SERVICING & STORMWATER MANAGEMENT REPORT
377-381 WINONA AVENUE

Project No.: CCO-23-1238

City File No.: D07-12-22-0154

Prepared for:

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McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by CSV Architects to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed development located at 377-381 Winona Avenue within the City of Ottawa.

The main purpose of this report is to present a servicing and stormwater management design for the development in accordance with the recommendations and guidelines provided by the City of Ottawa (City), the Rideau Valley Conservation Authority (RVCA), and the Ministry of the Environment, Conservation and Parks (MECP). This report will address the water, sanitary and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

This report should be read in conjunction with the following drawings:

- CCO-23-1238, C101 – Existing Conditions, Removals, Lot Grading, Drainage, Servicing, Erosion & Sediment Control Plan
- CCO-23-1238, PRE – Pre-Development Drainage Plan (***Appendix E***)
- CCO-23-1238, POST – Post-Development Drainage Plan (***Appendix F***)

1.2 Site Description

Figure 1: Site Map

The subject property, herein referred to as the site, is located at 377-381 Winona Avenue within the Kitchissippi ward. The site covers approximately ***0.10 ha*** and is located at the corner of Winona Avenue and Picton Avenue. The site is zoned for Traditional Mainstreet (TM). See Site Location Plan in ***Appendix 'A'*** for more details.

1.3 Proposed Development and Statistics

The proposed development consists of the addition of a 6-storey ***788 m²*** mixed use building, complete with underground parking with street access from Picton Avenue. Development is proposed within ***0.10 ha*** of the site. Refer to ***Site Plan*** prepared by CSV Architects and included in ***Appendix B*** for further details.

1.4 Existing Conditions and Infrastructures

The site is currently developed containing two 2-storey homes with asphalt driveways. The existing buildings are serviced by the municipal infrastructure within Winona Avenue.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal rights-of-way(s):

- Winona Avenue
  - 152 mm diameter UCI watermain, a
  - 225 mm diameter concrete sanitary sewer, and a
  - 450 mm diameter concrete storm sewer, tributary to the Ottawa River approximately 3km downstream.
- Picton Avenue
  - 152 mm diameter UCI watermain, a
  - 225 mm diameter concrete sanitary sewer, and a
  - 300 mm diameter concrete storm sewer, tributary to the Ottawa River approximately 3km downstream.

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control approval process. Site plan control requires the City to review, provided concurrence and approve the engineering design package. Permits to construct can be requested once the City has issued a site plan agreement.

An Environmental Compliance Approval (***ECA***) through the Ministry of Environment, Conservation and Parks (***MECP***) is not anticipated to be required since the proposed storm sewer system services one parcel of land and does not propose industrial use.

2.0 BACKROUND STUDIES, STANDARDS, AND REFERENCES

2.1 Background Reports / Reference Information

As-built drawings of existing services, provided by the City of Ottawa Information centre, within the vicinity of the proposed site were reviewed in order to identify infrastructure available to service the proposed development.

A topographic survey (23018-22) of the site was completed by AOV and dated August 9th, 2022.

The Site Plan (A100) was prepared by CSV Architects (***Site Plan***).

2.2 Applicable Guidelines and Standards

City of Ottawa:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (***Ottawa Sewer Guidelines***)
  - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014***. (ISTB-2014-01)***
  - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. ***(PIEDTB-2016-01)***
  - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018***. (ISTB-2018-01)***
  - Technical Bulletin ISTB-2018-04 City of Ottawa, March 2018. ***(ISTB-2018-04)***
  - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. ***(ISTB-2019-02)***
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (***Ottawa Water Guidelines***)
  - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. ***(ISD-2010-2)***
  - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. **(ISDTB-2014-02)**
  - Technical Bulletin ISTB-2018-02 City of Ottawa, March 2018. ***(ISTB-2018-02)***
  - Technical Bulletin ISTB-2021-03 City of Ottawa, August 2021. ***(ISTB-2021-03)***

Ministry of Environment, Conservation and Parks:

- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. ***(MECP Stormwater Design Manual)***
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008. (***MECP Sewer Design Guidelines***)

Other:

- Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020. (***FUS Guidelines***)

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was held with City staff on April 29, 2022 regarding the proposed site servicing. Specific design parameters to be incorporated within this design include the following:

- Pre-development and post-development flows shall be calculated using a time of concentration (Tc) no less than 10 minutes.
- Control 5 through 100-year post-development flows for the roof to the 2-year pre-development flow with a combined C value to a maximum of 0.50.
- The remainder of the site can be unrestricted provided it is directed towards the City ROW.

4.0 WATERMAIN

4.1 Existing Watermain

The site is located within the 1W pressure zone, as per the Water Distribution System mapping included in ***Appendix C***. There are two municipal fire hydrants on Winona Avenue and one municipal hydrant on Picton Avenue available to service the proposed development.

4.2 Proposed Watermain

It is proposed to service the new building with a 150 mm diameter water service connected to the 152 mm diameter water main within Picton Avenue. The existing service connections to the existing buildings will be blanked at the main and removed.

Table 1, below, summarizes the water supply design criteria obtained from the ***Ottawa Water Guidelines*** and utilized for the water analysis.

Table 1: Water Supply Design Criteria

Site Area	0.10 ha
Residential	280 L/day/person
Residential Apartment – 1 Bedroom	1.4 person/unit
Residential Apartment – 2 Bedroom	2.1 person/unit
Max Day Peaking Factor - Residential	4.9 x avg. day
Peak Hour Peaking Factor - Residential	7.4 x avg. day

The OBC and Fire Underwriters Survey 2020 (FUS) methods were utilized to estimate the required fire flow for the proposed building. Fire flow requirements were calculated per City of Ottawa Technical Bulletin ***ISTB-2018-02***. The following parameters were utilized for the calculations:

FUS:

- Type of construction – Non-Combustible Construction
- Occupancy Type – Limited Combustible
- Sprinkler Protection – Standard Sprinkler System

OBC:

- Type of construction – Non-Combustible Construction
- Occupancy Type: Group C and E
- Water Supply Coefficient (K): 17 (Worst case occupancy “K’ value used)

The results of the FUS calculations yielded a required fire flow of ***9,000 L/min*** (150.0 L/s), and the results of the OBC calculation yielded a required fire flow of ***9,000 L/min*** (150.0 L/s). The detailed calculations for the FUS and OBC can be found in ***Appendix C***.

Boundary conditions have been provided by the City of Ottawa for the current conditions and are available in Appendix 'C'. A water model was completed using Bentley's WaterCAD based on the boundary conditions. The normal operating pressure range is anticipated to be 430.6 to 492.3 kPa and will not be less than 275 kPa (40 psi) or exceed 689 kPa (100 psi).

Based on correspondence with City Staff, the results of the multi-hydrant analysis indicate the existing hydrants in the vicinity of the site can provide adequate fire flow to the proposed development. The results of the water model can be found in ***Table 2***, below.

Table 2: Water Pressure at Junction Per Scenario

Junction	Average Day (psi)	Peak Hourly (psi)
J-1 (BLDG)	71.40	62.45

To confirm the adequacy of fire flow to protect the proposed development, existing hydrants within 150 m of the proposed building were analysed per City of Ottawa ***ISTB 2018-02*** Appendix I Table 1. The results are summarized below.

Table 3: Fire Protection Confirmation

Building	Fire Flow Demand (L/min.)	Fire Hydrant(s) within 75m (5,700 L/min)	Fire Hydrant(s) within 150m (3,800 L/min)
377-381 Winona Avenue	9,000 (OBC) 9,000 (FUS)	2 Public	3 Public

Based on City guidelines (***ISTB-2018-02***), the existing hydrants provide adequate protection for the proposed development. A hydrant coverage figure can be found in ***Appendix C***.

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

There are two existing service connections to the 225 mm diameter concrete sanitary sewer located within Winona Avenue, tributary to the West Nepean Collector.

5.2 Proposed Sanitary Sewer

A new 150 mm diameter gravity sanitary service will be extended from the 225 mm diameter sanitary main within Picton Avenue to service the proposed building. The existing services will be blanked at the main and removed. Refer to drawing C102 for a detailed servicing layout.

Table 4, below, summarizes the wastewater design criteria identified by the ***Ottawa Sewer Guidelines***.

Table 4: Sanitary Design Criteria

Design Parameter	Value
Site Area	0.10 ha
Residential	280 L/person/day
1 Bedroom Apartment	1.4 persons/unit
2 Bedroom Apartment	2.1 persons/unit
Residential Peaking Factor	3.59
Extraneous Flow Allowance	0.33 L/s/ha
Estimated Population	101 persons

Table 5 below, summarizes the estimated wastewater flow from the proposed building. Refer to ***Appendix D*** for detailed calculations.

Table 5: Summary of Estimated Sanitary Flow

Design Parameter	Total Flow (L/s)
Total Estimated Average Dry Weather Flow	0.36
Total Estimated Peak Dry Weather Flow	1.21
Total Estimated Peak Wet Weather Flow	1.24

As noted above, the development is proposed to be serviced via a proposed 150 mm sanitary service connection to the 225 mm concrete sanitary sewer within Picton Avenue.

The full flowing capacity of a 150 mm diameter service at 2.0% slope is estimated to be ***22.47 L/s***. Per ***Table 5***, a peak wet weather flow of ***1.24 L/s*** will be conveyed within the 150 mm diameter service, therefore the proposed system is sufficiently sized for the development. Due to the complexity of the downstream network the City will need to advise of any downstream constraints.

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

Stormwater runoff from the existing site flows overland towards the Winona Avenue and Picton Avenue right of way. Runoff is then collected by municipal infrastructure, and travels approximately 3km downstream before discharging into the Ottawa River.

6.2 Proposed Storm Sewers

The proposed development will be serviced through two a new 150 mm service connection to the existing 300 mm diameter storm sewer within Picton Avenue.

Runoff collected on the roof of the proposed building will be stored and controlled internally using 4 roof drains. The roof drains will be used to limit the flow from the roof to the specified allowable release rate. Roof drainage will be directed to a 150 mm diameter service connected to the 300 mm diameter storm sewer within Picton Avenue. For calculation purposes a Watts Accutrol roof drain was used to estimate a reasonable roof flow. Other products may be specified at detailed building design provided release rates and storage volumes are respected.

Runoff from the walkways and landscaped areas will be directed towards the Winona Avenue and Picton Avenue right of way. Flow restriction is not proposed for the surface runoff.

Foundation drainage is proposed to be conveyed via a 150 mm storm service connected to the 300 mm diameter storm sewer within Picton Avenue. Foundation drainage will be pumped via a sump pump with a back flow preventer and appropriate backup power.

See CCO-23-1238 - *POST* include in ***Appendix F*** of this report for more details. The Stormwater Management design for the subject property will be outlined in *Section 7.0* of this report.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

As per *Section 6.2*, stormwater management for the proposed development will be provided by roof storage. The controlled stormwater flow will be directed to the existing 300 mm diameter storm sewer within Picton Avenue.

In summary, the following design criteria have been employed in developing the stormwater management design for the site as directed by the RVCA and City:

Quality Control

- Based on consultation with the RVCA included in Appendix B, quality controls are not required.

Quantity Control

- Any storm events greater than the 2-year, up to 100-year, and including 100-year storm event must be detained on the roof only. The remainder of the site is permitted to direct unrestricted flow towards the City ROW.
- Post-development roof area to be restricted to the 2-year storm event, based on a calculated time of concentration of at least 10 minutes and a combined maximum rational method coefficient of 0.50. Refer to *Section 7.2* for further details.

7.2 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 Ottawa IDF curves)
A = Drainage area in hectares

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any SWM facility sized using this method is expected to function as intended. The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	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.

7.3 Pre-Development Drainage

It has been assumed that the development area contains no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2-, 5-, and 100-year events are summarized below in ***Table 6***. See CCO-23-1238 - *PRE* in ***Appendix E*** and ***Appendix G*** for calculations.

Table 6: Pre-Development Runoff Summary

Drainage Area	Area (ha)	C 2/5 & 100-Year	Q (L/s)		
			2-Year	5-Year	100-Year
A1	0.07	0.64 / 0.72	9.38	12.73	24.59
A2	0.03	0.39 / 0.45	2.25	3.06	6.10
Total	**0.10**	-	**11.64**	**15.79**	**30.68**

7.4 Post-Development Drainage

To meet the stormwater objectives, the development will contain flow attenuation via rooftop storage. ***Table 7,*** below, summarizes the required restricted flow for the roof.

Table 7: Required Restricted Flow

Drainage Area	Area (ha)	C (2-Year)	Q (L/s) 2-Year
A1	0.07	0.50	7.38

Based on the criteria listed in *Section 7.1*, the development will be required to restrict roof flow to the 2-year storm event. It is estimated that the target release rate for the roof during the 100-year event will be ***7.38 L/s***. See ***Appendix G*** for calculations.

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-23-1238 - *POST* in ***Appendix F*** of this report for more details. A summary of the post-development runoff calculations can be found below.

Table 8: Post-Development Runoff Summary

Drainage Area	Area (ha)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)	100-year Storage Required (m^3)	100-year Storage Available (m^3)
B1A	0.016	0.80	0.91	5.82	6.30
B1B	0.014	0.32	0.32	6.92	7.02
B1C	0.024	1.45	1.89	13.09	13.25
B1D	0.016	0.79	0.90		
B2	0.027	5.29	10.18	-	-
Total	**0.10**	**8.65**	**14.21**	**25.83**	**26.57**

Runoff from areas B1A-B1D will be controlled and stored on the roof of the proposed building **(B1)** using 4 roof drains. The roof drains will be used to limit the flow from the roof to the specified allowable release rate.

For calculation purposes a Watts Accutrol roof drain in varying positions was used to estimate a reasonable roof flow. Other products may be specified at detailed building design provided release rates and storage volumes are respected.

Runoff for area B2 will flow overland towards the Winona Avenue and Picton Avenue right of way.

As seen in ***Table 9*** below, roof runoff will be restricted to a maximum release rate of **4.02 L/s**, allowing for a proposed **26.57 m^3** of roof storage. Emergency roof scuppers have been proposed to ensure roof ponding does not exceed 150mm.

Table 9: Roof Drainage Summary

Drainage Area	Area (ha)	# of Roof Drains	Storage Depth (mm)		Total Flow Rate (L/s)	
			5-Year	100-Year	5-Year	100-Year
B1A	0.016	1	105	140	0.80	0.91
B1B	0.014	1	110	150	0.32	0.32
B1C	0.024	1	115	150	1.45	1.89
B1D	0.016	1	100	135	0.79	0.90
Total	**0.07**	**4**	**-**	**-**	**3.36**	**4.02**

7.5 Quality Control

As noted in *Section 7.1*, quality controls are not required for the development based on consultation with the RVCA.

8.0 EROSION AND SEDIMENT CONTROL

8.1 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. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will 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, 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. Fibre roll barriers are to be installed at all existing curb inlet catch basins and filter fabric is to be placed under the grates of all existing catch basins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures are 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 City and/or 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 warrant. Please see the *Site Grading, Drainage and* Sediment *& Erosion Control Plan* for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

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.

9.0 SUMMARY

- A new 6-storey ***788 m²*** building is proposed to be constructed at 377-381 Winona Avenue. The development is proposed within ***0.10 ha*** of the site.
- It is proposed to service the new building through a new 150 mm diameter water service and 150 mm diameter sanitary service. A new 150 mm diameter storm service is proposed to collect and control drainage within the development area.
- It is proposed to blank the existing services at the main and remove them.
- It is proposed to service the development area via roof storage. The storm system will connect to the existing 300 mm diameter concrete storm sewer located within Picton Avenue.
- Storage for the 5- through 100-year storm events will be provided on the roof.
- Quality controls are not required based on consultation with the RVCA.

10.0 RECOMMENDATION

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 development at 377-381 Winona Avenue.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

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11.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of CSV Architects. 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, Parks 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.