FISHER ENGINEERING

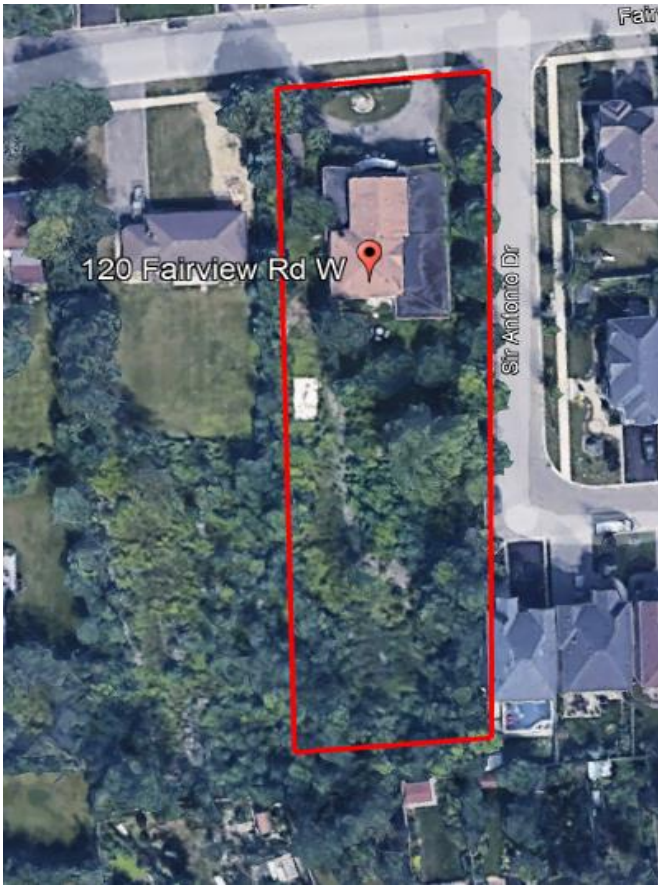
ENGINEERING

Professional Engineers Ontario

LABORATORY

CALA
Canadian Association for Laboratory Accreditation Inc.

GEOTECHNICAL INVESTIGATION



PROPOSED NEW DEVELOPMENT

120 FAIRVIEW ROAD WEST,

MISSISSAUGA,

ONTARIO L5B 1K6

Prepared for:

Land and Building Experts.

Project No. FG 23-13005

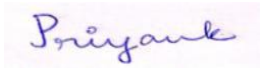
June 16, 2023

400 Esna Park Drive, Unit 15
Markham, ON
L3R 3K2

Tel: (905) 475-7755
Fax: (905) 475-7718
www.fishereng.com

Issued to:	Land and Building Experts 6-570 Alden Rd, Markham, ON L3R 8N5
Contact:	Mia Xue landbuildex@gmail.com 905-940-9937
Project Name:	Geotechnical Investigation for Proposed Development
Project Address:	120 Fairview Road West, Mississauga, ON
Project Number:	FG- 23-13005
Issued on:	June 16, 2023

Report Prepared By:



Priyank Srivastava, M. Eng.,
Geotechnical Technician
Priyank@fishereng.com

Project Manager:
(Primary Contact)

Clive Wiggan, PhD., PMP.,
Project Manager
clive@fishereng.com

Report Reviewed By:

Frank Fan, PEng.,
Geotechnical Engineer
frank@fishereng.com

TABLE OF CONTENTS

1. INTRODUCTION **1**

2. SITE AND PROJECT DESCRIPTIONS **1**

3. FIELD AND LABORATORY WORK **2**

4. SUBSOIL CONDITIONS **3**

5. GROUNDWATER LEVELS **4**

6. FOUNDATION CONSIDERATIONS **5**

6.1 SPREAD/STRIP FOOTINGS 5

6.2 GENERAL COMMENTS ABOUT FOOTING CONSTRUCTION 6

7. SEISMIC DESIGN CONSIDERATIONS **7**

8. BASEMENT WALL DESIGN **7**

9. EXCAVATION AND BACKFILL CONSIDERATIONS **8**

10. GROUNDWATER CONSIDERATIONS **9**

11. SLAB ON GRADE AND PERMANENT DRAINAGE **9**

12. UNDERGROUND UTILITIES **10**

13. PAVEMENT **11**

14. CHEMICAL ANALYSES **13**

15. LIMITATIONS **13**

APPENDIX A: SITE & LOCATION PLANS ..... **A**

APPENDIX B: LOG OF BOREHOLES ..... **B**

APPENDIX C: GRAIN SIZE, MOISTURE CONTENT & CHEMICAL ANALYSES ..... **C**

1. INTRODUCTION

Fisher Engineering Limited (Fisher) was commissioned by Land & Building Experts to carry out a Geotechnical Investigation for the proposed development located at 120 Fairview Road West, Mississauga, ON, hereinafter referred to as the 'Site'.

The purpose of this investigation was to assess subsurface soil and groundwater conditions at the site and to outline geotechnical parameters and make recommendations for the design of the proposed structures.

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

2. SITE and PROJECT DESCRIPTIONS

Site Settings

The site is located at the southwest intersection of Fairview Road West and Sir Antonio Drive, approximately 400m west of Hurontario St, in a residential area of Mississauga, and is bounded by houses to the south and west, Fairview Rd W to the north and Sir Antonio Dr to the east, beyond which are residential properties. The site has an approximate area of 3614.25 m^2 (0.90 acres) and was occupied by a single storey dwelling at the time of the investigation. Access to the property was via a circular driveway off Fairview Rd W.

Topography

The site is generally flat and slopes from northeast to southwest with elevations changing from approximately 142.21m asl at BH2, located in the northeast corner, to 140.27m asl at BH5, located at the southwest corner of the site.

Proposed Development

Site Plans prepared by Land & Building Experts, provided to Fisher during the investigation, shows the proposed development consisting of 9 single family residences with basements. Details, such as finished floor elevations, were not available during the investigations. The existing house will be demolished.

3. FIELD and LABORATORY WORK

Public and private utilities clearances were carried out by Ontario One-Call and Utility Marx, on behalf of Fisher, prior to drilling.

Subsurface Investigation

Subsurface exploration for the geotechnical investigation was conducted on May 23, 2023 during which six (6) boreholes were extended to approximate depths of 3.66m to 6.55m below prevailing grades (elevations of 134.0m to 136.82m asl). Monitoring wells were installed in five of the boreholes, MW1, MW2 & MW4 to MW6, for groundwater level monitoring, sampling and testing purposes. The wells were constructed with 3.05m (10') long, 51mm diameter PVC slotted screen pipes, with the bases at approximate depths as shown in the logs of boreholes at Appendix B. A clean silica sand pack was placed around each well screen which was isolated with bentonite extending to slightly below existing grade.

A D-50 track mounted drill rig equipped with solid stem augers, supplied by Terra Firma Services, was used for drilling under direct supervision of Fisher Engineering personnel. Soil samples were taken at regular intervals using a split–spoon sampler advanced by means of the Standard Penetration Test (SPT) which was conducted in general accordance with ASTM Specification D1586. All recovered soil samples were placed in clear, sealable plastic bags in the field and transported to Fisher Engineering laboratory for further examination, characterization and laboratory analyses.

A description of the subsurface conditions encountered at each borehole location is presented in Appendix B - Log of Boreholes.

Laboratory Analyses

The soil samples were taken to the Fisher Engineering laboratory for further visual assessment and classification. Representative samples from BH1 to BH6 were submitted to the laboratory for moisture content tests along with grain size and hydrometer analyses. Six (6) soil samples from BH2, BH4 and BH5 were submitted for chemical analyses (pH, chloride and sulphate tests). The laboratory results, which are presented in Appendix C, are consistent with the field description for subsurface soils discussed in Section 4.0.

The soil samples recovered during the investigation will be stored in the Fisher Engineering 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 interpolated from a topographic survey plan, prepared by Wahba Surveying, dated July 22, 2022, provided to Fisher during the investigation.

4. SUBSOIL CONDITIONS

Surface and subsurface conditions encountered at borehole locations are shown in Appendix B - Log of Boreholes and are summarized in the following sections. The logs include stratification at borehole locations along with detailed soil descriptions. Variations in soil stratification may occur and should be expected between borehole locations and elsewhere on the site.

Topsoil/Asphalt: An approximately 0.15m thick layer of topsoil was observed at the surface of BH3 to BH6 while asphalt layers (approximately 50mm thick) were encountered at the surface of BH1 and BH2.

Fill/Granular Material: The asphalt layers of BH1 & BH2 were underlain by granular materials followed by fill consisting of brown to greenish brown, moist, loose sandy silt with some clay and trace gravel extending to maximum depths of 1.22m below prevailing grade as shown in Table 1.

Table 1: Summary of fill depth and elevation

Borehole No.	Surface Elevation (m asl)	Depth of Borehole (m)	Elevation at Bottom of Borehole (m asl)	Depth of Fill (m)	Elevation at Bottom of Fill (m asl)
BH1	142.18	5.36	136.82	1.22	140.96
BH2	142.21	6.17	136.04	0.30	141.91
BH3	140.84	6.4	134.44	0.15	140.69
BH4	140.55	6.55	134.0	0.15	140.4
BH5	140.27	3.66	136.61	0.15	140.12
BH6	140.31	3.66	136.65	0.15	140.16

Sandy Silt Till: Grey, moist, very dense sandy silt with trace to some clay and trace gravel was observed below the fill layer in BH1 extending to depth of 5.18m bgs (137.0 m asl). Pieces of shale were observed embedded in this layer at 4.57m bgs.

Clayey Silt/Silty Clay: Layers of dark brown / brown to grey, moist, soft to hard clayey silt/silty clay with trace to some sand and trace gravel were encountered below the fill layer in BH2 & BH3 extending to approximate depths of 0.79m and 1.14m bgs (139.70m & 141.42m asl) respectively and below the topsoil layers in BH4, BH5 and BH6 extending to 0.76m bgs (BH5) to 2.29m bgs (BH4).

Sandy Clayey Silt: Grey, moist, hard sandy clayey silt with trace gravel was encountered below the clayey silt till in BH4 extending to 3.05m bgs (137.50m asl).

Silty Gravel / Gravelly Sandy Silt: Grey, moist, compact to very dense silty gravel/ gravelly sandy silt with some sand & trace to some clay was encountered below the clayey silt layer in BH2 and BH5 extending to depth 1.37m bgs (140.84m asl) and 2.74m bgs (137.53m asl) respectively. Trace of organic material was observed in BH2 in this layer.

Clayey Silt Till: Layers of grey, dry to moist, very dense clayey silt till with trace sand and some gravel were encountered below the silty gravel layer in BH2 extending to 2.74m bgs (139.47m asl); below sandy clayey silt layer in BH4 extending to 3.66m bgs (136.89m asl) and below the silty clay layer in BH5 extending to 2.0m bgs (138.27m asl).

Silt Till: Grey, moist, dense to very dense silt till with trace to some sand, trace clay and pieces of shale were encountered below the clayey silt layer in BH3 and BH6 extending to depth 2.74m bgs (138.10m asl) and 3.20m (137.11m asl), respectively.

Shale: Grey, dry, hard shale with some sandy silt and trace gravel was encountered below the sandy silt/clayey silt till/ silt till layers in BH1 to BH6 extending to termination depths of 3.66m (BH5 & BH6) to 6.55m (BH4) (elevation of 136.65m to 134.0m asl).

5. GROUNDWATER LEVELS

Standing water was observed at depths of 4.88m and 5.49m bgs (135.96m & 135.06m asl) in the open borehole (BH3 & BH4) while caving in of soils occurred at 3.35m and 3.05m bgs in BH5 and BH6. Boreholes BH1, BH2, BH5 and BH6 were dry on completion of drilling. Approximate locations of the monitoring wells are presented in Appendix A. Measured groundwater depths and elevations are summarized in Table 2.

Table 2: Groundwater Levels and Elevations

Monitoring Well No.		MW1	MW2	BH3	MW4	MW5	MW6
Surface Elevation (m asl)		142.18	152.21	140.84	140.55	140.27	140.31
Depth of Well/BH, m bgs		5.33	4.57	-	6.1	3.35	3.05
Elevation at well base, m asl		136.85	137.64	-	134.45	136.92	137.26
In open borehole on Completion	GW level, m bgs	Dry	Dry	4.88	5.49	Dry BH Caved in at 3.35m	Dry BH Caved in at 3.05m
	GW Ele, m asl			135.96	135.06		
7-June-23	GW level, m bgs	Dry	Dry	n/a	3.9	Dry	2.95
	GW Ele, m asl				136.65		137.36

6. FOUNDATION CONSIDERATIONS

It was understood that the proposed development will consist of nine single family residences with basement. Details such as finished floor elevations were not available during the investigation. The subsurface investigation showed that the predominant native soils, below the fill layers, consist generally of compact to very dense sandy silt till/ clayey silt to silt till. The sandy/silty till soils were underlain generally by hard shale. The following foundation options are recommended based on the observed soil conditions:

6.1 Spread/Strip Footings

The proposed building(s) may be supported on conventional spread/strip footings founded on undisturbed native, sandy silt till/clayey silt till/silt till. Recommended approximate founding depths/ elevations and corresponding bearing resistance at limit states (SLS and ULS) in the native soils are presented in Table 3. For the building(s) with basement level, footings will likely be located at depths at or below 3m bgs. For footings placed on shale, bearing capacity of 500 kPa at SLS and 750 kPa at ULS may be used for design purposes.

Table 3: Foundation Design for Conventional Footings

Building/Borehole			Elevation at BH surface (m asl)	Approx. depth of footings at or below (m bgs)	Approx. elevation of footings at or below (m asl)	Bearing Resistance at SLS (kPa)	Bearing Resistance at ULS (kPa)
Proposed single family residences	BH1	With basement level	142.18	1.50	140.68	250	375
	BH2		142.21	1.50	140.71	250	375
	BH3		140.84	1.50	139.34	250	375
	BH4		140.55	1.50	139.05	250	375
	BH5		140.27	1.50	138.77	250	375
	BH6		140.31	1.50	138.81	250	375

6.2 General Comments about Footing Construction

- For footings founded at different levels in the vicinity of each other or located adjacent to excavated and backfilled areas, such as footing/sewer/utility trenches/previous excavations etc., the slope of the imaginary line joining the bottom of two footings or the bottom of footing and excavation should not be steeper than 10 horizontal to 7 vertical.
- For frost protection, a minimum 1.2m soil cover should be provided for footings exposed to freezing weather conditions.
- The existing building is to be removed and soils excavated to the native soils in the area of any new building.
- Base conditions at the footing founding levels should be observed by geotechnical personnel from Fisher, prior to pouring concrete, to ensure that design bearing pressures are being attained.

7. SEISMIC DESIGN CONSIDERATIONS

The building must be designed to resist a minimum earthquake force. The Ontario Building Code (2016) specifies that the building be designed to withstand a minimum lateral seismic force ***V***, which is assumed to act non-currently in any direction on the building as per the following expression:

$$\boldsymbol{V = S(T_a)M_v I_E W/(R_d R_o)}$$

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

In accordance with **Table 4.1.8.4.A**. of the current Ontario Building Code, the Site can be classified as **Site Class C** for Seismic Site Response. Acceleration and velocity-based Site coefficients, ***Fa*** and ***Fv***, should be determined from **Tables 4.1.8.4.B**. and **4.1.8.4.C**. respectively of the OBC, using linear interpolation for intermediate values of ***Sa(0.2)*** and ***Sa(1.0).***

The seismic design data given in Table 1.2 of the Supplementary Standard SB-1 in Volume 2 of the Ontario Building Code, for selected Municipal locations, should be used to complete the seismic analysis. For a higher site classification, Shear Wave Velocity tests are recommended.

8. BASEMENT WALL DESIGN

Basement walls should be designed to resist a minimum pressure “p”, in the overburden soils, at any depth “h” below the surface, as given by the expression:

$$\boldsymbol{p = K[\Upsilon h + q]}$$

Where: K = coefficient of earth pressure

Υ = unit weight of soil, and

q = Surcharge load in kPa if any.

Design parameters K and Υ are recommended in Section 9 of this report.

If perimeter/underfloor drainage systems are not permitted, and a watertight structure design (full or partial) is adopted then impacted lowest basement and floor slab must be designed to resist hydrostatic/uplift pressures. The highest observed groundwater should be used to determine the water pressures. Walls should be waterproofed to at least 1m above the highest observed water level.

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

$$p = K (\gamma h_1 + \gamma' h_{2+} q) + \gamma_w h_2$$

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

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

γ_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. EXCAVATION AND BACKFILL CONSIDERATIONS

It is anticipated that no major problems will be encountered for the excavation depths for footings and underground utilities. The excavations must however be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA).

For excavations deeper than 1.2m, the sides should be sloped in accordance with the requirements of OHSA. Where this condition cannot be met, a temporary shoring system should be introduced.

Based on the subsurface exploration, the encountered subsoils are dominated generally by compact to dense sandy silt till/silt till to clayey silt till. For the subject site excavation, in accordance with O. Reg. 213/91, S.226 (1) the fill and native, moist, predominantly compact to very dense till soils may be classified as **Type 2 soils**. It should be noted that wet seams/layers may require flattening of the side slopes. Geotechnical parameters are presented in Table 4.

For backfill against subsurface walls and footings, Granular Class 'B' aggregates are recommended. On-site excavated material may be acceptable subject to further inspection on the site.

Table 4: Geotechnical Parameters

SUBSOIL	Depth, m	Unit Weight, γ (KN/m³)	Coefficient of Earth Pressure		
			K_a	K_p	K_o
Fill	To 1.22m	19	0.35	2.86	0.48
Clayey Silt/Silty Clay	1.14m	20.5	0.3	3.24	0.47
Silt	3.66m	15	0.33	3.0	0.4
Sandy Silt Till	5m	19	0.27	3.65	0.43

10. GROUNDWATER CONSIDERATIONS

Standing water was observed at 4.88m & 5.49m bgs (135.96m & 135.06m asl) in the open borehole (BH3 & BH4) while caving in of soils occurred at 3.35m and 3.05m bgs in BH5 and BH6. Boreholes BH1, BH2, BH5 and BH6 were dry on completion of drilling. Static groundwater levels were measured at 3.90m and 2.95m in the shallow monitoring wells (MW4 & MW6); elevations 136.65m & 137.36m asl, while the remaining wells remained dry within the screened depths. Moisture content values from laboratory tests on subsurface soils were in the range 4.5% to 19.7% indicating dry to wet conditions. Based on the field investigation and laboratory results it is expected that some amount of groundwater may be encountered within the estimated footing depths during excavation in some areas of the site.

It should be noted that perched water may also be encountered within the expected footing depths in some areas. Any perched/seepage water or surface run-off, if encountered, is not expected to be significant and may be handled by pumping from sump pits if required.

11. SLAB ON GRADE AND PERMANENT DRAINAGE

For the subject site, the floor slab should rest on a compacted bed of size 19mm clear stone at least 200mm thick overlaying competent native subsoil or engineered fill. The stones will act as a vapour barrier and should meet the requirements of OPSS 1004 for clear stone. If required, the thickness of the stone layer can be increased to 500mm to accommodate mechanical components of floor drainage.

If engineered fill is used to raise subgrade up for slab construction, the engineered fill must be placed on a thoroughly proof-rolled exposed base provided organic soil /topsoil / fill / construction debris / underside

utilities are fully removed and the base is approved by engineering staff from Fisher before commencing of engineered fill construction. Any soft spots revealed during proof-rolling should be sub-excavated and backfilled with suitable granular materials, compacted to 98% SPMDD.

The basement level should be equipped with an efficient drainage system, which includes perimeter weeping tiles around the bottom of the garage wall footings and interior weeping tiles below the floor slab. The perimeter weepers should be surrounded by clear stone or pea gravel encased in a granular filter or filter cloth. Both weepers should be connected to independently positive frost-free sump pits from where the water is constantly removed.

Where there is insufficient space for the installation of exterior perimeter weeping tiles, the drainage system can be modified by providing vertical drainage between the basement walls and 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 basement wall footings.

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.

12. UNDERGROUND UTILITIES

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

Bedding for utilities - For the subject site, it is expected that the underground services would be founded on sandy silt/ sand & silt layers. Granular Class 'A' aggregate is generally considered well suited to be used as bedding material. It is expected that the sewer trenches would be founded on compact to dense sandy silt till/ sand & silt to till may be into moist to wet subsoil. If this is the case, then higher-class bedding may have to be used combined with a geotextile. Localized dewatering may be required depending on observations during construction (will be negligible and can be handled by pumping from sump pits).

If the excavation is deeper than 1.2m, the 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.

Trench backfill should be uniformly compacted to a density that minimizes the risk of long-term settlement. Selected on-site excavated native soils/fill may be considered suitable for re-use in trench

backfilling, provided that organics/construction debris are sorted out and the material is not allowed to be wet. Moisture content should be within 2% of the optimal 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.

The backfill in the upper 1.0m from road subgrade or in settlement sensitive areas should be placed in maximum 200mm thick lifts and compacted to 98% SPMDD. Beyond these zones a 95% SPMDD compaction criterion is considered acceptable.

13. PAVEMENT

It is expected that associated pavement for driveways and parking areas will be developed on the site. Pavement structures can be constructed on the native soils, engineering fill, or possibly fill materials from the site, subject to design grade and further onsite inspection.

Prior to the construction of asphalt pavement, topsoil, organic soil and construction debris must be removed. The exposed base should be proof-rolled and supervised/approved by geotechnical personnel. Any soft spongy spots detected during proof-rolling should be sub-excavated and replaced with suitable materials and compacted to 98% of SPMDD. The placement of engineering fill, if any, should be supervised and inspected by Fisher Engineering staff.

The finished subgrade must be contoured/graded and finally proof-rolled and approved by Fisher before placing the upper granular materials.

Perforated drains connected to sewer MHs/CBs should be provided under the entire length of curb and constructed in accordance with required local regulations. Typical flexible pavement designs are presented in Table 5.

Table 5: Typical flexible pavement design

PAVEMENT LAYER	COMPACTED THICKNESSES	
	LIGHT DUTY PARKING	DRIVEWAYS & HEAVY DUTY PARKING
Asphalt top course, HL-3	40mm	40mm
Asphalt base course, HL-8	50mm	60mm
Granular 'A' or 20mm crusher run limestone base	150mm	150mm
50mm crusher run limestone sub-base	200mm	300mm

The pavement structure should also meet the minimum municipal design requirements, if any, for the proposed development.

The above thicknesses are applicable for dry and stable subgrade conditions during summer season construction only. If the construction is carried out during winter, and for unstable subgrade conditions, the thicknesses of granular materials may have to be increased.

The granular base materials should conform to O.P.S.S. Form 1010 specifications and be compacted to at least 98% of their SPMDD's. Similarly, asphaltic concretes should meet O.P.S.S. Form 1150 requirements for specified grades and be compacted to at least 92% of their Marshall Densities.

The subgrade should be prepared as described previously prior to placement of granular base. The finished sub-grade should be contoured to eliminate depressions and sloped at catch basins or perimeter ditches/drains to facilitate drainage of subgrade and base materials.

Water should not be allowed to accumulate at/near the pavement edges. The importance of sub-grade drainage and regular maintenance and repairs cannot be over-emphasized.

14. CHEMICAL ANALYSES

Six (6) soil samples from boreholes BH2, BH4 and BH5 were submitted to Fisher Environmental laboratory for chemical analyses related to potential sulphate attack on buried concrete. Results of the analyses are presented in Appendix C.

- The chemical analyses show that sulphate concentration values in the soil samples are <1 mg/kg or <0.0001%, 3mg/kg or 0.0003% for BH2; 5mg/kg or 0.0005%, 2mg/kg or 0.0002% for BH4; and 92mg/kg or 0.0092%, 10mg/kg or 0.001% for BH5. According to CSA-A23.1 Table 3, the results indicate negligible degree of exposure to sulphate attack.
- Chloride contents in the samples were <10 or <0.001% in BH2 and BH4 while 13.9 or 0.00139% and <10 or <0.001% in BH5 indicating potential mild corrosion of exposed ferrous metals.
- pH levels of 8.60 & 8.68 in BH2, 8.33 & 8.20 in BH4 and 8.37 & 8.17 in BH5 are within the expected range for subsurface soils (5-11).

15. LIMITATIONS

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 named client, their design engineers and those directly involved in the project.

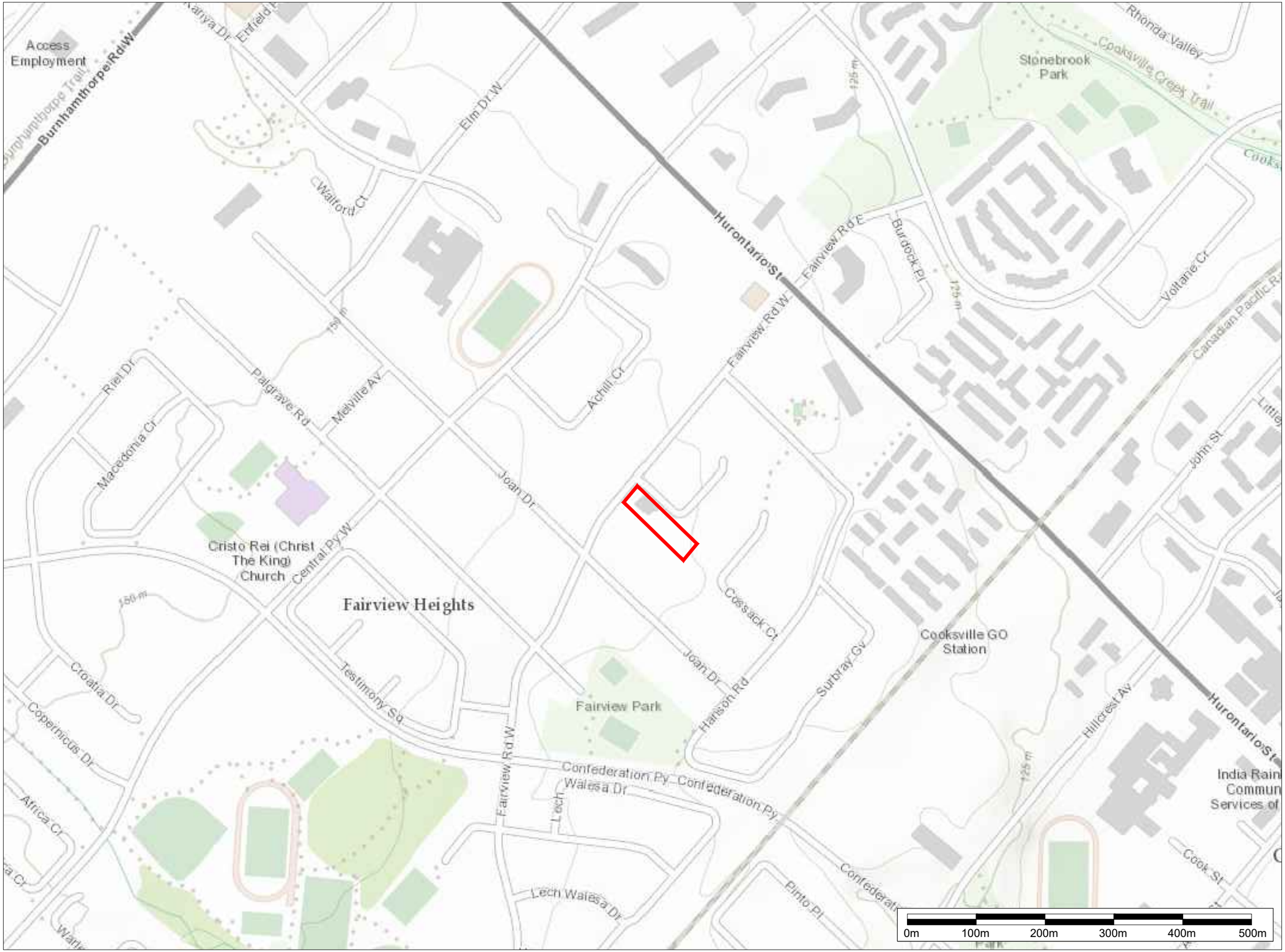
The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction.

Localized variations in the subsoil conditions, and particularly the fill material, may be present between and beyond the boreholes on which the recommendations are made and will 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 soils and the potential reuse of these soils on/off site.

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

APPENDIX A: SITE & LOCATION PLANS



FISHER ENGINEERING

400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2

Tel: 905 475-7755

NORTH

N

LEGEND

SITE BOUNDARY

PROJECT NAME AND ADDRESS

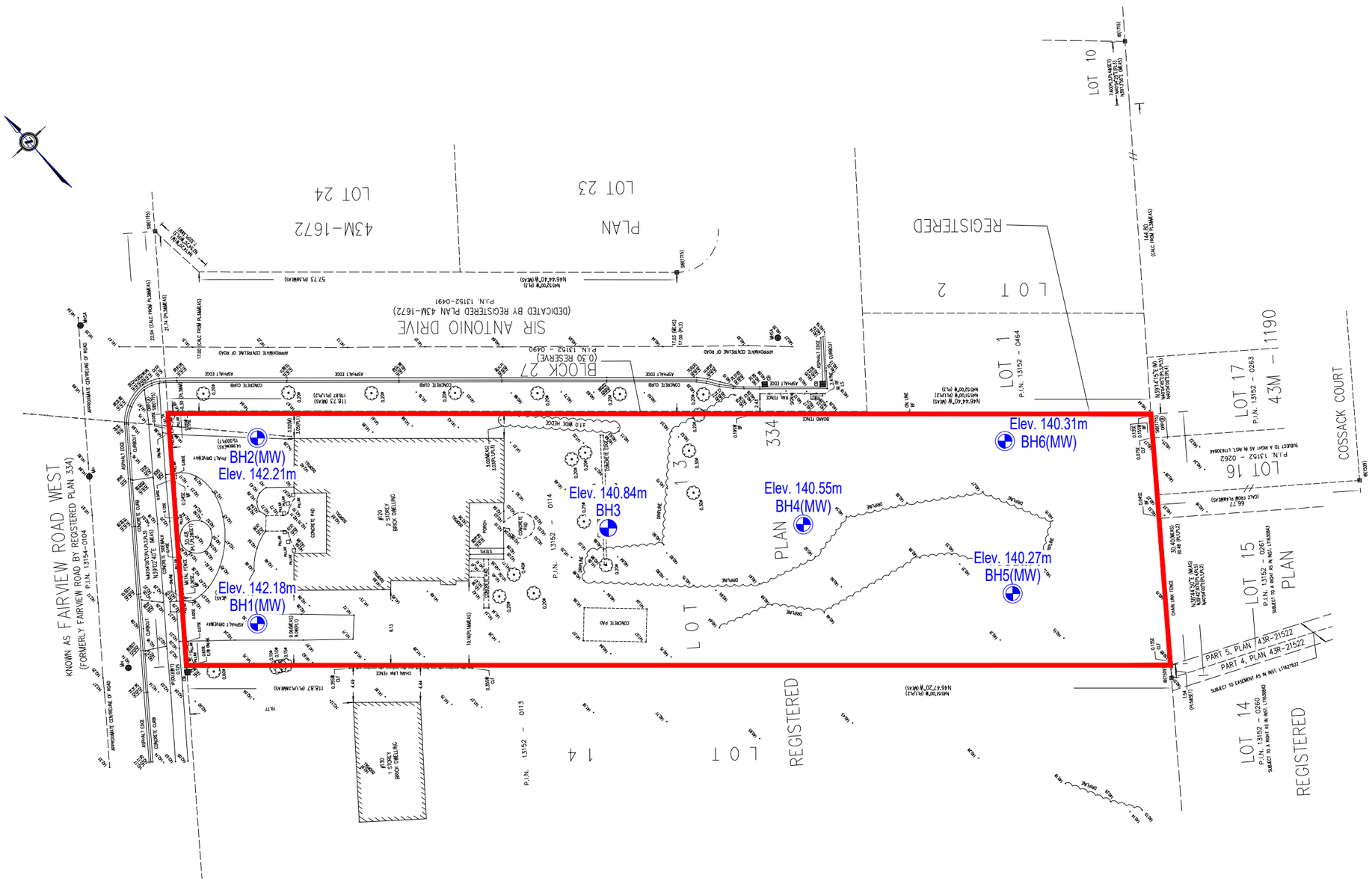
GEOTECHNICAL INVESTIGATION

120 Fairview Road West,
Mississauga, ON

FIGURE A1:

SITE LOCATION PLAN

PROJECT NO.	SHEET NO.
FE 23-13005	A1
DATE: 25 May 2023	
SCALE: AS SHOWN	



FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755

NORTH

LEGEND

- SITE BOUNDARY
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION

PROJECT NAME AND ADDRESS

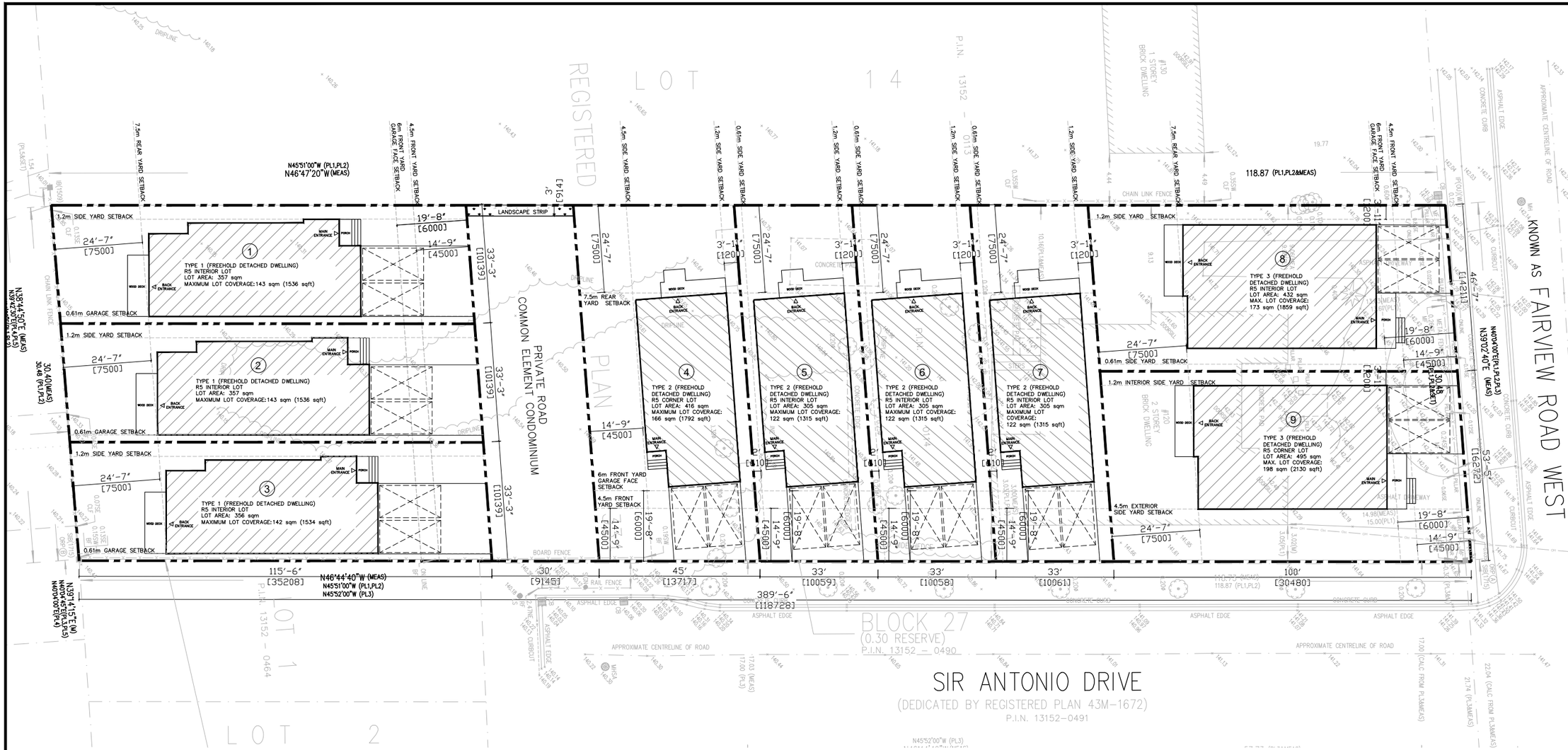
GEOTECHNICAL INVESTIGATION

120 Fairview Road West,
Mississauga, ON

FIGURE A2:

SITE PLAN WITH BOREHOLES / MONITORING WELL LOCATIONS

PROJECT NO.	SHEET NO.
FE 23-13005	A2
DATE: 25 May 2023	
SCALE: AS SHOWN	



1 A-100 SITE PLAN
SCALE : 36'-0"" = 1'-0"

ZONING MATRIX		
ADDRESS: 120 FAIRVIEW, MISSISSAUGA		
ZONING: R5 (INTERIOR LOT)		
	REQUIREMENTS	BY-LAW
LOT AREA	MIN. 295m^2	ZONING BY-LAW 0225-2007, 4.2.1, 3.1
LOT FRONTAGE	MIN. 9.75m	ZONING BY-LAW 0225-2007, 4.2.1, 4.1
LOT COVERAGE	MAX. 40%	ZONING BY-LAW 0225-2007, 4.2.1, 5.0
FRONT YARD	MIN. 4.5m / MIN. 6m (GARAGE FACE)	ZONING BY-LAW 0225-2007, 4.2.1, 6.0
INTERIOR SIDE YARD	MIN. 1.2m ON ONE SIDE & MIN. 0.61m ON THE OTHER SIDE	ZONING BY-LAW 0225-2007, 4.2.1, 8.1
EXTERIOR SIDE YARD	MIN. 4.5m / MIN. 6m (GARAGE FACE)	ZONING BY-LAW 0225-2007, 4.2.1, 7.0
REAR YARD	MIN. 7.5m	ZONING BY-LAW 0225-2007, 4.2.1, 9.1
DRIVEWAY WIDTH	WIDTH OF GARAGE DOOR OPENINGS PLUS 2m UP TO MAX. 6m	ZONING BY-LAW 0225-2007, 4.2.1, 12.3
LANDSCAPED SOFT AREA	MIN. 30% OF FRONT YARD AND/OR EXTERIOR SIDE YARD	ZONING BY-LAW 0225-2007, 4.2.1, 12.4

ZONING MATRIX		
ADDRESS: 120 FAIRVIEW, MISSISSAUGA		
ZONING: R5 (CORNER LOT)		
	REQUIREMENTS	BY-LAW
LOT AREA	MIN. 415m^2	ZONING BY-LAW 0225-2007, 4.2.1, 3.2
LOT FRONTAGE	MIN. 13.5m	ZONING BY-LAW 0225-2007, 4.2.1, 4.2
LOT COVERAGE	MAX. 40%	ZONING BY-LAW 0225-2007, 4.2.1, 5.0
FRONT YARD	MIN. 4.5m / MIN. 6m (GARAGE FACE)	ZONING BY-LAW 0225-2007, 4.2.1, 6.0
INTERIOR SIDE YARD	MIN. 1.2m	ZONING BY-LAW 0225-2007, 4.2.1, 8.2
EXTERIOR SIDE YARD	MIN. 4.5m / MIN. 6m (GARAGE FACE)	ZONING BY-LAW 0225-2007, 4.2.1, 7.0
REAR YARD	MIN. 7.5m	ZONING BY-LAW 0225-2007, 4.2.1, 9.2
DRIVEWAY WIDTH	WIDTH OF GARAGE DOOR OPENINGS PLUS 2m UP TO MAX. 6m	ZONING BY-LAW 0225-2007, 4.2.1, 12.3
LANDSCAPED SOFT AREA	MIN. 30% OF FRONT YARD AND/OR EXTERIOR SIDE YARD	ZONING BY-LAW 0225-2007, 4.2.1, 12.4

KEY PLAN (N.T.S.)

DO NOT SCALE DRAWINGS.

The contractor must verify and accept responsibility for all dimensions and conditions on site and must notify the Designer/Engineer of any variations from the supplied drawings and informations before proceeding with the work. Construction must conform to all applicable codes and requirements of authorities having jurisdiction.

NO.	ISSUED FOR	DATE
1	CLIENT REVIEW	03/06/2023

PREPARED BY:
LAND& BUILDING EXPERTS
570 Alden Rd., Unit 6, Markham, ON. L3R 8N5
(647) 340-8649 landbuildex@gmail.com

PROJECT INFO:

120 FAIRVIEW RD W, MISSISSAUGA, ON L5B 1K6

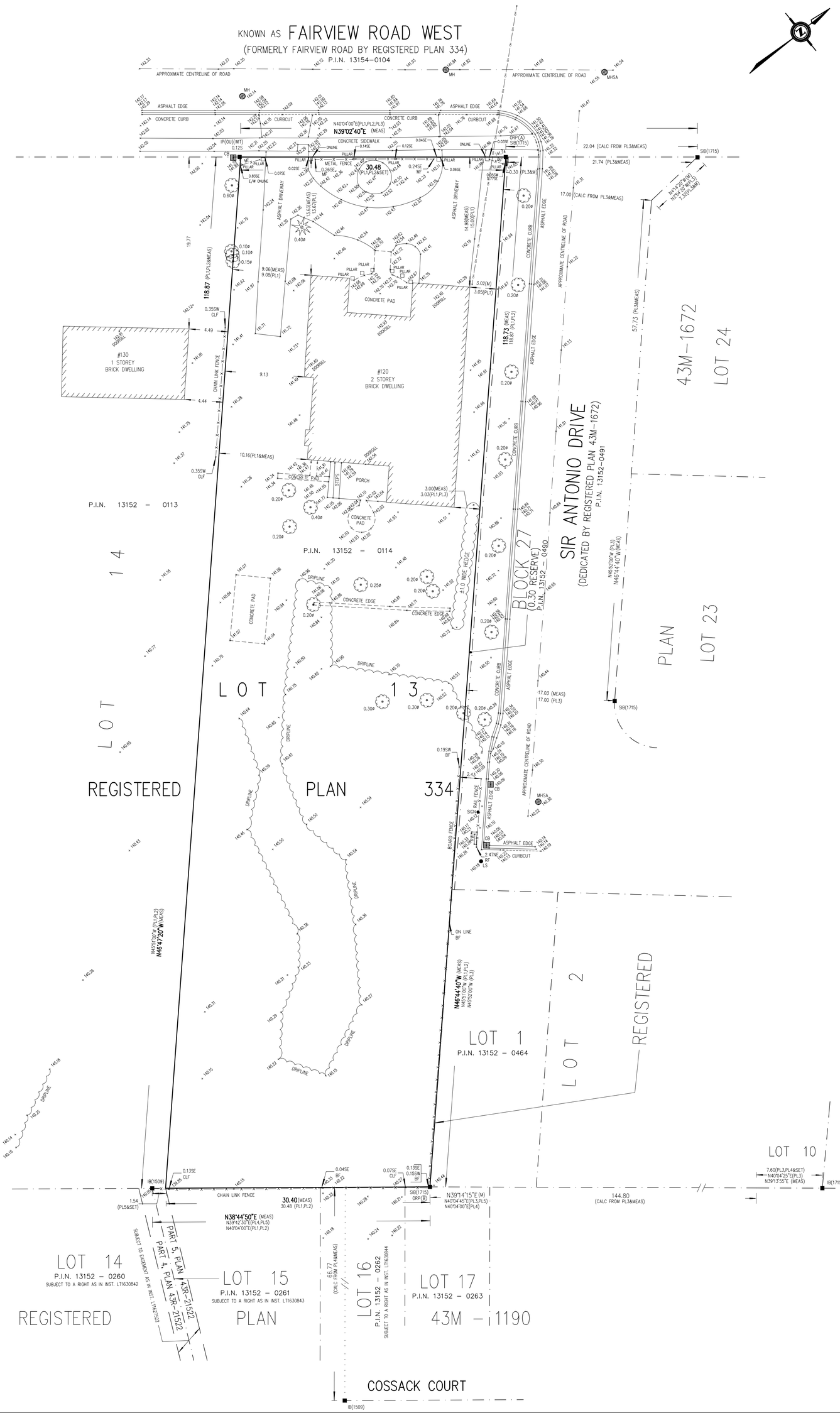
PROJECT NAME:

PROPOSED SUBDIVISION TO HAVE 9 LOTS

DRAWING TITLE:

SITE PLAN

SCALE AS INDICATED	DWG. NO. A-100
DRAWN BY:	
CHECKED BY:	
PROJECT NO.:	



SURVEYOR'S REAL PROPERTY REPORT AND TOPOGRAPHY OF

PART 1,
PLAN OF LOT 13
REGISTERED PLAN 334
CITY OF MISSISSAUGA

REGIONAL MUNICIPALITY OF PEEL

SCALE 1:250

10m 5m 0 5 10 15 20 m

C. WAHBA SURVEYING LTD.

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2146988

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)

NOTES

■	DENOTES MONUMENT FOUND
□	DENOTES MONUMENT SET
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
IB	DENOTES IRON BAR
IP	DENOTES IRON PIPE
(OU)	DENOTES ORIGIN UNKNOWN
(WIT)	DENOTES WITNESS
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
PL1	DENOTES PLAN OF SURVEY BY C. PEAT O.L.S., DATED APRIL 17, 1987
PL2	DENOTES REGISTERED PLAN 334
PL3	DENOTES REGISTERED PLAN 43M-1672
PL4	DENOTES REGISTERED PLAN 43M-1190
PL5	DENOTES PLAN 43R-21522
(1715)	DENOTES ROWAN-STANCIU LTD., O.L.S.
(1509)	DENOTES DUNCAN ASHWORTH, O.L.S.
MEAS/M	DENOTES MEASURED
CALC.	DENOTES CALCULATED
ORP	DENOTES OBSERVED REFERENCE POINT
INST.	DENOTES INSTRUMENT
N,S,W,E	DENOTES NORTH, SOUTH, WEST, EAST
CLF	DENOTES CHAIN LINK FENCE
CB	DENOTES CATCH BASIN
MHSA	DENOTES SANITARY MANHOLE
MH	DENOTES MANHOLE
MF	DENOTES METAL FENCE
BF	DENOTES BOARD FENCE
RF	DENOTES RAIL FENCE
-x-	DENOTES FENCE LINE
ø	DENOTES DIAMETER
-OH-	DENOTES OVERHEAD WIRE
	DENOTES DECIDUOUS TREE
	DENOTES CONIFEROUS TREE

INTEGRATION NOTE

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A & B BY REAL TIME NETWORK (RTN), UTM ZONE 17, NAD 83 (ORIGINAL):

ORP Ⓐ	NORTH 4 826 692.64	EAST 610 641.45
ORP Ⓑ	NORTH 4 826 611.28	EAST 610 727.93

COORDINATES ARE UTM ZONE 17, NAD 83 (ORIGIONAL), TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELEVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999978.

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 367 AND HAVING AN ELEVATION OF 141.958 METRES. ON THE EAST FACE AT THE NORTH CORNER OF A BRICK BUNGALOW, # 164 ON THE SOUTH-WEST CORNER OF FAIRVIEW ROAD AND JOAN DRIVE.

PART 2 (SURVEY REPORT)

REGISTERED EASEMENTS AND/OR RIGHT-OF-WAYS: NONE.

ADDITIONAL COMMENTS: NOTE THE CHAIN LINK FENCE LOCATION ALONG THE WEST AND SOUTH LIMITS OF THE SUBJECT PROPERTY. ALSO NOTE THE BOARD FENCE LOCATED ALONG THE EAST AND SOUTH LIMITS OF THE SUBJECT PROPERTY. ALSO NOTE METAL FENCE LOCATED ALONG THE NORTH LIMIT OF THE SUBJECT PROPERTY. ALSO NOTE THE BRICK PILLARS LOCATED ALONG THE NORTH LIMIT OF THE SUBJECT PROPERTY.

THIS PLAN DOES NOT CERTIFY COMPLIANCE WITH ZONING BY-LAWS.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 15th DAY OF JULY, 2022.

JULY 22, 2022
DATE

C. WAHBA
ONTARIO LAND SURVEYOR

DRAWN: S.S.	CHECKED: C.W.
CAD FILE: 22-091-SRPR+TOPO	PROJECT No. 22-091

285 Vaughan Valley Blvd. Woodbridge ON L4H3B5 Tel. 905.851.1300 www.wahbasurveying.com

WAHBA SURVEYING

APPENDIX B: LOG OF BOREHOLES

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH1(MW) SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13005

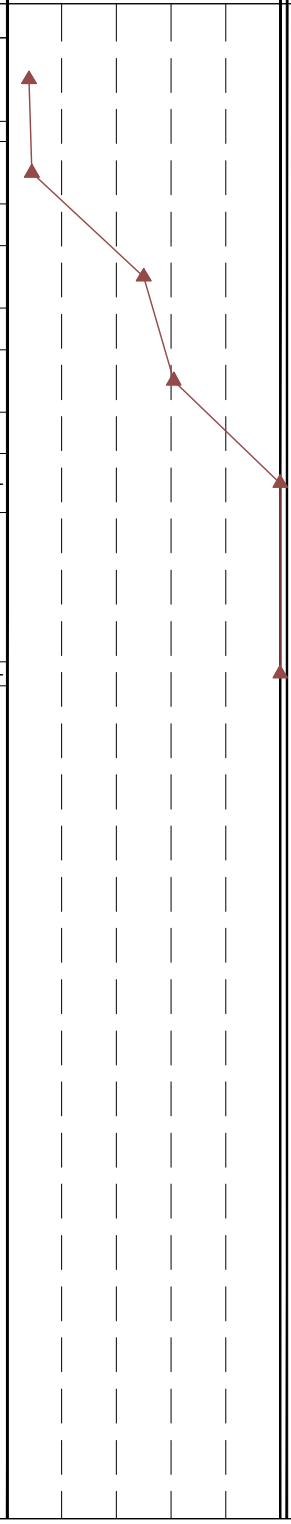
PROJECT NAME: GEOTECHNICAL INVESTIGATION

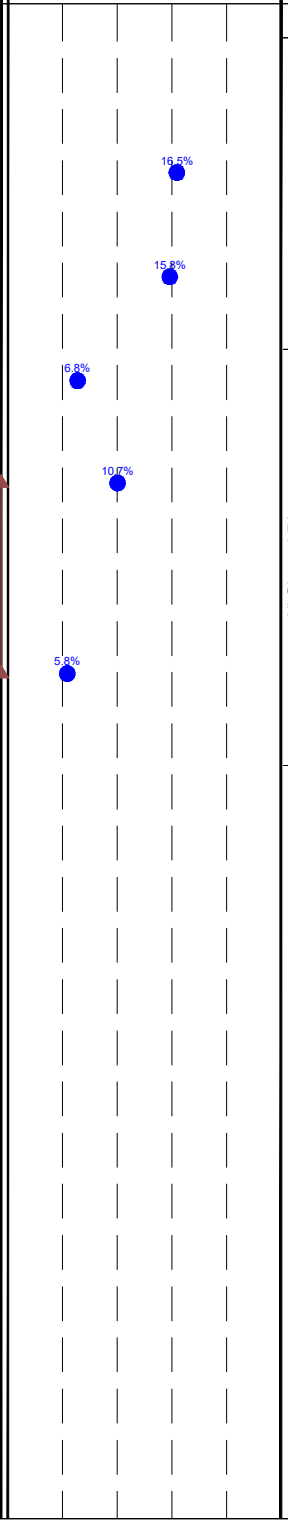
LOCATION: 120 Fairview Road West, Mississauga, ON

DRILLING METHOD: D-50 Track, Solid Stem

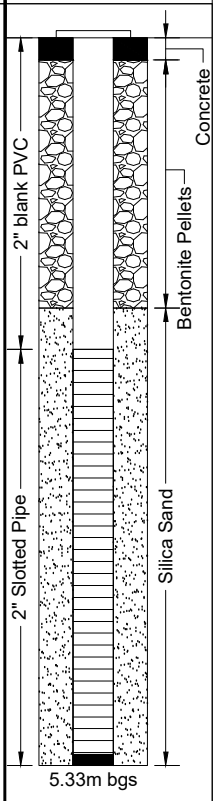
DRILLING DATE: 23 May, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				142.18			
0	0	~2" ASPHALT ~4" GRANULAR MATERIAL				SS-1	8
2	1	FILL (DISTURBED SOIL): Brown, moist, loose, sandy silt, some clay, trace gravel				SS-2	9
4				1.22 / 140.96			
	2	SANDY SILT TILL : Grey, moist, very dense, trace to some clay, trace gravel				SS-3	50
8						SS-4	61
10	3					SS-5	100+
12							
	4	Some shale @ 4.57m					
14						SS-6	100+
16	5			5.18 / 137.00			
		SHALE: Grey, dry, hard Auger refusal @ 5.33m End of borehole at 5.36m		5.36 / 136.82			
18							
20	6						
22							
	7						
24							
26	8						
28							
	9						
30							
32	10						
34							





PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth (m): on completion: Dry; on 7 June, 2023: Dry

DRAWN: D.C. | LOGGED: D.G. | CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH2(MW) SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13005

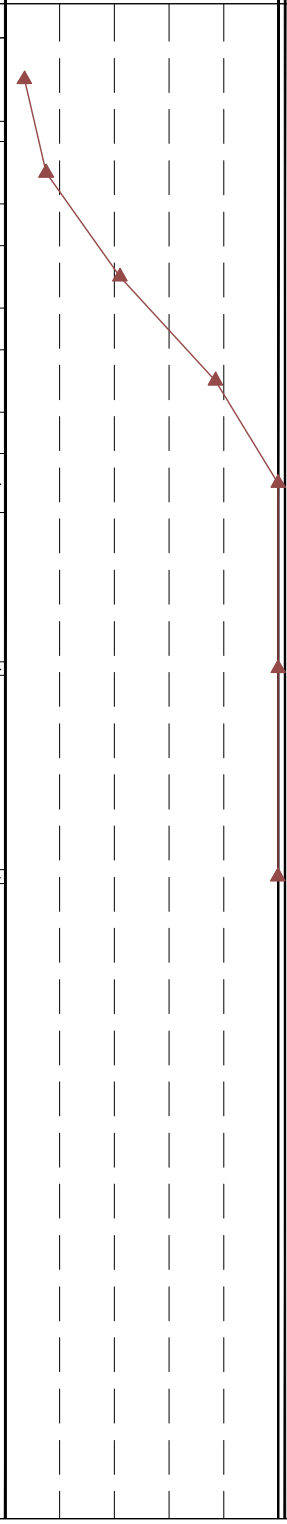
PROJECT NAME: GEOTECHNICAL INVESTIGATION

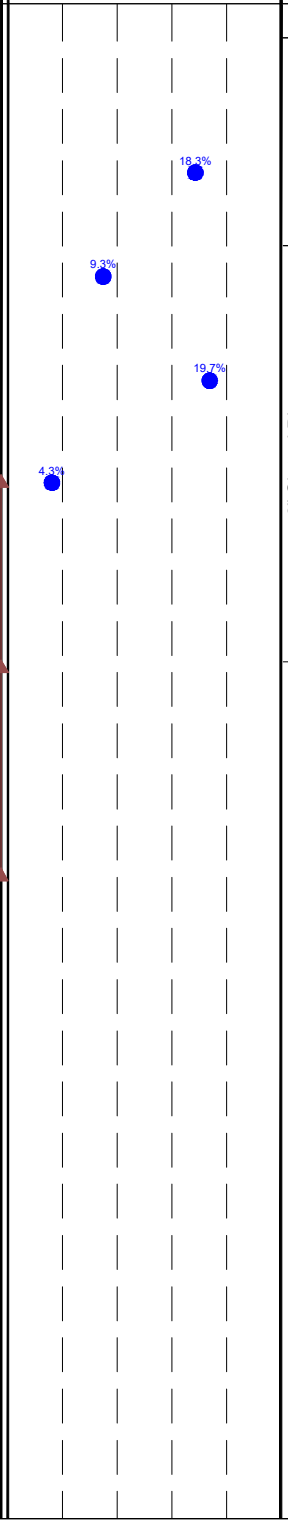
LOCATION: 120 Fairview Road West, Mississauga, ON

DRILLING METHOD: D-50 Track, Solid Stem

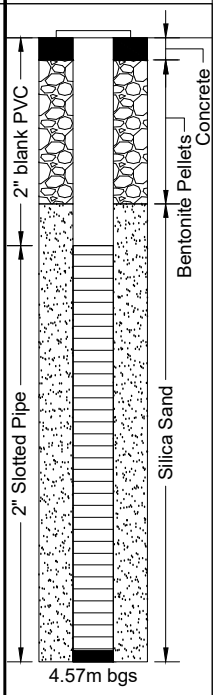
DRILLING DATE: 23 May, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				142.21			
0	0	~2" ASPHALT ~4" GRANULAR MATERIAL		0.30 / 141.91		SS-1	7
2	1	FILL (DISTURBED SOIL): Greenish brown, moist, loose, sandy silt, some clay, trace gravel		0.79 / 141.42		SS-2	15
4		CLAYEY SILT: Dark brown, moist, firm, trace sand,					
		SILTY GRAVEL: Grey, moist, compact, some sand and some clay, trace organic		1.37 / 140.84		SS-3	42
6	2	CLAYEY SILT TILL: Grey, moist, hard, trace sand and some gravel					
8						SS-4	77
				2.74 / 139.47			
10	3	SHALE: Grey, moist to dry, hard, some sandy silt, trace gravel				SS-5	100+
12	4						
14						SS-6	100+
16	5			5.18 / 137.03			
18		SHALE: Grey, dry, hard					
20	6			6.17 / 136.04		SS-7	100+
		End of borehole at 6.17m					
22	7						
24							
26	8						
28							
30	9						
32							
34	10						





PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth (m): on completion: Dry; on 7 June, 2023: Dry

DRAWN: D.C. LOGGED: D.G. CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH3 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13005

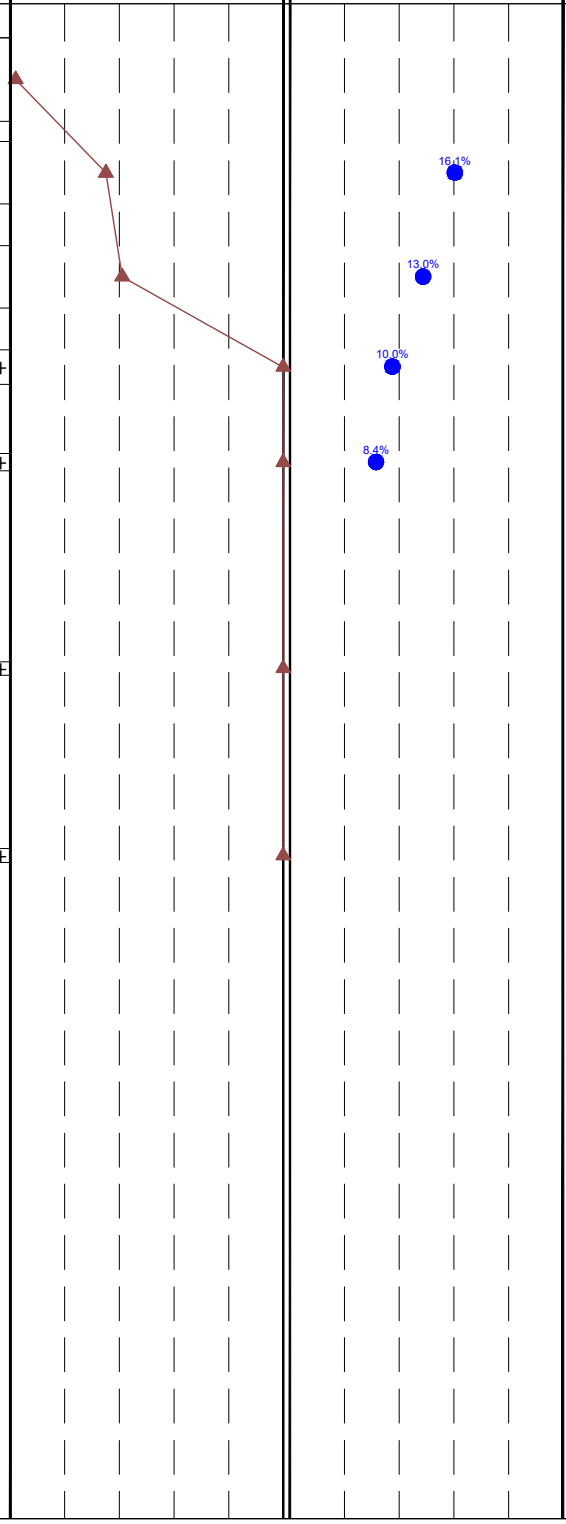
PROJECT NAME: GEOTECHNICAL INVESTIGATION

LOCATION: 120 Fairview Road West, Mississauga, ON

DRILLING METHOD: D-50 Track, Solid Stem

DRILLING DATE: 23 May, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				140.84			
0	0	~6" TOPSOIL		0.15 / 140.69		SS-1	2
2		CLAYEY SILT: Brown, moist, soft to hard, some sand					
4	1			1.14 / 139.70		SS-2	35
6	2	SILT TILL: Grey, moist, dense, trace clay, trace sand, trace shale				SS-3	41
8						SS-4	100+
10	3	SHALE: Grey, dry, hard		2.74 / 138.10		SS-5	100+
12	4						
14		Wet @ 4.88m				SS-6	100+
16	5	Auger grinding from 5.18m to 5.94m Auger refusal @ 5.94m					
18							
20	6					SS-7	100+
		End of borehole at 6.40m		6.40 / 134.44			
22	7						
24							
26	8						
28							
30	9						
32							
34	10						



PIEZOMETER OR WELL CONSTRUCTION

Groundwater Depth (m): on completion: 4.88m

DRAWN: D.C. LOGGED: D.G. CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH4(MW) SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13005

PROJECT NAME: GEOTECHNICAL INVESTIGATION

LOCATION: 120 Fairview Road West, Mississauga, ON

DRILLING METHOD: D-50 Track, Solid Stem

DRILLING DATE: 23 May, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				140.55			
		~6" TOPSOIL		0.15 / 140.40		SS-1	5
		CLAYEY SILT: Grey, moist, firm, trace sand Auger grinding @ 0.61m		0.76 / 139.79		SS-2	27
		CLAYEY SILT TILL: Grey moist very stiff to hard, trace sand some gravel				SS-3	68
				2.29 / 138.26		SS-4	100+
		SANDY CLAYEY SILT: Grey, moist hard, trace gravel					
				3.05 / 137.50		SS-5	100+
		CLAYEY SILT TILL: Grey, moist, hard, some gravel		3.66 / 136.89			
		SHALE: Grey, dry, hard Wet @ 4.27m Auger grinding from 4.57m to 6.10m				SS-6	100+
						SS-7	100+
		End of borehole at 6.55m		6.55 / 134.00			

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

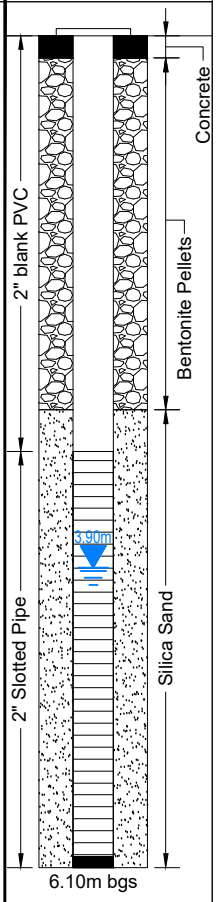
13.5%

10.1%

5.8%

11.2%

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth (m): on completion: 5.49m; on 7 June, 2023: 3.90m

DRAWN: D.C. LOGGED: D.G. CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH5(MW) SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13005

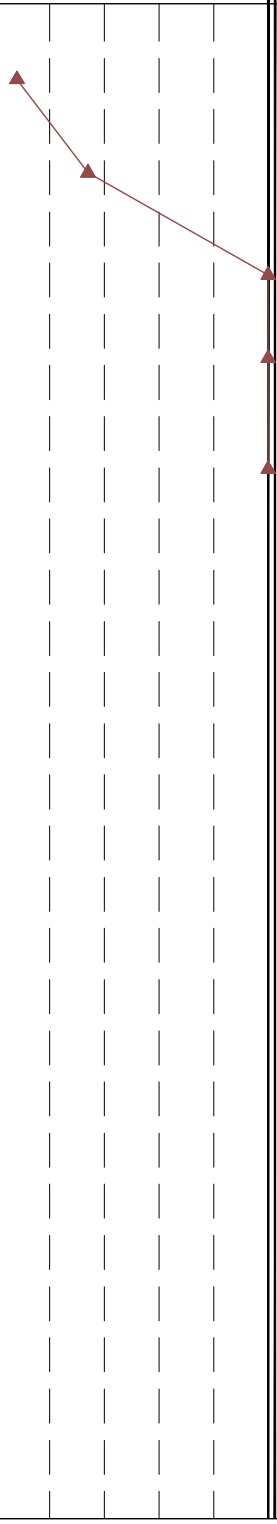
PROJECT NAME: GEOTECHNICAL INVESTIGATION

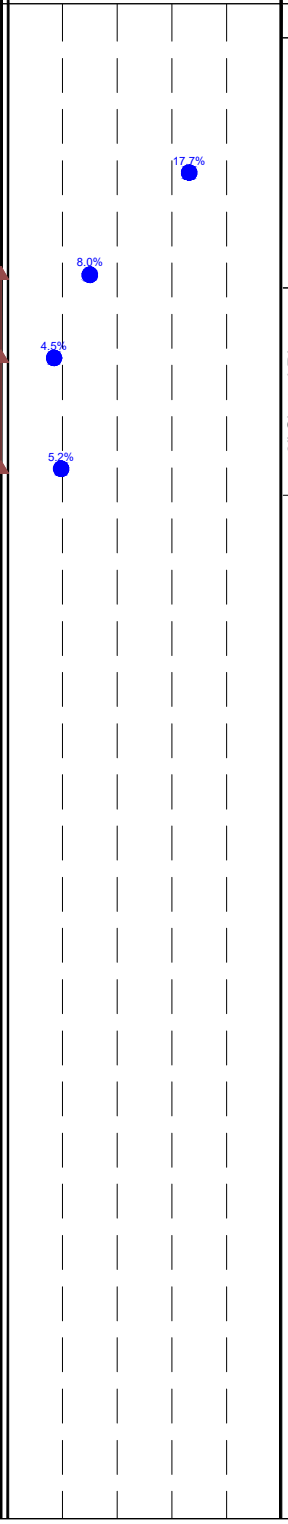
LOCATION: 120 Fairview Road West, Mississauga, ON

DRILLING METHOD: D-50 Track, Solid Stem

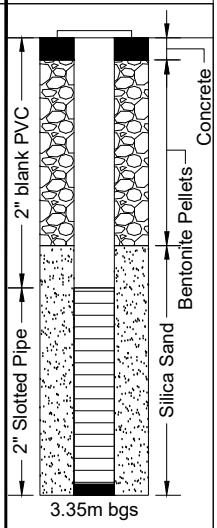
DRILLING DATE: 23 May, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				140.27			
0	0	~6" TOPSOIL		0.15 / 140.12		SS-1	8
2		SILTY CLAY: Brown, moist, firm Auger grinding @ 0.61m		0.76 / 139.51			
4	1	CLAYEY SILT TILL: Grey, dry to moist, dense to very dense, trace to some sand & gravel				SS-2	34
6	2					SS-3	100+
8		GRAVELLY SANDY SILT: Grey, moist, very dense, trace clay		2.00 / 138.27		SS-4	100+
10	3	SHALE: Grey, dry, hard Auger grinding from 3.35m to 3.66m Auger refusal @ 3.66m		2.74 / 137.53		SS-5	100+
12	4	Borehole caved-in to 3.35m End of borehole at 3.66m		3.66 / 136.61			
14							
16	5						
18							
20	6						
22							
24	7						
26	8						
28							
30	9						
32							
34	10						





PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth (m): on completion: Dry; on 7 June, 2023: Dry

DRAWN: D.C. LOGGED: D.G. CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. BH6(MW) SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13005

PROJECT NAME: GEOTECHNICAL INVESTIGATION

LOCATION: 120 Fairview Road West, Mississauga, ON

DRILLING METHOD: D-50 Track, Solid Stem

DRILLING DATE: 23 May, 2023

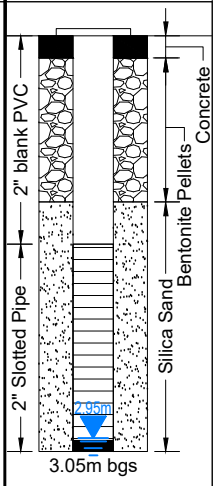
DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				140.31			
0	0	~6" TOPSOIL		0.15 / 140.16		SS-1	4
2	1	CLAYEY SILT: Brown, moist, stiff, some sand, trace gravel. Auger grinding @ 0.76m				SS-2	15
4		SILT TILL: Grey, moist, very dense, some sand, trace clay, trace gravel, trace shale		1.07 / 139.24			
6	2	Auger grinding @ 2.13m				SS-3	60+
8						SS-4	100+
10	3			3.20 / 137.11		SS-5	100+
		SHALE: Grey, dry, hard					
12		Auger grinding @ 3.66m. Auger refusal @ 3.66m		3.66 / 136.65			
14	4	Borehole caved-in to 3.05m. End of borehole at 3.66m					
16	5						
18							
20	6						
22	7						
24							
26	8						
28							
30	9						
32							
34	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40



PIEZOMETER OR WELL CONSTRUCTION

Groundwater Depth (m): on completion: Dry; on 7 June, 2023: 2.95m

DRAWN: D.C. | LOGGED: D.G. | CHECKED: C.W.

APPENDIX C: GRAIN SIZE, MOISTURE CONTENT & CHEMICAL ANALYSES

Project Name:	Geotechnical Investigation	***F.E. Lab #:***	23-446
Client:	Land and Building Experts	***Date Sampled:***	23-May-2023
Project ID:	23-13005	***Date Received:***	25-May-2023
Location:	120 Fairview Road West, Mississauga, Ontario	***Date Reported:***	9-Jun-2023

Certificate of Analysis

Analyses	Matrix	Quantity	Testing Date	Method Reference
Moisture Content	Soil	24	25-May-23	ASTM D2216
Grain Size (Sieve Analysis)	Soil	9	30-May-23	LS-602
Grain Size (Hydrometer)	Soil	3	07-Jun-23	LS-702
Atterberg test	Soil	0	N.A.	LS-703/704

Authorized by: Behnam Sayad-Pour

Behnam Sayad Pour Zanjani
Geo-Lab Supervisor

400 Esna Park Drive, Unit 15, Markham, ON L3R 3K2
Tel:(905) 475-7755 www.fishereng.com

Certificate of Analysis

Analysis Requested:	Moisture Content	***Sample Description:***	24 Soil Sample(s)

Sample Info	BH1 SS2	BH1 SS3	BH1 SS4	BH1 SS5	BH1 SS6	BH2 SS2
Sample Depth (m)	0.76-1.22	1.53-1.98	2.29-2.75	3.05-3.51	4.58-5.03	0.76-1.22
Moisture Content (%)	16.5	15.8	6.8	10.7	5.8	18.3

Sample Info	BH2 SS3	BH2 SS4	BH2 SS5	BH3 SS2	BH3 SS3	BH3 SS4
Sample Depth (m)	1.53-1.98	2.29-2.75	3.05-3.51	0.76-1.22	1.53-1.98	2.29-2.75
Moisture Content (%)	9.3	19.7	4.3	16.1	13.0	10.0

Sample Info	BH3 SS5	BH4 SS2	BH4 SS3	BH4 SS4	BH4 SS5	BH5 SS2
Sample Depth (m)	3.05-3.51	0.76-1.22	1.53-1.98	2.29-2.75	3.05-3.51	0.76-1.22
Moisture Content (%)	8.4	13.5	10.1	5.9	11.2	17.7

Sample Info	BH5 SS3	BH5 SS4	BH5 SS5	BH6 SS2	BH6 SS3	BH6 SS4
Sample Depth (m)	1.53-1.98	2.29-2.75	3.05-3.51	0.76-1.22	1.53-1.98	2.29-2.75
Moisture Content (%)	8.0	4.5	5.2	7.5	7.7	9.3

Certificate of Analysis

Analysis Requested:	Grain Size (Sieve Analysis)	***Sample Quantity:***	9	Soil Sample(s)

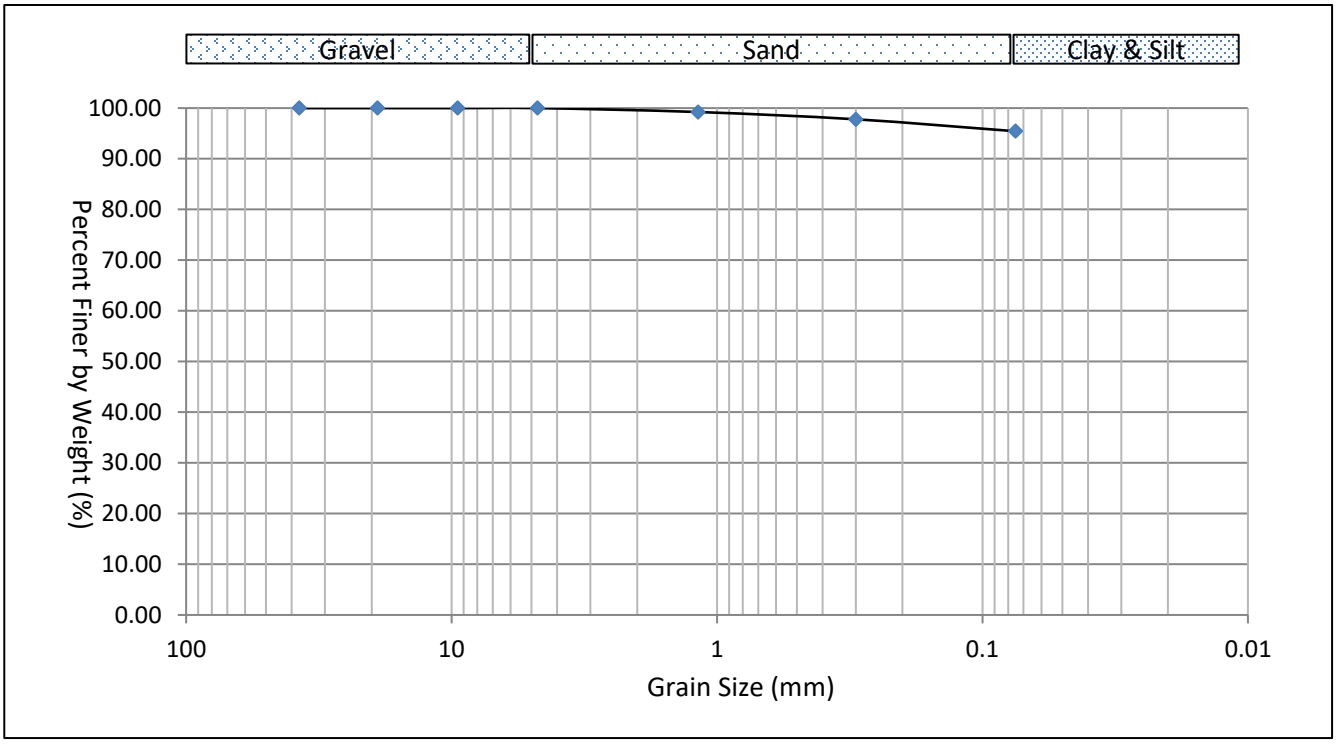
Sample Info	***23-447 BH2 SS2***	***23-448 BH2 SS3***	***23-450 BH2 SS5***	***23-451 BH4 SS2***	***23-453 BH4 SS4***	***23-454 BH4 SS5***
Sample Depth (m)	***0.76-1.22***	***1.53-1.98***	***3.05-3.51***	***0.76-1.22***	***2.29-2.75***	***3.05-3.51***
Grain Size (%)						
>19mm	0.0	15.0	7.0	11.9	0.0	0.0
9.5mm-19mm	0.0	23.7	0.0	1.4	1.2	12.6
4.75mm-9.5mm	0.0	6.3	1.8	1.6	2.4	4.5
1.18mm-4.75mm	0.8	3.1	3.6	2.1	6.8	4.0
300um-1.18mm	1.4	3.9	6.3	3.1	9.6	5.1
75um-300um	2.4	4.0	7.1	3.8	10.9	7.3
<75um	95.4	43.9	74.2	76.2	69.2	66.4
Clay and Silt	**95.4**	**43.9**	**74.2**	**76.2**	**69.2**	**66.4**
Sand	**4.6**	**11.0**	**16.9**	**9.0**	**27.2**	**16.5**
Gravel	**0.0**	**45.1**	**8.8**	**14.8**	**3.6**	**17.1**

Sample Info	***23-455 BH5 SS2***	***23-457 BH5 SS4***	***23-458 BH5 SS5***			
Sample Depth (m)	***0.76-1.22***	***2.29-2.75***	***3.05-3.51***			
Grain Size (%)						
>19mm	0.0	13.6	4.7			
9.5mm-19mm	0.0	7.1	7.3			
4.75mm-9.5mm	0.5	5.3	18.5			
1.18mm-4.75mm	2.1	8.4	15.5			
300um-1.18mm	3.0	11.9	14.8			
75um-300um	4.2	11.6	11.8			
<75um	90.2	42.0	27.2			
Clay and Silt	**90.2**	**42.0**	**27.2**			
Sand	**9.3**	**32.0**	**42.1**			
Gravel	**0.5**	**26.0**	**30.6**			

Grain Size Distribution

Sample ID: 23-447 BH2 SS2 0.76-1.22m

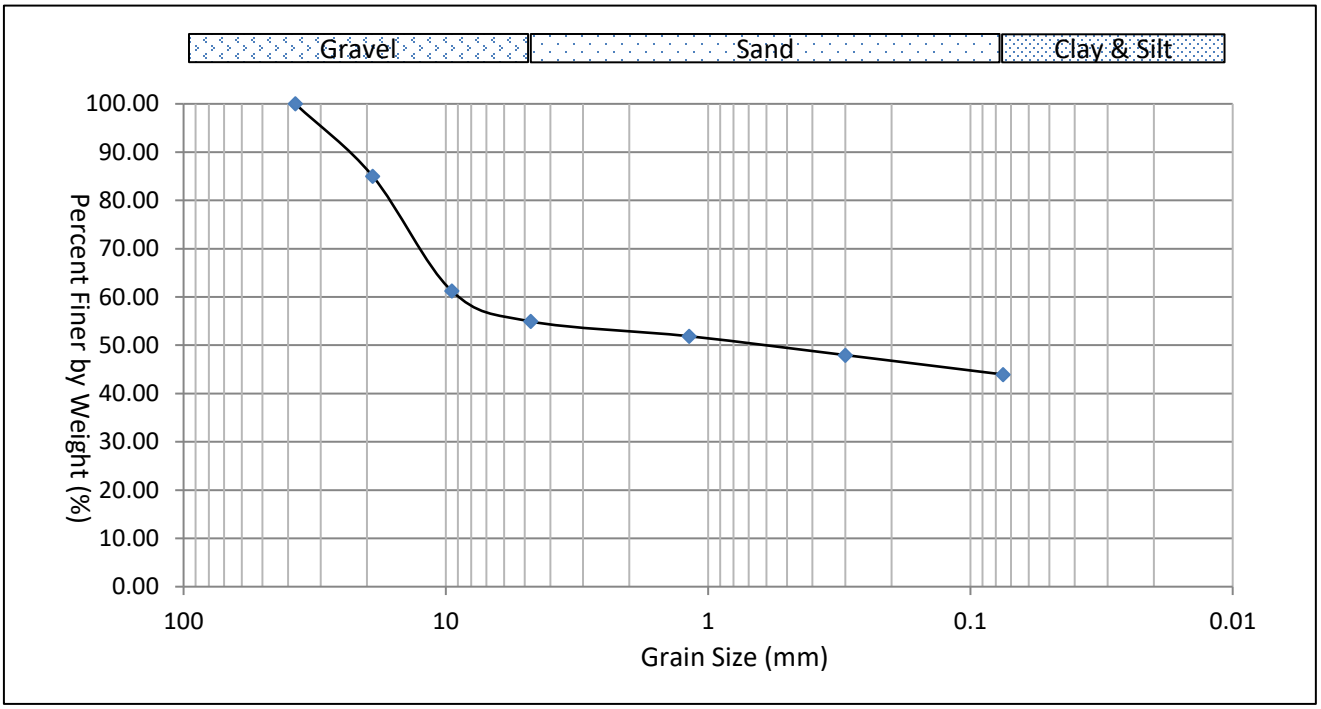
Gravel: 0% Sand: 4.6% Clay and Silt 95.4%



Grain Size Distribution

Sample ID: 23-448 BH2 SS3 1.53-1.98m

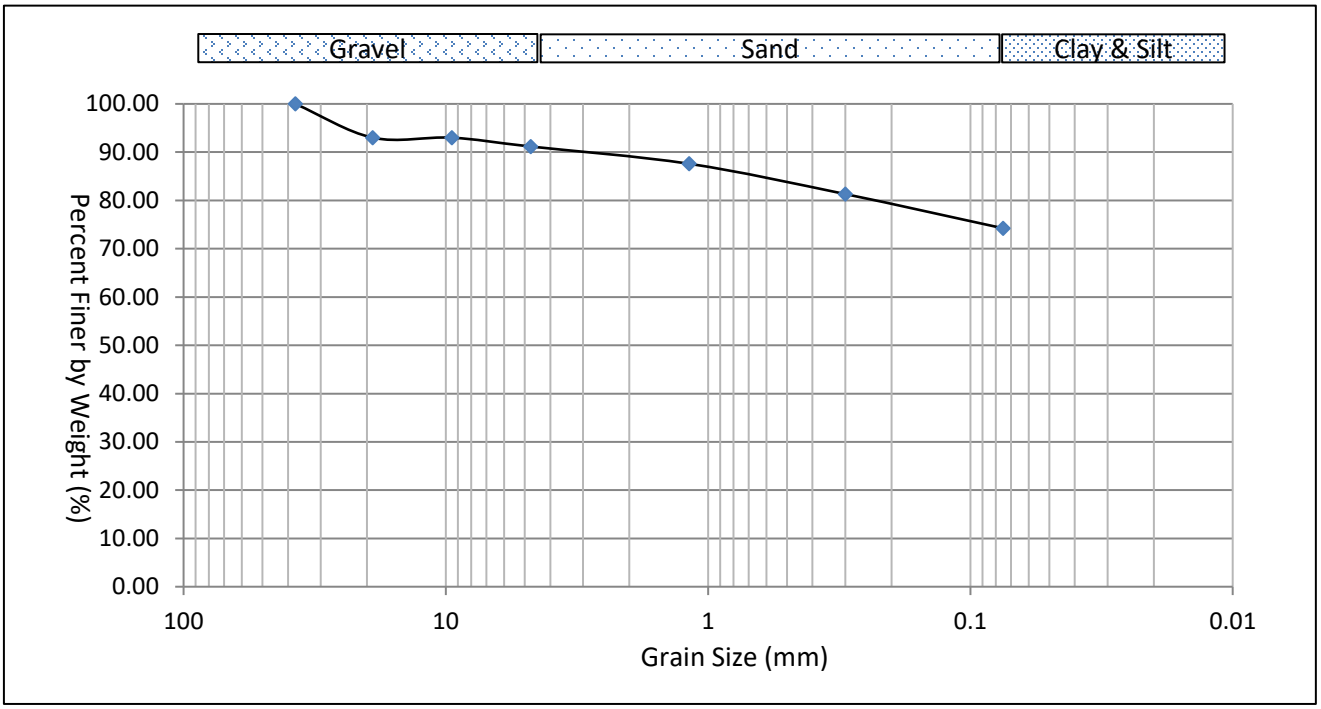
Gravel: 45.1% Sand: 11% Clay and Silt 43.9%



Grain Size Distribution

Sample ID: 23-450 BH2 SS5 3.05-3.51m

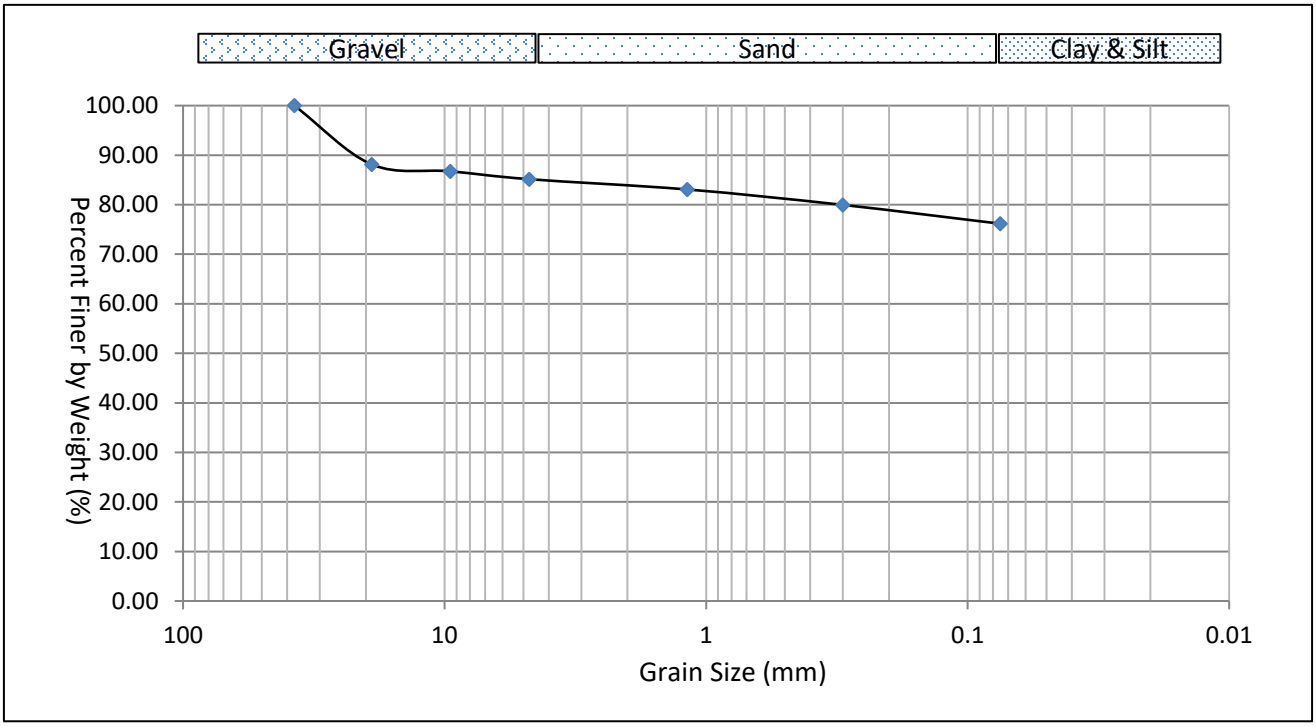
Gravel: 8.8% Sand: 16.9% Clay and Silt 74.2%



Grain Size Distribution

Sample ID: 23-451 BH4 SS2 0.76-1.22m

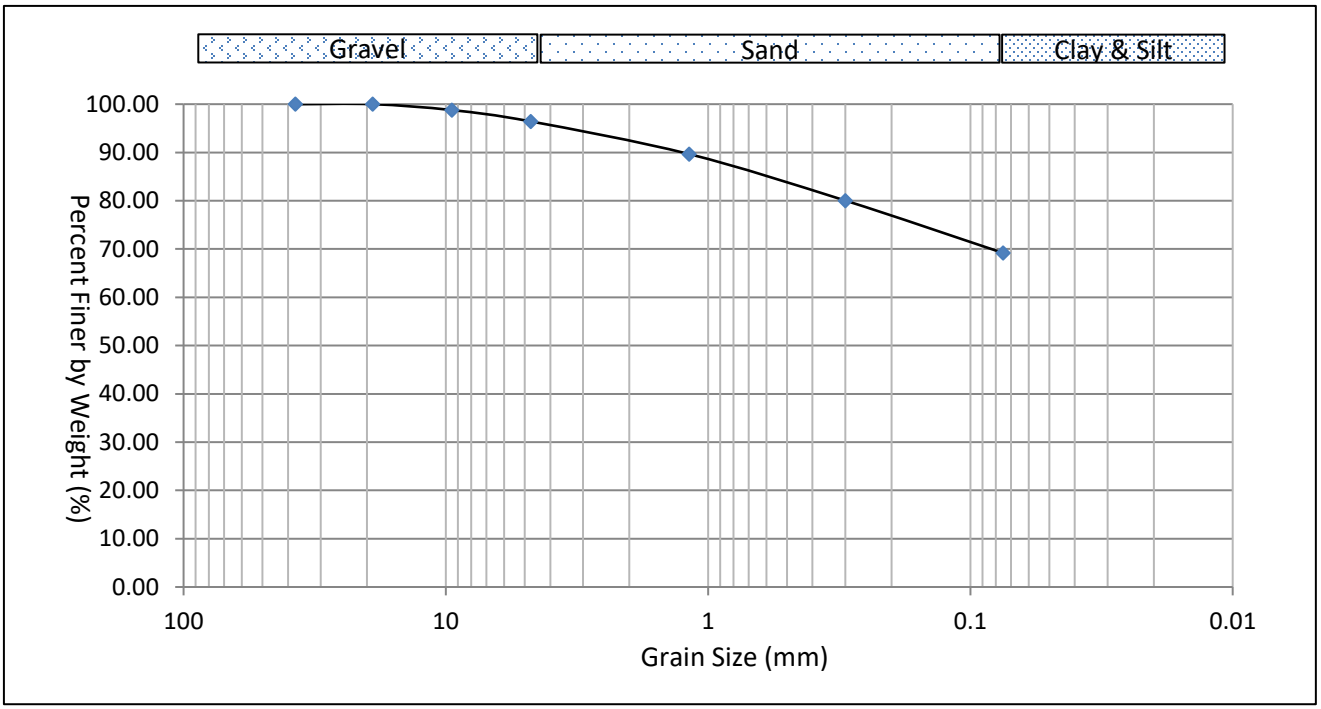
Gravel: 14.8% Sand: 9% Clay and Silt 76.2%



Grain Size Distribution

Sample ID: 23-453 BH4 SS4 2.29-2.75m

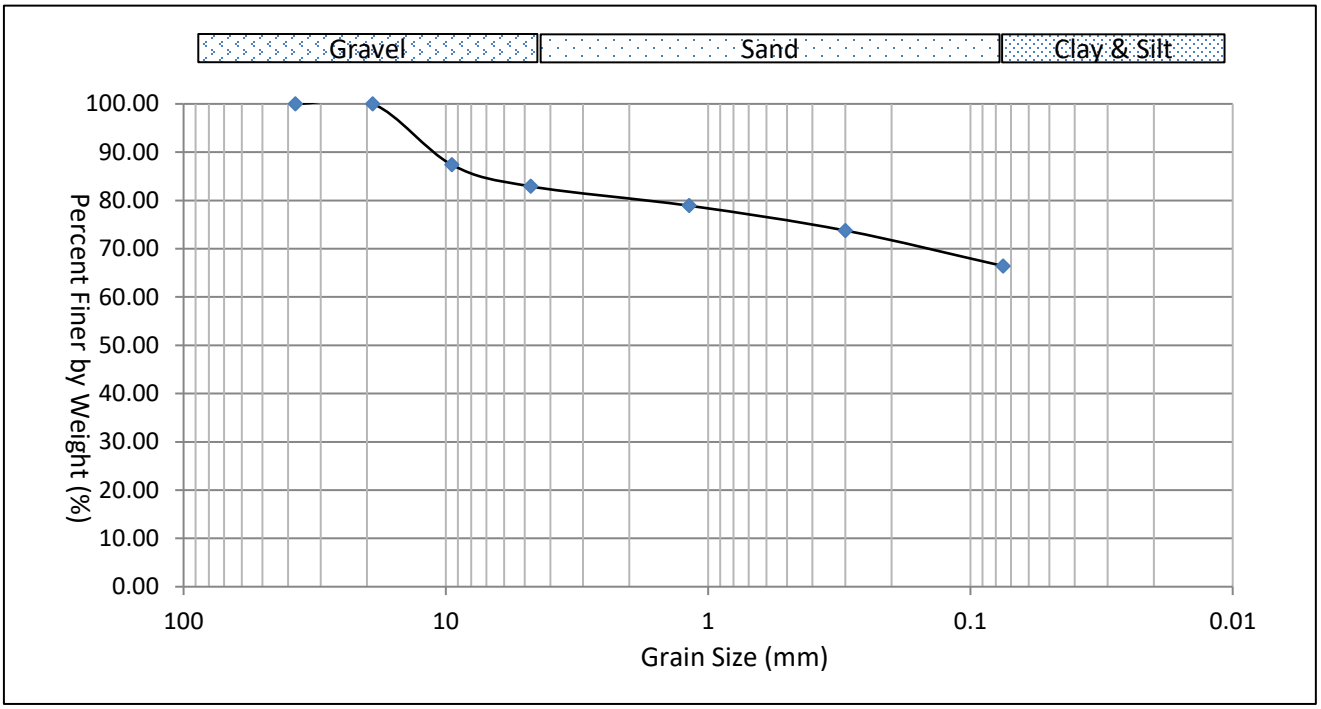
Gravel: 3.6% Sand: 27.2% Clay and Silt 69.2%



Grain Size Distribution

Sample ID: 23-454 BH4 SS5 3.05-3.51m

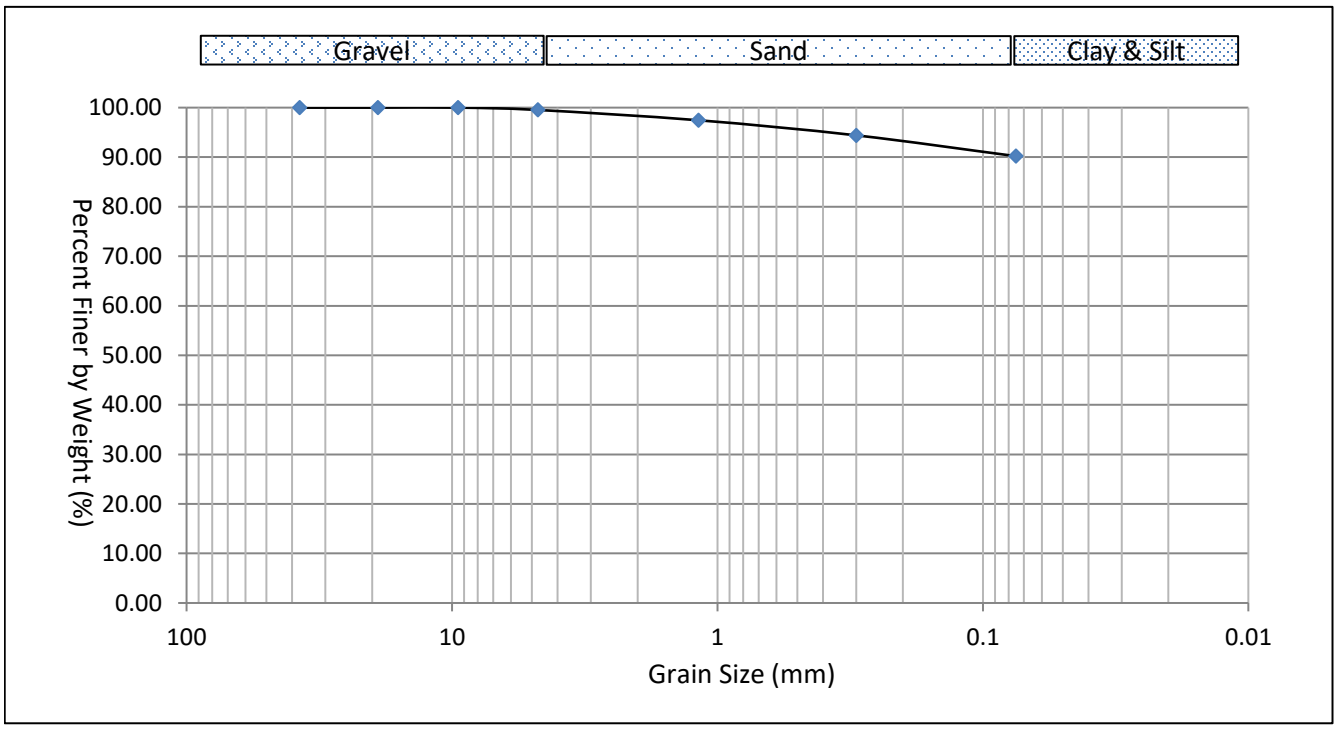
Gravel: 17.1% Sand: 16.5% Clay and Silt 66.4%



Grain Size Distribution

Sample ID: 23-455 BH5 SS2 0.76-1.22m

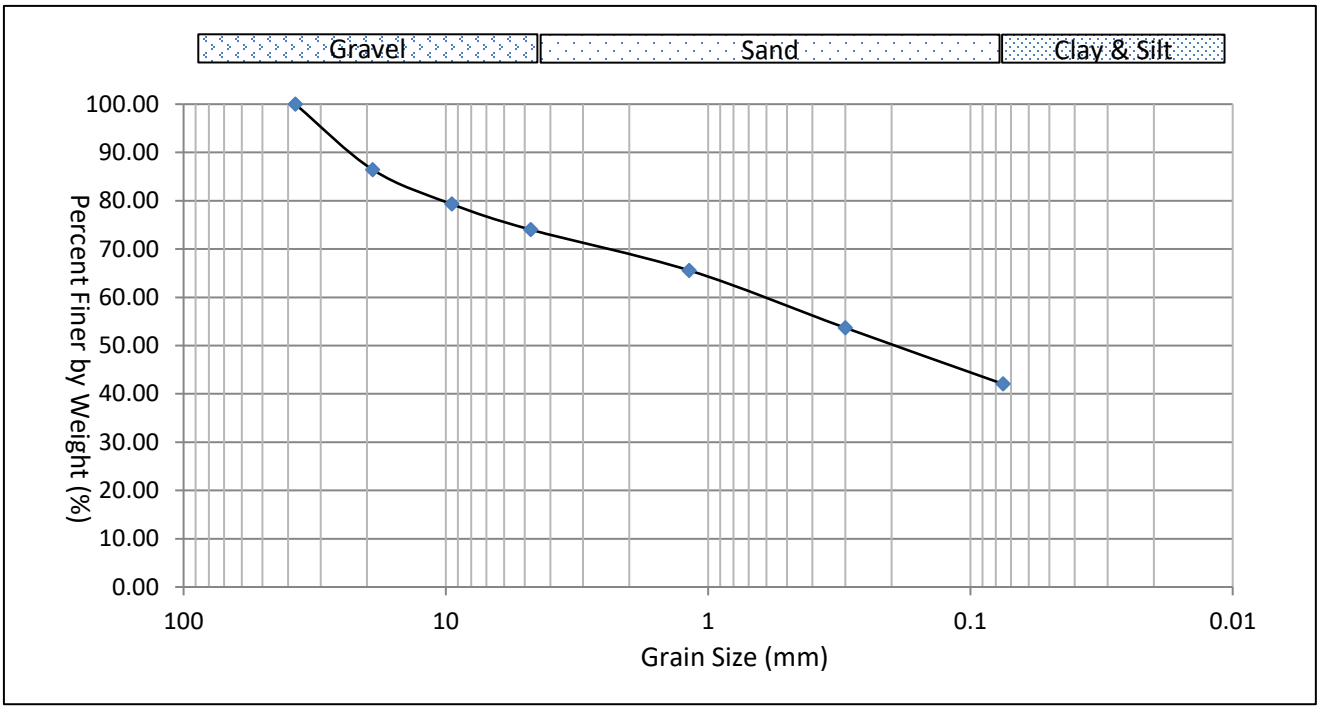
Gravel: 0.5% Sand: 9.3% Clay and Silt 90.2%



Grain Size Distribution

Sample ID: 23-457 BH5 SS4 2.29-2.75m

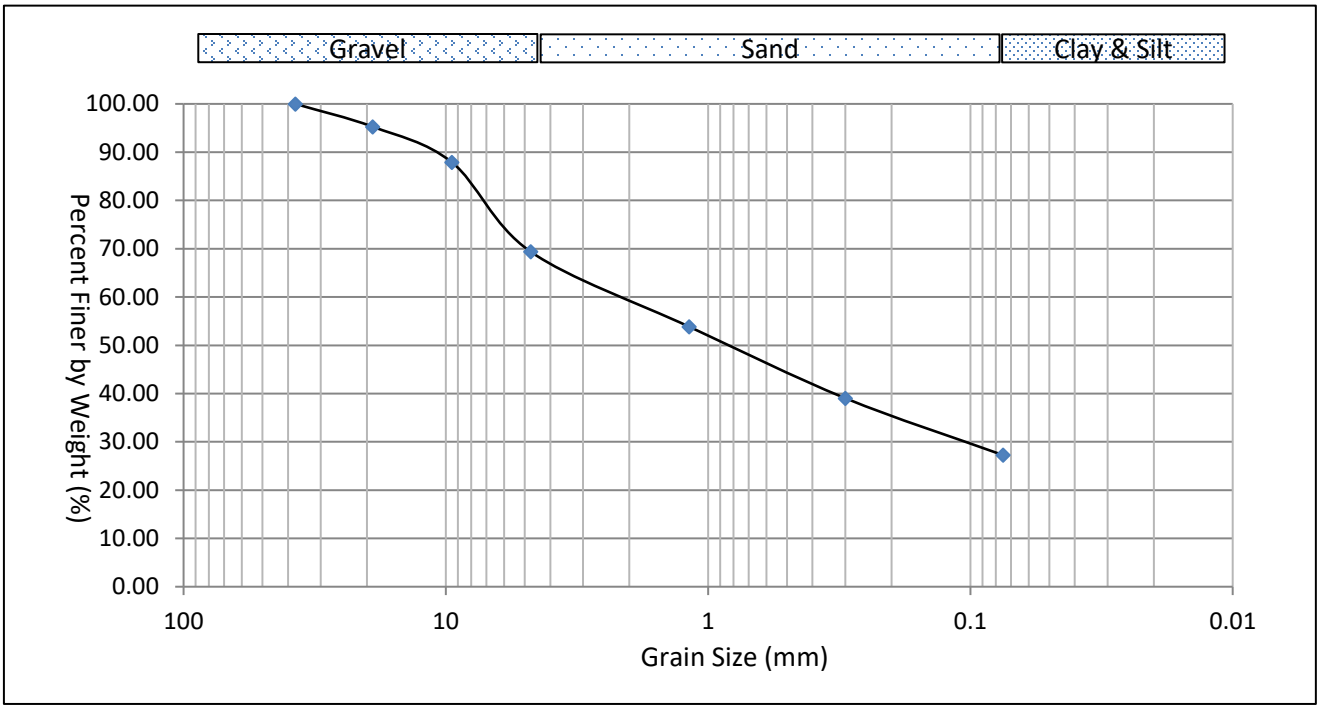
Gravel: 26% Sand: 32% Clay and Silt 42%



Grain Size Distribution

Sample ID: 23-458 BH5 SS5 3.05-3.51m

Gravel: 30.6% Sand: 42.1% Clay and Silt 27.2%



F.E. Job #: 23-446

Certificate of Analysis

Analysis Requested:	Grain Size (Hydrometer)
Sample Description:	3 Soil Sample(s)

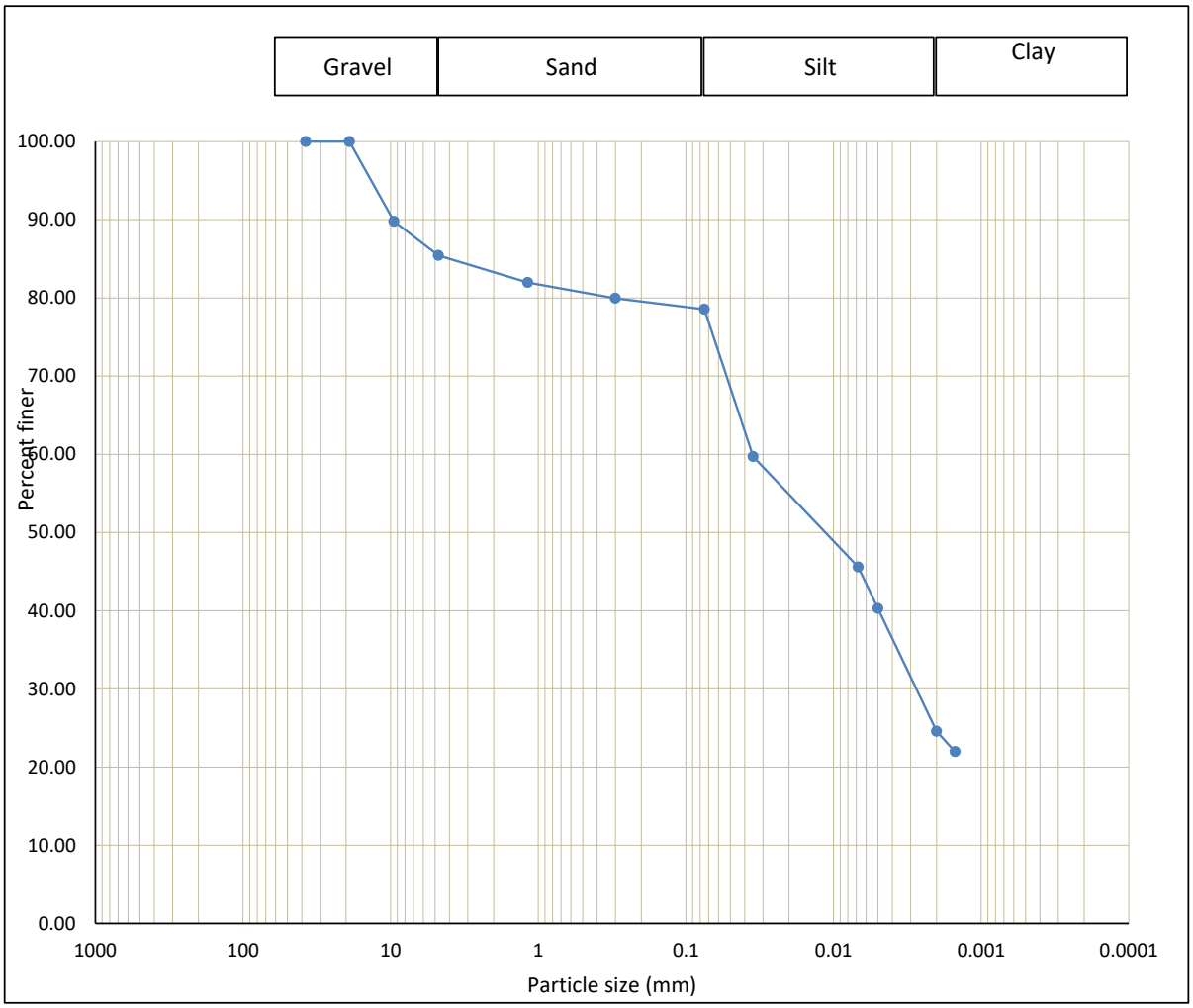
Sample Info	***23-449 BH2 SS4***	***23-452 BH4 SS3***	***23-456 BH5 SS3***			
Sample Depth (m)	***2.29-2.75***	***1.53-1.98***	***1.53-1.98***			
Grain Size (%)						
>19mm	0.0	0.0	7.2			
9.5mm-19mm	10.2	8.7	2.7			
4.75mm-9.5mm	4.4	8.5	1.9			
1.18mm-4.75mm	3.4	2.4	3.0			
300um-1.18mm	2.0	1.4	2.8			
75um-300um	1.4	1.2	2.2			
5um-75um	38.3	35.6	35.5			
2um-5um	15.7	14.7	19.0			
<2um	24.6	27.5	25.7			
Clay	**24.6**	**27.5**	**25.7**			
Silt	**54.0**	**50.3**	**54.5**			
Sand	**6.9**	**5.0**	**8.0**			
Gravel	**14.6**	**17.2**	**11.8**			

F.E. Job #: 23-446

Grain Size Distribution

Sample ID: 23-449 BH2 SS4 2.29-2.75m

Gravel: 14.6% Sand: 6.9% Silt: 54% Clay: 24.6%

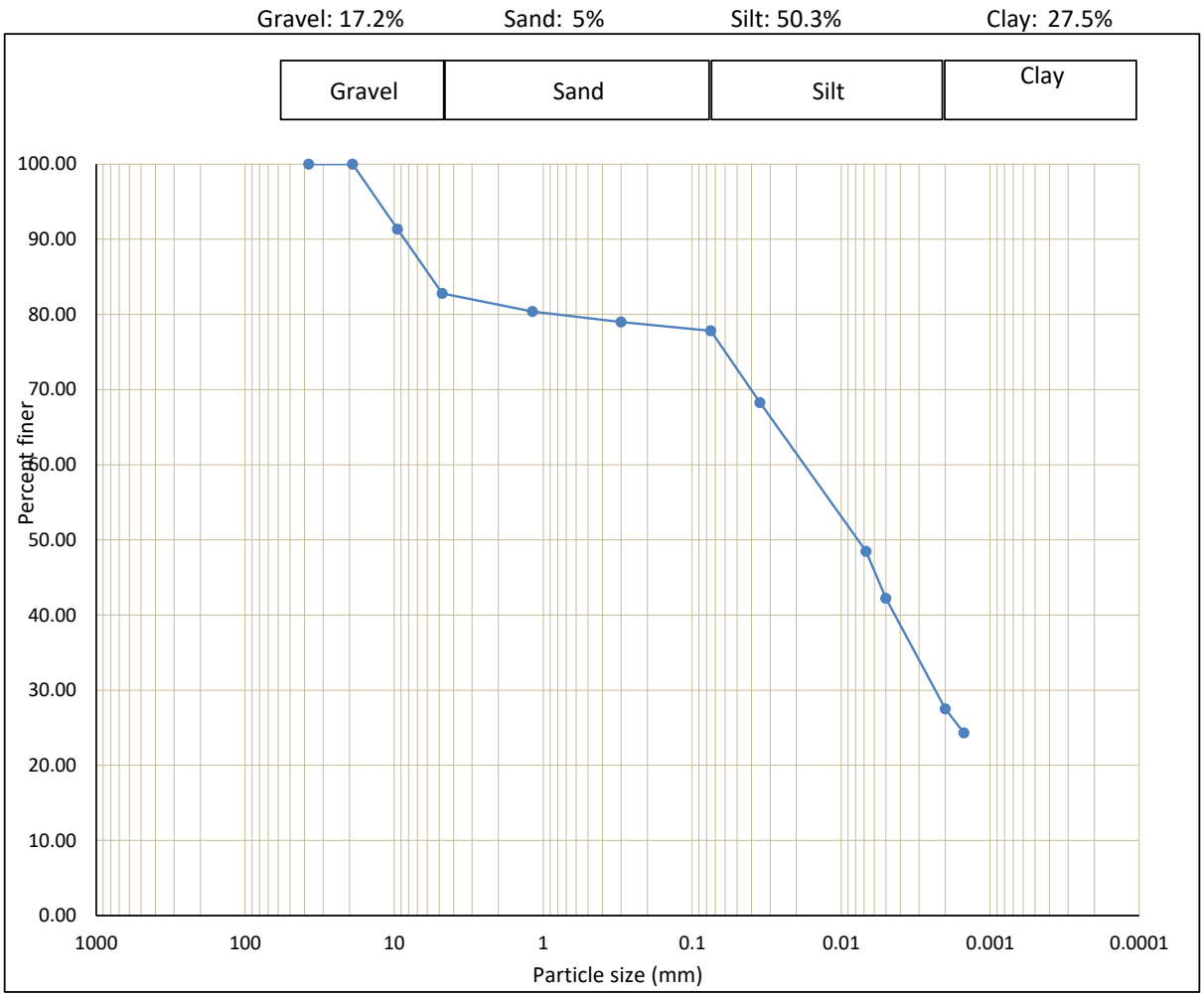


Sample ID: 23-449 BH2 SS4 2.29-2.75m		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	14.6	Gravel
1.18mm-4.75mm	3.4	Coarse Sand
300um-1.18mm	2.0	Medium Sand
75um-300um	1.4	Fine Sand
5um-75um	38.3	Silt
2um-5um	15.7	
<2um	24.6	Clay

F.E. Job #: 23-446

Grain Size Distribution

Sample ID: 23-452 BH4 SS3 1.53-1.98m



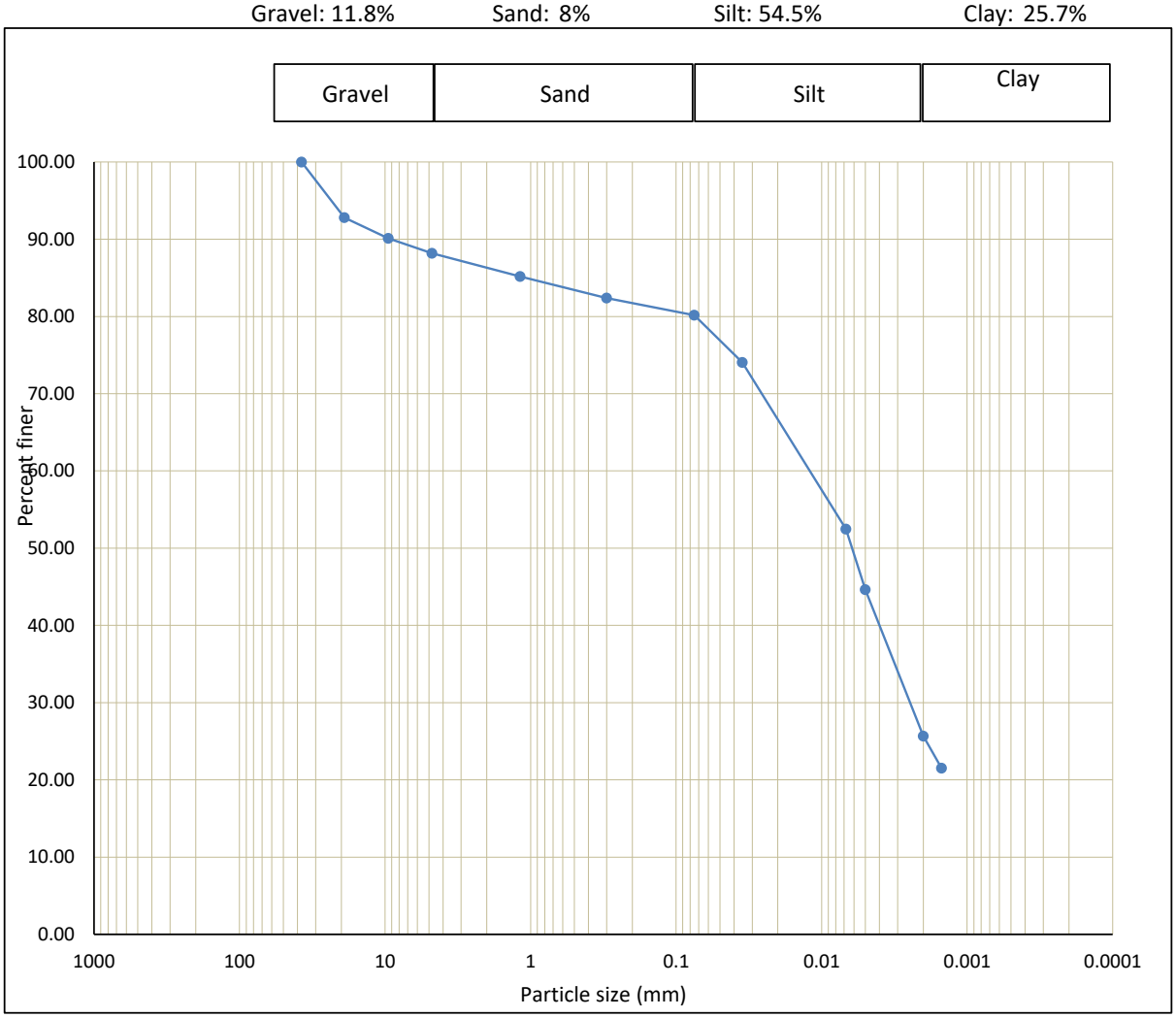
Sample ID: 23-452 BH4 SS3 1.53-1.98m		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	17.2	Gravel
1.18mm-4.75mm	2.4	Coarse Sand
300um-1.18mm	1.4	Medium Sand
75um-300um	1.2	Fine Sand
5um-75um	35.6	Silt
2um-5um	14.7	
<2um	27.5	Clay

F.E. Job #: 23-446

Grain Size Distribution

Sample ID: 23-456 BH5 SS3 1.53-1.98m

Gravel: 11.8% Sand: 8% Silt: 54.5% Clay: 25.7%



Sample ID: 23-456 BH5 SS3 1.53-1.98m		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	11.8	Gravel
1.18mm-4.75mm	3.0	Coarse Sand
300um-1.18mm	2.8	Medium Sand
75um-300um	2.2	Fine Sand
5um-75um	35.5	Silt
2um-5um	19.0	
<2um	25.7	Clay

FISHER ENGINEERING

GEOTECHNICAL-LABORATORY

T. 905 475-7755 fisher@fishereng.com
15-400 Esna Park Drive • Markham, ON • L3R 3K2
Hours: 9AM - 5PM M-F
Call for Emergency Response

LAB JOB No: 23-446

Standard Laboratory Request Form: Chain of Custody

CLIENT INFORMATION
Name:
Contact:
Address: 120 Fairview Road W. Mississauga
Email:
Fax: Fax results ☐
Phone: Email results ☐

PROJECT INFORMATION
Project Name: Geotechnical Investigation
Project ID: 23-13025
Sampled By: David

BILLING INFORMATION
Purchase Order No:
Verbal Authorization:
Credit Card Type (e.g. MC/Visa/AMEX…):
Credit Card #:
Expiry Date:

TURNAROUND TIME (TAT): Check ONE if all samples are the same/or see below.

STD - Standard (5-7 bus. days)	✓	Standard Charge	Reg. Business Hrs. 9am to 5pm Samples received after 2pm are considered next day orders.
3D - Three-Day (72 hrs.)		+25% SURCHARGES MAY APPLY Custom quotations (if applicable) will be reflected on final billing. CALL for: Emergencies, Bulk Quotes, or other Questions.	

LAB SAMPLE ID	CLIENT'S SAMPLE ID AND DESCRIPTION	SAMPLING DATE/TIME	SAMPLE MATRIX	CONTAINER NO. and TYPE	TAT (Above)	ANALYSIS REQUESTED (Check or Specify) Moisture Content	Sieve Analysis	Hydrometer	Atterberg Limits	Proctor						NOTES
	BH1 @2.5-4')	May 23	Soil	Bag	STD	✓										
	(5-6.5')															
	(7.5-9')															
	(10-11.5')															
	(15-16.5')															
	BH2 (2.5-4')						✓									
	(5-6.5')						✓									
	(7.5-9')						✓	✓								
	(10-11.5')						✓									
	BH3 (2.5-4')															
	(5-6.5')															
	(7.5-9')															
	(10-11.5')															
	(15-16.5')															

Relinquished by:
Name: (print)
Signature: Clive
Date & Time: May 25/23
Method of Shipment:

Client's Comments:

Regulatory Requirements:
OPSS Reg.

Purpose for sampling:
Road Base **Engineering Fill**
Road Subbase **Soil Classification**
Subgrade **Other**
Backfill

Received by (Internal):
Name:
Date & Time:

Arrival Temperature °C:
Laboratory Remarks:

FISHER ENGINEERING

GEOTECHNICAL-LABORATORY

T. 905 475-7755 fisher@fishereng.com
15-400 Esna Park Drive • Markham, ON • L3R 3K2
Hours: 9AM - 5PM M-F
Call for Emergency Response

LAB JOB No:

Standard Laboratory Request Form: Chain of Custody

CLIENT INFORMATION
Name:
Contact:
Address: 120 Fairview
Email:
Fax: Fax results ☐
Phone: Email results ☐

PROJECT INFORMATION
Project Name:
Project ID: 23-1300 5
Sampled By: David

TURNAROUND TIME (TAT): Check ONE if all samples are the same/or see below.

STD - Standard (5-7 bus. days)	✓	Standard Charge	Reg. Business Hrs. 9am to 5pm Samples received after 2pm are considered next day orders.
3D - Three-Day (72 hrs.)		+25% SURCHARGES MAY APPLY Custom quotations (if applicable) will be reflected on final billing. CALL for: Emergencies, Bulk Quotes, or other Questions.	

BILLING INFORMATION
Purchase Order No:
Verbal Authorization:
Credit Card Type (e.g. MC/Visa/AMEX...):
Credit Card #:
Expiry Date:

LAB SAMPLE ID	CLIENT'S SAMPLE ID AND DESCRIPTION	SAMPLING DATE/TIME	SAMPLE MATRIX	CONTAINER NO. and TYPE	TAT (Above)	ANALYSIS REQUESTED (Check or Specify) Moisture Content	Sieve Analysis	Hydrometer	Atterberg Limits	Proctor						NOTES
	BH4 (2.5-4')		Soil	Bag	STD	✓	✓									
	(5-6.5')						✓	✓								
	(7.5-9')						✓	✓								
	(10-11.5')						✓									
	BH5 (2.5-4')						✓									
	(5-6.5')						✓	✓								
	(7.5-9')						✓									
	(10-11.5')						✓									
	BH6 (2.5-4')															
	(5-6.5')															
	(7.5-9')															
	(10-11.5')															
	(15-16.5')															

Relinquished by:
Name: (print)
Signature:
Date & Time:
Method of Shipment:

Client's Comments:

Regulatory Requirements:
OPSS Reg.

Received by (Internal):
Name:
Date & Time:

Arrival Temperature °C:
Laboratory Remarks:

Purpose for sampling:
Road Base **Engineering Fill**
Road Subbase **Soil Classification**
Subgrade **Other**
Backfill

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: Land and Building Experts
Address:

Tel.:
Email:
Attn.:

F.E. Job #: 23-1257
Project Name: Geotechnical Investigation
Project ID: FG-P 23-13005
Date Sampled:
Date Received: 25-May-2023
Date Reported: 1-Jun-2023
Location: 120 Fairview Road West
Mississauga, ON

Certificate of Analysis

Analyses	Matrix	Quantity	Date Extracted	Date Analyzed	Lab SOP	Method Reference
pH	Soil	6	1-Jun-23	1-Jun-23	pH-EC-SAR F-16	SW-846, 9045D
Chloride	Soil	6	N/A	1-Jun-23	Chloride F-20	SM 4500-Cl-E
Sulphate	Soil	6	1-Jun-23	1-Jun-23	Sulphate F-21	SM 4500-SO_4

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:	pH, Sulphate, Chloride
Sample Description:	6 Soil Sample(s)

Parameter	***23-1257-1*** BH2 SS3 1.52-1.98m	***23-1257-2*** BH2 SS4 2.29-2.74m	***23-1257-3*** BH4 SS3 1.52-1.98m	***23-1257-4*** BH4 SS4 2.29-2.74m	***23-1257-5*** BH5 SS3 1.52-1.98m	**Soil Standards** *
pH *(pH unit)*	8.60	8.68	8.33	8.20	8.37	(5-11) 5-9

Parameter	***23-1257-6*** BH5 SS4 2.29-2.74m					**Soil Standards** *
pH *(pH unit)*	8.17					(5-11) 5-9

* Surface soil pH value from 5 - 9, Sub-surface soil pH value from 5-11.

QA/QC Report

Parameter	**LCS**	**AR**	**Duplicate**	**AR**		
	Absolute Difference *(pH Unit)*					
pH *(pH unit)*	7.01	6.90-7.20	0.02	<0.3		

LEGEND:
LCS - Laboratory Control Sample
AR - Acceptable Range

Certificate of Analysis

Analysis Requested:	pH, Sulphate, Chloride
Sample Description:	6 Soil Sample(s)

Parameter	***23-1257-1*** BH2 SS3 1.52-1.98m	***23-1257-2*** BH2 SS4 2.29-2.74m	***23-1257-3*** BH4 SS3 1.52-1.98m	***23-1257-4*** BH4 SS4 2.29-2.74m	***23-1257-5*** BH5 SS3 1.52-1.98m	***23-1257-6*** BH5 SS4 2.29-2.74m
	Concentration (µg/g)					
Chloride in Soil	<10	<10	<10	<10	13.9	<10

< result obtained was below RL (Reporting Limit).

QA/QC Report

Parameter	**Blank**	**RL**	**LCS**	**AR**	**MS**	**AR**
	(µg/g)		**Recovery (%)**		**Recovery (%)**	
Chloride in Soil	<10	10	97	70-130	104	70-130

Parameter	**Duplicate**	**AR**				
	RPD (%)					
Chloride in Soil	0.0	0-20				

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

Certificate of Analysis

Analysis Requested:	pH, Sulphate, Chloride
Sample Description:	6 Soil Sample(s)

Parameter	***23-1257-1*** BH2 SS3 1.52-1.98m	***23-1257-2*** BH2 SS4 2.29-2.74m	***23-1257-3*** BH4 SS3 1.52-1.98m	***23-1257-4*** BH4 SS4 2.29-2.74m	***23-1257-5*** BH5 SS3 1.52-1.98m	***23-1257-6*** BH5 SS4 2.29-2.74m
Sulphate *(mg/kg)*	<1	3	5	2	92	10

< result obtained was below RL (Reporting Limit).

QA/QC Report

Parameter	**Blank**	**RL**	**LCS/Spike**	**AR**	**Duplicate**	**AR**
	(mg/kg)		**Recovery (%)**		**RPD (%)**	
Sulphate	<1	1	100	70-130	0	0-30

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

FISHER ENVIRONMENTAL LABORATORY

T. 905 475-7755 x227 E. laboratory@fisherenvironmental.com
400 Esna Park Drive No. 15 • Markham, ON • L3R 3K2
Hours: 9AM - 5PM M-F
Call for Emergency Response

LAB JOB No: 23-1257

STANDARD LABORATORY REQUEST FORM: CHAIN OF CUSTODY

CLIENT INFORMATION

Name: Land and Building Experts.
Contact:
Address: 120 Fairview Rd W.
Mississauga
Email:
Fax: Fax results?
Phone: Email results? ✓

PROJECT INFORMATION

Project Name: Geotechnical Investigation
Project ID: 23-13005
Sampled By: David

BILLING INFORMATION

Purchase Order No:
Verbal Authorization:
Credit Card Type (e.g. MC/Visa/AMEX...):
Credit Card #:
Expiry Date: CVV

TURNAROUND TIME (TAT): Check ONE if all samples are the same/or see below.

STD - Standard (5-7 bus. days)	✓	Standard Charge	Reg. Business Hrs. 9am to 5pm. Samples received after 2pm are considered next day orders.
3D - Three-Day (72 hrs.)		+25%	SURCHARGES MAY APPLY. Custom quotations (if applicable) will be reflected on final billing. CALL for: Emergencies, Bulk Quotes, or other Questions.
SR - Semi Rush (48 hrs.)		+50%	
R - Rush (24 hrs.)		+75%	
SD - Same Day - 100%		+100%	

LAB SAMPLE ID	CLIENT'S SAMPLE ID AND DESCRIPTION	SAMPLING DATE/TIME	SAMPLE MATRIX	CONTAINER NO. and TYPE	TAT (Above)	ANALYSIS REQUESTED (✓ check or specify) Metals	PHCs	VOCs	PAHs	PCBs	PH	CL	SO4	NOTES
(1)	BH2 SS3 (5-6.5')		Soil	Bag	STD						✓	✓	✓	
(2)	BH2 SS4 (7.5-9')		✓	✓	✓						✓	✓	✓	
(5)	BH5 SS3 (5-6.5')		✓	✓	✓						✓	✓	✓	
(6)	BH5 SS4 (7.5-9'		✓	✓	✓						✓	✓	✓	
(3)	BH4 SS3 (5-6.5')		✓	✓	✓						✓	✓	✓	
(4)	BH4 SS4 (7.5-9')		✓	✓	✓						✓	✓	✓	

Relinquished by:
Name: (print)
Signature: Clive Acheson
Date & Time: May 25/23
Method of Shipment:

Client's Comments:

Regulatory Requirements:

Reg. 153
Table _____
☐ Residential / Parkland
☐ Industrial / Commercial
☐ Agricultural
Soil Texture
☐ Coarse ☐ Med/Fine

Sewer Use
☐ Sanitary
☐ Storm
Region _____

Reg. 558
☐ TCLP

Received by (Internal): Ko
Name:
Date & Time: May 25, 23

Laboratory Remarks: