FISHER ENVIRONMENTAL LTD.

**ENGINEERING**

Professional Engineers Ontario

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# GEOTECHNICAL INVESTIGATION

## 3855 DUNDAS STREET, EAST

## MISSISSAUGA, ONTARIO

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Project No. FE-P 18-9089Geo.

November 12, 2018

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|---|---|
| **Issued to:** | Dymon Group of Companies |
| **Contact:** | Bliss Edwards<br>2-1830 Walkley Road<br>Ottawa, ON K1H 8K3 |
| **Project Name:** | Geotechnical Investigation |
| **Project Address:** | 3855 Dundas Street, East<br>Mississauga, Ontario |
| **Project Number:** | FE-P 18-9089Geo |
| **Issued on:** | November 12, 2018 |
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## 1. INTRODUCTION

Fisher Environmental Ltd. (Fisher) was commissioned by the Dymon Group of Companies to carry out a Geotechnical Investigation at the property municipally addressed as 3855 Dundas Street, East, Mississauga, Ontario.

The current area of investigation was a sub-parcel of land located on the western portion of the property, hereinafter referred to as the 'Site'. The Site has an approximate area of 8,053m$^2$ and is rectangular in shape

The purpose of this geotechnical investigation is to provide a geotechnical report in regards to the subsurface soil and groundwater conditions and to outline geotechnical parameters and recommendations for the design of the proposed developments.

Discussion of the findings and results of the geotechnical investigation is in accordance with the general terms of reference. This report was prepared specifically and solely for the purpose of assessing geotechnical conditions as they relate to the development of the site with respect to the proposed structures as detailed to Fisher at the time of the investigation.

## 2. SITE AND PROJECT DESCRIPTIONS

The Site is located at the north corner of the intersection of Dundas St., E. and Ninth Line and is bounded by Dundas St. to the south east, Ninth Line to the south west, and undeveloped land to the north east and north west.

At the time of investigation, the site was vacant, with indications of recent grading works and a surface cover of fill material across the Site.

The Site is generally flat with relative ground elevation changes of approximately 0.4m, as measured between BH1 and BH3.

A Proposed Site Plan, prepared by Nicholas Caragianis Architect Inc dated July 24, 2018, was provided to Fisher prior to the Site Investigation. Based on the Site Plan, the proposed development will consist of a single 5-storey building to be used for commercial and self-storage uses. The building has a footprint of 2,972m$^2$ with no underground parking. Finish Floor Elevations (FFE) of the structure had not yet been determined.

## 3. FIELD AND LABORATARY WORK

Site drilling work for the geotechnical investigation was carried out on October 26, 2018 and consisted of the drilling of five (5) boreholes (BH1 to BH5). Boreholes drilled at this time were advanced to depths of 6.55 to 7.80m below grade with corresponding relative termination elevations ranging from 92.60 to 94.80m. The boreholes are presented at approximate locations shown on the attached Site Plan - Appendix A.

A CME-55 Truck -mounted drill rig, equipped with solid stem augers, provided by Terra Firm Environmental Services Ltd., was used for drilling work. Soil samples were taken at regular intervals using a split–spoon sampler advanced by means of the Standard Penetration Test (SPT) and was conducted in general accordance with ASTM specification D1586.

All recovered soil samples were placed in clear, sealed plastic bags in the field and were transported back to Fisher laboratory for further examination, characterization and laboratory analyses.

In addition, two (2) 2" diameter monitoring wells were installed in BH2 and BH4 to monitor groundwater levels and facilitate water sampling if required.

A total of seven representative soil samples, from BH3 and BH4 were selected and submitted to Fisher laboratory for moisture content and/or grain size analyses, respectively. Results of the moisture content and grain size analyses are attached in Appendix C.

The ground surface elevation at each borehole/well location was surveyed by Fisher on November 2, 2018. Elevations, referred to in this report, are metric and were referenced to a local Temporary Benchmark (TBM) "TOP OF A CATCH BASIN", which is located about 4m away from the sites northwest boundary on the Ninth Line curb shoulder, and was assigned an elevation of 100.00m.

The soil samples recovered during the investigation will be stored in the Fisher laboratory for a period of 30 days after submitting this report and will be discarded thereafter unless otherwise instructed by the client.

## 4. SUBSOIL CONDITIONS

Subsoil conditions encountered at borehole locations are shown on the Borehole Log Sheets at Appendix B, and can be summarized as follows:

- **FILL** – A layer of fill material was encountered in all boreholes at ground surface and extended generally from 0.30 to 0.60m, with the exception of BH2, in which fill extended to a depth of 1.85m. The fill materials, encountered in BH1, BH3, BH4 and BH5, consisted of reddish brown clayey silty, some to trace of shale fragments /pieces with occasional silty sand and sand pockets, and as a result from recent earth work during the site grading. In BH2, below earth fill layer, the existing fill materials consisted of brown to grey silty clay with sand seams were detected to a depth of 1.50m, and subsequently followed by a layer of black organic silty clay to a depth of 1.85m. The encountered layer of fill, as a result of earth work, was moist and had loose to compact relative density. The fill in BH2, identified as existing fill at the lower level, was moist and had soft to firm consistency with SPT 'N' values ranging from 5 to 3 blows per 300mm.

  The depths of the topsoil and fill with corresponding elevations are presented in the Table 1 below.

  **Table 1: Summary of Depth and Elevation of Fill**

| Borehole No. | BH1 | BH2 | BH3 | BH4 | BH5 |
|---|---|---|---|---|---|
| Borehole Ground Elevation (m) | 100.0 | 100.10 | 100.40 | 100.35 | 100.05 |
| Depth of Borehole (m) | 6.55 | 6.70 | 7.80 | 6.55 | 6.55 |
| Depth of Topsoil/Fill (m) | 0.30 | 1.85 | 0.75 | 0.45 | 0.45 |
| Elev. at Bottom of Fill (m) | 99.60 | 98.25 | 99.65 | 99.95 | 99.65 |

  It is recommended that further test pit investigations to be conducted in the areas around BH2 to characterize the extent, depth and type of fill prior to construction works.

