Site Servicing and Stormwater Management Report
365 Forest Street, Ottawa, ON

Client:
11061917 Canada Inc.
200-768 St. Joseph Boulevard
Gatineau, QC J8Y 4B8

Submitted for:
Site Plan Control, Zoning By-law Amendment & Official Plan Amendment

Project Name:
365 Forest Street

Project Number:
OTT-00252570-A0

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Date Submitted:
2021-05-26

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1 Introduction

1.1 Overview

EXP Services Inc. (EXP) was retained by 11061917 Canada Inc. to prepare a Site Servicing and Stormwater Management report for the proposed redevelopment of 365 Forest Street in support of Official Plan Amendment, Zoning By-Law Amendment and Site Plan Control applications.

The 0.54-hectare site is situated at the corner of Richmond Road and Forest Street as illustrated in **Figure 1-1** below. The site is within the City of Ottawa urban boundary and situated in Bay Ward. The description of the subject property is noted below:

- Part of Lots 42, 56 and 57, Registered Plan 311, in the City of Ottawa, consisting of:
- PIN 039620357 or 1420 Richmond Road.
- PIN 039620356 or 365 Forest Street.
- PIN 039620352 or 2589 Bond Street.
- PIN 039620390 & PIN 039620391, 2583 Bond Street.

The development will consist of two high-rise buildings. Tower A is a 12-storey high-rise comprised of 168 units and Tower B is 12-storey high-rise and comprised of 223 units. Below the towers, five levels of underground parking will be provided.

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. This report provides a design brief for submission, along with the engineering drawings, for City approval.

Figure 1-1 - Site Location

2 Existing Conditions

Within the four subject properties, there are two (2) existing buildings. The following summarizes the current land use conditions.

- 1420 Richmond Road — Vacant property, but currently used as gravel parking lot.
- 365 Forest Street — Automobile garage and repair shop including asphalt parking lot.
- 2589 Bond Street — Automobile repair shop and asphalt parking lot.
- 2583 Bond Street — Vacant property.

All four properties are zoned Arterial Mainstreet Zone (AM10).

The topography of the subject site falls in a southerly and easterly direction along Forest Street and Bond Street, with a localized roadway sag condition on Forest Street approximately ±50m south of Richmond Road.

3 Existing Infrastructure

The site includes two commercial buildings that will be removed during the redevelopment of the site.

From review of the sewer and watermain mapping, as-built drawings and Utility Central Registry (UCC) plans, the following summarizes the onsite and adjacent offsite infrastructure:

Within property

- Storm, sanitary and watermain laterals to the two buildings that will be abandoned.

On Bond Street

- 150mm watermain
- 225mm sanitary sewer
- 300mm storm sewer
- 35mm Gas / Bell / Streetlighting/ Hydro

On Forest Street

- 300mm watermain
- 250mm sanitary sewer
- 300mm storm sewer
- Hydro /Bell / Streetlighting / Hydro

On Richmond Road

- 300mm watermain
- 225 mm sanitary sewer
- 525mm storm sewer
- 200mm Gas / Hydro / Bell / Streetlighting

As-built drawings for Bond Street, Forest Street, and Richmond Road were obtained from the City's vault and are included in **Appendix F**.

1.3 Pre-Consultation / Permits / Approvals

A pre-consultation meeting was held with the City prior to design commencement. This meeting outlined the submission requirements and provided information to assist with the development proposal. A copy of pre-consultation correspondence is included in **Appendix E**.

The proposed site is located within the Rideau Valley Conservation Authority (RVCA) jurisdiction, therefore signoff from the RVCA will be required prior to Site Plan approval. The RVCA has been contacted to confirm the stormwater management quality control requirements. A copy of the correspondence with the RCVA is attached in **Appendix E**.

Generally, an Environmental Compliance Approval (ECA) would be obtained from the Ministry of Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC), for any onsite private Sewage Works.

The onsite Sewage Works would generally include the onsite stormwater works such as flow controls, associated stormwater detention, and treatment works. However, an Approval Exemption under Ontario Regulation 525/98 can be applied. Under Section 3 of O. Reg 525/98, Section 53 (1) and (3) do not apply to the alteration, extension, replacement or a change to a stormwater management facility that 1) is designed to service one lot or parcel of land, b) discharges into a storm sewer that is not a combined sewer, c) does not service industrial land or a structure located on industrial land, and finally d) is not located on industrial land.

Based on this exemption, if the parcels noted above are merged into one property parcel, then by completing this the Approval Exemptions under O. Reg 525/98, would be satisfied and not require an ECA. Prior to City signoff on the infrastructure design a pre-consultation meeting will be held with the local MECP, to confirm that the site will not require an ECA.

In addition, various design guidelines were referred to in preparing the current report including:

- Bulletin ISDTB-2012-4 (20 June 2012)
  - Technical Bulletin ISDTB-2014-01 (05 February 2014)
  - Technical Bulletin PIEDTB-2016-01 (September 6, 2016)
  - Technical Bulletin ISDTB-2018-01 (21 March 2018)
  - Technical Bulletin ISDTB-2018-04 (27 June 2018)
- Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:
  - Technical Bulletin ISDTB-2014-02 (May 27, 2014)
  - Technical Bulletin ISTB-2018-02 (21 March 2018)
- 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), 1999.
- Ontario Building Code 2012, Ministry of Municipal Affairs and Housing.

4 Water Servicing

4.1 Existing Water Servicing

The subject site is within the City of Ottawa 1W pressure zone. The site is currently serviced by the existing 300mm watermain on Forest Street and the 150mm watermain on Bond Street. The two existing buildings are serviced by laterals that will be blanked during construction.

4.2 Water Servicing Proposal

The proposed development will consist of two high-rise buildings. Tower A is a 12-storey high-rise comprised of 168 units and Tower B is 12 storeys and comprised of 223 units. Architectural plans and rendering of the proposed building along with building statistics are provided in **Appendix H.**

Water supply for the site will be provided by twin 200mm watermains supplied from the existing watermain on Forest Street. The need for a twin watermain is the result of the average day water demands exceeding 50 m^3/day. The watermain feeds from the underground parking level and will connect directly to the existing 300mm watermain on Forest Street and will have an isolation valve between them, consistent with City of Ottawa Water Design Guidelines.

The buildings will be protected by automatic sprinkler systems. A fire department connection (or siamese) will be located within 45 metres of an adjacent municipally owned fire hydrant. In order to achieve this, a new hydrant will be installed off the existing 300mm watermain within Forest Street. Detailed layout of the proposed water services is provided in drawing C100 of **Appendix H.**

4.3 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 was greater than 500, standard residential peaking factors were used, rather than based on MECP Table 3-3 which would be necessary when the design population is less than 500 persons.
- Estimated the required fire flow (RFF) 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 to the building will be necessary as per Section 4.31 of the WDG001. **Table B-51** in **Appendix B** provides detailed calculations of the total water demands.

A review of the estimated watermain pressures at the building connection, based on the boundary conditions provided, was completed based on using two watermains. **Table B-5** in **Appendix B** provides a comparison of anticipated pressures at the building connection based on using a single or double watermain feed. A single watermain analysis was completed to determined if the water pressure still met the City requirement during either the maximum day plus fire flow or peak hour condition, if one of the laterals was out of service.

Based on results, the use of two 150mm watermains would result in a pressure of ±47.0 psi at the building, while the use of two 200mm watermains would improve the pressure to ±49.3 psi under maximum day plus fire flow conditions. The minimal

difference in pressure is the result of the short length of the water service lateral. In the event one of the watermains are down for service, the pressure at the building using only a single 150mm or 200mm watermain would be ±39.0 psi or ±47.2 psi respectively.

Under peak hour conditions, there is little difference using a 150mm or 200mm watermain, with anticipated pressure at the building of ±52.2 psi.

Based on the results, the installation of two 200mm watermains with a shut-off valve between them is proposed. Detailed calculations of the anticipated water pressures, based on City of Ottawa boundary conditions, is provided in **Table B-5**.

No pressure reducing measures are required as operating pressures are within 40 psi and 80 psi.

4.4 Water Servicing Design Criteria

Table 4-1 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 in **Table 4-1**.

Table 4-1 - 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	
Average Day Demands – Residential	350 L/person/day	✓
Average Day Demands – Commercial / Institutional	28,000 L/gross ha/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	2.2 x Maximum Day Demands	✓
Peak Hour Demands – Commercial / Institutional	1.8 x Maximum 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)	✓

4.5 Estimated Water Demands

The following **Table 4-2** below summarizes the anticipated water demands for the proposed development based on following:

- Tower A having 168 units and estimated population of 264.6 persons.
- Tower B having 223 units and estimated population of 342.3 persons.

Table 4-2 : Water Demand Summary

Water Demand Conditions	Tower A - Water Demands (L/sec)	Tower B - Water Demands (L/sec)	Total Water Demands (L/sec)
Average Day	1.1	1.4	2.5
Max Day	2.7	3.5	6.2
Peak Hour	5.9	7.6	13.6

4.6 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 F**.

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

- Minimum HGL = 108.5 m
- Max Day + Fire Flow = 107.0 m
- Maximum HGL = 115.7 m

Based on a ground elevation of approximately 74.85m at the boundary condition location this results in a system water pressure of 33.7m or 47.9 psi during peak hour conditions.

4.7 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along the adjacent roadways: Bond Street, Forest Street, Croydon Avenue, and Richmond Road. The required fire flows for the proposed buildings were calculated based on typical values as established by the Fire Underwriters Survey 1999 (FUS).

The following equation from the Fire Underwriters document “Water Supply for Public Fire Protection”, 1991, 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 4-3** 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 H.**

The following summarizes the parameters used for both proposed buildings.

- Type of Construction — Non-combustible
- Occupancy — Limited combustible
- Sprinkler Protection — Fully Supervised Automatic Sprinkler

Table 4-3 - Summary of Design Parameters Used in Calculating Required Fire Flows (RFF) Using FUS

Design Parameter	Value
Coefficient Related to type of Construction C	0.80 (Towers A, Tower B)
Total Floor Area (m2)	7,239 (Tower A) 9,409 (Tower B)
Fire Flow prior to reduction (L/min)	14,974 (Tower A) 17,072 (Tower B)
Reduction Due to Occupancy Non-combustible (-25%), Limited Combustible (-15%), Combustible (0%), Free Burning (+15%), Rapid Burning (+25%)	-15% (Tower A) -15% (Tower B)
Reduction due to Sprinkler (Max 50%) Sprinkler Conforming to NFPA 13 (-30%), Standard Water Supply (-10%), Fully Supervised Sprinkler (-10%)	-50% (Tower A) -50% (Tower B)
Exposures	+20% (Tower A) +46% (Tower B)

The estimated required fire flows (RFF) based on the FUS methods is: 133 L/sec for Tower A, and 183 L/sec for Tower B.

4.8 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001) and Appendix I of Technical Bulletin ISTB-2018-02. To meet the fire hydrant spacing guidelines of 90m for apartments and high-density areas, an additional fire hydrant is proposed on Bond Street, approximately 25m east of Forest Street. An additional fire hydrant is proposed on Forest Avenue to be within 45m of the fire department connection on each building.

As per Section 3 of Appendix I of Technical Bulletin ISTB-2018-02, 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.

Table 4-4 – Required Fire Flows

Building	Required Fire Flow (L/min)	Available Fire flow Based on Hydrant Spacing as per ISTB-2018-02 (L/min)
Tower A	8,000 (or 133 L/sec)	22,800
Tower B	11,000 (or 183 L/sec)	28,500

The total available contribution of flow from hydrants was estimated at ±23,000 L/min and ±28,500 L/min for Towers A and B, whereas the required fire flows (RFF) for each building is only 8,000 L/min and 11,000 L/min. Therefore, the available flows from hydrants exceed each building's fire flow requirements as identified in Appendix I of Technical Bulletin ISTB-2018-02. Additional information on the available flows from hydrants is provided in **Table B-4**.

5 Sewage Servicing

5.1 Existing Sewage Conditions

The subject property is located within the Pinecrest Collector Sewershed, which then discharges to the West Nepean Collector. From the property sewage is discharged:

- Southerly on Forest Street (±45m of 250mm pipe),
- Easterly on Bond Street (130m of 225mm and 250mm pipe)
- Northerly on Croydon Avenue (±180m of 225mm pipe)
- Easterly on Richmond Road (±625m of 300mm pipe) to Pinecrest Collector
- Northerly on Transitway (±460m of 900mm pipe) to West Nepean Collector

Sewage Flows within the property were estimated in order to compare with developed conditons. **Table 5-3** below summarizes the approximate sewage flows generated from the existing properties, based on a commerical flow and infiltration allowance.

Table 5-1 – Summary of Existing Sewage Flows

Sewage Condition	Sanitary Sewage Flow (L/sec)
Average Day Sewage Flow	0.26
Infiltration Flow (at 0.33 L/ha/sec)	0.18
Peak Wet Weather Sewage Flow	0.44

5.2 Proposed Sewage Conditions

It is proposed to provide one single sanitary sewer connection from the subject property to the existing sanitary sewer on Forest Street. Each tower will have a separate building lateral which will discharge to an onsite sanitary manhole. This manhole will be installed near the property line and be used as a monitoring manhole. The sanitary sewer system was designed based on a population flow with an area-based infiltration allowance. A 250mm diameter sanitary sewer is proposed with a minimum 2% slope, having a capacity of 87.7 L/sec based on Manning's Equation under full flow conditions. Based on the OBC, the maximum permitted hydraulic load for a 250mm at 2% is 4,500 fixture units. **Table 5-2** below summarizes the design parameters used.

Table 5-2 – 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	
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	1.0	✓
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	✓

The estimated peak sanitary flow rate from the proposed property at 365 Forest Street is **6.76 L/sec** based on City Design Guidelines. Sewage rates below include a total infiltration allowance of 0.18 L/ha/sec based on the total gross site area. Refer to **Appendix B** for detailed calculations.

Table 5-3 – Summary of Anticipated Sewage Rates

Sewage Condition	Sanitary Sewage Flow (L/sec)
Peak Residential / Commercial Flow	6.58
Infiltration Flow	0.18
Peak Design Flow	6.76

A review of the downstream sanitary sewer capacity was completed. The minimum sewer capacity of the last sewer run on Croydon Street (with a slope of 0.36%) has a calculated full flow capacity of 27 L/sec. It is anticipated that the increase in peak sewage flows up to 6.76 L/sec can be accommodated in the downstream sanitary sewer system.

6 Storm Servicing & Stormwater Management

Since the subject properties are located within the Ottawa River East subwatershed, stormwater works are therefore subject to both the Rideau Valley Conservation Authority (RVCA) and City of Ottawa (COO) approval.

The RVCA was contacted to determine quality control requirements for the site. Correspondence from the RVCA is provided in **Appendix F**, which clarifies that no onsite quality control is required. Similarly, no quality control was noted in the pre-consultation meeting held with the COO, which is also provided in **Appendix F.**

The requirements related to stormwater quantity control were noted in the pre-consultation meeting as follows:

- *Stormwater quantity control criteria – control the quantity to the 5-year pre-development/existing level for all storms up to and including the 100-year storm.*

- *When using the modified rational method to calculate the storage requirements for the site, the underground storage should not be included in the overall available storage. The modified rational method assumes that the restricted flow rate is constant throughout the storm which, in this case, underestimates the storage requirement prior to the 1: 100-year head elevation being reached. Alternately, if you wish to include the underground storage, you may use an assumed average release rate equal to 50% of the peak allowable rate. Otherwise, disregard the underground storage as available storage or provide modeling to support the design.*

6.1 Design Criteria

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 in the proceeding sections below.

6.2 Minor System Design Criteria

- The storm sewer was sized based on the Rational Method and Manning's Equation under free flow conditions for the 2-year storm using a 10-minute inlet time.
- Since a detailed site plan was available for the site, including building footprints, calculations of the average runoff coefficients for each drainage area were completed.
- Minimum sewer slopes to be based on minimum velocities for storm sewers of 0.80 m/sec.

6.3 Major System Design Criteria

- The major system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm. On-site storage is calculated based on the 100-year design storm with on-site detention storage provided on the roof and within the underground parking structure (stormwater cistern).
- On site storage is provided and calculated for up to the 100-year design storm. There is no surface ponding proposed on the ground surface.
- 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 15cm.
- The emergency overflow spill elevation is at least 30 cm below the lowest building opening.

Table 6-1 – Spillway Elevations

Building	Spillway Elevation	Lowest building opening Elevation	Lowest Ground Elevation at Building
Tower A (Richmond Road)	74.85	75.60	75.40
Tower B (Bond St./Croydon Ave.)	74.08	74.40	74.40

6.4 Runoff Coefficients

Runoff coefficients used for 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. Average runoff coefficients were calculated for subcatchments (or drainage areas) using the area-weighting routine in PCSWMM. The runoff coefficients for pre-development and post-development catchments are provided in **Appendix D**, with a summary provided in **Table 6-** below.

Table 6-2 – Summary of Runoff Coefficients

Location	Area (hectares)	Pre-Development Runoff Coefficient, C_{AVG}	Post-Development Runoff Coefficient, C_{AVG}
Entire Site	0.5434	0.75	0.81

6.5 Time of Concentration

A minimum time of concentration of 10-minutes was used for both pre-development and post-development subcatchments.

6.6 Pre-Development Conditions

Under current conditions stormwater runoff from the 0.5434-hectare site is divided into two drainage areas. Stormwater runoff discharges: 1) in a northwestern direction towards Richmond Road / Forest Street and 2) in a southern direction towards Bond Street. **Figure A-1** illustrates these pre-development drainage areas. These drainage areas (or subcatchments) are derived from PCSWMM using the Watershed Delineation Tool.

Table 6-3 – Summary of Pre-Development Flows

Return Period Storm	Peak Flows to Richmond Road / Forest Street Storm Sewers (L/sec)	Peak Flows to Bond Street Storm Sewers (L/sec)	Total Peak Flows (L/sec)
2-year	26.1	61.4	87.5
5-year	35.4	83.3	118.8
100-year	75.9	178.4	254.2

6.7 Allowable Release Rate

Rather than meeting pre-development released rates, the City of Ottawa imposes a more restrictive stormwater release rate as noted in Section 8.3.7.3 of the SDG002. The allowable discharge release rate from the site was established using the peak flows derived based on a 5-year return period storm, a maximum runoff coefficient of 0.50 and a standard time of concentration of 10 minutes.

The allowable release rate of 78.8 L/sec from the proposed site will be based on a 5-year storm event. **Table D-9** provides detailed calculations on the total allowable peak flow, and the distribution to each outfall. In summary, the allowable release rate of 78.8 L/sec is comprised of 23.9 L/sec to Forest Street and 54.8 L/sec to Bond Street.

Table 6-4 – Summary of Allowable Release Rates

Area (onsite)	Area (ha)	Storm = 2 Year Q_{2ALLOW} (L/sec)	Storm = 5 Year Q_{5ALLOW} (L/sec)
Pre-1	0.1652	17.6	23.9
Pre-2	0.3783	40.4	54.8
Totals	0.5435	58.0	78.8

6.8 Proposed Stormwater System

Stormwater runoff from the proposed site will drain from a combination of controlled and uncontrolled areas. As a result of the changes onsite the overall post-development runoff coefficient will change over pre-development conditions. This increase / decrease in runoff is the result of changes due to site development (i.e. additional hard surfaces, roof areas and hard landscaping).

