Site Servicing & Storm Water Management Brief

Three ½ Storey Residential Building
845 Champlain Street
Ottawa, ON

Ainley Group
Project No. 23010-1

Prepared for:
Evospace Developments Inc.

December 15th, 2023
FINAL REV 1

Ainley CONSULTING ENGINEERS PLANNERS

Final Report Rev 1	Guy Ste-Croix	15/12/2023	Anmar Al-Faraj
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Issue or Revision	**Reviewed By:**	**Date (DD/MM/YYYY)**	**Issued By:**

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1.0 INTRODUCTION

The Ainley Group has been retained by Evospace Developments Inc. to prepare a Site Servicing & Stormwater Management brief addressing the re-zoning application requirements by the City of Ottawa.

The subject site is located at 845 Champlain Street, at the south / east corner of Jeanne-d'Arc Boulevard and Champlain St, (See Key Map in Appendix A).

The subject site has an area of 0.10 ha (i.e. 10716.39 sq.ft). We note that the existing house will be demolished to accommodate the proposed site plan. The proposed development will be a 3 ½ storey and 2 storey flat and stacked towns. The building includes a basement, main, 2nd and 3rd floors for residential use. The total combined floor area is approx. 980 sq.m (10,559 sq.ft). There are a total of 10 residential units containing two bedrooms. Parking will be provided south of the proposed building and will include 10 parking spaces.

This brief will address the sanitary, storm, and water servicing requirements for the proposed 3 ½ storey stacked townhouses as well as the stormwater management requirements.

2.0 MUNICIPAL DRINKING & FIRE PROTECTION WATER SERVICES

Using the City of Ottawa guidelines, the anticipated average daily demand for the 3 1/2 -storey apartment building has been calculated at **0.085 L/s** as follows:

- 10 units (2 bedrooms) X 2.1 persons per unit X 350 L/person/day = 7350 L/day = 0.085 L/s

The anticipated maximum daily demand and maximum hourly daily demand (peak hour) based on peaking factors from MOE Table 3.3 – Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People for residential use is **0.81 L/s** and **1.22 L/s**, respectively. The peaking factors for the 10 residential units are estimated by applying a power trendline fitting curve to the data presented in MOE Table 3.3 (Appendix B).

- Average Daily Demand: 0.085L/s (residential)
- Max. Daily Demand: 0.085 L/s X 9.5 (peaking factor for 10 units serviced) = 0.81 L/s
- Max. Hourly Daily Demand (Peak Hour): 0.085 L/s X 14.3 (peaking factor for 10 units serviced) = 1.22 L/s

Based on water pipe sizing calculation, assuming a maximum velocity of 1.8 m/s, it was determined that a minimum 29mm diameter water service Copper tubing (or approved equal) would be required to service the proposed development. Pipe size has been rounded up to the nearest available pipe diameter of 32mm (1 ¼").

Minimum pipe diameter $d = (4Q/\pi v)^{1/2}$ = 29 mm (use 32mm = 1 ¼"), Where Q = 1.22 L/s, v = 1.8 m/s

The anticipated fire flow (based on the Fire Underwriters Survey – Water Supply for Public Fire Protection 2020) was calculated to be **8,000 L/min** or **133 L/s.** A detailed calculation can be seen in Appendix B.

There are four (4) fire hydrants located in close proximity to the development. Fire hydrant distance to the nearest face of the proposed building is summarized below. The location of the Fire Hydrants and the Exposure Distances can be seen in Appendix B.

Hydrant Class	Fire Hydrant ID	Distance to Building (m)
AA (blue)	380038H072	6.5m
AA (blue)	380038H079	66.8m
AA (blue)	380038H156	91.5m
AA (blue)	380038H073	123.2m

The aggregate fire flow capacity of all contributing Class AA hydrants noted above (2 x 5,700 + 2 x 3,800 = **19,000 L/min**) is **greater** than the required fire flow (**8,000 L/min**) for the proposed building. The hydrant capacity is assessed based on Table 1 – Maximum flow to be considered from a given hydrant found in Appendix I in the City of Ottawa Technical Bulletin ISTB-2018-02 Revisions to Ottawa Design Guidelines – Water Distribution and summarized below.

Hydrant Class	Distance to Building (m)	Maximum Fire Flow Hydrant Capacity (L/min)
AA	< 75	5700
AA	> 75 and < 150	3800

A boundary condition analysis has been provided by the City of Ottawa. The results are as follows and can be seen in Appendix E.

Minimum HGL = 114.10 m
Maximum HGL / Peak Hour = 109.50 m
Max Day + Fire Flow = 110.40 m

Based on a ground elevation of 58.60 m and using the hydrostatic pressure equation P = ρgh, where P = water pressure, ρ = water density (~1,000 kg/m^3), g = gravitational acceleration (9.81 m/s^2), and h = water depth (m). 1 psi ≈ 6.9 kPa.

Minimum HGL = 1,000 kg/m^3 X 9.81 m/s^2 X (114.1 – 58.6) m = 544.5 kPa = 78.9 psi
Maximum HGL = 1,000 kg/m^3 X 9.81 m/s^2 X (109.5 – 58.6) m = 499.3 kPa = 72.3 psi
Max Day + Fire Flow = 1,000 kg/m^3 X 9.81 m/s^2 X (110.4 – 58.6) m = 508.2 kPa = 73.5 psi

Ainley has reviewed the results of the City of Ottawa hydraulic analysis and find that they meet the requirements set out by the ODG for water distribution, as seen below:

- Normal operating pressure ranges between 50 psi and 80 psi under a condition of maximum daily flow.
- Under maximum hourly demand conditions, the pressures are not less than 40 psi.
- During periods of maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 20 psi.
- The maximum pressure at any point in the distribution system in occupied areas outside of the public right-of-way shall not exceed 80 psi.
- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 100 psi.

3.0 SANITARY SEWER SERVICES

Based on the average daily demand of 0.085 L/s calculated above in section 2.0 the anticipated peak sanitary flow has been calculated at **0.37 L/s**.

- 0.085 L/s X 4.0 (peaking factor for domestic flow using Harmon Formula with minimum permissible peaking factor being 2.0 and the maximum being 4.0) = 0.34 L/s
- 0.34 L/s + (0.1 ha X 0.28 L/s/gross ha) = 0.37 L/s

A standard 0.28 L/s/gross ha was used for infiltration allowance.

A proposed 150mm diameter PVC at 2% slope has a capacity of 21.5 L/s (calculated using the manning equation with 0.013 used as the manning's roughness coefficient) will service the proposed building. The proposed sanitary service lateral has a direct access and will be connected to the existing 250mm diameter AC municipal sanitary sewer on Champlain Street. It is anticipated that the sanitary sewer on Champlain Street has the capacity to service the proposed site.

The proposed sanitary service lateral will be furnished with backwater valve. The sanitary backwater valve will be located inside the building at a location that will allow for ease of access and maintenance.

The proposed sanitary lateral will have a minimum of 2.0m of pipe cover measured from the finished grade.

4.0 DRAINAGE & STORM SEWER SYSTEM

With regards to stormwater management and based on the pre-application consultation meeting notes with the City (Appendix E), the City noted the following:

- Runoff Coefficient: lesser of 0.5 or existing
- Minor / major system design requirements: control post-development peak flow rate to equal or lesser than the 5-year pre-development peak flow rate for all storm events up to and including the 100-year storm.
- Time of Concentration T_c: 10 minutes.

Rational Method

Q = R x A x I x N

Catchment Area	A1 = 0.0725 hectares, A2 = 0.0275 hectares, A_{total} = 0.1 hectares
Runoff Coefficient	R1 = [0.0503ha x 0.25 + 0.0222ha x 0.9] / 0.0725ha = 0.45 (actual, used), R2 = [0.0195ha x 0.25 + 0.008ha x 0.9] / 0.0275ha = 0.44 (actual, used), R_{total} = [0.45 x 0.0725ha + 0.44 x 0.0275] / 0.1ha = 0.45 (actual, used)
	R = 0.50 (maximum)
Time of Concentration	T_c = 10 min
5-year Rainfall Intensity	I = 998.071 / $(T_c + 6.053)^{0.814}$ = 104.19 mm/hr (based on Ottawa Sewer Design Guideline)
Conversion Factor	N = 2.78

5-year Pre-Development Flow:

Q1 = 0.45 x 0.0725 x 104.19 x 2.78 = 9.45 L/s (to Jeanne D'Arc Blvd)
Q2 = 0.44 x 0.0275 x 104.19 x 2.78 = 3.50 L/s (to Champlain St)
Q_{total} = 0.45 x 0.1 x 104.19 x 2.78 = 13.03 L/s

After a meeting with the City on December 11, 2023 it was agreed on to assume/approximate uncontrolled drainage area to demonstrate that the design is feasible at this concept design stage. As such, it was assumed, based on best engineering judgement that there could be uncontrolled flow on the north, east, and west side of the proposed building. The area uncontrolled is assumed to be 28% of the total site area (i.e., 28% x 0.1ha = 0.028ha). This uncontrolled flow will be subtracted from the pre-development flow rate to establish the allowable release rate from the controlled area. It should be noted that it is assumed that the roof drainage is directed to discharge to the controlled area (i.e., the parking lot area).

$Q_{uncontrolled}$ = ([0.0155 x 0.25 + 0.0125 x 0.9] / 0.028) x 0.028 x 104.19 x 2.78 = 4.38 L/s

Therefore, the proposed site will be controlled to the aforementioned Q_{total} 5-year pre-development level less the post-development uncontrolled drainage area $Q_{uncontrolled}$.

Thus, the total 100-year post-development release rate for the site shall be less or equal to **8.65 L/s** (13.03 – 4.38 = 8.65 L/s).

Storage volume requirements were determined by applying the 5-year and 100-year rainfall intensity values at 10-minute intervals until a peak storage volume was attained, (Refer to Storage Table 1 in Appendix 'C'). Based on recent similar submissions to the City they noted that when underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. Hence, the City requires that an average release rate equal to 50% of the peak allowable rate be applied to estimate the required volume.

Stormwater storage requirements including maximum release rate has been determined for the subject site and shall be as follows:

Stormwater 5-year storage volume requirements = **10.0 cu.m (calculated based on 50% of the peak allowable rate)**
Stormwater Controlled Release Rate for 5-year storm = **3.16 L/s (based on orifice head 0.07m)**
Stormwater 100-year Storage volume requirements = **25.7 cu.m (calculated based on 50% of the peak allowable rate)**
Stormwater Controlled Release Rate for 100-year storm= **7.83 L/s (based on orifice head of 0.43m)**

This can be achieved by providing underground storage. Underground stormwater chamber to be constructed in the parking area to achieve the storage volume requirements. StormTech Chamber SC-740 system by ADS is proposed to control water quantity. The proposed system will provide 38.6 cu.m of storage. Refer to Appendix C for the StormTech Chamber sizing report. The actual chamber sizing will be confirmed at detail design.

Alternative solutions (e.g., retaining water on the parking lot surface or by a combination of underground and surface storage) can be investigated further, at the detailed design stage, contingent on approval from the City.

Discharge will be controlled by installing Inlet Control Device at the downstream end of the storm system which will control the release of storm water to pre-development rates. Foundation and/or under slab drains are to be connected downstream of any stormwater controls. It is our understanding that the proposed building will have a sloped roof that will drain through eavestrough and downspouts to the parking surface.

As noted by the City, the storm system has to be designed to provide enhanced quality control treatment (80% TSS). This TSS removal will be accomplished with the use of Isolator Row attached with the StormTech Chambers. Storm flow will pass through the Isolator Row before leaving the site to the existing 450mm concrete municipal storm sewer on Champlain Street. The Isolator Row will provide 80% TSS removal. The Isolator Row is verified and tested to ISO 14034 ETV. Isolator Row Product Sheet and ETV Verification Statement are attached in Appendix C.

A proposed 250mm diameter PVC at 2% slope has a capacity of 84.0 L/s (calculated using the manning equation with 0.013 used as the manning's roughness coefficient) will service the proposed site. The proposed 250mm pipe will be installed on the StormTech Chamber outlet and will connect to the existing 450mm concrete pipe on Champlain Street. The pipe will be furnished with ICD (75mm diameter) that will control the release rate to pre-development levels or less (i.e. 8.65 L/s). Refer to Appendix C for ICD sizing report.

The proposed storm service lateral has a direct access and will be connected to the existing 450mm diameter concrete municipal storm sewer on Champlain Street. It is anticipated that the storm sewer on Champlain Street has the capacity to service the proposed site.

Refer to Appendix D for the pre- and post-development stormwater management plan.

Also, based on our review, it's our understanding that the exemptions set out under Ontario Regulations 525/98 - Approval Exemptions are satisfied and that this project will not be subject to an Environmental Compliance Approval (ECA). Since the City of Ottawa participates in the ToR program, it's the Ministry's expectation that the ECA requirement determination would be completed by the City's review engineer/project manager. In situations where the review engineer/project manager is unsure of the requirements, it is expected that the City would contact MECP Ottawa District Office for clarification.

5.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures shall be implemented during construction to minimize the migration of sediments from the proposed construction. To accomplish this task, items such as silt fences and geo-textile membranes shall be installed to capture sediment before it leaves the construction area. During construction, all erosion control features shall be maintained and repaired as necessary and adjacent roadways kept free of debris and sediment as required. A mud mat may be required on construction entrances to the site, depending on frequency of heavy vehicle travel and condition of the site.

During excavation and site construction, if tracking out sediment into the street is occurring the street will be swept on as-needed basis. Dust will be controlled with sweeping and water as required or as directed by the Engineer, minimum once per day and using Calcium Chloride for non-working hours including weekends. The contractor is responsible to schedule tasks to minimize the exposure of soil.

All erosion and sediment control measures will remain in place until the area is stabilized and deemed no longer sediment producing. All control measures to be cleaned of sediment and decommissioned in a way that does not release sediment into the sewer system.

6.0 CONCLUSION

1. The max daily and fire flow water demands for the site were calculated to be 0.81 L/s and 133 L/s respectively. A building fire sprinkler system is not anticipated for this development.
2. It is expected that the building will be serviced by a 32mm (1 ¼") diameter Copper water service pipe (or approve equal).
3. The peak wastewater flow for the site was calculated to be 0.37 L/s including the infiltration allowance.
4. The proposed 150mm diameter PVC sanitary service lateral at 2% slope has a capacity of 21.5 L/s.
5. The stormwater management measures proposed will result in a 100-year post-development release rate of 7.83 L/s, which is less/equal to the allowable release rate of 8.65 L/s. Underground stormwater chamber to be constructed in the parking area to achieve the 100-year stormwater storage requirement of 25.7 cu.m.
6. StormTech Chamber system by ADS provides 38.6 cu.m storage which is greater than the required storage of 25.7 cu.m.
7. The Isolator Row of the StormTech chambers provide 80% TSS removal rate and is ISO 14034 ETV verified and tested.
8. Water quantity will be controlled by 75mm diameter orifice / ICD installed at the outlet of the StormTech Chamber.
9. Erosion and sediment control measures shall be implemented during construction to minimize the migration of sediments from the proposed construction.
10. All erosion and sediment control measures will remain in place until the area is stabilized and deemed no longer sediment producing.

We trust that this Site Servicing & Stormwater Management brief meets all of your requirements. Should you have any questions or require further clarification, please do not hesitate to contact our office.

Sincerely,
Prepared by:

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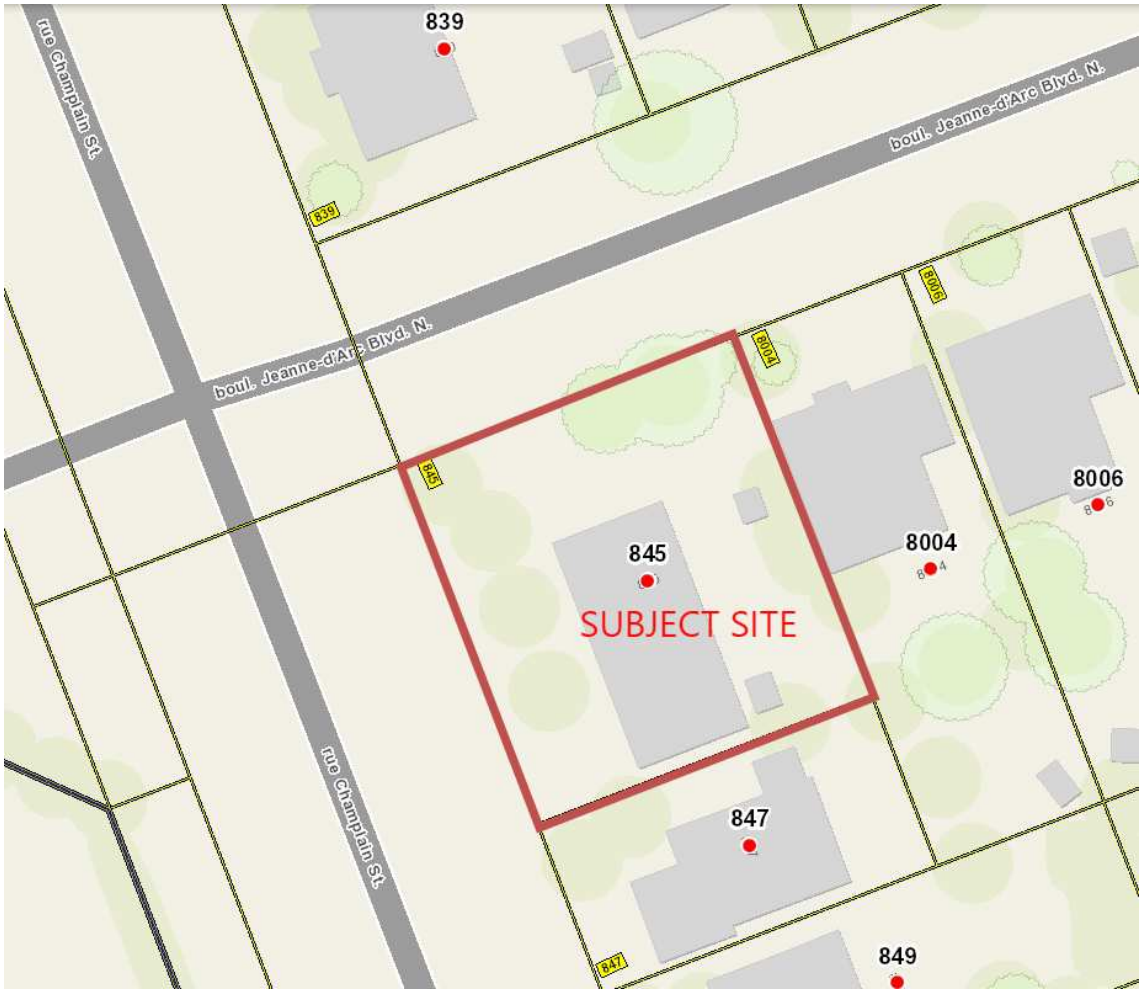
Project Engineer

Reviewed by:

Guy Ste-Croix, LEL, C.E.T., PMP
Vice President & Branch Manager

APPENDIX A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rue Champlain St.
boul. Jeanne-d'Arc Blvd. N.
839
boul. Jeanne-d'Arc Blvd. N.
8006
8006
845
845
SUBJECT SITE
8006
8004
847
847
849

APPENDIX B

FUS Calculations

845 Champlain Street

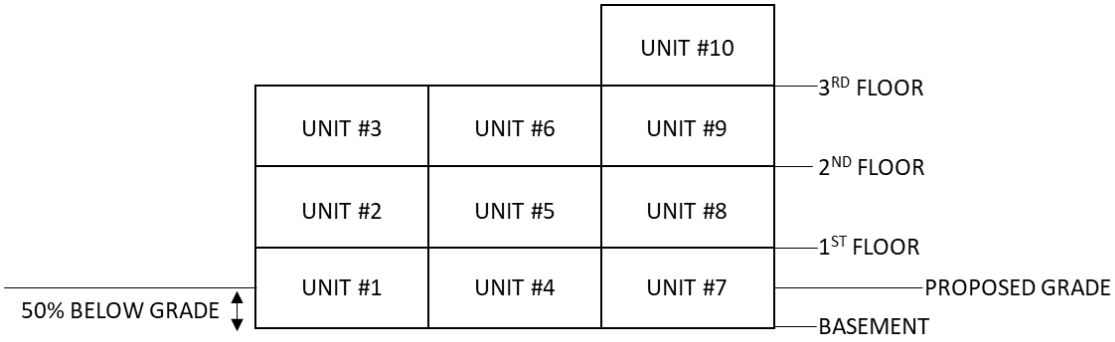
$F = 220 \times C \times \sqrt{A}$

Where C = 1.0 for Ordinary Construction (i.e. minimum 1-hour fire resistance rating – vertical and horizontal)

We note the following statement(s) would apply for this project / building:

> *For a building classified with a Construction Coefficient from 1.0 to 1.5, consider 100% of all floor areas in determining the total effective area to be used in the formula.*
>
> *Basement floor area is excluded from the Total Effective Area when the basement is at least 50% below grade in the building being considered.*
>
> Therefore, it's our interpretation that the underlined requirement noted above shall apply for this project / building. Thus, units 1, 4 and 7 (i.e. basement area) are excluded from calculation.

Basement Area = 2,983 ft^2 = 980 m^2
1st Floor / Main Floor Area = 3,136 ft^2 = 291 m^2
2nd Floor Area = 3,361 ft^2 = 312 m^2
3rd Floor Area = 1,079 ft^2 = 100 m^2



A = (1st Floor / Main Floor) + (2nd Floor) + (3rd Floor)
A = (291) + (312) + (100)
A = 703 m^2

$F = 220 \times 1.0 \times \sqrt{703}$

$F = 5{,}833\ L/min$

$F \sim 6{,}000\ L/min$, rounded to the nearest 1,000 L/min

FUS Reductions / Increases:

Occupancy and Contents Adjustment Factor

It is noted that 'Residential Occupancies' are examples of Low Hazard Occupancies.

Therefore, a "*limited combustibility"* reduction of 15% (900 L/min) will be applied.

$F = 5{,}100\ L/min$

Modifier for Sprinkler System

Not applicable.

$M_1 = 0\ L/min$

Modifier for Exposure

The proposed building will have the following approximate clearances to existing structures:

East:	bet'w 0 and 3m	*25% increase*
West:	greater than 30	*0% increase*
North:	bet'w 20.1 and 30m	10*% increase*
South:	bet'w 10.1 and 20m	15*% increase*

Total Increase: 50*%*

$M_2 = 2{,}550\ L/min$

The final fire flow, according to the FUS, will be the fire flow as a result of the Occupancy reduction (5,100 L/s), minus the value M_1, and plus the value M_2.

$F = 5{,}100\ L/\min - 0\ L/\min + 2{,}550\ L/min$

$F = 7{,}650\ L/min$

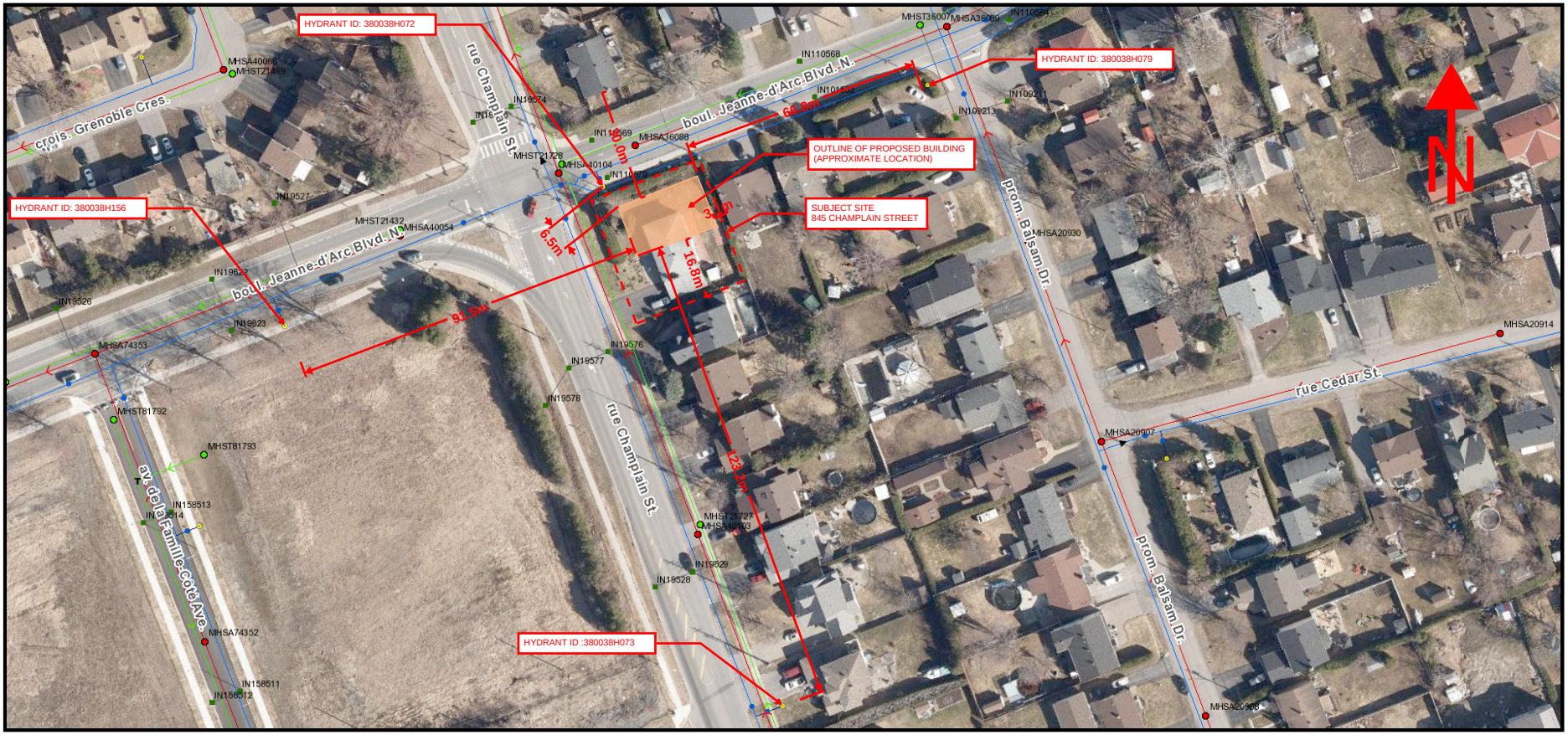
$F \sim 8{,}000\ L/min$, rounded to the nearest 1,000 L/min

$F \sim 133.3\ L/s$

Conclusion:

The conservative FUS fire flow requirement for this building (based on our assumptions noted above) is **133.3 L/s.**

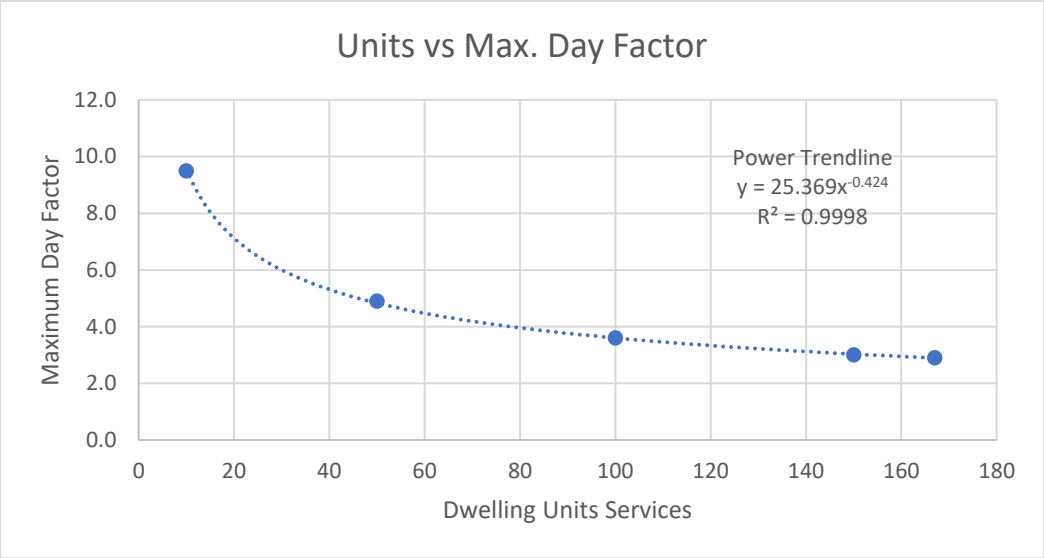
FUS EXPOSURE DISTANCE AND FIRE HYDRANT COVERAGE PLAN
845 CHAMPLAIN STREET

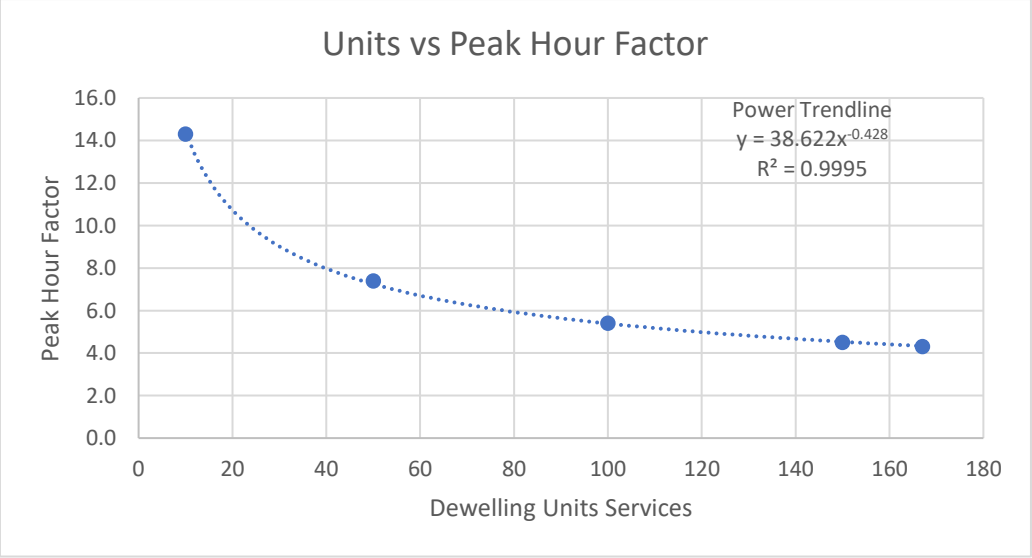


MOE - Design Guideline for Drinking Water Systems

Table 3-3 Peaking Factors for Drinking Water Systems Serving Fewer than 500 People

Dwelling Units Serviced	Maximum Day Factor	Peak Hour Factor
10	9.5	14.3
50	4.9	7.4
100	3.6	5.4
150	3.0	4.5
167	2.9	4.3
Thus for, 10	**9.6**	**14.4**
	y = 25.369x^-0.424	y = 38.622x^-0.428





APPENDIX C

AINLEY Project: 23010-1 845 Champlain Street

Location: 845 Champlain Street

Client: EvoSpace Developments Inc.

Note: the City noted from previous similar submissions that when underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. Hence, the City requires that an average release rate equal to 50% of the peak allowable rate be applied to estimate the required volume.
Allowable release rate = 8.65 L/s, thus use 4.33 L/s for storage calculations

Table 1. Storage Requirements for Controlled Area

Area = **0.072** hectares

5 year Runoff Coefficient = **0.90** post developme **100 year Runoff Coefficient =** **1.00**

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	18.77	4.3	14.4	8.7
	20	70.25	12.66	4.3	8.3	10.0
	30	53.93	9.71	4.3	5.4	9.7
	40	44.18	7.96	4.3	3.6	8.7
	50	37.65	6.78	4.3	2.5	7.4
	60	32.94	5.93	4.3	1.6	5.8
	70	29.37	5.29	4.3	1.0	4.1
100 Year	10	178.56	35.74	4.3	31.4	18.8
	20	119.95	24.01	4.3	19.7	23.6
	30	91.87	18.39	4.3	14.1	25.3
	40	75.15	15.04	4.3	10.7	25.7
	50	63.95	12.80	4.3	8.5	25.4
	60	55.89	11.19	4.3	6.9	24.7
	70	49.79	9.97	4.3	5.6	23.7
	80	44.99	9.01	4.3	4.7	22.5
	90	41.11	8.23	4.3	3.9	21.1
	100	37.90	7.59	4.3	3.3	19.6

AINLEY Project: 23010-1 845 Champlain Street

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Table 2. Orifice Equation

Q = 0.61 x A x sqrt (2 x g x h)

Q =	release rate (cu.m/s)		
A =	area of orifice (sq.m)		
g =	9.81 (m/s2)		
H =	Head above CL of Orifice (m)		
Orifice Plate Size =		0.075	m diameter
		3.0	inches

Note: Minimum orifice opening for plate or plug type ICDs is 75mm (round) - City of Ottawa Sewer Design Guidelines Clause 8.3.8.1

StormTech chamber is 1.07m high. Orifice has to be located 0.21m from bottom of chamber to yield discharge of 7.83 L/s when orifice head is 0.43m.

Storm - 100 year

Allowable Release Rate =	8.65	L/s
Controlled Release Rate =	7.8	L/s
Area of Orifice =	0.0044	sq.m
Orifice Head =	0.43	m
Q =	0.00783	cu.m/s
Q =	7.83	L/s

Storm - 5 year

Allowable Release Rate =	8.65	L/s
Controlled Release Rate =	3.2	L/s
Area of Orifice =	0.0044	sq.m
Orifice Head =	0.07	m
Q =	0.00316	cu.m/s
Q =	3.16	L/s

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

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23010-1
OTTAWA, ON, CANADA

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

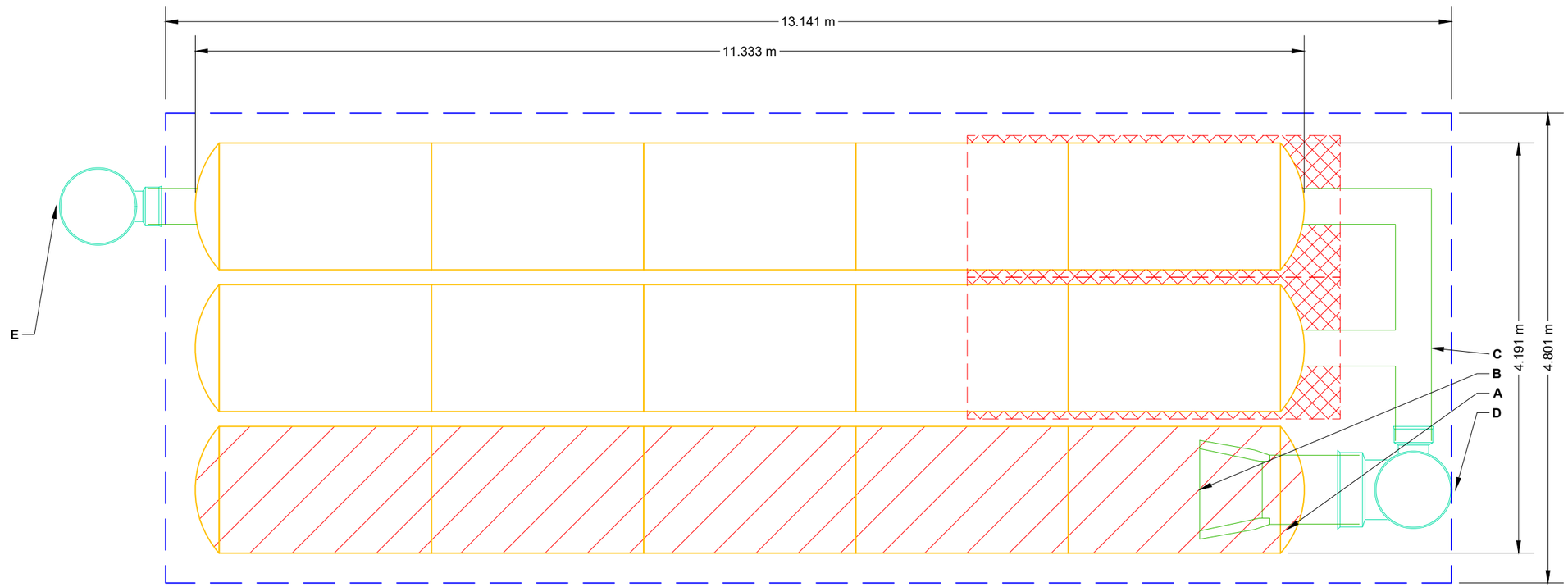
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS:	
15	STORMTECH SC-740 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	3.353
6	STORMTECH SC-740 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.524
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.372
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.372
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.372
38.6	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	1.067
		TOP OF SC-740 CHAMBER:	0.914
		300 mm x 300 mm TOP MANIFOLD INVERT:	0.470
		300 mm BOTTOM CONNECTION INVERT:	0.183
63.1	SYSTEM AREA (m^2)	600 mm ISOLATOR ROW PLUS INVERT:	0.155
35.9	SYSTEM PERIMETER (m)	BOTTOM OF SC-740 CHAMBER:	0.152
		BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	600 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	3 mm	
FLAMP	B	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: SC74024RAMP		
MANIFOLD	C	300 mm x 300 mm TOP MANIFOLD, ADS N-12	318 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		130 L/s IN
NYLOPLAST (OUTLET)	E	750 mm DIAMETER (DESIGN BY ENGINEER)		57 L/s OUT



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

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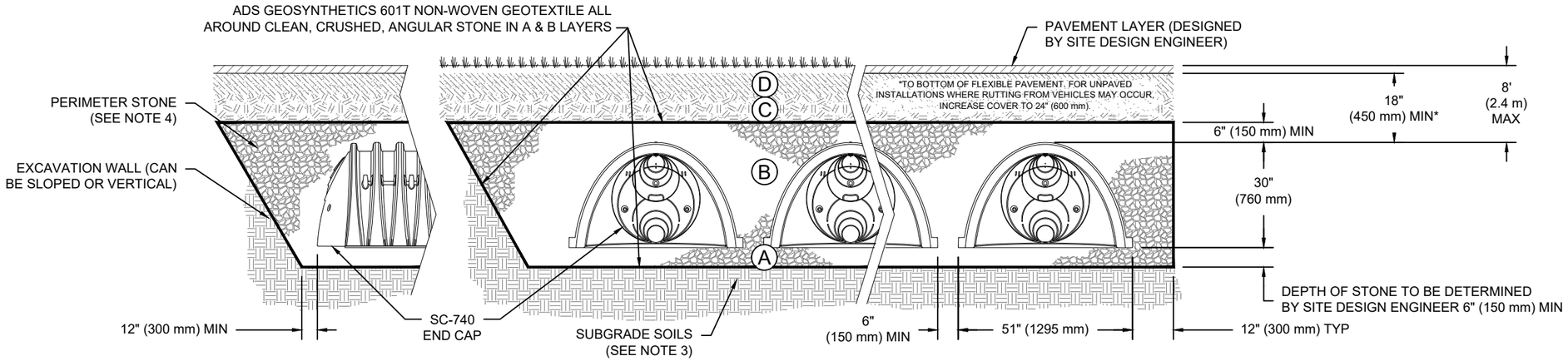
1-800-733-7473

SCALE = 1 : 50

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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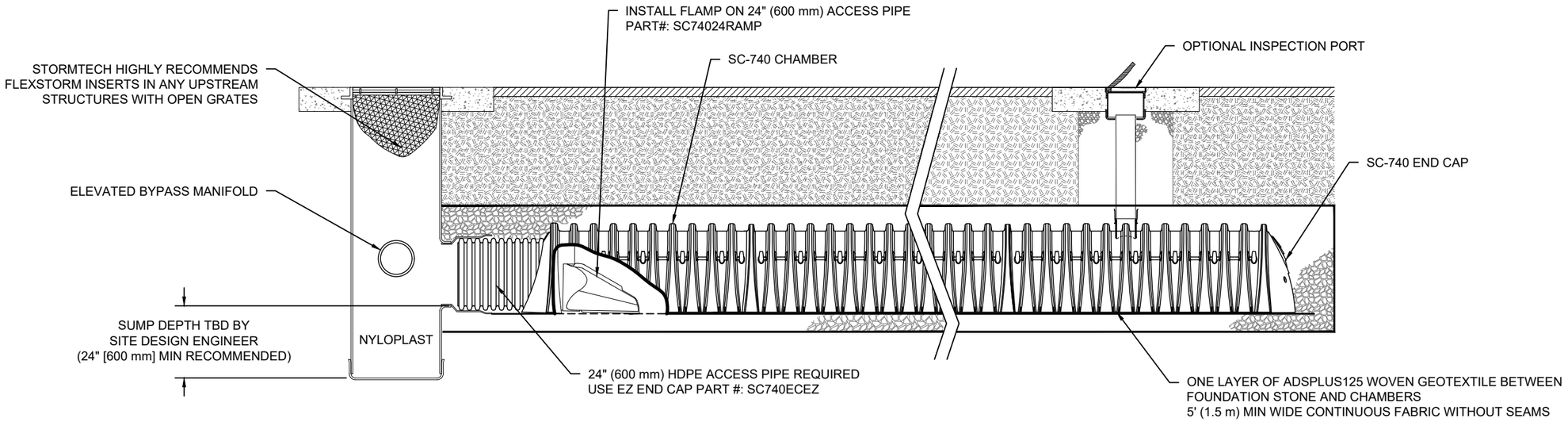

SC-740 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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SC-740 TECHNICAL SPECIFICATION

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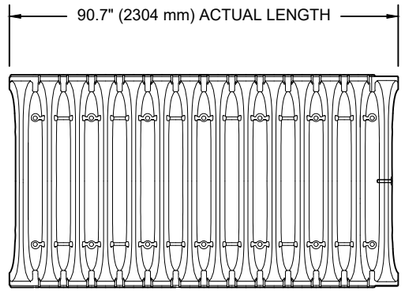
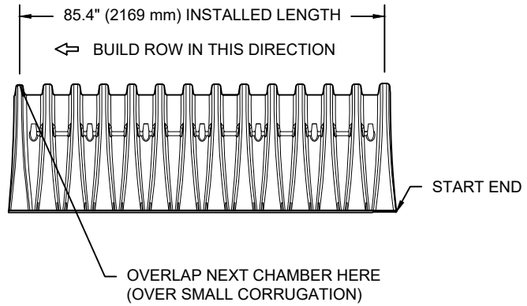
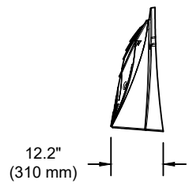
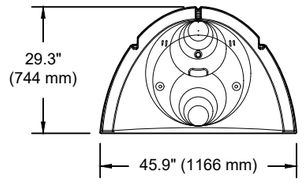
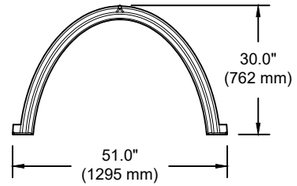






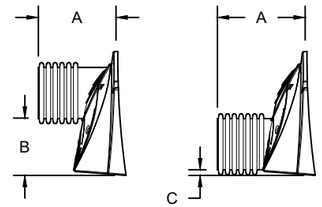




NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

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NYLOPLAST DRAIN BASIN

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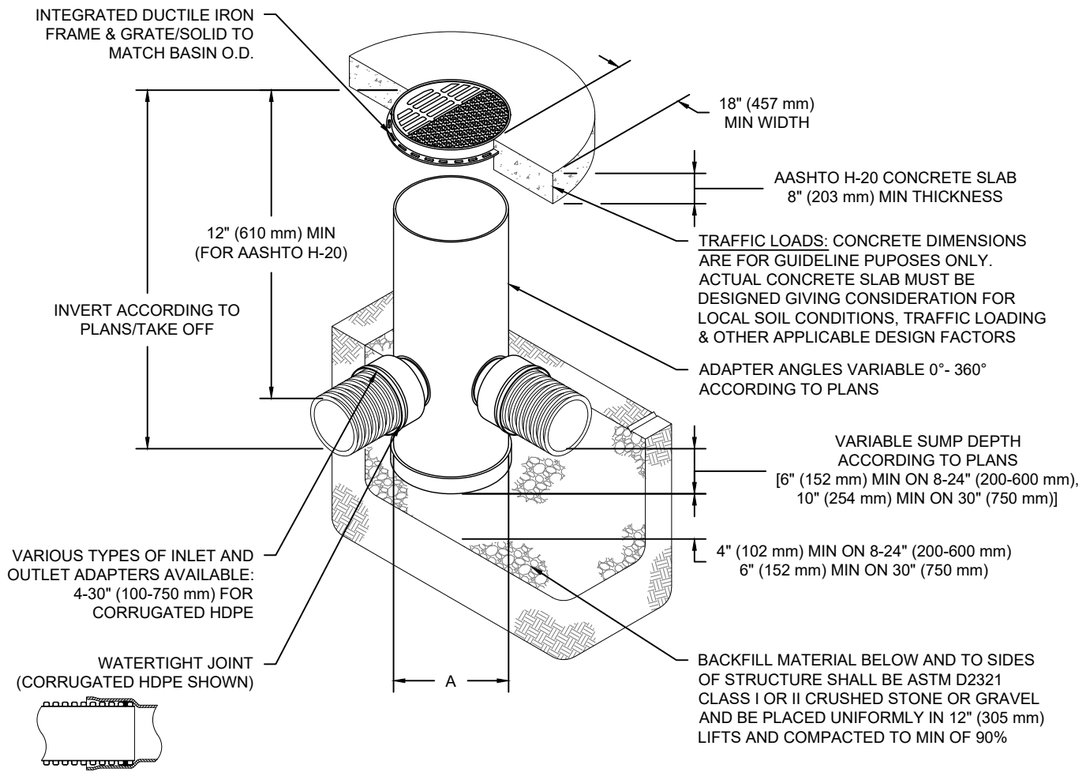

NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

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8'-6 3/8" [2.60]
8'-6 3/8" [2.60]
8'-6 3/8" [2.60]
8'-6 3/8" [2.60]
8'-6 3/8" [2.60]
7'-10 1/2" [2.40]
7'-10 1/2" [2.40]
7'-10 1/2" [2.40]
7'-10 [2.40]
SETBACK
16'-4 3/4" [5.00]
OHW
SETBACK
AISLE
24'-7 3/8" [7.50]
OHW
OHW
OHW
PROPERTY LINE 100'-0 3/8" [30.49m]

User Inputs

Chamber Model:	SC-740
Outlet Control Structure:	Yes
Project Name:	23010-1
Engineer:	Anmar Al-Faraj
Project Location:	Ontario
Measurement Type:	Metric
Required Storage Volume:	35.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	153 mm.
Stone Above Chambers:	153 mm.
Average Cover Over Chambers:	458 mm.
Design Constraint Dimensions:	(6.10 m. x 15.00 m.)

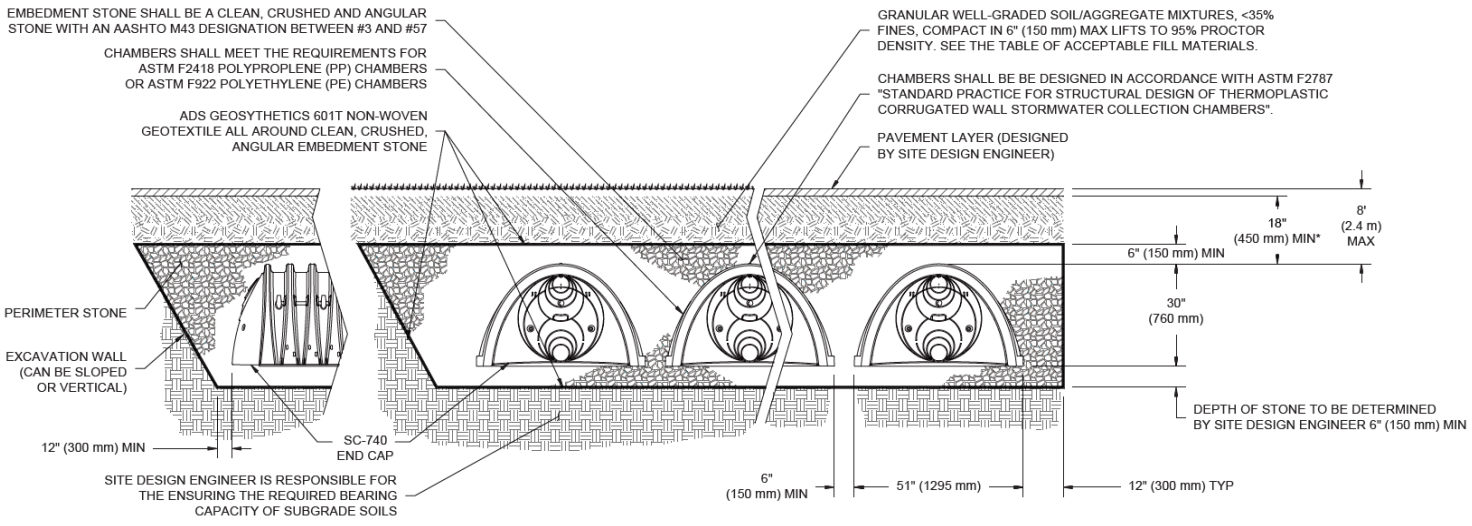
Results

System Volume and Bed Size

Installed Storage Volume:	38.62 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	15
Number Of End Caps Required:	6
Chamber Rows:	3
Maximum Length:	13.15 m.
Maximum Width:	4.81 m.
Approx. Bed Size Required:	63.09 square meters.

System Components

Amount Of Stone Required:	48 cubic meters
Volume Of Excavation (Not Including Fill):	68 cubic meters
Total Non-woven Geotextile Required:	198 square meters
Woven Geotextile Required (excluding Isolator Row):	14 square meters
Woven Geotextile Required (Isolator Row):	21 square meters
Total Woven Geotextile Required:	34 square meters
Impervious Liner Required:	0 square meters



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

Project: 23010-1

Chamber Model -	SC-740	
Units -	**Metric**	
	-	
Number of chambers -	15	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	0.00	m
Amount of Stone Above Chambers -	152	mm
Amount of Stone Below Chambers -	152	mm

63.08580931 sq.meters Min. Area - 47.1 sq.meters

StormTech SC-740 Cumulative Storage Volumes

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
1067	0.00	0.00	0.64	0.64	38.629	1.07
1041	0.00	0.00	0.64	0.64	37.988	1.04
1016	0.00	0.00	0.64	0.64	37.347	1.02
991	0.00	0.00	0.64	0.64	36.706	0.99
965	0.00	0.00	0.64	0.64	36.065	0.97
940	0.00	0.00	0.64	0.64	35.424	0.94
914	0.00	0.02	0.63	0.65	34.783	0.91
889	0.00	0.07	0.61	0.68	34.128	0.89
864	0.01	0.12	0.59	0.71	33.446	0.86
838	0.02	0.26	0.54	0.79	32.733	0.84
813	0.02	0.34	0.50	0.85	31.938	0.81
787	0.03	0.40	0.48	0.88	31.093	0.79
762	0.03	0.46	0.46	0.91	30.210	0.76
737	0.03	0.50	0.44	0.94	29.295	0.74
711	0.04	0.54	0.43	0.96	28.353	0.71
686	0.04	0.58	0.41	0.99	27.390	0.69
660	0.04	0.62	0.39	1.01	26.404	0.66
635	0.04	0.65	0.38	1.03	25.392	0.64
610	0.04	0.67	0.37	1.04	24.363	0.61
584	0.05	0.70	0.36	1.06	23.319	0.58
559	0.05	0.72	0.35	1.07	22.259	0.56
533	0.05	0.74	0.34	1.09	21.185	0.53
508	0.05	0.77	0.33	1.10	20.097	0.51
483	0.05	0.79	0.33	1.11	18.997	0.48
457	0.05	0.80	0.32	1.12	17.883	0.46
432	0.05	0.82	0.31	1.13	16.760	0.43
406	0.06	0.84	0.31	1.14	15.626	0.41
381	0.06	0.85	0.30	1.15	14.482	0.38
356	0.06	0.87	0.29	1.16	13.329	0.36
330	0.06	0.88	0.29	1.17	12.167	0.33
305	0.06	0.89	0.28	1.18	10.997	0.30
279	0.06	0.91	0.28	1.18	9.820	0.28
254	0.06	0.91	0.27	1.19	8.636	0.25
229	0.06	0.92	0.27	1.20	7.446	0.23
203	0.06	0.93	0.27	1.20	6.250	0.20
178	0.06	0.94	0.27	1.20	5.049	0.18
152	0.00	0.00	0.64	0.64	3.845	0.15
127	0.00	0.00	0.64	0.64	3.205	0.13
102	0.00	0.00	0.64	0.64	2.564	0.10
76	0.00	0.00	0.64	0.64	1.923	0.08
51	0.00	0.00	0.64	0.64	1.282	0.05
25	0.00	0.00	0.64	0.64	0.641	0.03

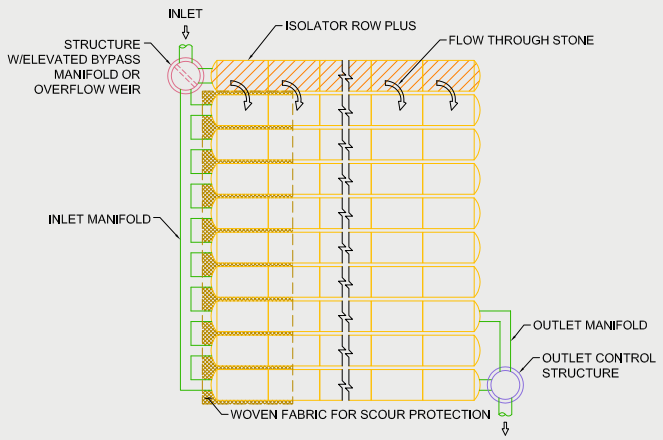
Isolator® Row Plus

The StormTech Isolator Row Plus is an enhancement to our proven water quality treatment system. This updated system is an NJCAT verified water quality treatment device that can be incorporated into any system layout.

Features

- Isolator Row Plus is now NJCAT verified. As a Manufactured Treatment Device it achieves over 80% TSS removal by filtration NJDEP Laboratory Protocol Assessment NJCAT Technology Verification.
- A patented Flamp™ (Flared End Ramp) provides a smooth transition from pipe invert to fabric bottom. The Flamp is attached to the inlet pipe inside the chamber end cap and improves chamber function over time by distributing sediment and debris that would otherwise collect at the inlet. It also serves to improve the fluid and solid flow back into the inlet pipe during maintenance and cleaning.
- Proprietary ADS Plus fabric maintains durability and sediment removal while allowing for higher water quality flow rates. A single layer of ADS Plus fabric is placed between the angular base stone and the Isolator Row Plus chambers.

Schematic of the StormTech Isolator Row Plus System



Technology Descriptions

The Isolator Row Plus is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume or a flow basis. An upstream manhole not only provides access to the Isolator Row Plus but includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with either an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

Summary of Verified Claims[1]

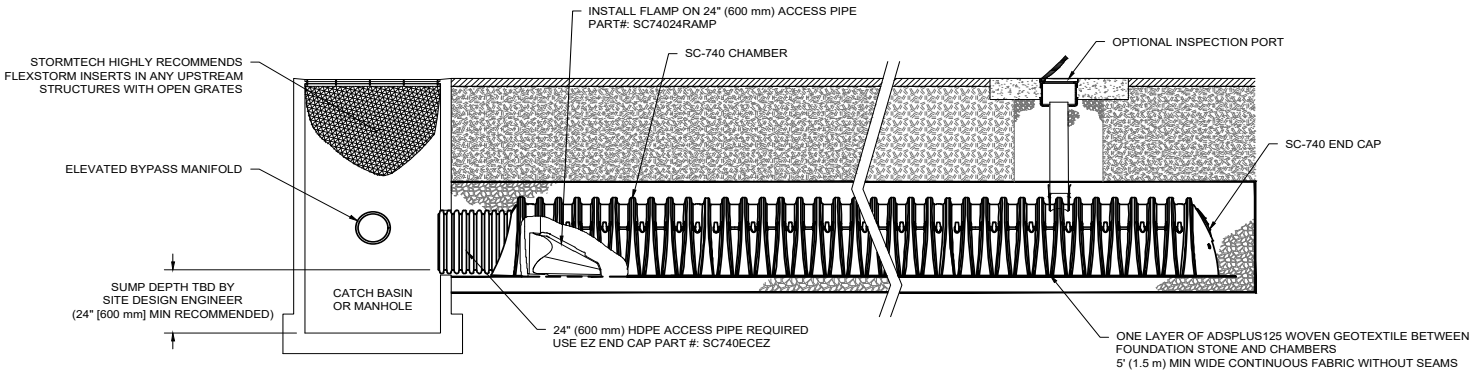
Treatment Rate (gpm/ft²)	4.1
Underlying Geotextile Layers	1
NJDEP Test Sediment	1-1000µ
Mean Particle Concentration (mg/L)	200
TSS Removal Efficiency	>80%

[1] Verification testing of the StormTech SC-740 Isolator Row PLUS in accordance with NJDEP Laboratory protocol to access total suspended solids removal by filtration manufactured treatment device, 2013

ADS StormTech™

adspipe.com
800-821-6710

StormTech Isolator Row Plus (not to scale)



Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediment to just one row of the StormTech system, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout.

Maintenance is accomplished with the JetVac® process. The JetVac process utilizes a high-pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediment. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency.

StormTech Isolator Row Plus

Chamber Model	Chamber Storage	Chamber Footprint	Treatment Rate
SC-160LP	15.0 cf (0.42 m^3)	11.45 sf (1.06 m^2)	0.11 cfs (3.11 L/s)
SC-310	31.0 cf (0.88 m^3)	17.7 sf (1.64 m^2)	0.16 cfs (4.53 L/s)
SC-740	74.9 cf (2.12 m^3)	27.8 sf (2.58 m^2)	0.26 cfs (7.36 L/s)
DC-780	78.4 cf (2.22 m^3)	27.8 sf (2.58 m^2)	0.26 cfs (7.36 L/s)
MC-3500	175.0 cf (4.96 m^3)	42.9 sf (3.99 m^2)	0.40 cfs (11.32 L/s)
MC-4500	162.6 cf (4.60 m^3)	30.1 sf (2.80 m^2)	0.28 cfs (7.93 L/s)
MC-7200	267.3 cf (7.57 m^3)	50.0 sf (4.65 m^2)	0.45 cfs (12.74 L/s)

Installation

Installation of the stormwater treatment unit(s) shall be preformed per manufacture's installation instructions. Such instructions can be obtained by calling Advanced Drainage Systems Inc. at (800) 821-6710 or by logging on to adspipe.com.

ADS StormTech™

adspipe.com
800-821-6710

Verification Statement

StormTech Isolator® Row PLUS
Registration number: (V-2020-10-01)
Date of issue: (2020-October-27)

Technology type	Stormwater Filtration Device
Application	Stormwater filtration technology to remove sediments, nutrients, heavy metals, and organic contaminants from stormwater runoff
Company	StormTech, LLC.
Address	520 Cromwell Avenue, Rocky Hill, CT 06067 USA **Phone** +1-888-892-2694
Website	www.stormtech.com
E-mail	info@stormtech.com

Verified Performance Claims

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Based on the laboratory testing conducted, the verified performance claims are as follows:

Total Suspended Solids (TSS) Removal Efficiency - The StormTech Isolator® Row PLUS achieved 82% ± 1% removal efficiency of suspended sediment concentration (SCC) at a 95% confidence level.

Average Loading Rate - Based on the reported flow rate data and the effective sedimentation and filtration treatment area of the test unit, the average loading rate of the test unit was 4.15 ± 0.03 GPM/ft^2 at a 95% confidence level.

Maximum Treatment Flow Rate (MTFR) - Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 gpm/ ft^2 of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft^2.

Detention Time and Volume - The StormTech Isolator Row PLUS detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft^3 and a detention time of 2.2 minutes.

Maximum Sediment Storage Depth and Volume - The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft^3 at a sediment depth of 0.5 inches.

Effective Sedimentation/Filtration Treatment Areas - The Effective Sedimentation Area (ESA) and the Effective Filtration Treatment Area (EFTA) increase as the size of the system increases. For the two overlapping StormTech SC-740 chambers tested, the ESA and the ratio of ESA/EFTA were 54.5 ft^2 and 1.0, respectively.

Sediment Mass Load Capacity - The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs ± 0.8 lbs (2.91 ±0.01 lbs/ ft^2) following a total sediment loading of 195.2 lbs.

Technology Application

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers covered in a non-woven geotextile fabric with a single layer of proprietary woven fabric at the bottom that serves as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal. The following features make the Isolator® Row PLUS effective as a water quality solution:

- Enhanced infiltration Surface Area
- Runoff Volume Reduction
- Peak Flow Reduction
- Sediment/Pollutant Removal
- Internal Water Storage (IWS)
- Water Temperature Cooling (Thermal Buffer).

Technology Description

The Isolator® Row PLUS (shown in Figures 1 and 2) is the first row of StormTech chambers that is surrounded with filter fabric and connected to a closely located manhole for easy access. The Isolator® Row PLUS provides for settling and filtration of sediment as stormwater rises in the chamber and ultimately passes through the filter fabric. The open-bottom chambers allow stormwater to flow out of the chambers, while sediment is captured in the Isolator® Row PLUS.

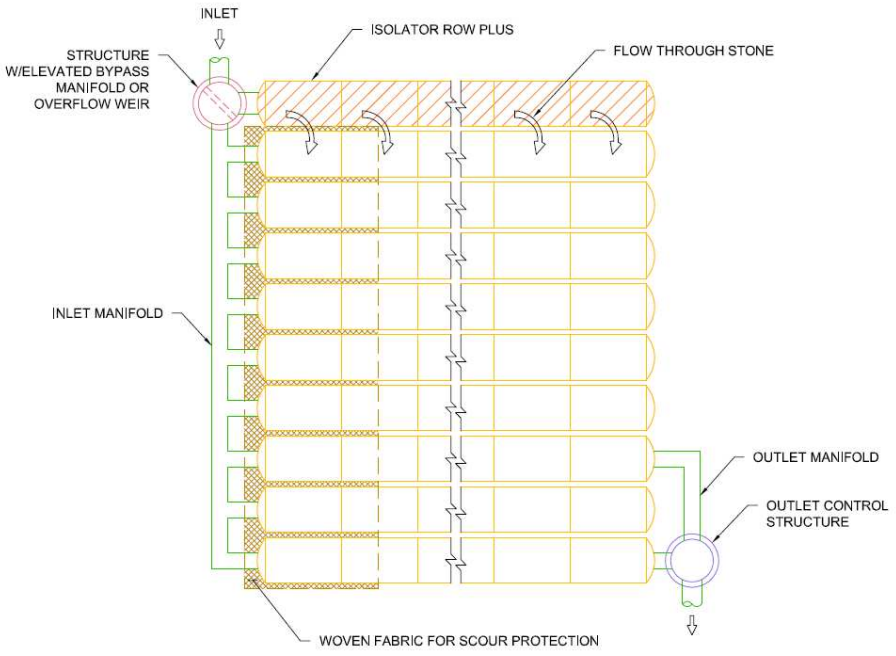


Figure 1: Schematic of the StormTech Isolator® Row PLUS System

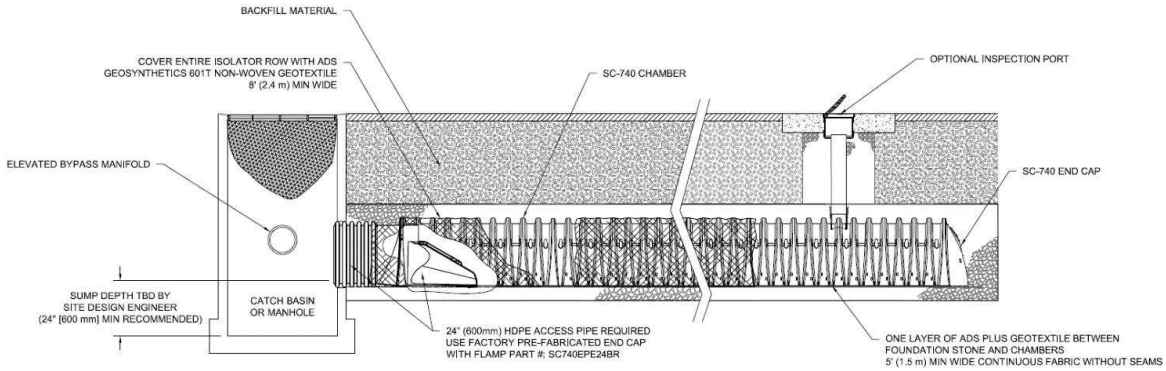


Figure 2: Isolator® Row PLUS Detail

A single layer of proprietary Advanced Drainage Systems (ADS) PLUS fabric is placed between the angular base stone and the Isolator Row PLUS chamber. The geotextile provides the means for stormwater filtration and provides a durable surface for maintenance operations. A 6 oz. non-woven fabric is placed over the chambers.

The Isolator® Row PLUS is designed to capture the “first flush” and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator® Row PLUS but includes a high low/concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator® Row PLUS bypass through a manifold to the other chambers. This is achieved with either a high-flow weir or an elevated manifold. This creates a differential between the Isolator® Row PLUS and the manifold, thus allowing for settlement time in the Isolator® Row PLUS. After Stormwater flows through the Isolator® Row PLUS and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

StormTech developed and owns the Isolator® Row PLUS technology and has filed a number of patent applications relating to the Isolator® Row PLUS system.[1]

Description of Test Procedure for the StormTech Isolator® Row PLUS

In January 2020, two overlapping StormTech SC-740 Isolator® Row PLUS commercial size chambers were installed at the Mid-Atlantic Storm Water Research Center (MASWRC, a subsidiary of BaySaver), in Mount Airy, Maryland, to evaluate the performance of the Isolator® Row PLUS system for Total Suspended Solid (TSS) removal (Figure 3) All testing and data collection procedures were supervised by Boggs Environmental Consultants, Inc. (BEC), who was hired by ADS for third party oversight, and were in accordance with the *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device (January 2013)*.

Prior to the start of testing, a Quality Assurance Project Plan (QAPP), revision dated January 09, 2020, was submitted and approved by the New Jersey Corporation for Advanced Technology (NJCAT), c/o Center for Environmental Systems, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07030.

[1] (U.S. Provisional Application No. 62/753,050, filed October 30, 2018; U.S. Non-Provisional Application No. 16/670,628, filed October 31, 2019; International Application No. PCT/US2019/059283, filed October 31, 2019; U.S. Application No. 16/938,482, filed July 24, 2020; U.S. Application No. 16/938,657, filed July 24, 2020; PCT International Application No. PCT/US2020/043543, filed July 24, 2020; PCT International Application No. PCT/US2020/043557, filed July 24, 2020.

Figure 3: StormTech "Isolator® Row PLUS" Test Set-up at MASWRC

Verification Results

The verification process for the StormTech Isolator® Row PLUS technology was conducted by GHL in accordance with the VerifiGlobal Verification Plan for the StormTech "Isolator® Row PLUS" Technology – 2020-09-09. The technology performance claims verified by GHL are summarized at the front of this Verification Statement and in Table 6 on Page 8 under the heading "Verification Summary".

Particle size distribution analysis was performed by ECS Mid-Atlantic, LLC of Frederick, MD in accordance with ASTM D422-63(2007). ECS is accredited by the American Association of State Highways and Transportation Officials (AASHTO).

ASTM D422-63(2007) is a sieve and hydrometer method where the larger particles, > 75 microns, are measured using a standard sieve stack while the smaller particles are measured based on their settling time using a hydrometer.

The PSD meets the requirements of NJDEP, which is generally accepted as representative of the type of particle sizes an OGS would be designed to treat. Actual PSD is site and rainfall event specific, so it was necessary to choose a standard PSD to make testing and comparison manageable.

Table 1 shows the NJDEP PSD specification. Table 2 and Figure 4 show the incoming material PSD as determined by ECS Mid-Atlantic and confirmed by the verifier.

Table 1: NJDEP PSD Specification

Particle Size (µm)	NJDEP Minimum Specification
1000	98
500	93
250	88
150	73
100	58
75	48
50	43
20	33
8	18
5	8
2	3
d_{50}	< 75 µm

Table 2 – Particle Size Distribution (PSD) of Test Sediment

Mesh (mm)	US Sieve Size	Sample ID		
		PSD A	PSD B	PSD C
		Percent Finer		
9.525	0.375	100.0	100.0	100.0
4.750	#4	100.0	100.0	100.0
4.000	#5	100.0	100.0	100.0
2.360	#8	100.0	100.0	100.0
2.000	#10	100.0	100.0	100.0
1.180	#16	100.0	100.0	100.0
1.000	#18	100.0	100.0	100.0
0.500	#35	100.0	100.0	100.0
0.425	#40	93.3	93.0	93.6
0.250	#60	90.3	89.8	90.2
0.150	#100	79.3	78.1	78.1
0.125	#120	73.6	71.7	71.7
0.106	#140	68.4	65.2	64.8
0.090	#170	60.2	58.3	57.5
0.075	#200	52.0	50.9	50.3
0.053	#270	48.0	48.3	47.8
0.045	Hydrometer	46.6	46.7	46.7
0.032		42.8	42.9	41.0
0.021		37.1	37.2	35.3
0.0125		25.7	25.7	25.8
0.0090		20.1	20.1	19.2
0.0064		16.3	16.4	14.5
0.0032		8.8	8.7	7.8
0.0014		3.8	3.7	3.8

The suspended sediment concentration analysis was completed by Fredericktowne Labs Inc., Meyersville, MD. Fredericktown Labs is accredited by the Maryland Department of Environment as Maryland Certified Water Quality Laboratory. The analysis procedure was ASTM D3977-97, Suspended Sediment Concentration. The sampling procedure and submission of samples to the test lab were overseen by the independent observer, Boggs Environmental Consultants, Inc.

All test data and calculations were detailed in the report “NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC”, July 2020, which was submitted to and verified by the New Jersey Corporation for Advanced Technology (NJCAT).

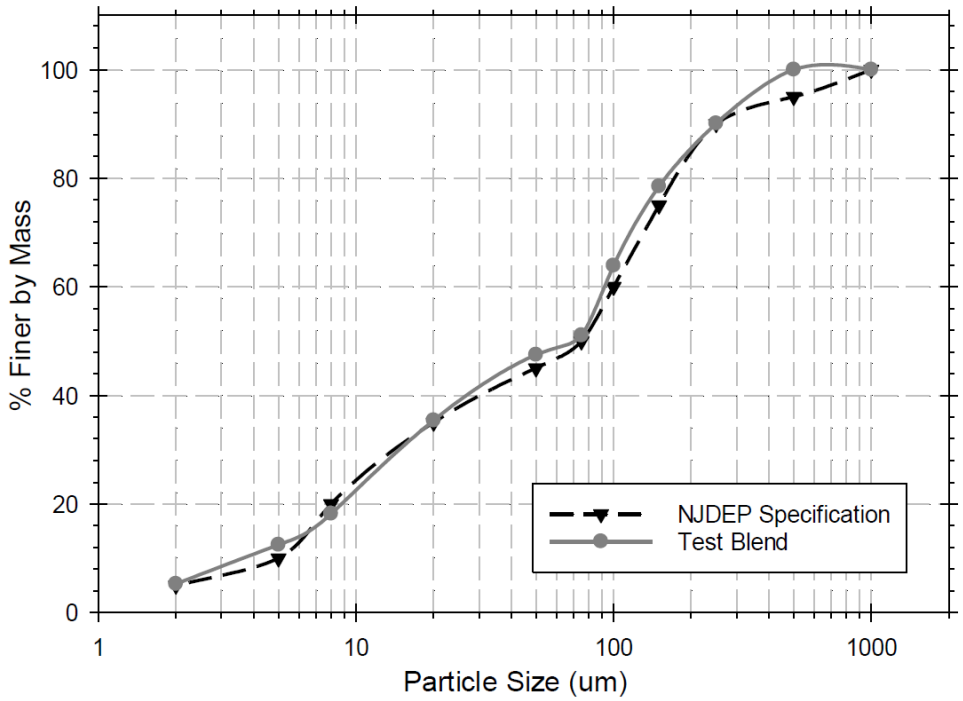


Figure 4– Particle Size Distribution (PSD)

The data in Table 3 (Flow Rate and Temperature) and Table 4 (Removal Efficiency) form the basis for the verified technology performance claim, specifically, flow rate, sediment captured and removal efficiency.

Table 3: Flow Rate and Temperature Summary

Run	Max Flow (gpm)	Min Flow (gpm)	Average Flow (gpm)	Flow COV	Flow Compliance (COV< 0.1)	Maximum Temperature (Fahrenheit)	NJDEP Temperature Compliance (< 80 F)
1	232.8	223.9	226.3	0.0078	Y	48.2	Y
2	228.9	218.6	220.8	0.0104	Y	51.5	Y
3	229.4	220.0	227.2	0.0094	Y	44.7	Y
4	230.2	218.7	223.2	0.0138	Y	40.5	Y
5	228.7	216.9	222.2	0.0103	Y	44.7	Y
6	227.6	217.0	224.2	0.0115	Y	46.7	Y
7	229.7	221.9	226.4	0.0092	Y	44.6	Y
8	230.3	222.2	226.8	0.0089	Y	43.5	Y
9	233.2	218.4	225.6	0.0136	Y	45.5	Y
10	232.2	219.7	228.4	0.0126	Y	44.7	Y
11	226.9	219.2	224.1	0.0088	Y	52.4	Y
12	232.2	222.1	226.9	0.0107	Y	48.5	Y
13	234.7	221.2	226.1	0.0109	Y	48.5	Y
14	231.9	223.4	228.7	0.0103	Y	45.6	Y
15	236.8	224.1	231.4	0.0131	Y	52.2	Y
16	232.5	221.3	229.0	0.0137	Y	47.8	Y

Table 4: Removal Efficiency Results

Run	Average Influent TSS (mg/L)	Influent Water Volume (gal)	Adjusted Average Effluent TSS (mg/L)	Effluent Water Volume (gal)	Adjusted Average Drain Down TSS (mg/L)	Drain Down Water Volume (gal)	Single Run Removal Efficiency (%)	Mass of Captured Sediment (g)	Cumulative Removal Efficiency (%)
1	203	7166	46	6881	34	285	77.8	4282	77.8
2	199	6993	32	6639	27	354	84.0	4415	80.8
3	207	7197	37	6793	27	403	82.6	4654	81.4
4	217	7068	33	6635	29	433	84.9	4923	82.3
5	215	7037	39	6593	29	444	82.2	4705	82.3
6	207	7097	40	6643	31	454	81.2	4504	82.1
7	198	7169	37	6693	30	476	81.6	4386	82.0
8	201	7184	37	6716	32	468	81.6	4473	82.0
9	205	7147	38	6675	30	472	81.8	4539	82.0
10	203	7235	38	6759	31	476	81.4	4523	81.9
11	208	7096	38	6624	30	472	81.8	4567	81.9
12	209	7185	41	6709	30	476	80.7	4584	81.8
13	198	7162	41	6680	32	482	79.7	4277	81.6
14	200	7242	43	6757	34	485	78.8	4318	81.4
15	196	7329	41	6842	32	487	79.5	4320	81.3
16	202	7254	44	6769	31	485	78.9	4384	81.2
Avg.	**204.2**	**7160**	**39**	**6713**	**31**	**447**	**81.2**	**4491**	**N/A**
Cumulative Mass Removed (g)							**71854**		
Cumulative Mass Removed (lb)							**158.4**		
Total Mass Loaded (lb)							**195.2**		
Cumulative Removal Efficiency (%)							**81.2**		

Quality Assurance

Performance verification of the StormTech Isolator® Row PLUS technology was performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. This included reviewing all data sheets and calculated values, as well as overall management of the test system, quality control and data integrity.

Additional information on quality control measures taken can be found in section 5 of the QAPP for StormTech Isolator Row New Jersey Department of Environmental Protection Testing, Rev. 1/9/2020.

Specific QA/QC measures reviewed by the verifier are summarized in Table 5 below.

Table 5. Validation of QA/QC Procedures

QC Parameter	Acceptance Criteria
Independence of observer	Confirmed in letter from Boggs Environmental Consultants, Inc. to NJCAT
Consistency of procedure	Daily logs confirm proper procedure
Existence of QAPP	Confirmed. “QAPP For StormTech Isolator Row New Jersey Department of Environmental Protection Testing”, Rev. 1/9/2020*)*
Use of appropriate sample analysis method – ASTM D3799	Confirmed by method reference on lab reports from Fredericktowne Labs Inc.
Test method appropriate for the technology	Used industry stakeholder approved protocol: *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids*

	Removal by a Filtration Manufactured Treatment Device (January 2013)
Test parameters stayed within required limits	Confirmed in report "NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC", July 2020
Third party verified data	All testing was observed and reviewed by Boggs Environmental Consultants, Inc.

Variance

Performance claims regarding structural load limitations were not verified as they are outside the scope of the performance testing that was conducted in accordance with the 'Quality Assurance Project Plan (QAPP) for StormTech Isolator Row, New Jersey Department of Environmental Protection Testing', revision dated January 09, 2020.

Verification Summary

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers wrapped in woven geotextile fabric with two layers at the bottom that serve as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal.

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Table 6 summarizes the verification results in relation to the technology performance parameters that were identified in the Verification Plan to determine the efficacy of the StormTech Isolator® Row PLUS technology.

Table 6 - Summary of Verification Results Against Performance Parameters

Parameters	Verified Claims	Accuracy
Total Suspended Solids (TSS) Removal Efficiency	Based on the laboratory testing conducted, the StormTech Isolator® Row PLUS achieved an average 82% removal efficiency of SSC	± 1% (95% confidence level)
Average Loading Rate	Based on the laboratory testing parameters, the StormTech Isolator® Row PLUS maintained a loading rate of 4.15 GPM/sf	±0.03 GPM/sf (95% confidence level)
Maximum Treatment Flow Rate (MTFR)	Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 GPM/ft^2 of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft^2.	± 1.4 GPM (95% confidence level)
Detention Time and Volume	Detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft^3 (based on	N/A

	physical measurement) and a detention time of 2.2 minutes.	
Maximum Sediment Storage Depth and Volume	The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft^3 at a sediment depth of 0.5 inches.	N/A
Effective Sedimentation/ Filtration Treatment Area	The effective sedimentation and filtration treatment area increases as the size of the chamber increases. Under the tested conditions using 2 overlapping chambers, the treatment area was 54.5 ft^2	The sedimentation /filtration area was determined from the actual physical dimensions of the test unit*
Sediment Mass Load Capacity	The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs (2.91 lbs/ ft^2) following a total sediment loading of 195.2 lbs	± 0.8 lbs (±0.01 lbs/ft^2) (95% confidence level)

*Note: These numbers are determined based on physical measurement or a dimensional drawing, which is standard practice. Highly accurate measurements are not practical.

In conclusion, the StormTech Isolator® Row PLUS is a viable technology that can be used to remove contaminants from stormwater runoff via filtration. This technology has proven effective at removing suspended sediment from stormwater through in-lab testing using an industry recognized laboratory protocol.

By extension of sediment removal, this technology should also remove particle bound nutrients, heavy metals, and a wide variety of organic contaminants. Performance is a function of pollutant properties, hydraulic retention time, filter media, pre-treatment, and flow rate, such that proper design of the system is critical to achieving the desired results.

What is ISO 14034?

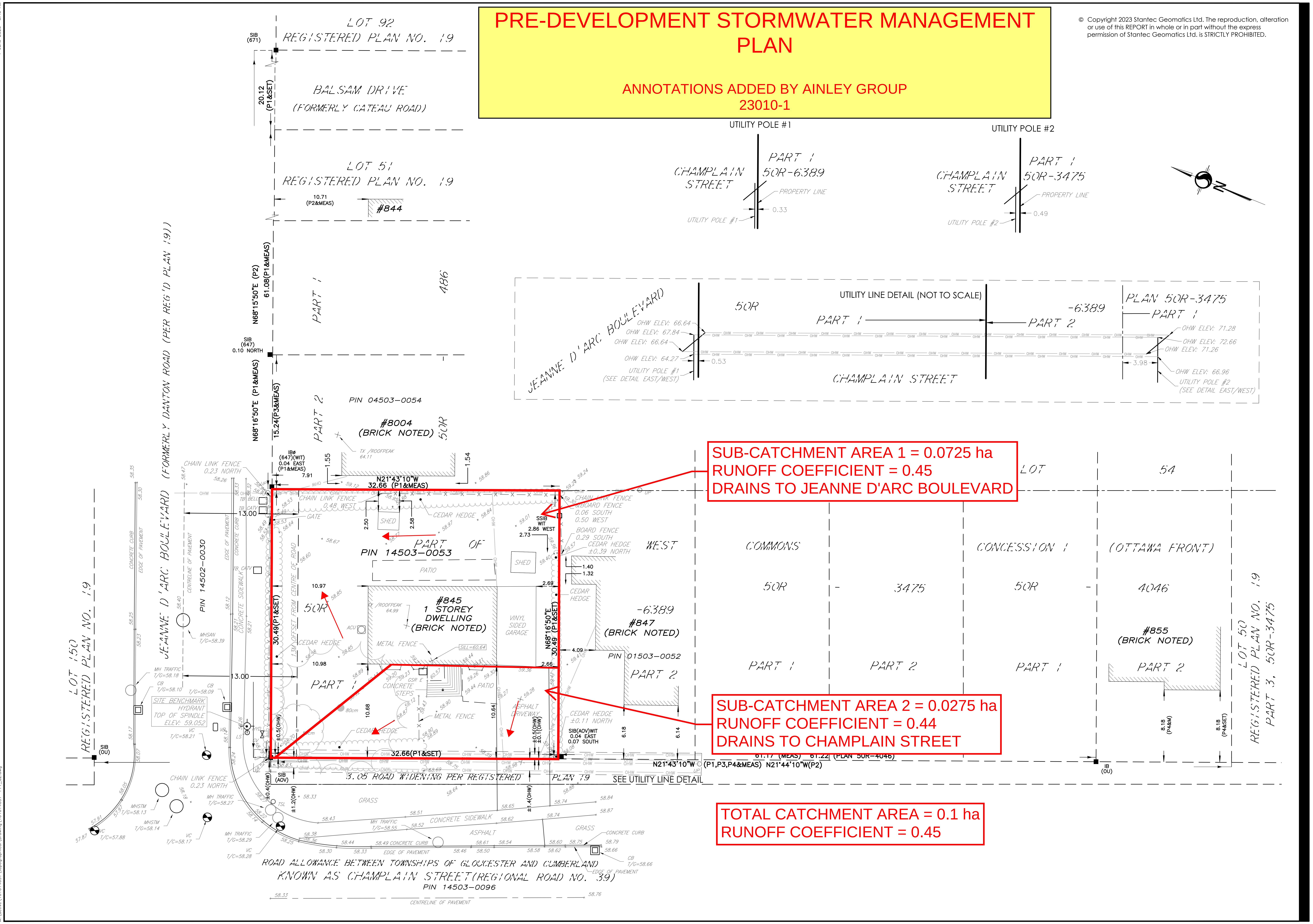
The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

For more information on the StormTech "Isolator® Row PLUS" technology, contact:	For more information on VerifiGlobal, contact:
StormTech, LLC. 520 Cromwell Avenue, Rocky Hill, CT 06067 USA t: +1-888-892-2694 e: info@stormtech.com w: www.stormtech.com	VerifiGlobal c/o ETA-Danmark A/S Göteborg Plads 1, DK-2150 Nordhaven t +45 7224 5900 e: info@verifiglobal.com w: www. verifiglobal.com
Signed for StormTech: *Original signed by:* *Greg Spires* Greg Spires, P.E. General Manager	Signed for VerifiGlobal: *Original signed by:* *Thomas Bruun* Thomas Bruun, Managing Director *Original signed by:* *John Neate* John Neate, Managing Director

APPENDIX D



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Stantec

Stantec Geomatics Ltd.
300-1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

TOPOGRAPHIC PLAN OF SURVEY OF

PART OF THE WEST COMMONS WEST OF LOT 37 CONCESSION 1 (OTTAWA FRONT) OLD SURVEY

(GEOGRAPHIC TOWNSHIP OF CUMBERLAND)

CITY OF OTTAWA

Scale 1:250

5 0 5 10 15 METRES

Stantec Geomatics Ltd.

METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT; OTTAWA ELEVATION=95.230.

BEARING NOTE

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

FOR COMPARISON PURPOSES AN ANGLE OF 0°42'08" COUNTER CLOCKWISE HAS BEEN APPLIED TO P1, P3 AND P4

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
M/MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
P1	"	PLAN 50R-6389
P2	"	PLAN BY FARLEY, SMITH & DENIS SURVEYING LTD. DATED MAY 14, 2021
P3	"	PLAN 50R-486
P4	"	PLAN BY WEBSTER AND SIMMONDS SURVEYING LTD. DATED JUNE 26, 1987
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
CB	"	CATCH BASIN
HYD	"	FIRE HYDRANT
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MH TRAFFIC	"	MAINTENANCE HOLE TRAFFIC
LS	"	LIGHT STANDARD
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
UP	"	UTILITY POLE
VC	"	VALVE CHAMBER
	"	TREE CONIFEROUS (D.B.H. SHOWN)
	"	TREE DECIDUOUS (D.B.H. SHOWN)
OHW		OVERHEAD UTILITY WIRE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THE SURVEY WAS COMPLETED ON THE 31st DAY OF MAY, 2023.

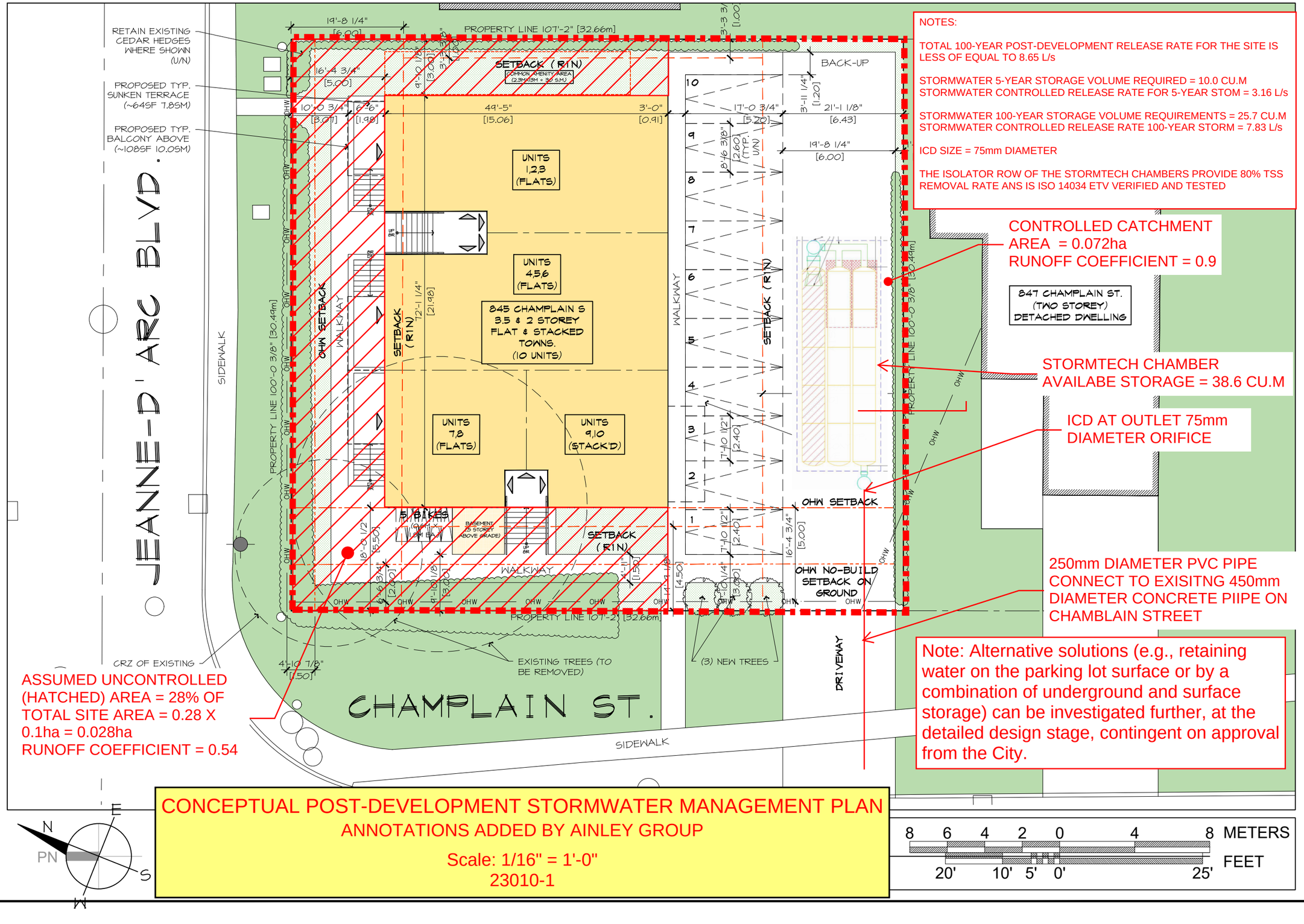
DATE

R. G. BENNETT
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-39357.

DRAWN: TMT CHECKED: CK PM: CT FIELD: AW PROJECT No.: 161614697-111

CONCEPT - PRELIMINARY ONLY



NOTES:

TOTAL 100-YEAR POST-DEVELOPMENT RELEASE RATE FOR THE SITE IS LESS OF EQUAL TO 8.65 L/s

STORMWATER 5-YEAR STORAGE VOLUME REQUIRED = 10.0 CU.M
STORMWATER CONTROLLED RELEASE RATE FOR 5-YEAR STOM = 3.16 L/s

STORMWATER 100-YEAR STORAGE VOLUME REQUIREMENTS = 25.7 CU.M
STORMWATER CONTROLLED RELEASE RATE 100-YEAR STORM = 7.83 L/s

ICD SIZE = 75mm DIAMETER

THE ISOLATOR ROW OF THE STORMTECH CHAMBERS PROVIDE 80% TSS REMOVAL RATE ANS IS ISO 14034 ETV VERIFIED AND TESTED

CONCEPTUAL POST-DEVELOPMENT STORMWATER MANAGEMENT PLAN

ANNOTATIONS ADDED BY AINLEY GROUP

Scale: 1/16" = 1'-0"

23010-1

PLOT DATE: 23-10-18

PAUL A. COOPER
ARCHITECT

76 CHAMBERLAIN AVE.
OTTAWA, ONTARIO
K1S 1V9
(819) 685 9512 Tel.

PROJECT TITLE

845 CHAMPLAIN STREET
OTTAWA, ONT.

10	PRE-APP. CONSULT	2023 07-28
9	RE-ZONING DRAFT	2023 07-26
8	CONCEPT REV.	2023 06-30
7	CONCEPT REV.	2023 05-17
6	CONCEPT REV.	2023 05-02
#	REV.	2023 XX-XX

DRAWING TITLE:

PROPOSED SITE PLAN

PROJECT No. :

DATE:	23-02-20
SCALE:	NOTED
DWG BY:	P.A.C.

DWG No:

A0

APPENDIX E

Boundary Conditions
845 Champlain

Provided Information

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	114.1	78.9
Peak Hour	109.5	72.3
Max Day plus Fire Flow	110.4	73.5

[1] Ground Elevation = 58.6 m

Location

Results

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	114.1	78.9
Peak Hour	109.5	72.3
Max Day plus Fire Flow	110.4	73.5

[1] Ground Elevation = 58.6 m

Notes

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Anmar Al-Faraj

From: Anmar Al-Faraj
Sent: June 22, 2023 11:16 AM
To: 'Elsby, Cam'; Christian Campanale
Cc: Guy Ste-Croix
Subject: RE: 845 Champlain Street, Ottawa

Thanks Cam for the clarification, much appreciated.

Regards,

Anmar Al-Faraj, P.Eng., PMP
Project Engineer

Cell: (902) 210-3305
Email: anmar.al-faraj@ainleygroup.com

WWW.AINLEYGROUP.COM

From: Elsby, Cam <Cam.Elsby@ottawa.ca>
Sent: June 22, 2023 9:15 AM
To: Christian Campanale <Christian@evospace.dev>
Cc: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: RE: 845 Champlain Street, Ottawa

Hi Christian, Guy, and Anmar,

My apologies, the pre-application consultation occurred when the switch had not yet been official; I can confirm that we now identify quality control requirements. For this site, it will be required to demonstrate a minimum 80% TSS removal for all effluent stormwater.

Please don't hesitate to reach out should you have any further questions or concerns.

Kind regards,

Cam Elsby
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique

Development Review – East Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 21443
cam.elsby@ottawa.ca

From: Christian Campanale <Christian@evospace.dev>
Sent: June 21, 2023 11:04 PM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: FW: 845 Champlain Street, Ottawa

Hi Cam,

Hope all is well. it's my pleasure to introduce you to Guy and Anmar who are our civil engineer consultants for this project at 845 Champlain.

Anmar is requesting some guidance from you with respects to the water quality requirements, see email thread below. Would you please advise?

Thank you,

Christian Campanale
Evospace Developments
President
Tel:3436882333 ext 201
1161 Cyrville Road
Ottawa, ON, K1J 7S6
www.evospace.dev

From: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>
Sent: Wednesday, June 21, 2023 3:32 PM
To: Christian Campanale <Christian@evospace.dev>

Cc: Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: FW: 845 Champlain Street, Ottawa

Hi Christian,

Please see highlighted in Yellow in the email chain below as a response from the RVCA regarding stormwater quality. Who is your contact at the City? Maybe it is easier if you could circulate this email to them so they can confirm the stormwater quality requirements for our site, if any.

"The RVCA defers water quality protection requirements to the City of Ottawa, I would direct you to the municipality to determine your water quality control requirements. This change was made as a result of Bill 23 changes at the start of the year."

Regards,

Anmar Al-Faraj, P.Eng., PMP
Project Engineer

Cell: (902) 210-3305
Email: anmar.al-faraj@ainleygroup.com

WWW.AINLEYGROUP.COM

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: June 21, 2023 3:29 PM
To: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>
Cc: Emily LeBlanc <emily.leblanc@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: RE: 845 Champlain Street, Ottawa

Hi Anmar,

This has been the standard response for years, it may be that they forgot to update this section when putting their notes together. (It's been an on-going adjustment and the City hasn't completely caught up on the change).

If there are any other questions I'm happy to reach out to the specific individual at the city if needed.

Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>
Sent: Wednesday, June 21, 2023 3:26 PM

To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Emily LeBlanc <emily.leblanc@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: RE: 845 Champlain Street, Ottawa

Hi Eric,

Thank you for the clarification. It's a bit weird though since the City noted in our pre-application consultation with them to reach out to the conservation authority for water quality requirement. Nonetheless, I'll circle this email back to them for further clarification.

Storm Water Management:

Quality Control:

- Conservation Authority to provide quality control requirements. Please reach out to the Conservation Authority prior to submission and include correspondence in the Stormwater Management Report

I'll reach out to you if I have any other questions.

Regards,

Anmar Al-Faraj, P.Eng., PMP
Project Engineer

Cell: (902) 210-3305
Email: anmar.al-faraj@ainleygroup.com

WWW.AINLEYGROUP.COM

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: June 21, 2023 3:18 PM
To: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>
Cc: Emily LeBlanc <emily.leblanc@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: RE: 845 Champlain Street, Ottawa

Hi Anmar,

The RVCA defers water quality protection requirements to the City of Ottawa, I would direct you to the

municipality to determine your water quality control requirements. This change was made as a result of Bill 23 changes at the start of the year.

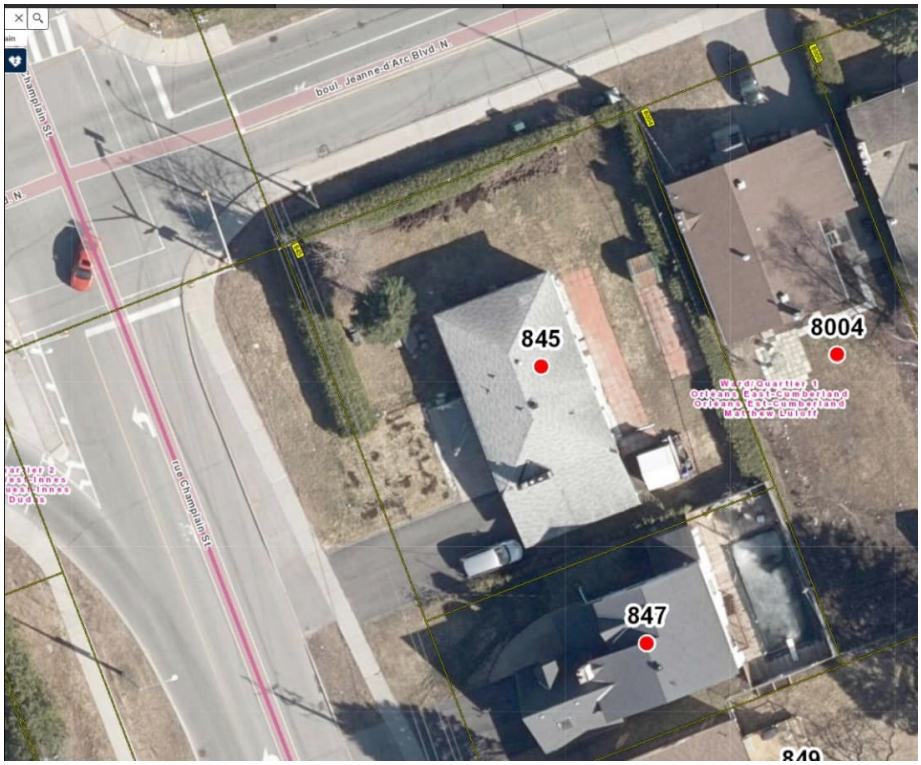
Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>
Sent: Tuesday, June 20, 2023 1:00 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Emily LeBlanc <emily.leblanc@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: 845 Champlain Street, Ottawa

Hi Eric,

We are currently working on a proposed development (i.e. 10 stacked dwelling units) at 845 Champlain Street in Ottawa. The existing building shown in the screenshot below will be demolished and a new 10 stacked dwelling units are proposed along with asphalt parking lot and drive aisle (10 parking spaces). We've attached the Architect's plan for your reference. The City of Ottawa of late has been asking us to contract the RVCA and include correspondence in our site servicing and stormwater management brief regarding stormwater quality requirements. It's our understanding that the RVCA might require on-site water quality protection (i.e. oil/grit separator) based on the proposed site plan and the proposed 10 spaces parking lot.. We await your confirmation.



Regards,

Anmar Al-Faraj, P.Eng., PMP
Project Engineer

Cell: (902) 210-3305
Email: anmar.al-faraj@ainleygroup.com

WWW.AINLEYGROUP.COM

Ainley Group is committed to providing accessible customer service. Please inform us if you require this information in an alternative format or require communication supports.

'

'

845 Champlain Street (Ward 1) – Pre-application Consultation Notes

Meeting Date: Wednesday, March 29, 2023

Meeting Notes sent on: Tuesday, May 02, 2023

Attendees	Callen Hofland, Applicant Cam Elsby, Project Manager (Development Review), City of Ottawa Christian Campanale, Applicant Chris Moise, Architect and Urban Designer, City of Ottawa Lucy Ramirez, Planner (Development Review), City of Ottawa Michael Boughton, Senior Planner (Development Review), City of Ottawa Paul Cooper, Architect, Paul A. Cooper Architect & Monstrous Designs Barrett Wagar, Planner, Stantec
Regrets	Hayley Murray, Forester – PRED, City of Ottawa Josiane Gervais, Project Manager (Transportation), City of Ottawa Jessica Button, Planner (Parks), City of Ottawa Mohammad, HAFSA, Owner Saaeed Adil, Owners

Contents

Proposal Summary

The site is currently zoned R1N, and the Applicant is proposing to rezone the site to a R4 zone to permit 10 stacked dwelling units.

Context

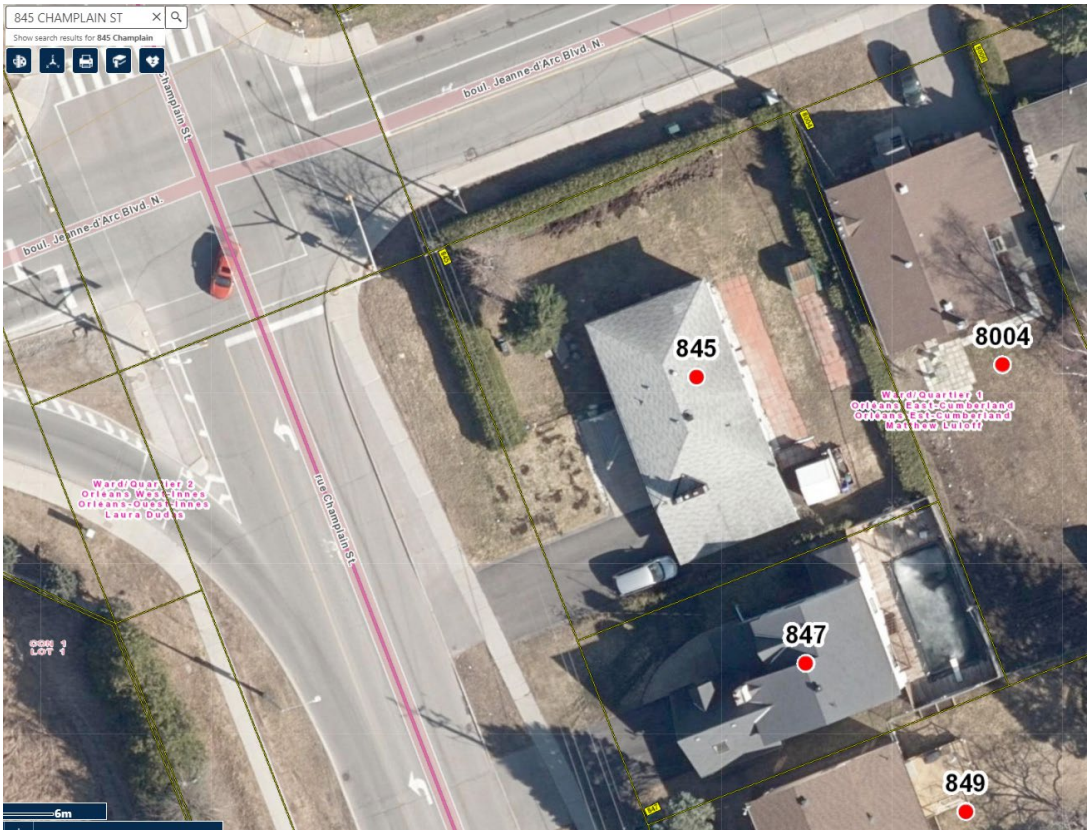


Figure 1:Aerial view of 845 Champlain St. The lot is approximately 995 square metres, with 30.49 metres of frontage along Jeanne-d'Arc Boulevard N and 32.65 metres of frontage along Champlain Street.

Figure 2: 2021 Streetscape view, source: Google Streetview. From a preliminary review it looks like the coniferous tree will be within the proposed building footprint. The deciduous tree is outside the building footprint and should be protected.

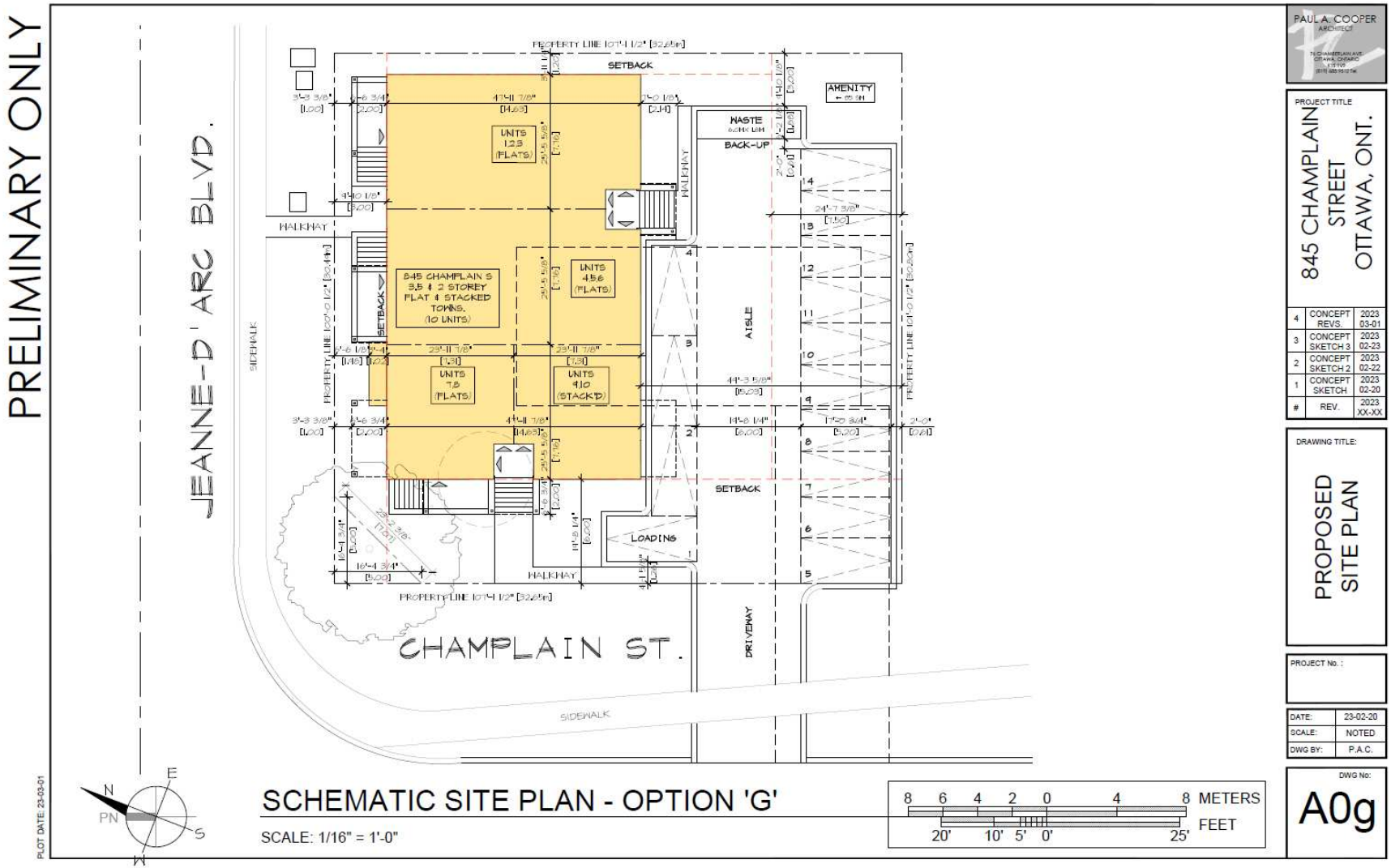


Figure 3: Preliminary Concept Plan

City Surveyor

Bill Harper, City's Surveyor | Bill.Harper@ottawa.ca

The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.

Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

Engineering

Cam Elsby, Project Manager Infrastructure Approvals | Cam.Elsby@ottawa.ca

Water:

Frontage charges apply ($190.00 per metre) ☐ **Yes** ☒ **No**

Accessible Water Main: direct access to 406mm DI municipal watermain on Champlain Street.

Sanitary Sewers:

Accessible Sanitary Sewer: direct access to 250mm AC municipal sanitary sewer on Champlain Street.

Is a monitoring maintenance hole required on private property? ☐ yes ☒ no

Storm Sewers:

Accessible Storm Sewer: direct access to 450mm concrete municipal storm sewer on Champlain Street.

Is a monitoring maintenance hole required on private property? ☐ yes ☒ no

Storm Water Management:

Quality Control:

- Conservation Authority to provide quality control requirements. Please reach out to the Conservation Authority prior to submission and include correspondence in the Stormwater Management Report

Quantity Control:

- Runoff Coefficient: lesser of 0.5 or existing.
- Minor/major system design requirements: Control post-development peak flow rate to equal or lesser than the pre-development peak flow rate for all storm events up to and including the 100-year event.
- Time of concentration (Tc) to be calculated, min Tc = 10mins

MECP ECA requirements

Dependent on the utilization of shared sanitary and/or storm servicing or drainage between properties, an MECP Environmental Compliance Approval (Municipal/Private Sewage Works) may be required for the proposed development. Please contact Ontario Ministry of the Environment and Climate Change, Ottawa District Office to arrange a pre-submission consultation.

Additional Notes:

- No Capital Work Project that would impact the application has been identified at this time
- No road moratorium that would impact the application has been identified
- Any easement identified should be shown on all plans
- Sensitive Marine Clay (SMC) is widely found across Ottawa- geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane

Required Plans and Studies

Required supporting plans and studies required for the infrastructure component of your submission

Zoning Bylaw Amendment application

1. Stormwater Management Brief
2. Adequacy of Public Services Report

For information on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines (October 2012)
- Ottawa Design Guidelines – Water Distribution (2010)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)

Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455

Should you have any questions or require additional information, please contact Cam Elsby directly at (613) 580-2424, ext. 21443 or by email at Cam.Elsby@ottawa.ca.

Forestry

Hayley Murray, Forester – PRED | Hayley.Murray@ottawa.ca

There are well established trees on this property. Please submit a Tree Information Report (TIR) that shows the as of right building footprint for the current zoning and the footprint of the buildings with the proposed setbacks to understand the impacts of the Zoning By-law Amendment on tree retention. Please see Schedule C - Tree Information Report Guidelines of the Tree Protection By-law (By-law 2020-340).

Parks

Jessica Button, Planner (Parks and Facilities Planning) | Jessica.Button@ottawa.ca

1. Parkland Dedication will be requested in the form of Cash in lieu of Parkland Dedication in accordance with the Parkland Dedication By-law 2022-280 as amended by the Planning
2. The value of the land will be determined by the City's Realty Services Branch. The owner is responsible for any appraisal costs incurred by the City.
3. Please provide Parks & Facilities Planning with a surveyor's note (or equivalent) which specifies the gross land area of the property with your application.

Transportation

Josiane Gervais, Project Manager, Infrastructure Approvals | Josiane.Gervais@ottawa.ca

1. Follow Transportation Impact Assessment Guidelines:
    a. Submit a Screening Form at your earliest convenience to josiane.gervais@ottawa.ca. A TIA will be required if triggers are met.
    b. Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
    c. An update to the *TRANS Trip Generation Manual* has been completed (October 2020). This manual is to be utilized for this TIA. A copy of this document can be provided upon request.
2. The following comments should be considered when preparing the Site Plan for this development:

a. ROW protection on Jeanne d'Arc between Champlain and Tenth Line is 26m even. Future ROW line must be shown on the site plan.
b. Provide corner triangles as per OP, Collector Road to Collector Road: 5 m x 5 m.
c. Site access should remain in the existing location as it provides a longer corner clearance and is as far away from the traffic signal as possible (note that corner clearances as per TAC Figure 8.8.2 cannot be met due to the size of the site).
d. Site is within 600m of Place d'Orléans LRT Station.
e. As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, visitor parking, etc.).
f. Ensure site access meets the City's Private Approach Bylaw.
g. Sidewalk is to be continuous across access as per City Specification 7.1.
h. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.
i. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

Planning

Lucy Ramirez, Planner – Development Review | Lucy.Ramirez@ottawa.ca

Official Plan

Per the New Official Plan (2022) the subject property is designated *Suburban Corridor – Minor* as Jeanne D'Arc Boulevard is a corridor – minor (Schedule A and B8). The site is across the street from land that is part of the Orléans Town Centre Hub designation, and the Protected Major Transit Station Area (PMTSA) on Schedules B8 and C1. The Suburban Transect is generally characterized by Low- to Mid-density development.

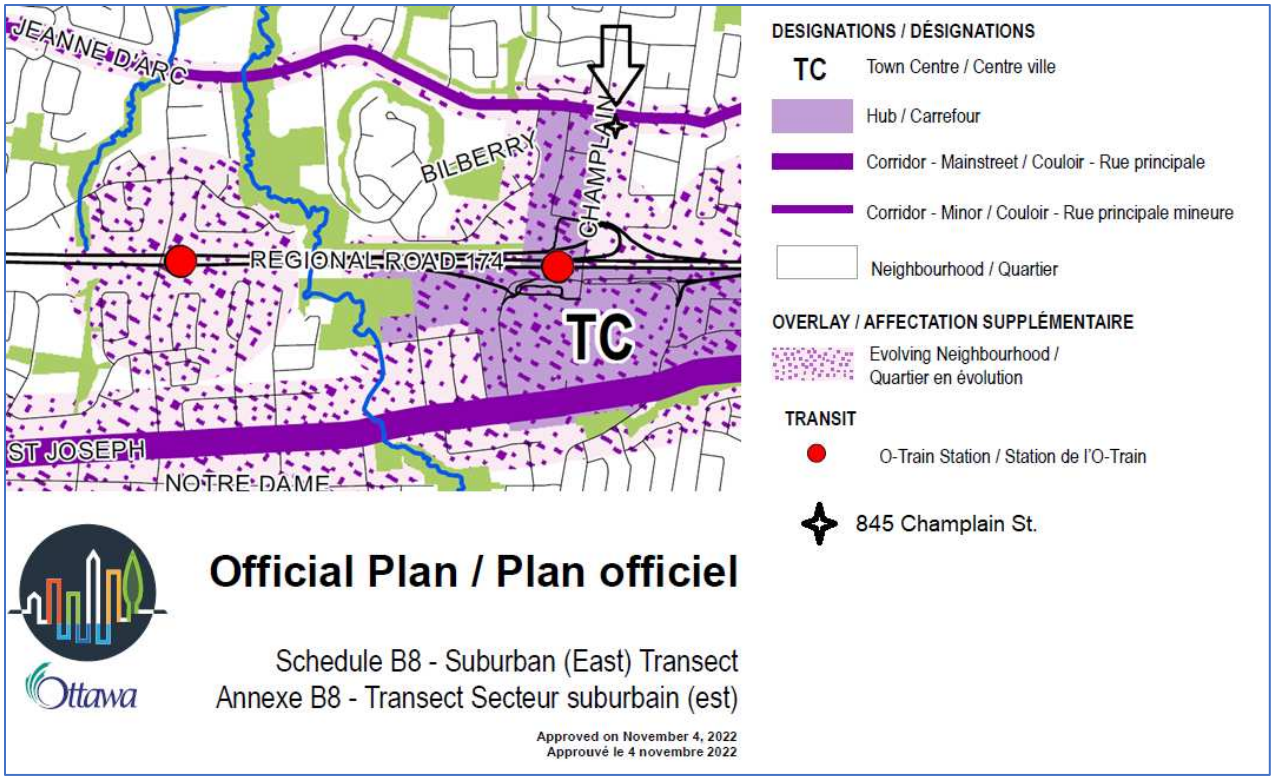


Figure 4: Capture from Schedule B8 of the Official Plan, with the subject property identified

Secondary Plan

The subject site is within the Orléans Corridor Secondary Plan (Council approved the secondary plan on September 21, 2022, and the plan is being appealed), the subject site is designated O-Train Minor Corridor per Schedule A, and the maximum permitted building height is 4 storeys per Schedule B of the secondary plan.

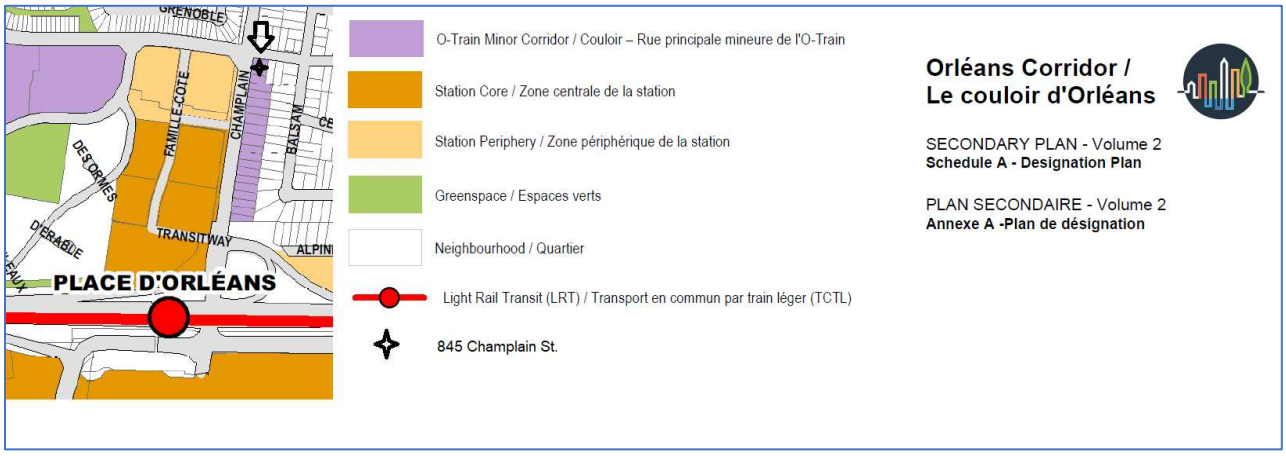


Figure 5: Capture from Schedule A of the Orléans Corridor Secondary Plan with subject property identified

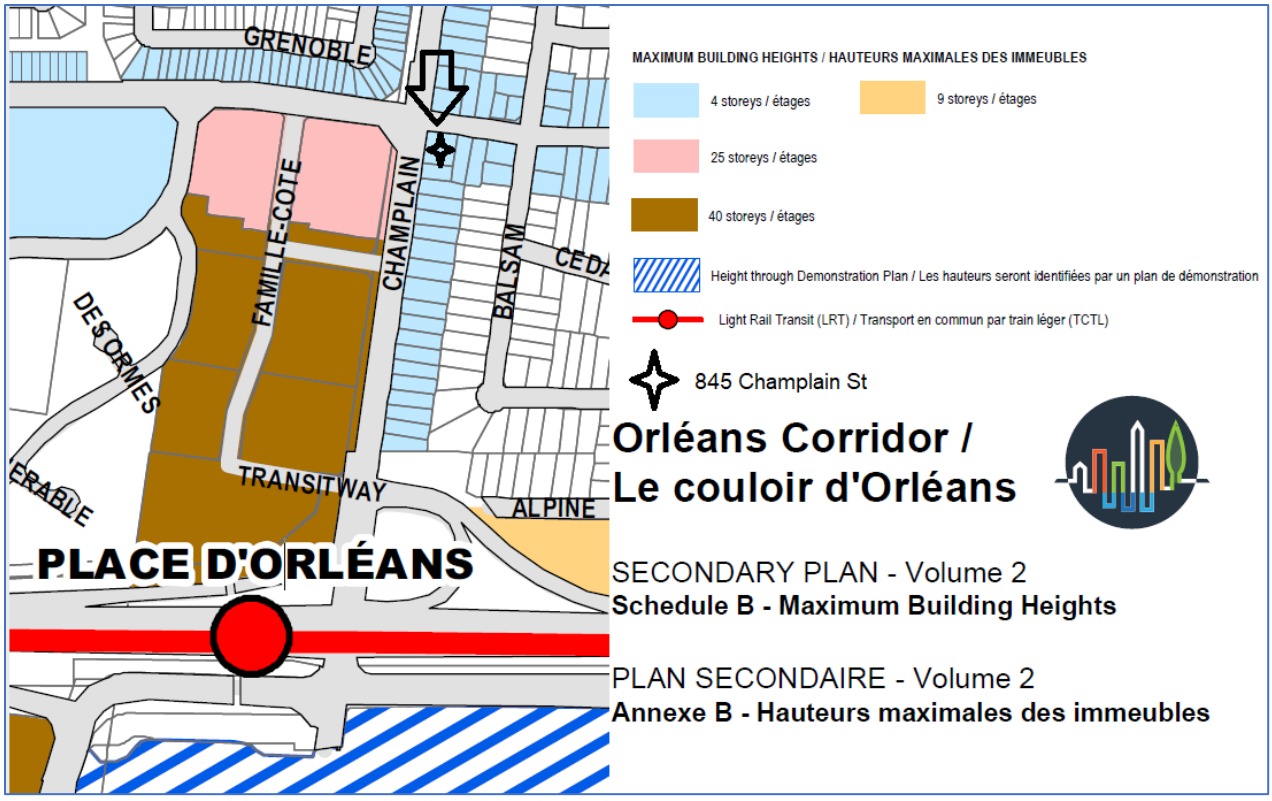


Figure 6: Capture from Schedule B of the Orléans Corridor Secondary Plan with subject property identified

See excerpt of section **5.4 O-Train Minor Corridor** below:

> *Multiple street segments located across the Study Area provide opportunities for intensification and improvements to pedestrian and cycling infrastructure in proximity to Station Areas.*
>
> *1) The O-Train Minor Corridor designation will be characterized by a low-rise residential built form.*
> *2) Development up to 6- storeys in height is permitted within the Local Commercial Anchor Overlay subject to the provisions of commercial or employment use on the ground floor.* [not applicable to 845 Champlain St.]
> *3) Small-scale commercial activities are permitted on the ground floor of any building fronting onto Jeanne d'Arc Boulevard.*
> *4) The city will undertake a feasibility study of additional improvements to cycling and pedestrian infrastructure and necessary traffic calming along Jeanne d'Arc Boulevard, east of Champlain Boulevard.*

Figure 7: Capture from O-Train Minor Corridor from section 5.4 of the Orléans Secondary Plan

Zoning By-law Amendment

The site is currently zoned R1N, and the proposal is to rezone it to a R4 zone to permit 10 stacked dwelling units.

Comments

As proposed this site is too small to accommodate the Right-of Way Protection and the parking spaces required for 10 Stacked Dwellings. Have you considered a townhouse dwelling typology with additional dwellings within the townhouse dwellings units. No parking would be required for the additional dwellings; therefore, you could maintain your dwelling count but reduce the parking requirement.

Bill 23

Bill 23, More Homes Built Faster Act, 2022 received Royal Assent on November 28, 2022. Now on a parcel of urban residential land, an owner is permitted either three units within an existing detached, semi-detached, or rowhouse dwelling, or a combination of two units in a principal building, and one unit within an ancillary building, for example a coach house.

I spoke with a zoning plan examiner on how building permit applications are currently being processed post Bill 23. To proceed with a townhouse dwelling typology with additional units in each dwelling unit you would need to create the individual lots for the townhouse dwelling units. So, you would need to submit consent applications to the Committee of Adjustment.

In the aforementioned scenario a – townhouse block with additional dwelling units – a secondary dwelling unit could be in the basement, and you could have another secondary dwelling unit above ground. Please note that the size restriction would remain for the above ground unit, see Zoning By-law section 133 (5), which states that *if located at or above grade, the secondary dwelling unit must not be greater in size than an amount equal to 40% of the gross floor area of its principal dwelling unit.*

There is a city-initiated zoning by-law amendment in the works to respond to Bill 23 https://devapps.ottawa.ca/en/applications/D02-02-23-0017/details and it is tentatively anticipated to go to the Planning and Housing Committee in the second half of June, which means there may be zoning provisions coming into effect in August to address Bill 23 changes.

Site Plan Control

I understand that you are proposing ten stacked dwellings in part because the province has exempted development with 10 units or less from Site Plan Control Approval. Therefore, a Zoning By-law Amendment (ZBLA) is the only opportunity to comment on the proposal.

Site Plan Control would apply if you had more than 10 units, secondary and/or additional dwelling units are counted towards the 10 units.

Right-of-way (ROW) Protection

I'll be looking to protect the ROW via a larger front yard setback requirement either five or six metres, with permitted projections only permitted to extend two metres.

Parking in the extension of the corner side yard is not permitted

Per Section 109 of the Zoning By-law, parking is not permitted in the extension of the required corner side yard. As proposed you have fives parking spaces either

partially or completely within the corner side yard, this is not permitted, and these spaces will need to be eliminated.

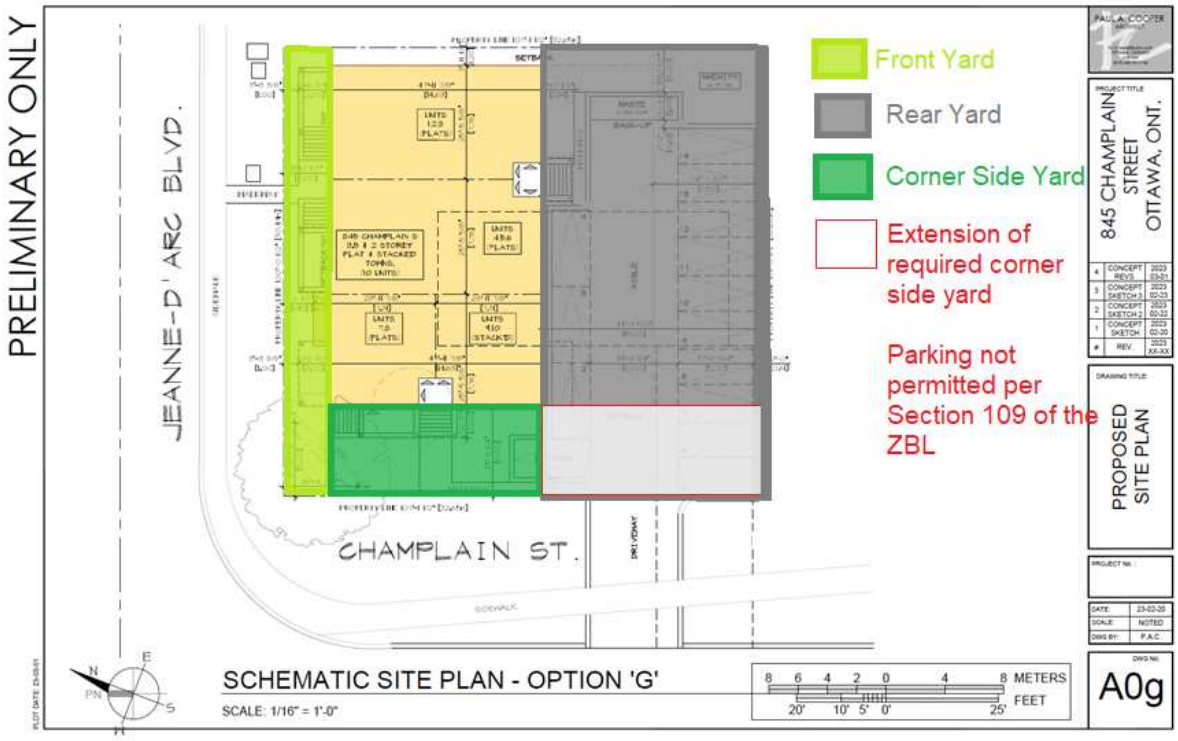


Figure 8: Sketch up of concept plan showing the front, corner, and rear yards, and the extension of the required corner side yard where parking is not permitted.

Bicycle parking

If you were to proceed with a townhouse block with additional dwelling units, then I want to see bicycle parking for the additional dwelling units that are not required to have vehicle parking spaces. I'd write the requirement for bicycle parking into the ZBLA via an urban exception.

Waste management

Please review Section 143, entitled Waste Management. The waste management zoning provisions were introduced in 2018 as part of the R4 Phase 1 changes. A single storage area may be required for the entire building. If required, then it would need to be 3.5 cubic metres with a minimum floor area of not less than 2.0 square metres.

Commercial Uses

I understand that you would like to accommodate commercial uses on site. The Orléans Secondary Plan is supportive of small-scale commercial activities on the ground floor of any building fronting onto Jeanne d'Arc Boulevard.

There are existing home-based business provisions that are applicable. Further, there is a residential neighbourhood commercial suffix "- c" that could be incorporated into the Zoning By-law Amendment. The purpose of the Residential Neighbourhood Commercial suffix is to:

1. *regulate development in a manner that is compatible with existing land use patterns so that the residential character of a neighbourhood is maintained or enhanced;*
2. *allow a variety of small, locally-oriented convenience and service uses that complement adjacent residential land uses, and are of a size and scale consistent with the needs of nearby residential areas;*
3. *provide conveniently located non-residential uses predominantly accessible to pedestrians, cyclists and transit users from the surrounding residential neighbourhood; and*
4. *impose development standards that will ensure that the size and scale of development are consistent with that of the surrounding residential area.*

See Section 141 for more information.

Low-rise Infill Guidelines

Please see the Urban Design Guidelines for Low-rise Infill Housing (Approved by City Council on July 6, 2022)

Driveways

As noted in the transportation comments, site access should remain in the existing location as it provides a longer corner clearance and is as far away from the traffic signal as possible. You may want to consider a rear attached garages that can be accessed via a shared driveway.

Figure 9: sketch of a three-unit townhouse block with parking at the back, source: Urban Design Guidelines for Low-rise Infill Housing (2022) page 18

You asked, if you could have a driveway off Jeanne d'Arc Blvd with a different building configuration. A driveway off Jeanne d'Arc could be explored; however, we'd also want to see the driveway as far away from the intersection as possible. There are potential conflicts with a driveway off Jeanne d'Arc Boulevard such as utilities, a bus stop, corner clearance, etcetera. Please review the Private Approach By-law (By-law 2003-447), in particular Section 25.

Conclusion

The proposed development appears to be overdevelopment of the lot. Please consider alternative configurations, such as a townhouse block with additional dwelling units in each townhouse dwelling unit. The following zoning should be considered: Residential Third Density Zone, subzone YY, local commercial suffix (R3YY – c), see capture of Table 160A and 160 B. Other subzones that could be considered are R3A, R3C, R3F, R3M, R3WW, R3XX.

TABLE 160A – R3 SUBZONE PROVISIONS (OMB Order File N°: PL150797, issued July 25, 2016 - By-law 2015-228) (By-law 2020-288)

I Sub-Zone	II Prohibited Uses	III Principal Dwelling Type	IV Minimum Lot Width (m)	V Minimum Lot Area (m2)	VI Maximum Building Height (m)	VII Minimum Front Yard Setback (m)	VIII Minimum Corner Side Yard Setback (m)	IX Minimum Rear Yard Setback (m)	X Minimum Interior Side Yard Setback (m)	XI Endnotes (see Table 160B)
YY	None	Planned Unit Development	18	1,400	As per dwelling type	6	4.5	varies[1]	varies [1]	1
		Three Unit	18	450	10.7 in Schedule 342, in other cases 12	6	4.5	6	1.2	
		Duplex	14	380	10 in Schedule 342[6], in other cases 12	6	4.5	6	1.2	6
		Detached, Linked-detached	9	240	10 in Schedule 342[6], in other cases 12	6	4.5	6	1.8 total, 0.6 for one side yard	6
		Long Semi	10	270	10 in Schedule 342[6], in other cases 12	6	4.5	6	1.8 total, 0.6 for one side yard	6
		Semi-detached	7	190	10 in Schedule 342[6], in other cases 12	6	4.5	6	0.9	6
		Townhouse	6	150	10 in Schedule 342[6], in other cases 12	6	4.5	6	1.2	6

TABLE 160B – ADDITIONAL ZONING PROVISIONS (By-law 2020-288)

I Endnote Number	II Additional Zoning Provisions	
1	Despite the definitions of rear yard and interior side yard, buildings in a planned unit development (PUD) must be located so that they are set back,	
	(a)	an amount equal to the minimum required rear yard setback for the dwelling type proposed, from a lot line where it abuts a rear yard on an abutting lot but need not exceed 7.5 metres,
	(b)	an amount equal to the minimum required interior side yard setback for the dwelling type proposed, from a lot line where it abuts a side yard on an abutting lot,
	(c)	in the case of an abutting vacant lot, a minimum required interior side yard of 1.8 metres, and a minimum required rear yard. setback based on the minimum rear yard setback applicable to the dwelling type proposed to be located within the PUD adjacent to the rear lot line.
6	For lands within the Schedule 342, where a building has a peaked roof having a slope of 1 in 3 (4/12 pitch) or steeper, the maximum building height is 11 metres. Where the property is located outside of Area A on Schedule 342, or where the building has a peaked roof having a slope of 1 in 3 (4/12 pitch) or steeper, the maximum building height is 12 m in the R3YY subzone, or 11 m in any other subzone. (By-law 2020-288)	

Planning Application Fees

The following outlines the application fees (effective April 1, 2022). Please note fees increase each year.

Zoning By-law Amendment

$23,107.27 plus an initial Conservation Authority fee of $ 410*.

* The Conservation Authority will invoice for any additional fees and technical report review as required.

Additional information regarding fees related to planning applications can be found here.

Submission Requirements

Attachment 1 is the Applicant Study and Plan List.

Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).

All PDF submitted documents are to be unlocked and flattened.

Committee of Adjustment Process

Currently, to proceed with an alternative such as a townhouse block with additional units in the townhouse dwelling, Staff understand that consent applications would need to be filed with the Committee of Adjustment. The consent applications would create the lots for the townhouse dwellings units, the required easements, and rights-of-way (ROW).

Lot Creation, Easements, and Rights-of-Way via Committee of Adjustment: Please note that Consent applications are handled by the Committee of Adjustment. The Planning Department provides comments on Committee of Adjustment applications; however, the Committee of Adjustment makes the decision. For more information on the Committee of Adjustment please visit: https://ottawa.ca/en/city-hall/planning-and-development/committee-adjustment. The Committee of Adjustment can be contacted directly at cofa@ottawa.ca or at (613)-580-2436.

Timelines: The Committee of Adjustment process takes approximately 12 to 14 weeks from application submission to the end of the appeal period. My understanding is that once your application has been deemed complete it takes four to six weeks before the application is heard at a Committee hearing.

Public Consultation: The Committee meeting is the official public meeting; however, the Committee strongly recommends applicants consult with the public beforehand.

Conditions or provisional consents: The *Planning Act* allows the Committee of Adjustment the ability to impose any condition to a provisional consent, as long as it believes the condition is reasonable and has regard to the nature of the development proposed. Below are conditions which will likely be imposed (not an exhaustive list).

a. Cash-in-lieu of Parkland fees for additional density
b. Capping/Blanking of existing services and demolition of existing dwelling and accessory structure (demonstrated through a demolition permit and follow up inspection report)
c. Separate services from the street required (demonstrated through a servicing plan)
d. Demonstration of appropriate grading and drainage (demonstrated through a grading and drainage plan)
e. Development Agreement to implement protection and mitigation measures in the Tree Information Report (TIR), if applicable.
f. Noise condition
g. Joint Use and Maintenance Agreement (JUMA) for common elements, such as party wall.
h. Easement Agreement

Urban Design

Christopher Moise, OAA MRAIC

Architect |Urban Designer | Christopher.Moise@ottawa.ca

- This proposal does not run along or does not meet the threshold in one of the City's Design Priority Areas and need not attend the City's UDRP. Staff will be responsible for evaluating the proposal and providing design direction.

Comments and Questions

- We have the following comments/questions about the current design:
    - If re-zoning is approved, then will it need to go for site plan?

- What is the planned context based on the secondary plan?
  - Regarding setbacks and building alignment?
  - Regarding height?
- Recommend an illustration that analysis and rationalizes the future for this corridor. Include neighbouring properties.
- No parking between the building and the street. We recommend considering parking under the rear of the building.
- We understand there is a requirement for greater setback from Jeanne D'Arc and we recommend this align to neighbouring context and future built form.
- We recommend increasing the landscaping to the required amount.

Scoped Design Brief Required

- A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.
  - It is important to study the broader existing and future contexts.
  - It is important to explore and analyze alternative site planning and massing options. Alternative options explored and the analysis should be documented in the Design Brief.
  - ***Note. The Design Brief submittal should have a section which addresses these pre-consultation comments.***

Additional Notes

This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Good luck.

Waste Services

New multi-unit residential development, defined as containing six (6) or more units, intending to receive City waste collection services will be required, as of June 1, 2022, to participate in the City's Green Bin program in accordance with Council's approval of the multi-residential waste diversion strategy. The development must include adequate facilities for the proper storage of allocated garbage, recycling, and green bin containers and such facilities built in accordance with the approved site design. Questions regarding this change and requirements can be directed to Andre.Laplante@ottawa.ca.

Waste Reduction Workplan Summary

For sites containing one or more buildings with a total GFA greater than 2,000 square metres a Waste Reduction Workplan Summary is required for the construction project as required by O.Reg. 102/94, being “Waste Audits and Waste Reduction Work Plans” made under the Environmental Protection Act, RSO 1990, c E.19, as amended.

Next Steps

Bill 109

It is anticipated that, as a result of the Bill 109, *More Homes for Everyone Act, 2022*, for applications for site plan approval and zoning by-law amendments, new processes in respect of pre-application consultation will be put in place. The new processes are anticipated to require a multiple phase pre-application consultation approach before an application will be deemed complete. Applicants who have not filed a complete application by the effective date may be required to undertake further pre-application consultation(s) consistent with the provincial changes. The by-laws to be amended include By-law 2009-320, the Pre-Consultation By-law, By-law 2022-239, the planning fees by-law and By-law 2022-254, the Information and Materials for Planning Application By-law.

I’ve included a link regarding the changes expected because of Bill 109 on the City’s engage website.

https://engage.ottawa.ca/provincial-legislation-planning/news_feed/bill-109-next-steps

There will be a report going to Council in Q1 or Q2 of 2023, that will speak more to the upcoming changes and the implementation date.

Attachments

1. TIA Screening Form
2. Required Plans and Report Submission
3. Urban Design Brief Applicable to 845 Champlain St.

Anmar Al-Faraj

From: Environmental Permissions (MECP) <enviropermissions@ontario.ca>
Sent: June 20, 2023 4:46 PM
To: Anmar Al-Faraj
Cc: Emily LeBlanc; Guy Ste-Croix; Environmental Permissions (MECP)
Subject: RE: ECA Pre-Submission Query - 845 Champlain Street, Ottawa

Hello Anmar,

Thank you for your email to the Ministry of the Environment, Conservation and Parks (MECP).

With regards to your inquiry, please take a look at the following links:

- https://www.ontario.ca/page/environmental-compliance-approval
- https://www.ontario.ca/document/guide-applying-environmental-compliance-approval-0
- https://www.ontario.ca/page/sewage-self-assessment

If you have further questions or concerns, please respond to this email or contact us by phone at 416-314-8001 or 1-800-461-6290 (toll free).

Kind Regards,

Vani Manoharan (on behalf of Environmental Permissions)
Client Service Representative
Client Services & Permissions Branch (CSPB)
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, ON M4V 1P5
General Inquiries: E: enviropermissions@ontario.ca | P: 416-314-8001 | F: 416-314-8452
New Environmental Permissions Online Services – Videos

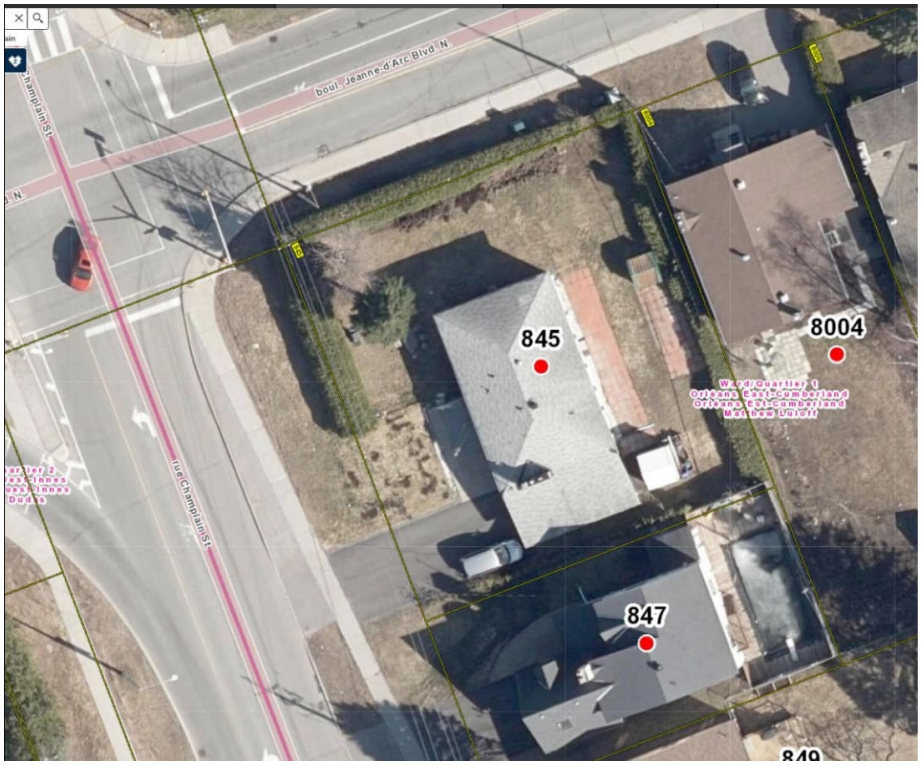
If you have any accommodation needs or require communication supports or alternate formats, please let me know.
Si vous avez des besoins en matière d'adaptation, ou si vous nécessitez des aides à la communication ou des médias substituts, veuillez me le faire savoir.

Did you know? At this time, the ministry strongly encourages online submissions for some environmental permissions. You can submit your application and supporting documents, make payments, and track application progress online. For more information, please visit the ministry website or you may contact the Client Services and Permissions Branch by phone at 416-314-8001 or 1-800-461-6290, or by email at enviropermissions@ontario.ca.

From: Anmar Al-Faraj <anmar.al-faraj@ainleygroup.com>
Sent: June 20, 2023 1:28 PM
To: Environmental Permissions (MECP) <enviropermissions@ontario.ca>
Cc: Emily LeBlanc <emily.leblanc@ainleygroup.com>; Guy Ste-Croix <guy.ste-croix@ainleygroup.com>
Subject: ECA Pre-Submission Query - 845 Champlain Street, Ottawa

Hi,

We are currently working on a proposed development (i.e. 10 stacked dwelling units) at 845 Champlain Street in Ottawa. The existing residential building shown in the screenshot below will be demolished and a new 10 stacked dwelling units is proposed along with asphalt parking lot and drive aisle (10 parking spaces). The proposed work will involve the installation of sanitary, water and storm service laterals. Stormwater will be managed per the City of Ottawa and the Rideau Valley Conservation Authority guidelines / requirements (both quality and quantity) We've attached the Architect's plan for your reference. The City of Ottawa of late has been asking us to contact the MECP and include correspondence in our site servicing and stormwater management brief to confirm if an ECA is required. It's our understanding that an ECA is not required based on the proposed site plan. We await your confirmation.



Regards,

Anmar Al-Faraj, P.Eng., PMP
Project Engineer

Cell: (902) 210-3305
Email: anmar.al-faraj@ainleygroup.com

WWW.AINLEYGROUP.COM

range of land uses and configurations. However, in some instances involving dead-end watermains, standard spacing requirements may not be sufficient to meet RFF.

Standard design practice involves systematic checking of design fire flows at every node in hydraulic models of proposed water distribution systems. Normally the entire design fire flow is applied to each node in succession. Nodes are typically at water main junctions rather than actual hydrant locations. This significantly simplifies the design process and the current software packages that are normally used for this purpose have been developed based on this practice. The "point load assumption" produces a conservative design.

Table 1. Maximum flow to be considered from a given hydrant

Hydrant Class	Distance to asset/structure/building (m)[a]	Contribution to required fire flow (L/min)[b]
AA	≤ 75	5,700
	> 75 and ≤ 150	3,800
A	≤ 75	3,800
	> 75 and ≤ 150	2,850
B	≤ 75	1,900
	> 75 and ≤ 150	1,500
C	≤ 75	800
	> 75 and ≤ 150	800

[a] Distance of contributing hydrant from the structure, measured in accordance with NFPA 1 (Appendix A).

[b] Maximum flow contribution to be considered for a given asset/structure/building, at a residual pressure of 20 psi, measured at the location of the main, at ground level.

4. Intended Application of Guideline

The intent of this procedure is to:

- Determine the appropriate sizing of dead end watermains and associated hydrant requirements.
- Provide an optional approach to local watermain network sizing that will assist the designer in determining the minimum pipe sizing needed to meet RFF.

The procedure permits the designer to: (a) reconcile available hydrant flow with computed RFFs, and (b) allow the distribution of RFFs along multiple hydrants, rather

than consider RFF to be a point flow. The application of this protocol may result in reduced watermain diameters compared to those determined based on a traditional design approach. Caution is required in the application of the procedure to ensure that the transmission function of any watermains identified in a Master Servicing Study is not compromised. Normally, watermains 300mm in diameter and larger that are identified in such studies would not be considered for resizing.

5. Application Procedure

5.1 Rated hydrants

The procedure described here would apply to an existing watermain network with existing hydrants (i.e., re-development or infill in existing neighborhoods):

- Identify critical zones within the (re)development area, e.g., high RFF, dead ends, small diameter watermains, low C factor, and/or high geographic elevation zones.
- For the critical zones use Table 1 to examine if there are sufficient hydrants to deliver the RFF (following procedure described in 5.3).
- If hydrant capacity is insufficient, then consider either:
    - adding hydrants as appropriate;
    - determine if the existing hydrants can be upgraded to higher rating; or
    - upgrade existing watermains.

5.2 Un-rated hydrants

There are currently about 24,800 hydrants in the City of Ottawa, of which about 78% are rated. Of the rated hydrants, 96% are AA (Blue), 3% are A (Green). Many of the un-rated hydrants are located in old parts of the City, often installed on water mains with minimum diameter of 6" (150 mm), and would be likely to have a low rating.

Based on a review of hydrants that have been installed as part of recent urban development, approximately 99% of those which were rated are rated AA, and only 1% are rated A.

5.2.1 Un-rated Existing Hydrants

In cases where fire flow is to be evaluated in areas with an established water distribution network and with existing fire hydrants (i.e., re-development or infill in existing neighborhoods), all un-rated hydrants should be tested and rated in accordance with NFPA standard 291. The procedure described in Section 5.1 can then be followed to complete the design.