COLBORNE COURT APARTMENTS
3777, 3791, & 3815 PORTAGE ROAD, NIAGARA FALLS

FUNCTIONAL SERVICING DESIGN BRIEF
NEW STORM, SANITARY AND WATER SERVICES

REV 0 – December 12, 2024

PREPARED BY:

HALLEX PROJECT #231216

HALLEX NIAGARA
4999 VICTORIA AVENUE
NIAGARA FALLS, ON L2E 4C9

HALLEX HAMILTON
745 SOUTH SERVICE ROAD, UNIT 205
STONEY CREEK, ON L8E 5Z2

TABLE OF CONTENTS

1. INTRODUCTION

The proposed Colborne Court Apartments development consists of the demolition of the two existing commercial buildings complete with asphalt parking areas/laneways and grass areas and the redevelopment of the two existing three-storey apartment buildings, the asphalt parking areas / laneways and the grass areas. This consists of the construction of a two-storey addition on the existing westerly three-storey apartment building, a four-storey addition on the existing southerly three-storey apartment building, a new twelve-storey apartment building, a new half-storey and underground parking garage, new asphalt laneway and parking areas and grass areas. This development is located at 3777, 3791 & 3815 Portage Road, which is south of Colborne Street and Portage Road 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 west to the east side of the property via overland flow and storm sewers as per the Topographic Survey provided to Hallex Engineering Ltd. on March 28, 2024. The overland flow and storm sewers ultimately drain to the existing municipal storm sewer at Portage Road.

2.2 STORM SEWER

The existing site is currently serviced with a 200mm storm lateral connection to Portage Road as it consists of the existing Colborne Court apartment buildings. The existing drainage infrastructure at Portage Road consists of a 525mm municipal storm sewer which drains northerly towards Colborne Street.

2.3 SANITARY SEWER

The existing site is currently serviced with at least three sanitary lateral connections to Portage Road as it consists of the existing Colborne Court apartment buildings and the two existing commercial buildings, however the sizes and locations of the existing sanitary laterals are unknown. The existing sanitary infrastructure at Portage Road consists of a 525mm concrete municipal sanitary sewer on the west side of the road and a 300mm concrete municipal sanitary sewer on the east side of the road. Both sanitary sewers drain northerly towards Colborne Street.

2.4 WATERMAIN

The existing site is currently serviced with two 20mm copper and a 100mm cast iron / PVC water service connections to Portage Road as it consists of the existing Colborne Court apartment buildings and the two existing commercial buildings. The existing watermain infrastructure at Portage Road consists of a 600mm concrete regional watermain and a 300mm PVC municipal watermain.

3. STORM SEWER SYSTEM

3.1 PRE-DEVELOPMENT SITE FLOW

The total drainage area for the subject development is 0.878 hectares with an existing runoff coefficient of 0.62 based on the existing roof, asphalt, gravel 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:

Storm Event	Pre-Development Storm Flow
5-year Storm	126.8 L/s
100-year Storm	201.9 L/s

These flows are calculated using the City of Niagara Falls intensity-duration-frequency curves. The pre-development flows for the subject development are provided in Exhibit #1 for the five-year storm and Exhibit #2 for the one-hundred-year storm at the end of the design brief.

3.2 POST-DEVELOPMENT SITE FLOW

The proposed development includes the existing westerly three-storey apartment building with the two-storey addition, the existing southerly three-storey apartment building with the four-storey addition, the twelve-storey apartment building, the half-storey and underground parking garage, asphalt laneway and parking areas and grass areas. The grading for the site will ensure drainage through the proposed storm sewer system for storm water quantity and quality controls. The total drainage for the site consists of 0.878 hectares with a calculated runoff coefficient of 0.73 based on the proposed roof, asphalt and grass surfaces. The proposed storm sewer system for the site will then discharge to the existing 525mm municipal storm sewer at Portage Road. 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:

Storm Event	Post-Development Storm Flow
5-year Storm	148.6 L/s
100-year Storm	236.6 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 #3 for the five -year storm and Exhibit #4 for the one-hundred-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 21.8 L/s for the five-year storm and 34.6 L/s for the one-hundred-year 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 in a cast-in-place stormwater management tank formed as part of the underground parking garage prior to discharging to the existing 525mm municipal storm sewer at Portage Road. The cast-in-place stormwater management tank will be sized to ensure the resulting 38.0m^3 volume generated for the five-year storm event and 57.0m^3 volume generated for the one-hundred-year storm event can be stored within the tank.

3.4 STORMWATER QUALITY CONTROL

Stormwater quality controls for the site can be achieved by utilizing a Hydroguard HG5 prior to draining to the existing 525mm municipal storm sewer at Portage Road. This will achieve a total suspended solids removal of at least 74% based on the above post-development site conditions. This value is greater than the required 'Normal' treatment of 70% as indicated in the MOE Stormwater Management Planning and Design Manual, dated March 2003 (refer to Chapter 3: Environmental Design Criteria, Section 3.3.1.1. Level of Protection).

