GEOTECHNICAL INVESTIGATION
PROPOSED ADDITION TO EXISTING BUILDING
510 TAUNTON ROAD EAST
OSHAWA, ONTARIO

Prepared for:

MICHAEL MANTZORIS ARCHITECT

PATRIOT ENGINEERING LTD.
Consulting Engineers

Project 40129
May 28, 2020

80 Nashdene Road, Unit 62
Toronto, Ontario
M1V 5E4
416-293-7716

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DRAWINGS

PATRIOT
ENGINEERING LTD.
Consulting Engineers

Project 40129

May 28, 2020

Michael Mantzoris Architect
79 Helendale Avenue
Toronto, Ontario, M4R 1C6

Attention: Mr. Michael Mantzoris

Geotechnical Investigation
Proposed Addition to Existing Building
510 Taunton Road East
Oshawa, Ontario

1.0 INTRODUCTION

As requested, Patriot Engineering Ltd., has carried out a geotechnical investigation at the above project site to determine the soil and groundwater conditions in order to provide geotechnical recommendations for type of foundations, safe soil bearing pressures, earthquake design parameters, earth pressure coefficients, excavations and backfill procedures, reuse of excavated material and slab-on-grade floor construction. Authorization to proceed with this investigation was provided by Mr. Michael Mantzoris, from Michael Mantzoris Architect, on behalf of the Owner.

It is understood that the proposed development will consist of constructing a single storey addition to the existing single storey structure. The addition will not contain a basement. The existing structure also does not contain a basement.

The site fronts on the north side of Taunton Road East and is located approximately 125m west from the intersection of Wilson Road North and Taunton Road East, in Oshawa, Ontario. The terrain at the proposed location of the addition is relatively flat and is covered with asphalt with the exception of a narrow strip of grass located along the perimeter of the back side of the existing building.

2.0 FIELDWORK

The fieldwork for this investigation was performed in two phases. The first phase took place on May 12, 2020 and consisted of drilling a total of four (4) boreholes (BH1 to BH4) to a depth of 8.1m each, using solid stem augers.

The second phase was carried out on May 13, 2020, and involved the excavation and inspection of one test pit (TP1) at the outside face of a foundation wall of the existing structure that was situated within the footprint of the proposed addition. The purpose of this test pit was to inspect and determine the type and depth of the existing foundations, obtain general foundation dimensions and an assessment of the bearing capacity of the founding soil.

The approximate borehole locations and test pit location along with their surface elevation at the time their respective fieldwork was carried out, are shown on the Partial Site Plan, Figure 1.

The ground surface elevations for the boreholes and test pit were determined by members of our field engineering staff and referenced at:

> Top of existing catch basin, located on Taunton Road East, near the southeast corner of the property. The location of this catch basin is also shown on the Partial Site Plan, Figure 1.

The elevation at this point is understood to be at Elev. 158.17m.

The scope of work for the geotechnical investigation for this project is as it is presented in this report, which is being provided on the assumption that the applicable codes and standards will be met. If there are any changes in the design features relevant to the geotechnical analysis, or if there are any apparent deviations of the report from relevant codes and standards, our office should be contacted to review the design.

3.0 SUBSURFACE CONDITIONS

The detailed stratigraphy encountered in the boreholes is presented on the Borehole Logs, Drawings 2 to 5. The stratigraphy inside the test pit is shown on the Test Pits Log, Figure 6.

In general, all boreholes were drilled from above the existing asphalt paved regions at the site and initially advanced through asphalt that ranged in thickness from approximately 40mm 50mm. Below this, the granular fill components of the existing paved areas were present and consisted of loose to dense, brown, slightly moist to moist, sand and gravel. The thickness of this material generally ranged from approximately 125mm to 150mm, with the exception in Borehole BH3 where its thickness was 650mm, which in this case most likely represents a combination of pavement component thickness, as well as, material used to backfill and raise the subgrade at this area.

Underlying the granular fill pavement components, a layer of earth fill material was next encountered in all boreholes expect in Borehole BH3. The earth fill consisted of brown, slightly moist to moist sandy silt. The "N" values (blows/foot) that were obtained within this layer ranged from 6 to well over 36, revealing relative densities that were loose to dense. The moisture contents varied from 5% to 13%. Traces of clay and gravel were also observed within this material.

The depth of the fill layers inside the boreholes was approximately 0.7m below existing grade.

Beneath the fill layers, native material was present in all boreholes and was composed of brown, slightly moist to moist, sand. The "N" values that were recorded within this layer ranged from 17 to well over 50, demonstrating relative densities that were compact to very dense. The moisture contents varied from 2% to 9%. This layer was largely fine grained and also contained traces to some gravel, plus traces of clay, silt and cobbles. Figure 7 shows the results of a grain size distribution test that was performed on a sample extracted from the sand material. Local variations of the composition of the material can occur at the sampling locations.

Below the sand layer, the next layer that was encountered consisted of brown, moist, silt. The "N" values that were obtained in this material ranged from 29 to well over 50, indicating relative densities that were compact to very dense. The moisture contents varied from 16% to 18%. This material also contained some sand plus traces of clay and gravel. Minor dilation was noted in this layer in Borehole BH2 Sample SS6, as well as, in Borehole BH3 Sample SS6. The results from our grain size distribution test performed on a sample extracted from this silt layer are shown on Figure 8.

Underlying the above mentioned silt layer, cohesive material was next encountered and it was composed of hard, grey, slightly moist to moist, silt and clay till. Its undrained shear strength (Cu) is estimated to be greater than 200 kPa. The moisture contents ranged from 8% to 16%. This layer also contained traces of gravel, sand, cobbles and isolated wet sand seams. A grain size distribution test was performed on a sample extracted from this silt and clay till material and the results are shown on Figure 9.

The short term groundwater levels that were recorded inside the boreholes upon the completion of drilling and inside the test pit following the excavation and inspection activities are indicated below on Table 1. These groundwater level readings are also shown on the individual borehole logs and test pit log.

Table 1
Measured Short Term Groundwater Levels Upon Completion of Drilling of Boreholes and Completion of Test Pit Excavation and Inspection

Borehole/ Test Pit No.	Depth of Borehole/ Test Pit (m)	Borehole/ Test Pit Surface Elevation (m)	Approximate Depth of Groundwater Level Below Existing Ground (m)	Approximate Groundwater Elevation (m)
BH1	8.1	160.2	5.8	154.4
BH2	8.1	160.3	7.3	153.0
BH3	8.1	160.1	6.1	154.0
BH4	8.1	160.1	7.6	152.5
TP1	1.7	160.0	DRY	-

Long term groundwater levels have not been established and some seasonal fluctuations and higher water levels should be anticipated.

The soil and groundwater conditions presented in this report have been deducted from soil sampling that was noncontinuous and therefore, should not be taken to represent exact planes of geological change. Furthermore, the geotechnical recommendations and comments provided in this report have been based on boreholes that were widely spaced. Therefore, the soil and groundwater conditions between the boreholes could vary significantly. The interpretation between boreholes and the recommendations in this report must therefore be checked through field inspections, provided by our office during the construction stages, to validate the information for use.