- **CLAYERY SILT TILL** – Reddish brown to greyish brown, moist silty clay till with a trace of gravel, shale pieces were encountered in all boreholes below the fill and extended to the maximum investigation depth of 7.80m, at a corresponding elevation of 92.60m. The encountered clayey silt till was generally overlain by a dark brown to grey clayey silty, silty clay and silty sand layers within the upper 0.3m to 0.6m, that were generally less compact. SPT 'N' values of the encountered clayey silt till ranged from 15 to over 100 blows per 300mm indicative of a stratum of stiff to hard consistency.

## 5. GROUNDWATER CONDITIONS

The boreholes were noted to be dry on completion of drilling.

On November 2, 2018, groundwater levels were measured in the two (2) installed monitoring wells MW2 and MW4 at 5.80m and 1.67m bgs, respectively. Groundwater depths and elevations are summarized in Table 2.

**Table 2: Groundwater Depths and Elevations**

| Well No. | Elev. of Well Ground (m) | Depth of Well (m) | Depth to Groundwater (m) | Groundwater Elevation (m) |
|---|---|---|---|---|
| | | | November 2, 2018 | November 2, 2018 |
| MW2 | 100.10 | 6.70 | 5.70 | 94.40 |
| MW4 | 100.35 | 6.55 | 1.67 | 98.68 |

It is noted that groundwater levels are subject to seasonal fluctuations; consequently, definitive information on the long-term groundwater levels could not be obtained at the present time.

## 6. FOUNDATION CONSIDERATIONS

Based on the Site Plan, the proposed development will consist of a single 5-storey commercial building with no underground parking located within the central portions of the Site. The Finish Floor Elevation (FFE) is uncertain at this time therefore this geotechnical investigation should be considered preliminary.

The investigations generally revealed that the site's native soil was dominated by a stiff to hard clayey silt till from depths of 0.30 to 0.75m bgs to the maximum investigation depth of 7.80m. All boreholes were in a dry condition on completion with static groundwater levels recorded in installed wells MW2 and MW4 at 5.70m and 1.67m bgs. respectively, six days after.

For the site development comprised of a 5-storey commercial building without underground parking, a shallow foundation is recommended for support of the structure.

### *6.1 Spread/ Strip Footing Found on Native Soils*

The proposed structures may be supported on conventional spread/strip footings founded on the native undisturbed very stiff clayey silt till.

Recommended approximate founding depths / elevations and corresponding bearing resistance for limit states (SLS and ULS) are presented in Table 3.

**Table 3: Foundation Design for Conventional Footings**

| Building/Borehole | | | Elev. of B.H. Ground (m) | Approx. Depth of Footings at or below (m) | Approx. Elevation of Footings at or below (m) | Bearing Resistance at SLS (KPa) | Bearing Resistance at ULS (KPa) |
|---|---|---|---|---|---|---|---|
| Proposed Commercial Building | BH1 | No Basement or Underground Parking | 100.00 | 1.65 / 2.25 | 98.35 / 97.75 | 250 / 300 | 350 / 420 |
| | BH2 | | 100.10 | 2.40 / 2.70 | 97.70 / 97.40 | 250 / 300 | 350 / 420 |
| | BH3 | | 100.40 | 1.80 / 2.40 | 98.60 / 98.00 | 250 / 300 | 350 / 420 |
| | BH4 | | 100.35 | 1.80 / 2.40 | 98.55 / 97.85 | 250 / 300 | 350 / 420 |
| | BH5 | | 100.05 | 1.80 / 2.40 | 98.25 / 97.65 | 250 / 300 | 350 / 420 |

Footings designed to the above specified bearing pressure values are expected to settle less than 25mm total and 19mm differential.

### *6.2 General Comments about Footing Construction*

Adjacent footings founded at different elevations should be stepped at 10 horizontals to 7 verticals.

For frost protection requirements, all exterior footings must have a minimum soil cover of 1.22m.

As the designed founding strata are at a relatively deep depth, consideration can be given to the utilization of a trench footings for the building construction.

It is noted that the recommended bearing resistance and foundation elevations noted above were calculated from limited borehole information and are intended for design purposes only.

More specific information with respect to soil conditions between and beyond the boreholes will be available when the proposed construction is underway. Therefore, the encountered soil/foundation conditions must be verified in the field, and all footings must be inspected and approved by geotechnical personnel from our office prior to placement of concrete.

## 7. EARTHQUAKE CONDITIONS

The building must be designed to resist a minimum earthquake force. The Ontario Building Code (2012) specifies that the building be designed to withstand a minimum lateral seismic force ***V***, which is assumed to act non-currently in any direction on the building as per the following expression:

$$\boldsymbol{V = S(Ta)MvIEW/(RdRo)}$$

Where **S (Ta**) should be calculated by **Sa(Ta)Fa** or **Sa(Ta)Fv**, depending on fundamental lateral period **Ta**. The term, which is relevant to the geotechnical conditions at the Site, are acceleration-based Site Coefficient **Fa** and velocity–based Site coefficient **Fv**.

For the subject Site, the Site Classification for Seismic Site Response is determined using penetration resistance test (SPT) as set out in Table 4.1.8.4A of the OBC. Boreholes drilled at this time were advanced to a maximum depth of 7.80m. Blow counts recorded in Standard Penetration Test (SPT) ranged from 7 to over 100 blows / 300mm in the native stratum. For seismic design purposes the weighted average penetration resistance will most likely be identified as $15< \tilde{N}_{60}< 50$ blows per 300mm within upper 30m overburden depth. As such the subject Site may be designated as “Class D”. For potential application of a higher designation of “Class C”, Shear Wave Velocity investigations could be undertaken at the Site.

## 8. EXCAVATION AND BACKFILL

No major problems should be encountered for the anticipated depths of excavation for the footings/underground garage. The excavations for footings or underground services must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA).

If the excavation is deeper than 1.2m, the excavation sides should be sloped in accordance with requirements of OHSA. If this condition cannot be met, a temporary shoring system/ trench box should be introduced.

In accordance with O. Reg. 213/91, S.226 (1), the Site subsoils within anticipated excavation depths mainly consisted of earth fill, clayey silt till and can be generally classified as Type 3 soils.

