FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

BATHURST AND RICHMOND STREET
152-164 BATHURST STREET AND 623-627 RICHMOND STREET
TORONTO, ON M2K 0C8

PREPARED FOR:
TORONTO (BATHURST & RICHMOND) LP
2 ST. CLAIR EAST
TORONTO, ON M5V 2R3

DATE: APRIL 2022

PROJECT NO. 211176

PREPARED BY HUSSON
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
GENERAL@HUSSON.CA

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF DRAWINGS

1.0 INTRODUCTION

The purpose of this report is to provide site servicing and stormwater management (SWM) design information in support of the Zoning Bylaw Amendment (ZBA) and Site Plan Approval (SPA) applications for the proposed residential development at Bathurst and Richmond Street in the City of Toronto.

Specifically, this report will demonstrate how the site will be serviced and the SWM measures that will be undertaken to deal with the quantity, quality and water balance requirements for the site.

1.1 Site Description

The site is located on the southwest corner of Bathurst Street and Richmond Street. The existing land use is commercial and residential. The existing buildings on the side will be demolished as part of the development, with the exception of the historical building in the northeast corner of the site. The exterior of this building will be retained and the interior will be renovated. The site area is 1,968m^2.

The site is bordered by residential developments to the west (along Richmond Street) and commercial/residential development to the south on Bathurst Street.

It is proposed to construct a 17-storey residential development with retail space on the first floor and two levels of underground parking. Approximately 512m^2 of commercial retail space is proposed on the ground floor with frontage on Bathurst Street and Richmond Street. The site location is shown on **Figure 1**.

1.2 Background

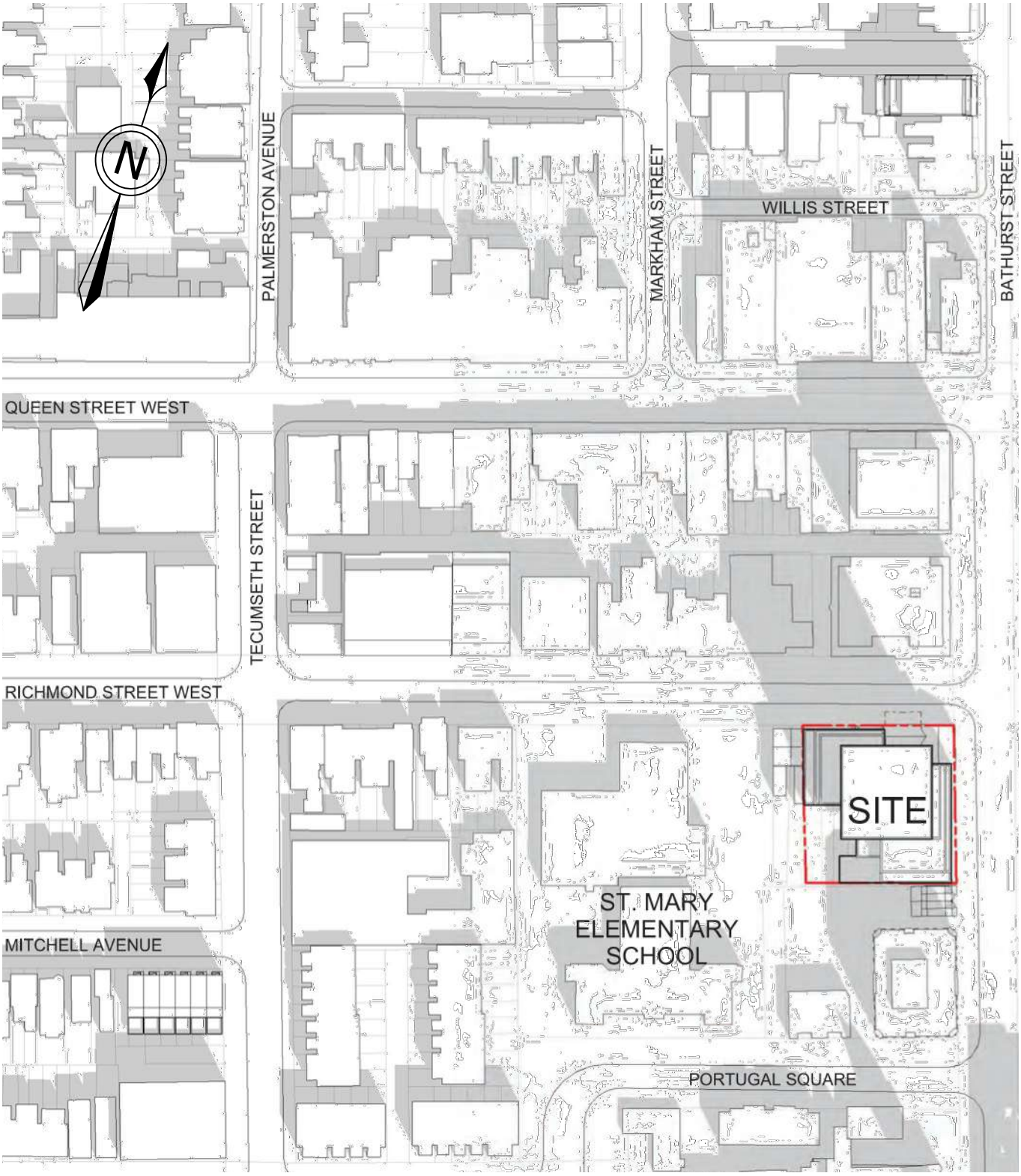
The SWM design for the site has been prepared to meet the requirements of the City of Toronto. The following materials were referenced in the preparation of this report:

- The City of Toronto's Wet Weather Flow Management Guidelines (WWFM Guidelines).
- The site servicing design has been designed following the City of Toronto, Design Criteria for Sewers and Watermain, January 2021.
- The Stormwater Management Planning and Design Manual (MECP Guidelines), prepared by the Ministry of the Environment, Conservation and Parks, March 2003, were referenced in the preparation of the stormwater management plan.
- Plan and profile drawings showing the existing services on Richmond and Bathurst Streets and DMOG mapping of the surrounding area provided by the City.
- The Preliminary Hydrogeological Impact Assessment, 152-164 Bathurst and 623-627 Richmond Street West, Toronto, Ontario, completed by PGL Environmental Consultants, dated April 2021.

2.0 STORM DRAINAGE

2.1 Existing Drainage

There is an existing 600mm by 900mm combined sewer on Richmond Street West flowing to a 750mm x 1125mm combined sewer on Bathurst Street, which flows to the south across the frontage of the site. There are no dedicated storm sewers in the vicinity of the site.



HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

FIGURE 1
BATHURST AND RICHMOND
SITE LOCATION PLAN

DATE: APRIL 2022 SCALE: N.T.S. PROJECT: 211176

The existing site consists of building, paved and gravel parking areas and an outdoor patio. The rainwater leaders for the buildings discharge at grade both to the Richmond Street frontage and rear parking areas. Drainage is generally from north to south. The rear parking area drains south, through the neighboring properties toward Portugal Square and the toward Bathurst Street.

The site is generally higher than the neighboring properties to the west and south. It received no external drainage.

The existing site is primarily parking lot and rooftop with an overall runoff coefficient of 0.87. As this runoff coefficient exceeds 0.50, a runoff coefficient of 0.50 used to determine the allowable peak flow, based on Section 2.2.3.8 of the WWFM Guidelines. Refer to **Figure 2** for details of the existing site conditions.

2.2 Site Grading

All grading will be completed in a manner to satisfy the following goals:

- Enable gravity servicing connections (where possible) to the existing sewers located on Richmond Street West.
- Meet the stormwater management objectives for the site.

Grading of the boulevards around the building will be maintained at existing elevations, to the extent possible.

The site will be graded to suit the City's design criteria and accommodate any constraints that may be imposed by the storm drainage and servicing objectives. Details can be referenced on **Drawing SW1.**

2.3 Minor System Drainage

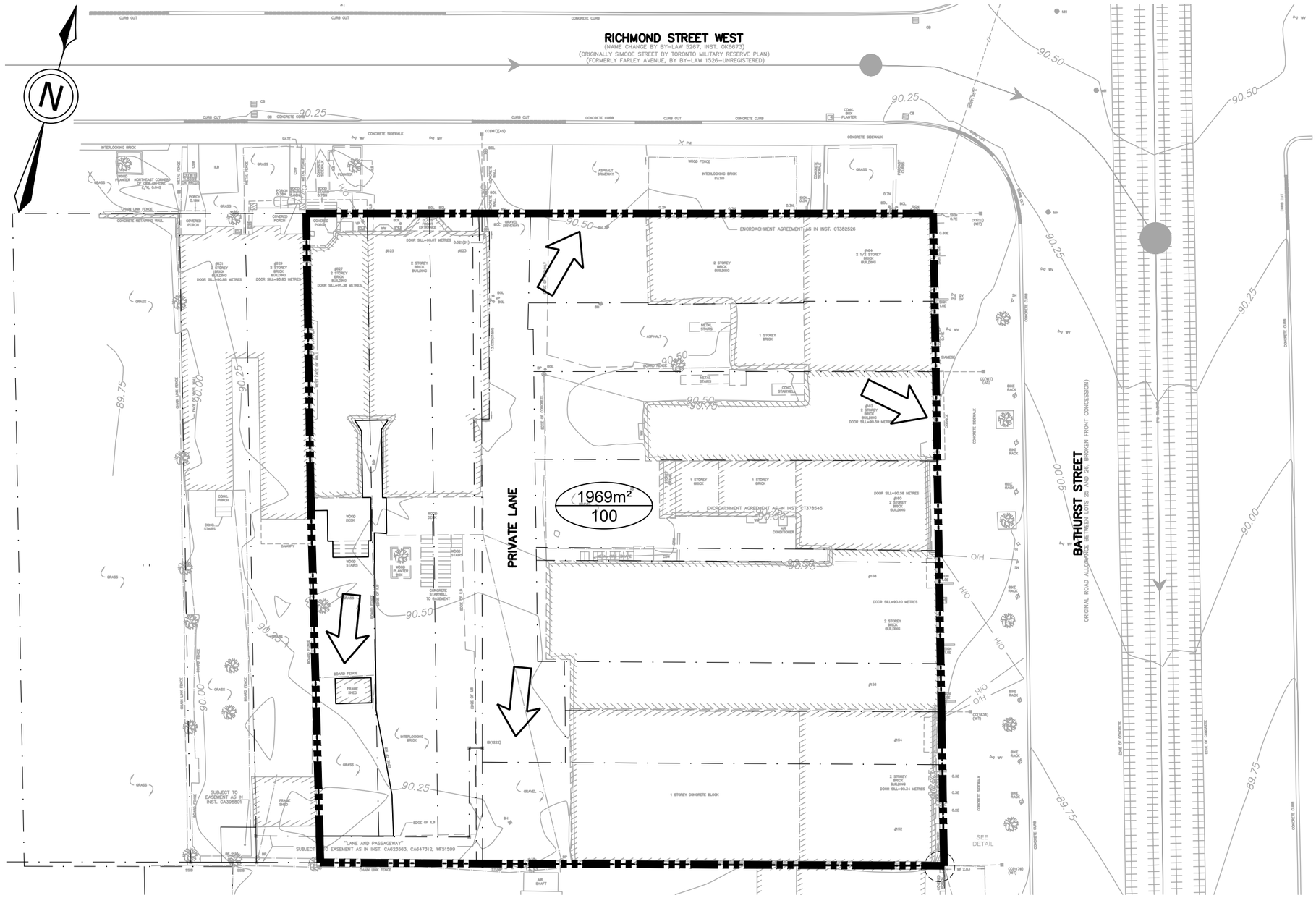
The development's internal storm system will be designed to collect drainage from the majority of the site for the 100-year design storm. In addition, roof drainage will be collected by roof drains and routed towards a cistern located underground in the northern portion of the site.

The controlled stormwater flows will discharge by gravity through a flow control device to the storm sewer located on Richmond Street West. Refer to **Section 3.0** for details on the on-site controls.

2.4 Major System Drainage

Since the majority of the site will be covered by the building with the exception of the southwest driveway, the internal storm system will be designed for the 100-year event. All site drainage will be directed to the cistern on the P1 level, which will have an emergency overflow through the access chamber which will flow toward Richmond Street. In the event of total system blockage, the rear parking lot area will flow overland towards the south and west.

A portion of the site frontage along Bathurst and Richmond Streets will drain uncontrolled to the right-of-way due to grading constraints. Drainage from the remainder of the site will be over-controlled to account for this uncontrolled runoff.



CATCHMENT 100			
	AREA (ha)	C	C x A
PERVIOUS	98	0.25	24.48
IMPERVIOUS	1871	0.90	1683.54
TOTAL	1969	0.87	1708.02

HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

LEGEND

1969m² / 100 — CATCHMENT AREA / CATCHMENT ID

CATCHMENT BOUNDARY

OVERLAND FLOW DIRECTION

FIGURE 2
BATHURST AND RICHMOND EXISTING DRAINAGE PLAN

DATE: APRIL 2022 SCALE: 1:300 PROJECT: 211176

2.5 Groundwater

A hydrogeological impact assessment was completed by PGL Environmental Consultants, in April 2021. Groundwater depths were monitored and the high groundwater level varied between elevation of 80.88m and 87.72m above sea level. The high-water level did not stabilize during the testing, therefore, a seasonally high-water tale elevation of 88.72 was assumed for de-watering volume calculations. It was assumed that a conservative estimate for the underside of footings would be at an elevation of 80.61m, therefore the building would need to be constructed water tight, or a foundation drainage system would need to be connected to the municipal sewer.

Short Term Discharge

It was estimated that the short-term construction average water taking volume under steady state conditions would be approximately 241L/day (0.002L/s) and when accounting for initial draining of pores, precipitation, runoff and uncertainty, the maximum anticipated daily flow is approximately 966L/day (0.01L/s). For the downstream capacity analysis, included in Section 3.3, the discharge from the site, including post development sanitary flow and groundwater is 4.66/s (4.41L/s residential plus 0.25L/s groundwater), therefore, the peak discharge to the sanitary sewer, during construction, should be limited to this rate.

The interim outlet for the groundwater will be the existing sanitary service to the site which connects to the 600mm by 900mm combined sewer on Richmond Street West.

Long Term Discharge

It was estimated that the long-term post construction water taking volume would be approximately 300L/day. The report also concludes that no permit to take water will be required due to peak flow daily discharges, and a permit from Toronto Water needs to be obtained for the private water to discharge into the City's storm or sanitary sewer system. The foundation drainage will be collected and pumped to the sanitary control maintenance hole which will be connected to the sanitary sewer on Richmond Street West.

The Hydrogeological Impact Assessment included a Water Quality Control Report to determine the suitability of groundwater for discharge into the municipal storm and/or sanitary sewer system. The groundwater quality was compared to Table 1 – Limits for Sanitary and Combined Sewers Discharge and the Table 2 – Limits for Storm Sewer Discharge in the sewer use by-law. It was determined that pre-treatment of the groundwater for total suspended solids and manganese would be required prior to discharge to the storm sewer; however, the water quality met the requirements for discharge to a sanitary or combined sewer. At this point, it is assumed that discharge will be to the combined sewer on Richmond Street West. An application for a Discharge Permit for Private Water will be made under a separate cover.

The peak long-term groundwater flow rate is 300L/day (0.003L/s). Refer to Section 3.3 for details. The analysis to confirm compliance with MECP Procedure F-5-5 assumed a peak groundwater pump rate of 0.25L/s. A letter from the mechanical engineer, confirming this flow rate is included in **Appendix C**.

The groundwater will discharge to the 600mm by 900mm combined sewer on Richmond Street West via the new sanitary service to be provided to the site. The hydrogeological impact assessment is included in **Appendix C**.

3.0 STORMWATER MANAGEMENT PLAN

3.1 Stormwater Management Criteria

The WWFM Guidelines require a hierarchy approach to wet weather flow management using source controls, conveyance controls and finally end-of-pipe controls to meet the following objectives:

- Water balance – maintenance or reduction of annual runoff volume may be required.
- Water quality – water quality control. Enhanced control is required based on MOE guidelines, where applicable.
- Water quantity - peak flow controls for flood management and erosion protection.

The SWM criteria are referenced in Table 7 of the WWFM Guidelines, based on Section 3 – Residential Development (relatively small isolated development or intensification situations with site areas less than 5ha and storm/combined sewer infrastructure exists). The requirements are as follows:

Water Balance – The minimum on-site runoff retention requires the proponent to retain all runoff from a small design rainfall event, typically 5mm (in Toronto, storms with 24-hour volumes of 5mm or less contribute about 50 percent of annual rainfall volume). The City of Toronto permits a maximum drawdown time of 72 hours for infiltration measures. The on-site retention requirements for this site will be achieved through use of site landscaping, green roof and stormwater re-use for irrigation.

Water Quality – The water quality criteria for this site is 80 percent average annual TSS removal from runoff originating on-site. Filtration will be implemented to achieve the water quality requirements on-site.

Water Quantity – The site will outlet to a municipal combined sewer; therefore, the flood flow requirement is to control the 100-year post development flow to the 2-year pre-development level, as per the WWFM Guidelines.

For small infill/redevelopment sites less than 2 hectares, erosion control in the form of stormwater detention is not required, provided the on-site minimum runoff retention from a 5mm rainfall event is achieved under the Water Balance criteria.

The following measures are proposed to meet the requirements for this site:

- Landscaping and green roof.
- A filter unit to provide quality control for the driveway runoff.
- A cistern for detention and retention storage in conjunction with a flow control device to provide storage, peak flow control and to retain stormwater for re-use.

The proposed stormwater management facilities can be referenced on **Drawing SW2**.

3.2 Water Balance

The WWFM Guidelines require retention of water on site, to the extent possible, to match pre-development runoff volumes. This requirement is typically achieved by retaining the runoff from a 5mm, 24-hour storm on site, which is equivalent to approximately 50 percent of the total average annual rainfall volume (WWFM Guidelines). Alternatively, on-site retention can be reviewed on an annual basis, based on an annual rainfall volume of 840mm. Since irrigation is proposed, which can only be used for a portion of the year, the annual basis approach is taken.

As noted in Section 1, the site area is 1,968m^2. Based on the total annual rainfall in the City of Toronto being 840mm, approximately 827m^3 of rainfall is required to be retained on site. However, this volume can be reduced by applying the initial abstraction (IA) values for the site surfaces. The initial abstraction values based on Toronto Standards are as follows:

- For paved areas and rooftop areas, the initial abstraction is 1.0mm.
- For extensive green roofs, the initial abstraction is 5.0mm.
- For planters an initial abstraction of 7.0mm can be applied.

Based on the initial abstraction values and Figure 1a from the WWFM Guidelines, the annual capture for each surface was estimated. This results in an annual capture of 12%, 50% and 58% corresponding to initial abstraction values of 1.0mm, 5.0mm and 7.0mm, respectively. **Table 1** below summarizes the total annual capture from the proposed site, based on the average annual rainfall of 840mm in Toronto.

Table 1. Proposed Site Annual Capture from Initial Abstraction

Catchment	Area (m^2)	% of Total Area	IA (mm)	Annual Capture (%)	Annual Capture (m^3)
Flat Roof and Terraces	1017	52%	1.0	12%	102.5
Green Roof	623	32%	5.0	50%	261.7
Landscape & Planters	1	0%	7.0	58%	0.5
Pavement/Driveways	328	17%	1.0	12%	33.1
Total	**1969**	**100%**	**2.3**		**397.7**

The initial abstraction from the proposed site surfaces will capture approximately 398m^3 of rainfall on an annual basis. This reduces the total requirement of 827m^3 down to 429m^3. Therefore, the total amount of rainwater required to be retained, or re-used, on an annual basis is 429m^3.

The water balance requirements for this site will be addressed through water re-use from a portion of the cistern system that will not outlet to the municipal sewer system. The retention portion of the cistern will have a volume of 41m^3. This volume will be re-used on site for irrigation as described below.

Preliminary irrigation calculations have been prepared to estimate the monthly irrigation volumes, and can be referenced in **Appendix B**. **Table 2** below details the irrigation demands for the proposed site.

Table 2. Total Water Applied (Irrigation)

Month	Total Water Applied (m^3)
April	27.5
May	49.3
June	60.6
July	67.1
August	53.6
September	34.7
October	30.5
Total	**323.3**

As shown above, with the irrigation demands provided in **Table 2**, a total of 323.3m^3 can be used each year during the warmer months (April-October).

Calculations were completed to determine if sufficient water would be captured by the retention portion of the cistern to satisfy the above water demands. 1,786m^2 of site area will be captured by the retention portion of the cistern. The proposed retention portion of the cistern is approximately 41m^3. This would result in an equivalent initial abstraction over the site of approximately 23.0mm. Using Figure 1a from the WWFM Guidelines, an initial abstraction value of 23.0mm corresponds to approximately 94 percent of annual rainfall capture. Therefore, over the year, the retention portion of the cistern will capture approximately 94 percent of the total rainfall. Using this value in conjunction with the runoff coefficient of the proposed site (0.74) and monthly precipitation values for the City of Toronto, the total rainfall collected can be calculated. **Table 3** below summarizes the volume of rainwater captured and remaining in the retention portion of the cistern at the end of each month.

Table 3. Total Water Collected

Month	Total Precipitation (mm)	Runoff Coefficient	Water Collected (%)	Rainwater Volume Collected (m^3)	Total Consumption (m^3)	Retention Volume at End of Month (m^3)
January	61	0.74	94%	76.1	0	41
February	50			62.3	0	41
March	66			82.3	0	41
April	71			88.5	27.5	41
May	74			92.3	49.3	41
June	73			91.0	60.6	41
July	68			84.8	67.1	41
August	81			101.0	53.6	41
September	84			104.7	34.7	41
October	65			81.0	30.5	41
November	76			94.8	0	41
December	71			88.5	0	41
Total	840				**Yearly Deficit =**	0.0

As shown above, there is an adequate supply of water for the proposed irrigation demands. Therefore, 323m^3 of rainwater will be re-used for irrigation on an annual basis. We note that these are preliminary calculations to get an order of magnitude for the on-site retention and should be verified by an irrigation consultant at the detailed design stage.

On an annual basis, the site will retain or re-use a total volume of 323m^3. The target of 429m^3 on an annual basis is not met due to site constraints. The proposed development consists of a large area of residential terraces where a green roof could not be used. Additionally, misting or internal water re-use are not likely feasible, based on the proposed building layout and type of development. Best efforts have been made to meet the water balance requirements for the site. Additional methods for re-use can be explored at the detailed design stage. Additional storage is available in the cistern, specifically, in the winter months, for additional re-use measures.

Refer to **Appendix B** for additional calculations.

3.3 Quality Control

Based on the City's requirements, the water quality criterion for this site is 80 percent average annual TSS removal from runoff originating onsite. The majority of the site is rooftop which produces clean runoff, additional treatment will be provided by the landscaped areas and on-site retention.

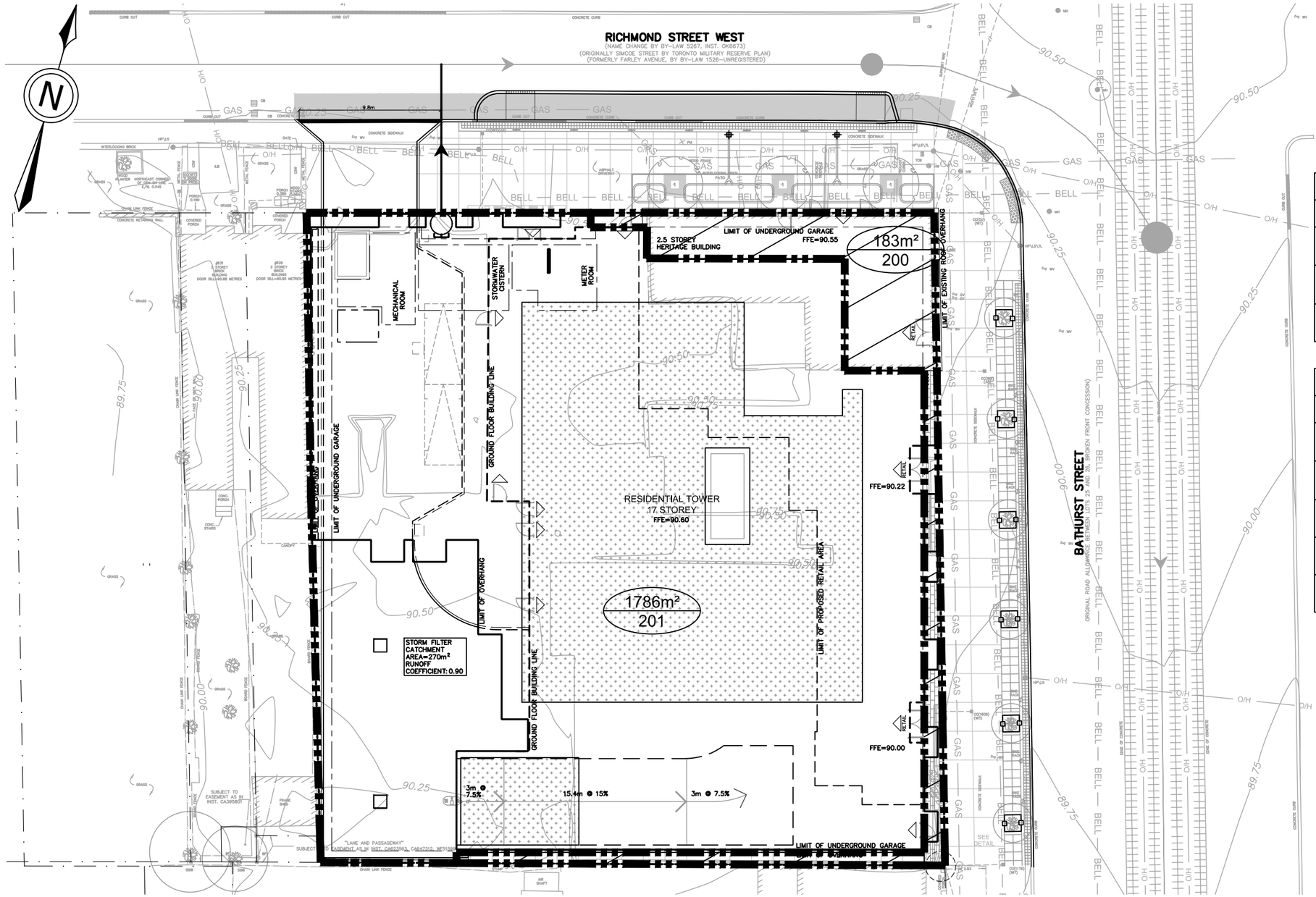
Overall TSS removal capabilities are based on the following assumptions:

- Rooftop runoff is generally clean, runoff from the rooftop will be routed to the cistern. Based on acceptable values provided by Toronto Water, rooftop runoff is credited with 80 percent TSS removal.
- Landscaped areas provide significant infiltration and generally have a lower TSS loading compared to roadways. Based on acceptable values provided by Toronto Water, landscape runoff is credited with 80 percent TSS removal.
- The remaining site area is the driveway, which is credited with 0 percent TSS removal as per Toronto Water standards. Therefore, the driveway runoff is proposed to be treated with a Storm Filter System (SFPD0806). The system uses variable flow controls, media-filled cartridges, and a storage sump to capture and retain a broad spectrum of pollutants, and is certified for 80 percent TSS removal by the State of New Jersey Department of Environmental Protection (NJDEP).

Runoff from the driveway will be captured in area drains and flow by gravity to the Storm Filter, located on the P1 level, and then be routed to the cistern for re-use or controlled discharge. The StormFilter has been designed to treat a catchment area of 0.03ha, with a runoff coefficient of 0.90, as shown on **Figure 3**.

The StormFilter System is an offline system consisting of three chambers; the inlet bay, outlet bay and filtration bay. Only the low flows, not exceeding the filter capacity, will enter the filtration bay. There is a weir between the inlet bay and outlet bay such that, during high flows, the filtration bay will be by-passed. The treatment flow rate will be 1.5L/s, based on the catchment area parameters and the quality control storm event.

Therefore, with the Storm Filter in place, all runoff originating on site will be treated to the minimum requirement of 80 percent TSS removal. System specifications, as well has the New Jersey Department Environmental Protection Certification are included in **Appendix D**.



CATCHMENT 200			
	AREA (m²)	C	C x A
PERVIOUS	0	0.25	0.00
IMPERVIOUS	183	0.90	164.70
TOTAL	183	0.90	164.70

CATCHMENT 201			
	AREA (m²)	C	C x A
PERVIOUS	1	0.25	0.25
IMPERVIOUS	261	0.90	234.90
GREEN ROOF	623	0.45	280.35
BUILDING	901	0.90	810.90
TOTAL	1786	0.74	1326.40

HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5625
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

LEGEND

183m² / 200 — CATCHMENT AREA / CATCHMENT ID

CATCHMENT BOUNDARY

OVERLAND FLOW DIRECTION

FIGURE 3
BATHURST AND RICHMOND STORMWATER MANAGEMENT PLAN

DATE: APRIL 2022 SCALE: 1:300 PROJECT: 211176

3.4 Quantity Control

3.4.1 Target Release Rate

A rational method calculation was used to determine the target flow from the site, based on the 2-year pre-development peak flow. The pre-development peak flow from the site was calculated using the existing imperviousness, which resulted in a corresponding runoff coefficient of 0.87, therefore 0.50 was used for calculations, and the City of Toronto 2-year storm IDF curve. The allowable peak release rate for the site is 24.1L/s.

3.4.2 Quantity Control Measures

Quantity control will be provided in the cistern in conjunction with inlet control device which allow for excess runoff to be stored and released at a controlled rate. The upper rooftop will be a green roof. The remainder of the rooftop area will be comprised of terraces. Therefore, controlled flow rooftop has not been assumed at this time.

Uncontrolled Drainage

There is a portion of walkway area along the north and west sides of the building, as well as the rooftop from the retained historical building which will drain uncontrolled towards the municipal roads. The area is approximately 188m^2 in size with a runoff coefficient of 0.90, which contributes approximately 11.8L/s to the total site discharge in the 100-year storm event (Refer to **Figure 3**).

Cistern Storage

In the 100-year event, the required active storage volume is 51.2m^3. The cistern will be used to provide all of the required storage. The cistern will have a footprint of 29m^2. Active storage will be provided between the outlet pipe invert of 88.23m and the 100-year water level of 90m, resulting in a total storage depth of 1.77m. A total volume of 51.3m^3 is provided to at the top of the cistern (90.0m).

The retention portion of the cistern will be located below the outlet and therefore will never discharge to the offsite to the municipal storm sewer system. A retention storage depth of 1.41m is proposed to the bottom elevation of the cistern of 86.82m, resulting in a total retention volume of 41m^3 for reuse which exceeds the requirement of 16m^3. An irrigation pump will be provided to use the retention volume during the warmer months.

A 65mm orifice plate would be required to control the runoff captured in cistern to a maximum release rate of 12L/s. Since this is less than the minimum recommended size of 75mm diameter, as per the MECP Guidelines, it is proposed to use a Hydro-Brake Optimum vortex control device. The Hydro-Brake is less susceptible to clogging than a vertical orifice plate. The Hydro-Brake has been designed to provide peak a peak flow of 12L/s at 1.77m head.

The 100-year water level is 89.9. All flows captured in the cistern will be discharged through the site storm sewer connection to the Richmond Street West combined sewer. Calculations for the discharge rate at the maximum water level can be found in **Appendix A**. Details of the Hydro-Brake Optimum can be found in **Appendix E**.

Site Release Rate

The site flows are summarized below in **Table 4**.

Table 4. Site Quantity Control

Catchment Name (Catchment Number)	Area (m^2)	100 Year Runoff Coefficient (C)	Storage Required (m^3)	Peak Flow (L/s)
Controlled	1,786	0.74	49.3	12.0
Uncontrolled	183	0.90	-	11.5
Total	**1,969**		**49.3**	**23.5**

Therefore, with all controls in place the 100-year post development peak flow will not exceed the target flow of 24.1L/s.

Figure 3 shows the proposed catchment plan. Refer to **Drawing SW2** for the full servicing and cistern details. Hydrology calculations are provided in **Appendix A**.

The existing municipal storm infrastructure can support the proposed site without the need for external upgrades or retrofit.

3.5 Maintenance & Monitoring

3.5.1 Cistern

Based on the pretreatment and clean flows directed to the cistern there should be minimal sediment accumulation. The cistern and access hatches will be installed in the northern portion of the site. The system should be inspected every 6 months for the first two years and annually after that, once the sediment loading rate is determined. The cistern should be cleaned out when there is noticeable sediment accumulation to ensure the pump intake does not become obstructed by sediment.

3.5.2 Storm Filter System

The Storm Filter System is to be inspected on a regular interval as specified in the manufacture's maintenance guidelines. Maintenance is to take place on regular intervals ranging from 1 to 3 years as specified by the manufacturer. This maintenance includes replacement of filter cartridges and removal of any debris or sediment which have accumulated in the vault. Refer to manufacturer's specifications for all inspection and maintenance requirements.

4.0 EROSION AND SEDIMENT CONTROL

All Erosion and Sediment Control measures must be designed, maintained and constructed in accordance with the GTA CA's Erosion and Sediment Control Guidelines for Urban Construction (2006) and/or other City of Toronto requirements.

Erosion and sediment control plans have been prepared to meet the requirements of the City. The plans have been designed to limit sediment and debris from leaving the site during construction and from entering the adjacent lands. The plans consist of the following:

- A sediment control fence will be installed along the perimeter of the site where the grade will direct flows off-site.
- Site access will be limited to one entrance. A gravel access pad will be installed to remove mud from vehicles leaving the site.

- Once the site has been stripped of topsoil and then pre-graded, the lot will generally be lower than the surrounding property. This will limit runoff from entering neighbouring properties until the storm sewers are installed.
- Once the storm sewer system has been constructed, catchbasin sediment control devices will be installed and maintained until the majority of the construction is complete.

Erosion measures will be in place prior to any grading on the site. A program will be in place to monitor and maintain the erosion and sediment controls. The sediment controls will be inspected by the Site Engineer and contractor every two weeks and after each significant rainfall event.

Proper construction sequencing will also help with erosion and sediment control. The following schedule is recommended:

1. Install sediment control fence and gravel access road.
2. Strip topsoil and export.
3. Rough grade site to subgrade elevations.
4. Install services and sediment control devices on catchbasins.
5. Re-vegetate disturbed areas.
6. Remove sediment controls.

Refer to **Drawing SW3** for erosion and sediment control details.

5.0 WASTEWATER

4.1 Receiving System

There is an existing 600mm by 900mm combined sewer on Richmond Street West flowing to a 750mm x 1125mm combined sewer on Bathurst Street, which flows to the south across the frontage of the site. All existing buildings are connected to these sewers.

It is proposed to construct a new sanitary service connection from the building to the combined sewer on Richmond Street. Refer to **Drawing SW2** for the proposed sanitary design. Calculations are provided in **Appendix D**.

Table 5 and **Table 6** provides a comparison of the pre and post development peak flows from the site to the combined sewer system. The detailed calculations are provided in **Appendix B**.

Table 5. Existing Development Sanitary Flows

	Quantity	Unit Rate	Peaking Factor	Total Flow (L/s)
Residential	34 People	240L/c/d	4.3	0.41[1]
Commercial	2,381m^2	180,000L/ha/d	included	0.50
Total				**0.91**

[1] Equivalent Flow as per the latest City of Toronto *Design Criteria for Sewers and Watermain*
(Average wastewater flow = 240 L/capita/day, peaking factor: Harmon)

Table 6. Proposed Development Sanitary Flows

	Quantity	Unit Rate	Peaking Factor	Total Flow (L/s)
Residential	384 People	240L/c/d	4.0	4.30[1]
Commercial	517m^2	180,000L/ha/d	included	0.11
Groundwater				0.25
Total				**4.66**

[1] Equivalent Flow as per the latest City of Toronto *Design Criteria for Sewers and Watermain*
(Average wastewater flow = 450 L/capita/day, peaking factor: Harmon)

The I&I for residential flows is based on drainage area. For the existing development a unit rate of 3.0L/s/ha is used as per City Criteria. This rate can be reduced to 0.26L/s/ha for the new development as per City Criteria. Since there is no change in site area, to be conservative, this flow is ignored in the above flow estimates. By comparing the peak flows in the pre and post development scenarios, it can be seen that there is a net increase of 3.5L/s. Since both storm and sanitary sewers outlet to the combined sewer, this flow is offset by the decrease in the 2-year post development peak stormwater flow. This is described in Section 4.2.

4.2 MECP Procedure F-5-5

Since the site will discharge to a combined sewer system, it is necessary to demonstrate compliance with MECP Procedure F-5-5. It must be demonstrated that:

a) Increases in dry weather flow (DWF) causes no overflows at downstream CSO point/diversion structures under DWF plus 90% of the volume resulting from wet weather flow (WWF) from an average year.

b) Under wet weather flow conditions, there is no increase in overflow volumes at downstream CSO points/diversion structures.

In this case, it is proposed to meet the requirements by reducing the stormwater peak flow to offset the increase in sanitary flow. Therefore, based on the City's guidelines, the following is required:

Provide an on-site assessment of discharges (i.e., wastewater, inflow & infiltration and storm runoff) from the subject site showing no net increase in total flows under post-development conditions to the receiving combined sewer compared to existing conditions. The following conditions must be considered:

i. Confirm that storm runoff from the existing site is currently draining into the combined sewer system through investigations (e.g., sewer survey, service connection cards, CCTV, dye/smoke tests) to confirm any existing storm servicing connections (i.e., foundation / roof drain / catch basin connections).

ii. Where existing storm contributions are confirmed to the combined sewer, demonstrate that reductions in the post-development storm runoff rate as a result of on-site SWM controls can offset the increase in dry weather flows for the 2-year design storm event.

As indicated in Section 2.1, there are no separate storm sewers in the vicinity of the site. The roof drains discharge at grade and drain toward the municipal right-of-ways. During frequent storm events the rainwater would be collected in the catchbasins and drain to the combined sewers. Likewise, the surface drainage is collected in catchbasins which drain to the combined sewer system. It is not known if the existing buildings have foundation drain connections to the combined sewer, therefore, to be conservative, this flow is ignored in the pre-development flow estimate.

Since it is evident that the storm drainage is directed to the combined sewer system, for frequent storm events (2-year), a comparison of pre- and post-development peak flows to the combined sewers was completed (refer to **Table 7**).

Table 7. Flow Comparison to Combined Sewer

	Pre-Development (L/s)	Post Development (L/s)
2-Year Peak Flow (Storm)	41.8	16.0
Sanitary	0.9	4.4
Groundwater	0	0.25
Total	**42.7**	**20.7**

Therefore, there will be a net decrease of 22L/s from the site to the combined sewer system. Therefore, the requirements for MECP Procedure F-5-5 are satisfied.

Based on the analysis, there will be a decrease in the peak flow to the combined sewers. Therefore, there will be no adverse impacts on the existing municipal infrastructure and the existing municipal combined sewer infrastructure can support the proposed development without the need for external upgrades or retrofit.

6.0 WATER DISTRIBUTION

6.1 Proposed Water System

There is an existing 300mm diameter watermain under the roadway of Richmond Street West across the frontage of the site. It is proposed to provide a 100mm diameter domestic and 150mm diameter fire line to service the new development.

6.2 Water Design Criteria

The following calculations for water demand and fire flow for the proposed development are based on the City of Toronto's Design Criteria for Sewers and Watermains and the Fire Underwriters Survey (FUS).

City of Toronto's Design Criteria for Sewers and Watermains:

Persons per unit (ppu):	Apartment	
	Bachelor/1 Bedroom	1.4
	2 Bedroom	2.1
	3 Bedroom	3.1

Residential (high rise apartment):		191L/cap/day
Peaking Factor (pf):	Peak Hour	2.48
	Maximum Day	1.65
Commercial:		180,000L/ha/day
Peaking Factor (pf):	Peak Hour	1.10
	Maximum Day	1.20

Minimum Pressure (under non-fire demand scenario)	275kPa
Minimum Pressure (under fire demand scenario)	140kPa

Fire Underwriters Survey:

Minimum high rise fire flow – 19,000L/min - 2 hour duration (5,019gal/min)

6.3 Watermain Analysis

The Average Daily Demand is calculated based on the residential population and gross floor area of the retail development as shown in **Table 8**.

Table 8. Average Daily Demand Calculation

Unit Type	Number of Units	People per Unit	Population
Bachelor/1 BR	116	1.4	162.4
2BR	73	2.1	153.3
3BR	22	3.1	68.2
Total	**211**		**384**

Average Daily Demand Res. (L/day)		73,344
Commercial Flow:		
GFA (m2)	517	
Average Daily Demand Comm. (L/day)		9,396
Average Daily Demand Total (L/day)		**85,987**

Based on the Average Daily Demand and peaking factors

Peak Hour Demand:

Residential	=136.3L/min
Commercial	= 7.8L/min
Total	= 134.1L/min

Maximum Day Demand:

Residential	= 84.0L/min
Commercial	= 7.8L/min
Total	= 91.1L/min

Fire Demand:

The detailed fire formula on page 17 of the FUS was used to calculate the minimum fire flow.

Table 9 provides the estimate for the maximum GFA.

Table 9. Building Area Breakdown

	GFA
Residential GFA	14,370.8
Retail GFA	517.1
Subtract Residential GFA (P1/P2)	69
Total	**14,819m^2**

The following is assumed regarding the construction of the building.

- Non-combustible construction (unprotected metal structural).
- Sprinklers are will be provided as per NFPA 13, at a minimum with a fully automatic sprinkler system.

Table 10. Fire Flow Estimates

Population Type	Area (m^2)	Construction Coefficient	Occupancy Increase/ Decrease	Sprinkler	Exposure	Required Flow (L/min.)
Full Building	14,819	0.8	0%	50%	65%	25,000

As shown in **Table 10**, when using this information, the minimum fire flow is 25,000L/min. Refer to calculations attached in **Appendix F**.

A hydrant flow test was completed by Corix Water Services, dated June 9, 2021. The results of the hydrant flow test show that the theoretical fire flow at the minimum City pressure of 140kPA (20psi) was 25,188L/min (2,772gal/min). The required fire flow of 25,000L/min plus the maximum day demand 91L/min is 25,091L/min. This is less than the theoretical fire flow of 25,188L/min at 140kPa. Therefore, the proposed building will be protected. The hydrant flow test results are provided in **Appendix F**.

The existing municipal water infrastructure can support the proposed site without the need for external upgrades or retrofit.

7.0 CONCLUSIONS

The stormwater management design for the site is summarized on **Table 11** and **Table 12** below.

Table 11. Site Quantity Control Summary

Target Release Rate (L/s)	Actual Release Rate (L/s)	Orifice Plate Size (mm)	Storage Required (m^3)	Storage Provided (m^3)
24.1	**23.5**	Hydro-Brake Optimum	49.3	51.3

Table 12. Site Quality Control Summary

Filter System	Number of Cartridges	Media Type	Annual TSS Removal	Percent Runoff Capture	Catchment Area (ha)	Runoff Coefficient
StormFilter SPFD0806	1	Perlite	**80%**	**94%**	0.30	0.90

The proposed development meets the City of Toronto's requirements as follows:

- Retention measures, including a cistern with retention storage in conjunction with an irrigation system for on-site re-use and landscaping will be provided to reduce runoff volumes.
- Quality control will be provided by a StormFilter system to treat the storm runoff to a minimum of 80% TSS removal for the driveway. The remainder of the site will be rooftop or landscape and therefore, 80% TSS removal is provided.
- A cistern in conjunction with an inlet control device will be provided on site to meet the storage requirements and to limit the release rates to below the allowable release rate as per the WWFM Guidelines.
- An effective erosion and sediment control plan has been prepared to limit sediment from leaving the site during construction.
- Gravity connections can be provided to the new development from the existing municipal sanitary sewer on Richmond Street West.
- A hydrogeological impact assessment was completed by PGL Environmental Consultants and recommendations in the report will be followed. An application for a Discharge Permit for Private Water into the sanitary sewer will be made under a separate cover. Groundwater collected by the foundation drainage system will be pumped to the sanitary sewer at a rate of 0.4L/s.
- The sanitary, storm and groundwater discharge from the site to the combined sewer system has been analyzed to confirm compliance with the MECP Procedure F-5-5. The reduced stormwater discharge in the 2-year storm will offset the increase in wastewater and groundwater flows from the new development.
- The water system has been analyzed and adequate fire and domestic flows can be provided to the site from the municipal main.
- The existing municipal infrastructure can support the proposed site without the need for external upgrades or retrofit.

With the proposed controls in place, the site design will meet the requirements of the Wet Weather Flow Management Guidelines and City of Toronto Standards.

Greg Rapp, P.Eng.

APPENDIX A

STORMWATER MANAGEMENT CALCULATIONS

Rational Method Calc.

Project:	Bathurst and Richmond
Project No.:	211176
Municipality:	Toronto
Catchment:	Controlled

Pre Development Peak Flows

	100 Year	2 Year	2 Year Actual
Runoff Coefficient (C) =	0.50	0.50	0.87
Area (A) =	0.197	0.197	0.197
A:	59.70	21.80	21.80
B:	0.00	0.00	0.00
C:	-0.80	-0.78	-0.78
Tc:	0.167	0.167	0.17
Intensity (I) mm/hr =	250.3	88.2	88.2
Peak Flow (Q) L/s =	68.4	24.1	41.8

	Area	C	CxA
Landscape	98	0.25	24.5
Hard surface	1870	0.90	1682.9
Building	0	0.90	0.0
	1968	**0.87**	1707.4

Rational Method Calc.

Project:	Bathurst and Richmond
Project No.:	211176
Municipality:	Toronto
Catchment:	Uncontrolled

Post Development Peak Flows

	100 Year	2 Year
Runoff Coefficient (C) =	0.90	0.90
Area (A) =	0.018	0.018
A:	59.70	21.80
B:	0.00	0.00
C:	-0.80	-0.78
Tc:	0.167	0.167
Intensity (I) mm/hr =	250.3	88.2
Peak Flow (Q) L/s =	11.5	4.0

	Area	C	CxA
Landscape	0	0.25	0
Hard Landscape	67	0.90	60.3
Building	116	0.90	104.4
	183.0	**0.90**	164.7

Summary (MECP F5-5)

Post UC (2 Year)	4.0	L/s
Post Controlled	12.0	L/s
Sanitary	4.6	L/s
GW	0.4	L/s
Total	21.0	L/s
Pre (2 year)	41.8	L/s
Sanitary	0.9	L/s
Total	42.7	L/s

Rational Method Calc.

Project:	Bathurst and Richmond
Project No.:	211176
Municipality:	Toronto
Catchment:	Controlled

Post Development Peak Flows

	100 Year	2 Year
Runoff Coefficient (C) =	0.74	0.74
Area (A) =	0.179	0.179
A:	59.70	21.80
B:	0.00	0.00
C:	-0.80	-0.78
Tc:	0.167	0.167
Intensity (I) mm/hr =	250.3	88.2
Peak Flow (Q) L/s =	92.2	32.5

	Area	C	CxA
Landscape	1	0.25	0.3
Hard Landscape	261	0.90	234.9
Green Roof	623	0.45	280.4
Building	901	0.90	810.9
	1786	**0.74**	1326.4

Full Site

	Area	C	CxA
Landscape	1	0.25	0.3
Hard Landscape	328	0.90	295.2
Green Roof	623	0.45	280.4
Building	1017	0.90	915.3
	1969	**0.76**	1491.1

Modified Rational Method

Project: Bathurst and Richmond
Project No.: 211176
Municipality: Toronto

Controlled

Area:	0.1786	ha	Rainfall $I=A*(T+B)^C$	
Runoff Coefficient:	0.74		A:	1579.4
			B:	0
Discharge Rate:	0.0120	m^3/s	C:	-0.8
Storage Required	49.3	m3		

Initial Time 10 min Increment 2 min

Time (min)	Intensity (mm/hr)	Peak Flow (m^3/s)	Roof Flow (m^3/s)	Total Flow (m^3/s)	Runoff Volume (m^3)	Discharge Volume (m^3)	Storage Volume (m^3)
10	250.3	0.092	0.0000	0.0922	55.34	7.20	48.1
12	216.3	0.080	0.0000	0.0797	57.39	8.64	48.8
14	191.2	0.070	0.0000	0.0705	59.19	10.08	49.1
16	171.9	0.063	0.0000	0.0633	60.79	11.52	49.3
18	156.4	0.058	0.0000	0.0576	62.24	12.96	49.3
20	143.8	0.053	0.0000	0.0530	63.57	14.40	49.2
22	133.2	0.049	0.0000	0.0491	64.79	15.84	48.9
24	124.3	0.046	0.0000	0.0458	65.93	17.28	48.6
26	116.6	0.043	0.0000	0.0429	66.99	18.72	48.3
28	109.8	0.040	0.0000	0.0405	67.99	20.16	47.8
30	103.9	0.038	0.0000	0.0383	68.93	21.60	47.3
32	98.7	0.036	0.0000	0.0364	69.83	23.04	46.8
34	94.0	0.035	0.0000	0.0346	70.68	24.48	46.2
36	89.8	0.033	0.0000	0.0331	71.50	25.92	45.6
38	86.0	0.032	0.0000	0.0317	72.27	27.36	44.9
40	82.6	0.030	0.0000	0.0304	73.02	28.80	44.2
42	79.4	0.029	0.0000	0.0293	73.73	30.24	43.5
44	76.5	0.028	0.0000	0.0282	74.42	31.68	42.7
46	73.8	0.027	0.0000	0.0272	75.09	33.12	42.0
48	71.4	0.026	0.0000	0.0263	75.73	34.56	41.2
50	69.1	0.025	0.0000	0.0255	76.35	36.00	40.4
52	66.9	0.025	0.0000	0.0247	76.95	37.44	39.5
54	64.9	0.024	0.0000	0.0239	77.53	38.88	38.7
56	63.1	0.023	0.0000	0.0232	78.10	40.32	37.8

APPENDIX B

WATER BALANCE CALCULATIONS

On-Site Irrigation Calculations

Project: Bathurst and Richmond
Project No.: 211176
Municipality: Toronto

Site Area = **1969 m2**
Total Annual Rainfall= **840 mm**
50% Capture= **827 m3**

Catchment	Area (m^2)	% of Total Area	IA (mm)	Annual Capture (%)	Annual Capture (m^3)
Flat Roof and Terraces	1017	52%	1.0	12%	102.5
Green Roof	623	32%	5.0	50%	261.7
Landscape & Planters	1	0%	7.0	58%	0.5
Pavement/Driveways	328	17%	1.0	12%	33.1
Total	**1969**	**100%**	**2.3**		**397.7**

Total required to be captured by cistern for reuse = **429 m3**

On-Site Irrigation Calculations

Project: Bathurst and Richmond
Project No.: 211176
Municipality: Toronto

Catchment Area = 1,785 m2
Runoff Coefficient= 0.74

Irrigation Factors

Landscape Type	Area [m²]	Species Factor [Ks]	Density Factor [Kd]	Microclimate Factor [Kmc]	KL	IE
Shrubs	0	0.5	1	1.1	0.55	Drip
Mixed	1	0.5	1.3	1	0.65	Drip
Greenroof	623	0.7	1	1	0.7	Drip

Total Water Applied - Irrigation

Month	ET	ETL Shrubs	ETL Mixed	ETL Turfgrass	IE	Total Water Use [m3]
January						
February						
March						
April	56.6	31.1	36.8	39.6	0.9	27.5
May	101.6	55.9	66.0	71.1	0.9	49.3
June	124.9	68.7	81.2	87.4	0.9	60.6
July	138.2	76.0	89.8	96.7	0.9	67.1
August	110.4	60.7	71.8	77.3	0.9	53.6
September	71.6	39.4	46.5	50.1	0.9	34.7
October	62.9	34.6	40.9	44.0	0.9	30.5
November						
December						
Total						**323.3**

On-Site Water Reuse Calculations

Project: Bathurst and Richmond
Project No.: 211176
Municipality: Toronto

Catchment Area (A) =	1,786	m2	
Runoff Coefficient (C) =	0.74		
Cistern Volume =	41	m3	
Cistern as rainfall depth	23.0	mm	= A / V
% Total Collection	94%		From Figure 1A in WWFM Guildelines.

Total Water Applied | **Total Water Collected**

Month	(1) Irrigation[1] [per month]	(2) Indoor Wash [per month]	(3) Outdoor Wash [per month]	(4) = (1)+(2)+(3) Total Consumption [per month]	(5) Monthly Precip. mm	(6) % of Total Collection	(7) = (5)x(6)xCxA Rainwater Volume [m3]	(8) See notes. Vol Remaining [m3]
January	0	0.0		0.0	61.0		76.1	41
February	0	0.0		0.0	50.0		62.3	41
March	0	0.0		0.0	66.0		82.3	41
April	27.5	0.0	0	27.5	71.0		88.5	41
May	49.3	0.0	0	49.3	74.0		92.3	41
June	60.6	0.0	0	60.6	73.0	94%	91.0	41
July	67.1	0.0	0	67.1	68.0		84.8	41
August	53.6	0.0	0	53.6	81.0		101.0	41
September	34.7	0.0	0	34.7	84.0		104.7	41
October	30.5	0.0		30.5	65.0		81.0	41
November	0	0.0		0.0	76.0		94.8	41
December	0	0.0		0.0	71.0		88.5	41
Total	323.3	0.0		**323.3**	**840.0**		**Yearly Deficit=**	**0.0**

Total Yearly Water Demand =	323.3	m3
Total Yearly Supply Deficit =	0.0	m3
Total Water Consumption =	**323.3**	m3
Water Balance Requirement =	**429.3**	m3

Notes:
(1) From "On-Site Irrigation Calculations" table.
(5) From "Canadian Climate Normals 1981-2010 Station Data" Toronto. Monthly values were factored by 1.011 to match the annual rainfall volume of 840mm as per WWFM Guidelines.
(6) From Figure 1A in WWFM Guildelines. 94% of annual rainfall comes from storms less than 23mm.
(8) = Volume remaining from previous month + surplus/deficit from previous month. Volume cannot be greater than the cistern volume.
Total Water Consumption = Total Yearly Demand - Total Yearly Supply Deficit.
Total Water Consumption per 72 hours = Total Water Consumption / (7 months * 10 72 hour periods per month)
Total Water Consumption per 72 hours = 4.62

APPENDIX C

HYDROLOGICAL IMPACT ASSESSMENT

152–164 Bathurst Street and
623–627 Richmond Street West
Toronto, ON

Preliminary Hydrogeological Impact Assessment

PREPARED FOR:
Toronto (Bathurst & Richmond) LP
257 Borden Street
Toronto, ON M5S 2N5

PREPARED BY:
PGL Environmental Consultants
250 Water Street, Suite 102
Whitby, ON L1N 0G5

PGL File: 5660-03.03

April 2021 v1

PGL ENVIRONMENTAL CONSULTANTS

solve and simplify

Executive Summary

PGL Environmental Consultants (PGL) conducted a Preliminary Hydrogeological Impact Assessment at 152–164 Bathurst Street and 623–627 Richmond Street West, Toronto, Ontario (the Site). The investigation was completed for Toronto (Bathurst & Richmond) LP. PGL assessed groundwater conditions at the Site, and potential impacts on groundwater from dewatering during the excavation and operation of the Site. This report is preliminary as PGL has not finished collecting groundwater elevations for three months, as mandated by Toronto Water. This report will be updated once that work is complete.

The Site is comprised of nine parcels on the southwest corner of Bathurst Street and Richmond Street West, and it is improved with mixed-use, low-rise buildings (residential and commercial). The proposed development includes construction of a 17-storey, mixed-use condominium building with two levels of underground parking. The building at 164 Bathurst Street has been incorporated into the new building design; all other existing buildings will be removed.

Seven monitoring wells were installed at the Site: two shallow wells, four intermediate wells, and one deep well ranging in depth from 4.5m to 13m below ground surface (bgs).

Groundwater conditions were assessed by reviewing existing information and reports on geology and hydrogeology. The hydraulic conductivity is based on published literature associated with soil stratigraphy where the water table was observed. This data was then used to approximate flow volumes during construction dewatering and long-term dewatering for the development. PGL then evaluated potential impacts to groundwater due to construction dewatering.

The key results of the hydrogeological impact assessment for the Site are:

- Construction dewatering will be required during the excavation, with a maximum estimated flow of 966L/day;
- There are no anticipated impacts to aquifers, nearby water wells, or baseflow to surface water features due to the planned construction dewatering for the new residential building;
- Construction dewatering at the Site will not likely require registration in the Environmental Activity and Sector Registry;
- A Permit to Take Water is not likely required for the construction dewatering;
- Long-term dewatering of groundwater for the entire Site is anticipated to be a maximum of 300L/day;
- Groundwater at the Site met the City of Toronto Sanitary Sewer By-Law limits;
- Groundwater at the Site exceeded the City of Toronto Storm Sewer By-Laws for Total Suspended Solids and total manganese. Confirmatory sampling or groundwater treatment should be completed prior to dewatering operations; and
- If the construction dewatering plan changes or any of the assumptions stated in this report are otherwise violated, re-evaluation of the potential hydrogeological impact will be required.

Assessment of ground settling due to dewatering was outside the scope of this work program and area of expertise of the authors. We recommend this potential impact be evaluated by a geotechnical engineer.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

PGL
ENVIRONMENTAL CONSULTANTS

Table of Contents

LIST OF TABLES

In text

Appended

LIST OF FIGURES

LIST OF APPENDICES

List of Acronyms

asl	-	above sea level
BH___M	-	borehole with monitoring well installed
bgs	-	below ground surface
ESA	-	Environmental Site Assessment
m/s	-	metres per second
m asl	-	metres above sea level
m bgs	-	metres below ground surface
MECP	-	Ministry of the Environment, Conservation and Parks
MW	-	borehole with a monitoring well installed
PGL	-	PGL Environmental Consultants
TSS	-	Total Suspended Solids

1.0 INTRODUCTION

Toronto (Bathurst & Richmond) LP retained PGL Environmental Consultants (PGL) to conduct a Preliminary Hydrogeological Impact Assessment at 152–164 Bathurst Street and 623–627 Richmond Street West in Toronto, Ontario (the Site, Figure 1). The investigation was conducted to assess groundwater conditions at the Site in advance of proposed redevelopment activities.

This report is preliminary, as PGL has not finished collecting groundwater elevations for three months, as mandated by Toronto Water. This report will be updated once that work is complete.

The Site is comprised of nine parcels on the southwest corner of Bathurst Street and Richmond Street West. The Site is improved with mixed-use, low-rise buildings (residential and commercial). Most of the rear yards are paved for parking.

The proposed development includes construction of a 17-storey, mixed-use condominium building with two levels of underground parking. The building at 164 Bathurst Street will most likely be designated as a heritage building, and as such it has been incorporated into the new building design; all other existing buildings will be removed.

This work was completed concurrently with supplemental PGL's Phase 2 Environmental Site Assessment (ESA), and Terrapex Environmental's (Terrapex's) geotechnical investigation. The fieldwork included drilling and installing seven monitoring wells: two shallow wells, four intermediate wells, and one deep well ranging in depth from 4.5m to 13m below ground surface (bgs). PGL retained Terrapex to complete the geotechnical investigation, and their report will be submitted under separate cover.

This Hydrogeological Impact Assessment has been prepared in accordance with Ontario *Water Resources Act*, Ontario Regulation 387/04, and Toronto Municipal Code Chapter 681 –Sewers.

2.0 SCOPE OF WORK

To meet the objectives noted above, PGL:

1. Reviewed and evaluated existing Site information, including:
    a. Borehole logs and monitoring well installation details of the seven onsite monitoring wells installed in February 2021 (Appendix 1);
    b. Architect drawings by KIRKOR Architects and Planners, April 15, 2021 (Appendix 2);
    c. A Grading Plan by Husson Engineering + Management April 8, 2021 (Appendix 3); and
    d. Available Ministry of the Environment, Conservation and Parks (MECP) well records, and Ministry of Natural Resources and Forestry Heritage maps.
2. Measured static groundwater levels and completed single-well response tests at each of the five onsite monitoring wells. Groundwater recovery and recharge at the Site is very slow, and the single-well response tests did not yield useable data. The estimated hydraulic conductivity at the Site is from published reference materials.
3. Completed a total of three of six measurements of static groundwater levels as required by Toronto Water. Three events are pending.

4. Determined whether groundwater would be encountered during construction, and estimated flow rate for dewatering;
5. Collected a water sample on March 17, 2021 from one onsite well (BH204M / MW204) to assess water quality to the City of Toronto's sanitary and stormwater sewer by-law limits; and
6. Conducted a Hydrogeological Impact Assessment to identify possible project impacts on groundwater quantity and quality.

3.0 SITE DESCRIPTION

The Site encompasses nine rectangular properties on the southwest corner of Bathurst Street and Richmond Street West. It is bounded to the north by Richmond Street West followed by commercial properties, to the east by Bathurst Street followed by former residential properties undergoing redevelopment, to the south by a residential condominium, and to the west by residential properties and a public school. The Site buildings vary in construction and are used for residential or mixed commercial and residential purposes.

The Site is roughly 0.20 hectares with a mix of building types, occupants, and uses as summarized below.

Table A: Site Buildings and Current Uses

Address	Building Description and Current Use
152–154 Bathurst Street	Two-storey commercial building with a basement. Occupied by Royal LePage, realty brokerage.
156–158 Bathurst Street	Two-storey, mixed-use building, with a partial basement on the west side of the building. The basement and ground floor are currently vacant. Previously occupied by Cyclemotive – a store selling bicycles and accessories, and providing bicycle servicing. The second floor is a large residential unit.
160 Bathurst Street	Former two-storey residential building with a basement. The building was severely damaged by a fire that occurred in March 2019. The building has been demolished and was most recently used as an outdoor patio.
162 Bathurst Street	Former two-storey, mixed-use building. The ground floor was previously used as a barber shop with a residential unit on the second floor. The building was severely damaged by a fire that occurred in March 2019. The building has been demolished and was most recently used as an outdoor patio.
164 Bathurst Street	Mixed-use, three-storey building with a basement. The basement and ground floor are occupied by a restaurant. The second and third floor are residential units.
623–625 Richmond Street	Three-storey, semi-detached, multi-unit residential building with a basement.
627 Richmond Street	Three-storey, multi-unit residential building with a basement.

3.1 Topography and Physical Setting

The Site and area are generally flat. Lake Ontario is about 1.2km south of the Site.

No Ministry of Natural Resources Heritage Sites, Area of Natural and Scientific Research sites, Oak Ridges Moraine, Niagara Escarpment or Environmentally Sensitive areas were identified within 250m of the Site.

Based on topography and proximity of Lake Ontario, the inferred local and regional groundwater flow direction is to the southeast toward Lake Ontario.

3.2 Geology

Geological maps show the surficial soils near the Site are expected to be glaciolacustrine deposits: sand, gravelly sand, and gravel nearshore and beach deposits (OGS, 2000). Overburden at the Site is underlain by Georgian Bay Formation bedrock consisting of shale, limestone, dolostone, and siltstone (OGS, 2010). Bedrock is expected to be at a depth of roughly 11m based on review of Ministry of the Environment, Conservation, and Parks (MECP) well records.

PGL / Terrapex advanced 12 boreholes, ranging in depth from 0.9m bgs to 16m bgs across the Site in February 2021 (BH201 to BH212). Seven monitoring wells ranging in depth from 4.5m bgs to 13m bgs were installed and are identified interchangeable as MW20# or BH20#M (BH201MD, BH201MS, BH202M, BH203M, BH204M and BH205M, BH206M. The Well BH201M location has two wells “nested” one deep (D) and the second one shallow (S).

The borehole logs are provided in Appendix 1. Soil stratigraphy beneath the asphalt, brick pavers, or topsoil consisted of various fill layers consisting of either gravelly sand, clayey silt, and silty sand to a maximum depth of 3.5m bgs. The fill was underlain by the following soil types: silty clay (till), silty fine sand, silty clay till and weathered shale, and shale with limestone interbeds. The locations of all wells are provided in Figure 1. In general, Site geology comprised the following:

Table B: Site Geology

Stratigraphy	Approximate Depths (m bgs)
Asphalt, brick pavers, topsoil	0.0–0.2
Fill gravelly sand, clayey silt, silty sand	0.2–3.5
Silty clay (till), some sand	2.0–9.0
Silty fine sand	8.5–10.5
Silty clay (till) and weathered shale	10.0–12.5
Shale with limestone interbeds	12.0–16.0

4.0 HYDROGEOLOGICAL WORK PROGRAM

To estimate groundwater extraction rates during construction, several hydrogeological parameters must be measured or calculated. The following sections describe how the Site groundwater elevations, inferred groundwater flow direction, hydraulic gradient, and hydraulic conductivity were estimated.

4.1 Groundwater Elevations and Flow Direction

PGL measured depth to groundwater in each of the seven monitoring wells on three occasions, as shown in Table 1 (appended). Groundwater depths and elevations for the March 9, 2021 monitoring round are shown in Table C below. The depth to groundwater was recorded using a Solinst water level tape to establish static groundwater levels. The measured depth to groundwater was translated to elevation above sea level (asl) based on the ground surface elevations determined in the elevation survey.

The groundwater elevation fluctuated by 0.21m to 4.80m in each well during the three monitoring rounds from March 9 to March 25, 2021. The minimum measured groundwater elevation was

80.88m asl, and the maximum was 87.72m asl. Static groundwater has not been achieved, as groundwater elevations are continuing to increase in the wells, although this may be due to the seasonal spring high water levels.

Table C: Groundwater Levels and Elevations

Location	Ground Elevation (m asl)	9-Mar-2021	
		Depth to Groundwater (m bgs)	Groundwater Elevation (m asl)
Shallow Wells			
BH202M	90.18	dry @ 6.104	Dry
BH206M	87.43	3.336	86.66
Intermediate Wells			
BH201MS	90.23	7.908	82.32
BH203M	90.33	2.611	87.72
BH204M	90.50	6.751	83.75
BH205M	90.18	7.674	82.51
Deep Well			
BH201MD	90.23	8.226	82.00

Notes: asl = above sea level bgs = below ground surface

Figure 2 shows the groundwater elevations measured on March 9, 2021. Groundwater contours were not generated, as groundwater recharge is very slow, and levels have not recovered from the drilling and groundwater monitoring events conducted in early March.

Based on local topography and proximity to Lake Ontario, groundwater flow direction is most likely to the south toward Lake Ontario.

4.2 Aquifer Performance Tests

Single-well response tests (slug tests) were conducted at all wells on March 25, 2021 to estimate the hydraulic conductivity of the subsurface materials expected to be encountered during the excavation of basements or building footings. However, due to very low recharge rates, the monitoring wells had not yet recovered from drilling two weeks prior, and the results of the slug tests could not be reliably interpreted.

Instead, we have reviewed literature values for silt (5×10^{-7} to 1×10^{-6}m/s), clay (1×10^{-10} to 1×10^{-7}m/s), and shale (1×10^{-13} to 1×10^{-9}m/s), respectively.[1] As the recharge rates are so low, use of literature values for hydraulic conductivity were determined by PGL to be sufficient for the purposes of dewatering calculations.

The main soil type observed at the Site is a silty clay till unit. This till unit is likely not homogeneous, so the uncertainty in the estimated hydraulic conductivities is likely elevated. To account for this increased uncertainty, and the observed low recharge rate, we have used an estimated hydraulic conductivity of 1×10^{-8}m/s for the dewatering calculations.

[1] J. Patrick Powers, Arthur B. Corwin, Paul C. Schm, "Construction Dewatering and Groundwater Control, New Methods and Applications, 3rd Edition", John Wiley and Sons Inc, 2007.

5.0 DEWATERING CALCULATIONS

To evaluate the potential impacts on nearby groundwater receptors from construction dewatering for the hotel excavation, approximate groundwater flow rates need to be calculated. In addition, the radius of influence needs to be estimated. The radius of influence is the maximum distance from the area of groundwater extraction where groundwater pressure decreases can be measured, and represents the area where potential hydrogeological impacts may occur.

Several analytical models have been developed to generate these estimates. These models typically have similar assumptions to the hydraulic conductivity solutions discussed in Section 4.2, including steady-state flow and a homogeneous aquifer of infinite extent.

The elevations listed in Table D were used to determine the dewatering volumes. These are based on the drawings provided in Appendices 2 and 3.

Table D: Elevations for Dewatering Calculations

Lowest Basement Elevation	80.91m asl
Foundation Elevation	80.61m asl (lowest basement with 0.3m deep footings)
Ground Elevation	Existing elevation ranges from 89.90m to 90.47m asl Finished floor will range from 89.95m to 90.6 m asl

5.1 Dewatering Volumes: Construction Dewatering

To calculate approximate flow volumes of groundwater into the redevelopment excavation during construction, the excavation was assumed to be rectangular, and this rectangular excavation was modelled as an equivalent well, assuming groundwater will be flowing radially into the excavation. The equation representing this analytical model, from Powers et al. (2007)[2], is:

$$Q_w = \frac{\pi K(H^2 - h_w^2)}{\ln R_0/r_w}$$

Where:

Parameter	Input	Description
Q (L/day)	-	**Q** is the volumetric flow into the excavation (i.e., parameter being calculated)
K (m/s)	1.0 x 10^{-8}	**K** is the hydraulic conductivity. We have used a K value from published literature. The excavation will extend through the silty clay till layer (Table B), and therefore we have used 1.0 x 10-8 for the hydraulic conductivity (Section 4.2) of the till to approximate groundwater flow.

[2] J. Patrick Powers, Arthur B. Corwin, Paul C. Schm, "Construction Dewatering and Groundwater Control, New Methods and Applications, 3rd Edition", John Wiley and Sons Inc, 2007.

Parameter	Input	Description
H (m)	10.72	**H** is the static height of the water table (potentiometric surface) with respect to a datum. The highest measured groundwater elevation was 87.72m asl in BH203M. To be conservative and account for further seasonal and short-term fluctuations, we have assumed that the water table could fluctuate up to 1m above this level. The assumed groundwater elevation across the Site is therefore 88.72m asl. The elevation of the datum is conservatively estimated to be 78m asl (approximately the top of the weathered shale unit, which is interpreted to be the bottom of the aquifer) and corresponds to the design groundwater elevation (78.56m asl) required for construction. **H** is the difference between the water level elevation (88.72m asl) and the assumed datum (78.0m asl) which is 10.72m.
h (m)	0.56	**h** is the static height of the water table with respect to the level required in the excavation. The existing Site elevation in the southeast corner, 89.90m asl (Appendix 3), was used for the finished Site level. The building is to be completed with two levels of underground parking (P1 and P2). Based on email communication, the underground parking is split level, and the lowest excavated area is below Level P2 (-9.04m bgs) with allowance for footings (0.3m), elevator pit (0.5m), and buffer (0.5m). The depth of excavation is 79.56m asl. In order to maintain dry and stable working conditions during excavation, dewatering of 1m below the excavation floor is required. The water level required in the excavation is therefore 78.56m asl. The height of the required water level (78.56m asl) above the datum level (78.0m asl) is therefore 0.56m.
R_o	100	**R_o**, the radius of influence, is related to the maximum distance where drawdown from pumping can be measured, which corresponds to the lateral distance between **H** and **h**. **R_o** that was calculated using the empirical relationship developed by Sichart (Powers et al, 2007): **$R_o = 3000^* (H-h)^*K^{0.5}$**. This empirical equation yields a value of 10.0m. Considerable professional judgement is required to employ this relationship. For these flow calculations, the Sichart relationship yields a value close to the edge of the excavation, which would result in large hydraulic gradients and high flow rates. Experience and professional judgement dictate this is unrealistic. Although smaller **R_o** values result in higher estimated groundwater flow rates and the use of the Sichart method is precautionary, the radius of influence must be significantly larger than the equivalent radius of the excavation, **r**. Based on professional judgement, 10.0m is too small to be used for hydrogeological impact assessment. Based on PGL's experience, 100m is a reasonable radius of influence for the magnitude of drawdowns and hydraulic conductivities anticipated at the Site. As a conservative measure, the radius of influence, **R_o**, was assumed to be 100m.
r	27.60	**r** is the equivalent radius of the excavation when modelled as an equivalent well. We have assumed that the entire Site will be excavated to allow for utilities trenches and building footings. As indicated in the provided Site plans (Appendix 2), the Site width is 40.20m, and the Site length is 42.50m. We have added an extra 1m at each end to act as a buffer. The equivalent radius is calculated by **(a+b)/π**, where a = 42.20m, and b = 44.50m, which equals 16.92m.

Using these input values, the total volumetric flow to the excavation for construction is estimated at **241L/day** under steady-state conditions. To account for the initial draining of pores, precipitation, additional dewatering of service utility trenches, runoff, and uncertainty in the input parameter estimates, a safety factor of **4** was deemed reasonable, based on experience at similar sites. The maximum anticipated flow rate is therefore **966L/day**.

5.2 Dewatering Volume: Long-term Drainage into Perimeter Drains

To calculate the long-term drainage volumes at the basement perimeter drains, all parameter estimates from Section 5.1 remain the same, except:

Parameter	Input	Description
H (m)	8.11	**The datum changes to 80.61m asl**, corresponding to the maximum depth of the basement level P2 (9.04m) plus the footings (0.3m), and assumes horizontal passive flow to the foundation drain. The difference between the static groundwater level (88.72) and the datum is therefore 8.11m.
h (m)	0	No dewatering is required below the footings. The difference in elevation between the datum and the required water level is therefore zero.
R_o	50	For these flow calculations, the Sichart relationship yields a value of 7.98m. Based on professional judgement, 7.98m is too small for hydrogeological impact assessment. Based on PGL's experience, 50m is a reasonable radius of influence for the magnitude of drawdowns and hydraulic conductivities anticipated at the Site for long-term dewatering. As a conservative measure, the radius of influence, **R_o**, was assumed to be 50m.
r	27.60	For long-term drainage, only dewatering of the building footprint is required. The maximum dimensions measured on the provided drawings (Appendix 2) are 40.2m and 42.50m. We have added an extra meter at each end to act as a buffer. The equivalent radius is calculated as (a+b)/ π, where a = 42.20m and b = 44.50m. The equivalent radius is therefore 20.18m.

Using these new input values, the total flow of groundwater into the building's foundation drainage system is estimated to be a maximum of **300L/day** under steady-state conditions. No additional safety factor is required for long-term dewatering calculations.

6.0 HYDROGEOLOGICAL IMPACT ASSESSMENT

The impact assessment portion of PGL's scope characterized the potential impacts of the construction dewatering at the building foundation. This assessment discusses quantity and then quality of groundwater.

6.1 Groundwater Quantity

Potential hydrogeological impacts evaluated for the proposed construction are:

- Impacts to water levels in aquifers;
- Impacts to water levels in nearby water wells; and
- Impacts to baseflow in nearby surface water features.

Geological maps (Toronto and Region Conservation[3]) show that between Queen Street and Lake Ontario within the West Don River watershed, it is likely that only the Scarborough Aquifer underlies the Site, and is overlain by recent sediments. The Scarborough Aquifer lays directly on the shale bedrock. Based on the provided borehole logs, and the stratigraphy encountered during drilling, this aquifer was either not encountered or is dominated by very fine-grained sediments

[3] Toronto and Region Conservation (2009). *Don River Watershed Plan: Geology and Groundwater Resources – Report on Current Conditions. Figure 17: Don River watershed cross section A-A.*

near the Site. Regardless, impact to the aquifer is expected to be negligible as dewatering is anticipated to be less than 1,000L/day.

PGL conducted a water well search for wells within 500m of the Site, and identified 169 total wells. These are identified as:

- 2 wells abandoned;
- 2 monitoring wells;
- 4 monitoring wells classified as abandoned;
- 54 wells listed as monitoring/test hole;
- 29 not classified;
- 7 observation wells;
- 5 observation wells listed as not used;
- 46 wells listed as observation and monitoring wells;
- 19 test holes; and
- 1 test hole listed as not used.

The 29 unclassified wells are not likely to be used for water supply. The Site is in downtown Toronto, which is municipally serviced, and all unclassified wells were likely installed in or after 2010, when the existing municipal services were likely to be in place. It is therefore likely that these wells are monitoring wells/test holes.

Only seven wells were within the 100m radius of influence – four wells not classified, and three test hole/observation/monitoring wells. As the Site is within Toronto, these are not expected to be drinking water wells. No adverse impacts to these wells or any wells within 500m of the Site are expected.

The closest surface water body is Lake Ontario, over 1m south of the Site. There are no surface water bodies within the anticipated radius of influence; therefore, baseflow to them will not likely be impacted by Site dewatering.

6.1.1 Environmental Activity and Sector Registry and Permit to Take Water

In Ontario, groundwater takings for construction dewatering require registration in the Environmental Activity and Sector Registry if the extracted groundwater rates are greater than 50,000L/day and less than 400,000L/day. Based on the current construction plan, the dewatering volumes during construction at the Site will not require registration in the Environmental Activity and Sector Registry for online construction dewatering registration.

A Permit to Take Water is required by Ontario for long-term takings of greater than 50,000L/day and construction dewatering projects of greater than 400,000L/day. It is unlikely a Permit to Take Water will be required for this work.

If the proposed development is revised and the excavation will extend deeper than proposed, a Permit to Take Water may be required for construction. In addition, if any design changes violate the assumptions regarding the dewatering, a Permit to Take Water may be required.

6.2 Groundwater Quality

PGL collected a groundwater sample from the Site on March 17, 2021. The groundwater results were compared against the City of Toronto Sanitary and Storm Sewer By-Laws to evaluate if treatment may be required prior to discharge of groundwater to the sewer system. The laboratory Certificate of Analysis is presented in Appendix 4.

Groundwater exceeded the City of Toronto Sewer By-Laws Limits for Storm Sewer Discharge for Total Suspended Solids and total manganese. Groundwater concentrations met all other respective limits for Sanitary Sewer Discharge and Storm Sewer discharge.

We recommend confirmatory sampling for the applicable parameters prior to discharge to the storm or sanitary sewer system, so that the appropriate permits can be obtained prior to dewatering operations. Alternatively, a treatment system could be incorporated into the dewatering operations to ensure concentrations meet the applicable by-laws.

7.0 SUMMARY

PGL completed a Hydrogeological Impact Assessment at 152–164 Bathurst Street and 623–627 Richmond Street West in Toronto, Ontario. The purpose of the assessment was to determine potential impacts due to construction and dewatering at the Site.

The assessment determined the following features of the Site:

- Groundwater elevation ranged between 80.88m asl to 87.72m asl between March 9 and 25, 2021;
- The excavation will extend down to an elevation of 79.56m asl, within the silty clay till, and dewatering is required to an elevation of 78.56 asl; and
- The hydraulic conductivity is based on published literature associated with soil stratigraphy, where the water table was observed, and where the excavation will extend is $1.0x10^{-8}$m/s.

The key results of the Hydrogeological Impact Assessment for the Site are:

- Construction dewatering will be required during the excavation, with a maximum estimated flow of 966L/day;
- There are no anticipated impacts to aquifers, nearby water wells, or baseflow to surface water features due to the planned construction dewatering for the new residential building;
- Construction dewatering at the Site will not likely require registration in the Environmental Activity and Sector Registry;
- A Permit to Take Water is not likely required for the construction dewatering;
- Long-term dewatering of groundwater for the entire Site is anticipated to be a maximum of 300L/day;
- Groundwater at the Site met the City of Toronto Sanitary Sewer By-Law limits;
- Groundwater at the Site exceeded the City of Toronto Storm Sewer By-Laws for Total Suspended Solids and total manganese. Confirmatory sampling or groundwater treatment should be completed prior to dewatering operations; and
- If the construction dewatering plan changes or any of the assumptions stated in this report are otherwise violated, re-evaluation of the potential hydrogeological impact will be required.

Assessment of ground settling due to dewatering was outside the scope of this work program and area of expertise of the authors. We recommend this potential impact be evaluated by a geotechnical engineer.

8.0 STANDARD LIMITATIONS

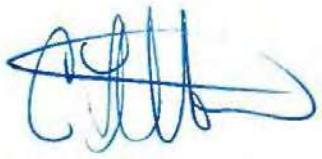
This report is accurate at a high level for reasonably foreseeable conditions. The limitations of the work are not always obvious, and the best way to understand them is discussion with the authors in the context of your intended use. This work is a snapshot in time, so any use must consider that conclusions may change materially because of changes in site condition or regulatory context.

Only the addressee, our client, and their agents may rely on this report for the stated purpose. We warrant only that the work was done as described and is similar to the work that would be done by other qualified consultants in this area. Our contract includes limitations on liability related to professional errors and omissions.

Respectfully submitted,

PGL ENVIRONMENTAL CONSULTANTS

Per:



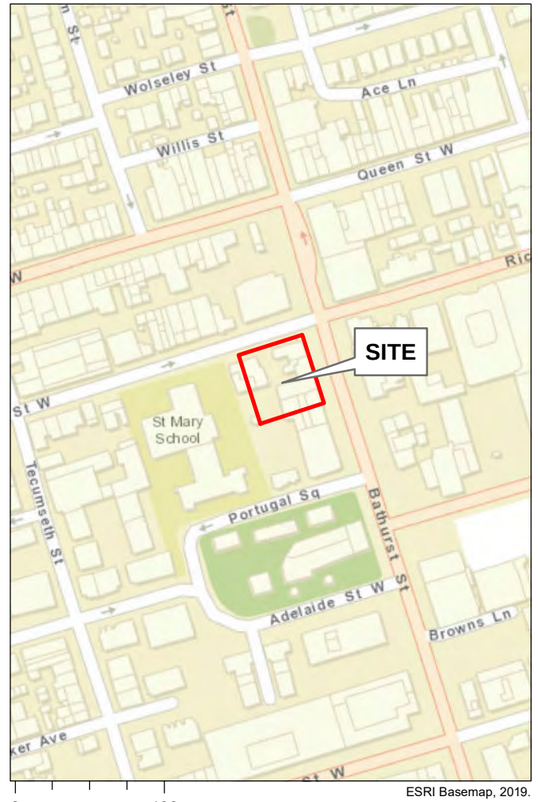
Salima Jaffer, B.Sc.
Environmental Consultant

Christina Trotter, M.Sc., P.Geo.
Senior Hydrogeologist

SAJ/CET/mtl
Y:\5600-5699\5660 - Originate\03-03_Client Docs\r-5660-03-03-HydroG-v1.doc

Figures

PGL
ENVIRONMENTAL CONSULTANTS



Site Boundary (Approximate)

Monitoring Well

Site boundary and site features are approximate and are presented for discussion purposes only.

0 20 m

2018 orthoimage and street map from ESRI
Parcel data from Ontario MNRF web GIS
NAD 1983 UTM Zone 17N

SITE LOCATION & INVESTIGATION LOCATIONS

152 - 164 Bathurst Street, & 623 - 627 Richmond Street West, Toronto, Ontario

TORONTO (BATHURST & RICHMOND) LP

PGL ENVIRONMENTAL CONSULTANTS

File No.:	Dwg No.:	FIGURE
5660-03.03	HG_0010	1
Date: APR 2021	Drawn by: RSS	

Y:\5600-5699\5660 - Originate\03-03\Graphics\56600303_HG_0010_SiteLocationInvestigationLocations.mxd

Site Boundary (Approximate)

Inferred Groundwater Flow Direction *

##.## Groundwater Elevation (m asl)

Monitoring Well

* GROUNDWATER TABLE IS STILL RECOVERING. GROUNDWATER FLOW DIRECTION INFERRED TO BE SOUTH TOWARDS LAKE ONTARIO

Site boundary and site features are approximate and are presented for discussion purposes only.

0 20 m

2018 orthoimage and street map from ESRI
Parcel data from Ontario MNRF web GIS
NAD 1983 UTM Zone 17N

GROUNDWATER ELEVATIONS AND FLOW DIRECTION - (MARCH 9, 2021)

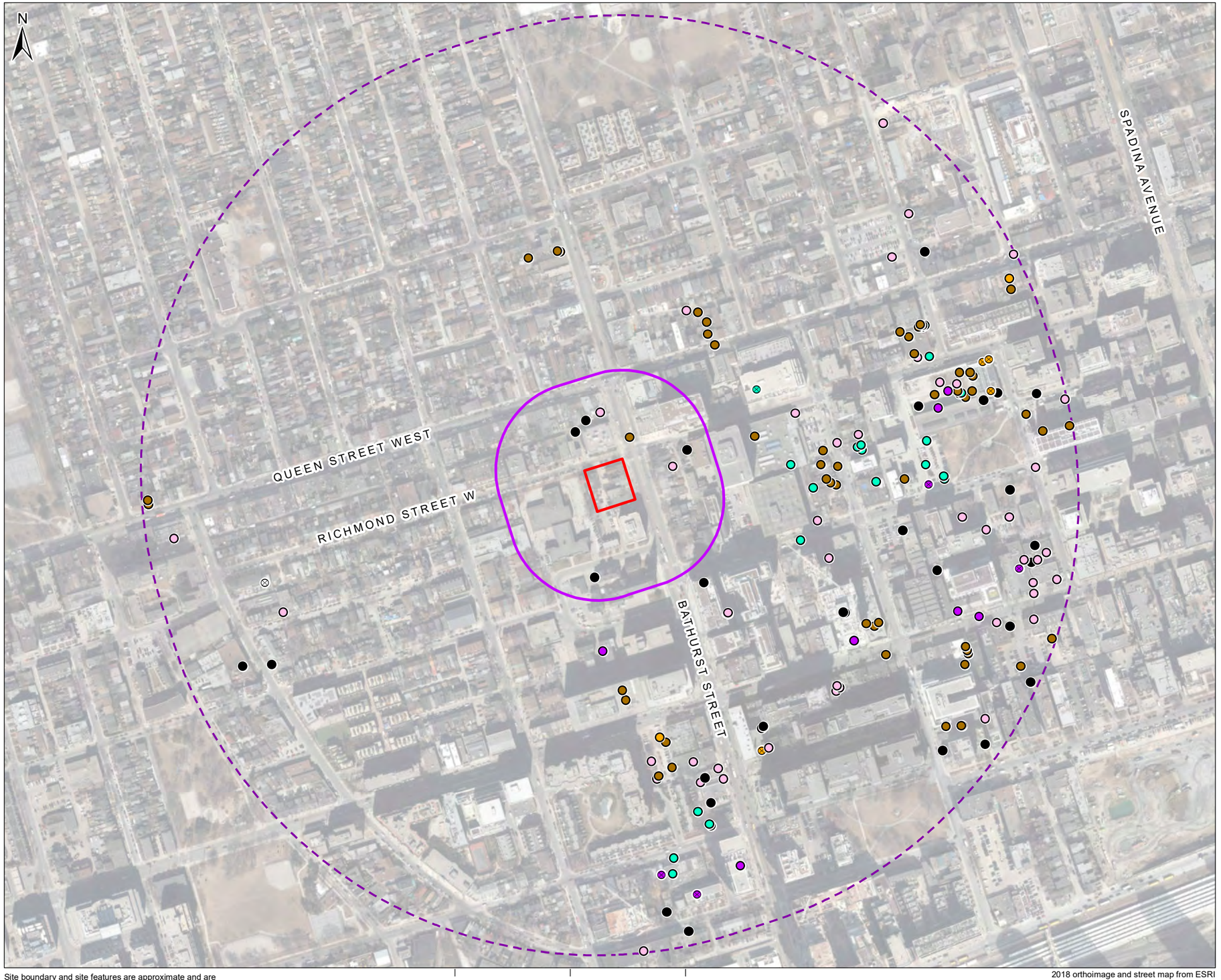
152 - 164 Bathurst Street, & 623 - 627 Richmond Street West, Toronto, Ontario

TORONTO (BATHURST & RICHMOND) LP

PGL ENVIRONMENTAL CONSULTANTS

File No.:	Dwg No.:	FIGURE
5660-03.03	HG_0020	2
Date: APR 2021	Drawn by: RSS	

Y:\5600-5699\5660 - Originale\03-03\Graphics\56600303_HG_0020_GroundwaterElevationsFlowDirection.mxd



Site Boundary (Approximate)

WellSearchArea - 500m

Radius of Influence - 100m

Ontario Well Record DB Classification

- Abandoned
- Monitoring Well
- Monitoring Well - Abandoned
- Monitoring Well/Test Hole
- Not Classified
- Observation Well
- Observation Well - Not Used
- Observation/Monitoring Well
- Test Hole
- Test Hole - Not Used

Site boundary and site features are approximate and are presented for discussion purposes only.

0 260 m

2018 orthoimage and street map from ESRI
Parcel data from Ontario MNRF web GIS
NAD 1983 UTM Zone 17N

RADIUS OF INFLUENCE

152 - 164 Bathurst Street, & 623 - 627 Richmond Street West, Toronto, Ontario

TORONTO (BATHURST & RICHMOND) LP

PGL ENVIRONMENTAL CONSULTANTS

File No.:	Dwg No.:	FIGURE
5660-03.03	HG_0030	3
Date: APR 2021	Drawn by: RSS	

Y:\5600-5699\5660 - Originate\03-03\Graphics\56600303_HG_0030_RadiusOfInfluence.mxd

Tables

PGL ENVIRONMENTAL CONSULTANTS

PGL Environmental Consultants
Analytical Table Notes
Soil and Groundwater Samples

BH_M	Monitoring Well
MW	Monitoring Well
m asl	metres above sea level
m btr	metres below top of riser
m bgs	metres below ground surface
CNA	could not access

PGL ENVIRONMENTAL CONSULTANTS

Table 1
Groundwater Elevations
152-164 Bathurst Street 623-627 Ricmond Street West, Toronto, Ontario
Toronto (Bathurst Richmond) LP, PGL File 5660-03.03

Location	Riser Elevation (m asl)	Ground Elevation (m asl)	09-Mar-21			17-Mar-21			25-Mar-21		
			Depth to Groundwater (m btr)	Depth to Groundwater (m bgs)	Groundwater Elevation (m asl)	Depth to Groundwater (m btr)	Depth to Groundwater (m bgs)	Groundwater Elevation (m asl)	Depth to Groundwater (m btr)	Depth to Groundwater (m bgs)	Groundwater Elevation (m asl)
Shallow Wells											
BH202M	90.10	90.18	dry @6.024	dry @6.104	Dry	5.56	5.65	84.54	5.24	5.32	84.86
BH206M	87.43	87.43	3.241	3.336	84.19	3.34	3.48	84.09	3.12	3.22	84.31
Intermediate Wells											
BH201MS	90.14	90.23	7.821	7.908	82.32	7.68	7.77	82.46	7.48	7.57	82.66
BH203M	90.22	90.33	2.504	2.611	87.72	7.02	7.13	83.20	7.30	7.41	82.92
BH204M	90.38	90.50	6.634	6.751	83.75	5.26	5.38	85.12	2.98	3.10	87.40
BH205M	90.07	90.18	7.564	7.674	82.51	7.34	7.43	82.73	7.04	7.15	83.04
Deep Well											
BH201MD	90.14	90.23	8.136	8.226	82.00	9.26	9.33	80.88	8.75	8.84	81.39

Appendix 1

Borehole Logs

PGL
ENVIRONMENTAL CONSULTANTS

Borehole Logs by PGL Environmental

PGL
ENVIRONMENTAL CONSULTANTS

BOREHOLE RECORD

BOREHOLE NO: **BH207**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.14 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		**TOPSOIL**						90.0
		Clayey SILT (FILL) with rock fragments, grey, moist						
0.4							Bentonite	89.8
0.6				**BH207-SS1**: Metals PAHs PHCs	<25			89.6
0.8								89.4
		End of borehole at 0.90 m						

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 25, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes: Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

BOREHOLE RECORD

BOREHOLE NO: **BH208**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.5 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		**Sandy SILT (FILL)** with gravel, trace clay, grey and brown, moist						90.4
0.4							Bentonite	90.2
0.6			**BH208**: Metals PAHs PHCs		<25			90.0
0.8								89.8
		End of borehole at 0.90 m						89.6

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 25, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes: Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

PGL ENVIRONMENTAL CONSULTANTS

BOREHOLE RECORD

BOREHOLE NO: **BH209**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.488 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	● PID READING (ppmv) ● ■ VAPOUR READING (ppmv) ■	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		**Silty SAND (FILL)** trace gravel, grey, moist						90.4
0.4				**BH209-SS1**: Metals PAHs PHCs	■<25		Bentonite	90.2 90.0
0.6		**Clayey SILT** trace construction debris, brown, moist						89.8
0.8				**BH209-SS2**	■<25			89.6

End of borehole at 0.90 m

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 25, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes ⋈ Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

PGL ENVIRONMENTAL CONSULTANTS

BOREHOLE RECORD

BOREHOLE NO: **BH210**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.414 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	● PID READING (ppmv) ● ■ VAPOUR READING (ppmv) ■	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
		ASPHALT						90.4
0.2		**Silty SAND (FILL)** with gravel, grey, moist						90.2
0.4				**BH210-SS1**: Metals PAHs PHCs	■<25		Bentonite	90.0
0.6		**Clayey SILT (FILL)** trace construction debris, trace gravel, brown, moist						89.8
0.8				**BH210-SS2**	■<25			89.6

End of borehole at 0.90 m

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 25, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes ⋈ Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

BOREHOLE RECORD

BOREHOLE NO: **BH211**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.365 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
		ASPHALT						
		Silty SAND (FILL) with gravel, brown, moist						
0.2		**Silty CLAY (FILL)** trace construction debris, brown, moist						90.2
0.4				**BH211-SS1**: Metals PAHs PHCs	<25		Bentonite	90.0
0.6								89.8
0.8								89.6

End of borehole at 0.90 m

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 25, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes: Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

PGL ENVIRONMENTAL CONSULTANTS

BOREHOLE RECORD

BOREHOLE NO: **BH212**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.251 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	● PID READING (ppmv) ● ■ VAPOUR READING (ppmv) ■	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
		TOPSOIL						90.2
0.2		**Clayey SILT (FILL)** with rock fragments, grey, moist		**BH212-SS1**: Metals PAHs PHCs	■<25			90.0
0.4							Bentonite	89.8
0.6		**Silty CLAY (FILL)** trace construction debris, brown, moist		**BH212-SS2**	■<25			89.6
0.8								89.4

End of borehole at 0.90 m

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 25, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes: Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW201D**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.23 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		Brick Pavers 50 mm					Roadbox, J-plug Silica Sand	90.0
0.4		**SAND AND GRAVEL (FILL)** some clay, some silt, brown, moist						89.8
0.6								89.6
0.8								89.4
1.0								89.2
1.2		**Clayey SILT (FILL)** trace construction debris, brown, moist						89.0
1.4								88.8
1.6								88.6
1.8								88.4
2.0		**Silty CLAY** some sand, trace gravel, brown, moist						88.2
2.2								88.0
2.4								87.8
2.6								87.6
2.8								87.4
3.0								87.2
3.2								87.0
3.4								86.8
3.6								86.6
3.8								86.4
4.0								86.2
4.2								86.0
4.4								85.8
4.6								85.6
4.8								85.4
5.0								85.2
5.2								85.0
5.4								84.8
5.6								84.6
5.8								84.4
6.0								84.2
6.2								84.0
6.4								83.8
6.6							Bentonite	83.6
6.8								83.4
7.0								83.2
7.2								83.0
7.4								82.8
7.6								82.6
7.8								82.4
8.0								82.2
8.2								82.0
8.4								81.8
8.6								81.6
8.8								81.4
9.0								81.2
9.2		**Silty SAND** trace clay, trace gravel, grey, moist						81.0
9.4								80.8
9.6								80.6
9.8								80.4
10.0								80.2
10.2								80.0
10.4		**Silty CLAY** grey, moist						79.8
10.6								79.6
10.8								79.4
11.0								79.2
11.2								79.0
11.4								78.8
11.6								78.6
11.8								78.4
12.0								78.2
12.2								78.0
12.4								77.8
12.6		Weathered Shale						77.6
12.8								77.4
13.0								77.2
13.2								77.0
13.4								76.8
13.6								76.6
13.8								76.4
14.0								76.2
14.2							Silica Sand 50mm 010 Slot PVC	76.0
14.4								75.8
14.6								75.6
14.8								75.4
15.0								75.2
15.2								75.0
15.4								74.8
15.6								74.6
15.8								74.4
16.0							Slough	

MW201D-SS3: Metals, PAHs, PHCs

MW201D-SS4: Metals, PAHs, PHCs

End of borehole at 16.00 m

Screened interval from 12.9 m to 15.9 m below surface.
GW 9.33 mbgs
(3/17/2021)

INVESTIG. METHOD: B37X Diamond Drill

INVESTIG. DATE: February 22, 2021

LOGGED BY: RSC HOLE DIAM (mm): 203

Sample Notes ☒ Split Spoon

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW201S**

PGL ENVIRONMENTAL CONSULTANTS

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.23 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		Brick Pavers 50 mm			Roadbox, J-plug Silica Sand	90.0
0.4		**SAND AND GRAVEL (FILL)** some clay, some silt, brown, moist				89.8
0.6		**Clayey SILT** trace construction debris, brown, moist				89.6
0.8						89.4
1.0						89.2
1.2						89.0
1.4						88.8
1.6						88.6
1.8						88.4
2.0						88.2
2.2		**Silty CLAY** some sand, trace gravel, brown, moist				88.0
2.4						87.8
2.6					Bentonite	87.6
2.8						87.4
3.0						87.2
3.2						87.0
3.4						86.8
3.6						86.6
3.8		grey below 3.7m				86.4
4.0						86.2
4.2						86.0
4.4						85.8
4.6						85.6
4.8						85.4
5.0						85.2
5.2						85.0
5.4						84.8
5.6						84.6
5.8						84.4
6.0						84.2
6.2					Silica Sand 50mm 010 Slot PVC	84.0
6.4						83.8
6.6						83.6
6.8						83.4
7.0						83.2
7.2						83.0
7.4						82.8
7.6			▼			82.6
7.8						82.4
8.0					Slough	

End of borehole at 8.00 m

Screened interval from 4.9 m to 7.9 m below surface.
GW 7.77 mbgs
(3/17/2021)

INVESTIG. METHOD: B37X Diamond Drill
INVESTIG. DATE: February 22, 2021
LOGGED BY: RSC HOLE DIAM (mm): 203

Sample Notes

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW202**

PGL ENVIRONMENTAL CONSULTANTS

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.18 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		**Clayey SILT (FILL)** some gravel, some sand, brown, moist		**MW202-SS1**: Metals PAHs PHCs	<25			Roadbox, J-plug Silica Sand	90.0
0.4									89.8
0.6									89.6
0.8				**MW202-SS2**: Metals PAHs PHCs	<25	5			89.4
1.0									89.2
1.2									89.0
1.4				**MW202-SS3**	<25				88.8
1.6		grey, moist to dry below 1.5m						Bentonite	88.6
1.8		0.15m sand seam at 1.8m							88.4
2.0				**MW202-SS4**: Metals PAHs PHCs	<25				88.2
2.2									88.0
2.4									87.8
2.6				**MW202-SS5**	<25				87.6
2.8									87.4
3.0									87.2
3.2				**MW202-SS6/Z001**: Metals PAHs	<25				87.0
3.4									86.8
3.6		**Silty CLAY** trace gravel, brown, moist							86.6
3.8									86.4
4.0		grey below 3.8m							86.2
4.2				**MW202-SS7**	<25				86.0
4.4								Silica Sand 50mm 010 Slot PVC	85.8
4.6									85.6
4.8									85.4
5.0									85.2
5.2									85.0
5.4									84.8
5.6				**MW202-SS8**	<25				84.6
5.8									84.4
6.0									84.2
6.2				**MW202-SS9**	<25				84.0
6.4									83.8
6.6									83.6
6.8								Slough	83.4
7.0									83.2
7.2				**MW202-SS10**	<25				83.0
7.4									82.8
7.6									82.6

End of borehole at 7.60 m

Screened interval from 3 m to 6.1 m below surface.
GW 5.65 mbgs
(3/17/2021)

INVESTIG. METHOD: B37X Diamond Drill
INVESTIG. DATE: February 23, 2021
LOGGED BY: RSC HOLE DIAM (mm): 203

Sample Notes ☒ Split Spoon

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

PGL MULTI-TEST VAPOR LOG 2015 5660-03.GPJ PGL CANADA 2015.GDT 4/22/21

WELL RECORD

WELL NO: **MW203**

PGL PROJECT NO: **5660-03.03**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

SURFACE ELEVATION: **90.33 m**

DEPTH (m)	SOIL DESCRIPTION	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	COMPLETION NOTES	ELEVATION (m)
0.2	**Clayey SILT (FILL)** trace gravel with rock fragments, trace roots, grey, dry to moist	**MW203-SS1**: Metals PAHs PHCs	<25	Roadbox, J-plug Silica Sand	90.2
0.4					90.0
0.6					89.8
0.8					89.6
1.0		**MW203-SS2**: Metals PAHs PHCs	<25		89.4
1.2					89.2
1.4					89.0
1.6					88.8
1.8	**SAND (FILL)** some gravel, brown, moist	**MW203-SS3**	<25		88.6
2.0					88.4
2.2					88.2
2.4	**Silty CLAY** grey and brown, moist	**MW203-SS4**: Metals PAHs PHCs	<25		88.0
2.6					87.8
2.8				Bentonite	87.6
3.0					87.4
3.2					87.2
3.4		**MW203-SS5**	<25		87.0
3.6					86.8
3.8					86.6
4.0	grey below 4m	**MW203-SS6/Z002**: VOCs	<25		86.4
4.2					86.2
4.4					86.0
4.6					85.8
4.8					85.6
5.0					85.4
5.2					85.2
5.4					85.0
5.6					84.8
5.8					84.6
6.0					84.4
6.2					84.2
6.4				Silica Sand 50mm 010 Slot PVC	84.0
6.6					83.8
6.8					83.6
7.0					83.4
7.2					83.2
7.4					83.0
7.6					82.8
7.8					82.6
8.0					82.4
8.2					82.2
8.4					82.0
8.6	**Silty SAND** trace clay, trace gravel, grey, wet				81.8
8.8					81.6
9.0				Slough	81.4
9.2					81.2
9.4					81.0
9.6					80.8
9.8					80.6
					80.4

INVESTIG. METHOD: B37X Diamond Drill

INVESTIG. DATE: February 24, 2021

LOGGED BY: RSC HOLE DIAM (mm): 203

Sample Notes ⊠ Split Spoon

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

PGL ENVIRONMENTAL CONSULTANTS

WELL RECORD

WELL NO: **MW203**

CLIENT: Originate Developments Inc.

PGL PROJECT NO: **5660-03.03**

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

SURFACE ELEVATION: **90.33 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	● PID READING (ppmv) ● ■ VAPOUR READING (ppmv) ■	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
10.2									80.2
10.4		**Silty CLAY** grey, moist							80.0
10.6									79.8
10.8									79.6
11.0									79.4
11.2									79.2
11.4									79.0
11.6									78.8
11.8									78.6
12.0									78.4
12.2		Weathered Shale							78.2
12.4								Slough	78.0
12.6									77.8
12.8									77.6
13.0									77.4
13.2									77.2
13.4									77.0
13.6									76.8
13.8									76.6
14.0									76.4
14.2									76.2
14.4									76.0
14.6									75.8

End of borehole at 14.60 m

Screened interval from 4.9 m to 7.9 m below surface.
GW 7.13 mbgs
(3/17/2021)

PGL MULTI-TEST VAPOR LOG 2015 5660-03.GPJ PGL CANADA 2015.GDT 4/22/21

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW204**

PGL ENVIRONMENTAL CONSULTANTS

CLIENT: Originate Developments Inc.

PGL PROJECT NO: **5660-03.03**

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

SURFACE ELEVATION: **90.5 m**

DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2	**ASPHALT**						Roadbox, J-plug Silica Sand	90.4
0.4	**Gravelly SAND (FILL)** with construction debris, brown, moist	MW204-SS1	Metals, PAHs, PHCs	<25				90.2
0.6								90.0
0.8								89.8
1.0	**Clayey SILT (FILL)** brown, moist							89.6
1.2								89.4
1.4		MW204-SS2	Metals, PAHs, PHCs	<25				89.2
1.6								89.0
1.8								88.8
2.0	**Silty CLAY** some sand, trace gravel, brown, moist	MW204-SS3		<25				88.6
2.2								88.4
2.4								88.2
2.6							Bentonite	88.0
2.8		MW204-SS4/Z004	Metals, PAHs, PHCs	<25				87.8
3.0								87.6
3.2								87.4
3.4								87.2
3.6								87.0
3.8	grey below 3.7m							86.8
4.0								86.6
4.2								86.4
4.4								86.2
4.6								86.0
4.8								85.8
5.0								85.6
5.2					▼			85.4
5.4								85.2
5.6								85.0
5.8								84.8
6.0								84.6
6.2								84.4
6.4							Silica Sand 50mm 010 Slot PVC	84.2
6.6								84.0
6.8								83.8
7.0								83.6
7.2								83.4
7.4								83.2
7.6								83.0
7.8								82.8
8.0								82.6
8.2								82.4
8.4								82.2
8.6	with weathered shale below 8.5m							82.0
8.8								81.8
9.0							Slough	81.6
9.2								81.4
9.4								81.2
9.6								81.0
9.8								80.8
								80.6

INVESTIG. METHOD: B37X Diamond Drill

INVESTIG. DATE: February 25 - February 26, 2021

LOGGED BY: RSC HOLE DIAM (mm): 203

Sample Notes: Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

PGL ENVIRONMENTAL CONSULTANTS

WELL RECORD

WELL NO: **MW204**

CLIENT: Originate Developments Inc.

PGL PROJECT NO: **5660-03.03**

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

SURFACE ELEVATION: **90.5 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	● PID READING (ppmv) ● ■ VAPOUR READING (ppmv) ■	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
10.2		**Silty CLAY** some sand, trace gravel, brown, moist *continued from previous page*							80.4
10.4									80.2
10.6									80.0
10.8									79.8
11.0									79.6
11.2									79.4
11.4									79.2
11.6									79.0
11.8									78.8
12.0									78.6
12.2									78.4
12.4								Slough	78.2
12.6		Weathered Shale							78.0
12.8									77.8
13.0									77.6
13.2									77.4
13.4									77.2
13.6									77.0
13.8									76.8
14.0									76.6
14.2									76.4
14.4									76.2
14.6									76.0

End of borehole at 14.60 m

Screened interval from 4.9 m to 7.9 m below surface.
GW 5.38 mbgs
(3/17/2021)

PGL MULTI-TEST VAPOR LOG 2015 5660-03.GPJ PGL CANADA 2015.GDT 4/22/21

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW205**

PGL PROJECT NO: **5660-03.03**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

SURFACE ELEVATION: **90.18 m**

DEPTH (m)	SOIL DESCRIPTION	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2	**Clayey SILT (FILL)** trace sand, brown, moist	**MW205-SS1**: Metals PAHs PHCs	<25		Roadbox, J-plug Silica Sand	90.0
1.8	**Silty CLAY** some sand, trace gravel, brown, moist	**MW205-SS2**: Metals PAHs PHCs	<25			88.4
2.4		**MW205-SS3**	<25			87.8
3.0		**MW205-SS4**: Metals PAHs PHCs	<25		Bentonite	87.2
8.4	**Silty SAND** trace clay, trace gravel, grey, moist				Silica Sand 50mm 010 Slot PVC	81.8
9.8					Slough	80.4

INVESTIG. METHOD: B37X Diamond Drill

INVESTIG. DATE: February 24, 2021

LOGGED BY: RSC HOLE DIAM (mm): 203

Sample Notes: Split Spoon

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW205**

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **90.18 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	● PID READING (ppmv) ● ■ VAPOUR READING (ppmv) ■	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
10.2									80.0
10.4		**Silty CLAY** with weathered shale, grey, moist							79.8
10.6									79.6
10.8									79.4
11.0									79.2
11.2									79.0
11.4								Slough	78.8
11.6									78.6
11.8									78.4
12.0									78.2
12.2									78.0
12.4									77.8
12.6		Weathered Shale							77.6
12.8									77.4

End of borehole at 12.80 m

Screened interval from 4.9 m to 7.9 m below surface.
GW 7.43 mbgs
(3/17/2021)

PGL MULTI-TEST VAPOR LOG 2015 5660-03.GPJ PGL CANADA 2015.GDT 4/22/21

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

WELL RECORD

WELL NO: **MW206**

PGL ENVIRONMENTAL CONSULTANTS

CLIENT: Originate Developments Inc.

PROJECT: 156-164 Bathurst St. & 623-627 Richmond St. West, Toronto, ON

PGL PROJECT NO: **5660-03.03**

SURFACE ELEVATION: **87.43 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	PID READING (ppmv) / VAPOUR READING (ppmv)	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		**CONCRETE**						Roadbox, J-plug	87.2
0.4		**GRAVEL (FILL)** grey, dry						Silica Sand	87.0
0.6		**Silty CLAY** trace rock fragments, trace sand, brown, moist		**MW206-SS1**: Grain Size, Metals, PAHs, pH, PHCs	<25				86.8
0.8									86.6
1.0								Bentonite	86.4
1.2				**MW206-SS2/ Z003**: Metals, PAHs, PHCs, VOCs	<25				86.2
1.4									86.0
1.6		grey below 1.5m							85.8
1.8		some gravel at 1.65m							85.6
2.0		no sand below 1.8m			<25				85.4
2.2				**MW206-SS3**					85.2
2.4									85.0
2.6									84.8
2.8				**MW206-SS4**: Metals, PAHs, PHCs	<25				84.6
3.0								Silica Sand 50mm 010 Slot PVC	84.4
3.2									84.2
3.4						▼			84.0
3.6				**MW206-SS5**	<25				83.8
3.8									83.6
4.0									83.4
4.2				**MW206-SS6**	<25				83.2
4.4									83.0
4.6									82.8
4.8				**MW206-SS7**	<25				82.6
5.0								Slough	82.4
5.2									82.2
5.4				**MW206-SS8**	<25				82.0

End of borehole at 5.50 m

Screened interval from 1.5 m to 4.6 m below surface.

Borehole located within the basement of Site address
GW 3.48 mbgs
(3/17/2021)

INVESTIG. METHOD: Geoprobe 420M

INVESTIG. DATE: February 24, 2021

LOGGED BY: RSC HOLE DIAM (mm): 102

Sample Notes: Macro Core Sampler

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

Borehole Logs by Terrapex Environmental

PGL
ENVIRONMENTAL CONSULTANTS

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling	**BH No.: BH201MD**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN / ELEV. (m) 90.23	
LOCATION: Toronto, Ontario	NORTHING: 4833784.86 / EASTING: 628704.11	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
	BRICK PAVERS 50 mm FILL, gravelly sand and clayey silt	0	90	17	20	1A		17		Borehole advanced with hollow stem augers. 50 mm diameter monitoring well installed.
	FILL firm to stiff, moist brown and black clayey silt trace brick fragments	0.5	89.5	8	21	1B				
		1			17	2		8		
		1.5	89							
		2	88.5	13	16	3		13		
		2.5	88	22	16	4		22		
		3	87.5							
		3.5	87	15	22	5		15		
	brown -----	4	86.5	18		6		18		
	grey	4.5	86							
	very stiff to stiff	5	85.5	14	15	7		14		
	-----	5.5	85							
	firm moist SILTY CLAY some sand to sandy trace gravel (TILL)	6	84.5							
		6.5	84	5	17	8		5		
		7	83.5	67						
		7.5	83							
		8	82.5	6	19	9		6		
		8.5	82							
		9	81.5							
	dense, moist, grey SILTY fine SAND trace clay, trace gravel	9.5	81	34	15 16	10A 10B		34		
			80.5							

TERRAPEX

LOGGED BY: JC | DRILLING DATE: February 22, 2021

REVIEWED BY: VN |

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH201MD**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.23	
LOCATION: Toronto, Ontario	NORTHING: 4833784.86	EASTING: 628704.11	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
	dense, moist, grey SILTY fine SAND trace clay, trace gravel	10	80							
	very dense SILTY CLAY (TILL) and weathered SHALE COMPLEX	10.5	79.5	47	10	11		47		
		11	79							
		11.5	78.5	40	14	12		40		
		12	78		12	13A		100+		
		12.5	77.5	100+		13B				
	grey weathered SHALE	13	77	100+	5	14		100+		TCR 85% RQD 61%
	grey SHALE with limestone interbeds slightly weathered moderately fractured	13.5	76.5			15				Unconfined compressive strength at 13.7 m depth is 53.7 MPa. TCR 100% RQD 93%
		14	76							
		14.5	75.5							
		15	75			16				
		15.5	74.5							
	END OF BOREHOLE									

TERRAPEX

LOGGED BY: JC | DRILLING DATE: February 22, 2021

REVIEWED BY: VN |

CLIENT: PGL Environmental Consultants	METHOD: Augering		**BH No.: BH201MS**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.23	
LOCATION: Toronto, Ontario	NORTHING: 4833784.86	EASTING: 628704.11	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		REFER TO BOREHOLE BH201MD FOR SOIL STRATIGRAPHY	0 – 7.5	90 – 82.5							Borehole advanced with hollow stem augers. 50 mm diameter monitoring well installed.
		END OF BOREHOLE									

TERRAPEX

LOGGED BY: EM | DRILLING DATE: February 23, 2021

REVIEWED BY: VN | Page 1 of 1

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH202M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.18	
LOCATION: Toronto, Ontario	NORTHING: 4833816.34	EASTING: 628723.99	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		FILL stiff to very stiff, moist dark brown and grey clayey silt occasional pockets of crusher run limestone and gravelly sand	0 – 3.5	90 – 86.5	N-Value: 24, 9, 16, 17, 18		1A, 1B, 2, 3A, 3B, 4A, 4B, 5A, 5B		24, 9, 16, 17, 18		Borehole advanced with hollow stem augers. 50 mm diameter monitoring well installed.
		stiff to firm, moist, grey SILTY CLAY some sand to sandy trace gravel (TILL)	3.5 – 8	86.5 – 82	N-Value: 9, 8, 4, 6, 4, 4		6, 7, 8, 9, 10, 11		9, 8, 4, 6, 4, 4		
		END OF BOREHOLE									

TERRAPEX

LOGGED BY: EM	DRILLING DATE: February 23, 2021
REVIEWED BY: VN	Page 1 of 1

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH203M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.33	
LOCATION: Toronto, Ontario	NORTHING: 4833809.60	EASTING: 628727.77	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		TOPSOIL 100 mm	0	90	15	17	1A				Borehole advanced with hollow stem augers.
		FILL stiff, moist, brown and grey clayey silt occasional shale fragments occasional pockets of crusher run limestone	0.5	89.5	9	7	1B		15		50 mm diameter monitoring well installed in straight augered borehole adjacent to sampled borehole.
			1	89			2		9		
			1.5	88.5	25	15	3A				
			2	88			3B		25		
			2.5	87.5	14	18	4		14		
		brown	3	87	8	17	5		8		
		-----	3.5	86.5							
		grey	4	86	7	16	6		7		
			4.5	85.5	3	18	7		3		
		stiff to firm, moist SILTY CLAY some sand to sandy trace gravel (TILL)	5	85							
			5.5	84.5							
			6	84	7	3	8		7		
			6.5	83.5							
			7	83							
			7.5	82.5	8	20	9		8		
			8	82							
			8.5	81.5							
		dense, wet, grey SILTY fine SAND trace clay, trace gravel	9	81	40	17	10		40		
			9.5	80.5							

TERRAPEX

LOGGED BY: JC | DRILLING DATE: February 24, 2021

REVIEWED BY: VN |

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH203M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.33	
LOCATION: Toronto, Ontario	NORTHING: 4833809.60	EASTING: 628727.77	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

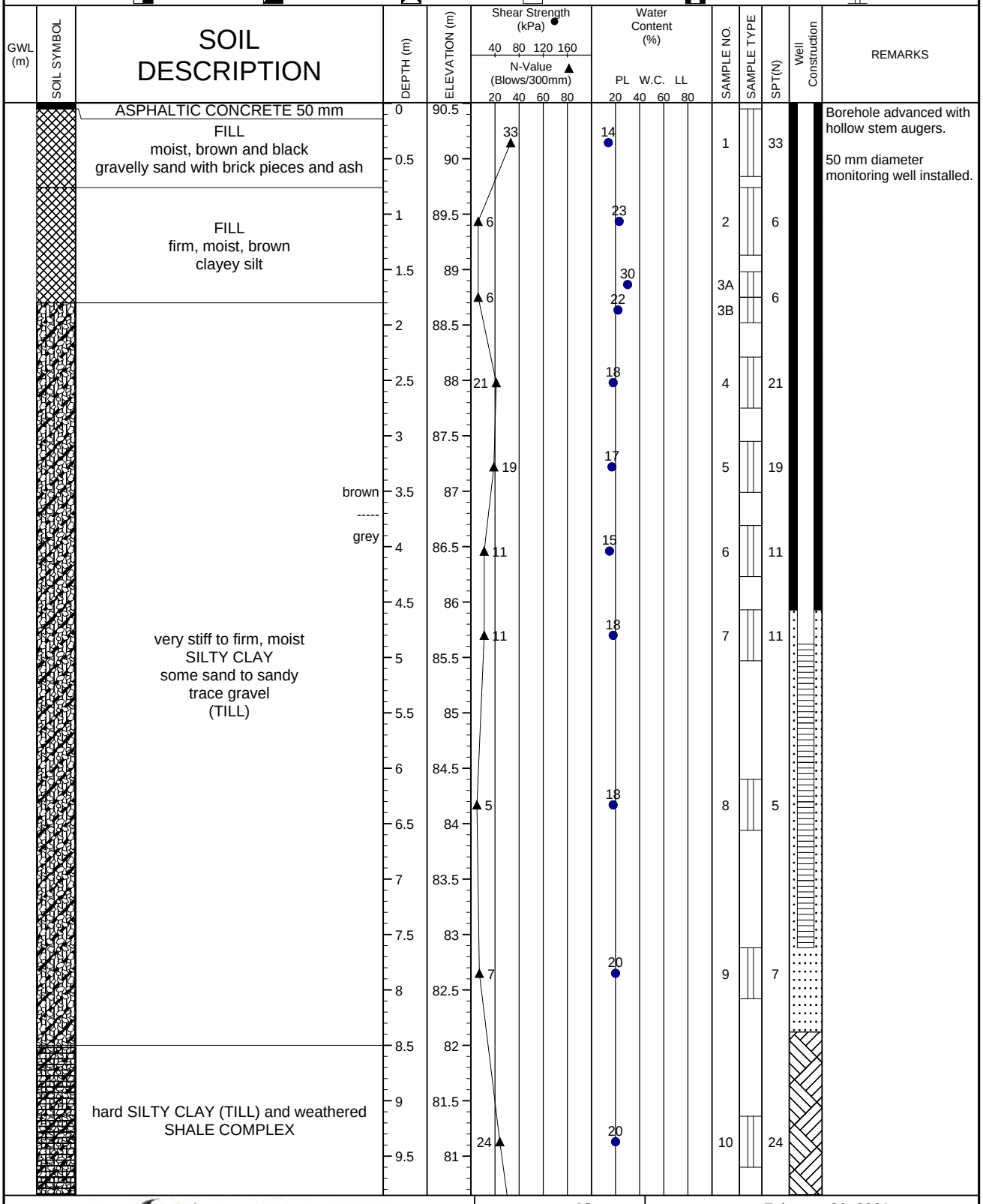
GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		dense, wet, grey SILTY fine SAND, trace clay, trace gravel	10								
			10.5	80							
		hard SILTY CLAY (TILL) and weathered SHALE COMPLEX	11	79.5	39	12	11		39		
			11.5	79							
			12	78.5	100+	9	12		100+		TCR 100% RQD 46%
		grey SHALE with limestone interbeds slightly weathered moderately fractured	12.5	78			13				TCR 100% RQD 94%
			13	77.5							
			13.5	77							Shale unconfined compressive strength at 13.5 m depth is 17.1 MPa.
			14	76.5			14				
		END OF BOREHOLE	14.5	76							

TERRAPEX

LOGGED BY: JC	DRILLING DATE: February 24, 2021
REVIEWED BY: VN	Page 2 of 2

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH204M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.50	
LOCATION: Toronto, Ontario	NORTHING: 4833822.21	EASTING: 628701.54	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



Borehole advanced with hollow stem augers.

50 mm diameter monitoring well installed.

TERRAPEX	LOGGED BY: JC	DRILLING DATE: February 26, 2021
	REVIEWED BY: VN	Page 1 of 2

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH204M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.50	
LOCATION: Toronto, Ontario	NORTHING: 4833822.21	EASTING: 628701.54	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

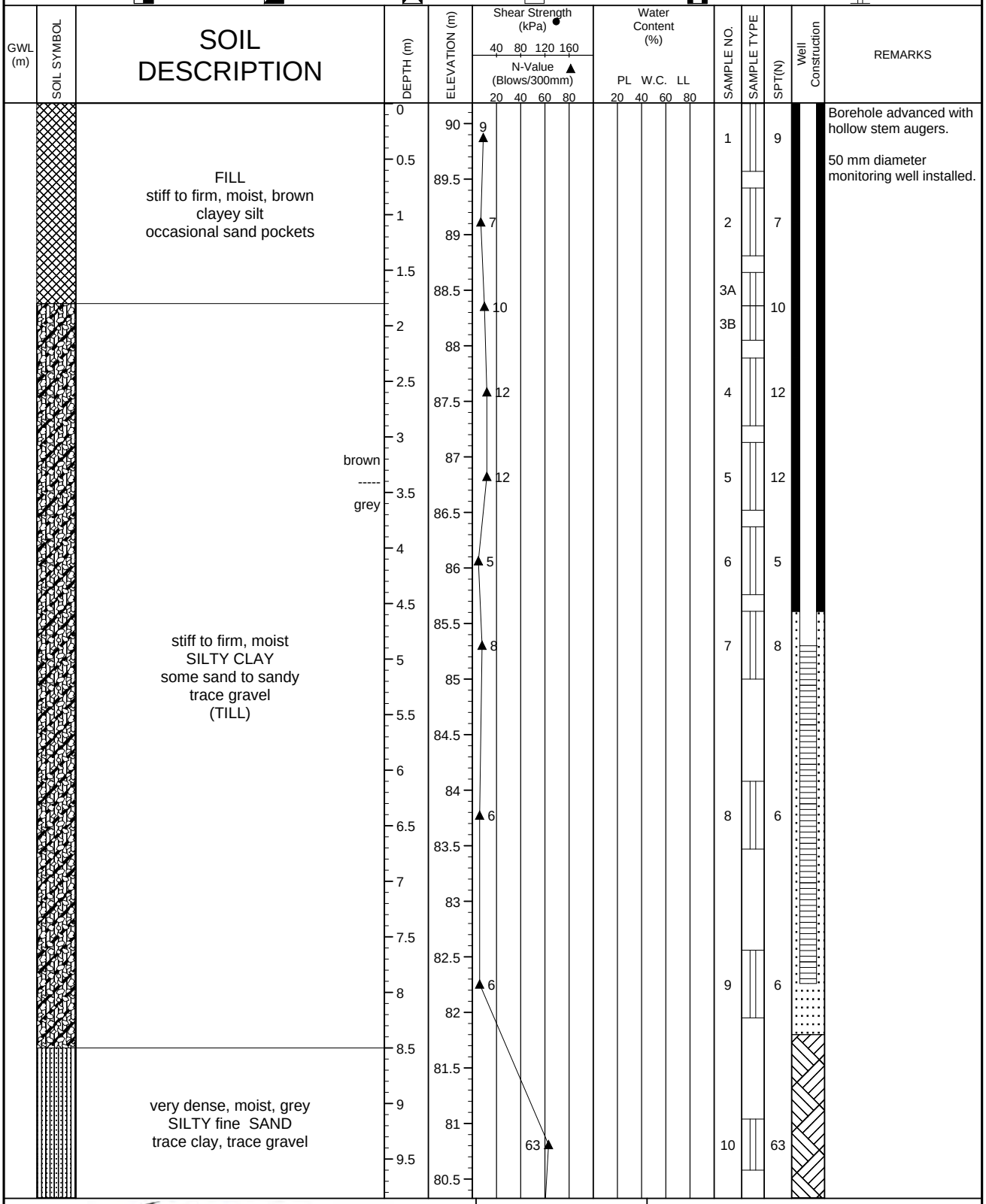
GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		hard SILTY CLAY (TILL) and weathered SHALE COMPLEX	10	80.5	43	9	11		43		
			10.5	80							
			11	79.5							
			11.5	79							
			12	78.5	61	10	12		61		
			12.5	78	100+		13		100+		
		grey weathered SHALE	13	77.5							
			13.5	77							
			14	76.5							
			14.5	76	100+		14		100+		
		END OF BOREHOLE									

TERRAPEX

LOGGED BY: JC	DRILLING DATE: February 26, 2021
REVIEWED BY: VN	Page 2 of 2

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH205M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.18	
LOCATION: Toronto, Ontario	NORTHING: 4833805.47	EASTING: 628711.82	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



TERRAPEX	LOGGED BY: JC	DRILLING DATE: February 24, 2021
	REVIEWED BY: VN	Page 1 of 2

CLIENT: PGL Environmental Consultants	METHOD: Augering and Split Spoon Sampling		**BH No.: BH205M**
PROJECT: SW Corner of Richmond and Bathurst	PROJECT ENGINEER: VN	ELEV. (m) 90.18	
LOCATION: Toronto, Ontario	NORTHING: 4833805.47	EASTING: 628711.82	PROJECT NO.: 21-014

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	Well Construction	REMARKS
		very dense, moist, grey SILTY fine SAND, trace clay, trace gravel	10	80							
		hard SILTY CLAY (TILL) and weathered SHALE COMPLEX	10.5	79.5	55		11		55		
			11	79							
			11.5	78.5	49		12		49		
			12	78							
		grey weathered SHALE	12.5	77.5	100+		13		100+		
		END OF BOREHOLE									

TERRAPEX

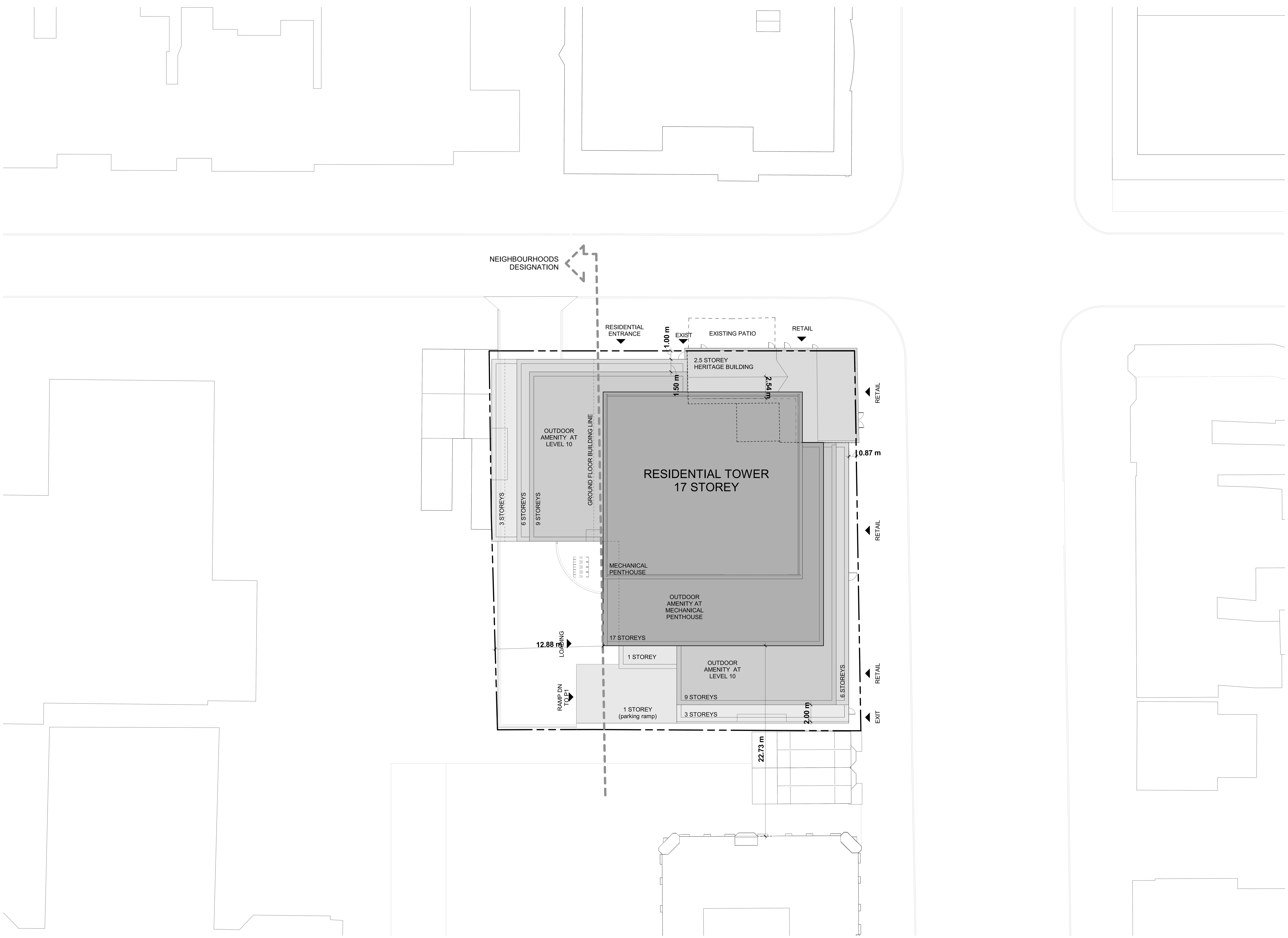
LOGGED BY: JC | DRILLING DATE: February 24, 2021

REVIEWED BY: VN

Appendix 2

Proposed Development Plans

PGL
ENVIRONMENTAL CONSULTANTS



Site Plan 1 dA1.3
1 : 200

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

Date:

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

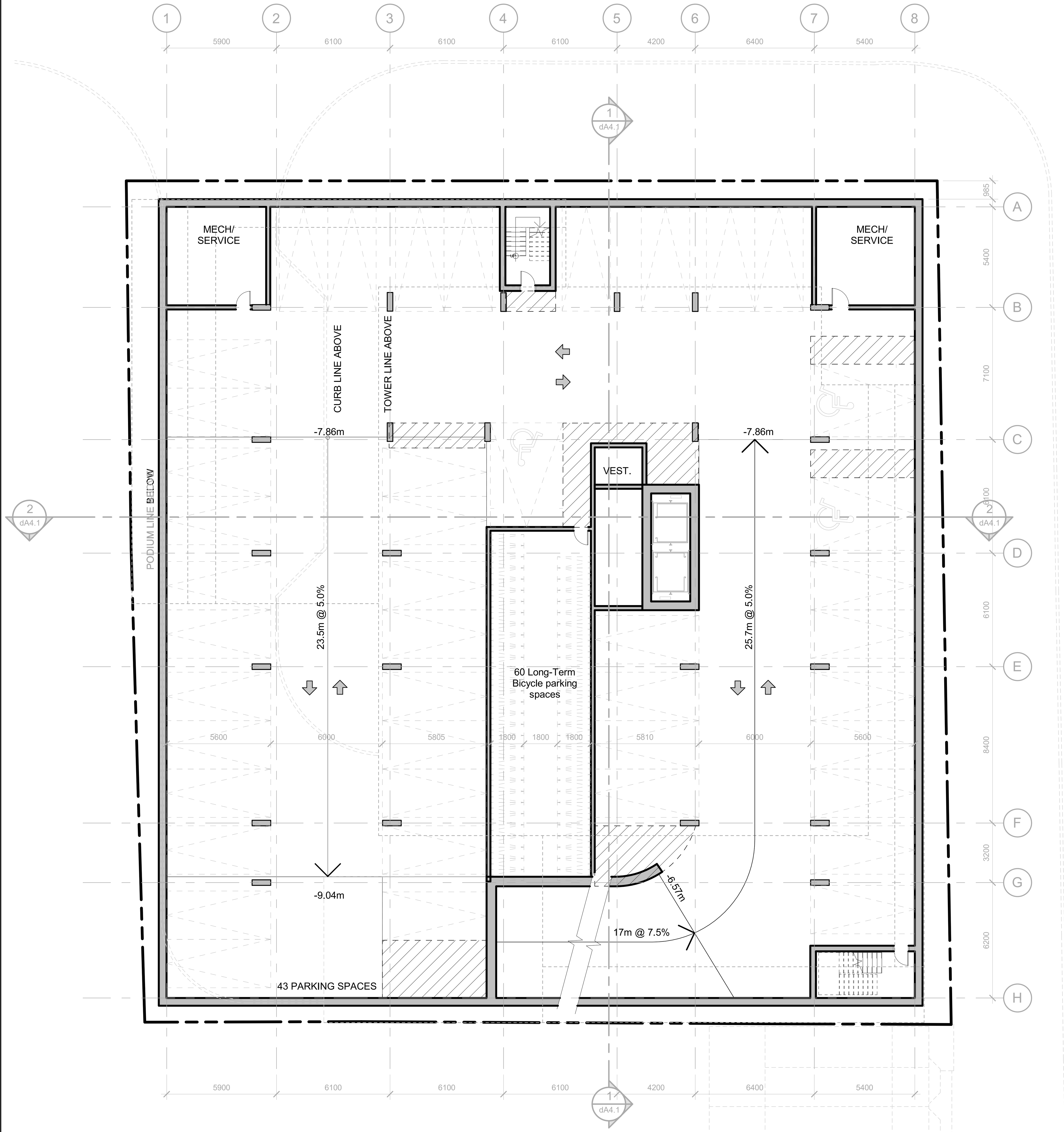
Drawing Title:
Site Plan

Client:
Originate

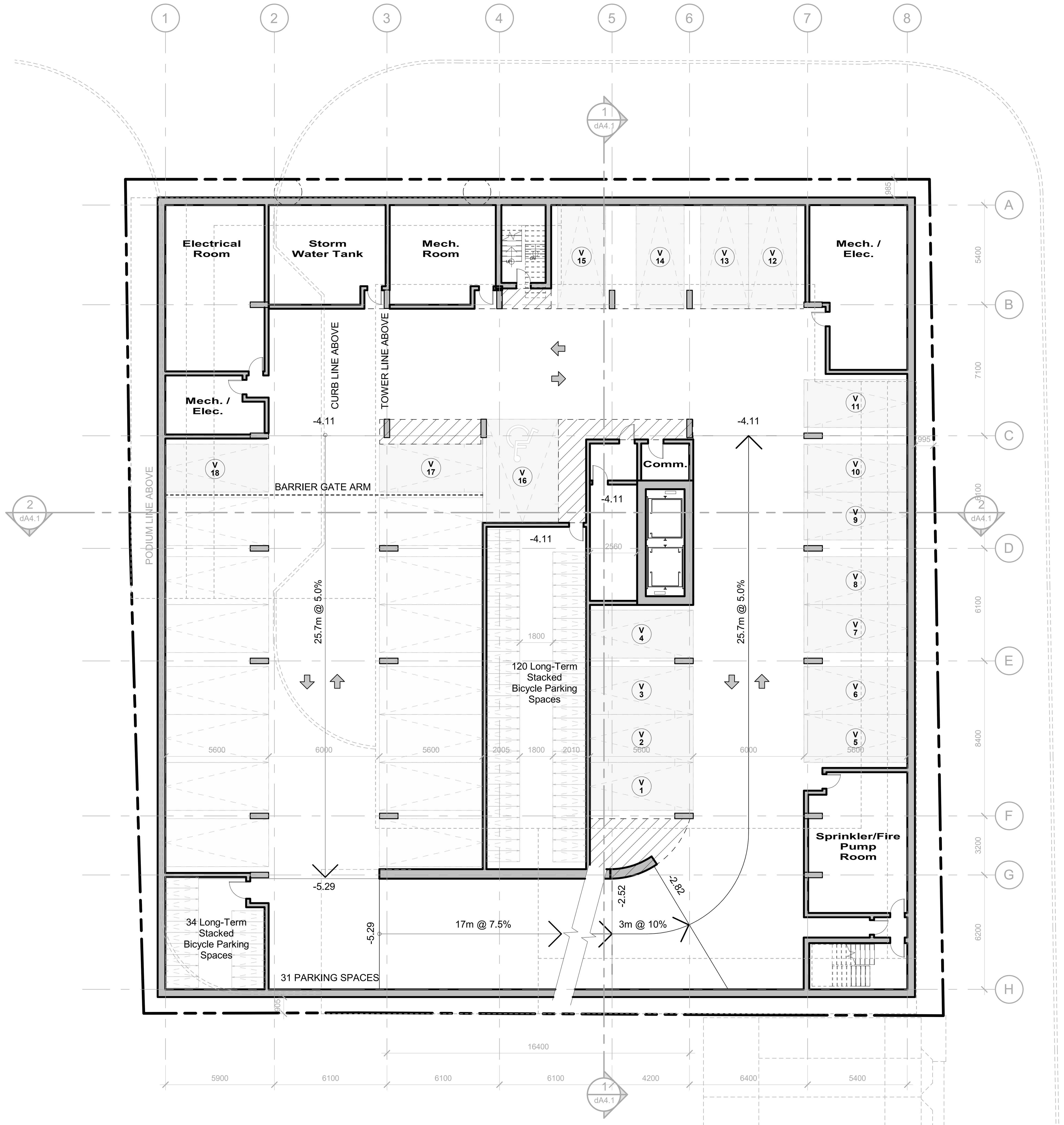
Project:
Bathurst and Richmond

152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 200
Drawn by: N.P
Checked by: A.L
Project No.: 20-018
Date: April 15, 2021
Drawing No.: dA1.3



Floor plan P2 1 dA2.1
1 : 150



Floor plan P1 2 dA2.1
1 : 150

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

Date:

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

Drawing Title:

Floor Plan - Level P2 & P1

Client:

Originate

Project:

Bathurst and Richmond

152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 150

Drawn by: N.P

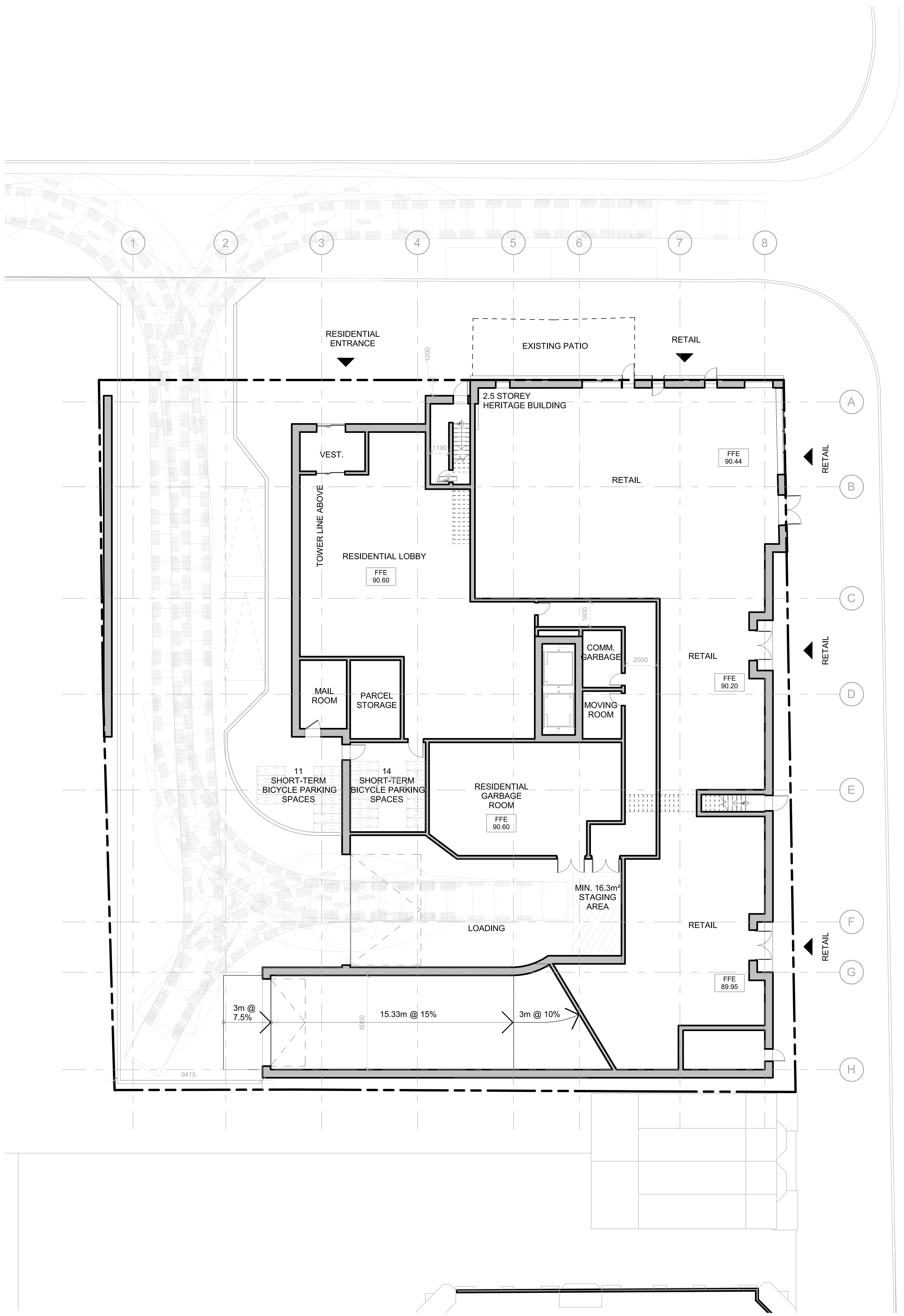
Checked by: A.L

Project No.: 20-018

Date: April 15, 2021

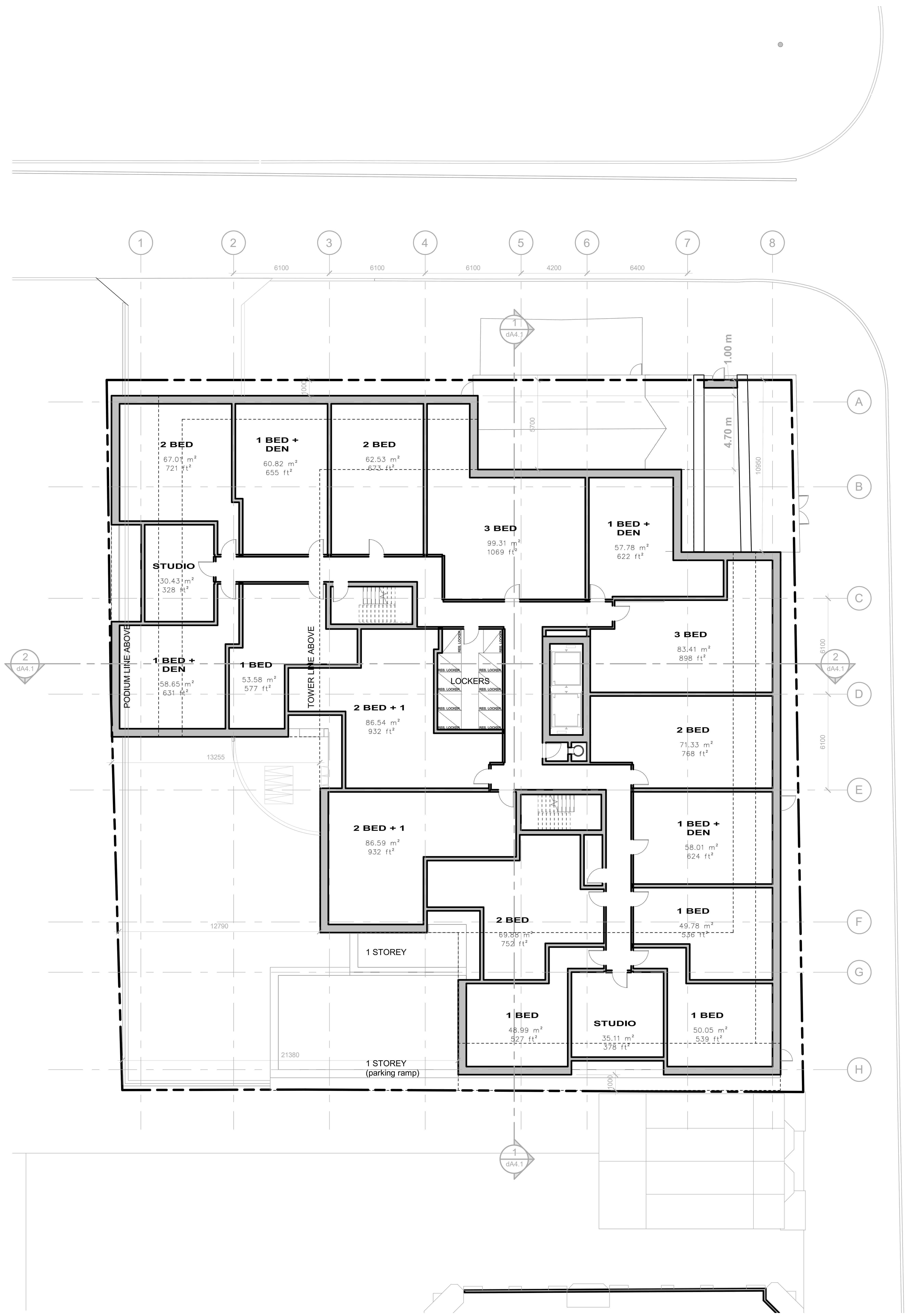
Drawing No.:

dA2.1



Floor Plan - Level 1 (1 / dA2.2)

1 : 150



Floor Plan - Levels 2-3 (2 / dA2.2)

1 : 150

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

Date:

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

Drawing Title:

Floor plan - Level 1 & 2-3

Client:

Originate

Project:

Bathurst and Richmond

152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 150

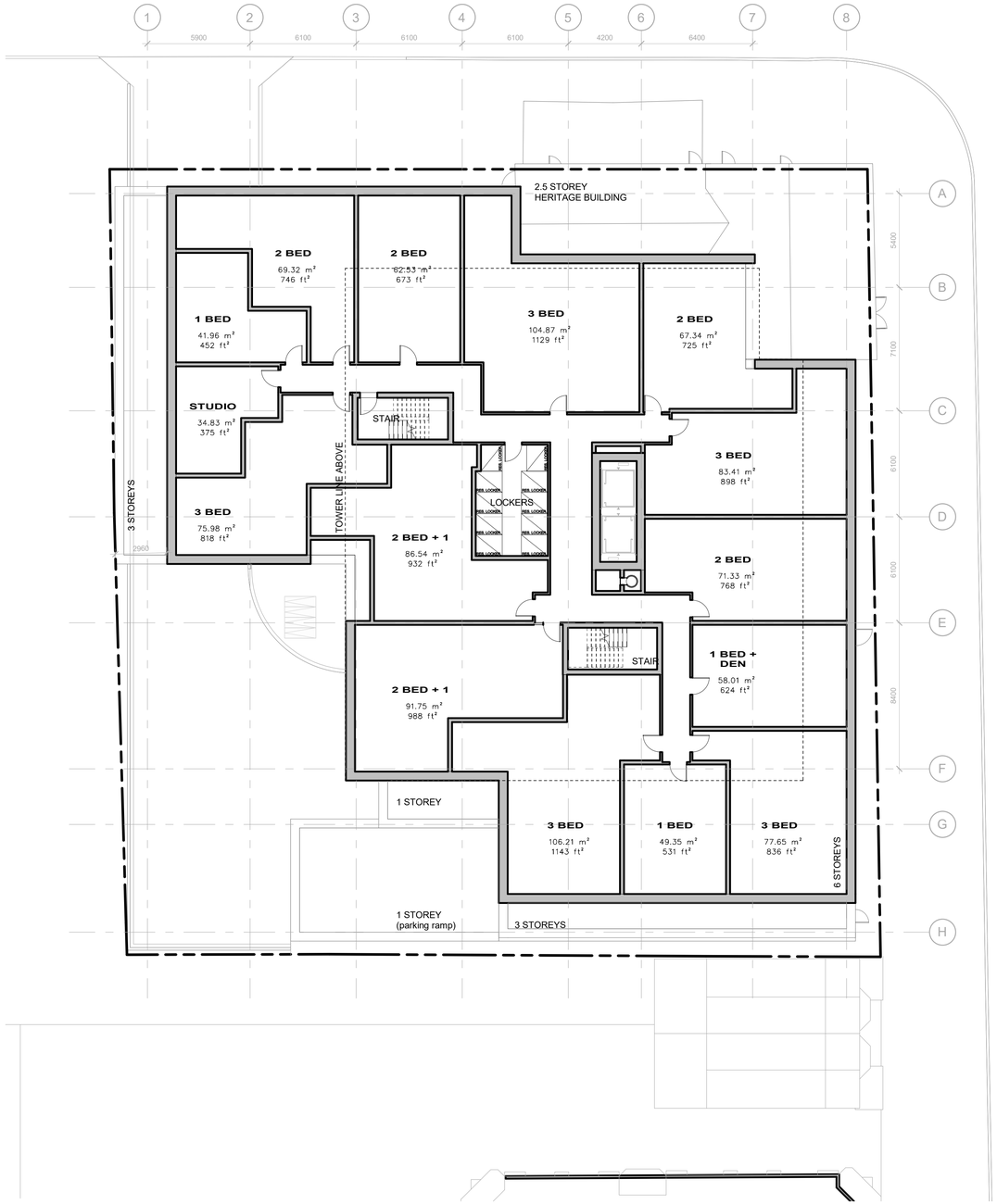
Drawn by: N.P

Checked by: A.L

Project No.: 20-018

Date: April 15, 2021

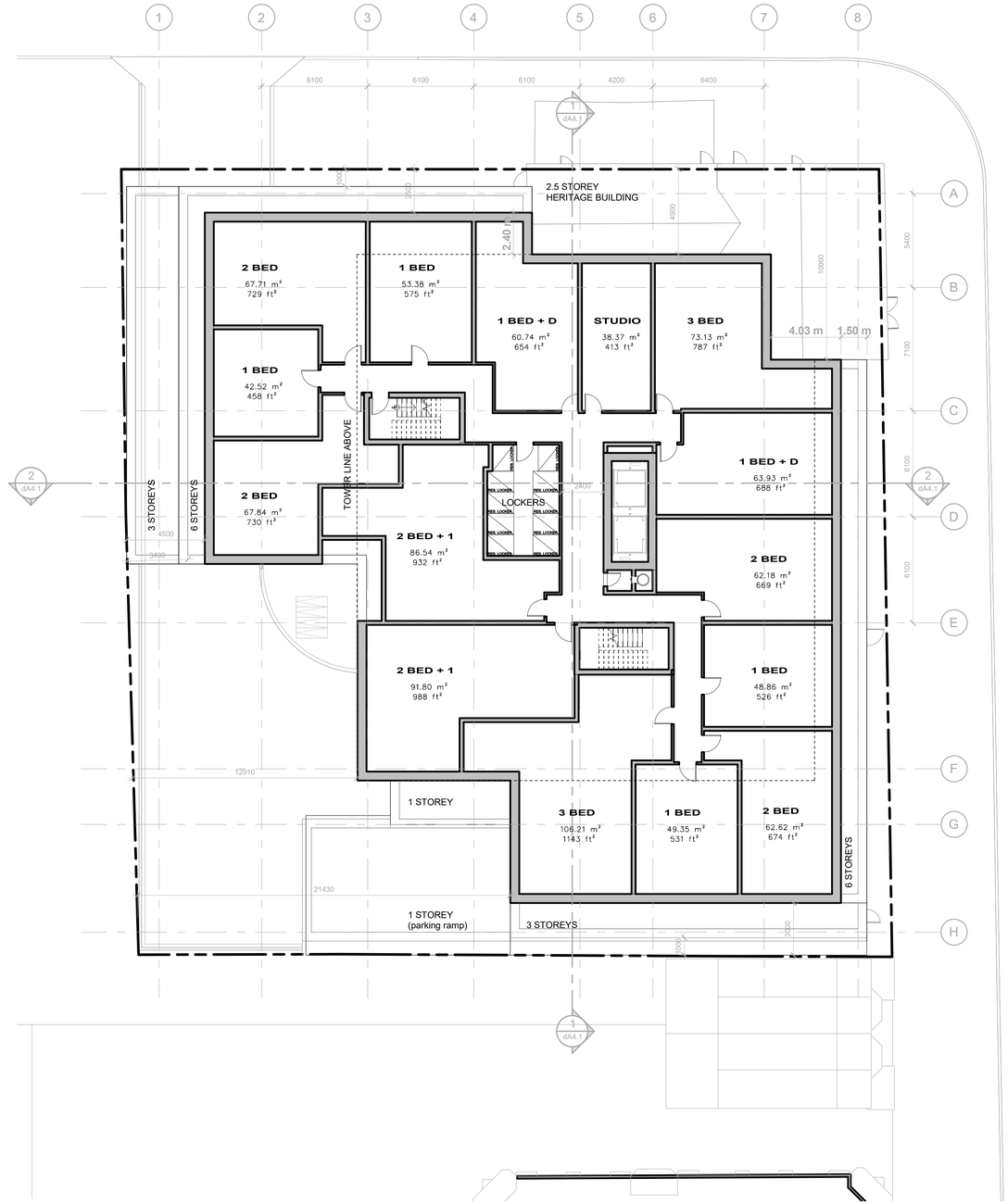
Drawing No.: dA2.2



Floor Plan - Levels 4-6

1 : 150

1 dA2.3



Floor Plan - Levels 7-9

1 : 150

2 dA2.3

2020.02.26

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

Drawing Title:

Floor plan - Levels 4-6 & 7-9

Client:

Originate

Project:

Bathurst and Richmond

152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 150

Drawn by: N.P

Checked by: A.L

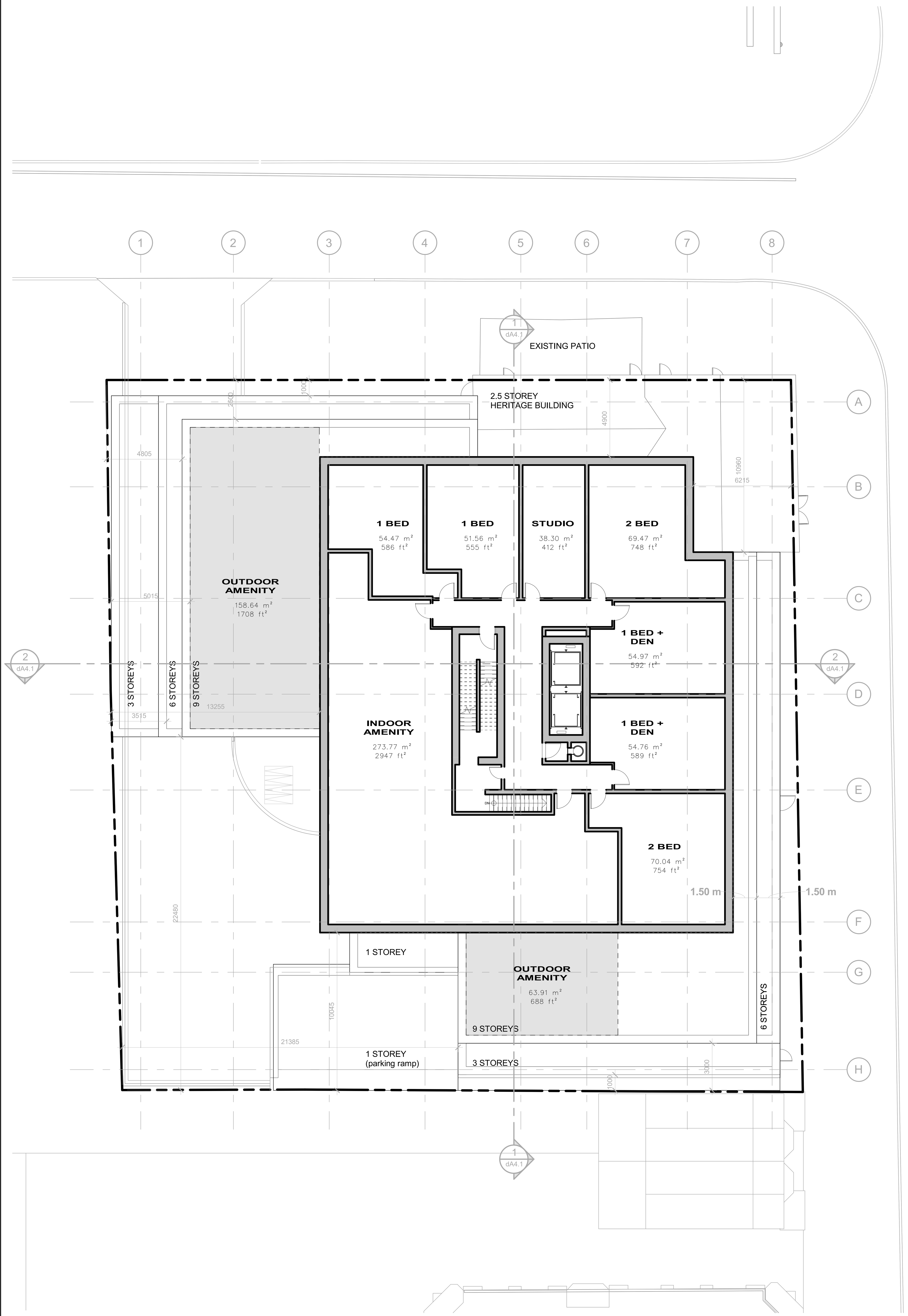
Project No.: 20-018

Date: April 15, 2021

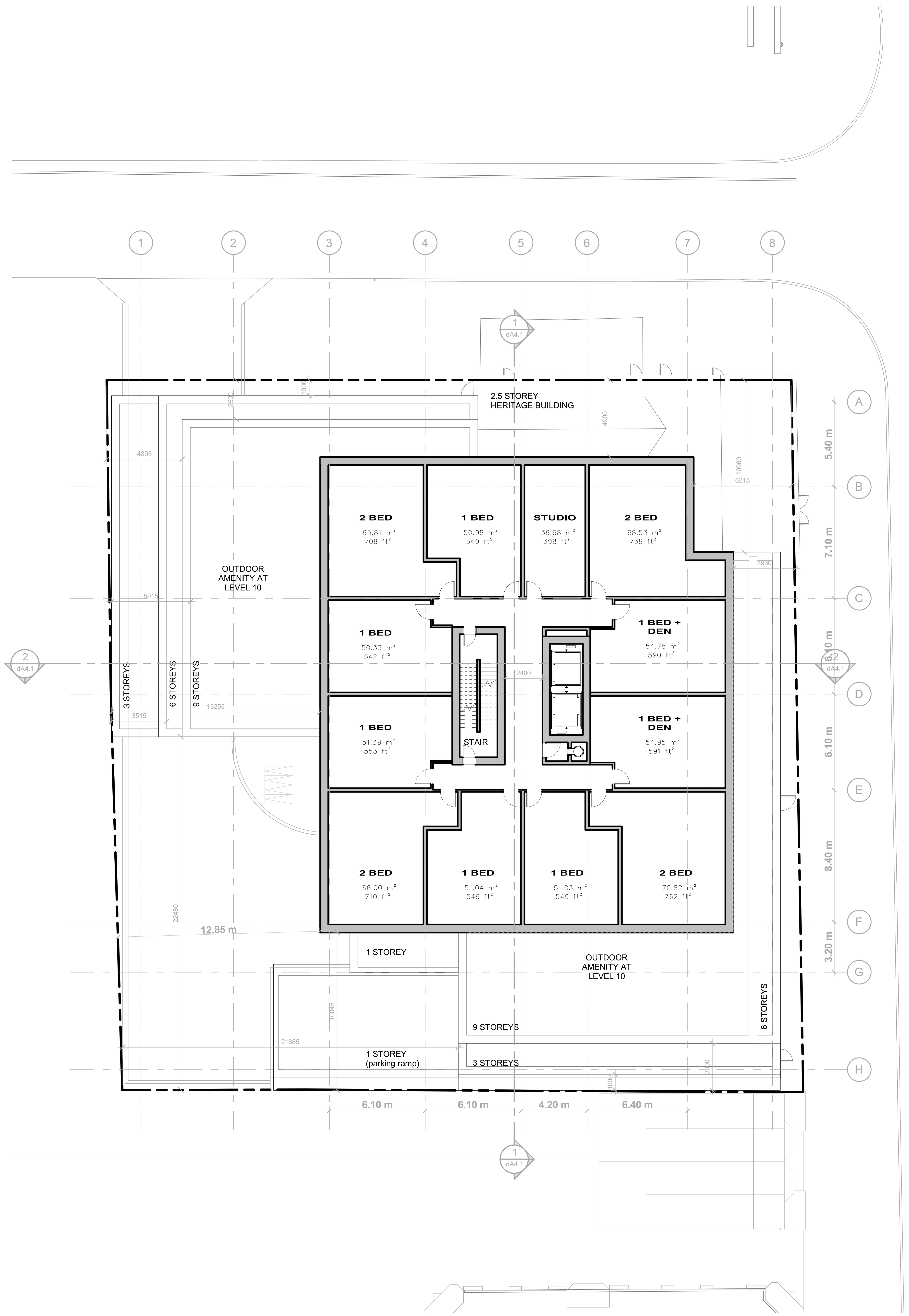
Drawing No.:

dA2.3

Plot Date: 2021-04-15 7:47:33 AM File Path: C:\Revit\2019\20018_Bathurst & Richmond_R19\2018_modelcentral.rvt



Floor Plan - Level 10 1 dA2.4
1 : 150



Floor Plan - Levels 11-17 2 dA2.4
1 : 150

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

Date:

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

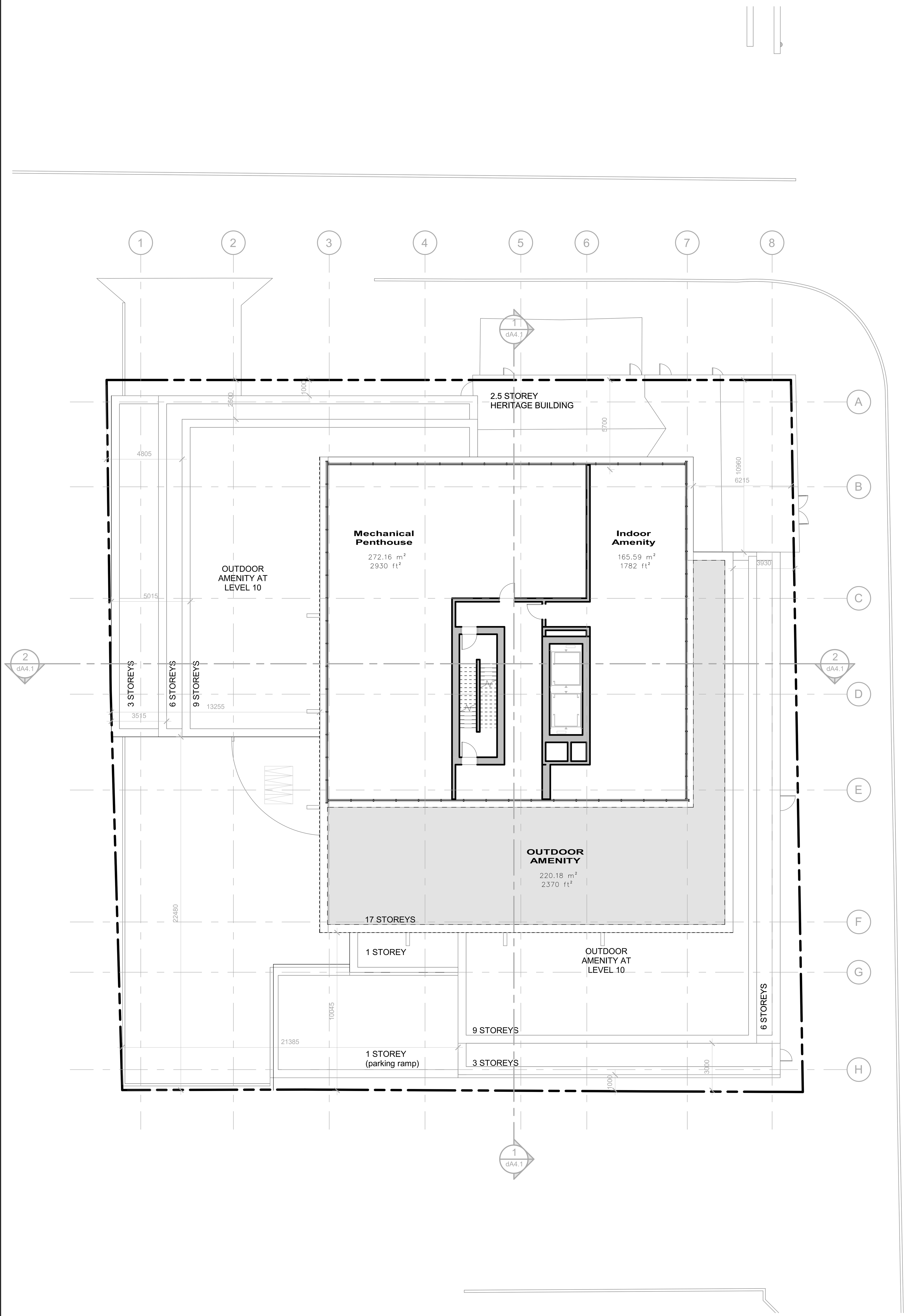
Drawing Title:
Floor plan - Levels 10 & 11-17

Client:
Originate

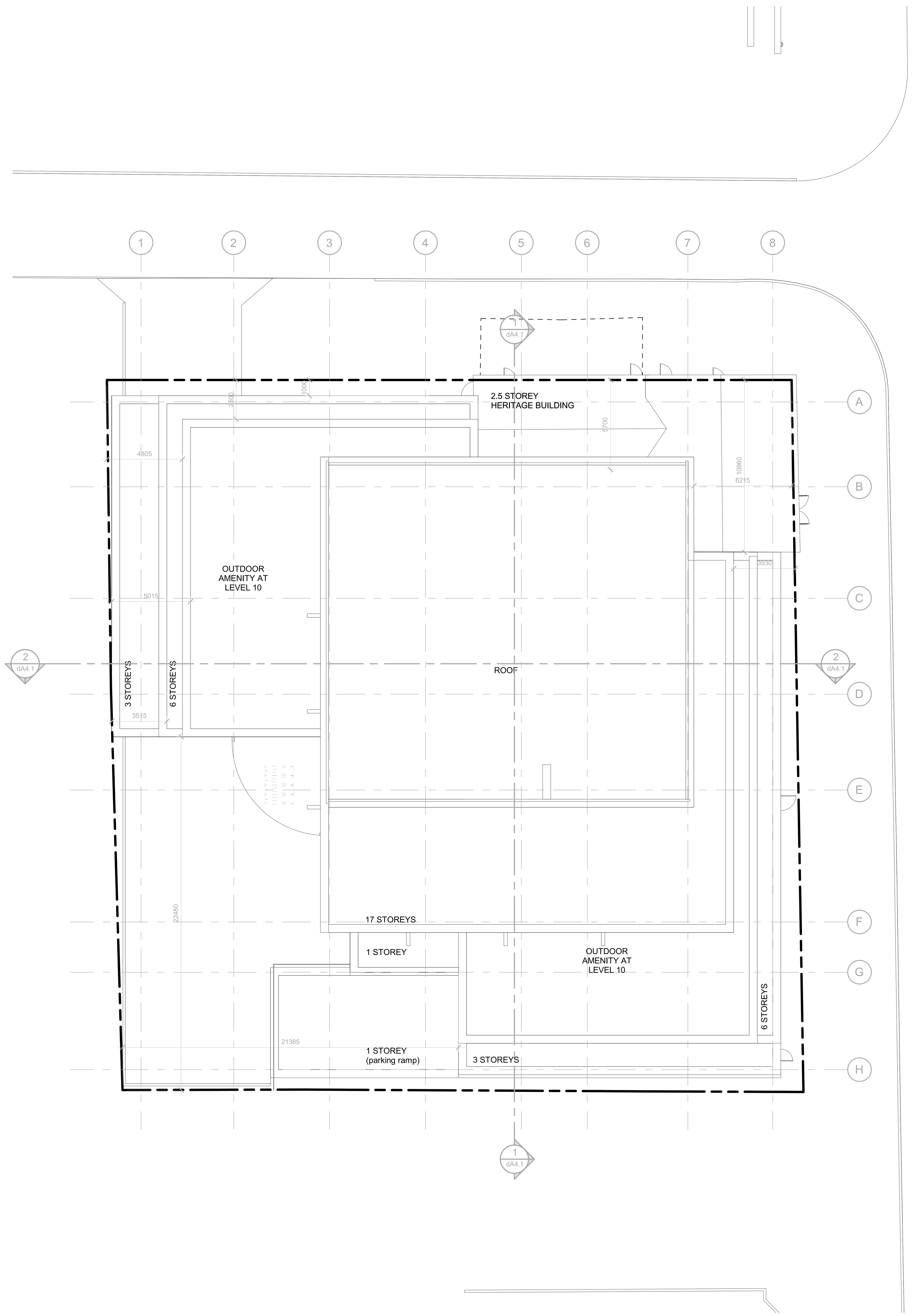
Project:
Bathurst and Richmond

152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 150
Drawn by: N.P
Checked by: A.L
Project No.: 20-018
Date: April 15, 2021
Drawing No.: dA2.4



Floor Plan - Mechanical Penthouse 1 dA2.5
1 : 150



Roof Plan 2 dA2.5
1 : 150

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

Date:

