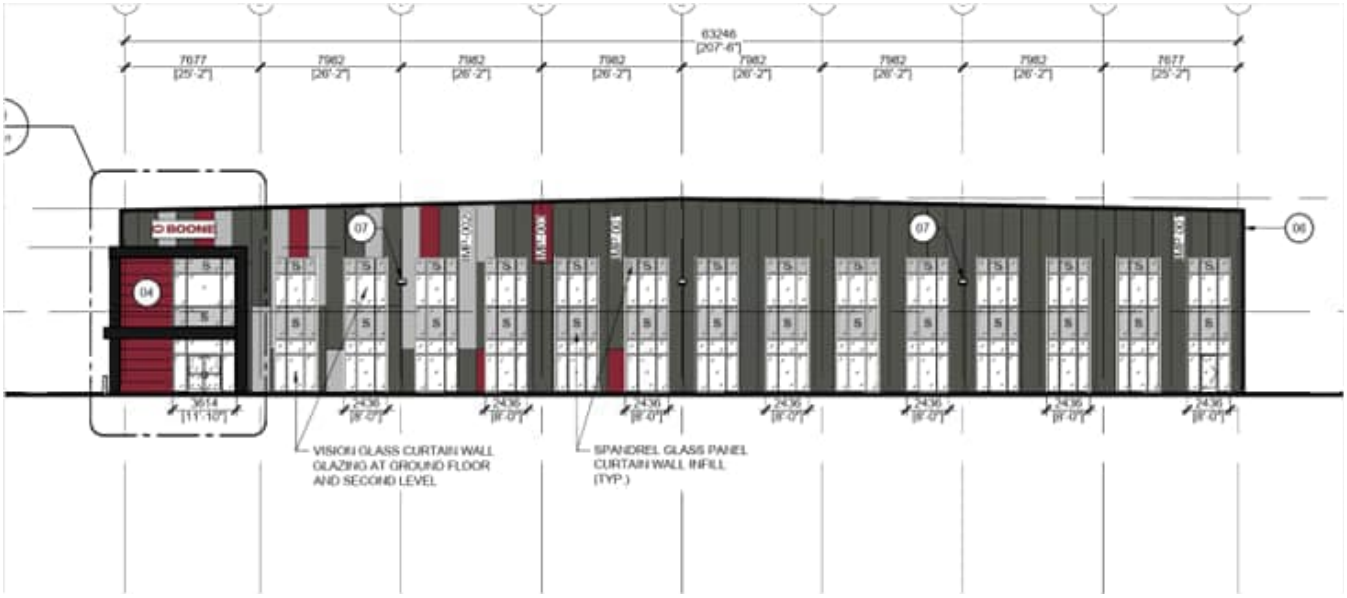
SERVICING & STORMWATER MANAGEMENT REPORT
BOONE PLUMBING – 1560 STAR TOP ROAD



Project No.: CCO-23-3725

City File No.: PC2023-0107

Prepared for:

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August 4, 2023

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by BBS Construction LTD. to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed Boone Plumbing Warehouse, located at 1560 Star Top Road 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 (the City), the Rideau Valley Conservation Authority (RVCA), and the Ministry of the Environment, Conservation and Parks (MECP). This report will address the water, sanitary and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

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

- CCO-23-3725, C101 – Site Grading and Drainage Plan,
- CCO-23-3725, C102 – Site Servicing Plan,
- CCO-23-3725, PRE – Pre-Development Drainage Area Plan (*Appendix 'E'*), and
- CCO-23-3725, POST – Post-Development Drainage Area Plan (*Appendix 'F'*).

1.2 Site Description

The property is located at 1560 Star Top Road and is described as Part of Lot 25, Concession 2 (Ottawa Front), Geographic Township of Gloucester, City of Ottawa. The land in question covers approximately 3.0 ha and is bounded by Star Top Road and other industrial sites.

The subject property is a large industrial site currently occupied by four small buildings and a large outdoor storage area serving several tenants. The property is accessed via two driveways on Star Top Road and two bridges over a drainage channel that connect to 1282 Algoma Street.

The subject property is zoned Light Industrial (IL). See Site Location Plan in *Appendix 'A'* for more details.

Figure 1: Site Map

1.3 Existing Conditions and Infrastructure

The existing site is currently partially developed with existing water and sanitary services. Stormwater runoff currently flows overland from the southwest of the site towards the east at Star Top Road and towards the north to the South Cyrville Municipal Drain. There is an existing ditch adjacent to the west property line that has an outlet to the Municipal Drain. There is also an existing ditch at the east of the site, adjacent to Star Top Road, which collects runoff from the existing site and Star Top Road.

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

- 305mm diameter water main within Star Top Road
- 300mm diameter sanitary sewer within Star Top Road

There is an existing 675mm diameter sanitary sewer north of the property but is not permitted to be connected to. There is no storm sewer for this property.

1.4 Proposed Development and Statistics

The proposed development consists of an *8,368m²* storage building to consolidate the Boone Plumbing storage into one contiguous site that will allow for future expansion. On the subject property, the two existing buildings in the area proposed for the new building are to be demolished, as well as the existing building closest to Star Top Road. The one additional existing building is to remain. Parking will be provided along the northern boundaries of the site, and additional parking will be added adjacent to the existing fenced storage yard. Further details are available in the site plan provided by Deimling Architecture and Interior Design in *Appendix 'B'.*

1.5 Approvals

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

An Environmental Compliance Approval (ECA) through the Ministry of Environment, Conservation and Parks (MECP) is not anticipated to be required for the development since the development proposes no manufacturing element to its property usage.

2.0 BACKROUND STUDIES

Background studies that have been completed for the proposed site include City of Ottawa as-built drawings, a Geotechnical Investigation, an Environmental Impact Study, a Phase II Environmental Site Assessment, and a topographical survey.

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 McIntosh Perry Surveying Inc., dated June 15, 2023.

A Phase II Environmental Site Assessment (ESA) was completed by Paterson Group, dated June 8, 2023.

A Geotechnical Investigation for the proposed warehouse development was completed by Paterson Group, dated June 22, 2023.

An Environmental Impact Study (EIS) was completed by Muncaster Environmental Planning Inc., on July 14, 2023.

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on May 12, 2023, regarding the proposed site. Specific design parameters to be incorporated within this design include the following:

- The pre-development discharge rate for the site will need to be calculated based on the pre-development runoff coefficient or a maximum equivalent value of 0.5, whichever is less.
- The post-development discharge rates for the site shall match the pre-development discharge rates for all storm events.
- Ensure no overland flow for all storm events up to and including the 100-year event. Provide adequate emergency overflow conveyance off-site.
- Provide Enhanced level of protection (80%) for suspended solids removal.
- Provide a water balance analysis as per the conservation authority guidelines for development applications. Control the recharge to meet Pre-development conditions on property.

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

4.0 WATERMAIN

4.1 Existing Watermain

There is an existing 305mm diameter watermain within Star Top Road. The watermain services the existing property and adjacent properties as well as the fire hydrants along Star Top Road.

As there are existing buildings on the subject property, it is assumed that there are existing water services. These services have not been identified on the plans or in the as-builts, but can be seen on the GeoOttawa database, along with existing hydrants and valves, as shown in Figure 2 below.

Figure 2: GeoOttawa Existing Water Services

4.2 Proposed Watermain

A new 200mm diameter PVC water service is proposed to service the site complete with a water valve located at the property line and will be connected to the existing 300 mm diameter watermain within Star Top Road. The water service is designed to have a minimum of 2.4m cover and will be insulated where required per City standards.

The Fire Underwriters Survey 2020 (FUS) method and Ontario Building 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 *0.8* (noncombustible type construction). The total floor area ('A' value) for the FUS calculation was determined to be *8,853 m²*. The results of the calculations yielded a required fire flow of 1*7,000 L/min*. Due to the occupancy, sprinklers, and exposures, the adjusted required fire flow is 6,000 L/min. A fire flow of *9,000 L/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 in *Table 1*, below.

Table 1: Water Demands

Site Area	3.0 ha
Industrial - Light	35,000 L/ha/day
Average Day Demand (L/s)	1.22
Maximum Daily Demand (L/s)	1.82
Peak Hourly Demand (L/s)	3.28
FUS Fire Flow Requirement (L/s)	100
OBC Fire Flow Requirement (L/s)	150

Boundary conditions for the site have been requested from the City of Ottawa but are not available at this time of submission.

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

There is an existing 300 mm diameter sanitary sewer within Star Top Road. There is also an existing 675mm diameter sanitary sewer north of the property which is not permitted to be connected to.

As there are existing buildings on the subject property, it is assumed that there is an existing sanitary service. Although, this service has not been identified on the plans or in the as-builts.

5.2 Proposed Sanitary Sewer

A new 150 mm diameter gravity sanitary lateral is proposed be connected to the existing 300 mm diameter sanitary sewer within Star Top Road. Monitoring for site sanitary flows will occur at the proposed maintenance hole just inside the property line. Refer to drawing *C102* for a detailed servicing layout.

The peak design flows for the proposed building were calculated using criteria from the *Ottawa Sewer Guidelines* and are summarized in Table 2, below. Based on the unit occupancy statistics provided by the architect, the proposed site development will generate a flow of *7.55 L/s*. See *Appendix 'D'* of this report for more details.

Table 2: Sanitary Design Criteria

Design Parameter	Value
Site Area	3.0 ha
Industrial - Light	35,000 L/ha/day
Light Industrial Peaking Factor	5.4
Extraneous Flow Allowance	0.33 L/s/ha

Table 3 below, summarizes the estimated wastewater flow from the proposed development. Refer to *Appendix D for* detailed calculations.

Table 3: Summary of Estimated Sanitary Flow

Design Parameter	Total Flow (L/s)
Total Estimated Average Dry Weather Flow	1.37
Total Estimated Peak Dry Weather Flow	6.71

Total Estimated Peak Wet Weather Flow	7.55

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

There are no existing storm sewers on the subject property. Water runoff from the site is currently split, as a portion is draining towards an existing ditch adjacent to the west property line which outlets to the Cyrville Municipal Drain, and the remainder is draining to the existing ditch on Star Top Road. Runoff from the property northeast of the site at 1528 Star Top Road is currently collected by private catch basins and conveyed to an existing ditch draining north of the subject property. Star Top Road. Refer to *Appendix 'E'*.

6.2 Proposed Storm Sewers

Most of the runoff from the proposed site will be collected in proposed catch basins. The catch basins are proposed throughout the subject property, which will connect to the proposed storm sewer system. The new system will collect storm flows and restrict runoff leaving the site. The storm sewer will outlet to the existing ditch adjacent to Star Top Road.

A storm sewer design sheet was created using the rational method and City of Ottawa 5-year storm event. 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. Storm runoff will be controlled by various inlet control device (ICDs) or orifice plates to limit flows to the specified allowable release rates. The storm sewers will range from 200 to 525mm in diameter throughout the subject property.

Half of the runoff from the proposed building will be conveyed to the rear-yard dry retention area along the western boundary of the site. This retention area will be controlled by an ICD or orifice plate and will outlet to an existing ditch onsite that ultimately outlets to the Cyrville Municipal Drain. The use of the ICD's will result in ponding in the retention areas. These controls allow for adequate storage within the site.

See CCO-23-3725 – *POST* and *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, onsite storage, a new underground storm sewer system. The runoff from the proposed building will be captured by a dry retention area and outlet to the existing ditch onsite prior to outletting to the Cyrville Municipal Drain. The storm system will capture the parking lot runoff and store water in proposed surface ponding areas. The restricted flow in the storm sewer system will then release into the existing ditch adjacent to Star Top Road.

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 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 5/100-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:

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

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.

7.3 Pre-Development Drainage

In existing conditions, stormwater runoff currently flows overland from the southwest of the site towards the east at Star Top Road and towards the north to the South Cyrville Municipal Drain. There is an existing ditch adjacent to the west property line that has an outlet to the Municipal Drain. There is also an existing ditch at the east of the site, adjacent to Star Top Road, which collects runoff from the existing site and Star Top Road.

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. Refer to Appendix 'G' for detailed calculations.

Table 4: Pre-Development Runoff Summary

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.98	0.45	0.57	16	80.5	137.5	99.05	211.65
A2	2.02	0.48	0.60	16	80.5	137.5	218.49	466.89
Total	3.00						317.53	678.54

7.4 Post-Development Drainage

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 runoff from the proposed building will be conveyed to the rear-yard dry retention area at the western boundary of the site. This retention area will be controlled by an ICD that will then outlet to an existing ditch on site and ultimately outlet to the Cyrville Municipal Drain.

There is an uncontrolled area on the north side of the site that will drain towards the Cyrville Municipal Drain as per existing conditions.

The storm system will capture the parking lot runoff and store water in proposed surface ponding areas within the parking structure. The emergency overland flow route for the proposed site will be directed east towards the existing ditch adjacent to Star Top Road.

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-23-3725 – *POST* in Appendix 'F' of this report for more details. A summary of the Post-Development Runoff Calculations can be found below.

Table 5: Post-Development Runoff Summary

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
B1	0.55	0.84	0.94	10	104.2	178.6	133.28	254.43
B2	0.54	0.75	0.84	10	104.2	178.6	115.92	222.36
B3	0.29	0.90	1.00	10	104.2	178.6	75.27	143.33
B4	0.72	0.90	1.00	10	104.2	178.6	187.73	357.46
B5	0.24	0.71	0.80	10	104.2	178.6	50.04	96.18
B6	0.67	0.73	0.82	10	104.2	178.6	141.68	272.00
Total	3.00						845.61	1,617.77

Post-development drainage conveyed to Star Top Road will be restricted to a maximum release rate of 314.56 and 605.00 L/s for 5-year and 100-year storm events respectively.

To meet the stormwater objectives, the development includes site storage through surface ponds restricted by ICDs.

Runoff for areas B1, B3, B4 and B5 will be restricted, and the required storage will be provided within the parking area. Runoff for Area B2 will be restricted and stored within the proposed dry retention area west of the proposed building. The flow will be controlled by various inlet control devices. A device is to be located in STMH 1, which will pond areas B3 and B4 to the same elevation of 66.40m in the event of a 100-year storm. Another device will be located at the outlet of CB 3 to control area B5. An additional device is to be placed within CB 4 controlling area B1. Finally, an ICD or orifice plate will be placed at the outlet of CB 5 to control drainage area B2. The restriction devices will account for the unrestricted flow (Area B6) leaving the site uncontrolled. This quantity and quality control will be further detailed in Sections 7.5 and 7.6.

7.5 Quantity Control

The 5 and 100-year post-development runoff for this site has been restricted to match the 5 and 100-year pre-development flow rate with a combined C value of 0.50 or less. (See Appendix 'B' for pre-consultation notes). These values create the following allowable release rate and storage volumes for the development site. 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 to B5 will be restricted as shown in the table below.

Table 6: Post-Development Restricted Runoff 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	133.28	254.43	46.72	90.00	54.15	102.25	54.15	102.25
B2	115.92	222.36	20.66	40.00	70.81	133.98	109.70	211.00
B3	75.27	143.33	91.07	175.00	107.86	203.19	109.70	211.00
B4	187.73	357.46						
B5	50.04	96.18	14.44	28.00	23.17	44.07	24.87	46.39
B6	141.68	272.00	141.68	272.00	x	x	x	x
Total	703.93	1345.77	314.56	605.00	255.99	483.50	298.42	570.64

Runoff from Areas B1, B2, B3, B4, and B5 will be restricted at the various structures mentioned in the text above. ICDs and Orifice plates have yet to be sized by the manufacturer, but detailed and adjusted flow rates will be available in the following submission. The orifice plug at STMH 1 will restrict areas B3 & B4 to 91.07 L/s for 5-year storm events and 175.00 L/s for 100-year storm events. The restriction creates a water surface elevation (WSEL) of 66.34m for the 5-year storm event and 66.40m for the 100-year storm event. The storage for this area will be provided above the parking lot structures CB 1 and CB 2.

The orifice plug at CB 3 will restrict area B5 to 14.44 L/s for 5-year storm events and 28.00 L/s for 100-year storm events. The restriction creates a water surface elevation (WSEL) of 66.93m for the 5-year storm event and 66.69m for the 100-year storm event. The storage for this area will be provided above the parking lot structure CB 3.

The orifice plug at CB 4 will restrict area B1 to 46.72 L/s for 5-year storm events and 90.00 L/s for 100-year storm events. The restriction creates a water surface elevation (WSEL) of 65.74m for the 5-year storm event and 65.80m for the 100-year storm event. The storage for this area will be provided above the parking lot structure CB 4.

Finally, the orifice plug at CB 5 will restrict area B2 to 20.66 L/s for 5-year events and 40.00 L/s for 100-year storm events. The restriction creates a water surface elevation (WSEL) of 66.81m for the 5-year storm event and 67.00m for the 100-year storm event. The storage for this area will be provided in the retention area above structure CB 5.

See Appendix 'G' for details of the required and provided storage volumes.

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 east entrance at Star Top Road. The proposed Grading Plan has been designed to ensure no water backs up towards the existing building, nor the proposed.

7.6 Quality Control

The following methods will be utilized to provide quality controls for the site:

Area B2 will collect rooftop drainage and therefore drainage is considered clean. Roof drainage will sheet drain to the dry retention area to the west of the building, and outlet to the existing ditch onsite.

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.

A quality treatment unit has been proposed to provide a TSS removal rate of 80% as per Rideau Valley Conservation Authority requirements. The OGS (Oil & Grit Separator) unit will provide a water quality of at least 80% TSS. The OGS Unit shall be placed downstream of the parking area storm structures and sewers to provide the required water quality treatment for the site runoff before discharging to the ditch adjacent to Star Top Road.

Detailed OGS sizing is not available at the time of submission but will be provided in the follow up submission. The OGS will be sized to achieve a TSS removal of 80% or greater under the Fine PSD criteria.

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 filter fabric is 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 are to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled

and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the City and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions warrant. Please see the *Site Grading, Drainage and Sediment & Erosion Control Plan* for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

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 8,368m^2 warehouse building is proposed along the west property line at 1560 Star Top Road.
- A new 200mm diameter water service is proposed to service the site, extending from the existing 300mm watermain within Star Top Road.
- A new 150mm sanitary service is proposed to service the site. The service will extend from a proposed maintenance hole at the existing 300mm sanitary sewer within Star Top Road.
- The proposed storm sewer, ranging in diameter from 200 mm to 525 mm, will be installed throughout the site and drain to the existing ditch adjacent to Star Top Road.
- Storage for the 5- through 100-year storm events will be provided within the parking lot areas above the proposed storm structures, and within the dry retention area.
- An OGS downstream of the site restrictions will provide quality control for the proposed storm network.

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 warehouse development at 1560 Star Top Road.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

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11.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Bayview Orleans 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, Conservation and Parks, 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


ch. Algoma Rd.
ch. Comstock Rd.
ch. Star Top Rd.
Hwy. 417

APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

City Surveyor

Bill Harper, City's Surveyor | Bill.Harper@ottawa.ca

The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.

Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

The survey being prepared for the application will indicate whether easements over the City-owned right of way over the South Cyrville Drain at the northern boundary of the lot are existing or required.

Engineering

Kelsey Charie, Project Manager Infrastructure Approvals | kelsey.charie@ottawa.ca

List of Reports and Plans (Site Plan Control):

1. Site Servicing Plan
2. Site Grading and Ponding Plan
3. Erosion and Sediment Control Plan
4. Existing Condition Storm Drainage Plan
5. Post Development Storm Drainage Plan
6. Stormwater Management and Site Servicing Report
7. Geotechnical Investigation Report

Please note the following information regarding the engineering design submissions 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/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans

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

- Ottawa Sewer Design Guidelines, Second Edition, (October 2012), including Technical Bulletins, ISDTB-2014-01, PIEDTB-2016-01, ISTB 2018-01, ISTB-2018-04, and ISTB-2019-02
- Ottawa Design Guidelines – Water Distribution, First Edition, (July 2010), including Technical Bulletins ISD-2010-2, ISDTB-2014-02, ISTB-2018-02, and ISTB-2021-03
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (Revised 2008)
- City of Ottawa Slope Stability Guidelines for Development Applications (Revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January 2016)
- City of Ottawa Hydrogeological and Terrain Analysis Guidelines (March 2021)
- 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. Stormwater Management Criteria

   i. Quantity

   - The storm water quantity control requirements for this site shall be based on the existing/pre-development conditions.
   - The pre-development discharge rate for the site will need to be calculated based on the pre-development runoff coefficient or a maximum equivalent value of 0.5, whichever is less.
   - The post development discharge rates for the site shall match the pre-development discharge rates for all storm events. i.e.: the 2-year post development rate shall match the 2-year pre-development rate and so on for the 5-year and 100-year events
   - Ensure no overland flow for all storm events up to and including the 100-year event. Provide adequate emergency overflow conveyance off-site

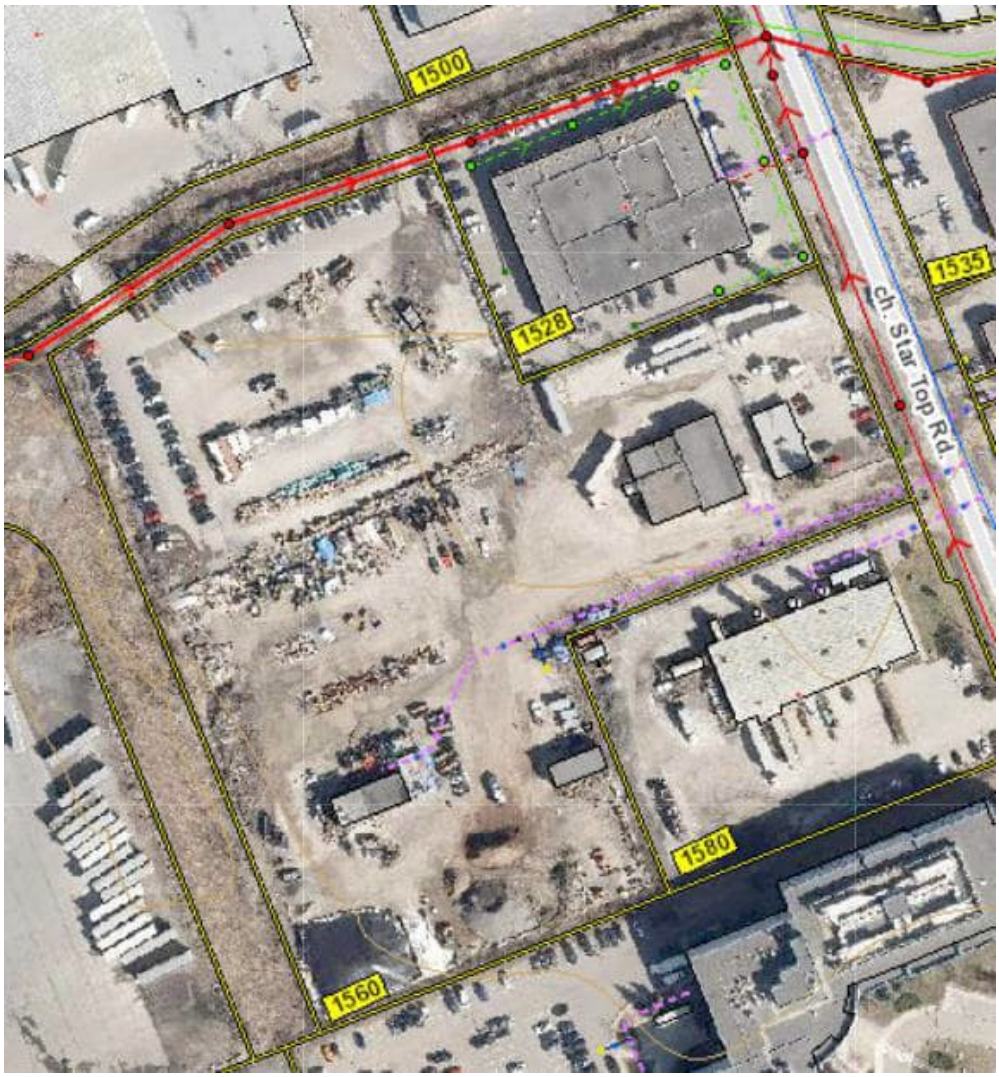
   ii. Quality

   - Characterize the water quality to be protected and Stormwater Contaminants (e.g., suspended solids, nutrients, bacteria, water

temperature) for potential impact on the Natural Environment, and control as necessary, OR

- As per the watershed/subwatershed plan, similar area-wide Stormwater study, or Stormwater management plan to minimize, or where possible, prevent increases in contaminant loads and impacts to receiving waters.
- Provide Enhanced level of protection (80%) for suspended solids removal.
- Provide a water balance analysis as per the conservation authority guidelines for development applications. Control the recharge to meet Pre-development conditions on property.

5. Deep Services:



i. A plan view of the approximate existing public services may be seen above. The sizing of available services are:

Connections:

i. 305 mm dia. water main within Star Top Road
ii. 300 mm dia. sanitary sewer within Star Top Road
iii. Note: the 675 mm dia. sanitary sewer north of the property is not permitted to be connected to
iv. Note: There is also no storm sewer for this property. The South Cyrville Drain may be a possibility to drain to but will likely require additional measures prior to approval

ii. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*

iii. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (i.e. Not in a parking area).*

iv. *Provide information on the type of connection permitted*

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

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

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

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

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

e. *No submerged outlet connections.*

v. *Please provide estimated sanitary flows with the first submission (or beforehand if possible), to allow the City to confirm whether there are any downstream capacity constraints.*

6. Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission. 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(s)

ii. Type of development and the amount of fire flow required (as per FUS, 2020).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

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

vi. Hydrant location and spacing to meet City's Water Design guidelines.

vii. Water supply redundancy will be required for more than 50 m3/day water demand.

7. 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.

8. All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP):

    a. The consultants determine if an approval for sewage works under Section 53 of OWRA is required and determines what type of application. The City's project manager may help confirm and coordinate with the MECP as required.

    b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.

    c. Pre-consultation is not required if applying for standard or additional works (Schedule A of the Agreement) under Transfer Review.

    d. Pre-consultation with local District office of MECP is recommended for direct submission.

    e. Consultant completes an MECP request form for a pre-consultation. Send request to moeccottawasewage@ontario.ca

    f. ECA applications are required to be submitted online through the MECP portal. A business account required to submit ECA application. For more information visit https://www.ontario.ca/page/environmental-compliance-approval

    NOTE: Site Plan Approval, or Draft Approval, is required before an application is sent to the MECP.

9. General Engineering Submission requirements:

PLAN OF SURVEY SHOWING TOPOGRAPHIC DETAIL OF PART OF LOT 25 CONCESSION 2 (OTTAWA FRONT) GEOGRAPHIC TOWNSHIP OF GLOUCESTER CITY OF OTTAWA

McINTOSH PERRY SURVEYING INC

SCALE 1 : 500

0 10 20 30 40 50 Metres

THE INTENDED PLOT SIZE OF THIS PLAN IS 914mm IN WIDTH BY 660mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1 : 500.

METRIC:

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

ELEVATIONS:

ELEVATIONS ARE GEODETIC (CGVD 28/78) BY GNSS OBSERVATIONS REFERENCED TO THE CANADA HT_2 GEOID MODEL AND ARE ILLUSTRATED VIA CONTOUR SURFACE MODELLING AT 0.25m INTERVALS.

BENCHMARKS:

TOPOGRAPHIC INFORMATION DERIVED FROM FIELD SURVEY BY McINTOSH PERRY SURVEYING INC. (MPSI). THIS FIELD WORK WAS COMPLETED ON THE 26TH DAY OF APRIL, 2023.

TEMPORARY SITE BENCHMARK #1 – CUT CROSS SET ON BASE OF LS, HAVING AN ELEVATION OF 66.38m.

TEMPORARY SITE BENCHMARK #2 – TOP OF SPINDLE ON FIRE HYDRANT, HAVING AN ELEVATION OF 67.24m.

TEMPORARY SITE BENCHMARK #2 – TOP OF SPINDLE ON FIRE HYDRANT, HAVING AN ELEVATION OF 67.03m.

BEARINGS & DISTANCES:

BEARINGS SHOWN HEREON ARE MTM GRID BEARINGS, DERIVED FROM REAL–TIME NETWORK (RTN) GPS OBSERVATIONS ON OBSERVED REFERENCE POINTS 'A' AND 'B', SHOWN HEREON, AND ARE RELATED TO NAD83 (ORIGINAL) MTM ZONE 9 (CENTRAL MERIDIAN 76° 30' W).

DISTANCES SHOWN ON THIS PLAN ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999951.

BEARING ROTATION:

FOR THE PURPOSE OF COMPARISON, ASTRONOMIC BEARINGS HAVE BEEN ROTATED AS FOLLOWS:

PLAN	ROTATION	DIRECTION
(p1), (p5), (p6)	00°43'40"	COUNTER CLOCKWISE

INTEGRATION DATA:

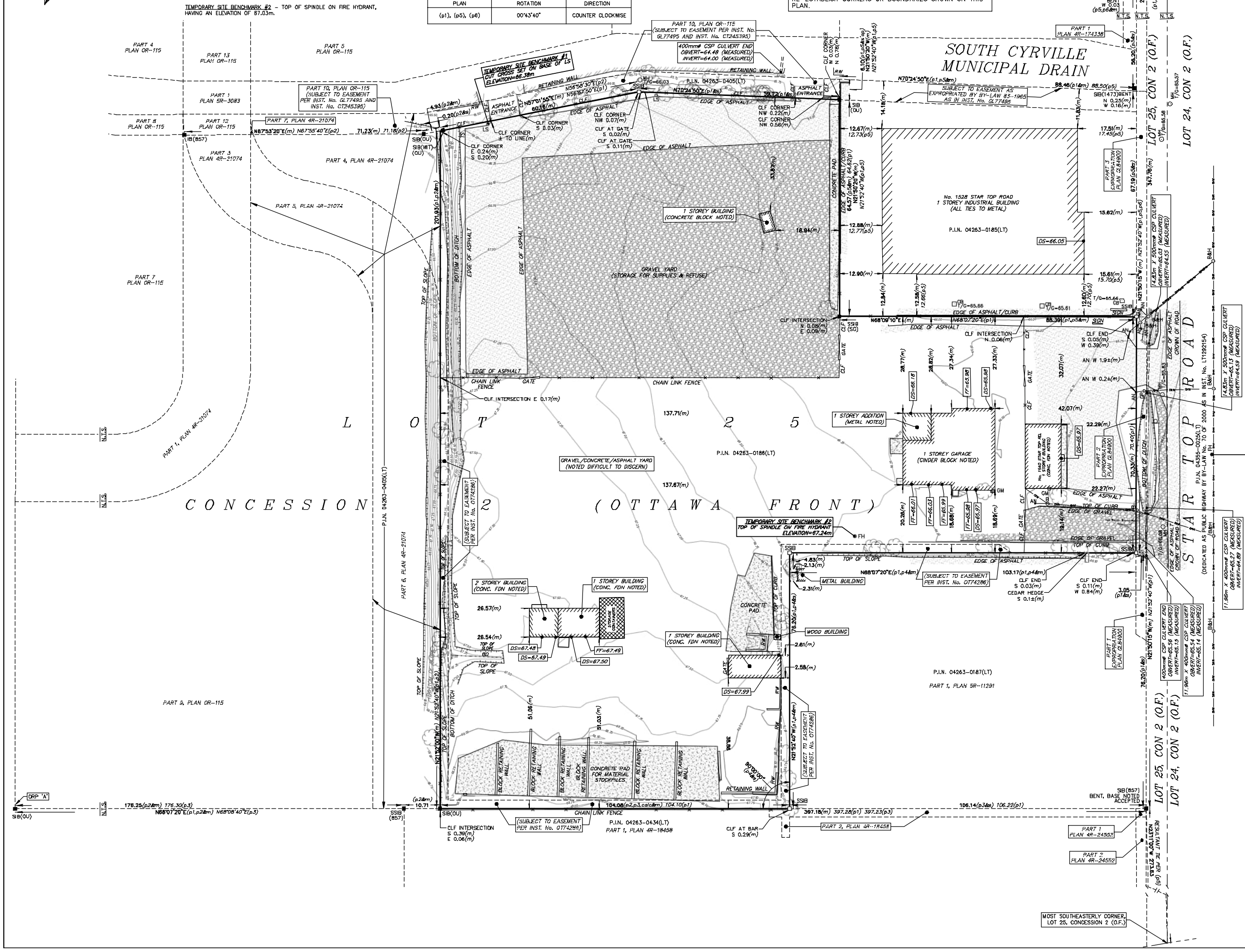
OBSERVED REFERENCE POINTS (ORPs) DERIVED FROM GNSS OBSERVATIONS USING THE CANNET REAL TIME NETWORK (RTN) SERVICE. COORDINATES ARE CONFIRMED BY THE NRCAN RTK COMPLIANCE AGREEMENT.

COORDINATE SYSTEM : NAD83 (ORIGINAL), MTM ZONE 9.

COORDINATES TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
ORP 'A'	5030725.83	373685.29
ORP 'B'	5031195.46	373921.66

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.



SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 15TH DAY OF JUNE, 2023.

JUNE 15, 2023 — DATE

JOHN GAUTHIER
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V–50077.

LEGEND:

□	DENOTES	MONUMENT PLANTED
■	DENOTES	MONUMENT FOUND
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
N,S,E,W	DENOTES	NORTH, SOUTH, EAST, WEST
NE	DENOTES	NORTHEAST
NW	DENOTES	NORTHWEST
SE	DENOTES	SOUTHEAST
SW	DENOTES	SOUTHWEST
N.T.S.	DENOTES	NOT TO SCALE
CON 2	DENOTES	CONCESSION 2
(O.F.)	DENOTES	OTTAWA FRONT
(WIT)	DENOTES	WITNESS
(s)	DENOTES	SET
(m)	DENOTES	MEASURED
(s'op)	DENOTES	SET ON PRODUCTION
FDN	DENOTES	FOUNDATION
S/T	DENOTES	SUBJECT TO
INST.	DENOTES	INSTRUMENT
No.	DENOTES	NUMBER
(p1)	DENOTES	PLAN OR–115
(p2)	DENOTES	PLAN 4R–21074
(p3)	DENOTES	PLAN 4R–18458
(p4)	DENOTES	PLAN 5R–11291
(p5)	DENOTES	SURVEYOR'S REAL PROPERTY REPORT BY STANTEC GEOMATICS LTD, DATED OCTOBER 3, 2007
(p6)	DENOTES	PLAN 4R–17338
(857)	DENOTES	FAIRHALL, MOFFATT & WOODLAND LTD, D.L.S.
(1152)	DENOTES	JOHN E. KIHL, O.L.S.
(1473)	DENOTES	DOUGLAS A. SIMMONDS, O.L.S.
(SG)	DENOTES	STANTEC GEOMATICS, O.L.S.
(OU)	DENOTES	ORIGIN UNKNOWN
ELEV	DENOTES	ELEVATION
B&H	DENOTES	BELL & HYDRO UTILITY POLE
BP	DENOTES	BELL UTILITY POLE
GP	DENOTES	GUY POLE
AN	DENOTES	ANCHOR
OHW	DENOTES	OVERHEAD UTILITY WIRES
GM	DENOTES	GAS METER
FH	DENOTES	FIRE HYDRANT
CONC.	DENOTES	CONCRETE
MH	DENOTES	MAINTENANCE HOLE
CB	DENOTES	CATCH BASIN
T/G	DENOTES	TOP OF GRATE/LID
DS	DENOTES	DOOR SILL ELEVATION
FF	DENOTES	FINISHED FLOOR ELEVATION
LS	DENOTES	LIGHT STANDARD
BD	DENOTES	BOTTOM OF DITCH
TS	DENOTES	TOP OF SLOPE
–W–	DENOTES	UNDERGROUND WATER SERVICE
CLF	DENOTES	CHAIN LINK FENCE
(tree symbol)	DENOTES	TREE(S)
(sign symbol)	DENOTES	SIGN

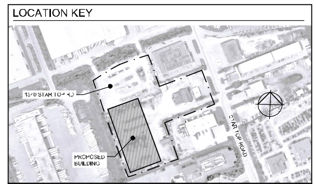
UTILITIES:

THE LOCATION AND CONFIGURATION OF UNDERGROUND SERVICES AND UTILITIES WERE NOT INCLUDED IN THIS SURVEY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE CONFIGURATION AND LOCATION OF UNDERGROUND SERVICES AT THE SITE PRIOR TO CONSTRUCTION.

JOB: CSI 23–3729	DWG: CSI 23–3729 – 1540 STAR TOP ROAD TOPO (RF)
THIS PLAN WAS PREPARED FOR: McINTOSH PERRY CONSULTING ENGINEERS	
EXAMINED BY: J.G.	DRAFTED BY: R.F., S.R.

McINTOSH PERRY SURVEYING INC.
3240 Drummond Con. 5A, R.R. #7, Perth, ON K7H 3C3
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

LOCATION KEY



ZONING INFORMATION

PER THE CITY OF OTTAWA ZONING BY-LAW 2008-250 CONSOLIDATION

LEGAL DESCRIPTION:
PART OF LOT 25, CONCESSION 2 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

PROPOSAL:
NEW 8,369 m² [90,051 ft²] SINGLE STOREY BUILDING.

ZONING:

DESIGNATION: (IL) LIGHT INDUSTRIAL

ZONING PROVISIONS (PER TABLE 203):
- LOT AREA (MIN.) = 2,000 m²
  ACTUAL LOT AREA = 30,051 m²
- LOT WIDTH (MIN.) = NO MINIMUM
  ACTUAL FRONTAGE = 73 m
- SETBACKS (MIN.)
  - FRONT = 7.5 m
  - INT. SIDE = 7.5 m
  - REAR = 7.5 m
- FLOOR SPACE INDEX (MAX.) = 2
  ACTUAL INDEX = < 2
- LANDSCAPED MIN. WIDTHS = 3m ABUTTING STREETS
  = NO MIN. ELSEWHERE
- LOT COVERAGE = 65% MAX.
  ACTUAL LOT COVERAGE = 29.9 % (8,993 m²)
- MAX. BUILDING HEIGHT = 15 m
  ACTUAL HEIGHT = 11.02 m

LOADING REQUIREMENTS:
(PER TABLE 113A UNDER PART 4)

BASED ON THE GROSS FLOOR AREA OF THE BUILDING, A MINIMUM OF 1 LOADING SPACE IS REQUIRED.

GROSS FLOOR AREAS BY USE (for the purpose of parking calculations)

GROUND FLOOR	
WAREHOUSE	7,861 m²
OFFICE AREA	508 m²
MEZZANINE	
OFFICE	508 m²

PARKING:
(PER TABLE 101 UNDER PART 4)

ROW N95 - WAREHOUSE REQUIRES 0.8 PARKING SPACES PER 100m² OF GROSS FLOOR AREA FOR THE FIRST 5,000 m², AFTER-WHICH 0.1 PARKING SPACES ARE REQUIRED PER 100m² BEYOND 5,000m² OF GROSS FLOOR AREA. PARKING SPACES UNDER THIS SECTION RECOGNIZE ONLY THOSE WHICH ARE WITHIN THE PROPERTY BOUNDARY.

REQUIRED: 52 SPACES

ROW N59 - OFFICE USE REQUIRES 2.4 PARKING SPACES PER 100m² OF GROSS FLOOR AREA. PARKING SPACES UNDER THIS SECTION RECOGNIZE ONLY THOSE WHICH ARE WITHIN THE PROPERTY BOUNDARY.

REQUIRED: 25 SPACES

TOTAL REQUIRED: 77 SPACES

EXISTING SPACES: 26
NEW SPACES: 53
TOTAL PROVIDED: 109 SPACES

BARRIER-FREE PARKING:
(PER SECTION 111 UNDER PART C OF BY-LAW No. 2017-301):

RESERVED BARRIER-FREE PARKING SPACES:
REQUIRED: 2 SPACES
PROVIDED: 2 SPACES

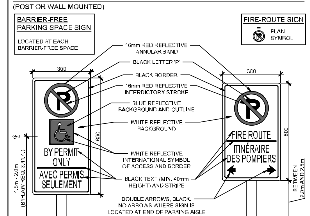
SIGNAGE FOR BARRIER-FREE PARKING SHALL COMPLY WITH SECTION 113 UNDER PART C OF BY-LAW No. 2017-301.

BICYCLE PARKING:
(PER SECTION 111 UNDER PART C OF BY-LAW No. 2017-301):

OFFICE: 1 PER 250m² GFA = 5 SPACES
WAREHOUSE: 1 PER 2000m² GFA = 4 SPACES

VERTICAL PARKING LOT SIGNAGE

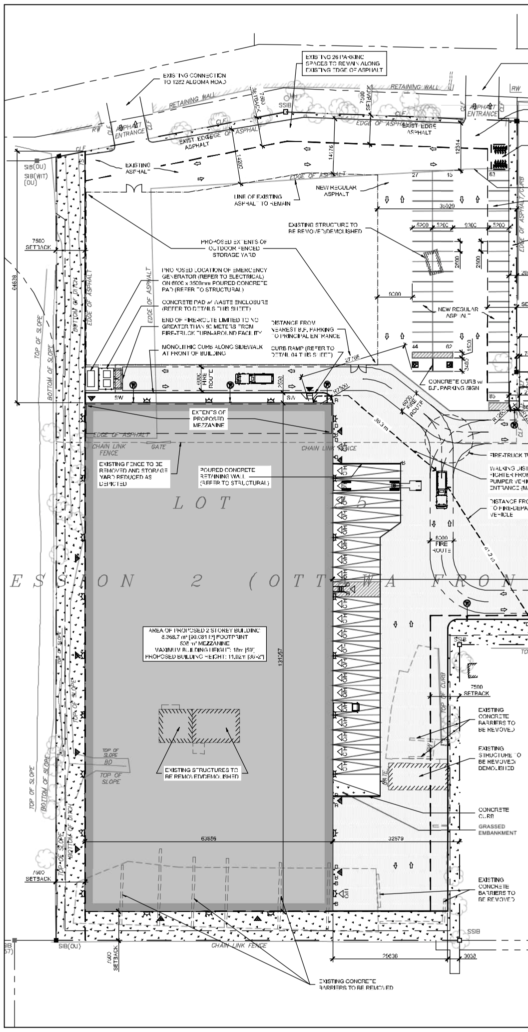
(POST OR WALL MOUNTED)



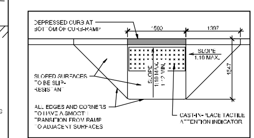
SITE PLAN LEGEND

- PROPERTY LINE
- PROPERTY MARKERS
- SETBACK LINE
- FIRE ROUTE LINES
- NEIGHBOURING PROPERTY LINE
- FENCELINE
- FIRE HYDRANT
- 1525 x 1525mm BARRIER-FREE PARKING PAVEMENT MARKING
- EXTENTS OF EXISTING BUILDINGS/STRUCTURES
- EXTENTS OF PROPOSED BUILDING
- LANDSCAPED AREA (REFER TO LANDSCAPE DRAWINGS)
- HEAVY DUTY ASPHALT (REFER TO CIVIL)
- CONCRETE SIDEWALK
- BARRIER-FREE CURB RAMP w/ TACTILE ATTENTION INDICATORS
- APPROXIMATE LOCATION AND CROWN OF NEW AND EXISTING VEGETATION (REFER TO CIVIL DRAWINGS FOR SPECIES)
- PRINCIPAL BUILDING ENTRANCES
- EMERGENCY EXITS
- SECONDARY ACCESS DOORS AND/OR OVERHEAD DOORS (O/H)
- "E" = EXISTING
- 1500mm HIGH CONCRETE-FILLED METAL BOLLARD SET INTO CONCRETE BASE TO DEPTH AS SPECIFIED BY STRUCTURAL ENGINEER. PAINTED HAVIS YELLOW.
- TRAFFIC FLOW
- FIRE ROUTE/NO PARKING SIGNAGE - INSTALLED MAX. 25m ALONG ROUTE (SEE DETAIL THIS SHEET)
- EXTERIOR WALL MOUNTED LIGHT PACKS (REFER TO ARCHITECTURAL ELEVATIONS AND ELECTRICAL ENGINEER'S DRAWINGS)

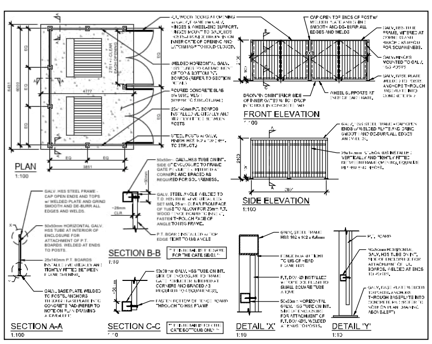
03 SP-A01 GENERAL INFO
SCALE: 1:500



01 SP-A01 PROPOSED SITE PLAN
SCALE: 1:500



04 SP-A01 CURB RAMP DETAIL
SCALE: 1:50



02 SP-A01 WASTE ENCLOSURE DETAILS
SCALE: AS NOTED

DEIMLING
ARCHITECTURE & INTERIOR DESIGN

BBS CONSTRUCTION (Ontario) LTD.

BOONE

North

Revisions

No.	By	Description	Date
03	JF	ISSUED FOR SITE PLAN CONTROL	01 AUG 2023
02	JF	ISSUED FOR REVIEW AND COORDINATION	25 JUL 2023
01	JF	ISSUED FOR REVIEW AND COORDINATION	29 JUN 2023

Project
BOONE PLUMBING
NEW WAREHOUSE

1540 STAR TOP ROAD, OTTAWA, ONTARIO

Drawing
PROPOSED SITE PLAN

Scale AS NOTED
Drawn J.F.
Checked J.F. / C.D.

Stamp
ONTARIO ASSOCIATION OF ARCHITECTS
CHRISTOPHER LEE DEIMLING
LICENCE
6238

Project No. 23-128
Date JUNE 2023
Drawing No. SP-A01

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

WATER DEMAND CALCULATIONS

PROJECT: New Warehouse Building
LOCATION: 1560 Startop Rd, Gloucester, ON
CLIENT: BBS Construction Ltd.

McINTOSH PERRY

LOCATION	RESIDENTIAL UNITS									RESIDENTIAL DEMANDS								INDUSTRIAL/AMENITY DEMANDS									TOTAL DEMANDS		
	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
	UNIT TYPES							AREA	POPULATION	PEAKING FACTORS		AVERAGE DAY FLOW Q(a)		MAX DAY FLOW Q(max)		PEAK HOURLY FLOW Q(h)		AREA	PEAKING FACTORS		AVERAGE DAY FLOW Q(a)		MAX DAY FLOW Q(max)		PEAK HOURLY FLOW Q(h)			
1540 Star Top Road	SF	SD	TH	1BR	2BR	3BR	STU.	(ha)		MAX DAY	PEAK HOUR	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(ha)	MAX DAY	PEAK HOUR	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	Average Day (L/s)	Max Day (L/s)	Peak Hour (L/s)
Proposed Industiral Building																		3.00	1.5	2.7	1.215	0.073	1.823	0.11	3.281	0.20	1.22	1.82	3.28
TOTALS																		3.0			1.2	0.073	1.8	0.11	3.3	0.20	1.22	1.82	3.28

Design Parameters:

Single Family	3.4	p/p/u
TH/SD	2.7	p/p/u
1 Bed/Studio	1.4	p/p/u
2 Bedroom	2.1	p/p/u
3 Bedroom	3.1	p/p/u
Studio (Avg.)	1.8	p/p/u
Commercial	28000	L/ha/d
Industrial - Light	35000	

Notes:

1. Domestic Flow: 280 L/(cap day)
2. Peaking factors based on 501-3000 population

Q (a) = Average Daily Flow
Q (max) = Maximum Daily Flow — Q (max) = Q(a) * Peaking Factor
Q (h) = Peak Hour Flow — Q (h) = Q(a) * Peaking Factor
Q (min) = Night Minimum Hour Flow — Q (min) = Q(a) * Peaking Factor

REF: CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

Designed: M. Raper
Checked: C. Melanson
Project No.: CCO-23-3725

Ontario Building Code 2006 - Fire Flow Calculations

Building No. / Type: 1560 Star Top Road , 3-Storey Warehouse

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

Water Supply for Fire-Fighting

A. Determine the Major Occupancy Classification of the Building

Refer to OBC Table 3.1.2.1:

Input:	F3	*Low hazard industrial occupancies*

B. Determine the Construction Type & Water Supply Coefficient

Choose the building construction type:

Input:	1	*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*

Resulting Water Supply Coefficient (From Table 1): **K =** **12**

C. Determine Building Volume

Floor No.		Area (m^2)	Floor Height (m)	Floor Volume (m^3)	Total Building Volume (m^3)
1	=	8368.7	11.0	92056	92056
		Input:			

D. Determine Spatial Coefficient Due to Exposures

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

Exposure Side		Exposure Distance (m)	Spatial Coefficient	Total Spatial Coefficient $S_{tot} = 1.0 + [S_{north} + S_{south} + S_{east} + S_{west}]$
S_{north}	=	126.0	0	1
S_{east}	=	66.0	0	
S_{south}	=	39.5	0	
S_{west}	=	152.0	0	
		Input:		

Ontario Building Code 2006 - Fire Flow Calculations

E. Determine Required On-Site Water Volume

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

$$Q = K \times V \times S_{tot}$$

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

S_{tot} = total of spatial coefficient values from the property line exposures on all sides

Q = 1,104,672 L

F. Determine Required On-Site Water Flow Rate

Is the building one-storey with building area not exceeding 600m^2 ? **Input:** No

Minimum Flow Rate (from Table 2) =	9000 L/min	(Q > 270,000 L)

115 Walgreen Road, R.R.3. Carp, ON K0A 1L0 | T. 613-836-2184 | F. 613-836-3742
info@mcintoshperry.com | www.mcintoshperry.com

McINTOSH PERRY

Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 2020

Building No. / Type: 1560 Star Top Road, 3-Storey Warehouse

An estimate of the Fire Flow required for a given fire area may be estimated by:

RFF = 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 Construction Coefficient (C)

Choose the construction type and coefficient to be used in the required fire flow formula:

C = 1.5	**Type V** Wood Frame Construction
= 0.8	**Type IV-A** Mass Timber Construction
= 0.9	**Type IV-B** Mass Timber Construction
= 1.0	**Type IV-C** Mass Timber Construction
= 1.5	**Type IV-D** Mass Timber Construction
= 1.0	**Type III** Ordinary Construction
= 0.8	**Type II** Noncombustible Construction
= 0.6	**Type I** Fire Resistive Construction

Input: C = Type II Noncombustible Construction = 0.8

B. Determine Total Effective Floor Area (A)

Input building floor areas:

Floor No.		Area (m^2)	% Used	Area Used (m^2)	Total (m^2)
1	=	8853.7 Input:	100%	8853.7	8853.7

C. Determine Required Fire Flow

RFF = **220 x C x √A** = 16561 L/min
= **17000 L/min** *(Rounded to nearest 1,000 L/min)*

D. Determine Increase or Decrease Based on Occupancy Contents Adjustment Factor

Choose the combusitbility of building contents:

Option		Input:	Factor	Fire Flow Change	Adjusted RFF
Non-Combustible	-25%				
Limited Combustible	-15%				
Combustible	0%	**Non-Combustible**	**-25%**	**-4250 L/min**	**12750 L/min**
Free Burning	15%				
Rapid Burning	25%				

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info@mcintoshperry.com | www.mcintoshperry.com

Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 2020

E. Determine the Decrease for Automatic Sprinkler Protection, if Applicable

Choose the sprinkler options that apply:

Option		Applicable?	Factor	Fire Flow Change	Adjusted RFF
Automatic sprinkler conforms to NFPA 13	-30%	Yes	-30%	-3825 L/min	8925 L/min
Standard water supply for system and Fire Department hose line	-10%	Yes	-10%	-1275 L/min	7650 L/min
Fully supervised system	-10%	Yes	-10%	-1275 L/min	6375 L/min

F. Determine the Total Increase for Exposures

Choose separation distance and wall lengths:

Subject Side	Separation Distance (m)	Exposed Wall Type	Wall Length (m)	No. of Storeys	Length-Height Factor	Charge (%) (See FUS-Table 6)	Total Charge (%)	Fire Flow Change (L/min)	Adjusted RFF (L/min)
North	126	Type II	66.86	3	200.58	0%	0%	0	6375
South	39.45	Type II	63.86	3	191.58	0%			
East	66	Type II	130.135	3	390.405	0%			
West	152	Type II	130.135	3	390.405	0%			
			Input:						

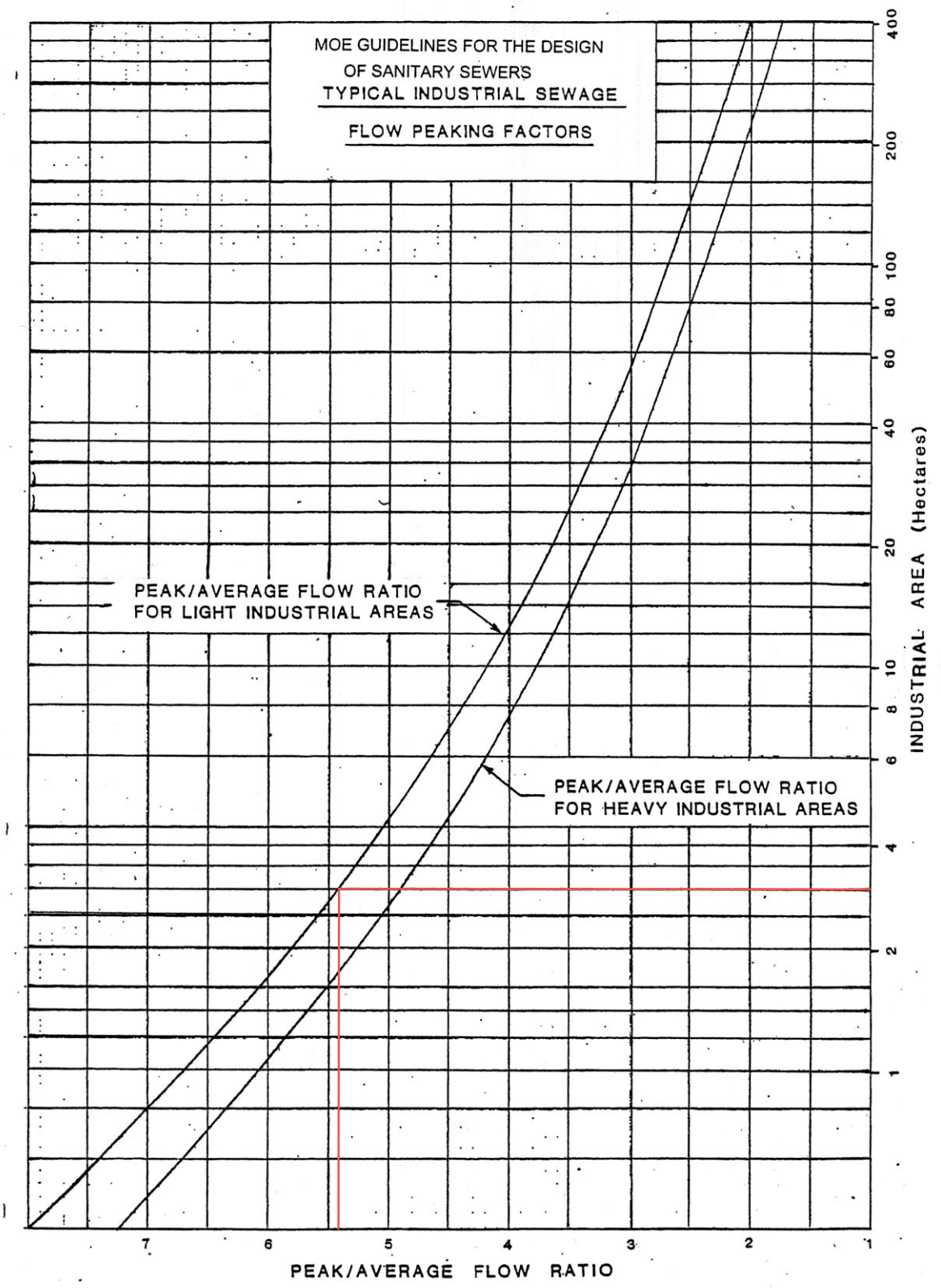
G. Determine the Total Required Fire Flow

Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	6000 L/min
Total Required Fire Flow (L/sec) =	100 L/sec
Does the 10,000 L/min (167 L/sec) RFF limit apply, based on "TECHNICAL BULLITEN ISTB-2018-02"? =	No
Resultant Total Required Fire Flow (L/sec) =	**100 L/sec**

APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

APPENDIX 4-B PEAKING FACTOR FOR INDUSTRIAL AREAS



McINTOSH PERRY

CCO-23-3725 - 1560 Star Top Road - Sanitary Demands

Project:	1560 Star Top Road
Project No.:	CCO-23-3725
Designed By:	R.R.R.
Checked By:	C.J.M.
Date:	August 4, 2023

Site Area	3.00	Gross ha		
Duplex	0		0.00	Persons per unit
Apartment	0		0.00	Persons per unit

Total Population	0	Persons
Commercial Area	0.00	m^2
Amenity Space	0.00	m^2

DESIGN PARAMETERS

Light Industrial Peaking Factor	5.4	*Check Ottawa Sewer Design Guidelines Appendix 4B
Institutional/Commercial Peaking Factor	1.5	*Check technical bulleting (Either use 1.0 or 1.5)
Residential Peaking Factor	3.80	** Using Harmon Formula =* 1+(14/(4+P^0.5))*0.8
		where P = population in thousands, Harmon's Correction Factor = 0.8
Mannings coefficient (n)	0.013	
Demand (per capita)	280	L/day
Infiltration allowance	0.33	L/s/Ha

EXTRANEOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.15
Wet	0.84
Total	**0.99**

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d		0.00
Industrial - Light**	35,000	L/gross ha/d	3.00	1.22
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m² /d)		0.00
Hospital	900	L/(bed/day)		0
Schools	70	L/(Student/d)		0
Trailer Parks no Hook-Ups	340	L/(space/d)		0
Trailer Park with Hook-Ups	800	L/(space/d)		0
Campgrounds	225	L/(campsite/d)		0
Mobile Home Parks	1,000	L/(Space/d)		0
Motels	150	L/(bed-space/d)		0
Hotels	225	L/(bed-space/d)		0
Office	75	L/7.0m^2/d		0
Tourist Commercial	28,000	L/gross ha/d		0
Other Commercial	28,000	L/gross ha/d		0

AVERAGE RESIDENTIAL FLOW	0.00	L/s
PEAK RESIDENTIAL FLOW	0.00	L/s
AVERAGE ICI FLOW	0.00	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.00	L/s
PEAK INDUSTRIAL FLOW	6.56	L/s
TOTAL PEAK ICI FLOW	6.56	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	1.37	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	6.71	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	7.55	L/s

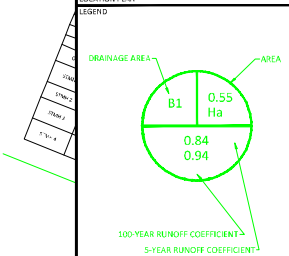
** PEAK INDUSTRIAL FLOW PER CITY OF OTTAWA SEWER DESIGN GUIDELINES APPENDIX 4B

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY

LOCATION PLAN

LEGEND



FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR SITE LAN APPLICATION	2023.08.04

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

SCALE 1:500
0 10 20 30 40 50 Metres

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

Client:
BBS CONSTRUCTION
1681 WOODWARD DRIVE
OTTAWA, ON. K2C 0P9

Project:
BOONE PLUMBING WAREHOUSE
1560 STAR TOP ROAD

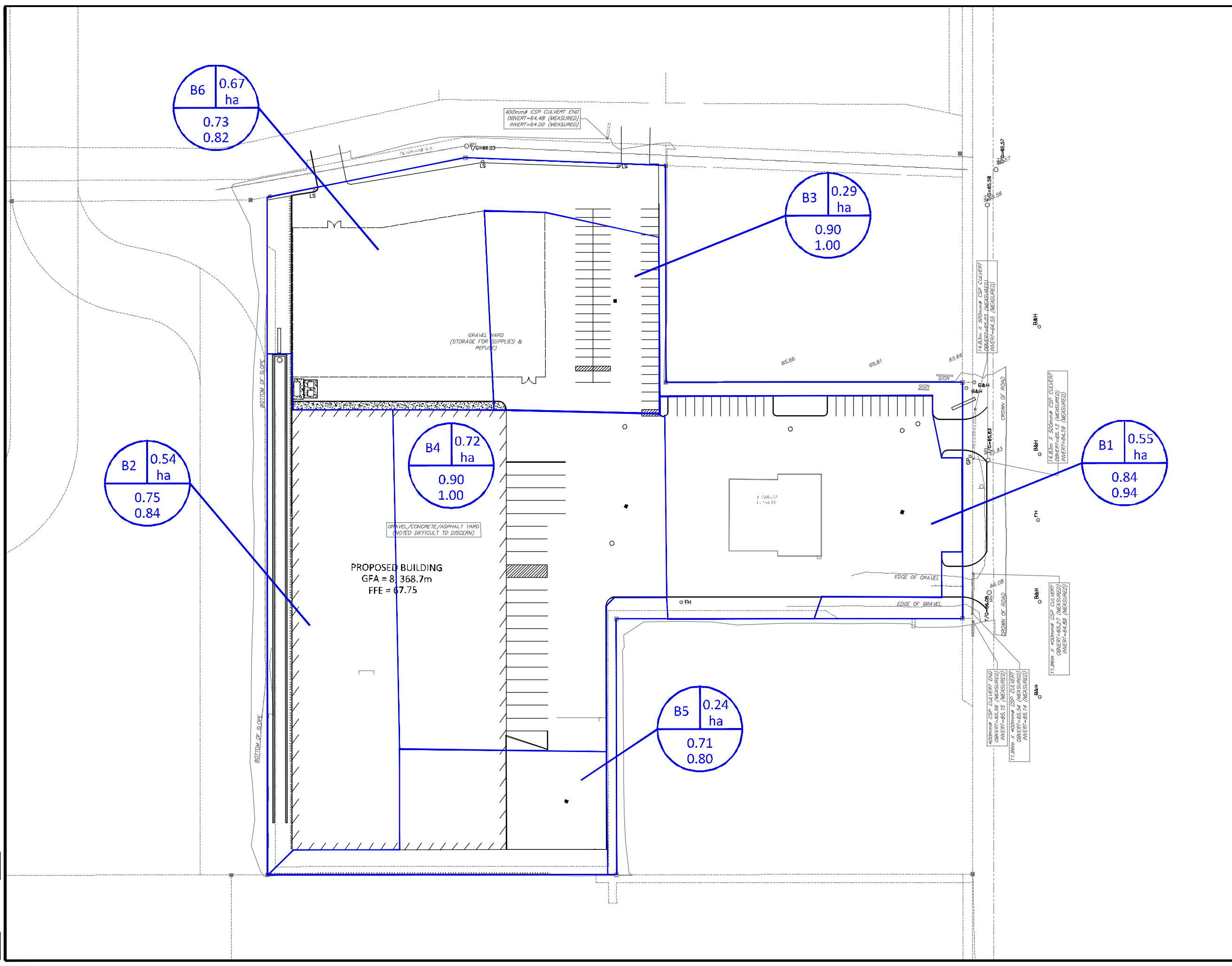
Drawing title:
PRE DEVELOPMENT DRAINAGE PLAN

Scale: 1:500	Project No./Dwg. No.: CCO-23-3725
Drawn by: M.C	
Checked by: A.B.	Drawing Number: SS
Approved by: M.C	

D07-12-XX-XXXX
4XXXX

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



LOCATION PLAN

LEGEND

DRAINAGE AREA — B1 — 0.55 Ha — AREA
0.84
0.94
100-YEAR RUNOFF COEFFICIENT
5-YEAR RUNOFF COEFFICIENT

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR SITE LAN APPLICATION	2023.08.04

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

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

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

Stamp:

Client:
BBS CONSTRUCTION
1805 WOODWARD DRIVE
OTTAWA, ON K2C 0P9

Project:
BOONE PLUMBING WAREHOUSE
1560 STAR TOP ROAD

Drawing Title:
POST DEVELOPMENT DRAINAGE PLAN

Scale:	1:500	Project Number:	CCO-23-3725
Drawn By:	M.R.		
Checked By:	A.B.	Drawing Number:	SS
Designed By:	M.R.		

D07-12-XX-XXXX

#XXXXX

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CCO-23-3725 - Boone Plumbing - Runoff Calculations

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 5-Year	C_{AVG} 100-Year
A1	0.98	0.00	0.90	8,229.86	0.50	1,565.64	0.20	0.45	0.57
A2	2.02	0.00	0.90	19,075.60	0.50	1,150.36	0.20	0.48	0.60

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	0.98	0.45	0.57	16	80.5	137.5	99.05	211.65
A2	2.02	0.48	0.60	16	80.5	137.5	218.49	466.89
Total	**3.00**						**317.53**	**678.54**

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	0.55	5,009.26	0.90	0.00	0.60	465.51	0.20	0.84	0.94	Roof
B2	0.54	4,184.58	0.90	0.00	0.60	1,180.03	0.20	0.75	0.84	Restricted
B3	0.29	2,887.49	0.90	0.00	0.60	0.00	0.20	0.90	1.00	Restricted
B4	0.72	7,201.13	0.90	0.00	0.60	0.00	0.20	0.90	1.00	Restricted
B5	0.24	1,777.21	0.90	0.00	0.60	641.19	0.20	0.71	0.80	Restricted
B6	0.67	5,077.16	0.90	0.00	0.60	1,609.35	0.20	0.73	0.82	Unrestricted

Post-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		
B1	0.55	0.84	0.94	10	104.2	178.6	133.28	254.43	EAST LOT	Roof
B2	0.54	0.75	0.84	10	104.2	178.6	115.92	222.36	ROOF/POND	Restricted
B3	0.29	0.90	1.00	10	104.2	178.6	75.27	143.33	N POND	Restricted
B4	0.72	0.90	1.00	10	104.2	178.6	187.73	357.46	M POND	Restricted
B5	0.24	0.71	0.80	10	104.2	178.6	50.04	96.18	S POND	Restricted
B6	0.67	0.73	0.82	10	104.2	178.6	141.68	272.00		Unrestricted
Total	**3.00**						**845.61**	**1,617.77**		

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I 5-Year	I 100-Year	Q 5-Year	Q 100-Year
A1	0.98	0.45	0.57	16	80.5	137.5	99.05	211.65
A2	2.02	0.48	0.60	16	80.5	137.5	218.49	466.89
Total	**3.00**						**317.53**	**678.54**

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	133.28	254.43	46.72	90.00	54.15	102.25	54.15	102.25	RESTRICTED
B2	115.92	222.36	20.66	40.00	70.81	133.98	109.70	211.00	RESTRICTED
B3	75.27	143.33	91.07	175.00	107.86	203.19	109.70	211.00	RESTRICTED
B4	187.73	357.46							RESTRICTED
B5	50.04	96.18	14.44	28.00	23.17	44.07	24.87	46.39	RESTRICTED
B6	141.68	272.00	141.68	272.00	x	x	x	x	Unrestricted
Total	**703.93**	**1345.77**	**314.56**	**605.00**	**255.99**	**483.50**	**298.42**	**570.64**	

Storage Requirements for Area B1

2-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)
0	167.2	213.91	33.89	180.02	0.00
5	103.6	132.49	33.89	98.59	29.58
10	76.8	98.25	33.89	64.35	38.61
15	61.8	79.01	33.89	45.12	40.61
20	52.0	66.56	33.89	32.66	39.20
25	45.2	57.78	33.89	23.88	35.83
30	40.0	51.22	33.89	17.33	31.19
35	36.1	46.13	33.89	12.23	25.69
40	32.9	42.04	33.89	8.15	19.55
45	30.2	38.68	33.89	4.79	12.93
				Maximum Storage Required 2-Year (m^3) =	40.61

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)
0	230.5	294.83	46.72	248.12	0.00
5	141.2	180.60	46.72	133.88	40.16
10	104.2	133.28	46.72	86.57	51.94
15	83.6	106.89	46.72	60.17	54.15
20	70.3	89.87	46.72	43.15	51.78
25	60.9	77.90	46.72	31.18	46.77
				Maximum Storage Required 100-Year (m^3) =	54.15

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)
0	398.6	568.00	90.00	478.00	0.00
5	242.7	345.84	90.00	255.84	76.75
10	178.6	254.43	90.00	164.43	98.66
15	142.9	203.61	90.00	113.61	102.25
20	120.0	170.92	90.00	80.92	97.10
25	103.8	147.97	90.00	57.97	86.96
30	91.9	130.91	90.00	40.91	73.63
				Maximum Storage Required 100-Year (m^3) =	102.25

IPEX LMF 74

Storage Occupied In Area B1

2-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 4	582.06	0.220	43.24
		Total	**43.24**

Storage Available (m^3) =	**43.24**
Storage Required (m^3) =	**40.61**

*Pond volumes derived in CAD

5-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 4	691.16	0.240	55.96
		Total	**55.96**

Storage Available (m^3) =	**55.96**
Storage Required (m^3) =	**54.15**

*Pond volumes derived in CAD

100-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 4	1074.68	0.300	108.51
		Total	**108.51**

Storage Available (m^3) =	**108.51**
Storage Required (m^3) =	**102.25**

*Pond volumes derived in CAD

Storage Requirements for Area B2

2-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	167.2	186.05	14.99	171.06	0.00
5	103.6	115.23	14.99	100.24	30.07
10	76.8	85.45	14.99	70.46	42.28
15	61.8	68.72	14.99	53.73	48.36
20	52.0	57.89	14.99	42.90	51.48
25	45.2	50.25	14.99	35.26	52.89
30	40.0	44.55	14.99	29.56	53.21
35	36.1	40.12	14.99	25.13	52.77
40	32.9	36.56	14.99	21.57	51.77
45	30.2	33.64	14.99	18.65	50.36
50	28.0	31.20	14.99	16.21	48.62
55	26.2	29.12	14.99	14.13	46.61
				Maximum Storage Required 2-Year (m^3) =	**53.21**

5-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	230.5	256.43	20.66	235.77	0.00
5	141.2	157.07	20.66	136.41	40.92
10	104.2	115.92	20.66	95.26	57.16
15	83.6	92.96	20.66	72.30	65.07
20	70.3	78.16	20.66	57.50	69.00
25	60.9	67.75	20.66	47.09	70.63
30	53.9	60.00	20.66	39.34	70.81
35	48.5	53.98	20.66	33.32	69.97
40	44.2	49.16	20.66	28.50	68.39
				Maximum Storage Required 100-Year (m^3) =	**70.81**

100-Year Storm Event

Tc (min)	I (mm/hr)	B2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	398.6	496.41	40.00	456.41	0.00
5	242.7	302.24	40.00	262.24	78.67
10	178.6	222.36	40.00	182.36	109.42
15	142.9	177.95	40.00	137.95	124.15
20	120.0	149.38	40.00	109.38	131.25
25	103.8	129.32	40.00	89.32	133.98
30	91.9	114.41	40.00	74.41	133.93
35	82.6	102.84	40.00	62.84	131.96
40	75.1	93.58	40.00	53.58	128.59
45	69.1	85.99	40.00	45.99	124.17
50	64.0	79.64	40.00	39.64	118.93
55	59.6	74.25	40.00	34.25	113.03
60	55.9	69.61	40.00	29.61	106.58
35	82.6	102.84	40.00	62.84	131.96
40	75.1	93.58	40.00	53.58	128.59
45	69.1	85.99	40.00	45.99	124.17
50	64.0	79.64	40.00	39.64	118.93
				Maximum Storage Required 100-Year (m^3) =	**133.98**

IPEX LMF 74

Storage Occupied In Area B2

2-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
LSCB 1	244.69	0.440	53.58
		Total	**53.58**

Storage Available (m^3) =	**53.58**
Storage Required (m^3) =	**53.21**

*Pond volumes derived in CAD

5-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
LSCB 1	284.14	0.510	72.09
		Total	**72.09**

Storage Available (m^3) =	**72.09**
Storage Required (m^3) =	**70.81**

*Pond volumes derived in CAD

100-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
LSCB 1	378.75	0.700	135.05
		Total	**135.05**

Storage Available (m^3) =	**135.05**
Storage Required (m^3) =	**133.98**

*Pond volumes derived in CAD

Storage Requirements for Area B2-B4

2-Year Storm Event

Tc (min)	I (mm/hr)	B2-B4 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	167.2	422.10	66.07	356.03	0.00
5	103.6	261.43	66.07	195.36	58.61
10	76.8	193.87	66.07	127.80	76.68
15	61.8	155.91	66.07	89.84	80.86
20	52.0	131.34	66.07	65.26	78.32
25	45.2	114.01	66.07	47.94	71.91
30	40.0	101.08	66.07	35.00	63.01
35	36.1	91.02	66.07	24.95	52.39
40	32.9	82.95	66.07	16.88	40.52
				Maximum Storage Required 2-Year (m^3) =	80.86

5-Year Storm Event

Tc (min)	I (mm/hr)	B2-B4 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	230.5	581.78	91.07	490.71	0.00
5	141.2	356.36	91.07	265.29	79.59
10	104.2	263.00	91.07	171.93	103.16
15	83.6	210.91	91.07	119.85	107.86
20	70.3	177.33	91.07	86.26	103.51
25	60.9	153.71	91.07	62.65	93.97
30	53.9	136.12	91.07	45.06	81.10
35	48.5	122.47	91.07	31.40	65.94
				Maximum Storage Required 100-Year (m^3) =	107.86

100-Year Storm Event

Tc (min)	I (mm/hr)	B2-B4 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)	
0	398.6	1,117.98	175.00	942.98	0.00	IPEX LMF xx
5	242.7	680.70	175.00	505.70	151.71	
10	178.6	500.79	175.00	325.79	195.48	
15	142.9	400.77	175.00	225.77	203.19	
20	120.0	336.42	175.00	161.42	193.70	
25	103.8	291.25	175.00	116.25	174.38	
30	91.9	257.66	175.00	82.66	148.78	
35	82.6	231.60	175.00	56.60	118.87	
40	75.1	210.76	175.00	35.76	85.81	
45	69.1	193.66	175.00	18.66	50.39	
				Maximum Storage Required 100-Year (m^3) =	203.19	

Storage Occupied In Area B2-B4

2-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 1	491.07	0.220	36.47
CB 2	637.37	0.220	48.62
		Total	**85.09**

Storage Available (m^3) =	**85.09**
Storage Required (m^3) =	**80.86**

*Pond volumes derived in CAD

5-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 1	583.17	0.240	47.19
CB 2	753.39	0.240	62.51
		Total	**109.70**

Storage Available (m^3) =	**109.70**
Storage Required (m^3) =	**107.86**

*Pond volumes derived in CAD

100-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 1	906.92	0.300	91.54
CB 2	1159.53	0.300	119.46
		Total	**211.00**

Storage Available (m^3) =	**211.00**
Storage Required (m^3) =	**203.19**

*Pond volumes derived in CAD

Storage Requirements for Area B5

2-Year Storm Event

Tc (min)	I (mm/hr)	B5 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	167.2	80.32	10.47	69.84	0.00
5	103.6	49.75	10.47	39.27	11.78
10	76.8	36.89	10.47	26.42	15.85
15	61.8	29.67	10.47	19.19	17.27
20	52.0	24.99	10.47	14.52	17.42
25	45.2	21.69	10.47	11.22	16.83
30	40.0	19.23	10.47	8.76	15.77
35	36.1	17.32	10.47	6.85	14.37
40	32.9	15.78	10.47	5.31	12.75
Maximum Storage Required 2-Year (m^3) =					17.42

5-Year Storm Event

Tc (min)	I (mm/hr)	B5 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	230.5	110.70	14.44	96.27	0.00
5	141.2	67.81	14.44	53.37	16.01
10	104.2	50.04	14.44	35.61	21.36
15	83.6	40.13	14.44	25.70	23.13
20	70.3	33.74	14.44	19.31	23.17
Maximum Storage Required 100-Year (m^3) =					23.17

100-Year Storm Event

Tc (min)	I (mm/hr)	B5 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	398.6	214.71	28.00	186.71	0.00
5	242.7	130.73	28.00	102.73	30.82
10	178.6	96.18	28.00	68.18	40.91
15	142.9	76.97	28.00	48.97	44.07
20	120.0	64.61	28.00	36.61	43.93
25	103.8	55.93	28.00	27.93	41.90
30	91.9	49.48	28.00	21.48	38.67
35	82.6	44.48	28.00	16.48	34.61
Maximum Storage Required 100-Year (m^3) =					44.07

IPEX LMF 74

Storage Occupied In Area B5

2-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 3	253.32	0.210	19.40
		Total	**19.40**

Storage Available (m^3) =	**19.40**
Storage Required (m^3) =	**17.42**

*Pond volumes derived in CAD

5-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 3	294.08	0.230	24.87
		Total	**24.87**

Storage Available (m^3) =	**24.87**
Storage Required (m^3) =	**23.17**

*Pond volumes derived in CAD

100-Year Storm Event

Pond Storage			
Location	Area*	Depth	Volume (m^3)
CB 3	425.61	0.290	46.39
		Total	**46.39**

Storage Available (m^3) =	**46.39**
Storage Required (m^3) =	**44.07**

*Pond volumes derived in CAD

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1	**184**	**1.40**	16	14

Therefore, a Tc of 10 can be used

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

c= Balanced Runoff Coefficient

L= Length of drainage area

S= Average slope of watershed

STORM SEWER DESIGN SHEET

PROJECT: CCO-23-3725
LOCATION: 1560 Star Top Road
CLIENT: BBS Construction

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	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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
N Pond	B3	CB 1	STMH 1	0.90	0.29	0.26	0.26	10.00	0.59	10.59	104.19	122.14	178.56	75.60	88.62	129.56		75.60	121.33	37.57	375			0.44	1.064	45.73	37.68%
M Pond	B4	CB 2	STMH 1	0.90	0.72	0.65	0.65	10.00	0.28	10.28	104.19	122.14	178.56	187.70	220.03	321.66		187.70	230.39	23.89	450			0.60	1.403	42.69	18.53%
Combined Flow	B3/B4	STMH 1	STMH 3	0.90	1.01	0.00	0.91	10.59	0.50	11.09	101.18	118.60	173.35	255.69	299.70	438.07	91.07	255.69	148.72	27.00	450			0.25	0.506	148.72	38.76%
S Pond	B5	CB 3	STMH 2	0.71	0.24	0.17	0.17	10.00	1.74	11.74	104.19	122.14	178.56	49.36	57.86	84.59	14.44	49.36	24.19	78.05	200			0.50	0.746	9.75	40.32%
SPond	B5	STMH 2	STMH 3	0.71	0.00	0.00	0.17	11.74	1.22	12.96	95.80	112.26	164.05	45.28	53.06	77.53	14.44	45.28	43.87	63.14	250			0.50	0.866	29.43	67.08%
Flows (B3/B4/B5)	B3/B4/B5	STMH 3	STMH 4	0.90	0.10	0.00	1.08	12.96	0.72	13.68	90.79	106.36	155.38	272.33	319.04	466.08	105.51	272.33	126.19	33.31	450			0.18	0.769	20.68	16.38%
E Pond	B1	CB 4	STMH4	0.84	0.55	0.46	0.46	10.00	0.51	10.51	104.19	122.14	178.56	133.82	156.87	229.33	46.72	133.82	57.95	24.280	300			0.33	0.794	11.23	19.38%
Flows(B1/B3/B4/B5)	Parking Area Total	STMH 4	OGS1	0.00	0.00	0.00	1.54	13.68	0.09	13.78	88.07	103.17	150.69	377.31	441.96	645.57	152.23	377.31	200.65	5.100	525			0.20	0.898	48.42	24.13%
	Parking Area Total	OGS 1	Ex. East Ditch	0.00	0.00		1.54	13.78	0.40	14.18	87.73	102.76	150.10	375.84	440.23	643.03	152.23	375.84	173.76	18.620	525			0.15	0.778	21.53	12.39%
W Pond	B2	CB 5	Ex. West Ditch	0.75	0.54	0.41	0.41	10.00	0.14	10.14	104.19	122.14	178.56	118.76	139.22	203.52	20.66	118.76	86.19	9.65	300			0.73	1.181	65.53	76.03%

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: M.R.
Checked: A.B.
Project No.: CCO-23-3725
Date: 2023.08.03

No.	Revision	Date
1.	Issued for Site Plan Application	2023.08.03

Sheet No: 1 of 1

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

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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 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 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 Background Studies, Standards and References
☐ 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 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	Appendix C
☐ 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	Appendix C, Section 4.2

☐ 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.	Site Servicing Plan (C101)
☐ 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 5.2 Proposed 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)	Section 5.3 Proposed Sanitary Design
☐ 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 Proposed 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 Sewer Design & 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.	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 Sewer Design & 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 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Stormwater Sewer Design & 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.	Site Grading 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 Appendix G
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Sewer Design & 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 6.0 Stormwater Sewer Design & 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 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 Section 10.0 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