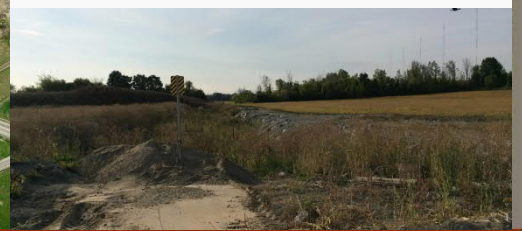


**McINTOSH
PERRY**



CONSTRUCTION (Ontario) LTD.



Myers Bodyshop – Proposed Bodyshop and Future Dealership

550 Dealership Drive, City of Ottawa

Site Servicing and Stormwater Management Report

Prepared for:

BBS Construction
1805 Woodward Drive
Ottawa, ON
K2C 0P9

Prepared by:

McIntosh Perry
115 Walgreen Road
Carp, ON
K0A 1L0

December 2nd, 2016
REV05: June 28, 2019
CP-16-0421

www.mcintoshperry.com

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1.0 PROJECT DESCRIPTION

1.1 Purpose

This report will address the servicing (water, sanitary, and storm) and stormwater management requirements associated with the proposed development located at 550 Dealership Drive within the City of Ottawa.

1.2 Site Description

The property is located at 550 Dealership Drive within the approved Citi Gate 416 Corporate Campus Development (City File Number D07-16-12-0023). It is described as Block 10, Registered Plan 4M-1538, City of Ottawa. The land in question covers approximately 2.14 ha and is located at the future intersection of Dealership Drive and Citi Gate Drive.

The existing site is currently un-developed and is made up of grass areas, low lying vegetation and two stock piles of clay and top soil. The existing site has been serviced with water, sanitary and storm lateral stubs as well as the downstream SWM facility as part of the Citi Gate development.

The proposed development consists of a 1,570 m² body shop and a 1,164 m² future addition. Parking and drive aisles will be provided throughout the site along with landscaping. There will be two site accesses for the development extending from Dealership Drive and a future connection to Citi Gate Drive.



Figure 1: Key Map: 550 Dealership Drive, Ottawa

2.0 BACKGROUND STUDIES

Background studies that have been completed for the site include review of the City of Ottawa as-built drawings, Citi Gate 416 Corporate Campus Development plans and reports, a topographical survey of the site, a geotechnical report and a traffic impact statement.

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

The original Citi Gate 416 Corporate Campus Development plans and reports (City File Number D07-16-12-0023) were reviewed for the Block 10 specific design criteria.

A topographic survey of the site was completed by McIntosh Perry Survey Inc. (MPSI) dated September 28th, 2016, and can be found under separate cover.

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

- Geotechnical Investigation completed by Paterson Group dated September 23rd, 2016.
- Traffic Impact Statement completed by McIntosh Perry dated November 2016.

3.0 PRE-CONSULTATION SUMMARY

City of Ottawa Staff have been pre-consulted regarding this proposed development in person on October 26th, 2016. 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 as outlined in the approved Citi Gate report (Section 6.1.1, Citi Gate Lands – West Side of O’Keefe Drain).
- Ponding of water shall not exceed 0.35 m for the 100-year storm event within the asphalt parking areas.
- Quality control is provided via the existing SWM pond design as part of the Citi Gate Development (Block 12) and is located downstream on the site.

Correspondence with the City can be found in Appendix ‘A’.

4.0 EXISTING SERVICES

4.1 Dealership Drive

There is an existing 450 mm diameter concrete sanitary main located within Dealership Drive as well as a 1,350 mm diameter concrete storm sewer. There is also a 250 mm diameter watermain within Dealership Drive that is looped to Philsar Street through the adjacent Block 9.

The watermain services the adjacent property as well as the fire hydrants along the Dealership Drive. The existing hydrants are located along the south side of Dealership Drive.

There is an existing private 825 mm diameter concrete private storm stub within an existing 6.0 m easement along the east property line that services the adjacent Block 9 (undeveloped) and Block 8 (Honda dealership). A 200 mm diameter PVC sanitary stub and a 200 mm PVC water stub have been extended into the site from Dealership Drive west of the existing fire hydrant.

5.0 SERVICING PLAN

5.1 Water Servicing

A new 200 mm PVC diameter water lateral will be connected to the existing 200 mm PVC water stub that was extended from Dealership Drive, complete with the existing water valve located at the property line. A private hydrant will be located within the site along the north property line.

The proposed building will be equipped with a sprinkler system for fire protection. The required fire protection from the Ontario Building Code (OBC) is 6,300 L/min (See Appendix 'B' for calculation); this is increased to 9,000 L/min with the future addition. The required fire protection from the Fire Underwriters Survey (FUS) is 5,000 L/min (provided for information purposes only); this is increased to 6,000 L/min with the future addition. Both of these required fire flows are consistent with the flows calculated within the Citi Gate SWM report for Large and Medium size buildings (Section 5.3, Table 5.5 of the Citi Gate report). The Citi Gate report states that the proposed watermain is capable of meeting all design criteria for the initial and ultimate buildout. Boundary conditions obtained from the City of Ottawa are included in Appendix 'B'.

The water demands for the new buildings have been calculated as per the Ottawa Design Guidelines – Water Distribution and are as follows: the average and maximum daily demands are 0.87 L/s and 1.30 L/s respectively. The maximum hourly demand was calculated as 2.34 L/s (Refer to Appendix 'B' for flow details). Boundary conditions have been provided by the City of Ottawa and can be found in Appendix 'B'.

5.2 Sanitary Servicing

A new 200 mm diameter gravity sanitary service will be connected to the existing 200 mm diameter SDR35 PVC sanitary stub extended from Dealership Drive. The sanitary service will be complete with a maintenance manhole (SAN MH1A) just inside the property line as per the Ottawa Sewer Design Guidelines (SDG) SD002, October 2012, City of Ottawa, Clause 4.4.4.7 and City of Ottawa Sewer-Use By-Law 2003-514 (14).

The peak design flow for the proposed site was determined to be 0.3 L/s, therefore the proposed 200 mm diameter lateral has sufficient capacity to convey the flows (See Appendix 'C' for detailed calculations). It is anticipated that there will be no issues with capacity constraints within the proposed lateral or the existing sanitary main within Dealership Drive as the amount of flow leaving the site is below the flow calculation of 1.86 L/s within the Citi Gate report. This flow was determined using the building occupancy and car wash load.

Therefore, the proposed 200 mm sanitary lateral on site has the capacity to accommodate the sanitary flows for the proposed development.

5.3 Storm Servicing

Site runoff within the development area will sheet flow to the new storm network within the parking lot areas. The new storm network will direct runoff to the existing 825 mm diameter storm stub along the east property line before outletting to the existing MOECC approved SWM facility. The storm system will be further detailed in Section 6.0.

6.0 STORMWATER MANAGEMENT

Stormwater management for this site will be maintained through positive drainage away from the proposed buildings and into a new underground storm sewer system within the site. This SWM plan will protect the receiving waterways from excessive erosion by implementing velocity and quantity control strategies. The storm runoff will enter the pipe system through catch basins (CB's) and catchbasin manholes (CBMH's) located throughout the site. The restricted stormwater runoff will be directed to the existing lateral extended from Dealership Drive; similarly the overland flow route will be directed towards Dealership Drive. The quantitative and qualitative properties of the storm runoff for both the pre- and post-development flows are further detailed below.

6.1 Design Methodology

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

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

C=Runoff coefficient
I=Rainfall intensity in mm/hr.
A=Drainage area in hectares

It is recognized that the rational method tends to overestimate runoff rates. As a by-product of using extremely conservative prediction method, any facilities that are sized using these results are expected to function as intended in real world conditions.

In conjunction with the City of Ottawa Sewer Design Guidelines the following runoff coefficients were used to develop a balanced 'C' for each drainage area:

Building roofs, Asphalt, Concrete	0.90
Grass, undeveloped areas	0.20
Gravel	0.60

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

As per the pre-consultation meeting with the City of Ottawa the time of concentration (Tc) used for pre-development and post-development flows shall be calculated using a time of concentration (Tc) of 20 minutes and 10 minutes, respectively.

6.2 Site Drainage

6.2.1 Pre-Development Drainage

The existing site has been demonstrated as drainage area A1. Drawing CP-16-0421 PRE (Appendix 'D') indicates the limits of these drainage areas.

Table 1: Pre-Development Drainage Summary

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	2.14	0.20	0.25	83.4	178.1
Total	2.14			83.4	178.1

(See Appendix 'F' for Calculations)

6.2.2 Post-Development Drainage

The proposed site has been demonstrated as drainage areas B1-B9. Drawing CP-16-0421 Post (Appendix 'E') indicates the limits of these drainage areas.

Table 2: Post-Development Runoff Calculations

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
B1	0.11	0.20	0.25	6.6	14.1
B2	0.21	0.77	0.86	47.7	91.4
B3	0.31	0.86	0.96	76.6	146.6
B4	0.34	0.84	0.94	82.4	158.0
B5	0.40	0.20	0.25	23.0	49.4
B6	0.14	0.85	0.94	34.8	65.9
B7	0.19	0.65	0.73	35.9	69.1
B8	0.32	0.71	0.79	65.1	124.1
B9	0.12	0.90	1.00	30.3	57.8
Total	2.14			402.5	776.3

(See Appendix 'F' for Calculations)

Runoff from areas B2 through B9 will be restricted before outletting to the existing private storm system through Blocks 8 and 9. The total flow leaving the site will be controlled by an inlet control device located within CBMH#2 and account for the unrestricted flow leaving the site. See Appendix 'F' for calculations. This restriction and quality runoff control will be further detailed in Sections 6.3 and 6.4.

6.3 Quantity Control

After discussing with City staff the stormwater management criteria for the site, the total post-development runoff for this site has been restricted to match the required flows within the Citi Gate SWM report (See Appendix 'A' for pre-consultation notes). These values create the following allowable release rates and storage volume for the development site.

Table 3: Allowable Release Rates and Required Storage Volumes

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	2.14	0.80	120%	495.0	594.0

(See Appendix 'F' for Calculations)

Reducing site flows will be achieved using a flow restriction and will create the need for onsite storage. Runoff from areas B2 through B9 will be restricted as detailed in the table below.

Table 4: Post-Development Restricted Runoff Calculations

Area	Post-Development Unrestricted (l/s)		Post-Development (Restricted) (l/s)		
	5-yr	100-yr	5-yr	100-yr	
B1	6.6	14.1	6.6	14.1	UNRESTRICTED
B2	47.7	91.4	488.3	497.2	RESTRICTED
B3	76.6	146.6			
B4	82.4	158.0			
B5	23.0	49.4			
B6	34.8	65.9			
B7	35.9	69.1			
B8	65.1	124.1			
B9	30.3	57.8			
Total	402.5	776.3	494.9	511.3	

(See Appendix 'F' for Calculations)

Runoff from Area B2-B9 will be restricted at CBMH#2 through a 398 mm diameter orifice plug. This orifice plug will restrict areas B2-B9 to 488.3 L/s and 497.2 L/s for the 5 and 100-year storm events, respectively. The restriction creates a water surface elevation (WSEL) of 95.31 m for the 5-year storm event and 95.39 m for the 100-year storm event. The storage for this area will be provided above the parking lot structures. Table 5 details the allowable and provided release rates for the site as per the Citi Gate Report.

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 south-east corner of the site away from the building. An elevation difference of 0.36 m has been provided from the finished floor (95.75) of the building to the overland flow route elevation (95.39).

The following table summarizes the storage requirements and the depth of the water ponding during the 2, 5 and 100-year storm events to meet the required storage volumes.

Table 5: Storage Summary

	5-Yr Storm Event	10-Yr Storm Event	25-Yr Storm Event	50-Yr Storm Event	100-Yr Storm Event
Required Storage (m ³)	94.6	131.6	217.3	273.1	325.3
Provided Storage (m ³)	108.6	153.4	243.0	279.5	363.6
Depth of Ponding (m)	0.06 - 0.21	0.08 - 0.23	0.11 - 0.26	0.12 - 0.27	0.14 - 0.29

(See Appendix 'F' for Calculations)

6.4 Quality Control

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. Lot level BMP's typically include temporary retention of the parking lot runoff, minimizing ground slopes and maximizing landscaped areas. This is consistent with the intent of the best management practices for stormwater management as outlined in the Citi Gate Report (2014) and the work invested into re-aligning and protecting the ecological health of O'Keefe drain's aquatic habitat.

As per Section 6.1.1 of the Citi Gate Report a Stormwater Management (SWM) Facility has been constructed on the west side of the O'Keefe Drain as part of the Phase 1 development of the Citi Gate Lands. This facility has been designed to accommodate runoff from all future development within the tributary drainage area, including Phases 1, 2 and adjacent lands. Additionally, the facility has been over-sized to reduce the quantity control storage requirements for the lands on the east side of the O'Keefe Drain.

As the site is on the west side of the O'Keefe Drain, quantity control is provided within the downstream SWM facility. The combination of the above BMP's and the sites flow control measures will aid in the thermal protection of O'Keefe Drain.

7.0 SEDIMENT AND EROSION CONTROL

The site-grading contractor is responsible for ensuring sediment control structures are installed in accordance with the Site Grading and Drainage Plan as indicated. Silt fences shall be installed on site before construction or earth-moving operations begin, as shown on the site plan.

Geosock is to be installed under the grates of all existing structures along the frontage of the site and any new structures immediately upon its installation. The Geosock is to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

At the discretion of the project manager, municipal staff or conservation authority, additional silt control devices shall be installed at designated locations.

8.0 SUMMARY

- A new 1,570 m² body shop and a 1,164 m² future addition will be constructed centrally on the site located at 550 Dealership Drive (Block 10).
- A new 200 mm diameter sanitary service and monitoring manhole will be installed and connected to the existing 200 mm diameter stub within Dealership Drive.
- A new 200 mm diameter water lateral will be extended from the existing 200 mm diameter stub to the private hydrant then reduced to a service the new building.
- A new storm network will be installed onsite and connect to the existing 825 mm storm lateral extended into the site from Blocks 8 and 9.
- As discussed with the City of Ottawa staff, the stormwater management design will ensure that the post-development flow rates conform to the allowable release rates from the Citi Gate SWM Report for the entire site area.
- Storage for the 5- through 100-year storm events will be provided within the parking lot areas above the proposed storm structures and on the proposed flat roof.
- An MOECC approved downstream SWM Facility (Block 12) has been constructed as part of the Citi Gate Development to ensure 80% TSS removal is achieved for the site.

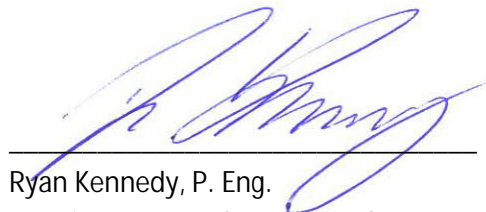
9.0 RECOMMENDATION

We respectfully recommend that:

This revised report, dated June 28, 2019 combined with the Lot Grading, Drainage, Sediment and Erosion Control Plan and the Site Servicing and Utility Plan be approved for engineering details.

The sediment and erosion control plan outlined in Section 7.0 and detailed in the Lot Grading, Drainage, Sediment and Erosion Control Plan notes are to be implemented by the contractor.

This report is respectfully being submitted for approval.



Ryan Kennedy, P. Eng.
Practice Area Lead, Land Development
613-903-5766
R.Kennedy@mcintoshperry.com

APPENDIX A: CITY OF OTTAWA PRE-CONSULTATION NOTES

Jonathan Jonker

From: Curtis Melanson
Sent: November-09-16 3:00 PM
To: Jonathan Jonker
Subject: FW: 550 Dealership Drive - Pre-Consulation Follow-up

Follow Up Flag: Follow up
Flag Status: Completed

FYI

Curtis Melanson

T. 613.836.2184 (2240) | F. 613.836.3742



From: Bernier, John [mailto:John.Bernier@ottawa.ca]
Sent: November-09-16 2:45 PM
To: Curtis Melanson
Cc: Shillington, Jeffrey; Yousfani, Asad; Frits Bosman (frits@bbsconstruction.ca); Gavin Barrowman; David Traher (dtraher@myers.ca)
Subject: RE: 550 Dealership Drive - Pre-Consulation Follow-up

Good afternoon Curtis,

Given the rationale below, a transportation brief is no longer a requirement for a complete submission. I apologize for the extra effort that this may have required.

Please keep me posted on when you plan to submit and let me know if you have any further questions.

Kind regards,

John Bernier

Planner

Development Review - South

Planning, Infrastructure and Economic Development Department

City of Ottawa | Ville d'Ottawa

☎ 613.580.2424 ext/poste. 21576

ottawa.ca/planning / ottawa.ca/urbanisme

*****Absence alert: Please note that I will be out of the office as of November 11th and will be returning to the office on November 15th*****

From: Curtis Melanson [mailto:c.melanson@mcintoshperry.com]
Sent: Tuesday, November 08, 2016 11:21 AM
To: Bernier, John

Cc: Shillington, Jeffrey; Yousfani, Asad; Frits Bosman (frits@bbsconstruction.ca); Gavin Barrowman; David Traher (dtraher@myers.ca)

Subject: RE: 550 Dealership Drive - Pre-Consultation Follow-up

Hi John,

Thanks for the information. Our traffic engineer reached out to Asad directly to discuss the requirement of a Traffic Brief, he's calculated the expected trip generation for the proposed Myers body shop on Dealership drive based on the ITE trip generation manual. The assumed land use was "Automobile Care Centre" [ITE#942] as this was thought to be the most similar land use to the actual body shop use. The generated trips are expected to be:

- 49 trips during the morning peak hour; and,
- 64 trips during the afternoon peak hour.

As per the city of Ottawa's Transportation Impact Assessment Guidelines, a Transportation Brief is triggered when the total number of expected trips generated during the peak hour is between 76 vph and 150 vph (please see table 4 in the attached document). Below 76 generated trips, it identifies that no assessment is required.

As the site is well below the 76 vph I trust that this is enough information to alleviate us from having to complete a Transportation Brief.

If you could please confirm at your earliest convenience it would be greatly appreciated. We are aiming to submit a package in the coming weeks and want to make sure we have all the right documentation for a complete submission.

Thank you for your time.

Best Regards,

Curtis Melanson

T. 613.836.2184 (2240) | F. 613.836.3742



From: Bernier, John (<mailto:John.Bernier@ottawa.ca>)

Sent: November-07-16 11:05 AM

To: Curtis Melanson

Cc: Shillington, Jeffrey; Yousfani, Asad

Subject: FW: 550 Dealership Drive - Pre-Consultation Follow-up

Good morning Curtis,

The transportation requirements for this site are as follows:

A Transportation Brief (TB) is required for this proposal. The TB will evaluate the existing primary intersection & driveways, which will service the proposal. Also, the TB will identify any specific road modifications, which are necessary to safely accommodate the site generated traffic.

Please include **9 copies** of this brief with your submission.

Best regards,

John Bernier
Planner

From: Bernier, John
Sent: Friday, November 04, 2016 5:12 PM
To: 'Curtis Melanson'
Cc: Shillington, Jeffrey
Subject: 550 Dealership Drive - Pre-Consultation Follow-up

Good afternoon,

It was nice meeting you for a pre-application consultation (PC2016-0314) on October 26th, 2016, regarding 550 Dealership Drive. We met to discuss the development of an autobody shop and associated parking area.

The following is a brief summary of our meeting and the requirements of a formal application:

Planning Comments:

1. A design brief/cover letter will be required which discusses how this property is meeting relevant policy. Attention should be directed to the Citi Gate Design Guidelines and the Secondary Plan – ie. A high proportion of the lot area should be dedicated to landscaping.
2. More landscaping internally – such as caps at the end of parking rows.
3. Define the spaces on the site plan, such as visitor parking area, storage, etc.
4. Add zoning table.
5. Identify approximate location of spaces within the building and their proportions.
6. Show snow storage.
7. Add directional sign and detail for the shared entrance and for any other signs on the property.
8. Add accessible parking.
9. Include address and legal description of lands.

Design Comments:

10. Greater emphasis should be placed on the landscape treatment on both Dealership Drive and future Nortel Drive.

Transportation:

11. To be confirmed.

Engineering Comments:

12. The servicing design should conform to the Citi Gate – 416 Corporate Campus – Detailed Servicing and Stormwater Management Report (Phase 1), dated October 1, 2014.
13. Section 6.1.1 of the above report, outlines the Allowable release rates and storage requirements for the individual sites:
 - a. Based on a runoff coefficient of C=0.80
 - i. the 5 year peak flow can be released uncontrolled

- ii. the maximum release rate is not to exceed 120% of the 5-year peak flow for all storms up to and including the 100-year event.
 - iii. Ensure no overland flow for all storms up to and including the 100-year event.
14. Should be no issues with sanitary and water.
15. Please pre-consult with the MOE regarding if an MOE ECA (direct submission) is required for an industrial use.
16. The private storm sewers along the front of Blocks 8, 9 and 10 do not have an MOE ECA for them. I believe this may have been because at the time they were all under the ownership of Regional Group and therefore not required. Now that the Blocks are under separate ownership I believe that an MOE ECA (transfer of review) is required. Please confirm with the MOE.

The posed application will be a (New, Manager Approval, Public Consultation) [Application](#), which costs \$20,684.31 (click here for exact [fees](#)), plus the engineering design review and inspection fee, legal fees, as well as conservation authority fee.

Please find attached the “Applicant’s Study and Identification List” including the number of copies required for each in order for the application to be deemed complete. Here is the link to the guide for preparing studies and plans: <http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans>

Best regards,

John Bernier

Planner

Development Review - South

Planning, Infrastructure and Economic Development Department

City of Ottawa | Ville d'Ottawa

☎ 613.580.2424 ext/poste. 21576

ottawa.ca/planning / ottawa.ca/urbanisme

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APPENDIX B: EXISTING WATERMAIN FLOW AND FIRE CALCULATIONS

550 DEALERSHIP DRIVE - OBC FIRE PROTECTION CALCULATIONS

Pg 1 of 1
10-Nov-16

Project:	550 DEALERSHIP DRIVE - WITHOUT ADDITION
Project No.:	CP-16-0421
Designed By:	JMJ
Checked By:	CJM
Date:	November 10, 2016

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

Water Supply for Fire-Fighting - Store/Office & Warehouse Building

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

Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearing walls, columns and arches.

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

(a) $Q = K \times V \times Stot$

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 = $1.0 + [S_{side1} + S_{side2} + S_{side3} + \dots \text{etc.}]$

K	14	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	15,943	(Total building volume in cu.m.)
Stot	1.0	(From figure 1 pg A-32)
Q =	223,205.42 L	

From Figure 1 (A-32)

Snorth	45 m	0.0
Seast	34 m	0.0
Ssouth	97 m	0.0
Swest	29 m	0.0

*approximate distances

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

6300 L/min (if 190,000 L < Q < 270,000 L)

1664 GPM

550 DEALERSHIP DRIVE - OBC FIRE PROTECTION CALCULATIONS

Pg 1 of 1
10-Nov-16

Project:	550 DEALERSHIP DRIVE - WITH ADDITION
Project No.:	CP-16-0421
Designed By:	JMJ
Checked By:	CJM
Date:	November 10, 2016

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

Water Supply for Fire-Fighting - Store/Office & Warehouse Building

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

Building is of noncombustable construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearing walls, columns and arches.

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

(a) $Q = K \times V \times Stot$

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 = $1.0 + [S_{side1} + S_{side2} + S_{side3} + \dots \text{etc.}]$

K	14	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	22,145	(Total building volume in cu.m.)
Stot	1.0	(From figure 1 pg A-32)
Q =	310,027.65 L	

From Figure 1 (A-32)

Snorth	45 m	0.0
Seast	34 m	0.0
Ssouth	97 m	0.0
Swest	29 m	0.0

*approximate distances

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

9000 L/min (if $190,000 L < Q < 270,000 L$)
2378 GPM

Table 1					
WATER SUPPLY COEFFICIENT - K					
TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1. of the Building Code				
	A-2 B-1 B-2 B-3 C D	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches.	10	12	14	17	23
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.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2.	18	22	25	31	41
Building is of combustible construction. 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.	23	28	32	39	53
Column 1	2	3	4	5	6

3.2.2.55.

2006 Building Code



Table 3.2.2.55.
Maximum Building Area, Group D, up to 2 Storeys
Forming Part of Sentence 3.2.2.55.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 000	1 250	1 500
2	800	1 000	1 200
Column 1	2	3	4

A-3.2.5.7. - Div. B

2006 BUILDING CODE COMPENDIUM



Table 2	
OBC Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min)
One-storey building with building area not exceeding 600 m ²	1800
All other buildings	2700 (if $Q \leq 108,000 \text{ L}^{(1)}$) 3600 (if $Q > 108,000 \text{ L}$ and $\leq 135,000 \text{ L}^{(1)}$) 4500 (if $Q > 135,000 \text{ L}$ and $\leq 162,000 \text{ L}^{(1)}$) 5400 (if $Q > 162,000 \text{ L}$ and $\leq 190,000 \text{ L}^{(1)}$) 6300 (if $Q > 190,000 \text{ L}$ and $\leq 270,000 \text{ L}^{(1)}$) 9000 (if $Q > 270,000 \text{ L}^{(1)}$)

Note to Table 2:

(1) $Q = KVS_{to}^{0.5}$ as referenced in Paragraph 3(a)

550 Dealership - Water Demands

Pg 1 of 1
10-Nov-16

Project: 550 Dealership Drive
Project No.: CP-16-0421
Designed By: JMJ
Checked By: CJM
Date: November 10, 2016
Site Area: 2.14 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/(1000m ² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Parks no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Othe Commercial	28,000	L/gross ha/d
AVERAGE DAILY DEMAND	0.87	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	1.30	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	2.34	L/s

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

Project: 550 Dealership Drive - WITHOUT ADDITION
 Project No.: CP-16-0421
 Designed By: JMJ
 Checked By: CJM
 Date: February 22, 2017



1. From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

$F = 220 \times C \times \sqrt{A}$ 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 storeys, but excluding basements at least 50 percent below grade) in the building being considered.

2. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 2,038.78 m²
 Floor Area (Second Floor) = 180.51 m²
 Total Floor Area = 2,219.29 m²

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

3. Calculate Required Fire Flow

$F = 220 \times C \times \sqrt{A}$

C = 0.80
 A = 2,219.29
 $F = 220.00 \times 0.80 \times \sqrt{2,219.29}$
 $F = 8,291.24 \text{ L/min.}$

4. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 2.00

5. Determine Increase or Decrease Based on Occupancy

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

Combustible
 No Change
 $F = 8,291.24 \text{ L/min.}$

6. 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 8,300 L/min – 50% (The building is sprinklered with a standard system and fire department hose lines)

$F = 4,145.62 \text{ L/min.}$

7. Determine the Total Increase for Exposures

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

- There are no existing buildings surrounding the remainder of the site that are within 45m.
- Therefore the charge for exposure is 35% of the value obtained in Step 5.
- 4,200 L/min + (8,300 L/min x 0%)

$F = 4,145.62 \text{ L/min.}$

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 5,000 L/min (1,320 GPM).

The existing fire hydrant does have sufficient capacity to provide fire protection for the proposed building based on the FUS calculations.

MAX HGL = 155.4 m
 MAX DAY + FIRE = 147.1 m
 PROPOSED GRADE = 95.35
 MAX HGL - PROPOSED GRADE X 1.42 = 85.271 Greater than 80 PSI, a PRV will be required
 MAXDAY + FIRE - PROPOSED GRADE X 1.42 = 73.485 Greater than 20 PSI

Project: 550 Dealership Drive - WITH ADDITION
 Project No.: CP-16-0421
 Designed By: JMJ
 Checked By: CJM
 Date: February 22, 2017



1. From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

$F = 220 \times C \times \sqrt{A}$ 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 storeys, but excluding basements at least 50 percent below grade) in the building being considered.

2. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 2,831.82 m²
 Floor Area (Second Floor) = 973.55 m²
 Total Floor Area = 3,805.37 m²

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

3. Calculate Required Fire Flow

$F = 220 \times C \times \sqrt{A}$

C = 0.80
 A = 3,805.37
 $F = 220.00 \times 0.80 \times \sqrt{3805.37}$
 $F = 10,857.03 \text{ L/min.}$

4. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 2.00

5. Determine Increase or Decrease Based on Occupancy

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

Combustible
 No Change
 $F = 10,857.03 \text{ L/min.}$

6. 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 10,900 L/min – 50% (The building is sprinklered with a standard system and fire department hose lines)

$F = 5,428.52 \text{ L/min.}$

7. Determine the Total Increase for Exposures

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

- There are no existing buildings surrounding the remainder of the site that are within 45m.
- Therefore the charge for exposure is 35% of the value obtained in Step 5.
- 5,500 L/min + (10,900 L/min x 0%)

$F = 5,428.52 \text{ L/min.}$

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 6,000 L/min (1,585 GPM).

The existing fire hydrant does have sufficient capacity to provide fire protection for the proposed building based on the FUS calculations.

MAX HGL = 155.4 m
 MAX DAY + FIRE = 147.1 m
 PROPOSED GRADE = 95.35
 MAX HGL - PROPOSED GRADE X 1.42 = 85.271 Greater than 80 PSI, a PRV will be required
 MAXDAY + FIRE - PROPOSED GRADE X 1.42 = 74.337 Greater than 20 PSI

Jonathan Jonker

From: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Sent: December 6, 2016 2:43 PM
To: Jonathan Jonker
Subject: FW: Boundary Conditions at 550 Delarship Dr.docx
Attachments: Boundary Conditions at 550 Delarship Dr.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Jon,

The previously sent Boundary Conditions had an error as the Fire Flow they were using was 5000 L/s rather than the 6000 L/s. Please use the attached for your report.

Jeff

From: Rahman, Mohammad
Sent: Monday, December 05, 2016 10:38 AM
To: Shillington, Jeffrey
Subject: Boundary Conditions at 550 Delarship Dr.docx

Hi Jeff,
Here is the BCs with the revised Fireflow.
Regards,

Mohammad

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

Boundary Conditions at 550 Dealership Dr

Information Provided:

Date provided: 29 November 2016

Criteria	Demand (L/s)
Average Demand	0.87
Maximum Daily Demand	1.30
Peak Hourly Demand	2.34
Fire Flow Demand	100
Maximum Daily + Fire Flow Demand	101.3

Location:



Results:

Connection-1:

Criteria	Head (m)	Pressure (psi)
Max HGL	155.4	85.7
PKHR	148.2	75.5
MXDY + Fire Flow (100 L/s)	147.1	73.8

Considerations:

1. According to the City of Ottawa Water Design Guidelines as well as the Ontario Building Code, the maximum pressure at any point within a distribution system shall not exceed 80 psi in occupied areas. Measures should be taken to try to reduce the residual pressure below 80 psi without the use of special pressure control equipment. In circumstances where the residual pressure cannot be reduced below 80 psi without the use of pressure control equipment, a pressure reducing valve (**PRV**) should be installed at site.

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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

APPENDIX C: SANITARY SEWER CALCULATION



Project Name: 550 Dealership Drive
Ottawa, Ontario

Re: Sanitary Flow Calculations – Final Build-out

1. Building Occupancy

The maximum building occupancy will be 55 persons, similar to other Myers dealerships.

2. Daily Volume in Litres

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

Various buildings and places of employment – e.g. store employees, office workers – depends on facility

- = 75 Liters/Person/Day

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

(Car) Wash – Hand Wash

- = 400 Liters/Car

3. Peak Flow (Q/p)

- $Q_1(p) = F \times P$ Where:
F = Litres/Person/Day (as per City of Ottawa Sewer Design Guidelines)
P = 50 Persons (as per attached email from Architect)
 - Therefore, $Q_1(p) = (75) \times (55) = 4,125 \text{ L/Day (0.048 L/Sec)}$
- $Q_2(p) = F \times P$ Where:
F = 400 Litres/Car (as per City of Ottawa Sewer Design Guidelines)
P = 55 Cars (Daily average)
 - Therefore, $Q_2(p) = (400) \times (55) = 22,000 \text{ L/Day (0.255 L/Sec)}$
- Therefore, $Q_{TOTAL}(p) = Q_1(p) + Q_2(p) = 26,125 \text{ L/Day (0.302 L/s)}$

It is anticipated that there will be no issues with capacity constraints within the existing sanitary main or lateral as the amount of flow leaving the site is negligible. Therefore, the existing sanitary lateral stub within Dealership Drive has the capacity to accommodate the new flows.

(MP File # CP-16-0421)

APPENDIX 4-A

DAILY SEWAGE FLOW FOR VARIOUS ESTABLISHMENTS

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
<ul style="list-style-type: none"> Sewer connected to a SS other than the one at SC <ul style="list-style-type: none"> sewage generated at the CS sewage to connected SS when CS is available sewage to connected SS when no CS available 	per site per site per site	275-375 100(200)-60(150) 125(425)
<i>Sites with no sewer connections. Water supplied by a connection or From a nearby faucet</i>		
<ul style="list-style-type: none"> sewage generated at a nearby CS sewage to vehicle tanks (TRL sites) Grey water to nearby Class 2 SS 	per site per site per site	275-425 60(150)-100(400) 15-25
For more details on designs flows and related assumptions see Section 14-2-16 and Appendix 14.2.1. Figures in brackets are for tank design.		
(CAR) WASH		
- Hand wash	per car	200
- Truck wash	per truck	400
CHURCHES		
- With kitchen facilities	per sanctuary seat	30
- No kitchen facilities	per sanctuary seat	15
- Kitchen wastes – paper service	per meal	5
- Kitchen wastes – normal service	per meal	15
COUNTRY CLUBS		
- Residents	per person	375
- Non residents – no meals	per person	100
- Showers during use	per fixture	1800
- Water closets	per fixture	550
- Wash basins	per fixture	350
- Urinals – hand flush	per fixture	350
- Showers	per person	20
- Day staff	per person	150
DANCE HALLS		
- Hall – washrooms only-per day in use	per m ²	15
- Dance hall restaurant	per seat	125
- Dance hall bar	per seat	20
- Dance hall plus restaurant plus bar	per patron	150

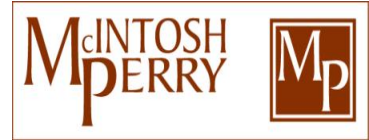
APPENDIX 4-A

DAILY SEWAGE FLOW FOR VARIOUS ESTABLISHMENTS

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
DOG KENNELS	per closure	75
DINING HALLS – see restaurants		
DWELLINGS		
- Single family houses, apartments Condominiums, cottages, etc.	per person	350
- Each dwelling unit of -	1 bedroom	275
- Each dwelling unit of -	2 bedrooms	1100
- Each dwelling unit of -	3 bedrooms	1600
- Each dwelling unit of -	4 bedrooms	2000
- Add for each bedroom over 4	per bedroom	300
- Boarding or Rooming houses	per person	200
- Boarding or Rooming houses without meals or laundry	per person	150
- Non resident staff	per person	40
- Luxury homes – 4 bedrooms	per residence	3000
- Luxury homes – 5 bedrooms	per residence	3500
- Luxury homes – add for each bedroom over 5		500
EMPLOYEES – VARIOUS LOCATIONS		
- Factory or plant workers per day or per shift – includes showers but no industrial	per person	125
- Factory or plant workers as above but no showers	per person	75
- Various buildings and places of Employment – e.g. store employees, Office workers – depends on facilities	per person	75 *
- Medical Office buildings, dental Offices and medical clinics		
- Doctors, nurses & medical staff	per person	275
- Office staff	per person	75
- Patients	per person	25
HOTELS – See Motels		

SANITARY SEWER DESIGN SHEET

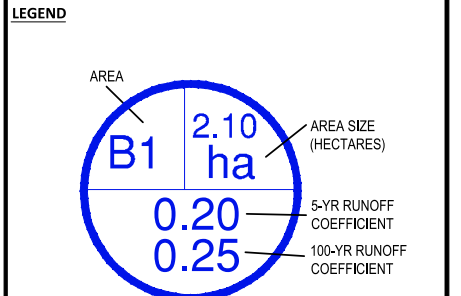
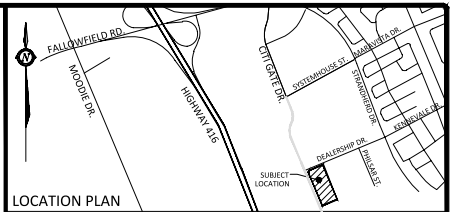
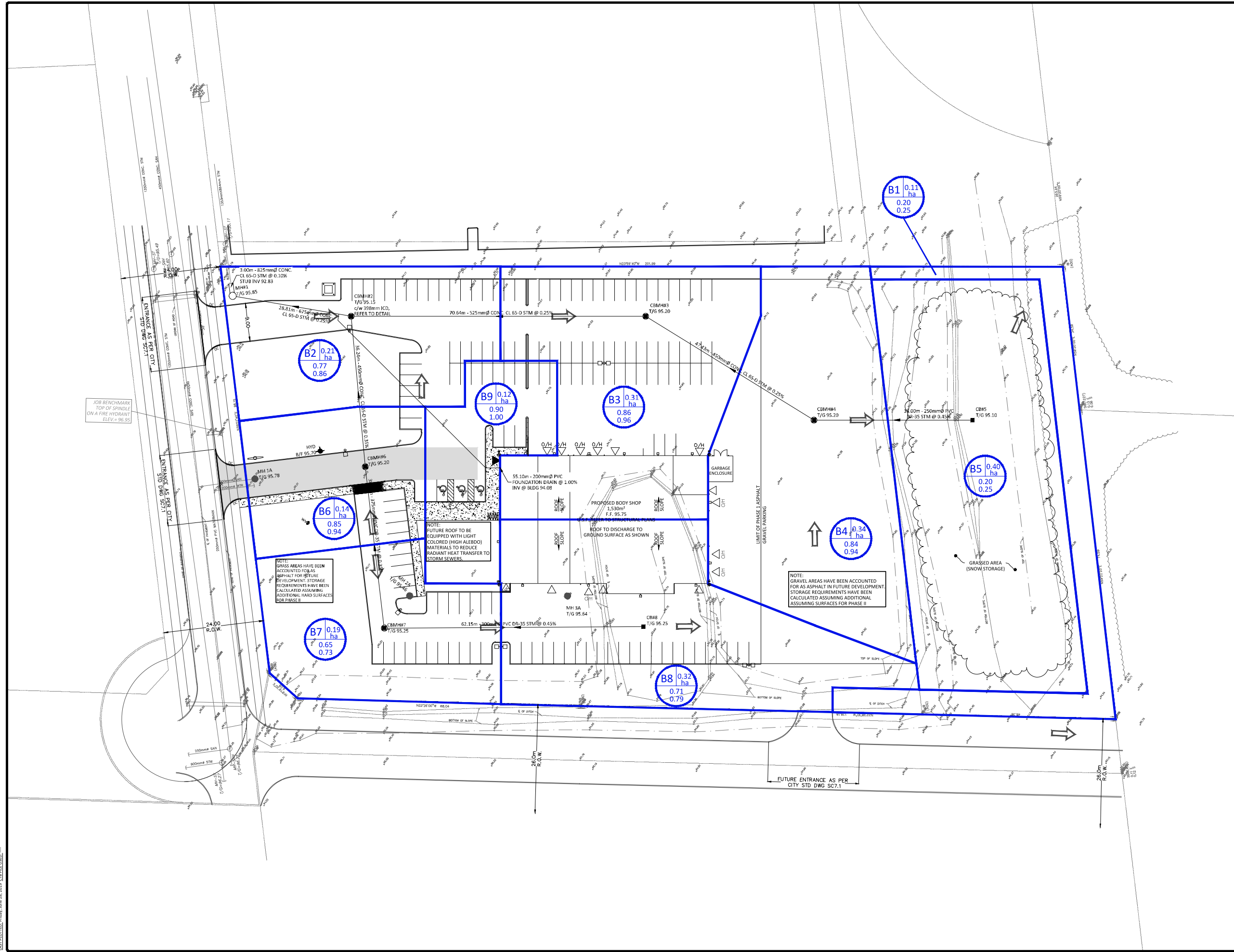
PROJECT: MYERS BODYSHOP
LOCATION: Dealership Drive
CLIENT: BBS Construction (Ontario) Ltd.

[illegible]

APPENDIX D: PRE-DEVELOPEMENT PLAN


APPENDIX E: POST-DEVELOPMENT PLAN

FILENAME: I:\01 Project - Progress\2016\01\CP\CP-16-0421 BBS - Barrham Building - Block 10, Dealership Drive\01-15 - Drawings\CP-16-0421 - PRESENTATION.dwg
LAST SAVED: Friday, June 28, 2019 1:52:56 PM
LAST SAVED BY: p.kirkens
LAST PRINTED: Friday, June 28, 2019 1:52:56 PM

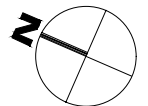


08	REVISED SITE PLAN	JUN. 28, 2019
07	REVISED WATER SIZE	MAY 14, 2019
06	ISSUED FOR MYLAR SUBMISSION	JAN. 2, 2018
05	REVISED AS PER SITE PLAN RECEIVED NOV. 24, 2017	NOV. 29, 2017
04	REVISED AS PER SITE PLAN RECEIVED SEPT. 5, 2017	SEPT. 7, 2017
03	REVISED AS PER SITE PLAN RECEIVED JUN. 23, 2017	JUN 30, 2017
02	REVISED AS PER CITY COMMENTS	FEB 24, 2017
01	ISSUED FOR SITE PLAN CONTROL	DEC 02, 2016
No.	Revision/Issue	Date

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



115 Walgreen Road R.R. #3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742



Stamp:

Client:
BBS CONSTRUCTION (ONTARIO) LTD.
1805 WOODWARD DRIVE OTTAWA, ON, K2C 0P9
P:613-226-8830 F:613-226-7709

Project:
**550 DEALERSHIP DRIVE
MYERS BODYSHOP**

OTTAWA ONTARIO

Drawing Title:
POST-DEVELOPMENT DRAINAGE PLAN

Scale: N.T.S.	Project Number: CP-16-0421
Drawn by: CDH	
Checked By: CJM/RPK	Drawing Number:
Designed By: JMJ	
Date: SEP 29, 2016	SHEET 1 of 1

POST

D07-12-16-0183

APPENDIX F: STORMWATER CALCULATIONS

AVERAGE PRE-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area A1					EXISTING SITE				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
GRASS	0.20	0.22	0.24	0.25	21360.79	4272.2	4699.4	5126.6	5340.2
Avg C	0.20	0.22	0.24	0.25					

AVERAGE POST-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area B1					SOUTH PROPERTY - UNRESTRICTED				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
GRASS	0.20	0.22	0.24	0.25	1138.66	227.7	250.5	273.3	284.7
Avg C	0.20	0.22	0.24	0.25					

Area B2					NORTH EAST CORNER - DRAINS TO CBMH#2				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
HARD	0.90	0.99	1.00	1.00	1054.95	949.5	1044.4	1055.0	1055.0
FUTURE HARD	0.90	0.99	1.00	1.00	683.00	614.7	676.2	683.0	683.0
GRASS	0.20	0.22	0.24	0.25	402.49	80.5	88.5	96.6	100.6
Avg C	0.77	0.85	0.86	0.86					

Area B3					EAST PORTION - DRAINS TO CBMH#3				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
HARD	0.90	0.99	1.00	1.00	2129.92	1916.9	2108.6	2129.9	2129.9
BUILDING	0.90	0.99	1.00	1.00	765.32	688.8	757.7	765.3	765.3
GRASS	0.20	0.22	0.24	0.25	180.93	36.2	39.8	43.4	45.2
Avg C	0.86	0.94	0.96	0.96					

Area B4					REAR PARKING - DRAINS TO CBMH#4				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
HARD	0.90	0.99	1.00	1.00	629.86	566.9	623.6	629.9	629.9
FUTURE HARD	0.90	0.99	1.00	1.00	2474.02	2226.6	2449.3	2474.0	2474.0
GRASS	0.20	0.22	0.24	0.25	76.49	15.3	16.8	18.4	19.1
FUTURE GRASS	0.20	0.22	0.24	0.25	205.36	41.1	45.2	49.3	51.3
Avg C	0.84	0.93	0.94	0.94					

Area B5					REAR GRASS AREA - DRAINS TO CB#5				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
GRASS	0.20	0.22	0.24	0.25	3978.45	795.7	875.3	954.8	994.6
Avg C	0.20	0.22	0.24	0.25					

Area B6					NORTH WEST ENTRANCE - DRAINS TO CBMH#6				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
HARD	0.90	0.99	1.00	1.00	680.86	612.8	674.1	680.9	680.9
FUTURE HARD	0.90	0.99	1.00	1.00	627.93	565.1	621.7	627.9	627.9
GRASS	0.20	0.22	0.24	0.25	104.31	20.9	22.9	25.0	26.1
Avg C	0.85	0.93	0.94	0.94					

Area B7					NORTH WEST CORNER - DRAINS TO CBMH#7				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
HARD	0.90	0.99	1.00	1.00	680.25	612.2	673.4	680.3	680.3
FUTURE HARD	0.90	0.99	1.00	1.00	538.93	485.0	533.5	538.9	538.9
GRASS	0.20	0.22	0.24	0.25	688.48	137.7	151.5	165.2	172.1
Avg C	0.65	0.71	0.73	0.73					

Area B8					WEST PORTION - DRAINS TO CB#8				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
HARD	0.90	0.99	1.00	1.00	1200.94	1080.8	1188.9	1200.9	1200.9
BUILDING	0.90	0.99	1.00	1.00	804.72	724.2	796.7	804.7	804.7
FUTURE HARD	0.90	0.99	1.00	1.00	277.52	249.8	274.7	277.5	277.5
GRASS	0.20	0.22	0.24	0.25	759.12	151.8	167.0	182.2	189.8
FUTURE GRASS	0.20	0.22	0.24	0.25	121.49	24.3	26.7	29.2	30.4
Avg C	0.71	0.78	0.79	0.79					

Area B9					PROPOSED FLAT ROOF - DRAINS TO CBMH#3-CBMH#2				
Type	C (5, 10-yr)	C (25-yr)	C (50-yr)	C (100-yr)	Area (m ²)	Product (2.5 10-yr)	Product (25-yr)	Product (50-yr)	Product (100-yr)
FUT. BUILDING	0.90	0.99	1.00	1.00	1163.69	1047.3	1152.1	1163.7	1163.7
Avg C	0.90	0.99	1.00	1.00					

550 DEALERSHIP DRIVE - STORMWATER MANAGEMENT CALCULATIONS

Pg 2 of 6
28-Jun-19

Tc (min.)	5-Year (mm/hr)	10-Year (mm/hr)	25-Year (mm/hr)	50-Year (mm/hr)	100-Year (mm/hr)	
20.00	70.3	82.2	97.3	108.5	120.0	PRE-DEVELOPMENT
10.00	104.2	122.1	144.7	161.5	178.6	POST-DEVELOPMENT

PRE-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	2.14	0.20	0.25	83.4	178.1
Total	2.14			83.4	178.1

POST-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5, 10-yr	Balanced Runoff Coefficient (C) 25-yr	Balanced Runoff Coefficient (C) 50-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	10-Year Flow Rate (l/s)	25-Year Flow Rate (l/s)	50-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
B1	0.11	0.20	0.22	0.24	0.25	6.6	7.7	10.1	12.3	14.1
B2	0.21	0.77	0.85	0.86	0.86	47.7	56.0	73.2	82.6	91.4
B3	0.31	0.86	0.94	0.96	0.96	76.6	89.8	116.3	132.6	146.6
B4	0.34	0.84	0.93	0.94	0.94	82.4	96.6	126.7	142.9	158.0
B5	0.40	0.20	0.22	0.24	0.25	23.0	27.0	35.2	42.9	49.4
B6	0.14	0.85	0.93	0.94	0.94	34.8	40.8	52.9	59.6	65.9
B7	0.19	0.65	0.71	0.73	0.73	35.9	42.1	54.5	62.5	69.1
B8	0.32	0.71	0.78	0.79	0.79	65.1	76.3	99.3	112.2	124.1
B9	0.12	0.90	0.99	1.00	1.00	30.3	35.6	46.3	52.2	57.8
Total	2.14					402.5	471.8	614.4	699.8	776.3

REQUIRED RESTRICTED FLOW RATE PER (Citi Gate SWM Report Section 6.1.1, TC 10 mins)

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	2.14	0.80	120%	495.0	594.0

ACTUAL STORM WATER RUNOFF FROM SITE (l/s)

Area	Post-Development Unrestricted (l/s)					Post-Development (Restricted) (l/s)					
	5-yr	10-yr	25-yr	50-yr	100-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
B1	6.6	7.7	10.1	12.3	14.1	6.6	7.7	10.1	12.3	14.1	UNRESTRICTED
B2	47.7	56.0	73.2	82.6	91.4	488.3	490.5	493.9	495.0	497.2	RESTRICTED
B3	76.6	89.8	116.3	132.6	146.6						
B4	82.4	96.6	126.7	142.9	158.0						
B5	23.0	27.0	35.2	42.9	49.4						
B6	34.8	40.8	52.9	59.6	65.9						
B7	35.9	42.1	54.5	62.5	69.1						
B8	65.1	76.3	99.3	112.2	124.1						
B9	30.3	35.6	46.3	52.2	57.8						
Total	402.5	471.8	614.4	699.8	776.3	494.9	498.3	503.9	507.2	511.3	

Area	Post-Development Unrestricted (l/s)		Post-Development (Restricted) (l/s)		
	5-yr	100-yr	5-yr	100-yr	
B1	6.6	14.1	6.6	14.1	UNRESTRICTED
B2	47.7	91.4	488.3	497.2	RESTRICTED
B3	76.6	146.6			
B4	82.4	158.0			
B5	23.0	49.4			
B6	34.8	65.9			
B7	35.9	69.1			
B8	65.1	124.1			
B9	30.3	57.8			
Total	402.5	776.3	494.9	511.3	

STORAGE REQUIREMENTS FOR AREA B2-B9

5-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (l/s) B2	Runoff (l/s) 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	Allowable Outflow (l/s)	Runoff To Be Stored (l/s)	Storage Required (m³)
6	131.6	60.3	96.8	104.0	29.1	43.9	45.4	82.2	38.3	244.1	255.9	92.1
7	123.3	56.5	90.7	97.5	27.3	41.2	42.5	77.0	35.9	244.1	224.4	94.2
8	116.1	53.2	85.4	91.8	25.7	38.8	40.0	72.5	33.8	244.1	197.0	94.6
9	109.8	50.3	80.8	86.8	24.3	36.7	37.8	68.6	32.0	244.1	173.1	93.5
10	104.2	47.7	76.6	82.4	23.0	34.8	35.9	65.1	30.3	244.1	151.8	91.1

Maximum Storage Required (m³) = 94.6

10-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (l/s) B2	Runoff (l/s) 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	Allowable Outflow (l/s)	Runoff To Be Stored (l/s)	Storage Required (m³)
7	144.7	66.3	106.4	114.4	32.0	48.3	49.9	90.4	42.1	245.3	304.6	127.9
8	136.2	62.4	100.2	107.7	30.1	45.5	47.0	85.1	39.7	245.3	272.3	130.7
9	128.7	59.0	94.7	101.8	28.5	43.0	44.4	80.4	37.5	245.3	243.8	131.6
10	122.1	55.9	89.8	96.5	27.0	40.8	42.1	76.2	35.6	245.3	218.7	131.2
11	116.3	53.3	85.5	92.0	25.7	38.8	40.1	72.6	33.9	245.3	196.6	129.8

Maximum Storage Required (m³) = 131.6

25-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (l/s) B2	Runoff (l/s) 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	Allowable Outflow (l/s)	Runoff To Be Stored (l/s)	Storage Required (m³)
10	144.7	73.2	116.3	126.7	35.2	52.9	54.5	99.3	46.3	246.9	357.4	214.4
11	137.7	69.6	110.7	120.5	33.5	50.3	51.8	94.5	44.1	246.9	328.2	216.6
12	131.4	66.5	105.6	115.0	32.0	48.0	49.5	90.1	42.1	246.9	301.9	217.3
13	125.7	63.6	101.0	110.0	30.6	45.9	47.3	86.2	40.3	246.9	278.1	216.9
14	120.5	60.9	96.9	105.5	29.3	44.0	45.4	82.7	38.6	246.9	256.3	215.3

Maximum Storage Required (m³) = 217.3

50-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (l/s) B2	Runoff (l/s) 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	Allowable Outflow (l/s)	Runoff To Be Stored (l/s)	Storage Required (m³)
12	146.6	75.0	120.4	129.7	38.9	54.1	56.8	101.9	47.4	247.5	376.7	271.2
13	140.3	71.8	115.2	124.1	37.2	51.8	54.3	97.5	45.4	247.5	349.9	272.9
14	134.5	68.8	110.4	119.0	35.7	49.7	52.1	93.5	43.5	247.5	325.2	273.1
15	129.2	66.1	106.1	114.3	34.3	47.7	50.0	89.8	41.8	247.5	302.6	272.3
16	124.4	63.7	102.1	110.1	33.0	45.9	48.2	86.4	40.2	247.5	282.2	270.9

Maximum Storage Required (m³) = 273.1

100-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (l/s) B2	Runoff (l/s) 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	Allowable Outflow (l/s)	Runoff To Be Stored (l/s)	Storage Required (m³)
13	155.1	79.4	127.3	137.2	42.9	57.3	60.0	107.8	50.2	248.6	413.5	322.5
14	148.7	76.1	122.1	131.6	41.1	54.9	57.6	103.3	48.1	248.6	386.2	324.4
15	142.9	73.1	117.3	126.4	39.5	52.8	55.3	99.3	46.2	248.6	361.4	325.3
16	137.5	70.4	112.9	121.7	38.0	50.8	53.2	95.5	44.5	248.6	338.4	324.8
17	132.6	67.9	108.9	117.3	36.7	49.0	51.3	92.1	42.9	248.6	317.4	323.8

Maximum Storage Required (m³) = 325.3

STORAGE OCCUPIED IN AREA B2-B9

5-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) = 95.31			
Location	T/G	INV. (out)	Area (m ²)	Depth (m)	Volume (m ³)
CBMH#2	95.15	92.93	287.43	0.16	18.12
CBMH#3	95.20	93.14	324.14	0.11	11.93
CBMH#4	95.20	93.29	278.96	0.11	10.23
CB#5	95.10	93.49	850.64	0.21	61.40
CBMH#6	95.20	93.12	109.14	0.11	4.61
CBMH#7	95.25	93.26	49.38	0.06	0.98
CB#8	95.25	93.60	66.70	0.06	1.33
Total					108.6

Storage Available (m ³) = 108.6
Storage Required based on flow (m ³) = 94.6

10-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) = 95.33			
Location	T/G	INV. (out)	Area (m ²)	Depth (m)	Volume (m ³)
CBMH#2	95.15	92.93	337.14	0.18	24.36
CBMH#3	95.20	93.14	442.34	0.13	19.58
CBMH#4	95.20	93.29	389.62	0.13	16.88
CB#5	95.10	93.49	1015.02	0.23	80.03
CBMH#6	95.20	93.12	137.73	0.13	7.08
CBMH#7	95.25	93.26	81.87	0.08	2.28
CB#8	95.25	93.60	118.57	0.08	3.16
Total					153.4

Storage Available (m ³) = 153.4
Storage Required based on flow (m ³) = 131.6

50-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) = 95.37			
Location	T/G	INV. (out)	Area (m ²)	Depth (m)	Volume (m ³)
CBMH#2	95.15	92.93	449.26	0.22	39.99
CBMH#3	95.20	93.14	710.56	0.17	42.49
CBMH#4	95.20	93.29	671.56	0.17	37.79
CB#5	95.10	93.49	1387.31	0.27	127.88
CBMH#6	95.20	93.12	193.29	0.17	13.70
CBMH#7	95.25	93.26	157.87	0.12	7.04
CB#8	95.25	93.60	260.96	0.12	10.63
Total					279.5

Storage Available (m ³) = 279.5
Storage Required based on flow (m ³) = 273.1

25-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) = 95.36			
Location	T/G	INV. (out)	Area (m ²)	Depth (m)	Volume (m ³)
CBMH#2	95.15	92.93	418.18	0.21	35.65
CBMH#3	95.20	93.14	639.53	0.16	35.75
CBMH#4	95.20	93.29	591.52	0.16	31.48
CB#5	95.10	93.49	1288.79	0.26	114.50
CBMH#6	95.20	93.12	179.35	0.16	11.84
CBMH#7	95.25	93.26	138.02	0.11	5.56
CB#8	95.25	93.60	222.72	0.11	8.22
Total					243.0

Storage Available (m ³) = 243.0
Storage Required based on flow (m ³) = 217.3

100-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) = 95.39			
Location	T/G	INV. (out)	Area (m ²)	Depth (m)	Volume (m ³)
CBMH#2	95.15	92.93	519.51	0.24	49.66
CBMH#3	95.20	93.14	860.57	0.19	58.19
CBMH#4	95.20	93.29	853.39	0.19	52.99
CB#5	95.10	93.49	1595.22	0.29	157.68
CBMH#6	95.20	93.12	223.70	0.19	17.87
CBMH#7	95.25	93.26	198.84	0.14	10.60
CB#8	95.25	93.60	339.80	0.14	16.64
Total					363.6

Storage Available (m ³) = 363.6
Storage Required based on flow (m ³) = 325.3



Project Name: MYERS BODY SHOP
Project Number: CP-15-0338

Structure: CBMH#2 Date: 6-28-19 1:40 PM
Designer: JMJ

For Orifice Flow, C= 0.6
For Weir Flow, C= 0.66

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	92.93			X
center of crest elevation	93.13			X
orifice width / weir length	398 mm			X
orifice height				
orifice area (m ²)	0.124	0.000	0.000	X

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1 H [m]	Orifice 1 Q [m ³ /s]	Orifice 2 H [m]	Orifice 2 Q [m ³ /s]	Weir 1 H [m]	Weir 1 Q [m ³ /s]	Weir 2 H [m]	Weir 2 Q [m ³ /s]	Total Q [l/s]
93.20	0.07	0.088					x	x	88.1
93.25	0.12	0.115					x	x	115.0
93.30	0.17	0.137					x	x	136.7
93.35	0.22	0.155					x	x	155.4
93.40	0.27	0.172					x	x	172.1
93.45	0.32	0.187					x	x	187.3
93.50	0.37	0.201					x	x	201.4
93.55	0.42	0.215					x	x	214.5
93.60	0.47	0.227					x	x	226.9
93.65	0.52	0.239					x	x	238.7
93.70	0.57	0.250					x	x	249.8
93.75	0.62	0.261					x	x	260.6
93.80	0.67	0.271					x	x	270.8
93.85	0.72	0.281					x	x	280.8
93.90	0.77	0.290					x	x	290.3
93.95	0.82	0.300					x	x	299.6
94.00	0.87	0.309					x	x	308.6
94.05	0.92	0.317					x	x	317.3
94.10	0.97	0.326					x	x	325.8
94.15	1.02	0.334					x	x	334.1
94.20	1.07	0.342					x	x	342.2
94.25	1.12	0.350					x	x	350.1
94.30	1.17	0.358					x	x	357.8
94.35	1.22	0.365					x	x	365.4
94.40	1.27	0.373					x	x	372.8
94.45	1.32	0.380					x	x	380.0
94.50	1.37	0.387					x	x	387.1
94.55	1.42	0.394					x	x	394.1
94.60	1.47	0.401					x	x	401.0
94.65	1.52	0.408					x	x	407.8
94.70	1.57	0.414					x	x	414.4
94.75	1.62	0.421					x	x	421.0
94.80	1.67	0.427					x	x	427.4
94.85	1.72	0.434					x	x	433.8
94.90	1.77	0.440					x	x	440.0
94.95	1.82	0.446					x	x	446.2
95.00	1.87	0.452					x	x	452.3
95.05	1.92	0.458					x	x	458.3
95.10	1.97	0.464					x	x	464.2
95.15	2.02	0.470					x	x	470.0
95.20	2.07	0.476					x	x	475.8
95.25	2.12	0.482					x	x	481.5
95.26	2.13	0.483					x	x	482.7
95.27	2.14	0.484					x	x	483.8
95.28	2.15	0.485					x	x	484.9
95.29	2.16	0.486					x	x	486.1
95.30	2.17	0.487					x	x	487.2
95.31	2.18	0.488					x	x	488.3
95.32	2.19	0.489					x	x	489.4
95.33	2.20	0.491					x	x	490.5
95.34	2.21	0.492					x	x	491.6
95.35	2.22	0.493					x	x	492.8
95.36	2.23	0.494					x	x	493.9
95.37	2.24	0.495					x	x	495.0
95.38	2.25	0.496					x	x	496.1
95.39	2.26	0.497					x	x	497.2
95.40	2.27	0.498					x	x	498.3
95.41	2.28	0.499					x	x	499.4
95.42	2.29	0.500					x	x	500.5
95.43	2.30	0.502					x	x	501.6
95.44	2.31	0.503					x	x	502.6
95.45	2.32	0.504					x	x	503.7
95.46	2.33	0.505					x	x	504.8
95.47	2.34	0.506					x	x	505.9
95.48	2.35	0.507					x	x	507.0
95.49	2.36	0.508					x	x	508.0
95.50	2.37	0.509					x	x	509.1
95.51	2.38	0.510					x	x	510.2
95.52	2.39	0.511					x	x	511.3
95.53	2.40	0.512					x	x	512.3
95.54	2.41	0.513					x	x	513.4
95.55	2.42	0.514					x	x	514.5
95.60	2.47	0.520					x	x	519.7
95.65	2.52	0.525					x	x	525.0
95.70	2.57	0.530					x	x	530.2

5-YR

10-YR

25-YR

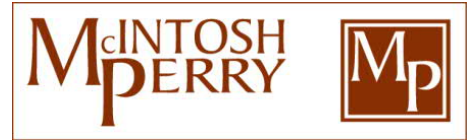
50-YR

100-YR

- Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir Equation: $Q = CLH^{3/2}$
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroid of the orifice.
6. H for weir equations is depth of water above the weir crest.

STORM SEWER DESIGN SHEET

PROJECT: Myers Body Shop
LOCATION: 550 Dealership Drive
CLIENT: BBS Construction
PAGE: 6 of 6



LOCATION				CONTRIBUTING AREA (ha)								RATIONAL DESIGN FLOW										SEWER DATA								
1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)				
																					DIA	W	H			(L/s)	(%)			
	B8	CB#8	CBMH#7	0.71	0.32	0.22	0.22	10.00	1.12	11.12	104.19	122.14	178.56	65.07					65.07	67.67	62.15	300				0.45	0.927	2.61	3.85%	
	B7	CBMH#7	CBMH#6	0.65	0.19	0.12	0.35	11.12	0.68	11.80	98.64	115.60	168.96	95.60					95.60	108.21	38.95	375				0.35	0.949	12.61	11.65%	
	B6	CBMH#6	CBMH#2	0.85	0.14	0.12	0.47	11.80	0.56	12.36	95.55	111.97	163.62	124.52					124.52	175.96	36.24	450				0.35	1.072	51.45	29.24%	
	B5	CB#5	CBMH#4	0.20	0.40	0.08	0.08	10.00	0.77	10.77	104.19	122.14	178.56	23.05					23.05	41.62	38.00	250				0.45	0.821	18.57	44.62%	
	B4	CBMH#4	CBMH#3	0.84	0.34	0.28	0.36	10.77	0.87	11.64	100.29	117.54	171.80	101.48					101.48	148.72	47.43	450				0.25	0.906	47.24	31.77%	
	B3	CBMH#3	CBMH#2	0.86	0.31	0.26	0.63	11.64	1.17	12.82	96.24	112.78	164.81	168.17					168.17	224.33	70.64	525				0.25	1.004	56.16	25.04%	
	B9	ROOF	CBMH#2 - MH#	0.90	0.12	0.10	0.10	10.00	0.87	10.87	104.19	122.14	178.56	30.34					30.34	34.22	55.10	200				1.00	1.055	3.88	11.34%	
	B2	CBMH#2	MH#1	0.77	0.21	0.16	1.37	12.82	0.40	13.22	91.35	107.02	156.35	347.09					347.09	438.47	28.81	675				0.25	1.187	91.38	20.84%	
		MH#1	EX. STUB				1.37	13.22	0.06	13.28	89.78	105.18	153.64	341.15					341.15	473.55	3.00	825				0.10	0.858	132.40	27.96%	
		EX. STUB	EX. MH				1.37	13.28	0.19	13.47	89.56	104.92	153.26	340.31					340.31	473.55	9.60	825				0.10	0.858	133.24	28.14%	
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: JMJ						No.	Revision						Date					
																		1.	ISSUED FOR SITE PLAN CONTROL						2016-11-11					
												Checked: CJM						2.	REVISED AS PER CITY COMMENTS						24/02/2017					
																		3.	REVISED AS PER SITE PLAN RECEIVED JUN. 23, 2017						30/06/2017					
												Project No.: CP-16-0241						4.	REVISED AS PER SITE PLAN RECEIVED NOV. 24, 2017						29/11/2017					
																		5.	REVISED AS PER SITE PLAN RECEIVED JUN. 25, 2019						28/06/2019					
																		Date: 2016-11-11										Sheet No: 6 of 6		

APPENDIX G: EXISTING MOECC ECA APPROVAL

AMENDED ENVIRONMENTAL COMPLIANCE APPROVALNUMBER 3156-9SPPR3
Issue Date: January 14, 2015

Strandherd Road Inc.
1737 Woodward Drive, 2nd Floor
Ottawa, Ontario
K2C 0P9

Site Location: Citi Gate 416 Corporate Campus - Phase 1
4123, 4225, 4337, 4433, and 4501 Strandherd Drive
Part of Lots 17, 18, 19 and 20, Concession 4 (Rideau Front)
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

an amendment to the wastewater infrastructure Works serving Phase 1 of the Citi Gate 416 Corporate (Business Park) Campus located on the west side of Strandherd Drive, south of Fallowfield Road, within the Jock River watershed, within the South Nepean Secondary Plan Area - Annex 6 of the City of Ottawa, to add stormwater management facilities for the collection, treatment and disposal of stormwater run-off from the Citi Gate 416 Corporate Campus, providing Enhanced Level water quality control and erosion protection and attenuating post-development peak flows to pre-development levels for all storm events up to and including the 100-year storm event, consisting of the following:

Proposed Works:

collector swale: - a temporary perimeter collector swale constructed along the east side of Block 14 and 15, on land owned by the Owner, to intercept run-off from the undeveloped Phase 2 areas to the west of Phase 1 of the Citi Gate 416 Corporate Campus, and continuing along the south side of the Systemhouse Street and the temporary swale along the west side of Block 19, from Systemhouse Street to the inlet to the stormwater management facility (Pond A), identified below;

stormwater management facility (Pond A - catchment area 66.75 hectares): - one (1) wet pond with two (2) sediment forebays, located on Block 12 on the north side of Dealership Street, west of Strandherd Drive, serving approximately 12.28 hectares of Phase 1 and 54.47 hectares of the proposed Phase 2 Citi Gate 416 Corporate Campus, with an inlet from the storm sewer on Dealership Drive and an inlet from the temporary collector swale along the west side of Block 19, from Systemhouse Street, having a permanent pool volume of 15,448 m³, an

extended detention volume of 4,612 m³, and a total storage volume for the 100-year storm event of approximately 48,079 m³, including the permanent pool volume, at a total depth of 3.4 m, discharging southward via an outlet control structure and box culvert to the relocated O'Keefe Drain at Dealership Street, and via the Jock River and Rideau River to the Ottawa River;

oil and grit separators: - four (4) oil and grit separators located within the municipal right-of-way serving Phase 1 of the Citi Gate 416 Corporate Campus, draining to the realigned O'Keefe Drain, as follows:

OGS #1A - one (1) Vortechs System (Model 5000 or Approved Equivalent - catchment area 0.59 hectares) oil and grit separator, located on Nortel Drive, north of Crosskey Place (STM MH 206), having a sediment storage capacity of 2.45 m³, an oil storage capacity of 1,383 L, a total storage volume of 7.731 m³, a maximum treatment flow rate of 240 L/s and a net annual load removal efficiency of 90% for the stormwater run-off from a portion of Nortel Drive;

OGS #1B - one (1) Vortechs System (Model 5000 or Approved Equivalent - catchment area 0.71 hectares) oil and grit separator, located on Crosskey Place, east of Nortel Drive (STM MH 300A), having a sediment storage capacity of 2.45 m³, an oil storage capacity of 1,383 L, a total storage volume of 7.731 m³, a maximum treatment flow rate of 240 L/s and a net annual load removal efficiency of 90% for the stormwater run-off from a portion of Crosskey Place;

OGS #2 - one (1) Vortechs System (Model 3000 or Approved Equivalent - catchment area 0.35 hectares) oil and grit separator, located on Systemhouse Street, east of the O'Keefe Drain (STM MH 408), having a sediment storage capacity of 1.38 m³, an oil storage capacity of 853 L, a total storage volume of 4.672 m³, a maximum treatment flow rate of 125 L/s and a net annual load removal efficiency of 92% for the stormwater run-off from a portion of Systemhouse Street;

OGS #3 - one (1) Vortechs System (Model 4000 or Approved Equivalent - catchment area 0.86 hectares) oil and grit separator, located on the west end of Philsar Street (STM MH 602), having a sediment storage capacity of 1.84 m³, an oil storage capacity of 1,105 L, a total storage volume of 6.116 m³, a maximum treatment flow rate of 175 L/s and a net annual load removal efficiency of 90% for the stormwater run-off from a portion of Philsar Street;

oil and grit separators: - seven (7) oil and grit separators located within Blocks 16, 1, 2, 3, 4, 5/6 of Phase 1 of the Citi Gate 416 Corporate Campus, discharging directly to the realigned O'Keefe Drain, as follows:

OGS #4 - one (1) Stormceptor (Model STC 3000 or Approved Equivalent - catchment area 2.5 hectares) oil and grit separator, located within Block 16, having a sediment storage capacity of 11.965 m³, an oil storage capacity of 2,890 L, a total storage volume of 15.27 m³, a maximum treatment flow rate of 30 L/s and a net annual load removal efficiency of 80% for the stormwater run-off from Block 16, discharging to the O'Keefe Drain culvert under the intersection of Nortel Drive and Crosskey Place;

OGS #5 - one (1) Stormceptor (Model STC 5000 or Approved Equivalent - catchment area 3.52 hectares) oil and grit separator, located within Block 1, having a sediment storage capacity of 20.94 m³, an oil storage capacity of 3,360 L, a total storage volume of 24.71 m³, a maximum treatment flow rate of 50 L/s and a net

annual load removal efficiency of 80% for the stormwater run-off from Block 1, discharging to the O'Keefe Drain culvert under the intersection of Nortel Drive and Crosskey Place;

OGS #6/7 - two (2) Stormceptor (Model STC 9000 or Approved Equivalent - combined catchment area 12.04 hectares) oil and grit separators, both located within Block 2, each having a sediment storage capacity of 32.98 m³, an oil storage capacity of 10,555 L, a total storage volume of 44.355 m³, a maximum treatment flow rate of 100 L/s and a net annual load removal efficiency of 80% for the stormwater run-off from Block 2, both discharging to the O'Keefe Drain culvert under Systemhouse Street;

OGS #8 - one (1) Stormceptor (Model STC 9000 or Approved Equivalent - catchment area 5.28 hectares) oil and grit separator, located within Block 3, having a sediment storage capacity of 32.98 m³, an oil storage capacity of 10,555 L, a total storage volume of 44.355 m³, a maximum treatment flow rate of 100 L/s and a net annual load removal efficiency of 80% for the stormwater run-off from Block 3, discharging to the O'Keefe Drain approximately 220 m north of Dealership Drive;

OGS #9 - one (1) Stormceptor (Model STC 4000 or Approved Equivalent - catchment area 3.41 hectares) oil and grit separator, located within Block 4, having a sediment storage capacity of 16.49 m³, an oil storage capacity of 3,360 L, a total storage volume of 20.255 m³, a maximum treatment flow rate of 50 L/s and a net annual load removal efficiency of 80% for the stormwater run-off from Block 4, discharging to the O'Keefe Drain approximately 210 m north of Dealership Drive;

OGS #10 - one (1) Stormceptor (Model STC 4000 or Approved Equivalent - catchment area 3.49 hectares), located within Block 5/6, having a sediment storage capacity of 16.49 m³, an oil storage capacity of 3,360 L, a total storage volume of 20.255 m³, a maximum treatment flow rate of 50 L/s and a net annual load removal efficiency of 80% for the stormwater run-off from Block 5/6, discharging to the O'Keefe Drain approximately 190 m south of Dealership Drive;

Previous Works:

sanitary and storm sewers to be constructed in the City of Ottawa, on Nortel Drive (from Station 20+020 to Station 20+625), Crosskey Place (from Station 3+042 to Station 3+310), Systemhouse Street (from Station 4+011 to Station 4+467), Dealership Street (from Station 5+159 to Station 5+723), and Philsar Street (from Station 6+010 to Station 6+200);

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

"Approved Equivalent" means a substituted product that meets the required quality and performance standards of a named product and has been approved for substitution in writing by the Director.

"Director" means a person appointed by the Minister pursuant to section 5 of the Environmental Protection Act for the purposes of Part II.1 of the Environmental Protection Act;

"District Manager" means the District Manager of the Ottawa office of the Ministry;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Owner" means Strandherd Road Inc. and includes their successors and assignees;

"Previous Works" means those portions of the sewage Works previously approved under an Approval;

"Property" means the property located within Phase 1 of the Citi Gate 416 Corporate Campus and includes the blocks located within the Phase 1 development;

"Water Supervisor" means the Water Supervisor of the Ottawa office of the Ministry;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the Conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) The designation of the City of Ottawa as the operating authority of the site on the application for approval of the Works does not relieve the Owner from the responsibility of complying with any and all of the Conditions of this Approval.

(3) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(4) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date

shall prevail.

(5) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(6) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(7) The issuance of, and compliance with the Conditions of this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

(8) This Approval includes the treatment and disposal of stormwater run-off from approximately 66.75 hectares of Phase 1 and Phase 2 of the Citi Gate 416 Corporate Campus draining to Pond A, assuming an average imperviousness of approximately 82%. Any changes within the drainage areas that might increase the required storage volumes or increase the flows to or from the stormwater management facility or any structural/physical changes to the stormwater management facility including the inlets or outlets will require an amendment to this Approval.

(9) This Approval includes the treatment and disposal of stormwater run-off from Blocks 16, 1, 2, 3, 4, and 5/6 of Phase 1 of the Citi Gate 416 Corporate Campus draining to oil and grit separators located on the Blocks and discharging directly to the realigned O'Keefe Drain. Any changes within each Block that might increase the required storage volume or increase the flows to or from any or all of the oil and grit separators or any structural/physical changes to any or all of the oil and grit separators including the outlets to the O'Keefe Drain will require an amendment to this Approval.

2. EXPIRY OF APPROVAL

(1) This Approval will cease to apply to those parts of the Works which have not been constructed within **five (5) years** of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B17 shall be included in the notification to the District Manager;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, other than a change in ownership to the municipal, i.e. assumption of the Works, the Owner shall notify the succeeding owner in writing of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

(3) Notwithstanding any other requirements in this Approval, upon transfer of the ownership of the Works to a municipality, if applicable, any reference to the "District Manager" within the Terms and Conditions of this Approval shall be replaced with "Water Supervisor".

4. OPERATION AND MAINTENANCE

(1) The Owner shall ensure that the design minimum liquid retention volume is maintained at all times.

(2) The Owner shall inspect the Works at least **once a year** and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(3) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's office for inspection by the Ministry. The logbook shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. MONITORING AND REPORTING

(1) The Owner shall carry out a monitoring program and evaluate the performance of the stormwater management Works commencing at the initial completion of construction of the Works and continuing for a minimum of two (2) years after 90% of the Blocks in the Citi Gate 416 Corporate Business Park - Phase 1 have been occupied.

(2) The monitoring program shall include obtaining grab samples at the outlet structure from Pond A (STM MH 1050) discharging to the box culvert draining to the O'Keefe Drain at Dealership Street, and

obtaining grab samples from each of the outlets from Blocks 16, 1, 2, 3, 4, and 5/6 of Phase 1 of the Citi Gate 416 Corporate Campus to the O'Keefe Drain, for at least three (3) rainfall wet events per year (a wet event is defined as a minimum of 15 mm of rain in the previous 24 hours). Two (2) of the events must occur within the May to September time period.

(3) Samples should be tested for Total Suspended Solids (mg/L) and Temperature ($^{\circ}\text{C}$), and results recorded.

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

(5) The Owner shall submit to the District Manager, **every year**, a copy of the test results as per Condition 5, Subsection (3), above.

(6) The Owner shall submit to the District Manager, **every five (5) years**, a Performance Assessment Report addressing the following:

(a) a description of any operating problems encountered and corrective actions taken during the reporting period and the need for further investigations in the following reporting period for system refinements or ways of improving the performance of the Works;

(b) measurement of the mass of accumulated sediment removed when undertaking maintenance of the Works as per Condition 4, Subsection (3), above;

(7) The measurement frequency specified in Condition 5, Subsection (2) and reporting frequency specified in Condition 5, Subsections (5) and (6), above, may, **after five (5) years** of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(8) The Owner shall copy the District Manager on any and all reports submitted to the City of Ottawa and/or the Rideau Valley Conservation Authority related to the monitoring and maintenance program for the Works.

6. DISCLOSURE OF APPROVAL

(1) Pursuant to Section 103 of the Ontario Water Resources Act, no person having an interest in the Property, shall deal with the Property in any way without first giving a copy of this Approval to each person acquiring an interest in the Property as a result of the dealing.

(2) The Owner shall make arrangements to have a Site Plan Agreement, in a form satisfactory to the City of Ottawa, registered on the title of each Property containing an oil and grit separator, to ensure the maintenance program for the oil and grit separator will be adhered to by any new property owners.

7. TEMPORARY EROSION AND SEDIMENT CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every **two (2) weeks** and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

(2) The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

8. RECORD KEEPING

The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

Schedule "A"

1. Application from Strandherd Road Inc., dated July 24, 2014, including final plans and specifications prepared by Novatech Engineering Consultants Ltd.;
2. Application for Environmental Compliance Approval, dated July 24, 2014 and received on October 10, 2014, submitted by the City of Ottawa;
3. Citi Gate 416 Corporate Campus Detailed Servicing and Stormwater Management Report (Phase 1), Volume 1 and Volume 2, dated October 1, 2014, prepared by Novatech Engineering Consulting Ltd.;
4. Preliminary Geotechnical Investigation, Proposed Commercial Development Strandherd Drive, dated November 1, 2012, prepared by Paterson Group Inc.;
5. Preliminary Geotechnical Investigation, 4337 and 4225 Strandherd Drive, dated November 1, 2012, prepared by Paterson Group Inc.;
6. Set of Engineering Drawings (11 drawings) for Citi Gate 416 Corporate Campus Roads, Sewers and Watermains, Issued for MOE Approval - SWM Pond, dated October 6, 2014, prepared by Novatech Engineering Consulting Ltd.;
7. E-mail from Mike Petepiece of Novatech Engineering Consulting Ltd. to the Ministry, dated January 13, 2015; and
8. E-mail from Melanie Riddell of Novatech Engineering Consulting Ltd. to the Ministry, dated January 13, 2015.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that any subsequent Owner of the Works is made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected.
5. Condition 5 is included to enable the Owner to evaluate and demonstrate the performance of the Works on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works do not cause any impairment of the receiving watercourse.
6. Condition 6 is included to require the Owner to give notice of this Approval to potential future owners of the property before the property is dealt with.
7. Condition 7 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.
8. Condition 8 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7146-9PNJXJ issued on October 7, 2014.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 14th day of January, 2015



Edgardo Tovilla
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

DC/

c: District Manager, MOECC Ottawa office
Water Supervisor, MOECC Ottawa office
M. Rick O'Connor, Clerk, City of Ottawa (File No. D07-16-12-0023)
Damien Whittaker, Senior Engineer, Infrastructure Approvals, City of Ottawa
Linda Carkner, Program Manager, Infrastructure Services, City of Ottawa
John Riddell, P.Eng., Novatech Engineering Consultants Ltd.

APPENDIX H: CITY OF OTTAWA DESIGN CHECKLIST

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)
<input type="checkbox"/> Executive Summary (for larger reports only).	N/A
<input type="checkbox"/> Date and revision number of the report.	On Cover
<input type="checkbox"/> Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix 'E'
<input type="checkbox"/> Plan showing the site and location of all existing services.	Site Servicing and Utility Plan
<input type="checkbox"/> 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
<input type="checkbox"/> Summary of Pre-consultation Meetings with City and other approval agencies.	Appendix 'A'
<input type="checkbox"/> 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 defensible design criteria.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management

<input type="checkbox"/> Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary
<input type="checkbox"/> Identification of existing and proposed infrastructure available in the immediate area.	N/A
<input type="checkbox"/> 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).	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
<input type="checkbox"/> 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.	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
<input type="checkbox"/> 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
<input type="checkbox"/> Proposed phasing of the development, if applicable.	N/A
<input type="checkbox"/> Reference to geotechnical studies and recommendations concerning servicing.	See Geotech
<input type="checkbox"/> All preliminary and formal site plan submissions should have the following information: <ul style="list-style-type: none"> ○ 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 	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
<input type="checkbox"/> Confirm consistency with Master Servicing Study, if available	N/A
<input type="checkbox"/> Availability of public infrastructure to service proposed development	N/A
<input type="checkbox"/> Identification of system constraints	N/A
<input type="checkbox"/> Identify boundary conditions	N/A
<input type="checkbox"/> Confirmation of adequate domestic supply and pressure	N/A
<input type="checkbox"/> 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'
<input type="checkbox"/> 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
<input type="checkbox"/> Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
<input type="checkbox"/> Address reliability requirements such as appropriate location of shut-off valves	N/A
<input type="checkbox"/> Check on the necessity of a pressure zone boundary modification.	N/A
<input type="checkbox"/> 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

<input type="checkbox"/> 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
<input type="checkbox"/> Description of off-site required feeder mains, 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
<input type="checkbox"/> Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix 'B'
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Description of existing sanitary sewer available for discharge of wastewater from proposed development.	5.2 Sanitary Servicing

<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Description of proposed sewer network including sewers, pumping stations, and forcemains.	5.2 Sanitary Servicing
<input type="checkbox"/> 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
<input type="checkbox"/> Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
<input type="checkbox"/> Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
<input type="checkbox"/> Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	6.0 Stormwater Management
<input type="checkbox"/> Analysis of available capacity in existing public infrastructure.	N/A
<input type="checkbox"/> A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre- and Post-Development Plans
<input type="checkbox"/> 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.	6.0 Stormwater Management
<input type="checkbox"/> Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	6.0 Stormwater Management
<input type="checkbox"/> Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	6.0 Stormwater Management
<input type="checkbox"/> Set-back from private sewage disposal systems.	N/A
<input type="checkbox"/> Watercourse and hazard lands setbacks.	N/A
<input type="checkbox"/> Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
<input type="checkbox"/> Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
<input type="checkbox"/> Storage requirements (complete with calculations) and	Appendix 'F'

conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	
<input type="checkbox"/> Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Sediment and Erosion Control Plan
<input type="checkbox"/> 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.	6.0 Stormwater Management, Appendix 'F'
<input type="checkbox"/> Any proposed diversion of drainage catchment areas from one outlet to another.	6.0 Stormwater Management
<input type="checkbox"/> Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	6.0 Stormwater Management
<input type="checkbox"/> 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'
<input type="checkbox"/> Identification of potential impacts to receiving watercourses	N/A
<input type="checkbox"/> Identification of municipal drains and related approval requirements.	N/A
<input type="checkbox"/> Descriptions of how the conveyance and storage capacity will be achieved for the development.	6.0 Stormwater Management
<input type="checkbox"/> 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Lot Grading, Drainage Plan & sediment Control Plan
<input type="checkbox"/> Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

<input type="checkbox"/> Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	7.0 Sediment and Erosion Control
<input type="checkbox"/> 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
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
<input type="checkbox"/> Changes to Municipal Drains.	N/A
<input type="checkbox"/> 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)
<input type="checkbox"/> Clearly stated conclusions and recommendations	8.0 Summary 9.0 Recommendations
<input type="checkbox"/> 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
<input type="checkbox"/> All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped