

PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

FOR

RE-ZONING

CITY OF OTTAWA

SERVICING REPORT

REPORT R-819-106A

T.L. MAK ENGINEERING CONSULTANTS LTD.

APRIL 2023

REFERENCE FILE NUMBER 819-106

Table of Contents

| | PAGE |
|---|------|
| Introduction | 1 |
| Existing Site Conditions and Servicing..... | 1 |
| Proposed Stacked Dwelling | 2 |
| A. Water Supply | 2 |
| Demand Projections | 2 |
| Boundary Conditions..... | 3 |
| Hydraulic Analysis | 3 |
| Maximum Day + Fire Flow | 4 |
| Conclusions..... | 5 |
| B. Sanitary Flow | 5 |
| C. Storm Flow | 6 |
| Development Property Area Calculations..... | 6 |
| Pre-development Flow Estimation | 7 |
| Post-development Flow Estimation..... | 8 |
| Erosion and Sediment Control | 10 |

Appendices

| | |
|-------------------|--|
| Appendix A | Site Plan and Legal Survey Plan |
| Appendix B | Site Pre-development Condition <ul style="list-style-type: none">- Google Image (2019)- Aerial Images (2019 - GeoOttawa) |
| Appendix C | Moodie Drive City of Ottawa Plan & Profile and UCC Drawings |
| Appendix D | City of Ottawa <ul style="list-style-type: none">- Site Plan and Architectural Drawing- FUS Fire Flow Calculations- FUS Exposure Distance (Figure 1)- Water Boundary Conditions- Supporting Hydraulic Calculations- Figure 3 – Firewall Configuration for Wood Construction At 572 Moodie Drive- Figure 4 – Firewall Configuration for Wood Construction At 572 Moodie Drive (1)- Figure 5 – Firewall Configuration for Wood Construction At 572 Moodie Drive (2)- Figure 6 – Hydrant Spacing for 572 Moodie Drive |
| Appendix E | Sanitary Sewer Design Sheet - Sheet No. 1 of 1 |
| Appendix F | Development Servicing Study Checklist Summary |

Introduction

The developer (Jami Omar Mosque) of the residential property under consideration is proposing to apply for a minor re-zoning I1B[407]H15 of the site at 572 Moodie Drive in order to permit construction of a 3 ½ storey stacked dwelling comprising of 6 residential units.

The proposed re-development site (± 0.0767 ha.) at 572 Moodie Drive abuts the existing 3990 Old Richmond Road Jami Omar Mosque complex. This site is located at the west side of Moodie Drive, south of Arnold Drive and north of Songbird Private. See site plan and legal survey plan in Appendix A for details. The proposed stacked building contains six (3) bedroom units. The other development features will consist of landscaped area at the front and rear of the building, a concrete access ramp to the main entrance, etc. to meet City of Ottawa's site plan requirements.

Legal property description of this site is referenced as Part of Lots 32 and 33 Concession 5 (Rideau Front) Geographical Township of Nepean City of Ottawa located in Ward 8 (College).

A site geotechnical report was prepared by the owner's soils engineer EXP entitled "Geotechnical Investigation – Proposed Building Additions" – 4000 Old Richmond Road, 572 Moodie Drive (Project No. OTT-00260904-AO) dated September 4, 2020 for this proposed development property.

T.L. Mak Engineering Consultants Ltd. has been retained to provide a "Servicing Report" for this site as a supplement to the site re-zoning application process.

Existing Site Conditions and Servicing

This property is currently occupied by a 1 ½ storey stucco siding residential building. The building is linked to Moodie Drive by an existing interlock pedestrian pathway. There exist a (2) car asphalt parking area located in front of the building which is adjacent to the existing asphalt access road into the Mosque at 3990 Old Richmond Road. The existing south half of the lot at the front and rear of the house is mostly covered with soft landscaping. Additionally, an existing interlock patio area of approximately ± 90.0 sq.m is found at the rear north-west quadrant of the Imam's residence.

The existing topography of the land is found to be sloped primarily to drain from west to east (back to front) across the site. The existing gradient of the lot is found to be sloping at an approximate gradient of $\pm 1.35\%$.

The existing house water and sanitary service lateral currently servicing the existing dwellings on 572 Moodie Drive will be removed. The existing water services shall be blanked at the main

and the existing house laterals shall be capped at the front property line for re-development of this site.

As for the availability of underground municipal services, there are existing municipal services along Moodie Drive in front of this property consisting of a 750mm diameter storm sewer, a 250mm diameter sanitary sewer, and a 200mm diameter watermain for development of this property. Refer to the City of Ottawa Moodie Drive UCC and As-built plan and profile drawings included in Appendix C for details.

For additional details of the site's pre-development conditions, refer to the coloured Google Image and aerial photography from (GeoOttawa 2019) in Appendix B.

Proposed Stacked Dwelling

A. Water Supply

The proposed building located within the City of Ottawa's pressure zone 2W at 572 Moodie Drive is a 3.5 storey stacked residential townhouses. The building contains six 3-bedroom units. The total gross floor area is 1,184 m² (12,745 ft²), equivalent to 296 m²/floor (3,186 ft²/floor). The building is to be serviced by the 200 mm diameter watermain along Moodie Drive. The building will not have sprinklers.

The ground elevation along Moodie Drive in front of the property in question is approximately 99.4 m, as provided by the City in the **Water Boundary Conditions Email** (See Appendix D) for details.

Demand Projections

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines, where the residential consumption rate of 350 L/cap/d was used to estimate average day demands (AVDY). Maximum day (MXDY) demands were calculated by multiplying AVDY demands by a factor of 2.5. Peak hour (PKHR) demands were calculated by multiplying MXDY by a factor of 2.2. Persons per unit (PPU) for each unit were estimated based on the City of Ottawa's Water Design Guidelines. **Table 1** show the estimated domestic demands of the proposed building at 572 Moodie Drive.

Table 1: Estimated Domestic Demand at 572 Moodie Drive

| Unit Type | Unit Count | PPU | Consumption Rate (L/c/d) | AVDY | | MXDY | | PKHR | |
|----------------------|------------|-----|--------------------------|--------------|-------------|---------------|-------------|---------------|-------------|
| | | | | L/d | L/s | L/d | L/s | L/d | L/s |
| Apartment, 3-Bedroom | 6 | 3.1 | 350 | 6,510 | 0.08 | 16,275 | 0.19 | 35,805 | 0.41 |
| Total | 6 | | | 6,510 | 0.08 | 16,275 | 0.19 | 35,805 | 0.41 |

The fire flows required were determined following the Fire Underwriter Survey (FUS) method and are provided in the attached worksheets in Appendix D.

The proposed building at 572 Moodie Drive will be wood construction and will not have sprinklers. It is assumed that the basement will be more than 50% below ground level. The resulting total required FUS fire flow is 12,000 L/min (200 L/s) for a duration of 2.5 hours.

Details are provided in the **FUS Fire Flow Calculations** attached in Appendix D. **Figure 1** provides separation distances from adjacent buildings. The proposed **Site Plan** attached in Appendix D was used to determine distances from the proposed building to the property lines

In summary, for the building at 572 Moodie Drive:

- AVDY = 6,510 L/d (0.08 L/s)
- MXDY = 16,275 L/d (0.19 L/s);
- PKHR = 35,805 L/d (0.41 L/s); and,
- Fire Flow = 12,000 L/min (200 L/s).

Boundary Conditions

The hydraulic gradeline (HGL) boundary conditions for 572 Moodie Drive, as presented in **Table 2**, were provided by the City on April 29, 2021 (see attached **Water Boundary Conditions Email** in Appendix D).

Table 2: Boundary Conditions for 572 Moodie Drive

| Demand Scenario | Head (m) | Flow (L/s) |
|---------------------------------------|----------|------------|
| Minimum HGL (Peak Hour) | 126.8 | |
| Maximum HGL (Average Day) | 132.1 | |
| Available Fire Flow @ Residual 20 psi | | 117 |

Hydraulic Analysis

Peak Hour & Average Day

During peak hour demands, the resulting minimum hydraulic gradeline of 126.8 m corresponds to a peak hour pressure of 269 kPa (39 psi). This value is 6 kPa (1 psi) below the minimum pressure objective of 276 kPa (40 psi) for residential buildings up to two storeys. It is recommended that the service line be oversized to reduce the headloss entering the building, and therefore meet the minimum pressure objective. Adding 5 psi per floor above two stories, a minimum pressure of 310 kPa (45 psi) would be required for the third floor. In addition to oversizing the service line, the proponent will have to implement measures to ensure sufficient

pressures to the third floor and this may include individual internal booster pumping and/or oversized internal plumbing within the building.

During average day demands, the resulting maximum hydraulic gradeline of 132.1 m corresponds to a maximum pressure of 321 kPa (46 psi). This value is less than the maximum pressure objective of 552 kPa (80 psi) and therefore considered acceptable. This value is also above the minimum pressure value of 310 kPa (45 psi) recommended for a three-storey building.

Supporting hydraulic calculations are attached in Appendix D.

Maximum Day + Fire Flow

The reported available fire flow at a residual pressure of 20 psi is 117 L/s (7,020 L/min).

Based on Table 1 of Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02 and a desktop review (i.e., Google Street View) to confirm hydrant class, the combined hydrant flow coverage for the building is estimated to be 13,248 L/min, which exceeds the FUS required fire flow (RFF) of 12,000 L/min. However, it should be noted that hydrant flow coverages are limited to the available flow per the City's Boundary Condition.

Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02 specifies that an RFF of 10,000 L/min is required to protect a block of townhouses up to 600 m² in footprint. Based on the boundary conditions provided by the City, a flow of 10,000 L/min at a residual pressure above the minimum of 140 kPa (20 psi) would be available from the Old Richmond Rd watermain, and the proponent could consider connecting to that watermain to provide the RFF.

Alternatively, to reduce the RFF to the available 7,000 L/min or less, the proponent could separate the stacked dwellings with firewalls. If wood construction is maintained, using two firewalls would reduce the RFF to 6,000 L/min to 7,000 L/min, depending on the unit considered. This configuration is illustrated in **Figure 3** in Appendix D and supporting **FUS Fire Flow Calculations** are provided (calculations #3 to #5).

If instead of wood, ordinary construction is adopted, one firewall could be installed, reducing the RFF to 4,000 L/min to 6,000 L/min, depending on the configuration and the units considered. This is illustrated in **Figure 4** and in **Figure 5**, and supporting **FUS Fire Flow Calculations** are provided (calculations #6 to #9) in Appendix D.

Hydrant coverage and classes are illustrated in **Figure 6** attached in Appendix D. A breakdown of available hydrant flow is summarized in **Table 6**.

C. Storm Flow

The storm water outlet for the proposed development property will be the existing 750mm diameter concrete storm sewer located on Moodie Drive. The proposed 3 ½ storey three unit stacked dwelling is designed with pitched roofs and therefore on-site flat rooftop attenuation is not achievable with this proposed building on a small parcel of land ±0.0767 ha.

The building foundation weeping tile drainage system shall have its own separate pipe for gravity flow where weeping tile water is outletted via a 135mm diameter storm lateral to the existing 750mm diameter storm sewer from each of the (3) units.

Based on the current residential site plan from the owner's architect, the average post development runoff coefficient is estimated at $C = 0.75$ and $A = 0.0767$ hectares.

The pre-development C_{pre} is estimated at $C_{pre} = 0.64$. Discussions were held with City Engineering staff and they recognize the limited lot size to building area of this site. Therefore, the site is to be designed with as much soft landscaping as possible so as to minimize post development flow impact and achieve where possible flows approximating to that of the pre-development levels into the existing Moodie Drive ditching and storm piping system.

The proposed 3 ½ storey stacked dwelling at this site was architecturally designed with pitch roofs to comply with City's planning requirement and meeting the Architectural consistency of the immediate neighbourhood.

Development Property Area

Post-Development Site Area Characteristics

| | | |
|----------------------|---|-----------------------|
| Development Lot Area | = | 767.10 m ² |
| Roof Surface Area | = | 393.94 m ² |
| Concrete Area | = | 24.04 m ² |
| Grass Area | = | 163.66 m ² |
| Asphalt Area | = | 185.46 m ² |

$$C = \frac{(393.94 \times 0.9) + (163.66 \times 0.9) + (24.04 \times 0.9) + (185.46 \times 0.2)}{767.10}$$

$$C = \frac{575.828}{767.10}$$

$$C = 0.7507$$

Say "C" = 0.75

Therefore, the average post-development "C" for this site is 0.75.

Pre-Development Flow Estimation

Node #102 (See Dwg. No. 819-106 D-2)

Pre-Development Site Area Characteristics

| | | |
|----------------------|---|-----------------------|
| Development Lot Area | = | 767.10 m ² |
| Asphalt Area | = | 175.86 m ² |
| Concrete Area | = | 17.86 m ² |
| Roof Area | = | 261.26 m ² |
| Grass Area | = | 284.20 m ² |
| Interlock Area | = | 27.92 m ² |

$$C_{pre} = \frac{(261.26 \times 0.9) + (175.86 \times 0.9) + (27.92 \times 0.8) + (284.2 \times 0.2) + (11.66 \times 0.9)}{767.10}$$

$$C_{pre} = \frac{488.658}{767.10}$$

$$C_{pre} = 0.637$$

$$\text{Say } C_{pre} = 0.64$$

$T_c = D/V$ where $D = 26.0$ m, $\Delta H = 0.35$ m, $S = 1.35\%$, and $V = 0.85$ feet/second = 0.26 m/s

Therefore,

$$T_c = \frac{26.0 \text{ m}}{0.26 \text{ m/s}}$$

$$T_c = 1.73 \text{ minutes}$$

Use $T_c = 10$ minutes

$$I_2 = 77.10 \text{ mm/hr [City of Ottawa, two (2)-year storm]}$$

Using the Rational Method

$$Q = 2.78 (0.64) (77.10) (0.0767)$$

$$Q = 10.52 \text{ L/s}$$

Therefore, the two (2)-year pre-development flow is 10.52 L/s.

The pre-development flow of the two (2)-year and 100-year storm event draining to the Moodie Drive road right of way is as follows:

Where, $T_c = 10$ min.

$$Q_{2pre} = 2.78 \text{ CIA}$$

$$C_{2pre} = \frac{488.658}{767.10}$$

$$C_{2pre} = 0.637$$

$$\text{Say, } C_{2pre} = 0.64$$

$$Q_{2pre} = 2.78 (0.64) (77.10) (0.0767) \\ = 10.52 \text{ L/s}$$

$$C_{100pre} = \frac{(261.26 \times 1.0) + (175.86 \times 1.0) + (27.92 \times 1.0) + (11.66 \times 1.0) + (284.20 \times 0.2 \times 1.25)}{767.10}$$

$$C_{100pre} = \frac{547.75}{767.10}$$

$$C_{100pre} = 0.714$$

$$\text{Say, } C_{100pre} = 0.71$$

$$Q_{100pre} = 2.78 (0.71) (178.6) (0.0767) \\ = 27.04 \text{ L/s}$$

Therefore under current site conditions the 2 year pre-development flow is estimated at 10.52 L/s and the 100 year pre-development flow is estimated at 27.04 L/s.

A coloured Google image and aerial photography of these current pre-development conditions of the site is provided in Appendix C of this report for reference.

Post-Development Flow Estimation

Node #10 (See Dwg. No. 819-106 D-2)

The post-development flow of the two (2)-year and 100-year storm event all draining to the existing Moodie Drive road right of way uncontrolled is as follows:

2-Year Storm Event

Where, $T_c = 10$ min.

Node #10

$$Q_{2\text{post}} = 2.78 \text{ CIA}$$

$$C_{2\text{post}} = 0.7507$$

$$\text{Say, } C_{2\text{post}} = 0.75$$

$$Q_{2\text{post}} = 2.78 (0.75) (77.10) (0.0767) \\ = 12.33 \text{ L/s}$$

100-Year Storm Event

$$C_{100\text{post}} = \frac{(393.94 \times 1.0) + (185.46 \times 0.2 \times 1.25) + (163.66 \times 1.0) + (24.04 \times 1.0)}{767.10}$$

$$C_{100\text{post}} = \frac{628.005}{767.10}$$

$$C_{100\text{post}} = 0.819$$

$$\text{Say, } C_{100\text{post}} = 0.82$$

$$Q_{100\text{post}} = 2.78 (0.82) (178.6) (0.0767) \\ = 31.23 \text{ L/s}$$

Therefore under post development condition, the 2 year uncontrolled flow off-site is estimated at 12.33 L/s and the 100 year uncontrolled flow is 31.23 L/s.

The said site at 572 Moodie Drive is proposed to house a 3 ½ storey stacked dwelling unit with pitch roofs. Discussions were held with the City Engineering Department and it was agreed that softening the site as much as possible and thereby mitigating the post development 2 Year and 100 Year flow impact to be within a reasonable range of increase from that of the pre-development 2 Year to 100 Year flow level.

The **2 Year event** post development flow is estimated at 12.33 L/s with pre-development flow calculated at 10.52 L/s which is an increase of 1.81 L/s to the Moodie Drive roadway ditch system and 750mm large diameter storm sewer.

The **100 Year event** post development flow is estimated at 31.23 L/s with pre-development flow calculated at 27.04 L/s which is an increase of 4.19 L/s to the city 750 mm large diameter storm sewer and roadway ditch system at Moodie Drive.

In comparing the magnitude of the 2 Year and 100 Year pre and post development flow, the 2 Year post development flow of 12.33 L/s is slightly higher than the 2 Year pre-development flow of 10.52 L/s. As for the 100 Year post development flow of 31.23 L/s it is 4.19 L/s greater than the 100 Year pre-development flow of 27.04 L/s. Therefore, drainage from this proposed site development will increase the 2 Year flow by $\pm 17.0\%$ and $\pm 15.0\%$ for the 100 Year event in comparison to the current stormwater loading to the existing municipal storm sewer system. Therefore, the proposed re-development site at 572 Moodie Drive is not expected to negatively impact the existing municipal storm sewer system.


The building weeping tile drainage system will outlet via its separate 100mm diameter PVC storm lateral for each of the (3) separate stacked units, where upon the (3) laterals are connected directly to the existing Moodie Drive 750mm diameter storm sewer. Refer to the Proposed Site Grading and Servicing Plan (Dwg. 819-106 G-2) for details.

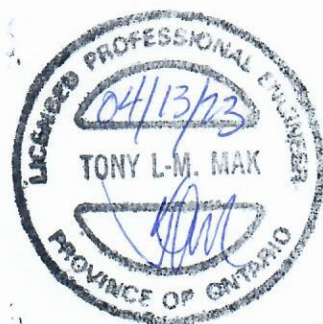
Erosion and Sediment Control

The contractor shall implement Best Management Practices to provide for protection of the receiving storm sewer during construction activities. These practices are required to ensure no sediment and/or associated pollutants are released to the receiving watercourse. These practices include installation of a "silt sack" catch basin sediment control device or equal in catch basins as recommended by manufacturer on-site and off-site within the Moodie Drive road right of way adjacent to this property. Siltsack shall be inspected every 2 to 3 weeks and after major storm. The deposits will be disposed of as per the requirements of the contract. See Dwg. 819-106 ESC-2 for details.

Refer to Appendix F for the summary of the Development Servicing Study Checklist that is applicable to this development.

PREPARED BY T.L. MAK ENGINEERING CONSULTANTS LTD.


TONY L. MAK, P.ENG



PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

CITY OF OTTAWA

APPENDIX A

SITE PLAN AND LEGAL SURVEY PLAN

PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

CITY OF OTTAWA

APPENDIX B

SITE PRE-DEVELOPMENT CONDITION

GOOGLE IMAGE (2019)

AND

AERIAL PHOTOGRAPHY 2019 (GEOOTTAWA)







PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

CITY OF OTTAWA

APPENDIX C

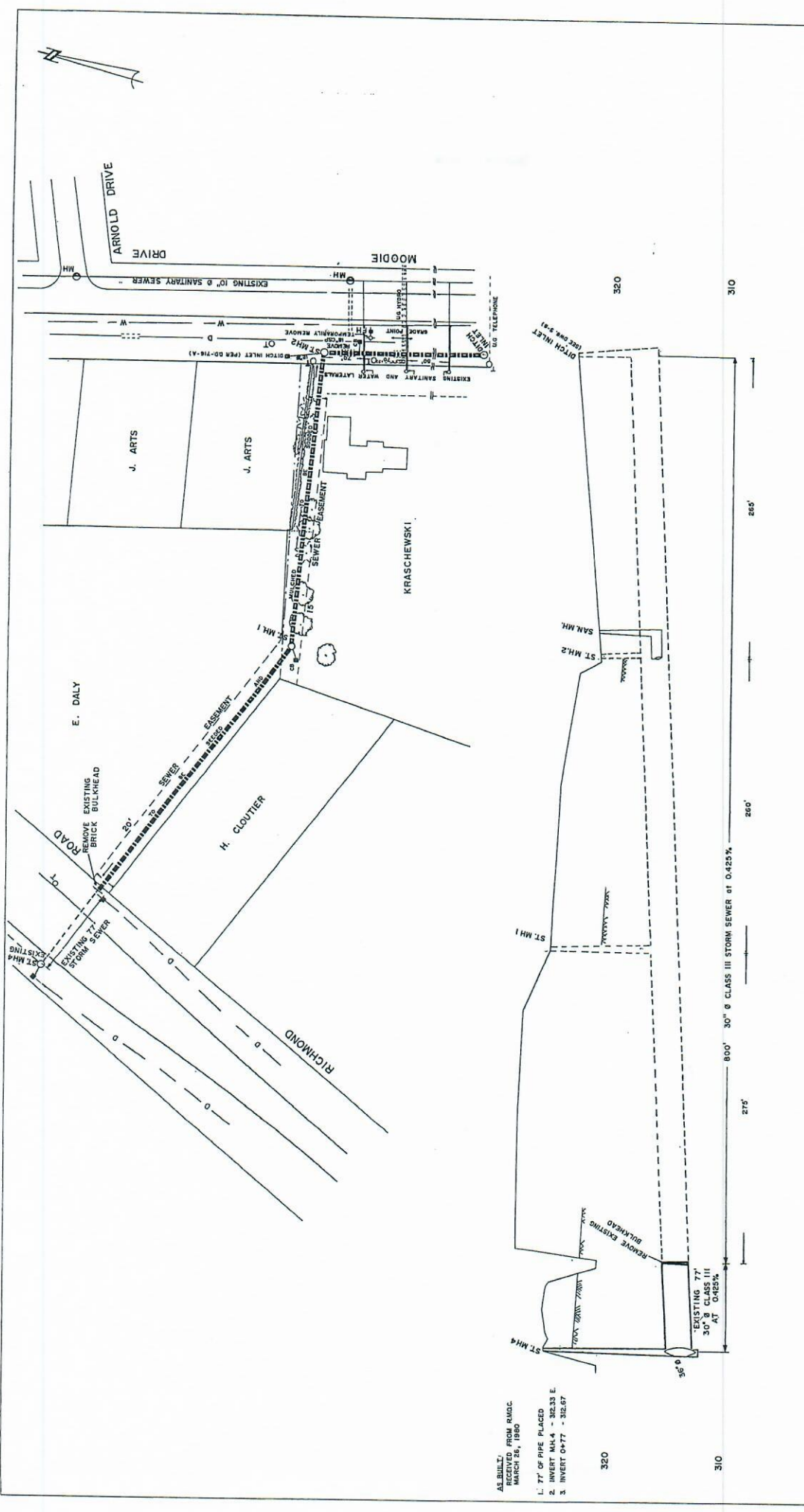
MOODIE DRIVE

CITY OF OTTAWA

PLAN AND PROFILE

AND

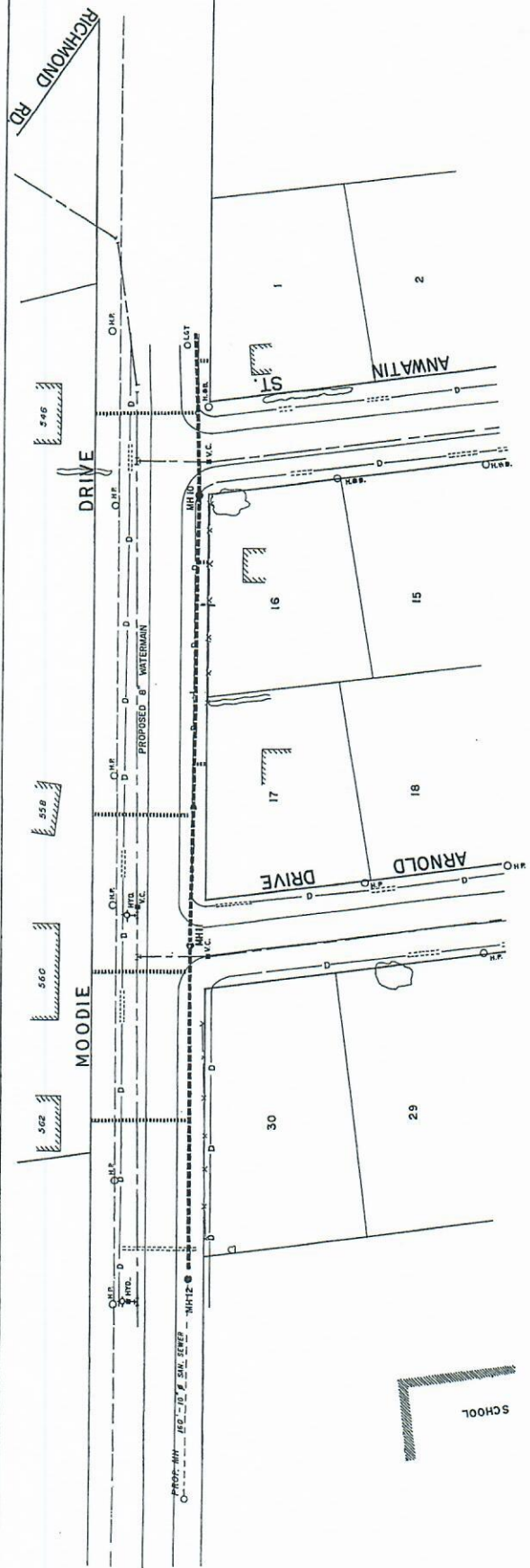
UCC DRAWINGS



AS BUILT
RECEIVED FROM RMDC
MARCH 26, 1980

1. 77' OF PIPE PLACED
2. INVERT M4.4 - 312.33 E.
3. INVERT 0+77 - 312.67

| CITY OF NEPEAN WORKS DEPARTMENT | | MOODIE DRIVE STORM SEWERS | | <small>DWG. NO.</small> 143 <small>SCALE</small> 1" = 40' <small>DATE</small> 11/3/80 <small>COMMISSIONER OF WORKS</small> <small>A.C. BELLINGER, P. ENG.</small> <small>DWG. NO.</small> | |
|------------------------------------|------------|------------------------------|-------|--|--------|
| STATIONS | ELEVATIONS | | 30+80 | 316.07 | 323.40 |
| | SURFACE | STORM INVERT | | | |
| 22+05 | 311.63 | 312.33 | 22+16 | 312.70 | 323.50 |
| 22+40 | 312.56 | 312.67 | 22+72 | 320.80 | 324.30 |
| 22+90 | 322.90 | 327.90 | 23+00 | 327.40 | 325.10 |
| 24+00 | 327.90 | 327.90 | 24+00 | 327.40 | 325.10 |
| 25+50 | 327.40 | 327.40 | 26+00 | 324.70 | 324.30 |
| 26+00 | 324.70 | 324.70 | 26+10 | 314.90 | 320.80 |
| 26+50 | 314.90 | 314.90 | 28+00 | 312.60 | 322.60 |
| 28+10 | 312.60 | 312.60 | 28+15 | 314.90 | 320.80 |
| 30+80 | 316.07 | 316.07 | 30+80 | 316.07 | 323.40 |

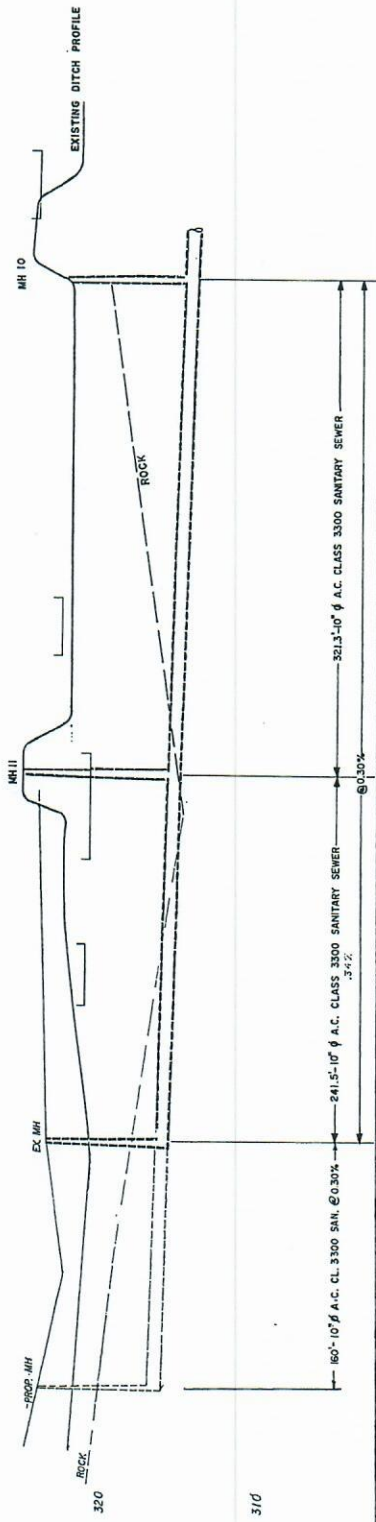


NOTE: BASEMENT ELEVATIONS
--- WEST SIDE
--- EAST SIDE

330

320

310



| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------|--|-------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| TOWNSHIP OF NEPEAN DEPARTMENT OF ENGINEERING | | ARBEATHA PARK SANITARY SEWERS (NEW SCHOOL) | | DWG. NO. 9405-4 SCALE 1"=40' DATE 13-4-71 COMMISSIONER OF WORKS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STATIONS | ELEVATIONS | 324.6 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 | 322.0 |

PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

CITY OF OTTAWA

APPENDIX D

CITY OF OTTAWA

- **SITE PLAN AND ARCHITECTURAL DRAWING**
- **FUS FIRE FLOW CALCULATIONS**
- **FUS EXPOSURE DISTANCE (FIGURE 1)**
- **WATER BOUNDARY CONDITIONS**
- **SUPPORTING HYDRAULIC CALCULATIONS**
- **FIGURE 3 – FIREWALL CONFIGURATION FOR WOOD CONSTRUCTION AT 572 MOODIE DRIVE**
- **FIGURE 4 – FIREWALL CONFIGURATION FOR WOOD CONSTRUCTION AT 572 MOODIE DRIVE (1)**
- **FIGURE 5 – FIREWALL CONFIGURATION FOR WOOD CONSTRUCTION AT 572 MOODIE DRIVE (2)**
- **FIGURE 6 – HYDRANT SPACING FOR 572 MOODIE DRIVE**

SITE PLAN AND ARCHITECTURAL DRAWING

LOW-RISE APARTMENT
BUILDING
3990 OLD RICHMOND
ROAD
STACKED DWELLING
572 MOODIE DRIVE

| | | |
|----|---------------------|-----------------------------|
| 1 | PROJECT NO. | 18-001 |
| 2 | PROJECT NAME | LOW-RISE APARTMENT BUILDING |
| 3 | PROJECT ADDRESS | 3990 OLD RICHMOND ROAD |
| 4 | PROJECT CITY | ST. LOUIS, MO |
| 5 | PROJECT STATE | MISSOURI |
| 6 | PROJECT ZIP | 63113 |
| 7 | PROJECT PHONE | (314) 322-3237 |
| 8 | PROJECT FAX | (314) 322-3237 |
| 9 | PROJECT EMAIL | s.smith@stsmith.com |
| 10 | PROJECT DATE | APRIL 2018 |
| 11 | PROJECT SCALE | 1/8" = 1'-0" |
| 12 | PROJECT SHEET NO. | 18-001-01 |
| 13 | PROJECT SHEET TOTAL | 18-001-02 |

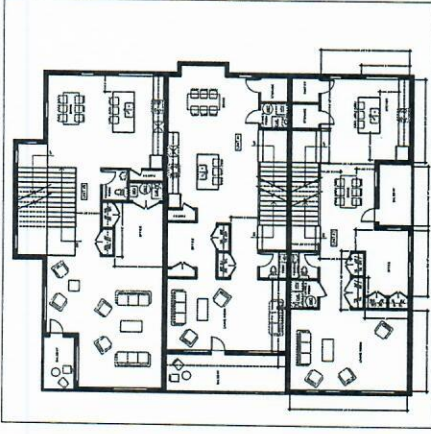
NOTE:
1. All dimensions are to be checked on site.
2. All work to be done should be reported prior to work on site or prior to construction.
3. All work to be done should be reported prior to work on site or prior to construction.
4. Drawings to be used in conjunction with structural drawings.

SUSAN D. SMITH ARCHITECT
841 MERVILE RD.
ST. LOUIS, MO 63113
(314) 322-3237
s.smith@stsmith.com

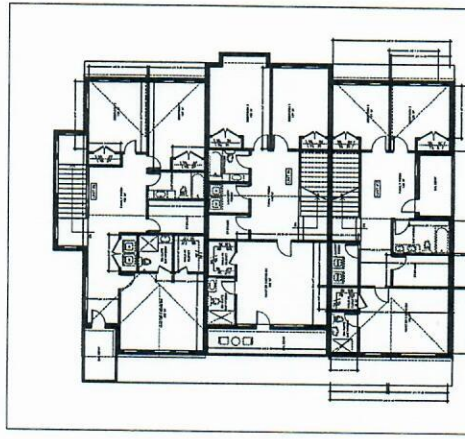
ZONING AMENDMENT
3990 OLD RICHMOND ROAD &
572 MOODIE DRIVE
FLOOR PLANS
ELEVATIONS

PROJECT NO. 18-001
PROJECT NAME LOW-RISE APARTMENT BUILDING
PROJECT ADDRESS 3990 OLD RICHMOND ROAD
PROJECT CITY ST. LOUIS, MO
PROJECT STATE MISSOURI
PROJECT ZIP 63113
PROJECT PHONE (314) 322-3237
PROJECT FAX (314) 322-3237
PROJECT EMAIL s.smith@stsmith.com

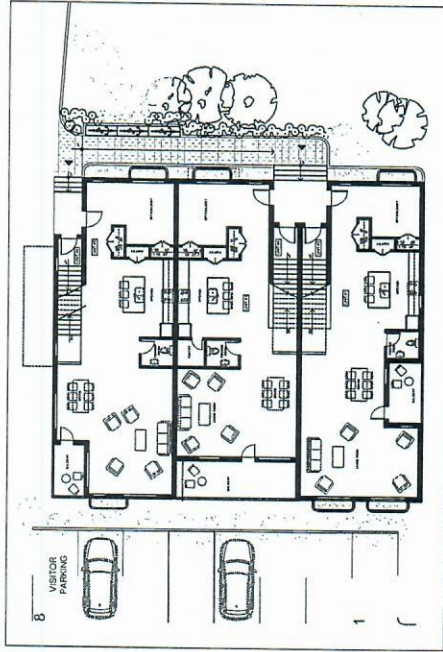
A3



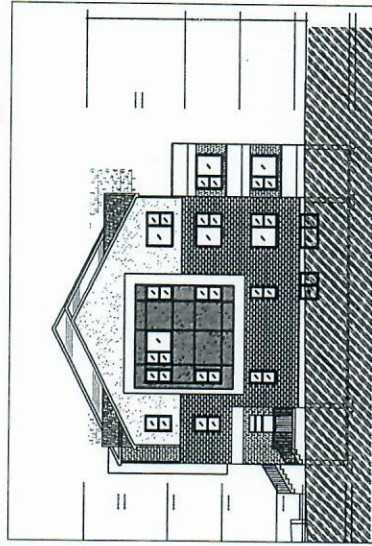
2 SECOND FLOOR
Scale: 1/8" = 1'-0"



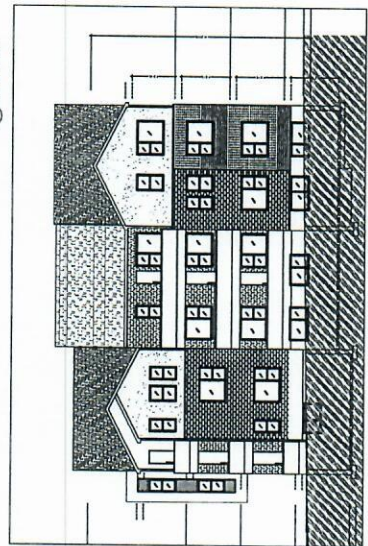
4 FOURTH FLOOR
Scale: 1/8" = 1'-0"



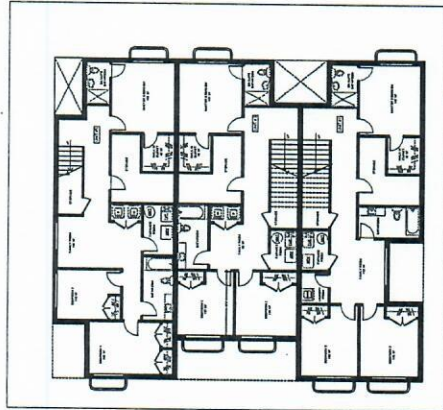
3 GROUND FLOOR
Scale: 1/8" = 1'-0"



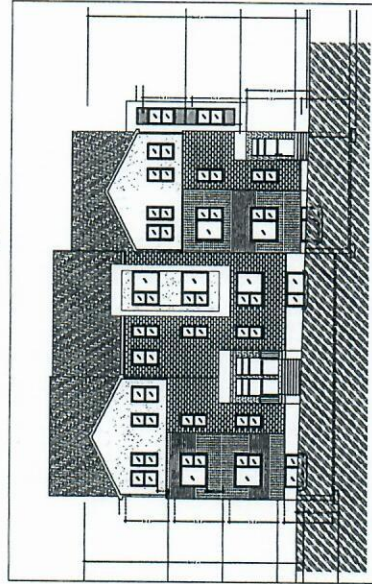
6 NORTH ELEVATION
Scale: 1/8" = 1'-0"



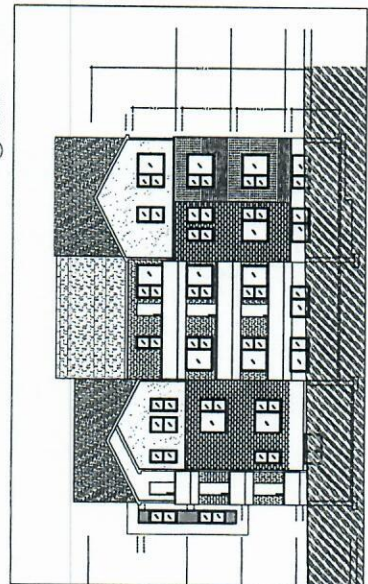
8 SOUTH ELEVATION
Scale: 1/8" = 1'-0"



1 BASEMENT
Scale: 1/8" = 1'-0"



5 FRONT (EAST) ELEVATION
Scale: 1/8" = 1'-0"



7 REAR (WEST) ELEVATION
Scale: 1/8" = 1'-0"

FUS FIRE FLOW CALCULATIONS



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084
 Project Name: 572 Moodie Dr
 Date: April 21, 2021
 Data inputted by: Christène Razafimaharo, M.Sc., EIT
 Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 2
 Building Type/Description/Name: Residential

Notes: Basement is more than 50% below grade.

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 | Coefficient related to type of construction (C) | Framing Material | | | | | | |
| | | | Wood Frame | 1.5 | Wood Frame | 1.5 | m | | |
| | | | Ordinary construction | 1 | | | | | |
| | | | Non-combustible construction | 0.8 | | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | | |
| | | | Fire resistive construction (> 2 hrs) | 0.6 | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Type of Housing | Floor Space Area | | | | | | |
| | | | Single Family | 1 | Other (Comm, Ind, Apt etc.) | 6 | Units | | |
| | | | Townhouse - indicate # of units | 1 | | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 296 | 888 | Area in Square Meters (m ²) | | |
| | | | | | Square Metres (m2) | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1,000 L/min | | | | | | | 10,000 |
| 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 | Limited combustible | -0.15 | N/A | 8,500 | |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 | |
| | | | None | 0 | | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 | |
| | | | Water supply is not standard or N/A | 0 | | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 | |
| | | | Sprinkler not fully supervised or N/A | 0 | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | 10.1 to 20.0m | 0.15 | 0.45 | m | 3,825 | |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | | |
| | | | South Side | 0 to 3.0m | 0.25 | | | | |
| | | | West Side | 45.1m or greater | 0 | | | | |
| | | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | | 12,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | | 200 |
| | | Required Duration of Fire Flow (hrs) | | | | | | | 2.50 |
| | | Required Volume of Fire Flow (m ³) | | | | | | | 1,800 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 3

Building Type/Description/Name: Residential



Notes: Basement is more than 50% below grade.
Wood construction with 2 firewalls (fire flow for stacked units #3 & #4)

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 | 1.5 | Wood Frame | 1.5 | m | |
| | | | Ordinary construction | 1 | | | | |
| | | | Non-combustible construction | 0.8 | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | |
| | | | Fire resistive construction (> 2 hrs) | 0.6 | | | | |
| 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, Apt etc.) | 6 | Units | |
| | | | Townhouse - indicate # of units | 1 | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 99 | 296 | Area in Square Meters (m ²) | |
| | | | Square Metres (m2) | | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1,000 L/min | | | | | | 6,000 |
| 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 | Limited combustible | -0.15 | N/A | 5,100 |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 |
| | | | None | 0 | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 |
| | | | Water supply is not standard or N/A | 0 | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 |
| | | | Sprinkler not fully supervised or N/A | 0 | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | Fire Wall | 0.1 | 0.25 | m | 1,275 |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | |
| | | | South Side | Fire Wall | 0.1 | | | |
| | | | West Side | 45.1m or greater | 0 | | | |
| | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | 6,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | 100 |
| | | Required Duration of Fire Flow (hrs) | | | | | | 2.00 |
| | | Required Volume of Fire Flow (m ³) | | | | | | 720 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 4

Building Type/Description/Name: Residential



Notes: Basement is more than 50% below grade.
Wood construction with 2 firewalls (fire flow for stacked units #5 & #6)

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 | Coefficient related to type of construction (C) | Framing Material | | | | | | |
| | | | Wood Frame | 1.5 | Wood Frame | 1.5 | m | | |
| | | | Ordinary construction | 1 | | | | | |
| | | | Non-combustible construction | 0.8 | | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | | |
| | | | Fire resistive construction (> 2 hrs) | 0.6 | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Type of Housing | Floor Space Area | | | | | | |
| | | | Single Family | 1 | Other (Comm, Ind, Apt etc.) | 6 | Units | | |
| | | | Townhouse - indicate # of units | 1 | | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 99 | 296 | Area in Square Meters (m ²) | | |
| | | | | | Square Metres (m2) | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1,000 L/min | | | | | | | 6,000 |
| 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 | Limited combustible | -0.15 | N/A | 5,100 | |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 | |
| | | | None | 0 | | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 | |
| | | | Water supply is not standard or N/A | 0 | | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 | |
| | | | Sprinkler not fully supervised or N/A | 0 | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | 10.1 to 20.0m | 0.15 | 0.3 | m | 1,530 | |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | | |
| | | | South Side | Fire Wall | 0.1 | | | | |
| | | | West Side | 45.1m or greater | 0 | | | | |
| | | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | | 7,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | | 117 |
| | | Required Duration of Fire Flow (hrs) | | | | | | | 2.25 |
| | | Required Volume of Fire Flow (m ³) | | | | | | | 945 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 5

Building Type/Description/Name: Residential



Notes: Basement is more than 50% below grade.
Wood construction with 2 firewalls (fire flow for stacked units #1 & #2)

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 | Coefficient related to type of construction (C) | Framing Material | | | | | | |
| | | | Wood Frame | 1.5 | Wood Frame | 1.5 | m | | |
| | | | Ordinary construction | 1 | | | | | |
| | | | Non-combustible construction | 0.8 | | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | | |
| | Fire resistive construction (> 2 hrs) | 0.6 | | | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Type of Housing | Floor Space Area | | | | | | |
| | | | Single Family | 1 | Other (Comm, Ind, Apt etc.) | 6 | Units | | |
| | | | Townhouse - indicate # of units | 1 | | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 99 | 296 | Area in Square Meters (m ²) | | |
| | | Square Metres (m2) | | | | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1,000 L/min | | | | | | | 6,000 |
| 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 | Limited combustible | -0.15 | N/A | 5,100 | |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 | |
| | | | None | 0 | | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 | |
| | | | Water supply is not standard or N/A | 0 | | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 | |
| | Sprinkler not fully supervised or N/A | 0 | | | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | Fire Wall | 0.1 | 0.4 | m | 2,040 | |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | | |
| | | | South Side | 0 to 3.0m | 0.25 | | | | |
| | | | West Side | 45.1m or greater | 0 | | | | |
| | | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | | 7,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | | 117 |
| | | Required Duration of Fire Flow (hrs) | | | | | | | 2.25 |
| | | Required Volume of Fire Flow (m ³) | | | | | | | 945 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 6

Building Type/Description/Name: Residential

Notes: Basement is more than 50% below grade.

Ordinary construction with 1 firewall (fire flow for stacked units #1 & #2, #3 & #4)



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

| 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 | Coefficient related to type of construction (C) | Framing Material | | | | | | |
| | | | Wood Frame | 1.5 | Ordinary construction | 1 | m | | |
| | | | Ordinary construction | 1 | | | | | |
| | | | Non-combustible construction | 0.8 | | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | | |
| | | | Fire resistive construction (> 2 hrs) | 0.6 | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Type of Housing | Floor Space Area | | | | | | |
| | | | Single Family | 1 | Other (Comm, Ind, Apt etc.) | 6 | Units | | |
| | | | Townhouse - indicate # of units | 1 | | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 197 | 592 | Area in Square Meters (m ²) | | |
| | | | | | Square Metres (m2) | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) ($F = 220 \cdot C \cdot \sqrt{A}$) Round to nearest 1,000 L/min | | | | | | | 5,000 |
| 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 | Limited combustible | -0.15 | N/A | 4,250 | |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 | |
| | | | None | 0 | | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 | |
| | | | Water supply is not standard or N/A | 0 | | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 | |
| | | | Sprinkler not fully supervised or N/A | 0 | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | Fire Wall | 0.1 | 0.4 | m | 1,700 | |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | | |
| | | | South Side | 0 to 3.0m | 0.25 | | | | |
| | | | West Side | 45.1m or greater | 0 | | | | |
| | | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | | 6,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | | 100 |
| | | Required Duration of Fire Flow (hrs) | | | | | | | 2.00 |
| | | Required Volume of Fire Flow (m ³) | | | | | | | 720 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

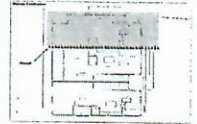
Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 7

Building Type/Description/Name: Residential



Notes: Basement is more than 50% below grade.
Ordinary construction with 1 firewall (fire flow for stacked units #5 & #6)

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 | 1.5 | Ordinary construction | 1 | m | | |
| | | | Ordinary construction | 1 | | | | | |
| | | | Non-combustible construction | 0.8 | | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | | |
| | | | Fire resistive construction (> 2 hrs) | 0.6 | | | | | |
| 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, Apt etc.) | 6 | Units | | |
| | | | Townhouse - Indicate # of units | 1 | | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 99 | 296 | Area in Square Meters (m ²) | | |
| | | | | | Square Metres (m2) | | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) ($F = 220 \cdot C \cdot \sqrt{A}$) Round to nearest 1,000 L/min | | | | | | | 4,000 |
| 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 | Limited combustible | -0.15 | N/A | 3,400 | |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 | |
| | | | None | 0 | | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 | |
| | | | Water supply is not standard or N/A | 0 | | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 | |
| | | | Sprinkler not fully supervised or N/A | 0 | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | 10.1 to 20.0m | 0.15 | 0.3 | m | 1,020 | |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | | |
| | | | South Side | Fire Wall | 0.1 | | | | |
| | | | West Side | 45.1m or greater | 0 | | | | |
| | | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | | 4,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | | 67 |
| | | Required Duration of Fire Flow (hrs) | | | | | | | 1.50 |
| | | Required Volume of Fire Flow (m ³) | | | | | | | 360 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 8

Building Type/Description/Name: Residential

Notes: Basement is more than 50% below grade.
Ordinary construction with 1 firewall (fire flow for stacked units #3 & #4, #5 & #6)



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 | Coefficient related to type of construction (C) | Framing Material | | | | | |
| | | | Wood Frame | 1.5 | Ordinary construction | 1 | m | |
| | | | Ordinary construction | 1 | | | | |
| | | | Non-combustible construction | 0.8 | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | |
| Fire resistive construction (> 2 hrs) | 0.6 | | | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Type of Housing | Floor Space Area | | | | | |
| | | | Single Family | 1 | Other (Comm, Ind, Apt etc.) | 6 | Units | |
| | | | Townhouse - indicate # of units | 1 | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 197 | 592 | Area in Square Meters (m ²) | |
| | | | | | Square Metres (m2) | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) ($F = 220 \cdot C \cdot \sqrt{A}$) Round to nearest 1,000 L/min | | | | | | 5,000 |
| 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 | Limited combustible | -0.15 | N/A | 4,250 |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 |
| | | | None | 0 | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 |
| | | | Water supply is not standard or N/A | 0 | | | | |
| | | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | | | | |
| Sprinkler not fully supervised or N/A | 0 | | | | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | 10.1 to 20.0m | 0.15 | 0.3 | m | 1,275 |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | |
| | | | South Side | Fire Wall | 0.1 | | | |
| | | | West Side | 45.1m or greater | 0 | | | |
| | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | 6,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | 100 |
| | | Required Duration of Fire Flow (hrs) | | | | | | 2.00 |
| | | Required Volume of Fire Flow (m ³) | | | | | | 720 |



FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Fire Flow Calculation #: 9

Building Type/Description/Name: Residential



Notes: Basement is more than 50% below grade.
Ordinary construction with 1 firewall (fire flow for stacked units #1 & #2)

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 | Coefficient related to type of construction (C) | Framing Material | | | | | |
| | | | Wood Frame | 1.5 | Ordinary construction | 1 | m | |
| | | | Ordinary construction | 1 | | | | |
| | | | Non-combustible construction | 0.8 | | | | |
| | | | Fire resistive construction (< 2 hrs) | 0.7 | | | | |
| Fire resistive construction (> 2 hrs) | 0.6 | | | | | | | |
| 2 | Choose Type of Housing (if TH, Enter Number of Units Per TH Block) | Type of Housing | Floor Space Area | | | | | |
| | | | Single Family | 1 | Other (Comm, Ind, Apt etc.) | 6 | Units | |
| | | | Townhouse - indicate # of units | 1 | | | | |
| | | | Other (Comm, Ind, Apt etc.) | 6 | | | | |
| 2.2 | # of Storeys | Number of Floors/Storeys in the Unit (do not include basement if 50% below grade): | | | 3 | 3 | Storeys | |
| 3 | Enter Ground Floor Area of One Unit | Average Floor Area (A) based total floor area of all floors (non-fire resistive construction): | | | 99 | 296 | Area in Square Meters (m ²) | |
| | | | | | Square Metres (m2) | | | |
| 4 | Obtain Required Fire Flow without Reductions | Required Fire Flow (without reductions or increases per FUS) ($F = 220 \cdot C \cdot \sqrt{A}$) Round to nearest 1,000 L/min | | | | | | 4,000 |
| 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 | Limited combustible | -0.15 | N/A | 3,400 |
| | | | 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 | Adequate Sprinkler conforms to NFPA13 | -0.3 | None | 0 | N/A | 0 |
| | | | None | 0 | | | | |
| | | Water Supply Credit | Water supply is standard for sprinkler and fire dept. hose line | -0.1 | Water supply is not standard or N/A | 0 | N/A | 0 |
| | | | Water supply is not standard or N/A | 0 | | | | |
| | | Sprinkler Supervision Credit | Sprinkler system is fully supervised | -0.1 | Sprinkler not fully supervised or N/A | 0 | N/A | 0 |
| | | | Sprinkler not fully supervised or N/A | 0 | | | | |
| 5.3 | Choose Separation Distance Between Units | Exposure Distance Between Units | North Side | Fire Wall | 0.1 | 0.4 | m | 1,360 |
| | | | East Side | 30.1 to 45.0m | 0.05 | | | |
| | | | South Side | 0 to 3.0m | 0.25 | | | |
| | | | West Side | 45.1m or greater | 0 | | | |
| | | | | | | | | |
| 6 | Obtain Required Fire Flow, Duration & Volume | Total Required Fire Flow, rounded to nearest 1,000 L/min, with max/min limits applied: | | | | | | 5,000 |
| | | Total Required Fire Flow (above) in L/s: | | | | | | 83 |
| | | Required Duration of Fire Flow (hrs) | | | | | | 1.75 |
| | | Required Volume of Fire Flow (m ³) | | | | | | 525 |

FIGURE 1 – FUS EXPOSURE DISTANCES

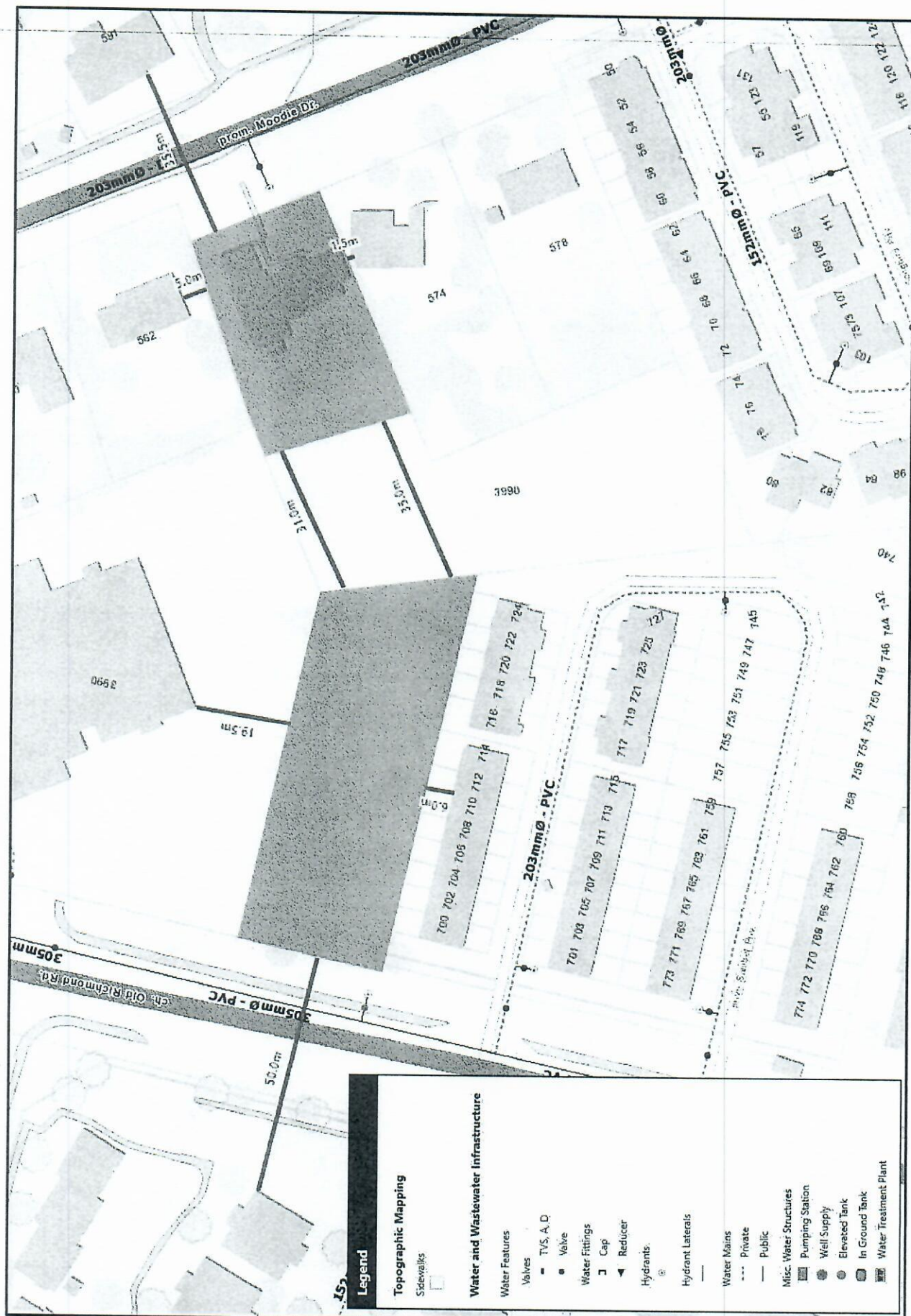


Figure 1: FUS Exposure Distances for 3990 Old Richmond Rd and 572 Moodie Dr (Property Line to Adjacent Buildings) Source: geoOttawa 2020; Contains information licensed under the Open Government Licence – City of Ottawa.

WATER BOUNDARY CONDITIONS

Razafimaharo, Christene

From: Armstrong, Justin <justin.armstrong@ottawa.ca>
Sent: Thursday, April 29, 2021 4:13 PM
To: Alemany, Kevin; TL MaK
Cc: Razafimaharo, Christene
Subject: RE: 3990 Old Richmond Road Water Boundary Conditions
Attachments: 3990 Old Richmond Road April 2021.pdf

Hi Tony,

See boundary condition results below.

The following are boundary conditions, HGL, for hydraulic analysis at 3990 Old Richmond Road (zone 2W2C) assumed to be connected to the 305mm on Old Richmond Road and the 203mm on Moodie Drive (see attached PDF for location).

Both Connections:

Minimum HGL = 126.8m

Maximum HGL = 132.1m

Old Richmond Road Connection: Max Day + Fire Flow (167 L/s) = 124.4m

Moodie Drive Connection: Available Fire Flow @ 20psi = 117 L/s assuming a ground elevation of 99.1m.

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 watermain 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.

Regards,

During this period of uncertainty surrounding COVID-19, we are following best practices recommended to minimize the risk of exposure, while ensuring that service to our clients remains as uninterrupted as possible. For the most part I am working from home and will respond to emails at my earliest opportunity. Should there be delays due to internet connectivity, I thank your understanding and patience.

Justin Armstrong, E.I.T.

Project Manager

Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique

Development Review - West Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 21746, justin.armstrong@ottawa.ca

From: Armstrong, Justin

Sent: April 21, 2021 3:31 PM

To: Alemany, Kevin <kevin.alemany@stantec.com>; TL MaK <tlmakecl@bellnet.ca>

Cc: Razafimaharo, Christene <Christene.Razafimaharo@stantec.com>
Subject: RE: 3990 Old Richmond Road Water Boundary Conditions

Thank you all.

I have forwarded off the request for boundary conditions and will provide the results once I am in receipt.

Regards,

Justin

From: Alemany, Kevin <kevin.alemany@stantec.com>
Sent: April 21, 2021 3:18 PM
To: TL MaK <tlmakecl@bellnet.ca>; Armstrong, Justin <justin.armstrong@ottawa.ca>
Cc: Razafimaharo, Christene <Christene.Razafimaharo@stantec.com>
Subject: RE: 3990 Old Richmond Road Water Boundary Conditions

Good afternoon Tony & Justin,

In the most recent boundary condition request, the gross floor area (GFA) was reduced to 3,948 m², assuming that vertical separation would be provided every 3rd floor, as described in the Ontario Building Code (OBC) 1.1.3.2, thus limiting the number of storeys to 3 in the FUS calculations. However, recognizing that no vertical separation has been specified in the plans for the building at 3990 Old Richmond Rd, it is preferred to account for all 4 storeys of the building in the FUS calculations as noted by Justin, resulting in a GFA of 5,264 m².

We therefore agree with the proposed modification, resulting in an RFF for the 3990 Old Richmond building of 10,000 L/min (167 L/s). Attached are supporting revised calculations.

In summary, the following are the demands for the boundary conditions:

For the building at 3990 Old Richmond Rd:

- AVDY = 29,645 L/d (0.34 L/s);
- MXDY = 74,113 L/d (0.86 L/s);
- PKHR = 163,048 L/d (1.89 L/s); and,
- Fire Flow = 10,000 L/min (167 L/s)

For the building at 572 Moodie Dr:

- AVDY = 6,510 L/d (0.08 L/s);
- MXDY = 16,275 L/d (0.19 L/s);
- PKHR = 35,805 L/d (0.41 L/s); and,
- Fire Flow = 12,000 L/min (200 L/s).

Thanks for the follow up.

Regards, Kevin

Kevin Alemany
Principal, Water

Direct: 613 724-4091
Mobile: 613 292-4226
Fax: 613 722-2799
kevin.alemany@stantec.com

Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4



The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

From: TL MaK <tlmakecl@bellnet.ca>
Sent: Wednesday, April 21, 2021 1:43 PM
To: Alemany, Kevin <kevin.alemany@stantec.com>
Subject: RE: 3990 Old Richmond Road Water Boundary Conditions

Hi Kevin,

Can you please answer Justin's questions.

Thank you,

Tony Mak

T.L. Mak Engineering Consultants Ltd.
1455 Youville Drive, Suite 218
Ottawa, ON. K1C 6Z7
Tel. 613-837-5516 | Fax: 613-837-5277
E-mail: tlmakecl@bellnet.ca

From: Armstrong, Justin [<mailto:justin.armstrong@ottawa.ca>]
Sent: April 21, 2021 11:27 AM
To: TL MaK
Cc: 'Susan Smith'; 'anver.malam anver.malam'; 'Zuzana Keslerova'
Subject: RE: 3990 Old Richmond Road Water Boundary Conditions

Hi Tony,

As it relates to the FUS requirement for the 3990 Old Richmond building, why has the gross floor area changed from 5,264 m² in the first boundary condition request to 3,948 m² in this most recent request? Your description below, and the architectural plans provided indicate that this building is to be a 4-storey building with GFA/floor of 1,316m². At 4 storeys, this equates to a total GFA for the building of 5,264m². The new FUS calculations should use this GFA. If I apply this GFA, it results in an RFF for the 3990 Old Richmond building of 10,000 L/min (166.67 L/s). If you are in agreement with this modification, please let me know and I can make the change to the demands as follows and send off for boundary conditions:

In summary, for the building at 3990 Old Richmond Rd:

- AVDY = 29,645 L/d (0.34 L/s);
- MXDY = 74,113 L/d (0.86 L/s);
- PKHR = 163,048 L/d (1.89 L/s); and,
- Fire Flow = 10,000 L/min (166.67 L/s)

For the building at 572 Moodie Dr:

- AVDY = 6,510 L/d (0.08 L/s);
- MXDY = 16,275 L/d (0.19 L/s);
- PKHR = 35,805 L/d (0.41 L/s); and,
- Fire Flow = 12,000 L/min (200 L/s).

Otherwise, please modify the FUS calculations for Building A (3990 Old Richmond) using the proper GFA so that I may request boundary conditions.

All other concerns have been addressed.

Regards,

Justin

During this period of uncertainty surrounding COVID-19, we are following best practices recommended to minimize the risk of exposure, while ensuring that service to our clients remains as uninterrupted as possible. For the most part I am working from home and will respond to emails at my earliest opportunity. Should there be delays due to internet connectivity, I thank your understanding and patience.

Justin Armstrong, E.I.T.

Project Manager

Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique

Development Review - West Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2400 ext./poste 21746, justin.armstrong@ottawa.ca

From: TL MaK <tlmakecl@bellnet.ca>

Sent: April 21, 2021 10:04 AM

To: Armstrong, Justin <justin.armstrong@ottawa.ca>

Cc: 'Susan Smith' <s.smith@sdsarch.ca>; 'anver.malam anver.malam' <anver.malam@sympatico.ca>; 'Zuzana Keslerova' <z.keslerova@sdsarch.ca>

Subject: RE: 3990 Old Richmond Road Water Boundary Conditions

Hi Justin,

Further to the City's review comments of March 26, 2021, we have updated and revised our water boundary condition for 3990 Old Richmond Road and 572 Moodie Drive. Please note the proposed building at 3990 Old Richmond Road will be ordinary construction and will have sprinklers and the proposed building at 572 Moodie Drive will be wood construction and will not have sprinklers.

Here is the revised boundary condition request for 3990 Old Richmond Rd and 572 Moodie Dr:

The proposed buildings are located within Pressure Zone 2W, on the lot occupying the intersection of Old Richmond Rd and Moodie Dr.

The proposed building at 3990 Old Richmond Rd is a 4-storey apartment building with an underground parking. The building contains thirty-two bachelor units, twenty-four 1-bedroom units, and three 2-bedroom units. Each floor covers a gross floor area of 1,316 m²/floor (14,165 ft²/floor), and the underground parking occupies an area of 2,125 m² (22,873 ft²). The building is to be serviced by the 300-mm diameter watermain along Old Richmond Rd. The building will have sprinklers, considered to be fully automated, connected to a standard water supply, and fully supervised.

The proposed building at 572 Moodie Dr is a 3.5-storey stacked dwelling. The building contains six 3-bedroom units. The total gross floor area is 1,184 m² (12,745 ft²), equivalent to 296 m²/floor (3,186 ft²/floor). The building is to be serviced by the 200-mm diameter watermain along Moodie Dr. The building will not have sprinklers.

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines, where the residential consumption rate of 350 L/cap/d was used to estimate average day demands (AVDY). Maximum day (MXDY) demands were calculated by multiplying AVDY demands by a factor of 2.5. Peak hour (PKHR) demands were calculated by multiplying MXDY by a factor of 2.2. Persons per unit (PPU) for each unit were estimated based on the

City of Ottawa's Water Design Guidelines. **Table 1** and **Table 2** show the estimated domestic demands of the proposed buildings at 3990 Old Richmond Rd and 572 Moodie Dr, respectively.

Table 1: Estimated Domestic Demand at 3990 Old Richmond Rd

| Unit Type | Unit Count | PPU | Consumption Rate (L/c/d) | AVDY | | MXDY | | PKHR | |
|----------------------|------------|-----|--------------------------|---------------|-------------|---------------|-------------|----------------|-------------|
| | | | | L/d | L/s | L/d | L/s | L/d | L/s |
| Apartment, Bachelor | 32 | 1.4 | 350 | 15,680 | 0.18 | 39,200 | 0.45 | 86,240 | 1.00 |
| Apartment, 1-Bedroom | 24 | 1.4 | | 11,760 | 0.14 | 29,400 | 0.34 | 64,680 | 0.75 |
| Apartment, 2-Bedroom | 3 | 2.1 | | 2,205 | 0.03 | 5,513 | 0.06 | 12,128 | 0.14 |
| Total | 59 | | | 29,645 | 0.34 | 74,113 | 0.86 | 163,048 | 1.89 |

Table 2: Estimated Domestic Demand at 572 Moodie Dr

| Unit Type | Unit Count | PPU | Consumption Rate (L/c/d) | AVDY | | MXDY | | PKHR | |
|----------------------|------------|-----|--------------------------|--------------|-------------|---------------|-------------|---------------|-------------|
| | | | | L/d | L/s | L/d | L/s | L/d | L/s |
| Apartment, 3-Bedroom | 6 | 3.1 | 350 | 6,510 | 0.08 | 16,275 | 0.19 | 35,805 | 0.41 |
| Total | 6 | | | 6,510 | 0.08 | 16,275 | 0.19 | 35,805 | 0.41 |

The fire flows required were determined following the Fire Underwriter Survey (FUS) method and are provided in the attached worksheets.

The proposed building at 3990 Old Richmond Rd will be ordinary construction and will have sprinklers. The underground parking is more than 50% below ground level. The resulting total required FUS fire flow is 9,000 L/min (150 L/s) for a duration of 1.75 hours.

The proposed building at 572 Moodie Dr will be wood construction and will not have sprinklers. It is assumed that the basement will be more than 50% below ground level. The resulting total required FUS fire flow is 12,000 L/min (200 L/s) for a duration of 2.5 hours.

In summary, for the building at 3990 Old Richmond Rd:

- AVDY = 29,645 L/d (0.34 L/s);
- MXDY = 74,113 L/d (0.86 L/s);
- PKHR = 163,048 L/d (1.89 L/s); and,
- Fire Flow = 9,000 L/min (150 L/s)

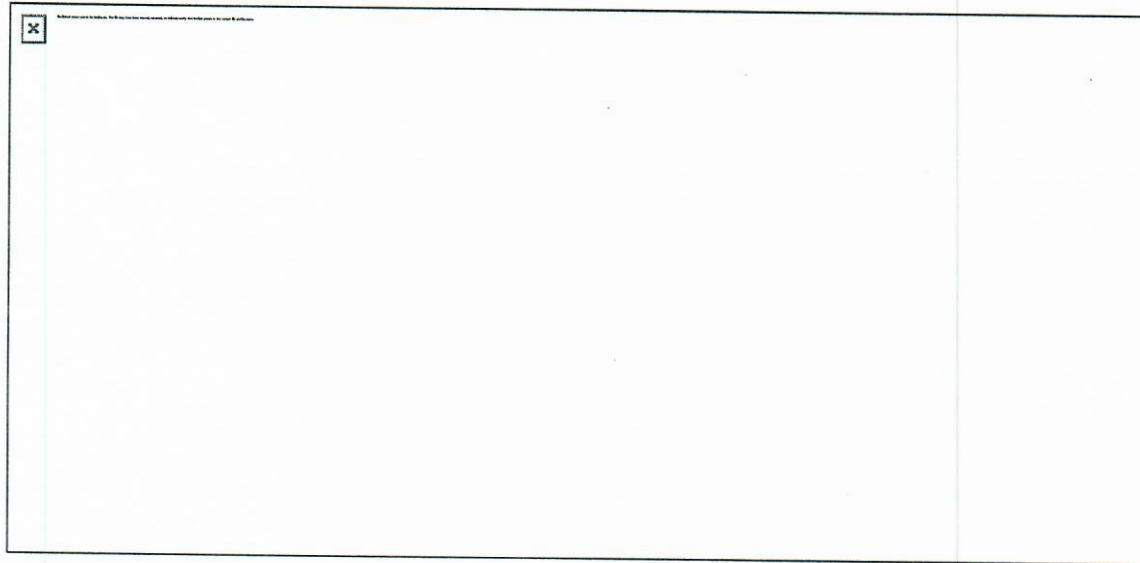
For the building at 572 Moodie Dr:

- AVDY = 6,510 L/d (0.08 L/s);
- MXDY = 16,275 L/d (0.19 L/s);
- PKHR = 35,805 L/d (0.41 L/s); and,
- Fire Flow = 12,000 L/min (200 L/s).

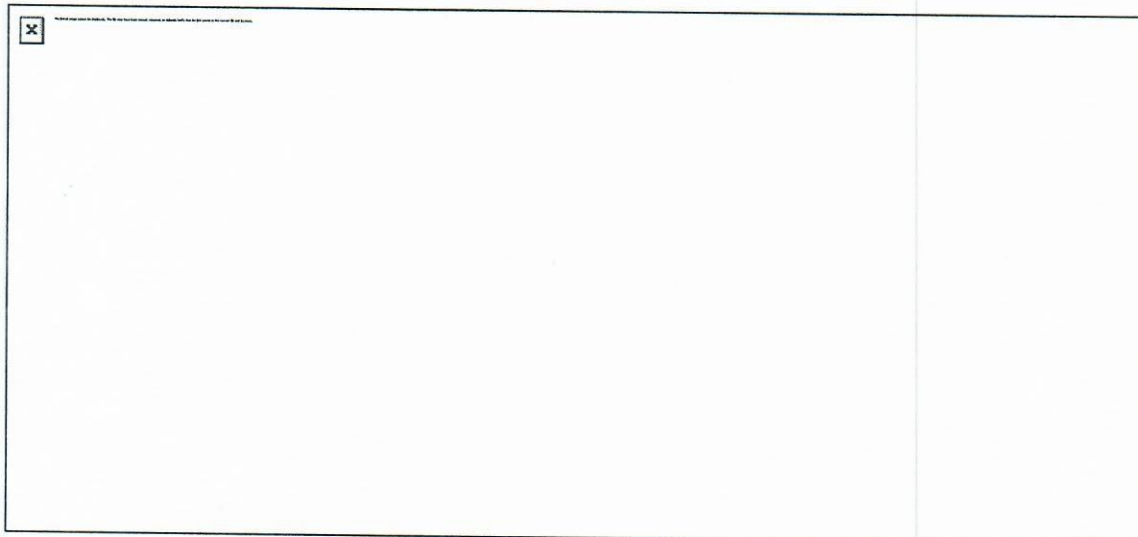
The City is requested to provide boundary conditions for the Average Day, Maximum Day, Peak Hour and Fire Flow conditions indicated above.

Furthermore, we have reviewed the City's comments and questions regarding the exposure distances. Below are our responses.

Regarding the exposure distances from the planned building on 572 Moodie Dr to existing neighbouring buildings, we have verified the distances on the draft plan. It is estimated that the planned 572 Moodie Dr building will be approximately 3.3m away from the existing 574 Moodie Dr building on the southern side, and therefore they were considered separate fire areas.



It is estimated that the planned 572 Moodie Dr building will be approximately 11m away from the existing 562 Moodie Dr building on the north side. This results in a northern exposure within the 10.1 to 20.0m range, as used in the fire flow calculations.



As requested, a geoOttawa snippet of the approximate proposed connection location for each site is attached (see dashed blue lines).

The City is requested to provide boundary conditions for the Average Day, Maximum Day, Peak Hour and Fire Flow conditions indicated above.

Thank you for your prompt attention to this matter. Please forward the boundary conditions as soon as possible.

Regards,

Tony Mak

T.L. Mak Engineering Consultants Ltd.
1455 Youville Drive, Suite 218
Ottawa, ON. K1C 6Z7
Tel. 613-837-5516 | Fax: 613-837-5277
E-mail: tlmakecl@bellnet.ca

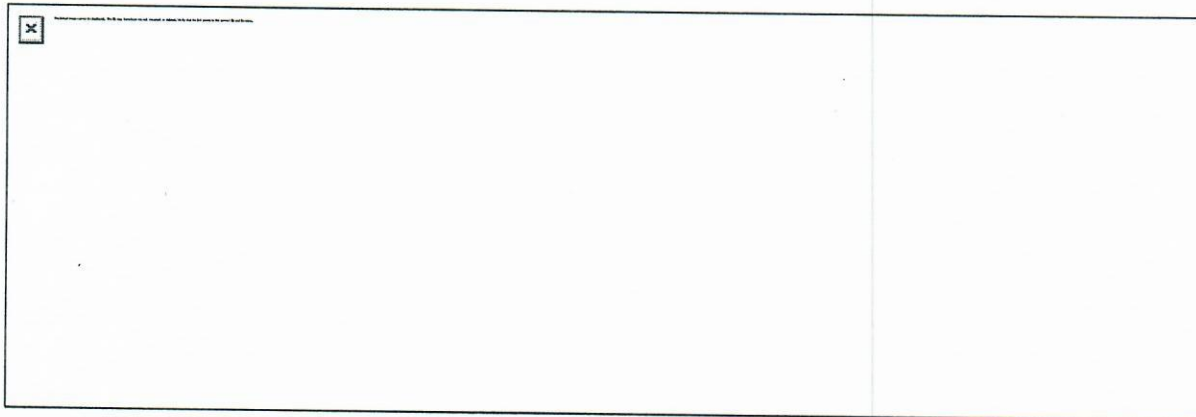
From: Armstrong, Justin [<mailto:justin.armstrong@ottawa.ca>]
Sent: March 26, 2021 1:36 PM
To: TL MaK
Cc: 'Susan Smith'
Subject: RE: 3990 Old Richmond Road Wwater Boundary Conditions

Hi Tony,

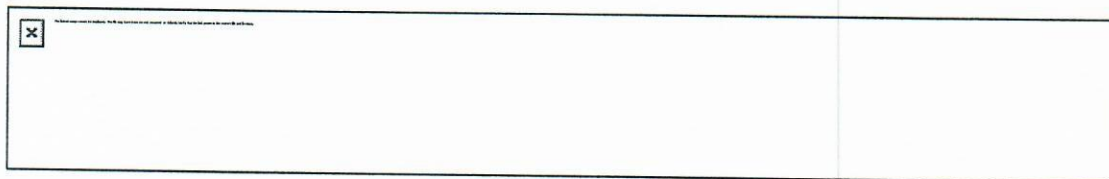
Thanks for this – appreciate the detailed description.

After looking at the below and attached, there are a couple items that need clarification before forwarding off for boundary conditions:

- The attached FUS Fire Flow Calculation sheet identifies that the Required Fire Flow (RFF) for 572 Moodie was assessed under two possible scenarios: 1 – Wood construction without firewalls, and 2 – Wood construction with firewalls. Clarification is needed on what is meant by the inclusion of firewalls (i.e. proposed location, fire resistive rating, etc.). Consider the below excerpt from the City of Ottawa Water Distribution Guidelines Technical Bulletin ISTB-2018-02:



As described in the excerpt, a firewall can be implemented to separate closely spaced buildings into separate fire areas, however, this does not seem to be how it was applied in the FUS calculations for both 572 Moodie scenarios. Under both scenarios 1 and 2, the total floor space areas remained the same (888 m²) while the construction class went from *wood frame (1.5)* for scenario 1 to *ordinary construction (1)* for scenario two. The implementation of firewalls, as described above, should not change the construction class. Again, consider the following excerpt from the Technical Bulletin:



This excerpt indicates that a construction class of *ordinary construction (1)* can be used for wood frame construction if the exterior walls are masonry or non-combustible. Is this what was meant for scenario 2 – Wood construction with firewalls? If so, please confirm this and the use of construction class *ordinary construction (1)* is okay for scenario 2.

Further, if the future 572 Moodie building is proposed to be within 3.0 metres of any adjacent wood-frame building, the adjacent building's area should be included in the FUS calculation. The proposed 572 Moodie building looks to be within 3.0 metres of the existing 574 Moodie building. In order to separate the continuous fire area between these two buildings, a proposed location for a 2-hr rated firewall should be indicated along the southern wall of the proposed 572 Moodie building. This would provide a break to the continuous fire area and the 572 Moodie building can be considered as a single fire area.

- The northern exposure distance for the proposed 572 Moodie building looks like it could be less than 10 metres, however it is provided as 10.1 to 20.0m in the attached FUS Fire Flow Calculation sheet. Please confirm that 10.1 to 20.0m is acceptable for the northern exposure.
- Please provide a GeoOttawa snippet showing the approximate proposed connection location to the City watermain in Old Richmond and in Moodie.
- For Site Plan Control submission: Note that prior to site plan approval, a stamped and signed memo will need to be provided from the mechanical consultant confirming that the sprinkler system for 3990 Old Richmond will be fully supervised.
- For Site Plan Control submission: Note that for the 3990 Old Richmond Building, a redundant water supply will need to be provided as the number of dwelling units exceeds 50.

Following a response to the above points, I will forward off for boundary conditions.

Thanks, and have a great weekend.

Justin

Justin Armstrong, E.I.T.

Project Manager

Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique

Development Review - West Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2400 ext./poste 21746, justin.armstrong@ottawa.ca

From: TL MaK <tlmakecl@bellnet.ca>

Sent: March 25, 2021 4:17 PM

To: Armstrong, Justin <justin.armstrong@ottawa.ca>

Cc: 'Susan Smith' <s.smith@sdsarch.ca>

Subject: 3990 Old Richmond Road Wwater Boundary Conditions

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Justin,

Regarding this site, we are requesting for water boundary conditions from the City of Ottawa to be provided for our hydraulic analysis. The particulars are as follows:

The proposed buildings are located within Pressure Zone 2W, on the lot occupying the intersection of Old Richmond Rd and Moodie Dr.

The proposed building at 3990 Old Richmond Rd is a 4-storey apartment building with an underground parking. The building contains thirty-two bachelor units, twenty-four 1-bedroom units, and three 2-bedroom units. Each floor covers a gross floor area of 1,316 m²/floor (14,165 ft²/floor), and the underground parking occupies an area of 2,125 m² (22,873 ft²). The building is to be serviced by the 300-mm diameter watermain along Old Richmond Rd. The building will have sprinklers.

The proposed building at 572 Moodie Dr is a 3.5-storey stacked dwelling. The building contains six 3-bedroom units. The total gross floor area is 1,184 m² (12,745 ft²), equivalent to 296 m²/floor (3,186 ft²/floor). The building is to be serviced by the 200-mm diameter watermain along Moodie Dr. The building will not have sprinklers.

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines, where the residential consumption rate of 350 L/cap/d was used to estimate average day demands (AVDY). Maximum day (MXDY) demands were calculated by multiplying AVDY demands by a factor of 2.5. Peak hour (PKHR) demands were calculated by multiplying MXDY by a factor of 2.2. Persons per unit (PPU) for each unit were estimated based on the City of Ottawa's Water Design Guidelines. **Table 1** and **Table 2** show the estimated domestic demands of the proposed buildings at 3990 Old Richmond Rd and 572 Moodie Dr, respectively.

Table 1: Estimated Domestic Demand at 3990 Old Richmond Rd

| Unit Type | Unit Count | PPU | Consumption Rate (L/c/d) | AVDY | | MXDY | | PKHR | |
|----------------------|------------|-----|--------------------------|---------------|-------------|---------------|-------------|----------------|-------------|
| | | | | L/d | L/s | L/d | L/s | L/d | L/s |
| Apartment, Bachelor | 32 | 1.4 | 350 | 15,680 | 0.18 | 39,200 | 0.45 | 86,240 | 1.00 |
| Apartment, 1-Bedroom | 24 | 1.4 | | 11,760 | 0.14 | 29,400 | 0.34 | 64,680 | 0.75 |
| Apartment, 2-Bedroom | 3 | 2.1 | | 2,205 | 0.03 | 5,513 | 0.06 | 12,128 | 0.14 |
| Total | 59 | | | 29,645 | 0.34 | 74,113 | 0.86 | 163,048 | 1.89 |

Table 2: Estimated Domestic Demand at 572 Moodie Dr

| Unit Type | Unit Count | PPU | Consumption Rate (L/c/d) | AVDY | | MXDY | | PKHR | |
|----------------------|------------|-----|--------------------------|--------------|-------------|---------------|-------------|---------------|-------------|
| | | | | L/d | L/s | L/d | L/s | L/d | L/s |
| Apartment, 3-Bedroom | 6 | 3.1 | 350 | 6,510 | 0.08 | 16,275 | 0.19 | 35,805 | 0.41 |
| Total | 6 | | | 6,510 | 0.08 | 16,275 | 0.19 | 35,805 | 0.41 |

The fire flows required were determined following the Fire Underwriter Survey (FUS) method and are provided in the attached worksheets.

The proposed building at 3990 Old Richmond Rd will be wood construction and will have sprinklers. The underground parking is more than 50% below ground level. The resulting total required FUS fire flow is 15,000 L/min (250 L/s) for a duration of 3.25 hours. However, considering the building could be categorized as a "Group C - Retirement Home, up to 4 storeys, Sprinklered" building in the Ontario Building Code (Section 3.2.2.48C), firewalls would likely be required. Additionally, it was indicated that the proposed

building could also be steel construction. In these cases, required fire flow may be reduced to 10,000 L/min (167 L/s) for a duration of 2 hours.

The proposed building at 572 Moodie Dr will be wood construction and will not have sprinklers. It is assumed that the basement will be more than 50% below ground level. The resulting total required FUS fire flow is 12,000 L/min (200 L/s) for a duration of 2.5 hours. If built with firewalls, required FUS fire flow can be reduced to 9,000 L/min (150 L/s) for a duration of 1.75 hours.

In summary, for the building at 3990 Old Richmond Rd:

- AVDY = 29,645 L/d (0.34 L/s);
- MXDY = 74,113 L/d (0.86 L/s);
- PKHR = 163,048 L/d (1.89 L/s); and,
- Fire Flow:
 - Fire Flow for wood construction without firewalls: 15,000 L/min (250 L/s)
 - Fire Flow for wood or steel construction with firewalls: 10,000 L/min (167 L/s)

For the building at 572 Moodie Dr:

- AVDY = 6,510 L/d (0.08 L/s);
- MXDY = 16,275 L/d (0.19 L/s);
- PKHR = 35,805 L/d (0.41 L/s); and,
- Fire Flow = 12,000 L/min (200 L/s).
 - Fire Flow for wood construction without firewalls: 12,000 L/min (200 L/s)
 - Fire Flow for wood construction with firewalls: 9,000 L/min (150 L/s)

The City is requested to provide boundary conditions for the Average Day, Maximum Day, Peak Hour and Fire Flow conditions indicated above.

Thank you for your prompt attention to this matter. Please forward the boundary conditions as soon as possible.

Regards,

Tony Mak

T.L. Mak Engineering Consultants Ltd.
1455 Youville Drive, Suite 218
Ottawa, ON. K1C 6Z7
Tel. 613-837-5516 | Fax: 613-837-5277
E-mail: tlmakecl@bellnet.ca

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

Boundary Conditions for 3990 Old Richmond Road

The map displays a network of roads and land parcels. Key roads include Arnold Dr, Moodie Dr, Old Richmond Rd, and various residential streets like Forester Cres, Sonnet Cres, and Seyton Dr. Numerous lots are numbered, including 146, 37, 40, 41, 45, 46, 49, 50, 53, 54, 57, 58, 61, 62, 66, 68, 158, 162, 203, 305, 390, 3978, 3990, 3991, 558, 560, 562, 574, 578, 595, 599, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Legend

- PRIVATE
- PUBLIC

PRIVATE
PUBLIC

SUPPORTING HYDRAULIC CALCULATIONS



Supporting Hydraulic Calculations

Stantec Project #: 163401084

Project Name: 572 Moodie Dr

Date: May 3, 2021

Data inputted by: Christène Razafimaharo, M.Sc., EIT

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Boundary Conditions provided by the City:

Scenario 1: Peak Hour (Min HGL): 126.8 m;

Scenario 2: Average Day (Max HGL): 132.1 m; and

Scenario 3: Maximum Day plus Fire Flow: 113.5 m.

Sample Calculations

$$HGL(m) = hp + hz \quad (1)$$

where: hp = Pressure Head (m); and hz = Elevation Head (m), estimated from topography.

For Scenario 1, we have:

$$HGL(m) = 126.8 \text{ and } hz(m) = 99.4.$$

Rearranging Equation 1, we can calculate the Pressure Head (hp) as follow:

$$hp(m) = HGL - hz$$

$$\therefore hp = 126.8 - 99.4 \text{ m} = 27.4 \text{ m}.$$

To convert from Pressure Head (m) to a pressure value (kPa), the following equation can be used:

$$P(kPa) = (\rho * g * hp) / 1000 \quad (2)$$

where: ρ = density of water = 1000 kg/m^3 ; and g = gravitational acceleration = 9.81 m/s^2 .

Using Equation 2, we can calculate the Pressure (P) as follow:

$$P(kPa) = (1000 * 9.81 * 27.4) / 1000$$

$$\therefore P = 269 \text{ kPa}.$$

Considering that $1 \text{ kPa} = 0.145 \text{ psi}$, the pressure under Scenario 1 is equal to:

$$P = 39 \text{ psi}.$$

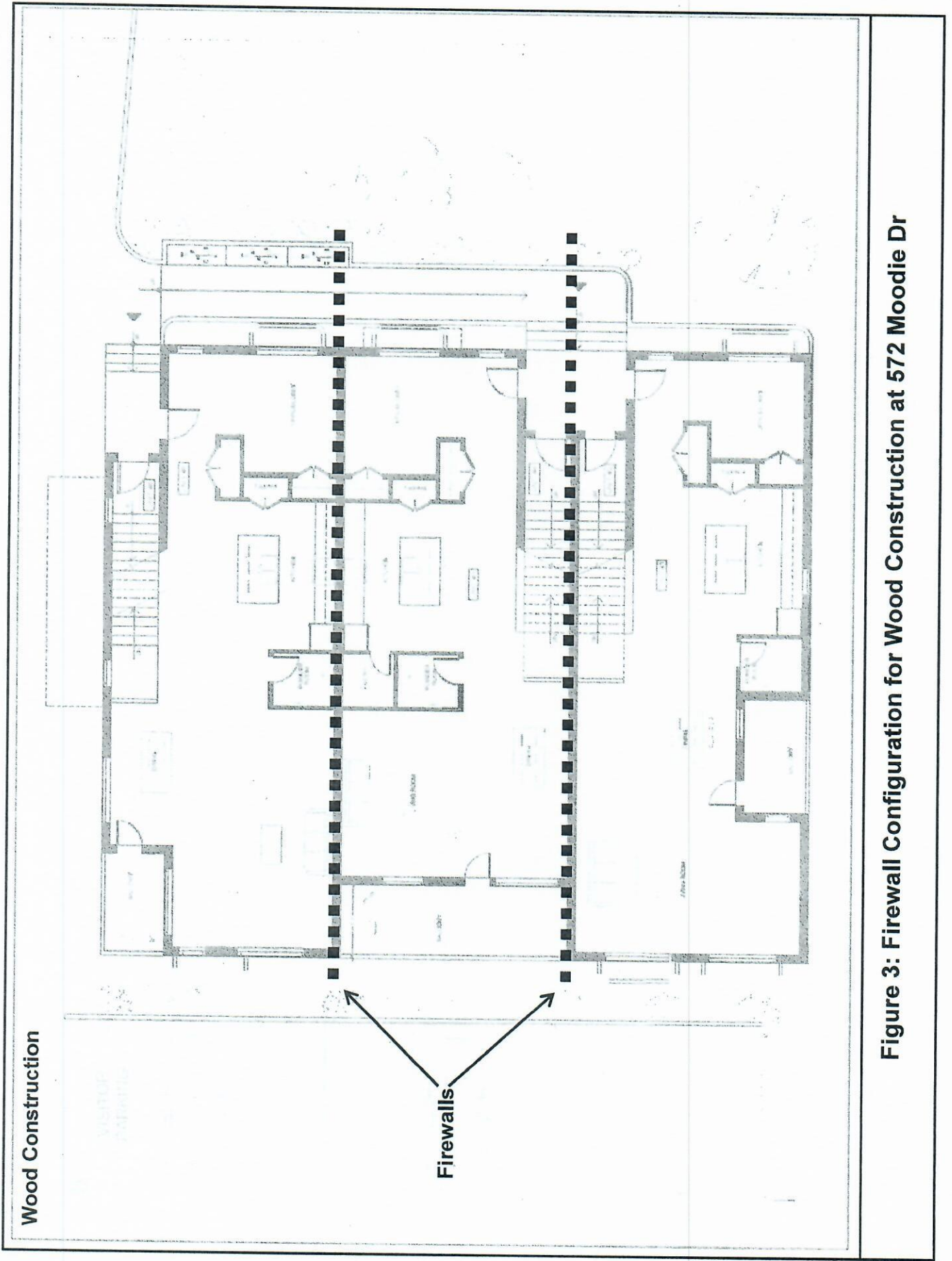
Applying the same procedures, the pressures under Scenario 2 and Scenario 3 are calculated as follows:

Scenario 2: $P = 46 \text{ psi}$; and Scenario 3: $P = 20 \text{ psi}$.

To summarize:

| |
|---|
| Scenario 1: Minimum Pressure under Peak Hour Demand: 269 kPa (39 psi) |
| Scenario 2: Maximum Pressure under Average Day Demand: 321 kPa (46 psi) |
| Scenario 3: Minimum Pressure under Maximum Day + Fire Flow Demand: 138 kPa (20 psi) |

**FIGURE 3 – FIREWALL CONFIGURATION FOR WOOD
CONSTRUCTION AT 572 MOODIE DRIVE**



**FIGURE 4 – FIREWALL CONFIGURATION FOR WOOD
CONSTRUCTION AT 572 MOODIE DRIVE (1)**

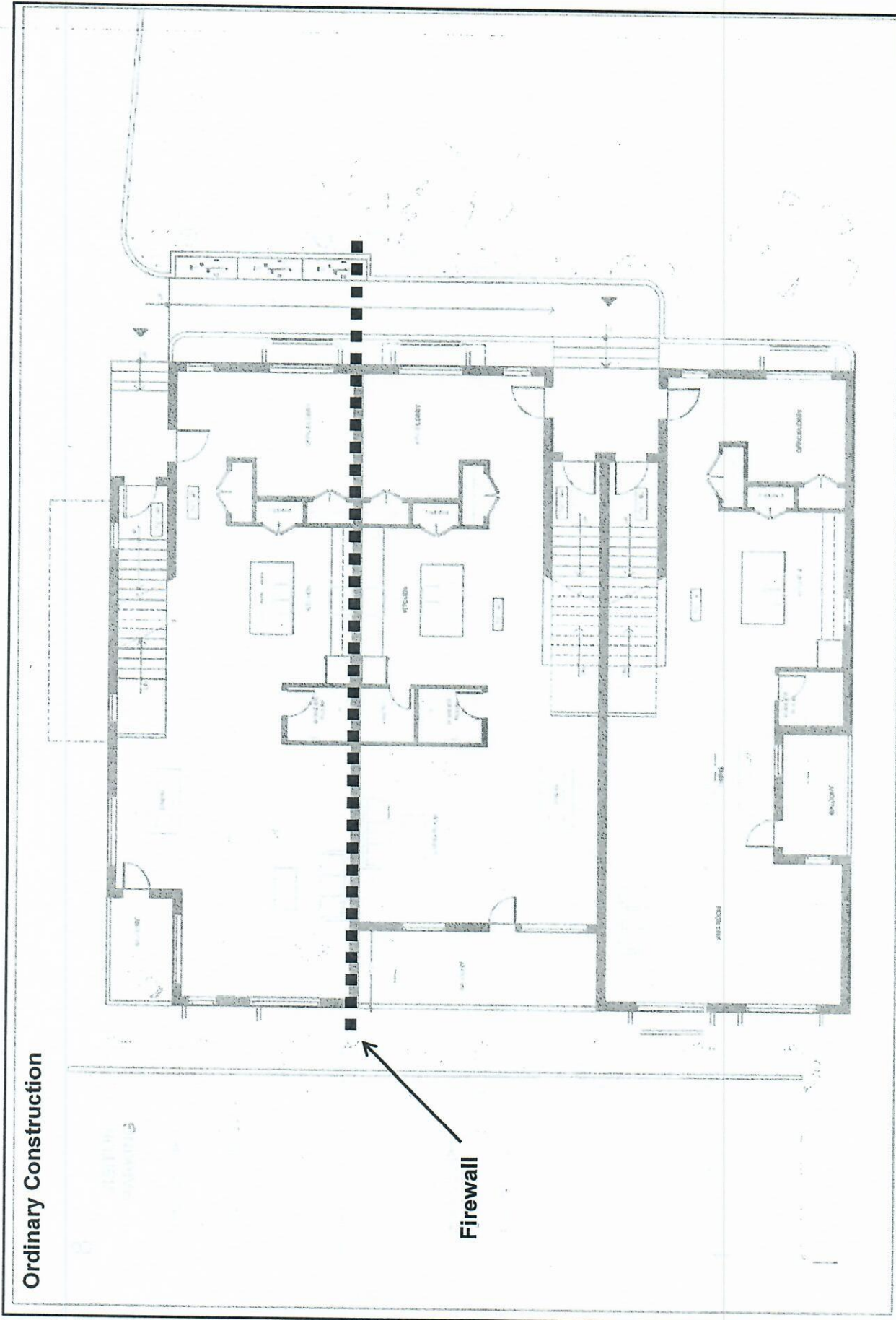


Figure 4: Firewall Configuration for Ordinary Construction at 572 Moodie Dr (1)

**FIGURE 5 – FIREWALL CONFIGURATION FOR WOOD
CONSTRUCTION AT 572 MOODIE DRIVE (2)**

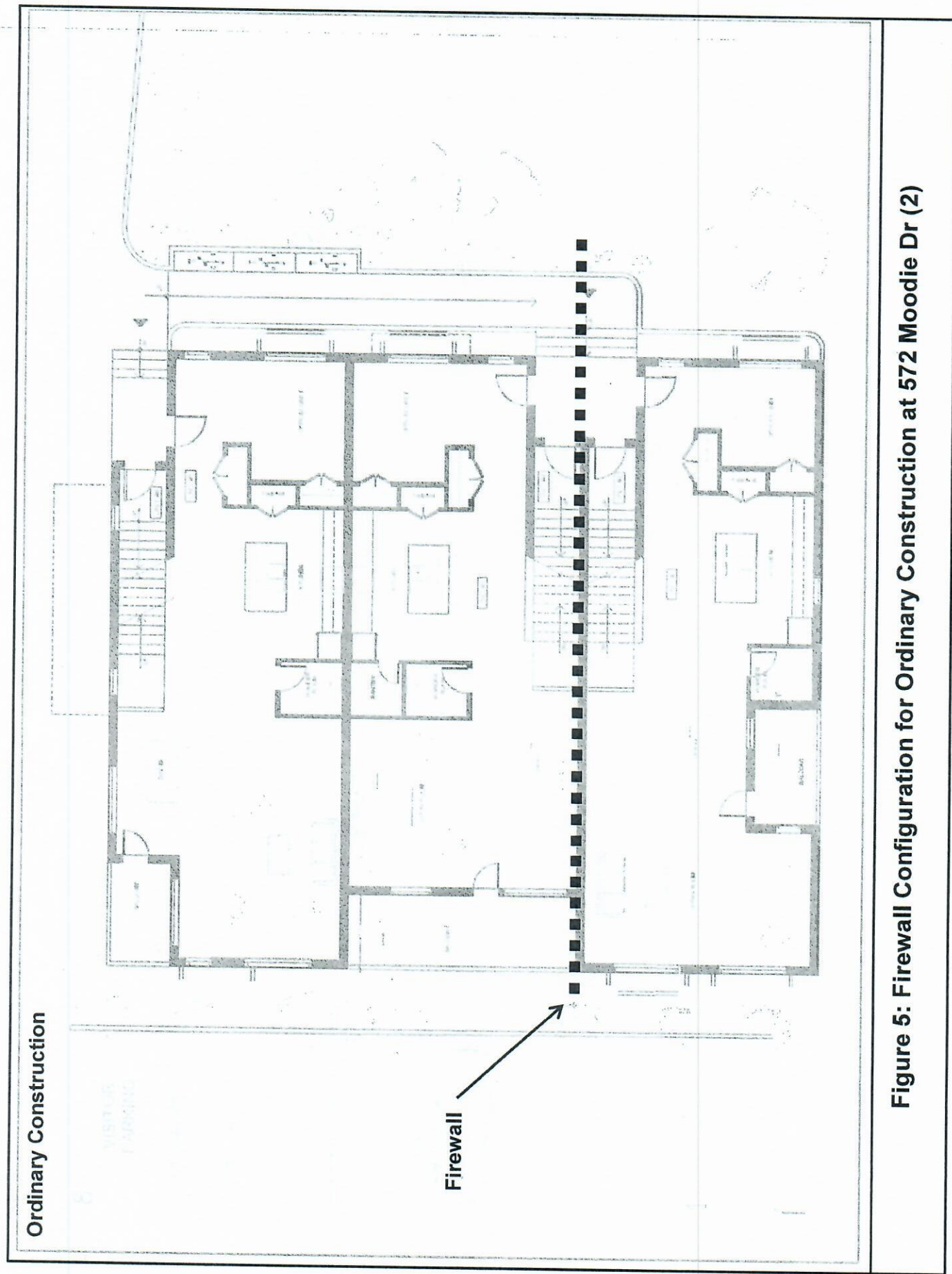


FIGURE 6 – HYDRANT SPACING FOR 572 MOODIE DRIVE

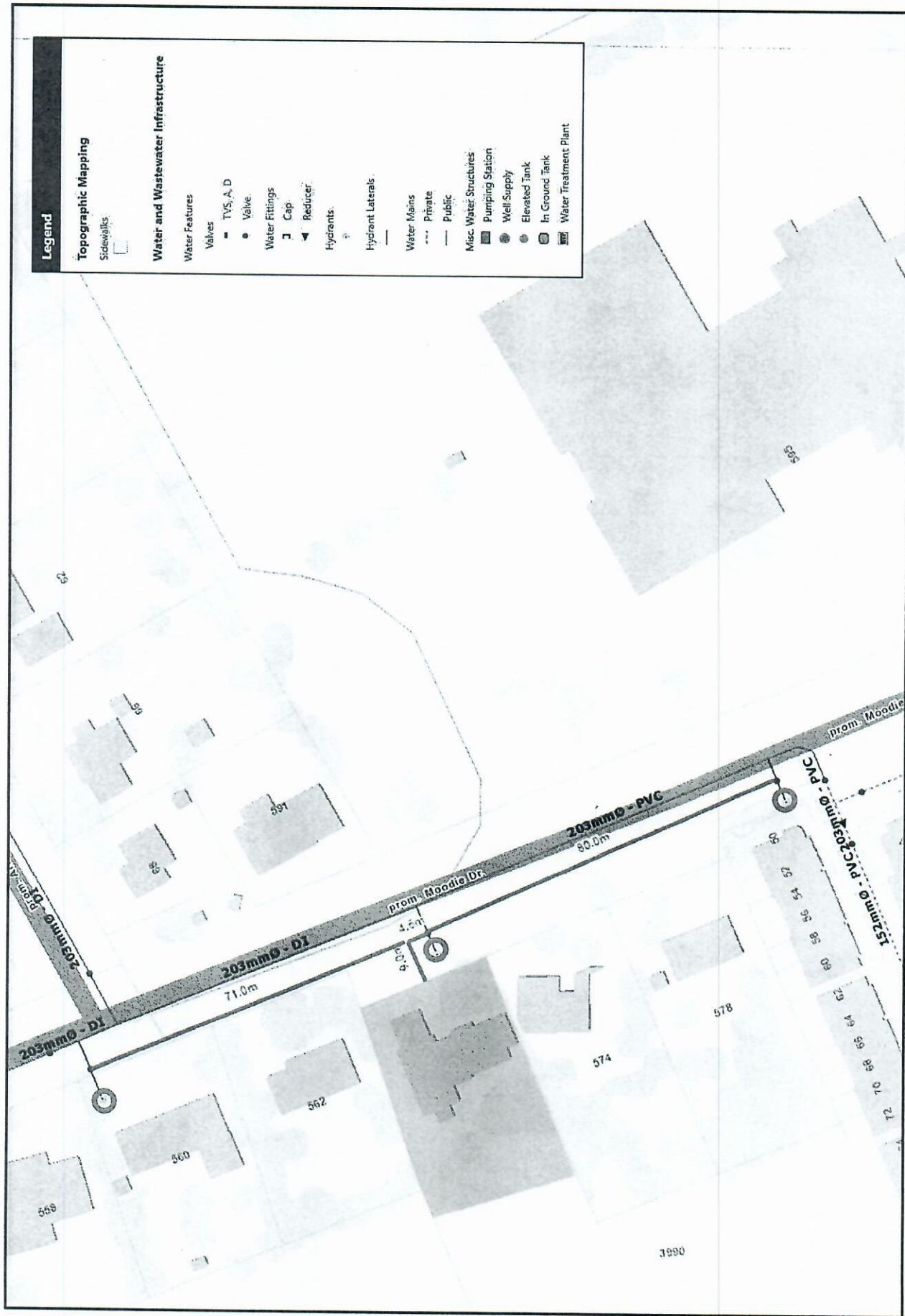


Figure 6: Hydrant Spacing for 572 Moodie Dr

Source: geoOttawa 2020; Contains information licensed under the Open Government Licence – City of Ottawa.

PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

CITY OF OTTAWA

APPENDIX E

CITY OF OTTAWA

SANITARY SEWER DESIGN SHEET

SHEET No. 1 OF 1

PROPOSED 3 ½ STOREY STACKED TOWNHOUSES

572 MOODIE DRIVE

CITY OF OTTAWA

APPENDIX F

DEVELOPMENT SERVICING STUDY CHECKLIST SUMMARY

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

- ☐ Executive Summary (for larger reports only).
- ☒ Date and revision number of the report.
- ☒ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☒ Plan showing the site and location of all existing services.
- ☐ 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.
- ☐ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☐ 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.
- ☒ Statement of objectives and servicing criteria.
- ☒ Identification of existing and proposed infrastructure available in the immediate area.
- ☐ 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).
- ☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management 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.
- ☐ 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.
- ☐ Proposed phasing of the development, if applicable.

- ☒ Reference to geotechnical studies and recommendations concerning servicing.
- ☒ All preliminary and formal site plan submissions should have the following information:
 - Metric scale
 - North arrow (including construction North)
 - Key plan
 - Name and contact information of applicant and property owner
 - Property limits including bearings and dimensions
 - Existing and proposed structures and parking areas
 - Easements, road widening and rights-of-way
 - Adjacent street names

4.2 Development Servicing Report: Water

- ☐ Confirm consistency with Master Servicing Study, if available
- ☒ Availability of public infrastructure to service proposed development
- ☒ Identification of system constraints
- ☒ Identify boundary conditions
- ☒ Confirmation of adequate domestic supply and pressure
- ☒ 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 at locations throughout the development.
- ☒ 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.
- ☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
- ☐ Address reliability requirements such as appropriate location of shut-off valves
- ☒ Check on the necessity of a pressure zone boundary modification.
- ☒ 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

- ☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- ☐ 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.
- ☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- ☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- ☒ Summary of proposed design criteria (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).
- ☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.
- ☐ 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 condition of sewers.
- ☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☐ 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)
- ☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.
- ☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.
- ☐ 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).
- ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☐ Special considerations such as contamination, corrosive environment etc.

4.4 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)
- ☐ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ Water quantity 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.
- ☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- ☐ Set-back from private sewage disposal systems.
- ☐ Watercourse and hazard lands setbacks.
- ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☒ 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.
- ☐ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☐ 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.
- ☐ Identification of potential impacts to receiving watercourses
- ☐ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 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.
- ☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- ☐ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 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 the 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.
- ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- ☐ Changes to Municipal Drains.
- ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- ☒ Clearly stated conclusions and recommendations
- ☐ 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