SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455
Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922

PROJECT NO.: SM 301951A-G October 14, 2021

CACHET DEVELOPMENTS
361 CONNIE CRESCENT, SUITE 200
Concord, Ontario
L4K 5R2

Attention: Marcus Gagliardi
Development Planner

PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
7581 SIDEROAD 15
ELORA, ONTARIO

Dear Mr. Gagliardi,

Further to your authorisation and subsequent discussions with Mr. Michael DeBiasio, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P301951, dated July 1, 2021, later revised and confirmed through email communication on August 3, 2021. This report should be read in conjunction with the formal report for the Clayton Lands to the west SM 301951B-G, dated October 5, 2021. Our comments and recommendations based on our findings at the seven [7] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development consisting of single-family dwellings and townhouses along asphalt paved roadways, including the installation of associated underground municipal services, located at 7581 Sideroad 15 [Gibson Farms] in Elora, Ontario. The purpose of this preliminary geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

SOIL-MAT ENGINEERS was provided with a sub-watershed study that encompasses the surrounding area – including the subject site – prepared by Aquafor Beech Limited, dated February 2008. The results of this investigation have been considered in preparation of this geotechnical report.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation. It is noted that SOIL-MAT ENGINEERS has also conducted Phase One and Two Environmental Site Assessments (ESAs) for the subject site, which have been reported under a separate cover.

2. PROCEDURE

A total of seven [7] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on August 5 and 6, 2021 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 2.1 and 5.2 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Upon completion of drilling, a groundwater monitoring well was installed at Borehole No. 4 to allow for the future monitoring of the groundwater level. The monitoring well consisted of 50-millimetre PVC pipe screened in the lower 1.5 metres. The monitoring well was encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite ‘hole plug’ to the surface and fitted with a protective steel ‘stick up’ casing. The remaining boreholes were backfilled in general accordance with

Ontario Regulation 903, and the ground surface was reinstated even with the surrounding grade.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site, clearance of underground utilities, and the drawing that was forwarded to our office. Best efforts were made to minimize crop damage by locating the majority of the boreholes to the perimeter of the fields. The ground surface elevation at the borehole locations has been referenced to a geodetic benchmark, described as North American 1983 CSRS, as per the survey plan completed by POI Aerial, dated August 10, 2021, which was provided to our office.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 7, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is currently an undeveloped agricultural property located at 7581 Sideroad 15 in Elora, Ontario. There is a single-family dwelling and an existing barn structure near the middle of the site, setback approximately 200 metres from Sideroad 15. The parcel is bordered to the south by an existing agricultural field, to the east by Gerrie Road, to the north by Sideroad 15, and to the west by Irvine Street, assuming a north-south orientation of Irvine Street. The field is bisected by a tributary of the Irvine Creek – a ditch-like drainage feature – at the north eastern portion of the site. West of the tributary, the two parcels generally slope down to the north, with a relief of approximately 6 metres, as measured across the boreholes. The grade is relatively flat and even with Gerrie Road on the east side of the tributary descending towards the creek with an approximate relief of 15 metres measured across the boreholes.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 150 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is also noted that the term 'topsoil' has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life. Given the property has been historically used for agricultural purposes the upper levels of the soils would be expected to have a reworked nature resulting in more variable depths of topsoil over the site. As such, it is recommended that a conservative approach be taken when estimating topsoil quantities across the site for stripping, i.e. account for slightly greater stripping depth than those specifically noted at the borehole locations.

Sandy Silt/Clayey Silt

Native sandy silt/clayey silt was encountered beneath the topsoil in the majority of the boreholes, and beneath a sand deposit in Borehole Nos. 3 and 6. The fine-grained granular to slightly cohesive soils were brown in colour, transitioning to grey below about 2.5 metres in Borehole No. 2, with trace to some clay and gravel, with a notable increasing clay content with depth in some of the boreholes. The native sandy silt/clayey silt soils were generally noted to have a reworked or weathered appearance in the upper levels, and were generally noted to have a loose to compact state. The sandy silt/clayey silt deposit was present to depths of approximately 1.1 to 1.9 metres in Borehole Nos. 1 and 4, and was proven to termination at depths of approximately 2.1 to 3.7 metres below the existing ground surface in Borehole Nos. 2, 3, 5, 6, and 7.

Sand

A native sand deposit was encountered beneath the topsoil in Borehole Nos. 3 and 6, and beneath the sandy silt/clayey silt layer in Borehole Nos. 1 and 4. The fine to medium grained soils were brown in colour, with a noted to transition to grey at a depth of approximately 4.8 metres in Borehole No. 4, contained trace amounts of clay, silt, and gravel, and was generally in a compact to dense state. The native sand soils were proven to a depth of approximately 1.5 and 1.8 metres within Borehole Nos. 3 and 6, and proven to termination at depths of between approximately 3.6 and 5.2 metres below the existing ground surface in Borehole Nos. 1 and 4.

Grain Size Analyses

Grain size analyses were conducted on three [3] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

TABLE A
GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH3 SS3	1.5 m	22	44	28	6	10^{-7}	<10
BH4 SS5	3.0 m	2	7	80	11	10^{-2}	150 to 300
BH6 SS5	3.0 m	11	44	36	9	10^{-6}	10 to 15

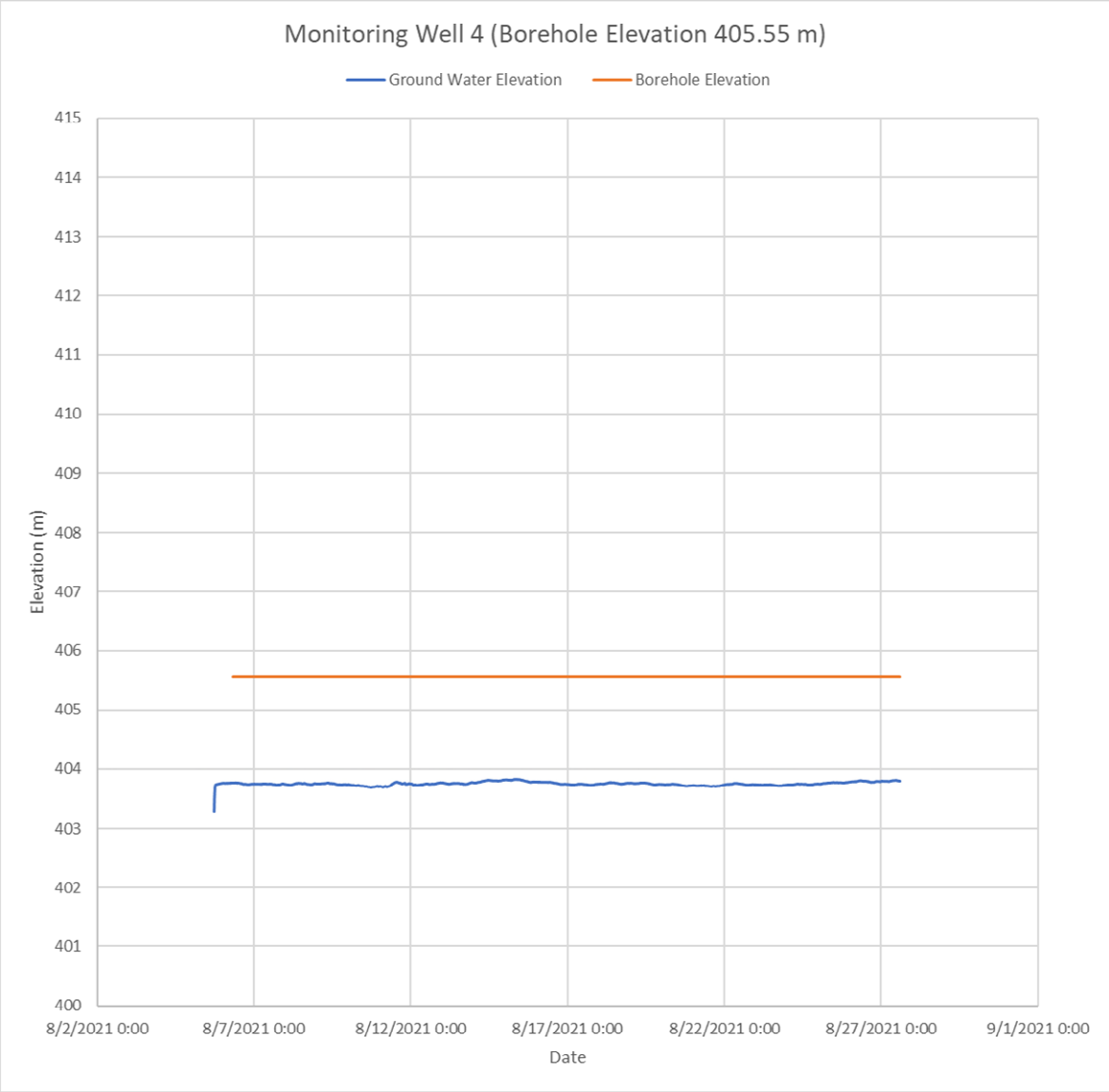
The field and laboratory testing demonstrate the native soils to generally consist of a sandy silt/clayey silt with some clay and traces of gravel in the upper levels, transitioning to a highly permeable sand with traces of clay, silt, and gravel at depth. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. – inorganic silts and very fine sands, clayey silts with slight plasticity in the upper levels overlying S.P. – poorly graded sands, with little to no fines at depth. The sandy silt/clayey silt in the upper levels would generally behave as a low permeable material, but would not be considered as an impermeable material, and would be highly frost susceptible. The underlying sand deposit is highly permeable, relatively free draining.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to be in areas noting to consist of stone-poor sandy silt to silty sand-textured till, ice-contact stratified deposits of sand and gravel, with minor silt and clay, as well as river deposits of coarse gravel. These conditions are consistent with the observations during drilling.

Groundwater Observations

Borehole No. 6 was noted to have 'caved' to a depth of approximately 2.4 metres and 'wet' at a depth of approximately 2.0 metres, while Borehole No. 4 was noted to be open and 'wet' at a depth of 2.7 metres upon completion. Borehole Nos. 1 was noted to have cave to a depth of 1.5 metres, and dry upon completion. The remainder of the boreholes were noted as being open and 'dry' [i.e. no free groundwater present] upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes.

As noted above, a monitoring well was installed at Borehole No. 4, to allow for future measurements of the static groundwater level. Furthermore, it is noted that 3 additional monitoring wells were installed on the abutting parcel of land to the west, the work of which was completed in concert with the fieldwork on the Gibson Farm lands. A data logger was installed in Borehole No. 4 to allow for continuous monitoring of the groundwater level between August 6 and August 27, 2021, the readings of which have been illustrated in the following graph:


Monitoring Well 4 (Borehole Elevation 405.55 m)
Ground Water Elevation
Borehole Elevation
Elevation (m)
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
400
8/2/2021 0:00
8/7/2021 0:00
8/12/2021 0:00
8/17/2021 0:00
8/22/2021 0:00
8/27/2021 0:00
9/1/2021 0:00
Date

In addition to this, manual monitoring well readings were also taken from all of the installed monitoring well locations across the site on August 6 and August 27, 2021 and have been summarized in the following chart:

TABLE B
SUMMARY OF GROUNDWATER LEVELS

Monitoring Well	Ground Surface Elevation [m]	August 6, 2021		August 27, 2021	
		Groundwater Depth [m]	Groundwater Elevation [m]	Groundwater Depth [m]	Groundwater Elevation [m]
MW4	405.55	2.74	402.81	1.75	403.80

The groundwater level observed at this monitoring well location, as well as the monitoring wells installed on the adjacent property [summarised in our geotechnical report SM 301951B-G under a separate cover] indicate a groundwater level on the order of approximately 2 to 7 metres below the existing grade, at an elevation of roughly 403.8 to 410.5 metres, varying with the physical topography, and shallower closer the tributary. As noted above this estimate is based on the groundwater data collected from Borehole No. 4, as well as the monitoring wells installed on the Clayton Lands to the west. There is an evident drop in the groundwater level from southwest to northeast, generally following the topography towards the Irvine Creek Tributary. It is noted that the groundwater level would be expected to fluctuate seasonally. It is also noted that the observed groundwater levels may be influenced by more localised shallower 'perched' deposits in more permeable seams within the sandy silt/clayey silt. Further long-term monitoring may allow for a more accurate estimate of the static groundwater level, including more data during the 'wet' and 'dry' seasons.

As noted above, SOIL-MAT ENGINEERS was also provided a sub-watershed study by Aquafor Beech, which included a number of monitoring wells to the east to monitor the groundwater elevations. The conditions and groundwater levels described in this geotechnical report are consistent with those encountered during our fieldwork as described above.

General Soil Conditions

As noted above the subsurface conditions are generally characterized as sandy silt/clayey silt deposit in the upper levels, underlain by a permeably cohesionless sand deposit. The grain size analyses indicate the sandy silt/clayey silt soils to have 10 to 20 percent clay content, lending a slightly cohesive characteristic. The sandy silt/clayey silt soils are relatively consistent in terms of its constituents but are noted to contain an increasing clay content with depth in some of the boreholes, as noted above. Where the material transitions into a sand the native soils are generally fine in gradation in the upper levels, becoming medium to coarse with depth. As demonstrated above the subsurface conditions exhibit a relatively inconsistent layered structure across the large area, but can be generally distinguished by a layer of slightly cohesive sandy silt overlying a cohesionless sand. The conditions will be best assessed during excavations on an area-by-area basis. As such it may also be prudent to advance a series of test excavations in the area of proposed deeper excavations and/or stormwater management ponds to confirm soil composition and groundwater conditions in the area of deep excavations.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 5 metres below the existing grade. Excavations through the native sandy silt/clayey silt and sand soils, as well as any engineered fill placed as part of site grading works, should be relatively straightforward, with the sides remaining stable for short construction periods at inclinations of up to 45 degrees to the horizontal, and possibly steeper depending on moisture condition and clay content. Where wet or more permeable seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to ‘slough in’ to as flat as 3 horizontal to 1 vertical, or flatter.

Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sandy silt/clayey silt and sand soils would generally be considered a Type 2 or 3 soil, depending on the moisture content and relative compact to dense condition, as outlined in the Ontario Health and Safety Act III – Excavations. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above, the groundwater level varies between depths of approximately 2 to 7 metres below the existing grade, roughly elevation 403.8 to 410.5 metres. The majority of excavations are anticipated to be above the groundwater level. Nevertheless, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated. Such infiltration should be readily controlled using typical construction dewatering methods. 'Perched' deposits of water may be encountered within more permeable pockets, which may require greater initial dewatering efforts and instability in the excavations, especially during the 'wet' times of the year. Where excavations extend to greater depths, to and below the groundwater level, especially within the sand deposit, the rate of infiltration will be much greater and additional pumping or more sophisticated dewatering methods should be anticipated. In this regard, ongoing monitoring of the groundwater levels, and careful review of the design servicing elevations, is recommended. As noted above, the advancement of test excavations in the area of proposed deep services and stormwater management ponds would allow for a first hand look at how groundwater levels may affect such excavations. More water should be expected when connections are made to existing services. Surface water should be directed away from the excavations.

The base of the excavations in the native soils, above the groundwater level, encountered in the boreholes should generally remain firm and stable. Where excavations extend to greater depths, to or below the groundwater level, or where 'perched' water is encountered, some base instability should be expected, especially during 'wet' times of the year. This will be especially likely in the high silt content sandy silt/clayey silt soils. Areas of base instability may be stabilised with the placement of additional bedding or ballast stone, the use of coarser stone material, etc. The appropriate measures are best assessed based on the actual conditions at the time of construction. With a firm and stable base condition, stabilised where warranted, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or County of Wellington should be satisfactory. The bedding should be well compacted to provide sufficient support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations

extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist primarily of the sandy silt/clayey silt and sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that the sandy silt/clayey silt soils encountered are not considered to be free draining and should not be used where this characteristic is necessary. It is also noted that these fine grained granular soils will present difficulties in achieving effective compaction when they become 'wet' of optimum, and where access with compaction equipment is restricted. The sandy silt/clayey silt soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content, with some noted 'wet' seams. Some moisture conditioning will be required depending upon the weather conditions at the time of construction. It is noted that these silty soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas. The sand soils are generally well draining, and tend to be near optimum moisture content. At depth, approaching or below the water level, the sand soils will be expected to be saturated, requiring time to drain excess moisture or other drying efforts in order to achieve effective compaction.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is

well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained to cohesive soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 95 per cent of its standard Proctor maximum dry density [SPMDD], and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. All structural fill should be compacted to 100 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density. A geofabric separator

should be provided between the free draining material and the on-site silt soils to prevent the intrusion of fines.

The thrust blocks in the native soils or engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~2,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, 'rip rap', etc.] 'punched' into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) sub-base material. It is also important

that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. A typical generic pavement structure would consist of 350 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 60 millimetres of HL8 or HL4 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete. Where a pit run, Granular B Type I, aggregate is utilised in the granular base, it should be increased to a minimum thickness of 450 millimetres. It is our opinion that this design is suitable for use on a residential roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. Notwithstanding, the pavement structure should conform to the relevant County of Wellington requirements where they are to be assumed by the County. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or County of Wellington requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. A typical recommended light duty pavement structure for residential driveways would

consist of a minimum of 200 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. Bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils. In areas where 'wet' seams are present, or the native soils present in less compact condition, reduced bearing values of 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] are recommended. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete.

In the event that site grading works result in engineered fill below founding elevations, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 percent standard Proctor maximum dry density, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. The design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This

reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. PRELIMINARY HYDROGEOLOGICAL CONSIDERATIONS

As noted above, it is understood that the development will consist of single family dwellings and townhouse blocks, including the installation of associated underground municipal services along asphalt paved roadways. Excavations for the proposed development services are expected to extend to depths of up to approximately to 2 to 5 metres below the existing ground surface, while excavations for foundations would be expected to extend to up to approximately 2 metres. Measurements of the groundwater level at the monitoring well locations indicate a groundwater level on the order of approximately 2 to 7 metres below the existing ground surface, however further groundwater monitoring may be conducted to more accurately assess the static groundwater level.

The short term excavations for the proposed servicing are generally anticipated to extend into the sandy silt/clayey silt and sand soils to depths above the static groundwater level. Such excavations would be expected to be subject to relatively minor groundwater infiltration, such that it should be possibly to adequately control such infiltration using conventional construction dewatering techniques such as pumping from sumps in the base of the excavation. During wet times of year, some instability of the excavations may be experienced. The rate of dewatering would be expected to be below 50,000 L/day, and certainly below 400,000 L/day, such that an EASR or PTTW should not be required. Where deeper excavations are identified to be required, extending below the static groundwater level, the need for temporary dewatering controls during construction should be more closely evaluated. Depending on the proposed depths of excavations for the proposed footings and site services, the rate of dewatering could approach or be greater than 50,000 L/day, potentially requiring an EASR. As such, once available, the site servicing and grading plans detailing depths of construction should be forwarded onto our office for further review and comments.

The generally permeable condition of the native sand deposit present over the site will generally allow for natural drainage and movement of groundwater. As such, it is not considered likely that service trenches would present any conflict or impact to the natural groundwater conditions. As such, the provision of clay ‘cut-offs’ within trench backfill is not expected to be required.

Excavations for the proposed basement levels should be well above the groundwater level, and so would not be expected to require significant ongoing groundwater control, other than typical perimeter weeping tile and sump pump as noted above.

The final grading of the site should appropriately consider the groundwater levels in order to minimise or avoid conflict or impact to the groundwater during and post construction. In this regard the grading and storm water management plan should accommodate surface runoff that follows the existing overall drainage patterns as much as possible.

It is also noted that the use of Low Impact Design [LID] methods as part of the stormwater management for the proposed development would be viable for much of the site and should be considered. The permeable sand deposit, above the groundwater level, would afford an opportunity for natural infiltration of surface runoff, such is in 'dry' ponds, infiltration galleries, etc.

Based on our observations and details of the proposed development, it is not anticipated that the proposed construction will have an adverse impact on the groundwater condition in the area, and further detailed hydrogeological assessment is not considered warranted at this time. As the detailed design of the proposed development proceeds, this office should be consulted to review the hydrogeological conditions and assess the potential for concern, or need for additional study.

10. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. 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. SOIL-MAT ENGINEERS 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 trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

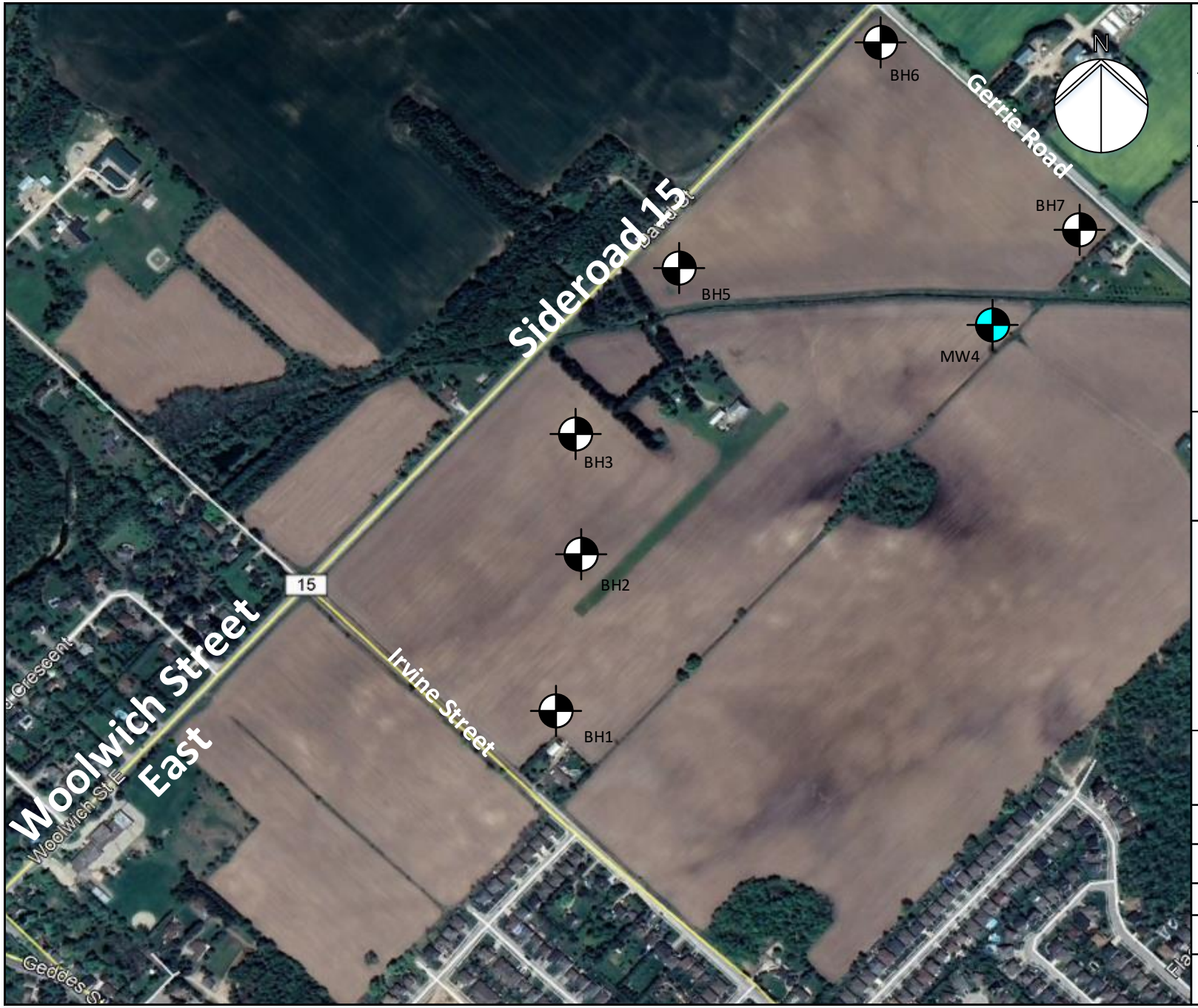
Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Scott Wylie, B.Eng., EIT.

Ian Shaw, P. Eng.
Senior Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 7, inclusive
Grain Size Analyses
Drawing No. 2, Recommended Design Requirements for Basement Construction

Distribution: Cachet Developments [pdf]



LEGEND

Borehole Location
BH#

Monitoring Well Location
MW#

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 301951A-G.

2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Residential Development
7581 Sideroad 15
Elora, Ontario

Borehole Location Plan

Project No. SM 301591A-G

Date: September 2021

Drawn: SW	Checked: KR

SM 301591A-G Borehole Location Plan

Drawing No. 1

Log of Borehole No. 1

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838268
E: 545454

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		413.05		Ground Surface								
0	0	412.80		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	4 5 7 6	12			
3	1	411.90		**Sandy Silt** Brown, trace clay, trace gravel, reworked in upper levels, compact.		SS	2	6 7 6 6	13			
6	2			**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, compact.		SS	3	5 8 12 14	20			
9	3					SS	4	12 10 13 10	23			
11		409.40				SS	5	6 11 13 15	24			
12	4			End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as dry and caved to a depth of 1.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

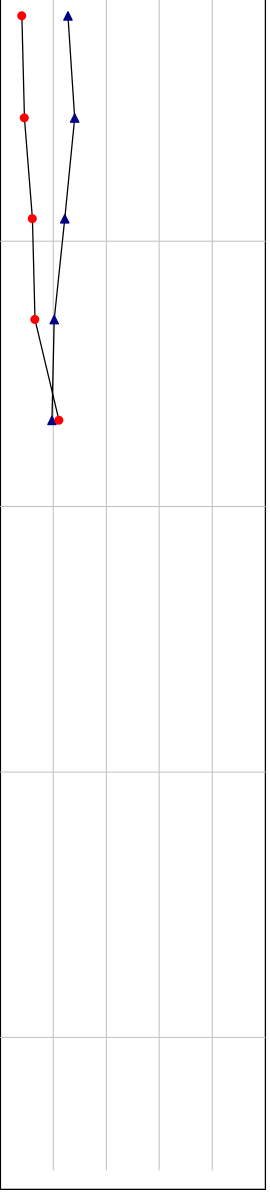
Log of Borehole No. 2

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838469
E: 545516

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	415.00	Ground Surface								
0 / 0	414.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	2 4 4 5	8			
3 / 1	413.50	**Sandy Silt** Brown, reworked in upper levels, trace clay, silt, and gravel, loose.		SS	2	4 3 6 8	9			
7 / 2	412.50	**Clayey Silt** Brown, trace to some sand and gravel, stiff to very stiff.		SS	3	6 6 6 7	12		3.5	
8 / 2		Transition to grey.		SS	4	3 7 6 7	13		4.0	
11 / 3	411.30			SS	5	9 7 15 18	22		>4.5	
12 / 4		End of Borehole								

Moisture Content w% (10 20 30 40)
Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 3

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838652
E: 545505

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	Moisture Content w% (10 20 30 40) / Standard Penetration Test blows/300mm (20 40 60 80)
		409.93		Ground Surface									
0	0			**Topsoil** Approximately 150 millimetres of topsoil.		SS	1	4 6 10 8	16				
3	1			**Sand** Brown, reworked in upper levels, trace clay, silt, and gravel, compact.		SS	2	6 10 10 7	20				
6		408.10				SS	3	6 8 10 11	18				
7	2	407.80		**Sandy Silt** Brown, trace to some gravel and clay, compact.									
				End of Borehole									

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 6, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 6, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838792
E: 546044

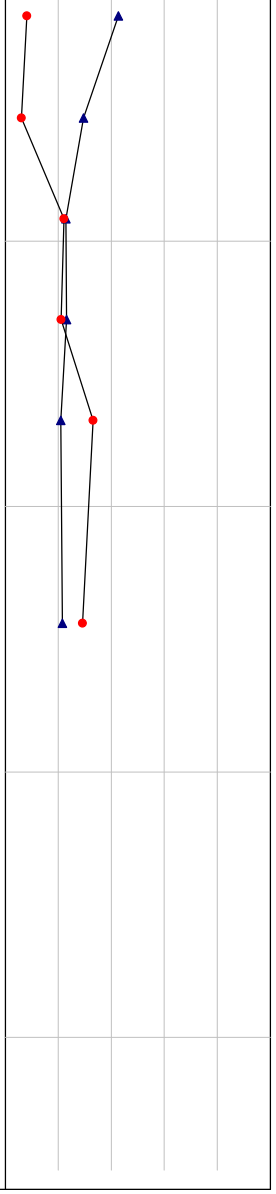
Depth (ft)	Depth (m)	Elevation (m)	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		405.55	Ground Surface							
0	0	405.35	**Topsoil** Approximatelty 200 millimetres of topsoil.							
1			**Sandy Silt** Brown, trace to some clay, trace gravel, reworked in upper levels, loose.	SS	1	2 3 5 6	8			
2				SS	2	4 3 3 5	6			
3	1									
4										
5										
6		403.70	**Sand** Brown, trace clay, silt, and gravel, medium to coarse gradation, wet, compact to dense.	SS	3	8 10 12 15	22			
7	2									
8				SS	4	8 10 11 10	21			
9										
10	3			SS	5	8 10 23 30	33			
11										
12										
13	4									
14										
15		400.70								
16	5	400.40	Transition to grey.	SS	6	3 11 18 23	29			
17			End of Borehole							
18										
19										
20	6									
21										
22										
23	7									
24										
25										
26	8									
27										
28										
29	9									

Well Data

SAMPLE

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on August 5, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 2.7 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

August 6, 2021 - 2.74 metres below ground surface.

August 27, 2021 - 1.75 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: August 5, 2021
Hole Size: 200 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838939
E: 545636

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		412.10		Ground Surface								
0	0	411.90		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2 4 5 7	9			
3	1			**Sandy Silt** Brown, reworked in upper levels, trace to some clay, increasing clay content with depth, occasional gravel, loose to compact.		SS	2	1 3 3 5	6			
6	2	410.00				SS	3	3 5 7 9	12			
				End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 2.1 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 6

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4839162
E: 545871

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	420.91		Ground Surface								
0 / 0	420.70		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	4 4 4 4	8			
3 / 1	419.40		**Sand** Brown, reworked in upper levels, trace rootlets, loose to compact.		SS	2	3 5 6 6	11			
6 / 2			**Sandy Silt** Brown, trace clay, increasing clay content with depth, loose to compact.		SS	3	5 6 6 7	12			
9 / 3					SS	4	3 4 4 4	8			
11 / 3	417.30				SS	5	5 11 10 15	21			
12 / 4			End of Borehole								

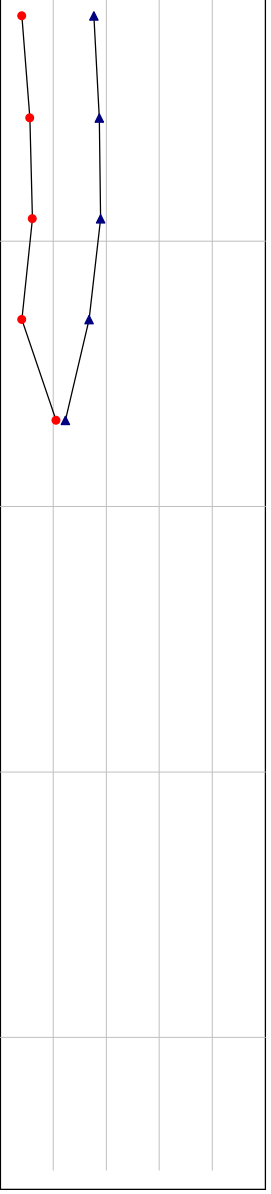
NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.6 metres.

2. Borehole was recorded as wet at depth of 2.0 metres, and caved to a depth of 2.4 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w%: 10 20 30 40
Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Log of Borehole No. 7

Project No: SM 301951-G
Project: Proposed Residential Development
Location: 7581 Nichol Road, Elora
Client: Cachet Development

Project Manager: Ian Shaw, P. Eng
Borehole Location: See Drawing No. 1
UTM Coordinates - N: 4838910
E: 546126

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	408.39		Ground Surface								
0 / 0	408.10		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	3 5 6 7	11			
3 / 1	406.90		**Sandy Silt** Brown, trace rootlets, trace clay, reworked in upper levels, increasing clay content with depth, compact.		SS	2	10 8 10 10	18			
6 / 2			**Clayey Silt** Brown, trace to some sand and gravel, stiff to hard.		SS	3	3 5 6 6	11		2.0	
9 / 3					SS	4	5 7 10 18	17		2.5	
11 / 3	404.70				SS	5	24 36 50/5"	100		>4.5	
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using solid stem auger equipment on August 5, 2021 to termination at a depth of 3.0 metres.

2. Borehole was recorded as open and dry upon completion and backfilled as per Ontario Regulation 903.

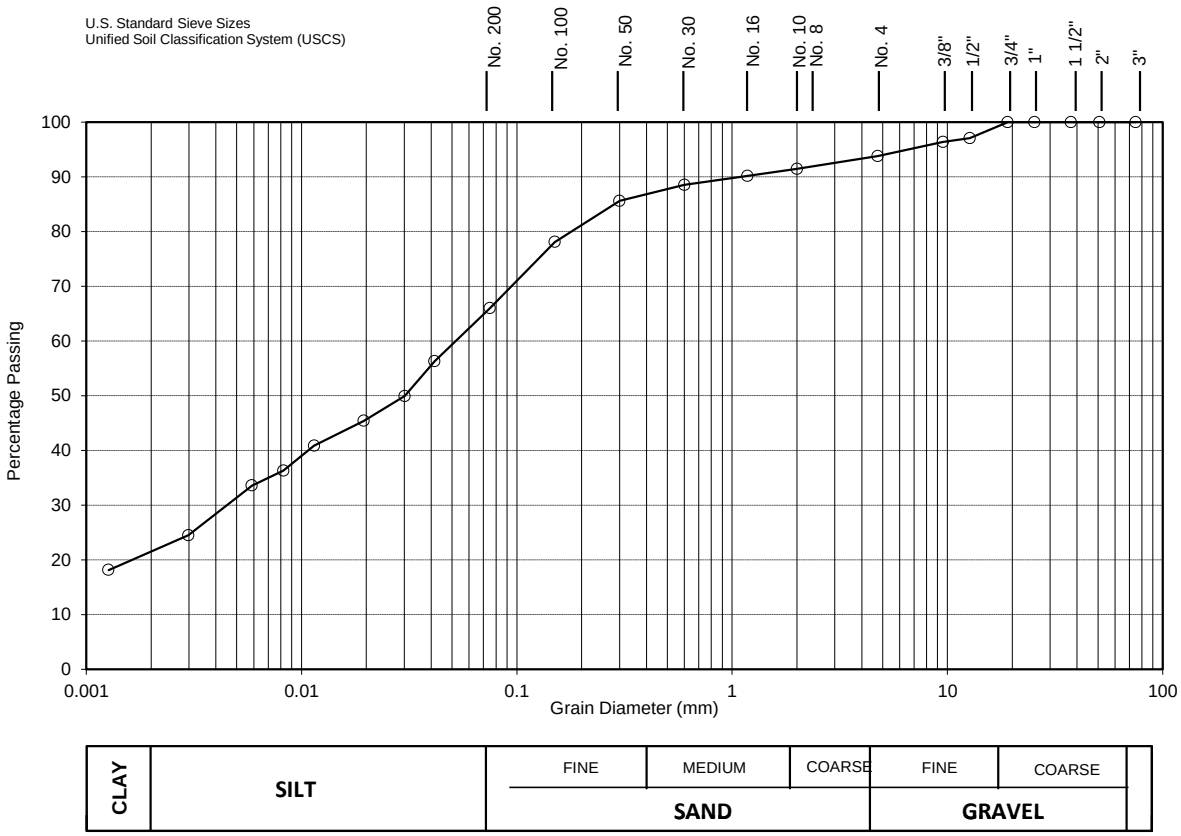
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: August 5, 2021
Hole Size: 150 millimetres
Drilling Contractor: Altech

Soil-Mat Engineers & Consultants Ltd.
130 Lancing Drive, Hamilton, ON L8W 3A1
T: 905.318.7440 F: 905.318.7455
E: info@soil-mat.ca

Datum: Geodetic
Field Logged by: EC
Checked by: SW
Sheet: 1 of 1

Mechanical & Hydrometer Analyses



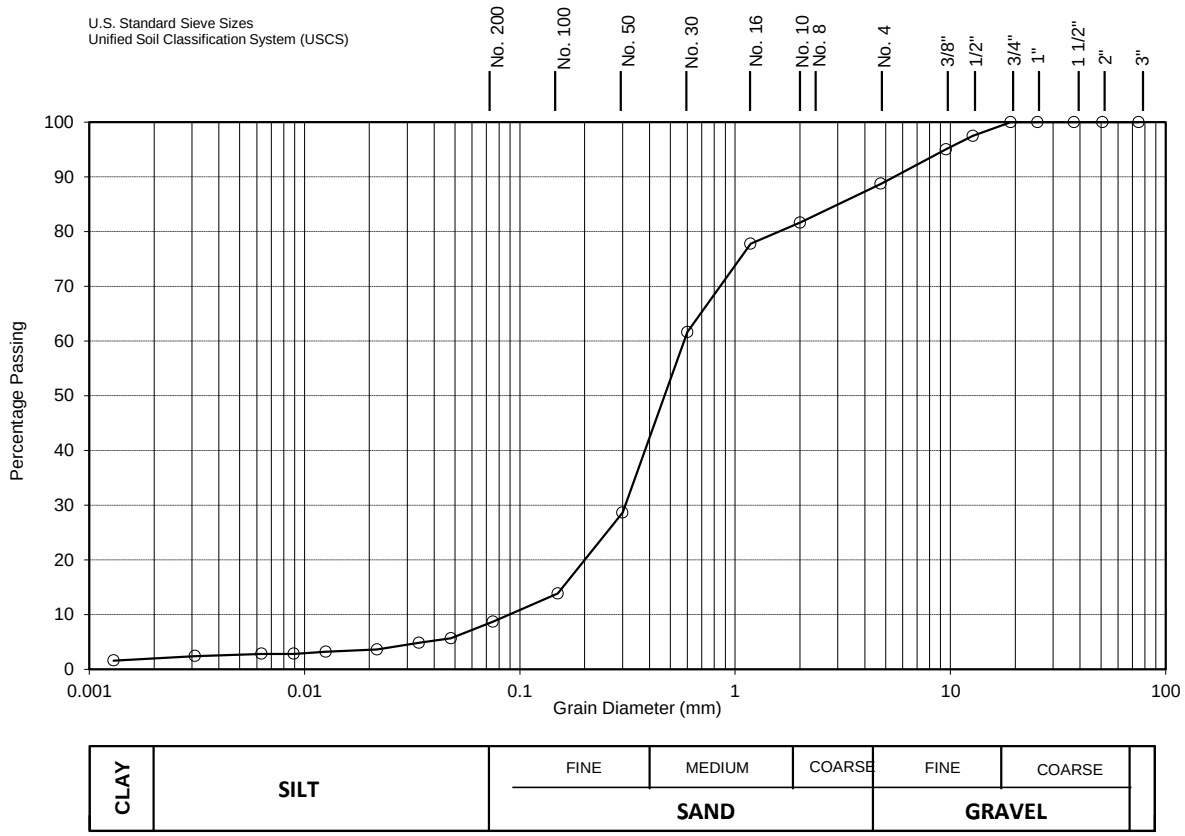
Lab No.:	**21-335**	Notes: Depth: 5'			
Sample No.:	**3**				
Borehole No.:	**3**				
CLAY [%]:	**22**	Soil Description:	**Brown Sandy Silt w/ some Clay and trace Gravel**		
SILT [%]:	**44**		**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**		
SAND [%]:	**28**				
GRAVEL [%]:	**6**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0005**	Coefficient of Uniformity C_U:	**102.0**	Coefficient of Curvature C_C:	**0.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 1**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses



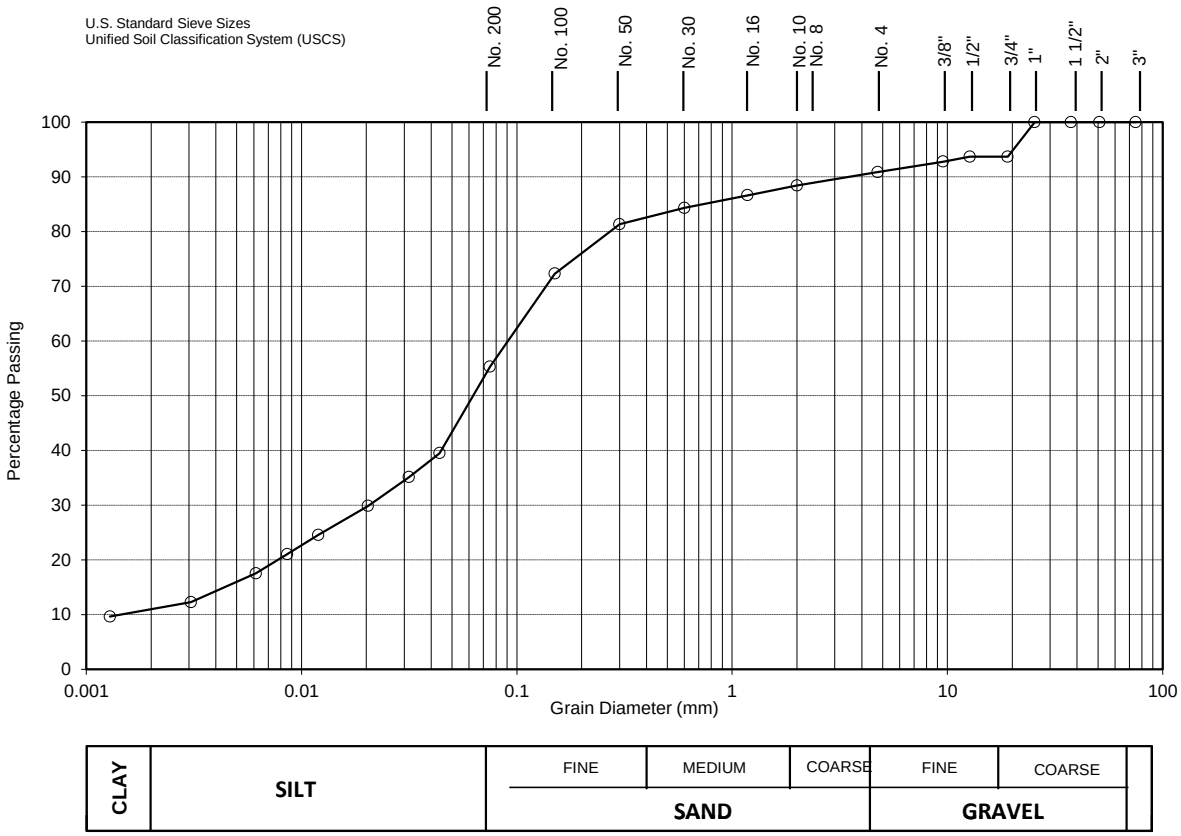
Lab No.:	**21-340**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**4**		
CLAY [%]:	**2**	Soil Description: **Brown Sand w/ some Gravel and traces of Silt and Clay**	
SILT [%]:	**7**	**S.P. - Poorly graded sands, little or no fines**	
SAND [%]:	**80**		
GRAVEL [%]:	**11**	Estimated Infiltration Rate [mm/hr] : **150 to 300**	Estimated Permeability, k [cm/s] **10^{-2}**
D_{10} (Effective Diam. in mm):	**0.090**	Coefficient of Uniformity C_U: **6.6**	Coefficient of Curvature C_C: **1.8**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 2**	**Project No.: SM 301951-T**

Mechanical & Hydrometer Analyses

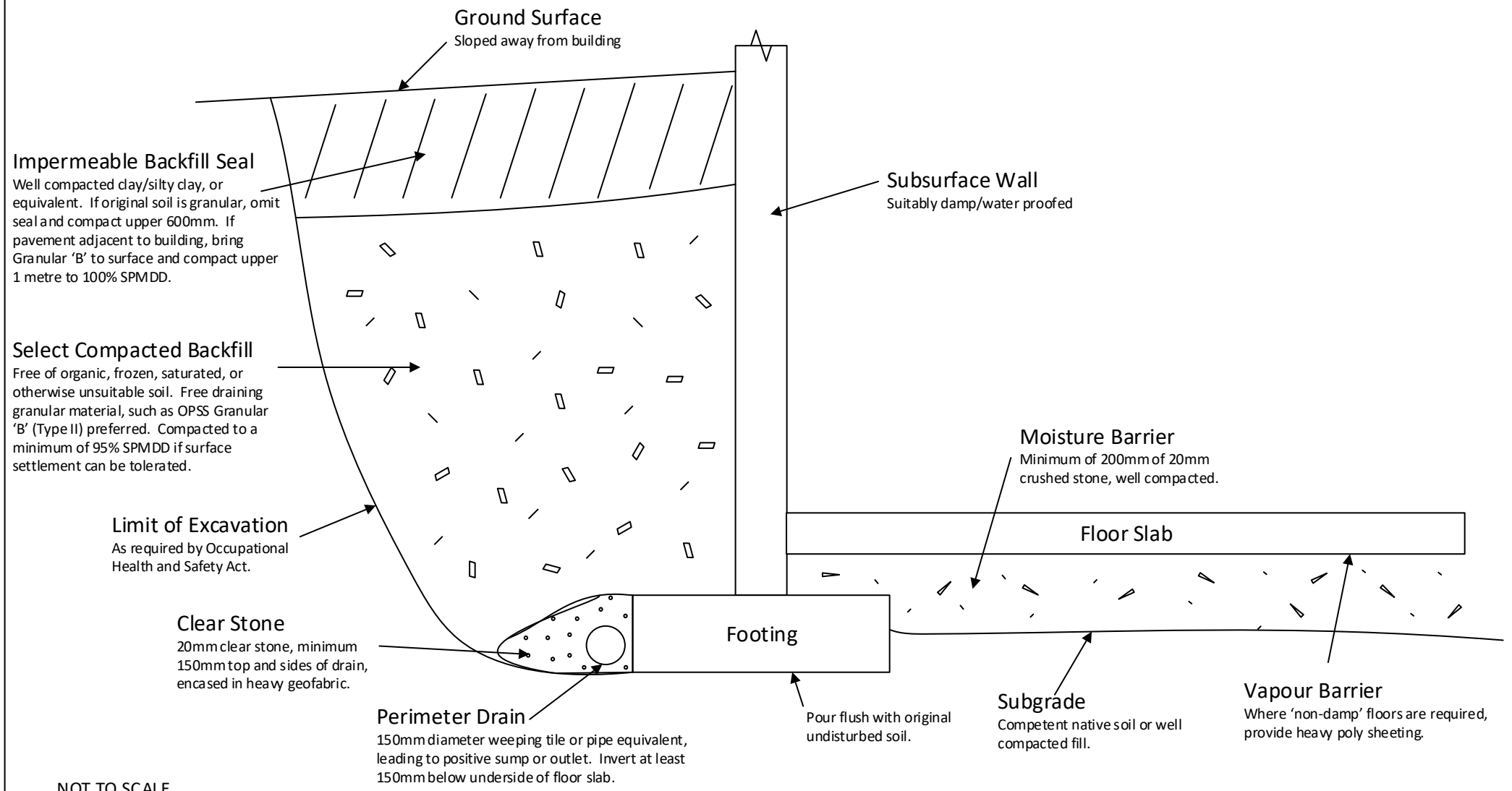


Lab No.:	**21-336**	Notes: Depth: 10'	
Sample No.:	**5**		
Borehole No.:	**6**		
CLAY [%]:	**11**	Soil Description: **Brown Sandy Silt w/ some Clay and trace Gravel**	
SILT [%]:	**44**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity**	
SAND [%]:	**36**		
GRAVEL [%]:	**9**	Estimated Infiltration Rate [mm/hr] : **10 to 15**	Estimated Permeability, k [cm/s] **10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0015**	Coefficient of Uniformity C_U: **60.0**	Coefficient of Curvature C_C: **3.3**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

7581 Sideroad 15, Elora ON

August 2021	**Grain Size Analysis No. 3**	**Project No.: SM 301951-T**



NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 301951-G
Date:	September 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2