A storm drainage plan is illustrated on **Figure A-2**. A total five (5) subcatchments (or drainage areas) within the development site are shown on this drawing with average runoff coefficients calculated for each drainage area. As the entire site property contains an underground parking structure, the stormwater works shall consist of the following elements:

- The proposed grading for the site will generally meet the existing drainage pattern sloping from west at Richmond Road and Forest Street southerly/easterly to Bond Street.
- Each building to have a separate 250mm storm lateral connection to the municipal storm sewer system.
- Flow-control roof drains for Towers A & B discharging to internal storm plumbing downstream of stormwater cistern.
- Runoff from surface areas will be collected by area drains and discharge to underground storage (2.0 m x 5.0 m x 6.0 m stormwater cistern) located in the underground parking structure on P1. This in turn discharges to the storm lateral outletting from Tower B to STMMH 101.
- Remaining drainage areas along frontage of Forest Street and Bond Street to flow uncontrolled overland to the right-of-way.

A summary of the proposed storm and foundation infrastructure is provided in **Table 6-5** below.

Table 6-5 – Summary of Proposed Storm System

<table>
<tr><th>Storm Laterals</th><th>Manhole</th><th>Foundation Drainage</th><th>Catchbasins</th><th>Area Drains</th></tr>
<tr><td>250mm from Tower A to existing 300 mm Storm Sewer on Forest Street at Richmond Rd.</td><td>STMMH 102
STMH 103</td><td rowspan="3">To STMMH 101</td><td rowspan="2">CBE1
CB1
CBE2
CB2
CBT1
CBT2
CBE3</td><td rowspan="2">AD1 through AD10</td></tr>
<tr><td>250 mm Tower B to existing 300 mm Storm Sewer on Bond Street</td><td>STMMH 100
STMMH 101</td></tr>
<tr><td colspan="2"></td><td colspan="2">Above CBs and ADs drain to cistern at south east corner in Parking Garage with controlled flow to existing storm sewer on Bond Street.</td></tr>
</table>

A summary of the post-development flows is provided in **Table 6-6** below.

Table 6-6 – Summary of Post-Development Flows

Return Period Storm	Peak Flows to Richmond Road / Forest Street Storm Sewers (L/sec)	Peak Flows to Bond Street Storm Sewers (L/sec)	Total Peak Flows (L/sec)	Allowable Peak Flows (L/sec)
2-year	8.8	19.6	28.4	78.8
5-year	11.9	26.6	38.5	
100-year	23.8	54.3	78.1	
			Allowable to Forest / Richmond =	23.9
			Allowable to Bond =	54.8

To achieve the quantity control requirements and meet the allowable discharge rates as noted in **Section 6.7**, the roof drains on both Towers will require flow controlled weirs. Based on the roof areas, an estimate of the number of roof drains required was completed. WATTS ACCUTROL weirs were used to determine the total discharge rates from the roof areas based on the number of drains. In addition, the total cumulative prism volumes on the roofs were calculated at a maximum permitted depth of 150mm. Additional information on the estimated 100-year volumes is provided in **Section 6.9**.

6.9 Flow Attenuation

Stormwater flow attenuation will be achieved by utilizing roof storage and stormwater storage in the underground parking structure. Using the allowable release rates, the Modified Rational Method was used to determine the 2-year, 5-year, and 100-year volumes that will occur for corresponding release rates.

Table D-12, Table D-13 and **Table D-14** provide the storage volumes required on the roof and in the cistern in the underground parking structure to attenuate the controlled release rates. **Table D-11** 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 6-7** below.

Table 6-7 – Summary of Post-Development Storage

Area No.	Outlet	Release Rate (L/s)			Storage Required (m^3) (MRM)			Storage Provided (m^3)		Control Method
		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr	Roof	Cistern	
Tower A Roof	Richmond / Forest	5.1	6.9	13.2	11.2	15.1	28.6	44.6		Flow Controlled Roof Drains with Weir (Set at Open Position)
Surface - Uncontrolled		3.7	50	10.6						None
Tower B Roof	Bond St	5.1	6.9	13.2	15.8	21.3	40.2	55.7		Flow Controlled Roof Drains with Weir (Set at Open Position)
Surface - Controlled		11.4	15.4	33.0	13.6	18.4	59.0		59.0	Pump Rate from Cistern
Surface - Uncontrolled		3.2	4.3	8.1						none
Totals =		28.4	38.5	78.1	40.6	54.7	127.8	100.1	59.0	

7 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.

8 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 parallel 200mm watermains are proposed to service the residential Towers A and B, as the average day demands exceed 50 m^3 per day, which is mandatory as per Section 4.31 of the WDG001.
- Two new hydrants are proposed; one located on Bond Street to meet spacing requirements of 90m for apartments and high-density areas as per WDG001 and the other located on Forest Street within 45m from the proposed fire department connections.
- The Required Fire Flows (RFFs) were estimated at **8,000 L/min** (133 L/sec) for Tower A, and **11,000 L/min** (183 L/sec) for Tower B. The total minimum available flows for firefighting purposes, based on the contribution from hydrants, was estimated at **22,800 L/min**.
- Based on hydraulic boundary conditions (HGL) provided by the City of Ottawa, a system pressure of **±52.2 psi** under peak hourly demands is anticipated at the proposed building. This exceeds the City's guideline of 20 psi.
- Domestic water booster and Fire pump will be provided in the mechanical room at P1 parking level.

Sewage

- Estimated peak sewage flows of **6.76 L/sec** are anticipated. This exceeds the estimated current sewage flows of **0.44 L/sec** under existing conditions. An initial review of the downstream sanitary sewer system from the site and the Pinecrest Collector indicates minimum pipe capacity of 27 L/sec for a sewer run on Croydon Ave.

Stormwater

- For the stormwater system, the allowable capture rate from the entire site was calculated based on a runoff coefficient of 0.50, time of concentration of 10 minutes for a 5-year storm event. The allowable release rate for the entire site was calculated to be **78.8 L/sec**. Runoff in excess of this will be detained onsite for up to the 100-year storm.
- Two minor surface drainage areas will flow uncontrolled to the right-of-way. The 100-year peak flows from these two areas were accounted for (ie. subtracted) from the total runoff rate to establish the allowable rate.
- In order to meet the allowable release rate, a total retention volume of **±127.8 m^3** metres is required.
- Runoff on the building roofs will be controlled using flow-controlled roof drains. For each roof-drain is equipped with WATTS ACCUTROL weirs and set at the OPEN position are proposed. Each drain having maximum discharge rate of 30 gpm at 150mm depth. A maximum discharge rate of **13.2 L/sec for each tower** was established for the 100-year event.
- A total 100-year storage volume requirements on the roofs of Tower A and Tower B was estimated as **68.8 m^3** (28.6 m^3 and 40.2 m^3 respectively), based on the above release rates, using the Modified Rational Method. The volumes available on the roofs are **100.1 m^3** (44.6 m^3 and 55.7 m^3 respectively), therefore exceeding the required volumes.
- Runoff from the surface areas above the parking structure will be collected and detained in an underground stormwater chamber (cistern) located in the parking structure. The allowable discharge rate of **33.0 L/sec** from the cistern will be met using an equal pump rate. The volume necessary to detain the 100-year event, is **59.0 m^3**, based on using 50% of the allowable release rate as required by the City of Ottawa. The stormwater tank (cistern) will be sized to hold a minimum volume of approximately **59.0 m^3.**

Erosion & Sediment Control

- Erosion and sediment control methods will be used during construction to limit erosion potential.

9 Legal Notification

This report was prepared by EXP Services Inc. for the account of 11061917 Canada 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

Figure A-1 - Pre-Development Drainage Areas

Figure A-2 - Post-Development Drainage Areas

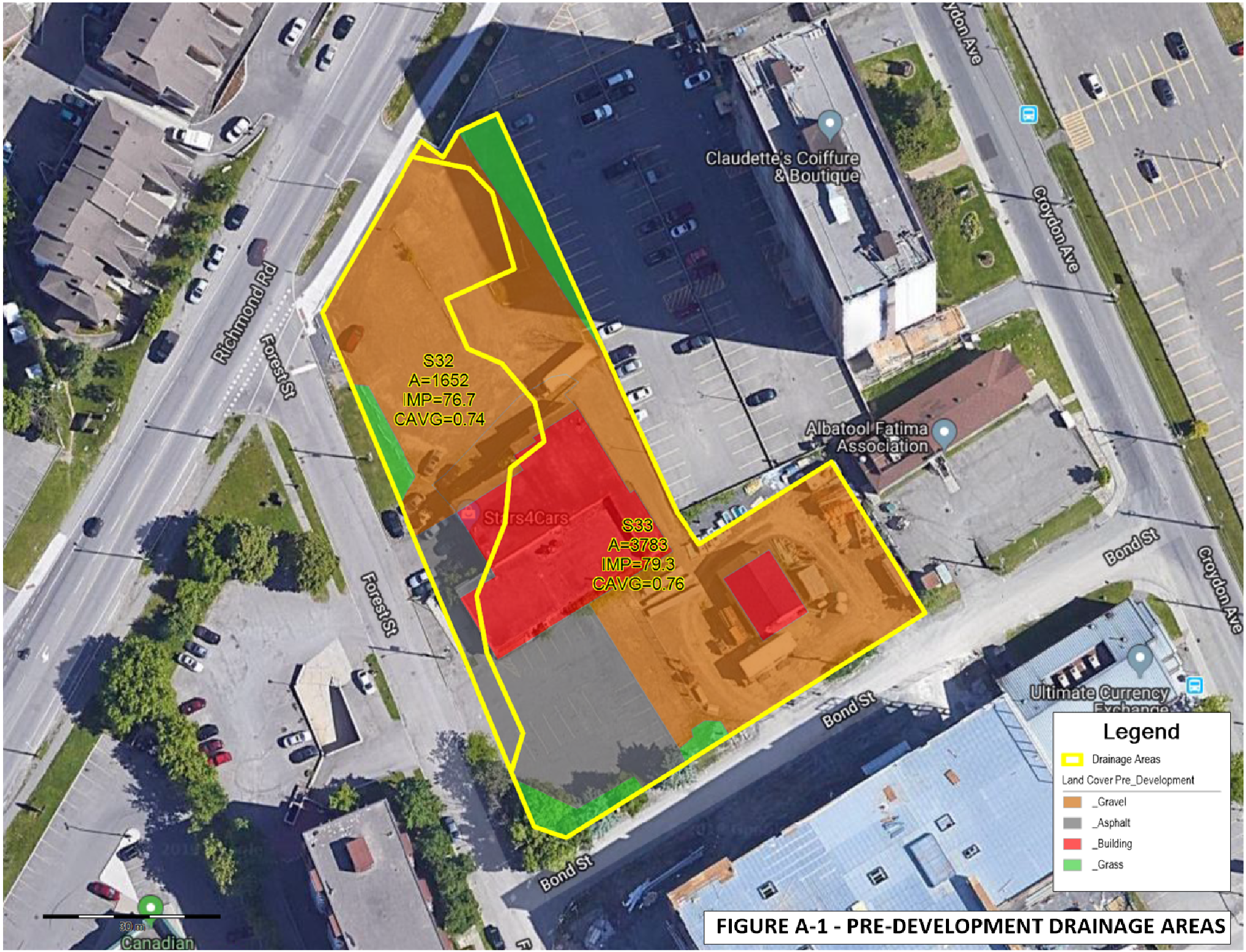


FIGURE A-1 - PRE-DEVELOPMENT DRAINAGE AREAS

FIGURE 2 - POST-DEVELOPMENT DRAINAGE AREAS

Appendix B – Water Servicing Tables

Table B-1 – Water Demand Chart

Table B-2 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Tower A

Table B-3 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Tower B

Table B-4 – Available Fire Flows Based on Hydrant Spacing

Table B-5 – Estimated Water Pressure at Proposed Building

Table B-1

Water Demand Chart

Building	No. of Units										Total Pop	Residential Demands					Commercial						Total Demands in (L/sec)		
	Singles/Semis/Towns				Apartments							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)	Peaking Factors (x Avg Day)		Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Peak Hour (L/s)
	Single Familty	Semi	Duplex	Townhome	Bachelor	1-Bed Apt	1-Bed +Den Apt	2 Bed Apt	2-Bed +Den Apt	3 Bed Apt									Max Day	Peak Hour					
Tower A					11	13	102	42			264.6	92,610	2.5	2.2	231,525	509,355	0.0256	717	1.5	1.8	1075.2	1935.4	1.08	2.69	5.92
Tower B					23	12	145	43			342.3	119,805	2.5	2.2	299,513	658,928	0.0092	257.6	1.5	1.8	386.4	463.7	1.39	3.47	7.63
Totals =					34	25	247	85			606.9	212,415			531,038	1,168,283	0.0348	974			1,461.6	2,399.0	2.47	6.16	13.55

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
2-Bed + Den Apt Unit	2.1
3-Bed Apt Unit	3.1

Residential

Residential Consumption (L/pers/day) =	350
Max Day Peaking Factor (* avg day) =	2.5
Peak Hour Factor (* max day) =	2.2

Industrial/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 (* max day) =	1.8

Project:	365 Forest Street
Designed: J Diaz, P.Eng.	Location: Ottawa, Ontario
Checked: B. Thomas, P.Eng.	
File Reference: 252570 Water - Demand Chart, May 21, 2021.xlsx	Page No: 1 of 1

TABLE B-2
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999 FOR TOWER A

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	
Floor 12	1,186	0%	0	2 largest adjoining floors+ 50% of floors above (up to eight)
Floor 11	1,193	0%	0	
Floor 10	1,193	50%	597	
Floor 9	1,193	50%	597	
Floor 8	1,193	50%	597	
Floor 7	1,158	50%	579	
Floor 6	1,210	50%	605	
Floor 5	1,210	50%	605	
Floor 4	1,210	50%	605	
Floor 3	1,210	50%	605	
Floor 2	1,225	100%	1,225	
Floor 1 (Ground)	1,225	100%	1,225	
Basement (At least 50% below grade, not included)	0			

Fire Flow (F)	F = 220 * C * SQRT(A)	14,974
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%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Lenth-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1 (west)	36	5	30.1 to 45	Type B	45	19	855	5E	5%	20%	1,275	7,650
	Side 2 (east)	36	5	30.1 to 45	Type B	0	0	0	5A	5%			
	Front (north)	52	6	> 45.1	Type B	29	2	58	6	0%			
	Back (south)	15	3	10.1 to 20	Type B	23	12	30	3A	10%			

Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**8,000**
	Total Required Fire Flow, L/s =	**133**

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

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

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 to 45m	5
> 45.1m	6

TABLE B-3
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999 FOR TOWER B

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			
	Floor 12		1,507	50%	754	2 largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 11		1,518	50%	759			
	Floor 10		1,518	50%	759			
	Floor 9		1,518	50%	759			
	Floor 8		1,518	50%	759			
	Floor 7		1,468	50%	734			
	Floor 6		1,652	50%	826			
	Floor 5		1,652	50%	826			
	Floor 4		1,652	100%	1,652			
	Floor 3		1,652	100%	1,652			
	Floor 2		1,500	0%	0			
	Floor 1 (Ground)		1,470	0%	0			
	Basement (At least 50% below grade, not included)		0					
Fire Flow (F)	F = 220 * C * SQRT(A)							17,136
Fire Flow (F)	Rounded to nearest 1,000							**17,000**

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%	-2,550	14,450
	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%	-4,335	10,115
	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%	-1,445	8,670
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,445	7,225
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Lenth-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1 (west)	26	4	20.1 to 30	Type B	4	1	4	4A	6%	46%	3,324	10,549
	Side 2 (east)	7	2	3.1 to 10	Type B	14	8	112	2D	19%			
	Front (north)	15	3	10.1 to 20	Type B	25	12	300	3E	15%			
	Back (south)	24	4	20.1 to 30	Type B	66	11	30	4A	6%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**11,000**
	Total Required Fire Flow, L/s =												**183**

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

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

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 to 45m	5
> 45.1m	6

TABLE B-4

AVAILABLE FIRE FLOWS BASED ON HYDRANT SPACING

Hydrant #	Location	Tower A		Tower B	
		[1]Distance (m)	[2]Fire Flow Contribution (L/min)	Distance (m)	Fire Flow Contribution (L/min)
New FH-1	Forest Street	8	5,700	32	5,700
New FH-2	Bond Street	82	3,800	98	3,800
360024H013	Forest Steet at Richmond Rd	37	5,700	62	5,700
360024H038	Forest Steet at Carling Ave	122	3,800	95	3,800
360024HP120	Forest Steet near Bond St	76	3,800	52	5,700
360024H041	Bond Street at Croydon Ave	170	0	145	3,800
Total (L/min)			22,800		28,500
FUS RFF in L/min or (L/sec)			8,000 (133)		11,000 (183)
Meets Requreiment (Yes/No)			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 B-5

ESTIMATED WATER PRESSURE AT PROPOSED BUILDING

Description	From	To	Demand (L/sec)	Pipe Length (m)	Pipe Dia (mm)	Dia (m)	Q (m3/sec)	Area (m2)	C	Vel (m/s)	Slope of HGL (m/m)	Head Loss (m)	Elev From (m)	Elev To (m)	*Elev Diff (m)	Pressure From kPa	(psi)	Pressure To kPa	(psi)	Pressure Drop (psi)
Avg Day Conditons																				
Single 200mm watermain	Main	Building	2.5	11 m	204	0.204	0.0025	0.032685	110	0.0756	6E-05	0.0007	74.85	71.80	3.1	330.1	(47.9)	360.0	(52.2)	-4.3
Double 200mm watermain	Main	Building	1.2	11 m	204	0.204	0.0012	0.032685	110	0.0378	1.7E-05	0.0002	74.85	71.80	3.1	330.1	(47.9)	360.0	(52.2)	-4.3
Max Day Conditons																				
Single 200mm watermain	Main	Building	6.2	11 m	204	0.204	0.0062	0.032685	110	0.1885	0.00033	0.0036	74.85	71.80	3.1	400.7	(58.1)	430.6	(62.5)	-4.3
Double 200mm watermain	Main	Building	3.1	11 m	204	0.204	0.0031	0.032685	110	0.0942	9.1E-05	0.001	74.85	71.80	3.1	400.7	(58.1)	430.6	(62.5)	-4.3
Peak Hour Conditons																				
Single 200mm watermain	Main	Building	13.6	11 m	204	0.204	0.0136	0.032685	110	0.4146	0.00141	0.0155	74.85	71.80	3.1	330.1	(47.9)	359.9	(52.2)	-4.3
Double 200mm watermain	Main	Building	6.8	11 m	204	0.204	0.0068	0.032685	110	0.2073	0.00039	0.0043	74.85	71.80	3.1	330.1	(47.9)	360.0	(52.2)	-4.3
Max Day Plus Fireflow Conditons																				
Single 200mm watermain	Main	Building	189.2	11 m	204	0.204	0.1892	0.032685	110	5.7873	0.18628	2.0491	74.85	71.80	3.1	315.4	(45.7)	325.2	(47.2)	-1.4
Double 200mm watermain	Main	Building	94.6	11 m	204	0.204	0.0946	0.032685	110	2.8937	0.0516	0.5676	74.85	71.80	3.1	315.4	(45.7)	339.7	(49.3)	-3.5
Peak Hour Conditons (Review of 150mm)																				
Single 150mm watermain	Main	Building	13.6	11 m	155	0.155	0.0136	0.018869	110	0.7181	0.00538	0.0592	74.85	71.80	3.1	330.1	(47.9)	359.4	(52.1)	-4.3
Double 150mm watermain	Main	Building	6.8	11 m	155	0.155	0.0068	0.018869	110	0.3591	0.00149	0.0164	74.85	71.80	3.1	330.1	(47.9)	359.9	(52.2)	-4.3
Max Day Plus Fireflow (Review of 150mm)																				
Single 150mm watermain	Main	Building	189.2	11 m	155	0.155	0.1892	0.018869	110	10.025	0.70982	7.808	74.85	71.80	3.1	315.4	(45.7)	268.7	(39.0)	6.8
Double 150mm watermain	Main	Building	94.6	11 m	155	0.155	0.0946	0.018869	110	5.0124	0.19663	2.1629	74.85	71.80	3.1	315.4	(45.7)	324.1	(47.0)	-1.3

Water Demand Info

Average Demand =	2.47	L/sec
Max Day Demand =	6.16	L/sec
Peak Hr Deamand =	13.55	L/sec
Fireflow Requirement =	183	L/sec
Max Day Plus FF Demand =	189.2	L/sec

Pipe Lengths

From watermain to building =	11 m
Hazen Williams C Factor for Friction Loss in Pipe, C=	110

Boundary Conditon

	Min HGL	Max HGL	Peak Hr	Max Day + Fireflow	
HGL (m)	108.5	115.7	108.5	107.0	(From City of Ottawa)
Approx Ground Elev (m) =	74.85	74.85	74.85	74.85	
Approx Mech Room FF Elev (m) =	71.80	71.80	71.80	71.80	
Pressure (m) =	33.65	40.85	33.65	32.15	
Pressure (Pa) =	330,107	400,739	330,107	315,392	
Pressure (psi) =	47.9	58.1	47.9	45.7	

Appendix C – Sanitary Servicing Tables

Table C-6 – Sanitary Sewer Design Sheet

Table C-6

SANITARY SEWER CALCULATION SHEET

LOCATION			RESIDENTIAL AREAS AND POPULAITONS												COMMERCIAL				INFILTRATION				SEWER DATA							
				NUMBER OF UNITS							POPULATION				AREA (ha)				AREA (ha)											
Street	U/S MH	D/S MH	Area (ha)	Single	Semi	1-Bed Apt.	1-Bed + Den Apt	2-Bed Apt.	2-Bed + Den Apt	3-Bed Apt.	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Forest	Tower A	MH 200	0.2717			24	102	42			264.6	264.6	4.00	3.43	0.0256	0.0256	1.0	0.008	0.2717	0.2717	0.09	3.53	250	251.46	2.0	6.1	85.4	4%	1.72
	Tower B	MH 200	0.2717			35	145	43			342.3	342.3	4.00	4.44	0.0092	0.0092	1.0	0.003	0.2717	0.2717	0.09	4.53	250	251.46	2.0	1.0	85.4	5%	1.72
	MH 200	MH 201										606.9	3.34	6.57		0.0348	1.0	0.011		0.5434	0.18	6.76	250	251.46	2.0	9.7	85.4	8%	1.72
			0.543			59	247	85			607								0.543										

Residential Avg. Daily Flow, q (L/p/day) =	280	Commercial Peak Factor =	1.5	(when area >20%)		Unit Type	Ppu	Designed:	Project:
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	Peak Population Flow, (L/sec)	Singles =	3.4	J. Diaz, P.Eng.	365 Forest Street
or L/gross ha/sec =	0.324				= P*q*M/86.4	Semi-Detached =	2.7		
Institutianal Avg. Daily Flow (L/s/ha) =	28,000	Institutional Peak Factor =	1.5	(when area >20%)	Peak Extraneous Flow, (L/sec)	1-bed Apt	1.4	Checked:	Location:
or L/gross ha/sec =	0.324		1.0	(when area <20%)	= I*Ac	1-bed + Den Apt	1.4		
Light Industrial Flow (L/gross ha/day) =	35,000				Residential Peaking Factor, M	2-bed Apt. Unit =	2.1	B. Thomas, P.Eng.	Ottawa, Ontario
or L/gross ha/sec =	0.4051	Residential Correction Factor, K =	0.80		= 1 + (14/(4+P^0.5)) * K	2-bed + Den Apt	2.1		
Light Industrial Flow (L/gross ha/day) =	55,000	Manning N =	0.013		Sewer Capacity, Qcap (L/sec)	3-bed Apt. Unit =	3.1	File Reference:	Page No:
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I)	= 1/N $S1^{1/2}$ $R^{2/3}$ A_c			252570 Sanitary - Sewer Design Sheet, May 16, 2021.xlsx	**1 of 1**

Appendix D – Stormwater Servicing Tables

Table D-7 – Average Runoff Coefficients for Pre-Development

Table D-8 – Estimation of Pre-Development Peak Flows

Table D-9 – Estimation of Allowable Peak Flows (Based on Max C=0.50 with Tc=10mins)

Table D-10 – Average Runoff Coefficients for Post-Development

Table D-11 – Summary of Post-Development Peak Flows (Uncontrolled and Controlled)

Table D-12 – Storage Volumes for 2-year, 5-year and 100-Year Storms (Area PST-1)

Table D-13 – Storage Volumes for 2-year, 5-year and 100-Year Storms (Area PST-3)

Table D-14 – Storage Volumes for 2-year, 5-year and 100-Year Storms (Area PST-4)

Table D-15 – Estimation of Roof Storage and Outflow - Tower A

Table D-16 – Estimation of Roof Storage and Outflow - Tower B

Table D-7 AVERAGE RUNOFF COEFFICIENTS FOR PRE-DEVELOPMENT

Runoff Coeffients		C_{GRAVEL} =	0.725	C_{ROOF} =	0.90	C_{GRASS} =	0.20	$C_{Asphalt}$ =	0.900
Area No.	Gravel 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)
PRE-1								1652.0	0.74
PRE-2								3782.5	0.76

Notes
1) Cavg derived with area-weighting command in PCSWMM

Table D-8 ESTIMATION OF PRE-DEVELOPMENT PEAK FLOWS

Catchment No.	Area (ha)	Outlet Location	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
				I_2 (mm/hr)	Cavg	Q_{2PRE} (L/sec)	I_5 (mm/hr)	Cavg	Q_{5PRE} (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100PRE} (L/sec)
PRE-1	0.1652	To Richmond / Forest	10.0	76.81	0.74	26.1	104.29	0.74	35.4	178.56	0.93	75.9
PRE-2	0.3783	To Bond St	10.0	76.81	0.76	61.4	104.29	0.76	83.3	178.56	0.95	178.4
Totals	0.5435					87.5			118.8			254.2

Notes
1) Intensity, I = $732.951/(Tc+6.199)^{0.810}$ (2-year, City of 0ttawa)
2) Intensity, I = $998.071/(Tc+6.035)^{0.814}$ (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

Table D-9 ESTIMATION OF ALLOWABLE PEAK FLOWS (Based on Max C=0.50 with Tc=10mins)

Area (onsite)	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr		
			I_5 (mm/hr)	Cavg	Q_{5ALLOW} (L/sec)	I_5 (mm/hr)	Cavg	Q_{5ALLOW} (L/sec)
PRE-1	0.1652	10	76.81	0.50	17.6	104.29	0.50	23.9
PRE-2	0.3783	10	76.81	0.50	40.4	104.29	0.50	54.8
Totals	0.5435				**58.0**			**78.8**

Notes
1) Allowable Capture Rate is based on 5-year storm at Tc=10 minutes.
2) Intensity, I5 = 998.071/(Tc+6.035)^0.814 (5-year, City of 0ttawa)

Allowable Discharge (based on 5-yr storm)

Table D-10 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
PST-1	To Richmond / Forest								1111	0.90	Tower A Roof
PST-2									224	0.77	Surface - Uncontrolled
PST-3	To Bond St								1385	0.90	Tower B Roof
PST-4									2551	0.61	Surface - Controlled
PST-5									164	0.90	Surface - Uncontrolled
Totals									5,434		

Notes

1) Cavg derived with area-weighting command in PCSWMM

Table D-11 SUMMARY OF POST-DEVELOPMENT PEAK FLOWS (Uncontrolled and Controlled)

			Storm = 2 yr				Storm = 5 yr				Storm = 100 yr					
Area No	Area (ha)	Time of Conc, Tc (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	Comments
PST-1	0.1111	10	0.90	76.81	21.3	**(5.1)**	0.90	104.19	28.9	**(6.9)**	1.00	178.56	55.1	**(13.2)**	To Richmond / Forest	Tower A Roof
PST-2	0.0224	10	0.77	76.81	3.7	**(3.7)**	0.77	104.19	5.0	**5.0**	0.96	178.56	10.6	**10.6**		Surface - Uncontrolled
PST-3	0.1385	10	0.90	76.81	26.6	**(5.1)**	0.90	104.19	36.1	**(6.9)**	1.00	178.56	68.8	**(13.2)**	To Bond St	Tower B Roof
PST-4	0.2551	10	0.61	76.81	33.0	**(11.4)**	0.61	104.19	44.7	**(15.4)**	0.76	178.56	95.8	**(33.0)**		Surface - Controlled
PST-5	0.0164	10	0.90	76.81	3.1	**3.1**	0.90	104.19	4.3	**4.3**	1.00	178.56	8.1	**8.1**		Surface - Uncontrolled
Totals	0.5434				87.7	**28.4**			118.9	**38.5**			238.4	**78.1**		

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 D-12 Storage Volumes for 2-year, 5-Year and 100-Year Storms Area: PST-1

Area No: PST-1
C_{AVG} = 0.90 (2-yr)
C_{AVG} = 0.90 (5-yr)
C_{AVG} = 1.00 (100-yr, Max 1.0)
Time Interval = 5.00 (mins)
Drainage Area = 0.1111 (hectares)

Duration (min)	Release Rate = 5.1 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C))					Release Rate = 6.9 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C))					Release Rate = 13.2 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, 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	46.4	5.10	41.3	0.00	230.5	63.9	6.917	57.0	0.00	398.6	123.1	13.200	109.9	0.00
5	103.6	28.7	5.10	23.6	7.08	141.2	39.1	6.917	32.2	9.67	242.7	74.9	13.200	61.7	18.52
10	76.8	21.3	5.10	16.2	9.72	104.2	28.9	6.917	22.0	13.18	178.6	55.1	13.200	41.9	25.15
15	61.8	17.1	5.10	12.0	10.82	83.6	23.2	6.917	16.2	14.62	142.9	44.1	13.200	30.9	27.82
20	52.0	14.4	5.10	9.3	11.19	70.3	19.5	6.917	12.6	15.07	120.0	37.0	13.200	23.8	28.60
25	45.2	12.5	5.10	7.4	11.13	60.9	16.9	6.917	10.0	14.95	103.8	32.1	13.200	18.9	28.29
30	40.0	11.1	5.10	6.0	10.80	53.9	15.0	6.917	8.0	14.46	91.9	28.4	13.200	15.2	27.29
35	36.1	10.0	5.10	4.9	10.29	48.5	13.5	6.917	6.5	13.72	82.6	25.5	13.200	12.3	25.82
40	32.9	9.1	5.10	4.0	9.63	44.2	12.2	6.917	5.3	12.80	75.1	23.2	13.200	10.0	24.00
45	30.2	8.4	5.10	3.3	8.87	40.6	11.3	6.917	4.3	11.74	69.1	21.3	13.200	8.1	21.92
50	28.0	7.8	5.10	2.7	8.03	37.7	10.4	6.917	3.5	10.57	64.0	19.7	13.200	6.5	19.63
55	26.2	7.3	5.10	2.2	7.12	35.1	9.7	6.917	2.8	9.31	59.6	18.4	13.200	5.2	17.18
60	24.6	6.8	5.10	1.7	6.15	32.9	9.1	6.917	2.2	7.98	55.9	17.3	13.200	4.1	14.60
65	23.2	6.4	5.10	1.3	5.15	31.0	8.6	6.917	1.7	6.59	52.6	16.3	13.200	3.1	11.91
70	21.9	6.1	5.10	1.0	4.10	29.4	8.1	6.917	1.2	5.15	49.8	15.4	13.200	2.2	9.12
75	20.8	5.8	5.10	0.7	3.02	27.9	7.7	6.917	0.8	3.67	47.3	14.6	13.200	1.4	6.25
80	19.8	5.5	5.10	0.4	1.91	26.6	7.4	6.917	0.4	2.15	45.0	13.9	13.200	0.7	3.31
85	18.9	5.3	5.10	0.2	0.78	25.4	7.0	6.917	0.1	0.59	43.0	13.3	13.200	0.1	0.31
90	18.1	5.0	5.10	-0.1	-0.37	24.3	6.7	6.917	-0.2	-0.99	41.1	12.7	13.200	-0.5	-2.74
95	17.4	4.8	5.10	-0.3	-1.55	23.3	6.5	6.917	-0.5	-2.60	39.4	12.2	13.200	-1.0	-5.85
100	16.7	4.6	5.10	-0.5	-2.74	22.4	6.2	6.917	-0.7	-4.23	37.9	11.7	13.200	-1.5	-8.99
Max =					**11.19**					**15.07**					**28.60**

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

Table D-13 Storage Volumes for 2-year, 5-Year and 100-Year Storms Area: PST-3

Area No: PST-3
C_{AVG} = 0.90 (2-yr)
C_{AVG} = 0.90 (5-yr)
C_{AVG} = 1.00 (100-yr, Max 1.0)
Time Interval = 5.00 (mins)
Drainage Area = 0.1385 (hectares)

Duration (min)	Release Rate = 5.1 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C))					Release Rate = 6.9 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C))					Release Rate = 13.2 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, 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	58.0	5.11	52.9	0.00	230.5	79.9	6.932	73.0	0.00	398.6	153.5	13.200	140.3	0.00
5	103.6	35.9	5.11	30.8	9.24	141.2	48.9	6.932	42.0	12.60	242.7	93.5	13.200	80.3	24.08
10	76.8	26.6	5.11	21.5	12.91	104.2	36.1	6.932	29.2	17.51	178.6	68.8	13.200	55.6	33.34
15	61.8	21.4	5.11	16.3	14.67	83.6	29.0	6.932	22.0	19.83	142.9	55.0	13.200	41.8	37.65
20	52.0	18.0	5.11	12.9	15.51	70.3	24.4	6.932	17.4	20.90	120.0	46.2	13.200	33.0	39.60
25	45.2	15.7	5.11	10.5	15.82	60.9	21.1	6.932	14.2	21.26	103.8	40.0	13.200	26.8	40.19
30	40.0	13.9	5.11	8.8	15.79	53.9	18.7	6.932	11.8	21.17	91.9	35.4	13.200	22.2	39.93
35	36.1	12.5	5.11	7.4	15.52	48.5	16.8	6.932	9.9	20.76	82.6	31.8	13.200	18.6	39.07
40	32.9	11.4	5.11	6.3	15.08	44.2	15.3	6.932	8.4	20.12	75.1	28.9	13.200	15.7	37.78
45	30.2	10.5	5.11	5.4	14.50	40.6	14.1	6.932	7.2	19.31	69.1	26.6	13.200	13.4	36.16
50	28.0	9.7	5.11	4.6	13.83	37.7	13.1	6.932	6.1	18.36	64.0	24.6	13.200	11.4	34.29
55	26.2	9.1	5.11	4.0	13.07	35.1	12.2	6.932	5.2	17.30	59.6	23.0	13.200	9.8	32.22
60	24.6	8.5	5.11	3.4	12.25	32.9	11.4	6.932	4.5	16.15	55.9	21.5	13.200	8.3	29.98
65	23.2	8.0	5.11	2.9	11.37	31.0	10.8	6.932	3.8	14.93	52.6	20.3	13.200	7.1	27.60
70	21.9	7.6	5.11	2.5	10.44	29.4	10.2	6.932	3.2	13.65	49.8	19.2	13.200	6.0	25.10
75	20.8	7.2	5.11	2.1	9.47	27.9	9.7	6.932	2.7	12.31	47.3	18.2	13.200	5.0	22.50
80	19.8	6.9	5.11	1.8	8.46	26.6	9.2	6.932	2.3	10.92	45.0	17.3	13.200	4.1	19.81
85	18.9	6.6	5.11	1.5	7.43	25.4	8.8	6.932	1.9	9.49	43.0	16.5	13.200	3.3	17.05
90	18.1	6.3	5.11	1.2	6.37	24.3	8.4	6.932	1.5	8.03	41.1	15.8	13.200	2.6	14.22
95	17.4	6.0	5.11	0.9	5.28	23.3	8.1	6.932	1.1	6.53	39.4	15.2	13.200	2.0	11.33
100	16.7	5.8	5.11	0.7	4.17	22.4	7.8	6.932	0.8	5.01	37.9	14.6	13.200	1.4	8.39
Max =					**15.82**					**21.26**					**40.19**

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

Table D-14 Storage Volumes for 2-year, 5-Year and 100-Year Storms Area: PST-4

Area No: PST-4

C_{AVG} = 0.61 (2-yr)

C_{AVG} = 0.61 (5-yr)

C_{AVG} = 0.76 (100-yr, Max 1.0)

Time Interval = 2.00 (mins)

Drainage Area = 0.2551 (hectares)

Actual Release Rate (L/sec) = 33.0

Percentage of Actual Rate (City of Ottawa requirement) 50%

Release Rate Used for Estimation of 100-year Storage (L/sec) = 16.5

Duration (min)	Release Rate = 11.4 (L/sec), Return Period = 2 (years), IDF Parameters, A = 732.951, B = 0.810, (I = A/(T_c+C)), C = 6.199					Release Rate = 15.4 (L/sec), Return Period = 5 (years), IDF Parameters, A = 998.071, 0.814, (I = A/(T_c+C)), C = 6.053					Release Rate = 16.5 (L/sec), Return Period = 100 (years), IDF Parameters, A = 1735.688, 0.820, (I = A/(T_c+C)), C = 6.014				
	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	71.8	11.36	60.4	0.00	230.5	98.9	15.405	83.5	0.00	398.6	213.8	16.5	197.3	0.00
2	133.3	57.2	11.36	45.9	5.50	182.7	78.4	15.405	63.0	7.56	315.0	169.0	16.5	152.5	18.30
4	111.7	47.9	11.36	36.6	8.78	152.5	65.4	15.405	50.0	12.01	262.4	140.7	16.5	124.2	29.82
6	96.6	41.5	11.36	30.1	10.84	131.6	56.5	15.405	41.1	14.78	226.0	121.2	16.5	104.7	37.70
8	85.5	36.7	11.36	25.3	12.15	116.1	49.8	15.405	34.4	16.52	199.2	106.8	16.5	90.3	43.37
10	76.8	33.0	11.36	21.6	12.96	104.2	44.7	15.405	29.3	17.58	178.6	95.8	16.5	79.3	47.57
12	69.9	30.0	11.36	18.6	13.42	94.7	40.6	15.405	25.2	18.17	162.1	87.0	16.5	70.5	50.73
14	64.2	27.6	11.36	16.2	13.61	86.9	37.3	15.405	21.9	18.39	148.7	79.8	16.5	63.3	53.15
16	59.5	25.5	11.36	14.2	13.61	80.5	34.5	15.405	19.1	18.36	137.5	73.8	16.5	57.3	54.99
18	55.5	23.8	11.36	12.5	13.45	75.0	32.2	15.405	16.8	18.11	128.1	68.7	16.5	52.2	56.38
20	52.0	22.3	11.36	11.0	13.17	70.3	30.1	15.405	14.7	17.69	120.0	64.3	16.5	47.8	57.41
22	49.0	21.0	11.36	9.7	12.78	66.1	28.4	15.405	13.0	17.13	112.9	60.5	16.5	44.0	58.14
24	46.4	19.9	11.36	8.5	12.30	62.5	26.8	15.405	11.4	16.46	106.7	57.2	16.5	40.7	58.63
26	44.0	18.9	11.36	7.5	11.76	59.3	25.5	15.405	10.1	15.69	101.2	54.3	16.5	37.8	58.92
28	41.9	18.0	11.36	6.6	11.15	56.5	24.2	15.405	8.8	14.84	96.3	51.6	16.5	35.1	59.03
30	40.0	17.2	11.36	5.8	10.49	53.9	23.1	15.405	7.7	13.92	91.9	49.3	16.5	32.8	59.00
32	38.3	16.5	11.36	5.1	9.78	51.6	22.1	15.405	6.7	12.94	87.9	47.1	16.5	30.6	58.83
34	36.8	15.8	11.36	4.4	9.03	49.5	21.2	15.405	5.8	11.91	84.3	45.2	16.5	28.7	58.55
36	35.4	15.2	11.36	3.8	8.25	47.6	20.4	15.405	5.0	10.82	81.0	43.4	16.5	26.9	58.16
38	34.1	14.6	11.36	3.3	7.44	45.8	19.7	15.405	4.3	9.70	77.9	41.8	16.5	25.3	57.69
40	32.9	14.1	11.36	2.7	6.59	44.2	19.0	15.405	3.6	8.53	75.1	40.3	16.5	23.8	57.14
Max =					**13.61**					**18.39**					**59.03**

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

TABLE D-15
ESTIMATION OF ROOF STORAGE AND OUTFLOW - TOWER A

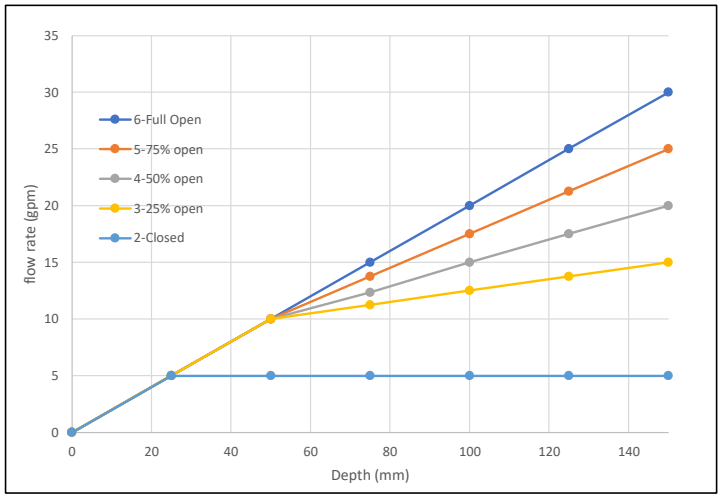
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1-None	2-Closed	3-25% open	4-50% open	5-75% open	6-Full Open
	Max Flow Rate per wier @150mm in gpm					
0	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.05	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.1	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.15	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
2-Closed	0	5	5	5	5	5	5	0.315
3-25% open	0	5	10	11.25	12.5	13.75	15	0.946
4-50% open	0	5	10	12.35	15	17.5	20	1.262
5-75% open	0	5	10	13.75	17.5	21.25	25	1.577
6-Full Open	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION

Buidling Number	**D-15**	
Total Roof Area (m2)	**892**	
Minimium Number of Drains Required	1.0	*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)	20,523	
Max Permitted Load from All Drains (L/sec)	22.8	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	400	
Estimated Distance from roof edge to drains (m)	**10**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated No. of Drains Requried	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	7	*Use if known*
Effecive Roof Percentage (%)	**74%**	*Allowance for 100 s.m. of Mechanical units on roof plus 130 s.m terrace*
Effecive Total Roof Area (m2)	662	
Area per Drain (m2)	95	*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)	44.6	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	13.2	*Based on Maximum Depth of Ponding of 150mm*
Equiv Runoff C for 100-yr Storm	0.30	*Based on 100-yr storm Intensity of 178.6 mm/hr, where I =1735.688 / (Tc + 6.014)^0.820, with Tc=10min)*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH			Total Ponding Volume - All Drains (m3)
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 (m2)	Ponding Volume Per Drain (m3)	
0	0	0.00	0.00000	0	0.0	0.0	0.0
0.025	5	0.32	0.00221	0.025	2.6	0.0	0.2
0.05	10	0.63	0.00442	0.05	10.5	0.2	1.2
0.075	15	0.95	0.00662	0.075	23.7	0.6	4.1
0.1	20	1.26	0.00883	0.1	42.1	1.4	9.8
0.125	25	1.58	0.01104	0.125	65.7	2.7	19.2
0.15	30	1.89	0.01325	0.15	94.6	4.7	33.1
Weir Position = **6-Full Open**							

RATING CURVE FOR MODELLING OUTLET

Head or Ponding Depth (m)	Outlfow (L/sec)
0	0.0000
0.025	2.2082
0.05	4.4163
0.075	6.6245
0.1	8.8326
0.125	11.0408
0.15	13.2489

RATING CURVE FOR MODELLING ROOF STORAGE

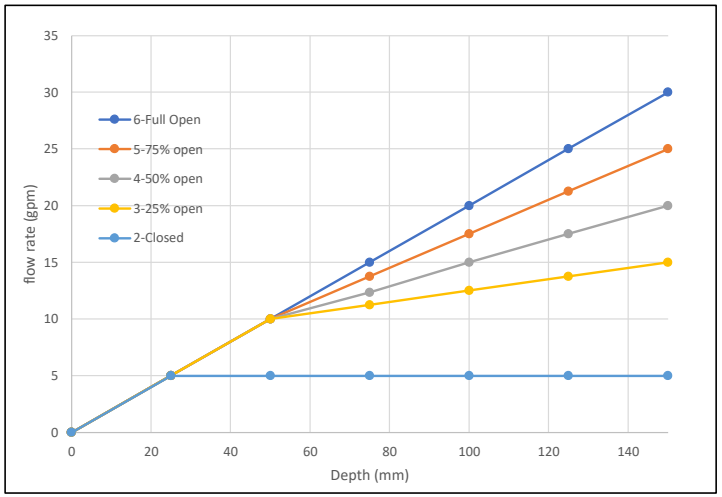
Head or Ponding Depth (m)	Ponding Area (m2)
0	0.0
0.025	2.6
0.05	10.5
0.075	23.7
0.1	42.1
0.125	65.7
0.15	94.6

TABLE D-16
ESTIMATION OF ROOF STORAGE AND OUTFLOW - TOWER B

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

Depth	Weir Position					
	1-None	2-Closed	3-25% open	4-50% open	5-75% open	6-Full Open
	Max Flow Rate per wier @150mm in gpm					
0	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.05	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.1	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.15	0	5	15	20	25	30

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



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
2-Closed	0	5	5	5	5	5	5	0.315
3-25% open	0	5	10	11.25	12.5	13.75	15	0.946
4-50% open	0	5	10	12.35	15	17.5	20	1.262
5-75% open	0	5	10	13.75	17.5	21.25	25	1.577
6-Full Open	0	5	10	15	20	25	30	1.893

BUILDING ROOF INFORMATION

Buidling Number	**D-16**	
Total Roof Area (m2)	**1114**	
Minimium Number of Drains Required	1.2	*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)	25,627	
Max Permitted Load from All Drains (L/sec)	28.5	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	400	
Estimated Distance from roof edge to drains (m)	**10**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated No. of Drains Requried	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	7	*Use if known*
Effecive Roof Percentage (%)	**72%**	*Allowance for 100 s.m. of Mechanical units on roof plus 208s.m terrace*
Effecive Total Roof Area (m2)	806	
Area per Drain (m2)	115	*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)	55.7	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	13.2	*Based on Maximum Depth of Ponding of 150mm*
Equiv Runoff C for 100-yr Storm	0.24	*Based on 100-yr storm Intensity of 178.6 mm/hr, where I =1735.688 / (Tc + 6.014)^0.820, with Tc=10min)*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH			Total Ponding Volume - All Drains (m3)
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 (m2)	Ponding Volume Per Drain (m3)	
0	0	0.00	0.00000	0	0.0	0.0	0.0
0.025	5	0.32	0.00221	0.025	3.2	0.0	0.2
0.05	10	0.63	0.00442	0.05	12.8	0.2	1.5
0.075	15	0.95	0.00662	0.075	28.8	0.7	5.0
0.1	20	1.26	0.00883	0.1	51.2	1.7	11.9
0.125	25	1.58	0.01104	0.125	80.0	3.3	23.3
0.15	30	1.89	0.01325	0.15	115.2	5.8	40.3
Weir Position =	**6-Full Open**						

RATING CURVE FOR MODELLING OUTLET

Head or Ponding Depth (m)	Outlfow (L/sec)
0	0.0000
0.025	2.2082
0.05	4.4163
0.075	6.6245
0.1	8.8326
0.125	11.0408
0.15	13.2489

RATING CURVE FOR MODELLING ROOF STORAGE

Head or Ponding Depth (m)	Ponding Area (m2)
0	0.0
0.025	3.2
0.05	12.8
0.075	28.8
0.1	51.2
0.125	80.0
0.15	115.2

Appendix E – Consultation / Correspondence

Pre-consultation meeting minutes

Email on Water System Boundary Conditions

Email Sent to RCVA on Stormwater Management Requirements

Email Received from RCVA on Stormwater Management Requirements

365 Forest Street, 1420 Richmond Road & 2583-2589 Bond Street
Pre-Consultation Meeting Minutes

Location: Room 4103E, City Hall
Date: May 28, 2pm to 3pm

Attendee	Role	Organization
Mary Dickinson	Planner	City of Ottawa
Santosh Kuruvilla	Project Manager (Infrastructure)	
Melanie Knight	Planner (Urban Design)	
Samantha Gatchene	Planning Assistant	
Jamie Posen	Planner	FoTenn
Steve Heafey	Owner's Representative	Heafey Group
Carmine Zayoun	Owner's Representative	
Shawn Vandette	Owner	
Mathieu LaPalm	Architect	LaPalm Rheault Architects

Comments from Applicant

1. The applicant is proposing the development two 12-storey high rise buildings at 365 Forest Street, 1420 Richmond Road, and 2583-2589 Bond Street. The buildings would be residential in nature with 333 units total. Currently, no commercial uses at grade are proposed.
2. Underground parking and surface vehicle parking would be provided as well as bicycle parking.
3. The current two access points off Richmond Road and Forest Street are proposed to be maintained.

Planning Comments

1. A Zoning By-law Amendment and an Official Plan Amendment would be required to permit the 12-storey building option, in accordance with the settlement of Official Plan Amendment 150 (OPA 150). The amendment to Section 3.6.3 maintains that up to 9-storeys is permitted on Arterial Mainstreets unless stated in a secondary plan or if the building is located at a qualifying node defined as a location that is:

    a. within 400 metres walking distance of a Rapid Transit Station on Schedule D of this Plan; or
    b. directly abutting an intersection of the Mainstreet with another Mainstreet or a Transit Priority Corridor on Schedule D of this Plan; or

c. directly abutting a Major Urban Facility.

2. Under OPA 150, the site is not considered a node and would require an OPA. Information regarding the settlement of OPA 150 building height and design appeals can be found in the April 24th Planning Committee Report.

3. The City is in the early stages of creating a secondary plan for the area. This process is scheduled to begin in late 2019/early 2020. City staff strongly encourage the applicant to participate in that process.

4. Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval as per the Parkland Dedication By-law. For commercial and industrial purposes, parkland is calculated as 2% of the gross land area of the site being developed.

5. Building A should include a main front entrance directly from Richmond Road, or at the corner where Richmond Road and Forest Street meet. This is in accordance with the current AM10 zoning requirements. Please refer to the development standards in this zone for all other provisions including minimum glazing, minimum ceiling heights for the first storey etc.

Urban Design Comments

1. Site design:

   - All vehicular access should be off of Forest and/or Bond. Preference would be for all vehicular access off of Bond. Bond Street should be treated as a 'laneway' to the site where access to underground parking and any loading or servicing can be located.

   - There are hydro lines along Forest and Bond, which requires minimum building setbacks. If the hydro lines are to be buried, the building should still be set back to allow for enough space for street trees along Forest and Bond.

   - A sidewalk should be provided along Forest to connect to the sidewalk recently built along Forest towards Carling (Dymon Storage site).

   - All parking should be located underground. This would significantly improve the immediate area, which is dominated by surface parking lots.

   - There is an opportunity at the corner of Richmond and Forest to create a plaza space either as a POPS (privately owned public spaces) or a patio space associated with a commercial use

2. Built form/building design:

- The building separation in the current design between Building A and B should be maintained to break up the façade along Forest.

- The long frontage along Forest needs to be designed well to ensure that there is permeability to the site and the buildings do not negatively dominate the streetscape.

3. Building A (12 storeys)

   - With vehicular access from Richmond removed, the building fronting onto Richmond Road can be designed as a complete perimetre corner building with design emphasis on the corner of Richmond and Forest.

   - Main pedestrian entrances should be located off of Richmond with a corner entrance/plaza space at the corner of Richmond and Forest.

   - The building should be designed with consideration for the City's High Rise Design Guidelines specifically with respect to built form (chapter 2).

   - Consider the shadowing impacts to the low-rise residential homes on the north side of Richmond Road with the shaping of Building A

4. Building B (12 storeys)

   - At 12 storeys, the mass of Building B dominates the site and Bond Street. A reduced building footprint and a reduced height down to 9 storeys is recommended. Please refer to Chapter 2 in the High Rise Design Guidelines for guidance on the appropriateness, mass and height of a bar building.

   - This building should create a transition from the newly constructed building at 2599 Carling Avenue.

   - The roof top amenity space could be realigned north/south to take better advantage of sun exposure and provide relief between the Building A and B.

   - The building should be designed with consideration for the City's High Rise Design Guidelines specifically with respect to built form (Chapter 2).

5. General comments:

   - This site presents an opportunity for redevelopment which can improve the existing context that is dominated by surface parking lots and oversized (high rise) bar buildings.

   - With frontage on three streets, there is an opportunity to make a significant contribution to the public realm. Please refer to the City's High Rise Design

Guidelines (chapter 3) for more direction on the design of the pedestrian realm.

Engineering Comments

1. Stormwater quantity control criteria – control the quantity to the 5-year pre-development/existing level for all storms up to and including the 100-year storm.

2. When calculating the existing composite runoff coefficient (C) for the site, please provide a drawing showing the individual area and its runoff coefficient.

3. It appears that the subject site consists of more than one parcel. Therefore, MECP ECA is required. All parcels can be merged into one to avoid MECP ECA requirement.

4. Stormwater quality control – Consult with the Conservation Authority (RVCA) for their requirements. Include the correspondence with RVCA in the stormwater/site servicing report.

5. Show the existing storm and sanitary lateral service connections on the site servicing plan.

6. When using the modified rational method to calculate the storage requirements for the site, the underground storage should not be included in the overall available storage. The modified rational method assumes that the restricted flow rate is constant throughout the storm which, in this case, underestimates the storage requirement prior to the 1: 100-year head elevation being reached. Alternately, if you wish to include the underground storage, you may use an assumed average release rate equal to 50% of the peak allowable rate. Otherwise, disregard the underground storage as available storage or provide modeling to support the design.

7. Engineering plans are to be submitted on standard A1 size (594mm x 841mm) sheets.

8. Provide the following information for water main boundary conditions:
    a. Location map with water service connection location
    b. Average daily demand (l/s)
    c. Maximum daily demand (l/s)
    d. Maximum hourly demand
    e. Fire flow demand (provide fire detailed flow calculations based on the fire underwriters survey method)
    f. If you are proposing any exterior light fixtures, all must be included and approved as part of the site plan approval. Therefore, the lights must be clearly identified by make, model and part number. All external light

fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. The location of all exterior fixtures, a table showing the fixture types (including make, model, part number), and the mounting heights must be included on a plan.

Transportation Comments

1. Please revise your screening form to indicate that the property is located on a Spine Bicycle Network (Richmond)

2. Follow Traffic Impact Assessment Guidelines
    a. Traffic Impact Assessment will be required.
    b. Start this process asap.
    c. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).

3. ROW protection on Richmond between HWY 417 and Ottawa River Parkway is 37.5m even (18.75 metres from centreline of road).

4. Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following location on the final plan will be required:
    a. Local Road to Local Road: 3 metre x 3 metres
    b. Local Road to Arterial Road: 5 metre x 5 metres

5. Noise Impact Studies required for the following:
    a. Road
    b. Stationary (due to the proximity to neighbouring exposed mechanical equipment) and/or (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)

6. Clear throat requirements on an arterial (Richmond) are as follows:

Apartments	Unit Count	Length (m)
	<100 units	15
	100-200 units	25
	>200 units	40

**Please note that vehicular access from Richmond Road is not our desired configuration.

7. On site plan:
    a. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    b. Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    c. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    d. Show lane/aisle widths.
    e. Sidewalk and cycle tracks are to be continuous across access as per City Specification 7.1.
    f. Grey out any area that will not be impacted by this application.

Requested Plans and Studies

1. A list of required plans and studies required for a complete combined Official Plan Amendment, Zoning By-law Amendment and Site Plan Control application have been attached.

Process

1. This is a pre-consultation to determine the nature of the application and the requirements for a complete application.

    a. For an Official Plan Amendment application, subject to Public Consultation, the application form, timeline, and fees can be found here.

    b. For a Major Zoning By-law Amendment application, Manager Approval, subject to Public Consultation, the application form, timeline, and fees can be found here.

2. This proposal will trigger a Site Plan Control application, Manager Approval, subject to Public Consultation. The proposal would fall under the 'complex' category as per the Site Plan Control Subtype Threholds. The application form, timeline and fees can be found here.

3. The applicant will be required to present their proposal to the Urban Design Review Panel (UDRP). The site is in a Design Priority Area and a pre-consultation is recommended. The next UDRP meeting is scheduled for Friday, July 12th and the submission deadline is Friday, June 28. Information regarding the review process and timelines can be found here.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at mary.dickinson@ottawa.ca or at 613-580-2424 extension 13923 if you have any questions.

Sincerely,

Mary Dickinson MCIP RPP
Planner II
Development Review - West

Jason Fitzpatrick

From: Kuruvilla, Santhosh <Santhosh.Kuruvilla@ottawa.ca>
Sent: Wednesday, July 24, 2019 9:42 AM
To: Dickinson, Mary; Jason Fitzpatrick
Subject: RE: Request for Boundary Conditions - 365 Forest Street
Attachments: 365 Forest July 2019.pdf

Categories: RECEIVED - ACTION REQUIRED

Hi Jason,

Here is the boundary conditions for the subject application. Please see attached for the connection locations.

The following are boundary conditions, HGL, for hydraulic analysis at 365 Forest (zone 1W) assumed to be connected to the 305mm on Forest and 305mm on Richmond (see attached PDF for location).

Minimum HGL = 108.5m, same at both connections

Maximum HGL = 115.7m, same at both connections

MaxDay + FireFlow (150L/s) = 107.0m, Forest connection

MaxDay + FireFlow (150L/s) = 109.0m, Richmond connection

These are for current conditions and are based on computer model simulation.

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.

Santhosh

From: Dickinson, Mary
Sent: July 10, 2019 3:58 PM
To: Kuruvilla, Santhosh <Santhosh.Kuruvilla@ottawa.ca>; jason.fitzpatrick@exp.com
Subject: FW: Request for Boundary Conditions - 365 Forest Street

Hi Jason,

I'm forwarding your request to Santhosh Kuruvilla who will be able to make the request for the boundary conditions.

Thank you,
Mary

Mary Dickinson, MCIP, RPP
Planner
Development Review West
Urbaniste
Examen des demandes d'aménagement ouest

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 13923
ottawa.ca/planning / ottawa.ca/urbanisme

From: Jason Fitzpatrick <jason.fitzpatrick@exp.com>
Sent: July 10, 2019 3:32 PM
To: Dickinson, Mary <mary.dickinson@ottawa.ca>
Cc: Bruce Thomas <bruce.thomas@exp.com>; Moe Ghadban <Moe.Ghadban@exp.com>
Subject: Request for Boundary Conditions - 365 Forest Street

Hi Mary,

We are working with the Heafey Group on a site plan application for 365 Forest Street, and would appreciate if you could arrange for IAD/water Resources to provide hydraulic boundary conditions that we will need for the watermain design. I have attached a sketch of the site and the approximate boundary condition locations. We are requesting boundary conditions at locations at this time to evaluate the best connection location within the right of way.

The following is a summary of the demands and the required fire flows (RFF) we have estimated. We would appreciate the hydraulic boundary conditions based on our estimated water demands and required fire flows as noted below:

Average Day: 2.4 L/sec
Max Day: 6.0 L/sec
Peak Hour: 13.2 L/sec
Fire flow (RFF): Tower A: 100 L/sec, Tower B: 150 L/sec (worst case). (based on FUS method)
Max Day + FF: 156.0 L/sec.

In the event you require confirmation of the above demands and the RFF, I've attached the design tables for reference.

Regards,

Jason Fitzpatrick, P.Eng.
EXP | Project Engineer
t : +1.613.688.1899 | m : +1.613.302.7441 | e : jason.fitzpatrick@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

exp.com | legal disclaimer
keep it green, read from the screen

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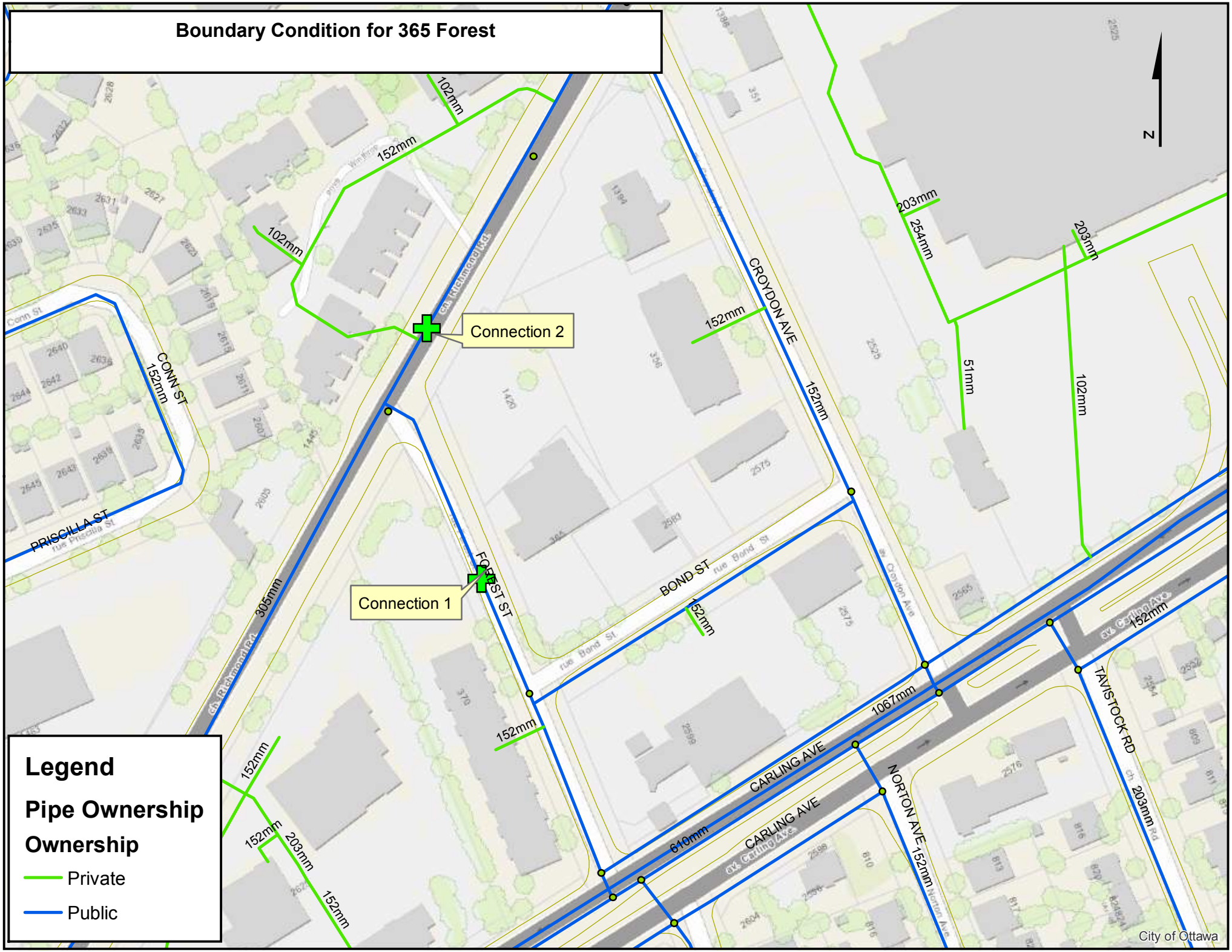

Boundary Condition for 365 Forest
Connection 2
Connection 1
CONN ST
152mm
PRISCILLA ST
305mm
FOREST ST
152mm
BOND ST
152mm
CROYDON AVE
152mm
102mm
152mm
102mm
203mm
254mm
203mm
51mm
102mm
152mm
152mm
152mm
203mm
152mm
1067mm
CARLING AVE
610mm
CARLING AVE
NORTON AVE
152mm
TAVISTOCK RD
203mm
152mm
N
Legend
Pipe Ownership
Ownership
Private
Public
City of Ottawa

Moe Ghadban

From: Moe Ghadban
Sent: Monday, September 23, 2019 9:20 AM
To: glen.mcdonald@rvca.ca
Cc: Jason Fitzpatrick
Subject: Request for SWM Criteria for 365 Forest Street
Attachments: 365 Forest Street.pdf

Hi Glen,

We are preparing a site servicing and stormwater report for a client who is proposing to construct two high rise buildings at 365 Forest street. Tower A is a 13-storey high-rise comprised of 235 units and Tower B is 12-storeys and comprised of 140 units. (See attached PDF)

There will be a shared underground parking garage for both high rise buildings.

We are emailing the Conservation Authority to provide the water quality requirements for the proposed development.

Thank you for your review and input.

Regards,

Moe Ghadban
EXP | Engineering Designer
t : +1.613.688.1899 | m : +1.613.808.4089 | e : moe.ghadban@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

Moe Ghadban

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Tuesday, October 15, 2019 9:31 AM
To: Moe Ghadban
Cc: Jason Fitzpatrick
Subject: RE: Request for SWM Criteria for 365 Forest Street

Hi Moe,

The RVCA has will not require quality control protection for the city, however encourage best management practices where possible.

Thank you,

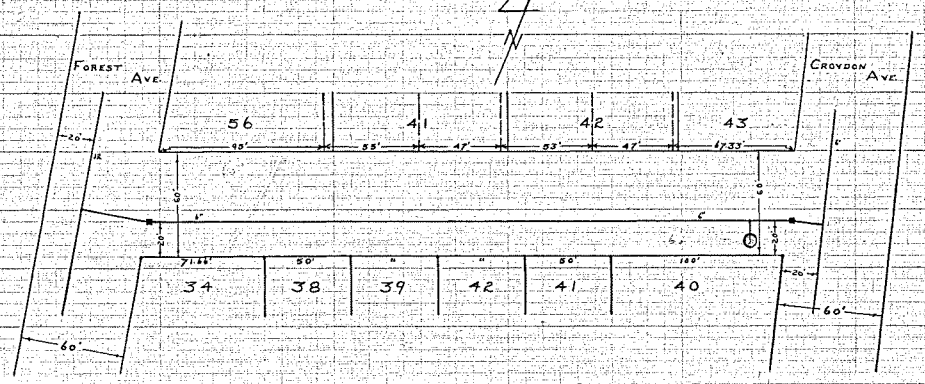
Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

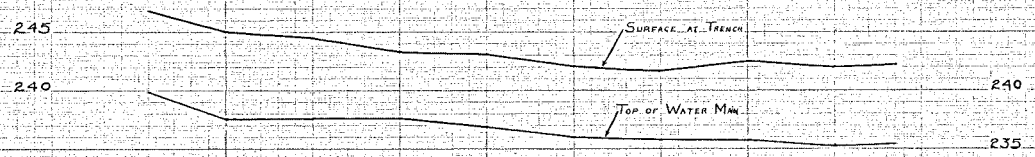
Appendix F – Background Information

City of Ottawa Vault Drawings (Plan and Profiles)

WATTS ACCUTROL Weir for Roof Drains

BOND ST.





0+45 - 6"x12" SDR @ FOREST
0+84 - 6" VALVE
1+00
1+00
2+00
3+00
3+40 - HYD 11 OFF 6"WM
3+64 - 6" VALVE
3+85 - 6"x6" SDR @ CROYDON

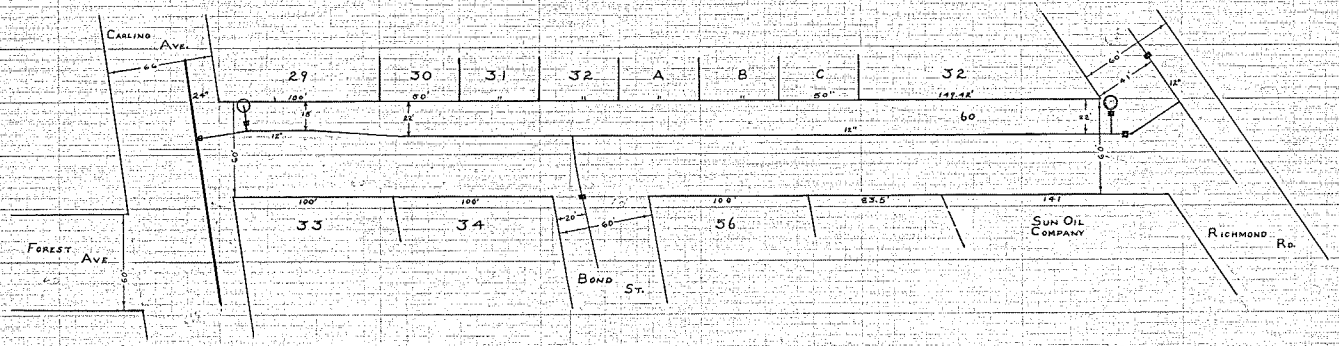
CITY OF OTTAWA
WATER WORKS DEPARTMENT

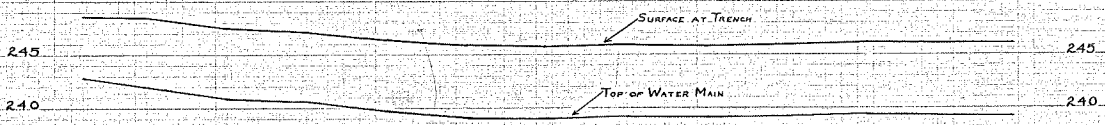
6" W.M. INSTALLED ON BOND ST.
FROM FOREST AVE.
TO CROYDON AVE.

DWN BY L. A. Irvine — DATE: JAN. 29/60
ENGINEER — SCALE: HOR. 1"=40' VERT. 1"=5'
DEPUTY COMMISSIONER — INSTALLED: SEPT. 1959
COMMISSIONER OF WATER WORKS — BOOK NO. 170

6114

FOREST AVE.

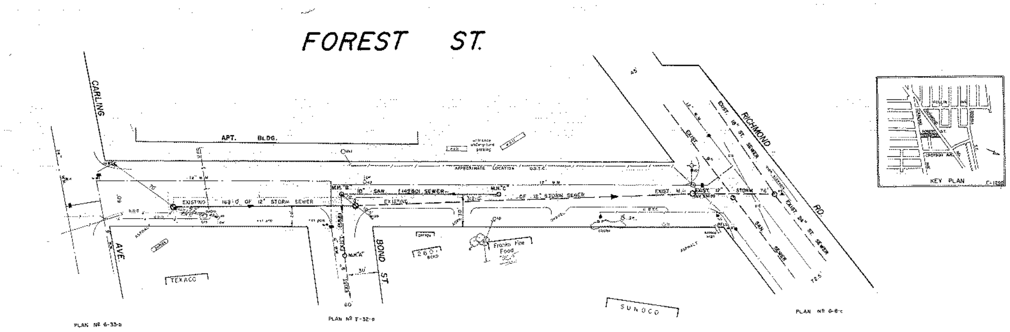


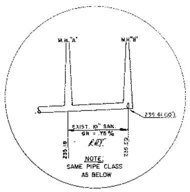


0+00 - EXISTING ON FOR. HYD
0+10 - EXISTING ON FOR. HYD
1+00
2+00
2+35 - 6"x12" SDR BOND ST
3+00
4+00
5+00
5+50 - 6"x12" HOFF & WM.
5+78 - 12" VALVE
5+92 - 12" DI PIPE
5+92 - 12"x12" SDR RICHMOND RD.

CITY OF OTTAWA WATER WORKS DEPARTMENT	
12" W.M. INSTALLED ON FOREST AVE. FROM CARLING AVE. TO RICHMOND RD.	
DWN BY: L. D. Irvine	DATE: FEB. 1/60
ENGINEER W.	SCALE HOR.: 1"=40' VERT.: 1"=4'
DEPUTY COMMISSIONER	INSTALLED: SEPT. 1959
COMMISSIONER OF WATER WORKS	BOOK NO.: 170

6114





FINAL MEASUREMENTS
SANITARY SEWER
WORK START FEB 72
WORK COMP. MAR 72
INSPECTOR T. CONNORS
CONTRACTOR TIRRELL CONST.
INST'L MAN D. M'NAB
BOOK 3535 REL.
JUNE 8 /72

CITY OF OTTAWA DEPARTMENT OF PHYSICAL ENVIRONMENT SEWER SERVICES AND POLLUTION CONTROL BRANCH			
PROPOSED STORM SEWER IN FOREST ST FROM CHAINAGE 1+53 to 6+32			
L.D. SMITH P.Eng. BRANCH DIRECTOR	DATE APRIL 5,74	CHECKED BY	SCALE HOR. 1"=40' VER. 1"= 6'
J.E. MacKenzie P.Eng. COMMISSIONER	FIELD BOOK	DRAWN BY P.F. BARBS	PLAN Nº.
DESIGNED BY	CHIEF DESIGN AND CONST. ENGIN.		

NOTE

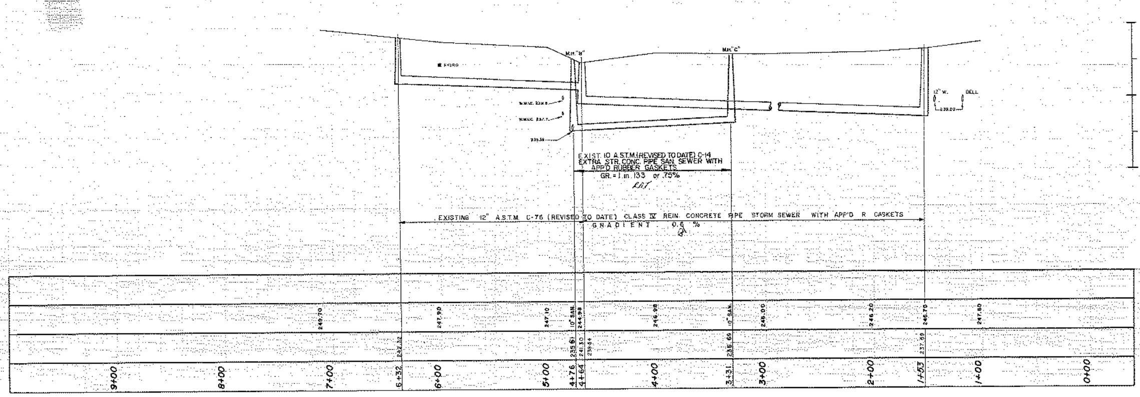
SOILS INFORMATION SHOWN IS NOT GUARANTEED AND CONTRACTORS ARE ADVISED TO COLLECT ADDITIONAL INFORMATION AS DEEMED NECESSARY.

UTILITIES SHOWN ARE TAKEN FROM THE BEST AVAILABLE RECORDS CONTRACTOR IS REQUESTED TO CHECK WITH ALL UTILITY COMPANIES BEFORE DIGGING.

FINAL MEASURMENT	
FOREST ST. FROM RICHMOND	FOR STORM TO 480' SOUTH
WORK START. OCT.1,74 WORK COMP. OCT.25,74 FINAL MEAS. OCT.24,74	DESIGNER K. SPERO INSPECTOR E. CONNERS CONTRACTOR HANSEN
FIELD BOOKS DESIGN 3681 CONSTR. 3681 FINAL MEAS. 3681	INST. MAN R. ST GERMAIN APPROVED BY. D. SMALL CONTRACT NO. FINAL MEAS. FOLDER 1309
TO ORIGINALS K. TOEG	DATE : NOV. 29, 74

CITY OF OTTAWA BENCH MARK N-52 CARLING & FOREST
ELEVATION 249.86

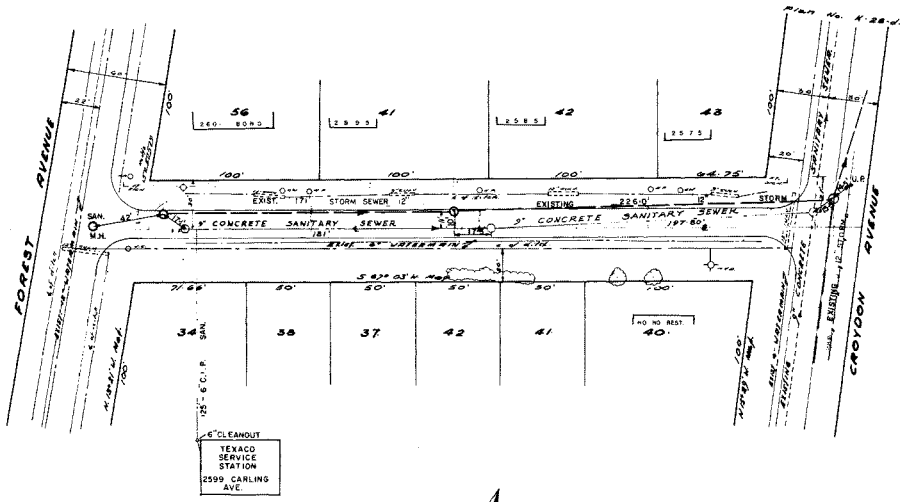
27/1/72 BELL TEL. AS INDICATED
WATER
GAS NILL
HYDRO NILL
16/2/74 BELL TEL. AS INDICATED
HYDRO



SANITARY SEWER
IN
FOREST ST
FROM FOREST TO 145' NORTH
1"=40'
1"=6'
27 / 1 / 71
3535
D-38-c

D38c

BOND STREET



NOTE
UTILITIES SHOWN ARE TAKEN FROM THE BEST AVAILABLE RECORDS. CONTRACTORS ARE REQUESTED TO CHECK WITH ALL UTILITY COMPANIES BEFORE DIGGING.

SOILS INFORMATION SHOWN IS NOT GUARANTEED AND CONTRACTORS ARE ADVISED TO COLLECT ADDITIONAL SOILS INFORMATION AS DEEMED NECESSARY.

NOTES

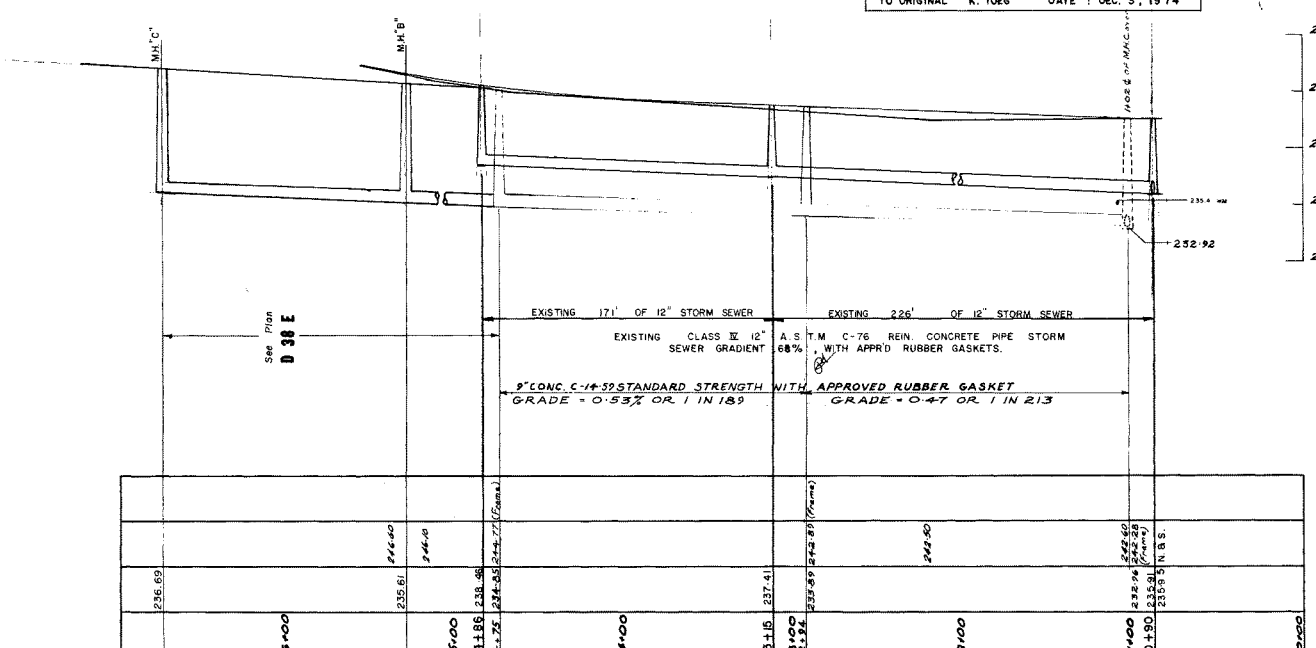
REG'D PLAN N° : 511 & 548.
AYDELOTT - 1967/68 P.E. HAYES.

FINAL MEASURMENT	
BOND STREET FROM CROYDON AVE.	FOR STORM SEWER TO FOREST AVE.
WORK START. OCT. 1, 74	DESIGNER K. SPERO
WORK COMP. OCT. 25, 74	CONTRACTOR HANBEN
FINAL MEAS. OCT. 24, 74	INSPECTOR E. CONNERS
FIELD BOOKS	INST. MAN R. ST GERMAIN
DESIGN 3681	APPROVED BY D. SMALL
CONSTR, 3681	
FINAL MEAS. 3681	F. M. FOLDER 1309
TO ORIGINAL K. TOEG	DATE : DEC. 3, 1974

CITY OF OTTAWA
DEPARTMENT OF PHYSICAL ENVIRONMENT
SEWER SERVICES AND POLLUTION CONTROL BRANCH
STORM SEWER
BOND STREET

K.C. SPERO DESIGNED BY	DRAWN BY P.E. HAYES	SCALE HOR. 1"=40' VER. 1"=5'
L.D. SMITH, P. ENG. DIRECTOR	CHECKED BY	DATE APRIL, 3/74
J.E. MCKENZIE, P. ENG. COMMISSIONER		
CHIEF DESIGN AND CONST. ENGINEER	FIELD BOOK 3681	PLAN N°

REVISIONS			
DATE:	DESCRIPTION	DRN. BY	APP'D BY
	SANITARY SEWER Work Commenced Nov. 1961 Work Completed Nov. 1961 Contractor Sparling Const. Inspector A. Shields Final Measurments Dec. 12/61 Book 307a Page 22 Instrumentman D.R. McNab		



HOUSE CONNECTIONS

HOUSE	LENGTH	LOCATION
2583	33'	13' E/M.H. 2+94
2595	33'	88' W/M.H. 2+74
2601	33'	5' E/M.H. 4+75

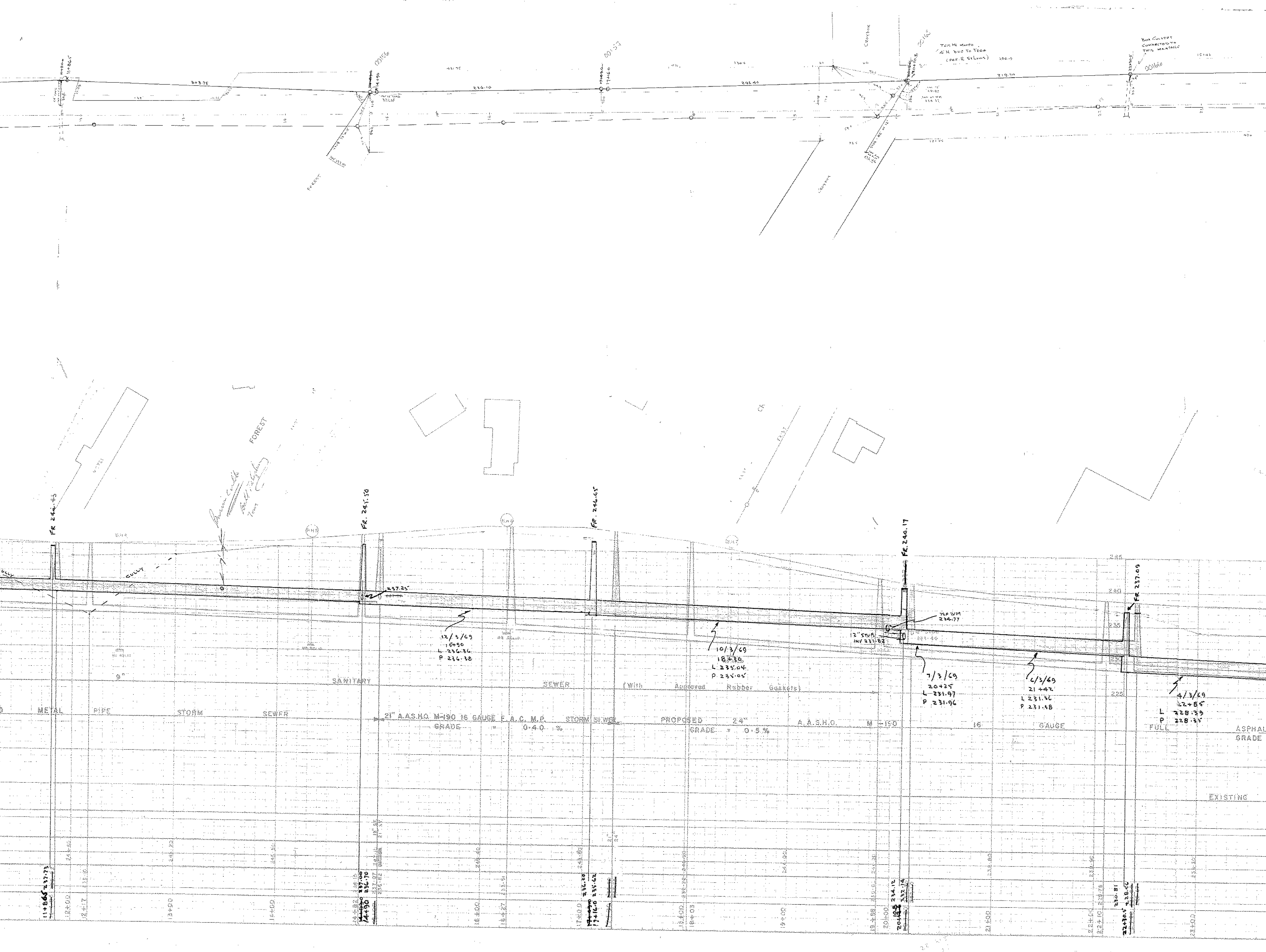
DESIGN BY	DATE
ROAD GRADE	
SAN. SEWER C.McCoomb	July 20/61
STORM SEWER K.C.Spero	

CITY OF OTTAWA
PLANNING AND WORKS DEPARTMENT
SEWERAGE AND DRAINAGE

BOND STREET
CROYDON AVE. to FOREST AVENUE.

	DRAWN BY: P. H.D.	SCALE: Hor: 1"=40' Ver: 1"=5'
	CHECKED BY: C.M.	DATE: PLAN N°
P.E. AYERS ASSN.	AUGUST 1961	E-32-a.

P.32a


FOREST
FR. 244.73
FR. 245.30
FR. 246.65
FR. 244.17
FR 237.09
GULLY
12/3/69
15+90
L 236.36
P 236.38
10/3/69
18+30
L 235.04
P 235.05
12" STUB
INV 231.82
TOP WM
234.77
7/3/69
20+25
L 231.97
P 231.96
6/3/69
21+42
L 231.36
P 231.38
4/3/69
22+85
L 228.39
P 228.38
9"
SANITARY SEWER (With Approved Rubber Gaskets)
METAL PIPE STORM SEWER
21" A.A.S.H.O. M-190 16 GAUGE F.A.C.M.P. STORM SEWER
GRADE = 0.40 %
PROPOSED 24" A.A.S.H.O. M-190 16 GAUGE FULL ASPHAL
GRADE = 0.5%
GRADE
EXISTING
11+86
13+00
14+00
16+00
17+00
19+00
20+00
21+00
22+00

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

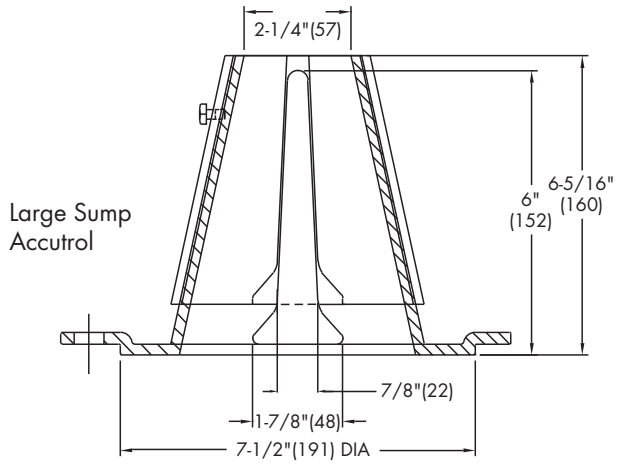
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

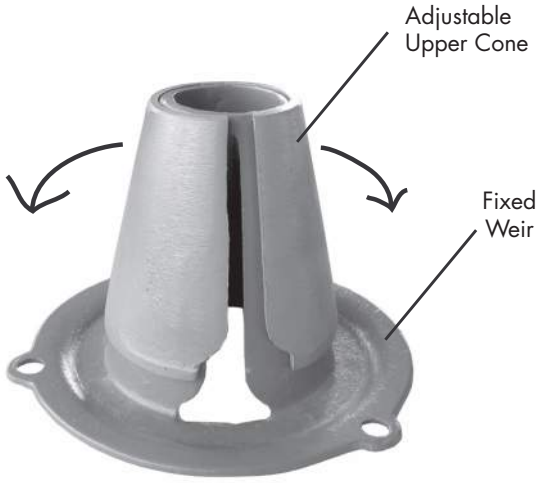
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 _____

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

WATTS®
A Watts Water Technologies Company

Appendix G – Checklist

GENERAL CONTENT		RESPONSE
☐	Executive Summary (for larger reports only).	Not included
☒	Date and revision number of the report.	Date of report provided
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Page 1 and Appendix G
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 2 of report
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	In Appendix E
☐	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	No Master Servicing Studies.
☒	Statement of objectives and servicing criteria.	Section 1 of report
☒	Identification of existing and proposed infrastructure available in the immediate area.	Section 2 & 3 of report
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Not applicable
☐	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Not applicable
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	Not applicable
☐	Proposed phasing of the development, if applicable.	Not applicable
☐	Reference to geotechnical studies and recommendations concerning servicing.	Not applicable
☒	All preliminary and formal site plan submissions should have the following information: Metric scale North arrow (including construction North) Key plan name and contact information of applicant and property owner Property limits including bearings and dimensions Existing and proposed structures and parking areas Easements, road widening and rights-of-way Adjacent street names	Functional Report, Civil and Architectural Plans provided all this information.
DEVELOPMENT SERVICING REPORT: WATER		**RESPONSE**
☐	Confirm consistency with Master Servicing Study, if available Availability of public infrastructure to service proposed development Identification of system constraints	Not applicable
☒	Identify boundary conditions	Section 4.6
☒	Confirmation of adequate domestic supply and pressure	Section 4.3
☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 4.7
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Section 4.6 & Table B-5 Appendix B
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	Not applicable
☒	Address reliability requirements such as appropriate location of shut-off valves Check on the necessity of a pressure zone boundary modification.	Section 4.3
☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Section 4.5 & Table B-1 Appendix B
☒	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Section 4.2

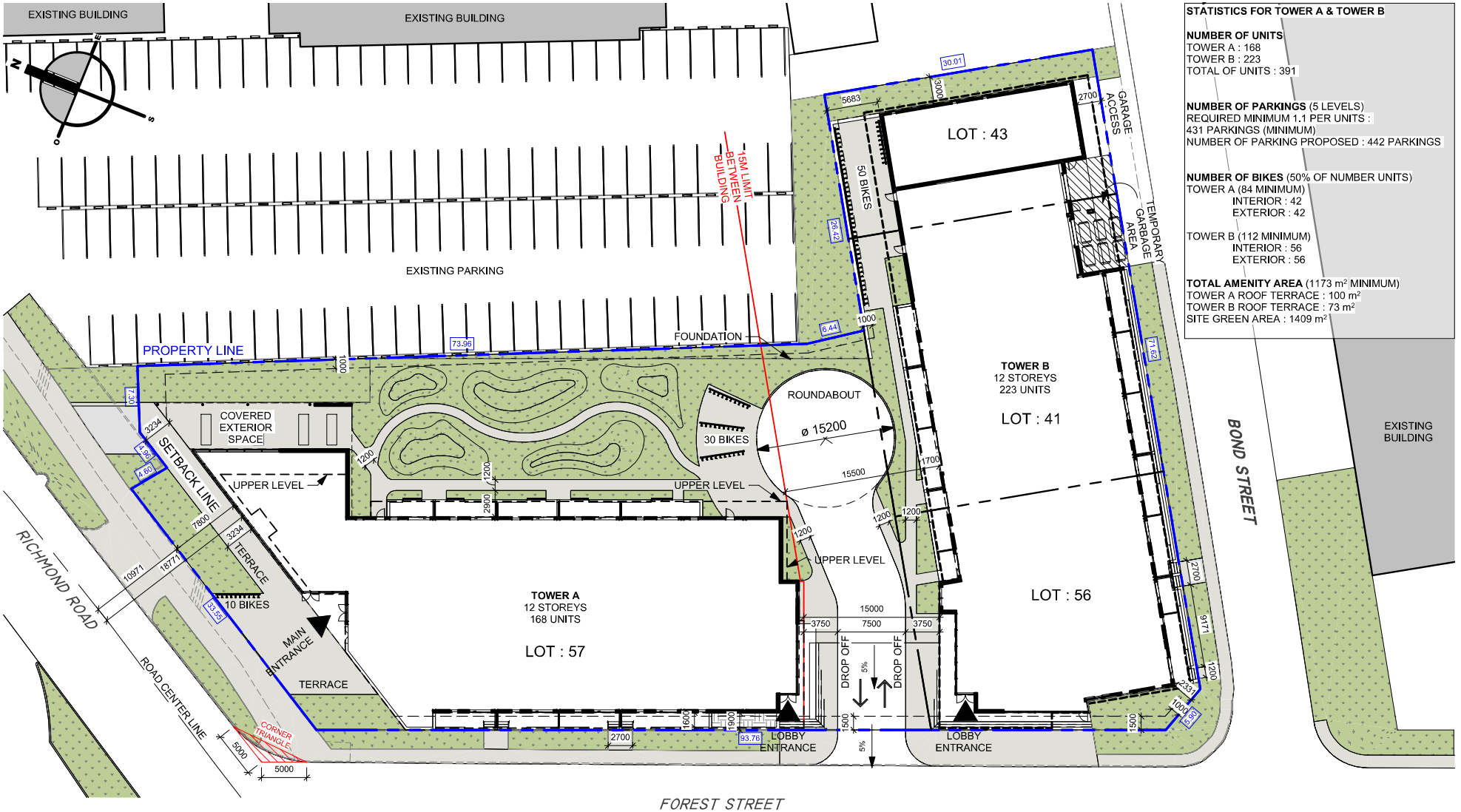
☐	Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	Not applicable
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Table B-1 Appendix B
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Not applicable
DEVELOPMENT SERVICING REPORT: WASTEWATER		**RESPONSE**
☒	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 5.1
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	Not applicable
☒	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	Section 5.2
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2
☐	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Not applicable
☒	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Table C-6 in Appendix C
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	Not applicable
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	Not applicable
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	Not applicable
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	Not applicable
☐	Special considerations such as contamination, corrosive environment etc.	Not applicable
DEVELOPMENT SERVICING REPORT: STORMWATER CHECKLIST		**RESPONSE**
☒	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6
☐	Analysis of available capacity in existing public infrastructure.	Not applicable
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Figure A-1 & A-2
☐	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Not Applicable
☐	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Not Applicable
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.2 & 6.3
☐	Set-back from private sewage disposal systems. Watercourse and hazard lands setbacks.	Not Applicable
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix E
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Not Applicable
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 6.9 & Table D12-D16 of Appendix D

☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Not Applicable
☒	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 6.6, 6.8 & Table D-8 & D11 of Appendix D
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	Not Applicable
☒	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.8
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Not Applicable
☐	Identification of potential impacts to receiving watercourses Identification of municipal drains and related approval requirements.	Not Applicable
☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.9
☒	100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Grading Plan
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	Not Applicable
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	Not Applicable – No requirements from Conservation Authority
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	See geotechnical report
☒	The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:	Appendix E
☐	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in theAct.	Not Applicable
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	Not Applicable
☐	Changes to Municipal Drains.	Not Applicable
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	Not Applicable
CONCLUSION CHECKLIST		**RESPONSE**
☒	Clearly stated conclusions and recommendations	In Section 8
☒	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	Appendix E
☒	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	Signed and stamped

Appendix H – Drawings

Site Plan and Renderings (11 pages)

Civil Engineering Design Drawings by EXP (separate)



STATISTICS FOR TOWER A & TOWER B

NUMBER OF UNITS
TOWER A : 168
TOWER B : 223
TOTAL OF UNITS : 391

NUMBER OF PARKINGS (5 LEVELS)
REQUIRED MINIMUM 1.1 PER UNITS :
431 PARKINGS (MINIMUM)
NUMBER OF PARKING PROPOSED : 442 PARKINGS

NUMBER OF BIKES (50% OF NUMBER UNITS)
TOWER A (84 MINIMUM)
INTERIOR : 42
EXTERIOR : 42

TOWER B (112 MINIMUM)
INTERIOR : 56
EXTERIOR : 56

TOTAL AMENITY AREA (1173 m² MINIMUM)
TOWER A ROOF TERRACE : 100 m²
TOWER B ROOF TERRACE : 73 m²
SITE GREEN AREA : 1409 m²

TOWER A & B - SITE LEVEL 1

LAPALME RHEAULT ARCHITECTES +ASSOCIÉS

Dessiné par : Tanya Nadeau
Conçu par : Christian Rheault

53 blvd Saint-Raymond, Suite 200-A
Gatineau, QC J8Y 1R8
www.lrarch.ca

GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

1 : 400

1887-2303-19

A02

D07-12-20-0041

2021.05.21

P1 PARKING
NUMBER OF PARKING : 94 SPACES

P2 PARKING
NUMBER OF PARKING : 116 SPACES

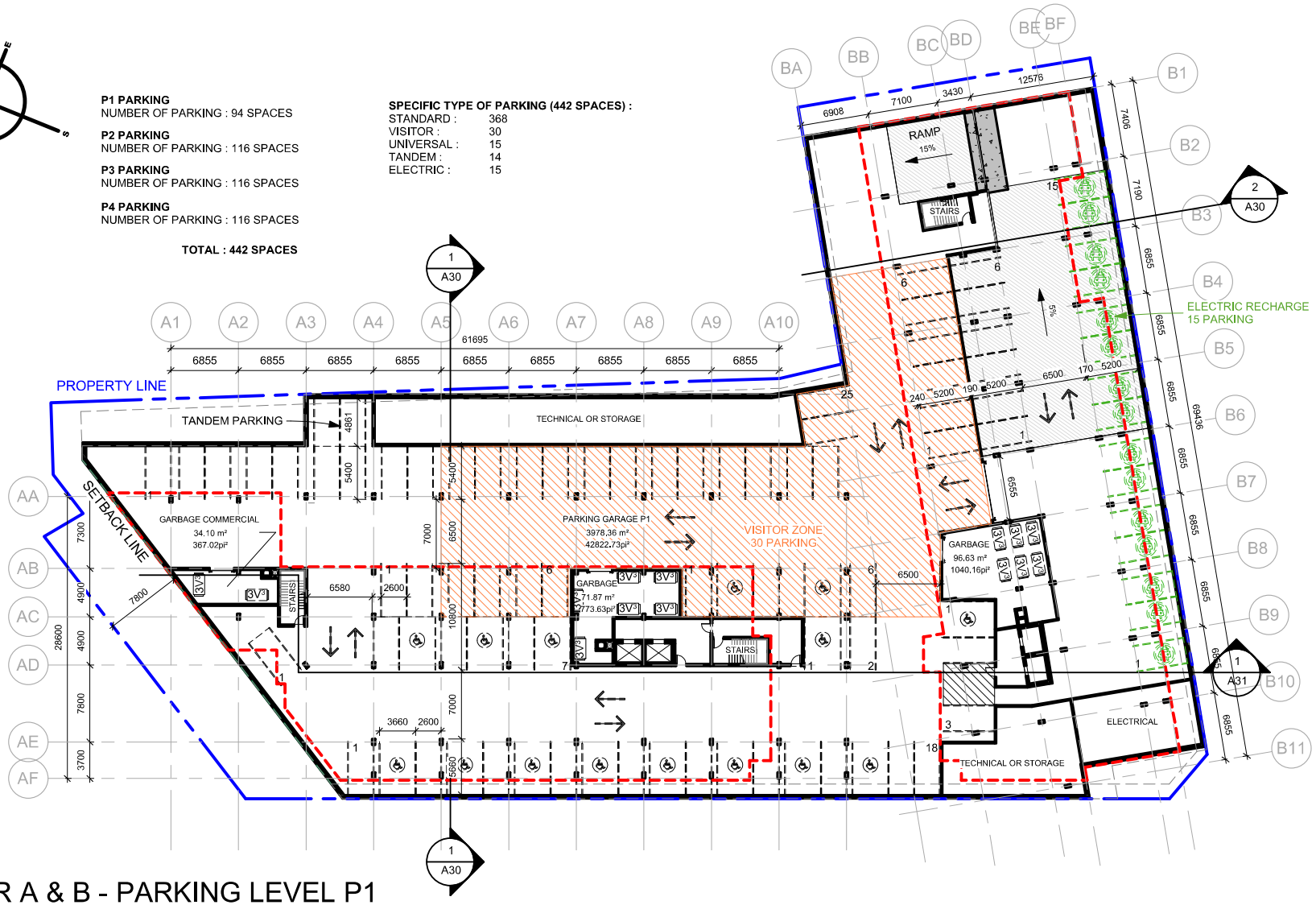
P3 PARKING
NUMBER OF PARKING : 116 SPACES

P4 PARKING
NUMBER OF PARKING : 116 SPACES

TOTAL : 442 SPACES

SPECIFIC TYPE OF PARKING (442 SPACES) :

STANDARD :	368
VISITOR :	30
UNIVERSAL :	15
TANDEM :	14
ELECTRIC :	15



TOWER A & B - PARKING LEVEL P1

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

Dessiné par : Tanya Nadeau
Conçu par : Christian Rheault

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GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

1 : 400

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A04

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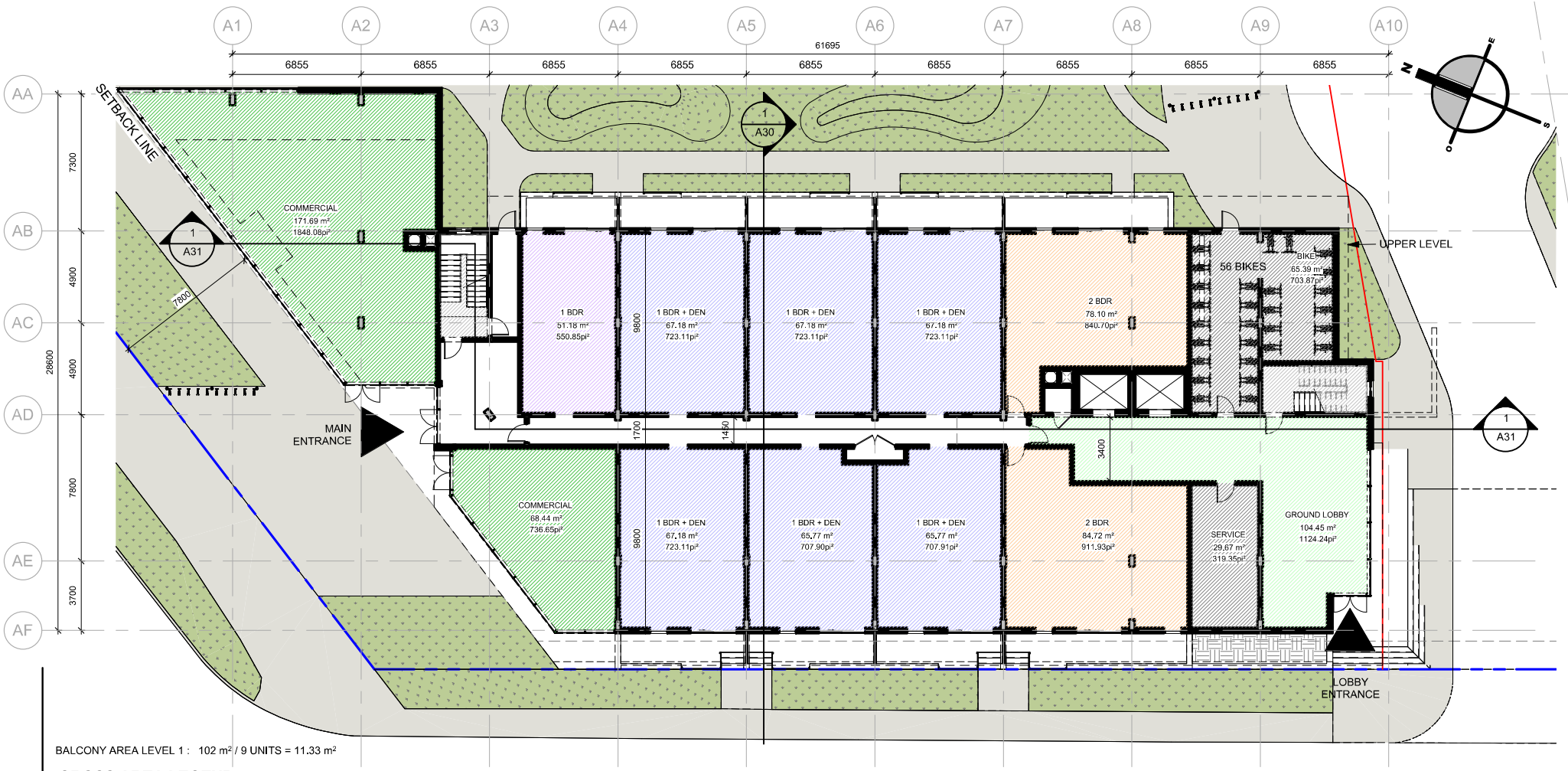

BALCONY AREA LEVEL 1 : 102 m² / 9 UNITS = 11.33 m²

GROSS AREA LEGEND

1 BDR | 1 BDR + DEN | 2 BDR | BIKE | COMMERCIAL | GROUND LOBBY | SERVICE | STAIRS

TOWER A - LEVEL 1

GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

1 : 200

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

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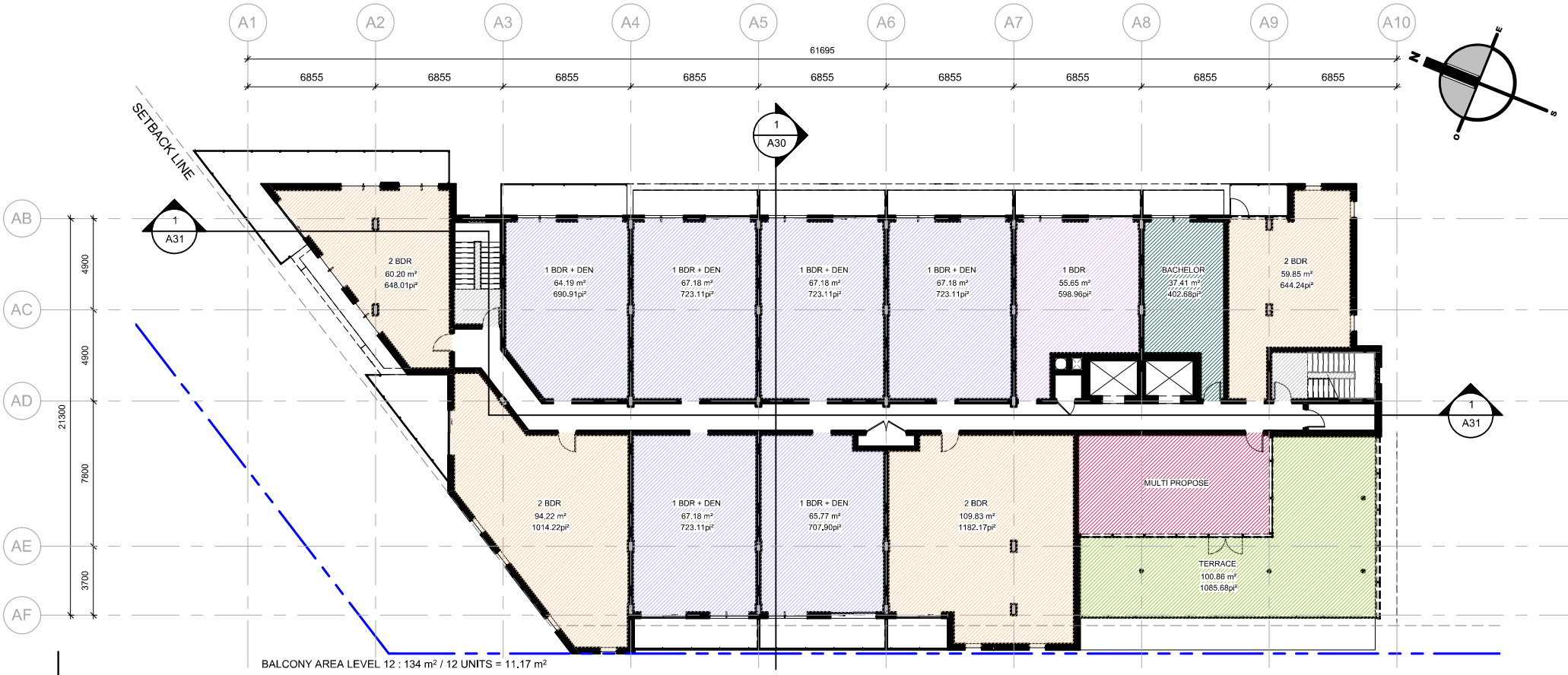

GROSS AREA LEGEND

1 BDR | 1 BDR + DEN | 2 BDR | BACHELOR | MULTI PROPOSE | STAIRS | TERRACE

TOWER A - LEVEL 12

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

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Conçu par : Christian Rheault

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GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

1 : 200

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A15

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ROOM TYPOLOGY - TOWER A

LEVEL	NAME	QTY
LEVEL 1	1 BDR	1
LEVEL 1	1 BDR + DEN	6
LEVEL 1	2 BDR	2
LEVEL 2	1 BDR	2
LEVEL 2	1 BDR + DEN	9
LEVEL 2	BACHELOR	1
LEVEL 3	1 BDR	1
LEVEL 3	1 BDR + DEN	9
LEVEL 3	2 BDR	4
LEVEL 3	BACHELOR	1
LEVEL 4	1 BDR	1
LEVEL 4	1 BDR + DEN	9
LEVEL 4	2 BDR	4
LEVEL 4	BACHELOR	1
LEVEL 5	1 BDR	1
LEVEL 5	1 BDR + DEN	9
LEVEL 5	2 BDR	4
LEVEL 5	BACHELOR	1
LEVEL 6	1 BDR	1
LEVEL 6	1 BDR + DEN	9
LEVEL 6	2 BDR	4
LEVEL 6	BACHELOR	1
LEVEL 7	1 BDR	1
LEVEL 7	1 BDR + DEN	9
LEVEL 7	2 BDR	4
LEVEL 7	BACHELOR	1
LEVEL 8	1 BDR	1
LEVEL 8	1 BDR + DEN	9
LEVEL 8	2 BDR	4
LEVEL 8	BACHELOR	1
LEVEL 9	1 BDR	1
LEVEL 9	1 BDR + DEN	9
LEVEL 9	2 BDR	4
LEVEL 9	BACHELOR	1
LEVEL 10	1 BDR	1
LEVEL 10	1 BDR + DEN	9
LEVEL 10	2 BDR	4
LEVEL 10	BACHELOR	1
LEVEL 11	1 BDR	1
LEVEL 11	1 BDR + DEN	9
LEVEL 11	2 BDR	4
LEVEL 11	BACHELOR	1
LEVEL 12	1 BDR	1
LEVEL 12	1 BDR + DEN	6
LEVEL 12	2 BDR	4
LEVEL 12	BACHELOR	1
TOTAL UNITS: 168		

1 BDR - TOWER A

NIVEAU	NOM	NOMBRE
LEVEL 1	1 BDR	1
LEVEL 2	1 BDR	2
LEVEL 3	1 BDR	1
LEVEL 4	1 BDR	1
LEVEL 5	1 BDR	1
LEVEL 6	1 BDR	1
LEVEL 7	1 BDR	1
LEVEL 8	1 BDR	1
LEVEL 9	1 BDR	1
LEVEL 10	1 BDR	1
LEVEL 11	1 BDR	1
LEVEL 12	1 BDR	1
TOTAL: 13		

1 BDR + DEN - TOWER A

NIVEAU	NOM	NOMBRE
LEVEL 1	1 BDR + DEN	6
LEVEL 2	1 BDR + DEN	9
LEVEL 3	1 BDR + DEN	9
LEVEL 4	1 BDR + DEN	9
LEVEL 5	1 BDR + DEN	9
LEVEL 6	1 BDR + DEN	9
LEVEL 7	1 BDR + DEN	9
LEVEL 8	1 BDR + DEN	9
LEVEL 9	1 BDR + DEN	9
LEVEL 10	1 BDR + DEN	9
LEVEL 11	1 BDR + DEN	9
LEVEL 12	1 BDR + DEN	6
TOTAL: 102		

2 BDR - TOWER A

NIVEAU	NOM	NOMBRE
LEVEL 1	2 BDR	2
LEVEL 3	2 BDR	4
LEVEL 4	2 BDR	4
LEVEL 5	2 BDR	4
LEVEL 6	2 BDR	4
LEVEL 7	2 BDR	4
LEVEL 8	2 BDR	4
LEVEL 9	2 BDR	4
LEVEL 10	2 BDR	4
LEVEL 11	2 BDR	4
LEVEL 12	2 BDR	4
TOTAL: 42		

2 BDR + DEN - TOWER A

NIVEAU	NOM	NOMBRE

TYPOLOGY - TOWER A

NOM	NOMBRE	%
1 BDR	13	7%
1 BDR + DEN	102	61%
2 BDR	42	28%
BACHELOR	11	4%
TOTAL DE LOGEMENTS: 168		100%

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

Dessiné par : Tanya Nadeau
Conçu par : Christian Rheault

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GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

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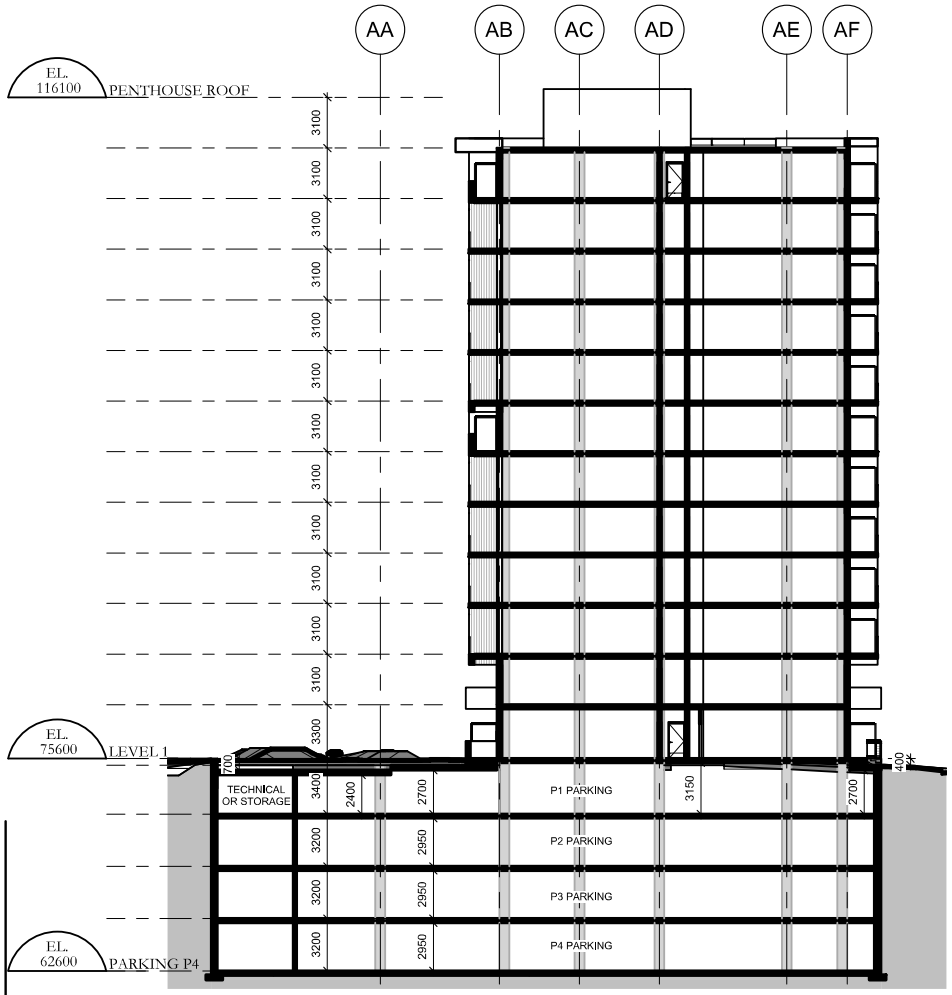

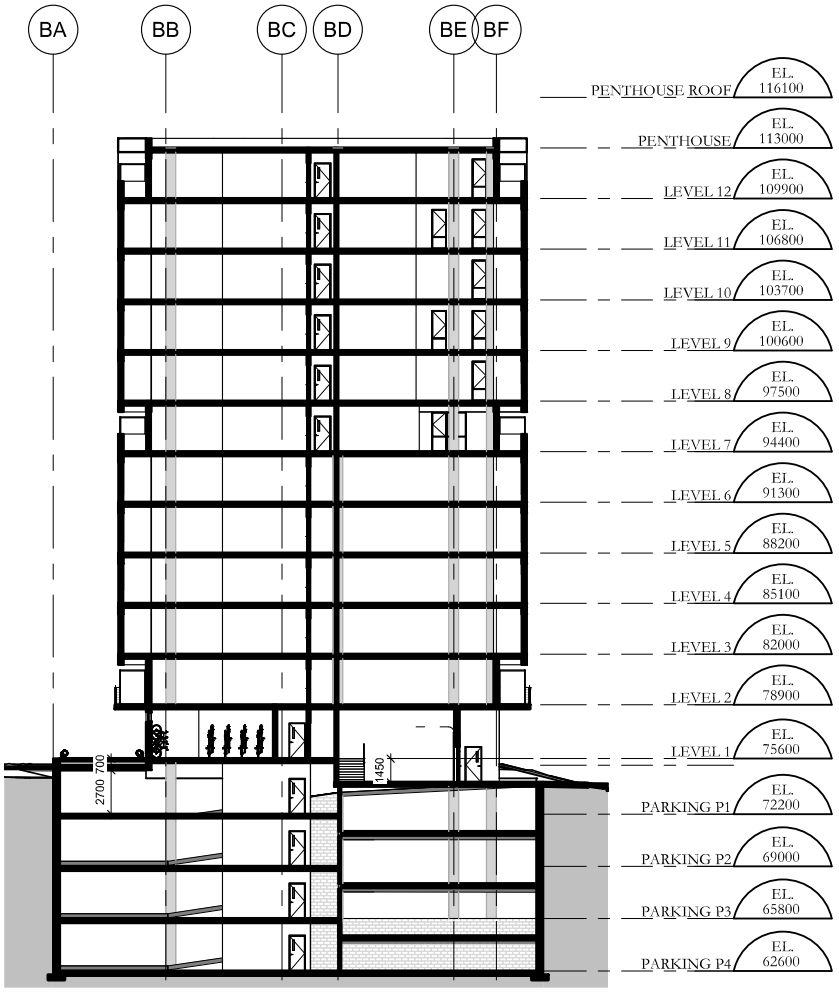

TOWER A - SECTION

TOWER B - SECTION

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

Dessiné par : Tanya Nadeau
Conçu par : Christian Rheault

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GROUP HEAFEY

365 Forest Street, Ottawa, ON K2B 7Z7

1 : 300

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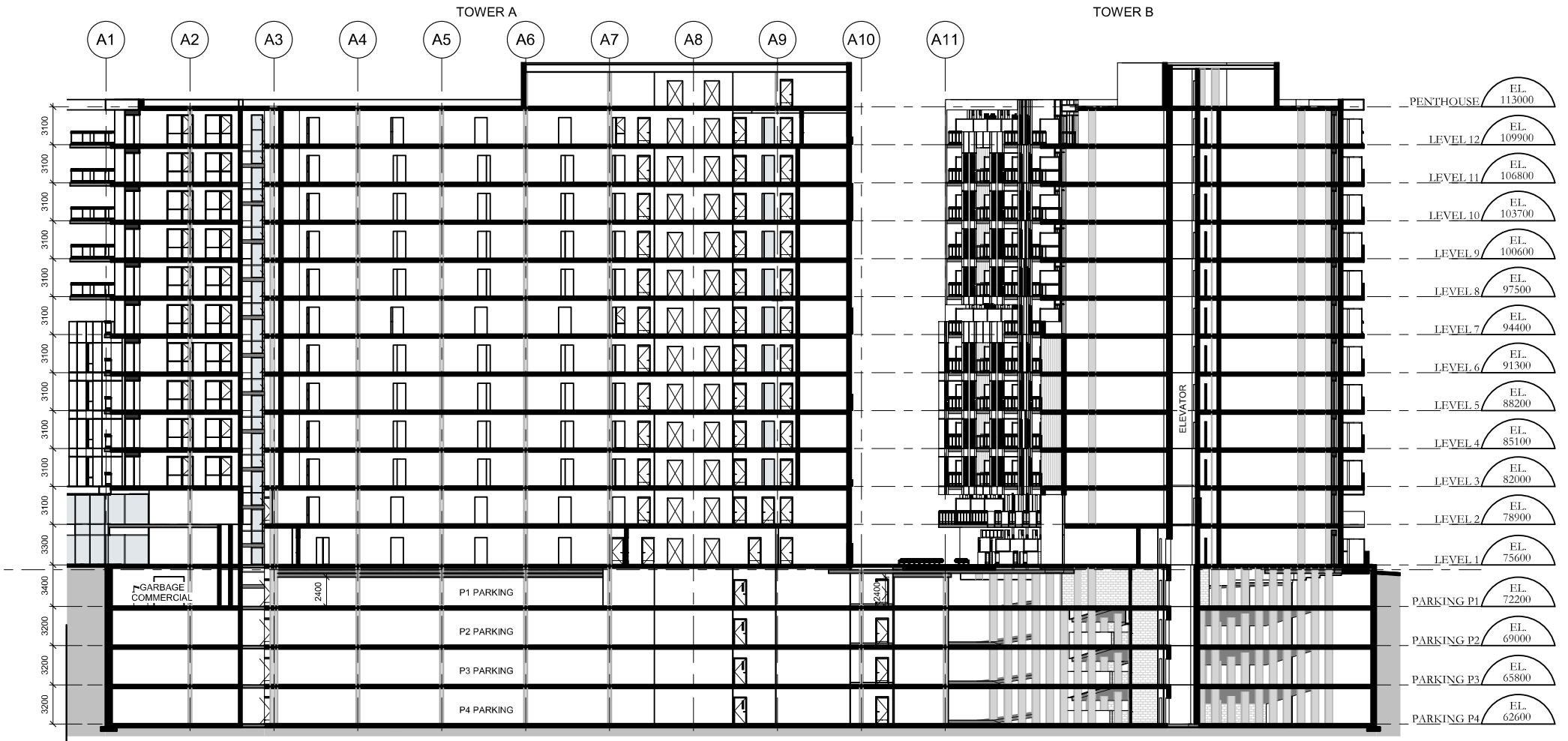

TOWER A & B - SECTION

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

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Conçu par : Christian Rheault

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GROUP HEAFEY

365 Forest Street, Ottawa, ON K2B 7Z7

1 : 300

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A31

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GROSS AREA LEGEND

BALCONY AREA LEVEL 1 : 137 m² / 12 UNITS = 11.42 m²

1 BDR | 1 BDR + DEN | 2 BDR | BACHELOR | BIKE | GARBAGE ROOM | GROUND LOBBY | GYM | SERVICE | STAIRS

TOWER B - LEVEL 1

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

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Conçu par : Christian Rheault

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GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

1 : 200

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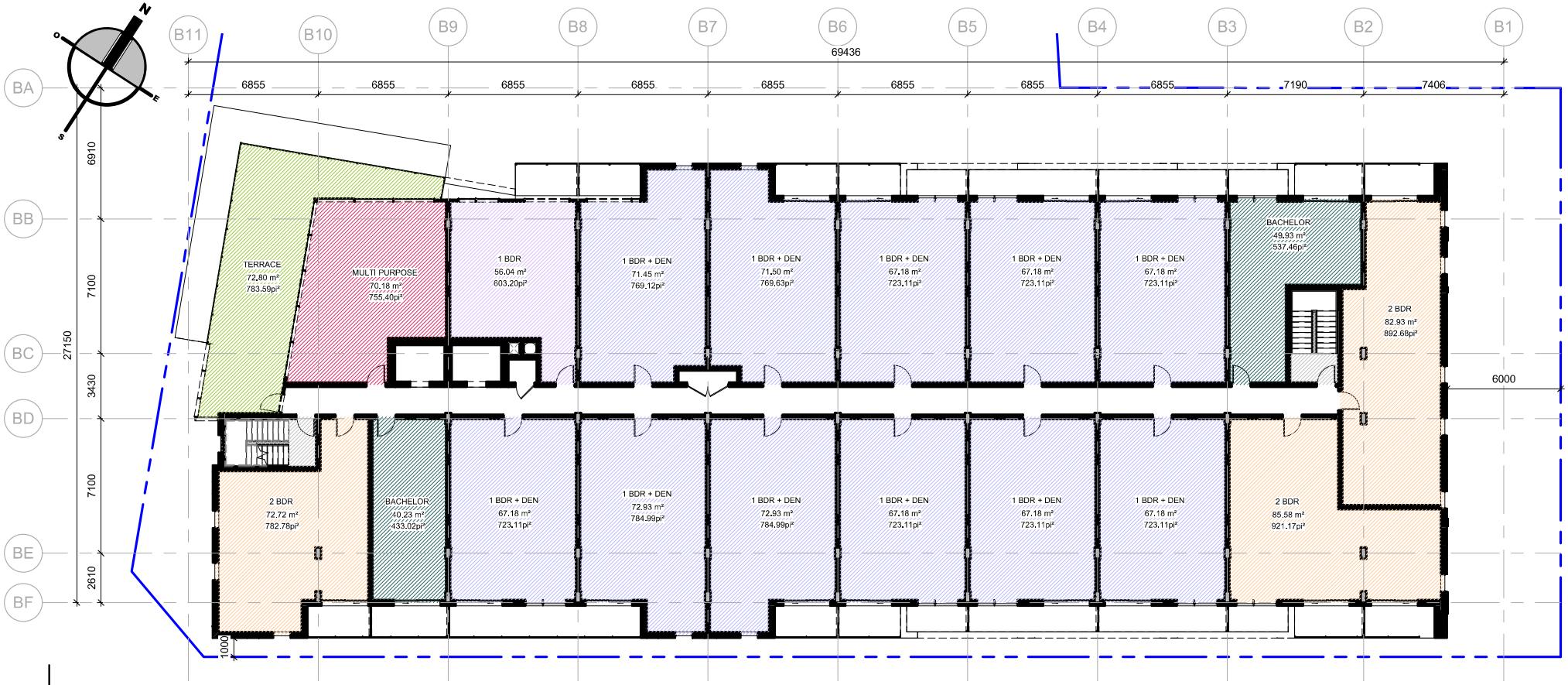

GROSS AREA LEGEND

1 BDR | 1 BDR + DEN | 2 BDR | BACHELOR | MULTI PURPOSE | STAIRS | TERRACE

BALCONY AREA LEVEL 12 : 144 m² / 17 UNITS = 8.47 m²

TOWER B - LEVEL 12

GROUP HEAFEY

365 Forest Street, Ottawa, ON K2B 7Z7

1 : 200

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LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

Dessiné par : Tanya Nadeau

Conçu par : Christian Rheault

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ROOM TYPOLOGY - TOWER B

LEVEL	NAME	QTY
LEVEL 1	1 BDR	1
LEVEL 1	1 BDR + DEN	9
LEVEL 1	2 BDR	1
LEVEL 1	BACHELOR	1
LEVEL 2	1 BDR	1
LEVEL 2	1 BDR + DEN	13
LEVEL 2	2 BDR	3
LEVEL 2	BACHELOR	2
LEVEL 3	1 BDR	1
LEVEL 3	1 BDR + DEN	13
LEVEL 3	2 BDR	4
LEVEL 3	BACHELOR	2
LEVEL 4	1 BDR	1
LEVEL 4	1 BDR + DEN	13
LEVEL 4	2 BDR	4
LEVEL 4	BACHELOR	2
LEVEL 5	1 BDR	1
LEVEL 5	1 BDR + DEN	13
LEVEL 5	2 BDR	4
LEVEL 5	BACHELOR	2
LEVEL 6	1 BDR	1
LEVEL 6	1 BDR + DEN	13
LEVEL 6	2 BDR	4
LEVEL 6	BACHELOR	2
LEVEL 7	1 BDR	1
LEVEL 7	1 BDR + DEN	12
LEVEL 7	2 BDR	4
LEVEL 7	BACHELOR	2
LEVEL 8	1 BDR	1
LEVEL 8	1 BDR + DEN	12
LEVEL 8	2 BDR	4
LEVEL 8	BACHELOR	2
LEVEL 9	1 BDR	1
LEVEL 9	1 BDR + DEN	12
LEVEL 9	2 BDR	4
LEVEL 9	BACHELOR	2
LEVEL 10	1 BDR	1
LEVEL 10	1 BDR + DEN	12
LEVEL 10	2 BDR	4
LEVEL 10	BACHELOR	2
LEVEL 11	1 BDR	1
LEVEL 11	1 BDR + DEN	12
LEVEL 11	2 BDR	4
LEVEL 11	BACHELOR	2
LEVEL 12	1 BDR	1
LEVEL 12	1 BDR + DEN	11
LEVEL 12	2 BDR	3
LEVEL 12	BACHELOR	2
TOTAL DE LOGEMENTS: 223		

1 BDR - TOWER B

LEVEL	NAME	QTY
LEVEL 1	1 BDR	1
LEVEL 2	1 BDR	1
LEVEL 3	1 BDR	1
LEVEL 4	1 BDR	1
LEVEL 5	1 BDR	1
LEVEL 6	1 BDR	1
LEVEL 7	1 BDR	1
LEVEL 8	1 BDR	1
LEVEL 9	1 BDR	1
LEVEL 10	1 BDR	1
LEVEL 11	1 BDR	1
LEVEL 12	1 BDR	1
TOTAL: 12		

2 BDR - TOWER B

LEVEL	NAME	QTY
LEVEL 1	2 BDR	1
LEVEL 2	2 BDR	3
LEVEL 3	2 BDR	4
LEVEL 4	2 BDR	4
LEVEL 5	2 BDR	4
LEVEL 6	2 BDR	4
LEVEL 7	2 BDR	4
LEVEL 8	2 BDR	4
LEVEL 9	2 BDR	4
LEVEL 10	2 BDR	4
LEVEL 11	2 BDR	4
LEVEL 12	2 BDR	3
TOTAL: 43		

TYPOLOGY - TOWER B

NAME	QTY	%
1 BDR	12	5%
1 BDR + DEN	145	66%
2 BDR	43	22%
BACHELOR	23	7%
TOTAL DE LOGEMENTS: 223		100%

1 BDR + DEN - TOWER B

LEVEL	NAME	QTY
LEVEL 1	1 BDR + DEN	9
LEVEL 2	1 BDR + DEN	13
LEVEL 3	1 BDR + DEN	13
LEVEL 4	1 BDR + DEN	13
LEVEL 5	1 BDR + DEN	13
LEVEL 6	1 BDR + DEN	13
LEVEL 7	1 BDR + DEN	12
LEVEL 8	1 BDR + DEN	12
LEVEL 9	1 BDR + DEN	12
LEVEL 10	1 BDR + DEN	12
LEVEL 11	1 BDR + DEN	12
LEVEL 12	1 BDR + DEN	11
TOTAL: 145		

2 BDR + DEN - TOWER B

LEVEL	NAME	QTY

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

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Conçu par : Christian Rheault

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GROUP HEAFEY
365 Forest Street, Ottawa, ON K2B 7Z7

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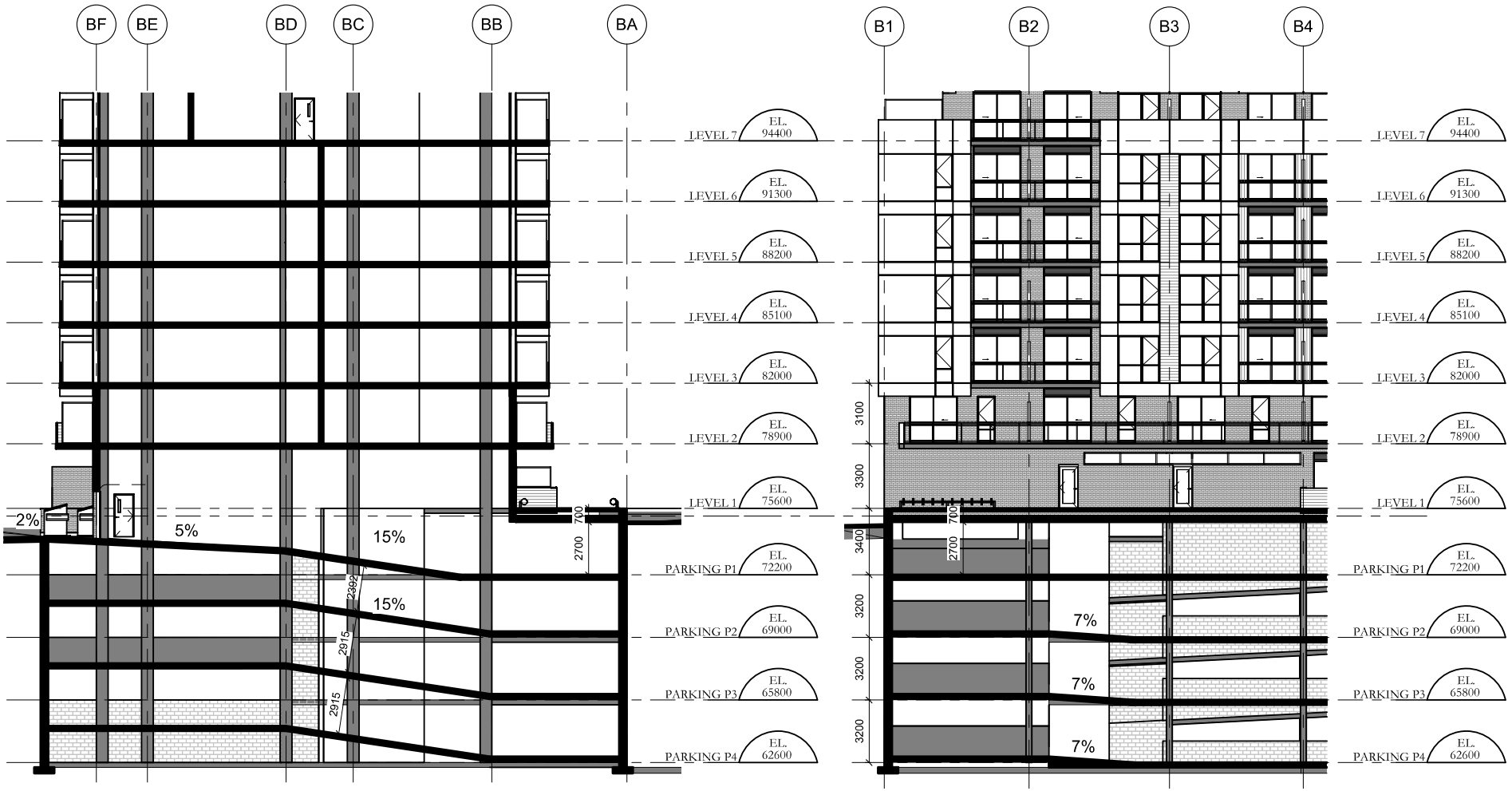

TOWER B - SECTION

TOWER B - SECTION

GROUP HEAFEY

365 Forest Street, Ottawa, ON K2B 7Z7

1 : 200

LAPALME RHEAULT ARCHITECTES + ASSOCIÉS

Dessiné par : Tanya Nadeau
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