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SERVICEABILITY BRIEF

**PROPOSED CONVERSTION OF CHURCH
TO RESIDENTIAL BUILDING
87 MANN AVENUE, OTTAWA, ON.**

Prepared for:

2367352 Ontario Inc.
100 Argyle Avenue,
Ottawa Ontario
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File No. 130375

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Prepared for Site Plan Control Application August 7, 2013

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INTRODUCTION

This brief has been prepared in support of a site plan control application to the City of Ottawa to convert an existing church building located on the property at 87 Mann Avenue, City of Ottawa. For the purposes of this brief and the engineering design drawings, Mann Avenue is considered to oriented along an east west axis. The property is located at the northeast corner of the intersection of Russell Avenue and Mann Avenue within the City of Ottawa. The property is currently occupied by a church building and Manse. The current water and sanitary services for the Manse and sanitary service for the church building are from Russell Avenue. The current water service for the church building is from Mann Avenue.

It is understood that the owner of the subject property intends to remove the existing manse building and replace the manse building with a four storey addition to the existing church building. It is understood that the existing church building will be completely renovated to accommodate residential bachelor or studio style apartments. It is understood there will be a total of 60 residential units.

This brief presents a description of the proposed servicing and an analysis of the adequacy of the existing municipal storm and sanitary sewers to accommodate the flow associated with the proposed renovation and addition.

SANITARY SEWER CONNECTION

The sanitary sewage flow for the proposed building was calculated based on the City of Ottawa Sewer Design Guidelines (Section 4.4.1.2) as follows:

- Residential occupancy = 1.4 persons per one bedroom apartment unit
    - 1.4 x 60 units = 84 person total occupancy

- Residential average flow = 350 L/day per pers.
    - 84 x 350 L/day/person = 29400 L/day or 0.34 L/sec

The peaking factor was calculated based on the Harmon Equation with a maximum peaking factor for domestic flows of 4:

Harmon Equation: $P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) \times K$

Where: P = Population
K = Correction factor = 1

Peak Flow:
$(Q_{san})_{max}$ = 0.34 L/s x 4.0 (P.F) = 1.36 L/s

Peak extraneous flows (Infiltration Allowance) = 0.28 L/s/effective gross ha.
Site area = 1453 m2 = 0.1453 ha. Peak extraneous flow = 0.04 L/s

The peak sanitary sewage flow to be discharged from the site = 1.40 L/s

Sewage discharges will be domestic in type and in compliance with the City of Ottawa Sewer Use By-law. The proposed service connection from the proposed apartment building will be made at the west side of the property to the existing sanitary sewer on Russell Avenue. The proposed service will be a 150 mm diameter PVC pipe installed at a minimum slope of 1%. The capacity of this proposed service is 15.23 L/s which is well in excess of the peak sanitary flow from the site.

The existing sanitary sewer along Russell Avenue consists of 250 mm diameter PVC sanitary sewer at 3.4 percent. From the attached sanitary sewer calculation sheet, the capacity of the existing sewer is about 110 L/s. The proposed sanitary demand from the site is about 1.4 L/s. The peak sanitary flow from the proposed development is equal to about 1.3 percent of the capacity of the existing sanitary. As such the proposed increase in sanitary flow as a result of the conversion of the existing church building into residential occupancy is negligible and there is sufficient available capacity for the proposed development.

Proposed Sanitary Service

The Ontario Building Code specifies minimum pipe size and maximum hydraulic loading for sanitary sewer pipe. OBC 7.4.10.8 (2) states "Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity." Since 1.4 L/s is much less than 0.65 x 15.23 = 9.9 L/s the sanitary building sewer is properly sized.

In addition, from Table 7.4.10.8, the allowable number of fixture units for a 150 mm diameter sanitary service pipe with a slope of 1% is 700. There are 60 units with a kitchen sink and bathroom group or 7.5 fixtures / unit and additional fixture units for the proposed ground floor amenity / commercial space. The total proposed fixture units will be 450 plus the additional fixtures or approximately between 450 and 500 proposed fixtures in the building.

The existing sanitary sewer has the capacity to accommodate the proposed development and the proposed 150 mm diameter sanitary service is adequate.

WATER DEMAND

Domestic Water Requirement

The water demand for the proposed development was calculated based on the City of Ottawa Water Distribution Design Guidelines as follows:

- Residential occupancy = 1.4 persons per one bedroom apartment unit
- 60 units of one bedroom units x 1.4 pers./unit = 84 persons

Total occupancy = 84 persons

Residential Average Daily Demand = 350 L/c/d.