4.0 GEOTECHNICAL RECOMMENDATIONS

The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling and the like, would be much greater than that carried out for design purposes. Contractors and/or subcontractors bidding on or undertaking the work should, in this light, decide on their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

4.1 Inspection of Foundations of Existing Structure

Test Pit 1 was excavated to inspect the foundations, depth and founding soil conditions of the existing structure. The foundation details and founding soil conditions are shown on the Test Pit Log, Figure 6.

At the test pit location, a parged foundation was present and located at a depth of 1.5m below existing grade. This parged foundation was vertical and it did not display a footing type projection. It rested on dense, brown, slightly moist, sand.

At the location of Test Pit 1, the bearing pressure at the underside level of the existing foundation which is sustained by the dense, sand, is estimated below:

Serviceability Limit State (kPa)	Factored Bearing Capacity at Ultimate Limit State (kPa)
350	525

4.2 Foundations for Proposed Addition

Based on the soil and groundwater conditions encountered at the borehole locations, conventional spread footings may be used for the proposed addition and must be founded below all fill, buried topsoil, loosened soil and deleterious materials on the native undisturbed, compact to dense, sand. The following soil bearing pressures and specified founding depths as shown on Table 2 are recommended:

Table 2
Soil Bearing Pressures for Spread Footings

Borehole No.	Serviceability Limit State (SLS) (kPa)	Factored Bearing Capacity at Ultimate Limit State (ULS) (kPa)	Approximate Founding Elevation (m)	Approximate Founding Depth Below Existing Ground (m)
1	350	525	Below 158.7	Below 1.5
2	400	600	Below 159.3	Below 1.0
3	290	435	Below 159.1	Below 1.0
4	350	525	Below 158.6	Below 1.5

Provided that the foundation bases are not disturbed by excavation, surface water inflow, or freezing and thawing action, foundations designed with the serviceability condition SLS soil pressures shown above, should not exceed the total and differential settlements of 25mm (1 inch) and 20mm (3/4 inch), respectively.

All new footings or footings exposed to freezing ground conditions must be provided with a minimum of 1.2m (4 ft.) of soil cover or equivalent.

New footings must be stepped along a line of 7 vertical to 10 horizontal where founding grades are variable. Efforts must be made to ensure that new excavations do not cut into the angle of repose or undermine the footing from the existing structure. If so, then underpinning will be required at the affected portion of the existing structure.

It is essential that all foundation bases be inspected by a geotechnical engineer from our office to verify the bearing pressures suggested in this report.

It is recommended that the foundation drawings be reviewed by our office for general conformance with our geotechnical recommendations.

4.3 Earthquake Design Parameters

In accordance to the Ontario Building Code, the site's classification for Seismic Response would be Class C. Also, the Acceleration Coefficient, F_a = 1.0 and the Velocity Coefficient, F_v = 1.0 are applicable to this site.

4.4 Earth Pressure Coefficients

For this site, the following parameters may be used to assess the earth pressure:

Soil	γ (kN/m^3)	ϕ degrees	K_a	K_o	K_p
Onsite Compacted Fill or Compacted Granular Fill - OPSS Granular B	21.0	32	0.31	0.47	3.25
Native Sand Subsoil	21.2	33	0.30	0.46	3.39
Native Silt Subsoil	21.5	34	0.28	0.44	3.54

Where
γ = bulk unit weight of soil, kN/m^3
ϕ = internal angle of friction, degrees
K_a = coefficient of active earth pressure
K_o = coefficient of earth pressure at rest
K_p = coefficient of passive earth pressure

4.5 Excavation and Backfill

No major groundwater problems are anticipated with the excavations to building foundation base elevations on this site. Surface water inflows and any minor seepage from perched water level should be handled adequately with properly filtered sumps and peripheral ditches in slightly oversized excavations.

All temporary shallow excavations may be cut at 1 vertical to 1.5 horizontal. Some sloughing of the upper zones may require shallower slopes in localized areas. All excavations must be made to conform to the regulations set out in the Occupational Health and Safety Act. Using the classification system described in the Occupational Health and Safety Act, the fill soils on site can be classified as Type 3. The native soils can also be considered as Type 3. Any wet and saturated soils, or soils located below the groundwater level are classified as Type 4.

Excavations must not be cut below an imaginary line drawn downward from existing foundations or underground services at 7 vertical to 10 horizontal, otherwise adequate temporary shoring and/or underpinning will be required.

Backfilling of foundations shall be carried out with approved native material or OPSS approved Granular B Type I (sand and gravel) material provided it can be placed in maximum 300mm (1 ft.) loose lifts and compacted to a minimum of 95% Standard Proctor maximum dry density. The upper 1.2m (4 ft.) of backfill shall be compacted to a minimum of 98% Standard Proctor maximum dry density.

Backfilling of underslab interior excavations must be made with approved OPSS Granular B Type I (sand and gravel) material, placed in 300mm (1 ft.) loose lifts and compacted to at least 98% Standard Proctor maximum dry density.

Backfilling of service trenches under proposed pavement areas shall be carried out using approved native soils or OPSS approved Granular B Type I (sand and gravel) material provided it can be placed in maximum 300mm (1 ft.) loose lifts and compacted to a minimum of 95% Standard Proctor maximum dry density. The upper 1.2m (4 ft.) of backfill shall be compacted to a minimum of 98% Standard Proctor maximum dry density.

The suitability and reuse of the onsite material as backfill should be inspected and assessed during the initial stages of construction. Materials that have been approved for reuse should be maintained within 2% of their optimum moisture content. They must also be protected from the weather with tarps.

4.6 Slab-On-Grade Floor and Drainage Requirements

From our borehole investigation, it is noted that the site contains fill materials consisting of sandy silt fill in Boreholes BH1, BH2 and BH4, as well as, sand and gravel fill in Borehole BH3. The fill materials extend to a depth of approximately 0.7m below existing grade. This indicates that the exposed subgrade surface at the envelope of the proposed addition is expected to be constructed within these fill layers. The fill materials each appeared to be uniform in structure. It is our opinion that the fill layers are considered suitable to remain as a subgrade. Therefore, the concrete floor may be constructed by conventional slab-on-grade techniques on an adequately prepared subgrade consisting of compact to dense sandy silt fill, and compact sand and gravel fill, provided that the followings items are complied with:

1. The exposed subgrade must be stripped of any topsoil, vegetation, loose, wet and deleterious material.

2. Any weak spots encountered on the exposed subgrade must be excavated and removed.

3. The amount of organics appeared minor in the samples, however, during construction, if it becomes greater then localized areas of the fill containing excessive organics must be excavated and removed.

4. The exposed surface of the subgrade within the footprint of the proposed addition must be heavily proofrolled under geotechnical supervision and compacted to a minimum of 98% Standard Proctor maximum dry density. It must be inspected and approved by a geotechnical engineer.

5. The grade must then be raised to the design subgrade level to fill any such voids as indicated on Item 2 above, and/or to fill any areas with relatively lower surface elevations with OPSS approved Granular B Type I (sand and gravel) material, placed in 300mm (12 inch) loose lifts compacted to a minimum of 98% Standard Proctor maximum dry density.