4. SANITARY SEWER SYSTEM

Given the site is to be redeveloped for the proposed Colborne Court Apartments development, all existing sanitary laterals are to be located, capped and abandoned as required at the municipal sanitary sewer. A new sanitary lateral shall be proposed from the site to the existing 525mm concrete municipal sanitary sewer on the west side of Portage Road.

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 domestic sewage design flow is based on the recommendation in Section 5.5.2.1 – Domestic Sewage Flows of the Ministry of the Environment Design Guidelines for Sewage Works 2008 and Section 3 - Sanitary Drainage Systems of the City of Niagara Falls Engineering Design Guidelines Manual
- The average commercial daily design flow is based on the recommendation in Section 5.5.2.2 Commercial and Institutional Sewage Flows of the Ministry of the Environment Design Guidelines for Sewage Works 2008 assuming the flow is distributed over 8 hours.
- The existing westerly three-storey apartment building is assumed to have 15 one-bedroom and 11 two-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.
- The existing westerly three-storey apartment building with the two-storey addition is assumed to have 25 one-bedroom and 19 two-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.
- The existing southerly three-storey apartment building is assumed to have 6 one-bedroom and 17 two-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.
- The existing southerly three-storey apartment building with the four-storey addition is assumed to have 14 one-bedroom and 41 two-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.
- The proposed twelve-storey apartment building is assumed to have 13 one-bedroom and 81 two-bedroom apartment units. Each apartment is assumed to have a maximum of 2 persons per bedroom.

The peak dry weather design flow for the existing site is determined to be 3.726 L/s, and the peak wet weather design flow is determined to be 3.972 L/s. These calculations are based on the Pre-Development Sanitary Catchment Area Plan CSK3 and the Pre-Development Sanitary Sewer Design sheet provided in Exhibit #5, attached.

The peak dry weather design flow for the proposed development is determined to be 15.656 L/s, and the peak wet weather design flow is determined to be 15.902 L/s. These calculations are based on the Post-Development Sanitary Catchment Area Plan CSK4 and the Post-Development Sanitary Sewer Design sheet provided in Exhibit #6, attached.

Based on the above, Hallex recommends a minimum 200mm sanitary sewer @ 1.0% to be installed to convey sanitary flows from the proposed development to the existing 525mm concrete municipal sanitary sewer on the west side of Portage Road.

5. WATER DISTRIBUTION SYSTEM

Given the site is to be redeveloped for the proposed Colborne Court Apartments development, the two existing 20mm copper water services and the existing 100mm cast iron / PVC water service are to be capped and abandoned as required at the municipal watermain. A new water service shall be proposed from the site to the existing 300mm PVC municipal watermain at Portage Road.

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 domestic average daily water demand is based on Section 3.4.2. Domestic Water Demands of the Ministry of the Environment Design Guidelines for Drinking-Water Systems 2008.
- The peaking factors are based on the recommendation in Table 3-1: Peaking Factors of the Ministry of the Environment Design Guidelines for Drinking-Water Systems 2008.
- The building is assumed to be fire protected vertically between floors (including the protection of vertical openings between floors), of non-combustible construction and will have sprinklers and hose cabinets installed throughout the building as per applicable standards.

The domestic water demand for the proposed development is calculated as follows:

Site	Average Day Water Demand	Maximum Day Water Demand	Peak Hour Water Demand
Area.1	300.6 m^3/day	826.7 m^3/day	39.5 L/s

The resulting domestic flow head losses for the proposed development are determined to be 8.1 kPa (1.17 psi). The resulting fire flow head losses for the development are determined to be 32.28 kPa (4.68 psi). As such, the minimum working pressure within the existing municipal watermain is required to be at least 41.17 psi to ensure a minimum normal operating pressure of 40 psi (domestic) and 20 psi (fire) within the municipal watermain. These calculations are based on the Post-Development Water Demand Design sheet provided in Exhibit #7, attached.

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 five-storey apartment building, 5,000 L/min for the seven-storey apartment building and 5,000 L/min for the twelve-storey apartment building based on the above assumptions as shown in Exhibits #8-10, attached. There are two existing municipal fire hydrants located near the site. The first is approximately 13.6m north of the property on the west side of Portage Road. The second is approximately 19.0m south of the property on the west side of Portage Road.

Based on the above, Hallex recommends a minimum 150mm diameter water service to be installed to provide water supply to the proposed development from the existing 300mm PVC municipal watermain at Portage Road. The water service is to be separated at the property line with a 150mm domestic water service and a 150mm fire protection service and shall extend to the mechanical room of the proposed building. The installation of the new water service will require crossing the existing 600mm concrete regional watermain at Portage Road. As such, protection of the 600mm concrete regional watermain during the installation of the new water service shall be completed in accordance with Region of Niagara requirements.

6. CONCLUSION

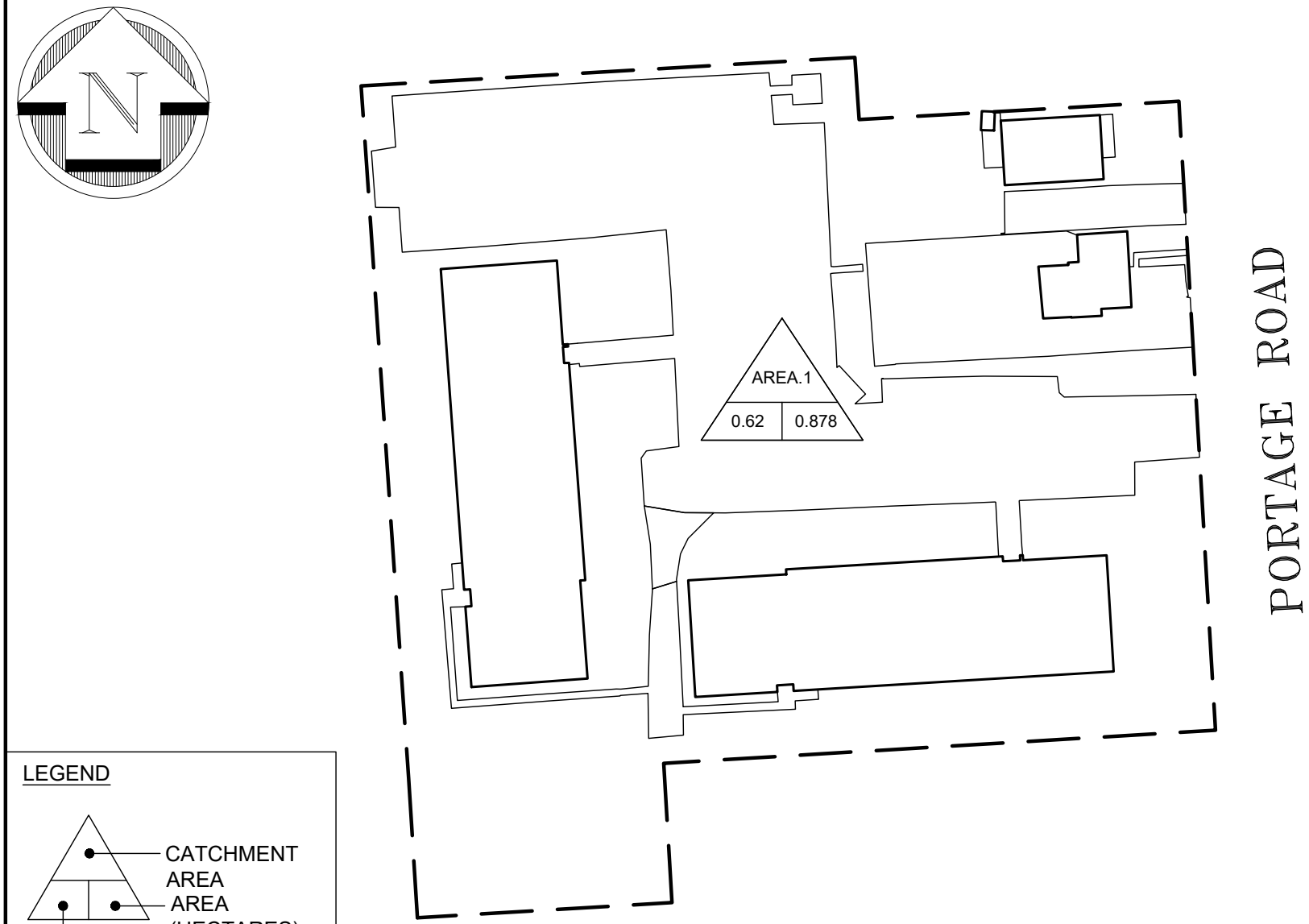
The aforementioned calculations and recommendations for the storm, sanitary and water services are based on the current design for the site as of writing this report. A final sealed report, complete with updates to the recommendations made in this report, may be required based on the final site design.

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



LEGEND

CATCHMENT AREA

AREA (HECTARES)

AVERAGE RUNOFF COEFFICIENT

HALLEX ENGINEERING LTD.

4999 Victoria Avenue,
Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105

745 South Service Rd. Unit 205,
Stoney Creek, ON L8E 5Z2
Tel: 905-561-4016 Fax: 905-561-1105

PROJECT:
COLBORNE COURT APARTMENTS
3777, 3791 & 3815 PORTAGE ROAD, NIAGARA FALLS, ON.

SHEET TITLE:
PRE-DEVELOPMENT CATCHMENT AREA PLAN

DATE: 12/12/2024

SCALE: 1:750

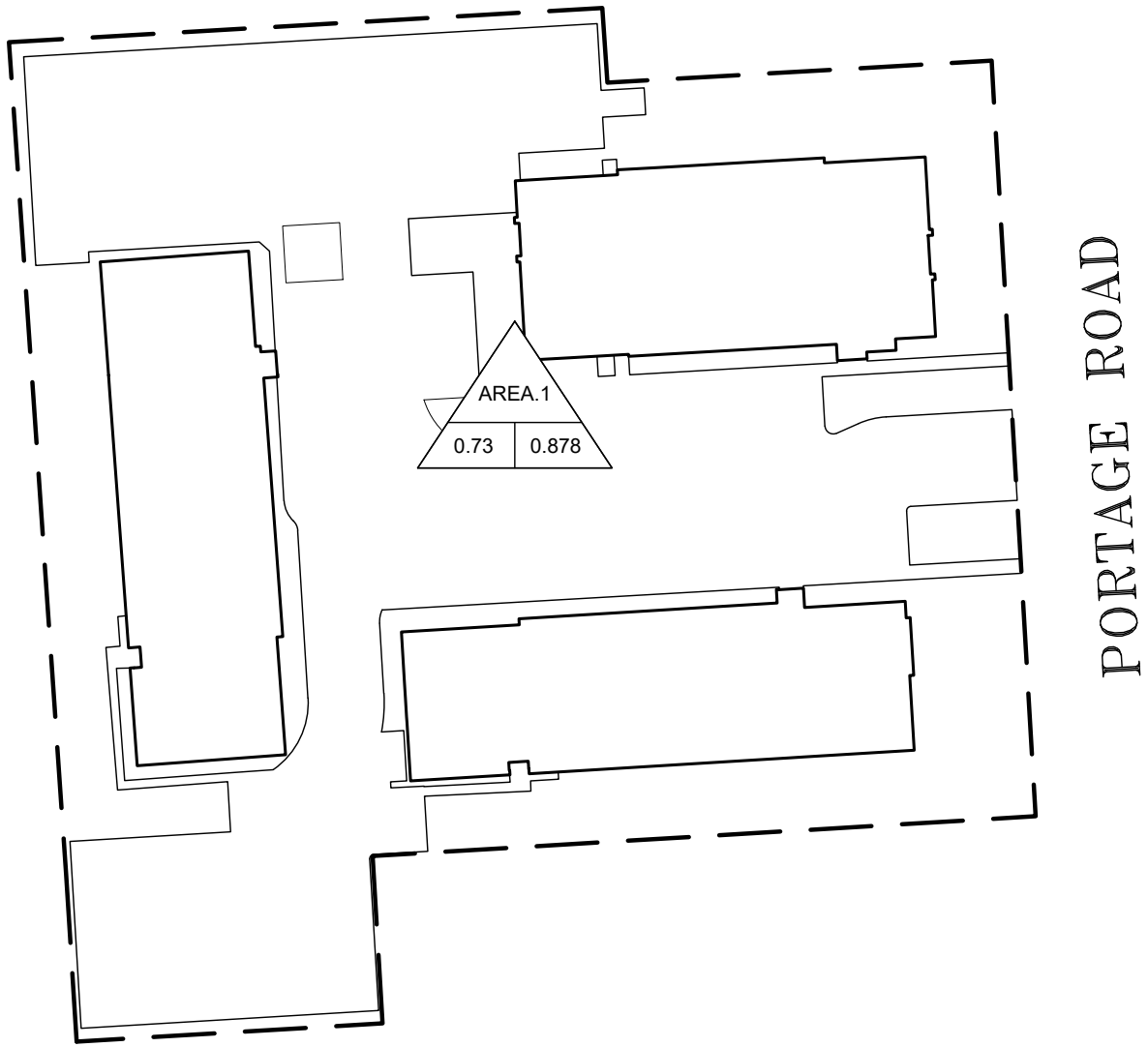
DR. BY: KV

CH. BY: JS/JH

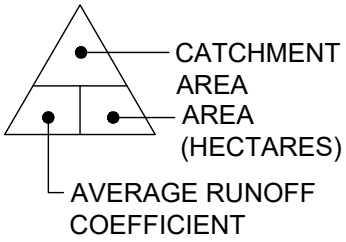
JOB No.: 231216

DWG. CSK1

REV. 0



LEGEND



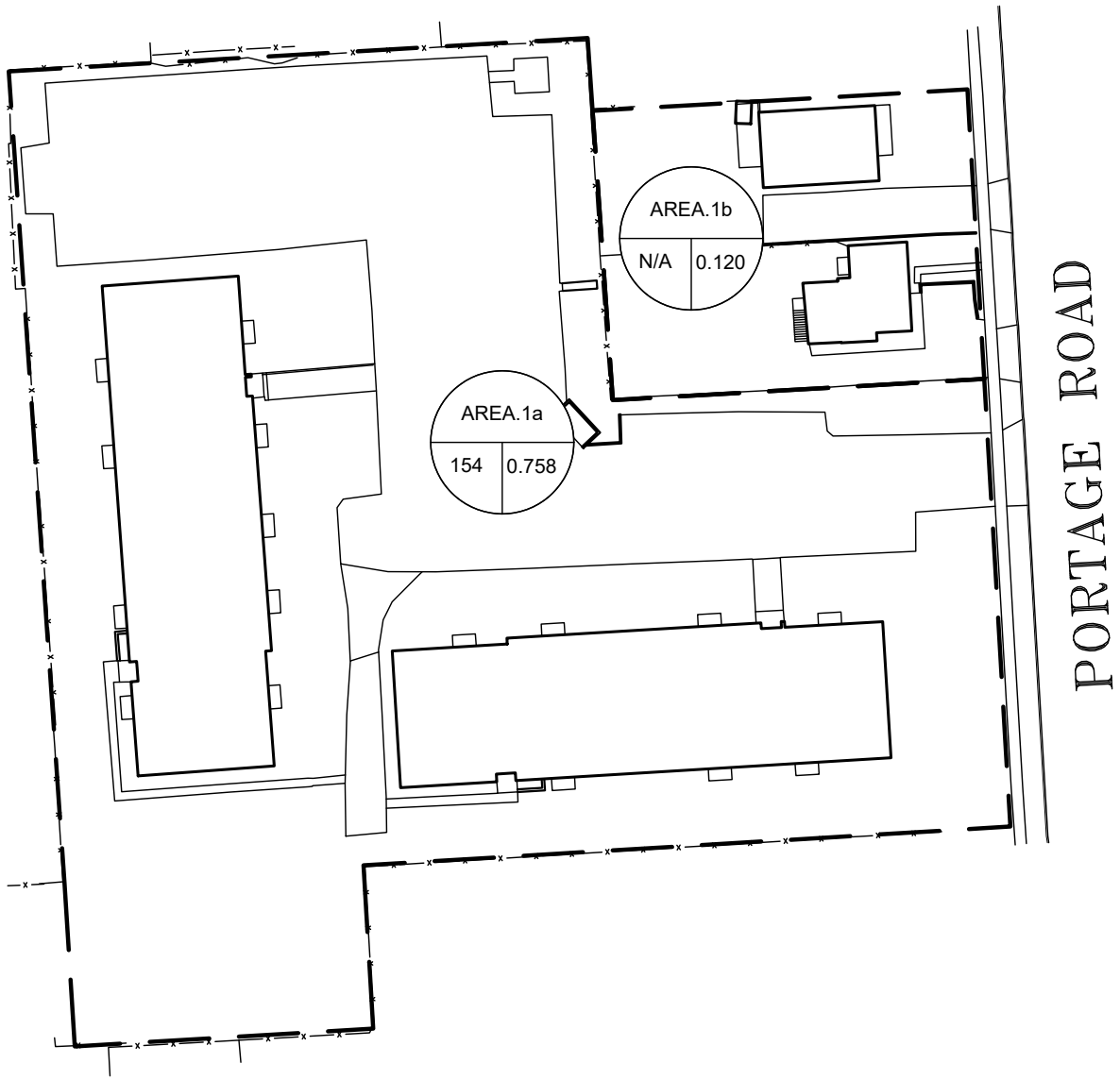
HALLEX ENGINEERING LTD.
4999 Victoria Avenue, Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105
745 South Service Rd. Unit 205, Stoney Creek, ON L8E 5Z2
Tel: 905-561-4016 Fax: 905-561-1105

PROJECT:
COLBORNE COURT APARTMENTS
3777, 3791 & 3815 PORTAGE ROAD, NIAGARA FALLS, ON.

SHEET TITLE:
POST-DEVELOPMENT CATCHMENT AREA PLAN

DATE: 12/12/2024
SCALE: 1:750
DR. BY: KV
CH. BY: JS/JH

JOB No.: 231216
DWG. CSK2
REV. 0



LEGEND

CATCHMENT AREA
AREA (HECTARES)
POPULATION

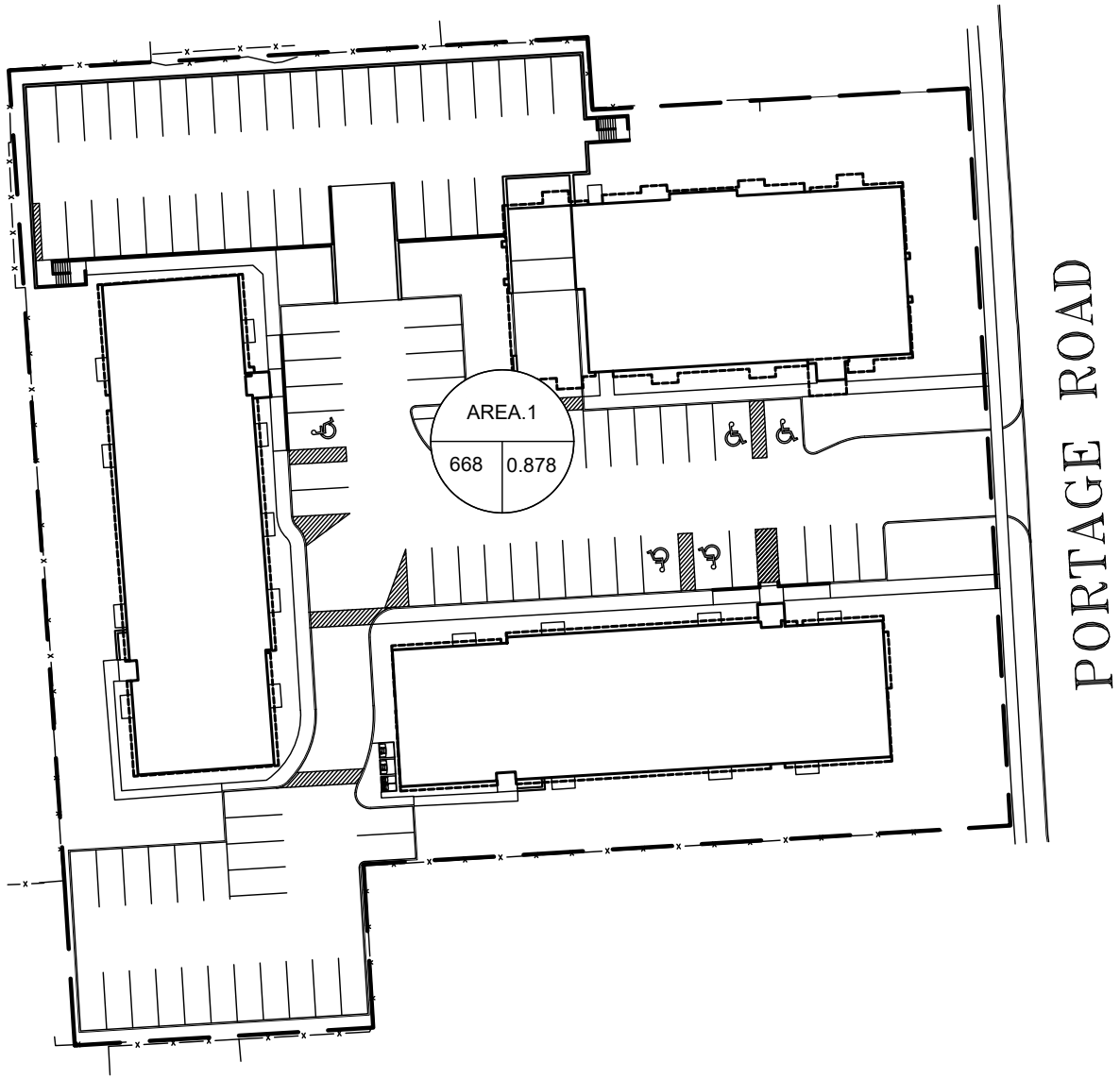
HALLEX ENGINEERING LTD.
4999 Victoria Avenue, Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105
745 South Service Rd. Unit 205, Stoney Creek, ON L8E 5Z2
Tel: 905-561-4016 Fax: 905-561-1105

PROJECT:
COLBORNE COURT APARTMENTS
3777, 3791 & 3815 PORTAGE ROAD, NIAGARA FALLS, ON.

SHEET TITLE:
PRE-DEVELOPMENT SANITARY CATCHMENT AREA PLAN

DATE: 12/12/2024
SCALE: 1:750
DR. BY: KV
CH. BY: JS/JH

JOB No.: 231216
DWG. CSK3
REV. 0



LEGEND

CATCHMENT AREA
AREA (HECTARES)
POPULATION

HALLEX ENGINEERING LTD.

4999 Victoria Avenue,
Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105

745 South Service Rd. Unit 205,
Stoney Creek, ON L8E 5Z2
Tel: 905-561-4016 Fax: 905-561-1105

PROJECT:
COLBORNE COURT APARTMENTS
3777, 3791 & 3815 PORTAGE ROAD, NIAGARA FALLS, ON.

SHEET TITLE:
POST-DEVELOPMENT SANITARY CATCHMENT AREA PLAN

DATE: 12/12/2024
SCALE: 1:750
DR. BY: KV
CH. BY: JS/JH

JOB No.: 231216
DWG. CSK4
REV. 0

Colborne Court Apartments
Exhibit #1 - 5 Year Pre - Development Calculations

2024-12-12
Job: #231216

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		Incre-ment	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**	**0.878**	**0.878**	**10.00**	**N/A**	**84**	**60497**	**10957.1**	**0.1268**
Roof	-	-	-	0.170	-	-	-	-	19157.5	3256.8	-
Paved	-	-	-	0.313	-	-	-	-	18149.2	5680.7	-
Gravel	-	-	-	0.004	-	-	-	-	12099.5	48.4	-
Grass	-	-	-	0.391	-	-	-	-	5041.4	1971.2	-

Run-off Coefficients Used:

Roof Structure	C =	0.95
Paved Surface	C =	0.90
Gravel Surface	C =	0.60
Grass Surface	C =	0.25

Velocity Range:

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

Time of Concentration = 10 min

Colborne Court Apartments
Exhibit #2 - 100 Year Pre - Development Calculations

2024-12-12
Job: #231216

MUNICIPALITY: **Niagara Falls**

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

Rainfall Intensity Values = A= 1264.570
B= 7.720
C= 0.781

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 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**	**0.878**	**0.878**	**10.00**	**N/A**	**134**	**96322**	**17445.5**	**0.2019**
Roof	-	-	-	0.170	-	-	-	-	30502.0	5185.3	-
Paved	-	-	-	0.313	-	-	-	-	28896.6	9044.6	-
Gravel	-	-	-	0.004	-	-	-	-	19264.4	77.1	-
Grass	-	-	-	0.391	-	-	-	-	8026.8	3138.5	-

Run-off Coefficients Used:

Roof Structure	C =	0.95
Paved Surface	C =	0.90
Gravel Surface	C =	0.60
Grass Surface	C =	0.25

Velocity Range:

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

Time of Concentration = 10 min

Colborne Court Apartments
Exhibit #3 - 5 Year Post - Development Calculations

2024-12-12
Job: #231216

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**	**0.878**	**0.878**	**10.00**	**N/A**	**84**	**42348**	**12836.5**	**0.1486**
Roof	-	-	-	0.242	-	-	-	-	19157.5	4636.1	-
Paved	-	-	-	0.381	-	-	-	-	18149.2	6914.8	-
Grass	-	-	-	0.255	-	-	-	-	5041.4	1285.6	-

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

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

Colborne Court Apartments
Exhibit #4 - 100 Year Post - Development Calculations

2024-12-12
Job: #231216

MUNICIPALITY: **Niagara Falls**

Rainfall Intensity Values = A= 1264.570
B= 7.720
C= 0.781

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**	**0.878**	**0.878**	**10.00**	**N/A**	**134**	**67425**	**20437.9**	**0.2366**
Roof	-	-	-	0.242	-	-	-	-	30502.0	7381.5	-
Paved	-	-	-	0.381	-	-	-	-	28896.6	11009.6	-
Grass	-	-	-	0.255	-	-	-	-	8026.8	2046.8	-

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

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

HALLEX ENGINEERING LTD.

Niagara Falls

Colborne Court Apartments
Exhibit #5 - Pre-Development Sanitary Sewer Design

2024-12-12
Job: #231216

Location			Length	INDIVIDUAL			CUMULATIVE			M	Q (p)	Q (i)	Q
Pipe	From Node	To Node		Resid'l Populat'n	Comrc'l Area	Resid'l Area	Resid'l Populat'n	Comrc'l Area	Resid'l Area				
			(m)		(ha)	(ha)		(ha)	(ha)		(L/s)	(L/s)	(L/s)
1	Area. 1	Street.	N/A	154	0.120	0.758	154	0.120	0.758	4.50	3.726	0.246	3.972

Calculations:

M = domestic peaking factor — $M = \frac{5}{P_r^{0.2}}$ where P=population in 1000's; Min M=2.0 and Max M=4.5

Q (p) = peak population flow (L/s) — $Q(p) = \frac{P_r * q_r * M}{86.4} + \frac{A_c * q_c}{28.8}$ where P=population and A=area in 1000's

Q (i) = peak extraneous flow (L/s) — $Q(i) = I * (A_r + A_c)$ (L/s) where A = area in hectares

Q = peak design flow (L/s) — $Q = Q(p)+Q(i)$ (L/s)

q_d = domestic sewage flow 450 L/cap.d — P_r = residential population

q_c = commercial daily flow 28000 L/ha.d — A_c = commercial area (hectares)

I = infiltration allowance 0.280 L/ha.s — A_r = residential area (hectares)

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

HALLEX ENGINEERING LTD.

Niagara Falls

Colborne Court Apartments
Exhibit #6 - Post-Development Sanitary Sewer Design

2024-12-12
Job: #231216

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

Location			Length	INDIVIDUAL		CUMULATIV	M	Q (p)	Q (i)	Q	Sewer Design			
Pipe	From Node	To Node		Resid'l Populat'n	Resid'l Area	Resid'l Populat'n					Slope	Capacity Full	Velocity Full	Dia-meter
			(m)		(ha)			(L/s)	(L/s)	(L/s)	(m/m)	(L/s)	(m/s)	(m)
1	Area. 1	Street.	N/A	668	0.878	668	4.50	15.656	0.246	15.902	0.0100	32.798	1.044	0.200

Calculations:

M = domestic peaking factor — $M = \frac{5}{P_r^{0.2}}$

Q (p) = peak population flow (L/s) — $Q(p) = \frac{P_r * q_d * M}{86.4}$ where P=population and A=area in 1000's

Q (i) = peak extraneous flow (L/s) — $Q(i) = I * A_r$ (L/s) where A = area in hectares

Q = peak design flow (L/s) — Q = Q(p)+Q(i) (L/s)

q_d = domestic sewage flow 450 L/cap.d — P_r = residential population

I = infiltration allowance 0.280 L/ha.s — A_r = residential area (hectares)

Velocity Range:

Minimum Velocity = 0.60 m/s

Maximum Velocity = 3.00 m/s

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

Colborne Court Apartments
Exhibit #7 - Post- Development Water Demand Design

2024-12-12
Job: #231216

Roughness Coefficient = 100 for 150mm pipe
110 for 200-250mm pipe

Location			Length	Pop.	Area	Area Type	Water Demand by Pop'n &			Fire Flow	Watermain Design						
Pipe	From Node	To Node					Average Day	Maximum Day	Peak Hour		Dia-meter	Dom. Head Loss	Domestic Pressure Loss		Fire Head Loss	Fire Pressure Loss	
			(m)		(ha)		m^3/day	m^3/day	L/s	(L/s)	(m)	(m)	(kPa)	(psi)	(m)	(kPa)	(psi)
1	Area. 1	Street	15.1	668	0.878	Apartments	300.6	826.7	39.50	83.33	0.150	0.827	8.10	1.17	3.294	32.28	4.68

Calculations:

Avg Daily Water Demand (Domestic)	0.450 m^3/cap./day	Max Day Factor	2.75
Fluid Specific Weight	9.8 kN/m^3	Max Hourly Peaking Factor	4.13

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

HALLEX ENGINEERING LTD.

Colborne Court Apartments
Exhibit #8 - Fire Water Demand
Five-Storey Apartment Building

2024-12-12
Job: #231216

FIRE WATER SUPPLY

Building Type: Fire Protected (Vertically)

Floor Area		Reduct.	
First Floor	760.9 m^2	0.00	0 m^2
Second Floor	776.1 m^2	1.00	776.1 m^2
Third Floor	769.3 m^2	0.25	192.325 m^2
Fourth Floor	769.3 m^2	0.25	192.325 m^2
Fifth Floor	769.3 m^2	0.00	0 m^2
			1160.75 m^2

Construction Type: Non-Combustible Const.

Construction Coefficient: 0.8

1st Preliminary Fire Flow = 6000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -900 L/min

2nd Preliminary Fire Flow = 5100 L/min

Sprinkler System: Sprinkler & Hose Lines

Sprinkler System Factor: -0.4

Net Decrease = -2040 L/min

Separation Factor

North	31.7 m	0.05
South	40.2 m	0.05
West	18.8 m	0.15
East	12.2 m	0.15
		0.40

Net Increase = 2040 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

HALLEX ENGINEERING LTD.

Colborne Court Apartments
Exhibit #9 - Fire Water Demand
Seven-Storey Apartment Building

2024-12-12
Job: #231216

FIRE WATER SUPPLY

Building Type: Fire Protected (Vertically)

Floor Area		Reduct.	
First Floor	767.7 m^2	0.00	0 m^2
Second Floor	778.4 m^2	1.00	778.4 m^2
Third Floor	771.7 m^2	0.25	192.925 m^2
Fourth Floor	771.7 m^2	0.25	192.925 m^2
Fifth Floor	771.7 m^2	0.00	0 m^2
Sixth Floor	771.7 m^2	0.00	0 m^2
Seventh Floor	771.7 m^2	0.00	0 m^2
			1164.25 m^2

Construction Type: Non-Combustible Const.

Construction Coefficient: 0.8

1st Preliminary Fire Flow = 6000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -900 L/min

2nd Preliminary Fire Flow = 5100 L/min

Sprinkler System: Sprinkler & Hose Lines

Sprinkler System Factor: -0.4

Net Decrease = -2040 L/min

Separation Factor

North	26.2 m	0.10
South	13.8 m	0.15
West	12.2 m	0.15
East	45+ m	0.00
		0.40

Net Increase = 2040 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

HALLEX ENGINEERING LTD.

Colborne Court Apartments
Exhibit #10 - Fire Water Demand
Twelve-Storey Apartment Building

2024-12-12
Job: #231216

FIRE WATER SUPPLY

Building Type: Fire Protected (Vertically)

Floor Area		Reduct.	
First Floor	616.9 m^2	0.00	0 m^2
Second Floor	751.9 m^2	1.00	751.9 m^2
Third Floor	751.9 m^2	0.25	187.975 m^2
Fourth Floor	751.9 m^2	0.25	187.975 m^2
Fifth Floor	751.9 m^2	0.00	0 m^2
Sixth Floor	751.9 m^2	0.00	0 m^2
Seventh Floor	751.9 m^2	0.00	0 m^2
Eighth Floor	751.9 m^2	0.00	0 m^2
Ninth Floor	751.9 m^2	0.00	0 m^2
Tenth Floor	751.9 m^2	0.00	0 m^2
Eleventh Floor	751.9 m^2	0.00	0 m^2
Twelfth Floor	751.9 m^2	0.00	0 m^2
			1127.85 m^2

Construction Type: Non-Combustible Const.

Construction Coefficient: 0.8

1st Preliminary Fire Flow = 6000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -900 L/min

2nd Preliminary Fire Flow = 5100 L/min

Sprinkler System: Sprinkler & Hose Lines

Sprinkler System Factor: -0.4

Net Decrease = -2040 L/min

Separation Factor

North	12.8 m	0.15
South	26.2 m	0.10
West	28.3 m	0.10
East	45+ m	0.00
		0.35

Net Increase = 1785 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

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2