

559 Riverdale Avenue Ottawa

Assessment of
Adequacy of Public Services



Project # CW-07-15

Prepared for:

Mr. Luca Diaconescu
34 Glencairn Avenue
Ottawa, Ontario, K1S 1N6

By:

Arch-Nova Design Inc.

April 2016

(Updated June 2017)

Table of Contents

| | |
|---|---|
| 1. Introduction..... | 2 |
| 2. Public Services Capacity..... | 2 |
| 2.1 Water Supply | 3 |
| 2.2 Sanitary Sewer | 5 |
| 3. Stormwater..... | 6 |
| 3.1 Existing Site Stormwater Services | 6 |
| 3.2 Proposed Development | 6 |
| 4. Conclusion..... | 8 |

Appendix A: Calculations

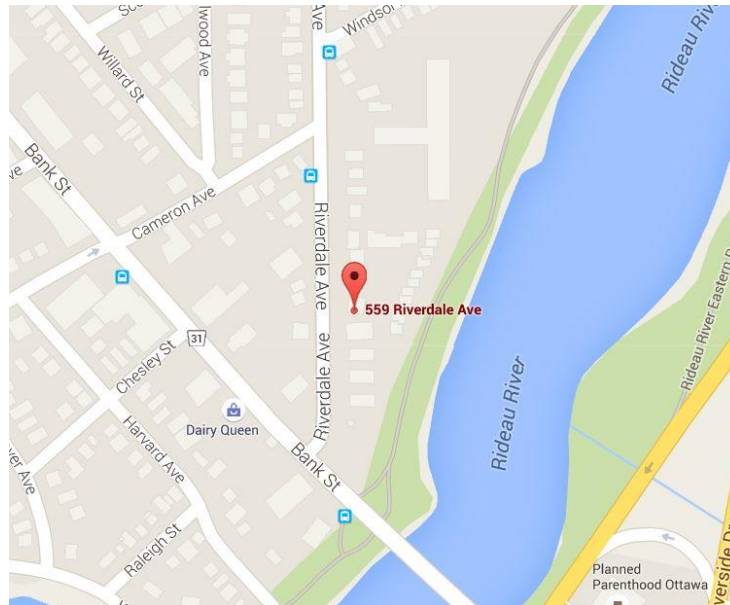
Appendix B: Correspondence

1. Introduction

The subject property is located at 559 Riverdale Avenue, Ottawa. The proposed work comprises of a 3-storey+basement apartment building. For the purpose of this report the site is considered to run south-north.

Currently, a bungalow house is located on the central part of the property. It is occupied, but scheduled for demolition. A yard covered with grass is located on the east side of the property. On the north side of the house there is a garage at the basement level with access driveway-ramp. Adjacent properties are also residential.

The area is serviced by municipal water, sanitary and storm water systems.



559 Riverdale Avenue, Ottawa: Location

2. Public Services Capacity

This section of the report will analyze existing municipal services and the potential impact of the proposed building at 559 Riverdale Avenue on the existing service capacity.

2.1 Water Supply

¹The following are boundary conditions, HGL, for a hydraulic analysis at 559 Riverdale Avenue, connecting to the 203 mm watermain:

Max Day + FF = 108 m assuming a fire flow of 150 L/s

Minimum HGL = 102.4 m

Maximum HGL = 116.8 m, the estimated ground elevation is 59.2 m, the estimated maximum pressure is more than 80 psi.²

Table 1 presents the City of Ottawa design criteria based on MOE Guidelines.

| Design Parameter | Value |
|--|--|
| Residential Average Apartment | 1.8 P/unit |
| Residential Average Daily Demand | 350 L/d/P |
| Residential Maximum Daily Demand | 9.5 x Average Daily * |
| Residential Maximum Hourly | 1.5 x Maximum Daily * |
| Commercial Demand | 2.5 L / m ² /d |
| Commercial Maximum Daily Demand | 1.5 x Average Daily |
| Commercial Maximum Hourly | 1.8 x Maximum Daily |
| Minimum Watermain Size | 150mm diameter |
| Minimum Depth of Cover | 2.4m from top of watermain to finished grade |
| During Peak Hourly Demand operating pressure must remain within | 275kPa and 552kPa (40-80 psi; 28-56m) |
| During fire flow operating pressure must not drop below | 140kPa (20 psi; 14 m) |
| * Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons. | |

Table 1.: Water Supply Design Criteria

The consumption is expected to increase from **4.55 l/min (0.08 l/sec)** to **60.61 l/min (1.01 l/sec)** for peak period. The fire flow for residential

¹ City of Ottawa boundary condition information is based on current operation of the city water distribution system (also see Appendix A for complete correspondence information)

² City of Ottawa: April 01. 2015

spaces was estimated to be 8,000 l/min (133 l/sec)³ however, the Fire Underwriters Survey (FUS) calculation⁴ provided the following:

- a. fire flow: 8,000 l/min
- b. available fire flow⁵ is 5,100 l/min (85 l/sec) which will require additional fire protection measures including fire separation structures, Siamese fire connection and/or fire extinguishers on each floor. Updated plans (October 2016) included Siamese connection as the closest fire hydrant is more than 45 m away from the site.

The table below summarizes the pressure for the designed parameters:

| Design Parameter | Anticipated Demand ¹ (L/min) | Boundary Condition ² (kPa) |
|----------------------|--|--|
| Average Daily Demand | 4.25 | |
| Max Day + Fire Flow | 5140.41 | 116.8 |
| Peak Hour | 60.61 | 102.4 |

Table 2: Water Demand and Boundary Conditions

³ OBC Section A.3.2.5.7, Table 2.

⁴ See Appendix A: Calculations

⁵ City of Ottawa: Boundary Conditions, April 2016

2.2 Sanitary Sewer

Current sanitary sewer outflow from the location of 559 Riverdale Avenue is estimated **0.22 l/sec** (peak flow+wet weather). The estimated outflow for the new buildings is **0.30 l/sec** (peak flow+wet weather), therefore the maximum flow increase is estimated to be **0.08 l/sec**.

| Design Parameter | Value ⁶ |
|--|---|
| Residential Average Apartment | 1.8 P/unit |
| Average Daily Demand | 350 L/d/per |
| Peaking Factor | Harmon's Peaking Factor. Max 4.0, Min 2.0 |
| Commercial Space | 5L/m ² /day |
| Infiltration and Inflow Allowance | 0.28L/s/ha |
| Sanitary sewers are to be sized employing the Manning's Equation | $Q = (1/n)AR^{2/3}S^{1/2}$ |
| Minimum Sewer Size | 200mm diameter |
| Minimum Manning's 'n' | 0.013 |
| Minimum Depth of Cover | 2.5m from crown of sewer to grade |
| Minimum Full Flowing Velocity | 0.6m/s |
| Maximum Full Flowing Velocity | 3.0m/s |

Table 3: Wastewater Design Criteria

Existing municipal sewer 225 mm has a capacity of 46.58 l/sec for 0.54% slope and the flow from proposed development will create only 0.2% of increase.

Detailed calculation of pre and post development flow is presented in Appendix A.

⁶ Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2004.

3. Stormwater

3.1 Existing Site Stormwater Services

The subject property is covered with different surfaces as shown in the Table 4. The roof drains onto the green area. No other storm water services (i.e. storage, ponds) are on the property.

| Surface Type | ID | Area (ha) | Percent of total Area | C | A X C (ha) |
|---------------------|----|-----------|-----------------------|------|------------|
| Green area | A1 | 0.00069 | 1.3% | 0.35 | 0.000 |
| Building+driveway | A2 | 0.01752 | 34.3% | 0.95 | 0.017 |
| Patio | A3 | 0.00218 | 4.3% | 0.70 | 0.002 |
| Backyard | A4 | 0.02041 | 40.0% | 0.30 | 0.006 |
| Patio | A5 | 0.00274 | 5.4% | 0.70 | 0.002 |
| Green area | A6 | 0.00753 | 14.7% | 0.30 | 0.002 |
| TOTAL | | 0.0511 | 100.0% | | 0.029 |
| Weighted C = | | | | | 0.50 |

Table 4: Current Drainage Areas

Entire site drains uncontrolled over surface to Riverdale Avenue or to the rear access driveway. Predevelopment C=0.5 is used for the calculation for the post development calculation⁷. Also the 100-year runoff coefficient is increased for 25% to compensate for the climate changes.

A municipal stormwater service 675 mm is provided on Riverdale Avenue and has capacity of 132 l/sec for slope of 0.31% and 30% full and 660 l/sec for 80% full.

Proposed development will provide on-site storage and there will be no impact on the municipal system.

3.2 Proposed Development

The proposed 3-storey building will cover the main part of the property however the flat roof storage is expected to compensate for the pervious areas so the balance between pre and post development run-off is not

⁷ City of Ottawa stormwater management design requirement

changed. Also, the main drainage routes, such as the roof drains to the front (Riverdale Ave.) and the backyard will remain almost unchanged. There is an increase in impervious surfaces in the area where the existing yard is.

For the purpose of managing the 5 year predevelopment runoff (7.40 l/sec), the uncontrolled post development runoff was used to determine the controlled runoff from the roof storage. The postdevelopment uncontrolled runoff is calculated to be 4.58 l/sec which leaves 2.82 l/sec for the controlled runoff. The excess of water should be stored on the roof and released under this condition.

| Predevelopment Runoff: | | |
|-------------------------------|-------|-------|
| Uncontrolled Runoff | | |
| 5-year | 7.40 | l/sec |
| 100-year | 15.85 | l/sec |
| Controlled Runoff: | | |
| 5-year | 0.00 | l/sec |
| 100-year | 0.00 | l/sec |

| Postdevelopment Runoff: | | |
|--------------------------------|-------|-------|
| Uncontrolled Runoff | | |
| 5-year | 2.67 | l/sec |
| 100-year | 4.58 | l/sec |
| Controlled Runoff: | | |
| 5-year | 9.34 | l/sec |
| 100-year | 16.85 | l/sec |

| Controlled allowable runoff | | |
|------------------------------------|------|-------|
| Controlled Runoff: | | |
| 5-year | 4.73 | l/sec |
| 100-year* | 2.82 | l/sec |

Table 5: Uncontrolled and Controlled Runoff Summary

The calculation was based on 10 minutes concentration times. Detailed calculation is provided in Appendix A.

The drainage system comprises of weeping tiles around the building and a connection to the storm pipe at Riverdale Avenue. Details are presented in the Grading and Site Services Plan.

Adjacent property on south will be protected with 6" high curb in order to prevent overflow from the site.

The basement of the new building will be used as a parking and access to the parking will be over a ramp. The basement will be equipped with drains and a sump pump in order to prevent atmospheric water entering the basement.

Details are presented in Appendix A.

4. Conclusion

Based on the information provided by the City of Ottawa, the existing municipal services are adequate and will not be overloaded after the construction of the buildings at 559 Riverdale.

Water supply system will not provide sufficient flow for the fire protection however, additional preventive and structural measures are proposed; Siamese connection will be installed in front of the building and it will compensate for the hydrant which is more than 45 meters away from the site as well as for the insufficient flow.

Sanitary system inflow will be increased for only 0.2% of its capacity and it is deemed as capable to receive flow from the site.

Stormwater system will not be impacted by the new development as the site will provide storage for water and its release under the predevelopment condition.

Prepared by:

Zoran Mrdja, P.Eng.

April 2016.
Updated June 2017.



