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GEOTECHNICAL INVESTIGATION

PROPOSED NEW DEVELOPMENT,

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Prepared for:
440 Essa Developments Inc. JV

Project No. FE-P 20-10636GEO

June 8, 2021

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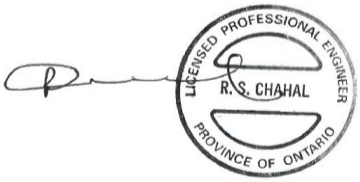

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1. INTRODUCTION

Fisher Engineering Ltd (Fisher) was commissioned by 440 Essa Developments Inc. JV to carry out a Geotechnical Investigation at the properties municipally addressed as 440 Essa Road, Barrie, Ontario, hereinafter referred to as the 'Site'.

The purpose of the investigation was to provide a geotechnical report in regard to the subsurface soil and groundwater conditions and to outline geotechnical parameters and recommendations for the design of the proposed new development.

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

2. SITE AND PROJECT DESCRIPTIONS

Site Settings

The site is located at the east side of Essa Road, approximately 1.34km south of highway 400. The property is bounded by Essa Road to the west/northwest, beyond which are residential dwellings; under construction property 430 Essa Road to the northeast, beyond which is Veterans Drive and, residential houses to the south/south-east, beyond which is Harvie Road. The property has an approximate area of 5,011m^2 and is roughly rectangular in shape.

At the time of the investigation the site was occupied by a single-story commercial building and gas pump canopy structure in the middle portion along with asphalt paved driveways/parking areas.

Topography

The site is generally flat and is graded for drainage towards catch basins. Elevation changes from approximately 313.18 m asl at BH3 in the southeast corner to 312.96 m asl at BH6 in the northwest corner.

Proposed Development

Architectural Site plans/drawings, prepared by JCI dated August 22, 2019, were provided to Fisher at the time of site investigation. Based on the drawings, the proposed development will comprise of an 8- story

mixed use building with two-levels of underground parking. The building is located in the central to east potion of the site with a footprint of approximately 3370m^2 and has an approximately same underground parking area. The proposed building has a ground floor elevation set at 313.11m and the lowest garage floor slab (P2 level) at 307.41m.

3. FIELD AND LABORATARY WORK

Drilling works

Subsurface exploration for the Hydrogeological Investigation was conducted concurrent with drilling for the Hydrogeological Investigation on February 10 & May 17, 18, 2021 and consisted of the drilling of six (6) boreholes to depths varying from 12.50m to 15.54m below prevailing grades. All boreholes were instrumented as groundwater monitoring wells (MW1 to MW6) upon completion with screen bottom at depths ranging from 6.10m to 15.24m bgs. The wells were installed with 50mm PVC slotted pipes and a clean silica sand pack placed around the well screens and isolated with bentonite to depths below existing grade as shown in the borehole logs/details in Appendix B.

The boreholes were advanced using solid and hollow stem augers. Drilling and well installation were carried out by Terra Firma Services under direct supervision of Fisher Engineering personnel.

Laboratory Analyses

Thirteen **(**13) representative soil samples, from BH2, BH4 and BH6 were selected and submitted to Fisher Environmental laboratory for moisture content and grain size analyses. The laboratory results, which are presented in Appendix C, are consistent with the field descriptions for subsurface soils discussed in Section 4.0.

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

Site Survey

Elevations at borehole/monitoring well locations were surveyed by Fisher personnel and referenced to a local benchmark (TBM) 'Top of a Double CB', which is located on the west edge of Essa Road, approximately **5**m northeast from the property NE corner. The reference local benchmark has a**n**

elevation of 312.75m as shown on the Site Plan of 430 Essa Road property, which is currently under development**.** The plan dated in July, 2018 was prepared by Paul Marques- Architect Inc.

4. SUBSOIL CONDITIONS

- **ASPHALT PAVEMENT / FILL LAYER** – Asphalt/granular material were encountered at the surface of all boreholes extending to depths of 0.30 to 0.46m and followed by fill materials, which generally consisted of dark brown and or some black organic silty sand/sand silt with some to trace of gravel. The encountered fill layers extended to depths of 0.61m to 2.29m bgs. Fill depths and elevations are presented in Table 1.
- **BROWN/GREYISH BROWN SILTY SAND TILL**– The fill and/or granular base materials were underlain by brown to greyish brown, moist to wet silty sand till, which was in a compact to dense condition and extend to depths varying from 6.10 to 7.62m with elevations from 306.7m to 305.35m asl.
- **GREY CLAYEY SILT TILL** – The brown/greyish brown silty sand tills were underlain by grey, moist, very stiff to hard clayey silt till extending to approximate depths of 9.15m bgs, at elevations of 303.91m to 303.65m asl.
- **BROWN FINE SAND** – The brown fine sand was encountered underlying the clayey silty till and boreholes 2 to 6 were terminated in this layer at the depths of 12.50m to 12.65m. In the deeper BH1, fine sand further extended to a depth of 15.25m bgs, followed by a brown, wet medium sand towards the bottom of the borehole at 15.55m. The encountered fine sand is dry to slightly moist and in a very dense condition with SPT penetration blow counts generally over 100 blows per 300mm.

Table 1: Fill Depths and Elevations

Borehole No.	MW1	MW2	MW3	MW4	MW5	MW6
Surface Elevation (m asl)	312.80	313.08	313.18	312.98	313.16	312.96
Depth of Borehole (m)	15.24	12.65	12.65	12.65	12.65	12.50
Elevation at Bottom of Borehole (m asl)	297.56	300.43	300.43	300.33	300.51	300.46
Depth of Fill (m)	1.52	0.91	1.52	0.91	2.29	0.61
Elevation at Bottom of Fill (m asl)	311.28	312.17	311.66	312.07	310.87	312.35

5. GROUNDWATER

Groundwater was observed during drilling and measured at the completion of drilling works in the open boreholes. BH2, BH3 and BH4 were observed dry upon completion, while BH1, BH5 and BH6 were found with standing water below 11.50m.

On May 21, 27, 2021, groundwater levels were measured in all monitoring wells. The observed groundwater depths and elevations are summarized in Table 2.

Table 2: Groundwater Depths and Elevations

No.	Elev. at Ground (m)	Depth of Well, m bgs	On Completion		21-May21		27-May-21	
			GW level, m bgs	GW Ele, m asl	GW level, m bgs	GW Ele, m asl	GW level, m bgs	GW Ele, m asl
MW1	312.80	15.24	11.50	301.30	--	-	13.70	299.10
MW2	313.08	10.67	Dry	-	10.80	-	--	--
MW3	313.18	12.19	Dry	-	11.35	301.83	--	--
MW4	312.98	6.10	Dry	-	0.98	312.00	1.13	311.85
MW5	313.16	7.64	12.05	301.11	2.15	311.01	2.23	310.93
MW6	312.96	6.10	12.20	300.76	--	--	1.70	311.26

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

Architectural Site plans/drawings, prepared by JCI dated August 22, 2019, was provided to Fisher at the time of site investigation. Based on the review of the drawings, the proposed development will comprise of an 8- storey mixed use building with two-level underground parking. The building will be located in the central to east potions of the site with building footprint of approximately 3370m^2 and has an approximately same underground parking area. The proposed building ground floor elevation is at 313.11m with a lowest underground level slab elevation (P2 level) at 307.41m.

6.1 Spread/ Strip Footing Found on Native Soils

For the proposed eight (8) mid-rising building with two underground levels, the structures may be constructed as conventional spread/strip footings foundations that extend down to bear on the undisturbed native soil typically consisting of dense silty sand 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 8 storey Building	BH1	2- Level Underground Parking	312.80	5.50/9.30	307.30/303.50	300/500	420//750
	BH2		313.08	5.50/9.30	307.58/303.78	300/500	420//750
	BH3		313.18	5.50/7.95	307.68/305.23	300/500	420//750
	BH4		312.98	5.50/7.95	307.48/305.03	300/500	420//750
	BH5		313.16	5.50/9.45	307.66/303.71	300/500	420//750
	BH6		312..96	5.50/7.95	307.46/305.01	300/500	420//750

6.2 General Comments about Footing Construction

For frost protection requirements, all exterior footings exposed to ambient air temperature must be provided with a minimum of 1.22m of earth cover or equivalent insulation. Footings in unheated basement should have a minimum soil cover of 0.8 m.

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

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

It should also be noted that till soil and interbedded sand, in the Southern Ontario are glacial/interglacial in origin and as such contain cobbles, boulders and other erratic rock, the precise placement and location

of which cannot be determined without comprehensive excavation. Therefore, a construction contract provision including the unit pricing for excavation and foundation installations into such soil should be provided to minimize potential unexpected extra costs.

Furthermore, the recommended bearing resistance and foundation elevations have been calculated from the limited borehole information and are intended for design purposes only. The footings for lighter structures, located outside the underground parking garage may use 150kPa (SLS) for footings placed on undisturbed native silty sand, subject to further site inspections.

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 field, and all footings must be inspected and approved by our office prior to placement of concrete.

7. EARTHQUAKE CONDITIONS

For the subject Site, the Site Classification for Seismic Site Response is determined referencing 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 15.55m. Recorded Standard Penetration Test (SPT) in glacial till are generally between 15 to 50 and, underlying fine sand are generally over 100 blows penetration per 300mm within investigation depth. For seismic design purposes, the weighted average penetration resistance will most likely be identified as $\tilde{N}_{60} > 50$ blows per 300mm for the upper 30 meters and, as such the subject Site designation is expected to be “Class C” for proposed building with two levels underground.

8. EXCAVATION AND BACKFILL

No major problems should be encountered for the anticipated depths of excavation for the footings. 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 1.2 m, 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 loose to compact topsoil/fill, compact to dense silty sand till overlying a layer of hard clayey silty till and very dense sand in further depth. For underground structures /footings construction, the expected excavations depths are expected extending to 7.0m below the prevailing ground surface, correspondingly elevation of approximately 306.00m asl. the subsoil above this depth can be generally classified as Type 3. For open excavation, the bank slopes should be maintained at a 1:1 inclination condition from excavation bottom.

The excavation will encounter groundwater seepage when into silty sand till deposit. Construction dewatering may need to lower groundwater level to facility excavation. Detailed groundwater condition/ construction dewatering discharge rate will be addressed in the site Hydrogeological Investigation Report, under Fisher project NO. 20-10637H and submitted separately.

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 by lifts no more than 200 mm in thickness 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, on site selected excavation fill materials, native soils can be used as backfill in service trenches, provided that the excavated materials are free of organic soils /construction debris and contain 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 materials may be acceptable subject to further site inspection.

Geotechnical parameters for earthworks on the Site are presented in Table 4.

Table 4: Geotechnical Soil Parameter

Parameter	Sandy Fill (loose to Compact)	Brown Silty San Till (compact in General)	Grey Clayey Silt (Hard)	Brown Fine Sand (Very Dense)
Depth of Soil Stratum	Between 0.30m to 2.29m	To 6.10 m-7.62m	To 9.15m	Below 9.15m
Bulk Unit Weight (kN/m^3)	19	20	19	18
Effective friction angle, φ^o	30	32	32	36

Parameter	Sandy Fill (loose to Compact)	Brown Silty San Till (compact in General)	Grey Clayey Silt (Hard)	Brown Fine Sand (Very Dense)
K_o (at rest)	0.50	0.45	0.47	0.40
K_a (active)	0.33	0.31	0.31	0.26
K_p (passive)	3.00	3.25	3.25	3.80

Any applicable surcharge loads must also be included in the calculations of lateral earth pressure.

9. SHORING REQUIREMENTS

9.1 General Considerations

A shoring system should be designed, particularly at the east boundary of front of Essa Road to facilitate the excavation of underground levels and protect adjacent structures and underground utilities. The shoring system should be designed in accordance with the requirements set out in the Canadian Foundation Engineering Manual, 4th edition.

Typical shoring systems include:

- A soldier pile and timber lagging system where some deflection of the wall is permitted, and groundwater is not a concern or can be handled with conventional dewatering system, or dewatering system is carried out and
- A caisson wall, formed from secant piles, where only minor deflections of the wall are permitted, and groundwater is a concern or where dewatering is prohibited.

Three factors should be considered for the subject Site:

1. The highest observed groundwater level was 1.13m12.44m bgs, with highest elevation of 311.85m asl.
2. The excavation for the proposed lowest underground level P2 is at an elevation of 307.41m asl with a consideration of footing depth towards 306.41m asl below.
3. The proposed building will be located immediately adjacent to Essa Road with the Road traffic and buried service presented.

It should be noted, an installed caisson wall may intercept the groundwater influx into the excavation and reduce proposed dewatering discharge rate. In some case, the caisson wall may also design as structural caisson to support perimeter wall footings.

9.2 Basement Wall Design

The parking garage walls under free drainage conditions, can be designed for a lateral earth pressure P, as given by the following expression:

$$P = K (yh + q)$$

where K = Coefficient of earth pressure

Y = Unit weight of soil

q = Surcharge load, if any

Design parameters K, y are suggested in section 8 of this report.

If the perimeter/underfloor drainage systems are not permitted and water tight structure design is adopted then parking garage walls & floor slabs must be designed to resist hydrostatic/uplift pressures. Highest groundwater level should be used for determining the water pressures. Walls should be waterproofed to at least 1m above the highest water level.

For a waterproofed basement, the lateral earth pressures acting on basement walls may be calculated from the following expression:

$$p = K (yh_1 + y' h_2 + q) + y_w h_2$$

where p = lateral earth pressure in kPa acting at depth h

K = earth pressure coefficient, assumed to be 0.4 for vertical walls and horizontal backfill

y' = submerged unit weight of backfill of 12kN/m^3 may be assumed

y_w = Unit weight of water, a value of 10kN/m^3 can be used

h_1 = depth to the highest groundwater table in metre

h_2 = depth below water table in metres

q = Equivalent value of surcharge on the ground surface in kPa

9.3 Subdrain Considerations

For the excavation supported by shoring wall, the drainage system must be provided between the garage walls and the adjacent shoring. A series of drain holes should be precast through the walls below the garage floor slab level, forming a complete drainage path to the interior weeping tiles placed beside the garage wall footings.

Underfloor weeping tile drainage system should be provided under the floor slab to release any potential uplift pressure on the slab-on-grade. The drains should be encased in 150 mm of clear stone/pea gravel wrapped in geotextile filter and connected positively to sump pit. The geotextile filter should have equipment opening size of less than 60 µm.

The entire drainage system should be designed by competent professionals, to ensure its capacity and effectiveness concerning the efficient transmittal of volume of water generated without any migration of fines from the surrounding soils.

