SOIL-MAT ENGINEERS & CONSULTANTS LTD.

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PROJECT NO.: SM 250069-G April 23, 2025

NIAGARA ORCHARD & VINEYARD CORP.
R.R.#5, 1196 Irvine Road
Niagara-on-the-Lake, Ontario
L0S 1J0

Attention: Arnie Lepp

GEOTECHNICAL INVESTIGATION
PROPOSED AGRICULTURAL FACILITY
727 EAST & WEST LINE
NIAGARA-ON-THE-LAKE, ONTARIO

Dear Mr. Lepp,

Further to your authorisation, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The investigation and reporting were undertaken in general accordance with our proposal P250069, dated February 5, 2025. Our comments and recommendations, based on our findings at the eight [8] borehole locations, are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of an agricultural facility, including single-storey storage buildings, septic tanks and beds, and associated parking/loading areas at the property located at 727 East & West Line in Niagara-on-the-Lake, Ontario. The purpose of this geotechnical investigation is to assess the subsurface soil 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.

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.

2. PROCEDURE

A total of eight [8] sampled boreholes were advanced at the locations illustrated in the attached Drawing Nos. 1A and 1B, Borehole Location Plan(s). The boreholes were advanced uncased using solid-stem continuous flight power auger equipment to termination at depths of between approximately 3.6 to 9.7 metres below the existing grade on March 11, 2025, under the direction of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD.

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 the 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. Twelve [12] selected samples were also subjected to laboratory grain size analyses.

Groundwater observations were made during the drilling operations. Upon completion of drilling, the boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface reinstated even with the existing grade.

The boreholes were located in the field by a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD. in general accordance with the drawing provided to our office, based on accessibility over the site and clearance of underground utilities. The ground surface elevation at the borehole locations was referenced to a site-specific temporary benchmark, described as the grade at the base of the hydro pole LR508, located west of the existing driveway of 747 East & West Line. This benchmark has been assigned an elevation of 100.00 metres for convenience.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Boreholes Nos 1 to 8, 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 as the exact planes of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject property is located at 727 East & West Line in Niagara-on-the-Lake, Ontario. The subject site consists of an existing single-family dwelling with a detached garage, and is surrounded by agricultural lands. The area of the proposed facility is relatively flat and even with the surrounding roadways as measured at the borehole locations.

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

Topsoil

A surficial veneer of topsoil approximately 200 to 250 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil in agricultural fields can be indistinct due to historical agricultural activities and may vary across the site and from the borehole locations. As such a conservative approach should be taken when estimating topsoil quantities. It is noted that the term 'topsoil' is used from a geotechnical perspective, and does not necessarily reflect on the nutrient content of the soil and its ability to support plant life.

Sandy Silt

Native sandy silt was encountered beneath the topsoil at all of the borehole locations, and beneath both the topsoil and a layer of native silty clay/clayey silt in Borehole No. 6. The native soil was brown to grey in colour, typically transitioning to grey below at depths of approximately 2 to 3 metres, containing traces of, to some, clay and gravel, with occasional clayey seams, and was generally in a loose to compact condition. The native sandy silt was proven to depths of approximately 2.0 to 9.7 metres at nearly all borehole locations, with the exception of Borehole Nos. 1 and 6, where the native sandy silt was proven to termination at a depth of approximately 3.6 and 9.7 metres below the existing ground surface, respectively.

Silty Clay/Clayey Silt

Native silty clay/clayey silt was encountered beneath the topsoil in Borehole No. 6, and beneath the sandy silt in Borehole Nos. 2 through 5, 7 and 8. The native cohesive soil was brown to grey in colour, containing trace amounts sand and gravel, and was generally very soft to very stiff in consistency. The native silty clay/clayey silt was proven to a depth of approximately 7.2 metres below the existing ground surface at Borehole No. 6, and was proven to termination at depths of approximately 3.6 to 6.7 metres below the existing ground surface where encountered at the remaining borehole locations.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface to consist of coarse textured glaciolacustrine deposits consisting primarily of sand and gravel, with minor silt and clay. This is consistent with our experience in the area and the conditions encountered on site.

Geotechnical Laboratory Testing

As noted above, twelve [12] selected samples of the recovered soils were subjected to grain size analyses including sieve and hydrometer tests. The results of these tests have been appended to the end of this report, and summarised in Table A as follows;

TABLE A: GRAIN SIZE ANALYSES

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate* [mm/hr]	Percolation Time, T [min/cm]
BH2 SS3	1.5 m	20	66	14	0	10^{-7}	<10	>50
BH3 SS5	3.0 m	14	70	16	0	10^{-7}	10 to 15	>50
BH5 SS3	1.5 m	22	54	24	0	10^{-7}	<10	>50
BH5 SS5	3.0 m	44	50	5	1	10^{-7}	<10	>50
BH6 SS2	0.8 m	25	59	13	3	10^{-7}	<10	>50
BH6 SS4	2.3 m	17	51	31	1	10^{-7}	<10	>50
BH6 SS6	4.6 m	22	54	20	4	10^{-7}	<10	>50
BH7 SS2	0.8 m	22	65	13	0	10^{-7}	<10	>50
BH7 SS4	2.3 m	13	84	3	0	10^{-6}	10 to 15	50
BH7 SS5	3.0 m	22	75	3	0	10^{-7}	<10	>50
BH8 SS3	1.5 m	25	44	30	1	10^{-7}	<10	>50
BH8 SS4	2.3 m	41	51	7	1	10^{-8}	<5	>50

* - Note: Infiltration rate estimated using Hazen's equation for permeability, and correlation referencing CVC LID Design Guide – Appendix C.

The field and laboratory testing demonstrated the native soils to consist of a sandy silt with traces of gravel and traces of, to some, clay, transitioning to silty clay/clayey silt soil with trace amounts of gravel, and traces of, to some sand. According to the Unified Soil Classification System (USCS), the soils are classified as M.L. - Clayey silts with slight plasticity, inorganic silts, and very fine sand, clayey fine sands, to C.L. - Inorganic clays of low to medium plasticity, and would be considered effectively impermeable.

Groundwater Observations

All boreholes were noted to be 'wet' at depths of approximately 1.2 to 7.9 metres below the existing ground surface upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes. Based on this data, our observations during drilling and experience in the area, the static groundwater level is estimated at depths of 2 to 3 metres below the existing ground surface, potentially within the anticipated depths of construction. It is also understood that a separate hydrogeological assessment is in the process of being conducted by a third party, which may include more detailed groundwater information.

4. FOUNDATION CONSIDERATIONS

It is anticipated that the proposed agricultural facility will have founding levels on the order of 1.2 to 2.0 metres below the existing ground surface. The soil conditions encountered at the borehole locations are considered suitable to support the proposed new agricultural facility on conventional spread footings founded in the undisturbed native sandy silt or native silty clay/clayey silt, below any fill or otherwise unsuitable material. Spread footings may be designed considering a bearing capacity of 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS, based on the total and differential settlements not exceeding 25 and 20 millimetres respectively.

It is noted that the SLS value represents the Serviceability Limit State, which is governed by the tolerable deflection [settlement] based on the proposed building type, using unfactored load combination. The ULS value represents the Ultimate Limit State and is intended to reflect the upper limit of the available bearing capacity of the founding soils in terms of geotechnical design, using factored load combinations. There is no direct relationship between ULS and SLS; rather they are a function of the soil type and the tolerable deflections for serviceability, respectively. The above dissertation assumes a typical building. Evidently, the bearing capacity values would be lower for very settlement sensitive structures and larger more flexible buildings.

The native sand and silt soils as described above are sensitive to moisture and disturbance, such as from construction traffic. It would be advisable to protect the base of excavations with the placement of a thin, perhaps 50 millimetres thick, concrete 'mud' slab. This will serve to protect the founding soils from disturbance and provide a clean working surface for the placement of reinforcing steel. Foot traffic in the exposed footing bases should be limited. In any event, whether mud slab or footing, concrete should be placed over the prepared founding level as soon as possible, ideally within the same day it is excavated and evaluated by a representative from this office.

In areas where it will be necessary to provide adjacent footings at different founding elevations, the lower footing should be constructed before the higher footing is constructed, if possible, and the higher footing should be set below an imaginary line drawn up from the edge of the lower footing at 10 horizontal to 7 vertical. This practice will limit stress transfer from the higher footings to the lower footings.

All footings exposed to the environment must be provided with a minimum of 1.2 metres of earth cover or equivalent insulation to protect against frost damage. This frost protection would also be required if construction were undertaken during the winter months. All footings and foundations should be designed and constructed in accordance with the current Ontario Building Code.

It is noted, that the stress-strain properties of the supporting soils are never uniform across the site, nor are the loads on the various foundation elements. Some settlements must be expected in response to the applied load until equilibrium is achieved. Therefore, as is typical in most new construction, 'cosmetic' cracking of plasterboard, foundation walls, slabs, etc. may occur within the first year of construction as a result of shrinkage, minor settlement, etc. Subsequent to repair, additional cracking should be minimal.

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 of this report and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

5. SEISMIC DESIGN CONSIDERATIONS

The structure shall be designed according to Section 4.1.8 of the Ontario Building Code, Ontario Regulation 203/24, which took effect in January 2025. Based on the subsurface soil conditions encountered in this investigation, the applicable Site Classification for the seismic design is Site Class D – Stiff Soil, based on the average soil characteristics for the site. It is noted that site specific shear wave velocity testing may further refine the applicable seismic design values, however, on the preliminary basis considering a seismic site class of D, the applicable seismic data from the 2020 National Building Code 2%-in-50 years for the subject site are as follows:

$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	$S_a(5.0)$	$S_a(10.0)$	PGA	PGV
0.447	0.353	0.197	0.0897	0.0231	0.00704	0.284	0.233

6. EXCAVATIONS

It is anticipated that excavations for the proposed addition will extend to depth of up to approximately 2 to 3 metres beneath the existing ground surface. Excavations through the native sandy silt and native silty clay/clayey silt soils would be expected to remain stable for the short construction period at inclinations of up to 45 degrees to the horizontal. Where wet seams are encountered, or during periods of extended precipitation, excavation faces may 'slough' in as flat as 3 horizontal to 1 vertical, or flatter. Notwithstanding the forgoing, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects.

As noted above the depth of the static groundwater level is anticipated to be approximately 2 to 3 metres below the existing ground surface, and potentially within the anticipated depths of construction. Infiltration of perched water through permeable seams, as well as from surface run off into open excavations should be anticipated, especially during the 'wet' times of the year. The rate of infiltration is expected to be relatively low, such that it is possible to control such infiltration that may seep into the excavations using conventional construction 'dewatering' techniques, such as pumping from sumps and ditches. More groundwater control should be anticipated when connections are made to existing services and foundations. Surface water should be directed away from the excavations.

The sand and silt soils present over the subject site are generally considered to be suitable for the proposed development, however the effect of the relatively shallow groundwater conditions may cause significant challenges for construction, depending on the final grades versus the existing grades. The fine grained granular soils are sensitive to moisture conditions and have a moderate to high capillary potential. As such the sand and silt soils are prone to base instability, disturbance from construction traffic, etc. It may be prudent to consider raising the final grade of the development, to reduce the depth of excavations for services below the existing grade level, and thus maintain excavation requirements above the groundwater level.

7. FLOOR SLAB AND PERMANENT DRAINAGE

The building floor slab may be constructed using conventional slab-on-grade techniques on a prepared subgrade. The exposed subgrade surface should be evaluated and well compacted in the presence of a senior representative of SOIL-MAT ENGINEERS, although caution should be given to excessive compaction to avoid 'pumping up' groundwater into the fine-grained soils by capillary action, increasing pore water pressure and destabilising the subgrade. Any soft 'spots' delineated during this work must be sub-excavated and replaced with quality backfill material compacted to a minimum of 98 per cent of its standard Proctor maximum dry density [SPMDD]. Granular fill, such as an

imported Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) or approved alternative, is preferred within the building footprint due to its relative insensitivity to weather conditions, ease in achieving the required degree of compaction, its quick response to applied stresses.

As with all concrete floor slabs, there is a tendency for the floor slabs to crack. The slab thickness, concrete mix design, the amount of steel and/or fiber reinforcement and/or wire mesh placed into the concrete slab, if any, will therefore be a function of the owner's tolerance for cracks in, movements of, the slabs-on-grade, etc. The 'saw-cuts' in the concrete floor, for crack control, should extend to a minimum depth of 1/3 of the thickness of the slab.

A moisture barrier will be required under the floor slabs such as the placement of at least 200-milimetres of well compacted 20-millimetre clear crushed stone. At a minimum the moisture barrier material should contain no more then 10 per cent passing the No. 4 sieve. Where 'non-damp' floor slabs are required, as for instance under sheet vinyl floor coverings, etc., extra efforts will be required to damp proof the floor slab, as with the additional provisions of a heavy 'poly' sheet, damp proofing sprays/membranes, drainage board products, etc. Where 'poly' sheets are used care should be taken to prevent puncturing and tearing, and a sufficiently heavy gauge material be provided. The floor finish product supplier should be consulted regarding the requirement for such a non-damp condition.

Curing of the slab-on-grade must be carefully specified to ensure that slab curl is minimised. This is especially critical during hot weather when the surface of the slab tends to dry out quickly while high moisture conditions in the moisture barrier or water trapped on top of any 'poly' sheet at the sawcut joints and cracks, and at the edges of the slabs, maintains the underside of the slab in a moist condition. It is important that the concrete mix design provide a limiting water/cement ratio and total cement content, which will mitigate moisture related problems with low permeance floor coverings, such as debonding of vinyl and ceramic tile. It is equally important that excess free water not be added to the concrete during its placement as this could increase the potential for shrinkage cracking and curling of the slab.

Where the finished floor is less than 300 millimetres above the finished exterior grade consideration should be given to the provision of a perimeter weeping tile system to prevent the build up of water against the foundations. Where provided, the perimeter drainage system should consist of 100-millimetre diameter perforated pipe, encased in a geofabric sock and covered with a minimum of 200 millimetres of a 20-millimetre clear crushed stone product in turn encased in a heavy filter geotextile product. The suppliers

of the filter geotextile should be consulted as to the best type suited to this project. Great care should be taken during the installation of the drains, as even a small break in the filtering materials could result in loss of fines into the drains with attendant performance difficulties, including settlements of the ground surface. The perimeter drains should outlet to a gravity stormwater connection, ditch, or a sump pit a minimum of 150 millimetres below the underside of the finished floor. The exterior grade around the structure should be sloped away from the structure to prevent the ponding of water against the foundation walls. The enclosed Drawing No. 2 shows schematics of the typical requirements for slab-on-grade construction without a basement level.

In the event that a perimeter weeping tile system is not provided, it is recommended that the exterior foundation walls be provided with an impermeable barrier or 'slip plane' to prevent the frost-susceptible backfill soils from freezing against the exterior concrete foundations. The ground surface should be sloped away from the building and be provided with a relatively low permeability 'cap' beneath surficial topsoil to prevent infiltration of water against the building foundations.

8. BACKFILL CONSIDERATIONS

The majority of the excavated materials will primarily consist of the native sandy silt or the native silty clay/clayey silt encountered in the boreholes, as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided they are free of organics, large construction debris, or otherwise deleterious materials, and that their moisture contents can be controlled to within 3 per cent of their standard Proctor optimum moisture content. Some selective sorting of organic material should be anticipated to be required.

It is noted that the native soils encountered on site are highly frost-susceptible and not considered to be free draining and should not be used where this characteristic is necessary. These soils will also present difficulties in achieving effective compaction where access with compaction equipment is restricted, such as within the building footprint or against foundations. The use of a free draining granular material, such as an OPSS Granular 'B', Type II (crushed limestone bedrock), or approved alternative, in areas of restricted access areas such as within the building footprints or against the building foundations. These materials are more efficiently compacted in such areas, and generally provide a more uniform support condition for the exterior concrete and pavements.

The on-site soils encountered are generally considered to be near to slightly 'wet' of their standard Proctor optimum moisture content. Some moisture conditioning may be required depending upon the weather conditions at the time of construction. These soils are also noted to be sensitive to high moisture conditions and will be almost impossible to effectively compact when they become well 'wet' of their optimum. After a period of heavy precipitation, and near-surface wet, saturated or softened material should be allowed to air dry or be removed and discarded.

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, therefor reducing its ability to support construction traffic and therefore impacting pavement structure construction. If the soil is compacted 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. It is therefore very important that the placement 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 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'. All structural fill, backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness, and be compacted to a minimum of 98 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 used during construction.

9. PAVEMENT CONSIDERATIONS

All areas to be paved should be stripped of all topsoil, along with any otherwise unsuitable materials. The exposed subgrade should be proof rolled with 3 to 4 passes of a heavy vibratory roller 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 must be sub-excavated and replaced with suitable backfill material. Alternatively, the soft areas may be stabilised by placing coarse crushed stone and 'punching' it into the soft areas. The need for the treatment of softened subgrade will be reduced if construction is undertaken during the dry summer months and careful attention is paid to the compaction operations. The fill over shallow utilities cut into or across paved areas must also be compacted to a minimum of 98 per cent of its SPMDD.

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 mitigate 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 should be taken to ensure that the subgrade is not unduly disturbed by construction traffic. These measures would include minimising the amount of heavy traffic travelling over the subgrade, such as during the placement of granular base layers.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as typically experienced during the Fall and Spring months, or during colder winter weather, 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 exposed subgrade.

The suggested pavement structures outlined in Table B below are based on subgrade parameters estimated on the basis of visual and tactile examinations of the on-site soils and past experience. The outlined pavement structure may be expected to have an approximate ten-to-fifteen-year lifespan, assuming that regular maintenance is performed. Should a more detailed pavement structure design be required, site specific traffic information would be needed, together with detailed laboratory testing of the subgrade soils.

TABLE B: TYPICAL SUGGESTED PAVEMENT STRUCTURES

LAYER DESCRIPTION	COMPACTION REQUIREMENTS	LIGHT DUTY SECTIONS	HEAVY DUTY [TRUCK ROUTE]
Asphaltic Concrete Wearing course OPSS HL 3 or HL 3A	92 per cent Marshall	40 millimetres	40 millimetres
Binder Course OPSS HL 8	92 per cent Marshall	50 millimetres	80 millimetres
Base Course OPSS Granular A	100% SPMDD	150 millimetres	150 millimetres
Sub-base Course OPSS Granular B Type II	100% SPMDD	300 millimetres	450 millimetres

* SPMDD denotes Standard Proctor Maximum Dry Density, ASTM-D698.

Depending on the anticipated traffic, a reduced light duty asphalt structure consisting of 65 millimetres of HL3 surface course may also perform sufficiently. This would be reasonable in areas subjected only to light vehicles such as cars for parking. Such a structure may have a reduced lifespan if subjected to heavier vehicles, and would also not allow for 'mill and pave' type operations for future rehabilitation.

Asphaltic concrete pavement surfaces at industrial/agricultural facilities may be exposed to significant surficial distress due to static loading and frequent turning heavy multi-axle trucks. It would be prudent to consider a concrete pavement structure in areas of such high-volume traffic areas. A recommended heavy concrete pavement structure may consist of 300 millimetres of OPSS Granular 'B', Type II (crushed limestone bedrock), overlain by 150 millimetres of OPSS Granular 'A', with 200 millimetres of surficial concrete. As noted above, depending on the condition of the subgrade at the time of construction, sub-excavation of unsuitable subgrade materials may be required. Alternatively, the use of a reinforced asphalt product such as Aramid Fibre reinforced asphalt or similar product may be considered. As these products are proprietary in nature, a specialty contractor should be consulted regarding the use of such a product.

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 course particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Alternatively, a granular pavement structure may be considered. A typical heavy duty granular pavement structure would consist of a minimum of 450 millimetres of OPSS Granular 'B', Type II (crushed limestone bedrock), surfaced with 400 millimetres of OPSS Granular 'A' material. It may also be feasible to make use of alternative granular materials, such as recycled concrete aggregate, however, such materials should be reviewed and approved by our office prior to use.

11. 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 to it 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.

Bennett Sabourin, B. Eng.
Geotechnical Associate

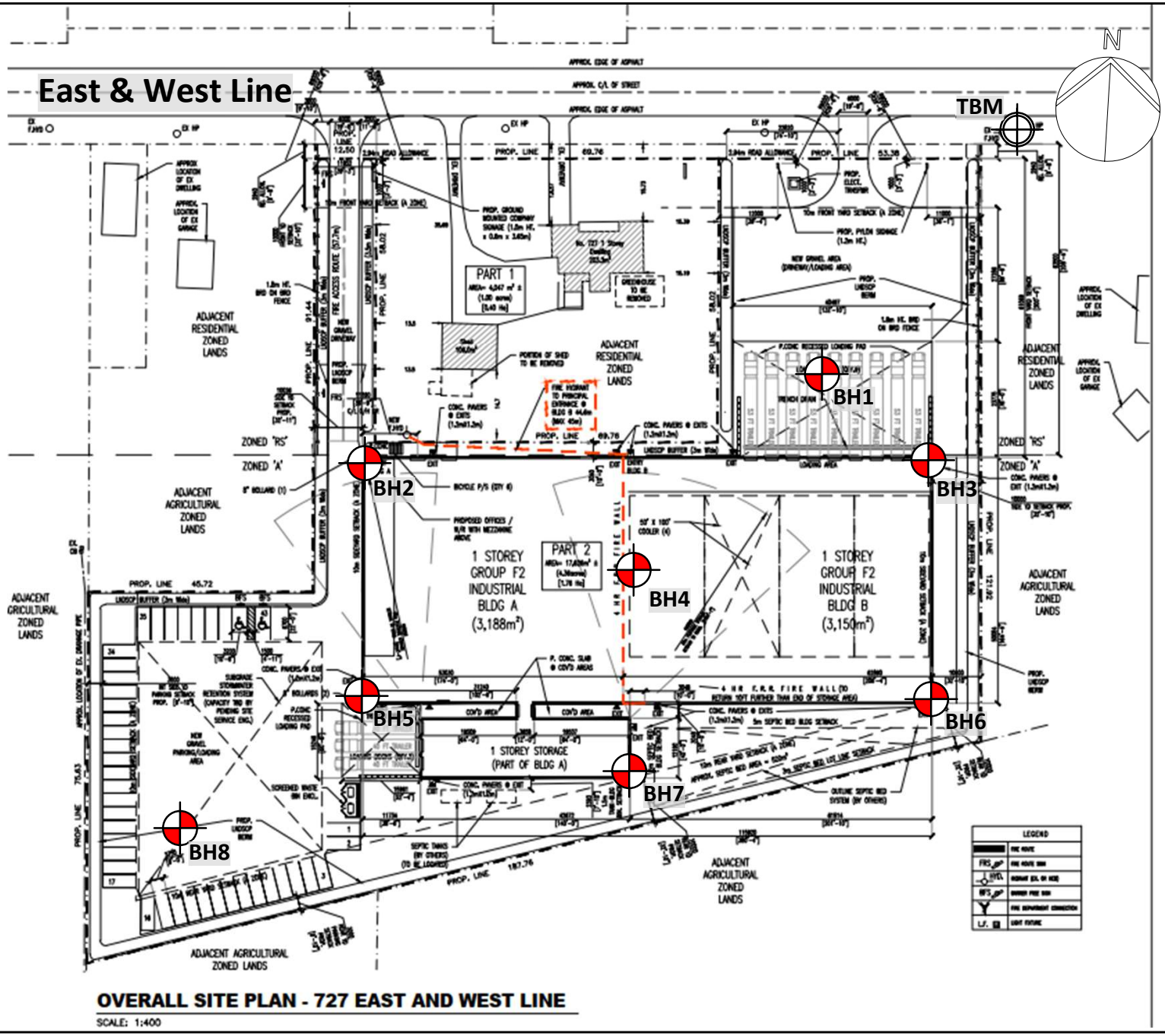
Kyle Richardson, P. Eng.
Senior Engineer

LICENSED PROFESSIONAL ENGINEER
APR 23/25
S. R. SEARS
PROVINCE OF ONTARIO

Stephen R. Sears, B. Eng. Mgmt., P. Eng., QP$_{ESA}$
Senior Engineer

Enclosures: Drawing Nos. 1A and 1B, Borehole Location Plan(s)
Log of Borehole Nos. 1 to 8
Drawing No. 2, Slab on Grade Perimeter Drainage
Grain Size Analyses Nos. 1 to 12

Distribution: Niagara Orchard & Vineyard Corp. [pdf]



LEGEND

Borehole Location
BH#

Temporary Benchmark
TBM
Base of Hydro Pole No. LR508, assigned elevation of 100.00 metres.

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 250069-G.

2. Borehole locations are approximate.

SOIL-MAT
ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Agricultural Facility
727 East & West Line
Niagara-on-the-Lake, Ontario

Borehole Location Plan

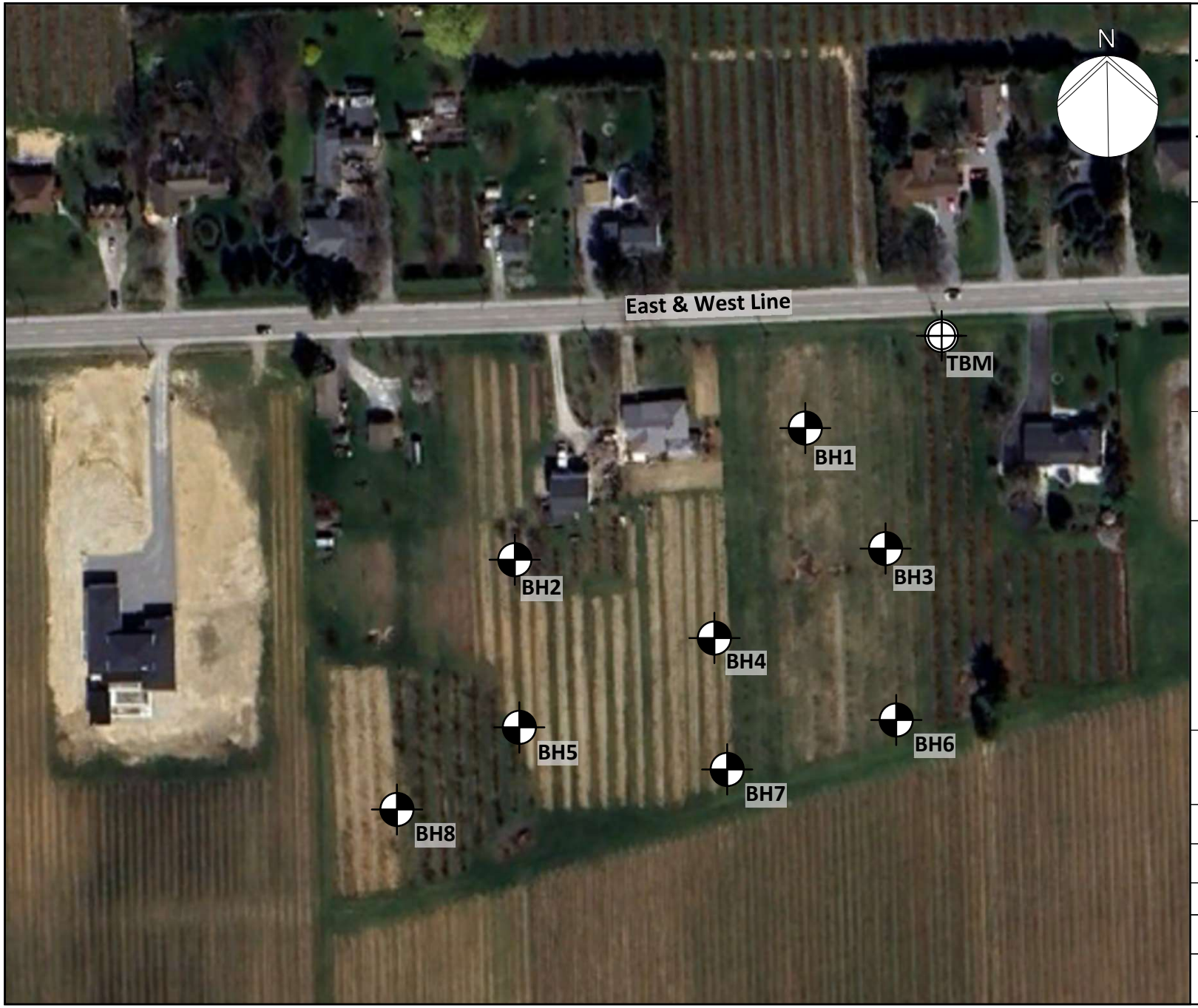
Project No. SM 250069-G

Date: April, 2025

Drawn: BS

Checked: KR

Drawing No. 1A



LEGEND

BH# Borehole Location

TBM Temporary Benchmark
Base of Hydro Pole No. LR508, assigned elevation of 100.00 metres.

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 250069-G.

2. Borehole locations are approximate.

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ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Agricultural Facility
727 East & West Line
Niagara-on-the-Lake, Ontario

Borehole Location Plan

Project No. SM 250069-G

Date: April, 2025

Drawn: BS

Checked: KR

Drawing No. 1B

Log of Borehole No. 1

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788460
E: 652964

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	SAMPLE Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	100.02	Ground Surface							
0–3 / 0–1		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	3,4,3,4	7		
3–6 / 1–2	98.10	**Sandy Silt** Brown, trace to some clay and gravel, occasional clayey seams, loose to compact. Transition to grey in colour		SS	2	3,3,8,13	11		
6–9 / 2–3				SS	3	6,7,7,8	14		
9–12 / 3–4	96.40			SS	4	3,4,6,18	10		
12 / 4		End of Borehole		SS	5	5,7,8,5 Wet Spoon	15		

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 March 11, 2025 to termination at a depth of 3.6 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.0 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 Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

Soil-Mat Engineers & Consultants Ltd.
401 Grays Road, Hamilton, Ontario, L8E 2Z3
T: 905.318.7440, TF: 800.243.1922, F: 905.318.7455
www.soil-mat.ca E: info@soil-mat.ca

Datum: Temporary Benchmark
Field Logged by: YP
Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 2

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788406
E: 652880

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	99.64	Ground Surface							
0 – 2.5 / 0 – 0.8		**Topsoil** Approximately 200 millimetres of topsoil.							
2.5 – 23 / 0.8 – 7		**Sandy Silt** Brown to greyish brown, trace to some clay and gravel, occasional clayey seams, loose to compact.	>50	SS	1	1,1,3,3	4		
				SS	2	1,2,3,5	5		
				SS	3	6,7,7,13	14		
				SS	4	6,6,17,14	18		
				SS	5	8,6,12,16	18		
				SS	6	14,6,4,5	10		
				SS	7	5,8,11,13	19		
23 – 29.5 / 7 – 9	92.50	**Silty Clay/Clayey Silt** Brown, trace to some sand and gravel, occasional cobbles in lower levels, very stiff.		SS	8	1,6,13,14	19		
	89.90			SS	9	4,7,8,25	15		
32 / 10		End of Borehole							

NOTES:

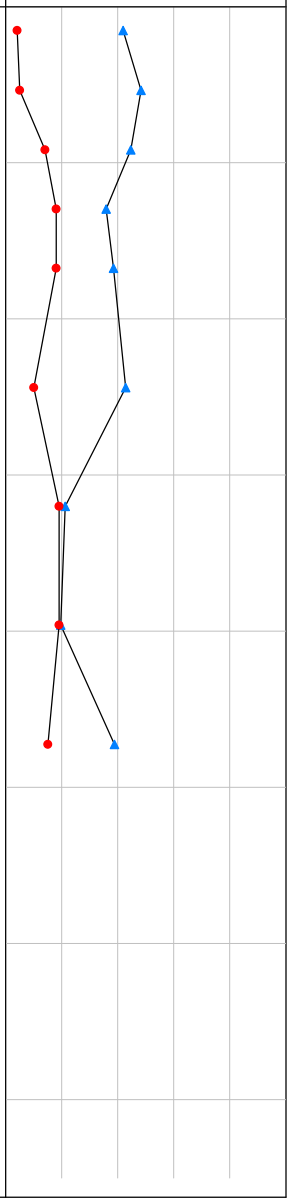
1. Borehole was advanced using solid stem auger equipment on March 11, 2025 to termination at a depth of 9.7 metres.

2. Borehole was recorded as open to a depth of 9.1 metres and 'wet' at depth of 6.7 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.

Moisture Content w% (10 20 30 40)

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



Drill Method: Solid Stem Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

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401 Grays Road, Hamilton, Ontario, L8E 2Z3
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Datum: Temporary Benchmark
Field Logged by: YP
Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 3

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788423
E: 652997

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	SAMPLE Number	SAMPLE Blow Counts	SAMPLE Blows/300mm	SAMPLE Recovery	PP (kgf/cm2)
	100.38	Ground Surface							
0 / 0		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	1,1,2,1	3		
1 / 1		**Sandy Silt** Brown, trace to some clay and gravel, occasional clayey seams, loose to compact.		SS	2	2,5,9,14	14		
2 / 2				SS	3	5,9,10,14	19		
3 / 3				SS	4	6,10,11,14	21		
4 / 4	96.20		>50	SS	5	6,12,14,11	26		
5 / 5		**Silty Clay/Clayey Silt** Grey, trace to some sand and gravel, stiff to very stiff.		SS	6	3,4,7,9	11		
6 / 6	93.70			SS	7	3,8,8,10	16		
7 / 7		End of Borehole							

NOTES:

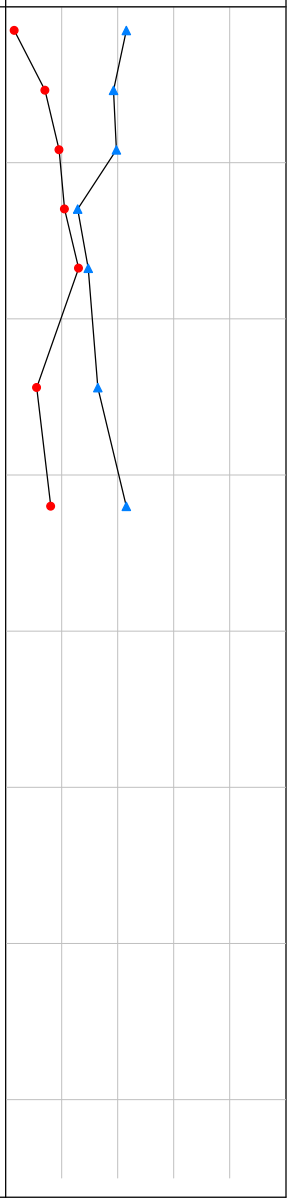
1. Borehole was advanced using solid stem auger equipment on March 11, 2025 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.6 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 Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

Soil-Mat Engineers & Consultants Ltd.
401 Grays Road, Hamilton, Ontario, L8E 2Z3
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Datum: Temporary Benchmark
Field Logged by: YP
Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788395
E: 652936

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	SAMPLE Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	99.66	Ground Surface							
0–3 / 0–1		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2,2,2,3	4		
3–8 / 1–2	97.10	**Sandy Silt** Brown to greyish brown, trace to some clay and gravel, occasional clayey seams, very loose to compact.		SS	2	2,4,8,9	12		
				SS	3	5,8,17,24	25		
				SS	4	14,15,10,7 Wet Spoon	25		
8–12 / 3–4	96.00	**Silty Clay/Clayey Silt** Grey, trace to some sand and gravel, very stiff to firm.		SS	5	2,3,3,3 Wet Spoon	6		
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 March 11, 2025 to termination at a depth of 3.6 metres.

2. Borehole was recorded as open to a depth of 1.8 metres and 'wet' at depth of 1.7 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.

Drill Method: Solid Stem Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

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Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788431
E: 652882

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	100.38	Ground Surface							
0 – 6 / 0 – 2		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	2,2,3,3	5		
				SS	2	2,4,9,7	13		
	98.40	**Sandy Silt** Brown, trace to some clay and gravel, occasional clayey seams, loose to compact.	>50	SS	3	4,7,15,15	22		
				SS	4	3,3,3,5	6		
10 – 21 / 3 – 6		**Silty Clay/Clayey Silt** Grey, trace to some sand and gravel, very soft to stiff.	>50	SS	5	1,2,4,3	6		
				SS	6	0,0,1,1	1		
	93.70			SS	7	3,5,7,9	12		
22 / 7		End of Borehole							

NOTES:

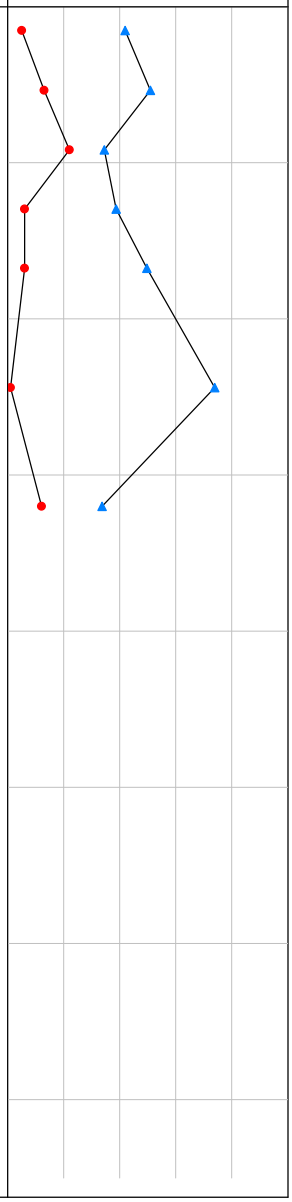
1. Borehole was advanced using solid stem auger equipment on March 11, 2025 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open to 5.7 metres and 'wet' at a depth of 4.8 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 Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

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401 Grays Road, Hamilton, Ontario, L8E 2Z3
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Datum: Temporary Benchmark
Field Logged by: YP
Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 6

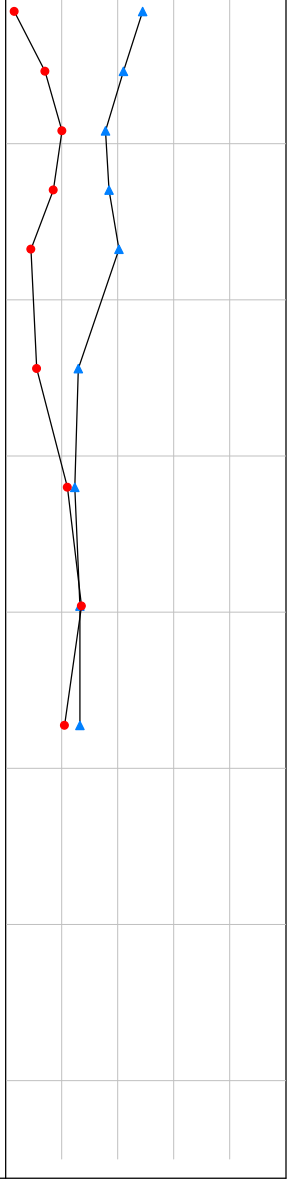
Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788384
E: 652999

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	SAMPLE Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	100.36	Ground Surface							
0–3 / 0–1		**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	1,1,2,3	3		
			>50	SS	2	4,5,9,14	14		
3–7 / 1–2	98.10	**Sandy Silt** Brown, trace to some clay and gravel, occasional clayey seams, very loose to compact.		SS	3	6,10,10,13	20		
7–9 / 2–3	97.30	Transition to grey in colour	>50	SS	4	11,10,17,9	17		
9–23 / 3–7		**Silty Clay/Clayey Silt** Grey, trace to some sand and gravel, occasional cobbles in lower levels, stiff to very stiff.		SS	5	3,4,5,6	9		
			>50	SS	6	3,5,6,5	11		
				SS	7	15,9,13,20	22		
23–31 / 7–9	93.20	**Sandy Silt** Grey, trace to some clay and gravel, occasional clayey seams, compact.		SS	8	8,11,16,24	27		
				SS	9	4,10,11,13	21		
31–49 / 9–15	90.60	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 March 11, 2025 to termination at a depth of 9.7 metres.

2. Borehole was recorded as open to a depth of 7.9 metres and 'wet' at depth of 9.7 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.

Drill Method: Solid Stem Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

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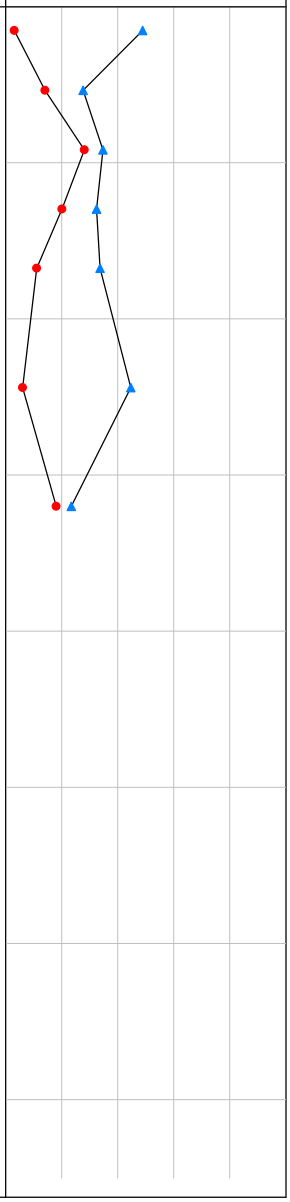
Log of Borehole No. 7

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788355
E: 652944

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	SAMPLE Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	100.08	Ground Surface							
0 / 0	99.80	**Topsoil** Approximately 250 millimetres of topsoil.		SS	1	1,1,2,3	3		
1 / 0									
2 / 1			>50	SS	2	5,7,7,15	14		
3 / 1		**Sandy Silt** Brown, trace to some clay and gravel, occasional clayey seams, veery loose to compact.							
4 / 1				SS	3	6,11,17,15	28		
5 / 2									
6 / 2									
7 / 2	97.80								
8 / 2	97.50								
9 / 3			50	SS	4	8,10,10,13	20		
10 / 3		Transition to grey in colour							
11 / 3		**Silty Clay/Clayey Silt** Grey, trace to some sand and gravel, firm to very stiff.	>50	SS	5	4,5,6,5	11		
12 / 4									
13 / 4									
14 / 4									
15 / 4									
16 / 5				SS	6	2,3,3,4	6		
17 / 5									
18 / 5									
19 / 5									
20 / 6									
21 / 6				SS	7	6,10,8,10	18		
22 / 6	93.40								
23 / 7		End of Borehole							
24 / 7		NOTES:							
25 / 7									
26 / 8		1. Borehole was advanced using solid stem auger equipment on March 11, 2025 to termination at a depth of 6.7 metres.							
27 / 8									
28 / 8									
29 / 9									
30 / 9									
31 / 9		2. Borehole was recorded as open to 3.9 metres and 'wet' at a depth of 5.7 metres upon completion and backfilled as per Ontario Regulation 903.							
32 / 9									
33 / 10									
34 / 10									
35 / 10									
36 / 11		3. Soil samples will be discarded after 3 months unless otherwise directed by our client.							
37 / 11									
38 / 11									
39 / 12									
40 / 12									
41 / 12									
42 / 13									
43 / 13									
44 / 13									
45 / 14									
46 / 14									
47 / 14									
48 / 14									
49 / 15									



Drill Method: Solid Stem Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

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Checked by: KR
Sheet: 1 of 1

Log of Borehole No. 8

Project No: SM 250069-G
Project: Proposed Agricultural Facility
Location: 727 East & West Line, NOTL
Client: Niagara Orchard & Vineyard Corp.

Project Manager: Kyle Richardson, P. Eng.
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4788340
E: 652845

Depth (ft / m)	Elevation (m)	Description	T-Time (mins/cm)	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)
0 / 0	99.81	Ground Surface							
0 / 0		**Topsoil** Approximately 200 millimetres of topsoil.		SS	1	1,2,2,4	4		
3 / 1				SS	2	1,3,5,7	8		
7 / 2	97.50	**Sandy Silt** Brown, trace to some clay and gravel, occasional clayey seams, loose to compact.	>50	SS	3	7,11,13,13	24		
10 / 3		**Silty Clay/Clayey Silt** Grey, trace to some sand and gravel, stiff to firm.	>50	SS	4	3,5,6,5	11		
12 / 4	96.10			SS	5	3,4,4,6	8		
		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 March 11, 2025 to termination at a depth of 3.6 metres.

2. Borehole was recorded as open to 2.1 metres and 'wet' at a depth of 1.2 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 Auger
Drill Date: March 11, 2025
Hole Size: 150 millimetres
Drilling Contractor: Elite Drilling

Soil-Mat Engineers & Consultants Ltd.
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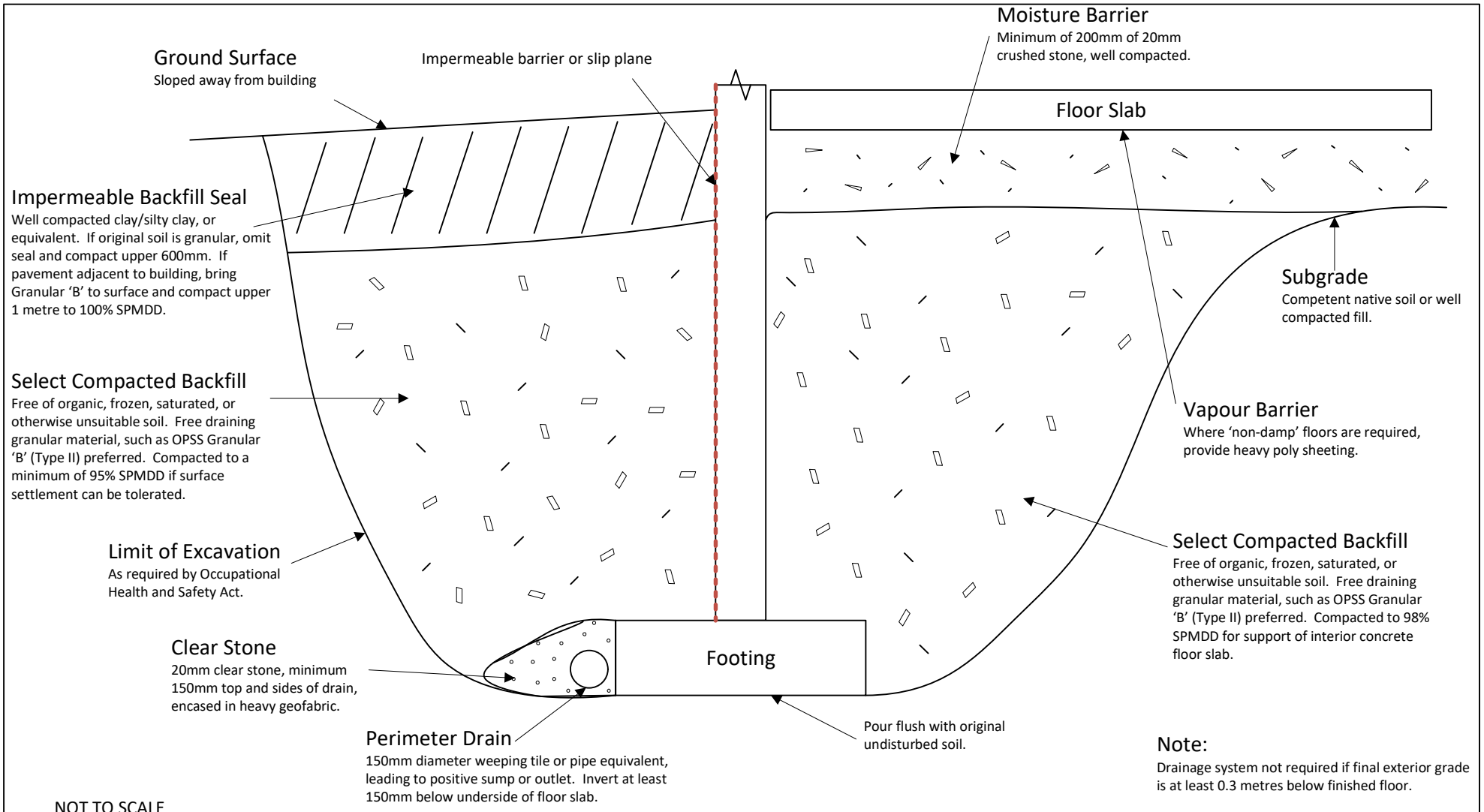
Datum: Temporary Benchmark
Field Logged by: YP
Checked by: KR
Sheet: 1 of 1



Note:
Drainage system not required if final exterior grade is at least 0.3 metres below finished floor.

NOT TO SCALE

Soil-Mat

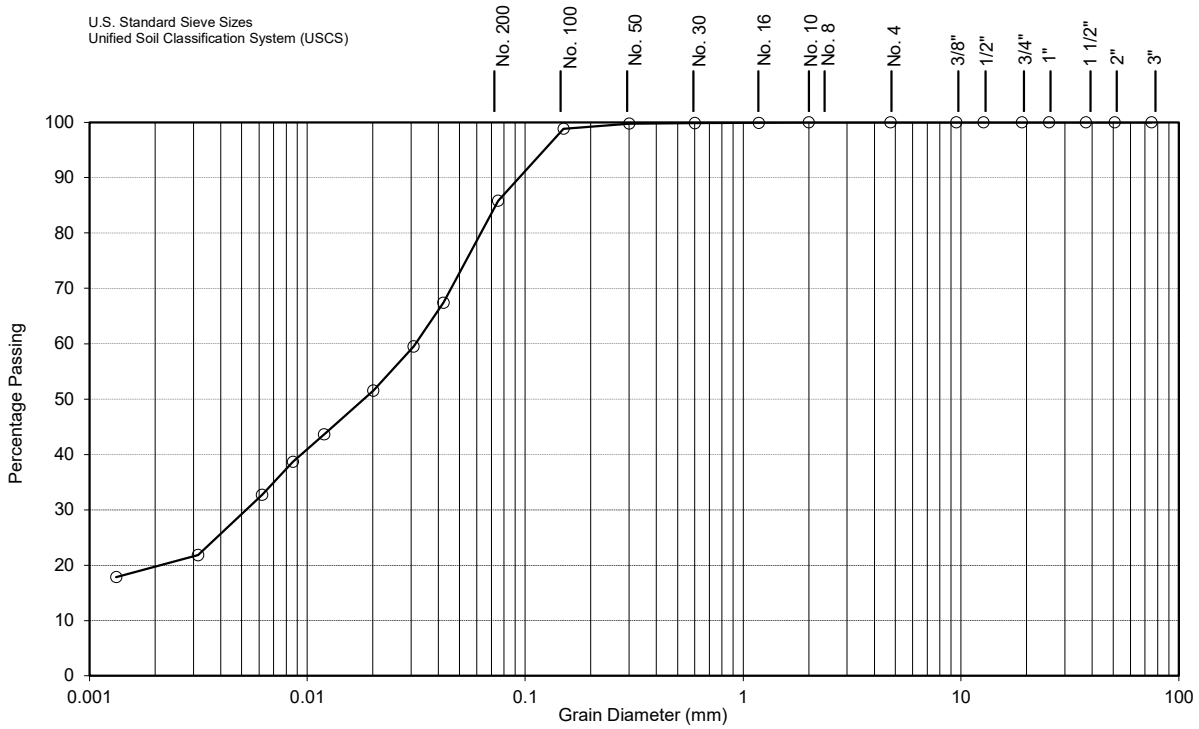
Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 250069-G
Date:	April, 2025

Typical Design Requirements
Slab-on-Grade with Perimeter Drainage

Drawing No. 2

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

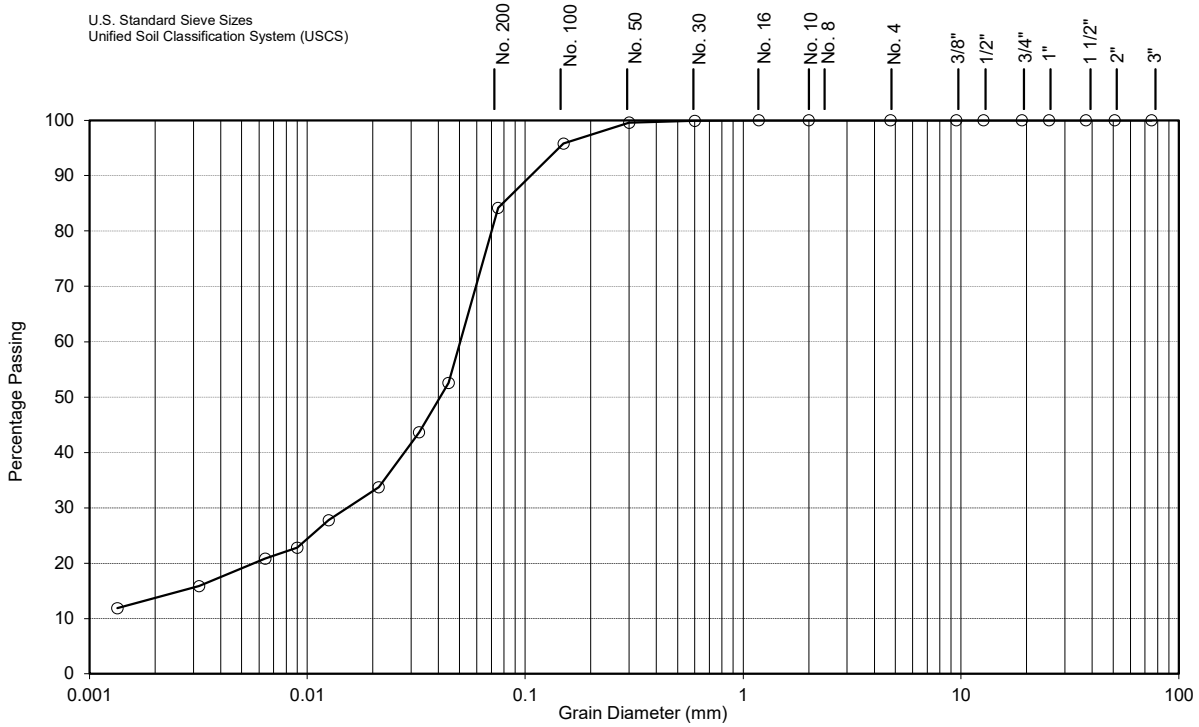
Lab No.:	**25-073**	Notes: Depth: 5'			
Borehole No.:	**2**				
Sample No.:	**3**				
CLAY [%]:	**20**	Soil Description: **Brown Clayey Silt w/ some Sand**			
SILT [%]:	**66**	**M.L. - Clayey silts with slight plasticity, inorganic silts and very fine sands, clayey fine sands**			
SAND [%]:	**14**				
GRAVEL [%]:	**0**	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:	**64.0**	Coefficient of Curvature C_C:	**1.7**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

727 East West Line, Niagara-on-the-Lake ON

Date Tested: March 24, 2025	Grain Size Analysis No. 1	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

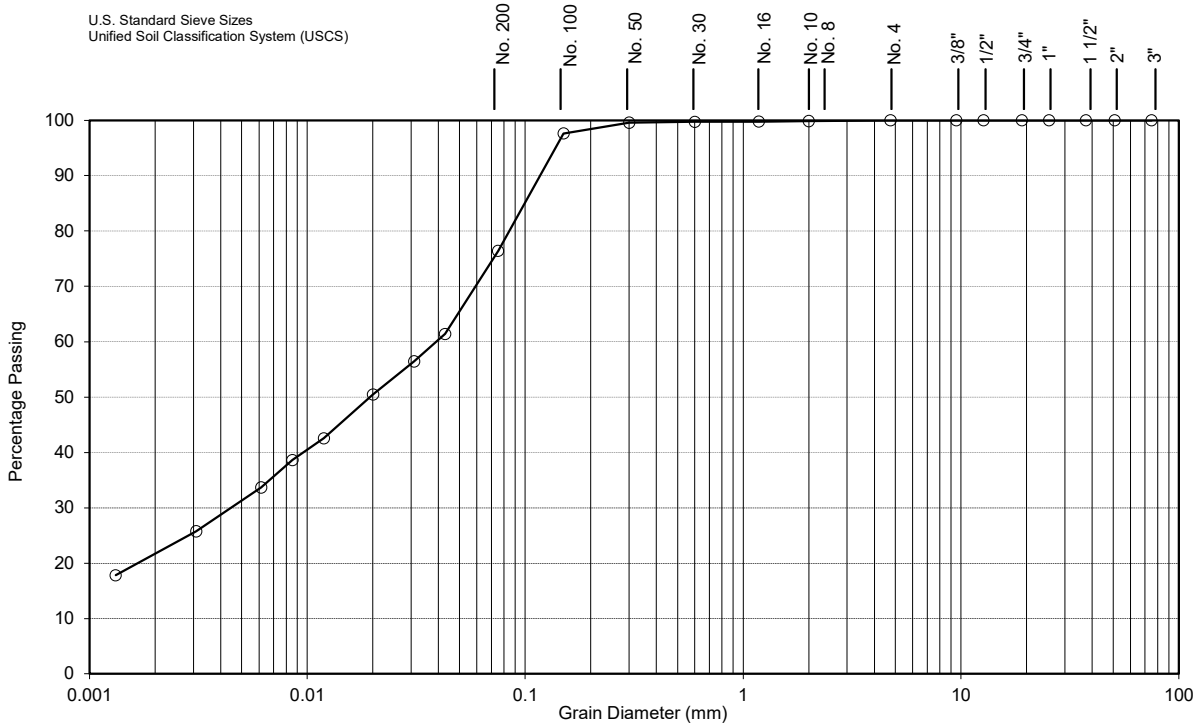
Lab No.:	**25-074**	Notes: Depth: 10'			
Borehole No.:	**3**				
Sample No.:	**5**				
CLAY [%]:	**14**	Soil Description: **Greyish Brown Silt w/ some Sand and Clay**			
SILT [%]:	**70**	**M.L. - Inorganic silts and very fine sands to C.L. - Inorganic clays of low to medium plasticity**			
SAND [%]:	**16**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**10 to 15**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0009**	Coefficient of Uniformity C_U:	**55.6**	Coefficient of Curvature C_C:	**5.7**

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

727 East West Line, Niagara-on-the-Lake ON

Date Tested: March 24, 2025	Grain Size Analysis No. 2	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-075**	Notes: Depth: 5'			
Borehole No.:	**5**				
Sample No.:	**3**				
CLAY [%]:	**22**	Soil Description: **Brown Sandy and Clayey Silt**			
SILT [%]:	**54**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity, clayey fine sands**			
SAND [%]:	**24**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0006**	Coefficient of Uniformity C_U:	**65.0**	Coefficient of Curvature C_C:	**0.9**

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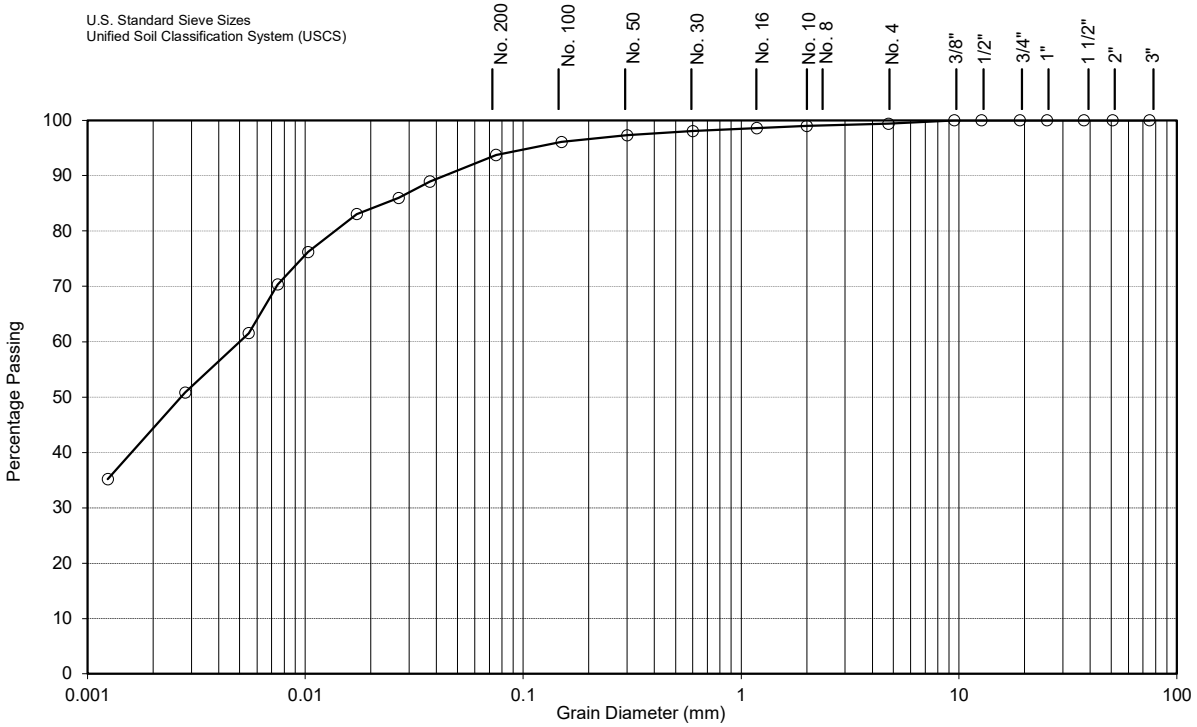
727 East West Line, Niagara-on-the-Lake ON

Date Tested: March 25, 2025	Grain Size Analysis No. 3	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-076**	Notes: Depth: 10'			
Borehole No.:	**5**				
Sample No.:	**5**				
CLAY [%]:	**44**	Soil Description: **Greyish Brown Silt and Clay w/ traces of Sand and Gravel**			
SILT [%]:	**50**	**M.L. - Inorganic silts and very fine sands to C.L. - Inorganic clays of low to medium plasticity**			
SAND [%]:	**5**				
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0004**	Coefficient of Uniformity C_U:	**12.5**	Coefficient of Curvature C_C:	**0.5**

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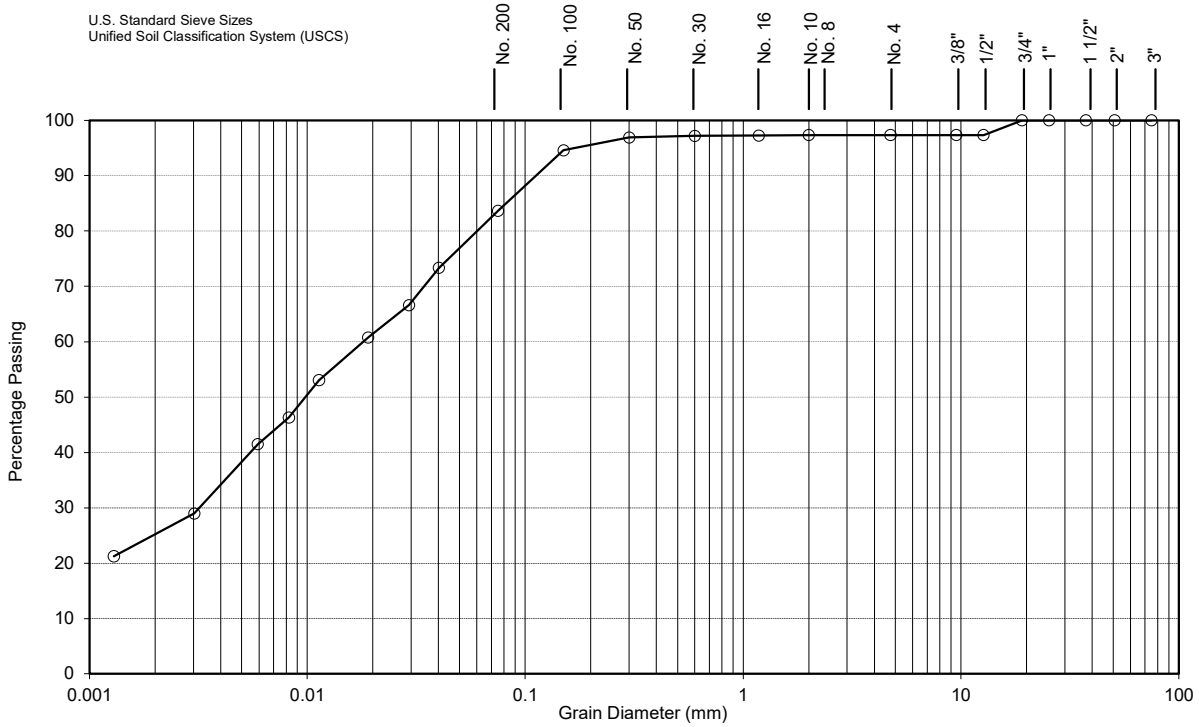
727 East West Line, Niagara-on-the-Lake ON

Date Tested: March 25, 2025	Grain Size Analysis No. 4	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-095**	Notes: Depth: 2.5'			
Borehole No.:	**6**				
Sample No.:	**2**				
CLAY [%]:	**25**	Soil Description: **Brown Clayey Silt w/ some Sand and a trace of Gravel**			
SILT [%]:	**59**	**M.L. - Clayey silts with slight plasticity, inorganic silts and very fine sands, clayey fine sands**			
SAND [%]:	**13**				
GRAVEL [%]:	**3**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0004**	Coefficient of Uniformity C_U:	**45.0**	Coefficient of Curvature C_C:	**1.4**

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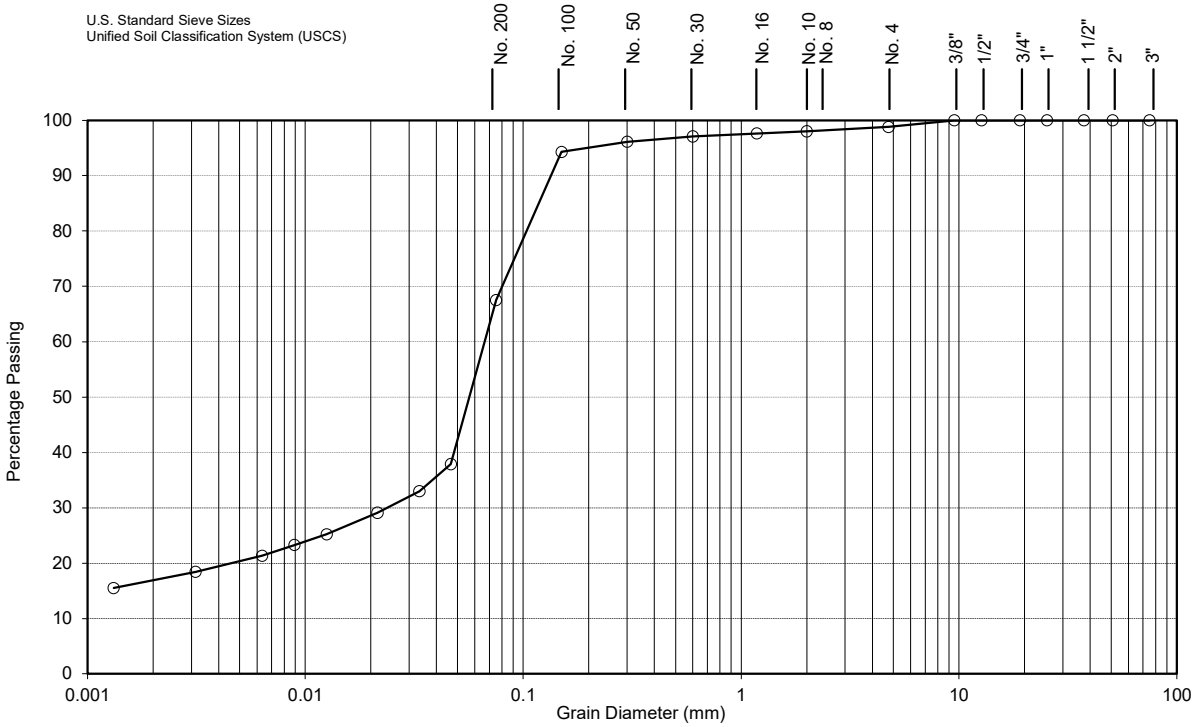
727 East West Line, Niagara-on-the-Lake ON

Date Tested: April 3, 2025	Grain Size Analysis No. 5	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-100**	Notes: Depth: 7.5'			
Borehole No.:	**6**				
Sample No.:	**4**				
CLAY [%]:	**17**	Soil Description: **Greyish Brown Sandy Silt w/ some Clay and a trace of Gravel**			
SILT [%]:	**51**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity, clayey fine sands**			
SAND [%]:	**31**				
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0004**	Coefficient of Uniformity C_U:	**167.5**	Coefficient of Curvature C_C:	**21.5**

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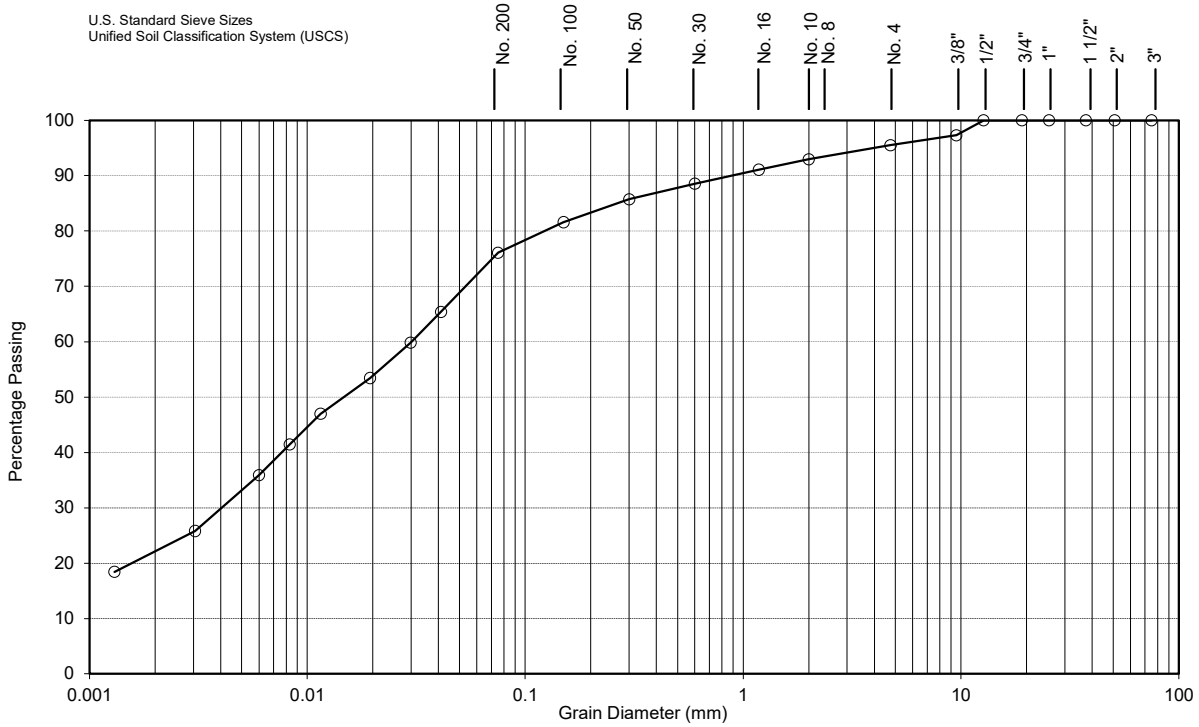
Date Tested: April 4, 2025	Grain Size Analysis No. 6	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-101**	Notes: Depth: 15'			
Borehole No.:	**6**				
Sample No.:	**6**				
CLAY [%]:	**22**	Soil Description: **Greyish Brown Clayey and Sandy Silt w/ a trace of Gravel**			
SILT [%]:	**54**	**M.L. - Clayey silts with slight plasticity, inorganic silts and very fine sands, clayey fine sands**			
SAND [%]:	**20**				
GRAVEL [%]:	**4**	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:	**60.0**	Coefficient of Curvature C_C:	**1.1**

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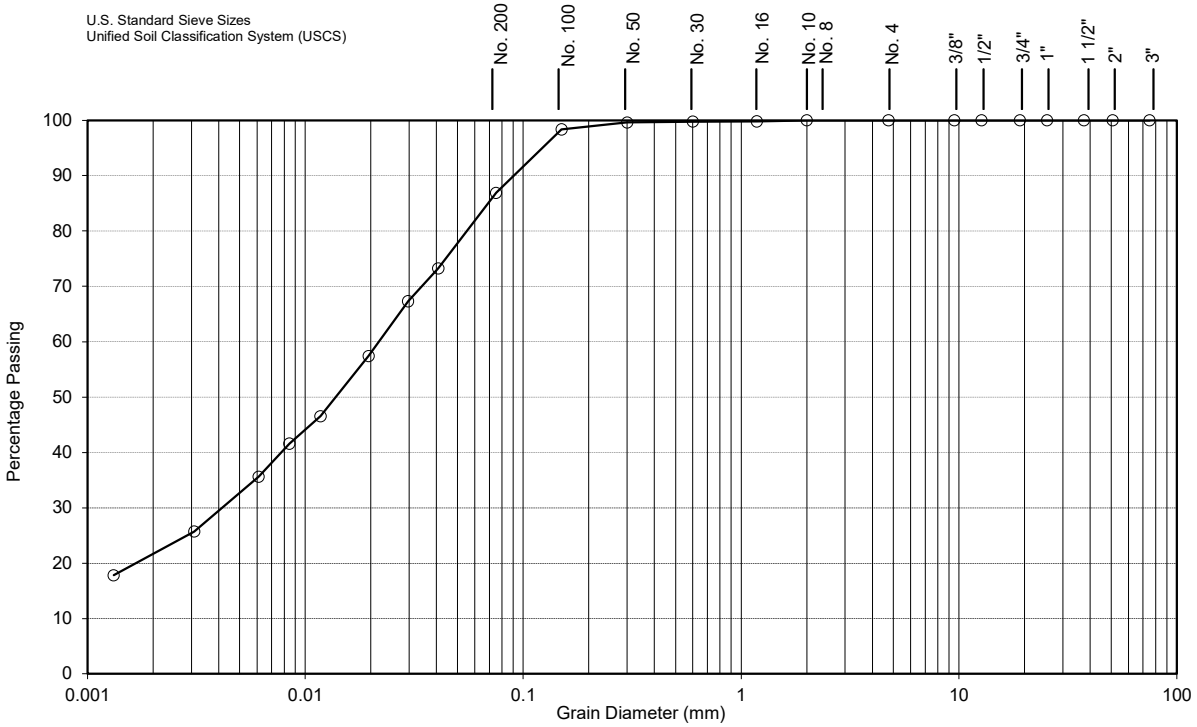
727 East West Line, Niagara-on-the-Lake ON

Date Tested: April 8, 2025	Grain Size Analysis No. 7	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-102**	Notes: Depth: 2.5'			
Borehole No.:	**7**				
Sample No.:	**2**				
CLAY [%]:	**22**	Soil Description: **Brown Clayey Silt w/ some Sand**			
SILT [%]:	**65**	**M.L. - Clayey silts with slight plasticity, inorganic silts and very fine sands, clayey fine sands**			
SAND [%]:	**13**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0006**	Coefficient of Uniformity C_U:	**36.7**	Coefficient of Curvature C_C:	**1.3**

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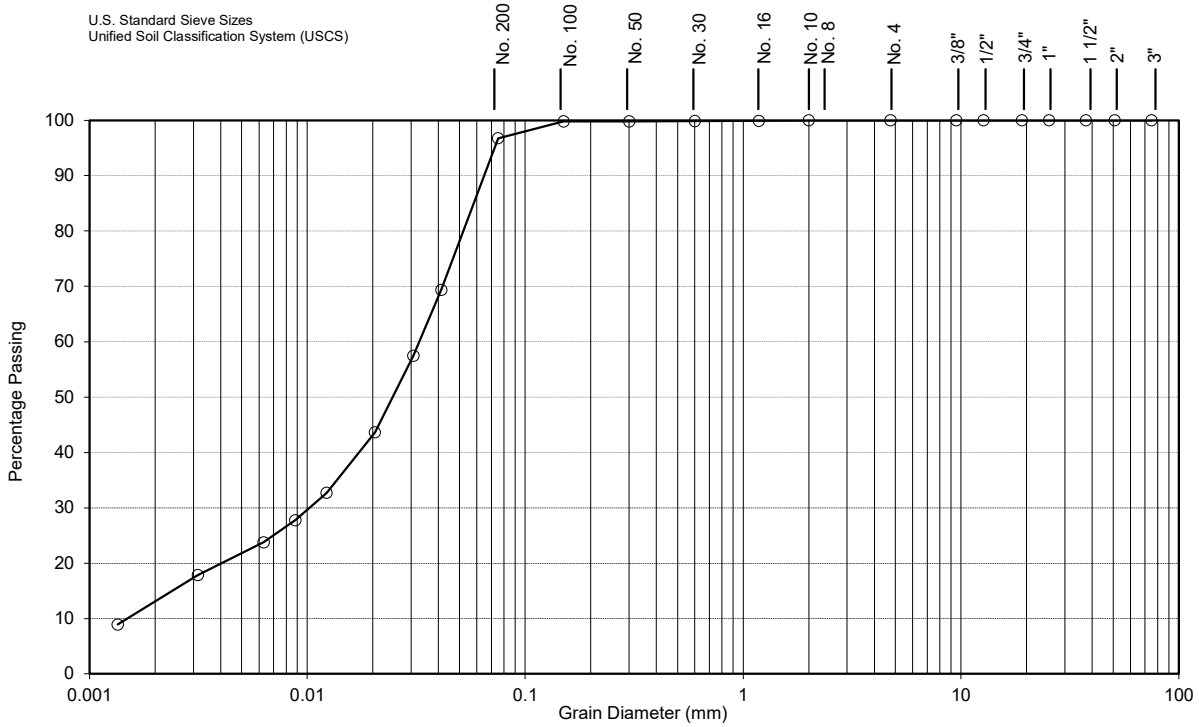
Date Tested: April 8, 2025	Grain Size Analysis No. 8	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-103**	Notes: Depth: 7.5'			
Borehole No.:	**7**				
Sample No.:	**4**				
CLAY [%]:	**13**	Soil Description:	**Greyish Brown Silt w/ some Clay and a trace of Sand**		
SILT [%]:	**84**		**M.L. - Inorganic silts and very fine sands**		
SAND [%]:	**3**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**10 to 15**	Estimated Permeability, k [cm/s]:	**10^{-6}**
D_{10} (Effective Diam. in mm):	**0.0016**	Coefficient of Uniformity C_U:	**20.0**	Coefficient of Curvature C_C:	**2.0**

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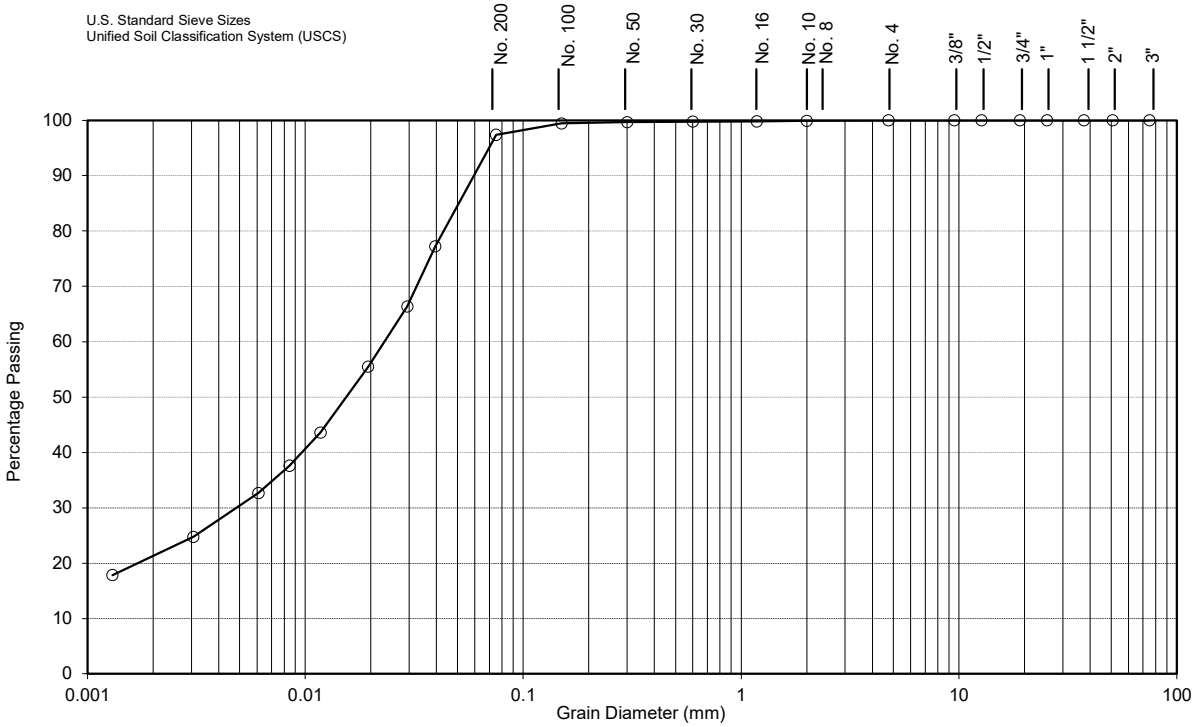
Date Tested: April 9, 2025	Grain Size Analysis No. 9	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-104**	Notes: Depth: 10'			
Borehole No.:	**7**				
Sample No.:	**5**				
CLAY [%]:	**22**	Soil Description:	**Greyish Brown Clayey Silt w/ a trace of Sand**		
SILT [%]:	**75**		**M.L. - Clayey silts with slight plasticity, inorganic silts and very fine sands**		
SAND [%]:	**3**				
GRAVEL [%]:	**0**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0006**	Coefficient of Uniformity C_U:	**38.3**	Coefficient of Curvature C_C:	**1.7**

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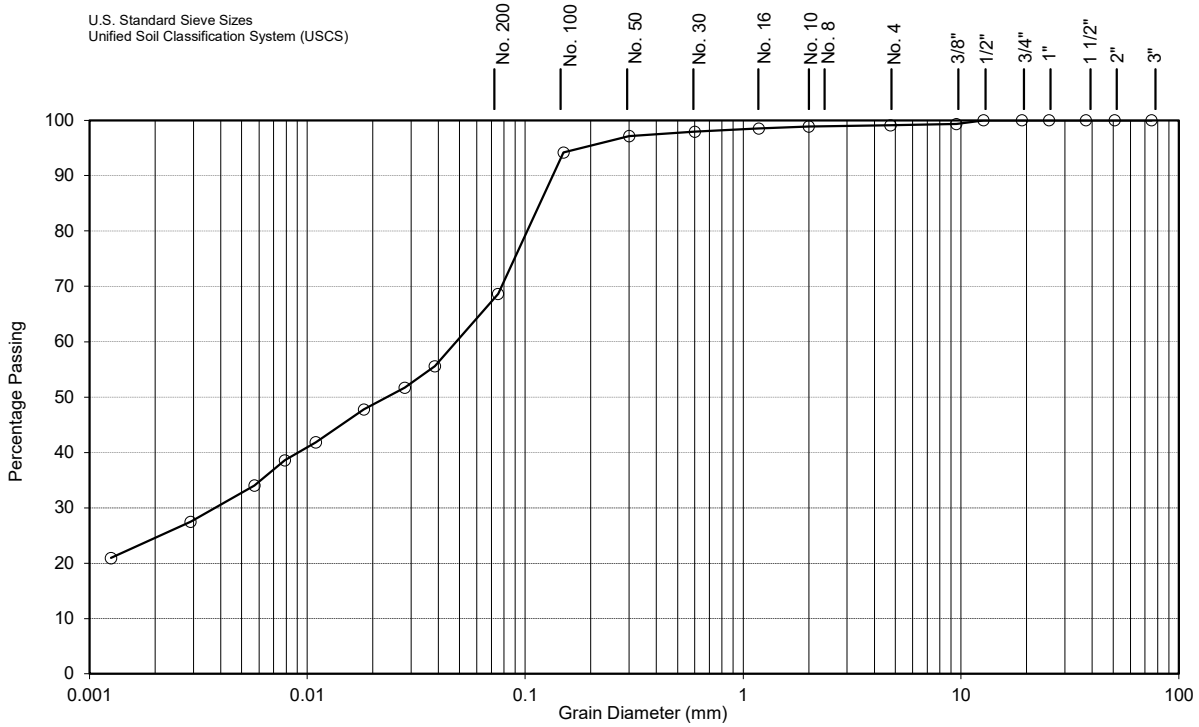
Date Tested: April 9, 2025	Grain Size Analysis No. 10	Project No.: SM 250069-T

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-105**	Notes: Depth: 5'			
Borehole No.:	**8**				
Sample No.:	**3**				
CLAY [%]:	**25**	Soil Description: **Brown Sandy and Clayey Silt w/ a trace of Gravel**			
SILT [%]:	**44**	**M.L. - Inorganic silts and very fine sands, clayey silts with slight plasticity, clayey fine sands**			
SAND [%]:	**30**				
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] :	**< 10**	Estimated Permeability, k [cm/s]:	**10^{-7}**
D_{10} (Effective Diam. in mm):	**0.0004**	Coefficient of Uniformity C_U:	**122.5**	Coefficient of Curvature C_C:	**0.8**

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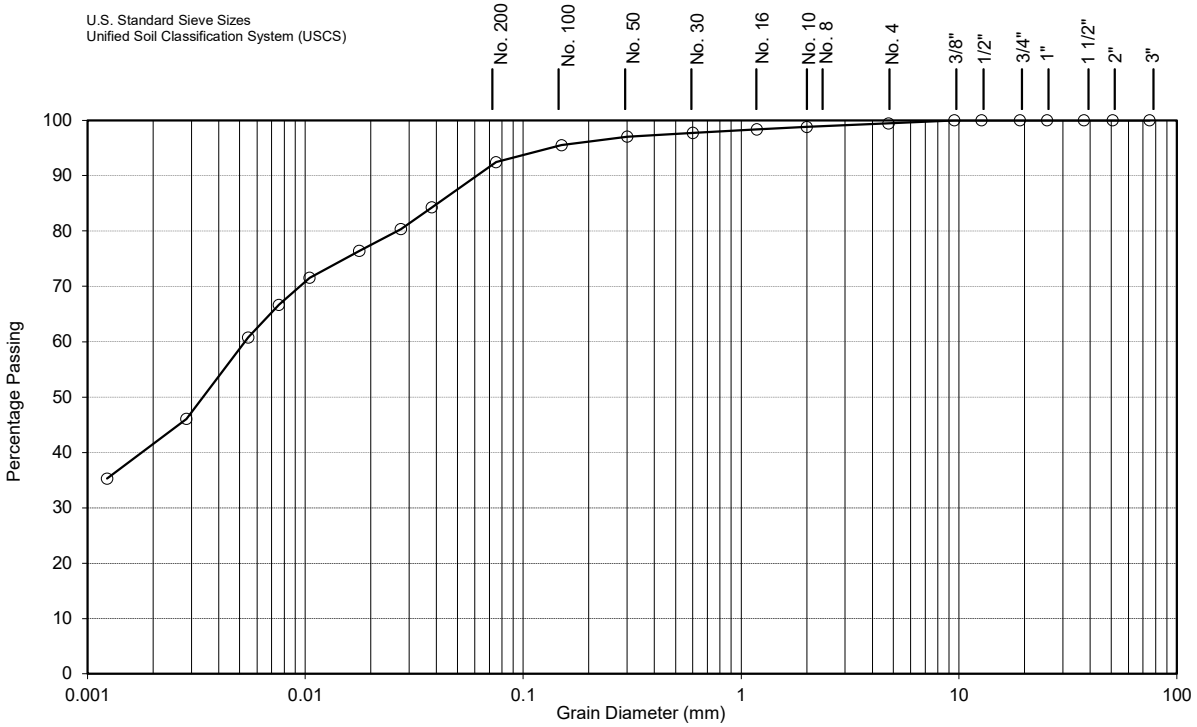
Date Tested: April 9, 2025	**Grain Size Analysis No. 11**	**Project No.: SM 250069-T**

Mechanical & Hydrometer Analyses



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	**25-106**	Notes: Depth: 7.5'			
Borehole No.:	**8**				
Sample No.:	**4**				
CLAY [%]:	**41**	Soil Description: **Greyish Brown Silt and Clay w/ traces of Sand and Gravel**			
SILT [%]:	**51**	**M.L. - Inorganic silts and very fine sands to C.L. - Inorganic clays of low to medium plasticity**			
SAND [%]:	**7**				
GRAVEL [%]:	**1**	Estimated Infiltration Rate [mm/hr] :	**< 5**	Estimated Permeability, k [cm/s]:	**10^{-8}**
D_{10} (Effective Diam. in mm):	**0.0002**	Coefficient of Uniformity C_U:	**25.5**	Coefficient of Curvature C_C:	**0.6**

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Date Tested: April 10, 2025	Grain Size Analysis No. 12	Project No.: SM 250069-T