SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

1375 Clyde Avenue
Ottawa, Ontario

Report No. 19058

December 17, 2019

LICENSED PROFESSIONAL ENGINEER
D.B. GRAY
17016502
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D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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SERVICING BRIEF &
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1375 Clyde Avenue
Ottawa, Ontario

This report describes the services and addresses the stormwater management requirements of a 1.08 hectare property at 1375 Clyde Avenue in Ottawa. Currently there is a 2,013 sq.m. single-storey building with Motor Sports World (MSW) as the tenant. Most of the remainder of the property is currently asphalted. Part of the MSW building (528 sq.m.) will be demolished and a 450 sq.m. addition is proposed (when complete the building will be 1,935 sq.m. in area). A six-storey Dymon Storage building, having 2,841 sq.m. footprint, is proposed. A 393 sq.m. single-storey restaurant (Benny's) is also proposed.

This report forms part of the stormwater management design for the proposed development. Refer to drawing C-1 to C-7 also prepared by D. B. Gray Engineering Inc.

Civil engineering documents for an earlier site plan layout were previously submitted to the City for Site Plan Approval by J. L. Richards & Associates Limited.

WATER SUPPLY FOR FIREFIGHTING:

The existing MSW building has a fire department connection (FDC) located near the front entrance to the building. The proposed Dymon building will have a sprinkler system and will have a FDC located on the façade of the building facing Clyde Avenue. There is an existing fire hydrant on the Clyde Avenue right of way approximately 63 m unobstructed distance from the existing MSW FDC and 78 m from the proposed Dymon FDC. Since the fire hydrant is greater than 45 m to the FDCs a private onsite fire hydrant (FH-1) is proposed near the Clyde Avenue entrance to the property. It will be located approximately 31 m unobstructed distance from the MSW FDC and 42 m from the Dymon FDC. A second private fire hydrant (FH-2) is proposed near the Baseline Road entrance approximately 18 m from the front entrance of the restaurant building. FH-1 will connect to one of two existing 150 mm private watermains (located parallel and immediately adjacent to each other each connecting to the 300 mm municipal watermain in Clyde Avenue). FH-2 will connect to a proposed 200 mm private watermain which will connect to an existing 200 mm private watermain (which connects to the two 150 mm watermains).

The Dymon building requires a fire flow of 283.3 L/s (17,000 L/min), as calculated as per the Fire Underwriter Survey "Water Supply For Fire Protection" and the restaurant building requires a fire flow of 66.7 L/s (4,000 L/min).

A model was created using EPANET software to analyze the hydraulics of the existing 150 mm and 200 mm watermains and the proposed 200mm private watermain. Using the 145.0 m HGL boundary condition provided by the City which was based on a 284.4 L/s flowrate (Max day (1.1 L/s) + Fire Flow (283.3 L/s)), and using this flowrate, the pressure at fire hydrant FH-1 was determined to be 192 kPa (27.9 psi). Since the pressure is above 138 kPa (20 psi) there will be an adequate water supply for firefighting.

The EPANET model was also used determine the pressure at fire hydrant FH-2 under fire flow conditions. Using the 160.0 m HGL boundary condition provided by the City which was based on a 67.8 L/s flowrate (Max day (1.1 L/s) + Fire Flow (66.7 L/s)), and using this flowrate, the pressure at FH-2 was determined to be 518 kPa (75.2 psi). Since the pressure is above 138 kPa (20 psi) there will be an adequate water supply for firefighting.

WATER SERVICE:

As previously mentioned the proposed Dymon building will have a sprinkler system. To service the sprinkler system, a 150 mm water service, connecting to the private 200 mm watermain, is proposed. The 150mm service will be adequate for the domestic demand in the Dymon Building. A 50 mm water service is proposed for the restaurant building.

As per the City of Ottawa Design Guidelines the daily average consumption rate for a commercial development is 28,000 litres per day per hectare. Based on a 12-hour day the maximum daily demand for the subject property is calculated to be 0.7 L/s. Based on a maximum daily peaking factor of 1.5 times the daily average demand and a maximum hourly peaking factor of 1.8 times the maximum daily demand, the maximum daily demand is 1.1 L/s and maximum hourly demand is 1.9 L/s.

To determine water pressure under these demands, boundary conditions, based on the City of Ottawa computer simulation of the water distribution system, at the subject location, are required. In summary, we requested the boundary conditions for the subject area based on the following:

Average Daily Demand: 0.7 L/s.
Maximum Daily Demand: 1.1 L/s
Maximum Hourly Demand: 1.9 L/s

Based on the boundary conditions received from the city, the minimum HGL (hydraulic grade line) is 158.5 m and the maximum is 163.5 m. With these HGLs the water pressure is calculated to vary throughout the proposed development from 582 kPa to 652 kPa (84 to 95 psi). Since water pressure is above 80 psi the installation of a pressure reducing valve (PRV) immediately downstream of the water meters is recommended.

SANITARY SERVICE:

A 200mm private sanitary sewer system is proposed to connect to an existing 150 mm sanitary sewer connection which connects to an existing 200 mm municipal sanitary sewer in Clyde Avenue.

Based on the City of Ottawa Sewer Design Guidelines for a commercial property (28,000 L/ha/day; 1.5 peaking factor (and a 12-hour day); and a 0.33 L/s/ha infiltration flow) the post development peak flow is calculated to be 1.41 L/s. This flow will be adequately handled by the proposed sanitary sewer system with the last segment being only 7% full (200mm at 0.32% - 19.4 L/s capacity. The existing 150 mm sanitary service connection is estimated to have a slope of at least 0.5%. Based on this slope the existing sanitary sewer is calculated to be 13% full. Therefore, this flow will be adequately handled by the existing sanitary sewer connection.

The 1.41 L/s in sanitary flows contributing to the existing 200mm municipal sanitary sewer is expected to have an acceptable impact given its capacity of 19.1 L/s (at 0.31%).

STORMWATER MANAGEMENT:

Water Quality Control:

There are currently no quality control measures on the subject property. The City has advised that an enhanced level of treatment (80% TSS removal) is required.

To achieve the above criteria an oil/grit separator (OGS) manhole is proposed. An AquaShield Aqua-Swirl Concentrator model AS-4 was selected to achieve a minimum 80% TSS removal. Based on software supplied by the manufacturer, the Aqua-Swirl AS-4 will remove approximately 86% of TSS from the runoff produced by the drainage area. Output from the manufacturer’s software is attached to the report. The Aqua-Swirl model AS-4 has a sediment capacity of 0.90 cubic metres and an oil / debris capacity of 720 litres.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-4 and notes 2.1 to 2.6 on drawing C-5). In summary: to filter out construction sediment; a silt fence barrier will be installed at the perimeter of the site where runoff will drain onto adjacent properties; sediment capture filter sock inserts will be installed in all existing catch basins and all new catch basins as they are installed; and any material deposited on a public road will be removed at the end of each day.

Water Quantity Control:

There are currently no quantity control measures on the subject property. In an email from the City (Eric Suprenant) to JL Richards the City has advised that the stormwater management criterion for this property is a maximum allowable release rate 60 L/s.

Stormwater will be stored on the roof of the proposed Dymon and restaurant buildings; on the asphalted surface above one catch basin; and in underground chambers surrounded by clear stone and wrapped in a waterproof membrane (Soleno Hydrostor Chambers or approved equal).

Calculations are based on the Rational Method. The runoff coefficients for the 100-year event are increased by 25% to maximum 1.00. To calculate the required storage volume in the underground chambers an average release rate is assumed to be equal to 50% of the maximum release rate.

Drainage Area I
(Uncontrolled Flow – 435 sq.m.):
The runoff from front of the site will be allowed to flow uncontrolled. The flow from this area is calculated at 15 minutes concentration.

	100-year	5-year
Maximum flow rate:	9.12 L/s	4.55 L/s

Drainage Area II (Dymon Roof – 2,841 sq.m.):
The six roof drains will be a flow control type which will restrict the flow and cause the storm water to temporally pond on the roof. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (1 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100-A1 or equal. The roof drain will be installed at the low point of the roof which will be 145 mm lower than the perimeter of the roof. Twelve scuppers are required, each 700mm wide, and installed 145 mm above the roof drains. The structural engineer will be required to design the roof for a maximum 50 mm depth of water at the scuppers and provide necessary documentation to acquire an exemption of the Ontario Building Code requirement that water on the roof cannot exceed 150 mm.

	100-year	5-year
The maximum release rate:	10.66 L/s	8.24 L/s
The maximum ponding depth:	143 mm	111 mm
The maximum stored volume:	120.60 cu.m.	55.73 cu.m.

Drainage Area III (Restaurant Roof 1 – 2,841 sq.m.):
The two roof drains will be a flow control type which will restrict the flow and cause the storm water to temporally pond on the roof. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (1 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100-A1 or equal. The roof drain will be installed at the low point of the roof which will be 145 mm lower than the perimeter of the roof. Two scuppers are required, each 600mm

wide and installed 145 mm above the roof drains. The structural engineer will be required to design the roof for a maximum 50 mm depth of water at the scuppers and provide necessary documentation to acquire an exemption of the Ontario Building Code requirement that water on the roof cannot exceed 150 mm.

	100-year	5-year
The maximum release rate:	2.98 L/s	2.17 L/s
The maximum ponding depth:	120 mm	87 mm
The maximum stored volume:	12.71 cu.m.	5.73 cu.m.

Drainage Area IV (1,056 sq.m.):
An inlet control device (ICD) located at the outlet pipe of catch basin / manhole CB/MH-3 will control the release of stormwater from this drainage area. The ICD will restrict the flow and force the stormwater to back up into an underground chamber. Specifically six Soleno Hydrostor HS180 Chambers (or approved equal) surrounded by clear stone and wrapped in a waterproof membrane will be used. The ICD shall be a plug style with a round orifice and trash basket design manufactured by Pedro Plastics (or approved equal) and shall be sized by the manufacturer for a discharge rate of 14.35 L/s at 1.58 m head. It is calculated that an orifice area of 4,223 sq.mm. ($\pm$73 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 14.35 L/s at a head of 1.58 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 11.97 L/s at 1.10 m.

	100-year	5-year
Maximum release rate:	14.35 L/s	11.97 L/s
Maximum water elevation:	96.36 m	95.79 m
Maximum stored volume:	30.60 cu.m.	12.69 cu.m.

Drainage Area V (2,662 sq.m.):
An inlet control device (ICD) located at the outlet pipe of catch basin / manhole CB/MH-7 will control the release of stormwater from this drainage area. The ICD will restrict the flow and force the stormwater to back up into an underground chamber and onto the asphalted surface above catch basin / manhole CB/MH-7. Specifically twenty-seven Soleno Hydrostor HS75 Chambers (or approved equal) surrounded by clear stone and wrapped in a waterproof membrane will be used. The ICD shall be a Hydrovex "VHV Vertical Vortex Flow Regulator" (or approved equal) and shall be sized by the manufacturer for a discharge rate of 12.69 L/s at 1.72 m head. It is calculated that an orifice area of 7,854 sq.mm. (100 mm in diameter) and a discharge coefficient of 0.269 will restrict the outflow rate to 12.69 L/s at 1.72 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 10.28 L/s at 1.20 m.

	100-year	5-year
Maximum release rate:	12.69 L/s	10.28 L/s
Maximum water elevation:	95.87 m	95.35 m
Maximum stored volume above CB:	53.27 cu.m.	0 cu.m.
Maximum stored volume in chamber:	57.24 cu.m.	50.21 cu.m.
Total Maximum stored volume:	110.51 cu.m.	50.21 cu.m.

Drainage Area VI (3,429 sq.m.):
An inlet control device (ICD) located at the outlet pipe of manhole MH-10 will control the release of stormwater from this drainage area. The ICD will restrict the flow and force the stormwater to back up into an underground chamber. Specifically thirty-five Soleno Hydrostor HS180 Chambers (or approved equal) surrounded by clear stone and wrapped in a waterproof membrane will be used. The ICD shall be a Hydrovex "VHV Vertical Vortex Flow Regulator" (or approved equal) and shall be sized by the manufacturer for a discharge rate of 10.61 L/s at 1.72 m head. It is calculated that an orifice area of 7,854 sq.mm. (100 mm in diameter) and a discharge coefficient of 0.233 will restrict the outflow rate to 10.61 L/s at 1.72 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 8.6 L/s at 1.13 m.

	100-year	5-year
Maximum release rate:	10.61 L/s	8.60 L/s
Maximum water elevation:	95.44 m	94.85 m
Maximum stored volume:	178.50 cu.m.	66.60 cu.m.

The Entire Site:

	100-year	5-year
Maximum permitted release rate:	60.00 L/s	60.00 L/s
Maximum release rate:	60.00 L/s	45.81 L/s
Maximum stored volume:	452.92 cu.m.	190.97 cu.m.

Therefore maximum post-development release rate for the 100-year storm event is calculated to be equal to the maximum allowable and the maximum post-development release rate for the 5-year storm event is calculated to be less than the maximum allowable.

A private storm sewer system is proposed. Stormwater will be conveyed off the site via a private 375 mm storm sewer connecting to a 375 mm municipal storm sewer located in Clyde Avenue at a proposed manhole. The unrestricted flowrate resulting from one in five-year storm event will produce a peak flow of 218.0 L/s resulting in the last pipe segment being 238% full. However, the flow control roof drains and an inlet control devices (ICDs) will restrict the flow to a maximum flow of 42.3 L/s during the 5-year event so that the last pipe segment will actually be 46% full. Since the subject site is currently mostly hard surfaces and there are currently no stormwater quantity control measures the current flow off the site would be approximately the same as the 218 L/s unrestricted flow rate. Therefore the proposed restricted flow of 42.3 L/s contributing to the existing 375 m municipal storm sewer is expected to have a positive impact.

MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS (MECP) ENVIRONMENTAL COMPLIANCE APPROVAL (ECA):

While the Dymon Storage facilities are not considered an industrial use, the Motor Sports World has a service department where oil changes are performed. Therefore, it is expected that the MECP will consider the property “industrial lands” and an ECA will be required.

CONCLUSIONS:

1. Two onsite private fire hydrants are proposed. One near the Clyde Avenue entrance to the property will be located within the required 45 m unobstructed distance from the Motor Sports World building and Dymon storage building fire department connections. A second private fire hydrant is proposed near the Baseline Road entrance approximately 18 m from the front entrance of the restaurant building.

2. There is an adequate water supply for firefighting for the Dymon Storage and restaurant buildings.

3. A 200 mm private watermain is proposed to connect to an existing 200 mm private watermain (which connects to two existing 150 mm private watermains located parallel and immediately adjacent to each other each connecting to the 300 mm municipal watermain in Clyde Avenue).

4. The Dymon Storage building will have sprinkler system and will require a 150mm water service which will be adequate for the domestic demand. A 50 mm water service is proposed for the restaurant building.

5. The water pressure is calculated to vary throughout the proposed development from 84 to 95 psi. Since water pressure is above 80 psi the installation of a pressure reducing valve (PRV) immediately downstream of the water meters is recommended.

6. A 200mm private sanitary sewer system is proposed to connect to an existing 150 mm sanitary sewer connection which connects to an existing 200 mm municipal sanitary sewer in Clyde Avenue. The proposed flows will be adequately handled by the existing 150 mm sanitary sewer connection.

7. The proposed sanitary flows contributing to the existing 200mm municipal sanitary sewer is expected to have an acceptable impact.

8. There are currently no quality control measures on the subject property but 80% TSS removal is required. The proposed oil/grit separator (OGS) manhole will remove approximately 86% of TSS from the runoff produced by the drainage area.

9. An erosion and sediment control plan has been developed to be implemented during construction.

10. There are currently no quantity control measures on the subject property. The City has advised that the stormwater management criterion for this property is a maximum allowable release rate 60 L/s. Flow control roof drains are proposed to cause stormwater to be temporarily stored on the roof of the proposed Dymon and restaurant buildings. Three inlet control devises (ICDs) are proposed to cause stormwater to be temporarily stored on the asphalted surface above one catch basin and in underground chambers surrounded by clear stone and wrapped in a waterproof membrane. The maximum post-development release rate for the 100-year storm event is calculated to be equal to the maximum allowable and for the 5-year event is calculated to be less than the maximum allowable.

11. A private storm sewer system is proposed. Stormwater will be conveyed off the site via a 375 mm private storm sewer connecting to a 375 mm municipal storm sewer located in Clyde Avenue at a proposed manhole. The restricted flowrate during five-year storm event will produce a maximum flow of 42.3 L/s during the 5-year event so that the last pipe segment will only be 46% full. Since the subject site is currently mostly hard surfaces and there are currently no stormwater quantity control measures the proposed restricted flow contributing to the existing 375 m municipal storm sewer is expected to have a positive impact.

12. It is expected that the MECP will consider the property “industrial lands” and an ECA will be required.

D. B. GRAY ENGINEERING INC.

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31-Jul-19

1375 Clyde Ave
Ottawa, Ontario

Fire Flow Requirements

Proposed 6 Storey Self Storage Building

Fire flow requirement as calculated as per Fire Undewriter Survey "Water Supply For Fire Protection".

F = $220\ C\ A^{0.5}$ = the required fire flow in litres per minute

C = coefficient related to the type of construction
= 0.8 Non-combustible Construction (unprotected structural components)

A = total floor area (all storeys excluding basements at least 50% below grade)

6th Floor	2839
5th Floor	2839
4th Floor	2839
3rd Floor	2839
2nd Floor	2839
Ground Floor	2603

A (TOTAL FIRE AREA) = 16798 sq.m.

F = 22,811 L/min
= 23,000 L/min (rounded off to the nearest 1,000 L/min)

15% Charge for Combustible Occupancy

= 26,450 L/min

50% Reduction for Sprinkler System supervised with water flow and control valve alarm

= 13,225 L/min

Increase for Separation Exposed Buildings

			Adjacent Building			Length-Height
			Constuction	Length m	Storeys	Factor
10%	North	10.1 to 20m	Ordinary	26	1	26
0%	East	>45				0
6%	South	20.1 to 30m	Ordinary	48	1	48
0%	West	>45				0

16% Total Increase for Exposure (maximum 75%)
= 4,232 L/min Increase

= 17,457 L/min
F = 17,000 L/min (rounded off to the nearest 1,000 L/min)
= 283.3 l/s

Proposed 1 Storey Restaurant

Fire flow requirement as calculated as per Fire Undewriter Survey "Water Supply For Fire Protection".

F = $220\ C\ A^{0.5}$ = the required fire flow in litres per minute

C = coefficient related to the type of construction
= 0.8 Non-combustible Construction (unprotected structural components)

A = total floor area (all storeys excluding basements at least 50% below grade)

A = 392 sq.m.

F = 3,485 L/min
= 3,000 L/min (rounded off to the nearest 1,000 L/min)

0% Charge for Combustible Occupancy

= 3,000 L/min

0% Reduction for Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

			Adjacent Building			Length-Height Factor
			Constuction	Length m	Storeys	
0%	North	>45				0
0%	East	>45				0
10%	South	20.1 to 30m	NC	17	6	102
8%	West	20.1 to 30m	Ordinary	4	1	4

18% Total Increase for Exposure (maximum 75%)
= 540 L/min Increase

= 3,540 L/min
F = 4,000 L/min (rounded off to the nearest 1,000 L/min)
= 66.7 l/s

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31-Jul-19
REVISED 9-Dec-19

1375 Clyde Ave
Ottawa, Ontario

Water Demand

DAILY AVERAGE							
	COMMERCIAL:	28,000	l /gross ha / day (as per Ottawa Design Guidelines)				
		1.08	ha (land area)				
		30240	l / day				
		12	hour day				
		42.0	l/min	0.7	l/s	11.1	USgpm
MAXIMUM DAILY DEMAND		1.5	(Peaking Factor as per Ottawa Design Guidelines)				
		63.0	l/min	1.1	l/s	16.6	USgpm
MAXIMUM HOURLY DEMAND		1.8	(Peaking Factor as per Ottawa Design Guidelines)				
		113.4	l/min	1.9	l/s	30.0	USgpm
MSW							
	Elevation of Water Meter:	96.96	m ASL				
	Finish Floor Elevation:	96.06	m ASL				
				Static Pressure at Water Meter			
	MINIMUM HGL:	158.5	m ASL	88	psi	603	kPa
	MAXIMUM HGL:	163.5	m ASL	95	psi	652	kPa
DYMON							
	Elevation of Water Meter:	97.22	m ASL				
	Finish Floor Elevation:	96.32	m ASL				
				Static Pressure at Water Meter			
	MINIMUM HGL:	158.5	m ASL	87	psi	601	kPa
	MAXIMUM HGL:	163.5	m ASL	94	psi	650	kPa
BENNY'S							
	Elevation of Water Meter:	99.1	m ASL				
	Finish Floor Elevation:	98.2	m ASL				
				Static Pressure at Water Meter			
	MINIMUM HGL:	158.5	m ASL	84	psi	582	kPa
	MAXIMUM HGL:	163.5	m ASL	92	psi	631	kPa

Gmail by Google

Douglas Gray <d.gray@dbgrayengineering.com>

FW: 1375 Clyde Ave - Boundary Condition Request

1 message

Surprenant, Eric <Eric.Surprenant@ottawa.ca> Wed, Aug 7, 2019 at 11:25 AM
To: Douglas Gray <d.gray@dbgrayengineering.com>
Cc: "c.kennedy@dbgrayengineering.com" <c.kennedy@dbgrayengineering.com>, "Dickinson, Mary" <mary.dickinson@ottawa.ca>

Hello Doug,

Please find attached the boundary conditions as requested for 1375 Clyde.

The following are boundary conditions, HGL, for hydraulic analysis at 1375 Clyde (zone ME) assumed to be connected to the 305mm on Clyde (see attached PDF for location).

Minimum HGL = 158.5m

Maximum HGL = 163.5m the maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MaxDay + FireFlow (283 L/s) = 145.0m

MaxDay + FireFlow (67 L/s) = 160.0m

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

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

Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals

Development Review Suburban Services Branch

Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure

Examen des demandes d'aménagement (Services Suburbains Ouest)

Services de la planification, de l'infrastructure et du développement économique

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From: Douglas Gray <d.gray@dbgrayengineering.com>
Sent: August 01, 2019 3:35 PM
To: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Cc: Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>
Subject: 1375 Clyde Ave - Boundary Condition Request

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ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Eric

The Dymon Storage project at 1375 Clyde Ave has been revised.

Please provide the boundary conditions based on the following expected demands:

Scenario 1:

Average daily demand: 0.9 l/s.

Maximum daily demand: 1.4 l/s.

Maximum hourly daily demand: 2.5 l/s

Fire Flow demand: 283.3 l/s

Fire Flow + Max Day: 284.7 l/s

Scenario 2:

Average daily demand: 0.9 l/s.

Maximum daily demand: 1.4 l/s.

Maximum hourly daily demand: 2.5 l/s

Fire Flow demand: 66.7 l/s

Fire Flow + Max Day: 68.1 l/s

Calculations are attached. Also attached is sketch showing the location of the proposed service connection.

Thanks, Doug

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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1375 Clyde Aug 2019.pdf
119K

Boundary Condition for 1375 Clyde

1375 Clyde Avenue
Ottawa, Ontario

EPANET HYDRAULIC MODELLING RESULTS

FIRE HYDRANT FH-1 + DYMON BUILDING SPRINKLERS: 283.3 lps

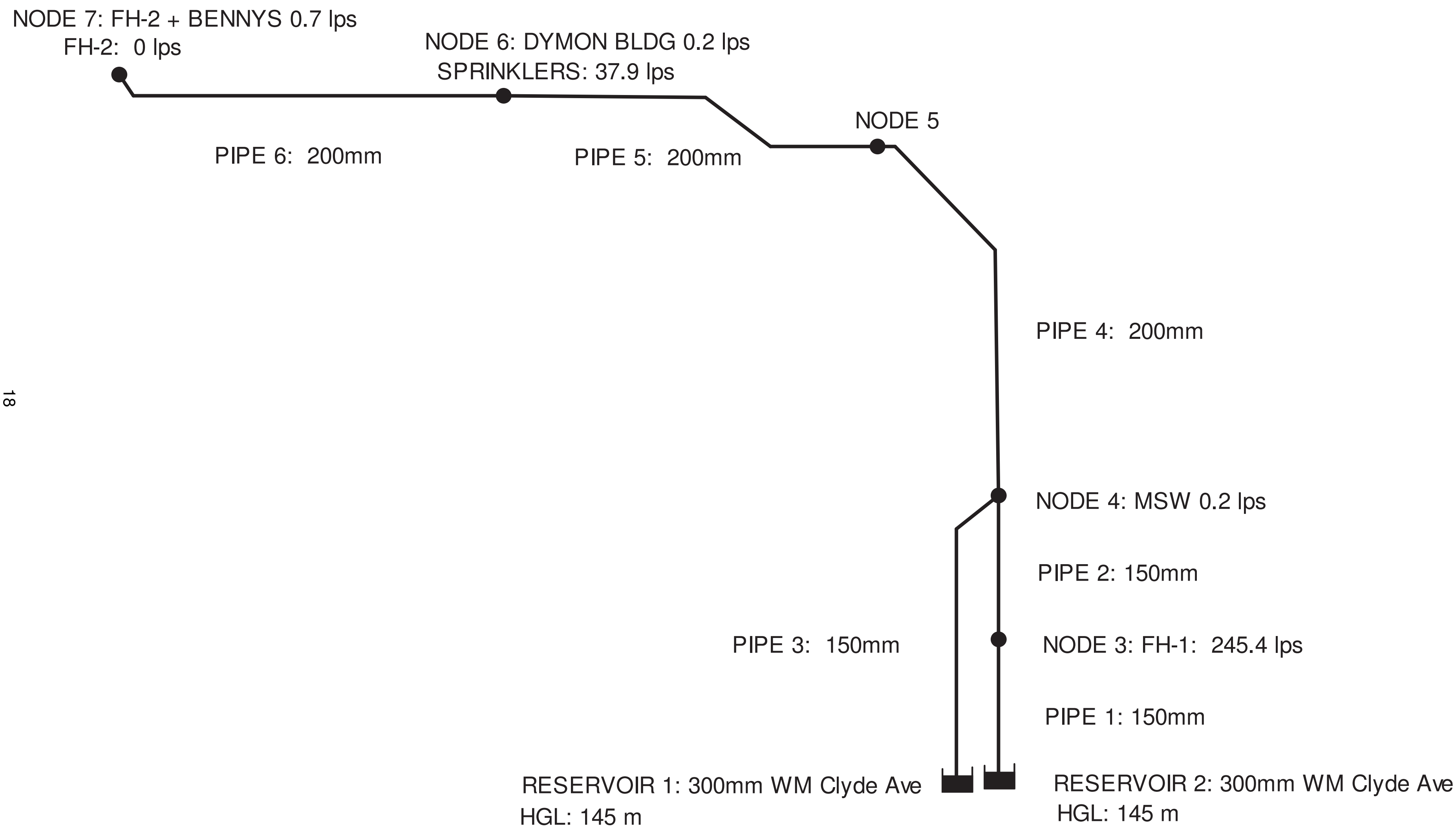
Node ID	Demand	Head	Elevation	Pressure		
	l/s	m	m	m	psi	kPa
1 Reservoir 1 (Connection to 300 WM Clyde Ave)	-110.84	145.00	95.25	49.75	70.7	488
2 Reservoir 2 (Connection to 300 WM Clyde Ave)	-173.56	145.00	95.25	49.75	70.7	488
3 Fire Hydrant FH-1 (283.3 l/s less 37.9 l/s to Dymon Bldg sprinklers)	245.40	115.25	95.65	19.60	27.9	192
4 - MSW Connection (0.2 l/s Max Day)	0.20	119.62	96.06	23.56	33.5	231
5	0.00	118.74	96.15	22.59	32.1	221
6 - Dymon Connection (37.9 l/s to sprinklers + 0.2 l/s Max Day)	38.10	118.15	96.32	21.83	31.0	214
7 Fire Hydrant FH-2 (0 l/s) & Benny's Connection (0.7 l/s Max Day)	0.70	118.15	98.98	19.17	27.3	188

Link ID	Diameter	Length	Roughness	Loss Coeff.	Flow	Velocity
	mm	m			l/s	m/s
Pipe 1	150	20.0	100	2.60	173.56	9.82
Pipe 2	150	23.3	100	0.60	71.84	4.07
Pipe 3	150	43.7	100	4.60	110.84	6.27
Pipe 4	200	64.2	110	2.25	38.80	1.24
Pipe 5	200	44.5	110	1.40	38.80	1.24
Pipe 6	200	38.5	110	1.25	0.70	0.02

FIRE HYDRANT FH-2: 66.7 lps

Node ID	Demand	Head	Elevation	Pressure		
	l/s	m	m	m	psi	kPa
1 Reservoir 1 (Connection to 300 WM Clyde Ave)	-32.91	160.00	95.25	64.75	92.1	635
2 Reservoir 2 (Connection to 300 WM Clyde Ave)	-34.89	160.00	95.25	64.75	92.1	635
3 Fire Hydrant FH-1 (0 l/s)	0.00	158.61	95.65	62.96	89.5	617
4 - MSW Connection (0.2 l/s Max Day)	0.20	157.48	96.06	61.42	87.3	602
5	0.00	154.99	96.15	58.84	83.7	577
6 - Dymon Connection (0.2 l/s Max Day)	0.20	153.30	96.32	56.98	81.0	559
7 Fire Hydrant FH-2 (66.7 l/s) & Benny's Connection (0.7 l/s Max Day)	67.40	151.84	98.98	52.86	75.2	518

Link ID	Diameter	Length	Roughness	Loss Coeff.	Flow	Velocity
	mm	m			l/s	m/s
Pipe 1	150	20.0	100	2.60	34.89	1.97
Pipe 2	150	23.3	100	0.60	34.89	1.97
Pipe 3	150	43.7	100	4.60	32.91	1.86
Pipe 4	200	64.2	110	2.25	67.60	2.15
Pipe 5	200	44.5	110	1.40	67.60	2.15
Pipe 6	200	38.5	110	1.25	67.40	2.15

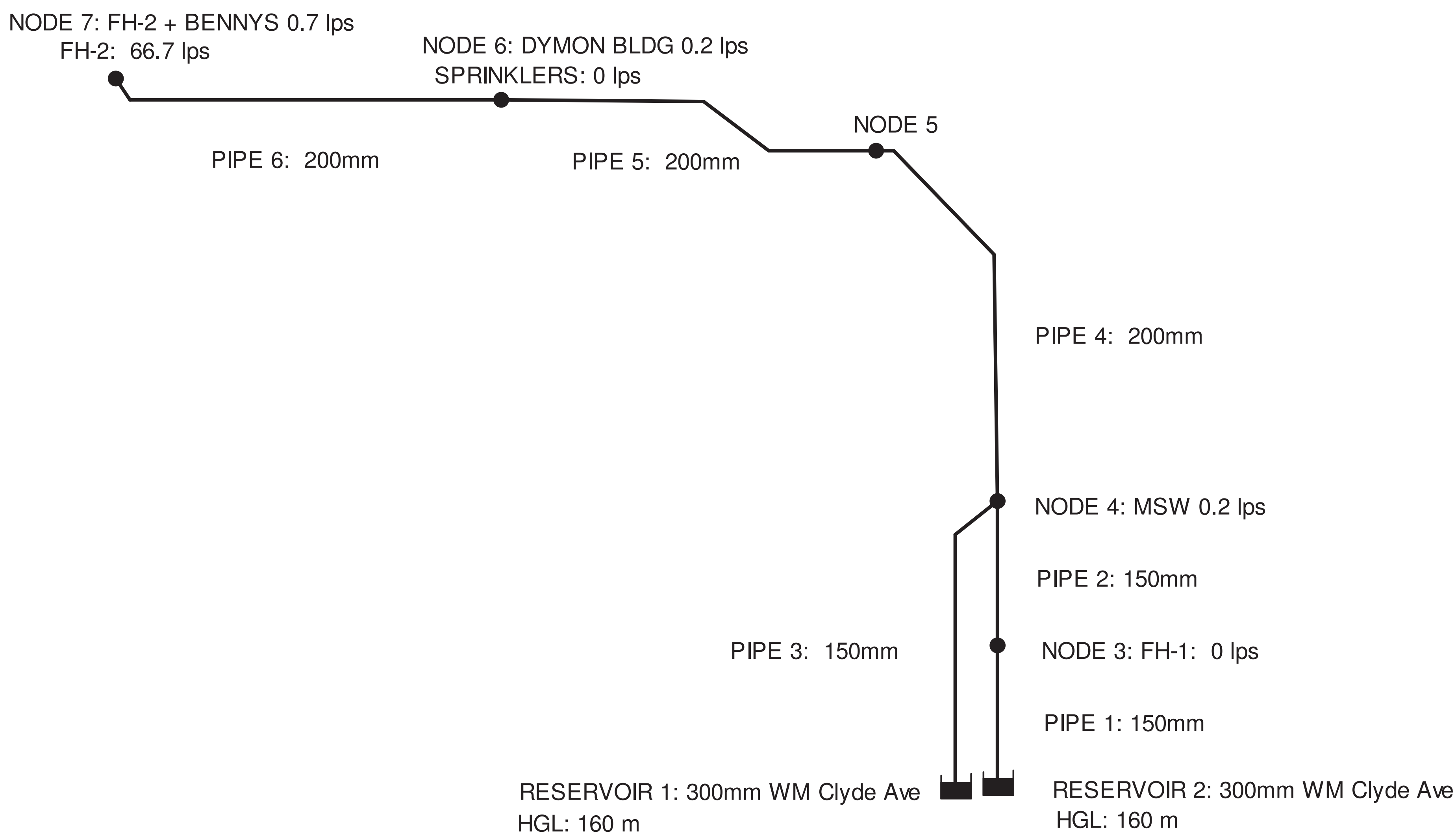

NODE 7: FH-2 + BENNYS 0.7 lps
FH-2: 0 lps
NODE 6: DYMON BLDG 0.2 lps
SPRINKLERS: 37.9 lps
NODE 5
PIPE 6: 200mm
PIPE 5: 200mm
PIPE 4: 200mm
NODE 4: MSW 0.2 lps
PIPE 2: 150mm
PIPE 3: 150mm
NODE 3: FH-1: 245.4 lps
PIPE 1: 150mm
RESERVOIR 1: 300mm WM Clyde Ave
HGL: 145 m
RESERVOIR 2: 300mm WM Clyde Ave
HGL: 145 m

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc 3	95.65	245.4	245.40	115.25	19.60
Junc 4	96.06	0.2	0.20	119.62	23.56
Junc 5	96.15	0	0.00	118.74	22.59
Junc 6	96.32	38.1	38.10	118.15	21.83
Junc 7	98.98	0.7	0.70	118.15	19.17
Resvr 1	145	#N/A	-110.84	145.00	0.00
Resvr 2	145	#N/A	-173.56	145.00	0.00

Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s
Pipe 1	20.0	150	100	173.56	9.82
Pipe 2	23.3	150	100	-71.84	4.07
Pipe 3	43.7	150	100	110.84	6.27
Pipe 4	64.2	200	110	38.80	1.24
Pipe 5	44.5	200	110	38.80	1.24
Pipe 6	38.5	200	110	0.70	0.02


NODE 7: FH-2 + BENNYS 0.7 lps
FH-2: 66.7 lps
NODE 6: DYMON BLDG 0.2 lps
SPRINKLERS: 0 lps
NODE 5
PIPE 6: 200mm
PIPE 5: 200mm
PIPE 4: 200mm
NODE 4: MSW 0.2 lps
PIPE 2: 150mm
PIPE 3: 150mm
NODE 3: FH-1: 0 lps
PIPE 1: 150mm
RESERVOIR 1: 300mm WM Clyde Ave
HGL: 160 m
RESERVOIR 2: 300mm WM Clyde Ave
HGL: 160 m

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc 3	95.65	0	0.00	158.61	62.96
Junc 4	96.06	0.2	0.20	157.48	61.42
Junc 5	96.15	0	0.00	154.99	58.84
Junc 6	96.32	0.2	0.20	153.30	56.98
Junc 7	98.98	67.40	67.40	151.84	52.86
Resvr 1	160	#N/A	-32.91	160.00	0.00
Resvr 2	160	#N/A	-34.89	160.00	0.00

Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s
Pipe 1	20.0	150	100	34.89	1.97
Pipe 2	23.3	150	100	34.89	1.97
Pipe 3	43.7	150	100	32.91	1.86
Pipe 4	64.2	200	110	67.60	2.15
Pipe 5	44.5	200	110	67.60	2.15
Pipe 6	38.5	200	110	67.40	2.15

D. B. GRAY ENGINEERING INC.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

SANITARY SEWER DESIGN FORM

Average Daily Flows:
Residential: 280 l / capita / day
Commercial: 28,000 l / ha / day
Instituational: 28,000 l / ha / day
Light Industrial: 35,000 l / ha / day
Heavy Industrial: 55,000 l / ha / day

Infiltration Allowance: 0.33 l / s / ha

Peaking Factor:
Residential (Harmon Equation): $P.F. = 1 + \frac{14}{4 + P^{0.5}}$
P = Population / 1000
Harmon Correction Factor 0.8
Commercial & Institutional: 1.5 If contrinbution > 20%
Commercial & Institutional: 1.0 If contrinbution < 20%
Industrial: As per Ottawa Guidelines Appendix 4-B

PROJECT: 1375 CLYDE AVE DYMON STORAGE

Designed By: DBG

9-Dec-19

LOCATION			Section								Cumulative		Section			Cumulative					SEWER DATA								COMMENTS
			Single Family	Semi/Townhouse	Duplex / Triplex	Apartments (average)	Apartments (1 Bed.)	Apartments (2 Bed.)	Apartments (3 Bed.)	Resid-ential Area	Residential		Non-Residential								n = 0.013								
STREET	FROM	TO	ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.8	ppu = 1.4	ppu = 2.1	ppu = 3.1		Pop.	Peaking Factor	Area	Flow	Peaking Factor	Flow	Area	Sewage Flow	Infil-tration Flow	Total Flow	Type of Pipe	Dia. Actual	Dia. Nom.	Slope	Length	Capacity	Velocity	Ratio	
			No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	ha			ha	l/ha/day		l/s	ha	l/s	l/s	l/s	Pipe	(mm)	(mm)	(%)	(m)	(l/s)	(m/s)	Q/Qfull	
															3.0 = 1.5 x 24hrs / 12hrs														
	BENNY'S BLDG	MH-SA.1									0	3.2	0.69	28000	3.0	0.67	0.69	0.67	0.23	0.90	PVC	152.4	150	2.00	10.0	22.5	1.23	0.04	
	MH-SA.1	MH-SA.2									0	3.2	0.00	28000	3.0	0.67	0.69	0.67	0.23	0.90	PVC	203.2	200	4.03	47.2	68.7	2.12	0.01	
	DYMON BLDG	MH-SA.2									0	3.2	0.20	28000	3.0	0.19	0.20	0.19	0.06	0.26	PVC	152.4	150	1.00	12.2	15.9	0.87	0.02	
	MH-SA.2	MH-SA.3									0	3.2	0.00	28000	3.0	0.86	0.88	0.86	0.29	1.15	PVC	203.2	200	0.32	44	19.4	0.60	0.06	
	MSW BLDG	MH-SA.3									0	3.2	0.20	28000	3.0	0.19	0.20	0.19	0.06	0.26	PVC	152.4	150	1.00	5.9	15.9	0.87	0.02	
	MH-SA.3	MH-SA.4									0	3.2	0.00	28000	3.0	1.05	1.08	1.05	0.36	1.41	PVC	203.2	200	0.32	77.5	19.4	0.60	0.07	
	MH-SA.4	EXISTING 200 SAN									0	3.2	0.00	28000	3.0	1.05	1.08	1.05	0.36	1.41	PVC	152.4	150	0.50	26.1	11.2	0.62	0.13	existing sewer assumed slope
																					EXISTING 200mm MUNICIPAL SANITARY SEWER IN CLYDE AVENUE								
																						203.2	200	0.31		19.1	0.59		

STORMWATER MANAGEMENT CALCULATIONS

The orifice calculations are based on the following formula:

$$Q = C_d \times A_o \sqrt{2gh} \times 1000$$

where:

Q = flowrate in litres per second
C_d = coefficient of discharge
A_o = orifice area in sq.m.
g = 9.81 m/s2
h = head above orifice in meters

Flow control roof drain calculations are based on the following formula:

$$Q = N \times S \times d \times F$$

where:

Q = flowrate in litres per second
N = number of roof drains
S = slots per weir
d = pond depth at roof drain in mm
F = flowrate through each slot
0.0124 litres per second per mm pond depth (5 USgpm per inch)

Storage calculations on the roof and parking area are based on the following formula for volume of a cone:

$$V = (A \times d)/3$$

where:

V = volume in cu.m.
A = ponding area in sq.m.
d = ponding depth in meters

Summary Tables

ONE HUNDRED YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	9.12	-	-
AREA II (Dymon Storage Roof)	-	10.66	120.60	120.60
AREA III (Benny's Roof)	-	2.98	12.71	12.71
AREA IV	-	14.346	30.60	30.60
AREA V	-	12.288	110.51	110.51
AREA VI	-	10.613	178.50	178.50
TOTAL	60.00	60.00	452.92	452.92

FIVE YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	4.55	-	-
AREA II (Dymon Storage Roof)	-	8.24	55.73	55.73
AREA III (Benny's Roof)	-	2.17	5.73	5.73
AREA IV	-	11.97	12.69	12.69
AREA V	-	10.28	50.21	50.21
AREA VI	-	8.60	66.60	66.60
TOTAL	60.00	45.81	190.97	190.97

December 13, 2019

1375 Clyde Ave

Ottawa, Ontario

STORM WATER MANAGEMENT CALCULATIONS
Rational Method

Maximum Allowable Release Rate

Maximum Allowable Release Rate:	60.00	L/s	Refer to Sep 18-18 email from City of Ottawa (Eric Suprenant) to JL Richards

ONE HUNDRED YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	100	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	335	sq.m	0.25
Total Catchment Area:	435	sq.m	0.42

Area (A):	435	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coeficient (C):	0.42	
Flow Rate (2.78AiC):	9.12	L/s

DRAINAGE AREA II (Dymon Storage Roof)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	2841	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	2841	sq.m	1.00

No. of Roof Drains:	6	
Slots per Wier:	1	0.0124 l/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drain:	143	mm
Maximum Release Rate:	10.66	L/s

Pond Area:	2526	sq.m
Achieved Volume:	120.60	cu.m
Maximum Volume Required:	120.60	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	191.69	10.66	181.03	54.31
10	179	141.03	10.66	130.37	78.22
15	143	112.86	10.66	102.20	91.98
20	120	94.74	10.66	84.08	100.90
25	104	82.02	10.66	71.36	107.04
30	92	72.56	10.66	61.90	111.42
35	83	65.22	10.66	54.56	114.58
40	75	59.35	10.66	48.69	116.86
45	69	54.54	10.66	43.88	118.47
50	64	50.51	10.66	39.85	119.56
55	60	47.09	10.66	36.43	120.23
60	56	44.15	10.66	33.49	120.56
65	53	41.58	10.66	30.92	120.60
70	50	39.32	10.66	28.67	120.40
75	47	37.32	10.66	26.66	119.99
80	45	35.53	10.66	24.88	119.41
85	43	33.92	10.66	23.27	118.66
90	41	32.47	10.66	21.81	117.78
95	39	31.15	10.66	20.49	116.78
100	38	29.94	10.66	19.28	115.67
105	36	28.83	10.66	18.17	114.46
110	35	27.80	10.66	17.15	113.16
115	34	26.86	10.66	16.20	111.78
120	33	25.98	10.66	15.32	110.32
125	32	25.16	10.66	14.51	108.80
130	31	24.40	10.66	13.75	107.22
135	30	23.69	10.66	13.03	105.58
140	29	23.02	10.66	12.37	103.88
145	28	22.40	10.66	11.74	102.14
150	28	21.81	10.66	11.15	100.34
180	24	18.88	10.66	8.22	88.78
210	21	16.70	10.66	6.04	76.13
240	19	15.01	10.66	4.35	62.69
270	17	13.66	10.66	3.00	48.63
300	16	12.55	10.66	1.89	34.08

DRAINAGE AREA III (Restaurant Roof)

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	393	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	393	sq.m	1.00

No. of Roof Drains: 2

Slots per Wier: 1 0.0124 l/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 120 mm

Maximum Release Rate: 2.98 L/s

Pond Area: 269 sq.m

Achieved Volume: 12.71 cu.m

Maximum Volume Required: 12.71 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	26.52	2.98	23.54	7.06
10	179	19.51	2.98	16.53	9.92
15	143	15.61	2.98	12.63	11.37
20	120	13.11	2.98	10.13	12.15
25	104	11.35	2.98	8.37	12.55
30	92	10.04	2.98	7.06	12.71
35	83	9.02	2.98	6.04	12.69
40	75	8.21	2.98	5.23	12.56
45	69	7.54	2.98	4.57	12.33
50	64	6.99	2.98	4.01	12.03
55	60	6.51	2.98	3.54	11.67
60	56	6.11	2.98	3.13	11.26
65	53	5.75	2.98	2.77	10.82
70	50	5.44	2.98	2.46	10.34
75	47	5.16	2.98	2.19	9.83
80	45	4.92	2.98	1.94	9.30
85	43	4.69	2.98	1.72	8.75
90	41	4.49	2.98	1.51	8.17
95	39	4.31	2.98	1.33	7.59
100	38	4.14	2.98	1.16	6.98
105	36	3.99	2.98	1.01	6.36
110	35	3.85	2.98	0.87	5.73
115	34	3.72	2.98	0.74	5.09
120	33	3.59	2.98	0.62	4.44
125	32	3.48	2.98	0.50	3.78
130	31	3.38	2.98	0.40	3.11
135	30	3.28	2.98	0.30	2.43
140	29	3.18	2.98	0.21	1.74
145	28	3.10	2.98	0.12	1.05
150	28	3.02	2.98	0.04	0.35
180	24	2.61	2.61	0.00	0.00
210	21	2.31	2.31	0.00	0.00
240	19	2.08	2.08	0.00	0.00
270	17	1.89	1.89	0.00	0.00
300	16	1.74	1.74	0.00	0.00

DRAINAGE AREA IV

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	910	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	146	sq.m	0.25
Total Catchment Area:	1056	sq.m	0.90

Water Elevation:	96.36	m
Invert of Outlet Pipe - CB/MH-3:	94.65	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-3)	94.78	m
Head:	1.58	m
Orifice Diameter:	73	mm
Orifice Area:	4223	sq.mm
Coefficient of Discharge:	0.61	
Maximum Release Rate:	14.35	L/s

Underground Storage

Volume Per Chamber (cu.m)	# of Chambers	Volume	
5.10	6	30.60	cu.m

Achieved Volume:	30.60	cu.m
Maximum Volume Required:	30.60	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	63.86	7.17	56.69	17.01
10	179	46.98	7.17	39.81	23.89
15	143	37.60	7.17	30.43	27.38
20	120	31.56	7.17	24.39	29.27
25	104	27.32	7.17	20.15	30.23
30	92	24.17	7.17	17.00	30.60
35	83	21.73	7.17	14.56	30.57
40	75	19.77	7.17	12.60	30.24
45	69	18.17	7.17	11.00	29.69
50	64	16.83	7.17	9.66	28.97
55	60	15.69	7.17	8.52	28.10
60	56	14.71	7.17	7.53	27.12
65	53	13.85	7.17	6.68	26.05
70	50	13.10	7.17	5.93	24.90
75	47	12.43	7.17	5.26	23.68
80	45	11.84	7.17	4.67	22.39
85	43	11.30	7.17	4.13	21.06
90	41	10.82	7.17	3.64	19.68
95	39	10.38	7.17	3.20	18.26
100	38	9.97	7.17	2.80	16.80
105	36	9.60	7.17	2.43	15.31
110	35	9.26	7.17	2.09	13.79
115	34	8.95	7.17	1.77	12.25
120	33	8.66	7.17	1.48	10.67
125	32	8.38	7.17	1.21	9.08
130	31	8.13	7.17	0.96	7.47
135	30	7.89	7.17	0.72	5.83
140	29	7.67	7.17	0.50	4.18
145	28	7.46	7.17	0.29	2.51
150	28	7.27	7.17	0.09	0.83
180	24	6.29	6.29	0.00	0.00
210	21	5.56	5.56	0.00	0.00
240	19	5.00	5.00	0.00	0.00
270	17	4.55	4.55	0.00	0.00
300	16	4.18	4.18	0.00	0.00

DRAINAGE AREA V

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	2217	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	445	sq.m	0.25
Total Catchment Area:	2662	sq.m	0.87

Water Elevation:	95.87	m
Invert of Outlet Pipe - CB/MH-7:	94.10	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-7)	94.15	m
Head:	1.72	m
Orifice Diameter:	100	mm
Orifice Area:	7854	sq.mm
Coefficient of Discharge:	0.269	
Maximum Release Rate:	12.29	L/s

Surface Storage Above Catch-Basin

CB	Top Area (sq.m)	Depth (m)	Volume	
CB/MH-7	725	0.22	53.27	cu.m

Underground Storage

Volume Per Chamber (cu.m)	# of Chambers	Volume	
2.12	27	57.24	cu.m

Achieved Volume: 110.51 cu.m

Maximum Volume Required: 110.51 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	157.09	6.14	150.95	45.28
10	179	115.57	6.14	109.43	65.66
15	143	92.49	6.14	86.34	77.71
20	120	77.64	6.14	71.49	85.79
25	104	67.22	6.14	61.07	91.61
30	92	59.46	6.14	53.32	95.97
35	83	53.45	6.14	47.31	99.34
40	75	48.64	6.14	42.49	101.99
45	69	44.69	6.14	38.55	104.08
50	64	41.39	6.14	35.25	105.75
55	60	38.59	6.14	32.45	107.08
60	56	36.18	6.14	30.03	108.12
65	53	34.08	6.14	27.93	108.93
70	50	32.23	6.14	26.08	109.55
75	47	30.59	6.14	24.44	109.99
80	45	29.12	6.14	22.98	110.29
85	43	27.80	6.14	21.66	110.46
90	41	26.61	6.14	20.46	110.51
95	39	25.52	6.14	19.38	110.47
100	38	24.53	6.14	18.39	110.33
105	36	23.62	6.14	17.48	110.12
110	35	22.78	6.14	16.64	109.83
115	34	22.01	6.14	15.87	109.47
120	33	21.29	6.14	15.15	109.06
125	32	20.62	6.14	14.48	108.59
130	31	20.00	6.14	13.85	108.07
135	30	19.42	6.14	13.27	107.50
140	29	18.87	6.14	12.72	106.89
145	28	18.35	6.14	12.21	106.23
150	28	17.87	6.14	11.73	105.54
180	24	15.47	6.14	9.33	100.73
210	21	13.69	6.14	7.54	95.02
240	19	12.30	6.14	6.16	88.67
270	17	11.19	6.14	5.05	81.81
300	16	10.29	6.14	4.14	74.55

DRAINAGE AREA VI

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	1935	sq.m	1.00
Asphalt/Concrete Area:	1289	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	205	sq.m	0.25
Total Catchment Area:	3429	sq.m	0.96

Water Elevation:	95.44	m
Invert of Outlet Pipe - MH-10:	93.67	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of MH-10)	93.72	m
Head:	1.72	m
Orifice Diameter:	100	mm
Orifice Area:	7854	sq.mm
Coefficient of Discharge:	0.233	
Maximum Release Rate:	10.61	L/s

Underground Storage

Volume Per Chamber (cu.m)	# of Chambers	Volume	
5.10	35	178.50	cu.m

Achieved Volume:	178.50	cu.m
Maximum Volume Required:	178.50	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	243	220.99	5.31	215.68	64.70
10	179	162.58	5.31	157.27	94.36
15	143	130.11	5.31	124.80	112.32
20	120	109.22	5.31	103.91	124.69
25	104	94.55	5.31	89.25	133.87
30	92	83.65	5.31	78.34	141.01
35	83	75.19	5.31	69.88	146.75
40	75	68.42	5.31	63.11	151.47
45	69	62.87	5.31	57.57	155.43
50	64	58.23	5.31	52.92	158.77
55	60	54.29	5.31	48.98	161.64
60	56	50.89	5.31	45.59	164.11
65	53	47.94	5.31	42.63	166.25
70	50	45.33	5.31	40.03	168.12
75	47	43.03	5.31	37.72	169.74
80	45	40.97	5.31	35.66	171.16
85	43	39.11	5.31	33.80	172.40
90	41	37.43	5.31	32.13	173.48
95	39	35.91	5.31	30.60	174.42
100	38	34.51	5.31	29.20	175.23
105	36	33.23	5.31	27.92	175.93
110	35	32.05	5.31	26.75	176.52
115	34	30.96	5.31	25.66	177.02
120	33	29.95	5.31	24.64	177.44
125	32	29.01	5.31	23.70	177.78
130	31	28.13	5.31	22.83	178.05
135	30	27.31	5.31	22.01	178.25
140	29	26.54	5.31	21.24	178.39
145	28	25.82	5.31	20.51	178.47
150	28	25.14	5.31	19.83	178.50
180	24	21.76	5.31	16.46	177.74
210	21	19.25	5.31	13.95	175.72
240	19	17.31	5.31	12.00	172.78
270	17	15.75	5.31	10.44	169.13
300	16	14.47	5.31	9.16	164.93

FIVE YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(FIVE YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	100	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	335	sq.m	0.20
Total Catchment Area:	435	sq.m	0.36
Area (A):	435	sq.m	
Time of Concentration:	10.0	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.36		
Flow Rate (2.78AiC):	4.55	L/s	

DRAINAGE AREA II (Dymon Storage Roof)

(FIVE YEAR EVENT)

			C
Roof Area:	2841	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
Total Catchment Area:	2841	sq.m	0.90

No. of Roof Drains:	6	
Slots per Wier:	1	0.0124 l/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drain:	111	mm
Maximum Release Rate:	8.24	L/s

Pond Area:	1510	sq.m
Achieved Volume:	55.73	cu.m
Maximum Volume Required:	55.73	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	100.35	8.24	92.11	27.63
10	104	74.06	8.24	65.82	39.49
15	84	59.39	8.24	51.15	46.04
20	70	49.94	8.24	41.70	50.04
25	61	43.29	8.24	35.05	52.57
30	54	38.33	8.24	30.09	54.17
35	49	34.49	8.24	26.25	55.12
40	44	31.41	8.24	23.17	55.60
45	41	28.88	8.24	20.64	55.73
50	38	26.76	8.24	18.53	55.58
55	35	24.97	8.24	16.73	55.20
60	33	23.42	8.24	15.18	54.64
65	31	22.07	8.24	13.83	53.93
70	29	20.88	8.24	12.64	53.08
75	28	19.82	8.24	11.58	52.13
80	27	18.88	8.24	10.64	51.08
85	25	18.03	8.24	9.79	49.94
90	24	17.26	8.24	9.03	48.74
95	23	16.57	8.24	8.33	47.46
100	22	15.93	8.24	7.69	46.13
105	22	15.34	8.24	7.10	44.74
110	21	14.80	8.24	6.56	43.31
115	20	14.30	8.24	6.06	41.83
120	19	13.84	8.24	5.60	40.31
125	19	13.41	8.24	5.17	38.75
130	18	13.00	8.24	4.76	37.16
135	18	12.63	8.24	4.39	35.54
140	17	12.27	8.24	4.04	33.90
145	17	11.94	8.24	3.70	32.22
150	16	11.63	8.24	3.39	30.52
180	14	10.08	8.24	1.84	19.87
210	13	8.92	8.24	0.69	8.63
240	11	8.03	8.03	0.00	0.00
270	10	7.31	7.31	0.00	0.00
300	9	6.72	6.72	0.00	0.00

DRAINAGE AREA III (Restaurant Roof)

(FIVE YEAR EVENT)

			C
Roof Area:	393	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
Total Catchment Area:	393	sq.m	0.90

No. of Roof Drains: 2

Slots per Wier: 1 0.0124 l/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 87 mm

Maximum Release Rate: 2.17 L/s

Pond Area: 162 sq.m

Achieved Volume: 5.73 cu.m

Maximum Volume Required: 5.73 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	13.88	2.17	11.72	3.51
10	104	10.25	2.17	8.08	4.85
15	84	8.22	2.17	6.05	5.44
20	70	6.91	2.17	4.74	5.69
25	61	5.99	2.17	3.82	5.73
30	54	5.30	2.17	3.14	5.65
35	49	4.77	2.17	2.60	5.47
40	44	4.34	2.17	2.18	5.23
45	41	3.99	2.17	1.83	4.94
50	38	3.70	2.17	1.54	4.61
55	35	3.45	2.17	1.29	4.25
60	33	3.24	2.17	1.07	3.86
65	31	3.05	2.17	0.89	3.46
70	29	2.89	2.17	0.72	3.03
75	28	2.74	2.17	0.58	2.59
80	27	2.61	2.17	0.45	2.14
85	25	2.49	2.17	0.33	1.67
90	24	2.39	2.17	0.22	1.20
95	23	2.29	2.17	0.13	0.71
100	22	2.20	2.17	0.04	0.22
105	22	2.12	2.12	0.00	0.00
110	21	2.05	2.05	0.00	0.00
115	20	1.98	1.98	0.00	0.00
120	19	1.91	1.91	0.00	0.00
125	19	1.85	1.85	0.00	0.00
130	18	1.80	1.80	0.00	0.00
135	18	1.75	1.75	0.00	0.00
140	17	1.70	1.70	0.00	0.00
145	17	1.65	1.65	0.00	0.00
150	16	1.61	1.61	0.00	0.00
180	14	1.39	1.39	0.00	0.00
210	13	1.23	1.23	0.00	0.00
240	11	1.11	1.11	0.00	0.00
270	10	1.01	1.01	0.00	0.00
300	9	0.93	0.93	0.00	0.00

DRAINAGE AREA IV

(FIVE YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	910	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	146	sq.m	0.20
Total Catchment Area:	1056	sq.m	0.80

Water Elevation:	95.79	m
Invert of Outlet Pipe - CB/MH-3:	94.65	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-3)	94.69	m
Head:	1.10	m
Orifice Diameter:	73	mm
Orifice Area:	4223	sq.mm
Coefficient of Discharge:	0.61	
Maximum Release Rate:	11.97	L/s

Underground Storage

Area (sq.m)	Length (m)	Volume	
0.89	14.2	12.69	cu.m

Achieved Volume:	12.69	cu.m
Maximum Volume Required:	12.69	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	33.29	5.99	27.30	8.19
10	104	24.57	5.99	18.58	11.15
15	84	19.70	5.99	13.72	12.34
20	70	16.57	5.99	10.58	12.69
25	61	14.36	5.99	8.37	12.56
30	54	12.72	5.99	6.73	12.11
35	49	11.44	5.99	5.45	11.45
40	44	10.42	5.99	4.43	10.64
45	41	9.58	5.99	3.59	9.70
50	38	8.88	5.99	2.89	8.68
55	35	8.28	5.99	2.30	7.57
60	33	7.77	5.99	1.78	6.41
65	31	7.32	5.99	1.33	5.20
70	29	6.93	5.99	0.94	3.94
75	28	6.58	5.99	0.59	2.65
80	27	6.26	5.99	0.28	1.33
85	25	5.98	5.98	0.00	0.00
90	24	5.73	5.73	0.00	0.00
95	23	5.50	5.50	0.00	0.00
100	22	5.28	5.28	0.00	0.00
105	22	5.09	5.09	0.00	0.00
110	21	4.91	4.91	0.00	0.00
115	20	4.74	4.74	0.00	0.00
120	19	4.59	4.59	0.00	0.00
125	19	4.45	4.45	0.00	0.00
130	18	4.31	4.31	0.00	0.00
135	18	4.19	4.19	0.00	0.00
140	17	4.07	4.07	0.00	0.00
145	17	3.96	3.96	0.00	0.00
150	16	3.86	3.86	0.00	0.00
180	14	3.34	3.34	0.00	0.00
210	13	2.96	2.96	0.00	0.00
240	11	2.66	2.66	0.00	0.00
270	10	2.43	2.43	0.00	0.00
300	9	2.23	2.23	0.00	0.00

DRAINAGE AREA V

(FIVE YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	2217	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	445	sq.m	0.20
Total Catchment Area:	2662	sq.m	0.78

Water Elevation:	95.35	m
Invert of Outlet Pipe - CB/MH-7:	94.10	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-7)	94.15	m
Head:	1.20	m
Orifice Diameter:	100	mm
Orifice Area:	7854	sq.mm
Coefficient of Discharge:	0.269	
Maximum Release Rate:	10.28	L/s

Underground Storage			
Area (sq.m)	Length (m)	Volume	
0.84	60.0	50.21	cu.m

Achieved Volume:	50.21	cu.m
Maximum Volume Required:	50.21	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	81.80	5.14	76.66	23.00
10	104	60.37	5.14	55.23	33.14
15	84	48.42	5.14	43.27	38.95
20	70	40.71	5.14	35.56	42.68
25	61	35.29	5.14	30.14	45.22
30	54	31.25	5.14	26.11	46.99
35	49	28.11	5.14	22.97	48.24
40	44	25.60	5.14	20.46	49.11
45	41	23.54	5.14	18.40	49.68
50	38	21.82	5.14	16.68	50.03
55	35	20.35	5.14	15.21	50.19
60	33	19.09	5.14	13.95	50.21
65	31	17.99	5.14	12.85	50.10
70	29	17.02	5.14	11.88	49.89
75	28	16.16	5.14	11.02	49.58
80	27	15.39	5.14	10.25	49.20
85	25	14.70	5.14	9.56	48.75
90	24	14.07	5.14	8.93	48.23
95	23	13.50	5.14	8.36	47.67
100	22	12.98	5.14	7.84	47.05
105	22	12.51	5.14	7.36	46.40
110	21	12.07	5.14	6.92	45.70
115	20	11.66	5.14	6.52	44.97
120	19	11.28	5.14	6.14	44.20
125	19	10.93	5.14	5.79	43.41
130	18	10.60	5.14	5.46	42.58
135	18	10.29	5.14	5.15	41.74
140	17	10.01	5.14	4.86	40.86
145	17	9.74	5.14	4.59	39.97
150	16	9.48	5.14	4.34	39.06
180	14	8.22	5.14	3.08	33.21
210	13	7.28	5.14	2.13	26.89
240	11	6.54	5.14	1.40	20.21
270	10	5.96	5.14	0.82	13.25
300	9	5.48	5.14	0.34	6.09

DRAINAGE AREA VI

(FIVE YEAR EVENT)

			C
Roof Area:	1935	sq.m	0.90
Asphalt/Concrete Area:	1289	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	205	sq.m	0.20
Total Catchment Area:	3429	sq.m	0.86

Water Elevation:	94.85	m
Invert of Outlet Pipe - MH-10:	93.67	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of MH-10)	93.72	m
Head:	1.13	m
Orifice Diameter:	100	mm
Orifice Area:	7854	sq.mm
Coefficient of Discharge:	0.233	
Maximum Release Rate:	8.60	L/s

Underground Storage

Area (sq.m)	Length (m)	Volume	
0.85	78	66.60	cu.m

Achieved Volume: 66.60 cu.m

Maximum Volume Required: 66.60 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	141	115.49	8.60	106.89	32.07
10	104	85.23	8.60	76.63	45.98
15	84	68.35	8.60	59.75	53.78
20	70	57.47	8.60	48.87	58.64
25	61	49.82	8.60	41.21	61.82
30	54	44.12	8.60	35.51	63.93
35	49	39.69	8.60	31.09	65.29
40	44	36.14	8.60	27.54	66.11
45	41	33.24	8.60	24.64	66.51
50	38	30.80	8.60	22.20	66.60
55	35	28.73	8.60	20.13	66.43
60	33	26.95	8.60	18.35	66.05
65	31	25.40	8.60	16.79	65.50
70	29	24.03	8.60	15.43	64.79
75	28	22.81	8.60	14.21	63.96
80	27	21.73	8.60	13.13	63.01
85	25	20.75	8.60	12.15	61.97
90	24	19.87	8.60	11.27	60.85
95	23	19.06	8.60	10.46	59.64
100	22	18.33	8.60	9.73	58.37
105	22	17.66	8.60	9.05	57.04
110	21	17.03	8.60	8.43	55.66
115	20	16.46	8.60	7.86	54.22
120	19	15.93	8.60	7.32	52.74
125	19	15.43	8.60	6.83	51.21
130	18	14.97	8.60	6.36	49.65
135	18	14.53	8.60	5.93	48.05
140	17	14.13	8.60	5.53	46.41
145	17	13.74	8.60	5.14	44.75
150	16	13.38	8.60	4.78	43.06
180	14	11.60	8.60	3.00	32.39
210	13	10.27	8.60	1.67	21.04
240	11	9.24	8.60	0.64	9.19
270	10	8.41	8.41	0.00	0.00
300	9	7.74	7.74	0.00	0.00

D.B. GRAY ENGINEERING INC.
Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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Ottawa, Ontario K1T 4E9

613-425-8044
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STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

n = 0.013

Project: 1375 Clyde Avenue
Designed By: DBG
Date: December 9, 2019
Page: 1 of 1

LOCATION			AREA (ha)				Individual 2.78 A R	Accum. 2.78 A R	Time of Conc. (min)	Rainfall Intensity i (mm/hr)	Peak Flow Q (l/s)	SEWER DATA									COMMENTS
			Hard	Gravel	Landscape	Roof						Type of Pipe	Dia. Actual (mm)	Dia. Nominal (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Time of Flow (min)	Ratio Q/Qfull	
STREET	FROM	TO	R = 0.90	R = 0.70	R = 0.20	R = 0.90															
	CB-0	CB/MH-1	0.0011		0.0040		0.005	0.005	10.00	104.2	0.5	PVC	254.0	250	0.43	7.8	40.7	0.80	0.16	0.01	
	CB/MH-1	MH-2	0.0011		0.0040		0.005	0.010	10.16	103.3	1.0	PVC	254.0	250	0.43	14.2	40.7	0.80	0.29	0.02	
	Benny's Roof	MH-2				0.0393	0.098	0.098	10.00	104.2	10.2	PVC	152.4	150	2.00	8.5	22.5	1.23	0.12	0.46	
											2.17	PVC	152.4	150	2.00	8.5	22.5	1.23	0.12	0.10	RESTRICTED FLOW THROUGH FLOW CONTROL ROOF DRAINS
	CB/MH-3	MH-2	0.0910		0.0146		0.236	0.236	10.00	104.2	24.6	PVC	254.0	250	0.43	2.9	40.7	0.80	0.06	0.60	
											12.01	PVC	254.0	250	0.43	2.9	40.7	0.80	0.06	0.30	RESTRICTED FLOW THROUGH ICD
	MH-2	MH-4						0.344	10.46	101.8	35.0	PVC	304.8	300	4.03	47.2	202.5	2.78	0.28	0.17	
											15.2	PVC	304.8	300	4.03	47.2	202.5	2.78	0.28	0.07	RESTRICTED FLOW
	Dymon Roof	MH-4				0.2841	0.711	0.711	10.00	104.2	74.1	PVC	254.0	250	2.00	9.9	87.7	1.73	0.10	0.84	
											8.24	PVC	254.0	250	2.00	9.9	87.7	1.73	0.10	0.09	RESTRICTED FLOW THROUGH FLOW CONTROL ROOF DRAINS
	MH-4	MH-6						1.055	10.74	100.4	105.9	PVC	304.8	300	0.34	45.1	58.8	0.81	0.93	1.80	
											23.4	PVC	304.8	300	0.34	45.1	58.8	0.81	0.93	0.40	RESTRICTED FLOW
	CB/MH-7	MH-6	0.2214		0.0445		0.579	0.579	10.00	104.2	60.3	PVC	381.0	375	0.34	15.0	106.7	0.94	0.27	0.57	
											10.28	PVC	381.0	375	0.34	15.0	106.7	0.94	0.27	0.10	RESTRICTED FLOW THROUGH ICD
	MSW Roof	MH-8				0.1930	0.483	0.483	10.00	104.2	50.3	PVC	254.0	250	1.00	9.3	62.0	1.22	0.13	0.81	
	CB-9	MH-8	0.0811				0.203	0.203	10.00	104.2	21.1	PVC	254.0	250	0.43	3.2	40.7	0.80	0.07	0.52	
	MH-8	MH-10						0.686	10.13	103.5	71.0	PVC	304.8	300	0.51	41.5	72.0	0.99	0.70	0.99	
	CB-15	CB/MH-12	0.0000		0.0185		0.010	0.010	10.00	104.2	1.1	PVC	254.0	250	0.43	42.7	40.7	0.80	0.89	0.03	
	CB-11	CB/MH-12	0.0357		0.0050		0.092	0.092	10.00	104.2	9.6	PVC	254.0	250	0.43	7.2	40.7	0.80	0.15	0.24	
	CB/MH-12	MH-10	0.0051		0.0048		0.015	0.118	10.89	99.7	11.8	PVC	254.0	250	0.43	13.0	40.7	0.80	0.27	0.29	
	MH-10	MH-6						0.804	11.16	98.5	79.1	PVC	381.0	375	0.34	5.9	106.7	0.94	0.11	0.74	
											8.60	PVC	381.0	375	0.34	5.9	106.7	0.94	0.11	0.08	RESTRICTED FLOW THROUGH ICD
	MH-6	MH-13						2.437	11.67	96.1	234.2	PVC	381.0	375	0.25	78.6	91.5	0.80	1.63	2.56	
											42.3	PVC	381.0	375	0.25	78.6	91.5	0.80	1.63	0.46	RESTRICTED FLOW
	MH-13	MH-14						2.437	13.31	89.5	218.0	PVC	381.0	375	0.25	12.4	91.5	0.80	0.26	2.38	
											42.3	PVC	381.0	375	0.25	12.4	91.5	0.80	0.26	0.46	RESTRICTED FLOW
													EXISTING 375 ST IN CLYDE AVENUE								
													381.0	375	0.43		119.9	1.05			

Lucie Dalrymple, P.Eng.
Associate
Senior Civil Engineer

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864 Lady Ellen Place, Ottawa, ON K1Z 5M2
Tel: 613-728-3571 Fax: 613-728-6012

J.L. Richards & Associates Limited
ENGINEERS • ARCHITECTS • PLANNERS

CANADA'S BEST MANAGED COMPANIES

From: Surprenant, Eric [mailto:Eric.Surprenant@ottawa.ca]
Sent: June 8, 2017 10:42 AM
To: Lucie Dalrymple
Cc: Karla Ferrey; Bliss Edwards; Guy Forget; Dickinson, Mary
Subject: RE: 1375 Clyde - preconsultation follow up

Hi Lucie,
I am providing the below information which was taken from our municipal system. You may need to make additional inquiries to obtain any other missing information.

Following up on the pre-application consultation for the 1375 Clyde, apologies as design guidelines affecting the stormwater design for the proposed site had not been attached to the previous information I had provided. This site actually drains to the Pinecrest Creek and I've obtained the final draft Stormwater Management Guidelines for the Pinecrest Creek/ Westboro Area (June 2012) and have the following information to convey to the applicant:

- Storm Water Quantity – The more stringent of the following criteria will govern:
  i. Developments draining to Pinecrest Creek shall control the 1:100 year discharge from the site to a maximum rate of 33.5 L/s/ha; this unit flow target has been set based on the hydrologic (SWMHYMO) modelling conducted for the Pinecrest Creek/Westboro Stormwater Management Retrofit Study (May 2011); or
  ii. Requirements of section 8 of the Ottawa Sewer Design Guidelines;
- Storm Water Quality – The equivalent of an enhanced level of treatment (TSS removal of 80%) is required for institutional/commercial/industrial sites draining to Pinecrest Creek; the proponent may wish to consult with the conservation authority to confirm that no additional requirements are applicable.

Particular measures for controlling stormwater release to the receiving storm sewer in Clyde would have been required being that the receiving storm sewers had been constructed pre-1970, however in this case the above Pinecrest Creek criteria is the criteria which would apply.

As it relates to Sanitary and Watermain public services analysis for Zoning , please ensure that existing uses and flows are compared against proposed development requirements, i.e.(fire flow requirements and confirming sanitary flows all versus existing.

If you require any additional information, please don't hesitate to contact me.

Annie Williams

From:	Sheldon Dattenberger
Sent:	September 18, 2018 11:17 AM
To:	Annie Williams; Bliss Edwards (bedwards@dymon.ca)
Cc:	Guy Forget
Subject:	FW: Dymon site - 1375 Clyde - Storm water Retention with existing service
Follow Up Flag:	Follow up
Flag Status:	Completed

From: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Sent: September 17, 2018 3:39 PM
To: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Subject: RE: Dymon site - 1375 Clyde - Storm water Retention with existing service

Hello Sheldon,

Sorry for the delay in following up on the below. Considering the context of this site we had to carefully consider your request.

Just as additional background, which you may be aware of already, the site is located immediately outside of the Pinecrest Creek study area, which would have imposed much more stringent controls on the site. Even though the site is just outside of the study area the drainage still goes to Pinecrest Creek and therefore the constraints are a real issue that we needed to consider.

With that said and considering the pre development conditions we have reviewed the below information you have provided and we agree with a maximum 60L/s release rate.

On the other item relating to the valve chamber, we will need to insist on the inclusion of a chamber and valve at property line.

Please look at how this could be achieved.
Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals

Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure
Examen des demandes d'aménagement (Services Suburbains Ouest)
Services de la planification, de l'infrastructure et du développement économique

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27794

ottawa.ca/planning / ottawa.ca/urbanisme

Eric S.

AquaShield™ STORMWATER TREATMENT SOLUTIONS

Sizing Report

2733 Kanasita Drive • Suite 111 • Chattanooga, TN 37343 • Phone: (423) 870-8888 • Fax: (423) 826-2112 • www.aquashieldinc.com

Site Information

Project Name: **1375 Clyde Ave.**

Site Area (hectacres): **1.0816**

Unit Label: **OGS 1**

Runoff Coeff. : **.82**

Unit Location: **Ottawa, ON**

Target Removal Efficiency(%): **80% based on NJDEP**

Product Recommendation

Aqua-Swirl™ Model	Net Annual TSS Removal Efficiency	Chamber Diameter	Maximum Inside Diameter (mm)		Oil/Debris Storage Capacity	Sediment Storage Capacity
			Offline	BYP[5]		
AS-4	85.64 %	1296 mm.	303 mm.	603 mm.	720 L	0.9 m^3

Rainfall Information

NCDC Station[1]: **OTTAWA MACDONALD-CARTIER INT'L A**

Data Range[4]: **261,759 readings taken hourly between 1967 to 2007 (~40 years)**

Rainfall Event Range (mm/hre)	Rainfall Interval Point (mm/hre)	Operating Rate (Lps/m^2)	Total Rainfall (%)	Removal Efficiency (%)[2]	Relative Efficiency(%)
02.00 - 03.00	02.50	04.17	44.18	93.41	41.27
03.00 - 04.00	03.50	05.84	21.52	90.68	19.51
04.00 - 05.00	04.50	07.50	11.68	87.48	10.22
05.00 - 06.00	05.50	09.17	06.68	83.81	05.60
06.00 - 07.00	06.50	10.84	04.03	79.67	03.21
07.00 - 08.00	07.50	12.50	01.99	75.05	01.49
08.00 - 09.00	08.50	14.17	01.84	69.97	01.29
09.00 - 10.00	09.50	15.84	01.81	64.42	01.17
10.00 - 15.00	12.50	20.84	04.12	44.93	01.85
15.00 - 20.00	17.50	29.18	01.02	03.03	00.03
		Total Cumulative Rainfall %:	**98.87[3]**	**Net Annual %:**	**85.64**

Sales Agent Information

Agent Name: **Dave Kanters**

Phone: **416-347-2799**

Company Name: **Soleno**

Fax:

Address: **347, 15-75 Bayly St. W.**

E-mail: **dkanters@soleno.com**

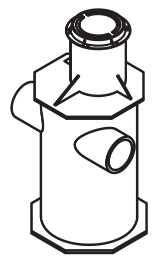
City, State Zip: **Ajax, ON L1S7K7**

Footnotes

1. Recorded as hourly precipitation rainfall data (inches), National Climatic Data Center (NCDC)
2. Based on Tennessee Tech University laboratory testing of the AquaSwirl™ Model AS-3 for OK-110 silica particles 50-125 microns(Neary, 2002)
3. 90% Rainfall Event, calculated as a cumulative percentile of individual events, www.stormwatercenter.net, sizing criteria (Center for Watershed Protection)
4. NCDC data may not be consecutive, skipping days, months and/or years in the range of dates.
5. The Aqua-Swirl™ Internal Bypass (BYP) provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.
6. When applicable, the performance curve was adjusted via Peclet Scaling to provide estimated sizing per NJDEP PSD (d50 = 67 microns).

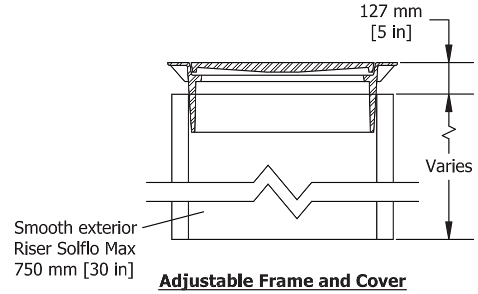
To receive pricing and/or technical support on the Aqua-Swirl, please contact Soleno. (www.Soleno.com)
Paul Antoine Sales Representative Tel: 613-292-4094 Email: pantoine@soleno.com
David Kanters Engineer, Technical Service Tel: 416-347-2799 Email: dkanters@soleno.com

Aqua-Swirl High Density Polyethylene (HDPE) Stormwater Treatment System



Projected View
SCALE 1:80

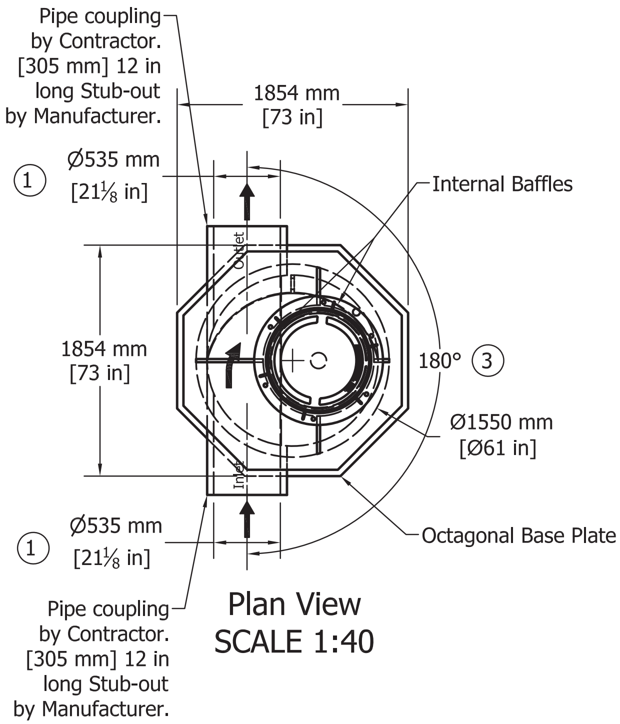
Please see accompanied Aqua-Swirl specification notes. See Site Plan for actual system orientation. Approximate dry (pick) weight: 1000 kg [2200 lbs].



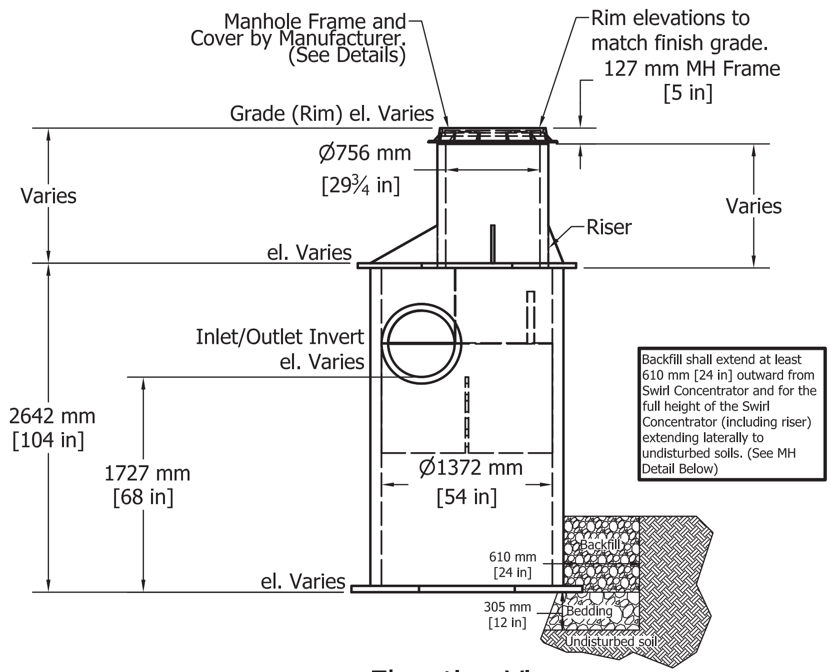
Adjustable Frame and Cover

System shall be designed for the following capacities:
Swirl Treatment Flow: 91 L/s [3.2 cfs]
Swirl Sediment Storage: 0.91 m³ [32 ft³]
Swirl Oil/Debris Storage: 719 L [190 gal]

1. AS-4 BYP inlet/outlet pipe size ranges from 305 mm [12 in] to 686 mm [27 in].
2. AS-4 chamber height may vary from 2337 mm [92 in] to 2718 mm [107 in], depending on inlet/outlet pipe size.
3. Orientation may vary from a minimum of 90° to a maximum of 180°.



Plan View
SCALE 1:40



Elevation View
SCALE 1:40

AquaShield™ WATER TREATMENT SOLUTIONS 2733 Kanasita Drive, Suite 111, Chattanooga, TN 37343 Phone (888) 344-9044 Fax (423) 826-2112 www.aquashieldinc.com	Aqua-Swirl Concentrator AS-4 BYP CW STD Standard Detail	Structure #:	AS-4 STD	Rvwed	Rvw. Date
		Drawn By:	OFlores		
		Scale:	As Shown		
		Date:	3/8/2018		
		U.S. Patent No. 6524473 and other Patent Pending			

City of Ottawa Servicing Study Checklist

General Content

Executive Summary (for large reports only): not applicable

Date and revision number of the report: see page 1 of Servicing Brief and Stormwater Management Report

Location map and plan showing municipal address, boundary, and layout of proposed development: see drawings C-1 to C-7

Plan showing the site and location of all existing services: see drawings C-1 to C-7

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: not applicable

Summary of Pre-consultation Meetings with City and other approval agencies: not available

Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria: not applicable

Statement of objectives and servicing criteria: see page 2 of Servicing Brief and Stormwater Management Report

Identification of existing and proposed infrastructure available in the immediate area: see drawings C-1 to C-7

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). see drawings C-1 to C-37

<u>**Concept level master grading plan**</u> **to confirm existing and proposed grades in the development 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:** not applicable

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: not applicable

Proposed phasing of the development, if applicable: not applicable

Reference to geotechnical studies and recommendations concerning servicing: see note 1.5 on drawing C-5

All preliminary and formal site plan submissions should have the following information:

- **Metric scale:** included
- **North arrow:** included
    - **(including construction North):** not included
- **Key Plan:** included

- **Name and contact information of applicant and property owner:** not available
- **Property limits**: included
    - **including bearings and dimensions:** not included
- **Existing and proposed structures and parking areas:** included
- **Easements, road widening and rights-of-way:** included
- **Adjacent street names:** included

Development Servicing Report: Water

Confirm consistency with Master Servicing Study, if available: not applicable

Availability of public infrastructure to service proposed development: see page 2 of Servicing Brief

Identification of system constraints: see page 2 of Servicing Brief

Confirmation of adequate domestic supply and pressure: see page 2 of Servicing Brief

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 locations throughout the development: see page 2 & 5 to 15 of Servicing Brief

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: see page 2 of Servicing Brief

Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design: not applicable

Address reliability requirements such as appropriate location of shut-off valves: not applicable

Check on the necessity of a pressure zone boundary modification:. not applicable

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: not applicable

Description of the proposed water distribution network, including locations of proposed connections to the existing systems, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions: not applicable

Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation: not applicable

Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines: see page 2 of Servicing Brief

Provision of a model schematic showing the boundary conditions locations, streets , parcels, and building locations for reference: not applicable

Development Servicing Report: Wastewater

Summary of proposed design criteria: see page 3 of Servicing Brief

(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): not applicable

Confirm consistency with Master Servicing Study and /or justification for deviations: not applicable

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 conditions of sewers: not applicable

Descriptions of existing sanitary sewer available for discharge of wastewater from proposed development: see page 3 of Servicing Brief

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): not applicable

Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format. see page 15 of Servicing Brief

Description of proposed sewer network including sewers, pumping stations, and forcemains: see page 3 of Servicing Brief

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): not applicable

Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development: not applicable

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: not applicable

Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: not applicable

Special considerations such as contamination, corrosive environment etc: not applicable

Development Servicing Report: Stormwater Checklist

Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property): see page 4 of Servicing Brief and Stormwater Management Report

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing C-3

Water quality 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: see Stormwater Management Report Servicing Brief and Stormwater Management Report

Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements: Servicing Brief and Stormwater Management Report

Descriptions of the references and supporting information.
Set-back from private sewage disposal systems. not applicable

Watercourse and hazard lands setbacks: not applicable

Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed: the pre-application consultation record is not yet been issued

Confirm consistency with sub-waterched and Master Servicing Study, if applicable study exists: not applicable

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawings C-1 to C-7 and Servicing Brief and Stormwater Management Report

Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals. see drawings C-1 to C-7 and Servicing Brief and Stormwater Management Report

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: see Servicing Brief and Stormwater Management Report

Any proposed diversion of drainage catchment areas from one outlet to another. : not applicable

Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities. : not applicable

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: not applicable

Identification of potential impacts to receiving watercourses: Servicing Brief and Stormwater Management Report

Identification of municipal drains and related approval requirements. : not applicable

Descriptions of how the conveyance and storage capacity will be achieved for the development: see page 5 of Servicing Brief and Stormwater Management Report

100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading:

Inclusion of hydraulic analysis including hydraulic grade line elevations. : not applicable

Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors: see notes 2.1 to 2.5 on drawing C-2

Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplains elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current: not applicable

Identification of fill constraints related to floodplain and geotechnical investigation. : not applicable

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:

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 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: see page 19 of Servicing Brief and Stormwater Management Report

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act:

Changes to Municipal Drains. : not applicable

Other permits (National Capital commission, Parks Canada, public Works and Government Services Canada, Ministry of transportation etc.) : not applicable

Conclusion Checklist

Clearly stated conclusions and recommendations: see page 7 of Servicing Brief

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 draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario: included