A permanent perimeter drainage system for shoring wall /open excavation foundation walls should be provided and installed following the instructions of drawings shown on Appendix D.

10. SLAB ON GRADE AND PERMANENT DRAINAGE

For the proposed building with 2-level of underground parking, the lowest floor slab (P2) can be constructed as slab on grade supported by competent native undisturbed silty sand and or clayey silt.

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

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

Engineered fill materials, compaction quality and finished subgrade proof-rolling should be supervised and inspected by Fisher. Engineered fill must be placed in lifts with no more than 200 mm and compacted to 98% SPMDD. Wherever engineered fill was performed, the layer of fill should have a minimum thickness of 0.70 m below the slab.

Onsite excavated native soils and selected fill materials can be used as engineered fill provided it contains suitable moisture content. Granular Class ‘B’ aggregates will be preferable for the subgrade construction for

slab on grade especially during the winter time or wet season. If Granular Class 'B' aggregates are used, the minimum thickness of such material pad may be reduced to 0.5 m.

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 19 mm clear limestone at least 200 mm thick. The stone bed would act as a barrier and prevent capillary rise of moisture from the subgrade to the floor slab.

Subgrade Modulus Value for undisturbed native soils on the site below 3m, may be taken as 25,000kN/m^3.

Perimeter drainage along the perimeter foundation walls and under slab will be required under current site groundwater conditions, unless the subsurface structures are designed as water-tight. The elevator shaft with additional depth should be designed as a water- tight structure in any circumstance for the site.

11. UNDERGROUND UTILITIES

Pipe bedding and backfill materials specifications and compaction criteria for watermain 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.

It is expected that the underground services / sewer construction will be generally above the groundwater table, granular Class 'A' aggregate is considered well suited to be used as bedding material foundered on undisturbed native soils. However, if excavation below the water table with existence of excess hydrostatic pressure, or the construction methods will disturb the subgrade i.e., piping, existing footing, boulder removal etc. then higher-class bedding may have to be used combined with a geotextile.

Selected on site 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.

12. PAVEMENT

Based on the Site Plan, the associated pavement of driveways and parking areas would be developed on the Site. 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 structural compacted layers and thicknesses are as follows:

	Heavy Duty	**Medium Duty**
Asphaltic Concrete	40 mm HL3	40 mm HL3
	65 mm HL8	40 mm HL8
19 mm Crushed Limestone	150 mm	150 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 92.0% of their Marshall Relative Density that is provided by the asphaltic concrete supplier.

13. 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.

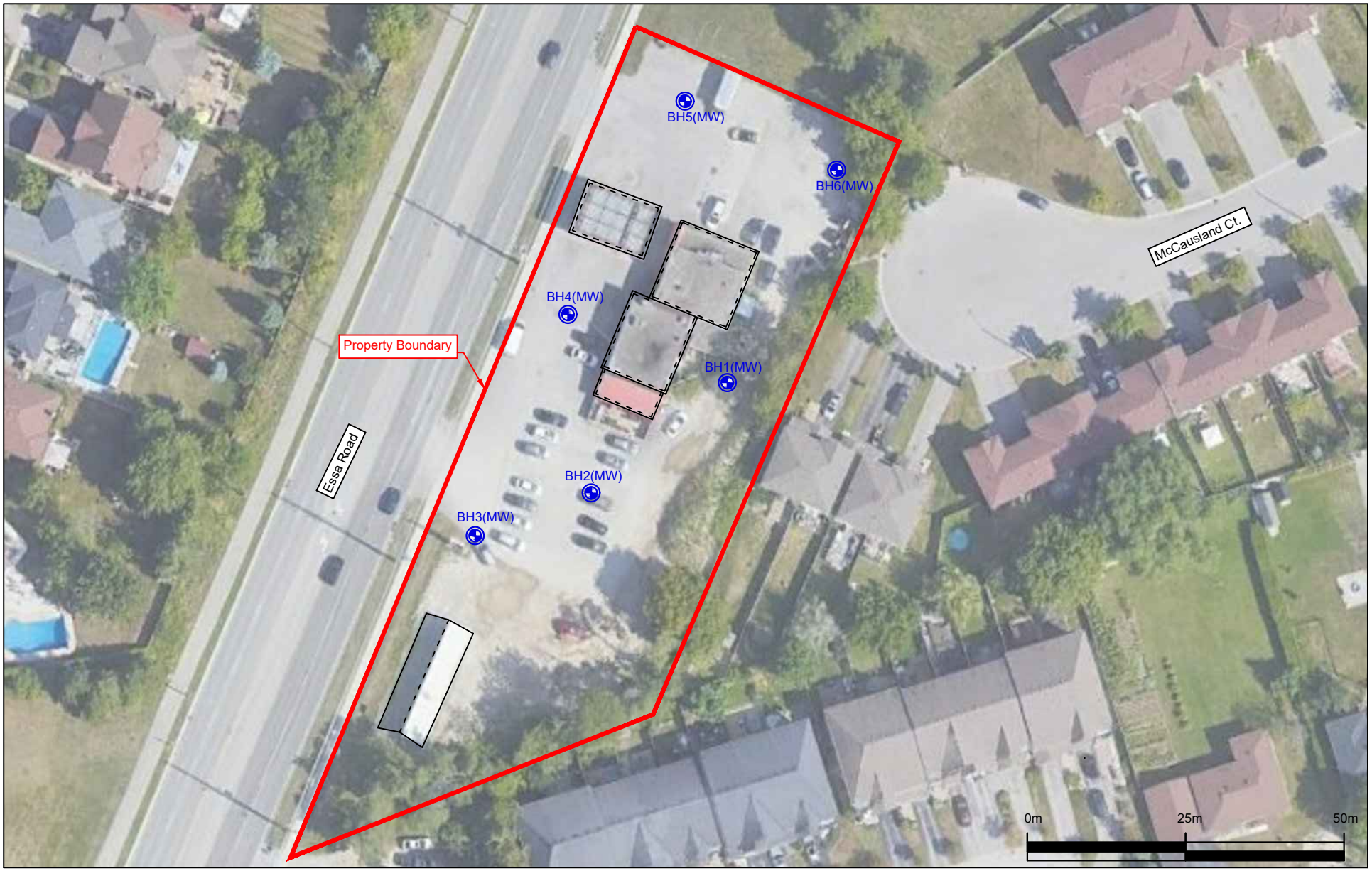
The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction.

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

LEGEND

Borehole and Monitoring Well Locations

PROJECT NAME AND ADDRESS

Geotechnical and Hydrological Investigation

440 Essa Road
Barrie, ON

PROJECT NO.
FE-P 20-10636/37

DATE
26 May 2021

SCALE
As Shown

FIGURE 1:

Site Plan with BH(MW) Locations

PROPOSED MIXED USE DEVELOPMENT

440 Essa Road

AUGUST 22, 2019

DRAWING LIST

ARCHITECTURAL

	COVER
A0.00	DEVELOPMENT STATISTICS
A1.00	CONTEXT PLAN
A1.01	SITE PLAN
A3.00	P2 & P1 LEVEL
A3.01	G.F. & 2ND FLOOR PLANS
A3.02	3RD & 4TH FLOOR PLANS
A3.03	5TH & 6TH FLOOR PLANS
A3.04	7TH & 8TH FLOOR PLANS
A3.05	ROOFTOP & ROOF PLANS
A6.00	BUILDING SECTION
A10.0	3D VIEWS

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PROPOSED MIXED USE DEVELOPMENT
440 Essa Road
AREA SUMMARY

Lot Area (existing): **5,011.0 m2** **53,938 sf** Density: **3.36** Lot Coverage: **53%**
Total Building GFA: **16,843.3 m2** **181,300 sf**

Level	COMMON AREA/ CIRCULATION		PARKING		RESIDENTIAL		**BALCONY		COMMERCIAL		INDOOR AMENITY		OUTDOOR AMENITY		CONSTRUCTION AREA		EFFICIENCY	GFA EXEMPTIONS*		TOTAL GFA**	
	m2	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*	*m2*	*sf*		*m2*	*sf*	*m2*	*sf*
P-2	209.4	2,254	3,548.9	38,200	190.9	2,055	0.0	0	0.0	0	0.0	0	0.0	0	**3,949.2**	**42,509**	*5%*	3,911.3	42,101	**37.9**	**408**
P-1	252.9	2,722	3,505.4	37,732	190.9	2,055	0.0	0	0.0	0	0.0	0	0.0	0	**3,949.2**	**42,509**	*0%*	3,911.3	42,101	**37.9**	**408**
Ground Floor	319.6	3,440	* 1,702.1	18,321	0.0	0	0.0	0	1,208.5	13,008	208.7	2,246	109.2	1,175	**1,736.8**	**18,695**	*70%*	271.9	2,927	**1,464.9**	**15,768**
Second Floor	367.9	3,960	0.0	0	1,886.9	20,310	0.0	0	0.0	0	0.0	0	0.0	0	**2,254.8**	**24,270**	*84%*	55.3	595	**2,199.5**	**23,675**
Third Floor	191.4	2,060	0.0	0	2,467.8	26,563	43.1	464	0.0	0	0.0	0	0.0	0	**2,659.2**	**28,623**	*93%*	55.3	595	**2,603.9**	**28,028**
Fourth Floor	191.4	2,060	0.0	0	2,467.8	26,563	43.1	464	0.0	0	0.0	0	0.0	0	**2,659.2**	**28,623**	*93%*	55.3	595	**2,603.9**	**28,028**
Fifth Floor	191.4	2,060	0.0	0	2,459.8	26,477	49.2	530	0.0	0	0.0	0	0.0	0	**2,651.2**	**28,537**	*93%*	55.3	595	**2,595.9**	**27,942**
Sixth Floor	193.8	2,086	0.0	0	2,053.6	22,105	452.7	4,873	0.0	0	0.0	0	0.0	0	**2,247.4**	**24,191**	*91%*	55.3	595	**2,192.1**	**23,596**
Seventh Floor	199.6	2,148	0.0	0	1,726.1	18,580	323.0	3,477	0.0	0	0.0	0	0.0	0	**1,925.7**	**20,728**	*90%*	62.4	672	**1,863.3**	**20,056**
Eighth Floor	132.3	1,424	0.0	0	1,171.8	12,613	621.6	6,691	0.0	0	0.0	0	0.0	0	**1,304.1**	**14,037**	*90%*	60.1	647	**1,244.0**	**13,390**
Rooftop Floor	111.3	1,198	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	699.2	7,526	**111.3**	**1,198**	*0%*	111.3	1,198	**0.0**	**0**
Total	**2361.0**	**25,414**	**8,756.4**	**94,253**	**14,233.8**	**153,211**	**1,532.7**	**16,498**	**1,208.5**	**13,008**	**208.7**	**2,246**	**808.4**	**8,702**	**25,448.1**	**273,921**	***88.6%***	**8,604.8**	**92,621**	**16,843.3**	**181,300**

Note: not including balcony area

* exterior surface parking at grade (not included in construction area)
** included in amenity space calculations

SHEETSET
440 Essa Road
UNIT SUMMARY

Level	RESIDENTIAL UNITS							COMMERCIAL UNITS
	Studio	*1B*	*1B+D*	*2B*	*2B+D*	*3B*	**Total**	
Ground Floor	-	-	-	-	-	-	0 units	1208.5
Second Floor	0	0	0	4	20	2	26 units	
Third Floor	0	0	0	8	23	3	34 units	
Fourth Floor	0	0	0	8	23	3	34 units	
Fifth Floor	0	0	0	9	22	3	34 units	
Sixth Floor	0	3	18	12	0	1	34 units	
Seventh Floor	2	1	1	1	12	15	32 units	
Eighth Floor	0	0	0	0	0	0	0 units	
ROOF							0 units	
Total	**2**	**4**	**19**	**42**	**100**	**27**	**194**	**residential units**
% Total	1.0%	2.1%	9.8%	21.6%	51.5%	13.9%		
Affordable Units	**0**	**4**	**19**	**42**	**10**	**0**	**75**	
	0.0%	100%	100%	100%	10%	0%	38.7%	

