

### Summary of Water Analysis

RFB Job No. 18-0119  
Date: 18-Oct-18

Calculations based on Architectural Site Plan dated August 14, 2018, and are in accordance with the City of Vancouver Sewer Design Manual (for population calculations) and MMCD Design Guidelines 2005 for per capita water usages.

| Building No.                  | Max. Day Demand (MDD)<br>Required (L/min) | Peak Hour Demand (PHD)<br>Required (L/min) | Fire Demand (F)<br>Required (L/min) | Design Flow ( $Q_{design}$ )<br>(MDD+F)<br>Required (L/min) |
|-------------------------------|---|--|-------------------------------------|---|
| MID-RISE<br>RESIDENTIAL UNITS | 113                                       | 170  | 6,000                               | <b>6,113</b>  |

Assumptions:

1. Mid-rise residential areas are assumed to be concrete construction with fully protected vertical openings
2. Assume residential areas are concrete construction.
3. All buildings are automatically sprinklered.
4. Fire flow calculations based on Fire Underwriter's Survey (1999)
5. In the absence of design data provided by the City, per capita water demands were taken from the MMCD 2005 Design Guideline Manual. Population equivalents were determined using the City of Vancouver Sewer Design Manual. This document uses site FSR information: 1 person per 35 sq. m for apartments/condos

**Domestic Flow Estimate**  
 Mixed-Use Development

Job #: 18-0119

City: City of Vancouver

Date: October 18, 2018

Address: 33rd Avenue and Quebec Street

Eng.: SS

**MID-RISE RESIDENTIAL UNITS**

(See Summary for assumptions)

1. Per Capita Demand:

Maximum day demand (D): 1,200 L/c/d  
 Peak hour demand (H): 1,800 L/c/d

as per MMCD Design Guideline Manual

2. Design Population:

| Unit Type | Units | FSR | Floor Area (sq. m) | Pop. Density | Design Population |
|-----------|-------|-----|--------------------|--------------|-------------------|
| Condo     | 55    | 2.3 | 4739               | 35           | 136               |

2. Assume residential areas are concrete construction.

3. Demand:

D= 113 L/min  
 H= 170 L/min

**Fire Flow Estimate**  
 Mid-Rise Residential

Job #: 18-0119

City: City of Vancouver

Address Quebec St and 33rd Avenue

Date: October 18, 2018

Eng.: Spencer Smythies

Prev. Fire Flow No.: \_\_\_\_\_

Fire Flow No.: \_\_\_\_\_

Formula (a): **F = 220 \* C \* A<sup>1/2</sup>**

- C =**
- 1.5 for wood frame construction
  - 1.0 for ordinary construction  
(brick or other masonry walls, combustible floor and interior)
  - 0.8 for non-combustible construction  
(unprotected metal structural components, masonry or metal walls)
  - 0.6 for fire-resistive construction (fully protected frame, floors, roof)

**MID-RISE RESIDENTIAL UNITS**

(See Summary for assumptions)

Fire Area Considered: 1,397 m<sup>2</sup> (Floor area of the largest floor plus 25 percent of each adjoining floor)

A. Type of Construction: Concrete **C =** 0.8

|                        |                          |                 |          |
|------------------------|--------------------------|-----------------|----------|
| B. Level 1 Floor Area: | <u>838 m<sup>2</sup></u> | No. of Storeys: | <u>1</u> |
| Level 2 Floor Area:    | <u>899 m<sup>2</sup></u> | No. of Storeys: | <u>1</u> |
| Level 3 Floor Area:    | <u>938 m<sup>2</sup></u> | No. of Storeys: | <u>1</u> |
| Level 4 Floor Area:    | <u>938 m<sup>2</sup></u> | No. of Storeys: | <u>1</u> |
| Level 5 Floor Area:    | <u>563 m<sup>2</sup></u> | No. of Storeys: | <u>1</u> |
| Level 6 Floor Area:    | <u>563 m<sup>2</sup></u> | No. of Storeys: | <u>1</u> |

C. Total Floor Area: 4,739 m<sup>2</sup>

D. Fire Flow From Formula (a): = 7,000 L/min

E. Occupancy: Low Hazard / Non-Combustible Subtract: 25% -1750 L/min  
**Subtotal (b)** 5,250 L/min

F. Automatic Sprinklers: Yes Subtract: 50% x (b) = -2,625 L/min

G. Exposures:

|                        |             |                      |                    |           |
|------------------------|-------------|----------------------|--------------------|-----------|
| 1. Front               | <u>20 m</u> | Add                  | <u>15%</u>         | <u>15</u> |
| 2. Rear                | <u>14 m</u> | Add                  | <u>15%</u>         | <u>15</u> |
| 3. Left                | <u>0 m</u>  | Add                  | <u>25%</u>         | <u>25</u> |
| 4. Right               | <u>25 m</u> | Add                  | <u>10%</u>         | <u>10</u> |
| <b>Total (max 75%)</b> |             | <b>65% x (b) = +</b> | <u>3,413 L/min</u> |           |

H. Fire Flow Required 7,000 L/min 117 L/s

- Assume concrete construction
- Assumed building is low hazard for Section E (apartment, 1hr fire rated load bearing and party walls)
- Assumed building has fully automatic sprinkler system (30%), standard water supply (10%), and has a fully supervised system (10%) for a total of 50% in Section F
- Values for Section G are approximated based on Vancouver GIS orthophoto and current Architectural drawings
- Required fire flow based on Fire Underwriters Survey - 1999 - Water Supply for Public Fire Protection