Based on static groundwater measurements carried out on November 2, 2018 groundwater was found at a depth of 5.70m bgs. in MW2, and 1.67m bgs. in MW4. As the boreholes were dry on completion of drilling, and no aquifer/wet water bearing media was encountered within the investigation depths it is anticipated that the elevated water levels noted within MW 4 are representative of infiltration or a perched water condition. Significant groundwater issues are not expected during the construction of the footings/underground services. However, occasional water seepage may be encountered from more permeable seams / lenses and/or surface run-off, especially following a heavy rainfall event, and contractors should be prepared to handle such occurrences through traditional sump pit pumping methodologies.

The material to be used for backfill in service trenches should be suitable for compaction, i.e. free of organics and with moisture content within 2 percent of the optimum moisture value. The backfill material should be compacted in lifts of no more than 200 mm in thickness and to at least 98 percent of Standard Proctor Maximum Dry Density (SPMDD) in the upper 1.0 m from road subgrade or in settlement sensitive areas. Beyond these zones, a 95 % SPMDD compaction criterion is considered acceptable.

Additionally, onsite excavated fill materials and native soils may be used as backfill in service trenches, provided that the excavated materials are free of organic soils /construction debris and are of suitable moisture content.

For backfill against the subsurface walls and footings it is recommended that backfill materials consist of Granular Class ‘B’ aggregates. On-site excavated granular material may be acceptable subject to further site inspection.

## 9. SLAB ON GRADE AND PERMANENT DRAINAGE

For the proposed building, the finished floor slab can be constructed as slab on grade supported by competent native undisturbed clayey silt till or engineered fill. Engineered fill may be utilized for the replacement of existing fill (subject to further site test pits and inspection), especially in the area around BH2.

If engineered fill is required to raise subgrade up for slab construction, the engineered fill must be placed on a thoroughly proof-rolled exposed base and organic soil / topsoil/ fill / construction debris /underside utilities removed and the base approved by engineering staff from our office before the commencing of engineered fill construction.

Furthermore, any soft spots revealed during proof-rolling should be sub-excavated and back filled with suitable granular materials, compacted to 98% SPMDD.

Engineered fill materials, compaction quality and finished subgrade proof-rolling should be supervised and inspected by engineering staff from our office. Engineered fill must be placed in layer with no more than 200mm and compacted to 98% SPMDD.

Onsite excavated native soils and selected fill materials can be used for engineered fill provided it contains suitable moisture content. Granular Class 'B' aggregates are preferred for subgrade construction for slab on grade especially during the winter time or wet season.

For backfill against the subsurface walls and footings it is recommended that backfill materials consist of Granular Class 'B' aggregates

Upon completion of foundation work, the floor slab should rest on a well compacted bed of size 19mm clear stone at least 200mm thick. The stone bed would act as a barrier and prevent capillary rise of moisture from the subgrade to the floor slab.

No perimeter drainage will be required, if the floor slab is at least 200 mm above the exterior grade. The exterior grade should slope away from the building at an inclination of 1 to 2 percent to prevent ponding of water close to exterior walls. If this condition cannot be complied with, then a permanent perimeter drainage system shown on Appendix D. is recommended for the footing/foundation walls.

## 10. UNDERGROUND UTILITIES

Pipe bedding and backfill materials specifications and compaction criteria for water and sewer services should be in accordance with the pipe designer's recommendations and/or local municipal requirements.

If the excavation is deeper than 1.2m, the excavation sides should be sloped in accordance with requirements of OHSA. If this condition cannot be met, a temporary shoring system or trench box should be introduced.

For the subject site, it is expected that the underground services would be founded on the clayey silt till. Granular Class 'B' aggregate is generally considered well suited to be used as bedding material. However, it should be noted, that the recommended type of bedding is to be placed on undisturbed subgrade above the groundwater level. If the construction methods will disturb the subgrade i.e. piping, existing footing, boulder removal etc. or existence of excess hydrostatic pressure, then higher-class bedding may have to be used combined with a geotextile. In some areas, localized dewatering may be required.

Selected onsite excavated fill materials / native soils are considered to be suitable for re-use in trench backfilling, provided that organics / construction debris are sorted out and material are not allowed to be wet and moisture should be 2% within the optimum moisture content.

In normal sewer construction practice, the problem of road settlement largely occurs adjacent to manholes, catch basins and service crossings. In these areas, granular materials are generally required for backfill and compaction.

Water lines installed outside of heated areas should be provided with a minimum of 1.5 m soil cover or equivalent for frost protection.

## 11. PAVEMENT

The site development will be associated with asphalt paved driveways and parking areas. Pavement structures can be constructed on the native soils, engineered fill, or possibly fill materials for the Site, subject to design grade and further onsite inspection.

Prior to asphalt pavement construction, topsoil/organic soil/ construction debris should be removed. The exposed base should be proof rolling and supervised / approved by our office. Any soft/ spongy spots detected during proof-rolling should be sub-excavated and replaced with suitable materials and compact to 98% of SPMDD. Engineered fill construction, if any, should be supervised and inspected by an engineering staff from our office.

The finished subgrade must be contoured/ graded and finally proof-rolling and approved by our office before placing upper granular materials.

Granular materials will be used in construction of asphalt pavement bases. Compaction for granular bases should reach to 100 % of Standard Proctor Maximum Dry Density,

Perforated drains connected to sewer MHs/ CBs should be provided under the entire length of curb and constructed in accordance with required local regulations.

Typical flexible pavement designs are as follows:

| Layer | Heavy Duty | Medium Duty | Light Duty |
|---|---|---|---|
| **Asphaltic Concrete** | 40 mm HL3<br>65 mm HL8 | 40 mm HL3<br>50 mm HL8 | 50 mm HL3 |
| **19 mm Crushed Limestone** | 150 mm | 150 mm | 200 mm |
| **Granular B Sub-base** | 300 mm | 200 mm | |

The pavement thickness should also meet the minimum local region Pavement Design Standards.

The asphalt material should meet the OPSS requirements for specified grade and be compacted to at least 92% of their MRD.

## 12. GENERAL COMMENTS

This report is limited in scope to those items specifically referenced in the text. The discussions and recommendations presented in this report are intended only as guidance for the client named and design engineers.