A moisture barrier consisting of at least 200mm (8 inch) thick of 20mm (3/4 inch) of OPSS Granular A crusher run limestone must be provided under the proposed floor slab. It shall be compacted to at least 98% Standard Proctor maximum dry density.

The proposed concrete floor may then be constructed by conventional slab-on-grade techniques directly above the Granular A crusher run limestone basecourse.

A Modulus of Subgrade Reaction (k_s) of 27,150 kN/m^3 (100 pci) is suggested for designing the proposed floor slab.

The requirements for the perimeter drainage, underfloor fill and backfill are provided on Figure 10.

We trust this report will assist you with your proposed development. Should you have any questions, please do not hesitate to contact our office.

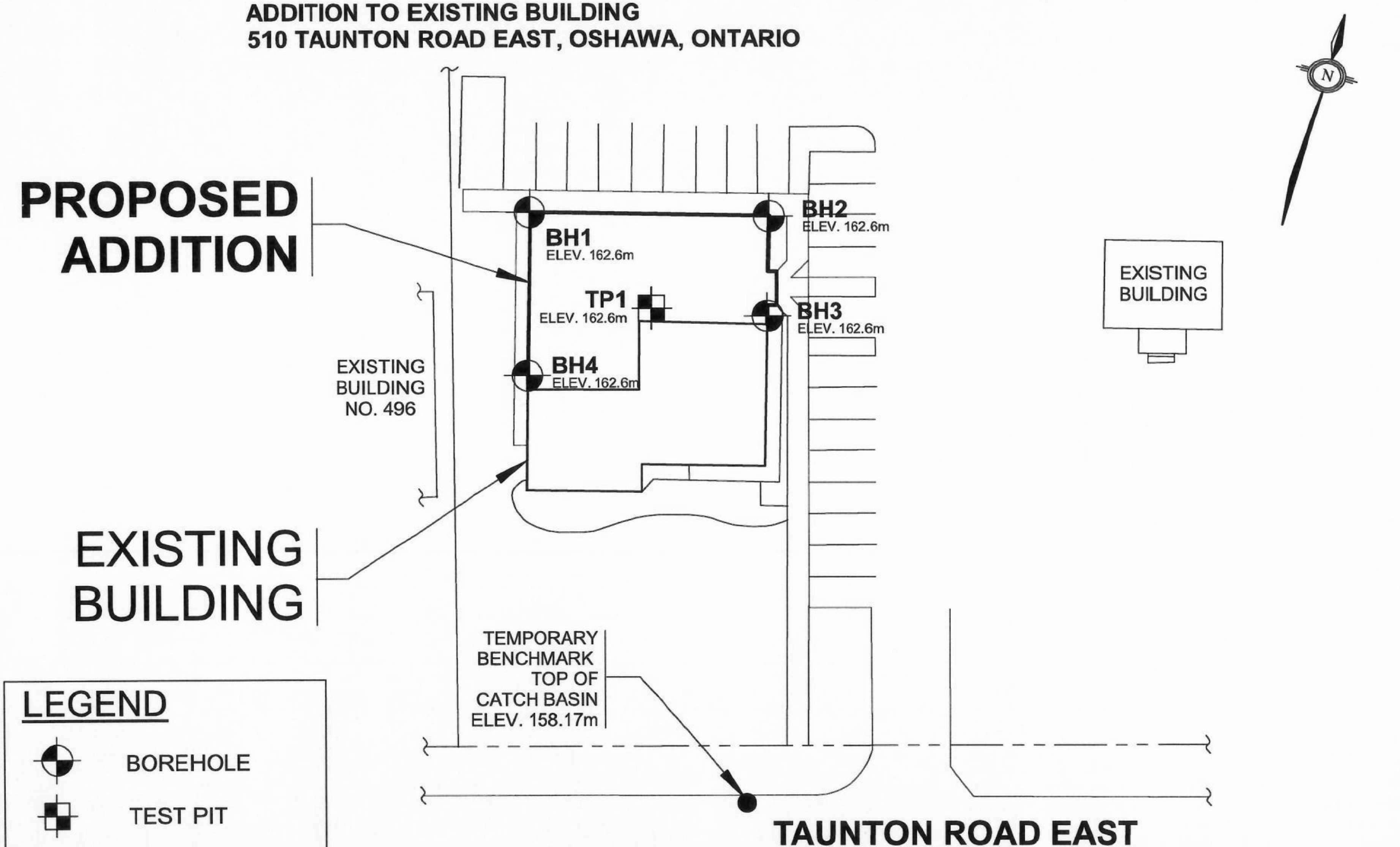
Sincerely,
PATRIOT ENGINEERING LTD.

LICENSED PROFESSIONAL ENGINEER L. GALIMANIS PROVINCE OF ONTARIO

Larry Galimanis, P.Eng.
Principal/Consulting Engineer

Distribution: Mr. Michael Mantzoris, Michael Mantzoris Architect (4)

FIGURE 1: PARTIAL SITE PLAN SHOWING THE APPROXIMATE BOREHOLE AND TEST PIT LOCATIONS
ADDITION TO EXISTING BUILDING
510 TAUNTON ROAD EAST, OSHAWA, ONTARIO



REFERENCE:
SITE PLAN INFORMATION ADAPTED FROM SITE PLAN DRAWING NO. SP1, PREPARED BY RAMPRASAD ENGINEERS INC. DATED MAY 16, 2019.

	Name	Date
Drawn By	S.B.	May '20
Checked By	L.G.	May '20
Revisions		
Scale	REDUCED FROM ORIGINAL	

PATRIOT ENGINEERING LTD.
Consulting Engineers

Project: 40129
Figure: 1

Project No: 40129

Project: Addition to Existing Building

Location: 510 Taunton Road East, Oshawa, Ontario

Client: Michael Mantzoris Architect

Borehole #: BH1

Borehole Location: See Figure 1

Project Engineer: L.G.

Drawing No.: 2

SUBSURFACE PROFILE

Depth (m)	Description	Elevation (m)
0	Ground Surface	160.2
	ASPHALT - 40mm	160.0
	GRANULAR FILL - 150mm (SAND AND GRAVEL) compact, brown, moist	
	FILL - SANDY SILT compact, brown, moist, trace clay, trace gravel	159.5
	SAND compact to very dense, brown, slightly moist, largely fine grained, trace clay, trace silt, some gravel, trace cobbles	
	SILT very dense, brown, moist, trace clay, some sand, trace gravel	154.6
	SILT AND CLAY TILL hard, grey, moist, trace sand, trace gravel, trace cobbles	153.1
	END OF BOREHOLE	152.1

SAMPLE

Type	N = Blows/300mm	Recovery (%)	U.Wt.(kN/m3)
SS1	17	85	
SS2	20	100	
SS3	58	100	
SS4	65	100	
SS5	51	100	
SS6	64	100	
SS7	50	100	
SS8	50	100	

Notes:
1. Borehole advanced using solid stem augers to 8.1m depth on May 12, 2020.
2. Short term groundwater level measured at 5.8m depth upon completion of drilling.

