



HADDAD GEOTECHNICAL INC.

Geotechnical & Environmental Engineers

**Geotechnical Investigation
Proposed Apartment Building
481 Yonge Street
Barrie, Ontario**

Prepared for:

481 Yonge Developments
145 Welham Road, Unit 10
Barrie, Ontario
L4N 8Y3

Project: 21-15954

April 12th, 2022



HADDAD GEOTECHNICAL INC.

Geotechnical & Environmental Engineers

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Project: 21-15954

481 Yonge Developments Inc.
145 Welham Road, Unit 10
Barrie, Ontario
L4N 8Y8

**Re: Geotechnical Investigation
Proposed Apartment Building
481 Yonge Street
Barrie, Ontario**

Dear Edward Lea,

Further to your authorization and our previous report #13-9408 dated, January 6, 2014, Haddad Geotechnical Inc. has conducted a supplementary investigation of subsurface conditions in the area of proposed apartment building to be constructed on the subject property. The results of this investigation, together with our recommendations and comments with regards to design and construction of foundations for the proposed new building, excavation and temporary shoring, permanent drainage, etc., are presented in the enclosed report.

We trust that the information presented in this report satisfies your present requirements. Should you require further information, please contact our office.

Yours very truly,
HADDAD GEOTECHNICAL INC.

Nelson Weese, Geotechnical Engineering Technologist.

Encs:

Dist:

481 Yonge Developments Inc.
Colliers International, Attn: Julia Erridge
File: 21-15954.481.Yonge.Street.GI.2022

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HADDAD GEOTECHNICAL INC.

Geotechnical & Environmental Engineers

**Geotechnical Investigation
Proposed Apartment Building
481 Yonge Street
Barrie, Ontario**

1. INTRODUCTION

1.1 Project

1. The architectural plans for the project, prepared by Naylor Architect Inc, indicate that the proposed development of the subject site will comprise the construction of a new four-story, multi-unit apartment building, with one level of underground parking at the property under consideration.
2. The plans for the proposed project indicate that the finished main floor for proposed apartment building is to be set at elevation 251.50±m, with the finished floor elevation for the proposed underground parking garage is to be set at elevation 248.45±m.
3. The property under consideration is currently vacant.

1.2 Purpose

The objectives of the subsurface investigation were to:

- provide subsurface information with regards to the types, thicknesses and variability of the subsoils underlying the area of the proposed building.
- establish groundwater conditions (if any).
- provide information for the design and construction of foundations, excavation, temporary shoring, earthworks, permanent drainage provisions, floor construction, etc. for the proposed apartment building.

1.3 Site Description

1. The site under consideration is located on the southeast corner of Yonge Street and Macmillian Crescent in the City of Barrie.
2. At the time of our investigation the site under consideration is vacant land with no structure present on site. A few old growth trees were observed on the property.
3. The topography of the subject site was observed to slope down considerably from Yonge Street, and then continues to slope northeast along Macmillian Crescent for the entire site.



2. FIELD AND LABORATORY WORK

2.1 Fieldwork

1. The fieldwork, carried out on March 14th and 15th, 2022, consisted of the drilling of eight (8) boreholes, and installation of five (5) monitoring wells at the approximate locations as shown on Drawing No. 1.
2. Borehole Nos. 101 to 105 were advanced to 5.0±m below existing grades, and Borehole Nos. 106 to 108 were advanced to 2.8±m below existing grades using track mounted power drilling equipment with 100mm diameter, continuous flight augers. Samples were obtained with a split spoon sampler, driven by a 140-lb hammer, falling 30" (760mm).
3. Detailed descriptions of the subsoils encountered in the sampled Boreholes are presented on the borehole logs, Drawing Nos. 2 to 9.
4. The surface elevations at the Borehole locations are referenced to the northwest corner of the property, having an elevation of 251.55±m, as per the site survey provided by Naylor Architect Inc.

2.2 Subsurface Conditions

2.2.1 Surficial Materials and Fill

1. The surficial materials at Borehole Nos. 101 to 108 were observed to consist of 50±mm to 200±mm of grass and topsoils.
2. Fill materials consisting of loose sandy silt with trace clay and occasional organics and roots in moist condition, and brown to dark brown in colour, were observed below the surficial materials at borehole locations 101 to 104, and 108, and extended to 1.53±m below grades at borehole locations 101 to 104, and 0.7±m below grade at Borehole No. 108.
3. Fill materials consisting of loose, clayey silt with occasional gravels, organics, and roots in moist condition, and brown in colour, were observed below the surficial materials at borehole locations 105 to 107 and extended to 1.53±m below grade at Borehole No. 105, and 0.7±m below grades at Borehole Nos. 105 and 106.

2.2.2 Natural Subsoils

1. Natural, loose to very dense, silty sand subsoils with trace to some clay and trace gravels in moist condition were observed to underlie the fill materials at borehole locations 101 to 105 and extended to the fully explored depths of 5.0±m below grades. The results of Standard Penetration Tests (SPT) in the silty sand subsoils indicated penetration resistance of 8 blows per 300mm, to over 50 blows per 100mm.
2. Natural, loose to very dense, silt and sand subsoils with trace clay and gravels in moist condition were observed to underlie the fill materials at borehole locations 106 to 108 and extended to the fully explored depths of 2.8±m below grades. The results of Standard Penetration Tests (SPT) in the silt and sand subsoils indicated penetration resistance of 5 to 27 blows per 300mm.

**2. FIELD AND LABORATORY WORK** (cont'd)**2.3 Groundwater** (cont'd)

- Monitoring Well Nos. 1 to 5, MW - 1 to MW - 5, were installed in Borehole Nos. 101 to 105, as shown on the provided Site Plan, Drawing No. 1.
- Table No. 1 below, presents the elevations of groundwater levels at the monitoring wells, upon borehole completion of drilling operations and four and seventeen days after drilling completion.

**Table No. 1
Elevations of Groundwater at Monitoring Well Location
Reading on March 18th & March 31st, 2022**

Monitoring Well (BH) No.	Existing Grade Elevation, ±m	Reading on March 18, 2022		Reading on March 31, 2022		Soils
		Depth, ±m	Groundwater Elevation at or below, ±m	Depth, ±m	Groundwater Elevation at or below, ±m	
MW1	248.7	1.28	247.42	1.85	246.85	Silty Sand
MW2	249.03	0.89	248.14	0.88	248.15	Fill
MW3	249.39	1.35	248.04	2.00	247.39	Silty Sand
MW4	248.47	2.07	246.40	2.56	245.91	Silty Sand
MW5	247.95	2.03	245.92	2.43	245.52	Silty Sand

- It is to be noted that additional information of water tables will be presented in Hydrogeological Assessment Report of the property, currently in progress by Haddad Geotechnical Inc.

2.4 Laboratory Work

- The laboratory analysis of borehole samples included the determination of moisture contents and gradation analyses.
- The results of moisture content are presented on the Borehole Logs and the results of gradation analyses carried out on four representative samples of the native subsoils encountered in Borehole Nos. 101, 104, 106 and 108, are presented on Drawing No. 10.
- The results of the gradation analyses carried out on the upper natural subsoils sample obtained from Borehole No. 101 indicated 7% gravel, 46% sand, 31% silt, and 16% clay.
- The results of the gradation analyses carried out on the upper natural subsoils sample obtained from Borehole No. 104 indicated 1% gravel, 46% sand, 34% silt, and 9% clay.
- The results of the gradation analyses carried out on the upper natural subsoils sample obtained from Borehole No. 106 indicated 3% gravel, 51% sand, 39% silt, and 7% clay.
- The results of the gradation analyses carried out on the upper natural subsoils sample obtained from Borehole No. 108 indicated 2% gravel, 45% sand, 53% silt and finer.



3. DISCUSSION AND RECOMMENDATIONS

3.1 Geotechnical Design Considerations

1. The architectural drawings, prepared by Naylor Architects Inc, indicate the main floor for the proposed apartment building to be set at elevation 251.50±m, and the finished floor of the underground parking is to be set at elevation 248.45±m.
2. With the assumption of founding level for conventional spread, at a minimum depth of 0.5±m below the floor level, this will situate the underside of proposed footings of the underground parking at elevation of 247.95±m, or lower in order to accommodate for thickness of slab-on-grade and underlying granular basecourses.
3. It should be noted that the proposed founding level of 247.95±m is located above the existing grade for a portion of the site, borehole locations 105 to 108. Excavations for the proposed foundations in these areas must be extended a minimum of 1.2±m below existing grade for purposes of frost protection.
4. The organic stained fill materials encountered at each borehole location, ranging from depths of 0.7±m to 1.5±m below the existing grades on site are not suitable for the support of any permanent structures.
5. The above-noted founding levels of basement i.e. 247.95±m, will place the conventional spread foundations of the proposed apartment building within the observed loose, sandy silt fill materials encountered in Borehole Nos. 101 to 104, which will not provide satisfactory conditions for the support of conventional spread foundations.
6. Excavations for the foundations of the proposed apartment building at the subject site must be extended to the natural, silty sand and/or silt and sand subsoils encountered at depth ranging from 1.8±m to 2.3±m below grades, (elevations ranging from 243.6±m to 247.6±m) within the explored depths at Borehole Nos. 101 to 106.
7. The water table was observed within Borehole Nos. 101 to 105, at 0.8±m to 2.6±m below the existing grade, at an elevation of 248.15±m to 245.952±m. The observed water table is above the underside of the proposed spread foundations. It should be noted that the boreholes were conducted in March 2022, at normally a wet time of year.
8. Due to the height of the proposed apartment building with one of underground parking, the existing grade changes on site, and the observed high-water tables, it is our opinion that a deep foundation such as helical piers supported by grade beams may be considered for support for the proposed apartment building to transfer the required load down to competent subsoils.

