

**FUNCTIONAL SERVICING AND
STORMWATER MANAGEMENT REPORT
401 KINGSTON ROAD CORP.**

**375-421 KINGSTON ROAD
MIXED-USE DEVELOPMENT**

CITY OF PICKERING

PROJECT: 2024-5504

MARCH 2025

Issued & Revision Log

DATE	DESCRIPTION	PREPARED	APPROVED
March 2025	ZBA submission	D. Wong	H. Sarkissian



SCHAEFFERS
CONSULTING ENGINEERS

6 Ronrose Drive
Concord, Ontario L4K 4R3

Table of Contents

1.0 INTRODUCTION	1
1.1 Objective	1
1.2 Subject site	1
1.3 Proposed Development Plan and Population	1
2.0 STORMWATER MANAGEMENT.....	4
2.1 Existing Site Conditions.....	4
2.2 Stormwater Design Criteria	4
2.3 Proposed Storm Servicing.....	5
2.4 Allowable Release Rate	5
2.5 Quantity Control.....	6
2.6 Quality Control	7
2.7 Water Balance.....	7
2.8 Emergency Overland Flow Route & Erosion and Sediment Control	8
2.9 Floodplain & Spill Condition Analysis	8
3.0 SANITARY SERVICING	12
3.1 Existing Sanitary Infrastructure.....	12
3.2 Design Criteria & Parameters.....	12
3.3 Existing Sanitary Flows	12
3.4 Proposed Sanitary Servicing	12
3.5 Downstream Sanitary System Analysis	14
4.0 WATER SUPPLY SERVICING	16
4.1 Existing Water Servicing Infrastructure	16
4.2 Water Supply Design Criteria	16
4.3 Proposed Water Servicing	16
5.0 GROUNDWATER & FOUNDATION DRAINAGE	20
6.0 SUMMARY	21

List of Figures

Figure 1.1: Site Location	3
Figure 2.1: Existing Drainage Plan	9
Figure 2.2: Proposed Drainage Plan	10
Figure 2.3: Storm Servicing Plan	11
Figure 3.1: Sanitary Servicing Plan	15
Figure 4.1: Water Servicing Plan	19

List of Tables

Table 1-1: Population Estimate	2
Table 2-1: Allowable Release Rates	6
Table 3-1: Sanitary Design Criteria	12
Table 3-2: Proposed Sanitary Flows	13
Table 4-1: Water Supply Design Criteria	16
Table 4-2: Water Demand Summary	17
Table 6-1: Stormwater Management Summary	21

Appendices

- Appendix A: Background Information
- Appendix B: Stormwater Management Calculations & Documentation
- Appendix C: Sanitary Calculations & Documentation
- Appendix D: Water Supply Calculations
- Appendix E: Groundwater Conditions
- Appendix F: Engineering Drawings

1.0 INTRODUCTION

1.1 Objective

Schaeffer Consulting Engineers has been retained by 401 Kingston Road Corp. to prepare a Functional Servicing and Stormwater Management Report in support of the proposed high-rise mixed-use development at 375-421 Kingston Road, in the City of Pickering.

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 regarding storm drainage, sanitary drainage and water servicing. All of the proposed infrastructure shall be in accordance with the City's design requirements. Additionally, this report is to clearly demonstrate the impact the proposed development has on the capacity of the existing municipal services and to ensure the existing municipal infrastructure is capable of servicing the proposed site, and to address any impacts to the municipal services.

In preparing this report, Schaeffers' staff reviewed and secured Region of Durham and City of Pickering as-built plan and profile drawings for the roads and existing infrastructure adjacent to the site. Refer to **Appendix A** for the as-built plan and profile drawings.

It should be noted that the proposed development has also incorporated the Regional Capital Works Bus Rapid Transit (BRT) project on Kingston Road, with the project's current design indicated on the grading plans for the site.

1.2 Subject site

The site is a **1.81 ha** parcel of land, including **0.13 ha** of MTO lands. It is currently occupied by six (6) commercial and residential buildings and associated parking area. The site is bound by Kingston Road to the north, Rougemont Drive to the west, Evelyn Avenue to the east, and Highway 401 to the south. The location of the subject site is illustrated in **Figure 1.1**.

1.3 Proposed Development Plan and Population

The proposed development consists of four (4) high-rise residential towers on top of two (2) podiums and at-grade commercial space with two (2) levels of underground parking. In addition, **0.18 ha** parcel of land will be dedicated as parkland under post-development conditions.

The proposed development will be constructed in two (2) phases (total of 4 sub-phases). Phase 1 includes Towers A and B on top of a podium, and consists of **0.82 ha**. Phase 2 includes Towers C and D on top of a podium, and consists of **0.81 ha**.

Total unit breakdown and population estimate for the overall site are summarized in **Table 1-1** below, utilizing residential population density per Region of Durham design specifications for sanitary sewers. These populations have been used in the design of the water supply and sanitary services for the site, and is further explored in the following sections. The latest site plan and site statistics, prepared by Studio JCI, have been included in **Appendix A**.

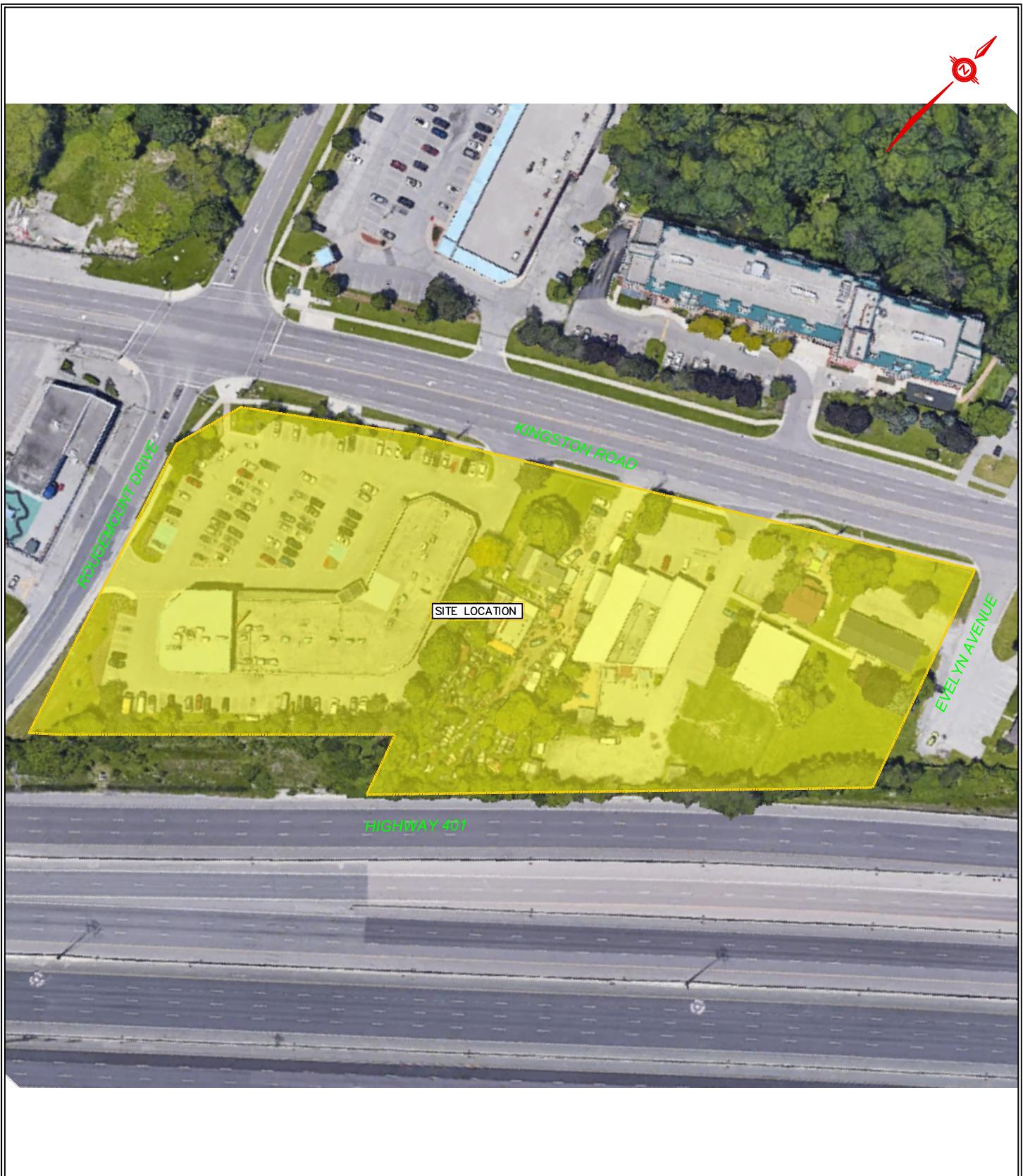
Table 1-1: Population Estimate

Phase 1 (Towers A & B)

Tower	Tenure Type	No. of Units	Population Density	Population
Tower A	1 Bedroom	213	1.5 person/unit	320
	2 Bedroom	106	2.5 person/unit	265
	3 Bedroom	2	3.5 person/unit	7
Sub-Total	-	321	-	592
Tower B	1 Bedroom	221	1.5 person/unit	332
	2 Bedroom	110	2.5 person/unit	275
	3 Bedroom	2	3.5 person/unit	7
Sub-Total	-	333	-	614

Phase 2 (Towers C & D)

Tower	Tenure Type	No. of Units	Population Density	Population
Tower C	1 Bedroom	229	1.5 person/unit	344
	2 Bedroom	114	2.5 person/unit	285
	3 Bedroom	2	3.5 person/unit	7
Sub-Total	-	345	-	636
Tower D	1 Bedroom	237	1.5 person/unit	356
	2 Bedroom	118	2.5 person/unit	295
	3 Bedroom	2	3.5 person/unit	7
Sub-Total	-	357	-	658



375-421 KINGSTON ROAD

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com

www.schaeffers.com

LEGEND



PROPERTY LINE

FIGURE 1.1
LOCATION PLAN

5504 JANUARY 2025 SCALE: N.T.S.

2.0 STORMWATER MANAGEMENT

2.1 Existing Site Conditions

According to records obtained from the Region of Durham, there is an existing 300mmØ to 375mmØ storm sewer running east on Kingston Road. The location of the existing storm infrastructure in relation to the proposed development is shown in **Figure 2.1**.

The existing storm connections in the subject site will be removed, capped, and abandoned as per City standards.

The site is currently occupied by six (6) commercial and residential buildings and associated parking area. Refer to **Appendix B** for the area breakdown included in the stormwater management calculations.

Under pre-development conditions, the site is divided into four (4) drainage areas based on the existing topography. Refer to **Figure 2.1** for the existing storm drainage plan. Drainage Area A.1 is composed of 0.44 ha, directing flows north to the storm sewer on Kingston Road. Drainage Area A.2 is composed of 0.43 ha, directing flows south towards Highway 401. Drainage Area A.3 is composed of 0.13 ha, directing flows towards Highway 401. It should be noted that Drainage Area A.3 is identified as MTO lands. Drainage Area A.4 is composed of 0.81 ha, directing flows north to the storm sewer on Kingston Road.

Drainage Area A.4 is picked up by a 300mmØ storm sewer, which drains to the municipal sewer on Kingston Road. Stormwater management controls exist on site as per the Stormwater Management Detention Facilities Rougemont Drive – Commercial Development report from the City of Pickering. Refer to **Appendix B** for the background stormwater management report.

2.2 Stormwater Design Criteria

As per the City of Pickering's Design Criteria and the Region of Durham Stormwater Management Criteria, the following guidelines were used in the design calculations:

- Storm sewers shall be designed using Rational Formula: $Q = 0.00278 \times C \times I \times A$, where Q is the flow rate in $[m^3/s]$, C is the runoff coefficient. For less frequent storms, an Antecedent Precipitation Factor (Ca) should be used and Rational Formula is modified accordingly to: $Q = 0.00278 \times A \times I \times Ca \times C$ where, 'Ca' values are listed below:
 - 1- to 10-year storm – Ca = 1.00
 - 25-year storm – Ca = 1.10
 - 50-year storm – Ca = 1.20
 - 100-year storm – Ca = 1.25 and the product of 'Ca x C' should not exceed 1.00
- Design storms should be derived from the City of Pickering Rainfall Intensity-Duration Frequency: $I = A/(Tc+B)^C$, where I is rainfall intensity in $[mm/hr]$ and Tc is time of concentration in minutes (min. Tc = 15 minutes)

- Enhanced stormwater quality control must be provided for the site (removal of 80% of TSS for 90% of the cumulative annual runoff)
- First 5 mm of rainfall shall be retained on site

2.3 Proposed Storm Servicing

It should be noted that the Region has indicated that there is a new storm sewer design underway for the Kingston Road BRT Project. Once received from the Region, we will incorporate it into the development design if or as required.

In proposed conditions, the site is divided into four (4) drainage areas based on site grading and development plan. Refer to **Figure 2.2** for the proposed storm drainage plan. Drainage Area P.1 is composed of 0.75 ha of Phase 1 development, directing flows to the storm sewer on Kingston Road. Drainage Area P.2 is composed of 0.84 ha of Phase 2 development, directing flows to the storm sewer on Kingston Road. Drainage Area P.3 is composed of 0.18 ha of parkland, directing uncontrolled flows to the storm sewer on Kingston Road. Drainage Area P.4 is composed of 0.03ha, directing uncontrolled flows to Highway 401.

The proposed Phase 1 and Phase 2 will have separate stormwater management scheme designed to meet quantity, quality and water balance requirements. To meet quantity control targets, underground storage tanks are proposed to control storm events from the 2- to 100-year return period. The release rates and storage volumes will be discussed in the subsequent sections.

To provide water quality control, flows will be treated using filtration units to provide an enhanced level of treatment. Additionally, 5 mm retention will be provided through the use of on-site rainwater harvesting tanks in order to meet water balance and erosion requirements. Refer to **Figure 2.3** for the proposed stormwater management strategy and **Appendix F** for the Site Servicing Plan (SS-1).

2.4 Allowable Release Rate

Phase 1 Development

The allowable release rates from Phase 1 development and parkland to Kingston Road should comply with the existing stormwater runoff at 2-year storm and pre-development runoff coefficient of maximum 0.5. As shown below in **Table 2.2**, the maximum allowable release rate from Phase 1 development and parkland is **37.7 L/s.**

Table 2-1: Allowable Release Rates

Post-Development	Pre-Development Drainage Area	Pre-Development Area (ha)	Runoff Coeff.	Maximum Allowable Release Rate (L/s)
Phase 1 & Parkland	A.1 Drainage to Kingston Road	0.44	0.50	37.7

It is assumed that parkland will be designed with runoff coefficient of 0.25 and drain uncontrolled to Kingston Road. The uncontrolled flow from parkland to Kingston Road will produce a 100-year uncontrolled peak flow of 23.4 L/s. The allowable release rate from Phase 1 development is adjusted by subtracting the uncontrolled flow from the maximum allowable release rate. As such, the adjusted allowable release rate from Phase 1 to Kingston Road is **14.4 L/s** ($37.7 - 23.4 = 14.4$ L/s).

Phase 2 Development

As mentioned in **Section 2.1**, the city has provided information regarding the previous considerations for pre-development Drainage Area A.4. Based on the given documents, the site was originally designed to consider a drainage area of approximately 0.082 ha. In the original design, a release rate of **28.5 L/s** was considered from the drainage area.

Based on the proposed storm connection location and development plan, the allowable release rate from Phase 2 development refers to the above designed release rate of **28.5 L/s**.

2.5 Quantity Control

As discussed in the previous section, allowable release rates from Phase 1 and Phase 2 development have been established as **14.4 L/s** and **28.5 L/s**.

Parkland

To minimize future disturbance to the park, no stormwater management control is proposed for parkland. As such, the park will direct uncontrolled flow to the storm sewer on Kingston Road. As mentioned in Section 2.4, the uncontrolled flow from parkland at 100-year storm event was calculated to be **23.4 L/s** based on 0.18 ha drainage area and 0.25 runoff coefficient. Supporting calculations are provided in **Appendix B**.

Should the parkland have the area and runoff coefficient greater than the allocated, further stormwater management control for the parkland will be reviewed at the time of detailed design.

Phase 1 Development

Based on the post-development drainage area and maximum allowable release rate, a rational method analysis is conducted and estimates a required storage of approximately **376 m³**. It is

noted that this requirement includes consideration for groundwater. A groundwater allowance of **1 L/s** has been considered.

Due to the depth of the existing storm sewer on Kingston Road, a gravity storage solution would not be possible. As a result, the detention volumes will be pumped up to a stabilization chamber. Flows will be controlled by an orifice control structure prior to the storm sewer on Kingston Road. A **100mmØ orifice tube** with 0.25 m of head will be required to achieve the actual release rate of **14.3 L/s**. Supporting calculations are provided in **Appendix B**.

Phase 2 Development

Based on the post-development drainage area and maximum allowable release rate, a rational method analysis is conducted and estimates a required storage of approximately **377 m³**. It is noted that this requirement includes consideration for groundwater. A groundwater allowance of **1 L/s** has been considered.

Due to the depth of the existing storm sewer on Kingston Road, a gravity storage solution would not be possible. As a result, the detention volumes will be pumped up to a stabilization chamber. Flows will be controlled by an orifice control structure prior to the storm sewer on Kingston Road. A **150mmØ orifice tube** with 0.19 m of head will be required to achieve the actual release rate of **28.0 L/s**. Supporting calculations are provided in **Appendix B**.

2.6 Quality Control

The water quality target, as set out in the City of Pickering Stormwater Management Design Guidelines, is the long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development based on the post-development level of imperviousness.

The site is covered by buildings, driveway, walkway, and landscape areas. Subsequently, it is anticipated that the main source of pollution is the driveway and walkway on site, as the roof areas and landscape areas are free of typical sediment-generating activities.

For quality control, filter units are proposed downstream of the SWM tanks to provide a TSS removal rate of 80% or above, abiding to the 80% requirement. The filter unit design and calculation will be provided at the detailed design stage.

2.7 Water Balance

The City of Pickering Stormwater Management (SWM) Design Guidelines requires that the development provides a runoff retention of 5 mm across all impervious surfaces through infiltration, evapotranspiration, or re-use. In addition, Low Impact Development (LID) measures shall be designed in accordance with the TRCA & CVC LID Stormwater Management Planning & Design Guide and the City's SWM Design Guidelines.

Due to the site layout and significant underground structure, stand-alone infiltration facilities are not feasible. Therefore, LID measures such as permeable paver and topsoil amendment will be optimized before reviewing re-use options. Re-use options such as irrigation may be utilized to

achieved the remaining volume from the required 5 mm retention storm event. Permeable paver is proposed within walkways and parking area. In addition, 300 mm depth of topsoil amendment is also proposed within landscaped area to enhance infiltration.

Phase 1 development consists of **0.65 ha** of impervious area and the 5 mm retention volume would equal **32.5 m³**. Phase 2 development consists of **0.73 ha** of impervious area and the 5 mm retention volume would equal **36.6 m³**.

All retention volumes will be stored in rainwater harvesting (RWH) tanks located adjacent to the stormwater management tanks. RWH tanks will collect clean water from roof and landscaped areas. During large rainfall events, excess flows will be allowed to the stormwater management tanks via baffle wall. Water retained in the RWH tanks will be stored for maximum 72 hours and re-used for irrigation. The re-use methods will be confirmed during the detailed design stage.

2.8 Emergency Overland Flow Route & Erosion and Sediment Control

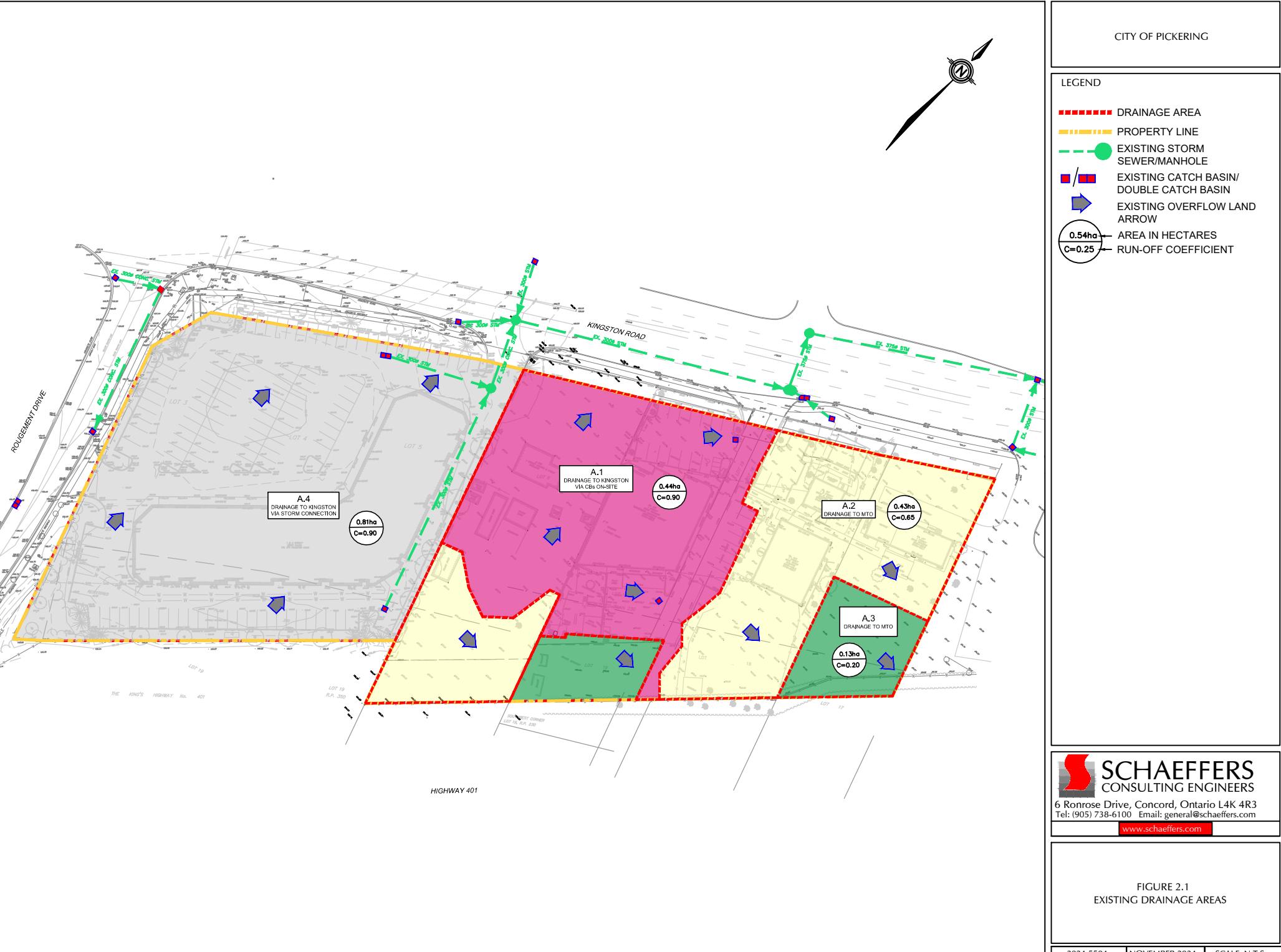
The site grading has been designed to alleviate the ground floor from flooding during the 100 year-storm events. As mentioned in **Section 2.4**, drainage will be contained on-site, which means the area drains and catch basins will be sized to capture the 100-year storm event plus a 50% blockage factor. Area drain and catch basin calculations will be provided at the detailed design stage. The proposed site grading has been designed in a manner to ensure the site allows conveyance of emergency overland flows to Kingston Road and Highway 401, essentially reflecting the pre-development drainage patterns.

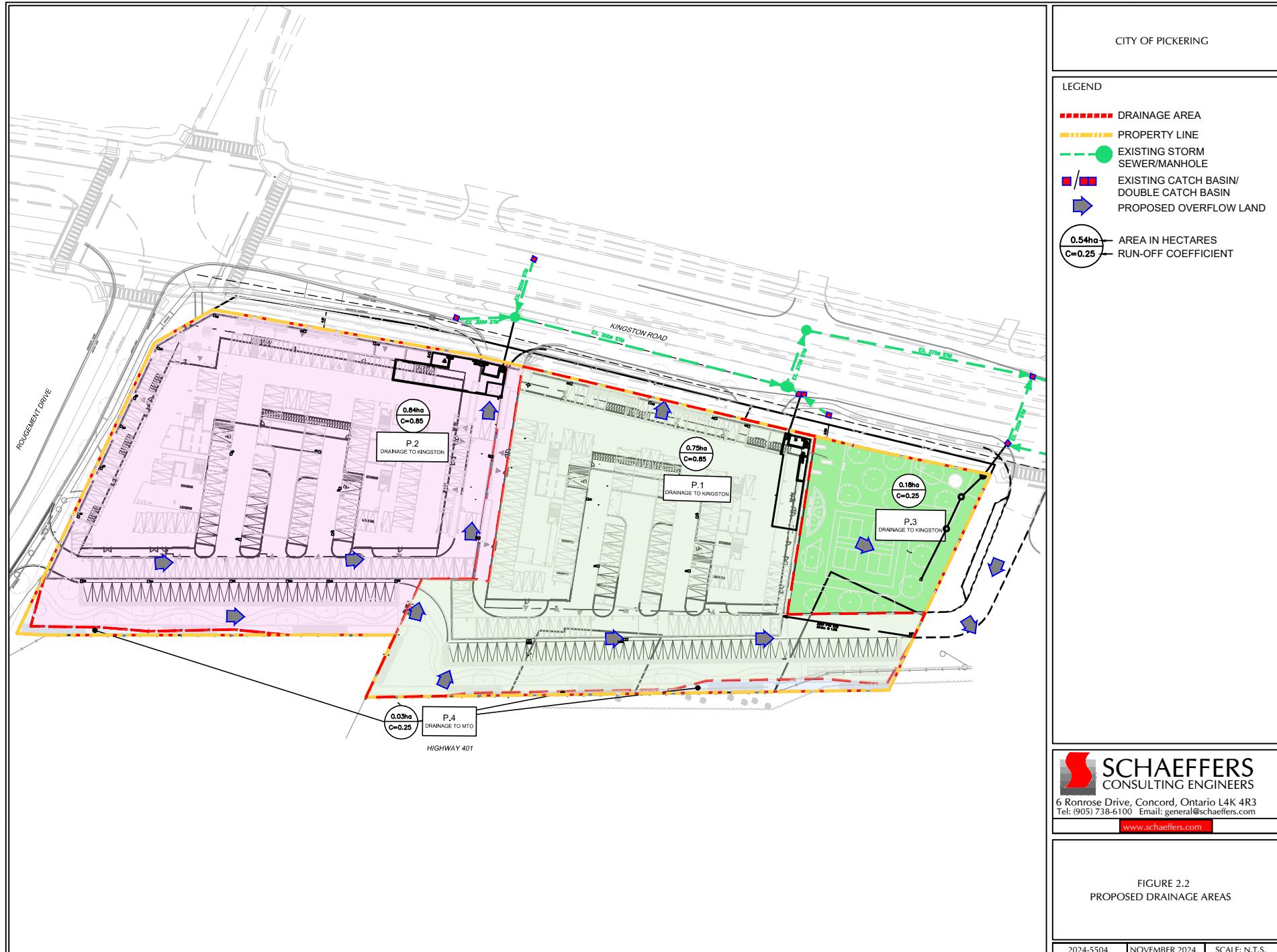
It should also be noted that erosion control is not required for the subject site considering that the site area is less than 2 ha in size, and the retention of stormwater runoff from the 5 mm design storm event is provided.

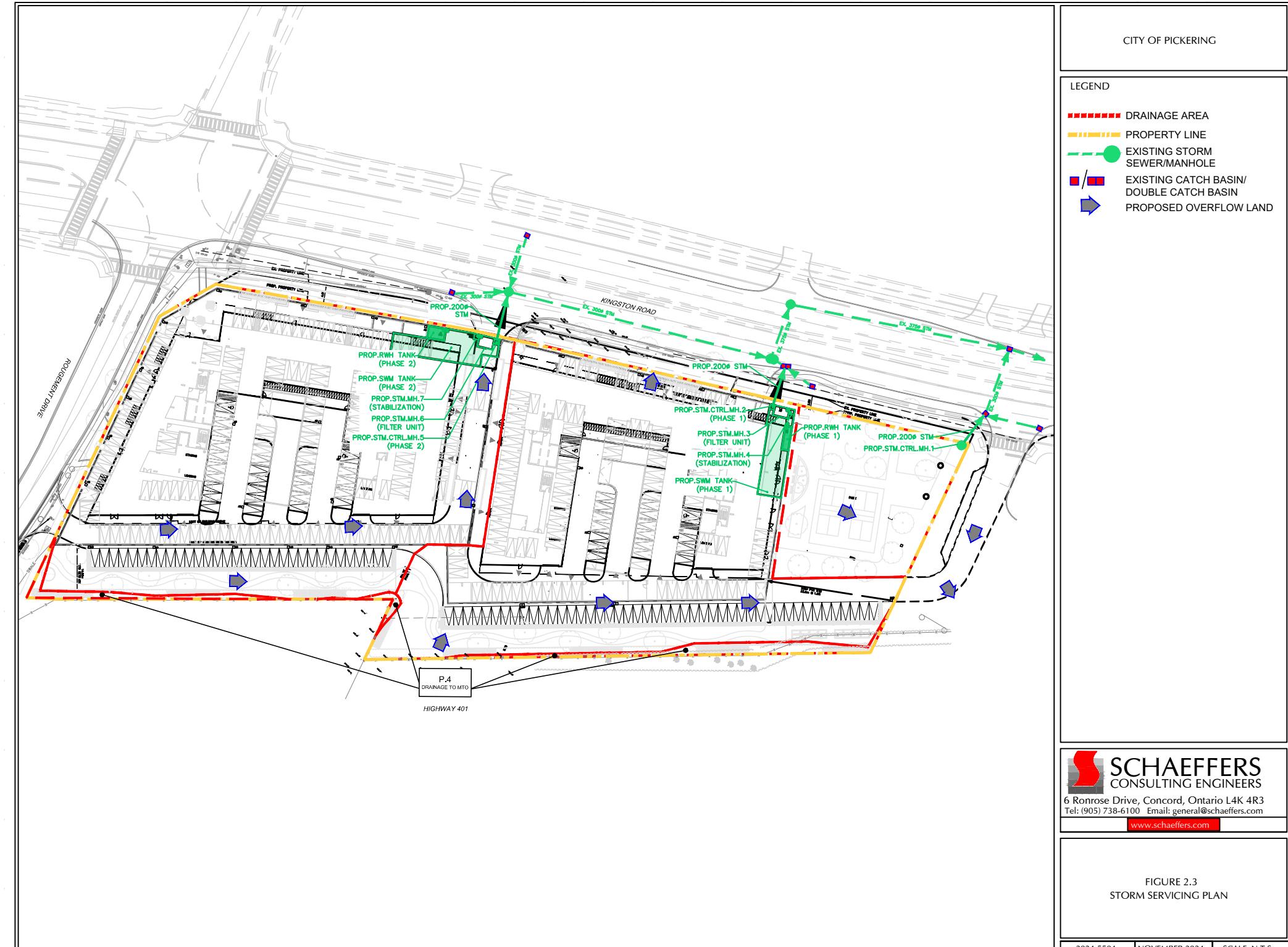
All erosion and sediment control best management practices (BPMs) shall be designed, constructed and maintained in all development sites in accordance with the GTA CA's Erosion & Sediment Control Guidelines for Urban Construction (2019) and/or other City of Pickering requirements on a site-by-site basis, where applicable.

2.9 Floodplain & Spill Condition Analysis

Schaeffers Consulting Engineers has been coordinating with TRCA regarding the floodplain spill analysis for the subject site area. The terms of reference have been agreed upon, and the analysis is underway. The fulsome modelling and the hydraulic modelling and spill analysis will be presented under separate cover.







3.0 SANITARY SERVICING

3.1 Existing Sanitary Infrastructure

According to records obtained from the Region of Durham, there is an existing 600mmØ sanitary sewer running east on Kingston Road. The location of the existing sanitary infrastructure in relation to the proposed development is shown in **Figure 3.1**.

The existing sanitary connections in the subject site will be removed or decommissioned per Region standards.

3.2 Design Criteria & Parameters

In accordance to the Region of Durham design specifications for sanitary sewers, guidelines for residential and commercial development were used for the sanitary sewer design calculations as shown in **Table 3-1** below:

Table 3-1: Sanitary Design Criteria

Design Criteria	Parameters
Region of Durham Design Specifications for Sanitary Sewers	Population Density (Single Family Dwelling) $P = 3.5 \text{ persons/unit}$
	Average Flow (Residential) $Q_R = 364 \text{ litres/person/day}$
	Design Flow (Commercial) $Q_C = 180 \text{ m}^3/\text{floor ha/day}$
	Infiltration Flow $Q_I = 22.5 \text{ m}^3/\text{ha/day}$
	Harmon Peaking Factor $M = [1 + (14/(4+P(\text{total}))^{1/2})]$ Maximum 3.8; Minimum 1.5

3.3 Existing Sanitary Flows

The existing site is currently compromised of six (6) commercial and residential buildings. The existing sanitary peak flow is estimated to be **1.23 L/s** as indicated in the calculations included in **Appendix C**. The Region's sanitary sewer design specification has been utilized to calculate the existing sanitary flows.

3.4 Proposed Sanitary Servicing

Four (4) 200mmØ sanitary service connections are proposed to connect to the existing 600mmØ sanitary sewer on Kingston Road. Each sanitary service connection will be provided with a control manhole at the north property line fronting Kingston Road. Refer to **Figure 3.1** and Site Servicing Plan in **Appendix F** for the proposed sanitary servicing plan.

Based on population computed in **Table 1-1**, proposed sanitary flows are calculated below in **Table 3-2**. Refer to **Appendix C** for the detailed sanitary demand calculations.

Table 3-2: Proposed Sanitary Flows

Phase 1 (Tower A)

Tenure Type	Population	Average Demand (L/s) ⁽¹⁾	M ⁽²⁾	Floor Area (ha)	Peak Flow (L/s) ⁽³⁾	Site Area (ha)	Infiltration (L/s) ⁽⁴⁾	Total Peak Flow (L/s)
Residential	592	2.49	3.8	-	9.48	-	-	-
Commercial	-	-	-	0.04	0.09	-	-	-
Sub-Total	-	-	-	-	9.56	0.39	0.10	9.66

Phase 1 (Tower B)

Tenure Type	Population	Average Demand (L/s) ⁽¹⁾	M ⁽²⁾	Floor Area (ha)	Peak Flow (L/s) ⁽³⁾	Site Area (ha)	Infiltration (L/s) ⁽⁴⁾	Total Peak Flow (L/s)
Residential	614	2.59	3.8	-	9.83	-	-	-
Commercial	-	-	-	0.08	0.17	-	-	-
Sub-Total	-	-	-	-	10.00	0.43	0.11	10.12

Phase 2 (Tower C)

Tenure Type	Population	Average Demand (L/s) ⁽¹⁾	M ⁽²⁾	Floor Area (ha)	Peak Flow (L/s) ⁽³⁾	Site Area (ha)	Infiltration (L/s) ⁽⁴⁾	Total Peak Flow (L/s)
Residential	636	2.68	3.8	-	10.18	-	-	-
Commercial	-	-	-	0.08	0.16	-	-	-
Sub-Total	-	-	-	-	10.34	0.37	0.10	10.44

Phase 2 (Tower D)

Tenure Type	Population	Average Demand (L/s) ⁽¹⁾	M ⁽²⁾	Floor Area (ha)	Peak Flow (L/s) ⁽³⁾	Site Area (ha)	Infiltration (L/s) ⁽⁴⁾	Total Peak Flow (L/s)
Residential	658	2.77	3.8	-	10.53	-	-	-
Commercial	-	-	-	0.09	0.19	-	-	-
Sub-Total	-	-	-	-	10.72	0.44	0.11	10.83

(1) Based on 364 litres/person/day for residential

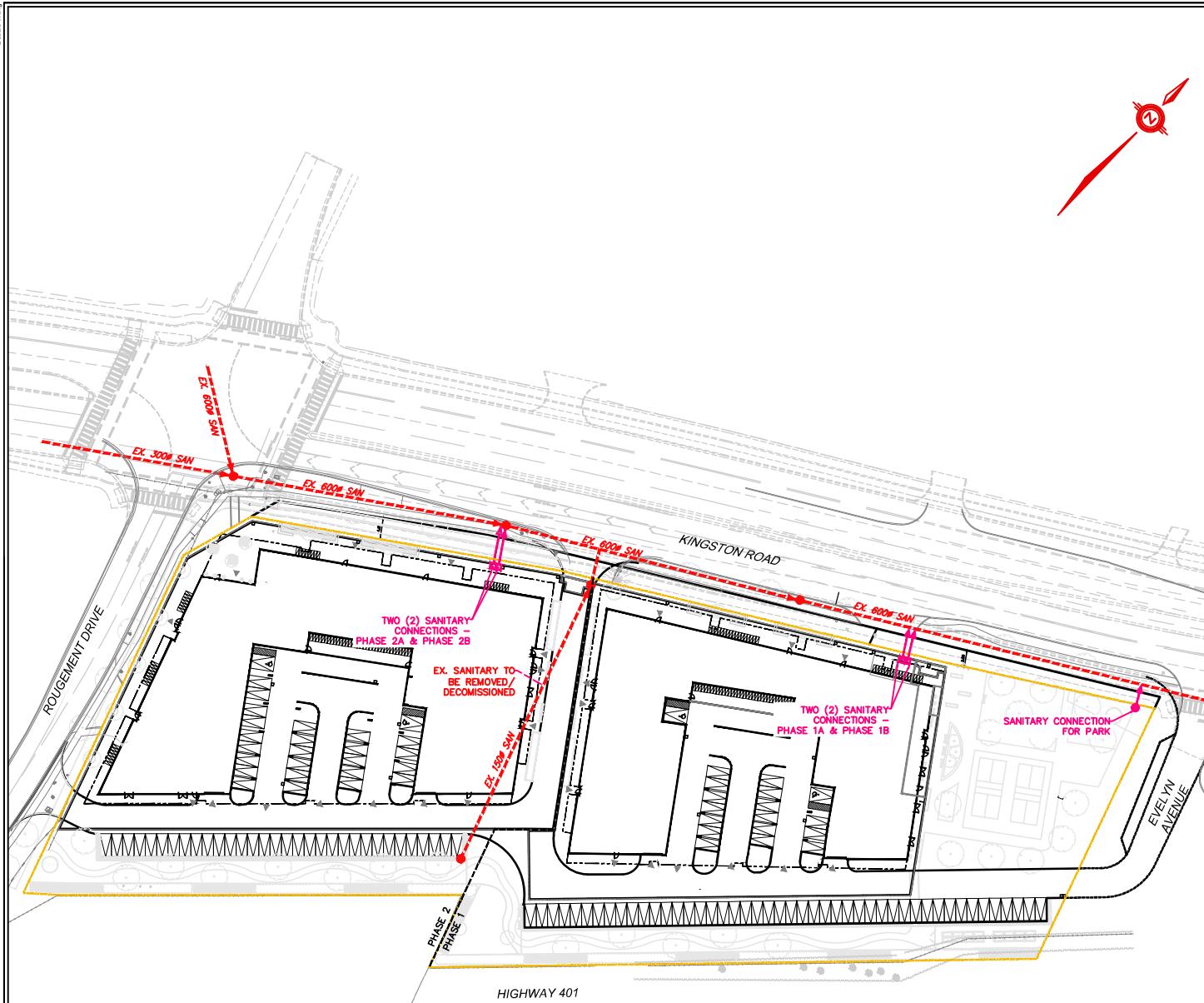
(2) $M = 1 + 14 / (4 + (P/1000)^{1/2})$

(3) Based on 180 m³/floor ha/day for commercial

(4) Based on 22.5 m³/ha/day infiltration flow

3.5 Downstream Sanitary System Analysis

The Region has advised that capacity constraints are not expected in the downstream Regional sewers. It should be noted that capacity is allocated on a first come, first serve basis at the time of signing a development agreement.



375-421 KINGSTON ROAD

4.0 WATER SUPPLY SERVICING

4.1 Existing Water Servicing Infrastructure

According to records obtained from the Region of Durham, there is an existing 500mmØ watermain on Kingston Road. There is also a 150mmØ watermain on Rougemont Drive. The location of the existing water servicing infrastructure in relation to the proposed development is shown in **Figure 4.1**.

It should be noted that the Region has indicated that there is a new watermain design underway for the Kingston Road BRT Project. Once received from the Region, we will incorporate it into the development if or as required.

The existing water service connections in the subject site will be removed or decommissioned per Region standards.

4.2 Water Supply Design Criteria

In accordance to the Region of Durham design specifications for watermains, guidelines for residential and commercial development were used for the water supply design calculations as shown in **Table 4-1** below:

Table 4-1: Water Supply Design Criteria

Design Criteria	Parameters
Ministry of the Environment Design Guidelines for Drinking-Water Systems	Average Water Demand (Residential) $Q_R = 450 \text{ litres/capita/day}$
	Maximum Day Factor (Residential) = 2.50 Peak Hour Factor (Residential) = 3.75
Region of Durham Design Specifications for Watermains	Average Water Demand (Commercial) $Q_C = 5,000 \text{ litres/1,000 m}^2/\text{day}$
	Maximum Static Pressure = 700 kPa Minimum Pressure During Maximum Day and Fire Flow Demand = 140 kPa Minimum Pressure During Peak Hour Demand = 275 kPa
Fire Underwriters Survey	Refer to the Fire Underwriters Survey Calculations in Appendix E for the applicable guidelines

4.3 Proposed Water Servicing

The proposed development will be serviced by the existing 500mmØ watermain on Kingston Road via four (4) 150mmØ domestic services and four (4) 200mmØ fire services. Individual 150mmØ domestic service will be provided for each residential tower. The water services will

include valve and boxes at the property line. The associated water meters will be installed in the mechanical room within the building in accordance with the Region's design standards and OBC standards. As discussed with Regional staff in November 2024, we have proposed "h" connections (with the domestic services feeding off the fire connections) in order to reduce the number of connection points into the Regional watermain.

Four (4) fire services are proposed to comply with Sections 3.2 (Building Fire Safety), Sentence 2.3.9.7.(4) of the current Ontario Building Code (OBC), as the proposed building heights are over 84 m. It should be noted each Sub-Phase will constitute one (1) building per the OBC.

There is an existing fire hydrant on Kingston Road and an existing fire hydrant on Rougemont Drive. To ensure fire coverage of all residential towers, two (2) private hydrants will be provided within the property limits. The proposed Siamese connections will be located within 45 m of fire hydrants. **Figure 4.1** illustrates the proposed water servicing strategy for the subject site.

A summary of the proposed water demand for the subject site is shown in **Table 4-2** below. Associated calculations are included in **Appendix D**.

Table 4-2: Water Demand Summary

Phase 1 (Tower A)

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s) ⁽¹⁾	May Day Demand (L/s) ⁽²⁾	Peak Hour Demand (L/s) ⁽³⁾	Fire Flow (L/s) ⁽⁴⁾	Max Day Demand + Fire Flow (L/s)
Residential	592	-	3.08	7.71	11.56	-	-
Commercial	-	0.04	0.02	0.02	0.02	-	-
Sub-Total	-	-	3.11	7.73	11.59	116.67	124.40

Phase 1 (Tower B)

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s) ⁽¹⁾	May Day Demand (L/s) ⁽²⁾	Peak Hour Demand (L/s) ⁽³⁾	Fire Flow (L/s) ⁽⁴⁾	Max Day Demand + Fire Flow (L/s)
Residential	614	-	3.20	7.99	11.99	-	-
Commercial	-	0.08	0.05	0.05	0.05	-	-
Sub-Total	-	-	3.25	8.04	12.04	133.33	141.38

Phase 2 (Tower C)

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s) ⁽¹⁾	May Day Demand (L/s) ⁽²⁾	Peak Hour Demand (L/s) ⁽³⁾	Fire Flow (L/s) ⁽⁴⁾	Max Day Demand + Fire Flow (L/s)
Residential	636	-	3.31	8.28	12.42	-	-
Commercial	-	0.08	0.05	0.05	0.05	-	-
Sub-Total	-	-	3.36	8.33	12.47	133.33	141.66

Phase 2 (Tower D)

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s) ⁽¹⁾	May Day Demand (L/s) ⁽²⁾	Peak Hour Demand (L/s) ⁽³⁾	Fire Flow (L/s) ⁽⁴⁾	Max Day Demand + Fire Flow (L/s)
Residential	658	-	3.43	8.57	12.85	-	-
Commercial	-	0.09	0.05	0.05	0.05	-	-
Sub-Total	-	-	3.48	8.62	12.90	166.67	175.29

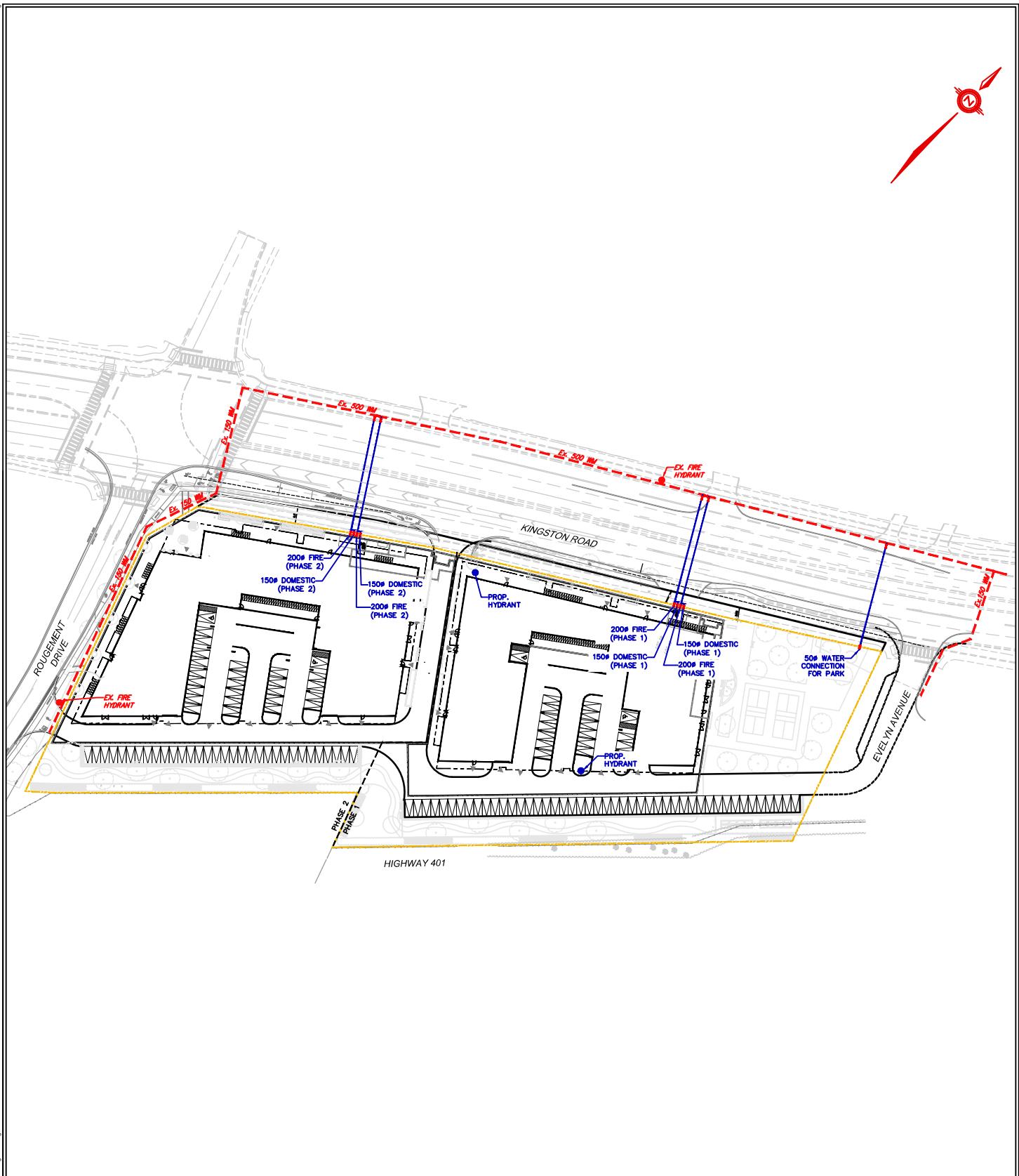
(1) Based on 450 litres/capita/day for residential and 5,000 litres/1,000 m²/day for commercial

(2) Based on maximum day factor = 2.50 for residential

(3) Based on peak hour factor = 3.75 for residential

(4) Based on FUS guidelines

As the proposed development will be high-rise residential towers, fire flows for the proposed development have been estimated based on the use of non-combustible construction. As well, all vertical openings are assumed to be protected in accordance with the National Building Code (NBC). In addition, use of a NFPA 13 (or equivalent) sprinkler system has been assumed. Fire Underwriters Survey (FUS 2020) calculations indicate maximum fire flow of **133 L/s** for Phase 1 Tower B and **167 L/s** for Phase 2 Tower D. Refer to **Appendix D** for FUS and water supply calculations.



375-421 KINGSTON ROAD

The logo for Schaeffers Consulting Engineers. It features a stylized red 'S' icon followed by the company name 'SCHAEFFERS' in a bold, black, sans-serif font. Below the name, 'CONSULTING ENGINEERS' is written in a smaller, black, all-caps font.

6 Ronrose Drive, Concord, Ontario L4K 4R3

Tel: (905) 738-6100 Email: general@schaefers.com

www.schaeffers.com

FIGURE 4.1 WATERMAIN SERVICING PLAN

5504 JANUARY 2025 SCALE: N.T.S.

5.0 GROUNDWATER & FOUNDATION DRAINAGE

Hydrogeological calculations and analysis for the subject site was undertaken by Fisher Engineering to assess the potential effects of groundwater on the proposed development. Their findings have been summarized in the Hydrogeological Investigation Report, with excerpts shown in **Appendix E**.

The detailed investigation has indicated that both construction and permanent dewatering will be required. The construction dewatering is estimated to be **59.22 m³/day (0.69 L/s)** and **54.01m³/day (0.63 L/s)** for Phase 1 and Phase 2 development respectively. The permanent dewatering is estimated to be **28.01 m³/day (0.32 L/s)** and **25.03 m³/day (0.29 L/s)** for Phase 1 and Phase 2 development respectively.

Construction dewatering is proposed to discharge to the sanitary sewer on Kingston Road. As the construction dewatering rates of **0.69 L/s** and **0.63 L/s** are less than the proposed sanitary flows of **19.45 L/s** and **20.85 L/s** for Phase 1 and Phase 2 development, as mentioned in **Section 3.4**, the flows can be safely handled by the municipal infrastructure.

As permanent dewatering discharge to the regional sanitary sewer in the vicinity of the site is not permitted, permanent foundation drainage is proposed to discharge to the storm sewer on Kingston Road. As noted in **Section 2.5**, a groundwater allowance of **1 L/s** has been considered for permanent foundation drainage for both Phase 1 and Phase 2 development.

The applicant should ensure that the quality of the groundwater complies with the Region's sewer by-law prior to its discharge. If the groundwater exceeds the discharge parameters, pre-treatment will be required.

Required permitting shall be obtained for the above noted dewatering and discharge.

6.0 SUMMARY

As outlined above, the conclusions for the functional servicing of the subject site are as follows:

- A stormwater management plan can be implemented to meet quantity, quality, and water balance requirements. On-site controls are proposed to ensure the actual release rates are within the allowable release rates to the existing storm sewer on Kingston Road. Filter units are proposed to provide at least 80% TSS removal. The SWM tanks are located within the P1 level. Rainwater re-use shall be achieved through irrigation at the time of detailed design.

Table 6-1: Stormwater Management Summary

Stormwater Characteristics	Phase 1 Development	Phase 2 Development
Allowable Release Rate (L/s)	14.4	28.5
Actual Release Rate at 100-Year (L/s)	14.3	28.0
Required Detention (m ³)	376	377
Required Retention (m ³)	32.5	36.6

- Sanitary servicing for the proposed development will be provided by four (4) 200mmØ connections to the existing 600mmØ sanitary sewer on Kingston Road. As noted, the Region has advised that capacity constraints are not expected in the downstream Regional sewers.
- Water supply for the proposed development will be provided by four (4) "h" connections with 200mmØ fire services and 150mmØ domestic services to the existing 500mmØ watermain on Kingston Road.
- Construction dewatering will be discharged to the municipal sanitary sewer on Kingston Road and permanent dewatering will be discharged to the municipal storm sewer on Kingston Road. Pre-treatment will be provided as required such that the quality of the groundwater complies with the Region's sewer by-law prior to its discharge.

We trust that you will find the contents of this report satisfactory. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

Debbie

Debbie Wong

Designer

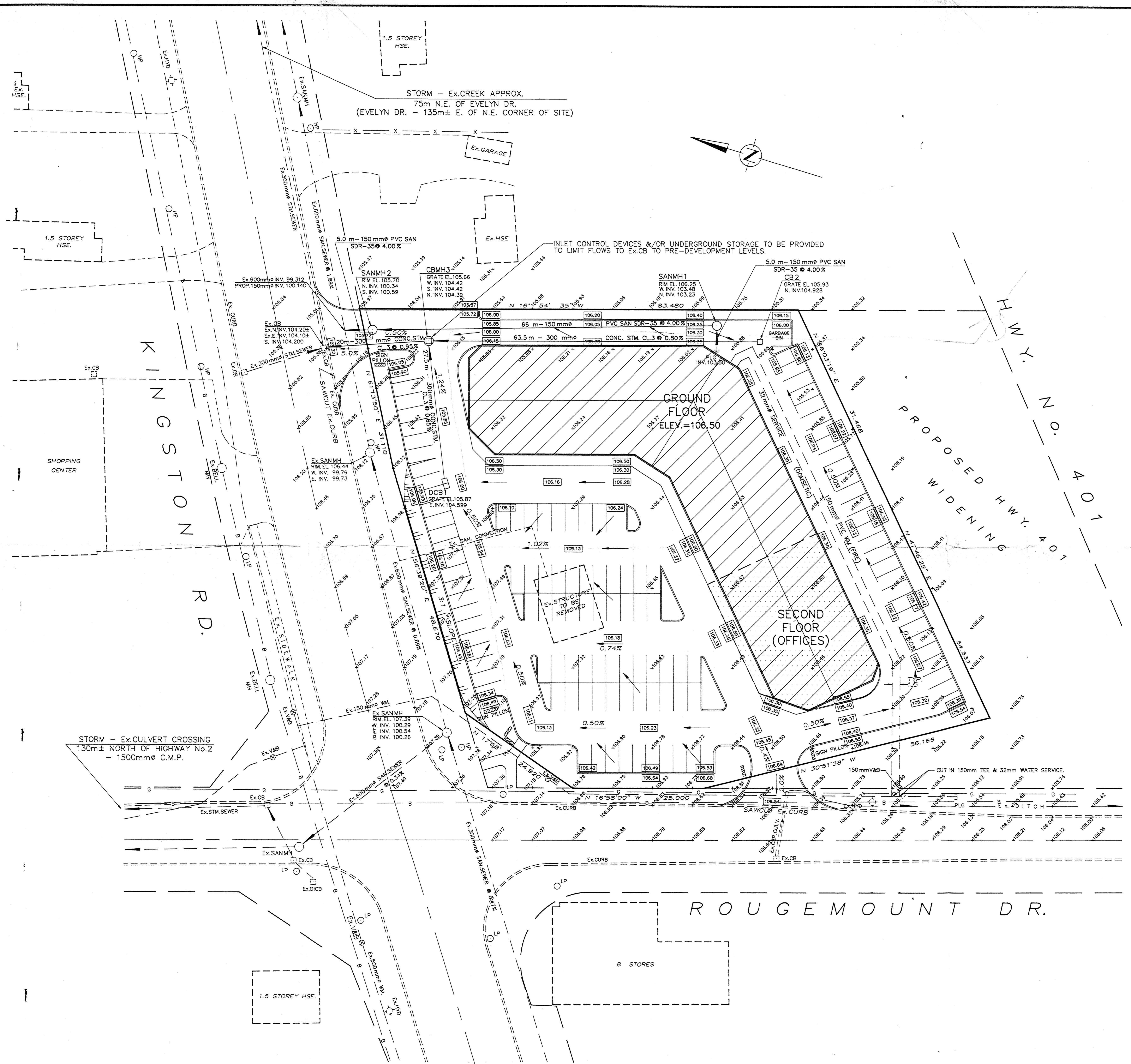


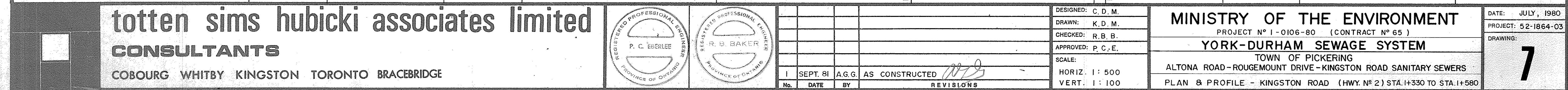
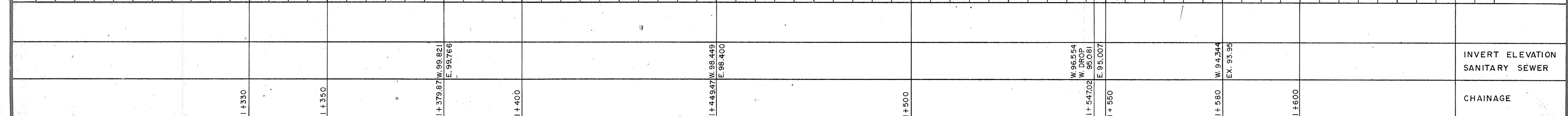
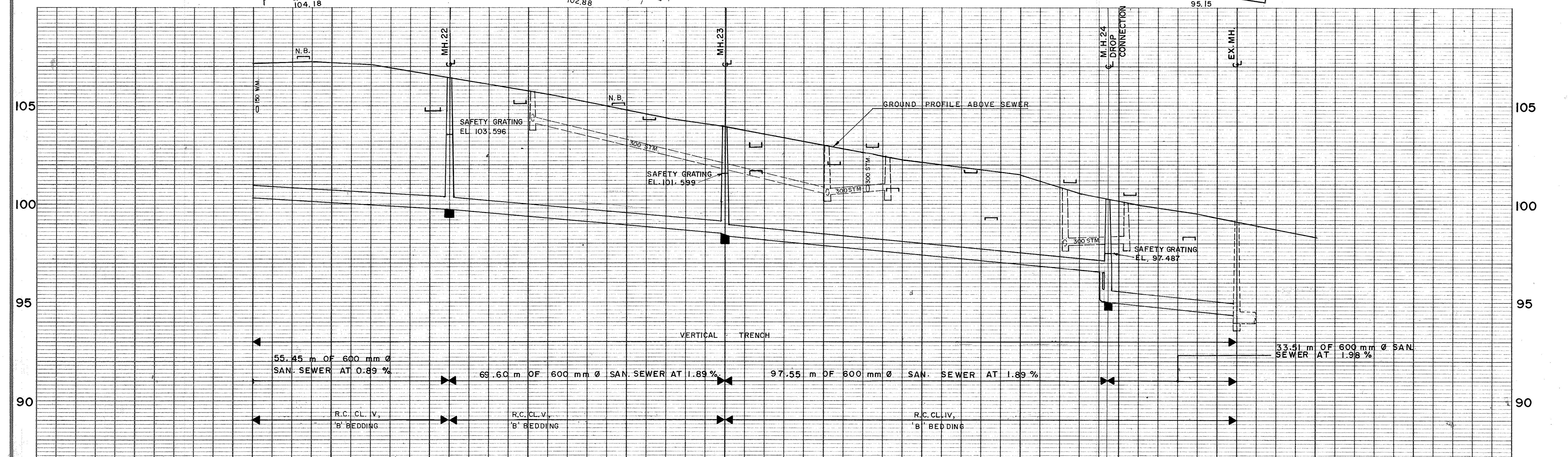
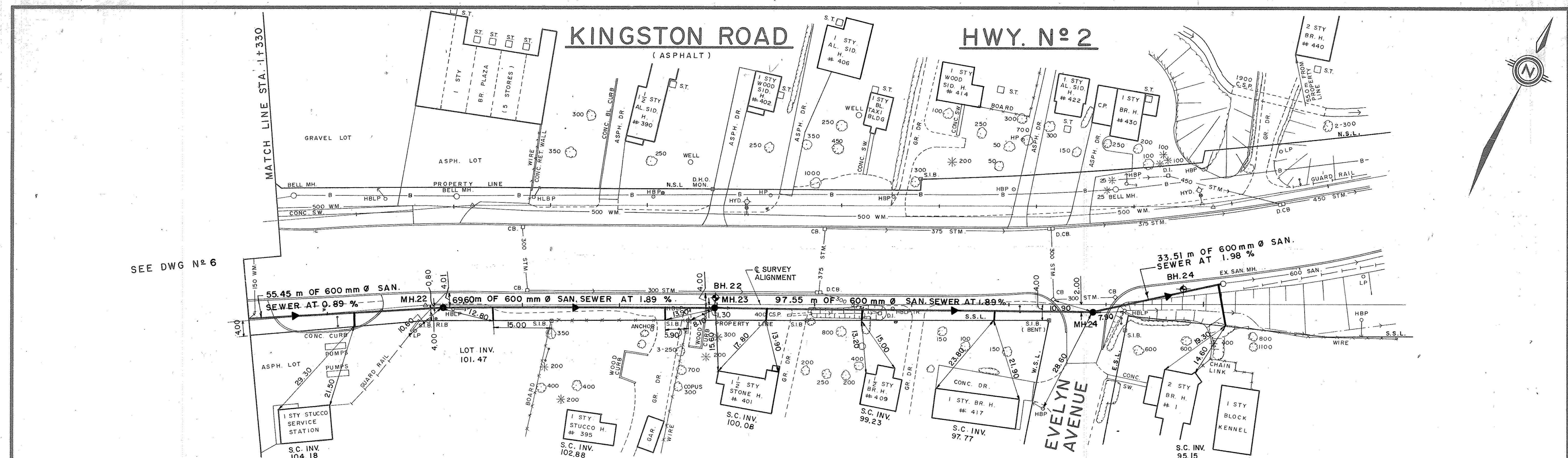
Hagop Sarkissian, P.Eng.

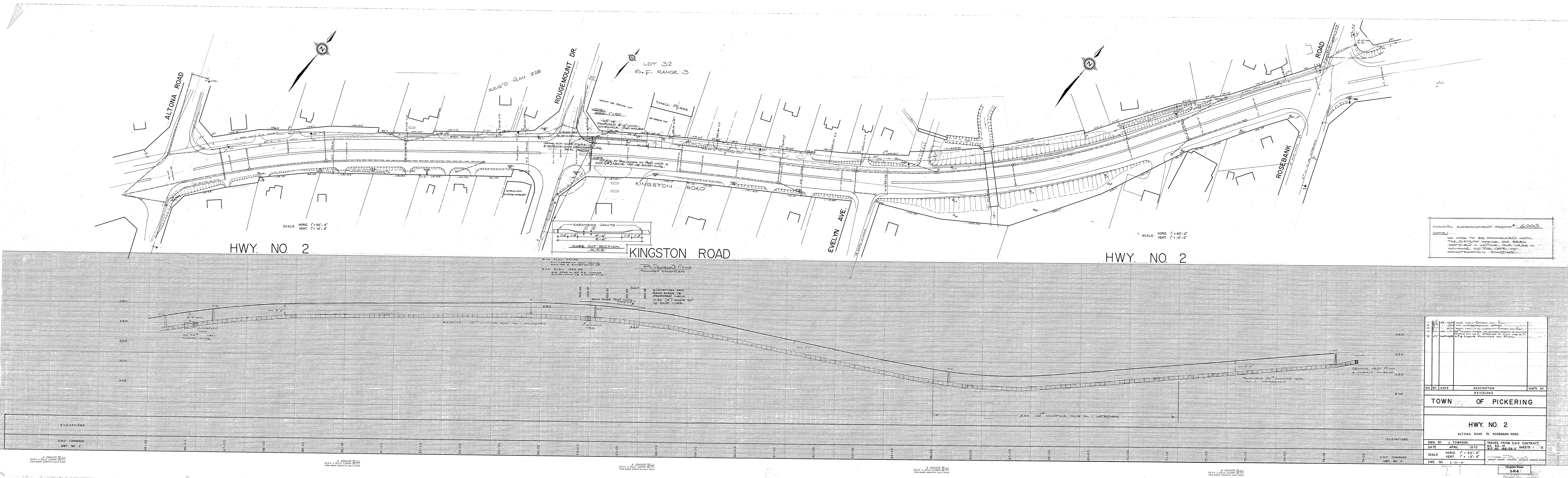
Partner

APPENDIX A

BACKGROUND INFORMATION







PROPOSED MIXED USE DEVELOPMENT
375-409 KINGSTON ROAD, PICKERING, ON L1V 1A3

PROJECT SUMMARY - TOTAL (BUILDING 1 AND BUILDING 2)

01. SITE AREA - TOTAL		m ²	sf
Existing lot area		17,601.9	189,465.3
MTO lands		1,337.7	14,398.9
Net Lot Area		18,067.1	194,472.6
Parkland Dedication (10% of net lot area)		1,806.7	19,447.3
TOTAL LOT AREA		16,260.4	175,025.4

02. GROSS FLOOR AREA - TOTAL		m ²	sf
Estimated GFA		92,767.5	998,541.1

03. F.S.I - TOTAL		PROPOSED
(including Parkland dedication)		5.13
(excluding Parkland dedication)		6.39

04. LOT COVERAGE - TOTAL		%
(including Parkland dedication)		49.0%
(excluding Parkland dedication)		54.4%

05. RETAIL - TOTAL		PROPOSED
Estimated Commercial		2,911.4

06. RESIDENTIAL UNITS - TOTAL		ESTIMATED
1 Bedroom and 1 Bedroom +Den		899 66%
2 Bedroom and 2 Bedroom +Den		449 33%
3 Bedroom		8 1%
TOTAL		1356 100%

07. CAR PARKING - TOTAL		ESTIMATED
	REGULAR	ACCESSIBLE
P2	300	4
P1	259	4
Underground Mezzanine	70	3
Ground Floor	40	4
Mezzanine	58	6
Floor 2	197	4
Floor 3	201	4
TOTAL PARKING SPACES (per type)	1125	29
TOTAL PARKING SPACES		1154
RATIO (Parking Spaces per Unit)		0.85

PARKING SPACES WITHIN MTO SETBACK	77
TOTAL RATIO (Parking Spaces per Unit)	0.91

08. BIKE PARKING - TOTAL		ESTIMATED
	LONG-TERM	SHORT-TERM
P2	254	0
P1	248	0
Underground Mezzanine	232	0
Ground Floor	0	137
TOTAL	734	137

09. STORAGE - TOTAL		ESTIMATED
	m ²	sf
ESTIMATED STORAGE AREA	2,874.9	30,945.2
ESTIMATED LOCKER COUNT (26sf per Locker)	1190	

10. AMENITY - TOTAL		ESTIMATED
	m ²	sf
Indoor	1399.4	15,063.0
Outdoor	4209.1	45,306.4
TOTAL	5608.5	60,369.4
Proposed Amenity Rate per Unit	4.1	44.5

11. BUILDING HEIGHT - TOWER A		ESTIMATED (m)
Building height		102.63
Building height (including mech)		107.63

11. BUILDING HEIGHT - TOWER B		ESTIMATED (m)
Building height		105.58
Building height (including mech)		110.58

11. BUILDING HEIGHT - TOWER C		ESTIMATED (m)
Building height		106.77
Building height (including mech)		111.77

11. BUILDING HEIGHT - TOWER D		ESTIMATED (m)
Building height		109.72
Building height (including mech)		114.72

AREA SUMMARY - TOTAL (BUILDING 1 AND BUILDING 2)

LEVEL	ESTIMATED GCA		GFA EXEMPTION		ESTIMATED GFA		RESIDENTIAL		COMMON		STORAGE		INDOOR AMENITY		OUTDOOR AMENITY		COMMERCIAL		PARKING	
	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf
P2	12,003.2	129,201.4	11895.0	128,036.7	108.2	1,164.7	0.0	0.0	483.5	5,204.4	723.2	7,784.5	0.0	0.0	0.0	0.0	10,813.6	116,396.6		
P1	11,965.0	128,790.2	11856.8	127,625.5	108.2	1,164.7	0.0	0.0	1,444.6	15,549.5	412.6	4,441.2	0.0	0.0	0.0	0.0	10,649.5	114,630.3		
UNDERGROUND MEZZANINE	4,936.6	53,137.1	4882.5	52,554.8	54.1	582.3	0.0	0.0	187.3	2,016.1	780.4	8,400.2	0.0	0.0	0.0	0.0	10,650.5	114,641.0		
GROUND FLOOR	4,960.7	53,396.5	934.8	10,062.1	4,025.9	43,334.4	0.0	0.0	2,097.0	22,571.9	0.0	0.0	0.0	0.0	0.0	0.0	2,911.4	31,338.0	504.2	5,427.2
MEZZANINE	4,952.8	53,311.5	3999.5	43,050.3	953.3	10,261.2	0.0	0.0	1,238.6	13,332.2	309.1	3,327.1	0.0	0.0	0.0	0.0	2,857.1	30,753.6		
FLOOR 2	8,846.3	95,220.8	8613.1	92,710.6	233.2	2,510.1	0.0	0.0	541.6	5,829.7	395.6	4,258.2	0.0	0.0	0.0	0.0	7,863.4	84,640.9		
FLOOR 3	8,846.3	95,220.8	8618.1	92,764.5	228.2	2,456.3	0.0	0.0	788.6	7,950.2	254.0	2,734.0	0.0</							

PROPOSED MIXED USE DEVELOPMENT
375-409 KINGSTON ROAD, PICKERING, ON L1V 1A3

PROJECT SUMMARY - BUILDING 2

01. SITE AREA - BUILDING 2		
	m ²	sf
Existing lot area	8,447.7	90,930.3
Road widening	388.0	4,176.4
BUILDING 2 LOT AREA	8,059.7	86,753.9

02. GROSS FLOOR AREA - BUILDING 2		
	m ²	sf
Total GFA (including Parking below grade)	81,428.8	876,492.3
Estimated GFA	33,093.8	356,218.7

03. F.S.I - BUILDING 2	
	PROPOSED
	4.11

04. LOT COVERAGE - BUILDING 2	
	%
	59.6%

05. RETAIL - BUILDING 2	
	PROPOSED
Estimated Commercial	1,668.7

06. RESIDENTIAL UNITS - BUILDING 2	
	ESTIMATED
1 Bedroom and 1 Bedroom + Den	466 66%
2 Bedroom and 2 Bedroom + Den	232 33%
3 Bedroom	4 1%
TOTAL	702 100%

07. CAR PARKING - BUILDING 2	
	ESTIMATED
REGULAR	ACCESSIBLE
P2	168 3
P1	149 3
Underground Mezzanine	44 1
Ground Floor	24 2
Mezzanine	26 3
Floor 2	109 2
Floor 3	110 2
TOTAL PARKING SPACES (per type)	630 16
TOTAL PARKING SPACES	646
RATIO (Parking Spaces per Unit)	0.92
PARKING SPACES AT MTO SETBACK	32
TOTAL RATIO	0.97

08. BIKE PARKING - BUILDING 2	
	ESTIMATED
LONG-TERM	SHORT-TERM
P2	128 0
P1	168 0
Underground Mezzanine	106 0
Ground Floor	0 71
TOTAL	402 71

09. STORAGE - BUILDING 2	
	ESTIMATED
m²	sf
ESTIMATED STORAGE AREA	1,561.9 0.0
ESTIMATED STORAGE LOCKER COUNT (26sf per Locker)	647

10. AMENITY - BUILDING 2	
	ESTIMATED
m²	sf
Indoor	734.8 7,909.3
Outdoor	2565.5 27,614.8
TOTAL	3300.3 35,524.1
Proposed Amenity Rate per Unit	4.7 50.6

11. BUILDING HEIGHT - TOWER C	
	ESTIMATED (m)
Building height	106.77
Building height (including mech)	111.77

11. BUILDING HEIGHT - TOWER D	
	ESTIMATED (m)
Building height	109.72
Building height (including mech)	114.72

AREA SUMMARY - BUILDING 2

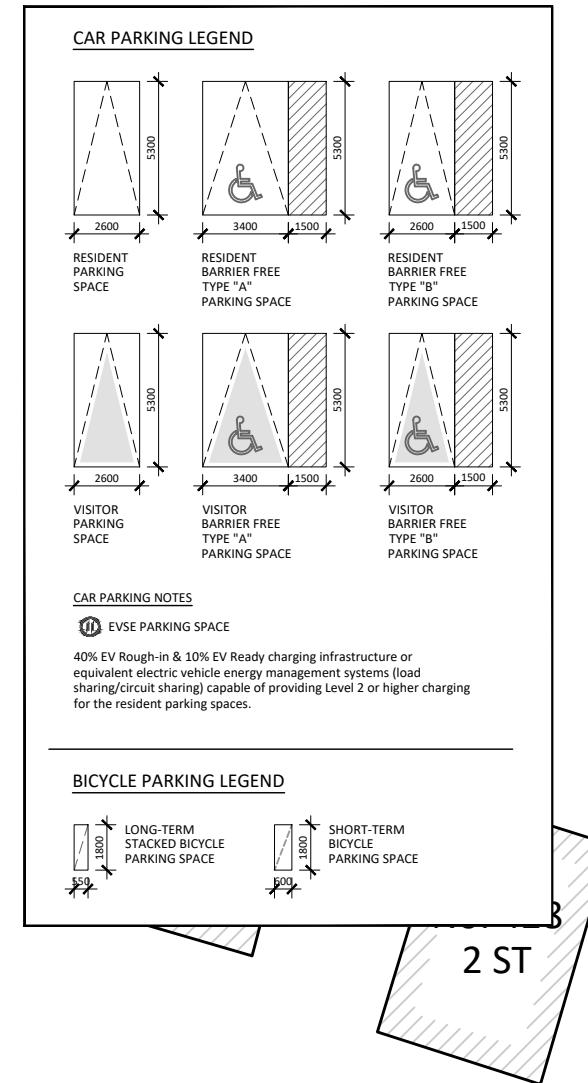
LEVEL	ESTIMATED GCA		GFA EXEMPTION		ESTIMATED GFA		RESIDENTIAL		COMMON		STORAGE		INDOOR AMENITY		OUTDOOR AMENITY		COMMERCIAL		PARKING	
	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf	m ²	sf
P2	6,659.9	71,686.6	6,605.8	71,104.2	54.1	582.3	0.0	0.0	244.3	2,629.6	481.7	5,185.0	0.0	0.0	0.0	0.0	0.0	0.0	5,933.8	63,870.9
P1	6,639.5	71,467.0	6,585.4	70,884.7	54.1	582.3	0.0	0.0	849.6	9,145.0	210.3	2,263.7	0.0	0.0	0.0	0.0	0.0	0.0	5,579.5	60,057.2
UNDERGROUND MEZZANINE	2,615.3	28,150.9	2,588.2	27,859.2	27.1	291.7	0.0	0.0	86.1	926.8	1,761.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,365.6	25,463.1
GROUND FLOOR	2,728.8	29,372.6	482.7	5,195.7	2,246.1	24,176.8	0.0	0.0	1,060.1	11,410.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MEZZANINE	2,517.6	27,099.2	1,904.6	20,500.9	613.0	6,598.3	0.0	0.0	613.0	6,598.3	242.2	2,607.0	0.0	0.0	0.0	0.0	0.0	0.0	1,662.4	17,893.9
FLOOR 2	4,805.3	51,723.8	4,660.8	50,168.4	144.5	1,555.4	0.0	0.0	256.9	2,765.2	295.0	3,175.4	0.0	0.0	0.0	0.0	0.0	0.0	4,253.4	45,783.2
FLOOR 3	4,805.3	51,723.8	4,665.8	50,222.3	139.5	1,501.6	0.0	0.0	382.8	4,120.4	169.1	1,820.2	0.0	0.0	0.0	0.0	0.0	0.0	4,253.4	45,783.2
FLOOR 4 (AMENITY)	1,821.0	19,601.1	848.6	9,134.3	972.4	10,466.8	806.8	8,684.3	279.4	3,007.4	0.0	0.0	734.8	7,909.3	2,565.5	27,614.8	0.0	0.0	0.0	0.0
FLOOR 5	1,639.9	17,651.7	113.8	1,224.9	1,526.1	16,426.8	1,406.2													

1. These Contract Documents are the property of the Architect. The Architect bears no responsibility for the interpretations of these documents by the Contractor. Upon request, the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents. The Architect's review of the Drawings submitted by the Contractor for design conformance only.

2. Drawings are not to be scaled for construction. Contractors to verify all existing conditions and dimensions required to perform the Work and report any discrepancies with the Contract Documents to the Architect before commencing work.

3. Positions of exposed or finished mechanical or electrical devices, fittings, and fixtures are indicated on the Architectural drawings. The locations shown on the Architectural drawings are the locations of the mechanical and electrical drawings. Those items not clearly located will be located as directed by the Architect.

4. Specifications must be read in conjunction with all the contract documents, including the combination drawings, schedules, and any other graphic representation supplementing the written text in the event of conflict between drawings and specifications. Specifications take precedence over the drawings.



Car parking notes:
EV PARKING SPACE
40% EV Rough-in & 10% EV Ready charging infrastructure or sharing/circuit sharing capable of providing Level 2 or higher charging for the resident parking spaces.

Bicycle parking legend showing long-term and short-term bicycle parking spaces.

RE ISSUED FOR ZBA #2 Feb 14, 2025
RE ISSUED FOR ZBA #1 Dec 17, 2021
Description Date



1. BE ADVISED THAT SHOULD ANY PARTY, INCLUDING THE APPLICANT OR ANY SUBSEQUENT OWNER, APPLY FOR MORE THAN ONE CONDOMINIUM CORPORATION ENCOMPASSING ANY OR ALL OF THIS DEVELOPMENT OR MAKE AN APPLICATION THAT RESULTS IN A LAND DIVISION, STAFF MAY REQUIRE LEGAL ASSURANCES, INCLUDING BUT NOT LIMITED TO EASEMENTS, WITH RESPECT TO THE APPROVED SERVICES. SUCH ASSURANCES WILL BE DETERMINED AT THE TIME OF APPLICATION FOR CONDOMINIUM APPROVAL.
2. THE RECONSTRUCTED LANDSCAPING AND SIDEWALK ALONG KINGSTON ROAD, ROUGEMONT DRIVE AND EVELYN AVENUE, SITE FRONTRAGE WILL BE BUILT TO CITY STANDARDS AND AT NO COST TO THE MUNICIPALITY.
3. REFER TO LANDSCAPE DRAWINGS PREPARED BY MBHB FOR EXTENT AND DETAILS OF ALL HARD SURFACE MATERIALS.
4. REFER TO SITE GRADING PLAN PREPARED BY SCHAEFFERS FOR THE PURPOSES OF OBTAINING SITE GRADING INFORMATION.
5. ESTABLISHED GRADE DETERMINED PER CITY OF PICKERING'S DRAFT ZONING BY-LAW.
6. ALL THE CURRENT CURB CUTS ALONG KINGSTON ROAD, ROUGEMONT DRIVE AND EVELYN AVENUE FRONTRAGE OF THE SUBJECT SITE MUST BE REMOVED AND REPLACED WITH PROPER CONCRETE CURBS ACCORDING TO THE CITY OF TORONTO STANDARD DRAWING NO. T-500-05-1.
7. LOAD SUPPORT SHALL BE SUFFICIENT TO SUPPORT THE EXPECTED LOADS IMPOSED BY FIREFIGHTING EQUIPMENT, MEET THE CANADIAN HIGHWAY BRIDGE DESIGN CODE, AND CAN/CSA-S6 REQUIREMENTS, AND BE SURFACED TO BE ACCESSIBLE UNDER ALL CLIMATIC CONDITIONS.
8. NO FEATURE, AMENITY, OR OPERATIONAL ARRANGEMENT (SUCH AS, BUT NOT LIMITED TO, FIRE ROUTES, EMERGENCY ACCESS/EXITS, PARKING, LOADING DOCKS, ACCESS TO LOADING DOCKS, STORM-WATER MANAGEMENT PONDS) THAT IS REQUIRED BY BY-LAW OR IS ESSENTIAL TO THE VIABILITY OF THIS SITE, WILL BE LOCATED WITHIN THE SETBACKS.
9. A FLAG PERSON MUST ACCOMPANY ALL THE LOADING MANEUVERS WITHIN THE PROPERTY LIMITS.



Architects:
STUDIO JCI

20 De Boers Drive, Suite
325
Toronto, ON M3J 0H1
T. (416) 901 6528
www.studiojci.com

PROPOSED MIXED-USE
DEVELOPMENT

APPENDIX B

**STORMWATER MANAGEMENT CALCULATIONS &
DOCUMENTATION**

City of Pickering

Runoff Coefficient - Pre-Development Stage

Project: 375-421 Kingston Road

2024-5504

Criteria:

The Runoff Coefficients were taken from City's Design Criteria.

Calculations for Drainage Area A1 - Draining to Kingston Road

	Area (ha)	Runoff Coeff.	A x C
Impervious Area	0.41	0.95	0.39
Pervious Area	0.03	0.20	0.01
Sub Total	0.44		0.40

Weighted Coefficient - Drainage Area A1 to Kingston Road	0.90
---	-------------

Calculations for Drainage Area A2 - Draining to MTO

	Area (ha)	Runoff Coeff.	A x C
Impervious Area	0.26	0.95	0.24
Pervious Area	0.17	0.20	0.03
Sub Total	0.43		0.28

Weighted Coefficient - Drainage Area A2 to MTO	0.65
---	-------------

Calculations for Drainage Area A3 - Draining to MTO

	Area (ha)	Runoff Coeff.	A x C
Impervious Area	0.00	0.95	0.00
Pervious Area	0.13	0.20	0.03
Sub Total	0.13		0.03

Weighted Coefficient - Drainage Area A3 to MTO	0.20
---	-------------

Calculations for Drainage Area A4 - Draining to Kingston Road

	Area (ha)	Runoff Coeff.	A x C
Impervious Area	0.75	0.95	0.71
Pervious Area	0.05	0.20	0.01
Sub Total	0.81		0.73

Weighted Coefficient - Drainage Area A4 to Kingston Road	0.90
---	-------------

City of Pickering
 Release Rate - Pre-Development Stage
 Project: 375-421 Kingston Road
 2024-5504

Rainfall intensity - City of Pickering

Design Storm Event	A	B	C	I (mm/hr)
2-Year	715.076	5.262	0.815	61.575
5-Year	1082.901	6.007	0.837	84.678
10-Year	1313.979	6.026	0.845	100.198
25-Year	1581.718	6.007	0.848	119.609
50-Year	1828.009	6.193	0.856	133.893
100-Year	2096.425	6.485	0.863	148.541

Note:
T=15 minutes
 $I = A/(T+B)^C$

Q_{A1} = Existing Peak Discharge Rate for Drainage Area A1 to Existing Storm Sewer on Kingston Road

Runoff Coefficient, C	0.90	
Drainage Area	0.44	ha
2-Year Peak Flow, Q_2	67.9	l/s
5-Year Peak Flow, Q_5	93.4	l/s
10-Year Peak Flow, Q_{10}	110.5	l/s
*25-Year Peak Flow, Q_{25}	145.1	l/s
*50-Year Peak Flow, Q_{50}	164.1	l/s
*100-Year Peak Flow, Q_{100}	182.0	l/s

$Q_{A2\&3}$ = Existing Peak Discharge Rate for Drainage Areas A2 & A3 to MTO Lands

Runoff Coefficient, C	0.54	
Drainage Area	0.56	ha
2-Year Peak Flow, Q_2	52.2	l/s
5-Year Peak Flow, Q_5	71.7	l/s
10-Year Peak Flow, Q_{10}	84.9	l/s
*25-Year Peak Flow, Q_{25}	111.5	l/s
*50-Year Peak Flow, Q_{50}	136.1	l/s
*100-Year Peak Flow, Q_{100}	157.3	l/s

Q_{A4} = Existing Peak Discharge Rate for Drainage Area A4 to Existing Storm Sewer on Kingston Road

Runoff Coefficient, C	0.90	
Drainage Area	0.81	ha
2-Year Peak Flow, Q_2	124.2	l/s
5-Year Peak Flow, Q_5	170.8	l/s
10-Year Peak Flow, Q_{10}	202.1	l/s
*25-Year Peak Flow, Q_{25}	265.4	l/s
*50-Year Peak Flow, Q_{50}	300.1	l/s
*100-Year Peak Flow, Q_{100}	332.9	l/s

*For 25-year, 50-year and 100-year storms, antecedent precipitation factor should be used

City of Pickering
 Allowable Release Rate
 Project: 375-421 Kingston Road
 2024-5504

Rainfall intensity - City of Pickering

Design Storm Event	A	B	C	I (mm/hr)	Note:
2-Year	715.076	5.262	0.815	61.575	T=15 minutes
5-Year	1082.901	6.007	0.837	84.678	I=A/(T+B)^C
10-Year	1313.979	6.026	0.845	100.198	
25-Year	1581.718	6.007	0.848	119.609	
50-Year	1828.009	6.193	0.856	133.893	
100-Year	2096.425	6.485	0.863	148.541	

If the existing Weighted Coefficient is more than 0.5, a Runoff Coefficient of C=0.50 should be used.

Q_{p1} = Allowable Release Rate for Phase 1 and Parkland = Existing Peak Discharge Rate from Drainage Area A1 to Existing Storm Sewer on Kingston Road

Adjusted Runoff Coefficient, C	0.50	
Drainage Area	0.44	ha
2-Year Peak Flow, Q_2	37.7	l/s
5-Year Peak Flow, Q_5	51.9	l/s
10-Year Peak Flow, Q_{10}	61.4	l/s
*25-Year Peak Flow, Q_{25}	80.6	l/s
*50-Year Peak Flow, Q_{50}	98.4	l/s
*100-Year Peak Flow, Q_{100}	113.8	l/s

Adjusted Runoff Coefficient, C	0.50	
Drainage Area	0.44	ha
Q_{p1} = Allowable Release Rate for Phase 1 and Parkland = Existing 2-Year Peak Flow from Drainage Area A1	37.7	l/s

Allowable Release Rate for Phase 1 and Parkland to Kingston Road **37.7** l/s

Q_{p3} = Proposed Peak Discharge Rate from Parkland to Existing Storm Sewer on Kingston Road

Runoff Coefficient, C	0.25	
Drainage Area	0.18	ha
2-Year Peak Flow, Q_2	7.7	l/s
5-Year Peak Flow, Q_5	10.7	l/s
10-Year Peak Flow, Q_{10}	12.6	l/s
*25-Year Peak Flow, Q_{25}	16.6	l/s
*50-Year Peak Flow, Q_{50}	20.2	l/s
*100-Year Peak Flow, Q_{100}	23.4	l/s

Presuming Parkland will be designed with C=0.25 and drain uncontrolled to Kingston Road, the adjusted allowable release rate for Phase 1 to Kingston Road **14.4** l/s

*For 25-year, 50-year and 100-year storms, antecedent precipitation factor should be used

DESIGN CALCULATION

Stormwater Detention Facilities
Rougemount Drive - Commercial Development
Town of Pickering

Design Criteria : zero increase in stormwater runoff
(10 - Year predevelopment flow condition)

Stormwater Detention methods :

1. Roof Top Detention
2. Surface Detention
3. Underground Detention

Pre-development Flow For Ex. CB on HW 2

Drainage Area = 0.082 ha (0.203 acres)

Runoff Coefficient (asphalt paved) $C \approx 0.90$

Assume $t_c \approx 5 \text{ min}$, $I_{10} \approx 138 \text{ mm/hr}$

Apply $Q = 0.0028 \text{ CIS}$

$$\begin{aligned} i. Q &= 0.0028 (0.90) (138) (0.082) \\ &= 0.0285 \text{ m}^3/\text{s} (1.01 \text{ cfs}) \end{aligned}$$

Roof Top Storage

The drainage for the commercial building will be designed on the basis of using controlled flow roof drains.

Site area : 1.86 acres

Roof area : 23,570 sq. ft.

$$A \times R = \frac{23,570}{43,560} \times 1.0 = 0.54$$

City of Pickering

PHASE 1 - SWM Tank - Storage Volume

Project: 375-421 Kingston Road

2024-5504

Modified Rational Method

Area (ha) = 0.75
RC = 0.85
RC*Ca ₁₀₀ = 1.00
Allowable 100-Year Release Rate (l/s) = 14.4
Actual Release Rate (l/s) = 14.3
 <u>Allowance for Permanent Foundation Drainage (l/s) = 1.00</u>

100 Year Storm

Design Storm = City of Pickering
A = 2096.425
B = 6.485
C = 0.863

Time (min)	100 Year					Total Runoff	Maximum Release Volume (m ³)	Required Storage (m ³)
	Intensity (mm/hr)	Total Runoff (l/s)	Runoff Roof (l/s)	Foundation Drainage (l/s)	Total Runoff (l/s)			
10	186.69	388.69	0.00	1.00	389.69	233.81	8.56	225.25
11	177.44	369.43	0.00	1.00	370.43	244.48	9.41	235.07
12	169.13	352.11	0.00	1.00	353.11	254.24	10.27	243.97
13	161.61	336.46	0.00	1.00	337.46	263.22	11.13	252.10
14	154.78	322.24	0.00	1.00	323.24	271.52	11.98	259.54
15	148.54	309.25	0.00	1.00	310.25	279.23	12.84	266.39
20	124.00	258.17	0.00	1.00	259.17	311.00	17.12	293.88
25	106.81	222.37	0.00	1.00	223.37	335.06	21.40	313.67
30	94.05	195.81	0.00	1.00	196.81	354.26	25.67	328.59
31	91.88	191.30	0.00	1.00	192.30	357.67	26.53	331.14
32	89.82	187.00	0.00	1.00	188.00	360.96	27.39	333.57
33	87.85	182.91	0.00	1.00	183.91	364.13	28.24	335.89
34	85.98	179.00	0.00	1.00	180.00	367.20	29.10	338.10
35	84.19	175.27	0.00	1.00	176.27	370.17	29.95	340.21
36	82.47	171.70	0.00	1.00	172.70	373.04	30.81	342.23
37	80.83	168.29	0.00	1.00	169.29	375.83	31.66	344.16
38	79.26	165.02	0.00	1.00	166.02	378.53	32.52	346.01
39	77.76	161.89	0.00	1.00	162.89	381.15	33.38	347.78
40	76.31	158.88	0.00	1.00	159.88	383.70	34.23	349.47
45	69.87	145.47	0.00	1.00	146.47	395.46	38.51	356.95
50	64.50	134.29	0.00	1.00	135.29	405.86	42.79	363.07
55	59.95	124.81	0.00	1.00	125.81	415.16	47.07	368.10
60	56.04	116.66	0.00	1.00	117.66	423.59	51.35	372.24
65	52.64	109.59	0.00	1.00	110.59	431.29	55.63	375.66

Required Storage (m³): 376.0

Provided Storage (m³): 446.2

City of Pickering
Control Orifice Sizing - Phase 1

Project: 375-421 Kingston Road
2024-5504

Allowable Release Rate = **14.4 l/sec**

Control Manhole Orifice(s) =

Orifice 1
DIA (mm) = **100**
AREA m² = **0.008**
COEFF = **0.82**

GRAVITY = **9.81**
K = **1.0**
D/S HGL (m) = **N/A**
Orifice Inv. (m) = **100.94**

Effective Head (m)	Depth of Water (m)	Orifice 1	TOTAL FLOW	Elevation of Water (m)
		Q _p m ³ /s	Q _p m ³ /s	
0.00	0.050	0.0000	0.0000	100.99
0.190	0.240	0.0124	0.0124	101.18
0.210	0.260	0.0131	0.0131	101.20
0.230	0.280	0.0137	0.0137	101.22
0.250	0.300	0.0143	0.0143	101.24
0.270	0.320	0.0148	0.0148	101.26
0.290	0.340	0.0154	0.0154	101.28

ORIFICE FLOW Q(m³/s) = COEF*AREA*(2*GRAVITY*HEAD/K)^{0.5}
WEIR FLOW Q(m³/s) = CLH^{1.5} C=1.5

City of Pickering

PHASE 2 - SWM Tank - Storage Volume

Project: 375-421 Kingston Road

2024-5504

Modified Rational Method

Area (ha) = 0.84
RC = 0.85
RC*Ca ₁₀₀ = 1.00
Allowable 100-Year Release Rate (l/s) = 28.5
Actual Release Rate (l/s) = 28.0

Allowance for Permanent Foundation Drainage (l/s) = 1.00
--

100 Year Storm

Design Storm = City of Pickering
A = 2096.425
B = 6.485
C = 0.863

Time (min)	100 Year					Runoff Volume (m ³)	Total Runoff Volume (m ³)	Maximum Release Volume (m ³)	Required Storage (m ³)
	Intensity (mm/hr)	Total Runoff (l/s)	Runoff (l/s)	Foundation (l/s)	Total (l/s)				
	100 year								
10	186.69	438.10	0.00	1.00	439.10	263.46	16.79	246.67	
11	177.44	416.39	0.00	1.00	417.39	275.48	18.47	257.01	
12	169.13	396.87	0.00	1.00	397.87	286.47	20.14	266.33	
13	161.61	379.23	0.00	1.00	380.23	296.58	21.82	274.76	
14	154.78	363.20	0.00	1.00	364.20	305.93	23.50	282.43	
15	148.54	348.57	0.00	1.00	349.57	314.61	25.18	289.43	
20	124.00	290.98	0.00	1.00	291.98	350.38	33.57	316.81	
25	106.81	250.64	0.00	1.00	251.64	377.46	41.97	335.50	
30	94.05	220.71	0.00	1.00	221.71	399.07	50.36	348.71	
31	91.88	215.62	0.00	1.00	216.62	402.90	52.04	350.87	
32	89.82	210.77	0.00	1.00	211.77	406.60	53.72	352.88	
33	87.85	206.16	0.00	1.00	207.16	410.17	55.40	354.77	
34	85.98	201.75	0.00	1.00	202.75	413.62	57.07	356.54	
35	84.19	197.55	0.00	1.00	198.55	416.96	58.75	358.20	
36	82.47	193.53	0.00	1.00	194.53	420.19	60.43	359.76	
37	80.83	189.68	0.00	1.00	190.68	423.32	62.11	361.21	
38	79.26	186.00	0.00	1.00	187.00	426.36	63.79	362.57	
39	77.76	182.46	0.00	1.00	183.46	429.31	65.47	363.84	
40	76.31	179.07	0.00	1.00	180.07	432.17	67.15	365.03	
45	69.87	163.96	0.00	1.00	164.96	445.39	75.54	369.85	
50	64.50	151.36	0.00	1.00	152.36	457.07	83.93	373.13	
55	59.95	140.67	0.00	1.00	141.67	467.52	92.33	375.19	
60	56.04	131.49	0.00	1.00	132.49	476.98	100.72	376.26	
65	52.64	123.52	0.00	1.00	124.52	485.62	109.11	376.51	

Required Storage (m³): 377.0

Provided Storage (m³): 442.6

City of Pickering
Control Orifice Sizing - Phase 2

Project: 375-421 Kingston Road
2024-5504

Allowable Release Rate = 28.5 l/sec

Control Manhole Orifice(s) =

Orifice 1
DIA (mm) = **150**
AREA m² = 0.018
COEFF = **0.82**

GRAVITY = 9.81
K = 1.0
D/S HGL (m) = N/A
Orifice Inv. (m) = **104.67**

Effective Head (m)	Depth of Water (m)	Orifice 1	TOTAL FLOW	Elevation of Water (m)
		Q _p m ³ /s	Q _p m ³ /s	
0.00	0.075	0.0000	0.0000	104.75
0.160	0.235	0.0257	0.0257	104.91
0.170	0.245	0.0265	0.0265	104.92
0.180	0.255	0.0272	0.0272	104.93
0.190	0.265	0.0280	0.0280	104.94
0.290	0.365	0.0346	0.0346	105.04
0.390	0.465	0.0401	0.0401	105.14

ORIFICE FLOW Q(m³/s) = COEF*AREA*(2*GRAVITY*HEAD/K)^{0.5}
WEIR FLOW Q(m³/s) = CLH^{1.5} C=1.5

WATER BALANCE ANALYSIS - PHASE 1

375-421 Kingston Road, City of Pickering

A = REQUIRED AVG. ANNUAL PRECIPITATION TO BE RETAINED

Over the site area of 0.75 ha, the 5mm translates to a volume of (5 mm x 0.75ha) =

5	mm
37.4	m^3

B = RETENTION

Site Features	Area (ha)	% of Site Area	Retention (mm)	Overall Site Capture (mm)
Pervious Landscape	0.10	13.2%	5	0.66
Impervious Surface	0.65	86.8%	0	0.00
Total	0.75	100.0%		0.66

Note: Impervious surfaces have not been considered for retention calculations. Best efforts have been made to reduce runoff by implementing significantly large green roofs and pervious landscape areas throughout the site.

Over the site area of 0.75 ha, the 0.66mm translates to a volume of (0.66 mm x 0.75ha) =

4.9	m^3
-----	-------

SUMMARY

A= Required average annual Precipitation depth to be retained 5 mm

B= Total Retention over entire site through the surface 0.66 mm

C= Total Capture over entire site through Tree Canopy Interception 0.00 mm

D= Total Captured over entire site (B + C) 0.66 mm

Deficit = A - D =	4.34	mm
-------------------	------	----

Total Capture over entire site through the surface = D x Area =	4.9	m^3
---	-----	-------

Total Required 5mm Retention = 5mm x Area =	37.4	m^3
---	------	-------

Total required volume for rain harvesting =	32.5	m^3
---	------	-------

Total provided volume for rain harvesting =	36.8	m^3
---	------	-------

Schaeffers Consulting Engineers

Job No.5504

2025-03-04

WATER BALANCE ANALYSIS - PHASE 2

375-421 Kingston Road, City of Pickering

A = REQUIRED AVG. ANNUAL PRECIPITATION TO BE RETAINED

Over the site area of 0.84 ha, the 5mm translates to a volume of (5 mm x 0.84ha) =

5	mm
42.2	m^3

B = RETENTION

Site Features	Area (ha)	% of Site Area	Retention (mm)	Overall Site Capture (mm)
Pervious Landscape	0.11	13.3%	5	0.67
Impervious Surface	0.73	86.7%	0	0.00
Total	0.84	100.0%		0.67

Note: Impervious surfaces have not been considered for retention calculations. Best efforts have been made to reduce runoff by implementing significantly large green roofs and pervious landscape areas throughout the site.

Over the site area of 0.84 ha, the 0.67mm translates to a volume of (0.67 mm x 0.84ha) =

5.6	m^3
-----	-------

SUMMARY

A= Required average annual Precipitation depth to be retained	5	mm
B= Total Retention over entire site through the surface	0.67	mm
C= Total Capture over entire site through Tree Canopy Interception	0.00	mm
D= Total Captured over entire site (B + C)	0.67	mm

Deficit = A - D =	4.33	mm
-------------------	------	----

Total Capture over entire site through the surface = D x Area =	5.6	m^3
---	-----	-------

Total Required 5mm Retention = 5mm x Area =	42.2	m^3
Total required volume for rain harvesting =	36.6	m^3
Total provided volume for rain harvesting =	39.5	m^3

Schaeffers Consulting Engineers

Job No.5504

2025-03-04

APPENDIX C

SANITARY CALCULATIONS & DOCUMENTATION

EXISTING SANITARY DEMAND CALCULATIONS

Municipality: City of Pickering
 Project Name: 375-421 Kingston Road
 Project No. 2024-5504
 Completed By: D.W.
 Checked By: H.S.
 Date: 2025-03-31



SCHAEFFERS
CONSULTING ENGINEERS

SCHAEFFER & ASSOCIATES LTD.

Peak Flow Calculation

Tenure Type	No. of Unit	Population *	Average Flow (L/s) **	M ***	Floor Area (ha)	Peak Flow (L/s) ****	Site Area (ha)	Infiltration (L/s) *****	Total Peak Flow (L/s)
Commercial	-	-	-	-	0.34	0.70	-	-	-
Single Family	1	4	0.02	3.8	-	0.06	-	-	-
Total	-	-	-	-	-	0.76	1.81	0.47	1.23

* Based on 3.5 persons/unit

** Based on 364 litres/person/day for residential

*** $M=1+(14/(4+P^{0.5}))$

**** Based on 180 m³/floor ha/day for commercial

***** Based on 22.5 m³/ha/day infiltration flow

PROPOSED SANITARY DEMAND CALCULATIONS

Municipality: City of Pickering
 Project Name: 375-421 Kingston Road
 Project No. 2024-5504
 Completed By: D.W.
 Checked By: H.S.
 Date: 2025-03-31



Phase 1 (Tower A + Tower B) Peak Flow Calculation

Tower A

Tenure Type	Population	Average Flow (L/s) *	M **	Floor Area (ha)	Peak Flow (L/s) ***	Site Area (ha)	Infiltration (L/s) ****	Total Peak Flow (L/s)
Residential	592	2.49	3.8	-	9.48	-	-	-
Commercial	-	-	-	0.04	0.09	-	-	-
Sub-Total	-	-	-	-	9.56	0.39	0.10	9.66

Tower B

Tenure Type	Population	Average Flow (L/s) *	M **	Floor Area (ha)	Peak Flow (L/s) ***	Site Area (ha)	Infiltration (L/s) ****	Total Peak Flow (L/s)
Residential	614	2.59	3.8	-	9.83	-	-	-
Commercial	-	-	-	0.08	0.17	-	-	-
Sub-Total	-	-	-	-	10.00	0.43	0.11	10.12

Phase 2 (Tower C + Tower D) Peak Flow Calculation

Tower C

Tenure Type	Population	Average Flow (L/s) *	M **	Floor Area (ha)	Peak Flow (L/s) ***	Site Area (ha)	Infiltration (L/s) ****	Total Peak Flow (L/s)
Residential	636	2.68	3.8	-	10.18	-	-	-
Commercial	-	-	-	0.08	0.16	-	-	-
Sub-Total	-	-	-	-	10.34	0.37	0.10	10.44

Tower D

Tenure Type	Population	Average Flow (L/s) *	M **	Floor Area (ha)	Peak Flow (L/s) ***	Site Area (ha)	Infiltration (L/s) ****	Total Peak Flow (L/s)
Residential	658	2.77	3.8	-	10.53	-	-	-
Commercial	-	-	-	0.09	0.19	-	-	-
Sub-Total	-	-	-	-	10.72	0.44	0.11	10.83

* Based on 364 litres/person/day for residential

** $M=1+(14/(4+P^{0.5}))$

*** Based on 180 m³/floor ha/day for commercial

**** Based on 22.5 m³/ha/day infiltration flow

APPENDIX D

WATER SUPPLY CALCULATIONS

Water Supply Calculation - Phase 1

Municipality: City of Pickering
 Project Name: 375-421 Kingston Road
 Project No. 2024-5504
 Completed By: D.W.
 Checked By: H.S.
 Date: 2025-03-31



Generation Rate:

450
5,000

 L/capita/day for residential
 L/1000 m²/day for commercial

Tower A

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s)	Max Day Demand (L/s) *	Peak Hour Demand (L/s) **	Fire Flow (L/s)	Max Day Demand + Fire Flow (L/s)
Residential	592	-	3.08	7.71	11.56	-	-
Commercial	-	0.04	0.02	0.02	0.02	-	-
Sub-Total	-	-	3.11	7.73	11.59	116.67	124.40

Tower B

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s)	Max Day Demand (L/s) *	Peak Hour Demand (L/s) **	Fire Flow (L/s)	Max Day Demand + Fire Flow (L/s)
Residential	614	-	3.20	7.99	11.99	-	-
Commercial	-	0.08	0.05	0.05	0.05	-	-
Sub-Total	-	-	3.25	8.04	12.04	133.33	141.38

* Maximum day factor = 2.50 for residential

** Peak hour factor = 3.75 for residential

Water Supply Calculation - Phase 2

Municipality: City of Pickering
 Project Name: 375-421 Kingston Road
 Project No. 2024-5504
 Completed By: D.W.
 Checked By: H.S.
 Date: 2025-03-31



Generation Rate:

450
5,000

 L/capita/day for residential
 L/1000 m²/day for commercial

Tower C

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s)	Max Day Demand (L/s) *	Peak Hour Demand (L/s) **	Fire Flow (L/s)	Max Day Demand + Fire Flow (L/s)
Residential	636	-	3.31	8.28	12.42	-	-
Commercial	-	0.08	0.05	0.05	0.05	-	-
Sub-Total	-	-	3.36	8.33	12.47	133.33	141.66

Tower D

Tenure Type	Population	Floor Area (ha)	Average Demand (L/s)	Max Day Demand (L/s) *	Peak Hour Demand (L/s) **	Fire Flow (L/s)	Max Day Demand + Fire Flow (L/s)
Residential	658	-	3.43	8.57	12.85	-	-
Commercial	-	0.09	0.05	0.05	0.05	-	-
Sub-Total	-	-	3.48	8.62	12.90	166.67	175.29

* Maximum day factor = 2.50 for residential

** Peak hour factor = 3.75 for residential

Fire Flow Calculations - Tower A

Municipality: City of Pickering
Project Name: 375-421 Kingston Road
Project No. 2024-5504
Completed By: D.W.
Checked By: H.S.
Date: 2025-03-31



A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient: **0.8**

D = Fire Flow (000's)

GFA	2,885 square metres
Construction Type	0.8
Fire Flow	9,453 L/min.

GFA includes the largest floor + 25% of two adjoining floors
= 2046 + 25% of (1309 + 2046)

Fire Flow **9,000 L/min.**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor **-15%**
Fire Flow **7,650 L/min.**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor: **-30% inc 10% Standard Connection Size**

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
Greater than 30 m	0%	

North Side > 30 m
East Side > 30 m
South Side > 30 m
West Side = 0 m

Exposure Factor **25% (no more than 75%)**

H - Net Fire Flow Required

	Charge
F + G Factors	-5%
	7267.5 L/min.
Fire Flow:	7000 L/min.
	117 L/s

Fire Flow Calculations - Tower B

Municipality: City of Pickering
Project Name: 375-421 Kingston Road
Project No. 2024-5504
Completed By: D.W.
Checked By: H.S.
Date: 2025-03-31



A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient: **0.8**

D = Fire Flow (000's)

GFA	2,774	square metres
Construction Type	0.8	
Fire Flow	9,270	L/min.

GFA includes the largest floor + 25% of two adjoining floors
= 1995 + 25% of (1122 + 1995)

Fire Flow **9,000 L/min.**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor **-15%**
Fire Flow **7,650 L/min.**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor: **-30% inc 10% Standard Connection Size**

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
Greater than 30 m	0%	

North Side > 30 m
East Side = 0 m
South Side > 30 m
West Side = 14.8 m

Exposure Factor **40% (no more than 75%)**

H - Net Fire Flow Required

	Charge
F + G Factors	10%
	8415 L/min.
Fire Flow:	8000 L/min.
	133 L/s

Fire Flow Calculations - Tower C

Municipality: City of Pickering
Project Name: 375-421 Kingston Road
Project No. 2024-5504
Completed By: D.W.
Checked By: H.S.
Date: 2025-03-31



A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient: **0.8**

D = Fire Flow (000's)

GFA	2,780	square metres
Construction Type	0.8	
Fire Flow	9,280	L/min.

GFA includes the largest floor + 25% of two adjoining floors
= 2004 + 25% of (1101 + 2004)

Fire Flow **9,000 L/min.**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor **-15%**
Fire Flow **7,650 L/min.**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor: **-30% inc 10% Standard Connection Size**

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
Greater than 30 m	0%	

North Side > 30 m
East Side = 14.8 m
South Side > 30 m
West Side = 0 m

Exposure Factor **40% (no more than 75%)**

H - Net Fire Flow Required

	Charge
F + G Factors	10%
	8415 L/min.
Fire Flow:	8000 L/min.
	133 L/s

Fire Flow Calculations - Tower D

Municipality: City of Pickering
Project Name: 375-421 Kingston Road
Project No. 2024-5504
Completed By: D.W.
Checked By: H.S.
Date: 2025-03-31



A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient: **0.8**

D = Fire Flow (000's)

GFA	3,854 square metres
Construction Type	0.8
Fire Flow	10,925 L/min.

GFA includes the largest floor + 25% of two adjoining floors
= 2802 + 25% of (1404 + 2802)

Fire Flow **11,000 L/min.**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor **-15%**
Fire Flow **9,350 L/min.**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Fully Supervised System	-50%

Sprinkler Factor: **-30% inc 10% Standard Connection Size**

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
Greater than 30 m	0%	

North Side > 30 m
East Side = 0 m
South Side > 30 m
West Side = 23.7 m

Exposure Factor **35% (no more than 75%)**

H - Net Fire Flow Required

	Charge
F + G Factors	5%
	9817.5 L/min.
Fire Flow:	10000 L/min.

167 L/s

APPENDIX E

GROUNDWATER CONDITIONS



ENGINEERING



Professional Engineers Ontario

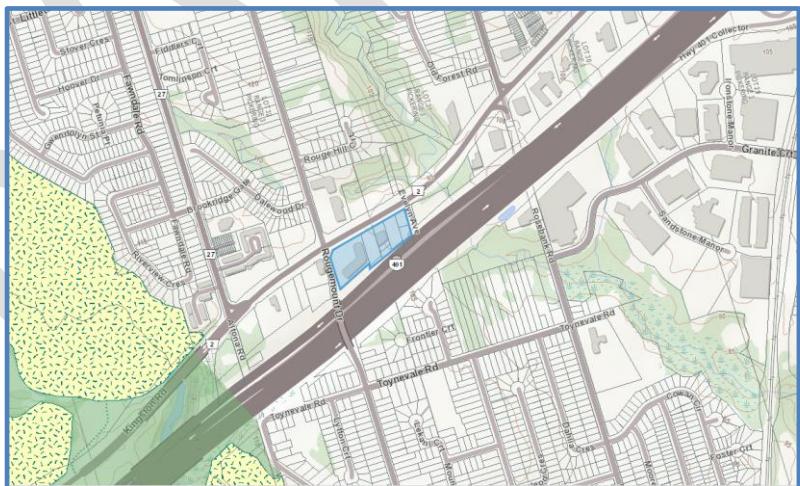
LABORATORY



CALA

Canadian Association for
Laboratory Accreditation Inc.

HYDROGEOLOGICAL INVESTIGATION



**PROPOSED DEVELOPMENT,
375-417 KINGSTON ROAD, PICKERING, ONTARIO,
L1V 1A3**

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

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

Prepared for:

**375 Kingston Road Corporation &
401 Kingston Road Corporation**

Project No. FH24-14411 V1

February 14, 2025



Issued to: 375 Kingston Road Corporation &
401 Kingston Road Corporation

Contact: Kirby Wilson
Decade Capital
1806 Avenue Road, Unit 2
Toronto, ON M5M 3Z1
Tel: 416-781-0623 Ext. 6
Email: kirby@decadecapital.ca

Project Name: Hydrogeological Investigation for Proposed Development

Project Address: 375-417 Kingston Road, Pickering, Ontario, L1V 1A3

Project Number: FH24-14411_V1

Issued on: February 14, 2025

Project Manager: Clive Wiggan, PhD., PMP., P.Eng.
(Primary Contact)
Project Manager
clive@fishereng.com

Report Reviewed By: _____

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

10 DISCUSSION

1. Hydraulic conductivity values (k) calculated from on-site single well response tests, in overburden monitoring wells, are in the range 3.03×10^{-8} to 3.03×10^{-6} m/s (0.003 to 0.261 m/day). These are representative of the water bearing soils consisting of sandy silt till with interbedded sandy clayey silt till within the expected excavation depths.
2. Construction groundwater dewatering flowrates of 22.81 and 19.34 m³/day were estimated for Phases 1 and 2 construction respectively.
3. Permanent under-slab and perimeter drainage will be required for the buildings with 2UG levels. Permanent drainage rates of 22.81 to 2.26 m³/day are applicable.
4. A factor of safety of 1.5 should be applied to construction groundwater and permanent drainage rates.
5. An additional volume of 25 m³/day should be added to the factored construction groundwater dewatering for each development phase to account for accumulated precipitation.
6. Registration on the MECP's EASR Website for water taking during construction will be required.
7. An application for PTTW will not generally be required for each development phase for permanent drainage. If, however, both development phases are combined, then an application for PTTW will be required for permanent drainage.
8. Based on the subsurface investigation, rising head slug tests & analyses and types of soils at the expected excavation depth, recharge of groundwater is relatively slow. Construction dewatering may therefore be handled by pumping from sump pits.
9. Exceedances of storm and sanitary sewer quality were observed in groundwater analyses for sewer discharge. Treatment of the groundwater may therefore be required before it can be discharged to the public sewer system.
10. It should be noted that if it is intended that any accumulated water, following periods of heavy rainfall, be discharged into the public sewer, then a permit to discharge would be required along with laboratory analyses to ensure compliance with the Regional Sewer Use Bylaws.
11. Construction dewatering rates presented in the preceding are based on common practice and reasonable assumptions for the site.



APPENDIX F

ENGINEERING DRAWINGS
(Included Separately with Submission Package)