

Functional Servicing and Stormwater Management Report



Project: 48 Grenoble Drive

Microbjo Properties Inc. c/o Tenblock

PREPARED BY:



Isaak Chlorotiris, P.E., M.A.Sc.
Project Designer

REVIEWED BY:



John Pasalidis, P.E., M.A.Sc.
Project Engineer

AUTHORIZED FOR ISSUE BY:

LITHOS GROUP INC.



Nick Moutzouris, P.Eng., M.A.Sc.
Principal

Identification	Date	Description of issued and/or revision
FSR/SWM Report	March 18 th , 2022	Issued for Zoning and Site Plan Application

Statement of Conditions

This Report / Study (the “Work”) has been prepared at the request of, and for the exclusive use of, the Owner / Client, the City of Toronto and its affiliates (the “Intended User”). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Lithos Group Inc. and its Owner. Lithos Group Inc. expressly excludes liability to any party except the intended User for any use of, and/or reliance upon, the work.

Neither possession of the Work, nor a copy of it, carries the right of publication. All copyright in the Work is reserved to Lithos Group Inc. The Work shall not be disclosed, produced or reproduced, quoted from, or referred to, in whole or in part, or published in any manner, without the express written consent of Lithos Group Inc. and the Owner.

Executive Summary

Lithos Group Inc. (Lithos) was retained by Microbjo Properties Inc. (the “Owner”) to prepare a Functional Servicing and Stormwater Management (FSR-SWM) Report in support of Zoning and Site Plan Application for a proposed residential development at 48 Grenoble Drive, in the City of Toronto (the “City”). The following is a summary of our conclusions:

Storm Drainage

The site stormwater discharge will be controlled to the 2-year pre-development flow and will be connected to the proposed 300mm diameter storm sewer on Grenoble Drive. In order to attain the target flows and meet the City’s Wet Weather Flow Management Guidelines (WWFMG), quantity controls will be utilized and up to 115.3 m³ on-site storage will be required for the proposed residential development. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of Environment, Conservation and Parks (MECP). Quality control will be provided for the subject site for a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

Three (3) separate connections will be provided for the proposed development: one for the East Tower; one for the Podium; and one for the West Tower. All sanitary connections will lead to a proposed 450 mm diameter sanitary sewer on Grenoble Drive flowing West. The additional net discharge flow from the entire property (proposed and existing development), is anticipated at approximately 15.17 L/s.

Under Dry and Wet-Weather, post-development conditions, the maximum downstream capacity of the sanitary sewer network will not be exceeded, and the freeboard distance will be well over 1.8m. Therefore, the property under proposed conditions will not adversely affect flow conditions downstream and the existing infrastructure will be capable to support the proposed development.

Water Supply

Five (5) separate fire lines will be provided for the proposed development : two (2) for the East Tower; two (2) for the West Tower; and one for the Podium according to the Ontario Building Code (OBC), to support the proposed development’s sprinkler system. In addition, three (3) of the above noted fire lines will split into domestic connections that will service the proposed development. Water supply for the site will be from the existing 400 mm diameter watermain on the East side of Deauville Lane and the existing 400 mm diameter watermain on the North side of Grenoble Drive. Upon receipt of the fire hydrant test results in spring of 2022, an addendum to this report will be prepared and submitted to the City on the “Client’s” behalf.

Site Grading

The proposed grades will match current drainage patterns wherever feasible. Grades will be maintained along property lines to the extent practical. Furthermore, under post-development conditions, there will be no surface drainage towards the Parkland Dedication portion of the site from the residential development.

Table of Contents

1.0	Introduction	1
2.0	Site Description	1
3.0	Site Proposal	1
4.0	Terms of Reference and Methodology	2
4.1.	Terms of Reference	2
4.2.	Methodology: Stormwater Drainage and Management.....	2
4.3.	Methodology: Sanitary Discharge	2
4.4.	Methodology: Water Usage.....	3
5.0	Stormwater Management and Drainage	3
5.1.	Existing Conditions.....	3
5.2.	Stormwater Management	4
5.2.1.	Water Balance	5
5.2.2.	Quantity Controls	5
5.2.3.	Underground Storage Tank	6
5.2.4.	Quality Controls.....	7
5.3.	Proposed Storm Connection	7
6.0	Sanitary Drainage System	7
6.1.	Existing Sanitary Drainage System	7
6.2.	Existing and Proposed Sanitary Flows	7
6.3.	Proposed Sanitary Connection.....	8
7.0	Groundwater.....	8
7.1.	Long Term Dewatering	8
7.2.	Short Term Dewatering	8
8.0	Sanitary Sewer Capacity Analysis.....	8
8.1.	Capacity Assessment Results	9
9.0	Water Supply System	10
9.1.	Existing System	10
9.2.	Proposed Water Supply Requirements	10
9.3.	Proposed Watermain Connection	12
10.0	Site Grading	12
10.1.	Existing Grades	12
10.2.	Proposed Grades.....	12
11.0	Conclusions and Recommendations.....	13

List of Figures

Figure 1 - Location Plan

Figure 2 - Aerial Plan

List of Tables

Table 4-1 – Sanitary Flows	3
Table 4-2 – Water Usage	3
Table 5-1 – Target Input Parameters	4
Table 5-2 – Target Peak Flows	4
Table 5-3 – Post-development Input Parameters	5
Table 5-4 – Post-development Quantity Control as per City Requirements	6
Table 5-5 – Site TSS Removal	7
Table 9.1 – Fire Flow Input Parameters (West Tower)	10
Table 9-2 – Fire Flow Input Parameters (East Tower)	11
Table 9-3 – Fire Flow Input Parameters (Podium)	11

Appendices

Appendix A – Site Photographs

Appendix B – Background Information

Appendix C – Stormwater Analysis

Appendix D – Sanitary Data Analysis

Appendix E – Water Data Analysis

1.0 Introduction

Lithos Group Inc. (Lithos) was retained by Microbjo Properties Inc. (the “Owner”) to prepare a Functional Servicing and Stormwater Management (FSR-SWM) Report in support of Zoning and Site Plan Applications for a proposed residential use development at 48 Grenoble Drive (M3C 1C8), in the City of Toronto (City).

The purpose of this report is to provide site-specific information for the City’s review with respect to infrastructure, required to support the proposed development. More specifically, the report will present details on sanitary discharge, water supply and stormwater management drainage.

We contacted the City’s engineering department to obtain existing information in preparation of this report. The following documents were available for our review:

- Plan and profile drawings of Deauville Lane, from Grenoble Drive to Rochefort Drive, drawing No. D-186-01, dated October, 1959;
- Plan and profile drawings of Easement, from Grenoble Drive to St. Dennis Drive, drawing No. SA-58-R-01, dated January, 1967;
- Plan and profile drawings of Grenoble Drive, from Gateway Boulevard to Deauville Lane, drawing No. G-113-03, January, 1967;
- Toronto CU Maps of Grenoble Drive and Deauville Lane;
- Geotechnical engineering report by Grounded Engineering Inc., dated March 11, 2022;
- Hydrogeological review report by Grounded Engineering Inc., dated March 10, 2022;
- Site Plan prepared by Diamond Schmitt Architects, dated March 18, 2022;
- Site Statistics prepared by Diamond Schmitt Architects, dated March 18, 2022;
- Survey Plan prepared by R. AVIS SURVEYING INC., dated August 4, 2021.

2.0 Site Description

The existing site is approximately 6,748.9 m² (0.674 hectares). It is currently occupied by residential development, facilitated by outdoor parking area. The site is bound by a residential development to the north, Deauville Lane to the east, Grenoble Drive to the south and Parkland to the west. Refer to **Figures 1** and **2** following this report and site photographs in **Appendix A**.

The entire City was deemed as an area of basement flooding. As shown in the updated map, included in **Appendix B**, Environmental Assessment (EA) Studies are being performed across the City of Toronto, separated in areas. According to the “*Current Basement Flooding Investigation Environmental Assessment Studies*” for the City of Toronto found online, the site is located in area 55 into which, EA study is in progress .

3.0 Site Proposal

The proposed development will be comprised by:

- A residential high-rise development;
- Parkland area to be dedicated to the City.

The proposed development will consist of a 6-storey podium with two (2) high-rise, 43-storey and 41-storey towers, supporting residential use.

It will consist of 993 residential units and will be facilitated by four (4) levels of underground parking. The total development will be approximately 67,941 m² of Gross Floor Area (GFA).

The west portion of the site, with an area of 677 m², will be dedicated to the City to be used as parkland. Please refer to **Appendix B** for the proposed site plan and statistics.

4.0 Terms of Reference and Methodology

4.1. Terms of Reference

The Terms of Reference used for the scope of this report were based on the City's Development Guide Servicing Report Terms of Reference, December 2007, the January 2021 Second Edition of the City of Toronto Design Criteria for Sewers and Watermains and the November 2006 Wet Weather Flow Management Guidelines (WWFMG).

All erosion and sediment control BMP's shall be designed, constructed and maintained in all development sites in accordance with the GTA CA's Erosion and Sediment Control Guidelines for Urban Construction (2005) and/or other City of Toronto requirements on a site-by-site basis.

4.2. Methodology: Stormwater Drainage and Management

This report provides a detailed Stormwater Management (SWM) review of the pre-development and post-development conditions and comments on opportunities to reduce peak flows. This is illustrated on a proposed servicing connection plan. Other requirements set by the WWFMG will also be discussed.

The proposed development will be designed to meet the City's WWFMG and the standards of the Province of Ontario as set out in the Ministry of Environment, Conservation and Parks (MECP) 2003 Stormwater Management Planning and Design Manual (SWMPD). The following design criteria will be reviewed:

- Post-development peak flow for the 100-year storm event from the site will be controlled to the two (2)-year target flow;
- A specified rainfall depth of 5 mm is to be retained on-site, as required by the WWFMG; and,
- A safe overland flow will be provided for all flows in excess of the 100-year storm event.

4.3. Methodology: Sanitary Discharge

The sanitary sewage discharge from the site will be determined using sanitary sewer design sheets that incorporate the land use and building statistics, as supplied by the design team. The calculated values provide peak sanitary discharge flow that considers infiltration.

The estimated sanitary discharge flows from the proposed site will be calculated based on the criteria shown in **Table 4-1** below.

Table 4-1 – Sanitary Flows

Usage	Design Flow	Units	Population Equivalent
Residential	240	Litres / capita / day	Townhouse unit = 2.7 ppu Studio/1 Bedroom Unit = 1.4 ppu 2 Bedroom Unit = 2.1 ppu 3 Bedroom Unit = 3.1 ppu

Based on the calculated peak flows, the adequacy of the existing infrastructure to support the proposed development will be discussed.

4.4. Methodology: Water Usage

The fire flow requirements were estimated using the method prescribed by the Fire Underwriters Survey (FUS). This method is based on the fire protected building floors, the type and combustibility of the structural frame and the separation distances with adjoining building units. The domestic water usage was calculated based on the City's design criteria (OBC Table 8.2.3.B) outlined in [Table 4-2](#) below.

Table 4-2 – Water Usage

Usage	Water Demand	Units
Residential	190	Litres / capita / day

Pressure and flow testing will be conducted on hydrants, in the vicinity of the proposed development to obtain existing flows, residual and static pressure on the existing infrastructure along Grenoble Drive and Deauville Lane. The results will be compared to the anticipated domestic and fire protection usage to determine if there is adequate capacity to support the development. Upon receipt of the test results, an addendum to this report will be prepared and submitted to the City on the "Client's" behalf.

5.0 Stormwater Management and Drainage

5.1. Existing Conditions

According to available records, there are three (3) existing storm sewers abutting the subject property. More specifically, there is:

- A 300 mm diameter storm sewer on Grenoble Drive, flowing west;
- A 375 mm diameter storm sewer within the parkland area, flowing south; and
- A 450 mm diameter storm sewer on Deauville Lane, flowing north.

Residential Development

Following an investigation (please refer to 'Pre Development Site Investigation Report' prepared by Lithos Group dated March 8th, 2022 in [Appendix B](#)), it was discovered that storm water from the existing building located at 48 Grenoble Drive reaches the storm sewer networks at Grenoble Drive and Deauville Lane. Refer to drainage figure [DAP-1](#) in [Appendix C](#). Furthermore, our investigation showed that there is no overland external storm flow towards our site under pre-development conditions.

Parkland Dedication

The existing Park and future Parkland Dedication is located at the west portion of the site. As mentioned above, storm runoff from that area flows overland uncontrolled towards the City's storm sewer network at Grenoble Drive.

The existing run-off coefficients are estimated based on the infiltration of the area as well as the City's WWFMG guidelines. **Table 5-1** shows the input parameters which are illustrated on the pre-development drainage area plan in **Figure DAP-1** in **Appendix C**.

Table 5-1 – Target Input Parameters

Catchment	Drainage Area (ha)	Design "C"	Tc (min.)
A1 Pre – towards Grenoble Drive	0.549	0.50	10
A2 Pre – towards Deauville Lane	0.067	0.25	10
A3 Pre – towards Grenoble Drive	0.058	0.32	10

Peak flows calculated for the existing conditions are shown in **Table 5-2** below. Detailed calculations are in **Appendix C**.

Table 5-2 – Target Peak Flows

Catchment	Peak Flow Rational Method (L/s)		
	2-year	5-year	100-year
A1 Pre – towards Grenoble Drive	67.2	100.5	190.9
A2 Pre – towards Deauville Lane	4.5	6.8	12.9
A3 Pre – towards Grenoble Drive	4.1	6.1	11.6

As shown in **Table 5-2**, post-development flows will need to be controlled to the target flow of 67.2 L/s + 4.1 L/s = 71.3 L/s for the entire site (including the development and parkland dedication).

The proposed storm sewer connection for the development will be to the existing 300 mm diameter storm sewer on Grenoble Drive. ***In order to ensure that storm discharge flow from the site will not have an adverse impact on the storm sewer network under post-development conditions, the existing 2-year event flow towards Grenoble Drive of 67.2 L/s + 4.1 L/s = 71.3 L/s, will be used as a target flow.*** Refer to **Pre-development storm flow contribution into the municipal lane** calculation in **Appendix C**, for the calculated target flow.

5.2. Stormwater Management

In order to meet the WWFMG criteria, the post development flow rate from the subject site is to be controlled to the two (2)-year target flow established in **Section 4.2**. The site consists of six (6) internal drainage areas:

1. A1 Post – Storm runoff from the green roof, controlled into the underground storage tank;
2. A2 Post – Storm runoff from the rooftop/terraces/walkways, controlled into the underground storage tank;

3. A3 Post – Storm runoff from driveway, controlled into the underground storage tank;
4. A4 Post – Storm runoff from landscape surfaces, controlled into the underground storage tank;
5. A5 Post – Storm runoff from Hardscape surfaces, uncontrolled area.
and
6. A6 Post – Storm runoff from the Parkland Dedication uncontrolled area.

The post-development drainage areas and runoff coefficients are indicated on **Figure DAP-2**, located in **Appendix C** and summarized in **Table 5-3** below.

Table 5-3 – Post-development Input Parameters

Drainage Area	Drainage Area (ha)	"C"	Tc (min.)
A1 Post - Green Roof (Controlled in Tank)	0.095	0.25	10
A2 Post - Rooftop/Terraces/walkways (Controlled in Tank)	0.310	0.90	10
A4 Post - Driveway (Controlled in Tank)	0.014	0.90	10
A4 Post - Landscape (Controlled in Tank)	0.158	0.25	10
A5 Post - Hardscape (uncontrolled area)	0.030	0.90	10
A6 Post- Parkland Dedication (Uncontrolled area)	0.068	0.25	10

5.2.1. Water Balance

Residential Development

The City's WWFMG requires 5 mm of rainfall over the site equates to a required water balance volume of 30.37 m³. In order to achieve this, the following low impact development (LID) techniques may be implemented.

- Rainwater captured in storage tank to be reused for irrigation purposes; and,
- Green Roof and Planters.

Based on the initial abstraction values, the entire site will provide 16.19 m³ of initial abstraction in post-development conditions and the remaining 14.17 m³ will initially be retained at the bottom of the proposed underground storage tank. Then with a pump a minimum of 6.50 m³ will be conveyed and be retained at the proposed underground infiltration gallery and 7.67 m³ will be used for irrigation purposes and should be utilized within 72 hours.

Parkland Dedication

The parkland dedication area is all landscape, thus it meets the water balance requirement.

5.2.2. Quantity Controls

Using the City's intensity-duration-frequency (IDF) data, modified rational method calculations were undertaken to determine the maximum storage required during each storm event. Results for the 2, 5 and 100-year storm events are provided in **Table 5-4**. The detailed post-development quantity control calculations are provided in **Appendix C**.

Table 5-4 – Post-development Quantity Control as per City Requirements

Site	Storm Event	Target Flow (L/s)	Required Storage Volume (m³)	Maximum Controlled Release Rate Achieved (L/s)	Total Site Release Rate (L/s)
48 Grenoble Drive	2-year	71.3	36.7	20.1	30.8
	5-year		57.8	25.0	41.1
	100-year		122.5	30.5	61.0

As shown in **Table 5-4**, post-development flows from the development and Parkland Dedication will be controlled to a target flow of 71.3 L/s, in a way that the storm sewer network along Grenoble Drive will not be adversely affected during post-development conditions. The required on-site storage is accommodated by combination of green roof application and an underground storage tank located at P2 level.

Storm water from the driveway will be gravity driven towards the treatment device (Stormfilter SFPD 0608), before being discharged into the underground storage tank. Please refer to engineering drawing **SS-01** (submitted separately).

The Green Roof make up (Drainage Area A1 Post), considered for this development is **ZinCo Extensive Green Roof with Floradrain FD25** (details can be found in **Appendix C**) with a manufacturer's claim of water retention of 25.00 L/m².

The stormwater flow released from the green roof, the rooftops, walkways and landscaped surfaces (Drainage Areas A1 Post, A2 Post and A4 Post), will be gravity driven into the proposed underground storage tank at P2 level. The 100-year storm yielded an underground storage tank of 63.3m² controlled by a **100 mm orifice tube** with a maximum release rate of 38.5 L/s, achieved. Detailed orifice tube calculations are provided in **Appendix C**. The uncontrolled flow from the Parkland Dedication and the hardscape area is 30.5 L/s for the 100-year event. Therefore, the total site release rate will be 69.0 L/s which is less than the target flow of 71.3 L/s. Consequently, the proposed SWM plan in conjunction with the proposed grading and servicing, retains enough runoff volume to reduce the post-development peak flows for each storm event to the required target flow for the proposed residential development.

5.2.3. Underground Storage Tank

An underground storage tank is proposed to meet the quantity control requirements set forth by the City's WWFMG. Stormwater from the green roof (A1 Post), rooftop/terraces/walkways (A2 Post), driveway area (A3 Post) and landscaped area (A4 Post) and will be gravity driven into the underground storage tank. The Drainage Area A3 Post will be driven to the treatment device before being discharged into the underground storage tank (refer to engineering drawing SS-01, submitted separately).

The storage tank, located at P2 basement level (refer to engineering drawing SS-01, submitted separately), will have a storage capacity of at least 115.3 m³ with a minimum storage depth of 1.82 m and during the 100-year storm, will outlet through a 100mm diameter orifice tube, ultimately reaching the City's infrastructure through gravity.

5.2.4. Quality Controls

For MECP Enhanced Level protection, the removal of 80% total suspended solids (TSS) is required. Stormwater, discharged from the areas that will not be polluted by car waste, is considered “clean” and will be driven to the underground tank. Car waste polluted water from the driveway, captured by the proposed area drain #4, #5 and #6, will be driven into the manufactured treatment device (Stormfilter SFPD 0608 with two (2) 12in cartridges), before being discharged into the underground storage tank. Therefore, polluted stormwater will be “cleaned” prior being discharged into the City’s storm sewer network. The detailed quality control calculations and Proposed manufactured treatment device can be found in [Appendix C](#). A summary of the site quality control is included in [Table 5-5](#) below.

Table 5-5 – Site TSS Removal

Drainage Area	Drainage Area (ha)	Overall TSS Removal	Additional Quality Control Required
Rooftop / Terraces / Green Roof/ Walkways / Hardscape Areas	0.563	78%	Inherent
Driveway / Landscape Areas	0.014	2%	Stormfilter SFPD 0608
Total	0.577	80%	

5.3. Proposed Storm Connection

The storm sewer system for the residential development will be designed to meet the City’s requirements and discharge into the existing 300 mm diameter storm on Grenoble Drive via a 200 mm diameter storm lateral connection with a minimum grade of 2.00% (or equivalent design). In order to support the proposed development a part of the sewer segment (from MH 33A to MH 38) along Grenoble Drive will be replaced. The engineering drawing [SS-01](#) (submitted separately), indicates the stormwater service connection.

6.0 Sanitary Drainage System

6.1. Existing Sanitary Drainage System

The existing site is currently occupied by one (1) residential building. According to available records, there is one (1) sanitary sewer, abutting the subject property. More specifically there is:

- A 450 mm diameter sanitary sewer on the west side of the subject property and within the parkland area, flowing south towards Grenoble Drive.

Upon review of the information provided by the City, the sanitary network abutting our property eventually discharges into the trunk sewer between Don Mills Road and Don Valley Parkway.

6.2. Existing and Proposed Sanitary Flows

The sanitary flow generated by the proposed development at 48 Grenoble Drive was compared to the existing flow in order to quantify the net increase in the storm sewer.

Using the design criteria outlined in [Section 4.3](#) and existing site information, the sanitary discharge flow from the existing residential building is estimated at 4.19 L/s. Detailed calculations can be found in [Appendix D](#).

Using the design criteria outlined in [Section 4.3](#) and the proposed development statistics, the proposed development will discharge 19.36 L/s into the City’s infrastructure.

The capacity of the existing sanitary sewer network along Grenoble Drive to accommodate the post-development sanitary flow, will be discussed under **Section 8.0** of this report.

6.3. Proposed Sanitary Connection

In order to support the proposed development a sanitary sewer extension to the existing sanitary sewer system is required. Therefore it's proposed a new 450 mm diameter sanitary sewer with a minimum grade of 0.5% along Grenoble Drive flowing West.

Three (3) separate 200mm lateral connections will be provided for the proposed development: one for the East Tower; one for the Podium; and one for the West Tower.

7.0 Groundwater

According to the "Geotechnical Engineering Report" prepared by 'Grounded Engineering Inc.' dated March 11th, 2022 and to the "Hydrogeological Review Report" prepared by Grounded Engineering Inc.', dated March 10th, 2022, the stabilized ground water level is at an elevation of approximately 117.00 masl.

The results of groundwater sampling on site, reveal that groundwater exceeds the City's limits of total suspended solids, cyanide, BOD and manganese for discharging into the storm sewer network, however is within the City's limits for discharging into the sanitary and combined sewer network. The results of the Hydrogeological review report can be found in **Appendix B**.

7.1. Long Term Dewatering

The proposed development will be serviced by four (4) basement levels (lowest basement slab elevation at 114.00 masl), therefore it is anticipated that the proposed underground construction will be partially submerged under the existing groundwater table. Following that fact, the proposed underground construction is proposed to be water-tight.

7.2. Short Term Dewatering

Site dewatering during construction, under the worst case scenario, is anticipated at 206,000 L/day, which translates to approximately 2.38 L/s. Following the fact that the existing network along Grenoble Drive can accommodate the proposed total net flow of 15.17 L/s under post-development conditions, it is anticipated that it will be capable to accommodate the groundwater discharge during construction. Groundwater will be discharged into the 450mm diameter sanitary sewer along **Grenoble Drive**.

8.0 Sanitary Sewer Capacity Analysis

The Capacity Sewer Analysis, prepared by Lithos Group Inc., dated March, 2022, has been provided in order to identify the impact of the proposed development into the existing sanitary network. Sanitary flow from the proposed development will be discharged into the City's sanitary network. A Downstream Sanitary Sewer Capacity Analysis has been conducted using pre- and post-development flows and can be found in **Appendix D**.

According to the Capacity Sewer Analysis, eight (8) model scenarios were developed to access the sewer condition. Scenarios and findings are listed below:

- **Scenario 1:** Sewer capacity under existing dry weather conditions (DWF Existing Conditions).

- **Scenario 2:** Sewer capacity under post-development dry weather conditions (DWF Proposed Conditions).
- **Scenario 3:** Sewer capacity under existing wet weather conditions (WWF Existing Conditions).
- **Scenario 4:** Sewer capacity under post-development wet weather conditions (WWF Proposed Conditions).
- **Scenario 5:** Hydraulic Grade Line Analysis under pre-development dry weather conditions (DWF Existing Conditions).
- **Scenario 6:** Hydraulic Grade Line Analysis under post-development dry weather conditions (DWF Proposed Conditions).
- **Scenario 7:** Hydraulic Grade Line Analysis under pre-development wet weather conditions (WWF Existing Conditions).
- **Scenario 8:** Hydraulic Grade Line Analysis under post-development wet weather conditions (WWF Proposed Conditions).

Sanitary sewer analysis has been prepared up to the outlet of the sewer segment leading to the trunk sewer, in order to evaluate the impact of the proposed development to the existing sanitary network. In addition, the Downstream Sanitary Capacity Analysis, includes all updates to the model to reflect changes (i.e., sewer construction), since the model was initially prepared, as well as new buildings, sites where zoning has been completed and where applications are currently in progress.

8.1. Capacity Assessment Results

The external analysis conducted by Lithos Group Inc., shows that under **pre-development Dry Weather Conditions**, the capacity of the existing sanitary sewer network downstream of the site does not carry more than 38.3% (**Scenario 1**). Under **post-development Dry Weather Conditions (Scenario 2)**, the capacity of the existing network up to the Trunk sewer reaches 43.9%.

Furthermore, the external analysis regarding **pre and post-development Wet Weather Conditions (Scenario 3 and Scenario 4)** shows that the decrease to the capacity of the downstream sanitary sewer segments are not more than 6.2% (from 65.2% to 71.4%). Consequently, the proposed development will not adversely affect the functionality of the downstream sanitary sewer system.

In addition, according to the Hydraulic Grade Line Analysis conducted by Lithos Group Inc., under **existing and proposed development Dry-Weather conditions (Scenario 5 and Scenario 6)**, the system operates under free flow conditions and there is no surcharge to the sanitary network up to the trunk sewer. We have been led to the aforementioned conclusion taking into account that the freeboard varies between 2.51 m and 7.62 m under pre development conditions and between 2.50 m and 7.61 m under post development conditions.

Finally, under **existing and proposed Wet-Weather Conditions (Scenario 7 and 8)**, the Hydraulic Grade Line Analysis indicated that the system is not experiencing any surcharge at downstream segments. The sanitary sewer network downstream of the site has a minimum freeboard equal to 2.41 m > 1.8 m in the worst case scenario of proposed Wet Weather Conditions.

The Downstream Sanitary Capacity Analysis Report can be found in [Appendix D](#).

9.0 Water Supply System

9.1. Existing System

Based on plans provided by the City, the existing watermain system consists of the following waterlines:

- A 400 mm diameter watermain on the south side of Deauville Lane; and
- A 400 mm diameter watermain on the west side of Grenoble Drive.

Upon receipt of the fire hydrant test results in spring of 2022, an addendum to this report will be prepared and submitted to the City on the Clients behalf.

9.2. Proposed Water Supply Requirements

The estimated water consumption was calculated based on the occupancy rates shown on [Table 4-2](#), based on the City's watermain design criteria, revised in November 2009. Calculations for the east tower, podium and west tower, were conducted to confirm that can be supported by the existing water servicing infrastructure.

Residential Development

West Tower

It is anticipated that an average consumption of approximately 1.78L/s (153,710L/day), a maximum daily consumption of 2.67L/s (230,565L/day) and a peak hourly demand of 4.00L/s (14,410L/hr) will be required to service this development with domestic water. Detailed calculations are found in [Appendix E](#).

The fire flow requirements we estimated using the method prescribed by the Fire Underwriters Survey (FUS) be undertaken to assess the minimum requirement for fire suppression. The fire flow calculations is normally conducted for the largest storey, by area, and for the two immediately adjacent storey.

As a result to the above mentioned method, we have selected Levels 1, 2 and 3 to determine the fire flow demand. [Table 9.1](#) illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 102.00 L/s (1,617 USGPM) will be required. Refer to detailed calculations found in [Appendix E](#).

Table 9.1 – Fire Flow Input Parameters (West Tower)

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				North	West	South	East
Value according to FUS options	ordinary construction	limited combustible occupancy	Yes	3.1m to 10m	> 45m	> 45m	> 45m
Surcharge/reduction from base flow	1.0	15%	30%	20%	0%	0%	0%

East Tower

It is anticipated that an average consumption of approximately 1.63L/s (140,600 L/day), a maximum daily consumption of 2.44 L/s (210,900L/day) and a peak hourly demand of 3.66L/s (13,181L/hr) will be required to service this development with domestic water. Detailed calculations are found in [Appendix E](#).

The fire flow requirements were estimated using the method prescribed by the Fire Underwriters Survey (FUS) be undertaken to assess the minimum requirement for fire suppression. The fire flow calculations is normally conducted for the largest storey, by area, and for the two immediately adjacent storey.

As a result to the above mentioned method, we have selected Levels 1, 2 and 3 to determine the fire flow demand. **Table 9-2** below illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 89.25 L/s (1,415 USGPM) will be required. Refer to detailed calculations found in **Appendix E**.

Table 9-2 – Fire Flow Input Parameters (East Tower)

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				North	East	South	West
Value according to FUS options	ordinary construction	limited combustible occupancy	Yes	3.1m to 10m	> 45m	> 45m	> 45m
Surcharge/reduction from base flow	1.0	15%	30%	20%	0%	0%	0%

Podium

It is anticipated that an average consumption of approximately 0.43 L/s (36,860L/day), a maximum daily consumption of 0.64L/s (55,290L/day) and a peak hourly demand of 0.96 L/s (3,456L/hr) will be required to service this development with domestic water. Detailed calculations are found in **Appendix E**.

The fire flow requirements were estimated using the method prescribed by the Fire Underwriters Survey (FUS) be undertaken to assess the minimum requirement for fire suppression. The fire flow calculations is normally conducted for the largest storey, by area, and for the two immediately adjacent storey.

As a result to the above mentioned method, we have selected Levels 3, 4 and 5 to determine the fire flow demand. **Table 9-3** below illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 191.25 L/s (3,032 USGPM) will be required. Refer to detailed calculations found in **Appendix E**.

Table 9-3 – Fire Flow Input Parameters (Podium)

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				North	East	South	West
Value according to FUS options	ordinary construction	limited combustible occupancy	Yes	3.1m to 10m	> 45m	> 45m	> 45m
Surcharge/reduction from base flow	1.0	15%	30%	20%	0%	0%	20%

Following the fire hydrant test, an addendum to this report will be prepared and submitted to the City on the Clients' behalf, to confirm that the existing network can support the proposed development.

9.3. Proposed Watermain Connection

According to the Ontario Building Code (OBC), for each building greater than 84m in height at least three (3) fire lines are required. Three (3) separate domestic connections will be provided for the proposed development: one for the South Tower; one for the Podium and one for the North Tower. The connections will be as follows:

East Tower

Residential-Use of the high-rise building: one (1) 200 mm diameter fire split to a 150 mm domestic water will connect on the on the 400 mm watermain sewer on Deauville Lane and one (1) 200 mm diameter fire will connect on the 400 mm watermain sewer on Grenoble Drive;

Podium

Residential-Use of the Podium: one (1) 150 mm diameter fire split to a 100 mm domestic water will connect on the 4000 mm watermain on Deauville Lane;

West Tower

Residential-Use of the high-rise building: one (1) 200 mm diameter fire split to a 150 mm domestic water will connect on the 400 mm watermain on Grenoble Drive and one (1) 200 mm diameter fire will connect on the 400 mm watermain sewer on Deauville Lane.

According to City's standard drawing T-1104.02-3, fire and domestic connections on Grenoble Drive and Deauville Lane will be split two (2) meters away from the property line and valve and boxes will be installed on each service at the property line. For details refer to the engineering drawing **SS-01** (submitted separately).

10.0 Site Grading

10.1. Existing Grades

The site drains mainly towards Grenoble Drive and Deauville Lane.

10.2. Proposed Grades

The proposed grades will improve the existing drainage patterns wherever feasible. Grades will be maintained along property lines to the extent practical. Furthermore, under post-development conditions, there will be no surface drainage towards the Parkland Dedication portion of the site from the residential development.

Therefore, the owner shall be responsible to provide flood protection or a safe overland flow route for the proposed development without causing damage to the proposed and adjacent public and private properties.

11.0 Conclusions and Recommendations

Based on our investigations, we conclude the following:

Storm Drainage

The site stormwater discharge will be controlled to the 2-year pre-development flow and will be connected to the proposed 300mm diameter storm sewer on Grenoble Drive. In order to attain the target flows and meet the City's Wet Weather Flow Management Guidelines (WWFMG), quantity controls will be utilized and up to 115.3 m³ of on-site storage will be required for the proposed mixed-use development. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of Environment, Conservation and Parks (MECP). Quality control will be provided for the subject site for a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

Three (3) separate connections will be provided for the proposed development: one for the East Tower; one for the Podium; and one for the West Tower. All sanitary connections will lead to a proposed 450 mm diameter sanitary sewer on Grenoble Drive flowing West. The additional net discharge flow from the entire property (proposed and existing development), is anticipated at approximately 15.17 L/s.

Under Dry and Wet-Weather, post-development conditions, the maximum downstream capacity of the sanitary sewer network will not be exceeded, and the freeboard distance will be well over 1.8m. Therefore, the property under proposed conditions will not adversely affect flow conditions downstream and the existing infrastructure will be capable to support the proposed development.

Water Supply

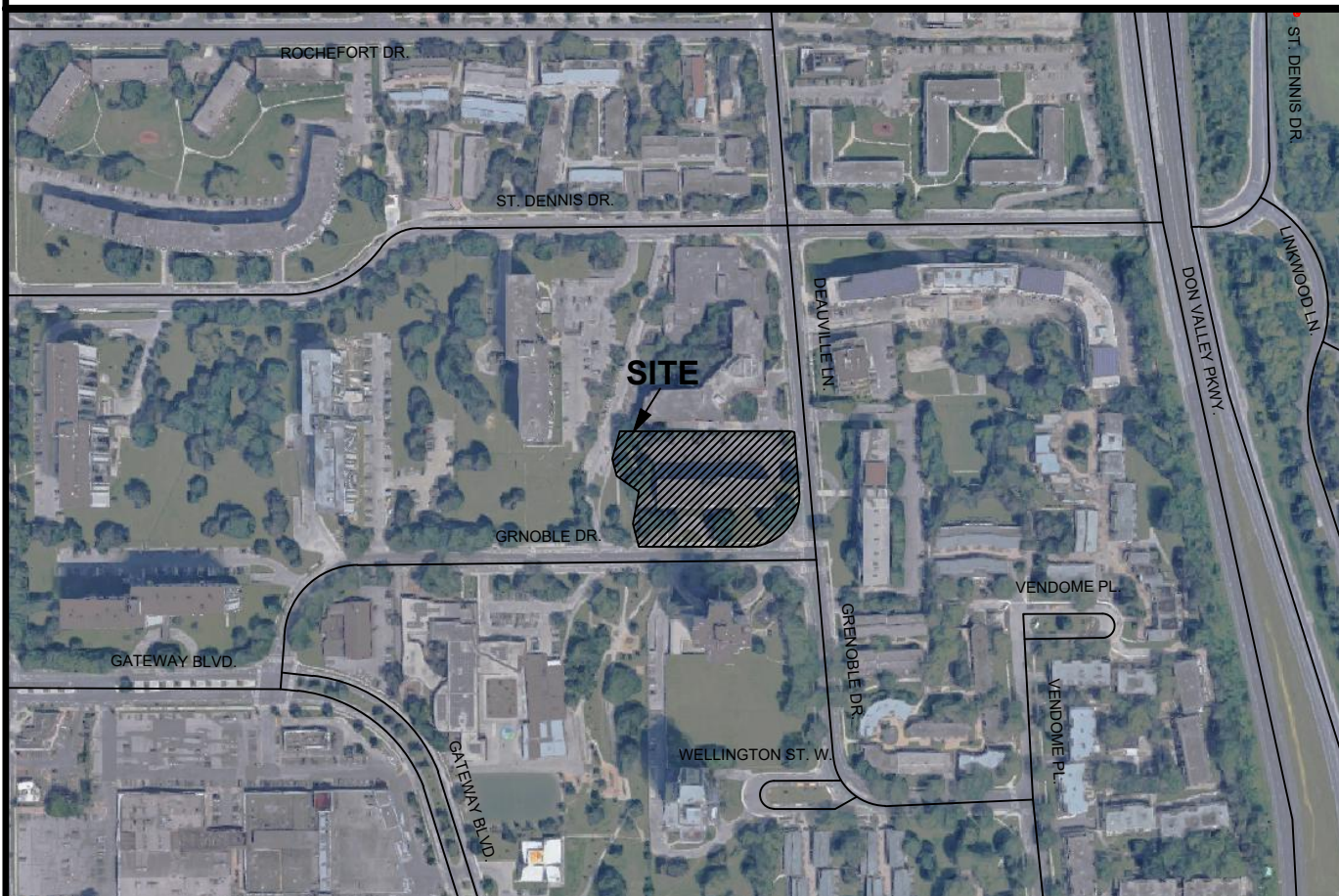
Five (5) separate fire lines will be provided for the proposed development : two (2) for the East Tower; two (2) for the West Tower; and one for the Podium according to the Ontario Building Code (OBC), to support the proposed development's sprinkler system. In addition, three (3) of the above noted fire lines will split into domestic connections that will service the proposed development. Water supply for the site will be from the existing 400 mm diameter watermain on the East side of Deauville Lane and the existing 400 mm diameter watermain on the North side of Grenoble Drive. Upon receipt of the fire hydrant test results in spring of 2022, an addendum to this report will be prepared and submitted to the City on the "Client's" behalf.



150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LOCATION PLAN
RESIDENTIAL USE DEVELOPMENT
48 GRENABLE DRIVE
TORONTO, ONTARIO

DATE:	MARCH 2022	PROJECT No:	PUD21-110
SCALE:	N.T.S.	FIGURE No:	FIG 1



150 Bermondsey Road, Toronto, Ontario M4A 1Y1

AERIAL PLAN
RESIDENTIAL USE DEVELOPMENT
48 GRENABLE DRIVE
TORONTO, ONTARIO

DATE:	MARCH 2022	PROJECT No:	PUD21-110
SCALE:	N.T.S.	FIGURE No:	FIG 2

Appendix A

Site Photographs



North East Corner of Property along Deauville Lane – Facing South West



South West Corner along Grenoble Drive – Facing North East



South East Corner along Grenoble Drive – Facing North West

Appendix B

Background Information

PLAN OF SURVEY OF
PART OF BLOCK G2
REGISTERED PLAN M-834
CITY OF TORONTO

SCALE 1 : 250

R. AVIS SURVEYING INC.

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

© COPYRIGHT: "NO PERSON MAY COPY, REPRODUCE, DISTRIBUTE OR ALTER THIS PLAN IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF R. AVIS, O.L.S."

NOTES AND LEGEND

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM OBSERVE REFERENCE POINTS (S) AND (B) HAVING A BEARING OF N15°41'52" E BY REAL TIME NETWORK (RTN) OBSERVATION, ZONE 10, CENTRAL MERIDIAN 79° 30' WEST LONGITUDE
(1) MODIFIED TRANSVERSE MERCATOR PROJECTION, NAD 83 (CSRS-2010)

3' MTM ZONE 10 COORDINATES		
NAD83(CSRS-2010) (CENTRAL MERIDIAN 79°30' WEST LONGITUDE)		
	NORTHING	EASTING
A	4841837.355	318364.595
B	4841857.513	318425.919
C	4841898.285	318444.610
D	4841930.651	318430.958

- DENOTES SURVEY MONUMENT FOUND
 - RB DENOTES SURVEY MONUMENT PLANTED
 - SB DENOTES ROUND IRON BAR
 - IB DENOTES STANDARD IRON BAR
 - WT DENOTES WITNESS
 - W(1042) DENOTES EDWARDS & GUNN LIMITED
 - (OU) DENOTES ORIGIN UNKNOWN
 - MEAS/N DENOTES MEASURED
 - N,S,E,W DENOTES NORTH, SOUTH, EAST, WEST
 - RP DENOTES REGISTERED PLAN M-834
 - P1 DENOTES SURVEYOR'S REAL PROPERTY REPORT BY P.SALNA COMPANY LTD., O.L.S. DATED OCTOBER 08, 2001
 - P2 DENOTES PLAN 66R-11956
 - BD DENOTES BRICK
 - BRW DENOTES BRICK RETAINING WALL
 - BF DENOTES BOARD FENCE
 - CLF DENOTES CHAIN LINK FENCE
 - CONC. DENOTES CONCRETE
 - CB DENOTES CONCRETE
 - FI DENOTES FIRE HYDRANT
 - GM DENOTES GAS METER
 - C DENOTES COLUMN
 - LS DENOTES LIGHT STANDARD
 - MH DENOTES MANHOLE
 - TS DENOTES TRAFFIC SIGN
 - TR DENOTES TRANSFORMER
 - (T) DENOTES TOP OF CURB
 - (B) DENOTES BOTTOM OF CURB
 - (G) DENOTES GUTTER
 - AV DENOTES AIR VENT
 - ICV DENOTES IRRIGATION CONTROL VALVE
 - SAN DENOTES SANITARY
 - PED DENOTES PEDIESTAL
 - DENOTES OVERHEAD WIRE
- 0.100 DENOTES CONIFEROUS TREE WITH TRUNK DIAMETER 0.10 metres
- 0.050 DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER 0.10 metres
- DENOTES SPOT ELEVATION

AREA = 6748.9 sq. m.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.

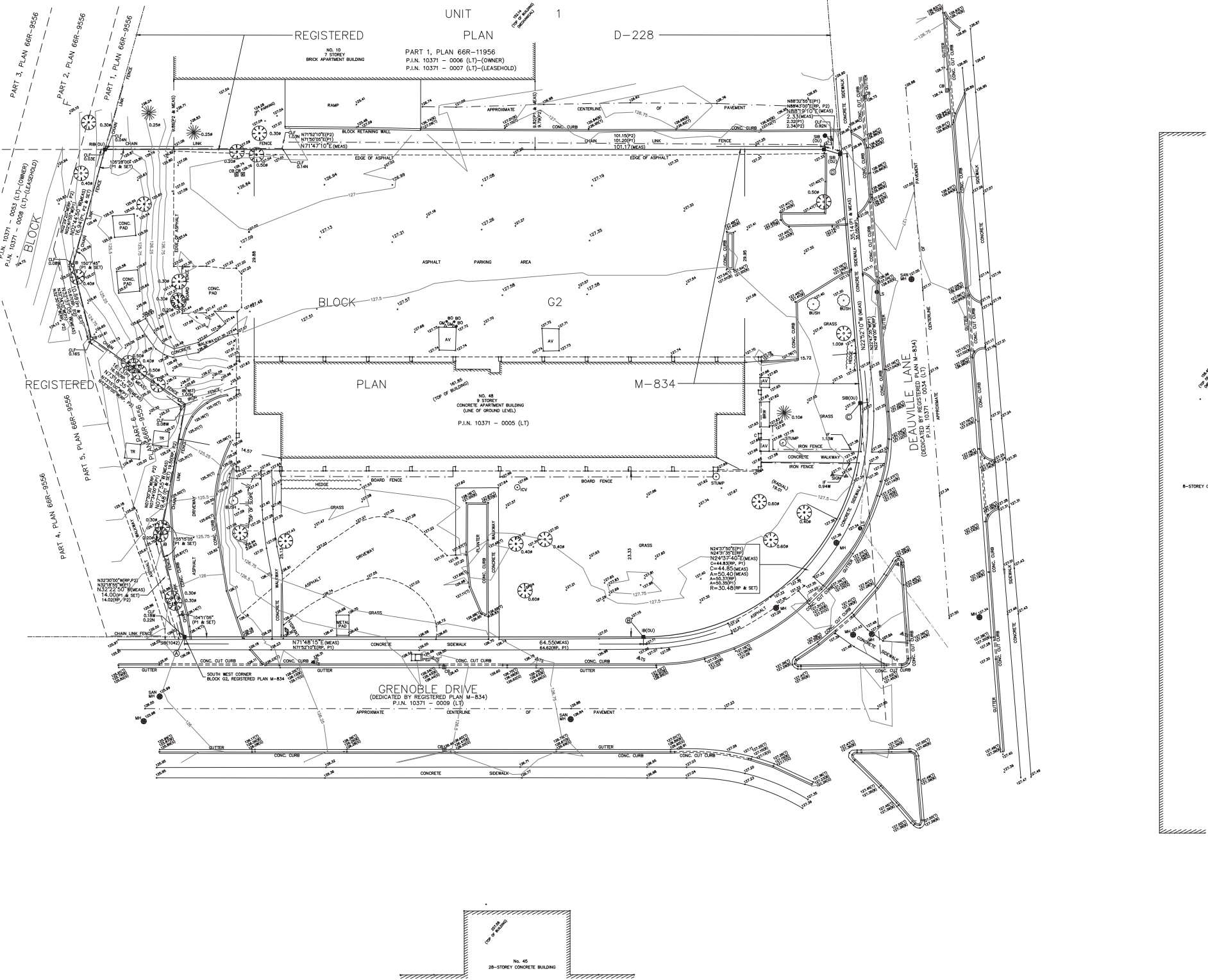
2. THE SURVEY WAS COMPLETED ON THE 4th DAY OF AUGUST, 2021

AUGUST 5, 2021
DATE

PIRATHEEPAN RAMACHANDRAN
Ontario Land Surveyor

R. AVIS SURVEYING INC.
SUITE 203
235 YORKLAND BOULEVARD
TORONTO, ONTARIO
M2J 4Y8
TEL: (416) 490-8352 FAX: (416) 491-8206
www.ravissurveying.com

CHECKED BY : P.R. O.L.S.	PROJECT No. : 3487-0
CALCULATED BY : .B	DRAWING No. : 3487-0T
DRAWN BY : .B	



No.	Date	Description
-----	------	-------------

			Proposed
Gross Floor Area, as defined in Green Roof Bylaw (m ²)			62,337
Total Roof Area (m ²)			2,141
Area of Residential Private Terraces (m ²)			0
Roof-top Outdoor Amenity Space, if in a Residential Building (m ²)			1738
Area of Renewable Energy Devices (m ²)			0
Tower (s) Roof Area with floor plate less than 750 m ²			912
Total Available Roof Space (m ²)			548
Green Roof Coverage		Required	Proposed
Coverage of Available Roof Space (m ²)		60%	
Coverage of Available Roof Space (%)		30%	63%

NEW RESIDENTIAL

EAST BUILDING				
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	3	8	6	17
7	-	-	-	-
6-41 per level	8	3	1	12
6-41 Total	272	102	34	408
TOTALS	275	110	40	425

RENTAL REPLACEMENT AT PODIUM				
1	0	0	0	0
2	5	8	0	13
4	15	17	0	32
5	15	17	0	32
6	0	0	0	0
TOTALS	50	59	0	109

	46%	54%	0	
Grand Total	616	284	93	993

[illegible]

EAST BUILDING											
1	1	1,032	11,105	1,032	11,105	584	6,283	-	-	174	1,873
2	1	-	-	-	-	-	-	-	-	-	-
3	1	-	-	-	-	-	-	-	-	-	-
4	1	-	-	-	-	-	-	-	-	-	-
5	1	-	-	-	-	-	-	-	-	-	-
6	1	-	-	-	-	-	-	-	-	-	-
7 - Juvenity	1	1,630	17,543	1,630	17,543	1,537	16,547	-	-	-	-
8-41	790	8,504	790	8,504	51	549	850	9,149	676	7,276	-
MEMO	790	8,504	26,860	29,714	24,723	206,117	-	-	-	-	-
	790	8,504	790	8,504	40	431	-	-	-	-	-
TOTALS	42		31,102	339,174	26,935	289,927	850	9,149	850	9,149	

PODIUM (Rental replacement)											
1	1	625	6,728	625	6,728	133	1,432	220	2,368	218	2,347
2	1	2,483	26,725	2,483	26,725	2,293	24,686	-	-	-	-
3	1	3,260	35,086	3,260	35,086	3,082	33,278	-	-	-	-
4	1	3,260	35,086	3,260	35,086	3,082	33,278	-	-	-	-
5	1	3,260	35,086	3,260	35,086	3,082	33,278	-	-	-	-
TOTALS	5			12,887	138,710	11,701	125,951	220	2,368	218	2,347

GRAND TOTAL	Total GCA		Res GFA*		Amenity (Ext)		Amenity (Int)	
	m2	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²
	99,580	1,071,870	67,941	731,312	1,990	21,420	1,988	21,399

4.0 AMENITY

	Total units	Exterior		Exterior/ unit (m ²)	Interior		Interior/ unit (m ²)
		m ²	ft ²		m ²	ft ²	
WEST BUILDING	459	920	9,903	2.00	920	9,903	2.00
EAST BUILDING	425	850	9,149	2.00	850	9,149	2.00
PODIUM (Rental Replacement)	109	220	2,368	2.02	218	2,347	2.00
TOTALS	993	1,990	21,420	2	1,988	21,399	2

5.0 PARKING											
Level	Residential Car Parking			Visitor Car Parking			Total Car Parking	Bicycle Parking		Total Bicycle Parking	
	Regular	BT	Total	Regular	BT	Total		Long-Term	Short-Term		
P1	40	1	41	41	0	41	51	50	170	0	170
P2	140	7	147	-	-	-	0	147	0	0	0
P3	142	7	149	-	-	-	0	149	-	-	-
P4	129	5	135	-	-	-	0	135	-	-	-
1	-	-	-	-	-	-	-	-	-	200	200
2	-	-	-	-	-	-	-	-	724	0	724
TOTALS	451	20	471	47	4	51	522	894	200	1094	

Vehicle Parking Rate achieved	0.5
Visitors Vehicle Parking	0.0
Resident Vehicle Parking	0.4

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

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

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

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

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

Cycling infrastructure	Required	Proposed	Proposed %
Number of long-term bicycle parking spaces (residential)	894	894	100
Number of long-term bicycle parking spaces (all other uses)	0	0	
Number of long-term bicycle parking (all uses) located on:			
a) first storey of building		0	
b) second storey of building		724	
c) first level below-ground		170	
d) second level below-ground		0	
e) other levels below-ground		0	

Cycling Infrastructure	Required	Proposed	Proposed %
Number of short-term bicycle parking spaces (residential)	200	200	100
Number of short-term bicycle parking spaces (all other uses)	0	0	
Number of male shower and change facilities (non-residential)	0	0	
Number of female shower and change facilities (non-residential)	0	0	

Section 2: For Site Plan Control Applications

UHI Non-roof Hardscape	Required	Proposed	Proposed %
Total non-roof hardscape area (m ²)		2158	
Total non-roof hardscape area treated for Urban Heat Island (minimum 50%) (m ²)	1080	1080	100%
Area of non-roof hardscape treated with: (indicate m ²)			100%

Green & Cool Roofs	Required	Proposed	Proposed %
Available Roof Space (m ²)	-	1512	-
Available Roof Space provided as Green Roof (m ²)	907	948	104%
Available Roof Space provided as Cool Roof (m ²)	0	0	
Available Roof Space provided as Solar Panels (m ²)	0	0	

Water Efficiency	Required	Proposed	Proposed %
Total landscaped site area (m ²)		958	
Landscaped site area planted with drought-tolerant plants (minimum 50% (m ² and %) (if applicable)	479	479	100%

Native and Pollinator Supportive Species	Required	Proposed	Proposed %
Total number of plants		15	
Total number of native plants and % of total plants (min.50%)	7.5	2	15%

*Areas given are within 16m above grade

The site plan shows the proposed development at 10 Deauville Ln, highlighted in orange. The development is located on a corner lot bounded by St Dennis Dr to the north, Grenoble Dr to the east, and Deauville Ln to the south. Surrounding streets include 7th St, 9th St, 11th St, 13th St, 15th St, 17th St, 19th St, 21st St, 23rd St, 25th St, 27th St, 29th St, 31st St, 33rd St, 35th St, 37th St, 39th St, 41st St, 43rd St, 45th St, 47th St, 49th St, 51st St, 53rd St, 55th St, 57th St, 59th St, 61st St, 63rd St, 65th St, 67th St, 69th St, 71st St, 73rd St, 75th St, 77th St, 79th St, 81st St, 83rd St, 85th St, 87th St, 89th St, 91st St, 93rd St, 95th St, 97th St, 99th St, 101st St, 103rd St, 105th St, 107th St, 109th St, 111th St, 113th St, 115th St, 117th St, 119th St, 121st St, 123rd St, 125th St, 127th St, 129th St, 131st St, 133rd St, 135th St, 137th St, 139th St, 141st St, 143rd St, 145th St, 147th St, 149th St, 151st St, 153rd St, 155th St, 157th St, 159th St, 161st St, 163rd St, 165th St, 167th St, 169th St, 171st St, 173rd St, 175th St, 177th St, 179th St, 181st St, 183rd St, 185th St, 187th St, 189th St, 191st St, 193rd St, 195th St, 197th St, 199th St, 201st St, 203rd St, 205th St, 207th St, 209th St, 211st St, 213th St, 215th St, 217th St, 219th St, 221st St, 223rd St, 225th St, 227th St, 229th St, 231st St, 233rd St, 235th St, 237th St, 239th St, 241st St, 243rd St, 245th St, 247th St, 249th St, 251st St, 253rd St, 255th St, 257th St, 259th St, 261st St, 263rd St, 265th St, 267th St, 269th St, 271st St, 273rd St, 275th St, 277th St, 279th St, 281st St, 283rd St, 285th St, 287th St, 289th St, 291st St, 293rd St, 295th St, 297th St, 299th St, 301st St, 303rd St, 305th St, 307th St, 309th St, 311st St, 313th St, 315th St, 317th St, 319th St, 321st St, 323rd St, 325th St, 327th St, 329th St, 331st St, 333rd St, 335th St, 337th St, 339th St, 341st St, 343rd St, 345th St, 347th St, 349th St, 351st St, 353rd St, 355th St, 357th St, 359th St, 361st St, 363rd St, 365th St, 367th St, 369th St, 371st St, 373rd St, 375th St, 377th St, 379th St, 381st St, 383rd St, 385th St, 387th St, 389th St, 391st St, 393rd St, 395th St, 397th St, 399th St, 401st St, 403rd St, 405th St, 407th St, 409th St, 411st St, 413th St, 415th St, 417th St, 419th St, 421st St, 423rd St, 425th St, 427th St, 429th St, 431st St, 433rd St, 435th St, 437th St, 439th St, 441st St, 443rd St, 445th St, 447th St, 449th St, 451st St, 453rd St, 455th St, 457th St, 459th St, 461st St, 463rd St, 465th St, 467th St, 469th St, 471st St, 473rd St, 475th St, 477th St, 479th St, 481st St, 483rd St, 485th St, 487th St, 489th St, 491st St, 493rd St, 495th St, 497th St, 499th St, 501st St, 503rd St, 505th St, 507th St, 509th St, 511st St, 513th St, 515th St, 517th St, 519th St, 521st St, 523rd St, 525th St, 527th St, 529th St, 531st St, 533rd St, 535th St, 537th St, 539th St, 541st St, 543rd St, 545th St, 547th St, 549th St, 551st St, 553rd St, 555th St, 557th St, 559th St, 561st St, 563rd St, 565th St, 567th St, 569th St, 571st St, 573rd St, 575th St, 577th St, 579th St, 581st St, 583rd St, 585th St, 587th St, 589th St, 591st St, 593rd St, 595th St, 597th St, 599th St, 601st St, 603rd St, 605th St, 607th St, 609th St, 611st St, 613th St, 615th St, 617th St, 619th St, 621st St, 623rd St, 625th St, 627th St, 629th St, 631st St, 633rd St, 635th St, 637th St, 639th St, 641st St, 643rd St, 645th St, 647th St, 649th St, 651st St, 653rd St, 655th St, 657th St, 659th St, 661st St, 663rd St, 665th St, 667th St, 669th St, 671st St, 673rd St, 675th St, 677th St, 679th St, 681st St, 683rd St, 685th St, 687th St, 689th St, 691st St, 693rd St, 695th St, 697th St, 699th St, 701st St, 703rd St, 705th St, 707th St, 709th St, 711st St, 713th St, 715th St, 717th St, 719th St, 721st St, 723rd St, 725th St, 727th St, 729th St, 731st St, 733rd St, 735th St, 737th St, 739th St, 741st St, 743rd St, 745th St, 747th St, 749th St, 751st St, 753rd St, 755th St, 757th St, 759th St, 761st St, 763rd St, 765th St, 767th St, 769th St, 771st St, 773rd St, 775th St, 777th St, 779th St, 781st St, 783rd St, 785th St, 787th St, 789th St, 791st St, 793rd St, 795th St, 797th St, 799th St, 801st St, 803rd St, 805th St, 807th St, 809th St, 811st St, 813th St, 815th St, 817th St, 819th St, 821st St, 823rd St, 825th St, 827th St, 829th St, 831st St, 833rd St, 835th St, 837th St, 839th St, 841st St, 843rd St, 845th St, 847th St, 849th St, 851st St, 853rd St, 855th St, 857th St, 859th St, 861st St, 863rd St, 865th St, 867th St, 869th St, 871st St, 873rd St, 875th St, 877th St, 879th St, 881st St, 883rd St, 885th St, 887th St, 889th St, 891st St, 893rd St, 895th St, 897th St, 899th St, 901st St, 903rd St, 905th St, 907th St, 909th St, 911st St, 913th St, 915th St, 917th St, 919th St, 921st St, 923rd St, 925th St, 927th St, 929th St, 931st St, 933rd St, 935th St, 937th St, 939th St, 941st St, 943rd St, 945th St, 947th St, 949th St, 951st St, 953rd St, 955th St, 957th St, 959th St, 961st St, 963rd St, 965th St, 967th St, 969th St, 971st St, 973rd St, 975th St, 977th St, 979th St, 981st St, 983rd St, 985th St, 987th St, 989th St, 991st St, 993rd St, 995th St, 997th St, 999th St, 1001st St, 1003rd St, 1005th St, 1007th St, 1009th St, 1011st St, 1013th St, 1015th St, 1017th St, 1019th St, 1021st St, 1023rd St, 1025th St, 1027th St, 1029th St, 1031st St, 1033rd St, 1035th St, 1037th St, 1039th St, 1041st St, 1043rd St, 1045th St, 1047th St, 1049th St, 1051st St, 1053rd St, 1055th St, 1057th St, 1059th St, 1061st St, 1063rd St, 1065th St, 1067th St, 1069th St, 1071st St, 1073rd St, 1075th St, 1077th St, 1079th St, 1081st St, 1083rd St, 1085th St, 1087th St, 1089th St, 1091st St, 1093rd St, 1095th St, 1097th St, 1099th St, 1101st St, 1103rd St, 1105th St, 1107th St, 1109th St, 1111st St, 1113th St, 1115th St, 1117th St, 1119th St, 1121st St, 1123rd St, 1125th St, 1127th St, 1129th St, 1131st St, 1133rd St, 1135th St, 1137th St, 1139th St, 1141st St, 1143rd St, 1145

Contractor Must Check & Verify all Dimensions on the Job.
Do Not Scale Drawings.
All Drawings, Specifications and Related Documents are the Copyright Property of the Architect and Must be Returned Upon Request. Reproduction of Drawings, Specifications and Related Documents in Part or in Whole is Forbidden Without the Written permission of the Architect.
This Drawing is Not to be Used for Construction Until Signed by the Architect.

48 Grenoble Drive

211033

CONTEXT PLAN, STATISTICS & TEMPLATES

1 : 2000

A011

No.	Date	Description
-----	------	-------------

NOTES

- [illegible]

 CONVEX MIRROR

2 BICYCLE PARKING
STACKED TYPICAL

P1-V DENOTES VISITOR PARKING USE
P1-R DENOTES RESIDENT PARKING USE
P1- EV DENOTES PARKING STATIONS WITH EVSE

NOT FOR
CONSTRUCTION

Contractor Must Check & Verify all Dimensions on the Job.

All Drawings, Specifications and Related Documents are the Copyright Property of the Architect and Must be Returned Upon Request. Reproduction of Drawings, Specifications and Related Documents in Part or in Whole is Forbidden Without the Written permission of the Architect.

This Drawing is Not to be Used for Construction Until Signed by the Architect

48 Grenoble Drive

211033

SITE PLAN

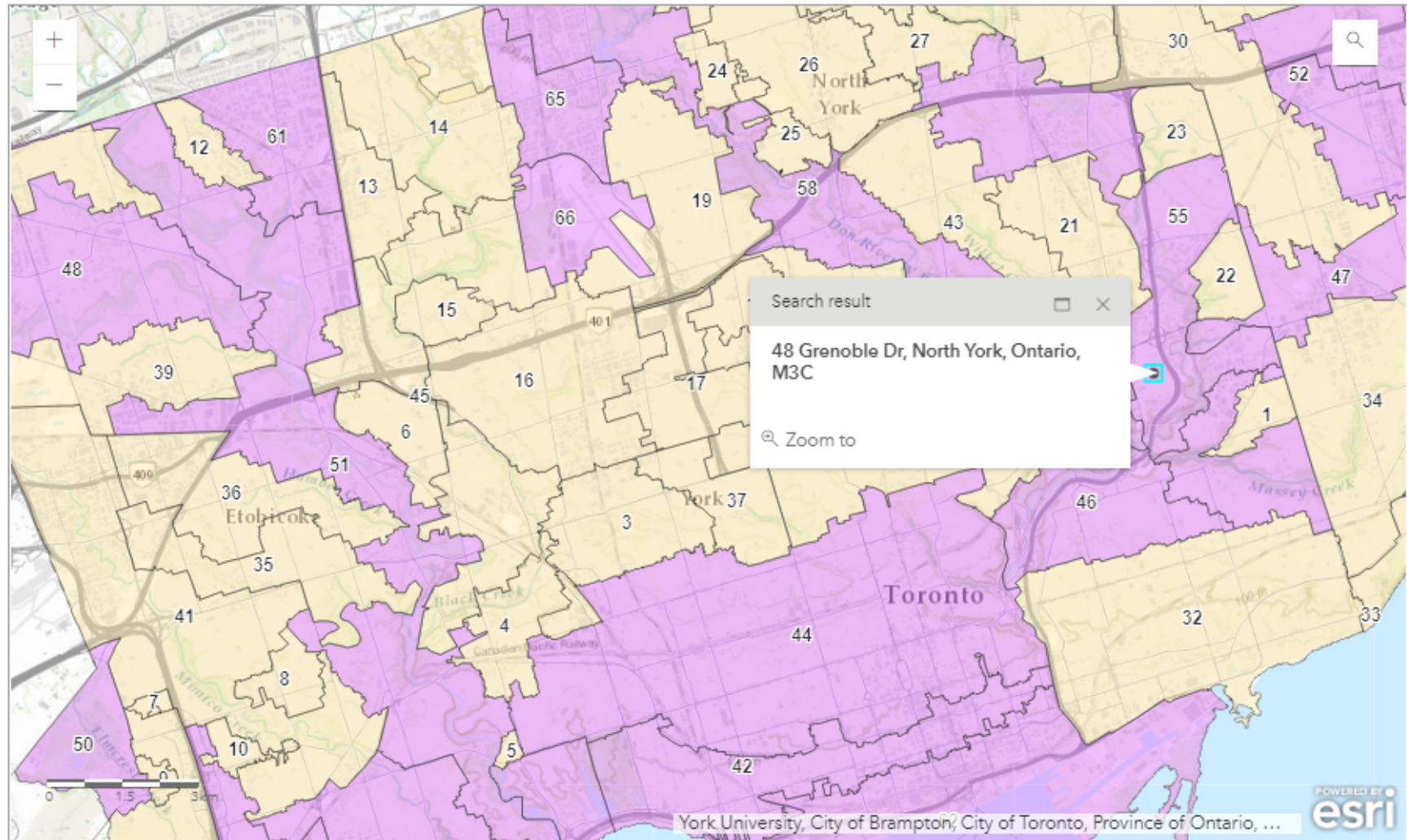
As indicated

A012

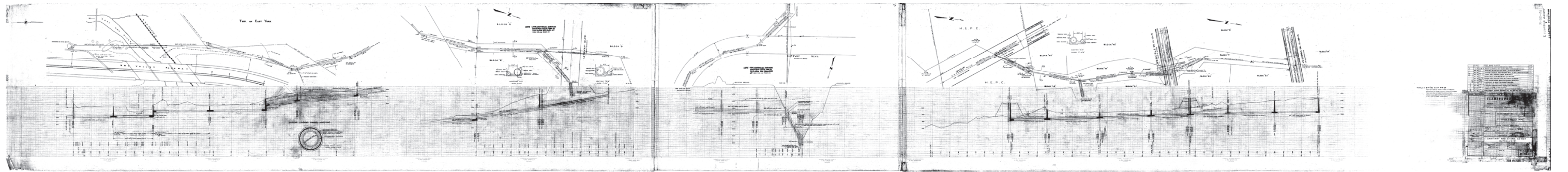
Map Legend

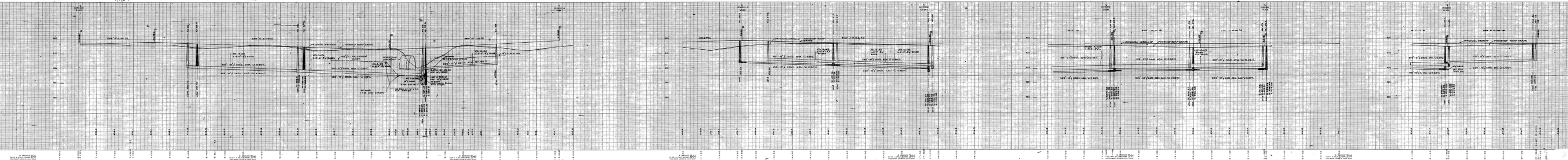
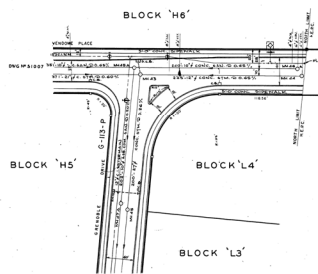
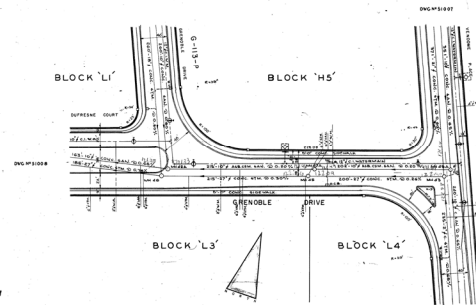
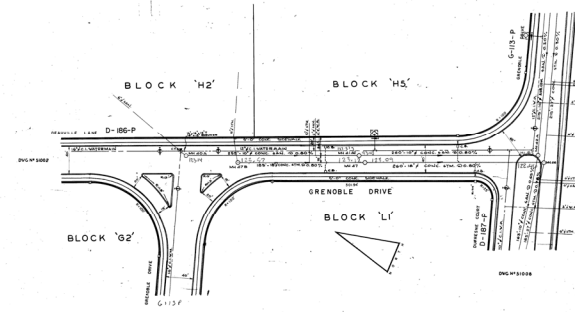
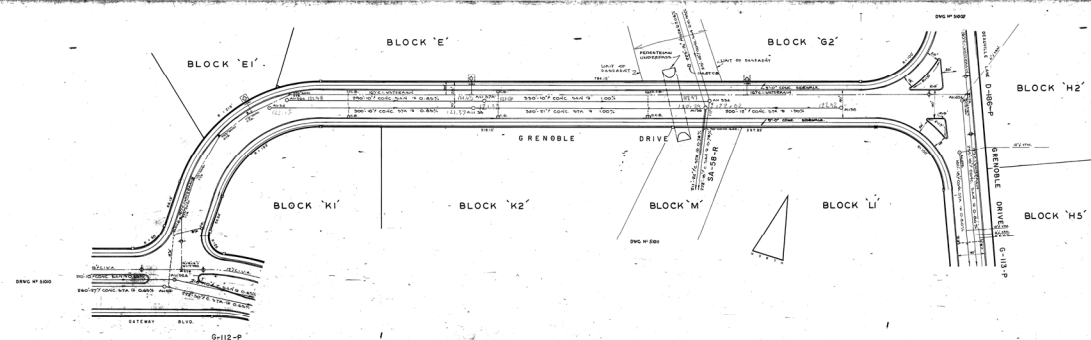
- Basement Flooding Study Completed
- Basement Flooding Study in Progress (started before 2019)
- Basement Flooding Study in Progress (started in 2019)

For more information enter an address in the search bar and/or click on the shaded area in the map



[illegible]





General Information	
Date: March 08,2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Transportation	
Time leaving the office : 9 am	Distance from the office (KM) : 3.3 Km
Time on-site: 9:30 am	Total Distance Travelled (KM) : 6.6 Km
Time leaving the site : 11:45 am	Transportation Method : ☒ Company's Vehicle ☐ Own Vehicle
Time on the office : 12:00 pm	

Attendants			
	Name	Title	Contact Info.
Inspector	Keyvan Vahedi	Senior Project Coordinator	437-776-4086
Inspector	Matiur Rahman	Senior Project Inspector	416-750-7769
Inspector	Surabhi Suresh	Project Coordinator	647-394-1527

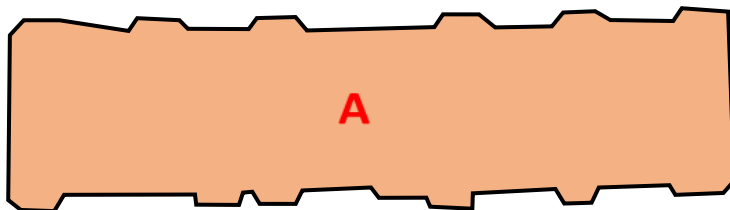
Weather Condition			
☒ Sunny	☒ Cold	☐ Light Rain	☐ Windy
☐ partly cloudy	☐ Cool	☐ Heavy Rain	☐ Foggy
☐ Cloudy	☐ Warm	☐ Light Snow	
Temperature : -2°C	☐ Hot	☐ Heavy Snow	

Existing Facilities at Project/Site
The subject property is occupied by nine story residential building .

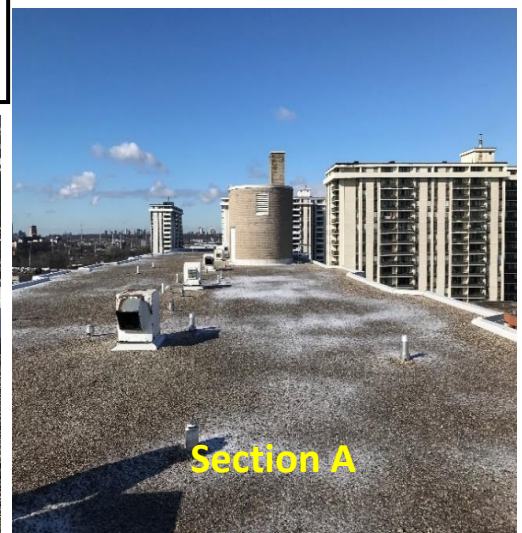


General Information	
Date: March 08,2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Area Inspected and Findings

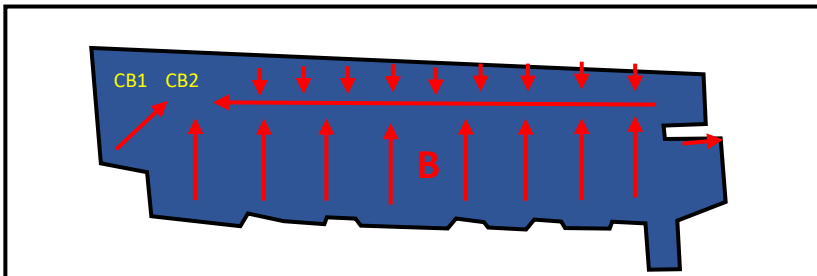
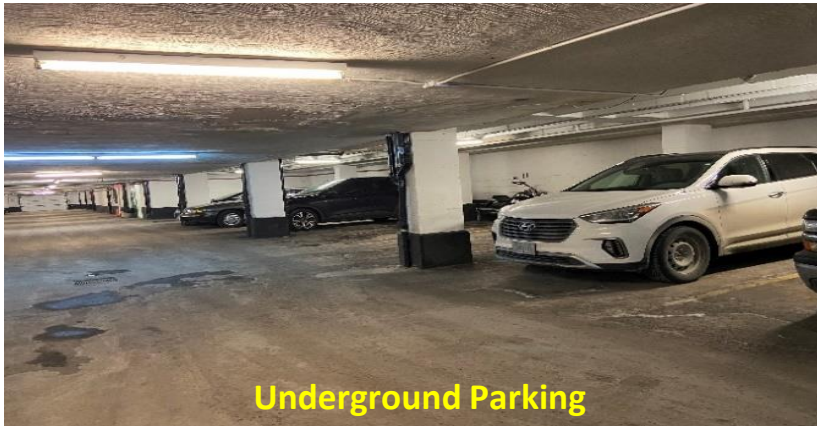


- A-Roof Top
- B-Outside parking lot
- C-Landscape area with grass fill
- D-Asphalt pathway
- E-Concrete walk way



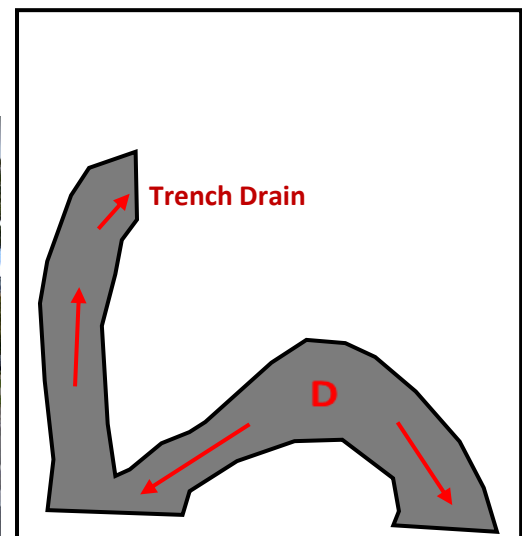
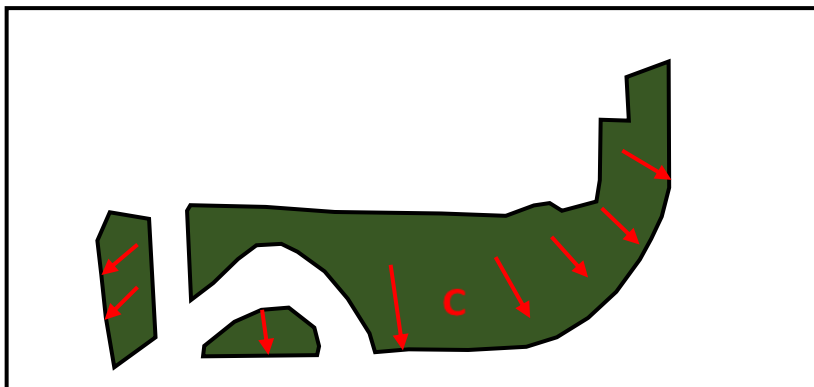
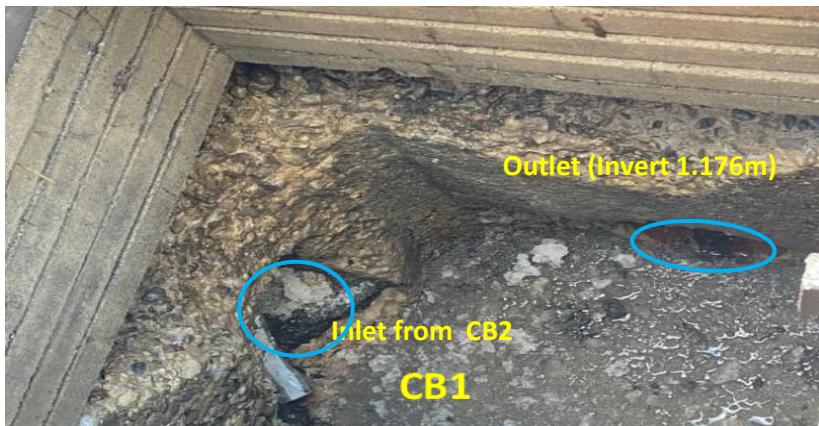
General Information	
Date: March 08,2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Area Inspected and Findings



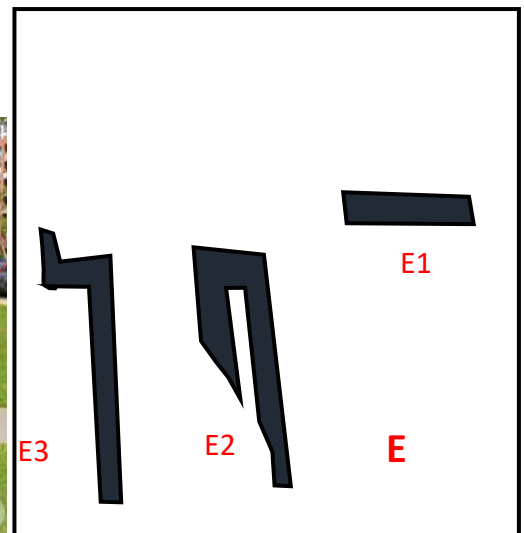
General Information	
Date: March 08, 2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Area Inspected and Findings



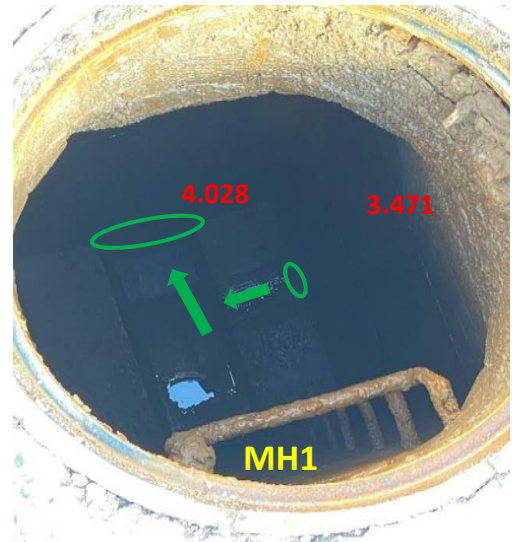
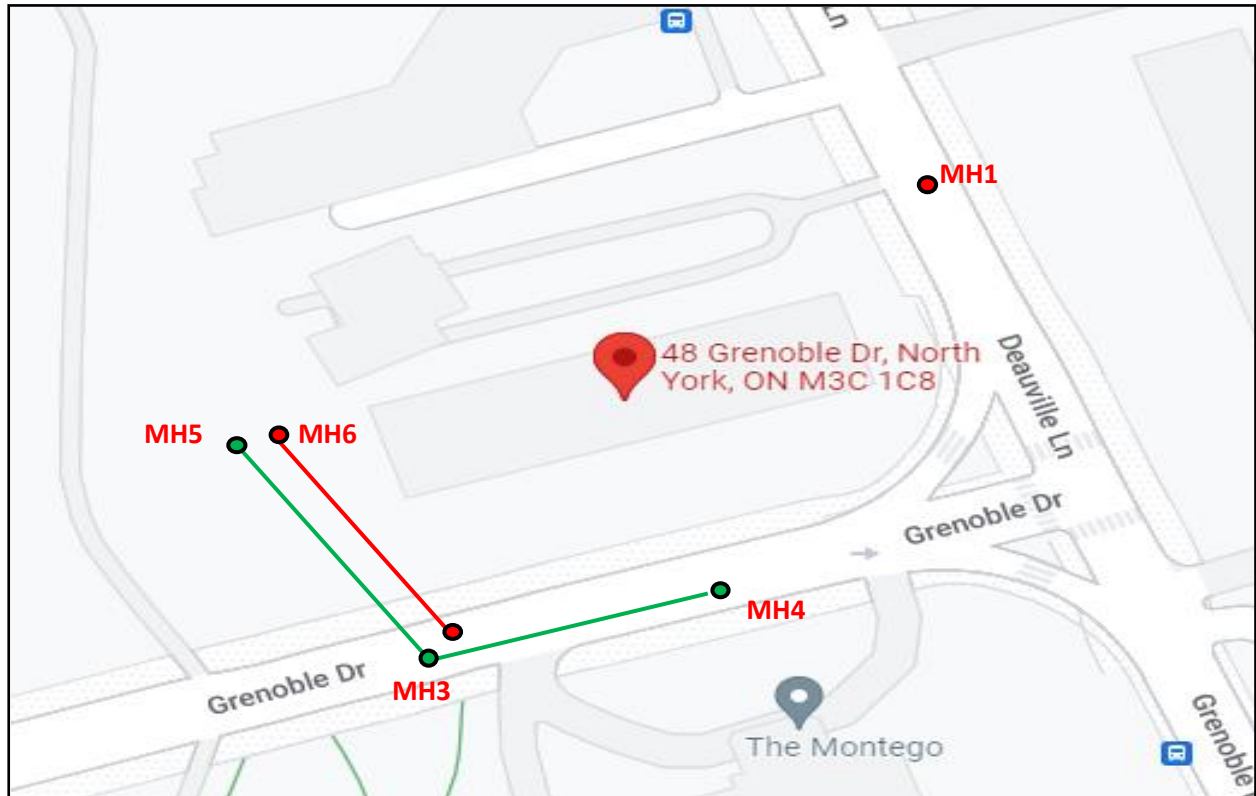
General Information	
Date: March 08,2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Area Inspected and Findings



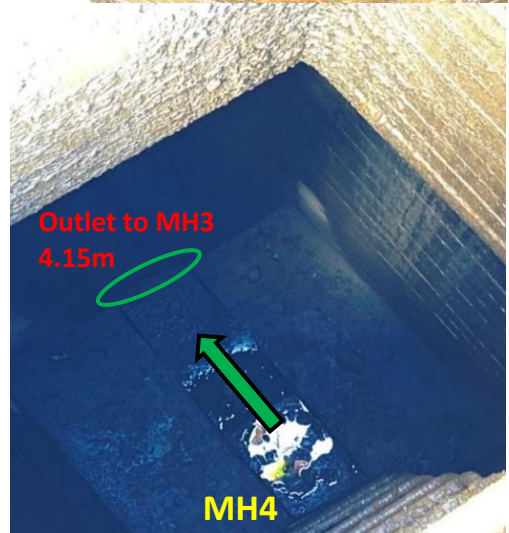
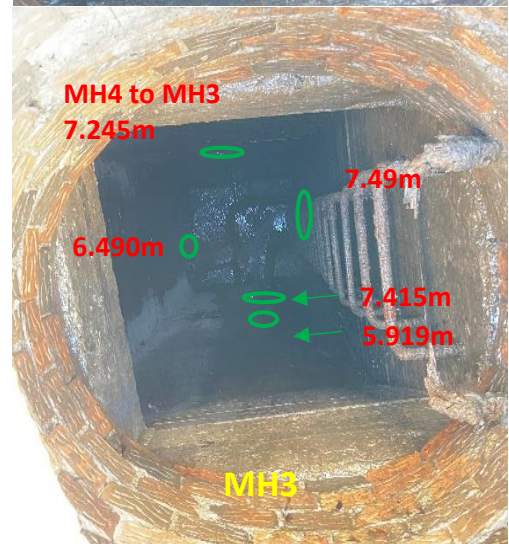
General Information	
Date: March 08,2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Existing Site Servicing



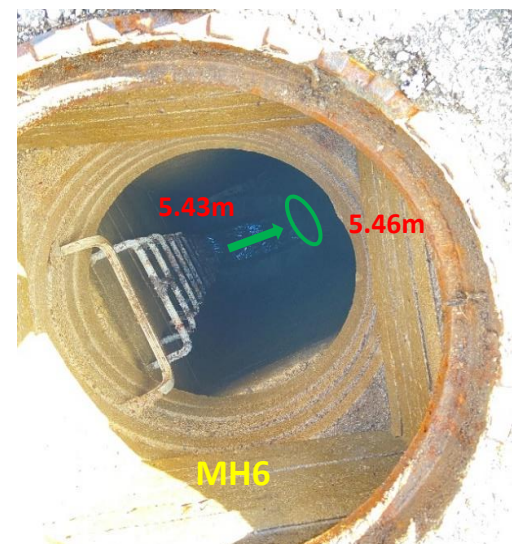
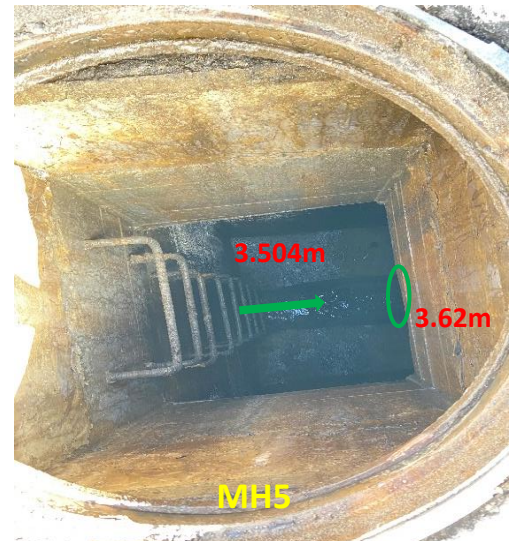
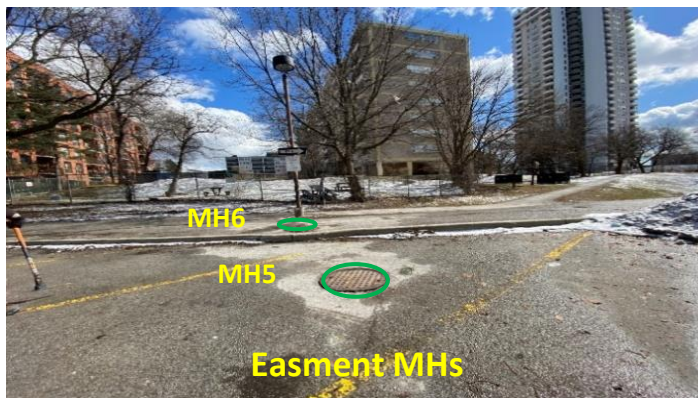
General Information	
Date: March 08, 2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Site Servicing



General Information	
Date: March 08,2022	Report No. : R22-03-14-01
Project No. : PUD21-110	Address : 48 Grenoble Drive ,NY,ON
Owner : Lifestyle Group of Companies	Region/ Municipality: Toronto

Site Servicing



March 18, 2022

Attention:

Chief Engineer and Executive Director, Engineering and Construction Services
c/o Manager, Development Engineering
55 John Street, 16th Floor
Toronto, ON M5v 3C6

cc:

General Manager, Toronto Water
c/o Manager, Environmental Monitoring and Protection Unit
30 Dee Ave, Toronto ON M9N 1S9

Re: 48 Grenoble Drive, Toronto, ON
Our Project No. 22.161

Dear Sir or Madam,

I, Anthony Mirvish, confirm that all buildings on the subject lands (48 Grenoble Drive) can be constructed water-tight below grade in a manner that will resist hydrostatic pressure without any necessity for Private Water Drainage System (subsurface drainage system) consisting of but 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 directly or indirectly or drainage system for disposal directly or indirectly in a municipal sewer.

Sincerely,
Honeycomb Group Inc.



Anthony Mirvish, P. Eng.
Principal
anthony.mirvish@honeycombgroup.ca
416-451-9806





30 Soudan Ave., Suite 200
Toronto, Ontario M4S 1V6
Direct line: 416.322.4112
mkelling@tenblock.ca

Microbjo Properties Inc. c/o Tenblock
30 Soudan Avenue, Suite 200
Toronto, ON M4S 1V6

March 18, 2022

Attention: Chief Engineer and Executive Director, Engineering and Construction Services
c/o Manager, Development Engineering
Metro Hall
55 John Street, 16th Floor
Toronto ON M5V 3C6

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

Dear Sir or Madam,

I, Tenblock, confirm and undertake that I will construct and maintain all building(s) on the subject lands (48 Grenoble Drive) in a manner which shall be completely water-tight below grade and resistant to hydrostatic pressure without any necessity for Private Water Drainage System (subsurface drainage system) consisting of but 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 directly or indirectly or drainage system for disposal directly or indirectly in a municipal sewer.

Sincerely,
Tenblock

A handwritten signature in black ink, reading "Matthew Kelling".

Matthew Kelling, Development Manager
mkelling@tenblock.ca

I, Matthew Kelling, have the authority to bind the corporation.



Smith + Andersen

1100 – 100 Sheppard Ave. East, Toronto ON, M2N 6N5

416 487 8151 f 416 487 9104 smithandandersen.com

2022-03-15

Attention: Chief Engineer and Executive Director, Engineering and Construction Services
c/o Manager, Development Engineering

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

Dear Sir or Madam,

I Vadim Vatoutine, confirm that all building(s) on the subject lands 48 Grenoble Dr. will be designed and constructed in a manner without Private Water Drainage System (subsurface drainage system) consisting of but 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 directly or indirectly or drainage system for disposal directly or indirectly in a municipal sewer. Underground structure(s) of the proposed building(s) will be built completely watertight without any direct or indirect connection to the City sewer for the discharge of groundwater (from a PWDS or floor drain or other infrastructure).

I understand that a Private Water Drainage System as an emergency back up system is not permitted, as part of this proposal.

Yours truly,

SMITH + ANDERSEN



Vadim Vatoutine, P.Eng.
Senior Project Manager

21729.002.m. - 48 Grenoble Dr - GW Letter.docx

HYDROGEOLOGICAL REVIEW REPORT

PREPARED FOR:
Tenblock Management LP
30 Soudan Avenue, Suite 200
Toronto, ON M4S 1V6

ATTENTION:
Matthew Kelling

**48 Grenoble Drive | Toronto,
Ontario**

Grounded Engineering Inc.
File No. 21-195
Issued March 10, 2022



Executive Summary

Grounded Engineering Inc. (Grounded) was retained by Tenblock Management LP to conduct a Hydrogeological Review for the proposed redevelopment of 48 Grenoble Drive in Toronto, Ontario (site). The conclusions of the investigation are summarized as follows:

Development Information

Current Development					
Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
1 Building	9	1	Unknown	Unknown	Unknown

Proposed Development					
Development Phase	Above Grade Levels	Below Grade Levels			
		Level #	Lowest Finished Floor		Approximate Base of Footings (masl)
			Depth (m)	Elevation (masl)	
1 Building (2 towers and associated podium)	Podium - 6 Tower A - 41 Tower B - 43	4	13.5	114.0	111.5

Site Conditions

Site Stratigraphy				
Stratum/Formation	Aquifer or Aquitard	Depth Range (mbgs)	Elevation Range (masl)	Hydraulic Conductivity (m/s)
Fill	Aquifer	0.0 – 3.1	127.5 – 124.4	$1.0 \times 10^{-5***}$
Gravelly Sands	Aquifer	3.1 – 6.9	124.4 – 120.6	$3.6 \times 10^{-6**}$
Upper Glacial Till	Aquifer	6.9 – 20.2	120.6 – 107.3	$5.5 \times 10^{-8*}$
Clayey Silt	Aquitard	20.2 – 26.3	107.3 – 101.2	$1.6 \times 10^{-8*}$
Lower Sands	Aquifer	26.3 – 36.7	101.2 – 90.8	$1.5 \times 10^{-6*}$
Lower Glacial Till	Aquifer	36.7 – 39.7	90.8 – 87.8	$1.0 \times 10^{-7***}$

*Indicates conductivity was calculated by Slug Test

**Indicates conductivity was estimated using grain size analysis

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

Maximum Groundwater Elevation		
Monitoring Well ID	Depth Below Grade (m)	Elevation (masl)
BH1	13.1	113.8
BH2	15.2	111.9
BH3	16.2	111.5
BH4	14.8	112.8
BH5	10.6	117.0



Maximum Groundwater Elevation		
BH6	17.5	107.7
BH7	30.2	96.9
BH8	30.7	96.8
BH9	30.4	97.0

Groundwater Quality				
Sample ID	Sample Date	Sample Expiry Date	City of Toronto Storm Sewer Limits	City of Toronto Sanitary and Combined Sewer Limits
SW-UF-BH2	Feb 16, 2022	Aug 16, 2022	Exceeds	Meets

Groundwater Control

Stored Groundwater (pre-excavation/dewatering)					
Volume of Excavation (m ³)	Volume of Excavation Below Water Table (m ³)	Volume of Stored Groundwater		Volume of Available Groundwater	
		(m ³)	(L)	(m ³)	(L)
86,940	21,735	12,500	12,500,000	7,100	7,100,000

Short Term (Construction) Groundwater Quantity – Safety Factor of 2.0 Used					
Groundwater Seepage		Design Rainfall Event (25mm)		Total Daily Water Takings	
L/day	L/min	L/day	L/min	L/day	L/min
50,000	34.7	156,000	108.3	206,000	143.1

Long Term (Permanent) Groundwater Quantity – Safety Factor of 2.0 Used						
Scenario	Groundwater Seepage		Infiltration Design Rainfall Event (25mm)		Total Daily Water Takings	
	L/day	L/day	L/min	L/day	L/day	L/min
Drained Structure	25,000	17.4	23,000	16.0	48,000	33.3
Fully Watertight Structure	0	0	0	0	0	0

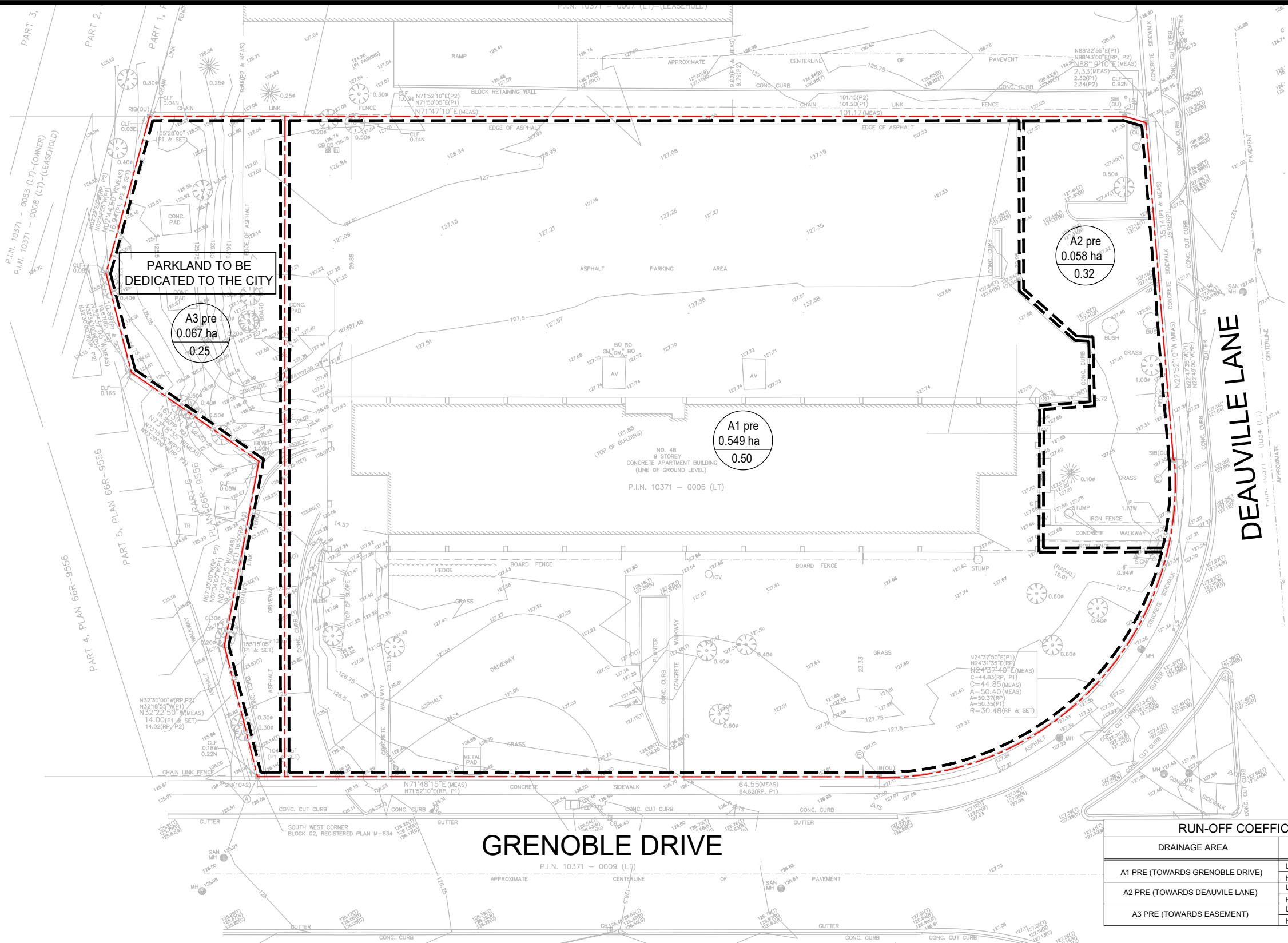
Land Stability	
Maximum Zone of Influence (m)	Maximum Potential Settlement (mm)
5	Drained Structure - 32
	Fully Watertight Structure - 0



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

Appendix C

Storm Analysis



GRENOBLE DRIVE

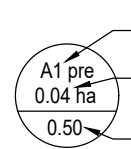
DEAUVILLE LANE

RUN-OFF COEFFICIENTS					
DRAINAGE AREA	LAND USE	AREA (ha)	INITIAL COEFFICIENT	ACTUAL COEFFICIENT	DESIGN COEFFICIENT
A1 PRE (TOWARDS GRENOBLE DRIVE)	LANDSCAPE	0.159	0.25	0.71	0.50
	HARDSCAPE	0.390	0.90		
A2 PRE (TOWARDS DEAUVILLE LANE)	LANDSCAPE	0.034	0.25	0.32	0.32
	HARDSCAPE	0.024	0.90		
A3 PRE (TOWARDS EASEMENT)	LANDSCAPE	0.067	0.25	0.25	0.25
	HARDSCAPE	0.000	0.90		



150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LEGEND



- STORM DRAINAGE AREA NUMBER
- DRAINAGE AREA (ha)
- COMPOSITE RUNOFF COEFFICIENT
- PRE-DEVELOPMENT STORM DRAINAGE AREA
- PROPERTY LINE

PRE-DEVELOPMENT
DRAINAGE AREA PLAN
RESIDENTIAL USE DEVELOPMENT
48 GRENOBLE DRIVE
TORONTO, ONTARIO

DATE: MARCH 2022 PROJECT No: UD21-110
SCALE: N.T.S. FIGURE No: DAP1



Prepared By: Isaak Chlorotiris, P.E., M.A.Sc.
Reviewed by: John Pasalidis, P.Eng., M.A.Sc.

Rational Method Pre-Development Flow Calculation

48 Grenoble Drive

File No. UD21-110

City of Toronto

Date: March 2022

Area Number	Area (ha)	Actual Coefficient	Design Coefficient
A1 Pre – towards Grenoble Drive	0.549	0.71	0.50
A2 Pre – towards Deauville Lane	0.058	0.32	0.32
A3 Pre – towards Grenoble Drive	0.067	0.25	0.25

Rational Method Calculation

A1 Pre – towards Grenoble Drive

Event 2-year		IDF Data Set City of Toronto		a =	21.80	c =	-0.780
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A1 Pre	0.549	0.50	0.27	10	88.2	0.067	67.2

Event 5-year		IDF Data Set City of Toronto		a =	32.00	c =	-0.790
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A1 Pre	0.549	0.50	0.27	10	131.8	0.100	100.5

Event 100-year		IDF Data Set City of Toronto		a =	59.70	c =	-0.800
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A1 Pre	0.549	0.50	0.27	10	250.3	0.191	190.9

A2 Pre – towards Deauville Lane

Event 2-year		IDF Data Set City of Toronto		a =	21.80	c =	-0.780
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A2 Pre	0.058	0.32	0.02	10	88.2	0.005	4.5

Event 5-year		IDF Data Set City of Toronto		a =	32.00	c =	-0.790
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A2 Pre	0.058	0.32	0.02	10	131.8	0.007	6.8

Event 100-year		IDF Data Set City of Toronto		a =	59.70	c =	-0.800
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A2 Pre	0.058	0.32	0.02	10	250.3	0.013	12.9

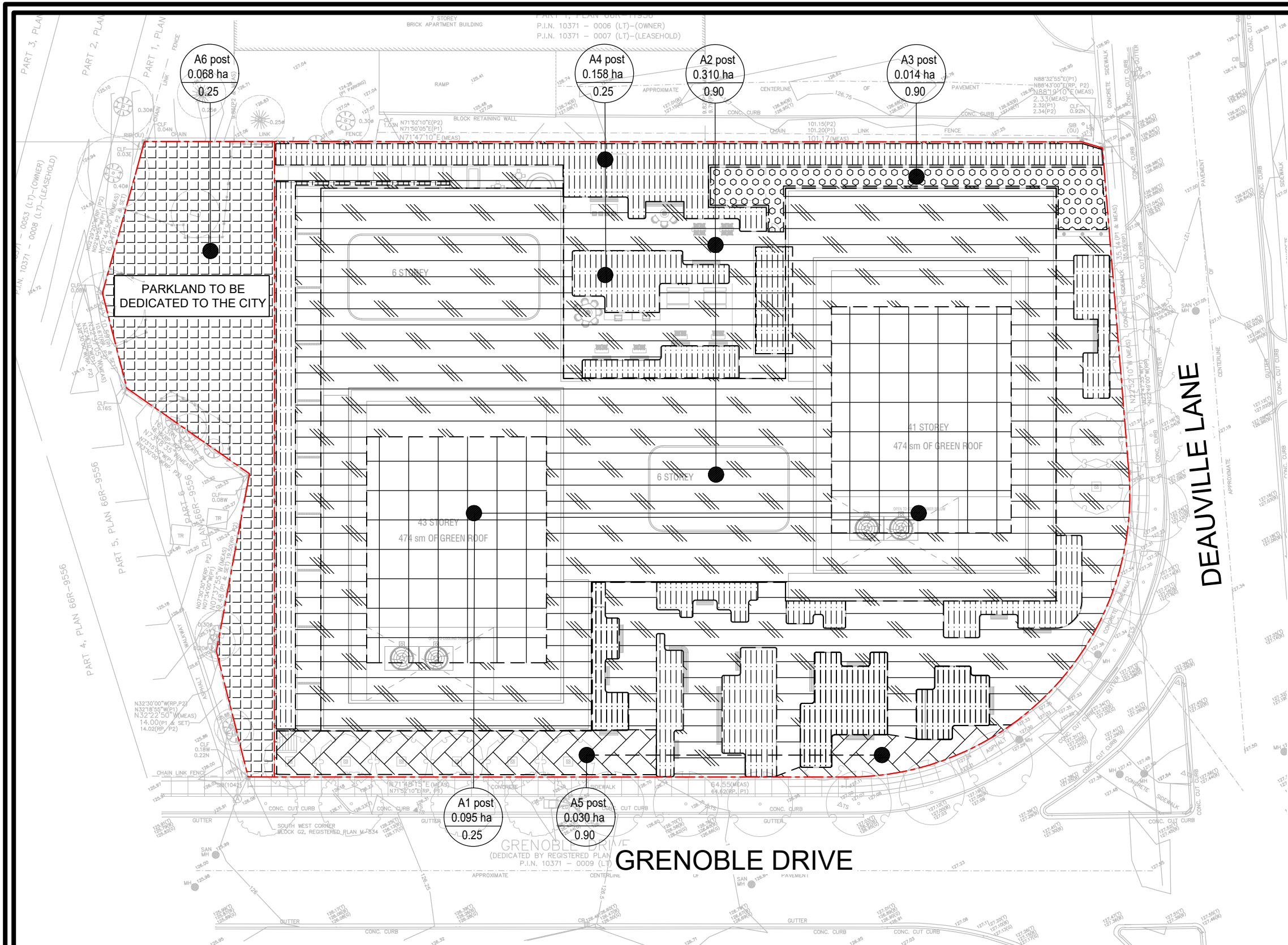
Rational Method Calculation

A3 Pre

Event 2-year		IDF Data Set City of Toronto		a =	21.80	c =	-0.780
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A3 Pre	0.067	0.25	0.02	10	88.2	0.004	4.1

Event 5-year		IDF Data Set City of Toronto		a =	32.00	c =	-0.790
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A3 Pre	0.067	0.25	0.02	10	131.8	0.006	6.1

Event 100-year		IDF Data Set City of Toronto		a =	59.70	c =	-0.800
Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m ³ /s)	Q (L/s)
A3 Pre	0.067	0.25	0.02	10	250.3	0.012	11.6



DRAINAGE AREA	LEGEND	AREA (ha)	TOTAL AREA (ha)
A1 POST		0.095	0.674
A2 POST		0.310	
A3 POST		0.014	
A4 POST		0.158	
A5 POST		0.030	
A6 POST		0.068	

RUN-OFF COEFFICIENTS			
DRAINAGE AREA	LAND USE	AREA (ha)	COEFFICIENT
A1 POST (GREEN ROOF-CONTROLLED IN TANK)	LANDSCAPE	0.095	0.25
A2 POST (ROOFTOP/ TERRACES/ WALKWAYS-CONTROLLED IN TANK)	HARDSCAPE	0.310	0.90
A3 POST (DRIVEWAY AREA-CONTROLLED IN TANK)	HARDSCAPE	0.014	0.90
A4 POST (LANDSCAPE AREA-CONTROLLED IN TANK)	LANDSCAPE	0.158	0.25
A5 POST (HARDSCAPE AREA-UNCONTROLLED)	LANDSCAPE	0.030	0.90
A6 POST (PARKLAND DETICATION AREA-UNCONTROLLED)	LANDSCAPE	0.068	0.25



150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LEGEND

- STORM DRAINAGE AREA NUMBER
- DRAINAGE AREA (ha)
- COMPOSITE RUNOFF COEFFICIENT
- POST-DEVELOPMENT STORM DRAINAGE AREA
- PROPERTY LINE

POST-DEVELOPMENT
DRAINAGE AREA PLAN
RESIDENTIAL USE DEVELOPMENT
48 GRENABLE DRIVE
TORONTO, ONTARIO

DATE: MARCH 2022 PROJECT No: UD21-110
SCALE: N.T.S. FIGURE No: DAP2



Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary - towards Grenoble Drive
City of Toronto

File No. UD21-110
Date: March 2022
Prepared By: Isaak Chlorotyris, P.E., M.A.Sc.
Reviewed By: John Pasalidis, P.Eng., M.A.Sc.

Drainage Area A1 Post		Green Roofs - Controlled In Underground Tank					Drainage Area A2 Post		Rooftops/Driveway/Walkways - Controlled In Underground Tank		Drainage Area A3 Post		Driveway area - Controlled In Underground Tank		Landscaped - Controlled In Underground Tank		Hardscape - Uncontrolled area		Lnadscape (Parkland Detication) - Uncontrolled area		Total Site			
																					Total Site = A1 + A2 + A3 +A4 + A5 +A6			
																					2-yr Pre-Development Site Release Rate = 71.3 L/s			
																					Uncontrolled Flow (Parkland Dedication)= 4.1 L/s			
																					Uncontrolled Flow = 6.6 L/s			
																					Total Uncontrolled Release Rate Achieved = 10.8 L/s			
																					Controlled Release Rate Achieved = 20.1 L/s			
100-Year Design Storm																								
a=	21.80																							
c=	-0.78																							
I =	A(T) ^c																							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)				
Time	Rainfall	Rainfall	Total Storm	Green Roof Captured Volume (A1 Post)	Released	Released	Storm	Runoff	Storm	Runoff	Storm	Runoff	Storm	Runoff	Storm	Runoff	Total Storm	Released	Storage	Storage				
	Intensity	Rate (A1 Post)	Volume (A1 Post)	Volume (A1 Post)	Volume (A1 Post)	Runoff (A1 Post)	Runoff (A2 Post)	Volume (A2 Post)	Runoff (A3 Post)	Volume (A3 Post)	Runoff (A4 Post)	Volume (A4 Post)	Runoff (A5 Post)	Volume (A5 Post)	Runoff (A6 Post)	Volume (A6 Post)	Runoff Volume	Volume	Volume	Depth of Tank				
(min)	(mm/hr)	(m³/s)	(m³)	(m³)	(m³)	(m³/s)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³/s)	(m³)	(m³)	(m³)	(m³)	(m)				
10.0	88.2	0.006	3.48	23.70	0.00	0.00	0.068	40.98	0.003	1.91	0.010	5.81	0.007	3.96	0.004	2.49	48.70	12.04	36.7	0.58				
15.0	64.3	0.004	3.81	23.70	0.00	0.00	0.050	44.81	0.002	2.08	0.007	6.36	0.005	4.33	0.003	2.72	53.25	18.06	35.2	0.56				
20.0	51.4	0.003	4.06	23.70	0.00	0.00	0.040	47.74	0.002	2.22	0.006	6.77	0.004	4.62	0.002	2.90	56.73	24.08	32.6	0.52				
25.0	43.2	0.003	4.26	23.70	0.00	0.00	0.033	50.14	0.002	2.33	0.005	7.11	0.003	4.85	0.002	3.04	59.58	30.11	29.5	0.47				
30.0	37.4	0.002	4.44	23.70	0.00	0.00	0.029	52.19	0.001	2.43	0.004	7.40	0.003	5.05	0.002	3.17	62.02	36.13	25.9	0.41				
35.0	33.2	0.002	4.59	23.70	0.00	0.00	0.026	53.99	0.001	2.51	0.004	7.66	0.002	5.22	0.002	3.28	64.16	42.15	22.0	0.35				
40.0	29.9	0.002	4.73	23.70	0.00	0.00	0.023	55.60	0.001	2.59	0.003	7.89	0.002	5.38	0.001	3.38	66.07	48.17	17.9	0.28				
45.0	27.3	0.002	4.85	23.70	0.00	0.00	0.021	57.06	0.001	2.65	0.003	8.09	0.002	5.52	0.001	3.46	67.81	54.19	13.6	0.21				
50.0	25.1	0.002	4.96	23.70	0.00	0.00	0.019	58.40	0.001	2.72	0.003	8.28	0.002	5.65	0.001	3.54	69.40	60.21	9.2	0.15				
55.0	23.3	0.002	5.07	23.70	0.00	0.00	0.018	59.63	0.001	2.77	0.003	8.46	0.002	5.77	0.001	3.62	70.87	66.23	4.6	0.07				
60.0	21.8	0.001	5.17	23.70	0.00	0.00	0.017	60.79	0.001	2.83	0.002	8.62	0.002	5.88	0.001	3.69	72.24	72.25	0.0	0.00				
65.0	20.5	0.001	5.26	23.70	0.00	0.00	0.016	61.87	0.001	2.88	0.002	8.78	0.002	5.98	0.001	3.76	73.52	78.27	0.0	0.00				
70.0	19.3	0.001	5.34	23.70	0.00	0.00	0.015	62.88	0.001	2.93	0.002	8.92	0.001	6.08	0.001	3.82	74.73	84.30	0.0	0.00				
75.0	18.3	0.001	5.43	23.70	0.00	0.00	0.014	63.85	0.001	2.97	0.002	9.06	0.001	6.17	0.001	3.88	75.87	90.32	0.0	0.00				
80.0	17.4	0.001	5.50	23.70	0.00	0.00	0.013	64.76	0.001	3.01	0.002	9.19	0.001	6.26	0.001	3.93	76.96	96.34	0.0	0.00				
85.0	16.6	0.001	5.58	23.70	0.00	0.00	0.013	65.63	0.001	3.05	0.002	9.31	0.001	6.35	0.001	3.98	77.99	102.36	0.0	0.00				
90.0	15.9	0.001	5.65	23.70	0.00	0.00	0.012	66.46	0.001	3.09	0.002	9.43	0.001	6.43	0.001	4.03	78.98	108.38	0.0	0.00				
95.0	15.2	0.001	5.72	23.70	0.00	0.00	0.012	67.25	0.001	3.13	0.002	9.54	0.001	6.50	0.001	4.08	79.92	114.40	0.0	0.00				
100.0	14.6	0.001	5.78	23.70	0.00	0.00	0.011	68.02	0.001	3.16	0.002	9.65	0.001	6.58	0.001	4.13	80.83	120.42	0.0	0.00				
105.0	14.1	0.001	5.84	23.70	0.00	0.00	0.011	68.75	0.001	3.20	0.002	9.75	0.001	6.65	0.001	4.17	81.70	126.44	0.0	0.00				
110.0	13.6	0.001	5.90	23.70	0.00	0.00	0.011	69.46	0.000	3.23	0.001	9.85	0.001	6.72	0.001	4.22	82.54	132.46	0.0	0.00				
115.0	13.1	0.001	5.96	23.70	0.00	0.00	0.010	70.14	0.000	3.26	0.001	9.95	0.001	6.78	0.001	4.26	83.35	138.49	0.0	0.00				
120.0	12.7	0.001	6.02	23.70	0.00	0.00	0.010	70.80	0.000	3.29	0.001	10.04	0.001	6.85	0.001	4.30	84.14	144.51	0.0	0.00				
125.0	12.3	0.001	6.07	23.70	0.00	0.00	0.010	71.44	0.000	3.32	0.001	10.13	0.001	6.91	0.001	4.34	84.90	150.53	0.0	0.00				
130.0	11.9	0.001	6.12	23.70	0.00	0.00	0.009	72.06	0.000	3.35	0.001	10.22	0.001	6.97	0.001	4.37	85.63	156.55	0.0	0.00				
135.0	11.6	0.001	6.18	23.70	0.00	0.00	0.009	72.66	0.000	3.38	0.001	10.31	0.001	7.03	0.001	4.41	86.35	162.57	0.0	0.00				
140.0	11.3	0.001	6.23	23.70	0.00	0.00	0.009	73.24	0.000	3.41	0.001	10.39	0.001	7.08	0.001	4.45	87.04	168.59	0.0	0.00				
145.0	11.0	0.001	6.27	23.70	0.00	0.00	0.008	73.81	0.000	3.43	0.001	10.47	0.001	7.14	0.001	4.48	87.71	174.61	0.0	0.00				
150.0	10.7	0.001	6.32	23.70	0.00	0.00	0.008	74.36	0.000	3.46	0.001	10.55	0.001	7.19	0.001	4.51	88.37	180.63	0.0	0.00				
155.0	10.4	0.001	6.37	23.70	0.00	0.00	0.008	74.90	0.000	3.49	0.001	10.62	0.001	7.24	0.000	4.55	89.01	186.65	0.0	0.00				
160.0	10.1	0.001	6.41	23.70	0.00	0.00	0.008	75.43	0.000	3.51	0.001	10.70	0.001	7.29	0.000	4.58	89.63	192.68	0.0	0.00				
165.0	9.9	0.001	6.45	23.70	0.00	0.00	0.008	75.94	0.000	3.53	0.001	10.77	0.001	7.34	0.000	4.61	90.24	198.70	0.0	0.00				
170.0	9.7	0.001	6.50	23.70	0.00	0.00	0.007	76.44	0.000	3.56	0.001	10.84	0.001	7.39	0.000	4.64	90.84	204.72	0.0	0.00				
175.0	9.5	0.001	6.54	23.70	0.00	0.00	0.007	76.93	0.000	3.58	0.001	10.91	0.001	7.44	0.000	4.67	91.42	210.74	0.0	0.00				
180.0	9.3	0.001	6.58	23.70	0.00	0.00	0.007	77.41	0.000	3.60	0.001	10.98	0.001	7.49	0.000	4.70	91.99	216.76	0.0	0.00				
185.0	9.1	0.001	6.62	23.70	0.00	0.00	0.007	77.88	0.000	3.62	0.001	11.05	0.001	7.53	0.000	4.73	92.54	222.78	0.0	0.00				
190.0	8.9	0.001	6.66	23.70	0.00	0.00	0.007	78.33	0.000	3.64	0.001	11.11	0.001	7.58	0.000	4.75	93.09	228.80	0.0	0.00				
195.0	8.7	0.001	6.70	23.70	0.00	0.00	0.007	78.78	0.000	3.67	0.001	11.17	0.001	7.62	0.000	4.78	93.62	234.82	0.0	0.00				
200.0	8.5	0.001	6.73	23.70	0.00	0.00	0.007	79.22	0.000	3.69	0.001	11.24	0.001	7.66	0.000	4.81	94.15	240.84	0.0	0.00				
205.0	8.4	0.001	6.77	23.70	0.00	0.00	0.006	7																



Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary - towards Grenoble Drive
City of Toronto

File No. UD21-110
Date: March 2022
Prepared By: Isaak Chlorotyris, P.E., M.A.Sc.
Reviewed By: John Pasalidis, P.Eng., M.A.Sc.

100-Year Design Storm		Drainage Area A1 Post					Drainage Area A2 Post		Drainage Area A3 Post		Drainage Area A4 Post		Drainage Area A5 Post		Drainage Area A6 Post		Total Site			
		Green Roofs - Controlled In Underground Tank					Rooftops/Driveway/Walkways - Controlled In Underground Tank		Driveway area - Controlled In Underground Tank		Landscaped - Controlled In Underground Tank		Hardscape - Uncontrolled area		Lnadscape (Parkland Detication) - Uncontrolled area		Total Site = A1 + A2 + A3 +A4 + A5 +A6			
		Area (A1) = 0.095 ha "C" = 0.25 AC1= 0.02 Tc = 10.0 min Time Increment = 5.0 min Water Retention = 25 L/m ² Void of Volume Space = 23.7 m ³ Max. Release Rate = 0.0 L/s					Area (A2) = 0.310 ha "C" = 0.90 AC2= 0.279 Tc = 10 min Time Increment = 5 min Max. Release Rate = 102.1 L/s		Area (A3) = 0.014 ha "C" = 0.90 AC3= 0.013 Tc = 10 min Time Increment = 5 min Max. Release Rate = 4.7		Area (A4) = 0.158 ha "C" = 0.25 AC4= 0.040 Tc = 10 min Time Increment = 5 min Max. Release Rate = 14.5 L/s		Area (A5) = 0.030 ha "C" = 0.90 AC5= 0.03 Tc = 10.0 min Time Increment = 5.0 min Max. Release Rate = 9.9 L/s		Area (A6) = 0.068 ha "C" = 0.25 AC6= 0.02 Tc = 10.0 min Time Increment = 5.0 min Max. Release Rate = 6.2 L/s		2-yr Pre-Development Site Release Rate = 71.3 L/s			
																	Uncontrolled Flow (Parkland Dedication)= 6.2 L/s Uncontrolled Flow = 9.9 L/s Total Uncontrolled Release Rate Achieved = 16.1 L/s Controlled Release Rate Achieved = 25.0 L/s			
																			Total Site Release Rate Achieved = 41.1 L/s	
																	Max. Storage Tank Size = 57.8 m ³ Stor. Tank footprint Area = 63.34 m ²			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Time	Rainfall	Rainfall	Total Storm	Green Roof Captured Volume (A1 Post)	Released Volume (A1 Post)	Released Runoff (A1 Post)	Storm Runoff (A2 Post)	Runoff Volume (A2 Post)	Storm Runoff (A3 Post)	Runoff Volume (A3 Post)	Storm Runoff (A4 Post)	Runoff Volume (A4 Post)	Storm Runoff (A5 Post)	Runoff Volume (A5 Post)	Storm Runoff (A6 Post)	Runoff Volume (A6 Post)	Total Storm Runoff Volume	Released Volume	Storage Volume	Storage Depth of Tank
(min)	(mm/hr)	(m ³ /s)	(m ³)	(m ³)	(m ³)	(m ³ /s)	(m ³ /s)	(m ³)	(m ³ /s)	(m ³)	(m ³ /s)	(m ³)	(m ³ /s)	(m ³)	(m ³ /s)	(m ³)	(m ³)	(m ³)	(m ³)	(m)
10.0	131.8	0.009	5.21	23.70	0.00	0.00	0.102	61.25	0.005	2.85	0.014	8.69	0.010	5.92	0.006	3.72	72.79	15.02	57.8	0.91
15.0	95.7	0.006	5.67	23.70	0.00	0.00	0.074	66.69	0.003	3.10	0.011	9.46	0.007	6.45	0.004	4.05	79.25	22.53	56.7	0.90
20.0	76.2	0.005	6.02	23.70	0.00	0.00	0.059	70.85	0.003	3.30	0.008	10.05	0.006	6.85	0.004	4.30	84.19	30.04	54.2	0.85
25.0	63.9	0.004	6.31	23.70	0.00	0.00	0.049	74.24	0.002	3.45	0.007	10.53	0.005	7.18	0.003	4.51	88.23	37.55	50.7	0.80
30.0	55.3	0.004	6.56	23.70	0.00	0.00	0.043	77.14	0.002	3.59	0.006	10.94	0.004	7.46	0.003	4.68	91.67	45.06	46.6	0.74
35.0	49.0	0.003	6.77	23.70	0.00	0.00	0.038	79.68	0.002	3.71	0.005	11.30	0.004	7.71	0.002	4.84	94.69	52.57	42.1	0.66
40.0	44.1	0.003	6.96	23.70	0.00	0.00	0.034	81.95	0.002	3.81	0.005	11.62	0.003	7.93	0.002	4.97	97.38	60.08	37.3	0.59
45.0	40.2	0.003	7.14	23.70	0.00	0.00	0.031	84.00	0.001	3.91	0.004	11.91	0.003	8.12	0.002	5.10	99.82	67.59	32.2	0.51
50.0	37.0	0.002	7.30	23.70	0.00	0.00	0.029	85.88	0.001	4.00	0.004	12.18	0.003	8.31	0.002	5.21	102.05	75.10	27.0	0.43
55.0	34.3	0.002	7.45	23.70	0.00	0.00	0.027	87.61	0.001	4.08	0.004	12.43	0.003	8.47	0.002	5.32	104.12	82.61	21.5	0.34
60.0	32.0	0.002	7.58	23.70	0.00	0.00	0.025	89.23	0.001	4.15	0.004	12.66	0.002	8.63	0.002	5.42	106.04	90.12	15.9	0.25
65.0	30.0	0.002	7.71	23.70	0.00	0.00	0.023	90.74	0.001	4.22	0.003	12.87	0.002	8.78	0.001	5.51	107.83	97.63	10.2	0.16
70.0	28.3	0.002	7.83	23.70	0.00	0.00	0.022	92.17	0.001	4.29	0.003	13.07	0.002	8.91	0.001	5.59	109.53	105.14	4.4	0.07
75.0	26.8	0.002	7.95	23.70	0.00	0.00	0.021	93.51	0.001	4.35	0.003	13.26	0.002	9.04	0.001	5.68	111.12	112.64	0.0	0.00
80.0	25.5	0.002	8.06	23.70	0.00	0.00	0.020	94.79	0.001	4.41	0.003	13.44	0.002	9.17	0.001	5.75	112.64	120.15	0.0	0.00
85.0	24.3	0.002	8.16	23.70	0.00	0.00	0.019	96.00	0.001	4.47	0.003	13.62	0.002	9.28	0.001	5.83	114.08	127.66	0.0	0.00
90.0	23.2	0.002	8.26	23.70	0.00	0.00	0.018	97.16	0.001	4.52	0.003	13.78	0.002	9.40	0.001	5.90	115.46	135.17	0.0	0.00
95.0	22.3	0.001	8.35	23.70	0.00	0.00	0.017	98.27	0.001	4.57	0.002	13.94	0.002	9.50	0.001	5.97	116.78	142.68	0.0	0.00
100.0	21.4	0.001	8.44	23.70	0.00	0.00	0.017	99.33	0.001	4.62	0.002	14.09	0.002	9.61	0.001	6.03	118.04	150.19	0.0	0.00
105.0	20.6	0.001	8.53	23.70	0.00	0.00	0.016	100.36	0.001	4.67	0.002	14.23	0.002	9.71	0.001	6.09	119.26	157.70	0.0	0.00
110.0	19.8	0.001	8.61	23.70	0.00	0.00	0.015	101.34	0.001	4.72	0.002	14.37	0.001	9.80	0.001	6.15	120.43	165.21	0.0	0.00
115.0	19.1	0.001	8.69	23.70	0.00	0.00	0.015	102.29	0.001	4.76	0.002	14.51	0.001	9.89	0.001	6.21	121.56	172.72	0.0	0.00
120.0	18.5	0.001	8.77	23.70	0.00	0.00	0.014	103.21	0.001	4.80	0.002	14.64	0.001	9.98	0.001	6.27	122.65	180.23	0.0	0.00
125.0	17.9	0.001	8.85	23.70	0.00	0.00	0.014	104.10	0.001	4.84	0.002	14.77	0.001	10.07	0.001	6.32	123.71	187.74	0.0	0.00
130.0	17.4	0.001	8.92	23.70	0.00	0.00	0.013	104.96	0.001	4.88	0.002	14.89	0.001	10.15	0.001	6.37	124.73	195.25	0.0	0.00
135.0	16.9	0.001	8.99	23.70	0.00	0.00	0.013	105.80	0.001	4.92	0.002	15.01	0.001	10.23	0.001	6.42	125.72	202.76	0.0	0.00
140.0	16.4	0.001	9.06	23.70	0.00	0.00	0.013	106.61	0.001	4.96	0.002	15.12	0.001	10.31	0.001	6.47	126.69	210.27	0.0	0.00
145.0	15.9	0.001	9.13	23.70	0.00	0.00	0.012	107.39	0.001	5.00	0.002	15.23	0.001	10.39	0.001	6.52	127.62	217.78	0.0	0.00
150.0	15.5	0.001	9.19	23.70	0.00	0.00	0.012	108.16	0.001	5.03	0.002	15.34	0.001	10.46	0.001	6.57	128.54	225.29	0.0	0.00
155.0	15.1	0.001	9.26	23.70	0.00	0.00	0.012	108.91	0.001	5.07	0.002	15.45	0.001	10.53	0.001	6.61	129.42	232.80	0.0	0.00
160.0	14.7	0.001	9.32	23.70	0.00	0.00	0.011	109.64	0.001	5.10	0.002	15.55	0.001	10.60	0.001	6.66	130.29	240.31	0.0	0.00
165.0	14.4	0.001	9.38	23.70	0.00	0.00	0.011	110.35	0.001	5.13	0.002	15.65	0.001	10.67	0.001	6.70	131.13	247.82	0.0	0.00
170.0	14.1	0.001	9.44	23.70	0.00	0.00	0.011	111.04	0.001	5.17	0.002	15.75	0.001	10.74	0.001	6.74	131.96	255.33	0.0	0.00
175.0	13.7	0.001	9.50	23.70	0.00	0.00	0.011	111.72	0.000	5.20	0.002	15.85	0.001	10.80	0.001	6.78	132.77	262.84	0.0	0.00
180.0	13.4	0.001	9.55	23.70	0.00	0.00	0.010	112.38	0.000	5.23	0.001	15.94	0.001	10.87	0.001	6.82	133.55	270.35	0.0	0.00
185.0	13.1	0.001	9.61	23.70	0.00	0.00	0.010	113.03	0.000	5.26	0.001	16.03	0.001	10.93	0.001	6.86	134.32	277.86	0.0	0.00
190.0	12.9	0.001	9.66	23.70																



Modified Rational Method - Hundred Year Storm
Site Flow and Storage Summary - towards Grenoble Drive
City of Toronto

File No. UD21-110
Date: March 2022
Prepared By: Isaak Chlorotyris, P.E., M.A.Sc.
Reviewed By: John Pasalidis, P.Eng., M.A.Sc.

		Drainage Area A1 Post					Drainage Area A2 Post		Drainage Area A3 Post		Drainage Area A4 Post		Drainage Area A5 Post		Drainage Area A6 Post		Total Site			
		Green Roofs - Controlled In Underground Tank					Rooftops/Driveway/Walkways - Controlled In Underground Tank		Driveway area - Controlled In Underground Tank		Landscaped - Controlled In Underground Tank		Hardscape - Uncontrolled area		Lnadscape (Parkland Detication) - Uncontrolled area		Total Site = A1 + A2 + A3 +A4 + A5 +A6			
		Area (A1) = 0.095 ha "C" = 0.25 AC1= 0.02 Tc = 10.0 min Time Increment = 5.0 min Water Retention = 25 L/m²					Area (A2) = 0.310 ha "C" = 0.90 AC2= 0.279 Tc = 10 min Time Increment = 5 min		Area (A3) = 0.014 ha "C" = 0.90 AC3= 0.013 Tc = 10 min Time Increment = 5 min		Area (A4) = 0.158 ha "C" = 0.25 AC4= 0.040 Tc = 10 min Time Increment = 5 min		Area (A5) = 0.030 ha "C" = 0.90 AC5= 0.03 Tc = 10.0 min Time Increment = 5.0 min		Area (A6) = 0.068 ha "C" = 0.25 AC6= 0.02 Tc = 10.0 min Time Increment = 5.0 min		2-yr Pre-Development Site Release Rate = 71.3 L/s			
		Void of Volume Space = 23.7 m³ Max. Release Rate = 0.0 L/s					Max. Release Rate = 193.9 L/s		Max. Release Rate = 9.0		Max. Release Rate = 27.5 L/s		Max. Release Rate = 18.8 L/s		Max. Release Rate = 11.8 L/s		Uncontrolled Flow (Parkland Dedication)= 11.8 L/s Uncontrolled Flow = 18.8 L/s Total Uncontrolled Release Rate Achieved = 30.5 L/s Controlled Release Rate Achieved = 38.5 L/s			
		100-Year Design Storm															Total Site Release Rate Achieved = 69.0 L/s			
		a= 59.70															Max. Storage Tank Size = 115.3 m³ Stor. Tank footprint Area = 63.34 m²			
		c= -0.80																		
		I = A(T) ^c																		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Time	Rainfall	Rainfall	Total Storm	Green Roof	Released	Released	Storm	Runoff	Storm	Runoff	Storm	Runoff	Storm	Runoff	Storm	Runoff	Total Storm	Released	Storage	Storage
	Intensity	Rate	Volume	Captured	Volume	Runoff	Runoff	Volume	Runoff	Volume	Runoff	Volume	Runoff	Volume	Runoff	Volume	Runoff Volume	Volume	Volume	Depth of Tank
(min)	(mm/hr)	(A1 Post)	(A1 Post)	(A1 Post)	(A1 Post)	(A1 Post)	(A2 Post)	(A2 Post)	(A3 Post)	(A3 Post)	(A4 Post)	(A4 Post)	(A5 Post)	(A5 Post)	(A6 Post)	(A6 Post)	(m³)	(m³)	(m³)	(m)
10.0	250.3	0.016	9.89	23.70	0.00	0.00	0.194	116.33	0.009	5.41	0.028	16.50	0.019	11.25	0.012	7.06	138.25	23.09	115.2	1.82
15.0	181.0	0.012	10.72	23.70	0.00	0.00	0.140	126.16	0.007	5.87	0.020	17.89	0.014	12.20	0.009	7.66	149.92	34.64	115.3	1.82
20.0	143.8	0.009	11.36	23.70	0.00	0.00	0.111	133.63	0.005	6.22	0.016	18.95	0.011	12.92	0.007	8.11	158.80	46.18	112.6	1.78
25.0	120.3	0.008	11.88	23.70	0.00	0.00	0.093	139.73	0.004	6.50	0.013	19.82	0.009	13.51	0.006	8.48	166.05	57.73	108.3	1.71
30.0	103.9	0.007	12.32	23.70	0.00	0.00	0.081	144.92	0.004	6.74	0.011	20.55	0.008	14.02	0.005	8.80	172.22	69.27	102.9	1.63
35.0	91.9	0.006	12.70	23.70	0.00	0.00	0.071	149.46	0.003	6.95	0.010	21.20	0.007	14.45	0.004	9.07	177.61	80.82	96.8	1.53
40.0	82.6	0.005	13.05	23.70	0.00	0.00	0.064	153.50	0.003	7.14	0.009	21.77	0.006	14.85	0.004	9.32	182.42	92.36	90.1	1.42
45.0	75.1	0.005	13.36	23.70	0.00	0.00	0.058	157.16	0.003	7.31	0.008	22.29	0.006	15.20	0.004	9.54	186.76	103.91	82.9	1.31
50.0	69.1	0.005	13.64	23.70	0.00	0.00	0.054	160.51	0.002	7.47	0.008	22.77	0.005	15.52	0.003	9.74	190.74	115.45	75.3	1.19
55.0	64.0	0.004	13.90	23.70	0.00	0.00	0.050	163.60	0.002	7.61	0.007	23.20	0.005	15.82	0.003	9.93	194.41	127.00	67.4	1.06
60.0	59.7	0.004	14.15	23.70	0.00	0.00	0.046	166.47	0.002	7.75	0.007	23.61	0.004	16.10	0.003	10.10	197.83	138.55	59.3	0.94
65.0	56.0	0.004	14.38	23.70	0.00	0.00	0.043	169.15	0.002	7.87	0.006	23.99	0.004	16.36	0.003	10.27	201.02	150.09	50.9	0.80
70.0	52.8	0.003	14.59	23.70	0.00	0.00	0.041	171.68	0.002	7.99	0.006	24.35	0.004	16.60	0.002	10.42	204.02	161.64	42.4	0.67
75.0	49.9	0.003	14.79	23.70	0.00	0.00	0.039	174.07	0.002	8.10	0.005	24.69	0.004	16.83	0.002	10.57	206.85	173.18	33.7	0.53
80.0	47.4	0.003	14.99	23.70	0.00	0.00	0.037	176.33	0.002	8.20	0.005	25.01	0.004	17.05	0.002	10.70	209.54	184.73	24.8	0.39
85.0	45.2	0.003	15.17	23.70	0.00	0.00	0.035	178.48	0.002	8.30	0.005	25.31	0.003	17.26	0.002	10.83	212.10	196.27	15.8	0.25
90.0	43.2	0.003	15.34	23.70	0.00	0.00	0.033	180.53	0.002	8.40	0.005	25.61	0.003	17.46	0.002	10.96	214.54	207.82	6.7	0.11
95.0	41.3	0.003	15.51	23.70	0.00	0.00	0.032	182.49	0.001	8.49	0.005	25.88	0.003	17.65	0.002	11.08	216.87	219.36	0.0	0.00
100.0	39.7	0.003	15.67	23.70	0.00	0.00	0.031	184.37	0.001	8.58	0.004	26.15	0.003	17.83	0.002	11.19	219.10	230.91	0.0	0.00
105.0	38.2	0.003	15.82	23.70	0.00	0.00	0.030	186.18	0.001	8.66	0.004	26.41	0.003	18.01	0.002	11.30	221.25	242.45	0.0	0.00
110.0	36.8	0.002	15.97	23.70	0.00	0.00	0.028	187.92	0.001	8.74	0.004	26.65	0.003	18.17	0.002	11.41	223.32	254.00	0.0	0.00
115.0	35.5	0.002	16.12	23.70	0.00	0.00	0.027	189.60	0.001	8.82	0.004	26.89	0.003	18.34	0.002	11.51	225.32	265.54	0.0	0.00
120.0	34.3	0.002	16.25	23.70	0.00	0.00	0.027	191.22	0.001	8.90	0.004	27.12	0.003	18.49	0.002	11.61	227.24	277.09	0.0	0.00
125.0	33.2	0.002	16.39	23.70	0.00	0.00	0.026	192.79	0.001	8.97	0.004	27.34	0.002	18.64	0.002	11.70	229.10	288.64	0.0	0.00
130.0	32.2	0.002	16.52	23.70	0.00	0.00	0.025	194.31	0.001	9.04	0.004	27.56	0.002	18.79	0.002	11.79	230.91	300.18	0.0	0.00
135.0	31.2	0.002	16.64	23.70	0.00	0.00	0.024	195.78	0.001	9.11	0.003	27.77	0.002	18.93	0.001	11.88	232.66	311.73	0.0	0.00
140.0	30.3	0.002	16.76	23.70	0.00	0.00	0.023	197.21	0.001	9.18	0.003	27.97	0.002	19.07	0.001	11.97	234.36	323.27	0.0	0.00
145.0	29.5	0.002	16.88	23.70	0.00	0.00	0.023	198.60	0.001	9.24	0.003	28.17	0.002	19.21	0.001	12.06	236.01	334.82	0.0	0.00
150.0	28.7	0.002	16.99	23.70	0.00	0.00	0.022	199.95	0.001	9.30	0.003	28.36	0.002	19.34	0.001	12.14	237.61	346.36	0.0	0.00
155.0	27.9	0.002	17.11	23.70	0.00	0.00	0.022	201.26	0.001	9.36	0.003	28.55	0.002	19.46	0.001	12.22	239.18	357.91	0.0	0.00
160.0	27.2	0.002	17.22	23.70	0.00	0.00	0.021	202.55	0.001	9.42	0.003	28.73	0.002	19.59	0.001	12.29	240.70	369.45	0.0	0.00
165.0	26.6	0.002	17.32	23.70	0.00	0.00	0.021	203.80	0.001	9.48	0.003	28.91	0.002	19.71	0.001	12.37	242.19	381.00	0.0	0.00
170.0	25.9	0.002	17.43	23.70	0.00	0.00	0.020	205.02	0.001	9.54	0.003	29.08	0.002	19.83	0.001	12.44	243.64	392.54	0.0	0.00
175.0	25.4	0.002	17.53	23.70	0.00	0.00	0.020	206.21	0.001	9.59	0.003	29.25	0.002	19.94	0.001	12.52	245.05	404.09	0.0	0.00
180.0	24.8	0.002	17.63																	



Orifice Design

48 Grenoble Drive

File No. UD21-110

Date: March 2022

Prepared By: Isaak Chlorotiris, P.E., M.A.Sc.

Reviewed by: John Pasalidis, P.Eng., M.A.Sc.

Orifice Equation for 100 mm orifice tube

$$Q = C \times A \times \sqrt{2 \times g \times h}$$

100 yr event

d= 100 mm
C= 0.82
A= 0.008 m²
g= 9.81 m/s²
h= 1.82 m
Q= 38.5 L/s

5 yr event

d= 100 mm
C= 0.82
A= 0.008 m²
g= 9.81 m/s²
h= 0.77 m
Q= 25.0 L/s

2 yr event

d= 100 mm
C= 0.82
A= 0.008 m²
g= 9.81 m/s²
h= 0.50 m
Q= 20.1 L/s



Water Balance Calculation

48 Grenoble Drive

File No. UD21-110

Date: March 2022

Prepared By: Isaak Chlorotiris, P.E., M.A.Sc.

Reviewed By: John Pasalidis, P.Eng., M.A.Sc.

Contributing Drainage Area	6073	m ²
Rainfall depth to be retained	5.0	mm
Total rainfall volume required at 5mm	30.37	m³

Initial Abstraction Calculations

Surface	Area (m ²)	IA (mm)	Volume (m ³)
Landscape	2530	5.0	12.65 m ³
Roof		1.0	0.00
Hardscape	3543	1.0	3.54 m ³
Total	6073		16.19 m ³

Additional Water Balance Required to be Stored	14.17	m³
---	--------------	----------------------



Water Quality Calculations

48 Grenoble Drive

File No. UD21-110

Date: March 2022

Prepared By: Isaak Chlorotiris, P.E., M.A.Sc.

Reviewed by: John Pasalidis, P.Eng., M.A.Sc.

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Controlled Site	Overall TSS Removal
Rooftop/ Terraces/Green Roof/Walkways/Landscape/Hardscape	Inherent	80%	0.563	98%	78%
Driveway / Landscape Area	SPFD 0608	80%	0.014	2%	2%
Total			0.577	100%	80%

Note: Uncontrolled water does not account in the above calculations



Determining Number of Cartridges for Flow Based Systems

Date

3/3/2022

Black Cells = Calculation

Site Information

Project Name	48 Grenoble Drive
Project Location	Toronto, ON
OGS ID	Stormfilter
Drainage Area, Ad	0.03 ac (0.014 ha)
Impervious Area, Ai	0.03 ac
Pervious Area, Ap	0.00
% Impervious	100%
Runoff Coefficient, Rc	0.90
Treatment storm flow rate, Q_{treat}	0.02 cfs (0.7 L/s)
Peak storm flow rate, Q_{peak}	0.32 cfs (9 L/s)

Filter System

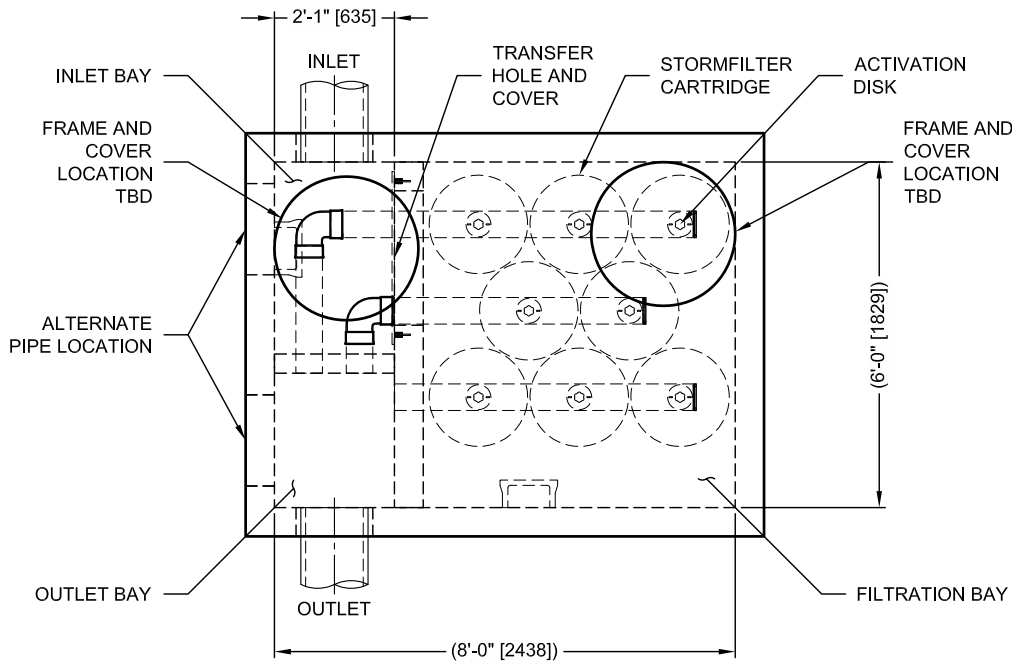
Filtration brand	StormFilter
Cartridge height	12 in
Specific Flow Rate	2.00 gpm/ft ²
Flow rate per cartridge	10.00 gpm

SUMMARY

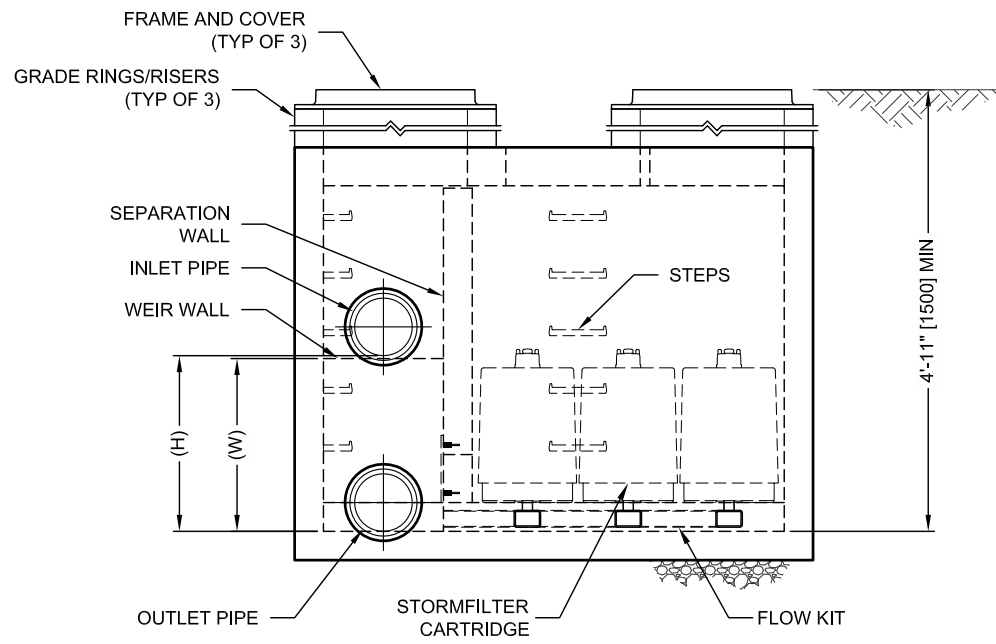
Number of Cartridges	2
Media Type	Perlite

Event Mean Concentration (EMC)	120 mg/L
Annual TSS Removal	80%
Percent Runoff Capture	90%

Recommend SF08608 vault or CIP



PLAN



ELEVATION



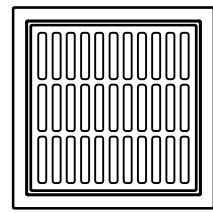
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING
U.S. PATENTS: 5,322,629; 5,524,576; 5,707,527; 5,985,157; 6,027,639; 6,649,048;
RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

STORMFILTER DESIGN NOTES

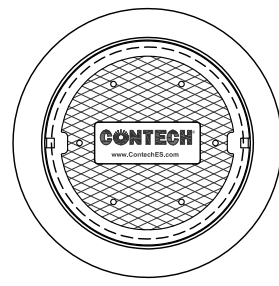
- STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD
- A 6' x 8' [1829 x 2438] PEAK DIVERSION STYLE STORMFILTER IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (8) AND IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR A RIGHT INLET CONFIGURATION
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS NOTED OTHERWISE

CARTRIDGE SIZE (in. [mm])	27 [686]			18 [457]			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H) (ft. [mm])	3.05 [930]			2.3 [701]			1.8 [549]		
HEIGHT OF WEIR (W) (ft. [mm])	3.00 [914]			2.25 [686]			1.75 [533]		
SPECIFIC FLOW RATE (gpm/sf [L/s/m ²])	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]
CARTRIDGE FLOW RATE (gpm [L/s])	22.5 [1.42]	18.79 [1.19]	11.25 [0.71]	15 [0.95]	12.53 [0.79]	7.5 [0.47]	10 [0.63]	8.35 [0.53]	5 [0.32]

* 1.67 gpm/sf [1.13 L/s/m²] SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY



FRAME AND GRATE
(24" SQUARE)
(NOT TO SCALE)



FRAME AND COVER
(30" ROUND)
(NOT TO SCALE)

SITE SPECIFIC
DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (cfs [L/s])			
PEAK FLOW RATE (cfs [L/s])			
RETURN PERIOD OF PEAK FLOW (yrs)			
CARTRIDGE FLOW RATE			
CARTRIDGE SIZE (27, 18, LOW DROP (LD))			
MEDIA TYPE (PERLITE, ZPG, PSORB)			
NUMBER OF CARTRIDGES REQUIRED			
INLET BAY RIM ELEVATION			
FILTER BAY RIM ELEVATION			
PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
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" [178].** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **38 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF [1.36 L/s/m²] (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 [13.39 L/s/m³] 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. ALTERNATE DIMENSIONS ARE IN MILLIMETERS [mm] UNLESS NOTED OTHERWISE.
4. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
5. 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.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 10' [3048] 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

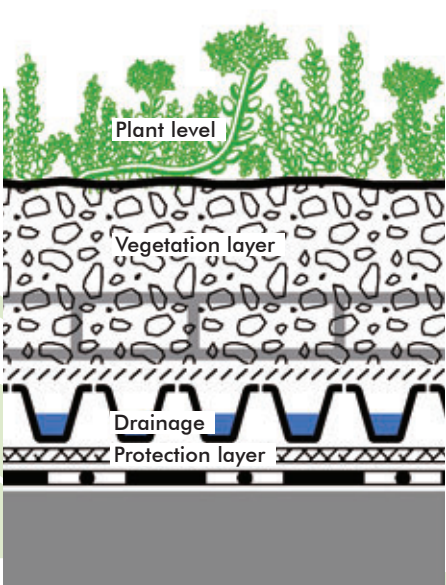
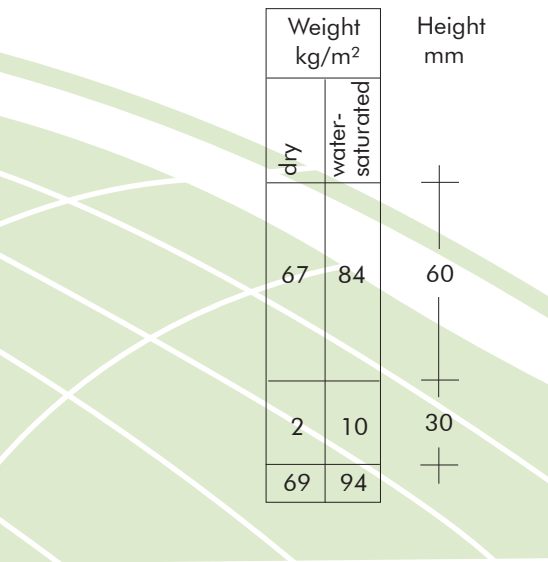
- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
- C. CONTRACTOR TO INSTALL 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 OPENING 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

SFPD0608 (6' x 8')
PEAK DIVERSION STORMFILTER
STANDARD DETAIL



Plant Suggestions "Sedum Carpet"				
Plants in small groups (groups of 3, 5 or 7)				
Botanical Name	Common Name	Height (mm)	Blossom Colour	Blossom Period (month)
<i>Sedum album</i> varieties e.g. ‚Coral Carpet‘ ‚Murale‘	White stonecrop varieties	50–100	white	6–8
		50–100		
		50–100	white pale- rose	6–8 6
<i>Sedum cauticulum</i>	Nettle-leaved goosefoot	100–150	rose	8–9
<i>Sedum floriferum</i> ‚Weihenstep. Gold‘	Gold sedum	100–150	yellow	6–7
<i>Sedum hybridum</i> ‚Immergrünchen‘	Hybrid stonecrop	100–150	yellow	7–8
<i>Sedum reflexum</i>	Crooked yellow stonecrop	200–250	yellow	6–7
<i>Sedum sexangulare</i>	Tasteless yellow stonecrop	50–100	yellow	6–7
<i>Sedum spurium</i> in varieties. e.g. ‚Album Superbum‘ ‚Fuldaglut‘ ‚Roseum Superbum‘ ‚Splendens‘ ‚Variegatum‘	Dragon`s blood			
		100–150	white**	7–8
		100–150		7–8
		100–150		7–8
		100–150		7–8
		100–150		7–8
** infrequent blooming				



Mixture of Sedum Cuttings according to plant suggestions "Sedum Carpet"

System Substrate "Sedum Carpet"

Safety Device "Fallnet®", if required (attention to load requirements)

Filter Sheet SF

Floradrain® FD 25-E

Protection Mat SSM 45

Root Barrier WSF 40, if waterproofing is not root-resistant

Build-up height:	ca. 90 mm
Weight, saturated:	ca. 95 kg/m²
Water retention capacity:	ca. 25 l/m²



System Build-ups with European Technical Assessment. Details on Page 15.



System Build-up with EPD verification. Details on Page 15.

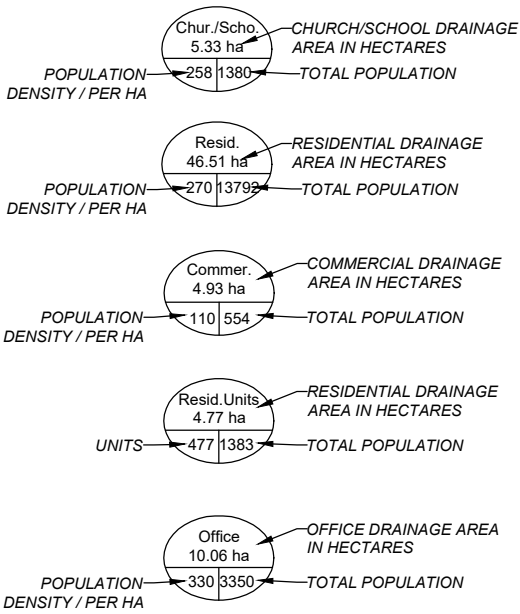
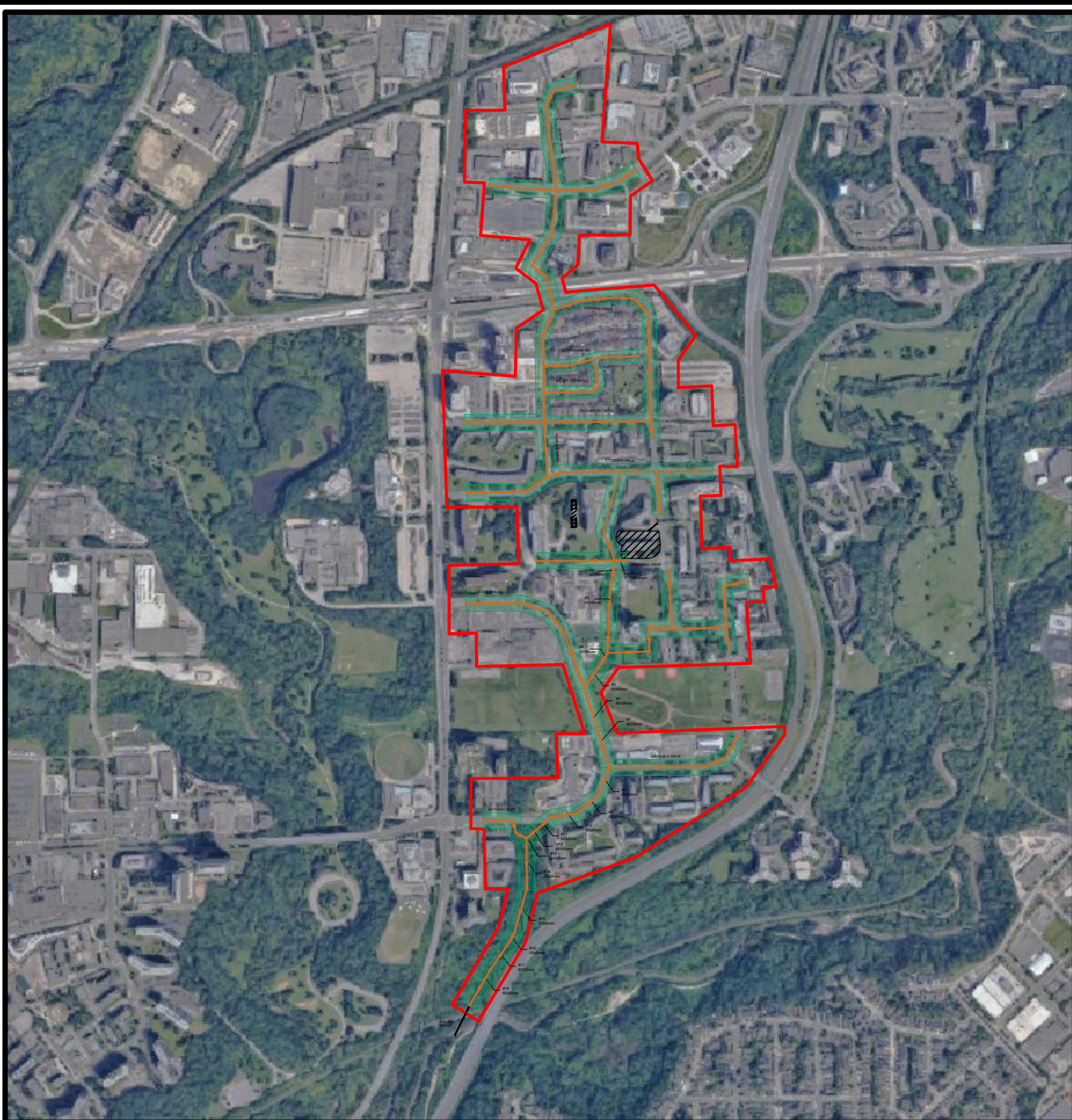
Appendix D

Sanitary Data Analysis



SANITARY SEWER DESIGN SHEET
48 Grenoble Dr
CITY OF TORONTO

LOCATION	RESIDENTIAL								COMMERCIAL		FLOW										SEWER DESIGN						
	SECTION AREA	NUMBER OF UNITS						SECTION POP.	COMM AREA	SECTION POP.	TOTAL ACCUM.	AVERAGE	HARMON	RES. PEAK	AVERAGE	TOTAL	INFILT.	TOTAL	PEAK	TOTAL	PIPE	PIPE	SLOPE	FULL FLOW	% of DESIG		
		Single	Townhouse	Studio	1 Bed Apts.	2 Bed Apts.	3 Bed Apts.																			POP.	RESIDENTIAL FLOW '@' 240 L/c/d
(ha.)	@ 3.5 ppu	@ 2.7	@ 1.4 ppu	@ 1.4 ppu	@ 2.1 ppu	@ 3.1 ppu	(persons)	(ha.)	(persons)	(persons)	(L/s)		(L/s)	(L/s)	(ha.)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/sec)	(%)			
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
Existing Condition Residential Development	0.675	0.00	0.00	0	112	48	32	357	0	0	357	0.99	4.05	4.01	0.00	0.675	0.18	4.01	0.00	4.19							
Proposed Condition Residential Development																											
Podium	0.407	0	0	0	50	59	0	194	0.000	0	194	0.54	4.15	2.24	0.00	0.407	0.11	2.24	0.00	2.35		150	2.0%	21.54	10.9%		
East Building	0.100	0	0	0	275	110	40	740	0.000	0	740	2.06	3.88	7.98	0.00	0.100	0.03	7.98	0.00	8.01		200	2.0%	46.38	17.3%		
West Building	0.100	0	10	0	291	115	53	840	0.000	0	840	2.33	3.85	8.98	0.00	0.100	0.03	8.98	0.00	9.01		200	2.0%	46.38	19.4%		
Residential Flow Rate - 240 litres/capita/day																				19.36							
Commercial/Office Flow Rate - 250 litres/capita/day																				15.17							
Firehouse Flow Rate - 180000 L/ha/day																											
Infiltration - 0.26 L/ha																											
Foundation allowance - 3.0 L/ha																											
Peaking Factor = 1 + [14 / (4 + P ^{0.5})], P=Population in thousands																											
Site Area (ha): 0.607																											
			Prepared by: Isaak Chlorotiris, P.E., M.A.Sc. Reviewed by: John Pasalidis, P.Eng., M.A.Sc. Date: March 2022								Project: 48 Grenoble Dr Project: UD21-110												Sheet 1 OF 7				
											City of Toronto																



DOWNSTREAM COMBINED SEWER SEGMENT INFORMATION

SEWER SEGMENT	TYPE	SIZE (mm)	LENGTH (m)	SLOPE (%)
#1	CIR	450	28.5	1.00
#2	CIR	450	67.7	0.74
#3	CIR	450	90.5	0.79
#4	CIR	525	87.2	0.50
#5	CIR	525	64.0	0.55
#6	CIR	600	102.4	0.30
#7	CIR	600	99.7	0.30
#8	CIR	600	74.1	0.57
#9	CIR	600	67.1	0.60
#10	CIR	600	61.0	0.60
#11	CIR	600	48.2	0.65
#12	CIR	600	20.7	46.50
#13	CIR	600	5.4	2.00
#14	CIR	525	113.4	3.26
#15	CIR	525	104.2	2.00
#16	CIR	525	55.2	3.60
#17	CIR	600	97.5	0.36
#18	CIR	600	97.5	0.36



150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LEGEND

- EXISTING MANHOLE
- NUMBERED SEGMENT AS INDICATED IN "EXTERNAL ANALYSIS" DESIGN SHEET
- DRAINAGE AREA

- EXISTING COMBINED SEWER
- INFILTRATION AREA
- FUTURE DEVELOPMENTS

COMBINED SEWER NETWORK
DRAINAGE AREA PLAN
RESIDENTIAL DEVELOPMENT
48 GRENABLE DRIVEWAY
TORONTO, ONTARIO

DATE: FEBRUARY 2022

PROJECT No: UD21-110

SCALE: N.T.S.

FIGURE No: DAP3



EXTERNAL SANITARY SEWER SEGMENTS
48 Grenoble Dr
DRY WEATHER
City of Toronto

450 L/c/day - new commercial/residential
250 L/c/day - existing institutional/commercial
240 L/c/day - existing residential
M = Peaking Factor (residential) = 1 + 14/(4+P^{0.5}) where P = population in 1000's
q = average daily per capita flow (c.m./d) = unit of peak extraneous flow
Q (p) = peak population flow (L/s) Q(p) = PqM/86.4 (L/s)
Q (I) = peak extraneous flow (L/s) Q(I) = IA (L/s) where I = 0.26 L/s/ha, and A = drainage area - commercial area (ha)
Q (C) = peak flow from commercial area Q(C) = based on Y L/p/day - residential equivalent (see below)
Q (d) = peak design flow (L/s) Q(d) = Q(p) + Q(I) + Q(C)+ Q(F)

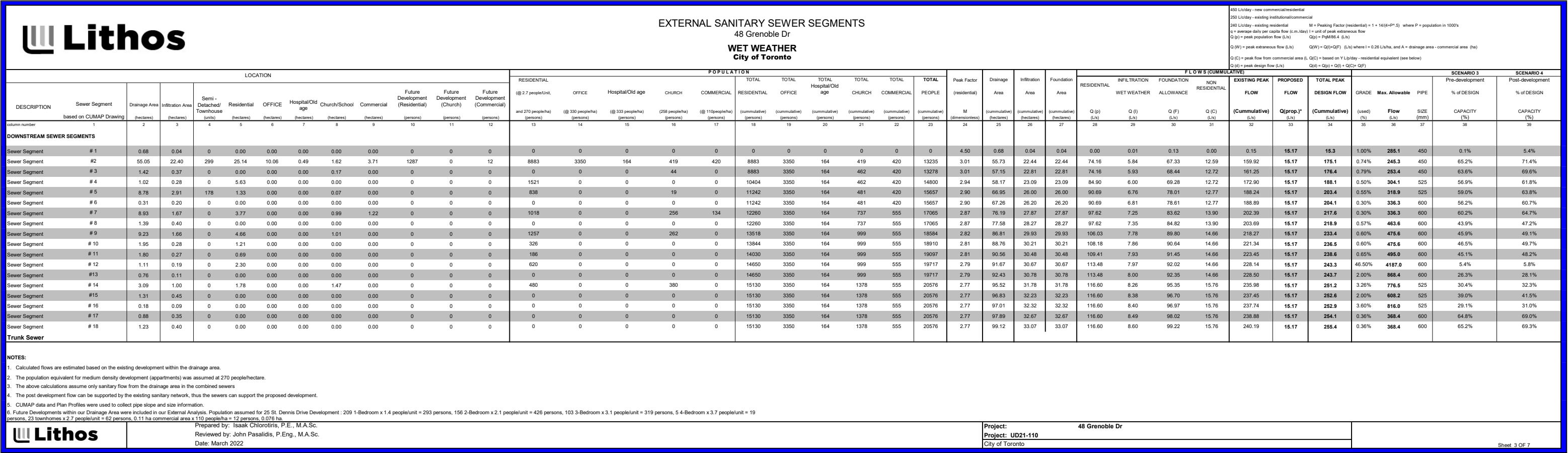
LOCATION												POPULATION										Peak Factor (residential)	Drainage Area	Infiltration Area	F L O W S (CUMULATIVE)					TOTAL PEAK DESIGN FLOW	SCENARIO 1			SCENARIO 2										
DESCRIPTION	Sewer Segment based on CUMAP Drawing	Drainage Area (hectares)	Infiltration Area (hectares)	Semi - Detached/ Townhouse (units)	Residential (hectares)	OFFICE (hectares)	Hospital/Old age (hectares)	Church/School (hectares)	Commercial (hectares)	Future Development (Residential) (persons)	Future Development (Church) (persons)	Future Development (Commercial) (persons)	RESIDENTIAL (@ 2.7 people/Unit, and 270 people/ha) (persons)		OFFICE (@ 330 people/ha) (persons)		Hospital/Old age (@ 333 people/ha) (persons)		CHURCH (258 people/ha) (persons)		COMMERCIAL (@ 110people/ha) (persons)				TOTAL RESIDENTIAL (cumulative) (persons)	TOTAL OFFICE (cumulative) (persons)	TOTAL Hospital/Old age (cumulative) (persons)	TOTAL CHURCH (cumulative) (persons)	TOTAL COMMERCIAL (cumulative) (persons)		TOTAL PEOPLE (cumulative) (persons)	Q (p) (L/s)	Q (I) (L/s)	Q (C) (L/s)	EXISTING PEAK FLOW (Cumulative) (L/s)	PROPOSED FLOW Q(prop.)* (L/s)	GRADE (used) (%)	Max. Allowable Flow (L/s)	PIPE SIZE (mm)	Pre-development		Post-development		
													RESIDENTIAL	INFLTRATION DRY WEATHER	NON RESIDENTIAL	FLOW	FLOW	% of DESIGN	CAPACITY (%)	% of DESIGN	CAPACITY (%)																							
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37							
DOWNSTREAM SEWER SEGMENTS																																												
Sewer Segment	# 1	0.68	0.04	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.50	0.68	0.04	0.00	0.01	0.00	0.02	15.17	15.2	1.00%	285.1	450	0.0%	5.3%							
Sewer Segment	#2	55.05	22.40	299	25.14	10.06	0.49	1.62	3.71	1287	0	12	8883	3350	164	419	420	8883	3350	164	419	420	13235	3.01	55.73	22.44	74.16	5.84	12.59	92.59	15.17	107.8	0.74%	245.3	450	37.8%	43.9%							
Sewer Segment	# 3	1.42	0.37	0	0.00	0.00	0.00	0.17	0.00	0	0	0	8883	3350	164	462	420	8883	3350	164	462	420	13278	3.01	57.15	22.81	74.16	5.93	12.72	92.82	15.17	108.0	0.79%	253.4	450	36.6%	42.6%							
Sewer Segment	# 4	1.02	0.28	0	5.63	0.00	0.00	0.00	0.00	0	0	0	1521	0	0	0	0	10404	3350	164	462	420	14800	2.94	58.17	23.09	84.90	6.00	12.72	103.62	15.17	118.8	0.50%	304.1	525	34.1%	39.1%							
Sewer Segment	# 5	8.78	2.91	178	1.33	0.00	0.00	0.07	0.00	0	0	0	838	0	0	19	0	11242	3350	164	481	420	15657	2.90	66.95	26.00	90.69	6.76	12.77	110.23	15.17	125.4	0.55%	318.9	525	34.6%	39.3%							
Sewer Segment	# 6	0.31	0.20	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	11242	3350	164	481	420	15657	2.90	67.26	26.20	90.69	6.81	12.77	110.28	15.17	125.5	0.30%	336.3	600	32.8%	37.3%							
Sewer Segment	# 7	8.93	1.67	0	3.77	0.00	0.00	0.99	1.22	0	0	0	1018	0	0	256	134	12260	3350	164	737	555	17065	2.87	76.19	27.87	97.62	7.25	13.90	118.77	15.17	133.9	0.30%	336.3	600	35.3%	39.8%							
Sewer Segment	# 8	1.39	0.40	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	12260	3350	164	737	555	17065	2.87	77.58	28.27	97.62	7.35	13.90	118.87	15.17	134.0	0.57%	463.6	600	25.6%	28.9%							
Sewer Segment	# 9	9.23	1.66	0	4.66	0.00	0.00	1.01	0.00	0	0	0	1257	0	0	262	0	13518	3350	164	999	555	18584	2.82	86.81	29.93	106.03	7.78	14.66	128.48	15.17	143.7	0.60%	475.6	600	27.0%	30.2%							
Sewer Segment	# 10	1.95	0.28	0	1.21	0.00	0.00	0.00	0.00	0	0	0	326	0	0	0	0	13844	3350	164	999	555	18910	2.81	88.76	30.21	108.18	7.86	14.66	130.71	15.17	145.9	0.60%	475.6	600	27.5%	30.7%							
Sewer Segment	# 11	1.80	0.27	0	0.69	0.00	0.00	0.00	0.00	0	0	0	186	0	0	0	0	14030	3350	164	999	555	19097	2.81	90.56	30.48	109.41	7.93	14.66	132.00	15.17	147.2	0.65%	495.0	600	26.7%	29.7%							
Sewer Segment	# 12	1.11	0.19	0	2.30	0.00	0.00	0.00	0.00	0	0	0	620	0	0	0	0	14650	3350	164	999	555	19717	2.79	91.67	30.67	113.48	7.97	14.66	136.12	15.17	151.3	46.50%	4187.0	600	3.3%	3.6%							
Sewer Segment	#13	0.76	0.11	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	14650	3350	164	999	555	19717	2.79	92.43	30.78	113.48	8.00	14.66	136.15	15.17	151.3	2.00%	868.4	600	15.7%	17.4%							
Sewer Segment	# 14	3.09	1.00	0	1.78	0.00	0.00	1.47	0.00	0	0	0	480	0	0	380	0	15130	3350	164	1378	555	20576	2.77	95.52	31.78	116.60	8.26	15.76	140.63	15.17	155.8	3.26%	776.5	525	18.1%	20.1%							
Sewer Segment	#15	1.31	0.45	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	15130	3350	164	1378	555	20576	2.77	96.83	32.23	116.60	8.38	15.76	140.75	15.17	155.9	2.00%	608.2	525	23.1%	25.6%							
Sewer Segment	# 16	0.18	0.09	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	15130	3350	164	1378	555	20576	2.77	97.01	32.32	116.60	8.40	15.76	140.77	15.17	155.9	3.60%	816.0	525	17.3%	19.1%							
Sewer Segment	# 17	0.88	0.35	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	15130	3350	164	1378	555	20576	2.77	97.89	32.67	116.60	8.49	15.76	140.86	15.17	156.0	0.36%	368.4	600	38.2%	42.4%							
Sewer Segment	# 18	1.23	0.40	0	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	15130	3350	164	1378	555	20576	2.77	99.12	33.07	116.60	8.60	15.76	140.97	15.17	156.1	0.36%	368.4	600	38.3%	42.4%							
Trunk Sewer																																												

- NOTES:
- Calculated flows are estimated based on the existing development within the drainage area.
 - The population equivalent for medium density development (apartments) was assumed at 270 people/hectare.
 - The above calculations assume only sanitary flow from the drainage area in the combined sewers
 - The post development flow can be supported by the existing sanitary network, thus the sewers can support the proposed development.
 - CUMAP data and Plan Profiles were used to collect pipe slope and size information.
 - Future Developments within our Drainage Area were included in our External Analysis. Population assumed for 25 St. Dennis Drive Development : 209 1-Bedroom x 1.4 people/unit = 293 persons, 156 2-Bedroom x 2.1 people/unit = 426 persons, 103 3-Bedroom x 3.1 people/unit = 319 persons, 5 4-Bedroom x 3.7 people/unit = 19 persons, 23 townhomes x 2.7 people/unit = 62 persons, 0.11 ha commercial area x 110 people/ha = 12 persons, 0.076 ha.



Prepared by: Isak Chlorotinis, P.E., M.A.Sc.
Reviewed by: John Pasalidis, P.Eng., M.A.Sc.
Date: March 2022

Project: 48 Grenoble Dr
Project: UD21-110
City of Toronto





HYDRAULIC GRADE LINE ANALYSIS

DRY WEATHER - PRE-DEVELOPMENT CONDITIONS

48 Grenoble Dr
City of Toronto

SCENARIO 5

DESCRIPTION Sewer Segment based on CUMAP Drawing	EXISTING	GRADE	Max. Allowable	PIPE	Pre-development											
	PEAK FLOW (Cumulative) (L/s)	(used) (%)	Flow (L/s)	SIZE (mm)	% of DESIGN CAPACITY (%)	PIPE LENGTH (m)	GROUND ELEVATION (m)	UPPER INVERT (m)	UPPER OBVERT (m)	LOWER INVERT (m)	LOWER OBVERT (m)	FULL FLOW VELOCITY (m/s)	FULL FLOW CAPACITY (L/s)	U/s HGL (m)	U/s SURCHARGE (m)	U/s FREEBOARD (m)
column number	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DOWNSTREAM SEWER SEGMENTS																
Sewer Segment # 1	0.02	1.00%	285.1	450	0.0%	28.5	124.730	119.320	119.770	118.700	119.150	1.79	285.11	119.320	0.00	5.41
Sewer Segment #2	92.59	0.74%	245.3	450	37.8%	67.7	126.000	118.660	119.110	118.160	118.610	1.54	245.26	118.853	0.00	7.15
Sewer Segment # 3	92.82	0.79%	253.4	450	36.6%	90.5	122.850	118.130	118.580	117.420	117.870	1.59	253.41	118.320	0.00	4.53
Sewer Segment # 4	103.62	0.50%	304.1	525	34.1%	87.2	120.090	117.150	117.675	116.700	117.225	1.40	304.10	117.361	0.00	2.73
Sewer Segment # 5	110.23	0.55%	318.9	525	34.6%	64.0	121.310	116.670	117.195	116.320	116.845	1.47	318.94	116.885	0.00	4.42
Sewer Segment # 6	110.28	0.30%	336.3	600	32.8%	102.4	124.050	116.190	116.790	115.930	116.530	1.19	336.31	116.426	0.00	7.62
Sewer Segment # 7	118.77	0.30%	336.3	600	35.3%	99.7	122.520	115.900	116.500	115.620	116.220	1.19	336.31	116.146	0.00	6.37
Sewer Segment # 8	118.87	0.57%	463.6	600	25.6%	74.1	121.050	115.350	115.950	114.930	115.530	1.64	463.57	115.556	0.00	5.49
Sewer Segment # 9	128.48	0.60%	475.6	600	27.0%	67.1	119.940	114.900	115.500	114.500	115.100	1.68	475.61	115.109	0.00	4.83
Sewer Segment # 10	130.71	0.60%	475.6	600	27.5%	61.0	119.480	114.470	115.070	114.100	114.700	1.68	475.61	114.679	0.00	4.80
Sewer Segment # 11	132.00	0.65%	495.0	600	26.7%	48.2	119.170	114.070	114.670	113.760	114.360	1.75	495.03	114.279	0.00	4.89
Sewer Segment # 12	136.12	46.50%	4187.0	600	3.3%	20.7	116.280	113.150	113.750	103.530	104.130	14.81	4187.00	113.216	0.00	3.06
Sewer Segment #13	136.15	2.00%	868.4	600	15.7%	5.4	106.520	103.070	103.670	102.940	103.540	3.07	868.34	103.248	0.00	3.27
Sewer Segment # 14	140.63	3.26%	776.5	525	18.1%	113.4	105.760	99.710	100.235	96.010	96.535	3.59	776.50	99.859	0.00	5.90
Sewer Segment #15	140.75	2.00%	608.2	525	23.1%	104.2	98.300	94.820	95.345	92.730	93.255	2.81	608.20	94.990	0.00	3.31
Sewer Segment # 16	140.77	3.60%	816.0	525	17.3%	55.2	96.310	92.680	93.205	90.700	91.225	3.77	815.99	92.825	0.00	3.49
Sewer Segment # 17	140.86	0.36%	368.4	600	38.2%	97.5	93.720	88.740	89.340	88.390	88.990	1.30	368.41	88.997	0.00	4.72
Sewer Segment # 18	140.97	0.36%	368.4	600	38.3%	97.5	91.130	88.360	88.960	88.010	88.610	1.30	368.41	88.617	0.00	2.51
Trunk Sewer																

NOTES:

1. Calculated flows are estimated based on the existing development within the drainage area.
2. Flows were retrieved from the External Sanitary Analysis design sheet.
3. Information on the existing Sanitary System, were retrieved from the City.



Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.
Reviewed by: John Pasalidis, P.Eng., M.A.Sc.
Date: March 2022

Project: 48 Grenoble Dr
Project: UD21-110
City of Toronto

Sheet 4 OF 7



HYDRAULIC GRADE LINE ANALYSIS

DRY WEATHER - POST-DEVELOPMENT CONDITIONS

48 Grenoble Dr
City of Toronto

SCENARIO 6

DESCRIPTION Sewer Segment based on CUMAP Drawing	PROPOSED				Post-development												
	PEAK FLOW (Cumulative) (L/s)	GRADE (used) (%)	Max. Allowable Flow (L/s)	PIPE SIZE (mm)	% of DESIGN CAPACITY (%)	PIPE LENGTH (m)	GROUND ELEVATION (m)	UPPER INVERT (m)	UPPER OBVERT (m)	LOWER INVERT (m)	LOWER OBVERT (m)	FULL FLOW VELOCITY (m/s)	FULL FLOW CAPACITY (L/s)	U/s HGL (m)	U/s SURCHARGE (m)	U/s FREEBOARD (m)	
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DOWNSTREAM SEWER SEGMENTS																	
Sewer Segment # 1	15.19	1.00%	285.1	450	5.3%	28.5	124.730	119.320	119.770	118.700	119.150	1.79	285.11	119.388	0.00	5.34	
Sewer Segment #2	107.76	0.74%	245.3	450	43.9%	67.7	126.000	118.660	119.110	118.160	118.610	1.54	245.26	118.868	0.00	7.13	
Sewer Segment # 3	107.99	0.79%	253.4	450	42.6%	90.5	122.850	118.130	118.580	117.420	117.870	1.59	253.41	118.334	0.00	4.52	
Sewer Segment # 4	118.79	0.50%	304.1	525	39.1%	87.2	120.090	117.150	117.675	116.700	117.225	1.40	304.10	117.378	0.00	2.71	
Sewer Segment # 5	125.40	0.55%	318.9	525	39.3%	64.0	121.310	116.670	117.195	116.320	116.845	1.47	318.94	116.898	0.00	4.41	
Sewer Segment # 6	125.45	0.30%	336.3	600	37.3%	102.4	124.050	116.190	116.790	115.930	116.530	1.19	336.31	116.443	0.00	7.61	
Sewer Segment # 7	133.94	0.30%	336.3	600	39.8%	99.7	122.520	115.900	116.500	115.620	116.220	1.19	336.31	116.164	0.00	6.36	
Sewer Segment # 8	134.04	0.57%	463.6	600	28.9%	74.1	121.050	115.350	115.950	114.930	115.530	1.64	463.57	115.569	0.00	5.48	
Sewer Segment # 9	143.65	0.60%	475.6	600	30.2%	67.1	119.940	114.900	115.500	114.500	115.100	1.68	475.61	115.125	0.00	4.82	
Sewer Segment # 10	145.88	0.60%	475.6	600	30.7%	61.0	119.480	114.470	115.070	114.100	114.700	1.68	475.61	114.699	0.00	4.78	
Sewer Segment # 11	147.17	0.65%	495.0	600	29.7%	48.2	119.170	114.070	114.670	113.760	114.360	1.75	495.03	114.295	0.00	4.88	
Sewer Segment # 12	151.29	46.50%	4187.0	600	3.6%	20.7	116.280	113.150	113.750	103.530	104.130	14.81	4187.00	113.228	0.00	3.05	
Sewer Segment #13	151.32	2.00%	868.4	600	17.4%	5.4	106.520	103.070	103.670	102.940	103.540	3.07	868.34	103.253	0.00	3.27	
Sewer Segment # 14	155.80	3.26%	776.5	525	20.1%	113.4	105.760	99.710	100.235	96.010	96.535	3.59	776.50	99.868	0.00	5.89	
Sewer Segment #15	155.92	2.00%	608.2	525	25.6%	104.2	98.300	94.820	95.345	92.730	93.255	2.81	608.20	95.001	0.00	3.30	
Sewer Segment # 16	155.94	3.60%	816.0	525	19.1%	55.2	96.310	92.680	93.205	90.700	91.225	3.77	815.99	92.833	0.00	3.48	
Sewer Segment # 17	156.03	0.36%	368.4	600	42.4%	97.5	93.720	88.740	89.340	88.390	88.990	1.30	368.41	89.009	0.00	4.71	
Sewer Segment # 18	156.14	0.36%	368.4	600	42.4%	97.5	91.130	88.360	88.960	88.010	88.610	1.30	368.41	88.629	0.00	2.50	
Trunk Sewer																	

NOTES:

1. Calculated flows are estimated based on the existing development within the drainage area.
2. Flows were retrieved from the External Sanitary Analysis design sheet.
3. Information on the existing Sanitary System, were retrieved from the City.



Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.
Reviewed by: John Pasalidis, P.Eng., M.A.Sc.
Date: March 2022

Project: 48 Grenoble Dr
Project: UD21-110
City of Toronto

Sheet 5 OF 7



HYDRAULIC GRADE LINE ANALYSIS

WET WEATHER - PRE-DEVELOPMENT CONDITIONS

48 Grenoble Dr
City of Toronto

SCENARIO 7

DESCRIPTION Sewer Segment based on CUMAP Drawing	EXISTING PEAK FLOW (Cumulative) (L/s)	GRADE (used) (%)	Max. Allowable Flow (L/s)	PIPE SIZE (mm)	Pre-development % of DESIGN CAPACITY (%)	PIPE LENGTH (m)	GROUND ELEVATION (m)	UPPER INVERT (m)	UPPER OBVERT (m)	LOWER INVERT (m)	LOWER OBVERT (m)	FULL FLOW VELOCITY (m/s)	FULL FLOW CAPACITY (L/s)	U/s HGL (m)	U/s SURCHARGE (m)	U/s FREEBOARD (m)
column number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DOWNSTREAM SEWER SEGMENTS																
Sewer Segment # 1	0.15	1.00%	285.1	450	0.1%	28.5	124.730	119.320	119.770	118.700	119.150	1.79	285.11	119.320	0.00	5.41
Sewer Segment #2	159.92	0.74%	245.3	450	65.2%	67.7	126.000	118.660	119.110	118.160	118.610	1.54	245.26	118.921	0.00	7.08
Sewer Segment # 3	161.25	0.79%	253.4	450	63.6%	90.5	122.850	118.130	118.580	117.420	117.870	1.59	253.41	118.389	0.00	4.46
Sewer Segment # 4	172.90	0.50%	304.1	525	56.9%	87.2	120.090	117.150	117.675	116.700	117.225	1.40	304.10	117.432	0.00	2.66
Sewer Segment # 5	188.24	0.55%	318.9	525	59.0%	64.0	121.310	116.670	117.195	116.320	116.845	1.47	318.94	116.958	0.00	4.35
Sewer Segment # 6	188.89	0.30%	336.3	600	56.2%	102.4	124.050	116.190	116.790	115.930	116.530	1.19	336.31	116.510	0.00	7.54
Sewer Segment # 7	202.39	0.30%	336.3	600	60.2%	99.7	122.520	115.900	116.500	115.620	116.220	1.19	336.31	116.233	0.00	6.29
Sewer Segment # 8	203.69	0.57%	463.6	600	43.9%	74.1	121.050	115.350	115.950	114.930	115.530	1.64	463.57	115.627	0.00	5.42
Sewer Segment # 9	218.27	0.60%	475.6	600	45.9%	67.1	119.940	114.900	115.500	114.500	115.100	1.68	475.61	115.184	0.00	4.76
Sewer Segment # 10	221.34	0.60%	475.6	600	46.5%	61.0	119.480	114.470	115.070	114.100	114.700	1.68	475.61	114.757	0.00	4.72
Sewer Segment # 11	223.45	0.65%	495.0	600	45.1%	48.2	119.170	114.070	114.670	113.760	114.360	1.75	495.03	114.352	0.00	4.82
Sewer Segment # 12	228.14	46.50%	4187.0	600	5.4%	20.7	116.280	113.150	113.750	103.530	104.130	14.81	4187.00	113.240	0.00	3.04
Sewer Segment #13	228.50	2.00%	868.4	600	26.3%	5.4	106.520	103.070	103.670	102.940	103.540	3.07	868.34	103.298	0.00	3.22
Sewer Segment # 14	235.98	3.26%	776.5	525	30.4%	113.4	105.760	99.710	100.235	96.010	96.535	3.59	776.50	99.907	0.00	5.85
Sewer Segment #15	237.45	2.00%	608.2	525	39.0%	104.2	98.300	94.820	95.345	92.730	93.255	2.81	608.20	95.048	0.00	3.25
Sewer Segment # 16	237.74	3.60%	816.0	525	29.1%	55.2	96.310	92.680	93.205	90.700	91.225	3.77	815.99	92.872	0.00	3.44
Sewer Segment # 17	238.88	0.36%	368.4	600	64.8%	97.5	93.720	88.740	89.340	88.390	88.990	1.30	368.41	89.088	0.00	4.63
Sewer Segment # 18	240.19	0.36%	368.4	600	65.2%	97.5	91.130	88.360	88.960	88.010	88.610	1.30	368.41	88.708	0.00	2.42
Trunk Sewer																

NOTES:

1. Calculated flows are estimated based on the existing development within the drainage area.
2. Flows were retrieved from the External Sanitary Analysis design sheet.
3. Information on the existing Sanitary System, were retrieved from the City.



Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.
Reviewed by: John Pasalidis, P.Eng., M.A.Sc.
Date: March 2022

Project: 48 Grenoble Dr
Project: UD21-110
City of Toronto

Sheet 6 OF 7



HYDRAULIC GRADE LINE ANALYSIS

WET WEATHER - POST-DEVELOPMENT CONDITIONS

48 Grenoble Dr
City of Toronto

SCENARIO 8

DESCRIPTION Sewer Segment based on CUMAP Drawing	PROPOSED				Post-development												
	PEAK FLOW	GRADE	Max. Allowable	PIPE	% of DESIGN												
	(Cumulative) (L/s)	(used) (%)	Flow (L/s)	SIZE (mm)	CAPACITY (%)	PIPE LENGTH (m)	GROUND ELEVATION (m)	UPPER INVERT (m)	UPPER OBVERT (m)	LOWER INVERT (m)	LOWER OBVERT (m)	FULL FLOW VELOCITY (m/s)	FULL FLOW CAPACITY (L/s)	U/s HGL (m)	U/s SURCHARGE (m)	U/s FREEBOARD (m)	
column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DOWNSTREAM SEWER SEGMENTS																	
	Sewer Segment # 1	15.32	1.00%	285.1	450	5.4%	28.5	124.730	119.32	119.77	118.70	119.15	1.79	285.11	119.388	0.00	5.34
	Sewer Segment #2	175.09	0.74%	245.3	450	71.4%	67.7	126.000	118.66	119.11	118.16	118.61	1.54	245.26	118.937	0.00	7.06
	Sewer Segment # 3	176.42	0.79%	253.4	450	69.6%	90.5	122.850	118.13	118.58	117.42	117.87	1.59	253.41	118.405	0.00	4.45
	Sewer Segment # 4	188.07	0.50%	304.1	525	61.8%	87.2	120.090	117.15	117.68	116.70	117.23	1.40	304.10	117.448	0.00	2.64
	Sewer Segment # 5	203.41	0.55%	318.9	525	63.8%	64.0	121.310	116.67	117.20	116.32	116.85	1.47	318.94	116.972	0.00	4.34
	Sewer Segment # 6	204.06	0.30%	336.3	600	60.7%	102.4	124.050	116.19	116.79	115.93	116.53	1.19	336.31	116.527	0.00	7.52
	Sewer Segment # 7	217.56	0.30%	336.3	600	64.7%	99.7	122.520	115.90	116.50	115.62	116.22	1.19	336.31	116.248	0.00	6.27
	Sewer Segment # 8	218.86	0.57%	463.6	600	47.2%	74.1	121.050	115.35	115.95	114.93	115.53	1.64	463.57	115.637	0.00	5.41
	Sewer Segment # 9	233.44	0.60%	475.6	600	49.1%	67.1	119.940	114.90	115.50	114.50	115.10	1.68	475.61	115.195	0.00	4.74
	Sewer Segment # 10	236.51	0.60%	475.6	600	49.7%	61.0	119.480	114.47	115.07	114.10	114.70	1.68	475.61	114.770	0.00	4.71
	Sewer Segment # 11	238.62	0.65%	495.0	600	48.2%	48.2	119.170	114.07	114.67	113.76	114.36	1.75	495.03	114.360	0.00	4.81
	Sewer Segment # 12	243.31	46.50%	4187.0	600	5.8%	20.7	116.280	113.15	113.75	103.53	104.13	14.81	4187.00	113.247	0.00	3.03
	Sewer Segment #13	243.67	2.00%	868.4	600	28.1%	5.4	106.520	103.07	103.67	102.94	103.54	3.07	868.34	103.306	0.00	3.21
	Sewer Segment # 14	251.15	3.26%	776.5	525	32.3%	113.4	105.760	99.71	100.24	96.01	96.54	3.59	776.50	99.913	0.00	5.85
	Sewer Segment #15	252.62	2.00%	608.2	525	41.5%	104.2	98.300	94.82	95.35	92.73	93.26	2.81	608.20	95.055	0.00	3.24
	Sewer Segment # 16	252.91	3.60%	816.0	525	31.0%	55.2	96.310	92.68	93.21	90.70	91.23	3.77	815.99	92.880	0.00	3.43
	Sewer Segment # 17	254.05	0.36%	368.4	600	69.0%	97.5	93.720	88.74	89.34	88.39	88.99	1.30	368.41	89.104	0.00	4.62
	Sewer Segment # 18	255.36	0.36%	368.4	600	69.3%	97.5	91.130	88.36	88.96	88.01	88.61	1.30	368.41	88.724	0.00	2.41
Trunk Sewer																	

NOTES:

1. Calculated flows are estimated based on the existing development within the drainage area.
2. Flows were retrieved from the External Sanitary Analysis design sheet.
3. Information on the existing Sanitary System, were retrieved from the City.



Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.
Reviewed by: John Pasalidis, P.Eng., M.A.Sc.
Date: March 2022

Project: 48 Grenoble Dr
Project: UD21-110
City of Toronto

Sheet 7 OF 7

Appendix E

Water Data Analysis



WATER DEMAND

48 Grenoble Dr

Project No: UD21-110

Date: March 2022

Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.

Reviewed by: John Pasalidis, P.Eng., M.A.Sc.

Fire Flow Calculation

East Tower

- 1 $F = 220 C (A)^{1/2}$
Where F= Fire flow in Lpm
C= construction type coefficient
= 1.0 ordinary construction
A = total floor area in sq.m. excluding basements, includes garage*

		Area Applied
Level 2=	584.0 m ²	100%
Level 1=	584.0 m ²	25%
Level 3=	584.0 m ²	25%
=	876 sq.m.	

Note: The levels indicated, reference the floors with the largest areas (refer to building stats)

$$F = 6,511 \text{ L/min}$$

$$F = 7,000 \text{ L/min} \quad \text{Round to nearest 1000 l/min}$$

- 2 Occupancy Reduction
15% reduction for limited combustible occupancy
F = 5950 L/min

- 3 Sprinkler Reduction
30% Reduction for NFPA Sprinkler System
F = 4165 l/min

- 4 Separation Charge
20% North 3.1m to 10m
0% East > 45m
0% South > 45m
0% West > 45m
20% Total Separation Charge, 1190 L/min

F = 5,355 L/min
89.25 L/s
F = 1415 US GPM

Domestic Flow Calculations

Population High Rise = 740 Persons from Site Statistics
Average Day Demand = 190 L/cap/day 1 US Gallon=3.785 L
Residential Flow= 1.63 L/s

Retail/Commercial Area= 0 m2 from Site Statistics
Average Day Demand= 2.8 L/m2/day 1 US GPM=15.852L/s
Retail/Commercial Flow= 0.00 L/s

Total Flow= 1.63 L/s
= 25.36 US GPM

Max. Daily Demand Peaking Factor = 1.5
Max. Daily Demand = 2.44 L/s = 39 US GPM

or
Max. Hourly Demand Peaking Factor = 2.25
Max. Hourly Demand = 3.66 L/s = 58 US GPM

Max Daily Demand = 2.44 L/s
Fire Flow = 89.25 L/s

Required 'Design' Flow = 91.69 L/s
1453 US GPM

Note: Required 'Design' Flow is the maximum of either:
1) Fire Flow + Maximum Daily Demand
2) Maximum Hourly Demand



WATER DEMAND

48 Grenoble Dr

Project No: UD21-110

Date: March 2022

Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.

Reviewed by: John Pasalidis, P.Eng., M.A.Sc.

Fire Flow Calculation

Podium

- 1 $F = 220 C (A)^{1/2}$
Where F= Fire flow in Lpm
C= construction type coefficient
= 1.0 ordinary construction
A = total floor area in sq.m. excluding basements, includes garage*

		Area Applied
Level 4=	3092.0 m ²	100%
Level 3=	3092.0 m ²	25%
Level 5=	3092.0 m ²	25%
=	4,638 sq.m.	

Note: The levels indicated, reference the floors with the largest areas (refer to building stats)

$$F = 14,983 \text{ L/min}$$

$$F = 15,000 \text{ L/min} \quad \text{Round to nearest 1000 l/min}$$

- 2 Occupancy Reduction
15% reduction for limited combustible occupancy
F = 12750 L/min

- 3 Sprinkler Reduction
30% Reduction for NFPA Sprinkler System
F = 8925 l/min

- 4 Separation Charge
20% North 3.1m to 10m
0% East > 45m
0% South > 45m
0% West > 45m
20% Total Separation Charge, 2550 L/min
FALSE The total percentage shall be the sum of the percentage for all sides, but shall not exceed 75%
- $$F = 11,475 \text{ L/min}$$
- $$191.25 \text{ L/s}$$
- $$F = 3032 \text{ US GPM}$$

Domestic Flow Calculations

Population High Rise =	194 Persons	from Site Statistics
Average Day Demand =	190 L/cap/day	1 US Gallon=3.785 L
Residential Flow=	0.43 L/s	

Retail/Commercial Area=	0 m ²	from Site Statistics
Average Day Demand=	2.8 L/m ² /day	1 US GPM=15.852L/s
Retail/Commercial Flow=	0.00 L/s	
Total Flow=	0.43 L/s	
=	6.65 US GPM	

- Max. Daily Demand Peaking Factor = 1.5
Max. Daily Demand = 0.64 L/s = 10 US GPM
- or
- Max. Hourly Demand Peaking Factor = 2.25
Max. Hourly Demand = 0.96 L/s = 15 US GPM

$$\text{Max Daily Demand} = 0.64 \text{ L/s}$$

$$\text{Fire Flow} = 191.25 \text{ L/s}$$

$$\text{Required 'Design' Flow} = 191.89 \text{ L/s}$$

$$3042 \text{ US GPM}$$

Note: Required 'Design' Flow is the maximum of either:

- 1) Fire Flow + Maximum Daily Demand
- 2) Maximum Hourly Demand



WATER DEMAND

48 Grenoble Dr

Project No: UD21-110

Date: March 2022

Prepared by: Isaak Chlorotiris, P.E., M.A.Sc.

Reviewed by: John Pasalidis, P.Eng., M.A.Sc.

Fire Flow Calculation

West Tower

- 1 $F = 220 C (A)^{1/2}$
 Where F= Fire flow in Lpm
 C= construction type coefficient
 = 1.0 ordinary construction
 A = total floor area in sq.m. excluding basements, includes garage*

		Area Applied
Level 2=	949.0 m ²	100%
Level 1=	949.0 m ²	25%
Level 3=	949.0 m ²	25%
=	1,424 sq.m.	

Note: The levels indicated, reference the floors with the largest areas (refer to building stats)

$$F = 8,300 \text{ L/min}$$

$$F = 8,000 \text{ L/min} \quad \text{Round to nearest 1000 l/min}$$

- 2 Occupancy Reduction
 15% reduction for limited combustible occupancy
 $F = 6800 \text{ L/min}$

- 3 Sprinkler Reduction
 30% Reduction for NFPA Sprinkler System
 $F = 4760 \text{ l/min}$

- 4 Separation Charge
 20% North 3.1m to 10m
 0% East > 45m
 0% South > 45m
 0% West > 45m
 20% Total Separation Charge, 1360 L/min
 FALSE The total percentage shall be the sum of the percentage for all sides, but shall not exceed 75%
- $$F = 6,120 \text{ L/min}$$
- $$102.00 \text{ L/s}$$
- $$F = 1617 \text{ US GPM}$$

Domestic Flow Calculations

Population High Rise =	809 Persons	from Site Statistics	
Average Day Demand =	190 L/cap/day		1 US Gallon=3.785 L
Residential Flow=	1.78 L/s		

Retail/Commercial Area=	0 m2	from Site Statistics	
Average Day Demand=	2.8 L/m2/day		1 US GPM=15.852L/s
Retail/Commercial Flow=	0.00 L/s		

$$\text{Total Flow} = 1.78 \text{ L/s}$$

$$= 27.72 \text{ US GPM}$$

- Max. Daily Demand Peaking Factor = 1.5
 Max. Daily Demand = 2.67 L/s = 42 US GPM
- or
- Max. Hourly Demand Peaking Factor = 2.25
 Max. Hourly Demand = 4.00 L/s = 63 US GPM

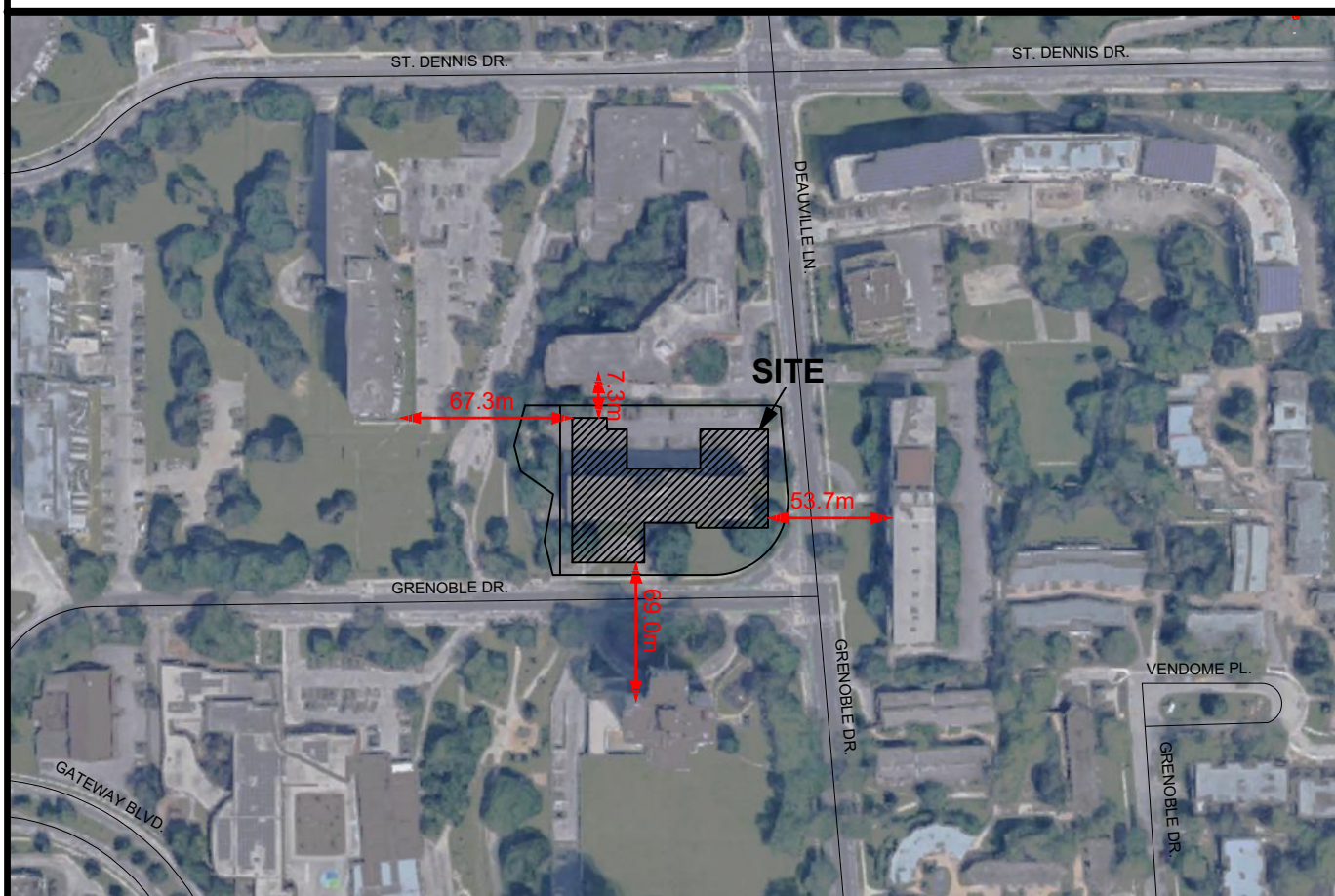
$$\text{Max Daily Demand} = 2.67 \text{ L/s}$$

$$\text{Fire Flow} = 102.00 \text{ L/s}$$

$$\text{Required 'Design' Flow} = 104.67 \text{ L/s}$$

$$1659 \text{ US GPM}$$

Note: Required 'Design' Flow is the maximum of either:
 1) Fire Flow + Maximum Daily Demand
 2) Maximum Hourly Demand



SEPARATION DISTANCES

RESIDENTIAL USE DEVELOPMENT
48 GRENABLE DRIVE
TORONTO, ONTARIO

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

DATE: MARCH 2022

SCALE: N.T.S.

PROJECT No: PUD21-110

FIGURE No: FIG 4