Drill Method: S/S Auger

Drill Date: May 12, 2020

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e-mail: info@patrioteng.ca

Datum: Geodetic

Checked by: L.G.

Project No: 40129

Project: Addition to Existing Building

Location: 510 Taunton Road East, Oshawa, Ontario

Client: Michael Mantzoris Architect

Borehole #: BH2

Borehole Location: See Figure 1

Project Engineer: L.G.

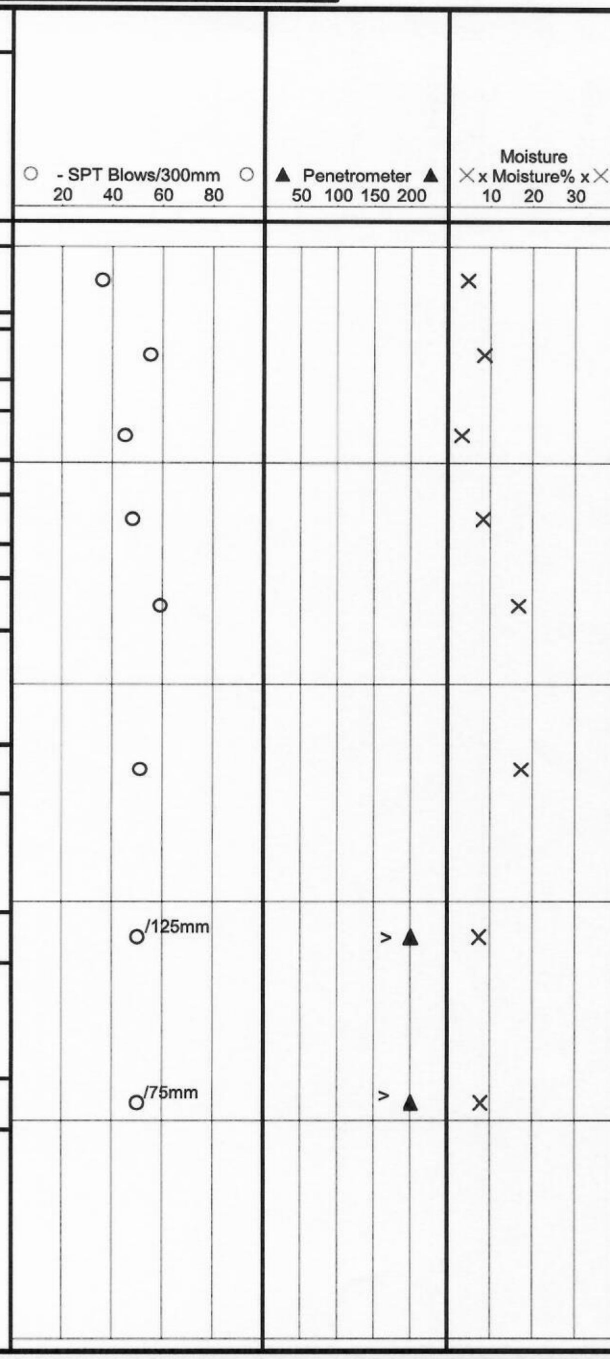
Drawing No.: 3

SUBSURFACE PROFILE			SAMPLE			
Description		Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U.Wt.(kN/m3)
Ground Surface		160.3				
ASPHALT - 45mm		160.1				
GRANULAR FILL - 125mm (SAND AND GRAVEL) dense, brown, slightly moist		159.6	SS1	36	92	
FILL - SANDY SILT dense, brown, slightly moist, trace clay, trace gravel, isolated pockets of clay			SS2	55	100	
SAND very dense to dense, brown, slightly moist, largely fine grained, trace clay, trace silt, trace gravel, trace cobbles, isolated pockets of silt		157.6	SS3	45	100	
			SS4	48	80	
			SS5	59	90	
SILT very dense, brown, moist, trace clay, some sand, trace gravel, dilated at Sample SS6		154.7	SS6	51	70	
SILT AND CLAY TILL hard, grey, slightly moist, trace sand, trace gravel, trace cobbles, isolated wet sand seems		152.2	SS7	50	100	
			SS8	50	100	
END OF BOREHOLE						

Depth (m): 0–10

END OF BOREHOLE

Notes:
1. Borehole advanced using solid stem augers to 8.1m depth on May 12, 2020.
2. Short term groundwater level measured at 7.3m depth upon completion of drilling.



Drill Method: S/S Auger

Drill Date: May 12, 2020

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Project No: 40129

Project: Addition to Existing Building

Location: 510 Taunton Road East, Oshawa, Ontario

Client: Michael Mantzoris Architect

Borehole #: BH3

Borehole Location: See Figure 1

Project Engineer: L.G.

