Site Servicing and Stormwater Management Report
1015 Tweddle Road, Ottawa, ON

Client:
Trim 1 GP Inc.
7 de Tellier
Gatineau, QC J8T 8C2

Submitted for:
Site Plan Application (SPA)

Project Name:
1015 Tweddle Road

Project Number:
OTT-00259629-A0

Prepared By:
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Date Submitted:
May 30, 2025

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Date Submitted:
May 30, 2025

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1 Introduction

1.1 Overview

EXP Services Inc. (EXP) was retained by Trim 1 GP Inc. to prepare a Site Servicing and Stormwater Management Report for the proposed development of 1015 Tweddle Road in support of the Site Plan Application.

The site is situated at the north-east corner of Tweddle Road and Jeanne D'Arc Boulevard North as illustrated in **Figure 1-1** below. The site is within the City of Ottawa urban boundary and situated in Orleans Ward (Ward 1).

Figure 1-1 - Site Location

The overall property area is 3.42 ha. The proposed development will occupy 1.28 ha of the total property parcel. The proposed development will consist of four high-rise buildings. Tower B1 and B3 both will be 28 storey, tower B2 will be 32 storey and tower B4 will be 24 storeys high. All four towers will be constructed above underground parking. Proposed development will have total 1,258 residential units and around 2,471 m^2 of commercial/retail space. Tower B1 will have 326 units, Tower B2 will have 372units, Tower B3 will have 324 units and Tower B4 will have 2236 units.

This report will discuss the adequacy of the adjacent municipal watermain, sanitary sewers and storm sewers to provide the required water supply, convey the sewage and stormwater flows that will result from the proposed development.

2 Existing Conditions

2.1 Site Topography

The site is currently undeveloped. The site is bounded to the west by Tweddle Road, to the south by Jeanne-D'Arc Boulevard North to the east by undeveloped land, and to the north by the Ottawa River. **Figure 2-1** below illustrates the topography of the site which slopes in a northerly direction towards the Ottawa River.

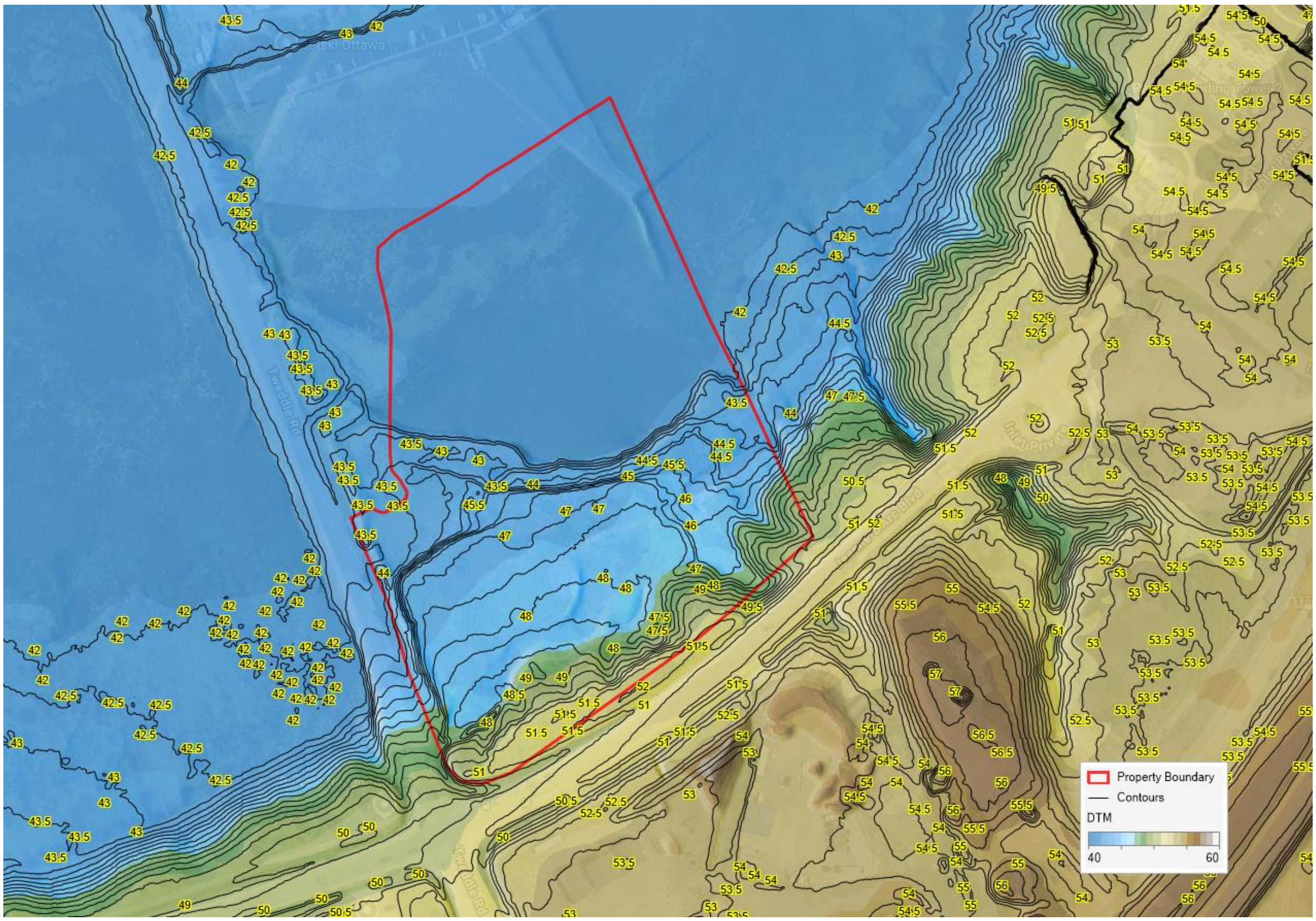


Figure 2-1 - Site Topography

Within the site the topography ranges from ±52m down to ±42m. A digital terrain model (DTM) was derived from 2019-2020 Ottawa Gatienau LIDAR Derived DTM (Land Inventory Ontario) and is shown in **Figure 2-1**. The normal water surface elevation within the adjacent Ottawa River is approximately ±42.0m, with a 100-year flood elevation being 45.0m. The Topographic Survey in **Appendix E** shows Ottawa River Normal High Water Mark, Edge of Wetlands, Ottawa River 100-Yr Regulatory Floodplain, Limit of Hazard Lands, Top of Slope Line, 15m Setback from Top of Slope and 30m Setback from Wetlands.

3 Existing Infrastructure

From review of the sewer and watermain mapping, as-built drawings and the City's GeoOttawa mapping, the following summarizes the onsite and adjacent offsite infrastructure:

Within property

- Subject property is currently undeveloped with no services or utilities

Within Jeanne-D'Arc Boulevard North, opposite the site

- 406 mm watermain and fire hydrants
- 300mm sanitary sewer
- Open drainage ditches on east side of Trim Road and along the north side of Jeanne D'Arc Boulevard North
- Enbridge Consumers Gas
- Overhead hydro lines and communication cables

Within Tweddle Road

- 75 mm watermain
- 75mm sewage forcemain
- Overhead Hydro and communication

4 Pre-Consultation / Permits / Approvals

A pre-consultation meeting was held with the City prior to design commencement. This meeting, held August 1, 2024, outlined the submission requirements and provided information to assist with the development proposal.

The proposed site is located within the Rideau Valley Conservation Authority (RVCA) jurisdiction, therefore signoff from the RVCA will be required. From previous development consultation on the property, the RVCA has noted that enhanced protection (80% TSS removal) is required. The RVCA has been contacted to confirm the stormwater management quality control requirements.

Stormwater management quantity control will not be required for the portion of the development that will be discharging directly to the Ottawa River. Additional information on this will be provided in proceeding sections.

An Environmental Compliance Approval (ECA) will be required from the Ministry of Environment, Conservation and Parks (MECP), for the upsizing of the sanitary sewer and the proposed storm sewer within Jeanne D'Arc Boulevard. A MECP ECA will also be required for the stormwater discharge from the site to the Ottawa River. Design Guidelines

Various design guidelines were referred to in preparing the current report including:

- Bulletin ISDTB-2012-4 (20 June 2012)
  - Technical Bulletin ISDTB-2012-04
  - Technical Bulletin ISDTB-2014-01
  - Technical Bulletin PIEDTB-2016-01
  - Technical Bulletin ISDTB-2018-01
  - Technical Bulletin ISDTB-2018-03
  - Technical Bulletin ISDTB-2018-04
  - Technical Bulletin ISDTB-2019-02
  -
- Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:
  - Technical Bulletin ISDTB-2010-02
  - Technical Bulletin ISDTB-2014-02
  - Technical Bulletin ISTB-2018-02
  - Technical Bulletin ISTB-2021-03
- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).
- Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS).
- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 2020.
- Ontario Building Code 2012, Ministry of Municipal Affairs and Housing.

5 Water Servicing

5.1 Water Servicing Design Criteria

Table 5-1 below summarizes the Design Criteria that was used to establish the water demands and the required fire flows, based on the proposed building uses. The design parameters that apply to this project and used for calculations are identified below.

Table 5-1 - Summary of Water Supply Design Criteria

Design Parameter	Value	Applies
Population Density – Single-family Home	3.4 persons/unit	
Population Density – Semi-detached Home	2.7 persons/unit	
Population Density – Townhome or Terrace Flat	1.8 persons/unit	
Population Density – Bachelor Apartment	1.4 persons/unit	
Population Density – Bachelor + Den Apartment	1.4 persons/unit	
Population Density – One Bedroom Apartment	1.4 persons/unit	✓
Population Density – One Bedroom plus Den Apartment	1.4 persons/unit	✓
Population Density – Two Bedroom Apartment	2.1 persons/unit	✓
Population Density – Two Bedroom plus Den Apartment	2.1 persons/unit	
Population Density – Three Bedroom Apartment	3.1 persons/unit	✓
Average Day Demands – Residential	280 L/person/day	✓
Average Day Demands – Commercial / Institutional	5 L/m^2 floor area/day	✓
Average Day Demands – Light Industrial / Heavy Industrial	35,000 or 55,000 L/gross ha/day	
Maximum Day Demands – Residential	2.5 x Average Day Demands	✓
Maximum Day Demands – Commercial / Institutional	1.5 x Average Day Demands	✓
Peak Hour Demands – Residential	5.5 x Average Day Demands	✓
Peak Hour Demands – Commercial / Institutional	2.7 x Average Day Demands	✓
Fire Flow Requirements Calculation	FUS	✓
Depth of Cover Required	2.4m	✓
Maximum Allowable Pressure	551.6 kPa (80 psi)	✓
Minimum Allowable Pressure	275.8 kPa (40 psi)	✓
Minimum Allowable Pressure during fire flow conditions	137.9 kPa (20 psi)	✓

5.2 Water Servicing Proposal

The proposed development will include 1,258 residential units and 2,471 square meters of level 1 and level 2 retail space housed within the four towers.

Architectural plans and rendering of the proposed building along with building statistics are provided in **Appendix E.**

It is proposed that the water supply for the site will be provided by two twin 200mm watermains supplied from the existing 406mm watermain on Jeanne D'Arc Boulevard North. The development will require independent and twin watermain services, which is the result of the average day water demands exceeding 50 m^3/day. The watermain feeds from the underground parking level will connect directly to the existing 406mm watermain on Jeanne D'Arc Boulevard and will have an isolation valve between them, consistent with City of Ottawa Water Design Guidelines.

The buildings will be protected by an automatic sprinkler system. Fire department connections (or siamese) will be located within 45 metres of existing adjacent municipally owned fire hydrants for towers B2, B3 and B4. In existing conditions there are no fire hydrants within Tweddle Road in near proximity of Tower B1. A new fire hydrant and lead are required on Tweddle Road to service Tower B1. Hence, it is proposed to extend a municipal 200mm diameter watermain within Tweddle Road to be capped north of the new fire hydrant.

5.3 Estimated Water Demands

The following **Table 5-2** below summarizes the anticipated water demands for the proposed development based on following:

- 4 towers having total 1,258 residential units. Estimated residential population of 2,069 persons.
- Commercial & Amenity spaces on level 1 and 2. Estimated area of 4,200 m^2.

Table 5-2 : Water Demand Summary

Water Demand Conditions	Tower B1 Water Demands (L/sec)	Tower B2 Water Demands (L/sec)	Tower B3 Water Demands (L/sec)	Tower B4 Water Demands (L/sec)	Total Water Demands (L/sec)
Average Day	2.22	2.45	2.11	1.28	8.07
Max Day	5.07	5.65	4.88	3.20	18.80
Peak Hour	10.43	11.71	10.14	7.04	39.32

5.4 Boundary Conditions

Hydraulic Grade Line (HGL) boundary conditions were obtained from the City for design purposes. A copy of the correspondence received from the City is provided in **Appendix D**.

The following hydraulic grade line (HGL) boundary conditions were provided:

- Maximum HGL = 113.6 m
- Peak Hour HGL = 106.7 m
- Max Day Plus Fire Flow 1 = 112.0 m (100 L/sec)
- Max Day Plus Fire Flow 2 = 102.9 m (167 L/sec)

The provided HGL ranges of 106.7 m – 113.6 m were used to estimate pressures at the building. Under Max Day Plus fire flow conditions, the lower HGL of 102.9 m was used, whereas for Peak Hour conditions the HGL of 106.7 m was used.

5.5 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along on Jeanne D'Arc Boulevard. The required fire flows for the proposed buildings were calculated based on typical values as established by the Fire Underwriters Survey 2020 (FUS).

The following equation from the Fire Underwriters document "Water Supply for Public Fire Protection", 2020, was used for calculation of the on-site supply rates required to be supplied by the hydrants:

$F = 200 * C * \sqrt{(A)}$

where:

F	=	Required Fire flow in Litres per minute
C	=	Coefficient related to type of Construction
A	=	Total Floor Area in square metres

The proceeding **Table 5-3** summarizes the parameters used for estimating the Required Fire Flows (RFF) based on the Fire Underwriters Survey (FUS) and the latest City of Ottawa Technical Bulletins. The RFFs were estimated in accordance with ISTB-2018-02, and based on floor areas provided by the architect, which are illustrates in **Appendix E.**

Detailed calculation of Required Fire Flow (RFF) for proposed buildings can be found in **Table B3** to **Table B6** in **Appendix B.**

Table 5-3 - Summary of Design Parameters Used in Calculating Required Fire Flows (RFF) Using FUS

Building #	[1]No of Storeys	Fire Flow, F (L/min)	Type of Constr. Coeff, C	Reduction Due to Occupancy (%)	Reduction Due to Sprinklers (%)	Total Increase due to Exposures (%)	Required Fire Flow in	
							(L/min)	(L/sec)
Tower B1	28	15,000	0.8	-15%	-50%	5%	7,000	117
Tower B2	32	14,000	0.8	-15%	-50%	10%	7,000	117
Tower B3	28	14,000	0.8	-15%	-50%	10%	7,000	117
Tower B4	24	13,000	0.8	-15%	-50%	5%	6,000	100

5.6 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 metres were reviewed to assess the total possible available flow from these contributing hydrants. For each hydrant the distance to the proposed building was determined to arrive at the contribution of fire flow from each. All hydrants are expected to be of Class AA as per Section 5.1 of Appendix I. For each hydrant the straight-line distance, distance measured along a fire route or roadway, whether its location is accessible, and its contribution to the required fire flow.

Figure 5-1 below illustrates all the hydrants that are within the 75 metre and 150 metre offsets from the subject property. Fire hydrants that are denoted with a number having a HP versus H represents a PRIVATE hydrant rather than a CITY owned hydrant. All hydrants were reviewed to determine if they were accessible or non-accessible. For example, a hydrant would not be accessible if they were located on the opposite side of a median, limiting fire truck access. A summary table of the total fire flows available versus the required fire flows (RFFs) is presented in **Table 5-4** below.

Table 5-4 –Fire Flows Based on Hydrant Spacing

Building	Required Fire Flow (L/min)	Available Fireflow Based on Hydrant Spacing as per ISTB-2018-02 (L/min)
Tower B1	7,000 (or 100 L/sec)	7,600
Tower B2	7,000 (or 117 L/sec)	15,200
Tower B3	7,000 (or 117 L/sec)	13,300
Tower B4	6,000 (or 100 L/sec)	9,500

Detailed calculations of the available fire flows based on hydrant spacing is provided in **Table B7** found in **Appendix B.** Therefore, the available flows from hydrants exceed each building's fire flow requirements as identified in Appendix I of Technical Bulletin ISTB-2018-02.

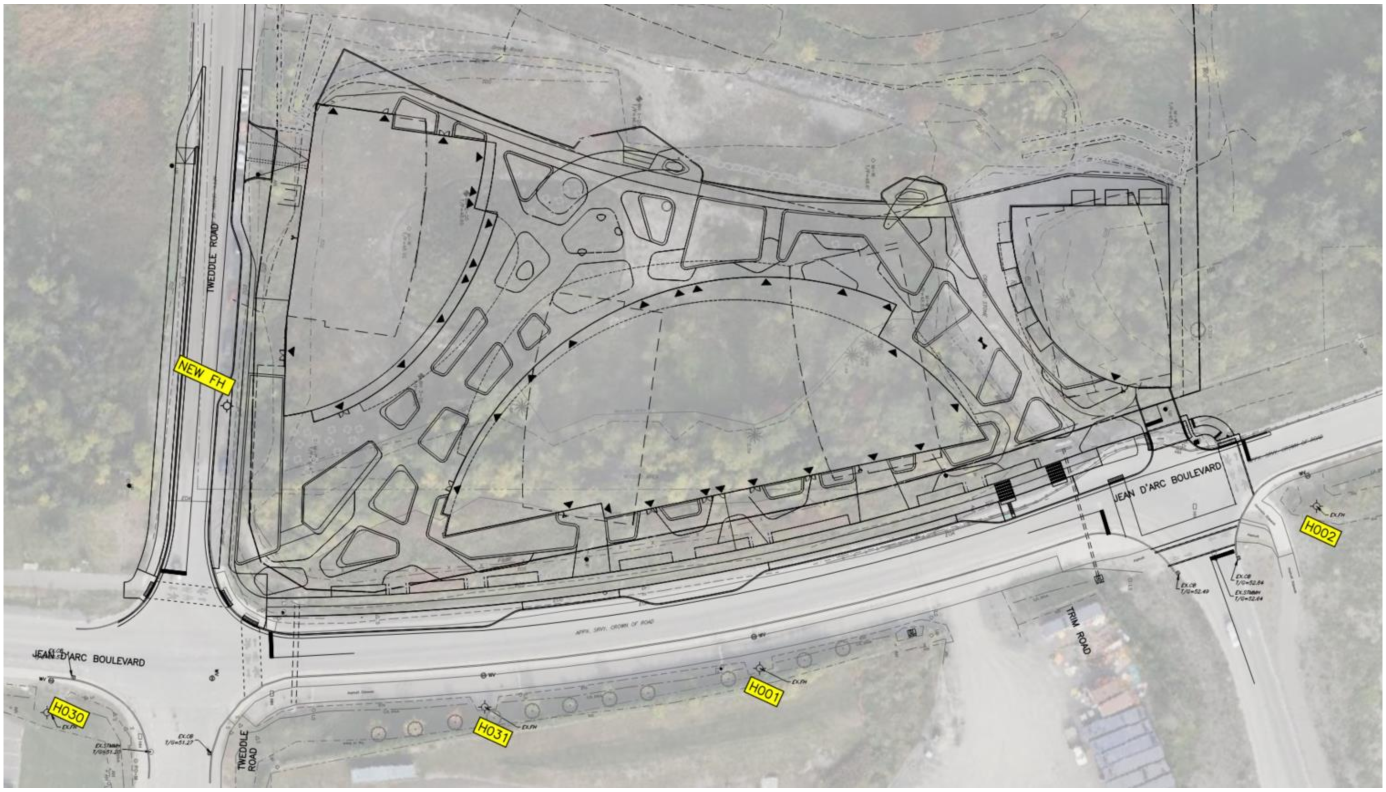
5.7 Water Servicing Design

The water servicing requirements for the proposed building is designed in accordance with the City Design Guidelines (July 2010). The following steps indicate the basic methodology that was used in our analysis:

- Estimated water demands under average day, maximum day and peak hour conditions. As the total population estimate is greater than 500, standard residential peaking factors were used.
- Estimated the required fire flow (RFF) based on the Fire Underwriters Survey (FUS).
- Reviewed the available flows from hydrants within 150m of the buildings, based on the City's WDG002 and compared to the required fire flows (RFFs) based on the Fire Underwriters Survey (FUS).
- Obtained hydraulic boundary conditions (HGL) from the City, based on the above water demands and required fire flows.
- Boundary condition data and water demands were used to estimate the pressure at the proposed building, and this was compared to the City's design criteria.

Since the average day demand exceed 50 m^3 per day, two watermain feeds for the development will be necessary as per Section 4.31 of the WDG001. Please refer to **Table B1** in **Appendix B** for detailed calculations of the total water demands.

Figure 5-1 – Review of Hydrant Spacing



Based on the hydraulic grad e line (HGL) provided from the City it is evident that high pressures exist in the water distribution system at the property. Static pressures of ± 70 psi – 90 psi are typically available. This is due to the lower elevation relative to the reservoir.

Based on the results, the installation of two twin 200mm watermains with a shut-off valve between them is proposed. As the maximum hydraulic grade line (HGL) provided by the city indicates pressures greater than 80 psi, pressure reducing measures will be required.

6 Sanitary Sewage Servicing

Sanitary Sewage Design Criteria

The sanitary sewer system is designed based on a population flow and an area-based infiltration allowance. The flows were calculated using City sewer design guidelines (SDG002). **Table 6-1** below summarizes the design parameters used.

Table 6-1 – Summary of Wastewater Design Criteria / Parameters

Design Parameter	Value	Applies
Population Density – Single-family Home	3.4 persons/unit	
Population Density – Semi-detached Home	2.7 persons/unit	
Population Density – Duplex	2.3 persons/unit	
Population Density – Townhome (row)	2.7 persons/unit	
Population Density – Bachelor Apartment	1.4 persons/unit	
Population Density – Bachelor + Den Apartment	1.4 persons/unit	
Population Density – One Bedroom Apartment	1.4 persons/unit	✓
Population Density – One Bedroom plus Den Apartment	1.4 persons/unit	✓
Population Density – Two Bedroom Apartment	2.1 persons/unit	✓
Population Density – Two Bedroom plus Den Apartment	2.1 persons/unit	✓
Population Density – Three Bedroom Apartment	3.1 persons/unit	✓
Average Daily Residential Sewage Flow	280 L/person/day	✓
Average Daily Commercial / Intuitional Flow	28,000 L/gross ha/day	✓
Average Light / Heavy Industrial Daily Flow	35,000 / 55,000 L/gross ha/day	
Residential Peaking Factor – Harmon Formula (Min = 2.0, Max =4.0, with K=0.8)	$M = 1 + \frac{14}{4 + P^{0.5}} * k$	✓
Commercial Peaking Factor	1.5	✓
Institutional Peaking Factor	1.5	
Industrial Peaking Factor	As per Table 4-B (SDG002)	
Unit of Peak Extraneous Flow (Dry Weather / Wet Weather)	0.05 or 0.28 L/s/gross ha	
Unit of Peak Extraneous Flow (Total I/I)	0.33 L/s/gross ha	✓

6.1 Proposed Sewage Conditions

It is proposed that the mechanical piping from each building discharge into a sanitary manhole onsite, which will then discharge to the existing sanitary sewer on Jeanne-D'Arc Boulevard. This manhole will be installed near the property line and be used as a monitoring manhole.

Two 300mm diameter sanitary service laterals are proposed to service the full development. The estimated peak sanitary flow rate from the proposed property is **±21.14/sec** based on City Design Guidelines. Sewage rates include a total infiltration allowance of 0.33 L/ha/sec based on the total gross site area.

Table 6-2 below summarizes the sewage anticipated peak sewage flows for the proposed site.

Table 6-2 – Summary of Anticipated Sewage Rates

Sewage Condition	Sanitary Sewage Flow (L/sec)
Peak Residential Flow (for 2,069 persons)	20.52
Peak Commercial Flow (for 4,200 m2)	0.20
Infiltration Flow (for 1.28 ha)	0.42
Peak Design Flow	21.14

6.2 Offsite Sanitary Sewer Review

The sanitary sewer run on Jeanne D'Arc Boulevard North (from Tweddle Road easterly to municipal limits) was designed and constructed to allow for the development of Phase I (Tower 1) of Brigil's Petrie's Landing II to proceed. Approximately 320 metres of sanitary sewer was extended from the Tweddle Road (Formerly Trim Road) intersection easterly to service Petrie's Landing II. A review of previous reports by David MacManus (DME) for Phase 1, and EXP Services (EXP) for Phase 2, confirmed that the sanitary sewer system on Jeanne D'Arc Boulevard North was sized, not only for the 3.9-hectare Petrie's Landing development site, but also for an additional 9.9 hectares of commercial development along Jeanne D'Arc Boulevard North. The commercial flow allowance established was 50,000 L/ha/day and included an additional infiltration allowance at 0.28 L/ha/sec.

As taken from the DME report, the total peak sanitary flows from both Petrie's Landing development (all 5 phases) and the additional 9.9 hectares was 34.7 L/sec, which included ±23.4 L/sec from Petrie's Landing and ±11.4 L/sec from the additional area along Jeanne D'Arc Boulevard North. At the time of the design of Tower 1 by DME, this was based on a residential population of 1512 persons.

In 2016, during the design of Tower 2 by EXP Services Inc (EXP), further refinement of the sanitary sewage flows from the Petrie's II Landing development was completed, based on number of proposed residential units. A revised population of 1822 persons was used and included the same offsite commercial flow allowance for the 9.9-hectares along Jeanne D'Arc Boulevard North. The peak flow was updated to 39.2 L/sec with 27.8 L/sec from Petrie's Landing development and 11.4 L/sec from the offsite areas.

The review of all sanitary sewer runs on Jean D'Arc Boulevard North were completed based on the most up to date information. A sanitary sewer design sheet was compiled based on data from the Petrie's Landing II project and based on the City's most recent Technical Bulletins. It should be noted that March 2018, revisions to the City's SDG002, were made to residential flow allowances as noted in Technical Bulletin ISTB-2018-01. The per capita flow allowance was lowered from 350 L/p/day to 280 L/p/day, along with the addition of the correction factors of 0.8 to the Harmon Formula Peaking Factors. These revised allowances were used to review sanitary sewer capacities.

Table B8 in **Appendix B** summarizes the anticipated peak sewage flows in all sanitary sewers runs up to the Tweddle Road (formerly Trim Road) intersection, whereas *Sanitary Drainage Area Plan C500* illustrates the sanitary drainage areas tributary to this sewer run.

It should be noted that the developer has proposed to acquire Part 9 of Plan 50R-5818 – Jeanne D'Arc ROW at the north-east corner of Jeanne D'Arc Boulevard North and Tweddle Road (formerly Trim Road), from the City. Sanitary manhole #MHSA22037 & MH#54993 are proposed to be relocated outside the property line. With this relocation, it is also proposed to upsize the pipes between MHSA22037 & MHSA54992 from 300mm dia. to 375mm dia. as shown on *Site Servicing Plan C100*.

Table B8 in **Appendix B** shows that the most restricted proposed 375 sanitary sewer will run at 56% capacity at 0.17% slope, with full flow capacity of ±79.53 L/sec.

For the site at 1015 Tweddle Road (formerly 1009 Trim Road), two 300mm diameter PVC sewer laterals having a minimum slope of 2.0% are proposed to service the development. The estimated capacity of a 300mm pipe at 2% is ±136 L/sec. A lateral at this slope would permit 8,300 fixture units as per OBC. Further detail and coordination with mechanical consultant will be advanced as the project progresses.

7 Storm Servicing & Stormwater Management

7.1 Design Criteria

The subject property is located within the Rideau Valley subwatershed; therefore, stormwater works are subject to both the Rideau Valley Conservation Authority (RVCA) and City of Ottawa (COO) approval.

The RVCA has noted that (80% TSS removal) quality control requirements for the site will be required.

Also clarified during the pre-consultation meeting, the requirements related to stormwater quantity control are noted as follows:

- *No quantity control is required for this development ONLY if it is discharging to the river.*
- *Please contact the City if this development will require municipal stormwater servicing.*

The proposed stormwater system is designed in conformance with the latest version of the City of Ottawa Design Guidelines (October 2012). Section 5 “Storm and Combined Sewer Design” and Section 8 “Stormwater Management”. A summary of the design criteria that relates to this design report is the proceeding sections below.

7.1.1 Minor System Design Criteria

- The storm sewer sizing will be based on the Rational Method and Manning’s Equation under free flow conditions for the 2-year storm using a 10-minute inlet time.
- Minimum sewer slopes to be based on minimum velocities for storm sewers of 0.80 m/sec.

7.1.2 Major System Design Criteria

- Any onsite stormwater detention (if used) will be estimated based on the 100-year design storm. It is proposed that roof top storage be incorporated where possible.
- Onsite detention will we estimated using the Modified Rational Method (MRM).
- Emergency overland flow routes are provided.
- The vertical distance from the spill elevation on the street and the ground elevation at the buildings is at least 150mm.
- The emergency overflow spill elevation is at least 30 cm below the lowest building opening.

7.2 Runoff Coefficients

Runoff coefficients used were based on actual areas taken from CAD. Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, whereas those for pervious surfaces (grass/landscaping) were taken as 0.20. Runoff coefficient for gravel surface was taken as 0.75. Average runoff coefficients were calculated for catchments (or drainage areas) using the area-weighting method in Excel or spatial-weighting in PCSWMM. The runoff coefficients for all pre-development and post-development catchments are provided in **Table B10** and **Table B13,** respectively.

7.3 Pre-Development Release Rate

The proposed development will occupy 1.28 ha out of 3.42 ha of total site area. Pre-development runoff coefficient for 1.28 ha site area was estimated to be 0.29. The calculated time of concentration was 3.58 mins. Therefore, the pre-development discharge rates during 2-year, 5-year and 100-year storm events were estimated with average runoff coefficient of 0.29 and time of concentration of 10 mins as per the City of Ottawa guidelines, summarized in Table 7-1 below. Detailed calculation of pre-development peak runoff rate can be found in **Table B12** in **Appendix B**.

