SERVICING AND STORMWATER MANAGEMENT REPORT

Project No.: 0CP-17-0565

Prepared for:

FIRM CAPITIAL PROPERTIES INC.
163 CARTWRIGTH AVENUE
TORONTO, ON
K2G 1E8

Prepared by:

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115 Walgreen Road, RR3, Carp, ON K0A 1L0

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

This report will address the servicing (water, sanitary, and storm) and stormwater management requirements associated with the proposed development located at 2950-2960 Bank Street within the City of Ottawa.

1.2 Site Description

The property is located at 2950 – 2960 Bank Street and is described as the South half of Lot 9, Concession 4, City of Ottawa, Ontario. The land in question covers approximately 5.87 ha and is located southwest of the intersection of Bank Street and Queensdale Avenue.

The existing site is currently developed as part of the existing Blossom Park Shopping Center and TD bank site. The existing site has sanitary, water and storm services within the parking lot that will be utilized for the construction of the two new buildings.

The proposed development consists of two new one-storey retail buildings located in the southeast area of the existing parking lot. The first building (Building "A") will encompass an area of 692 square meters while the second building (Building "B") encompasses an area of 975 square meters. As part of the development several drive aisles, parking spaces will need to be reconfigured in order to accommodate the new buildings. There will be two site accesses for the development; the existing shared entrance from Queensdale will be maintained and the existing entrance coming off Bank Street will be reconfigured.

Figure 1: Key Map: 2950-2690 Bank Street

2.0 BACKGROUND STUDIES

Background studies that have been completed for the site and include review of the City of Ottawa as-built drawings, a topographical survey of the site, a geotechnical report, a subwatershed study and a Phase I Environmental Site Assessment (ESA).

A topographic survey of the site was completed by McIntosh Perry Surveying Inc. dated January 8th, 2019 and can be found under separate cover.

The following reports have previously been completed and are available under separate cover:

- Geotechnical Investigation completed by McIntosh Perry dated January 2018.
- Sawmill Creek Subwatershed Study by CH2M HILL Canada Limited dated May 23, 2003.
- Phase One ESA completed by McIntosh Perry dated October 2018.

PRE-CONSULTATION SUMMARY

City of Ottawa staff have been pre-consulted regarding this proposed development. Specific design parameters to be incorporated within this design include the following:

- Post-development flows, from 5-year up to and including the 100-year event, cannot exceed pre-development conditions.

Correspondence with the City can be found in Appendix 'A'.

3.0 EXISTING SERVICES

The site is currently fully serviced with a 150mm watermain, multiple storm sewers and a 150mm sanitary sewer located within the existing parking lot. Both the existing storm and sanitary systems drain out into Queensdale Avenue.

The new buildings can be connected to the on-site water and sanitary laterals and parking lot grading will be designed so that runoff will be directed to both new and existing catch basins located on the site.

4.0 SERVICING PLAN

4.1 Proposed Servicing Overview

The overall servicing will be provided via the existing service connections. The water servicing will be extended from the 150mm diameter watermain and the sanitary servicing for buildings A and B will be connected to the existing 150mm diameter sewer at various points. Both Buildings A and B are to have storm laterals extending from existing pipes located on the site. Details pertaining to the final proposed servicing locations have been reviewed and are shown on the proposed Site Servicing Plan included within the drawing package submission.

4.2 Proposed Water Design

Both buildings will be serviced with new 50mm diameter services. Additionally, new hydrants will be serviced via extensions from the existing mains.

The required fire protection from the Fire Underwriters Survey (FUS) is 4,000 L/min and 5,000 L/min for buildings A and B respectively (provided for information purposes only.)

The water demands for the new buildings have been calculated as per the Ottawa Design Guidelines – Water Distribution and are as follows: the average and maximum daily demands are 0.07 L/s and 0.09 L/s respectively. The maximum hourly demand was calculated as 0.17 L/s and 0.12 L/s (Refer to Appendix 'B' for flow details). Boundary conditions have been provided by the City of Ottawa and can be found in Appendix 'B'. A water model was completed using Bentley's WaterCAD based on the boundary conditions and can be found in Appendix 'B'.

4.3 Proposed Sanitary Design

Building "B" is serviced with a new 150 mm diameter gravity sanitary service connecting to an existing sanitary manhole. Similarly, Building "A" is serviced with a 150mm diameter pipe that will connect into the existing sanitary service located within the parking lot (See servicing plan for details). The existing sanitary sewer eventually connects to a main located in Queensdale avenue.

The peak design flows for the proposed buildings were determined to be 0.09 L/s and 0.12 L/s. The proposed 200 mm diameter laterals have sufficient capacity to convey the flows (See Appendix 'C' for detailed calculations). It is anticipated that there will be no issues with capacity constraints within the existing lateral or the existing sanitary main located within Queensdale Avenue, as the flows are negligible.

4.4 Proposed Storm Design (Conveyance and Management)

Stormwater runoff will be conveyed by way of overland sheet flow to proposed and existing catch basins located within the parking areas. Please see the Site Grading and Drainage Plans for detailed locations of the proposed stormwater infrastructure. The individual buildings will be serviced via two 200mm diameter service laterals extending from existing catch basins located within the existing parking lot where they will eventually drain to the existing storm main located in Queensdale Avenue. It is anticipated that there will be no capacity constraints within the proposed laterals, existing services, or main.

4.5 Site Utilities

All relevant utility companies (telephone - Bell, gas – Enbridge and hydro – Hydro Ottawa) shall be contacted prior to construction in order to confirm adequate utility servicing for the site.

4.6 Service Locations/Cover

The proposed sanitary and water services will be placed under the parking lot and laneway as is typical in this kind of development. Hydro, telephone and gas services will be primarily placed in a common utility trench

connecting to existing infrastructure along Bank Street. It is anticipated that the hydro, water and gas meters will be located at the centre of the buildings. The minimum cover for the sanitary, storm and water will be as follows:

Service	Minimum Cover
Sanitary Sewer	2.0m
Storm Sewer	2.0m
Watermain	2.4m

All minimum cover requirements are as per City of Ottawa Standards. Separation distances between the storm, water and sanitary will be maintained as per Ministry of the Environment, Conservation, and Parks (MECP) requirements.

5.0 PROPOSED STORMWATER MANAGEMENT

5.1 Design Criteria and Methodology

Stormwater management for this site will be maintained through positive drainage away from the proposed buildings and into the existing underground storm sewer system within the site. This SWM plan will implement quantity control strategies. The storm runoff will enter the pipe system through catch basins (CB's) and catchbasin manholes (CBMH's) located throughout the site. The restricted stormwater runoff will be restricted with a number of roof drains located on the proposed buildings. The quantitative and qualitative properties of the storm runoff for both the pre- and post-development flows are further detailed below.