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

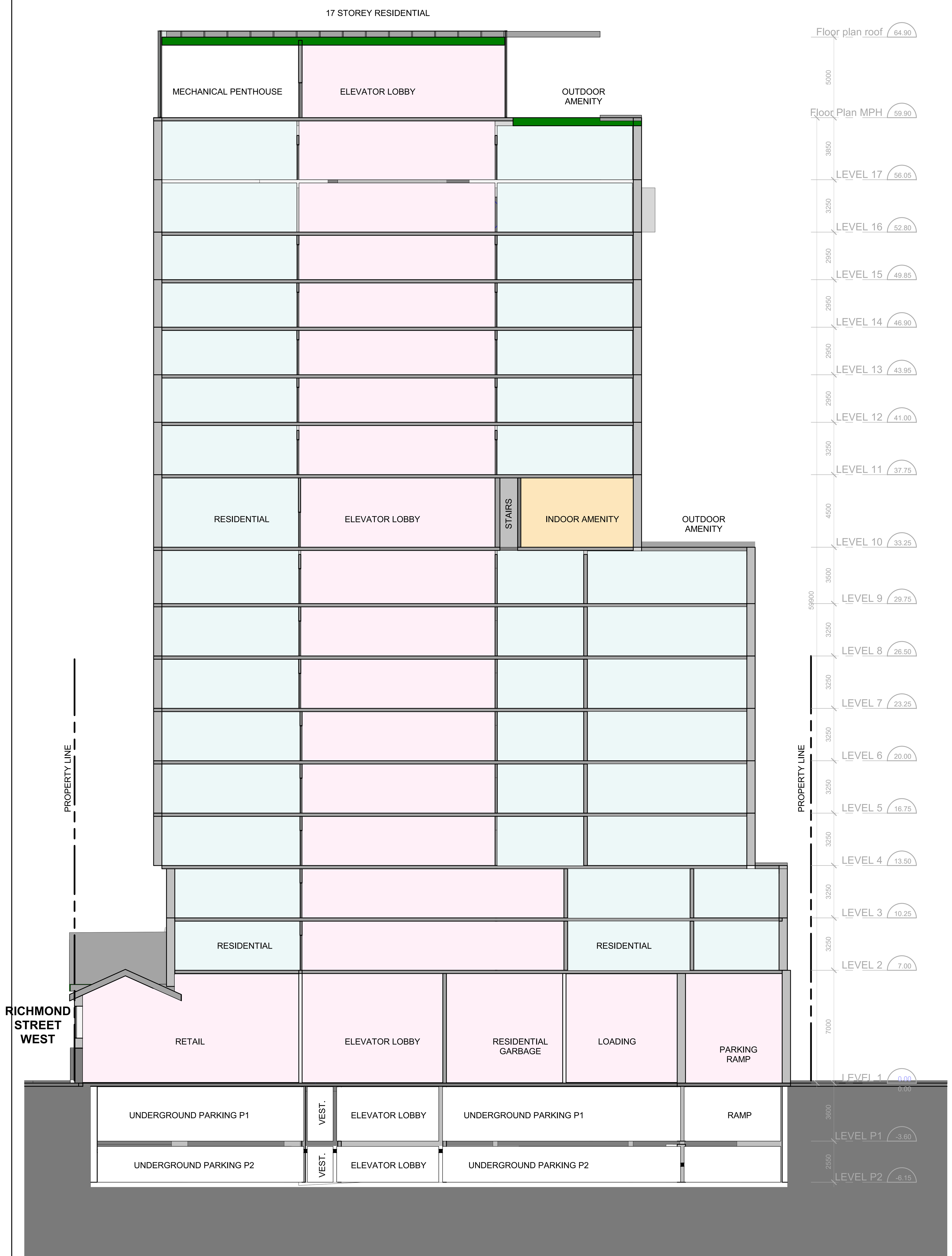
Drawing Title:
Floor plan - Mechanical Penthouse & Roof Plan

Client:
Originate

Project:
Bathurst and Richmond

152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 150
Drawn by: N.P
Checked by: A.L
Project No.: 20-018
Date: April 15, 2021
Drawing No.: dA2.5



Building Section 1 (1 / dA4.1)

1 : 150

Building Section 3 (2 / dA4.1)

1 : 150

Authorities Having Jurisdiction

PROGRESS SET
April 15, 2021

Date:

KIRKOR ARCHITECTS AND PLANNERS
20 De Boers Dr. # 400 Toronto ON M3J 0H1
TEL 416 665 6060 kirkorarchitects.com

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:

Drawing Title:
Building Sections

Client:
Originate

Project:
Bathurst and Richmond

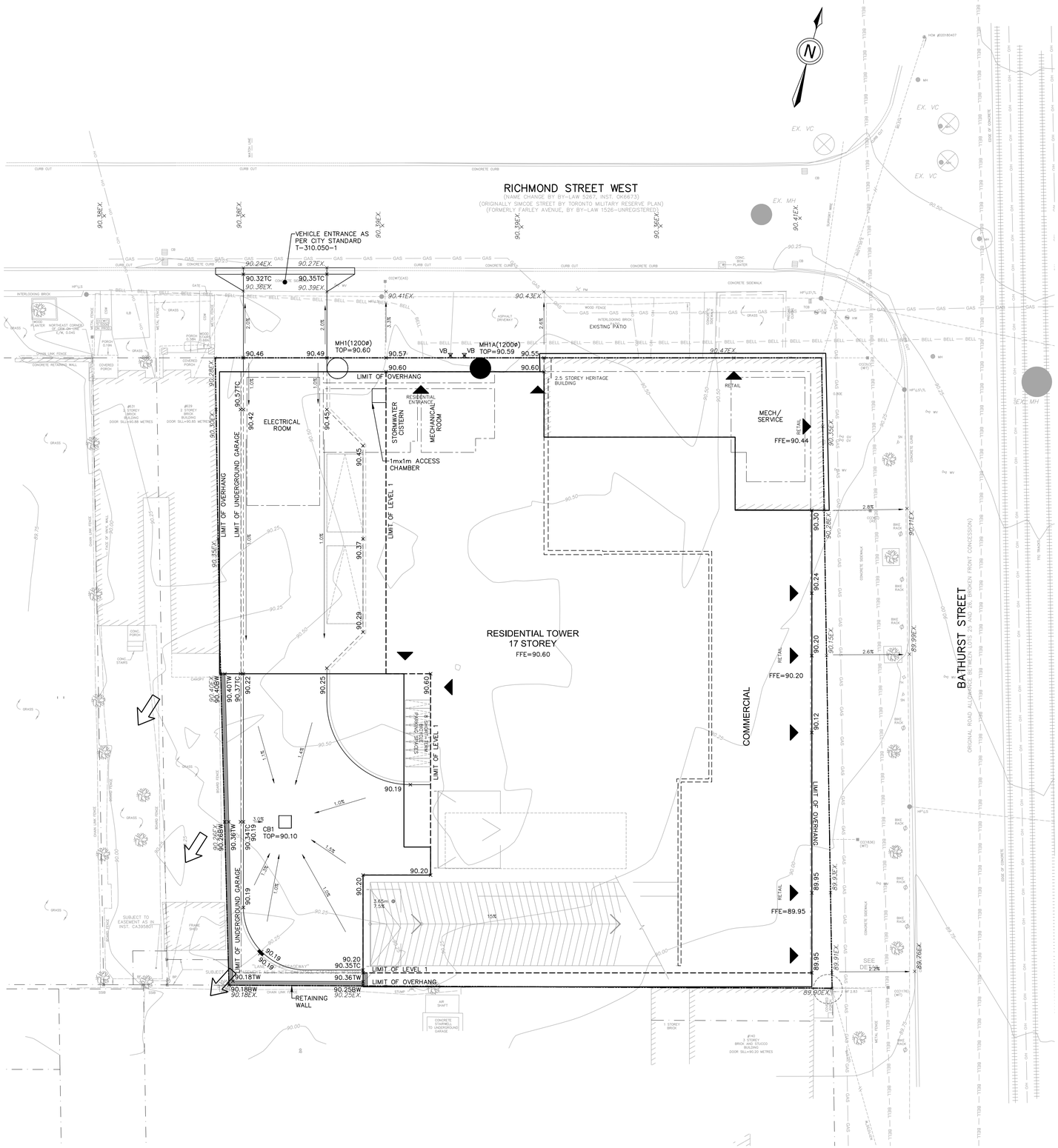
152-164 Bathurst Street and 623-627 Richmond Street, Toronto

Scale: 1 : 150
Drawn by: N.P
Checked by: A.L
Project No.: 20-018
Date: April 15, 2021
Drawing No.: dA4.1

Appendix 3

Site Grading Plans (existing and proposed Site elevations)

PGL
ENVIRONMENTAL CONSULTANTS



GRADING

1. ALL AREA GRADING AND RESULTING DRAINAGE PATTERNS SHALL NOT ADVERSELY AFFECT ADJACENT LANDS.
2. THE STORM DRAINAGE SHALL BE SELF-CONTAINED WITHIN THE SUBJECT PROPERTY UNTIL IT CAN BE DISCHARGED, REUSED, INFILTRATED AND/OR EVAPOTRANSPIRED IN A MANNER ACCEPTABLE TO THE CITY.
3. MINIMUM GENERALLY ACCEPTED GRADIENT – 2.0 PERCENT.
4. MAXIMUM GENERALLY ACCEPTED GRADIENT – 5.0 PERCENT.
5. MAXIMUM ACCEPTABLE SLOPE 3 PARTS HORIZONTAL TO 1 PART VERTICAL.
6. NO ALTERATION TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE CITY.
7. MINIMUM SWALE GRADIENT – 2.0 PERCENT.
8. MINIMUM SWALE DEPTH – 150mm.
9. ALL SWALES OR DITCHES HAVING VELOCITY IN EXCESS OF 1.5m/s SHALL BE DESIGNED TO INCORPORATE EROSION PROTECTION.
10. THE MINIMUM GRADIENT ON ANY DRIVEWAY SHALL BE 2.0 PERCENT.
11. THE MAXIMUM GRADIENT ON ANY DRIVEWAY SHALL BE 8.0 PERCENT.
12. ANY DISCREPANCIES BETWEEN THE SITE CONDITIONS AND THE DRAWINGS MUST BE REPORTED TO THE CONSULTING ENGINEER/CITY PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE CITY OF TORONTO.
13. ALL SURVEY POINTS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE LAYOUT SHALL BE REPORTED TO THE CONSULTING ENGINEER AND THE CONSULTING ENGINEER SHALL NOTIFY THE CITY OF THE NECESSARY CHANGES.
14. ALL AREAS DISTURBED DURING CONSTRUCTION WITHIN THE CITY'S RIGHT OF WAY SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION. GRASSED AREAS SHALL BE PROVIDED WITH 100mm OF TOPSOIL AND SHALL BE SODDED AS PER T.S. 5.00 AND T.S. 5.10.

ROAD RECONSTRUCTION:

1. RECONSTRUCTION OF DRIVEWAY ENTRANCES SHALL BE ACCORDING TO T-310.050-8.
2. LIMITS OF SIDEWALK / CURB RECONSTRUCTION ARE APPROXIMATE. ACTUAL LIMITS ARE TO BE CONFIRMED IN THE FIELD BY THE CONTRACT ADMINISTRATOR.
3. CHAINAGE IS ESTABLISHED FROM THE CENTRELINE OF CONSTRUCTION AND GUTTER GRADES ARE CALCULATED ALONG THE GUTTER LINE.
4. HEIGHT OF CURB FACES MAY VARY ALONG LENGTH OF GUTTER, AS SHOWN ON PROFILE, OR TO BE CONFIRMED IN THE FIELD.
5. ADJUST ALL STRUCTURES (MAINTENANCE HOLES, CATCH BASINS, ETC.) TO SUIT NEW DESIGN ELEVATIONS INCLUDING BREAKING DOWN AND REMOVAL OF PORTION OF TOP OF STRUCTURES TO ALLOW FOR MINIMUM 150 MM ADJUSTMENTS.
6. ALL CURB SHALL BE CONSTRUCTED WITH A LEDGE AT THE BACK OF THE CURB TO FACILITATE FUTURE SIDEWALK CONSTRUCTION.
7. FULL DEPTH SAW-CUTS ARE REQUIRED AT CONSTRUCTION LIMITS OF EXISTING CURB, SIDEWALK AND PAVEMENT UNLESS OTHERWISE SHOWN.
8. SAW CUT EXISTING PAVEMENT, SIDEWALK, CURB, GUTTER, DRIVEWAYS, WALKWAYS, ETC. AT CONSTRUCTION LIMITS TO PROVIDE A CLEAN JOINT FOR THE PROPOSED WORK.
9. CONSTRUCT PEDESTRIAN SIDEWALK RAMPS WITH TACTILE WALKING SURFACE INDICATORS ACCORDING TO T-310.030-7, T-310.030-8, T-310.030-9, T-310.030-10 AND T-310.030-11.
10. EXISTING ENTRANCE RAMPS TO BE RE-INSTATED, VEHICULAR SIDEWALK RAMP SHALL BE ACCORDING TO T-310.050-1.
11. ADJUSTMENT OF APPROACHES, WALKWAYS, AND STEPS MAY BE REQUIRED, LIMITS ARE TO BE DETERMINED IN THE FIELD BY THE CONTRACT ADMINISTRATOR.
12. EXISTING ASPHALT THICKNESS MAY VARY, TAPER TO MATCH EXISTING AT CONSTRUCTION LIMITS (MINIMUM 2.0m).
13. FILTER FABRIC TO BE PLACED UNDER GRATES ON ALL CATCHBASINS TO TRAP SEDIMENT. SILT TRAPS ARE TO BE CLEANED REGULARLY AND ARE NOT TO BE REMOVED UNTIL SUCH TIME AS THE CURBS ARE CONSTRUCTED AND THE BOULEVARDS ARE SODDED OR BACKYARDS GRADED AND FILTER FABRIC FOR SILT CONTROL TO BE TERRA FIX 270R OR APPROVED EQUIVALENT.

CONSTRUCTION NOTES:

1 ALL AREAS DISTURBED DURING CONSTRUCTION WITHIN THE CITY'S RIGHT-OF-WAY SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION AND TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR. GRASS AREAS SHALL BE TREATED WITH 100 MM OF TOPSOIL AND SHALL BE SODDED ACCORDING TO TS 5.00 AND TS 5.10.

2 ALL EXISTING UTILITIES SHOWN ON DRAWINGS (PLAN AND PROFILE) ARE FOR REFERENCE PURPOSES ONLY. THE CONTRACTOR SHALL SATISFY THEMSELVES AS TO THE ACTUAL LOCATION AND DEPTH OF ANY UTILITY AND SHALL BE LIABLE FOR ALL OR ANY DAMAGE.

3 ANY DISCREPANCIES BETWEEN SITE CONDITIONS AND CONSTRUCTION DRAWINGS MUST BE REPORTED TO THE CITY PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR.

4 ALL SURVEY STAKE LAYOUT POINTS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE LAYOUT SHALL BE IMMEDIATELY REPORTED TO THE CITY.

5 ATTENTION IS DIRECTED TO THE POSSIBILITY OF EXISTING PRIVATE SPRINKLERS AND LIGHTING SYSTEMS WITHIN THE RIGHT-OF-WAY, WHICH ARE NOT SHOWN ON THE PLANS. LOCATING, WORKING AROUND AND PROTECTING THESE SYSTEMS SHALL BE COMPLETED AT NO EXTRA COST TO THE CITY.

6 ALL DIMENSIONS ARE EXPRESSED IN METRES (m) AND PIPE SIZES ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

7 ALL MATERIAL FOR SEWER, FORCEMAIN, WATERMAIN, HYDRANTS AND APPURTENANCES, SHALL BE ACCORDING TO CITY OF TORONTO MATERIAL/MANUFACTURER SPECIFICATIONS AS REQUIRED BY CHAPTER 6, MATERIAL SPECIFICATIONS FROM DESIGN CRITERIA FOR SEWERS AND WATERMAINS MANUAL.

8 UTILITY SEPARATION SHALL BE ACCORDING TO APPENDIX 'D' OF THE CITY OF TORONTO DESIGN CRITERIA FOR SEWERS AND WATERMAINS MANUAL.

9 SERVICE CONNECTIONS AND UTILITY CUTS MADE IN ROAD PAVEMENTS SHALL BE BACKFILLED WITH UNSHRINKABLE FILL ACCORDING TO TS 4.60.

10 AT ALL LOCATIONS WHERE THE PROPOSED WATERMAIN CROSSES UNDER OR ABOVE THE EXISTING SEWERS, OR UTILITIES, GRANULAR A BEDDING MATERIAL IS TO EXTEND FROM THE LOWER PIPE TO THE TOP OF THE UPPER PIPE. GRANULAR A TO BE COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.

11 CONTRACTOR TO PROVIDE ADEQUATE SUPPORT DURING CONSTRUCTION BETWEEN THE NEW WATERMAIN AND EXISTING GAS MAINS. MAINTAIN 300mm MINIMUM VERTICAL CLEARANCES BETWEEN THE NEW WATERMAIN AND EXISTING GAS MAINS LESS THAN 300mm IN DIAMETER. MAINTAIN 600mm MINIMUM VERTICAL CLEARANCE BETWEEN THE NEW WATERMAIN AND EXISTING GAS MAINS EQUAL TO OR GREATER THAN 300mm IN DIAMETER.

12 ALL EXISTING WATERMAINS AND SEWER PIPES LARGER THAN 300mm DIAMETER SHALL BE SUPPORTED ACCORDING TO DRAWING T-1007.01-4.

CONTACT INFORMATION:

1. PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT-OF-WAY, THE CONTRACTOR SHALL APPLY FOR A ROAD OCCUPANCY PERMIT FROM THE CITY'S RIGHT-OF-WAY MANAGEMENT UNIT DISTRICT OFFICE.
2. ALL TTC TRAFFIC IS TO BE MAINTAINED DURING CONSTRUCTION OF THIS WATERMAIN, SEWER OR ROAD. IN ORDER TO CO-ORDINATE ALL DISRUPTIONS IN SERVICE, CONTRACTOR TO CONTACT MS EMILY ASSUNCAO 416-393-3302 AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
3. NOTIFY TORONTO WATER, WATER TREATMENT AND SUPPLY AT 416-397-0187 OR SEND AN E-MAIL MESSAGE TO TRUNKWATER@TORONTO.CA TWO WEEKS PRIOR TO EXCAVATION NEAR ANY TRANSMISSION WATERMAIN SO THAT A TORONTO WATER INSPECTOR MAY BE PRESENT.
4. DURING THE CONSTRUCTION OF WATERMAIN / SERVICES OR SEWER / LATERALS CLOSE TO AN EXISTING TRANSMISSION WATERMAIN, CONTRACTOR TO NOTIFY TORONTO WATER AT 416-397-0187 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.

LEGISLATION, REGULATION AND CODES:

1. ALL WORK WITHIN THE CITY RIGHT-OF-WAY SHALL BE CONSTRUCTED ACCORDING TO THE LATEST CITY OF TORONTO STANDARD DRAWINGS AND SPECIFICATIONS, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS MAY, SUBJECT TO THE APPROVAL OF THE CITY OF TORONTO, BE USED WHERE NO CITY STANDARD OR SPECIFICATION IS AVAILABLE.
2. ALL WORK SHALL BE COMPLETED ACCORDING TO THE CURRENT *OCCUPATIONAL HEALTH AND SAFETY ACT* AND *REGULATIONS FOR CONSTRUCTION PROJECTS*. THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
3. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL BE ACCORDING TO THE CURRENT *ONTARIO TRAFFIC MANUAL BOOK 7: TEMPORARY CONDITIONS FIELD EDITION.*

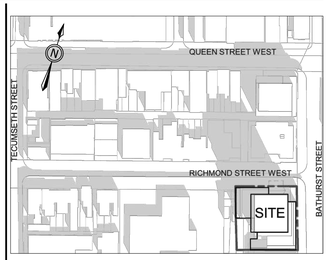
ORIGINAL DATA SOURCE;

1. INFORMATION ABOUT EXISTING COMBINED SEWER AND WATERMAIN OBTAINED FROM THE CITY OF TORONTO FILES NO. 18-01304-004 RICHMOND STREET WEST DATED JANUARY 2018 AND NO. F-24 RICHMOND STREET WEST DATED JUNE 8, 1971.
2. DMOG OBTAINED FROM CITY OF TORONTO FILE ID 28568.
3. LEGAL BOUNDARY OBTAINED FROM KRCMAR SURVEYORS LIMITED TOPOGRAPHIC SURVEY. DATED JULY 20, 2020.

OTHER NOTES:

PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT-OF-WAY THE CONTRACTOR, DEVELOPER, OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT-OF-WAY MANAGEMENT UNIT CONTACT 416-392-7877.

TORONTO
ENGINEERING and CONSTRUCTION SERVICES DIVISION
ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS.
THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.
Manager, Development Engineering DATE: _____



LEGEND

x90.00	PROPOSED ELEVATIONS
x90.00EX	EXISTING ELEVATIONS
x90.00TC	PROPOSED TOP OF CURB ELEVATIONS
2.0%	SLOPE
90.00	EXISTING CONTOURS
	PROPOSED STORM MANHOLE
	PROPOSED SANITARY MANHOLE
	EXISTING COMBINED MANHOLE
	PROPOSED STORM CATCHBASIN
	PROPOSED VALVE & BOX
	PROPERTY LINE
	LIMIT OF OVERHANG
	LIMIT OF LEVEL 1
	LIMIT OF UNDERGROUND GARAGE
	PROPOSED CURB UNDER BUILDING
	PROPOSED RESIDENTIAL AND COMMERCIAL DIVISION

ELEVATION

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO CITY OF TORONTO BENCH MARK No. CT556 HAVING AN ELEVATION OF 91.165 METRES.

REV.No.	REVISION NOTE	DATE

FOR COORDINATION
(21-04-08)

BATHURST AND RICHMOND

HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

SW1
GRADING PLAN

DATE: APRIL 8, 2021 SCALE: 1:150 PROJECT: 211176
DESIGNED BY: WS CHECKED BY: GKR
DRAWN BY: WS CHECKED BY: GKR

Appendix 4

Laboratory Certificates of Analysis

PGL
ENVIRONMENTAL CONSULTANTS

Your Project #: 5660-03.03
Your C.O.C. #: 818096-01-01

Attention: Ryan Cook

Pottinger Gaherty Environmental Consultants Ltd
250 Water Street
Unit 102
Whitby, ON
CANADA L1N 0G5

Report Date: 2021/03/26
Report #: R6570215
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C172290
Received: 2021/03/18, 15:33

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sewer Use By-Law Semivolatile Organics	1	2021/03/19	2021/03/22	CAM SOP 00301	EPA 8270 m
Biochemical Oxygen Demand (BOD)	1	2021/03/19	2021/03/24	CAM SOP-00427	SM 23 5210B m
Chromium (VI) in Water	1	N/A	2021/03/22	CAM SOP-00436	EPA 7199 m
Total Cyanide	1	2021/03/19	2021/03/19	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2021/03/19	2021/03/19	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2021/03/23	2021/03/23	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	1	N/A	2021/03/23	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2021/03/18	CAM SOP-00552	MOE LSB E3371
Total Nonylphenol in Liquids by HPLC	1	2021/03/23	2021/03/24	CAM SOP-00313	In-house Method
Nonylphenol Ethoxylates in Liquids: HPLC	1	2021/03/23	2021/03/24	CAM SOP-00313	In-house Method
Animal and Vegetable Oil and Grease	1	N/A	2021/03/24	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2021/03/23	2021/03/24	CAM SOP-00326	EPA1664B m,SM5520B m
Polychlorinated Biphenyl in Water	1	2021/03/24	2021/03/25	CAM SOP-00309	EPA 8082A m
pH	1	2021/03/19	2021/03/19	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2021/03/22	CAM SOP-00444	OMOE E3179 m
Total Kjeldahl Nitrogen in Water	1	2021/03/19	2021/03/23	CAM SOP-00938	OMOE E3516 m
Total PAHs (1)	1	N/A	2021/03/23	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (2)	1	2021/03/23	2021/03/24	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2021/03/20	2021/03/22	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2021/03/22	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Your Project #: 5660-03.03
Your C.O.C. #: 818096-01-01

Attention: Ryan Cook

Pottinger Gaherty Environmental Consultants Ltd
250 Water Street
Unit 102
Whitby, ON
CANADA L1N 0G5

Report Date: 2021/03/26
Report #: R6570215
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C172290
Received: 2021/03/18, 15:33

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(2) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Deepthi Shaji, Project Manager
Email: Deepthi.Shaji@bureauveritas.com
Phone# (905)817-5700 Ext:7065843

==========

This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				PCL839		
Sampling Date				2021/03/17 14:00		
COC Number				818096-01-01		
	UNITS	**San**	**Stm**	**MW204**	**RDL**	**QC Batch**
Calculated Parameters						
Total Animal/Vegetable Oil and Grease	mg/L	**150**	-	<0.50	0.50	7254170
Inorganics						
Total BOD	mg/L	**300**	15	<2	2	7255889
Fluoride (F-)	mg/L	**10**	-	0.56	0.10	7256372
Total Kjeldahl Nitrogen (TKN)	mg/L	**100**	-	2.8	0.10	7256922
pH	pH	**6.0:11.5**	6.0:9.5	7.88		7256391
Phenols-4AAP	mg/L	**1.0**	0.008	<0.0010	0.0010	7259063
Total Suspended Solids	mg/L	**350**	15	24	10	7258487
Total Cyanide (CN)	mg/L	**2**	0.02	<0.0050	0.0050	7257264
Petroleum Hydrocarbons						
Total Oil & Grease	mg/L	**-**	-	<0.50	0.50	7262504
Total Oil & Grease Mineral/Synthetic	mg/L	**15**	-	<0.50	0.50	7262511
Miscellaneous Parameters						
Nonylphenol Ethoxylate (Total)	mg/L	**0.2**	0.01	<0.005	0.005	7261321
Nonylphenol (Total)	mg/L	**0.02**	0.001	<0.001	0.001	7261318
Metals						
Chromium (VI)	ug/L	**2000**	40	<0.50	0.50	7254030
Mercury (Hg)	mg/L	**0.01**	0.0004	<0.00010	0.00010	7261315
Total Aluminum (Al)	ug/L	**50000**	-	180	4.9	7260231
Total Antimony (Sb)	ug/L	**5000**	-	1.1	0.50	7260231
Total Arsenic (As)	ug/L	**1000**	20	4.2	1.0	7260231
Total Cadmium (Cd)	ug/L	**700**	8	<0.090	0.090	7260231
Total Chromium (Cr)	ug/L	**4000**	80	<5.0	5.0	7260231
Total Cobalt (Co)	ug/L	**5000**	-	1.7	0.50	7260231
Total Copper (Cu)	ug/L	**2000**	40	1.9	0.90	7260231
Total Lead (Pb)	ug/L	**1000**	120	<0.50	0.50	7260231
Total Manganese (Mn)	ug/L	**5000**	50	430	2.0	7260231
Total Molybdenum (Mo)	ug/L	**5000**	-	20	0.50	7260231
Total Nickel (Ni)	ug/L	**2000**	80	3.5	1.0	7260231
Total Phosphorus (P)	ug/L	**10000**	400	<100	100	7260231
Total Selenium (Se)	ug/L	**1000**	20	<2.0	2.0	7260231
Total Silver (Ag)	ug/L	**5000**	120	<0.090	0.090	7260231
Total Tin (Sn)	ug/L	**5000**	-	1.7	1.0	7260231

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				PCL839		
Sampling Date				2021/03/17 14:00		
COC Number				818096-01-01		
	UNITS	**San**	**Stm**	**MW204**	**RDL**	**QC Batch**
Total Titanium (Ti)	ug/L	**5000**	-	7.2	5.0	7260231
Total Zinc (Zn)	ug/L	**2000**	40	12	5.0	7260231
Semivolatile Organics						
Di-N-butyl phthalate	ug/L	**80**	15	<2	2	7257468
Bis(2-ethylhexyl)phthalate	ug/L	**12**	8.8	<2	2	7257468
3,3'-Dichlorobenzidine	ug/L	**2**	0.8	<0.8	0.8	7257468
Pentachlorophenol	ug/L	**5**	2	<1	1	7257468
Phenanthrene	ug/L	-	-	<0.2	0.2	7257468
Anthracene	ug/L	-	-	<0.2	0.2	7257468
Fluoranthene	ug/L	-	-	<0.2	0.2	7257468
Pyrene	ug/L	-	-	<0.2	0.2	7257468
Benzo(a)anthracene	ug/L	-	-	<0.2	0.2	7257468
Chrysene	ug/L	-	-	<0.2	0.2	7257468
Benzo(b/j)fluoranthene	ug/L	-	-	<0.2	0.2	7257468
Benzo(k)fluoranthene	ug/L	-	-	<0.2	0.2	7257468
Benzo(a)pyrene	ug/L	-	-	<0.2	0.2	7257468
Indeno(1,2,3-cd)pyrene	ug/L	-	-	<0.2	0.2	7257468
Dibenzo(a,h)anthracene	ug/L	-	-	<0.2	0.2	7257468
Benzo(g,h,i)perylene	ug/L	-	-	<0.2	0.2	7257468
Dibenzo(a,i)pyrene	ug/L	-	-	<0.2	0.2	7257468
Benzo(e)pyrene	ug/L	-	-	<0.2	0.2	7257468
Perylene	ug/L	-	-	<0.2	0.2	7257468
Dibenzo(a,j) acridine	ug/L	-	-	<0.4	0.4	7257468
7H-Dibenzo(c,g) Carbazole	ug/L	-	-	<0.4	0.4	7257468
1,6-Dinitropyrene	ug/L	-	-	<0.4	0.4	7257468
1,3-Dinitropyrene	ug/L	-	-	<0.4	0.4	7257468
1,8-Dinitropyrene	ug/L	-	-	<0.4	0.4	7257468
Calculated Parameters						
Total PAHs (18 PAHs)	ug/L	**5**	2	<1	1	7255014
Volatile Organics						
Benzene	ug/L	**10**	2	<0.40	0.40	7256872
Chloroform	ug/L	**40**	2	<0.40	0.40	7256872
1,2-Dichlorobenzene	ug/L	**50**	5.6	<0.80	0.80	7256872
1,4-Dichlorobenzene	ug/L	**80**	6.8	<0.80	0.80	7256872

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

TORONTO SANITARY&STORM SEWER (100-2016)

BV Labs ID				PCL839		
Sampling Date				2021/03/17 14:00		
COC Number				818096-01-01		
	UNITS	**San**	**Stm**	**MW204**	**RDL**	**QC Batch**
cis-1,2-Dichloroethylene	ug/L	**4000**	5.6	<1.0	1.0	7256872
trans-1,3-Dichloropropene	ug/L	**140**	5.6	<0.80	0.80	7256872
Ethylbenzene	ug/L	**160**	2	<0.40	0.40	7256872
Methylene Chloride(Dichloromethane)	ug/L	**2000**	5.2	<4.0	4.0	7256872
1,1,2,2-Tetrachloroethane	ug/L	**1400**	17	<0.80	0.80	7256872
Tetrachloroethylene	ug/L	**1000**	4.4	<0.40	0.40	7256872
Toluene	ug/L	**16**	2	<0.40	0.40	7256872
Trichloroethylene	ug/L	**400**	7.6	<0.40	0.40	7256872
p+m-Xylene	ug/L	**1400**	4.4	<0.40	0.40	7256872
o-Xylene	ug/L	**1400**	4.4	<0.40	0.40	7256872
Total Xylenes	ug/L	**1400**	4.4	<0.40	0.40	7256872
PCBs						
Total PCB	ug/L	**1**	0.4	<0.05	0.05	7265276
Microbiological						
Escherichia coli	CFU/100mL	**-**	200	<10	10	7255548
Surrogate Recovery (%)						
2,4,6-Tribromophenol	%	**-**	-	66		7257468
2-Fluorobiphenyl	%	**-**	-	70		7257468
D14-Terphenyl (FS)	%	**-**	-	76		7257468
D5-Nitrobenzene	%	**-**	-	87		7257468
D8-Acenaphthylene	%	**-**	-	86		7257468
Decachlorobiphenyl	%	**-**	-	81		7265276
4-Bromofluorobenzene	%	**-**	-	97		7256872
D4-1,2-Dichloroethane	%	**-**	-	111		7256872
D8-Toluene	%	**-**	-	94		7256872

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
San,Stm: Toronto Sanitary and Storm Sewer Use By Law Guidelines, respectively. Referenced to Chapter 681

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: C172290
Report Date: 2021/03/26

Pottinger Gaherty Environmental Consultants Ltd
Client Project #: 5660-03.03
Sampler Initials: AES

TEST SUMMARY

BV Labs ID: PCL839
Sample ID: MW204
Matrix: Water

Collected: 2021/03/17
Shipped:
Received: 2021/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sewer Use By-Law Semivolatile Organics	GC/MS	7257468	2021/03/19	2021/03/22	Kathy Horvat
Biochemical Oxygen Demand (BOD)	DO	7255889	2021/03/19	2021/03/24	Nusrat Naz
Chromium (VI) in Water	IC	7254030	N/A	2021/03/22	Lang Le
Total Cyanide	SKAL/CN	7257264	2021/03/19	2021/03/19	Aditiben Patel
Fluoride	ISE	7256372	2021/03/19	2021/03/19	Surinder Rai
Mercury in Water by CVAA	CV/AA	7261315	2021/03/23	2021/03/23	Gagandeep Rai
Total Metals Analysis by ICPMS	ICP/MS	7260231	N/A	2021/03/23	Prempal Bhatti
E.coli, (CFU/100mL)	PL	7255548	N/A	2021/03/18	Tasbir Singh
Total Nonylphenol in Liquids by HPLC	LC/FLU	7261318	2021/03/23	2021/03/24	Tonghui (Jenny) Chen
Nonylphenol Ethoxylates in Liquids: HPLC	LC/FLU	7261321	2021/03/23	2021/03/24	Dennis Boodram
Animal and Vegetable Oil and Grease	BAL	7254170	N/A	2021/03/24	Automated Statchk
Total Oil and Grease	BAL	7262504	2021/03/23	2021/03/24	Jay Tailor
Polychlorinated Biphenyl in Water	GC/ECD	7265276	2021/03/24	2021/03/25	Svitlana Shaula
pH	AT	7256391	2021/03/19	2021/03/19	Surinder Rai
Phenols (4AAP)	TECH/PHEN	7259063	N/A	2021/03/22	Bramdeo Motiram
Total Kjeldahl Nitrogen in Water	SKAL	7256922	2021/03/19	2021/03/23	Rajni Tyagi
Total PAHs	CALC	7255014	N/A	2021/03/23	Automated Statchk
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	7262511	2021/03/23	2021/03/24	Jay Tailor
Total Suspended Solids	BAL	7258487	2021/03/20	2021/03/22	Shivani Desai
Volatile Organic Compounds in Water	GC/MS	7256872	N/A	2021/03/22	Blair Gannon

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C

Sample PCL839 [MW204] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7254030	LLE	Matrix Spike	Chromium (VI)	2021/03/22		100	%	80 - 120
7254030	LLE	Spiked Blank	Chromium (VI)	2021/03/22		102	%	80 - 120
7254030	LLE	Method Blank	Chromium (VI)	2021/03/22	<0.50		ug/L	
7254030	LLE	RPD	Chromium (VI)	2021/03/22	NC		%	20
7255889	NNA	QC Standard	Total BOD	2021/03/24		92	%	80 - 120
7255889	NNA	Method Blank	Total BOD	2021/03/24	<2		mg/L	
7255889	NNA	RPD	Total BOD	2021/03/24	1.6		%	30
7256372	SAU	Matrix Spike	Fluoride (F-)	2021/03/19		106	%	80 - 120
7256372	SAU	Spiked Blank	Fluoride (F-)	2021/03/19		101	%	80 - 120
7256372	SAU	Method Blank	Fluoride (F-)	2021/03/19	<0.10		mg/L	
7256372	SAU	RPD	Fluoride (F-)	2021/03/19	0.46		%	20
7256391	SAU	Spiked Blank	pH	2021/03/19		102	%	98 - 103
7256391	SAU	RPD	pH	2021/03/19	0.042		%	N/A
7256872	BG1	Matrix Spike	4-Bromofluorobenzene	2021/03/22		106	%	70 - 130
			D4-1,2-Dichloroethane	2021/03/22		109	%	70 - 130
			D8-Toluene	2021/03/22		102	%	70 - 130
			Benzene	2021/03/22		89	%	70 - 130
			Chloroform	2021/03/22		97	%	70 - 130
			1,2-Dichlorobenzene	2021/03/22		93	%	70 - 130
			1,4-Dichlorobenzene	2021/03/22		104	%	70 - 130
			cis-1,2-Dichloroethylene	2021/03/22		98	%	70 - 130
			trans-1,3-Dichloropropene	2021/03/22		99	%	70 - 130
			Ethylbenzene	2021/03/22		84	%	70 - 130
			Methylene Chloride(Dichloromethane)	2021/03/22		97	%	70 - 130
			1,1,2,2-Tetrachloroethane	2021/03/22		100	%	70 - 130
			Tetrachloroethylene	2021/03/22		92	%	70 - 130
			Toluene	2021/03/22		90	%	70 - 130
			Trichloroethylene	2021/03/22		101	%	70 - 130
			p+m-Xylene	2021/03/22		87	%	70 - 130
			o-Xylene	2021/03/22		84	%	70 - 130
7256872	BG1	Spiked Blank	4-Bromofluorobenzene	2021/03/22		105	%	70 - 130
			D4-1,2-Dichloroethane	2021/03/22		104	%	70 - 130
			D8-Toluene	2021/03/22		103	%	70 - 130
			Benzene	2021/03/22		89	%	70 - 130
			Chloroform	2021/03/22		96	%	70 - 130
			1,2-Dichlorobenzene	2021/03/22		93	%	70 - 130
			1,4-Dichlorobenzene	2021/03/22		103	%	70 - 130
			cis-1,2-Dichloroethylene	2021/03/22		97	%	70 - 130
			trans-1,3-Dichloropropene	2021/03/22		93	%	70 - 130
			Ethylbenzene	2021/03/22		86	%	70 - 130
			Methylene Chloride(Dichloromethane)	2021/03/22		94	%	70 - 130
			1,1,2,2-Tetrachloroethane	2021/03/22		95	%	70 - 130
			Tetrachloroethylene	2021/03/22		94	%	70 - 130
			Toluene	2021/03/22		91	%	70 - 130
			Trichloroethylene	2021/03/22		103	%	70 - 130
			p+m-Xylene	2021/03/22		90	%	70 - 130
			o-Xylene	2021/03/22		88	%	70 - 130
7256872	BG1	Method Blank	4-Bromofluorobenzene	2021/03/22		101	%	70 - 130
			D4-1,2-Dichloroethane	2021/03/22		111	%	70 - 130
			D8-Toluene	2021/03/22		94	%	70 - 130
			Benzene	2021/03/22	<0.20		ug/L	
			Chloroform	2021/03/22	<0.20		ug/L	

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichlorobenzene	2021/03/22	<0.40		ug/L	
			1,4-Dichlorobenzene	2021/03/22	<0.40		ug/L	
			cis-1,2-Dichloroethylene	2021/03/22	<0.50		ug/L	
			trans-1,3-Dichloropropene	2021/03/22	<0.40		ug/L	
			Ethylbenzene	2021/03/22	<0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2021/03/22	<2.0		ug/L	
			1,1,2,2-Tetrachloroethane	2021/03/22	<0.40		ug/L	
			Tetrachloroethylene	2021/03/22	<0.20		ug/L	
			Toluene	2021/03/22	<0.20		ug/L	
			Trichloroethylene	2021/03/22	<0.20		ug/L	
			p+m-Xylene	2021/03/22	<0.20		ug/L	
			o-Xylene	2021/03/22	<0.20		ug/L	
			Total Xylenes	2021/03/22	<0.20		ug/L	
7256872	BG1	RPD	Benzene	2021/03/22	NC		%	30
			Chloroform	2021/03/22	NC		%	30
			1,2-Dichlorobenzene	2021/03/22	NC		%	30
			1,4-Dichlorobenzene	2021/03/22	NC		%	30
			cis-1,2-Dichloroethylene	2021/03/22	NC		%	30
			trans-1,3-Dichloropropene	2021/03/22	NC		%	30
			Ethylbenzene	2021/03/22	NC		%	30
			Methylene Chloride(Dichloromethane)	2021/03/22	NC		%	30
			1,1,2,2-Tetrachloroethane	2021/03/22	NC		%	30
			Tetrachloroethylene	2021/03/22	NC		%	30
			Toluene	2021/03/22	NC		%	30
			Trichloroethylene	2021/03/22	NC		%	30
			p+m-Xylene	2021/03/22	NC		%	30
			o-Xylene	2021/03/22	NC		%	30
			Total Xylenes	2021/03/22	NC		%	30
7256922	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2021/03/23		95	%	80 - 120
7256922	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2021/03/23		101	%	80 - 120
7256922	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2021/03/23		101	%	80 - 120
7256922	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2021/03/23	<0.10		mg/L	
7256922	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2021/03/23	4.7		%	20
7257264	ABP	Matrix Spike	Total Cyanide (CN)	2021/03/19		88	%	80 - 120
7257264	ABP	Spiked Blank	Total Cyanide (CN)	2021/03/19		97	%	80 - 120
7257264	ABP	Method Blank	Total Cyanide (CN)	2021/03/19	<0.0050		mg/L	
7257264	ABP	RPD	Total Cyanide (CN)	2021/03/19	NC		%	20
7257468	KHO	Matrix Spike	2,4,6-Tribromophenol	2021/03/22		78	%	10 - 130
			2-Fluorobiphenyl	2021/03/22		84	%	30 - 130
			D14-Terphenyl (FS)	2021/03/22		86	%	30 - 130
			D5-Nitrobenzene	2021/03/22		94	%	30 - 130
			D8-Acenaphthylene	2021/03/22		92	%	30 - 130
			Di-N-butyl phthalate	2021/03/22		95	%	30 - 130
			Bis(2-ethylhexyl)phthalate	2021/03/22		91	%	30 - 130
			3,3'-Dichlorobenzidine	2021/03/22		51	%	30 - 130
			Pentachlorophenol	2021/03/22		59	%	30 - 130
			Phenanthrene	2021/03/22		94	%	30 - 130
			Anthracene	2021/03/22		90	%	30 - 130
			Fluoranthene	2021/03/22		102	%	30 - 130
			Pyrene	2021/03/22		103	%	30 - 130
			Benzo(a)anthracene	2021/03/22		92	%	30 - 130
			Chrysene	2021/03/22		106	%	30 - 130

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(b/j)fluoranthene	2021/03/22		99	%	30 - 130
			Benzo(k)fluoranthene	2021/03/22		94	%	30 - 130
			Benzo(a)pyrene	2021/03/22		88	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2021/03/22		96	%	30 - 130
			Dibenzo(a,h)anthracene	2021/03/22		94	%	30 - 130
			Benzo(g,h,i)perylene	2021/03/22		95	%	30 - 130
			Dibenzo(a,i)pyrene	2021/03/22		100	%	30 - 130
			Benzo(e)pyrene	2021/03/22		107	%	30 - 130
			Perylene	2021/03/22		88	%	30 - 130
			Dibenzo(a,j) acridine	2021/03/22		94	%	30 - 130
			7H-Dibenzo(c,g) Carbazole	2021/03/22		73	%	30 - 130
			1,6-Dinitropyrene	2021/03/22		109	%	30 - 130
			1,3-Dinitropyrene	2021/03/22		120	%	30 - 130
			1,8-Dinitropyrene	2021/03/22		81	%	30 - 130
7257468	KHO	Spiked Blank	2,4,6-Tribromophenol	2021/03/22		76	%	10 - 130
			2-Fluorobiphenyl	2021/03/22		80	%	30 - 130
			D14-Terphenyl (FS)	2021/03/22		88	%	30 - 130
			D5-Nitrobenzene	2021/03/22		99	%	30 - 130
			D8-Acenaphthylene	2021/03/22		91	%	30 - 130
			Di-N-butyl phthalate	2021/03/22		97	%	30 - 130
			Bis(2-ethylhexyl)phthalate	2021/03/22		90	%	30 - 130
			3,3'-Dichlorobenzidine	2021/03/22		101	%	30 - 130
			Pentachlorophenol	2021/03/22		44	%	30 - 130
			Phenanthrene	2021/03/22		94	%	30 - 130
			Anthracene	2021/03/22		91	%	30 - 130
			Fluoranthene	2021/03/22		103	%	30 - 130
			Pyrene	2021/03/22		103	%	30 - 130
			Benzo(a)anthracene	2021/03/22		92	%	30 - 130
			Chrysene	2021/03/22		105	%	30 - 130
			Benzo(b/j)fluoranthene	2021/03/22		99	%	30 - 130
			Benzo(k)fluoranthene	2021/03/22		104	%	30 - 130
			Benzo(a)pyrene	2021/03/22		85	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2021/03/22		97	%	30 - 130
			Dibenzo(a,h)anthracene	2021/03/22		94	%	30 - 130
			Benzo(g,h,i)perylene	2021/03/22		94	%	30 - 130
			Dibenzo(a,i)pyrene	2021/03/22		103	%	30 - 130
			Benzo(e)pyrene	2021/03/22		104	%	30 - 130
			Perylene	2021/03/22		92	%	30 - 130
			Dibenzo(a,j) acridine	2021/03/22		90	%	30 - 130
			7H-Dibenzo(c,g) Carbazole	2021/03/22		82	%	30 - 130
			1,6-Dinitropyrene	2021/03/22		115	%	30 - 130
			1,3-Dinitropyrene	2021/03/22		120	%	30 - 130
			1,8-Dinitropyrene	2021/03/22		82	%	30 - 130
7257468	KHO	Method Blank	2,4,6-Tribromophenol	2021/03/22		54	%	10 - 130
			2-Fluorobiphenyl	2021/03/22		85	%	30 - 130
			D14-Terphenyl (FS)	2021/03/22		89	%	30 - 130
			D5-Nitrobenzene	2021/03/22		95	%	30 - 130
			D8-Acenaphthylene	2021/03/22		90	%	30 - 130
			Di-N-butyl phthalate	2021/03/22	<2		ug/L	
			Bis(2-ethylhexyl)phthalate	2021/03/22	<2		ug/L	
			3,3'-Dichlorobenzidine	2021/03/22	<0.8		ug/L	
			Pentachlorophenol	2021/03/22	<1		ug/L	

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2021/03/22	<0.2		ug/L	
			Anthracene	2021/03/22	<0.2		ug/L	
			Fluoranthene	2021/03/22	<0.2		ug/L	
			Pyrene	2021/03/22	<0.2		ug/L	
			Benzo(a)anthracene	2021/03/22	<0.2		ug/L	
			Chrysene	2021/03/22	<0.2		ug/L	
			Benzo(b/j)fluoranthene	2021/03/22	<0.2		ug/L	
			Benzo(k)fluoranthene	2021/03/22	<0.2		ug/L	
			Benzo(a)pyrene	2021/03/22	<0.2		ug/L	
			Indeno(1,2,3-cd)pyrene	2021/03/22	<0.2		ug/L	
			Dibenzo(a,h)anthracene	2021/03/22	<0.2		ug/L	
			Benzo(g,h,i)perylene	2021/03/22	<0.2		ug/L	
			Dibenzo(a,i)pyrene	2021/03/22	<0.2		ug/L	
			Benzo(e)pyrene	2021/03/22	<0.2		ug/L	
			Perylene	2021/03/22	<0.2		ug/L	
			Dibenzo(a,j) acridine	2021/03/22	<0.4		ug/L	
			7H-Dibenzo(c,g) Carbazole	2021/03/22	<0.4		ug/L	
			1,6-Dinitropyrene	2021/03/22	<0.4		ug/L	
			1,3-Dinitropyrene	2021/03/22	<0.4		ug/L	
			1,8-Dinitropyrene	2021/03/22	<0.4		ug/L	
7257468	KHO	RPD	Di-N-butyl phthalate	2021/03/22	8.9		%	40
			Bis(2-ethylhexyl)phthalate	2021/03/22	NC		%	40
			3,3'-Dichlorobenzidine	2021/03/22	NC		%	40
			Pentachlorophenol	2021/03/22	NC		%	40
			Phenanthrene	2021/03/22	NC		%	40
			Anthracene	2021/03/22	NC		%	40
			Fluoranthene	2021/03/22	NC		%	40
			Pyrene	2021/03/22	NC		%	40
			Benzo(a)anthracene	2021/03/22	NC		%	40
			Chrysene	2021/03/22	NC		%	40
			Benzo(b/j)fluoranthene	2021/03/22	NC		%	40
			Benzo(k)fluoranthene	2021/03/22	NC		%	40
			Benzo(a)pyrene	2021/03/22	NC		%	40
			Indeno(1,2,3-cd)pyrene	2021/03/22	NC		%	40
			Dibenzo(a,h)anthracene	2021/03/22	NC		%	40
			Benzo(g,h,i)perylene	2021/03/22	NC		%	40
			Dibenzo(a,i)pyrene	2021/03/22	NC		%	40
			Benzo(e)pyrene	2021/03/22	NC		%	40
			Perylene	2021/03/22	NC		%	40
			Dibenzo(a,j) acridine	2021/03/22	NC		%	40
			7H-Dibenzo(c,g) Carbazole	2021/03/22	NC		%	40
			1,6-Dinitropyrene	2021/03/22	NC		%	40
			1,3-Dinitropyrene	2021/03/22	NC		%	40
			1,8-Dinitropyrene	2021/03/22	NC		%	40
7258487	SDE	QC Standard	Total Suspended Solids	2021/03/22		96	%	85 - 115
7258487	SDE	Method Blank	Total Suspended Solids	2021/03/22	<10		mg/L	
7258487	SDE	RPD	Total Suspended Solids	2021/03/22	5.1		%	25
7259063	BMO	Matrix Spike	Phenols-4AAP	2021/03/22		97	%	80 - 120
7259063	BMO	Spiked Blank	Phenols-4AAP	2021/03/22		103	%	80 - 120
7259063	BMO	Method Blank	Phenols-4AAP	2021/03/22	<0.0010		mg/L	
7259063	BMO	RPD	Phenols-4AAP	2021/03/22	NC		%	20
7260231	PBA	Matrix Spike	Total Aluminum (Al)	2021/03/23		115	%	80 - 120

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Antimony (Sb)	2021/03/23		100	%	80 - 120
			Total Arsenic (As)	2021/03/23		101	%	80 - 120
			Total Cadmium (Cd)	2021/03/23		101	%	80 - 120
			Total Chromium (Cr)	2021/03/23		95	%	80 - 120
			Total Cobalt (Co)	2021/03/23		100	%	80 - 120
			Total Copper (Cu)	2021/03/23		99	%	80 - 120
			Total Lead (Pb)	2021/03/23		103	%	80 - 120
			Total Manganese (Mn)	2021/03/23		97	%	80 - 120
			Total Molybdenum (Mo)	2021/03/23		102	%	80 - 120
			Total Nickel (Ni)	2021/03/23		98	%	80 - 120
			Total Phosphorus (P)	2021/03/23		104	%	80 - 120
			Total Selenium (Se)	2021/03/23		107	%	80 - 120
			Total Silver (Ag)	2021/03/23		99	%	80 - 120
			Total Tin (Sn)	2021/03/23		99	%	80 - 120
			Total Titanium (Ti)	2021/03/23		97	%	80 - 120
			Total Zinc (Zn)	2021/03/23		102	%	80 - 120
7260231	PBA	Spiked Blank	Total Aluminum (Al)	2021/03/23		105	%	80 - 120
			Total Antimony (Sb)	2021/03/23		101	%	80 - 120
			Total Arsenic (As)	2021/03/23		104	%	80 - 120
			Total Cadmium (Cd)	2021/03/23		102	%	80 - 120
			Total Chromium (Cr)	2021/03/23		98	%	80 - 120
			Total Cobalt (Co)	2021/03/23		103	%	80 - 120
			Total Copper (Cu)	2021/03/23		102	%	80 - 120
			Total Lead (Pb)	2021/03/23		104	%	80 - 120
			Total Manganese (Mn)	2021/03/23		100	%	80 - 120
			Total Molybdenum (Mo)	2021/03/23		104	%	80 - 120
			Total Nickel (Ni)	2021/03/23		102	%	80 - 120
			Total Phosphorus (P)	2021/03/23		108	%	80 - 120
			Total Selenium (Se)	2021/03/23		110	%	80 - 120
			Total Silver (Ag)	2021/03/23		101	%	80 - 120
			Total Tin (Sn)	2021/03/23		99	%	80 - 120
			Total Titanium (Ti)	2021/03/23		98	%	80 - 120
			Total Zinc (Zn)	2021/03/23		106	%	80 - 120
7260231	PBA	Method Blank	Total Aluminum (Al)	2021/03/24	<4.9		ug/L	
			Total Antimony (Sb)	2021/03/24	<0.50		ug/L	
			Total Arsenic (As)	2021/03/24	<1.0		ug/L	
			Total Cadmium (Cd)	2021/03/24	<0.090		ug/L	
			Total Chromium (Cr)	2021/03/24	<5.0		ug/L	
			Total Cobalt (Co)	2021/03/24	<0.50		ug/L	
			Total Copper (Cu)	2021/03/24	<0.90		ug/L	
			Total Lead (Pb)	2021/03/24	<0.50		ug/L	
			Total Manganese (Mn)	2021/03/24	<2.0		ug/L	
			Total Molybdenum (Mo)	2021/03/24	<0.50		ug/L	
			Total Nickel (Ni)	2021/03/24	<1.0		ug/L	
			Total Phosphorus (P)	2021/03/24	<100		ug/L	
			Total Selenium (Se)	2021/03/24	<2.0		ug/L	
			Total Silver (Ag)	2021/03/24	<0.090		ug/L	
			Total Tin (Sn)	2021/03/24	<1.0		ug/L	
			Total Titanium (Ti)	2021/03/24	<5.0		ug/L	
			Total Zinc (Zn)	2021/03/24	<5.0		ug/L	
7260231	PBA	RPD	Total Aluminum (Al)	2021/03/24	4.0		%	20
			Total Antimony (Sb)	2021/03/24	NC		%	20

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Arsenic (As)	2021/03/24	NC		%	20
			Total Cadmium (Cd)	2021/03/24	3.4		%	20
			Total Chromium (Cr)	2021/03/24	NC		%	20
			Total Cobalt (Co)	2021/03/24	NC		%	20
			Total Copper (Cu)	2021/03/24	1.7		%	20
			Total Lead (Pb)	2021/03/24	NC		%	20
			Total Manganese (Mn)	2021/03/24	1.4		%	20
			Total Molybdenum (Mo)	2021/03/24	3.9		%	20
			Total Nickel (Ni)	2021/03/24	1.6		%	20
			Total Phosphorus (P)	2021/03/24	NC		%	20
			Total Selenium (Se)	2021/03/24	NC		%	20
			Total Silver (Ag)	2021/03/24	NC		%	20
			Total Tin (Sn)	2021/03/24	5.0		%	20
			Total Titanium (Ti)	2021/03/24	13		%	20
			Total Zinc (Zn)	2021/03/24	1.4		%	20
7261315	GR1	Matrix Spike	Mercury (Hg)	2021/03/23		95	%	75 - 125
7261315	GR1	Spiked Blank	Mercury (Hg)	2021/03/23		99	%	80 - 120
7261315	GR1	Method Blank	Mercury (Hg)	2021/03/23	<0.00010		mg/L	
7261315	GR1	RPD	Mercury (Hg)	2021/03/23	NC		%	20
7261318	TJC	Matrix Spike	Nonylphenol (Total)	2021/03/23		109	%	50 - 130
7261318	TJC	Spiked Blank	Nonylphenol (Total)	2021/03/23		103	%	50 - 130
7261318	TJC	Method Blank	Nonylphenol (Total)	2021/03/23	<0.001		mg/L	
7261318	TJC	RPD	Nonylphenol (Total)	2021/03/24	NC		%	40
7261321	DEO	Matrix Spike	Nonylphenol Ethoxylate (Total)	2021/03/23		88	%	50 - 130
7261321	DEO	Spiked Blank	Nonylphenol Ethoxylate (Total)	2021/03/23		83	%	50 - 130
7261321	DEO	Method Blank	Nonylphenol Ethoxylate (Total)	2021/03/23	<0.005		mg/L	
7261321	DEO	RPD	Nonylphenol Ethoxylate (Total)	2021/03/23	NC		%	40
7262504	JT5	Spiked Blank	Total Oil & Grease	2021/03/24		97	%	85 - 115
7262504	JT5	RPD	Total Oil & Grease	2021/03/24	0.52		%	25
7262504	JT5	Method Blank	Total Oil & Grease	2021/03/24	<0.50		mg/L	
7262511	JT5	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2021/03/24		97	%	85 - 115
7262511	JT5	RPD	Total Oil & Grease Mineral/Synthetic	2021/03/24	3.1		%	25
7262511	JT5	Method Blank	Total Oil & Grease Mineral/Synthetic	2021/03/24	<0.50		mg/L	
7265276	SVS	Matrix Spike	Decachlorobiphenyl	2021/03/25		89	%	60 - 130
			Total PCB	2021/03/25		45 (1)	%	60 - 130
7265276	SVS	Spiked Blank	Decachlorobiphenyl	2021/03/25		62	%	60 - 130
			Total PCB	2021/03/25		79	%	60 - 130
7265276	SVS	Method Blank	Decachlorobiphenyl	2021/03/25		89	%	60 - 130
			Total PCB	2021/03/25	<0.05		ug/L	

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7265276	SVS	RPD	Total PCB	2021/03/25	NC		%	40

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

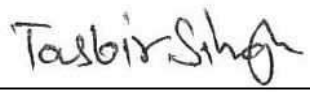
(1) Matrix Spike exceeds acceptance limits,probable matrix interference.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Anastassia Hamanov, Scientific Specialist



Tasbir Singh, Lab Technician

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

MICRO

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel (905) 817-5700 Toll-free 800-563-6266 Fax (905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#12541 Pottinger Gaherty Environmental Consultants	Company Name:	PGL	Quotation #:	C10356	BV Labs Job #:	Bottle Order #: 818096
Attention:	Accounts Payable	Attention:	~~Paula Schuster~~ Ryan Cook	P.O. #:			
Address:	250 Water Street Unit 102 Whitby ON L1N 0G5	Address:		Project:	5660-03.03		
Tel:	(905) 668-4908 Fax: (905) 668-4909	Tel:	(905) 668-4908 Ext: 115 Fax:	Project Name:		COC #: C#818096-01-01	Project Manager: Deepthi Shaji
Email:	AP@pggroup.com; labdataon@pggroup.com	Email:	rcook@pggroup.com ~~pschuster@pggroup.com~~,LabDataON@pggroup.com	Site #:			
				Sampled By:	AES + RSC		

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BV LABS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine	☐ CCME ☑ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ Reg 558 ☑ Storm Sewer Bylaw	
☐ Table 3 ☐ Agr/Other ☐ For RSC	☐ MISA Municipality	
☐ Table ___	☐ PWQO ☐ Reg 406 Table	
	☐ Other	

Include Criteria on Certificate of Analysis (Y/N)? Y

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Toronto Sanitary&Storm Sewer (100-2916)	O.Reg 153 VOCs by HS & F1-F4	O.Reg 153 PAHs	O.Reg 153 Dissolved ICPMS Metals	O.Reg 153 VOCs by HS	Toronto Storm and Sewer	# of Bottles	Comments
1		MW 204	2021/03/17	2pm	GW	N						X	19	
2														
3														
4														
5														
6														
7														
8														
9														
10														

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

18-Mar-21 15:33
Deepthi Shaji
C172290
ATM env-1305

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Present	Yes	No
Ayesha Shah	21/03/18	9:30	Poseur Poseur Poseur	21/03/18	15:33	0		5/3/5	Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

White: BV Labs Yellow: Client

Exceedance Summary Table – Toronto San/Stm Sewer

Result Exceedances

Sample ID	BV Labs ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

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	152-164 Bathurst Street and 623-627 Richmond Street West, Toronto ON	Cover Page	
Postal Code	N/A - multi address site	N/A	
Property Owner (on request for comments memo)	Toronto (Bathurst & Richmond) LP	Cover Page	
Proposed description of the project (if applicable) (point towers, number of podiums)	17-storey, mixed-use condominium building with two levels of underground parking	Page 1 Section 1.0	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Mixed use (residential and commercial)	Page 1 Section 1.0	
Number of below grade levels for the proposed structure	Two	Page 1 Section 1.0	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	April 2021	Cover Page	
Who Performed the Hydrological Review (Consulting Firm)	PGL Environmental Consultants	Cover Page	
Name of Author of Hydrological Review	Christina Totter, MSc., P.Geo.	Page 10 Section 8.0	

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	Page 1 Section 1.0	
		Page # & Section # of every occurrence in the Review	**Review Includes this Information City Staff (Check)**

TORONTO

August 2018

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) **with safety factor included**	966 L/day What safety factor was used? 4	Page 6 Section 5.1	
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **without safety factor included**	241 L/day	Page 6 Section 5.1	
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	300 L/day What safety factor was used? No safety factor required for long term watering calculations	Page 7 Section 5.2	
List the nearest surface water (river, creek, lake)	Lake Ontario	Page 2 Section 3.1	

TORONTO

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Lowest basement elevation	80.91m asl	Page 5 Section 5.0	
Foundation elevation	80.61m asl	Page 5 Section 5.0	
Ground elevation	Existing elevation: 89.90m to 90.47m asl Finished floor elevations: 89.95m to 90.6m asl	Page 5 Section 5.0	
STUDY AREA MAP		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
Study area map(s) have been included in the report.	☑ Yes	Figures	N/A
Study area map(s) been prepared according to the Hydrological Review Terms of Reference.	☑ Yes	Figures	N/A
WATER LEVEL AND WELLS		**Page # & Section # of every occurrence**	**Review Includes this Information (City Staff Initial)**

TORONTO

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review in the Review	Review Includes this Information City Staff (Check)
The groundwater level has been monitored using all wells located on site (within property boundary).	Yes	Page 3 Section 4.1	
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.	No, the 3 months of monitoring is currently ongoing but not yet complete. This report will be updated once the work is complete.	Page 3 Section 4.1	
All water levels in the wells have been measured with respect to masl.	Yes	Page 4 Section 4.1	
A table of geology/soil stratigraphy for the property has been included.	Yes	Page 3 Section 3.2	
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	Page 3 Section 3.2	
Key aquifers and the site's proximity to nearby surface water has been identified.	☑ **Yes**	Page 7 Section 6.1	N/A

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
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.	No, pumping tests were not completed.	N/A	
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	Yes, slug tests completed. Data not usable.	Page 4 Section 4.2	
Have the monitoring well(s) have been monitored using digital devices? If yes how frequently?	Yes, this is ongoing.	n/a	
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 Groundwater level was monitored prior and post slug test however it seems that static groundwater has not been achieved. Digital monitoring is ongoing.	Page 4 Section 4.1	N/A
The above noted slug or pump tests have been included in the report.	☐ Yes No as the results could not be reliably interpreted	Page 4 Section 4.2	
WATER QUALITY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of 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.	An unfiltered sample was collected on March 17, 2021.	Appendix 4	
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	N/A	
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.**	No exceedences of the sanitary/combined Bylaw limits.	Page 9 Section 6.2	
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.**	Total Suspended Solids and Total Manganese	Page 9 Section 6.2	
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.	☑ **Yes** Bureau Veritas	Appendix 4	N/A

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
List of Canadian accredited laboratories: Standards Council of Canada	Bureau Veritas	Appendix 4	
A chain of custody record for the samples is included with the report.	Yes	Appendix 4	
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 4	
List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.	None	Appendix 4	
A true copy of the Certificate of Analysis report, is included with the report.	Yes	Appendix 4	
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)? Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?	◯ **Yes** ◯ **No** ◯ **Yes** ◯ **No** This Reviewer is not qualified to make Geotechnical Assessments	N/A	
The taking and discharging of groundwater on site has been analyzed to ensure that no negative	☐ **Yes**	N/A	N/A

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
impacts will occur to: the City sewage works in terms of quality and quantity (including existing infrastructure), the natural environment, and settlement issues.	This Reviewer is not qualified to make Geotechnical Assessments	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?	◯ **Yes** **If yes, identify impact:** ◯ **No** This Reviewer is not qualified to make Geotechnical Assessments	N/A	N/A

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

Appendix A:

SANITARY/COMBINED **Sample Location:** MW204

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L			ug/L
BOD	300		< 2 mg/L	300,000
Fluoride	10	0.56 mg/L		10,000
TKN	100	2.8 mg/L		100,000
pH	6.0 - 11.5	7.88 pH		6.0 - 11.5
Phenolics 4AAP	1		<0.0010 mg/L	1,000
TSS	350	24 mg/L		350,000
Total Cyanide	2		<0.0050 mg/L	2,000
Metals				
Chromium Hexavalent	2		<0.50 ug/L	2,000
Mercury	0.01		<0.00010 mg/L	10
Total Aluminum	50	180 ug/L		50,000
Total Antimony	5	1.1 ug/L		5,000
Total Arsenic	1	4.2 ug/L		1,000
Total Cadmium	0.7		<0.090 ug/L	700
Total Chromium	4		<5.0 ug/L	4,000
Total Cobalt	5	1.7 ug/L		5,000
Total Copper	2	1.9 ug/L		2,000
Total Lead	1		<0.50 ug/L	1,000
Total Manganese	5	430 ug/L		5,000
Total Molybdenum	5	20 ug/L		5,000
Total Nickel	2	3.5 ug/L		2,000
Total Phosphorus	10		<100 ug/L	10,000
Total Selenium	1		<2.0 ug/L	1,000
Total Silver	5		<0.090 ug/L	5,000
Total Tin	5	1.7 ug/L		5,000
Total Titanium	5	7.2 ug/L		5,000
Total Zinc	2	12 ug/L		2,000
Petroleum Hydrocarbons				
Animal/Vegetable Oil & Grease	150		<0.50 mg/L	150,000
Mineral/Synthetic Oil & Grease	15		<0.50 mg/L	15,000

August 2018

HYDROLOGICAL REVIEW SUMMARY

Volatile Organics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L			ug/L
Benzene	0.01		<0.40 ug/L	10
Chloroform	0.04		<0.40 ug/L	40
1,2-Dichlorobenzene	0.05		<0.80 ug/L	50
1,4-Dichlorobenzene	0.08		<0.80 ug/L	80
Cis-1,2-Dichloroethylene	4		<1.0 ug/L	4,000
Trans-1,3-Dichloropropylene	0.14		<0.80 ug/L	140
Ethyl Benzene	0.16		<0.40 ug/L	160
Methylene Chloride	2		<4.0 ug/L	2,000
1,1,2,2-Tetrachloroethane	1.4		<0.80 ug/L	1,400
Tetrachloroethylene	1		<0.40 ug/L	1,000
Toluene	0.016		<0.40 ug/L	16
Trichloroethylene	0.4		<0.40 ug/L	400
Total Xylenes	1.4		<0.40 ug/L	1,400
Semi-Volatile **Organics**				
Di-n-butyl Phthalate	0.08		<2 ug/L	80
Bis (2-ethylhexyl) Phthalate	0.012		<2 ug/L	12
3,3'-Dichlorobenzidine	0.002		<0.8 ug/L	2
Pentachlorophenol	0.005		<1 ug/L	5
Total PAHs	0.005		<1 ug/L	5
Misc **Parameters**				
Nonylphenols	0.02		<0.001 mg/L	20
Nonylphenol Ethoxylates	0.2		<0.005 mg/L	200

Sample Collected: March 17, 2021
Temperature: 3.7 degrees celsius

August 2018

HYDROLOGICAL REVIEW SUMMARY

STORM **Sample Location:** MW204

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	**mg/L**			**ug/L**
pH	6.0 - 9.5	7.88 pH		
BOD	15		< 2 mg/L	15,000
Phenolics 4AAP	0.008		<0.0010 mg/L	8
TSS	15	24 mg/L		15,000
Total Cyanide	0.02		<0.0050 mg/L	20
Metals				
Total Arsenic	0.02	4.2 ug/L		20
Total Cadmium	0.008		<0.090 ug/L	8
Total Chromium	0.08		<5.0 ug/L	80
Chromium Hexavalent	0.04		<0.50 ug/L	40
Total Copper	0.04	1.9 ug/L		40
Total Lead	0.12		<0.50 ug/L	120
Total Manganese	0.05	430 ug/L		50
Total Mercury	0.0004		<0.00010 mg/L	0.4
Total Nickel	0.08	3.5 ug/L		80
Total Phosphorus	0.4		<100 ug/L	400
Total Selenium	0.02		<2.0 ug/L	20
Total Silver	0.12		<0.090 ug/L	120
Total Zinc	0.04	12 ug/L		40
Microbiology				
E.coli	200		< 10 CFU/100 ml	200,000
Volatile Organics				
Parameter	**mg/L**			**ug/L**
Benzene	0.002		<0.40 ug/L	2
Chloroform	0.002		<0.40 ug/L	2
1,2-Dichlorobenzene	0.0056		<0.80 ug/L	6
1,4-Dichlorobenzene	0.0068		<0.80 ug/L	7
Cis-1,2-Dichloroethylene	0.0056		<1.0 ug/L	6
Trans-1,3-Dichloropropylene	0.0056		<0.80 ug/L	6
Ethyl Benzene	0.002		<0.40 ug/L	2
Methylene Chloride	0.0052		<4.0 ug/L	5
1,1,2,2-Tetrachloroethane	0.017		<0.80 ug/L	17
Tetrachloroethylene	0.0044		<0.40 ug/L	4
Toluene	0.002		<0.40 ug/L	2
Trichloroethylene	0.0076		<0.40 ug/L	8
Total Xylenes	0.0044		<0.40 ug/L	4

August 2018

HYDROLOGICAL REVIEW SUMMARY

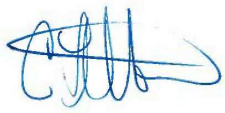
Semi-Volatile Organics		Sample Result	Sample Result with upper RDL included	
Di-n-butyl Phthalate	0.015		<2 ug/L	5
Bis (2-ethylhexyl) Phthalate	0.0088		<2 ug/L	8.8
3,3'-Dichlorobenzidine	0.0008		<0.8 ug/L	0.8
Pentachlorophenol	0.002		<1 ug/L	2
Total PAHs	0.002		<1 ug/L	2
PCBs	0.0004		<0.05 ug/L	0.4
Misc Parameters				
Nonylphenols	0.001		<0.001 mg/L	1
Nonylphenol Ethoxylates	0.01		<0.005 mg/L	10

Sample Collected: March 17th 2021
Temperature: 3.7 degrees celsius

Consulting Firm that prepared Hydrological Report: PGL Environmental Consultants

Qualified Professional who completed the report summary: Christina Trotter

Print Name

Qualified Professional who completed the report summary:  April 28, 2021

Signature Date & Stamp

TORONTO

December 2017

SERVICING REPORT GROUNDWATER SUMMARY

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

For City Staff Use Only:	
Name of ECS Case Manager (please print)	
Date Review Summary provided to to TW	

A. SITE INFORMAITON		**Included in SR (reference page number)**	**Report Includes this information City staff (Check)**
Date Servicing Report was prepared: May 2021		Cover	
Title of Servicing Report: FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT		Cover	
Name of Consulting Firm that prepared Servicing Report:		Cover	
Site Address	152-164 BATHURST STREET AND 623-627 RICHMOND STREET Toronto, Ontario	Cover	
Postal Code	M5V 2R3	Cover	
Property Owner (identified on planning request for comments memo)	TORONTO (BATHURST & RICHMOND) LP	Cover	
Proposed description of the project (ex. number of point towers, number of podiums, etc.)	17 Storey Residentail Development with commercial on main floor.	1	
Land Use (ex. commercial, residential, mixed, industrial, institutional) as defined by the Planning Act	Commercial/residential	1	
Number of below grade levels	2	1	

December 2017

SERVICING REPORT GROUNDWATER SUMMARY

Does the SR include a private water drainage system (PWDS)? **PWDS: Private Water Drainage System:** A subsurface drainage system which may consist of but is not limited to weeping tile(s), foundation drain(s), private water collection sump(s), private water pump or any combination thereof for the disposal of private water on the surface of the ground or to a private sewer connection or drainage system for disposal in a municipal sewer.	If **Yes** continue completing Section B (Information Relating to Groundwater) **ONLY** **If Yes, Number of PWDS?** **_____1_____** *(Each of these PWDS may require a separate Toronto Water agreement)* If **No** skip to Sections C (On-site Groundwater Containment) and/or D (Water Tight Requirements) as applicable	**X YES** ◯ NO	
B. INFORMATION RELATING TO GROUNDWATER		**Included in SR (reference page number)**	**Report Includes this information City Staff (Check)**
A copy of the pump schedule(s) for **ALL** groundwater sump pump(s) for the development site has been included in the SR **or** A letter written by a Mechanical Consultant (signed and stamped by a Professional Engineer of Ontario) shall be attached to the SR stating the peak flow rate of the groundwater discharge for the development site for all groundwater sump pump(s). This	**Estimated pump flow = 0.25/s.** **Letter included in Appendix C**	3 App C	

SERVICING REPORT GROUNDWATER SUMMARY

peak flow rate must be based on the pump schedule(s) that have been designed by the Mechanical Consultant. A template of this letter is attached in Schedule A. ****If there is more than one groundwater sump they must ALL be included in the letters along with a combined flow****			
Is it proposed that the groundwater from the development site will be discharged to the sanitary, combined or storm sewer?	◯ **Sanitary Sewer** **X** Combined Sewer ◯ Storm Sewer	3	
Will the proposed PWDS discharge from the site go to the Western Beaches Tunnel (WBT)? *Reference attached WBT drainage map*	◯ YES X **NO** **If Yes, private water discharge fees will apply and site requires a sanitary discharge agreement.**		
What is the street name where the receiving sewer is located?	Richmond Street West	3	
What is the diameter of the receiving sewer?	600mm x 900mm	3	
Is there capacity in the proposed local sewer system? X YES ◯ **NO**	Are there any improvements required to the sewer system? If yes, identify them below and refer to the section and page number of the SR where this information can be found. If a sewer upgrade is required, the owner is required to enter into an Agreement with the City to improve the infrastructure? ◯ YES	12	
Has Toronto Water-WIM confirmed that there is there capacity in the proposed infrastructure listed below?	No confirmation received to date.		

SERVICING REPORT GROUNDWATER SUMMARY

- Trunk System? ◯ YES **X** **NO** -Pumping Station? ◯ YES X **NO** -Wastewater treatment plant? ◯ YES X **NO** -Outfall? ◯ YES X **NO** -Combined Sewer Overflow? ◯ YES X **NO** *If there is no capacity in any of the above then alternative options need to be considered by the Owner and site cannot discharge to City sewer system.			
Total allowable peak flow rate during a 100 year storm event (L/sec) to storm sewer When groundwater is to be discharged to the storm sewer the total groundwater and stormwater discharge shall not exceed the permissible peak flow rate during a 2 year pre development storm event, as per the City's Wet Weather Flow Management Guidelines, dated 2006	_24.1 L/sec	8	
Short-Term Groundwater Discharge Provide proposed total flow rate to the sanitary/combined sewer in post-development scenario Total Flow (L/sec) = sanitary flow + peak short-term groundwater flow rate	__4.66_____ L/sec	3	
Long-Tem Groundwater Discharge		10	

SERVICING REPORT GROUNDWATER SUMMARY

Provide proposed total flow rate to the sanitary/combined sewer in post-development scenario Total Flow (L/sec) = sanitary flow + peak long-term groundwater flow rate	____4.66____ L/sec		
Does the water quality meet the receiving sewer Bylaw limits? **X** YES ◯ NO	If the water quality does not meet the applicable receiving sewer Bylaw limits and the applicant is proposing a treatment system the applicant will need to include a letter stating that a treatment system will be installed and the details of the treatment system will be included in the private water discharge application that will be submitted to TW EM&P.	3	
C. ON-SITE GROUNDWATER CONTAINMENT		**Included in SR (reference page number)**	**Report Includes this information City Staff (Check)**
How is the site proposing to manage the groundwater discharge on site?	N/A		
Has the above proposal been approved by:	◯ TW-WIM And ◯ TW-EM&P And ◯ ECS		
If the site is proposing a groundwater infiltration gallery, has it been stated that the groundwater infiltration gallery will not be connected to the	◯ YES		

SERVICING REPORT GROUNDWATER SUMMARY

municipal sewer? A connection between the infiltration gallery/dry well and the municipal sewer is not permitted Please be advised if an infiltration gallery/dry well on site is not connected to the municipal sewer, the site **must** submit two letters using the templates in Schedule B and Schedule C.	◯ NO		
Confirm that the infiltration gallery can infiltrate 100% of the expected peak groundwater flow year round, ensure that the top of the infiltration trench is below the frost line (1.8m depth), not less than 5 m from the building foundation, bottom of the trench 1m above the seasonally high water table, and located so that the drainage is away from the building.			
D. WATER TIGHT REQUIREMENTS		**Included in SR (reference page number)**	**Report Includes this information City Staff (Check)**
If the site is proposing a water tight structure: 1. The owner must submit a letter using the template in Schedule D. 2. A Professional Engineer (Structural), licensed to practice in Ontario and qualified in the subject must submit a letter using the template in Schedule E. 3. A Professional Engineer (Mechanical), licensed to practice in Ontario and qualified in the subject must submit a letter using the template in Schedule F.			

Provide a copy of the approved SR to Toronto Water Environmental Monitoring & Protection Unit at pwapplication@toronto.ca.

Consulting Firm that prepared Servicing Report: _____HUSSON Limited_____

SERVICING REPORT GROUNDWATER SUMMARY

Professional Engineer who completed the report summary: Greg Rapp
Print Name

Professional Engineer who completed the report summary: _____
Signature Date & Stamp

Smith + Andersen
1100 – 100 Sheppard Ave. East, Toronto ON, M2N 6N5
416 487 8151 f 416 487 9104 smithandandersen.com

2022-04-22

Attention: Executive Director, Engineering and Construction Services
c/o Manager, Development Engineering
5100 Yonge Street, 4th floor.
Toronto, Ontario, M2N 5V7

cc: General Manager, Toronto Water
c/o Manager, Environmental Monitoring and Protection Unit
30 Dee Avenue
Toronto, Ontario, M9N 1S9

RE: 152-164 BATHURST AND 623-627 RICHMOND STREET, TORONTO, ONTARIO
S+A PROJECT # 22121.000.M.000
GROUND WATER DISCHARGE STRATEGY

To whom it may concern;

This letter is to confirm that groundwater from the Private Water Drainage System for the above mentioned project will be collected and discharged into the sanitary control manhole of the Site located at **152-164 Bathurst and 623-627 Richmond Street.**

The groundwater sump pumps will be sized at 0.25 L/sec (groundwater peak flow rate) and are expected to run approximately less than 1 hours per day.

This peak flow rate will be used for assessing capacity for the peak discharge flow into the City's sanitary sewer system.

Once the proposed groundwater peak flow rate of 0.25L/sec is approved by Engineering Construction Services (ECS), City of Toronto, the property owner will not be allowed to amend this flow rate in the future. Should there be any amendment to the peak flow rate of 0.25 L/sec in future, the property owner shall re-submit either the updated pump schedule or a revised letter to ECS. In addition, the sewer capacity will need to be re-assessed.

Smith + Andersen

Bram Atlin P.Eng., LEED AP
Principal
22121.000.m.001.l001 - Ground Water Strategy (Bath-Rich)

APPENDIX D

STORMFILTER SIZING AND DETAILS

Determining Number of Cartridges for Flow Based Systems

Date	**08/04/2021**	**Black Cells =**	**Calculation**

Site Information

Project Name	**164 Bathurst Street**		
Project Location	**Toronto, ON**		
OGS ID	**OGS 1**		
Drainage Area, Ad	**0.07**	ac	(0.03 ha)
Impervious Area, Ai	**0.07**	ac	
Pervious Area, Ap	**0.00**		
% Impervious	**100%**		
Runoff Coefficient, Rc	**0.90**		
Treatment storm flow rate, Q_{treat}	**0.05**	cfs	(1.5 L/s)
Peak storm flow rate, Q_{peak}	**TBD**	cfs	

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**12**	in
Specific Flow Rate	**2.00**	gpm/ft^2
Flow rate per cartridge	**10.00**	gpm

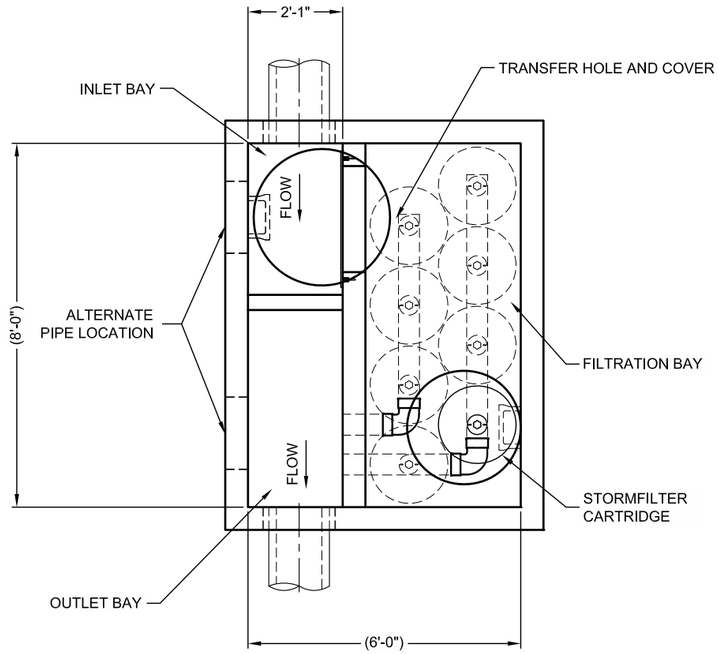
SUMMARY

Number of Cartridges	3
Media Type	Perlite

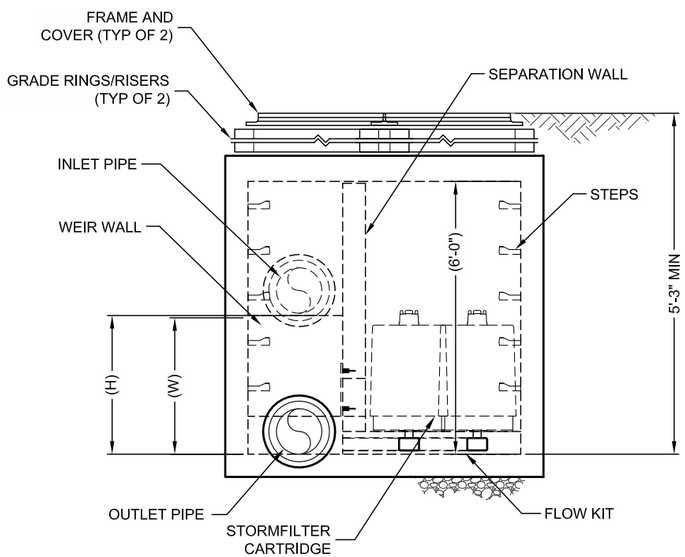
Event Mean Concentration (EMC)	**150**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend SFPD0806 vault or CIP

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825



PLAN



ELEVATION

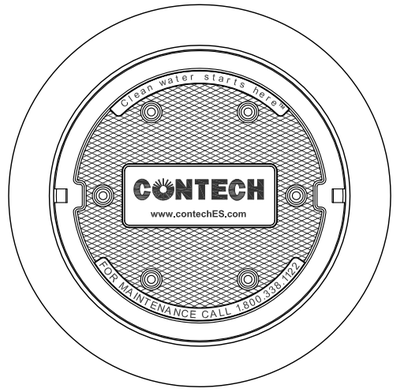
The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,324,579; 5,707,527; 5,985,157; 6,027,639; 6,946,065; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

STORMFILTER DESIGN TABLE

- THE 8' x 6' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (CSF, PERLITE, ZPG)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

INLET BAY RIM ELEVATION	*
FILTER BAY RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 6' PEAK DIVERSION STORMFILTER STANDARD DETAIL

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
Mail Code 401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 14, 2016

Derek M. Berg
Director - Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Laboratory Certification
Stormwater Management StormFilter® (StormFilter) by Contech Engineered Solutions LLC
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the StormFilter System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the StormFilter System by Contech Engineered Solutions LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2.12 gpm/sf of effective filtration treatment area.

2. The StormFilter System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormFilter, which is attached to this document. However, it is recommended to review the maintenance website at http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2813&PortalId=0&DownloadMethod=attachment for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for a StormFilter System.

   Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a StormFilter System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The calculation of the minimum number of cartridges for use in the StormFilter System is based upon both the MTFR and the maximum inflow drainage area. It is necessary to calculate the required cartridges using both methods and to rely on the method that results in the highest minimum number of cartridges determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the StormFilter System in this example is 0.25 acres. Based upon the information in Table 1 below, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the maximum drainage area:

1. Five (5) 12” cartridges,
2. Three (3) 18” cartridges, or
3. Two (2) 27” cartridges

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the MTFR:

1. Thirty-six (36) 12” cartridges,
2. Twenty-four (24) 18” cartridges, or
3. Sixteen (16) 27” cartridges

The MTFR Evaluation results will be used since that method results in the higher minimum number of cartridges determined by the two methods.

The sizing table corresponding to the available system models are noted below:

TABLE 1 STORMFILTER CARTRIDGE HEIGHTS AND NEW JERSEY TREATMENT CAPACITIES

StormFilter Cartridge Heights and New Jersey Treatment Capacities				
StormFilter Cartridge Height	**Filtration Surface Area (sq.ft)**	**MTFR[1] (GPM)**	**Mass Capture Capacity (lbs)**	**Maximum Allowable Inflow Area[2] (acres)**
Low Drop (12")	4.71	10	36.3	0.061
18"	7.07	15	54.5	0.09
27"	10.61	22.5	81.8	0.136

Notes:

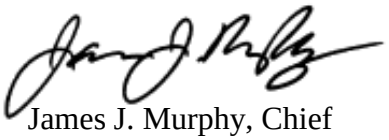
1. *MTFR calculated based on 4.72x10-3 cfs/sf (2.12 gpm/sf) of effective filtration treatment area.*
2. *Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually.*

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of

indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

CONTECH®
ENGINEERED SOLUTIONS

StormFilter Inspection and Maintenance Procedures

The Stormwater Management StormFilter®

Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. **Inspection**
   - Inspection of the vault interior to determine the need for maintenance.
2. **Maintenance**
   - Cartridge replacement
   - Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/ maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..

Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to weather or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
   a. If >4" of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
   a. If >1/4" of accumulation, maintenance is required.
3. Submerged cartridges.
   a. If >4" of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
   a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
   a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
   a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
   a. If pronounced scum line (say ≥ 1/4" thick) is present above top cap, maintenance is required.

Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

   Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

B. Remove the used cartridges (up to 250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

C. Set the used cartridge aside or load onto the hauling truck.

D. Continue steps a through c until all cartridges have been removed.

Method 2:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

B. Unscrew the cartridge cap.

C. Remove the cartridge hood and float.

D. At location under structure access, tip the cartridge on its side.

E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.

F. Set the empty, used cartridge aside or load onto the hauling truck.

G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.

Inspection Report

Date: Personnel:

Location: System Size:

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

Sediment Thickness in Forebay: Date:

Sediment Depth on Vault Floor:

Structural Damage:

Estimated Flow from Drainage Pipes (if available):

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water:

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal:

☐ Minor Structural Repairs:

☐ Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source:

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source:

Erosion of Landscaped Areas: Yes ☐ No ☐ Source:

Items Needing Further Work:

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

List Safety Procedures and Equipment Used: _____

_____

_____

System Observations

Months in Service:

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: _____

Replace Cartridges: Yes ☐ No ☐ Details: _____

Sediment Removed: Yes ☐ No ☐ Details: _____

Quantity of Sediment Removed (estimate?):

Minor Structural Repairs: Yes ☐ No ☐ Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:

_____

_____

_____

_____

_____

_____

_____

RECYCLED PAPER

CONTECH®
ENGINEERED SOLUTIONS

800-338-1122

www.ContechES.com

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit contech-cpi.com or call 800.338.1122.

Support

- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

800.338.1122
www.conteches.com

APPENDIX E

INLET CONTROL DEVICE DETAILS

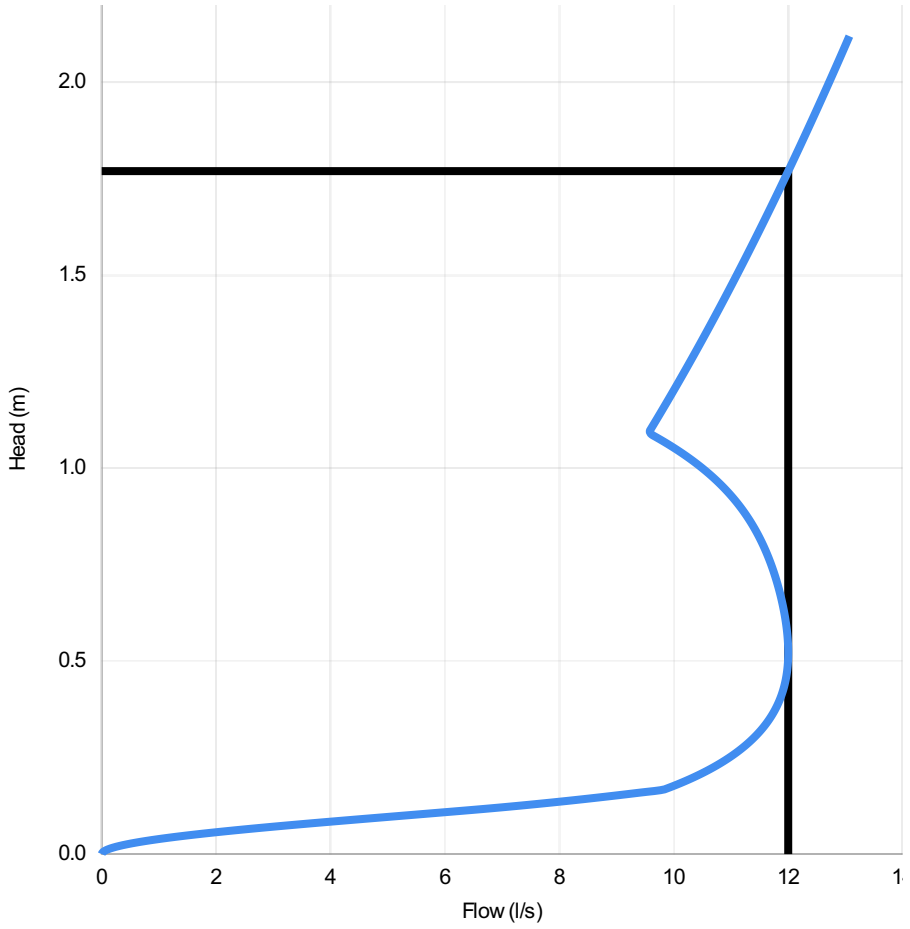
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.770	12.000
Flush-Flo	0.523	12.000
Kick-Flo®	1.090	9.552
Mean Flow		10.492

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.061	2.283
0.122	7.056
0.183	10.103
0.244	10.908
0.305	11.423
0.366	11.740
0.427	11.915
0.488	11.990
0.549	11.995
0.610	11.948
0.671	11.864
0.732	11.744
0.793	11.584
0.854	11.369
0.916	11.078
0.977	10.685
1.038	10.158
1.099	9.586
1.160	9.833
1.221	10.072
1.282	10.306
1.343	10.534
1.404	10.757
1.465	10.975
1.526	11.188
1.587	11.397
1.648	11.602
1.709	11.803
1.770	12.000

DESIGN ADVICE

The head/flow characteristics of this SHE-0147-1200-1770-1200 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modeling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International®

DATE	6/4/2021 9:29 PM
Site	Bathurst & Richmond
DESIGNER	Greg Rapp
Ref	mh1

SHE-0147-1200-1770-1200

Hydro-Brake Optimum®

Technical Specification		
Control Point	Head (m)	Flow (l/s)
Primary Design	1.770	12.000
Flush-Flo™	0.523	12.000
Kick-Flo®	1.090	9.552
Mean Flow		10.492

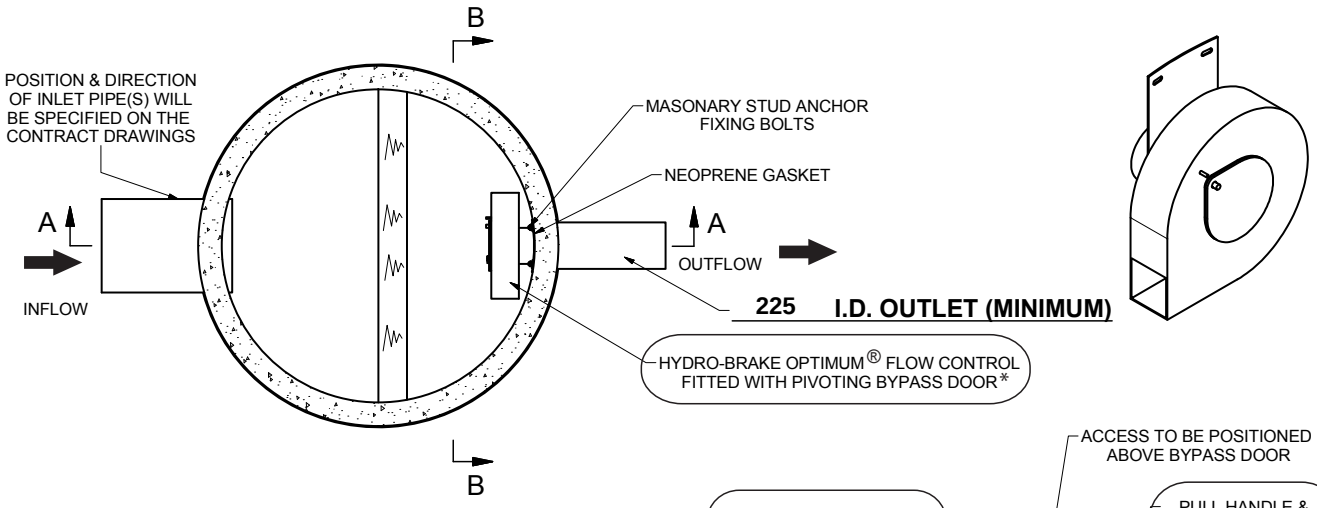
hydro-int.com/patents

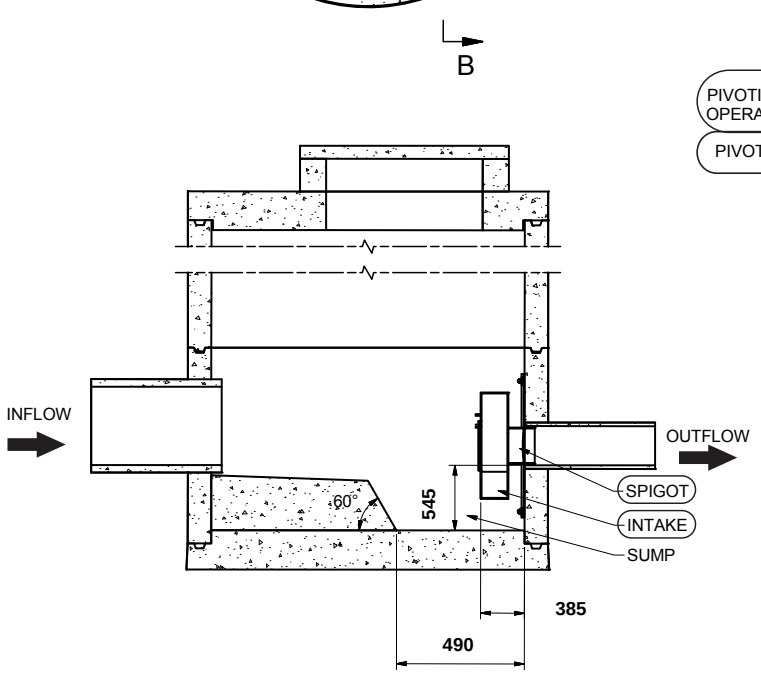
Hydro-Brake Optimum® Flow Control including:

- **3 mm** grade 304L stainless steel
- Integral stainless steel pivoting bypass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Bead blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Neoprene gasket to seal outlet

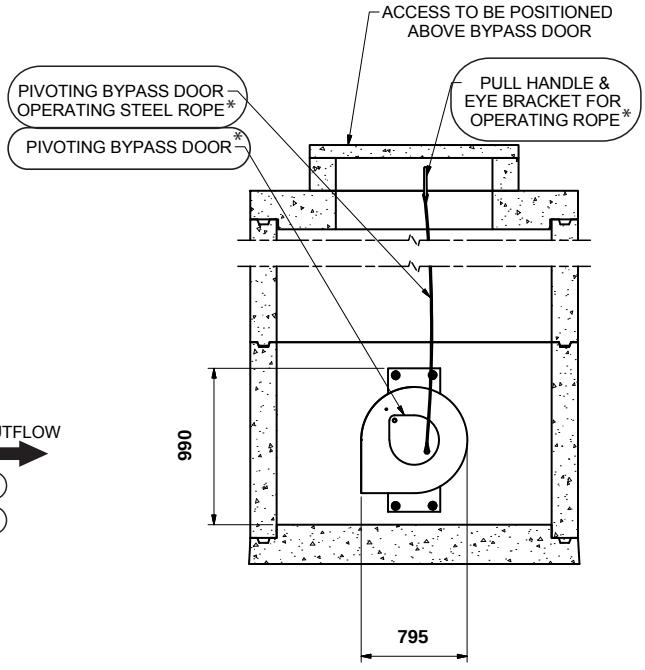
BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No 08/4596

WRc APPROVED PT/329/0412





SECTION A-A



SECTION B-B

IMPORTANT: ( ) LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE OPTIMUM® FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !

The head/flow characteristics of this SHE-0147-1200-1770-1200 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International

DATE	6/4/2021 9:29 PM
SITE	Bathurst & Richmond
DESIGNER	Greg Rapp
REF	mh1

SHE-0147-1200-1770-1200

Hydro-Brake Optimum®

 Hydro International, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD. Tel 01275 878371 Fax 01275 874979 Web www.hydro-int.com Email enquiries@hydro-int.com

greg.rapp@husson.ca

HUSSON

APPENDIX F

WATER DEMAND CALCULATIONS

Fire Flow Requirements

Project: Bathurst and Richmond
Project No.: 211176
Municipality: Toronto

Commercial/Office Building
GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW
(as per the Water Supply for Public Fire Protection 1999 manual by the Fire Underwriters Survey)

STEP 1
Determine the fire flow.

Required Fire Flow (F)	F = 220 x C x sqrt(A)	The required fire flow in litres per minute.
Maximum Floor Area (A) =	14819 m2	Total Above Grade GFA
Coefficient (C) =	0.8	Coefficient related to the type of construction. = 1.5 for wood frame construction (structure essentially all combustible). = 1.0 for ordinary construction (brick or other masonry walls, combustible floor = 0.8 for non-combustible construction (unprotected metal structural) = 0.6 for fire-resistive construction (fullyprotected frame,floors, roof).
F =	21500 L/min.	

STEP 2
Determine the increase or decrease for occupancy.

	0%	Reduction for Low Hazard Occupancy (Dwellings).
Decrease	0 L/min.	

STEP 3
Determine the decrease, if any, for automatic sprinkler protection.

	50%	30% for sprinklered as per NFPA 13.
Decrease	10750 L/min.	50% for fully automatic sprinkler.

STEP 4
Determine the total increase for exposures.

0 -3m (25%), 3-10m (20%), 10-20m (15%), 20-30m (10%), 30-45m (5%)

North - 35m	10%	21
East - <3m	5%	31
South - >20m	25%	1
West - 8m	25%	1
	65.0%	Maximum exposure increase is 75%.
Increase	13975 L/min.	

STEP 5
Determine the minimum required fire flow.

F =	**25,000 L/min.**	**Round to the nearest 1000L/min.**

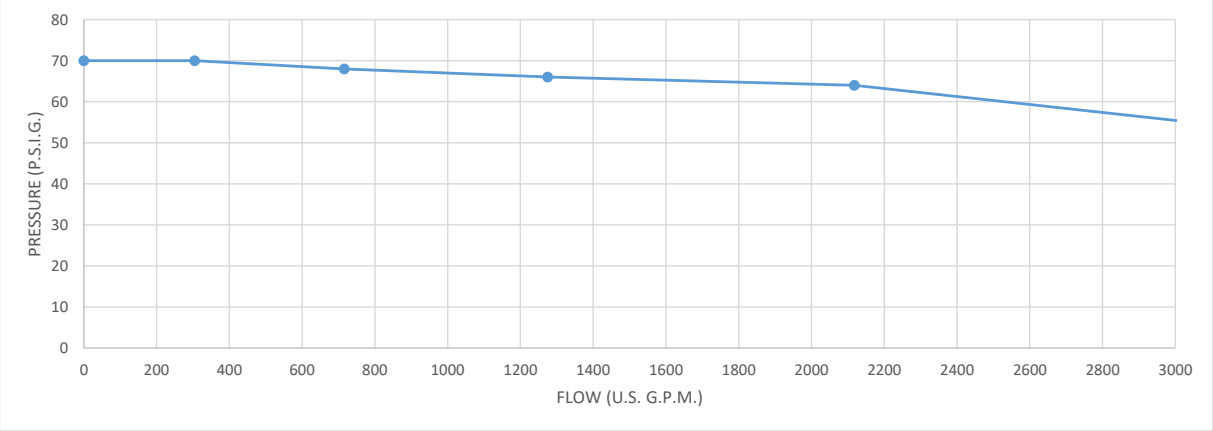
10 Estate Drive
Toronto, Ontario
Canada M1H 2Z1

T 416.282.1665
F 416.282.7702
www.corix.com

FLOW TEST REPORT

Date	JUNE 9TH 2021
Customer	HUSSON ENGINEERING
Job Location	152-164 BATHURST STREET, TORONTO ON
Time of Test	9:45AM
Location of test (flow)	MCAVITY M67 BRIGADIER HYD, 608 RICHMOND STREET WEST
Location of test (residual)	MCAVITY M67 BRIGADIER HYD, 656 RICHMOND STREET WEST
Main Size (mm)	
Static Pressure (psi)	70

	Number of Outlets & Orifice Size	PITOT Pressure (psi)	Flow (U.S. G.P.M.)	Residual Pressure (psi)
#1	1 x 1 1/8	66	305	70
#2	1 x 1 3/4	62	716	68
#3	1 x 2 1/2	58	1275	66
#4	2 x 2 1/2	40	2117	64
#5			6654	20
Colour code	Blue			



Comments	PERFORMED ONE COMPLETE NFPA 291 FLOW TEST AS REQUESTED.
Crew Member	COLIN MACDONALD