Table 7-1 – Summary of Stormwater Peak Flows

Development	Pre-Development Discharge Rates (L/sec)		
	2-year	5-year	100-year
1015 Tweddle Road (formerly 1009 Trim Road)	79.1	107.3	229.9

7.4 Post-Development Stormwater Management Scheme

As noted above, the City of Ottawa permitted no quantity control of post-development runoff due to the sites proximity to the Ottawa River, if stormwater system is discharging directly into the Ottawa river. The portion of development discharging to the City ROW would be controlled to 5-year pre-development discharge rates with maximum runoff coefficient of 0.5. However, at this stage, the whole site is proposed to discharge via one outlet to the north into the Ottawa River. Therefore, no quantity control has been proposed.

7.5 Stormwater Model Development

PCSWMM was used to create a hydrologic/hydraulic model of the stormwater system. The model includes both the minor system (storm sewer), for estimating peak flows and runoff volumes and the major system (roads and swales, etc.). Calculations of runoff was completed based on the PCSWMM's EPA SWM 5 engine.

PCSWMM is an advanced software application for stormwater, wastewater, watershed, and water distribution system modelling. PCSWMM was developed by Computational Hydraulics International (CHI) https://www.chiwater.com/Home and is based on the EPA storm water management model (SWMM), which is a dynamic rainfall-runoff-routing simulation model used for single event or long-term (continuous) simulation of runoff. PCSWMM was used to determine peak runoff rates and provide hydraulic profiles of the depth of runoff during various storm events. PCSWMM calculates runoff based on the non-linear reservoir model for subcatchments. The model conceptualizes a subcatchment as a rectangular surface that has a uniform slope and a width that drains to a single outlet. The subcatchments receive inflow from precipitation and losses from evaporation and infiltration. The net excess volume ponds atop the subcatchment surface. Ponded water above the depression storage depth, can become runoff outflow. Depression storage accounts for initial rainfall abstractions such as surface ponding, interception by flat roofs and vegetation and surface wetting.

Subcatchment parameters were taken from City of Ottawa's SDG002 Design parameters. The following design parameters and assumptions are noted in

Table 7-2 below:

Table 7-2 : Subcatchment Parameters

Parameter	PCSWMM Parameter	Value
Infiltration Loss Method		Horton
Maximum Infiltration Rate	Max. Infil. Rate	76 mm/hr
Minimum Infiltration Rate	Min. Infil. Rate	13.2 mm/hr
Decay Constant (1/hr)	Decay Constant	4.14
Manning N (Impervious)	N Impev	0.013
Manning N (Pervious)	N Perv	0.25
Depression Storage – Impervious Surfaces	Dstore Imperv	1.57 mm
Depression Storage – Pervious Surfaces	Dstore Perv	4.67 mm
Zero Percent Impervious	Zero Imper	varies
Subcatchment Slopes	Slope	varies

The following design parameters and assumptions are noted as follows:

- Subcatchment areas were derived tributary to each surface inlet (catchbasin).
- Runoff coefficient for all subcatchments were determined using area weighting routine and based on actual hard and soft surface areas. Runoff coefficients were calculated from the impervious levels using the relationship C = (IMP x 0.7) + 0.20.
- Subcatchment widths are determined using PCSWMM. A Flow-Path layer was created in PCSWMW, and flow paths were created for each subcatchment. The software averages the flow path lengths to calculate the subcatchment widths. The width is equal to the subcatchment area divided by the overland flow path length.
- 2-year, 3-hour Chicago storm used to review minor system design based on Rational Method.
- 3-hr, 2-year, 5-year, 100-year, and 100-year +20% storms were used to assess the impact of major event and determine peak flows and depth of runoff.

7.6 Rainfall Data

Rainfall used for stormwater modelling and calculations were based on data provided in the City of Ottawa's Sewer Design Guidelines (SDG002). Generation of storm hyetographs for use in hydraulic/hydraulic modelling were derived from the total rainfall depths for various storm durations noted in the **Table 7-3** below. Chicago storm distributions were established using PCSWMM's Design Strom Creator using a,b,c IDF parameters taken from Section 5.4.2 of the SDG002.

Table 7-3 : Summary of Rainfall Data (From City of Ottawa SDG002)

Duration	Rainfall Amounts (mm) for Specified Return Period					
	2-year	5-year	10-year	25-year	50-year	100-year
5 mins	9.8	13.1	15.2	17.9	19.9	21.8
10 mins	12.1	16.2	18.7	22.1	24.5	26.9
15 mins	13.7	18.3	21.2	24.9	27.7	30.4
30 mins	16.9	22.5	26.1	30.7	34.1	37.4
1 hour	20.8	27.7	32.1	37.8	42.0	46.1
2 hours	25.6	34.2	39.6	46.6	51.8	56.8
6 hours	35.4	47.4	55.2	64.8	72.0	79.2
12 hours	44.4	58.8	68.4	80.4	85.2	97.2
24 hours	55.2	72.0	84.0	98.4	110.4	120.0

Four (4) storm events were modeled including:

- 3-hour 2-year Chicago storm. (10 min timestep), with total rainfall of 31.88mm.
- 3-hour 5-year Chicago storm. (10 min timestep), with total rainfall of 42.54mm.
- 3-hour 100-year Chicago storm. (10 min timestep), with total rainfall of 71.58mm.
- 3-hour 100-year + 20% Chicago storm. (10 min timestep), with total rainfall of 85.9mm.

7.7 Proposed Stormwater System

Stormwater runoff from the proposed site will drain from a combination of controlled and uncontrolled areas. A storm drainage plan is illustrated on Figure A1. A total of eleven (11) subcatchments (or drainage areas) are shown on this drawing with average runoff coefficients calculated for each drainage area. The stormwater works shall consist of the following elements:

- For Towers B1, B2, B3 and B4, Flow-control roof drains to be provided.
- Runoff from surface areas surrounding the proposed towers (S104) will be collected by area drains and discharge to internal drainage piping in the underground parking structure. This in turn discharges directly to an oil-grit separator manhole, prior to discharging to the Ottawa River.
- Runoff from the lower landscaped areas (S015 & S106) along the river front to the north will discharge into the Ottawa River by overland flow.
- Runoff from the lower landscaped areas (S100 & S101) along the Jeanne D' Arc Blvd will be collected by the proposed storm sewer system and discharge into the Ottawa River at new Outfall #2. Detailed discussions of modeled peak runoffs from S100 & S101 are included in **Section 7.11**.
- Runoff from the lower landscaped areas (S102 & S103) along east side of Tweddle Rd will be collected and conveyed by the street gutter on Tweddle Rd and eventually discharge to Ottawa River. Detailed discussions of modeled peak runoffs from S102 & S103 are included in **Section 7.12**.
- All roof area will utilize flow-controlled weirs and based on the roof areas an estimate of the number of roof drains was completed. WATTS ACCUTROL weirs were used to determine the total discharge rates from the roof areas based on the estimated number of drains. In addition, the total cumulative prism volumes on the roofs were calculated at a maximum permitted depth of 150mm. Information on the estimated 100-year volumes on each roof is provided in Table B20 – Summary of Roof Drains and Roof Storage
- Table B21 to Table B24 in **Appendix B.**

Drawing C401 shows the existing storm drainage area for the 3 existing culverts along Jeanne D'Arc Boulevard near the proposed site. The existing culvert at the intersection on Jeanne D'Arc Boulevard and Tweddle Road is proposed to be rerouted as shown on servicing plan drawing to allow for the proposed development and to maintain the existing storm drainage pattern.

7.8 Flow Attenuation & Storage

The attenuation of stormwater will be achieved by utilizing roof storage. Using the release rates estimated on the roofs to determine the 2-year, 5-year, and 100-year volumes that will occur for corresponding release rates.

Table B16 through **Table B19**, provide the storage volumes necessary on the roof to attenuate the controlled release rates. **Table B15** summarizes the combined controlled and uncontrolled flows leaving the subject site. A summary of release rates, storage volume requirements, and provided storage volumes are identified in **Table 7-4** below.

Table 7-4 – Summary of Post-Development Storage

Area	Location	Release Rate (L/s)			Storage Required (m^3)			Available Storage (m^3)
		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr	
B1	Tower B1 roof	2.9	4.0	7.6	11.5	15.4	29.0	46.4
B2	Tower B2 roof	2.9	4.0	7.6	11.5	15.4	29.0	46.4
B3	Tower B3 roof	2.9	4.0	7.6	11.5	15.4	29.0	46.4
B4	Tower B4 roof	2.9	4.0	7.6	9.0	12.1	22.9	39.5
Total		**11.7**	**16.0**	**30.3**	**43.4**	**58.2**	**109.9**	**178.7**

7.9 Stormwater Model Results

Table 7-5 summarizes the modeled peak flows at Outfall #1, resulting from controlled roof drains (Tower B1, B2, B3, & B4), uncontrolled runoff from low raise roofs and landscaping area (S104), and overland flows from the landscaped area along river front (S105 & S106).

Table 7-5 : Summary of Post-Development Flows at Outfall #1

Storm Event	Peak Flow (L/sec) at Outfall #1
Chicago_3h_2yr	222.4
Chicago_3h_5yr	320.4
Chicago_3h_100yr	572.7
Chicago_3h_100yr + 20%	687.9

7.10 Quality Control

As a total suspended solids (TSS) removal efficiency of 80% is required, it is proposed to provide an oil grit separator for quality control. The following summarizes the design parameters used in the sizing of the Stormceptor manhole.

Table 7-6 – Design Parameters Used for Oil Grit Separator Sizing

Parameter	Value Used
Drainage Area	1.05 hectares
Runoff Coefficient	0.85
Target TSS Removal Requirements	80 %
Target Runoff Volume Capture	90 %
Flow attenuation upstream of OG separator (taken as 100-yr discharge & storage upstream of OG)	none
Particle distribution	fine

Output from the PCSWMM for Stormceptor program is provided in **Appendix E** for reference. A Stormceptor model **EF05** is necessary to meet the required TSS removal of 80%. The EF05 will provide an approximate TSS removal of 83%.

7.11 Jeanne-d'Arc Blvd Drainage Catchment

Urbanization is planned along Jeanne D'Arc Boulevard, as indicated on drawing #EJV-S0O174-RWY-DWG-3915 received from the City. As a result of urbanization and proposed development at 1015 Tweddle Road, a storm sewer is proposed under Jeanne D'Arc Boulevard. To allow for the development, the existing culvert and associated upstream drainage area will need to be rerouted to discharge into the proposed storm sewer.

The proposed storm sewer system for Jeanne D'Arc Blvd includes 244 m of storm sewers, with diameter ranging from 300mm to 525 mm. the system also consists of three manholes, three catchbasins, and one outfall structure (Outfall #2). Additionally, the existing 375mm diameter CSP culvert crossing Jeanne-d'Arc Blvd west of Trim Rd will be connected to the proposed storm sewer.

The contributing drainage subcatchments to the Jeanne D'Arc storm sewer system are illustrated in **Figure A2** of **Appendix A**. Six (6) subcatchments have been identified and analyzed with average runoff coefficients calculated for each drainage area.

- Runoff from Jeanne-d'Arc Blvd Right-Of-Way (S200, S201, &S202).
- Runoff from the development site (S100 & S101).
- Runoff from the existing drainage subcatchments south of Jeanne-d'Arc Blvd (S202 & S203).

Inlet control devices (ICD) will be installed in the proposed catch basins of the Jeanne-d'Arc storm sewer system to manage flows and prevent ponding during the 2-year storm event. There are six (6) primary inlet control devices used in the City of Ottawa for the control of runoff at catchbasins. The standard ICD discharge rates at 1.2 m hydraulic head are 13.4 L/sec, 19.8 L/sec, 28.1 L/sec 36.7 L/sec, 53.2 L/sec and 70.8 L/sec for Pedro Plastics Type X, and IPEX Tempests Type A, B, C, D, and F respectively. Type A was selected for use at most locations based on its suitability for the estimate runoffs and to avoid surface ponding at the ROW and development areas.

Table 7-7 below summarizes the discharge rates of IPEX Tempests Type A inlet control devices used. Please refer to the Storm Drainage Plan and Site Servicing Plans for the ICD types at each catchbasin.

Table 7-7 : Discharge Rates for Standard IPEX Tempests Type A

Head (m)	Discharge (L/s)
0.00	0.0
0.10	5.7
0.20	8.1
0.30	9.9
0.40	11.5
0.50	12.8
0.60	14.0
0.70	15.1
0.80	16.2
0.90	17.2
1.00	18.1
1.20	19.8
1.40	21.4
1.60	22.9
1.80	24.3
2.00	25.6
2.50	28.6
3.00	31.4

The storm sewer system has been designed to convey the runoff up to the 2-year storm event. For larger storm events (e.g. 100-year), excess runoff is managed by the major system. This includes overland flow routes such as swales and streets, which will convey flows toward Tweddle Road and ultimately discharge into the Ottawa River.

The major system was modeled using irregular conduits based on a half-street cross-section. The transect editor in PCSWMM was used to establish this transect, which was applied to the majority of the major system.

Table 7-8 summarizes the modeled peak flows at Outfall #2. These flows include:

- Controlled runoff from Jeanne-d'Arc ROW (S200, S201, & S204),
- Uncontrolled runoffs from existing subcatchments south of Jeanne-d'Arc Blvd (S202 & S203), and
- Overland flows from the development site (S100 & S101).

Table 7-8 : Summary of Post-Development Flows at Outfall #2

Storm Event	Peak Flow (L/sec) at Outfall #1
Chicago_3h_2yr	206.0
Chicago_3h_5yr	282.9
Chicago_3h_100yr	332.6
Chicago_3h_100yr + 20%	354.7

Figure 7-1 below illustrates a profile of the Jeanne-d'Arc storm sewer from its starting point to Outfall #2. Plotted on this figure is the 2-yr and 100-yr HGL.

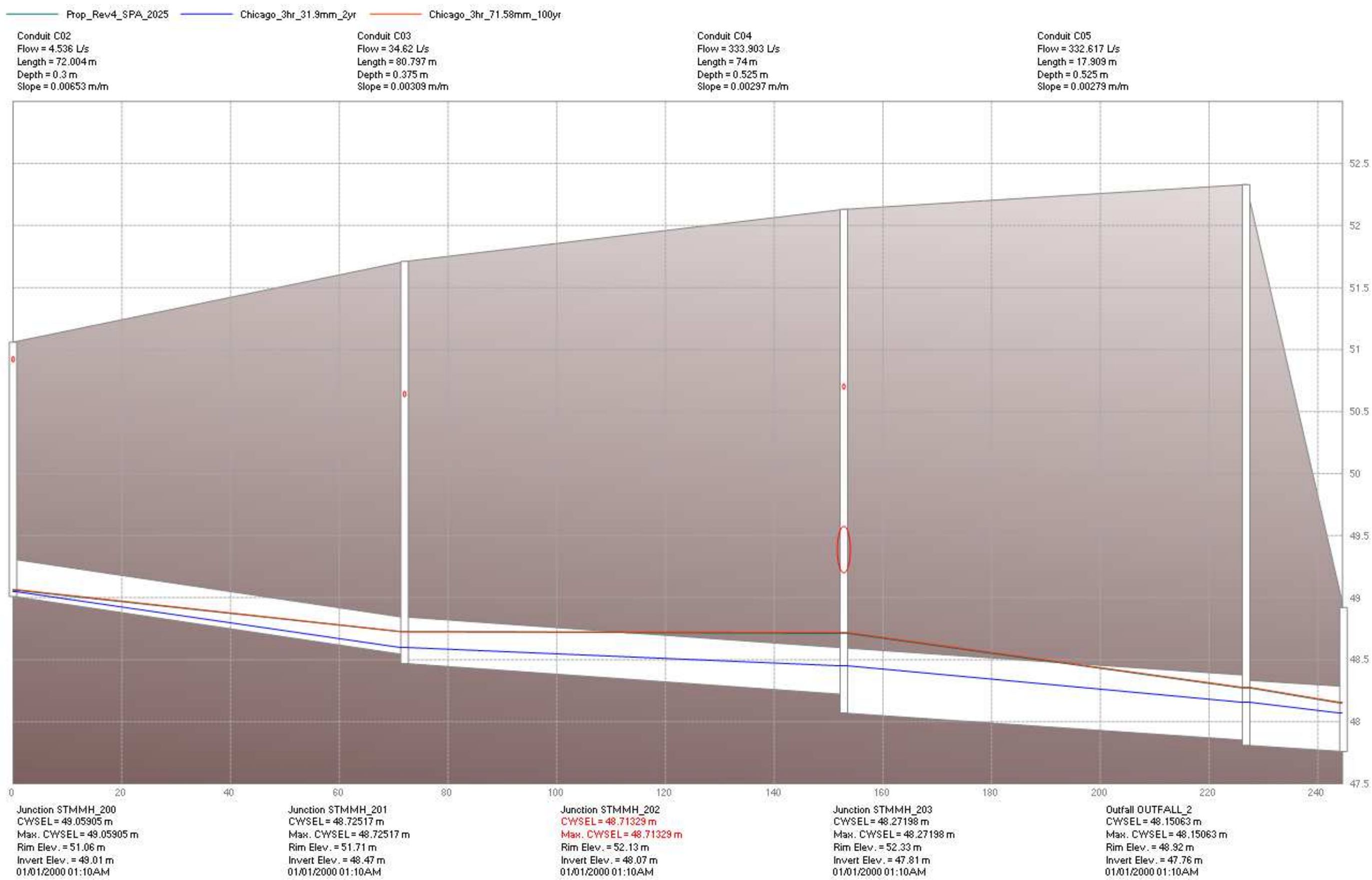


Figure 7-1: Hydraulic Grade Lines of 2-yr and 100-yr Storms of Jeanne-d'Arc Storm Sewers

Based on this analysis, we can confirm that the Jeanne-d'Arc storm sewer system will handle the runoffs from the 2-year storm without surcharging, and the maximum 100-year HGL will increase but no significant impact on the sewer capacity.

7.12 Tweddle Road Drainage Catchment

In response to comments received during the pre-consultation meeting, Tweddle Road north of Jeanne-d'Arc Blvd will be re-constructed to reduce the longitudinal slope and provide assess to proposed development at 1015 Tweddle Road.

Additionally, the existing 900 mm diameter culvert crossing Jeanne-d'Arc Blvd near Tweddle Rd will be removed. As a result, runoff from the existing drainage catchment located at the southeast corner of the intersection of Jeanne-d'Arc Blvd and Tweddle Rd will be redirected to the roadside ditch along south of Jeanne-d'Arc Blvd. a new 500mm diameter HDPE culver will be installed to convey this flow across Tweddle Rd to the existing roadside ditch, ultimately discharging to the Ottawa River.

Six (6) subcatchments are shown on **Figure A3** with average runoff coefficients calculated for each drainage area.

- Runoff from the existing drainage subcatchment southeast of the intersection of Jeanne-d'Arc and Tweddle (S205), will be redirected to the existing roadside ditch east of Tweddle Rd and will be discharged to the Ottawa River at Taylor Creek outfall. This will be facilitated by the installation of a 500 mm diameter HDPE culvert crossing Tweddle Rd.
- Runoff from the development site (S102 & S103) will overflow toward Tweddle Rd and discharge to the Ottawa River at Outfall #1A.
- Runoff from west half of Tweddle Rd (S300) will be collected by the street gutters and discharge to the Ottawa River at Outfall #4.
- Runoff from east half of Tweddle Rd (S301 & S303) will be collected by the street gutters and discharge to the Ottawa River at Outfall #1A.

Table 7-9 summarizes the modeled peak flows at the key outfalls under various design storm events.

Table 7-9 : Summary of Post-Development Flows at Outfall #2

Storm Event	Peak Flow (L/sec)		
	Outfall #1A	Outfall #3	Outfall #4
Chicago_3h_2yr	42.0	50.3	13.9
Chicago_3h_5yr	88.1	74.0	18.9
Chicago_3h_100yr	426.3	153.1	32.3
Chicago_3h_100yr + 20%	636.8	196.4	38.8

Figure 7-2 below illustrates flows and water depths at the proposed 500 mm diameter HDPE culvert crossing Tweddle Rd.

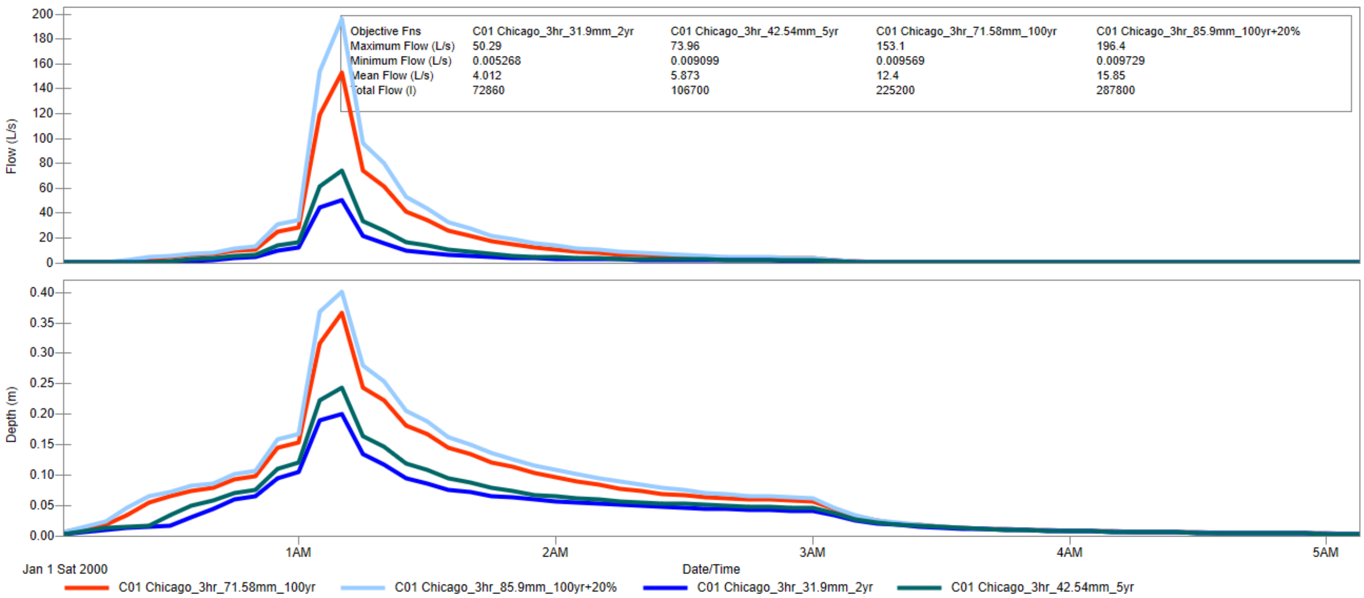


Figure 7-2: Flows and Water Depths at 500mm Culvert

Modeling results indicated that the proposed 500mm diameter HDPE culvert has sufficient capacity to convert runoffs from the drainage subcatchment to the existing road ditch west of Tweddle Rd.

8 Erosion & Sediment Control

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

- Filter cloth shall be installed between the frame and cover of all adjacent catch basins and catch basin manhole structures.
- Heavy duty silt fencing will be used to control runoff around the construction area. Silt fencing locations are identified on the site grading and erosion control plan.
- A mud mat will be installed at the construction entrance to help avoid mud from being transported to offsite roads.
- Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations.
- In some cases, barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed.
- Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract.
- During the course of construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) OPSS 805 and City of Ottawa specifications.

9 Conclusions and Recommendations

This Functional Servicing & Stormwater Report outlines the rationale which will be used to service the proposed development. The following summarizes the servicing requirements for the site:

Water

- Two twin 200mm watermains are proposed to service the development, as the average day demands exceed 50 m^3 per day, which is mandatory as per Section 4.31 of the WDG001.
- The Required Fire Flows (RFFs) were estimated at **7,000 L/min** (117 L/sec) for Tower B1, **7,000 L/min** (117 L/sec) for Tower B2, **7,000 L/min** (117 L/sec) for Tower B3 and **6,000 L/min** (100 L/sec) for Tower B4. The total minimum available flows for firefighting purposes, based on the contribution from hydrants, was estimated at **7,600 L/min, 15,200 L/min, 13,300 L/min and 9,500 L/min** for each building, respectively.
- Based on hydraulic boundary conditions (HGL) provided by the City of Ottawa, the maximum HGL indicates pressures greater than 80 psi, exceeding the City's guideline, therefore pressure reducing measures will be required.

Sewage

- Estimated peak sewage flows of **21.14 L/sec** are anticipated. A review of the sanitary sewers on Jeanne D'Arc Boulevard was completed. It was determined that the sanitary main between MHSA 22037 and MHSA 54993 will be re-routed and upsized from 300mm diameter to 375mm diameter pipes to match with the downstream pipes.

Stormwater

- Total pre-development discharge rate from the development area of the site was calculated based on a runoff coefficient of 0.29 and a time of concentration of 10 minutes. Pre-development discharge rates from the 1.28 ha development area were estimated to be **79.1 L/sec, 107.3 L/sec** and **229.9 L/sec** during 2-year, 5-year and 100-year storm events, respectively.
- Post-development release rates were calculated by estimating C_{AVG} based on the proposed development. Post-development C_{AVG} for the 1.28 ha development was estimated to be 0.75. Post-development discharge rates from 1.28 ha development area were estimated to **151.9 L/sec, 206.1 L/sec** and **437.8 L/sec** during 2-year, 50-year and 100-year storm events, respectively.
- The City did not impose onsite quantity control due to the proximity to the Ottawa River. This is contingent on using a direct connection to the river rather than discharging to a storm sewer. Although runoff does not need to be detained onsite, stormwater control and storage will be provided on building roof using flow control roof drains.
- Runoff on the building roofs will be controlled using flow-controlled roof drains. Each roof-drain is equipped with WATTS ACCUTROL weirs and set at the OPEN position and having maximum discharge rate of 30 gpm at 150mm depth. Each tower's roof will have 4 roof drains, resulting in a total combined maximum 100-year discharge rate of **30.4 L/sec** (Towers B1, B2, B3, B4). It was calculated that a total of **109.9m3** of storage will be required on the roofs to attain these flows.
- The remaining areas will not have flow controls with 100-yr anticipated peak flows of **407.5 L/sec.**
- An oil-grit separator (OG) is required to meet the TSS removal efficiency of 80%. A Stormceptor Model EF05 was selected which is estimated to have a removal efficiency of **83%.**

Legal Notification

This report was prepared by EXP Services Inc. for the account of Trim 1 GP Inc.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Appendix A – Figures

FIG A1: POST-DEVELOPMENT SUBCATCHMENTS

FIG A2: JDA SUBCATCHMENTS

FIG A3: TWEDDLE SUBCATCHMENTS

Appendix B – Design Tables

TABLE B1: Water Demand Chart

(Building)	No. of Units									Total Pop	Residential Demands					Commercial						Total Demands in (L/sec)		
	Singles/Semis/Towns				Apartments													Peaking Factors (x Avg Day)						
	Single Family	Semi	Duplex	Townhome	1-Bed Apt	1-Bed+ Den Apt	2 Bed Apt	3 Bed Apt	Avg Apt.		Avg Day Demand (L/day)	Max Day Peaking Factor	Max Hour Peaking Factor	Max Day Demand (L/day)	Peak Hourly Demand (L/day)	Area (ha)	Avg Demand (L/day)	Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Peak Hour (L/s)
B1					53	163	107	3		536.4	150,192	2.5	5.5	375,480	826,056	1492.0	41,776	1.5	1.8	62664.0	75196.8	2.22	5.07	10.43
B2					62	186	123	1		608.6	170,408	2.5	5.5	426,020	937,244	1479.0	41,412	1.5	1.8	62118.0	74541.6	2.45	5.65	11.71
B3					51	167	105	1		528.8	148,064	2.5	5.5	370,160	814,352	1233	34,524	1.5	1.8	51786.0	62143.2	2.11	4.88	10.14
B4						144	92			394.8	110,544	2.5	5.5	276,360	607,992							1.28	3.20	7.04
Totals =					166	660	427	5		2068.6	579,208			1,448,020	3,185,644					176,568	211,882	8.07	18.80	39.32

Unit Densities	Persons/Unit
Singles	3.4
Semi-Detached	2.7
Duplex	2.3
Townhome	2.7
Bachelor Apt Unit	1.4
1-Bed Apt Unit	1.4
1-Bed + Den Apt Unit	1.4
2-Bed Apt Unit	2.1
3-Bed Apt Unit	3.1
Avg. Apt Unit	1.8

Residential

Residential Consumption (L/pers/day) =	280
Max Day Peaking Factor (* avg day) =	2.5
Peak Hour Factor (* avg day) =	5.5

Industrrial/Commercial/Institutional Water Consumption

Light Industrial (L/gross ha/day) =	35,000
Heavy Industrial (L/gross ha/day) =	55,000
Commer/Instit (L/gross ha/day) =	28,000
Max Day Peaking Factor (* avg day) =	1.5
Peak Hour Factor (* avg day) =	1.8

Project:	
249629 - 1015 Tweddle Road	
Designed: A.Salem, P.Eng.	Location: Ottawa, Ontario
Checked: B. Thomas, P.Eng.	
File Reference: 259629 Water Demand Chart, May 29, 2025.xlsx	Page No: 1 of 1

TABLE B2
SUMMARY OF REQUIRED FIREFLOWS (RFFs)

Building #	Description	[1]No of Storeys	Fire Flow, F (L/min)	[2]Type of Constr. Coeff, C	[3]Reduction Due to Occupancy (%)	[4]Reduction Due to Sprinklers (%)	[5]Total Increase due to Exposures (%)	[6]Required Fire Flow in	
								(L/min)	(L/sec)
Tower B1	high-rise condo	28	15,000	0.8	-15%	-50%	5%	7,000	117
Tower B2	high-rise condo	32	14,000	0.8	-15%	-50%	10%	7,000	117
Tower B3	high-rise condo	28	14,000	0.8	-15%	-50%	10%	7,000	117
Tower B4	high-rise condo	24	13,000	0.8	-15%	-50%	5%	6,000	100

Notes
1 - If basements are included (<50% below grade) then denoted as +.
2 -Types of constructions: 0.8 for non-combustible, 1.0 for ordinary construction,1.5 for wood frame construction.
3 - Reductions due to Occupancy are -25% for non-combustible or -15% for limited combustible.
4 - Reductions due to Sprinkler Systems
5 – Increase due to exposures were calculated based on FUS 2020.
6 – Required Fire Flows are rounded to nearest 1,000 L/min.

TABLE B3 (Tower B1

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1015 Tweddle Road
Building No: Tower B1

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	6982.0 m²	
	Floor 11 to 28		928.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)		
	Floor 10		928.0	50%	464.0			
	Floor 9		928.0	50%	464.0			
	Floor 8		928.0	50%	464.0			
	Floor 7		928.0	50%	464.0			
	Floor 6		928.0	50%	464.0			
	Floor 5		928.0	50%	464.0			
	Floor 4		928.0	50%	464.0			
	Floor 3		928.0	50%	464.0			
	Floor 2		1570.0	100%	1570.0			
	Floor 1 (Main Level)		1700.0	100%	1700.0			
	Basement (At least 50% below grade, not included)			0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)							14,706
Fire Flow (F)	Rounded to nearest 1,000							15,000

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-2,250	12,750
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,825	8,925
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,275	7,650
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,275	6,375
	Not Fully Supervised or N/A	0%				

Task	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
Choose Structure Exposure Distance	Side 1 (west)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%	5%	638	7,013
	Side 2 (east)	25	4	20.1 to 30	Type IV-III (U)	38	28	1064	4F	5%			
	Front (north)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
	Back (south)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												7,000
	Total Required Fire Flow, L/s =												117

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

TABLE B4 (Tower B2)

FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1015 Tweddle Road
Building No: Tower B2

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	6668.0 m²	
	Floor 11 to 32		928.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)		
	Floor 10		928.0	50%	464.0			
	Floor 9		928.0	50%	464.0			
	Floor 8		928.0	50%	464.0			
	Floor 7		928.0	50%	464.0			
	Floor 6		928.0	50%	464.0			
	Floor 5		928.0	50%	464.0			
	Floor 4		928.0	50%	464.0			
	Floor 3		928.0	50%	464.0			
	Floor 2		1478.0	100%	1478.0			
	Floor 1 (Main Level)		1478.0	100%	1478.0			
	Basement (At least 50% below grade, not included)			0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)							14,372
Fire Flow (F)	Rounded to nearest 1,000							**14,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-2,100	11,900
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,570	8,330
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,190	7,140
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,190	5,950
	Not Fully Supervised or N/A	0%				

Task	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	Fire Flow Total (L/min)
Choose Structure Exposure Distance	Side 1 (west)	25	4	20.1 to 30	Type IV-III (U)	42	28	1176	4F	5%	10%	1,190	7,140
	Side 2 (east)	25.6	4	20.1 to 30	Type IV-III (U)	40	28	1120	4F	5%			
	Front (north)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
	Back (south)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**7,000**
	Total Required Fire Flow, L/s =												**117**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

TABLE B5 (Tower B3)

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1015 Tweddle Road
Building No: Tower B3

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input	Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction	0.8	
	Ordinary Construction	1			
	Non-combustible Construction	0.8			
	Fire Resistive Construction	0.6			

Task	Options	Area	% Used	Area Used	Comment	Value Used	Fire Flow Total (L/min)
Input Building Floor Areas (A)	Floor 11 to 28	928.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)	6730.0 m²	
	Floor 10	928.0	50%	464.0			
	Floor 9	928.0	50%	464.0			
	Floor 8	928.0	50%	464.0			
	Floor 7	928.0	50%	464.0			
	Floor 6	928.0	50%	464.0			
	Floor 5	928.0	50%	464.0			
	Floor 4	928.0	50%	464.0			
	Floor 3	928.0	50%	464.0			
	Floor 2	1405.0	100%	1405.0			
	Floor 1 (Main Level)	1613.0	100%	1613.0			
	Basement (At least 50% below grade, not included)		0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)						14,438
Fire Flow (F)	Rounded to nearest 1,000						**14,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-2,100	11,900
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,570	8,330
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,190	7,140
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,190	5,950
	Not Fully Supervised or N/A	0%				

Task	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	Fire Flow Total (L/min)
Choose Structure Exposure Distance	Side 1 (west)	25.6	4	20.1 to 30	Type IV-III (U)	31	28	868	4F	5%	10%	1,190	7,140
	Side 2 (east)	22	4	20.1 to 30	Type IV-III (U)	26	24	624	4F	5%			
	Front (north)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
	Back (south)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**7,000**
	Total Required Fire Flow, L/s =												**117**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

TABLE B6 (Tower B4)

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1015 Tweddle Road
Building No: **Tower B4**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	5279.0 m²	
	Floor 11 to 28		900.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)		
	Floor 10		900.0	50%	450.0			
	Floor 9		900.0	50%	450.0			
	Floor 8		900.0	50%	450.0			
	Floor 7		900.0	50%	450.0			
	Floor 6		900.0	50%	450.0			
	Floor 5		900.0	50%	450.0			
	Floor 4		900.0	50%	450.0			
	Floor 3		900.0	50%	450.0			
	Floor 2		897.0	100%	897.0			
	Floor 1 (Main Level)		782.0	100%	782.0			
	Basement (At least 50% below grade, not included)			0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)							12,788
Fire Flow (F)	Rounded to nearest 1,000							**13,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,950	11,050
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,315	7,735
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,105	6,630
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,105	5,525
	Not Fully Supervised or N/A	0%				

Task	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	Fire Flow Total (L/min)
Choose Structure Exposure Distance	Side 1 (west)	46	4	20.1 to 30	Type IV-III (U)	35	24	840	4F	5%	5%	553	6,078
	Side 2 (east)	25	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
	Front (north)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
	Back (south)	46	5	30.1 to 45	Type IV-III (U)	0	0	0	6	0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**6,000**
	Total Required Fire Flow, L/s =												**100**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

TABLE B7
FIRE FLOW REQUIREMENTS BASED ON HYDRANT SPACING

Hydrant #	Tower B1		Tower B2		Tower B3		Tower B4	
	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)
New FH	40	5,700	117	3,800	174	0	231	0
H030	125	3,800	140	3,800	185	0	276	0
H031	146	3,800	40	5,700	101	3,800	160	0
H001	180	0	47	5,700	42	5,700	111	3,800
H002	300	0	170	0	105	3,800	43	5,700
Total (L/min)		7,600		15,200		13,300		9,500
FUS RFF in L/min or (L/sec)		6,000 (100)		7,000 (117)		7,000 (117)		6,000 (100)
Meets Requreiment (Yes/No)		Yes		Yes		Yes		Yes

Notes:
[1]Distance is measured along a road or fire route.
[2]Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02

TABLE B8

SANITARY SEWER CALCULATION SHEET

LOCATION				RESEDENTIAL AREAS AND POPULAITONS															COMMERCIAL					INFILTRATION					SEWER DATA							
Street	U/S MH	D/S MH	Desc	Area (ha)	ACCU Area (ha)	NUMBER OF UNITS: Single	Semis	Towns	Batch Apt.	1-Bed Apt.	1-Bed + Den Apt.	2-Bed Apt.	3-Bed Apt.	Total Units	POPULATION: INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	AREA (ha): INDIV	ACCU	% of total	Comm Peak Factor	Peak Flow (L/sec)	AREA (ha): INDIV	ACCU	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Type	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Petrie's Landing		MHSA54989	Towers 1-6		3.919				132	721		365	14	1232	2004.1	2004.1	3.07	19.94	0.301	0.301	8%	1.0	0.10	3.92	3.919	1.29	21.33								
Jeane D'Arc Blvd North	MHSA54989	MHSA54990			3.919											2004.1	3.07	19.94		0.301					3.919	1.29	21.23	300	299.36	PVC	0.15	79.36	37.24	0.57	0.52
	MHSA54990	MHSA54991			3.919											2004.1	3.07	19.94		0.301					3.919	1.29	21.23	300	299.36	PVC	0.29	34.70	51.62	0.41	0.73
	MHSA54991	MHSA54992			3.919											2004.1	3.07	19.94		0.301					3.919	1.29	21.23	300	299.36	PVC	0.16	85.00	39.02	0.54	0.55
	MHSA54992	SAMH101	EXT-1	1.1350	5.054											2004.10	3.07	19.94		0.301				1.135	5.054	1.67	21.61								
			EXT-2	4.8806	9.934											2004.10	3.07	19.94	4.881	5.182	49%	1.5	2.52	4.881	9.934	3.28	25.74								
			Towers B4	0.3204	10.2548					51	167	105	1	324	528.8	2532.90	3.00	24.63		5.182				0.320	10.255	3.38	28.01								
			Towers B3	0.2196	10.4744						144	92		236	394.8	2927.70	2.96	28.08	0.123	5.305	56%	1.5	2.58	0.220	10.474	3.46	34.12	375	388.62	PVC	0.15	26.18	74.68	0.46	0.62
	SAMH101	SAMH100	Towers B2	0.3153	10.7897					62	186	123	1	372	608.6	3536.30	2.90	33.23	0.148	5.453	47%	1.5	2.65	0.315	10.790	3.56	39.45								
			Towers B1	0.4224	11.2121					53	163	107	3	326	536.4	4072.70	2.86	37.75	0.149	5.602	35%	1.5	2.72	0.422	11.212	3.70	44.17	375	388.62	PVC	0.17	71.30	79.51	0.56	0.67
	SAMH100	MHSA22037			11.2121											4072.70	2.86	37.75		5.602					11.212	3.70	41.45	375	388.62	PVC	0.16	24.85	77.13	0.54	0.65
	MHSA22037	MHSA22036			11.2121											4072.7	2.86	37.75		5.602					11.212	3.70	41.45	375	381	CONC	0.30	44.00	100.18	0.41	0.87
	MHSA22036	MHSA22035			11.2121											4072.7	2.86	37.75		5.602					11.212	3.70	41.45	375	381	CONC	0.30	104.40	100.18	0.41	0.87
	MHSA22035	MHSA22028			11.2121											4072.7	2.86	37.75		5.602					11.212	3.70	41.45	375	381	CONC	0.31	104.50	101.84	0.41	0.89
	MHSA22028	MHSA22027			11.2121											4072.7	2.86	37.75		5.602					11.212	3.70	41.45	375	381	CONC	0.38	5.30	112.75	0.37	0.98
				11.2121					132	887	660	792	19	2490	4072.7				5.602					11.212								843.9			

Residential Avg. Daily Flow, q (L/p/day) =	280	Commercial Peak Factor =	1.5	(when area >20%)	Peak Population Flow, (L/sec) =	Persons/Unit
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	Peak Extraneous Flow, (L/sec) =	3.4
or L/gross ha/sec =	0.324				Residential Peaking Factor, M =	5.7
Institutianal Avg. Daily Flow (L/s/ha) =	28,000	Institutional Peak Factor =	1.5	(when area >20%)	A_c = Cumulative Area (hectares)	2.7
or L/gross ha/sec =	0.324		1.0	(when area <20%)	P = Population (thousands)	1.4
Light Industrial Flow (L/gross ha/day) =	35,000					1.4
or L/gross ha/sec =	0.405092593	Residential Correction Factor, K =	0.80		Sewer Capacity, Qcap (L/sec) =	1.4
Light Industrial Flow (L/gross ha/day) =	55,000	Manning N =	0.013		(Manning's Equation)	2.1
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I)		3.1

Designed:	Project:
Jason Fitzpatrick, P.Eng.	1015 Tweddle Road (Formerly 1009 Trim Road)
Checked:	Location:
Bruce Thomas, P.Eng.	Ottawa, Ontario
File Reference:	Page No:
259629 Sanitary - Sewer Design Sheet, May 2025.xlsx	1 of 1

Notes

0.59	Existing sewer runs with velocity less than 0.60 m/sec (Section 6.1.2.2 of SDG002)

TABLE B9
STORM SEWER CALCULATION SHEET

Return Period Storm =	**2-year**	
Default Inlet Time=	10	(frontyard/row)
Default Inlet Time=	15	(rearyard)
Manning Coefficient =	0.013	

Street	Storm MH No:		AREA INFO				PEAK FLOWS (UNRESTRICTED - RATIONAL METHOD)							SEWER DATA										
	U/S	D/S	Catchment No:	Area (ha)	Accum. Area (ha)	Runoff Coeff, C	Indiv. 2.78*A*R	Accum. 2.78*A*R	Tc (mins)	I (mm/h)	Indiv. Flow	Return Period	Q (L/s)	Diameter (mm) Act	Diameter (mm) Nom	Type	Slope (%)	Length (m)	Capacity, Q_{CAP} (L/sec)	Velocity (m/s) Vf	Velocity (m/s) Va	Time in Pipe, Tt (min)	Hydraulic Ratios Q/Q_{CAP}	Hydraulic Ratios Va/Vf
Jeane D'Arc Blvd	200	201	S200	0.2265	0.2265	0.71	0.4471	0.4471	10.00	76.81	34.3	2-year	34.3											
			S100	0.0691	0.2956	0.63	0.1210	0.5681	10.00	76.81	9.3	2-year	43.6	299.4	300	PVC	0.65	72.00	77.52	1.10	0.78	1.54	0.56	0.71
	201	202	S201	0.1793	0.4749	0.72	0.3589	0.9270	10.00	76.81	27.6	2-year	71.2											
			S101	0.0372	0.5121	0.65	0.0672	0.9942	11.54	71.37	4.8	2-year	71.0	366.4	375	PVC	0.30	80.78	90.28	0.87	0.85	1.58	0.79	0.98
	202	203	S202	1.3325	1.8446	0.55	2.0374	3.0316	10.00	76.81	156.5	2-year	232.8											
			S203	0.3195	2.1641	0.44	0.3908	3.4224	10.00	76.81	30.0	2-year	262.9											
			S204	0.0366	2.2007	0.90	0.0916	3.5140	13.12	66.60	6.1	2-year	234.0	533.0	525	CONC	0.30	74.00	245.25	1.09	1.13	1.09	0.95	1.04
	205	HW 1			2.2007			3.5140	14.21	63.71		2-year	223.9	533.0	525	CONC	0.30	16.61	245.25	1.09	1.09	0.25	0.91	1.00
TOTALS =				**2.2007**		**0.57**	**3.514**				**268.6**													

Definitions:
Q = 2.78*AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Watershed Area (hectares)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficients (dimensionless)

Ottawa Rainfall Intensity Values from Sewer Design Guidelines, SDG002

	a	b	c
2-year	732.951	6.199	0.810
5-year	998.071	6.053	0.814
100-year	1735.688	6.014	0.820

Designed:	Project:	
J. Fitzpatrick, P.Eng.	1015 Tweedle Rd	
Checked:	Location:	
B. Thomas, P.Eng.	1015 Tweedle Rd	
Dwg Reference:	File Ref:	Sheet No:
Drawing C401	259629 Storm - Sewer Design Sheet, May 2025.xlsx	1 of 1

TABLE B10
CALCULATION OF AVERAGE RUNOFF COEFFICIENTS FOR PRE-DEVELOPMENT CONDITIONS

Area No.	Roof Areas		Asphalt Areas		Concrete / Pavers		Gravel		Grassed Areas		Sum AC	Total Area (m^2)	C_{AVG}
	C=0.90		C=0.90		C=0.90		C=0.75		C=0.20				
	Area (m^2)	A * C	Area (m^2)	A * C	Area (m^2)	A * C	Area (m^2)	A * C	Area (m^2)	A * C			
Site							2091.69	1568.8	10685.32	2137.06	3705.8	12777.01	0.29

TABLE B11
CALCULATION OF CATCHMENT TIME OF CONCENTRATION FOR PRE-DEVELOPMENT CONDITIONS

Catchment No.	Area (ha)	High Elev (m)	Low Elev (m)	Flow Path Length (m)	Indiv Slope	Avg. C	Time of Conc. Tc (mins)	Description
Site	1.278	48.5	46.2	78.3	2.9	0.29	3.58	See Note 1

Notes
1) For Catchments with Runoff Coefficient less than C=0.40, Time of Concentration Based on Federal Aviation Formula (Airport Method),
2) For Catchments with Runoff Coefficient greater than C=0.40, Time of Concentration Based on Bransby Williams Equation, from MTO

TABLE B12
CALCULATION OF PEAK RUNOFF FOR PRE-DEVELOPMENT CONDITIONS

Area No	Outlet Location	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
				I_2 (mm/hr)	Cavg	Q_2 (L/sec)	I_5 (mm/hr)	Cavg	Q_5 (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100} (L/sec)
Site	Ottawa River	1.278	10	76.81	0.29	79.1	104.19	0.29	107.3	178.56	0.36	229.9

__Notes__
1) Intensity, $I = 732.951/(Tc+6.199)^{0.810}$ (2-year, City of 0ttawa)
2) Intensity, $I = 998.071/(Tc+6.053)^{0.814}$ (5-year, City of 0ttawa)
3) Intensity, $I = 1735.688/(Tc+6.014)^{0.820}$ (100-year, City of Ottawa)
4) Cavg for 100-year is increased by 25% to a maximum of 1.0
5) The standard minimium Time of Concentraion of 10 minutes was used, rather then the calaculted time, since calcualted time was less than 10 minutes.

TABLE B13
AVERAGE RUNOFF COEFFICIENTS FOR POST-DEVELOPMENT

Runoff Coeffients $C_{ASPH/CONC}$ = 0.90 C_{ROOF} = 0.90 C_{GRASS} = 0.20

Area No.	Outlet Location	Asphalt & Conc Areas (m^2)	A * C_{ASPH}	Roof Areas (m^2)	A * C_{ROOF}	Grassed Areas (m^2)	A * C_{GRASS}	Sum AC	Total Area (m^2)	C_{AVG} (see note)	Comment
B1	Roof Drains			928	835.2			835.2	928	0.90	Building B1 roof
B2	Roof Drains			928	835.2			835.2	928	0.90	Building B2 roof
B3	Roof Drains			928	835.2			835.2	928	0.90	Building B2 roof
B4	Roof Drains			790	711.0			711.0	790	0.90	Building B3 roof
S100	Jeanne D'Arc Blvd ROW								691	0.63	See Note 1
S101	Jeanne D'Arc Blvd ROW								372	0.65	See Note 1
S102	Area Drains to Ott River								612	0.73	See Note 1
S103	Tweedle Rd ROW								686	0.36	See Note 1
S104	Area Drains to Ott River								6319	0.80	See Note 1
S105	Overland to Ottawa River								346	0.20	
S106	Overland to Ottawa River								359	0.20	
Total (All)				**3,574**	**3,217**				**12,959**		

1) Areas derived from spatial-weighting in PCSWMM

TABLE B14

SUMMARY OF POST-DEVELOPMENT PEAK FLOWS (Uncontrolled and Controlled)

		Time of Conc, Tc	Storm = 2 yr				Storm = 5 yr				Storm = 100 yr					
Area No	Area (ha)	(min)	C_{AVG}	I_2 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_5 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_{100} (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	Outlet Location	Comments
B1	0.0928	10	0.90	76.81	17.8	**(2.9)**	0.90	104.19	24.2	**(4.0)**	1.00	178.56	46.1	**(7.6)**	Roof Drains	Building B1 roof
B2	0.0928	10	0.90	76.81	17.8	**(2.9)**	0.90	104.19	24.2	**(4.0)**	1.00	178.56	46.1	**(7.6)**	Roof Drains	Building B2 roof
B3	0.0928	10	0.90	76.81	17.8	**(2.9)**	0.90	104.19	24.2	**(4.0)**	1.00	178.56	46.1	**(7.6)**	Roof Drains	Building B2 roof
B4	0.0790	10	0.90	76.81	15.2	**(2.9)**	0.90	104.19	20.6	**(4.0)**	1.00	178.56	39.2	**(7.6)**	Roof Drains	Building B3 roof
S100	0.0691	10	0.63	76.81	9.3	**9.3**	0.63	104.19	12.6	**12.6**	0.79	178.56	27.0	**27.0**	Jeanne D'Arc Blvd ROW	Uncontrolled to ROW
S101	0.0372	10	0.65	76.81	5.2	**5.2**	0.65	104.19	7.0	**7.0**	0.81	178.56	15.0	**15.0**	Jeanne D'Arc Blvd ROW	Uncontrolled to ROW
S102	0.0612	10	0.73	76.81	9.5	**9.5**	0.73	104.19	12.9	**12.9**	0.91	178.56	27.7	**27.7**	Area Drains to Ott River	Uncontrolled to Ottawa River
S103	0.0686	10	0.36	76.81	5.3	**5.3**	0.36	104.19	7.2	**7.2**	0.45	178.56	15.3	**15.3**	Tweedle Rd ROW	Uncontrolled to ROW
S104	0.6319	10	0.80	76.81	107.9	**107.9**	0.80	104.19	146.4	**146.4**	1.00	178.56	313.7	**313.7**	Area Drains to Ott River	Uncontrolled to Ottawa River
S105	0.0346	10	0.20	76.81	1.5	**1.5**	0.20	104.19	2.0	**2.0**	0.25	178.56	4.3	**4.3**	Overland to Ottawa River	Uncontrolled to Ottawa River
S106	0.0359	10	0.20	76.81	1.5	**1.5**	0.20	104.19	2.1	**2.1**	0.25	178.56	4.5	**4.5**	Overland to Ottawa River	Uncontrolled to Ottawa River
Total (All)	**1.2959**				**208.9**	**151.9**			**283.4**	**206.1**			**584.9**	**437.8**		

Notes

2-yr Storm Intensity, I = 732.951/(Tc+6.199)^0.810 (City of Ottawa)

5-yr Storm Intensity, I = 998.071/(Tc+6.035)^0.814 (City of Ottawa)

100-yr Storm Intensity, I = 1735.688/(Tc+6.014)&^0.820 (City of Ottawa)

Time of Concentration (min), Tc = ***10***

For Flows under column Qcap which are shown in brackets ***(0.0)*** *, denotes flows that are controlled*

TABLE B15

SUMMARY OF STORAGE

	Release Rate (L/s)			Storage Required (m^3) (MRM)			Storage Provided (m^3)		Control Method	Area Desc
Area No	2-yr	5-yr	100-yr	2-yr	5-yr	100-yr	Roof	Surface		
B1	2.9	4.0	7.6	11.5	15.4	29.0	46.4		Flow Controlled Roof Drains	Building B1 roof
B2	2.9	4.0	7.6	11.5	15.4	29.0	46.4		Flow Controlled Roof Drains	Building B2 roof
B3	2.9	4.0	7.6	11.5	15.4	29.0	46.4		Flow Controlled Roof Drains	Building B2 roof
B4	2.9	4.0	7.6	9.0	12.1	22.9	39.5		Flow Controlled Roof Drains	Building B3 roof
S100	9.3	12.6	27.0						none	
S101	5.2	7.0	15.0						none	
S102	9.5	12.9	27.7						none	
S103	5.3	7.2	15.3						none	
S104	107.9	146.4	313.7						none	
S105	1.5	2.0	4.3						none	
S106	1.5	2.1	4.5						none	
Total (All)	**151.9**	**206.1**	**437.8**	**43.4**	**58.2**	**109.9**	**178.7**			

TABLE B16

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: TOWER A

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 2.00 (mins)

Drainage Area = 0.0928 (hectares)

Intensity Incr (%) = 0% (Use 20% for Climate Change)

Actual Release Rate (L/sec) = 7.6

Percentage of Actual Rate (City of Ottawa requirement) = 100% (Set to 50% when U/G storage used)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 7.6

Duration (min)	Release Rate = 2.9 (L/sec); Return Period = 2.0 (years); IDF Parameters, A = 733.0, B = 0.810, C = 6.199 ($I = A/(T_c+C)$)					Release Rate = 4.0 (L/sec); Return Period = 5.0 (years); IDF Parameters, A = 998.1, B = 0.814, C = 6.053 ($I = A/(T_c+C)$)					Release Rate = 7.6 (L/sec); Return Period = 100.0 (years); IDF Parameters, A = 1735.7, B = 0.820, C = 6.014 ($I = A/(T_c+C)$)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	38.8	2.9	35.9	0.0	230.5	53.5	4.0	49.5	0.0	398.6	102.8	7.6	95.3	0.0
2	133.3	31.0	2.9	28.0	3.4	182.7	42.4	4.0	38.4	4.6	315.0	81.3	7.6	73.7	8.8
4	111.7	25.9	2.9	23.0	5.5	152.5	35.4	4.0	31.4	7.5	262.4	67.7	7.6	60.1	14.4
6	96.6	22.4	2.9	19.5	7.0	131.6	30.5	4.0	26.6	9.6	226.0	58.3	7.6	50.7	18.3
8	85.5	19.8	2.9	16.9	8.1	116.1	27.0	4.0	23.0	11.0	199.2	51.4	7.6	43.8	21.0
10	76.8	17.8	2.9	14.9	8.9	104.2	24.2	4.0	20.2	12.1	178.6	46.1	7.6	38.5	23.1
12	69.9	16.2	2.9	13.3	9.6	94.7	22.0	4.0	18.0	13.0	162.1	41.8	7.6	34.3	24.7
14	64.2	14.9	2.9	12.0	10.1	86.9	20.2	4.0	16.2	13.6	148.7	38.4	7.6	30.8	25.9
16	59.5	13.8	2.9	10.9	10.4	80.5	18.7	4.0	14.7	14.1	137.5	35.5	7.6	27.9	26.8
18	55.5	12.9	2.9	10.0	10.7	75.0	17.4	4.0	13.4	14.5	128.1	33.0	7.6	25.5	27.5
20	52.0	12.1	2.9	9.1	11.0	70.3	16.3	4.0	12.3	14.8	120.0	30.9	7.6	23.4	28.0
22	49.0	11.4	2.9	8.5	11.2	66.1	15.4	4.0	11.4	15.0	112.9	29.1	7.6	21.5	28.4
24	46.4	10.8	2.9	7.8	11.3	62.5	14.5	4.0	10.5	15.2	106.7	27.5	7.6	19.9	28.7
26	44.0	10.2	2.9	7.3	11.4	59.3	13.8	4.0	9.8	15.3	101.2	26.1	7.6	18.5	28.9
28	41.9	9.7	2.9	6.8	11.4	56.5	13.1	4.0	9.1	15.4	96.3	24.8	7.6	17.3	29.0
30	40.0	9.3	2.9	6.4	11.5	53.9	12.5	4.0	8.5	15.4	91.9	23.7	7.6	16.1	29.0
32	38.3	8.9	2.9	6.0	11.5	51.6	12.0	4.0	8.0	15.4	87.9	22.7	7.6	15.1	29.0
34	36.8	8.5	2.9	5.6	11.4	49.5	11.5	4.0	7.5	15.3	84.3	21.7	7.6	14.2	28.9
36	35.4	8.2	2.9	5.3	11.4	47.6	11.0	4.0	7.1	15.3	81.0	20.9	7.6	13.3	28.8
38	34.1	7.9	2.9	5.0	11.3	45.8	10.6	4.0	6.7	15.2	77.9	20.1	7.6	12.5	28.6
40	32.9	7.6	2.9	4.7	11.3	44.2	10.3	4.0	6.3	15.1	75.1	19.4	7.6	11.8	28.4
Max =					**11.5**					**15.4**					**29.0**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, I = $A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

City of Ottawa IDF Data (from SDG002)

IDF curve equations (Intensity in mm/hr)

100 year Intensity	= 1735.688 / (Time in min + 6.014) $^{0.820}$
50 year Intensity	= 1569.580 / (Time in min + 6.014) $^{0.820}$
25 year Intensity	= 1402.884 / (Time in min + 6.018) $^{0.819}$
10 year Intensity	= 1174.184 / (Time in min + 6.014) $^{0.816}$
5 year Intensity	= 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity	= 732.951 / (Time in min + 6.199) $^{0.810}$

TABLE B17

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: **TOWER B**

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 2.00 (mins)

Drainage Area = 0.0928 (hectares)

Intensity Incr (%) = 0% (Use 20% for Climate Change)

Actual Release Rate (L/sec) = 7.6

Percentage of Actual Rate (City of Ottawa requirement) = 100% (Set to 50% when U/G storage used)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 7.6

Duration (min)	Release Rate = 2.9 (L/sec); Return Period = 2.0 (years); IDF Parameters, A = 733.0, B = 0.810, C = 6.199 ($I = A/(T_c+C)$)					Release Rate = 4.0 (L/sec); Return Period = 5.0 (years); IDF Parameters, A = 998.1, B = 0.814, C = 6.053 ($I = A/(T_c+C)$)					Release Rate = 7.6 (L/sec); Return Period = 100.0 (years); IDF Parameters, A = 1735.7, B = 0.820, C = 6.014 ($I = A/(T_c+C)$)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	38.8	2.9	35.9	0.0	230.5	53.5	4.0	49.5	0.0	398.6	102.8	7.6	95.3	0.0
2	133.3	31.0	2.9	28.0	3.4	182.7	42.4	4.0	38.4	4.6	315.0	81.3	7.6	73.7	8.8
4	111.7	25.9	2.9	23.0	5.5	152.5	35.4	4.0	31.4	7.5	262.4	67.7	7.6	60.1	14.4
6	96.6	22.4	2.9	19.5	7.0	131.6	30.5	4.0	26.6	9.6	226.0	58.3	7.6	50.7	18.3
8	85.5	19.8	2.9	16.9	8.1	116.1	27.0	4.0	23.0	11.0	199.2	51.4	7.6	43.8	21.0
10	76.8	17.8	2.9	14.9	8.9	104.2	24.2	4.0	20.2	12.1	178.6	46.1	7.6	38.5	23.1
12	69.9	16.2	2.9	13.3	9.6	94.7	22.0	4.0	18.0	13.0	162.1	41.8	7.6	34.3	24.7
14	64.2	14.9	2.9	12.0	10.1	86.9	20.2	4.0	16.2	13.6	148.7	38.4	7.6	30.8	25.9
16	59.5	13.8	2.9	10.9	10.4	80.5	18.7	4.0	14.7	14.1	137.5	35.5	7.6	27.9	26.8
18	55.5	12.9	2.9	10.0	10.7	75.0	17.4	4.0	13.4	14.5	128.1	33.0	7.6	25.5	27.5
20	52.0	12.1	2.9	9.1	11.0	70.3	16.3	4.0	12.3	14.8	120.0	30.9	7.6	23.4	28.0
22	49.0	11.4	2.9	8.5	11.2	66.1	15.4	4.0	11.4	15.0	112.9	29.1	7.6	21.5	28.4
24	46.4	10.8	2.9	7.8	11.3	62.5	14.5	4.0	10.5	15.2	106.7	27.5	7.6	19.9	28.7
26	44.0	10.2	2.9	7.3	11.4	59.3	13.8	4.0	9.8	15.3	101.2	26.1	7.6	18.5	28.9
28	41.9	9.7	2.9	6.8	11.4	56.5	13.1	4.0	9.1	15.4	96.3	24.8	7.6	17.3	29.0
30	40.0	9.3	2.9	6.4	11.5	53.9	12.5	4.0	8.5	15.4	91.9	23.7	7.6	16.1	29.0
32	38.3	8.9	2.9	6.0	11.5	51.6	12.0	4.0	8.0	15.4	87.9	22.7	7.6	15.1	29.0
34	36.8	8.5	2.9	5.6	11.4	49.5	11.5	4.0	7.5	15.3	84.3	21.7	7.6	14.2	28.9
36	35.4	8.2	2.9	5.3	11.4	47.6	11.0	4.0	7.1	15.3	81.0	20.9	7.6	13.3	28.8
38	34.1	7.9	2.9	5.0	11.3	45.8	10.6	4.0	6.7	15.2	77.9	20.1	7.6	12.5	28.6
40	32.9	7.6	2.9	4.7	11.3	44.2	10.3	4.0	6.3	15.1	75.1	19.4	7.6	11.8	28.4
Max =					**11.5**					**15.4**					**29.0**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

IDF curve equations (Intensity in mm/hr)

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$

50 year Intensity = 1569.580 / (Time in min + 6.014) $^{0.820}$

25 year Intensity = 1402.884 / (Time in min + 6.018) $^{0.819}$

10 year Intensity = 1174.184 / (Time in min + 6.014) $^{0.816}$

5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

TABLE B18

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: TOWER C

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 3.00 (mins)

Drainage Area = 0.0928 (hectares)

Intensity Incr (%) = 0% (Use 20% for Climate Change)

Actual Release Rate (L/sec) = 7.6

Percentage of Actual Rate (City of Ottawa requirement) = 100% (Set to 50% when U/G storage used)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 7.6

Duration (min)	Release Rate = 2.9 (L/sec); Return Period = 2.0 (years); IDF Parameters, A = 733.0, B = 0.810, C = 6.199 ($I = A/(T_c+C)$)					Release Rate = 4.0 (L/sec); Return Period = 5.0 (years); IDF Parameters, A = 998.1, B = 0.814, C = 6.053 ($I = A/(T_c+C)$)					Release Rate = 7.6 (L/sec); Return Period = 100.0 (years); IDF Parameters, A = 1735.7, B = 0.820, C = 6.014 ($I = A/(T_c+C)$)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	38.8	2.9	35.9	0.0	230.5	53.5	4.0	49.5	0.0	398.6	102.8	7.6	95.3	0.0
3	121.5	28.2	2.9	25.3	4.5	166.1	38.6	4.0	34.6	6.2	286.0	73.8	7.6	66.2	11.9
6	96.6	22.4	2.9	19.5	7.0	131.6	30.5	4.0	26.6	9.6	226.0	58.3	7.6	50.7	18.3
9	80.9	18.8	2.9	15.8	8.6	109.8	25.5	4.0	21.5	11.6	188.3	48.6	7.6	41.0	22.1
12	69.9	16.2	2.9	13.3	9.6	94.7	22.0	4.0	18.0	13.0	162.1	41.8	7.6	34.3	24.7
15	61.8	14.3	2.9	11.4	10.3	83.6	19.4	4.0	15.4	13.9	142.9	36.9	7.6	29.3	26.4
18	55.5	12.9	2.9	10.0	10.7	75.0	17.4	4.0	13.4	14.5	128.1	33.0	7.6	25.5	27.5
21	50.5	11.7	2.9	8.8	11.1	68.1	15.8	4.0	11.8	14.9	116.3	30.0	7.6	22.4	28.3
24	46.4	10.8	2.9	7.8	11.3	62.5	14.5	4.0	10.5	15.2	106.7	27.5	7.6	19.9	28.7
27	43.0	10.0	2.9	7.0	11.4	57.9	13.4	4.0	9.5	15.3	98.7	25.5	7.6	17.9	29.0
30	40.0	9.3	2.9	6.4	11.5	53.9	12.5	4.0	8.5	15.4	91.9	23.7	7.6	16.1	29.0
33	37.5	8.7	2.9	5.8	11.5	50.5	11.7	4.0	7.8	15.4	86.0	22.2	7.6	14.6	29.0
36	35.4	8.2	2.9	5.3	11.4	47.6	11.0	4.0	7.1	15.3	81.0	20.9	7.6	13.3	28.8
39	33.5	7.8	2.9	4.8	11.3	45.0	10.4	4.0	6.5	15.1	76.5	19.7	7.6	12.2	28.5
42	31.8	7.4	2.9	4.4	11.2	42.7	9.9	4.0	5.9	15.0	72.6	18.7	7.6	11.1	28.1
45	30.2	7.0	2.9	4.1	11.0	40.6	9.4	4.0	5.5	14.7	69.1	17.8	7.6	10.2	27.7
48	28.9	6.7	2.9	3.8	10.9	38.8	9.0	4.0	5.0	14.5	65.9	17.0	7.6	9.4	27.1
51	27.6	6.4	2.9	3.5	10.7	37.1	8.6	4.0	4.6	14.2	63.0	16.3	7.6	8.7	26.6
54	26.5	6.2	2.9	3.2	10.5	35.6	8.3	4.0	4.3	13.9	60.4	15.6	7.6	8.0	26.0
57	25.5	5.9	2.9	3.0	10.2	34.2	7.9	4.0	4.0	13.6	58.1	15.0	7.6	7.4	25.3
60	24.6	5.7	2.9	2.8	10.0	32.9	7.6	4.0	3.7	13.2	55.9	14.4	7.6	6.8	24.7
Max =					**11.5**					**15.4**					**29.0**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

IDF curve equations (Intensity in mm/hr)

100 year Intensity	$= 1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity	$= 1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity	$= 1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity	$= 1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity	$= 998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity	$= 732.951 / (\text{Time in min} + 6.199)^{0.810}$

TABLE B19

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: TOWER D

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 2.00 (mins)

Drainage Area = 0.0790 (hectares)

Intensity Incr (%) = 0% (Use 20% for Climate Change)

Actual Release Rate (L/sec) = 7.6

Percentage of Actual Rate (City of Ottawa requirement) = 100% (Set to 50% when U/G storage used)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 7.6

Duration (min)	Release Rate = 2.9 (L/sec); Return Period = 2.0 (years); IDF Parameters, A = 733.0, B = 0.810, C = 6.199 ($I = A/(T_c+C)$)					Release Rate = 4.0 (L/sec); Return Period = 5.0 (years); IDF Parameters, A = 998.1, B = 0.814, C = 6.053 ($I = A/(T_c+C)$)					Release Rate = 7.6 (L/sec); Return Period = 100.0 (years); IDF Parameters, A = 1735.7, B = 0.820, C = 6.014 ($I = A/(T_c+C)$)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	33.1	2.9	30.1	0.0	230.5	45.6	4.0	41.6	0.0	398.6	87.5	7.6	80.0	0.0
2	133.3	26.4	2.9	23.4	2.8	182.7	36.1	4.0	32.1	3.9	315.0	69.2	7.6	61.6	7.4
4	111.7	22.1	2.9	19.2	4.6	152.5	30.1	4.0	26.2	6.3	262.4	57.6	7.6	50.1	12.0
6	96.6	19.1	2.9	16.2	5.8	131.6	26.0	4.0	22.0	7.9	226.0	49.6	7.6	42.1	15.1
8	85.5	16.9	2.9	14.0	6.7	116.1	23.0	4.0	19.0	9.1	199.2	43.7	7.6	36.2	17.4
10	76.8	15.2	2.9	12.2	7.3	104.2	20.6	4.0	16.6	10.0	178.6	39.2	7.6	31.6	19.0
12	69.9	13.8	2.9	10.9	7.8	94.7	18.7	4.0	14.7	10.6	162.1	35.6	7.6	28.0	20.2
14	64.2	12.7	2.9	9.8	8.2	86.9	17.2	4.0	13.2	11.1	148.7	32.7	7.6	25.1	21.1
16	59.5	11.8	2.9	8.8	8.5	80.5	15.9	4.0	11.9	11.4	137.5	30.2	7.6	22.6	21.7
18	55.5	11.0	2.9	8.0	8.7	75.0	14.8	4.0	10.8	11.7	128.1	28.1	7.6	20.6	22.2
20	52.0	10.3	2.9	7.4	8.8	70.3	13.9	4.0	9.9	11.9	120.0	26.3	7.6	18.8	22.5
22	49.0	9.7	2.9	6.8	8.9	66.1	13.1	4.0	9.1	12.0	112.9	24.8	7.6	17.2	22.7
24	46.4	9.2	2.9	6.2	9.0	62.5	12.4	4.0	8.4	12.1	106.7	23.4	7.6	15.9	22.8
26	44.0	8.7	2.9	5.8	9.0	59.3	11.7	4.0	7.8	12.1	101.2	22.2	7.6	14.6	22.9
28	41.9	8.3	2.9	5.4	9.0	56.5	11.2	4.0	7.2	12.1	96.3	21.1	7.6	13.6	22.8
30	40.0	7.9	2.9	5.0	9.0	53.9	10.7	4.0	6.7	12.0	91.9	20.2	7.6	12.6	22.7
32	38.3	7.6	2.9	4.6	8.9	51.6	10.2	4.0	6.2	12.0	87.9	19.3	7.6	11.7	22.5
34	36.8	7.3	2.9	4.3	8.9	49.5	9.8	4.0	5.8	11.8	84.3	18.5	7.6	10.9	22.3
36	35.4	7.0	2.9	4.1	8.8	47.6	9.4	4.0	5.4	11.7	81.0	17.8	7.6	10.2	22.1
38	34.1	6.7	2.9	3.8	8.7	45.8	9.1	4.0	5.1	11.6	77.9	17.1	7.6	9.5	21.8
40	32.9	6.5	2.9	3.6	8.6	44.2	8.7	4.0	4.8	11.4	75.1	16.5	7.6	8.9	21.4
Max =					**9.0**					**12.1**					**22.9**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

IDF curve equations (Intensity in mm/hr)

100 year Intensity	$= 1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity	$= 1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity	$= 1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity	$= 1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity	$= 998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity	$= 732.951 / (\text{Time in min} + 6.199)^{0.810}$

TABLE B20
SUMMARY OF ROOF DRAINS & ROOF STORAGE

Building	Area			Location	Roof Drain		Flow Controlled			Ponding (Yes/No)	# Drains per Area	Area Available for Ponding		Estimated Volume for Ponding (m3)
	(m^2)	(ha)	% Roof		Manuf	Model	Yes / No	Method	Peak Flow (L/sec)			% of Area	Area (m2)	
Tower B1	928	0.0928	54%	High Roof	WATTS	RD-100	Yes	ACCUTROL	7.6	Yes	4	90	835	46.4
	676	0.0676	39%	Terrace - 3rd Floor	WATTS	RD-100-BEM	No			No	5			
	116	0.0116	7%	Terrace - 2nd Floor	WATTS	RD-100-BEM	No			No	4			
Tower B2	928	0.0928	59%	High Roof	WATTS	RD-100-BEM	Yes	ACCUTROL	7.6	Yes	4	90	835	46.4
	598	0.0598	38%	Terrace - 3rd Floor	WATTS	RD-100-BEM	No			No	5			
	60	0.006	4%	Terrace - 2nd Floor	WATTS	RD-100-BEM	No			No	1			
Tower B3	928	0.0928	50%	High Roof	WATTS	RD-100	Yes	ACCUTROL	7.6	Yes	4	90	835	46.4
	822	0.0822	45%	Terrace - 3rd Floor	WATTS	RD-100-BEM	No			No	5			
	89	0.0089	5%	Terrace - 2nd Floor	WATTS	RD-100-BEM	No			No	2			
Tower B4	790	0.079	84.5%	High Roof	WATTS	RD100	Yes	ACCUTROL	7.6	Yes	4	90	711	39.5
	145	0.0145	15.5%	Podium	WATTS	RD-100-BEM	No			No	4			

TABLE B21

BUILDING ROOF INFORMATION: **TABLE B21**

Subcatchment Number		
Total Roof Area (m2)	**928**	
Minimum Number of Drains Required	2	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	21,344	
Max Permitted Load from All Drains (L/sec)	23.7	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**6**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	144	
Estimated No. of Drains Required	7	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**90.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	835	
Area per Drain (m2)	209	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	46.4	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (L/s)	**1.893**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Total Roof (L/sec)	7.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	5.8	23.2	0.0	0.2
0.050	10	0.63	0.00252	0.050	23.2	92.8	0.4	1.5
0.075	15	0.95	0.00379	0.075	52.2	208.8	1.3	5.2
0.100	20	1.26	0.00505	0.100	92.8	371.2	3.1	12.4
0.125	25	1.58	0.00631	0.125	145.0	580.0	6.0	24.2
0.150	30	1.89	0.00757	0.150	208.8	835.2	10.4	41.8
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	2.52
0.075	3.79
0.100	5.05
0.125	6.31
0.150	7.57

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	23
0.050	93
0.075	209
0.100	371
0.125	580
0.150	835

WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

0.0631

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS

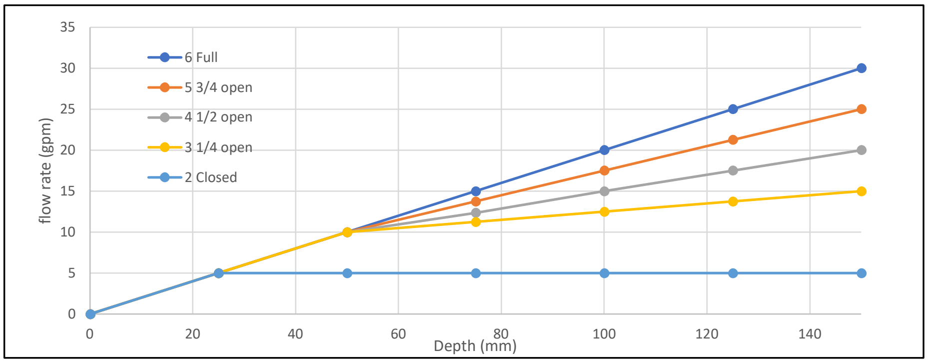


TABLE B22
BUILDING ROOF INFORMATION: **TABLE B22**

Subcatchment Number		
Total Roof Area (m2)	**928**	
Minimum Number of Drains Required	2	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	21,344	
Max Permitted Load from All Drains (L/sec)	23.7	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**6**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	144	
Estimated No. of Drains Required	7	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**90.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	835	
Area per Drain (m2)	209	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	46.4	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (L/s)	**1.893**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Total Roof (L/sec)	7.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	5.8	23.2	0.0	0.2
0.050	10	0.63	0.00252	0.050	23.2	92.8	0.4	1.5
0.075	15	0.95	0.00379	0.075	52.2	208.8	1.3	5.2
0.100	20	1.26	0.00505	0.100	92.8	371.2	3.1	12.4
0.125	25	1.58	0.00631	0.125	145.0	580.0	6.0	24.2
0.150	30	1.89	0.00757	0.150	208.8	835.2	10.4	41.8
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	2.52
0.075	3.79
0.100	5.05
0.125	6.31
0.150	7.57

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	23
0.050	93
0.075	209
0.100	371
0.125	580
0.150	835

WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

0.0631

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS

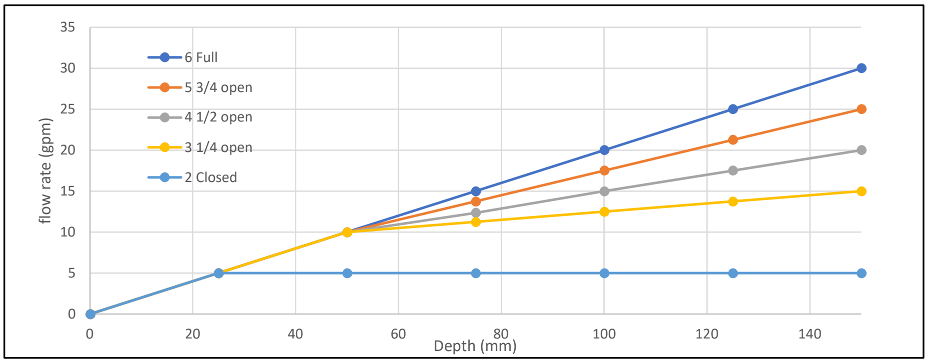


TABLE B23
BUILDING ROOF INFORMATION: **TABLE B23**

Subcatchment Number		
Total Roof Area (m2)	**928**	
Minimum Number of Drains Required	2	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	21,344	
Max Permitted Load from All Drains (L/sec)	23.7	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**6**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	144	
Estimated No. of Drains Required	7	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**90.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	835	
Area per Drain (m2)	209	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	46.4	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (L/s)	**1.893**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Total Roof (L/sec)	7.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	5.8	23.2	0.0	0.2
0.050	10	0.63	0.00252	0.050	23.2	92.8	0.4	1.5
0.075	15	0.95	0.00379	0.075	52.2	208.8	1.3	5.2
0.100	20	1.26	0.00505	0.100	92.8	371.2	3.1	12.4
0.125	25	1.58	0.00631	0.125	145.0	580.0	6.0	24.2
0.150	30	1.89	0.00757	0.150	208.8	835.2	10.4	41.8
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	2.52
0.075	3.79
0.100	5.05
0.125	6.31
0.150	7.57

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	23
0.050	93
0.075	209
0.100	371
0.125	580
0.150	835

WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

0.0631

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS

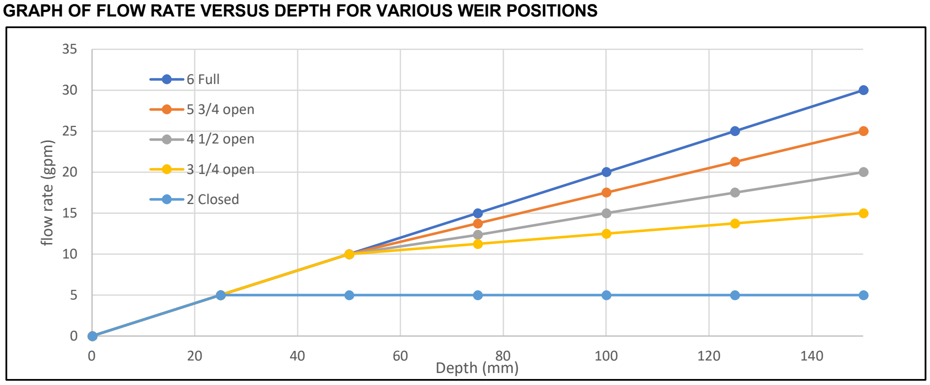


TABLE B24

BUILDING ROOF INFORMATION: **TABLE B24**

Subcatchment Number		
Total Roof Area (m2)	**790**	
Minimum Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	18,170	
Max Permitted Load from All Drains (L/sec)	20.2	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**6**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	144	
Estimated No. of Drains Required	6	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**90.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	711	
Area per Drain (m2)	178	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	39.5	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (L/s)	**1.893**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Total Roof (L/sec)	7.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	4.9	19.8	0.0	0.2
0.050	10	0.63	0.00252	0.050	19.8	79.0	0.3	1.3
0.075	15	0.95	0.00379	0.075	44.4	177.8	1.1	4.4
0.100	20	1.26	0.00505	0.100	79.0	316.0	2.6	10.5
0.125	25	1.58	0.00631	0.125	123.4	493.8	5.1	20.6
0.150	30	1.89	0.00757	0.150	177.8	711.0	8.9	35.6
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	2.52
0.075	3.79
0.100	5.05
0.125	6.31
0.150	7.57

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	20
0.050	79
0.075	178
0.100	316
0.125	494
0.150	711

WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

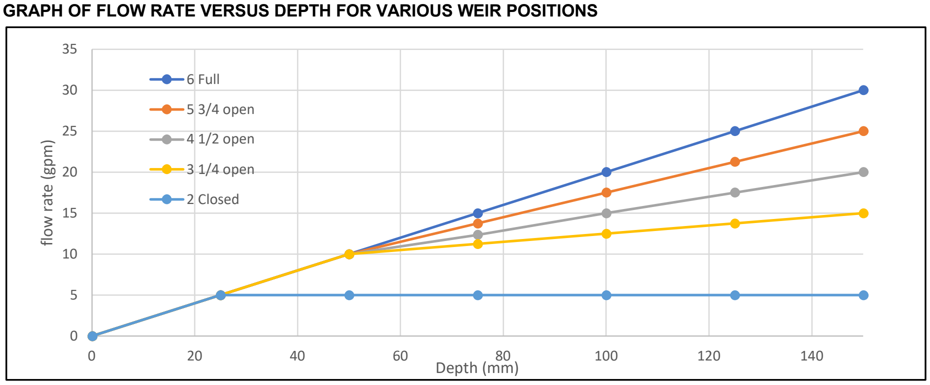
Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

0.0631

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



Appendix C – Manufacturers Information

Watts ACCUTROL Flow Control Specification

Stormceptor Sizing Report

Stormceptor EF Brochure

Stormceptor EF05 Detail

WATTS®	Adjustable Accutrol Weir Tag: ______________	Adjustable Flow Control for Roof Drains

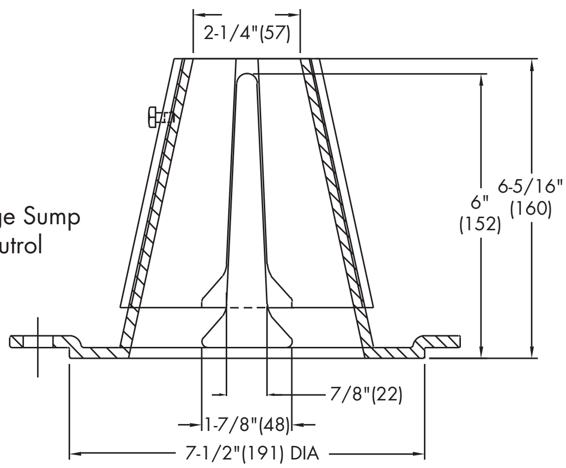
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

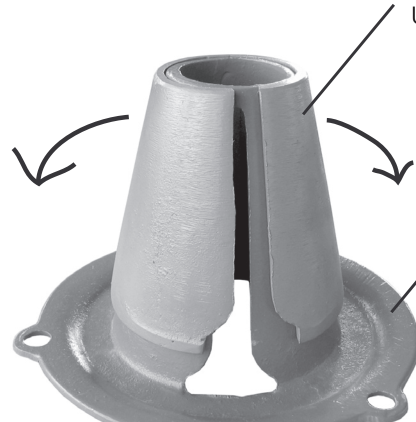
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name ______________ Contractor ______________

Job Location ______________ Contractor's P.O. No. ______________

Engineer ______________ Representative ______________

WATTS®
A Watts Water Technologies Company

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

Stormceptor EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

05/29/2025

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	1015 Tweddle Road

Drainage Area (ha):	1.05
Runoff Coefficient 'c':	0.85

Project Name:	1015 Tweddle
Project Number:	67908
Designer Name:	amr salem
Designer Company:	exp
Designer Email:	amr.salem@exp.com
Designer Phone:	613-688-1899
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	28.81
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1087
Estimated Average Annual Sediment Volume (L/yr):	884

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	78
EF5	83
EF6	87
EF8	92
EF10	95
EF12	97

Recommended Stormceptor EF Model:	**EF5**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**83**
Water Quality Runoff Volume Capture (%):	**> 90**

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

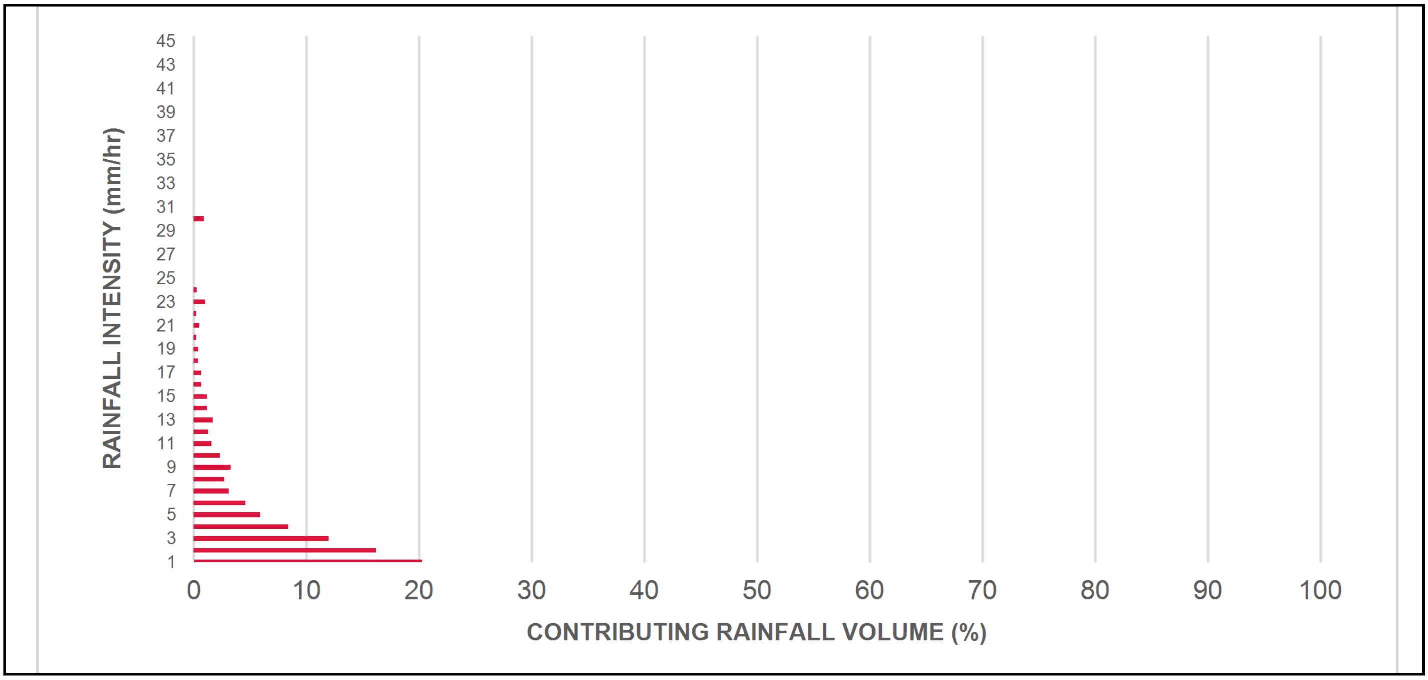
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

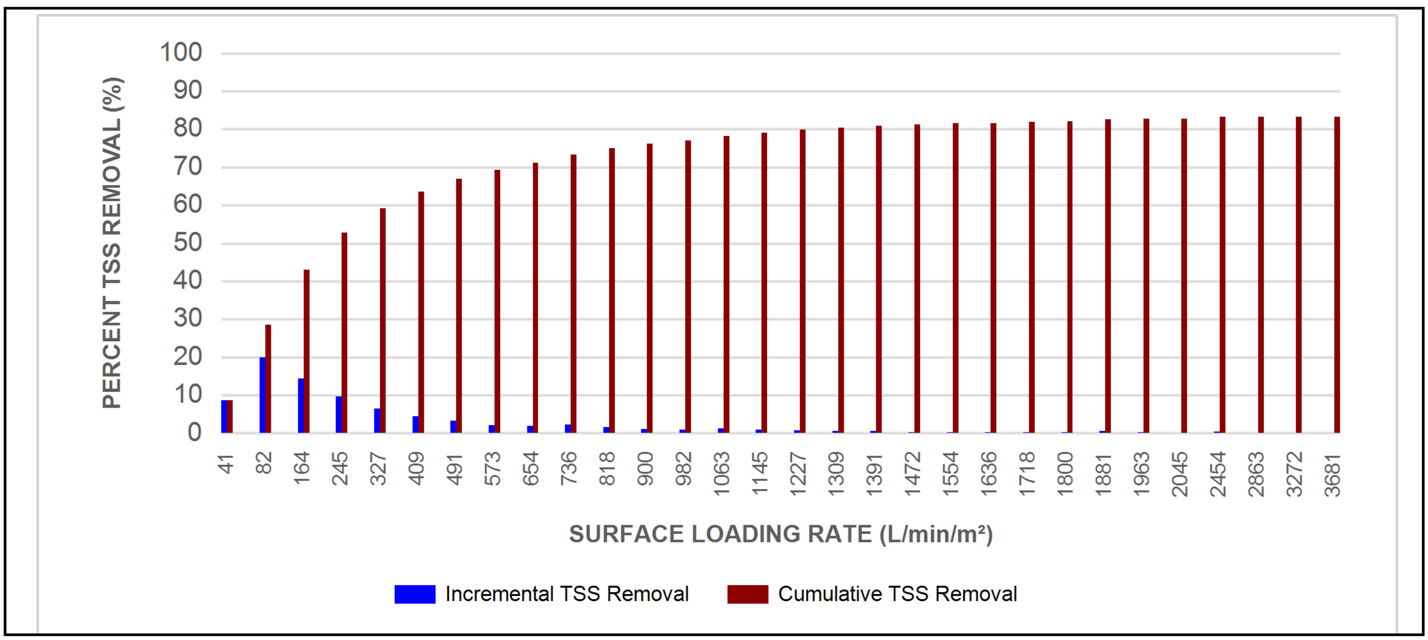
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	1.24	74.0	41.0	100	8.6	8.6
1.00	20.3	29.0	2.48	149.0	82.0	98	20.0	28.6
2.00	16.2	45.2	4.96	298.0	164.0	88	14.3	43.0
3.00	12.0	57.2	7.44	447.0	245.0	81	9.7	52.7
4.00	8.4	65.6	9.92	595.0	327.0	78	6.5	59.2
5.00	5.9	71.6	12.41	744.0	409.0	74	4.4	63.6
6.00	4.6	76.2	14.89	893.0	491.0	72	3.4	67.0
7.00	3.1	79.3	17.37	1042.0	573.0	71	2.2	69.2
8.00	2.7	82.0	19.85	1191.0	654.0	70	1.9	71.1
9.00	3.3	85.3	22.33	1340.0	736.0	70	2.3	73.4
10.00	2.3	87.6	24.81	1489.0	818.0	69	1.6	75.0
11.00	1.6	89.2	27.29	1638.0	900.0	68	1.1	76.1
12.00	1.3	90.5	29.77	1786.0	982.0	68	0.9	77.0
13.00	1.7	92.2	32.25	1935.0	1063.0	69	1.2	78.2
14.00	1.2	93.5	34.74	2084.0	1145.0	70	0.9	79.0
15.00	1.2	94.6	37.22	2233.0	1227.0	72	0.8	79.9
16.00	0.7	95.3	39.70	2382.0	1309.0	73	0.5	80.4
17.00	0.7	96.1	42.18	2531.0	1391.0	75	0.6	80.9
18.00	0.4	96.5	44.66	2680.0	1472.0	72	0.3	81.2
19.00	0.4	96.9	47.14	2829.0	1554.0	68	0.3	81.5
20.00	0.2	97.1	49.62	2977.0	1636.0	65	0.1	81.6
21.00	0.5	97.5	52.10	3126.0	1718.0	62	0.3	81.9
22.00	0.2	97.8	54.59	3275.0	1800.0	59	0.1	82.1
23.00	1.0	98.8	57.07	3424.0	1881.0	56	0.6	82.6
24.00	0.3	99.1	59.55	3573.0	1963.0	54	0.1	82.8
25.00	0.0	99.1	62.03	3722.0	2045.0	52	0.0	82.8
30.00	0.9	100.0	74.43	4466.0	2454.0	43	0.4	83.2
35.00	0.0	100.0	86.84	5210.0	2863.0	38	0.0	83.2
40.00	0.0	100.0	99.25	5955.0	3272.0	33	0.0	83.2
45.00	0.0	100.0	111.65	6699.0	3681.0	29	0.0	83.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**83 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

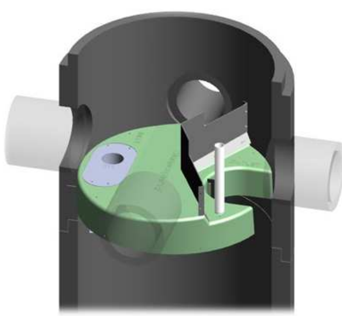
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

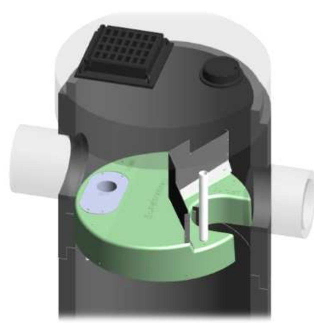
DESIGN FLEXIBILITY

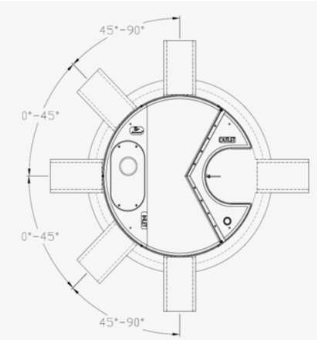
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP
Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS
The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS
For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef
STANDARD STORMCEPTOR EF/EFO SPECIFICATION
For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program’s **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Stormceptor® EF

Stormceptor® EF Overview

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About Imbrium® Systems

Imbrium® Systems is dedicated to protecting Canada's waterways. Based on our knowledge and experience in the Canadian stormwater industry, we have the ability to provide the most effective stormwater treatment technologies that capture and retain harmful pollutants from urban runoff before it enters our streams, rivers, lakes, and oceans.

Imbrium's engineered treatment solutions have been third-party tested and verified in accordance with the ISO 14034 Environmental Technology Verification (ETV) protocol to ensure performance in real-world conditions as designed. Our team of highly skilled engineers and partners provide the highest level of service from design to installation and long-term maintenance.

By working with Imbrium and our partners, you can expect superior treatment technology, unparalleled customer service, compliance with local stormwater regulations, and cleaner water. To find your local representative, please visit **www.imbriumsystems.com/localrep**.

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Learn About the Stormceptor® EF

Go online and watch our animation to learn how the Stormceptor EF works. The animation highlights important features of the Stormceptor EF including:

- Functionality
- Applications
- Inspection and Maintenance

To view the Stormceptor EF animation, visit **www.imbriumsystems.com/stormceptoref**

Stormceptor® EF

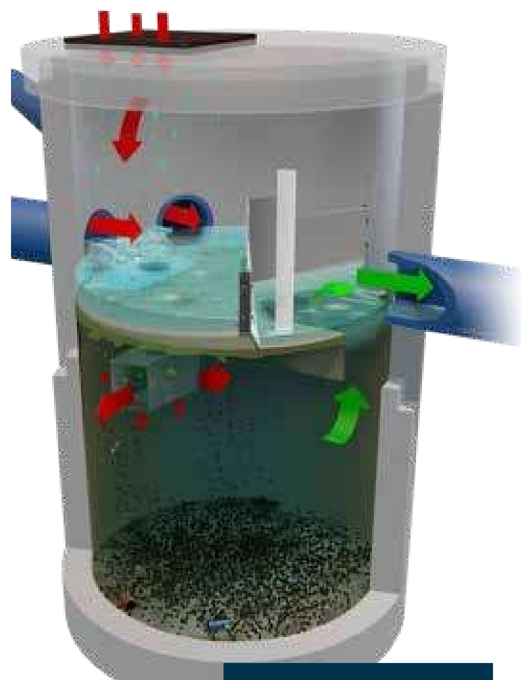
A CONTINUATION AND EVOLUTION OF THE MOST GLOBALLY RECOGNIZED OIL GRIT SEPARATOR (OGS) STORMWATER TREATMENT TECHNOLOGY

Stormceptor EF effectively targets sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's independently tested and verified, patent- pending treatment and scour prevention platform ensures pollutants are captured and contained during all rainfall events.

Stormceptor EF also offers design flexibility in one platform, accepting flow from a single inlet pipe, multiple inlet pipes, and from the surface through an inlet grate. Stormceptor EF can also accommodate a 90-degree inlet to outlet bend angle, and tailwater conditions.

Ideal Uses

- Sediment (TSS) removal
- Hydrocarbon control and hotspots (Stormceptor EF)
- Debris and small floatables capture
- Pretreatment for filtration, detention/retention systems, ponds, wetlands, and bioretention
- Retrofit and redevelopment projects

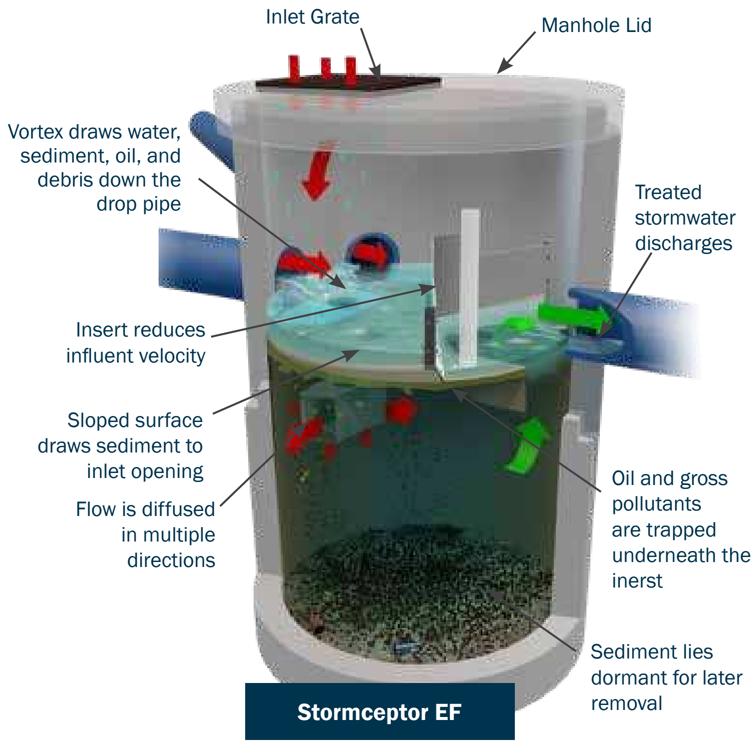


Stormceptor EF

Stormceptor EF and Stormceptor EFO have been verified in accordance with ISO 14034 Environment Management - Environmental Technology Verification (ETV) protocol.

How the Stormceptor® EF Works

- Flow enters the Stormceptor through one or more inlet pipes or an inlet grate.
- A specially designed insert reduces influent velocity by creating a pond upstream of the weir, allowing sediments to begin settling.
- Swirling flow sweeps water and pollutants across the sloped insert surface to the drop pipe, where a strong vortex draws water, sediment, oil, and debris down the drop pipe cone and into the lower chamber.
- Flow exits the drop pipe through two large rectangular openings, while also diffusing through perforations in multiple directions. This reduces stream velocities and increases pollutant removal efficiency while preventing resuspension and washout of previously captured pollutants.
- Floatables, such as oil and gross pollutants, rise up and are trapped beneath the insert.
- Sediment settles to the sump.
- Treated stormwater discharges to the top side of the insert downstream of the weir, where it exits through the outlet pipe.
- During intense storm events excess influent passes over the weir and exits through the outlet pipe. The pond continues to separate sediment from all incoming flows, while full treatment in the lower chamber continues at the maximum flow rate, without scour of previously captured pollutants.

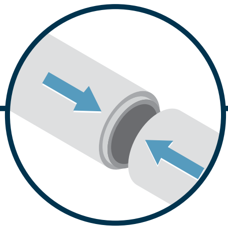


* Fiberglass system is an option

Stormceptor® EF Features & Benefits

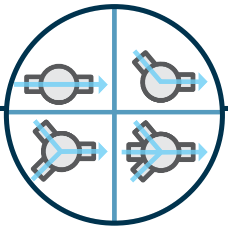
EASY TO INSTALL

Small footprint saves time and money with limited disruption to your site.



SEAMLESS

Minimal drop between inlet and outlet pipes makes Stormceptor ideal for retrofits and new development projects.



FLEXIBLE

Multiple inlets can connect to a single unit. Can be used as a bend structure.

FEATURES	BENEFITS
Patent-pending enhanced flow treatment and scour prevention technology	Superior, third-party verified performance
Third-party verified light liquid capture and retention (EFO version)	Proven performance for fuel/oil hotspot locations
Functions as bend, junction or inlet structure	Cost savings and design flexibility
Minimal drop between inlet and outlet	Site installation ease
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade

Stormceptor® EF Standard Configurations

Single Inlet Pipe

Multiple Inlet Pipes

Grate Inlet

High Tailwater

OPTIONS & ACCESSORIES

The following options and accessories are available for specific functions and site conditions:

- **Tailwater/Submerged Site** – For sites with standing water during dry weather periods, weir modifications can be implemented to ensure optimal performance.
- **Additional Sediment Storage Volume** – For sites with high pollutant loads or remote sites, additional sediment storage volume can easily be added.
- **Oil Alarm** – To mitigate spill liability, a monitoring system can be employed to trigger a visual and audible alarm when an oil or fuel spill occurs.
- **Additional Oil Capture** – A draw-off tank can be incorporated to increase spill storage capacity.
- **High Load** – Standard design loading is CHBDC or AASHTO H-20. Specialized loading can be designed to withstand very high loadings typical of airports and port facilities.
- **Lightweight** – Sites that required lightweight or above ground units are available as complete fiberglass systems.

Optional Oil Alarm

For any of these options or accessories, please contact your Stormceptor representative for design assistance.

Stormceptor® EFO

Accidents and spills happen, whether it is a fueling station, port, ndustrial site, or general hot spot with daily vehicle traffic. Protect the environment and your site from potentially costly clean-up, remediation, litigation and fines with the Stormceptor EFO configuration.

The Stormceptor EFO has been third-party tested to ensure oil capture, and retention during high flow events. The hydraulics of the Stormceptor EFO have been optimized to enhance oil and hydrocarbon capture.

STORMCEPTOR EFO – HYDROCARBON SPILL PROTECTION

- Stormceptor EFO configuration has been third-party performance tested for safe oil capture and retention.
- Patent-pending technology ensures captured oil and sediment are retained even during the largest rain events, for secure storage, environmental protection and easy removal.
- Stormceptor EFO provides double wall containment for captured hydrocarbons.
- Stormceptor EFO is ideal for gas stations, fuel depots, ports, garages, loading docks, industrial sites, fast food locations, high-collision intersections and other hotspots with spill-prone areas.
- Stormceptor EFO can accommodate an optional oil alarm and additional storage to increase spill storage capacity.

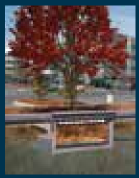
Stormceptor® Inspection & Maintenance

Conducted at grade, the Stormceptor EF design makes inspection and maintenance an easy and inexpensive process. Once maintained, the Stormceptor EF is functionally restored as designed, with full pollutant capture capacity.


Stormceptor maintenance is performed at grade with a standard vacuum truck

MAINTENANCE RECOMMENDATIONS:

- Inspect every six months for the first year to determine the pollutant accumulation rate.
- In subsequent years, inspections can be based on observations or local requirements.
- Inspect the unit immediately after an oil, fuel or chemical spill. A licensed waste management company should remove oil and sediment, and dispose responsibly.



FILTERRA BIORETENTION

The Filterra® Bioretention System is an engineered biofiltration device with components that make it similar to bioretention in pollutant removal and application, but has been optimized for high volume/flow treatment in a compact system.

JELLYFISH FILTER

The Jellyfish® Filter is a stormwater treatment technology featuring pretreatment and membrane filtration in a compact stand-alone treatment system that removes a high level and a wide variety of stormwater pollutants.

LITTATRAP CATCH BASIN

The LittaTrap™ is a simple and effective solution to remove sediment and trash from stormwater systems at its source. The LittaTrap sits inside the storm drain and captures and retains sediment and trash before it enters stormwater infrastructure, effectively pretreating downstream structures and aiding in pollutant removal.

LEARN MORE

- Access project profiles, photos, videos, and more online at **www.imbriumsystems.com/stormceptoref.**

REQUEST DESIGN ASSISTANCE

- Call us at (888) 279-8826 or 301-279-8827 to talk to one of our engineers for technical support or design assistance.

START A PROJECT

- Submit your system requirements on our product Design Worksheet at **www.imbriumsystems.com/pdw.**

FIND A LOCAL REPRESENTATIVE

- Visit **www.imbrumsystems.com/localrep** for contact information for your local Imbrium representative.

imbrium®

+1 416-960-9900

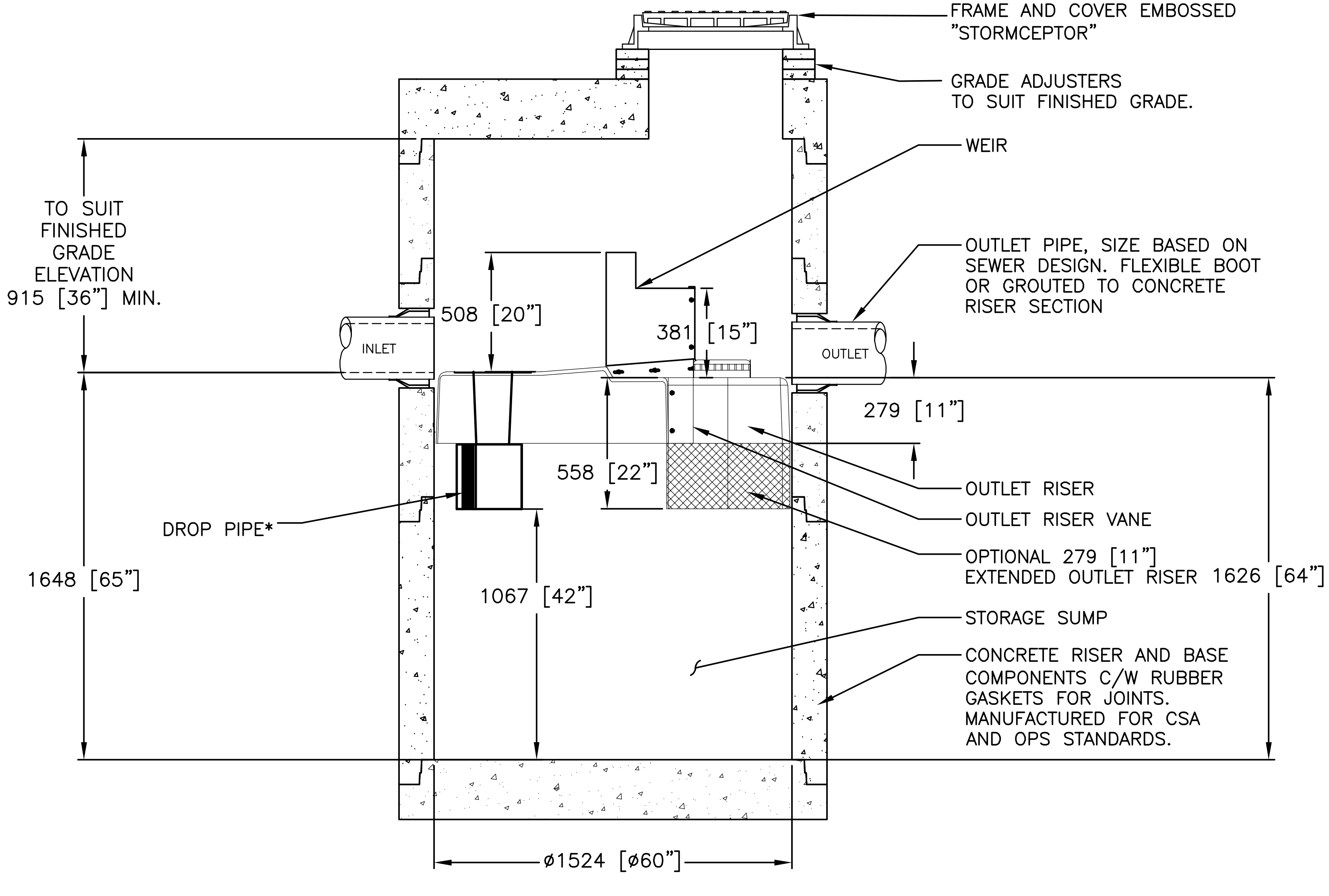
www.imbriumsystems.com

Imbrium® Systems is an engineered stormwater treatment company that designs and manufactures stormwater treatment solutions that protect water resources from harmful pollutants. By developing technologies to address the long-term impact of urban runoff, Imbrium ensures our clients' projects are compliant with government water quality regulations. For information, visit www.imbriumsystems.com or call +1 416-960-9900.

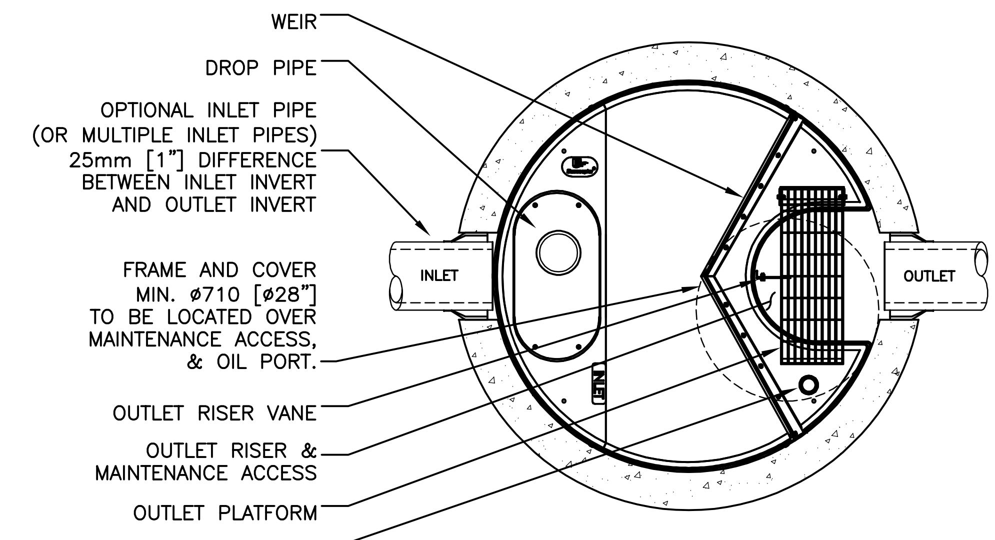
Get Social With Us!

IB-Stormceptor EF Bro 5/19 PDF

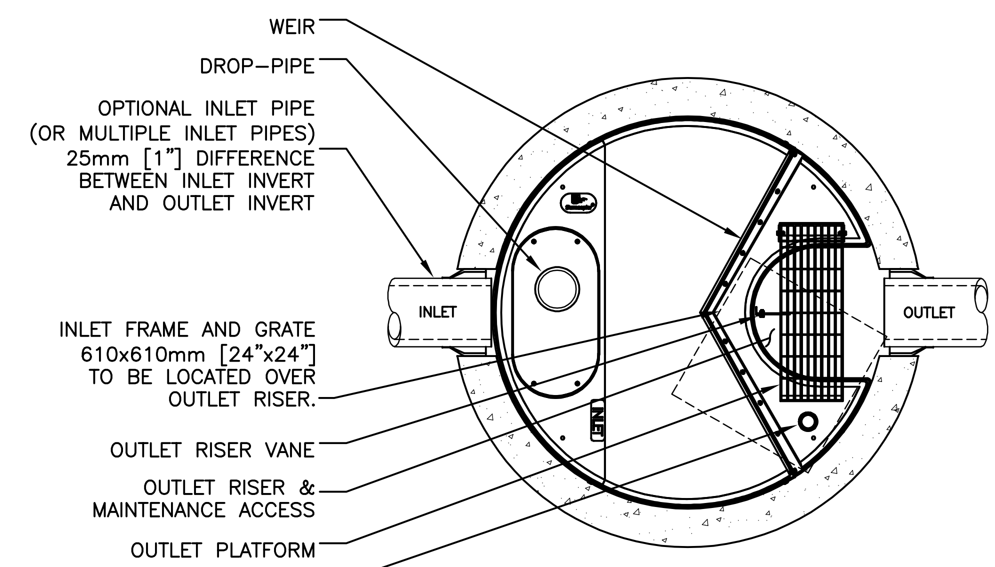
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF5 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO5 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO5				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

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If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Imbrium immediately for re-evaluation of the design. Imbrium accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
####	####	####	####
####	####	####	####
0	08/22/24	INITIAL RELEASE	EC

Stormceptor® EF

SCALE = NTS

imbrium®

407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9
TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900

THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING PATENTS

DATE: 8/22/2024	
DESIGNED: JSK	DRAWN: EC
CHECKED: BSF	APPROVED:
PROJECT No.: EFO5	SEQUENCE No.: *
SHEET: 1 OF 1	

C:\USERS\ERIC.CARMONA-EPP\ONEDRIVE - THE QUIKRETE COMPANIES\DESKTOP\EF5 EXTRA\EFO5-DETAIL.DWG 8/22/2024 4:30 PM

Appendix D – Consultation / Correspondence

City of Ottawa Water System Boundary Conditions

Boundary Conditions
1009 Trim Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	342	5.70
Maximum Daily Demand	852	14.20
Peak Hour	1,866	31.10
Fire Flow Demand #1	6,000	100.00
Fire Flow Demand #2	10,020	167.00

Location

Results

Connection 1 – Jeanne D'Arc Blvd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	113.6	88.5
Peak Hour	106.7	78.6
Max Day plus Fire 1	112.0	86.2
Max Day plus Fire 2	102.9	73.3

[1] Ground Elevation = 51.4 m

Connection 2 – Jeanne D'Arc Blvd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	113.6	89.2
Peak Hour	106.7	79.3
Max Day plus Fire 1	107.7	80.7
Max Day plus Fire 2	102.9	74.0

[1] Ground Elevation = 50.9 m

Notes

1. A second connection to the watermain is required to decrease vulnerability of the water system in case of breaks.
2. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
   a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
   b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Appendix E – Drawings

Architectural Plans

Plan of Topographic Survey

PARKING SCHEDULE	
Count	Type
-03 - SOUS-SOL 3	
39	2600mmx5200mm
1	3800mmx5000mm (HANDICAPÉ)
22	PRK_STATIONNEMENT TANDEM_PARKING_2600mm x 5200mm
170	PRK_STATIONNEMENT_PARKING_2600mm x 5200mm
57	PRK_STATIONNEMENT_REDUCED LENGTH_ 2600mm x 4600mm
19	PRK_STATIONNEMENT_REDUCED WIDTH_2400mm x 5200mm
-03 - SOUS-SOL 3: 308	
-02 - SOUS-SOL 2	
4	2600mmx5200mm
1	3800mmx5000mm (HANDICAPÉ)
18	MULTIFORME X 3'-0"
11	PRK_STATIONNEMENT TANDEM_PARKING_2600mm x 5200mm
205	PRK_STATIONNEMENT_PARKING_2600mm x 5200mm
59	PRK_STATIONNEMENT_REDUCED LENGTH_ 2600mm x 4600mm
18	PRK_STATIONNEMENT_REDUCED WIDTH_2400mm x 5200mm
-02 - SOUS-SOL 2: 316	
-01 - SOUS-SOL 1	
3	2600mmx5200mm
1	3800mmx5000mm (HANDICAPÉ)
20	PRK_STATIONNEMENT TANDEM_PARKING_2600mm x 5200mm
209	PRK_STATIONNEMENT_PARKING_2600mm x 5200mm
50	PRK_STATIONNEMENT_REDUCED LENGTH_ 2600mm x 4600mm
21	PRK_STATIONNEMENT_REDUCED WIDTH_2400mm x 5200mm
-01 - SOUS-SOL 1: 304	
Grand total: 928	

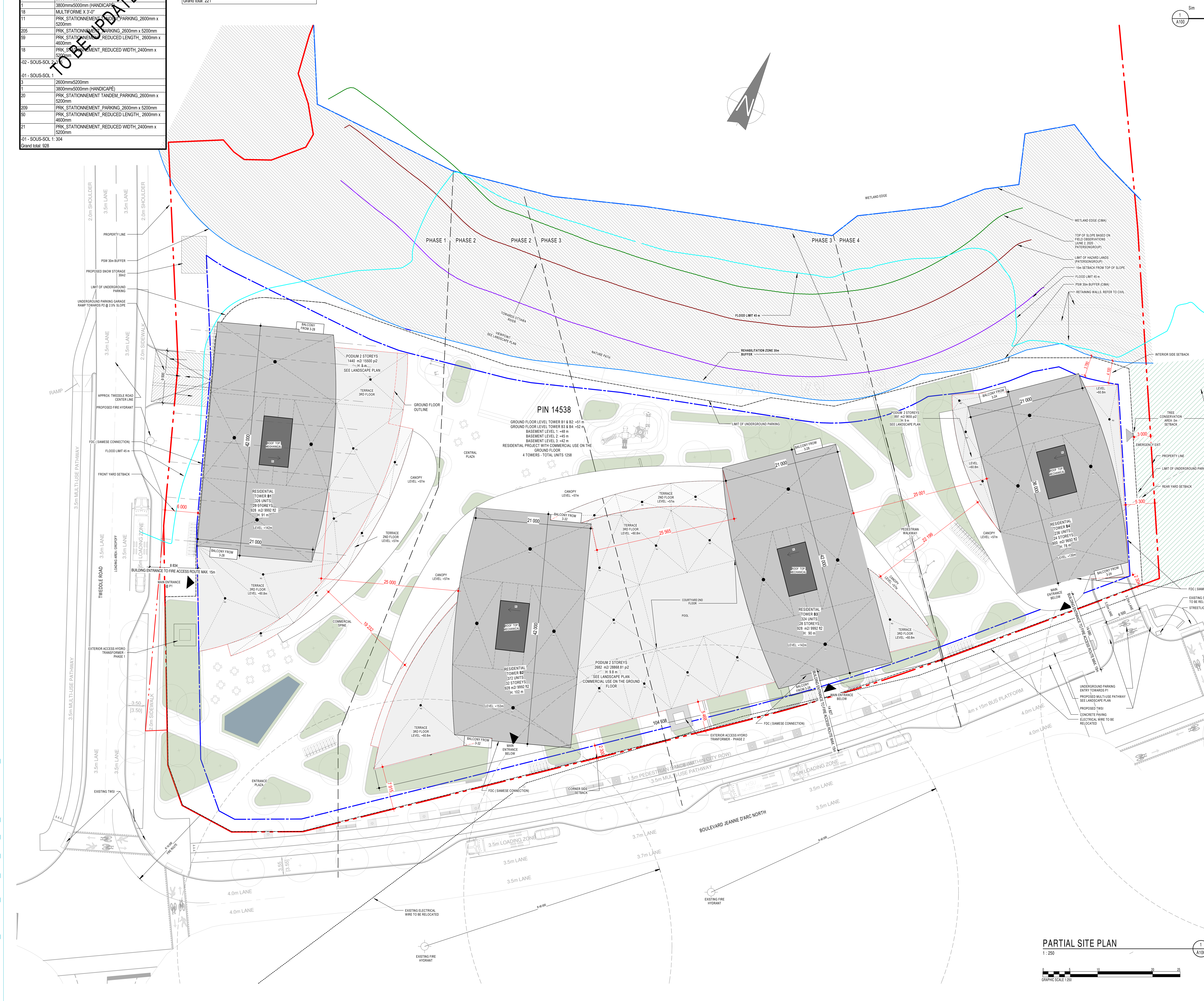
TO BE UPDATED

VERTICAL BIKE STORAGE SCHEDULE		
Level	Type	Count
-03 - SOUS-SOL 3		
-03 - SOUS-SOL 3	UN VELO	80
-03 - SOUS-SOL 3: 80		
-02 - SOUS-SOL 2		
-02 - SOUS-SOL 2	UN VELO	37
-02 - SOUS-SOL 2: 37		
-01 - SOUS-SOL 1		
-01 - SOUS-SOL 1	UN VELO	36
-01 - SOUS-SOL 1: 36		
REZ-DE-CHAUSSÉE		
REZ-DE-CHAUSSÉE	UN VELO	68
REZ-DE-CHAUSSÉE: 68		
Grand total: 221		

HORIZONTAL BIKE STORAGE SCHEDULE	
Count	Type
-03 - SOUS-SOL 3	
131	HORIZONTAL SINGLE STACK BIKE PARKING
-02 - SOUS-SOL 2	
123	HORIZONTAL SINGLE STACK BIKE PARKING
-01 - SOUS-SOL 1	
77	HORIZONTAL SINGLE STACK BIKE PARKING
REZ-DE-CHAUSSÉE	
138	HORIZONTAL SINGLE STACK BIKE PARKING
Grand total: 469	

LEGEND

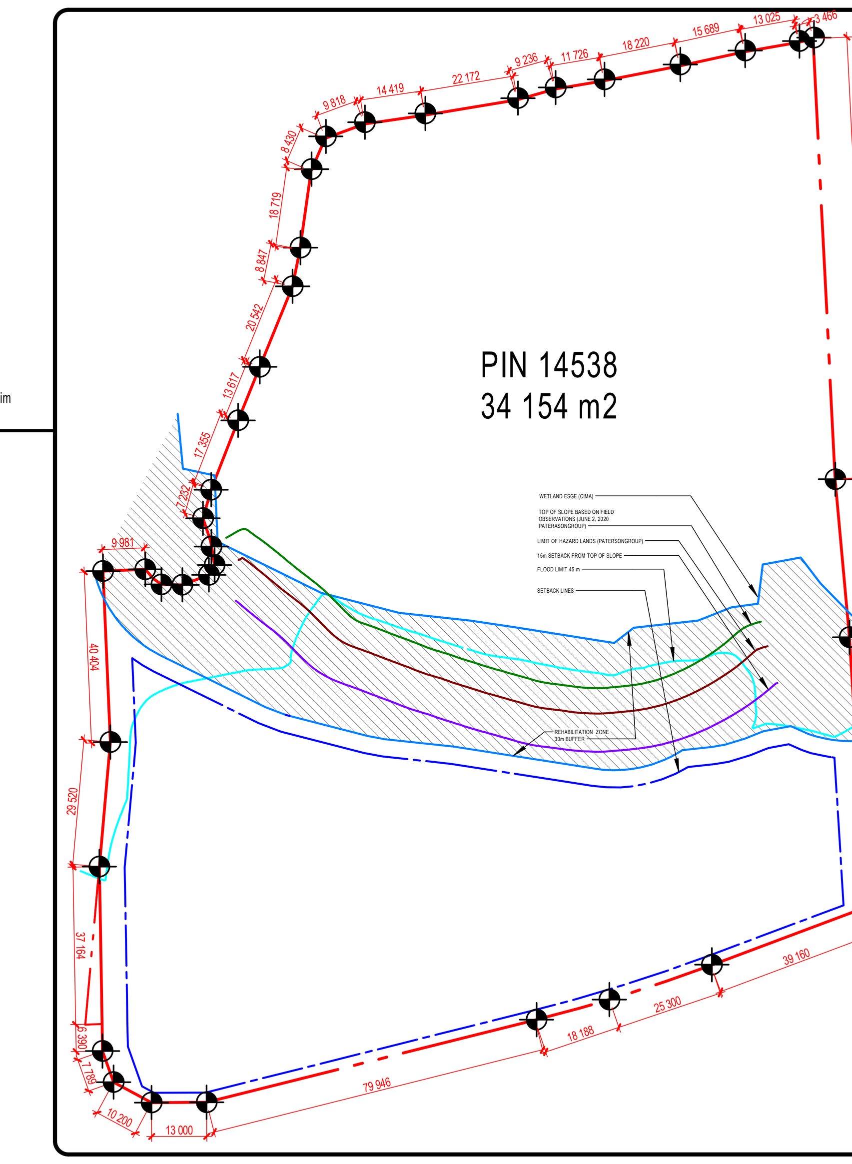
- PROPERTY LINE
- SETBACK LINE
- 100 YEAR FLOOD LIMIT (45m CONTOUR)
- WATER EDGE LINE
- UNDERGROUND PARKING LIMIT
- 15m SETBACK FROM TOP OF SLOPE
- LIMIT OF HAZARD LANDS (PATERSONGROUP)
- TOP OF SLOPE BASED ON FIELD OBSERVATIONS (JUNE 2ND 2020 PATERSONGROUP)
- 30m WETLAND EDGE BUFFER ZONE- REHABILITATION ZONE
- TREE CONSERVATION AREA
- ENTRANCE AT GF
- RD ROOF DRAINS
- FIRE HYDRANT



PARTIAL SITE PLAN

1 : 250

GRAPHIC SCALE 1:250



KEY PLAN - PROPERTY BOUNDARY

1 : 1000

NOTES:

- FOR PEDESTRIAN WALKING AREAS AND SURFACE MATERIALS REFER TO LANDSCAPE PLAN BY PROJET PAYSAGE.
- PROPERTY BOUNDARY INFORMATION AND PIN DERIVED AS WELL AS WETLAND EDGE, PSW 30m BUFFER, PATERSON TOP OF SLOPE, 15m SETBACK AND HAZARD LANDS LIMITS FROM PLAN OF SURVEY DATED OCTOBER 15TH, 2024 11th, BY ANNIS, O' SULLIVAN, VOLLEBEKK LTD PLAN 25483-24 M.Chenier Pt Lt30 C1 OS Cumberland O D5.
- PIN 14538

INFORMATION SUR LE PROJET - *PROJECT INFORMATION* — 10/16/2024

13383 — 1015 TWEDDLE ROAD — *Projet Global / Overall Project*

Province /*Province*	Ontario
Zonage / *Zoning*	City of Ottawa zoning By-law No. 2008-250
Superficie du Lot / *Property Area*	34,103 m² / *sq. m.* 367,082 pi² / *sq. ft*

STATISTIQUES SUR LE PROJET / *PROJECT STATISTICS*	TOWER B1	TOWER B2	TOWER B3	TOWER B4
Hauteur du Bâtiment (m)/ *Building Height* (m)	91m (28 STOREYS)	102m (32 STOREYS)	90m (28 STOREYS)	78m (24 STOREYS)

STATISTIQUES DES UNITÉS / *UNIT STATISTICS*	TOWER B1	TOWER B2	TOWER B3	TOWER B4
Studio / *Bachelor*	0	0	0	0
1 Chambre / *1 Bedroom*	216	248	217	144
2 Chambres / *2 Bedrooms*	109	123	105	92
3 Chambres / *3 Bedrooms*	1	1	1	0
Total Number of Units	326	372	323	236
				1257

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*	EXIGÉ / *REQUIRED*		[illegible]	
PHASE / *PHASE*	#/Unité / *#/Unit*	Parking	Ratio [illegible]	[illegible]ing
Tour B1- Résidentiel / *Tower B1 - Résidential*	-	-	[illegible]	[illegible]177
Tour B1 - Visitors / *Tower B1 - Visiteur*	0.1/unit	33	[illegible]	33
Tower B1 - Total Residential & Visitor Parking	0.1/unit	33	[illegible]	210
Tour B2 - Résidentiel / *Tower B2 - Résidential*	-	-	[illegible]	311
Tour B2 - Visitors / *Tower B2 - Visiteur*	0.1/unit	[illegible]	[illegible]	37
Tower B2 - Total Residential & Visitor Parking	0.1/unit	[illegible]	[illegible]	348
Tour B3 - Résidentiel / *Tower B3 - Résidential*	-	[illegible]	[illegible]	163
Tour B3 - Visitors / *Tower B3 - Visiteur*	0.1/unit	[illegible]	[illegible]	32
Tower B3 - Total Residential & Visitor Parking	0.1/u[illegible]	[illegible]	[illegible]2/unit	195
Tour B4 - Résidentiel / *Tower B4 - Résidential*	[illegible]	[illegible]	0.62/unit	123
Tour B4 - Visitors / *Tower B4 - Visiteur*	[illegible]	[illegible]	0.1/unit	24
Tower B4 - Total Residential & Visitor Parking	[illegible]	[illegible]	0.72/unit	147
Total Residential & Visitor Parking	[illegible]	[illegible]	0.72/unit	900

STATIONNEMENT COMMERCIALE / *COMMER[illegible]*		[illegible]E / *REQUIRED*		FOURNIS / *PROVIDED*	
PHASE / *PHASE*	[illegible]	[illegible]atio [illegible]oy. (m²) /	Commercial Parking	Ratio Moy. (m²) / *Avg. Ratio (m²)*	Commercial Parking
Tour B1 - Commerciale / *Tower B1 -* [illegible]	[illegible]	3.4/100	41	3.4/100	41
Tour B2 - Commerciale / *Tower P*[illegible]	[illegible]		36		36
Tour B3 - Commerciale / *Tow*[illegible]	[illegible]5		15		15
Tour B4 - Commerciale / [illegible]	0		0		0
Total Commercial [illegible]	2679	3.4/100	92	3.4/100	92

STATIONN[illegible]			EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
PHASE / *PHAS*[illegible]	Unités / *Units*	Aire (m²) / *Area (m²)*	Ratio / *Ratio*	Bicycle Parking	Ratio Moy. (m²) / *Avg. Ratio (m²)*	Bicycle Parking
Tour B1 - Résidentiel / Tow[illegible]	326		0.5/unit	163	0.5/unit	163
					Total B1 Residential Bicycle parking	163
Tour B2 - Résidentiel / Tower B2 - Residential	372		0.5/unit	186	0.5/unit	186
					Total B2 Residential Bicycle parking	186
Tour B3 - Résidentiel / Tower B3 - Residential	323		0.5/unit	162	0.5/unit	162
					Total B3 Residential Bicycle parking	162
Tour B4 - Résidentiel / Tower B4 - Residential	236		0.5/unit	118	0.5/unit	118
					Total B4 Residential Bicycle parking	118
Total Residential Bicycle Parking			0.5/unit	629	0.5/unit	629
Tour B1 - Commerciale / Tower B1 - Commercial		1200	1/250 m2	5	1/250 m2	5
Tour B2 - Commerciale / Tower B2 - Commercial		1054		4		4
Tour B3 - Commerciale / Tower B3 - Commercial		425		2		2
Tour B4 - Commerciale / Tower B4 - Commercial		0		0		0
Total Commercial Bicycle Parking		2679	1/250 m2	11	1/250 m2	11

TO BE UPDATED

ARPENTEUR Surveyor
Annis, O'Sullivan, Vollebekk Ltd.
14 Concourse Gate, Ottawa ON K2E 7S6
T 613 727 0850 Aovltd.com

PROMOTEUR Developer
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T 819 664 4195 Vuzeconstruction.com

PLANIFICATEUR Planner
Fotenn Planning and Design
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T 613 730 5709 Fotenn.com

ARCHITECTURE DE PAYSAGE Landscape Architect
Projet Paysage
24 Mont-royal West Suite 801, Montreal QC H2T 2S2
T 514 849 7700 Projetpaysage.com

CIVIL Civil
EXP
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T 514 931 1080 Exp.com

ARCHITECTES Architect
NEUF architect(e)s
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUF.ca

SCEAU / Seal

NEUF ARCHITECT(E)S

OUVRAGE Project

1015 TWEDDLE ROAD, ORLÉANS, ON, K4A 3P4

EMPLACEMENT Location: **OTTAWA, ON**

NO PROJET No. **13383**

NO REVISION DATE (aa-mm-jj)

Préliminaire NE PAS UTILISER POUR CONSTRUCTION

DESSINÉ PAR Drawn by: AT

VÉRIFIÉ PAR Checked by: AC

DATE (aa.mm.jj): 25.03.20

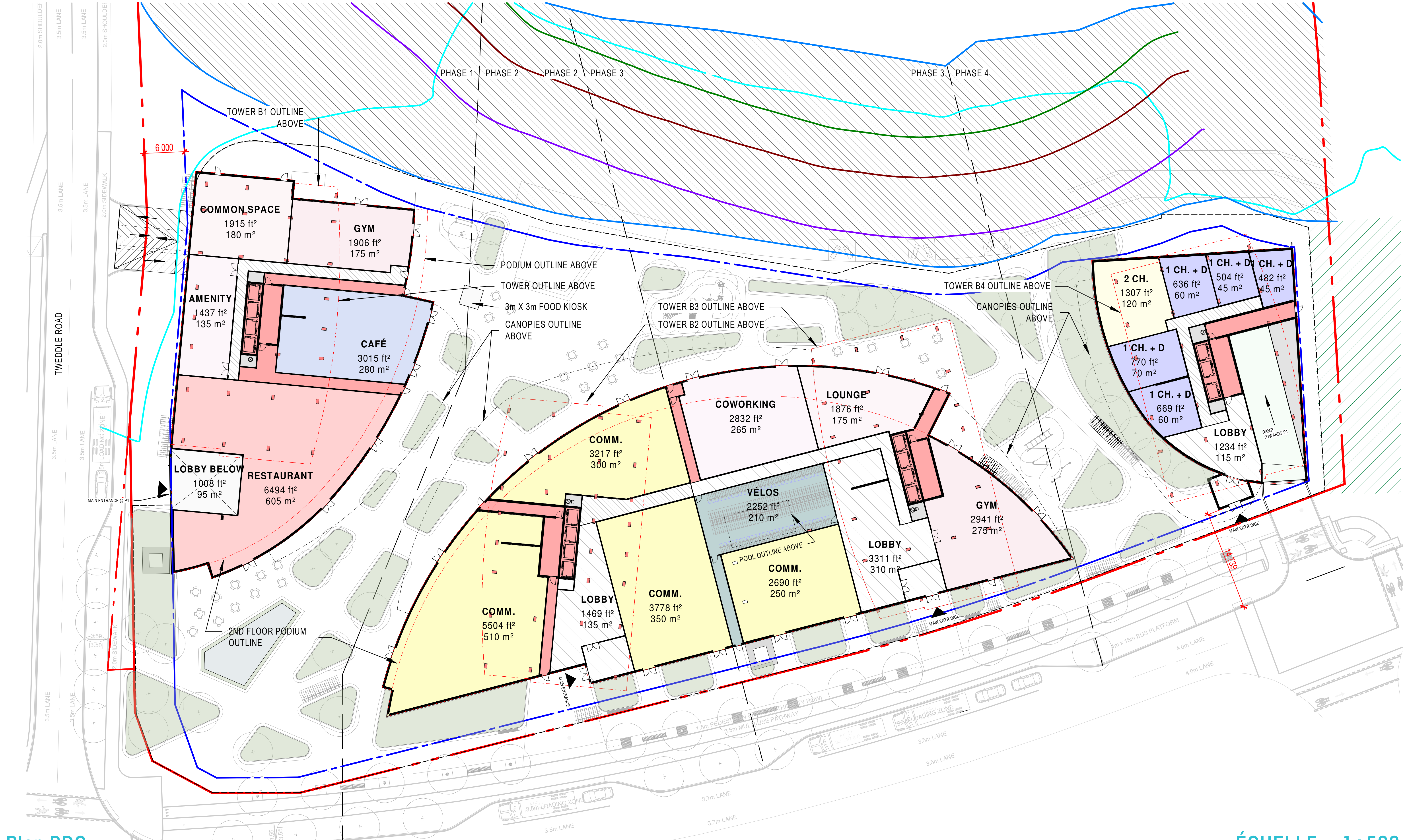
ÉCHELLE Scale: As indicated

TITRE DU DESSIN Drawing Title

SITE PLAN

RÉVISION Revision

NO. DESSIN Dwg Number: **A100**



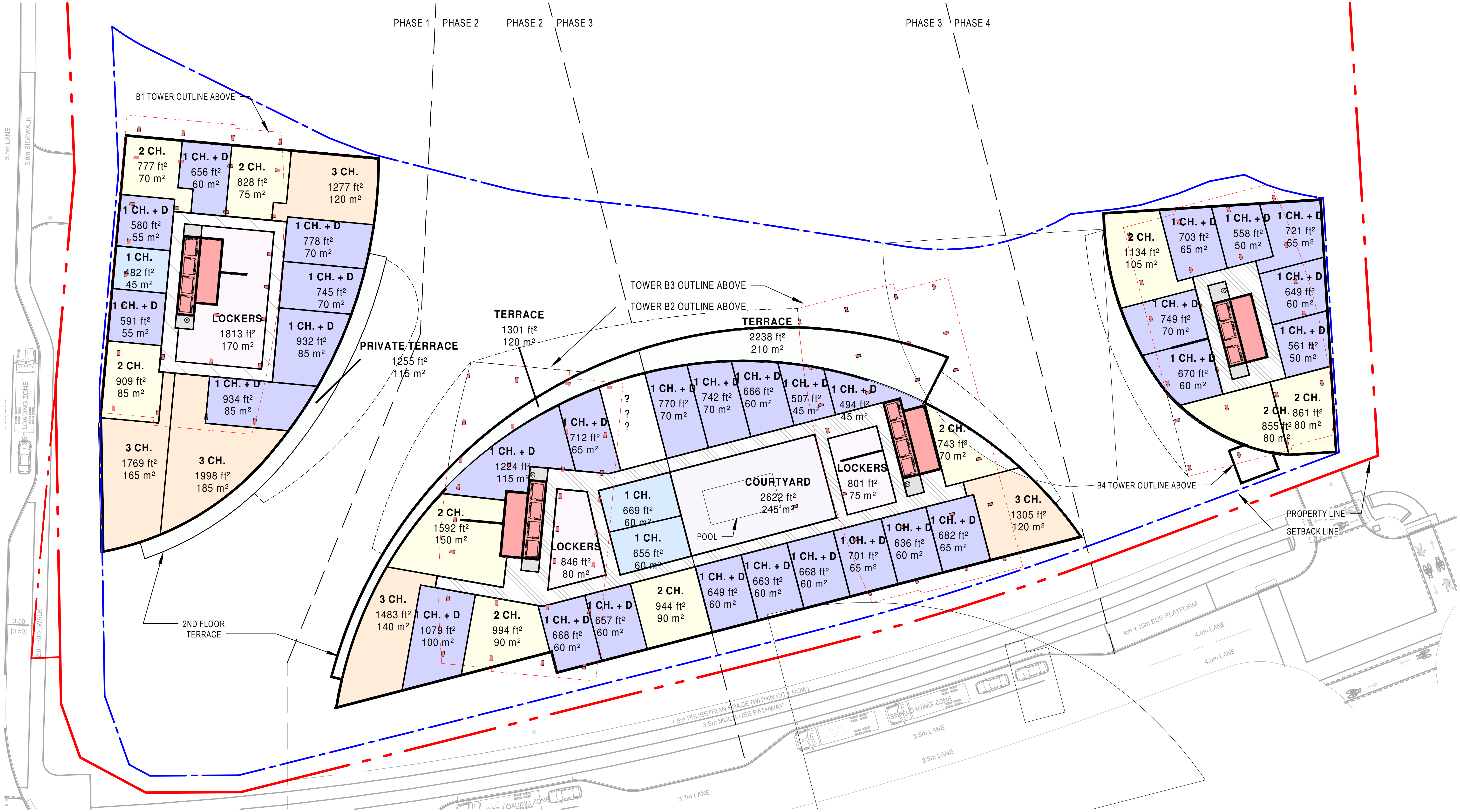
Plan RDC

ÉCHELLE = 1 : 500

NEUF
ARCHITECT(E)S

1015 TWEDDLE ROAD,
ORLÉANS, ON, K4A 3P4

24/09/18



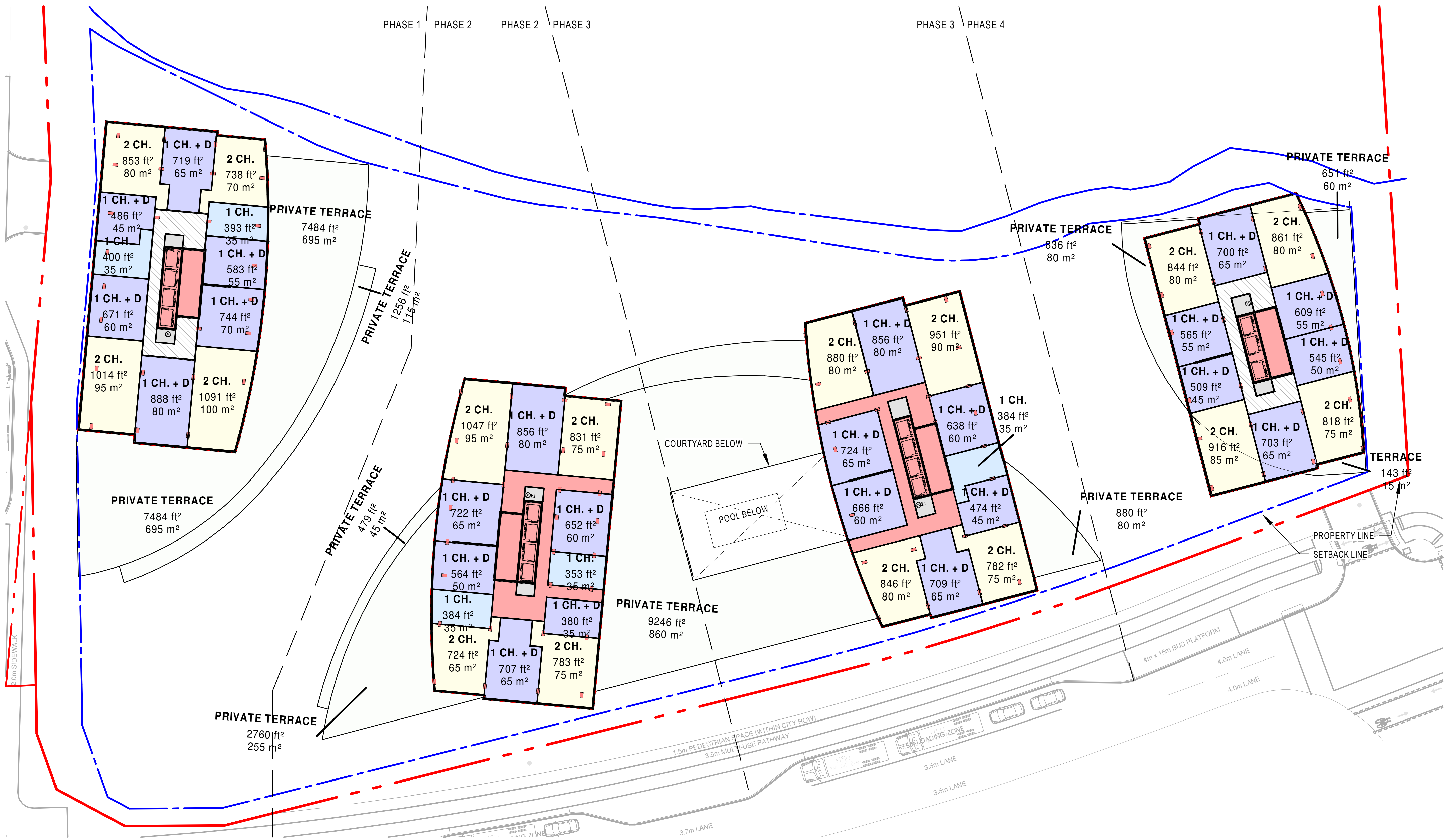
Plan Niveau 2

ÉCHELLE = 1 : 500

NEUF ARCHITECT(E)S

1015 TWEDDLE ROAD,
ORLÉANS, ON, K4A 3P4

10/09/24



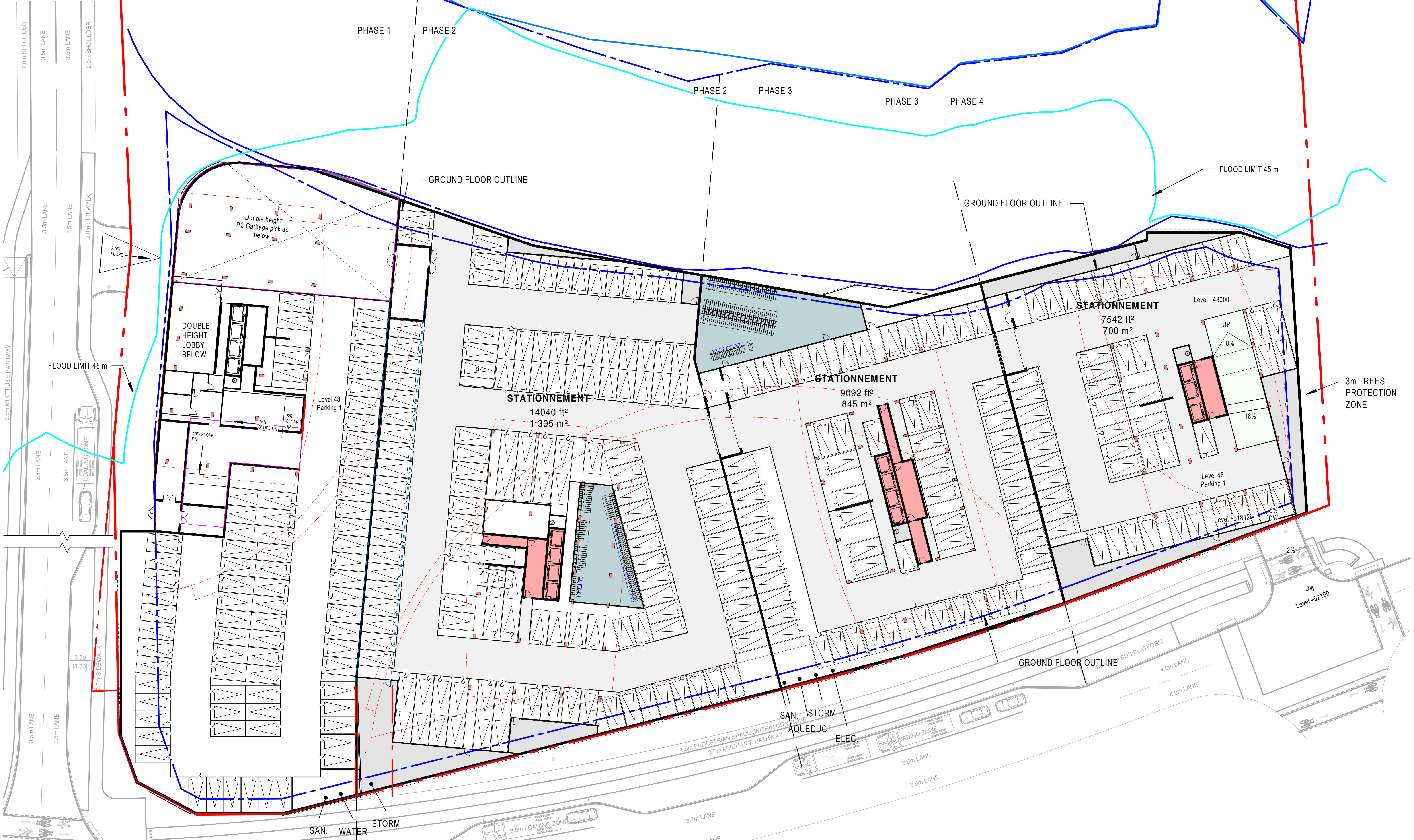
Plan Niveau 3

ÉCHELLE = 1 : 500

NEUF ARCHITECT(E)S

1015 TWEDDLE ROAD,
ORLÉANS, ON, K4A 3P4

05/13/24



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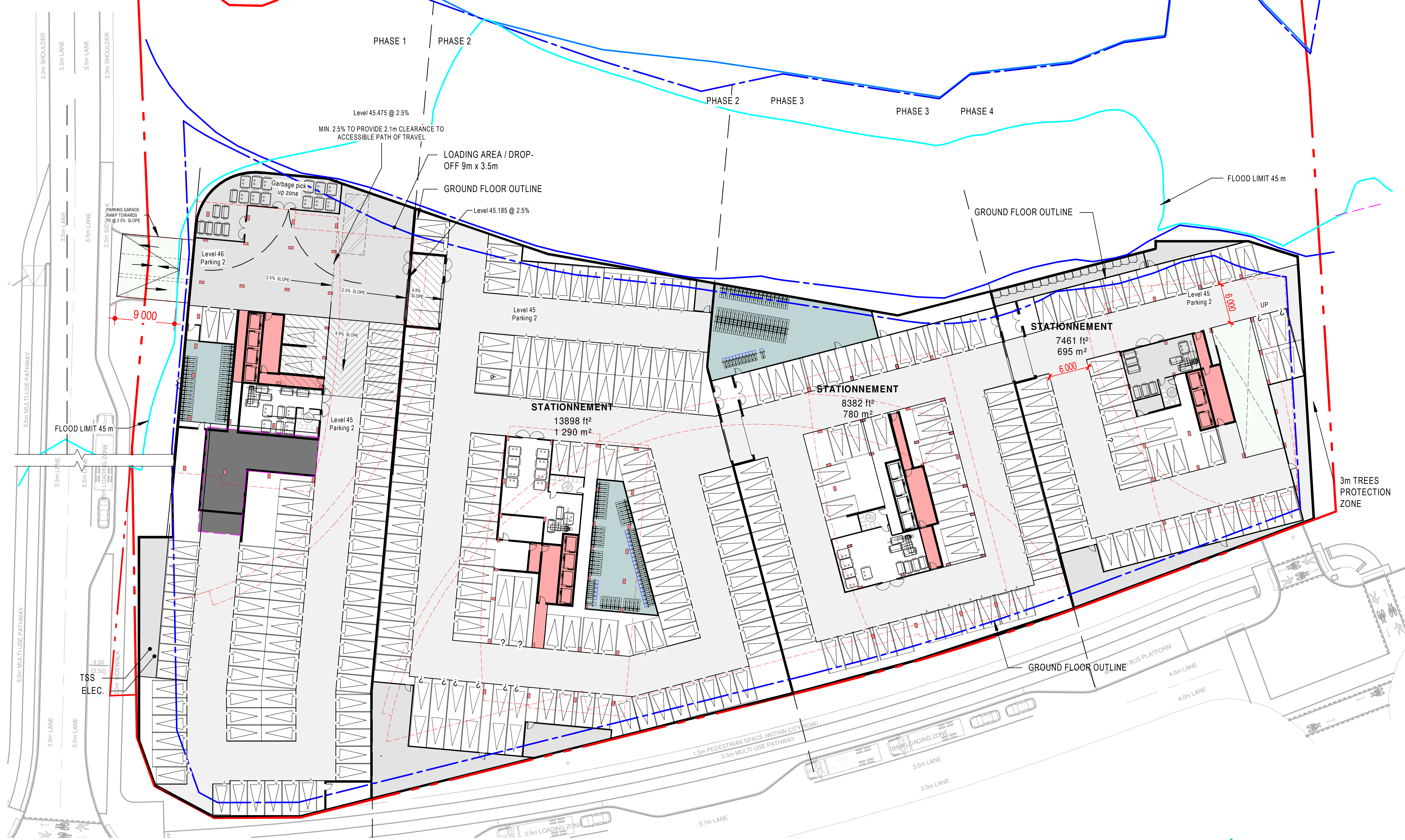


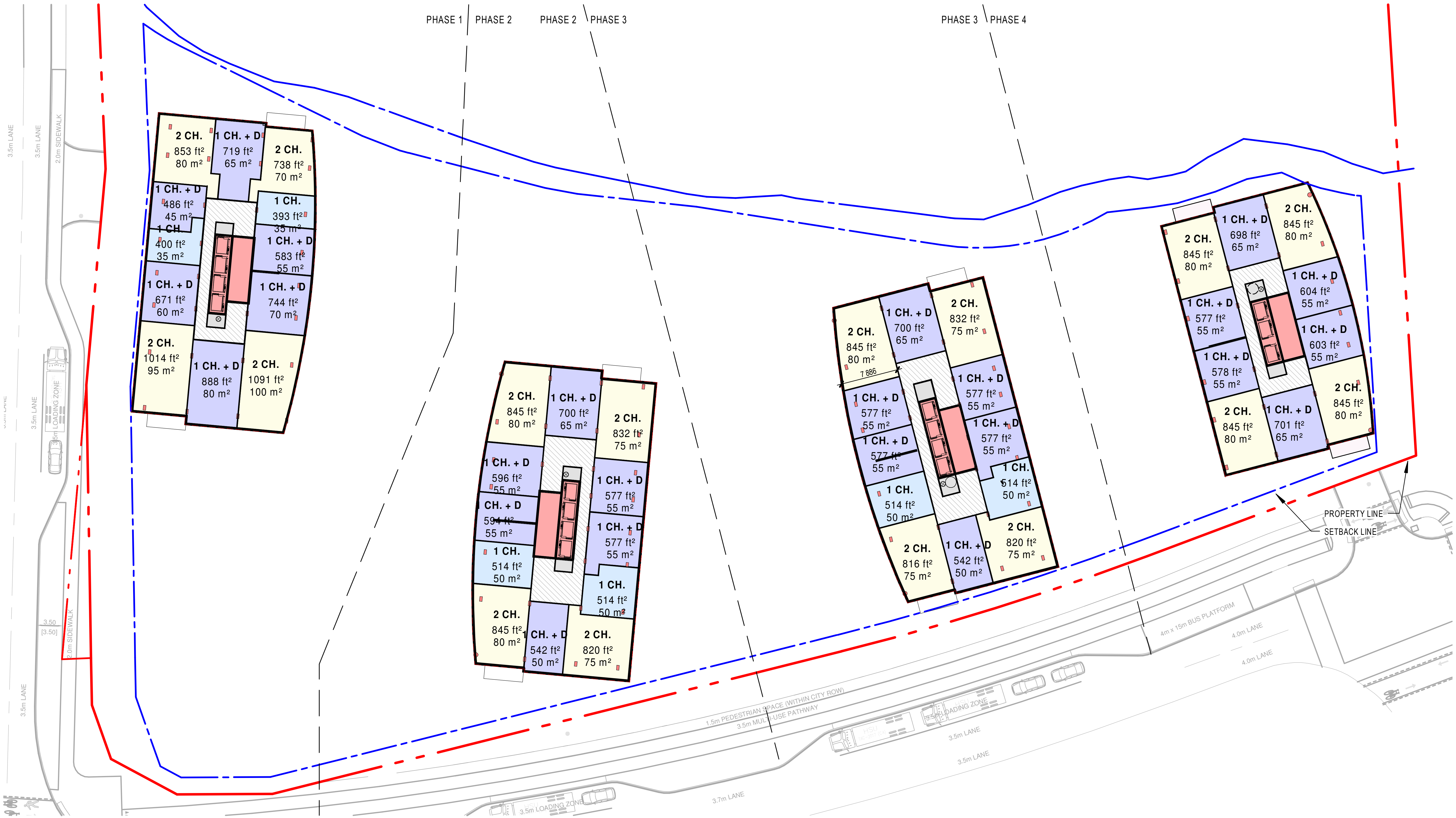
P2

ÉCHELLE = 1 : 500

NEUF
ARCHITECT(E)S

1015 TWEDDLE ROAD,
ORLÉANS, ON, K4A 3P4

10/09/24



Plan étage type - Niveau 7

ÉCHELLE = 1 : 500

1015 TWEDDLE ROAD ZONING GROSS FLOOR AREA

	B1		B2		B3		B4		TOTAL	
	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*
GROSS FLOOR AREA	**21838**	**235062**	**24454**	**263221**	**20470**	**220337**	**15334**	**165049**	**82096**	**883670**
ABOVE GRADE	21838	235062	24454	263221	20470	220337	15334	165049	82096	883670
UNDER GRADE	0	0	0	0	0	0	0	0	0	0
32nd Floor			738	7944						
31st Floor			736	7922						
30th Floor			738	7944						
29th Floor			736	7922						
28th Floor	761	8191	738	7944	738	7944				
27th Floor	761	8191	736	7922	734	7901				
26th Floor	761	8191	738	7944	738	7944				
25th Floor	761	8191	736	7922	734	7901				
24th Floor	761	8191	738	7944	738	7944	637	6857		
23rd Floor	761	8191	736	7922	734	7901	637	6857		
22nd Floor	761	8191	738	7944	738	7944	637	6857		
21st Floor	761	8191	736	7922	734	7901	637	6857		
20th Floor	761	8191	738	7944	738	7944	637	6857		
19th Floor	761	8191	736	7922	734	7901	637	6857		
18th Floor	761	8191	738	7944	738	7944	637	6857		
17th Floor	761	8191	736	7922	734	7901	637	6857		
16th Floor	761	8191	738	7944	738	7944	637	6857		
15th Floor	761	8191	736	7922	734	7901	637	6857		
14th Floor	761	8191	738	7944	738	7944	637	6857		
13th Floor	761	8191	736	7922	734	7901	637	6857		
12th Floor	761	8191	738	7944	738	7944	637	6857		
11th Floor	761	8191	736	7922	734	7901	637	6857		
10th Floor	761	8191	738	7944	738	7944	637	6857		
9th Floor	761	8191	736	7922	734	7901	637	6857		
8th Floor	761	8191	738	7944	738	7944	637	6857		
7th Floor	761	8191	736	7922	734	7901	637	6857		
6th Floor	761	8191	738	7944	738	7944	637	6857		
5th Floor	761	8191	736	7922	734	7901	637	6857		
4th Floor	761	8191	738	7944	738	7944	637	6857		
3rd Floor	761	8191	736	7922	734	7901	758	8155		
2nd Floor	1184	12744	1038	11173	827	8902	695	7481		
Ground Floor	868	9343	1306	14058	507	5457	504	5425		
Basement 1	0	0	0	0	0	0	0	0		
Basement 2	0	0	0	0	0	0	0	0		

13383_1015 TWEDDLE ROAD - STATISTICS - TOWER B1

Date | 2025-04-02

	Aire brute par plancher (construction) / *Gross area per floor (construction)*		Superficie nette estimée / *Estimated Net Area (0.91)*		Espaces de stationnement Interieur / *Parking spaces*	Aire Commerciale / *Commercial Area*		Aire d'agrément /*Amenity Area*		Aire non-vendable / *Non sellable area*		Aire Résidentielle Brute/ Gross Residential Area		Efficiency ratio / Ratio d'efficacité	UNITÉS TOTALES / *TOTAL UNITS*	UNIT MIX						
	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*		m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	Gross Residential / GFA		studio *bachelor*	1 chambre *1 bedroom*	1 ch + den *1 bed + den*	2 chambre *2 bedroom*	2 ch + den *2 bed + den*	3 chambre *3 bedroom*	3 ch + den *3 bed + den*
TOTAL	**37278**	**366806**	**27845**	**299718**	**229**	**885**	**9526**	**607**	**6529**	**3953**	**42552**	**21953**	**236304**		**326**	**0**	**53**	**163**	**107**	**0**	**3**	**0**
ABOVE GRADE	27398	297908	24932	268370	0											0.00%	16.26%	50.00%	32.82%	0.00%	0.92%	0.00%
UNDER GRADE	9601	103346			229																	
PCV	22838	245830			*3*	niveau parking																
Ratio		**83%**			**0.70**				**2.21%**		**14.43%**			**0.83**								
Mechanical	278	2997																				
28th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
27th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
26th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
25th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
24th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
23rd Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
22nd Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
21st Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
20th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
19th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
18th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
17th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
16th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
15th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
14th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
13th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
12th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
11th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
10th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
9th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
8th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
7th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
6th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
5th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
4th Floor	928	9989	844	9090		0	0	0	0	131	1410	797	8579	0.86	12	0	2	6	4	0	0	0
3rd Floor	928	9989	844	9090		0	0	0	0	131	1409	797	8580	0.86	12	0	2	6	4	0	0	0
2nd Floor (Podium)	1570	16899	1429	15378		0	0	117	1255	222	2391	1231	13254	0.78	14	0	1	7	3	0	3	0
Ground Floor 1	1700	18301	1547	16654		885	9526	490	5274	325	3500	0	0	0.00	0	0	0	0	0	0	0	0
Basement 1	3200	34449	2912	31348	75	*42.7*																
Basement 2	3200	34449			76	*42.1*																
Basement 3	3200	34449			78	*41.0*																

#REF!

13383_1015 TWEDDLE ROAD - STATISTICS - TOWER B2

Date | 2025-04-02

	Aire brute par plancher (construction) / *Gross area per floor (construction)*		Superficie nette estimée (0.91) / *Estimated Net Area (0.91)*		Espaces de stationnement Interieur / *Parking spaces*	Aire Commerciale / *Commercial Area*		Aire d'agrément / *Amenity Area*		Aire non-vendable / *Non sellable area*		Aire Résidentielle Brute/ Gross Residential Area		Efficiency ratio / Ratio d'efficacité	UNITÉS TOTALES / *TOTAL UNITS*	UNIT MIX						
	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*		m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	Gross Residential / GFA		studio *bachelor*	1 chambre *1 bedroom*	1 ch + den *1 bed + den*	2 chambre *2 bedroom*	2 ch + den *2 bed + den*	3 chambre *3 bedroom*	3 ch + den *3 bed + den*
TOTAL	**43128**	**464226**	**28024**	**301648**	**384**	**1161**	**12500**	**318**	**3422**	**4841**	**52108**	**24475**	**263451**		**372**	**0**	**62**	**186**	**123**	**0**	**1**	**0**
ABOVE GRADE	30796	334478	28024	301648	0											0.00%	16.67%	50.00%	33.06%	0.00%	0.27%	0.00%
UNDER GRADE	12054	129748			384																	
PCV	25637	275951			*3*	niveau parking																
Ratio		**83%**			**1.03**				**1.03%**		**15.72%**			**0.81**								
Mechanical	278	2997																				
32nd Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
31st Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
30th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
29th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
28th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
27th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
26th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
25th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
24th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
23rd Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
22nd Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
21st Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
20th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
19th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
18th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
17th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
16th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
15th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
14th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
13th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
12th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
11th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
10th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
9th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
8th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
7th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
6th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
5th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
4th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
3rd Floor	928	9989	844	9090		0	0	33	355	169	1819	726	7815	0.78	12	0	2	6	4	0	0	0
2nd Floor (Podium)	1478	15907	1345	14475		0	0	121	1301	286	3073	1071	11532	0.72	12	0	2	6	3	0	1	0
Ground Floor 1	1478	15907	1345	14475		1161	12500	164	1765	153	1641	0	0	0.00	0	0	0	0	0	0	0	0
Basement 1	4018	43249			128	*31.4*																
Basement 2	4018	43249			128	*31.4*																
Basement 3	4018	43249			128	*31.4*																

13383_1015 TWEDDLE ROAD - STATISTICS - TOWER B3

Date | 2025-04-02

	Aire brute par plancher (construction) / *Gross area per floor (construction)*		Superficie nette estimée (0.91) / *Estimated Net Area (0.91)*		Espaces de stationnement Interieur / *Parking spaces*	Aire Commerciale / *Commercial Area*		Aire d'agrément / *Amenity Area*		Aire non-vendable / *Non sellable area*		Aire Résidentielle Brute/ Gross Residential Area		Efficiency ratio / Ratio d'efficacité	UNITÉS TOTALES / *TOTAL UNITS*	UNIT MIX						
	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*		m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	Gross Residential / GFA		studio *bachelor*	1 chambre *1 bedroom*	1 ch + den *1 bed + den*	2 chambre *2 bedroom*	2 ch + den *2 bed + den*	3 chambre *3 bedroom*	3 ch + den *3 bed + den*
TOTAL	**34466**	**373980**	**24702**	**265894**	**210**	**425**	**4575**	**808**	**8697**	**4862**	**52329**	**21051**	**226591**		**324**	**0**	**51**	**167**	**105**	**0**	**1**	**0**
ABOVE GRADE	27146	295188	24702	265894	0											0.00%	15.74%	51.54%	32.41%	0.00%	0.31%	0.00%
UNDER GRADE	7320	78792			210																	
PCV	21476	231166			*3*	niveau parking																
Ratio		**78%**			**0.65**				**2.98%**		**17.91%**			**0.80**								
Mechanical	278	2997																				
28th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
27th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
26th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
25th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
24th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
23rd Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
22nd Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
21st Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
20th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
19th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
18th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
17th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
16th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
15th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
14th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
13th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
12th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
11th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
10th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
9th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
8th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
7th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
6th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
5th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
4th Floor	928	9989	844	9090		0	0	0	0	148	1593	780	8396	0.84	12	0	2	6	4	0	0	0
3rd Floor	928	9989	844	9090		0	0	36	388	171	1841	721	7761	0.78	11	0	1	6	4	0	0	0
2nd Floor (Podium)	1405	15121	1278	13760		0	0	215	2314	360	3873	830	8934	0.59	13	0	0	11	1	0	1	0
Ground Floor 1	1613	17359	1468	15797		425	4575	557	5995	631	6789	0	0	0.00	0	0	0	0	0	0	0	0
Basement 1	2440	26264			70	*34.9*																
Basement 2	2440	26264			70	*34.9*																
Basement 3	2440	26264			70	*34.9*																

13383_1015 TWEDDLE ROAD - STATISTICS - TOWER B4

Date | 2025-04-02

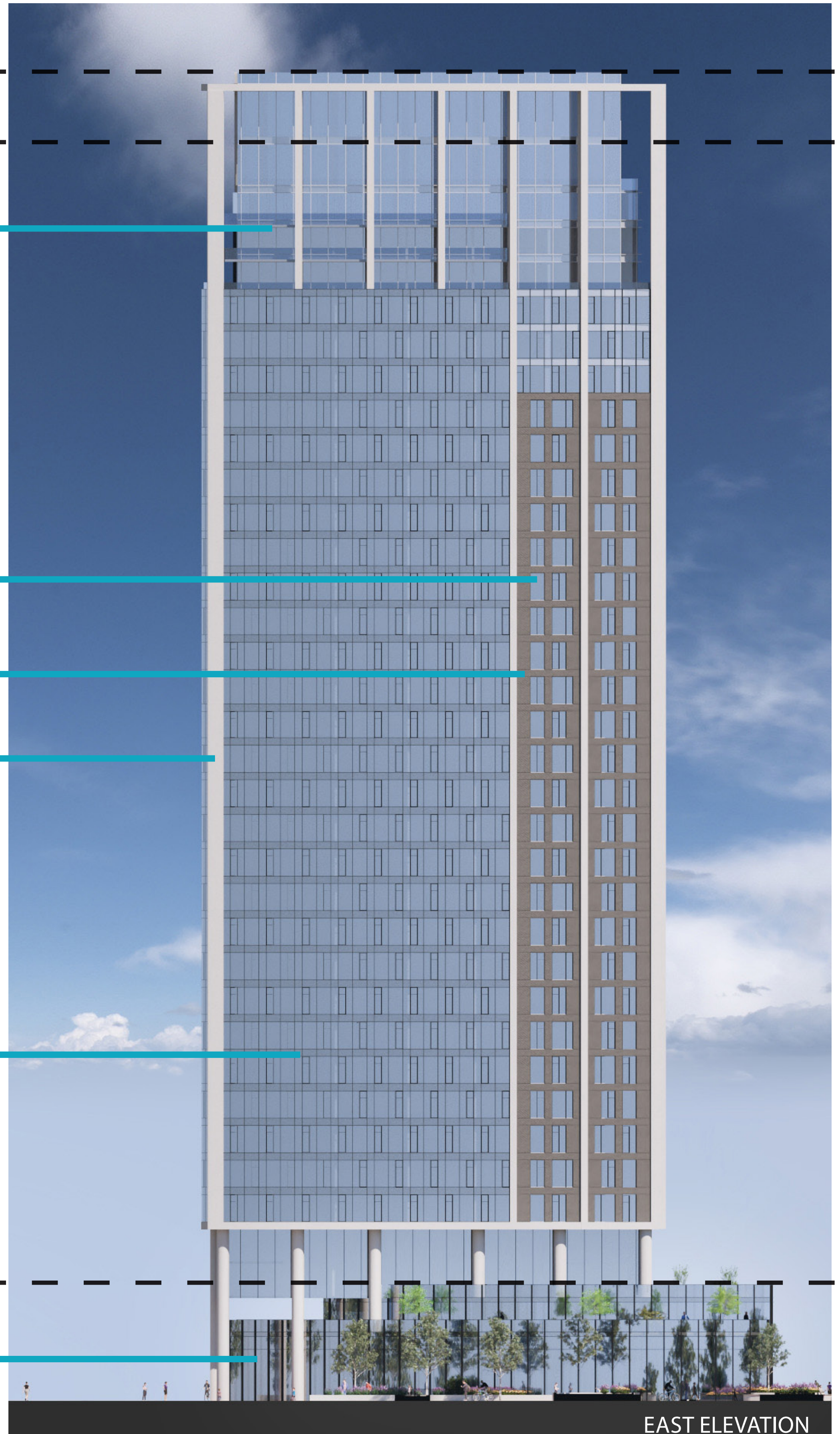
	Aire brute par plancher (construction) / *Gross area per floor (construction)*		Superficie nette estimée (0.91) / *Estimated Net Area (0.91)*		Espaces de stationnement Interieur / *Parking spaces*	Aire Commerciale / *Commercial Area*		Aire d'agrément / *Amenity Area*		Aire non-vendable / *Non sellable area*		Aire Résidentielle Brute/ Gross Residential Area		Efficiency ratio / Ratio d'efficacité	UNITÉS TOTALES / *TOTAL UNITS*	UNIT MIX						
	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*		m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	Gross Residential / GFA		studio *bachelor*	1 chambre *1 bedroom*	1 ch + den *1 bed + den*	2 chambre *2 bedroom*	2 ch + den *2 bed + den*	3 chambre *3 bedroom*	3 ch + den *3 bed + den*
TOTAL	**27420**	**298048**	**18834**	**202732**	**147**	**0**	**0**	**0**	**0**	**5225**	**56238**	**16255**	**174965**		**236**	**0**	**0**	**144**	**92**	**0**	**0**	**0**
ABOVE GRADE	21480	234110	18834	202732	0											0.00%	0.00%	61.02%	38.98%	0.00%	0.00%	0.00%
UNDER GRADE	5940	63938			147																	
PCV	16255	174965			3	niveau parking																
Ratio		**75%**			**0.62**				**0.00%**		**24.32%**			**0.76**								
Mechanical	270	2906																				
24th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
23rd Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
22nd Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
21st Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
20th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
19th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
18th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
17th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
16th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
15th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
14th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
13th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
12th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
11th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
10th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
9th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
8th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
7th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
6th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
5th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
4th Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
3rd Floor	900	9688	819	8816		0	0	0	0	220	2368	680	7319	0.76	10	0	0	6	4	0	0	0
2nd Floor (Podium)	897	9657	816	8788		0	0	0	0	109	1177	788	8480	0.88	10	0	0	7	3	0	0	0
Ground Floor 1	782	8421		0		0	0	0	0	275	2964	507	5457	0.65	6	0	0	5	1	0	0	0
Basement 1	1980	21313			47	42.1																
Basement 2	1980	21313			49	40.4																
Basement 3	1980	21313			51	38.8																

13383_1015 TWEDDLE ROAD - OVERALL STATISTICS

Date | 2025-04-02

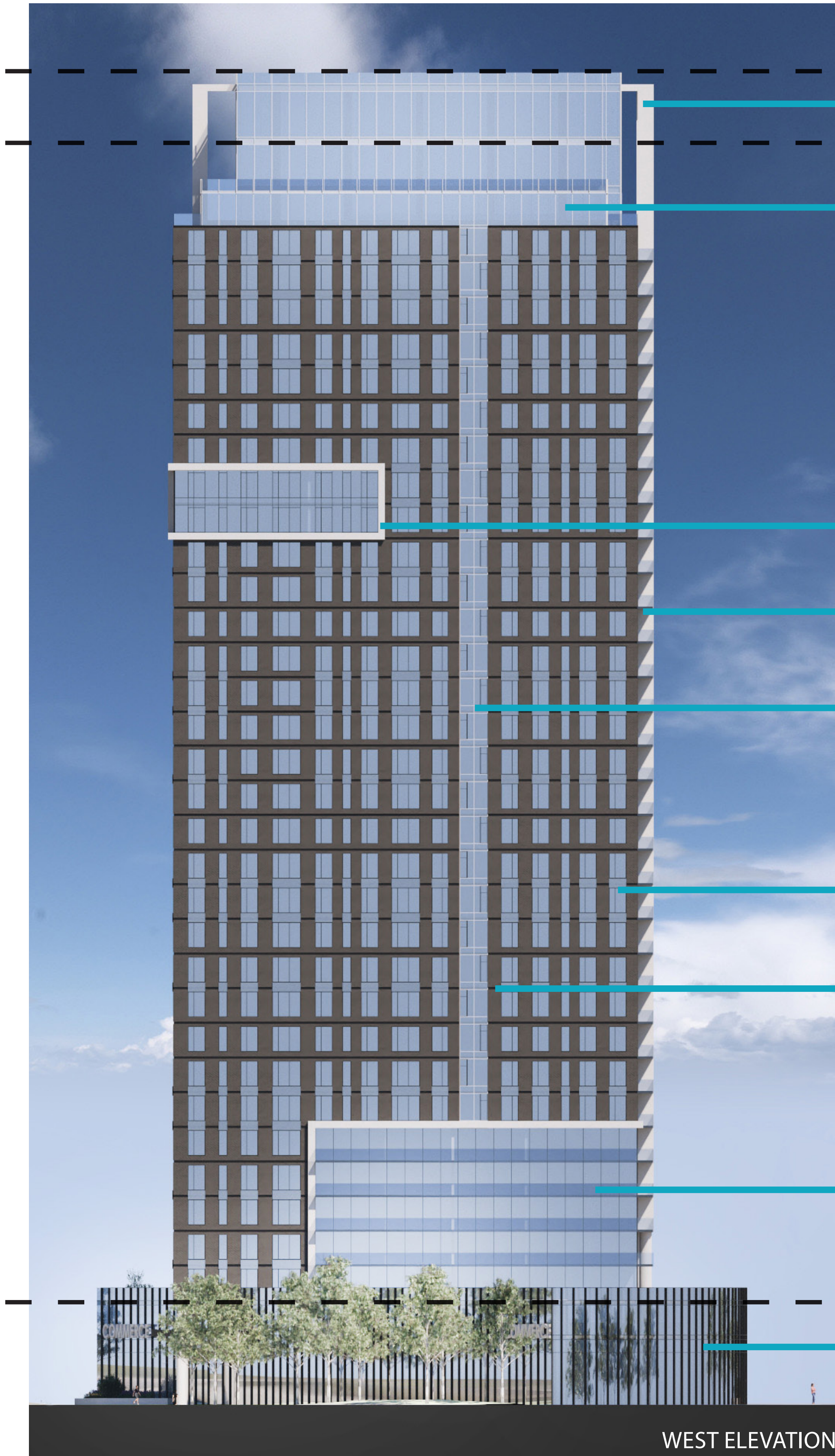
	Aire brute par plancher (construction) / *Gross area per floor (construction)*		Superficie nette estimée (0.91) / *Estimated Net Area (0.91)*		Espaces de stationnement Interieur / *Parking spaces*	Aire Commerciale / *Commercial Area*		Aire d'agrément / *Amenity Area*		Aire non-vendable / *Non sellable area*		Aire Résidentielle Brute/ Gross Residential Area		Efficiency ratio / Ratio d'efficacité	UNITÉS TOTALES / *TOTAL UNITS*	UNIT MIX						
	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*		m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	m² / *m²*	pi² / *ft²*	Gross Residential / GFA		studio *bachelor*	1 chambre *1 bedroom*	1 ch + den *1 bed + den*	2 chambre *2 bedroom*	2 ch + den *2 bed + den*	3 chambre *3 bedroom*	3 ch + den *3 bed + den*
TOTAL	**141734**	**1528609**	**97205**	**1046307**	**970**	**2471**	**26601**	**1211**	**13035**	**19402**	**208841**	**83735**	**901312**		**1258**	**0**	**166**	**660**	**427**	**0**	**5**	**0**
ABOVE GRADE	106819	1152785	80560	867146	0											0.00%	13.20%	52.46%	33.94%	0.00%	0.40%	0.00%
UNDER GRADE	34915	375824			970																	
PCV	86206	927913			*3*	niveau parking																
Ratio		**80%**			**0.77**				**1.13%**		**18.16%**			**0.80**								
Mechanical	278	2997																				
32nd Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
31st Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
30th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
29th Floor	928	9989	844	9090		0	0	0	0	146	1572	782	8417	0.84	12	0	2	6	4	0	0	0
28th Floor	2784	29967	2533	27270		0	0	0	0	425	4575	2359	25392	0.85	36	0	6	18	12	0	0	0
27th Floor	2784	29967	2533	27270		0	0	0	0	425	4575	2359	25392	0.85	36	0	6	18	12	0	0	0
26th Floor	2784	29967	2533	27270		0	0	0	0	425	4575	2359	25392	0.85	36	0	6	18	12	0	0	0
25th Floor	2784	29967	2533	27270		0	0	0	0	425	4575	2359	25392	0.85	36	0	6	18	12	0	0	0
24th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
23rd Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
22nd Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
21st Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
20th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
19th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
18th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
17th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
16th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
15th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
14th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
13th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
12th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
11th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
10th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
9th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
8th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
7th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
6th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
5th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
4th Floor	3684	39654	3352	36085		0	0	0	0	645	6943	3039	32712	0.82	46	0	6	24	16	0	0	0
3rd Floor	3684	39654	3352	36085		0	0	0	0	760	8179	2924	31475	0.79	45	0	5	24	16	0	0	0
2nd Floor (Podium)	5350	57584	4868	52402		0	0	0	0	1429	15384	3921	42200	0.73	49	0	3	31	10	0	5	0
Ground Floor 1	5573	59988	5071	54589		2471	26601	1211	13035	1384	14895	507	5457	0.09	6	0	0	5	1	0	0	0
Basement 1	11638	125275			320	*36.4*																
Basement 2	11638	125275			323	*36.0*																
Basement 3	11638	125275			327	*35.6*																

ELEVATIONS | TOWER B2

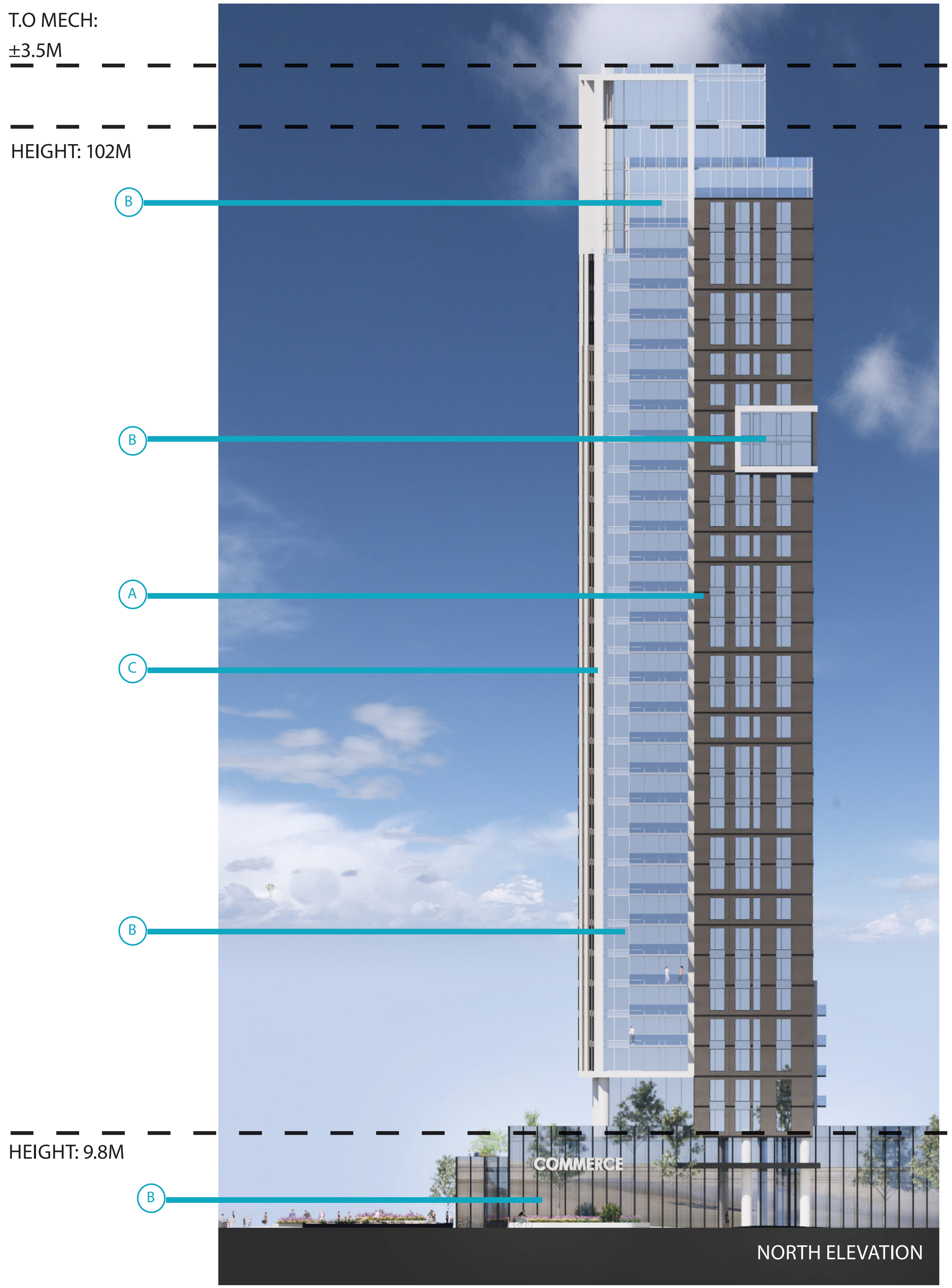


MATERIALS LEGEND

- (A) Brick
  Manufacturer: TBD
  Colour: TBD
- (B) Clear Glass
  Manufacturer: TBD
- (C) Concrete
  Manufacturer: TBD
  Colour: TBD

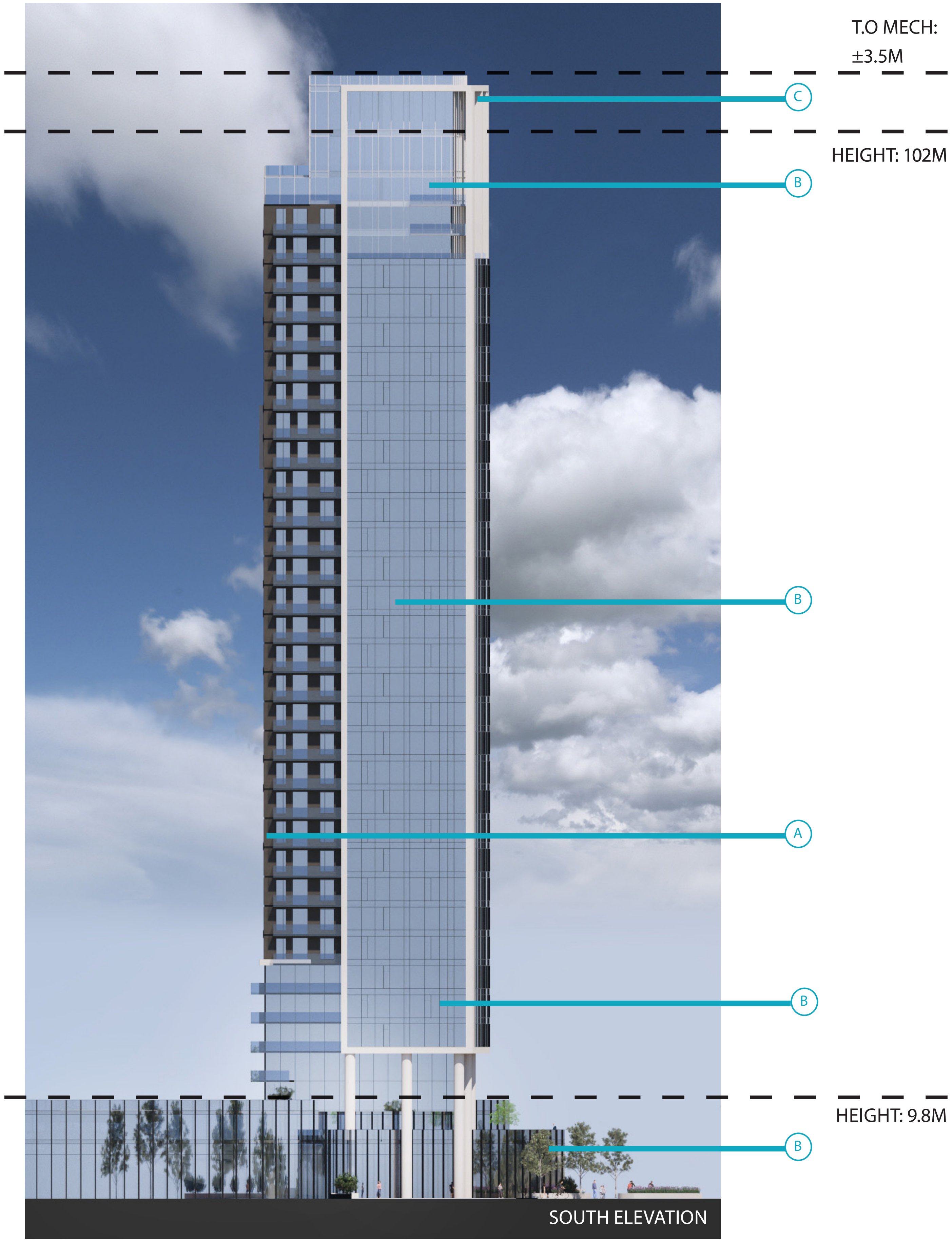


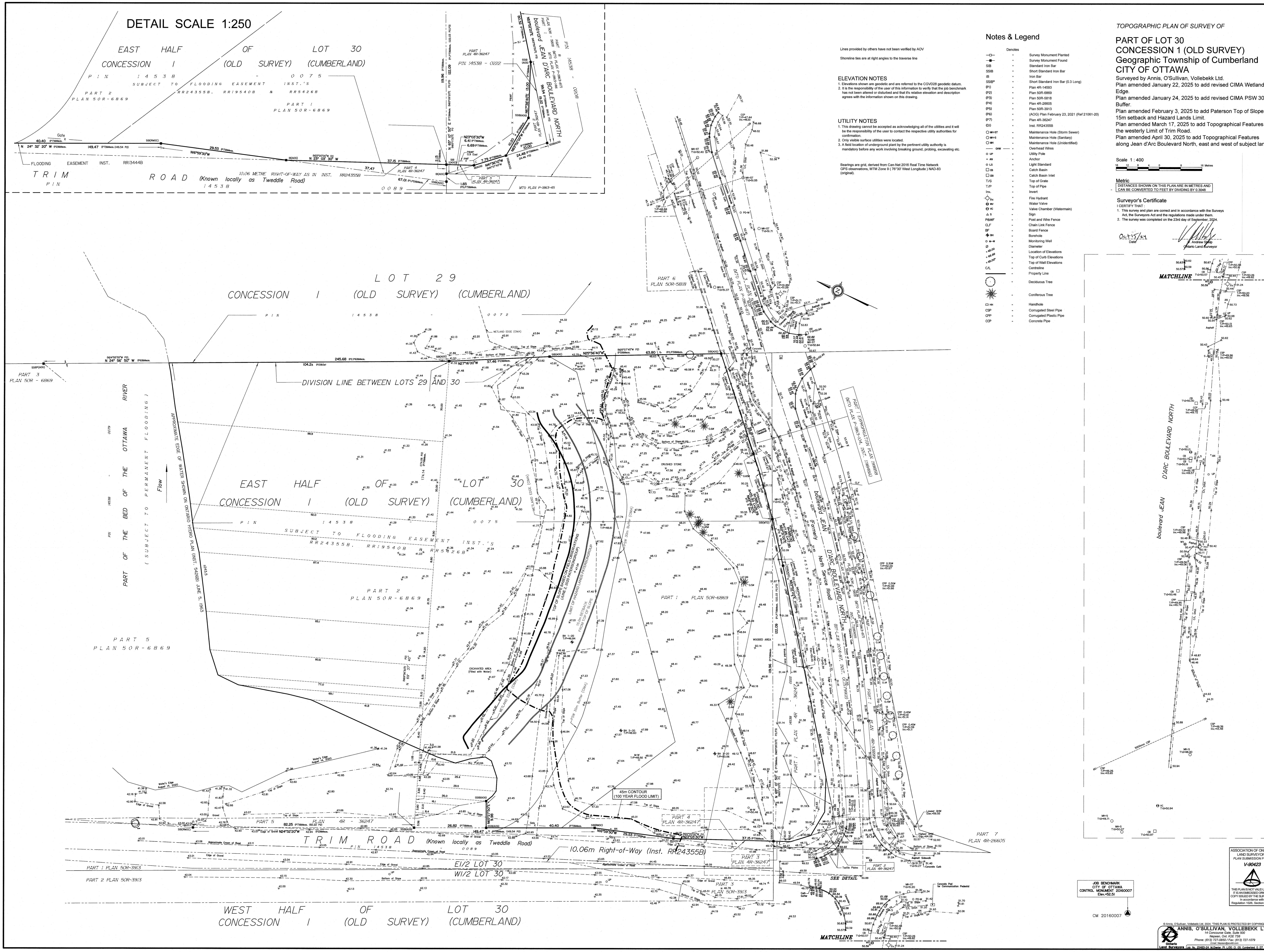
ELEVATIONS | TOWER B2



MATERIALS LEGEND

- (A) Brick
  Manufacturer: TBD
  Colour: TBD
- (B) Clear Glass
  Manufacturer: TBD
- (C) Concrete
  Manufacturer: TBD
  Colour: TBD





Lines provided by others have not been verified by AOV

Shoreline ties are at right angles to the traverse line

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Notes & Legend

	Denotes	
—□—	"	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
SSIB*	"	Short Standard Iron Bar (0.3 Long)
(P1)	"	Plan 4R-14593
(P2)	"	Plan 50R-6869
(P3)	"	Plan 50R-5818
(P4)	"	Plan 4R-26605
(P5)	"	Plan 50R-3913
(P6)	"	(AOG) Plan February 23, 2021 (Ref 21061-20)
(P7)	"	Plan 4R-36247
(DI)	"	Inst. RR24355B
MH-ST	"	Maintenance Hole (Storm Sewer)
MH-S	"	Maintenance Hole (Sanitary)
MH	"	Maintenance Hole (Unidentified)
OHW	"	Overhead Wires
UP	"	Utility Pole
AN	"	Anchor
LS	"	Light Standard
CB	"	Catch Basin
CBI	"	Catch Basin Inlet
T/G	"	Top of Grate
T/P	"	Top of Pipe
Inv.	"	Invert
FH	"	Fire Hydrant
WV	"	Water Valve
VC	"	Valve Chamber (Watermain)
S	"	Sign
P&WF	"	Post and Wire Fence
CLF	"	Chain Link Fence
BF	"	Board Fence
BH	"	Borehole
M-W	"	Monitoring Well
Ø	"	Diameter
+ 65.00	"	Location of Elevations
+ 65.00	"	Top of Curb Elevations
+ 65.00*	"	Top of Wall Elevations
C/L	"	Centreline
———	"	Property Line
	"	Deciduous Tree
	"	Coniferous Tree
HH	"	Handhole
CSP	"	Corrugated Steel Pipe
CPP	"	Corrugated Plastic Pipe
CCP	"	Concrete Pipe

TOPOGRAPHIC PLAN OF SURVEY OF

PART OF LOT 30
CONCESSION 1 (OLD SURVEY)
Geographic Township of Cumberland
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.
Plan amended January 22, 2025 to add revised CIMA Wetland Edge.
Plan amended January 24, 2025 to add revised CIMA PSW 30m Buffer.
Plan amended February 3, 2025 to add Paterson Top of Slope, 15m setback and Hazard Lands Limit.
Plan amended March 17, 2025 to add Topographical Features on the westerly Limit of Trim Road.
Plan amended April 30, 2025 to add Topographical Features along Jean d'Arc Boulevard North, east and west of subject land.

Scale 1 : 400
16 12 8 4 0 8 16 Metres

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

Surveyor's Certificate

I CERTIFY THAT :
1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the regulations made under them.
2. The survey was completed on the 23rd day of September, 2024.

Oct 15/24
Date

V. Andrew Shelp
Ontario Land Surveyor

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-90423
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3).

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
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Job No. 25483-24 M.Chenier Pt Lt30 CI OS Cumberland O D7 | FS

Appendix F – PCSWMM Results

PCSWMM Report

Prop_Rev4_SPA_2025_Report

Model Prop_Rev4_SPA_2025.inp

exp Services Inc.

May 30, 2025

Table of Contents

Summary 1A: Subcatchment attributes

Name	Prop_Rev4_SPA_2025	Chicago_3hr_31.9mm_2yr	Chicago_3hr_42.54mm_5yr
B1 - Area (ha)	0.0912	0.0912	0.0912
B2 - Area (ha)	0.0928	0.0928	0.0928
B3 - Area (ha)	0.0927	0.0927	0.0927
B4 - Area (ha)	0.0794	0.0794	0.0794
S100 - Area (ha)	0.0691	0.0691	0.0691
S101 - Area (ha)	0.0372	0.0372	0.0372
S102 - Area (ha)	0.0612	0.0612	0.0612
S103 - Area (ha)	0.0686	0.0686	0.0686
S104 - Area (ha)	0.6319	0.6319	0.6319
S105 - Area (ha)	0.0346	0.0346	0.0346
S106 - Area (ha)	0.0359	0.0359	0.0359
S200 - Area (ha)	0.2265	0.2265	0.2265
S201_2 - Area (ha)	0.1793	0.1793	0.1793
S202 - Area (ha)	1.3325	1.3325	1.3325
S203 - Area (ha)	0.3195	0.3195	0.3195
S204 - Area (ha)	0.0366	0.0366	0.0366
S205 - Area (ha)	0.4653	0.4653	0.4653
S300 - Area (ha)	0.0653	0.0653	0.0653
S301 - Area (ha)	0.1325	0.1325	0.1325
S303 - Area (ha)	0.0719	0.0719	0.0719
B1 - Slope (%)	1.5	1.5	1.5
B2 - Slope (%)	1.5	1.5	1.5
B3 - Slope (%)	1.5	1.5	1.5
B4 - Slope (%)	1.5	1.5	1.5
S100 - Slope (%)	2	2	2
S101 - Slope (%)	2	2	2
S102 - Slope (%)	1.5	1.5	1.5
S103 - Slope (%)	2	2	2
S104 - Slope (%)	1.5	1.5	1.5
S105 - Slope (%)	2	2	2
S106 - Slope (%)	2	2	2
S200 - Slope (%)	2	2	2
S201_2 - Slope (%)	2	2	2
S202 - Slope (%)	1.5	1.5	1.5
S203 - Slope (%)	2.1	2.1	2.1
S204 - Slope (%)	2	2	2
S205 - Slope (%)	1.5	1.5	1.5
S300 - Slope (%)	5	5	5
S301 - Slope (%)	5	5	5

Summary 1A: Subcatchment attributes (continued...)

Name	Prop_Rev4_SPA_2025	Chicago_3hr_31.9mm_2yr	Chicago_3hr_42.54mm_5yr
S303 - Slope (%)	5	5	5
B1 - Imperv. (%)	100	100	100
B2 - Imperv. (%)	100	100	100
B3 - Imperv. (%)	100	100	100
B4 - Imperv. (%)	100	100	100
S100 - Imperv. (%)	61.2	61.2	61.2
S101 - Imperv. (%)	63.6	63.6	63.6
S102 - Imperv. (%)	76	76	76
S103 - Imperv. (%)	22.2	22.2	22.2
S104 - Imperv. (%)	86.4	86.4	86.4
S105 - Imperv. (%)	0	0	0
S106 - Imperv. (%)	0	0	0
S200 - Imperv. (%)	73.2	73.2	73.2
S201_2 - Imperv. (%)	73.9	73.9	73.9
S202 - Imperv. (%)	49.3	49.3	49.3
S203 - Imperv. (%)	33.8	33.8	33.8
S204 - Imperv. (%)	100	100	100
S205 - Imperv. (%)	50.7	50.7	50.7
S300 - Imperv. (%)	100	100	100
S301 - Imperv. (%)	99.1	99.1	99.1
S303 - Imperv. (%)	100	100	100
B1 - Peak Runoff (L/s)	45.16	19.45	26.39
B2 - Peak Runoff (L/s)	45.95	19.79	26.86
B3 - Peak Runoff (L/s)	45.90	19.77	26.83
B4 - Peak Runoff (L/s)	39.31	16.93	22.98
S100 - Peak Runoff (L/s)	32.24	9.53	16.54
S101 - Peak Runoff (L/s)	17.46	5.34	9.13
S102 - Peak Runoff (L/s)	28.43	10.03	14.89
S103 - Peak Runoff (L/s)	28.98	3.85	11.16
S104 - Peak Runoff (L/s)	306.09	117.76	170.69
S105 - Peak Runoff (L/s)	13.72	0.36	4.18
S106 - Peak Runoff (L/s)	14.60	0.44	4.76
S200 - Peak Runoff (L/s)	106.30	36.02	55.46
S201_2 - Peak Runoff (L/s)	84.34	28.78	44.19
S202 - Peak Runoff (L/s)	439.67	140.95	209.31
S203 - Peak Runoff (L/s)	114.80	23.87	44.19
S204 - Peak Runoff (L/s)	18.12	7.81	10.59
S205 - Peak Runoff (L/s)	154.73	50.54	74.57
S300 - Peak Runoff (L/s)	32.33	13.93	18.90

Summary 1A: Subcatchment attributes (continued...)

Name	Prop_Rev4_SPA_2025	Chicago_3hr_31.9mm_2yr	Chicago_3hr_42.54mm_5yr
S301 - Peak Runoff (L/s)	65.51	28.14	38.24
S303 - Peak Runoff (L/s)	35.60	15.34	20.81

Summary 1B: Subcatchment attributes

Name	Chicago_3hr_71.58mm_100yr	Chicago_3hr_85.9mm_100yr+20%
B1 - Area (ha)	0.0912	0.0912
B2 - Area (ha)	0.0928	0.0928
B3 - Area (ha)	0.0927	0.0927
B4 - Area (ha)	0.0794	0.0794
S100 - Area (ha)	0.0691	0.0691
S101 - Area (ha)	0.0372	0.0372
S102 - Area (ha)	0.0612	0.0612
S103 - Area (ha)	0.0686	0.0686
S104 - Area (ha)	0.6319	0.6319
S105 - Area (ha)	0.0346	0.0346
S106 - Area (ha)	0.0359	0.0359
S200 - Area (ha)	0.2265	0.2265
S201_2 - Area (ha)	0.1793	0.1793
S202 - Area (ha)	1.3325	1.3325
S203 - Area (ha)	0.3195	0.3195
S204 - Area (ha)	0.0366	0.0366
S205 - Area (ha)	0.4653	0.4653
S300 - Area (ha)	0.0653	0.0653
S301 - Area (ha)	0.1325	0.1325
S303 - Area (ha)	0.0719	0.0719
B1 - Slope (%)	1.5	1.5
B2 - Slope (%)	1.5	1.5
B3 - Slope (%)	1.5	1.5
B4 - Slope (%)	1.5	1.5
S100 - Slope (%)	2	2
S101 - Slope (%)	2	2
S102 - Slope (%)	1.5	1.5
S103 - Slope (%)	2	2
S104 - Slope (%)	1.5	1.5
S105 - Slope (%)	2	2
S106 - Slope (%)	2	2
S200 - Slope (%)	2	2
S201_2 - Slope (%)	2	2

Summary 1B: Subcatchment attributes (continued...)

Name	Chicago_3hr_71.58mm_100yr	Chicago_3hr_85.9mm_100yr+20%
S202 - Slope (%)	1.5	1.5
S203 - Slope (%)	2.1	2.1
S204 - Slope (%)	2	2
S205 - Slope (%)	1.5	1.5
S300 - Slope (%)	5	5
S301 - Slope (%)	5	5
S303 - Slope (%)	5	5
B1 - Imperv. (%)	100	100
B2 - Imperv. (%)	100	100
B3 - Imperv. (%)	100	100
B4 - Imperv. (%)	100	100
S100 - Imperv. (%)	61.2	61.2
S101 - Imperv. (%)	63.6	63.6
S102 - Imperv. (%)	76	76
S103 - Imperv. (%)	22.2	22.2
S104 - Imperv. (%)	86.4	86.4
S105 - Imperv. (%)	0	0
S106 - Imperv. (%)	0	0
S200 - Imperv. (%)	73.2	73.2
S201_2 - Imperv. (%)	73.9	73.9
S202 - Imperv. (%)	49.3	49.3
S203 - Imperv. (%)	33.8	33.8
S204 - Imperv. (%)	100	100
S205 - Imperv. (%)	50.7	50.7
S300 - Imperv. (%)	100	100
S301 - Imperv. (%)	99.1	99.1
S303 - Imperv. (%)	100	100
B1 - Peak Runoff (L/s)	45.16	54.19
B2 - Peak Runoff (L/s)	45.95	55.14
B3 - Peak Runoff (L/s)	45.90	55.08
B4 - Peak Runoff (L/s)	39.31	47.18
S100 - Peak Runoff (L/s)	32.24	39.28
S101 - Peak Runoff (L/s)	17.46	21.22
S102 - Peak Runoff (L/s)	28.43	34.82
S103 - Peak Runoff (L/s)	28.98	36.59
S104 - Peak Runoff (L/s)	306.09	369.52
S105 - Peak Runoff (L/s)	13.72	17.73
S106 - Peak Runoff (L/s)	14.60	18.64
S200 - Peak Runoff (L/s)	106.30	129.71

Summary 1B: Subcatchment attributes (continued...)

Name	Chicago_3hr_71.58mm_100yr	Chicago_3hr_85.9mm_100yr+20%
S201_2 - Peak Runoff (L/s)	84.34	102.83
S202 - Peak Runoff (L/s)	439.67	568.36
S203 - Peak Runoff (L/s)	114.80	151.59
S204 - Peak Runoff (L/s)	18.12	21.75
S205 - Peak Runoff (L/s)	154.73	199.35
S300 - Peak Runoff (L/s)	32.33	38.80
S301 - Peak Runoff (L/s)	65.51	78.64
S303 - Peak Runoff (L/s)	35.60	42.72

Summary 2A: Outfall attributes

Name	Prop_Rev4_SPA_2025	Chicago_3hr_31.9mm_2yr	Chicago_3hr_42.54mm_5yr
OUTFALL_1 - Max. Flow (L/s)	572.97	222.48	320.53
OUTFALL_1A - Max. Flow (L/s)	480.73	46.84	99.84
OUTFALL_2 - Max. Flow (L/s)	336.63	207.42	289.25
OUTFALL_3 - Max. Flow (L/s)	153.64	50.34	74.10
OUTFALL_4 - Max. Flow (L/s)	32.33	13.93	18.90

Summary 2B: Outfall attributes

Name	Chicago_3hr_71.58mm_100yr	Chicago_3hr_85.9mm_100yr+20%
OUTFALL_1 - Max. Flow (L/s)	572.97	688.13
OUTFALL_1A - Max. Flow (L/s)	480.73	683.31
OUTFALL_2 - Max. Flow (L/s)	336.63	358.94
OUTFALL_3 - Max. Flow (L/s)	153.64	197.50
OUTFALL_4 - Max. Flow (L/s)	32.33	38.80

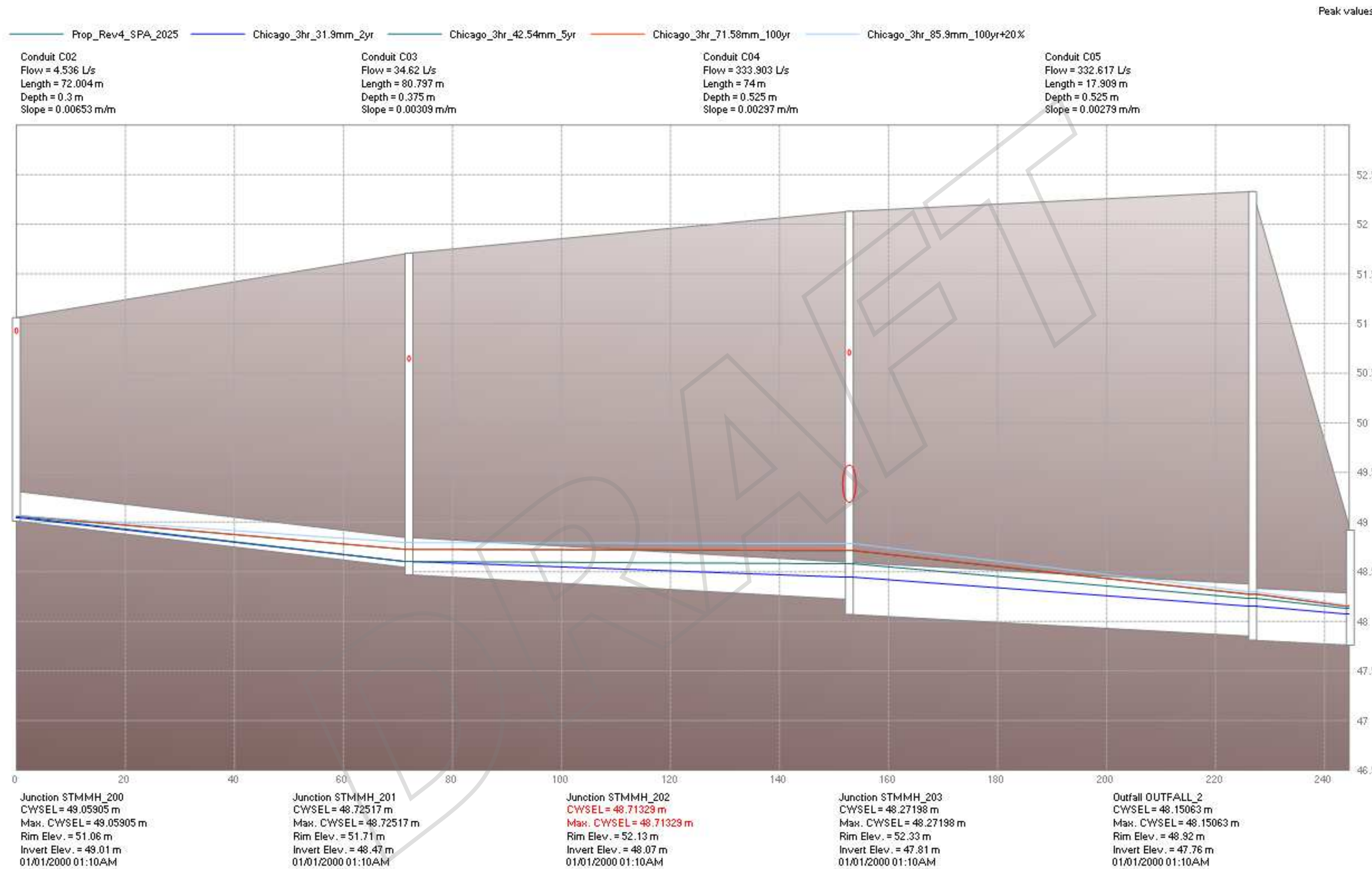

Figure 1: Node STMMH_200 to Node OUTFALL_2

Table 1: Subcatchments

Name	Imperv. (%)	CAVG	Area (ha)
B1	100	0.9	0.0912
B2	100	0.9	0.0928
B3	100	0.9	0.0927
B4	100	0.9	0.0794
S100	61.2	0.63	0.0691
S101	63.6	0.65	0.0372
S102	76	0.73	0.0612
S103	22.2	0.36	0.0686
S104	86.4	0.8	0.6319
S105	0	0.2	0.0346
S106	0	0.2	0.0359
S200	73.2	0.71	0.2265
S201_2	73.9	0.72	0.1793
S202	49.3	0.55	1.3325
S203	33.8	0.44	0.3195
S204	100	0.9	0.0366
S205	50.7	0.55	0.4653
S300	100	0.9	0.0653
S301	99.1	0.89	0.1325
S303	100	0.9	0.0719

Table 2: Outfalls

Name	Tag	Inflows	Invert Elev. (m)	Rim Elev. (m)	Tide Gate	Type	Fixed Stage (m)
OUTFALL_1	POST	NO	43	44	NO	FREE	0
OUTFALL_1A	TWEDDLE	NO	43	44	NO	FREE	0
OUTFALL_2	JDA	NO	47.76	48.92	NO	FREE	0
OUTFALL_3	TWEDDLE	NO	50.05	51	NO	FREE	0
OUTFALL_4	TWEDDLE	NO	43.2	43.2	NO	FREE	0

Table 3: Junctions

Name	Invert Elev. (m)	Rim Elev. (m)	Depth (m)
EX_DI_1	50	52.32	2.32
EX_DI_2	49.8	52.15	2.35
J01	50.11	50.26	0.15
J02	44.13	44.28	0.15
J03	50.11	50.26	0.15
J04	45.3	45.45	0.15
STMMH_200	49.01	51.06	2.05
STMMH_201	48.47	51.71	3.24
STMMH_202	48.07	52.13	4.06
STMMH_203	47.81	52.33	4.52
SU1	50.15	51.35	1.2

Table 4: Storages

Name	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Storage Curve
CB_1	49.5	51.05	1.55	TABULAR
CB_2	50.62	52.17	1.55	TABULAR
CB_3	50.68	52.23	1.55	TABULAR
OGS	48.3	52.1	3.8	TABULAR
ROOF_B1	142	142.15	0.15	TABULAR
ROOF_B2	142	142.15	0.15	TABULAR
ROOF_B3	142	142.15	0.15	TABULAR
ROOF_B4	142	142.15	0.15	TABULAR

Table 5: Conduits

Name	Inlet Node	Outlet Node	Length (m)	Roughness	Inlet Elev. (m)	Outlet Elev. (m)	Cross-Section	Geom1 (m)
C01	SU1	OUTFALL_3	35.94	0.024	50.15	50.05	CIRCULAR	0.5
C02	STMMH_200	STMMH_201	72.004	0.013	49.01	48.54	CIRCULAR	0.3
C03	STMMH_201	STMMH_202	80.797	0.013	48.47	48.22	CIRCULAR	0.375
C04	STMMH_202	STMMH_203	74	0.013	48.07	47.85	CIRCULAR	0.525
C05	STMMH_203	OUTFALL_2	17.909	0.013	47.81	47.76	CIRCULAR	0.525
C06	CB_3	CB_2	90.647	0.013	52.08	52.02	IRREGULAR	0
C07	J01	J02	117.008	0.013	50.11	44.13	IRREGULAR	0
C08	OGS	OUTFALL_1	39.565	0.013	48.3	43	CIRCULAR	0.6

Table 5: Conduits (continued...)

Name	Inlet Node	Outlet Node	Length (m)	Roughness	Inlet Elev. (m)	Outlet Elev. (m)	Cross-Section	Geom1 (m)
C09	CB_2	CB_1	94.246	0.013	52.02	50.9	IRREGULAR	0
C10	EX_DI_2	STMMH_202	13.896	0.024	49.8	49.2	CIRCULAR	0.375
C11	EX_DI_1	EX_DI_2	37.18	0.024	50	49.8	CIRCULAR	0.375
C12	CB_1	J01	23.03	0.013	50.9	50.11	IRREGULAR	0
C13	J02	OUTFALL_1A	50.682	0.035	44.13	43	TRAPEZOIDAL	0.5
C14	J03	J04	91.427	0.013	50.11	45.3	IRREGULAR	0
C15	J04	OUTFALL_4	14.75	0.035	45.3	43.2	TRAPEZOIDAL	0.5
C17	EX_DI_1	CB_2	37.03	0.013	52.17	52.02	RECT_OPEN	0.15