



GEOTECHNICAL INVESTIGATION REPORT

HOME FARM RENTAL DEVELOPMENT, TOWN OF THE BLUE MOUNTAINS, ON

PROJECT NUMBER: 26-062-01

CLIENT: MacPherson Builders Limited

DATE: August 21st, 2026

PREPARED BY: Green Geotechnical Ltd.

576 Bryne Drive, Unit 'O'

Barrie, ON

L4N 9P6



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1.0 SITE AND PROJECT BACKGROUND

Green Geotechnical Ltd. (Green Geotechnical) was retained by MacPherson Builders Limited to conduct a subsurface investigation and prepare a geotechnical report for the proposed rental residential development. The subject site consists of the land North of Block 87 within the Home Farm Development, approximately $\pm 200\text{m}$ east of Grey Road 19, in The Town of The Blue Mountains, Ontario. The site is currently vacant land surrounded by a forested area to the east, and an active residential development to the south. A site location plan is provided as Figure 1.

Based on the “*Concept Site Plan, Dwg. CON-3*” prepared by RN Design and the “*Storm Area Drainage Plan, Dwg. STM1*” dated December 10th, 2021, provided by Crozier, the proposed development consists of a residential subdivision including 56 low-rise townhouse units, internal roadways, and additional parking spaces, across an approximate 5.0 hectare area. The proposed site is presumed to be serviced by municipal water and wastewater, connecting to existing infrastructure

Based on the topographical information contained in the “*Overall Grading Plan*” dated July 10, 2021, by C.F. Crozier & Associates Inc (Crozier) and the *Draft Plan* certified by Ontario Land Surveyor Lynn H. Patten dated September 28, 2006, the site has varying ground elevations throughout the property, with existing grades ranging from approximately Elev. $\pm 219\text{m}$ to Elev. $\pm 212\text{m}$, generally sloping down towards the northeast. At the time of this investigation, grading and servicing plans were not yet available for review. Once they are available, they should be provided to Green Geotechnical to review from a geotechnical perspective. Any regrading within the influence zones of settlement sensitive areas (buildings, roads, services, etc.) is anticipated to be done with the use of Engineered Fill.

This report encompasses the geotechnical investigation conducted for the Property to assess its geotechnical suitability for the proposed development. The field investigation consisted of advancing a total of four (4) exploratory boreholes (Boreholes 1 to 4) at the property. The objective of the geotechnical investigation was to determine the prevailing subsurface soil and groundwater conditions, to provide geotechnical engineering recommendations for the design of the proposed residential subdivision’s building foundations, floor-slabs, seismic and lateral earth design parameters, pavement design, and pipe bedding/installation of underground utilities. In addition, comments are also included on the pertinent project construction aspects including excavation, backfill and groundwater control.

2.0 INVESTIGATION PROCEDURES AND METHODOLOGY

The field investigation was conducted on June 15th, 2026, and consisted of drilling and sampling a total of four (4) exploratory boreholes (Boreholes 1 to 4) extending to termination depths of 4.8m to 6.1m below existing ground surface.



The boreholes were staked out in the field by Green Geotechnical based on the proposed development and existing site features. The approximate borehole locations are shown on the enclosed Borehole Layout Plans as Figure 2A and Figure 2B.

Various utility locate agencies (including a private locate company) were contacted by Green Geotechnical to locate the borehole locations prior to the commencement of the field investigation.

Borehole elevations are inferred from the *“Overall Grading Plan”* dated July 10, 2021, by C.F. Crozier & Associates Inc (Crozier). The horizontal coordinates are reported relative to the Universal Transverse Mercator geographic coordinate system (UTM Zone 17T). It should be noted that the elevations, depths and coordinates provided on the Borehole Logs are approximate and provided only for the purpose of relating borehole soil stratigraphy and should not be used or relied on for other purposes.

The borings were drilled by a specialist drilling contractor using a track mounted drill rig power auger and sampled at regular intervals with a conventional 50mm diameter split barrel sampler when the Standard Penetration Test (SPT) was carried out (ASTM D 1586). The field work (drilling, sampling, and testing) was observed full time and recorded by Green Geotechnical field staff, who logged the boring and examined the samples as they were obtained.

All samples obtained during the investigation were sealed into plastic jars and transported to our geotechnical laboratory for detailed inspection and testing. The borehole samples were examined (tactile) in detail by a geotechnical engineer and classified according to visual and index properties. Geotechnical laboratory testing consisted of water content determination on all samples, grain size analysis on three (3) selected soil samples. The measured natural water contents of individual samples and the results of the grain size analysis tests are plotted on the enclosed borehole logs at respective sampling depths. The results of the grain size analyses are also summarized in Section 3.5 of this report and are appended in Appendix B.

Groundwater levels were observed in the open boreholes upon the completion of drilling. Monitoring wells were installed in three (3) boreholes, for one (1) stabilized groundwater level reading, which were taken on July 16th, 2026, by C.F. Crozier & Associates Inc. (Crozier). The results of the groundwater level readings are enclosed on the borehole logs and summarized in Section 3.4 of this report.

3.0 SUBSURFACE CONDITIONS

The specific soil conditions encountered at each borehole location are described in greater detail on the Borehole Logs, with a summary of the general subsurface soil conditions outlined below. This summary is intended to correlate this data to assist in the interpretation of the subsurface conditions at the site. The borehole logs are enclosed in Appendix A.



It should be noted that the subsurface conditions are confirmed at the borehole locations only and may vary between and beyond the borehole locations. The boundaries between the various strata as shown on the logs are based on non-continuous sampling. These boundaries represent an inferred transition between the various strata, rather than a precise plane of geologic change.

3.1 Topsoil

Surficial topsoil with a thickness ranging from approximately 100mm to 200mm was encountered at the ground surface of Borehole 2. The topsoil was dark brown in colour.

Topsoil thicknesses provided in this report were obtained at the individual borehole locations, as measured through the collar of the open borehole or sampling spoon. Thicknesses may vary between and beyond the borehole locations. They should be verified at the time of construction.

3.2 Earth Fill

Earth fill comprised of a sand to silt, trace to some gravel, trace to some clay, trace organics, occasional cobbles were encountered at surface (Boreholes 1, 3, and 4) or beneath the surficial topsoil (Borehole 2) extending to a depth of 0.6m below grade.

The Standard Penetration Test result (N-Values) obtained from the earth fill zone ranged from 10 to over 50 blows per 300mm of penetration, indicating a loose to very dense relative density.

The in-situ moisture contents of the earth fill samples ranged from 7 to 35 percent by weight, indicating generally moist conditions.

3.3 Silty Sand to Sandy Silt Glacial Till

Native deposits of a silty sand to sandy silt glacial till, some gravel to gravelly, trace to some clay, with occasional cobbles, was encountered in all Boreholes below the earth fill. The glacial till layer extended to the termination depth of each borehole ranging from 4.8m to 6.4m.

The Standard Penetration Test result (N-Values) obtained from this layer ranged from 20 to over 50 blows per 300mm of penetration, indicating a generally compact to very dense relative density.

The in-situ moisture contents of the gravelly sandy silt samples ranged from 5 to 11 percent by weight, indicating a generally moist condition.



3.4 Groundwater

The depth of groundwater and caving was measured in each of the boreholes immediately following the completion of drilling. Water level measurements were made by Crozier in the monitoring wells installed in Boreholes 1, 3 and 4, on July 16th, 2026. The groundwater observations of all the boreholes are summarized as follows:

Borehole No.	Depth of Borehole (m)	Depth to Cave (Depth) (m)	Unstabilized Water Level (Depth/Elevation) (m)	Stabilized Water Level in well on July 16 th , 2026 (Depth)/(Elevation) (m)
1	6.1	Open	Dry	0.88 / 213.12
2	6.1	Open	Dry	N/A
3	4.8	Open	Dry	2.62 / 210.88
4	6.4	5.4	4.6 / 212.9	0.59 / 216.91

Groundwater levels will fluctuate seasonally and depending on the amount of surface runoff, snow melt and precipitation. They are expected to be highest during the late winter/early spring thaw/snow melt.

3.5 Geotechnical Laboratory Test Results

The geotechnical laboratory testing consisted of natural moisture content determination for all samples, while grain size analysis was conducted on three (3) selected soil samples (Borehole 1, Sample 5, Borehole 3, Sample 3, and Borehole 4, Sample 6). The test results are listed on the enclosed Borehole Logs at the respective sampling depth.

The results (graphs) of the grain size analyses are appended, and a summary of the results are as follows:



Borehole No. Sample No.	Sampling Depth below Grade (m)	Percentage (by mass)				Descriptions (MIT System)
		Gravel	Sand	Silt	Clay	
BH1 SS5	3.0 – 3.66	24	30	35	11	SANDY GRAVELLY SILT, some clay,
BH3 SS3	1.5 – 2.1	27	29	32	12	GRAVELLY SANDY SILT, some clay
BH4 SS6	4.6 – 5.2	21	28	37	14	GRAVELLY SANDY SILT, some clay

4.0 GEOTECHNICAL ENGINEERING DESIGN

The following discussion and recommendations are based on the factual data obtained from this investigation and are intended for use by the owner and the design engineer. Contractors bidding or providing services on this project should review the factual data and determine their own conclusions regarding construction methods and scheduling.

This report is provided on the assumption that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards, and guidelines of practice. If there are any changes to the site development features or any additional information relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Green Geotechnical should be retained to review the implications of these changes with respect to the contents of this report.

4.1 Foundation Design Parameters

4.1.1 Foundations on Native Soils

Based on the field investigation at this site, below the earth fill zones that extend up to approximately 0.6m below grade, the subsurface conditions generally consist of a compact to very dense native silty sand to sandy silt glacial till. The undisturbed compact to very dense native site soils **are suitable** for the support of conventional spread footings, provided that all loose, caved, soft, or deleterious materials are removed, and any excess water is pumped out prior to concrete placement. The earth fill zones,



weathered/disturbed native soils or high organic soil areas and/or any other deleterious materials **are not suitable** to support building foundations.

Given the relatively high groundwater levels at the site, depending on the design USF elevations, groundwater may have to be managed during any earthworks, including foundation construction and servicing. Depending on grading and servicing design, **dewatering may be required**. Groundwater levels are expected to be highest in the spring and fall months. To avoid costly and lengthy construction, the foundation systems should be constructed in the driest summer months to minimize the required dewatering efforts and disturbance to the site soils. The project hydrogeologist and a dewatering specialty contractor should be consulted for establishing dewatering requirements and means/methods.

The generally compact to very dense native soil conditions encountered in this investigation will allow structure foundations placed at least 0.3m into them to be designed with a maximum net geotechnical reaction of **200kPa (SLS)** and a factored geotechnical resistance of **300kPa (ULS)**, subject to foundation inspection confirmation by Green Geotechnical. Additional capacity may be available on a case by case basis, following consultation with Green Geotechnical.

The minimum footing widths to be used in conjunction with the above recommended soil bearing pressures should be 0.5m for continuous footings and 0.9m for individual footings placed on native soils. The maximum footing widths to be used in conjunction with the above recommended soil bearing pressures should be 3.0m for footings placed on native soils. Where footings are designed to be wider than 3.0m, Green Geotechnical must be consulted to provide the relevant capacities on a case-by-case basis. The spread footings on native soils must be embedded a minimum of 1.0m below the above floor elevation. The above recommended bearing capacities are based on an estimated maximum total settlement of 25mm and differential settlement of 19mm.

The SLS capacity is estimated using conventional assumptions on footing uniformity and spacing for preliminary design purposes. In reality, a detailed spread footing plan includes a variety of footing sizes, spacings, and depths. Footings will influence each other if they are spaced closer than one footing width apart. Green Geotechnical should be retained to review the structural foundation design from a geotechnical perspective once available.

A minimum soil cover of 1.4m or equivalent insulation is recommended for frost protection to footings in exterior or unheated areas. Construction during cold weather should also ensure temporary frost protection of footing bases. Native soils tend to weather rapidly and deteriorate on exposure to the atmosphere and surface water. The time between foundation excavation and concrete placement should be minimized as much as possible. Consideration should be given to completing construction during the drier months of the year.



The placement of a thin layer of lean mix concrete or a 'mud slab' should be considered to prevent disturbance of sensitive sub-soils due to weathering, groundwater/surface water, and construction activity.

