH24-3 and the topsoil in BH24-1 and BH24-4 to BH24-6, weathered/disturbed clayey silt to silty clay with inclusions of rootlets was encountered and extended to a depths of 0.8 m below existing ground surface. The fill and weathered/disturbed clayey silt to silty clay were soft to very stiff/loose to compact with measured SPT 'N' values ranging from 3 to 19 blows per 300 mm penetration. Moisture content in the fill and weathered/disturbed clayey silt to silty clay ranged from 8 to 29%.

Clayey Silt to Silty Clay (Till):

Below the fill in boreholes BH24-2 and the weathered/disturbed soils in the remaining boreholes, clayey silt to silty clay (till) deposits were encountered and extended to depths ranging from 6.0 to 7.0 m below existing ground surface, i.e. depth of investigation in all boreholes, except BH24-3. The clayey silt to silty clay till deposits were found with trace to some gravel, some sand to sandy, fine roots in BH24-2, sandy silt layer and silt pockets in BH24-1, sand seams in BH24-4, and a silty sand layer in BH24-6. Cobbles/boulders were inferred within the till deposits during drilling. The clayey silt to silty clay (till) deposits were present in a stiff to hard consistency, with measured SPT 'N' values ranging from 8 to 37 blows per 300 mm of penetration. The moisture content of the clayey silt to silty clay (till) soil samples ranged from 11 to 20%.

Grain size analyses of four (4) soil samples from clayey silt to silty clay (till) (BH24-1/SS5, BH24-2/SS6, BH24-3/SS3 and BH24-6/SS5) were conducted and the results are provided on the respective borehole logs and on **Drawing 8**, with the following fractions:

Clay: 20 to 39%
Silt: 45 to 54%
Sand: 14 to 22%
Gravel: 0 to 5%

Atterberg limits tests of the above noted same samples (BH24-1/SS5, BH24-2/SS6, BH24-3/SS3 and BH24-6/SS5) were conducted. The results are shown on the borehole logs and on **Drawing 9**, and are summarized as follows:

Liquid limit (W_L): 22 to 37%
Plastic limit (W_P): 13 to 17%
Plasticity index (PI): 9 to 20

Sandy Silt Till:

Sandy silt (till) deposits were encountered below and embedded within the clayey silt to silty clay (till) deposits in boreholes BH24-3 and BH24-5 and extended to a depth of 6.7 and 4.7 m below existing ground surface, respectively. Borehole BH24-3 was terminated in the sandy silt (till) deposit. This deposit typically contained trace to some gravel, some clay to clayey, and occasional cobbles/boulders. The sandy silt (till) deposit was present in a compact to very dense state, with measured SPT 'N' values ranging from 12 to over 50 blows per 300 mm of penetration. The moisture content of the sandy silt (till) soil samples ranged from 10 to 13%.

Grain size analysis of one (1) soil sample from sandy silt (till) (BH24-5/SS4) were conducted and the results are provided on the respective borehole logs and on **Drawing 8**, with the following fractions:

Clay: 11%
Silt: 40%
Sand: 33%
Gravel: 16%

3.2 GROUNDWATER CONDITIONS

Water was observed during drilling in boreholes BH24-4 and BH24-5 at depths ranging from 2.3 to 4.6 m below existing ground surface.

Monitoring wells were installed in boreholes BH24-1, BH24-2, and BH24-6 for the long-term groundwater level monitoring. The groundwater levels in the monitoring wells were measured on December 23, 2024. The groundwater levels measured in the monitoring wells are summarized in **Table 1**. The water levels in the monitoring wells ranged from 1.0 to 5.7 m below the existing ground surface, corresponding to Elev. 258.6 to 255.3 m.

Table 1: Summary of Groundwater Level Measurements in Monitoring Wells

Borehole No.	Ground Surface Elev. (m)	Date of Observation	Depth of Groundwater (m)	Elevation of Groundwater (m)
BH24-1	259.6	Dec. 23, 2024	1.0	258.6
BH24-2	261.0	Dec. 23, 2024	5.7	255.3
BH24-6	260.3	Dec. 23, 2024	2.5	257.8

Further measurements of groundwater levels in the monitoring wells are recommended.

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

4. GEOTECHNICAL RECOMMENDATIONS FOR RESIDENTIAL DEVELOPMENT

Based on the borehole information, preliminary geotechnical discussion and recommendations for the proposed development are presented as follows.

4.1 SITE GRADING AND ENGINEERED FILL

The development of the site may require cut and fill operations to meet the design grading plans. 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 placement of engineered fill, all the existing topsoil, fills (if any) and weathered/disturbed native soils must be removed, and the exposed undisturbed native surface proof rolled. Any soft spots revealed during proof rolling must be sub-excavated and re-engineered. 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 and requirements for the placement and preparation of engineered fill are presented on **Appendix A**. Bearing capacity values of 150 kPa at SLS and 225 kPa at ULS can be used on engineered fill, provided that all requirements in **Appendix A** are adhered to. To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential.

The following is a recommended procedure for an engineered fill:

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 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. 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 must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Granular Fill preferred. Engineered fill should not be placed (where it will support footings) 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.

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 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. Bearing capacity values of 150 kPa at SLS and 225 kPa at ULS may be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested, and footings should 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 pad a second contractor may be selected to install footings. 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 pad must be protected from disturbance from traffic, rain, and frost.

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.

The native soils free from topsoil and organics to be excavated from cut-areas are considered suitable for re-use as engineered fill, provided that their moisture contents at the time of construction are at or near optimum. Clayey tills are likely to be excavated in cohesive chunks or blocks and will be difficult to compact. They should be pulverized and placed in thin layers not exceeding 150 to 200 mm and compacted using heavy equipment suitable for these types of soils (e.g., heavy sheepsfoot compactors).

4.2 ROADS

The investigation has shown that the predominant subgrade soil, after stripping the topsoil, weathered/disturbed soils and any other organic and otherwise unsuitable subsoil, will generally consist of clayey silt to silty clay (till), sandy silt to silty sand till or cohesionless silty sand, gravelly sand or silt.

Based on the above and assuming that traffic usage will be residential within the sub-division, the following minimum pavement thicknesses are recommended for the local and collector roads to be constructed within the development:

Local Roads: 40 mm HL3 Asphaltic Concrete
80 mm HL8 Asphaltic Concrete
150 mm Granular 'A'
300 mm Granular 'B'

Collector (Access) Roads: 40 mm HL3 HS Asphaltic Concrete
90 mm HL8 Asphaltic Concrete
150 mm Granular 'A'
450 mm Granular 'B'

Roads and driveway pavements/aprons should be constructed as per the Town of Caledon standards.

The site subgrade and weather conditions (i.e., if wet) at the time of construction may necessitate the placement of thicker granular sub-base layer in order to facilitate the construction. The need for filter fabric/geo-grid can be evaluated during construction stage. 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 truck traffic.

4.2.1. STRIPPING, SUB-EXCAVATION AND GRADING

Presuming that the conventional practice of cut/fill operation to achieve proposed grades includes all roads, the site should be stripped of all topsoil, fill (if any), disturbed/weathered native and any organic, 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.

Proper cambering is required to allow the surface water to escape towards the sides, where it can be removed by means of subdrains. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at ±2% of the optimum moisture content, imported granular material may need to be used.

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 at least 98% of its SPMDD or as per Town Standards. The compaction of the new fill should be checked by frequent field density tests.

4.2.2. ROAD 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 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.

4.2.3. DRAINAGE

The installation of full-length subdrains is required 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 4.2.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

4.3 SEWERS

As a part of the site development, a network of new sewers will be constructed. The inverts of utility pipes are unknown at the time of preparing this report. For the discussion purpose of this report, the invert of utility pipes is assumed not greater than 4 m below existing grade.

4.3.1. TRENCHING

Excavations can be carried out with heavy hydraulic backhoe. Cobbles and boulders are present at the site as evidence of auger grinding. Provisions should be provided in the contractor documents to deal with the boulders and cobbles encountered at the site.

Groundwater seepage within the clayey silt to silty clay (till) is expected to be slow and manageable by gravity drainage and pumping from filtered sumps. Dewatering will be required prior to any excavation in the sandy silt (till) and zone of sandy soils within the clayey silt to silty clay (till) below groundwater table. The groundwater level should be lowered to at least 1 m below the excavation base to maintain the stability of the base and side slopes of the trench excavations in these areas. To minimize any related problems, backfilling operations must follow closely after excavation and pipe installation. Surface water should be directed away from the open excavations. It should be recognized that groundwater and saturated soil levels may be influenced by the effects of precipitation as well as seasonal fluctuations. It is recommended that the construction be carried out during the dry seasons.

DS is currently completing a hydrogeological assessment at the subject site. More comments regarding the type and extent of groundwater control required during construction and permanent drainage will be addressed in our hydrogeological report.

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

The sides of excavations in the natural strata can be expected to be temporarily stable at relatively steep side slopes above the groundwater table for short periods of time but they should be cut back at slopes no steeper than 1V:1.5H in weathered/disturbed native soil or fill (if any) material and 1V:1H in clayey silt/silty clay till in order to comply with the safety regulations. The OHSA stipulates that any excavation deeper than 1.2 m must be shored or cut back at a slope of 1V:1H or flatter, depending on the soil type and groundwater conditions.

It should be noted that the till is a non-sorted sediment and therefore contain cobble and boulders. Possible obstructions may be present in any areas that have been filled. Provisions must be made in the excavation contract for the removal of possible boulders in the till and obstructions in the fill material.

4.3.2. BEDDING

The undisturbed native soils and/or engineered fill will provide adequate support for the sewer pipes and allow the use of normal Class B type bedding. The bedding should conform to the current Ontario Provincial Standard specifications (OPSS 401/OPSD 802) and/or standards set by the local municipality.

The recommended minimum thickness of Class B 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 or fill materials are encountered at the trench base level. 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 obvert 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 uniformly graded bedding material.

4.3.3. BACKFILLING OF TRENCHES

Based on visual and tactile examination, the existing weathered/disturbed native material free from topsoil/organics and undisturbed native soils can be reused as backfill material provided its water content is within 2 percent of optimum moisture content. Significant aeration of the wet excavated soils will be required prior to their use as backfill material.

The clayey deposits especially when its consistency is hard is likely to be excavated in cohesive chunks or blocks and will be difficult to compact in confined areas. For use as backfill, the clayey material will have to pulverized and placed in thin layers. The clayey soils will have to be compacted using heavy equipment suitable for these soils which may be difficult to operate in the narrow confines of the trenches. Unless the clayey materials are properly pulverized and compacted in sufficiently thin lifts post-construction settlements could occur. Their use in narrow trenches such as laterals (where heavy compaction equipment cannot be operated) may not be feasible.

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.

The backfill should be placed in maximum 200 mm thick layers at or near (±2%) their optimum water content and each layer should be compacted to at least 95% SPMDD. In the upper 1.0 m of the

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.

Granular B material should be used as backfill for trenches located under slab on grade or paved areas. Compaction of the granular soils should be carried out with vibratory compactors and loose lifts not exceeding about 200 mm.

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

The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

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.

cannot be reused as foundation or trench backfill material.

4.3.4. ANTI SEEPAGE COLLARS/TRENCH PLUGS

For pipes installed under the groundwater table, seepage between the trench backfill material and the trench wall may cause erosion of the backfill materials. it is recommended that nominal anti-seepage collars (maximum spacing 50 m) be provided to prevent erosion of the backfill materials. Anti seepage collar should not be located at pipe joint.

The anti-seepage collar may consist of a clay plug surrounding the sewer pipe. A typical clay plug will be about 1 m thick and extends laterally to a minimum distance of 0.5 m from the pipe circumference with a minimum of 0.3 m embedment into the shale or native sub-grade. Typical (not to scale) anti-seepage collar conceptual detail is provided on **Drawing 10.**

The on-site native clayey soils may be suitable for such purpose subject to additional sampling and testing.

4.3.5. THRUST BLOCKS AND JOINT RESTRAINTS

An allowable (or SLS) bearing resistance of 150 kPa and factored ULS bearing resistance of 225 kPa can be used in the design of thrust blocks constructed on undisturbed native soils or engineered fill.

4.4 FOUNDATION CONDITIONS

It is understood that the proposed subdivision will consist of single-family homes with a basement. The finish floor elevations of these proposed houses were not known to us at the time of writing this report.

The boreholes show that provided the foundation soil is undisturbed during the construction, in general, bearing capacity values of 150 kPa at SLS (Serviceability Limit State), and 225 kPa at ULS (Ultimate Limit State) are feasible on the undisturbed inorganic natural (native) soils below any fill (if any) and weathered/disturbed soil. These values would be suitable for the use of normal spread footing foundations to support normal single-family dwellings. All footings must be founded below the fill, weathered/disturbed soils and any loose or soft soils.

Where the grade needs to be raised, the proposed structures can be supported by spread and strip footings founded on engineered fill for bearing capacity values of 150 kPa at SLS (Serviceability Limit State), and for a factored geotechnical resistance of 225 kPa at ULS (Ultimate Limit State). The engineered fill supporting footings should be constructed in accordance with the guidelines presented in **Appendix A** and in Section 4.1 of this report.

Variations in the soil conditions are expected in between the borehole locations, and during construction, the soil bearing pressures should be confirmed by the Geotechnical Engineer.

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.

All footings exposed to seasonal freezing conditions must have at least 1.4 metres of soil cover for frost protection.

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 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.

4.5 EARTH PRESSURES

The lateral earth pressures acting on retaining walls or underground structures 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. GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Ltd. (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.

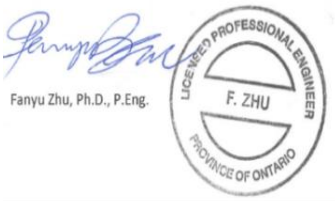
The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial 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 LTD

Osbert (Ozzie) Benjamin, P.Eng.
Senior Geotechnical Engineer

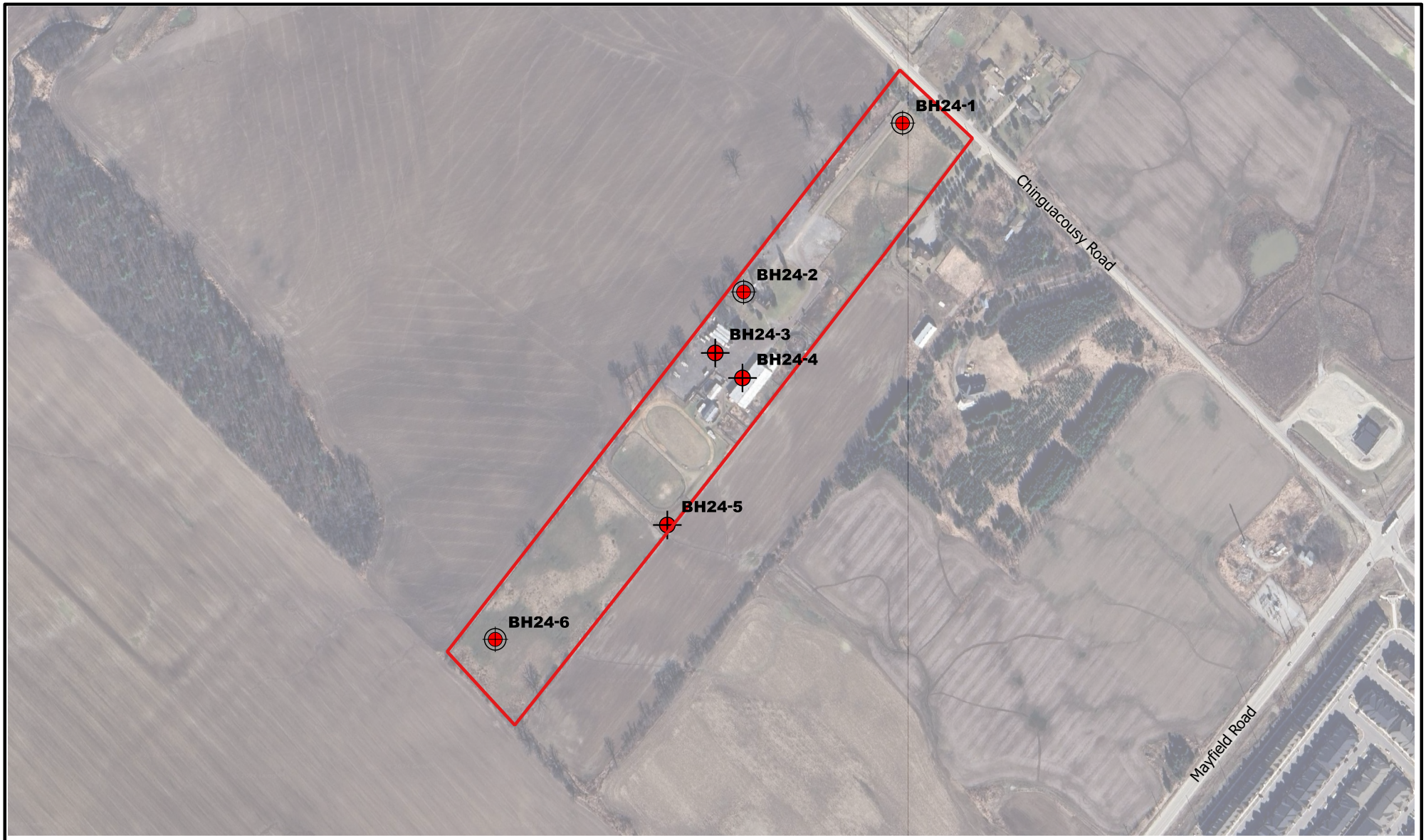


Fanyu Zhu, Ph.D., P.Eng.
Principal Engineer

Alka Sangar, M.Eng., P.Eng.

Drawings

J:\2024 Projects\24-371-600 Env - Geo - Phase I and II ESA, 12192 Chinguacousy Road, Caledon\Geotechnical\QGIS\1-QGIS\Drawing 1 Borehole Location Plan.qgs Jan-06 11:25



Legend

- Approx Site Boundary
- Borehole
- Borehole With Monitoring Well

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

Client: ARGO MAYFIELD WEST V LIMITED

Project: PRELIMINARY GEOTECHNICAL INVESTIGATION
12192 Chinguacousy Road, Caledon, ON

Title: **BOREHOLE LOCATION PLAN**

N

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	O.B	K.T	January 2025
Rev: 0	Scale: As Shown	Project No.: 24-371-600	Drawing No.: 1

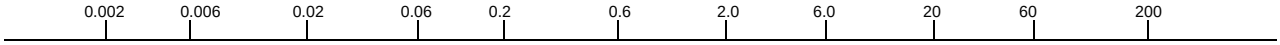
Image/Map Source: *Google Satellite Image*

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.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

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.

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-1

PROJECT: Preliminary Geotechnical Investigation
CLIENT: ARGO Mayfield West V Limited
PROJECT LOCATION: 12192 Chinguacousy Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4841148.4 E 592508

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-09-2024

REF. NO.: 24-371-600
ENCL NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m	ELEVATION
259.6 / 0.0	**TOPSOIL:** 250mm				
259.4 / 0.3	**CLAYEY SILT TO SILTY CLAY:** trace sand, trace gravel, trace rootlets, brown, moist, soft (weathered/disturbed)	1	SS	3	259
258.8 / 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown to grey, moist, stiff to hard	2	SS	15	
		3	SS	20	258
		4	SS	29	257
	grey below 3.1m	5	SS	23	256
	100mm wet sandy silt layer at 4.6m	6	SS	11	255
					254
252.9 / 6.7	with sandy silt layers and silt pockets at 6.4m	7	SS	31	253
	END OF BOREHOLE:				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Dec. 23, 2024 1.0

GROUND WATER CONDITIONS: W. L. 258.6 m Dec 23, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

	GR	SA	SI	CL
5	2	22	45	31

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

DS SOIL LOG-2021-FINAL 24-371-600GEO.GPJ DS.GDT 25-1-17

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-2

PROJECT: Preliminary Geotechnical Investigation
CLIENT: ARGO Mayfield West V Limited
PROJECT LOCATION: 12192 Chinguacousy Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4840993.1 E 592362.4

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-06-2024

REF. NO.: 24-371-600
ENCL NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
261.0 / 0.0	**TOPSOIL:** 200mm				
0.2	**FILL:** clayey silt to silty clay, trace rootlets, trace organics, dark brown to brown, moist, firm to stiff	1	SS	5	
		2	SS	10	260
259.5 / 1.5	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, grey, moist, stiff to very stiff	3	SS	25	
	fine roots at 2.3m	4	SS	17	259
	grey below 3.1m	5	SS	29	258
		6	SS	20	257
		7	SS	13	256
254.3 / 6.7	**END OF BOREHOLE:**				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
Dec. 23, 2024 5.7

W. L. 255.3 m
Dec 23, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	5	21	54	20

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

DS SOIL LOG-2021-FINAL 24-371-600GEO.GPJ DS.GDT 25-1-17

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-3

PROJECT: Preliminary Geotechnical Investigation
CLIENT: ARGO Mayfield West V Limited
PROJECT LOCATION: 12192 Chinguacousy Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4840937.1 E 592336.3

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-06-2024

REF. NO.: 24-371-600
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
261.1												
260.9 0.0	**GRANULAR FILL:** sand and gravel mixed with asphalt, 180mm											
0.2	**CLAYEY SILT TO SILTY CLAY:** trace sand, trace gravel, trace rootlets, brown, moist, very stiff (weathered/disturbed)		1	SS	19		261					
260.3 0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown to grey, moist, stiff to very stiff		2	SS	12		260					
			3	SS	21							0 14 47 39
			4	SS	24		259					
			5	SS	18		258					
	grey below 4.6m		6	SS	8		257					
255.1							256					
6.0	**SANDY SILT TILL:** some clay to clayey, trace gravel, grey, very moist, compact		7	SS	12		255					
254.4												
6.7	**END OF BOREHOLE:** Notes: 1) Water not encountered during drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