3.2 Foundations

3.2.1 Helical Pile Foundations

1. The helical pile system supported with grade beams may be considered by project structural engineer for the support of the proposed building. Design of the helical pile foundation system with concrete grade beams is to be conducted by a project structural engineer with the consideration of following comments.



3. DISCUSSION AND RECOMMENDATIONS (cont'd)

3.2 Foundations (cont'd)

3.2.1 Helical Pile Foundations (cont'd)

2. It has been our experience that helical piers established in earth conditions similar to the medium dense to very dense silty sand / silt and sand subsoils encountered in Borehole Nos. 101 to 106, at elevations ranging from 243.1±m to 246.0±m on the subject site, and installed by relatively light, portable equipment, may provide resistance (SLS) of up to 80kN (20kips) in compression (i.e., with end-bearing component). In order to achieve the above load capacity, it will be necessary to advance the lead section, with the helices at least 1.5±m into the lower, natural, very dense, strata encountered at Borehole Nos. 101 to 108.
3. It is recommended that the helical piers be installed with grouted concrete shafts, in order to provide increased stiffness and ability to resist lateral movements.
4. Design of the helical piers is to be conducted by a structural engineer and/or specialist firm. It is essential that the specialist contractors performing the installation operations for helical piers is fully aware of the subsurface conditions and must make every effort to use appropriate technique and equipment in order to accomplish this task.
5. It is recommended that the final plans of the proposed foundation system should be reviewed with the consideration of this report by a qualified professional engineer before installation, to ensure that the helical piers are advanced to competent subsoils.
6. It is strongly recommended that an engineer from our office should be on site to witness the installation of the helical piers to safely support the design loadings and to confirm adequate founding.

3.2.2 Protection against Frost Action

1. Footings and/or grade beams for portions of the structure in exterior and unheated interior areas must be protected against frost action by at least 1.2±m earth cover.
2. During cold weather, the freshly placed concrete must be covered with insulating blankets to protect against freezing, as per OPSS 904. Ice and snow are to be removed from the base of the excavation in the area where concrete is to be placed and the concrete must not be placed on frozen soil.

3.2.4 Earthquake Design Factors

1. For purpose of design of the proposed structure for earthquake loads and effects as per Table 4.1.8.4A, in the Ontario Building Code (2012), Site Class "D" conditions may be assumed for the foundations established on the natural, medium dense to very dense, silty sand and/or silt and sand silt subsoils at the anticipated elevations as described in Section 3.2.1, above.
2. The remaining parameters should be selected as per the Ontario Building Code.



3. DISCUSSION AND RECOMMENDATIONS (cont'd)

3.3 Excavation and Earthworks

3.3.1 General Excavation

1. In general, due to the observed water table elevation above the lowest level in MW 1 - 5, the excavation may require positive de-watering measures for at least the construction phase. Dewatering recommendations are to be provided in full Hydrogeological Investigation of the property currently in progress by Haddad Geotechnical Inc.
2. Excavations must be conducted in conformance with regulation 213/91 (construction projects) under the Ontario Construction Health and Safety Act.
3. The upper fill materials may be classified as Type 3 soils. The natural, medium dense, silty sand and/or silt and sand subsoils observed in Borehole Nos. 101 to 108 may be classified as Type 2 soils, as per the Ontario Occupational Health and Safety Act.
4. Within the confines of the project area, the sides of excavations in the upper fill materials and natural subsoils may be safely cut to 1V : 1H while above the observed water table. Below the water table, the side of the excavation may be safely cut to 1V : 2H.
5. Where the above-noted safe cut side of excavation cannot be accomplished within the limits of the subject property, the installation of temporary shoring will be required.
6. Prior to commencement of construction, a sedimentation control fence must be installed on the perimeter of the construction area, to minimize the effects of surface erosion on the surrounding area. A typical detail of a sedimentation control fence is shown on Drawing No. 11.
7. Where the general excavation will produce soil which are not re-used as fill or backfill within the limits of the subject property, these soils are determined to be "excess soil". Ontario Regulation 406/19 requires that an Excess Soils Characterization (ESC) report be prepared by a qualified person (QP_{ESA}), as defined by Regulation. The ESC report is to be prepared to determine options for off-site disposal of soils to be excavated and removed from the site. The report will require an environmental assessment to identify potential environmental issues which may impact soils to be excavated. Additional sampling and chemical analysis of soils on the site will be required for the above report, in conformance with Regulation 406/19. An additional report calls an Excess Soils Destination Assessment (ESDA) report, also prepared by qualified person, will also be required by Regulation 406/19, once receiving site for excess soil has been selected and prior to commencement of general excavation and removal of the soils from the subject site. The ESDA report s to be based on the finding of the ESC report.

