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

SITE SERVICING & STORMWATER MANAGEMENT REPORT

601 LAURIER AVENUE WEST
OTTAWA, ONTARIO

REPORT NO. 23121

SEPTEMBER 24, 2024

CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

This report has been prepared in support of the Zoning By-law Amendment application for 601 Laurier Avenue West in Ottawa, Ontario. The Zoning By-law Amendment would permit the development of the proposed 28-storey, 327-unit apartment building. The property is currently occupied by two apartment buildings to be demolished.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

Using the Fire Underwriters Survey Method, the required fire flow was calculated to be 10,000 L/min (166.7 L/s). Refer to calculations in Appendix A.

The boundary conditions in the 200 mm Laurier Avenue West municipal watermain provided by the City of Ottawa for a 66.7 L/s fire flow at the subject property indicate a hydraulic grade line (HGL) of 109.5 m. A new HGL of 100.1 m was extrapolated for the 166.7 L/s fire flow. The new HGL calculates to 189 kPa (27 psi). Refer to Appendix A. Since the pressure is above the Ontario Building Code's minimum required pressure of 140 kPa (20 psi), it is expected there is an adequate water supply for firefighting from the existing municipal water distribution system.

In accordance with 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. In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I, Class AA fire hydrants within 75 m can contribute 5,700 L/min (95 L/s).

The two closest existing municipal fire hydrants are Class AA and are within 75 m of the proposed building; one is located between 18 Cambridge Street North and 60 Cambridge Street North; and the other is located at the intersection of Laurier Avenue West and Bronson Avenue. Each can contribute 5,700 L/min (95 L/s) for an aggregate flow of 11,400 L/min (190 L/s), which is greater than the required fire flow of 10,000 L/min (166.7 L/s).

2.2 DOMESTIC WATER SUPPLY

In accordance with

i. the City of Ottawa Water Design Guidelines for the populations and peaking factors, and
ii. City of Ottawa Technical Bulletin ISTB-2021-03 for the consumption rate, and

based on the 202 – 1 bedroom apartment units, 104 – 2 bedroom apartment units and 21 – 3 bedroom apartment units, the average daily demand was calculated to be 1.8 L/s, the maximum daily demand was calculated to be 4.6 L/s and the maximum hourly demand was calculated to be 10.1 L/s. Refer to calculations in Appendix A. Since the average daily demand is more than 50,000 L/day, a redundant water supply separated by an isolation valve is required to avoid the creation of a vulnerable service area.

The boundary conditions in the 200 mm Laurier Avenue West municipal watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 107.5 m and a maximum HGL of 115.7 m. Refer to Appendix A. Based on these boundary conditions, the pressure at the water meter is calculated

to vary between 295 kPa (43 psi) and 375 kPa (54 psi). This is an acceptable range for the proposed development.

A 150 mm water service connecting to the existing 200 mm Laurier Avenue West municipal watermain could service the sprinkler system. The same 150 mm water service would provide an adequate domestic water supply.

3.0 SANITARY SERVICING

In accordance with

i. the City of Ottawa Sewer Design Guidelines for the populations,
ii. City of Ottawa Technical Bulletin ISTB-2018-01 for the average daily flow, Harmon Formula correction factor and infiltration allowance, and
iii. the Harmon Formula for the peaking factor, and

based on the 202 – 1 bedroom apartment units, 104 – 2 bedroom apartment units and 21 – 3 bedroom apartment units, the post-development sanitary flow rate was calculated to be 5.85 L/s. A 250 mm sanitary sewer service at the minimum 1% slope (59.47 L/s capacity) could service the development. At the design flow rate the sanitary sewer service would only be at 10% of its capacity. The 250 mm sanitary sewer service would connect to the existing 250 mm Laurier Avenue West municipal combined sewer, which at 0.5% slope has a capacity of 42.05 L/s. Refer to calculations in Appendix B. The post-development increase in flow is expected to have an acceptable impact on the 250 mm Laurier Avenue West municipal combined sewer.

4.0 STORMWATER MANAGEMENT

4.1 QUANTITY CONTROL

It is expected that the stormwater quantity control criterion will be to control the post-development peak flows with the use of flow control roof drains to the pre-development 2-year peak flow rate using the post-development roof area, a calculated pre-development runoff coefficient not more than 0.5 and a calculated pre-development time of concentration not less than 10 minutes. It was calculated that the pre-development conditions reflect a runoff coefficient of 0.59 during the 100-year event and 0.51 during the 2-year event. Using the Rational Method with a time of concentration of 10 minutes, the pre-development flow rates were calculated to be 56.78 L/s during the 100-year event and 21.41 L/s during the 2-year event. Using the Rational Method with the post-development roof area of 1,300 sq.m, a time of concentration of 10 minutes and runoff coefficient of 0.5, the expected target release rate for the roof was calculated to be 13.88 L/s. The Rational and Modified Rational Methods were used to calculate the post-development flow rates and corresponding storage volumes. Refer to calculations in Appendix C.

Drainage Area I (Uncontrolled Flow to Slater Street – 650 sq.m)
The north side of the property would drain uncontrolled off site to Slater Street. The flow rate is calculated at a time of concentration of 10 minutes.

	100-Year Event
Maximum Flow Rate	17.99 L/s

Drainage Area II (Uncontrolled Flow to Laurier Avenue West – 250 sq.m)
The south side of the property would drain uncontrolled off site to Laurier Avenue West. The flow rate is calculated at a time of concentration of 10 minutes.

	100-Year Event
Maximum Flow Rate	3.72 L/s

Drainage Area III (Penthouse Roof – 250 sq.m)
The 2 roof drains would be flow control type roof drains, which would restrict the flow of stormwater and cause it to pond on the roof.

	100-Year Event
Maximum Release Rate	2.99 L/s
Maximum Volume Stored	6.42 cu.m

Drainage Area IV (Level 28 Roof – 500 sq.m)
The 4 roof drains would be flow control type roof drains, which would restrict the flow of stormwater and cause it to pond on the roof.

	100-Year Event
Maximum Release Rate	5.96 L/s
Maximum Volume Stored	12.85 cu.m

Drainage Area V (Level 06 Roof – 300 sq.m)
The roof drain would be a flow control type roof drain, which would restrict the flow of stormwater and cause it to pond on the roof.

	100-Year Event
Maximum Release Rate	1.68 L/s
Maximum Volume Stored	11.01 cu.m

Summary

The maximum post-development release rate during the 100-year event for the entire property was calculated to be 32.34 L/s, which is 43% less than the pre-development flow rate during the 100-year event. The maximum post-development release rate during the 100-year event through the roof drains was calculated to be 23.04 L/s, which is 66% more than the target release rate. To achieve the maximum post-development release rate, a maximum storage volume of 30.28 cu.m would be required. The post-development reduction in flow is expected to have a positive impact on the 900 mm Slater Street municipal storm sewer.

	100-Year Event
Target Release Rate	13.88 L/s
Maximum Release Rate	23.04 L/s
Maximum Volume Required	30.28 cu.m

4.2 STORM SERVICING

The peak unrestricted roof flow rate during the 100-year event was calculated to be 64.53 L/s. The peak restricted roof flow rate during the 100-year event was calculated to be 23.04 L/s. A 300 mm storm sewer service at the minimum 1% slope (96.70 L/s capacity) could service the development. At the peak restricted 100-year flow rate the storm sewer service would only be at 24% of its capacity. The 300 mm storm sewer service would connect to a municipal storm sewer extension east on Laurier Avenue West to Bronson Avenue and north on Bronson Avenue to the existing 900 mm Slater Street municipal storm sewer, which at 2.88% slope has a capacity of 3,201 L/s. Refer to calculations in Appendix C.

5.0 CONCLUSIONS

1. It is expected there is an adequate water supply for firefighting from the existing municipal water distribution system.
2. It is expected there is an acceptable range of water pressures in the existing municipal water distribution system.
3. The post-development increase in sanitary flow is expected to have an acceptable impact on the existing municipal combined sewer.
4. The post-development reduction in stormwater flow is expected to have a positive impact on the existing municipal storm sewer.

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

September 24, 2024

601 Laurier Avenue West

28-Storey Apartment Building

Ottawa, Ontario

FIRE FLOW CALCULATIONS

FUS Method

RFF = Required Fire Flow in litres per minute
= $220CA^{0.5}$

C = Construction Coefficient related to the type of construction of the building
= 0.8 Type II Noncombustible Construction

A = Total Effective Floor Area in square meters of the building

Penthouse:	261	0%	0	sq.m Effective Floor Area
Level 28:	746	0%	0	sq.m Effective Floor Area
Level 27:	746	0%	0	sq.m Effective Floor Area
Level 26:	746	0%	0	sq.m Effective Floor Area
Level 25:	746	0%	0	sq.m Effective Floor Area
Level 24:	746	0%	0	sq.m Effective Floor Area
Level 23:	746	0%	0	sq.m Effective Floor Area
Level 22:	746	0%	0	sq.m Effective Floor Area
Level 21:	746	0%	0	sq.m Effective Floor Area
Level 20:	746	0%	0	sq.m Effective Floor Area
Level 19:	746	0%	0	sq.m Effective Floor Area
Level 18:	746	0%	0	sq.m Effective Floor Area
Level 17:	746	0%	0	sq.m Effective Floor Area
Level 16:	746	0%	0	sq.m Effective Floor Area
Level 15:	746	0%	0	sq.m Effective Floor Area
Level 14:	746	0%	0	sq.m Effective Floor Area
Level 13:	746	0%	0	sq.m Effective Floor Area
Level 12:	746	0%	0	sq.m Effective Floor Area
Level 11:	746	0%	0	sq.m Effective Floor Area
Level 10:	746	50%	373	sq.m Effective Floor Area
Level 09:	746	50%	373	sq.m Effective Floor Area
Level 08:	746	50%	373	sq.m Effective Floor Area
Level 07:	707	50%	353.5	sq.m Effective Floor Area
Level 06:	1,171	50%	585.5	sq.m Effective Floor Area
Level 05:	1,171	50%	585.5	sq.m Effective Floor Area
Level 04:	1,238	50%	619	sq.m Effective Floor Area
Level 03:	1,238	50%	619	sq.m Effective Floor Area
Level 02:	1,238	100%	1,238	sq.m Effective Floor Area
Level 01:	1,273	100%	1,273	sq.m Effective Floor Area
	23,963 sq.m		6,392.5	sq.m Total Effective Floor Area

RFF =	14,072	L/min
=	14,000	L/min (rounded to nearest 1,000 L/min)

Occupancy and Contents Adjustment Factor

-15%	Limited Combustible Contents

=	-2,100	L/min Occupancy and Contents Adjustment Factor

RFF =	11,900	L/min

Automatic Sprinkler Protection Credit

30%	Sprinkler system designed, installed and maintained in accordance with NFPA standards
10%	Standard water supply for both the sprinkler system and fire department hose lines

=	4,760	L/min Automatic Sprinkler Protection Credit

Exposure Adjustment Charge

Side	Charge	Distance	Construction	Length	Storeys	Factor
North	0%	over 30 m				
East	17%	3.1 m to 10 m	Type V	15	3	45
South	10%	20.1 m to 30 m	Type V	28	4	112
West	0%	over 30 m				

	27%	Exposure Adjustment Charge

=	3,213	L/min Exposure Adjustment Charge

RFF =	10,353	L/min
=	10,000	L/min (rounded to nearest 1,000 L/min)
=	166.7	L/s

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

September 24, 2024

601 Laurier Avenue West

28-Storey Apartment Building

Ottawa, Ontario

WATER DEMAND CALCULATIONS

	Number of Units	Persons per Unit	Population
1 Bedroom:	202	1.4	282.8
2 Bedroom:	104	2.1	218.4
3 Bedroom:	21	3.1	65.1
Total:	327		566.3

Average Daily Demand:	280	L/capita/day				
	110.1	L/min	1.8	L/s	29.1	USgpm
Maximum Daily Demand:	2.5	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	275.3	L/min	4.6	L/s	72.7	USgpm
Maximum Hourly Demand:	2.2	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	605.6	L/min	10.1	L/s	160.0	USgpm

Elevation of Water Meter:	77.4	m				
Basement Floor Elevation:	76.5	m				
Minimum HGL:	107.5	m				
Static Pressure at Water Meter:	30.1	m	295	kPa	43	psi
Maximum HGL:	115.7	m				
Static Pressure at Water Meter:	38.3	m	375	kPa	54	psi

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

RE: Request for Boundary Conditions - 601 Laurier Avenue West

1 message

Wessel, Shawn <shawn.wessel@ottawa.ca> Wed, Feb 14, 2024 at 4:02 PM
To: Ryan Faith <r.faith@dbgrayengineering.com>
Cc: "Fawzi, Mohammed" <mohammed.fawzi@ottawa.ca>, Douglas Gray <d.gray@dbgrayengineering.com>, "van Wyk, Adrian" <adrian.vanwyk@ottawa.ca>

Hello Ryan

Please find BC as requested, below and attached:

The following are boundary conditions, HGL, for hydraulic analysis at 601 Laurier Avenue West (zone 1W) assumed to be a dual connection to the 203mm watermain on Laurier Avenue West (see attached PDF for location).

Minimum HGL: 107.5 m

Maximum HGL: 115.7 m

Max Day + Fire Flow (66.7 L/s): 109.5 m

Please refer to Guidelines and Technical bulletin ISDTB-2014-02 concerning basic day demands greater than 0.5 L/s.

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.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji

Pronouns: he/him | Pronom: il

Project Manager - Infrastructure Approvals

Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale

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

City of Ottawa | Ville d'Ottawa

110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1

(613) 580 2424 Ext. | Poste 33017

Int. Mail Code | Code de Courrier Interne 01-14

shawn.wessel@ottawa.ca

Please consider the environment before printing this email

*****Please also note that, while my work hours may be affected by the current situation and am working from home, I still have access to email, video conferencing and telephone. Feel free to schedule video conferences and/or telephone calls, as necessary.*****

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: Tuesday, February 13, 2024 8:20 AM
To: Wessel, Shawn <shawn.wessel@ottawa.ca>
Cc: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>; van Wyk, Adrian <adrian.vanwyk@ottawa.ca>
Subject: Re: Request for Boundary Conditions - 601 Laurier Avenue West

Hi Shawn,

Thanks for the email and phone call yesterday. Also looking forward to hearing how your discussion with Eric goes. Am I correct to assume boundary conditions are just around the corner?

Regards,

Ryan Faith
D.B. Gray Engineering Inc.
700 Long Point Circle
Ottawa, Ontario K1T 4E9
613-425-8044

On Mon, Feb 12, 2024 at 1:07 PM Wessel, Shawn <shawn.wessel@ottawa.ca> wrote:

> Good afternoon, Ryan and Doug
>
> Further to internal discussions and based on my long history on this file, I wanted to let you know that this is a very tight system in this area, being the combined sewer on Cambridge St. N., which is seeing more development downstream of this site. There is historical flooding and the original SPC application was approved for approx. 10.5 L/s for storm release with a 1.2 L/s sanitary flow rate.
>
> A 25 L/s STM release rate will not work for this site and will certainly create flooding issues in the area.
>
> You will have to factor in your total sanitary (5 L/s as you indicated) and limit SW with more retention and storage on site to make this work, connecting to Cambridge St. N. This one will force you to be creative with storage on site.
>
> Several options, including connecting with extension through private lands to Sparks, below was entertained and due to topography, lack of infrastructure, and the fact that this site is upstream to all systems.
>
> The original proposal was approved and an ECA obtained, limiting to the aforementioned flows and now a neighbouring parcel has been added along with more density and SWM to this larger site.
>
> I have notified the File lead (Adrian) of this issue and suggest you discuss this information with your client, including any options you see fit, and invite you to contact me anytime to discuss

further.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji

Pronouns: he/him | Pronom: il

Project Manager - Infrastructure Approvals

Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale

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

City of Ottawa | Ville d'Ottawa

110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1

(613) 580 2424 Ext. | Poste 33017

Int. Mail Code | Code de Courrier Interne 01-14

shawn.wessel@ottawa.ca

Please consider the environment before printing this email

*****Please also note that, while my work hours may be affected by the current situation and am working from home, I still have access to email, video conferencing and telephone. Feel free to schedule video conferences and/or telephone calls, as necessary.*****

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: Thursday, February 8, 2024 8:20 AM
To: Wessel, Shawn <shawn.wessel@ottawa.ca>

Cc: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>; Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 601 Laurier Avenue West

Hi Shawn,

They don't have roof plans at this stage but the plan would be to restrict the roofs as much as practical. Preliminary target release rate is 25 L/s.

Regards,

Ryan Faith
D.B. Gray Engineering Inc.
700 Long Point Circle
Ottawa, Ontario K1T 4E9
613-425-8044

On Wed, Jan 31, 2024 at 10:26 AM Wessel, Shawn <shawn.wessel@ottawa.ca> wrote:

> Thank you Ryan
>
> Do you have Stm calcs with projected flows so that we can check with our Water Resources Dept. in regards to HGL and surcharge conditions, if any.
>
> Thanks again
>
> ***Regards,***
>
> **Shawn Wessel, A.Sc.T.,rcji**
>
> Pronouns: he/him | Pronom: il
>
> **Project Manager - Infrastructure Approvals**
>
> **Gestionnaire de projet – Approbation des demandes d'infrastructures**

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale

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

City of Ottawa | Ville d'Ottawa

110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1

(613) 580 2424 Ext. | Poste 33017

Int. Mail Code | Code de Courrier Interne 01-14

shawn.wessel@ottawa.ca

Please consider the environment before printing this email

*****Please also note that, while my work hours may be affected by the current situation and am working from home, I still have access to email, video conferencing and telephone. Feel free to schedule video conferences and/or telephone calls, as necessary.*****

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: Wednesday, January 31, 2024 9:11 AM
To: Wessel, Shawn <shawn.wessel@ottawa.ca>; Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 601 Laurier Avenue West

Hi Shawn and Mohammed,

Sanitary calculations attached.

Regards,

Ryan Faith
D.B. Gray Engineering Inc.
700 Long Point Circle
Ottawa, Ontario K1T 4E9
613-425-8044

On Thu, Jan 25, 2024 at 12:32 PM Ryan Faith <r.faith@dbgrayengineering.com> wrote:

Hi Shawn and Mohammed,

Please provide the boundary conditions for the 200 mm Laurier Avenue West municipal watermain at 601 Laurier Avenue West. We have calculated the following expected demands:

Fire flow demand: 66.7 L/s
Average daily demand: 1.7 L/s
Maximum daily demand: 4.2 L/s
Maximum hourly demand: 9.1 L/s

Fire flow + maximum daily demand: 70.9 L/s

Calculations are attached.

Thanks,

Ryan Faith
D.B. Gray Engineering Inc.
700 Long Point Circle
Ottawa, Ontario K1T 4E9
613-425-8044

'

'

'

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

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

'

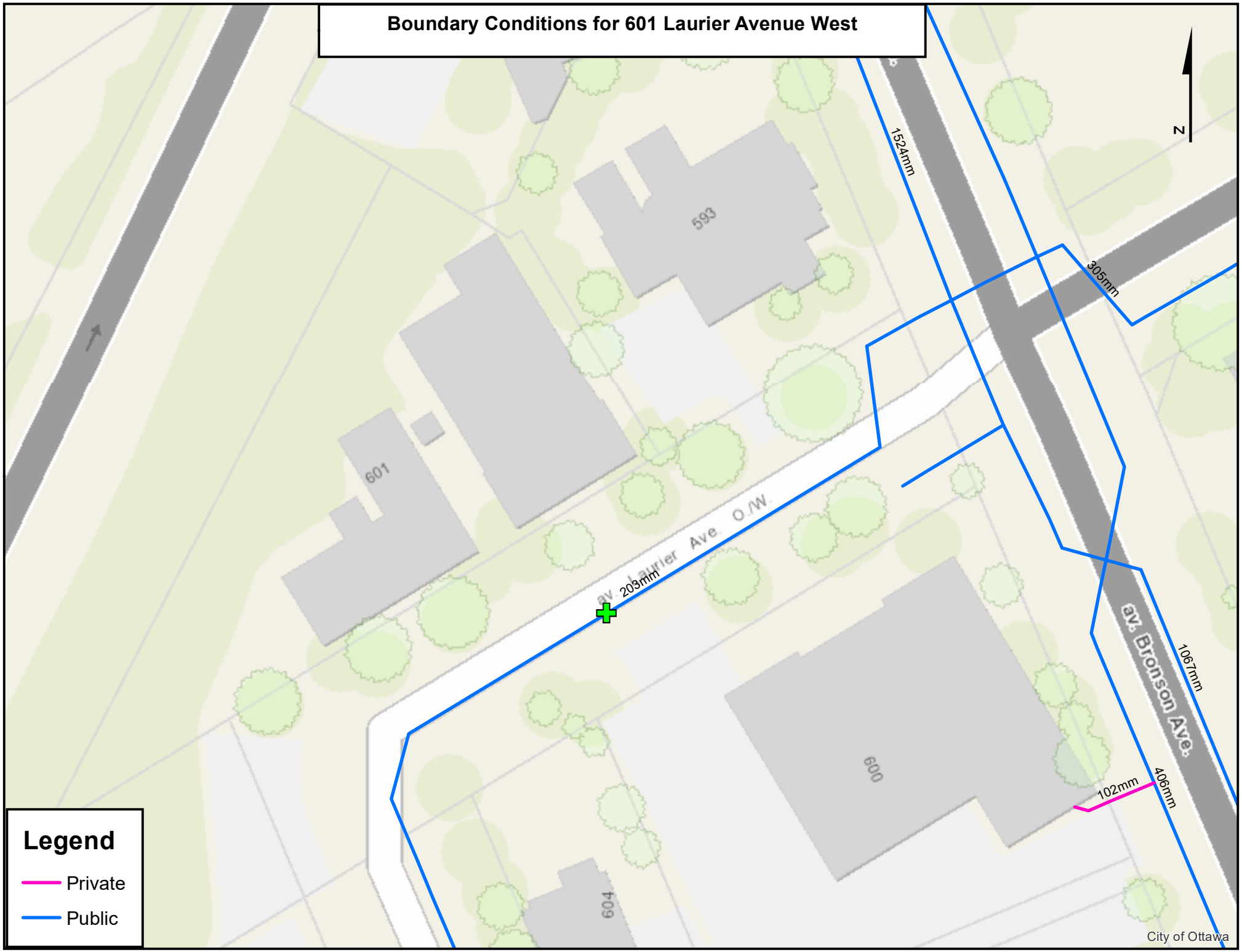
'

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

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

'

601 Laurier Avenue West January 2024.pdf
437K


Boundary Conditions for 601 Laurier Avenue West
N
1524mm
305mm
593
601
av. Laurier Ave. O./W.
203mm
av. Bronson Ave.
1067mm
600
102mm
406mm
604
Legend
Private
Public
City of Ottawa