Drawing No.: 4

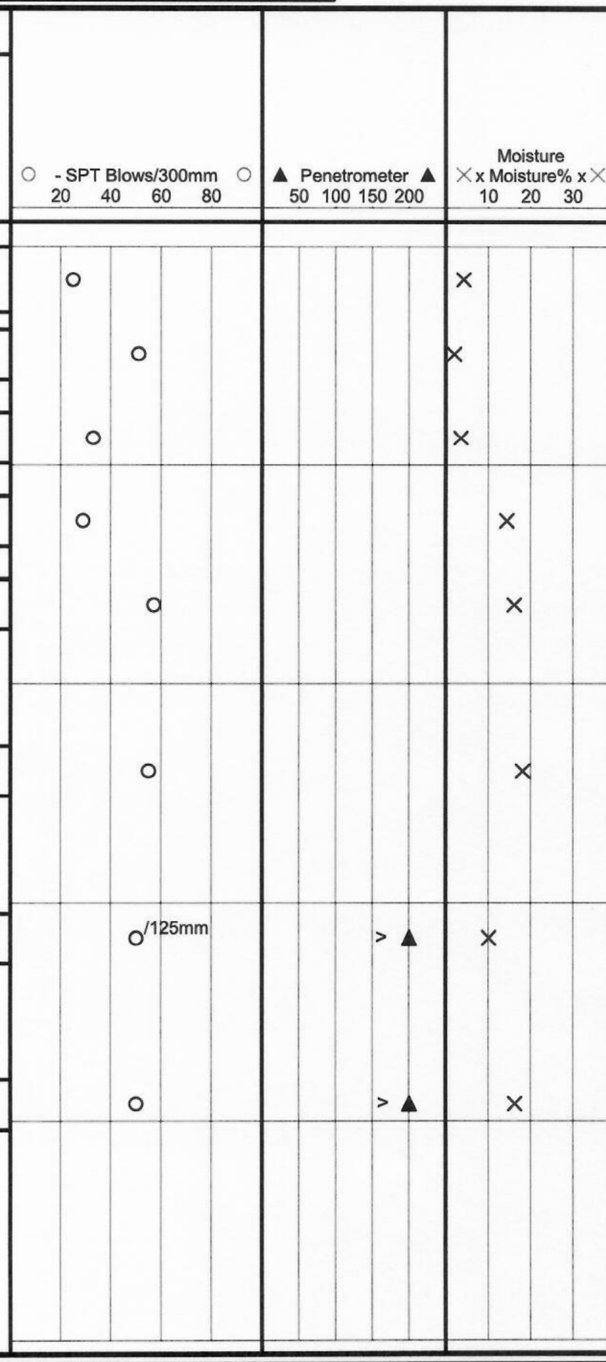
SUBSURFACE PROFILE

Depth (m)	Description	Elevation (m)
0	Ground Surface	160.1
0 – 0.05	**ASPHALT - 50mm**	
0.05 – 0.7	**GRANULAR FILL - 650mm (SAND AND GRAVEL)** compact, brown, slightly moist, trace plastic pieces	159.4
0.7 – 2.3	**SAND** very dense to dense, brown, slightly moist, largely fine grained, trace clay, trace silt, some gravel, trace cobbles, isolated pockets of silt	157.8
2.3 – 5.5	**SILT** compact to very dense, brown, moist, trace clay, some sand, trace gravel, minor dilation at Sample SS6	154.6
5.5 – 8.0	**SILT AND CLAY TILL** hard, grey, moist, trace sand, trace gravel, trace cobbles, isolated wet sand seams	152.1
8.0	**END OF BOREHOLE**	

Notes:
1. Borehole advanced using solid stem augers to 8.1m depth on May 12, 2020.
2. Short term groundwater level measured at 6.1m depth upon completion of drilling.

SAMPLE

Type	N = Blows/300mm	Recovery (%)	U.Wt.(kN/m3)
SS1	25	75	
SS2	51	100	
SS3	33	100	
SS4	29	90	
SS5	57	100	
SS6	55	100	
SS7	50	100	
SS8	63	100	



Drill Method: S/S Auger

Drill Date: May 12, 2020

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Checked by: L.G.

Project No: 40129

Project: Addition to Existing Building

Location: 510 Taunton Road East, Oshawa, Ontario

Client: Michael Mantzoris Architect

Borehole #: BH4

Borehole Location: See Figure 1

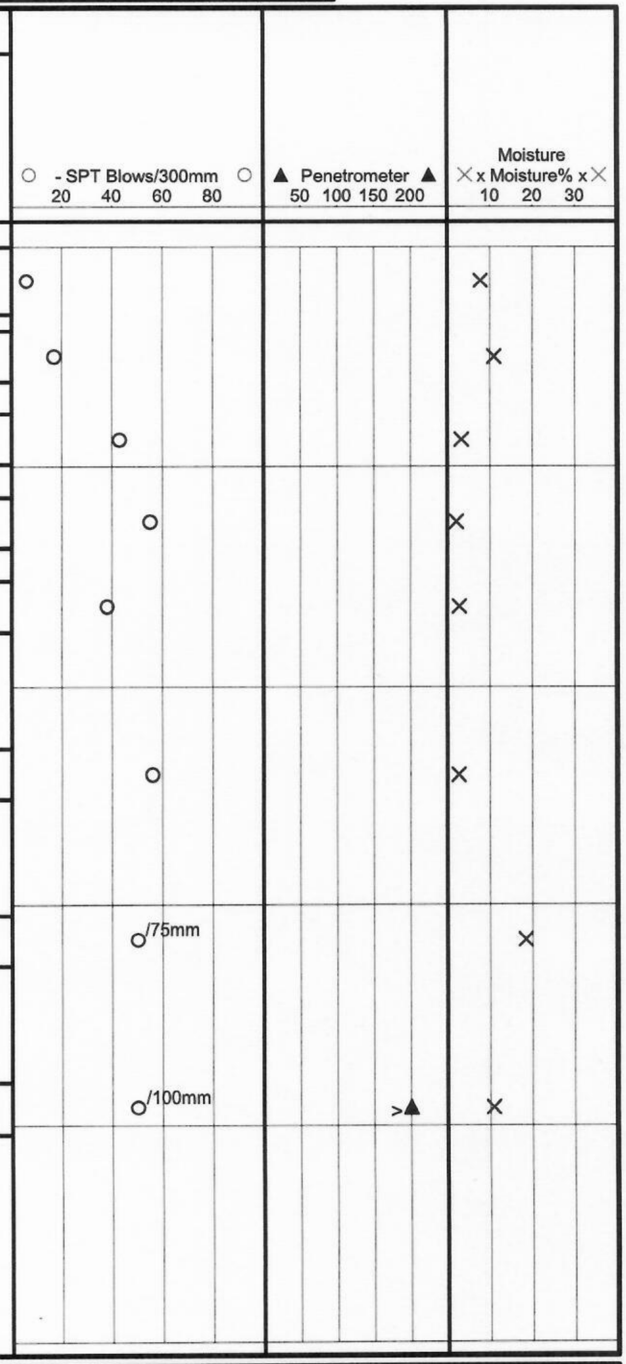
Project Engineer: L.G.

Drawing No.: 5

SUBSURFACE PROFILE		SAMPLE				
Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U.Wt.(kN/m3)
Ground Surface	160.1				
ASPHALT - 50mm	159.9				
GRANULAR FILL - 150mm (SAND AND GRAVEL) loose, brown, slightly moist		SS1	6	75	
FILL - SANDY SILT loose, brown, slightly moist, trace clay, trace gravel	159.4	SS2	17	90	
SAND compact to very dense, brown, moist to slightly moist, largely fine grained, trace clay, trace silt, some gravel, trace cobbles, isolated pockets of silt		SS3	43	100	
		SS4	55	80	
		SS5	38	100	
		SS6	56	100	
SILT very dense, brown, moist, trace clay, some sand, trace gravel	154.5	SS7	50	100	
SILT AND CLAY TILL hard, grey, moist, trace sand, trace gravel, trace cobbles	153.0	SS8	50	100	
END OF BOREHOLE	152.0				

Depth (m): 0–10

Notes:
1. Borehole advanced using solid stem augers to 8.1m depth on May 12, 2020.
2. Short term groundwater level measured at 7.6m depth upon completion of drilling.



Drill Method: S/S Auger

Drill Date: May 12, 2020

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Checked by: L.G.

PATRIOT ENGINEERING LTD. Consulting Engineers
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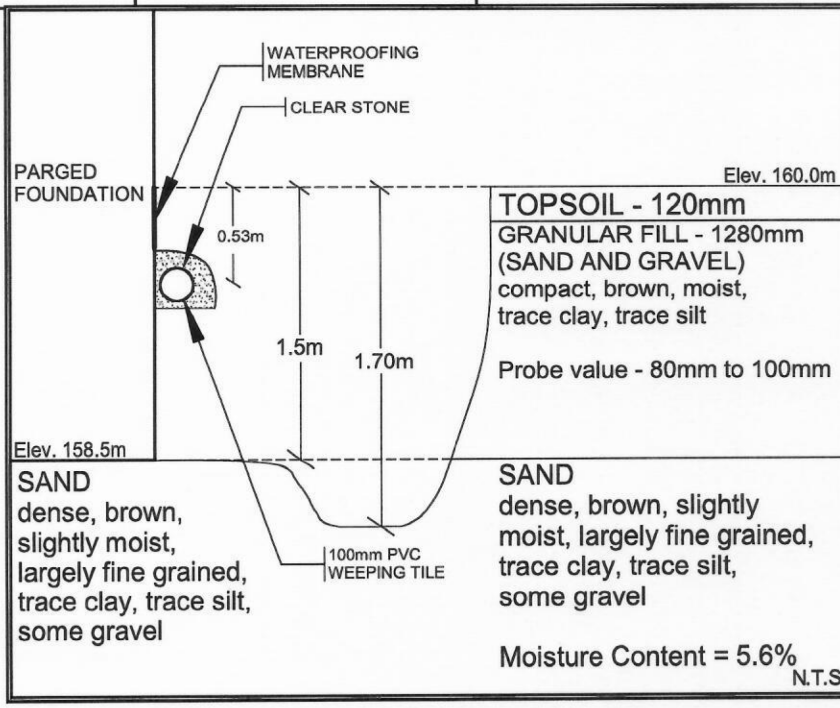
TEST PIT INSPECTION REPORT

Project Name: Addition to Existing Building 510 Taunton Road East Oshawa, Ontario	Project No: 40129 Test Pit No.: TP1
Report To: Michael Mantzoris Architect 79 Helendale Avenue Toronto, Ontario M4R 1C6 Attention: Mr. Michael Mantzoris	Site: Addition to Existing Building 510 Taunton Road East Oshawa, Ontario Date of Visit: May 13, 2020 Figure No.: 6

Subject: Test Pit TP1

Location: See Figure 1

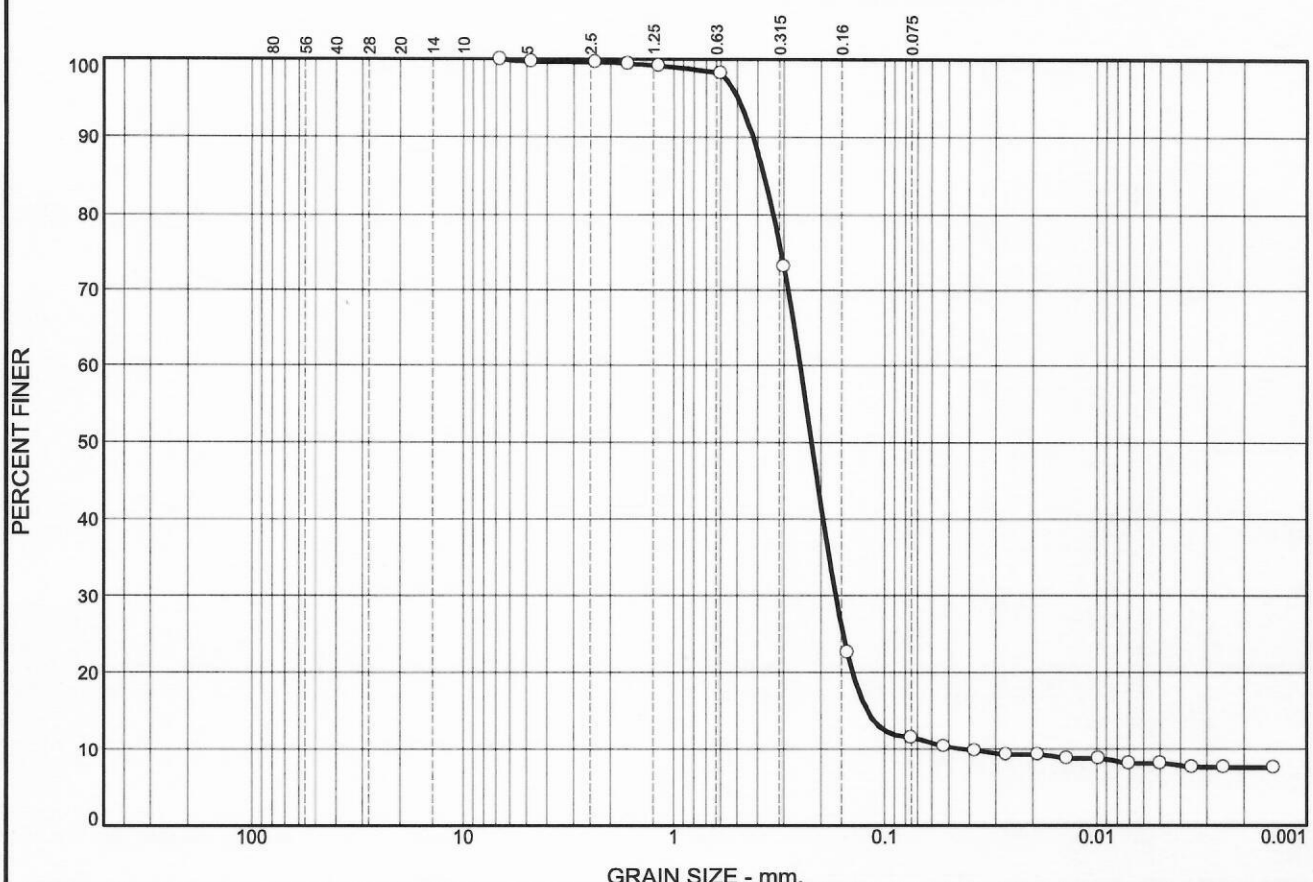


Comments:

1. On May 13, 2020, the test pit was initially machine excavated to the underside level of the existing foundation, which corresponds to 1.5m depth below existing grade, under our geotechnical supervision. The test pit was excavated 0.2m deeper during our inspection, which was also carried out on May 13, 2020, resulting to a total depth of 1.7m below existing grade, for verification of local uniformity and consistency of the soil conditions, with respect to depth.
2. Footing projection was not detected. The existing foundation wall was found to be parged. A stone facade was observed above the parged founation wall.
3. Test pit was found to be dry at the time of our inspection.
4. A 100mm diameter PVC weeping tile was detected adjacent to the side of the foundation wall at a depth of 0.53m below existing grade. The weeping tile was wrapped in clear stone.
5. Founding Soil at the underside of existing foundation consisted of: SAND - dense, brown, slightly moist, largely fine grained, trace clay, trace silt, some gravel.
6. Probe values at the underside of the existing footing = 5mm to 10mm.
7. Estimated in-situ soil bearing capacity at the underside of the existing foundation is 350 kPa at Serviceability Limit State.

Field Inspector: Milkias Woldegiorgis, P.Eng.

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.3	0.1	9.1	78.9	4.0	7.6

╳	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.3707	0.2510	0.2217	0.1701	0.1200	0.0423	2.73	5.94

Material Description	USCS	AASHTO
○ Sand, trace silt, trace clay, trace gravel		

Project No. 40129 **Client:** Michael Mantzoris Architect

Project: Addition to Existing Building, 510 Taunton Road East, Oshawa, Ontario

○ **Source of Sample:** BH2 SS3 **Depth:** 5' to 6.5' **Sample Number:** R4454

Remarks:
○Date of Sampling:
May 12, 2020

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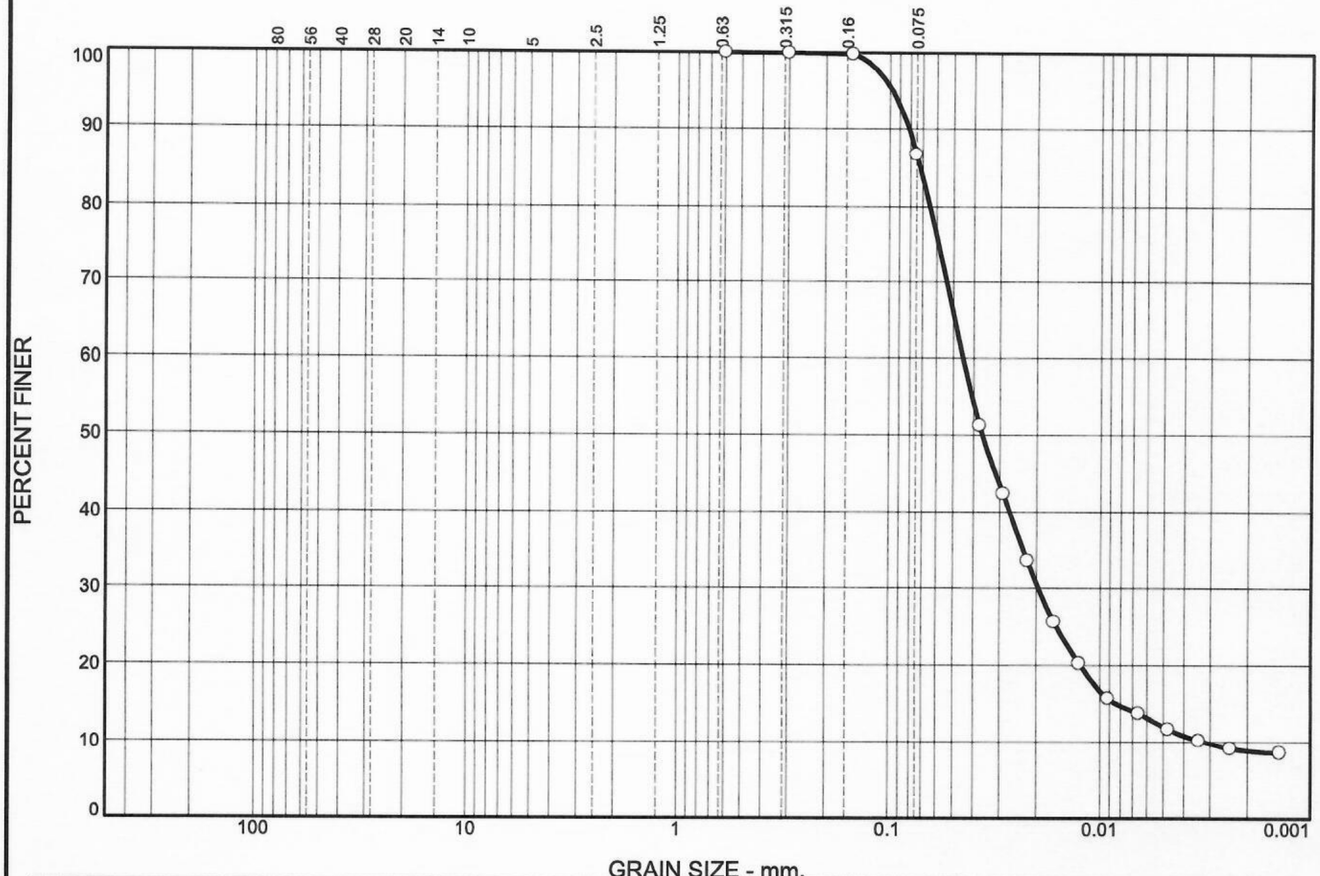
Figure 7

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.0	13.0	78.2	8.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0717	0.0450	0.0363	0.0195	0.0083	0.0033	2.61	13.80

Material Description	USCS	AASHTO
○ Silt, some sand, trace clay		

Project No. 40129 **Client:** Michael Mantzoris Architect
Project: Addition to Existing Building, 510 Taunton Road East, Oshawa, Ontario

○ **Source of Sample:** BH4 SS7 **Depth:** 20' to 21.5' **Sample Number:** R4455

Remarks:
○Date of Sampling:
May 12, 2020

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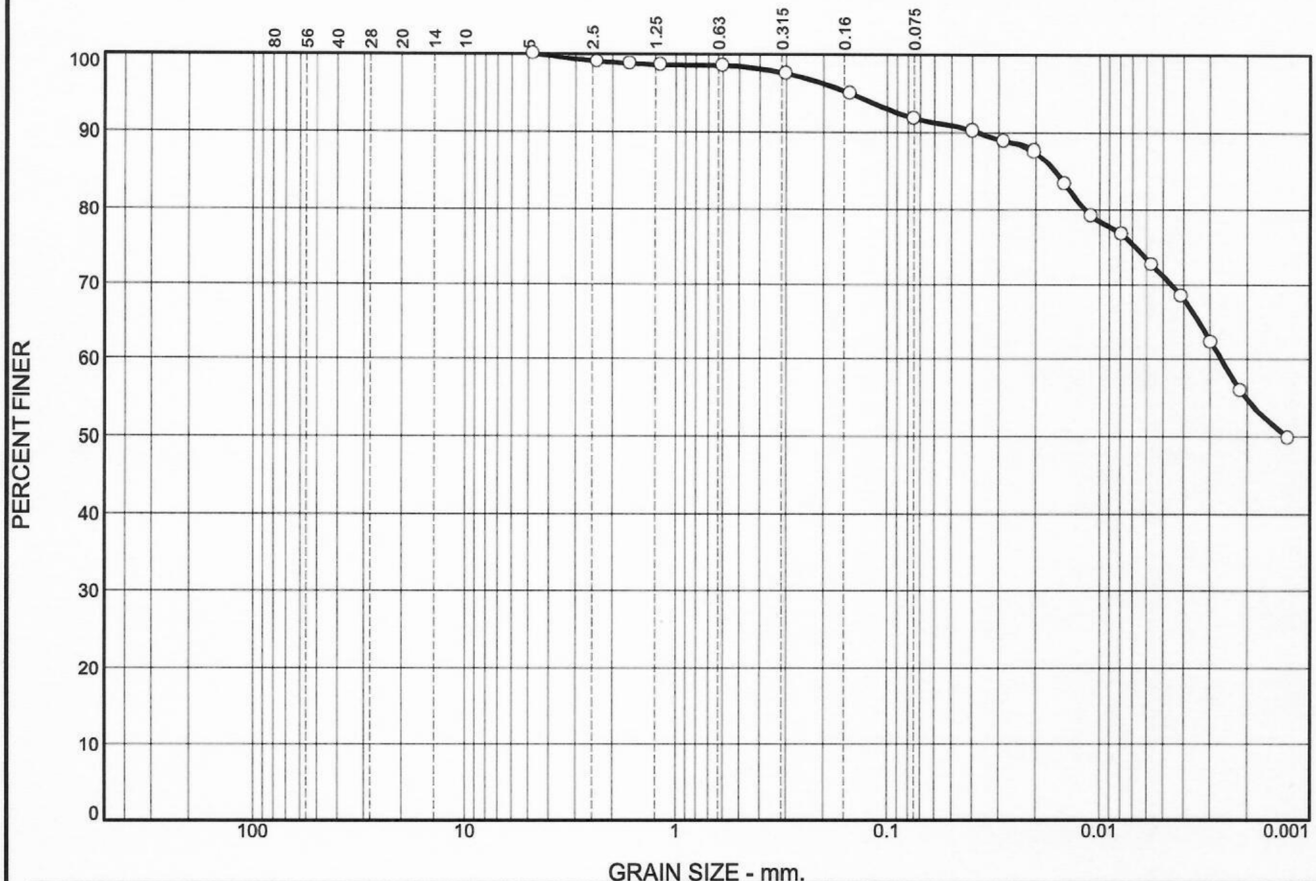
Figure 8

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	1.2	0.7	6.4	36.8	54.9

╳	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0161	0.0027	0.0013					

Material Description	USCS	AASHTO
○ Silt and clay, trace sand		

Project No. 40129 **Client:** Michael Mantzoris Architect

Project: Addition to Existing Building, 510 Taunton Road East, Oshawa, Ontario

○ **Source of Sample:** BH3 SS8 **Depth:** 25' to 26.5' **Sample Number:** R4456

Remarks:
○Date of Sampling:
May 12, 2020

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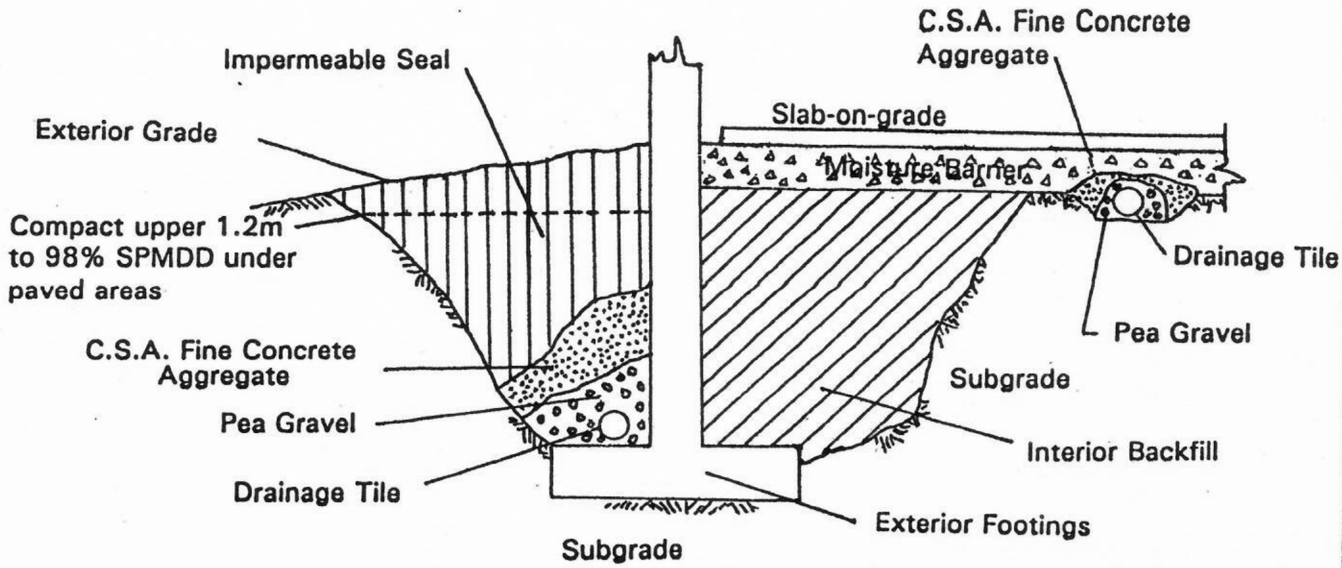
Figure 9



NOTES:

1. Drainage tile to consist of 10cm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be minimum of 15cm (6") below underside of floor slab.
2. Pea gravel 15cm (6") top and sides of drain. If drain is not on footing, place 10cm (4") of pea gravel below drain. 20mm (3/4") stone is an alternative, provided it is covered by an approved geotextile.
3. C.S.A. fine concrete aggregate to act as filter material. Minimum 30cm (12") top and side of tile drain. This may be replaced by an approved porous plastic membrane as indicated in 2.
4. Impermeable backfill seal-compacted clay, clay silt or equivalent. If original soil is free-draining, seal may be omitted.
5. The interior fill may be any clean, non organic soil which may be compacted to at least 98% Standard Proctor density in this confined space.
6. Do not use heavy compaction equipment within 0.5m (18") of the wall. Do not fill or compact within 1.8m (6') of wall unless the fill is placed on both sides simultaneously.
7. Moisture barrier to be at least 20cm (8") of compacted Granular "A" fill or equivalent free-draining material to be approved by our geotechnical staff.
8. The moisture barrier is to be compacted to 98% Standard Proctor maximum dry density.
9. Slab-on-grade should not be structurally connected to the wall or the footing.
10. Exterior grade to slope away from wall.
11. Underfloor drain invert to be at least 300mm (1') below the underside of floor slab. Tile placed in parallel rows 6-8m (20'- 25') centres one way.
12. Do not connect the underfloor drains to perimeter drains.
13. If the 20mm (3/4") stone requires surface blinding, use 6mm (1/4") stone chips.

DRAINAGE AND BACKFILL RECOMMENDATIONS

Not to Scale

	Name	Date
Drawn By		
Checked By		
Revisions		
Scale		

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Project : 40129	Figure: 10

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EXPLANATION OF THE FORM BORING LOG

PENETRATION RESISTANCE

Standard Penetration Resistance 'N'-The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3m , into subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The description of the soil is based on visual examination of the samples and laboratory tests. Each stratum is described according to the following classification and terminology:

Classification*	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	less than 0.002 mm	less than 0.002 mm
Silt	from 0.002 to 0.075 mm	from 0.002 mm to #200 sieve
Sand	from 0.075 to 4.75 mm	from #200 sieve to #4 sieve
Gravel	from 4.75 to 75 mm	from #4 sieve to 3 in.
Cobbles	from 75 to 200 mm	from 3 in. to 8 in.
Boulders	larger than 200 mm	over 8 in.

Terminology	Proportion
Trace, or occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

* Unified Soil Classification System (ASTM D2487-75).

The relative density of cohesionless soils and the consistency of cohesive soils are defined by the following:

Relative Density	Penetration Resistance "N" Blows 0.3 m or Blows foot
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

Consistency	Underdrained Shear Strength** kPa	psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000

** The compressive strength obtained from the quick (Q) triaxial test is equal to twice the shear strength of the clay.