SOLA ENGINEERING

RE: PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL SUBDIVISION
1045 DONNYBROOK DRIVE
DORCHESTER, ONTARIO

FOR: Lantern Capital
2425 Matheson Boulevard East, 8th Floor
Mississauga, Ontario
L4W 5K4

ATTENTION: Mr. Bav Malhi

REPORT NO.: 2021-15454

DATE: June 15, 2021

DISTRIBUTION: PDF Copy: Lantern Capital
- Mr. Bav Malhi [bmalhi@lanterncapital.ca]
- Mr. Stephen Maycher [smaycher@lanterncapital.ca]

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TABLE OF CONTENTS

TABLES

ENCLOSURES

390 Edgeley Blvd., Units 25 & 26,
Vaughan, Ontario L4K 3Z6
T: 905-760-9501 | F: 905-761-1822
W: www.solaengineering.ca

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1.0 INTRODUCTION

Sola Engineering Inc. (Sola) was retained by Lantern Capital (the Client) to carry out a preliminary geotechnical investigation for the proposed industrial subdivision located at 1045 Donnybrook Drive in Dorchester, Ontario (the subject site or site). Authorization to proceed with the investigation was received on April 26, 2021 through the acceptance of Sola's Proposal No. 2021-2716 dated April 21, 2021.

As per the scope of services detailed in Sola's proposal, the purpose of this investigation is to collect information on the soil and groundwater conditions at the subject site and, based on the investigation data to provide recommendations to assist with the preliminary design of the proposed industrial subdivision. It should be noted that a supplementary investigation will be required according to the building footprints for the detailed design.

This report presents the details of Sola's fieldwork and laboratory testing, outlines the soil and groundwater conditions at the site, and provides comments on the aforementioned items.

In this report, standard site investigation procedures have been adopted. The procedures including those developed by the Ontario Building Code (OBC), Canadian Foundation Engineering Manual (CFEM), American Society for Testing and Materials (ASTM), Ontario Ministry of Transportation (MTO) and Toronto Transit Commission (TTC), are considered by far the most accepted methods by the local geotechnical society for the general engineering purposes. Soil Classification Systems used for developing this report have been in general conformance with those outlined in the above-mentioned procedures, with modifications where appropriate. Where in doubt, this office must be contacted for further interpretation or clarification.

This report has been prepared for the Client, and their nominated engineers and designers. Third-party use or reproduction, in part or in full, of this report, is prohibited without written authorization from Sola. This report is also subject to the *Statement of Limitations* which forms an integral part of this document.

2.0 SITE SETTING

2.1 SITE LOCATION, DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is located at the open field at 1045 Donnybrook Drive in Dorchester, Ontario and is currently vacant. The site is bounded to the north by Donnybrook Drive and residential properties,

to the south by Highway 401, to the west by residential properties and to the east by farm land and tree covered areas.

The subject site is being considered for a industrial subdivision. It is understood that the Client is contemplating developing the site with single-storey slab-on-grade industrial buildings with office spaces.

2.2 PUBLISHED GEOLOGY

Based on a review of the existing geological publication for the site area, Ontario Geological Survey (OGS) Map P0606: "*PleistoceneGeology of the St. Thomas Area (East Half) (Southern Ontario)*", the site surrounding area is underlain by Glacial Erie Lobe, comprising Port Stanley silty clay till and clayey silt till, in places covered by thin patches of lacustrine silt; ground moraine plains and end moraine ridges; slightly undulating microtopography. According to the OGS Map 2197: "*Ontario Geological Map – Southern Sheet*", the surficial overburden is underlain by the bedrock of the Middle Devonian comprising Limestone, Dolostone, Shale and Gypsum.

3.0 GROUND INVESTIGATION

3.1 FIELD INVESTIGATION

3.1.1 Soil Investigation

Prior to undertaking field drilling, Sola obtained clearances of existing public utility services to the site from all applicable agencies and companies. In addition, private utility locates were also carried out.

The geotechnical field program was carried out on May 20, 2021 and comprised the drilling of four (4) boreholes (BH1 through BH4). The boreholes were advanced through the existing ground surface to the depth of approximately 6.6 m below the ground surface using a track-mounted drill rig equiped for split spoon sampling and standard penetration testing. The approximate locations of the boreholes are shown on **Enclosure 1**. Four (4) monitoring wells were installed at borehole locations BH1 through BH4.

All drilling equipment was supplied and operated by Terra Firma Environmental Services Ltd. of North York, Ontario, and the drilling works were completed under the full-time supervision of a qualified Sola Technician.

Standard Penetration Tests (SPTs) split spoon samples were collected in the drilled boreholes using a 50 mm outer diameter and 35 mm inner diameter split barrel sampler driven with a

63.5 kg automatic hammer dropping 760 mm. All soil samples were logged in the field and returned to Sola's laboratory in Vaughan for review and subsequent laboratory testing.

The logs of the boreholes completed are presented on **Enclosures 2 through 5**.

3.1.2 Groundwater Investigation

Groundwater level observations were made during drilling and in the open borehole upon completion of the drilling operations. Upon completion of each borehole, a monitoring well was installed to enable the a longer term monitoring of the groundwater at the site without interference from surface water. Details of groundwater observations for the boreholes are presented on the borehole logs on **Enclosures 2 through 5**. Further discussion on groundwater is provided in **Section 4.2** of this report.

3.2 GEOTECHNICAL LABORATORY TESTING

All soil samples were submitted to Sola's laboratory for natural moisture content determination. The results of the moisture content are presented on the borehole logs on **Enclosures 2 through 5**. In addition, two (2) representative soil samples were selected and submitted for testing of particle size distribution. The results of the laboratory tests are provided on **Enclosures 8 and 9**.

4.0 SUBSURFACE CONDITIONS

The detailed descriptions of the subsurface conditions encountered at each borehole location are given on the Borehole Logs on **Enclosures 2 through 5**.

The borehole data collected by Sola only represents the subsurface conditions at the borehole locations. It should be pointed out that the material boundaries indicated on the Borehole Logs are approximate and based on visual observations and interpolation between successive samples. These boundaries typically represent a transition from one material type to another and should not be regarded as an exact plane of geological change. It should also be noted that the subsurface conditions may vary across the site.

A summary of the characteristics for each unit of subsoil encountered within the borehole depths is given in the following paragraphs.

4.1 SOIL CHARACTERISATION

4.1.1 Topsoil

A layer of topsoil was encountered at all borehole locations. The thicknesses of topsoil was

measured to range from approximately 75 mm to 150 mm at the borehole locations.

It is important to note that topsoil thicknesses may vary throughout the site area, depending upon their location. As such, these findings should not be relied upon for any estimation of topsoil quantities to be stripped prior to construction.

4.1.2 Fill Materials (Including Probable Fill)

Fill materials were encountered at all borehole locations. The thicknesses of the fill materials at the borehole locations vary from approximately 0.7 m (BH1) to 1.4 m (BH2 and BH4). In BH1 underlying the fill, a 0.7 m thick layer of soil identified as Probable Fill was contacted. The fill (and probable fill) unit was found to extend to a depth of approximately 1.5 m in all boreholes.

Fill materials generally consisted of silty sand to sandy silt and clayey silt. The fill was generally brown in colour. In-situ resistance testing results ranged from 4 (BH2 and BH4) to 24 (BH1) blows per 300 mm of spoon penetration, indicating that the fill was not constructed under engineering control.

In the fill layer, the moisture content of the samples recovered ranged from 15.9% (BH3) to 21.3% (BH2), indicating a moist condition.

4.1.3 Clayey Silt

A clayey silt deposit was encountered below the fill in borehole BH3 at the depth of approximately 1.5 m and extended to the depth of approximately 2.3 m below the ground surface.

SPT “N” value for the clayey silt layer was recorded to be 11 blows per 300 mm of spoon penetration, indicating that the soil is in a stiff condition.

In the clayey silt soil layer, the moisture content of the sample recovered was approximately 14.4%, indicating a moist condition.

4.1.4 Glacial Till

Clayey silt till and silty clay till deposits were encountered below the fill materials or clayey silt deposit in all borehole locations, at the depth ranging from approximately 1.5 m (BH1, BH2 and BH4) to 2.3 m (BH3) below the ground surface. All boreholes were terminated in these deposits.

The composition of the till was found to change from primarily clayey silt with trace to some sand and gravel to a relatively more clayey till (i.e. silty clay till) with trace of sand and gravel at the depth of about 4.5 m to 6.6 m below the ground surface. Owing to their mode of deposition, the presence of cobbles and boulders should always be anticipated in the glacial till deposits.

SPT "N" values for the glacial till deposits were recorded from 12 (BH2 and BH4) to 36 (BH1) blows per 300 mm of spoon penetration, indicating that the deposits to be in a stiff to hard condition.

In the glacial till deposits, the moisture content of the samples recovered ranged from approximately 12.2% (BH3) to 18.3% (BH1), indicating a moist to very moist condition.

4.2 GROUNDWATER

The groundwater conditions encountered during drilling and cave in depths are presented on the borehole logs on **Enclosures 2 through 5** as well as in **Table 1**.

Table 1: Borehole Water Depth and Cave-in Upon Completion of Drilling

Borehole Number	Water Depth Upon Drilling Completion (mBGS)	Cave-in Depth Upon Drilling Completion (mBGS)	Groundwater Depth (mBGS) taken by Project Hydrogeologist on May 25, 2021
BH1	Dry	Open	4.80
BH2	Dry	Open	1.15
BH3	Dry	Open	4.15
BH4	Dry	Open	3.50

Note: mBGS = meters below ground surface

It should be noted that water levels can vary in response to seasonal fluctuations and major weather events. In addition, a perched water condition can occur due to the accumulation of surface water in the more pervious fill overlying less pervious deposits, especially during seasonally wetter periods.

Long-term "stabilized" groundwater level measurements should refer to the project hydrogeology study.

5.0 DISCUSSION AND RECOMMENDATIONS

The investigation and comments should be considered ongoing as new information about the underground conditions will continue to become available. When more specific information is available with respect to the

soil conditions, the interpretation and the recommendations of this report must therefore be checked through field inspections carried out by Sola to validate the information for use during construction.

For this preliminary investigation, the details of the proposed development have not been made available. It is understood that the Client is contemplating developing the site with single-storey slab-on-grade industrial buildings with office spaces. A supplementary investigation will be required according to the building footprints for the detailed design, when available. Based on the ground conditions found at the site, our recommendations are presented in the following sections.

5.1 FROST PROTECTION

All footings and structural elements exposed to seasonal freezing conditions must have at least 1.2 metres of permanent soil cover, or equivalent artificial insulation, for frost protection.

5.2 CONVENTIONAL SPREAD OR STRIP FOUNDATIONS

At the time of preparation of this report, design loading requirements have not been made available. The following discussions are provided to assist the preliminary design phase of the proposed industrial subdivision. For geotechnical design purposes, it is assumed that the footings will be positioned below the frost penetration depth, i.e., at least 1.2 m below the finished grade.

Based on borehole data, the proposed industrial development can be supported by spread and strip footings founded on undisturbed native soil and designed for geotechnical reactions at Serviceability Limit States (SLS) and factored geotechnical resistances at Ultimate Limit States (ULS) at the depths as outlined in **Table 2**.

Table 2: Bearing Resistances and Founding Depths

Borehole Number	SLS (kPa)	ULS (kPa)	Founding Depth (mBGS)	Founding Stratum
BH1	200	300	1.5	Clayey Silt Till
BH2	120	180	1.5	Clayey Silt Till
	160	240	2.3	Clayey Silt Till
BH3	100	150	1.5	Clayey Silt
	160	240	2.3	Clayey Silt Till
BH4	200	300	1.5	Clayey Silt Till

It is assumed that the dimensions of the footing units will not be greater than 3 x 3 m (square) or 1.0 m wide (strip). Larger footings may yield larger settlements and must be reviewed by the Geotechnical Engineer during the detailed structural design.

Alternatively, the footings can be founded on engineered fill. This would involve stripping of the existing fill to the surface of suitable native soils, inspecting and compacting from the surface, and backfilling in shallow layers of not more than 300 mm in thickness when first placed i.e., before applying compaction. Each layer would be compacted to not less than 100% of the Standard Proctor Maximum Dry Density (SPMDD). Imported granular fill would be utilized for this purpose. The entire process would be conducted under the supervision of geotechnical personnel from this office. An SLS value of 150 to 200 kPa and a ULS value of 225 to 300 kPa can be utilized depending on the property of the fill used and compaction procedures, including the degree of compaction. We will be pleased to provide more details of this procedure if it is to be considered.

Alternatively, a “trench-and-pour” construction technique can be utilized. In order to facilitate the construction, it is prudent to excavate a few test pits prior to construction in the general area to examine whether the trench walls can remain relatively stable for the proposed footing construction.

The design values provided above are based on the presumption that the bearing resistance at SLS is governed by total and differential settlements of 25 mm and 19 mm respectively, and the structure will tolerate an angular distortion of 1 in 300.

Where it is necessary to place footings on the soil at a different level, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line (10H:7V) drawn up from the base of the lower footing. The lower footing must be installed first to minimize the risk of undermining the upper footing.

Footings and any foundation wall should be reinforced as per the design to be provided by the Structural Engineer of the project.

The recommended bearing resistances and the corresponding founding elevations would need to be confirmed by geotechnical engineering staff at the site prior to pouring footing concrete.

It should be noted that the recommended bearing resistances have been calculated by Sola from the borehole information for the design stage only. Should higher bearing values be required, this office should be contacted to review this report.

Foundation walls and columns should be protected against heave due to adfreeze. Where construction is undertaken during winter conditions, footing subgrades should be protected from freezing.

5.3 EARTHQUAKE CONSIDERATIONS

Using the information provided by the site investigation, the general soil profile comprises *"Stiff Soil – Site Class D"* as defined by Table 4.1.8.4.A *"Site Classification for Seismic Site Response"* of the Ontario Building Code.

For industrial building construction, cost savings may be achieved if the Site Classification can be upgraded through shear wave velocity testing. This testing can be carried out by a specialist geophysics firm.

5.4 SLAB-ON-GRADE CONSTRUCTION

The existing topsoil and fill within the proposed building footprint should be removed to a depth of not less than 1.0 m below the exsiting ground surface. Depending on the design grade and loading conditions, some of the existing geotechnically and environmentally clean fill may be reused to raise the grade after striping to a depth of 0.5 m below the proposed floor slab, depending on the loading consitions. After striping, the exposed soil subgrade must be inspected, evaluated and approved. The approved subgrade should then be proof rolled to detect any soft or unstable areas, which must be removed and replaced with suitably compacted engineered fill, as defined in **Section 5.9** of this report. Once the required subgrade has been developed, Sola recommends that the exposed subgrade be inspected and approved by the Geotechnical Engineer before the placement of any granular fill or concrete.

For highly loaded floor areas (i.e., warehouses, etc.) sensitive to settlements, it is recommended that engineered fill be used. For this purpose, the site should be stripped of all the existing fill, and the subgrade should be approved by Sola. Upon approval, the on-site excavated clean selected material can be used to raise the grade to a depth of about 1.0 m below the bottom of the floor slab. We recommend that the remaining portion of the fill should consist of imported clean granular fill such as Granular 'B' material, type 2. Under light-loaded floor areas, which may not be sensitive to settlements, the existing fill can selectively be used to raise the grade to a depth of 0.5 m below the underside of the floor slab. For normal duty concrete floor-slab, it is recommended that an at least 200 mm thick layer of either OPSS Granular A or 20 mm Crusher-Run Limestone (to top over and above the Granular 'B') should be used and compacted to at least 100% SPMDD. For heavy-duty floor slabs, the granular thickness should be increased to 300 mm. These recommendations need to be adjusted when the details are known.

The minimum acceptable degree of compaction for the backfill typically ranges between 98% and 100% of the SPMDD depending on the details of the project.

It is considered by Sola that completed excavations for floor slabs should not be left open before pouring concrete for any period longer than 24 hours, particularly if the floor construction works are being completed during the winter months or wet weather periods. The base of any floor slab excavation that is to be left exposed for longer than 24 hours should be suitably covered and protected from water ponding, and/or protected to prevent degradation of the exposed founding stratum with the construction of a mud mat.

Prior to placing the stone bedding, the final subgrade should be proof-rolled and approved by a Geotechnical Engineer.

The design of the concrete slabs on improved fill may be made on the basis of a value of modulus of subgrade reaction which is 15 MPa/m on the surface of the granular moisture barrier.

The floor slab should be structurally independent from any load-bearing structural elements.

5.5 PERMANENT DRAINAGE CONSIDERATIONS

The finished exterior ground surface should be sloped away from the proposed industrial development area at a minimum cross-fall of 2%.

Perimeter drainage should be provided around all floor slab areas where water may accumulate. The perimeter drainage is not required if the interior finish floor elevation is at least 200 mm higher than the exterior elevation. If the interior finish floor elevation is less than 200 mm, this office should be contacted, and the drainage details can be provided. Based on the groundwater condition at the site, underfloor drains may not be required, however, the need for a subfloor drainage system should be determined by the designer in accordance with the latest Ontario Building Code requirements.

5.6 SITE PREPARATORY WORKS

The site preparation work may include stripping of the ground cover and existing fill in order to develop the required construction or engineered fill subgrades. Depending on the final grading plan, stripping depths will likely vary locally and should be adjusted to remove all unsuitable material.

It is recommended that the Geotechnical Engineer monitor the stripping operations to ensure that unsuitable materials have been fully removed prior to construction works or the placement of engineered fill. Unacceptable areas identified are to be remediated as soon as practicable and, the procedures would be dependent upon conditions encountered.

5.7 EXCAVATABILITY AND SITE EXCAVATIONS

It has been assumed that in general excavations for the building and utilities will be open cut. In order to enable entry into excavations during the construction process, all excavations must comply with the definitions prescribed by the "*Occupational Health and Safety Act*" (OHSA), Ontario Regulation 213/91 "*Construction Projects*".

Unless properly tapered, the sides of the excavation will not remain stable for a prolonged period of time. The borehole data indicate that the native glacial till deposits can be classified as a Type 2 material as defined in the OHSA and Regulations for Construction Projects (Part III Excavations, Section 226); native clayey silt deposit and fill, Type 3 above groundwater and Type 4 below groundwater. Excavations in these materials should be constructed in conformance with the regulations. It is noted that the above classifications have been estimated based on small, discontinuous samples from boreholes. The excavation conditions must be confirmed and/or modified on the basis of field inspections during the construction stage when large-scale observations can be made with ease.

As defined by the OHSA, excavation walls within the Type 3 soils will require battering back at slopes no steeper than 1H (horizontal):1V (vertical) and flatter for Type 4 material. Within the fill materials, a flatter than 1:1 side slope may be required even above the water table. For Type 2 material, the bottom 1.2 m high of the trench wall can be vertical, for temporary conditions.

Depending on the construction feasibility the excavation walls can be supported by temporary shoring systems. During excavations, adjacent existing structures and public right of way, if present, must be protected by proper shoring or sloping.

Based on the findings of the investigation, it is considered that excavation of the overburden soils at the site can be carried out using a conventional backhoe excavator.

It is important to note that the above discussion about the excavation is for information purposes only. Contractor bidding on the projects must make their own assessment based on the real site conditions.

Cobbles and boulders were inferred in the boreholes and are expected to be in the glacial till deposits. The contractor carrying out the excavation work should account for removing cobbles and boulders in their site excavation work.

It is assumed that the groundwater will be lowered to 1.0 m below the required excavation depth to enable the construction to be carried out in the 'dry' condition. It is expected that the 'perched water'

can be controlled by the conventional 'sump and pump' methodology. If more aggressive dewatering methods are required, a dewatering specialist should be consulted.

5.8 CONSTRUCTION DEWATERING

The borehole data have indicated that no unusual groundwater seepage problems should be expected during excavation and 'perched water' can be controlled by conventional sump pumping. However, the construction dewatering requirements should refer to the project hydrogeology study.

5.9 ENGINEERED FILL

On-site excavated, clean inorganic earth (native and/or fill) may selectively be reused as engineered fill material, provided that the moisture contents are strictly controlled.

If imported inorganic mineral soils are used for engineered fill construction, they must meet the applicable environmental guidelines, and their moisture contents should preferably be close to their respective optimum water content values.

The soil should be placed in thin lifts and suitable compaction equipment should be employed to achieve the specified degree of field density. The on site excavated clayey soils can be expected to require heavy sheepsfoot or padfoot type compacters to achieve a high degree of compaction. However, vibrations due to compaction may need to be reduced or curtailed to prevent damage to the existing structures and public right of way.

Consideration may also be given to backfilling excavations with a well-graded, compacted granular soil such as Granular B as it, if thoroughly compacted, would reduce the post-construction settlements to an acceptable level and may also expedite the compaction process.

Fill materials required for replacing locally softened soils or raising grades within the footprint of the structures and paved areas are to comprise suitably organic free materials approved for use by a Geotechnical Engineer. Fill materials are to be placed in lifts of a maximum thickness of 300 mm and compacted, using appropriate compaction equipment, to at least 98 % of its SPMDD.

Fill located in areas outside of the footprint of any proposed structure or paved areas should be compacted to at least 95 % of the material's SPMDD below 1.0 m of the subgrade level, and then to at least 98 % of its SPMDD up to the required grade. Imported granular fill used in confined areas should be compacted using only hand-held compaction equipment only.

Sola recommends that any and all engineered subgrades beneath proposed structures including

pavements be inspected and proof rolled prior to construction.

5.10 PAVEMENT

Pavement structure adjoining the proposed construction areas should be protected from damages resulting from construction activities. All heavy vehicles should be appropriately planned and re-routed to avoid such damages.

5.10.1 Pavement Thickness Design

For pavement construction, if contemplated, the existing subgrade soils, when compacted and proof rolled in the presence of Geotechnical personnel, can be expected to be competent to support a conventional pavement structural thickness. Any unsuitable soils, such as topsoil/organic mixed soil and other spongy materials, if found, should be sub-excavated and replaced with approved materials and the profiled subgrade compacted to not less than 98% of its SPMDD.

The pavement construction may consist of upfilling (if applicable) from the prepared subgrade surface to the underside of the granular base layer using a well-graded granular subbase material (OPSS Granular B-Type I) up to a maximum thickness of 500 mm. The material should be laid and compacted in thin lifts to at least 100% of their SPMDD. Per the County of Middlesex's Standard Details, we recommend the pavement design shown in **Table 3**. It is assumed that there will be only occasional delivery trucks allowed for light-duty areas. In the areas where fire routes and loading dock approaches, the heavy-duty pavement design should be implemented.

Table 3: Recommended Pavement Design

Pavement Component	Light Duty Thickness (mm)	Heavy-Duty Thickness (mm)	Compaction Requirements
Asphaltic Concrete Surface Course HL-3	40	40	Minimum of 92.0% of Maximum Relative Density (MRD)
Asphaltic Concrete Binder Course HL-8	50	80	
Granular Base (OPSS Granular 'A')	150	150	100% SPMDD
Granular Sub-Base (OPSS Granular 'B')	300	450	

The recommended granular base and sub-base materials shall meet the OPSS 1010 requirements. The granular base and subbase should be compacted to at least 100% of their SPMDD.

The asphaltic concrete courses are to be hot-mixed and hot-laid in accordance with current OPSS specifications and compacted to a minimum of 92% of Maximum Relative Density (MRD).

The pavement design as presented above in **Table 3** assumes that construction will be undertaken under dry weather conditions and that the subgrade is stable and not heaving under construction equipment traffic. However, if the construction conditions are non-ideal, with the final subgrade being wet and/or unstable, additional imported subbase material may become necessary.

The pavement make-up for the entrance driveways should match the respective road pavement design at the road/driveway interface. It may be preferable to use concrete pavements at loading docks.

Prior to placing the granular subbase, the final subgrade should be proof rolled to identify soft spots, if any, and rectified as required in consultation with a Geotechnical Engineer.

The recommended pavement structure should be considered for preliminary design purposes only. The functional design life of eight (8) to ten (10) years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific design life requirements. Such further analysis will also involve specific laboratory tests to determine the frost susceptibility and strength characteristics of the subgrade soils, as well as specific traffic loading data input from the Client.

Pavement Drainage: The ability of the soils to provide adequate subgrade support is reduced if allowed to become too wet. Therefore, in order to intercept infiltrating water and provide drainage of the subgrade and pavement material, it is recommended that 100 mm diameter sub-drains, wrapped in filter cloth, be provided along both sides of the driveways; in addition, similar sub-drains should be installed in four (4) directions from the catch basins and at strategic locations under the parking lot pavement. Furthermore, the subgrade should be graded to promote the flow of water towards the subdrains.

5.10.2 Pavement Construction Considerations

For pavement construction, the subgrade must be compacted to at least 98% SPMDD, for at least the upper 300 mm, unless an alternative is approved by Sola.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved.

Additional comments on the construction of pavement areas are as follows:

- The subgrade preparation should include stripping of any objectionable materials, e.g., loose fill with organics. The subgrade surface should be properly shaped and thoroughly proof rolled using suitable equipment. Soft and/or unstable subgrade areas should be further sub-excavated and backfilled to the design subgrade level using an approved material, placed in thin lifts, and compacted to at least 98% of its SPMDD;
- The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed grading. Assuming that satisfactory crossfalls in the order of 3% have been provided, subdrains extending from and between catch basins may be satisfactory. In the event that flatter crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by Sola; and,
- The most severe loading conditions on the pavement areas and subgrade may occur during construction. Consequently, special provisions such as restricted access routes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavourable weather.

It is recommended that Sola be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations in this report.

5.11 Service Installation Considerations (where applicable)

5.11.1 General

The materials found in the boreholes at the expected elevations of the proposed servicing trench generally consist of competent soils. In general, the native materials are suitable for pipeline support. Localized loose/soft subgrade conditions, if encountered during construction, should be sub excavated to a depth of at least 300 mm or to a firm base, if

shallower, and backfilled with clean, compactable materials and stabilized as per the project specifications. If the invert of the pipes falls within the fill soils, the fill should be removed and replaced with engineered fill, unless otherwise directed by the Geotechnical Engineer.

Prior to placement of bedding, the exposed subgrade at the bottom of each servicing trench excavation should be inspected by a Geotechnical Engineer to identify any soft, loose, or disturbed base conditions. All disturbed soils resulting from construction activities should be removed and replaced as noted above.

Design and construction considerations for both flexible (PVC) and rigid (concrete) pipes are included in the following sections.

5.11.2 Excavations and Health and Safety Considerations

The same recommendations as given in **Section 5.7** will generally apply to the excavations for laying of the underground services. The excavated soils should be placed not closer than the depth of the trenches from the trench edge.

5.11.3 Bedding

The improved fill materials and native subgrade in an undisturbed state will provide adequate support for the proposed service pipes and will allow the use of normal Class B type bedding. The bedding should conform to the current Ontario Provincial Standard Specifications (OPSS 1010) and/or the Middlesex County standards for bedding stone gradation requirements. The pipes should be placed with a minimum bedding thickness in conformance with Ontario Provincial Standard Drawing OPSD 802.010 (for flexible pipes) or OPSD 802.031 (for rigid pipes), though the bedding thickness will be subject to variation and ultimately be based on the proposed pipe diameter, bedding specifications used, etc. It is recommended that clear stone should not be used for bedding and as backfill above the obvert of the pipe, as soil fines from the silty subgrade may infiltrate into the voids of the clear stone, giving rise to settlements of the surface pipes and the trench surface, after the trenches are backfilled.

On completion of the servicing pipe installation, a granular surround of the same bedding material should be placed around the pipe to cover it to at least 300 mm above the pipe obvert.

The backfill above the bedding and cover materials may consist of clean, compactable fill. Based on the borehole data it is anticipated that some of the local soil material can selectively be reused as trench backfill, subject to approval by Geotechnical personnel. Some moisture

conditioning of the soil may be required to facilitate soil compaction. In the event that imported soil is used as a trench backfill, it must be ensured that the drainage properties of the subgrade are maintained and that there is no differential frost movement. Trench backfill should be compacted to at least 97% of the material's SPMDD, or Middlesex County standards, whichever is more stringent. Within the top one meter, the degree of compaction should be increased to at least 98% of the SPMDD of the material.

5.11.4 Trench Backfill

Backfilling During Dry-Weather Conditions

The excavated fill soils, if approved by the Geotechnical personnel at the time of construction, are considered suitable for re-use as fill to backfill service trenches, provided that suitable compaction equipment can be used to compact the fill material. However, the clayey soils will require heavy sheepsfoot or padfoot type compactors to achieve a high degree of compaction. The use of heavy compactors in the narrow confined service trenches may not be feasible. In confined areas, consideration may be also given to backfilling the areas with a well-graded, compacted granular soil such as Granular 'B' material. As such material, if thoroughly compacted, would reduce the post-construction settlements to an acceptable level and may also expedite the compaction process. However, proper tapering should be provided to prevent differential frost heave of the paved surface.

Each lift should be no greater than 300 mm thick when first placed and compacted using an appropriate heavy compaction machine to at least 95 % of the material's SPMDD to within 1 m of the top of the subgrade, and then to at least 98 % SPMDD up to the required grade.

Exposed, excavated soil stockpiles that are to be reused as fill on-site should be compacted at the surface or temporarily covered during wet weather to help maintain their original moisture content. Such stockpiles are prone to wet weather exposure and, as such, the increased moisture contents will make these materials too wet to achieve the required levels of compaction.

Conversely, if the excavated soils are too dry to achieve the required levels of compaction, some moisture addition/conditioning by means of water hosing or misting should be expected.

We recommend the subgrade be observed and approved by a Geotechnical Engineer prior to the placement of the bedding material to confirm that the subgrade conditions are consistent with the recommendations given in this report. Where unsuitable subgrade

conditions are observed, remedial procedures can be established in the field to avoid construction delays.

Backfilling During Winter Months

Should this project proceed during the winter months or when the ambient temperatures are below freezing, the following additional recommendations will apply in order to avoid any detrimental effects of frost.

In this situation, it is imperative that the excavation and backfilling operations follow simultaneously. This procedure is required to avoid time gaps between the two construction stages, as prolonged exposure to frost may lead to the inclusion of frozen material during backfilling. It is recommended that prior to resuming backfilling over the frozen surface, all frost should be removed to achieve a satisfactory bond between the current and previously laid fills. Also, this procedure would prevent leaving frozen layers of soils which could cause long-term settlements while undergoing slow thawing.

It is further recommended that any accumulation of water or ice in the small sheepsfoot compactor footprint overnight or weekends should be prevented by adequately shaping up and back blading the compacted grades prior to leaving the site.

In order to ensure that no frozen material is being backfilled in the trenches, it is recommended that the backfilling and compaction operations should be supervised and closely monitored by Sola on a continuous basis.

For the construction of the parking lot, the final subgrade should be prepared during 'dry weather' conditions so as to achieve a satisfactory end product.

5.12 CONSTRUCTION CONSIDERATIONS

Load-bearing soils are susceptible to disturbance from environmental factors (temperature, moisture change, etc.) and construction activity. Therefore, due care should be given to minimizing the trafficking of such areas during periods of excavation and the construction of the floor slab and footings to minimize the disturbance of the bearing soils.

Any excessive disturbances of the load-bearing and underlying soils affected during construction works could influence the long-term settlement of the structures and will therefore require further excavation and replacement of such impacted soils with suitable engineered fill.

During winter seasons, foundations and slab-on-grade construction should be carried out to avoid pouring concrete on frozen soil. Foundations must be adequately protected at all times from cold weather and freezing conditions.

A Geotechnical Engineer should evaluate all subgrade surfaces to confirm that the subgrade and founding conditions are consistent with the recommendations given by this report.

6.0 MATERIAL TESTING AND INSPECTION

It is recommended that Sola be appointed to carry out field inspection and materials testing during construction to ensure that the construction complies with the design recommendations.

7.0 DRAWING REVIEW

Once the final design drawings for this project are prepared, it is recommended that one (1) set of the drawings should be submitted to Sola for review and to make any amendments to our recommendations that may be required, prior to starting construction. Adequacy of the existing subgrade condition should be checked by Sola.

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

The comments given in this report are preliminary and intended only for the guidance of design engineers. Contractors bidding on or undertaking the works should make their own interpretations of the factual borehole results, so that they may draw their own conclusions on how the subsurface conditions may affect them.

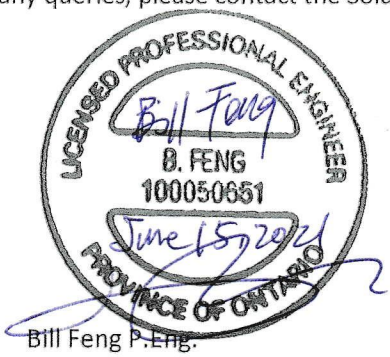
The information in this report in no way reflects on the environmental aspects of soil conditions at the site and has not been addressed in this report, since this aspect was beyond the scope and terms of reference.

8.0 CLOSURE

This report is subject to the Statement of Limitations which forms an integral part of this document. The Statement of Limitations is not intended to reduce the level of responsibility accepted by Sola, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

We trust that this report meets your needs. Should you have any queries, please contact the Sola office.

Sincerely,
SOLA ENGINEERING INC.



George Hao P. Eng.

Bill Feng P.Eng.
Chief Engineer

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Enclosures

STATEMENT OF LIMITATIONS

Standard of Care and Basis of this Report
Sola Engineering Inc. ("Sola Engineering") has prepared this report in a manner consistent with generally accepted engineering and/or environmental practices in the jurisdiction in which the specified services were provided. The information and conclusions set out in this report reflects Sola Engineering's best professional judgment in light of the information available to Sola Engineering at the time of preparation. Sola Engineering disclaims any and all warranties, express or implied, including without limitation any warranty of merchantability and/or fitness for a particular purpose, and makes no representations concerning the legal effect, interpretation or significance of this report or the information, conclusions or recommendations contained in it.

The conclusions and recommendations provided in this report have been prepared in relation to the specified site (the "Site") and the proposed project (the "Project"), as described by the Client to Sola Engineering. Given the nature of the work undertaken by Sola Engineering as part of this report, the Client acknowledges that ground conditions may vary over distances and may change over time. Should there arise any changes to the conditions of the Site or the Project (as to purpose or design), Sola Engineering is to be notified within a reasonable period of time, and in any event within 24 hours of the Client's learning of such changes, so as to give Sola Engineering an opportunity to review and revise this report in light of such changes. Sola Engineering accepts no liability or responsibility for any use of this report or reliance on this report following any changes to the conditions of the Site or the Project.

The scope of professional services provided by Sola Engineering for the Project are as set out in this report. Should such services be limited to those of a geotechnical nature, Sola Engineering shall not be held liable or responsible for any environmental services that may be required, nor shall this report be interpreted to reflect any environmental aspects of the Project. Alternatively, should such services be limited to those of an environmental nature, Sola Engineering shall not be held liable or responsible for any geotechnical services that may be required, nor shall this report be interpreted to reflect any geotechnical aspects of the Project.

This report is not intended to provide recommendations for possible future conditions or use of the Site or adjoining properties. Should the need arise for such recommendations Sola Engineering may need to conduct further investigations.

Use of this Report
This report is intended to be read and used in its entirety. No reliance may be made upon any individual portion or section of this report without reference to the entire report as a whole. In preparing this report, Sola Engineering has relied on information, instructions and communications given by the Client to Sola Engineering, the applicability, truth and accuracy of which is the sole responsibility of the Client.

This report with the information, sampling data, analysis, conclusions and recommendations contained in it (if any), has been prepared for and may only be used by the Client and only for the specific purpose as specified by the Client to Sola Engineering in connection with the Project. Without prior written consent from Sola Engineering, use of this report or any portion thereof by any person or entity other than the Client, or for any purpose other than as communicated by the Client to Sola Engineering, is strictly prohibited. Sola Engineering accepts no liability or responsibility for the unauthorized use of this report. This report and all documents that form part of it are the sole property of Sola Engineering. Sola Engineering relies on and retains any and all intellectual property rights it has in this report, including any copyright to which it is entitled. The Client shall not give, lend or sell this report, or any portion thereof, to any entity, person or association without the express prior written consent of Sola Engineering. This report and the information contained herein shall be treated as strictly confidential.

The contents of this report, inclusive of Sola Engineering's conclusions and recommendations in relation to the Project, are intended only for the guidance of the Client in carrying out the specified services for the Project, as described by the Client to Sola Engineering. Accordingly, Sola Engineering does not accept any liability or responsibility for any inaccuracy contained in this report arising as a result of or in any way connected with any exclusion, oversight or falsification of the information provided to Sola Engineering by the Client. This report, including the effect of the subsurface conditions as described in this report, is to be interpreted at the risk and discretion of the Client and any contractors or others bidding on or undertaking contractual work to be performed as part of the Project who may come into possession of or learn of this report or its contents. It is exigent that all contractors bidding or undertaking the work are to rely on their own interpretations of the data contained in this report in addition to their own investigations and conclusions. Sola Engineering shall not be held liable or responsible for any interpretation of or conclusions that may be drawn from the data or information contained in this report.

The information, recommendations and conclusions presented in this report are based on Sola Engineering's interpretation of conditions revealed through the limited investigation conducted within a defined scope of services. In no event will Sola Engineering be held responsible or liable to the Client or any other person or entity for any special, indirect, incidental, punitive or consequential loss or damage (including, loss of use, lost profits or expenses incurred) resulting from or in any way related to the independent interpretations, interpolations, conclusions or decisions of the Client or any other person or entity, based on the information contained in this report. The restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

Notwithstanding the exclusions of liability contained herein but without in any way limiting their effect or generality, if there is found to be any finding of liability or responsibility whatsoever on the part of Sola Engineering which in any way relates to or arises from this report, or the information, conclusions or recommendations contained in it, such liability and/or responsibility shall cease and forever be extinguished from and after the date which is two (2) years from the date of this report. In no event shall any liability or responsibility of Sola Engineering exceed the fees charged by Sola Engineering to the Client for the preparation of this report (excluding any arms' length disbursements or expenditures made or incurred by Sola Engineering as a result thereof and reimbursed by the Client).

Site Conditions
The material conditions, classifications, conclusions and recommendations contained in this report were based on the site conditions observed or tested by Sola Engineering or otherwise communicated to Sola Engineering by the Client. The description, identification and classification of soils, rocks, chemical contamination and other materials have been made based on limited investigations, sampling and testing of materials performed by Sola Engineering and its qualified representatives in reliance on the use of relevant or applicable equipment, all in accordance with commonly acceptable standards in the geotechnical and/or environmental disciplines. Accordingly, this report may include assumptions of conditions which are based on discrete sample locations and thus some conditions may not have been detected. The Client accepts all liability and risk for the use of this report and the information and data contained in it. Sola Engineering shall not be held liable or responsible for any conditions beyond the scope of tests conducted on samples of the subsurface and soil conditions of the subject property as set out in this report.

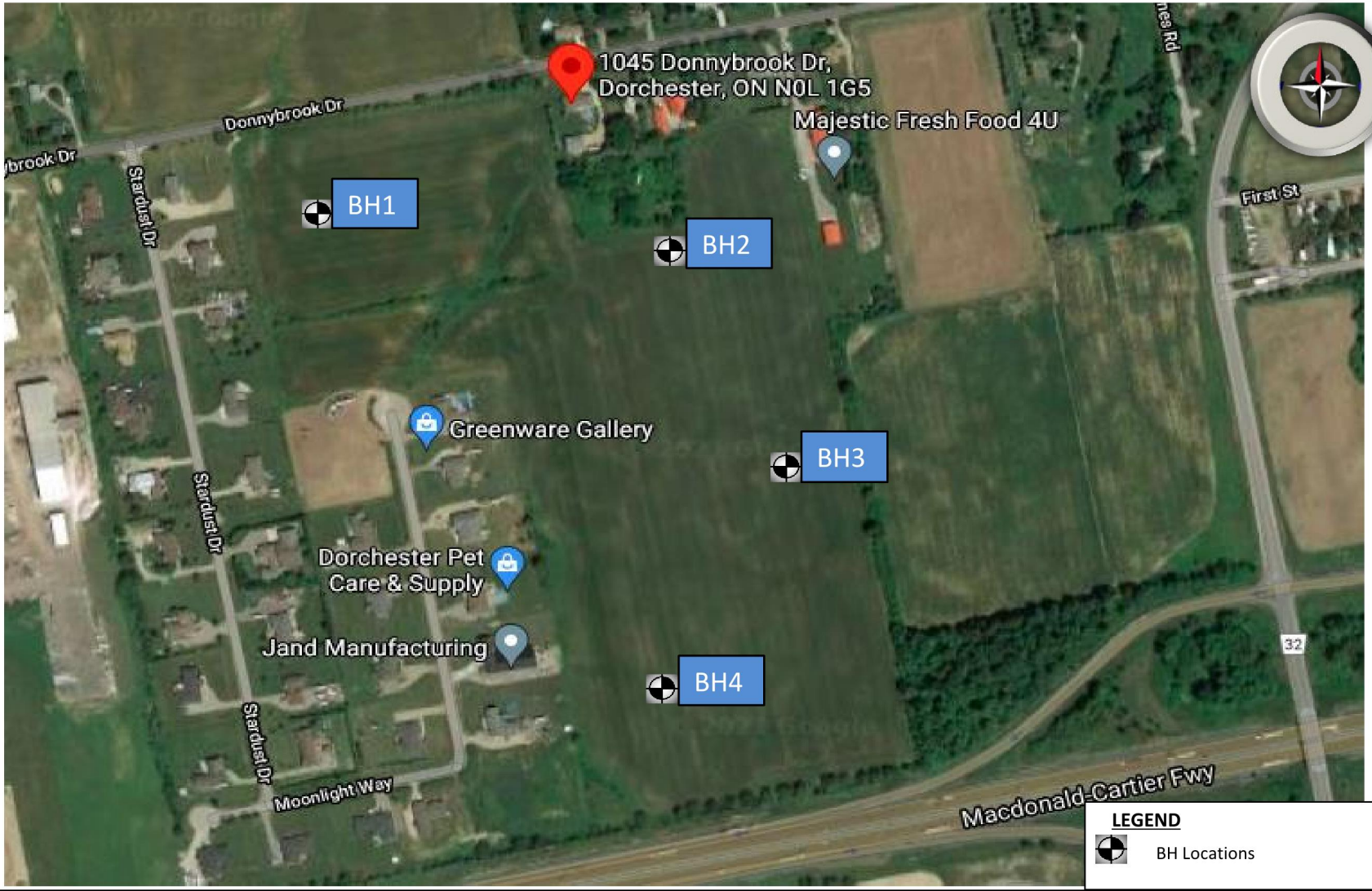
For clarity, the Client acknowledges and accepts that unique risks exist whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive sampling and testing program may fail to detect certain conditions. The environmental, geological, geotechnical, geochemical and hydrogeological conditions that Sola Engineering interprets to exist between sampling points may differ from those that actually exist. As a result, the Client acknowledges and accepts that because of the inherent uncertainties in subsurface evaluations, unanticipated underground conditions may occur or become known subsequent to Sola Engineering's investigation that could affect conclusions, recommendations, total Project cost and/or execution.

Indemnification of Risk
Though Sola Engineering adheres to the highest degree of integrity and employs due diligence in limiting the potential release of toxins and hazardous substances, the risk of accidental release of such substances is a possibility when providing geotechnical and environmental services.

In consideration of the provision of services by Sola Engineering, the Client agrees to defend, indemnify and hold Sola Engineering and its employees and agents harmless from and against any and all claims, liabilities, damages, causes of action, judgments, costs or expenses (including reasonable legal fees and disbursements), resulting from or arising by reason of the death or bodily injury to persons, damage to property, or other loss, whether related to an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project or otherwise, and whether or not resulting from Sola Engineering's negligent actions or omissions. This indemnification shall include and extend to any and all third party claims brought or threatened against Sola Engineering under any federal or provincial law or statute as a result of Sola Engineering conducting work on the Project. In addition to and notwithstanding the foregoing, the Client further agrees to unconditionally and irrevocably release Sola Engineering from, and not to bring any claims against Sola Engineering in connection with, any of the aforementioned claims or causes.

Subconsultants and Contractor Services
In conjunction with the services provided by Sola Engineering's own employees, external services provided by other persons or entities that are specializing in services other than those offered by Sola Engineering, such as drilling, excavation and laboratory testing, are often employed in order to carry out the defined scope of work. If such external services have been employed for this Project, the Client acknowledges that Sola Engineering is not in any way liable or responsible for any costs, claims or damages in relation to the services rendered by such other persons or entities or payment therefor, nor shall Sola Engineering be liable or responsible for damages for errors, omissions or negligence caused by such other persons or entities while providing such external services.

Work and Job Site Safety
Sola Engineering shall be responsible only for its activities and that of its employees on the Site. Sola Engineering shall not direct any of the fieldwork nor the work of any other person or entity on the Project. The presence of Sola Engineering staff on the Site does not relieve the Client or any contractor on the Site from their responsibilities pertaining to site safety. The Client at all times retains any and all responsibility for the safety of those individuals present on the Site and/or working on the Project, including Sola Engineering's employees.



SOLA ENGINEERING	File No.: 10826-S0456-GEO	**BH Location Plan**	The figure provided is for the intended purpose of presenting the approximate borehole locations. This figure should not be used for any other purposes including construction, architecture or for accuracy of dimensions and orientation of objects.	Enclosure No.: **1**
	Report Number: 2021-15454	**Proposed Industrial Subdivision**		
		1045 Donnybrook Drive, Dorchester, Ontario		
	Date: May 17, 2021	**Lantern Capital**		Not to Scale

SOLA ENGINEERING

ENCLOSURE No. 2

RECORD OF BOREHOLE No. BH1 1 OF 1 METRIC

PROJECT NUMBER 10826 LOCATION 1045 Donnybrook Drive, Dorchester, Ontario ORIGINATED BY RS

DIST ____ HWY ____ BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM ____ DATE 2021.05.20 - 2021.05.20 LATITUDE ____ LONGITUDE ____ CHECKED BY GH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Topsoil										
0.1	TOPSOIL - 100 mm thick FILL - clayey silt, trace gravel, trace sand, brown, moist		1	SS	7				○		
0.8	PROBABLE FILL - clayey silt, trace gravel, trace sand, brown, moist		2	SS	24				○		
1.5	CLAYEY SILT TILL - trace gravel, trace sand, occasional inferred cobble and boulder, brown, very stiff to hard, moist		3	SS	32				○		
			4	SS	36				○		
			5	SS	28				○		
			6	SS	21				○		
6.1	SILTY CLAY TILL - trace gravel, grey, very stiff, moist		7	SS	16				○		
6.6	End of Borehole at Targeted Depth; Borehole Was Open and Dry Upon Completion of Drilling; A Groundwater Measurement Was Taken By the Project Hydrogeology Team On May 25, 2021 and was Approximately 4.8 m Below Existing Ground Surface.										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 3

RECORD OF BOREHOLE No. BH2 1 OF 1 METRIC

PROJECT NUMBER 10826 LOCATION 1045 Donnybrook Drive, Dorchester, Ontario ORIGINATED BY RS

DIST HWY BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM DATE 2021.05.20 - 2021.05.20 LATITUDE LONGITUDE CHECKED BY GH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Topsoil										
0.1	TOPSOIL - 100 mm thick FILL - clayey silt, trace gravel, trace sand, brown, moist		1	SS	6				○		
			2	SS	4				○		
1.5	CLAYEY SILT TILL - trace gravel, brown, stiff to very stiff, moist		3	SS	12				○		
			4	SS	20				○		
			5	SS	21				○		
			6	SS	12				○		
6.1	SILTY CLAY TILL - trace gravel, grey, stiff, moist		7	SS	14				○		
6.6	End of Borehole at Targeted Depth; Borehole Was Open and Dry Upon Completion of Drilling; A Groundwater Measurement Was Taken By the Project Hydrogeology Team On May 25, 2021 and was Approximately 1.2 m Below Existing Ground Surface.										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 4

RECORD OF BOREHOLE No. BH3 1 OF 1 METRIC

PROJECT NUMBER 10826 LOCATION 1045 Donnybrook Drive, Dorchester, Ontario ORIGINATED BY RS

DIST HWY BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM DATE 2021.05.20 - 2021.05.20 LATITUDE LONGITUDE CHECKED BY GH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Topsoil TOPSOIL - 150 mm thick										
0.2	FILL - silty sand, trace gravel, trace clay, brown, moist		1	SS	5				○		
0.8	FILL - sandy silt, trace gravel, trace clay, pockets of clayey silt, brown, moist		2	SS	10				○		
1.5	CLAYEY SILT - trace gravel, brown, stiff, moist		3	SS	11				○		
2.3	CLAYEY SILT TILL - trace gravel, brown, stiff to very stiff, moist		4	SS	14				○		
			5	SS	20				○		
4.6	SILTY CLAY TILL - trace gravel, brownish grey, very stiff, very moist		6	SS	18				○		
			7	SS	16				○		
6.6	End of Borehole at Targeted Depth; Borehole Was Open and Dry Upon Completion of Drilling; A Groundwater Measurement Was Taken By the Project Hydrogeology Team On May 25, 2021 and was Approximately 4.2 m Below Existing Ground Surface.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 5

RECORD OF BOREHOLE No. BH4 1 OF 1 METRIC

PROJECT NUMBER 10826 LOCATION 1045 Donnybrook Drive, Dorchester, Ontario ORIGINATED BY RS

DIST HWY BOREHOLE TYPE Solid Stem Augers COMPILED BY CC

DATUM DATE 2021.05.20 - 2021.05.20 LATITUDE LONGITUDE CHECKED BY GH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Topsoil										
0.0 / 0.1	TOPSOIL - 75 mm thick										
	FILL - clayey silt, trace gravel, trace sand, brown, moist		1	SS	4				○		
			2	SS	5				○		
1.5	CLAYEY SILT TILL - trace gravel, trace sand, brown, very stiff, moist		3	SS	21				○		
			4	SS	26				○		
			5	SS	26				○		
4.6	SILTY CLAY TILL - trace gravel, grey, stiff to very stiff, moist		6	SS	18				○		
			7	SS	12				○		
6.6	End of Borehole at Targeted Depth; Borehole Was Open and Dry Upon Completion of Drilling; A Groundwater Measurement Was Taken By the Project Hydrogeology Team On May 25, 2021 and was Approximately 3.5 m Below Existing Ground Surface.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

KEY TO SYMBOLS

Enclosure No.: 6

PROJECT NUMBER 10826

PROJECT NAME Proposed Industrial Subdivision

LOCATION 1045 Donnybrook Drive, Dorchester, Ontario

CLIENT Lantern Capital

LITHOLOGIC SYMBOLS (Unified Soil Classification System)


CL-SL: clayey silt


CL-SL-TL: clayey silt till


FILL: TTC Fill (made ground)


SL-CL: silty clay


TOPSOIL: Topsoil/peat/organics

SAMPLER SYMBOLS


Split Spoon Sample

WELL CONSTRUCTION SYMBOLS


Bentonite Seal: 1 pipe group, 1 pipe


Concrete: 1 pipe group, 1 pipe


Filter Pack: 1 pipe group, 1 pipe


Slotted Pipe: 1 pipe group, 1 pipe


Slough at bottom of hole

Notes:

Terms describing RELATIVE DENSITY, based on Standard Penetration Test "N"-Value for COURSE GRAINED soils (major portion retained on No. 200 seive):

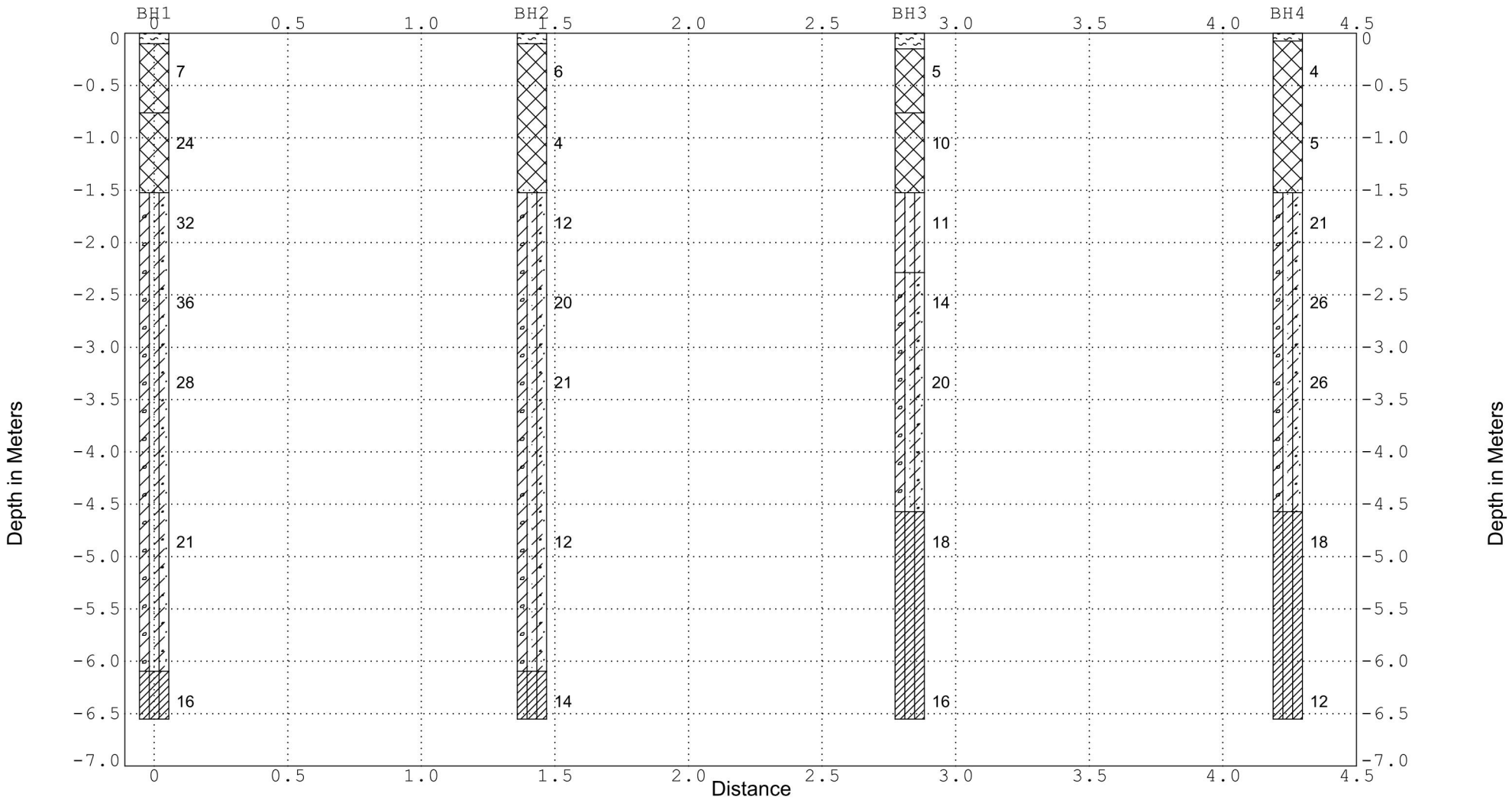
DESCRIPTIVE TERM ["N"-Value (blows/0.3m), Relative Density (%)]

- **Very Loose [less than 4, less than 15]**
- **Loose [4 to 10, 15 to 35]**
- **Compact or Medium [10 to 30, 35 to 65]**
- **Dense [30 to 50, 65 to 85]**
- **Very Dense [greater than 50, greater than 85]**

Terms describing CONSISTENCY, based on Standard Penetration Test "N"-Value for FINE GRAINED soils (major portion passing No. 200 sieve):

DESCRIPTIVE TERM [Unconfined Compressive Strength (kPa), "N"-Value (blows/0.3m)]

- **Very Soft [less than 25, less than 2]**
- **Soft [25 to 50, 2 to 4]**
- **Firm [50 to 100, 4 to 8]**
- **Stiff [100 to 200, 8 to 15]**
- **Very Stiff [200 to 400, 15 to 30]**
- **Hard [greater than 400, greater than 30]**



Plan View

SOLA ENGINEERING

SOLA ENGINEERING INC.
CONCEPTUAL SOIL PROFILE

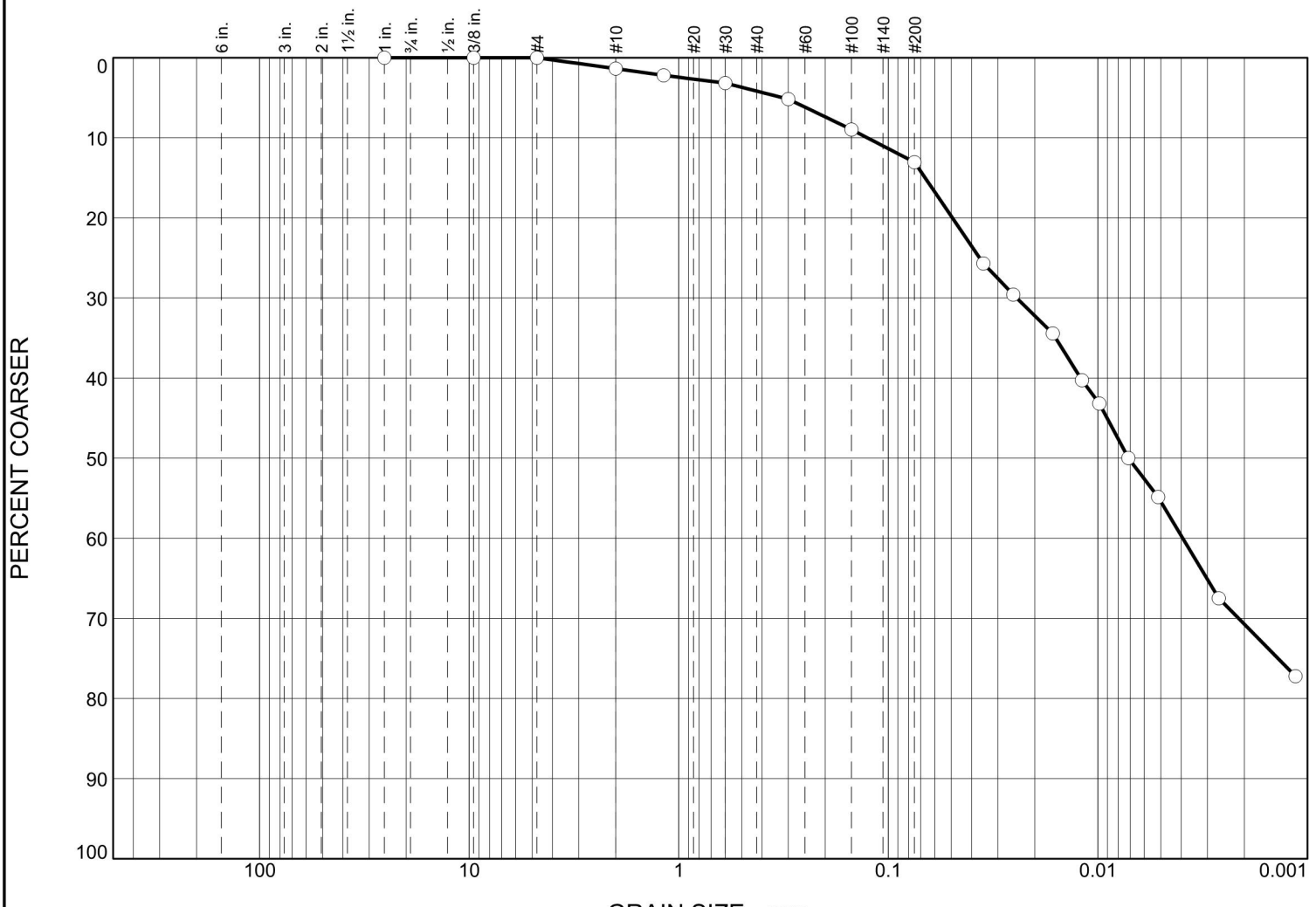
Horizontal Scale:	Drawn By:	
Vertical Scale:	Approved By:	

Proposed Industrial Subdivision
1045 Donnybrook Drive, Dorchester, Ontario

Project Number: 10826

Enclosure No.: 7

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0	0	0	1	3	9	87

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.0667	0.0121	0.0071	0.0021				

Material Description	USCS	AASHTO
○ CLAYEY SILT TILL (VISUAL/MANUAL) CLAYEY SILT (LAB)		

Project No. 10826 **Client:** Lantern Capital

Project: Proposed Industrial Subdivision

○ **Location:** BH1 SS4 **Sample Number:** 21-204

Date: ○

Remarks:

○ Smapled By: Rattan

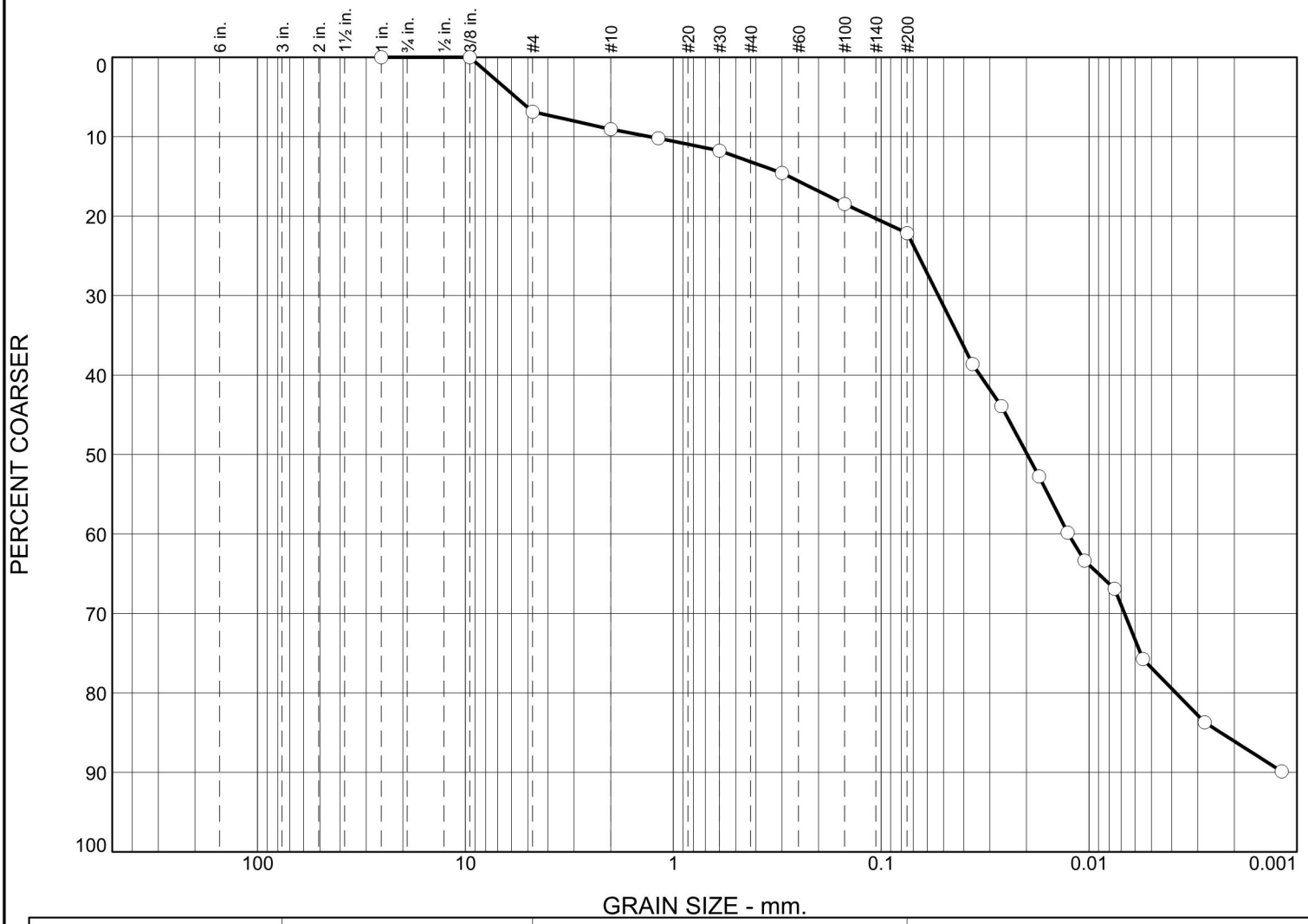
Date: May 20, 2021

Note: Additional Information is available upon request

SOLA ENGINEERING INC.

Enclosure 8

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0	0	7	2	4	9	78

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.2777	0.0334	0.0198	0.0068	0.0023			

Material Description	USCS	AASHTO
○ CLAYEY SILT TILL (VISUAL/MANUAL) CLAYEY SILT WITH SAND (LAB)		

Project No. 10826 **Client:** Lantern Capital

Project: Proposed Industrial Subdivision

○ **Location:** BH4 SS5 **Sample Number:** 21-203

Date: ○

Remarks:

○ Smapled By: Rattan

Date: May 20, 2021

Note: Additional Information is available upon request

SOLA ENGINEERING INC.