C.C. Tatham & Associates Ltd.
Consulting Engineers

276 STE. MARIE STREET

Town of Collingwood

Functional Servicing and Stormwater Management Report

prepared by:

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prepared for:

Bay Haven Retirement Residences

February 28, 2019

CCTA File 117268

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1 Introduction

C.C. Tatham & Associates Ltd. (CCTA) has been retained by Bay Haven Retirement Residences to prepare a Functional Servicing & Stormwater Management Report in support of a proposed building addition to facilitate rental apartments at 276 Ste. Marie Street in the Town of Collingwood. This report has been prepared to address the internal and external servicing requirements associated with this project. Specifically, this report will address the stormwater management, potable water supply, sanitary sewage collection and conveyance, utility distribution and site access and parking for the proposed development.

This Functional Servicing and Stormwater Management report was prepared based on the proposed Site Plan (dated February 23, 2019) by Tim Fanstone Architect. Collins Engineering was retained by the Owner to design the mechanical services including potable water supply, gas, flat roof drainage and sanitary services.

1.1 Site Description

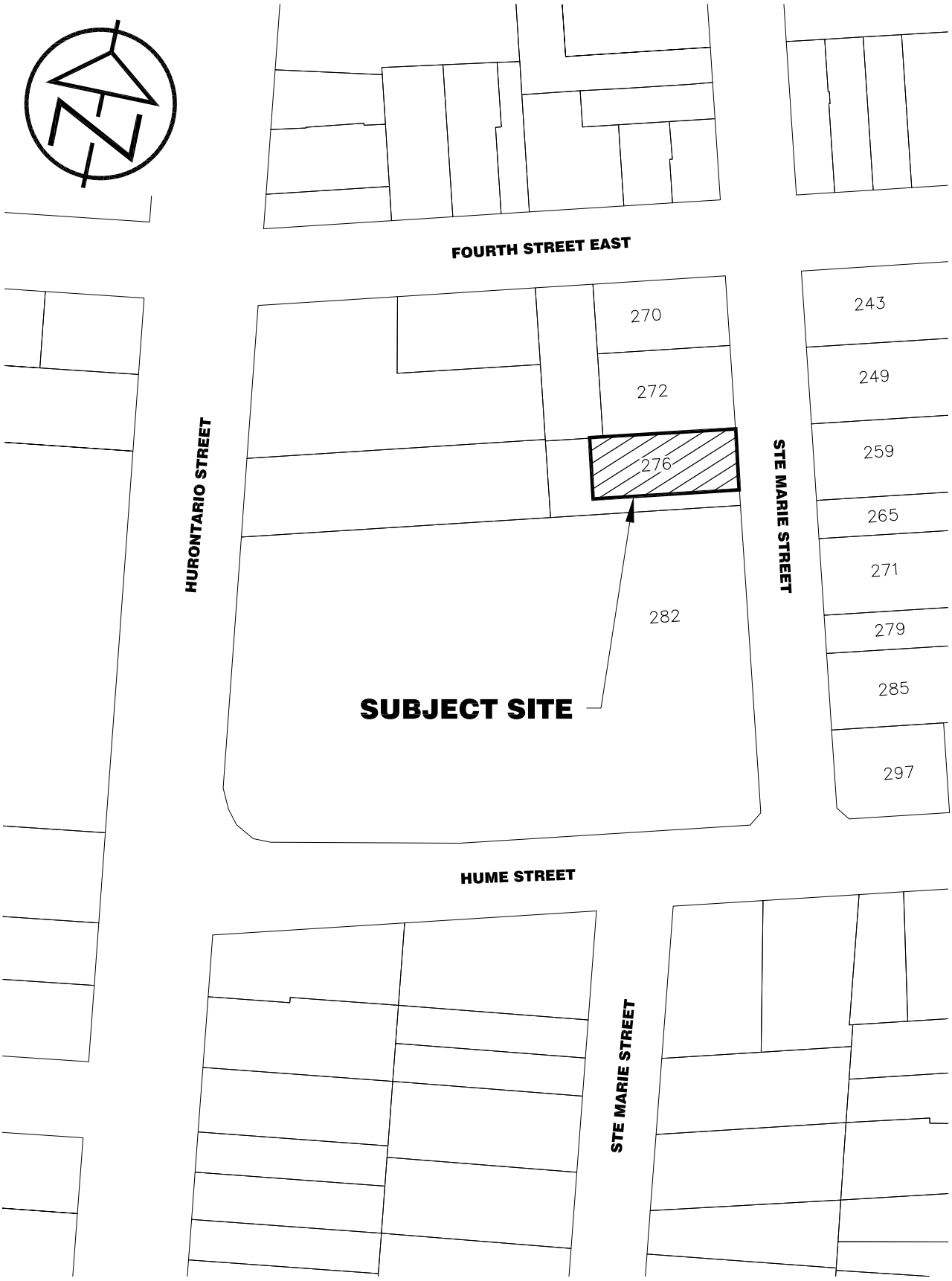
The subject property has an area of 0.06 ha with approximately 16 m of frontage on Ste. Marie Street. The property is bounded by Ste. Marie Street to the east, a commercial building to the north and vacant land to the west and south, which is the site for the proposed Monaco residential development. The location of the property is shown on Figure 1.

There is an existing two storey building on the property currently utilized for commercial and residential use. A driveway from Ste. Marie Street provides access to a gravel parking lot behind the building. The existing terrain of the site generally slopes from southeast to northwest, to a low-lying area which spills over onto neighbouring properties and eventually to Fourth Street. The Fourth Street storm sewer connects into the Ste. Marie Street storm sewer and flows north. A topographic survey of the property was completed by CCTA in February and April of 2018 to confirm existing features and elevations and was used to prepare the plans for this report.

