147 Spadina Avenue, Toronto

Site Servicing and Stage 1 Stormwater Management Report

August 19, 2021

arva

CANADA'S BEST MANAGED COMPANIES Platinum member

Prepared for:
HM RB (147 Spadina) LP

147 Spadina Avenue, Toronto

Site Servicing and Stage 1 Stormwater Management Report

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RVA 205518.01

August 19, 2021

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1.0 INTRODUCTION

HM RB (147 Spadina) LP referred to as Hullmark herein, is proposing the redevelopment of 147 Spadina Avenue in the City of Toronto.

R.V. Anderson Associates Limited (RVA) has been retained by Hullmark to prepare a Site Servicing and Stage 1 Stormwater Management (SWM) Report in support of a Zoning By-law Amendment (ZBA) application for the proposed site redevelopment.

The scope of this report specifically includes:

- Identification and review of existing municipal storm, sanitary and water services available for the site;
- Identification of the City of Toronto criteria with respect to sanitary, water and storm servicing including stormwater management criteria for the redevelopment of the site, in accordance with the City of Toronto Wet Weather Flow (WWF) Guideline criteria and targets;
- Estimate water, sanitary and storm demands that will result from the redevelopment;
- Investigation of the capacity of existing municipal water mains and sewers;
- Calculation of allowable post-development peak storm discharge rates;
- Calculation of WWF water balance target criteria and development of appropriate methods to achieve the criteria;
- Provide a summary of proposed servicing of the site with water, sanitary and storm services; and
- Recommendation and description of proposed stormwater management (SWM) system for the site to address water balance, water quality, and discharge rate targets.

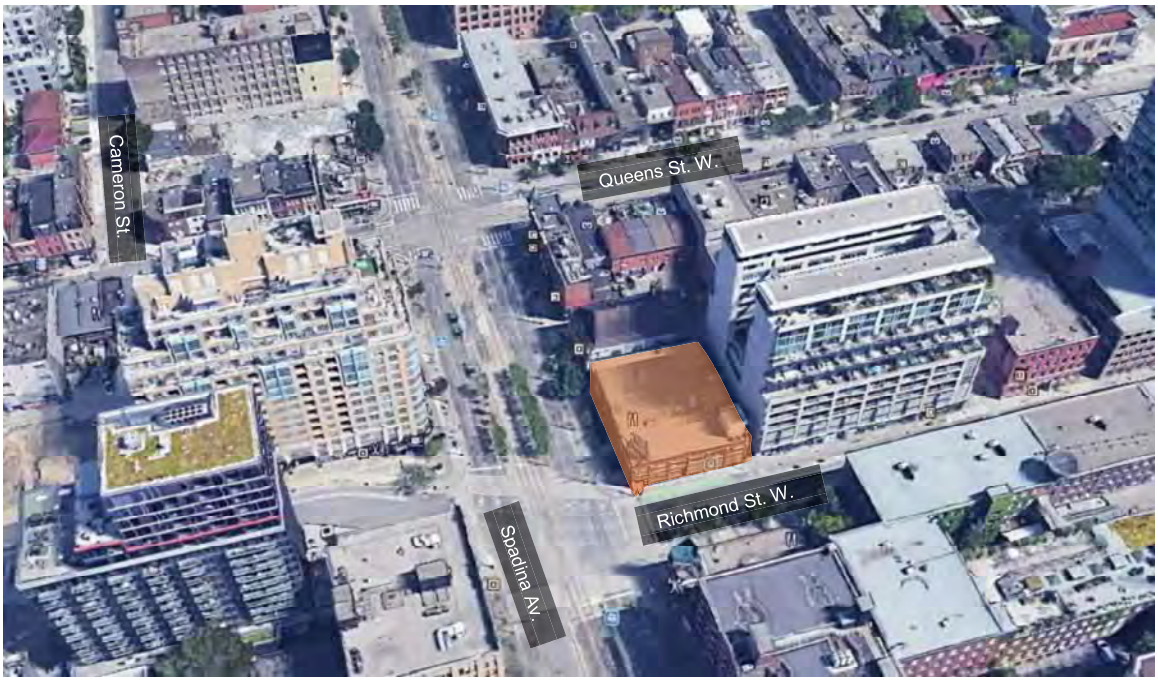
2.0 BACKGROUND

2.1 Existing Conditions

The site is located on the northeast corner of Spadina Avenue and Richmond Street in the City of Toronto. The 0.1081 hectare site is bounded by residential/commercial properties to the east and a two-storeys commercial building to the north; Spadina Avenue to the west and Richmond Street to the south. Refer to Figure 2.1 for the site location.

The site is presently occupied by a two-storeys commercial building. There is a 1.4m± strip of paved area along the north side of the building which acted as an access and fire escape for the building, and a 3.0m± strip of paved area along the east side of the structure.

Figure 2.1 – Site Location



2.2 Proposed Redevelopment

The proposed site redevelopment is comprised of a new twenty-five (25) storey mixed-use building with commercial at-grade, and twenty-four (24) storeys of residential use, and a mechanical penthouse. The ground floor will be occupied by lobby for residential units, commercial units, and loading area. Three (3) levels of underground parking will be accessible by the adjacent building parking garage at 380-400 Richmond Street via an existing legal property easement and existing built-in knockout panels.

The building roof and terrace area will effectively extend to the limits of the property line. There will be an enclosed loading area at the ground floor, where the garage door is set back from the building façade to allow for access to City's control manholes, stormwater management system, and exhaust grate at grade. This area will be entirely covered by the building overhang above.

Refer to Appendix A for the architectural site plans.

2.3 Background and Resource Information

In preparing this report, the following information was obtained and reviewed:

- PUCC Drawing 5-A-8;
- Toronto Sewer and Water Atlas Maps of surrounding underground infrastructure, dated January 9, 2010;
- City As-built Plan and Profile Drawings:
    - Richmond Street W. – Drawing 19-03578
    - Richmond Street W. – Drawing R-128
    - Richmond Street W. – Drawing R-273
    - Spadina Avenue – Drawing S-41
    - Spadina Avenue – Drawing S-315
    - Spadina Avenue – Drawing 56-M-1
    - Spadina Avenue – Drawing 74M-2
    - Spadina Avenue – Drawing R-605-3
    - Spadina Avenue – Drawing R-605-4
- Topographic Survey of Part of Block 1, Adjoining Military Reserve Plan, PIN 21412-0116 (LT), prepared by KRCMAR SURVEYORS LTD., signed September 26, 2019; and
- Site plan and project statistics provided by Audax Architecture Inc.

3.0 SERVICING INVESTIGATION

Information with respect to existing municipal services and utilities was determined from PUCC drawings, record plan and profile drawings, sewer and water atlas maps obtained from the City of Toronto and a site visit undertaken in November 2020.

The following sections address water, sanitary, and storm related servicing related to the redevelopment of the site.

3.1 Water Servicing

3.1.1 Water Servicing Criteria

The City of Toronto's Design Criteria for Sewers and Watermains (Jan 2021) was used to analyze the water demand from the proposed development. The City's criteria are summarized as follows:

- Water supply systems should be designed to satisfy the greater of maximum day demand plus fire flow or peak hour demand;
- Average domestic water demands of 190 litres per capita per day for high rise apartment buildings and condominiums with greater than six (6) units;
- Maximum day and peak hour factors for apartments are 1.30 and 2.50 respectively; and
- Maximum day and peak hour factors for commercial are 1.10 and 1.20 respectively.

3.1.2 Existing Water Servicing

Based on City records, there is a newly constructed 300 mm Ø watermain located along the centerline of Richmond Street West in 2019/2020. This watermain is interconnected with a 300 mm Ø watermain along the East side of Spadina Avenue. Please refer to Appendix B for the water atlas map for the area.

There is an existing fire hydrant located on the south side of Richmond Street directly across the property. There is a second existing fire hydrant on the east side of Spadina Avenue, at the northwest corner of the site. Both hydrants in front of the site can provide coverage of the entire site within 90 m.

Based on a site visit undertaken in November 2020 and City record drawings, a domestic water service enters the building from Richmond Street W. at approximately the southeast corner of the building.

3.1.3 Proposed Water Servicing

3.1.3.1 Domestic Water Demand Analysis

The total estimated average daily flow rates, maximum day, and peak demand rates required for the proposed development are estimated to be as follows:

Table 3.1 – Estimated Water Demand

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Residential	0.95	1.23	2.36
Commercial	0.01	0.01	0.01
TOTAL	**0.96**	**1.24**	**2.38**

Refer to Appendix B for water demand analysis calculations.

3.1.3.2 Fire Flow Analysis

In accordance with the Fire Underwriters Survey (FUS), reiterated in the City of Toronto Design Criteria for Sewers and Watermains, fire flows shall not be less than 80 L/s (4,800 L/min) for a 2-hour duration in addition to maximum daily domestic demand with a residual pressure of not less than 140 kPa (20 psi). Additionally, fire flows shall not be less than 83.3 L/s (5,000 L/min) for a 4-hour duration for commercial areas. This flow is to be delivered with a residual pressure of not less than 140 kPa (20 psi).

Calculations using the Fire Underwriters Survey (FUS) indicate a maximum required fire flow of 116.7 L/s (7,000 L/min) for the entire development (based on fire resistive construction with a sprinkler system designed to NFPA).

Refer to Appendix B for fire flow analysis calculations.

As described in Section 3.1.1, the water supply system should be designed to satisfy the greater of peak hour demand or maximum day demand plus fire flow. Therefore, the maximum day demand plus fire flow rate (i.e. 1.24 L/s + 116.7 L/s = 117.9 L/s (7,074 L/min)) is the governing requirement.

3.1.3.3 Proposed Watermain Service Connections

In accordance with the City of Toronto Municipal Watermain Code, new domestic water services are required for every building and existing services are to be removed. It is currently envisioned by the owner that there will be separate ownerships for the residential units and the commercial units. As a result, it is currently envisioned that there will be two (2) domestic water services for each ownership, and each service connection is complete with independent water meter and backflow preventor.

A fire service will also be required for the building sprinkler system. The OBC requires two source of water supply for fire protection to service a building that is 84 m or higher in

height (excluding mechanical penthouse). As the subject development will not exceed this height, only a single fire connection is required.

The new 150 mm Ø fire water services will be connected to the existing 300 mm Ø watermain located on the Richmond Street W. ROW. Approximately 2.0 m in front of the property line, a 100 mm Ø PVC domestic water service will be branched off of the eastern 150 mm Ø fire services in an "h" configuration. In addition, a separate second 100 mm Ø domestic service will be connected to the existing 300 mm Ø watermain. This configuration will provide the required one (1) fire service connections and two (2) domestic service connections.

Refer to Appendix A for the Basement Level Plan, and Appendix E for the Conceptual Servicing Plan which show the proposed water servicing configuration.

3.1.4 Capacity of Existing Watermain System

A hydrant flow test in accordance with NFPA STD 291, was performed by Lozzi Aqua Check on November 9, 2020 on the flow hydrant on the south side of Richmond Street W., first hydrant east of Spadina Ave. The hydrant test indicates that the existing 300 mm Ø watermain is capable of providing 564 L/s (8,942 GPM) at 20 psi. Refer to Appendix B for the hydrant flow test results

As the capacity of the municipal watermain is greater than the estimated maximum domestic and fire demand, outlined in Section 3.1.3.2, it is concluded that there is sufficient capacity to support the proposed development.

3.2 Foundation Drainage

The current City Sewer Code prohibits the discharge of foundation drainage to a municipal sewer except through a Private Water Discharge Agreement (PWDA). An Interim Hydrogeological Investigation prepared by Grounded Engineering Inc., dated August 17, 2021 has been completed for the site. This report indicates that the groundwater table is approximately 3.5 m below grade. Based on samples taken and analyzed for water quality, the groundwater is suitable for discharge to the sanitary sewer but not to storm (i.e. Municipal Code Chapter 681, Table 1 and Table 2 respectively). Therefore, pre-treatment would be required prior to discharge into the storm sewer system. However, discharging into the sanitary sewer system would not require pre-treatment.

The report estimates a short-term average discharge rate of 58,000 L/day (0.67 L/s) and a long-term average discharge rate of 31,000 L/day (0.36 L/s). It is the owner's intent to discharge the short-term and long-term foundation drainage into the municipal sanitary sewer. The peak pump rate of 1.0 L/s has been determined by a mechanical consultant, and was incorporated into the combined sewer capacity analysis to represent the long-

term foundation drainage discharge from the site. Please refer to Appendix C for mechanical engineer's letter in relation to long-term foundation drainage peak pump rate.

A long-term Private Water Discharge Agreement (PWDA) application will be submitted to the Environmental Monitoring & Protection (EM&P) Unit of Toronto. In addition to the long-term PWDA dewatering during construction will be required, and as such, a short-term PWDA application will be submitted to the EM&P Unit of Toronto Water.

3.3 Sanitary Servicing

3.3.1 Sanitary Servicing Criteria

The City of Toronto's Design Criteria for Sewers and Watermains (Jan 2021) was used to analyze the sanitary demand from the proposed development. The City criteria are generally summarized as follows:

- Average domestic residential sewage flows of 450 litres per capita per day for design flows for new or infill developments;
- The peak domestic sewage flow to be calculated by utilizing a calculated Harmon Peaking Factor of [$M = 1 + 14 / (4+P^{0.5})$];
- Average commercial/industrial/institutional flows of 180,000 litres per floor hectare per day for new or infill developments (peaking factor included in average flow);
- A dry weather peak infiltration allowance of 0.26 L/s/ha is required for all sewers; and
- Combined sewer flows will include dry weather domestic flows plus the runoff from a 2-year storm event.

3.3.2 Existing Sanitary Servicing

A review of the City's Sewer Atlas Mapping indicates that the site is located in an area of Toronto that is serviced by a network of storm and combined sewers. Based on these records and City as-built Plan and Profile drawings, a 300mm vitrified clay combined sewer in front of the site along the Richmond Street frontage drains east, then flows south along Peter Street. In addition, record indicates the aforementioned 300mm combined sewer has a 9" relief pipe which directs overflow to a 375mm vitrified clay combined sewer which drains west and then south along Spadina Avenue. Both directions ultimately flow into the trunk sewer along Adelaide Street. Please refer to Appendix C for the sewer atlas map for the area.

With respect to existing sanitary service connections, a site visit undertaken in November 2020 established that the existing building is serviced by a combined sewer service connection which exits the basement along the Richmond Street building face. It is anticipated that this is connected to the 300mm combined sewer draining east towards Peter Street, as the building was constructed prior to the relief line was installed.

The estimated peak sanitary discharge rate from the existing site is estimated to be 0.06 L/s (refer to Appendix C for calculations).

3.3.3 Proposed Sanitary Servicing

3.3.3.1 Sanitary Demand Analysis

The proposed site redevelopment will result in an estimated total peak sanitary flow rate of 9.88 L/s, which represents an estimated increase of 4.24 L/s over the existing sanitary flow rate. The estimated breakdown of peak sanitary discharge from the redevelopment is as follows:

Table 3.2 – Estimated Sanitary Demand

	Sanitary Flow (L/s) @ 450 L/c/d
Residential	8.97
Commercial	0.09
Foundation Drainage	1.00
Infiltration Allowance	0.03
TOTAL	**10.09**

Refer to Appendix C for sanitary servicing analysis calculations.

3.3.3.2 Proposed Sanitary Service Connection

In accordance with the City of Toronto Municipal Sewer Code, new domestic sanitary services are required for every building and existing services are to be removed. It is currently envisioned by the owner that there will be separate ownerships for the condominium units and the commercial units. As a result, two (2) sanitary service connections are proposed for the development.

In accordance with the City Sewer Code, a sanitary control maintenance hole (MH) will be provided for each sanitary service connections near the property line for City sampling purposes. The MHs will be incorporated into the basement structure where the basement extends out from the building at grade along the Richmond St. W. frontage. Upstream of

the sanitary control MH a groundwater sampling point will be installed for the groundwater discharge into the sanitary system.

Two (2) separate sanitary service connections will connect to the two control MH's outlined above, respectively. Two (2) 150 mm Ø sanitary service laterals will facilitate the residential and commercial ownerships, respectively. Both services will connect to the existing 300 mm Ø combined sewer on Richmond Street W. Refer to the Conceptual Servicing Plan in Appendix E which shows the proposed sanitary servicing configuration.

It appears that gravity connection to the 300 mm Ø Richmond Street. W. combined sewer is physically possible based on the City's record drawings. Furthermore, based on the existence of the combined drain connecting the site to the municipal combined sewer MH it is anticipated that proposed connections to the sewer are feasible. As such it currently proposed to connect the sanitary service directly to the combined sewer. However, further subsurface utility investigating may be undertaken to review the location and depths of buried utilities and the City watermain and combined sewer systems. This would identify whether any relocations will be required to facilitate the connections. Refer to Appendix E for the Conceptual Servicing Plan which show the proposed sanitary servicing configuration.

The capacity of the receiving combined sewer is discussed in section 3.5 of this report.

3.4 Storm Servicing

3.4.1 Existing Storm Servicing

As indicated in Section 3.3.2 of this report, the existing building storm is serviced by a combined sewer service connection which exits the basement along the Richmond Street building face. Additionally, based on visual observation and review of the topographic survey, a strip of land at the north of the property currently drains uncontrolled to the Spadina Avenue ROW catch-basins, and a 3m wide strip at the east of the property currently drains uncontrolled to the Richmond Street ROW catch-basins.

There is an existing 825mm storm located on the west side of the Spadina Avenue, but no storm sewer across the frontage of the site along Richmond Street West.

Using the Rational Method Equation Q = CiA, the existing 2-year storm event existing peak storm discharge rates from the site can be calculated as follows:

$$Q_{2yr\ Richmond-Building} = 2.78\ x\ CiA = 2.78\ x\ 0.90\ x\ 88.20\ mm/hr\ x\ 0.0934ha = 20.6\ L/s$$

$$Q_{2yr\ Richmond-Laneway} = 2.78\ x\ CiA = 2.78\ x\ 0.90\ x\ 88.20\ mm/hr\ x\ 0.0113ha = 2.5\ L/s$$

$$Q_{2yr\ Spadina-Laneway} = 2.78\ x\ CiA = 2.78\ x\ 0.90\ x\ 88.20\ mm/hr\ x\ 0.0030\ ha = 0.7\ L/s$$

Refer to Figure PRE-1 in Appendix E for the existing drainage plan.

3.4.2 Proposed Storm Servicing

3.4.2.1 Allowable Storm Discharge

Based on the WWFMP Guidelines, the allowed peak discharge from the site is to be based on controlling the discharge rate to the existing condition with a maximum runoff coefficient of C=0.5 or the existing capacity of the receiving sewer. Since the existing site is 100% impervious, a runoff coefficient of C=0.5 would therefore apply to the site and the allowed peak discharge rate from the redeveloped site can be calculated as follows:

$$Q_{allowable} = 2.78\ x\ CiA = 2.78\ x\ 0.50\ x\ 88.20\ mm/hr\ x\ 0.1081\ ha = 13.2\ L/s$$

This represents a 7.4 L/s decrease in 2-year peak storm flow that discharges to the Richmond Street West combined sewer. The capacity of the receiving combined sewer is discussed in the subsequent section 3.5.

3.4.2.2 Proposed Storm Service Connection & Stormwater Management Plan

Pursuant to City Municipal Code, Chapter 681 generally prohibits a storm connection from a site to the municipal sewer. However, in the case of site developments other than single family residential buildings, a storm service connection is required to meet WWFM Guidelines and implement the required SWM. The SWM plan serves as a request through the City of Toronto for a storm service connection and exemption from the associated requirements in the Sewer Code.

As required by the City municipal code with respect to sewers, a new storm service connection will be required, and the existing service connection will be required to be removed. Additionally, in accordance with the City Sewer Code, a storm control MH will be provided near the property line for City sampling purposes. This MH will be incorporated into the basement structure where the basement extends out from the finished portion of the above ground building. Refer to Appendix A for the basement Level Plan which shows the proposed location for the MH.

Generally, the City does not permit new storm system to be connected to existing combined sewers except as an interim measure where sewer separation is to be ultimately implemented. Although an 825mm storm sewer is available on the west side of Spadina Avenue, there are a significant number of utilities within the Spadina Avenue ROW, as well as TTC streetcar tracks at grade to make the construction of a storm connection challenging.

As there is no available storm sewer along the Richmond Street frontage, a single 150 mm Ø storm service connection to the 300mm combined sewer is proposed for the site.

The storm service connection will convey controlled drainage from the on-site SWM system that will be employed to meet the City's stormwater discharge requirements. A detailed (Stage 2) SWM Plan will be prepared to support the Site Plan Approval (SPA) application for the proposed development. The general SWM plan concept is presented as follows:

As outlined in Section 2.2. the configuration of the proposed redevelopment will result in a building footprint that will effectively extend to the developable limits of the site. The roof coverage will be comprised of mechanical roofs, terraces, and green roof surfaces. To meet the peak discharge rate requirements of the WWFM Guidelines, a stormwater detention tank will be incorporated into the building basement to control the 100-year post development peak discharge rate of the site to the allowable rate in accordance with WWFM Guidelines. The tank will be located near the southeast corner of the site, with access into the tank provided along the Richmond Street frontage of the site where the ground floor of the building is recessed from the property line at grade. The tank access will be provided through a grated manhole cover so that it will also serve as an emergency spillover to the roadway during storm events where the capacity of the tank is exceeded (i.e. events greater than the 100-year design storm). Refer to Appendix D for the storm calculations. To control the peak storm discharge from the site into the municipal sewers, the detention tank will have an outlet through an orifice control upstream of the storm control MH accessible by the City.

With respect to stormwater quality, green roofs, terraced amenity area, and conventional flat ballasted roofs are generally considered to inherently meet the City's water quality targets as they are not subjected to salt or other contaminants. As the site is effectively comprised entirely of roof area, the City's total suspended solids (TSS) water quality target minimum of 80 % will be achieved.

As the area available for green roofs is limited, the water balance target cannot be achieved with green roofs alone. To offset this water balance shortfall, a rainwater harvesting cistern will be provided below the stormwater detention tank. As the runoff directed to this tank will be entirely from relatively "clean" roof surfaces, separation between the rainwater harvesting cistern and the stormwater detention tank is not warranted and the two requirements will be combined in a single rainwater harvesting/detention SWM tank. The volume located above the gravity draining storm service connection from the SWM tank will serve as the detention storage required for discharge rate control and the volume of the SWM tank located below the gravity outlet will serve the volume requirements for rainwater harvesting. The SWM tank will discharge through an orifice plate upstream of the storm control manhole at the property line and to the City storm sewer system, via a sewer lateral.

The harvested rainwater will require usage that has sufficient demand to deplete the required volume within 72 hours on average. As the site is effectively all roof area, there is no opportunity for irrigation of at grade areas. While irrigation of the green roof areas could be a component of this use, it will be insufficient on its own. At this time, it is anticipated that toilet flushing will be employed to utilize harvested rainwater.

3.5 Combined Sewer Capacity

3.5.1 Criteria and Approach

As indicated in Section 3.3.3.1, the proposed redevelopment will result in an increase in sanitary demand on the municipal combined sewer. Based on 450 L/c/d, this increase is estimated to be 4.24 L/s, in which the City requires an assessment of the impact of the development on their sewer system. In addition, where combined sewers are involved, the City of Toronto requires the MOECC Procedure F-5-5 be reviewed for compliance.

Procedure F-5-5 outlines the requirements for determining treatment requirements for municipal and private combined sewers. With respect to new sanitary connections to combined sewer systems, the procedure requires that where a system is deficient, additional flow from new development shall be curtailed. In the City of Toronto where combined sewer systems exist without any sewer separation through the existence of dedicated storm sewers, combined sewer systems can often be considered deficient. As a result, in the absence of a combined sewer overflow study, to ensure compliance with procedure F-5-5 it must be demonstrated that no additional flow is being introduced into the municipal combined sewer system as part of a redevelopment.

In consideration of the above, while the redevelopment of the site will result in an increase in sanitary demand, the implementation of stormwater management as part of the redevelopment will allow the discharge rate of stormwater to be controlled to offset the additional sanitary demand.

Therefore, the assessment of the existing combined sewer system capacity will be based on a net zero or net negative impact approach in which the redevelopment site will employ measures to mitigate any additional discharge to the combined sewer from the existing condition.

3.5.2 Pre and Post Net Zero Analysis

A review of pre- and post-development combined sewer demands was undertaken to assess the impact of the development on the existing combined sewer system and establish the maximum discharge rate for the SWM system, and is summarized below in the following table:

Table 3.3 – Estimated Peak Flow Directed to Richmond St. W. Combined Sewer

	Pre-Development (L/s)	Post-Development (Residential Sanitary @450L/c/d) (L/s)	Difference (Residential Sanitary @450L/c/d) (L/s)
2 Year Storm Flow (L/S)	20.6	10.5*	-10.1
Sanitary Flow (L/s)	0.42	9.09	+8.67
Long-term Foundation Drainage Allowance (L/s)	-	1.00	+1.0
TOTAL (L/s)	**21.02**	**20.59**	**-0.43**

*Storm flows controlled to less than the allowable peak storm discharge rate of 13.2 L/s as outlined in Section 3.4.2.1.

Pursuant to MOECC procedure F-5-5, to ensure no additional flow is being introduced into the combined sewer system as part of a redevelopment, the peak storm discharge to the combined sewer shall be controlled to less than the allowable peak storm rate of 13.2 L/s prescribed in Section 3.4.2.1. Table 3.3 demonstrates that because of controlling the peak storm discharge from the site to comply with the WWFM guidelines, there is a net negative impact to the total storm and sanitary discharge to the Richmond Street combined system in the post-development condition.

It is noted that the redeveloped site does not propose to incorporate any discharge of stormwater to the ground surface at the north and east of the site as is the case in the existing condition. Therefore, there will also be a net decrease of discharge that enters the City's storm drainage system on Spadina Avenue and Richmond Street.

The net negative peak flow impact to the Richmond Street West combined sewer reasonably addresses the requirements of Procedure F-5-5.

3.6 Utilities

It is anticipated that Richmond St. W. will contain the necessary utilities associated with electrical power supply, street lighting, communications and gas to service the proposed site redevelopment. DMOG drawing information for the roadways fronting the site and the results of the subsurface utility engineering investigation indicate the presence of gas, hydro, and Bell. This information is reflected in Appendix E Conceptual Site Servicing Plan. As such, the provision of gas, hydro and communications services for the proposed redevelopment are not anticipated to be a concern.

4.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

Measures are to be taken during construction to ensure that erosion and/or transportation of sediments off-site is controlled. Mitigation measures include:

- Erection of sediment control fence prior to construction, and maintenance throughout construction activities;
- Construction of a clear-stone “mud-mat” at construction site exists to control the tracking of sediments off-site from the tires of vehicles;
- Use of watering for dust control; and
- Application to the City for a permit to discharge construction water, including the testing and sediment removal pre-pumping measures required to meet the City permit requirements and sewer use by-law.

5.0 CONCLUSION

With respect to the proposed redevelopment at 147 Richmond Street West, the proposed site servicing and stormwater management system will address the requirements of the City of Toronto, as follows:

Water

The proposed redevelopment will result in an estimated peak water demand of 117.9 L/s (7,074 L/min) comprised of maximum day demand plus fire flow. Hydrant flow test performed by Lozzi Aqua Check on November 9, 2020 indicated that the existing 300 mm Ø watermain fronting the site on Richmond Street West has the sufficient capacity to service the redevelopment. It is currently anticipated that two (2) domestic water services and one (1) fire service for the subject development will be connected to this watermain.

Sanitary

Two (2) sanitary service connection will convey drainage from the site to the existing 300 mm combined sewer located on Richmond Street West. The proposed sanitary services will convey peak flows of 10.09 L/s from the site (including foundation drainage). While this peak discharge is greater than the estimated sanitary discharge from the existing site, the storm discharge from the site will be over-controlled to result in a net negative post redevelopment discharge to the Richmond St. West combined sewer.

Storm

One (1) storm service connection to the existing 300 mm combined sewer located on Richmond St. W. will convey a maximum controlled discharge of less than 10.5 L/s from

the proposed building SWM system. This discharge rate was established so that in conjunction with the sanitary and groundwater discharge, the total discharge from the site to the Richmond St. W. combined sewer in the post development condition does not exceed the total pre-development discharge to the Richmond Street combined sewer. A 40m^3 SWM detention tank with an orifice control device, will provide the required detention volume for that discharge rate.

It is anticipated that the implementation of rainwater harvesting for reuse within the toilet systems will serve to meet the City's water balance target and limit the total average runoff volume to 50% of the annual average rainfall.

The site is effectively 100% building coverage and as a result the clean nature of roof runoff with respect to TSS will inherently serve to meet the City's 80% TSS removal water quality requirement.

Foundation Drainage

An interim Hydrogeological investigation prepared by Grounded Engineering Inc., dated August 17, 2021 has been completed for the site. The report estimates a short-term average discharge rate of 58,000 L/day (0.67 L/s) and a long-term average discharge rate of 31,000 L/day (0.36 L/s)

It is the owner's intent to discharge the short-term and long-term foundation drainage into the municipal sanitary sewer. A peak pump rate of 1.0 L/s has been determined by a mechanical consultant, and was incorporated into the combined sewer capacity analysis to represent the long-term foundation drainage discharge from the site. As such, the post-development storm flow will be further reduced to create an allowance for the additional foundation drainage flow into the combined sewer system, and maintain a net-zero approach with respect to capacity.

Summary of Key Servicing and SWM Parameters

Water Service Connection Size(s):

- 150 mm Ø fire with 100 mm Ø domestic branch; and
- 100 mm Ø domestic.

Sanitary Service Connection Size(s):

- Two (2) 150 mm Ø sanitary services

Storm Service Connection Size:

- 150 mm Ø storm service

Stormwater Detention Volume: 34.6 m^3 required, 40 m^3 provided.

Stormwater discharge control: Orifice Plate

Required Rainwater Harvesting Volume: Minimum of 3.4 m^3 required

We trust that this report satisfies the requirements of the City of Toronto with respect to the subject development. Should you have any questions, please do not hesitate to contact the undersigned.

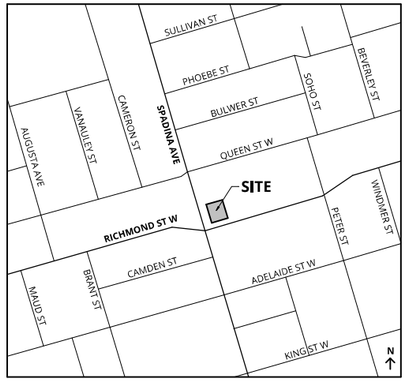
R. V. ANDERSON ASSOCIATES LIMITED

Report Prepared By

Alex Wong, P.Eng.
Project Manager

APPENDIX A

Architectural Plans and Site Statistics



1 KEY PLAN
1 : 4000

ARCHITECTURAL DRAWING LIST - ZBA	
A-000	COVER SHEET
A-001	STATISTICS, TGS
A-002	CONTEXT PLAN
A-003	SURVEY
A-004	SITE PLAN
A-005	PARKING CIRCULATON PLAN
A-101	FLOOR PLANS
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A-203	ELEVATIONS
A-301	BUILDING SECTIONS
A-901	ORTHOGRAPHIC VIEWS
A-902	PERSPECTIVE VIEWS

147 SPADINA AVENUE

TORONTO, ONTARIO

ARCHITECT	BUILDER	HERITAGE	PLANNING	LANDSCAPE	CIVIL	TRAFFIC	STRUCTURE	MECHANICAL / ELECTRICAL
AUDAX ARCHITECTURE INC. 160 PEARS AVENUE, SUITE 310 TORONTO, ONTARIO M5R 3P8 (416) 862-8403	**HULLMARK** 474 WELLINGTON STREET W, SUITE 200 TORONTO, ONTARIO M5V 1E3 (416) 510-1700	**PHILIP GOLDSMITH** 46 DORSET STREET E, PORT HOPE, ONTARIO L1A 1E3 905-885-0839	**BOUSFIELDS INC.** 3 CHURCH STREET, TORONTO, ONTARIO M5R 1M2 (416) 947-9744	**THE PLANNING PARTNERSHIP** 1255 BAY STREET, SUITE 500 TORONTO, ONTARIO M5R 2A9 (416) 975-1556	**R.V. ANDERSON** 2001 SHEPPARD AVENUE E, SUITE 300 NORTH YORK, ONTARIO M2J 4Z8 (416) 497-8600	**BA GROUP** 45 ST. CLAIR AVENUE W, SUITE 300 TORONTO, ONTARIO M4V 1K9 (416) 961-7110	**RJC LTD.** 100 UNIVERSITY AVENUE, NORTH TOWER, SUITE 300 TORONTO, ONTARIO M5J 1V6 (416) 977-5335	**SMITH + ANDERSEN** 100 SHEPPARD AVE. EAST, SUITE 1100 TORONTO, ONTARIO M2N 6N5 (416) 487-8151

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NO.	REVISION / ISSUED FOR	DATE
3	ISSUED FOR ZBA	2021-08-10
2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

COVER SHEET

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:

SCALE: 1 : 4000
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FILE NO.: 20-006

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT STATISTICS | BY-LAW 569-2013 | EXISTING ZONING: CRE (x80) | AUDAX architecture inc.

August 9, 2021 | 20-006

PROJECT SUMMARY

1.0 SUMMARY

	ft²	m²
SITE AREA	11,630	1,080.6
GROSS FLOOR AREA *	213,648	19,848.6
RESIDENTIAL AREA	208,981	19,415.0
RETAIL/COMMERCIAL AREA	4,667	433.6
AVERAGE SUITE SIZE	798	74.1
FLOOR SPACE INDEX ***	18.36	
PROPOSED BUILDING HEIGHT	25 STOREYS (73.8m + 6m)	
EFFICIENCY RATIO (ABOVE GRADE)	80%	[illegible]
EFFICIENCY RATIO (ABOVE GRADE)	77%	[illegible]

2.0 DETAILED AREAS

FLOOR LEVEL	TOTAL CONSTRUCTION AREA ft²	TOTAL CONSTRUCTION AREA m²	DEDUCTIONS ** (A), (B) ft²	(A), (B) m²	(C), (D), (H) ft²	(C), (D), (H) m²	(F), (G), (I) ft²	(F), (G), (I) m²	GROSS FLOOR AREA * ft²	GROSS FLOOR AREA * m²	RESIDENTIAL SALEABLE SUITE AREA ft²	SUITE AREA m²	UNIT COUNT BACH. (≤45 m²)	1B	2B	3B	SUBTOTAL	OTHER AREAS COMMON ft²	COMMON m²	INDOOR AMENITY ** ft²	INDOOR AMENITY ** m²	RETAIL/COMMERCIAL ft²	RETAIL/COMMERCIAL m²
P3	10,907	1,013.2	9,670	898.8	136	12.6	700	65.0	396	36.8								396	36.8				
P2	10,907	1,013.3	8,650	796.0	1,687	156.7	701	65.1	495	46.0								495	46.0				
P1	10,908	1,013.4	3,054	283.7	5,528	513.6	958	89.0	1,368	127.1								1,368	127.1				
SUBTOTAL	32,722	3,040.0	20,759	1,928.6	7,345	682.4	2,359	219.2	2,259	209.9								2,259	209.9				
1	10,631	988.2	560	52.0			1,085	98.0	9,076	843.2								4,403	409.6			4,667	433.6
2	10,959	1,018.1	560	52.0			1,259	117.0	9,140	849.1								1,921	178.5	7,219	670.7		
3	10,755	999.2					505	46.9	10,250	952.3	7,060	655.9		2	6		8	765	71.1	2,425	225.3		
4	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
5	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
6	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
7	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
8	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
9	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
10	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
11	10,685	992.7					505	46.9	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
12	10,685	992.7					505	38.7	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
13	10,685	992.7					505	38.7	10,180	945.8	9,415	874.7	1	6	4	1	12	765	71.1				
14	9,505	801.4					505	38.7	9,090	844.5	8,325	773.4	1	8	3		12	765	71.1				
15	8,381	778.6					505	38.7	7,876	731.7	7,111	660.6		5	1	3	9	765	71.1				
16	7,988	742.1					505	38.7	7,483	695.2	6,718	624.1		6	1	2	9	765	71.1				
17	7,988	742.1					505	38.7	7,483	695.2	6,718	624.1		6	1	2	9	765	71.1				
18	7,988	742.1					505	38.7	7,483	695.2	6,718	624.1		6	1	2	9	765	71.1				
19	7,988	742.1					505	38.7	7,483	695.2	6,718	624.1		6	1	2	9	765	71.1				
20	7,988	742.1					505	38.7	7,483	695.2	6,718	624.1		6	1	2	9	765	71.1				
21	7,988	742.1					505	38.7	7,483	695.2	6,718	624.1		6	1	2	9	765	71.1				
22	6,520	605.7					505	38.7	6,015	558.8	5,250	487.7			3	2	5	765	71.1				
23	6,520	605.7					505	38.7	6,015	558.8	5,250	487.7			3	2	5	765	71.1				
24	6,520	605.7					505	38.7	6,015	558.8	5,250	487.7			3	2	5	765	71.1				
25	6,520	605.7					505	38.7	6,015	558.8	5,250	487.7			3	2	5	765	71.1				
MPH	5,084	472.3			4,519	419.8	505	38.7	0	0.0													
SUBTOTAL	236,323	21,955.1	1,120	104.1	4,519	419.8	14,494	1,218.3	211,389	19,638.7	177,954	16,532.5	11	111	68	33	223	23,925	2,222.7	9,644	896.0	4,667	433.6
GRAND TOTAL	269,045	24,995.1	21,879	2,032.8	11,864	1,102.2	16,853	1,437.5	213,648	19,848.6	177,954	16,532.5	11	111	68	33	223	26,184	2,432.6	9,644	896.0	4,667	433.6

* 800.50(320) GROSS FLOOR AREA means the sum of the total area of each floor level of a building, above and below the ground, measured from the exterior of the main wall of each floor level [illegible]

** 50.5.40.40(3) In the Commercial Residential Employment Zone category the gross floor area of a mixed use building is reduced by the area in the building used for: [illegible]

(A) parking, loading and bicycle parking below-ground;
(B) [illegible] at or above-ground;
(C) storage rooms, washrooms, [illegible] in the basement;
(D) shower and change facilities [illegible] bicycle parking spaces;
(E) amenity space required by this By-law;
(F) elevator shafts;
(G) garbage shafts;
(H) mechanical penthouse; and
(I) exit stairwells in the building.

*** 50.5.40.40(4) In the Commercial Residential Employment Zone category the FLOOR SPACE INDEX for a mixed use building is the result of the gross floor area [illegible] lot.

2.1 AMENITY AREAS

AMENITY SPACE	REQUIRED RATIO		CALCULATION RATIO	# UNITS	AREA REQUIRED ft²	AREA REQUIRED m²	AREA PROVIDED ft²	AREA PROVIDED m²
TOTAL	MINIMUM	4 m² PER UNIT	4 x	223	9601	892.0	10136	941.7
INDOOR	MINIMUM	2 m² PER UNIT	2 x	223	4801	446.0	9644	896.0
OUTDOOR	MINIMUM	40 m²	N/A	N/A	431	40.0	492	45.7

2.2 GARBAGE AREAS

GARBAGE SPACE	REQUIRED RATIO	CALCULATION RATIO	# UNITS	AREA REQUIRED ft²	AREA REQUIRED m²	AREA PROVIDED ft²	AREA PROVIDED m²
MAIN GARB. RM.	25 m² FOR 50 UNITS + 13 m² PER 50 UNITS	25 + 13	223	829	77.0	835	77.6
BULK GARB. RM.	MINIMUM 10 m²	N/A	N/A	108	10.0	171	15.9
RETAIL GARB. RM.	N/A	N/A	N/A	N/A	N/A	831	77.2

3.0 VEHICLE PARKING

[illegible]

PARKING	REQUIRED RATIO *			CALCULATION RATIO	#	SUBTOTAL	TOTAL	VEHICLE PARKING PROVIDED
RESIDENTIAL	MINIMUM	0.3	PER BACHELOR (<45m²)	0.3 x	11	3	145	26
		0.5	PER 1B UNIT	0.5 x	111	55		
		0.8	PER 2B UNIT	0.8 x	68	54		
		1.0	PER 3B UNIT	1.0 x	33	33		
VISITOR	MINIMUM	0.1	PER UNIT	0.1 x	223	23		0
COMMERCIAL/RETAIL	MINIMUM	1.0	PER 100 m²	1.0 / 100 x	433.6	5		0
GRAND TOTAL VEHICLE PARKING SPACES REQUIRED						173		26

* [illegible]

ACESSIBLE PARKING	REQUIRED RATIO	CALCULATION # SPACES	RATIO	TOTAL *	ACCESSIBLE PARKING PROVIDED
RESIDENTIAL	[illegible]	145	1/25	6	2
VISITOR	[illegible]	23	1/25	1	0
COMMERCIAL/RETAIL	[illegible]	5	1/25	1	0
GRAND TOTAL ACCESSIBLE VEHICLE PARKING SPACES REQUIRED				8	2

* Accessible parking requirements are included as part of [illegible]

3.1 BICYCLE PARKING

BIKE PARKING		REQUIRED RATIO	CALCULATION RATIO	#	SUBTOTAL	TOTAL	BICYCLE PARKING PROVIDED	
RESIDENTIAL	SHORT-TERM	0.1 SPACES PER UNIT	0.1 x	223	23	224	26	248
	LONG-TERM	0.9 SPACES PER UNIT	0.9 x		201		222	
COMMERCIAL/RETAIL	SHORT-TERM	3 + 0.3 SPACES PER 100 m²	[illegible]	433.6	N/A *	N/A *	0	0
	LONG-TERM	0.2 SPACES PER 100m²	[illegible]		N/A *		0	
GRAND TOTAL BICYCLE PARKING SPACES REQUIRED					224		248	

BICYCLE PARKING SPACE BREAKDOWN FLOOR LEVEL	# HORIZONTAL	# VERTICAL	TOTAL
P3	0	0	0
P2	0	0	0
P1	248	0	248
1	0	0	0
GRAND TOTAL	248	0	248

* 230.5.10.1(5) [illegible]

3.2 LOADING

LOADING	REQUIRED RATIO	CALCULATION RATIO	#	TOTAL	LOADING SPACES PROVIDED
RESIDENTIAL	31 - 399 UNITS = 1 TYPE 'G'	N/A	223	1	1 TYPE 'G'
COMMERCIAL/RETAIL	500 - 1999m² = 1 TYPE 'B'	N/A	433.6	N/A *	N/A *

* 40.10.90.1(1) [illegible]

4.0 BUILDING HEIGHT & ESTABLISHED GRADE

BUILDING HEIGHT	ZONING	PERMITTED	PROPOSED
	CRE (x80)	39.0m	79.8m

BUILDING HEIGHT measured from ESTABLISHED GRADE to TOP OF MAIN ROOF [illegible]

50.5.40.10(1) [illegible]

GEODETIC (m)	NW CORNER	SW CORNER	SE CORNER	AVERAGE
ESTABLISHED GRADE	90.21	89.92	89.86	90.00

ESTABLISHED GRADE means the average elevation of the ground [illegible] front yard setback [illegible] side lot line.

Statistics Template - Toronto Green Standard Version 3.0

Mid to High Rise Residential and all New Non-Residential Development

The Toronto Green Standard Version 3.0 Statistics Template is submitted with Site Plan Control Applications and stand alone Zoning Bylaw Amendment applications. Complete the table and copy it directly onto the Site Plan submitted as part of the application.

For Zoning Bylaw Amendment applications: complete General Project Description and Section 1.

For Site Plan Control applications: complete General Project Description, Section 1 and Section 2.

For further information, please visit www.toronto.ca/greendevelopment

General Project Description	Proposed
Total Gross Floor Area	19,849 m²
Breakdown of project components (m²)	
Residential	19,415 m²
Retail	434 m²
Commercial	0
Industrial	0
Institutional/Other	0
Total number of residential units	223

Section 1: For Stand Alone Zoning Bylaw Amendment Applications and Site Plan Control Applications

Automobile Infrastructure	Required	Proposed	Proposed %
Number of Parking Spaces	173	26	15
Number of parking spaces dedicated for priority LEV parking	0	0	0
Number of parking spaces with EVSE	5	5	100

Cycling Infrastructure	Required	Proposed	Proposed %
Number of long-term bicycle parking spaces (residential)	201	222	110
Number of long-term bicycle parking spaces (all other uses)	0	0	0
Number of long-term bicycle parking (all uses) located on:			
a) first storey of building		0	
b) second storey of building		0	
c) first level below-ground		246	
d) second level below-ground		0	
e) other levels below-ground		0	

Cycling Infrastructure	Required	Proposed	Proposed %
Number of short-term bicycle parking spaces (residential)	23	26	113
Number of short-term bicycle parking spaces (all other uses)	0	0	0
Number of male shower and change facilities (non-residential)	0	0	0
Number of female shower and change facilities (non-residential)	0	0	0

Tree Planting & Soil Volume	Required	Proposed	Proposed %
Total Soil Volume (40% of the site area ÷ 66 m² x 30 m³)	196.5	204	104

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2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

STATISTICS, TGS

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:

SCALE:

PLOT DATE: 8/9/2021 6:11:33 PM

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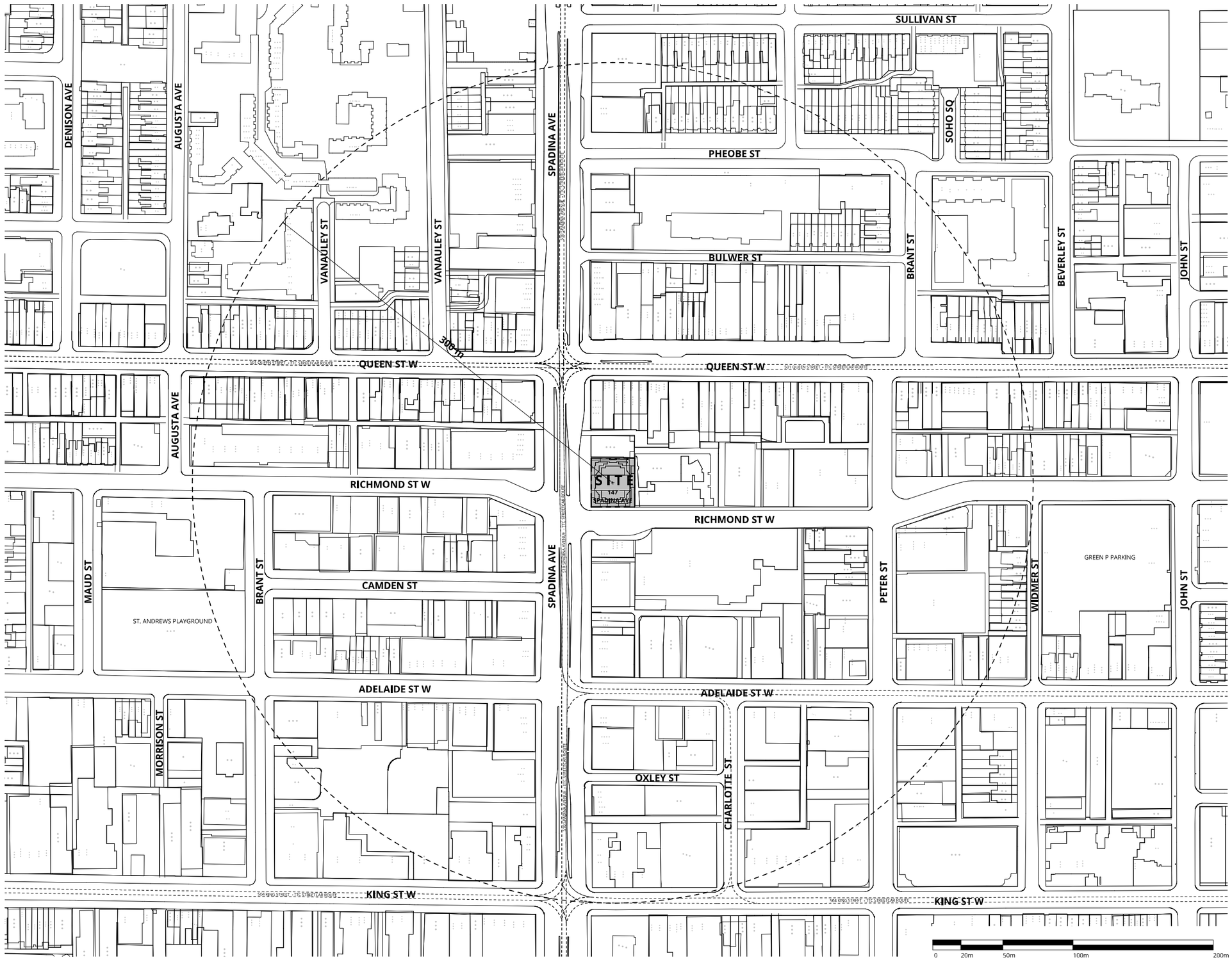

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---------- TTC STREETCAR ROUTE

NO.	REVISION / ISSUED FOR	DATE
3	ISSUED FOR ZBA	2021-08-10
2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

CONTEXT PLAN

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:

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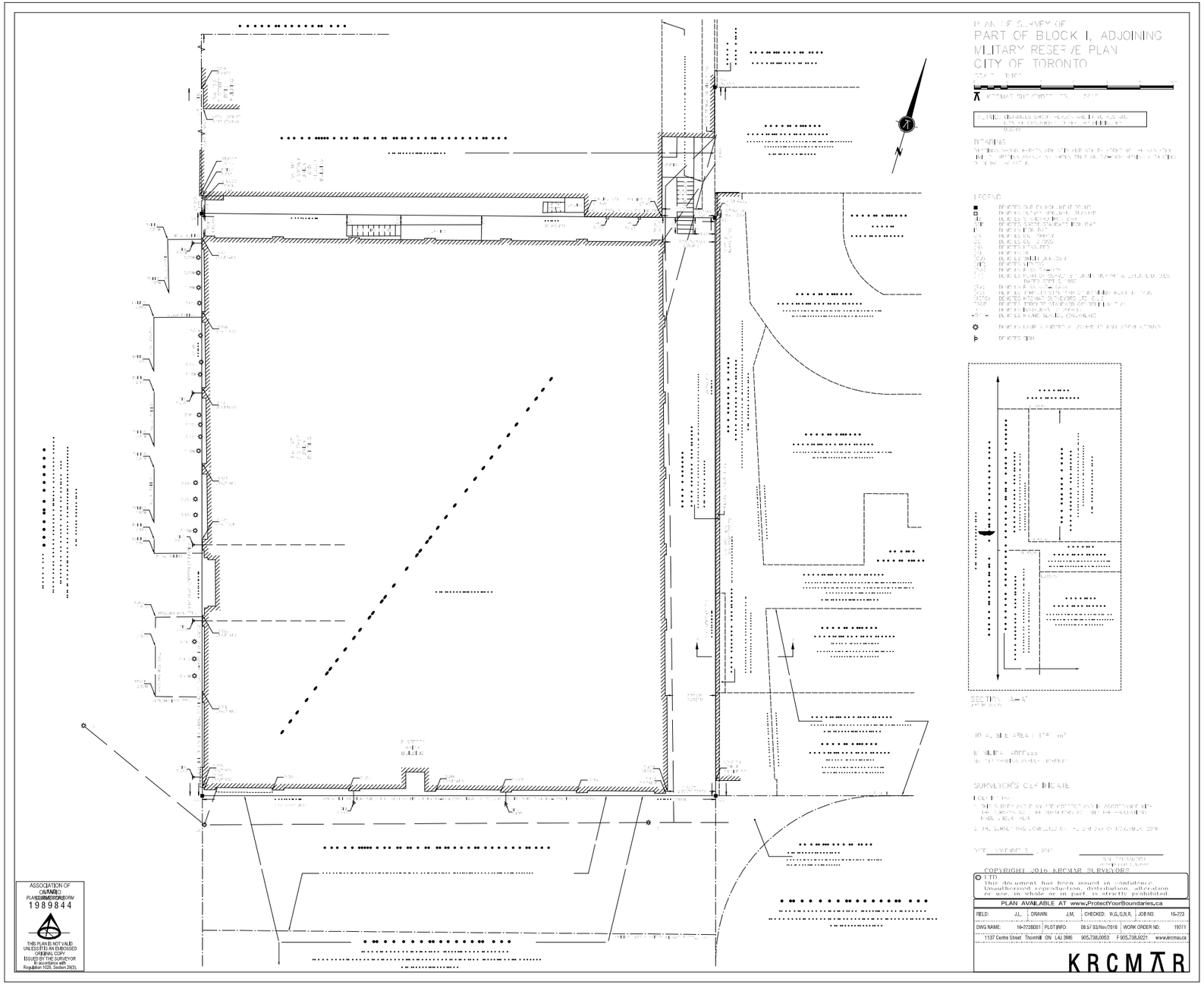

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DRAWING TITLE:

SURVEY

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:

N

SCALE: 1 : 100

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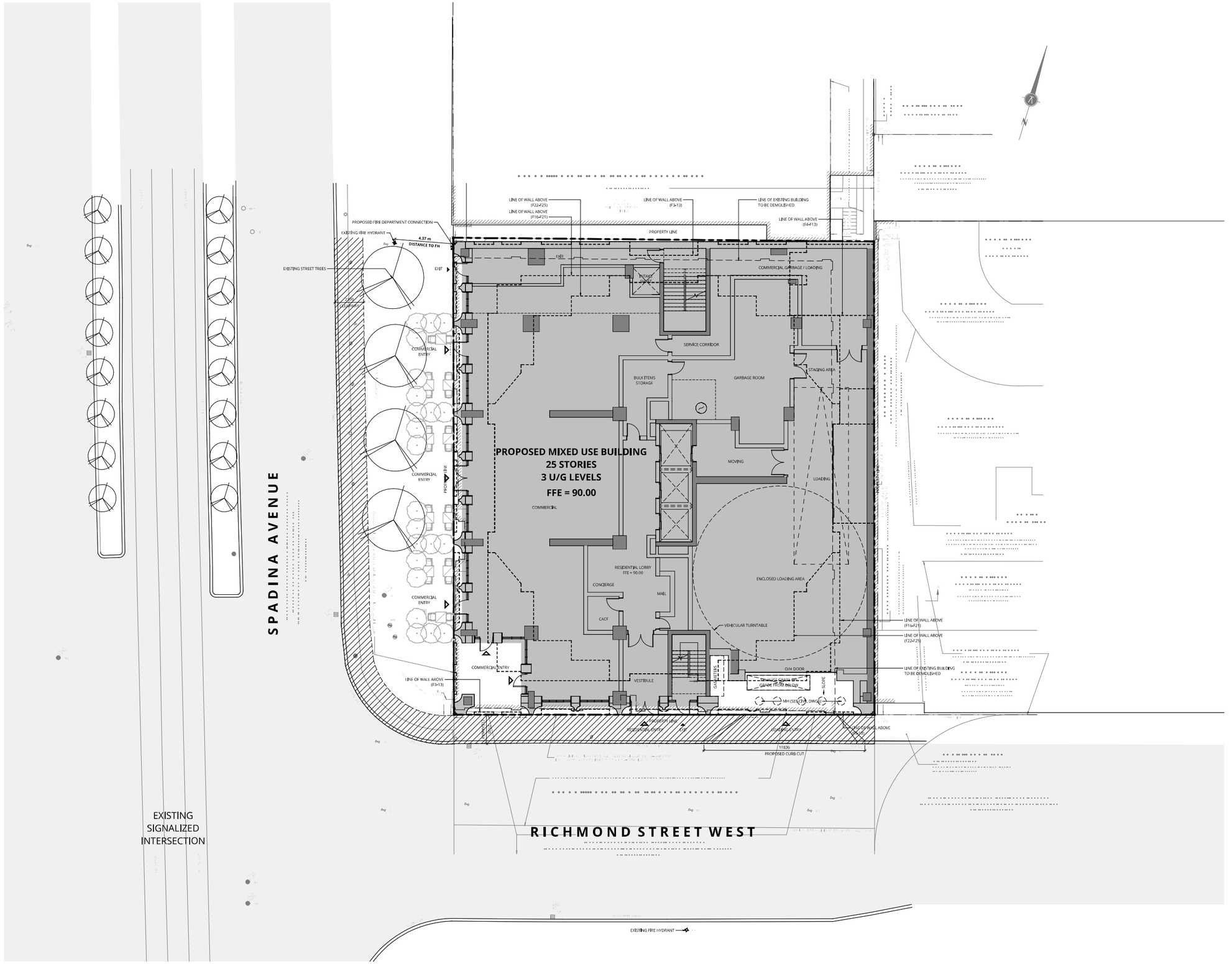

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1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

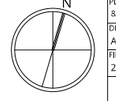
SITE PLAN

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:



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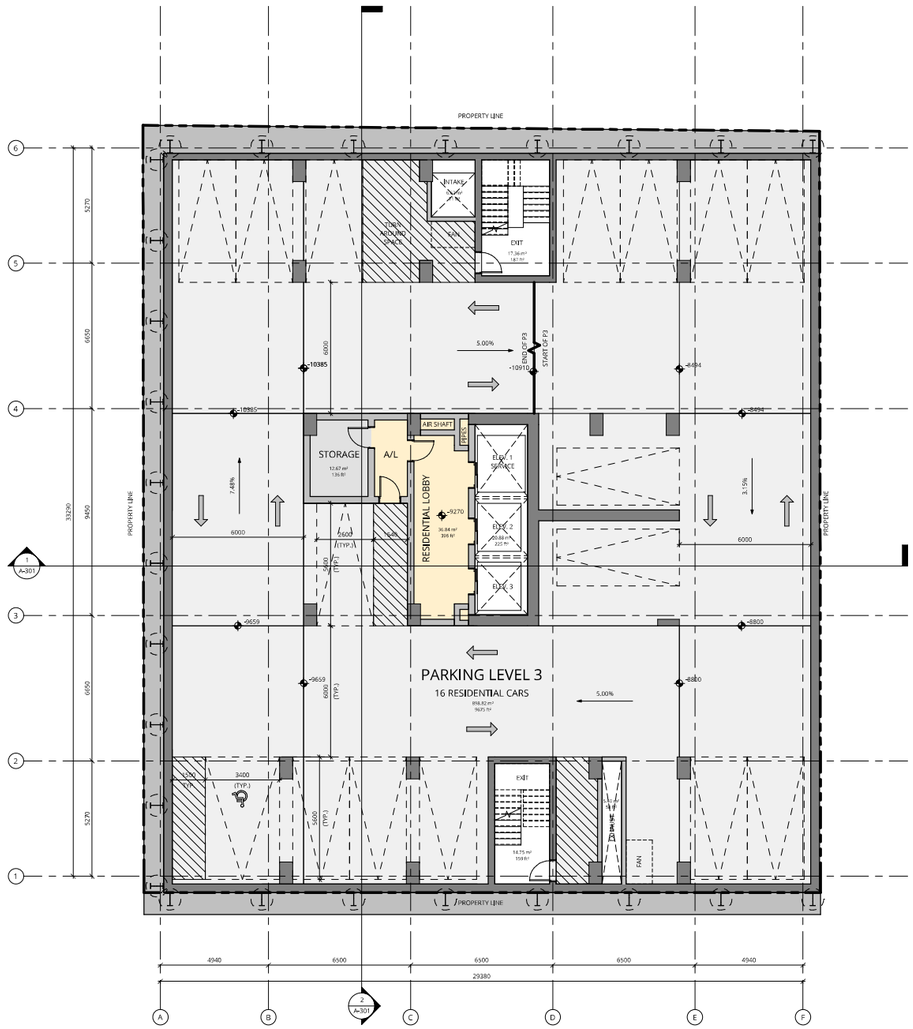
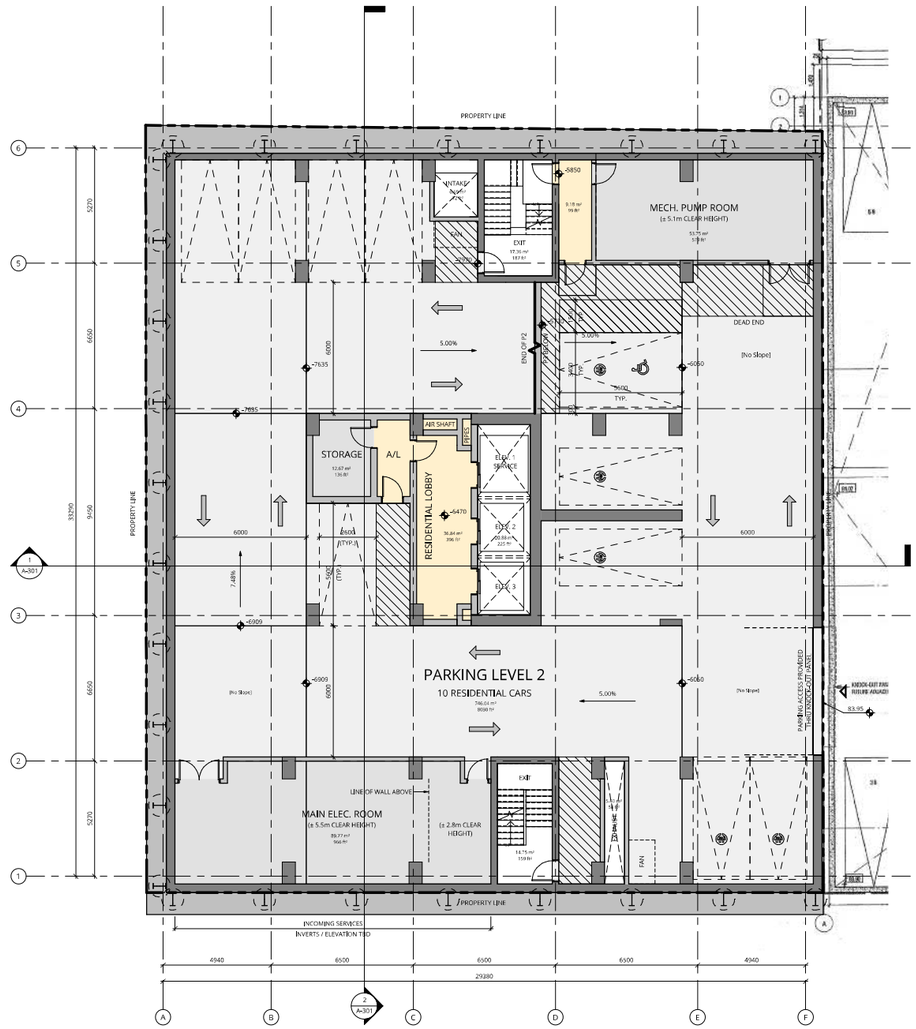


1 PARKING LEVEL 3
1 : 100



2 PARKING LEVEL 2
1 : 100

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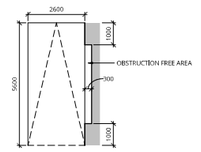
PARKING LEGEND:

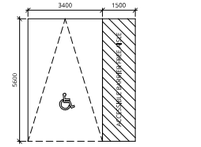
NOTES:

- PARKING SPACES ABOVE THE MINIMUM REQUIRED ARE TO BE DEDICATED FOR LOW-EMITTING VEHICLES (LEV).
- ALL PARKING SPACES WITHOUT EVSE SHALL BE PROVIDED WITH ROUGHED-IN CONDUITS.

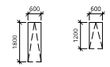
TYPICAL PARKING SPACE:
MIN. 2.6m (W) x 5.6m (L) x 2.0m (H)



ACCESSIBLE PARKING SPACE:
MIN. 3.4m (W) x 5.6m (L) x 2.0m (H)
WITH ADJACENT 1.5m (W) ACCESSIBLE BARRIER FREE AISLE



BICYCLE PARKING SPACE:
HORIZONTAL: MIN. 0.6m (W) x 1.8m (L) x 1.9m (H)
VERTICAL: MIN. 0.6m (W) x 1.2m (L) x 1.9m (H)



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1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

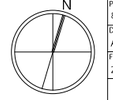
FLOOR PLANS

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:



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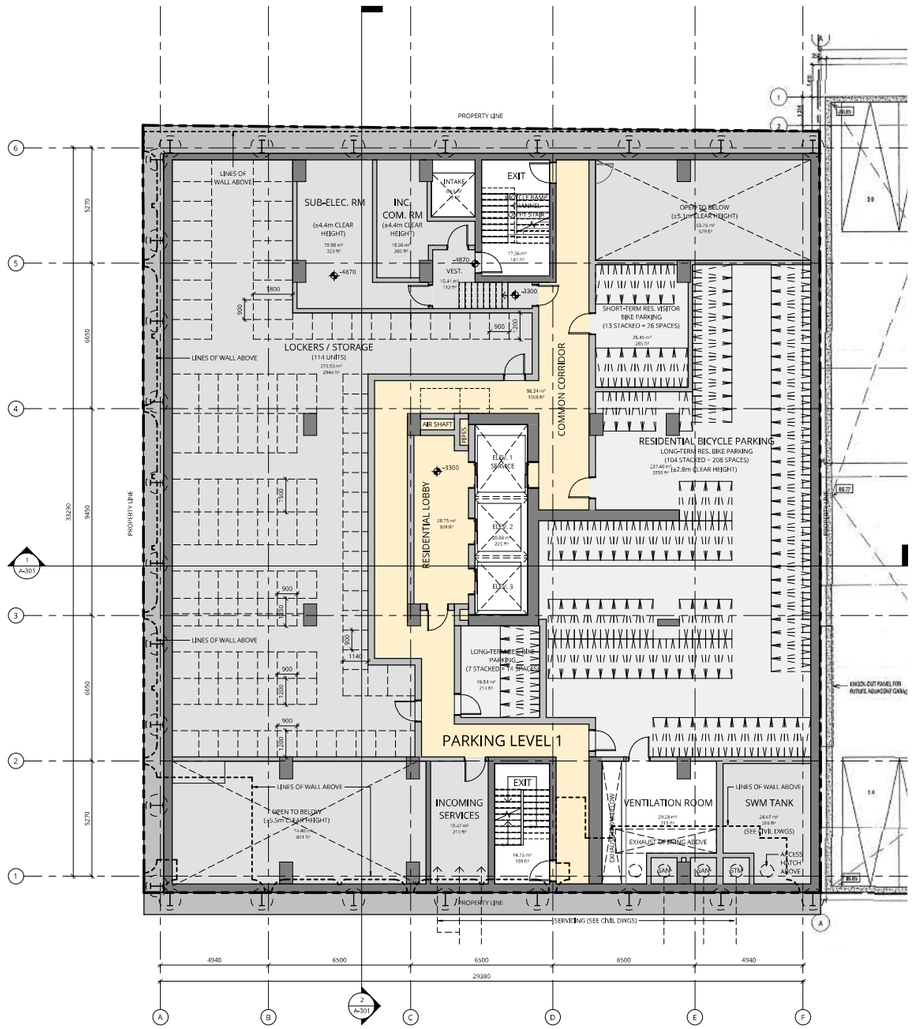

1 PARKING LEVEL 1
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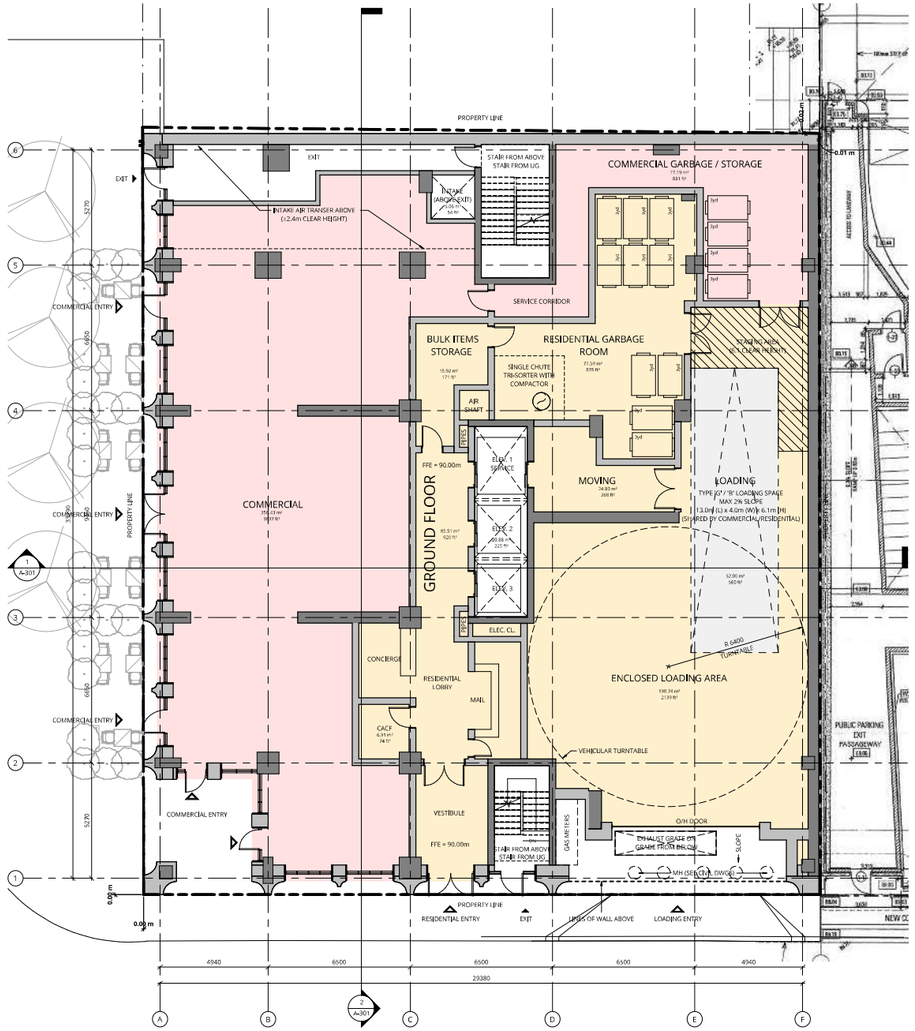

2 GROUND FLOOR PLAN
1 : 100

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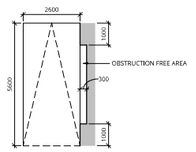
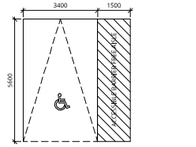
PARKING LEGEND:

NOTES:
- PARKING SPACES ABOVE THE MINIMUM REQUIRED ARE TO BE DEDICATED FOR LOW-EMITTING VEHICLES (LEV).
- ALL PARKING SPACES WITHOUT EVSE SHALL BE PROVIDED WITH ROUGHED-IN CONDUITS.

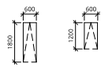
TYPICAL PARKING SPACE:
MIN. 2.6m (W) x 5.6m (L) x 2.0m (H)



ACCESSIBLE PARKING SPACE:
MIN. 3.4m (W) x 5.6m (L) x 2.0m (H)
WITH ADJACENT 1.5m (W) ACCESSIBLE BARRIER FREE AISLE



BICYCLE PARKING SPACE:
HORIZONTAL: MIN. 0.6m (W) x 1.8m (L) x 1.9m (H)
VERTICAL: MIN. 0.6m (W) x 1.2m (L) x 1.9m (H)



NO.	REVISION / ISSUED FOR	DATE
3	ISSUED FOR ZBA	2021-08-10
2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

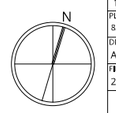
FLOOR PLANS

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:



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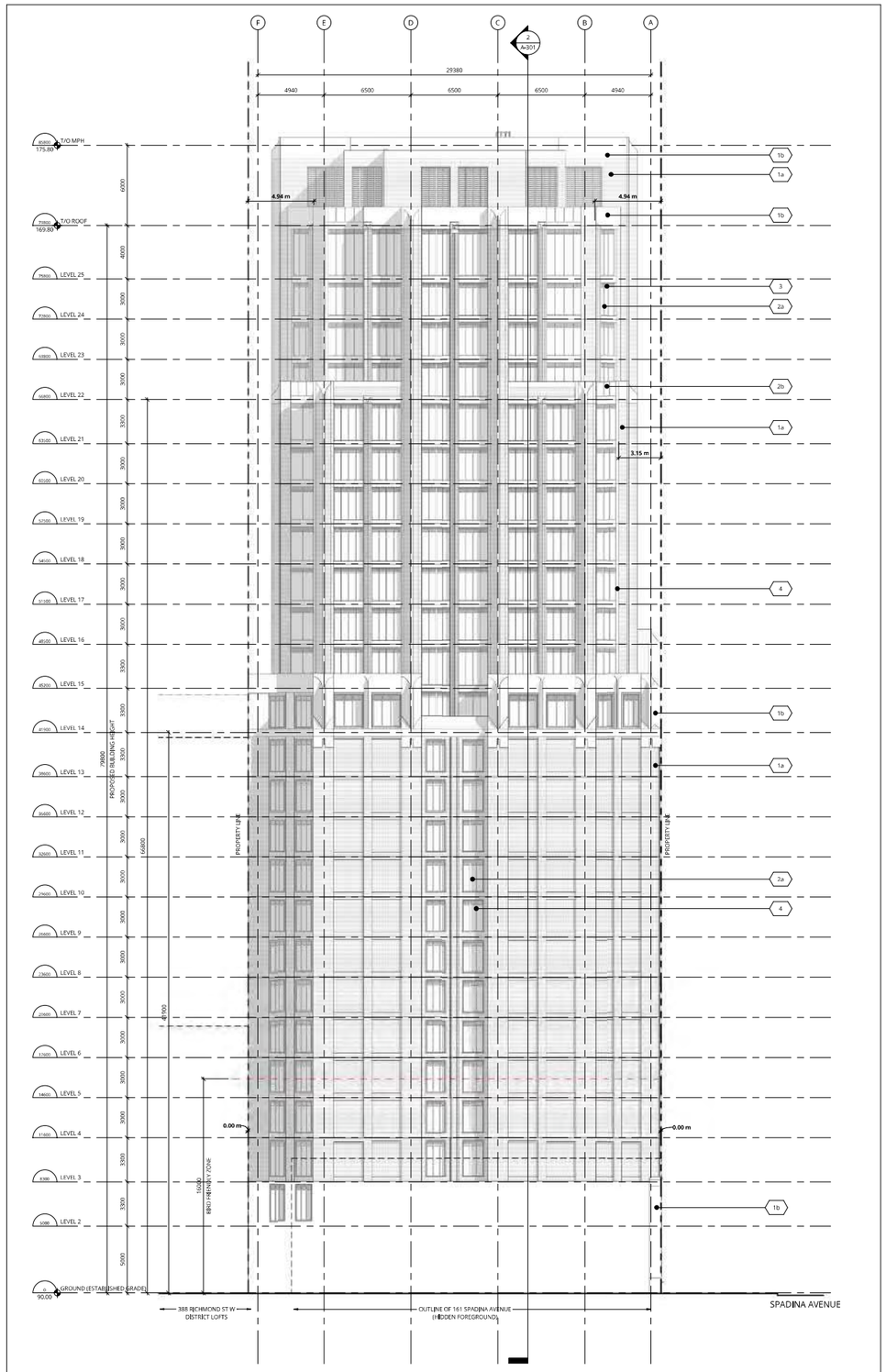
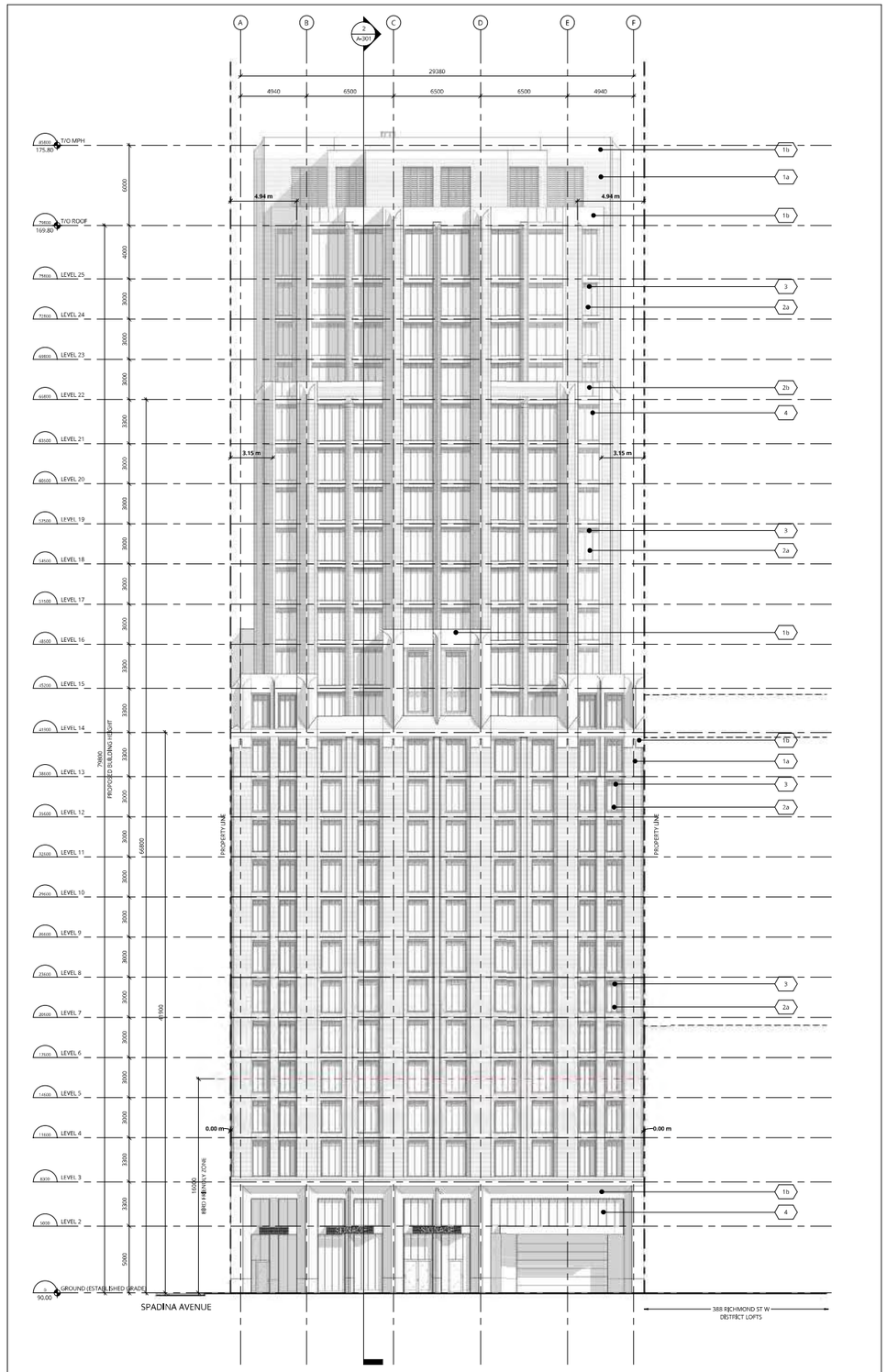
DRAWN BY:	Author
FILE NO.:	20-006



1 NORTH ELEVATION
1 : 150



2 SOUTH ELEVATION
1 : 150

AUDAX
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160 Front Avenue, Suite 310
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416.840.8420
www.audax.ca
mail@audax.ca

BIRD FRIENDLY DESIGN:

GENERAL NOTES IN ACCORDANCE WITH THE BIRD-FRIENDLY DEVELOPMENT GUIDELINES (FIRST 16 METERS ABOVE GRADE):

A MINIMUM OF 85% OF ALL EXTERIOR GLAZING WITHIN THE REQUIRED AREA WILL BE TREATED TO REDUCE BIRD COLLISIONS, USING A COMBINATION OF THE FOLLOWING STRATEGIES:

- ULTRAVIOLET (UV) TREATED GLASS
- VISUAL MARKERS (FRITTED GLASS, MULLIONS)
- LOW REFLECTANCE, OPAQUE MATERIALS
- SHADE BY BUILDING-INTEGRATED STRUCTURES / OVERHANGS

EXTERIOR FINISH LEGEND:

- 1a PRECAST CONCRETE PANEL (BRICK PATTERN FINISH)
- 1b PRECAST CONCRETE PANEL (STONE PATTERN FINISH)
- 2a VISION GLAZING (CLEAR)
- 2b SPANDREL GLAZING (BRONZE)
- 3 ARCHITECTURAL LOUVRE
- 4 ALUMINIUM MULLIONS (BRONZE)

NO.	REVISION / ISSUED FOR	DATE
3	ISSUED FOR ZBA	2021-08-10
2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

ELEVATIONS

PROJECT:

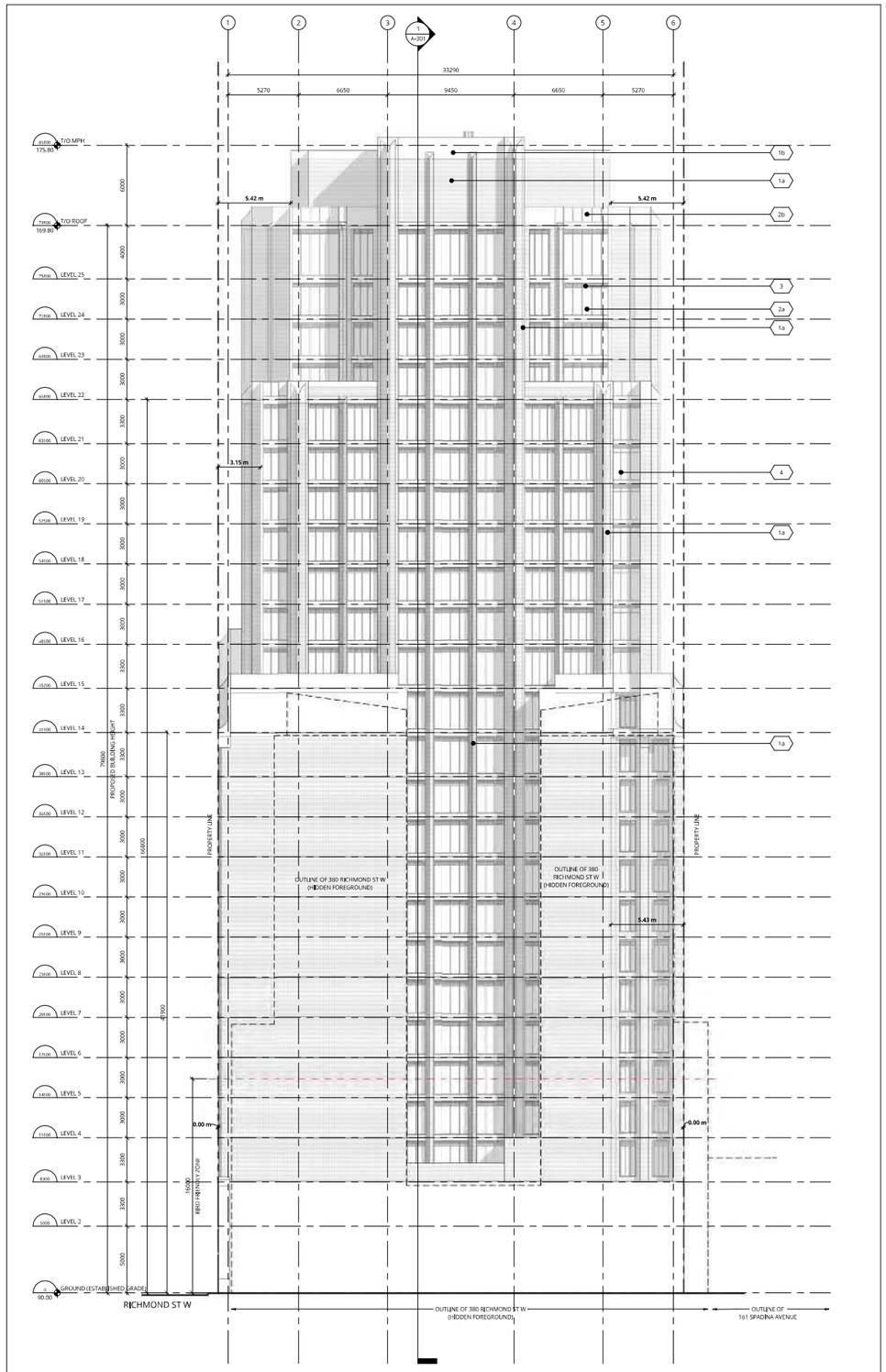
147 SPADINA AVENUE

TORONTO, ONTARIO

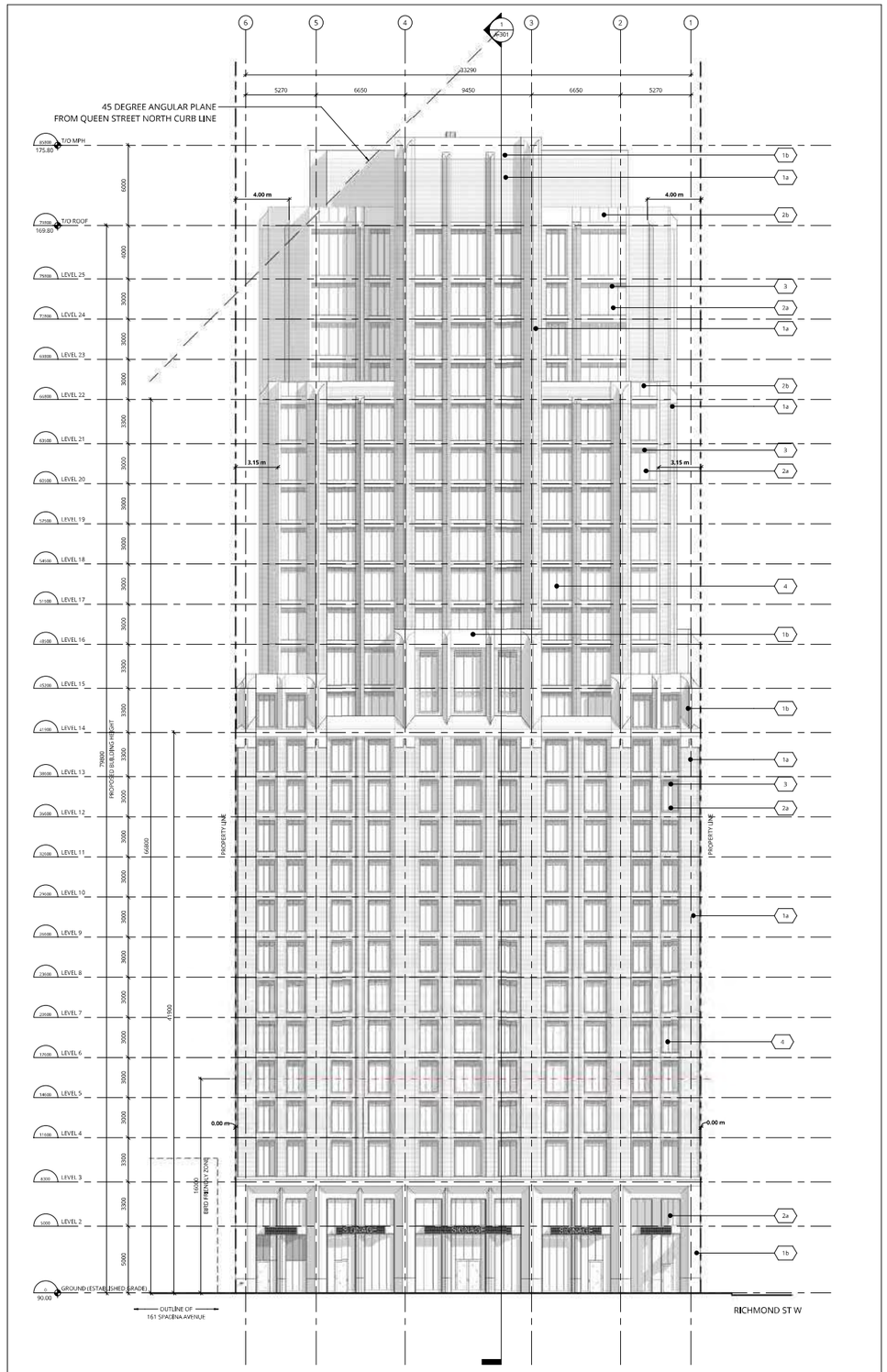
PROJECT NORTH:

SCALE: As indicated
PLOT DATE: 8/9/2021 6:22:13 PM
DRAWN BY: Author
FILE NO.: 20-006

A-202



1 EAST ELEVATION
1 : 150



2 WEST ELEVATION
1 : 150

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audax.ca

BIRD FRIENDLY DESIGN:

GENERAL NOTES IN ACCORDANCE WITH THE BIRD-FRIENDLY DEVELOPMENT GUIDELINES (FIRST 16 METERS ABOVE GRADE):

A MINIMUM OF 85% OF ALL EXTERIOR GLAZING WITHIN THE REQUIRED AREA WILL BE TREATED TO REDUCE BIRD COLLISIONS, USING A COMBINATION OF THE FOLLOWING STRATEGIES:

- ULTRAVIOLET (UV) TREATED GLASS
- VISUAL MARKERS (FRITTED GLASS, MULLIONS)
- LOW REFLECTANCE, OPAQUE MATERIALS
- SHADE BY BUILDING-INTEGRATED STRUCTURES / OVERHANGS

EXTERIOR FINISH LEGEND:

- 1a PRECAST CONCRETE PANEL (BRICK PATTERN FINISH)
- 1b PRECAST CONCRETE PANEL (STONE PATTERN FINISH)
- 2a VISION GLAZING (CLEAR)
- 2b SPANDREL GLAZING (BRONZE)
- 3 ARCHITECTURAL LOUVRE
- 4 ALUMINIUM MULLIONS (BRONZE)

NO.	REVISION / ISSUED FOR	DATE
3	ISSUED FOR ZBA	2021-08-10
2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

ELEVATIONS

PROJECT:

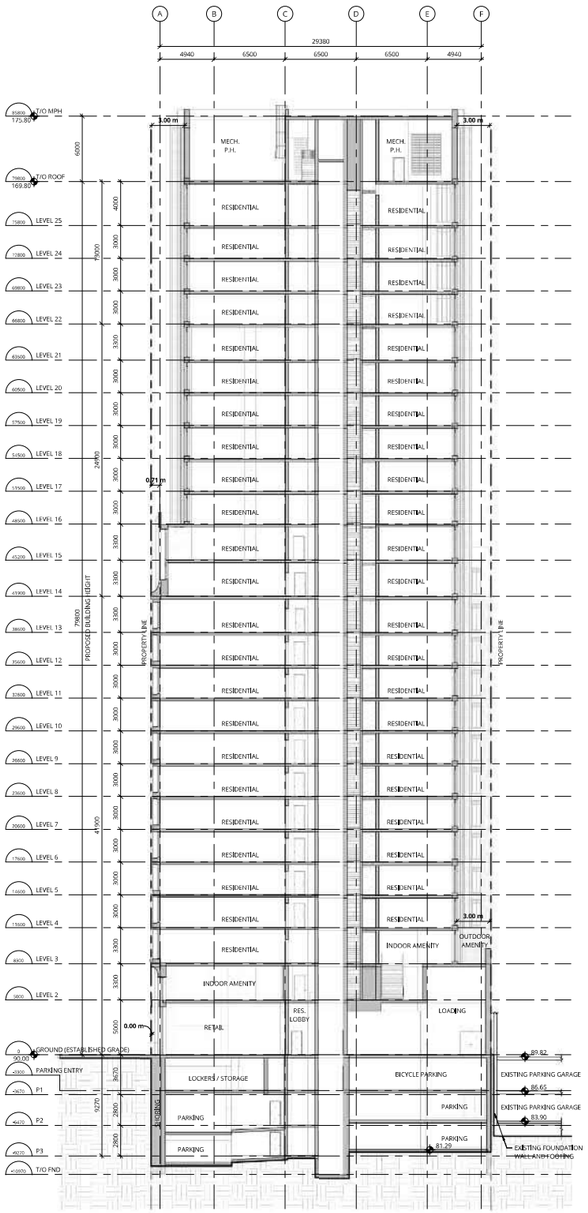
147 SPADINA AVENUE

TORONTO, ONTARIO

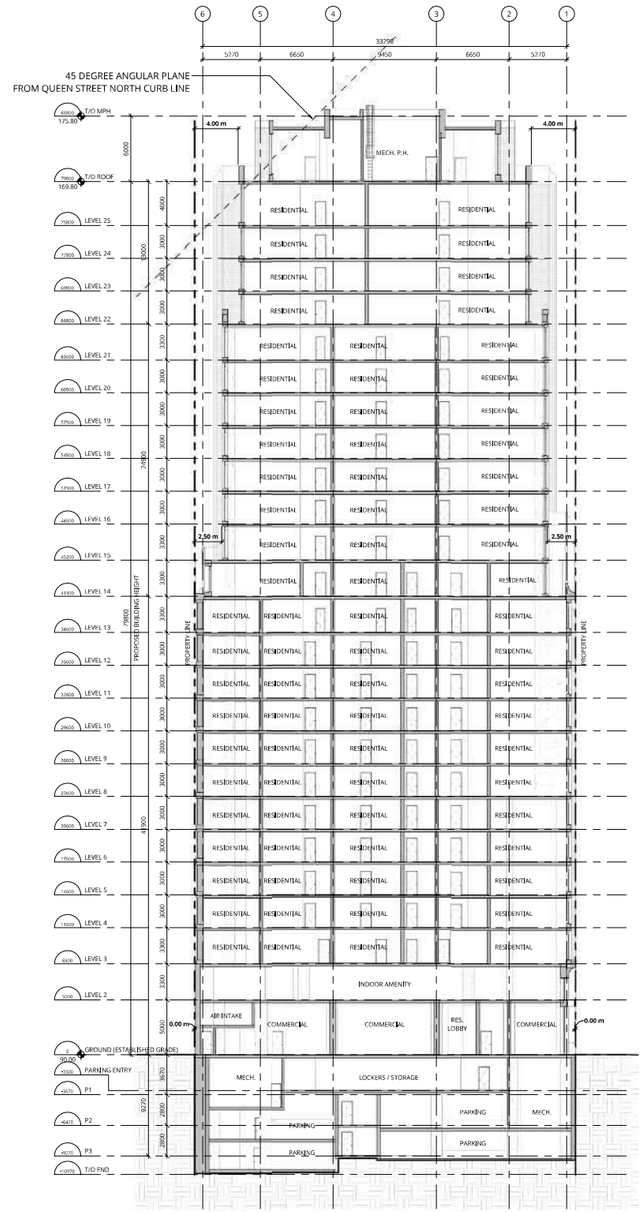
PROJECT NORTH:

SCALE:	As indicated
PLOT DATE:	8/9/2021 6:25:51 PM
DRAWN BY:	Author
FILE NO.:	20-006

A-203



1 SPA-SECTION E-W
1 : 200



2 SPA-SECTION N-S
1 : 200

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audax.ca

NO.	REVISION / ISSUED FOR	DATE
3	ISSUED FOR ZBA	2021-08-10
2	ISSUED FOR COORDINATION	2021-07-21
1	ISSUED FOR COORDINATION	2021-05-07

DRAWING TITLE:

BUILDING SECTIONS

PROJECT:

147 SPADINA AVENUE

TORONTO, ONTARIO

PROJECT NORTH:

SCALE: 1 : 200

PLOT DATE: 8/9/2021 6:26:12 PM

DRAWN BY: Author

FILE NO.: 20-006

A-301

APPENDIX B

Water Demand Analysis

TABLE B1 - PROPOSED PEAK WATER DEMAND CALCULATIONS - RESIDENTIAL

		TOTAL
1.1 Total Townhouse Units	units	0
1.2 Persons Per Unit*	persons/unit	2.7
1.3 Total One-Bedroom or One Bedroom + Den Units	units	122
1.4 Persons Per Unit*	persons/unit	1.4
1.5 Total Two Bedroom Units	units	68
1.6 Persons Per Unit*	persons/unit	2.1
1.7 Total Three Bedroom Units	units	33
1.8 Persons Per Unit*	persons/unit	3.1
1.9 Total Residential Population	persons	416
1.10 Total Population Used for Calculation Purposes**	persons	430
1.11 Per Capita Demand @ 190 L/person/day	L/day	81,700
1.12 Equivalent Population Demand	L/s	0.95
1.13 Peak Hour Peaking Factor*		2.5
1.14 Peak Hour Design Demand Rate	L/s	2.36
1.15 Peak Hour Design Demand Rate (m^3/day)	m^3/day	204
1.16 Maximum Day Peaking Factor*		1.3
1.17 Maximum Day Design Demand Rate	L/s	1.23
1.18 Maximum Day Design Demand Rate (m^3/day)	m^3/day	106

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan. 2021

TABLE B2 - PROPOSED PEAK WATER DEMAND CALCULATIONS - COMMERCIAL

BUILDING A

			TOTAL
2.1	Total Net Retail Floor Area	m^2	441
2.2	Persons Per $100m^2$*	persons/$100m^2$	1.1
2.3	Total Population	persons	5
2.4	Per Capita Demand @ 190 L/person/day	L/day	922
2.5	Equivalent Population Demand	L/s	0.01
2.6	Peak Hour Peaking Factor*		1.2
2.7	Peak Hour Design Demand Rate	L/s	0.01
2.8	Peak Hour Design Demand Rate (m^3/day)	m^3/day	1
2.9	Maximum Day Peaking Factor*		1.1
2.10	Maximum Day Design Demand Rate	L/s	0.01
2.11	Maximum Day Design Demand Rate (m^3/day)	m^3/day	1

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan. 2021

TABLE B3 - PROPOSED PEAK WATER DEMAND CALCULATIONS - DOMESTIC + COMMERCIAL

BUILDING A

		AVERAGE DEMAND	PEAK HOUR	MAXIMUM DAY
3.1 Residential Demand	L/s	0.95	2.36	1.23
3.2 Commerical Demand	L/s	0.01	0.01	0.01
3.3. Total Flow Rate	L/s	0.96	2.38	1.24
3.4 Total Flow Rate	L/min	57	143	74

TABLE B4 - FIRE DEMAND CALCULATIONS - BASED ON F.U.S. GUIDELINES

			TOTAL
4.1	Coefficient for type of construction:		0.6*
4.2	Height in Stories		25
4.3	1st Floor Area (Largest Floor Area)	m^2	1,018
4.4	2nd Floor Area	m^2	999
4.5	3rd Floor Area	m^2	993
4.6	Stories to Use in Calculation (1 + 25% of each of the two floors immediately adjoining the largest floor)		1 + 2 * 25%
4.7	Total Area **	m^2	1,502
4.8	Fire Flow Required	L/min	6,000
4.9	25% Reduction for Occupancy Charge - low fire hazard	L/min	-1,500
4.10	Fire Flow Required	L/min	4,500
4.11	30% Reduction for NFPA13 Comforming Sprinkler System	L/min	-1,350
4.12	Charge for Building Separation		
	North: Nearest Building	2.5	25%
	West: Nearest Building	40	5%
	South: Nearest Building	22	10%
	East: Nearest Building	0	25%
4.13	Charge for Building Separation	L/min	2,925
4.14	Fire Flow Required	L/min	7,000
4.15	Fire Flow Required	L/s	116.7

*Based on ISO class of construction "Modified Fire Resistive". Refer to Technical Bulletin ISTB-2018-02 Revisions to Ottawa Design Guidelines - Water Distribution dated March 21st, 2018

**As per FUS Guidelines, assuming the vertical openings and exterior vertical communications are properly protected (1 hr rating), consider only the area of the largest floor plus 25% of each of the 2 immediately adjoining floors.

TABLE B5 - PROPOSED REDEVELOPMENT TOTAL WATER DEMAND

PER CITY OF TORONTO DESIGN CRITERIA AND MOE DESIGN GUIDELINES, WATER SUPPLY SYSTEMS SHOULD BE DESIGNED TO SATISFY THE GREATER OF EITHER OF THE FOLLOWING DEMANDS:

-MAXIMUM DAY DOMESTIC DEMAND PLUS FIRE FLOW

-PEAK HOUR DOMESTIC DEMAND

BUILDING A
MAX DAY & FIRE FLOWS

MAX DAY	1.24 L/S
FIRE	116.67 L/s
Total Max Day & Fire Flow	117.91 L/s

PEAK HOUR DOMESTIC DEMAND

PEAK RATE	2.38 L/s

THEREFORE, MAX DAY + FIRE FLOW IS GOVERNING REQUIREMENT

WATER DEMAND

Max Day Demand	1.24 L/s	74 L/min
Fire Flow*	116.7 L/s	7,000 L/min
Total Water Demand Requirement	117.9 L/s	7,074 L/min

Note (*): Per City of Toronto's Design Criteria for Sewers and Watermains, in accordance with the Fire Underwriters Survey (FUS), fire flows will not be less than 4,800L/minute for a 2-hour duration in addition to maximum daily domestic demand, delivered with a residual pressure of not less than 140kPa (20psi).

Lozzi Aqua Check

4820 18th Sideroad

Schomberg, Ontario

L0G-1T0

Massimo Lozzi Cell: 416 990-2131

E-mail: lozziaquacheck@gmail.com

Hydrant Flow Test Form

Job Location: 147 Spadina Ave,Toronto Date: November 9,2020

Test Date

Time of Test: 11:00 am

Location of Flow Hydrant: 1st hydrant south of Queen St on east side of Spadina Ave.

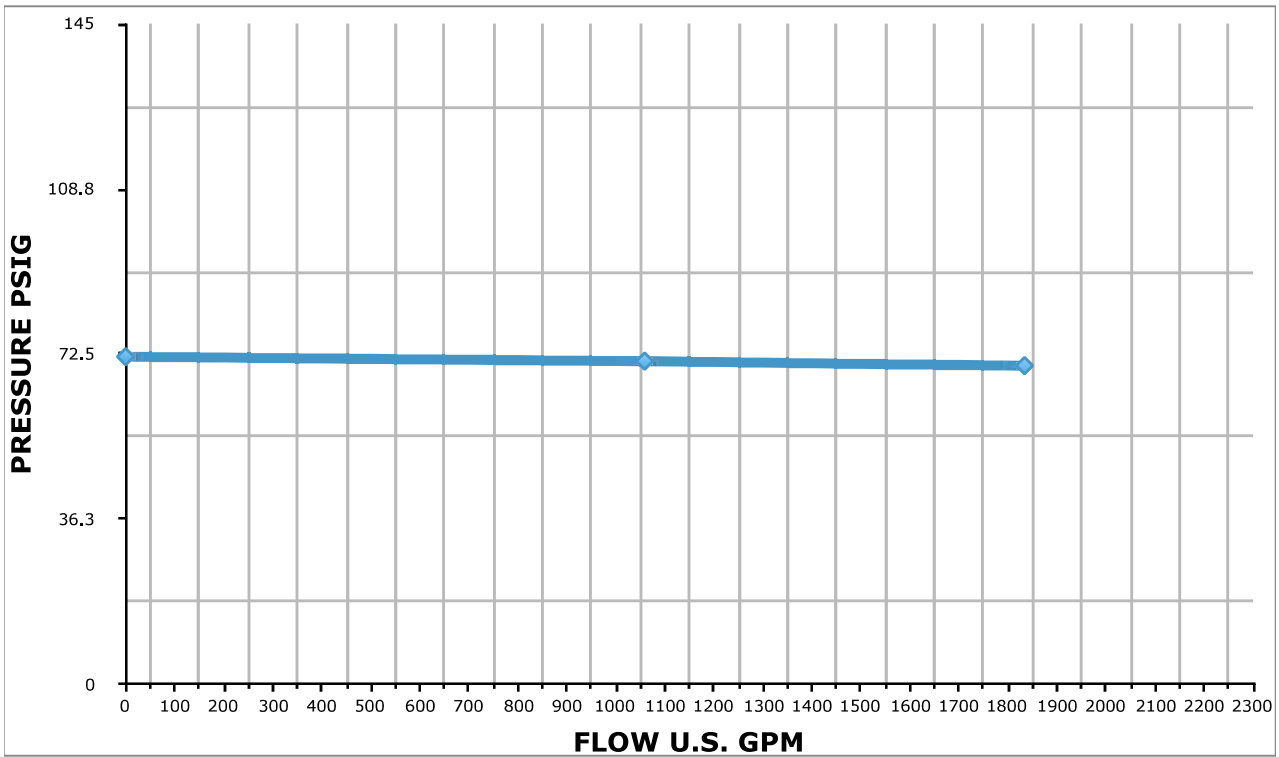
Residual hydrant: Second hydrant south of Queen St on east side of Spadina Ave..

Main Size: 300 mm Static Pressure: 72 psi

Theoretical GPM at 20 psi - 8942 gpm

	Number of Outlets & Orifice Size	Pitot Pressure (psi)	Flow (U.S. G.P.M.)	Residual Pressure (psi)
1.	Static	0	0	72
2.	1 x 2 ½	40	1059	71
3.	2 x 2 ½	30	1834	70

Note :Flow test conducted in accordance with NFPA Std 291



Lozzi Aqua Check

4820 18th Sideroad

Schomberg, Ontario

L0G-1T0

Massimo Lozzi Cell: 416 990-2131

E-mail: lozziaquacheck@gmail.com

Hydrant Flow Test Form

Job Location: 147 Spadina Ave,Toronto Date: November 9,2020

Test Date

Time of Test: 11:30 am

Location of Flow Hydrant: 1st hydrant east of Spadina Ave on S/S of Richmond St W.

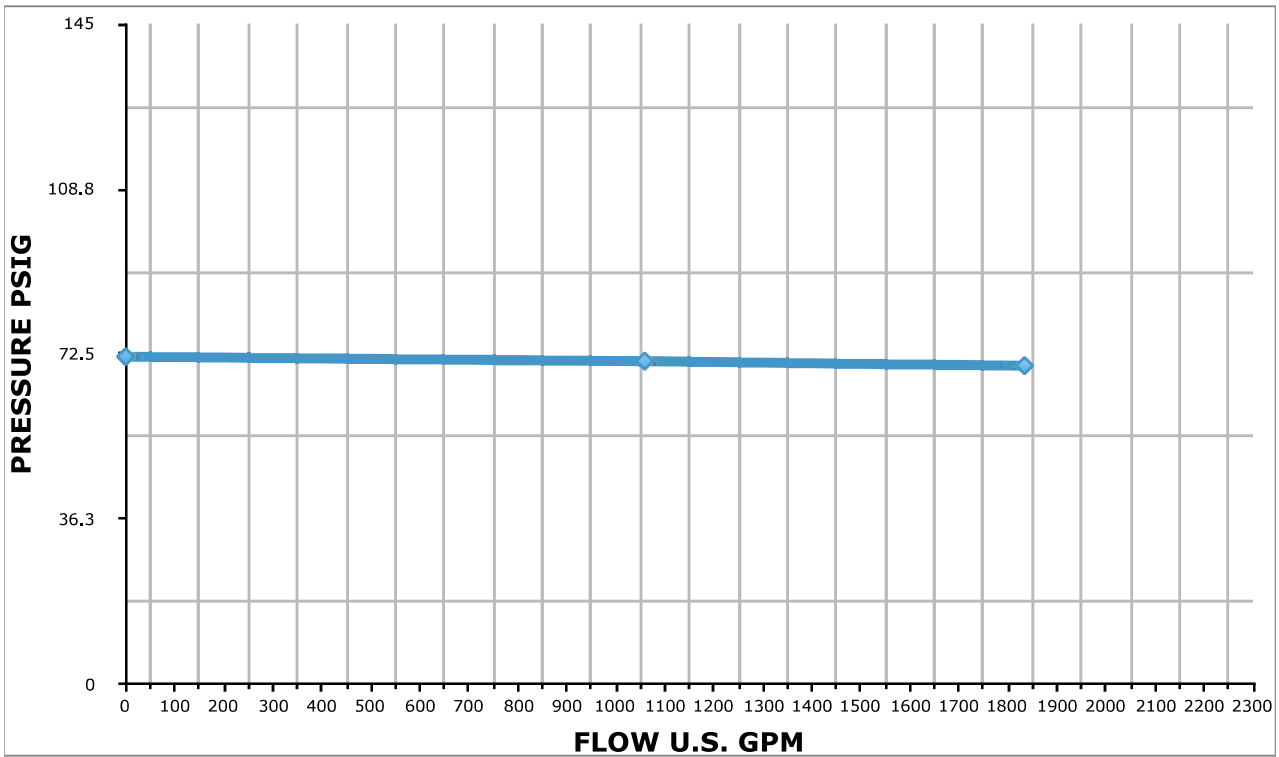
Residual hydrant: Second hydrant east of Spadina Ave on N/S of Richmond St W.

Main Size: 200 mm Static Pressure: 72 psi

Theoretical GPM at 20 psi - 8942 gpm

	Number of Outlets & Orifice Size	Pitot Pressure (psi)	Flow (U.S. G.P.M.)	Residual Pressure (psi)
1.	Static	0	0	72
2.	1 x 2 ½	40	1059	71
3.	2 x 2 ½	30	1834	70

Note :Flow test conducted in accordance with NFPA Std 291



APPENDIX C

Sanitary Demand Analysis

TABLE D1 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - RESIDENTIAL

BUILDING A

			TOTAL
1.1	Total Townhouse Units	units	0
1.2	Persons Per Unit*	persons/unit	2.7
1.3	Total Studio and One Bedroom/One Bedroom + Den Units	units	122
1.4	Persons Per Unit*	persons/unit	1.4
1.5	Total Two Bedroom Units	units	68
1.6	Persons Per Unit*	persons/unit	2.1
1.7	Total Three Bedroom Units	units	33
1.8	Persons Per Unit*	persons/unit	3.1
1.9	Total Residential Population	persons	416
1.10	Total Population Used for Calculation Purposes	persons	430
1.11	Total Residential Flow @ 450 L/capita/day*	L/day	193,500
1.12	Total Residential Flow	L/s	2.24
1.13	Peaking Factor**		4.01
1.14	**Total Residential Peak Flow @ 450 L/capita/day**	**L/s**	**8.97**

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021.

** Peaking Factor calculated by using Harmon's Formula (1+ 14/(4 + P^0.5)).

TABLE D2 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - COMMERCIAL

			Total
2.1	Total Net Commercial Floor Area	m^2	441
2.2	Total Commercial Average Flow @ 180,000L/floor ha/day	L/day	7938.00
2.6	**Total Commercial Peak Flow**	**L/s**	**0.09**

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021

TABLE D3 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - INFILTRATION

3.1	Site Area	m^2	1081
3.2	Site Area	ha	0.1081
3.3	Infiltration Allowance**	L/s/ha	0.26
3.4	**Total Infiltration Peak Flow**	L/s	**0.03**

Wet Weather Flow Estimate

3.1	Site Area	m^2	1081
3.2	Site Area	ha	0.1081
3.5	Infiltration Allowance**	L/s/ha	3.00
3.6	**Total Infiltration Peak Flow**	L/s	**0.32**

* Entire Site Area

** as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021

TABLE D4 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - SUMMARY

At 450 L/capita/day			TOTAL
4.1	Total Residential Peak Flow @ 450 L/capita/day	L/s	8.97
4.2	Total Commercial Peak Flow	L/s	0.09
4.3	Total Infiltration Peak Flow	L/s	0.03
4.4	Provisional Foundation Drainage Pump Flow	L/s	1.00
4.4	**Total Sanitary Peak Flow**	**L/s**	**10.09**

TABLE D5 - EXISTING TOTAL SANITARY FLOW ESTIMATE - COMMERICAL

			Total
5.1	Total Existing Site Area*	m^2	1866
5.2	Total Existing Site Area	ha	0.1866
5.3	Total Commercial/Office Average Flow @ 180,000 L/floor ha/day**	L/day	33,588.00
5.4	Total Commerical Flow	L/s	0.39
5.5	Existing Infiltration Allowance @ 0.26L/s/ha**	L/s	0.03
5.6	**Total Commerical Peak Flow**	**L/s**	**0.42**

* Existing GFA of the 2 storey building

** as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021

TABLE D6 - PROPOSED REDEVELOPMENT TOTAL NET SANITARY INCREASE (450 L/c/d)

			Total
6.1	Total Existing Sanitary Peak Flow	L/s	0.42
6.2	Total Redevelopment Sanitary Peak Flow	L/s	9.09
6.3	Provisional Foundation Drainage Allowance	L/s	1.00
6.4	**Total Net Sanitary Peak Flow Increase**	**L/s**	**7.68**

HM RB (147 Spadina) LP
474 Wellington Street West, Suite 200
Toronto, ON M5V 1E3

File No. 21-019
August 17, 2021

Attention: Charles Arbez

RE: PRELIMINARY HYDROGEOLOGICAL REVIEW REPORT
147 Spadina Ave, Toronto, Ontario

Grounded Engineering Inc. ("Grounded") is pleased to provide you with this Hydrogeological Review for the site known as 147 Spadina Ave, in Toronto, Ontario.

The following documents are provided as part of this package:

- City of Toronto Hydrogeological Review Summary Form
- Preliminary Hydrogeological Review Report

As part of the development applications process, the City of Toronto requires that both documents are submitted together for review.

We trust that the information contained with this report is adequate for your present requirements. If we can be of further assistance, please do not hesitate to contact us.

Katrina Morgenroth, EIT

Matthew Bielaski, P.Eng., QP_{ESA-RA}
Principal

August 2018

HYDROLOGICAL REVIEW SUMMARY

The form is to be completed by the Professional that prepared the Hydrological Review.
Use of the form by the City of Toronto is not to be construed as verification of engineering/hydrological content.

Refer to the Terms of Reference, Hydrological Review:
Link to Terms of Reference Hydrological Review

For City Staff Use Only:	
Name of ECS Case Manager (Please print)	
Date Review Summary provided to to TW, EM&P	

IF ANY OF THE REQUIREMENTS LISTED BELOW HAVE NOT BEEN INLCUDED IN THE HYDROLOGICAL REVIEW, THE REVIEW WILL BE CONSIDERED INCOMPLETE.
THE GREY SHADED BOXES WILL REQUIRE A CONSISTANCY CHECK BY THE ECS CASE MANAGER.

Summary of Key Information:

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Site Address	147 Spadina Ave, Toronto, Ontario	Title, i (Exec Sum), 1 (Sec 1)	
Postal Code	M5V 1E3	Title	
Property Owner (on request for comments memo)	HM RB (147 Spadina) LP	Title, i (Exec Sum), 1 (Sec 1)	
Proposed description of the project (if applicable) (point towers, number of podiums)	One 25± storey structure	i (Exec Sum), 1 (Sec 1)	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Current: commercial Proposed: commercial and residential	i (Exec Sum), 1 (Sec 1)	
Number of below grade levels for the proposed structure	Three (3)	i (Exec Sum), 1 (Sec 1)	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	2021-08-17	Title	
Who Performed the Hydrological Review (Consulting Firm)	Grounded Engineering Inc.	Title, i (Exec Sum), 2 (Sec 1)	
Name of Author of Hydrological Review	Matthew Bielaski, P.Eng., QP_{ESA-RA}	2 (Sec 1), 12 (Sec 14)	

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Check the directories on the website for Professional Geoscientists and/or Professional Engineers of Ontario been checked to ensure that the Hydrological Report has been prepared by a qualified person who is a licensed Professional Geoscientist as set out in the Professional Geoscientist Act of Ontario or a Professional Engineer? PEO: Professional Engineers of Ontario APGO: Association of Professional Geoscientists of Ontario	✓ Yes	N/A	
Has the Hydrological Review been prepared in accordance with all the following: • Ontario Water Resources Act • Ontario Regulation 387/04 • Toronto Municipal Code Chapter 681-Sewers	✓ Yes	2 (Sec 1)	
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **with safety factor included**	Seepage: 30,000 Rainfall: 28,000 **Total: 58,000 L/day** What safety factor was used? 2	ii (Exec Sum), 8 (Sec 10)	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **without safety factor included**	Seepage: 15,000 L/day	Appendix G	
Total Volume (L/day) Long Term drainage of groundwater (from foundation drainage, weeping tiles, sub slab drainage) **with safety factor included** If the development is part of a multiple tower complex, include total volume for each separate tower	Seepage: 30,000 Infiltration: 1,000 **Total: 31,000 L/day** What safety factor was used? 2	ii (Exec Sum), 8 (Sec 10)	
List the nearest surface water (river, creek, lake)	The nearest waterbody is Lake Ontario, located approximately 1,300 m south of the Property.	3 (Sec 3)	
Lowest basement elevation	78.5 masl – base of excavation 79.0 masl – finish floor elevation	i (Exec Sum), Appendix G	
Foundation elevation	77.5 masl – base of footings	i (Exec Sum)	
Ground elevation	90.3 masl (existing ground surface) Site will be re-graded to 90.0 masl	Appendix G	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
STUDY AREA MAP			**Review Includes this Information City Staff (Check)**
Study area map(s) have been included in the report.	✓ Yes	Figures 1 & 2	N/A
Study area map(s) been prepared according to the Hydrological Review Terms of Reference.	✓ Yes	Figures 1 & 2 3 (Sec 2)	N/A
WATER LEVEL AND WELLS		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information (City Staff Initial)**
The groundwater level has been monitored using all wells located on site (within property boundary).	✓ Yes	4 (Sec 4 and 5), Figures 2 & 3	
The static water level measurements have been monitored at all monitoring wells for a minimum of 3 months with samples taken every 2 weeks for a minimum of 6 samples. The intent is for the qualified professional to use professional judgement to estimate the seasonally high groundwater level.	✓ Yes	4 (Sec 4 and 5), Appendix A	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
All water levels in the wells have been measured with respect to masl.	✓ Yes	4 (Sec 5), Appendix A	
A table of geology/soil stratigraphy for the property has been included.	✓ Yes	i (Exec Sum), 3 (Sec 3)	
GEOLOGY AND PHYSICAL HYDROLOGY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information (City Staff Initial)**
The review has made reference to the soil materials including thickness, composition and texture, and bedrock environments.	✓ Yes	3 (Sec 3)	
Key aquifers and the site's proximity to nearby surface water has been identified.	✓ Yes	3 (Sec 3)	N/A
PUMP TEST/SLUG TEST/DRAWDOWN ANALYSIS		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
A summary of the pumping test data and analysis is included in the review.	A pumping test was not conducted.	5 (Sec 6.1)	
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	A pump test was not conducted. Slug tests were conducted.	6 (Sec 6.2)	
Have the monitoring well(s) have been monitored using digital devices? If yes how frequently?	✓ Yes	4 (Sec 5)	

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
If a slug or pump test has been conducted has the static groundwater level been monitored at all monitoring well(s) multiple times to measure recovery? -prior to the slug or pumping test(s)? -post slug or pumping test(s)?	✓ Yes ✓ Yes ✓ Yes	4 (Sec 5), 5 (Sec 6.2)	N/A
The above noted slug or pump tests have been included in the report.	✓ Yes	6 (Sec 6.2), Appendix D	
WATER QUALITY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
The report includes baseline water quality samples from a laboratory. The water quality must be analyzed for all parameters listed in Tables 1 and 2 of Chapter 681 Sewers of the Toronto Municipal Code (found in Appendix A) and the samples must have to be taken unfiltered within 9 months of the date of submission.	✓ Yes	7 (Sec 7), Appendix H	
The water quality data templates in Appendix A have been completed for each sample taken for both sanitary/combined and storm sewer limits.	For sanitary discharge- See the sanitary/combined sewer parameter limit template For storm discharge- See the storm sewer parameter limit template	8-11 of Hydrological Review Summary	

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HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the sanitary/combined Bylaw limits **If there are any sample parameter Exceedances the groundwater can't be discharged as is.**	Sanitary Combined Sewer: • The ground water sample met the Limits for Sanitary and Combined Sewer Discharge for all parameters analyzed.	7 (Sec 7)	
Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the storm Bylaw limits. **If there are any sample parameter exceedances the groundwater can't be discharged as is.**	Storm Sewer: • Total Manganese (Result 0.426 mg/L; Limit 0.05 mg/L)	7 (Sec 7)	
The water quality samples have been analyzed by a Canadian laboratory accredited and licensed by Standards Council of Canada and/or Canadian Association for Laboratory Accreditation. List of Canadian accredited laboratories: Standards Council of Canada	✓ Yes	Appendix H	N/A
A chain of custody record for the samples is included with the report.	✓ Yes	Appendix H	
Has the chain of custody reference any filtered sample? If yes, the report has to be amended and re-submitted to include only non-filtered samples.	◯ No	Appendix H	
List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.	Sanitary Combined Sewer: • The ground water sample met the Limits for Sanitary and Combined Sewer Discharge for all parameters analyzed. Storm Sewer: • Total Manganese (Result 0.426 mg/L; Limit 0.05 mg/L)	7 (Sec 7), Appendix H	

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HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
A true copy of the Certificate of Analysis report, is included with the report.	✓ Yes	Appendix H	
EVALUATION OF IMPACT		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
Does the report recommend a back-up system or relief safety valve(s)?	◯ No	8 (Sec 9)	
Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?	◯ No	n/a	
The taking and discharging of groundwater on site has been analyzed to ensure that no negative impacts will occur to: the City sewage works in terms of quality and quantity (including existing infrastructure), the natural environment, and settlement issues.	Yes	11-12 (Sec 11)	N/A
Has it been determined that there will be a negative impact to the natural environment, City sewage works, or surrounding properties has the study identified the following: the extent of the negative impact, the detail of the precondition state of all the infrastructure, City sewage works, and natural environment within the effected zone and the proposed remediation and monitoring plan?	◯ No	11-12 (Sec 11-12)	N/A

Summary of Additional Information and Key Items (if applicable):

Appendix A:

Chapter 168 – Table 1 Sanitary Combined Sewer Limits

Chapter 168 – Table 2 Storm Sewer Limits

Sample Location: SW – UF – BH 3

Parameter	Table 1 Limit	Table 2 Limit	Units	Sample Result	Sample Result with upper RDL* included	
Inorganics						
BOD	300	15	mg/L	8	8	2
Fluoride	10	n/a	mg/L	0.11	0.11	0.06
TKN	100	n/a	mg/L	12.6	12.6	0.5
pH	6.0 - 11.5	6.0 - 9.5	SU	7.40	7.40	0.05
Phenolics (4AAP)	1	0.008	mg/L	< 0.002	< 0.002	0.002
TSS	350	15	mg/L	15	15	2
Total Cyanide	2	0.02	mg/L	< 0.01	< 0.01	0.01
Metals						
Chromium Hexavalent	2	0.04	mg/L	< 0.0002	< 0.0002	0.0002
Total Mercury	0.01	0.0004	mg/L	< 0.00001	< 0.00001	0.00001
Total Aluminum	50	n/a	mg/L	0.367	0.367	0.001
Total Antimony	5	n/a	mg/L	< 0.0009	< 0.0009	0.0009
Total Arsenic	1	0.02	mg/L	0.0033	0.0033	0.0002
Total Cadmium	0.7	0.008	mg/L	0.000005	0.000005	0.000003
Total Chromium	4	0.08	mg/L	0.0043	0.0043	0.00008
Total Cobalt	5	n/a	mg/L	0.00057	0.00057	0.000004
Total Copper	2	0.4	mg/L	0.0005	0.0005	0.0002
Total Lead	1	0.12	mg/L	0.00021	0.00021	0.00001
Total Manganese	5	0.05	mg/L	0.426	0.426	0.00001
Total Molybdenum	5	n/a	mg/L	0.0017	0.0017	0.00004
Total Nickel	2	0.08	mg/L	0.0019	0.0019	0.0001
Total Phosphorus	10	0.4	mg/L	0.371	0.371	0.003
Total Selenium	1	0.02	mg/L	0.00017	0.00017	0.00004
Total Silver	5	0.12	mg/L	< 0.00005	< 0.00005	0.00005
Total Tin	5	n/a	mg/L	0.0028	0.0028	0.00006
Total Titanium	5	n/a	mg/L	0.0119	0.0119	0.00005
Total Zinc	2	0.04	mg/L	0.003	0.003	0.002
Microbiology						
E.coli	n/a	200	CFU	< 2	< 2	2
Petroleum Hydrocarbons						
Animal/Vegetable Oil & Grease	150	n/a	mg/L	< 4	< 4	4
Mineral/Synthetic Oil & Grease	15	n/a	mg/L	< 4	< 4	4
Volatile Organics						
Benzene	0.01	0.002	mg/L	< 0.0005	< 0.0005	0.0005
Chloroform	0.04	0.002	mg/L	< 0.0005	< 0.0005	0.0005

August 2018

HYDROLOGICAL REVIEW SUMMARY

Parameter	Table 1 Limit	Table 2 Limit	Units	Sample Result	Sample Result with upper RDL* included	
1,2-Dichlorobenzene	0.05	0.0056	mg/L	< 0.0005	< 0.0005	0.0005
1,4-Dichlorobenzene	0.08	0.0068	mg/L	< 0.0005	< 0.0005	0.0005
Cis-1,2-Dichloroethylene	4	0.0056	mg/L	< 0.0005	< 0.0005	0.0005
Trans-1,3-Dichloropropylene	0.14	0.0056	mg/L	< 0.0005	< 0.0005	0.0005
Ethyl Benzene	0.16	0.002	mg/L	< 0.0005	< 0.0005	0.0005
Methylene Chloride	2	0.0052	mg/L	< 0.0005	< 0.0005	0.0005
1,1,2,2-Tetrachloroethane	1.4	0.017	mg/L	< 0.0005	< 0.0005	0.0005
Tetrachloroethylene	1	0.0044	mg/L	< 0.0005	< 0.0005	0.0005
Toluene	0.016	0.002	mg/L	< 0.0005	< 0.0005	0.0005
Trichloroethylene	0.4	0.0076	mg/L	< 0.0005	< 0.0005	0.0005
Total Xylenes	1.4	0.0044	mg/L	< 0.0005	< 0.0005	0.0005
Semi-Volatile **Organics**						
Di-n-butyl Phthalate	0.08	0.015	mg/L	< 0.002	< 0.002	0.002
Bis (2-ethylhexyl) Phthalate	0.012	0.0088	mg/L	< 0.002	< 0.002	0.002
3,3'-Dichlorobenzidine	0.002	0.0008	mg/L	< 0.0005	< 0.0005	0.0005
Pentachlorophenol	0.005	0.002	mg/L	< 0.0005	< 0.0005	0.0005
Total PAHs	0.005	0.002	mg/L	< 0.001	< 0.001	---
Hexachlorocyclohexane	n/a	0.1	mg/L	Parameter Not In By-Law May 2016		
Misc **Parameters**						
Nonylphenols	0.02	0.001	mg/L	< 0.001	< 0.001	0.001
Nonylphenol Ethoxylates	0.2	0.01	mg/L	< 0.01	< 0.01	0.01
Temperature	< 60	< 40	°C	7	7	---
PCB	0.001	0.0004	mg/L	< 0.0001	< 0.0001	0.0001

* RDL corresponds to SGS Reporting Detection Limits

Sample Collected: SW – UF – BH 3

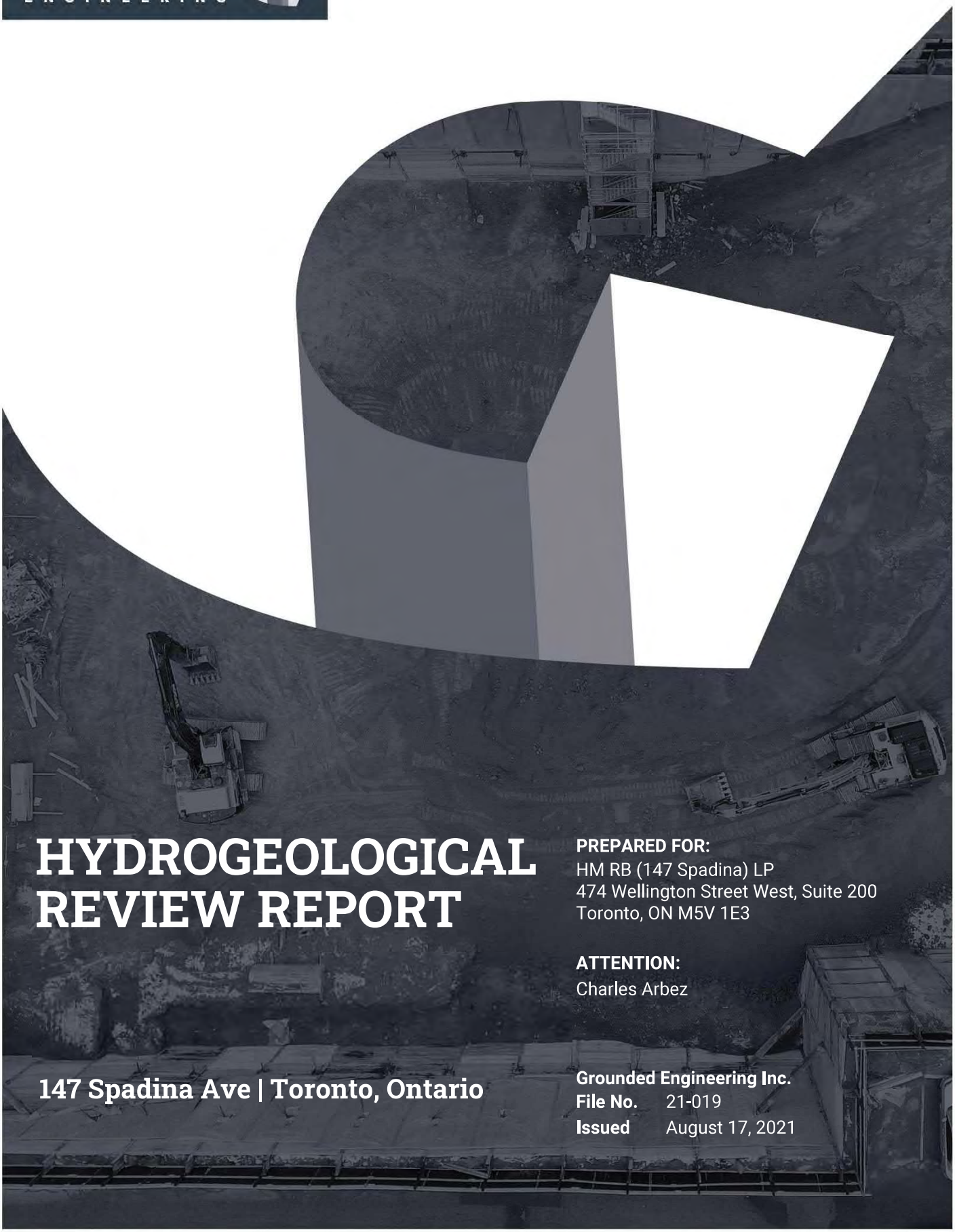
Temperature: 7°C

Consulting Firm that prepared Hydrological Report: Grounded Engineering Inc.
Print Name

Qualified Professional who completed the report summary: Matthew Bielaski, P.Eng., QP_{ESA-RA}
Print Name

Qualified Professional who completed the report summary:

Signature Date & Stam



HYDROGEOLOGICAL REVIEW REPORT

PREPARED FOR:
HM RB (147 Spadina) LP
474 Wellington Street West, Suite 200
Toronto, ON M5V 1E3

ATTENTION:
Charles Arbez

147 Spadina Ave | Toronto, Ontario

Grounded Engineering Inc.
File No. 21-019
Issued August 17, 2021

12 Banigan Drive, Toronto ON M4H 1E9 | (647) 264-7909 | groundedeng.ca | Grounded Engineering

Executive Summary

Grounded Engineering Inc. (Grounded) was retained by HM RB (147 Spadina) LP to conduct a Hydrogeological Review for the proposed redevelopment of 147 Spadina Ave in Toronto, Ontario (site). The conclusions of the investigation are summarized as follows:

Development Information

Current Development

Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
1 Building	2	1 (partial)	Unknown	Unknown	Unknown

Proposed Development

Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
1 Building	25±	3	11.0±	79.0±	77.5±

Site Conditions

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	Aquifer	0.2 – 1.5	90.4 – 89.4	1 x 10-6*
Sunnybrook Till	Aquitard	0.8 – 7.6	89.8 – 82.6	1 x 10-9*
Don Beds	Aquitard	4.6 – 9.1	86.0 – 81.1	1 x 10-8*
York Till	Aquitard	9.1 – 13.7	81.5 – 76.6	2.8 x 10^{-9}**
Weathered Bedrock	n/a	12.2 – 14.4	78.4 – 75.9	1.6 x 10^{-6}***
Sound Bedrock	n/a	13.0 – 16.9	77.6 – 73.7	1 x 10^{-7}*

* Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979).
** Indicates conductivity was estimated using grain size analysis.
*** Indicates conductivity was calculated by Slug Test.

Groundwater Elevation

Monitoring Well ID	Depth Below Grade (m)	Elevation (masl)
BH 1	10.6	79.7
BH 2	6.8	83.8
BH 3	7.5	82.8
BH 4	15.0	75.2
P-MW101	4.0	86.3
P-MW102	4.0	86.5
P-MW103	Dry	Dry

Groundwater Elevation		
P-MW104	Dry	Dry
P-MW105	Dry	Dry
P-MW106	Dry	Dry

Groundwater Quality				
Sample ID	**Sample Date**	**Sample Expiry Date**	**City of Toronto Storm Sewer Limits**	**City of Toronto Sanitary and Combined Sewer Limits**
UF – SW – BH 3	Feb 24, 2021	Aug 24, 2021	Exceeds	Meets

Groundwater Control

Stored Groundwater (pre-excavation/dewatering)			
Volume of Excavation (m^3)	**Volume of Excavation Below Water Table (m^3)**	**Volume of Storage Groundwater (m^3)**	**Volume of Storage Groundwater (L)**
12,800	8,700	2,700	2,636,600

Short Term (Construction) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		**Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
30,000	20.8	28,000	19.4	58,000	40.3

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		**Infiltration Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
30,000	20.8	1,000	0.7	31,000	21.5

Zone of Influence	
Zone of Influence (m)	**Maximum Potential Settlement (mm)**
2	9

Regulatory Requirements	
Environmental Activity and Sector Registry (EASR) Posting	Required
Short Term Permit to Take Water (PTTW)	Not Required
Long Term Permit to Take Water (PTTW)	Not Required
Short Term Discharge Agreement City of Toronto	Required
Long Term Discharge Agreement City of Toronto	Required

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FIGURES

APPENDICES

1 Introduction

HM RB (147 Spadina) LP has retained Grounded Engineering Inc. ("Grounded") to provide hydrogeological engineering design advice for their proposed development at 147 Spadina Ave, in Toronto, Ontario.

Property Information	
Location of Property	147 Spadina Ave
Ownership of Property	HM RB (147 Spadina) LP
Property Dimensions (m)	31 by 35
Property Area (m^2)	1085

Existing Development	
Number of Building Structures	1
Number of Above Grade Levels	2
Number of Underground Levels	1 (partial)
Sub-Grade Depth of Development (m)	Unknown
Sub-Grade Area (m^2)	Unknown
Land Use Classification	Commercial

Proposed Development	
Number of Building Structures	1
Number of Above Grade Levels	25±
Number of Underground Levels	3
Sub-Grade Depth of Development (m)	11.5±
Sub-Grade Area (m^2)	1085
Land Use Classification	Mixed commercial and residential

Qualified Person and Hydrogeological Review Information	
Qualified Person	Matthew Bielaski, P.Eng.
Consulting Firm	Grounded Engineering Inc.
Date of Hydrogeological Review	August 17, 2021
Scope of Work	▪ Review of MECP Water Well Records for the area ▪ Review of geological information for the area ▪ Review of topographic information for the area ▪ Advancement of 2 boreholes to a maximum depth of 17 m, which recovered 3m of sound bedrock core and were instrumented with monitoring wells ▪ Advancement of 2 boreholes to a maximum depth of 15 m, which were instrumented with monitoring wells ▪ Completion of a 24-hour pump test (if feasible) ▪ Completion of slug tests in all available monitoring wells ▪ Groundwater elevation monitoring for three (3) months, in 11 monitoring wells present onsite. 6 monitoring wells were installed by Pinchin Ltd. In the overburden. ▪ Groundwater sampling and analysis to the City of Toronto Sewer Use Limits ▪ Assessment of groundwater controls and potential impacts ▪ Report preparation in accordance with Ontario Water Resources Act, Ontario Regulation 387/04, and Toronto Municipal Code Chapter 681

General Hydrogeological Characterization	
Property Topography	The site has an existing ground surface elevation of approximately 90.3 masl. The site will be re-graded to an elevation of 90.0 masl.
Local Physiographic Features	The site is composed of clayey silt till deposits of the Sunnybrook Till, Don Beds, and York Till overlaying Georgian Bay Formation shale bedrock.
Regional Physiographic Features	The West St Lawrence Lowland consists of a limestone plain (elevation 200–250 masl) that is separated by a broad, shale lowland from a broader dolomite and limestone plateau west of Lake Ontario. This plateau is bounded by the Niagara Escarpment. From the escarpment the plateau slopes gently southwest to lakes Huron and Erie (elevation 173 masl). Glaciation has mantled this region with several layers of glacial till (i.e., an unsorted mixture of clay, sand, etc.), the youngest forming extensive, undulating till plains, often enclosing rolling drumlin fields.
Surface Drainage	Surface water is expected to flow to the municipal roads located to the South and West of the site. A downspout extends between the roof of the site and a drain located at grade, on the south of the site, which is used to collect storm water falling on the roof of the site.

2 Study Area Map

A map has been enclosed which shows the following information:

- All monitoring wells identified on site
- All boreholes identified on site
- All buildings identified on site and within the study area
- The property boundaries of the site
- Any watercourses and drainage features within the study area

3 Geology and Physical Hydrogeology

The site stratigraphy, including soil materials, composition and texture are presented in detail on the borehole logs in Appendix A. A summary of stratigraphic units that were encountered at the site are as follows:

Site Stratigraphy

Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Earth Fill	Aquifer	0.2 – 1.5	90.4 – 89.4	$1 \times 10^{-6*}$
Sunnybrook Till	Aquitard	0.8 – 7.6	89.8 – 82.6	$1 \times 10^{-9*}$
Don Beds	Aquitard	4.6 – 9.1	86.0 – 81.1	$1 \times 10^{-8*}$
York Till	Aquitard	9.1 – 13.7	81.5 – 76.6	$2.8 \times 10^{-9**}$

* Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979).
** Indicates conductivity was estimated using grain size analysis.

Bedrock

Stratum	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Weathered	12.2 – 14.4	78.4 – 75.9	$1.6 \times 10^{-6***}$
Sound	13.0 – 16.9	77.6 – 73.7	$1 \times 10^{-7*}$

* Indicates conductivity was estimated using typical published values from Freeze and Cherry (1979).
*** Indicates conductivity was calculated by Slug Test.

Surface Water

Surface Water Body	Distance from site (m)	Hydraulically Connected to Property
Lake Ontario	1,300	No

4 Monitoring Well Information

Well ID	Well Diameter (mm)	Ground Surface (masl)	Top of Screen (masl)	Bottom of Screen (masl)	Screened Geological Unit
Monitoring Wells by Grounded					
BH 1	51	90.3	81.1	78.1	York Till
BH 2	51	90.6	81.3	78.2	York Till
BH 3	51	90.3	79.6	76.6	York Till York Till / Weathered Bedrock
BH 4	51	90.2	77.3	74.2	Bedrock
Monitoring Wells by Others (Pinchin Ltd.)					
P-MW101	38	90.3	88.2	85.1	Sunnybrook Till
P-MW102	38	90.5	89.3	86.3	Sunnybrook Till
P-MW103	38	90.5	87.5	84.4	Sunnybrook Till
P-MW104	38	90.3	87.9	85.0	Sunnybrook Till
P-MW105	38	86.2	85.6	84.1	Sunnybrook Till
P-MW106	38	90.1	87.9	84.9	Sunnybrook Till

5 Groundwater Elevations

Table 5.1 - Groundwater Elevations in Monitoring Wells Installed by Grounded

	Groundwater Elevations (masl)			
	BH1	**BH2**	**BH3**	**BH4**
February 24, 2021	-	83.6	82.3	75.2
March 4, 2021	-	83.8	82.7	75.1
March 19, 2021	-	83.6	82.8	75.0
April 1, 2021	-	83.6	82.7	*
April 12, 2021	-	83.8	82.7	*
April 16, 2021	79.7	83.8	82.8	75.2
May 31, 2021	81.1	83.7	82.7	75.2
June 11, 2021	81.3	83.7	82.7	75.1
June 25, 2021	81.7	83.7	82.7	75.1
July 8, 2021	81.6	83.7	82.7	75.1
July 21, 2021	81.8	83.8	82.8	75.1

– indicates monitoring well has not been install yet as of this date.
* indicates no groundwater reading was possible on this date due to wells being inaccessible.

Table 5.2 – Groundwater Elevations in Monitoring Wells Installed by Others

	Groundwater Elevations (masl)					
	P-MW101	**P-MW102**	**P-MW103**	**P-MW104**	**P-MW105**	**P-MW106**
April 29, 2021	88.5	88.6	88.7	88.5	83.4	86.3
June 4, 2021	88.2	86.7	84.9	85.4	84.3	NA
June 6, 2021	-	-	-	-	-	dry
June 11, 2021	86.3	86.6	85.8	85.5	80.4	84.9
June 25, 2021	-	-	dry	dry	dry	dry
July 8, 2021	-	86.5	dry	dry	dry	dry

"–" indicates no groundwater measurement collected on this date.

For basement wall design purposes, the groundwater table is approximately 3.8 metres below existing grade, in the clayey silt deposit of the Sunnybrook Till. This deposit has a low permeability and will yield only minor seepage in the long term. There is also water within discrete fractures in the bedrock, and perched water in the earth fill.

Groundwater levels fluctuate with time depending on the amount of precipitation and surface runoff and may be influenced by known or unknown dewatering activities at nearby sites.

6 Aquifer Testing

6.1 Pump Test

A pump test was not completed at the site. Due to the nature of the soil materials present and slow ground recharge of the aquifer it was not feasible to complete a 24-hour pumping test. Please note however that recovery tests were completed on each of the monitoring wells installed at the site.

6.2 Single Well Response Test (Slug Test)

The hydraulic conductivities from the monitoring wells were determined based on slug tests (single-well response tests). These tests involve rapid removal of water or addition of a "slug" which displaces a known volume of water from a single well, and then monitoring the water level in the well until it recovers. The results of the slug tests were analyzed using the Bouwer and Rice method (1976).

The hydraulic properties of the strata applicable to the site are as follows:

Well ID	Well Screen Elevation (masl)	Screened Geological Unit	Hydraulic Conductivity (m/s)
BH 1	81.1 – 78.1	York Till	2.3×10^{-7}
BH 2	81.3 – 78.2	York Till	4.1×10^{-7}
BH 3	79.6 – 76.6	York Till / Weathered Bedrock	1.6×10^{-6}
BH 4	77.3 – 74.2	Bedrock	3.7×10^{-6}

6.3 Soil Grain Size Distribution

The hydraulic conductivities of various soil types can also be estimated from grain size analyses. An assessment of the grain sizes was conducted using the excel-based tool, HydrogeoSieve XL (*HydrogeoSieve XL ver.2.2, J.F. Devlin, University of Kansas, 2015*). HydrogeoSieve XL compares the results of the grain size analyses against fifteen (15) different analytical methods.

Given our experience in the area as well as published literature, some of the geometric means provided for the soil were biased low by one or more methods. In these instances, the values determined by these methods were excluded from the mean. The table below illustrates the hydraulic conductivity values estimated from the mean of the analytical methods where the soil met the applicable analysis criteria.

Sample ID	Soil Description	Applicable Analysis Methods	Hydraulic Conductivity (m/s)
BH 2 – SS 9	York Till	Alyamani and Sen, Barr, Sauerbrei	8.4×10^{-10}
BH 3 – SS 11	York Till	Alyamani and Sen, Barr, Sauerbrei	9.6×10^{-9}
BH 4 – SS 12	York Till	Alyamani and Sen, Barr, Sauerbrei	7.7×10^{-9}

The results of the analyses are appended.

6.4 Literature

According to Freeze and Cherry (1979), the typical hydraulic conductivity of the strata investigated at the site are:

Stratum/Formation	Hydraulic Conductivity (m/s)
Earth Fill	1×10^{-6}
Sunnybrook Till (clayey silt)	1×10^{-8}
Don Beds (clayey silt)	1×10^{-8}
York Till (silt and clay)	1×10^{-9}
Weathered Bedrock	1×10^{-7}
Bedrock (Shale)	1×10^{-6} to 10^{-13}

7 Water Quality

One (1) unfiltered groundwater sample was collected and analyzed by a Canadian laboratory accredited and licensed by Standards Council of Canada and or Canadian Association for Laboratory Accreditation.

The sample was collected directly from monitoring well 3 on February 24, 2021. The sample was analyzed for the following parameters:

- City of Toronto Municipal Code Chapter 681 Table 1 – Limits for Sanitary and Combined Sewers Discharge
- City of Toronto Municipal Code Chapter 681 Table 2 – Limits for Storm Sewer Discharge

The groundwater sample **exceeded** the **Limits for Storm Sewer Discharge** for the following parameters:

- Manganese (Limit 0.05 mg/L, Result 0.426 mg/L)

The groundwater sample **met** the **Limits for Sanitary and Combined Sewer Discharge** for all parameters analyzed.

A true copy of the analysis report, Certificate of Analysis, and a chain of custody record for the sample are enclosed.

8 Proposed Construction Method

The proposed shoring at the site will consist of conventional soldier piling and lagging.

For design purposes, the stabilized groundwater table is at about Elev. 86.5± m. The water table is present in all the native soil units. The lowest FFE is at about Elev. 79.0± m. Therefore,

- Bulk excavation will extend down to the elevation of the prevailing groundwater table;
- Foundation excavations will extend down to about 8 m below the prevailing groundwater table; and
- Foundation excavations will penetrate dense York Till, which will not yield free-flowing water.

Prior to excavation, positive dewatering to lower the groundwater table will be required to facilitate construction as well as to maintain the integrity of the subgrade for foundation and slab-on-grade support. The water level must be kept at least 1.2 m below the lowest excavation elevation during construction. Failure to dewater prior to excavation will result in unrecoverable disturbance of the subgrade, which will render advice provided for undisturbed subgrade conditions inapplicable. Dewatering of the bedrock is not required.

Dewatering will take some time to accomplish prior to the start of excavation. Stored water within the excavation will need to be considered prior to excavation/dewatering.

It is recommended that a professional dewatering contractor be consulted to review the subsurface conditions and to design a site-specific dewatering system. It is the dewatering contractor's responsibility to assess the factual data and to provide recommendations on dewatering system requirements.

The proposed structures will consist of drained foundations.

The City of Toronto will require Discharge Agreements in the short and long terms, if any water is to be discharged to the storm or sanitary sewers. If a discharge agreement is not feasible or supported by the City, all below-grade structures need to be designed as a fully waterproofed structure with no permanent dewatering.

9 Private Water Drainage System (PWDS)

If the proposed development consists of drained foundations, then a private water drainage system will be required. The total sub floor drain area will be approximately 1085 m^2 based on the drawings which have been provided.

If the development is designed with a private water drainage system, the drainage system is a critical structural element since it keeps water pressure from acting on the basement walls and floor slab. As such, the sump that ensures the performance of this system must have a duplexed pump arrangement for 100% pumping redundancy and these pumps must be on emergency power. The size of the sump should be adequate to accommodate the estimated groundwater seepage. It is anticipated that the groundwater seepage can be controlled with typical, widely available, commercial/residential sump pumps.

If the proposed development is designed as a leak tight structure, then a private water drainage system will not be required. However, the structure must then be designed to resist hydrostatic pressure and uplift forces.

10 Groundwater Extraction and Discharge

Numerical analyses were conducted for both short-term and long-term dewatering scenarios. The modeling was conducted using computer software, which deploys the finite element modelling method. The Finite Element Model (FEM) for groundwater seepage indicates the short term (construction) and long term (permanent) dewatering requirements as provided below. The finite element model results are presented in Appendix G.

The groundwater seepage estimates, which have been provided, represent the steady state groundwater seepage. There will be an initial drawdown of the groundwater before a steady state condition is reached. The rate of the initial drawdown, and therefore discharge, is dependent on the dewatering contractor and how the groundwater is being dealt with at the site. An estimated initial volume of stored groundwater which will require removal before steady state is reached has been provided below.

Please note that if excavation is exposed to the elements, storm water will have to be managed. The short-term control of groundwater should consider stormwater management from rainfall events. A dewatering system should be designed to consider the removal of rainfall from excavation. A design storm of 25 mm has been used in the quantity estimates.

As required by Ontario Regulation 63/16, a plan for discharge must consider the conveyance of storm water from a 100-year storm. The additional volume that will be generated in the occurrence of a 100-year storm event is approximately 102,000 L.

Stored Groundwater (pre-excavation/dewatering)			
Volume of Excavation (m^3)	**Volume of Excavation Below Water Table (m^3)**	**Volume of Storage Groundwater (m^3)**	**Volume of Storage Groundwater (L)**
12,800	8,700	2,700	2,636,600

Short Term (Construction) Groundwater Quantity – Safety Factor of 2 Used					
Groundwater Seepage		**Design Rainfall Event (25mm)**		**Total Daily Water Takings**	
L/day	**L/min**	**L/day**	**L/min**	**L/day**	**L/min**
30,000	20.8	28,000	19.4	58,000	40.3

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2 Used		
Groundwater Seepage	**Infiltration Design Rainfall Event (25mm)**	**Total Daily Water Takings**

L/day	L/min	L/day	L/min	L/day	L/min
30,000	20.8	1,000	0.7	31,000	21.5

Regulatory Requirements	
Environmental Activity and Sector Registry (EASR) Posting	Required
Short Term Permit to Take Water (PTTW)	Not Required
Long Term Permit to Take Water (PTTW)	Not Required
Short Term Discharge Agreement City of Toronto	Required
Long Term Discharge Agreement City of Toronto	Required

Please note:

- The native soils must be dewatered a minimum of 1.2 m below the footing elevation prior to excavation to preserve the in-situ integrity of the native soils during construction dewatering activities. Dewatering of the bedrock is not required. It is anticipated that the groundwater elevation will rise to the elevation of the subfloor drainage in the event of a drained structure or the waterproofing in the event of a leak tight structure.
- The proposed pump schedule for short term construction dewatering has not been completed. As such, the actual peak short term discharge rate is not available at the time of writing this report. The pump schedule must be specified by the dewatering contractor retained.
- The proposed pump schedule for long term permanent drainage has not been completed. As such the actual peak long term discharge rate is not available at the time writing of this report. The pump schedule must be specified by the mechanical consultant.
- A leak-tight structure (structure that has not included a private water drainage system) has not been considered as part of the proposed development at this time.
- On-site containment (infiltration gallery/dry well etc.) has not been considered as part of the proposed development at this time. If this option is considered, additional work will have to be conducted (i.e., infiltration testing).

11 Evaluation of Impact

11.1 Zone of Influence (ZOI)

The Zone of Influence (ZOI) with respect to groundwater was calculated based on the estimated groundwater taking rate and the hydraulic conductivity of the unit which water will be taken at the Property.

The ZOI was calculated using the Sichardt equation below.

Equation: $R_0 = 3000*dH*K^{0.5}$

Where:

dH is the dewatering thickness (m)

K is the hydraulic conductivity (m/s)

Calculation:

Geological Unit	dH (m)	K (m/s)	ZOI (m)
Sunnybrook Till	1.0	1×10^{-9}	0
Don Beds	4.5	1×10^{-8}	1
York Till	3.1	2.8×10^{-9}	1

The ZOI with respect to groundwater seepage at the site is 2± m.

11.2 Land Stability

The impacts to land stability of the proposed short term and long-term dewatering at the site on adjacent structures are summarized as follows:

- The proposed dewatering at the subject site locally lowers the groundwater table within the ZOI by a maximum of 8± m. This has the potential increase of effective stress of approximately 79 kPa in the native soils.
- Based on the change in effective stress and the compressibility of the soil subjected to that change, the proposed dewatering activities will induce a maximum 9 mm of additional settlement in the adjacent soils.
- The maximum induced settlement occurs directly adjacent to the proposed excavation and decreases in a nonlinear fashion with distance away from the excavation.
- For the structures within the public realm adjacent to the site, the dewatering-induced settlement is calculated to be 9 mm or less (depending on the depth of the structure).

On this basis, the impact of the proposed dewatering on the existing adjacent structures is considered by Grounded to be within acceptable limits.

11.3 City's Sewage Works

Negative impacts to City's sewage works may occur in terms of the quantity or quality of the groundwater discharged. This report provided the estimated quantity of the water discharge. However, this report does not speak to the sewer capacities. The sewer capacity analysis is provided under a separate cover by the civil consultant.

The quality of the proposed groundwater discharge is provided in Section 7. As noted in that section, the groundwater sample exceeded the Limits for Storm Sewer Discharge and met the Limits for Sanitary and Combined Sewer Discharge.

As such, additional treatment will be required before the water can be discharged to the Storm Sewer to avoid impacts to the City's sewage works caused by groundwater quality. Additional treatment will not be required before the water can be discharged to the Sanitary and Combined Sewer.

11.4 Natural Environment

There are no natural waterbodies within the ZOI that will be affected by the proposed construction dewatering or permanent drainage. Any groundwater which will be taken from the site will be discharged (if required) into the City's sewer systems and not into any natural water body. As such, there will be no impact to the natural environment caused by the water takings at the site.

11.5 Local Drinking Water Wells

The site is located within the municipal boundaries of the City of Toronto. The site and surrounding area are provided with municipal piped water and sewer supply. There is no use of the groundwater for water supply in this area of Toronto. As such, there will be no impact to drinking water wells.

12 Proposed Mitigation Measures and Monitoring Plan

The extent of the negative impact identified in previous sections will be limited to the ZOI caused by the groundwater taking at the site.

As a result of dewatering and draining the soil, changes in groundwater level have the potential to cause settlement based on the change in the effective stresses within the ZOI.

If adjacent buildings or municipal infrastructure are within the ZOI and will undergo settlement that may be considered unacceptable as identified the Land Stability Section, consideration should be given to implement a monitoring and mitigation program during dewatering activities.

Both the temporary construction dewatering system and the permanent building drainage system must be properly installed and screened to ensure sediments and fines will not be removed, which is typically a primary cause of dewatering related settlement.

13 Limitations

Natural occurrences, the passage of time, local construction, and other human activity all have the potential to alter the subsurface conditions directly or indirectly at or near the project site. Contractual obligations related to groundwater or stormwater control must be considered with attention and care as they relate this potential site alteration.

The hydrogeological engineering advice provided in this report is based on the factual observations made from the site investigations as reported. It is intended for use by the owner and their retained design team. If there are changes to the features of the development or to the scope, the interpreted subsurface information, geotechnical engineering design parameters, advice, and discussion on construction considerations may not be relevant or complete for the project. Grounded should be retained to review the implications of such changes with respect to the contents of this report.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Grounded accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, including consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

13.1 Report Use

The authorized users of this report are HM RB (147 Spadina) LP and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization from Grounded Engineering Inc. The City of Toronto may also make use of and rely upon this report, subject to the limitations as stated.

14 Closure

If there are any questions regarding the discussion and advice provided, please do not hesitate to contact our office. We trust that this report meets your requirements at present.

For and on behalf of our team,

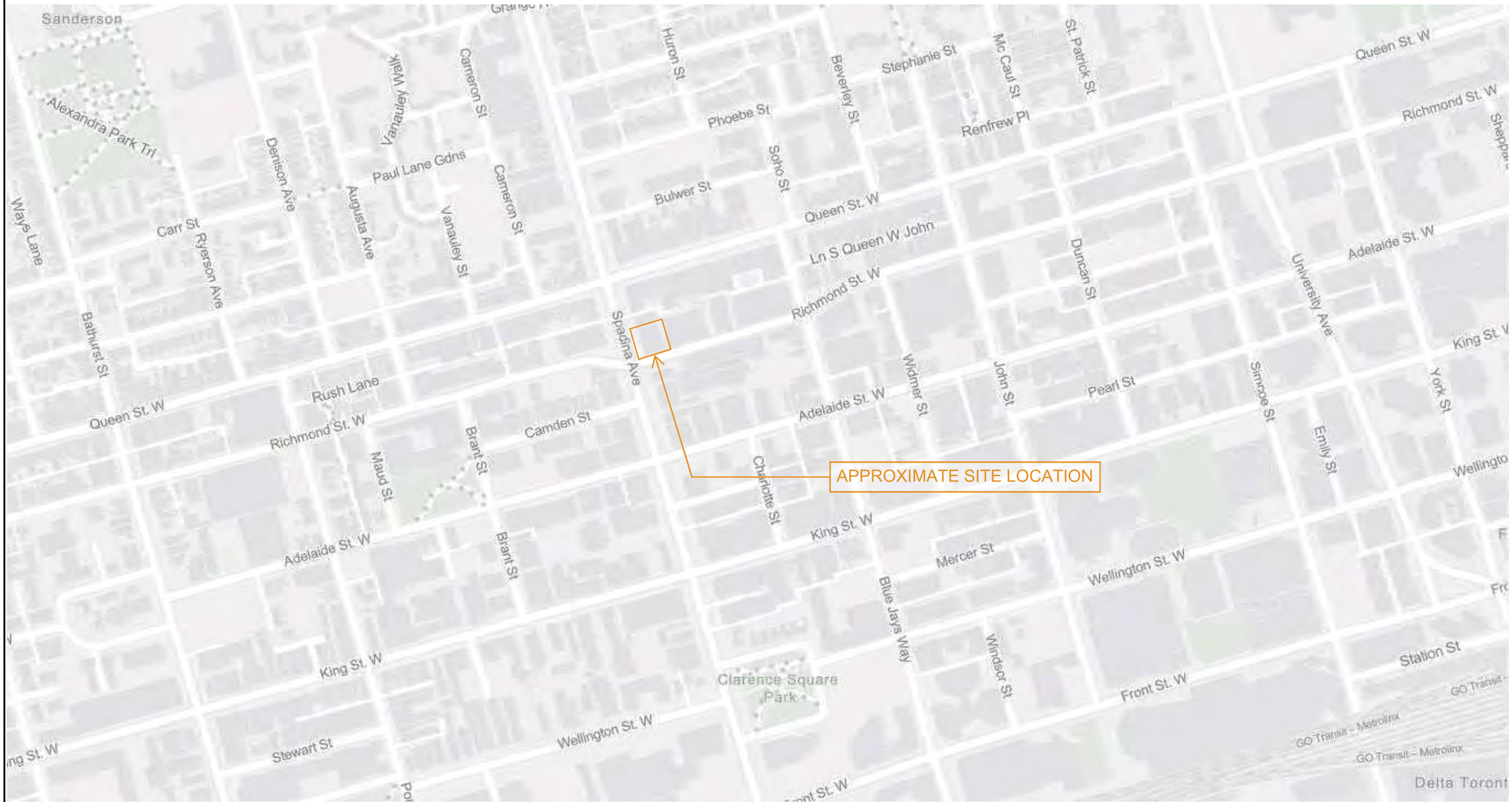
GROUNDED ENGINEERING

Katrina Morgenroth, EIT

Suvish Melanta, P.Eng., QP_{ESA}
Associate

Matthew Bielaski, P.Eng., QP_{RA-ESA}
Principal

FIGURES



GROUNDED ENGINEERING

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www.groundedeng.ca

LEGEND

APPROXIMATE SITE LOCATION

Note

Reference

Survey Drawing job no. 16-223.
Certificate date: Nov 3, 2016. Prepared by KRCMAR.

Project

147 SPADINA AVENUE, TORONTO, ONTARIO

Figure Title

SITE LOCATION PLAN

North

Date

AUGUST 2021

Scale

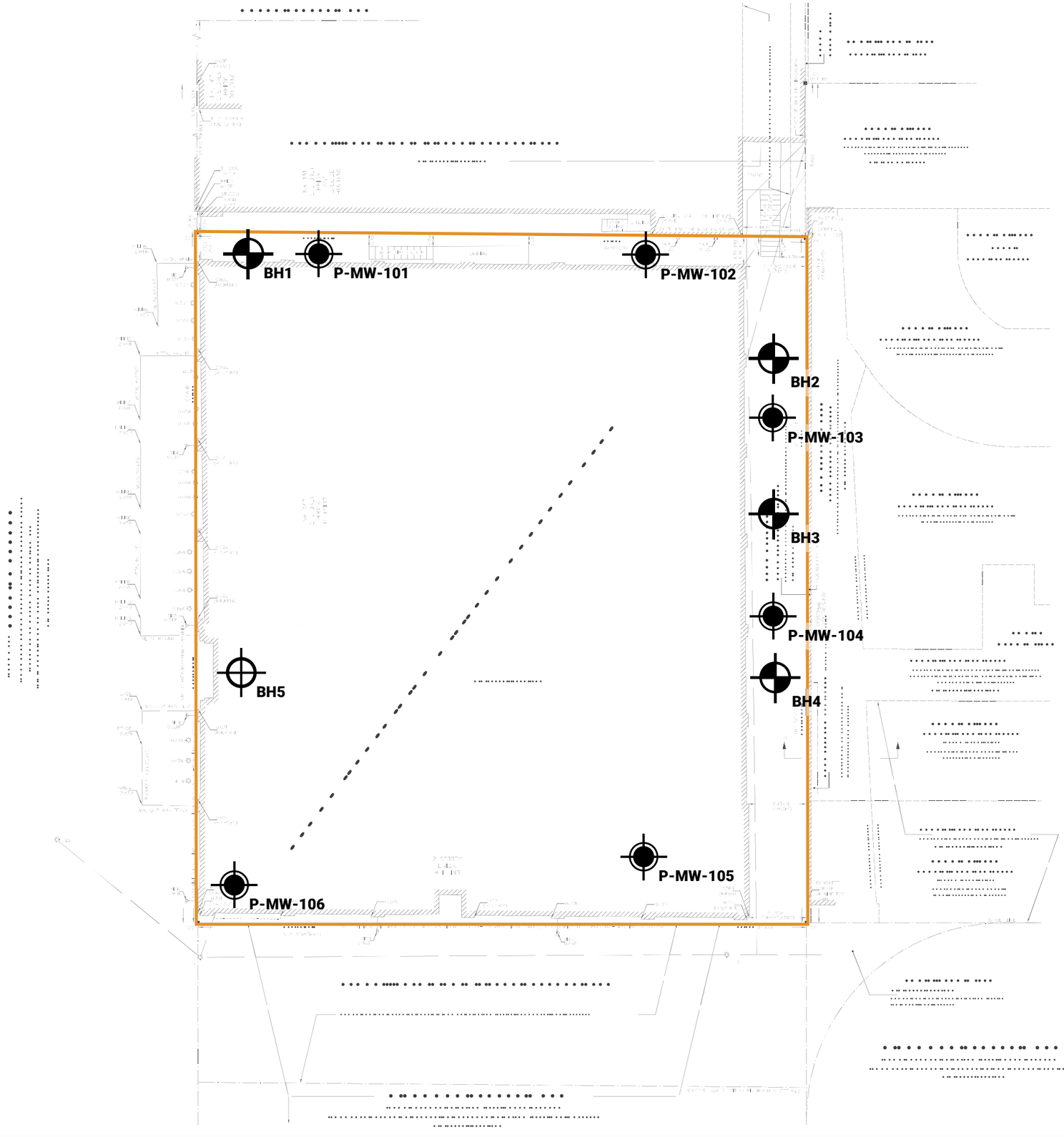
0m 50m 100m

Job No

21-019

Figure No

FIGURE 1



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GROUNDED BOREHOLE / MONITORING WELL LOCATION
- BOREHOLE LOCATION WITH MONITORING WELL BY OTHERS

Note

Reference

Survey Drawing job no. 16-223. Certificate date: Nov 3, 2016. Prepared by KRCMAR.

Project

147 SPADINA AVENUE, TORONTO, ONTARIO

Figure Title

BOREHOLE AND MONITORING WELL LOCATION PLAN (Existing)

North

Date

JULY 2021

Scale

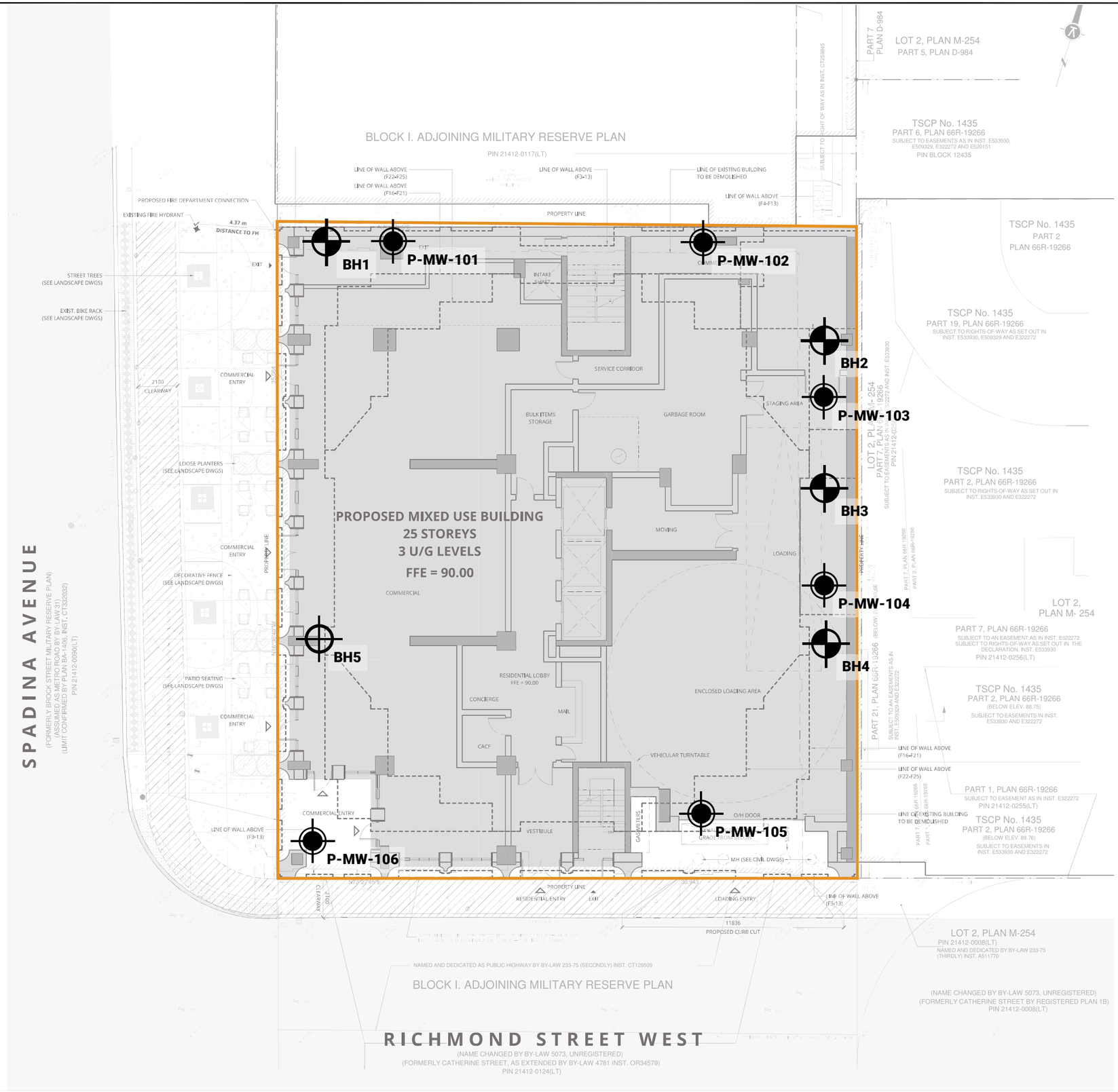
AS INDICATED

Job No

21-019

Figure No

FIGURE 2



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LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GROUNDED BOREHOLE / MONITORING WELL LOCATION
- BOREHOLE LOCATION WITH MONITORING WELL BY OTHERS

Note

Reference

Architectural Plans, "147 Spadina Avenue, Toronto, Ontario"; File no 20-006, dated August 10, 2021, prepared by Audax Architecture Inc.

Project

147 SPADINA AVENUE, TORONTO, ONTARIO

Figure Title

BOREHOLE AND MONITORING WELL LOCATION PLAN (Proposed)

North

Date

AUGUST 2021

Scale

AS INDICATED

Job No

21-019

Figure No

FIGURE 3

Ground Surface (Existing) - Elev 90.3 m

GWT - Elev 86.5 m

Lowest P3 FFE - Elev 79.0 m

Elevation (m)

92 90 88 86 84 82 80 78 76 74 72

P-MW101 | BH 1 | P-MW102 | P-MW103 | BH 2 | BH 3 | P-MW104 | BH 4 | P-MW106 | P-MW105

BH 1 'N': 4, 8, 19, 15, 12, 33, 43, 35, 40, 35, 86

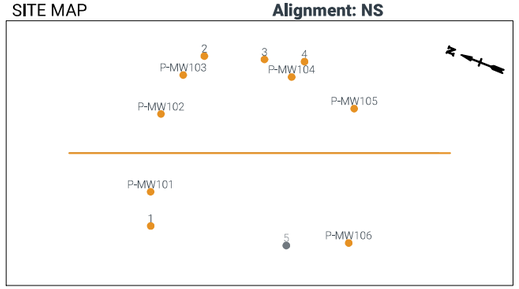
BH 2 'N': 6, 5, 20, 20, 11, 47, 19, 20, 45, 35, 67, 50 / 75mm, 81%, 82%; 0-2-61-37, PL=15%, LL=29%

BH 3 'N': 8, 3, 10, 14, 13, 21, 41, 30, 41, 43, 30, 50 / 25mm, 50 / 50mm, 50 / 75mm; 13-31-34-22, PL=11%, LL=21%

BH 4 'N': 5, 16, 16, 13, 6, 6, 16, 62, 40, 72 / 275mm, 75 / 75mm, 50 / 50mm, 72%, 79%, 89%; 12-31-36-22

SITE MAP

Alignment: NS



Boreholes Equally Spaced

LITHOLOGY GRAPHIC LEGEND

- Asphalt
- Fill
- Clayey Silt Till
- Clayey Silt
- Bedrock (inferred)
- Bedrock (cored)
- Concrete
- Sandy Silt Till (clayey)

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LEGEND

- FILL
- GRAVELS (gravel to gravelly sand)
- SILT TO SAND (not till)
- COHESIONLESS TILLS
- COHESIVE SOILS (clayey silt to clay, incl. tills)
- DISTURBED/REWORKED SOILS

water level, unstabilized

water level, stabilized

Project

147 SPADINA AVE TORONTO, ON

Figure Title

SUBSURFACE CROSS-SECTION

NS

Date

JULY 2021

Scale

AS INDICATED

Job No

21-019

Figure No

FIGURE 3

APPENDIX A

BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

PI: plasticity index

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized water level

▼ 1st water level measurement

▼ 2nd water level measurement most recent

▼ water level measurement

ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

VOC: volatile organic compound

PHC: petroleum hydrocarbon

BTEX: benzene, toluene, ethylbenzene and xylene

PPM: parts per million

FIELD MOISTURE (based on tactile inspection)

DRY: no observable pore water

MOIST: inferred pore water, not observable (i.e. grey, cool, etc.)

WET: visible pore water

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

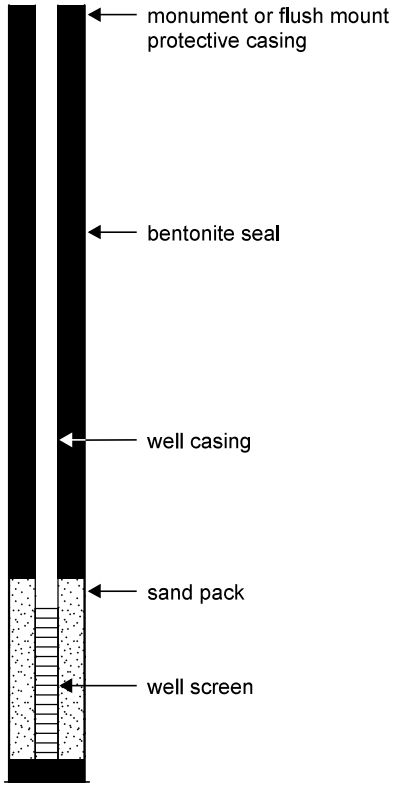
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT)
Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST)
Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

ASTM D4719 Pressuremeter Test (PMT)
Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

WELL LEGEND



ROCK CORE TERMINOLOGY (MTO SHALE)

TCR **Total Core Recovery** the total length of recovery (soil or rock) per run, as a percentage of the drilled length
SCR **Solid Core Recovery** the total length of sound full-diameter rock core pieces per run, as a percentage of the drilled length
RQD **Rock Quality Designation** the sum of all pieces of sound rock core in a run which are 10 cm or greater in length, as a percentage of the drilled length

Natural Fracture Frequency (typically per 0.3 m) The number of natural discontinuities (joints, faults, etc.) which are present per 0.3m. Ignores mechanical or drill-induced breaks, and closed discontinuities (e.g. bedding planes).

LOGGING DISCONTINUITIES

Discontinuity Type

BP bedding parting
CL cleavage
CS crushed seam
FZ fracture zone
MB mechanical break
IS infilled seam
JT Joint
SS shear surface
SZ shear zone
VN vein
VO void

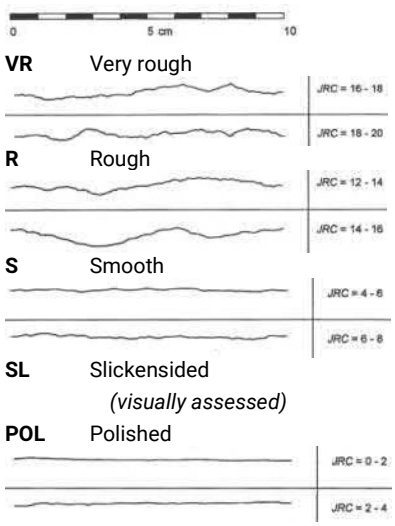
Coating

CN Clean
SN Stained
OX Oxidized
VN Veneer
CT Coating (>1 mm)

Dip Inclination

H	horizontal/flat	0 - 20°
D	dipping	20 - 50°
SV	sub-vertical	50 - 90°
V	vertical	90±°

Roughness (Barton et al.)



VR Very rough
R Rough
S Smooth
SL Slickensided *(visually assessed)*
POL Polished

Spacing in Discontinuity Sets (*ISRM 1981*)

VC	very close	< 60 mm
C	close	60 – 200 mm
M	mod. close	0.2 to 0.6 m
W	wide	0.6 to 2 m
VW	very wide	> 2 m

Aperture Size

T	closed / tight	< 0.5 mm
GA	gapped	0.5 to 10 mm
OP	open	> 10 mm

Planarity

PR	Planar
UN	Undulating
ST	Stepped
IR	Irregular
DIS	Discontinuous
CU	Curved

GENERAL

Degree of Weathering (*after MTO, RR229 Evaluation of Shales for Construction Projects*)

Zone	Degree	Description
Z1	unweathered	shale, regular jointing
Z2	partially weathered	angular blocks of unweathered shale, no matrix, with chemically weathered but intact shale
Z3		soil-like matrix with frequent angular shale fragments < 25mm diameter
Z4a		soil-like matrix with occasional shale fragments < 3mm diameter
Z4b	fully weathered	soil-like matrix only

Strength classification (*after Marinos and Hoek, 2001; ISRM 1981b*)

Grade		UCS (MPa)	Field Estimate (Description)
R6	extremely strong	> 250	can only be chipped by geological hammer
R5	very strong	100 - 250	requires many blows from geological hammer
R4	strong	50 - 100	requires more than one blow from geological hammer
R3	medium strong	25 - 50	can't be scraped, breaks under one blow from geological hammer
R2	weak	5 - 25	can be peeled / scraped with knife with difficulty
R1	very weak	1 - 5	easily scraped / peeled, crumbles under firm blow of geo. hammer
R0	extremely weak	< 1	indented by thumbnail

Bedding Thickness (*Q. J. Eng. Geology, Vol 3, 1970*)

Very thickly bedded	> 2 m
Thickly bedded	0.6 – 2m
Medium bedded	200 – 600mm
Thinly bedded	60 – 200mm
Very thinly bedded	20 – 60mm
Laminated	6 – 20mm
Thinly Laminated	< 6mm

GROUNDED ENGINEERING

Date Started : Apr 5, 2021
Position : E: 629370, N: 4834056 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 1

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

drill method	elev / depth (m)	description	graphic log	number	type	SPT N-value
	90.3	**GROUND SURFACE**				
hollow stem augers OD=215 mm		75mm **ASPHALT**		1	SS	4
		FILL, silt, some clay, trace sand, trace gravel, trace asphalt, trace brick, trace construction debris, loose, dark brown, moist		2	SS	8
	88.8	...at 0.8 m, trace clay, brown and grey				
	1.5	**CLAYEY SILT**, some sand, trace gravel, very stiff to stiff, brown, moist (SUNNYBROOK TILL)		3	SS	19
				4	SS	15
		...at 3.0 m, grey		5	SS	12
		...at 4.6 m, hard		6	SS	33
	84.2					
mud rotary lg OD=135 mm	6.1	**CLAYEY SILT**, trace sand, coarse sand and gravel seams, hard, grey, wet (DON BEDS)		7	SS	43
				8	SS	35
	81.2					
	9.1	**SILT AND CLAY**, trace sand, trace gravel, hard, grey, moist (YORK TILL)		9	SS	40
		...at 10.7 m, wet		10	SS	35
		...at 12.2 m, some shale fragments		11	SS	86
	77.7 12.6					

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12
elevation (m): 90 89 88 87 86 85 84 83 82 81 80 79 78

undrained shear strength (kPa): ○ unconfined + field vane ● pocket penetrometer ■ Lab Vane — 40 80 120 160
SPT N-values (bpf): × dynamic cone — 10 20 30 40
headspace vapour (ppm): × hexane □ isobutylene — 100 200 300
moisture / plasticity: PL MC LL — 10 20 30

unstabilized water level

lab data and comments
grain size distribution (%) (MIT) GR SA SI CL

4.3m: auger grinding

12.2m: auger grinding
12.6m: switch over to core attempted but casing was pushed by possible boulder around 5 m depth. Hole terminated.

END OF BOREHOLE
Refusal (obstruction in the hole)

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Apr 16, 2021	10.6	79.7
May 31, 2021	9.2	81.1
Jun 11, 2021	9.0	81.3
Jun 25, 2021	8.6	81.7
Jul 8, 2021	8.7	81.6
Jul 21, 2021	8.5	81.8

file: 21-019_gint.gpj

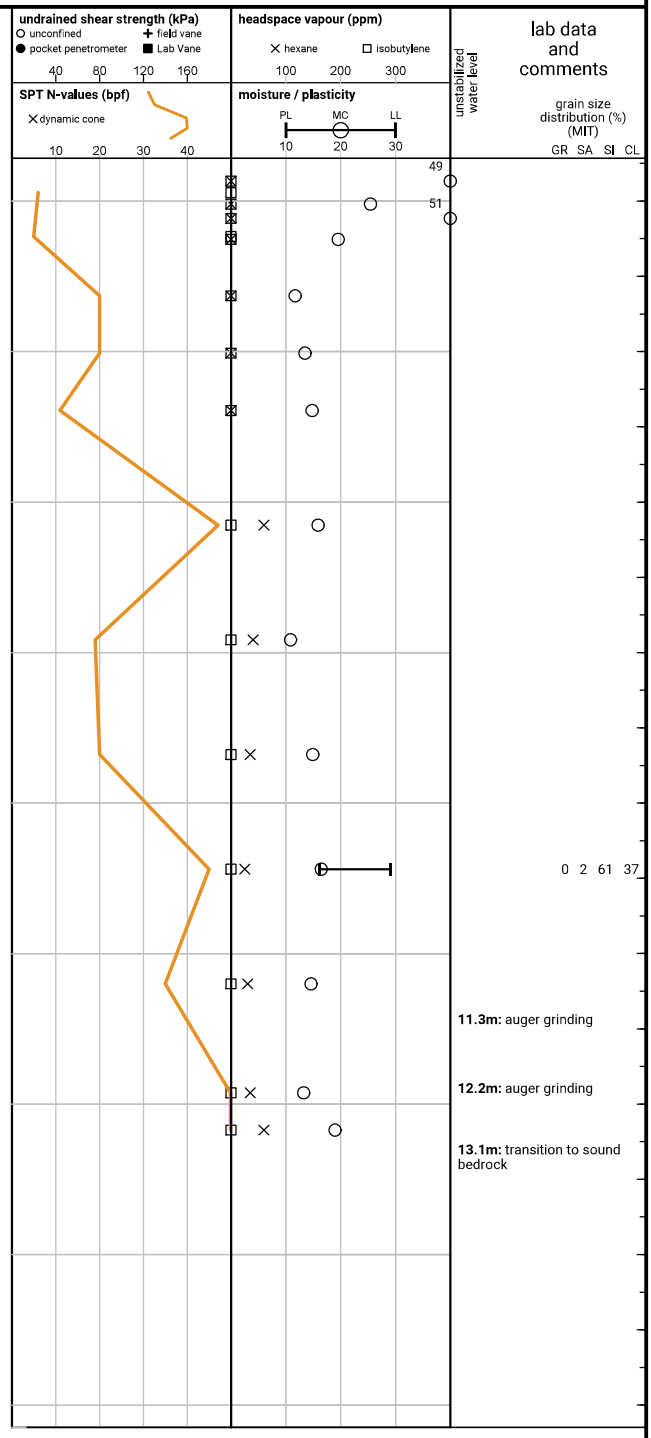
Tech : NP | **PM** : KM | **Rev** : MD

BOREHOLE LOG 2

Date Started : Feb 19, 2021
Position : E: 629398, N: 4834058 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

drill method	elev / depth (m)	description	graphic log	sample number	sample type	SPT N-value
hollow stem augers OD=215 mm STR-174	90.6	**GROUND SURFACE**				
		100mm **ASPHALT**		1A	SS	6
	89.8 / 0.8	**FILL**, sandy silt, some construction debris, trace clay, trace asphalt, loose, black, wet		1B		
		CLAYEY SILT, sandy, trace gravel, iron staining, firm, brown and grey, moist (SUNNYBROOK TILL)		2A/2B	SS	5
		...at 1.5 m, very stiff		3	SS	20
				4	SS	20
		...at 3.0 m, stiff		5	SS	11
	86.0 / 4.6					
mud rotary lg OD=135 mm		**CLAYEY SILT**, trace sand, coarse sand and gravel seams, hard, grey, moist to wet (DON BEDS)		6	SS	47
		...at 6.1 m, very stiff		7	SS	19
				8	SS	20
	81.5 / 9.1					
		SILT AND CLAY, trace sand, trace gravel, trace rock fragments, hard, grey, moist (YORK TILL)		9	SS	45
		...at 10.7 m, some shale and limestone fragments		10	SS	35
	78.4 / 12.2					
		INFERRED BEDROCK, shale and limestone fragments, grey, wet		11	SS	67
	77.6 / 13.0			12	SS	50 / 75mm
Rock coring (HQ) OD=96 mm		**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
				2	RUN	
				3	RUN	
	73.7 / 16.9					



END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Feb 24, 2021	7.0	83.6
Mar 4, 2021	6.8	83.8
Mar 19, 2021	7.0	83.6
Apr 1, 2021	7.0	83.6
Apr 12, 2021	6.8	83.8
Apr 16, 2021	6.8	83.8
May 31, 2021	6.9	83.7
Jun 11, 2021	6.9	83.7
Jun 25, 2021	6.9	83.7
Jul 8, 2021	6.9	83.7
Jul 21, 2021	6.8	83.8

file: 21-019_gint.gpj

Tech : DK/NP | **PM** : KM | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Feb 19, 2021
Position : E: 629398, N: 4834058 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 2

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

depth (m)	graphic log	stratigraphy	Run elev. depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
		Rock coring started at 13.0m below grade	**77.6**								
		GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, closed to gapped, clean; interbedded with **limestone**, light grey, very thinly bedded, medium strong	13.0 R1 76.9	TCR = **100**% SCR = **96**% RQD = **89**%	77	Z1 Z2 Z3 Z4	R1 R2 R3 R4 R5 R6	4 2 1			77
14		*Overall shale: 81%, limestone: 19%* **... at 13.1 m (Elev. 77.5 m), transition to sound rock** Run 1 : 15% limestone 85% shale	13.7 R2 75.3	TCR = **93**% SCR = **89**% RQD = **81**%	76			3 2 2 1			76
15		Run 2 : 10% limestone 90% shale						2 0			
			15.3 R3	TCR = **98**% SCR = **90**% RQD = **82**%	75			2 2 2			75
16		Run 3 : 29% limestone 71% shale	73.7		74			1		**15.8 / 74.7m:** RZ 50 mm	74
			16.9m								
		END OF COREHOLE									

file: 21-019_gint.gpj

Tech : DK/NP | **PM** : KM | **Rev** : MD

BOREHOLE LOG 3

Date Started : Feb 16, 2021
Position : E: 629401, N: 4834049 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

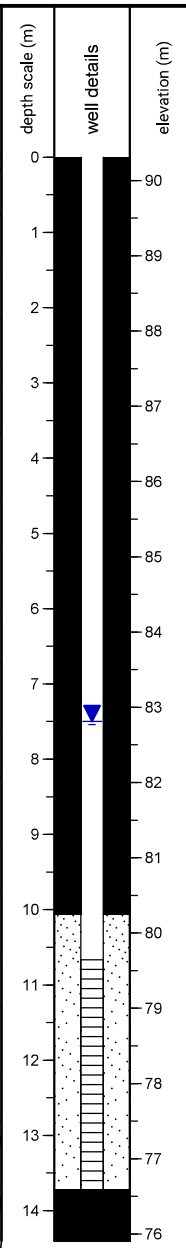
drill method : STR-174

elev / depth (m)	description	graphic log	sample number	sample type	SPT N-value
90.3	**GROUND SURFACE**				
90.0 / 0.3	300mm **ASPHALT**				
89.5 / 0.8	**FILL**, clayey silt, some sand, trace gravel, trace asphalt, trace construction debris, loose, black, moist to wet		1	SS	8
			2A / 2B	SS	3
	CLAYEY SILT, sandy, trace gravel, iron staining, soft, brown, moist (SUNNYBROOK TILL)		3	SS	10
	...at 1.5 m, stiff		4	SS	14
	...at 3.0 m, trace sand, grey, wet		5A / 5B	SS	13
85.7 / 4.6	**CLAYEY SILT**, trace sand, coarse sand and gravel seams, very stiff to hard, grey, moist (DON BEDS)		6	SS	21
			7	SS	41
			8	SS	30
81.2 / 9.1	**SILT AND CLAY**, trace sand, trace gravel, trace rock fragments, hard, grey, moist (YORK TILL)		9	SS	41
	...at 10.7 m, some rock fragments, cobbles inferred		10	SS	43
	...at 12.2 m, shale and limestone fragments		11	SS	30
77.7 / 12.6	**INFERRED BEDROCK**, shale and limestone fragments, grey, wet		12	SS	50 / 25mm
			13	SS	50 / 50mm
75.9 / 14.4	**END OF BOREHOLE**		14	SS	50 / 75mm

hollow stem augers OD=215 mm

mud rotary lg OD=135 mm

depth scale (m) | well details | elevation (m)

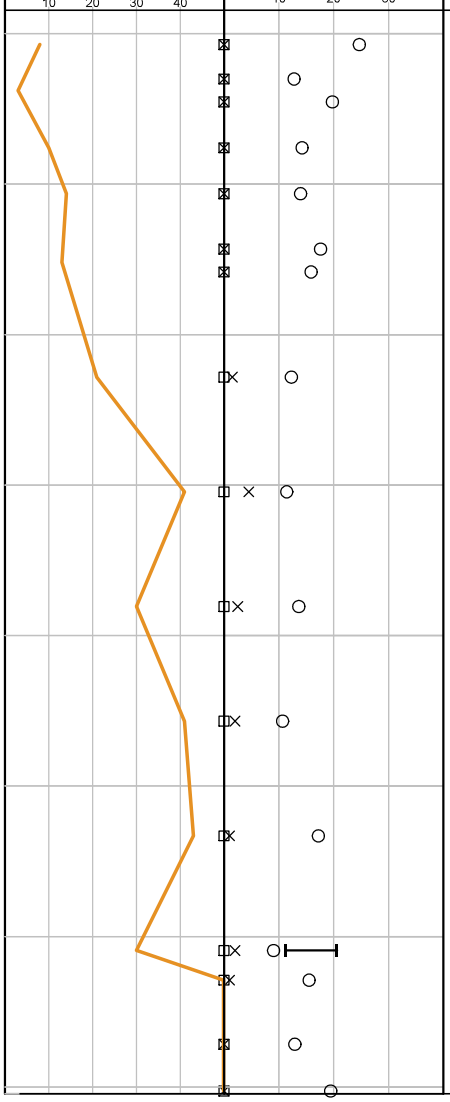


undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30



unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

10.7m: auger grinding

12.2m: auger grinding
13 31 34 22

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Feb 24, 2021	8.0	82.3
Mar 4, 2021	7.6	82.7
Mar 19, 2021	7.5	82.8
Apr 1, 2021	7.6	82.7
Apr 12, 2021	7.6	82.7
Apr 16, 2021	7.5	82.8
May 31, 2021	7.6	82.7
Jun 11, 2021	7.6	82.7
Jun 25, 2021	7.6	82.7
Jul 8, 2021	7.6	82.7
Jul 21, 2021	7.5	82.8

file: 21-019_gint.gpj

Tech : DK/NP | **PM** : KM | **Rev** : MD

BOREHOLE LOG 4

Date Started : Feb 17, 2021
Position : E: 629403, N: 4834043 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

drill method : STR-174

elev / depth (m)	description	graphic log	number	type	SPT N-value
90.2	**GROUND SURFACE**				
	175mm **ASPHALT**		1A/1B	SS	5
89.4 / 0.8	**FILL**, clayey silt, some sand, trace asphalt, trace construction debris, loose, black and brown, moist		2	SS	16
	CLAYEY SILT, sandy, trace gravel, very stiff, brown, moist (SUNNYBROOK TILL)		3	SS	16
	...at 2.3 m, stiff		4	SS	13
	...at 3.0 m, firm, grey, wet		5	SS	6
			6	SS	6
	...at 6.1 m, moist and very stiff		7	SS	16
82.6 / 7.6	**CLAYEY SILT**, trace sand, coarse sand and gravel seams, hard, grey, moist (DON BEDS)		8A/8B	SS	62
81.1 / 9.1	**SILT AND CLAY**, trace sand, trace gravel, trace rock fragments, hard, grey, moist (YORK TILL)		9	SS	40
	...at 10.7 m, wet		10	SS	72 / 275mm
78.0 / 12.2	**INFERRED BEDROCK**, shale and limestone fragments, grey, wet		11	SS	75 / 275mm
77.2			12	SS	50 / 50mm
13.0	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
74.0 / 16.2					

hollow stem augers OD=215 mm

mud rotary lg OD=135 mm

Rock coring (HQ) OD=96 mm

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

well details

elevation (m): 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160

SPT N-values (bpf): dynamic cone; 10 20 30 40

headspace vapour (ppm): hexane, isobutylene; 100 200 300

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

7.9m: auger grinding

9.1m: auger grinding

12.2m: auger grinding

12 31 35 22

13.1m: transition to sound bedrock

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

Date	Water Depth (m)	Elevation (m)
Feb 24, 2021	15.0	75.2
Mar 4, 2021	15.1	75.1
Mar 19, 2021	15.2	75.0
Apr 16, 2021	15.0	75.2
May 31, 2021	15.0	75.2
Jun 11, 2021	15.1	75.1
Jun 25, 2021	15.1	75.1
Jul 8, 2021	15.1	75.1
Jul 21, 2021	15.1	75.1

file: 21-019_gint.gpj

Tech : DK/NP | **PM** : KM | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Feb 17, 2021
Position : E: 629403, N: 4834043 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 4

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

depth (m)	graphic log	stratigraphy	Run elev. depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
		Rock coring started at 13.0m below grade	**77.2**								
		GEORGIAN BAY FORMATION **Shale**, grey, thickly bedded, weak; joints are horizontal, closed to gapped, clean;	13.0 R1 76.5	TCR = **129**% SCR = **100**% RQD = **72**%	77	Z1 Z2 Z3 Z4	R1 R2 R3 R4 R5 R6	1 + RZ 1 1			77
		interbedded with **limestone**, light grey, very thinly bedded, medium strong						1 1			
14		*Overall shale: 80%, limestone: 20%* **... at 13.1 m (Elev. 77.1 m), transition to sound rock**	13.7		76			1 1			76
		Run 1 : 3% limestone 97% shale	R2	TCR = **95**% SCR = **95**% RQD = **79**%				3			
15		Run 2 : 16% limestone 84% shale	74.9		75			1 5			75
			15.3 R3	TCR = **97**% SCR = **97**% RQD = **89**%				2			
16		Run 3 : 41% limestone 59% shale	74.0		74			1			74
		END OF COREHOLE	**16.2m**								

file: 21-019_gint.gpj

Tech : DK/NP | **PM** : KM | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Apr 9, 2021
Position : E: 629375, N: 4834035 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 5

File No. : 21-019 **Project** : 147 Spadina Ave, Toronto, ON **Client** : HM RB (147 Spadina) LP

drill method : *D30*

elev depth (m)	description	graphic log	samples: number	samples: type	samples: SPT N-value
90.0	**GROUND SURFACE**				
89.6	100mm **BRICK**				
0.4	Void space				

depth scale (m): 0

well details

elevation (m): 90

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

END OF BOREHOLE

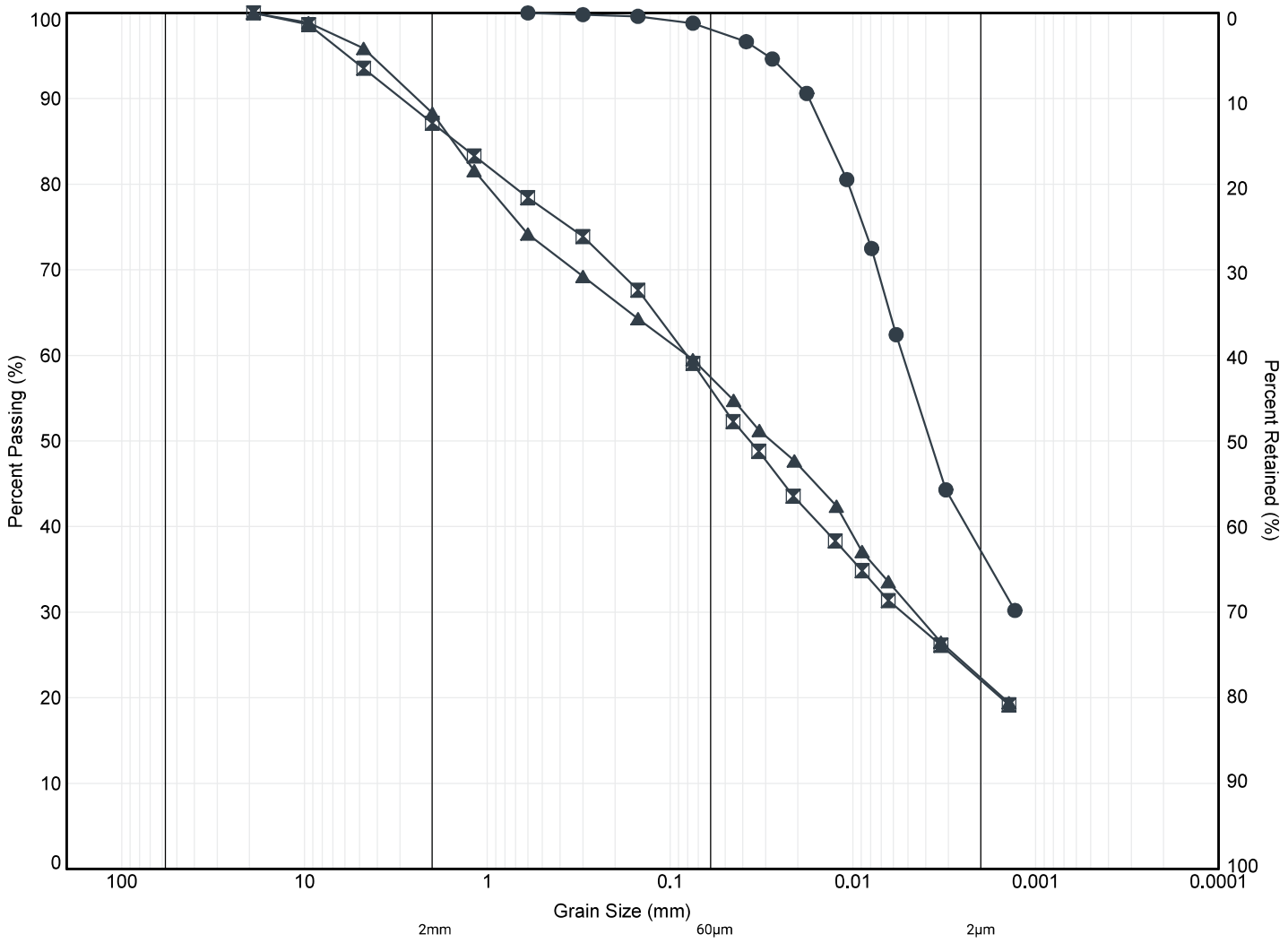
0.1m: Void space encountered under floor slab. Borehole terminated due to unsupported floor slab, leading to unsafe drilling conditions.

Dry and open upon completion of drilling.

file: 21-019_gint.gpj

Tech : NP | **PM** : KM | **Rev** : MD

APPENDIX B



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

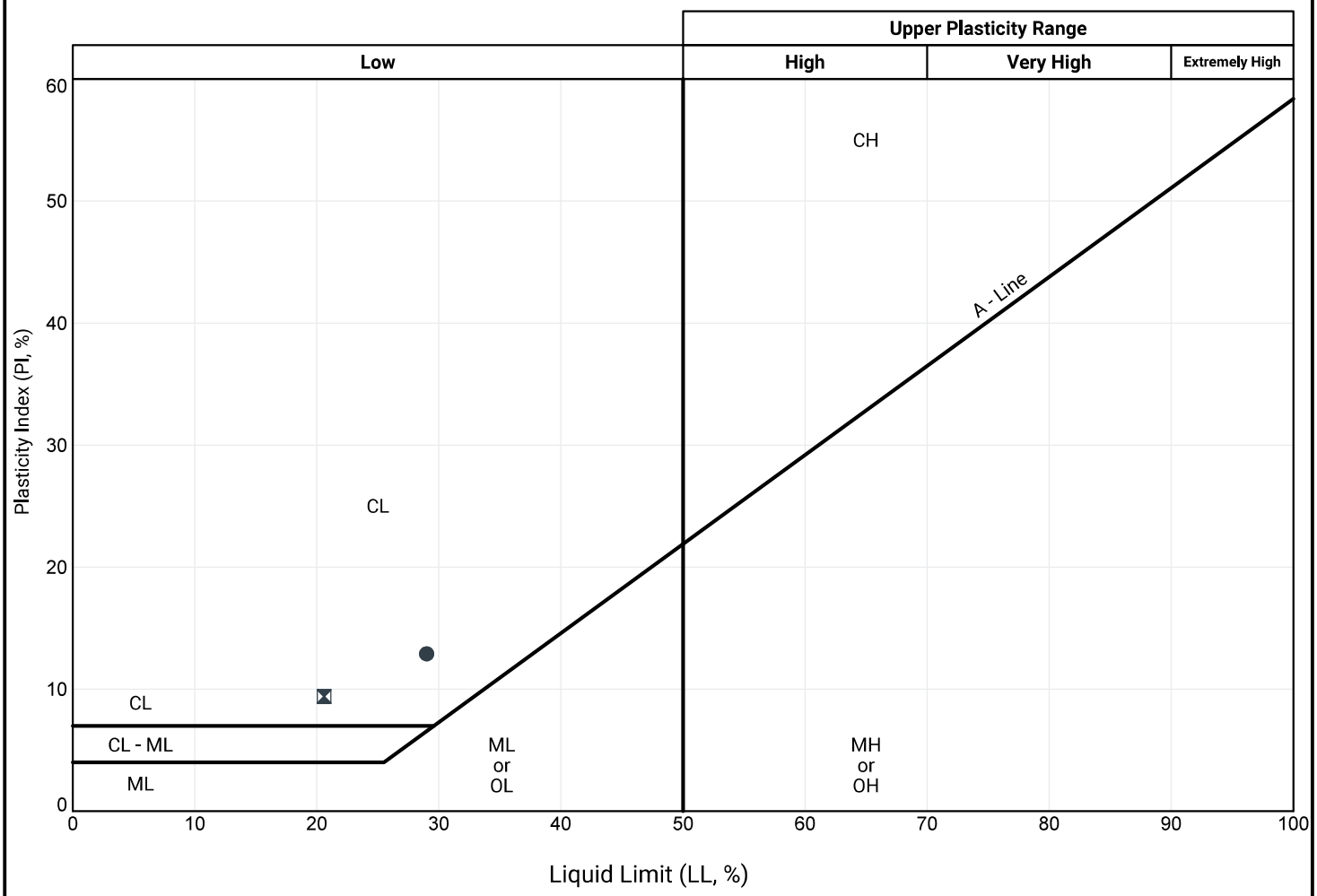
MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**2**	SS9	9.4	81.1	0	2	61	37
⊠	**3**	SS11	12.5	77.8	13	31	34	22
▲	**4**	SS12	12.9	77.2	12	31	35	22

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**

File No.: **21-019**



	Borehole	Sample	Depth (m)	Elev. (m)	LL (%)	PL (%)	PI (%)
●	**2**	SS9	9.4	81.1	29	16	13
⊠	**3**	SS11	12.5	77.8	21	11	10

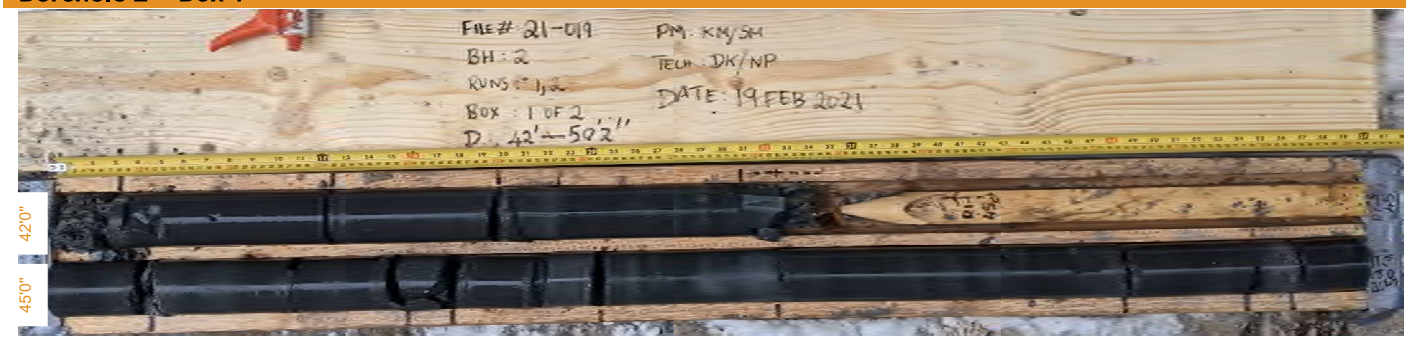
GROUNDED ENGINEERING

Title: **ATTERBERG LIMITS CHART**

File No.: **21-019**

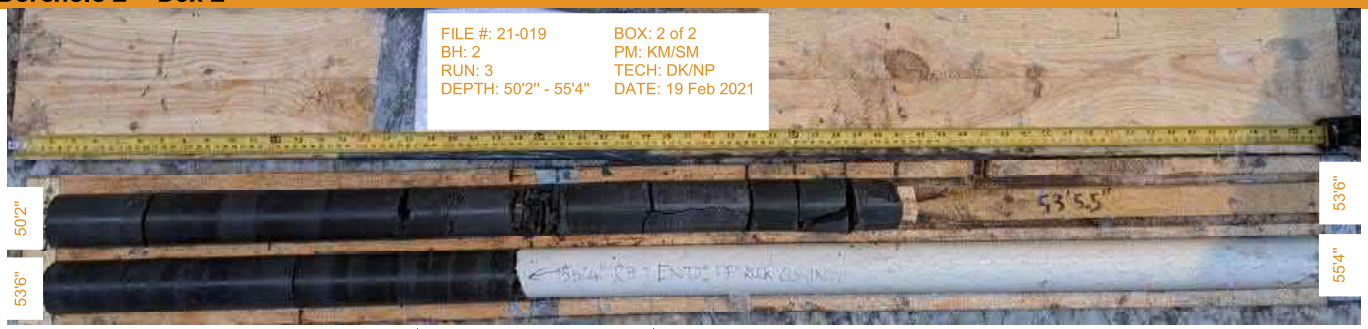
APPENDIX C

Borehole 2 – Box 1



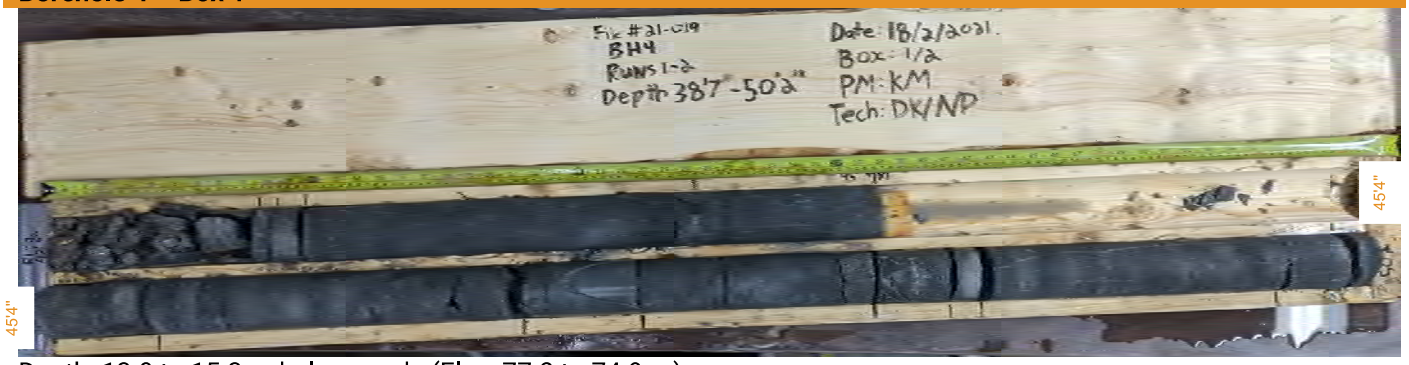
Depth: 13.0 to 15.3 m below grade (Elev. 77.6 to 75.3 m)

Borehole 2 – Box 2



Depth: 15.3 to 16.9 m below grade (Elev. 75.3 to 73.7 m)

Borehole 4 – Box 1

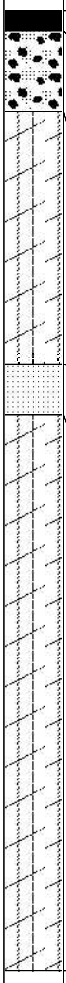


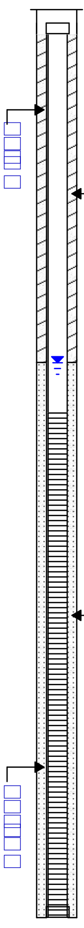
Depth: 13.0 to 15.3 m below grade (Elev. 77.2 to 74.9 m)

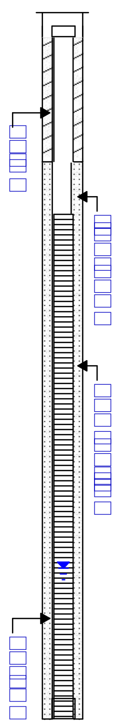
Borehole 4 – Box 2

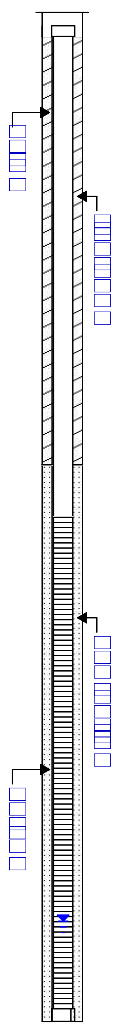
Depth: 15.3 to 16.2 m below grade (Elev. 74.9 to 74.0 m)

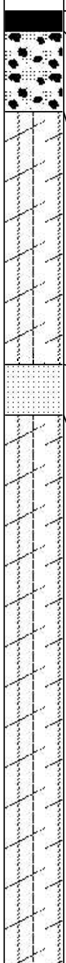
APPENDIX D

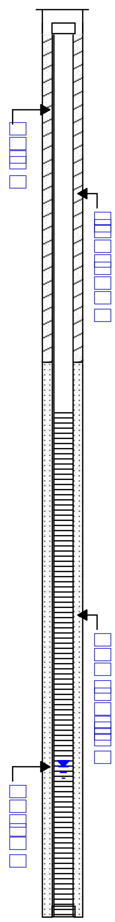


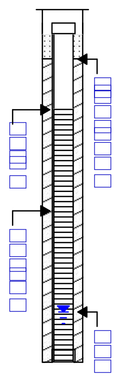












PINCHIN