

## Functional Servicing and Stormwater Management Report



Project: 2077-2105 Royal Windsor Dr, Mississauga  
CRW 1 LP & CRW 2 LP

**PREPARED BY:**



**Savaoglou Dimitra, P.E., M.A.Sc.**  
Project Designer

**REVIEWED BY:**



**Gina Liaropoulou, P.E., M.A.Sc.**  
Project Engineer

**AUTHORIZED FOR ISSUE BY:**

**LITHOS GROUP INC.**



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

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## Executive Summary

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Lithos Group Inc. (Lithos) was retained by CRW 1 LP & CRW 2 LP (the “Owner”) to prepare a Functional Servicing and Stormwater Management (FSR-SWM) Report in support of an Official Plan Amendment and a Zoning By-Law Amendment for a proposed mixed-use development at 2077-2105 Royal Windsor Dr (L5J 1K5), in the City of Mississauga (the “City”). The following summarizes our conclusions:

### Storm Drainage

The proposed development will be constructed in two phases. More specifically, Phase I will consist of a Podium and two high-rise Towers (Tower 1 and Tower 2), facilitated by five (5) underground parking levels, and Phase II of a Podium and two high-rise Towers (Tower 3 and Tower 4), facilitated by three (3) underground parking levels.

For Towers 1 and 2 along with their Podium (Phase I), stormwater flow will be connected to the proposed 300 mm storm sewer running along the proposed private road, flowing south, via a 250 mm storm sewer lateral connection, finally reaching the existing 1950mm storm sewer along Royal Windsor Drive. For Towers 3 and 4 along with their Podium (Phase II), stormwater flow will be discharged into the proposed 300 mm storm sewer running along the proposed private road, flowing west, via a 250 mm storm sewer lateral connection, eventually discharging to the existing 1950mm storm sewer along Royal Windsor Drive.

The post-development 100-year storm flow has been designed to match the two (2) year pre-development storm flow. In order to attain the target flows and meet the City’s guidelines, quantity controls will be utilized and up to approximately 334.3m<sup>3</sup> of on site storage will be required for Phase I. Similarly, 405.0m<sup>3</sup> are required to be retained on site for Phase II. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection, as specified by the Ministry of the Environment, Conservation and Parks (MECP). Quality control will be provided by the building’s rooftop/terraces for a total suspended solids (TSS) removal of 80%, as required by MECP. A more detailed Stormwater Management Report will be prepared at the Site Plan Application stage.

### Sanitary Sewers

Two (2) separate connections will be provided for the proposed mixed-use development: one for Phase I and one for Phase II. Phase’s I building will be connected to the proposed 300 mm sanitary sewer running along the proposed private road, flowing south, via a 200 mm sanitary sewer lateral connection. Phase’s II will be connected to the proposed 300 mm sanitary sewer running along the proposed private road, flowing west, via a 200 mm sanitary sewer lateral connection. The private sanitary network will eventually be discharging into the existing 400mm sanitary sewer running along Royal Windsor Drive. The additional net discharge flow from the proposed development, is anticipated at approximately 40.36 L/s.

### Water Supply

Water supply for the proposed development will be provided from two (2) separate water connections, one for each Phase. More specifically, Phases I and II will each be serviced by the proposed 150 mm diameter watermain, running along the proposed private road, connected to the existing 150mm water line located on the south west corner of the site prior reaching Royal Windsor Drive. It is anticipated that a total design flow of 133.45 L/s and 148.45 L/s will be required to support Phase I & II respectively. The results of the hydrant flow test, prepared by Lithos Group, dated September 28, 2022 reveal that the existing water infrastructure can support the proposed development.

## Site Grading

The proposed grades will match current drainage patterns and will improve the existing drainage conditions to meet the City's/Regional requirements. Grades will be maintained along the property line wherever feasible and overland flow will be directed towards the adjacent right of ways (ROW).

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## 1.0 Introduction

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Lithos Group Inc. (Lithos) was retained by CRW 1 LP & CRW 2 LP (the “Owner”) to prepare a Functional Servicing and Stormwater Management Report in support of an Official Plan Amendment and a Zoning By-Law Amendment for a proposed mixed-use development at 2077-2105 Royal Windsor Dr (L5J 1K5), in the City of Mississauga (the “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 an outline of the storm drainage pattern.

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 drawing of Southdown Road, drawing No.40156-D, dated April 04, 2007;
- Plan and Profile drawing of Southdown Road, drawing No C-9129, dated April 10, 1968;
- Plan and Profile drawing of Highway 122, drawing No C-9130, dated April 09, 1968;
- Plan and Profile drawing of Highway 122, drawing No C-9131, dated April 09, 1968;
- Plan and Profile drawing of Southdown and GO Station, drawing No 5015-05, dated November, 1989;
- Site Plan and Site Statistics prepared by Gensler Architects, dated December 13, 2022; and,
- Topographical Survey prepared by J.D. Barnes Limited, dated April 14, 2020.

## 2.0 Site Description

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The existing site is approximately 1.515 hectares. It is currently occupied by four (4) single-storey commercial buildings. The site area is bound by Royal Windsor Drive to the southeast, Southdown Road to the north-east, two single-storey commercial developments to the southwest and a parking to the north-west. Refer to [Figures 1 and 2](#) following this report and site photographs in [Appendix A](#) as well as to the topographic survey in [Appendix B](#).

## 3.0 Site Proposal

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The proposed development will be constructed in two (2) Phases, as follows:

- Phase I: A mixed-used development will be proposed with a total area of 0.685 hectares, consisting of one (1) eight-storey podium, with residential and retail area and two high-rise Towers. More specifically, Tower 1 will include 29-storeys of residential use, while Tower 2 will include 27-storeys of residential use. Phase I will be facilitated by five (5) underground parking levels and will be comprised of 650 units as well as 987.0 m<sup>2</sup> of retail space.
- Phase II: A mixed-use development will be proposed with a total area of 0.830 hectares, consisting of one (1) eight-storey podium, with residential and retail area and two high-rise Towers. More specifically, Tower 3 will include 25-storeys of residential use, while Tower 4 will include 23-storeys of residential use. Phase II will be facilitated by three (3) underground parking levels and will be comprised of 587 units as well as 990.0 m<sup>2</sup> of retail space.

The total development will approximately include 89,276 m<sup>2</sup> of Gross Floor Area (GFA). Please refer to [Appendix B](#) for the proposed site plan and building site statistic.



## 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:

- City of Mississauga Development Requirements Manual, revised November 2020;
- Region of Peel Watermain Design Criteria, revised June 2010;
- Region of Peel Sanitary Sewer Design Criteria, revised March 2017;
- Region of Peel Stormwater Design Criteria and Procedural Manual (Version 2.1) June 2019;
- Ministry of Environment: Guidelines for the Design of Sanitary Sewage Works – 2008;
- Ministry of Environment: Design Guidelines for Drinking Water Systems – 2008;
- Ministry of Environment: Stormwater Management Planning and Design Manual – 2003; and
- Ontario Building Code 2012 (O.B.C.)

### 4.2. Methodology: Stormwater Drainage and Management

This report provides an overview of the pre and post-development conditions and comments on opportunities to reduce peak flows. A detailed Stormwater Management report will be prepared at the Site Plan Application stage.

The proposed development will be designed to meet the Region’s and the standards of the Province of Ontario as set out in the Ministry of the Environment, Conservation and Park (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 should be controlled to the 2-year target flow;
- A safe overland flow route will be provided for all flows in excess of the 100-year storm event; and,
- A specified rainfall depth of 5mm is to be retained on-site as required by the City’s Guidelines.

### 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 flow discharge 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	302.8	Litres / capita / day	1 Bedroom Unit = 2.0 ppu 2 Bedroom Unit = 3.0 ppu 3 Bedroom Unit = 4.0 ppu
Commercial	50		50 persons/ha

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 outlined in **Table 4.2**.

**Table 4-2 – Water Usage**

Usage	Water Demand	Units
Residential	280	Litres / capita / day
Commercial / Retail	2.8	Litres / m <sup>2</sup> / day

Pressure and flow treating have been conducted on the existing hydrants located near the site to obtain existing flows residual and static pressure.

#### 5.0 Stormwater Management and Drainage

The existing site is approximately 1.515 hectares and is currently occupied by four (4) single-storey commercial buildings. According to available records, there is one (1) existing storm sewer abutting the subject property. More specifically there is:

- A 1950 mm diameter storm sewer along Royal Windsor Drive flowing east.

#### 5.1. Existing Conditions

The existing site is primarily covered by buildings and hardscaped areas, thus, there is no significant infiltration onsite. Although the existing run-off coefficient is estimated at 0.85, the City’s guidelines requires target flow calculations based on a run-off coefficient of 0.50. The input parameters are summarized in **Table 5.1** below, are illustrated in the pre-development drainage area plan in **Figure DAP-1** in **Appendix C**.

**Table 5-1 – Pre-development Input Parameters**

Catchment	Drainage Area (ha)	Actual “C”	Design “C”	Tc (min.)
A1 Pre (Phase I)	0.685	0.83	0.50	15
A2 Pre (Phase II)	0.830	0.85	0.50	15

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	10-year	25-year	50-year	100-year
A1 Pre (Phase I)	65.7	86.5	106.0	125.6	141.8	158.8
A2 Pre (Phase II)	79.6	104.8	128.4	152.1	171.9	192.4

As shown in **Table 5.2**, the post-development flows for Phase I & II will need to be controlled to the target flow of 65.7L/s and 79.6 L/s, respectively.

#### 5.2. Stormwater Management

In order to meet the City’s Storm Design requirements, the post development flow rate is to be controlled to the pre development two (2)-year target flow established in **Section 5.1**. Overland flow from the site will be directed towards the adjacent rights-of-way.

The site consists of two (2) internal drainage areas:

1. A1 Post – Storm runoff from Phase I;
2. A2 Post – Storm runoff from Phase II.

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"	"C <sub>100</sub> "	Tc (min.)
A1 Post (Phase I)	0.685	0.90	1.13	15
A2 Post (Phase II)	0.830	0.90	1.13	15

### 5.2.1. Water Balance

The City's Guidelines require a 5mm of onsite runoff from any rainfall event to be retained over the entirety of the site. A 5mm of rainfall over the entire site equates to a required water balance volume of 75.75 m<sup>3</sup>. In order to achieve this, the following low impact development (LID) techniques may be implemented.

- Rainwater capture in storage tanks to be reused for irrigation purposes;
- Potential swales and infiltration galleries; and,
- Green Roof and Planters.

Detailed calculation will be provided during the detailed design stage at Site Plan Application.

### 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, 10, 25, 50 and 100-year storm events are provided in **Table 5-4** below. The detailed post-development quantity control calculations are provided in **Appendix C**.

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

Drainage Area	Storm Event	Target Flow (L/s)	Minimum Required Storage Volume (m <sup>3</sup> )
A1 Post (Controlled)	2-year	65.7	47.3
	5-year		81.2
	10-year		117.4
	25-year		188.3
	50-year		263.1
	100-year		334.3
A2 Post (Controlled)	2-year	79.6	57.3
	5-year		98.4
	10-year		142.2
	25-year		228.1
	50-year		318.8
	100-year		405.0

As shown in **Table 5-4** above, in order to control post-development flows to 2-year pre-development conditions, a target flow of 65.7 L/s for Phase I and 79.6 L/s for Phase II, is to be satisfied. The minimum required on-site storage for Phases I & II is 334.3m<sup>3</sup> and 405.0 m<sup>3</sup>, respectively, for the 100-year storm event. Details of the above mentioned preliminary design feature will be provided at the detailed design stage of Site Plan Application. Please refer to engineering drawing **Site Servicing Plan (“SS-01” and “SS-02”**, submitted separately) for details.

### 5.2.3. Quality Controls

Stormwater treatment must meet Enhanced Protection criteria as defined by the MECP 2003 SWMPD Manual, including a minimum 80% of total suspended solids removal (TSS). Water quality calculations and quality measures in order to achieve an overall TSS removal of 80%, will be provided through the detailed design stage of the Site Plan Application (SPA).

## 5.3. Proposed Storm Connection

### Proposed Development

Phase’s I building will connect to the proposed 300 mm diameter storm sewer running along the proposed private road, flowing south, via a 250 mm storm sewer lateral connection with a minimum grade of 2.00% (or equivalent design). Phase’s II building will connect to the proposed 300 mm diameter storm sewer running along the proposed private road, flowing west, via a 250 mm storm sewer lateral connection with a minimum grade of 2.00% (or equivalent design). The proposed sewer running along the private road, will be connected and eventually discharging into the 1950mm storm sewer at Royal Windsor Drive. Refer to engineering drawing **Site Servicing Plan (“SS-01” and “SS-02”**, submitted separately) for details. The post-development 100-year storm flow from the site has been designed to match the two (2)-year pre-development storm flow.

Therefore, this development will not negatively affect flow conditions downstream of the site and the existing storm infrastructure along Royal Windsor Drive will be able to support the proposed development. Any excess flow, will run overland towards the City’s right-of-way.

## 6.0 Sanitary Drainage System

### 6.1. Existing Sanitary Drainage System

The existing site contains four (4) single-storey commercial buildings. According to available records, there are one (1) sanitary sewer abutting the subject property. More specifically there is :

- A 400 mm diameter sanitary sewer along Royal Windsor Drive flowing east.

### 6.2. Existing and Proposed Sanitary Flows

The sanitary flow generated by the proposed development at 2077-2105 Royal Windsor Drive was compared to the existing flow in order to quantify the net increase in the sanitary sewer.

Using the design criteria outlined in **Section 4.3** and existing site information, the sanitary discharge flow from the existing buildings is estimated at 0.31 L/s.

Similarly, using the design criteria and the proposed development statistics to calculate the proposed population, West Block (Phase I) and East Block (Phase II) will discharge a sanitary flow of 21.35 L/s and 19.32 L/s, respectively, to the proposed 300mm diameter sanitary sewer along the proposed private road, eventually discharging to the 400 sanitary sewer at Royal Windsor Drive.

The additional flow, which includes infiltration and sanitary, will be considered within the sanitary discharge rate. For detailed calculations refer to the sanitary sewer design sheet in **Appendix D**.

According to our coordination with the Region, further directions will be provided by the Regional/City's staff upon review of the submitted FSR/SWM report, in order to confirm that the existing infrastructure will be able to support the proposed development.

### 6.3. Proposed Sanitary Connection

Two (2) separate connections will be provided for the proposed development: one for West Block and one for East Block. The connections will be as follows:

#### West Block – Phase I

West Block will connect to the proposed 300mm diameter sanitary sewer along the proposed private road via a 200mm diameter lateral connection with a minimum grade of 2.00% (or equivalent pipe design).

#### East Block – Phase II

East Block will connect to the proposed 300mm diameter sanitary sewer along the proposed private road via a 200mm diameter lateral connection with a minimum grade of 2.00% (or equivalent pipe design).

The private sanitary network will eventually be connected to the 400mm sanitary sewer along Royal Windsor Drive. Please refer to engineering drawing **Site Servicing Plan ("SS-01" and "SS-02"**, submitted separately) for details.

## 7.0 Water Supply System

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### 7.1. Existing System

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

- a 250 mm diameter abandoned watermain on the north side of Royal Windsor Drive;
- a 400 mm diameter watermain on the south side of Royal Windsor Drive.

Fire hydrant test was carried out by Lithos Group, dated September 28, 2022 along Royal Windsor Drive, to determine the flow and pressure in the existing water network.

The results of the test along Royal Windsor Drive indicate the existing static pressure is 420 KPa (61 psi) and 101.55 L/sec (1609 USPGM) of water is available with a residual pressure of 372 KPa (54 psi). The full detailed report is included in **Appendix E**.

### 7.2. 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 design criteria. Calculation for West and East Block, were conducted to confirm that can be supported by the existing water infrastructure.

#### West Block – Phase I

It is anticipated that an average consumption of approximately 5.41L/s (467,424 L/day), a maximum daily consumption of 10.82/s (934,848L/day) and a peak hourly demand of 16.23L/s (58,428 L/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 are normally conducted for the largest storey, by area, and for the two immediately adjacent storeys.

As a result, to the above-mentioned method, we have the selected Levels 3, 4 and 5 which result the maximum fire flow requirement. **Table 7-1** illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 122.63L/s (1836 USGPM) will be required for Phase I. Refer to detailed calculations found in **Appendix E**.

**Table 7-1 – Fire Flow Input Parameters (West Block)**

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				West	North	South	East
Value according to FUS options	Non-Combustible Construction	Non-Combustible	Yes	20.1m to 30m	>45m	>45m	20.1m to 30m
Surcharge/reduction from base flow	0.8	25%	30%	10%	0%	0%	10%

In summary, the required design flow is the sum of ‘the minimum fire suppression flow’ and ‘maximum daily demand’ (122.63 + 10.82 =133.45L/s, 2115 USGPM). Detailed calculations are found in **Appendix E**.

**East Block – Phase II**

It is anticipated that an average consumption of approximately 4.84L/s (418,176 L/day), a maximum daily consumption of 9.68/s (836,352L/day) and a peak hourly demand of 14.52L/s (52,272 L/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 are normally conducted for the largest storey, by area, and for the two immediately adjacent storeys.

As a result, to the above-mentioned method, we have the selected Levels 3, 4 and 5 which result the maximum fire flow requirement. **Table 7-2** illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 138.77L/s (1760 USGPM) will be required for Phase II. Refer to detailed calculations found in **Appendix E**.

**Table 7-2 – Fire Flow Input Parameters (East Block)**

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				West	North	South	East
Value according to FUS options	Non-Combustible Construction	Non-Combustible	Yes	20.1m to 30m	>45m	>45m	3.1m to 10m
Surcharge/reduction from base flow	0.8	25%	30%	10%	0%	0%	20%

In summary, the required design flow is the sum of ‘the minimum fire suppression flow’ and ‘maximum daily demand’ (138.77 + 9.68 =148.45L/s, 2353 USGPM). The results of the hydrant flow test, prepared by Lithos Group, dated September 28, 2022 at Royal Windsor Drive, indicate that 263.78 L/s (4180 USGPM) of water is available with a pressure of 138KPa (20.0 psi). Therefore, the existing water infrastructure will support the proposed development.

The hydrant flow test and detailed calculations can be found in **Appendix E**.

### 7.3. Proposed Watermain Connections

Two (2) separate connections will be provided for the proposed development: one for West Block and one for East Block. The connections will be as follows:

#### West Block – Phase I

West Block will be serviced by a 150mm diameter fire ad a 100mm domestic water service. The proposed service will be connected to the proposed 150mm diameter watermain on the proposed private road.

#### East Block – Phase II

East Block will be serviced by a 150mm diameter fire ad a 100mm domestic water service. The proposed service will be connected to the proposed 150mm diameter watermain on the proposed private road.

The proposed 150mm waterline will be connected to the existing 150mm waterline located on the southwest corner of the property prior reaching the existing 400mm waterline at Royal Windsor Drive

Please refer to engineering drawing **Site Servicing Plan (“SS-01” and “SS-02”**, submitted separately) for details.

## 8.0 Site Grading

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### 8.1. Existing Grades

The existing site is approximately 1.515 hectares and it contains four (4) single-storey commercial buildings. Under pre-development conditions, the site drains uncontrolled towards the adjacent right of way (ROW).

### 8.2. Proposed Grades

The proposed grades will match current drainage patterns and will improve the existing drainage conditions to meet the City’s/Regional requirements. Grades will be maintained along the property line wherever feasible and emergency overland flow will be directed towards Royal Windsor Drive. Refer to engineering drawing Site Grading Plan (“SG-01” and “SG-02”, submitted separately) for details.

## 9.0 Conclusions and Recommendations

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Based on our investigations, we conclude the following:

### **Storm Drainage**

The proposed development will be constructed in two phases. More specifically, Phase I will consist of a Podium and two high-rise Towers (Tower 1 and Tower 2), facilitated by five (5) underground parking levels, and Phase II of a Podium and two high-rise Towers (Tower 3 and Tower 4), facilitated by three (3) underground parking levels.

For Towers 1 and 2 along with their Podium (Phase I), stormwater flow will be connected to the proposed 300 mm storm sewer running along the proposed private road, flowing south, via a 250 mm storm sewer lateral connection, finally reaching the existing 1950mm storm sewer along Royal Windsor Drive. For Towers 3 and 4 along with their Podium (Phase II), stormwater flow will be discharged into the proposed 300 mm storm sewer running along the proposed private road, flowing west, via a 250 mm storm sewer lateral connection, eventually discharging to the existing 1950mm storm sewer along Royal Windsor Drive.



The post-development 100-year storm flow has been designed to match the two (2) year pre-development storm flow. In order to attain the target flows and meet the City's guidelines, quantity controls will be utilized and up to approximately 334.3m<sup>3</sup> of on site storage will be required for Phase I. Similarly, 405.0m<sup>3</sup> are required to be retained on site for Phase II. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection, as specified by the Ministry of the Environment, Conservation and Parks (MECP). Quality control will be provided by the building's rooftop/terraces for a total suspended solids (TSS) removal of 80%, as required by MECP. A more detailed Stormwater Management Report will be prepared at the Site Plan Application stage.

### Sanitary Sewers

Two (2) separate connections will be provided for the proposed mixed-use development: one for Phase I and one for Phase II. Phase's I building will be connected to the proposed 300 mm sanitary sewer running along the proposed private road, flowing south, via a 200 mm sanitary sewer lateral connection. Phase's II will be connected to the proposed 300 mm sanitary sewer running along the proposed private road, flowing west, via a 200 mm sanitary sewer lateral connection. The private sanitary network will eventually be discharging into the existing 400mm sanitary sewer running along Royal Windsor Drive. The additional net discharge flow from the proposed development, is anticipated at approximately 40.36 L/s.

### Water Supply

Water supply for the proposed development will be provided from two (2) separate water connections, one for each Phase. More specifically, Phases I and II will each be serviced by the proposed 150 mm diameter watermain, running along the proposed private road, connected to the existing 150mm water line located on the south west corner of the site prior reaching Royal Windsor Drive. It is anticipated that a total design flow of 133.45 L/s and 148.45 L/ will be required to support Phase I & II respectively. The results of the hydrant flow test, prepared by Lithos Group, dated September 28, 2022 reveal that the existing water infrastructure can support the proposed development.





150 Bermonsdey Road, North York, Ontario M4A 1Y1

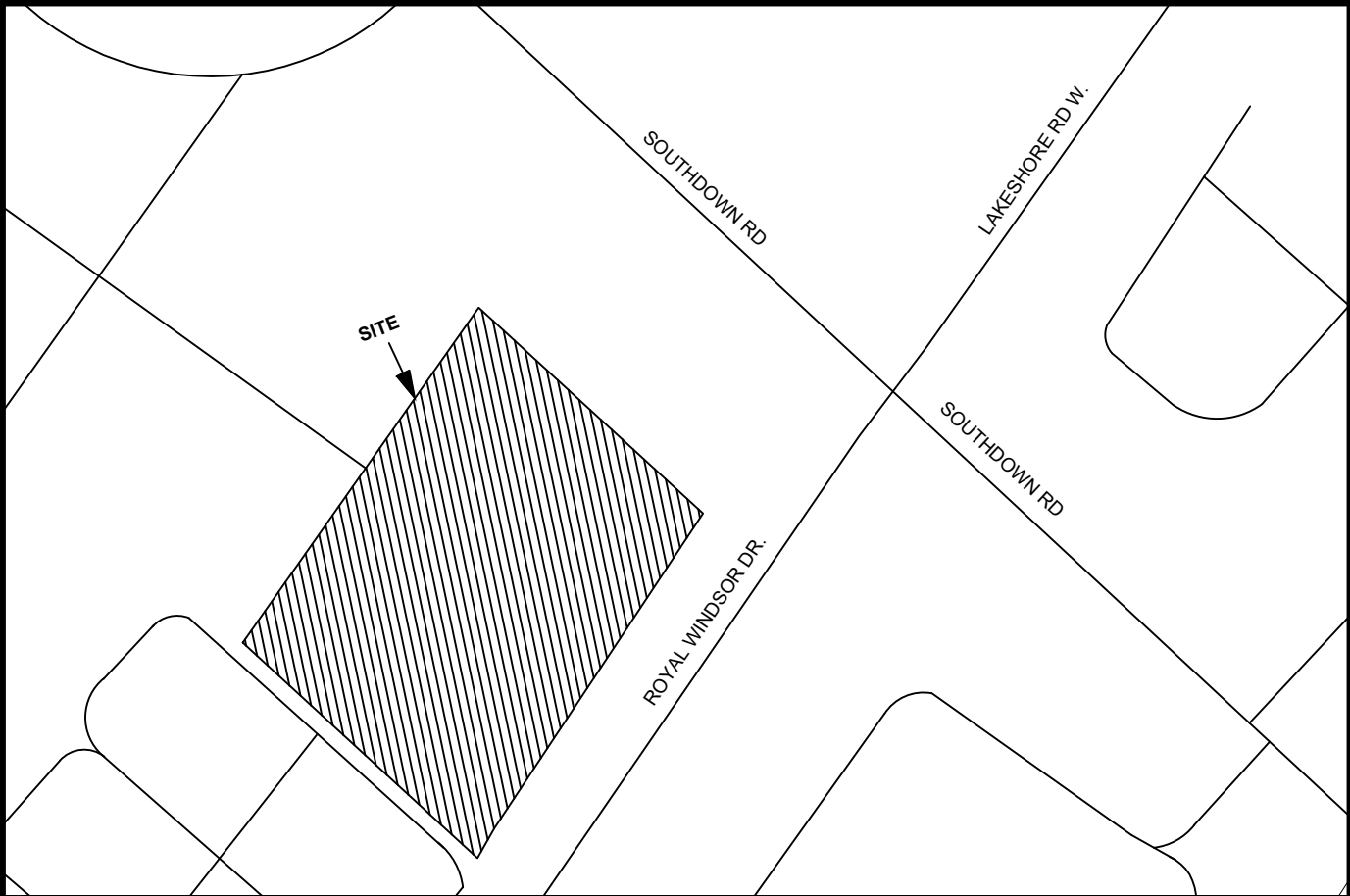
**AERIAL PLAN**  
MIXED USE DEVELOPMENT  
CLARKSON GO  
MISSISSAUGA, ONTARIO

DATE: DECEMBER 2022

SCALE: N.T.S.

PROJECT No: UD22-046

FIGURE No: FIG 2



LOCATION PLAN  
MIXED USE DEVELOPMENT  
CLARKSON GO  
MISSISSAUGA, ONTARIO

150 Bermonsdey Road, North York, Ontario M4A 1Y1

DATE: DECEMBER 2022

PROJECT No: UD22-046

SCALE: N.T.S.

FIGURE No: FIG 1

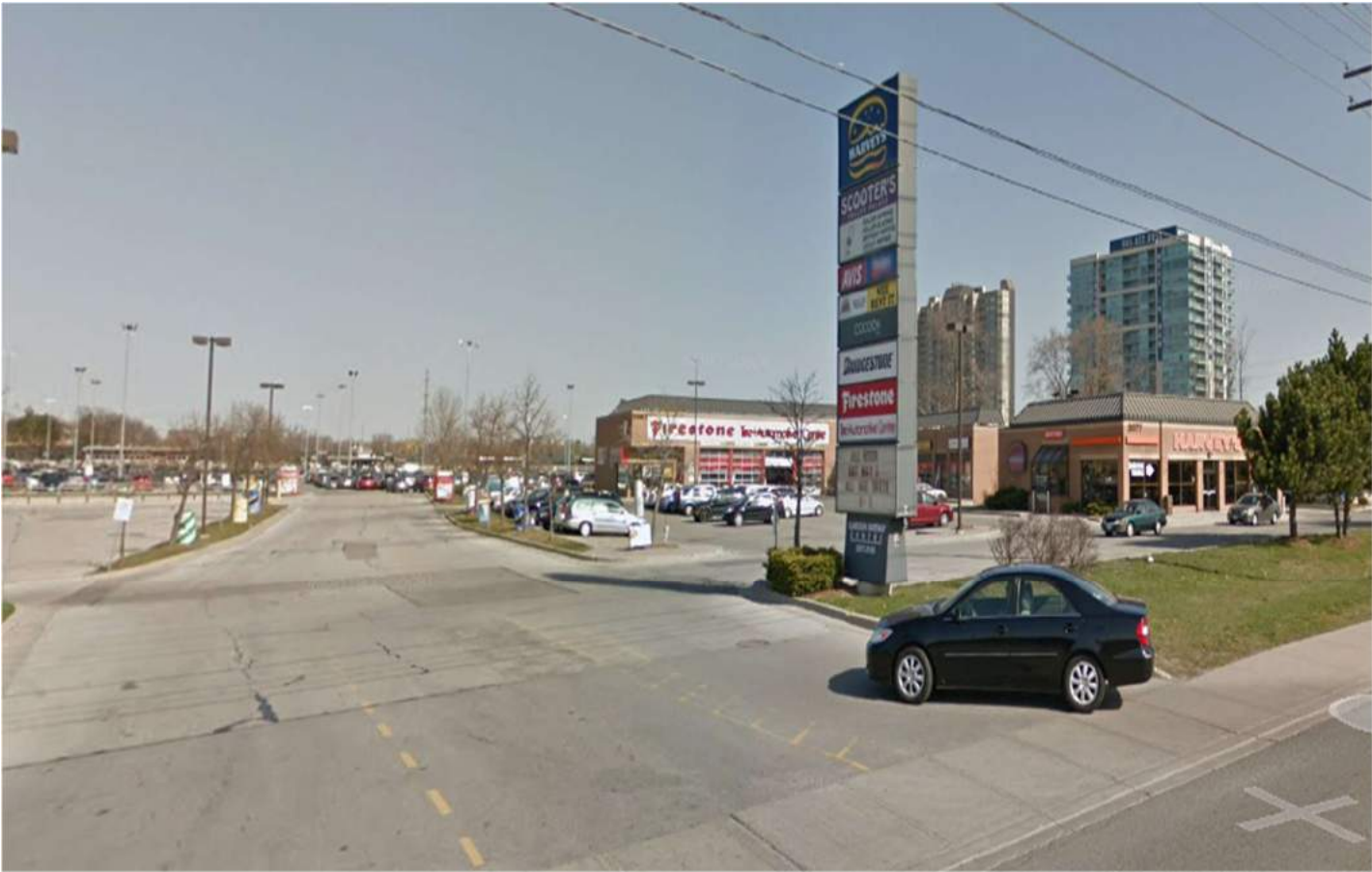
# Appendix A

---

## Site Photographs



South-East corner of the property along Royal Windsor Drive facing North-West



South-East side of the property along Royal Windsor Drive facing North North-West





East side inside the property facing West



South side inside the property facing North





West side inside the property facing East



North side inside the property facing South





East corner of the property facing West



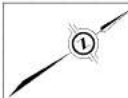
North corner of the property facing South

## **Appendix B**

---

# **Background Information**





SWITCH SHOWING TOPOGRAPHIC CONDITIONS ON  
**PART OF LOT 31 CONCESSION 2**  
**SOUTH OF DUNDAS STREET**  
 (GEOGRAPHIC TOWNSHIP OF TORONTO)  
**CITY OF MISSISSAUGA**  
 REGIONAL MUNICIPALITY OF PEELE  
 SCALE: 1" = 250'

J.D. BARNES LIMITED  
 2200 SHEPPARD AVENUE EAST, SUITE 100, MISSISSAUGA, ONTARIO L4X 1L3  
 TEL: (905) 277-8888  
 WWW.JDBARNES.COM

**NOTES**  
 1. ELEVATIONS ARE IN METERS DERIVED FROM REAL-TIME NETWORK (RTN) OBSERVATIONS USING A LEICA DISTO D300 (2015).  
 2. DISTANCES ARE GIVEN AND CAN BE CONVERTED TO FEET BY MULTIPLYING BY THE CONVERSION FACTOR OF 3.28084.  
 3. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

**ELEVATION NOTE**  
 1. ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM THE CITY OF MISSISSAUGA DATUM.  
 2. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

**LOCAL BENCHMARK**  
 1. THE LOCAL BENCHMARK IS LOCATED AT THE SOUTHWEST CORNER OF 2200 SHEPPARD AVENUE EAST, SUITE 100, MISSISSAUGA, ONTARIO L4X 1L3.  
 2. ELEVATION: 100.000 METERS.



- LEGEND**
- CENTER CIRCULAR
  - CENTER SQUARE
  - CENTER TRIANGLE
  - CENTER STAR
  - CENTER DIAMOND
  - CENTER CROSS
  - CENTER X
  - CENTER PLUS
  - CENTER MINUS
  - CENTER DIVIDE
  - CENTER PERCENT
  - CENTER EQUAL
  - CENTER LESS
  - CENTER GREATER
  - CENTER MULTIPLY
  - CENTER POWER
  - CENTER ROOT
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ROYAL WINDSOR DRIVE  
 (ROAD ALLOWANCE BETWEEN CONCESSIONS 2 AND 3, SOUTH OF DUNDAS STREET)

BEFORE FINAL UNDERGROUND SERVICES SHOULD BE LOCATED ON SITE BY THE RESPECTIVE AGENCIES.  
 IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT LOCAL BENCHMARKS HAVE NOT BEEN IN ERROR OF DISTANCE AND THAT THE RELATIVE ELEVATIONS AGREE WITH THE INFORMATION SHOWN ON THIS PLAN.

PROPERTY LINES ARE AT 0.50M INTERVALS.  
 BOUNDARY DIMENSIONS ARE AT 0.50M INTERVALS.  
 BOUNDARY INFORMATION IS DERIVED FROM SURVEYED REAL PROPERTY RECORDS BY J.D. BARNES LIMITED, DATED APRIL 2024, FILE NO. 20-498-04 AND 20-498-05.  
 SURVEY COMPLETED ON THE 26th DAY OF MARCH, 2024.

**J.D. BARNES**  
 LAND INFORMATION SPECIALISTS  
 2200 SHEPPARD AVENUE EAST, SUITE 100, MISSISSAUGA, ONTARIO L4X 1L3  
 TEL: (905) 277-8888 WWW.JDBARNES.COM

DATE: 03/26/24  
 DRAWN BY: JDB  
 CHECKED BY: JDB  
 PROJECT NO.: 20-498-04-1  
 FILE NO.: 20-498-04-1

**SLATE ASSET MANAGEMENT**

121 King St W  
Unit 200  
Toronto ON M5H 3T9

**Gensler**

150 King Street West  
Suite 1400  
Toronto, Ontario M5H 1J6  
Canada  
Tel: 416.911.3850



**1 PHASE 1 PLAN - WEST BLOCK**  
SCALE: 1:300

**2 PHASE 2 PLAN - EAST BLOCK**  
SCALE: 1:300

**LEGEND**

[Light Grey Box]	PHASE 1 - WEST BLOCK
[Dark Grey Box]	PHASE 2 - EAST BLOCK

Date	Description
2022-12-13	ISSUED FOR REZONING

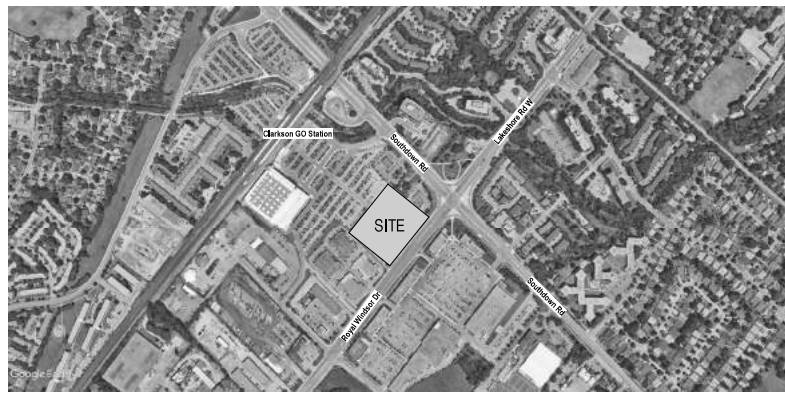
Seal / Signature

Project Name	CLARKSON GO
Project Number	067.1245.000
Description	PHASING PLAN

Scale  
As indicated

**A0.032**

2022/12/13 11:57 PM BM 360/907.1245.000 - Clarkson GO - 200m x 200m - 45.1245.000 - 200m x 200m



CONTEXT PLAN (SCALE: NTS)

DRAWING INDEX	
Sheet Number	Sheet Name
AL000	STATISTICS
AL001	ARCHITECTURAL SITE PLAN
AL002	PHASING PLAN
AL003	SITE SURVEY
AL004	BURIED IRON PLAN
AL100	LOWER LEVEL 00 PLAN (WEST)
AL101	LOWER LEVEL 00 PLAN (EAST)
AL102	LOWER LEVEL 01 TYPICAL PLAN
AL103	LOWER LEVEL 01 PLAN
AL104	LEVEL 01 PLAN
AL105	LEVEL 02
AL106	LEVEL 03-05 PLAN
AL107	LEVEL 06 PLAN
AL108	LEVEL 07 PLAN
AL109	LEVEL 08 PLAN - AMENITY
AL110	LEVEL 10 - TYPICAL TOWER
AL122	LEVEL 22 - TOWER 4 STEPBACK
AL123	LEVEL 23 - TOWER 4 STEPBACK
AL124	LEVEL 24 - TOWER 3 STEPBACK
AL125	LEVEL 25 - TOWER 3 STEPBACK
AL126	LEVEL 26 - TOWER 2 STEPBACK
AL127	LEVEL 27 - TOWER 2 STEPBACK
AL128	LEVEL 28 - TOWER 1 STEPBACK
AL129	LEVEL 29 - TOWER 1 STEPBACK
AL200	BUILDING ELEVATIONS
AL201	BUILDING ELEVATIONS
AL202	BUILDING SECTIONS
AL203	BUILDING SECTIONS

DRAWING INDEX



ROYAL WINDSOR DRIVE

SOUTHDOWN ROAD

**SLATE ASSET MANAGEMENT**

121 King St W  
Unit 200  
Toronto ON M5H 3T9

**Gensler**

150 King Street West  
Suite 1400  
Toronto, Ontario M5H 1J6  
Canada

Date	Description
1 - 2022-12-13	ISSUED FOR REZONING

\_\_\_\_\_  
Seal / Signature

Project Name  
**CLARKSON GO**

Project Number  
**067.1245.000**

Description  
**ARCHITECTURAL SITE PLAN**

Scale  
As indicated

**A0.031**

02/12/2023 11:52 PM BM 360/307.1245.000 - Clarkson GO Architectural Site Plan - 02.1245.000 - 20A\_20014

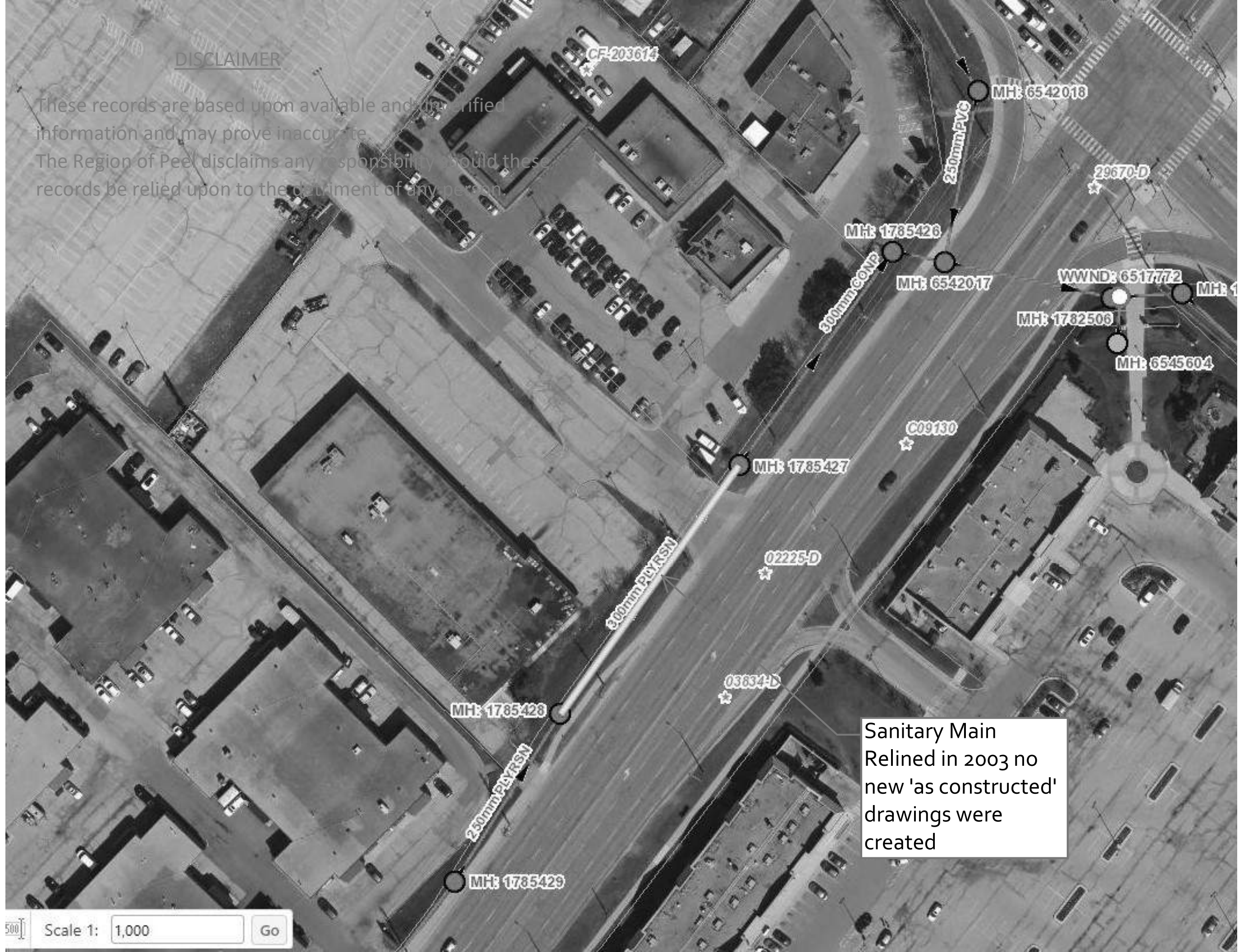
**01 SITE PLAN**  
SCALE: 1:300





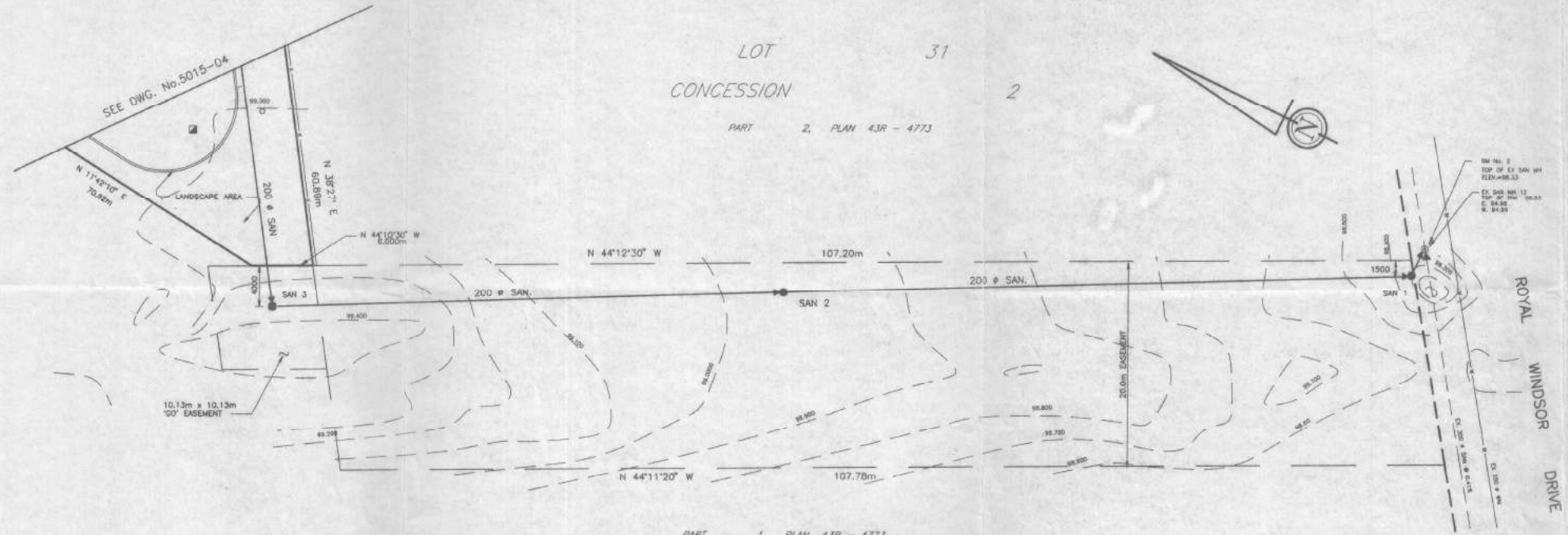
DISCLAIMER

These records are based upon available and unverified information and may prove inaccurate. The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.



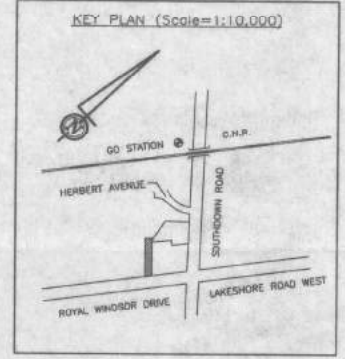
Sanitary Main  
Relined in 2003 no  
new 'as constructed'  
drawings were  
created



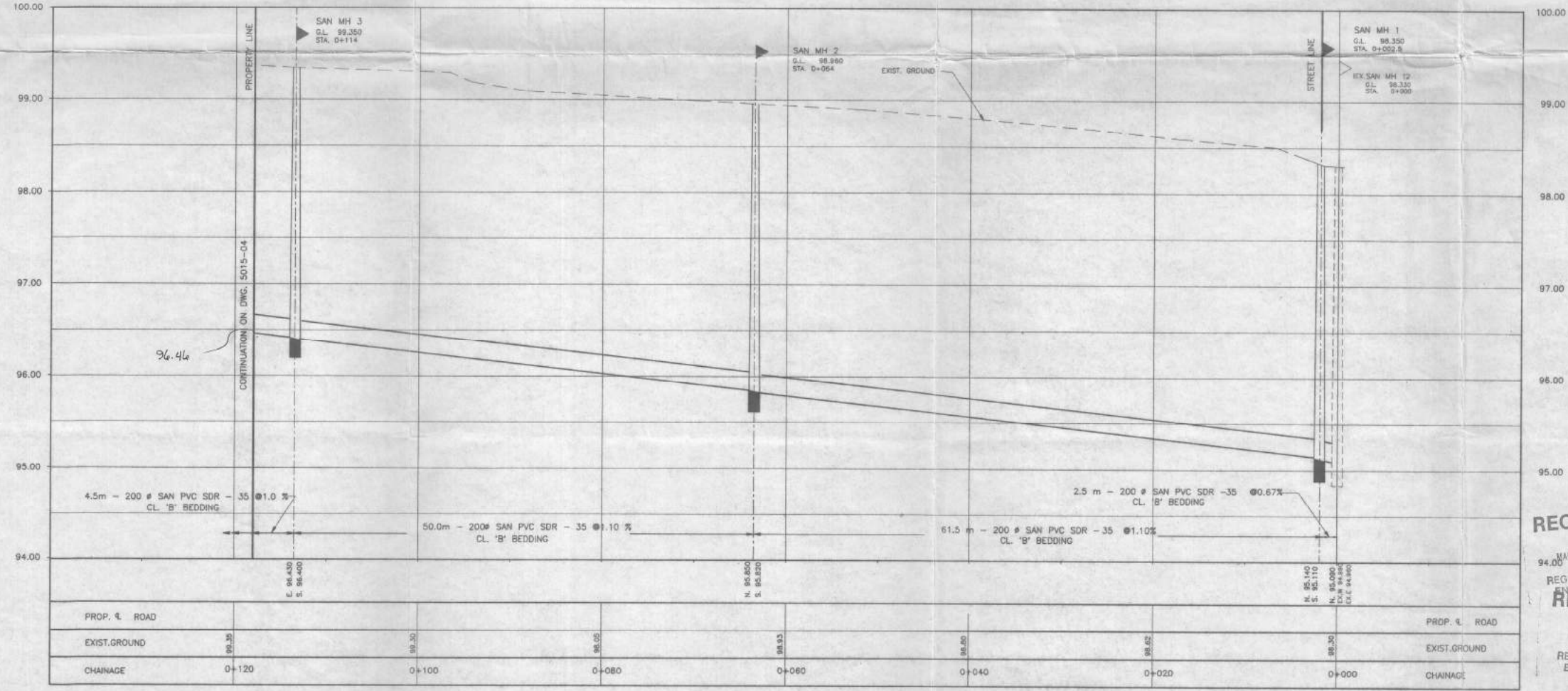


**DISCLAIMER**  
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NO.	REVISIONS	DATE	APP.
C.	REVISED SAN SEWER AS PER REGION COMMENT	MAR.8,90	NE
B.	REVISED AS PER REGION COMMENT	JAN.23,90	
A.	RELEASED FOR APPROVAL	NOV.30,89	



- REFERENCE DRAWINGS**
- 5015-01 SITE PLAN
  - 5015-02 GRADING PLAN
  - 5015-03 STORM DRAINAGE PLAN
  - 5015-04 SITE SERVICES PLAN
  - 5015-06 LANDSCAPING PLAN
  - 5015-07 TYPICAL SITUATION & EROSION CONTROL DETAILS



**NOTE**  
 SEE DWG. No. 5015-04 FOR CONSTRUCTION SPECIFICATION.

**SITE BENCHMARKS**  
 MISSISSAUGA No. 715  
 TABLET ON BOX CULVERT UNDER ROYAL WINDSOR DRIVE, 137m WEST OF SOUTHDOWN ROAD.  
 ELEV. = 97.857 (GEODETTIC)

**SUBMISSION DATE**

FIRST	SECOND	INTERIM	PRE-SERVICE	FINAL

REGION OF PEEL  
 PUBLIC WORKS/ENGINEERING & CONSTRUCTION DIVISION  
 WATER & SANITARY SERVICES CONSTRUCTION  
**APPROVED FOR CONSTRUCTION**  
 AS SUBMITTED  
 AS MARKED  
 DATE: 03-3-93

**ECG ECOS GARATECH**  
 CONSULTING ENGINEERS  
 BELLEVILLE (613) 967-0471 BRAMPTON (416) 456-4110

OWNER/CLIENT:  
**REGION OF PEEL**

RECEIVED  
 SOUTHDOWN AND 'GO' STATION SITE  
 1052 SOUTHDOWN ROAD  
 MISSISSAUGA, ONT.  
 MAR 6 1990

RECEIVED  
 REGION OF PEEL ENGINEERING  
 CITY OF MISSISSAUGA  
 ENGINEERING AND WORKS DEPARTMENT

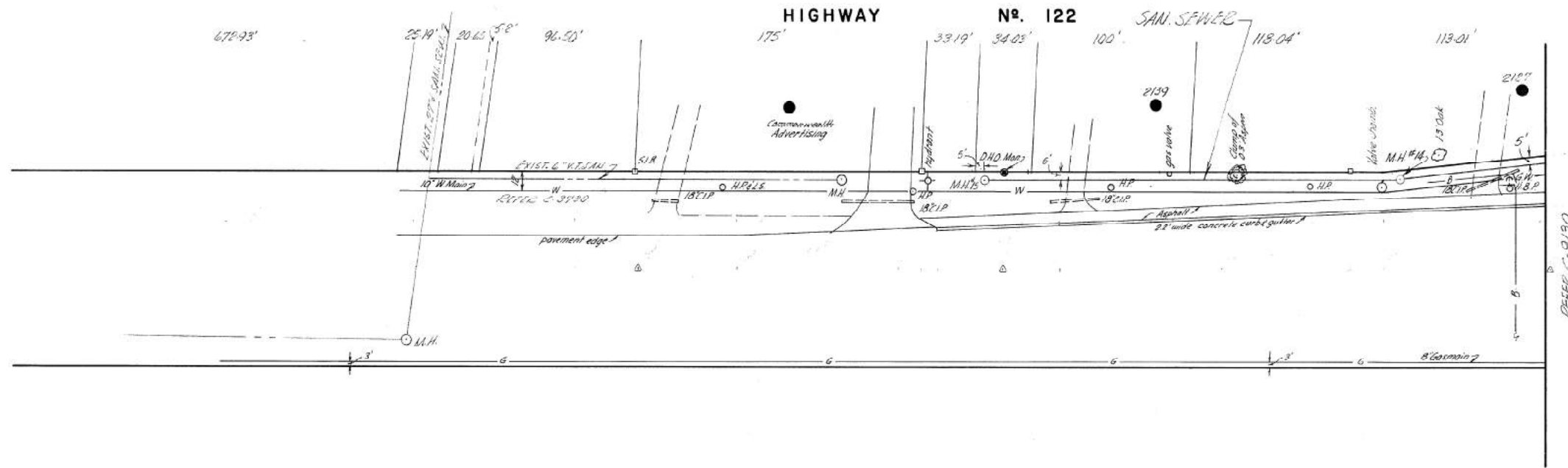
MAR 9 1990  
 REGION OF PEEL ENGINEERING  
 PLAN & PROFILE FOR SAN. SEWER  
 STA. 0+000 TO 0+114  
 SP-100-88W

DESIGNED: T.B.	DRAWN: D.W.	REV. NO. C
CHECKED: M.D.G.	DATE: NOV. 89	DWG. NO.
SCALE: HORIZ. 1:250	VERT. 1:25	JOB: 8500-15
		5015-05



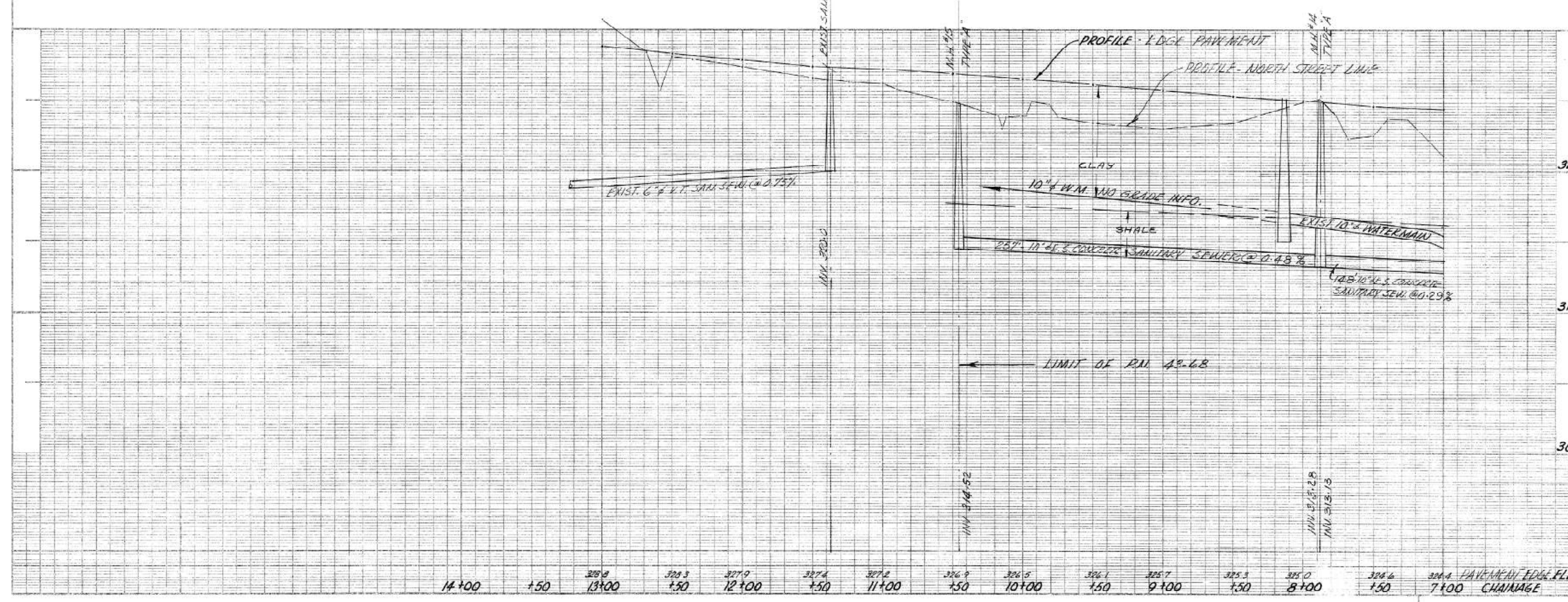


SERVICE DATA			
SAN SEWERS	DATE	BY	DATE
STORM SEWERS	APR 9 1968	J.R.	APR 9 1968
WATER MAINS	NAVERS	M.C.	JULY 13 1968
REVISIONS			
DATE	BY	REASON	NO.
MAY 2 1968	J.R.	PROP. SAN. SEW. P.N. 43-6B	1
JUN 4 1968	J.R.	REV. TO P.N. 43-6B	2
DEC 11 1968	J.R.	AS CONST. SAN. SEW. P.N. 43-6B	3



**DISCLAIMER**

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- GENERAL NOTES**
- ALL DRIVEWAY GRAVEL UNLESS OTHERWISE NOTED.
  - ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
  - CHIMNEY BUILDINGS - NOT LOCATED.
  - CHIMNEY BUILDINGS - LOCATED.
  - T.T.M. No. 113 ELEV. 319.07
  - TEMP. BENCH MARK ELEV. DESCRIP. TYP.

- SANITARY SEWERS TO HAVE TYPE 'E' BEDDING.

REGISTERED PROFESSIONAL ENGINEER  
C. D. LEAVERS  
PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER  
W. J. ANDERSON  
PROVINCE OF ONTARIO

APPROVED BY: *C. Leavers* and *W. J. Anderson*

**TOWN OF MISSISSAUGA**  
COUNTY OF PEEL  
ENGINEERING DEPARTMENT

**HIGHWAY No 122**  
FROM SOUTHDOWN RD. TO 1200' ± W'LY.  
STN 7+00 TO STN 12+00 ±

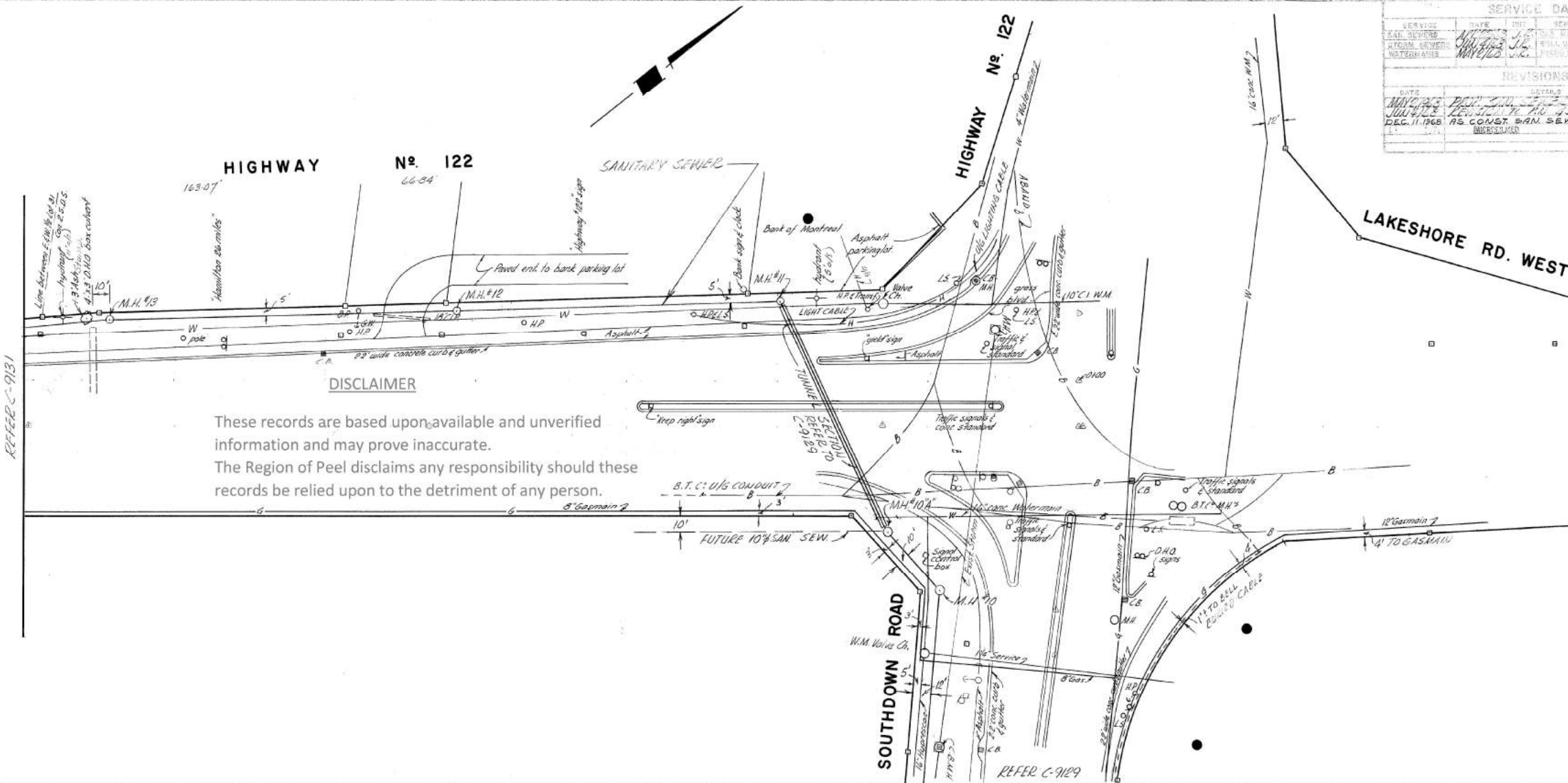
LOT/S	31	CONV	263.0 D.S.	PROJECT NO.	43-6B
SCALE	1" = 10'	DRAWN BY	J. ROOT	CHECKED BY	J.R.
DATE	APRIL 9, 1968	SHEET	5 OF 5	PLAN NO.	C-9131



SERVICE DATA			
SERVICE	DATE	INT.	DATE
SAN. SEWER	MAY 1968	J.P.	MAY 1968
STORM SEWER	MAY 1968	J.P.	MAY 1968
WATER MAIN	MAY 1968	J.P.	MAY 1968

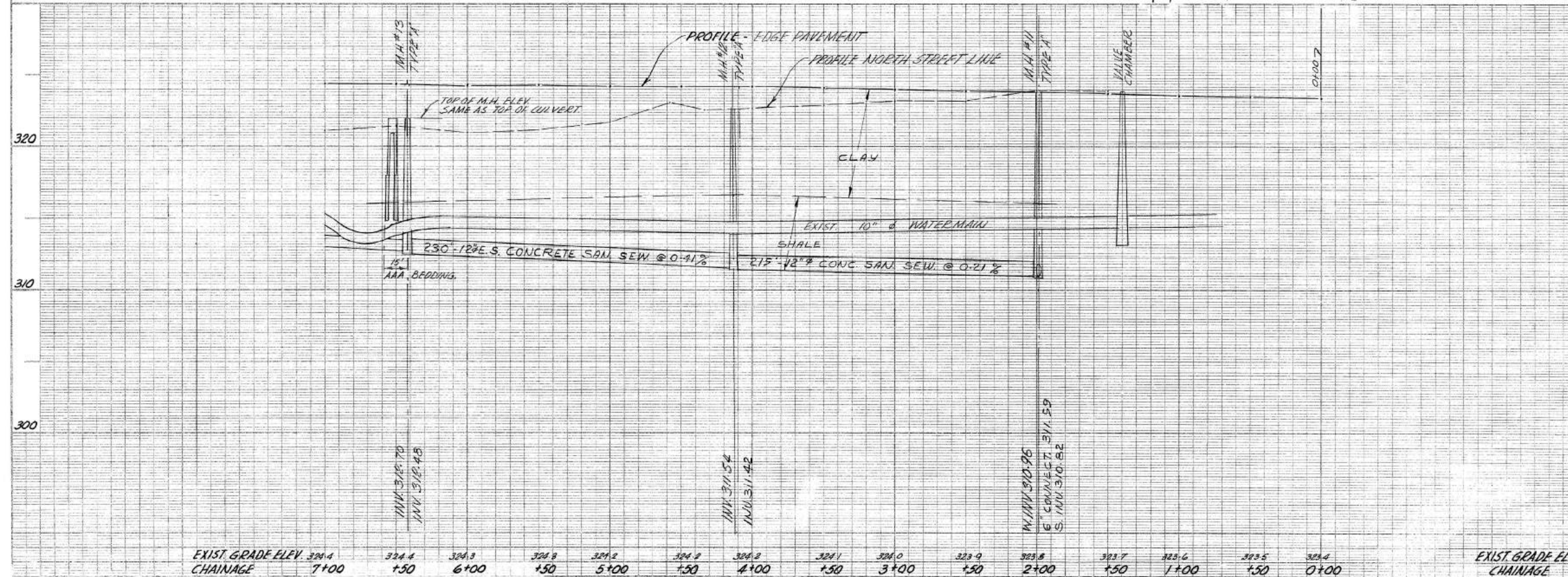
  

REVISIONS			
DATE	BY	REASON	NO.
MAY 1968	J.P.	REVISED PLAN 43-68	1
JUN 4 1968	J.P.	REVISED PLAN 43-68	2
DEC 11 1968	J.P.	REVISED SAN. SEW. PLAN 43-68	3



**DISCLAIMER**

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**GENERAL NOTES**

- ALL DRIVEWAYS SHALL UNLESS OTHERWISE NOTED
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- DENOTES BUILDING - NOT LOCATED.
- DENOTES BUILDING LOCATED.
- T.T.M. No. 133 ELEV. 319.07
- TEMP. BENCH MARK ELEV. 303.46
- DESCRIPTION RR SPUR IN R.F. S.W. CORNER SOUTHDOWN & 122 RD.

- SANITARY SEWERS TO HAVE TYPE-B BEDDING.

C. D. LEAVENS  
PROVINCE OF ONTARIO

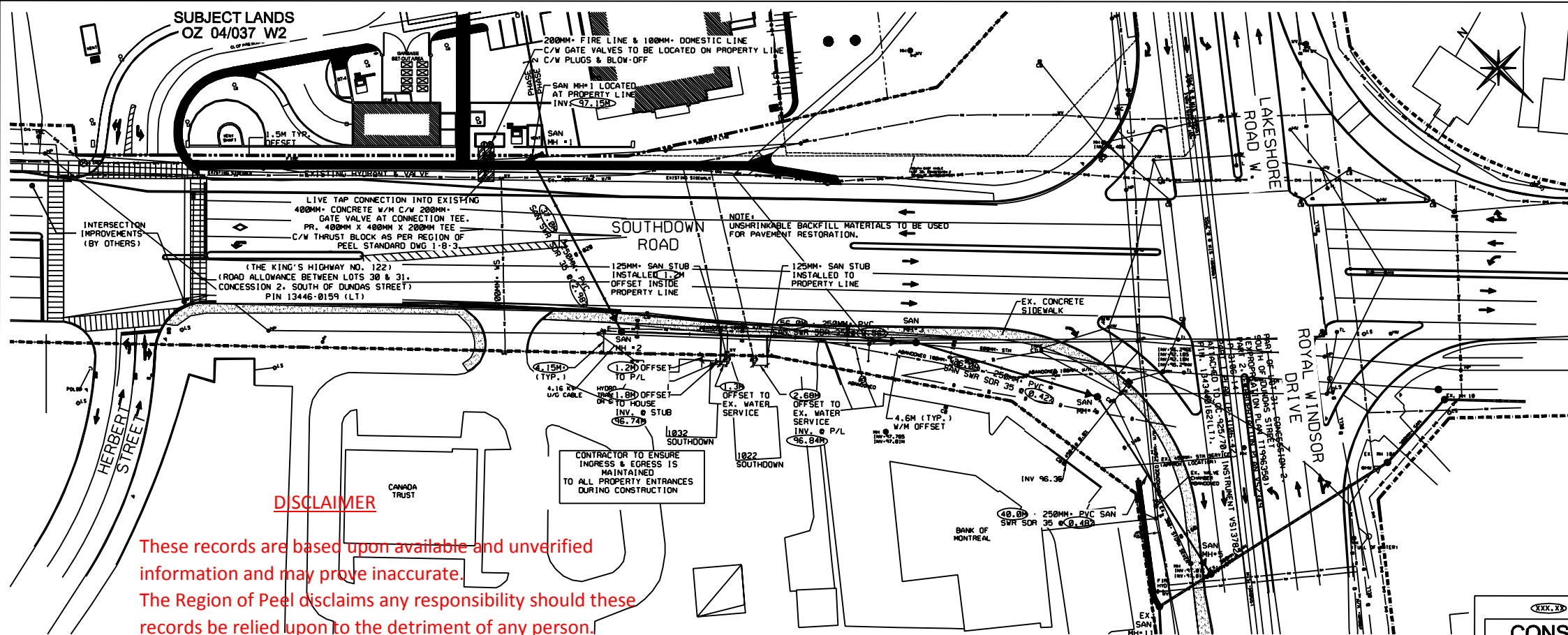
W. J. ANDERSON  
PROVINCE OF ONTARIO

**TOWN OF MISSISSAUGA**  
COUNTY OF PEEL  
ENGINEERING DEPARTMENT

**HIGHWAY No. 122**  
FROM SOUTHDOWN RD. TO 1200' ± W'LY.  
STN 0+00 TO STN 7+00

LOT/S	31	CON. / S.D.S.	2 & 3, S.D.S.	PROJECT NO.	43-68
SCALE	1" = 10'	DESIGN BY	J. ROOT	CHECKED BY	J.P.
DATE	APRIL 9, 1968	SHEET	4 OF 5	PLAN NO.	9130

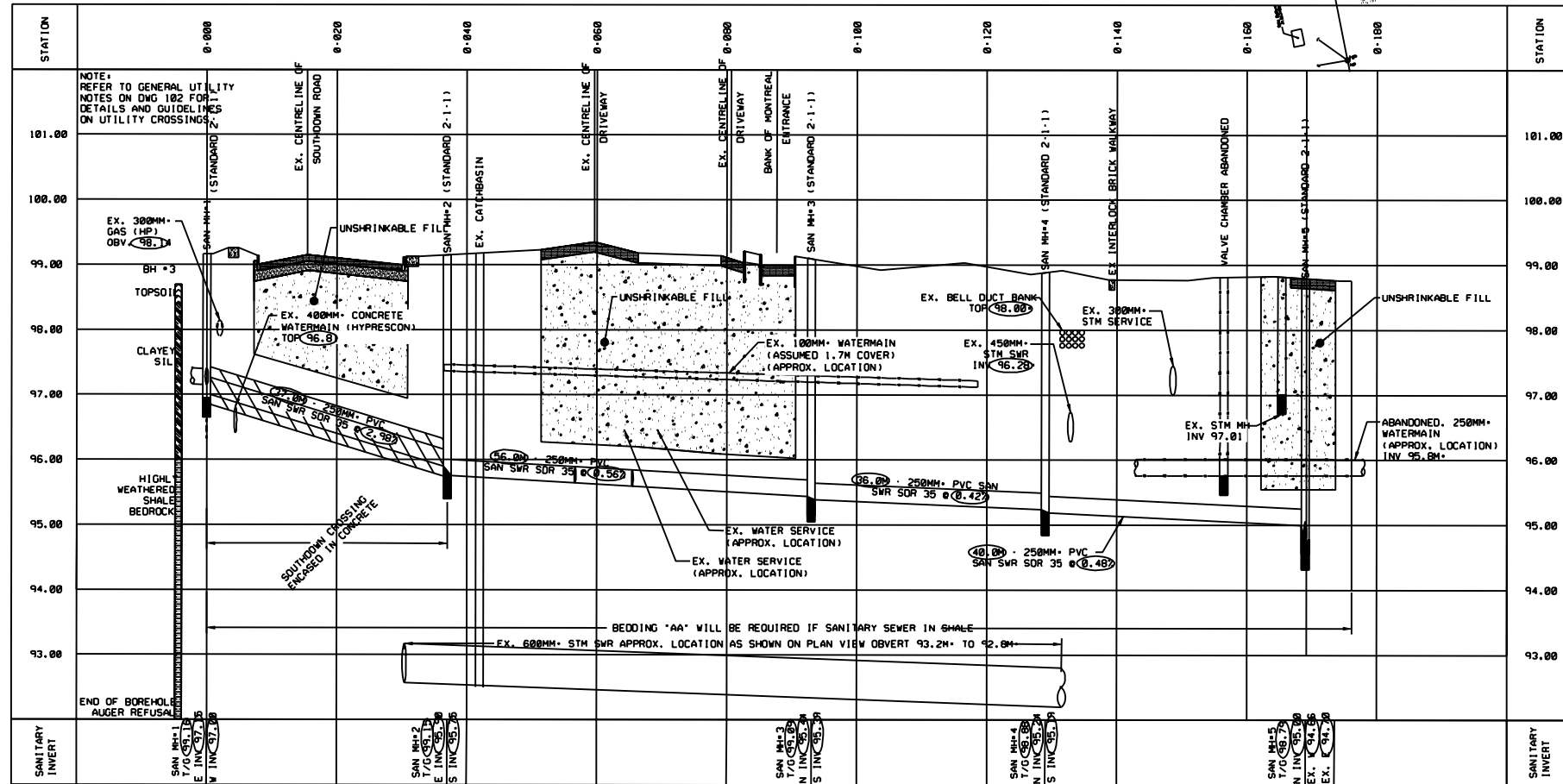
9130



**DISCLAIMER**

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CONTRACTOR TO ENSURE INGRESS & EGRESS IS MAINTAINED TO ALL PROPERTY ENTRANCES DURING CONSTRUCTION



NOTE: REFER TO DWG 107 FOR CONSTRUCTION & RESTORATION NOTES & DETAILS.

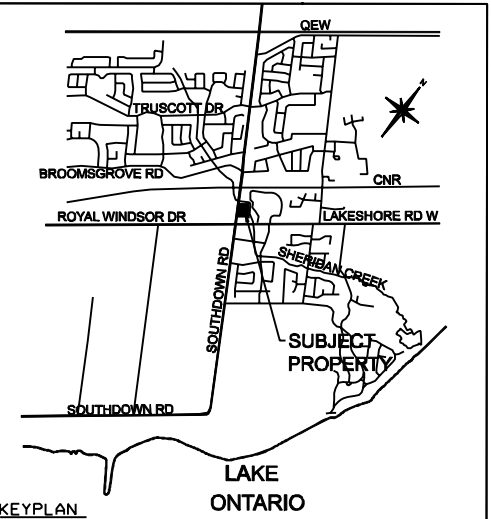
**CONSTRUCTION RECORD**

NOTE: THIS DRAWING HAS BEEN PREPARED BY "CF CROZIER ASSOCIATES INC." TO REFLECT CONSTRUCTION RECORD INFORMATION AND IS BELIEVED TO BE CORRECT. HOWEVER, THOSE RELYING ON THIS INFORMATION ARE ADVISED TO OBTAIN INDEPENDANT VERIFICATION AS TO ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.

NOTE: LOCATIONS OF MANHOLES ARE BASED ON SWING-TIE MEASUREMENTS OBTAINED BY THIS OFFICE. THIS INFORMATION IS AVAILABLE ON DIGITAL DRAWING.

**LEGEND**

- ROW LIMITS
- - - PROPERTY BOUNDARY
- PR. WATERMAIN & VALVE
- PR. HYDRANT & VALVE
- PR. SANITARY SEWER & MANHOLE
- PR. 200MM FIRE LINE
- PR. 100MM DOMESTIC LINE
- EX. OVERHEAD WIRES
- EX. CABLE
- EX. WATERMAIN
- EX. GAS LINE
- EX. 1.0M CONTOURS
- EX. MANHOLE
- EX. CATCHBASIN
- BPEX EX. BELL PEDESTAL
- EX. DOUBLE CATCHBASIN
- TL EX. TRAFFIC LIGHT
- EX. SIGN
- ☆ EX. LIGHT STANDARD
- EX. WATER VALVE
- EX. VALVE CHAMBER
- EX. WATER SERVICE



**BENCHMARK**  
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO CITY OF MISSISSAUGA DATUM BENCHMARK NO. 113 HAVING AN ELEVATION OF 97.254 METRES.

**LEGAL INFO:**  
1875 SOUTHDOWN RD.  
PART OF LOT 38, CONCESSION 2, SOUTH OF DUNDAS ST.  
CITY OF MISSISSAUGA, REGIONAL MUNICIPALITY OF PEEL  
PLAN 43R-25238, PIN 13446-0261 (LT)

NOTE: REFER TO LANDSCAPE ARCHITECT DRAWINGS FOR RETAINING WALL SPECIFICATIONS & OTHER SURFACE TREATMENT DETAILS.

NOTE: THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.

4. DO NOT SCALE THE DRAWINGS.

5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

No.	Issue / Revision	Date
0	SUBMISSION No. 1	04/12/2007
1	SUBMISSION No. 2	11/29/2007
2	FINAL SUBMISSION	04/09/2008
3	AS-CONSTRUCTED	11/01/2008

Approved By:

Engineer:

**cf crozier & associates inc**  
LAND DEVELOPMENT ENGINEERS  
110 PINE STREET  
COLLINGWOOD ON  
L9Y 2N6  
T: 705-448-8810  
F: 705-448-8850  
CFCROZIER.CA

DEVELOPER:  
**STONEBROOK PROPERTIES INC.**  
2904 SOUTH SHERIDAN WAY - SUITE 304  
OAKVILLE, ON L6J 7L7

**MISSISSAUGA**  
TRANSPORTATION & WORKS

Project: **SOUTHDOWN ROAD SANITARY EXTENSION**  
STA 0+000 TO 0+175.52

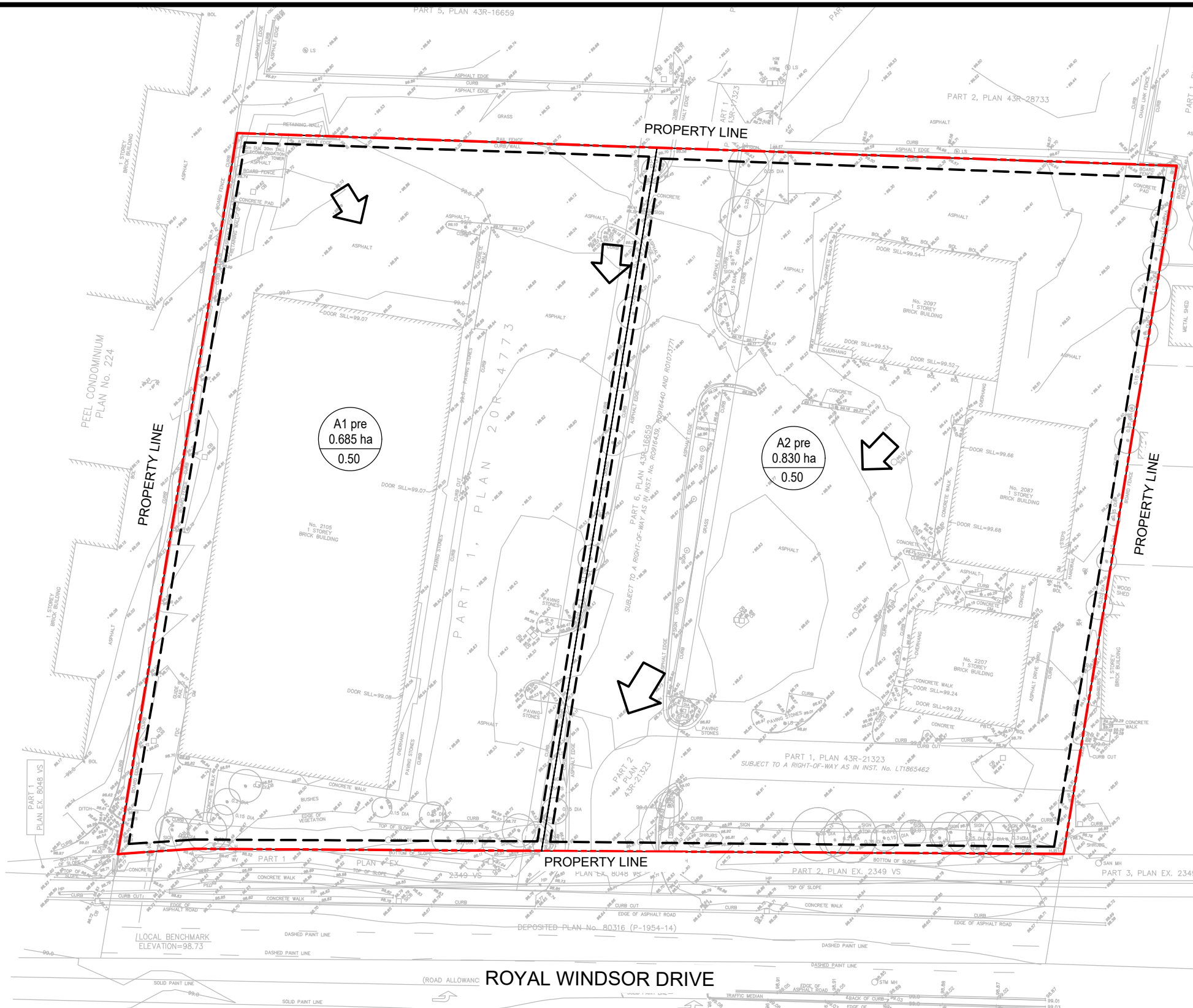
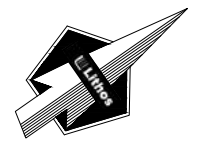
Project:	STONEBROOK CONDOMINIUM RESIDENCES	
City File:	OZ 04/037 W2	Region File: Z-10.302
Drawn By:	L.A.D.	Check By: K.A.M. / C.F.C.
Scale:	H: 1:500 V: 1:50	Project No: 141-2556
Date:	04/12/2007	Drawing No: 40156-D

# Appendix C

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## Storm Analysis





RUN-OFF COEFFICIENTS					
DRAINAGE AREA	LAND USE	AREA (ha)	INITIAL COEFFICIENT	ACTUAL COEFFICIENT	DESIGN COEFFICIENT
A1 PRE (TOWARDS ROYAL WINDSOR ROAD) PHASE I	LANDSCAPE	0.069	0.25	0.83	0.50
	HARDSCAPE	0.616	0.90		
A2 PRE (TOWARDS ROYAL WINDSOR ROAD) PHASE II	LANDSCAPE	0.069	0.25	0.85	0.50
	HARDSCAPE	0.761	0.90		



**LEGEND**

- STORM DRAINAGE AREA NUMBER
- DRAINAGE AREA (ha)
- COMPOSITE RUNOFF COEFFICIENT
- PRE-DEVELOPMENT STORM DRAINAGE AREA
- PROPERTY LINE
- DRAINAGE DIRECTION - BOTH MANOR AND MAJOR DRAINAGE PATTERNS

**PRE-DEVELOPMENT  
STORM DRAINAGE AREA PLAN**  
MIXED USE DEVELOPMENT  
CLARKSON GO  
MISSISSAUGA, ONTARIO

DATE: DECEMBER 2022    PROJECT No: UD22-046  
SCALE: N.T.S.    FIGURE No: DAP1



Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.  
 Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Rational Method**

**Pre-Development Flow Calculation - Phase I**

2077-2105 Royal Windsor Drive

File No. UD22-046

City of Mississauga

Date: December 2022

**Input Parameters**

Area Number	Area (ha)	Actual C	Design C	Tc (min.)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.83	0.50	15

$$Q = 0.0028 C I A$$

$$I = \frac{a}{(t + c)^b}$$

**Rational Method Calculation**

Event 2 yr  
 IDF Data Set Region of Peel  
 a = 1070  
 b = 0.8759  
 c = 7.85

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.50	0.34	15	69.0	0.066	65.7

Event 5 yr  
 IDF Data Set Region of Peel  
 a = 1593  
 b = 0.8789  
 c = 11.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.50	0.34	15	90.9	0.086	86.5

Event 10 yr  
 IDF Data Set Region of Peel  
 a = 2221  
 b = 0.9080  
 c = 12.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.50	0.34	15	111.4	0.106	106.0



Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.  
 Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Rational Method**

**Pre-Development Flow Calculation - Phase I**

**2077-2105 Royal Windsor Drive**

**File No. UD22-046**

City of Mississauga

Date: December 2022

Event 25 yr

IDF Data Set Region of Peel

a = 3158  
 b = 0.9335  
 c = 15.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.50	0.34	15	132.0	0.126	125.6

Event 50 yr

IDF Data Set Region of Peel

a = 3886  
 b = 0.9495  
 c = 16.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.50	0.34	15	149.1	0.142	141.8

Event 100 yr

IDF Data Set Region of Peel

a = 4688  
 b = 0.9624  
 c = 17.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A1 pre (Towards Royal Windsor Rd) Phase I	0.685	0.50	0.34	15	166.9	0.159	158.8



Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.  
 Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Rational Method**

**Pre-Development Flow Calculation- Phase II**

2075-2105 Royal Windsor Drive

File No. UD22-046

City of Mississauga

Date: December 2022

**Input Parameters**

Area Number	Area (ha)	Actual C	Design C	Tc (min.)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.85	0.50	15

$$Q = 0.0028 C I A$$

$$I = \frac{a}{(t + c)^b}$$

**Rational Method Calculation**

Event 2 yr  
 IDF Data Set Region of Peel  
 a = 1070  
 b = 0.8759  
 c = 7.85

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.50	0.42	15	69.0	0.080	79.6

Event 5 yr  
 IDF Data Set Region of Peel  
 a = 1593  
 b = 0.8789  
 c = 11.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.50	0.42	15	90.9	0.105	104.8

Event 10 yr  
 IDF Data Set Region of Peel  
 a = 2221  
 b = 0.9080  
 c = 12.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.50	0.42	15	111.4	0.128	128.4



Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.  
 Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Rational Method**

**Pre-Development Flow Calculation- Phase II**

**2075-2105 Royal Windsor Drive**

**File No. UD22-046**

City of Mississauga

Date: December 2022

Event 25 yr

IDF Data Set Region of Peel

a = 3158  
 b = 0.9335  
 c = 15.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.50	0.42	15	132.0	0.152	152.1

Event 50 yr

IDF Data Set Region of Peel

a = 3886  
 b = 0.9495  
 c = 16.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.50	0.42	15	149.1	0.172	171.9

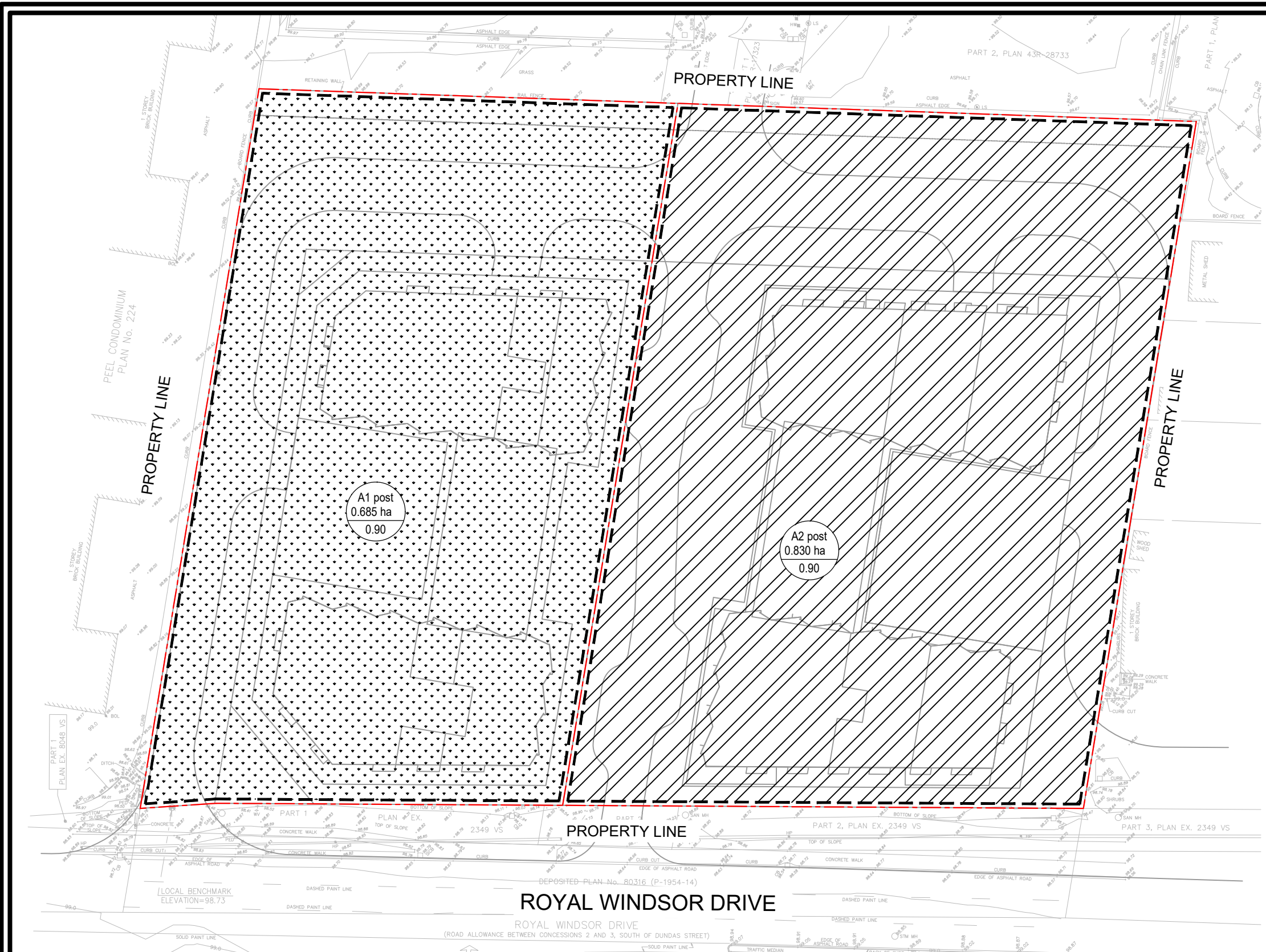
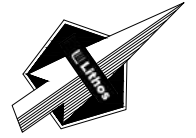
Event 100 yr

IDF Data Set Region of Peel

a = 4688  
 b = 0.9624  
 c = 17.00

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m <sup>3</sup> /s)	Q (L/s)
A2 pre (Towards Royal Windsor Rd) Phase II	0.830	0.50	0.42	15	166.9	0.192	192.4



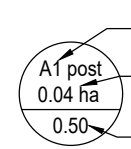


DRAINAGE AREA	LEGEND	AREA (ha)	TOTAL AREA (ha)
A1 POST		0.685	1.515
A2 POST		0.830	

RUN-OFF COEFFICIENTS			
DRAINAGE AREA	LAND USE	AREA (ha)	COMPOSITE COEFFICIENT
A1 POST - PHASE I	HARDSCAPE	0.685	0.90
A2 POST - PHASE II	HARDSCAPE	0.830	0.90



**LEGEND**



STORM DRAINAGE AREA NUMBER  
 DRAINAGE AREA (ha)  
 COMPOSITE RUNOFF COEFFICIENT



POST-DEVELOPMENT STORM DRAINAGE AREA



PROPERTY LINE

150 Bermonsdey Road, North York, Ontario M4A 1Y1

**POST-DEVELOPMENT STORM DRAINAGE AREA PLAN**  
 MIXED USE DEVELOPMENT  
 2077 & 2105 ROYAL WINDSOR DRIVE  
 MISSISSAUGA, ONTARIO

DATE: DECEMBER 2022 PROJECT No: UD22-046  
 SCALE: N.T.S. FIGURE No: DAP2



**Modified Rational Method - Two Year Storm**

**Site Flow and Storage Summary**

**2077-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A1 Post - Phase I**

Area (A1) = **0.685** ha  
 "C" = **0.90**  
 AC1= **0.62**  
 Tc = **15.0** min  
 Time Increment = **5.0** min  
 Allowable Release Rate = **65.7** L/s  
 Min.Storage = **47.3** m<sup>3</sup>

**2-Year Design Storm**

a= 1070  
 b= 0.88  
 c= 7.85  
 I = a / (c + t)<sup>b</sup>

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A1 Post) (m <sup>3</sup> /s)	Total Storm Volume (A1 Post) (m <sup>3</sup> )	Target Released Volume (A1 Post) (m <sup>3</sup> )	Total Required Storage (A1 Post) (m <sup>3</sup> )
15.0	69.0	0.118	106.42	59.1	47.30
20.0	58.1	0.099	119.31	78.8	40.48
25.0	50.2	0.086	129.05	98.5	30.52
30.0	44.4	0.076	136.79	118.2	18.55
35.0	39.8	0.068	143.16	137.9	5.21
40.0	36.1	0.062	148.53	157.7	0.00
45.0	33.1	0.057	153.17	177.4	0.00
50.0	30.6	0.052	157.23	197.1	0.00
55.0	28.5	0.049	160.84	216.8	0.00
60.0	26.6	0.046	164.08	236.5	0.00
65.0	25.0	0.043	167.02	256.2	0.00
70.0	23.6	0.040	169.71	275.9	0.00
75.0	22.3	0.038	172.18	295.6	0.00
80.0	21.2	0.036	174.47	315.3	0.00
85.0	20.2	0.035	176.61	335.0	0.00
90.0	19.3	0.033	178.60	354.7	0.00
95.0	18.5	0.032	180.47	374.4	0.00
100.0	17.7	0.030	182.23	394.1	0.00
105.0	17.0	0.029	183.89	413.8	0.00
110.0	16.4	0.028	185.47	433.5	0.00
115.0	15.8	0.027	186.97	453.3	0.00
120.0	15.3	0.026	188.40	473.0	0.00
125.0	14.8	0.025	189.77	492.7	0.00
130.0	14.3	0.024	191.07	512.4	0.00
135.0	13.9	0.024	192.33	532.1	0.00
140.0	13.5	0.023	193.53	551.8	0.00
145.0	13.1	0.022	194.69	571.5	0.00
150.0	12.7	0.022	195.80	591.2	0.00
155.0	12.4	0.021	196.88	610.9	0.00
160.0	12.0	0.021	197.91	630.6	0.00
165.0	11.7	0.020	198.92	650.3	0.00
170.0	11.4	0.020	199.89	670.0	0.00
175.0	11.2	0.019	200.83	689.7	0.00
180.0	10.9	0.019	201.75	709.4	0.00
185.0	10.7	0.018	202.63	729.1	0.00
190.0	10.4	0.018	203.50	748.9	0.00
195.0	10.2	0.017	204.34	768.6	0.00
200.0	10.0	0.017	205.15	788.3	0.00
205.0	9.8	0.017	205.95	808.0	0.00
210.0	9.6	0.016	206.72	827.7	0.00
215.0	9.4	0.016	207.48	847.4	0.00
220.0	9.2	0.016	208.22	867.1	0.00
225.0	9.0	0.015	208.94	886.8	0.00
230.0	8.9	0.015	209.65	906.5	0.00
235.0	8.7	0.015	210.34	926.2	0.00
240.0	8.6	0.015	211.01	945.9	0.00
245.0	8.4	0.014	211.67	965.6	0.00



**Modified Rational Method - Five Year Storm**

**Site Flow and Storage Summary**

**2077-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A1 Post - Phase I**

Area (A1) = **0.685** ha  
 "C" = **0.90**  
 AC1= **0.62**  
 Tc = **15.0** min  
 Time Increment = **5.0** min  
 Allowable Release Rate = **65.7** L/s  
 Min.Storage = **81.2** m<sup>3</sup>

**5-Year Design Storm**

a= 1593  
 b= 0.88  
 c= 11.00  
 I =  $a / (c + t)^b$

(1)	(2)	(3)	(4)	(5)	(6)
Time	Rainfall Intensity	Rainfall Rate (A1 Post)	Total Storm Volume (A1 Post)	Target Released Volume (A1 Post)	Total Required Storage (A1 Post)
(min)	(mm/hr)	(m <sup>3</sup> /s)	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )
15.0	90.9	0.156	140.11	59.1	80.99
20.0	77.9	0.133	160.06	78.8	81.23
25.0	68.3	0.117	175.43	98.5	76.90
30.0	60.9	0.104	187.78	118.2	69.54
35.0	55.1	0.094	198.00	137.9	60.05
40.0	50.3	0.086	206.67	157.7	49.01
45.0	46.3	0.079	214.15	177.4	36.79
50.0	43.0	0.074	220.72	197.1	23.65
55.0	40.1	0.069	226.55	216.8	9.78
60.0	37.6	0.064	231.78	236.5	0.00
65.0	35.4	0.061	236.52	256.2	0.00
70.0	33.5	0.057	240.84	275.9	0.00
75.0	31.8	0.054	244.81	295.6	0.00
80.0	30.2	0.052	248.48	315.3	0.00
85.0	28.8	0.049	251.88	335.0	0.00
90.0	27.6	0.047	255.06	354.7	0.00
95.0	26.4	0.045	258.04	374.4	0.00
100.0	25.4	0.043	260.83	394.1	0.00
105.0	24.4	0.042	263.47	413.8	0.00
110.0	23.5	0.040	265.97	433.5	0.00
115.0	22.7	0.039	268.34	453.3	0.00
120.0	21.9	0.038	270.59	473.0	0.00
125.0	21.2	0.036	272.73	492.7	0.00
130.0	20.6	0.035	274.78	512.4	0.00
135.0	20.0	0.034	276.75	532.1	0.00
140.0	19.4	0.033	278.63	551.8	0.00
145.0	18.8	0.032	280.43	571.5	0.00
150.0	18.3	0.031	282.17	591.2	0.00
155.0	17.8	0.031	283.84	610.9	0.00
160.0	17.4	0.030	285.45	630.6	0.00
165.0	16.9	0.029	287.01	650.3	0.00
170.0	16.5	0.028	288.52	670.0	0.00
175.0	16.1	0.028	289.98	689.7	0.00
180.0	15.8	0.027	291.39	709.4	0.00
185.0	15.4	0.026	292.76	729.1	0.00
190.0	15.1	0.026	294.08	748.9	0.00
195.0	14.7	0.025	295.38	768.6	0.00
200.0	14.4	0.025	296.63	788.3	0.00
205.0	14.1	0.024	297.85	808.0	0.00
210.0	13.9	0.024	299.04	827.7	0.00
215.0	13.6	0.023	300.20	847.4	0.00
220.0	13.3	0.023	301.33	867.1	0.00
225.0	13.1	0.022	302.43	886.8	0.00
230.0	12.8	0.022	303.51	906.5	0.00
235.0	12.6	0.022	304.56	926.2	0.00
240.0	12.4	0.021	305.59	945.9	0.00
245.0	12.2	0.021	306.59	965.6	0.00



**Modified Rational Method - Ten Year Storm**

**Site Flow and Storage Summary**

**2077-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

		<b>Controlled Area A1 Post - Phase I</b>			
		Area (A1) =	<b>0.685</b>	ha	
		"C <sub>10</sub> " =	<b>0.90</b>		
		AC1 =	<b>0.62</b>		
		Tc =	<b>15.0</b>	min	
		Time Increment =	<b>5.0</b>	min	
		Allowable Release Rate =	<b>65.7</b>	L/s	
		Min.Storage =	<b>117.4</b>	m <sup>3</sup>	
<b>Adjustment Factor</b>					
C(10) = 1.0 * C					
<b>10-Year Design Storm</b>					
a =	2221				
b =	0.91				
c =	12.00				
l =	a / (c + t) <sup>b</sup>				
(1)	(2)	(3)	(4)	(5)	(6)
<b>Time</b>	<b>Rainfall</b>	<b>Rainfall</b>	<b>Total Storm</b>	<b>Target Released</b>	<b>Total Required</b>
	<b>Intensity</b>	<b>Rate</b>	<b>Volume</b>	<b>Volume</b>	<b>Storage</b>
<b>(min)</b>	<b>(mm/hr)</b>	<b>(A1 Post)</b>	<b>(A1 Post)</b>	<b>(A1 Post)</b>	<b>(A1 Post)</b>
		<b>(m<sup>3</sup>/s)</b>	<b>(m<sup>3</sup>)</b>	<b>(m<sup>3</sup>)</b>	<b>(m<sup>3</sup>)</b>
15.0	111.4	0.191	171.69	59.1	112.57
20.0	95.5	0.163	196.19	78.8	117.37
25.0	83.7	0.143	214.95	98.5	116.42
30.0	74.6	0.128	229.90	118.2	111.66
35.0	67.3	0.115	242.18	137.9	104.23
40.0	61.4	0.105	252.50	157.7	94.84
45.0	56.5	0.097	261.34	177.4	83.98
50.0	52.4	0.090	269.03	197.1	71.97
55.0	48.8	0.084	275.81	216.8	59.04
60.0	45.7	0.078	281.85	236.5	45.37
65.0	43.0	0.074	287.28	256.2	31.10
70.0	40.6	0.070	292.20	275.9	16.31
75.0	38.5	0.066	296.69	295.6	1.09
80.0	36.6	0.063	300.82	315.3	0.00
85.0	34.9	0.060	304.62	335.0	0.00
90.0	33.3	0.057	308.15	354.7	0.00
95.0	31.9	0.055	311.44	374.4	0.00
100.0	30.6	0.052	314.51	394.1	0.00
105.0	29.4	0.050	317.40	413.8	0.00
110.0	28.3	0.049	320.12	433.5	0.00
115.0	27.3	0.047	322.68	453.3	0.00
120.0	26.4	0.045	325.11	473.0	0.00
125.0	25.5	0.044	327.41	492.7	0.00
130.0	24.7	0.042	329.61	512.4	0.00
135.0	23.9	0.041	331.70	532.1	0.00
140.0	23.2	0.040	333.69	551.8	0.00
145.0	22.5	0.039	335.60	571.5	0.00
150.0	21.9	0.037	337.43	591.2	0.00
155.0	21.3	0.036	339.18	610.9	0.00
160.0	20.7	0.036	340.87	630.6	0.00
165.0	20.2	0.035	342.50	650.3	0.00
170.0	19.7	0.034	344.06	670.0	0.00
175.0	19.2	0.033	345.57	689.7	0.00
180.0	18.8	0.032	347.03	709.4	0.00
185.0	18.3	0.031	348.44	729.1	0.00
190.0	17.9	0.031	349.80	748.9	0.00
195.0	17.5	0.030	351.13	768.6	0.00
200.0	17.1	0.029	352.41	788.3	0.00
205.0	16.8	0.029	353.65	808.0	0.00
210.0	16.4	0.028	354.86	827.7	0.00
215.0	16.1	0.028	356.04	847.4	0.00
220.0	15.8	0.027	357.18	867.1	0.00
225.0	15.5	0.027	358.30	886.8	0.00
230.0	15.2	0.026	359.38	906.5	0.00
235.0	14.9	0.026	360.44	926.2	0.00
240.0	14.7	0.025	361.47	945.9	0.00
245.0	14.4	0.025	362.47	965.6	0.00



**Modified Rational Method-Twenty Five Year Storm**

**Site Flow and Storage Summary**

**2077-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A1 Post - Phase I**

Area (A1) = **0.685** ha

"C<sub>25</sub>" = **0.99**

AC1 = **0.68**

T<sub>c</sub> = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **65.7** L/s

Min.Storage = **188.3** m<sup>3</sup>

**Adjustment Factor**

C(25) = 1.1 \* C

**25-Year Design Storm**

a = 3158

b = 0.93

c = 15.00

l = a / (c + t)<sup>b</sup>

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A1 Post) (m <sup>3</sup> /s)	Total Storm Volume (A1 Post) (m <sup>3</sup> )	Target Released Volume (A1 Post) (m <sup>3</sup> )	Total Required Storage (A1 Post) (m <sup>3</sup> )
15.0	132.0	0.249	223.76	59.1	164.64
20.0	114.3	0.215	258.36	78.8	179.54
25.0	100.9	0.190	285.10	98.5	186.57
30.0	90.4	0.170	306.50	118.2	188.26
35.0	81.9	0.154	324.09	137.9	186.14
40.0	75.0	0.141	338.86	157.7	181.20
45.0	69.1	0.130	351.48	177.4	174.11
50.0	64.1	0.121	362.41	197.1	165.34
55.0	59.8	0.113	372.01	216.8	155.23
60.0	56.1	0.106	380.51	236.5	144.03
65.0	52.8	0.100	388.12	256.2	131.93
70.0	49.9	0.094	394.98	275.9	119.08
75.0	47.3	0.089	401.20	295.6	105.60
80.0	45.0	0.085	406.88	315.3	91.58
85.0	42.9	0.081	412.10	335.0	77.09
90.0	41.0	0.077	416.92	354.7	62.20
95.0	39.2	0.074	421.38	374.4	46.95
100.0	37.6	0.071	425.53	394.1	31.39
105.0	36.2	0.068	429.40	413.8	15.56
110.0	34.8	0.066	433.03	433.5	0.00
115.0	33.6	0.063	436.43	453.3	0.00
120.0	32.4	0.061	439.64	473.0	0.00
125.0	31.3	0.059	442.68	492.7	0.00
130.0	30.3	0.057	445.55	512.4	0.00
135.0	29.4	0.055	448.27	532.1	0.00
140.0	28.5	0.054	450.86	551.8	0.00
145.0	27.7	0.052	453.32	571.5	0.00
150.0	26.9	0.051	455.68	591.2	0.00
155.0	26.1	0.049	457.92	610.9	0.00
160.0	25.4	0.048	460.08	630.6	0.00
165.0	24.8	0.047	462.14	650.3	0.00
170.0	24.2	0.046	464.12	670.0	0.00
175.0	23.6	0.044	466.02	689.7	0.00
180.0	23.0	0.043	467.86	709.4	0.00
185.0	22.5	0.042	469.62	729.1	0.00
190.0	21.9	0.041	471.32	748.9	0.00
195.0	21.5	0.040	472.97	768.6	0.00
200.0	21.0	0.040	474.55	788.3	0.00
205.0	20.5	0.039	476.09	808.0	0.00
210.0	20.1	0.038	477.58	827.7	0.00
215.0	19.7	0.037	479.02	847.4	0.00
220.0	19.3	0.036	480.42	867.1	0.00
225.0	18.9	0.036	481.77	886.8	0.00
230.0	18.6	0.035	483.09	906.5	0.00
235.0	18.2	0.034	484.37	926.2	0.00
240.0	17.9	0.034	485.62	945.9	0.00
245.0	17.6	0.033	486.83	965.6	0.00



**Modified Rational Method-Fifty Year Storm**

**Site Flow and Storage Summary**

**2077-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A1 Post - Phase I**

Area (A1) = **0.685** ha

"C<sub>50</sub>" = **1.08**

AC1 = **0.74**

T<sub>c</sub> = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **65.7** L/s

Min.Storage = **263.1** m<sup>3</sup>

**Adjustment Factor**

C(50) = 1.2 \* C

**50-Year Design Storm**

a = 3886

b = 0.95

c = 16.00

l = a / (c + t)<sup>b</sup>

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A1 Post) (m <sup>3</sup> /s)	Total Storm Volume (A1 Post) (m <sup>3</sup> )	Target Released Volume (A1 Post) (m <sup>3</sup> )	Total Required Storage (A1 Post) (m <sup>3</sup> )
15.0	149.1	0.306	275.75	59.1	216.63
20.0	129.4	0.266	319.00	78.8	240.17
25.0	114.3	0.235	352.43	98.5	253.89
30.0	102.5	0.211	379.14	118.2	260.90
35.0	92.9	0.191	401.05	137.9	263.10
40.0	85.0	0.175	419.39	157.7	261.74
45.0	78.4	0.161	435.02	177.4	257.66
50.0	72.8	0.150	448.52	197.1	251.45
55.0	67.9	0.139	460.32	216.8	243.54
60.0	63.6	0.131	470.74	236.5	234.26
65.0	59.9	0.123	480.03	256.2	223.85
70.0	56.6	0.116	488.38	275.9	212.49
75.0	53.6	0.110	495.93	295.6	200.33
80.0	51.0	0.105	502.79	315.3	187.49
85.0	48.6	0.100	509.07	335.0	174.06
90.0	46.4	0.095	514.85	354.7	160.13
95.0	44.4	0.091	520.18	374.4	145.75
100.0	42.6	0.088	525.13	394.1	130.99
105.0	40.9	0.084	529.72	413.8	115.88
110.0	39.4	0.081	534.02	433.5	100.47
115.0	37.9	0.078	538.04	453.3	84.79
120.0	36.6	0.075	541.82	473.0	68.85
125.0	35.4	0.073	545.37	492.7	52.70
130.0	34.2	0.070	548.73	512.4	36.35
135.0	33.2	0.068	551.90	532.1	19.82
140.0	32.1	0.066	554.91	551.8	3.12
145.0	31.2	0.064	557.77	571.5	0.00
150.0	30.3	0.062	560.49	591.2	0.00
155.0	29.5	0.061	563.08	610.9	0.00
160.0	28.7	0.059	565.55	630.6	0.00
165.0	27.9	0.057	567.92	650.3	0.00
170.0	27.2	0.056	570.18	670.0	0.00
175.0	26.5	0.055	572.35	689.7	0.00
180.0	25.9	0.053	574.44	709.4	0.00
185.0	25.3	0.052	576.44	729.1	0.00
190.0	24.7	0.051	578.37	748.9	0.00
195.0	24.1	0.050	580.22	768.6	0.00
200.0	23.6	0.049	582.01	788.3	0.00
205.0	23.1	0.047	583.74	808.0	0.00
210.0	22.6	0.046	585.41	827.7	0.00
215.0	22.1	0.046	587.02	847.4	0.00
220.0	21.7	0.045	588.58	867.1	0.00
225.0	21.3	0.044	590.10	886.8	0.00
230.0	20.9	0.043	591.56	906.5	0.00
235.0	20.5	0.042	592.98	926.2	0.00
240.0	20.1	0.041	594.37	945.9	0.00
245.0	19.7	0.041	595.71	965.6	0.00



**Modified Rational Method - Hundred Year Storm**

**Site Flow and Storage Summary**

**2077-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A1 Post - Phase I**

Area (A1) = **0.685** ha

"C<sub>100</sub>" = **1.13**

AC1 = **0.77**

T<sub>c</sub> = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **65.7** L/s

Min.Storage = **334.3** m<sup>3</sup>

**Adjustment Factor**

C(100) = 1.25 \* C

**100-Year Design Storm**

a = 4688

b = 0.96

c = 17.00

I = a / (c + t)<sup>b</sup>

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A1 Post) (m <sup>3</sup> /s)	Total Storm Volume (A1 Post) (m <sup>3</sup> )	Target Released Volume (A1 Post) (m <sup>3</sup> )	Total Required Storage (A1 Post) (m <sup>3</sup> )
15.0	166.9	0.357	321.52	59.1	262.40
20.0	145.1	0.311	372.80	78.8	293.97
25.0	128.5	0.275	412.48	98.5	313.95
30.0	115.3	0.247	444.20	118.2	325.95
35.0	104.6	0.224	470.18	137.9	332.23
40.0	95.7	0.205	491.91	157.7	334.26
45.0	88.3	0.189	510.38	177.4	333.02
50.0	82.0	0.175	526.30	197.1	329.23
55.0	76.5	0.164	540.19	216.8	323.41
60.0	71.7	0.153	552.42	236.5	315.94
65.0	67.5	0.144	563.30	256.2	307.11
70.0	63.7	0.136	573.04	275.9	297.14
75.0	60.4	0.129	581.82	295.6	286.22
80.0	57.4	0.123	589.79	315.3	274.49
85.0	54.7	0.117	597.06	335.0	262.05
90.0	52.2	0.112	603.73	354.7	249.01
95.0	50.0	0.107	609.87	374.4	235.44
100.0	47.9	0.103	615.54	394.1	221.41
105.0	46.0	0.099	620.81	413.8	206.96
110.0	44.3	0.095	625.71	433.5	192.16
115.0	42.7	0.091	630.28	453.3	177.03
120.0	41.2	0.088	634.57	473.0	161.61
125.0	39.8	0.085	638.60	492.7	145.93
130.0	38.5	0.082	642.39	512.4	130.01
135.0	37.3	0.080	645.96	532.1	113.88
140.0	36.1	0.077	649.34	551.8	97.55
145.0	35.0	0.075	652.54	571.5	81.05
150.0	34.0	0.073	655.58	591.2	64.38
155.0	33.1	0.071	658.47	610.9	47.57
160.0	32.2	0.069	661.23	630.6	30.61
165.0	31.3	0.067	663.85	650.3	13.53
170.0	30.5	0.065	666.36	670.0	0.00
175.0	29.8	0.064	668.76	689.7	0.00
180.0	29.0	0.062	671.05	709.4	0.00
185.0	28.3	0.061	673.26	729.1	0.00
190.0	27.7	0.059	675.37	748.9	0.00
195.0	27.0	0.058	677.41	768.6	0.00
200.0	26.4	0.057	679.36	788.3	0.00
205.0	25.9	0.055	681.24	808.0	0.00
210.0	25.3	0.054	683.06	827.7	0.00
215.0	24.8	0.053	684.81	847.4	0.00
220.0	24.3	0.052	686.51	867.1	0.00
225.0	23.8	0.051	688.14	886.8	0.00
230.0	23.3	0.050	689.72	906.5	0.00
235.0	22.9	0.049	691.26	926.2	0.00
240.0	22.5	0.048	692.74	945.9	0.00
245.0	22.1	0.047	694.18	965.6	0.00



### Water Quality Calculations

2077-2105 Royal Windsor Drive

File No. UD22-046

Date: December 2022

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Controlled Site	Overall TSS Removal
Rooftop/ Terraces/ Landscaped / Hardscaped Areas	Inherent	80%	0.685	100%	80%
Total			0.685	100%	80%





**Modified Rational Method - Two Year Storm**

**Site Flow and Storage Summary**

**2075-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A2 Post - Phase II**

Area (A2) = **0.830** ha  
 "C" = **0.90**  
 AC2= **0.75**  
 Tc = **15.0** min  
 Time Increment = **5.0** min  
 Allowable Release Rate = **79.6** L/s  
 Min.Storage = **57.3** m<sup>3</sup>

**2-Year Design Storm**

a= 1070  
 b= 0.88  
 c= 7.85  
 I =  $a / (c + t)^b$

(1)	(2)	(3)	(4)	(5)	(6)
Time  (min)	Rainfall  Intensity  (mm/hr)	Rainfall  Rate (A2 Post)  (m <sup>3</sup> /s)	Total Storm  Volume (A2 Post)  (m <sup>3</sup> )	Target Released  Volume (A2 Post)  (m <sup>3</sup> )	Total Required  Storage (A2 Post)  (m <sup>3</sup> )
15.0	69.0	0.143	128.94	71.6	57.31
20.0	58.1	0.120	144.56	95.5	49.05
25.0	50.2	0.104	156.37	119.4	36.98
30.0	44.4	0.092	165.75	143.3	22.48
35.0	39.8	0.083	173.46	167.1	6.31
40.0	36.1	0.075	179.97	191.0	0.00
45.0	33.1	0.069	185.59	214.9	0.00
50.0	30.6	0.064	190.51	238.8	0.00
55.0	28.5	0.059	194.89	262.7	0.00
60.0	26.6	0.055	198.82	286.5	0.00
65.0	25.0	0.052	202.38	310.4	0.00
70.0	23.6	0.049	205.64	334.3	0.00
75.0	22.3	0.046	208.63	358.2	0.00
80.0	21.2	0.044	211.41	382.1	0.00
85.0	20.2	0.042	213.99	405.9	0.00
90.0	19.3	0.040	216.40	429.8	0.00
95.0	18.5	0.038	218.67	453.7	0.00
100.0	17.7	0.037	220.80	477.6	0.00
105.0	17.0	0.035	222.82	501.4	0.00
110.0	16.4	0.034	224.73	525.3	0.00
115.0	15.8	0.033	226.55	549.2	0.00
120.0	15.3	0.032	228.28	573.1	0.00
125.0	14.8	0.031	229.94	597.0	0.00
130.0	14.3	0.030	231.52	620.8	0.00
135.0	13.9	0.029	233.04	644.7	0.00
140.0	13.5	0.028	234.50	668.6	0.00
145.0	13.1	0.027	235.90	692.5	0.00
150.0	12.7	0.026	237.25	716.3	0.00
155.0	12.4	0.026	238.55	740.2	0.00
160.0	12.0	0.025	239.81	764.1	0.00
165.0	11.7	0.024	241.03	788.0	0.00
170.0	11.4	0.024	242.20	811.9	0.00
175.0	11.2	0.023	243.34	835.7	0.00
180.0	10.9	0.023	244.45	859.6	0.00
185.0	10.7	0.022	245.53	883.5	0.00
190.0	10.4	0.022	246.57	907.4	0.00
195.0	10.2	0.021	247.59	931.3	0.00
200.0	10.0	0.021	248.58	955.1	0.00
205.0	9.8	0.020	249.54	979.0	0.00
210.0	9.6	0.020	250.48	1002.9	0.00
215.0	9.4	0.019	251.40	1026.8	0.00
220.0	9.2	0.019	252.30	1050.6	0.00
225.0	9.0	0.019	253.17	1074.5	0.00
230.0	8.9	0.018	254.03	1098.4	0.00
235.0	8.7	0.018	254.86	1122.3	0.00
240.0	8.6	0.018	255.68	1146.2	0.00
245.0	8.4	0.017	256.48	1170.0	0.00



**Modified Rational Method - Five Year Storm**

**Site Flow and Storage Summary**

**2075-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A2 Post - Phase II**

Area (A2) = **0.830** ha  
 "C" = **0.90**  
 AC2= **0.75**  
 Tc = **15.0** min  
 Time Increment = **5.0** min  
 Allowable Release Rate = **79.6** L/s  
 Min.Storage = **98.4** m<sup>3</sup>

**5-Year Design Storm**

a= 1593  
 b= 0.88  
 c= 11.00  
 I =  $a / (c + t)^b$

(1)	(2)	(3)	(4)	(5)	(6)
Time	Rainfall Intensity	Rainfall Rate (A2 Post)	Total Storm Volume (A2 Post)	Target Released Volume (A2 Post)	Total Required Storage (A2 Post)
(min)	(mm/hr)	(m <sup>3</sup> /s)	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )
15.0	90.9	0.189	169.77	71.6	98.13
20.0	77.9	0.162	193.94	95.5	98.42
25.0	68.3	0.142	212.56	119.4	93.17
30.0	60.9	0.126	227.53	143.3	84.26
35.0	55.1	0.114	239.91	167.1	72.77
40.0	50.3	0.104	250.42	191.0	59.39
45.0	46.3	0.096	259.49	214.9	44.58
50.0	43.0	0.089	267.44	238.8	28.66
55.0	40.1	0.083	274.51	262.7	11.84
60.0	37.6	0.078	280.84	286.5	0.00
65.0	35.4	0.073	286.58	310.4	0.00
70.0	33.5	0.069	291.82	334.3	0.00
75.0	31.8	0.066	296.63	358.2	0.00
80.0	30.2	0.063	301.07	382.1	0.00
85.0	28.8	0.060	305.20	405.9	0.00
90.0	27.6	0.057	309.05	429.8	0.00
95.0	26.4	0.055	312.66	453.7	0.00
100.0	25.4	0.053	316.05	477.6	0.00
105.0	24.4	0.051	319.24	501.4	0.00
110.0	23.5	0.049	322.27	525.3	0.00
115.0	22.7	0.047	325.14	549.2	0.00
120.0	21.9	0.046	327.87	573.1	0.00
125.0	21.2	0.044	330.47	597.0	0.00
130.0	20.6	0.043	332.95	620.8	0.00
135.0	20.0	0.041	335.33	644.7	0.00
140.0	19.4	0.040	337.61	668.6	0.00
145.0	18.8	0.039	339.79	692.5	0.00
150.0	18.3	0.038	341.90	716.3	0.00
155.0	17.8	0.037	343.93	740.2	0.00
160.0	17.4	0.036	345.88	764.1	0.00
165.0	16.9	0.035	347.77	788.0	0.00
170.0	16.5	0.034	349.59	811.9	0.00
175.0	16.1	0.033	351.36	835.7	0.00
180.0	15.8	0.033	353.07	859.6	0.00
185.0	15.4	0.032	354.73	883.5	0.00
190.0	15.1	0.031	356.34	907.4	0.00
195.0	14.7	0.031	357.90	931.3	0.00
200.0	14.4	0.030	359.42	955.1	0.00
205.0	14.1	0.029	360.90	979.0	0.00
210.0	13.9	0.029	362.34	1002.9	0.00
215.0	13.6	0.028	363.75	1026.8	0.00
220.0	13.3	0.028	365.11	1050.6	0.00
225.0	13.1	0.027	366.45	1074.5	0.00
230.0	12.8	0.027	367.75	1098.4	0.00
235.0	12.6	0.026	369.03	1122.3	0.00
240.0	12.4	0.026	370.27	1146.2	0.00
245.0	12.2	0.025	371.49	1170.0	0.00



**Modified Rational Method - Ten Year Storm**

**Site Flow and Storage Summary**

**2075-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A2 Post - Phase II**

Area (A2) = **0.830** ha

"C<sub>10</sub>" = **0.90**

AC2 = **0.75**

Tc = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **79.6** L/s

Min.Storage = **142.2** m<sup>3</sup>

**Adjustment Factor**

C(10) = 1.0 \* C

**10-Year Design Storm**

a = 2221

b = 0.91

c = 12.00

l = a / (c + t)<sup>b</sup>

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A2 Post) (m <sup>3</sup> /s)	Total Storm Volume (A2 Post) (m <sup>3</sup> )	Target Released Volume (A2 Post) (m <sup>3</sup> )	Total Required Storage (A2 Post) (m <sup>3</sup> )
15.0	111.4	0.231	208.03	71.6	136.40
20.0	95.5	0.198	237.72	95.5	142.21
25.0	83.7	0.174	260.45	119.4	141.06
30.0	74.6	0.155	278.57	143.3	135.30
35.0	67.3	0.140	293.44	167.1	126.29
40.0	61.4	0.127	305.95	191.0	114.92
45.0	56.5	0.117	316.66	214.9	101.76
50.0	52.4	0.109	325.98	238.8	87.20
55.0	48.8	0.101	334.20	262.7	71.54
60.0	45.7	0.095	341.52	286.5	54.98
65.0	43.0	0.089	348.09	310.4	37.68
70.0	40.6	0.084	354.06	334.3	19.76
75.0	38.5	0.080	359.50	358.2	1.32
80.0	36.6	0.076	364.49	382.1	0.00
85.0	34.9	0.072	369.10	405.9	0.00
90.0	33.3	0.069	373.38	429.8	0.00
95.0	31.9	0.066	377.36	453.7	0.00
100.0	30.6	0.064	381.09	477.6	0.00
105.0	29.4	0.061	384.59	501.4	0.00
110.0	28.3	0.059	387.88	525.3	0.00
115.0	27.3	0.057	390.99	549.2	0.00
120.0	26.4	0.055	393.93	573.1	0.00
125.0	25.5	0.053	396.72	597.0	0.00
130.0	24.7	0.051	399.38	620.8	0.00
135.0	23.9	0.050	401.91	644.7	0.00
140.0	23.2	0.048	404.33	668.6	0.00
145.0	22.5	0.047	406.64	692.5	0.00
150.0	21.9	0.045	408.86	716.3	0.00
155.0	21.3	0.044	410.98	740.2	0.00
160.0	20.7	0.043	413.03	764.1	0.00
165.0	20.2	0.042	414.99	788.0	0.00
170.0	19.7	0.041	416.89	811.9	0.00
175.0	19.2	0.040	418.72	835.7	0.00
180.0	18.8	0.039	420.49	859.6	0.00
185.0	18.3	0.038	422.20	883.5	0.00
190.0	17.9	0.037	423.85	907.4	0.00
195.0	17.5	0.036	425.45	931.3	0.00
200.0	17.1	0.036	427.01	955.1	0.00
205.0	16.8	0.035	428.52	979.0	0.00
210.0	16.4	0.034	429.98	1002.9	0.00
215.0	16.1	0.033	431.40	1026.8	0.00
220.0	15.8	0.033	432.79	1050.6	0.00
225.0	15.5	0.032	434.14	1074.5	0.00
230.0	15.2	0.032	435.45	1098.4	0.00
235.0	14.9	0.031	436.73	1122.3	0.00
240.0	14.7	0.030	437.98	1146.2	0.00
245.0	14.4	0.030	439.20	1170.0	0.00



**Modified Rational Method-Twenty Five Year Storm**

**Site Flow and Storage Summary**

**2075-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A2 Post - Phase II**

Area (A2) = **0.830** ha

"C<sub>25</sub>" = **0.99**

AC2= **0.82**

T<sub>c</sub> = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **79.6** L/s

Min.Storage = **228.1** m<sup>3</sup>

**Adjustment Factor**

C(25) = 1.1 \* C

**25-Year Design Storm**

a= 3158

b= 0.93

c= 15.00

l = a / (c + t)^b

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A2 Post) (m <sup>3</sup> /s)	Total Storm Volume (A2 Post) (m <sup>3</sup> )	Target Released Volume (A2 Post) (m <sup>3</sup> )	Total Required Storage (A2 Post) (m <sup>3</sup> )
15.0	132.0	0.301	271.13	71.6	199.49
20.0	114.3	0.261	313.05	95.5	217.54
25.0	100.9	0.230	345.45	119.4	226.06
30.0	90.4	0.206	371.38	143.3	228.11
35.0	81.9	0.187	392.69	167.1	225.55
40.0	75.0	0.171	410.59	191.0	219.56
45.0	69.1	0.158	425.88	214.9	210.97
50.0	64.1	0.146	439.13	238.8	200.34
55.0	59.8	0.137	450.75	262.7	188.09
60.0	56.1	0.128	461.06	286.5	174.52
65.0	52.8	0.121	470.28	310.4	159.86
70.0	49.9	0.114	478.59	334.3	144.29
75.0	47.3	0.108	486.13	358.2	127.95
80.0	45.0	0.103	493.01	382.1	110.96
85.0	42.9	0.098	499.34	405.9	93.41
90.0	41.0	0.094	505.17	429.8	75.36
95.0	39.2	0.090	510.57	453.7	56.89
100.0	37.6	0.086	515.60	477.6	38.04
105.0	36.2	0.083	520.29	501.4	18.85
110.0	34.8	0.079	524.69	525.3	0.00
115.0	33.6	0.077	528.82	549.2	0.00
120.0	32.4	0.074	532.71	573.1	0.00
125.0	31.3	0.072	536.38	597.0	0.00
130.0	30.3	0.069	539.86	620.8	0.00
135.0	29.4	0.067	543.16	644.7	0.00
140.0	28.5	0.065	546.30	668.6	0.00
145.0	27.7	0.063	549.28	692.5	0.00
150.0	26.9	0.061	552.13	716.3	0.00
155.0	26.1	0.060	554.86	740.2	0.00
160.0	25.4	0.058	557.47	764.1	0.00
165.0	24.8	0.057	559.97	788.0	0.00
170.0	24.2	0.055	562.36	811.9	0.00
175.0	23.6	0.054	564.67	835.7	0.00
180.0	23.0	0.052	566.89	859.6	0.00
185.0	22.5	0.051	569.03	883.5	0.00
190.0	21.9	0.050	571.09	907.4	0.00
195.0	21.5	0.049	573.08	931.3	0.00
200.0	21.0	0.048	575.01	955.1	0.00
205.0	20.5	0.047	576.87	979.0	0.00
210.0	20.1	0.046	578.67	1002.9	0.00
215.0	19.7	0.045	580.42	1026.8	0.00
220.0	19.3	0.044	582.11	1050.6	0.00
225.0	18.9	0.043	583.75	1074.5	0.00
230.0	18.6	0.042	585.35	1098.4	0.00
235.0	18.2	0.042	586.90	1122.3	0.00
240.0	17.9	0.041	588.41	1146.2	0.00
245.0	17.6	0.040	589.88	1170.0	0.00



**Modified Rational Method-Fifty Year Storm**

**Site Flow and Storage Summary**

**2075-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A2 Post - Phase II**

Area (A2) = **0.830** ha

"C<sub>50</sub>" = **1.08**

AC2= **0.90**

T<sub>c</sub> = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **79.6** L/s

Min.Storage = **318.8** m<sup>3</sup>

**Adjustment Factor**

C(50) = 1.2 \* C

**50-Year Design Storm**

a= 3886

b= 0.95

c= 16.00

I = a / (c + t)<sup>b</sup>

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A2 Post) (m <sup>3</sup> /s)	Total Storm Volume (A2 Post) (m <sup>3</sup> )	Target Released Volume (A2 Post) (m <sup>3</sup> )	Total Required Storage (A2 Post) (m <sup>3</sup> )
15.0	149.1	0.371	334.12	71.6	262.48
20.0	129.4	0.322	386.52	95.5	291.01
25.0	114.3	0.285	427.03	119.4	307.64
30.0	102.5	0.255	459.39	143.3	316.13
35.0	92.9	0.231	485.94	167.1	318.79
40.0	85.0	0.212	508.17	191.0	317.14
45.0	78.4	0.195	527.10	214.9	312.20
50.0	72.8	0.181	543.46	238.8	304.68
55.0	67.9	0.169	557.76	262.7	295.10
60.0	63.6	0.158	570.39	286.5	283.85
65.0	59.9	0.149	581.65	310.4	271.23
70.0	56.6	0.141	591.76	334.3	257.46
75.0	53.6	0.134	600.90	358.2	242.73
80.0	51.0	0.127	609.22	382.1	227.17
85.0	48.6	0.121	616.84	405.9	210.91
90.0	46.4	0.116	623.83	429.8	194.02
95.0	44.4	0.111	630.29	453.7	176.61
100.0	42.6	0.106	636.28	477.6	158.72
105.0	40.9	0.102	641.86	501.4	140.41
110.0	39.4	0.098	647.06	525.3	121.74
115.0	37.9	0.094	651.93	549.2	102.73
120.0	36.6	0.091	656.51	573.1	83.43
125.0	35.4	0.088	660.81	597.0	63.86
130.0	34.2	0.085	664.88	620.8	44.05
135.0	33.2	0.083	668.73	644.7	24.01
140.0	32.1	0.080	672.37	668.6	3.78
145.0	31.2	0.078	675.83	692.5	0.00
150.0	30.3	0.075	679.13	716.3	0.00
155.0	29.5	0.073	682.27	740.2	0.00
160.0	28.7	0.071	685.27	764.1	0.00
165.0	27.9	0.070	688.13	788.0	0.00
170.0	27.2	0.068	690.88	811.9	0.00
175.0	26.5	0.066	693.51	835.7	0.00
180.0	25.9	0.064	696.03	859.6	0.00
185.0	25.3	0.063	698.46	883.5	0.00
190.0	24.7	0.061	700.79	907.4	0.00
195.0	24.1	0.060	703.04	931.3	0.00
200.0	23.6	0.059	705.21	955.1	0.00
205.0	23.1	0.058	707.31	979.0	0.00
210.0	22.6	0.056	709.33	1002.9	0.00
215.0	22.1	0.055	711.28	1026.8	0.00
220.0	21.7	0.054	713.18	1050.6	0.00
225.0	21.3	0.053	715.01	1074.5	0.00
230.0	20.9	0.052	716.78	1098.4	0.00
235.0	20.5	0.051	718.51	1122.3	0.00
240.0	20.1	0.050	720.18	1146.2	0.00
245.0	19.7	0.049	721.80	1170.0	0.00





**Modified Rational Method - Hundred Year Storm**

**Site Flow and Storage Summary**

**2075-2105 Royal Windsor Drive**

Date: December 2022

File No. UD22-046

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

**Controlled Area A2 Post - Phase II**

Area (A2) = **0.830** ha

"C<sub>100</sub>" = **1.13**

AC2= **0.93**

T<sub>c</sub> = **15.0** min

Time Increment = **5.0** min

Allowable Release Rate = **79.6** L/s

Min.Storage = **405.0** m<sup>3</sup>

**Adjustment Factor**

C(100) = 1.25 \* C

**100-Year Design Storm**

a= 4688

b= 0.96

c= 17.00

l = a / (c + t)^b

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	Rainfall Intensity (mm/hr)	Rainfall Rate (A2 Post) (m <sup>3</sup> /s)	Total Storm Volume (A2 Post) (m <sup>3</sup> )	Target Released Volume (A2 Post) (m <sup>3</sup> )	Total Required Storage (A2 Post) (m <sup>3</sup> )
15.0	166.9	0.433	389.58	71.6	317.95
20.0	145.1	0.376	451.71	95.5	356.20
25.0	128.5	0.333	499.79	119.4	380.40
30.0	115.3	0.299	538.22	143.3	394.95
35.0	104.6	0.271	569.71	167.1	402.56
40.0	95.7	0.248	596.04	191.0	405.01
45.0	88.3	0.229	618.42	214.9	403.51
50.0	82.0	0.213	637.71	238.8	398.93
55.0	76.5	0.198	654.53	262.7	391.87
60.0	71.7	0.186	669.36	286.5	382.82
65.0	67.5	0.175	682.54	310.4	372.12
70.0	63.7	0.165	694.34	334.3	360.04
75.0	60.4	0.157	704.98	358.2	346.81
80.0	57.4	0.149	714.64	382.1	332.59
85.0	54.7	0.142	723.45	405.9	317.52
90.0	52.2	0.135	731.53	429.8	301.72
95.0	50.0	0.130	738.96	453.7	285.28
100.0	47.9	0.124	745.84	477.6	268.27
105.0	46.0	0.119	752.22	501.4	250.77
110.0	44.3	0.115	758.16	525.3	232.84
115.0	42.7	0.111	763.70	549.2	214.50
120.0	41.2	0.107	768.90	573.1	195.82
125.0	39.8	0.103	773.77	597.0	176.82
130.0	38.5	0.100	778.37	620.8	157.53
135.0	37.3	0.097	782.70	644.7	137.99
140.0	36.1	0.094	786.79	668.6	118.20
145.0	35.0	0.091	790.67	692.5	98.21
150.0	34.0	0.088	794.36	716.3	78.01
155.0	33.1	0.086	797.86	740.2	57.63
160.0	32.2	0.083	801.19	764.1	37.09
165.0	31.3	0.081	804.37	788.0	16.39
170.0	30.5	0.079	807.41	811.9	0.00
175.0	29.8	0.077	810.32	835.7	0.00
180.0	29.0	0.075	813.10	859.6	0.00
185.0	28.3	0.073	815.77	883.5	0.00
190.0	27.7	0.072	818.33	907.4	0.00
195.0	27.0	0.070	820.80	931.3	0.00
200.0	26.4	0.069	823.17	955.1	0.00
205.0	25.9	0.067	825.45	979.0	0.00
210.0	25.3	0.066	827.65	1002.9	0.00
215.0	24.8	0.064	829.77	1026.8	0.00
220.0	24.3	0.063	831.82	1050.6	0.00
225.0	23.8	0.062	833.81	1074.5	0.00
230.0	23.3	0.061	835.72	1098.4	0.00
235.0	22.9	0.059	837.58	1122.3	0.00
240.0	22.5	0.058	839.38	1146.2	0.00
245.0	22.1	0.057	841.12	1170.0	0.00



### Water Quality Calculations

2075-2105 Royal Windsor Drive

File No. UD22-046

Date: December 2022

Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.

Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Controlled Site	Overall TSS Removal
Rooftop/ Terraces/ Landscaped / Hardscaped Areas	Inherent	80%	0.830	100%	80%
Total			0.830	100%	80%

## **Appendix D**

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# **Sanitary Data Analysis**



**SANITARY SEWER DESIGN SHEET**  
**2077-2105 Royal Windsor Drive**  
**CITY OF MISSISSAUGA**

LOCATION	RESIDENTIAL					SECTION POP.	COMMERCIAL		FLOW							SEWER DESIGN																					
	SECTION AREA (ha.)	Studio @ 1.0 ppu	1 Bed Apts. @ 2.0 ppu	2 Bed Apts. @ 3.0 ppu	3 Bed Apts. @ 4.0 ppu	(persons)	COMMERCIAL/OFFICE AREA (ha.)	SECTION POP. @ 50p/ha (persons)	TOTAL ACCUM. POP. (persons)	AVERAGE RESIDENTIAL FLOW @ 302.8 L/c/d (L/s)	HARMON PEAKING FACTOR	RES. PEAK FLOW (L/s)	AVERAGE COMMERCIAL FLOW @ 50 L/c/d (L/s)	TOTAL ACCUM. AREA (ha.)	INFILT. @ 0.2 L/s/ha. (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE DIA. (mm)	SLOPE (%)	FULL FLOW CAPACITY n = 0.013 (L/sec)	% 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																
<b>Existing Condition</b>																																					
Commercial Development	1.515	0	0	0	0	0	0.38	19	0	0.00	4.50	0.000	0.01	1.515	0.303	<b>0.31</b>																					
<b>Proposed Condition</b>																																					
Phase I - West Block	0.685	3	335	262	50	1,659	0.10	5	1,659	5.81	3.65	21.21	0.00	0.685	0.137	<b>21.35</b>		200	2.0%	46.38	46.03%																
Phase II - East Block	0.830	6	313	220	48	1,484	0.10	5	1,484	5.20	3.68	19.15	0.00	0.830	0.166	<b>19.32</b>		200	2.0%	46.38	41.65%																
Commercial Flow Rate - 50 litres/capita/day Residential Flow Rate - 302.8 litres/capita/day Infiltration - 0.2 L/ha Peaking Factor = $1 + [14 / (4 + P^{0.5})]$ , P=Population in thousands Site Area: 1.086 ha																																					
<b>Total Net Flow</b>																																					



Prepared by: Dimitra Savvaoglou P.E., M.A.Sc.  
 Reviewed by: Gina Liaropoulou P.Eng., M.A.Sc.  
 Date: December 2022

**Project: 2077-2105 Royal Windsor Drive**  
**Project No: UD22-046**  
 City of Mississauga

# **Appendix E**

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## **Water Data Analysis**





# WATER DEMAND

2077-2105 Royal Windsor Drive, Mississauga

File No: PUD22-046

Date: December 2022

Prepared by: Dimitra Savvaoglou, P.E., M.A.Sc.

Reviewed By: Gina Liaropoulou, P.Eng., M.A.Sc.

## Fire Flow Calculation

### PHASE I

1  $F = 220 C (A)^{1/2}$

Where F= Fire flow in Lpm

C= construction type coefficient

= 0.8 non-combustible construction

A = total floor area in sq.m. excluding basements, includes garage\*

		<u>Area Applied</u>
Level 4 =	2538.85 m <sup>2</sup>	100%
Level 3 =	2538.85 m <sup>2</sup>	25%
Level 5 =	2538.85 m <sup>2</sup>	25%
=	3,808 sq.m.	

Note: The levels indicated, reference the worst case scenario for townhouse fire separation according to the OBC

F = 10,861.18 L/min

F = 10,900 L/min Round to nearest 100 l/min

2 Occupancy Reduction

25% non-combustible occupancy

F = 8175 L/min

3 Sprinkler Reduction

30% Reduction for NFPA Sprinkler System

F = 5723 l/min

4 Separation Charge

0% North >45m

10% East 20.1 to 30m

10% West 20.1 to 30m

0% South >45m

20% Total Separation Charge 1635 L/min

F = 7,358.00 L/min

122.63 L/s

F = 1944 US GPM

## Domestic Flow Calculations

Residential Population =	1659 Persons	(from sanitary design sheet for Residential)
Retail Area =	987 m <sup>2</sup>	(from sanitary design sheet for Commercial)
Average Day Demand (Residential Use)=	280 L/cap/day	1 US Gallon=3.785 L
Average Day Demand (Retail Use) =	2.8 L/m <sup>2</sup> /day	(OBC)
=	5.41 L/s	
=	86 US GPM	1 US GPM=15.852L/s

Max. Daily Demand Peaking Factor = 2.0 (For residential)  
 Max. Daily Demand = 10.82 L/s = 171 US GPM

or  
 Max. Hourly Demand Peaking Factor = 3.0  
 Max. Hourly Demand = 16.23 L/s = 257 US GPM

**Max Daily Demand = 10.82 L/s**  
**Fire Flow = 122.63 L/s**

**Required 'Design' Flow = 133.45 L/s**  
**2115 US GPM**

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



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### Pressure Losses

Hazen-Williams Formula

$$V = kCR_h^{0.63} S^{0.54}$$

k= 0.85 - conversion factor (0.849 for SI units and 1.318 for US customary units)

C= 140 - roughness coefficient (PVC : 140-150)

S=  $h_f/L$

R<sub>h</sub>= D/4 - hydraulic radius (D/4 for full flow, A/P<sub>w</sub> for partially flow)

### Fire Fighting and Domestic Head Loss

Flow Requirements= 133.5 L/s

Diameter= 150 mm

Area= 1.77E-02 m<sup>2</sup>

L= 10 m

V= 7.55 m/s

S= 2.80E-01

R<sub>h</sub>= 0.04

H<sub>f</sub>= 2.80 m

= 3.98 psi

### Flow Test (dated: September 28, 2022)

when:	Static Pressure =	61 psi	Flow =	0	GPM =	0.00 L/s
	Residual Pressure =	54 psi	Flow =	1609.42	GPM =	101.55 L/s

#### Pressure

<u>(psi)</u>	<u>Flow (L/s)</u>
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61      0.00

54      101.55

**49.4      133.45**

Based on the Pressure/Flow relationship, we have to confirm that the flow requirement of 133.45 L/s can be provided at minimum pressure (20.3 psi + Losses) as set out by the FUS guidelines

**Fire Flow is above minimum of 24.28 psi (20.3+H<sub>f</sub>)**

Since the flow of 133.45 L/s required for the proposed development is provided in the existing watermain at 49.4 psi (which is more than the minimum of 24.28 psi), we anticipate that the existing watermain infrastructure can support the proposed development.



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## Fire Flow Calculation

1  $F = 220 C (A)^{1/2}$

### PHASE II

Where F= Fire flow in Lpm

C= construction type coefficient

= 0.8 non-combustible construction

A = total floor area in sq.m. excluding basements, includes garage\*

	Area Applied
Level 4 =	2630 m <sup>2</sup> 100%
Level 3 =	2630 m <sup>2</sup> 25%
Level 5 =	2630 m <sup>2</sup> 25%
=	3,945 sq.m.

Note: The levels indicated, reference the worst case scenario for townhouse fire separation according to the OBC

F = 11,054.59 L/min

F = 11,100 L/min Round to nearest 100 l/min

2 Occupancy Reduction

25% non-combustible occupancy

F = 8325 L/min

3 Sprinkler Reduction

30% Reduction for NFPA Sprinkler System

F = 5828 l/min

4 Separation Charge

0% North >45m

20% East 3.1 to 10m

10% West 20.1 to 30m

0% South >45m

30% Total Separation Charge 2498 L/min

F = 8,326.00 L/min

138.77 L/s

F = 2200 US GPM

## Domestic Flow Calculations

Population = 1484 Persons (from sanitary design sheet for Residential)

Retail Area = 990 m<sup>2</sup> (from sanitary design sheet for Commercial)

Average Day Demand (Residential Use) = 280 L/cap/day 1 US Gallon=3.785 L

Average Day Demand (Retail Use) = 2.8 L/m<sup>2</sup>/day (OBC)

= 4.84 L/s

= 77 US GPM

1 US GPM=15.852L/s

Max. Daily Demand Peaking Factor = 2.0

Max. Daily Demand = 9.68 L/s

(For residential)

= 153 US GPM

or

Max. Hourly Demand Peaking Factor = 3.0

Max. Hourly Demand = 14.52 L/s

= 230 US GPM

Max Daily Demand = 9.68 L/s

Fire Flow = 138.77 L/s

Required 'Design' Flow = 148.45 L/s

2353 US GPM

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

1) Fire Flow + Maximum Daily Demand

2) Maximum Hourly Demand



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## Pressure Losses

*Hazen-Williams Formula*

$$V = kCR_h^{0.63}XS^{0.54}$$

k= 0.85 - conversion factor (0.849 for SI units and 1.318 for US customary units)

C= 140 - roughness coefficient (PVC : 140-150)

S=  $h_f/L$

Rh= D/4 - hydraulic radius (D/4 for full flow, A/P<sub>w</sub> for partially flow)

## **Fire Fighting and Domestic Head Loss**

Flow Requirements= 148.4 L/s  
 Diameter= 150 mm  
 Area= 1.77E-02 m<sup>2</sup>  
 L= 6.0 m  
 V= 8.40 m/s  
 S= 3.41E-01  
 R<sub>h</sub>= 0.04  
 H<sub>f</sub>= 2.05 m  
 = 2.91 psi

## **Flow Test** (dated: September 28, 2022)

when:	Static Pressure =	61 psi	Flow =	0	GPM =	0.00 L/s
	Residual Pressure =	54 psi	Flow =	1609.42	GPM =	101.55 L/s

<b>Pressure (psi)</b>	<b>Flow (L/s)</b>
61	0.00
54	101.55

Based on the Pressure/Flow relationship, we have to confirm that the flow requirement of 148.45 L/s can be provided at minimum pressure (20.3 psi + Losses) as set out by the FUS guidelines

**46.9      148.45**

**Fire Flow is above minimum of      23.21    psi (20.3+H<sub>f</sub>)**

Since the flow of 148.45 L/s required for the proposed development is provided in the existing watermain at 46.9 psi (which is more than the minimum of 23.21 psi), we anticipate that the existing watermain infrastructure can support the proposed development.

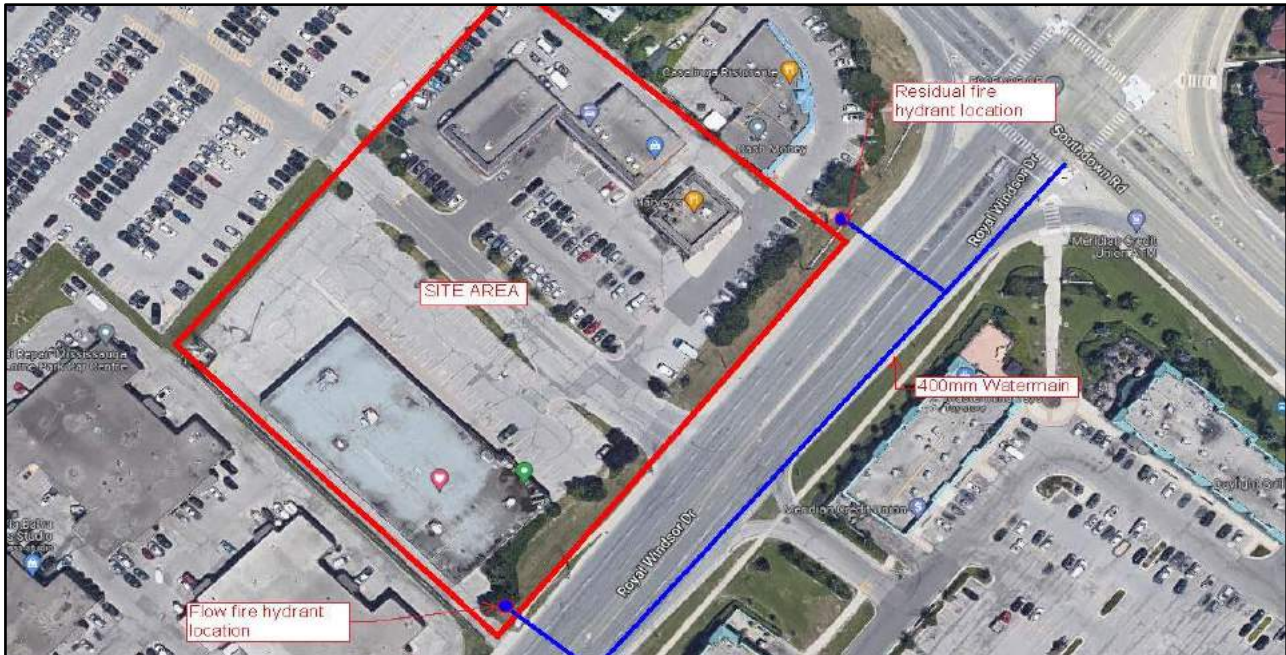
## General Information

Report No. : **FHR-22-09-28-1** Date : **28-Sep-22**  
 Project No. : **PUD 22-046**  
 Site Address/Location: **2075-2105 Royal Windsor Dr**  
 Region/Municipality: **City of Mississauga**  
 Residual Fire Hydrant Location/description : **2075 Royal Windsor Dr.**  
 Flow Fire Hydrant Location/description : **2105 Royal Windsor Dr.**  
 Watermain Pipe Size (mm) : **400 mm**  
 Test Equipment Orifice Size (in) : **2.5**  
 Test Equipment Orifice coefficient : **0.9**  
 Date of test: **28-Sep-22**  
 Time of test: **1:30 PM**  
 Temperature: **12°C**  
 Testing Method : **NFPA 291 (Recommended Practice for Fire Flow Testing and Marking of Hydrants)**

## Attendants

	Name	Title	Contact Info.
Lithos Inspector	<b>Alma</b>	<b>Project Inspector</b>	<b>(647)-901-3494</b>
Lithos Inspector	<b>Pradeep</b>	<b>Construction inspector</b>	<b>(905)-609-3435</b>
City of Vaughan Rep.	<b>Jim Root</b>	<b>Fire Inspector</b>	<b>(416)-420-7208</b>

## Site Plan/Sketch



## Pressure Readings (PSIG)

Flow Hydrant's Outlet Condition	C-0 { Outlet #1 : Close Outlet #2 : Close	C-1 { Outlet #1 : Open Outlet #2 : Close	C-2 { Outlet #1 : Open Outlet #2 : Open
Residual Fire Hydrant	<b>61</b>	<b>58</b>	<b>54</b>
Flow Fire Hydrant		<b>44</b>	<b>23</b>