PROPOSED MIXED USE DEVELOPMENT
440 Essa Road
ZONING STATS

STANDARD	REQUIRED 'C4'		REQUIRED 'MU2'		PROPOSED	
	metric	*imperial*	*metric*	*imperial*	*metric*	*imperial*
LOT AREA *(MIN)*	450.0 *m2*	4844 *sf*	-		5011.0 *m2*	53938 *sf*
LOT FRONTAGE *(MIN)*	15.0 *m*	49.2 *ft*	-		132.59 *m*	435.0 *ft*
FRONT YARD SETBACK *(MIN)*	6.0 *m*	19.7 *ft*	1.0 *m (MIN)* 5.0 *m (MAX)*	3.3 *ft (75% FRONT* 16.4 *ft (25% FRONT*	0.57 *m* 2.52 *m*	1.87 *ft* 8.27 *ft*
SIDE YARD SETBACK *(MIN)*	3.0 *m*	9.8 *ft*	3.0 *m (MAX)*	9.8 *ft*	1.48 *m*	4.9 *ft (NORTH)*
SIDE YARD SETBACK - EXTERIOR (STREET OR LANE) *(MIN)*	5.0 *m*	16.4 *ft*	3.0 *m*	9.8 *ft*	N/A	
SIDE YARD SETBACK - ABUTTING RESIDENTIAL *(MIN)*	6.0 *m*	19.7 *ft*	3.0 *m*	9.8 *ft*	7.54 *m*	24.7 *ft (SOUTH)*
REAR YARD SETBACK *(MIN)*	7.0 *m*	23.0 *ft*	-		N/A	
REAR YARD SETBACK - EXTERIOR (STREET OR LANE) *(MIN)*	6.0 *m*	19.7 *ft*	1.5 *m*	4.9 *ft*	15.22 *m*	49.9 *ft*
REAR YARD SETBACK- ABUTTING RESIDENTIAL *(MIN)*	10.0 *m*	32.8 *ft*	7.0 *m*	23.0 *ft*	15.22 *m*	49.9 *ft*
LANDSCAPE OPEN SPACE *(MIN)*	-		-		-	
DWELLING UNIT FLOOR AREA *(MIN)*	35 *m2* + 10 *m2 PER BEDROOM*		35 *m2* + 10 *m2 PER BEDROOM*		35 *m2* + 10 *m2 PER BEDROOM MINIMUM* (SEE PLANS)	
LOT COVERAGE *(MAX)*	50%		-		53%	
GROSS FLOOR AREA *(MAX - % OF LOT AREA)*	-		-		3.36	
STREET LEVEL FLOOR HEIGHT *(MIN)*	-		4.5 *m*	14.8 *ft*	4.0 *m*	13.1 *ft*
BUILDING HEIGHT *(MAX)*	9.0 *m*	29.5 *ft*	7.5 *m (MIN)* 25.5 *m (MAX)*	24.6 *ft* 83.7 *ft*	25.5 *m*	83.7 *ft*
BUILDING HEIGHT - ABUTTING RESIDENTIAL *(MAX)*	14.0 *m*	45.9 *ft*	7.5 *m (MIN)* 25.5 *m (MAX)*	24.6 *ft* 83.7 *ft*	25.5 *m*	83.7 *ft*
FRONT FAÇADE STEP-BACK *(MIN)*	-		45 DEGREE ANGULAR PLANE @ 80% EQUIV. ROW USING 3M STEP-BACK		COMPLIES (SEE SECTION)	
SIDE FAÇADE STEP-BACK *(MIN)*	-		IF ADJACENT TO AN OS ZONE, 5.5M @ HEIGHT ABOVE 80% EQUIV. ROW		N/A	
REAR FAÇADE STEP-BACK *(MIN)*	-		45 DEGREE ANGULAR PLANE ABOVE 7.5m USING 3m STEP-BACK		COMPLIES (SEE SECTION)	
GROUND FLOOR COMMERCIAL *(MIN % OF 1ST FLOOR GFA)*	20%		50%		70%	
AMENITY AREAS FOR RESIDENTIAL USES *(MIN)*	12 m2 / UNIT (CONSOLIDATED + OUTDOOR) 2328.0 *m2* 25058 *sf*		12 m2 / UNIT (OPEN LANDSCAPE, ROOFTOP AMENITY, PRIVATE BALC., OR OTHER AMENITY FEATURES) 2328.0 *m2* 25058 *sf*		2341.1 *m2*	25199 *sf*
LANDSCAPE BUFFER AND FENCING *(MIN. ABUTTING RESIDENTIAL)*	3m BUFFER & 2m HIGHT TIGHT BOARD FENCE (ALONG LOT LINE)		3m BUFFER & 2m HIGHT TIGHT BOARD FENCE (ALONG LOT LINE)		COMPLIES (SEE SECTION & PLANS)	
PARKING *(MIN)*	1 / 24m2 OF GFA (MULTIPLE COMMERCIAL USES) & 1.5 SPACES/UNIT (RESIDENTIAL) 51 Com/291 Res		1 / 24m2 OF GFA (MULTIPLE COMMERCIAL USES) & 1.0 SPACES/UNIT (RESIDENTIAL) 51 Com/194 Res		51 Commercial Spaces 5 Replaced parking spots for 430 Essa 203 Residential Spaces (4 Type A & 3 Type B BF spaces included)	
PARKING COVERAGE APARTMENT DWELLING UNITS *(MAX % LOT)*	-		35%		16 % (8 RESIDENTIAL PARKING SPACES ABOVE GRADE)	
FRONT YARD PARKING *(MAX)*	-		0%		N/A	
PARKING STALL SIZE *(MIN)*	REGULAR: 2.7m x 5.5m PARALLEL: 2.7m x 6.7m		REGULAR: 2.7m x 5.5m PARALLEL: 2.7m x 6.7m		COMPLIES	
PARKING STALL SIZE - BARRIER FREE *(MIN)*	TYPE A 3.4m x 5.5m TYPE B 3.1m x 5.5m WITH 1.5m ACCESS AISLE		TYPE A 3.4m x 5.5m TYPE B 3.1m x 5.5m WITH 1.5m ACCESS AISLE		COMPLIES	
DRIVE AISLE WIDTH *(MIN)*	6.4 *m*	21.0 *ft*	6.4 *m*	21.0 *ft*	6.4 *m*	21.0 *ft*
LOADING SPACES *(MIN)*	1 SPACE 3m x 9m x 4m(w x l x h)		1 SPACE 3m x 9m x 4m(w x l x h)		1 SPACE 3m x 9m x 4m(w x l x h)	
ACCESSORY BUILDING	SUBJECT TO C4 STANDARDS		HEIGHT(MAX): 4M, CONNOT OCCUPY FRONT OR EXTERIOR SIDE YARDS. SIDE: 0.6m, LOT(MAX): LESSER OF 10% OR 50m2		N/A	

Revisions:

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Consultants:

STRUCTURAL:

MECHANICAL:

ELECTRICAL:

ARCHITECT:

STUDIO JCI
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t. 416.901.6528 f. 416.901.8962
www.studiojci.com

PROPOSED MIXED USE DEVELOPMENT

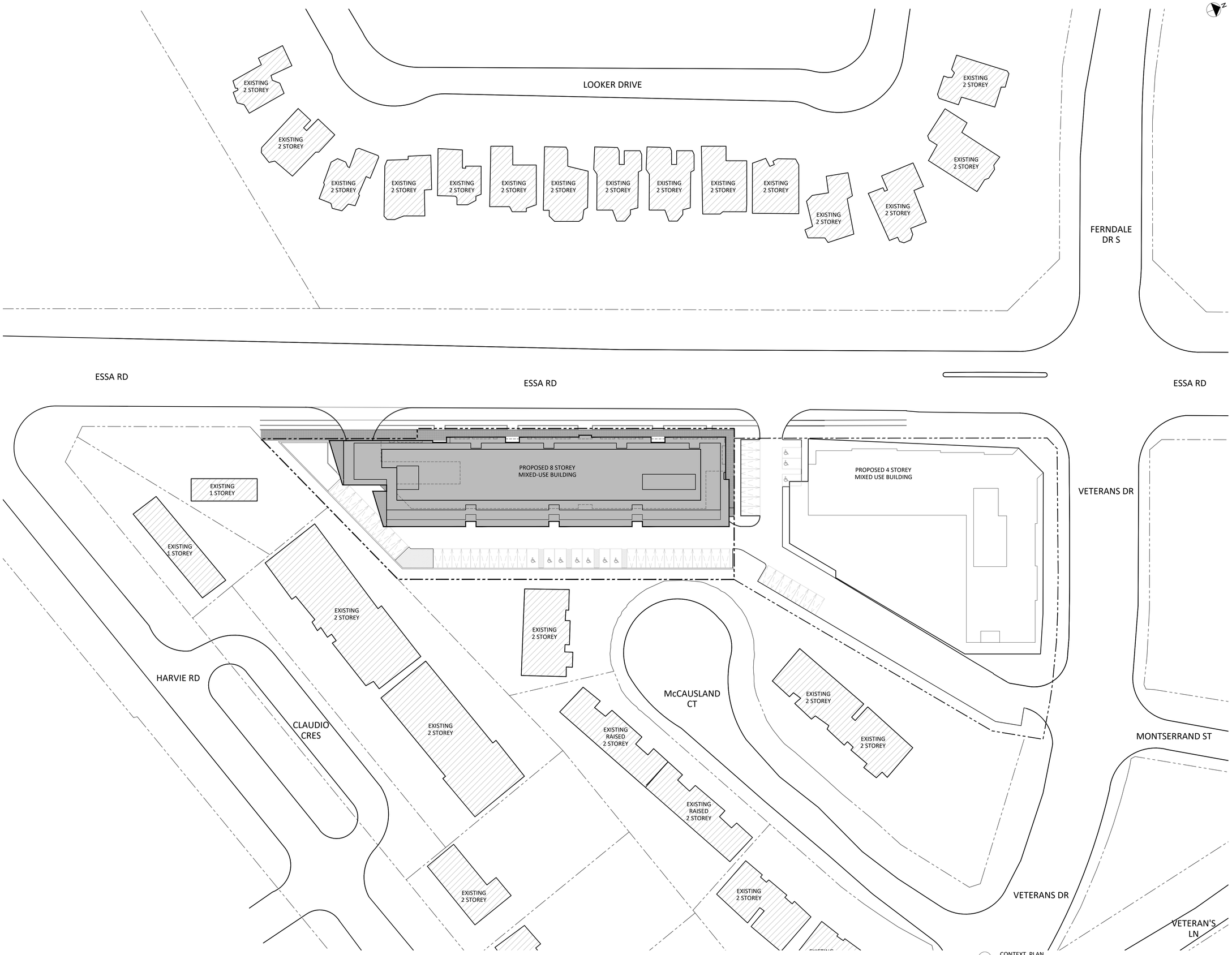
ADDRESS:
440 Essa Road, Barrie ON

DEVELOPMENT STATISTICS

PROJECT NO.: 1905
SCALE: 1 : 250
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A0.00



1 CONTEXT PLAN
Scale: 1 : 500

Revisions:

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PROPOSED MIXED USE DEVELOPMENT

ADDRESS:
440 Essa Road, Barrie ON

CONTEXT PLAN

PROJECT NO.: 1905
SCALE: 1:500
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A1.00

LEGEND:

- PROPOSED BUILDING FOOTPRINT
- PROPOSED SOD
- PROPOSED SOFT LANDSCAPING (PLANTING)
- PROPOSED NEW SIDEWALK
- PROPOSED LOW HEDGE
- PROPOSED MEDIUM GROWING NATIVE SHADE TREE
- PROPOSED LARGE GROWING NATIVE SHADE TREE
- BOUNDARY OF HEAVY DUTY ASPHALT
- PROPOSED ELEVATION
- EXISTING ELEVATION
- PROPOSED PEDESTRIAN ENTRY
- PROPOSED VEHICULAR ENTRY
- STOP SIGN
- MANHOLE (SANITARY)
- MANHOLE (STORM)
- CB CATCH BASIN
- ELS EXISTING LIGHT STANDARD - EXISTING
- PLS PROPOSED EXTERIOR LIGHT STANDARD - BOLLARD
- PLS PROPOSED EXTERIOR DOWN LIGHT STANDARD - SOFFIT
- PLS PROPOSED EXTERIOR LIGHT STANDARD - SCONCE
- PLS PROPOSED EXTERIOR LANDSCAPE DIRECTIONAL LIGHTING
- EM EMERGENCY VEHICLE SIGNAGE
- FH FIRE HYDRANT
- WATER VALVE
- H HYDRO SERVICE
- S SEWER CLEANOUT
- B BELL PEDESTAL BOX
- TP TELE COMM PEDESTAL
- G U/G GAS MAIN
- T U/G TELEPHONE LINE
- TB TELE COMM BOX
- E ELECTRICAL BOX
- SIAMESE CONNECTION
- HB HOSEBIB

* REFER TO LANDSCAPE & CIVIC DRAWINGS FOR PLANTING & GRADING INFO

FINISHED GRADE LEVEL: 313.11
AS PER CITY OF BARRIE
COMPREHENSIVE ZONING BY-LAW 2009-141

34M RIGHT-OF-WAY AS PER OFFICIAL PLAN ROAD WIDENING

ESSA ROAD

APPROXIMATE LOCATION OF EXISTING WATERMAIN
APPROXIMATE LOCATION EXISTING CONC. STM
APPROXIMATE LOCATION OF EXISTING SAN SEWER
APPROXIMATE LOCATION OF HYDRO LINES ABOVE

136.53m [447'-11"]
45.08m [147'-11"]
91.45m [300'-1"]

PROPOSED DRIVEWAY
R12m [R39'-4"]
7m [23']
2.95m [9'-8"]
COMM. ENTRY
6.07m [19'-9"]
4.22m [13'-10"]
2.52m [8'-3"]
MAIN RESIDENTIAL ENTRANCE
WALK WAY
PROPERTY LINE
BALCONY
PROPOSED TRANSFORMER
OUTDOOR AMENITY
PARKING ENTRANCE
PROPOSED 8 STOREY MIXED-USE BUILDING HEIGHT: 25.5 m
OUTDOOR AMENITY
MECH. PENTHOUSE
GAS METER
LOADING 3mx9mx4m
2.49m [8'-2"]
3.97m [13']
9.67m [31'-9"]
1.46m [4'-10"]
43.57m [142'-11"]
EXISTING PARKING SPOTS AT 430 ESSA
R7.5m [R24'-7"]
EXISTING 1 STOREY
2M HIGH TIGHT BOARD FENCE
7.5m [24'-9"]
5.5m [18'-1"]
6.4m [21']
56.61m [185'-9"]
3m [9'-10"]
8TH STOREY, HEIGHT: 22.42 m
7TH STOREY
6TH STOREY
2ND-5TH STOREY
RESIDENTIAL ENTRY
LOADING/ GARBAGE
TOTAL NUMBER OF COMMERCIAL PARKING SPOTS : 35
DASHED LINE OF GROUND FLOOR EXTENTS
20.42m [67']
22.82m [74'-10"]
20.01m [65'-8"]
17.22m [56'-6"]
15.22m [49'-11"]
8 RESIDENTIAL PARKING SPOTS
6.4m [21']
25.92m [85']
6 REPLACED PARKING SPOTS OF 430 ESSA
15.22m [49'-11"]
9.5m [31'-2"]
DESIGNATED SNOW STORAGE ZONE
5.5m [18'-1"]
2.7m [8'-10"]
5,5m [18'-1"]
R-1 TYPE A
R-2 TYPE B
R-3 TYPE A
R-4 TYPE B
R-5 TYPE A
1.5m [4'-11"]
R-6 TYPE B 3.1m [10'-2"]
R-7 TYPE A 3.4m [11'-2"]
R-8
RP-6 RP-5 RP-4 RP-3 RP-2 RP-1
7.6m [24'-11"]
3m [9'-10"]
3M LANDSCAPE BUFFER
2M HIGH TIGHT BOARD FENCE
96.97m [318'-2"]
EXISTING TREES
EXISTING 2 STOREY
EXISTING 2 STOREY
McCAUSLAND CT

1 SITE PLAN
Scale: 1 : 250

Revisions:

DESCRIPTION: DATE:

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PROPOSED MIXED USE DEVELOPMENT