Authorized by Professional Engineers of Ontario to
provide professional services to public

Appendix A: Calculations

Water Supply Design Criteria

| Design Parameter | Value |
|--|--|
| Residential Average Apartment | 1.8 P/unit |
| Residential Average Daily Demand | 350 L/d/P |
| Residential Maximum Daily Demand | 2.5 x Average Daily * |
| Residential Maximum Hourly | 2.2 x Maximum Daily * |
| Commercial Demand | 2.5 L / m ² /d |
| Commercial Maximum Daily Demand | 1.5 x Average Daily |
| Commercial Maximum Hourly | 1.8 x Maximum Daily |
| Minimum Watermain Size | 150mm diameter |
| Minimum Depth of Cover | 2.4m from top of watermain to finished grade |
| must remain within | 275kPa and 552kPa (40-80 psi; 28-56m) |
| During fire flow operating pressure must not drop below | 140kPa (20 psi; 14 m) |
| * Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons. | |

Domestic Demand

| Type of Housing | Per / Unit | Units | Pop |
|-----------------|------------|-------|-----|
| Single Family | 3.4 | 1 | 3 |
| Semi-detached | 2.7 | | 0 |
| Townhouse | 2.7 | | 0 |
| Apartment | | | 0 |
| Bachelor | 1.4 | | 0 |
| 1 Bedroom | 1.4 | | 0 |
| 2 Bedroom | 2.1 | | 0 |
| 3 Bedroom | 3.1 | | 0 |

| | Pop | Avg. Daily | | Max Day | | Peak Hour | |
|------------------------------|-----|-------------------|-------|-------------------|-------|-------------------|-------|
| | | m ³ /d | L/min | m ³ /d | L/min | m ³ /d | L/min |
| Total Domestic Demand | 3 | 1.19 | 0.83 | 2.98 | 2.07 | 6.55 | 4.55 |

Institutional / Commercial / Industrial Demand

| Property Type | Unit Rate | Units | Avg. Daily | | Max Day | | Peak Hour | |
|---------------------------|-----------------------------|-------|-------------------|-------|-------------------|-------|-------------------|-------|
| | | | m ³ /d | L/min | m ³ /d | L/min | m ³ /d | L/min |
| Commercial floor space | 2.5 L/m ² /d | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Office | 75.0 L/9.3m ² /d | | | | | | | |
| Restaurant* | 125.0 L/seat/d | | | | | | | |
| Industrial -Light | 35,000.0 L/gross ha/d | | | | | | | |
| Industrial -Heavy | 55,000.0 L/gross ha/d | | | | | | | |
| Total I/C/I Demand | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | |
|---------------------|------|------|------|------|------|------|
| Total Demand | 1.19 | 0.83 | 2.98 | 2.07 | 6.55 | 4.55 |
|---------------------|------|------|------|------|------|------|

Wastewater Design Criteria

| Design Parameter | Value |
|--|---|
| Residential Average Apartment | 1.8 P/unit |
| Average Daily Demand | 350 L/d/per |
| Peaking Factor | Harmon's Peaking Factor. Max 4.0, Min 2.0 |
| Commercial Space | 5L/m ² /day |
| Infiltration and Inflow Allowance | 0.28L/s/ha |
| Sanitary sewers are to be sized employing the Manning's Equation | $Q = (1/n)AR^{2/3}S^{1/2}$ |
| Minimum Sewer Size | 200mm diameter |
| Minimum Manning's 'n' | 0.013 |
| Minimum Depth of Cover | 2.5m from crown of sewer to grade |
| Minimum Full Flowing Velocity | 0.6m/s |
| Maximum Full Flowing Velocity | 3.0m/s |
| <i>Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2004.</i> | |

Sanitary Sewer Post Development Outflow

| | |
|-----------------------------------|-------------------|
| Site Area | 0.605 ha |
| Extraneous Flow Allowances | |
| Infiltration / Inflow | 0.1694 L/s |

Domestic Contributions

| Unit Type | Unit Rate | Units | Pop |
|------------------------------|-----------|-------|-----------------|
| Single Family | 3.4 | 1 | 3.4 |
| Semi-detached and duplex | 2.7 | | 0 |
| Duplex | 2.3 | | 0 |
| Townhouse | 2.7 | | 0 |
| Apartment | | | |
| Bachelor | 1.4 | | 0 |
| 1 Bedroom | 1.4 | | 0 |
| 2 Bedroom | 2.1 | | 0 |
| 3 Bedroom | 3.1 | | 0 |
| Average | 1.8 | | 0 |
| Total Population | | | 3.4 |
| Average Domestic Flow | | | 0.01 L/s |
| Peaking Factor | | | 4.00 |
| Peak Domestic Flow | | | 0.06 L/s |

Institutional / Commercial / Industrial Contributions

| Property Type | Unit Rate | No. of Units | Avg Wastewater (L/s) |
|---|-----------------------|--------------|----------------------|
| Commercial floor space* | 5 L/m ² /d | | 0 |
| Hospitals | 900 L/bed/d | | 0 |
| Industrial - Light** | 35,000 L/gross ha/d | 0 | 0 |
| Industrial - Heavy** | 55,000 L/gross ha/d | | 0 |
| School | 70 L/student/d | | 0 |
| Institutional Buildings (Church)*** | 36 L/Seat/d | 0 | 0 |
| Average I/C/I Flow | | | 0 |
| Peak Institutional / Commercial Flow | | | |
| Peak Industrial Flow** | | | |
| Peak I/C/I Flow | | | |

| | |
|--|-------------|
| Total Estimated Average Dry Weather Flow Rate | 0.01 |
| Total Estimated Peak Dry Weather Flow Rate | 0.06 |
| Total Estimated Peak Wet Weather Flow Rate | 0.22 |

* assuming a 12 hour commercial operation

** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B

*** Churches and Similar Places of Worship - per seat; Kitchen facilities provided

OBC (2012) Div.B, Section 8.2.1.3, Table B

559 Riverdale Avenue, Ottawa
New Development

Water Supply Design Criteria

| Design Parameter | Value |
|--|--|
| Residential Average Apartment | 1.8 P/unit |
| Residential Average Daily Demand | 350 L/d/P |
| Residential Maximum Daily Demand | 9.5 x Average Daily * |
| Residential Maximum Hourly | 1.5 x Maximum Daily * |
| Commercial Demand | 2.5 L / m ² /d |
| Commercial Maximum Daily Demand | 1.5 x Average Daily |
| Commercial Maximum Hourly | 1.8 x Maximum Daily |
| Minimum Watermain Size | 150mm diameter |
| Minimum Depth of Cover | 2.4m from top of watermain to finished grade |
| must remain within | 275kPa and 552kPa (40-80 psi; 28-56m) |
| During fire flow operating pressure must not drop below | 140kPa (20 psi; 14 m) |
| * Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons. | |

559 Riverdale Avenue, Ottawa
New Development

Domestic Demand

| Type of Housing | Per / Unit | Units | Pop |
|-----------------|------------|-------|-----|
| Single Family | 3.4 | | 0 |
| Semi-detached | 2.7 | | 0 |
| Townhouse | 2.7 | | 0 |
| Apartment | | | 0 |
| Bachelor | 1.4 | | 0 |
| 1 Bedroom | 1.4 | 8 | 11 |
| 2 Bedroom | 2.1 | 3 | 6 |
| 3 Bedroom | 3.1 | | 0 |

| | Pop | Avg. Daily | | Max Day | | Peak Hour | |
|------------------------------|-----|-------------------|-------|-------------------|-------|-------------------|-------|
| | | m ³ /d | L/min | m ³ /d | L/min | m ³ /d | L/min |
| Total Domestic Demand | 18 | 6.13 | 4.25 | 58.19 | 40.41 | 87.28 | 60.61 |

Institutional / Commercial / Industrial Demand

| Property Type | Unit Rate | Units | Avg. Daily | | Max Day | | Peak Hour | |
|---------------------------|-----------------------------|-------|-------------------|-------|-------------------|-------|-------------------|-------|
| | | | m ³ /d | L/min | m ³ /d | L/min | m ³ /d | L/min |
| Commercial floor space | 2.5 L/m ² /d | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Office | 75.0 L/9.3m ² /d | | | | | | | |
| Restaurant* | 125.0 L/seat/d | | | | | | | |
| Industrial -Light | 35,000.0 L/gross ha/d | | | | | | | |
| Industrial -Heavy | 55,000.0 L/gross ha/d | | | | | | | |
| Total I/C/I Demand | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | |
|---------------------|------|------|-------|-------|-------|-------|
| Total Demand | 6.13 | 4.25 | 58.19 | 40.41 | 87.28 | 60.61 |
|---------------------|------|------|-------|-------|-------|-------|

* Estimated number of seats at 1seat per 9.3m²

Water Demand and Boundary Conditions

Proposed Conditions

| Design Parameter | Anticipated Demand ¹ (L/min) | Boundary Condition ² (kPa) |
|----------------------|--|--|
| Average Daily Demand | 4.25 | |
| Max Day + Fire Flow | 5,140.41 | 108 |
| Peak Hour | 60.61 | 108.3 |

¹) Water demand calculation per Water Supply Guidelines. See Appendix B for detailed calculations.

²) Boundary conditions supplied by the City of Ottawa. See Appendix B for correspondence with the City.

559 Riverdale Avenue, Ottawa
New Development

Wastewater Design Criteria

| Design Parameter | Value |
|--|---|
| Residential Average Apartment | 1.8 P/unit |
| Average Daily Demand | 350 L/d/per |
| Peaking Factor | Harmon's Peaking Factor. Max 4.0, Min 2.0 |
| Commercial Space | 5L/m ² /day |
| Infiltration and Inflow Allowance | 0.28L/s/ha |
| Sanitary sewers are to be sized employing the Manning's Equation | $Q = (1/n)AR^{2/3}S^{1/2}$ |
| Minimum Sewer Size | 200mm diameter |
| Minimum Manning's 'n' | 0.013 |
| Minimum Depth of Cover | 2.5m from crown of sewer to grade |
| Minimum Full Flowing Velocity | 0.6m/s |
| Maximum Full Flowing Velocity | 3.0m/s |
| <i>Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2004.</i> | |

559 Riverdale Avenue, Ottawa
New Development

Sanitary Sewer Post Development Outflow

| | |
|-----------------------------------|--------------------|
| Site Area | 0.048 ha |
| Extraneous Flow Allowances | |
| Infiltration / Inflow | 0.01344 L/s |

Domestic Contributions

| Unit Type | Unit Rate | Units | Pop |
|------------------------------|-----------|-------|-----------------|
| Single Family | 3.4 | | 0 |
| Semi-detached and duplex | 2.7 | | 0 |
| Duplex | 2.3 | | 0 |
| Townhouse | 2.7 | | 0 |
| Apartment | | | |
| Bachelor | 1.4 | | 0 |
| 1 Bedroom | 1.4 | 8 | 11.2 |
| 2 Bedroom | 2.1 | 3 | 6.3 |
| 3 Bedroom | 3.1 | | 0 |
| Average | 1.8 | | 0 |
| Total Population | | | 17.5 |
| Average Domestic Flow | | | 0.07 L/s |
| Peaking Factor | | | 4.00 |
| Peak Domestic Flow | | | 0.28 L/s |

Institutional / Commercial / Industrial Contributions

| Property Type | Unit Rate | No. of Units | Avg Wastewater (L/s) |
|---|-----------------------|--------------|----------------------|
| Commercial floor space | 5 L/m ² /d | | 0 |
| Hospitals | 900 L/bed/d | | |
| School | 70 L/student/d | | |
| Industrial - Light | 35,000 L/gross ha/d | | |
| Industrial - Heavy | 55,000 L/gross ha/d | | |
| Average I/C/I Flow | | | 0 |
| Peak Institutional / Commercial Flow | | | |
| Peak Industrial Flow** | | | |
| Peak I/C/I Flow | | | |

| | |
|--|-------------|
| Total Estimated Average Dry Weather Flow Rate | 0.07 |
| Total Estimated Peak Dry Weather Flow Rate | 0.28 |
| Total Estimated Peak Wet Weather Flow Rate | 0.30 |

FUS Fire Flow Calculations

Project: 559 Riverdale Avenue , Ottawa

Calculations Based on 1999 Publication "Water Supply for Public Fire Protection " by Fire Underwriters' Survey (FUS)

Project Name: 559 Riverdale Avenue, Ottawa

Fire Flow Calculation #: 1

Date: March 13, 2016

Building Type/Description/Name: Apartment Building

Data input by: Zoran Mrdja, P.Eng.

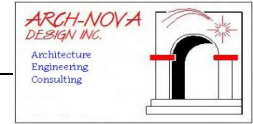
Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

| Step | Task | Term | Options | Multiplier Associated with Option | Choose: | Value Used | Unit | Total Fire Flow (L/min) | |
|---------------------------------------|--|--|---|-----------------------------------|---------------------------------|------------|---|-------------------------|-------|
| 1 | Choose Frame Used for Construction of Unit | Framing Material | | | | | | | |
| | | Coefficient related to type of construction (C) | Wood Frame | 1.50 | Non-combustible construction | 0.80 | m | | |
| | | | Ordinary construction | 1.00 | | | | | |
| | | | Non-combustible construction | 0.80 | | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.70 | | | | | |
| Fire resistive construction (> 2 hrs) | 0.60 | | | | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Floor Space Area | | | | | | | |
| | | Type of Housing | Single Family | 1 | Other (Comm, ind) | 1 | Units | | |
| | | | Townhouse - indicate # of units | 1 | | | | | |
| | | | Other (Comm, Ind, etc.) | 1 | | | | | |
| 2.2 | # of Storeys | Number of Floors/ Storeys in the Unit (do not include basement): | | 1 | 1 | Storeys | | | |
| 3 | Enter Ground Floor Area of One Unit | Enter Ground Floor Area (A) of One Unit Only : | | | | | | | |
| | | Measurement Units | Square Feet (ft ²) | 0.093 | Square Metres (m ²) | 760 | Area in Square Meters (m ²) | | |
| | | | Square Metres (m ²) | 1 | | | | | |
| | | | Hectares (ha) | 10000 | | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow(without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min | | | | | | | 4,852 |
| 5 | Apply Factors Affecting Burning | Reductions/Increases Due to Factors Affecting Burning | | | | | | | |
| 5.1 | Choose Combustibility of Building Contents | Occupancy content hazard reduction or surcharge | Non-combustible | -0.25 | Combustible | 0.00 | N/A | 0 | |
| | | | Limited combustible | -0.15 | | | | | |
| | | | Combustible | 0 | | | | | |
| | | | Free burning | 0.15 | | | | | |
| | | | Rapid burning | 0.25 | | | | | |
| 5.2 | Choose Reduction Due to Presence of Sprinklers | Sprinkler reduction | Complete Automatic Sprinkler Protection | -0.3 | None | 0.00 | N/A | 0 | |
| | | | None | 0 | | | | | |
| | | | | | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | 3.1-10.0 m | 0.20 | 0.65 | m | 3,154 | |
| | | | East Side | 10.1-20.0 m | 0.15 | | | | |
| | | | South Side | 3.1-10.0 m | 0.20 | | | | |
| | | | West Side | 20.1-30 m | 0.10 | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied: | | | | | | | 8,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | | 133 |
| | | Required Duration of Fire Flow (hrs) | | | | | | | 2.00 |
| | | Required Volume of Fire Flow (m ³) | | | | | | | 960 |

Note: The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline

| Legend | |
|--------|---|
| | Drop down menu - choose option, or enter value. |
| | No Information, No input required. |

Note: The structure is considered as non-combustible as separation walls are incorporated and the basement-garage is sprinklered. The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline. The basement of the building will be used as a gathering/dining area and it is recommended to be equipped with sprinkler system



PRE-DEVELOPMENT (UNCONTROLLED RUNOFF)

The pre-development time of concentration is **10** minutes

where:

$$I_5 = 998.071 / (Tc + 6.053)^{0.814}$$

$$I_5 = \mathbf{104.2 \text{ mm/hr}}$$

$$I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$$

$$I_{100} = \mathbf{178.6 \text{ mm/hr}}$$

| Surface Type | ID | Area (ha) | Percent of total Area | C | A X C (ha) |
|---------------------|----|-----------|-----------------------|------|------------|
| Green area | A1 | 0.00069 | 1.3% | 0.30 | 0.000 |
| Building+driveway | A2 | 0.01752 | 34.3% | 0.95 | 0.017 |
| Patio | A3 | 0.00218 | 4.3% | 0.70 | 0.002 |
| Backyard | A4 | 0.02041 | 40.0% | 0.30 | 0.006 |
| Patio | A5 | 0.00274 | 5.4% | 0.70 | 0.002 |
| Green area | A6 | 0.00753 | 14.7% | 0.30 | 0.002 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| TOTAL | | 0.0511 | 100.0% | | 0.029 |
| Weighted C = | | | | 0.50 | |

0.561564

$$Q_{5pre} = (2.78) * (C) * (I_5) * (A)$$

$$Q_{5pre} = 2.78 \times 0.50 \times 104.2 \times 0.0511$$

$$Q_{5pre} = \mathbf{7.40 \text{ L/s}}$$

$$Q_{100pre} = (2.78) * (C) * (I_{100}) * (A)$$

$$Q_{100pre} = 2.78 \times 0.63 \times 178.6 \times 0.0511$$

$$Q_{100pre} = \mathbf{15.85 \text{ L/s}}$$

C=0.5 used for predevelopment calculation (City of Ottawa requirement)

POST-DEVELOPMENT (UNCONTROLLED RUNOFF)

The post-development time of concentration is **10** minutes

where:

$$I_5 = 998.071 / (Tc + 6.053)^{0.814}$$

$$I_5 = \mathbf{104.2 \text{ mm/hr}}$$

$$I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$$

$$I_{100} = \mathbf{178.6 \text{ mm/hr}}$$

| Surface Type | ID | Area (ha) | Percent of total Area | C | A X C (ha) |
|---------------------|----|-----------|-----------------------|------|------------|
| Walkway | A1 | 0.0045 | 26.4% | 0.70 | 0.003 |
| Green Area | A3 | 0.0118 | 68.6% | 0.30 | 0.004 |
| Landscape | A4 | 0.0009 | 5.0% | 0.70 | 0.001 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| TOTAL | | 0.0172 | 100.0% | | 0.007 |
| Weighted C = | | | | 0.43 | |

$$Q_{5post} = (2.78) * (C) * (I_5) * (A)$$

$$Q_{5post} = 2.78 \times 0.54 \times 104.2 \times 0.0172$$

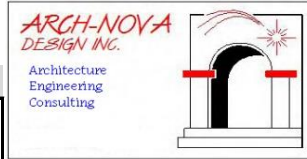
$$Q_{5post} = \mathbf{2.67 \text{ L/s}}$$

$$Q_{100post} = (2.78) * (C) * (I_{100}) * (A)$$

$$Q_{100post} = 2.78 \times 0.54 \times 178.6 \times 0.0172$$

$$Q_{100post} = \mathbf{4.58 \text{ L/s}}$$

ALLOWABLE RUNOFF



Predevelopment Runoff:

Uncontrolled Runoff

| | | |
|----------|-------|-------|
| 5-year | 7.40 | l/sec |
| 100-year | 15.85 | l/sec |

Controlled Runoff:

| | | |
|----------|------|-------|
| 5-year | 0.00 | l/sec |
| 100-year | 0.00 | l/sec |

Postdevelopment Runoff:

Uncontrolled Runoff

| | | |
|----------|------|-------|
| 5-year | 2.67 | l/sec |
| 100-year | 4.58 | l/sec |

Controlled Runoff:

| | | |
|----------|-------|-------|
| 5-year | 9.34 | l/sec |
| 100-year | 16.85 | l/sec |

Controlled allowable runoff

Controlled Runoff:

| | | |
|-----------|------|-------|
| 5-year | 4.73 | l/sec |
| 100-year* | 2.82 | l/sec |

Comment:

*Calculation is based on the 5-year pre-development runoff.

Storage Volumes (5-Year Storm)

Project: 559 Riverdale Avenue

$$T_c = \frac{10}{1} \text{ (mins)}$$

$$C_{AVG} = \frac{1.00}{1} \text{ (dimensionless)}$$

$$\text{Area} = \frac{0.0339}{1} \text{ (hectares)}$$

$$\text{Storm} = \frac{5}{1} \text{ (year)}$$

$$\text{Release Rate} = \frac{2.82}{1} \text{ (L/sec)}$$

$$\text{Time Interval} = \frac{5}{1} \text{ (mins)}$$

| Duration (min) | Rainfall Intensity (mm/hr) | Peak Flow (L/sec) | Release Rate (L/sec) | Storage Rate (L/sec) | Storage (m ³) |
|----------------|----------------------------|-------------------|----------------------|----------------------|---------------------------|
| 1 | 204 | 1.9 | 2.82 | | |
| 6 | 132 | 7.4 | 2.82 | 4.63 | 1.67 |
| 11 | 99 | 9.4 | 2.82 | 6.54 | 4.32 |
| 16 | 80 | 7.6 | 2.82 | 4.77 | 4.58 |
| 21 | 68 | 6.4 | 2.82 | 3.61 | 4.55 |
| 26 | 59 | 5.6 | 2.82 | 2.78 | 4.34 |
| 31 | 53 | 5.0 | 2.82 | 2.16 | 4.01 |
| 36 | 48 | 4.5 | 2.82 | 1.67 | 3.61 |
| 41 | 43 | 4.1 | 2.82 | 1.28 | 3.14 |
| 46 | 40 | 3.8 | 2.82 | 0.95 | 2.64 |
| 51 | 37 | 3.5 | 2.82 | 0.68 | 2.09 |
| 56 | 35 | 3.3 | 2.82 | 0.45 | 1.52 |
| 61 | 33 | 3.1 | 2.82 | 0.25 | 0.92 |
| 66 | 31 | 2.9 | 2.82 | 0.08 | 0.31 |
| 71 | 29 | 2.7 | 2.82 | -0.08 | -0.33 |
| 76 | 28 | 2.6 | 2.82 | -0.21 | -0.97 |
| 81 | 26 | 2.5 | 2.82 | -0.34 | -1.63 |
| 86 | 25 | 2.4 | 2.82 | -0.45 | -2.30 |
| 91 | 24 | 2.3 | 2.82 | -0.55 | -2.98 |
| 96 | 23 | 2.2 | 2.82 | -0.64 | -3.67 |
| 101 | 22 | 2.1 | 2.82 | -0.72 | -4.37 |
| 106 | 21 | 2.0 | 2.82 | -0.80 | -5.07 |
| 111 | 21 | 2.0 | 2.82 | -0.87 | -5.78 |
| 116 | 20 | 1.9 | 2.82 | -0.93 | -6.49 |
| 121 | 19 | 1.8 | 2.82 | -0.99 | -7.21 |
| 126 | 19 | 1.8 | 2.82 | -1.05 | -7.94 |
| 131 | 18 | 1.7 | 2.82 | -1.10 | -8.67 |
| 136 | 18 | 1.7 | 2.82 | -1.15 | -9.40 |

Notes

- 1) For a storm duration that is less than the time of concentration the peak flow is equal to the product of 2.78CIA and the ratio of the storm duration to the time of concentration.
- 2) Rainfall Intensity, I = 998.071 / (Tc + 6.053)^{0.814} (5 year, City of Ottawa)
- 3) Peak Flow = Duration/Tc x 2.78 x C x I x A (Duration < Tc)
- 4) Peak Flow = 2.78 x C x I x A (Duration > Tc)
- 5) Storage = Duration x Storage Rate

Storage Volumes (100-Year Storm)

$$T_c = \frac{10}{1} \text{ (mins)}$$

$$C_{AVG} = \frac{1.00}{1} \text{ (dimensionless)}$$

$$\text{Area} = \frac{0.0339}{1} \text{ (hectares)}$$

$$\text{Storm} = \frac{100}{1} \text{ (year)}$$

$$\text{Release Rate} = \frac{2.82}{1} \text{ (L/sec)}$$

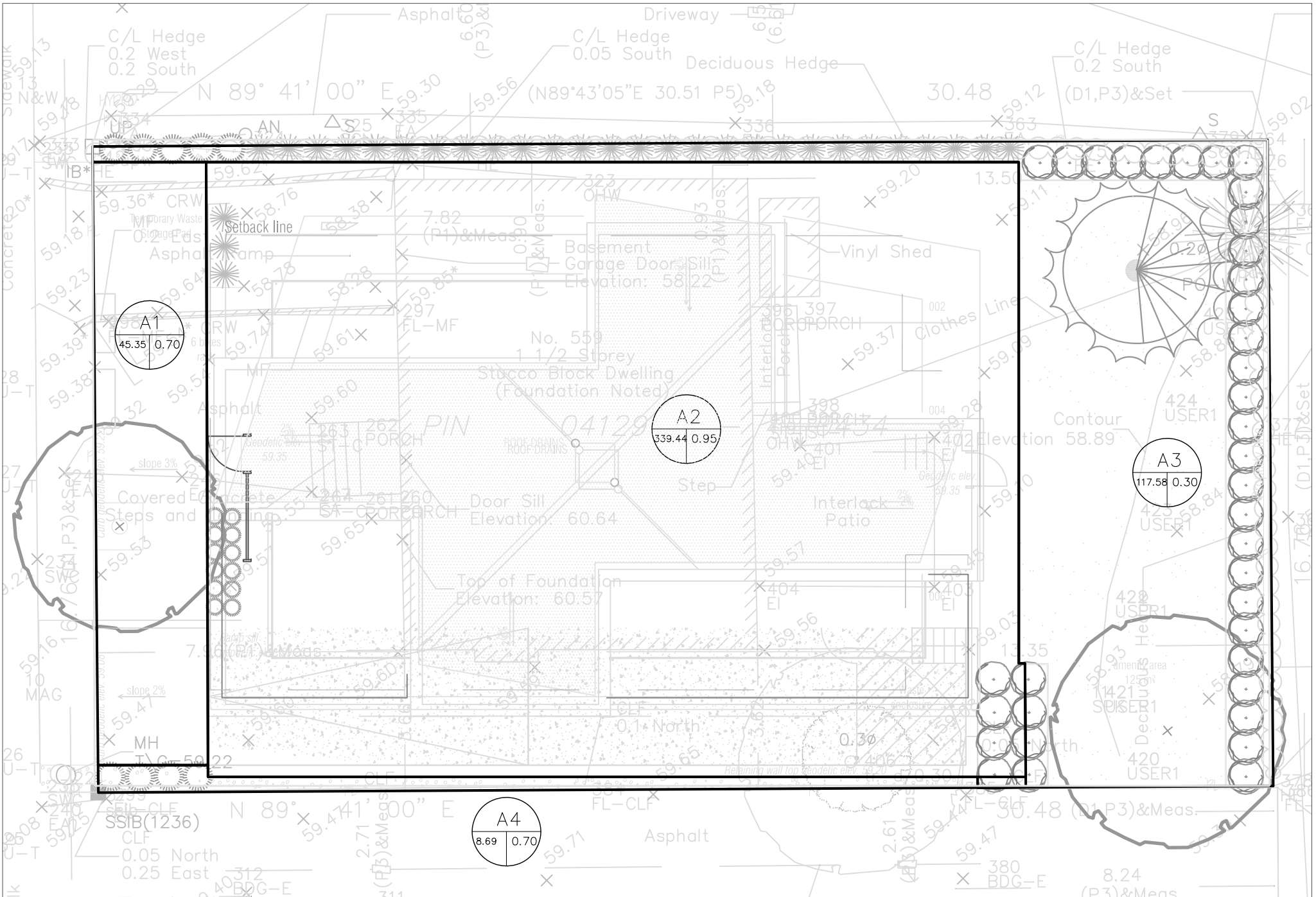
$$\text{Time Interval} = \frac{5}{1} \text{ (mins)}$$

| Duration (min) | Rainfall Intensity (mm/hr) | Peak Flow (L/sec) | Release Rate (L/sec) | Storage Rate (L/sec) | Storage (m ³) |
|----------------|----------------------------|-------------------|----------------------|----------------------|---------------------------|
| 1 | 351 | 3.3 | 2.82 | | |
| 6 | 226 | 12.8 | 2.82 | 9.98 | 3.59 |
| 11 | 170 | 16.0 | 2.82 | 13.21 | 8.72 |
| 16 | 138 | 13.0 | 2.82 | 10.16 | 9.75 |
| 21 | 116 | 11.0 | 2.82 | 8.16 | 10.28 |
| 26 | 101 | 9.5 | 2.82 | 6.73 | 10.50 |
| 31 | 90 | 8.5 | 2.82 | 5.66 | 10.52 |
| 36 | 81 | 7.6 | 2.82 | 4.82 | 10.41 |
| 41 | 74 | 7.0 | 2.82 | 4.15 | 10.20 |
| 46 | 68 | 6.4 | 2.82 | 3.59 | 9.92 |
| 51 | 63 | 5.9 | 2.82 | 3.13 | 9.58 |
| 56 | 59 | 5.6 | 2.82 | 2.73 | 9.18 |
| 61 | 55 | 5.2 | 2.82 | 2.39 | 8.75 |
| 66 | 52 | 4.9 | 2.82 | 2.09 | 8.29 |
| 71 | 49 | 4.6 | 2.82 | 1.83 | 7.79 |
| 76 | 47 | 4.4 | 2.82 | 1.60 | 7.28 |
| 81 | 45 | 4.2 | 2.82 | 1.39 | 6.74 |
| 86 | 43 | 4.0 | 2.82 | 1.20 | 6.18 |
| 91 | 41 | 3.8 | 2.82 | 1.03 | 5.61 |
| 96 | 39 | 3.7 | 2.82 | 0.87 | 5.03 |
| 101 | 38 | 3.5 | 2.82 | 0.73 | 4.43 |
| 106 | 36 | 3.4 | 2.82 | 0.60 | 3.82 |
| 111 | 35 | 3.3 | 2.82 | 0.48 | 3.19 |
| 116 | 34 | 3.2 | 2.82 | 0.37 | 2.56 |
| 121 | 33 | 3.1 | 2.82 | 0.27 | 1.93 |
| 126 | 32 | 3.0 | 2.82 | 0.17 | 1.28 |
| 131 | 31 | 2.9 | 2.82 | 0.08 | 0.62 |
| 136 | 30 | 2.8 | 2.82 | 0.00 | -0.04 |

Notes

- 1) For a storm duration that is less than the time of concentration the peak flow is equal to the product of 2.78CIA and the ratio of the storm duration to the time of concentration.
- 2) Rainfall Intensity, I = 1735.688 / (Tc + 6.014)^{0.820} (100 year, City of Ottawa)
- 3) Peak Flow = Duration/Tc x 2.78 x C x I x A (Duration < Tc)
- 4) Peak Flow = 2.78 x C x I x A (Duration > Tc)
- 5) Storage = Duration x Storage Rate





559 RIVERDALE AVE.
 SWM POSTDEVELOPMENT

ARCH-NOVA Design Inc.
 45 Banner Road NEPEAN ON K2H 8X5
 613-829-5722 contact@archnova.ca

Appendix B: Correspondence

From: White, Joshua <Joshua.White@ottawa.ca>
Sent: April 1, 2016 2:56 PM
To: 'gordana@archnova'
Cc: zoran@archnova.ca
Subject: RE: 559 Riverdale Ave: Boundary Conditions
Attachments: 559 Riverdale March 2016.pdf

Hello Zorn and Gordana,

Please find below the boundary conditions for your site. Please note that the maximum fire flow available is 85 L/s which is less than what has been requested, this may require either a change to the building design or the reconstruction of the watermain. Also due to the high pressure in the area a pressure reducing valve may be required.

I would recommend that you also get a copy of the hydrant pressure/flow tests for the hydrants in the area.

If you have any questions please let me know.

Josh

The following are boundary conditions, HGL, for hydraulic analysis at 559 Riverdale (zone 1W) assumed to be connected to the 152mm on Riverdale (see attached PDF for location).

Minimum HGL = 102.4m

Maximum HGL = 116.8m; *the maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

Available Flow = 85 L/s assuming a residual of 20 psi and a ground elevation of 59.2m

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.

Joshua White, P.Eng.
Project Manager, Infrastructure Approvals
Development Review, Urban Services, City of Ottawa
Please consider the environment before printing this e-mail.



City of Ottawa | Ville d'Ottawa

☎ 613.580.2424 ext./poste 15843

Email: joshua.white@ottawa.ca

ottawa.ca/planning / ottawa.ca/urbanisme

From: gordana@archnova [mailto:gordana@archnova.ca]

Sent: Friday, April 01, 2016 11:02 AM

To: White, Joshua

Cc: zoran@archnova.ca

Subject: FW: 559 Riverdale Ave: Boundary Conditions

Good morning Josh,

Our engineer Zoran Mrdja, has asked me to follow up with you regarding the 559 Riverdale Ave., boundary conditions. I have left a voice message this morning, but would like to follow up with an email.

Please advise if you need anything else from us, apart from the attached documents.

Best regards,

Gordana Mrdja, B.Sc.Arch.

Arch-Nova Design Inc.

45 Banner Road

Nepean, ON, K2H 8X5

613-829-5722

gordana@archnova.ca

From: zoran@archnova [mailto:zoran@archnova.ca]

Sent: March 21, 2016 1:29 PM

To: 'White, Joshua' <Joshua.White@ottawa.ca>

Subject: FW: 559 Riverdale Ave: Boundary Conditions

Hello Josh,

I am forwarding the email with attachments for 559 Riverdale Avenue.

Regards,

Zoran Mrdja, P.Eng., FEC

Arch-Nova Design Inc.

613-829-5722

From: zoran@archnova [<mailto:zoran@archnova.ca>]
Sent: March 20, 2016 10:23 PM
To: 'Kristin.bazinet@ottawa.ca' <Kristin.bazinet@ottawa.ca>
Subject: 559 Riverdale Ave: Boundary Conditions

Hello Kristin,

Please could you provide the boundary conditions for the location of 559 Riverdale Avenue. The owner is planning to construct a new apartment building at this location. Attached are the water and sewer calculations, water card, the site plan for proposed development and the City's updated UCC Central Registry plan

Type of development and the amount of fire flow required.

Average daily demand: 0.071 l/s.

Maximum daily demand: 0.67 l/s.

Maximum hourly daily demand: 1.01 l/s.

Also please could you provide the SWM requirements for this location?

Should you need more information please do not hesitate to contact us,

Zoran Mrdja, P.Eng., FEC
Arch-Nova Design Inc.
613-829-5722

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