September 24, 2024

601 Laurier Avenue West

28-Storey Apartment Building

Ottawa, Ontario

EXTRAPOLATED BOUNDARY CONDITIONS FOR 166.7 L/S

Based on Boundary Conditions Provided for 66.7 L/s

Elevation at Fire Hydrant:	80.9	m					
Old Fire Flow:	4,000	L/min	66.7	L/s	1,057	USgpm	
66.7 L/s Fire Flow HGL:	109.5	m					
Static Pressure at Fire Hydrant:	28.6	m	280	kPa	41	psi	
Minimum HGL:	107.5	m					
Static Pressure at Fire Hydrant:	26.6	m	261	kPa	38	psi	
Maximum HGL:	115.7	m					
Static Pressure at Fire Hydrant:	34.8	m	341	kPa	49	psi	

New Fire Flow:	10,000	L/min	166.7	L/s	2,642	USgpm	
166.7 L/s Fire Flow HGL:	100.1	m					
Static Pressure at Fire Hydrant:	19.2	m	189	kPa	27	psi	

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

Project: 601 Laurier Avenue West
28-Storey Apartment Building
Ottawa, Ontario

Date: September 24, 2024

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													Commercial				Infiltration			Q	Sewer Data						
		Individual									Cumulative				Individual	Cumulative			Individual	Cumulative		Total							
Location		Single	Semi	Duplex	Apartment	Apartment	Apartment	Apartment	Area	Population	Area	Population	Peaking	Flow Rate	Area	Area	Peaking	Flow Rate	Area	Area	Flow Rate	Flow Rate	Length	Nominal Diameter	Actual Diameter	Slope	Velocity	Q_{Full} Capacity	
From	To	Family	Detached		(1 Bed)	(2 Bed)	(3 Bed)	(Average)	(ha)		(ha)		Factor	(L/s)	(ha)	(ha)	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 Building	MHCH 10723				202	104	21		0.1609	566.3	0.1609	566.3	3.16	5.79					0.1609	0.1609	0.05	5.85		250	250	1	1.21	59.47	10%
																							Existing 250 mm Laurier Avenue West Municipal Combined Sewer:		250	250	0.5	0.86	42.05	

APPENDIX C

STORMWATER MANAGEMENT

September 24, 2024

601 Laurier Avenue West

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS

Modified Rational Method

PRE-DEVELOPMENT CONDITIONS

100-YEAR EVENT

			C
Roof Area:	625	sq.m	1.00
Hard Area:	250	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Soft Area:	1,075	sq.m	0.25
Total Catchment Area:	1,950	sq.m	0.59
Area (A):	1,950	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.59		
100-Year Pre-Development Flow Rate (2.78AiC):	56.78	L/s	

2-YEAR EVENT

			C
Roof Area:	625	sq.m	0.90
Hard Area:	250	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	1,075	sq.m	0.20
Total Catchment Area:	1,950	sq.m	0.51
Area (A):	1,950	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	77	mm/hr	
Runoff Coeficient (C):	0.51		
2-Year Pre-Development Flow Rate (2.78AiC):	21.41	L/s	

TARGET RELEASE RATE

			C
Roof Area:	1,300	sq.m	0.90
Hard Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	0	sq.m	0.20
Total Catchment Area:	1,300	sq.m	0.90
Area (A):	1,300	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	77	mm/hr (2-Year Event)	
Runoff Coeficient (C):	0.5		
Target Release Rate (2.78AiC):	13.88	L/s	

100-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow to Slater Street)

(100-YEAR EVENT)

			C
Roof Area:	250	sq.m	1.00
Hard Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Permeable Paver Area:	100	sq.m	0.375
Soft Area:	300	sq.m	0.25
Total Catchment Area:	650	sq.m	0.56
Area (A):	650	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.56		
Flow Rate (2.78AiC):	17.99	L/s	

DRAINAGE AREA II (Uncontrolled Flow to Laurier Avenue West)

(100-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Permeable Paver Area:	100	sq.m	0.375
Soft Area:	150	sq.m	0.25
Total Catchment Area:	250	sq.m	0.30
Area (A):	250	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.30		
Flow Rate (2.78AiC):	3.72	L/s	

DRAINAGE AREA III (Penthouse Roof)

(100-YEAR EVENT)

			C
Total Catchment Area:	250	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 Drains:	120	mm
Maximum Release Rate:	2.99	L/s

Pond Area: 160 sq.m

Maximum Volume Stored: 6.42 cu.m

Maximum Volume Required: 6.42 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	12.41	2.99	9.42	5.65
15	143	9.93	2.99	6.94	6.25
20	120	8.34	2.99	5.35	6.42
25	104	7.22	2.99	4.23	6.34
30	92	6.38	2.99	3.40	6.11
35	83	5.74	2.99	2.75	5.78
40	75	5.22	2.99	2.23	5.36
45	69	4.80	2.99	1.81	4.89
50	64	4.44	2.99	1.46	4.37
55	60	4.14	2.99	1.16	3.81
60	56	3.88	2.99	0.90	3.23
65	53	3.66	2.99	0.67	2.62
70	50	3.46	2.99	0.47	1.98
75	47	3.28	2.99	0.30	1.33
80	45	3.13	2.99	0.14	0.67
85	43	2.99	2.99	0.00	0.00
90	41	2.86	2.86	0.00	0.00
95	39	2.74	2.74	0.00	0.00
100	38	2.63	2.63	0.00	0.00
105	36	2.54	2.54	0.00	0.00
110	35	2.45	2.45	0.00	0.00
115	34	2.36	2.36	0.00	0.00
120	33	2.29	2.29	0.00	0.00

DRAINAGE AREA IV (Level 28 Roof)

(100-YEAR EVENT)

				C
Total Catchment Area:	500	sq.m		1.00

No. of Roof Drains:	4	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drains:	120	mm

Maximum Release Rate:	5.96	L/s	Pond Area:	321	sq.m
			Maximum Volume Stored:	12.85	cu.m
			Maximum Volume Required:	12.85	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	24.82	5.96	18.86	11.31
15	143	19.86	5.96	13.90	12.51
20	120	16.67	5.96	10.71	12.85
25	104	14.43	5.96	8.47	12.71
30	92	12.77	5.96	6.81	12.25
35	83	11.48	5.96	5.51	11.58
40	75	10.45	5.96	4.48	10.75
45	69	9.60	5.96	3.63	9.81
50	64	8.89	5.96	2.93	8.78
55	60	8.29	5.96	2.32	7.67
60	56	7.77	5.96	1.80	6.50
65	53	7.32	5.96	1.35	5.28
70	50	6.92	5.96	0.96	4.02
75	47	6.57	5.96	0.60	2.72
80	45	6.25	5.96	0.29	1.39
85	43	5.97	5.96	0.01	0.03
90	41	5.71	5.71	0.00	0.00
95	39	5.48	5.48	0.00	0.00
100	38	5.27	5.27	0.00	0.00
105	36	5.07	5.07	0.00	0.00
110	35	4.89	4.89	0.00	0.00
115	34	4.73	4.73	0.00	0.00
120	33	4.57	4.57	0.00	0.00

DRAINAGE AREA V (Level 06 Roof)

(100-YEAR EVENT)

			C
Total Catchment Area:	300	sq.m	1.00

No. of Roof Drains: 1
Slots per Wier: 1 0.01242 L/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drain: 135 mm

Maximum Release Rate: 1.68 L/s Pond Area: 244 sq.m

Maximum Volume Stored: 11.01 cu.m

Maximum Volume Required: 11.01 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	14.89	1.68	13.21	7.93
15	143	11.92	1.68	10.24	9.21
20	120	10.00	1.68	8.32	9.99
25	104	8.66	1.68	6.98	10.47
30	92	7.66	1.68	5.98	10.77
35	83	6.89	1.68	5.21	10.94
40	75	6.27	1.68	4.59	11.01
45	69	5.76	1.68	4.08	11.01
50	64	5.33	1.68	3.65	10.96
55	60	4.97	1.68	3.29	10.87
60	56	4.66	1.68	2.98	10.74
65	53	4.39	1.68	2.71	10.57
70	50	4.15	1.68	2.47	10.39
75	47	3.94	1.68	2.26	10.18
80	45	3.75	1.68	2.07	9.95
85	43	3.58	1.68	1.90	9.70
90	41	3.43	1.68	1.75	9.45
95	39	3.29	1.68	1.61	9.17
100	38	3.16	1.68	1.48	8.89
105	36	3.04	1.68	1.36	8.60
110	35	2.94	1.68	1.26	8.29
115	34	2.84	1.68	1.16	7.98
120	33	2.74	1.68	1.06	7.66

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

STORM SEWER CALCULATIONS

Rational Method

100-YEAR EVENT

Project: 601 Laurier Avenue West
28-Storey Apartment Building
Ottawa, Ontario

Date: September 24, 2024

Manning's Roughness Coefficient: 0.013

Location		Individual					Cumulative				Sewer Data							
		Roof C = 1.00	Hard C = 1.00	Gravel C = 0.875	Soft C = 0.25				Rainfall	Q		Nominal	Actual			Q_{Full}		
From	To	(ha)	(ha)	(ha)	(ha)	2.78AC	2.78AC	Time (min)	Intensity (mm/hr)	Flow Rate (L/s)	Length (m)	Diameter (mm)	Diameter (mm)	Slope (%)	Velocity (m/s)	Capacity (L/s)	Time (min)	Q / Q_{Full}
Roof Drains	250 ST	0.0250				0.0695	0.0695	10.00	179	12.41								
							Flow through flow control roof drains:			2.99								
Roof Drains	250 ST	0.0500				0.1390	0.1390	10.00	179	24.82								
							Flow through flow control roof drains:			5.96								
Roof Drains	250 ST	0.0300				0.0834	0.0834	10.00	179	14.89								
							Flow through flow control roof drain:			1.68								
Roof Drains	250 ST	0.0250				0.0695	0.0695	10.00	179	12.41								
Proposed Building							0.3614	10.00	179	64.53								
								Restricted upstream flow:		23.04		300	300	1	1.37	96.70		24%
											Existing 900 mm Slater Street Municipal Storm Sewer:	900	914	2.88	4.88	3,201		

APPENDIX D

CONCEPTUAL SITE SERVICING PLAN

5m
0m 25m

601 LAURIER AVENUE WEST

REPLACE EXISTING CB WITH CB/MH

EXISTING MH
(APPROXIMATE LOCATION)
TOP XX.XX
INV ±XX.XX(N)
INV ±XX.XX(E)

FH

ST MH

ST SEWER

ST MH

ST SEWER

EXISTING 1500 CONC WM

SAN SEWER

WATER SERVICE

EXISTING 200 PVC WM

EXISTING 400 PVC WM

EXISTING 250 PVC
COMB @ ±0.56%

EXISTING MH
TOP 80.86
INV ±78.71(NE)
INV ±78.70(SE)

EXISTING MH
TOP 80.76
INV ±78.80(N)
INV ±78.75(SW)

EXISTING 250 PVC
COMB @ ±0.5%

EXISTING MH
TOP 80.78
INV ±78.63

EXISTING VC
TOP 79.16

EXISTING CB
TOP 79.56
INV ±78.01

Site Benchmark
Fire Hydrant (Top of Spindle)
Elevation=80.60

PARKING RAMP

MAIN ENTRY

No. 593 Laurier Ave W.
3 STOREY
BRICK DWELLING
(Brick Noted)

No. 603 Laurier Ave W.
2 STOREY
BRICK DWELLING
(Brick Noted)

No. 601
3 STOREY
BRICK BUILDING
(Brick Noted)

No. 140
2 STOREY
BRICK DWELLING
(Foundation Noted)

LAURIER AVENUE
(NOT TRAVELLED)

SLATER STREET

CAMBRIDGE STREET

BRONSON AVENUE

(Formerly Concession Street) (OTTAWA FRONT) AND CONCESSION C (RIDEAU FRONT)

ROAD ALLOWANCE BETWEEN CONCESSIONS A AND 1 (OTTAWA FRONT)

LOT 1 REGISTERED PLAN 3459

LOT 2 REGISTERED PLAN 38992

LOT 3

LOT 4

PART 1 EXPROPRIATION PLAN INST. N287620

PART 22 PLAN 4R – 34083

PIN 04112 – 0083

PIN 04111 – 0257

PIN 04111 – 0256

PIN 04111 – 0260

PIN 04111

PIN 04112 – 0082

PIN 04112 – 0058

PIN CULTURAL HERITAGE BY-LAW INST. OC2209978

Known as PIN 04112 – 34082

REGISTERED PLAN 3459 LOT 1

LEGEND

	PROPERTY LINE
CB	CATCH BASIN
MH	STORM MANHOLE
CB/MH	CATCH BASIN/MANHOLE
MH	SANITARY MANHOLE
VC	VALVE CHAMBER
FH	FIRE HYDRANT
CS	CURB STOP & STANDPOST
VB	VALVE & VALVE BOX
SAN	SANITARY SEWER
ST	STORM SEWER
WS/WM	WATER SERVICE/WATERMAIN
OBV	OBVERT OF PIPE
SPL	SPRINGLINE OF PIPE
INV	INVERT OF PIPE
x99.99	EXISTING GRADE ELEVATION
T.O.S	TOP OF SLOPE
B.O.S	BOTTOM OF SLOPE

KEY PLAN

No.	DATE	REVISION
1	SEP 24-24	PRELIMINARY

D. B. GRAY ENGINEERING INC.
Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains
700 Long Point Circle 613-425-8044
Ottawa, Ontario d.gray@dbgrayengineering.com

Project
PROPOSED 28–STOREY APARTMENT BUILDING
601 LAURIER AVE WEST
OTTAWA, ONTARIO

Drawing Title
CONCEPTUAL SITE SERVICING PLAN

Engineer's Seal

Drawn	D.B.G
H. Scale	
V. Scale	
Date	SEP 24-24
Job No.	23121

Drawing No.
C–1
of 1