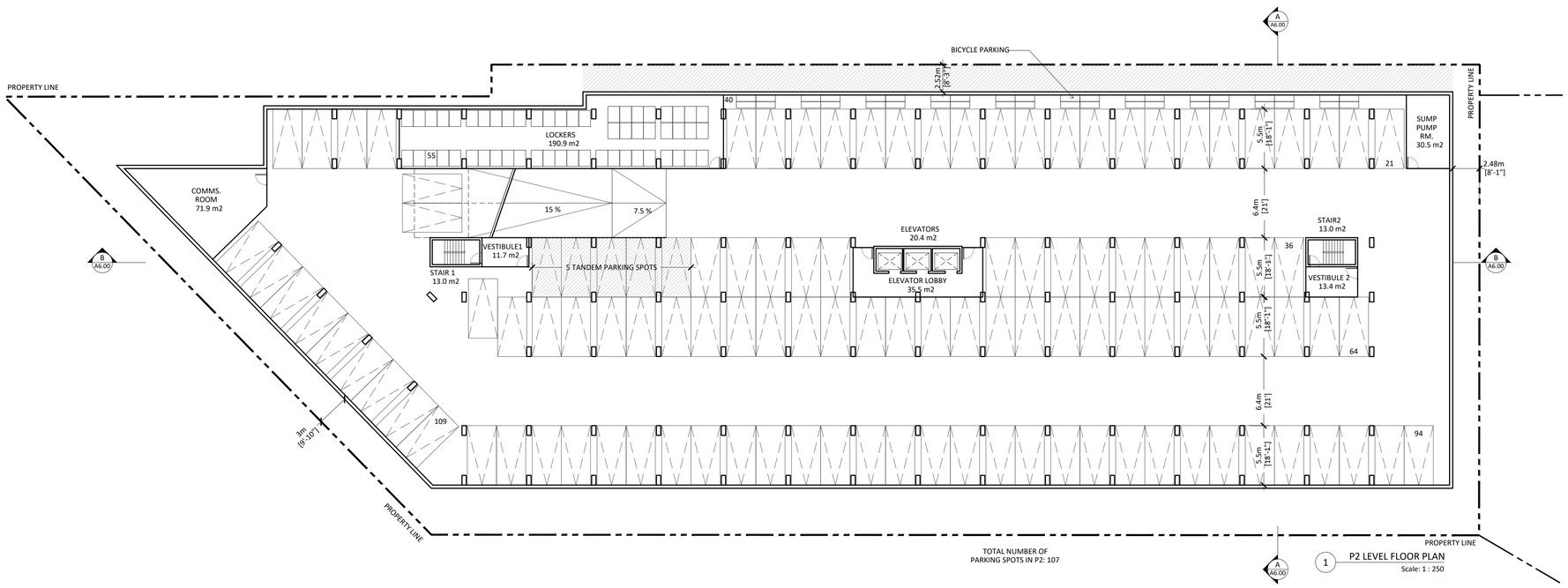
ADDRESS:
440 Essa Road, Barrie ON

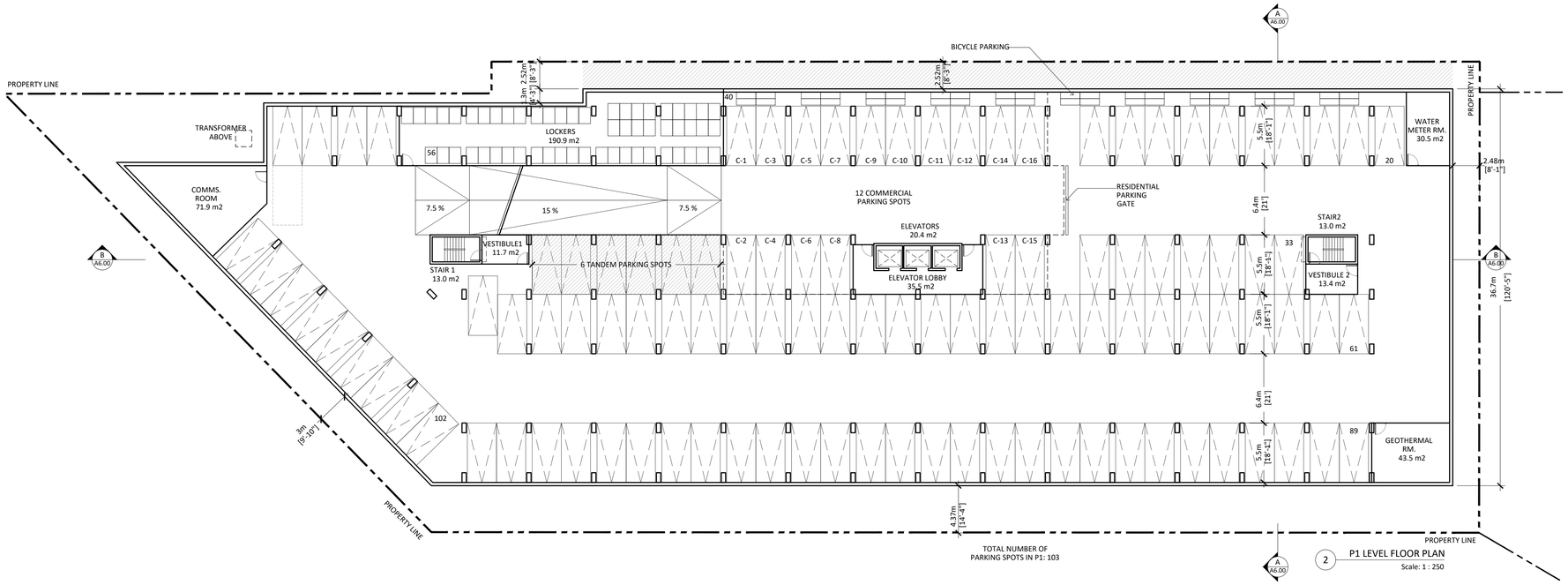
SITE PLAN

PROJECT NO.: 1905
SCALE: 1:250
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A1.01





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PROPOSED MIXED USE DEVELOPMENT

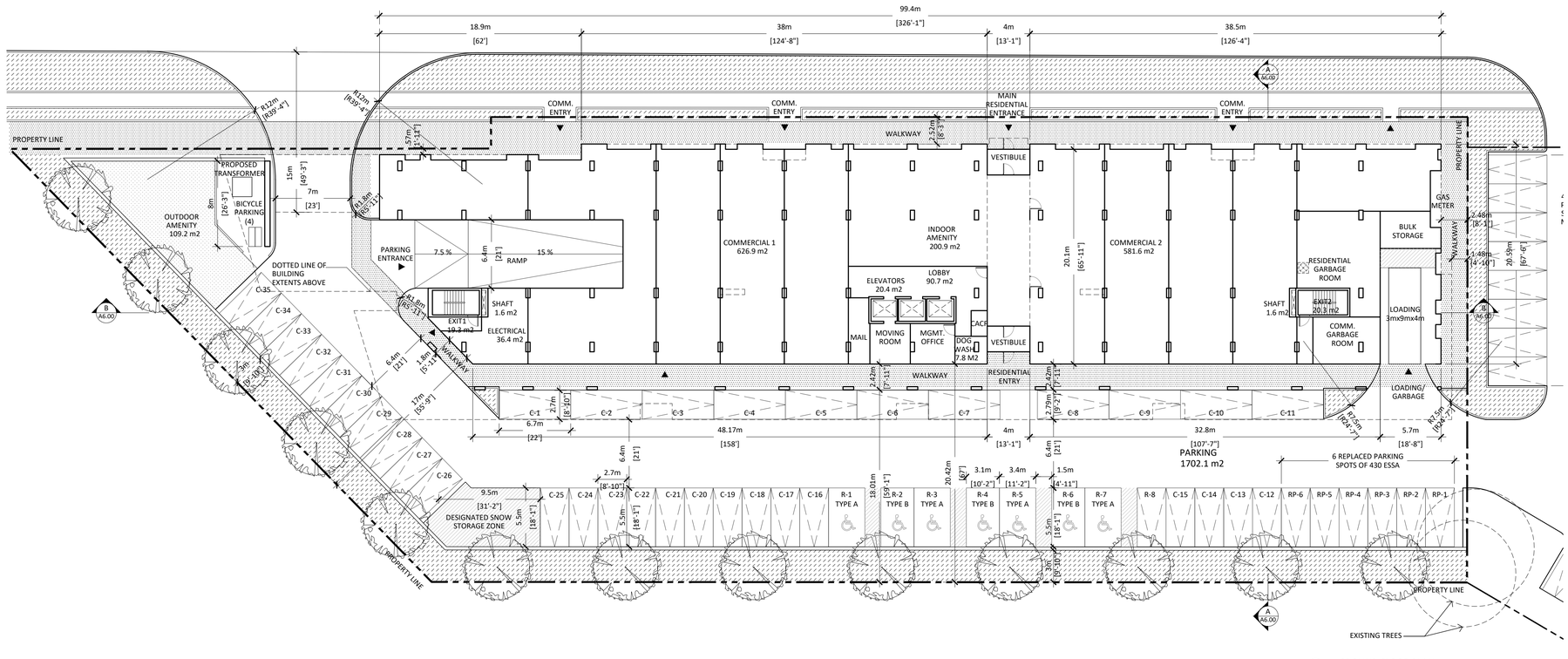
ADDRESS:
440 Essa Road, Barrie ON

P2 & P1 LEVEL FLOOR PLANS

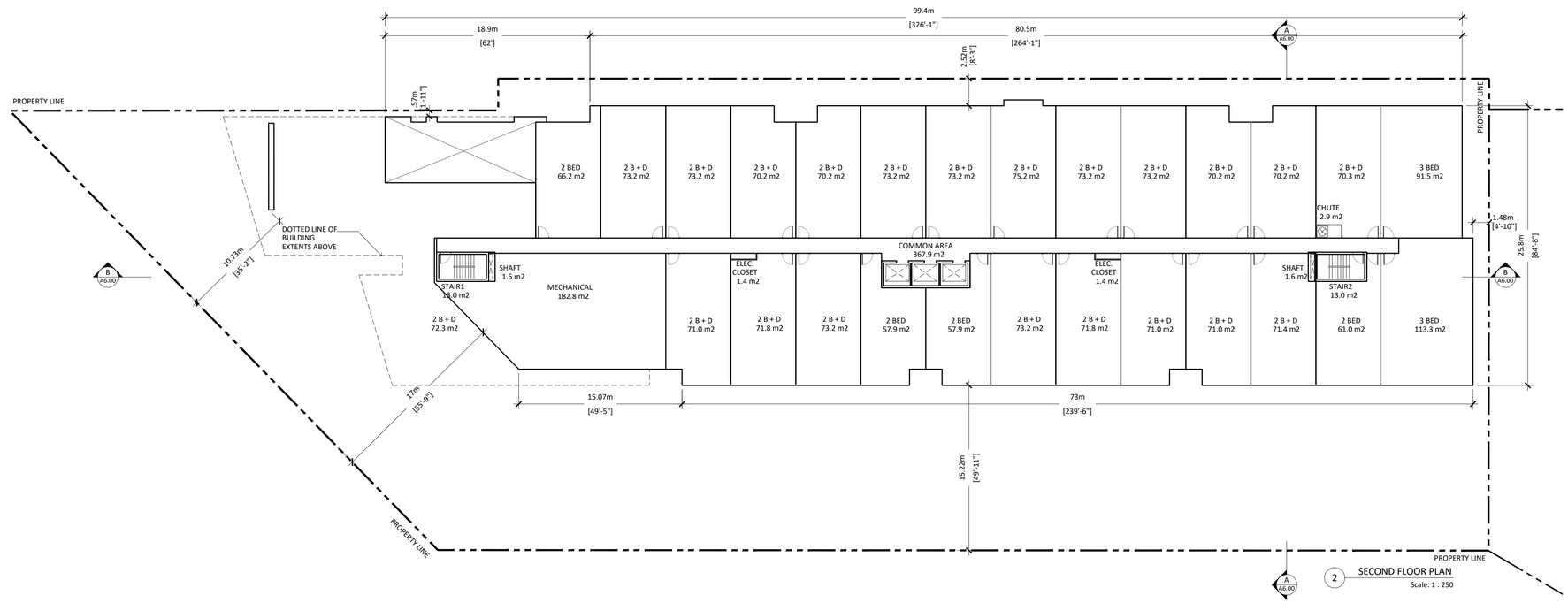
PROJECT NO.: 1905
SCALE: 1 : 250
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A3.00



1 GROUND FLOOR PLAN
Scale: 1 : 250



2 SECOND FLOOR PLAN
Scale: 1 : 250

Revisions:

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PROPOSED MIXED USE DEVELOPMENT

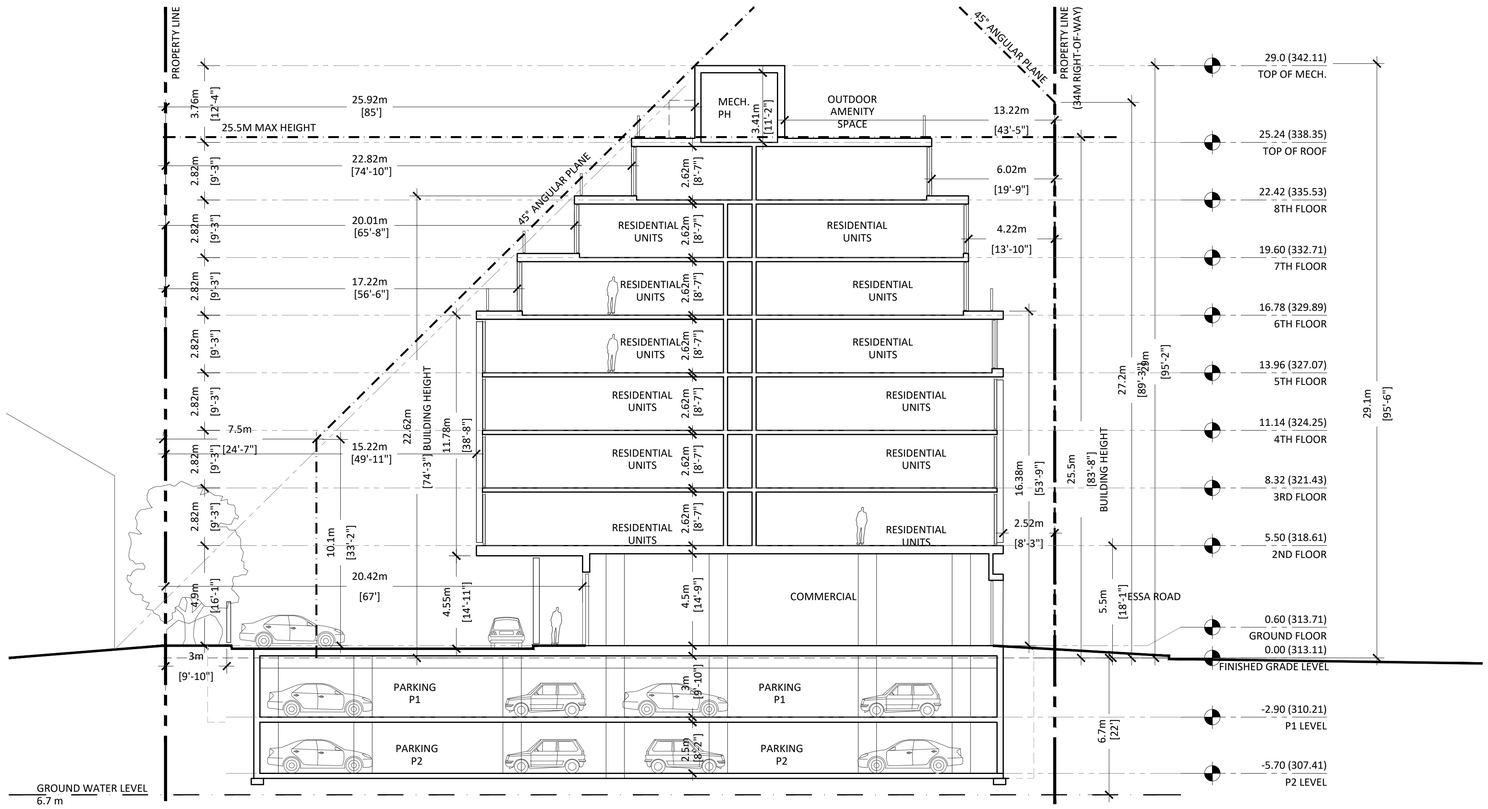
ADDRESS:
440 Essa Road, Barrie ON

G.F. & 2ND FLOOR PLANS

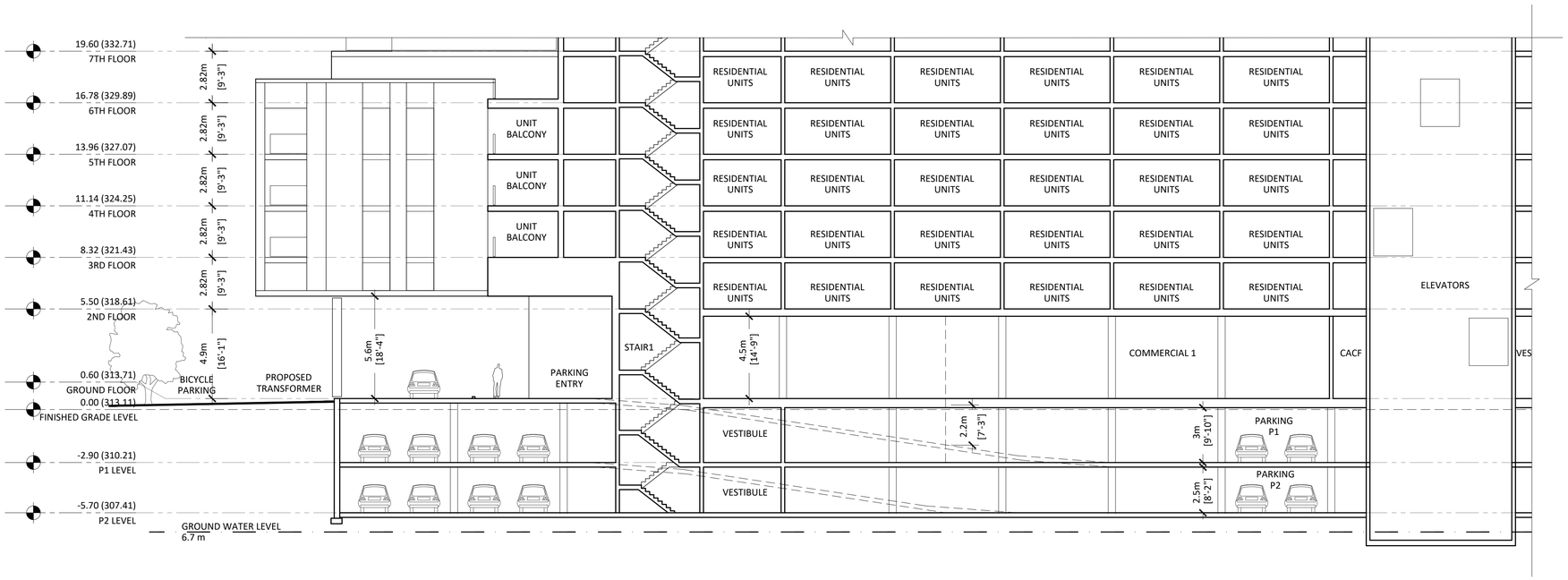
PROJECT NO.: 1905
SCALE: 1 : 250
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A3.01



1 CROSS SECTION A
Scale: 1 : 150



2 PARTIAL SECTION B
Scale: 1 : 150

Revisions:

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PROPOSED MIXED USE DEVELOPMENT

ADDRESS:
440 Essa Road, Barrie ON

BUILDING SECTION

PROJECT NO.: 1905
SCALE: 1:150
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A6.00

1 SOUTH WEST CORNER

2 NORTH WEST CORNER

3 SOUTH EAST CORNER

4 WEST (FRONT) ELEVATION

Revisions:

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1. These Contract Documents are the property of the Architect. The Architect bears no responsibility for the interpretations of these documents by the Contractor. Upon written application the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents. The Architect will review Shop Drawings submitted by the Contractor for design conformance only.

2. Drawings are not to be scaled for construction. Contractor to verify all existing conditions and dimensions required to perform the Work and report any discrepancies with the Contract Documents to the Architect before commencing work.

3. Positions of exposed or finished mechanical or electrical devices, fittings, and fixtures are indicated on the Architectural drawings. The locations shown on the Architectural drawings govern over the Mechanical and Electrical drawings. Those items not clearly located will be located as directed by the Architect.

Issued:

DESCRIPTION: DATE:

Consultants:

STRUCTURAL:

MECHANICAL:

ELECTRICAL:

ARCHITECT:

STUDIO JCI
20 De Boers Drive suite 525
Toronto ON M3H 0H1
t. 416.901.6528 f. 416.901.8962
www.studiojci.com

PROPOSED MIXED USE DEVELOPMENT

ADDRESS:
440 Essa Road, Barrie ON

3D VIEWS

PROJECT NO.: 1905
SCALE: N/A
DATE: August 22, 2019
DRAWN BY:

DRAWING NO.:

A10.0

APPENDIX B – LOG OF BOREHOLES

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH1(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Geotechnical & Hydrogeological Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: CME-75, Hollow Stem

DRILLING DATE: February 10, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	P.I.D. Reading	"N" VALUE
		GROUND SURFACE (m asl)		312.80				
		wet below 13.72m.				SS-10		67
						SS-11		100+
						SS-12		58
		MEDIUM SAND: brown, wet, very dense.		15.54/ 297.26		SS-13		53
		End of Borehole at 15.54m						

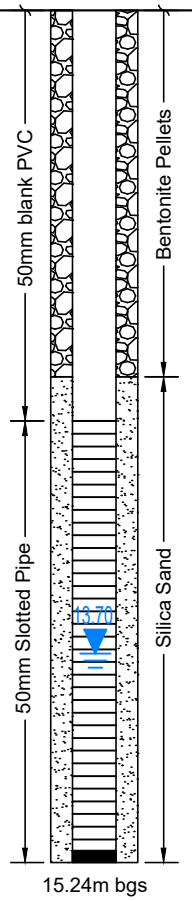
PENETRATION TESTING (SPT) ▲ 20 40 60 80

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: On Completion: 11.50m. on 21 May 2021: 13.70m

DRAWN: BL LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH2(MW) SHEET. 1 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Geotechnical & Hydrogeological Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: CME-75, Hollow Stem

DRILLING DATE: February 10, 2020

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID:	SAMPLES: TYPE NUMBER	SAMPLES: P.I.D. Reading	SAMPLES: "N" VALUE
		GROUND SURFACE (m asl)		313.08				
0	0	FILL: sand & gravel, brown to dark brown/black, moist, loose.				AS-1		
				0.91/ 312.17		SS-2		5
4	1	SILTY SAND TILL: trace gravel, greyish brown, moist, compact.						
6	2					SS-3		25
8						SS-4		14
10	3					SS-5		16
12	4							
14		moist below 4.57m.						
16	5					SS-6		23
18								
20	6					SS-7		28
22	7							
24				7.62/ 305.46				
26	8	CLAYEY SILT TILL: grey, moist, hard.				SS-8		32
28								
30	9			9.30/ 303.78				
		FINE SAND: brown, moist, very dense.				SS-9		100+
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

Flush Mount Cover

Bentonite Pellets

50mm blank PVC

50mm Slotted Pipe

Silica Sand

Groundwater Depth: On Completion: Dry on 21 May 2021: 10.80m

DRAWN: BL LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH2(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Geotechnical & Hydrogeological Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: CME-75, Hollow Stem

DRILLING DATE: February 10, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	P.I.D. Reading	"N" VALUE
		GROUND SURFACE (m asl)		313.08				
32	10							
34								
36	11					SS-10		82
38								
40	12					SS-11		100+
42				12.65/ 300.43				
	13	End of Borehole at 12.65m						
44								
46	14							
48								
50	15							
52								
54	16							
56								
58	17							
60								
62	18							
64								
66	19							

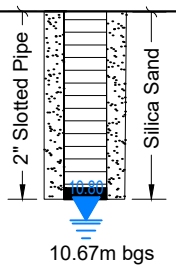
PENETRATION TESTING (SPT) ▲ 20 40 60 80

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: On Completion: Dry on 21 May 2021: 10.80m

DRAWN: BL LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH3(MW) SHEET. 1 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Solid Stem

DRILLING DATE: May 18, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
		GROUND SURFACE (m asl)		313.18			
0	0	Asphalt 50mm					
		Fill: SAND and GRAVEL, some SILT, black to dark brown, moist, compact			21-6236-1	SS-1	18
2	1	brown, moist, very loose				SS-2	4
4				1.52/ 311.66			
		SILTY SAND TILL: trace of GRAVEL, brown, moist, compact to dense				SS-3	26
6	2						
8						SS-4	37
10	3	wet at 3.35m				SS-5	20
12	4						
14							
16	5	wet at 4.88m				SS-6	27
18							
20	6					SS-7	35
22	7						
24				7.62/ 305.56			
		CLAYEY SILT TILL: trace of GRAVEL, some SILT pockets, grey, moist, hard				SS-8	+100
26	8						
28							
30	9			9.14/ 304.04			
		FINE SAND: light brown, slightly moist, very dense				SS-9	+100
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 ORWELL CONSTRUCTION

Flush Mount Cover

Bentonite Pellets

50mm blank PVC

50mm Slotted Pipe

Silica Sand

Groundwater Depth: On Completion: Dry. on 21 May 2021: 11.35m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH3(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Solid Stem

DRILLING DATE: May 18, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID	SAMPLES: Type NO.	SAMPLES: "N" VALUE
				313.18			
		End of Borehole at 12.65m		12.65/ 300.53		SS-10	100

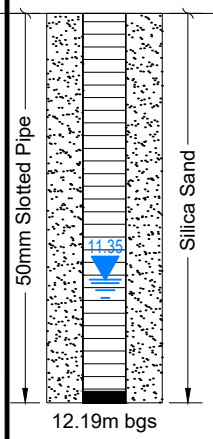
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER ORWELL CONSTRUCTION



Groundwater Depth: On Completion: Dry. on 21 May 2021: 11.35m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH4(MW) SHEET. 1 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Solid Stem

DRILLING DATE: May 18, 2021

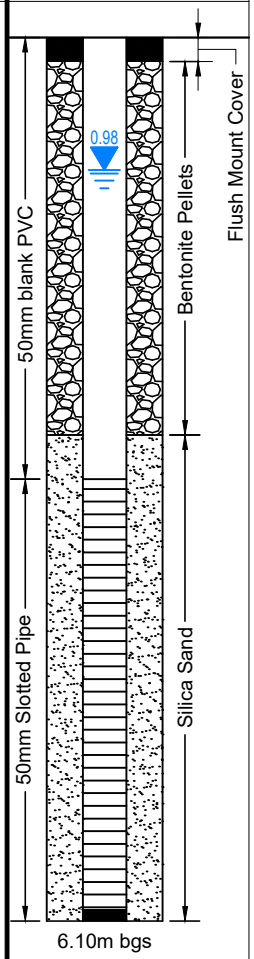
DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	SAMPLES Type NO.	"N" VALUE
		GROUND SURFACE (m asl)		312.98			
0	0	Asphalt 50mm					
		Fill: SAND and GRAVEL, some SILT, black to dark brown, moist, loose			21-6236-2	SS-1	6
2				0.91/ 312.07		SS-2	13
4	1	SILTY SAND TILL: trace of GRAVEL, moist, compact to dense					
6	2					SS-3	21
8		wet at 2.74m				SS-4	16
10	3					SS-5	10
12	4						
14							
16	5	wet at 4.88m				SS-6	35
18							
20	6					SS-7	33
22	7						
24				7.62/ 305.36			
26	8	CLAYEY SILT TILL: trace of GRAVEL, grey, moist, hard				SS-8	+100
28							
30	9			9.14/ 303.84			
32		FINE SAND: light brown, slightly moist, very dense				SS-9	+100
	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



Groundwater Depth: On Completion: Dry. on 21 May 2021: 0.98m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH4(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Solid Stem

DRILLING DATE: May 18, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID	SAMPLES: Type NO.	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 ORWELL CONSTRUCTION
				312.98						
32	10									
34										
36	11					SS-10	+100			
38										
40	12					SS-11	+100			
				12.65/ 300.33						
42		End of Borehole at 12.65m								
	13									
44										
46	14									
48										
	15									
50										
52	16									
54										
56	17									
58										
	18									
60										
62	19									
64										

Groundwater Depth: On Completion: Dry. on 21 May 2021: 0.98m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH5(MW) SHEET. 1 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Hollow Stem

DRILLING DATE: May 17, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	SAMPLES Type NO.	"N" VALUE
		GROUND SURFACE (m asl)		313.16			
0	0	Asphalt 50mm					
		Fill: SILT and SAND, moist, brown loose to compact at 0.46m				SS-1	8
2							
4	1					SS-2	20
6	2				21-6236-3	SS-3	6
				2.29/ 310.87			
8		SILTY SAND: brown, moist, compact,				SS-4	14
10	3	wet at 3.05m				SS-5	14
12							
14	4			4.57/ 308.59			
16	5	SILTY SAND TILL: trace of GRAVEL, light brown to greyish brown, dry to moist, very dense				SS-6	50
18		some SAND and GRAVEL at 4.54m and 6.10m					
20	6					SS-7	50
22	7						
24							
26	8					SS-8	36
28							
	9			9.14/ 304.02			
30		CLAYEY SILT TILL: grey, dense to very dense, moist				SS-9	46
32	10			9.60/ 303.56			

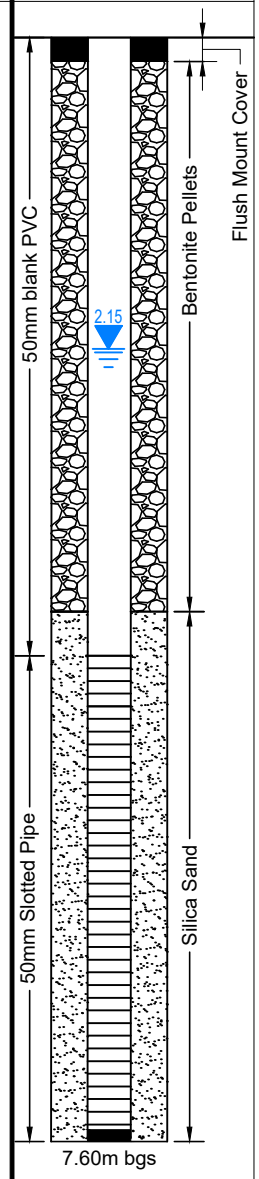
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER ORWELL CONSTRUCTION



Groundwater Depth: On Completion: Dry. on 21 May 2021: 2.15m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH5(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Hollow Stem

DRILLING DATE: May 17, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	SAMPLES Type NO.	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 ORWELL CONSTRUCTION
				313.16						
32	10	FINE SAND: light brown, very dense, moist								
34										
36	11					SS-10	+100			
38										
40	12	dry at 12.19m				SS-11	91			
42		End of Borehole at 12.65m		12.65/ 300.51						
44	13									
46	14									
48										
50	15									
52	16									
54										
56	17									
58										
60	18									
62	19									
64										

Groundwater Depth: On Completion: Dry. on 21 May 2021: 2.15m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH6(MW) SHEET. 1 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Hollow Stem

DRILLING DATE: May 17, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
		GROUND SURFACE (m asl)		312.96			
0	0	Asphalt 50mm					
		Fill: some stone, dark brown organic SILTY SAND, wet		0.61/ 312.35	21-6236-4	SS-1	6
2	1	SILTY SAND TILL: trace of GRAVEL, brown, moist, compact to very dense				SS-2	13
4							
6	2					SS-3	16
8						SS-4	17
10	3	some CLAY, below 3.05m				SS-5	16
12							
14	4						
16	5	little wet at 4.88m				SS-6	31
18							
20	6					SS-7	36
22	7	grey below 6.40m					
24				7.62/ 305.34			
26	8	CLAYEY SILT TILL: trace of GRAVEL, grey, moist, to dry, hard				SS-8	92
28							
30	9			9.14/ 303.82			
		FINE SAND: brown, moist to dry, very dense				SS-9	+100
32	10						

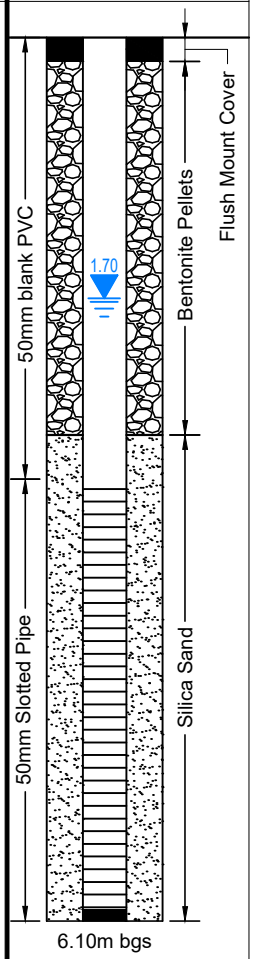
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER ORWELL CONSTRUCTION



Groundwater Depth: On Completion: 12.20m. on 21 May 2021: 1.70m

DRAWN: ZA LOGGED: AC CHECKED: FF

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH6(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 20-10636/37

PROJECT NAME: Hydrogeological and Geotechnical Investigations

LOCATION: 440 Essa Road, Barrie, Ontario

DRILLING METHOD: D-50 Hollow Stem

DRILLING DATE: May 17, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	SAMPLES Type NO.	SAMPLES "N" VALUE
				312.96			
32	10						
34							
36	11	dry below 10.83m				SS-10	+100
38							
40	12	dry at 12.19m				SS-11	+100
		End of Borehole at 12.50m		12.50/ 300.46			
42	13						
44							
46	14						
48							
50	15						
52	16						
54							
56	17						
58							
60	18						
62	19						
64							

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 ORWELL CONSTRUCTION

Groundwater Depth: On Completion: 12.20m. on 21 May 2021: 1.70m

DRAWN: ZA LOGGED: AC CHECKED: FF

APPENDIX C– MOISTURE CONTENT AND GRAIN SIZE DISTRUBUTION ANALYSIS

FISHER ENVIRONMENTAL LABORATORIES

FULL RANGE ANALYTICAL SERVICES • SOIL/WATER/AIR TESTING • ENVIRONMENTAL COMPLIANCE PACKAGES • 24 HOUR EMERGENCY RESPONSE • CALA ACCREDITED

400 ESNA PARK DRIVE #15
MARKHAM, ONT. L3R 3K2
TEL: 905 475-7755
FAX: 905 475-7718
www.fisherenvironmental.com

Client:	One Urban Developments Inc.	***F.E. Job #:***	21-6537
Address:	28 Rivalda Road	***Project Name:***	Geotechnical / Hydrogeological
	Toronto, ON	***Project ID:***	FE-P 20-10636 / 20-10637
	M9M 2M3	***Date Sampled:***	N/A
Tel.:		***Date Received:***	19-May-2021
Email:		***Date Reported:***	1-Jun-2021
Attn.:	Nick Stillo	***Location:***	440 Essa Road
	Principal, COO		Barrie, ON

Certificate of Analysis

Analyses	Matrix	Quantity	Date Extracted	Date Analyzed	Lab SOP	Method Reference
Moisture Content	Soil	13	N/A	25-May-21	Support Procedures F-99	Carter (1993)
Grain Size	Soil	7	N/A	31-May-21	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:	13 Soil Sample(s)

Parameter	***21-6537-1*** BH2 SS3 1.50-1.95m	***21-6537-2*** BH2 SS5 3.00-3.45m	***21-6537-3*** BH2 SS7 6.05-6.50m	***21-6537-4*** BH2 SS8 7.55-8.05m	***21-6537-5*** BH4 SS4 2.25-2.70m	***21-6537-6*** BH4 SS7 6.05-6.50m
Moisture Content (%)	11	10	5.8	22	8.5	9.2

Parameter	***21-6537-7*** BH4 SS8 7.55-8.05m	***21-6537-8*** BH4 SS10 10.60-11.05m	***21-6537-9*** BH6 SS2 0.75-1.20m	***21-6537-10*** BH6 SS5 3.00-3.45m	***21-6537-11*** BH6 SS7 6.05-6.65m	***21-6537-12*** BH6 SS8 7.55-8.05m
Moisture Content (%)	24	3.3	9.7	10	7.8	23

Parameter	***21-6537-13*** BH7 SS9 9.15-9.55m					
Moisture Content (%)	7.2					

QA/QC Report

Parameter	**Blank**	**RL**	**LCS**	**AR**	**Duplicate**	**AR**
			Recovery (%)		**RPD (%)**	
Moisture Content (%)	<0.1	0.1	100	70-130	1.1	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:	13 Soil Sample(s)

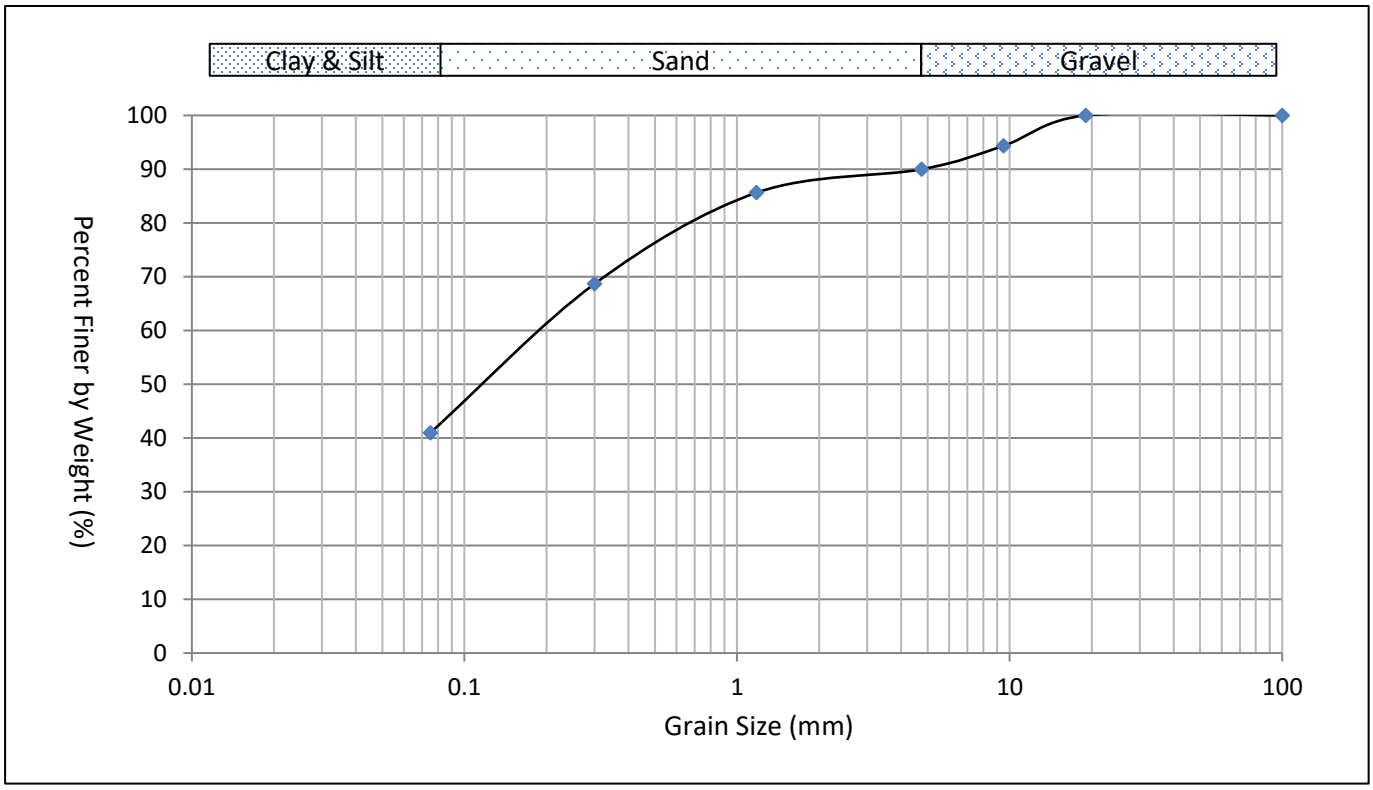
Parameter	***21-6537-2*** BH2 SS5 3.00-3.45m	***21-6537-4*** BH2 SS8 7.55-8.05m	***21-6537-5*** BH4 SS4 2.25-2.70m	***21-6537-6*** BH4 SS7 6.05-6.50m	***21-6537-7*** BH4 SS8 7.55-8.05m	***21-6537-8*** BH4 SS10 10.60-11.05m
Grain Size (%)						
>19mm	0.0	0.0	0.0	6.4	0.0	0.0
9.5mm-19mm	5.7	0.0	0.0	4.8	0.0	0.0
4.75mm-9.5mm	4.4	0.0	5.5	2.6	0.0	0.0
1.18m-4.75mmm	4.4	0.3	5.4	3.5	0.5	0.1
300um-1.18mm	17.0	0.7	26.2	13.3	4.2	2.2
75um-300um	27.7	0.5	27.9	20.4	4.0	18.0
<75um	41.0	98.5	35.0	49.1	91.3	79.7
Clay & Silt	**41**	**98**	**35**	**49**	**91**	**80**
Sand	**49**	**2**	**60**	**37**	**9**	**20**
Gravel	**10**	**0**	**6**	**14**	**0**	**0**

Parameter	***21-6537-13*** BH7 SS9 9.15-9.55m					
Grain Size (%)						
>19mm	0.0					
9.5mm-19mm	0.0					
4.75mm-9.5mm	0.0					
1.18m-4.75mmm	0.0					
300um-1.18mm	0.4					
75um-300um	62.4					
<75um	37.2					
Clay & Silt	**37**					
Sand	**63**					
Gravel	**0**					

Grain Size Distribution

Sample ID: 21-6537-2 BH2 SS5 3.00-3.45m

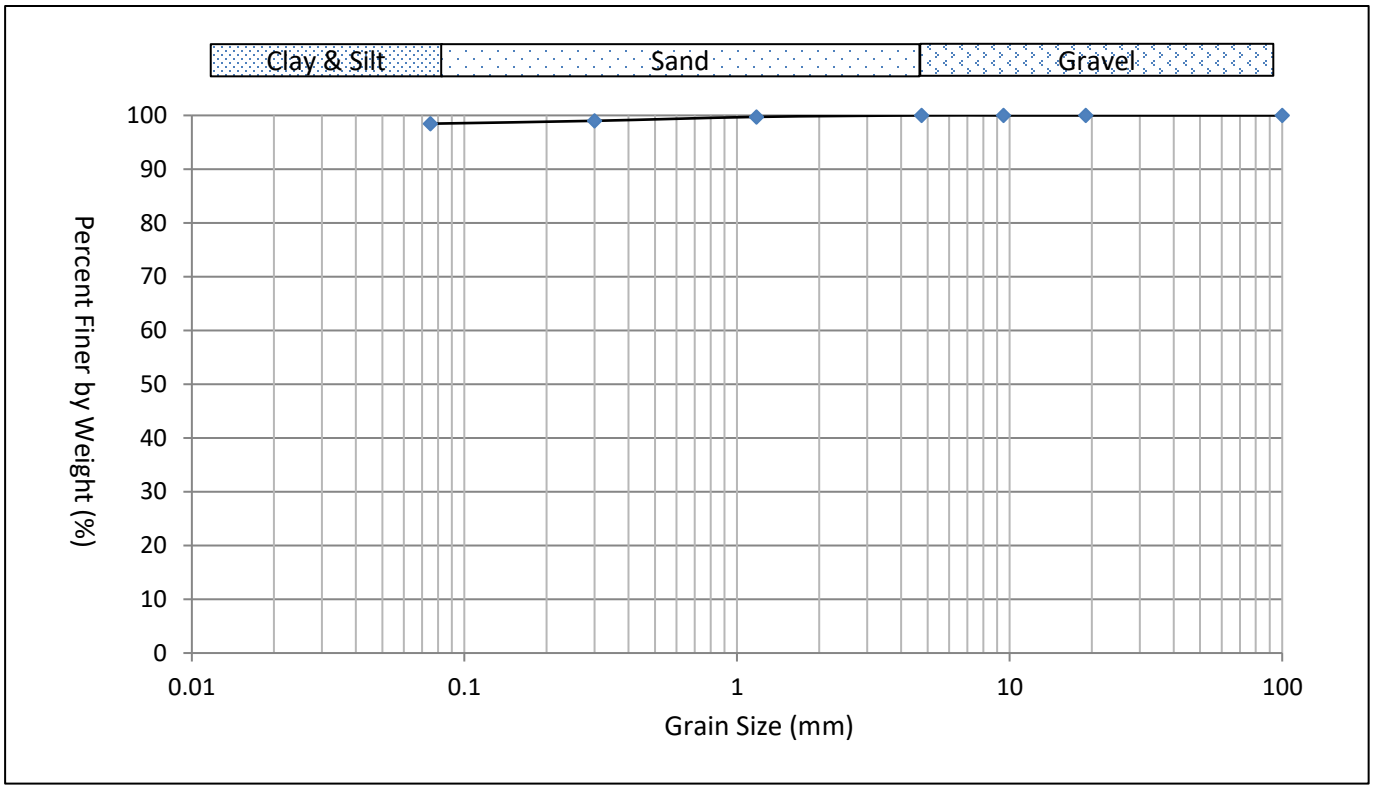
Clay & Silt: 41% Sand: 49% Gravel: 10%



Grain Size Distribution

Sample ID: 21-6537-4 BH2 SS8 7.55-8.05m

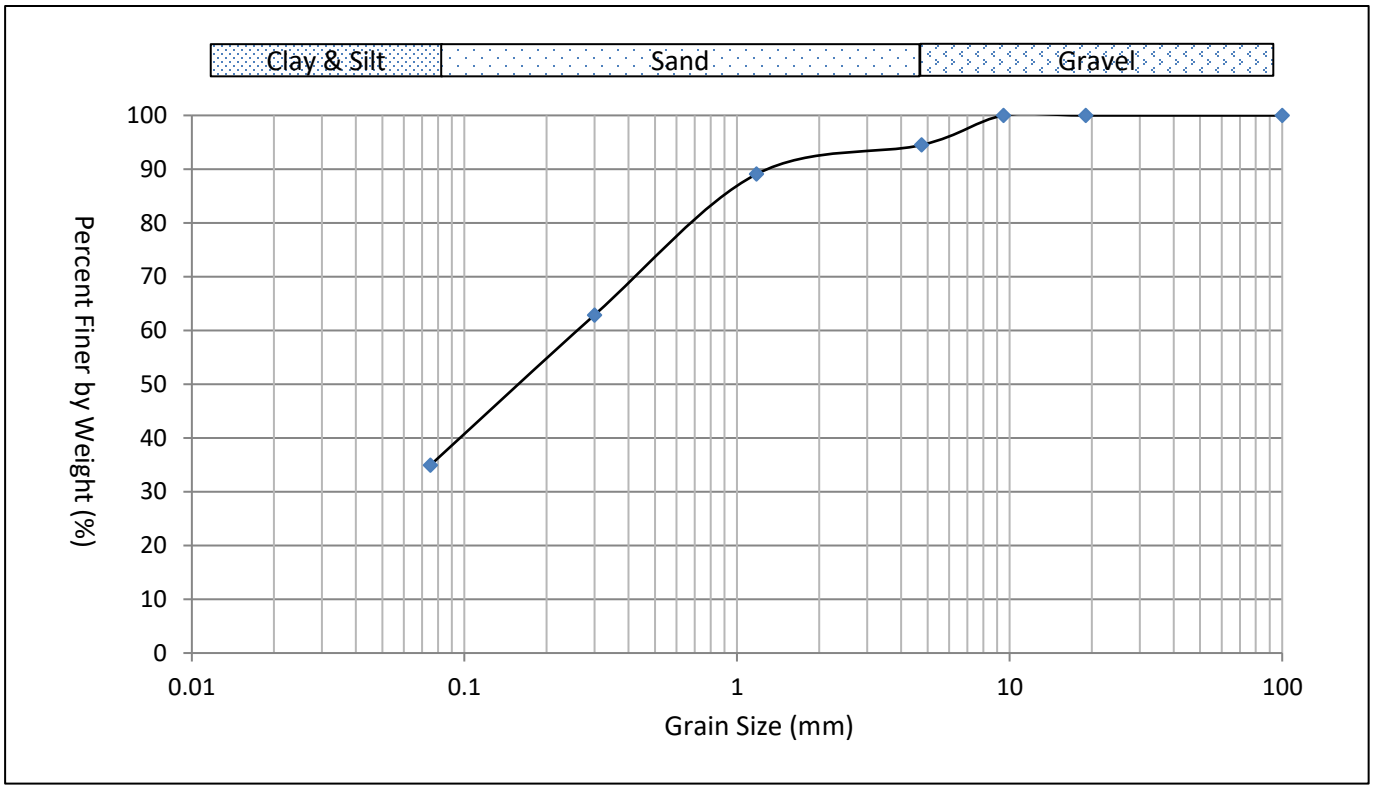
Clay & Silt: 98% Sand: 2% Gravel: 0%



Grain Size Distribution

Sample ID: 21-6537-5 BH4 SS4 2.25-2.70m

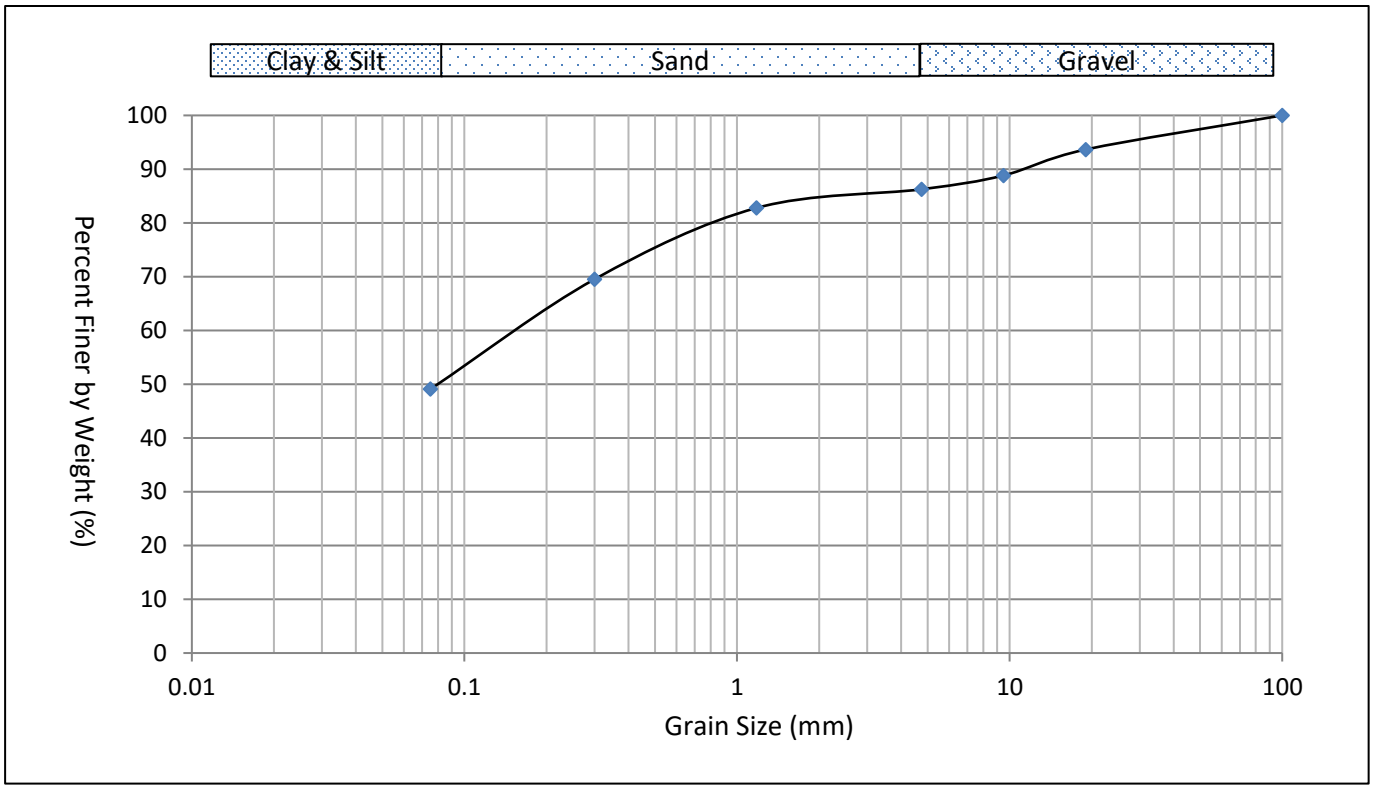
Clay & Silt: 35% Sand: 60% Gravel: 6%



Grain Size Distribution

Sample ID: 21-6537-6 BH4 SS7 6.05-6.50m

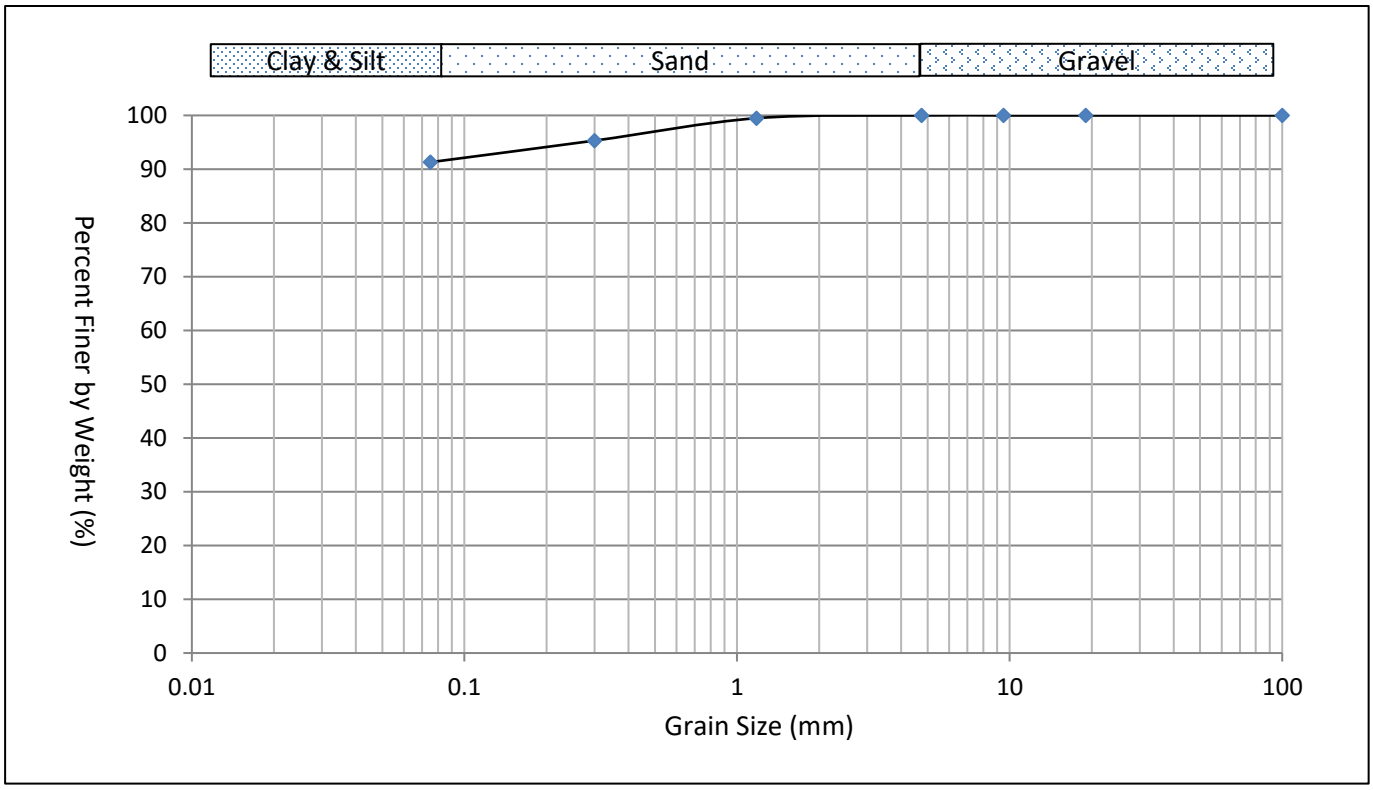
Clay & Silt: 49% Sand: 37% Gravel: 14%



Grain Size Distribution

Sample ID: 21-6537-7 BH4 SS8 7.55-8.05m

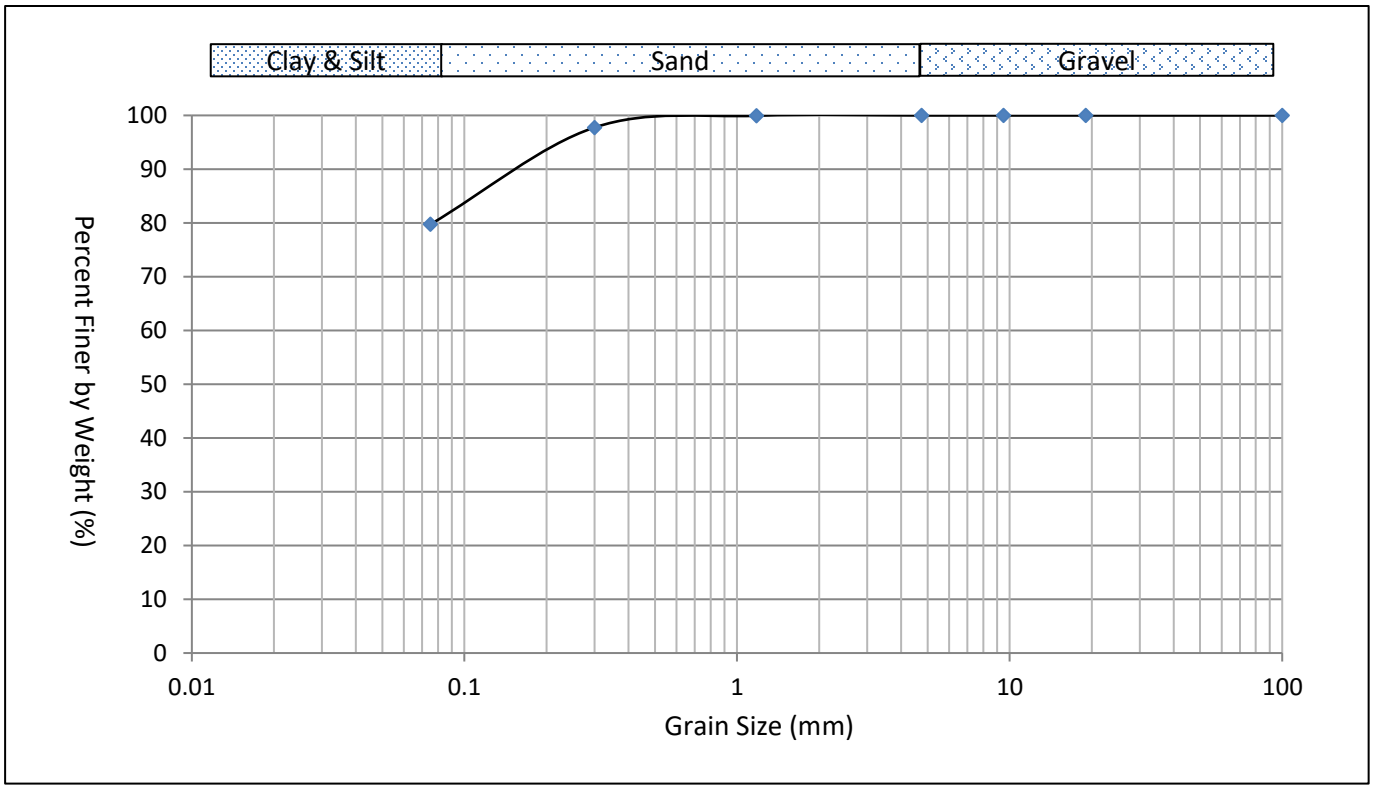
Clay & Silt: 91% Sand: 9% Gravel: 0%



Grain Size Distribution

Sample ID: 21-6537-8 BH4 SS10 10.60-11.05m

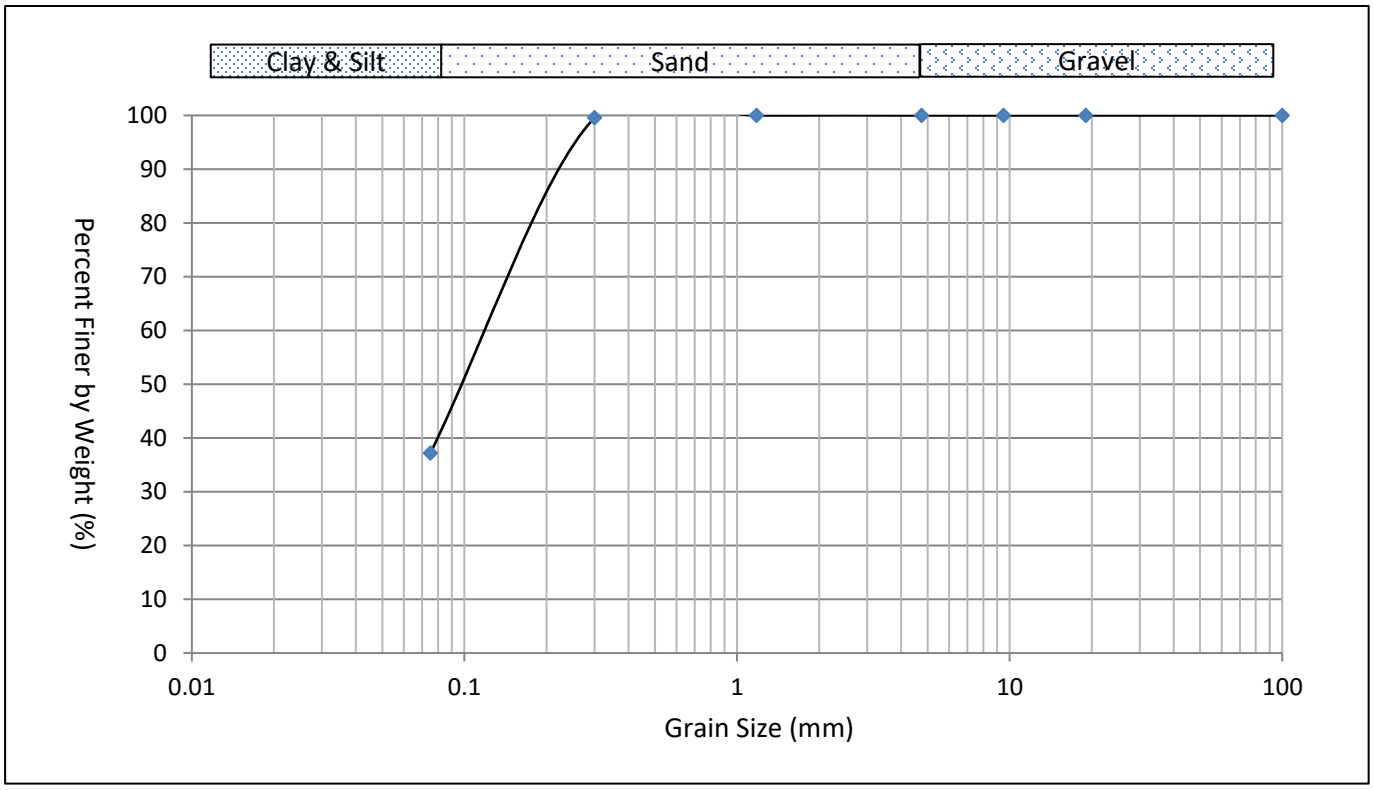
Clay & Silt: 80% Sand: 20% Gravel: 0%



Grain Size Distribution

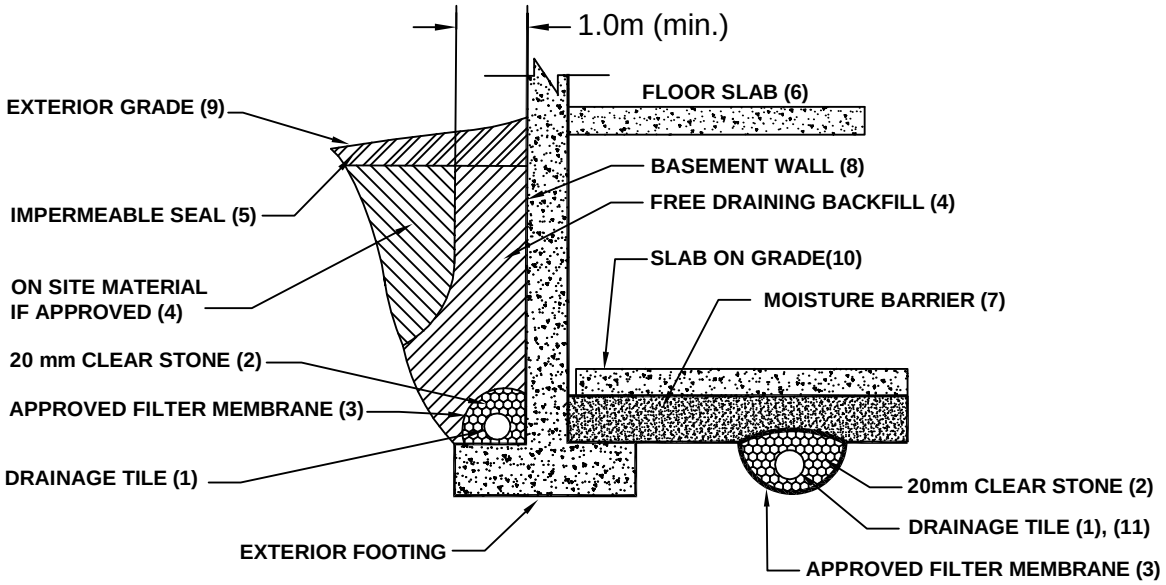
Sample ID: 21-6537-13 BH7 SS9 9.15-9.55m

Clay & Silt: 37% Sand: 63% Gravel: 0%



APPENDIX D– SUBDRAIN RECOMMENDATION

FISHER ENVIRONMENTAL LTD.



NOTES:

(1) DRAINAGE TILE TO CONSIST OF 100mm (4") DIAMETER WEEPING TILE OR EQUIVALENT PERFORATED PIPE LEADING TO A POSITIVE SUMP OR OUTLET.

(2) 20mm (3/4") CLEAR STONE - 150mm (6") TOP AND SIDE OF DRAIN. IF DRAIN IS NOT ON FOOTING, PLACE 100mm (4") OF STONE BELOW DRAIN.

(3) WRAP THE CLEAR STONE WITH AN APPROVED FILTER MEMBRANE (TERRAFIX 279R OR EQUIVALENT).

(4) FREE DRAINING BACKFILL - OPSS GRANULAR B OR EQUIVALENT COMPACTED TO THE SPECIFIED DENSITY. DO NOT USE HEAVY COMPACTION EQUIPMENT WITHIN 1.8m (6') OF WALL.

(5) IMPERMEABLE BACKFILL SEAL - COMPACTED CLAY, CLAYEY SILT OR EQUIVALENT. IF ORIGINAL SOIL IS FREE-DRAINING, SEAL MAY BE OMITTED. MAXIMUM THICKNESS OF SEAL TO BE 0.5m.

(6) DO NOT BACKFILL UNTIL WALL IS SUPPORTED BY BASEMENT AND FLOOR SLABS OR ADEQUATE BRACING.

(7) MOISTURE BARRIER TO BE AT LEAST 200mm (8") OF COMPACTED CLEAR 20mm (3/4") STONE OR EQUIVALENT FREE DRAINING MATERIAL. A VAPOUR BARRIER MAY BE REQUIRED FOR SPECIALTY FLOORS.

(8) BASEMENT WALL TO BE DAMP PROOFED.

(9) EXTERIOR GRADE TO SLOPE AWAY FROM BUILDING.

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

(11) UNDERFLOOR DRAIN INVERT TO BE AT LEAST 300mm (12") BELOW UNDERSIDE OF FLOOR SLAB. DRAINAGE TILE PLACED IN PARALLEL ROWS 6 TO 8m (20-25') CENTERS ONE WAY. PLACE DRAIN ON 100mm (4") CLEAR STONE WITH 150mm (6") OF CLEAR STONE ON TOP AND SIDES. ENCLOSE STONE WITH FILTER FABRIC AS NOTED IN (3)

(12) THE ENTIRE SUBGRADE TO BE SEALED WITH APPROVED FILER FABRIC (TERRAFIX 270R OR EQUIVALENT) IF NON-COHESIVE(SANDY) SOILS BELOW GROUND WATER TABLE ENCOUNTERED.

(13) DO NOT CONNECT THE UNDERFLOOR DRAINS TO PERIMETER DRAINS.

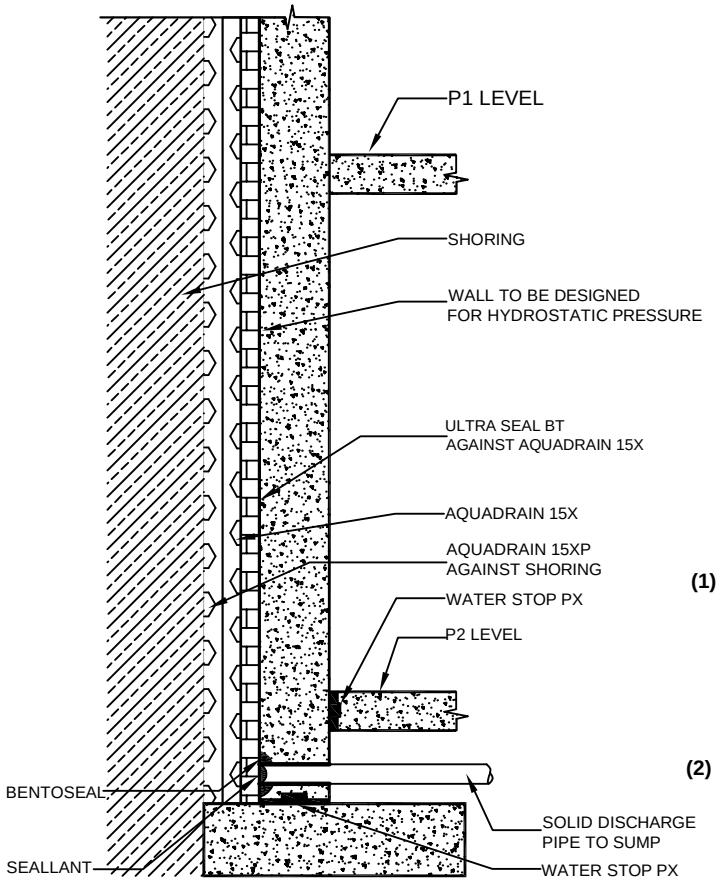
(14) REVIEW THE GEOTECHNICAL REPORT FOR SPECIFIC DETAILS.

DRAINAGE AND BACKFILL RECOMMENDATIONS

BASEMENT WITH UNDERFLOOR DRAINAGE

(NOT TO SCALE)

FISHER ENVIRONMENTAL LTD.



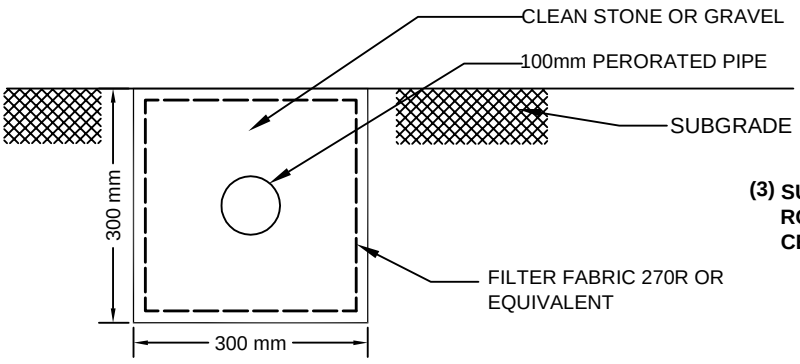
NOTES:

(1) ALL PERMANENT DRAINAGE PIPES MUST HAVE GEOTEXTILE FILTER SLEEVE TO PREVENT LONG TERM SILTING. TO FURTHER MINIMIZE SILTATION OF THE DRAINAGE SYSTEM, ALL DRAINAGE PIPE CONNECTION MUST BE SOLID PVC ELBOWS AND Ts. NO "BUTT" END CONNECTIONS SHOULD BE PERMITTED.

(2) PERIMETER COLLECTION PIPE TO BE SOLID PIPE,

SUGGESTED EXTERIOR DRAINAGE AGAINST SHORING

(NOT TO SCALE)



(3) SUBGRADE DRAIN TO BE PLACED IN PARALLEL ROWS 6-8 m (20'-25'), FROM CENTERLINE TO CENTERLINE.

DETAIL OF SUBGRADE DRAIN

(NOT TO SCALE)