PROPOSED 11-UNIT APARTMENT BUILDING
5567 ONTARIO AVENUE, NIAGARA FALLS

FUNCTIONAL SERVICING DESIGN BRIEF
NEW STORM, SANITARY AND WATER SERVICES

REV 1 – January 18, 2024

PREPARED BY:

HALLEX PROJECT #230722

HALLEX NIAGARA
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TABLE OF CONTENTS

1. INTRODUCTION

The proposed 11-unit apartment building development consists of the construction of a 3-storey apartment building, the existing 3-storey apartment building, an asphalt laneway and parking areas and grass areas. This development is located at 5567 Ontario Avenue, which is west of the Ontario Avenue and John Street intersection in the City of Niagara Falls, ON.

The purpose of the service assessment is to determine the functional sizing of the proposed storm, sanitary and water services in addition to the post-development flows from the site to determine the impact on the existing municipal infrastructure.

2. EXISTING MUNICIPAL INFRASTRUCTURE

2.1 EXISTING SITE DRAINAGE

The existing site currently drains from the northerly side to the southerly side of the property via overland flow as per the Topographic Survey completed by The Larocque Group, drawing file NS2020-070-01, dated November 17, 2020. This overland flow ultimately drains easterly along Ontario Avenue to the existing storm sewer at the Ontario Avenue and John Street intersection.

2.2 STORM SEWER

The existing site is not currently serviced as the site drainage consists of overland sheet flow. Additionally, a municipal storm sewer is not immediately adjacent to the frontage of the subject site. The existing drainage infrastructure at Ontario Avenue consists of an 825mm municipal storm sewer at the Ontario Avenue and John Street intersection which drains southerly along John Street towards Blondin Avenue.

2.3 SANITARY SEWER

The existing site is currently serviced with a 100mm sanitary lateral connection to Ontario Avenue as it consists of the existing 3-storey apartment building. The existing sanitary infrastructure at Ontario Avenue consists of a 150mm municipal sanitary sewer which drains easterly towards John Street.

2.4 WATERMAIN

The existing site is currently serviced with a 25mm copper water service connection to Ontario Avenue as it consists of the existing 3-storey apartment building. The existing watermain infrastructure at Ontario Avenue consists of a 150mm cast iron municipal watermain.

3. STORM SEWER SYSTEM

3.1 PRE-DEVELOPMENT SITE FLOW

The total drainage area for the subject development is 0.116 hectares with an existing runoff coefficient of 0.52 based on the existing roof, asphalt and grass surfaces. The catchment area plan for the pre-development site condition is provided on Hallex Sketch CSK1, attached.

Utilizing the rationale method (Q = CiA/360) and the minimum recommended time of concentration of 10 minutes, the allowable peak flow for the pre-development site is as follows:

	Pre-Development
Storm Event	Storm Flow
5-year Storm	14.1 L/s

These flows are calculated using the City of Niagara Falls intensity-duration-frequency curves. The pre-development flows for the proposed development are provided in Exhibit #1 for the five -year storm at the end of the design brief.

3.2 POST-DEVELOPMENT SITE FLOW

The proposed development includes the 3-storey apartment building, the existing 3-storey apartment building, an asphalt laneway and parking areas and grass areas. The grading for the site will ensure drainage through the proposed storm sewer for storm water quantity controls. The total drainage for the site consists of 0.116 hectares with a calculated runoff coefficient of 0.78 based on the existing / proposed roof, asphalt and grass surfaces.

Given a municipal storm sewer is not immediately adjacent to the frontage of the subject site, a new municipal storm sewer shall be extended from the 825mm municipal storm sewer at the Ontario Avenue and John Street intersection. The proposed storm sewer system for the site will then discharge to this municipal storm sewer extension at Ontario Avenue. The catchment area plan for the post-development site condition is provided on Hallex Sketch CSK2, attached.

Utilizing the rationale method (Q = CiA/360) and the minimum recommended time of concentration of 10 minutes, the calculated peak flow for the post-development site is as follows:

	Post-Development
Storm Event	Storm Flow
5-year Storm	21.1 L/s

These flows are calculated using the City of Niagara Falls intensity-duration-frequency curves. The post-development flows for the proposed development are provided in Exhibit #2 for the five -year storm at the end of the design brief.

3.3 STORMWATER QUANTITY CONTROL

The post-development storm water runoff for the subject site will increase by 7.0 L/s for the five-year storm from the maximum allowable flow from the site. As such, storm water detention will be required for the proposed development.

Stormwater quantity controls for the site can be achieved by utilizing an orifice plate within a manhole prior to discharging to the proposed municipal storm sewer extension at Ontario Avenue. The orifice plate will ensure the combined post development runoff is controlled to the pre-development runoff rate for the five-year storm event. The resulting 10 m^3 volume generated for the five-year storm event can be stored within a proposed storm sewer system consisting of oversized storm sewers, catchbasins / manholes and/or temporary surface ponding prior to discharging to the proposed municipal storm sewer extension at Ontario Avenue.

4. SANITARY SEWER SYSTEM

Given the existing 3-storey apartment building is to be unaltered by the development, it is proposed to maintain the existing sanitary lateral connection to Ontario Avenue provided the sewer is in good working condition. A new sanitary lateral shall be proposed from the new building to the existing 150mm diameter municipal sanitary sewer at Ontario Avenue.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The existing three-storey apartment building is assumed to have 7 one-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.
- The proposed three-storey apartment building is assumed to have 11 one-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.
- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #3 are assumed and may not represent the final building plumbing design.

The peak drainage rate for the existing building is determined to be 204.3 L/min and the proposed building is determined to be 239.3 L/min based on the fixtures and fixture units shown in Exhibit #3 attached. Table 7.4.10.5 in the Ontario Building Code is used to determine probable peak drainage rates for the total fixture units. The wastewater generation for the existing building is determined to be 3,850 L/day and the proposed building is determined to be 6,050 L/day using Table 8.2.1.3A of the Ontario Building Code as shown in Exhibit #3, attached.

Based on the above, Hallex recommends a minimum 100mm diameter sanitary lateral @ 1.0% to be installed to convey sanitary flows from the proposed three-storey apartment building to the existing 150mm diameter municipal sanitary sewer at Ontario Avenue.

5. WATER DISTRIBUTION SYSTEM

Given the existing 3-storey apartment building is to be unaltered by the development, it is proposed to maintain the existing water service connection to Ontario Avenue provided the service is in good working condition. A new water service shall be proposed from the new building to the existing 150mm diameter municipal watermain at Ontario Avenue.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #4 are assumed and may not represent the final building plumbing design.
- The existing three-storey apartment building is assumed to be of ordinary construction and does not have sprinklers installed throughout the building.
- The proposed three-storey apartment building is assumed to be of wood-frame construction and will not have sprinklers installed throughout the building.

The domestic water demand for the existing building is determined to be 196.1 L/min and the proposed building is determined to be 228.8 L/min based on the fixtures and fixture units shown in Exhibit #4 attached. Table 7.4.10.5 in the Ontario Building Code is used to determine water demands for the total fixture units.

Using the calculations provided in the Fire Underwriters Survey – 2020 Water Supply for Public Fire Protection, the minimum water supply flow rate for fire protection is determined to be 5,000 L/min for the existing building and 9,000 L/min for the proposed building based on the above assumptions as shown in Exhibits #5 & 6 respectively. There are two existing municipal fire hydrants located near the site. The first is approximately 51.9m east of the property near the southeast corner of the Ontario Avenue and John Street intersection. The second is approximately 51.9m east of the property near the southeast corner of the Ontario Avenue and John Street intersection.

Based on the above, Hallex recommends a minimum 50mm diameter domestic water service to be installed to provide water supply to the proposed three-storey apartment building from the existing 150mm diameter municipal watermain at Ontario Avenue. Given the separate water service, the proposed building shall be metered separately complete with a remote reader on the face of the building to monitor individual water usage.

6. CONCLUSION

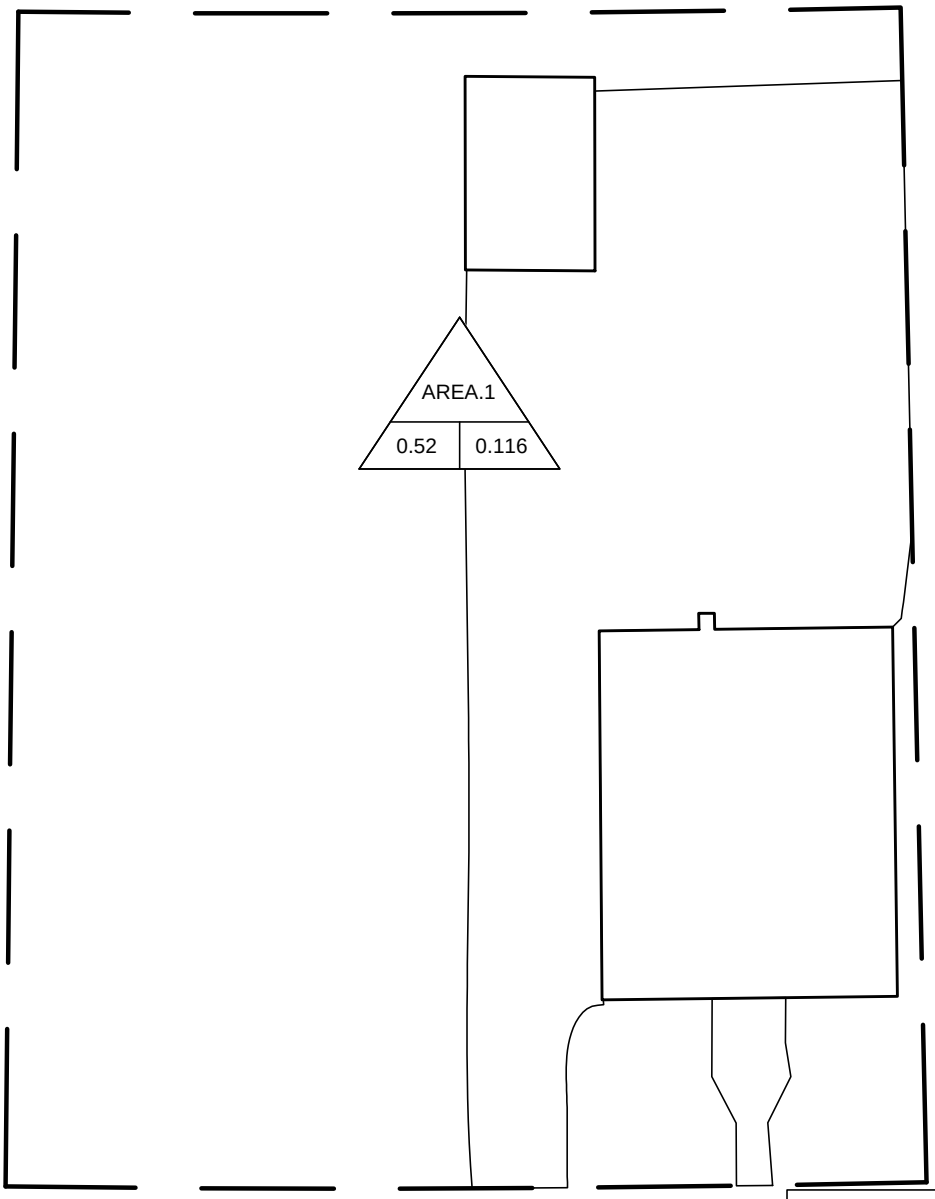
The aforementioned calculations and recommendations for the storm, sanitary and water services are based on the current design for the site as of writing this report. A final sealed report, complete with updates to the recommendations made in this report, may be required based on the final site design.

We trust this report meets your approval. Please contact the undersigned should you have any questions or comments.

Yours truly,
HALLEX ENGINEERING LTD

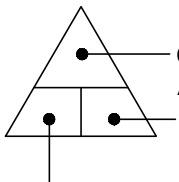
Jim Halucha P.Eng
Civil/Structural Engineer

Jonathan Skinner, C.E.T., B.Tech
Civil Technologist



ONTARIO AVENUE

LEGEND



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PROJECT: 11-UNIT APARTMENT BUILDING
5567 ONTARIO AVENUE, NIAGARA FALLS

SHEET TITLE: PRE-DEVELOPMENT CATCHMENT AREAS

DATE: 01/18/2024

SCALE: 1:250

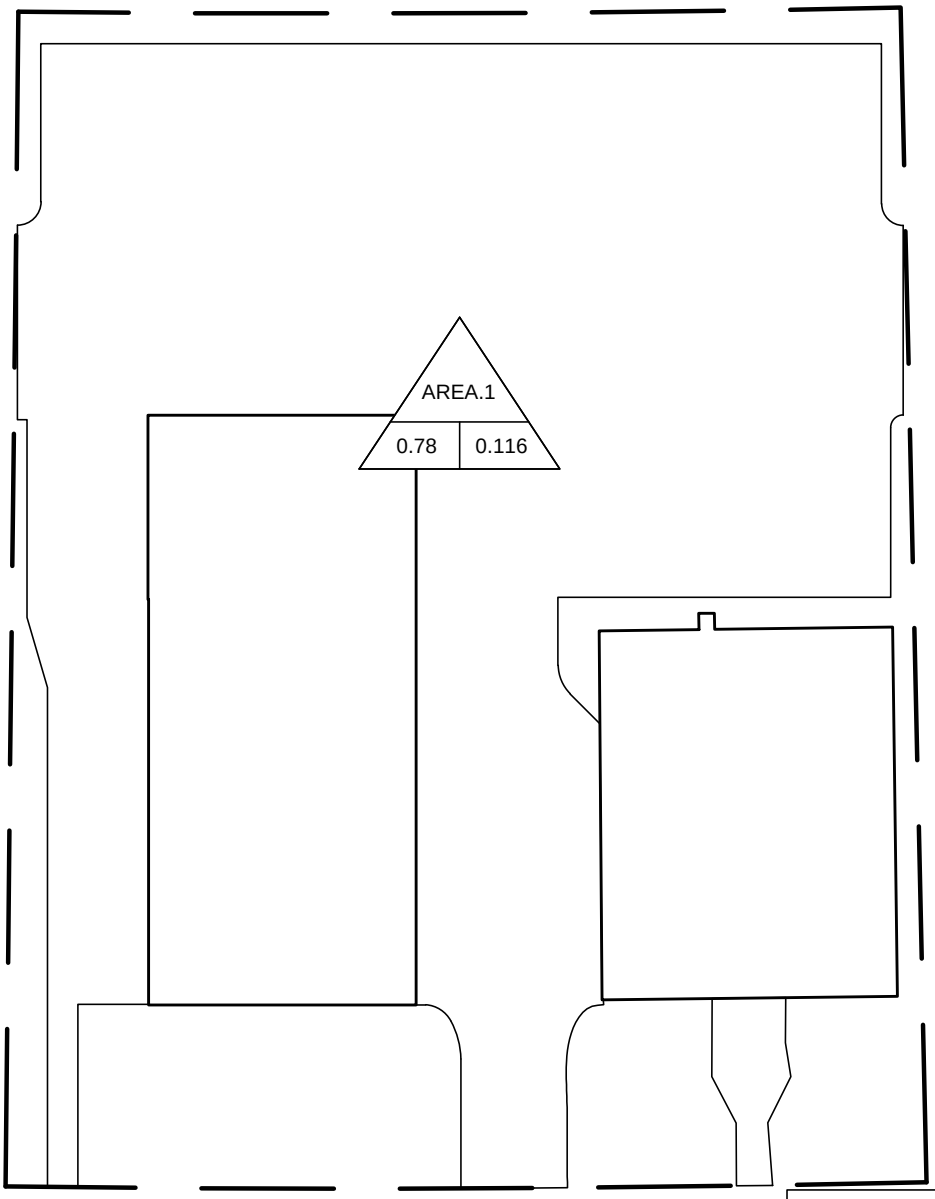
DR. BY: JS

CH. BY: JH

JOB No.: 230722

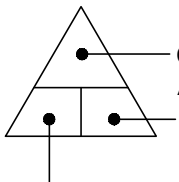
DWG. CSK1

REV. 1



ONTARIO AVENUE

LEGEND



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PROJECT:
11-UNIT APARTMENT BUILDING
5567 ONTARIO AVENUE, NIAGARA FALLS

SHEET TITLE:
POST-DEVELOPMENT CATCHMENT AREAS

DATE: 01/18/2024
SCALE: 1:250
DR. BY: JS
CH. BY: JH

JOB No.: 230722
DWG. CSK2
REV. 1

Ontario Avenue Apartment Building
Exhibit #1 - 5 Year Pre - Development Calculations

1/18/2024
Job: 230722

MUNICIPALITY: **Niagara Falls**

manning's n = 0.013 Conc Pipe
0.013 PVC Pipe
0.024 Corr. Stl Pipe

Rainfall Intensity Values = A= 719.500
B= 6.340
C= 0.769

Location			Length of Pipe	Area		Flow Time		Rainfall Intensity	Unit rate of Runoff	Design Flows	
Pipe	From Node	To Node		Increment	Cum Total	To Upper	In Sectio			Cum Flow	Cum Flow
			(m)	(ha)	(ha)	(min)	(min)	mm/hr	m^3/ha*day	(m^3/d)	(m^3/s)
1	**Area.1**	**Street**	**N/A**	**0.116**	**0.116**	**10.00**	**N/A**	**84**	**60497**	**1216.0**	**0.0141**
Roof	-	-	-	0.015	-	-	-	-	19157.5	287.4	-
Paved	-	-	-	0.032	-	-	-	-	18149.2	580.8	-
Grass	-	-	-	0.069	-	-	-	-	5041.4	347.9	-

Run-off Coefficients Used:

Roof Structure C = 0.95
Paved Surface C = 0.90
Grass Surface C = 0.25

Velocity Range:

Minimum Velocity = 0.80 m/s
Maximum Velocity = 6.00 m/s

Time of Concentration = 10 min

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Ontario Avenue Apartment Building
Exhibit #2 - 5 Year Post - Development Calculations

1/18/2024
Job: 230722

MUNICIPALITY: **Niagara Falls**

Rainfall Intensity Values =

A=	719.500
B=	6.340
C=	0.769

Location			Length of Pipe	Area		Flow Time		Rainfall Intensity	Unit rate of Runoff	Design Flows	
Pipe	From Node	To Node		Incre-ment	Cum Total	To Upper	In Section			Cum Flow	Cum Flow
			(m)	(ha)	(ha)	(min)	(min)	mm/hr	m^3/ha*day	(m^3/d)	(m^3/s)
1	**Area 1**	**Street**	**N/A**	**0.116**	**0.116**	**10.00**	**N/A**	**84**	**42348**	**1820.0**	**0.0211**
Roof	-	-	-	0.029	-	-	-	-	19157.5	555.6	-
Paved	-	-	-	0.063	-	-	-	-	18149.2	1143.4	-
Grass	-	-	-	0.024	-	-	-	-	5041.4	121.0	-

Run-off Coefficients Used:

Roof Structure	C =	0.95
Paved Surface	C =	0.90
Grass Surface	C =	0.25

Velocity Range:

Minimum Velocity =	0.80	m/s
Maximum Velocity =	6.00	m/s

Time of Concentration:

Time of Concentration = 10 min

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Ontario Avenue Apartment Building
Exhibit #3 - Wastewater Generation Rate & Peak Drainage Rate

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WASTEWATER GENERATION ASSESSMENT

Occupancy	# of Units	Development Statistics	Volume (Table 8.2.1.3. A / B)	Total Daily Volume	Notes
Existing Building					
Apartments	7	2 persons	275 L/person	3850 L/day	
			Total =	3850 L/day	
Proposed Building					
Apartments	11	2 persons	275 L/person	6050 L/day	
			Total =	6050 L/day	

Therefore the total calculated sanitary flow from the site is determined to be 3850 L/day for the existing building and 6050 L/day for the proposed building.

MAXIMUM PROBABLE DRAINAGE RATE

Fixture	# of Units	# of Plumbing Fixtures	Fixture Units (Table 7.4.9.3.)	Total Sanitary Fixture Units
Existing Building				
Bathroom group with flush tank	7	1 fixture	6 FUs	42 FUs
Sink (domestic)	7	1 fixture	1.5 FUs	10.5 FUs
Dishwasher (domestic)	6	1 fixture	1 FUs	6 FUs
Clothes washer (public, domestic)	1	2 fixtures	1.5 FUs	3 FUs
Laundry tray (single/double)	1	1 fixture	1.5 FUs	1.5 FUs
			Total =	63.0 FUs
			Total Flow =	204.3 L/min
Proposed Building				
Bathroom group with flush tank	11	1 fixture	6 FUs	66 FUs
Sink (domestic)	11	1 fixture	1.5 FUs	16.5 FUs
Dishwasher (domestic)	11	1 fixture	1 FUs	11 FUs
Clothes washer (public, domestic)	1	2 fixtures	1.5 FUs	3 FUs
Laundry tray (single/double)	1	1 fixture	1.5 FUs	1.5 FUs
			Total =	98.0 FUs
			Total Flow =	239.3 L/min

Therefore the total calculated peak drainage rate is determined to be 204.3L/min for the existing building and 239.3L/min for the proposed building.

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Ontario Avenue Apartment Building
Exhibit #4 - Water Demand

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DOMESTIC WATER SUPPLY

Fixture	# of Units	# of Plumbing Fixtures	Fixture Units (Table 7.6.3.2.A.)	Total Water Fixture Units
Existing Building				
Bathroom group with flush tank	7	1 fixture	3.6 FUs	25.2 FUs
Sink (domestic)	7	1 fixture	2 FUs	14 FUs
Dishwasher (domestic)	6	1 fixture	1.4 FUs	8.4 FUs
Clothes washer (public, domestic)	1	2 fixtures	4 FUs	8 FUs
Laundry tray (single/double)	1	1 fixture	1.4 FUs	1.4 FUs
			Total =	57.0 FUs
			Total Flow =	196.1 L/min

Proposed Building				
Bathroom group with flush tank	11	1 fixture	3.6 FUs	39.6 FUs
Sink (domestic)	11	1 fixture	2 FUs	22 FUs
Dishwasher (domestic)	11	1 fixture	1.4 FUs	15.4 FUs
Clothes washer (public, domestic)	1	2 fixtures	4 FUs	8 FUs
Laundry tray (single/double)	1	1 fixture	1.4 FUs	1.4 FUs
			Total =	86.4 FUs
			Total Flow =	228.8 L/min

Therefore the maximum domestic water demand is determined to be 196.1L/min for the existing building and 228.8L/min for the proposed building.

Ontario Avenue Apartment Building
Exhibit #5 - Fire Water Demand - Existing Building

1/18/2024
Job: 230722

FIRE WATER SUPPLY

Building Type: No Fire Protection

Floor Area			Reduct.	
First Floor	119.2	m^2	1.00	119.2 m^2
Second Floor	119.2	m^2	1.00	119.2 m^2
Third Floor	119.2	m^2	1.00	119.2 m^2
				357.6 m^2

Construction Type: Ordinary Construction

Construction Coefficient: 1.0

1st Preliminary Fire Flow = 4000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -600 L/min

2nd Preliminary Fire Flow = 3400 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

North	45+	m	0.00
South	25.8	m	0.10
West	6.0	m	0.20
East	20.5	m	0.10
			0.40

Net Increase = 1360 L/min

FINAL FIRE FLOW = 5000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 2020, by the Fire Underwriter's Survey

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Ontario Avenue Apartment Building
Exhibit #6 - Fire Water Demand - Proposed Building

1/18/2024
Job: 230722

FIRE WATER SUPPLY

Building Type: No Fire Protection

Floor Area			Reduct.	
First Floor	118.5	m^2	1.00	118.5 m^2
Second Floor	172.6	m^2	1.00	172.6 m^2
Third Floor	172.6	m^2	1.00	172.6 m^2
				463.7 m^2

Construction Type: Wood Frame Construction

Construction Coefficient: 1.5

1st Preliminary Fire Flow = 7000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -1050 L/min

2nd Preliminary Fire Flow = 5950 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

North	45+	m	0.00
South	22.9	m	0.10
West	5.1	m	0.20
East	6.0	m	0.20
			0.50

Net Increase = 2975 L/min

FINAL FIRE FLOW = 9000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 2020, by the Fire Underwriter's Survey

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