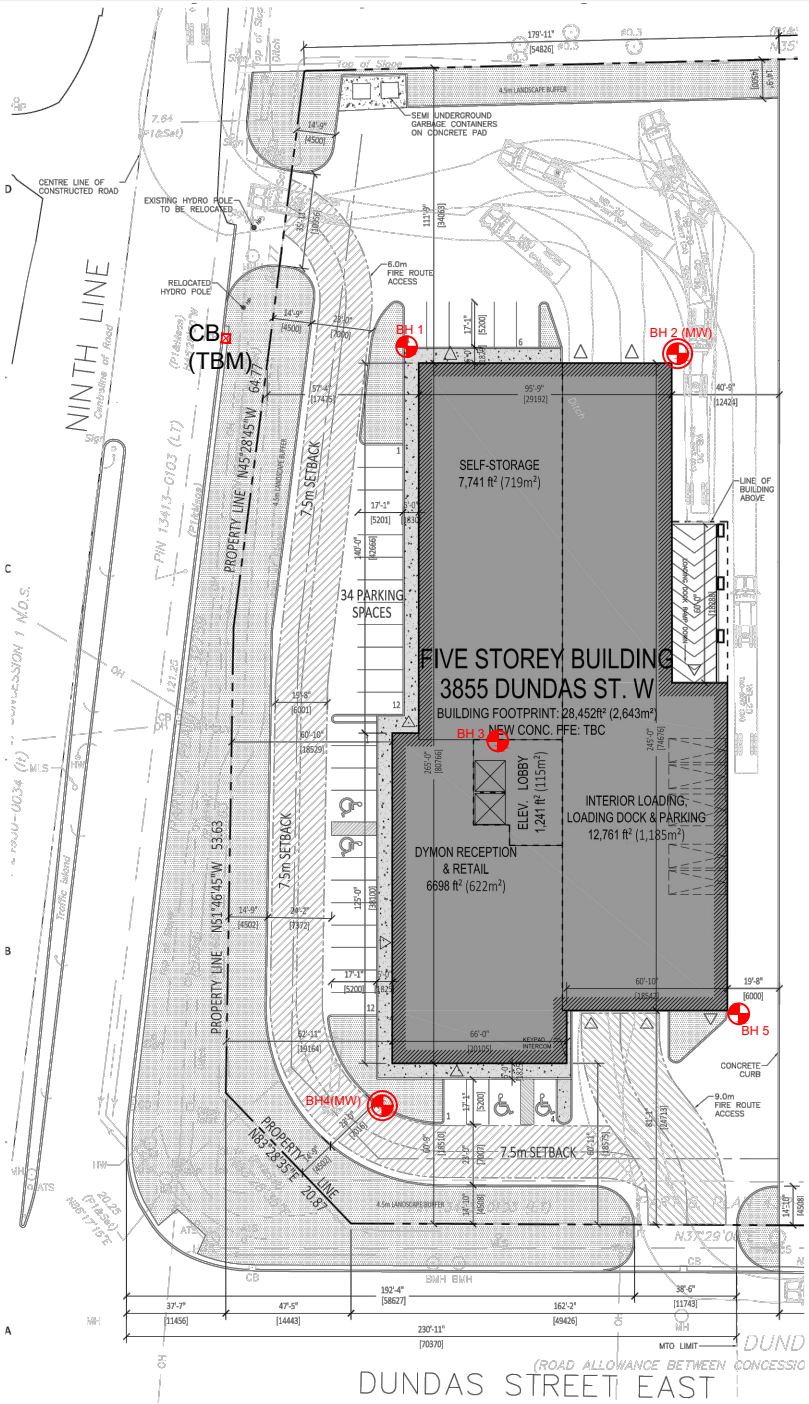
The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction.

The localized variations in the subsoil conditions may be presented between and beyond the boreholes on which have to be verified during construction. As more specific subsurface information becomes available during excavations on the subject Site, this report should be updated.

Contractors bidding on or undertaking the work should decide on their own investigations, as well as their own interpretations of the factual borehole results. This concern specifically applies to the classification of the subsurface soil and the potential reuse of these soils on/off site.

The contractors must draw their own conclusions as to how the near surface and subsurface conditions may affect them.

# APPENDIX A – SITE PLAN

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NORTH

N

LEGEND

BOREHOLE/MONITORING WELL LOCATIONS

PROJECT NAME AND ADDRESS

# GEOTECHNICAL INVESTIGATION

3855 DUNDAS ST
MISSISSAUGA, ON

FIGURE 1:

SITE PLAN WITH BOREHOLE/MONITORING WELL LOCATIONS

| PROJECT NO. | SHEET NO. |
|---|---|
| FE-P 18-9089 | 1 |
| DATE: 6 NOVEMBER 2018 | |
| SCALE: NTS | |

# APPENDIX B – LOG OF BOREHOLES

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# LOG OF BOREHOLE NO. 1 SHEET. 1 of 5

PROJECT NO.: FE-P 18-9089

PROJECT NAME: Geotechnical Investigation

LOCATION: 3855 Dundas St East, Mississauga ON

DRILLING METHOD: Solid Stem

DRILLING DATE: 26 October, 2018

| DEPTH (feet) | DEPTH (metres) | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: "N" VALUE | PENETRATION TESTING (SPT) ▲ 20 40 60 80 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160 | VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ○ 10 20 30 40 | PIEZOMETER OR WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE (m asl) | | 100.00 | | | | | | |
| 0 | 0 | FILL: Clayey silt, trace shale pieces, sand pockets, coarse loose. | | 98.15/ 1.52 | 1 | SS | 9 | | | |
| 2 | | | | | | | | | | |
| 4 | 1 | SANDY SILT TILL: Trace gravel, limestone, shale pieces, redish brown, moist, stiff to hard. | | | 2 | SS | 14 | | | |
| 6 | 2 | | | | 3 | SS | 26 | | | |
| 8 | | Shale fragments at 8.5' | | | 4 | SS | 31 | | | |
| 10 | 3 | | | | 5 | SS | 38 | | | |
| 12 | 4 | | | | | | | | | |
| 14 | | | | | | | | | | |
| 16 | 5 | | | | 6 | SS | 36 | | | |
| 18 | | | | | | | | | | |
| 20 | 6 | Grey below 20' | | | 7 | SS | 26 | | | |
| 22 | 7 | End of Borehole | | 93.11/ 6.56 | | | | | | |
| 24 | | | | | | | | | | |
| 26 | 8 | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | 9 | | | | | | | | | |
| 32 | 10 | | | | | | | | | |

Groundwater Depth (m): On Completion: Dry.

LOGGED: DL

CHECKED: FF

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# LOG OF BOREHOLE NO. 2 SHEET. 2 of 5

PROJECT NO.: FE-P 18-9089

PROJECT NAME: Geotechnical Investigation

LOCATION: 3855 Dundas St East, Mississauga ON

DRILLING METHOD: Solid Stem

DRILLING DATE: 26 October, 2018

| DEPTH (feet) | DEPTH (metres) | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" VALUE |
|---|---|---|---|---|---|---|---|
| 0 | 0 | GROUND SURFACE (m asl) | | 100.10 | | | |
| | | FILL: Clayey silt, trace shale fragments, reddish brown, moist, loose. | | | 1 | SS | 7 |
| 4 | 1 | Silty clay, brown to grey, trace sand seams, moist, brown sand layers at 4' | | | 2 | SS | 5 |
| | | | | 98.58/ 1.52 | | | |
| 6 | 2 | FILL: Silty clay, organics, black, moist, soft. | | 98.27/ 1.83 | 3 | SS | 3 |
| 8 | | CLAYEY SILT TILL: Trace gravel, limestone, and shale pieces, reddishbrown, moist, very stiff. | | | 4 | SS | 19 |
| 10 | 3 | Gray silty sand, silty clay at 6'. | | | 5 | SS | 31 |
| 12 | 4 | | | | | | |
| 14 | | | | | | | |
| 16 | 5 | Greyish brown below 15'. | | | 6 | SS | 30 |
| 18 | | | | | | | |
| 20 | 6 | Redish brown clayey silt with weathered shale complex at 20' very dense. | | | 7 | SS | 83 |
| 22 | 7 | End of Borehole | | 93.39/ 6.71 | | | |
| 24 | | | | | | | |
| 26 | 8 | | | | | | |
| 28 | | | | | | | |
| 30 | 9 | | | | | | |
| 32 | 10 | | | | | | |

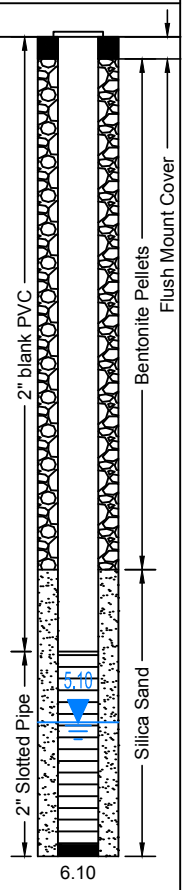
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ○ 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION




Groundwater Depth (m): On Completion: Dry. On 2 Nov 2018: 5.10m

LOGGED: DL

CHECKED: FF

FISHER ENVIRONMENTAL LTD.

# LOG OF BOREHOLE NO. 3 SHEET. 3 of 5

PROJECT NO.: FE-P 18-9089

PROJECT NAME: Geotechnical Investigation

LOCATION: 3855 Dundas St East, Mississauga ON

DRILLING METHOD: Solid Stem

DRILLING DATE: 26 October, 2018

| DEPTH (feet) | DEPTH (metres) | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" VALUE |
|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE (m asl) | | 100.40 | | | |
| 0 | 0 | FILL: Clayey silt, trace shale fragments, reddish brown, moist, compact. | | | 1 | SS | 14 |
| 2 | | | | 99.64/ 0.76 | | | |
| 4 | 1 | CLAYEY SILT TILL: Trace gravel, shale pieces, reddish brown, moist, stiff to hard. | | | 2 | SS | 17 |
| 6 | 2 | Dark brown clayey silt at 2.5'. | | | 3 | SS | 18 |
| 8 | | | | | 4 | SS | 30 |
| 10 | 3 | | | | 5 | SS | 30 |
| 12 | 4 | | | | | | |
| 14 | | | | | | | |
| 16 | 5 | Trace grey shale fragments at 16' | | | 6 | SS | 31 |
| 18 | | Mottened with greyish brown boulder at 21' | | | | | |
| 20 | 6 | Clayey silt, weathered shale complex at 25', very dense. | | | 7 | SS | 98 |
| 22 | 7 | | | | | | |
| 24 | | | | | | | |
| 26 | 8 | End of Borehole | | 92.63/ 7.77 | 8 | SS | 100+ |
| 28 | 9 | | | | | | |
| 30 | | | | | | | |
| 32 | 10 | | | | | | |

PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ○ 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION

Groundwater Depth (m): On Completion: Dry.

LOGGED: DL

CHECKED: FF

FISHER ENVIRONMENTAL LTD.

# LOG OF BOREHOLE NO. 4 SHEET. 4 of 5

PROJECT NO.: FE-P 18-9089

PROJECT NAME: Geotechnical Investigation

LOCATION: 3855 Dundas St East, Mississauga ON

DRILLING METHOD: Solid Stem

DRILLING DATE: 26 October, 2018

| DEPTH (feet) | DEPTH (metres) | DESCRIPTION | ELEV. DEPTH (m) | NUMBER | TYPE | "N" VALUE |
|---|---|---|---|---|---|---|
| | | GROUND SURFACE (m asl) | 100.35 | | | |
| 0 | 0 | FILL: Clayey silt, trace gravel, shale pieces, reddish brown silty sand, sand pocket below 1.5', compact | | 1 | SS | 28 |
| 2 | | | 99.89/ 0.46 | | | |
| 4 | 1 | | | 2 | SS | 13 |
| 6 | 2 | CLAYEY SILT TILL: trace shale fragments, reddish brown, moist, gray at uper 2', stiff to hard. | | 3 | SS | 15 |
| 8 | | Boulder at 8.5' | | 4 | SS | 30 |
| 10 | 3 | | | 5 | SS | 29 |
| 12 | 4 | Greyish brown at 11' | | | | |
| 14 | | | | 6 | SS | 31 |
| 16 | 5 | | | | | |
| 18 | | Greyish brown below 20' | | | | |
| 20 | 6 | | | 7 | SS | 32 |
| 22 | 7 | End of Borehole | 94.80/ 6.55 | | | |
| 24 | | | | | | |
| 26 | 8 | | | | | |
| 28 | | | | | | |
| 30 | 9 | | | | | |
| 32 | 10 | | | | | |

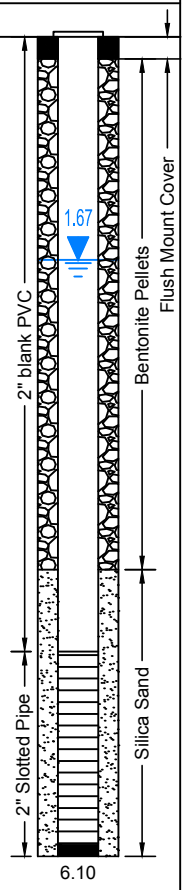
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ○ 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION




Groundwater Depth (m): On Completion: Dry. On 2 Nov 2018: 1.67m.

LOGGED: DL

CHECKED: FF

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# LOG OF BOREHOLE NO. 5 SHEET. 5 of 5

PROJECT NO.: FE-P 18-9089

PROJECT NAME: Geotechnical Investigation

LOCATION: 3855 Dundas St East, Mississauga ON

DRILLING METHOD: Solid Stem

DRILLING DATE: 26 October, 2018

| DEPTH (feet) | DEPTH (metres) | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES: NUMBER | TYPE | "N" VALUE | PENETRATION TESTING (SPT) ▲ 20 40 60 80 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160 | VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ○ 10 20 30 40 | PIEZOMETER OR WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE (m asl) | | 100.05 | | | | | | |
| 0 | 0 | FILL: Clayey silt, trace gravel, shale pieces, reddish brown silty sand, sand pocket below 1.5', compact. | | | 1 | SS | 28 | | | |
| 2 | | | | 99.89/ 0.46 | | | | | | |
| 4 | 1 | | | | 2 | SS | 13 | | | |
| 6 | 2 | CLAYEY SILT TILL: trace shale fragments, reddish brown, moist, stiff to hard. Gray at upper 2'. | | | 3 | SS | 15 | | | |
| 8 | | | | | 4 | SS | 30 | | | |
| 10 | 3 | Boulder at 8.5' | | | 5 | SS | 29 | | | |
| 12 | 4 | Greyish brown at 11' | | | | | | | | |
| 14 | | | | | 6 | SS | 31 | | | |
| 16 | 5 | | | | | | | | | |
| 18 | | | | | | | | | | |
| 20 | 6 | Greyish brown below 20' | | | 7 | SS | 32 | | | |
| 22 | | End of Borehole | | 94.80/ 6.55 | | | | | | |
| 24 | 7 | | | | | | | | | |
| 26 | 8 | | | | | | | | | |
| 28 | | | | | | | | | | |
| 30 | 9 | | | | | | | | | |
| 32 | 10 | | | | | | | | | |

Groundwater Depth (m): On Completion: Dry.

LOGGED: DL

CHECKED: FF

# APPENDIX C– MOISTURE CONTENT ANN GRAIN SIZE ANALYSIS

# FISHER ENVIRONMENTAL LABORATORIES

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***Client:*** Dymon Capital Corp
***Address:*** 2-1830 Walkley Rd.
Ottawa, Ontario
K1H 8K3
***Tel.:*** (613) 247-0888 ext. 222
***Email:*** gluckman@dymon.ca
***Attn.:*** Mr. Glen Luckman

***F.E. Job #:*** 18-1243
***Project Name:*** Geotechnical Investigation
***Project ID:*** FE-18-9089
***Date Sampled:*** 26-Oct-18
***Date Received:*** 1-Nov-18
***Date Reported:*** 6-Nov-18
***Location:*** 3855 Dundas Street
Mississauga, ON

# Certificate of Analysis

| Analyses | Matrix | Quantity | Date Extracted | Date Analyzed | Lab SOP | Method Reference |
|---|---|---|---|---|---|---|
| Moisture Content | Soil | 5 | N/A | 2-Nov-18 | Support Procedures F-99 | Carter (1993) |
| Grain Size | Soil | 2 | N/A | 5-Nov-18 | Grain Size F-28 | ASTM D6913-04 |

Fisher Environmental Laboratories is accredited by CALA (the Canadian Association for Laboratory Accreditation Inc.) for specific parameters as required by Ontario Regulation 153/04. All analytical testing has been performed in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act published by Ontario Ministry of the Environment.

***Authorized by:***


*Roger Lin, Ph. D., C. Chem.*
*Laboratory Manager*



*Results related only to the items tested*

# Certificate of Analysis

| | |
|---|---|
| ***Analysis Requested:*** | Moisture Content, Grain Size |
| ***Sample Description:*** | 5 Soil Samples |

| **Parameter** | ***18-1243-1*** BH3 SS4 | ***18-1243-2*** BH4 SS2 | ***18-1243-3*** BH4 SS3 | ***18-1243-4*** BH4 SS5 | ***18-1243-5*** BH3 SS3 | |
|---|---|---|---|---|---|---|
| ***Moisture Content (%)*** | 11 | 19 | 12 | 11 | 13 | |

# QA/QC Report

| **Parameter** | **Blank** | **RL** | **LCS** | **AR** | **Duplicate** | **AR** |
|---|---|---|---|---|---|---|
| | | | **Recovery (%)** | | **RPD (%)** | |
| ***Moisture Content (%)*** | <0.1 | 0.1 | 99 | 70-130 | 3.7 | 0-20 |

***LEGEND:***
RL - Reporting Limit
LCS - Laboratory Control Sample
AR - Acceptable Range
RPD - Relative Percent Difference

# Certificate of Analysis

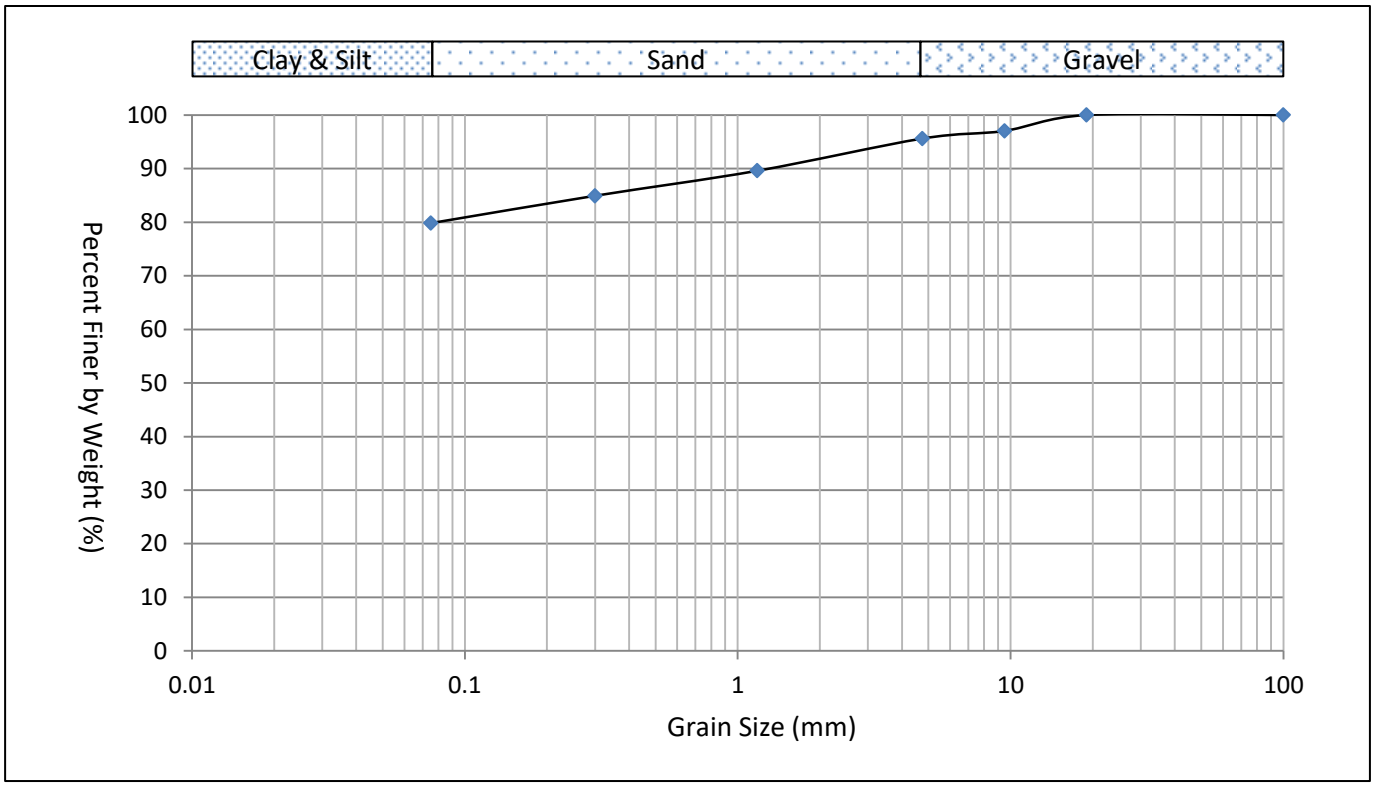
| | |
|---|---|
| ***Analysis Requested:*** | Moisture Content, Grain Size |
| ***Sample Description:*** | 5 Soil Samples |

| **Parameter** | ***18-1243-1*** BH3 SS4 | ***18-1243-3*** BH4 SS3 | | | | |
|---|---|---|---|---|---|---|
| ***Grain Size (%)*** | | | | | | |
| >19mm | 0.0 | 0.0 | | | | |
| 9.5mm-19mm | 3.0 | 2.4 | | | | |
| 4.75mm-9.5mm | 1.4 | 1.9 | | | | |
| 1.18m-4.75mmm | 6.0 | 2.9 | | | | |
| 300um-1.18mm | 4.7 | 2.7 | | | | |
| 75um-300um | 5.1 | 4.1 | | | | |
| <75um | 79.8 | 86.0 | | | | |
| **Clay & Silt** | **80** | **86** | | | | |
| **Sand** | **16** | **10** | | | | |
| **Gravel** | **4** | **4** | | | | |

# Grain Size Distribution

Sample ID: 18-1243-1, BH3, SS4

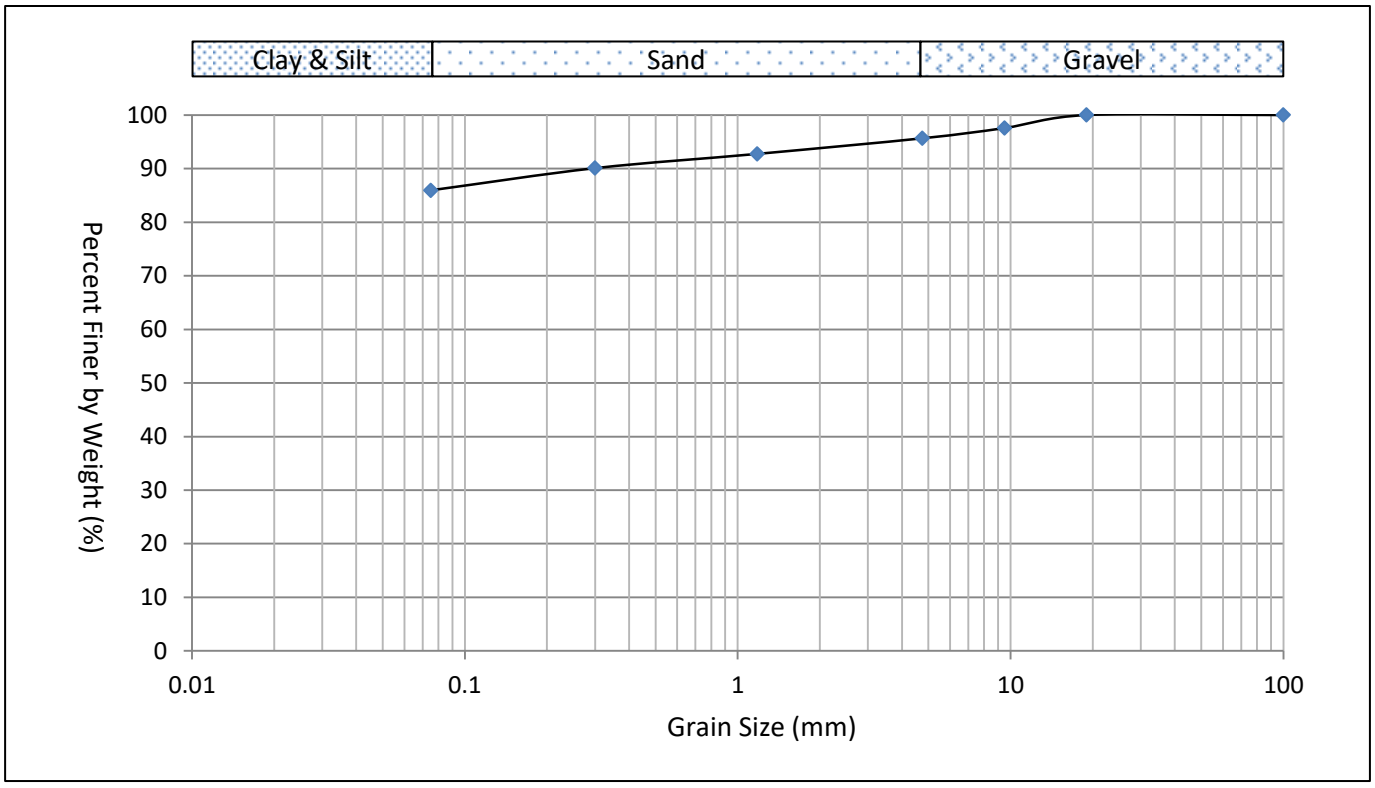
Clay & Silt 80%, Sand 16%, Gravel 4%



# Grain Size Distribution

Sample ID: 18-1243-3, BH4, SS3

Clay & Silt 86%, Sand 10%, Gravel 4%



# APPENDIX D – DRAINAGE AND BACKFILL RECOMMENDATIONS

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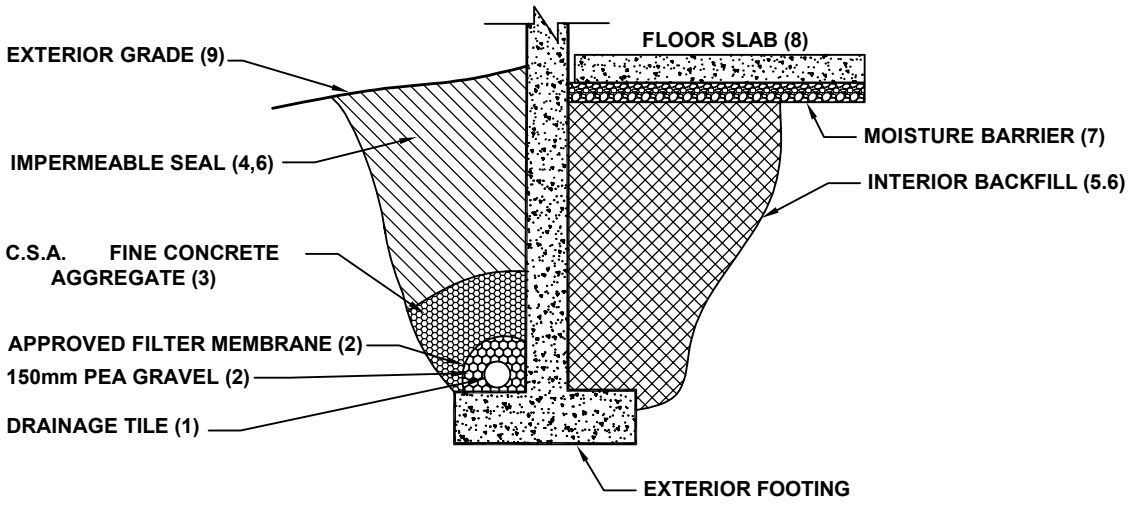


NOTES:

(1) DRAINAGE TILE TO CONSIST OF 100mm (4") DIAMETER WEEPING TILE OR EQUIVALENT PERFORATED PIPE LEADING TO A POSITIVE SUMP OR OUTLET. INVERT TO BE A MINIMUM OF 150MM (6") BELOW UNDERSIDE OF FLOOR SLAB.

(2) PEA GRAVEL-150mm (6") TOP AND SIDE OF DRAIN. IF DRAIN IS NOT ON FOOTING, PLACE 100mm (4") OF PEA GRAVEL BELOW DRAIN. 20mm (3/4") CLEAR STONE IS AN ALTERNATIVE PROVIDED IT IS SURROUNDED BY AN APPROVED FILTER FABRIC (TERRAFIX 270R OR EQUIVALENT).

(3) C.S.A. FINE CONCRETE AGGREGATE TO ACT AS FILTER MATERIAL. MINIMUM 300mm (12") TOP AND SIDE OF TILE DRAIN. THIS MAY BE REPLACED BY AN APPROVED FILTER FABRIC AS INDICATED IN (2).

(4) IMPERMEABLE BACKFILL SEAL - COMPACTED CLAY, CLAYEY SILT OR EQUIVALENT. IF ORIGINAL SOIL IS FREE-DRAINING, SEAL MAY BE OMITTED.

(5) THE ENTIRE FILL MAY BE ANY CLEAN NON-ORGANIC SOIL WHICH CAN BE COMPACTED TO THE SPECIFIED IN THIS CONFINED SPACE.

(6) DO NOT USE HEAVY COMPACTION EQUIPMENT WITHIN 450mm (18") OF THE WALL. DO NOT FILL OR COMPACT WITHIN 1.8m(6') OF THE WALL UNLESS FILL IS PLACED ON BOTH SIDES SIMULTANEOUSLY.

(7) MOISTURE BARRIER TO BE AT LEAST 200mm (8") OF COMPACTED CLEAR 20mm (3/4") STONE.

(8) SLAB ON GRADE SHOULD NOT BE STRUCTURALLY CONNECTED TO THE WALL OR FOOTING.

(9) EXTERIOR GRADE TO SLOPE AWAY FROM BUILDING.

(10) THIS SYSTEM IS NOT NORMALLY REQUIRED IF THE FLOOR SLAB IS AT LEAST 300mm (1') ABOVE THE EXTERIOR GRADE.

## DRAINAGE AND BACKFILL RECOMMENDATIONS

FOR SLAB ON GRADE CONSTRUCTION
(NOT TO SCALE)