3.3.2 Earthworks

1. Prior to filling and/or backfilling, the exposed subgrade should be thoroughly cleaned to remove all loose, disturbed, or organic materials.
2. Any regrading carried out up to the underside of basecourses below slab-on-grade or exterior pavement should be carried out using only approved, free draining materials, placed in shallow lifts not exceeding 150mm and compacted to at least 98% Standard Proctor maximum dry density.



3. DISCUSSION AND RECOMMENDATIONS (cont'd)

3.3.2 Earthworks (cont'd)

3. The upper fill materials are not suitable for backfill below slab-on-grade or exterior pavement due to the presence of roots and organic content but may be reused below soft-landscaped areas. The natural silty sand / silt and sand subsoils excavated from the area of the proposed new building may be re-used as backfill, up to the underside of basecourses below slab-on-grade and/or exterior pavement, provided that the materials are below optimum moisture content. Alternatively, imported materials conforming to OPSS Select Subgrade designation may also be used.
4. Prior to materials being imported to the site for backfilling purposes, originating from a source site other than a rock quarry or licensed sand and gravel pit, an Excess Soil Characterization report, prepared in conformance Ontario Regulation 153/04 must be provided by the source site for our review and approval, to certify that the incoming materials conform with the criteria of Ontario Regulation 153/04 Table 3 Generic Site Condition Standards for site in residential use, as is applicable to the subject property
5. Backfilling and compaction operations should be inspected by an engineer or technologist from our office, with in-situ density tests carried out to verify that a satisfactory degree of compaction is achieved.

3.4 Design of Underground Perimeter Walls and Retaining Walls

1. Underground walls must be adequately water-proofed and designed to resist an earth pressure, p , in kPa, at any depth, h , in metres, below grade, as given by the following expression:

$$p = k (\gamma h + q)$$

- where: k = 0.3, the coefficient of lateral earth pressure
 γ = 21kN/m³, the unit weight of the drained granular backfill materials to be retained by perimeter walls at other locations
 q = in kPa, the equivalent uniform vertical pressure of any surcharge acting near the wall.

2. The above parameters assume that the retained soil (i.e. wall backfill materials) can be drained effectively to eliminate hydrostatic pressure on the wall as described in Section 3.5, below.

3.5 Subsurface Drainage Provisions

1. Underground walls and the lowest slab must be positively water-proofed to avoid the ingress of water into the underground levels due to hydrostatic pressure on the walls. In addition, underfloor drains may be installed to prevent the build-up of hydrostatic pressure on the slab-on-grade.
2. Where the perimeter walls are adjacent to open cut areas and are to support backfill, the waterproofing, drainage and backfill requirements are presented on Drawing No. 12. It is recommended that cleanouts are placed at strategic locations to allow for periodic cleaning and washing of the weeping tile of the perimeter drainage to inhibit the clogging of the interior of the pipes.



3. DISCUSSION AND RECOMMENDATIONS (cont'd)

3.5 Subsurface Drainage Provisions (cont'd)

- 3 As the free groundwater level in boreholes conducted at the site is approximately at or above the proposed lowest floor level, it is anticipated that the foundation drains will intercept groundwater. Foundation drainage consisting of perimeter weeping tile, led to a positive outlet in a sump pit, will be required to intercept the anticipated groundwater.
- 4 Alternatively, discharge from foundation drains and sump pit to a subsurface infiltration facility may be considered. The subsurface infiltration facility, located at minimum 5m from the foundation wall of the building, as per Ontario Building Code (2016) section 9.14.5.3, and with base of facility at least 1.0m above the seasonal high groundwater level, as per requirement of Ministry of the Environment, Conservation and Parks (MECP).
- 5 The exterior grades should also be sloped away from the proposed building in order to minimize ponding of surface stormwater adjacent to the proposed building.

3.6 Floor Construction

1. Slab-on-grade type of floor construction may be considered for the lowest level of the proposed structure.
2. The exposed subgrade should be thoroughly cleaned to remove all loose, organic, and disturbed materials prior to filling. It is recommended that the placement of a non-woven geotextile be placed over the exposed subgrade to inhibit the migration of the lower, finer materials into the granular basecourses and subsurface drainage.
3. Any regrading carried out up to the underside of basecourses below slab-on-grade should be carried out using only approved, free draining materials, placed in shallow lifts not exceeding 150mm and compacted to at least 98% Standard Proctor maximum dry density.
4. Regrading operations should be inspected by an engineer or technologist from our office, with in-situ density tests carried out to verify that a satisfactory degree of compaction is achieved.
5. Following the successful completion of regrading operations as described in Section 3.3.3, above, the slab-on-grade may be constructed over a minimum thickness varying from 200mm (8") well-compacted Granular "A" or 300mm (12") of 19mm (³/₄") crushed stone or compacted (vibrated) clear stone.
6. The slab-on-grade should be constructed independently of any structural members (i.e. walls, columns, etc.) by means of fibre board or an equivalent isolation compound. Saw cuts should be provided along column lines, with "diamond" cuts around columns, to minimize uncontrolled cracking of floor slab.



4. REPORT LIMITATIONS

1. The information provided, and recommendations made in this report, in terms of the thickness, depth and type of subsoils encountered, groundwater levels, etc., are only applicable to the actual locations explored. Subsurface and groundwater conditions between and beyond the borehole locations may differ from those encountered at the borehole locations, and such conditions may become apparent during construction, which could not be detected or anticipated at the time of writing of this report. Should additional information become apparent upon excavation or construction, or further investigation, our office should be contacted so that the situation may be reassessed, and alternate recommendations made, if deemed necessary. It is recommended practice that the Geotechnical Engineer be retained during the construction to confirm that the subsurface conditions across the site do not deviate materially from those encountered in the boreholes.
2. The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, it is our recommendation that Haddad Geotechnical Inc. be retained during the final design stage to verify that the design is consistent with our recommendations, and that the assumptions made in our analysis are valid.
3. The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. The report has been prepared in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.
4. The information provided, and recommendations presented in this report reflect the best judgment of Haddad Geotechnical Inc. in light of the information available to it at the time of preparation. Any use which a third party makes of this report or any reliance on or decisions to be based on it are the responsibility of that third party. Haddad Geotechnical Inc. accepts no responsibility for damages, if any suffered by any third party as a result of decisions made or actions based on this report.



We trust that the information presented in this report satisfies your present requirements. Should you require further information, please contact our office.

Yours very truly,
HADDAD GEOTECHNICAL INC.

Nelson Weese, Geotechnical Engineering Technologist.

Damoon Kasemi, M.Sc., P.Eng.

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Engineering Data Sheet For Borehole No. 101 and Monitoring Well No. 1

Project No. 22-15954
Drawing No. 2

Project: Proposed Development		Field Supervision: RV/BZ
Location: 481 Yonge Street, Barrie		
Hole Location: see Drawing No. 1		
Hole Elevation & Datum: , see Note 1		
Start Date: Mar 14, 2022	End Date: Mar 14, 2022	

LEGEND		
51 mm dia Split Spoon Sample		Water Level
Auger Sample		Pocket Penetrometer
N - Standard Penetration Value		Gradation Analysis Completed
M		

Description	Elev. ±m	Depth ±m	Strength and Penetration Resistance (KPa)					Sample No.	N	Moisture Content %	
			0	50	100	150	200				250
GROUND SURFACE											
TOPSOIL - 200±mm FILL - loose, sandy silt with trace clay, organics, brown moist	248.70	0.0	0	20	40	60	80	100	SS0	11	17.3
SILTY SAND - with trace to some clay and trace gravels, oxidization seams, brown moist turns grey, becomes very moist at 2.3m occ. rocks becomes wet at 4.6	247.2	1.0							SS1	6	14.7
	246.85 (03/31/22)	2.0							SS2	9	12.0
		3.0							SS3	20	11.2
		4.0							SS4	16	8.8
		5.0							SS5	43	11.2
END OF BOREHOLE	243.7	5.0									
NOTES: 1. Elevation datum, Northwest corner of the property El. 251.222m, as per site survey provided by client 2. Borehole open to 5.0±m depth and wet upon completion. 3. Monitoring well MW1 installed March 14, 2022. Flush mount at grade. 0.0 - 1.6m riser 1.6 - 4.6m screen 0.0 - 1.1m bentonite backfill 1.1 - 4.6m sand backfill 4. Water level (depth, (elevations)), m March 18, 2022 1.28 (247.42) March 31, 2022 1.85 (246.85)											



HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 102 and Monitoring Well No. 2

Project No. 22-15954
Drawing No. 3

Project: Proposed Development
 Location: 481 Yonge Street, Barrie
 Hole Location: see Drawing No. 1
 Hole Elevation & Datum: , see Note 1
 Start Date: Mar 14, 2022 End Date: Mar 14, 2022
 Field Supervision: RV/BZ

LEGEND
 51 mm dia Split Spoon Sample Water Level
 Auger Sample
 N - Standard Penetration Value Pocket Penetrometer
 Gradation Analysis Completed M

Description	Elev. ±m	Depth ±m	Strength and Penetration Resistance (KPa)					Sample No.	N	Moisture Content %	
			0	50	100	150	200				250
GROUND SURFACE											
TOPSOIL - 150±mm FILL - loose, sandy silt with trace clay, organics, brown moist	249.03	0.0	0	20	40	60	80	100			
	-248.15 (03/31/22)	1.0									
SILTY SAND - with trace to some clay and trace gravels, oxidization seams, grey	247.5	2.0									
becomes very moist at 2.3m		3.0									
becomes wet below 4.6±m		4.0									
		5.0									
END OF BOREHOLE	244.0	6.0									
		7.0									
		8.0									
		9.0									
		10.0									
		11.0									
		12.0									
		13.0									
		14.0									
		15.0									

- NOTES:
- Elevation datum, Northwest corner of the property El. 251.222m, as per site survey provided by client
 - Borehole open to 5.0±m depth and wet upon completion.
 - Monitoring well MW2 installed March 14, 2022. Flush mount at grade.
 - 0.0 - 1.6m riser
 - 1.6 - 4.6m screen
 - 0.0 - 1.1m bentonite backfill
 - 1.1 - 4.6m sand backfill
 - Water level (depth, (elevations)), m
 - March 18, 2022 0.89 (248.14)
 - March 31, 2022 0.88 (248.15)



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Engineering Data Sheet For Borehole No. 103 and Monitoring Well No. 3

Project No. 22-15954
Drawing No. 4

Project: Proposed Development		Field Supervision: RV/BZ		LEGEND			
Location: 481 Yonge Street, Barrie				51 mm dia Split Spoon Sample		Water Level	
Hole Location: see Drawing No. 1		Auger Sample				Pocket Penetrometer	
Hole Elevation & Datum: , see Note 1		Gradation Analysis Completed		M			
Start Date: Mar 15, 2022	End Date: Mar 15, 2022						

Description	Elev. ±m	Depth ±m	Strength and Penetration Resistance (KPa)					Sample No.	N	Moisture Content %		
			0	50	100	150	200				250	
GROUND SURFACE												
TOPSOIL - 50±mm FILL - loose, sandy silt with trace clay, occ. gravel, organics, brown, moist	249.39	0.0	0	20	40	60	80	100				
			1.0								SS0	6
SILTY SAND - with some clay and trace gravels, oxidization seams, grey moist	247.9											
	-247.39 (03/31/22)	2.0								SS1	5	21.7
		3.0								SS2	17	33.4
		4.0								SS3	23	13.0
		5.0								SS4	27	8.9
END OF BOREHOLE NOTES: 1. Elevation datum, Northwest corner of the property El. 251.222m, as per site survey provided by client 2. Borehole open to 5.0±m depth and wet upon completion. 3. Monitoring well MW3 installed March 15, 2022. Flush mount at grade. 0.0 - 1.6m riser 1.6 - 4.6m screen 0.0 - 1.1m bentonite backfill 1.1 - 4.6m sand backfill 4. Water level (depth, (elevations)), m March 18, 2022 1.35 (248.04) March 31, 2022 2.00 (247.39)	244.3	5.0								SS5	27	8.7
		6.0										
		7.0										
		8.0										
		9.0										
		10.0										
		11.0										
		12.0										
		13.0										
		14.0										
		15.0										



HADDAD GEOTECHNICAL INC.

Engineering Data Sheet For Borehole No. 106

Project No. 22-15954
Drawing No. 7

Project: Proposed Development	
Location: 481 Yonge Street, Barrie	
Hole Location: see Drawing No. 1	
Hole Elevation & Datum: , see Note 1	
Start Date: Mar 15, 2022	End Date: Mar 15, 2022
Field Supervision: RV/BZ	

LEGEND	
51 mm dia Split Spoon Sample	Water Level
Auger Sample	Pocket Penetrometer
N - Standard Penetration Value	
Gradation Analysis Completed	M

Description	Elev. ±m	Depth ±m	Strength and Penetration Resistance (KPa)					Sample No.	N	Moisture Content %	
			0	50	100	150	200				250
GROUND SURFACE			N Blows/300mm								
TOPSOIL - 200±mm FILL - loose, clayey silt, occ. gravel, organics, brown, moist	245.92	0.0	0	20	40	60	80	100	SS0	4	20.5
SILT and SAND - with trace clay and trace gravels, oxidization seams, grey moist	245.2	1.0							SS1	6	13.8
		2.0							SS2	11	10.4
END OF BOREHOLE	243.1	3.0							M SS3	27	8.1
NOTES: 1. Elevation datum, Northwest corner of the property El. 251.222m, as per site survey provided by client 2. Borehole open to 2.8±m depth and wet upon completion.		4.0									
		5.0									
		6.0									
		7.0									
		8.0									
		9.0									
		10.0									
		11.0									
		12.0									
		13.0									
		14.0									
		15.0									



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Engineering Data Sheet For Borehole No. 108

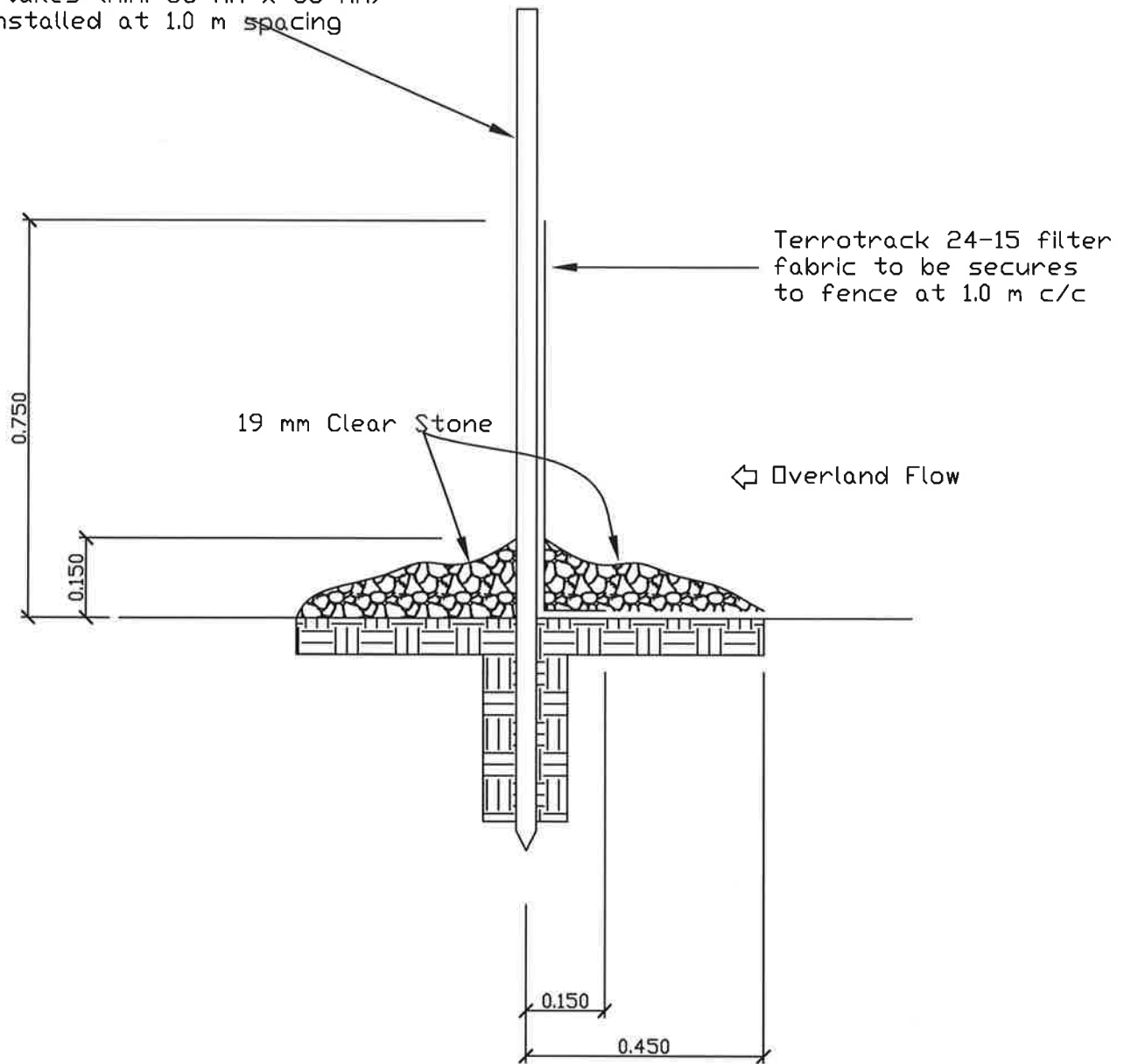
Project No. 22-15954
Drawing No. 9

Project: Proposed Development		LEGEND	
Location: 481 Yonge Street, Barrie		51 mm dia Split Spoon Sample	Water Level
Hole Location: see Drawing No. 1		Auger Sample	
Hole Elevation & Datum: , see Note 1		N - Standard Penetration Value	Pocket Penetrometer
Start Date: Mar 15, 2022	End Date: Mar 15, 2022	Gradation Analysis Completed	M
		Field Supervisor: RV/BZ	

Description	Elev. ±m	Depth ±m	Strength and Penetration Resistance (KPa)					Sample No.	N	Moisture Content %
			0	50	100	150	200			
GROUND SURFACE			N Blows/300mm							
TOPSOIL - 200±mm FILL - loose, silty sand with trace clay, occ. gravel, organics, brown, moist	247.85	0.0	0	20	40	60	80	100		
SILT and SAND - with trace clay and trace gravels, roots, brown, moist	247.1	1.0								
		2.0								
		3.0								
END OF BOREHOLE	245.1	3.0								
		4.0								
		5.0								
		6.0								
		7.0								
		8.0								
		9.0								
		10.0								
		11.0								
		12.0								
		13.0								
		14.0								
		15.0								

- NOTES:
- Elevation datum, Northwest corner of the property El. 251.222m, as per site survey provided by client
 - Borehole open to 2.8±m depth and wet upon completion.

Stakes (min. 38 mm x 38 mm)
installed at 1.0 m spacing



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151 Amber Street, Unit 17
Markham, Ontario, Canada, L3R 3B3

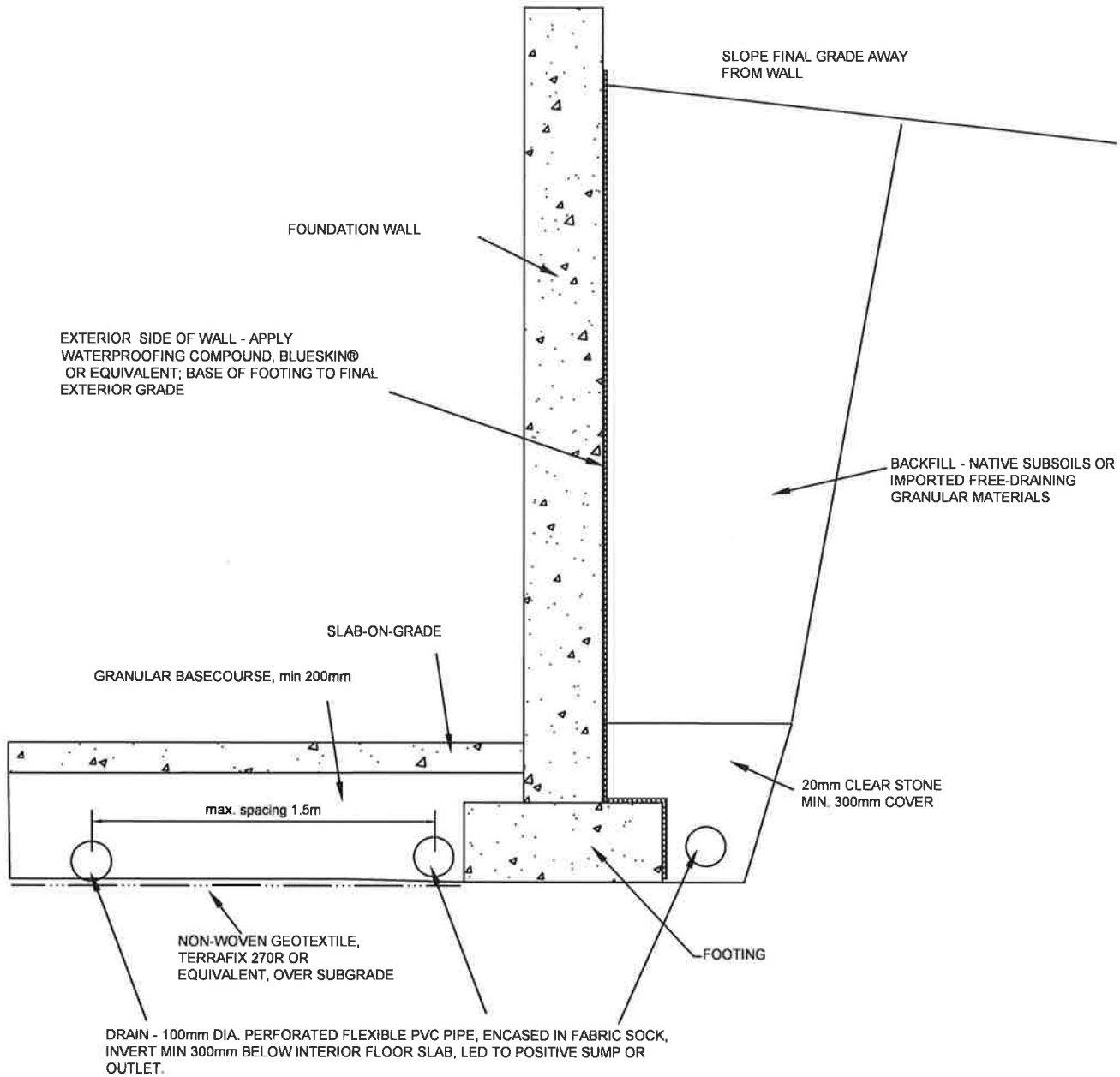
905-475-0951, fax: 905-475-8338
info@haddadgeo.com

481 YONGE STREET, BARRIE

**SCHEMATIC SECTION SHOWING
SEDIMENTATION CONTROL FENCE**

SCALE: AS NOTED
DRAWN BY: NW

PROJECT: 21-15954
DRAWING No. 11
DATE: APRIL 7, 2022




HADDAD GEOTECHNICAL INC.
 151 Amber Street, Unit 17
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 fax 905-475-8338 info@haddadgeo.com

481 YONGE STREET, BARRIE

**TYPICAL SECTION SHOWING PERIMETER
& SUB-FLOOR DRAINAGE PROVISIONS**

SCALE AS NOTED
DRAWN BY: NW

PROJECT: 21-15954
DRAWING No. 12
DATE: APRIL 8, 2022