FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

PROPOSED RETAIL DEVELOPMENT
320 COLEMAN STREET
CARLETON PLACE, ON

PAUL MARQUES ARCHITECT INC.
2610 WESTON ROAD, SUITE 207
NORTH YORK, ON M9N 2B1

DATE: NOVEMBER 2022

PROJECT NO. 221332

PREPARED BY HUSSON
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
GENERAL@HUSSON.CA

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1.0 INTRODUCTION

The Carleton Crossing commercial development is located on the north side of Coleman Street between McGregor Street and McNeely Avenue. It is currently proposed to construct Commercial Building (3) in the southwest corner of the site. Refer to **Figure 1** for the site location.

All site servicing for the proposed development will be provided by the extension of existing services from within the property. No new service connections to the municipal roads will be required.

Temporary erosion and sediment controls will be implemented during construction to limit erosion and prevent sediment from leaving the site and entering adjacent roadways and waterways.

1.1 Background

The majority of the existing plaza was constructed between 2007. The following documents were referenced for the design of the Building C1 parcel:

- Drawing 16 – Site Grading and Drainage Plan, Proposed Retail Complete, prepared by McIntosh Perry Consulting Engineers Ltd.., revised September 13, 2007.
- Brigil Subdivision – Phase 1 & Associated Works, prepared by McIntosh Perry Consulting Engineers Ltd., revised April 30, 2008.
- Minimum Standards for Design, Construction and Approval of Municipal Infrastructure and Residential, Commercial and Industrial Development (Town Design Standards), Corporation of the Town of Carleton Place, dated 2015.
- The Stormwater Management Planning and Design Manual (MECP Planning and Design Manual), prepared by the Ministry of the Environment, Conservation and Parks, March 2003.

The topographic survey for the site was prepared by Farley, Smith & Denis Surveying Ltd., dated February 18, 2022.

2.0 STORM DRAINAGE

2.1 Existing Site Drainage

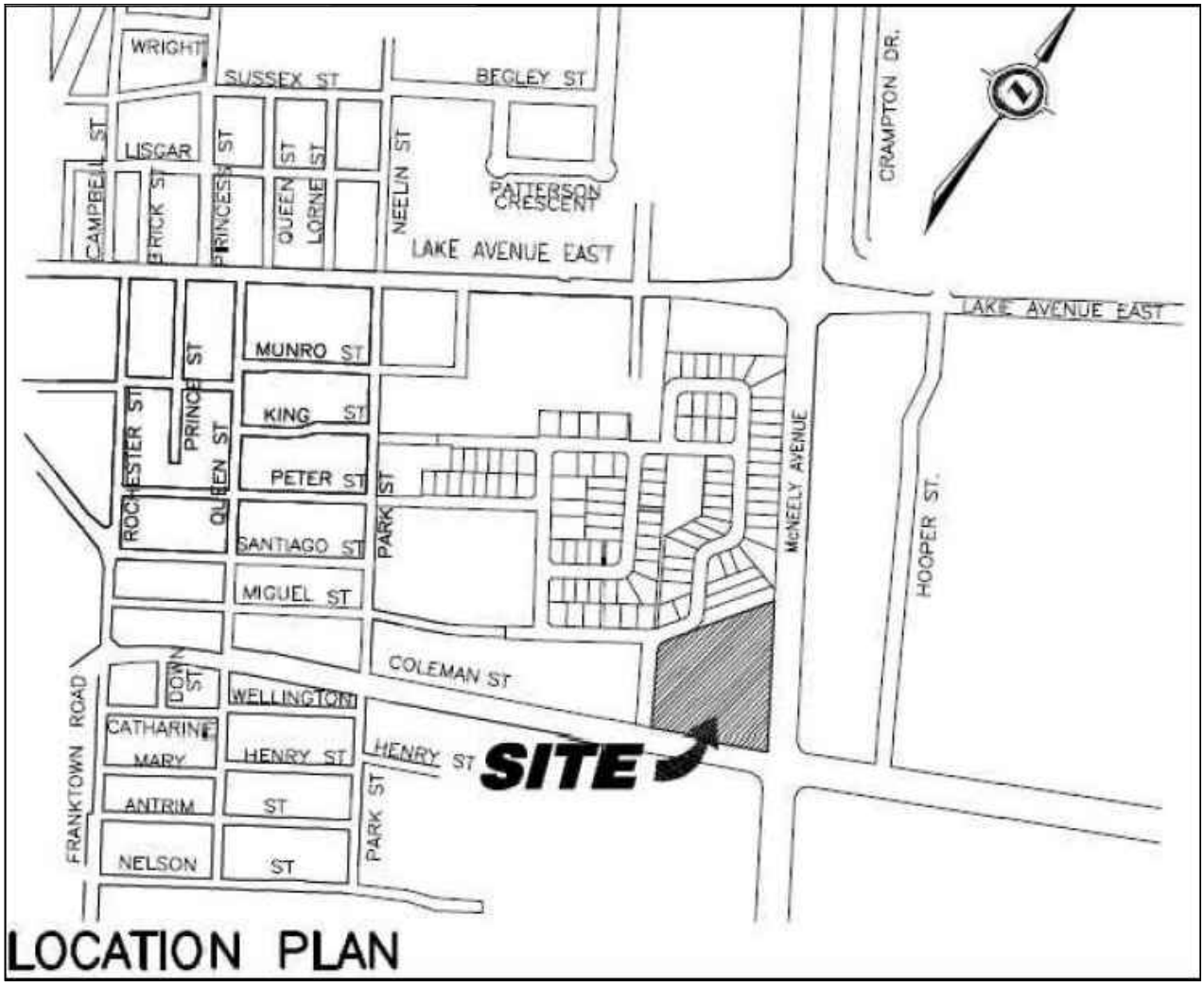
Existing drainage on the site is generally directed from west to east toward the roadside ditch on McNeely Avenue. An internal storm sewer network collects drainage from the building and parking lot catchbasins with 2 outlets north of the McNeely Avenue entrance.