Geotechnical investigation of the site has not been completed at this time. Based on the Soil Survey of Simcoe County Map No. 29 of the Ontario Soil Survey, the soils on the property are classified as Kemble clay loam or clay (Kc-sh). This soil has poor drainage characteristics.

1.2 Proposed Land Use

A four storey building addition is proposed on the west end of the existing building to facilitate six rental apartments and will include five parking spaces on the ground floor and designated roof top amenity space. The existing driveway location will be used to access the parking spaces. The walkway from the Ste. Marie Street sidewalk to the existing building will be upgraded. Another walkway on the south side of the building will be constructed to access the proposed building addition.



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Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

276 STE MARIE STREET
TOWN OF COLLINGWOOD
SITE LOCATION PLAN

SCALE: N.T.S.	DATE: SEPT/18	DWG NO. FIGURE 1

2 Servicing Requirements

2.1 Sanitary Sewer Servicing

Under existing conditions, sanitary flows from the building are conveyed to a 150 mm diameter sanitary service, connected to a 450 mm sanitary sewer along the centreline of Ste. Marie Street.

A sewage generation rate of 450 l/cap/d and wet weather infiltration rate of 0.23 l/ha/s, as per Town standards, and population density of 2.3 ppu, to be conservative, are assumed for this development. The existing building has one residential unit and one doctor's office (assumed to produce the same sanitary flows as one residential unit for the purpose of this analysis), and the proposed building addition will have six residential units. Based on the total equivalent population of 18.4 cap, the resulting average sanitary design flow for the proposed site has been calculated at 0.21 l/s, while the peak flow has been calculated at 0.54 l/s. Collins Engineering has recommended a 150 mm diameter sanitary service for this property, which will provide a flow capacity of 15.3 l/s at 1.0 % slope.

To service the building addition, while improving the hydraulics within the sanitary system, a new 150 mm diameter sanitary service is proposed in the driveway. This will also reduce the construction footprint as the driveway, sidewalk and apron are already being reconstructed. The internal plumbing of the existing building will be rerouted to direct sanitary flows to the north side of the building. The existing sanitary service will be removed to the main and capped. Cleanouts will be provided at horizontal bends.

The additional flows to the sanitary sewer will be confirmed through an inclusion in the Town's overall hydraulic network analysis. As the proposed development will add sanitary flows from only six additional units, an insignificant effect on the sanitary sewer hydraulics is expected. The proposed sanitary servicing is shown on the attached LGS-1 drawing.

2.2 Potable Water Servicing

An existing 200 mm diameter watermain is located along the east side of Ste. Marie Street. There is an existing service connection to the building and a capped 150 mm diameter service connection that was installed during the reconstruction of Ste. Marie Street for future development; which is located in the existing driveway.

The internal piping of the existing building will be rerouted such that the water meter and backflow preventer will be in the northeast corner of the existing basement. As such, the existing service at the front of the house will be removed back to the main and capped. The existing building and the building addition will be serviced by the 150 mm diameter water service in the driveway location.

The 150 mm diameter water service will be extended to the northeast corner of the existing building to a proposed Siamese connection for fire flow. Domestic flows for the existing building and the building

addition will be provided by a 38 mm diameter water service connected on the live side of the existing 150 mm diameter valve. A new curb stop valve will be installed at property line to control the domestic flow.

The internal water servicing design was completed by Collins Engineering. The proposed water distribution system will be incorporated in the Town of Collingwood overall water model to confirm pipe sizing required to provide adequate water pressures within the development. It is expected a 150 mm diameter water service will be sufficient to service this property. The proposed water servicing is shown on the attached LGS-1 drawing.

3 Utility Network

The relevant utility companies (hydro, gas and communication) were contacted to determine the availability of services for the site. Detailed connection strategies with all utility companies will be formalized prior to construction. However, sufficient utility services are available to service the proposed development.

4 Site Access and Parking

4.1 Sightlines

As previously illustrated in Figure 1, the proposed development is on the west side of Ste. Marie Street, which will continue to serve as the access to the property. Considering the proposed building addition is located at the back of the property, the sightlines from the driveway entrance will remain as existing.

As Ste. Marie Street has a straight alignment with a shallow profile, excellent sight lines are provided. The adjacent intersections are visible from the driveway and thus approaching motorists can be seen. Similarly, vehicles slowing to turn into the site can be seen by those approaching in both directions. The parking lane on Ste. Marie Street may obstruct the view of vehicles exiting the property. However, Ste. Marie Street is sufficiently wide to allow exiting vehicles to move forward, until visibility is restored in both directions.

4.2 Driveway

The existing gravel driveway provides access to the parking lot at the back of the existing building. The driveway has a width of 3.2 m at the location of the basement window sills, which is less than the requisite 4.0 m width for a single driveway as per Town of Collingwood Standard No. 405.

Under proposed conditions, the driveway is widened to 3.6 m by removing the existing basement windows. Although the requisite driveway width cannot be achieved at this site, due to the limited available space between the edge of existing building and property line, the proposed driveway is an improvement over the existing conditions.

4.3 Parking Spaces

The site will provide five parking spaces, including one barrier free space. As per the Collingwood Zoning By-Law, Section 5.8, the width and length of the barrier free parking space is 4.5 m and 6.0 m, respectively, and the width and length of the remaining parking spaces is 2.8 and 6.0 m, respectively.

5 Stormwater Management

5.1 Stormwater Management Criteria

The main objectives of stormwater management (SWM) strategy for the proposed development site are as follows:

- Drainage from the redevelopment of the site must not flow onto neighbouring properties;
- Post development peak flow rates must be controlled to match pre development flows for the 2 year through 100 year storm events;
- Safe conveyance of storm events exceeding the 100 year storm must be provided; and
- Runoff water quality must not be degraded as a result of the proposed development.

5.2 Stormwater Management Plan

Under existing conditions, the gravel parking lot receives external drainage from an approximately 0.04 ha area on the south side of the existing building. Drainage from the gravel parking lot flows onto the northern neighbouring properties, draining into the Fourth Street storm sewer and eventually into the Ste. Marie Street storm sewer. The proposed SWM strategy is to collect drainage within the subject site and pipe it directly to the Ste. Marie Street storm sewer. External drainage will be routed around the building addition to the northwest corner, matching existing conditions. A concrete curb will be installed along the northern and western edge of the driveway to contain overland flows within the subject site. The site will be graded to the north and directed to two proposed catch basins. An emergency overland flow route to Ste. Marie Street will be provided along the north side of the driveway. The sidewalk at the driveway entrance will be lowered to accommodate the spillway to Ste. Marie Street. Proposed lot grading and SWM measures are shown on attached drawing LGS-1.

5.3 Quantity Control

Given the small site area and limited space for construction of SWM measures, it was determined the water quantity control will be provided by storing runoff within a 600 mm diameter storm sewer pipe, at STM MH1. Peak outflows will be controlled through low flow orifices drilled into a cap at the end of the pipe. The pre and post development flows were calculated using the Modified Rational Method. A Stage-Storage-Discharge table was created to ensure sufficient detention volume is provided to limit outflows to below pre-development levels. See Appendix A for the pre and post drainage plans, Modified Rational Method calculations and Stage-Storage-Discharge table. A summary of the peak flows and required detention volumes is provided in Table 1.

Table 1: Peak Flow and Detention Volume Summary

Storm Event	Pre Development Peak Flow (l/s)	Post Development Peak Flow (l/s)	Required Detention Volume (m^3)
2-year	9.1	3.5	6.5
5-year	11.9	4.9	8.3
10-year	13.8	6.5	8.6
25-year	17.7	10.5	8.9
50-year	21.4	13.0	9.2
100-year	24.5	15.2	9.3

As shown in Table 1, post development peak flows are lower than pre development peak flows for all storm events. The 600 mm dia. pipe and two maintenance holes will provide a total storage volume of 9.87 m^3 at elevation 183.40. Therefore, all storms up to the 100 year storm will be retained in the underground pipe storage.

It is noted under proposed conditions, the site drains directly to the Ste. Marie Street storm sewer, thereby eliminating the existing overland flow onto neighbouring properties. However, this will result in additional flow to approximately 50 m of the Ste. Marie Street sewer, from the proposed storm sewer connection to the maintenance hole located at the intersection of Ste. Marie Street and Fourth Street. Provided the Ste. Marie Street sewer has a large drainage area, starting from Victory Dr. (~770 m upstream of subject property) and has a Manning's flow capacity of ~595 l/s, the additional 4.9 l/s of flow during the 5 year storm from the subject property is deemed insignificant.

5.4 Quality Control

Considering the subject site has a small drainage area, most of which has been improved with regards to water quality by converting the gravel parking area to rooftop area, runoff quality control will be provided by installing Brentwood Stormtank Shields within the catch basins. This will restrict floatables (trash, oils, hydrocarbons) from entering the storm sewer system. In addition, a 1.0 m sump depth will allow sediments to settle to the bottom of the catch basins. See Appendix B for the Brentwood Stormtank Shield installation guide.

5.5 Siltation and Erosion Controls

Siltation and erosion controls will be implemented for all construction activities, including topsoil stripping, material stockpiling and grading operations. Catch basins will be fitted with sediment traps during construction and activities and cleaned out as required.

6 Conclusions and Recommendations

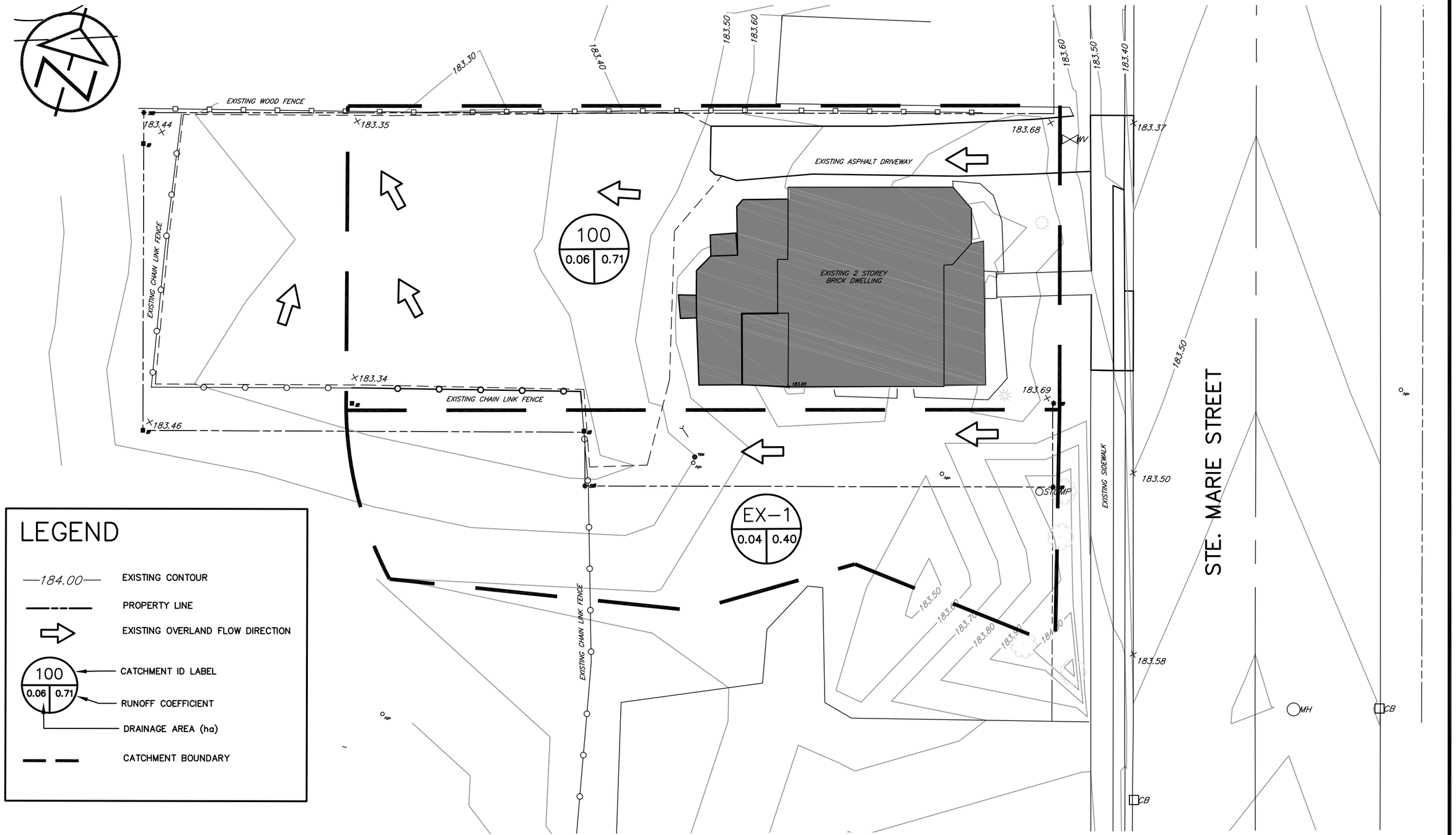
Based on the preceding analysis, the site has adequate services available to support the proposed development. The existing sanitary service will be removed and relocated to the driveway and connected to the existing building and the building addition. Currently, the existing building is connected to a water service in the front. This service will be removed, and a new water service, connected to the previously installed 150 mm watermain at the driveway location will be utilized for domestic use and fire flow. The existing driveway will be widened and extended to the five parking spaces at the back of the property.

The proposed stormwater management strategy demonstrates the development will meet the established criteria and can proceed without negatively impacting the existing infrastructure. Runoff from the subject property will be collected on site and piped directly to the Ste. Marie Street storm sewer. A 600 mm diameter storm sewer will be used for runoff storage. Low flow orifices will restrict post development peak flows to less than pre development levels. Water quality control will be provided by installing a Brentwood Stormtank Shield in the catch basins.

Authored by: Avneet Button, M.A.Sc., EIT
Intern Engineer

Reviewed by: Allan Brownridge, B.E.Sc., P.Eng.
Director, Group Leader

APPENDIX A:
STORMWATER MANAGEMENT CALCULATIONS



LEGAL INFORMATION TAKEN FROM SURVEY PREPARED BY ZUBEK, EMO, PATTEN AND THOMSEN LTD (PLAN 51R 40808) DATED JANUARY 24, 2017. TOPOGRAPHIC SURVEY BY CCTA DATED APRIL 6, 2018

276 STE. MARIE STREET
TOWN OF COLLINGWOOD

PRE DEVELOPMENT DRAINAGE PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

DWG. **DP-1**

SCALE: 1:200 | DATE: FEB./19 | JOB NO. 117268

CB2
RIM: 183.40

STM MH2
RIM: 183.44

CB1
RIM: 183.41

STM MH1
RIM: 183.54

183.30
183.40
183.50
183.60
183.60
183.50
183.40

EXISTING WOOD FENCE

15.2m–250mmø PVC STM @ 5.0%

30.5m–600mmø CONC. STM @ 0.1%

200
0.06 | 0.89
PROPOSED 4–STOREY BUILDING ADDITION

EXISTING 2 STOREY BRICK DWELLING

EXISTING WALKWAY

EXISTING CHAIN LINK FENCE

183.65

PROPOSED WALKWAY

EXISTING SIDEWALK

183.50

STE. MARIE STREET

EX–1
0.04 | 0.40

EXISTING CHAIN LINK FENCE

183.50
183.60
183.70
183.80
183.90
184.00

EX SAN MH36–7B

MH

CB

CB

LEGEND

—184.00—	EXISTING CONTOUR
———	PROPERTY LINE
→	PROPOSED MINOR OVERLAND FLOW DIRECTION
➡	PROPOSED MAJOR OVERLAND FLOW DIRECTION
200	CATCHMENT ID LABEL
0.06 | 0.89	RUNOFF COEFFICIENT
	DRAINAGE AREA (ha)
— —	CATCHMENT BOUNDARY

LEGAL INFORMATION TAKEN FROM SURVEY PREPARED BY ZUBEK, EMO, PATTEN AND THOMSEN LTD (PLAN 51R 40808) DATED JANUARY 24, 2017. TOPOGRAPHIC SURVEY BY CCTA DATED APRIL 6, 2018

276 STE. MARIE STREET
TOWN OF COLLINGWOOD

POST DEVELOPMENT DRAINAGE PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

DWG. **DP-2**

SCALE: 1:200 | DATE: FEB./19 | JOB NO. 117268

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

Project:	276 Ste. Marie Street
File No.:	117268
Date:	24-Sep-18
Designed By:	ASB
Checked By:	MAB
Subject:	CN Calculator

276 Ste. Marie Street
CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

EXISTING CONDITIONS

Catchment 100 **Area** 0.06 ha

WEIGHTED CN VALUE																									
Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Gravel			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
				Type	Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
Kc-sh	KEMBLE	D	Clay Loam or Clay	3	0.0591	1	0	0	79	0.0071	0.12	84	0		81	0.029	0.49	91	0.023	0.39	100	0		50	93.67
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	0.0591	1	0	0		0.00709	0.12		0	0		0.02896	0.49		0.02305	0.39		0	0		93.7

Initial Abstraction	2.85 mm
Runoff Coefficient	0.71

Wetlands	12
Woods	10
Meadows	8
Gravel	3
Lawns	5
Impervious	2

Landuse Type	Soil Series				
	Kc-sh	0	0	0	0
	3	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.35	#N/A	#N/A	#N/A	#N/A
Gravel	0.6	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.4	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.38	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.7125	#N/A	#N/A	#N/A	#N/A

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

Project:	276 Ste. Marie Street
File No.:	117268
Date:	24-Sep-18
Designed By:	ASB
Checked By:	MAB
Subject:	CN Calculator

276 Ste. Marie Street
CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

PROPOSED CONDITIONS

Catchment 200 **Area** 0.06 ha

WEIGHTED CN VALUE																									
Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Gravel			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
				Type	Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
Kc-sh	KEMBLE	D	Clay Loam or Clay	3	0.0591	1	0	0	79	0.0069	0.116	84	0		81	0		91	0.0522	0.884	100	0		50	98.144
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**0.0591**	**1**	**0**	**0**		**0.00686**	**0.116**		**0**	**0**		**0**	**0**		**0.05224**	**0.884**		**0**	**0**		**98.1**

Initial Abstraction	**2.348 mm**
Runoff Coefficient	**0.89**

Wetlands	12
Woods	10
Meadows	8
Gravel	3
Lawns	5
Impervious	2

Landuse Type	Soil Series				
	Kc-sh	0	0	0	0
	3	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.35	#N/A	#N/A	#N/A	#N/A
Gravel	0.6	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.4	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.38	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.8862	#N/A	#N/A	#N/A	#N/A

C.C.Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

Project:	276 Ste. Marie Street	Prepared by:	ASB
File No.:	116167	Date:	2/21/2019
Subject:	Underground Storage Volume	Checked by:	MAB

Elevation (m)	Depth (m)	Area (m^2)	Volume (m^3)	Accum. Volume (m^3)
181.70	0.00			0.00
181.75	0.05			0.34
181.80	0.10			0.95
181.85	0.15			1.69
181.90	0.20			2.52
181.95	0.25			3.40
182.00	0.30			4.31
182.05	0.35			5.22
182.10	0.40			6.11
182.15	0.45			6.94
182.20	0.50			7.68
182.25	0.55			8.28
182.30	0.60			8.62
182.40	0.70	1.13	0.11	8.74
182.90	1.20	1.13	0.57	9.30
183.40	1.70	1.13	0.57	9.87

Note 1: Pipe Length (m) = 30.5

Note 2: Volume provided in 600 mm pipe

Note 3: Volume provided in 1200 mm dia. MH

C.C.Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

Project:	276 Ste. Marie St
File No.:	117268
Date:	February 21, 2019
Designed By:	ASB
Checked By:	MAB
Subject:	SSD

STAGE-STORAGE-DISCHARGE TABLE

Outlet Type	Orifice	Orifice
Diameter (mm)	50	75
Area (sq.m)	0.002	0.004
Coefficient	0.63	0.63
Invert (m)	181.7	182.22

	Outlet		Outlet		Storage Volume			
Water	45 mm Orifice		75 mm Orifice		Dead	Active	Total	Total
Level	Head	Discharge	Head	Discharge	Storage	Storage	Storage	Discharge
(m)	(m)	(cms)	(m)	(cms)	(cu.m)	(cu.m)	(cu.m)	(cms)
181.70	0.00	0.000	0.00	0.000	0	0.00	0.00	0.000
181.75	0.03	0.001	0.00	0.000	0	0.34	0.34	0.001
181.80	0.08	0.001	0.00	0.000	0	0.95	0.95	0.001
181.85	0.13	0.002	0.00	0.000	0	1.69	1.69	0.002
181.90	0.18	0.002	0.00	0.000	0	2.52	2.52	0.002
181.95	0.23	0.003	0.00	0.000	0	3.40	3.40	0.003
182.00	0.28	0.003	0.00	0.000	0	4.31	4.31	0.003
182.05	0.33	0.003	0.00	0.000	0	5.22	5.22	0.003
182.10	0.38	0.003	0.00	0.000	0	6.11	6.11	0.003
182.15	0.43	0.004	0.00	0.000	0	6.94	6.94	0.004
182.20	0.48	0.004	0.00	0.000	0	7.68	7.68	0.004
182.25	0.53	0.004	0.03	0.000	0	8.28	8.28	0.004
182.30	0.58	0.004	0.04	0.003	0	8.62	8.62	0.007
182.40	0.68	0.004	0.14	0.005	0	8.74	8.74	0.009
182.90	1.18	0.006	0.64	0.010	0	9.30	9.30	0.016
183.40	1.68	0.007	1.14	0.013	0	9.87	9.87	0.020

Additional Notes:

NVCA Weir Flow Calculation Applied For Weir Flow Below Circular Orifice Centroid

$$Q_w = 1.65([(pi*(D^2)/4)(2*\cos^{-1}[(((D/2)-d)/(D/2))*(180/pi)]/360)-((D/2-d)(Dd-d^2)^{0.5})]/d)d^{1.5}$$

Where:
Q_w is weir flow (m^3/s)
D is orifice diameter (m)
d is depth of flow above the invert (m)

C.C. Tatham & Associates Ltd.
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Collingwood Bracebridge Orillia Barrie Ottawa

Project:	276 Ste. Marie Street	**Prepared By:**	ASB
File No.:	117268	**Reviewed By:**	MAB
Revision:	1	**Date:**	21-Feb-19
Description:	Modified Rational Method Calculation		

Municipality: Town of Collingwood

PRE DEVELOPMENT ANALYSIS

CATCHMENT 101

Runoff Coefficient (Municipal Standard)

2 Year	0.71	
5 Year	0.71	
10 Year	0.71	
25 Year	0.78	$=C_5*1.10$
50 Year	0.85	$=C_5*1.20$
100 Year	0.89	$=C_5*1.25$

Peak Rainfall Intensity Town of Collingwood

	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A	807.4	1135.4	1387.0	1676.2	1973.1	2193.1
B	6.8	7.5	8.0	8.3	9.0	9.0
C	0.828	0.841	0.852	0.858	0.868	0.871

2 Year	78.28 mm/hr	T_C =	10
5 Year	102.27 mm/hr	T_C =	10
10 Year	118.36 mm/hr	T_C =	10
25 Year	138.40 mm/hr	T_C =	10
50 Year	153.18 mm/hr	T_C =	10
100 Year	168.45 mm/hr	T_C =	10

Drainage Area 0.059 ha

Peak Runoff Rate - Rational Method (Q=CiA/360)

2 Year	0.0091 m^3/s
5 Year	0.0119 m^3/s
10 Year	0.0138 m^3/s
25 Year	0.0177 m^3/s
50 Year	0.0214 m^3/s
100 Year	0.0245 m^3/s

POST DEVELOPMENT ANALYSIS

CATCHMENT 201

Runoff Coefficient (Municipal Standard)

2 Year	0.89	
5 Year	0.89	
10 Year	0.89	
25 Year	0.98	=C5*1.10
50 Year	1.00	=C5*1.20
100 Year	1.00	=C5*1.25

Peak Rainfall Intensity Town of Collingwood

	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
A	807.4	1135.4	1387.0	1676.2	1973.1	2193.1
B	6.8	7.5	8.0	8.3	9.0	9.0
C	0.828	0.841	0.852	0.858	0.868	0.871

2 Year	78.28 mm/hr	T_C =	10
5 Year	102.27 mm/hr	T_C =	10
10 Year	118.36 mm/hr	T_C =	10
25 Year	138.40 mm/hr	T_C =	10
50 Year	153.18 mm/hr	T_C =	10
100 Year	168.45 mm/hr	T_C =	10

Drainage Area 0.059 ha

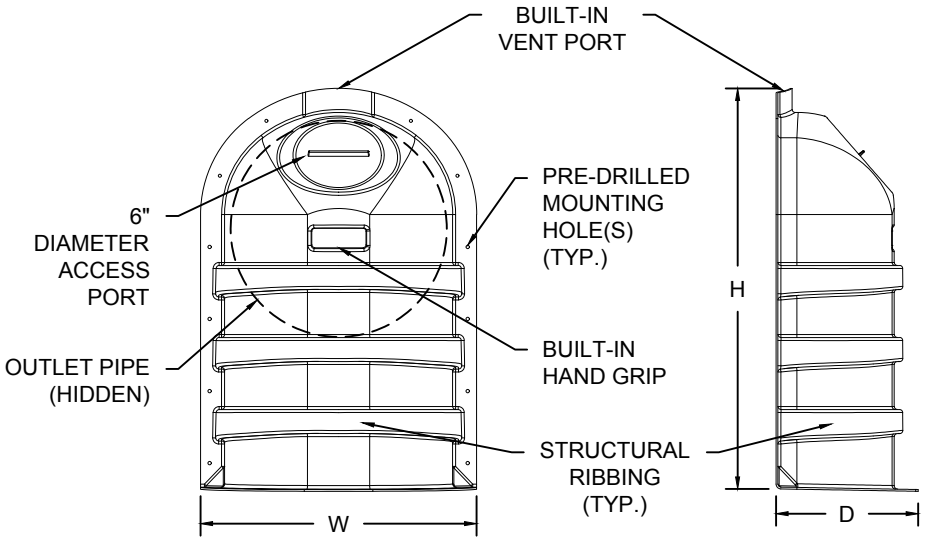
Peak Runoff Rate - Rational Method (Q=CiA/360)

		Q_{DIST}	
2 Year	0.011	0.0035	0.008 m^3/s
5 Year	0.015	0.0049	0.010 m^3/s
10 Year	0.017	0.0065	0.011 m^3/s
25 Year	0.022	0.0105	0.012 m^3/s
50 Year	0.025	0.0130	0.012 m^3/s
100 Year	0.028	0.0152	0.012 m^3/s

Required Storage Volumes

Dur.	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
10	4.8	6.0	6.5	7.0	7.3	7.4
20	6.1	7.8	8.4	8.9	9.2	9.3
30	6.5	8.3	8.6	8.6	8.6	8.3
40	6.5	8.1	8.2	7.4	7.0	6.3
50	6.2	7.6	7.4	5.8	4.8	3.5
60	5.7	7.0	6.4	3.8	2.2	0.4
70	5.2	6.2	5.2	1.6	-0.6	-2.9
80	4.6	5.3	3.9	-0.7	-3.6	-6.5
90	3.9	4.3	2.5	-3.2	-6.6	-10.1

APPENDIX B:
BRENTWOOD STORMTANK SHEILD INSTALLATION GUIDE



FRONT VIEW

SIDE VIEW

TO BE INSTALLED IN CB1 AND CB2

NOMINAL SIZING INFORMATION				
PRODUCT NAME	HEIGHT (H)	WIDTH (W)	DEPTH (D)	OPENING AREA
STKS-18	32.84"	23"	11.84"	1.063 sf
STKS-24	39.31"	37"	11.84"	1.906 sf
STKS-30	45.15"	40"	15.9"	2.907 sf
STKS-18R	32.97"	23.05"	10.55"	1.068 sf
STKS-24R	39.20"	34.36"	7.626"	1.872 sf

NOTES:

a. REFERENCE CURRENT INSTALLATION INSTRUCTIONS FOR PROPER INSTALLATION PRACTICES.

REV.	DATE		BY	APPRV.

StormTank
c/o Brentwood Industries, Inc.
500 Spring Ridge Drive
Reading, PA 19610
Phone: (610) 374-5109
www.stormtank.com
info@stormtank.com

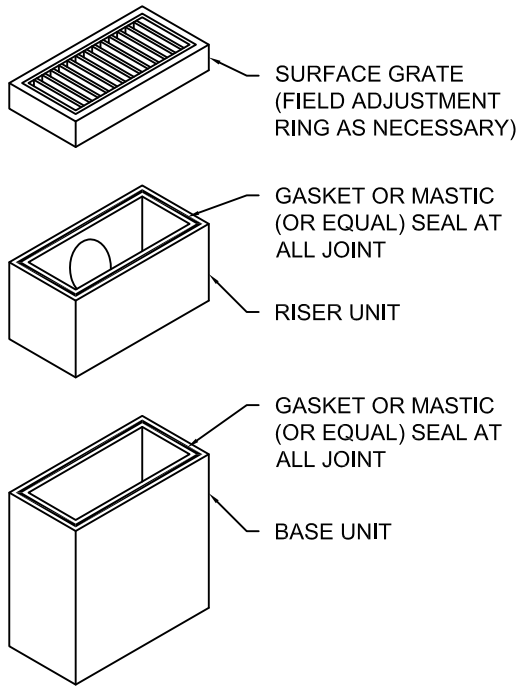
Project Name
PRODUCT DETAIL

Title
STORMTANK
SHIELD

Drawn By		Date
Drawing No.	Sheet	Scale

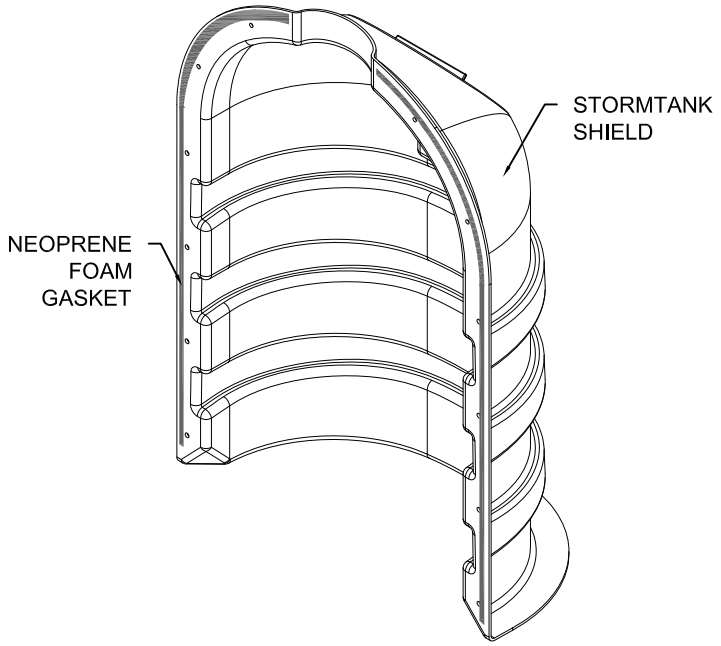
STEP #1

INSTALL STRUCTURE, ENSURING ALL JOINTS AND PENETRATIONS PROVIDE A WATERTIGHT SEAL.



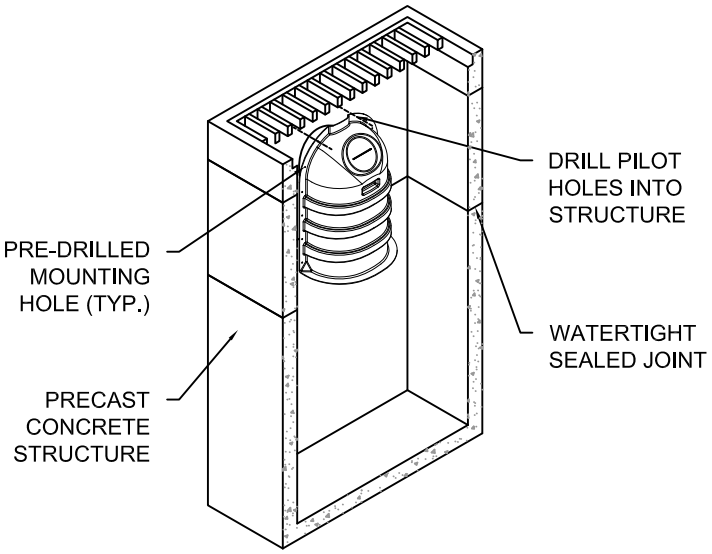
STEP #2

PREPARE STORMTANK SHIELD FOR INSTALLATION, BY APPLYING NEOPRENE FOAM GASKET (SUPPLIED BY MANUFACTURER) TO REAR FACE OF THE MOUNTING FLANGE.



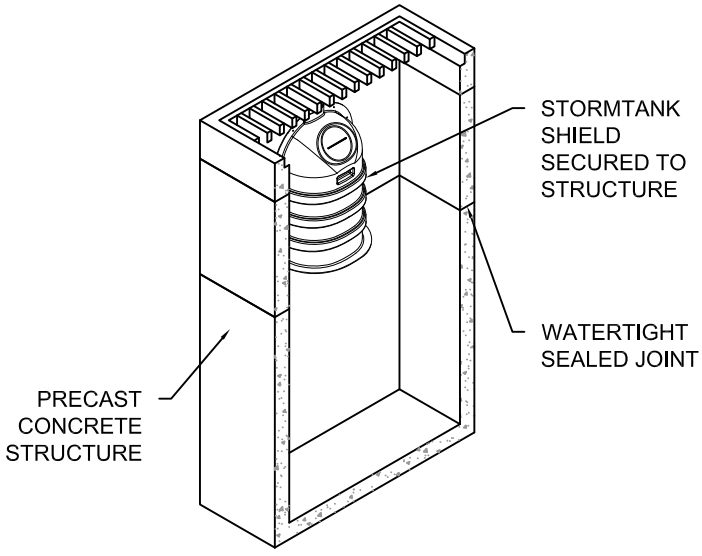
STEP #3

LOCATE SHIELD OVER OUTLET PIPE AND UTILIZING THE PRE-DRILL HOLES, IN THE SHIELD, DRILL PILOT HOLES INTO THE STRUCTURE



STEP #4

SECURE SHIELD TO STRUCTURE UTILIZING FASTENERS (SUPPLIED BY MANUFACTURER).



NOTES:

a. SUMP DEPTH TO BE A MINIMUM 36", FOR INCREASED TREATMENT, SUMP DEPTH SHOULD BE 2.5x THE OUTLET PIPE DIAMETER.

REV.	DATE	RECORD OF CHANGES	BY	APPRV.
A	8/13/13	INITIAL RELEASE	JKB	

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Project Name: INSTALLATION INSTRUCTIONS

Title: STORMTANK® SHIELD

Drawn By		Date
J.BAILEY		8/13/13
Drawing No.	Sheet	Scale
P1	1 of 1	NTS

STORMTANK® Shield

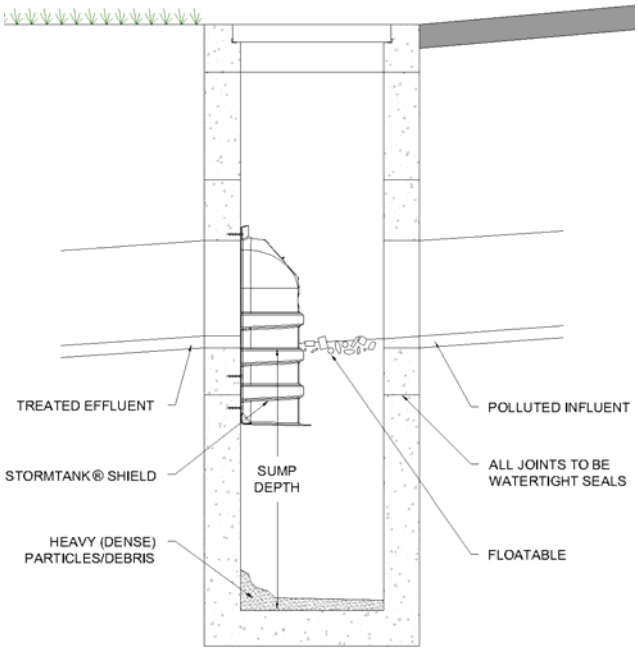
Design Guidelines

REV. 1 **8/13/13**

The ***StormTank® Shield*** is, a stormwater treatment device, intended to improve the treatment efficiency of sumped inlet water quality BMP's. By installing a ***StormTank® Shield*** in any sumped inlet, debris and contaminants with a density less than water are prevented from exiting the inlet during the first flush of runoff. This increases the treatment efficiency of the BMP, while also increasing the flow length and time of concentration that is vital to particle settling.

StormTank® Shield **Design Guidelines:**

1. ***StormTank® Shield*** hood shall enclose the entire opening area of the outlet pipe.
2. ***StormTank® Shield*** sizing should be selected to ensure flow capacity is not reduced beyond the capacity of the upslope system (tailwater condition).
3. The stormwater structure, to contain a ***StormTank® Shield***, shall be sized to contain a minimum 36" deep internal sump (for increased treatment, the sump should be a minimum 2.5x pipe diameter).
4. The structure shall be installed to ensure a watertight seal at all joints and penetrations. It is recommended that all seals be made with a gasket or mastic (or equal).



BRENTWOOD®

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