Prior to placing foundation concrete, all excavated foundation subgrade soils should be cleaned of all deleterious materials such as fill, loosened/softened or disturbed materials as well as any standing water. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the founding subgrade and concrete must be provided. It is required that the footing bases be inspected by Green Geotechnical to confirm the exposed soil conditions and recommended bearing capacities.

4.1.2 Foundations on Engineered Fill

While USF elevations are not yet established, the site may require Engineered Fill to accommodate regrading beneath the proposed buildings or within the influence zones of settlement sensitive areas. Where required, this must be completed under full time supervision by Green Geotechnical to monitor extent, lift thickness, compaction, material quality and the like.

The undisturbed native soils beneath the earth fill zones are considered suitable for the support of an Engineered Fill pad for supporting the building foundations. The Engineered Fill pad should extend at least 1m beyond any building footprint at underside of footing elevation and extend out at a 1:1 (horizontal to vertical) slope down to competent native soils. Unless the foundations are constructed immediately on the Engineered Fill pad, the pad should be built up at least an additional 0.6m in elevation to serve as a protective cap for the Engineered Fill at underside of footing level from the effects of weathering and freeze-thaw.

All deleterious or otherwise unsuitable materials such as topsoil, earth fill, materials with organic inclusions, and weathered/disturbed materials, as well as any standing water, must be removed prior to the placement of Engineered Fill. These materials do not constitute an adequate subgrade for support of Engineered Fill. After any unsuitable materials are removed, the exposed native soil subgrade must be inspected and approved by Green Geotechnical prior to the placement of Engineered Fill. Engineered fill material may consist of clean granular type soils (free from organic/topsoil or otherwise deleterious matter) placed with moisture control in maximum 150mm loose lifts and compacted uniformly to a minimum of 98 percent of Standard Proctor Maximum Dry Density (SPMDD). In addition to the subgrade inspection, Engineered Fill construction must be completed under full time supervision by Green Geotechnical to monitor extent, lift thickness, compaction, material quality, and the like.

Where Engineered Fill compaction is to be done within $\pm 1\text{m}$ of the groundwater table, it is recommended that **Granular B 'Type II' or 50mm crushed limestone be used as the Engineered Fill** material in order to achieve 98 percent SPMDD with minimal deflections. This will also reduce the need for costly/time-consuming sub-excavations and re-compaction of the Engineered Fill in order to have a stable surface.



Where structures are placed on Engineered Fill constructed on an approved native soil subgrade free from deleterious materials, the recommended maximum net geotechnical reaction may be **150kPa (SLS)** and factored geotechnical resistance may be **225kPa (ULS)**.

The minimum footing widths to be used in conjunction with the above recommended soil bearing pressures should be 0.6m for continuous footings and 1.0m for individual footings placed on Engineered Fill. The maximum footing widths to be used in conjunction with the above recommended soil bearing pressures should be 3.0m for footings placed on Engineered Fill. Where footings are designed to be wider than 3.0m, Green Geotechnical must be consulted to provide the relevant capacities on a case-by-case basis. The spread footings on Engineered Fill must be embedded a minimum of 1.0m below the above floor elevation. The above recommended bearing capacities are based on an estimated maximum total settlement of 25mm and differential settlement of 19mm.

It should be noted that for structures placed on Engineered Fill, nominal reinforcing steel (rebar) at a minimum be placed in the foundations comprising two (2) continuous 15M bars in the strip footings, and two (2) continuous 15M bars at the top and bottom of the foundation walls be provided. Any column footing will require 15M bars spaced at 0.3m on centre, in each direction of the column footing. The reinforcing steel requirements of the structure are to be reviewed by a structural engineer. A copy of “Engineered Fill Specifications” is enclosed in Appendix D of this report for reference purposes. These specifications should be included in the earthworks contract.

Prior to placing foundation concrete, all Engineered Fill should be cleaned of all deleterious materials such as softened or weathered/disturbed materials as well as any standing water. It is required that the foundations placed on Engineered Fill be inspected by Green Geotechnical in order to confirm the exposed soil conditions and recommended bearing capacities.

4.2 Floor Slab Design Parameters

The stabilized groundwater levels ranged between approximately $\pm 0.59\text{m}$ and $\pm 2.62\text{m}$ below grade (approx. elev. $\pm 216.91\text{m}$ to $\pm 210.88\text{m}$) in July of 2026. Groundwater levels are typically highest in late winter/early spring during the snow thaw/melt and heavy precipitation season. While no proposed floor elevations are available yet, all finished floor surfaces are **required to be at least 0.5m above the prevailing seasonally high groundwater level**.

All non-structural earth fill and any other deleterious or unsuitable materials must be removed prior to placement of new fill for supporting floor slabs. These materials do not constitute an adequate subgrade for support of floor slabs. After any unsuitable materials are removed, the exposed soil subgrade must be inspected and approved by Green Geotechnical at the time of construction. Any structural fill placed to raise grades, must be placed in maximum 150mm thick lifts, and compacted to at least 98 percent



Standard Proctor Maximum Dry Density (SPMDD). Conventional lightly loaded concrete slab-on-grade or basement floors can be placed on the Engineered Fill.

To assist in maintaining dry below-grade levels and preventing seepage, it is recommended that exterior grades around the buildings be sloped away at a 2% gradient or more, for a distance of at least 1.2 metres.

Due to the relatively high groundwater table and variability in the frost susceptibility of the site soils, floor slabs must be protected from frost if the pad is to be left over the winter. The slab must be enclosed and heated over the duration of the parts of the year where freezing temperatures are expected. The alternative is to place the slab on at least 1.1m of non-frost susceptible soils.

Subfloor drainage is required in conjunction with perimeter drainage of below-grade buildings, to collect and remove the water that infiltrates at the building perimeter and under the floor. **Subfloor drainage is required throughout below grade areas of any building with a basement within 1m of the seasonally high groundwater level.**

It is recommended that the subfloor drainage system consists of minimum 100mm diameter perforated pipes wrapped in filter fabric spaced at a maximum spacing of 3m on centre. The pipes must be surrounded by a minimum of 100 mm of 19mm clear stone/HL 8 Coarse Aggregate, and the pipe inverts should be a minimum 300mm below the base of the slab.

The subfloor drains can be constructed in trenches as shown in the typical detail, or alternatively they can be constructed on a flat subgrade subexcavated at least 300mm below the base of the slab. The subdrain system should be outlet to a suitable discharge point under gravity flow or connected to sumps (at least 2 recommended) located in the below-grade level. The water from the sumps must be pumped out to a suitable discharge point/positive outlet. The installation of the drains as well as the outlet must conform to the applicable plumbing code requirements.

It is necessary that building floor slabs be provided with a capillary moisture barrier and drainage layer. This is accomplished by placing the slab on a minimum 200mm layer of 19mm clear stone (OPSS.MUNI 1004) compacted by vibration to a dense state. The upper 50mm of the 200mm drainage layer may be replaced with 50mm of Granular A (OPSS.MUNI 1010) to provide a trafficable surface. The 19mm clear stone can be replaced in its entirety with Granular 'A' so long as a minimum 10mil poly-vapour barrier is used below the slab base. However, these do not replace the floor manufacturers' specific requirement(s) for a moisture and vapour barrier. A suitable non-woven geotextile filter (Terrafix 360R or equivalent approved by Green Geotechnical) must be installed (with a minimum 900mm overlap) below the capillary moisture break to properly filter the slab base from the subgrade. Otherwise, this could result in the loss of ground supporting the slab and clogging of the slab base.

Perimeter weeping drains (filtered) are recommended to be installed leading to positive outlets such as sump pumps in the below-grade level. Normal damp proofing with Miradrain is recommended.



The basement drainage system is a critical structural element since it keeps water pressure from acting on the basement floor slab or on the foundation walls, in addition to keeping moisture out of the basement. The size and arrangement of the pump system and battery backup system should be designed to be adequate to accommodate the anticipated groundwater and storm event flows.

Regardless of the approach to floor slab construction, the floor slabs that are to have bonded floor finishes (such as tiles with adhesives) should be provided with a capillary moisture and vapour barrier and drainage layer. The floor manufacturers have specific requirements for moisture and vapour barrier; therefore, the floor designer/architect must ensure that a provision of appropriate moisture and vapour barrier conforming to specific floor finish product requirements is incorporated in the project specifications. Adequate testing must be carried out to ensure acceptable levels of moisture and relative humidity in the concrete slab prior to the installation of floor finish(es).

4.3 Earthquake Design Parameters

The Ontario Building Code stipulates the methodology for earthquake design analysis. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification.

Seismic hazard is defined in the 2024 Ontario Building Code (OBC 2024) by uniform hazard spectra (UHS) at spectral coordinates of 0.2s, 0.5s, 1.0s and 2.0s and a probability of exceedance of 2% in 50 years. The OBC method uses a site classification system defined by the average soil/bedrock properties (e.g., shear wave velocity (v_s), Standard Penetration Test (SPT) resistance, and undrained shear strength (s_u) in the top 30 meters of the site stratigraphy below the foundation level, as set out in the Ontario Building Code. There are 6 site classes from A to F, decreasing in ground stiffness from A, hard rock, to E, soft soil; with site class F used to denote problematic soils (e.g., sites underlain by thick peat deposits and/or liquefiable soils). The site class is then used to obtain peak ground acceleration (PGA), peak ground velocity (PGV) site coefficients F_a and F_v , respectively, used to modify the UHS to account for the effects of site-specific soil conditions.

Based on the above, it is recommended that the site designation for seismic analysis be **Site Class X_c** , as per the 2024 Ontario Building Code. It should be noted that the above site seismic designation is estimated on the basis of rational analysis of the undrained shear strength information obtained from the boreholes advanced at the site only up to about 6.4m depth below grade.

The values of the site coefficient for design spectral acceleration at period T , $F(T)$, and of similar coefficients $F(PGA)$ and $F(PGV)$ shall conform to Tables 4.1.8.4.B. to 4.1.8.4.I. using linear interpolation for intermediate values of PGA.



4.4 Lateral Earth Pressure Design Parameters

The appropriate values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows:

Stratum/Parameter	γ	ϕ	K_a	K_o	K_p
Compact Granular Fill Granular 'B' (OPSS.MUNI 1010)	21	32	0.31	0.47	3.25
Earth Fill	18	28	0.36	0.53	2.77
Glacial Till (Dense to Very Dense)	20	36	0.26	0.41	3.85

where:

- γ = bulk unit weight of soil (kN/m³)
- ϕ = internal angle of friction (degrees)
- K_a = Rankine active earth pressure coefficient (dimensionless)
- K_o = Rankine at-rest earth pressure coefficient (dimensionless)
- K_p = Rankine passive earth pressure coefficient (dimensionless)

The above earth pressure parameters pertain to a horizontal grade condition behind a retaining structure. Values of earth pressure parameters for an inclined retained grade condition will vary.

Walls subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

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

where,

- P = the horizontal pressure at depth, h (m)
- K = the earth pressure coefficient
- h_w = the depth below the groundwater level (m)
- γ = the bulk unit weight of soil, (kN/m³)
- γ' = the submerged unit weight of the exterior soil, ($\gamma - 9.8$ kN/m³)
- q = the surcharge loading (kPa)

The above equation pertains to a horizontal grade condition behind a retaining structure. Values of earth pressure against retaining structures for an inclined retained grade condition will vary.

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall that would otherwise act in conjunction with the earth pressure, this equation can be simplified to:



$$P = K[\gamma h + q]$$

Resistance to sliding of retaining structures is developed by friction between the base of the footing and the soil. This factored geotechnical resistance to friction (R_f) depends on the normal load on the soil at the base of the footing (N), the frictional resistance of the soil ($\tan \phi$), and the reduction factor per the CFEM 5th Edition (0.8 for cohesionless soils/rock and 0.6 for cohesive soils). The factored geotechnical resistance to friction (R_f) at ULS is based on the following equation:

$$R_f = \Phi N \tan \phi$$

where,	R_f	=	frictional resistance (kN)
	Φ	=	reduction factor (see paragraph above)
	N	=	normal load at base of footing (kN)
	ϕ	=	internal angle of friction (see table above)

4.5 Pavement Design

The pavement subgrade is expected to comprise of native, undisturbed soils, or clean earth fill compacted to a minimum of 98% of SPMDD. The exposed subgrade should be shaped and graded with a typical 3% cross-fall, directed towards continuous subdrains with inverts at least 0.3m below subgrade level.

All non-structural earth fill, organic-rich, and otherwise deleterious material should be sub-excavated. The pavement subgrade should be assessed (proof rolled with a heavy rubber-tired vehicle, if deemed feasible by Green Geotechnical) and approved (no rutting or major deflections) by Green Geotechnical to ensure stability prior to the placement of the pavement granular courses. All unstable areas will require sub-excavation and re-compaction or increased thickness of granular subbase. It should be noted that the **upper site soils generally have moderate to high frost susceptibility**. Therefore, adequate subgrade drainage is recommended (see enclosed Pavement Drainage Details in Appendix C). Failure to do so will result in a reduced pavement life.

Given the potential for frost impacts on the soils which will be present in the upper approximately ± 400 mm of the pavement subgrade below the recommended pavement structure outlined below, depending on site grading design, **consideration should be given to sub-excavating the upper approximately ± 400 mm of the pavement subgrade and replacing it with low to non-frost susceptible material (such as OPSS.MUNI 1010 Select Subgrade Material (SSM), Granular B, or 50mm CRLS)** in maximum 150mm lifts compacted to 98 percent SPMDD under full-time testing and supervision by Green Geotechnical. This could be done to extend the service life of the new pavement structure and reduce the amount of frost-susceptible pavement subgrade within the upper 80% of the frost penetration zone. Should this subgrade removal and reconstruction not be completed, it can be expected that, even with



proper construction practices, the pavement structure can be expected to deteriorate (heaving/cracks/rutting/potholes) at a faster rate, and will require maintenance measures, such as a route and seal program, at an earlier stage of its service life than if the subgrade removal and replacement had taken place.

Consideration can also be given to placing Biaxial GeoGrid (such as Terrafix TBX3000 or NX850) in the subgrade and between the subgrade and subbase granular course to bridge over variability in any underlying earth fill. This additional reinforcement (minimum 2 layers) will reduce the amount of rutting/deflections/settlements in the roadway.

Based on the soil conditions encountered during our investigation, we recommend the following pavement structure for light duty (light vehicle traffic) and heavy-duty (truck /fire route traffic) traffic areas:

Pavement Structural Layers	Min. Thickness (mm)		Compaction Requirements
	Light Duty Traffic	Heavy Duty Traffic	
Hot Mix Asphalt Surface Course, OPSS 1150 HL 3	50	50	as per OPSS 310
Hot Mix Asphalt Binder Course, OPSS 1150 HL 8 or HL 4	60 (HL 8) Or 50 (HL4)	80 (HL 8) Or 70 (HL 4)	
Base Course, OPSS.MUNI 1010, Granular A or 19mm CRLS	150	150	100 percent of Standard Proctor Maximum Dry Density (SPMDD) (ASTM D698)
Subbase Course, OPSS.MUNI 1010, Granular B 'Type II' or 50mm CRLS	450 *	450	98 percent of Standard Proctor Maximum Dry Density (SPMDD) (ASTM D698)

*As per Town of The Blue Mountains Engineering Standards – Pavement Design

The above design assumes that sub-drainage of the granular fill will be provided. This should consist of continuous subdrains leading to catch basins.

If the existing as-built pavement structure at the transition locations differs from the recommended design pavement structure, consideration should be given to constructing a frost taper at the joints between the new asphalt and the existing asphalt to mitigate frost effects



It should be reiterated that the subgrade soils are generally **moderately to highly frost susceptible**. The subdrains are considered a valuable protection against frost heave damage and subgrade softening particularly impacting the long-term performance of the pavement.

An adequate granular working surface would likely be required in order to minimize subgrade disturbance and protect its integrity in wet periods. The fill material may consist of granular type material with a moisture content within ± 2 percent of optimum moisture content. Fill materials should be placed and compacted, and the subgrade should be compacted to 98 percent of SPMDD.

The granular subbase and base fill materials should be compacted to a minimum of 98% and 100% of Standard Proctor Maximum Dry Density (SPMDD), respectively, placed in lifts of 150mm or less. Asphaltic concrete materials should be rolled and compacted based on density testing. Care should be taken that construction occurs in the driest summer periods, where possible.

Control of surface water is an important factor in achieving a good pavement life. The need for **adequate subgrade drainage cannot be over-emphasized**. The subgrade must be free of depressions and sloped (preferably at a minimum grade of 3 percent) to provide effective drainage toward subgrade drains. Grading adjacent to pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement. Continuous pavement subdrains should be provided along both sides of the driveway and drained into respective catch basins to facilitate drainage of the subgrade and the granular materials. The subdrain inverts should be maintained at least 0.3m below subgrade level. Continuous subdrains should also be provided for pavement areas along any curb-lines/sidewalks.

Sidewalks and concrete walkways should be provided with a minimum granular base thickness of 150mm, consisting of 19mm crushed stone conforming to OPSS 1010 Granular 'A,' compacted to 100% of SPMDD. The subgrade in the sidewalk and boulevard should be sloped to promote drainage to the nearest surface runoff drainage feature to help minimize concrete slab heaving.

For sidewalks which will minimize long term maintenance, consideration should also be given to supporting the concrete surface sidewalk on a minimum of 1.4m thick of non-frost susceptible material to help minimize frost heaving.

The above pavement design thicknesses are considered adequate for design traffic. However, if the pavement construction occurs in wet or inclement weather, it may be necessary to provide additional subgrade support for heavy construction traffic by increasing the thickness of the granular sub-base, base, or both. Further, traffic areas for construction equipment may experience unstable subgrade conditions. These areas may be stabilized utilizing additional thickness of granular materials.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures must be maintained to ensure that uniform



subgrade moisture and density conditions are achieved as much as possible when fill is placed, and the natural subgrade is not disturbed or weakened after it is exposed.

It should be noted that in addition to adherence of the above pavement design recommendations, a close control on the pavement construction process will also be required in order to obtain the desired pavement life. Therefore, it is required that regular inspection and testing by Green Geotechnical be conducted during the pavement construction to confirm material quality, stability, thickness, and to ensure adequate compaction.

4.6 Pipe Bedding

Trench bases are expected to consist primarily of native, undisturbed soils, or clean earth fill compacted to a minimum of 98% of SPMDD. The native, undisturbed site soils as well as Engineered Fill will generally be suitable for support of underground services with conventional Class 'B' granular bedding. Additional granular bedding may be necessary for stabilization of wet trench bases or particularly loose/soft areas. The granular bedding should consist of a well graded material such as Granular 'A'.

Excavation bases should be free of standing water prior to and during bedding and service placement. Depending on pipe invert and manhole design elevations and given the groundwater conditions at the site, **dewatering may be necessary for any open-trench service installation**. The project hydrogeologist and a dewatering contractor should be consulted to best determine methodologies.

Any soft, loose, or disturbed soils encountered as a result of surface water runoff/groundwater seepage or construction traffic should be subexcavated and replaced with suitably compacted granular fill. Additionally, any loose or deleterious fill or organics encountered below proposed pipe inverts should be subexcavated and replaced with suitable compacted bedding material. Granular 'A' bedding material should be placed in thin lifts and compacted to a minimum of 95% of SPMDD. If HL8 coarse aggregate or 19mm clear stone is used this will require light tamping only. However, it should be cautioned that this HL8 aggregate or clear stone should not be used directly against native deposits unless a geotextile fabric is also considered as a complete wrap to prevent migration of fines into the bedding from the surrounding fine soil. Without proper filtering, this loss of ground could result in loss of support to the pipes and settlement.

In areas where the soils become wet, unstable and dilatant (easily disturbed) such as saturated silts, clays and water bearing granular soils, careful construction techniques and dewatering should be followed. If the pipes are laid on disturbed, dilatant soil, significant post-construction settlements could occur after the trenches are backfilled. In such cases, disturbed soils must be removed. The bottom of wet trenches will have to be stabilized by dewatering. The placement of a thin layer of lean mix concrete or a 'mud slab' may be considered to prevent heaving of sensitive or easily disturbed sub-soils and prevent



disturbance of sensitive sub-soils due to construction activity. If a 'mud slab' option is not used, then increasing the Class 'B' type bedding thickness in order to stabilize the subgrade soil is recommended.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation and Backfill

Excavations must be carried out in accordance with the Occupational Health and Safety Act, Ontario Regulation 213/91 (as amended), Construction Projects, Part III – Excavations, Sections 222 through 242. These regulations designate four (4) broad classifications of soils to stipulate appropriate measures for excavation safety. For practical purposes, earth fill and loose native site soils are classified as Type 3 soil above and Type 4 soil below the groundwater table. Dense native site soils are to be classified as Type 2 soil above and Type 4 soil below the groundwater table.

Where workers must enter excavations advanced deeper than 1.2m, the trench walls should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects. The regulation stipulates safe slopes of excavation by soil type as follows:

Soil Type	Base of Slope	Steepest Slope Inclination
1	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	from bottom of trench	1 horizontal to 1 vertical
4	from bottom of trench	3 horizontal to 1 vertical

Minimum support system requirements for steeper excavations are stipulated in the Occupational Health and Safety Act and Regulations for Construction Projects, and include provisions for timbering, shoring and moveable trench boxes.

Excavation within the native till soils is expected to be difficult, and will likely require ripping buckets/equipment, given the dense to very dense till subsurface conditions. Larger size particles (cobbles and boulders) are present in the native soils. The size and distribution of cobbles/boulders/obstructions cannot be predicted with boreholes, as the sampler size is insufficient to secure representative particles of this size. The risk and responsibility for the removal and disposal of cobbles/boulders/obstructions and appropriate use of equipment must be addressed in the contract documents for foundations, excavations and shoring contractors.

Structures such as existing old wells/cisterns, drainage tiles, boulders, rubble, etc. may also be present at the site. The presence of these structures if encountered, will likely affect construction methods and cost if they exist within proposed structure areas.



The surficial earth fill and native soil layers with amounts of organics should not be reused as backfill in settlement sensitive areas (beneath floor slabs, trench backfill and pavement areas). However, these materials may be stockpiled and reused for landscaping purposes.

Unsaturated native medium to coarse grained soils, that are free of organics, boulders, and deleterious inclusions, encountered above the groundwater table are considered to be suitable for reuse as backfill, so long as moisture content levels are within 2 percent of the optimum moisture content level. Otherwise, consideration should be given to importing granular type fill to achieve adequate compaction in Engineered Fill and trench backfill activities, where use of the site's coarser grained soils is not feasible.

If the native soils become excessively wet, disturbed, unsuitable for compaction, or encountering difficulties achieving adequate compaction, **imported granular fill should be considered for trench backfill and pavement subgrade construction.** Otherwise, if the asphalt binder course is laid shortly following the completion of the trench backfilling operations with fine-grained site soils, any settlement that may be reflected by subsidence will likely be observed on the surface of the binder asphalt. This can be compensated for by placing an additional thickness of binder asphalt or by padding. If possible, **the surface course asphalt should not be placed over the binder course asphalt for at least twelve (12) months.** Where scheduling requires that the surface course be placed over the binder course, asphalt trench backfill settlement may be reflected by subsidence and possible cracking of the finished pavement surface. Local repairs may be required at a later date. **An increased maintenance period is recommended.**

It should be noted that native soils excavated from below the prevailing groundwater level (if encountered) will likely be too wet to compact to required compaction specification.

The moisture content of the backfill soils should be within 2 percent of their optimum moisture content. Any soil material with in-situ moisture content higher than 2 percent of its optimum moisture content could be put aside to dry or be tilled to reduce the moisture content so that it can be effectively compacted. Alternatively, materials of higher moisture content could be wasted and replaced with imported material which can be readily compacted.

In settlement sensitive areas, the backfill should consist of clean earth and should be placed in lifts of 150mm thicknesses or less, and heavily compacted to a minimum of 98 percent SPMDD at a water content close to optimum. The soils encountered at the site as well as imported granular fill soils will be best compacted with a heavy smooth drum type roller.

It should be noted that the site soils vary widely in permeability and will be difficult to handle and compact should they become wetter as a result of inclement weather or seepage. Hence, it can be expected that earthworks will be difficult during the wet periods (i.e., spring and fall) of the year and may result in increased earthwork costs.



5.2 Groundwater Control

The stabilized groundwater levels ranged between approximately $\pm 0.59\text{m}$ and $\pm 2.62\text{m}$ below grade (approx. elev. $\pm 216.91\text{m}$ to $\pm 210.88\text{m}$) in July of 2026. However, long term monitoring was beyond the scope of this investigation, and the seasonal water table may fluctuate. Seepage above the groundwater levels should be handled adequately using filtered sump pumps placed at the base of the excavations for most of the site. More significant dewatering efforts will be required at and below the groundwater levels, and particularly in sandy/gravelly soil pockets. Depending on grading and servicing design, **dewatering may be required**. The project hydrogeologist and a dewatering contractor should be consulted to best determine methodologies.

The sands will yield high volumes of water and the glacial till consisting of various types of soils may yield varying amounts of groundwater seepage into the excavation depending upon the type of soil and the depth of excavation. The amount of water seepage is expected to increase with the depth of excavation. Groundwater control will be required for excavations extending into/or below the prevailing groundwater level, prior to and during the subsurface construction. Without positive groundwater control, the subgrade in wet permeable soils will become weak/disturbed and lose its integrity to support. Consideration should be given to install a skim coat of lean concrete (mud-slab) to preserve the subgrade integrity in these areas, and to provide a working platform, as deemed appropriate by the project geotechnical engineer during construction.

All finished floor surfaces are recommended to be at least 0.5m above the prevailing seasonally high groundwater level.

It should be noted that excavations carried through and below the water bearing soils will likely experience loosening and sloughing of the base and sides unless the groundwater level is lowered first to at least 1.0m below the bottom of the excavation.

5.3 Quality Control

The foundation installations must be reviewed in the field by Green Geotechnical, the geotechnical engineer, as they are constructed. The onsite review of the condition of the foundation subgrade as the foundations are constructed is an integral part of the geotechnical design function and is required by Section 4.2.2.2 of the Ontario Building Code. If Green Geotechnical is not retained to carry out foundation evaluations during construction, then Green Geotechnical accepts no responsibility for the performance or non-performance of the foundations, even if they are ostensibly constructed in accordance with the conceptual design advice contained in this report.

The long-term performance of the pavement is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade



moisture and density conditions are achieved as much as practically possible. The design advice in this report is based on an assessment of the subgrade support capabilities as indicated by the boreholes. These conditions may vary across the site depending on the final design grades and therefore, the preparation of the subgrade and the compaction of all fill should be monitored by Green Geotechnical at the time of construction to confirm material quality, thickness, and to ensure adequate compaction.

The requirements for fill placement on this project have been stipulated relative to Standard Proctor Maximum Dry Density (SPMDD). In situ determinations of density during fill placement on site are required to demonstrate that the specified placement density is achieved. Green Geotechnical can provide sampling and testing services for the project as necessary, with our qualified technical staff.

Concrete will be specified in accordance with the requirements of CAN3 - CSA A23.1. Green Geotechnical maintains a concrete laboratory and can provide concrete sampling and testing services for the project as necessary.

6.0 LIMITATIONS AND REPORT USE

6.1 Procedures

This subsurface investigation has been carried out using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by Green Geotechnical and other engineering practitioners, working under similar conditions and subject to the time, financial and physical constraints applicable to this project. The discussions and recommendations that have been presented are based on the factual data obtained by Green Geotechnical.

It must be recognized that there are special risks whenever engineering or related disciplines are applied to identify subsurface conditions. Even a comprehensive sampling and testing programme implemented in accordance with the most stringent level of care may fail to detect certain conditions. Green Geotechnical has assumed for the purposes of providing design parameters and advice, that the conditions that exist between sampling points are similar to those found at the sample locations. The conditions that Green Geotechnical has interpreted to exist between sampling points can differ from those that actually exist.

It may not be possible to drill a sufficient number of boreholes or sample and report them in a way that would provide all the subsurface information that could affect construction costs, techniques, equipment and scheduling. Contractors bidding on or undertaking work on the project should be directed to draw their own conclusions as to how the subsurface conditions may affect them, based on their own investigations and their own interpretations of the factual investigation results, cognizant of the risks



implicit in the subsurface investigation activities so that they may draw their own conclusions as to how the subsurface conditions may affect them.

6.2 Changes in Site and Scope

It must also be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions. Groundwater levels are particularly susceptible to seasonal fluctuations.

The discussion and recommendations are based on the factual data obtained from this investigation made at the site by Green Geotechnical and are intended for use by the owner and its retained designers in the design phase of the project. If there are changes to the project scope and development features, the interpretations made of the subsurface information, the geotechnical design parameters and comments relating to constructability issues and quality control may not be relevant or complete for the revised project. Green Geotechnical should be retained to review the implications of such changes with respect to the contents of this report.

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It is recognized that the regulatory agencies in their capacities as the planning and building authorities under Provincial statutes, will make use of and rely upon this report, cognizant of the limitations thereof, both expressed and implied.

We trust this report meets your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Sincerely,



Green Geotechnical Ltd.



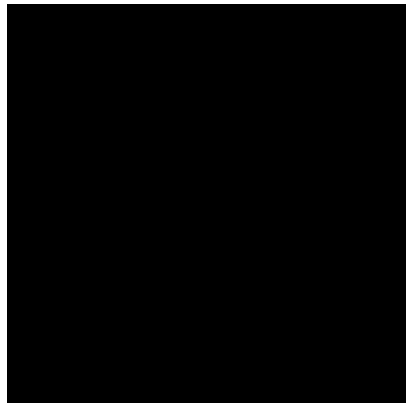
Alex Arcuri B.B.R.M.
Project Coordinator



Tristan Kutchar, P.Eng.
Geotechnical Team Lead



Steven Green, P.Eng
President



FIGURES



Title:

FIGURE 1: SITE LOCATION PLAN

Project:
Home Farm Rental Development, The Blue Mountains, ON

Reference:
Map Data © 2026 Google Earth

Drawn By:
AA

Reviewed By:
TK

Project Number:
26-062-01

Date:
JULY 2026



576 Bryne Drive, Unit 'O', Barrie, ON
705-503-9626
info@greengeo.ca

LEGEND

Borehole



Monitoring Well



Title:

FIGURE 2A: APPROXIMATE BOREHOLE LAYOUT PLAN (EXSISTNG CONDITIONS)

Project:
Home Farm Rental Development, The Blue Mountains, ON

Reference:
Map Data © 2026 Google Earth

Drawn By:
AA

Reviewed By:
TK

Project Number:
26-062-01

Date:
JULY 2026



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705-503-9626
info@greengeo.ca



LEGEND

Borehole 

Monitoring Well 

Title: Figure 2B: Proposed Borehole Layout Plan (Proposed Conditions)			
Project: Home Farm Rental Development, The Blue Mountains, ON		Drawn By: AA	Project Number: 26-062-01
Reference: Concept Site Plan, Dwg. No, CON-3, prepared by RN Design		Reviewed By: TK	Date: JULY 2026
		 576 Bryne Drive, Unit 'O', Barrie, ON 705-503-9626 info@greengeo.ca	

APPENDICIES

APPENDIX A

SYMBOLS and ABBREVIATIONS USED ON BOREHOLE LOGS

PROPORTIONAL TERMS

Term	Proportion
trace	0 to 10%
some	10 to 20%
-y or -ey	20 to 35%
and	>35%

MOISTURE DESCRIPTION

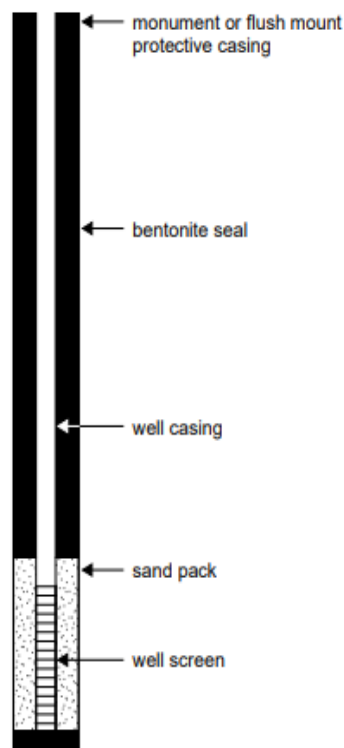
Term	Description
dry	No observable pore moisture
moist	Inferred pore moisture, no observable free water
wet	Weakened by moisture, free water on hands when handling

CONSISTENCY of COARSE-GRAINED SOILS

Consistency	Blow Count N
very loose	< 4
loose	4 to 10
compact	10 to 30
dense	30 to 50
very dense	> 50

Notes: SPT/DCPT 'N' values are 'raw' field blow counts, measured for 300 mm (12 inch) of penetration.

WELL LEGEND



CONSISTENCY of FINE-GRAINED SOILS

Consistency	Blow Count N	Undrained Shear Strength S_u (kPa)	
very soft	< 2	< 12	Easily exudes between fingers when squeezed
soft	2 to 4	12 to 25	Easily intended by fingers
firm	4 to 8	25 to 50	Can be intended by strong finger or thumb pressure
stiff	8 to 16	50 to 100	Cannot be intended by thumb pressure
very stiff	16 to 30	100 to 200	Can be intended by thumb nail
hard	> 30	> 200	Difficult to intend by thumb nail

ASTM STANDARDS

ASTM D1568 Standard Penetration Test (SPT) - Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760mm. The blows required to drive the split spoon 300mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

ASTM D1568 Cone Penetration Test (CPT) - Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm² Into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT) -

Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST) -

Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

SYMBOL	Description
AS	Auger Sample
CC	Continuous Core Sample
DC	Drill Cuttings
GS	Grab Sample
SS	SPT Spoon Sample
TS	Thin-walled / Shelby Sample
WS	Water Sample

SYMBOL	Description
▼	Measured in a piezometer or well
▽	Inferred water level based on observations during investigation

BOREHOLE LOG: BH1

Project: Home Farm Rental Developments

Project No.: 26-062-01

Site Address: Blue Mountains, ON

Client: MacPherson Builders

Easting: 553968

Northing: 4929547

Elevation: 214 m

Logged By: AA

Reviewed By: TK

Investigation Date: 2026-06-15

DEPTH	SOIL STRATIGRAPHY	SYMBOL	SAMPLES		STANDARD PENETRATION TEST (SPT)	NOTES/GRAIN SIZE (%)	MONITORING WELL	MOISTURE PLOT
			NO.	SYMBOLS				
					10 20 30 40			
Ground Surface at 214 m EL 214.00 m								
0	FILL sand, some silt, some gravel, trace to some clay, trace organics, loose, moist, brown		1	SS	10		#1	
	0.60 m EL 213.40 m							
1	SILTY SAND TO SANDY SILT TILL some gravel to gravelly, trace to some clay, occasional cobbles, very dense, moist, brown to grey		2	SS	(51)			
2			3	SS	(REF)	N: 50/150mm		
			4	SS	(71)			
3			5	SS	(REF)	N: 82/275mm Gr: 24%, Sa: 30%, Si: 35%, Cl: 11%		
4			6	SS	(REF)	N: 91/250mm		
5								
6								
6	6.10 m EL 207.90 m							
	BH1 Terminated at 6.1 m		7	SS	(REF)	N: 86/250mm		
7								



Notes:

Borehole was open and dry upon completion of drilling.
Stabilized water level was measured at 0.88 mbg (Elev. 213.62) on 2026/07/16.

BOREHOLE LOG: BH2

Project: Home Farm Rental Developments

Project No.: 26-062-01

Site Address: Blue Mountains, ON

Client: MacPherson Builders

Easting: 553889

Northing: 4929563

Elevation: 215 m

Logged By: AA

Reviewed By: TK

Investigation Date: 2026-06-15

DEPTH	SOIL STRATIGRAPHY	SYMBOL	SAMPLES		STANDARD PENETRATION TEST (SPT)	NOTES/GRAIN SIZE (%)	MONITORING WELL	MOISTURE PLOT
			NO.	SYMBOLS				
					10 20 30 40			
Ground Surface at 215 m EL 215.00 m								
0	TOPSOIL 0.10 m EL 214.90 m FILL silty sand, trace gravel, trace clay, trace organics, compact, moist, dark brown 0.60 m EL 214.40 m SILTY SAND TO SANDY SILT TILL some gravel to gravelly, trace to some clay, occasional cobbles, very dense, moist, brown to grey		1	SS	13		#1	
1			2	SS	(56)			
2			3	SS	(60)			
3			4	SS	(REF)	N: 50/75mm		
4			5	SS	(REF)	N: 50/125mm		
5			6	SS	(66)			
6	6.10 m EL 208.90 m BH2 Terminated at 6.1 m		7	SS	(REF)	N: 50/0mm		
7								



Notes:

Borehole was open and dry upon completion of drilling.

BOREHOLE LOG: BH3

Project: Home Farm Rental Developments

Project No.: 26-062-01

Site Address: Blue Mountains, ON

Client: MacPherson Builders

Easting: 553887

Northing: 4929612

Elevation: 213.5 m

Logged By: AA

Reviewed By: TK

Investigation Date: 2026-06-15

DEPTH	SOIL STRATIGRAPHY	SYMBOL	SAMPLES		STANDARD PENETRATION TEST (SPT)	NOTES/GRAIN SIZE (%)	MONITORING WELL	MOISTURE PLOT	
			NO.	SYMBOLS				W _{PL}	W _{LL}
					10 20 30 40			20 40 60 80	
Ground Surface at 213.5 m EL 213.50 m									
0	FILL silt, some sand, some clay, trace to some gravel, trace organics, loose, moist, dark brown		1	SS	10				
	0.60 m EL 212.90 m								
1	SILTY SAND some gravel, trace clay, very dense, moist, brown		2	SS	(56)				
	1.20 m EL 212.30 m								
2	SILTY SAND TO SANDY SILT TILL some gravel to gravelly, trace to some clay, occasional cobbles, very dense, moist, brown to grey		3	SS	(REF)	N: 50/100mm Gr: 27%, Sa: 29%, Si: 32%, Cl: 12%			
			4	SS	(REF)	N: 50/150mm			
3			5	SS	(REF)	N: 86/250mm			
4			6	SS	(REF)	N: 50/100mm			
5	BH3 Terminated at 4.8 m on inferred boulder								
6									
7									



Notes:

Borehole was open and dry upon completion of drilling.
Stabilized water level was measured at 2.62 mbg (Elev. 213.38) on 2026/07/16.

BOREHOLE LOG: BH4

Project: Home Farm Rental Developments

Project No.: 26-062-01

Site Address: Blue Mountains, ON

Client: MacPherson Builders

Easting: 553937

Northing: 4929496

Elevation: 217.5 m

Logged By: AA

Reviewed By: TK

Investigation Date: 2026-06-15

DEPTH	SOIL STRATIGRAPHY	SYMBOL	SAMPLES		STANDARD PENETRATION TEST (SPT)	NOTES/GRAIN SIZE (%)	MONITORING WELL	MOISTURE PLOT
			NO.	SYMBOLS				
					10 20 30 40			
Ground Surface at 217.5 m EL 217.50 m								
0	FILL sandy silt, some clay, trace gravel, trace organics, compact, moist, brown		1	SS	11			
	0.60 m EL 216.90 m							
1	SILTY SAND TO SANDY SILT TILL some gravel to gravelly, trace to some clay, occasional cobbles, very dense, moist, brown		2	SS	20			
2			3	SS	(REF)	N: 50/150mm		
			4	SS	(REF)	N: 50/100mm		
3			5	SS	(REF)	N: 50/150mm		
4			6	SS	(REF)	N: 98/200mm Gr: 21%, Sa: 28%, Si: 37%, Cl: 14%		
5			7	SS	(REF)	N: 50/75mm		
6								
7	BH4 Terminated at 6.1 m							
	6.40 m EL 211.10 m							

Notes:

Borehole caved to 5.4 mbg upon completion of drilling. Unstabilized water level was measured at 4.6 mbg (Elev. 212.89) upon completion of drilling. Stabilized water level was measured at 0.59 mbg (Elev. 216.91) on 2026/07/16.



APPENDIX B

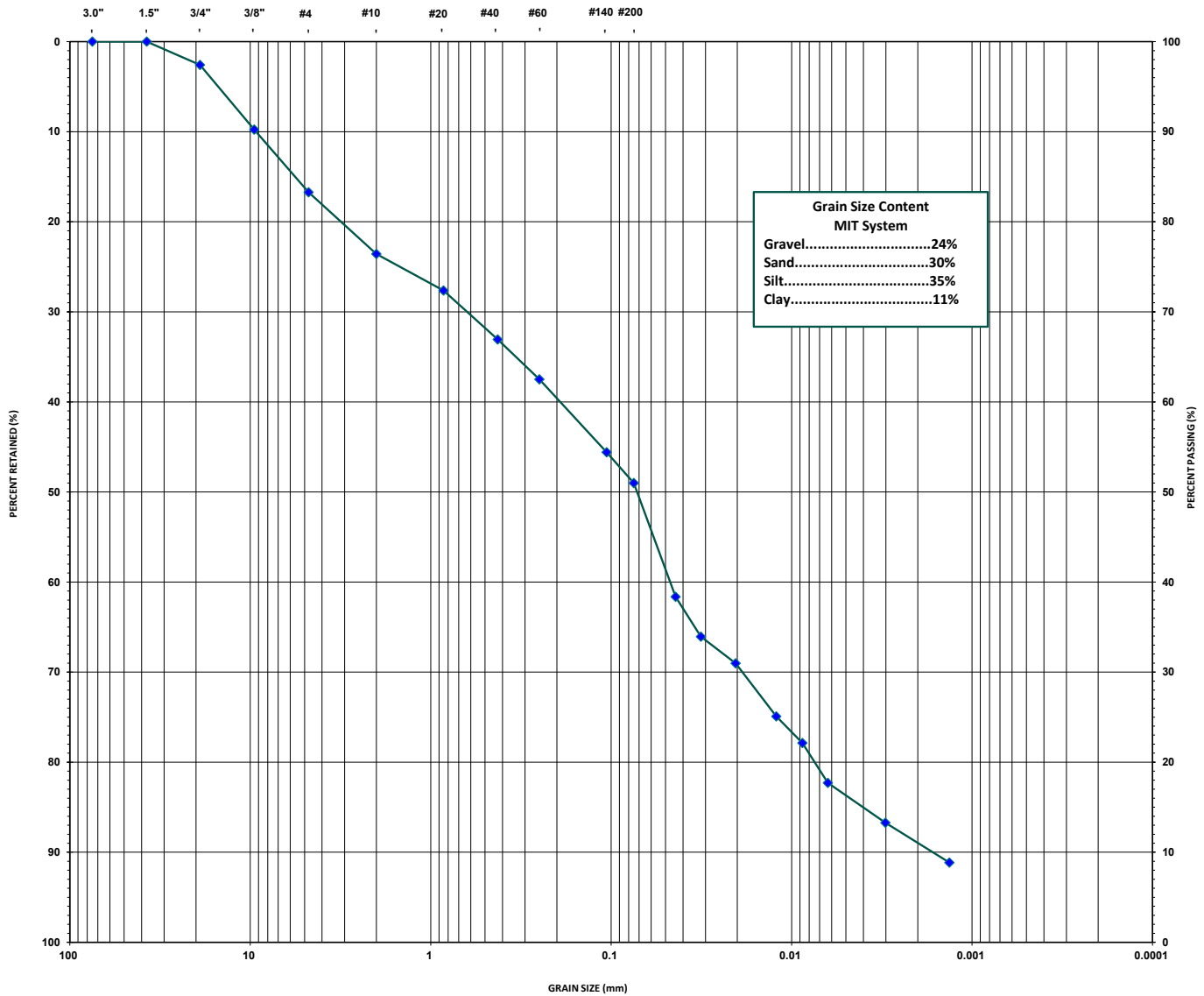


576 Bryne Drive, Unit 'O'
Barrie, ON
L4N 9P6

Hydrometer Analysis Form

Project Number:	26-062-01	Location:	Town of the Blue Mountains, ON	Project Name:	Home Farm Rental Development
Sample Date:	June 15 2026	Test Date:	July 13 2026	Client Name:	MacPherson Builders Limited
Sample Description:	Sandy gravelly silt, some clay	Lab Number:	1053	Tested By:	J. Duguid
Borehole No.:	1	Sample Depth:	3.0 to 3.66m	Sampled By:	AA
Sample Location:	Town of the Blue Mountains, ON	Sample Number:	5		
Estimated Septic T-Time:		N/A		Unified Soil Classification	SM

Grain Size Distribution
U.S. Standard Sieve Sizes



MIT System	Gravel	Coarse	Medium	Fine	Silt	Clay
Unified System	Coarse	Fine	Coarse	Medium	Fine	Silt and Clay

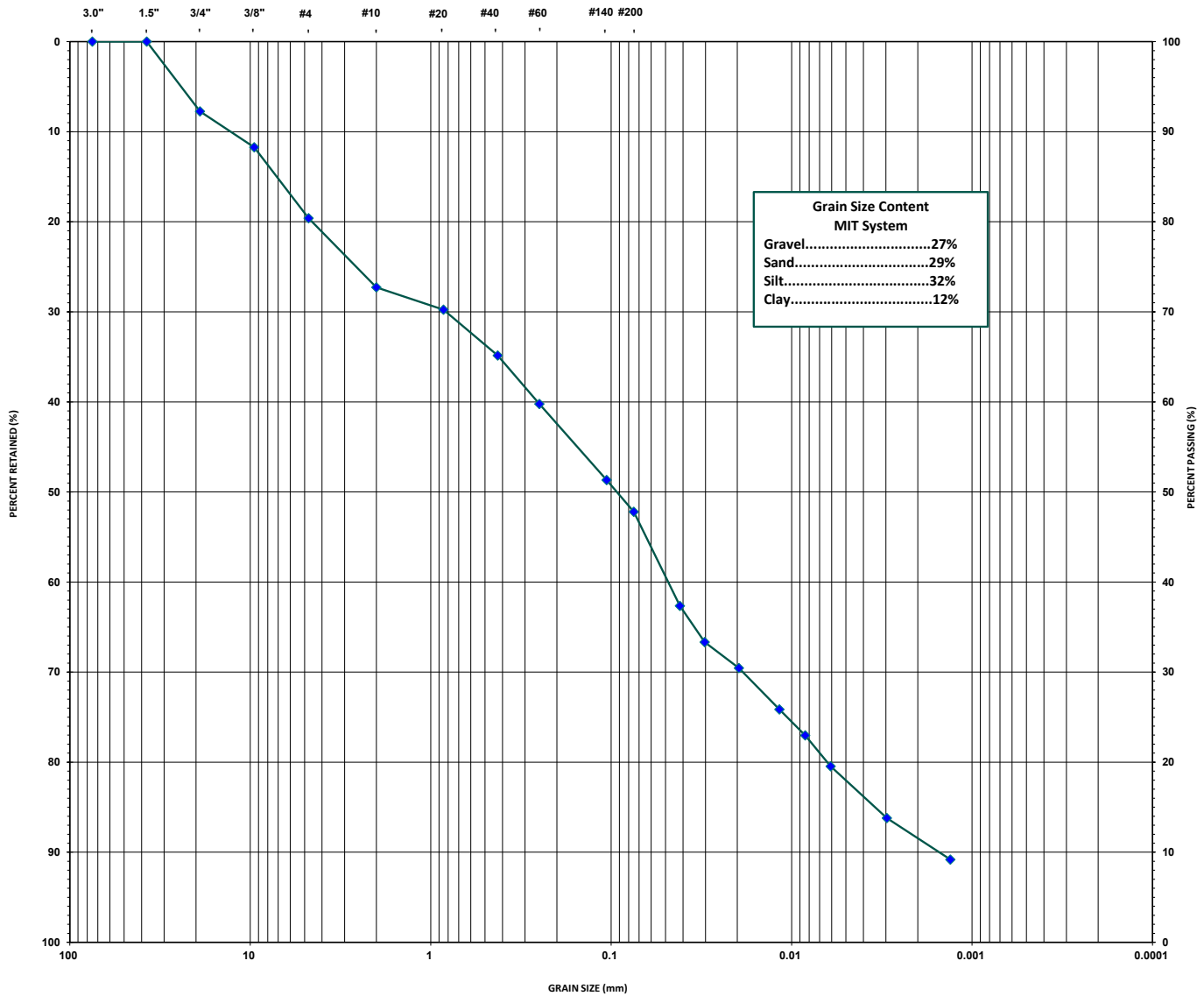


576 Bryne Drive, Unit 'O'
Barrie, ON
L4N 9P6

Hydrometer Analysis Form

Project Number:	26-062-01	Location:	Town of the Blue Mountains, ON		Project Name:	Home Farm Rental Development	
Sample Date:	June 15 2026	Test Date:	July 13 2026		Client Name:	MacPherson Builders Limited	
Sample Description:	Gravelly, sandy silt, some clay		Lab Number:	1052	Tested By:	J. Duguid	
Borehole No.:	3	Sample Depth:	1.5 to 2.1m		Sampled By:	AA	
Sample Location:	Town of the Blue Mountains, ON		Sample Number:	3			
Estimated Septic T-Time:	N/A			Unified Soil Classification		SM	

Grain Size Distribution
U.S. Standard Sieve Sizes



MIT System	Gravel		Coarse	Medium	Fine	Silt	Clay
Unified System	Coarse	Fine	Coarse	Medium	Fine	Silt and Clay	
	Gravel		Sand				

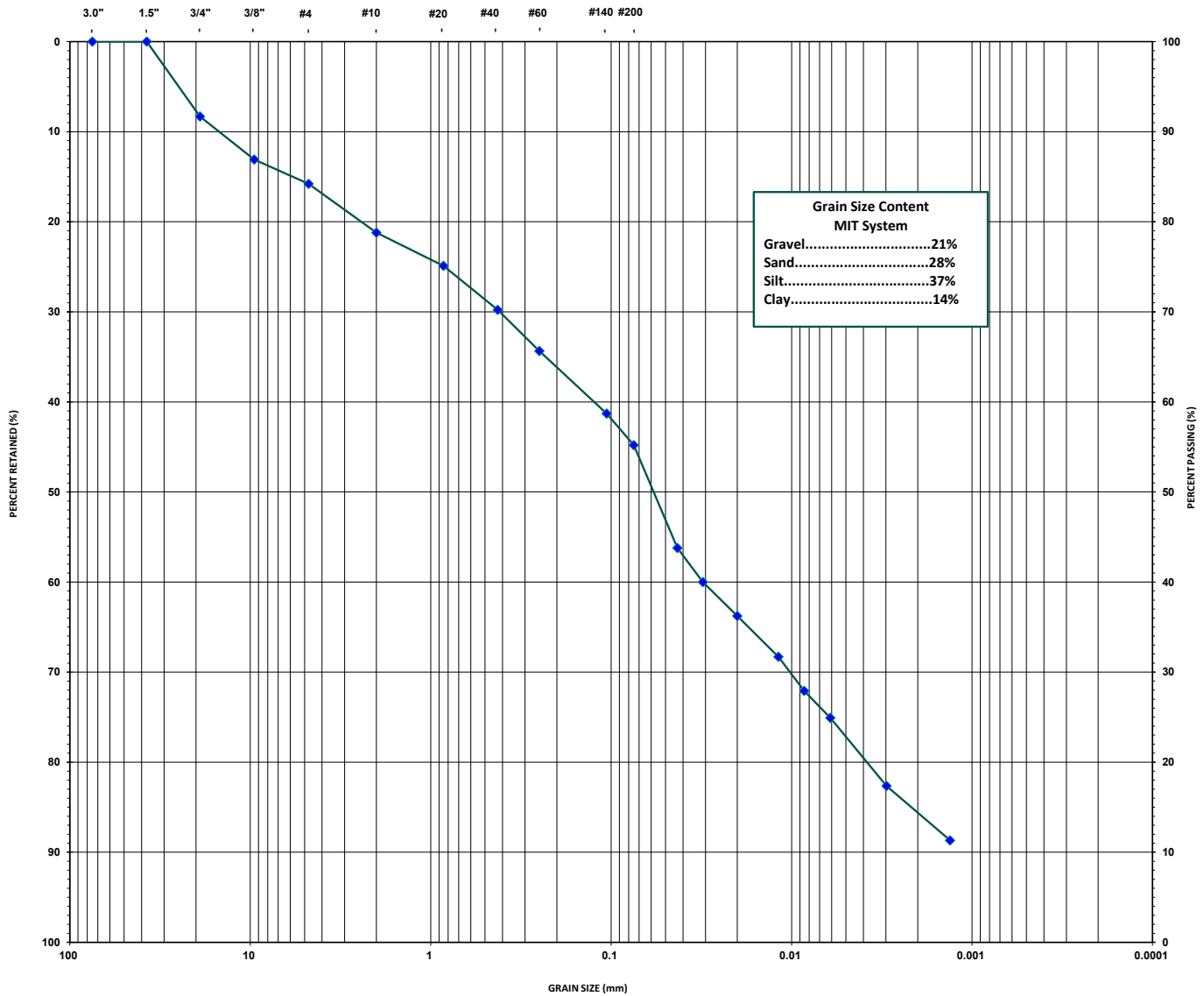


576 Bryne Drive, Unit 'O'
Barrie, ON
L4N 9P6

Hydrometer Analysis Form

Project Number:	26-062-01	Location:	Town of the Blue Mountains, ON		Project Name:	Home Farm Rental Development	
Sample Date:	June 15 2026	Test Date:	July 13 2026		Client Name:	MacPherson Builders Limited	
Sample Description:	Gravelly, sandy silt, some clay		Lab Number:	1054	Tested By:	J. Duguid	
Borehole No.:	4	Sample Depth:	4.6 to 5.2m		Sampled By:	AA	
Sample Location:	Town of the Blue Mountains, ON		Sample Number:	6			
Estimated Septic T-Time:	N/A			Unified Soil Classification		ML	

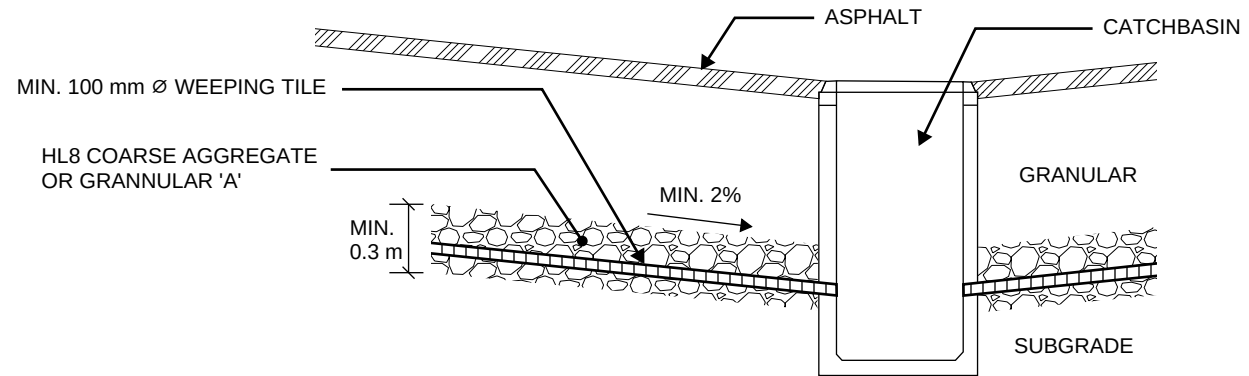
Grain Size Distribution
U.S. Standard Sieve Sizes



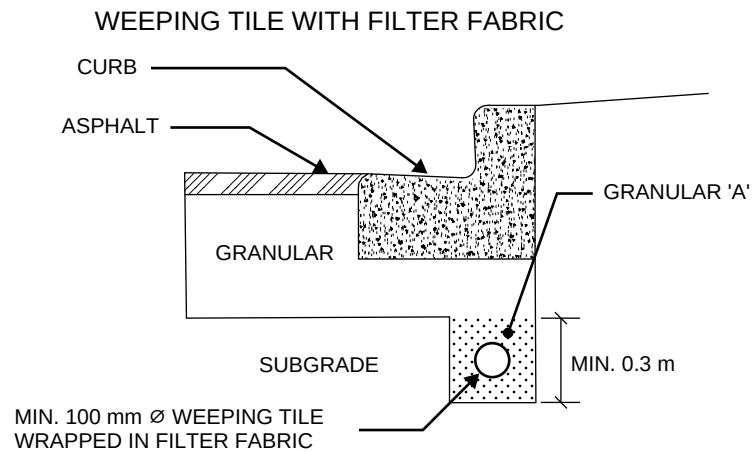
MIT System	Gravel		Coarse	Medium	Fine	Silt		Clay
Unified System	Coarse	Fine	Coarse	Medium	Fine	Silt and Clay		
	Gravel		Sand					

APPENDIX C

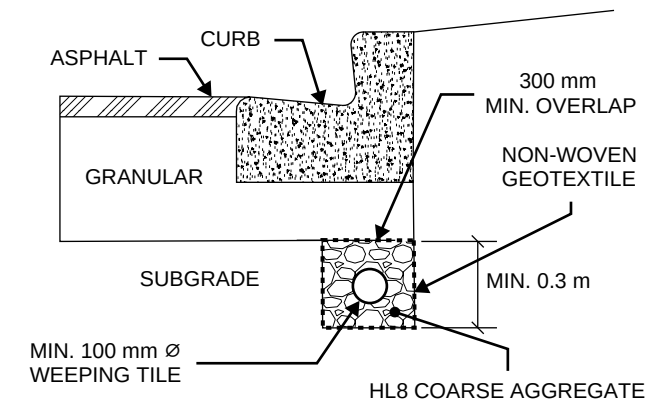
LONGITUDINAL SUBDRAIN CONNECTION TO CATCHBASIN



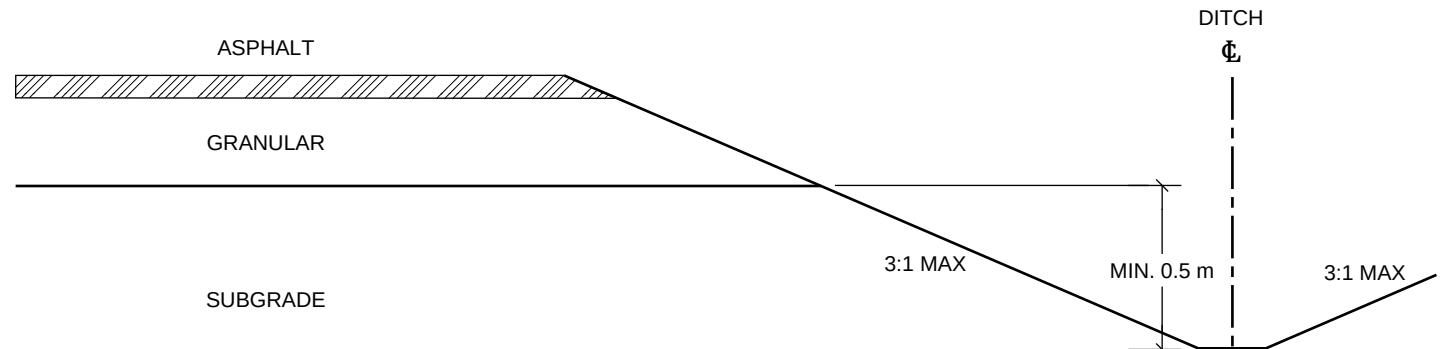
URBAN CROSS SECTIONS



WEeping TILE WITHOUT FILTER FABRIC



RURAL CROSS SECTIONS



Title:

PAVEMENT DRAINAGE ALTERNATIVES



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705-503-9626
info@greengeo.ca

APPENDIX D

ENGINEERED FILL SPECIFICATIONS

Overview

- Engineered Fill is a pre-approved material which has been placed under the full-time supervision of Green Geotechnical, including testing and inspection during construction to ensure subgrade stability, material quality, proper lift thickness, and adequate compaction have all been maintained.
- Engineered Fill is used to accommodate structural loads (such as for foundations, slabs, etc.) where site grades are being altered, or in order to accommodate structural design loads.
- Prior to concrete placement for footings and poured walls on Engineered Fill, Green Geotechnical must inspect the foundation subgrade soils, and reinforcing steel respectively.

Design

- Engineered fill material must be free of organic inclusions, construction debris, and any other deleterious material.
- Ideally, granular type soils, with less than 8% fines, such as OPSS 1010 Granular 'B,' are used.
- In sites where a high groundwater table or where wet conditions exist, (even with dewatering operations), in order to achieve stable layers and the specified compaction on the first one to two lifts, OPSS 1010 Granular 'B' Type II or 50 mm crusher run limestone may be advisable.
- The determination of whether the site soils are suitable for reuse as Engineered Fill, or if an imported material is to be used, is at the discretion of the opinion of the Geotechnical Engineer.
- Post construction settlement of the Engineered Fill is to be expected. The timeframe that this occurs varies based on the type of material used. Typically, time intervals of the following can be used:

	Self-Consolidation Settlement		Foundation Loading Settlement	
Material	Settlement Rate	Time Rate	Settlement Rate	Time Rate
Granular 'B' or Coarser	Minimal (0.2% D)	Immediate	Minor (0.5", 12mm)	Immediate
Fine Sand	Minimal (0.5% D)	1-50 hours	Minor (0.75", 19mm)	1-50 hours
Sandy Silt	Minor (0.75% D)	2-30 days	Minor (1", 25mm)	2-30 days
Clayey Silt	Moderate (1% D)	3-6 months	Moderate (1.25", 31mm)	3-6 months
Silty Clay	Major (1.5% D)	6-7 years	Major (1.5", 37mm)	6-7 years

D is the depth of the Engineered Fill

- It is imperative for avoiding excessive settlements that the construction of foundations take into account the post-construction settlement period.
- Engineered Fill is to extend a minimum of 1m beyond the base of any structure's foundations, and project down to the subgrade at a slope with a maximum steepness of 1H:1V.
- An allowable design bearing capacity of 150 kPa (SLS) can usually be used for Engineered Fill constructed on a stable, approved subgrade.
 - This is unless a different bearing capacity for the Engineered Fill has been recommended by the Geotechnical Engineer, based on the properties of the site soils.
- The Engineered Fill is to extend at least 1m above the highest foundation base elevation to provide the Engineered Fill at founding level(s) protection from frost, precipitation, runoff, wind, and weathering.
- Poured concrete footings are to be a minimum width of 0.6m for strip footings and 1.0m for individual footings.



- Reinforcing steel comprised of two (2) continuous 15M bars at the top and bottom of foundation walls, and 15M bars spaced at 0.3m in column pad footings, are required in all poured concrete foundations.

Construction

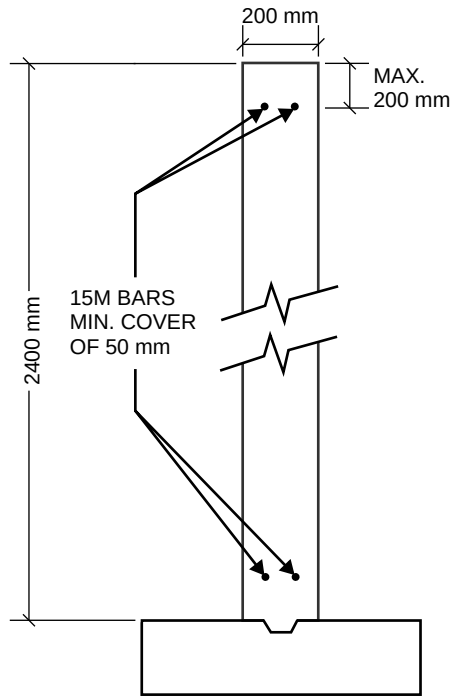
- Surveying should be done by the earthworks contractor or the surveying contractor to ensure that Engineered fill elevations and footprint are accurate and meet the specifications outlined in this document.
- The elevations should be provided to Green Geotechnical by the earthworks contractor or the surveying contractor at each placed lift of material, for recording compaction levels by elevation, and to ensure proper lift thickness.
- Topsoil and uncontrolled fill/deleterious material are to be excavated, leaving a stable, dry, native subgrade.
- Dewatering may be required, depending on the groundwater conditions at the site.
- Prior to the placement of any Engineered Fill, Green Geotechnical must approve the stability of the exposed native subgrade for Engineered Fill placement.
- Depending on the groundwater conditions and soil type at the site, a proof-roll with a heavy compaction roller or rubber-tire front-end loader with a full bucket may be required on the subgrade. Any noted unstable areas will have to be sub-excavated and brought back up with the placement of Engineered Fill.
- As previously mentioned, if wet conditions exist at the site, for the first one to two lifts of the Engineered Fill, the use of OPSS 101 Granular 'B' Type II or 50 mm crusher run limestone may be advisable.
- All material must be compacted to at least 98% SPMDD (Standard Proctor Maximum Dry Density) within 2% of OMC (Optimum Moisture Content).
- Green Geotechnical will take a sample of the Engineered Fill material to determine its SPMDD, OMC, and gradation.
- Green Geotechnical must test the compaction of the placed Engineered Fill at each lift.
- In wet site conditions, it is typically advisable that the first lift be static rolled, and that all subsequent lifts be compacted with vibration. In dry site conditions, compaction by vibration can occur at all lifts.
- Engineered Fill material shall be placed in maximum 150mm loose lifts.
 - The only exception to this is in the first one to two lifts placed in wet site conditions. Here, loose lifts shall be a maximum of 300mm-450mm.
- Engineered Fill should not be placed during months where freezing temperatures occur.

Certification

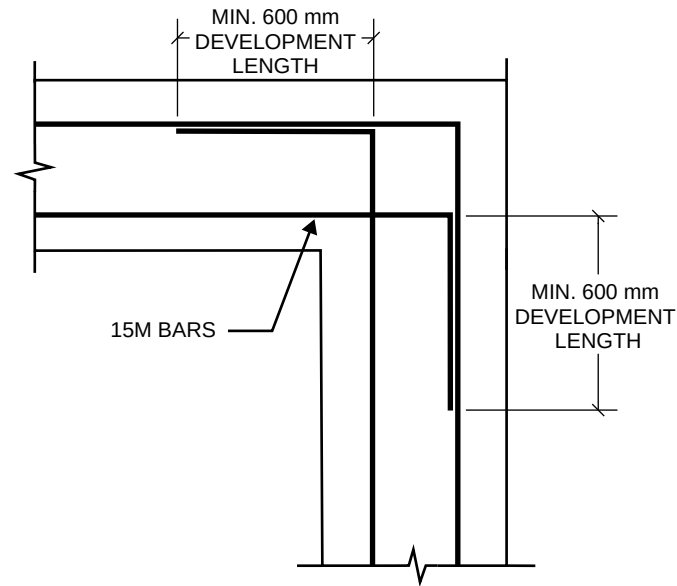
- Green Geotechnical must be present during Engineered Fill construction to approve the native subgrade, approve of and take a sample of the material, as well as record compaction and lift thickness at every lift.
 - Following this, a letter signed and sealed by a P.Eng. will be submitted certifying the Engineered Fill as being properly constructed, and displaying the field records.
- Green Geotechnical must inspect the foundation subgrade immediately prior to the placement of concrete for footings.
 - Following this, a letter signed and sealed by a P.Eng. will be submitted certifying the Engineered Fill foundation subgrade as being adequate to support the design bearing capacity.
- Green Geotechnical must inspect the reinforcing steel in the foundation walls prior to the placement of concrete. See the attached Typical Reinforced Wall Detail for more information.
 - Following this, a letter signed and sealed by a P.Eng. will be submitted certifying the reinforcing steel as being placed in accordance with the design.



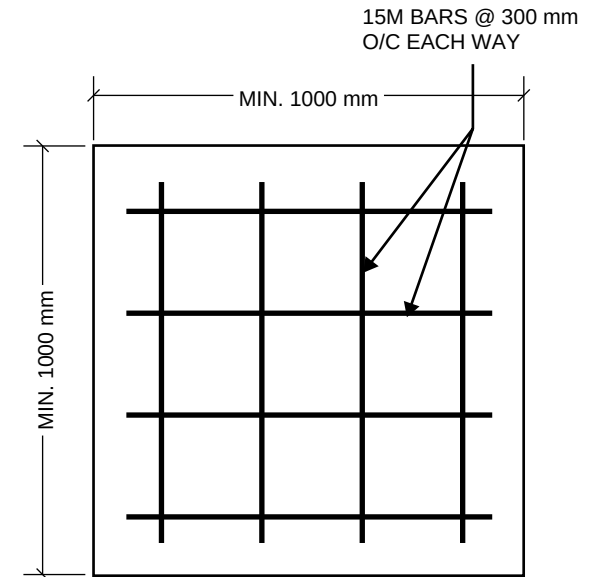
TYPICAL REINFORCED WALL



TYPICAL SPLICING AT CORNERS

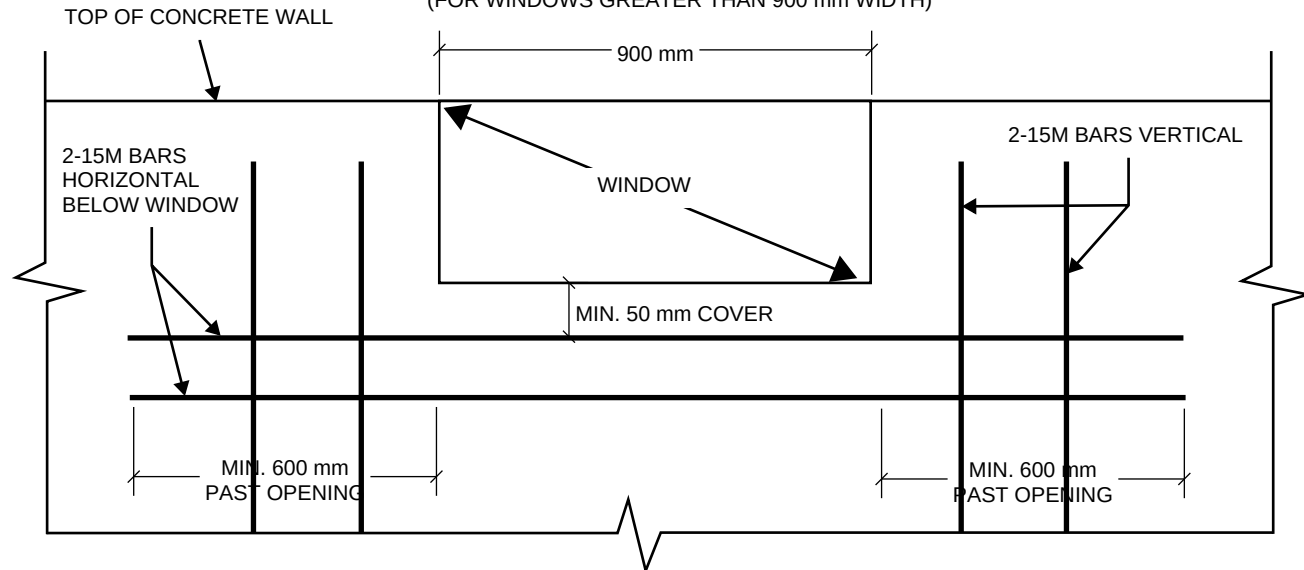


TYPICAL REINFORCEMENT OF COLUMN FOOTINGS



TYPICAL WINDOW REINFORCING

(FOR WINDOWS GREATER THAN 900 mm WIDTH)



NOTES:

1. REINFORCING STEEL C.S.A G30.18-09 GRADE 400
2. CONCRETE MINIMUM 28 DAY STRENGTH 20 MPa
3. BASE OF ALL FOOTING EXCAVATION TO BE INSPECTED AND APPROVED PRIOR TO PLACING FORMWORK
4. TO BE USED IN CONJUNCTION WITH STRUCTURAL REPORT
5. DRAWINGS ARE NOT TO SCALE

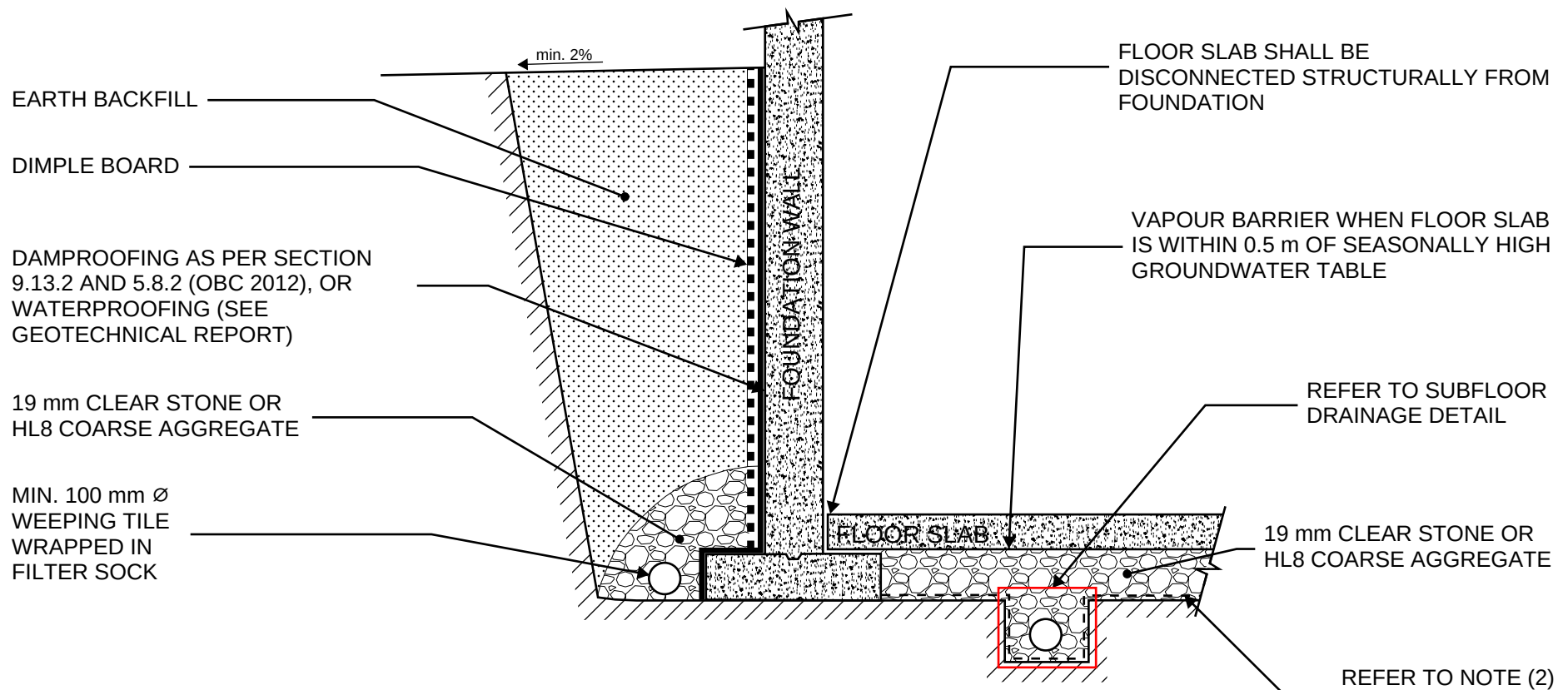
Title:

TYPICAL REINFORCED WALL DETAILS FOR HOUSES ON ENGINEERED FILL



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info@greengeo.ca

APPENDIX E



NOTES:

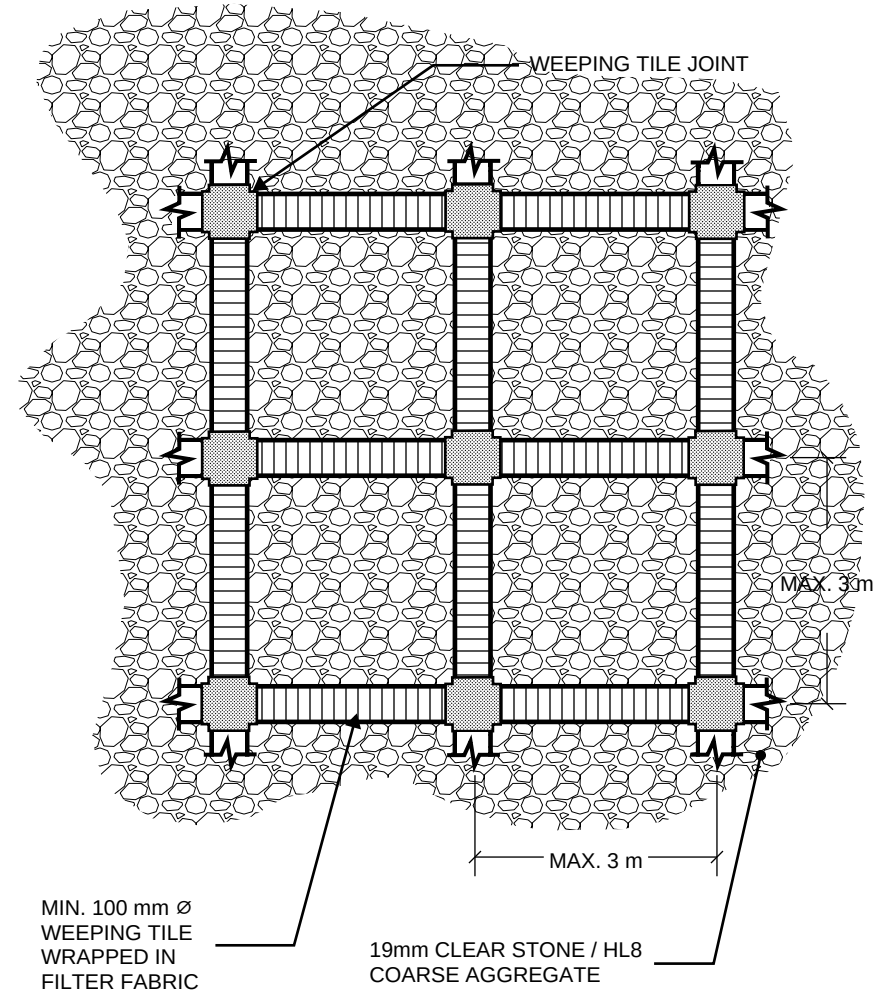
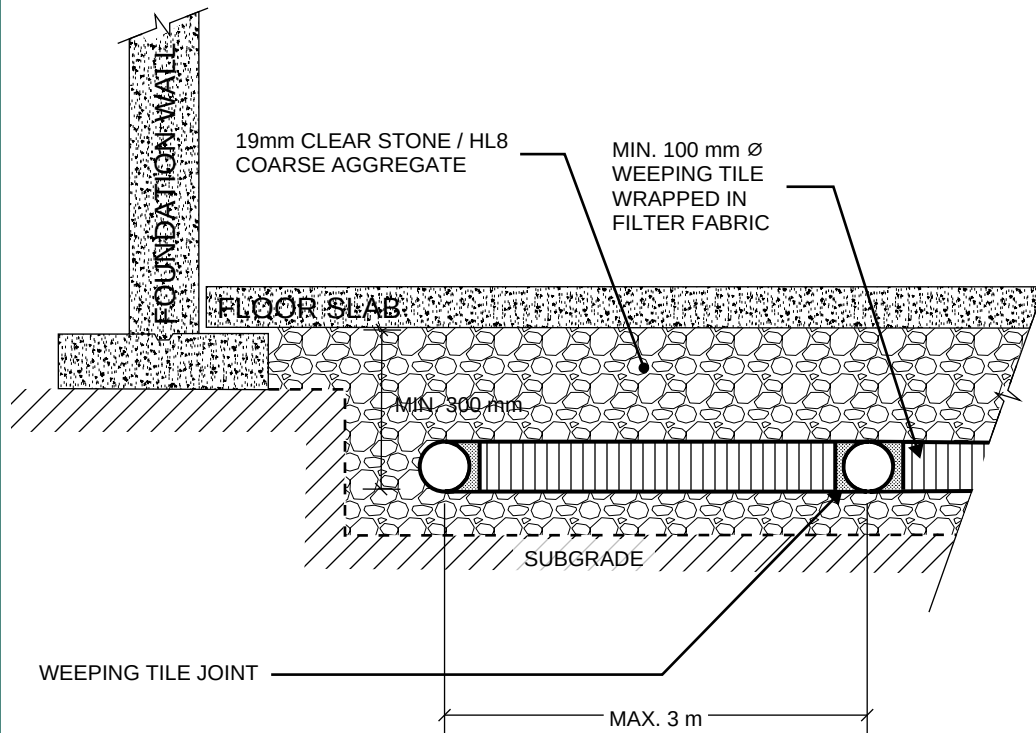
1. TYPICAL SCHEMATIC ONLY. MUST BE READ IN CONJUNCTION WITH GEOTECHNICAL REPORT.
2. WHEN THE SUBGRADE CONSISTS OF COHESIONLESS SOIL, IT MUST BE SEPARATED FROM THE SUBFLOOR DRAINAGE LAYER USING A NON-WOVEN GEOTEXTILE (TERRAFIX 360R OR EQUIVALENT)
3. NOT TO SCALE

Title:

TYPICAL BASEMENT DRAINAGE SCHEMATIC (OPEN EXCAVATION)



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NOTES:

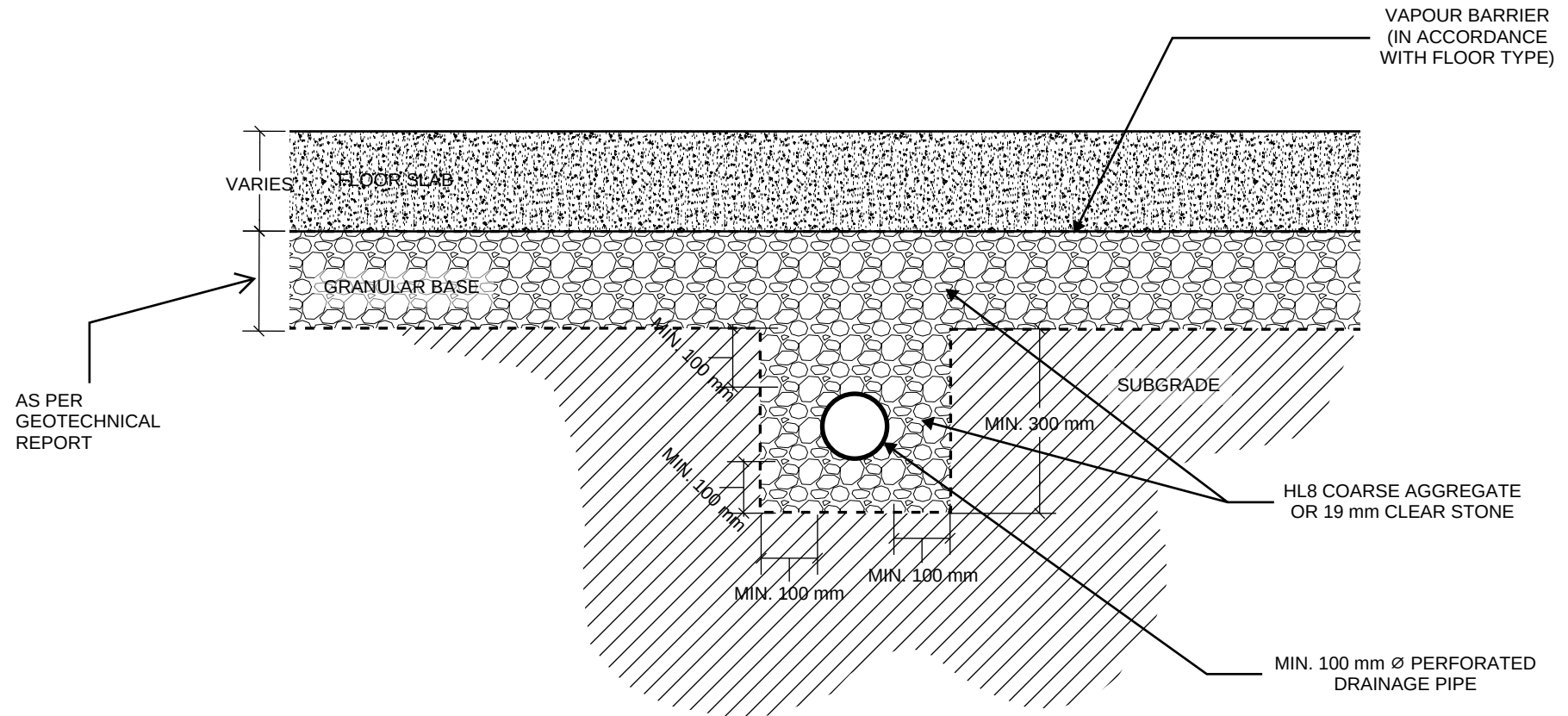
1. TYPICAL SCHEMATIC ONLY. MUST BE READ IN CONJUNCTION WITH GEOTECHNICAL REPORT.
2. WHEN THE SUBGRADE CONSISTS OF COHESIONLESS SOIL, IT MUST BE SEPARATED FROM THE SUBFLOOR DRAINAGE LAYER USING A NON-WOVEN GEOTEXTILE (TERRAFIX 360R OR EQUIVALENT)
3. UNDERFLOOR DRAINAGE SHOULD OUTLET TO PERIMETER DRAINAGE SYSTEM AND/OR SUMP PUMP
4. NOT TO SCALE

Title:

UNDERFLOOR DRAINAGE (SLAB WITHIN 1m OF SEASONALLY HIGH GWT)



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705-503-9626
info@greengeo.ca



NOTES:

1. Typical schematic only. Must be read in conjunction with Geotechnical Report.
2. When the subgrade consists of cohesionless soil, it must be separated from the subfloor drainage layer using a non-woven geotextile (Terrafox 360R or approved equivalent).
3. Not to Scale

Title:

TYPICAL BASEMENT DRAINAGE SCHEMATIC (OPEN EXCAVATION)



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705-503-9626
info@greengeo.ca