Drainage will pond above the catchbasins and drainage overland from west to east. The maximum depth of ponding above the catchbasins will generally be less than 0.3m.

There are no existing stormwater management controls identified on the grading and drainage plan.

The original site design contemplated a building in the proposed location; however, it had a smaller footprint.

The existing site drainage is shown on **Figure 2**.



LOCATION PLAN

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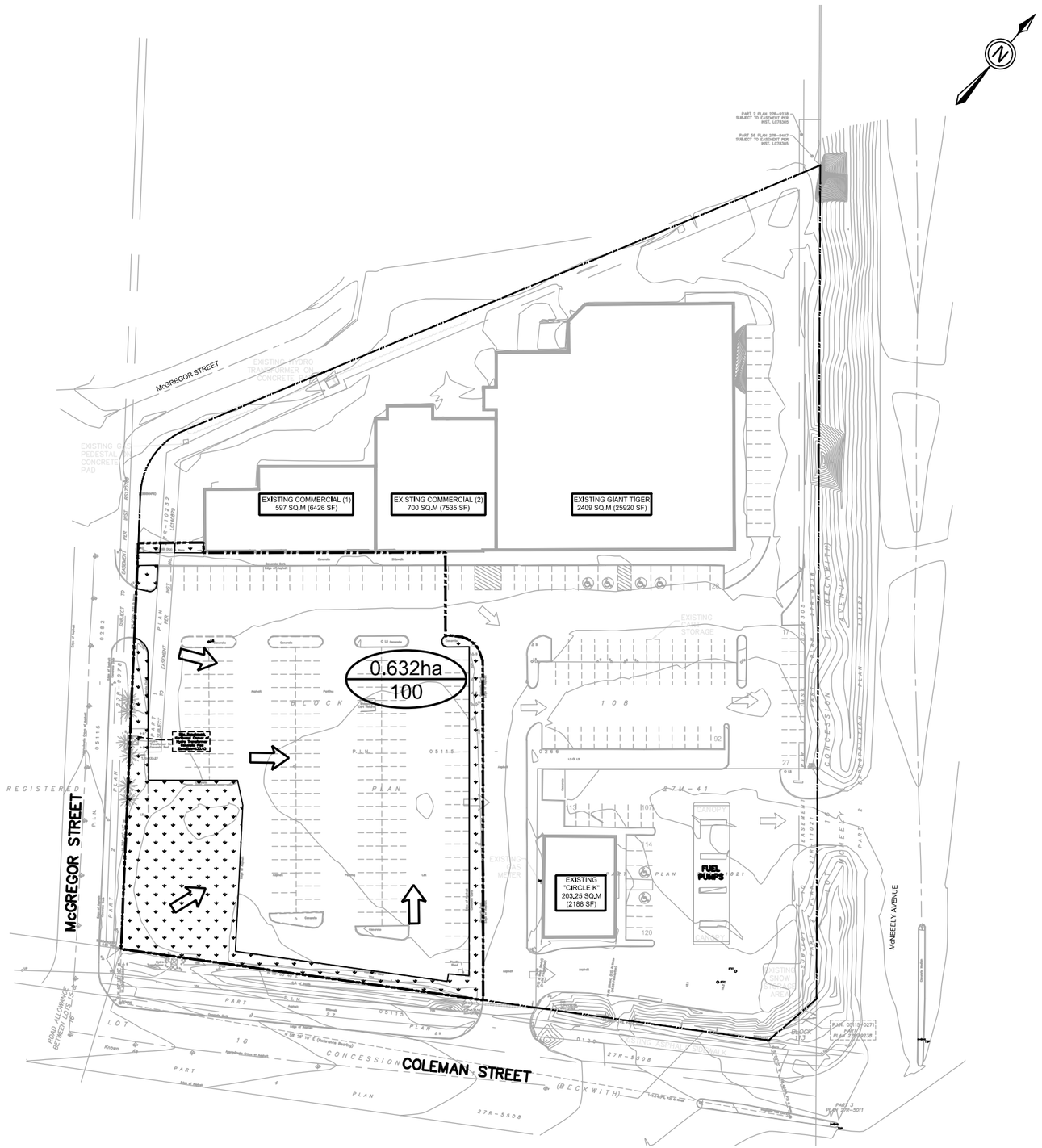
HUSSON.CA

FIGURE 1
320 COLEMAN
SITE LOCATION PLAN

DATE: NOVEMBER 2022 SCALE: N.T.S. PROJECT: 221332



LEGEND

- DRAINAGE BOUNDARY
- 0.632ha / 100 — CATCHMENT AREA (ha) / CATCHMENT ID
- PERVIOUS AREA
- OVERLAND FLOW DIRECTION

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FIGURE 2
320 COLEMAN STREET
EXISTING DRAINAGE

DATE: NOVEMBER 2022 SCALE: 1:1000 PROJECT: 221332

2.3 Proposed Drainage

The existing storm sewer network conveying drainage from the northwest corner of site is currently located within the footprint of the proposed building. This sewer network will be relocated around the east side of the new building. A new storm sewer network will extend around the north and west side of the new building to provide drainage for the drive-thru.

The proposed drainage will be directed to the existing catchbasins, to the extent feasible. New catchbasins will be required to collect runoff from the drive-thru.

The storm sewers have been sized to convey the peak flow from a 5-year design storm. Refer to **Appendix A** for the storm sewer design sheet.

Refer to **Drawing SW1** for the overland flow route and **Drawing SW2** for the existing and proposed minor system.

3.0 STORMWATER MANAGEMENT

The stormwater management design for the new development area has been designed to address water quantity and quality controls for the affected catchment area, as follows:

3.1 Quantity Control

Quantity controls will be in place such to ensure that the receiving drainage system (storm sewers and roadside ditch) will not be adversely impacted by the development.

A comparison of the pre and post development runoff coefficient for the development parcel was completed to compare the estimated runoff from the site. **Table 1** provides the calculations and **Figures 2** and **3** can be referenced for the various surface types.

Table 1. Runoff Coefficient Comparison

Existing Development

Catchment	Area (m^2)	C	CxA
Building	0	0.90	0.0
Pavement	4934	0.90	4440.6
Landscape	1390	0.25	347.5
Total/Composite	**6324**	**0.76**	**4788.1**

Proposed Development

Catchment	Area (m2)	C	CxA
Building	734	0.90	660.6
Pavement	4538	0.90	4084.2
Landscape	1052	0.25	263.0
Total/Composite	**6324**	**0.79**	**5007.8**

As per **Table 1**, there is a small increase in the runoff coefficient from 0.76 to 0.79. To ensure that there is no increase in the peak flows, controlled flow roof drainage will be implemented on the new building.

3.1.1 Rooftop Controls

In order to reduce the peak flows from the new development area, it is proposed to provide controlled flow roof drainage for the new building. The controlled roof will have an area of 734m^2 and a runoff coefficient of 0.90 (Catchment 101). The flows will be controlled by Zurn Z-105 roof drains with a flow rate of 5gpm (1.58L/s) per 125mm depth. **Table 2** provides a summary of the proposed rooftop controls. Refer to **Appendix B** for roof drain details and calculations.

Table 2. Controlled Flow Roof Drain Summary

Building	Area (m^2)	Release Rate (L/s)	Storage Required (m^3)	Number of Drains	Weirs per Drain
Commercial (3)	734	4.7	22	3	1

The roof will be controlled to a maximum release rate of 4.7L/s in the 100-year event. Based on this release rate approximately 22m^3 of storage will be required. The controlled rooftop drainage will have an average depth of 30mm and a maximum ponding depth of 150mm. Relief scuppers will be installed in the parapet walls to ensure that this depth will not be exceeded. The controlled flows will be routed to the on-site storm sewer system.

3.1.2 Peak Flows

Rational method calculations were competed to determine the peak flows from the re-development area during the 5- and 100-year storm events for the pre- and post-development conditions. The peak flows area summarized in **Table 3.** The catchment areas are shown on **Figure 3.**

Table 3. Peak Flow Summary

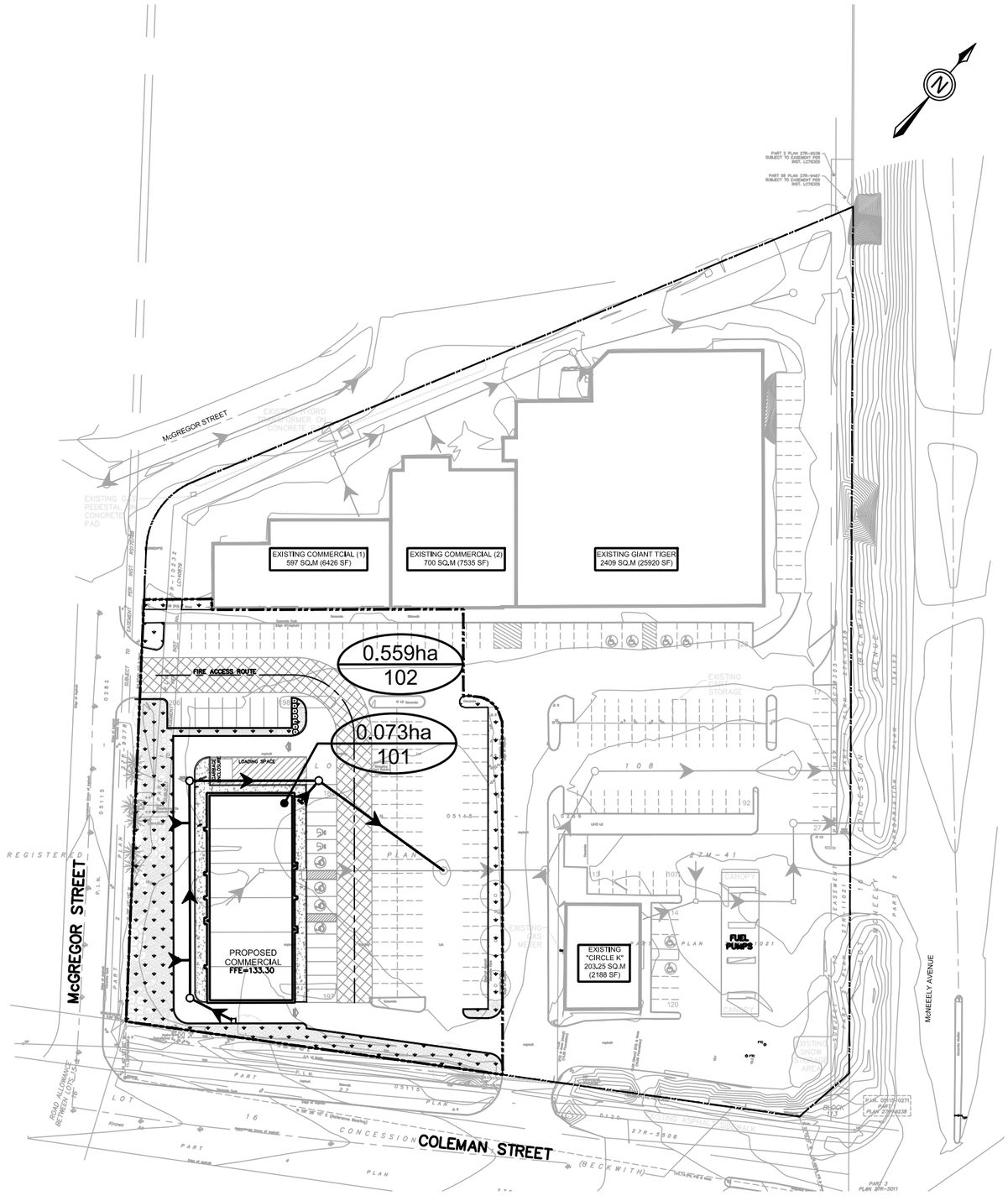
Scenario	Area (m^2)	5-Year Flow (L/s)	100-Year Flow (L/s)
Post Development			
Building (101)	734	4.7	4.7
Uncontrolled Site (102)	5590	124.6	215.6
Total Post-Development	**6324**	**129.3**	**220.3**
Pre-Development (100)	**6324**	**137.2**	**237.5**

With the proposed rooftop controls in place, there will be no increase in peak flows from the site, and therefore, no adverse impacts on the receiving stormwater network. Refer to **Appendix C** for peak flow calculations.

3.2 Quality Control

The proposed development consists of replacing existing asphalt parking areas with a building and landscape areas. As shown in **Table 1**, there is a net decrease in the runoff coefficient. As well, rooftop areas generally provide clean and no quality treatment is required.

Therefore, the proposed development will result in a net improvement in quality control for the site.



LEGEND

- DRAINAGE BOUNDARY
- 0.559ha / 102 — CATCHMENT AREA (ha) / CATCHMENT ID
- PERVIOUS AREA
- OVERLAND FLOW DIRECTION

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FIGURE 3
320 COLEMAN STREET
PROPOSED DRAINAGE

DATE: NOVEMBER 2022 SCALE: 1:1000 PROJECT: 221332

4.0 EROSION AND SEDIMENT CONTROL

An erosion and sediment control plan has been prepared for the site. The plan has been designed to limit sediment and debris from leaving the site during all stages of construction. The sediment control plan is shown on **Drawing SW3**.

4.1 Existing Site Condition

The existing site consists of a parking lot generally draining from west to east toward existing on-site stormwater infrastructure. Based on the gentle slopes across the site, there is a moderate potential for erosion from the site once the existing asphalt is removed.

4.2 Erosion and Sediment Control Plan

The sediment control plan for this site will consist of the following:

- A sediment control fence will be installed along the perimeter of the site where the grade will direct flows off-site.
- A gravel access pad will be installed for staging of construction material and vehicles.
- Any mud tracked from the site should be swept immediately and a sweeper truck should be used as necessary to remove any additional debris.
- Trucks leaving the site should be covered with tarpaulin.
- During dry weather, above freezing construction periods, dust control measures including wetting the site and egress points should be implemented on an as needed basis.
- Once the storm sewer system has been constructed, catchbasin sediment control and protection devices will be installed and maintained until the site is ready to be paved.

Erosion measures will be in place prior stripping topsoil from the site. A program will be in place to monitor and maintain the erosion and sediment controls. The sediment controls will be inspected by the Site Engineer and contractor:

- Once every 7 days and/or
- Within 24 hours following any significant rainfall event or snowmelt.

The inspection frequency can be extended to monthly inspections if there is no construction activity on-site.

Proper construction sequencing will also help with erosion and sediment control. The following schedule is recommended:

1. Install sediment control fence and access road.
2. Install sediment control devices on existing catchbasins receiving runoff from areas to be disturbed during construction.
3. Remove pavement, where required, and rough grade site to pre-grade elevations.
4. Install services and sediment control devices on new catchbasins.
5. Re-vegetate disturbed areas including lands left untouched for more than 30 days.
6. Remove sediment controls once the site has been 95 percent stabilized.

5.0 SANITARY SERVICING

There is an existing 200mm diameter sanitary sewer flowing east on McGregor Street. Existing sanitary servicing within the site is provided by a 150mm diameter service connection to the McGregor Street sewer. This is extended through the site with connections to the 3 commercial units backing onto McGregor Street and the gas station.

A commercial building was contemplated near the location of the proposed retail building; however, based on the size and location of the new building, it will be necessary to divert to sewer around the proposed building.

A new sanitary service will be provided to the west side of the new building from the existing sanitary sewer. As required by the Town, the new service into the building can be provided with a minimum grade of 1.0 percent and service the entire building.

The Town's criteria for sanitary capacity for commercial development is based on 28,000L/ha/day. As there is not proposed change of use for the site, no capacity issues in the receiving system are anticipated.

6.0 WATER DISTRIBUTION

There is an existing 150mm diameter watermain located on McGregor Street, and an existing 150mm water service connection from McGregor Street to the site. As with the sanitary servicing, it will be necessary to relocate the on-site watermain around the proposed building. A water service connection will be provided to the mechanical room on the west side of the retail building where the water meter will be provided.

The Town Design Standards was used to calculate the domestic water required to service the site. A hydrant flow test was completed by ABC Fire Extinguisher Services on September 20, 2022, refer to **Appendix D** for information.

Town Design Standards for Commercial Development:

Average Daily Demand = 28,000 L/ha/day

Peak Daily Demand = 1.5 x Average Daily Demand

Peak Hourly Demand = 2.7 x Average Daily Demand

Fire Flow Demand: 38 litres/s residential (2,280L/min.), 75 l/s industrial (4,500L/min).

Average Daily Demand:

Commercial = 2.04ha x 28,000 L/ha/day

= 57,128 litres/day (40 L/min)

Peak Daily Demand:

Commercial = 40L/min x 1.5

=60 L/min

Peak Hourly Demand:

Commercial = 40L/min x 2.7

=108 L/min

Based on the hydrant flow test under peak hour and maximum day flow conditions, the pressure in the watermain will be 482kPa (70psi); therefore, the proposed site will meet the City's minimum pressure of 275kPa (40psi). For detailed site servicing information please refer to the Servicing Plan (**Drawing SW2**).

Fire Analysis:

The minimum fire flow for commercial development, as per the Town standards is 4,500L/day. The more detailed fire formula on page 17 of the Fire Underwriters Survey (FUS) was used to calculate the minimum fire flow. Only the proposed commercial unit was considered in the fire analysis calculation. The minimum fire flows as shown in **Table 4** were calculated based on ordinary construction, no increase or decrease for occupancy, and sprinkler protection designer as per NFPA 13.

Table 4. Minimum Required Fire Flows

BLOCK	BLDG GFA (m^2)	Construction Coefficient	Sprinkler Reduction	Exposure Increase	MIN Fire Flow (L/min)
Commercial Unit	738	1.0	30%	5%	4,500

Based on the hydrant flow test the theoretical fire flow at the minimum City pressure of 140kPA (20psi) was calculated to be 10,878L/min (2,874gal/min). The required fire flow of 4,500L/min plus the maximum day demand 60L/min. is 4,560L/min. This is less than the theoretical fire flow of 10,878L/min at 140kPa. Therefore, the proposed building will be protected. The hydrant flow test results are provided in **Appendix D**.

The existing municipal water infrastructure can support the proposed site without the need for external upgrades or retrofit.

7.0 CONCLUSIONS

The stormwater management design for the site has been designed to meet the Town's requirements for quantity and quality controls. The plan will consist of the following:

- The proposed design will follow the existing drainage patterns with minor changes to the storm sewer network to avoid conflict with the proposed building. The peak flows from the site will be reduced in the post-development condition based on the implementation of controlled flow roof drainage on the proposed building.
- Water quality from the site will be reduced, as the existing parking area will be replaced by roof area with clean runoff.
- The existing sanitary sewers on site will be re-routed around the proposed building. The receiving system will have capacity to service the proposed development.
- A water analysis has been completed to confirm that there is adequate pressure and flow to provide domestic service and fire protection for the new building.

The requirements for servicing and stormwater management, the new development area have been addressed as required for Site Plan Approval.

Greg Rapp, P.Eng.

APPENDIX A

STORM SEWER DESIGN SHEET

Storm Sewer Design Sheet
Town of Carleton Place

Rainfall Intensity = $\frac{A}{(Tc+B)^c}$

	5-YEAR
A =	998.071
B =	6.053
c =	0.814

Starting Tc = 10 min

Project #: 221332
Date: July 22, 2022
Designed by DL

STREET	FROM MH	TO MH	5-YEAR AREA (ha)	5-YEAR RUNOFF COEFFICIENT "R"	5-YEAR "AR"	5-YEAR ACCUM. "AR"	5-YEAR RAINFALL INTENSITY (mm/hr)	5-YEAR ACCUM. FLOW (m3/s)	ACCUM. EXT/BLDG FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	Manning's "n"	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	% FULL	UPSTREAM TIME OF CONC. (min)	TIME OF CONC. (min)	DOWNSTREAM TIME OF CONC. (min)
SITE	MH103	MH102	0.09	0.90	0.08	0.08	104.19	0.024		0.024	43.4	0.50	300	0.013	0.068	0.967	36%	10.000	0.748	10.748
SITE	MH102	MH101		0.90		0.08	103.03	0.024		0.024	25.8	0.50	300	0.013	0.068	0.967	35%	10.222	0.445	10.667
SITE	PLUG1	MH101	0.07	0.90	0.06	0.06	104.19	0.018		0.018	5.7	1.00	200	0.013	0.033	1.044	56%	10.000	0.091	10.091
SITE	MH101	EX.CBMH5		0.90		0.15	101.83	0.042		0.042	30.7	1.20	300	0.013	0.106	1.499	39%	10.458	0.341	10.800

APPENDIX B

ROOF DRAINAGE DETAILS

Controlled Flow Roof Drains

Project:	320 Coleman Street		
Project No.:	221332		
Municipality:	Carleton Place		
Building:	Commercial 3		
Drain Type:	Zurn Z-105		
Number of Roof Drains:	3		
Max. Head (H)	5	inch	
	127	mm	
Flow per weir weir:	5	gpm	per inch of depth
	1.58	L/s	
Total Weirs:	3		
weirs per drain:	1.00		
Flow per drain	1.58	L/s	
Relief Scuppers:	125	mm	
Building Area (A)	734	m2	

Modified Rational Method

Project:	320 Coleman Street			
Project No.:	221332			
Municipality:	Carleton Place			
100 Year Storm				
Area:	0.073	ha	Rainfall $I=A*(T+B)^C$	
Runoff Coefficient:	0.90		A:	1735.688
			B:	6.014
Target Flow:	0.0047	m^3/s	C:	-0.82
Storage Required	22	m3		

Initial Time	5 min	Increment	5 min	
Time (min)	Intensity (mm/hr)	Peak Flow (m^3/s)	Runoff Volume (m^3)	Discharge Volume (m^3)	Storage Volume (m^3)
5	242.7	0.045	13.36	1.41	12.0
10	178.6	0.033	19.66	2.82	16.8
15	142.9	0.026	23.60	4.23	19.4
20	120.0	0.022	26.41	5.64	20.8
25	103.8	0.019	28.58	7.05	21.5
30	91.9	0.017	30.34	8.46	21.9
35	82.6	0.015	31.82	9.87	22.0
40	75.1	0.014	33.09	11.28	21.8
45	69.1	0.013	34.21	12.69	21.5

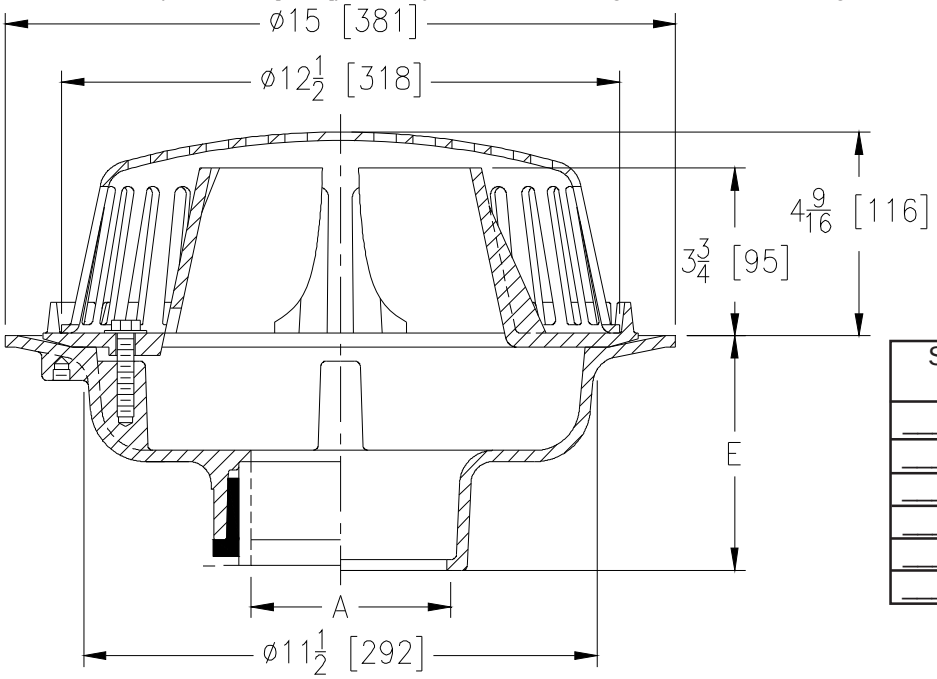
Z105

CONTROL-FLO ROOF DRAIN
W/ PARABOLIC WEIR

SPECIFICATION SHEET

TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



Specify Number of Notches in Weir	
___-N1	One Notch
___-N2	Two Notches
___-N3	Three Notches
___-N4	Four Notches
___-N5	Five Notches
___-N6	Six Notches

A- Pipe Size In.[mm]	Approx. Wt. Lbs. [kg]	Dome Open Area Sq. In. [cm²]
2,3,4 [51,76,102]	34 [15]	103 [665]

ENGINEERING SPECIFICATION: ZURN Z105
15" [381mm] Diameter Control-Flo roof drain for dead-level roof construction, Dura-Coated cast iron body, Control-Flo weir shall be linear functioning with integral membrane flashing clamp/gravel guard and Poly-Dome. All data shall be verified proportional to flow rates. Each notch will allow 10 GPM [LPM] of flow per 1" [25mm] of rain water build up above the drain.

OPTIONS (Check/specify appropriate options)

PIPE SIZE
3, 4 [76, 102]
2 , 3, 4 [51, 76, 102]
2 , 3, 4 [51, 76, 102]

(Specify size/type) **OUTLET**
_____ IC Inside Caulk
_____ NH No-Hub
_____ NL Neo-Loc

E BODY HT. DIM.
5-1/4 [133]
5-1/4 [133]
4-9/16 [116]

PREFIXES
_____ Z D.C.C.I. Body with Poly-Dome*
_____ ZA D.C.C.I. Body with Aluminum Dome
_____ ZC D.C.C.I. Body with Cast Iron Dome

SUFFIXES
_____ -C Underdeck Clamp
_____ -DP Top-Set® Deck Plate (Replaces both -C & -R)
_____ -E Static Extension 1 [25] thru 4 [102] (Specify Ht.)
_____ -EA Adjustable Extension Assembly 2-1/8 [54] thru 3-1/2 [89]
_____ -G Galvanized Cast Iron
_____ -R Roof Sump Receiver
_____ -TC Neo-Loc Test Cap Gasket (2,3,4 [51,76,102] NL Bottom Outlet Only)
_____ -VP Vandal Proof Secured Top
_____ -10 6 [152] High Parabolic Weir for Sloped Roof (ZC or ZA)

* Regularly furnished unless otherwise specified.

Zurn Industries, LLC | **Specification Drainage Operation**
1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-9876, Fax 814-454-7929
In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

Rev. K
Date: 09/25/17
C.N. No. 137793
Prod. | Dwg. No. Z105

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

Rational Method Calc.

Project:	320 Coleman Street
Project No.:	221332
Municipality:	Carleton Place
Catchment:	Pre-Development (100)

Existing Flows

	5 Year (Target)	100 Year
Runoff Coefficient (C) =	0.76	0.76
Area (A) =	0.632	0.632
A:	988.071	1735.688
B:	6.053	6.014
C:	-0.814	-0.82
Tc:	10.0	10.0
Intensity (I) mm/hr =	103.1	178.6
Peak Flow (Q) L/s =	**137.2**	**237.5**

Catchment 100

Surface Type	Area (m^2)	C	CxA
Building	0	0.90	0.0
Pavement	4934	0.90	4440.6
Landscape	1390	0.25	347.5
Total/Composite	6324	**0.76**	4788.1

Rational Method Calc.

Project:	320 Coleman Street
Project No.:	221332
Municipality:	Carleton Place
Catchment:	Proposed Development

Uncontrolled Parking Lot Flows (102)

	5 Year	100 Year
Runoff Coefficient (C) =	0.78	0.78
Area (A) =	0.559	0.559
A:	988.071	1735.688
B:	6.053	6.014
C:	-0.814	-0.82
Tc:	10.0	10.0
Intensity (I) mm/hr =	103.1	178.6
Peak Flow (Q) L/s =	**124.6**	**215.6**
Controlled Roof Flows	4.7	4.7
Total	**129.3**	**220.3**

Uncontrolled Catchment (102)

Surface Type	Area (m^2)	C	CxA
Building	0	0.90	0.0
Pavement	4538	0.90	4084.2
Landscape	1052	0.25	263.0
Total/Composite	5590	**0.78**	4347.2

Roof Drainage (101)

Surface Type	Area (m^2)	C	CxA
Building	734	0.90	660.6
Pavement	0	0.90	0.0
Landscape	0	0.25	0.0
Total/Composite	734	**0.90**	660.6

APPENDIX D

WATERMAIN CALCULATIONS

ABC Fire Extinguisher Services

314 Ferguson Falls Road
Carleton Place ON
K7C 3P1
613-253-8148
abcfireextinguisherservices@gmail.com

CARLETON CROSSING — SEP 20 2022
320 COLEMAN ST.
CARLETON PLACE ON K7C 0B5
GRANT DESOUZA / KEN BRUCE

FIRE HYDRANT

- 7:30 AM FLOW TEST

LOCATED IN PARKING LOT @ KIRK ORTHODONTIC
PARKING SPACE #5

◀ FM ▶
175 PSI
M6TB BRIGADIER
M'AVITY CANADA ULC
5'1/4 150
059D74

1 2'1/2" HYDRANT PORT
2 1'1/2" HYDRANT PORTS

ABC Fire Extinguisher Services

314 Ferguson Falls Road
Carleton Place ON
K7C 3P1
613-253-8148
abcfireextinguisherservices@gmail.com

CARLETON CROSSING — SEP 20 2022
320 COLEMAN ST.
CARLETON PLACE ON K7C 0B5
GRANT DESOUZA / KEN BRUCE

FIRE HYDRANT CONTINUED...

STATIC PRESSURE → 70 PSI
P-TOTE READING → 1 PORT OPEN → 55 PSI
2 PORTS OPEN → 25 PSI

UNABLE TO LOCATE HYDRANT SHUT OFF VALVE

→ DRAINED → OK ✓
→ GREASED → OK ✓

→ WITH ALL 3 PORTS OPEN HYDRANT PRODUCES 1500 GALLONS PER MINUTE

→ FRESHLY PAINTED (2021)

Fire Flow Requirements

Project: 320 Coleman Retail
Project No.: 221332
Municipality: Carlton Place

Commercial/Office Building
GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW
(as per the Water Supply for Public Fire Protection 1999 manual by the Fire Underwriters Survey)

STEP 1
Determine the fire flow.

Required Fire Flow (F)	F = 220 x C x sqrt(A)		The required fire flow in litres per minute.
Maximum Floor Area (A) =	738	m2	Total Above Grade GFA
Coefficient (C) =	1		Coefficient related to the type of construction. = 1.5 for wood frame construction (structure essentially all combustible). = 1.0 for ordinary construction (brick or other masonry walls, combustible floor = 0.8 for non-combustible construction (unprotected metal structural) = 0.6 for fire-resistive construction (fullyprotected frame,floors, roof).
F =	6000	L/min.	

STEP 2
Determine the increase or decrease for occupancy.

	0%		Reduction for Low Hazard Occupancy (Dwellings).
Decrease	0	L/min.	

STEP 3
Determine the decrease, if any, for automatic sprinkler protection.

	30%		30% for sprinklered as per NFPA 13.
Decrease	1800	L/min.	50% for fully automatic sprinkler.

STEP 4
Determine the total increase for exposures.

0 -3m (25%), 3-10m (20%), 10-20m (15%), 20-30m (10%), 30-45m (5%)

North - 35m	5%		36
East - >45m	0%		53
South - >45m	0%		60
West - >45m	0%		53
	5.0%		Maximum exposure increase is 75%.
Increase	300	L/min.	

STEP 5
Determine the minimum required fire flow.

F =	**4,500**	**L/min.**	**Round to the nearest 100L/min.**
QR =	2874	USGPM	**Flow Test Results**
	10,878	**L/min.**	

Fire Flow Calculation

Project: 320 Coleman Retail
Project No.: 221332
Municipality: Carlton Place

GUIDE FOR CALCULATING CAPACITY AT 20psi FOR FIRE FLOW
(as per the NFPA 291: Recommended Practice for Fire Flow Testing and Marking of Hydrants. (2010). (Section 4.10.1.2.))

The Formula for Calculating Rated Capacity at 20psi

$$\mathbf{Q_R = Q_F \times (H_R / H_F)^{0.54}}$$

Where:

Q_R = Rated Capacity at 20psi (in GPM)

Q_F = Total test flow (in GPM)

H_R = Static Pressure minus 20 psi

H_F = Static Pressure minus Residual Pressure

Flow Test Parameters:			Based on hydrant flow test by ABC Fire Extinguisher Services., September 20, 2022.
Static Pressure	70.0	psi	
Residual Pressure	55.0	psi	
Test Flow Rate	1500	GPM	

Q_R = 1500 x ((70.0 psi - 20) / (70.0 psi - 55.0 psi))$^{0.54}$

Q_R = 2874 GPM
10,878 L/min