SERVICING & STORMWATER MANAGEMENT REPORT
SYSCO TANNIS - FACILITY EXPANSION

Project No.: CP-18-0170

City File No.: D07-12-18-0135

Prepared for:

BBS Construction Ltd.
1805 Woodward Drive
Ottawa, ON K2C 0P9

Prepared by:

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Carp, ON K0A 1L0

September 10th, 2018
Revised: January 10th, 2019

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 Sysco Tannis Facility Expansion, located at 2390 Stevenage 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-18-0170, C101 – Site Grading & Drainage Plan
- CP-18-0170, C102 – Site Servicing Plan
- CP-18-0170, C103 – Sediment & Erosion Control and Noise Berm Improvement Plan

1.2 Site Description

The property is located at 2390 Stevenage Drive. It is described as Part of Lots 3 and 4, Concession 5 (Rideau Front), geographic Township of Gloucester, now City of Ottawa. The land in question covers approximately 6.53ha and is located west of the intersection of Stevenage Drive and Hawthorne Road.

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

The existing site is currently developed as part of the existing Sysco Tannis Facility. There is a large warehouse on site with an asphalt drive aisle and gravel/asphalt parking areas. A portion of the subject property is undeveloped with a variety of grass, shrubs and bush along with some trees. The existing site has storm, sanitary and water services.

The proposed development consists of the addition of 12,160m² of warehouse space and 813m^2 of office space to the existing facility. Parking and drive aisles will be provided throughout the site along with landscaping. There will be two site accesses for the development; both from Stevenage Drive.

2.0 BACKROUND STUDIES

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

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 Annis, O'Sullivan, Vollebekk Ltd. (AOV) and can be found under separate cover.

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

- Geotechnical Investigation - Proposed Warehouse Expansion - 2390 Stevenage Drive completed by Paterson Group Inc., dated July 30th, 2018.
- Phase I Environmental Site Assessment - 2390 and 2410 Stevenage Drive completed by Paterson Group Inc., dated August 7th, 2018.
- Phase II Environmental Site Assessment - 2390 and 2410 Stevenage Drive completed by Paterson Group Inc., dated August 10th, 2018.
- Designated Substance Survey - 2390 and 2410 Stevenage Drive completed by Paterson Group Inc., dated August 13th, 2018.

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on June 21st, 2018 regarding the proposed site. Specific design parameters to be incorporated within this design include the following:

- Pre-development and post-development flows shall be calculated using a time of concentration (Tc) of 20 minutes and 10 minutes, respectively.
- 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.
- Quality control is to be provided for this site.

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 watermain within Stevenage Drive. The existing Sysco Tannis Facility currently has an existing 100mm diameter domestic water service and a 150mm diameter watermain providing the required fire protection with three (3) existing fire hydrants on site.

4.2 Proposed Watermain

The existing 150mm diameter watermain within the subject property will be removed while the existing 100mm diameter water service will remain. A new 300mm diameter PVC watermain is proposed to service the site complete with water valves and a 50mm diameter water service with a water meter and remote meter. In addition to the 300mm diameter watermain, a new 250mm dimeter PVC water service will extend around the rear of the building in the same trench as the watermain from the water meters to the fire pump mechanical room to service the internal sprinkler system. Private hydrants have been proposed on each side of the building within the subject site and will connect to the 300mm diameter watermain. The watermain is designed to have a minimum of 2.4m cover.

The Fire Underwriters Survey 1999 (FUS) method was utilized to determine the required fire flow for the site. The 'C' factor (type of construction) for the FUS calculation was determined to be 1.0 (ordinary type construction). The total floor area ('A' value) for the FUS calculation was determined to be 23,100m^2. The results of the calculations yielded a required fire flow of 15,000L/min. A fire flow of 9,000L/min was calculated using the Ontario Building Code (OBC) requirements. The detailed calculations for the FUS and OBC can be found in Appendix 'C'.

A fire access route has been provided around the existing and proposed buildings, complete with three hydrants and a siamese connection. OBC requirements have been satisfied, the siamese connection and a fire hydrant are within 45m.

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	6.53ha
Other Commercial	28,000L/ha/day
Average Day Demand (L/s)	4.16
Maximum Daily Demand (L/s)	6.24
Peak Hourly Demand (L/s)	11.22
OBC Fire Flow Requirement (L/s)	150.00

FUS Fire Flow Requirement (L/s)	250.00
Max Day + Fire Flow (FUS) (L/s)	261.24

Boundary conditions have been provided by the City of Ottawa for the current conditions and are available in Appendix 'C'. A water model was completed using Bentley's WaterCAD based on the boundary conditions. The results determined that the proposed 300mm watermain can adequately service the proposed development and provide sufficient fire flow since Hydrants H-1, H-2 and H-3 produced available fire flows of 16,912L/min, 20,768L/min and 19,317L/min, respectively. Refer to drawing for more details. The water model results are available in Appendix 'C' of this report.

Prior to connecting to the municipal water distribution system, it is essential to determine whether the system has adequate capacity and that the overall impact to the existing system is minimal. A WaterCAD model was generated to determine the capacity, pressure and size of pipes required to service the proposed site. Three (3) different scenarios were analyzed within the model, namely average day, maximum day + fire flow and peak hourly demands.

When modelling the proposed water distribution system, it was necessary to determine which scenario produced a greater demand: the maximum day + fire flow or peak hourly. It was concluded that the maximum day + fire flow scenario would govern the design process, since it produced the higher demand. A layout of the WaterCAD model has been included in Appendix 'C'.

The normal operating pressure range is anticipated to be 462kPa to 504kPa and will not be less than 275kPa (40psi) or exceed 689kPa (100psi). The proposed watermain will meet the minimum required 20psi (140kPa) at the ground level under maximum day demand and fire flow conditions.

5.0 SANITARY SEWER

5.1 Existing Sanitary Sewer

There is an existing 300mm diameter sanitary sewer within Stevenage Drive. The existing Sysco Tannis Facility is currently serviced with an existing sanitary service. There is also an existing 1200mm diameter sanitary trunk sewer just south of the subject site but no connection to this main is proposed.

5.2 Proposed Sanitary Sewer

A new 200mm diameter gravity sanitary service will be connected to the existing 300mm diameter sanitary sewer within Stevenage Drive. Three (3) sanitary manholes will be installed to service the site. A maintenance manhole (MMH1A) will be installed just inside the property line as per the *City of Ottawa – Sewer Design Guidelines*, October 2012, Clause 4.4.4.7 and City of Ottawa Sewer-Use By-Law 2003-514 (14).

The subject site is a proposed warehouse facility. The total area of the building is 23,100m^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 (6.53ha) will generate a flow of 5.00L/s.

The proposed 200mm diameter gravity sanitary sewers will be installed throughout the subject property with a minimum full flow target velocity (cleansing velocity) of 0.6m/s and a full flow velocity of not more than 3.0m/s. As this may not be feasible on every length of pipe, as the capture area for the uppermost mains in the system is relatively small. This issue has been dealt with by increasing the slopes of the sanitary sewers on the uppermost mains. Design parameters for the site include an infiltration rate of 0.28L/s/ha.

The proposed service for the site will be connected to existing 300mm diameter sanitary sewer within Stevenage Drive. Even though the proposed sanitary flow of 5.00L/s is higher than the existing flow of 2.34L/s coming of the property, it is anticipated that there will be no issues with the additional capacity of 2.66L/s within the existing 300mm diameter sanitary main.

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

6.0 STORM SEWER

6.1 Existing Storm Sewers

There is an existing 600mm diameter storm sewer within Stevenage Drive. The existing Sysco Tannis Facility is currently serviced with an existing storm system within the subject property. There is also an existing 3600mm diameter storm trunk sewer just south of the subject site but no connection to this main is proposed.

6.2 Proposed Storm Sewers

A new sewer system will be extended from the existing 600mm diameter storm sewer within Stevenage 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.

Runoff from the proposed site will be collected and directed towards a dry retention area at the southeast corner of the subject property. Catchbasins are proposed throughout the subject property conveying flow to the dry retention area. The flow will be restricted in MH4 and the required storage for the subject property will be provided within the dry retention area. From the dry retention area the flow is conveyed to the existing 600mm diameter storm sewer within Stevenage Drive. The storm sewers will range from 250mm to 825mm in diameter throughout the subject property.

The storm sewers will be sized for the 5-year minor flow without any restriction. A storm sewer design sheet was created using the rational method and City of Ottawa 5-year storm event. Storm flows in excess of the 5-year event 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 *CP-18-0170 - 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 6.0.

7.0 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 dry retention area located at the southeast corner of the site. The restricted flow will then release into a proposed storm sewer that connects to the existing 600mm storm sewer located within Stevenage Drive. The emergency overland flow route for the proposed site will be directed south towards an adjacent drainage ditch. 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:

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

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 stormwater management facility sized using this method is expected to function as intended.

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

Impervious Area	0.90
Gravel	0.60
Pervious Area	0.20

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

As per the pre-consultation meeting with the City of Ottawa the time of concentration (Tc) used for pre-development shall be calculated using a Tc of 20 minutes and post-development flows shall be calculated using a Tc of 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	6.53	0.45	0.53	427.02	576.55	1,147.62
Total	**6.53**			**427.02**	**576.55**	**1,147.62**

See *CP-18-0170 - 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 *CP-18-0170 - 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	1.43	0.90	1.00	274.28	372.09	708.52
B2	0.08	0.90	1.00	15.62	21.19	40.35
B3	0.35	0.83	0.93	62.10	84.25	160.88
B4	0.31	0.82	0.92	54.30	73.67	140.75
B5	0.12	0.88	0.98	23.33	31.65	60.33
B6	0.23	0.82	0.92	40.25	54.60	104.31
B7	0.66	0.80	0.89	112.29	152.33	291.40
B8	0.05	0.34	0.39	3.47	4.71	9.51
B9	0.43	0.89	0.99	81.18	110.13	209.77
B10	0.34	0.82	0.91	60.43	81.98	156.64
B11	0.10	0.65	0.73	14.43	19.58	37.80
B12	0.31	0.90	1.00	60.21	81.68	155.56
B13	1.46	0.75	0.84	233.84	317.23	608.40
B14	0.65	0.20	0.25	27.88	37.83	81.03
Total	**6.53**			**1,063.64**	**1,442.93**	**2,765.25**

Runoff for areas B1-B13 will be restricted before outletting to the existing storm system within Stevenage Drive. The flow will be controlled within roof drains for area B1 and B2. Runoff for areas B3-B13 will be restricted and the required storage will be provided in the dry retention area. The flow will be controlled by an inlet control device located within MH4. The restriction devices will account for the unrestricted flow (Area B14) leaving the site. See Appendix 'G' for calculations. This restriction 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	6.53	0.45	576.55
Total	**6.53**		**576.55**

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 B13 will be restricted as shown in the table below.

Table 5: Post-Development Restricted Runoff Summary

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		
	5-Year	100-Year	5-Year	100-Year	
B1	372.09	708.52	14.52	25.08	*Restricted - Roof Drains*
B2	21.19	40.35	1.62	2.70	*Restricted - Roof Drains*
B3	84.25	160.88	195	245.00	*Restricted - MH4*
B4	73.67	140.75			
B5	31.65	60.33			
B6	54.60	104.31			
B7	152.33	291.40			
B8	4.71	9.51			
B9	110.13	209.77			
B10	81.98	156.64			
B11	19.58	37.80			
B12	81.68	155.56			
B13	317.23	608.40			
B14	37.83	81.03	37.83	81.03	*Unrestricted*
Total	**1,442.93**	**2,765.25**	**248.97**	**353.81**	

See Appendix 'G' for calculations.

Runoff from Area B1 will be restricted through twenty-two (22) roof drains before discharging to the new storm sewer downstream of MH3. The total flow leaving the roof will be 14.52L/s and 25.08L/s during the 5 and 100-year storm events, respectively. This will result in ponding depths of 55 and 95mm 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 Area B2 will be restricted through three (3) roof drains before discharging to the new storm sewer downstream of MH2. The total flow leaving the roof will be 1.62L/s and 2.70L/s during the 5 and 100-year storm events, respectively. This will result in ponding depths of 45mm 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-B13 will be restricted at MH4 through an IPEX Tempest MHF Plate ICD or an approved equivalent (Design Head of 0.66m). See Appendix 'G' for detailed ICD sizing from the manufacturer. This orifice plug will restrict areas B3-B13 to 195L/s and 245.00L/s for both the 5 and 100-year storm events. The restriction creates a water surface elevation (WSEL) of 80.78m for the 5-year storm event and 81.02m for the 100-year storm event. The storage for this area will be provided within the dry retention area. See below table for details of the required and provided storage volumes.

Table 6: Storage Summary

Drainage Area	Depth of Ponding (m)	Storage Required (m^3)	Storage Available (m^3)	Depth of Ponding (m)	Storage Required (m^3)	Storage Available (m^3)
	5-Year			100-Year		
B1	0.055	396.34	465.83	0.095	760.99	804.61
B2	0.045	18.31	25.61	0.075	35.92	42.68
B3-B13	0.42	647.17	666.39	0.66	1,366.74	1,367.10

See Appendix 'G' for calculations.

7.5.1 *Emergency Overland Flow*

In the event that there is a rainfall above the 100-year storm event, or a blockage within the storm network, an emergency overland flow route has been provided such that the storm water runoff will be conveyed towards the southeast corner of the site away from the building, and onto the adjacent City property south of the site.

There is an existing ditch within the City property that will convey the emergency overland flow which eventually discharges flow to McEwen Creek. The adjacent residential subdivision will not be affected by any drainage from the subject property.

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 orifice plug located within MH4 will restrict flows from the site, causing temporary ponding within the dry retention pond. There will be an opportunity for particle settlement during this process, but the full benefits of a larger scale end-of-pipe facility will not be fully realized at this site.

A quality treatment unit has been sized to provide a TSS removal rate of 80% as per RVCA requirements. The CDS 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 Stevenage Drive. See Appendix 'G' for quality control treatment unit detailed design and calculations.

8.0 SEDIMENT & EROSION 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, RVCA 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 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 RVCA to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions both warrant and permit. Please see the *Site Grading, 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 / Municipality or RVCA.

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

- An addition of 12,160m^2 of warehouse space will be added to the existing Sysco Tannis Facility located at 2390 Stevenage Drive.
- A new 300mm diameter watermain will be installed to service the site, along with the existing 100mm water service to remain.
- A new 250mm diameter water service will extend around the rear of the building to loop the internal sprinkler system.
- A new 200mm sanitary sewer will be installed to service the subject property and connect to the existing sanitary sewer within Stevenage Drive.
- The proposed storm sewer, ranging in diameter from 250mm to 825mm, will be installed throughout the site and drain to the proposed dry retention area prior to outletting to the existing storm sewers on Stevenage Drive.
- Storage for the 5- through 100-year storm events will be provided within the dry retention area located at the southeast corner of the subject property and on the proposed flat roof.
- A proposed oil/grit separator will be installed in order to provide the required quality control.

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 Sysco Tannis Facility Expansion.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

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11.0 STATEMENT OF LIMITATIONS

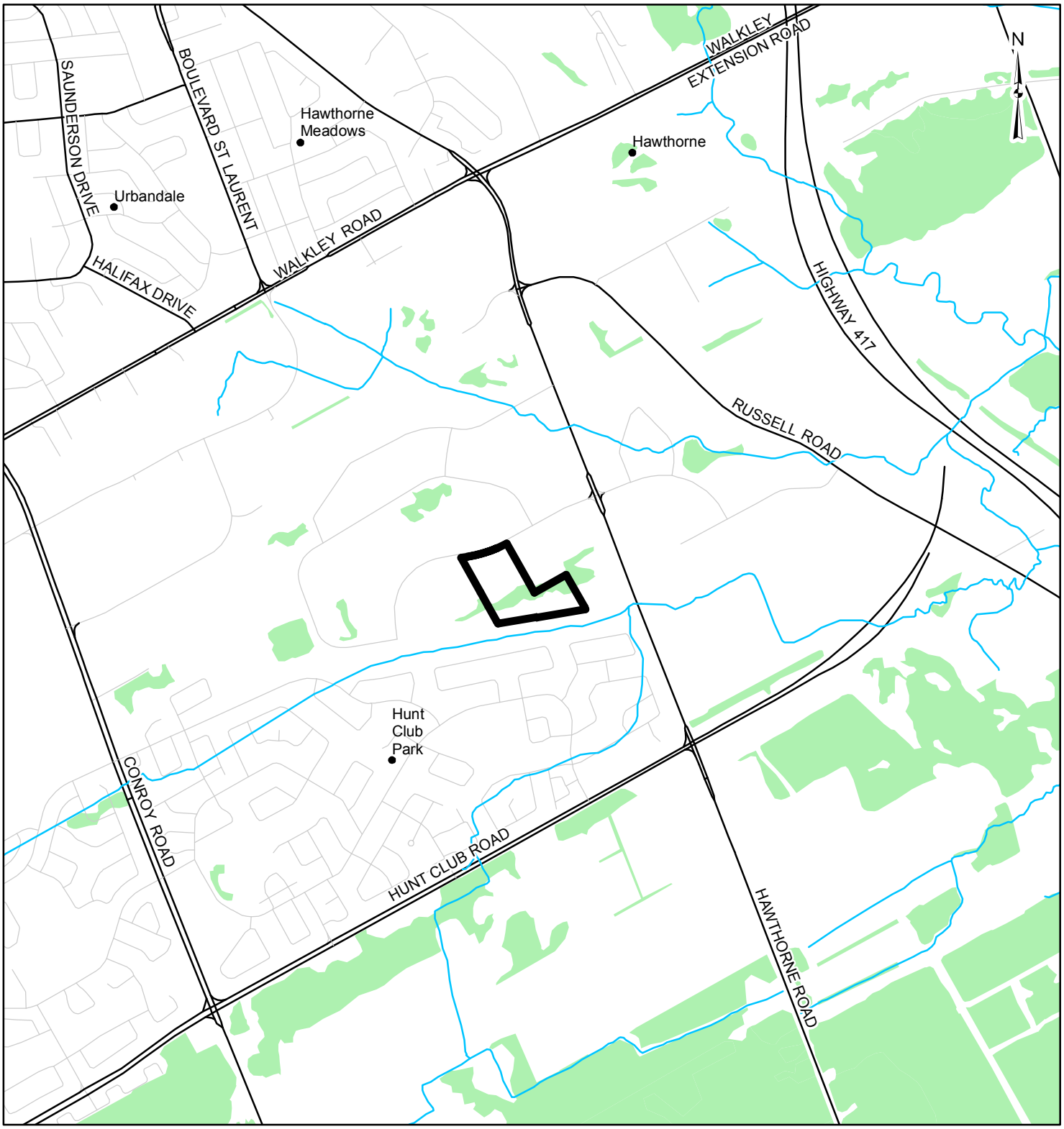
This report was produced for the exclusive use of BBS Construction Ltd. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry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

0.5 0.25 0 0.5

Kilometres

REFERENCE

Basedata provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

CLIENT:	BBS
PROJECT:	SYSCO BUILDING 2390 STEVENAGE DRIVE
TITLE:	SITE LOCATION MAP

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

PROJECT NO: CP-18-0170	
Date	Sep., 11, 2018
GIS	SK
Checked By	TF

FIGURE: 1

APPENDIX B
CITY OF OTTAWA PRE-CONSULTATION NOTES

McINTOSH PERRY

Tyler Ferguson

Subject: RE: 2390 Stevenage Drive - Preconsult Follow-up

From: Bernier, John [mailto:John.Bernier@ottawa.ca]
Sent: July-18-18 11:21 AM
To: Jacob Bolduc <bolduc@fotenn.com>
Subject: 2390 Stevenage Drive - Preconsult Follow-up

Good morning Jacob,

It was nice meeting your team for a pre-application consultation (PC2018-0169) on Jun 21st, 2017. We met to discuss the Tannis food distribution centre at 2390 Stevenage Drive (includes parcels addressed as 2200 and 2410 Stevenage Drive). The proposal described at this meeting was the expansion of the existing facility from 2,666 square metres in size to a total of 5,778 square metres. It also includes the enlargement of the parking area at the front of the facility, removal of the vegetation to the south of the site, and the expansion of the truck/trailer parking area at the rear of the property. Some areas within the building will be repurposed; However, this will be handled through the building permit process.

Planning & Design Comments:

1. Provide further detail on the buffer and berm located along the rear of the property along the hydro corridor.
2. Minimum requirement for landscape buffer is 3m within the Zoning By-law; However, a more robust buffer is recommended given the scale of the operation.
3. All dimensions should be in metric.
4. The parking spaces shown along the western drive-isle along the western edge of the property should be removed or a landscape island provided to reduce conflicts.
5. Improve front parking area by breaking up larger rows with landscape islands and caps.
6. Provide isle and parking space dimensions for this lot.
7. Due to the large amount of impervious surface and reduction in vegetation on site, consider providing a high albedo (white) roof on all additions. This may be in the Owner's best interest, given that the building has a high proportion of refrigerated areas.
8. Provide accurate surrounding site conditions, i.e. eastern access looks to be a shared access with the adjacent property. Include adjacent land uses.
9. Floor plan can be removed from Site Plan and replaced with general use and scale (in square metres) of each area of the building.
10. Clarify what is existing and what is proposed.
11. Site Plan should include zoning compliance table.
12. In response to one of the questions during the meeting, it would not be recommended to split the Site Plan between two applications for the office expansion at the front of the building and the other works described. This would cause confusion and likely wouldn't result in much efficiency, if any.

Environmental:

13. 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 for Site Plan approval

14. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
15. the removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
16. the TCR may be a separate report or in this case, it may be combined with the Landscape Plan provided all the necessary information is supplied
17. the TCR must list all trees on site by species, diameter and health condition – groupings of similar trees may combined using averages, species mix
18. the TCR must address all trees with a critical root zone that extends into the developable area.
19. If trees are to be removed, the TCR must clearly show where they are, and document the reason they can not be retained
20. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines listed on Ottawa.ca
21. 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
22. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
23. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca
24. An EIS is not required; However, ensure that any butternut trees as addressed in the TCR.

Transportation:

25. The TIA (Transportation Impact Assessment) Guidelines (2017) were approved by Transportation Committee and City Council on June 14, 2017. The new version of the TIA Guidelines (2017) that are posted on the web are now to be used for the TIA Submission for development applications.
    The following list highlights the significant changes to the 2006 TIA Guidelines
    1. A Screening Test (Step 1) quickly determines if a transportation study is required. Consultants should fill in the form in Appendix B.
    2. Study Scope (Step 2) is site specifically tailored; there are no longer three defined types of TIA reports. Scoping report is required and needs to be signed off by TPM before the consultant moves on to Forecasting volumes.
    3. Sign off from City Transportation Project Manager is required at key points in the review process prior to TIA Submission (Step 5). See Figure 1 on page 9 for a good flow chart of the process.
    4. Multi Modal Level of Service (MMLOS) and Complete Street analysis is required to assess the impact of all modes of travel rather than just vehicle traffic.
    5. There is no longer a requirement for consultant pre-approval. Consultants must now sign and submit the Credentials Form included in the Appendix A with each TIA report.
    6. The TIA Submission (report, drawings and/or monitoring plan) is required with the development application.

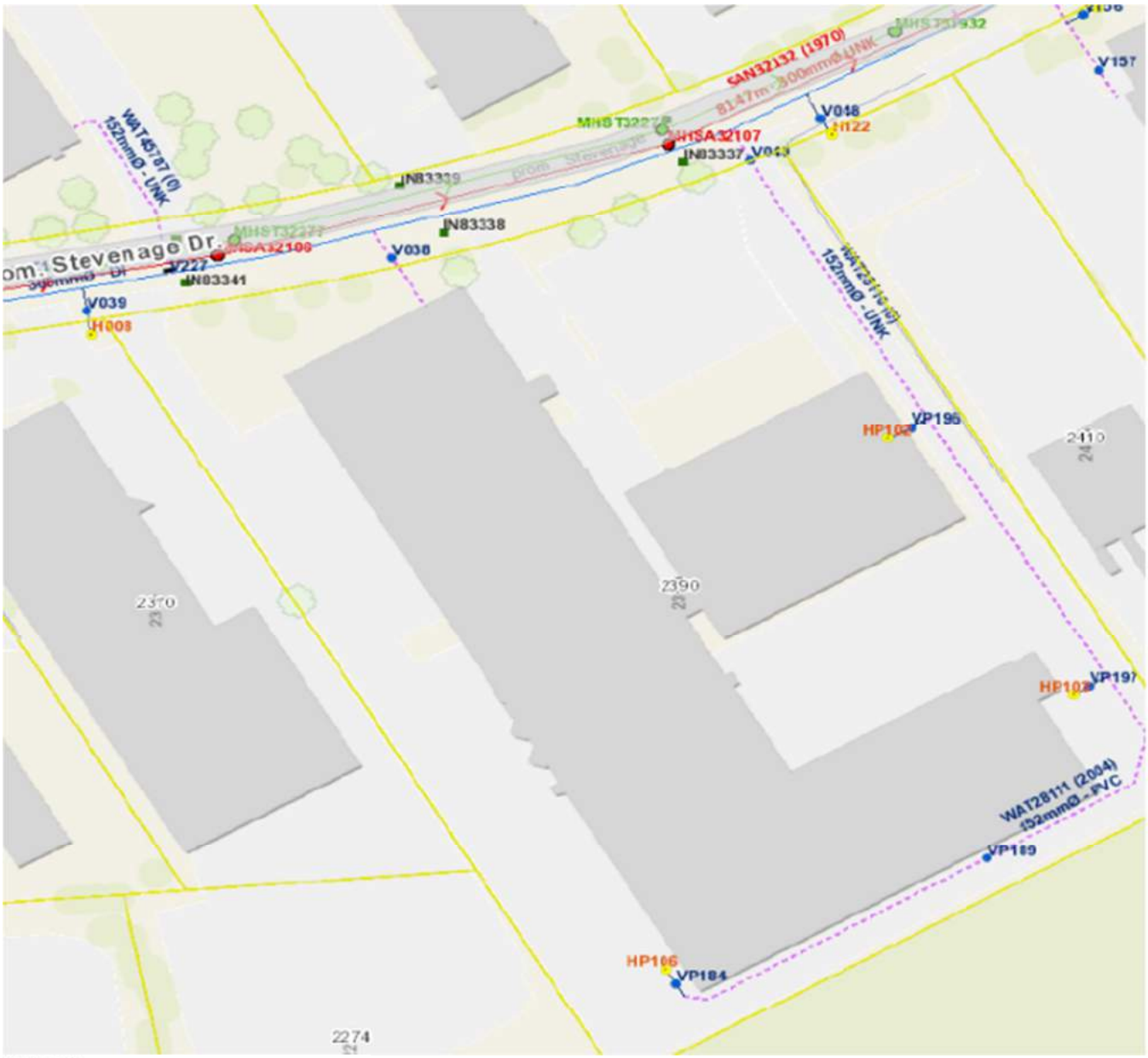
    Click on the website:
    http://documents.ottawa.ca/sites/documents.ottawa.ca/files/tia_guidelines_en.pdf

26. Should the development generate 60 peak hour person trips, the TIA guidelines Step 2 – Scoping report would be required ***Identified as a requirement June 26***.

27. Inadequate driveway throat length is a common problem when internal land development circulation is poorly designed. This can lead to situations in which traffic circulation within the development is chaotic. It can also lead to situations in which traffic turning into a development queues on the roadway while waiting for vehicles to clear the short driveway either by queuing or backing out into the driveway. This is unsafe and may cause accidents on the main roadway. Adequate throat length allows stacking, or queuing, to occur on site particularly for heavy vehicles. This reduces driver confusion, traffic problems, and unsafe conditions. Insufficient throat length and poor site planning can cause unsafe conditions and result in vehicles backing out onto the main roadway interrupting traffic flow.
28. Signs related to the development site are to be placed in accordance with the applicable sign by-law. An Encroachment Agreement will be required for any signage on the road allowance.
29. For more information on this please contact Wally Dubyk (Wally.Dubyk@ottawa.ca / ext. 13783).

Engineering Comments:

30. 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
31. Servicing and site works shall be in accordance with the following documents:
    - Ottawa Sewer Design Guidelines (October 2012) and Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
    - Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
    - 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)
32. 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).
33. The Stormwater Management Criteria, for the subject site, is to be based on the following:
    - 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.
    - For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
    - The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
    - A calculated time of concentration (Cannot be less than 10 minutes).
    - Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.
34. Deep Services (Storm, Sanitary & Water Supply)



a) A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:
    i. Stevenage Dr.:
        1. Sanitary – 300 mm (1970).
        2. Storm – 600 mm Concrete (1993).

3. Water – 300 mm Iron (1971).

b) As per City's Sewer Design guideline a monitoring manhole shall be required just inside the property line located in an accessible location (ie. Not in a parking area) for all non-residential and multi residential buildings connections from a private sewer to a public sewer.

c) As per City's Sewer Design guideline it is expected that the alternative of a high level sewer in a public right-of-way and connected to the collector sewer is the preferred method of servicing properties.

d) New connections to sewer or watermain services within the City right of way is subject to City approval and are to be made above the springline of the sewermain as per:
   a) Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.
   b) Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,
   c) Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,
   d) Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.
   e) No submerged outlet connections.

35. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
   i. Location of service
   ii. Type of development and the amount of fire flow required (as per FUS, 1999).
   iii. Average daily demand: ___ l/s.
   iv. Maximum daily demand: ___l/s.
   v. Maximum hourly daily demand: ___ l/s.
   vi. Hydrant location and spacing to meet City's Water Design guidelines.

36. MOECC ECA Requirements
   An MOECC Environmental Compliance Approval (Input Application Type -Industrial Sewage Works or Municipal/Private Sewage Works) will be required for the proposed development.
   If there is an existing ECA available, an amended will be required.
   Please contact Ontario Ministry of the Environment and Climate Change, Ottawa District Office to arrange a pre-submission consultation:
   For I/C/I applications: Emily Diamond
   (613) 521-3450, ext. 238
   Emily.Diamond@ontario.ca

General comments

37. The storm sewer discharging to Green's Creek (Mather Award Drain). Provide a Stormwater quality control discussion in the report and consult with Rideau Valley Conservation Authority (RVCA) for stormwater quality requirement.

38. Should you have any questions or require additional information, please contact Sharif Sharif directly at (613) 580-2424, x 20763 or by email at sharif.sharif@ottawa.ca.

The proposed application will be a Site Plan Control Application (Revision - Manager Approval, Public Consultation), which costs $20,287.13 (detail regarding fees)

Best regards,

John Bernier
Planner
Development Review South
City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext/poste. 21576
ottawa.ca/planning / ottawa.ca/urbanisme

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APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CP-18-0170 - 2390 Stevenage Drive - Water Demands

Project:	2390 Stevenage Drive
Project No.:	CP-18-0170
Designed By:	SVL
Checked By:	RPK
Site Area:	6.53 gross ha

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	350	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Parks no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	***28,000***	***L/gross ha/d***
AVERAGE DAILY DEMAND	**4.16**	**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	**6.24**	**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	**11.22**	**L/s**

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

McINTOSH PERRY

CP-18-0170 - 2390 Stevenage Drive - OBC Fire Calculations

Project:	2390 Stevenage Drive
Project No.:	CP-18-0170
Designed By:	SVL
Checked By:	RPK

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

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

Building is classified as Group : D, F3 (from table 3.2.2.55)

Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.

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	**19**	(from Table 1 pg A-31) (Worst case occupancy {F3} 'K' value used)
V	**161,231**	(Total building volume in m³.)
Stot	**1.0**	(From figure 1 pg A-32)
Q =	**3,063,389.00 L**	

From Figure 1 (A-32)

Snorth	over 10	m	0.0
Seast	over 10	m	0.0
Ssouth	over 10	m	0.0
Swest	over 10	m	0.0

*approximate distances

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

9000 L/min (if Q ≥ 270,000 L)
2378 gpm

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

CP-18-0170 - 2390 Stevenage Drive - Fire Underwriters Survey (FUS) Fire Calculations

Project:	2390 Stevenage Drive
Project No.:	CP-18-0170
Designed By:	SVL
Checked By:	RPK

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 Construction Class 3 (non-combustible). Therefore,

C = 0.80

B. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 23,100.00 m²

A = 23,100.00 m²

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

C. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 1.00

D. Calculate Required Fire Flow

F = 220 x C x √A

F = 220.00 X 0.80 X √ 23100.00

F = 26,749.68 L/min.

F = 27,000.00 L/min.

E. Determine Increase or Decrease Based on Occupancy

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

C-2 Limited Combustibility

-15%

Occupancy Decrease = 4,050.00 L/min.

F = 22,950.00 L/min.

CP-18-0170 - 2390 Stevenage 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 50% (The building is not sprinklered)

Reduction = 22,950.00 L/min. X 50%

Reduction = 11,475.00 L/min.

G. Determine the Total Increase for Exposures

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

- There are no existing buildings surrounding the site that are within 45m.
- Therefore the charge for exposure is 15% of the value obtained in Step E.

Increase = 22,950.00 L/min. X 15%

Increase = 3,442.50 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 = 22,950.00 L/min. - 11,475.00 L/min. + 3,442.50 L/min.
F = 14,917.50 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 15000 L/min (3963 GPM).

Tyler Ferguson

From: Sharif, Sharif <sharif.sharif@ottawa.ca>
Sent: September-13-18 3:29 PM
To: Sean Leflar
Cc: Tyler Ferguson; Peter Kirkimtzis
Subject: RE: 2390 Stevenage Drive - Request for Boundary Conditions
Attachments: 2390 Stevenage Sept 2018.pdf

Good Afternoon Sean,

Please see the information below and attached for the boundary condition. If you need any further information, please let me know. Thanks.

The following are boundary conditions, HGL, for hydraulic analysis at 2390 Stevenage (zone 2C) assumed to be connected to the 305mm on Stevenage (see attached PDF for location).

Minimum HGL = 124.0m

Maximum HGL = 130.7m

MaxDay + FireFlow (250L/s) = 116.5m

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.

Golam Sharif, P.Eng., M.Eng.
Project Manager, Infrastructure Approvals
Development Review, South Services
Planning, Infrastructure and Economic Development Department |
Services de planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20763, fax/téléc:613-580-2576, sharif.sharif@ottawa.ca

From: Sean Leflar <s.leflar@mcintoshperry.com>
Sent: Monday, September 10, 2018 9:41 AM
To: Sharif, Sharif <sharif.sharif@ottawa.ca>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>; Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Subject: RE: 2390 Stevenage Drive - Request for Boundary Conditions

Good Morning Sharif,

Please see attached for the FUS calculation sheet.

If you require any further information, feel free to get in contact.

Thanks,

Sean Leflar
Civil Engineering Technolgist
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.836.2184 (ext 2252) | **F.** 613.836.3742
s.leflar@mcintoshperry.com | www.mcintoshperry.com

From: Sharif, Sharif <sharif.sharif@ottawa.ca>
Sent: September 10, 2018 9:35 AM
To: Sean Leflar <s.leflar@mcintoshperry.com>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>; Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Subject: RE: 2390 Stevenage Drive - Request for Boundary Conditions

Good Morning Sean,

I am back in the Office from holiday. Please provide the fire flow (FUS) calculation sheet. I have to provide that to our IP group for the boundary condition. Thanks.

Sharif

From: Sean Leflar <s.leflar@mcintoshperry.com>
Sent: Tuesday, September 04, 2018 8:17 AM
To: Sharif, Sharif <sharif.sharif@ottawa.ca>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>; Peter Kirkimtzis <p.kirkimtzis@mcintoshperry.com>
Subject: 2390 Stevenage Drive - Request for Boundary Conditions

Good Morning,

I would like to request boundary conditions for a development located at 2390 Stevenage Drive. The development consists of a 1-storey addition to be applied to the existing building. The building will be sprinklered and hold a major occupancy of Group F, Division 3 with a possibility of group D in a portion of the addition . I have attached a site plan, which has been marked up showing the water connection to the 300mm diameter main within Stevenage Drive and location map for your reference.

Please find the below water demands to obtain boundary conditions.

Type of Development: Industrial
Location of Service: Connection to Stevenage Drive.
Amount of Fire Flow Required: 15,000 L/min or 250 L/sec
Gross Area: 6.53 ha
Average Daily Demand: 4.16 L/sec
Maximum Daily Demand: 6.24 L/sec
Maximum Hourly Demand: 11.22 L/sec

If you require any further information, please feel free to contact me.

Thank you,

Sean Leflar
Civil Engineering Technolgist
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.836.2184 (ext 2252) | **F.** 613.836.3742
s.leflar@mcintoshperry.com | www.mcintoshperry.com

McINTOSH PERRY

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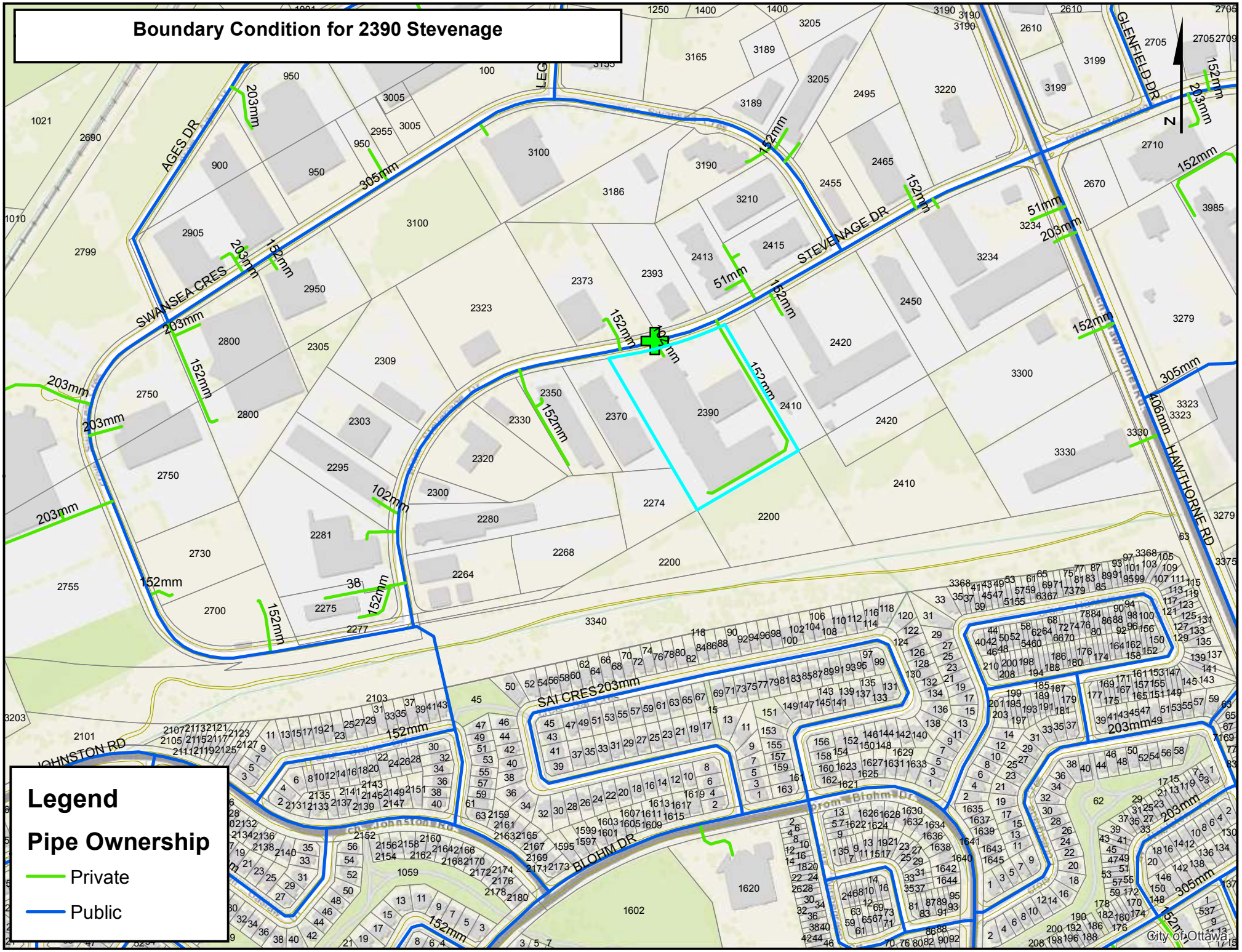
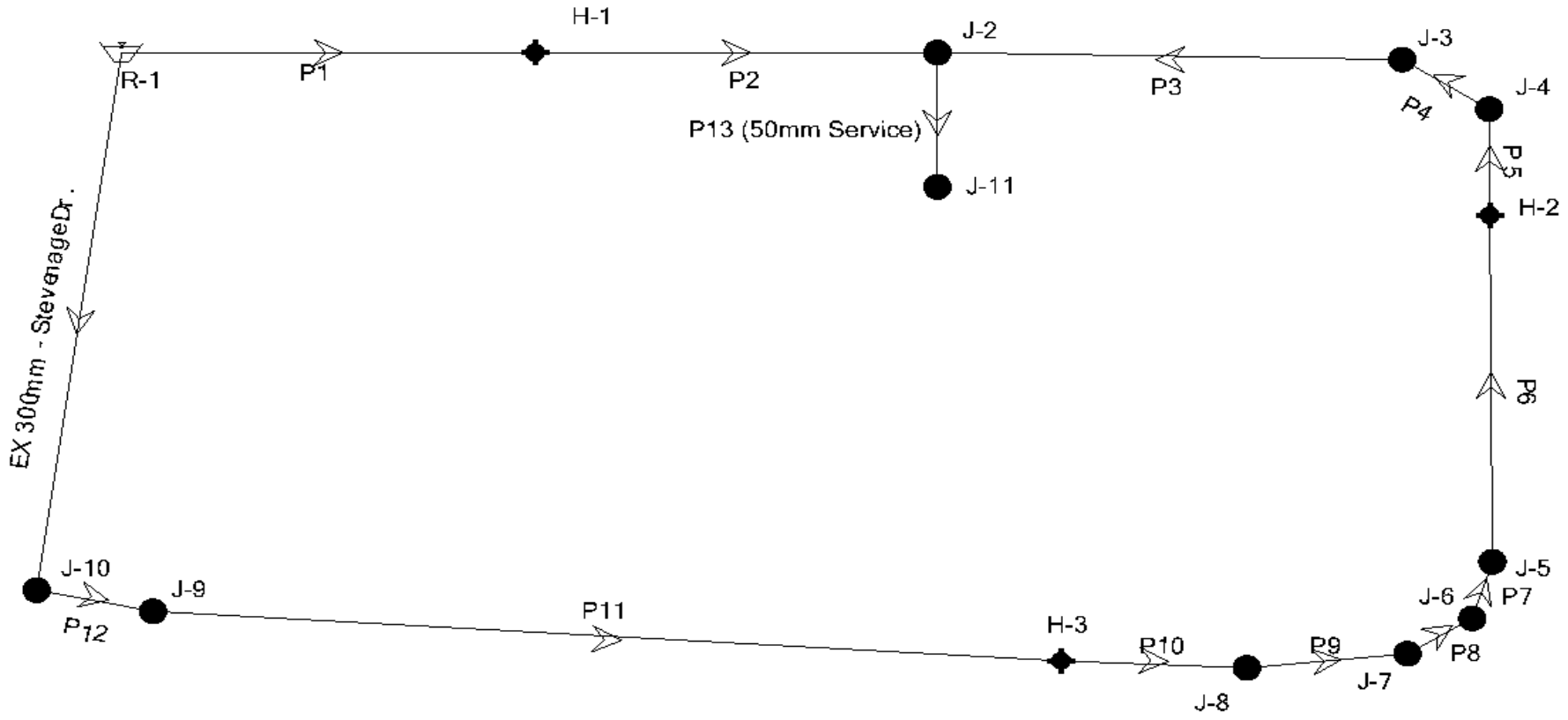
Boundary Condition for 2390 Stevenage



CP-18-0170 - 2390 Stevenage Drive - WaterCAD Model Schematic



Average Day

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-2	79.85	0.00	72.18	130.70
J-3	79.36	0.00	72.87	130.70
J-4	79.24	0.00	73.04	130.70
J-5	79.64	0.00	72.48	130.70
J-6	79.58	0.00	72.56	130.70
J-7	79.55	0.00	72.60	130.70
J-8	79.54	0.00	72.62	130.70
J-9	80.77	0.00	70.87	130.70
J-10	80.75	0.00	70.90	130.70
J-11	79.30	249.60	66.98	126.49

Peak Hourly

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-2	79.85	0.00	62.66	123.99
J-3	79.36	0.00	63.35	123.99
J-4	79.24	0.00	63.52	123.99
J-5	79.64	0.00	62.96	123.99
J-6	79.58	0.00	63.04	123.99
J-7	79.55	0.00	63.09	123.99
J-8	79.54	0.00	63.10	123.99
J-9	80.77	0.00	61.36	124.00
J-10	80.75	0.00	61.39	124.00
J-11	79.30	673.20	25.48	97.25

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)	Demand (L/min)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit @ Total Flow Needed) (psi)
H-1	True	True	15,000.00	16,911.81	52.36	79.61	0.00	20.00	37.25
H-2	True	True	15,000.00	20,768.21	52.56	79.47	0.00	20.00	36.70
H-3	True	True	15,000.00	19,316.80	51.65	80.11	0.00	20.00	37.91
J-2	False	False	15,000.00	(N/A)	52.02	79.85	0.00	20.00	(N/A)
J-3	False	False	15,000.00	(N/A)	52.71	79.36	0.00	20.00	(N/A)
J-4	False	False	15,000.00	(N/A)	52.89	79.24	0.00	20.00	(N/A)
J-5	False	False	15,000.00	(N/A)	52.32	79.64	0.00	20.00	(N/A)
J-6	False	False	15,000.00	(N/A)	52.40	79.58	0.00	20.00	(N/A)
J-7	False	False	15,000.00	(N/A)	52.45	79.55	0.00	20.00	(N/A)
J-8	False	False	15,000.00	(N/A)	52.46	79.54	0.00	20.00	(N/A)
J-9	False	False	15,000.00	(N/A)	50.72	80.77	0.00	20.00	(N/A)
J-10	False	False	15,000.00	(N/A)	50.74	80.75	0.00	20.00	(N/A)
J-11	False	False	15,000.00	(N/A)	40.08	79.30	374.40	20.00	(N/A)

APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

SANITARY SEWER DESIGN SHEET

PROJECT: SYSCO TANNIS - FACILITY EXPANSION
LOCATION: 2390 STEVENAGE DRIVE, OTTAWA
CLIENT: BBS CONSTRUCTION LTD.

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 (ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)						PEAK FLOW (L/s)	AREA (ha)		FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								L/s	(%)
													IND	CUM	IND	CUM	IND	CUM											
		BUILDING	MH3A					0.00	0.0	0.0	4.00	0.00		0.00	6.53	6.53		0.00	3.17	6.53	6.53	1.83	5.00	48.39	23.45	200	2.00	1.492	43.39	89.66
		MH3A	MH2A					0.00	0.0	0.0	4.00	0.00		0.00		6.53		0.00	3.17	0.00	6.53	1.83	5.00	20.24	103.50	200	0.35	0.624	15.24	75.29
		BUILDING	MH2A					0.00	0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	48.39	39.00	200	2.00	1.492	48.39	100.00
		MH2A	MMH1A					0.00	0.0	0.0	4.00	0.00		0.00		6.53		0.00	3.17	0.00	6.53	1.83	5.00	20.24	36.20	200	0.35	0.624	15.24	75.29
		MMH1A	*EXISTING*					0.00	0.0	0.0	4.00	0.00		0.00		6.53		0.00	3.17	0.00	6.53	1.83	5.00	20.24	14.85	200	0.35	0.624	15.24	75.29

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.

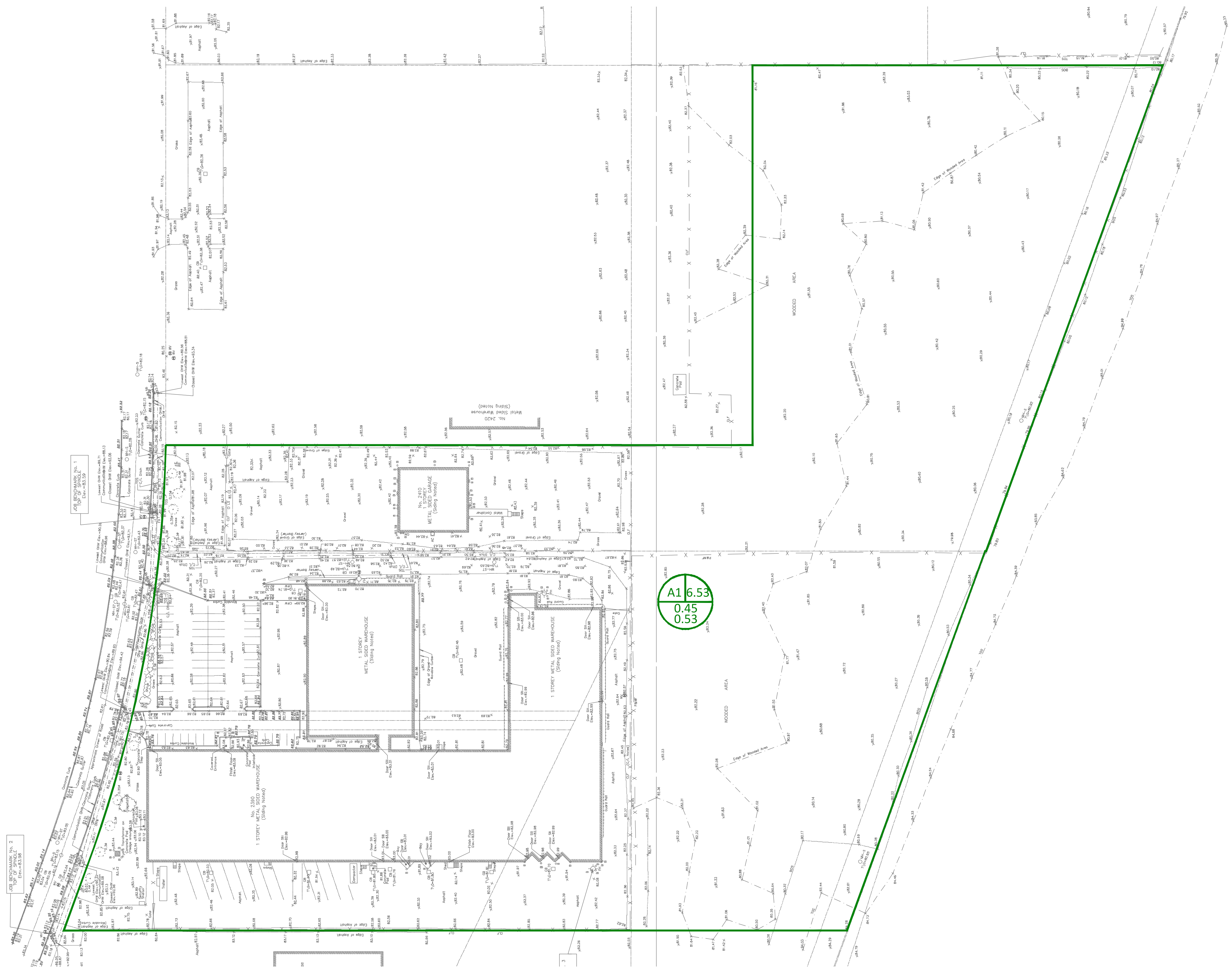
Project No.: CP-18-0170

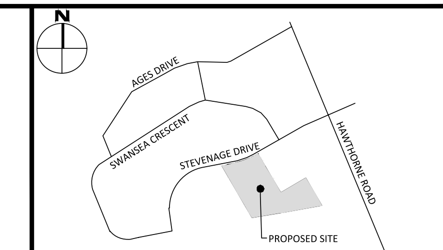
No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2018-09-10
2.	REVISED PER CITY COMMENTS	2019-01-10

Sheet No: 1 of 1

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY





LOCATION PLAN

LEGEND

- BARRIER CURB / CURB DEPRESION (DC)
- MOUNTABLE CURB
- EASEMENT
- HEAVY DUTY ASPHALT
- CONCRETE SIDEWALK
- PAVING STONE
- STORM MANHOLE (MH7)
- CATCHBASIN OR DITCH INLET (CB6, DI6)
- LANDSCAPE CATCHBASIN (ECB4)
- SANITARY MANHOLE (MH7A)
- PERFORATED PIPE IN SWALES
- WATER VAVLE/CHAMBER
- FIRE HYDRANT
- CENTRELINE OF SWALE
- SLOPING AT 3:1 (UNLESS SPECIFIED)
- PROPOSED ELEVATION 95.94 / EXISTING ELEVATION 93.20
- SWALE ELEVATION 95.94 (S)
- TOP OF WALL ELEVATION T/W100.50 / BOTTOM OF WALL ELEVATION B/W90.50
- EMERGENCY OVERLAND FLOW ROUTE
- SILT FENCE (AS PER OPSD 219.130)
- STRAW BALE CHECK DAM (AS PER OPSD 219.180)
- B1 0.25 / 0.90 / 1.00 — AREA NAME; AREA (Ha); 5yr & 100yr COEFFICIENT

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR SITE PLAN CONTROL	SEPT. 10, 2018

Check and verify all dimensions before proceeding with the work

Do not scale drawings

SCALE 1 : 750
0 25 50 75 Metres

McINTOSH PERRY

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Stamp:

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

Project:
SYSCO TANNIS - FACILITY EXPANSION
2390 STEVENAGE DRIVE
OTTAWA, ON K1G 3W3

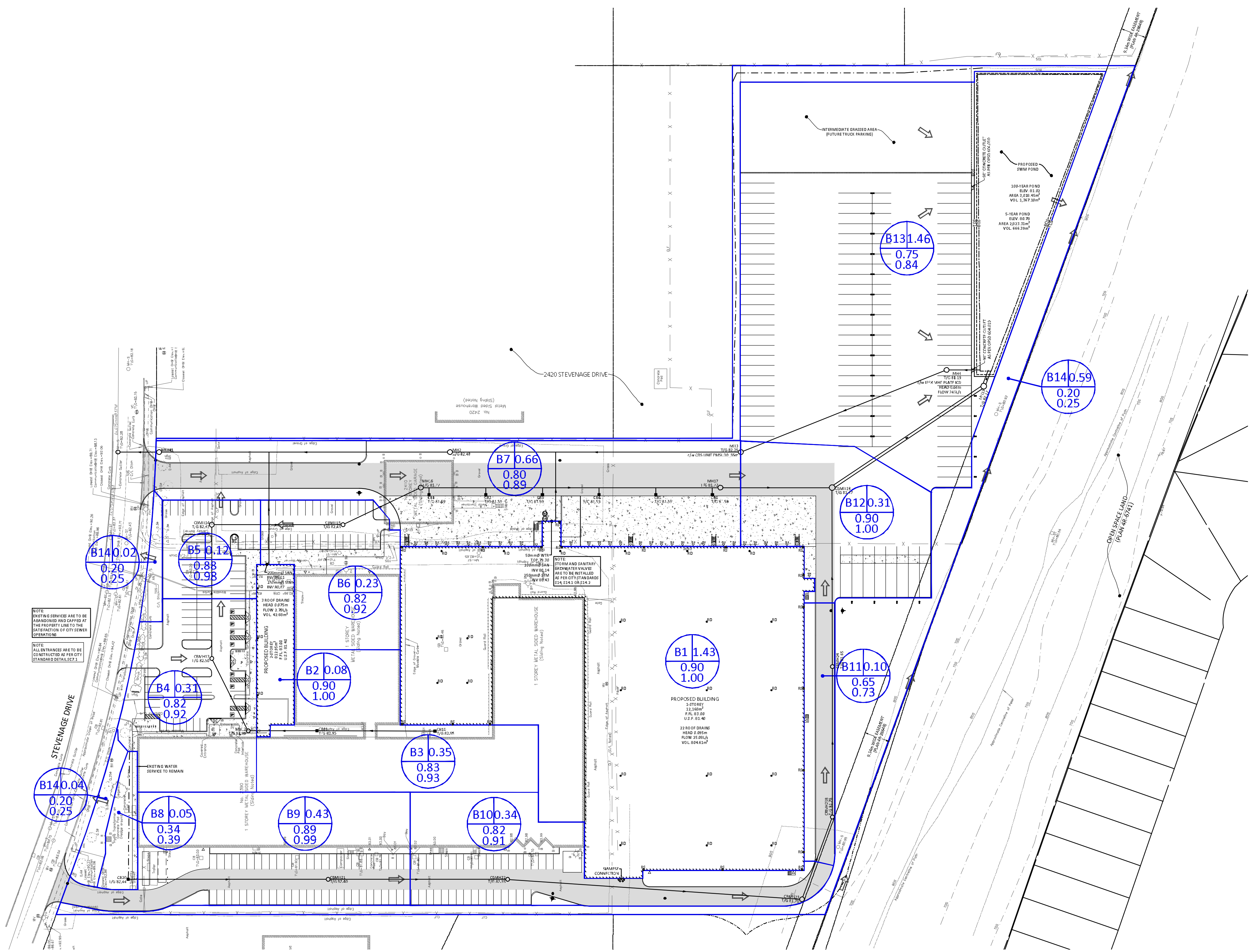
Drawing Title:
PRE-DEVELOPMENT DRAINAGE AREA PLAN

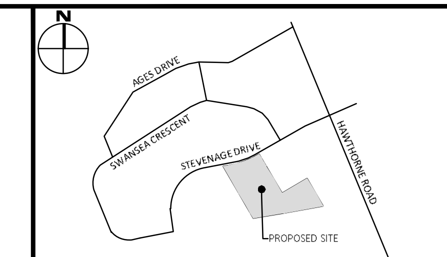
Scale:	1:750	Project Number:	CP-18-0170
Drawn By:	P.G.K.		
Checked By:	R.P.K.	Drawing Number:	PRE
Designed By:	P.G.K.		

FILENAME: H:\01 Project - Proposals\2018 Jobs\CP\0CP-18-0170 BBS_Sysco Building_2390 Stevenage Drive\Civil\15 - Drawings\CP-18-0170_Presentation.dwg
LAST SAVED: Monday, September 10, 2018 LAST SAVED BY: p.kirkimtzis
LAST PLOTTED: Monday, September 10, 2018 CTB FILE USED: ----

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY





LOCATION PLAN

LEGEND

- BARRIER CURB
- DC CURB DEPRESSION
- MOUNTABLE CURB
- EASEMENT
- HEAVY DUTY ASPHALT
- CONCRETE SIDEWALK
- PAVING STONE
- MH STORM MANHOLE
- CB CATCHBASIN OR DITCH INLET
- LANDSCAPE CATCHBASIN
- MH SANITARY MANHOLE
- PERFORATED PIPE IN SWALES
- WATER VAVLE/CHAMBER
- FIRE HYDRANT
- WATER METER LOCATION
- REMOTE METER LOCATION
- CENTRELINE OF SWALE
- CENTRELINE OF DITCH
- SLOPING AT 3:1 (UNLESS SPECIFIED)
- PROPOSED ELEVATION
- EXISTING ELEVATION
- SWALE ELEVATION
- TOP OF WALL ELEVATION
- BOTTOM OF WALL ELEVATION
- EMERGENCY OVERLAND FLOW ROUTE
- SILT FENCE (AS PER OPSD 219.130)
- STRAW BALE CHECK DAM (AS PER OPSD 219.180)
- RD ROOF DRAIN LOCATION
- RS ROOF SCUPPER LOCATION
- WATER COVER TABLE POINT
- CROSSING CONFLICT TABLE LOCATION
- PROPOSED ENTRANCE
- OVERHEAD DOOR ENTRANCE

B1 0.25 / 0.90 / 1.00 — AREA NAME; AREA (Ha); 5yr & 100yr COEFFICIENT

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
2	REVISED PER CITY COMMENTS	JAN. 10, 2019
1	ISSUED FOR SITE PLAN CONTROL	SEPT. 10, 2018

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

SCALE 1 : 750 (0, 25, 50, 75 Metres)

McINTOSH PERRY
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Stamp:

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

Project: SYSCO TANNIS - FACILITY EXPANSION
2390 STEVENAGE DRIVE
OTTAWA, ON K1G 3W3

Drawing Title: POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale:	1:750	Project Number:	CP-18-0170
Drawn By:	P.G.K.		
Checked By:	R.P.K.	Drawing Number:	POST
Designed By:	P.G.K.		

STORM SEWER DESIGN SHEET

PROJECT: SYSCO TANNIS - FACILITY EXPANSION
LOCATION: 2390 STEVENAGE DRIVE, OTTAWA
CLIENT: BBS CONSTRUCTION LTD.

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)	(%)
	B3	CBMH10	CBMH11	0.83	0.18	0.15	0.15	10.00	0.86	10.86	104.19	122.14	178.56	43.27				43.27	59.68	42.20	300			0.35	0.818	16.41	27.49%
		CBMH11	MH12	0.83	0.17	0.14	0.29	10.86	0.52	11.38	99.86	117.04	171.06	80.65				80.65	91.46	24.80	375			0.25	0.802	10.81	11.82%
		MH12	CBMH13			0.00	0.29	11.38	0.61	11.98	97.45	114.20	166.90	78.70				78.70	91.46	29.25	375			0.25	0.802	12.76	13.95%
	B4	CBMH13	CBMH14	0.82	0.31	0.25	0.54	11.98	0.97	12.95	94.77	111.04	162.26	143.51				143.51	184.99	48.28	525			0.17	0.828	41.48	22.42%
	B5	CBMH14	CBMH15	0.88	0.12	0.11	0.65	12.95	0.95	13.91	90.81	106.38	155.41	164.16				164.16	184.99	47.34	525			0.17	0.828	20.83	11.26%
	B6	CBMH15	CBMH16	0.82	0.23	0.19	0.84	13.91	0.57	14.48	87.26	102.21	149.29	203.50				203.50	264.11	31.14	600			0.17	0.905	60.61	22.95%
	B7	CBMH16	CBMH17	0.80	0.66	0.53	1.37	14.48	1.84	16.32	85.27	99.87	145.85	324.03				324.03	361.57	108.15	675			0.17	0.979	37.54	10.38%
		CBMH17	CBMH18			0.00	1.37	16.32	0.69	17.01	79.51	93.10	135.92	302.15				302.15	361.57	40.36	675			0.17	0.979	59.42	16.43%
	B8	CBMH20	CBMH21	0.34	0.05	0.02	0.02	10.00	1.46	11.46	104.19	122.14	178.56	4.92				4.92	41.62	72.13	250			0.45	0.821	36.69	88.17%
	B9	CBMH21	CBMH22	0.89	0.43	0.38	0.40	11.46	1.33	12.80	97.05	113.73	166.20	107.84				107.84	133.02	64.80	450			0.20	0.810	25.18	18.93%
	B10	CBMH22	CBMH23	0.82	0.23	0.19	0.59	12.80	2.21	15.01	91.42	107.11	156.48	149.52				149.52	179.46	106.52	525			0.16	0.803	29.94	16.68%
		CBMH23	CBMH23B	0.82	0.11	0.09	0.68	15.01	0.66	15.66	83.53	97.82	142.85	157.56				157.56	179.46	31.65	525			0.16	0.803	21.90	12.20%
	B11	CBMH23B	CBMH24	0.65	0.04	0.03	0.70	15.66	1.13	16.79	81.47	95.40	139.29	159.56				159.56	179.46	54.30	525			0.16	0.803	19.90	11.09%
		CBMH24	CBMH18	0.65	0.06	0.04	0.74	16.79	1.34	18.13	78.18	91.53	133.62	161.60				161.60	179.46	64.60	525			0.16	0.803	17.86	9.95%
	B12	CBMH18	MH19	0.90	0.31	0.28	2.39	18.13	1.08	19.21	74.64	87.37	127.51	495.79				495.79	560.31	65.85	825			0.14	1.015	64.53	11.52%
		MH19	POND			0.00	2.39	19.21	0.10	19.31	72.03	84.30	123.01	478.45				478.45	560.31	6.00	825			0.14	1.015	81.86	14.61%
	B13	POND	MH4	0.75	1.46	1.10	1.10	19.31	0.24	19.55	71.80	84.03	122.62	218.57			245.00	245.00	316.18	12.10	675			0.13	0.856	71.18	22.51%
		MH4	MH3			0.00	1.10	19.55	1.56	21.10	71.26	83.40	121.69	216.93			245.00	245.00	316.18	80.00	675			0.13	0.856	71.18	22.51%
	B1	MH3	MH2	0.90	1.43	1.29	2.38	21.10	2.04	23.15	67.92	79.47	115.93	449.74			259.52	259.52	316.18	105.00	675			0.13	0.856	56.66	17.92%
	B2	MH2	MH1	0.08	0.08	0.01	2.39	23.15	2.04	25.19	64.02	74.89	109.22	425.08			261.14	261.14	316.18	105.00	675			0.13	0.856	55.04	17.41%
		MH1	Ex.MH			0.00	2.39	25.19	0.29	25.48	60.59	70.86	103.32	402.30			261.14	261.14	316.18	14.85	675			0.13	0.856	55.04	17.41%

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-18-0170

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2018-09-10
2.	REVISED PER CITY COMMENTS	2019-01-10

Sheet No: 1 of 1

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	Average C (2&5-Year)	Average C (100-Year)
A1	6.53	19,889.77	0.90	6,324.98	0.60	39,127.65	0.20	0.45	0.53

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	6.53	0.45	0.53	20	52.0	70.3	120.0	427.02	576.55	1,147.62
Total	6.53							427.02	576.55	1,147.62

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	Average C (2&5-Year)	Average C (100-Year)
B1	1.43	14,273.32	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B2	0.08	812.95	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B3	0.35	3,158.72	0.90	0.00	0.60	328.69	0.20	0.83	0.93
B4	0.31	2,749.47	0.90	0.00	0.60	344.00	0.20	0.82	0.92
B5	0.12	1,205.22	0.90	0.00	0.60	40.24	0.20	0.88	0.98
B6	0.23	2,040.10	0.90	0.00	0.60	245.11	0.20	0.82	0.92
B7	0.66	5,626.95	0.90	0.00	0.60	973.55	0.20	0.80	0.89
B8	0.05	93.75	0.90	0.00	0.60	391.64	0.20	0.34	0.39
B9	0.43	4,214.98	0.90	0.00	0.60	43.55	0.20	0.89	0.99
B10	0.34	3,057.37	0.90	0.00	0.60	392.49	0.20	0.82	0.91
B11	0.10	668.17	0.90	0.00	0.60	372.97	0.20	0.65	0.73
B12	0.31	3,129.44	0.90	0.00	0.60	17.46	0.20	0.90	1.00
B13	1.46	11,466.80	0.90	0.00	0.60	3,158.71	0.20	0.75	0.84
B14	0.65	0.00	0.90	0.00	0.60	6,529.78	0.20	0.20	0.25

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	1.43	0.90	1.00	10	76.8	104.2	178.6	274.28	372.09	708.52
B2	0.08	0.90	1.00	10	76.8	104.2	178.6	15.62	21.19	40.35
B3	0.35	0.83	0.93	10	76.8	104.2	178.6	62.10	84.25	160.88
B4	0.31	0.82	0.92	10	76.8	104.2	178.6	54.30	73.67	140.75
B5	0.12	0.88	0.98	10	76.8	104.2	178.6	23.33	31.65	60.33
B6	0.23	0.82	0.92	10	76.8	104.2	178.6	40.25	54.60	104.31
B7	0.66	0.80	0.89	10	76.8	104.2	178.6	112.29	152.33	291.40
B8	0.05	0.34	0.39	10	76.8	104.2	178.6	3.47	4.71	9.51
B9	0.43	0.89	0.99	10	76.8	104.2	178.6	81.18	110.13	209.77
B10	0.34	0.82	0.91	10	76.8	104.2	178.6	60.43	81.98	156.64
B11	0.10	0.65	0.73	10	76.8	104.2	178.6	14.43	19.58	37.80
B12	0.31	0.90	1.00	10	76.8	104.2	178.6	60.21	81.68	155.56
B13	1.46	0.75	0.84	10	76.8	104.2	178.6	233.84	317.23	608.40
B14	0.65	0.20	0.25	10	76.8	104.2	178.6	27.88	37.83	81.03
Total	6.53							1,063.64	1,442.93	2,765.25

Required Restricted Flow

Drainage Area	Area (ha)	C (5-Year)	Tc (min)	I (mm/hr)	Q (L/s)
				5-Year	5-Year
A1	6.53	0.45	20	70.3	576.55

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)		
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	
B1	372.09	708.52	14.52	25.08	396.34	760.99	465.83	804.61	*RESTRICTED*
B2	21.19	40.35	1.62	2.70	18.31	35.92	25.61	42.68	*RESTRICTED*
B3	84.25	160.88	195.00	245.00	594.54	1,366.74	666.39	1,367.10	*RESTRICTED*
B4	73.67	140.75							
B5	31.65	60.33							
B6	54.60	104.31							
B7	152.33	291.40							
B8	4.71	9.51							
B9	110.13	209.77							
B10	81.98	156.64							
B11	19.58	37.80							
B12	81.68	155.56							
B13	317.23	608.40							
B14	37.83	81.03	37.83	81.03					*UNRESTRICTED*
Total	1,442.93	2,765.25	248.97	353.81	1,009.19	2,163.66	1,157.83	2,214.39	

Storage Requirements for Area B1

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)
115	20.1	71.85	14.52	57.33	395.58
120	19.5	69.52	14.52	55.00	396.02
125	18.9	67.36	14.52	52.84	396.26
130	18.3	65.33	14.52	50.81	396.34
135	17.8	63.44	14.52	48.92	396.27
140	17.3	61.67	14.52	47.15	396.05
145	16.8	60.00	14.52	45.48	395.69

Maximum Storage Required 5-Year (m^3) =	396.34

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)
125	31.9	126.43	25.08	101.35	760.10
130	30.9	122.60	25.08	97.52	760.68
135	30.0	119.03	25.08	93.95	760.97
140	29.2	115.67	25.08	90.59	760.99
145	28.4	112.52	25.08	87.44	760.77
150	27.6	109.56	25.08	84.48	760.31
155	26.9	106.76	25.08	81.68	759.63

Maximum Storage Required 100-Year (m^3) =	760.99

Storage Occupied In Area B1

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof Drains	8,469.60	0.055	465.83

Storage Available (m^3) =	465.83
Storage Required (m^3) =	396.34

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof Drains	8,469.60	0.095	804.61

Storage Available (m^3) =	804.61
Storage Required (m^3) =	760.99

Roof Drain Flow for Area B1

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	22	
	5-Year	100-Year
Rooftop Storage (m^3)	465.83	804.61
Storage Depth (m)	0.055	0.095
Flow (Per Roof Drain) (L/s)	0.66	1.14
Total Flow (L/s)	14.52	25.08

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, See attached sheets
*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	3.96
	0.24	20	5.28
	0.30	25	6.60
	0.36	30	7.92
	0.42	35	9.24
	0.48	40	10.56
	0.54	45	11.88
	0.60	50	13.20
5-year	0.66	55	14.52
	0.72	60	15.84
	0.78	65	17.16
	0.84	70	18.48
	0.90	75	19.80
	0.96	80	21.12
	1.02	85	22.44
	1.08	90	23.76
100-year	1.14	95	25.08
	1.20	100	26.40
	1.26	105	27.72
	1.32	110	29.04
	1.38	115	30.36
	1.44	120	31.68
	1.50	125	33.00
	1.56	130	34.32
	1.62	135	35.64
	1.68	140	36.96
	1.74	145	38.28
	1.80	150	39.60

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

Storage Requirements for Area B2

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
50	37.7	7.66	1.62	6.04	18.12
55	35.1	7.14	1.62	5.52	18.23
60	32.9	6.70	1.62	5.08	18.29
65	31.0	6.31	1.62	4.69	18.31
70	29.4	5.97	1.62	4.35	18.29
75	27.9	5.67	1.62	4.05	18.24
80	26.6	5.40	1.62	3.78	18.16

Maximum Storage Required 5-Year (m^3) =	18.31

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)
55	59.6	13.47	2.70	10.77	35.56
60	55.9	12.63	2.70	9.93	35.76
65	52.6	11.90	2.70	9.20	35.87
70	49.8	11.25	2.70	8.55	35.92
75	47.3	10.68	2.70	7.98	35.91
80	45.0	10.17	2.70	7.47	35.85
85	43.0	9.71	2.70	7.01	35.74

Maximum Storage Required 100-Year (m^3) =	35.92

Storage Occupied In Area B2

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m3)
Roof Drains	569.06	0.045	25.61

Storage Available (m^3) =	25.61
Storage Required (m^3) =	18.31

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m3)
Roof Drains	569.06	0.075	42.68

Storage Available (m^3) =	42.68
Storage Required (m^3) =	35.92

Roof Drain Flow for Area B2

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	3	
	5-Year	100-Year
Rooftop Storage (m^3)	25.61	42.68
Storage Depth (m)	0.045	0.075
Flow (Per Roof Drain) (L/s)	0.54	0.90
Total Flow (L/s)	1.62	2.70

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, See attached sheets
*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	0.54
	0.24	20	0.72
	0.30	25	0.90
	0.36	30	1.08
	0.42	35	1.26
	0.48	40	1.44
5-year	0.54	45	1.62
	0.60	50	1.80
	0.66	55	1.98
	0.72	60	2.16
	0.78	65	2.34
	0.84	70	2.52
100-year	0.90	75	2.70
	0.96	80	2.88
	1.02	85	3.06
	1.08	90	3.24
	1.14	95	3.42
	1.20	100	3.60
	1.26	105	3.78
	1.32	110	3.96
	1.38	115	4.14
	1.44	120	4.32
	1.50	125	4.50
	1.56	130	4.68
	1.62	135	4.86
	1.68	140	5.04
	1.74	145	5.22
	1.80	150	5.40

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

Storage Requirements for Area B3-B13

5-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	B4 Runoff (L/s)	B5 Runoff (L/s)	B6 Runoff (L/s)	B7 Runoff (L/s)	B8 Runoff (L/s)	B9 Runoff (L/s)	B10 Runoff (L/s)	B11 Runoff (L/s)	B12 Runoff (L/s)	B13 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
20	70.3	56.80	49.67	21.34	36.82	102.71	3.18	74.26	55.27	13.20	55.07	213.89	195.00	487.21	584.65
25	60.9	49.24	43.06	18.50	31.91	89.03	2.75	64.37	47.91	11.44	47.74	185.41	195.00	396.36	594.54
30	53.9	43.61	38.13	16.38	28.26	78.84	2.44	57.00	42.43	10.13	42.28	164.19	195.00	328.69	591.64
35	48.5	39.23	34.30	14.74	25.43	70.93	2.19	51.28	38.17	9.12	38.04	147.72	195.00	276.15	579.92
40	44.2	35.73	31.24	13.42	23.16	64.60	2.00	46.70	34.76	8.30	34.64	134.52	195.00	234.07	561.78
45	40.6	32.85	28.73	12.34	21.29	59.40	1.84	42.94	31.97	7.63	31.85	123.70	195.00	199.54	538.77
50	37.7	30.45	26.62	11.44	19.73	55.05	1.70	39.80	29.62	7.08	29.52	114.64	195.00	170.65	511.95

Maximum Storage Required 5-Year (m^3) =	594.54

100-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	B4 Runoff (L/s)	B5 Runoff (L/s)	B6 Runoff (L/s)	B7 Runoff (L/s)	B8 Runoff (L/s)	B9 Runoff (L/s)	B10 Runoff (L/s)	B11 Runoff (L/s)	B12 Runoff (L/s)	B13 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
25	103.8	93.56	81.86	35.08	60.67	169.47	5.53	122.00	91.10	21.98	90.47	353.84	245.00	880.57	1,320.85
30	91.9	82.77	72.42	31.04	53.67	149.92	4.89	107.93	80.59	19.45	80.04	313.02	245.00	750.73	1,351.31
35	82.6	74.40	65.09	27.90	48.24	134.76	4.40	97.01	72.44	17.48	71.94	281.37	245.00	650.04	1,365.09
40	75.1	67.70	59.23	25.39	43.90	122.63	4.00	88.28	65.92	15.91	65.47	256.04	245.00	569.48	1,366.74
45	69.1	62.21	54.43	23.33	40.34	112.69	3.68	81.12	60.57	14.62	60.16	235.28	245.00	503.42	1,359.22
50	64.0	57.62	50.41	21.61	37.36	104.37	3.41	75.13	56.10	13.54	55.72	217.91	245.00	448.18	1,344.54
55	59.6	53.72	47.00	20.14	34.83	97.30	3.18	70.05	52.30	12.62	51.94	203.16	245.00	401.24	1,324.10

Maximum Storage Required 100-Year (m^3) =	1,366.74

Storage Occupied In Area Outflow

5-Year Storm Event

	Water Elev. (m) =		80.78		
Location	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
Dry Retenion Area	80.36	2,823.31	0.42	0.42	666.39

Storage Available (m^3) = 666.39	*
Storage Required (m^3) = 594.54	

100-Year Storm Event

	Water Elev. (m) =		81.02		
Location	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
Dry Retenion Area	80.36	3,018.45	0.66	0.66	1,367.10

Storage Available (m^3) = 1,367.10	*
Storage Required (m^3) = 1,366.74	

*Available Storage calcualted from AutoCAD

TEMPEST Product Submittal Package R1

Date: January 4, 2019

Customer: McIntosh Perry

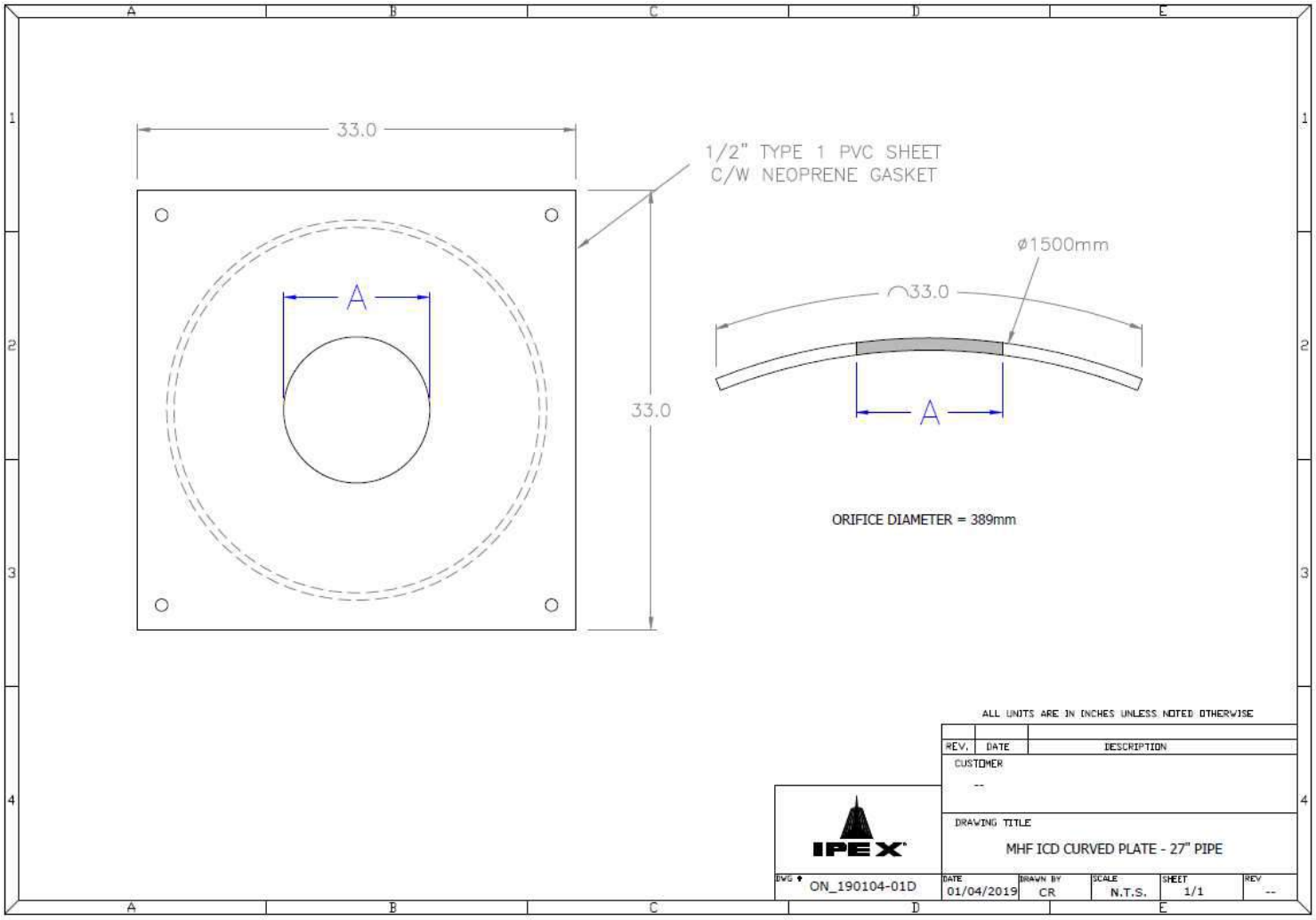
Contact: Tyler Ferguson

Location: Ottawa

Project Name: Sysco Tannis Facility Expansion

IPEX

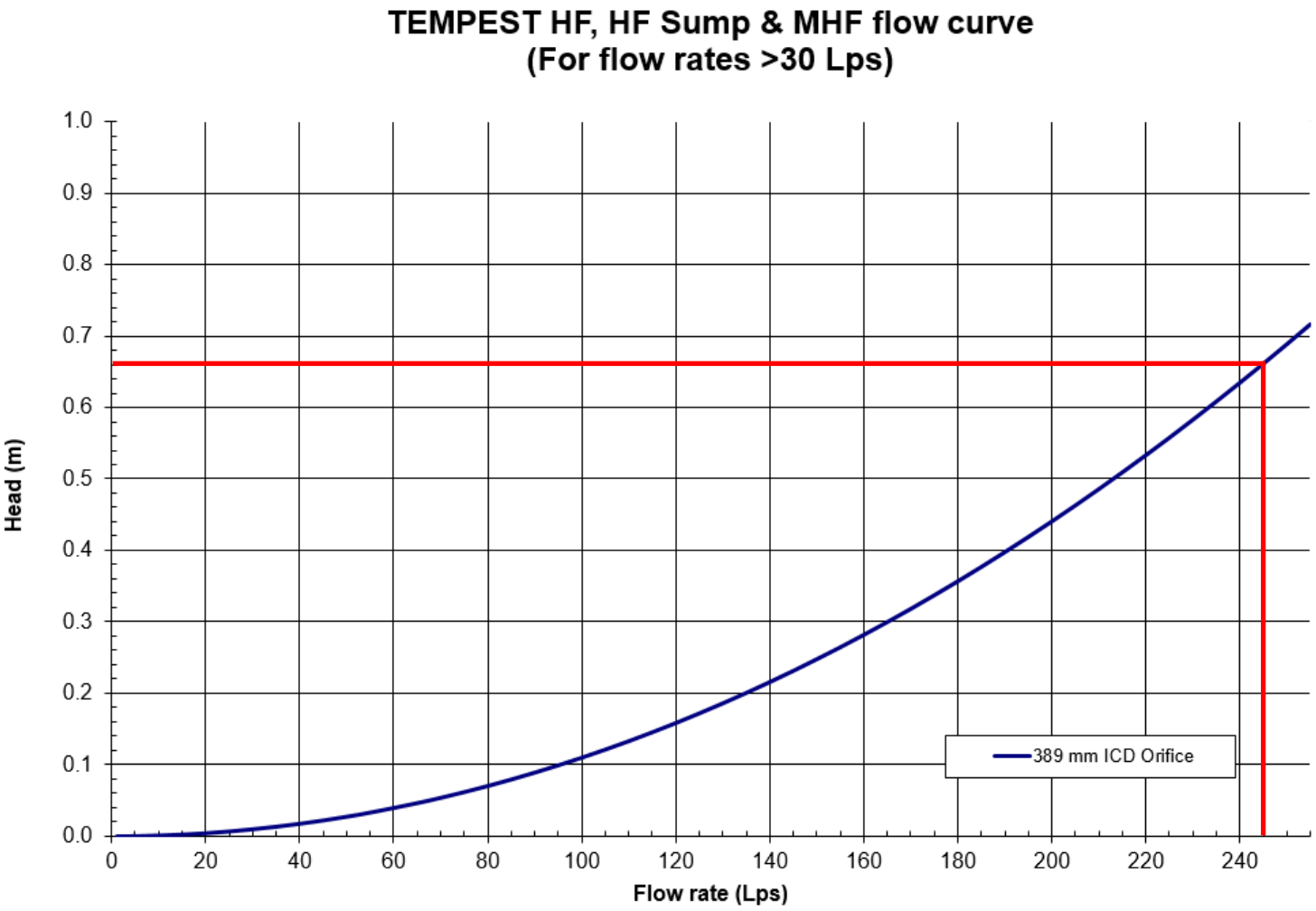
Tempest MHF Plate ICD Rd Shop Drawing



IPEX

MHF Plate ICD Flow Curve

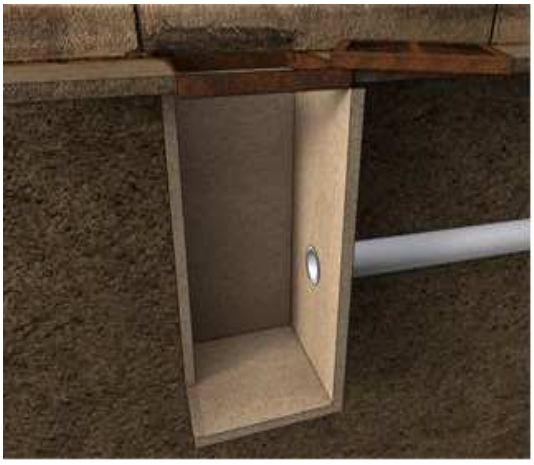
Flow: **245 L/s**
Head: **0.66 m**

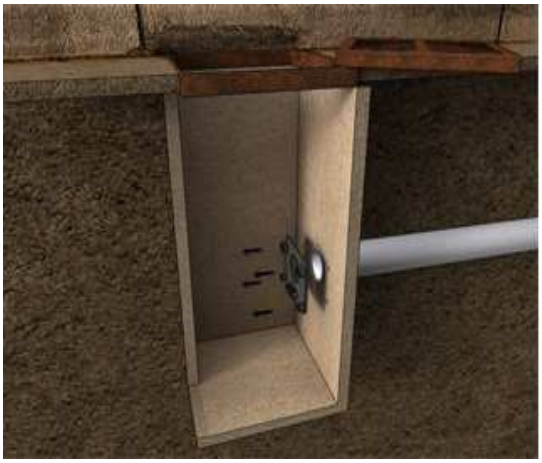


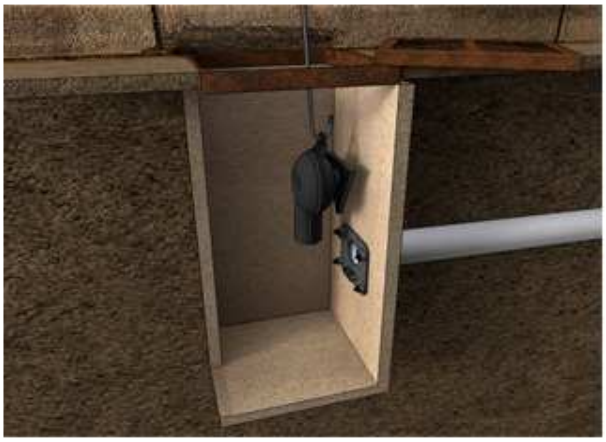
IPEX

Square CB Installation Notes:

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





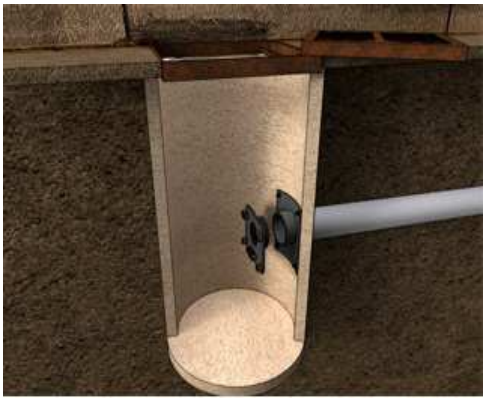


IPEX

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

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






CAUTION/WARNING/DISCLAIM:

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

IPEX

IPEX TEMPEST Inlet Control Devices Technical Specification

General

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

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

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

ICD's must have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

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

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

Area = 6.53 ha
C Value 0.80
CDS Model: PMSU3035_6
Flowrate: 105 l/s
IDF Data: Ottawa
PSD: Fine

Upstream Storage:
Storage 1367 m^3

Engineer: Mcintosh Perry
Contact: Tyler Ferguson, E.I.T.
Date: 11-Sep-18

Project: 2390 Stevenage Drive
Location: Ottawa, ON
OGS ID: CDS

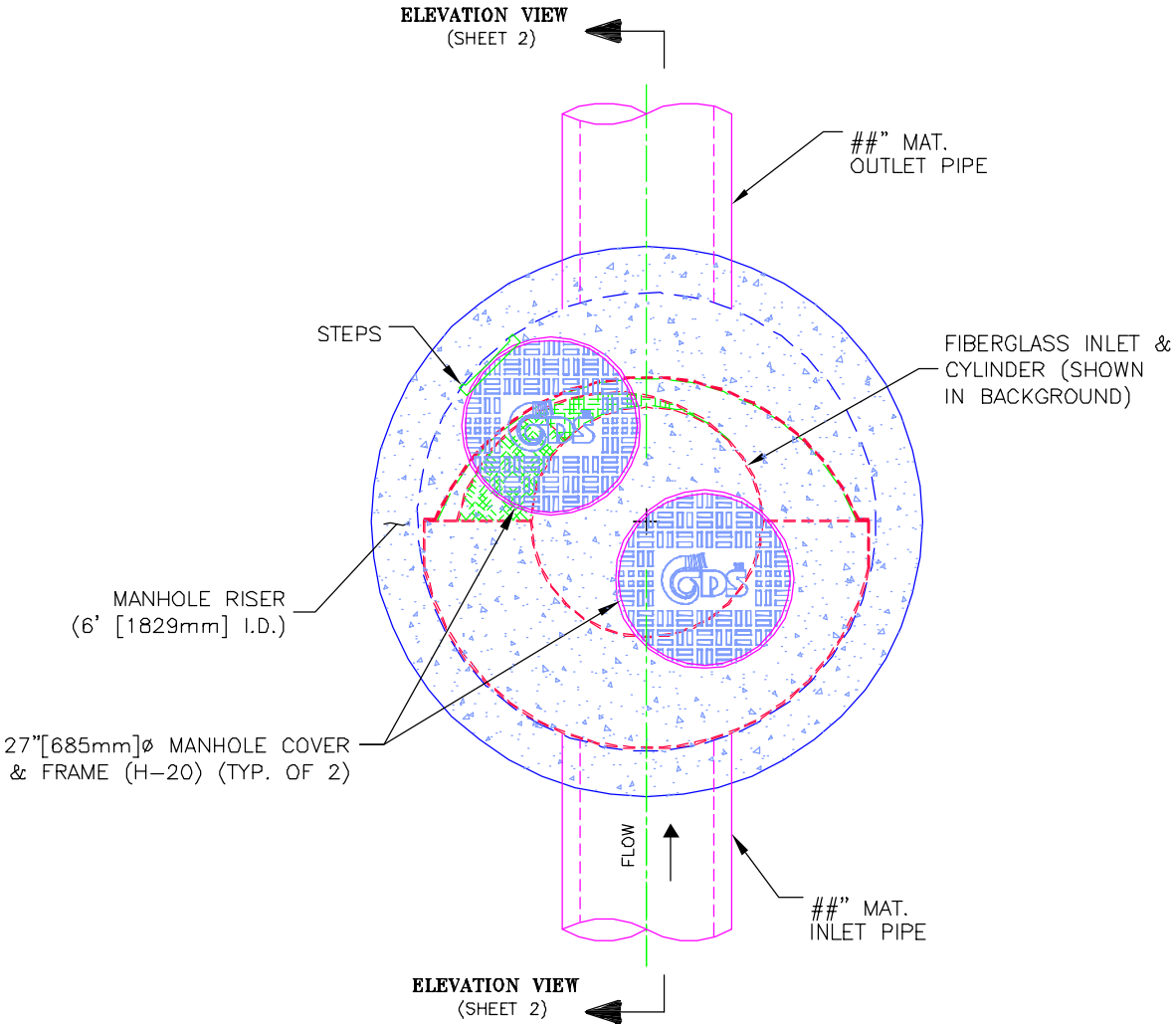
Return	Period	Peak Flow	TSS Percentage Captured	Treated Flow Volume	Total Flow Volume	Annual Exceedance Probability	System Flow	CDS Flow	By-Pass Flow	Volume Percentage Treated
month / yr	Yr	l/s	%	litres	litres	%	l/s	l/s	l/s	%
1-M	0.08	8.16	97.34	27510	27510	**100.00**	8.16	8.16	0.00	100.00
2-M	0.17	26.04	94.04	91159	91159	**99.75**	26.04	26.04	0.00	100.00
3-M	0.25	40.37	91.38	144180	144180	**98.17**	40.37	40.37	0.00	100.00
4-M	0.33	53.15	89.01	192649	192649	**95.04**	53.15	53.15	0.00	100.00
5-M	0.42	62.88	87.20	230464	230464	**90.91**	62.88	62.88	0.00	100.00
6-M	0.50	72.62	85.39	268278	268278	**86.47**	72.62	72.62	0.00	100.00
7-M	0.58	79.76	84.05	296969	296969	**82.01**	79.76	79.76	0.00	100.00
8-M	0.67	86.90	82.72	325661	325661	**77.67**	86.90	86.90	0.00	100.00
9-M	0.75	94.04	81.38	354352	354352	**73.64**	94.04	94.04	0.00	100.00
10-M	0.83	99.53	80.23	376050	377206	**69.90**	99.53	99.53	0.00	99.73
11-M	0.92	105.03	79.08	397748	400059	**66.40**	105.03	104.77	0.26	99.45
1-Yr	1	110.53	77.93	419446	422913	**63.21**	110.53	104.77	5.76	99.18
2-Yr	2	154.36	65.46	526835	614438	**39.35**	154.36	104.77	49.59	85.74
5-Yr	5	235.43	49.45	676331	1022784	**18.13**	235.43	104.77	130.66	66.13
10-Yr	10	413.74	30.17	1007652	2429458	**9.52**	413.74	104.77	308.97	41.48
25-Yr	25	556.83	23.79	1168395	3519397	**3.92**	556.83	104.77	452.06	33.20
50-Yr	50	801.75	19.51	1237410	4505605	**1.98**	801.75	104.77	696.98	27.46
100-Yr	100	997.33	17.53	1256310	5074467	**1.00**	997.33	104.77	892.56	24.76
Average Annual TSS Removal Efficiency [%]:					**81.9**	Ave. Ann. T. Volume [%]:				**96.8**

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 PMSU30_35m
STORM WATER TREATMENT UNIT
FLOW RATE 106 L/S

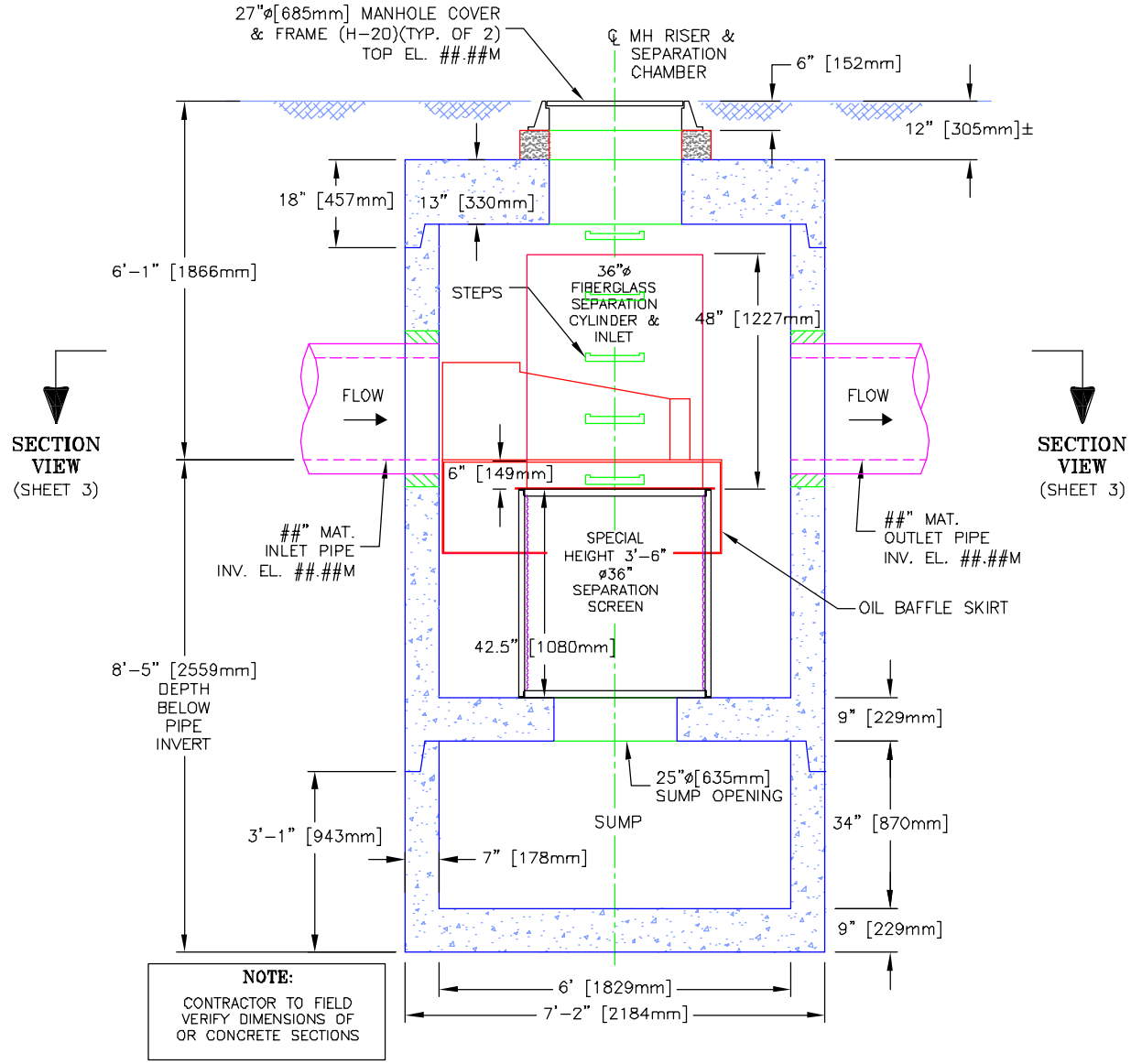
CONTECH STORMWATER SOLUTIONS

PROJECT NAME
CITY, STATE

JOB#	CAN-##-###	SCALE 1" = 2.5'
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

ELEVATION VIEW

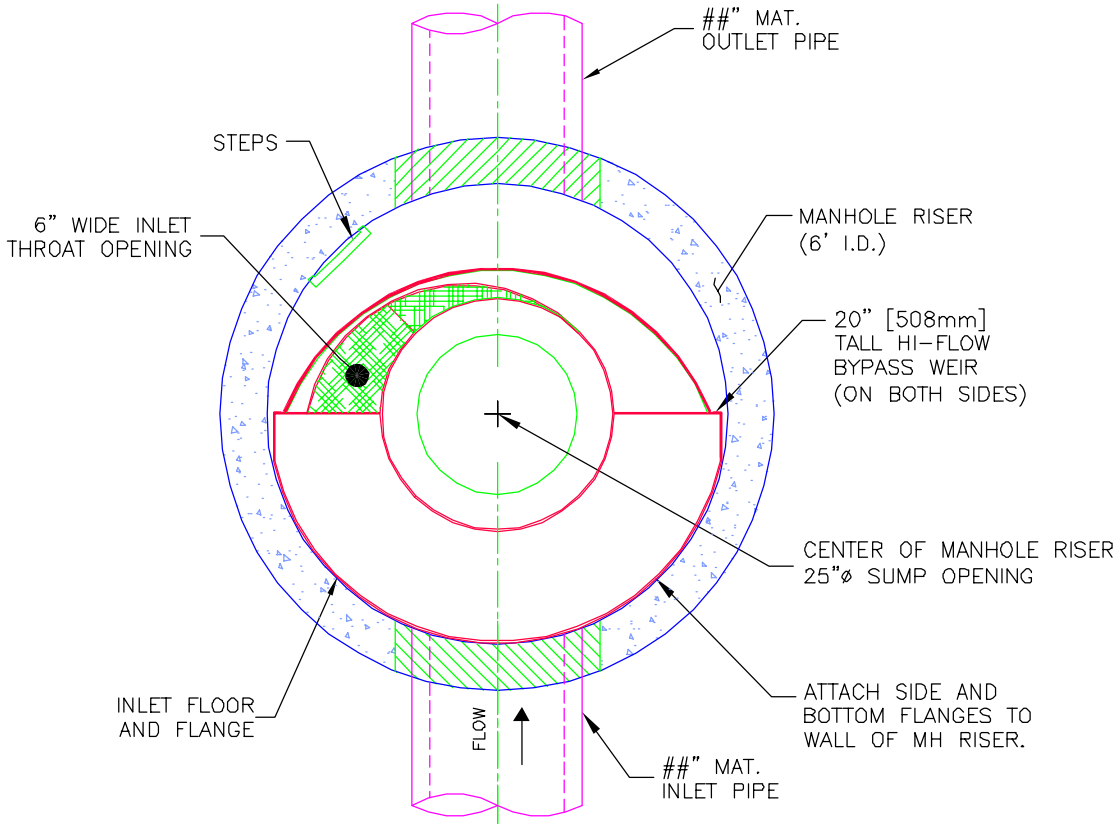


CDS MODEL PMSU30_35m
STORM WATER TREATMENT UNIT
FLOW RATE 106 L/S

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# CAN-##-###	SCALE 1" = 3'
		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

SECTION VIEW



NOTES:

1. ALL CONCRETE COMPONENTS SHALL BE CONSTRUCTED PER ASTM C-478.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

CDS MODEL PMSU30_35m
STORM WATER TREATMENT UNIT
FLOW RATE 106 L/S

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# CAN-##-###	SCALE 1" = 2.5'
		DATE ##/##/##	SHEET 3
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

McINTOSH PERRY

City of Ottawa

4. Development Servicing Study Checklist

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

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

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	On Cover
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix E
☐ Plan showing the site and location of all existing services.	Site Servicing Plan (C102)
☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Summary of pre-consultation meetings with City and other approval agencies.	Appendix A
☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

☐ Identification of existing and proposed infrastructure available in the immediate area.	N/A
☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐ Proposed phasing of the development, if applicable.	N/A
☐ Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Backround Studies
☐ All preliminary and formal site plan submissions should have the following information: ○ 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	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	N/A
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Appendix B
☐ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐ Address reliability requirements such as appropriate location of shut-off valves	N/A
☐ Check on the necessity of a pressure zone boundary modification.	N/A
☐ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	N/A

☐ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☐ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix B
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	N/A
☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Sanitary Sewer

☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	N/A
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Sanitary Sewer
☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐ Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0 Stormwater Management
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
☐ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5-year event (dependent on the receiving sewer design) to 100-year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 6.0 Stormwater Management
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0 Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Stormwater Management
☐ Set-back from private sewage disposal systems.	N/A
☐ Watercourse and hazard lands setbacks.	N/A
☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	Appendix F

☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Site Grading, Drainage, Sediment & Erosion Control Plan
☐ Calculate pre-and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 6.0 Stormwater Management Appendix F
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Management
☐ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Appendix A
☐ Identification of potential impacts to receiving watercourses	N/A
☐ Identification of municipal drains and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Stormwater Management
☐ 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0 Sediment & Erosion Control
☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐ Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Criteria	Location (if applicable)
☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	N/A
☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐ Changes to Municipal Drains.	N/A
☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	Section 8.0 Summary Section 9.0 Recommendations
☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	All are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped