2458 Cleroux Crescent, Ottawa
Assessment of Adequacy of Public Services & Stormwater Management Report

Project # CW-02-21

City Application # D07-12-22-0144

Prepared for:

Melmar Group
12 Southland Crescent
Ottawa, Ontario, K1G 5E4

By:

Arch-Nova Design Inc.

February 2023

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1. Introduction

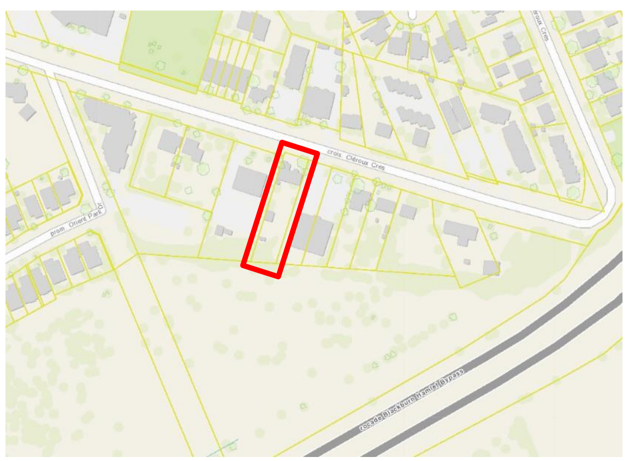
The subject property is located at 2458 Cleroux Crescent Ottawa. The proposed work comprises of a 3-storey+underground garage apartment building with total of 17 apartments and a garage for 24 vehicles at the parking level (basement). For the purpose of this report the site is considered to run north-south. Cleroux Crescent is extending east-west along the property's north edge.

Currently the property is used as a residential with a single house with backyard and two utility sheds.

Existing services locations are known and they will be disconnected before the demolition and will be recorded in the construction diary. The area is serviced by:

- Sanitary: 250mm Concrete .
- Storm: A 375 mm PVC Storm sewer (2000)
- Water: A 203 mm Ductile Iron.

The sidewalk in front of the property is at elevation between 82.41 and 82.43 m a.s.l.



2458 Cleroux Cres, Ottawa: Location

2. Public Services Capacity

This section of the report will analyze existing municipal services and the potential impact of the proposed building at 2458 Cleroux Cres. on the existing service capacity.

2.1 Water Supply

Existing building is supplied from DI 203 mm pipe and calculated current consumption is **0.20 l/sec** for the peak period.

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	9.5 x Average Daily *
Residential Maximum Hourly	1.5 x Maximum Daily *
Commercial Demand	2.5 L / m2 /d
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During Peak Hourly Demand operating pressure must remain within	275kPa and 552kPa
During fire flow operating pressure must not drop below	140kPa
* Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.	

Table 1: Water Supply Design Criteria

[1]The following are boundary conditions, HGL, for hydraulic analysis at Cleroux Cres. (zone R4) assumed to connected to the 203 mm watermain on Cleroux Crescent (see attached PDF for location).

Scenario	Demand	
	L/min	L/s
Average Daily Demand	6.60	0.11
Peak Hour	93.0	1.55
Fire Flow Demand #1	10,062.0	167.7

Required fire flow is available at residual pressure of 31.3 psi (215.8 Kpa) and with ground elevation of 83.3 m.

Design Parameter	Anticipated Demand1 (L/sec)	Boundary Condition2 (kPa)

[1] City of Ottawa boundary condition information is based on current operation of the city water distribution system (also see Appendix A for complete correspondence information)

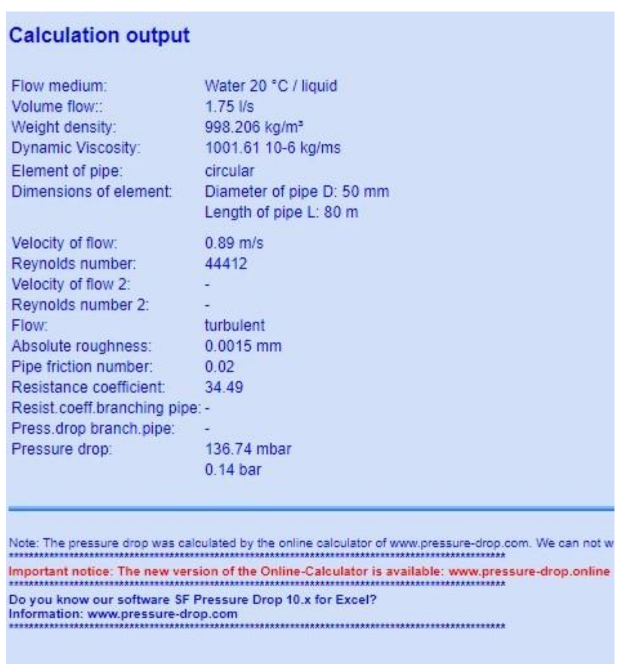
Average Daily Demand	**0.11**	**467.9**
Max Day + Fire Flow	**167.70**	**212.9**
Peak Hour	**1.55**	**428.7**

Ground Elevation = 83.3 m

Proposed building height is 12.1 m so the residual pressure at the top of the building will be 10.0 Kpa.

The consumption is expected to be **1.55 l/sec** for peak period. Total domestic consumption consists of two components: use/person (280/cap/day) and use for amenities of 2.5 l/m^2/day (gym, janitors, garage). In this case the garage is making relatively large portion of total space so use of domestic water for cleaning is not recommended. Other means of cleaning like use of commercial sweeper vehicles are more appropriate. For such a reason the garage flow requirement is shown as zero.

Using Darsy-Weisbach calculation, as shown below, it was determined that 50 mm lateral would provide required flow of 1.55 l/sec at 0.89 m/s velocity and the pressure loss at the building of 0.14 bar. For calculation estimated length of the lateral is 80 m.



Calculation output

Flow medium:	Water 20 °C / liquid
Volume flow::	1.75 l/s
Weight density:	998.206 kg/m³
Dynamic Viscosity:	1001.61 10-6 kg/ms
Element of pipe:	circular
Dimensions of element:	Diameter of pipe D: 50 mm
	Length of pipe L: 80 m
Velocity of flow:	0.89 m/s
Reynolds number:	44412
Velocity of flow 2:	-
Reynolds number 2:	-
Flow:	turbulent
Absolute roughness:	0.0015 mm
Pipe friction number:	0.02
Resistance coefficient:	34.49
Resist.coeff.branching pipe:	-
Press.drop branch.pipe:	-
Pressure drop:	136.74 mbar
	0.14 bar

Note: The pressure drop was calculated by the online calculator of www.pressure-drop.com. We can not w
****
Important notice: The new version of the Online-Calculator is available: www.pressure-drop.online
****
Do you know our software SF Pressure Drop 10.x for Excel?
Information: www.pressure-drop.com
****

2.2.1 Fire Flow

The FUS fire flow calculation will be used as the flow demand is higher than 9,000 l/min.

the Fire flow based on FUS calculation is 10,000 l/min (167.0 l/sec). A sprinkler system is recommended as the hydrant network (3 nearest hydrants) are at the limit of total fire flow.

Fire protection will be provided from the nearest hydrant (41.3 m).The second nearest hydrant is located south from the property at 114.1 m distance and a third hydrant is at distance of 195.8 m.

 In accordance with Table 18.5.4.3 of ISTB-2018-02 they have combined capacity of 12,302 l/min which is sufficient for the fire protection of the proposed building.

2458 Cleroux Cres, Ottawa: Hydrants location and distance

2.2 Sanitary Sewer

Sanitary sewer outflow for the current buildings is 0.096 l/sec (wet weather peak flow).

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Average Daily Demand	280 L/cap/day
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0

Correction Factor (City of Ottawa Tech.Bulletin ISTB-2018-01)	0.8
Commercial Space	28,000 L/ha/day
Infiltration and Inflow Allowance	0.33L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	Q =(1/n)AR2/3S1/2
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2012 & Infrastructure Technical Bulletins 2018	

Table 2: Wastewater Design Criteria

The estimated outflow for the new building is **0.4753 l/sec** (peak flow + wet weather). In addition, for covered garage flow for maintenance and cleaning was calculated as 6 l/parking space/day[2] (i.e snow and rain runoff from cars) was used to estimate the sewer outflow for this service.

Existing municipal sewer 250 mm has a capacity of 41.77 l/sec for 0.44% slope and 80% full.

Inputs:

Pipe Diameter, d_o	250.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_0	0.4400	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	80.0000	%

Results:

Flow, Q	38.5574	l/s
Velocity, v	0.9159	m/s
Velocity head, hv	0.0428	m
Flow Area, A	0.0421	m^2
Wetted Perimeter, P	0.5536	m
Hydraulic Radius	0.0760	m
Top Width, T	0.2000	m
Froude Number, F	0.64	

[2] Ottawa Sewer Design Guideline 2012, Appendix 4-A.5

Shear Stress (tractive force), τ	8.6293	N/m^2

Current residual capacity of 250 mm municipal sanitary pipe is not known however, as significant area upstream is conveyed to this pipe it was assumed that at least 45% of the pipe is full (below spring line) in front of the property.

Inputs:

Pipe Diameter, d_o	250.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_0	0.4400	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	45.0000	%

Results:

Flow, Q	16.4305	l/s
Velocity, v	0.7669	m/s
Velocity head, hv	0.0300	m
Flow Area, A	0.0214	m^2
Wetted Perimeter, P	0.3677	m
Hydraulic Radius	0.0583	m
Top Width, T	0.2487	m
Froude Number, F	0.83	
Shear Stress (tractive force), τ	4.8540	N/m^2

Increase for 0.47 l/sec would add 0.8% of depth in the receiving pipe so it is considered as minor increase with no potential adverse effect (back flow) and it is still below the spring line.

Inputs:

Pipe Diameter, d_o	250.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_0	0.4400	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	45.8000	%

Results:

Flow, Q	16.9486	l/s
Velocity, v	0.7731	m/s
Velocity head, hv	0.0305	m
Flow Area, A	0.0219	m^2
Wetted Perimeter, P	0.3717	m

Hydraulic Radius	0.0590	m
Top Width, T	0.2491	m
Froude Number, F	0.83	
Shear Stress (tractive force), τ	4.9403	N/m^2

The Manning formula was also used to assess the sewer lateral's size.. For given outflow and maximum achievable slope of 1.5% slope, the velocity in 200 mm lateral is 0.43 m/sec. Proposed monitoring manhole will be used for inspection and periodical cleaning of the lateral by vacuum and flushing machine.

Inputs: sanitary sewer lateral

Pipe Diameter, d_o	200.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_0	1.5000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	7.6000	%

Results:

Flow, Q	0.4700	l/s
Velocity, v	0.4306	m/s
Velocity head, hv	0.0095	m
Flow Area, A	0.0011	m^2
Wetted Perimeter, P	0.1117	m
Hydraulic Radius	0.0098	m
Top Width, T	0.1060	m
Froude Number, F	1.36	
Shear Stress (tractive force), τ	2.2358	N/m^2

Detailed calculation of water and sanitary flow is presented in Appendix A.

2.3 Site Stormwater Services

Current building and the rest of surface of the lot at 2458 Cleroux Crescent represent a typical urban site. All stormwater runoff is under uncontrolled condition for the entire site. For the purpose of protecting the municipal sewer system the City of Ottawa requires that the newly developed site must store certain amount of water and release it to the system under the 2-year predevelopment conditions.

Proposed stormwater retention will prevent increase of stormwater inflow into the system. The stormwater storage is proposed on the new building's flat roof. Total storage required for the 100 year event is 46.83 m^3.

The proposed side yards and grading will direct water toward the ravine. In comparison to the predevelopment runoff of 7.61 l/s (2 year) the post development flow will be 3.62 l/sec and 22.12 l/sec (100-year) to 8.42 l/sec for the post development. This will prevent erosion around the new foundation. The roof drains will be connected through inside of the building to the lateral. The roof drains will provide maximum of 0.15 l/sec and will be a single point for controlled outflow. The storm lateral 200 mm provides this flow at 4.5% full.

Inputs: storm lateral

Pipe Diameter, d_o	200.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_o	1.5000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	4.5000	%

Results:

Flow, Q	0.1540	l/s
Velocity, v	0.3067	m/s
Velocity head, hv	0.0048	m
Flow Area, A	0.0005	m^2
Wetted Perimeter, P	0.0855	m
Hydraulic Radius	0.0059	m
Top Width, T	0.0829	m
Froude Number, F	1.26	
Shear Stress (tractive force), τ	1.3238	N/m^2

Detailed calculation is provided in Appendix A.

3. Conclusion and Recommendation

3.1 Water Supply

The consumption is expected to be **1.55 l/sec** for peak period. Total domestic consumption consists of two components: use/person (280/cap/day) and use for amenities of 2.5 l/m^2/day (gym, janitors, garage). In this case the garage is making relatively large portion of total space so use of domestic water for cleaning is not recommended. Other means of cleaning like use of commercial sweeper vehicles are more appropriate. For such a reason the garage flow requirement is shown as zero.

Fire protection will be provided from the nearest hydrant (41.3 m).The second nearest hydrant is located south from the property at 114.1 m distance and a third hydrant is at distance of 195.8 m.

In accordance with Table 18.5.4.3 of ISTB-2018-02 they have combined capacity of 12,302 l/min which is sufficient for the fire protection of the proposed building.

3.2 Sanitary Sewer

The estimated outflow for the new building is **0.4753 l/sec** (peak flow + wet weather). In addition, for covered garage flow for maintenance and cleaning was calculated as 6 l/parking space/day[3] (i.e snow and rain runoff from cars) was used to estimate the sewer outflow for this service.

Increase for 0.47 l/sec would add 0.8% of depth in the receiving pipe so it is considered as minor increase with no potential adverse effect (back flow) and it is still below the spring line.

For given outflow and maximum achievable slope of 1.5% slope, the velocity in 200 mm lateral is 0.43 m/sec. Proposed monitoring manhole will be used for inspection and periodical cleaning of the lateral by vacuum and flushing machine.

3.3 Stormwater

For the purpose of protecting the municipal sewer system the City of Ottawa requires that the newly developed site must store certain amount of water and release it to the system under the 2-year predevelopment conditions.

Proposed stormwater retention will prevent increase of stormwater inflow into the system. The stormwater storage is proposed on the new building's flat roof. Total storage required for the 100 year event is 46.83 m^3.

[3] Ottawa Sewer Design Guideline 2012, Appendix 4-A.5

Runoff balance analysis shows that the post development runoff to the rear yard and the ravine behind is less that the predevelopment runoff.

In conclusion, all municipal services are assessed to have sufficient capacity to service the proposed development.

Prepared by:

Zoran Mrdja, P.Eng.

Professional Engineers Ontario

Authorized by Professional Engineers of Ontario to provide professional services to public

September 2022
Revised February 2023

Appendix A: Calculations

Water Supply Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Residential Average Daily Demand	350 L/d/P
Residential Maximum Daily Demand	9.5 x Average Daily *
Residential Maximum Hourly	1.5 x Maximum Daily *
Commercial Demand	2.5 L / m2 /d
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
must remain within	275kPa and 552kPa (40-80 psi; 28-56m)
During fire flow operating pressure must not drop below	140kPa (20 psi; 14 m)
* Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.	

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	0	0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4	0	0
1 Bedroom	1.4	3	4
2 Bedroom	2.1	14	29
3 Bedroom	3.1		0
4 Bedroom	4.2	0	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/sec	m^3/d	L/sec	m^3/d	L/sec
Total Domestic Demand	34	9.41	0.11	89.38	1.03	134.06	1.55

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	m^3/d	L/sec	m^3/d	L/sec	m^3/d	L/sec
Garage	2.5	$L/m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Office	75.0	$L/9.3m^2/d$	0.0	0.00	0.000	0.00	0.0000	0.00	0.0000
Restaurant*	125.0	L/seat/d							
Industrial -Light	35,000.0	L/gross ha/d							
Industrial -Heavy	55,000.0	L/gross ha/d							
Total I/C/I Demand				0.00	0.00	0.00	0.00	0.00	0.00

Total Demand	9.41	0.11	89.38	1.03	134.06	1.552

* Estimated number of seats at 1seat per $9.3m^2$

Water Demand and Boundary Conditions
Proposed Conditions

Design Parameter	Anticipated Demand[1] (L/sec)	Boundary Condition[2] (kPa)
Average Daily Demand	0.11	467.9
Max Day + Fire Flow	167.70	212.9
Peak Hour	1.55	428.7

[1)] Water demand calculation per Water Supply Guidelines. See Appendix B for detailed calculations.

[2)] Boundary conditions supplied by the City of Ottawa. See Appendix B for correspondence with the City.

[3)] estimated ground elevation **83.3 m**

Wastewater Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Average Daily Demand	280 L/cap/day
Peaking Factor	Harmon’s Peaking Factor. Max 4.0, Min 2.0
Correction Factor (City of Ottawa Tech.Bulletin ISTB-2018-0	0.8
Commercial Space	28,000 L/ha/day
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning’s Equation	$Q = (1/n)AR^{2/3}S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning’s ‘n’	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2012.	

2458 Cleroux Cres, Ottawa
New

Sanitary Sewer Post Development Outflow

Site Area	**0.138**	**ha**
Extraneous Flow Allowances		
Infiltration / Inflow	**0.04558**	**L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4	0	0
Semi-detached and duplex	2.7		0
Duplex	2.3		0
Townhouse	2.7		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	3	4.2
2 Bedroom	2.1	14	29.4
3 Bedroom	3.1	0	0
4 Bedroom	4.2	0	0
		Total Population	**33.6**
		Average Domestic Flow	**0.11 L/s**
		Peaking Factor	**3.9**
		Peak Domestic Flow	**0.43 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate		No. of Units	Avg Wastewater (L/s)
Commercial	28,000	L/gross ha/d	0	0.0000
Office	75	L/9.3m2/d	0	0.0000
Parking (Covered)*	6	l/park.space/d	12	0.0008
Institutional	28,000	L/gross ha/d	0	0.00
Industrial - Light	35,000	L/gross ha/d	0	0.00
Industrial - Heavy	55,000	L/gross ha/d	0	0.00
			Average I/C/I Flow	**0.0008**
			Peak Institutional / Commercial Flow*	**0.0000**
			Peak Industrial Flow**	**0.0000**
			Peak I/C/I Flow	**0.0000**

Total Estimated Average Dry Weather Flow Rate	**0.1097**
Total Estimated Peak Dry Weather Flow Rate	**0.4297**
Total Estimated Peak Wet Weather Flow Rate	**0.4753**

* Ottawa Sewer Design Guidelines 2012, Appendix 4-A.5
Ottawa TechBulletin ISTB-2018-01 Section 4.4.1 Page 4.5
**Use Apendix 4B diagram

Fire Flow Calculation Ontario Building Code 2006 (Appendix A)

Project: 2458 Cleroux Cres., Ottawa

Date: **March 5, 2023**

Data input by: Zoran Mrdja, P.Eng.

Type of Construction	Building Clasification	Water Supply Coefficient (K)	
Non-combustable construction, or a heavy timber conforming to article 3.1.4.6	A-2; B1-; B-2; B-3 C; D	16	
		Total Building Volume (V)(m3)	
Building Height (incl.Basement)	12.10	6,459.22	
Building Width	9.30		
Building Length	57.40		
Side	**Exposure Distance (m)**	**Spatial Coefficient**	**Total Spatial Coefficient S_{tot}***
North	8.00	0.25	2.6
East	2.00	0.5	
South	7.00	0.35	
West	2.00	0.5	
	Total Volume of Water Required Q**	**268,703.64**	
	Minimum Required Fire Flow (L/min) ***	**8,956.79**	
	Minimum Required Fire Flow (L/min) ***	**149.28**	

Note:

* S_{tot}= 1+(S_{side1}+S_{side2}+S_{side3}+S_{side4})

** V=KVS_{tot}

*** Flow=Q/30 (min) for min. duration of 30 min

Summary:

2. Nearest fire hydrant distance 38.4m;

FUS Fire Flow Calculations

Project: 2458 Cleroux Cres., Ottawa

Calculations Based on 1999 Publication "Water Supply for Public Fire Protection " by Fire Underwriters' Survey (FUS)

Fire Flow Calculation #: 1

Date: **2023-03-05**

Building Type/Description/Name: Apartment building

Data input by: Zoran Mrdja, P.Eng.

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Choose Frame Used for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.50	Ordinary Construction	1.00		
			Ordinary construction	1.00				
			Non-combustible construction	0.80				
			Fire resistive construction (< 2 hrs)	0.70				
			Fire resistive construction (> 2 hrs)	0.60				
		Floor Space Area						
2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	Type of Housing	Single Family	1	Other (Comm, ind)	1	Units	
			Townhouse - indicate # of units	1				
			Other (Comm, Ind, etc.)	1				
2.2	# of Storeys	Number of Floors/ Storeys in the Unit (do not include basement):			3	3	Storeys	
3	Enter Ground Floor Area of One Unit	Enter Ground Floor Area (A) of One Unit Only :			762	2286	Area in Square Meters (m_2)	
		Measurement Units	Square Feet (ft_2)	0.093	Square Metres (m2)			
			Square Metres (m_2)	762				
			Hectares (ha)	10000				
4	Obtain Required Fire Flow without Reductions	Required Fire Flow(without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						10,519
5	Apply Factors Affecting Burning	Reductions/Increases Due to Factors Affecting Burning						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	-1,578
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete Automatic Sprinkler Protection	-0.3	None	-0.30	N/A	-3,156
			None	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	30.1-45 m	0.05	0.40	m	4,207
			East Side	20.1-30 m	0.10			
			South Side	30.1-45 m	0.05			
			West Side	3.1-10 m	0.20			
6	Obtain Required Fire Flow, Duration & Volume	Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:						10,000
		Total Required Fire Flow (above) in L/s:						167
		Required Duration of Fire Flow (hrs)						2.00
		Required Volume of Fire Flow (m^3)						1200

Note: The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline

Legend	
(green)	Drop down menu - choose option, or enter value.
	No Information, No input required.

Note:

The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline.

Nearest fire hydrant distance 38.4m;

Manning Formula Uniform Pipe Flow at Given Slope and Depth

2458 Cleroux Cres, Ottawa

Inputs: Sanitary lateral

Pipe Diameter, d_o	200.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_o	1.5000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	7.6000	%

Results:

Flow, Q	0.4700	l/s
Velocity, v	0.4306	m/s
Velocity head, hv	0.0095	m
Flow Area, A	0.0011	m^2
Wetted Perimeter, P	0.1117	m
Hydraulic Radius	0.0098	m
Top Width, T	0.1060	m
Froude Number, F	1.36	
Shear Stress (tractive force), τ	2.2358	N/m^2

Manning Formula Uniform Pipe Flow at Given Slope and Depth

2458 Cleroux Cres, Ottawa

Inputs: storm lateral

Pipe Diameter, d_o	200.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_o	1.5000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	4.5000	%

Results:

Flow, Q	0.1540	l/s
Velocity, v	0.3067	m/s
Velocity head, hv	0.0048	m
Flow Area, A	0.0005	m^2
Wetted Perimeter, P	0.0855	m
Hydraulic Radius	0.0059	m
Top Width, T	0.0829	m
Froude Number, F	1.26	
Shear Stress (tractive force), τ	1.3238	N/m^2

Manning Formula Uniform Pipe Flow at Given Slope and Depth

2458 Cleroux Cres, Ottawa

Inputs:

Pipe Diameter, d_o	250.0000	mm
Manning Roughness, n	0.0130	
Pressure slope (possibly equal to pipe slope), S_o	0.4400	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	45.8000	%

Results:

Flow, Q	16.9486	l/s
Velocity, v	0.7731	m/s
Velocity head, hv	0.0305	m
Flow Area, A	0.0219	m^2
Wetted Perimeter, P	0.3717	m
Hydraulic Radius	0.0590	m
Top Width, T	0.2491	m
Froude Number, F	0.83	
Shear Stress (tractive force), τ	4.9403	N/m^2

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PRE-DEVELOPMENT (all unclontrolled)

The pre-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ 76.8 mm/hr $I_{100} =$ 178.6 mm/hr

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Vegetation area	A1	0.0360	25.8%	0.30	0.011
Green space	A2	0.0640	45.9%	0.40	0.026
Shed	A3	0.0035	2.5%	0.90	0.003
Shed2	A4	0.0008	0.6%	0.90	0.001
House	A5	0.0142	10.2%	0.90	0.013
Porch	A6	0.0030	2.2%	0.90	0.003
Green space	A7	0.0010	0.7%	0.40	0.000
Green space	A8	0.0110	7.9%	0.40	0.004
Driveway	A9	0.0040	2.9%	0.80	0.003
Wood ramp	A10	0.0020	1.4%	0.50	0.001
TOTAL		0.1395	100.0%		0.065
Weighted C =					0.46

0.46 Actual C factor

C=0.5 for predevlopment (City of Ottawa)

$Q_{2pre} = (2.78)*(C)*(I_5)*(A)$

$Q_{2pre} =$ 2.78 x 0.46 x 76.8 x 0.1395

$Q_{2pre} =$ 13.70 L/s

$Q_{100pre} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100pre} =$ 2.78 x 0.46 x 178.6 x 0.1395

$Q_{100pre} =$ 31.86 L/s

POST-DEVELOPMENT (UNCONTROLLED RUNOFF)

The post-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ 76.8 mm/hr $I_{100} =$ 178.6 mm/hr

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Landscape 1		0.067800	80.7%	0.25	0.017
Landscape 2		0.016200	19.3%	0.30	0.005
TOTAL		0.0840	100.0%		0.022
Weighted C =					0.26

0.26 Actual C factor

$Q_{2post} = (2.78)*(C)*(I_5)*(A)$

$Q_{2post} =$ 2.78 x 0.26 x 76.8 x 0.0840

$Q_{2post} =$ 4.66 L/s

$Q_{100post} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100post} =$ 2.78 x 0.33 x 178.6 x 0.0840

$Q_{100post} =$ 13.55 L/s

PRE-DEVELOPMENT

The pre-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ **76.8 mm/hr** $I_{100} =$ **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Bus Stop	A1	0.00000	0.0%	0.95	0.000
Parking	A2	0.00000	0.0%	0.95	0.000
Green area	A3	0.00000	0.0%	0.70	0.000
TOTAL		0.0000	0.0%		0.000
Weighted C =					0.00

Q_{2pre} = (2.78)*(C)*(I_5)*(A)
Q_{2pre} = 2.78 x 0.00 x 76.8 x 0.0000
Q_{2pre} = 0.00 L/s

Q_{100pre} = (2.78)*(C)*(I_{100})*(A)
Q_{100pre} = 2.78 x 0.00 x 178.6 x 0.0000
Q_{100pre} = 0.00 L/s

C=0.6 used for predevelopment calculation (City of Ottawa requirement)

POST-DEVELOPMENT (CONTROLLED RUNOFF)

The post-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ **76.8 mm/hr** $I_{100} =$ **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Building	A1	0.05550	0.0%	0.95	0.053
TOTAL		0.05550	0.0%		0.053
Weighted C =					1.00

Q_{2post} = (2.78)*(C)*(I_5)*(A)
Q_{2post} = 2.78 x 1.00 x 76.8 x 0.0555
Q_{2post} = 11.85 L/s

$Q_{100post}$ = (2.78)*(C)*(I_{100})*(A)
$Q_{100post}$ = 2.78 x 1.00 x 178.6 x 0.0555
$Q_{100post}$ = 27.56 L/s

ALLOWABLE RUNOFF

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Predevelopment Runoff:		
Uncontrolled Runoff		
2-year	13.70	l/sec
100-year	31.86	l/sec
Controlled Runoff:		
2-year	0.00	l/sec
100-year	0.00	l/sec

Postdevelopment Runoff:		
Uncontrolled Runoff		
2-year	4.66	l/sec
100-year	13.55	l/sec
Controlled Runoff:		
2-year	11.85	l/sec
100-year	27.56	l/sec

Controlled allowable runoff		
Controlled Runoff:		
2-year	**0.15**	**l/sec**
100-year	18.31	l/sec

Comment:

Storage Volumes (2-Year Storm)

2458 Cleroux Cres. Ottawa

Tc = 10 (mins)
C_{AVG} = 1.00 (dimmensionless)
Area = 0.0555 (hectares)
Storm = 2 (year)
Release Rate = 0.15 (L/sec)
Time Interval = 60 (mins)

Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
1	148	2.3	0.15		
61	24	3.7	0.15	3.60	13.17
121	14	2.2	0.15	2.09	15.15
181	11	1.6	0.15	1.49	16.14
241	8	1.3	0.15	1.16	16.74
301	7	1.1	0.15	0.95	17.10
361	6	0.9	0.15	0.80	17.33
421	5	0.8	0.15	0.69	17.45
481	5	0.8	0.15	0.61	17.50
541	4	0.7	0.15	0.54	17.49
601	4	0.6	0.15	0.48	17.43
661	4	0.6	0.15	0.44	17.34
721	4	0.5	0.15	0.40	17.22
781	3	0.5	0.15	0.36	17.06
841	3	0.5	0.15	0.33	16.89
901	3	0.5	0.15	0.31	16.69
961	3	0.4	0.15	0.29	16.48
1021	3	0.4	0.15	0.27	16.25
1081	3	0.4	0.15	0.25	16.01
1141	2	0.4	0.15	0.23	15.75
1201	2	0.4	0.15	0.21	15.48
1261	2	0.3	0.15	0.20	15.20
1321	2	0.3	0.15	0.19	14.92
1381	2	0.3	0.15	0.18	14.62
1441	2	0.3	0.15	0.17	14.31
1501	2	0.3	0.15	0.16	14.00
1561	2	0.3	0.15	0.15	13.68
1621	1.8	0.3	0.15	0.14	13.36

Notes

1) For a storm duration that is less than the time of concentration the peak flow is equal to the product of 2.78CIA and the ratio of the storm duration to the time of concentration.

2) Rainfall Intensity, I = 732.951 / (Tc + 6.199)^0.810 (2 year, City of Ottawa)
3) Peak Flow = Duration/Tc x 2.78 x C x I x A (Duration < Tc)
4) Peak Flow = 2.78 x C x I x A (Duration > Tc)
5) Storage = Duration x Storage Rate

Storage Volumes (100-Year Storm)

Tc = 10 (mins)
C_{AVG} = 1.00 (dimmensionless)
Area = 0.0555 (hectares)
Storm = 100 (year)
Release Rate = 0.15 (L/sec)
Time Interval = 60 (mins)

Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
1	351	5.4	0.15		
61	55	8.5	0.15	8.37	30.64
121	33	5.0	0.15	4.90	35.55
181	24	3.7	0.15	3.53	38.29
241	19	2.9	0.15	2.78	40.15
301	16	2.4	0.15	2.30	41.53
361	14	2.1	0.15	1.97	42.59
421	12	1.9	0.15	1.72	43.44
481	11	1.7	0.15	1.53	44.13
541	10	1.5	0.15	1.38	44.70
601	9	1.4	0.15	1.25	45.16
661	8	1.3	0.15	1.15	45.54
721	8	1.2	0.15	1.06	45.86
781	7	1.1	0.15	0.98	46.12
841	7	1.1	0.15	0.92	46.33
901	7	1.0	0.15	0.86	46.49
961	6	1.0	0.15	0.81	46.62
1021	6	0.9	0.15	0.76	46.72
1081	6	0.9	0.15	0.72	46.78
1141	5	0.8	0.15	0.68	46.82
1201	5	0.8	0.15	0.65	46.83
1261	5	0.8	0.15	0.62	46.82
1321	5	0.7	0.15	0.59	46.80
1381	5	0.7	0.15	0.56	46.75
1441	4	0.7	0.15	0.54	46.68
1501	4	0.7	0.15	0.52	46.60
1561	4	0.6	0.15	0.50	46.51
1621	4	0.6	0.15	0.48	46.40

Notes

1) For a storm duration that is less than the time of concentration the peak flow is equal to the product of 2.78CIA and the ratio of the storm duration to the time of concentration.

2) Rainfall Intensity, I = 1735.688 / (Tc + 6.014)^0.820 (100 year, City of Ottawa)
3) Peak Flow = Duration/Tc x 2.78 x C x I x A (Duration < Tc)
4) Peak Flow = 2.78 x C x I x A (Duration > Tc)
5) Storage = Duration x Storage Rate

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Storage Requirements

2-year	**17.50**	**m^3**
100-year	**46.83**	**m^3**

Surface Type	ID	Area (ha)	Percent of total Area	Required Storage 2 year	Required Storage 100 year	Max Allowed Drain Outflow l/s	Max Allowed Drain Outflow GPM
Roof	**A1**	0.0278	50.0%	8.75	23.42	0.07	1.16
Roof	**A2**	0.0278	50.0%	8.75	23.42	0.07	1.16
TOTAL		0.0555	100.0%	17.50	46.83	0.15	2.31

Legend:

data for 2-year event	
data for 100-year event	

Stage-Storage

Roof A1 (Drain 1)			**Roof A2 (Drain 2)**		
Depth m	**Area** m^2	**Volume** m^3	**Depth** m	**Area** m^2	**Volume** m^3
0.020	9.10	0.09	0.020	9.10	0.09
0.040	20.10	0.40	0.040	20.10	0.40
0.1	**175.00**	**8.75**	**0.1**	**175.00**	**8.75**
0.17	**277.00**	**23.55**	**0.17**	**277.00**	**23.55**

.

Notes:

Roof drains with controlled flow to be specified by manufacturer using the allowable flow rates presented in this chart

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PRE-DEVELOPMENT Uncontrolled to rear

The pre-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ 76.8 mm/hr $I_{100} =$ 178.6 mm/hr

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Vegetation area	A1	0.0360	32.3%	0.25	0.009
Green space	A2	0.0640	57.5%	0.25	0.016
Shed	A3	0.0035	3.1%	0.90	0.003
Shed2	A4	0.0008	0.7%	0.90	0.001
House	A5	0.0071	6.4%	0.90	0.006
TOTAL		0.11140	100.0%		0.035
Weighted C =					0.32

0.32 Actual C factor

Note: Maximum C=0.5 for predevlopment (City of Ottawa) * house's 1/2 of the roof drains to the rear yard

$Q_{2pre} = (2.78)*(C)*(I_5)*(A)$

$Q_{2pre} =$ 2.78 x 0.32 x 76.8 x 0.1114

$Q_{2pre} =$ 7.61 L/s

$Q_{100pre} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100pre} =$ 2.78 x 0.32 x 178.6 x 0.1114

$Q_{100pre} =$ 17.70 L/s

PRE-DEVELOPMENT Uncontrolled to front

The pre-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ 76.8 mm/hr $I_{100} =$ 178.6 mm/hr

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
House*	A5	0.0071	6.4%	0.90	0.006
Porch	A6	0.0030	2.7%	0.75	0.002
Green space	A7	0.0010	0.9%	0.25	0.000
Green space	A8	0.0110	9.9%	0.25	0.003
Driveway	A9	0.0040	3.6%	0.80	0.003
Wood ramp	A10	0.0020	1.8%	0.40	0.001
TOTAL		0.0281	25.2%		0.016
Weighted C =					0.56

0.56 Actual C factor

Note: * house's 1/2 of the roof drains toward the street

$Q_{2pre} = (2.78)*(C)*(I_5)*(A)$

$Q_{2pre} =$ 2.78 x 0.56 x 76.8 x 0.0281

$Q_{2pre} =$ 3.36 L/s

$Q_{100pre} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100pre} =$ 2.78 x 0.70 x 178.6 x 0.0281

$Q_{100pre} =$ 9.77 L/s

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POST-DEVELOPMENT Uncontrolled to rear)

The pre-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ **76.8 mm/hr** $I_{100} =$ **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Landscape 1		0.067800	418.5%	0.25	0.017
TOTAL		0.0678	418.5%		0.017
Weighted C =					0.25

0.25 Actual C factor

C=0.5 for predevlopment (City of Ottawa)

$Q_{2post} = (2.78)*(C)*(I_5)*(A)$

$Q_{2post} =$ 2.78 x 0.25 x 76.8 x 0.0678

$Q_{2post} =$ 3.62 L/s

$Q_{100post} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100post} =$ 2.78 x 0.25 x 178.6 x 0.0678

$Q_{100post} =$ 8.42 L/s

POST-DEVELOPMENT (UNCONTROLLED TO FRONT)

The post-development time of concentration is 10 minutes

where:

$I_2 = 732.951 / (Tc + 6.199)^{0.810}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

$I_2 =$ **76.8 mm/hr** $I_{100} =$ **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Landscape 2		0.016200	100.0%	0.30	0.005
TOTAL		0.0162	100.0%		0.005
Weighted C =					0.30

0.30 Actual C factor

$Q_{2post} = (2.78)*(C)*(I_5)*(A)$

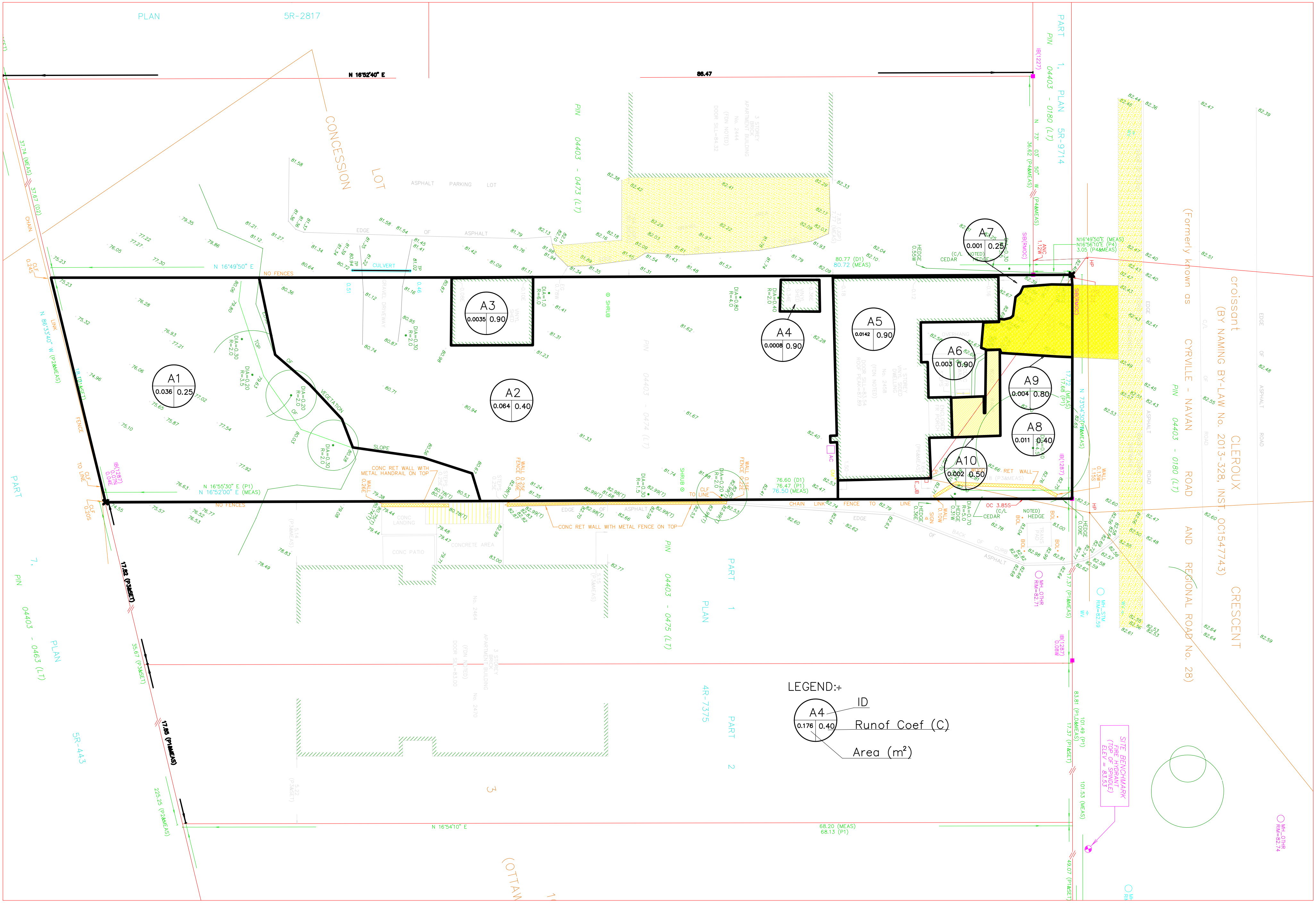
$Q_{2post} =$ 2.78 x 0.30 x 76.8 x 0.0162

$Q_{2post} =$ 1.04 L/s

$Q_{100post} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100post} =$ 2.78 x 0.38 x 178.6 x 0.0162

$Q_{100post} =$ 3.02 L/s



2458 CLEROUX CRES
SWM PREDEVELOPMENT

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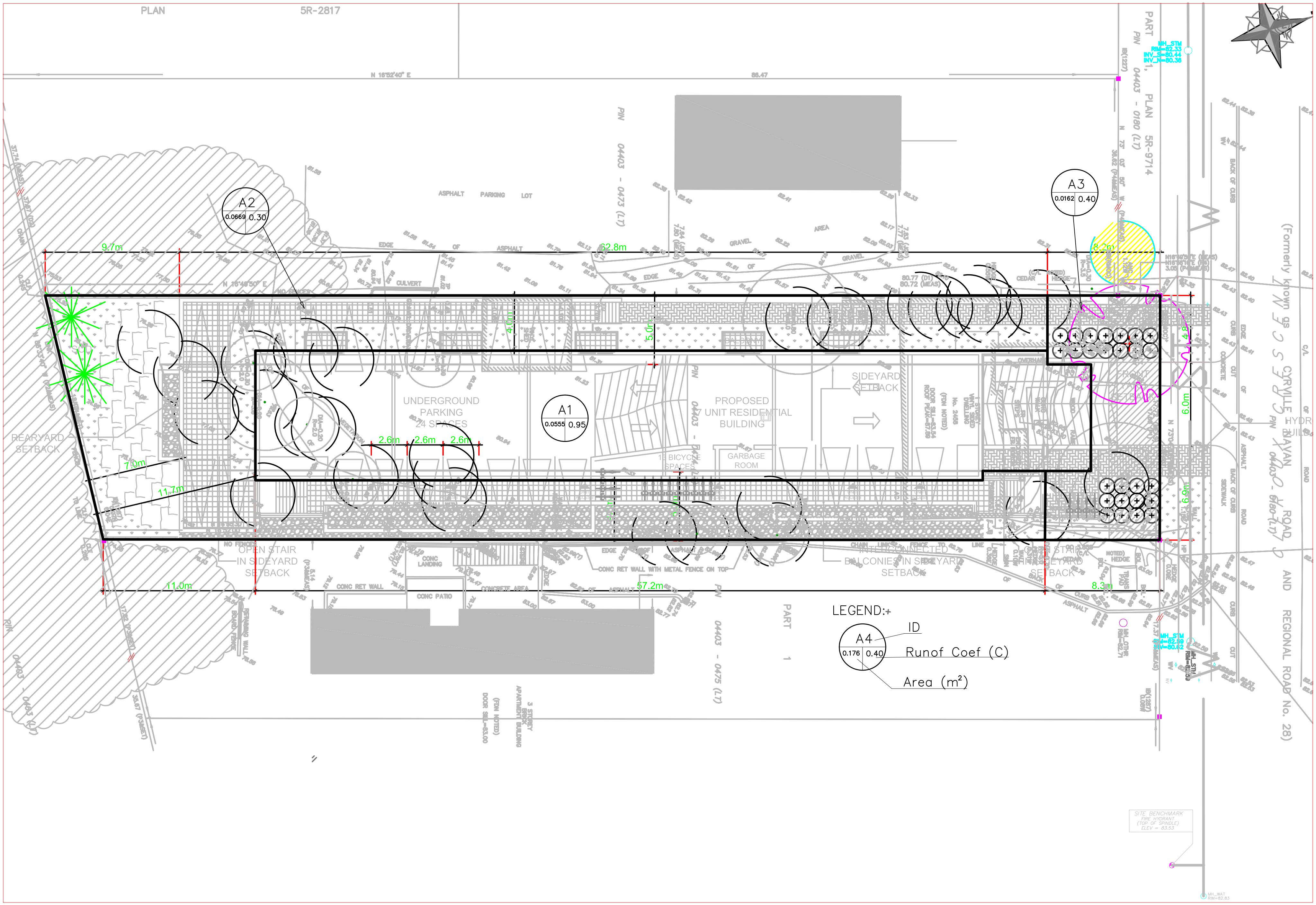
45 Banner Road NEPEAN ON K2H 8X5
613-702-3403 contact@archnova.ca



2458 CLEROUX CRES
SWM POSTDEVELOPMENT

ARCH-NOVA Design Inc.
45 Banner Road NEPEAN ON K2H 8X5
613-702-3403 contact@archnova.ca

Appendix B: Correspondence

Site Plan Pre- Application Consultation Notes

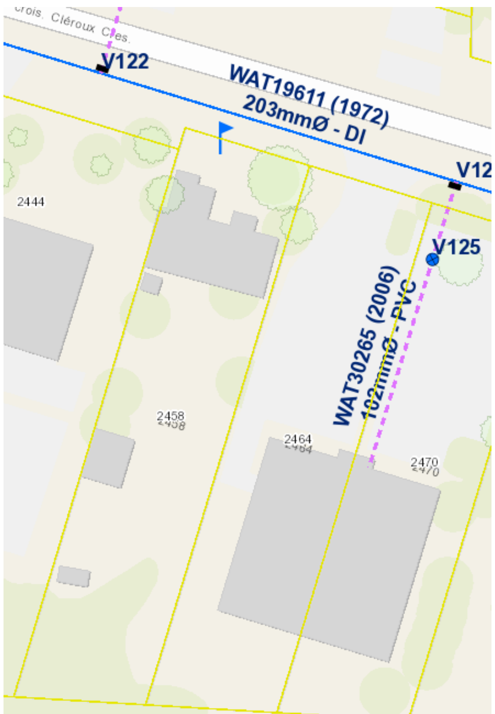
Date: Monday, March 18, 2021
Site Location: 2458 Cleroux Croissant
Type of Development: ☒ **Residential (**☐ **townhomes,** ☐ **stacked,** ☐ **singles,** ☒ **apartments),** ☐ **Office Space,** ☐ **Commercial,** ☐ **Retail,** ☐ **Institutional,** ☐ **Industrial, Other:** N/A

Infrastructure

Water

Existing public services:

- Cleroux Crossiant – 203 mm Ductile Iron



Watermain Frontage Fees to be paid ($190.00 per metre) on Woodroffe Avenue ☒ **Yes** ☐ **No**

Boundary conditions:
Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission.

- Water boundary condition requests must include the location of the service(s) and the expected loads required by the proposed developments. Please provide all the following information:
  - Location of service(s)
  - Type of development and the amount of fire flow required (as per FUS, 1999)
  - Average daily demand: ___ L/s
  - Maximum daily demand: ___ L/s
  - Maximum hourly daily demand: ___ L/s
- Fire protection (Fire demand, Hydrant Locations)
- Please submit sanitary demands with the water boundary conditions to identify any capacity constraints at the local pumping station

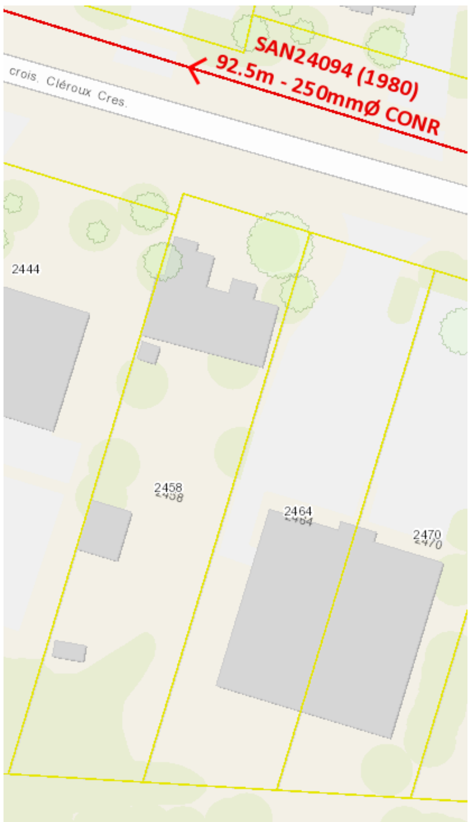
General comments

- Service areas with a basic demand greater than 50 m^3/day shall be connected with a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area.
- A District Metering Area Chamber (DMA) is required for services 150mm or greater in diameter.

Sanitary Sewer

Existing public services:

- Cleroux Crossiant – 250mm Concrete



Is a monitoring manhole required on private property? ☒ **Yes** ☐ **No**

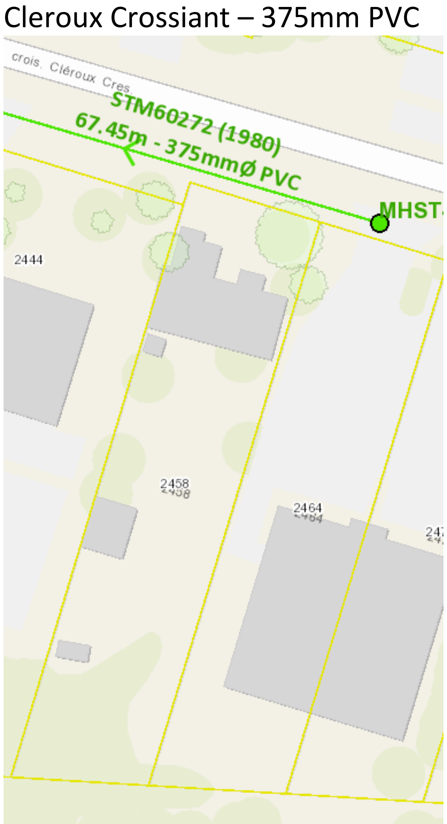
General comments

- Please submit sanitary demands with the water boundary conditions to identify any capacity constraints at the local pumping station.
- For concrete sewer pipe, maintenance holes shall be installed when the service is greater than 50% of the diameter of the mainline concrete pipe.

Storm Sewer

Existing public services:

- Cleroux Crossiant – 375mm PVC



General comments

- Ensure that the proposed drive ramp entrance to the underground parking garage is protected from the major overland flow route.
    - A minimum freeboard elevation of 350mm from highpoint of the ramp to the street spill elevation.
    - A minimum freeboard elevation of 300mm from the invert of the ramp drain to the 100 year HGL of the storm sewer.
    - In general conformity of City of Ottawa Standard S17.
- A separate storm service connection is required for the ramp drain and the foundation drain

Stormwater Management

Quality Control:

- Rideau Valley Conservation Authority to confirm quality control requirements.

Quantity Control:

- Site is located within the Mud (Green's) Creek Area Subwatershed Study Area draining to the Ottawa River
- Time of concentration (Tc): Tc = pre-development; maximum Tc = 10 min
- Allowable run-off coefficient C = 0.5
- Allowable flowrate: Allowable flowrate: Control the 100-year storm events to the 2-year storm event.

General Service Design Comments

- During the pre-consultation meeting there was a discussion about the servicing the units through a common corridor. Building Code Services is responsible for plumbing within the building and should be consulted for plumbing and fire suppression inquires. BuildingPermits@ottawa.ca
- Existing sewer or watermains that are not reused must be decommissioned as per City Standards.
- The City of Ottawa Standard Detail Drawings should be referenced where possible for all work within the Public Right-of-Way.

Other

Capital Works Projects within proximity to application? ☐ **Yes** ☒ **No**

References and Resources

- As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.
- All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions)
- Please find relevant City of Ottawa Links to Preparing Studies and Plans below: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#standards-policies-and-guidelines
- To request City of Ottawa plan(s) or report information please contact the City of Ottawa Information Centre:
  InformationCentre@ottawa.ca<mailto:InformationCentre@ottawa.ca>
  (613) 580-2424 ext. 44455
- geoOttawa
  http://maps.ottawa.ca/geoOttawa/

SITE PLAN APPLICATION – Municipal servicing

For information on preparing required studies and plans refer to:
http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S		1. Site Servicing Plan	2. Site Servicing Brief	S	
S		3. Grade Control and Drainage Plan	4. Geotechnical Study	S	
		5. Composite Utility Plan	6. Groundwater Impact Study		
		7. Servicing Options Report	8. Wellhead Protection Study		
		9. Community Transportation Study and/or Transportation Impact Study / Brief	10. Erosion and Sediment Control Plan / Brief	S	
S		11. Storm water Management Brief	12. Hydro-geological and Terrain Analysis		
		13. Water main Analysis	14. Noise / Vibration Study	S	
		15. Roadway Modification Design Plan	16. Confederation Line Proximity Study		

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, City Planning will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the City.

Notes:

4. Geotechnical Study / Slope Stability Study – required as per Official Plan section 4.8.3. All site plan applications need to demonstrate the soils are suitable for development. A Slope Stability Study may be required with unique circumstances (Schedule K or topography may define slope stability concerns).

10. Erosion and Sediment Control Plan – required with all site plan applications as per Official Plan section 4.7.3.

11. Stormwater Management Report/Brief - required with all site plan applications as per Official Plan section 4.7.6.

zoran@archnova.ca

From: Rasool, Rubina <Rubina.Rasool@ottawa.ca>
Sent: August 20, 2021 3:36 PM
To: zoran@archnova.ca
Subject: RE: 2458 Cleroux Cres: Boundary Codnitions
Attachments: 2458 Cleroux Cres_20August2021.docx

Good afternoon,

Please find attached the water boundary conditions for the proposed development.

Have a good weekend.

Rubina

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Rubina Rasool, E.I.T.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review – East Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue Laurier Ouest. Ottawa (Ontario) K1P 1J1 rubina.rasool@ottawa.ca

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From: zoran@archnova.ca <zoran@archnova.ca>
Sent: August 03, 2021 7:41 PM
To: Rasool, Rubina <Rubina.Rasool@ottawa.ca>
Subject: 2458 Cleroux Cres: Boundary Codnitions

Could you please provide the boundary conditions for the location of 2458 Cleroux Cres., Ottawa?
Following are the initial information:

1. Type of development: 3storey+covered garage, 20 units building.
2. Fire flow required: 217 l/sec (FUS); 163.98 (OBC); nearest hydrant distance 38.4 m
3. Average Daily Demand: 0.12 l/sec
4. Maximum Hourly Demand: 1.75 l/Sec
5. Maximum Daily Demand: 1.16 l/sec

Attached are calculation sheets, image of nearest hydrant distance (from GeoOttawa) and the site plan of proposed development.
Regards,

Zoran Mrdja, P.Eng., FEC

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613-818-3884

'

'

Boundary Conditions
2458 Cleroux Crescent

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	7	0.12
Maximum Daily Demand	70	1.16
Peak Hour	105	1.75
Fire Flow Demand #1	13,000	216.67

Location

Results

Connection 1 – Cleroux Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	67.7
Peak Hour	127.0	62.1
Max Day plus Fire 1	105.3	31.3

Ground Elevation = 83.3 m

Notes

1. A second connection to the watermain is recommended to decrease vulnerability of the water system in case of breaks.

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.