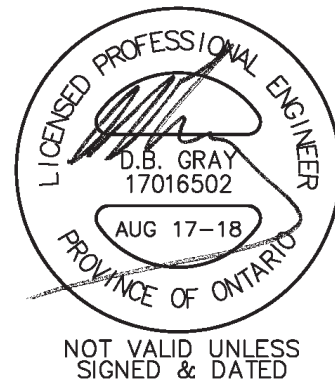


SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

443-447 Kent Street & 423-425 McLeod Street
Ottawa, Ontario

Report No. 17046

December 15, 2017
Revised August 17, 2018



D. B. GRAY ENGINEERING INC.

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

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SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

443-447 Kent Street & 423-425 McLeod Street
Ottawa, Ontario

This report describes the services and addresses the stormwater management requirements of an 874 sq.m. property at 443-447 Kent Street & 423-425 McLeod Street in Ottawa. The property currently has a small apartment building that will be retained (except for an addition that will be demolished) and two houses (that will also be demolished). A four-storey 31-unit apartment building is proposed. The existing building to be retained will have four apartment units.

This report forms part of the stormwater management design for the proposed development. Refer to drawing C-1 to C-3 also prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

There is an existing fire hydrant in the road right-of-way at the northeast corner of the Kent Street / McLeod Street intersection, located approximately 39m unobstructed distance from the fire department connection located adjacent to the main entrance. Since it is less than the required 45m an on-site fire hydrant is not required.

The construction of the proposed building has not yet been determined. Assuming a worst scenario of wood-framed construction a fire flow of 266.7 l/s (16,000 L/min) is required, as calculated as per the Fire Underwriter Survey "Water Supply For Fire Protection".

The boundary conditions received from the city (based on the city's computer model of the municipal water distribution system) includes the HGL of 104.9m during the 266.7 l/s fire flow conditions at the subject location which calculates to be 339 kPa (49 psi). Since the pressure is above 138 kPa (20 psi) there is an adequate water supply for firefighting for either option.

WATER SERVICE:

The proposed building will have a sprinkler system. To service the sprinkler system a 150 mm water service is proposed. The proposed water service will connect to an existing 300 mm municipal watermain in Kent Street.

Based on the City of Ottawa Water Distribution Design Guidelines for residential properties (25 one-bedroom apartment units / 1.4 person per unit and 6 two-bedroom apartment units / 2.1 persons per unit – 350 l/person/day) and Ministry of the

Environment Design Guidelines for peaking factors the daily average flow is 0.2 l/s with a maximum daily and maximum hourly demand of 1.7 and 2.6 l/s respectively. The 150mm service will be adequate for the domestic demand.

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

- Average Daily Demand: 0.2 l/s.
- Maximum Daily Demand: 1.7 l/s.
- Maximum Hourly Demand: 2.6 l/s
- Fire Flow Demand: 266.7 l/s
- Maximum Daily + Fire Flow Demand 268.4 l/s

Based on the boundary conditions received from the city, the minimum HGL (hydraulic grade line) is 107.1 m and the maximum is 115.9 m. With these HGLs the water pressure at the water meter is calculated to vary from 380 kPa to 466 kPa (55 to 68 psi). This is an acceptable range of pressures for the proposed development.

SANITARY SERVICE:

Based on the City of Ottawa Sewer Design Guidelines for a residential property (19 one-bedroom apartment units / 1.4 person per unit and 12 two-bedroom apartment units / 2.1 persons per unit – 280 l/person/day – 3.2 peaking factor) and a 0.33 l/s/ha infiltration flow) the post development flow is calculated to be 0.52 l/s.

This flow will be adequately handled by the proposed sanitary sewer service connection (150mm at 1% - 15.9 l/s capacity). The 0.52 l/s in sanitary flows contributing to the existing 300 mm municipal combined sewer in Kent Street is expected to have an acceptable impact given that the stormwater flow from the site will be significantly restricted (see stormwater management below), reducing the flow from 37.87 l/s to 7.46 l/s during the 100-year event and 19.78 l/s to 4.64 l/s during the 5-year event. The capacity of the 300 mm combined sanitary sewer is 110.5 l/s (300 mm at 1.2%).

STORMWATER MANAGEMENT:

Water Quality:

Comments and recommendations concerning the stormwater quality criteria for this site are required from the RVCA to determine if permanent on-site quality control measures required.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-2 and notes 2.1 to 2.5 on drawing C-3). In summary: to

filter out construction sediment; sediment capture filter sock inserts will be installed in all proposed catch basins and existing catch basins adjacent to the site; and geotextile fabric mud mats will be install at all points of egress to public roads

Water Quantity:

The stormwater management criteria for quantity control are to control the post development peak flows for the 5-year and 100-year storm events to peak flows during the 2-year storm event using a pre-development runoff coefficient or runoff coefficient of 0.40, whichever is less; and a 10 minute time of concentration. It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.78. Therefore based on runoff coefficient of 0.40 and using the Rational Method; the maximum allowable release rate is 7.46 l/s for all storm events. The runoff coefficients for the 100 year event are increased by 25% to maximum 1.00. To calculate the required storage volume an average release rate is assumed to be equal to 50% of the maximum release rate.

Stormwater will be stored within the development on the roof of the proposed building, on the surface above a catch basin in the parking area and underground in a catch basin, manhole and sewer pipes.

Drainage Area I

(Uncontrolled Flow Off Site – 133 sq.m.):

The runoff from part of the perimeter of the site will be allowed to flow uncontrolled off the site. The flow from is calculated at 10 minutes concentration.

	100-year	5-year
Maximum flow rate:	3.21 l/s	1.62 l/s

Drainage Area II (741 sq.m.):

An inlet control device (ICD) located at the outlet pipe of manhole MH-1 will control the release of stormwater from the site. The ICD will restrict the flow and force the stormwater to back up into an underground cistern. Stormwater released through the ICD will be conveyed off the site via a 250mm storm sewer connecting to the 300mm municipal combined sewer in Kent Street. The ICD shall be a Hydrovex "VHV Vertical Vortex Flow Regulator" and shall be sized by the manufacturer for a discharge rate of 4.25 l/s at 0.98m head. It is calculated that an orifice area of 4,418 sq.mm. (75 mm in diameter) and a discharge coefficient of 0.220 will restrict the outflow rate to 4.25 l/s at 0.98 m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 3.02 l/s at 0.49 m.

	100-year	5-year
Maximum release rate:	4.42 l/s	4.30 l/s
Maximum water elevation:	69.44 m	68.95 m
Maximum stored volume:	15.09 cu.m.	5.04 cu.m.

The Entire Site:

	100-year	5-year
Pre-development Flow Rate:	37.87 l/s	19.78 l/s
Maximum permitted release rate:	7.46 l/s	7.46 l/s
Maximum release rate:	7.46 l/s	4.64 l/s
Maximum stored volume:	31.59 cu.m.	15.17 cu.m.

The unrestricted flowrate resulting from one in five-year storm event will produce a peak flow of 18.0 l/s. However the inlet control device (ICD) located at the outlet pipe of CB/MH-1 will restrict the flow. The restricted flow calculates to a maximum flow of 3.0 l/s during the one in five storm event which will be adequately handled by a proposed storm sewer (250mm at 1.00% - 62.0 l/s capacity)

Stormwater will be conveyed off the site via the 250 mm storm sewer service connecting to a 300mm municipal combined sewer located in Kent Street. The 4.3 l/s in stormwater flows contributing to the existing 300 mm municipal combined sewer (at 1.20% - 350.8 l/s capacity) is expected to have an acceptable impact given the flows from the site are being significantly reduced.

MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE (MOECC)
ENVIRONMENTAL COMPLIANCE APPROVAL (ECA):

Since the stormwater discharges to a combined sewer it is expected that a MOECC ECA will be required.

CONCLUSIONS:

1. There is an adequate water supply for firefighting.
2. The existing water pressure is adequate for the proposed development.
3. The proposed water service connection is adequately sized to serve the development.
4. The expected sanitary sewage flow rate will be adequately handled by the proposed sanitary sewer service connection.
5. The sanitary flow contributing to the existing municipal combined sewer is expected to have an acceptable impact.
6. Comments are required from the RVCA to determine if permanent on-site quality control measures required.
7. An erosion and sediment control plan has been developed to be implemented during construction.
8. The stormwater management criteria for quantity control are to control the post development peak flows for the 5-year and 100-year storm events to peak flows during the 2-year storm event using a pre-development runoff coefficient or runoff coefficient of 0.40, whichever is less; and a 10 minute time of concentration. To achieve quantity control stormwater will be stored within the development in an underground cistern.
9. The restricted flowrate produced by a one in five year storm event will be adequately handled by the proposed storm sewer connection.
10. The restricted stormwater flow contributing to the existing municipal combined sewer is expected to have an acceptable impact.
11. It is expected that a MOECC ECA will be required.

REVISED	21-Nov-17
REVISED	24-Nov-17
REVISED	16-Feb-18
REVISED	23-Feb-18
REVISED	26-Jul-18

443-447 Kent Street & 423-425 McLeod Street 31-Unit Four Storey Apartment Building Ottawa, Ontario

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

$$F = 220 C A^{0.5}$$

F = the required fire flow in litres per minute

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

443-447 Kent Street & 423-425 McLeod Street

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

1st Floor Area:	406 sq.m.
2nd Floor Area:	508 sq.m.
3rd Floor Area:	318 sq.m.
4th Floor Area:	318 sq.m.
	<u>1550 sq.m.</u>

435-441 Kent Street

(2-storey wood framed apartment building less than 3m from 443-447 Kent St & 423-425 McLeod St)

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

1st Floor Area:	255 sq.m.
2nd Floor Area:	255 sq.m.
	<u>510 sq.m.</u>

430 Gladstone Ave

(1-storey wood framed commercial building less than 3m from 435-441 Kent St)

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

$$A_{TOTAL} = 2,330 \text{ sq.m.}$$

$$F = 15,929 \text{ L/min}$$

$$= 16,000 \text{ L/min (rounded off to the nearest 1,000 L/min)}$$

$$= 13,600 \text{ L/min}$$

-15% Change for Limited-combustible Occupancy

$$= 4,524 \text{ L/min Reduction}$$

Reduction to above for Supervised Sprinkler Protection with Alarm
-33% at 443-447 Kent St & 423-425 McLeod St
(-50% x 1550 sq.m. / 2,330 sq.m.)

Increase for Separation Exposed Buildings

Increase for Separation Exposed Buildings						Length- Height Factor
			Adjacent Building			
			Constuction	Length m	Storeys	
10%	North Side	20.1 to 30m	Ord.	28	5	140
20%	East Side	3.0 to 10m	W-F	48	2	96
8%	South Side	20.1 to 30m	W-F	12	2	24
10%	West Side	20.1 to 30m	W-F	49	2	98
48%	Total Increase for Exposure (maximum 75%)					
=	6,528	L/min Increase				

$$F = 15,604 \text{ L/min}$$

$$F = 16,000 \text{ L/min (rounded off to the nearest 1,000 L/min)}$$

$$= 266.7 \text{ l/s}$$

Elevation at Entrance: 70.36 m ASL

Static Pressure at Fire Hydrant

267 l/s FIRE FLOW: 104.9 m ASL 49 psi 339 kPa

21-Nov-17
 REVISÉ 24-Nov-17
 REVISÉ 27-Jul-18

443-447 Kent Street & 423-425 McLeod Street

31-Unit Four Storey Apartment Building

Ottawa, Ontario

Water Demand

	Number of Units	Persons Per Unit	Population
UNIT TYPE:			
Single Family:	0	3.4	0
Semi- detached:	0	2.7	0
Duplex:	0	2.3	0
Townhouse:	0	2.7	0
APARTMENTS:			
1 Bedroom:	25	1.4	35
2 Bedroom:	6	2.1	13
3 Bedroom:	0	3.1	0
Average Apartment:	0	1.8	0
TOTAL:			48

DAILY AVERAGE

350	litres / person / day			
11.6	l/min	0.2	l/s	3 USgpm

MAXIMUM DAILY DEMAND

8.8	(Peaking Factor for a population of 52: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)			
102.1	l/min	1.7	l/s	27 USgpm

MAXIMUM HOURLY DEMAND

13.3	(Peaking Factor for a population of 52: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)			
153.7	l/min	2.6	l/s	41 USgpm

APPROXIMATE

Elevation of Water Meter:	68.39	m ASL
Finish Floor Elevation:	67.49	m ASL

Static Pressure at Water Meter				
MINIMUM HGL:	107.1	m ASL	55	psi
			380	kPa
MAXIMUM HGL:	115.9	m ASL	68	psi
			466	kPa



Douglas Gray <d.gray@dbgrayengineering.com>

FW: 443-447 Kent St & 423-425 McLeod St

1 message

Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>

Fri, Feb 23, 2018 at 9:48 AM

To: Douglas Gray <d.gray@dbgrayengineering.com>

Cc: "Mottalib, Abdul" <Abdul.Mottalib@ottawa.ca>, "Wu, John" <John.Wu@ottawa.ca>

Hi Doug,

Please see below as requested.

Thanks,

Abdul Mottalib, P. Eng.

From:**Sent:** February 23, 2018 9:43 AM**To:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>**Cc:****Subject:** RE: 443-447 Kent St & 423-425 McLeod St

Hi Abdul,

Please see below.

The following are boundary conditions, HGL, for hydraulic analysis at 443-447 Kent/425 McLeod (zone 1W) assumed to be connected to the 305 mm on Kent (see attached PDF for location).

Minimum HGL = 107.1 m

Maximum HGL = 115.9 m

Max Day (1.8 L/s) + Fire Flow (266.7 L/s) = 104.9 m

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.

From: Douglas Gray [<mailto:d.gray@dbgrayengineering.com>]
Sent: February 16, 2018 2:16 PM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Lucio Renna <l.renna@dbgrayengineering.com>
Subject: Fwd: 443-447 Kent St & 423-425 McLeod St

Hi Abdul

I understand that John Wu is on vacation. We require boundary conditions at Kent St / McLeod St (see below and attached). Please provide.

Thanks. Doug

D. B. GRAY ENGINEERING INC.

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

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Tel: 613-425-8044

Ottawa, Ontario K1T 4E9

d.gray@dbgrayengineering.com

----- Forwarded message -----

From: Douglas Gray <d.gray@dbgrayengineering.com>
Date: Fri, Feb 16, 2018 at 2:13 PM
Subject: 443-447 Kent St & 423-425 McLeod St
To: John Wu <john.wu@ottawa.ca>
Cc: Lucio Renna <l.renna@dbgrayengineering.com>

Hi John

We have already received boundary conditions for the 31-unit 4-storey apartment building we are working on at 443-447 Kent St & 423-425 McLeod St but there have been some design changes that affect the flow required for firefighting

Please provide the boundary conditions at Kent St / McLeod St. I have calculated the following demands. (Calculations and our Site Servicing plan are attached.)

Average daily demand: 0.2 l/s.
Maximum daily demand: 1.8 l/s.
Maximum hourly daily demand: 2.7 l/s
Fire Flow demand: 266.7 l/s
Fire Flow + Max Day: 268.5 l/s

Thanks, Doug

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443-447 Kent November 2017.pdf

105K

Boundary Condition for 443-447 Kent/425 McLeod



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

613-425-8044
dbgray@rogers.com

SANITARY SEWER DESIGN FORM

PROJECT: 443-447 Kent & 423-425 McLeod St.

Peak Flow Factor: Residential (Horton Equation): $P.F. = 1 + \frac{14}{4 + P^{0.5}}$ Designed By: DBG

P = Population / 1000 Commercial & Institutional: 1.5 27-Jul-18

Industrial: As per Ottawa Guidelines Appendix 4-B

Infiltration Allowance: 0.33 l/s/ha

Page: 1 of 1

[illegible]

Summary Table

ONE HUNDRED YEAR EVENT				
Drainage Area	Pre-development Flow Rate	Maximum Allowable Release Rate	Maximum Release Rate	Maximum Volume Stored
	l/s	l/s	l/s	cu.m.
AREA I (Uncontrolled flow off site)	-	-	3.21	-
AREA II	-	-	4.25	31.59
TOTAL	37.87	7.46	7.46	31.59

FIVE YEAR EVENT				
Drainage Area	Pre-development Flow Rate	Maximum Allowable Release Rate	Maximum Release Rate	Maximum Volume Stored
	l/s	l/s	l/s	cu.m.
AREA I (Uncontrolled flow off site)	-	-	1.62	-
AREA II	-	-	3.02	15.17
TOTAL	19.78	7.46	4.64	15.17

443-447 Kent Street & 423-425 McLeod Street
Ottawa, Ontario

STORM WATER MANAGEMENT CALCULATIONS

Rational Method

ONE HUNDRED YEAR EVENT

Pre-development Conditions

			C
Roof Area:	380	sq.m.	1.00
Asphalt/Concrete Area:	346	sq.m.	1.00
Landscaped Areas:	148	sq.m.	0.25
Total Catchment Area	874	sq.m.	0.87

Area (A):	874	sq.m.
Time of Concentration:	10	min.
Rainfall Intensity (i):	179	mm/hr (100 year event)
Runoff Coefficient (C):	0.87	(see above)

Pre-development Flow Rate (2.78AiC): 37.87 l/s

Maximum Allowable Release Rate

Area (A):	874	sq.m.
Time of Concentration:	10	min.
Rainfall Intensity (i):	77	mm/hr (2 year event)
Runoff Coefficient (C):	0.40	(Combined Sewer - use pre conditions not greater than 0.4)

Maximum Allowable Release Rate (2.78AiC): 7.46 l/s

DRAINAGE AREA I (Uncontrolled Flow Off Site):

			C
Roof Area:	4	sq.m.	1.00
Asphalt/Concrete Area:	38	sq.m.	1.00
Landscaped Areas:	91	sq.m.	0.25
Total Catchment Area	133	sq.m.	0.49
Area (A):	133	sq.m.	
Time of Concentration:	10	min.	
Rainfall Intensity (i):	179	mm/hr (100 year event)	
Runoff Coefficient (C):	0.49		
Flow Rate (2.78AiC):	3.21	l/s	

DRAINAGE AREA II

(ONE HUNDRED YEAR EVENT)

			C
Roof Area:	511	sq.m.	1.00
Asphalt/Concrete Area:	170	sq.m.	1.00
Landscaped Areas:	60	sq.m.	0.25
Total Catchment Area	741	sq.m.	0.94

Water Elevation: 69.44 m

Invert of Outlet Pipe - CB/MH-1 : 68.42 m

		Storage in MH's & CB's			
Centroid of ICD Orifice:	68.46	m	Invert	Depth	
(ICD in Outlet Pipe of CB/MH-1):			m	m	
Head:	0.98	m	MH-1	68.42	1.1 cu.m.

		Storage in Sewer Pipes			
Orifice Diameter	75	mm	Upstream	Diam.	Length
			CB/MH	mm	m
			CISTERN	250	3.6
					0.1 cu.m.

Orifice Area:	4418	sq.mm.	Cistern		
			Area	Depth	
			sq.m.	m	
Coefficient of Discharge:	0.220		32.8	0.92	30.29 cu.m.

Maximum Release Rate: 4.25 l/s Achieved Vol: 31.59 cu.m.

Max. Vol. Required: 31.59 cu.m.

		50%				
Time	i	2.78AiC	Release	Stored	Stored	
min.	mm/hr	l/s	Rate	Rate	Volume	
			l/s	l/s	cu.m.	
5	243	46.96	2.12	44.84	13.45	
10	179	34.55	2.12	32.43	19.46	
15	143	27.65	2.12	25.52	22.97	
20	120	23.21	2.12	21.09	25.30	
25	104	20.09	2.12	17.97	26.95	
30	92	17.78	2.12	15.65	28.17	
35	83	15.98	2.12	13.85	29.09	
40	75	14.54	2.12	12.42	29.80	
45	69	13.36	2.12	11.24	30.34	
50	64	12.37	2.12	10.25	30.75	
55	60	11.54	2.12	9.41	31.06	
60	56	10.81	2.12	8.69	31.29	
65	53	10.19	2.12	8.06	31.45	
70	50	9.63	2.12	7.51	31.54	
75	47	9.14	2.12	7.02	31.59	
80	45	8.71	2.12	6.58	31.59	
85	43	8.31	2.12	6.19	31.56	
90	41	7.95	2.12	5.83	31.49	
95	39	7.63	2.12	5.51	31.39	
100	38	7.33	2.12	5.21	31.26	
105	36	7.06	2.12	4.94	31.11	
110	35	6.81	2.12	4.69	30.94	
115	34	6.58	2.12	4.46	30.75	
120	33	6.36	2.12	4.24	30.54	
125	32	6.16	2.12	4.04	30.31	
130	31	5.98	2.12	3.86	30.07	
135	30	5.80	2.12	3.68	29.81	
140	29	5.64	2.12	3.52	29.54	
145	28	5.49	2.12	3.36	29.26	
150	28	5.34	2.12	3.22	28.97	
180	24	4.62	2.12	2.50	27.02	
210	21	4.09	2.12	1.97	24.79	
240	19	3.68	2.12	1.55	22.38	
270	17	3.35	2.12	1.22	19.81	
300	16	3.07	2.12	0.95	17.13	

FIVE YEAR EVENT

Pre-development Conditions

			C
Roof Area:	380	sq.m.	0.90
Asphalt/Concrete Area:	346	sq.m.	0.90
Landscaped Areas:	148	sq.m.	0.20

Total Catchment Area 874 sq.m. 0.78

Area (A): 874 sq.m.
Time of Concentration: 10 min.
Rainfall Intensity (i): 104 mm/hr (100 year event)
Runoff Coefficient (C): 0.78 (see above)

Pre-development Flow Rate (2.78AiC): 19.78 l/s

Maximum Allowable Release Rate

Area (A): 874 sq.m.
Time of Concentration: 10 min.
Rainfall Intensity (i): 77 mm/hr (2 year event)
Runoff Coefficient (C): 0.40 (Combined Sewer - use pre conditions not greater than 0.4)

Maximum Allowable Release Rate (2.78AiC): 7.46 l/s

DRAINAGE AREA I (Uncontrolled Flow Off Site):

			C
Roof Area:	4	sq.m.	0.90
Asphalt/Concrete Area:	38	sq.m.	0.90
Landscaped Areas:	91	sq.m.	0.20
Total Catchment Area	133	sq.m.	0.42
Area (A):	133	sq.m.	
Time of Concentration:	10	min.	
Rainfall Intensity (i):	104	mm/hr (100 year event)	
Runoff Coefficient (C):	0.42		
Flow Rate (2.78AiC):	1.62	l/s	

DRAINAGE AREA II

(FIVE YEAR EVENT)

			C
Roof Area:	511	sq.m.	0.90
Asphalt/Concrete Area:	170	sq.m.	0.90
Landscaped Areas:	60	sq.m.	0.20
Total Catchment Area	741	sq.m.	0.84

Water Elevation: 68.95 m

Invert of Outlet Pipe - CB/MH-1 : 68.42 m

		Storage in MH's & CB's			
Centroid of ICD Orifice:	68.46	m	Invert	Depth	
(ICD in Outlet Pipe of CB/MH-1):			m	m	
Head:	0.49	m	MH-1	68.42	0.53
					0.6 cu.m.

		Storage in Sewer Pipes			
Orifice Diameter	75	mm	Upstream	Diam.	Length
			CB/MH	mm	m
			CISTERN	250	3.6
					0.1 cu.m.

Orifice Area:	4418	sq.mm.	Cistern		
			Area	Depth	
			sq.m.	m	
Coefficient of Discharge:	0.220		32.8	0.44	14.43 cu.m.

Maximum Release Rate: 3.02 l/s Achieved Vol: 15.17 cu.m.

Max. Vol. Required: 15.17 cu.m.

		50%				
Time	i	2.78AiC	Release	Stored	Stored	
min.	mm/hr	l/s	Rate	Rate	Volume	
			l/s	l/s	cu.m.	
5	141	24.53	1.51	23.02	6.91	
10	104	18.10	1.51	16.59	9.96	
15	84	14.52	1.51	13.01	11.71	
20	70	12.20	1.51	10.70	12.84	
25	61	10.58	1.51	9.07	13.61	
30	54	9.37	1.51	7.86	14.15	
35	49	8.43	1.51	6.92	14.53	
40	44	7.68	1.51	6.17	14.80	
45	41	7.06	1.51	5.55	14.99	
50	38	6.54	1.51	5.03	15.10	
55	35	6.10	1.51	4.59	15.16	
60	33	5.72	1.51	4.22	15.17	
65	31	5.39	1.51	3.89	15.15	
70	29	5.10	1.51	3.59	15.10	
75	28	4.84	1.51	3.34	15.02	
80	27	4.61	1.51	3.11	14.91	
85	25	4.41	1.51	2.90	14.79	
90	24	4.22	1.51	2.71	14.64	
95	23	4.05	1.51	2.54	14.48	
100	22	3.89	1.51	2.38	14.31	
105	22	3.75	1.51	2.24	14.12	
110	21	3.62	1.51	2.11	13.92	
115	20	3.50	1.51	1.99	13.71	
120	19	3.38	1.51	1.87	13.49	
125	19	3.28	1.51	1.77	13.26	
130	18	3.18	1.51	1.67	13.03	
135	18	3.09	1.51	1.58	12.78	
140	17	3.00	1.51	1.49	12.53	
145	17	2.92	1.51	1.41	12.27	
150	16	2.84	1.51	1.33	12.01	
180	14	2.46	1.51	0.96	10.32	
210	13	2.18	1.51	0.67	8.48	
240	11	1.96	1.51	0.45	6.54	
270	10	1.79	1.51	0.28	4.52	
300	9	1.64	1.51	0.13	2.43	

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

613-425-8044
dbgray@rogers.com

PROJECT: 443-447 Kent St & 423-425 McLeod St

Designed By: DBG

Date: 27-Jul-18

[illegible]

City of Ottawa Servicing Study Checklist

General Content

Executive Summary (for large reports only): not applicable

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

Location map and plan showing municipal address, boundary, and layout of proposed development: see drawings C-1 to C-3

Plan showing the site and location of all existing services: see drawings C-1 to C-3

Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere: not applicable

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

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

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

Identification of existing and proposed infrastructure available in the immediate area: see drawings C-1 to C-3

Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available). see drawings C-1 to C-3

Concept level master grading plan to confirm existing and proposed grades in the development and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths: not applicable

Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts: not applicable

Proposed phasing of the development, if applicable: not applicable

Reference to geotechnical studies and recommendations concerning servicing: see note 1.5 on drawing C-1

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

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

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

Development Servicing Report: Water

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

Availability of public infrastructure to service proposed development: see page 2 of Servicing Brief and Stormwater Management Report

Identification of system constraints: see page 2 and 3 of Servicing Brief

Confirmation of adequate domestic supply and pressure: see page 2 and 3 of Servicing Brief and Stormwater Management Report

Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow locations throughout the development: see page 2 & 7 to 9 of Servicing Brief

Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves: see page 3 of Servicing Brief

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

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

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

Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range: not applicable

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

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

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

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

Development Servicing Report: Wastewater

Summary of proposed design criteria: see page 3 of Servicing Brief and Stormwater Management Report

(Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure): not applicable

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

Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and conditions of sewers: not applicable

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

Verify available capacity in downstream sanitary sewer and / or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable): not applicable

Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format. see page 10 of Servicing Brief and Stormwater Management Report

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

Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality): not applicable

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

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

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

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

Development Servicing Report: Stormwater Checklist

Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property): see page 4 and 5 of Servicing Brief and Stormwater Management Report

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing C-2

Water quality control objective (e/g/ controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects: see Stormwater Management Report Servicing Brief and Stormwater Management Report

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

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

Watercourse and hazard lands setbacks: not applicable

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

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

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawings C-1 to C-3 and Servicing Brief and Stormwater Management Report

Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals. see drawings C-1 to C-3 and Servicing Brief and Stormwater Management Report

Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions: see Servicing Brief and Stormwater Management Report

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

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

If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event: not applicable

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

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

Descriptions of how the conveyance and storage capacity will be achieved for the development: see page 3 of Servicing Brief and Stormwater Management Report

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

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

Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors: see notes 2.1 to 2.5 on drawing C-3

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

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

Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act: see page 19 of Servicing Brief and Stormwater Management Report

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

Changes to Municipal Drains. : not applicable

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

Conclusion Checklist

Clearly stated conclusions and recommendations: see page 6 of Servicing Brief and Stormwater Management Report

Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

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