- Average daily demand of 350 L/c/day x 84 pers = 29.4 m^3/day or 0.34 L/s
- Maximum daily demand (factor of 2.5) is 0.34 L/s x 2.5 = 0.85 L/s
- Peak hourly demand (factor of 2.2) = 0.85 L/s x 2.2 = 1.87 L/s

Fire Fighting Requirement

Fire flow protection requirements were calculated as per the Fire Underwriter's Survey (FUS)
An estimate of the fire flow required is as follows:

Step 1

F = 220C√A
F = fire flow in litres per minute

C = co-efficient related to type of construction.
= 1.0 for ordinary construction
A = total floor area in square metres
= 2270 square metres
F = 220 x 1.0 x √2270
= 10482 L/min or 10000 L/min rounded to nearest 1000L/min

Step 2 reductions or increase due to occupancy
= low hazard occupancy = -25%
F = 10000 -0.25 x 10000
= 7500 L/min

Step 3 reduction for automatic sprinkler protection
= full sprinkler system designed to NFPA 13 standards = 30% reduction
= - 0.30 x 7500
= - 2250 L/min

Step 4 charge for structures exposed within 45 metres of separation.

Side	Separation m	Charge %
East	17.7	15
North	3.4	20
West	25.1	10
South	28.0	10
Total Charge		55 %

Total Charge not to exceed 75%.

= + 0.55 x 7500
= + 4125 L/min

Total Required Fire Flow rounded to the nearest 1000 L/min

F = 7500 – 2250 + 4125
= 9375

= 9,000 L/min
= 150 L/s

Required duration is 2.0 hours.

Boundary Conditions with Connection to Russell Avenue

The following Boundary Conditions were provided to Kollaard Associates Inc. by the City of Ottawa based on current operation of the city water distribution system and demand data provided by Kollaard Associates Inc.

Minimum HGL	= 100.4 m
Maximum HGL	= 115.4 m
Max Day + FF (150L/s)	= 97.3 m

Water Service

The proposed water service will be connected to Russell Avenue as indicated on the Site Servicing Drawing 130375-SS. In order to meet the fire fighting requirements, a fire department Siamese connection will be installed at the near the northwest corner of the west side of the existing building. To meet the requirements of OBC Sect. 3.2.5.2.(3), a fire hydrant will be added along the west side of the site as indicated.

In order to ensure a minimum pressure of 140 kPa (20 psi) in the water service line during fire flow demand, it is proposed to provide water services to the fire hydrant by means of a nominal 150 mm diameter PVC DR18 water service extended from the existing 203 mm diameter water main along Russell Avenue. The 150 mm water service will be reduced after the "T" to the hydrant valve to a 100 mm diameter IPEX Blue Brute water service which will be extended to the building.

From the boundary conditions supplied by the City of Ottawa, it is considered that a 150 mm diameter water service would have a minimum pressure during fire flow at the hydrant of greater than 150 kPa which is above the acceptable minimum pressure during fire flow conditions.

It is expected that there will be minimal loss of pressure between the water main and the building using a 100 mm diameter water service during normal peak flow demands.

STORM SEWER CONNECTION

The proposed stormwater management system is indicated on the Grading and Erosion Control Plan Kollaard Associates Inc drawing # 130375-GEP and on the Site Servicing Plan drawing # 130375-SS and described in the Stormwater Management Report. The proposed design involves collecting and temporarily storing storm water in an underground storage tank located below the parking area along the west side of the site. The storage tank will be constructed using double Atlantis Matrix Tanks modules. Stormwater will be released from the storage tank a controlled rate by means of a Hydrovex Model 75 VHV-1 outlet control device.

The stormwater design consisted of directing the runoff from the controlled areas of the site, including the roof top, to the storage tanks and then releasing the post development runoff at a rate not exceeding the runoff rate for the predevelopment 2 year design storm using a runoff coefficient of 0.4 to model the predevelopment conditions. The calculated runoff coefficient for the existing pre-development conditions prior to the proposed construction is 0.66 for a 2 year storm event.

The outlet storm service from the proposed stormwater storage tanks is connected to the existing 300 mm diameter concrete storm sewer along Russell Avenue with a slope of about 4.5 percent. This existing storm sewer has a capacity of about 0.21 m^3/sec. The existing 300 mm diameter storm sewer along Russell Avenue increases in diameter to a 375 mm diameter sewer about 60 metres north of the site.

The total runoff rate from the site is restricted such that the runoff during the 100 year design storm is less than or equal to the runoff rate for a 2 year design storm from the predevelopment site area using a runoff co-efficient of 0.4 for predevelopment conditions.

Using the rational method, the runoff rate for actual pre-development conditions during a 2 year design storm would be:

Q = 2.78CIA
= 2.78 * 0.66 * 76.8 * 0.145 = 20.3 L/sec

The runoff rate for pre-development conditions during a 2 year design storm using C = 0.4 would be:

Q = 2.78CIA
= 2.78 * 0.4 * 76.8 * 0.145 = 12.4 L/sec

The unrestricted runoff rate for actual pre-development conditions during a 100 year design storm would be:

Q = 2.78CIA
= 2.78 * 0.74 * 178.56 * 0.145 = 53.7 L/sec

Based on the stormwater management conditions, the above 100 year design storm runoff rate from the site is being restricted to less than or equal to 12.4 L/sec.

Based on the selected outlet control devise, the actual 100 year design storm runoff rate is being restricted to 10.6 L/s. As a result the runoff rate for the 5 year design storm is restricted to about 6.6 L/sec and the 2 year storm event is restricted to about 5.6 L/sec. As such the proposed restricted post development runoff rates are less than a third of the current runoff conditions from the site.

Based on the reduction in proposed runoff rate for the site when compared to the existing conditions, it is considered that there is adequate storm capacity for the proposed development.

Quality control for the site will be provided by a Stormceptor STC 300 placed in a manhole immediately downstream of the outlet control device.

We trust that this brief provides sufficient information for your present purposes. If you have any questions concerning this brief or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Report Prepared By:
KOLLAARD ASSOCIATES INC.

Steven deWit, P.Eng.

Sanitary Sewer Design Calculations

87 Mann Avenue, City Of Ottawa, Ontario

Location			Residential Flow								Commercial/Institutional			Infiltration		Flow	Sanitary Sewer Design						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
STREET	From	To	No. of Single Dwellings	No. of Apartment Units	Pop.	Area, A	Cumulative Pop.	Cumulative Area	Peaking Factor	Res. Flow, $Q_{(p)}$	Area, A	Cumulative Tributary Area, A	Cumulative Flow, Q(p)	Total Tributary Area	Infiltration Flow	Peak Design Flow	Length, L	Diameter, d_{nom}*	Slope, s	Pipe Capacity, Q_f	Full Flow Velocity, v_f	Pipe Capacity Ratio, Q_p/Q_f	Design peak Velocity Vp
	MH	MH			[no.]	[ha]	[no.]	[ha]		[L/s]	[Sq.m)	[ha]	[L/s]	[ha]	[L/s]	[L/s]	[m]	[mm]	[%]	[L/s]	[m/s]		[m/s]
Russell	5	Site	3	0	10	0.110	10	0.11	4.00	0.17	0	0.000	0.000	0.11	0.03	0.20	26	250	3.46%	110.62	2.25	0.00	0.38
Site			0	60	84	0.145	84	0.15	4.00	1.36	0	0.000	0.000	0.15	0.04	1.40	25	150	1.00%	15.23	0.86	0.09	0.55
Russell	Site	6	14	0	48	5.644	142	5.90	4.00	2.30	0	0.000	0.000	5.90	1.65	3.95	26	250	3.46%	110.62	2.25	0.04	1.08
(including Site)																							

Notes:

Q = Average daily flow per capita	350	L/day per capita
$Q_{ext.}$ = Unit peak extraneous flow	0.28	L/s per gross ha.
Pop. Single Family	3.4	Persons
Pop. Apartment	1.4	Persons
Commercial/institutional consumption rate	50000	L/gross ha/day
	0.579	L/ha/s
Commercial peak factor	1.5	
Commercial peak flow	0.868	L/ha/s

Project: Proposed Conversion of Church Building To Residencial Occupancy

Location 87 Mann Avenue
City Of Ottawa, Ontario

Design by: SD **Date:** August 6, 2013

Checked by: SD **Rev.** 1

Min Velocity of flow > 0.6m/s
Max Velocity of flow < 3m/s

Kollaard Associates File #: 130375

Column 1	Street location of sewer under consideration
Columns 2 and 3	Manholes between which sewer is located
Column 4	Estimated Number of single family dwellings directly connected to sewer
Column 5	Number of multi-unit dwellings directly connected to sewer
Column 6	Population associated with dwellings driectly connected to sewer = Column 4 x 3.4 pers/unit + Column 5 x 1.4 pers/unit
Column 7	Area considered for potential infiltration into sewer under consideration
Column 8	Population associated with upstream sewers and sewer under consideration 7250
Column 9	Area considered for potential infiltration into upstream sewers and sewer under consideration 10875
Column 10	Peaking factor calculated according to Harmon Equation (refer to report)
Column 11	Flow associated with residential population serviced by sewer and upstream sewers = column 8 x column 10 x 350 L/day per capita
Column 12	Area of commercial/Institutional properties seviced by sewer under consideration
Column 13	Area of commercial/Institutional properties seviced by upstream sewers and by sewer under consideration
Column 14	Flow associated with commercial properties serviced by upstream sewers and sewers under consideration = column 13 x 0.868 L/ha/s
Column 15	Column 13 + Column 9
Column 16	Extraneous flows = column 15 x 0.28 L/s
Column 17	Calculated peak flow in sewer under coonsideration = column 11 + column 14 + column 17
Column 18	Length of sewer under consideration (from sanitary sewer plan)
Column 19	Diameter of sewer under consideration (from sanitary sewer plan)
Column 20	Slope of sewer under consideration (from sanitary sewer plan)
Column 21	Capacity of sewer under consideration, calculated by Manning's equation, Q = (dia/4) 2/3 (slope)1/2 (1/n) where n = 0.013
Column 22	Velocity at pipe capacity
Column 23	Ratio of the calculated peak flow in the sewer pipe under consideration to the capacity of the sewer pipe.
Column 24	Velocity at calculated peak flow