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

DS SOIL LOG-2021-FINAL 24-371-600GEO.GPJ DS.GDT 25-1-17

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-4

PROJECT: Preliminary Geotechnical Investigation
CLIENT: ARGO Mayfield West V Limited
PROJECT LOCATION: 12192 Chinguacousy Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4840914.3 E 592361.1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-06-2024

REF. NO.: 24-371-600
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
260.8							
260.7 0.0	**TOPSOIL:** 150mm						
0.2	**FILL:** sand and gravel, dark brown, moist, loose		1	SS	6		
260.2 0.6	**CLAYEY SILT TO SILTY CLAY:**						
260.0 0.8	trace sand, trace rootlets, brown, moist, firm (weathered/disturbed)		2	SS	10		260
1	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown to grey, moist, stiff to very stiff		3	SS	16		
2	sand seams at 1.8m		4	SS	17		259
3			5	SS	27		258
4	grey below 4.6m		6	SS	15		257
5							256
6	some gravel at 6.4m		7	SS	16		255
254.1 6.7	**END OF BOREHOLE:** Notes: 1) Water encountered at 2.3m during drilling.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

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

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

DS SOIL LOG-2021-FINAL 24-371-600GEO.GPJ DS.GDT 25-1-17

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-5

PROJECT: Preliminary Geotechnical Investigation
CLIENT: ARGO Mayfield West V Limited
PROJECT LOCATION: 12192 Chinguacousy Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4840779.7 E 592292.1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-09-2024

REF. NO.: 24-371-600
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
258.6												
258.4 0.0	**TOPSOIL:** 180mm											
0.2 / 257.8	**CLAYEY SILT TO SILTY CLAY:** trace sand, trace gravel, trace rootlets, brown, moist, firm (weathered/disturbed)		1	SS	7		258					
0.8 / 256.3	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, occasional cobble, brown, moist, stiff to very stiff		2	SS	9							
			3	SS	18		257					
2.3 / 253.9	**SANDY SILT TILL:** some clay, some gravel, occasional cobble, brown to grey, moist, compact to very dense		4	SS	24		256					16 33 40 11
			5	SS	50/ 25mm		255					
4.7 / 251.9	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, grey, moist, stiff to hard		6	SS	8		254					
			7	SS	37		253					
							252					
6.7	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.6m during drilling,											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

DS SOIL LOG-2021-FINAL 24-371-600GEO.GPJ DS.GDT 25-1-17

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-6

PROJECT: Preliminary Geotechnical Investigation
CLIENT: ARGO Mayfield West V Limited
PROJECT LOCATION: 12192 Chinguacousy Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4840674.8 E 592134.8

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Dec-09-2024

REF. NO.: 24-371-600
ENCL NO.: 7

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
260.3												
260.0 0.0	**TOPSOIL:** 180mm											
0.2	**CLAYEY SILT TO SILTY CLAY:** trace sand, trace gravel, trace rootlets, brown, moist, stiff (weathered/disturbed)		1	SS	10		260					
259.5												
0.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown to grey, moist, stiff to very stiff		2	SS	15		259					
			3	SS	20							
			4	SS	28	W. L. 257.8 m Dec 23, 2024	258					
	grey below 3.1m		5	SS	16		257					3 21 48 28
			6	SS	12		256					
							255					
	wet silty sand layer at 6.4m		7	SS	19		254					
253.3 7.0	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Dec. 23, 2024 2.5											

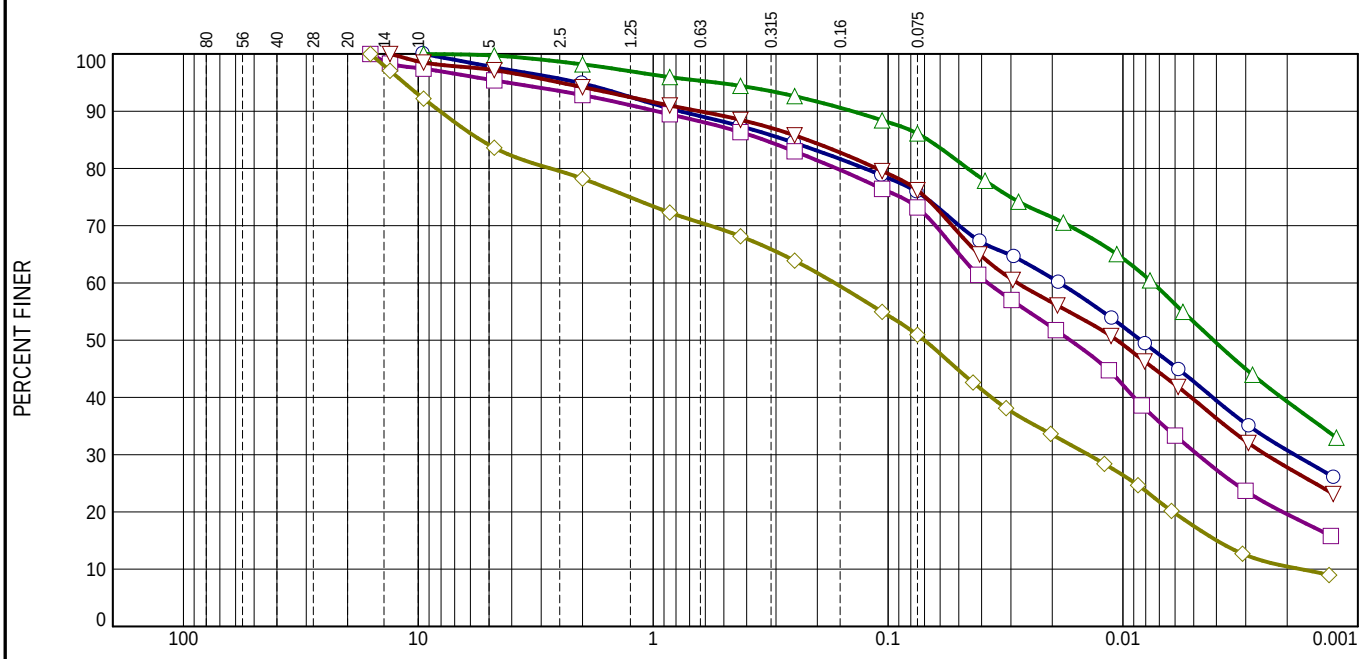
GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

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

DS SOIL LOG-2021-FINAL 24-371-600GEO.GPJ DS.GDT 25-1-17

Particle Size Distribution Report

ASTM D422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.3	2.9	7.4	11.5	45.1	30.8
□	0.0	0.0	4.6	2.6	6.4	13.2	53.6	19.6
△	0.0	0.0	0.3	1.5	3.8	8.3	46.8	39.3
◇	0.0	0.0	16.4	5.4	10.0	17.3	40.4	10.5
▽	0.0	0.0	2.8	3.0	5.7	12.3	48.4	27.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	31	16	0.2733	0.0186	0.0084	0.0019				
□	22	13	0.3378	0.0377	0.0168	0.0048				
△	37	17	0.0675	0.0075	0.0041					
◇			5.4389	0.1689	0.0701	0.0140	0.0040	0.0018	0.67	96.48
▽	27	14	0.2211	0.0282	0.0106	0.0025				

Material Description	USCS	AASHTO
○ Silty clay till, sandy, trace gravel	CL	A-6(9)
□ Silty clay till, sandy, trace gravel	CL	A-4(4)
△ Silty clay till, some sand, trace gravel	CL	A-6(17)
◇ Sandy silt till, some clay, some gravel		
▽ Silty clay till, sandy, trace gravel	CL	A-6(7)

Project No. 24-371-600 Client: ARGO Mayfield West V Limited.

Project: Preliminary Geotechnical Investigation - 12192 Chinguacousy Road, Caledon, ON

○ Location: BH24-1 SS5 Sample Number: VM-6310

□ Location: BH24-2 SS6 Sample Number: VM-6310

△ Location: BH24-3 SS3 Sample Number: VM-6310

◇ Location: BH24-5 SS4 Sample Number: VM-6310

▽ Location: BH24-6 SS5 Sample Number: VM-6310

DS CONSULTANTS LTD.

Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

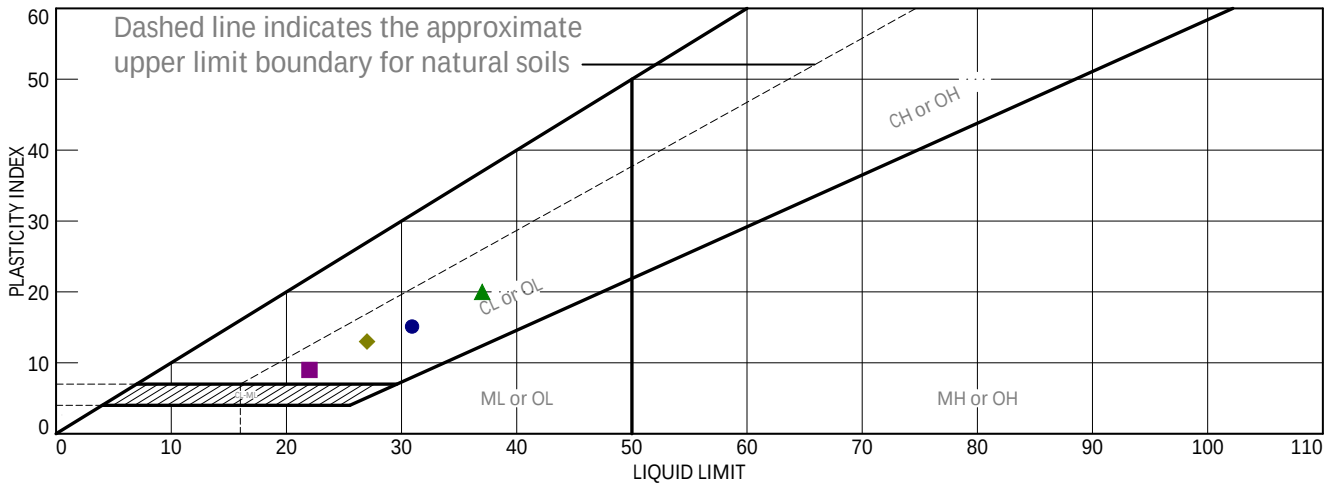
CCIL

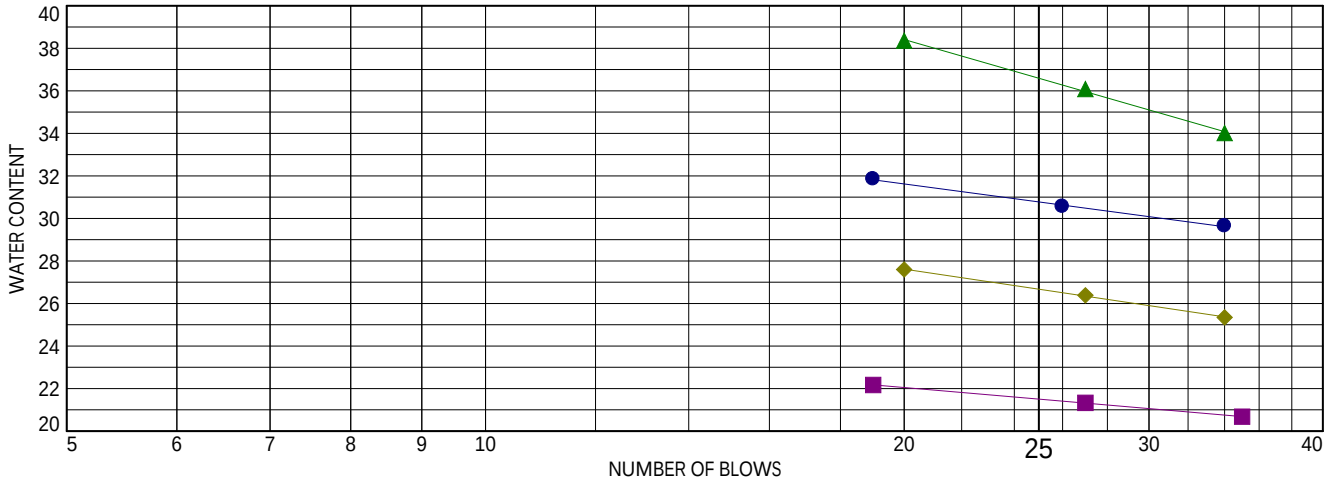
Remarks:

Figure: 8

Tested By: Helen/Disha Checked By: Kirupa

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty clay till, sandy, trace gravel	31	16	15	87.4	75.9	CL
■	Silty clay till, sandy, trace gravel	22	13	9	86.4	73.2	CL
▲	Silty clay till, some sand, trace gravel	37	17	20	94.4	86.1	CL
◆	Silty clay till, sandy, trace gravel	27	14	13	88.5	76.2	CL

Project No. 24-371-600 Client: ARGO Mayfield West V Limited.

Project: Preliminary Geotechnical Investigation - 12192 Chinguacousy Road, Caledon, ON

●Location: BH24-1 SS5 Sample Number: VM-6310

■Location: BH24-2 SS6 Sample Number: VM-6310

▲Location: BH24-3 SS3 Sample Number: VM-6310

◆Location: BH24-6 SS5 Sample Number: VM-6310

Remarks:

●Sampled on December 09,2024

■Sampled on December 06, 2024

▲Sampled on December 06, 2024

◆Sampled on December 09, 2024

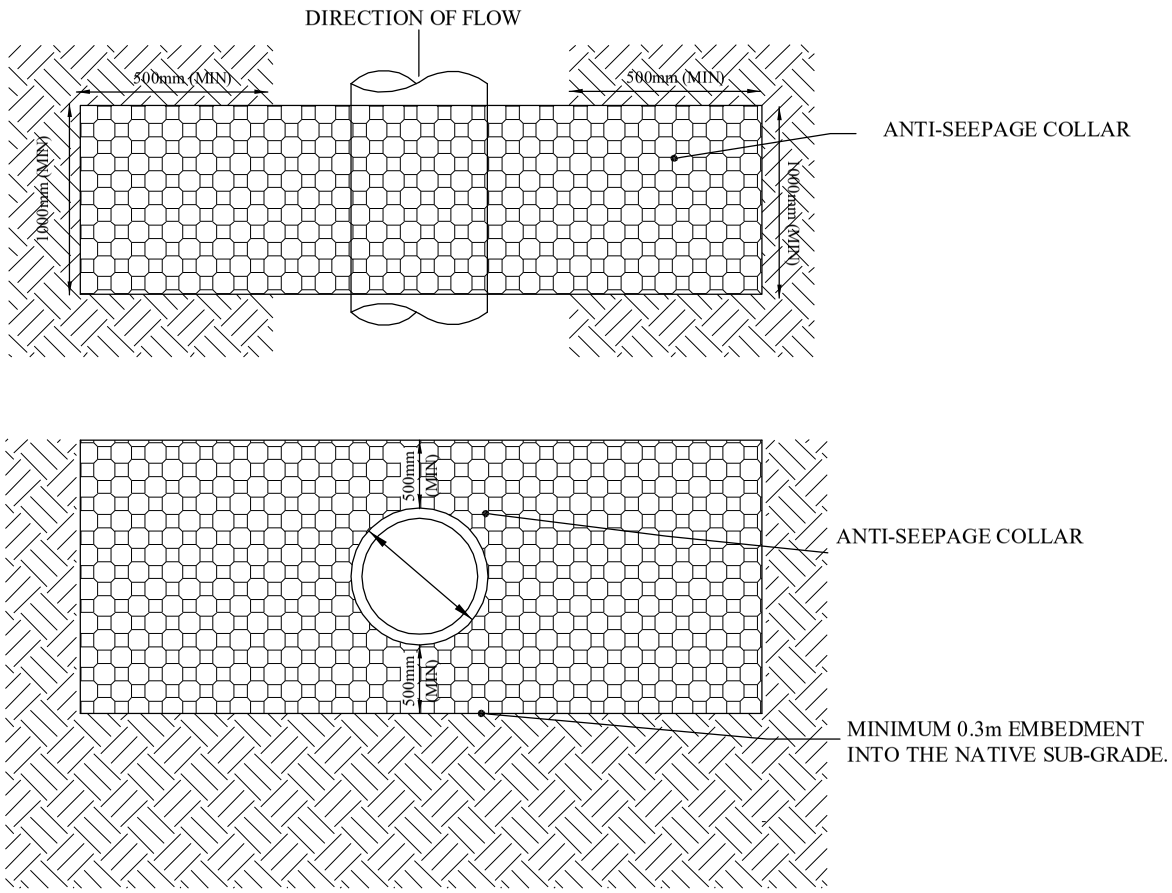
DS CONSULTANTS LTD.

Geotechnical ❖ Environmental ❖ Materials ❖ Hydrogeology

Figure: 9

Tested By: Disha Checked By: Kirupa

Drawing No. 10: TYPICAL TRENCH PLUG INSTALLATION



ANTI-SEEPAGE COLLAR DETAIL

SCALE: N.T.S.

Appendix A

General Requirements for Engineered Fill

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 (DSCL). Without this confirmation no responsibility for the performance of the structure can be accepted by DSCL. 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 DSCL 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 DSCL during placement of engineered fill is required. Work cannot commence or continue without the presence of the DSCL 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.

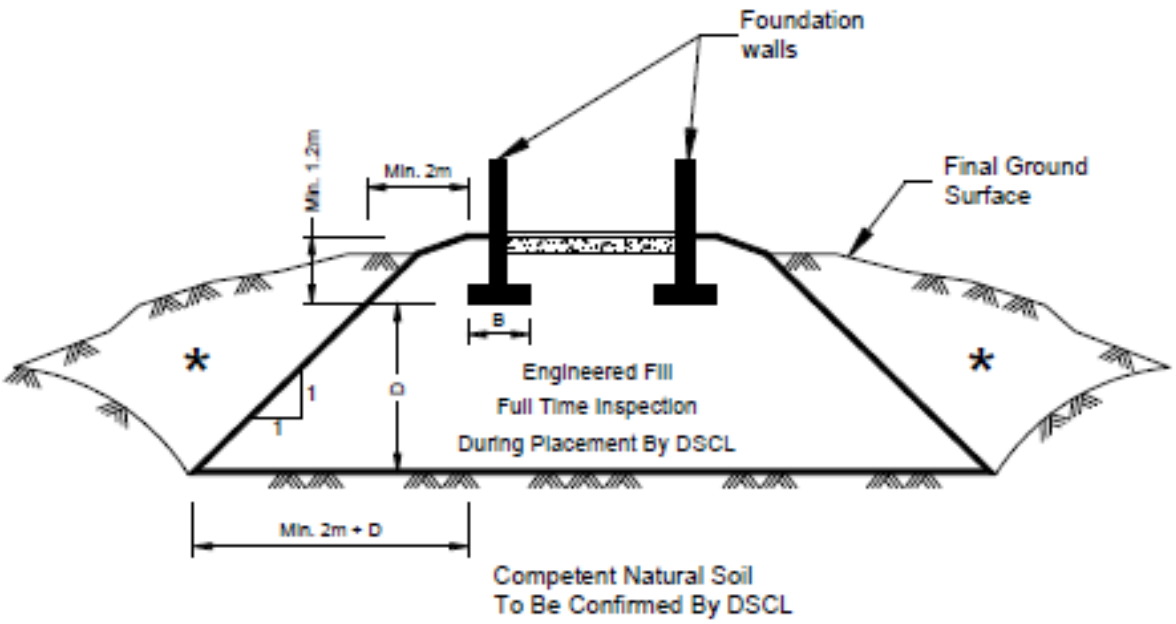
10. After completion of the engineered fill pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from DSCL prior to footing concrete placements. All excavations must be backfilled under full time supervision by DSCL to the same 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 DSCL.

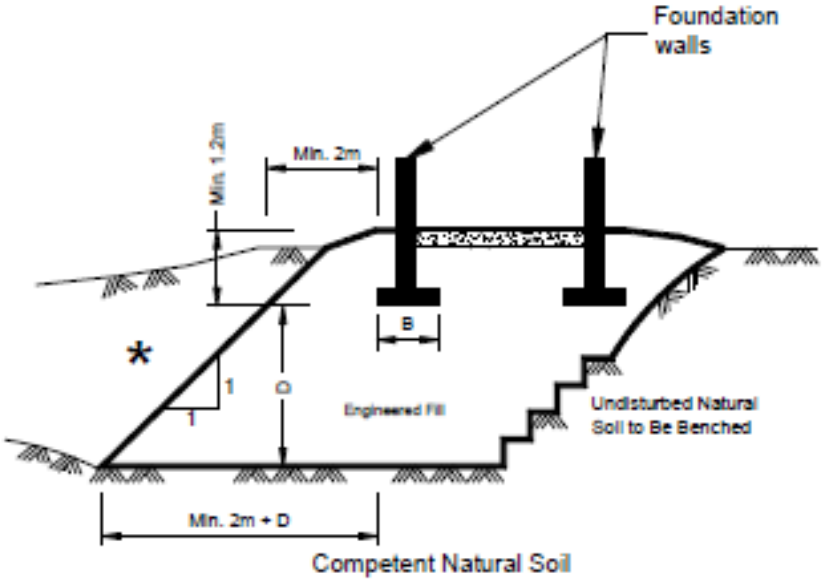
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any 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 DSCL report.