SERVICING AND STORMWATER MANAGEMENT REPORT
251 PENFIELD DRIVE – 8 UNIT TOWNHOUSE

Project No.: 0CP-19-0682
City File No.:

Prepared for:
Atelier 292 Architect Inc.
292 Main Street
Ottawa, ON
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Prepared by:
McIntosh Perry
115 Walgreen Road
Carp, ON
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June 12, 2020

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 251 Penfield Drive within the City of Ottawa.

1.2 Site Description

The property is located at 251 Penfield Drive, within the City of Ottawa. It is described as Block R1, Registered Plan 847, Part 1, City of Ottawa, Ontario. The land in question covers approximately 1.01 ha and is located on the northwest side of Penfield Drive, just east of Teron Road.

The existing site is currently developed with a two-storey apartment building. The existing building occupies the central northeastern portion of the site. There are three asphalt site accesses along Penfield Drive. The two accesses in front of the existing building form a turn around with some parking. The third sit access located further west leads to an existing parking area. The remainder of the site is grass area and the subject site shares a ditch with the adjacent property to the southwest that leads to a swampy area located at the rear of the subject site. The adjacent properties to the north and east are residential dwellings while to the southwest are a fire station and a restaurant.

The proposed development consists of a one storey, 8-unit apartment building totaling approximately 540m^2. The proposed building will be located along the southwest property line, parking and drive aisles will be provided in front of the proposed building. 14 parking spaces two of which are accessible will be provided to meet City requirements. The existing western most access will be removed and replaced with a new access for the proposed parking area. A site location plan has been provided in Appendix A for reference.

2.0 BACKGROUND STUDIES

Background studies that have been completed for the site include a review of the topographical survey of the site and a geotechnical report.

A topographic survey was completed for the site by Farley, Smith & Denis Surveying Ltd. dated September 30th, 2019. The survey was reviewed for existing services and features within the vicinity of the site in order to determine proper servicing and stormwater management schemes for the site. The survey can be found under separate cover.

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

- Geotechnical Investigation completed by GHD dated September 30, 2019.

3.0 PRE-CONSULTATION SUMMARY

City of Ottawa Staff and the MVCA have been pre-consulted regarding this proposed development through email in August 2019 and May 2020, respectively. Specific design parameters to be incorporated within this design include the following:

- Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site
- The 100-year post development allowable storm release rate shall be controlled to the pre-development 5-year storm release rate.
- The SWM is only required to address the new area being developed. The existing building and remainder of the site do not need to be included.
- 80% TSS Removal is required for stormwater quality control as per the MVCA requirements.

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

4.0 EXISTING SERVICES

All existing services to the existing building will remain. There is a 600mm diameter sanitary sewer and a 300mm diameter storm sewer within Penfield Drive.

There is also a 200 mm PVC diameter watermain within Penfield Drive with fire hydrants located along the east and west sides of the roadway located to north and south of the proposed development, respectively.

5.0 SERVICING PLAN

5.1 Proposed Servicing Overview

Servicing to the site will be provided by adding new site services in order to service the proposed apartment. The new services will be connected to the existing storm, sanitary, and water mains within Penfield Drive. 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.

5.2 Proposed Water Design

A new 100 mm PVC diameter water lateral will be connected to the existing 200 mm PVC watermain within Penfield Drive, complete with a water valve located at the property line. The existing fire hydrants within Penfield Drive will be used to service the site. The watermain is designed to have a minimum of 2.4m of cover.

The Fire Underwriters Survey 1999 (FUS) method was utilized to determine the required fire flow for the site. The 'C' factor (type of construction) for the FUS calculation was determined to be 1.0 (ordinary type construction). The total floor area ('A' value) for the FUS calculation was determined to be 540 m^2. The results of the calculations yielded a required fire flow of 7,000L/min. A fire flow of 2,700L/min was calculated using the Ontario Building Code (OBC) requirements. The detailed calculations for the FUS and OBC can be found in Appendix 'C'. A fire access route has been provided between the existing and proposed buildings.

The water demands for the proposed building have been calculated to adhere to the *Ottawa Design Guidelines – Water Distribution* manual and can be found in Appendix 'C'. The results have been summarized below:

Table 1: Water Demands

Persons	11.2
Residential	280 L/c/d
Average Day Demand (L/s)	0.04
Maximum Daily Demand (L/s)	0.05
Peak Hourly Demand (L/s)	0.10
OBC Fire Flow Requirement (L/s)	45
FUS Fire Flow Requirement (L/s)	116.67
Max Day + Fire Flow (FUS) (L/s)	116.72

Boundary Conditions have been requested from the City however were not available at the time of submission. Once boundary conditions are provided by the City, the subject property will be hydraulically modelled using WaterCAD to confirm the system has adequate capacity for the proposed development and the required fire flows can be met.

5.3 Proposed Sanitary Design

A new 200mm diameter gravity sanitary sewer will be connected to the existing 600 mm diameter sanitary sewer within Penfield Drive. Each unit will be individually serviced by a 135mm sanitary service which will tee into the proposed 200mm sanitary sewer. The sanitary service will be complete with a maintenance manhole (MH2A) just inside the property line as per the City of Ottawa – Sewer Design Guidelines, October 2012, Clause 4.4.4.7 and City of Ottawa Sewer-Use By-Law 2003-514 (14).

The proposed 200mm diameter gravity sanitary sewer will be installed with a minimum full flow target velocity (cleansing velocity) of 0.6m/s and a full flow velocity of not more than 3.0m/s. Design parameters for the site include an infiltration rate of 0.28L/s/ha.

The subject site is a proposed one-storey 8-unit townhouse. The total area of the building is 540m^2. The peak design flows for the proposed building were calculated using criteria from the *City of Ottawa – Sewer Design Guidelines, October 2012*. The peak design flow for the proposed site was determined to be 0.025 L/s, therefore the proposed 200 mm diameter lateral has sufficient capacity to convey the flows (See Appendix 'D' for detailed calculations). It is anticipated that there will be no issues with capacity constraints within the proposed lateral or within the existing sanitary main within Penfield Drive as the amount of flow leaving the site is minimal.

5.4 Proposed Strom Design

Stormwater runoff will be conveyed by way of overland sheet flow and a proposed storm sewer network. Runoff will be concentrated within the asphalt driving lanes where it will flow towards the proposed catchbasin to then be conveyed through the on-site stormwater management system to the existing 300mm storm sewer within Penfield Drive. The site will be constructed with adequate grading to ensure that all areas on the site are able to reach a suitable outlet and to ensure that the post-development restriction is achieved. Please see the Site Grading and Drainage Plan for detailed locations of the proposed stormwater infrastructure. The direction and location of overland sheet flow has also been indicated.

Stormwater management (SWM) design for the site will make use of on-site storage an inlet control device (ICD). The intent of the overall stormwater management design is to provide a system capable of capturing runoff, restricting flows to the 5-year pre-development flow rate, and providing the on-site storage necessary to accommodate the reduced runoff rate. In the event of a failure or blockage within the system, stormwater will be conveyed to existing drainage paths along the Southwest and Southeast of the property. The stormwater management design will be further detailed in Section 6.0.

6.0 PROPOSED STORMWATER MANAGEMENT

6.1 Design Criteria and Methodology

Stormwater management for this site will be maintained through positive drainage away from the proposed buildings and a new storm sewer system within the site. This SWM plan will implement quantity control strategies. Some of 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 directed to the existing sewer within Penfield Drive; similarly, overland flow will be directed towards Penfield Drive through existing drainage patterns. The remainder of the storm runoff will be directed to a rear yard swale. The runoff will remain within a retention area located at the end of the swale and outlet restricted to the existing on-site ditch. 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 "Lot level", "Conveyance" and "End of Pipe" locations. These concepts will be explained further in Section 6.3.

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

Quality Control

- A TSS removal of 80% is required by the MVCA.

Quantity Control

- Post-development flow (5 & 100 year) is to be restricted to match the 5-year pre-development flow with a maximum C value of 0.5.

6.2 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 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*	0.60
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 minimum time of concentration (Tc) of 10 minutes.

6.2.1 Pre-Development Drainage

The existing site has been demonstrated as drainage areas A1 and A2. The Pre-development Drainage Area Plan indicates the limits of the drainage area, see CP-19-0682 – PRE in Appendix 'E' of this report for more details. Drainage area A1 represents the flow that drains to the Penfield Drive. Drainage area A2 captures the flow that drains southwest within the site to the existing ditch located at the southwestern property line. The development area is covered mostly in asphalt and grass. A summary of the pre-development runoff calculations can be found below.

Table 2: Pre-Development Runoff Summary

Area ID	Drainage Area (ha)	5-Year Runoff Coefficient	100-Year Runoff Coefficient	T_c (min)	Unrestricted 5-year Peak Flow (L/s)	Unrestricted 100-year Peak Flow (L/s)
A1	0.12	0.42	0.49	20	15.27	30.24
A2	0.09	0.42	0.49	20	11.39	22.58
Total	**0.22**				**26.66**	**52.82**

See CP-19-0682 – PRE in Appendix 'E' and Appendix 'G' for calculations

6.2.2 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CP-19-0682 – POST in Appendix 'F' of this report for more details. A summary of the Post-Development Runoff Calculations can be found below.

Table 3: Post-Development Runoff Summary

Area ID	Drainage Area (ha)	5-Year Runoff Coefficient	100-Year Runoff Coefficient	T_c (min)	Unrestricted 5-year Peak Flow (L/s)	Unrestricted 100-year Peak Flow (L/s)
B1	0.11	0.76	0.85	10	23.47	44.99
B2	0.08	0.64	0.72	10	14.32	27.68
B3	0.03	0.40	0.46	10	3.86	7.69
Total	**0.22**				**41.66**	**80.36**

See CP-19-0682 – POST in Appendix 'F' and Appendix 'G' for calculations

Runoff will be captured and conveyed to a new storm sewer network which will connect to the existing 600mm storm sewer within Penfield Drive. In order to match pre-development flows, on site storage will be required. Storage will be provided using a combination of parking lot storage in the proposed parking area as well as a dry retention area. Some portions of the site will be left in existing condition and thus were not included in the development area. All other runoff will remain unrestricted and follow existing drainage patterns. An Inlet control device within "CB1" and an orifice within the dry retention area outlet will then restrict all the captured runoff to the 5-year pre-development flow. See Appendix 'G' for calculations.

6.3 Quantity Control

After discussing the stormwater management criteria for the site with City staff, the total post-development runoff for this site has been restricted to match the 5-year pre-development flow rates with a combined C value of 0.5. (See Appendix 'B' for pre-consultation notes). A time of concentration was calculated using the airport method. These values create the following allowable release rates and storage volumes for the development site.

Table 4: Allowable Release Rate

Area ID	Drainage Area (ha)	Runoff Coefficient	T_c (min)	Required Restricted Flow 5-year (L/s)
A1	0.12	0.42	10	15.27
A2	0.09	0.42	10	11.39
Total	**0.22**			**26.66**

See Appendix 'G' for calculations

Reducing site flows will be achieved using flow restrictions and will create the need for onsite storage. Runoff from areas B1 through B3 will be restricted as detailed in the table below.

Table 5: Post-Development Restricted Runoff

Area ID	Drainage Area (ha)	5-Year Runoff Coefficient	100-Year Runoff Coefficient	T_c (min)	Restricted 5-year Peak Flow (L/s)	Restricted 100-year Peak Flow (L/s)
B1	0.11	0.76	0.85	10	7.25	7.50
B2	0.08	0.64	0.72	10	7.81	11.24
B3	0.03	0.40	0.46	10	3.86	7.69
Total	**0.22**				**18.92**	**26.43**

See Appendix 'G' for calculations

Runoff from Area B1 will be restricted in CB1 through an IPEX MHF Plate ICD (Design Head of 2.28). This orifice plug will restrict area B1 7.25 L/s and 7.50 L/s for both the 5 and 100-year storm events. The restriction creates a required storage volume of 10.44 m^3 and a corresponding water surface elevation (WSEL) of 89.01 m for the 5-year storm event. Likewise, the restriction creates required storage volume of 27.65 m^3 and a WSEL of 89.09 m for the 100-year storm event. The storage for this area will be provided in the parking lot located above structure CB1. Table 8 details the required and provided storage volumes for the site.

Runoff from Area B2 will be restricted in in the dry retention area through a Plate ICD (Design Head of 0.23). This orifice plug will restrict area B2 7.81 L/s and 11.24 L/s for both the 5 and 100-year storm events. The restriction creates a required storage volume of 3.9 m^3 and a corresponding water surface elevation (WSEL) of 88.49 m for the 5-year storm event. Likewise, the restriction creates required storage volume of 10.0 m^3 and a WSEL of 88.64 m for the 100-year storm event. The storage for this area will be provided in the dry retention area. Table 8 details the required and provided storage volumes for the site

Runoff from area B3 will be unrestricted and flow will follow the existing drainage patterns on the site toward Penfield Drive.

In the event that there is rainfall above the 100-year storm event, or a blockage within the storm network occurs, an emergency overland flow route has been provided for each restriction area such that the storm water runoff will be conveyed away from the buildings and off of the site. Overland flow in area B1 will be directed to a Penfield Drive. Overland flow for area B2 will direct runoff to the existing ditch along the southwest property line. The following table summarizes the storage requirements during the 5 and 100-year storm events and the provided storage volumes.

Table 6: Storage Summary

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	23.47	44.99	7.25	7.50	10.44	27.65	11.36	29.53
B2	14.32	27.68	7.81	11.24	3.91	10.00	4.15	10.20
B3	3.86	7.69	3.86	7.69	0.00	0.00	0.00	0.00
Total	**41.66**	**80.36**	**18.92**	**26.43**	**14.35**	**37.65**	**15.51**	**39.73**

See Appendix 'G' for calculations

6.4 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.

As per the discussions with the MVCA, the existing storm main within Penfield Drive ties into Kizell Drain and requires an enhanced level of protection (80% TSS Removal). Therefore, a stormceptor has been provided on site to achieve the required removal prior to outletting to the 300mm diameter storm main within Penfield Drive. The combination of the above BMP's and the proposed flow control measures will aid in the thermal protection of the natural environment.

7.0 SEDIMENT EROSION CONTROL

7.1 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 onsite ditch along the property line 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 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 of Ottawa, MVCA 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. Geosock is 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 MVCA 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. Please see the Site Grading and Drainage Plan for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

7.2 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 MVCA.

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.

8.0 SUMMARY

- A new 540 m² apartment will be constructed on the site located at 251 Penfield Drive.
- A new 200 mm diameter sanitary sewer and monitoring manhole will be installed and connected to the existing 600 mm diameter sewer within Penfield Drive. Each unit will have a 135mm sanitary service that drains to 200mm sanitary sewer.
- A new 100 mm diameter water lateral will be extended from the existing 200 mm diameter main within Penfield Drive Drive to service the development.
- A new storm network will be installed onsite and will connect to the existing 300 mm storm sewer within Penfield Drive.
- As discussed with the City of Ottawa staff, the stormwater management design will ensure that the post-development flow rates are restricted to the 5-year pre-development flow rate calculated with a C value of 0.5.
- Storage for the 5- through 100-year storm events will be provided within the parking lot areas above the proposed storm structures and in the proposed dry retention area.
- Quality control will be provided with a stormceptor to meet 80% TSS removal.

9.0 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 apartment development on Penfield Drive.

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.

Nicholas Vachon, EIT
Engineering Intern, Land Development
McIntosh Perry Consulting Engineers
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E:n.vachon@mchintoshperry.com

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10.0 STATEMENT OF LIMITATIONS

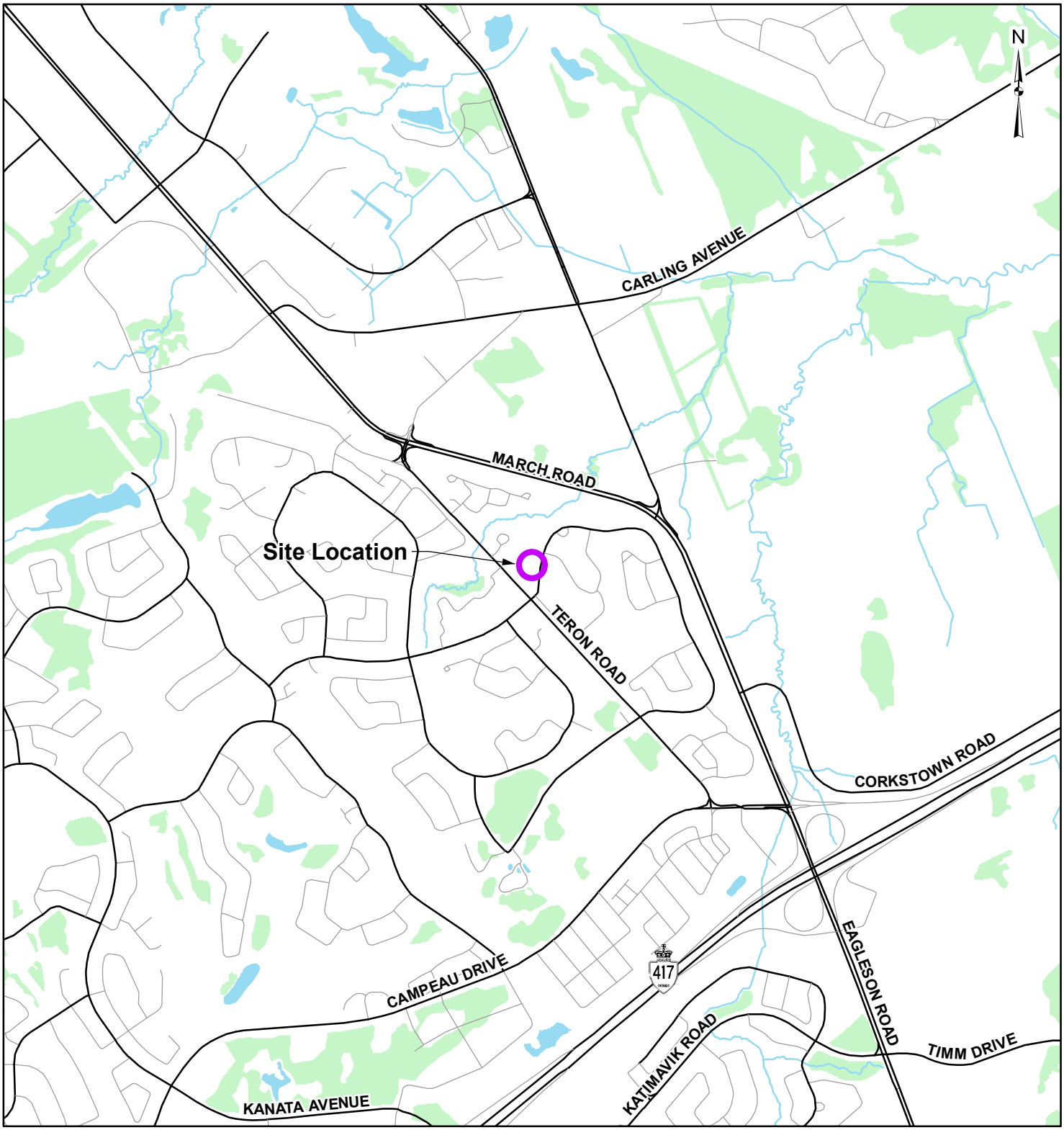
This report was produced for the exclusive use of Atelier 292 Architect Inc. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry 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
KEY PLAN

McINTOSH PERRY



500 250 0 500

Scale 1:20,000 Metres

LEGEND

- Site Location
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2020.

CLIENT: ATELIER 292 ARCHITECT INC.

PROJECT: 8 UNIT APARTMENT

TITLE: SITE LOCATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: CP-19-0682		FIGURE:
Date	May., 26, 2020	1
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APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

MEMO

Date: August 22, 2019

To / Destinataire	Mary Dickinson, Planner
From / Expéditeur	Julie Candow, Project Manager Development Review - West
Subject / Objet	**Pre-Application Consultation** **251 Penfield Drive**

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: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

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. The minor storm sewer system should outlet to Penfield Drive. The 100-yr post development allowable storm release rate shall be controlled to the pre-development 5-yr storm release rate.
   ii. Onsite storm runoff, in excess of the allowable release rate, and up to the 100-yr storm event must be detained on site.
   iii. Quantity control to be determined by the Mississippi Valley Conservation Authority (MVCA). Please include correspondence from the MVCA in the stormwater management report.
   iv. The existing storm service lateral for 231 Penfield Drive should be used/shared for the 251 Penfield Drive connection, if feasible.

5. No sanitary sewer capacity constraints were identified on Penfield Drive during the initial review of the concept plan. The March Ridge Trunk 600mm diameter sanitary sewer crosses the south corner of the site, and is the only feasible sanitary sewer outlet for the subject site. The minimum sewer size to be connected to the trunk sewer is a 200mm diameter sewer, service connections smaller than 200mm diameter will not be allowed. The existing sanitary service lateral for 231 Penfield Drive should be used/shared for the 251 Penfield Drive connection, if feasible.

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. An MECP Environmental Compliance Approval in not anticipated to be required for the subject site, assuming the following:

   i. The onsite storm sewers outlet to Penfield Drive.
   ii. The property parcels, 231 and 251 Penfield Drive, will be merged.

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, x13850 or by email at Julie.Candow@ottawa.ca.

Nicholas Vachon

From: Erica Ogden <eogden@mvc.on.ca>
Sent: May 20, 2020 10:00 AM
To: Nicholas Vachon
Cc: Tyler Ferguson
Subject: RE: 251 Penfield Drive - Quality Control Requirements

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Nicholas,

Thank you for your e-mail. I have reviewed the draft site plan for 251 Penfield Drive in the City of Ottawa. The subject property is located within the watershed of a tributary of Kizell Drain; as such an enhance level of protection (80% TSS Removal) is required for stormwater quality.

The subject property is not regulated by the Conservation Authority under Ontario Regulation 153/06.

If you have any other questions, please feel free to contact me.

Thank you,

Erica C. Ogden, MCIP, RPP | Environmental Planner | Mississippi Valley Conservation Authority
10970 Highway 7, Carleton Place, ON K7C 3P1
www.mvc.on.ca |t. 613 253 0006 ext. 229| f. 613 253 0122 | eogden@mvc.on.ca

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From: Nicholas Vachon <n.vachon@mcintoshperry.com>
Sent: May 19, 2020 2:09 PM
To: Erica Ogden <eogden@mvc.on.ca>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>
Subject: 251 Penfield Drive - Quality Control Requirements

Good Afternoon Erica,

I am working on the civil design for a one storey residential apartment building located at 251 Penfield Drive, Ottawa. We have consulted with the City and will be providing quantity control to match the post-development 100-yr storm event flows to the 5-yr storm event pre-development flows.

I have attached a draft site plan as well as a map showing the location of the site for your reference. If you don't mind, could you please review and let me know what kind of quality control the MVCA would require for this development?

Thank you for your time,

Nicholas Vachon, EIT
Engineering Intern
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
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APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CP-19-0682 - 251 Penfield Drive - Water Demands

Project:	251 Penfield Drive		
Project No.:	CP-19-0682		
Designed By:	N.B.V.		
Checked By:	T.D.F.		
Date:	05/19/2020		
1-Bedroom Apartments	8.00	1.4 Persons per unit	11.2

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	280	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
Othe 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	0.05	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	0.10	L/s

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

CP-19-0682 - 251 Penfield Drive - OBC Fire Calculations

Project:	251 Penfield Drive
Project No.:	CP-19-0682
Designed By:	N.B.V.
Checked By:	T.D.F.
Date:	05/19/2020

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

Water Supply for Fire-Fighting - One Storey Apartment

Building is classified as Group : C (from table 3.2.2.55)
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with subsections 3.2.2., including loadbearing 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	10	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	1,620	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	16,200.00 L	

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

2700 L/min (if Q <108,000 L)
713 gpm

From Figure 1 (A-32)

Snorth	70	m	0.0
Seast	10	m	0.0
Ssouth	50	m	0.0
Swest	23	m	0.0

*approximate distances

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McINTOSH PERRY

CP-19-0682 - 251 Penfield Drive - Fire Underwriters Survey (FUS) Fire Calculations

Project:	251 Penfield Drive
Project No.:	CP-19-0682
Designed By:	N.B.V.
Checked By:	T.D.F.
Date:	05/19/2020

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.

A. Determine The Coefficient Related To The Type Of Construction

The building is considered to be of ordinary construction type. Therefore,

C = 1.00

B. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 540.00 m²

A = 540.00 m²

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

C. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 1.00

D. Calculate Required Fire Flow

F = 220 x C x √A

F = 220.00 X 1.00 X √ 540.00

F = 5,112.34 L/min.

E. Determine Increase or Decrease Based on Occupancy

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

Low Hazard - Apartment

No Change

Occupancy Decrease = 0.00 L/min.

F = 5,112.34 L/min.

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F. 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
- The building will not have a sprinkler system
- Therefore the value obtained in Step E is reduced by 0%

Reduction = 5,112.34 L/min. X 0%

Reduction = 0.00 L/min.

G. Determine the Total Increase for Exposures

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

- Exposure distance to the existing buildings to the north & south of the proposed building is approximately 70m & 50m respectfully.
- Exposure distance to the existing buildings to the East & West of the proposed building is approximately 10m & 23m respectfully.
- Therefore the charge for exposure is 30% of the value obtained in Step E.

Increase = 5,112.34 L/min. X 30%

Increase = 1,533.70 L/min.

H. Determine the Total Fire Demand

- To the answer obtained in E, substract the value obtained in F and add the value obtained in G
- Fire flow should be no less than 2,000L/min. and the maximum value shoul not exceed 45,000L/min.

F = 5,112.34 L/min. - 0.00 L/min. + 1,533.70 L/min.
F = 6,646.04 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 7,000 L/min (1849 GPM).

APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

Project:	CP-19-0682 – 251 Penfield Drive
Designed By:	NBV
Checked By:	TDF
Date:	May 26, 2020

Re: Sanitary Flow Calculations

1. Building Occupancy

The maximum number of bedroom units will be 8 units as per the floors plans and the attached unit break down from the Architect.

2. Daily Volume in Litres

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

- Each Dwelling unit of 1 bedroom
  = 275 Liters/Dwelling/Day

3. Peak Flow (Q/p)

- $Q_{2\text{-BED}}(p) = F_{1\text{-BED}} \times P_{1\text{-BED}}$

  Where:
  $F_{1\text{-BED}}$ = 275 Litres/Dwelling/Day (as per City of Ottawa Sewer Design Guidelines)
  $P_{1\text{-BED}}$ = 8 Units (as per Site Plan)
- Therefore, $Q_{1\text{-BED}}(p) = (275) \times (8) =$ <u>2,200 L/Day (0.025 L/sec)</u>

The proposed site will have peak flows that are negligibly small and therefore it is anticipated that there will be no issues with capacity constraints within the existing 600mm diameter sanitary main. As per the City pre-consultation no capacity concerns are noted for the existing 600mm diameter sewer within Penfield Drive. The proposed 135mm services and 200mm sewer have capacities of 16.97L/s and 48.39 L/s respectively. Therefore, the proposed sanitary services and sewer as well as the existing 600mm diameter sanitary main within Penfield Drive has the capacity to accommodate the new flows.

SANITARY SEWER DESIGN SHEET

PROJECT: 8 Unit Apartment
LOCATION: 251 Penfield Drive
CLIENT: Atelier 292 Architect Inc.

McINTOSH PERRY

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			FLOW	SEWER DATA						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES SF	SD	TH	APT	AREA (ha)	POPULATION IND	CUM	PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha) INSTITUTIONAL IND	CUM	COMMERCIAL IND	CUM	INDUSTRIAL IND	CUM	PEAK FLOW (L/s)	AREA (ha) IND	CUM	FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	(%)
Penfield Drive		BLDG	MH1A				8	0.21	18.4	18.4	4.00	0.24		0.00		0.00		0.00	0.00	0.21	0.21	0.06	0.30	16.97	5.22	135	2.00	1.148	16.67	98.25
		MH1A	MH2A					0.00	0.0	18.4	4.00	0.24		0.00		0.00		0.00	0.00	0.00	0.21	0.06	0.30	48.39	42.27	200	2.00	1.492	48.09	99.39
		MH2A	Ex. 600mm					0.00	0.0	18.4	4.00	0.24		0.00		0.00		0.00	0.00	0.00	0.21	0.06	0.30	48.39	2.88	200	2.00	1.492	48.09	99.39

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u	INST	28,000	L/Ha/day	1.5
TH/SD	2.7	p/p/u	COM	28,000	L/Ha/day	1.5
APT	2.3	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha				

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5)*0.8)
where P = population in thousands

Designed: NBV

Checked: TDF

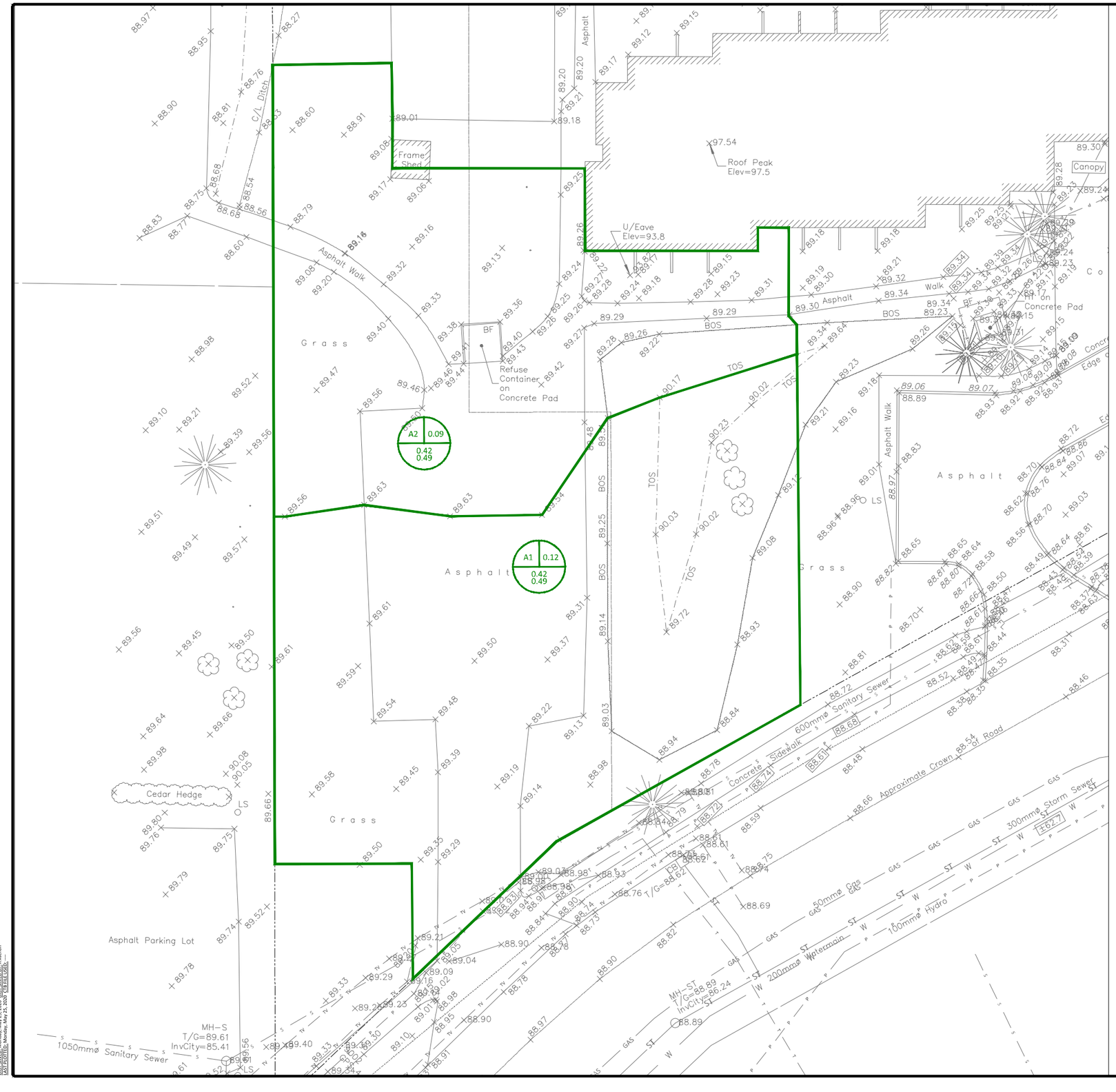
Project No.: CP-19-0682

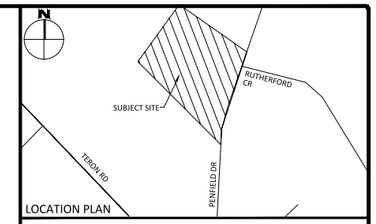
No.	Revision	Date
1.	Issued for Review	2020-05-26

Sheet No:
1 of 1

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY





LEGEND

AREA NAME
A1 | 0.25 — AREA (Ha)
0.90
1.00 — 5yr & 100yr COEFFICIENT

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR REVIEW	MAY 26, 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

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Stamp:

Client:
ATELIER 292 ARCHITECT INC.
292 MAIN STREET
OTTAWA, ON K1S 1E1

Project:
OCH - 8 UNIT INFILL
251 PENFIELD DRIVE

Drawing Title:
PRE-DEVELOPMENT DRAINAGE PLAN

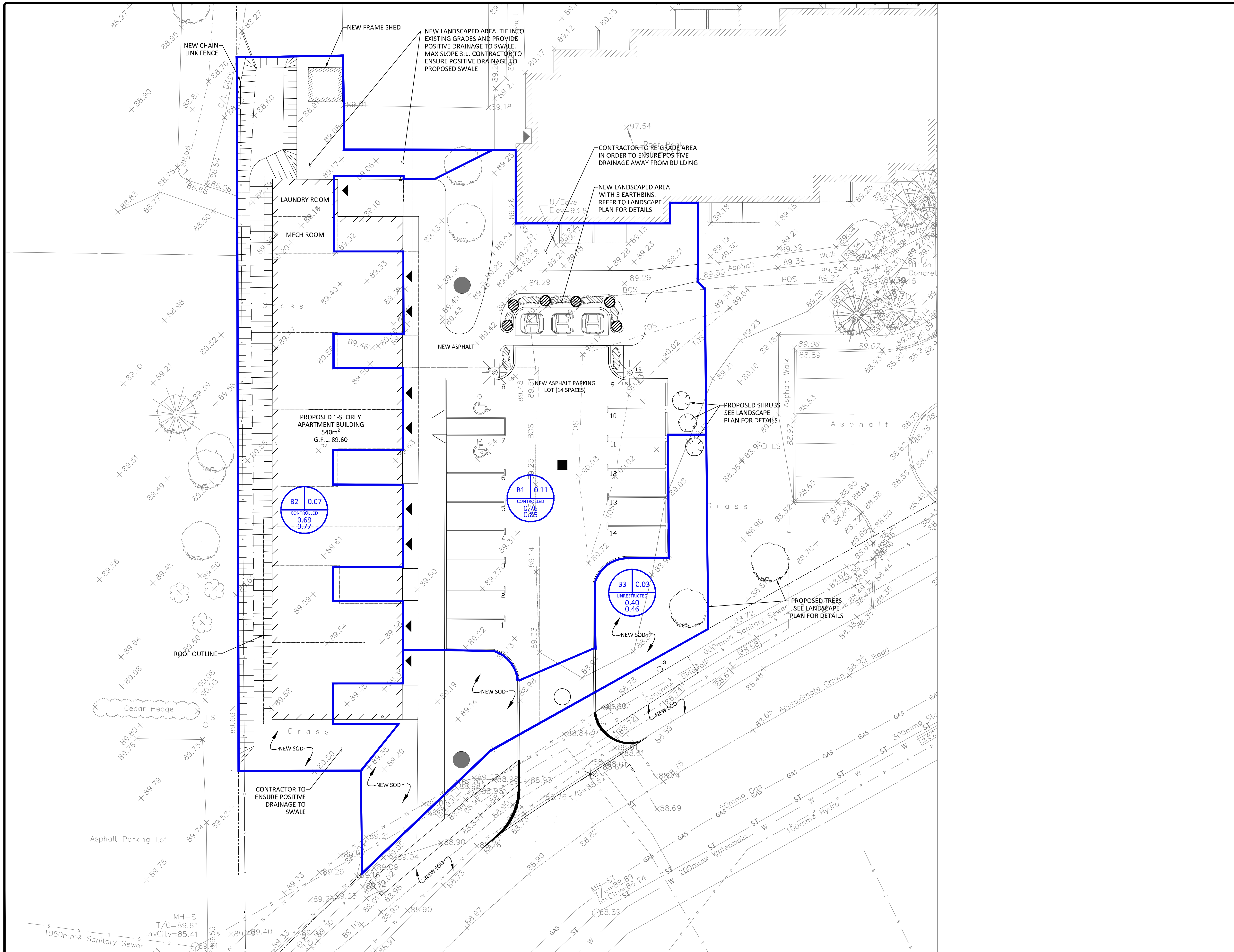
Scale: 1:150	Project Number: CP-19-0682
Drawn By: N.B.V.	
Checked By: T.D.F.	Drawing Number: PRE
Designed By: N.B.V.	

D07-12-XX-XXXX
#XXXXX

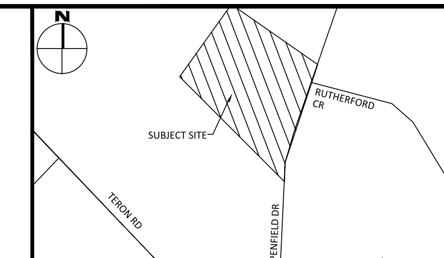
FILENAME: I:\Ottawa\01 Project - Proposals\2019 Jobs\CP\0CP Projects\0CP-19-0682 Atelier 292_OCH Apartment_251 Penfield Drive\12 - Drawings\CP-19-0682 Presentation.dwg
LAST SAVED: Monday, May 25, 2020 LAST SAVED BY: n.vachon
LAST PLOTTED: Monday, May 25, 2020 BY: NELSON

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY

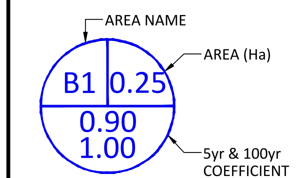


NEW FRAME SHED
NEW CHAIN LINK FENCE
NEW LANDSCAPED AREA. TIE INTO EXISTING GRADES AND PROVIDE POSITIVE DRAINAGE TO SWALE. MAX SLOPE 3:1. CONTRACTOR TO ENSURE POSITIVE DRAINAGE TO PROPOSED SWALE
CONTRACTOR TO RE-GRADE AREA IN ORDER TO ENSURE POSITIVE DRAINAGE AWAY FROM BUILDING
NEW LANDSCAPED AREA WITH 3 EARTHBINS. REFER TO LANDSCAPE PLAN FOR DETAILS
LAUNDRY ROOM
MECH ROOM
NEW ASPHALT
NEW ASPHALT PARKING LOT (14 SPACES)
PROPOSED SHRUBS SEE LANDSCAPE PLAN FOR DETAILS
PROPOSED 1-STOREY APARTMENT BUILDING 540m² G.F.L. 89.60
B2 0.07 CONTROLLED 0.69 0.77
B1 0.11 CONTROLLED 0.76 0.85
B3 0.03 UNRESTRICTED 0.40 0.46
PROPOSED TREES SEE LANDSCAPE PLAN FOR DETAILS
ROOF OUTLINE
NEW SOD
CONTRACTOR TO ENSURE POSITIVE DRAINAGE TO SWALE
Cedar Hedge
Asphalt Parking Lot
Asphalt
Grass
600mmø Sanitary Sewer
1050mmø Sanitary Sewer
300mmø Storm
200mmø Watermain
100mmø Hydro
50mmø Gas
Approximate Crown of Road
Concrete Sidewalk
MH-S T/G=89.61 InvCity=85.41
MH-ST T/G=88.89 InvCity=86.24



LOCATION PLAN

LEGEND



FOR REVIEW ONLY
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No.	Revisions	Date
1	ISSUED FOR REVIEW	MAY 26, 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)

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Stamp:

Client:
ATELIER 292 ARCHITECT INC.
292 MAIN STREET
OTTAWA, ON K1S 1E1

Project:
OCH - 8 UNIT INFILL
251 PENFIELD DRIVE

Drawing Title:
POST-DEVELOPMENT DRAINAGE PLAN

Scale:	1:150	Project Number:	CP-19-0682
Drawn By:	N.B.V.		
Checked By:	T.D.F.	Drawing Number:	POST
Designed By:	N.B.V.		

D07-12-XX-XXXX

#XXXXX

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

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	0.12	397.40	0.90	0.00	0.60	846.88	0.20	0.42	0.49
A2	0.09	294.10	0.90	0.00	0.60	643.38	0.20	0.42	0.49

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	0.12	0.42	0.49	10	104.2	178.6	15.27	30.24	To Penfield Drive
A2	0.09	0.42	0.49	10	104.2	178.6	11.39	22.58	To Existing Ditch
Total	0.22						26.66	52.82	

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	0.11	851.56	0.90	0.00	0.60	219.50	0.20	0.76	0.85
B2	0.08	484.33	0.90	0.00	0.60	292.86	0.20	0.64	0.72
B3	0.03	95.33	0.90	0.00	0.60	238.10	0.20	0.40	0.46

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	0.11	0.76	0.85	10	104.2	178.6	23.47	44.99	
B2	0.08	0.64	0.72	10	104.2	178.6	14.32	27.68	
B3	0.03	0.40	0.46	10	104.2	178.6	3.86	7.69	
Total	0.22						41.66	80.36	

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	23.47	44.99	7.25	7.50	10.44	27.65	11.36	29.53	Restricted	To Penfield Drive
B2	14.32	27.68	7.81	11.24	3.91	10.00	4.15	10.20	Restricted	To Existing Ditch
B3	3.86	7.69	3.86	7.69					Unrestricted	
Total	41.66	80.36	18.92	26.43						

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	23.47	7.25	16.22	9.73
12	94.7	21.33	7.25	14.08	10.14
14	86.9	19.58	7.25	12.33	10.36
16	80.5	18.12	7.25	10.87	10.44
18	75.0	16.89	7.25	9.64	10.41
20	70.3	15.83	7.25	8.58	10.29
22	66.1	14.90	7.25	7.65	10.10

Maximum Storage Required 5-Year (m^3) =	10.44

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	44.99	7.50	37.49	22.50
12	162.1	40.86	7.50	33.36	24.02
14	148.7	37.48	7.50	29.98	25.18
16	137.5	34.66	7.50	27.16	26.07
18	128.1	32.28	7.50	24.78	26.76
20	120.0	30.23	7.50	22.73	27.27
22	112.9	28.44	7.50	20.94	27.65

Maximum Storage Required 100-Year (m^3) =	27.65

5-Year Storm Event Storage Summary

Water Elev. (m) =		89.01	
INV. (out)	Depth (m)	Volume (m^3)	Head (m)
86.71	2.30	11.4	2.20

Storage Available (m^3) =	11.4
Storage Required (m^3) =	10.4

*Available Storage calculated from AutoCAD

100-Year Storm Event Storage Sumamry

Water Elev. (m) =		89.09	
INV. (out)	Depth (m)	Volume (m^3)	Head (m)
86.71	2.38	29.5	2.28

Storage Available (m^3) =	29.5
Storage Required (m^3) =	27.6

*Available Storage calculated from AutoCAD

Storage Requirements for Area B3

5-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	14.32	7.81	6.51	3.91
12	94.7	13.02	7.81	5.21	3.75
14	86.9	11.95	7.81	4.14	3.48
16	80.5	11.06	7.81	3.25	3.12
18	75.0	10.31	7.81	2.50	2.70
20	70.3	9.66	7.81	1.85	2.22
22	66.1	9.09	7.81	1.28	1.69

Maximum Storage Required 5-Year (m^3) =	3.91

100-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	27.68	11.24	16.44	9.86
12	162.1	25.13	11.24	13.89	10.00
14	148.7	23.05	11.24	11.81	9.92
16	137.5	21.32	11.24	10.08	9.68
18	128.1	19.85	11.24	8.61	9.30
20	120.0	18.59	11.24	7.35	8.82
22	112.9	17.50	11.24	6.26	8.26

Maximum Storage Required 100-Year (m^3) =	10.00

5-Year Storm Event Storage Summary

Water Elev. (m) =		88.49	
INV. (out)	Depth (m)	Volume (m^3)	Head (m)
88.30	0.19	4.2	0.14

Storage Available (m^3) =	4.2
Storage Required (m^3) =	3.9

*Available Storage calculated from AutoCAD

100-Year Storm Event Storage Sumamry

Water Elev. (m) =		88.64	
INV. (out)	Depth (m)	Volume (m^3)	Head (m)
88.30	0.34	10.2	0.29

Storage Available (m^3) =	10.2
Storage Required (m^3) =	10.0

*Available Storage calculated from AutoCAD

For Orifice Flow, C= 0.6
For Weir Flow, C= 3.33

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	88.30			
center of crest elevation	88.35			
orifice width / weir length	100 mm			
orifice height				
orifice area (m^2)	0.008	0.000		

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total
	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	Q [l/s]
88.30	x	x							0.00
88.35	x	x							0.00
88.40	0.05	0.005							4.67
88.41	0.06	0.005							5.11
88.42	0.07	0.006							5.52
88.43	0.08	0.006							5.90
88.44	0.09	0.006							6.26
88.45	0.10	0.007							6.60
88.46	0.11	0.007							6.92
88.47	0.12	0.007							7.23
88.48	0.13	0.008							7.53
88.49	0.14	0.008							7.81
88.50	0.15	0.008							8.08
88.51	0.16	0.008							8.35
88.52	0.17	0.009							8.61
88.53	0.18	0.009							8.86
88.54	0.19	0.009							9.10
88.55	0.20	0.009							9.33
88.56	0.21	0.010							9.57
88.57	0.22	0.010							9.79
88.58	0.23	0.010							10.01
88.59	0.24	0.010							10.23
88.60	0.25	0.010							10.44
88.61	0.26	0.011							10.64
88.62	0.27	0.011							10.85
88.63	0.28	0.011							11.05
88.64	0.29	0.011							11.24
88.65	0.30	0.011							11.43

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir flow calculated in Bentley's FlowMaster - Trapezoidal Channel at 0.1%, 3:1 side slopes, roughness coeff. Of 0.035
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1/A2	30	4.00	4	3

Therefore, a Tc of 10 can be used

Tc= (3.26(1.1-c)L^0.5/S^0.33)

c= Blanced Runoff Coefficient

L= Length of drainage area

S= Average slope of watershed

TEMPEST Product Submittal Package

Date: June 12, 2020

Customer: McIntosh Perry

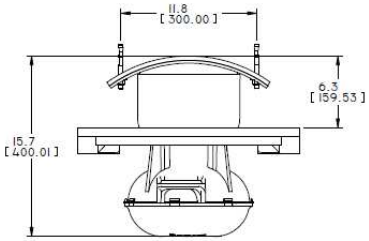
Contact: Nicholas Vachon

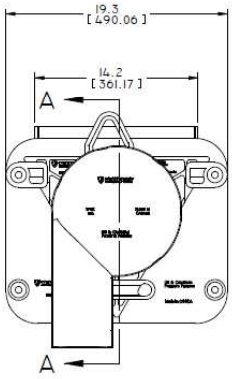
Location: Ottawa

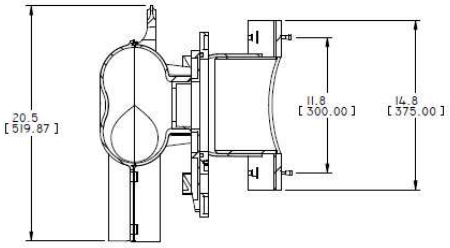
Project Name: 251 Penfield Drive

IPEX

Tempest LMF ICD Rd Shop Drawing





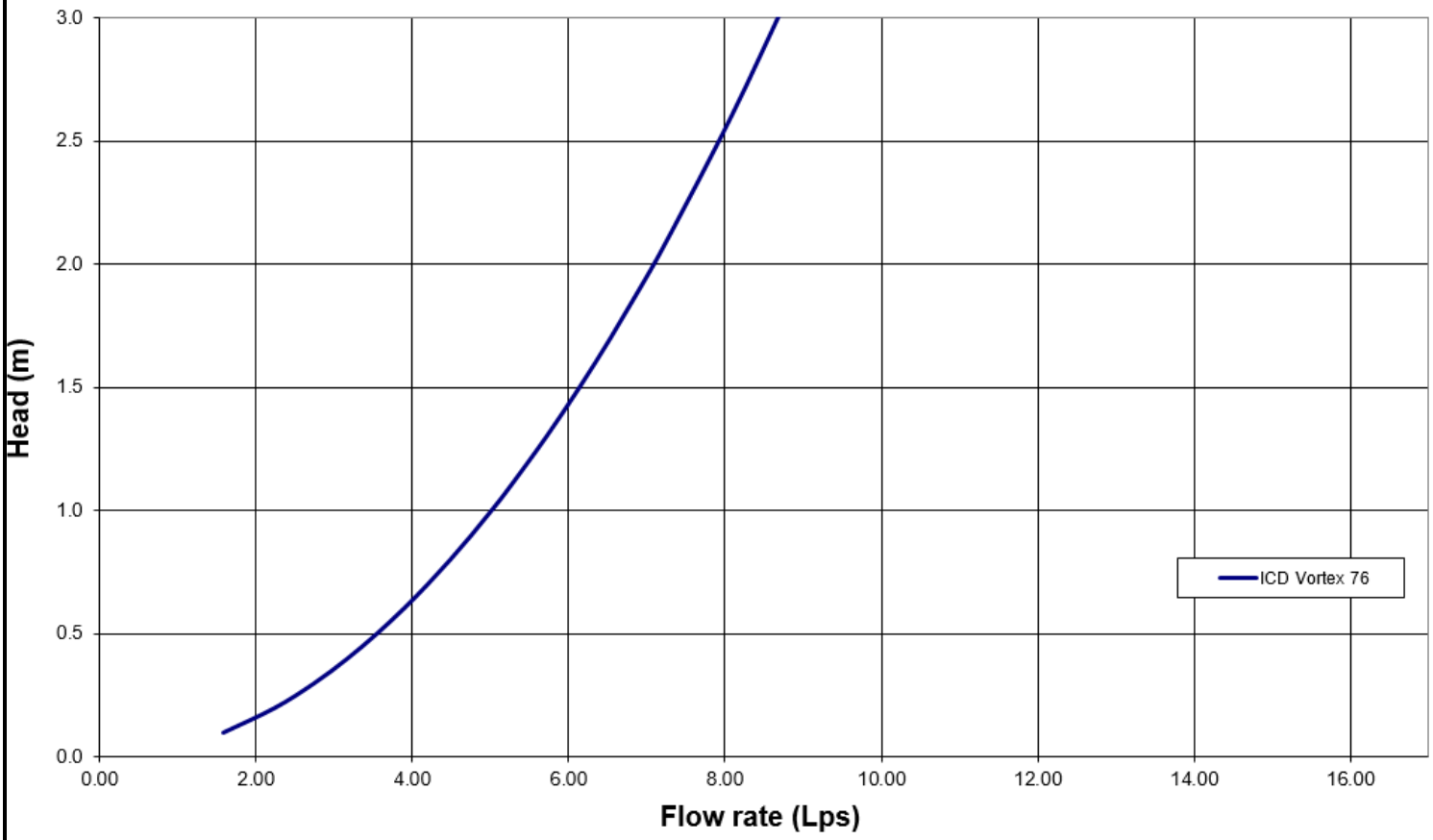


SECTION A-A

IPEX TECHNOLOGIES INC.			
PROJECTION	UNITS: in (mm)	TITLE: LMF ROUND CB ASSEMBLY	
DRAWN BY: H. M-MARTIN	DATE: 2011-07-26	SIZE: B	SCALE(S): 1/8
VERIFIED BY:	DATE: 2011-07-26	DRAWING NUMBER: SIGMTAL_FA002R03	REV: 3

Tempest LMF ICD Flow Curve

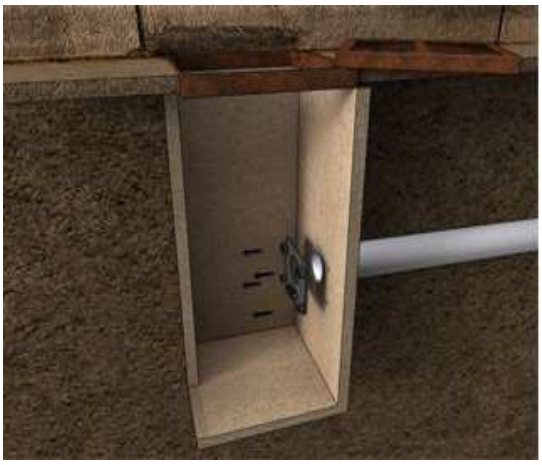
Flow: 7.50 L/s
Head: 2.28 m

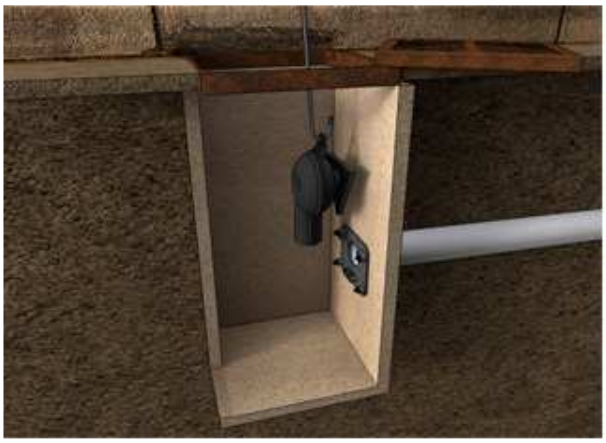


IPEX

Square CB Installation Notes:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8'' concrete bit, torque wrench for 9/16''nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8'' concrete bit to make the four holes at a minimum of 1-1/2'' depth up to 2-1/2''. Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you will hit the anchors with the hammer. Remove the nuts on the ends of the anchors
5. Install the wall mounting plate on the anchors and screw the nut in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the LMF device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.



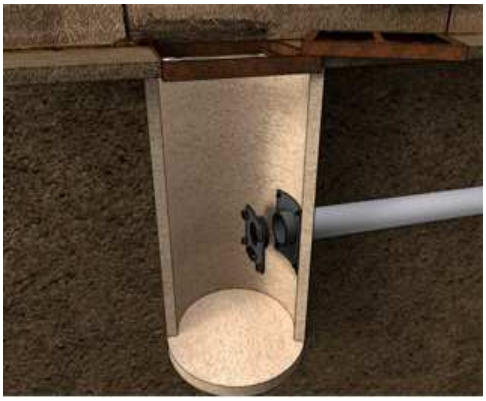


IPEX

Round CB Installation Notes: (Refer to square install notes above for steps 1 , 3, & 4)

2. Use spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lb-ft). There should be no gap between the CB spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate and the spigot of the spigot CB wall plate. Slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered into the mounting plate and has created a seal.






CAUTION/WARNING/DISCLAIM:

- Verify that the inlet(s) pipe(s) is not protruding into the catch basin. If it is, cut it back so that the inlet pipe is flush with the catch basin wall.
- Any required cement in the installation must be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Please refer to the IPEX solvent cement guide to confirm required curing times or attend the IPEX **Online Solvent Cement Training Course**.
- Call your IPEX representative for more information or if you have any questions about our products.

IPEX

IPEX TEMPEST Inlet Control Devices Technical Specification

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's must have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

STORM SEWER DESIGN SHEET

PROJECT: 251 Penfield Drive
LOCATION: Ottawa, Ontario
CLIENT: Atelier

LOCATION				CONTRIBUTING AREA (ha)								RATIONAL DESIGN FLOW											SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
STREET	AREA ID	FROM MH	TO MH	C-VALUE						INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
				0.20	0.64	0.76	0.85	0.87	0.90																DIA	W	H			(L/s)	(%)
	B1	CB1	MH2			0.11				0.08	0.08	10.00	0.32	10.32	104.19	122.14	178.56	23.47				23.47	34.22	20.26	200			1.00	1.055	10.75	31.41%
		MH2	Ex. MH							0.08	0.08	10.32	0.31	10.63	102.53	120.19	175.69	23.20				23.20	34.22	19.50	200			1.00	1.055	11.02	32.19%
	B2	Outlet			0.08					0.05	0.05	10.00	0.07	10.07	104.19	122.14	178.56	14.32				14.32	15.07	3.35	150			0.90	0.826	0.75	4.99%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: N.V.B.

Checked: T.D.F.

Project No.: CP-19-0682

No.	Revision	Date
1.	Issued for Review	2020-05-26

Sheet No: 1 of 1

APPENDIX H
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