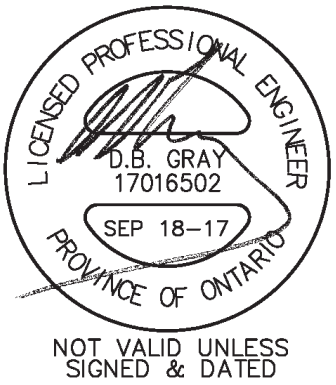
SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

PROPOSED 10 DWELLING UNITS
KINGSTON AVENUE
(PART OF 1132 FISHER AVENUE)
OTTAWA, ONTARIO

Report No. 16044

September 18, 2017



D. B. GRAY ENGINEERING INC.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
dbgray@rogers.com

SERVICING BRIEF &
STORMWATER MANAGEMENT REPORT

PROPOSED 10 DWELLING UNITS
KINGSTON AVENUE
(PART OF 1132 FISHER AVENUE)
OTTAWA, ONTARIO

This report describes the services and addresses the stormwater management requirements of proposed 10 lots (for four detached and six semi-detached units) on 2,710 sq.m. of property fronting on Kingston Avenue in Ottawa. The property is to be severed from a private school property having an address of 1132 Fisher Avenue. The property is currently vacant and backs onto a bicycle path and the Experimental Farm and is currently vacant.

This report forms part of the stormwater management design for the proposed development. Refer to drawing C-1 and C-2 also prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

There is an existing fire hydrant in the Kingston Avenue right-of-way located approximately 21m east of Lot 1.

As per the City of Ottawa Technical Bulletin ISDTB-2014-02, the fire flow requirement for the proposed development is 166.7 l/s (10,000 L/min). However, using the Ontario Building Code (OBC) method the fire flow requirement is calculated to be 45 l/s (2,700 L/min). (The OBC method was developed by Ontario`s Office of the Fire Marshal (OFM) for Part 3 buildings but the OFM states that their method can be used to determine the required fire flow for Part 9 buildings, such as dwellings.)

The boundary conditions received from the city (based on the city's computer model simulation of the municipal water distribution system) estimates that the maximum available flow is 113 l/s at 138 kPa (20 psi).

Therefore there is adequate flow for firefighting to meet the OBC requirements.

WATER SERVICE:

The proposed 19mm water service connections for each dwelling unit will connect to an existing 200mm municipal watermain in Kingston Avenue.

Based on the City of Ottawa Water Distribution Design Guidelines for residential properties (4 detached at 3.4 persons / unit and 6 semi-detached dwellings / 2.7 persons per unit and 350 l/person/day) and Ministry of the Environment Design Guidelines for peaking factors the total (for all 10 units) daily average flow is 0.1 l/s with a maximum daily and maximum hourly demand of 1.1 and 1.7 l/s respectively.

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: 0.1 l/s.
Maximum Daily Demand: 1.1 l/s.
Maximum Hourly Demand: 1.7 l/s

Based on the boundary conditions received from the city, the minimum HGL (hydraulic grade line) is 125.4 m and the maximum is 134.8 m. With these HGLs the water pressure at the water meter is calculated to vary from 454 kPa to 545 kPa (66 to 79 psi). This is an acceptable range of pressures for the proposed development.

SANITARY SERVICE:

The proposed 135mm sanitary sewer service connections for each dwelling unit will connect to an existing 225mm municipal sanitary sewer (at 0.33% slope) in Kingston Avenue having a capacity of 26.9 l/s.

The existing flow, based on the City of Ottawa Sewer Design Guidelines for residential properties (7 detached at 3.4 persons per unit – 350 l/person/day – 4.0 peaking factor) and a school (380 students and staff – 90 l/person/ day – 4.5 peaking factor) and a 0.28 l/s/ha infiltration flow) is calculated to be 2.97 l/s.

The additional post development flow, based on the City of Ottawa Sewer Design Guidelines for residential properties (4 detached at 3.4 persons per unit and 6 semi-detached dwellings / 2.7 persons per unit and 350 l/person/day – 4.0 peaking factor) is calculated to be 0.48 l/s.

Therefore the total post development flow of 3.46 l/s (= 2.97 l/s + 0.48 l/s) will be adequately handled by the existing municipal sanitary sewer.

STORMWATER SERVICE:

The existing 750mm municipal storm sewer in Kingston Avenue is shallow ($\pm$0.85m to $\pm$1.50m cover). Therefore it is not practical to connect the foundation drains to it and drain by gravity. Instead in each unit the foundation drains will drain to a sump with a sump pump. The pump will discharge onto a splash pad at grade.

STORMWATER MANAGEMENT:

Water Quality:

An erosion and sediment control plan has been developed to be implemented during construction, (see notes 2.1 to 2.4 on drawing C-1). In summary: to filter out construction sediment; sediment capture filter sock inserts will be installed in all existing catch basins adjacent to the site.

Water Quantity:

As identified by staff at City of Ottawa Infrastructure Approvals the property has been assigned runoff coefficient of 0.50. To achieve this value permeable pavers are proposed for the driveways and walkways.

Existing Ditch and Culvert:

Adjacent to the east property line is an existing ditch leading to a 750mm culvert that connects to the existing 750mm municipal storm sewer via a manhole. It is estimated that 133 hectares drain to the ditch including about 111 hectares from the Experimental Farm. Based on the 1:5-year storm event it is calculated that the peak flow at the existing ditch and culvert is 4815 l/s. The capacity of the existing culvert is only 367 l/s. Therefore during 1:5-year storm event there is overland flow over top of the culvert and onto the road.

It is proposed that the existing culvert be extended so that ditch can be backfilled. The proposed extensions will be 750mm in diameter but with a greater slope will have a capacity of 643 l/s, about 4.5 times the capacity of the existing culvert. However during 1:5-year storm event there will still be overland flow onto the road. To better facilitate the overland flow the boulevard and curb above the existing culvert will be depressed. It is calculated that during the 1:100-year event the overflow water depth at the depressed boulevard is 0.33m (79.41m elevation). (During the 1:5-year event the depth is calculated to be 0.21m (79.29m). The lowest grade elevation at the foundation of the proposed dwellings is 79.54m, 130mm above the 1:100-year overflow elevation.

CONCLUSIONS:

1. There is an adequate water supply for firefighting.
2. The existing water pressure is adequate for the proposed development.
3. The increase in sanitary sewage flow rate will be adequately handled by the existing municipal sanitary sewer.
4. An erosion and sediment control plan has been developed to be implemented during construction.
5. Permeable pavers are proposed for the driveways and walkways to achieve a maximum run-off coefficient of 0.50.
6. Adjacent to the east property line is an existing ditch that is proposed to be extended so that ditch can be backfilled. The proposed extensions will have about 4.5 times the capacity of the existing culvert. To better facilitate the overland flow the boulevard and curb above the existing culvert will be depressed. The lowest grade elevation at the foundation proposed dwellings is 79.54m, 130mm above the 1:100-year overflow elevation.

5-Sep-17

REVISED 18-Sep-17

Kingston Avenue 10 Residential Lots
Ottawa, Ontario

Fire Flow Requirements

Fire flow requirement as calculated as per Fire Undewriter 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 for Wood Frame Construction

A = total floor area (all storeys excluding basements at least 50% below grade)
(wood framed structures with less than 3 m separation and less than 2 hour fire walls are considered one fire area therefore the total floor area is the total area for all ten buildings)

Lot 1	Ground Floor Area:	148	sq.m.
	2nd Floor Area:	83	sq.m.
		231	sq.m.
Lot 2	Ground Floor Area:	113	sq.m.
	2nd Floor Area:	113	sq.m.
		226	sq.m.
Lot 3	Ground Floor Area:	125	sq.m.
	2nd Floor Area:	125	sq.m.
		250	sq.m.
Lot 4	Ground Floor Area:	113	sq.m.
	2nd Floor Area:	113	sq.m.
		226	sq.m.
Lot 5	Ground Floor Area:	101	sq.m.
	2nd Floor Area:	101	sq.m.
		202	sq.m.
Lot 6	Ground Floor Area:	95	sq.m.
	2nd Floor Area:	95	sq.m.
		190	sq.m.
Lot 7	Ground Floor Area:	95	sq.m.
	2nd Floor Area:	95	sq.m.
		190	sq.m.
Lot 8	Ground Floor Area:	101	sq.m.
	2nd Floor Area:	101	sq.m.
		202	sq.m.
Lot 9	Ground Floor Area:	101	sq.m.
	2nd Floor Area:	101	sq.m.
		202	sq.m.
Lot 10	Ground Floor Area:	95	sq.m.
	2nd Floor Area:	95	sq.m.
		190	sq.m.
	TOTAL AREA:	2109	sq.m.

Fire Flow Requirements (continued)

F =	15,156	L/min	
=	15,000	L/min (rounded off to the nearest 1,000 L/min)	
	-15%	Change for Limited-combustible Occupancy	
=	12,750	L/min	
	0%	Reduction for no Sprinkler System	
=	12,750	L/min	
		Added to above for Separation to Exposed Buildings	
	20%	West	3.0 to 10m
	10%	North	20.1 to 30m
	0%	East	> 45m
	0%	South	> 45m
	30%	Total Increase for Exposure (maximum 75%)	
=	16,575	L/min	
F =	17,000	L/min (rounded off to the nearest 1,000 L/min)	
=	283.3	l/s	
=	10,000	L/min - Capped as per City of Ottawa Technical Bulletin ISDTB-2014-02	
=	166.7	l/s	

166.7	l/s	Required fire flow requirement
1.1	l/s	Maximum Daily Domestic Demand
167.8	l/s	Required Minimum Water Supply Flow Rate (MAX DAY + FIRE FLOW)

18-Sep-17

Kingston Avenue 10 Residential Lots
Ottawa, Ontario

Water Supply for Fire-Fighting Calculations:

"Required Minimum Water Supply Flow Rate" as calculated using the Ontario Building Code - Appendix A - Article A-3.2.5.7 "Water Supply For Fire Fighting".

Fire Protection Water Supply $Q = KVS_{Tot}$

$S_{Tot} = 1.0 + S_{Side1} + S_{Side2} + S_{Side3} + S_{Side1} + S_{Side4}$

	Spatial Coefficient	Exposure Distance m	
S_{Side1}	0	13.6	(to center line of road)
S_{Side2}	0.5	1.2	(to east property line)
S_{Side3}	0.27	7.3	(to south property line)
S_{Side4}	0.5	1.5	(to west property line)
S_{Tot}	2.27		

K (Water Supply Coefficient)

23 As per A-3.2.5.7. Table 1 (Group C Occupancy / Combustible construction with no fire separations and fire resistance ratings as per OBC 3.2.2.)

V (Building Volume)

	Area sq.m.	Average Height m	Volume cu.m.
Lot 3 Ground Floor:	125	3.05	381
2nd Floor Area:	125	5.00	625
			1,006

$Q = KVS_{Tot}$

$= 52{,}536$ L

Required Minimum Water Supply Flow Rate (As per A-3.2.5.7. Table 2) 2,700 L/min 45 L/sec

5-Sep-17

Kingston Avenue 10 Residential Lots
Ottawa, Ontario

Water Demand

	Number of Units	Persons Per Unit	Population
UNIT TYPE:			
Single Family:	4	3.4	14
Semi- detached:	6	2.7	16
		TOTAL:	30

DAILY AVERAGE

350 litres / person / day

7.2	l/min	0.1	l/s	2 USgpm

MAXIMUM DAILY DEMAND 9.5 (Peaking Factor for a population of 30: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)

68.8	l/min	1.1	l/s	18 USgpm

MAXIMUM HOURLY DEMAND 14.3 (Peaking Factor for a population of 30: Table 3-3 MOE Design Guidelines for Drinking-Water Systems)

103.6	l/min	1.7	l/s	27 USgpm

Elevation of Water Meter: 79.22 m ASL
Finish Floor Elevation: 78.32 m ASL

			Static Pressure at Water Meter		
MINIMUM HGL:	125.5	m ASL	66	psi	454 kPa
MAXIMUM HGL:	134.8	m ASL	79	psi	545 kPa

Douglas Gray <d.gray@dbgrayengineering.com>

RE: 10 Lots - Kingston Ave

1 message

Oram, Cody <Cody.Oram@ottawa.ca> Mon, Sep 11, 2017 at 4:11 PM
To: Douglas Gray <d.gray@dbgrayengineering.com>
Cc: Lucio Renna <l.renna@dbgrayengineering.com>

The following are boundary conditions, HGL, for hydraulic analysis at 1132 Fisher (zone 2W) assumed to be connected to the 203mm on Kingston (see attached PDF for location).

Minimum HGL = 125.5m

Maximum HGL = 134.8m

MaxDay + FireFlow (100 L/s) = 99.5m

Available Flow = 113 L/s assuming a residual of 20 psi and a ground elevation of 79.1m

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: Tuesday, September 05, 2017 6:45 PM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Cc: Lucio Renna <l.renna@dbgrayengineering.com>
Subject: 10 Lots - Kingston Ave

Hi Cody

Please provide the boundary conditions at Kingston Ave. I have calculated the following expected demands for the based on the 10 proposed residential dwellings. (Calculations are attached.)

Average daily demand: 0.1 l/s.

Maximum daily demand: 1.1 l/s.

Maximum hourly daily demand: 1.7 l/s

Fire Flow demand: 166.7 l/s

Fire Flow + Max Day: 167.8 l/s

We are looking at alternative designs so please also provide the boundary conditions for a fire flow demand of 100.0 l/s.

Average daily demand: 0.1 l/s.

Maximum daily demand: 1.1 l/s.

Maximum hourly daily demand: 1.7 l/s

Fire Flow demand: 100.0 l/s

Fire Flow + Max Day: 101.1 l/s

Thanks, Doug

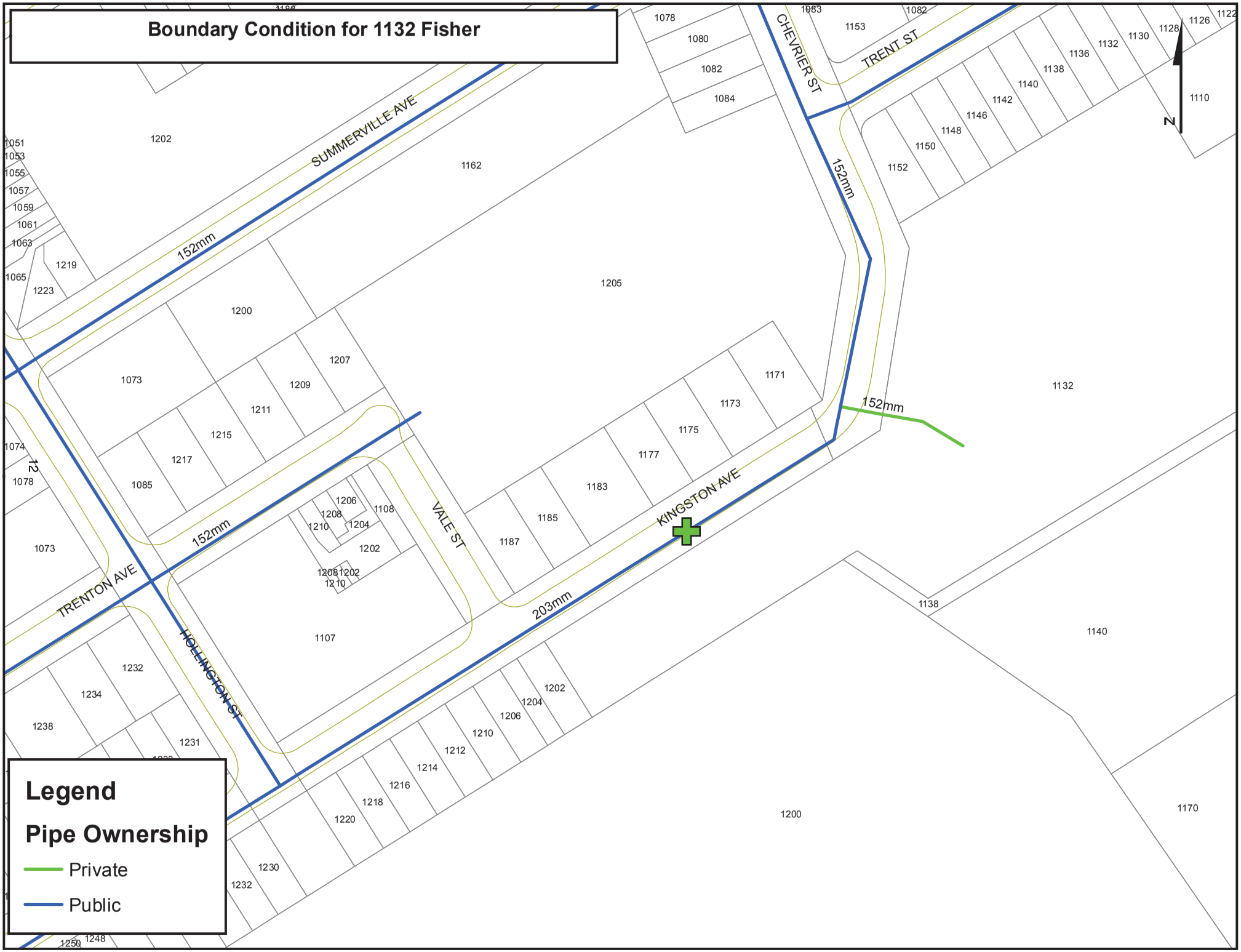
D. B. GRAY ENGINEERING INC.

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

700 Long Point Circle Tel: 613-425-8044

Ottawa, Ontario K1T 4E9 d.gray@dbgrayengineering.com

1132 Fisher Sept 2017.pdf
112K


Boundary Condition for 1132 Fisher
SUMMERVILLE AVE
CHEVRIER ST
TRENT ST
VALE ST
KINGSTON AVE
TRENTON AVE
HOLLINGTON ST
152mm
203mm
N
Legend
Pipe Ownership
Private
Public

D.B. GRAY ENGINEERING INC.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
dbgray@rogers.com

SANITARY SEWER DESIGN FORM

Average Daily Flows:

Residential:	350	l / capita / day
Commercial:	50,000	l / ha / day
Instituational:	50,000	l / ha / day
Light Industrial:	35,000	l / ha / day
Heavy Industrial:	55,000	l / ha / day

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

Infiltration Allowance: 0.28 l / s / ha

PROJECT: 10 Dwellings Kingston Avenue, Ottawa
Designed By: DBG
18-Sep-17

LOCATION			Section								Cumulative Residential		Section Non-Residential			Cumulative				SEWER DATA								COMMENTS
			Single Family	Semi / Townhouse	Duplex / Triplex	Apartments (average)	Apartments (1 Bed.)	Apartments (2 Bed.)	Apartments (3 Bed.)	Resid-ential Area										n = 0.013							
STREET	FROM	TO	ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.8	ppu = 1.4	ppu = 2.1	ppu = 3.1		Pop.	Peaking Factor	Area	Flow	Peaking Factor	Area	Sewage Flow	Infil-tration Flow	Total Flow	Type of Pipe	Dia. Actual	Dia. Nom.	Slope	Length	Capacity	Velocity	Ratio	
			No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	ha			ha	l/ha/day		ha	l/s	l/s	l/s		(mm)	(mm)	(%)	(m)	(l/s)	(m/s)	Q/Qfull	
			EXISTING																									
			7							0.82	24	4.0	2.06	16610	4.5	2.88	2.17	0.81	2.97									Non-residetial flow is based on a school - 350 students + 30 teachers & staff at 90 L per day (34,200 L/day or 16,610 L/ha/day) as per Ottawa Sewer Design Guidelines Appendix 4-A). Peaking Factor is based on an 8 hour day x 1.5
			PROPOSED																									
			4	6							30	4.0					0.48	0.00	0.48									Areas already included exisitng flows
																	TOTAL FLOW:		3.46									
																				MUNICIPAL SANITARY SEWER IN KINGSTON AVENUE								
																					228.6	225	0.33		26.9	0.66		

Kingston Avenue 10 Residential Lots
Ottawa, Ontario

No Permeable Pavers

		C-values	
Roof Area:	1087	sq.m.	0.90
Asphalt/Concrete Area:	285	sq.m.	0.90
Permeable Pavers:	0	sq.m.	0.30
Landscape Area:	1338	sq.m.	0.20
Total Catchment Area	2710	sq.m.	0.55

Permeable Pavers in Driveway & Walkway

		C-values	
Roof Area:	1087	sq.m.	0.90
Asphalt/Concrete Area:	50	sq.m.	0.90
Permeable Pavers:	235	sq.m.	0.30
Landscape Area:	1338	sq.m.	0.20
Total Catchment Area	2710	sq.m.	0.50

2-Aug-17

Kingston Avenue 10 Residential Lots
Ottawa, Ontario

CULVERT / DITCH CALCULATIONS

One Hundred-Year Event

			C-values
Roof Area:	0.4	ha	1.00
Asphalt/Concrete Area:	11.6	ha	1.00
Landscape Area:	9.8	ha	0.25
Cultivated Area:	111.3	ha	0.375
Total Catchment Area	133.0	ha	0.42

Time of Concentration:

$$Tc = \frac{3.26\,(1.1 - C)\,(L)^{1/2}}{Sw^{0.33}} + \frac{\text{Flow In Ditch } Ld}{V} \quad \text{min}$$

Runoff Coefficient (C):	0.375	Cultivated Lands
Sheet Flow Distance (L):	550	m
Slope of Land (Sw):	1.7	%
Time of Concentration (Sheet Flow):	46.5	min

Runoff (Rational Method):

$$Q = 2.78\,CiA \quad l/s$$

Area (A):	133.0	ha
Time of Concentration:	46.5	min. (see above)
Rainfall Intensity (i):	67.4	mm/hr (Ottawa IDF Curves - 100-Year Event)
Runoff Coefficient (C):	0.42	see above
100 Year Flow (Q_{100}):	10.5	m^3/s

Channel Slope:	5.0%	
Manning Roughness Coefficient n:	0.04	mowed grass
Side Slope:	3	:1
Lot Side Slope:	3	:1
Ditch Bottom Width:	11.50	m
Water Depth:	0.33	m
Water Top Width:	13.49	
Water Cross-Section Area:	4.15	sq.m.
Wetted Perimeter:	13.60	m
Hydraulic Radius:	0.31	m
Velocity:	2.53	m/s Based on water depth
Velocity:	2.53	m/s Using Manning's Formula:

Five-Year Event

			C-values
Roof Area:	0.4	ha	0.90
Asphalt/Concrete Area:	11.6	ha	0.90
Landscape Area:	9.8	ha	0.20
Cultivated Area:	111.3	ha	0.300
Total Catchment Area	133.0	ha	0.35

Time of Concentration:

$$Tc = \frac{3.26\,(1.1 - C)\,(L)^{1/2}}{Sw^{0.33}} + \frac{\text{Flow In Ditch } Ld}{V} \text{ min}$$

Runoff Coefficient (C):	0.300	Cultivated Lands
Sheet Flow Distance (L):	550	m
Slope of Land (Sw):	1.7	%
Time of Concentration (Sheet Flow):	51.3	min

Runoff (Rational Method):

$$Q = 2.78\,CiA \text{ l/s}$$

Area (A):	133.0	ha
Time of Concentration:	51.3	min. (see above)
Rainfall Intensity (i):	36.9	mm/hr (Ottawa IDF Curves - 5-Year Event)
Runoff Coefficient (C):	0.35	see above
100 Year Flow (Q_{100}):	4.7	m^3/s

Channel Slope:	5.0%	
Manning Roughness Coefficient n:	0.04	mowed grass
Side Slope:	3	:1
Lot Side Slope:	3	:1
Ditch Bottom Width:	11.50	m
Water Depth:	0.21	m
Water Top Width:	12.74	
Water Cross-Section Area:	2.51	sq.m.
Wetted Perimeter:	12.81	m
Hydraulic Radius:	0.20	m
Velocity:	1.89	m/s Based on water depth
Velocity:	1.89	m/s Using Manning's Formula:

D.B. GRAY ENGINEERING INC.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9
613-425-8044
dbgray@rogers.com

STORM SEWER COMPUTATION FORM

RATIONAL METHOD Q = 2.78 A I R FIVE YEAR EVENT

n = 0.013

PROJECT: Kingston Avenue Dwellings

Designed By: DBG

Date: 2-Aug-17

LOCATION			AREA (ha) Hard Surface	Roof	Grass / Landscape	Cultivated	Individual 2.78 A R	Accum. 2.78 A R	Time of Conc. (min)	Rainfall Intensity I (mm/hr)	Peak Flow Q (l/s)	SEWER DATA									COMMENTS
STREET	FROM	TO	R = 0.90	R = 0.90	R = 0.20	R = 0.30						Type of Pipe	Dia. Actual (mm)	Dia. Nom. (mm)	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (min)	Ratio Q/Qfull	
	NEW CULVERT	MH-1	11.4	0.1	9.0	111.3	126.6	126.6	50.00	37.7	4767.3	CONCRETE	762.0	750	2.00	1.0	1642.5	3.60	0.00	2.90	
	MH-1	MH-2					0.0	126.6	50.00	37.7	4767.0	CONCRETE	762.0	750	2.00	14.1	1642.5	3.60	0.07	2.90	
	MH-2	MH-3	0.17	0.26	0.68		1.5	128.1	50.07	37.6	4817.3	CONCRETE	762.0	750	2.00	13.5	1642.5	3.60	0.06	2.93	
	DI-4	MH-3			0.10		0.1	0.1	50.13	37.6	2.0	PVC SDR 35	304.8	300	1.00	1.0	100.9	1.38	0.01	0.02	
	MH-3	EXIST CB/MH						128.1	50.13	37.6	4814.9		762.0	750	0.10	14.0	367.3	0.81	0.29	13.11	EXISTING 750 CULVERT
		TOTALS:	11.6	0.4	9.8	111.3															

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-2

Plan showing the site and location of all existing services: see drawings C-1 to C-2

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

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

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

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

Identification of existing and proposed infrastructure available in the immediate area: see drawings C-1 to C-2

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-2

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 of Servicing Brief

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

Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow locations throughout the development: see page 2 & 6 to 10 of Servicing Brief and Stormwater Management Report

Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves: see page 2 of Servicing Brief

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

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

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

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

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

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

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

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 11 of Servicing Brief and Stormwater Management Report

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

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 3 & 4 of Servicing Brief and Stormwater Management Report

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing C-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-waterched and Master Servicing Study, if applicable study exists: not applicable

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawings C-1 to C-2 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-2 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 2.4 on drawing C-1

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 5 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