D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
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ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES & STORMWATER MANAGEMENT BRIEF

56 CAPILANO DRIVE
OTTAWA, ONTARIO

REPORT NO. 20032

APRIL 4, 2022

CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

This report describes the servicing and stormwater management requirements for a proposed 4-storey apartment building located on a 2,775 sq.m. property at 56 Capilano Drive in Ottawa, Ontario. This report has been prepared in support of the Zoning By-law Amendment application for the proposed development. The property is currently vacant.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

The proposed building will have a sprinkler system with the fire department connection (FDC) location to be determined. There is an existing municipal Class AA fire hydrant located at the northeast of the Capilano Drive / Gilbey Drive intersection. It is 60 m unobstructed distance to the proposed FDC, which is more than the maximum 45 m required by the Ontario Building Code (OBC); therefore, a private fire hydrant is required.

As per City of Ottawa Technical Bulletin ISTB-2021-03, when calculating the required fire flow where pipe sizing is affected, the Fire Underwriters Survey (FUS) method is to be used. Using the FUS method the required fire flow was calculated to be 19,000 L/min (316.7 L/s). The City commented that *"We've just received feedback from our senior water resources engineer that the fire demand of 316.7 L/s is very high and cannot be met. Mitigating measures should be considered in order to reduce the required fire demand."* and *"Available FF at 20 psi: 239 L/s, assuming a ground elevation of 95.6 m"*. With the introduction of a 2-hour firewall the required fire flow can be reduced to about 13,000 L/min (216.7 L/s). Refer to calculations in Appendix A.

As per City of Ottawa Technical Bulletin ISTB-2018-02, the aggregate flow of all contributing fire hydrants within 150 m of the building shall not be less than the required fire flow. The private on-site hydrant will be a Class AA contributing 5,700 L/min (95 L/s). There are two existing municipal Class AA fire hydrants within 75 m of the proposed building. As indicated above, one is located northeast of the intersection of Capilano Drive / Gilbey Drive. Another is located northeast of the intersection of Capilano Drive / Kerry Crescent. As per Table 1 of ISTB-2018-02 each can contribute 5700 L/min (95 L/s). Therefore, the aggregate flow of the three contributing fire hydrants is 17,100 L/min (285 L/s), which is greater than the required fire flow of 13,000 L/min (216.7 L/s).

2.2 DOMESTIC WATER SUPPLY

A 150 mm water service connecting to the 150 mm municipal watermain in Capilano Drive is proposed to service the sprinkler system. The same 150 mm water service will provide an adequate domestic water supply.

As per;

i. the City of Ottawa Water Design Guidelines for the population;
ii. City of Ottawa Technical Bulletin ISTB-2021-03 for the consumption rate; and
iii. the Ministry of the Environment Water Design Guidelines for the peaking factors;

the average daily demand was calculated to be 0.3 L/s, the maximum daily demand was calculated to be 2.1 L/s and the maximum hourly demand was calculated to be 3.2 L/s. Refer to calculations in Appendix A.

The boundary conditions in the 150 mm Capilano Drive watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 146.9 m and a maximum HGL of 158.3 m. Refer to Appendix A. Based on these boundary conditions the pressure at the water meter is calculated to vary between 490 kPa (71 psi) and 602 kPa (87 psi). This is an acceptable range for the proposed development. Since the water pressure may be above 80 psi at times it is recommended that a pressure test be conducted at the completion of construction to determine if a pressure reducing valve is required. If required, the pressure reducing valve is to be installed immediately after the water meter.

3.0 SANITARY SERVICING

As per;

i. the City of Ottawa Sewer Design Guidelines for the population;
ii. City of Ottawa Technical Bulletin ISTB-2018-01 for the consumption rate, Harmon Formula correction factor and infiltration allowance; and
iii. the Harmon Formula for the peaking factor;

the post-development sanitary flow rate was calculated to be 1.02 L/s.

A 150 mm sanitary service at 1% slope (14.43 L/s capacity) is proposed to service the development. At the design flow rate the 150 mm sanitary service will only be at 7% of its capacity. The proposed 150 mm sanitary service will connect to the existing 200 mm municipal sanitary sewer in Capilano Drive, which at 0.42% slope has a capacity of 21.54 L/s. The post development flow is expected to have an acceptable impact on the 200 mm Capilano Drive sanitary sewer. Refer to calculations in Appendix B.

4.0 STORMWATER MANAGEMENT

4.1 QUALITY CONTROL

Since runoff from most of the proposed development will be from roofs; or landscaped areas; it is anticipated that most of the runoff from the development will be considered “clean” and permanent quality control measures will not be required. However, if the Rideau Valley Conservation Authority (RVCA) requires quality control to achieve TSS (total suspended solids) removal; an oil/grit separator (OGS) manhole can be installed.

An erosion and sediment control plan will be developed to be implemented during construction.

4.2 QUANTITY CONTROL

It is expected that the stormwater quantity control criterion would be to control the post-development peak flows with the use of flow control roof drains. Based on two roof drains we have calculated the following release rates, ponding depth and required volume stored on the roof. Refer to calculations in Appendix C.

	100-Year Event	5-Year Event
Maximum Release Rate	3.65 L/s	2.84 L/s
Maximum Depth at Roof Drain	147 mm	114 mm
Maximum Volume Stored	63.17 cu.m	29.64 cu.m

The proposed development is expected to have an acceptable impact on the 300 mm Capilano Drive storm sewer.

4.3 STORM SERVICING

A 250 mm storm sewer connection at 1% slope (60.10 L/s capacity) is proposed to service the building. At the 5-year unrestricted roof flow rate of 35.01 L/s the storm sewer connection would be at 58% of its capacity. However, the 5-year restricted roof flow rate (through the flow control roof drains) was calculated to be 2.84 L/s; therefore, the storm sewer will only be at about 5% of its capacity. Refer to calculations in Appendix C. The proposed 250 mm storm service will connect to the existing 300 mm municipal storm sewer in Capilano Drive, which, at 0.36% slope, has a capacity of 57.51 L/s.

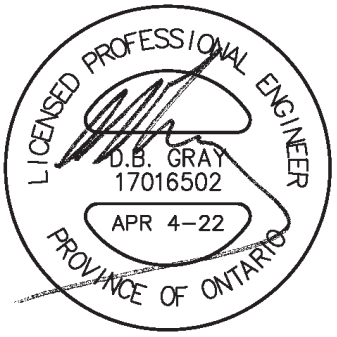
5.0 CONCLUSIONS

1. A private fire hydrant is required.
2. There is an adequate water supply for firefighting from the existing municipal water distribution system.
3. The aggregate flow of the three contributing fire hydrants is greater than the required fire flow.
4. The range of water pressures is acceptable for the proposed development.
5. Since the water pressure may be above 80 psi at times, it is recommended a pressure test be conducted at the completion of construction to determine if a pressure reducing valve is required.
6. The post-development sanitary flow rate will be adequately handled by the proposed sanitary service.
7. The post development sanitary flow is expected to have an acceptable impact on the existing 200 mm municipal sanitary sewer in Capilano Drive.
8. Quality control measures may not be required; however, if RVCA requires quality control an oil/grit separator (OGS) manhole can be installed.
9. An Erosion & Sediment Control Plan will be developed to be implemented during construction.

10. The post-development storm flow rates will be adequately handled by the proposed storm service.

11. The post-development stormwater flows is expected to have an acceptable impact on the existing municipal storm sewer in Capilano Drive.

Prepared by D.B. Gray Engineering Inc.



NOT VALID UNLESS
SIGNED & DATED

APPENDIX A

WATER SERVICING

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

March 16, 2022

56 Capilano Drive

4-Storey Apartment Building

Ottawa, Ontario

FIRE FLOW CALCULATIONS

FUS Method

F = Required fire flow in litres per minutes
= $220CA^{0.5}$

C = Coefficient related to the type of construction
= 1.5 Wood Frame Construction

A = Total floor area in square meters (excluding basements at least 50% below grade)

4th Floor:	1,343	sq.m
3rd Floor:	1,343	sq.m
2nd Floor:	1,343	sq.m
1st Floor:	1,343	sq.m
Total Fire Area:	5,372	sq.m

F = 24,187 L/min
= 24,000 L/min (rounded to nearest 1000 L/min)

-15% Charge for Limited Combustible Occupancy

= 20,400 L/min

30% Credit for sprinkler system designed as per NFPA 13
10% Credit for standard water supply for both sprinkler system and fire department hose lines

= 8,160 L/min

Charge	Side	Separation	Construction	Length (m)	Storeys	Length • Height
5%	Northwest	30.1 to 45m				
8%	Northeast	20.1 to 30m	Wood Frame	9	1	9
8%	Southeast	20.1 to 30m	Noncombustible	31	1	31
10%	Southwest	10.1 to 20m	Ordinary	24	1	24

31% Total Exposure Charge

= 6,324 L/min Exposure Increase

= 18,564 L/min
= 19,000 L/min (rounded to nearest 1000 L/min)
= 316.7 L/s

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March 31, 2022

56 Capilano Drive
4-Storey Apartment Building
Ottawa, Ontario

FIRE FLOW CALCULATIONS
FUS Method

F = Required fire flow in litres per minutes
= $220CA^{0.5}$

C = Coefficient related to the type of construction
= 1.5 Wood Frame Construction

A = Total floor area in square meters (excluding basements at least 50% below grade)

4th Floor NW of Firewall:	671.5	sq.m
3rd Floor NW of Firewall:	671.5	sq.m
2nd Floor NW of Firewall:	671.5	sq.m
1st Floor NW of Firewall:	671.5	sq.m
Total Fire Area:	2,686	sq.m

F = 17,103 L/min
= 17,000 L/min (rounded to nearest 1000 L/min)

-15% Charge for Limited Combustible Occupancy

= 14,450 L/min

30% Credit for sprinkler system designed as per NFPA 13
10% Credit for standard water supply for both sprinkler system and fire department hose lines

= 5,780 L/min

Charge	Side	Separation	Construction	Length (m)	Storeys	Length • Height
5%	Northwest	30.1 to 45m				
8%	Northeast	20.1 to 30m	Wood Frame	9	1	9
10%	Southeast	Firewall				
10%	Southwest	10.1 to 20m	Ordinary	24	1	24

33% Total Exposure Charge

= 4,769 L/min Exposure Increase

= 13,439 L/min
= 13,000 L/min (rounded to nearest 1000 L/min)
= 216.7 L/s

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March 31, 2022

56 Capilano Drive
4-Storey Apartment Building
Ottawa, Ontario

FIRE FLOW CALCULATIONS
FUS Method

F = Required fire flow in litres per minutes
= $220CA^{0.5}$

C = Coefficient related to the type of construction
= 1.5 Wood Frame Construction

A = Total floor area in square meters (excluding basements at least 50% below grade)

4th Floor SE of Firewall:	671.5	sq.m
3rd Floor SE of Firewall:	671.5	sq.m
2nd Floor SE of Firewall:	671.5	sq.m
1st Floor SE of Firewall:	671.5	sq.m
Total Fire Area:	2,686	sq.m

F = 17,103 L/min
= 17,000 L/min (rounded to nearest 1000 L/min)

-15% Charge for Limited Combustible Occupancy

= 14,450 L/min

30% Credit for sprinkler system designed as per NFPA 13
10% Credit for standard water supply for both sprinkler system and fire department hose lines

= 5,780 L/min

Charge	Side	Separation	Construction	Length (m)	Storeys	Length • Height
10%	Northwest	Firewall				
0%	Northeast	> 45m				
8%	Southeast	20.1 to 30m	Noncombustible	31	1	31
8%	Southwest	20.1 to 30m	Ordinary	48	1	48

26% Total Exposure Charge

= 3,757 L/min Exposure Increase

= 12,427 L/min
= 12,000 L/min (rounded to nearest 1000 L/min)
= 200.0 L/s

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March 31, 2022

56 Capilano Drive

4-Storey Apartment Building

50 Apartment Units

Ottawa, Ontario

WATER DEMAND CALCULATIONS

	Number of Units	Persons per Unit	Population
1 Bedroom:	0	1.4	0
2 Bedroom:	0	2.1	0
3 Bedroom:	0	3.1	0
Average:	50	1.8	90
Total:	50		90

Residential Average Daily Demand:	280	L/capita/day				
	17.5	L/min	0.3	L/s	4.6	USgpm
Residential Maximum Daily Demand:	7.2	(Peaking factor for a population of 90 interpolated from Table 3-3 MOE Design Guidelines for Drinking Water Systems)				
	126.0	L/min	2.1	L/s	33.3	USgpm
Residential Maximum Hourly Demand:	10.9	(Peaking factor for a population of 90 interpolated from Table 3-3 MOE Design Guidelines for Drinking Water Systems)				
	189.9	L/min	3.2	L/s	50.2	USgpm

Elevation of Water Meter:	96.9	m				
Finished Floor Elevation:	96.0	m				
Minimum HGL:	146.9	m				
Static Pressure at Water Meter:	50.0	m	490	kPa	71	psi
Maximum HGL:	158.3	m				
Static Pressure at Water Meter:	61.4	m	602	kPa	87	psi

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

RE: Request for Boundary Conditions - 56 Capilano Drive

1 message

Elsby, Cam <Cam.Elsby@ottawa.ca> Thu, Mar 31, 2022 at 2:07 PM
To: Ryan Faith <r.faith@dbgrayengineering.com>
Cc: "Schaeffer, Gabrielle" <gabrielle.schaeffer@ottawa.ca>, "Surprenant, Eric" <Eric.Surprenant@ottawa.ca>, Douglas Gray <d.gray@dbgrayengineering.com>

Hi Ryan,

My apologies, please find below boundary conditions as requested:

The following are boundary conditions, HGL, for hydraulic analysis at 56 Capilano Drive (zone ME) assumed to be connected to 152 mm on Capilano Drive (see attached PDF for location).

Minimum HGL = 146.9 m

Maximum HGL = 158.3 m

Max Day + FF (166.7 L/s) = 131.4 m

Available FF at 20 psi: 239 L/s, assuming a ground elevation of 95.6 m

The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

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.

Please don't hesitate to reach out should you have any further questions or concerns.

Kind regards,

Cam Elsby, EIT

Engineering Intern

Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique

Development Review – West Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 21443

cam.elsby@ottawa.ca

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: March 31, 2022 12:23 PM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>; Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 56 Capilano Drive

Hi Cam,

We suspected the 316.7 L/s at 20 psi may not be available but I was expecting either i) an HGL even if it yielded a lower pressure, or ii) what is available at 20 psi. It is still useful information to us in determining what mitigating measures may be required. Can you also send us the boundary conditions for the 166.7 L/s fire flow?

Thanks,

On Thu, Mar 31, 2022 at 11:56 AM Elsby, Cam <Cam.Elsby@ottawa.ca> wrote:

> Hi Ryan,

We've just received feedback from our senior water resources engineer that the fire demand of 316.7 L/s is very high and cannot be met. Mitigating measures should be considered in order to reduce the required fire demand.

Please don't hesitate to reach out should you have any questions or concerns.

Kind regards,

Cam Elsby, EIT

Engineering Intern

Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique

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613.580.2424 ext./poste 21443

cam.elsby@ottawa.ca

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: March 29, 2022 10:47 AM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>; Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 56 Capilano Drive

Hi Cam,

Do you have an idea when we might hear back from water resources?

Cheers,

On Wed, Mar 16, 2022 at 3:48 PM Elsby, Cam <Cam.Elsby@ottawa.ca> wrote:

> Hi Ryan,
>
> I've just submitted the boundary condition request to our senior water resources engineer as is, however I'll loop back if they state that the figure is required for their review.
>
> Kind regards,
>
> **Cam Elsby, EIT**
>
> Engineering Intern
>
> Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique
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> 613.580.2424 ext./poste 21443
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> cam.elsby@ottawa.ca
>
> ---
>
> **From:** Ryan Faith <r.faith@dbgrayengineering.com>
> **Sent:** March 16, 2022 12:41 PM
> **To:** Elsby, Cam <Cam.Elsby@ottawa.ca>
> **Cc:** Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>; Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>
> **Subject:** Re: Request for Boundary Conditions - 56 Capilano Drive

Hi Cam,

It's an Assessment of Adequacy of Public Services for a Zoning By-law Amendment application. The site plan is rough and may not even happen, there's no architectural floor plans, we won't even be submitting civil drawings and the property has less than 45 m frontage on Capilano Drive. The boundary conditions at the midpoint of the property line fronting Capilano should suffice.

Thanks,

On Wed, Mar 16, 2022 at 12:31 PM Elsby, Cam <Cam.Elsby@ottawa.ca> wrote:

> Hi Ryan,
>
> Just confirmed that we haven't received a servicing plan or a water service connection figure as part of this request. Can you please send over this information?
>
> Kind regards,
>
> **Cam Elsby, EIT**
>
> Engineering Intern
>
> Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique
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cam.elsby@ottawa.ca

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: March 16, 2022 11:09 AM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>; Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 56 Capilano Drive

Hi Cam,

Revised FUS calculations attached. The resulting fire flow for the wood frame option is all that changed but to summarize:

Average daily demand: 0.3 L/s

Maximum daily demand: 2.1 L/s

Maximum hourly demand: 3.2 L/s

Fire flow demand: 316.7 L/s (Wood Frame)

Fire flow + maximum daily demand: 318.8 L/s

Average daily demand: 0.3 L/s

Maximum daily demand: 2.1 L/s

Maximum hourly demand: 3.2 L/s

Fire flow demand: 166.7 L/s (Noncombustible)

Fire flow + maximum daily demand: 168.8 L/s

Thanks,

On Wed, Mar 16, 2022 at 10:49 AM Elsby, Cam <Cam.Elsby@ottawa.ca> wrote:

> Hi Ryan,
>
> I've just confirmed with our senior water resources engineer that we can also accept peaking factors from Table 3-3 based on population going forward, so no need to change the water demand calculations.
>
> Once the revised FUS calculations are provided with the northeast exposure details updated, we will begin to process the boundary condition requests.
>
> Please don't hesitate to reach out should you have any further questions or concerns.
>
> Kind regards,
>
> **Cam Elsby, EIT**
>
> Engineering Intern
>
> Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique
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> 613.580.2424 ext./poste 21443
>
> cam.elsby@ottawa.ca

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: March 16, 2022 9:11 AM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>; Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 56 Capilano Drive

Hi Cam,

Thanks for pointing out the northeast exposure discrepancy. It was 30 to 45 m separation in the original site plan, hence the disregard for the construction type and length-height factor. I will revise. As for the water demand peaking factors, we have always interpolated between the equivalent populations and it has never been questioned. It seems somewhat counterintuitive to calculate the average daily demand based on the population but the maximum daily and hourly demands based on the number of units don't you think? Regardless, I suppose we could interpolate between units moving forward if that's what the City is looking for. It will result in lower estimates for apartment buildings. Let me know.

Cheers,

On Tue, Mar 15, 2022 at 5:20 PM Elsby, Cam <Cam.Elsby@ottawa.ca> wrote:

> Good afternoon Ryan,
>
> Upon review of the water demand and FUS calculations provided, the following comments were identified:
>
> 1. As per Table 3-3 from the MOE Design Guidelines for Drinking Water Systems as seen below, the peaking factors corresponding to 50 dwelling units serviced are 4.9 and 7.4. Meanwhile, the calculations provided interpolate between equivalent populations listed, 30 and 150, to get peaking factors of 7.2 and 10.85 corresponding to a population of 90. Please revise or provide reasoning to substantiate the peaking factors calculation method used.
> 2. For both FUS calculations, please provide the construction type and length-height factor for the exposure charge in the northeast direction, in order to substantiate the exposure charge allocated.

Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People

Dwelling units serviced	Equivalent population	Night minimum hour factor	Maximum day factor	Peak hour factor
10	30	0.1	9.5	14.3
50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3.0	4.5
167	500	0.4	2.9	4.3

Please don't hesitate to reach out should you have any questions or concerns.

Kind regards,

Cam Elsby, EIT

Engineering Intern

Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique

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613.580.2424 ext./poste 21443

cam.elsby@ottawa.ca

From: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Sent: March 11, 2022 16:05
To: 'Ryan Faith' <r.faith@dbgrayengineering.com>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>; Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Subject: FW: Request for Boundary Conditions - 56 Capilano Drive

Hi Ryan,

This file is located in Development Review's West Group, I have cc'd Gabi and Eric who are the Senior PM's in that group.

Jeff

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: March 11, 2022 3:47 PM
To: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Request for Boundary Conditions - 56 Capilano Drive

Hi Jeff,

We are working on an Assessment of Adequacy of Public Services for 56 Capilano Drive.

Please provide the boundary conditions for the 150 mm Capilano Drive watermain at 56 Capilano Drive. We have calculated the following expected demands:

Average daily demand: 0.3 L/s

Maximum daily demand: 2.1 L/s

Maximum hourly demand: 3.2 L/s

Fire flow demand: 300 L/s (Wood Frame)

Fire flow + maximum daily demand: 302.1 L/s

We are looking at alternative designs so please also provide the boundary conditions for the following expected demands.

Average daily demand: 0.3 L/s

Maximum daily demand: 2.1 L/s

Maximum hourly demand: 3.2 L/s

Fire flow demand: 166.7 L/s (Noncombustible)

Fire flow + maximum daily demand: 168.8 L/s

Calculations are attached.

Thanks,

'

'

'

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APPENDIX B

SANITARY SERVICING

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 CALCULATIONS

56 Capilano Drive
4-Storey Apartment Building
Ottawa, Ontario

April 4, 2022

Residential Average Daily Flow:	280	L/capita/day	Residential Peaking Factor:	Harmon Formula
Commercial Average Daily Flow:	28,000	L/ha/day	Harmon Formula Correction Factor:	0.8
Institutional Average Daily Flow:	28,000	L/ha/day	Commercial Peaking Factor:	1.5
Light Industrial Average Daily Flow:	35,000	L/ha/day	Institutional Peaking Factor:	1.5
Heavy Industrial Average Daily Flow:	55,000	L/ha/day	Industrial Peaking Factor:	Ministry of the Environment
Infiltration Allowance:	0.33	L/s/ha	Manning's Roughness Coefficient:	0.013

		Residential													Non-Residential				Infiltration			Q	Sewer Data						
		Individual									Cumulative				Individual			Cumulative	Individual	Cumulative		Total							
Location		Single	Semi		Apartment				Area	Population	Area	Population	Peaking	Flow Rate	Area	Daily Flow	Peaking	Flow Rate	Area	Area	Flow Rate	Flow Rate	Length	Nominal Diameter	Actual Diameter	Slope	Velocity	Q_{Full} Capacity	
From	To	Family	Detached	Duplex	(1 Bed)	(2 Bed)	(3 Bed)	(Average)	(ha)		(ha)		Factor	(L/s)	(ha)	L/ha/day	Factor	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)	(mm)	(%)	(m/s)	(L/s)	Q / Q_{Full}
		ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.4	ppu = 2.1	ppu = 3.1	ppu = 1.8																					
Proposed	Existing							50	0.2775	90	0.2775	90	3.2	0.93					0.2775	0.2775	0.09	1.02		150	147	1	0.85	14.43	0.07
Building	200 SAN																												
																			Existing 200 mm Capilano Drive Sanitary Sewer:				200	201	0.42	0.68	21.54	

APPENDIX C

STORMWATER MANAGEMENT

March 11, 2022

56 Capilano Drive

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS
Modified Rational Method

ONE HUNDRED YEAR EVENT

DRAINAGE AREA I (Roof)

(ONE HUNDRED YEAR EVENT)

			C
Total Catchment Area:	1,343	sq.m	1.00

No. of Roof Drains:	2	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drain:	147	mm
Maximum Release Rate:	3.65	L/s

Pond Area:	1,289	sq.m
Maximum Volume Stored:	63.17	cu.m
Maximum Volume Required:	63.17	cu.m

DRAINAGE AREA I (Roof Continued)

(ONE HUNDRED YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
5	243	90.61	3.65	86.96	26.09
10	179	66.67	3.65	63.01	37.81
15	143	53.35	3.65	49.70	44.73
20	120	44.78	3.65	41.13	49.36
25	104	38.77	3.65	35.12	52.68
30	92	34.30	3.65	30.65	55.17
35	83	30.83	3.65	27.18	57.08
40	75	28.06	3.65	24.41	58.57
45	69	25.78	3.65	22.13	59.75
50	64	23.88	3.65	20.23	60.68
55	60	22.26	3.65	18.61	61.41
60	56	20.87	3.65	17.22	61.98
65	53	19.66	3.65	16.01	62.42
70	50	18.59	3.65	14.94	62.74
75	47	17.64	3.65	13.99	62.97
80	45	16.80	3.65	13.15	63.10
85	43	16.04	3.65	12.39	63.17
90	41	15.35	3.65	11.70	63.17
95	39	14.72	3.65	11.07	63.11
100	38	14.15	3.65	10.50	63.00
105	36	13.63	3.65	9.98	62.85
110	35	13.14	3.65	9.49	62.65
115	34	12.70	3.65	9.05	62.41
120	33	12.28	3.65	8.63	62.14
125	32	11.90	3.65	8.24	61.84
130	31	11.54	3.65	7.89	61.50
135	30	11.20	3.65	7.55	61.14
140	29	10.88	3.65	7.23	60.76
145	28	10.59	3.65	6.94	60.35
150	28	10.31	3.65	6.66	59.92
180	24	8.92	3.65	5.27	56.95
210	21	7.89	3.65	4.24	53.47
240	19	7.10	3.65	3.45	49.61
270	17	6.46	3.65	2.81	45.46
300	16	5.93	3.65	2.28	41.08

FIVE YEAR EVENT

DRAINAGE AREA I (Roof)

(FIVE YEAR EVENT)

			C
Total Catchment Area:	1,343	sq.m	0.90

No. of Roof Drains:	2	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drain:	114	mm
Maximum Release Rate:	2.84	L/s

Pond Area:	779	sq.m
Maximum Volume Stored:	29.64	cu.m
Maximum Volume Required:	29.64	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
5	141	47.44	2.84	44.60	13.38
10	104	35.01	2.84	32.17	19.30
15	84	28.08	2.84	25.24	22.72
20	70	23.61	2.84	20.77	24.92
25	61	20.46	2.84	17.63	26.44
30	54	18.12	2.84	15.28	27.51
35	49	16.30	2.84	13.47	28.28
40	44	14.85	2.84	12.01	28.82
45	41	13.65	2.84	10.81	29.20
50	38	12.65	2.84	9.82	29.45
55	35	11.80	2.84	8.97	29.58
60	33	11.07	2.84	8.23	29.64
65	31	10.43	2.84	7.59	29.62
70	29	9.87	2.84	7.03	29.54
75	28	9.37	2.84	6.53	29.40
80	27	8.93	2.84	6.09	29.22
85	25	8.52	2.84	5.69	29.01
90	24	8.16	2.84	5.32	28.75
95	23	7.83	2.84	4.99	28.47
100	22	7.53	2.84	4.69	28.15
105	22	7.25	2.84	4.42	27.82
110	21	7.00	2.84	4.16	27.45
115	20	6.76	2.84	3.92	27.07
120	19	6.54	2.84	3.70	26.67

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STORM SEWER CALCULATIONS

Rational Method

FIVE YEAR EVENT

56 Capilano Drive
4-Storey Apartment Building
Ottawa, Ontario

April 4, 2022

Manning's Roughness Coefficient: 0.013

		Individual					Cumulative				Sewer Data							
Location		Roof C = 0.90	Hard C = 0.90	Gravel C = 0.70	Soft C = 0.20			Time	Rainfall Intensity	Flow Rate	Length	Nominal Diameter	Actual Diameter	Slope	Velocity	Q_{Full} Capacity	Time	
From	To	(ha)	(ha)	(ha)	(ha)	2.78AC	2.78AC	(min)	(mm/hr)	(L/s)	(m)	(mm)	(mm)	(%)	(m/s)	(L/s)	(min)	Q / Q_{Full}
Roof	Existing	0.1343				0.3360	0.3360	10.00	104	35.01		250	251	1	1.21	60.10		0.58
Drains	300 ST					Flow through inlet control device:				2.84		250	251	1	1.21	60.10		0.05
							Existing 300 mm Capilano Drive Storm Sewer:					300	299	0.36	0.82	57.51		