Stormwater Best Management Practices (SWM BMP's) will be implemented at the "Conveyance" and "End of Pipe" locations. These concepts will be explained further in Section 5.4.

5.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA \text{ (L/s)}$$

Where C = Runoff coefficient

I = Rainfall intensity in mm/hr (City of Kingston IDF curves)

A = Drainage area in hectares

It is recognized that the rational method tends to overestimate runoff rates. As a by-product of using this extremely conservative prediction method, any facilities that are sized using these results are expected to function as intended in real world conditions.

The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Gravel*	0.90
Undeveloped and Grass	0.20

As per the City of Ottawa Sewer Design Guidelines, the 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0.

As per the pre-consultation meeting with the City of Ottawa the time of concentration (Tc) used for pre-development and post-development flows shall be calculated using a time of concentration (Tc) of 10 minutes.

5.2.1 Pre-Development Drainage

The existing site has been demonstrated as drainage areas A1 and A2. Area A1 represents the southeast portion of the site in which building 'B' is proposed. Area A2 represents the northeast corner of the site where building 'A' is proposed. It shall be noted that only the development area has been included in calculations as the remainder of the site will remain as is. Drawing CP-17-0565 PRE (Appendix 'D') indicates the limits of these drainage areas.

Table 1: Pre-Development Runoff Summary

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.74	0.90	1.00	10	104.2	178.6	191.69	365.00
A2	0.63	0.90	1.00	10	104.2	178.6	164.80	313.80
Total	1.37						356.48	678.79

5.2.1 Post-Development Drainage

The proposed site has been demonstrated as drainage areas B1-B4. Areas B1 and B2 represent the proposed buildings with flat roofs. Areas B3 and B4 represent the remainder of the development area. Drawing CP-17-0565 Post (Appendix 'E') indicates the limits of these drainage areas.

Table 2: Post-Development Runoff Summary

Drainage Area	Area (ha)	C 2&5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
B1	0.10	0.90	1.00	10	104.2	178.6	25.42	48.40
B2	0.07	0.90	1.00	10	104.2	178.6	18.04	34.35
B3	0.64	0.90	1.00	10	104.2	178.6	166.27	316.60
B4	0.56	0.90	1.00	10	104.2	178.6	146.76	279.45
Total	1.37						356.48	678.79

5.3 Quantity Control

Table 3: Allowable Release Rates

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)	
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year
B1	25.42	48.40	2.52	4.62	20.00	38.14	21.94	40.22
B2	18.04	34.35	1.80	3.30	14.16	27.01	15.57	28.55
B3	166.27	316.60	166.27	316.60	-	-	-	-
B4	146.76	279.45	146.76	279.45	-	-	-	-
Total	356.48	678.79	317.34	603.97	34.15	65.15	37.51	68.76

Runoff from area B2 (building 'A') will be restricted though 5 roof drains before discharging into drainage area B4. The total flow leaving the building 1.80L/s during the 2- & 5-year storm events and 3.30L/s during the 100-year storm event. This will result in a depth of 30mm during the 2- & 5-year storm events and 55mm for a 100-year storm event. All the storage required for this area will be located on the proposed flat roof, and emergency roof scuppers shall be installed to ensure ponding doesn't exceed the proposed ponding limits.

Similarly, runoff from area B1 (building 'B') will be restricted through 7 roof drains before discharging into drainage area B3. The total flow leaving the building during a 2- & 5-year storm event will be 2.52L/s and 4.62L/s for a 100year storm event. This will result in a ponding depth of 30mmm for the 2- & 5-year storm events and a depth of 55mm during 100-year storm event.

The restricted flow from roof drains will reduce the total post-development flow to be less then pre-development conditions. Areas B3 and B4 will continue to be unrestricted as the roofs provide sufficient restriction.

The following table summarizes the storage requirements and the depth of the water ponding during the 5 and 100-year storm events to meet the required storage volumes.

Table 4: Post-Development Restricted Runoff

	2 & 5-yr Storm Events			100-yr Storm Event		
Area ID	Depth of Ponding (m)	Storage Required (m^3)	Storage Available (m^3)	Depth of Ponding (m)	Storage Required (m^3)	Storage Available (m^3)
B1	0.030	20.0	21.9	55	38.1	40.2
B2	0.030	14.2	15.6	55	27.0	28.5

5.4 Quality Control

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. Lot level BMP's typically include temporary retention of the parking lot runoff, minimizing ground slopes and maximizing landscaped areas. Some of these BMP's cannot be provided for this site due to site constraints and development requirements.

6.0 SEDIMENT EROSION CONTROL

6.1 Temporary Measures

Before construction begins, temporary silt fence, straw bale or rock flow check dams will be installed at all natural runoff outlets from the property. For this project, areas of concern include the existing roadside ditch along Bank Street where runoff and sheet flow may leave the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control measures be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City of Ottawa, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Geosocks are to be installed under the grates of all existing structures along the frontage of the site and any new structures immediately upon installation. The Geosock is to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the

situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions both warrant and permit.

6.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip rapped area. Additional rip rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / City of Ottawa or Conservation Authority.

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

7.0 SUMMARY

- A new 975 m^2 retail building will be constructed on the south end of the site (building "B").
- A second 672m^2 retail building will be constructed towards the north end of the site (building "A").
- Building "B" will be serviced with a new 150 mm diameter sanitary service which will be installed and connected to the existing sanitary manhole #3.
- Building A and B will be serviced with new 50mm diameter services extending from the existing on-site mains.
- Two new catch basins are proposed on the site to capture flow.
- Building "A" will be serviced with a 150mm diameter sanitary service connecting from the existing 150mm diameter sanitary service located within the existing parking lot.
- Storm servicing will be provided by a 200mm diameter service laterals connecting to existing storm infrastructure within the site.
- 2 new fire hydrants will be constructed outside of buildings A and B and will be serviced with 150mm diameter laterals connecting to an existing 150mm diameter private water main.
- Storage for the 5- through 100-year storm events will be provided by roof storage located at both buildings A and B.

8.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management Report in support of the proposed Blossom Park redevelopment.

The sediment and erosion control plan outlined in Section 7.0 and detailed in the Grading and Drainage Plan notes are to be implemented by the contractor.

This report is respectfully being submitted for approval.

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Practice Area Lead
Land Development
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T: 613-903-5766

Charissa Hampel, E.I.T.
Engineering Intern
Land Development
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9.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Firm Capital Properties Inc. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment and Climate Change, City of Ottawa and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
CITY OF OTTAWA PRE-CONSULTATION NOTES

McINTOSH PERRY

MEMO

Date:

To / Destinataire	Kelby Lodoen Unseth, Planner	
From / Expéditeur	Adam Baker, Engineering Intern, Infrastructure Approvals	
Subject / Objet	**2950-2960 Bank Street** **Ward 10,** *Discussion to add a new pad site approximately 16,000 sq ft, which could be divided into 10 bays. The site is designated parking for an existing shopping centre.*	File No. PC2018-0237

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: http://ottawa.ca/en/development-application-review-process-0/servicing-study-guidelines-development-applications

2. Servicing and site works shall be in accordance with the following documents:

   - ⇨ Ottawa Sewer Design Guidelines (October 2012)
   - ⇨ Ottawa Design Guidelines – Water Distribution (2010)
   - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - ⇨ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - ⇨ City of Ottawa Park and Pathway Development Manual (2012)
   - ⇨ City of Ottawa Accessibility Design Standards (2012)
   - ⇨ Ottawa Standard Tender Documents (latest version)

⇨ Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

4. The Stormwater Management Criteria, for the subject site, is to be based on the following:

   i. Post-development flows, from the 5-year up to and including the 100-year event, cannot exceed pre-development conditions.

   ii. This site is subject to the Sawmill Creek Subwatershed Study.

5. Sewer connections to be made above the springline of the sewermain as per:

   a. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.

   b. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,

   c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,

   d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

   e. No submerged outlet connections.

6. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

   i. Location of service

   ii. Type of development and the amount of fire flow required (as per FUS, 1999).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

v. Maximum hourly daily demand: ___ l/s.

7. MOECC ECA Requirements

An MOECC Environmental Compliance Approval (Industrial Sewage Works) will be required for the proposed development. Please contact Ontario Ministry of the Environment and Climate Change, Ottawa District Office to arrange a pre-submission consultation:

For I/C/I applications: Emily Diamond

(613) 521-3450, ext. 238

Emily.Diamond@ontario.ca

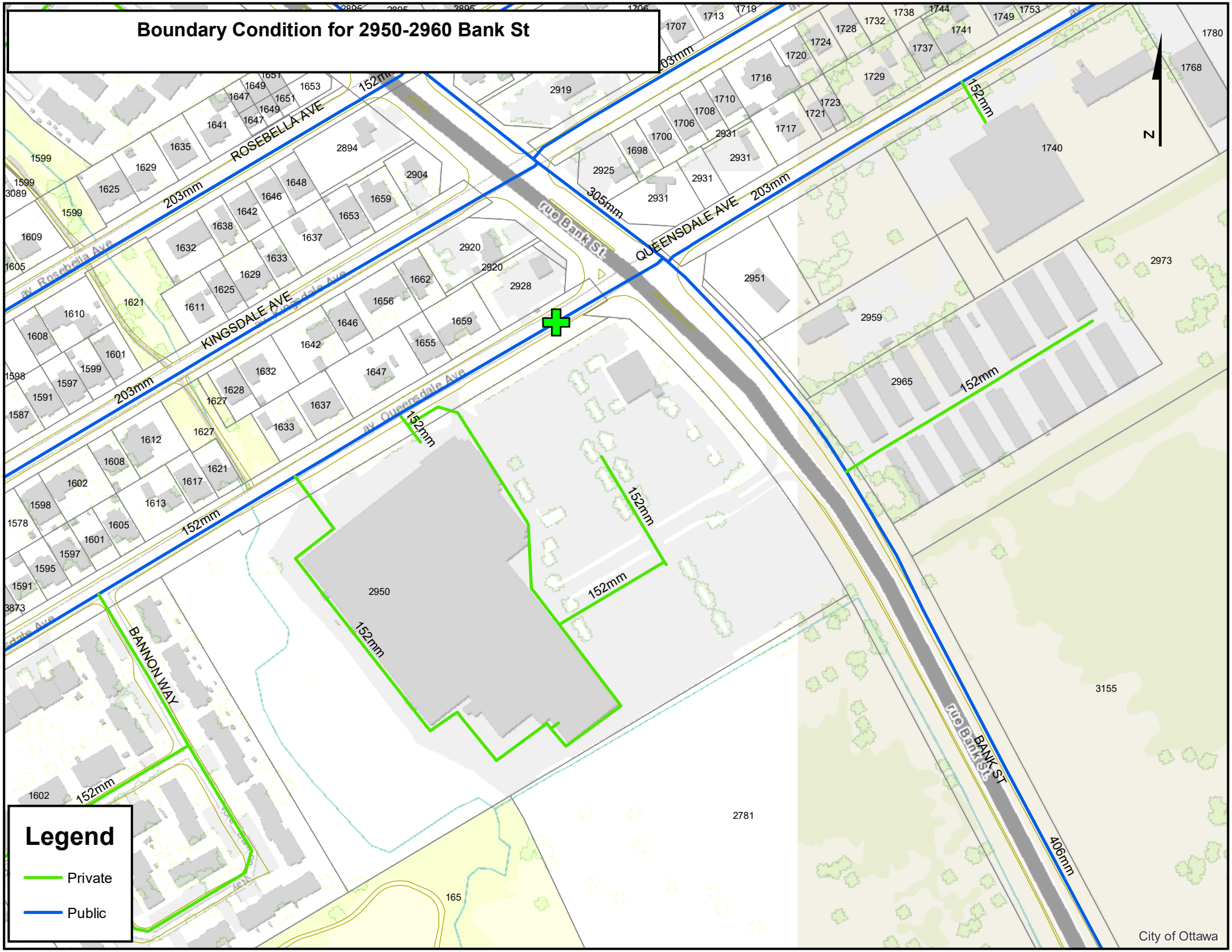
8. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x26552 or by email at adam.baker@ottawa.ca.

APPENDIX B
EXISTING WATERMAIN FLOW AND FIRE PROTECTION CALCULATIONS

McINTOSH PERRY

Boundary Condition for 2950-2960 Bank St



Charissa Hampel

From: Baker, Adam <adam.baker@ottawa.ca>
Sent: December 16, 2019 10:12 AM
To: Charissa Hampel
Subject: Water Boundary Conditions - 2950-2960 Bank Street
Attachments: 2950 Bank Nov 2019.pdf

Hi Charissa,

Please find below the water boundary conditions for 2950-2960 Bank.

The following are boundary conditions, HGL, for hydraulic analysis at 2950-2960 Bank (zone 2C) assumed to be connected to the 152mm on Queensdale (see attached PDF for location).

Minimum HGL = 124.0m

Maximum HGL = 132.5m

MAxDay + FireFlow (67 L/s) = 121.0m

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.

Thank you,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

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2960-2950 Blossom Park - Water Demands Building "A"

McINTOSH PERRY

Project:	2960-2950 Bank Street
Project No.:	CP-17-0565
Designed By:	S.P.G.
Checked By:	C.D.H.
Date:	November 20, 2019
Site Area:	0.07 gross ha

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	350	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Parks no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	*28,000*	*L/gross ha/d*
AVERAGE DAILY DEMAND	0.04	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	2.5 x avg. day	L/c/d
Industrial	1.5 x avg. day	L/gross ha/d
Commercial	*1.5 x avg. day*	*L/gross ha/d*
Institutional	1.5 x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	0.07	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	2.2 x max. day	L/c/d
Industrial	1.8 x max. day	L/gross ha/d
Commercial	*1.8 x max. day*	*L/gross ha/d*
Institutional	1.8 x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	0.12	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

2960-2950 Blossom Park - Water Demands Building "B"

McINTOSH PERRY

Project:	2960-2950 Bank Street
Project No.:	CP-17-0565
Designed By:	S.P.G.
Checked By:	C.D.H.
Date:	November 20, 2019
Site Area:	0.10 gross ha

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	350	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Parks no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	*28,000*	*L/gross ha/d*
AVERAGE DAILY DEMAND	0.06	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	2.5 x avg. day	L/c/d
Industrial	1.5 x avg. day	L/gross ha/d
Commercial	*1.5 x avg. day*	*L/gross ha/d*
Institutional	1.5 x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	0.09	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	2.2 x max. day	L/c/d
Industrial	1.8 x max. day	L/gross ha/d
Commercial	*1.8 x max. day*	*L/gross ha/d*
Institutional	1.8 x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	0.17	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

CP-17-0565 - 2960-2950 Bank Street Proposed Building A

Project:	2960-2950 Bank Street
Project No.:	CP-17-0565
Designed By:	SPG
Checked By:	CDH
Date:	November 20, 2019

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Retail Building

Building is classified as Group : E (from table 3.1.2.1)
Building is of noncombustable construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearging walls, columns and arches.

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:
Q = minimum supply of water in litres
K = water supply coefficient from Table 1
V = total building volume in cubic metres
Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:
Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	27	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	6,720	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	181,440.00 L	

From Figure 1 (A-32)

Snorth	42	m	0.0
Seast	65	m	0.0
Ssouth	60	m	0.0
Swest	79	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

5400 L/min (if Q >162,000 L and Q <190,000 L)
1427 gpm

CP-17-0565 - 2960- 2950 Bank Street Proposed Building B

Project:	2960-2950 Bank Street
Project No.:	CP-17-0565
Designed By:	SPG
Checked By:	CDH
Date:	November 20, 2019

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Retail Building

Building is classified as Group : E (from table 3.1.2.1)
Building is of noncombustable construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearging walls, columns and arches.

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:
Q = minimum supply of water in litres
K = water supply coefficient from Table 1
V = total building volume in cubic metres
Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:
Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	27	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	9,750	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	263,250.00 L	

From Figure 1 (A-32)

Snorth	60	m	0.0
Seast	75	m	0.0
Ssouth	N/A	m	0.0
Swest	86	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

6300 L/min (if Q >190,000 L and Q <270,000 L)
1664 gpm

2950 - 2960 BANK STREET - Fire Underwriters Survey (FUS) Fire Calculations

Project:	Blossom Park Proposed Building "A"
Project No.:	CP-17-0565
Designed By:	SPG
Checked By:	CJM
Date:	November 20, 2019

McINTOSH PERRY

1. From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

2. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 692.00 m²
Total Floor Area = 692.00 m²

This floor area represents the final build-out of the development; as outlined on the Site Plan drawing.

3. Calculate Required Fire Flow

F = 220 x C x √A

C = 0.80
A = 692.00
F = 220.00 X 0.80 X √ 692.00
F = 4,629.84 L/min.

4. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 1.00

5. Determine Increase or Decrease Based on Occupancy

From note 2, Page 18 of the Fire Underwriter Survey:

Non combustible - Retail
-25%
F = 3,472.38 L/min.

6. Determine the Decrease, if any for Sprinkler Protection

From note 3, Page 18 of the Fire Underwriter Survey:

- The flow requirement may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system.
- The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.
- Additional credit of 10% if water supply is standard for both the system and fire department hose lines
- If sprinkler system is fully supervised system, an additional 10% credit is granted

F = 3,472.38 L/min.

7. Determine the Total Increase for Exposures

From note 4, Page 18 of the Fire Underwriter Survey:

- Exposure distance to the existing building to the north & south of the proposed building is approximately 43m.
- There are no existing buildings surrounding the remainder of the site that are within 45m.
- Therefore the charge for exposure is 5% of the value obtained in Step 5.
- 3472.38 L/min + (3472.38 L/min x 5%)

F = 3,646.00 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 4,000 L/min (879.88 GPM).

2950-2960 Bank Street - Fire Underwriters Survey (FUS) Fire Calculations

Project:	2950-2960 Bank Street Propsed Buliding B
Project No.:	CP-17-0565
Designed By:	SPG
Checked By:	CJM
Date:	November 20, 2019

McINTOSH PERRY

1. From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

2. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 975.00 m²
Total Floor Area = 975.00 m²

This floor area represents the final build-out of the development; as outlined on the Site Plan drawing.

3. Calculate Required Fire Flow

F = 220 x C x √A

C = 0.80
A = 975.00
F = 220.00 X 0.80 X √ 975.00
F = 5,495.60 L/min.

4. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 1.00

5. Determine Increase or Decrease Based on Occupancy

From note 2, Page 18 of the Fire Underwriter Survey:

Non-Combustible - Retail
-25%
F = 4,121.70 L/min.

6. Determine the Decrease, if any for Sprinkler Protection

From note 3, Page 18 of the Fire Underwriter Survey:

- The flow requirement may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system.
- The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.
- Additional credit of 10% if water supply is standard for both the system and fire department hose lines
- If sprinkler system is fully supervised system, an additional 10% credit is granted

F = 4,121.70 L/min.

7. Determine the Total Increase for Exposures

From note 4, Page 18 of the Fire Underwriter Survey:

- There are no existing buildings surrounding the site that are within 45m.

F = 4,121.70 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 4,000 L/min (1,099.85 GPM).

APPENDIX C
SANITARY CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

Project:	CP-19-0565 Blossom Park Building "A"
Designed By:	S.P.G
Checked By:	R.P.K.
Date:	November 14, 2019

Re: Sanitary Flow Calculations

1. Building Occupancy

The proposed addition consists of a 692 m^2 retail building. The following occupancies have been provided by the architect.

- P_{Total} = 187 people

Daily Volume in Litres

As per the extract of the City of Ottawa Sewer Design Guidelines, Appendix 4-A; Daily Sewage Flow for retail locations;

- Drive in restaurants
  = 125 Liters/Seat/Day

2. Peak Flow (Q/p)

- $Q_{Building}(p) = F \times P$

Where:
F = 125 Litres/Per Seat/Day (as per city of Ottawa sewer guidelines)
P = 187 seats

- $Q_{Building}(p) = (125)\ (187)$
- 0.27L/S

McINTOSH PERRY

Project:	CP-19-0565 Blossom Park Building "B"
Designed By:	S.P.G
Checked By:	R.P.K.
Date:	November 14, 2019

Re: Sanitary Flow Calculations

1. Building Occupancy

The proposed addition consists of a 975 m^2 retail building. The following occupancies have been provided by the architect.

- P_{Total} = 263 people

Daily Volume in Litres

As per the extract of the City of Ottawa Sewer Design Guidelines, Appendix 4-A; Daily Sewage Flow for retail locations;

- Drive-in restaurants
  = 125 Liters/Seat/Day

2. Peak Flow (Q/p)

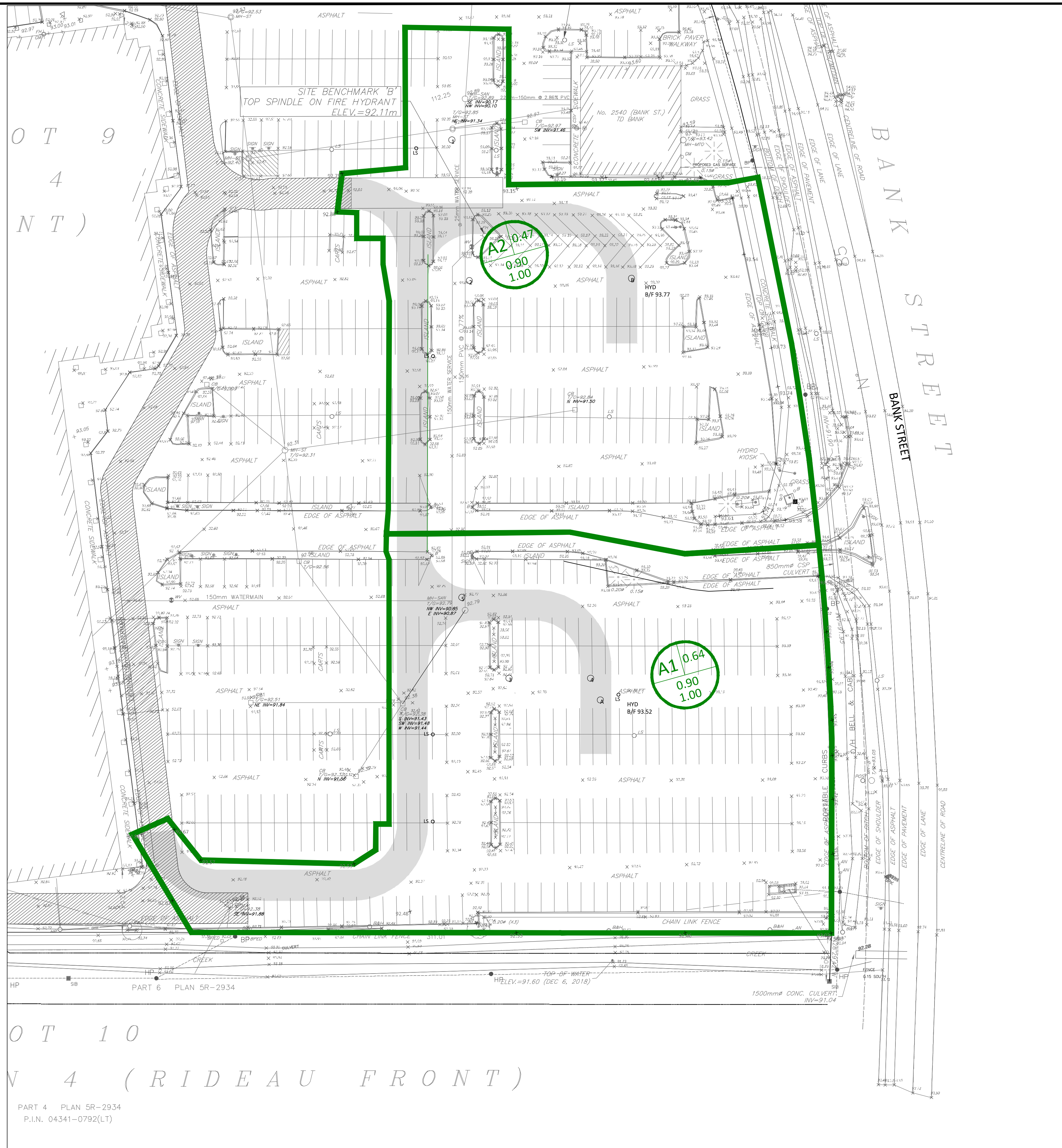
- $Q_{Building}(p) = F \times P$

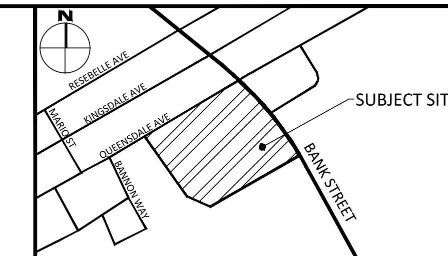
Where:
F = 40 Litres/m^2/Day (as per city of Ottawa sewer guidelines)
P = 263 seats

- $Q_{Building}(p) = (125) \times (263)$
- 0.380L/S

APPENDIX D
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY





LOCATION PLAN

LEGEND

Symbol	Description	Symbol	Description
DC	BARRIER CURB / CURB DEPRESION		CENTRELINE OF SWALE
	HEAVY DUTY ASPHALT		SLOPING AT 3:1 UNLESS SPECIFIED
	CONCRETE SIDEWALK	×95.94 93.20	PROPOSED ELEVATION / EXISTING ELEVATION
	PAVING STONE	×95.94 (S)	SWALE ELEVATION
MH	STORM MANHOLE	×T/W100.50 B/W90.50	TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION
DI	CATCHBASIN OR DITCH INLET		EMERGENCY OVERLAND FLOW ROUTE
TCB	LANDSCAPE CATCHBASIN		SILT FENCE BARRIER (AS PER OPSD 219.130)
MH	SANITARY MANHOLE		STRAW BALE CHECK DAM (AS PER OPSD 219.180)
	PERFORATED PIPE		SEDIMENT CONTROL DEVICE
	WATER VAVLE/CHAMBER	O/H	BUILDING ENTRANCE / OVERHEAD DOOR
	FIRE HYDRANT	RM	REMOTE WATER METER
1	CROSSING CONFLICT LOCATION	M	WATER METER

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR SITE PLAN CONTROL	FEB. 07, 2020

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 500 (0 10 20 30 40 50 Metres)

McINTOSH PERRY

115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Stamp:

Client:
FIRM CAPITIAL PROPERTIES INC.
163 CARTWRIGHT AVENUE
TORONTO, ON M6A 1V5

Project:
BLOSSOM PARK PROPOSED BUILDING
2950-2960 BANK STREET

Drawing Title:
POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale:	1:500	Project Number:	CP-19-17-0565
Drawn By:	S.P.G.		
Checked By:	R.P.K.	Drawing Number:	POST
Designed By:	S.P.G.		

D07-12-XX-XXXX

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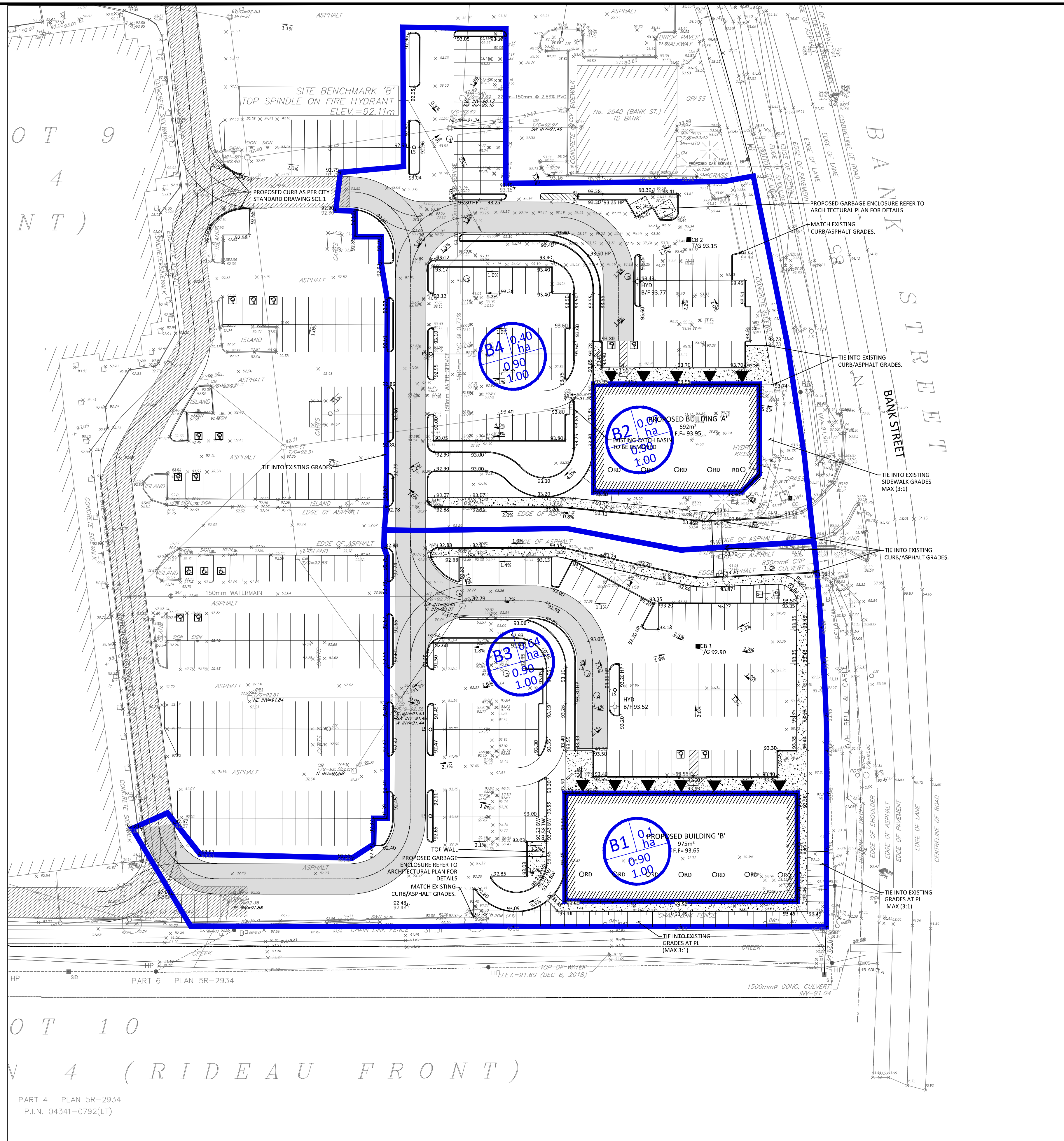
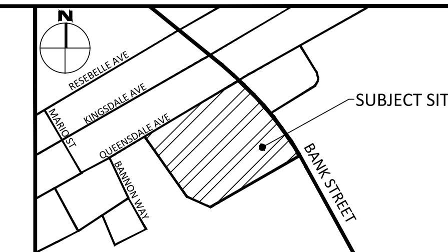
APPENDIX E
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY





LOCATION PLAN

LEGEND

DC	BARRIER CURB / CURB DEPRESSION		CENTRELINE OF SWALE
	HEAVY DUTY ASPHALT		SLOPING AT 3:1 UNLESS SPECIFIED
	CONCRETE SIDEWALK	95.94 / 95.20	PROPOSED ELEVATION / EXISTING ELEVATION
	PAVING STONE	95.94 SW	SWALE ELEVATION
MH	STORM MANHOLE	T/W100.50 B/W90.50	TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION
DI	CATCHBASIN OR DITCH INLET		EMERGENCY OVERLAND FLOW ROUTE
TCB	LANDSCAPE CATCHBASIN		SILT FENCE BARRIER (AS PER OPSD 219.130)
MH	SANITARY MANHOLE		STRAW BALE CHECK DAM (AS PER OPSD 219.180)
	PERFORATED PIPE		SEDIMENT CONTROL DEVICE
	WATER VAVLE/CHAMBER	O/H	BUILDING ENTRANCE OVERHEAD DOOR
	FIRE HYDRANT		REMOTE WATER METER
	CROSSING CONFLICT LOCATION		WATER METER

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR SITE PLAN CONTROL	FEB. 07, 2020

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 500 (0 10 20 30 40 50 Metres)

McINTOSH PERRY
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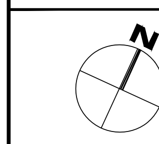

Stamp:

Client:
FIRM CAPITAL PROPERTIES INC.
163 CARTWRIGHT AVENUE
TORONTO, ON M6A 1V5

Project:
BLOSSOM PARK PROPOSED BUILDING
2950-2960 BANK STREET

Drawing Title:
POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale:	1:500	Project Number:	CP-19-17-0565
Drawn By:	S.P.G.		
Checked By:	R.P.K.	Drawing Number:	PRE
Designed By:	S.P.G.		

D07-12-XX-XXXX

#XXXXX

FILENAME: \\192.168.1.3\mpdocuments\01 Project - Proposals\2017 Jobs\CP\0CP-17-0565 Blossom Park & KWC_10 Bay Building_2950-2960 Bank Street\Civil\15 - Drawings\0CP-17-0565 - PRESENTATION.dwg
LAST SAVED: Friday, February 07, 2020 LAST SAVED BY: c.hampel
LAST PLOTTED: Friday, February 07, 2020 CTB FILE USED: ---

APPENDIX F
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CP-17-0565 - BLOSSOM PARK - Runoff Calculations

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 5-Year	C_{AVG} 100-Year
A1	0.74	7,352.97	0.90	0.00	0.60	0.00	0.20	0.90	1.00
A2	0.63	6,321.54	0.90	0.00	0.60	0.00	0.20	0.90	1.00

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.74	0.90	1.00	10	104.2	178.6	191.69	365.00
A2	0.63	0.90	1.00	10	104.2	178.6	164.80	313.80
Total	1.37						356.48	678.79

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 5-Year	C_{AVG} 100-Year
B1	0.10	975.00	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B2	0.07	692.00	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B3	0.64	6,377.97	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B4	0.56	5,629.54	0.90	0.00	0.60	0.00	0.20	0.90	1.00

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 2&5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
B1	0.10	0.90	1.00	10	104.2	178.6	25.42	48.40
B2	0.07	0.90	1.00	10	104.2	178.6	18.04	34.35
B3	0.64	0.90	1.00	10	104.2	178.6	166.27	316.60
B4	0.56	0.90	1.00	10	104.2	178.6	146.76	279.45
Total	1.37						356.48	678.79

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)		
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	
B1	25.42	48.40	2.52	4.62	20.00	38.14	21.94	40.22	*Roof - Building B*
B2	18.04	34.35	1.80	3.30	14.16	27.01	15.57	28.55	*Roof - Building A*
B3	166.27	316.60	166.27	316.60					
B4	146.76	279.45	146.76	279.45					
Total	356.48	678.79	317.34	603.97	34.15	65.15	37.51	68.76	

ROOF DRAIN FLOW FOR FLAT ROOF - BUILDING A

Flow Rate Vs. Build-Up (One Weir)	
Metric	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
40	0.48
45	0.54
50	0.60
55	0.66

*Roof Drain model to be Accutrol Weirs, See attached sheets
*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

5 roof drain during a 5 year storm
elevation of water = 30mm
Flow leaving 5 roof drain = (5 x 0.36 L/s) = 1.80 L/s

5 roof drain during a 100 year storm
elevation of water = 55mm
Flow leaving 5 roof drain = (5 x 0.66 L/s) = 3.30 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	5 Roof Drains Flow (l/s)
	0.18	15	0.90
	0.24	20	1.20
	0.30	25	1.50
5-YR	0.36	30	1.80
	0.42	35	2.10
	0.48	40	2.40
	0.54	45	2.70
	0.60	50	3.00
100-YR	0.66	55	3.30
	0.72	60	3.60
	0.78	65	3.90
	0.84	70	4.20
	0.90	75	4.50
	0.96	80	4.80
	1.02	85	5.10
	1.08	90	5.40
	1.14	95	5.70
	1.20	100	6.00
	1.26	105	6.30
	1.32	110	6.60
	1.38	115	6.90
	1.44	120	7.20
	1.50	125	7.50
	1.56	130	7.80
	1.62	135	8.10
	1.68	140	8.40
	1.74	145	8.70
	1.80	150	9.00

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for Area B2

5-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	18.04	1.80	16.24	9.74
15	83.6	14.47	1.80	12.67	11.40
20	70.3	12.16	1.80	10.36	12.44
25	60.9	10.54	1.80	8.74	13.12
30	53.9	9.34	1.80	7.54	13.57
35	48.5	8.40	1.80	6.60	13.86
40	44.2	7.65	1.80	5.85	14.04
45	40.6	7.03	1.80	5.23	14.13
50	37.7	6.52	1.80	4.72	14.16
55	35.1	6.08	1.80	4.28	14.13
60	32.9	5.70	1.80	3.90	14.05

Maximum Storage Required 5-Year (m^3) =	14.16

100-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	34.35	3.30	31.05	18.63
15	142.9	27.49	3.30	24.19	21.77
20	120.0	23.08	3.30	19.78	23.73
25	103.8	19.98	3.30	16.68	25.02
30	91.9	17.67	3.30	14.37	25.87
35	82.6	15.89	3.30	12.59	26.43
40	75.1	14.46	3.30	11.16	26.77
45	69.1	13.28	3.30	9.98	26.96
50	64.0	12.30	3.30	9.00	27.01
55	59.6	11.47	3.30	8.17	26.96
60	55.9	10.75	3.30	7.45	26.83

Maximum Storage Required 100-Year (m^3) =	27.01

STORAGE OCCUPIED IN AREA B2

5-Year Storm Event

Location	T/G	INV. (out)	75% of Area (m^2)	Depth (m)	Volume (m^3)
ROOF	N/A	N/A	519.0	0.030	15.6
				Total	15.6

Storage Available (m^3) =	15.6
Storage Required (m^3) =	14.2

100-YEAR STORM EVENT

Location	T/G	INV. (out)	75% of Area (m2)	Depth (m)	Volume (m^3)
ROOF	N/A	N/A	519.0	0.055	28.5
				Total	28.5

Storage Available (m^3) =	28.5
Storage Required (m^3) =	27.0

ROOF DRAIN FLOW FOR FLAT ROOF - BUILDING B

Flow Rate Vs. Build-Up (One Weir)	
Metric	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
40	0.48
45	0.54
50	0.60
55	0.66

*Roof Drain model to be Accutrol Weirs, See attached sheets
*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

7 roof drains during a 5 year storm
elevation of water = 30mm
Flow leaving 7 roof drain = (7 x 0.36 L/s) = 2.52 L/s

7 roof drains during a 100 year storm
elevation of water = 55mm
Flow leaving 7 roof drain = (7 x 0.66 L/s) = 4.62 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	7 Roof Drains Flow (l/s)
	0.18	15	1.26
	0.24	20	1.68
	0.30	25	2.10
2 & 5- YR	0.36	30	2.52
	0.42	35	2.94
	0.48	40	3.36
	0.54	45	3.78
	0.60	50	4.20
100-YR	0.66	55	4.62
	0.72	60	5.04
	0.78	65	5.46
	0.84	70	5.88
	0.90	75	6.30
	0.96	80	6.72
	1.02	85	7.14
	1.08	90	7.56
	1.14	95	7.98
	1.20	100	8.40
	1.26	105	8.82
	1.32	110	9.24
	1.38	115	9.66
	1.44	120	10.08
	1.50	125	10.50
	1.56	130	10.92
	1.62	135	11.34
	1.68	140	11.76
	1.74	145	12.18
	1.80	150	12.60

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for Area B1

5-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	25.42	2.52	22.90	13.74
15	83.6	20.38	2.52	17.86	16.08
20	70.3	17.14	2.52	14.62	17.54
25	60.9	14.86	2.52	12.34	18.50
30	53.9	13.16	2.52	10.64	19.14
35	48.5	11.84	2.52	9.32	19.56
40	44.2	10.78	2.52	8.26	19.82
45	40.6	9.91	2.52	7.39	19.96
50	37.7	9.19	2.52	6.67	20.00
55	35.1	8.57	2.52	6.05	19.96
60	32.9	8.04	2.52	5.52	19.86

Maximum Storage Required 5-Year (m^3) =	20.00

100-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	48.40	4.62	43.78	26.27
15	142.9	38.73	4.62	34.11	30.70
20	120.0	32.51	4.62	27.89	33.47
25	103.8	28.15	4.62	23.53	35.29
30	91.9	24.90	4.62	20.28	36.51
35	82.6	22.38	4.62	17.76	37.30
40	75.1	20.37	4.62	15.75	37.80
45	69.1	18.72	4.62	14.10	38.06
50	64.0	17.33	4.62	12.71	38.14
55	59.6	16.16	4.62	11.54	38.09
60	55.9	15.15	4.62	10.53	37.91

Maximum Storage Required 100-Year (m^3) =	38.14

STORAGE OCCUPIED IN AREA B2

5-Year Storm Event

Location	T/G	INV. (out)	75% of Area (m^2)	Depth (m)	Volume (m^3)
ROOF	N/A	N/A	731.3	0.030	21.9
				Total	21.9

Storage Available (m^3) =	21.9
Storage Required (m^3) =	20.0

100-YEAR STORM EVENT

Location	T/G	INV. (out)	75% of Area (m2)	Depth (m)	Volume (m^3)
ROOF	N/A	N/A	731.3	0.055	40.2
				Total	40.2

Storage Available (m^3) =	40.2
Storage Required (m^3) =	38.1

APPENDIX G
CITY OF OTTAWA DESIGN CHECKLIST

McINTOSH PERRY

City of Ottawa

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
• Executive Summary (for larger reports only).	N/A
• Date and revision number of the report.	On Cover
• Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix E
• Plan showing the site and location of all existing services.	Site Servicing Plan (C102)
• 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
• Summary of pre-consultation meetings with City and other approval agencies.	Appendix A
• 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
• Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

• Identification of existing and proposed infrastructure available in the immediate area.	N/A
• 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).	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
• 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.	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
• 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.	N/A
• Proposed phasing of the development, if applicable.	N/A
• Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Backround Studies
• All preliminary and formal site plan submissions should have the following information: o Metric scale o North arrow (including construction North) o Key plan o Name and contact information of applicant and property owner o Property limits including bearings and dimensions o Existing and proposed structures and parking areas o Easements, road widening and rights-of-way o Adjacent street names	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
• Confirm consistency with Master Servicing Study, if available	N/A
• Availability of public infrastructure to service proposed development	N/A
• Identification of system constraints	N/A
• Identify boundary conditions	N/A
• Confirmation of adequate domestic supply and pressure	N/A
• 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.	Appendix B
• 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.	N/A
• Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
• Address reliability requirements such as appropriate location of shut-off valves	N/A
• Check on the necessity of a pressure zone boundary modification.	N/A
• 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	N/A

• 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.	N/A
• Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
• Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix B
• Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
• 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).	N/A
• Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
• 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.	N/A
• Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Sanitary Sewer

• 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)	N/A
• Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
• Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Sanitary Sewer
• 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).	N/A
• Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
• Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
• Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
• Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
• Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0 Stormwater Management
• Analysis of available capacity in existing public infrastructure.	N/A
• A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
• 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.	Section 6.0 Stormwater Management
• Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0 Stormwater Management
• Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Stormwater Management
• Set-back from private sewage disposal systems.	N/A
• Watercourse and hazard lands setbacks.	N/A
• Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
• Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
• Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	Appendix F

• Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Site Grading, Drainage, Sediment & Erosion Control Plan
• 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 6.0 Stormwater Management Appendix F
• Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Management
• Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Management
• 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.	Appendix A
• Identification of potential impacts to receiving watercourses	N/A
• Identification of municipal drains and related approval requirements.	N/A
• Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Stormwater Management
• 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
• Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

• Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0 Sediment & Erosion Control
• 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.	N/A
• Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

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:

Criteria	Location (if applicable)
• 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 the Act.	N/A
• Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
• Changes to Municipal Drains.	N/A
• Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
• Clearly stated conclusions and recommendations	Section 8.0 Summary Section 9.0 Recommendations
• 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.	All are stamped
• All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped