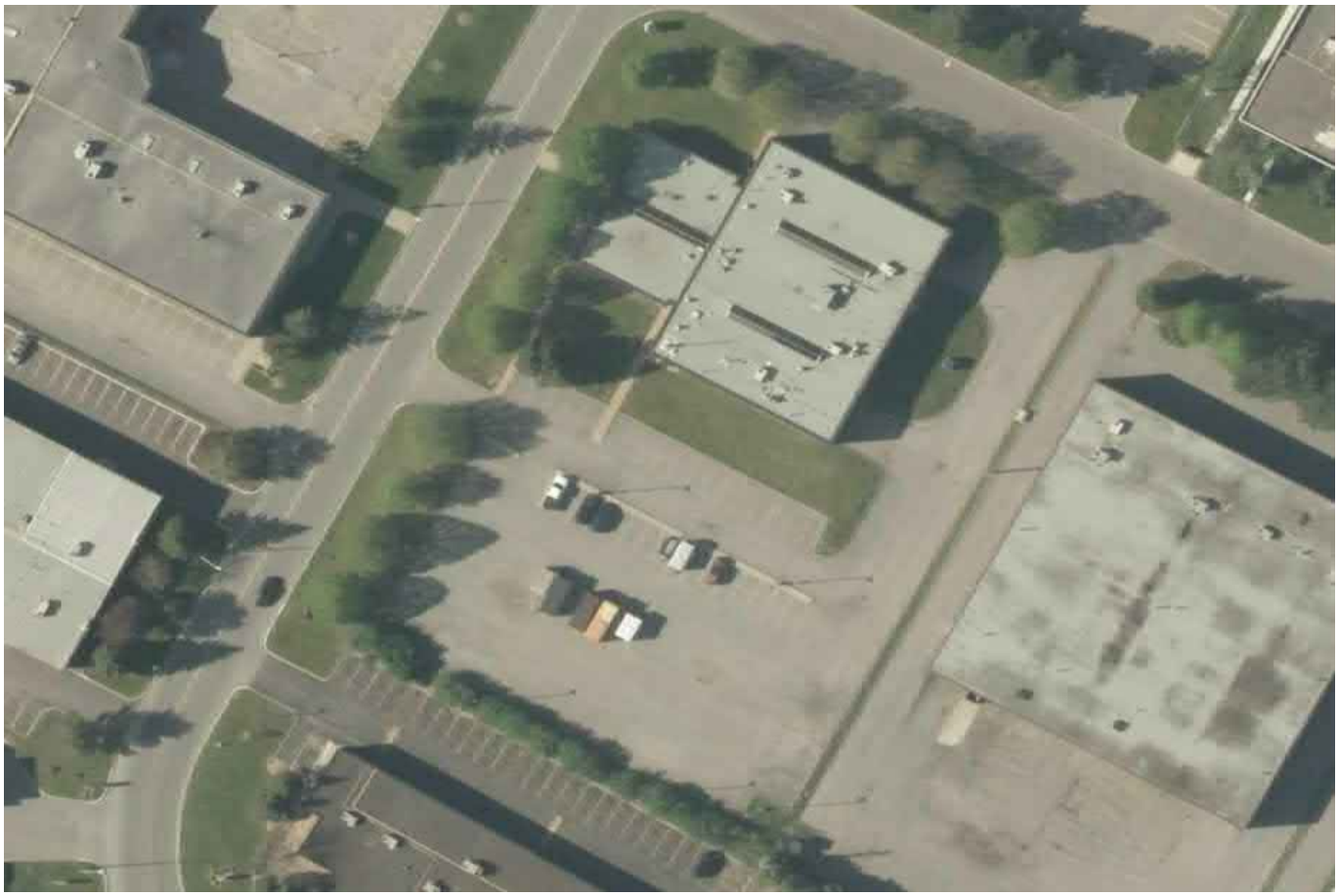
SERVICING & STORMWATER MANAGEMENT REPORT
RED PINE WAREHOUSE – 31 ANTARES DRIVE



Project No.: CP-18-0275

City File No.: D07-12-19-0080

Prepared for:

Robertson Martin Architects
216 Pretoria Avenue
Ottawa, ON K1S 1X2

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road
Carp, ON K0A 1L0

Revision 3: August 7, 2019

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by Robertson Martin Architects (RMA) to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed Red Pine Warehouse, located at 31 Antares Drive within the City of Ottawa.

The main purpose of this report is to present a servicing 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:

- CP-18-0275, C101 – Site Grading & Drainage Plan, and
- CP-18-0275, C102 – Site Servicing, Sediment & Erosion Control Plan.

1.2 Site Description

The property is located at 31 Antares Drive within the Hunt Club South Industrial area. It is described on Plan 4R-31113 as Part of Lots 26 and 27, Concession A (Rideau Front), Geographic Township of Nepean, City of Ottawa. The land in question covers approximately 0.31ha and is located between Merivale Road and Prince of Wales Drive, southwest of West Hunt Club Road.

See Site Location Plan in Appendix 'A' for more details.

The site is currently developed as part of the existing 29 Antares Drive site and is made up of an asphalt parking area and sea can storage. The existing site has no sewer or water services, however the neighbouring site may be required to relocate some storm sewers to accommodate the lot severance and parking lot reconfiguration proposed.

The proposed development consists of a 992m², one storey warehouse with small office. Parking and drive aisles will be provided throughout the site along with landscaping. There will be two site accesses for the development. The existing entrance from Antares Drive will be removed and reconfigured to provide vehicular traffic for both 29 and 31 Antares drive. A separate entrance is also proposed to Antares Drive from the proposed site.

2.0 BACKROUND STUDIES

Background studies that have been completed for the proposed site include City of Ottawa as-built drawings, a topographical survey and a geotechnical report.

As-built drawings of existing services within the vicinity of the proposed site were reviewed in order to determine accurate servicing and stormwater management schemes for the site.

A topographic survey of the site was completed by Stantec Geomatics Ltd.

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

- 29 Antares Drive - Geotechnical Report completed by McIntosh Perry, dated December 2018.

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on May 8, 2018 regarding the proposed site. Specific design parameters to be incorporated within this design include the following:

- A calculated time of concentration (Tc) cannot be less than 10min.
- Control 5 through 100-year post-development flows to the 5-year pre-development flows with a combined C value to a maximum of 0.50.
- Ponding of water shall not exceed 0.35 m for the 100-year storm event within the asphalt parking areas.
- Quality control is required to be provided for this site (80% TSS Removal).

The notes from the City of Ottawa can be found in Appendix 'B'.

4.0 WATERMAIN

4.1 Existing Watermain

There is an existing 300mm diameter ductile iron watermain within Antares Drive that services various properties as well as the fire hydrants along the east side of the road.

4.2 Proposed Watermain

A new 50mm diameter PVC watermain is proposed to service the site complete with a water valves at the property line and water meters at the building. The watermain is designed to maintain a minimum of 2.4m cover and will not conflict with any other sewer services.

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 970m^2. The results of the calculations yielded a required fire flow of 7,000L/min. A fire flow of 3,600L/min was calculated using

the Ontario Building Code (OBC) requirements. The detailed calculations for the FUS and OBC can be found in Appendix 'C'.

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

Site Area (ha)	0.31
Industrial – Light (L/ha/day)	35,000
Average Day Demand (L/s)	0.13
Maximum Daily Demand (L/s)	0.19
Maximum Hourly Demand (L/s)	0.34
OBC Fire Flow Requirement (L/s)	60.00
FUS Fire Flow Requirement (L/s)	116.67
Max Day + Fire Flow (FUS) (L/s)	116.86

Boundary conditions have been provided by the City of Ottawa for the current conditions and can be found in Appendix 'C'. A water model was completed using Bentley's WaterCAD program using the boundary conditions received. The results determined that the proposed 50mm servicing can adequately service the proposed development. Results of the water model can be found in Appendix 'C'.

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

There is an existing 300mm diameter PVC SDR-35 sanitary collection sewer within Antares Drive fronting the proposed property. The existing sewer collects all sanitary flow from the area and directs it towards West Hunt Club Road.

5.2 Proposed Sanitary Sewer

A new 150mm diameter PVC SDR-28 gravity sanitary service will be connected to the existing 300mm diameter sanitary sewer within Antares Drive. A monitoring maintenance manhole (MMH) will be installed 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 subject site is a proposed warehouse facility with a total building area of 992m^2. The peak design flows for the proposed building were calculated using criteria from the City of Ottawa – Sewer Design Guidelines, October 2012. The proposed site development area (0.31ha) will generate a flow of 0.21L/s.

The proposed service for the site will be connected to existing 300mm diameter sanitary sewer within Antares Drive. It is anticipated that there will be no issues with capacity constraints within the proposed lateral or within the existing sanitary main.

See Sanitary Sewer Design Sheet in Appendix 'D' of this report for more details.

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

The subject property currently drains toward a storm sewer network located on the neighbouring property at 29 Antares Drive. The existing storm sewer network connects to an existing 975mm storm sewer within Capella Court. A catchbasin and sewer pipe may be relocated to account for a new parking lot configuration on the neighbouring property.

6.2 Proposed Storm Sewers

A new sewer system will be extended from the existing 975mm diameter concrete storm sewer within Antares Drive. The new pipe network will collect storm flows and restrict runoff prior to leaving the site. The storm service from the proposed building will be connected to the proposed on site storm system just downstream of the restriction in MH1.

Catchbasins are proposed throughout the subject property to convey flow to MH1. The flow will be restricted in MH1 and the required storage for the subject property will be provided within the parking area. From MH1, the restricted site flow will join with the building service and drain to the existing 975mm diameter sewer. The storm sewers will range from 200mm to 375mm in diameter throughout the subject property.

The minor storm sewers will be sized for the 5-year storm event without any restriction. A storm sewer design sheet was created using the rational method and City of Ottawa 5-year storm event. Storm flows will be controlled by an inlet control device (ICD) to limit flows to the specified allowable release rate.

The storm design sheet calculates the proper sizing of the storm pipes within the development. Drainage area information, along with respective pipe slopes and other necessary information was utilized to evaluate the performance of the storm sewer network. The time of concentration calculated for the storm sewer system is based on a 10 minute inlet time at the uppermost sewer run. Within the design sheet, pipe capacities and associated full flow velocities have been calculated. The design flow (peak flow) was checked against the theoretical capacity to ensure that each storm sewer pipe can convey the 5-year unrestricted flow.

See drawing CP-18-0275 - POST and the Storm Sewer Design Sheet in Appendix 'F' of this report for more details. The Stormwater Management design for the subject property will be outlined in Section 7.0.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

Stormwater management for the proposed site will be maintained through positive drainage away from the proposed building and into a new underground storm sewer system. The storm system will capture the parking lot runoff and direct the flow to a maintenance hole with an ICD (MH1). The restricted flow will then release into a proposed storm sewer that connects to the existing 975mm storm sewer located within Antares Drive. The emergency overland flow route for the proposed site will be via the proposed shared entrance on the north east side of the property. The quantitative and qualitative properties of the storm runoff for both the pre & 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 7.6.

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

- The site has been designed to achieve an 80% total suspended solids removal (enhanced level) using a proposed oil/grit separator.

Quantity Control

- Post-development flow 5/100-year is be restricted to match the 5-year pre-development flow with a maximum C value of 0.50.

7.2 Runoff Calculations

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

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

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
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 both pre-development and post-development flows shall be 10 minutes.

7.3 Pre-Development Drainage

The existing site drainage limits are demonstrated on the Pre-Development Drainage Area Plan. A summary of the pre-development runoff calculations can be found below.

Table 2: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (2/5-Year)	Runoff Coefficient (100-Year)	2-year Peak Flow (L/s)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
A1	0.31	0.80	0.90	53.29	72.30	138.26
Total	0.31			53.29	72.30	138.26

See drawing CP-18-0275 - PRE in Appendix 'E' and Appendix 'G' for calculations.

7.4 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See drawing CP-18-0275 - 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

Drainage Area	Area (ha)	Runoff Coefficient (2/5-Year)	Runoff Coefficient (100-Year)	2-year Peak Flow (L/s)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
B1	0.01	0.45	0.52	0.75	1.02	2.00
B2	0.10	0.90	1.00	18.31	24.84	47.29
B3	0.08	0.83	0.93	14.53	19.71	37.64
B4	0.04	0.88	0.98	8.28	11.24	21.41
B5	0.08	0.88	0.98	15.46	20.97	39.95
Total	0.31			57.32	77.76	148.30

See Appendix 'G' for calculations. Runoff for areas B2-B5 will be restricted before outletting to the existing storm system within Antares Drive. The flow will be controlled with roof drains for area B2. Runoff for areas B3-B5 will be restricted and the required storage will be provided within the parking area. The flow will be controlled by an ICD located within MH1. The restriction device will account for the unrestricted flow (Area B1) leaving the site. This quantity and quality control will be further detailed in Sections 7.5 and 7.6.

7.5 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 rate with a combined C value of 0.50. (See Appendix 'B' for pre-consultation notes). These values create the following allowable release rate and storage volumes for the development site.

Table 4: Allowable Release Rate Summary

Drainage Area	Area (ha)	Runoff Coefficient	Required Restricted Flow *5-Year* (L/s)
A1	0.31	0.50	45.04

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 B2 to B5 will be restricted as shown in the table below.

Table 5: Post-Development Restricted Runoff Summary

Drainage Area	Post Development Unrestricted Flow (L/s)			Post Development Restricted Flow (L/s)			
	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	
B1	0.75	1.02	2.00	0.75	1.02	2.00	Unrestricted
B2	18.31	24.84	47.29	1.32	1.32	1.80	Restricted - Roof
B3	14.53	19.71	37.64	41.00	41.00	41.00	Restricted - MH1
B4	8.28	11.24	21.41				
B5	15.46	20.97	39.95				
Total	57.32	77.76	148.30	43.07	43.34	44.80	

See Appendix 'G' for calculations.

Runoff from Area B2 will be restricted through two (2) roof drains before discharging to the new storm sewer downstream of MH1. The total flow leaving the roof will be 1.32L/s and 1.80L/s during the 5 and 100-year storm events, respectively. This will result in ponding depths of 55mm and 75mm for the 5 and 100-year storm events, respectively. All of the storage required for this area will be located on the proposed roof, and emergency roof scuppers will be installed to ensure ponding does not exceed the proposed ponding limits.

Runoff from Areas B3 and B5 will be restricted at MH1 through a Hydrovex Vertical Vortex Flow Regulator (VHV) or an approved equivalent (Design Head of 1.55m). This ICD will restrict areas B3 to B5 to 41.00L/s for both the 5 and 100-year storm events. The restriction creates a water surface elevation (WSEL) of 89.39m for the 5-year storm event and 89.54m for the 100-year storm event. The storage for this area will be provided above the

parking lot structures CB1 and CBMH2. See below table for details of the required and provided storage volumes.

Table 6: Storage Summary

Drainage Area	Storage Required (m^3)	Storage Available (m^3)	Depth of Ponding (m)	Storage Required (m^3)	Storage Available (m^3)	Depth of Ponding (m)	Storage Required (m^3)	Storage Available (m^3)
	2-Year		5-Year			100-Year		
B2	-	-	0.055	24.05	36.68	0.075	49.61	50.02
B3 – B5	3.52	12.95	0.17	8.84	10.23	0.14-0.32	35.20	52.61
Total	3.52	12.95	-	32.89	46.91	-	84.81	102.63

See Appendix 'G' for calculations.

In the event that there is a rainfall above the 100-year storm event, or a blockage within the storm sewer system, an emergency overland flow route has been provided so that the storm water runoff will be conveyed towards the northeast entrance to Antares Drive.

7.6 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.

An ICD located within MH1 will restrict flows from the site, causing temporary ponding within the parking area. There will be an opportunity for particle settlement during this process.

A quality treatment unit has been sized to provide a TSS removal rate of 80% as per RVCA requirements. The Oil and Grit Separator unit (OGS) will provide a water quality of at least 80% TSS. The OGS unit shall be placed downstream of the restriction unit in order to provide the required water quality treatment for the site runoff before discharging to the storm sewer within Antares Drive. Detailed sizing information for the proposed OGS unit can be found in Appendix 'G'.

The combination of the above BMP's and the proposed flow control measures will aid in the thermal protection of the natural environment.

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 catchbasins and inlet sediment control devices are to be placed under the grates of all existing catchbasins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures 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 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 Servicing, Sediment & Erosion Control Plan for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 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 or Conservation Authority.

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

9.0 SUMMARY

- A new 992m^2 warehouse with office will be constructed at 31 Antares Drive.
- A new 50mm diameter water service will be installed to service the site, connecting to the existing 300mm diameter ductile iron watermain within Antares Drive.
- A new 150mm diameter sanitary service and monitoring maintenance hole will be installed to service the proposed site and connect to the existing 300mm diameter PVC sewer within Antares Drive.
- The proposed storm sewer system, ranging in diameter from 200mm to 375mm, will be installed throughout the site and drain to the existing 975mm diameter storm within Antares Drive.
- Storage for the 5 through 100-year storm events will be provided within the parking lot area above the proposed storm structures and on the proposed flat roof.
- A OGS unit is proposed for this site to provide a water quality of at least 80% TSS.

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 Red Pine Warehouse at 31 Antares Drive.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

Ryan Kennedy, P.Eng.
Practice Area Lead, Land Development
T: 613.903.5766
E: r.kenndy@mcintoshperry.com

Peter Kirkimtzis, C.Tech.
Civil Engineer Technologist
T: 613.903.5769
E: p.kirkimtzis@mcintoshperry.com

11.0 STATEMENT OF LIMITATIONS

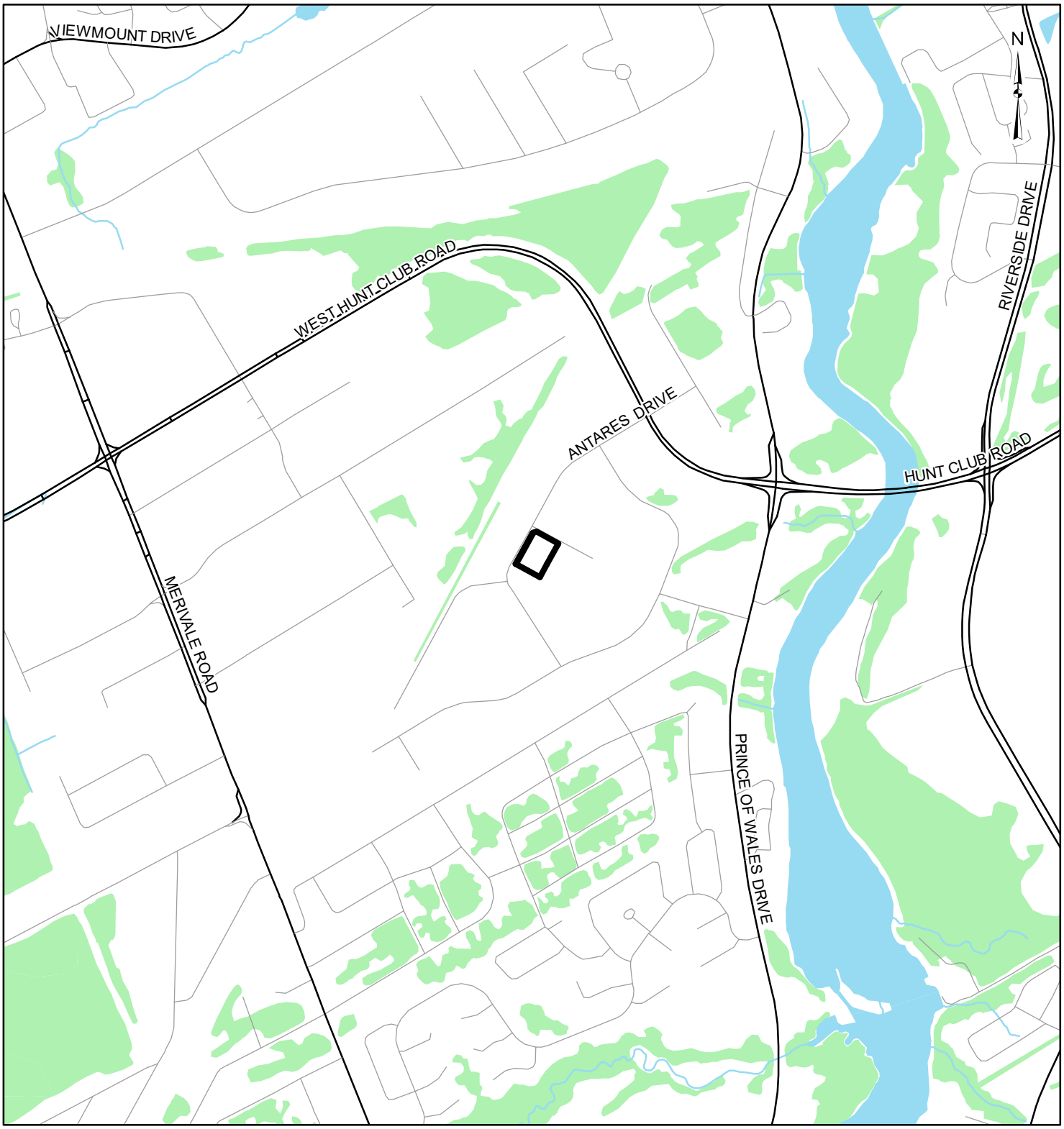
This report was produced for the exclusive use of Robert Martin Architects. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment 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
SITE LOCATION PLAN

McINTOSH PERRY



LEGEND

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

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2019 and the City of Ottawa, 2019.

CLIENT: ROBERT MARTIN ARCHITECTS

PROJECT: RED PINE WAREHOUSE
31 ANTARES DRIVE

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-18-0275
Date	Mar., 19, 2019
GIS	LC
Checked By	PK

FIGURE: 1

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APPENDIX B
CITY OF OTTAWA PRE-CONSULTATION NOTES

McINTOSH PERRY

29 (31) Antares Drive
Pre-Consultation Meeting Minutes

Location: Room 4103E, City Hall
Date: May 3, 2:30pm to 3:30pm

Attendee	Role	Organization
Stream Shen	Planner	City of Ottawa
Gabrielle Schaeffer	Project Manager (Engineer)	
Brad Cripps	Project Manager (Engineer)	
Rosanna Baggs	Project Manager (Transportation)	
Robert Martin	Architect	Robertson Martin Architects

Comments from Applicant

1. The applicant is proposing a 12,000 square foot pre-fabricated warehouse building with a small office component.
2. The building will be used as a warehouse for the Red Pine Outdoor Equipment, a wholesale distributor for outdoor equipments.
3. The property is currently subject to a conditional severance application D08-01-18/B-00001 & B-00003 from Committee of Adjustment. Included in the application are requirement for right-of-way widening dedication, cash-in-lieu of parkland payment and evidence of payment for all applicable local improvement charges and water frontage charge.
4. There is a Bell easement across the rear property line, the applicant indicated that it is for underground conduits only and that pavement is permitted on the surface.
5. The applicant presented on two development scenarios, option one included a looped driveway surrounding the building and option two included a one-way access to the loading space. Therefore, truck turning for option two will be made on Antares. Both options included two new accesses on Antares and removal of the existing shared access with the remnant parcel.
6. The applicant indicated that the owner requires both a loading space at grade and a depressed dock loading space.
7. The building will include sprinklers.

Planning Comments

1. This is a pre-consultation for a Site Plan Control application, Manager Approval, subject to Public Consultation. Application form, timeline and fees can be found here. https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms#site-plan-control
2. Given that the applicant indicated that the severance will be finalized before site plan approval, the front property line and all zoning compliance should be measured from the front property line post the right-of-way dedication. This includes the front-yard setback for the building, required 3m landscape buffer abutting public street, etc.
3. Please ensure that the minimum number of parking spaces are met. The parking space calculation should be based on the portion of the building gross floor area dedicated to each specific use (e.g. office, warehouse, etc).
4. Minimum required aisle width are shown on Section 107, Table 107 of the Zoning By-law. For parking angle between 71 to 90 degrees, the required aisle width is 6.7m. The required width is reduced based on the degree on of the angled parking. Please consult the by-law for full detail.
5. Landscaping are recommended surrounding the property boundary where possible.
6. Please consult with the Ward Councillor prior to submission.
7. The pre-consultation meeting minutes and list of required plans and studies will lapse on May 3, 2019.

Engineering Comments

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), specifically Section 8 and the related Technical Bulletins.
   - ⇨ 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). If you have any issues obtaining information, please contact the Infrastructure Approvals Project Manager.
4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
   i. Post development peak 100 year flows are to be controlled to the pre-development peak 5 year release rate. Excess stormwater is to be detained on-site.
   ii. The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
   iii. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
   iv. A calculated time of concentration (Cannot be less than 10 minutes).
   v. No ponding on drive aisles and parking areas is permitted for during the 2 year event.
   vi. SWM calculations using the modified rational method is acceptable, however, if a combination of surface ponding and underground storage is used, the consultant is reminded to either: (a) use a dynamic computer model or (b) use the modified rational method assuming an average release rate of 50% of the area-specific peak flow rate where above and below ground storage is provided.
5. Drinking 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 (map/plan view)
   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.

6. An MOECC Environmental Compliance Approval (Industrial/Private Sewage Works) through Direct Submission is required for the proposed development.
    a. At the pre-application consultation it was the Applicant's opinion that this site would be captured by Transfer of Review (ToR) process. The following is extracted from the MOECC ToR agreement with the City of Ottawa page 3, item1:

    "The Municipality can review and submit applications for their own municipal works projects. The Municipality may also submit applications for sewage works on behalf of other parties whose projects are entirely located within the municipal boundary of the Municipality and there is an agreement with the Municipality pursuant to the Planning Act which provides that ownership of the system may be transferred to the Municipality and the works require an Environmental Compliance Approval (ECA)."

    b. When filling out the ECA note that this site is within the Mississippi Rideau Source Water Protection Area, specifically being significant groundwater recharge area, and having a highly vulnerable aquifer. Only significant threats are regulated and this area does not appear to be significant, therefore, no action is required except marking it down on the ECA application.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x22517 or by email at gabrielle.schaeffer@ottawa.ca

Transportation Comments

1. Please complete the Transportation Impact Assessment process prior to Site Plan submission. For any questions, please contact Rosanna Baggs at Rosanna.baggs@ottawa.ca or by telephone at 613-580-2424 Ext. 26388.
2. Please show truck-turning templates for all the required loading spaces. Please take into consideration all obstacles (e.g. parking spaces, rail for the depressed loading space).
3. Please show the full portion of Antares Drive and any pavement marking on the road.
4. Please include any curb radii, access width, parking dimension on the site plan drawing.
5. Accessible parking space(s) is required if the number of parking space exceeds 19.
6. Please review and conforms to all applicable requirements within the Private Approach By-law. Some provision to consider includes:

a. Minimum distance between the nearest limits of any two-way vehicular traffic and any other private approach to the same property shall be a minimum of 9m.

b. No private approach intended for two-way vehicular traffic shall exceed 9m.

c. No person shall construct a private approach within 3m of any property line. This is only for the private approach, not the entire duration of the driveway within the property.

Forestry Comments

1. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval.
2. Any removal of privately-owned trees 10cm or larger in diameter require a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR.
3. In this case, the TCR may be combined with the Landscape Plan.
4. The TCR must list all trees on site by species, diameter and health condition.
5. The TCR must address all trees with a critical root zone that extends into the developable area.
6. If trees are to be removed, the TCR must clearly show where they are and document the reason they can not be retained.
7. All retained trees must also be shown and all retained trees within the area impacted by the development process must be protected as per the City guidelines listed on Ottawa.ca
8. Trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees.
9. The City does encourage the retention of healthy trees wherever possible; please ask your design/planning team to find opportunities for retention wherever possible if the trees are healthy and will contribute to the design/function of the site. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca
10. The removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR; note that Forestry Services may ask for compensation for any City-owned tree that has to be removed.

Please contact me at stream.shen@ottawa.ca or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,

Stream Shen MCIP RPP
Planner II
Development Review - West

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CP-18-0275 - 31 Antares Drive - Water Demands

Project:	31 Antares Drive
Project No.:	CP-18-0275
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	March 7, 2019
Site Area:	0.31 gross ha

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	350	L/c/d
Industrial - Light	***35,000***	***L/gross ha/d***
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Parks no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Othe Commercial	28,000	L/gross ha/d
AVERAGE DAILY DEMAND	**0.13**	**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	**0.19**	**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	**0.34**	**L/s**

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

McINTOSH PERRY

CP-18-0275 - 31 Antares Drive - OBC Fire Calculations

Project:	31 Antares Drive
Project No.:	CP-18-0275
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	March 7, 2019

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

***Water Supply for Fire-Fighting* - Store/Office & Warhouse Building**

Building is classified as Group : F3, 1-storey (from table 3.2.2.55)
Building is of noncombustable construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearging walls, columns and arches.

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

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+…etc.]

K	**12**	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	**9,695**	(Total building volume in m^3)
Stot	**1.0**	(From figure 1 pg A-32)
Q =	**116,340.00 L**	

			From Figure 1 (A-32)
Snorth	26	m	0.0
Seast	24	m	0.0
Ssouth	23	m	0.0
Swest	46	m	0.0

*approximate distances

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

3,600 L/min (if Q >108,000 L and <135,000 L)
951 gpm

McINTOSH PERRY

CP-18-0275 - 31 Antares Drive - Fire Underwriters Survey (FUS) Fire Calculations

Project:	31 Antares Drive
Project No.:	CP-18-0275
Designed By:	P.G.K.
Checked By:	R.P.K.
Date:	March 7, 2019

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) = 969.50 m²

A = 969.50 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 √ 969.50

F = 6,850.09 L/min.

E. Determine Increase or Decrease Based on Occupancy

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

Low Hazard - Office Building

No Change

Occupancy Decrease = 0.00 L/min.

F = 6,850.09 L/min.

CP-18-0275 - 31 Antares Drive - Fire Underwriters Survey (FUS) Fire Calculations

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 entire building will be installed with a fully automated, standardized with the City of Ottawa Fire Department and fully supervised.
- Therefore the value obtained in Step E is reduced by 30% (The building is sprinklered with a standard system and fire department hose lines)

Reduction = 6,850.09 L/min. X 30%

Reduction = 2,055.03 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, east & south of the proposed building falls within 23m-26m.
- There are no existing buildings surrounding the remainder of the site that are within 45m.
- Therefore the charge for exposure is 35% of the value obtained in Step E.

Increase = 6,850.09 L/min. X 35%

Increase = 2,397.53 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 = 6,850.09 L/min. - 2,055.03 L/min. + 2,397.53 L/min.
F = 7,192.59 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 (1,849 GPM).

Peter Kirkimtzis

From: Cripps, Brad <brad.cripps@ottawa.ca>
Sent: March 25, 2019 1:35 PM
To: Peter Kirkimtzis
Subject: RE: 31 Antares Drive - Boundary Conditions
Attachments: 31 Antares March 2019.pdf

Hi Peter,

Please see the requested boundary condition information below provided by the water resources group.

Brad

The following are boundary conditions, HGL, for hydraulic analysis at 31 Antares (zone 2W) assumed to be connected to the 305mm on Antares (see attached PDF for location).

Minimum HGL = 126.0m

Maximum HGL = 134.0m

Max Day + Fire Flow (117 L/s) = 126.3m

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

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

From: Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Sent: March 13, 2019 3:20 PM
To: Cripps, Brad <brad.cripps@ottawa.ca>
Subject: RE: 31 Antares Drive - Boundary Conditions

Hi Brad,

Please find attached our calculations for water demands at 31 Antares Drive, as requested.

Regards,

Peter Kirkimtzis

Civil Engineering Technologist
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.903.5769 | **F.** 613.836.3742
p.kirkimtzis@mcintoshperry.com | www.mcintoshperry.com

From: Cripps, Brad [mailto:brad.cripps@ottawa.ca]
Sent: Tuesday, March 12, 2019 3:16 PM
To: Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Subject: RE: 31 Antares Drive - Boundary Conditions

Hi Peter,

Thanks for this information, before I can submit your request for Boundary Conditions I will also need the fire flow demand as well as the supporting FUS calculations to show how that value was determined.

Once you provide that I can submit the request to have the boundary conditions provided it typically takes 2-3 weeks.

Thanks,
Brad
Brad Cripps, P.Eng.
Project Manager, Infrastructure Approvals
Development Review West
City of Ottawa
110 Laurier Avenue West, Ottawa ON, K1P 1J1
613-580-2424, Ext. 28699
Brad.Cripps@ottawa.ca

From: Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Sent: March 11, 2019 10:37 AM
To: Cripps, Brad <brad.cripps@ottawa.ca>
Subject: 31 Antares Drive - Boundary Conditions

Good morning,

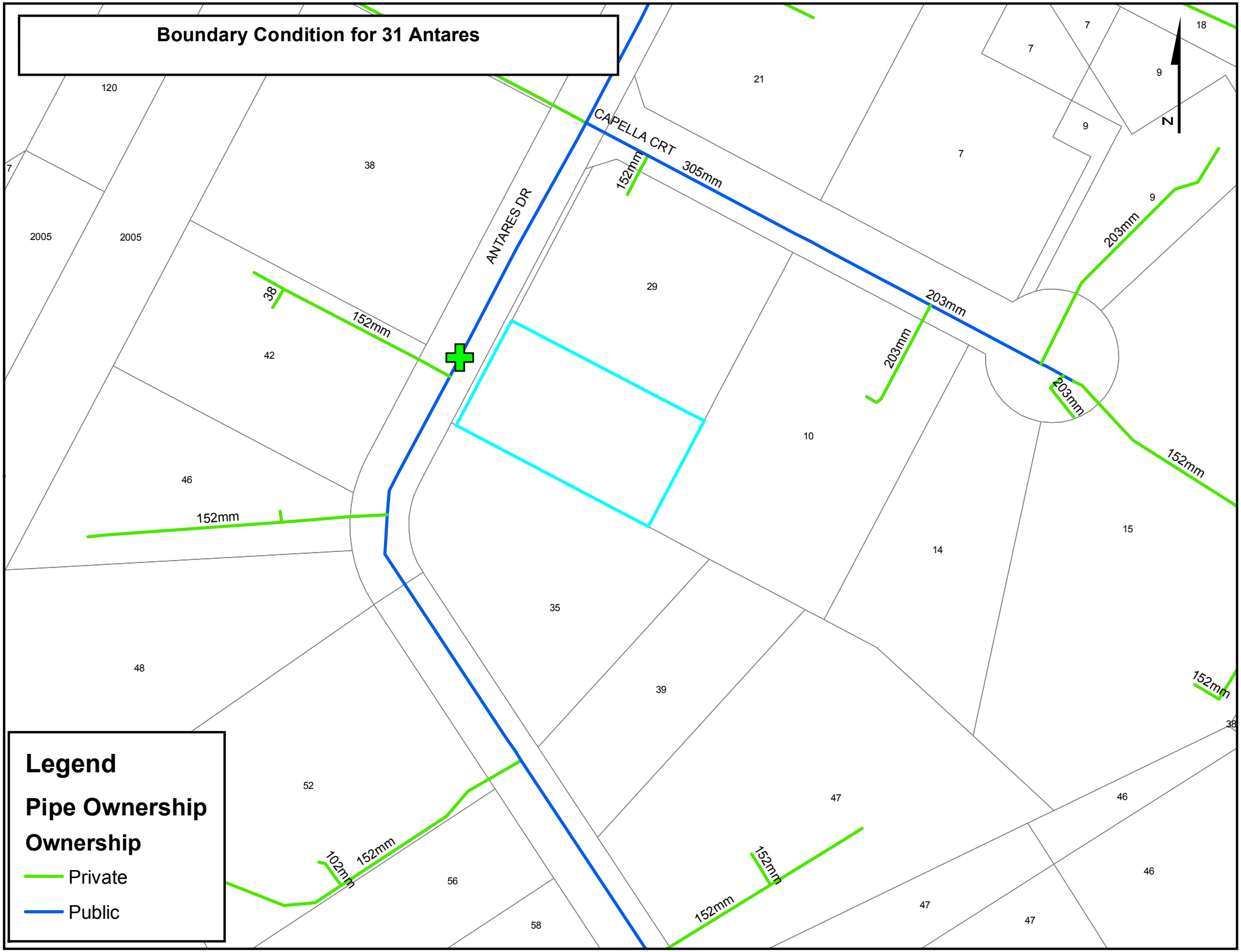
Below are the anticipated water demands for the proposed site at 31 Antares Drive, to obtain the boundary conditions. A location map is also attached for review.

1. Type of development: Warehouse with small office, zoned IG5 (general industrial zone)
2. Average daily demand: 0.13L/s
3. Maximum daily demand: 0.19L/s
4. Maximum hourly daily demand: 0.34L/s

If you have any comments or concerns, please don't hesitate to contact me.

Regards,

Peter Kirkimtzis
Civil Engineering Technologist
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.903.5769 | **F.** 613.836.3742
p.kirkimtzis@mcintoshperry.com | www.mcintoshperry.com


Boundary Condition for 31 Antares
CAPELLA CRT
ANTARES DR
305mm
203mm
203mm
203mm
152mm
152mm
152mm
152mm
152mm
152mm
152mm
102mm
N
Legend
Pipe Ownership
Ownership
Private
Public

Average Day

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
CONN.	87.25	0.00	66.4	134.00
BLDG	87.16	7.80	66.5	133.99

Peak Hourly

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
CONN.	87.25	0.00	55.0	126.00
BLDG	87.16	20.40	55.1	125.95

Max. Day + Fire Flow

Label	Is Fire Flow Run Balanced?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/min)	Fire Flow (Available) (L/min)	Pressure (psi)	Elevation (m)
H-2	True	True	7,000.00	23,675.18	55.1	87.50
CONN.	False	False	7,000.00	(N/A)	55.4	87.25
BLDG	False	False	7,000.00	(N/A)	55.5	87.16

APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

SANITARY SEWER DESIGN SHEET

PROJECT: 31 ANTARES DRIVE
LOCATION: OTTAWA, ON
CLIENT: ROBERTSON MARTIN ARCHITECTS

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				AREA	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)						PEAK FLOW (L/s)	AREA (ha)		FLOW	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT	(ha)	IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM	(L/s)							L/s	(%)
													IND	CUM	IND	CUM	IND	CUM											
	WAREHOUSE	BUILDING	MMH					0.00	0.0	0.0	4.00	0.00		0.00		0.00	0.31	0.31	0.13	0.31	0.31	0.09	0.21	15.89	18.45	150	1.00	0.871	15.68	98.66
		MMH	*300mm dia.*					0.00	0.0	0.0	4.00	0.00		0.00		0.00		0.31	0.13	0.00	0.31	0.09	0.21	15.89	12.50	150	1.00	0.871	15.68	98.66

Design Parameters:

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

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))
   where P = population in thousands

Designed: P.G.K.

Checked: R.P.K.

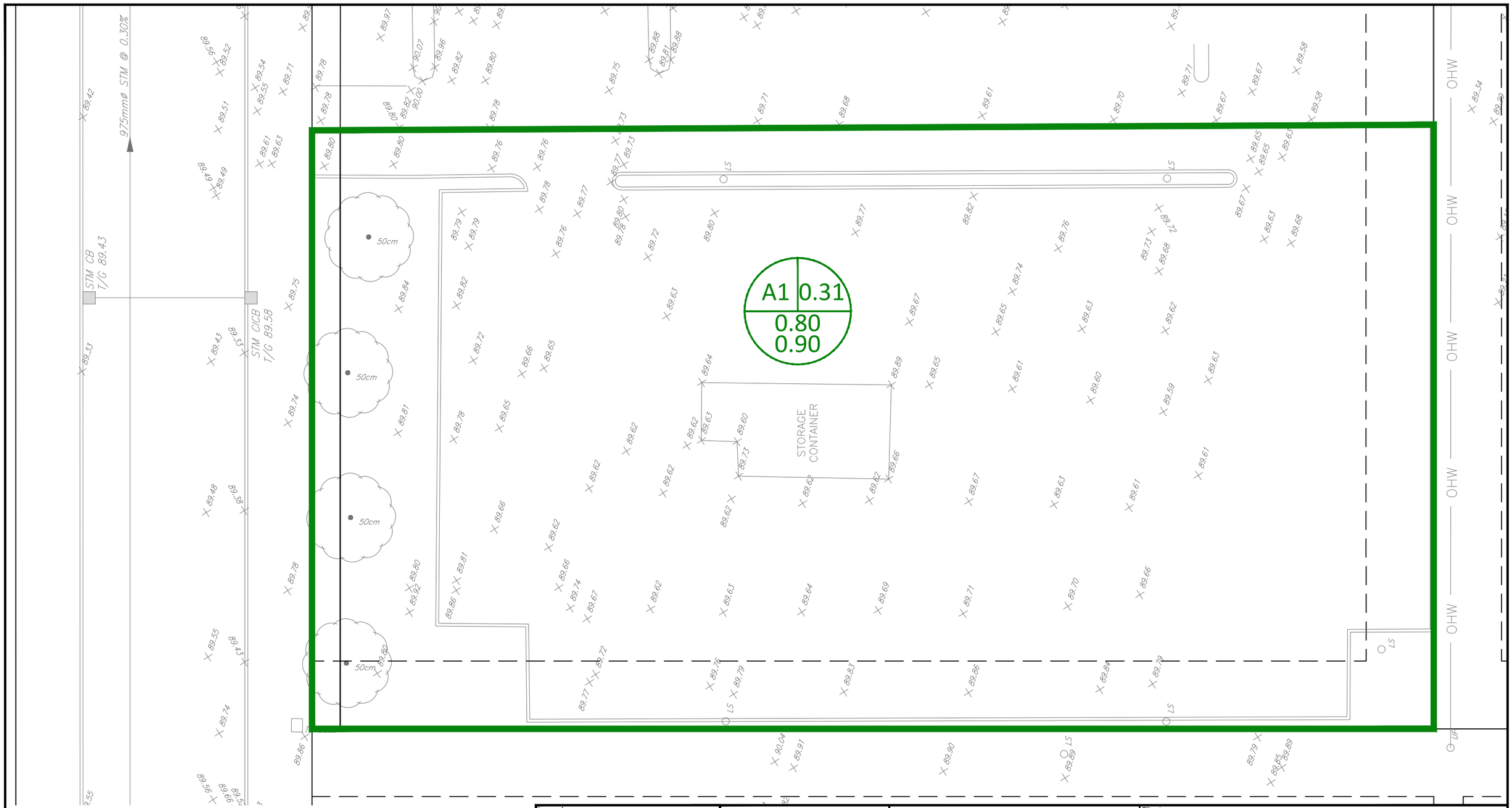
Project No.: CP-18-0170

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2019-03-22
2.	RE-ISSUED FOR SITE PLAN CONTROL	2019-05-10

Sheet No: 1 of 1

APPENDIX E
PRE-DEVELOPMENT DRAINAGE AREA PLAN

McINTOSH PERRY



SCALE 1 : 250

0 5 10 15 20 25 Metres

Legend:

AREA I.D. — AREA (Ha)

A1 | 0.25

0.90

1.00

5yr & 100yr COEFFICIENT

N

McINTOSH PERRY

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

Tel: 613-836-2184 Fax: 613-836-3742

www.mcintoshperry.com

Client: ROBERTSON MARTIN ARCHITECTS
216 PRETORIA AVENUE OTTAWA, ON K1S 1X2

Project: RED PINE WAREHOUSE
31 ANTARES DRIVE OTTAWA, ON

Drawing Title: PRE-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:			Drawing Number:
P.G.K.	R.P.K.			PRE
Scale: 1:250	Project Number: CP-18-0275	1	ISSUED FOR SITE PLAN CONTROL	MAR. 22, 2019
		No.	Revisions	Date

FILENAME:H:\01 Project - Proposals\2018 Jobs\(CP)\CP-18-0275 RMA_Red Pine Warehouse_29 Antares Drive\15 - Drawings\CP-18-0275_PRESENTATION.dwg
LAST SAVED: Thursday, March 21, 2019 LAST SAVED BY: p.kirkmitis
LAST PLOTTED: Thursday, March 21, 2019, 1:51 PM EST, 1:250

APPENDIX F
POST-DEVELOPMENT DRAINAGE AREA PLAN

McINTOSH PERRY

B1 0.01 | 0.45 / 0.52

B2 0.10 | 0.90 / 1.00

B3 0.08 | 0.83 / 0.93

B4 0.04 | 0.88 / 0.98

B5 0.08 | 0.88 / 0.98

A1 0.25 | 0.90 / 1.00

PROPOSED BUILDING
992.00m²
F.FL. OFFICE = 89.85
F.FL. WAREHOUSE = 90.45
U.S.F. = 88.25
(REFER TO STRUCTURAL DESIGN FOR FOUNDATION ELEVATIONS)

OFFICE

FUTURE BUILDING EXPANSION

LOADING DOCK

ROOF DRAIN

ROOF DRAIN

975mmØ STM @ 0.30%

STM CB T/G 89.43

STM CICB T/G 89.58

CB1 T/G 89.40

CB2 T/G 89.54

CB3 T/G 89.54

CBMH2 T/G 89.22

MH1

MH2

MH3

16.35m - 200mmØ STM @ 0.60%

17.50m - 200mmØ STM @ 0.60%
BLDG INV. 88.00
OUT INV. 87.89

19.08m - 200mmØ STM @ 0.60%

35.13m - 250mmØ STM @ 0.45%

8.47m - 250mmØ STM @ 0.45%

29.07m - 250mmØ STM @ 0.45%

7.50m - 375mmØ STM @ 0.25%

13.10m - 375mmØ STM @ 0.25% INV. 87.74

c/w TEMPEST HF ICD LOCATED AT OUTLET HEAD 1.55m FLOW 41.00l/s

OGS

DC

O/H

50cm

89.60 89.62 89.65 89.79 90.12 90.15HP 90.12 89.68 89.64 89.67 89.52 89.85 89.70 90.42 90.45 90.42 90.09 89.51 89.60 89.75 89.64 89.85 89.85 89.70 89.64 89.70 89.85 89.57HP 89.85 89.45 89.45 89.52 89.53 89.68 89.27 90.14 90.45 90.09 90.45T/W 89.84B/W 90.06 89.24 89.54HP 89.43 89.68 89.65 89.67 89.35 89.68HP 89.75

Legend:
AREA I.D. — AREA (Ha)
5yr & 100yr COEFFICIENT

SCALE 1 : 250
0 5 10 15 20 25 Metres

N

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

Client: ROBERTSON MARTIN ARCHITECTS
216 PRETORIA AVENUE OTTAWA, ON K1S 1X2

Project: RED PINE WAREHOUSE
31 ANTARES DRIVE OTTAWA, ON

Drawing Title: POST-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:
P.G.K.	R.P.K.
Scale: 1:250	Project Number: CP-18-0275

No.	Revisions	Date
3	REVISED PER CITY COMMENTS	AUG. 7, 2019
2	REISSUED FOR SITE PLAN CONTROL	MAY 10, 2019
1	ISSUED FOR SITE PLAN CONTROL	MAR. 22, 2019

Drawing Number: POST

FILENAME: H:\01 Project - Proposals\2018 Jobs\CP\0CP-18-0275 RMA_Red Pine Warehouse_29 Antares Drive\15 - Drawings\CP-18-0275_PRESENTATION.dwg
LAST SAVED: Wednesday, August 14, 2019 LAST SAVED BY: p.kirkmtds
LAST PLOTTED: Wednesday, August 14, 2019 - CTB EL EXCL

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} 2&5-Year	C_{AVG} 100-Year
A1	0.31	2,677.12	0.90	0.00	0.60	432.84	0.20	0.80	0.90

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 2&5-Year	C 100-Year	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
A1	0.31	0.80	0.90	10	76.8	104.2	178.6	53.29	72.30	138.26
Total	0.31							53.29	72.30	138.26

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} 2&5-Year	C_{AVG} 100-Year
B1	0.01	27.82	0.90	0.00	0.60	50.15	0.20	0.45	0.52
B2	0.10	952.69	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B3	0.08	737.89	0.90	0.00	0.60	81.14	0.20	0.83	0.93
B4	0.04	428.18	0.90	0.00	0.60	12.77	0.20	0.88	0.98
B5	0.08	800.10	0.90	0.00	0.60	19.21	0.20	0.88	0.98

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 2&5-Year	C 100-Year	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	0.01	0.45	0.52	10	76.8	104.2	178.6	0.75	1.02	2.00
B2	0.10	0.90	1.00	10	76.8	104.2	178.6	18.31	24.84	47.29
B3	0.08	0.83	0.93	10	76.8	104.2	178.6	14.53	19.71	37.64
B4	0.04	0.88	0.98	10	76.8	104.2	178.6	8.28	11.24	21.41
B5	0.08	0.88	0.98	10	76.8	104.2	178.6	15.46	20.97	39.95
Total	0.31							57.32	77.76	148.30

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	Tc (min)	I (mm/hr)	Q (L/s)
				5-Year	5-Year
A1	0.31	0.50	10	104.2	45.04

Post-development peak 100-year flow is to be controlled to pre-development peak 5-year flow with the runoff coefficient being a max. value of C=0.50

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)			Restricted Flow (L/s)			Storage Required (m^3)			Storage Provided (m^3)		
	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	0.75	1.02	2.00	0.75	1.02	2.00	-	-	-	-	-	-
B2	18.31	24.84	47.29	1.32	1.32	1.80	24.14	24.14	49.79	36.68	36.68	50.02
B3	14.53	19.71	37.64	41.00	41.00	41.00	3.52	8.84	35.20	12.95	10.23	52.61
B4	8.28	11.24	21.41									
B5	15.46	20.97	39.95									
Total	57.32	77.76	148.30	43.07	43.34	44.80	27.66	32.98	84.99	49.62	46.91	102.63

Storage Requirements for Area B2

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
80	26.6	6.33	1.32	5.01	24.05
85	25.4	6.05	1.32	4.73	24.11
90	24.3	5.79	1.32	4.47	24.13
95	23.3	5.56	1.32	4.24	24.14
100	22.4	5.34	1.32	4.02	24.13
105	21.6	5.14	1.32	3.82	24.09
110	20.8	4.96	1.32	3.64	24.05

Maximum Storage Required 5-Year (m^3) =	24.14

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
110	35.2	9.32	1.80	7.52	49.65
115	34.0	9.01	1.80	7.21	49.72
120	32.9	8.71	1.80	6.91	49.77
125	31.9	8.44	1.80	6.64	49.79
130	30.9	8.18	1.80	6.38	49.79
135	30.0	7.94	1.80	6.14	49.77
140	29.2	7.72	1.80	5.92	49.74

Maximum Storage Required 100-Year (m^3) =	49.79

Storage Occupied In Area B2

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	666.88	0.055	36.68

Storage Available (m^3) =	36.68
Storage Required (m^3) =	24.14

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	666.88	0.075	50.02

Storage Available (m^3) =	50.02
Storage Required (m^3) =	49.79

Roof Drain Flows for Area B2

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	2	
Storm Event	5-Year	100-Year
Rooftop Storage (m^3)	36.68	50.02
Storage Depth (m)	0.055	0.075
Flow (Per Roof Drain) (L/s)	0.66	0.90
Total Flow (L/s)	1.32	1.80

Flow Rate vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

*Roof drain model to be Accutrol Weirs
*Roof drain flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

1 roof drain during a 5 year storm
elevation of water = 25mm
Flow leaving 1 roof drain = (1 x 0.30 L/s) = 0.30 L/s

1 roof drain during a 100 year storm
elevation of water = 50mm
Flow leaving 1 roof drain = (1 x 0.60 L/s) = 0.60 L/s

4 roof drains during a 5 year storm
elevation of water = 25mm
Flow leaving 4 roof drains = (4 x 0.30 L/s) = 1.20 L/s

4 roof drains during a 100 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

	Roof Drain Flow		
	Flow (L/s)	Storage Depth (mm)	Drains Flow (L/s)
	0.18	15	0.36
	0.24	20	0.48
	0.30	25	0.60
	0.36	30	0.72
	0.42	35	0.84
	0.48	40	0.96
	0.54	45	1.08
	0.60	50	1.20
5-year	0.66	55	1.32
	0.72	60	1.44
	0.78	65	1.56
	0.84	70	1.68
100-year	0.90	75	1.80
	0.96	80	1.92
	1.02	85	2.04
	1.08	90	2.16
	1.14	95	2.28
	1.20	100	2.40
	1.26	105	2.52
	1.32	110	2.64
	1.38	115	2.76
	1.44	120	2.88
	1.50	125	3.00
	1.56	130	3.12
	1.62	135	3.24
	1.68	140	3.36
	1.74	145	3.48
	1.80	150	3.60

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

Storage Requirements for Areas B3-B5

2-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	B4 Runoff (L/s)	B5 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
1	148.1	28.02	15.98	29.81	41.00	32.81	1.97
2	133.3	25.22	14.38	26.83	41.00	25.43	3.05
3	121.5	22.97	13.10	24.44	41.00	19.52	3.51
4	111.7	21.13	12.05	22.48	41.00	14.66	3.52
5	103.6	19.59	11.17	20.84	41.00	10.60	3.18
6	96.6	18.28	10.42	19.45	41.00	7.15	2.57
7	90.7	17.15	9.78	18.25	41.00	4.17	1.75

Maximum Storage Required 2-Year (m^3) =	3.52

5-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	B4 Runoff (L/s)	B5 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
5	141.2	26.70	15.22	28.41	41.00	29.34	8.80
6	131.6	24.88	14.19	26.48	41.00	24.55	8.84
7	123.3	23.32	13.30	24.82	41.00	20.43	8.58
8	116.1	21.96	12.52	23.37	41.00	16.85	8.09
9	109.8	20.77	11.84	22.10	41.00	13.70	7.40
10	104.2	19.71	11.24	20.97	41.00	10.91	6.55
11	99.2	18.76	10.70	19.96	41.00	8.42	5.56

Maximum Storage Required 5-Year (m^3) =	8.84

100-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	B4 Runoff (L/s)	B5 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	37.64	21.41	39.95	41.00	58.00	34.80
11	169.9	35.81	20.38	38.02	41.00	53.21	35.12
12	162.1	34.17	19.44	36.28	41.00	48.90	35.20
13	155.1	32.69	18.60	34.71	41.00	45.00	35.10
14	148.7	31.35	17.84	33.28	41.00	41.46	34.83
15	142.9	30.12	17.14	31.97	41.00	38.23	34.41
16	137.5	28.99	16.50	30.78	41.00	35.27	33.85

Maximum Storage Required 100-Year (m^3) =	35.20

Storage Occupied In Area B3-B5

2-Year Storm Event

Structure/Pipe	Size (mm)	Depth/ Length (m)	Area (m^2)	Volume (m^3)
CB3	600x600	1.81	0.37	0.67
CB3-CB2	200	19.08	0.03	0.60
CB2	600x600	1.94	0.37	0.72
CB2-MH3	250	8.47	0.05	0.42
MH3	1200	1.90	1.13	2.15
MH3-CBMH2	250	29.07	0.05	1.43
CBMH2	1200	1.54	1.13	1.74
CBMH2-MH1	250	35.13	0.05	1.72
CB1	600x600	1.66	0.37	0.62
CB1-MH1	200	16.35	0.03	0.51
MH1	1200	2.09	1.13	2.36

Storage Available (m^3) =	12.95
Storage Required (m^3) =	3.52

5-Year Storm Event

Water Elevation (m) =		89.39	OUTLET INVERT (m)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
Structure	T/G (m)	Pipe dia. (mm)					
CB1	89.40	200	88.34	-	-	0.95	-
CB2	89.54	250	88.20	-	-	1.07	-
CB3	89.54	200	88.33	-	-	0.96	-
MH1	89.59	375	87.80	-	-	1.40	-
CBMH2	89.22	250	87.98	142.32	0.17	1.29	10.23
MH3	89.71	250	88.11	-	-	1.16	-

Storage Available (m^3) =	10.23	*
Storage Required (m^3) =	8.84	

100-YEAR STORM EVENT

Water Elevation (m) =		89.54	OUTLET INVERT (m)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
Structure	T/G (m)	Pipe dia. (mm)					
CB1	89.40	200	88.34	200.83	0.14	1.10	10.96
CB2	89.54	250	88.20		-	1.22	
CB3	89.54	200	88.33		-	1.11	
MH1	89.59	375	87.80		-	1.55	
CBMH2	89.22	250	87.98	270.86	0.32	1.44	41.65
MH3	89.71	250	88.11	-	-	1.31	-

Storage Available (m^3) =	52.61	*
Storage Required (m^3) =	35.20	

*Available Storage calculated from AutoCAD

John Meunier - Hydrovex VHV ICD Curves

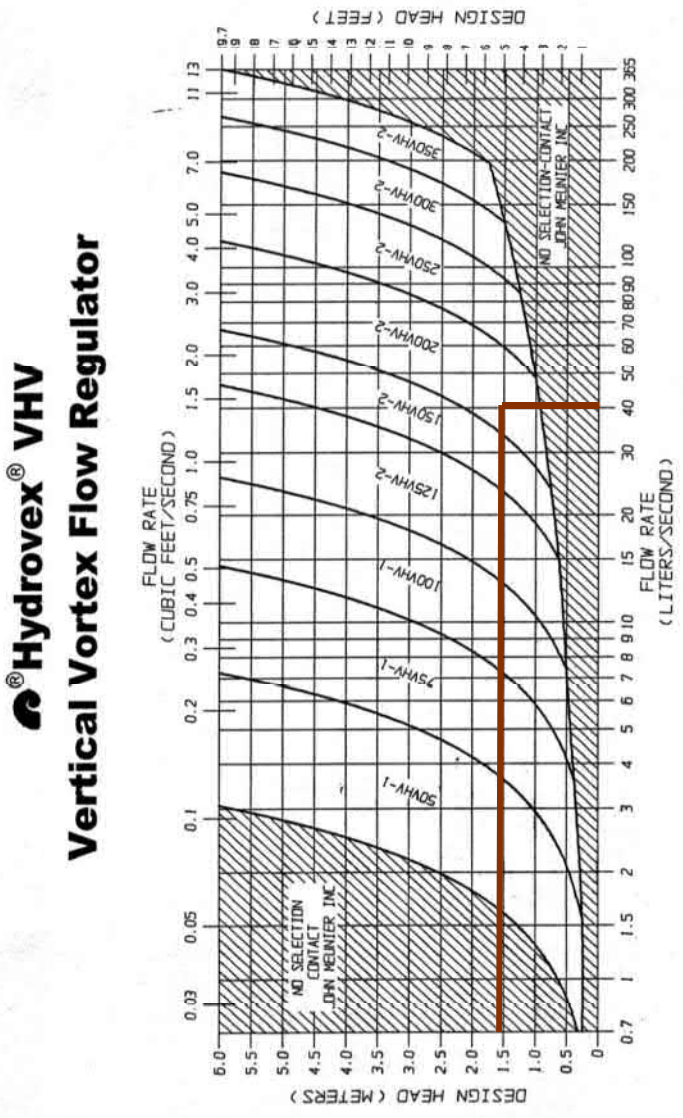


FIGURE 2 - VHV

STORM SEWER DESIGN SHEET

PROJECT: 31 ANTARES DRIVE
LOCATION: OTTAWA, ON
CLIENT: ROBERTSON MARTIN ARCHITECTS

McINTOSH PERRY

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
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA (ha)	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)	
																					DIA	W	H			(L/s)	(%)
	B5	CB3	CB2	0.88	0.04	0.04	0.04	10.00	0.39	10.39	104.19	122.14	178.56	10.20				10.20	26.50	19.08	200			0.60	0.817	16.31	61.53
		CB2	MH3	0.88	0.03	0.03	0.06	10.39	0.17	10.56	102.18	119.77	175.08	17.50				17.50	41.62	8.47	250			0.45	0.821	24.12	57.95
		MH3	CBMH2	0.88	0.05	0.04	0.04	10.00	0.59	10.59	104.19	122.14	178.56	12.74				12.74	41.62	29.07	250			0.45	0.821	28.87	69.38
	B4	CBMH2	MH1			0.00	0.11	10.59	0.71	11.30	101.18	118.59	173.34	29.70				29.70	41.62	35.13	250			0.45	0.821	11.91	28.63
	B3	CB1	MH1	0.84	0.09	0.08	0.08	10.00	0.33	10.33	104.19	122.14	178.56	21.90				21.90	26.50	16.35	200			0.60	0.817	4.61	17.38
	B2	BUILDING	MH1-CDS	0.90	0.09	0.08	0.08	10.56	0.37	10.93	101.32	118.76	173.59	22.82				22.82	26.50	18.00	200			0.60	0.817	3.69	13.92
		MH1	OGS			0.00	0.26	11.30	0.16	11.46	97.78	114.59	167.47	71.27				71.27	91.46	7.50	375			0.25	0.802	20.18	22.07
		OGS	*975mm Ø*			0.00	0.26	11.46	0.27	11.73	97.07	113.76	166.24	70.76				70.76	91.46	13.10	375			0.25	0.802	20.70	22.63

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: P.G.K.

Checked: R.P.K.

Project No.: CP-18-0275

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2019-03-22
2.	REISSUED FOR SITE PLAN CONTROL	2019-05-10

Sheet No: 1 of 1

CDS Average Annual Efficiency For TSS Removal & Total Annual Volume Treated

Area = 0.30 ha
C-value: 0.860
CDS Model: PMSU2015_4
Flowrate: 20 l/s
IDF Data: Ottawa
PSD: FINE

Upstream Storage:
Storage 41 m^3

Engineer: McIntosh Perry Consulting Engineers Ltd.
Contact: Peter Kirkimtzis
Date: 22-Mar-19

Project: 31 Antares Drive
Location: Ottawa, ON
OGS ID: CDS (PMSU2015_4)

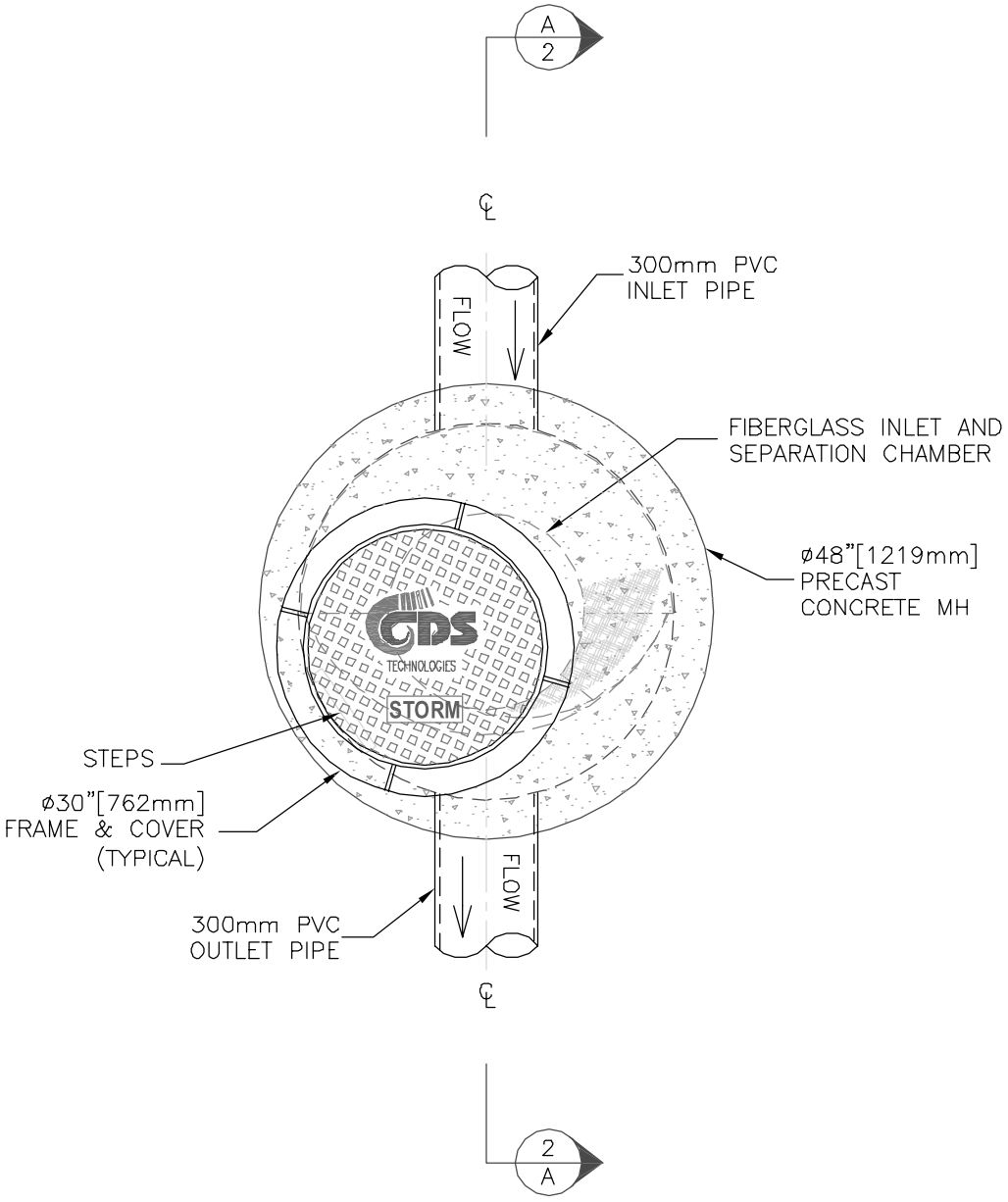
Return	Period	Peak Flow	TSS Percentage Captured	Treated Flow Volume	Total Flow Volume	Annual Exceedance Probability	System Flow	CDS Flow	By-Pass Flow	Volume Percentage Treated
month / yr	Yr	l/s	%	litres	litres	%	l/s	l/s	l/s	%
1-M	0.08	4.32	94.85	4856	4856	**100.00**	4.32	4.32	0.00	100.00
2-M	0.17	6.81	92.54	7536	7536	**99.75**	6.81	6.81	0.00	100.00
3-M	0.25	8.87	90.59	9802	9802	**98.17**	8.87	8.87	0.00	100.00
4-M	0.33	10.72	88.81	11889	11889	**95.04**	10.72	10.72	0.00	100.00
5-M	0.42	12.14	87.42	13528	13528	**90.91**	12.14	12.14	0.00	100.00
6-M	0.50	13.57	86.04	15168	15168	**86.47**	13.57	13.57	0.00	100.00
7-M	0.58	14.62	85.00	16423	16423	**82.01**	14.62	14.62	0.00	100.00
8-M	0.67	15.68	83.96	17677	17677	**77.67**	15.68	15.68	0.00	100.00
9-M	0.75	16.73	82.93	18931	18931	**73.64**	16.73	16.73	0.00	100.00
10-M	0.83	17.54	82.11	19938	19938	**69.90**	17.54	17.54	0.00	100.00
11-M	0.92	18.36	81.29	20945	20945	**66.40**	18.36	18.36	0.00	100.00
1-Yr	1	19.17	80.48	21952	21952	**63.21**	19.17	19.17	0.00	100.00
2-Yr	2	25.67	71.36	28525	30523	**39.35**	25.67	20.10	5.56	93.45
5-Yr	5	36.63	55.23	35321	47346	**18.13**	36.63	20.10	16.53	74.60
10-Yr	10	37.64	53.96	35848	49120	**9.52**	37.64	20.10	17.53	72.98
25-Yr	25	39.59	51.61	36821	52653	**3.92**	39.59	20.10	19.49	69.93
50-Yr	50	40.44	50.64	37238	54237	**1.98**	40.44	20.10	20.33	68.66
100-Yr	100	41.84	49.09	37950	56960	**1.00**	41.84	20.10	21.74	66.63
Average Annual TSS Removal Efficiency [%]:					**86.1**	Ave. Ann. T. Volume [%]:				**98.9**

Notes:
1) CDS Efficiency based on testing conducted at the University of Central Florida
2) CDS design flowrate and scaling based on standard manufacturer model & product specificiations

ECHELON ENVIRONMENTAL

CDS TECHNOLOGIES

PLAN VIEW

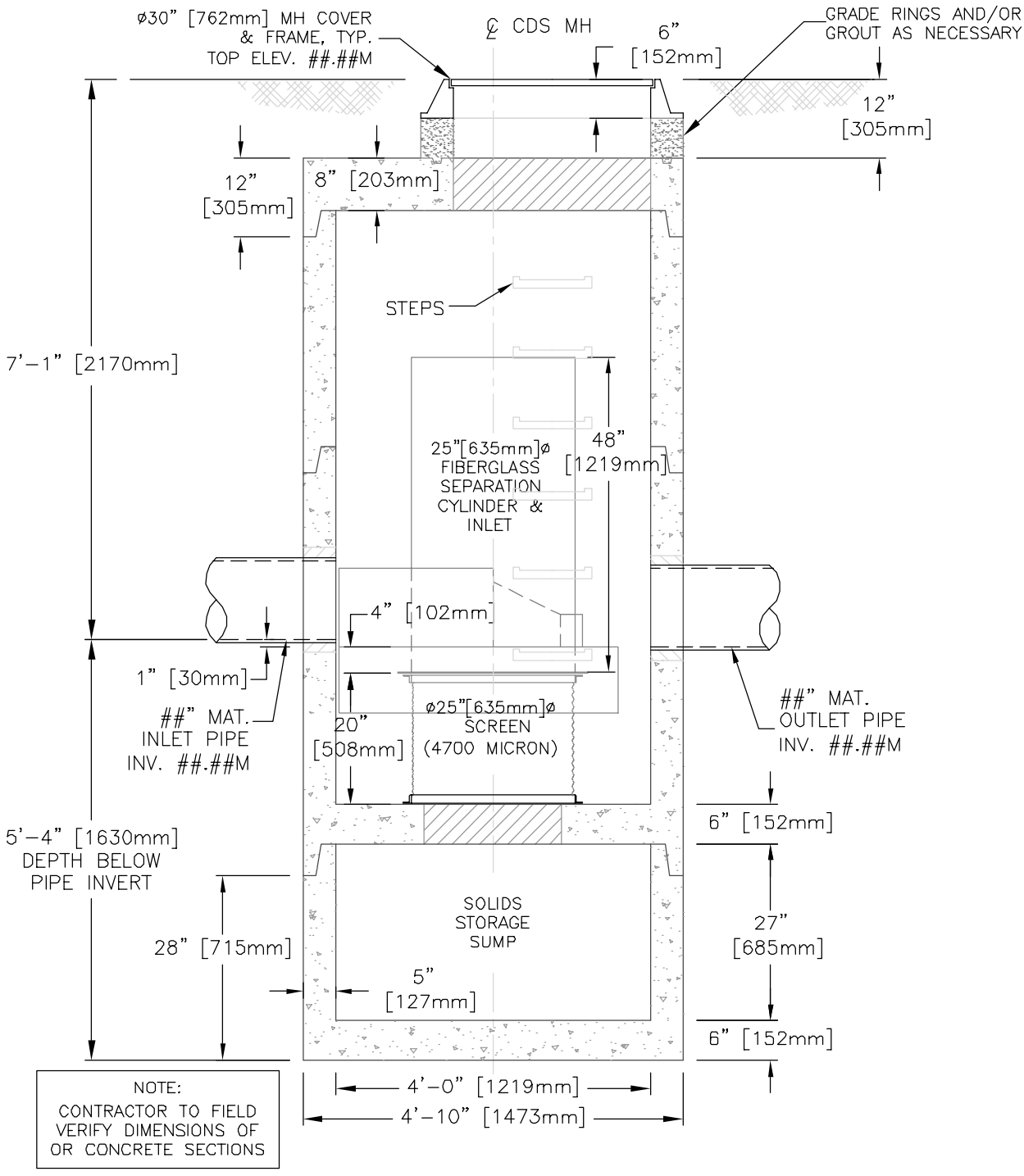


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 1
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX–##–###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

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 A
☐ 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 B
☐ 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 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 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: ○ Metric scale ○ North arrow (including construction North) ○ Key plan ○ Name and contact information of applicant and property owner ○ Property limits including bearings and dimensions ○ Existing and proposed structures and parking areas ○ Easements, road widening and rights-of-way ○ Adjacent street names	C101 & C102

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 C
☐ 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 C
☐ 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 5.1 Existing 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 7.0 Proposed 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.	Appendix E Appendix F
☐ 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 7.0 Proposed 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 7.0 Proposed Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 7.0 Proposed 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 G

☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	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 7.0 Proposed Stormwater Management
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 7.0 Proposed Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 7.0 Proposed 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.	N/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 7.0 Proposed 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 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 8.0 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 9.0 Summary
☐ 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