2705460 ONTARIO INC.

112 MONTREAL ROAD

STORMWATER MANAGEMENT REPORT

APRIL 03, 2023

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STORMWATER MANAGEMENT REPORT

2705460 ONTARIO INC.

PROJECT NO.: 19M-01935-00
CLIENT REF:
DATE: APRIL 03, 2023

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April 3, 2023
Date

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April 3, 2023
Date

[1] Approval of this document is an administrative function indicating readiness for release and does not impart legal liability on to the Approver for any technical content contained herein. Technical accuracy and fit-for-purpose of this content is obtained through the review process. The Approver shall ensure the applicable review process has occurred prior to signing the document.

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Scope 1

1.2 Site Location 1

1.3 Stormwater Management Plan Objectives 2

1.4 Design Criteria 2

2 PRE-DEVELOPMENT CONDITIONS 3

2.1 General 3

2.2 Rainfall Information 3

2.3 Allowable Flow Rates 3

3 POST-DEVELOPMENT CONDITIONS 4

3.1 General 4

3.2 Quantity Control 4

3.3 Water Quality Control 6

3.4 Erosion Control 6

4 RIDEAU RIVER FLOOD PLAIN 7

5 CONCLUSIONS 8

TABLES

TABLE 2-1: PRE-DEVELOPMENT PEAK FLOW RATE CALCULATIONS (RUNOFF COEFFICIENT, C = 0.50 AND T_c=20 MIN) 3
TABLE 3-1 POST-DEVELOPMENT MODELLING RESULTS (A) 5
TABLE 3-2 POST-DEVELOPMENT MODELLING RESULTS (B) 5
TABLE 3-3: POST-DEVELOPMENT MODELLING RESULTS (C) 6

FIGURES

FIGURE 1: SITE LOCATION 1

APPENDICES

A RVCA CORRESPONDENCE
B EXISTING SITE CONDITIONS
C PRE-DEVELOPMENT CALCULATIONS
D PROPOSED SITE DRAWINGS
E CATCHMENT PLAN
F SUPPORTING DOCUMENTS
F-1 HYDRO-BRAKE RATING CURVE
F-2 WATTS ACUTROL ROOF DRAIN
F-3 STORMTECH CHAMBER
G HYDROCAD MODEL OUTPUT
G-1 5-YEAR ANALYSIS (PEAK DISCHARGE)
G-2 100-YEAR ANALYSIS (PEAK DISCHARGE)
G-3 100-YEAR ANALYSIS (PEAK CHAMBER STORAGE)
G-4 100-YEAR ANALYSIS (PEAK ROOF STORAGE)
H FLOOD PLAIN MAPPING AND ELEVATIONS

1 INTRODUCTION

1.1 SCOPE

WSP Canada Group Ltd. was retained by 2705460 Ontario Inc. to conduct a stormwater management study to service the proposed redevelopment of the existing Econolodge site into a new group of residential towers.

1.2 SITE LOCATION

The existing site is located at 112 Montreal Road in Ottawa, Ontario, close to the south-west corner of the Montreal Road and Vanier Parkway intersection. The location of the proposed re-development is illustrated in **Figure 1**.

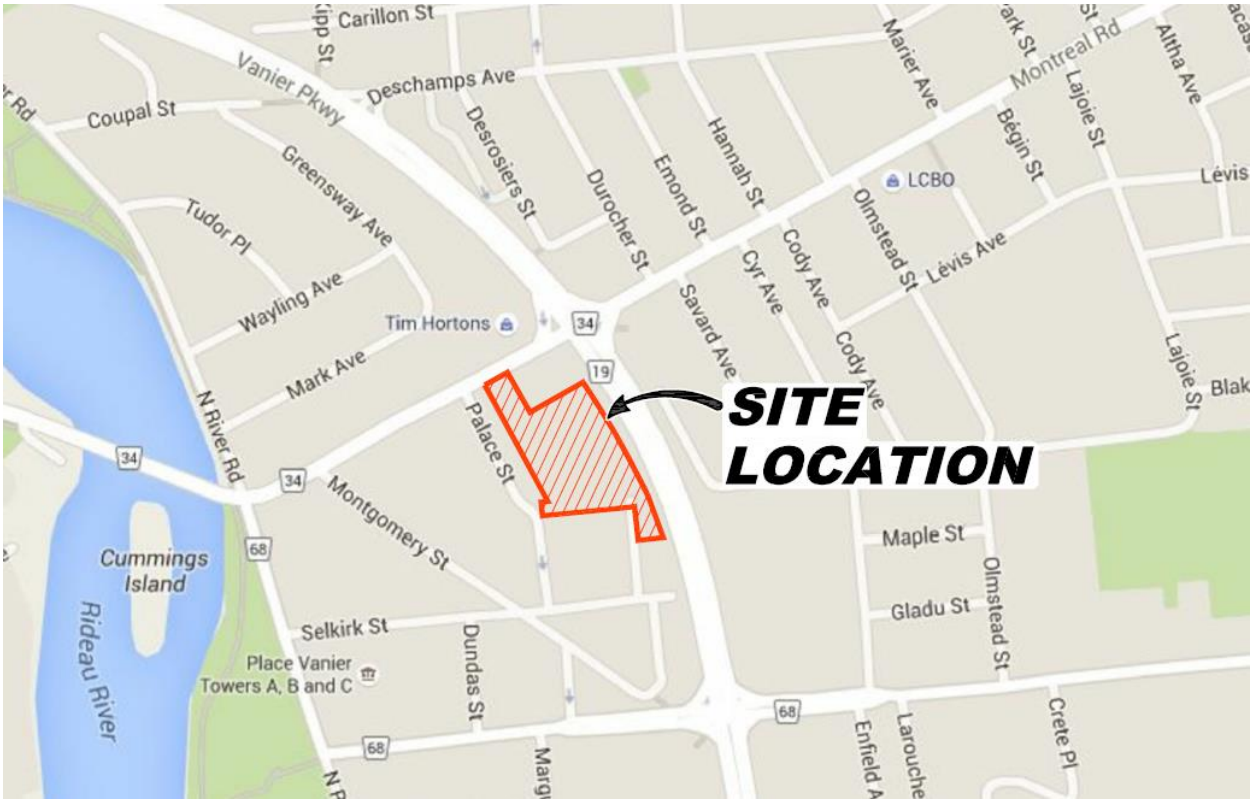

Figure 1: Site Location

1.3 STORMWATER MANAGEMENT PLAN OBJECTIVES

The objectives of the stormwater management plan are as follows:

- Determine site specific stormwater management requirements to ensure that the plan is in conformance with the City of Ottawa Sewer Design Guidelines, October 2012.
- Prepare a stormwater management report documenting the strategy along with the technical information necessary for the justification and sizing of the proposed stormwater management facilities.

1.4 DESIGN CRITERIA

The City of Ottawa (the City) was contacted to determine the stormwater management (SWM) requirements for discharge into the local City sewers for the project site. Joshua White at the City specified that flows greater than the 5-year flow generated from a runoff coefficient of 0.50 must be controlled on site up to the 100-year return period (consistent with Section 8.3.7.3 of the Ottawa Sewer Design Guidelines, October 2012).

The runoff coefficient used for design (100-year return period), was increased by 25% to comply with section 5.4.5.2.1 of the Ottawa Sewer Design Guidelines (October 2012).

As per section 8.3.7 of the Ottawa Sewer Design Guidelines "New development draining to an existing system that has no stormwater treatment facility may be subject to on-site treatment (i.e. best management practice, oil grit separators, etc.). Some existing areas within the City may be subject to a cash-in-lieu policy with respect to stormwater treatment. The designer must confirm with the City if the development area in question is subject to this policy". The City directed WSP to contact the Rideau Valley Conservation Authority (RVCA) to determine any applicable water quality criteria to be used in the design. The RVCA specified no treatment criteria for this site. A record of this conversation has been included in **Appendix A**. Similarly, the City has not specified any water quality requirements for use at this site. Therefore, none have been specifically included in the design.

In summary, the design criteria for stormwater management at the site are:

- Control the 100-year outflow from the site to the 5-year flow using a runoff coefficient of 0.50 and a T_c of 20 minutes; and
- No water quality treatment is required.

2 PRE-DEVELOPMENT CONDITIONS

2.1 GENERAL

The subject property pre-development includes an impervious at-grade parking lot, an existing group of commercial buildings (Econolodge) and a pervious landscaped area at the south-east corner of the project site. The total site area is 1.22 ha. Please refer to **Appendix B** for existing site conditions.

2.2 RAINFALL INFORMATION

The rainfall intensity is calculated in accordance with Section 5.4.2 of the Ottawa Sewer Design Guidelines (October 2012):

$$i = \left[\frac{A}{(Td + C)^B}\right]$$

Where;

- A, B, C = regression constants for each return period (defined in section 5.4.2)
- i = rainfall intensity (mm/hour)
- Td = storm duration (minutes)
- The IDF parameters/regression constants are included in **Appendix C**.

2.3 ALLOWABLE FLOW RATES

As noted in section 1.4, the City of Ottawa specified the allowable discharge rate from this site as the 5-year flow generated from a runoff coefficient of 0.50, controlled on site up to the 100-year return period.

The allowable release rate to the municipal storm sewer system from the proposed development is 119 l/sec, based on the 5-year pre-development flow rate calculated with a runoff coefficient value of 0.50.

The calculated peak flow rates for the site in the pre-development condition are summarized below in Table 2-1. Detailed calculations are contained within Appendix C.

Table 2-1: Pre-Development Peak Flow Rate Calculations (Runoff Coefficient, C = 0.50 and T_c=20 min)

RETURN PERIOD (YEARS)	RAINFALL INTENSITY (MM/HOUR)	PEAK FLOW RATE (L/SEC)	TARGET RELEASE RATE (L/SEC)
2	52.0	88.2	**119.0**
5	70.3	**119.0**	
10	82.2	139.3	
25	97.3	164.8	
50	108.5	183.8	
100	120.0	203.2	

3 POST-DEVELOPMENT CONDITIONS

3.1 GENERAL

The project proposals consist of a mixed-use development with 2 towers; a 37-storey residential tower (Tower B1), and an 8-storey mixed use building (Tower A). A multi-level basement structure is proposed over the majority of the project site area. As described further in subsequent sections of the report, a SWM underground storage chamber will be provided at the south end of the site with a connection to Montreal Road. Please refer to **Appendix D** for an illustration of the project (Storm Drainage Area Plan).

The analysis for the site and the sizing of the underground storage chamber has been completed with provisions for future development in the southeast quadrant of the site. A runoff coefficient of 0.8 has been assigned to represent the future land-use in this area (S06 and S07 on the Storm Drainage Area Plan).

The following assumptions have been used to quantify stormwater runoff for modelling/analysis purposes: 100% of proposed roof surfaces have been considered as impervious, and the top level of the rooftop area of each tower will be available for temporary surface ponding (via drainage by controlled discharge roof drains).

The entire project area will comply with the target allowable release rate.

3.2 QUANTITY CONTROL

As noted in section 2.3, the target allowable discharge rate to the municipal sewer system from the site is 119 L/sec. This is equivalent to the peak runoff rate under pre-development conditions during a 5-year design storm event with a runoff coefficient of 0.50. Compliance with the target offsite discharge rate will be achieved through use of controlled flow rooftop drains, and the provision of an underground storage chamber. Post-development runoff calculations have accounted for uncontrolled runoff from portions of the site that will not drain to storage features.

An underground storage chamber was identified as the preferred storage option given the substantial underground parking requirement for the site; surface storage was not considered a viable option and was not accounted for in this analysis.

The underground storage chamber is designed to receive runoff (for all events up to and including the 100-year return period), from roof surfaces and at-grade areas within the development area. The controlled and uncontrolled project areas are illustrated in **Appendix E**. The underground storage chamber will discharge to the existing municipal storm sewer system via gravity, and peak outflow rates will be controlled via a vortex flow control device (**Appendix F**).

To satisfy net target release rates for controlled and uncontrolled site areas, the recommended peak discharge rate for flow control device is 112 L/sec. If a storm event that occurs fills the underground storage chamber, the access hatch at the top of the underground storage chamber would allow water to spill to the Palace Street major system. It is noted that the return period associated with an overflow event requiring these facilities to spill would exceed 100-years.

As per the Site Servicing Plan Drawing, discharge from the underground storage chamber is proposed to the Montreal Road trunk storm sewer. This trunk storm sewer is 1050mm and it is believed that the City's flow control requirements for the site (which currently drains to this same storm sewer) are sufficient to ensure that there will be no adverse surcharging of the storm sewer.

As noted above, the top level of the rooftop area of each tower will be available for temporary surface ponding (via drainage by controlled discharge roof drains), and the remaining roof areas will drain directly to the underground storage chamber without any rooftop storage. Calculations were done based on the roof drain layouts, with five roof drains on Tower A and four roof drains on Tower B1. For modelling purposes, these outlets were simulated using rating curves for a *Watts Accutrol* product (in the "fully closed" position) (**Appendix F)**.

Appendix E illustrates the small portions of the project site that will drain offsite uncontrolled in post-development conditions. These uncontrolled runoff rates contribute to the total allowable release rate modelled.

A HydroCAD model of the project was constructed and utilized to include:

- storage and controlled release of stormwater from top level of rooftop areas (Towers A and B1) to the underground storage chamber;
- runoff from the remaining rooftop areas (Towers A and B1) directly to the underground storage chamber;
- controlled runoff from at-grade areas directed to the underground storage chamber; and
- uncontrolled runoff rates generated from at grade areas (S08 and S09)

The Modified Rational Method (an inherent subroutine of the HydroCAD software) has been used for the modelling exercise, and the model has informed the maximum storage volume used in the stormwater underground storage chamber based on the proposed flow. Flow rates generated from uncontrolled drainage areas within the project site and controlled flow from the underground storage chamber meet the target offsite discharge rate required (119 l/s).

The rainfall intensity and storm duration combination resulting in the largest peak flow discharged to the sewer system occurs at the critical storm duration, t_d= 10 minutes for the 100-year event (determined iteratively using HydroCAD). A summary of the model results and storage controls are listed in **Table 3-1** to **Table 3-3** and the full modelling output is included in **Appendix G**.

The modelled post-development peak flow rates comply with the allowable release rate for the 100-year return period (**Table 3-1**).

Table 3-1 Post-Development Modelling Results (A)

RETURN PERIOD (YEARS)	MODELLED POST-DEV.PEAK FLOW RATE (L/SEC)[1]	ALLOWABLE RELEASE RATE (L/SEC)
5	110	119
100	119	

[1] *Includes flow rates generated from uncontrolled drainage areas within the project site and controlled flow from the underground storage chamber*

The HydroCAD analysis completed allows the performance of the SWM drainage system to be verified in all possible storm durations (based on Modified Rational method calculations) and helps identify the critical duration for different components of the system. For example, the critical storm duration for the underground storage chamber (resulting in maximum storage utilized) was found to be t_d = 30 minutes. A summary of these modelling results is provided below.

The results show that the maximum utilized storage volume in the underground storage chamber is 312 m^3 to control the 100-year post-development runoff **(Table 3-2)**. Details for the proposed Stormtech chambers are included in **Appendix F-3**.

Table 3-2 Post-Development Modelling Results (B)

RETURN PERIOD (YEARS)	MAXIMUM UTILIZED STORAGE AND ASSOCIATED PEAK FLOW (L/S)	
	(m^3)	(L/s)
100	312	112

[1] *Critical duration resulting in maximum storage utilized in the underground storage chamber*

Maximum rooftop storage volumes and release rates (based on the critical duration for each of the different components of the system), in addition to uncontrolled flow rates generated from uncontrolled areas are provided in **Table 3-3**.

Table 3-3: Post-Development Modelling Results (C)

RETURN PERIOD (YEARS)	ROOFTOP MAXIMUM STORAGE VOLUME, PEAK RELEASE RATE[1], AND PONDING DEPTH						UNCONTROLLED FLOW RATE[2] (L/S)
	TOWER A			TOWER B1			
	(m^3)	(L/s)	(m)	(m^3)	(L/s)	(m)	
5	4.5	1.5	0.054	6.4	1.2	0.073	2.9
100	11.5	1.5	0.086	15.4	1.2	0.142	8.3

[1] *Based on the critical duration resulting in maximum storage utilized on each roof surface*

[2] *Based on the critical duration resulting in the maximum flow released from the site*

3.3 WATER QUALITY CONTROL

As per Section 1.4, no water quality treatment is required.

3.4 EROSION CONTROL

Please refer to the Erosion and Sedimentation Control plan drawing C.05 as part of the Engineering Drawing Set.

4 RIDEAU RIVER FLOOD PLAIN

The RVCA were consulted to obtain flood plain mapping for the Rideau River in the vicinity of the subject site. Please refer to mapping excerpt provided in **Appendix H**.

It is noted that the 100-year flood plain extends onto Montreal Road, to a modelled elevation of 56.52 m (cross section reference 2474). The site design has accounted for this by setting the minimum ground elevation at the project threshold to an elevation of 56.62 m (refer to Grading and Drainage Plan Drawing C.02 for details), and by specifying the use of non-return backflow preventers within the flow control device associated with the underground storage chamber.

5 CONCLUSIONS

A stormwater management plan has been prepared to support the site plan application for the 112 Montreal Road development in the City of Ottawa. The key points are summarized below.

WATER QUANTITY

Controlled runoff collected from the project site will be directed to a stormwater underground storage chamber with a minimum active storage volume of 312 m^3 to control the 100-year event. Discharge from the underground storage chamber to the municipal storm sewer will be controlled using a vortex flow control device (specified with a peak discharge rate of 112 l/sec).

For the 100-year return period, the uncontrolled runoff (S08 and S09) and flow controlled from the underground storage chamber directed to the municipal storm sewer system will comply with the allowable 5-year release rate of 119 L/sec (calculated using a runoff coefficient of 0.50 and a T_c of 20 minutes).

WATER QUALITY

No specific water quality treatment features are required.

This report demonstrates that the proposed SWM strategy will address stormwater management related impacts from this project and meet the requirements of the City of Ottawa.

APPENDIX

A RVCA CORRESPONDENCE

MMM GROUP

1145 Hunt Club Road, Suite 300
Ottawa, Ontario K1V 0Y3
Tel: (613) 736-7200
Fax: (613) 736-8710

TELECOM RECORD

W.O.: 1013081
DATE: August 11, 2014
TIME: 2:30
CALL FROM: Bryan Orendorff
REPRESENTING: MMM
CALL TO: Brandon Williams
REPRESENTING: RVCA

REGARDING: SWM requirements for proposed 112 Montreal Road Development

DISCUSSION: MMM contacted the RVCA to determine if they had any SWM requirements for the proposed site. The City had previously directed MMM to take this action. Brandon replied that the RVCA did not anticipate any involvement was required on their part for this site from a floodplain perspective (the site is outside the floodplain) and that they typically would not comment on a site application until it was circulated to them by the City. He indicated that the RVCA in this case could rely on the City to ensure that all appropriate requirements were being met.

ACTION: No actions required.

CC:

APPENDIX

B EXISTING SITE CONDITIONS

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

TOPOGRAPHIC SURVEY OF
LOT 5 AND PART OF LOTS 6 AND 7 BLOCK 2 REGISTERED PLAN 29 AND LOT 88 AND PART OF LOTS 40 & 41 REGISTERED PLAN 49 CITY OF OTTAWA

SCALE 1 : 250

0 5 10 20 25 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

LEGEND

- ■ – SURVEY MONUMENT FOUND
- SIB – STANDARD IRON BAR
- SSIB – SHORT STANDARD IRON BAR
- IB – IRON BAR
- MN&W – MAGNETIC NAIL & WASHER
- ø – ROUND
- (P) – PLAN 5R–6112
- (P1) – PLAN 5R–258
- (M) – MEASURED
- (S) – SET
- (857) – FAIRHALL, MOFFATT & WOODLAND LIMITED, O.L.S.
- (CITY) – CITY OF OTTAWA
- (SU) – SOURCE UNKNOWN
- (WIT) – WITNESS
- PIN – PROPERTY IDENTIFIER NUMBER
- DIA. – DIAMETER
- INV. – INVERT
- BLDG – BUILDING
- E – EAST
- W – WEST
- N – NORTH
- ▲ – PROJECT CONTROL MONUMENT
- P – PILLAR
- CB – CATCH BASIN
- MH – MANHOLE
- LS – LAMP STANDARD
- UP – UTILITY POLE
- FH – FIRE HYDRANT
- WV – WATER VALVE
- BH – BOREHOLE
- BP – BELL PEDESTAL
- JB – JUNCTION BOX
- FP – FLAG POLE
- – GUY WIRE AND ANCHOR
- – BOLLARD
- – SIGN
- – CONIFEROUS TREE
- – DECIDUOUS TREE
- – SHRUB
- – HANDICAP
- – NO PARKING
- —W— – WATERMAIN
- — · — – OVERHEAD UTILITY WIRES
- —UH— – UNDERGROUND HYDRO
- —UB— – UNDERGROUND BELL
- —G— – GAS MAIN
- —ST— – STORM SEWER
- —S— – SANITARY SEWER
- —R— – ROGERS CABLE
- ══ – CURB

ELEVATION NOTES

1. ELEVATIONS SHOWN HEREON ARE REFERRED TO GEODETIC DATUM.
2. ELEVATIONS FOR MANHOLE COVERS AND CATCH BASINS HAVE TO BE INDEPENDENTLY CONFIRMED BEFORE THEY CAN BE ACCEPTED FOR FINAL DESIGN OR CONSTRUCTION PURPOSES.
3. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARKS HAVE NOT BEEN ALTERED OR DISTURBED AND THAT THEIR RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

UTILITY NOTES

1. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ALL OF THE UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
2. UNDERGROUND UTILITIES, AS REPORTED ON THIS DRAWING, ARE NOT BASED ON AN ACTUAL 'FIELD LOCATE' BY THE RESPECTIVE UTILITY AGENCIES BUT HAVE BEEN COMPILED FROM DATA OBTAINED FROM THE FOLLOWING SOURCE:
   a) CITY OF OTTAWA PUBLIC UTILITIES REGISTRY
3. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

NOTES

1. BEARINGS ARE ASTRONOMIC AND ARE DERIVED FROM THE WESTERLY LIMIT OF PART 1, PLAN 5R–6112 SHOWN AS HAVING A BEARING OF N 28°27'30" W.
2. REVISION: JULY 16, 2014 – ADDED UTILITIES ALONG VANIER PARKWAY AND INTERSECTION OF VANIER PARKWAY AND MONTREAL ROAD.

THIS IS NOT A VALID COPY UNLESS EMBOSSED WITH SEAL

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JULY 12, 2014.

DATE

JOHN H. GUTRI
ONTARIO LAND SURVEYOR

INVERT TABLE

NUMBER	ELEVATION	INVERTS	NUMBER	ELEVATION	INVERTS
MH#1	56.52	53.86 North	CB#11	56.21	55.55 Northwest
		53.89 South			Full of Debris
MH#2	56.37	54.24 North	CB#12	56.71	55.40 South
		54.44 South	CB#13	56.73	55.74 East
		54.34 South			Full of Debris
MH#3	56.06	53.42 North			& Water
		Full of Water	MH#14	56.81	55.41 North
MH#4	56.11	53.69 East			55.38 South
		53.65 North	CB#15	56.90	Inaccessible
CB#5	56.00	Invert Inaccessible	MH#16	57.45	55.13 North
CB#6	56.11	Northeast Inaccessible			55.12 South
		55.01 Southeast	CB#17	57.31	55.52 Inv.
MH#7	56.22	West Inaccessible			55.87 West
		54.05 East	MH#18	56.70	54.07 North
CB#8	55.80	54.86 North			54.06 South
		54.80 West	MH#19	56.50	53.89 North
CB#9	55.79	Inaccessible			53.90 South
CB#10	55.82	Inaccessible	CB#20	56.33	55.52 West

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
100–600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591–2580 FAX: (613) 591–1495
www.fmw.on.ca

JOB No. T25600
E 370053, N 5032955
REFERENCE No. 21(a)–49, 15(a)–29
S:\JOBS\T25600\DWG 2014–07–17
TP256T.DWG (nj)

APPENDIX

C PRE-DEVELOPMENT CALCULATIONS

	Stormwater Management Calculations	Project: 112 Montreal Road	No.: 19M-01935-00	
	Pre-Dev Release Rates	By: JW Checked: MH	Date: 5/7/2021	Page: 1

Step 1: Determine Pre-development Flow using Rational Formula

* Runoff Coefficient, C in accordance with City of Ottawa Sewer Design Guidelines (section 8.3.7.3)

Runoff Coefficient, C = 0.5 -

Rainfall intensity calculated in accordance with City of Ottawa Sewer Design Guidelines (section 5.4.2):

$$i = \left[\frac{A}{(Td + C)^B}\right]$$

Where: A, B, C = regression constants for each return period (defined in section 5.4.2)
i = rainfall intensity (mm/hour)
Td = storm duration (minutes) 180 minutes

Time of Concentration = 20 minutes
Catchment Area = 1.22 ha

Return Period	2	5	10	25	50	100
a =	733.0	998.1	1,174.2	1,402.9	1,569.6	1,735.7
b =	0.810	0.814	0.816	0.819	0.820	0.820
c =	6.199	6.053	6.014	6.018	6.014	6.014
$Intensity_{peak}$ (mm/hr) =	52.0	70.3	82.2	97.3	108.5	120.0
Q_{peak} (L/s) =	88.2	119.0	139.3	164.8	183.8	203.2
Q_{peak} (m^3/s) =	0.088	0.119	0.139	0.165	0.184	0.203

Return Period = 5 year
Q = 119.0 L/s Pre-development flow rate

Conclusion:

The 5-year pre-development flow rate for a 20 minute Tc governs the 100-year maximum post-development release rate and is 120.5 L/s.

Filepath:

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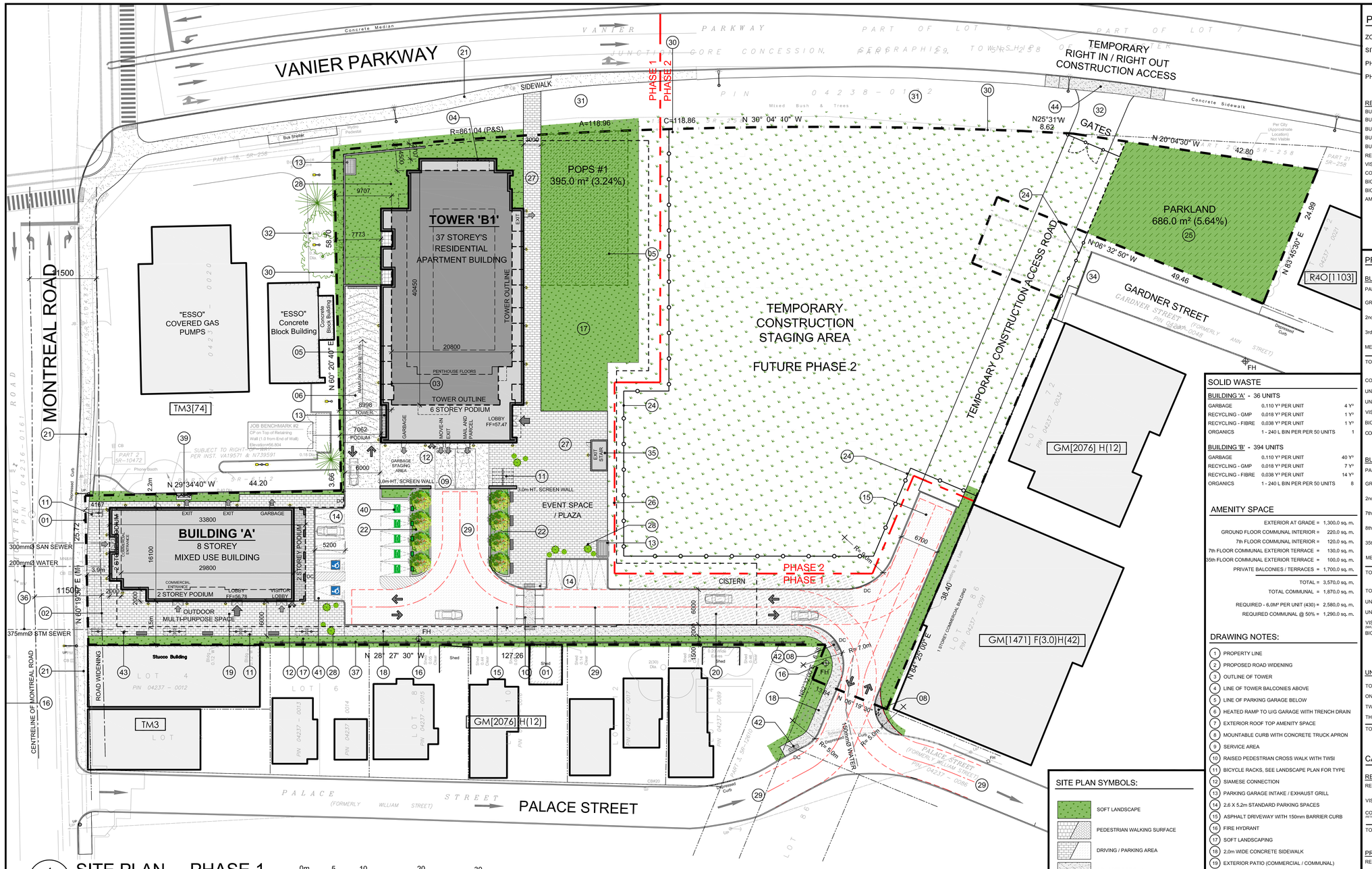
APPENDIX

D PROPOSED SITE DRAWINGS



1 / SP-1 SITE PLAN - PHASE 1

SCALE = 1 : 300

0m 5 10 20 30

SCALE 1: 300

PROJECT INFORMATION

ZONING	TM[2363] S365-h
SITE AREA	12,165.45 sq m 130,948 sq ft
PHASE 1 AREA	6,150.19 sq m 66,200 sq ft
PHASE 2 AREA	6,015.26 sq m 64,748 sq ft

REQUIRED

BUILDING HEIGHT - BLDG A	8 Storey's / 29,0m
BUILDING HEIGHT - BLDG B1	37 Storey's / 116,0m
BUILDING HEIGHT - BLDG B2	28 Storey's / 89,0m
BUILDING HEIGHT - BLDG B3	16 Storey's / 53,0m
BUILDING SETBACKS	as per Schedule S365-h
RESIDENTIAL PARKING - AREA 'Y'	0,5 per unit
VISITOR PARKING - AREA 'Y'	0,1 per unit
COMMERCIAL PARKING - RESTAURANT	not requited
BICYCLE PARKING	0,5 per unit
BICYCLE PARKING - COMMERCIAL	1 per 250m² of GFA
AMENITY SPACE	6,0 m² per unit

SOLID WASTE

BUILDING 'A' - 36 UNITS

GARBAGE	0,110 Y³ PER UNIT	4 Y³
RECYCLING - GMP	0,018 Y³ PER UNIT	1 Y³
RECYCLING - FIBRE	0,038 Y³ PER UNIT	1 Y³
ORGANICS	1 - 240 L BIN PER PER 50 UNITS	1

BUILDING 'B' - 394 UNITS

GARBAGE	0,110 Y³ PER UNIT	40 Y³
RECYCLING - GMP	0,018 Y³ PER UNIT	7 Y³
RECYCLING - FIBRE	0,038 Y³ PER UNIT	14 Y³
ORGANICS	1 - 240 L BIN PER PER 50 UNITS	8

AMENITY SPACE

EXTERIOR AT GRADE =	1,300,0 sq. m.
GROUND FLOOR COMMUNAL INTERIOR =	220,0 sq. m.
7th FLOOR COMMUNAL INTERIOR =	120,0 sq. m.
7th FLOOR COMMUNAL EXTERIOR TERRACE =	130,0 sq. m.
35th FLOOR COMMUNAL EXTERIOR TERRACE =	100,0 sq. m.
PRIVATE BALCONIES / TERRACES =	1,700,0 sq. m.
TOTAL =	3,570,0 sq. m.
TOTAL COMMUNAL =	1,870,0 sq. m.
REQUIRED - 6,0M² PER UNIT (430) =	2,580,0 sq. m.
REQUIRED COMMUNAL @ 50% =	1,290,0 sq. m.

DRAWING NOTES:

1. PROPERTY LINE
2. PROPOSED ROAD WIDENING
3. OUTLINE OF TOWER
4. LINE OF TOWER BALCONIES ABOVE
5. LINE OF PARKING GARAGE BELOW
6. HEATED RAMP TO U/G GARAGE WITH TRENCH DRAIN
7. EXTERIOR ROOF TOP AMENITY SPACE
8. MOUNTABLE CURB WITH CONCRETE TRUCK APRON
9. SERVICE AREA
10. RAISED PEDESTRIAN CROSS WALK WITH TWSI
11. BICYCLE RACKS, SEE LANDSCAPE PLAN FOR TYPE
12. SIAMESE CONNECTION
13. PARKING GARAGE INTAKE / EXHAUST GRILL
14. 2,6 X 5,2m STANDARD PARKING SPACES
15. ASPHALT DRIVEWAY WITH 150mm BARRIER CURB
16. FIRE HYDRANT
17. SOFT LANDSCAPING
18. 2,0m WIDE CONCRETE SIDEWALK
19. EXTERIOR PATIO (COMMERCIAL / COMMUNAL)
20. BELOW GRADE CISTERN
21. EXISTING CITY SIDEWALK INSTALL SUMMER OF 2021
22. RAISED PLANTER
23. EXISTING CHAIN LINK FENCE
24. CONSTRUCTION STAGING FENCE
25. PARKLAND DEDICATION AREA
26. PHASING LINE
27. HARD SURFACE WALKING SURFACE
28. AT GRADE PRIVATE PATIOS
29. 6,0M WIDE FIRE ROUTE
30. EXISTING CHAIN LINK FENCE
31. EXISTING SOFT LANDSCAPED BOULEVARD
32. PHASE 1 CONSTRICTION ACCESS
33. EXISTING TREE TO REMAIN PROTECT AS REQUIRED
34. ALTER EXISTING STREET AS SHOWN
35. PARKING GARAGE EXIT STAIR
36. PROPOSED BUILDING SERVICES, SEE CIVIL
37. 2,1m HT. SOLID WOOD FENCE
38. SEASONAL PLANTERS
39. GAS PRESSURE RELEASE STATION
40. ELECTRIC VEHICLE CHARGING STATION
41. ACCESSIBLE PARKING SPACE
42. DEPRESSED CURB - TWSI AS SHOWN
43. CYCLE REPAIR STATION
44. DEPRESSED CURB AND CONTINUOUS SIDEWALK TO CITY STANDARDS, SEE CIVIL

SITE PLAN SYMBOLS:

- SOFT LANDSCAPE
- PEDESTRIAN WALKING SURFACE
- DRIVING / PARKING AREA
- CONCRETE SIDEWALK
- EXISTING CITY CONCRETE SIDEWALK
- CONCRETE DRIVEWAY / RAMP
- UNDEVELOPED AREA
- PARKLAND DEDICATION
- PROPERTY LINE
- FENCE LINE
- BIKE RACK
- ENTRANCE / EXIT DOOR
- COMMERCIAL / EXIT DOOR
- FIRE HYDRANT
- VEHICULAR DIRECTION
- EXISTING TREE TO REMAIN
- SIAMESE CONNECTION

NOTE:
SEE LANDSCAPE FOR ALL SURFACE MATERIAL AND PATTERN

KEY MAP

PROJECT STATISTICS - PHASE 1

BUILDING 'A' — STAGE 1 CONSTRUCTION

PARKING LEVEL		0,0 sq, m, 000 sq, ft,
GROUND FLOOR		234,6 sq, m, 2,525 sq, ft,
2nd FLOOR		415,8 sq, m, 4,476 sq, ft,
3rd - 8th FLOOR	6 x 311,0 sq, m, 6 x 3,346 sq, ft,	1,866,2 sq, m, 20,088 sq, ft,
MECHANICAL LEVEL		0,0 sq, m, 000 sq, ft,
TOTAL AREA		2,516,6 sq, m, 27,088 sq, ft,
COMMERCIAL AREA		234,6 sq, m, 2,525 sq, ft,
UNIT COUNT		36
UNIT PARKING	0,5 PER UNIT AFTER 12 UNITS	12
VISITOR PARKING	0,1 PER UNIT AFTER 12 UNITS	2
BICYCLE PARKING	0,5 PER UNIT	18
COMMERCIAL BICYCLE	1,0 PER 250m² of GFA	1

BUILDING 'B' — STAGE 2 CONSTRUCTION

PARKING LEVEL		0,0 sq, m, 000 sq, ft,
GROUND FLOOR		257,2 sq, m, 2,768 sq, ft,
2nd - 6th FLOOR	5 x 889,83 sq, m, 5 x 9,578 sq, ft,	4,449,1 sq, m, 47,890 sq, ft,
7th FLOOR		524,4 sq, m, 5,645 sq, ft,
8th - 34th FLOOR TOWER	27 x 650,04 sq, m, 27 x 6,997 sq, ft,	17,551,15 sq, m, 188,919 sq, ft,
35th- 37th FLOOR	3 x 454,8 sq, m, 3 x 4,896 sq, ft,	1,364,56 sq, m, 14,688 sq, ft,
MECHANICAL LEVEL		0,0 sq, m, 000 sq, ft,
TOTAL AREA		24,146,4 sq, m, 259,910 sq, ft,
TOWER FOOTPRINT		807,2 sq, m, 8,689 sq, ft,
UNIT COUNT		394
UNIT PARKING	0,5 PER UNIT AFTER 12 UNITS	191
VISITOR PARKING (MAXIMUM 30 REQUIRED)	0,1 PER UNIT AFTER 12 UNITS	30
BICYCLE PARKING	0,5 PER UNIT	197

UNIT MIX

TOWNHOUSE UNIT	0
ONE BEDROOM	291
TWO BEDROOM UNIT	107
THREE BEDROOM UNIT	32
TOTAL UNITS	430

CAR PARKING

REQUIRED by ZONING BY-LAW

RESIDENCE	- 0,5 PER UNIT (AFTER 12 UNITS)	203
VISITOR	- 0,1 PER DWELLING UNIT (AFTER 12 UNITS) (MAX 30)	32
COMMERCIAL RETAIL (RETAIL FOOD BANK & CONVENIENCE STORE)	- NON REQUIRED	0
TOTAL		235

PROVIDED

RESIDENCE	- 0,59 PER UNIT	358
VISITOR	- 0,07 PER UNIT	32
COMMERCIAL RETAIL (RETAIL FOOD BANK & CONVENIENCE STORE)		0
TOTAL		390

LOCATION

SURFACE	14
BELOW GRADE - 3 LEVELS	369

BICYCLE PARKING

REQUIRED

RESIDENCE	- 0,5 PER UNIT (430 UNITS)	215
COMMERCIAL RETAIL	- 1,0 PER 250m² OF G.F.A.	1
TOTAL		216

PROVIDED

EXTERIOR	26
U/G PARKING LEVEL P1 FOR - PHASE 1	410
U/G PARKING LEVEL P1 FOR - PHASE 2	465
TOTAL	901

LOT COVERAGE

UNDEVELOPED AREA =	43,81%	5,329,2 sq, m,
PARK LAND SPACE =	5,64%	686,0 sq, m,
PAVED SURFACE =	13,64%	1,660,0 sq, m,
BUILDING FOOTPRINT =	13,13%	1,597,5 sq, m,
LANDSCAPE OPEN SPACE =	23,78%	2,892,69 sq, m,
TOTAL =	100,00%	12,165,45 sq, m,

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.

DO NOT SCALE DRAWINGS.

NOTATION SYMBOLS:

- (00) INDICATES DRAWING NOTES, LISTED ON EACH SHEET.
- (00) INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDULE.
- (00) INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- (000) INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.
- 00 DETAIL NUMBER / TITLE / SCALE / DETAIL REFERENCE PAGE / DETAIL CROSS REFERENCE PAGE

No.	ISSUED	DATE
7	ISSUED FOR SPC 1st COMMENT RESPONCE	2023 03 15
6	ISSUED FOR SPC 1st COMMENT REVIEW	2023 03 04
5	ISSUED FOR UDRP SPC SUBMISSION	2023 01 19
4	ISSUED FOR CONSULTANT COORDINATION	2023 01 10
3	ISSUED FOR SPC APPLICATION - PHASE 1	2022 09 13
2	ISSUED FOR CONSULTANT COORDINATION	2022 08 22
1	ISSUED FOR CONSULTANT COORDINATION	2022 02 21

REVISIONS:

ARCHITECT SEAL: ONTARIO ASSOCIATION OF ARCHITECTS — RODERICK C. LAHEY — LICENCE 4375 — SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT:

2705460 Ontario Inc.

ARCHITECT:
rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t. 613.724.9932 f. 613.724.1209 rlaarchitecture.ca

PROJECT TITLE:

112 MONTREAL ROAD

OTTAWA ONTARIO

SHEET TITLE:

SITE PLAN
PHASE 1

DRAWN: RV	CHECKED: R.V.
SCALE: 1:300	SHEET No. SP-1
PROJECT No. 2026	

D07-12-22-0138

PROJECT DEVELOPER

Manor Park Management
231 Brittany Drive, Suite D
Ottawa, ON Canada, K1K 0R8

E-Mail: lsa@manorparkcap.com

PROJECT MANAGER

Renfroe Land Management
371A Richmond Rd. Unit 2,
Ottawa, ON K2L 1Y3
Tel: (613) 883-6124
E-Mail: davidrenfroe@outlook.com

LEGAL DESCRIPTION

TOPOGRAPHIC SURVEY OF
LOT 5 AND PART OF LOTS 6 AND 7
BLOCK 2
REGISTERED PLAN 29 AND
LOT 88 AND PART OF LOTS 40 & 41
REGISTERED PLAN 49
CITY OF OTTAWA

SURVEYOR

FAIRHALL, MOFFATT & WOODLAND LIMITED
100-600 TERRY FOX DRIVE
KANATA, ONTARIO K2L 4B6
Tel: (613) 591-2580
Fax: (613) 591-1495
Email:

GEOTECHNICAL ENGINEER

paterson group
154 Colonnade Road South
Ottawa, Ontario, K2E 7J5
Tel: 613.226-7381
Email: DGilbert@Patersongroup.ca

URBAN PLANNER

FoTenn Consultants Inc.
396 Cooper Street, Unit 300
Ottawa, ON Canada, K2P 2H7
Tel.: (613) 730-5709
Fax: (613) 730-1136
E-Mail: posen@fotenn.com

CIVIL ENGINEER

WSP
300 - 2611 Queensview Drive
Ottawa, ON K2B 8K2
Tel:+1 613-829-2800
Email: Ishaque.Jafferjee@wsp.com

TRANSPORTATION ENGINEER

CGH Transportation Inc.
6 Plaza Court
Ottawa, ON K2H 7W1
Tel: (343) 999-9117
Cell: (613) 697-3797
Email: andrew.harte@cghtransportation.com

LANDSCAPE DESIGNER

LEVSTEK CONSULTANTS
5871 Hugh Crescent
Ottawa, ON Canada, K0a 2w0
Tel: (613) 826-0518
E-Mail: rlevstek@larocquelevstek.com

APPENDIX

E CATCHMENT PLAN

VANIER PARKWAY

TEMPORARY
RIGHT IN / RIGHT OUT
CONSTRUCTION ACCESS

SIDEWALK

GATES

TOWER 'B1'
37 STOREY'S
RESIDENTIAL
APARTMENT BUILDING

TOWER B1
35–STOREY
FFE=57.47
MAIN LEVEL

S02
CONTROLLED
0.081 | 0.90

TEMPORARY
CONSTRUCTION
STAGING AREA

FUTURE PHASE 2

TEMPORARY CONSTRUCTION
STAGING AREA
FUTURE PHASE 2

S06
CONTROLLED
0.520 | 0.80

PARK LAND
PARKLAND
686.0 m² (5.64

S07
CONTROLLED
0.069 | 0.80

TEMPORARY CONSTRUCTION ACCESS ROAD

GARDNER STREET

LOBBY
FF=57.47

GARBAGE
STAGING
AREA

S08
UNCONTROLLED
0.011 | 0.90

BUILDING

TOWER A
8–STOREY
FFE= 56.78
MAIN LEVEL

S01
CONTROLLED
0.050 | 0.90

2 STOREY PODIUM

S03
CONTROLLED
0.379 | 0.71

S05
CONTROLLED
0.025 | 0.61

S04
CONTROLLED
0.072 | 0.74

OUTDOOR
MULTI-PURPOSE SPACE

ROAD WIDENING

S09
UNCONTROLLED
0.010 | 0.58

PALACE STREET
(FORMERLY WILLIAM STREET)

PALACE STREET

180mmØ WATER

Uncontrolled Drainage Area

Controlled Drainage Area

Proposed Cistern Location

GENERAL NOTES:

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

KEY PLAN
(N.T.S)

SUBJECT TO APPROVAL

BENCH MARK No.1 ELEVATION=56.43

ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM THE WESTERLY LIMIT OF PART 1, PLAN 5R-6112 SHOWN AS HAVING A BEARING OF N28°27'30"W.

TOWNSHIP: CITY OF OTTAWA

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPA	D.Y.	2022-09-13

HORIZONTAL SCALE:
5m 2 0 5 10m
SCALE: 1:300

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

LICENSED PROFESSIONAL ENGINEER
D. B. YANG
100230568
2022-09-13
PROVINCE OF ONTARIO

NOT VALID UNLESS SIGNED AND DATED

wsp
2611 Queensview Dr. Ottawa, ON Canada K2B 8K2
t: 613.829.2800 f: 613.829.8299 www.wspgroup.com

CLIENT

2705460 ONTARIO INC.
C/O ANAND AGGARWAL
MANOR PARK MANAGEMENT
231 BRITTANY DRIVE, SUITE D
OTTAWA, ON K1K 0R8

rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t.613.724.9932 f.613.724.1209 rlaarchitecture.ca

ANNIS,O'SULLIVAN, VOLLEBEKK
Ontario Land Surveyors
14 CONCOURSE GATE, SUITE 500, NEPEAN, ONTARIO, K2E 7S6
TEL.(613)727-0850 FAX(613)727-1079

DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.Y.	J.T.	D.Y.

PROJECT

112 MONTREAL ROAD
RESIDENTIAL DEVELOPMENT

DRAWING TITLE

STORM DRAINAGE
AREA PLAN

PROJECT NO. 19M-01935-00

DRAWING NO. C04

D07-12-22-0138

#18856

FILENAME: V:\10-13 MKLD\19M-01935-00 - 112 Montreal Road - Site Plan\3. Drawings\Working drawings\19M-01935-00_C_NEW.dwg
PLOTDATE: Mar 09, 2023 - 1:58pm, CAJTI07401

APPENDIX

F SUPPORTING DOCUMENTS

APPENDIX

F-1 HYDRO-BRAKE RATING CURVE

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.430	112.000
Flush-Flo™	0.624	111.480
Kick-Flo®	1.106	98.784
Mean Flow		90.219

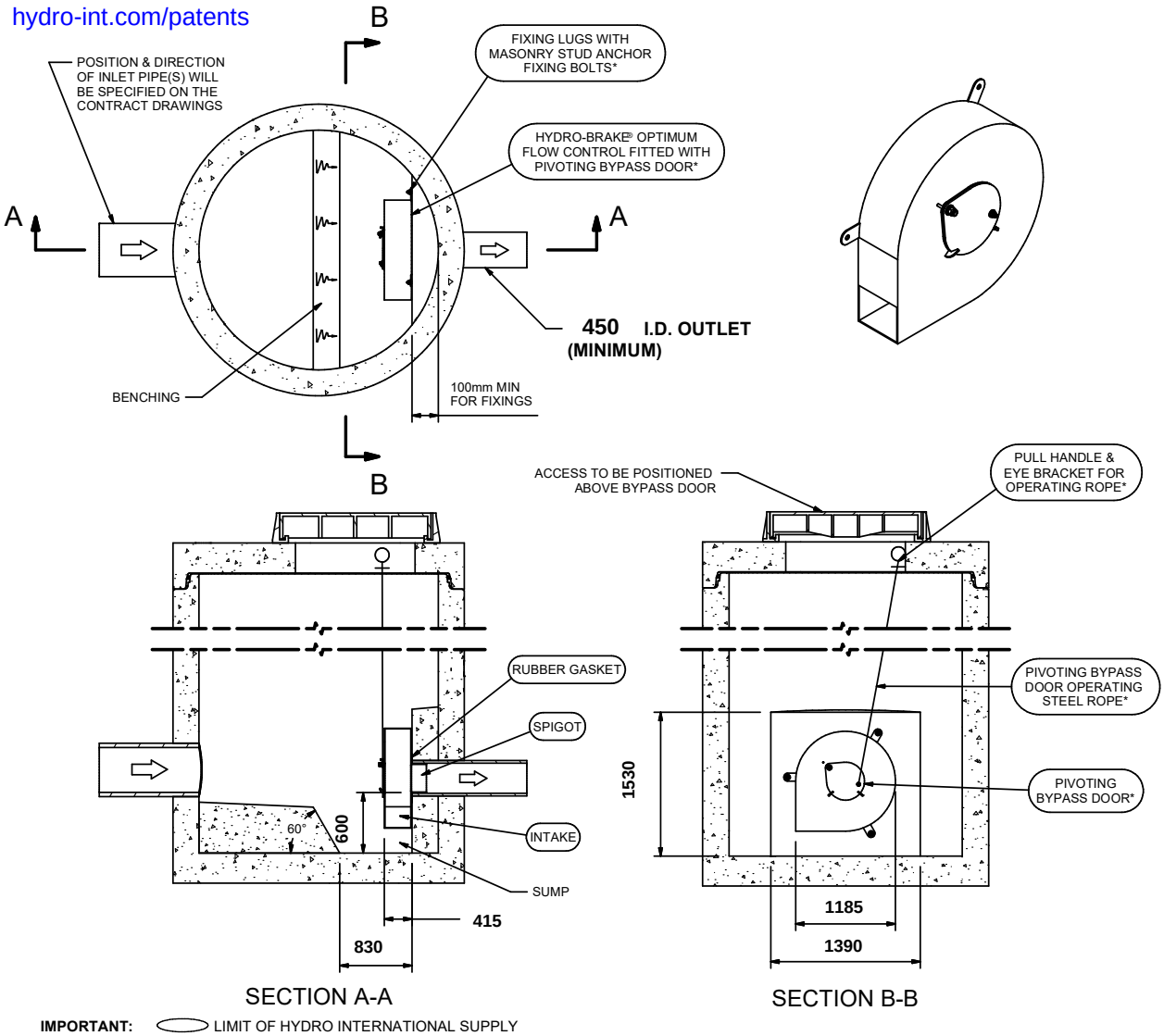
Hydro-Brake® Optimum Flow Control including:

- **5 mm** grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 147 kg

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

WRc Approved PT/329/0412

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0408-1120-1430-1120 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	3/3/2023 12:50 PM
SITE	112 Montreal Rd
DESIGNER	**Kathryn Kerker**
REF	**CBMH02**

SHE-0408-1120-1430-1120

Hydro-Brake® Optimum

kathryn.kerker@wsp.com

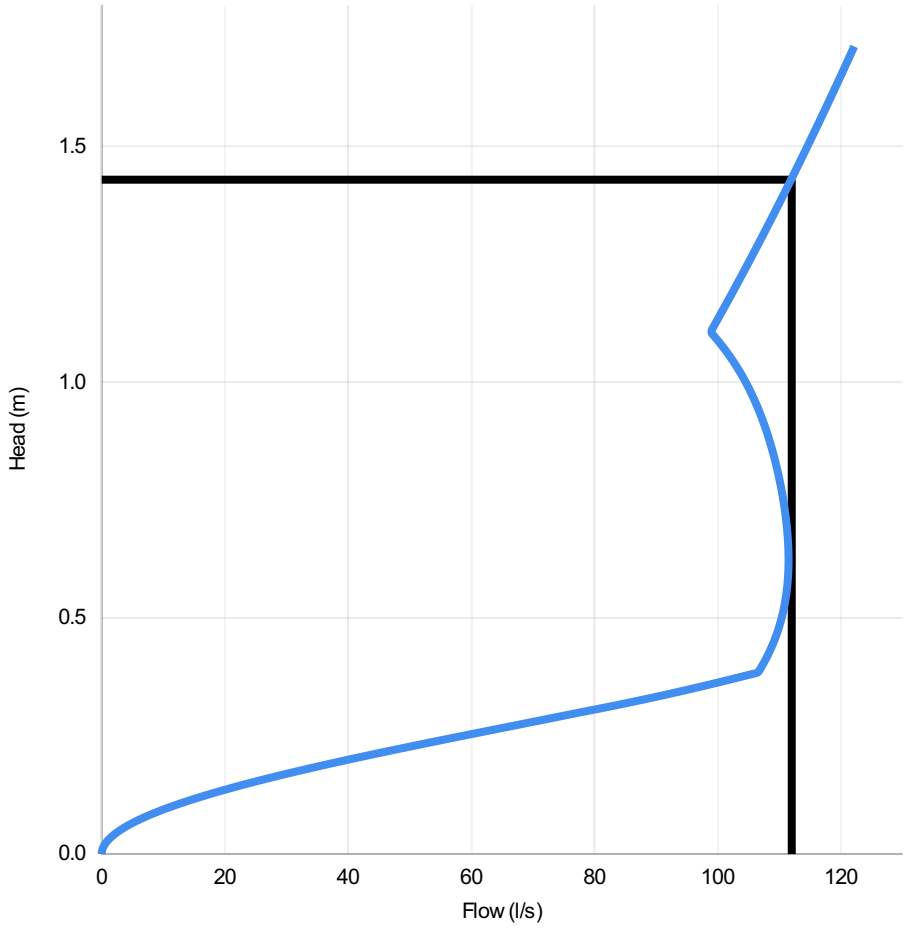
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.430	112.000
Flush-Flo	0.624	111.480
Kick-Flo®	1.106	98.784
Mean Flow		90.219

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.049	2.831
0.099	10.844
0.148	23.211
0.197	38.977
0.247	57.008
0.296	75.890
0.345	93.970
0.394	106.976
0.444	108.885
0.493	110.201
0.542	111.016
0.592	111.412
0.641	111.462
0.690	111.229
0.740	110.761
0.789	110.087
0.838	109.217
0.888	108.131
0.937	106.782
0.986	105.096
1.036	102.965
1.085	100.260
1.134	99.982
1.183	102.067
1.233	104.109
1.282	106.109
1.331	108.071
1.381	109.997
1.430	111.888

DESIGN ADVICE

The head/flow characteristics of this SHE-0408-1120-1430-1120 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modeling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International®

DATE	3/3/2023 12:50 PM
Site	112 Montreal Rd
DESIGNER	Kathryn Kerker
Ref	CBMH02

SHE-0408-1120-1430-1120

Hydro-Brake Optimum®

APPENDIX

F-2 WATTS ACUTROL ROOF DRAIN

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

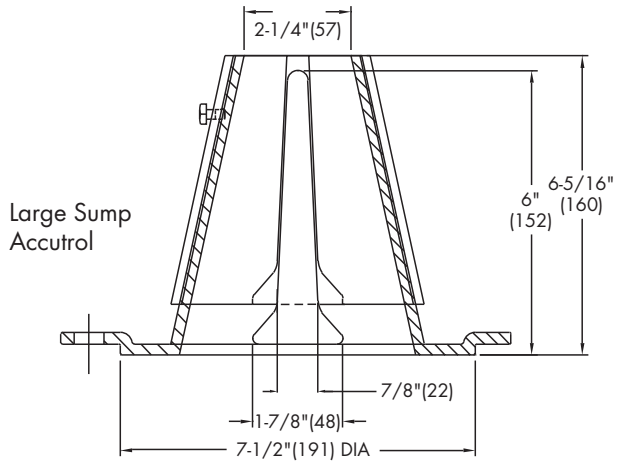
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

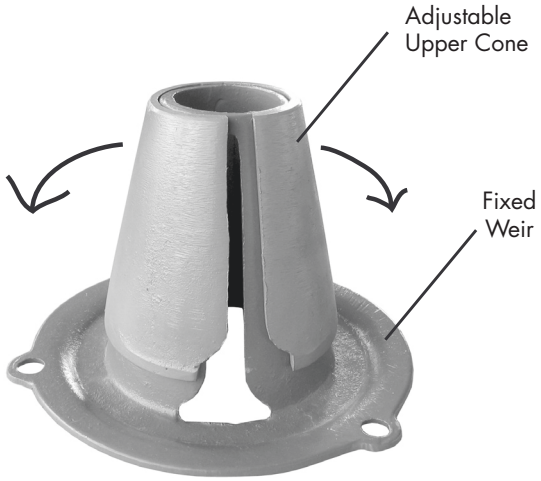
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

WATTS®
A Watts Water Technologies Company

APPENDIX

F-3 STORMTECH CHAMBER

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	HAIDER NASRULLAH 647-850-9417 HAIDER.NASRULLAH@ADSPIPE.COM
ADS SALES REP:	HASSAN ELMI 416-985-9757 HASSAN.ELMI@ADSPIPE.COM
PROJECT NO:	S334625
ONTARIO SITE COORDINATOR:	RYAN RUBENSTEIN 519-710-3687 RYAN.RUBENSTEIN@ADS-PIPE.COM

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

112 MONTREAL ROAD

OTTAWA, ON.

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
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" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
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 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 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 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 MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 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. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. 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 MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 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 CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING 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

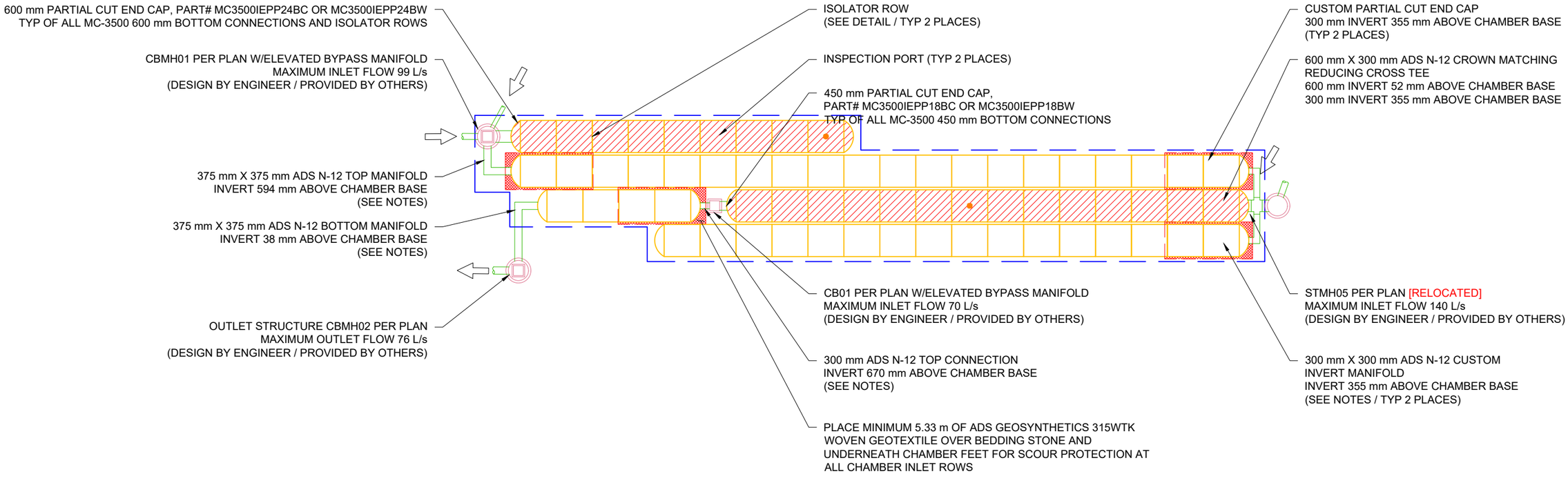
63	STORMTECH MC-3500 CHAMBERS
10	STORMTECH MC-3500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
310.0	**INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 54.268 (PERIMETER STONE INCLUDED)**
348.4	SYSTEM AREA (m²)
113.7	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

57.809	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
55.981	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
55.828	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
55.828	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
55.828	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
55.676	TOP OF STONE:
55.371	TOP OF MC-3500 CHAMBER:
54.898	300 mm TOP CONNECTION INVERT:
54.822	375 mm TOP MANIFOLD INVERT:
54.583	300 mm CUSTOM MANIFOLD INVERT:
54.280	600 mm ISOLATOR ROW INVERT:
54.273	450 mm ISOLATOR ROW INVERT:
54.268	375 mm BOTTOM MANIFOLD INVERT:
54.228	BOTTOM OF MC-3500 CHAMBER:
53.999	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL 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.
- THE SITE DESIGN ENGINEER MUST REVIEW THE PROXIMITY OF THE CHAMBERS TO THE SLOPE AND CONSIDER EFFECTS OF POSSIBLE SATURATED SOILS ON THE SLOPE'S INTEGRITY.
- THE SITE DESIGN ENGINEER MUST REVIEW THE PROXIMITY OF THE CHAMBERS TO THE BUILDING/STRUCTURE. NO FOUNDATION LOADS SHALL BE TRANSMITTED TO THE CHAMBERS. THE SITE DESIGN ENGINEER MUST CONSIDER EFFECTS OF POSSIBLE SATURATED SOILS ON BEARING CAPACITY OF SOILS AND SEEPAGE INTO BASEMENTS.



112 MONTREAL ROAD
OTTAWA, ON.

DATE: 01/25/23 | DRAWN: JR | CHECKED: RWD
PROJECT #: S334625

DATE	DRWN	CHKD	DESCRIPTION
2/23/23	RCT	RCT	VOLUME ABOVE OUTLET/ADD CHAMBERS
02/03/23	RCT	RCT	REVISED PER NEW PLAN

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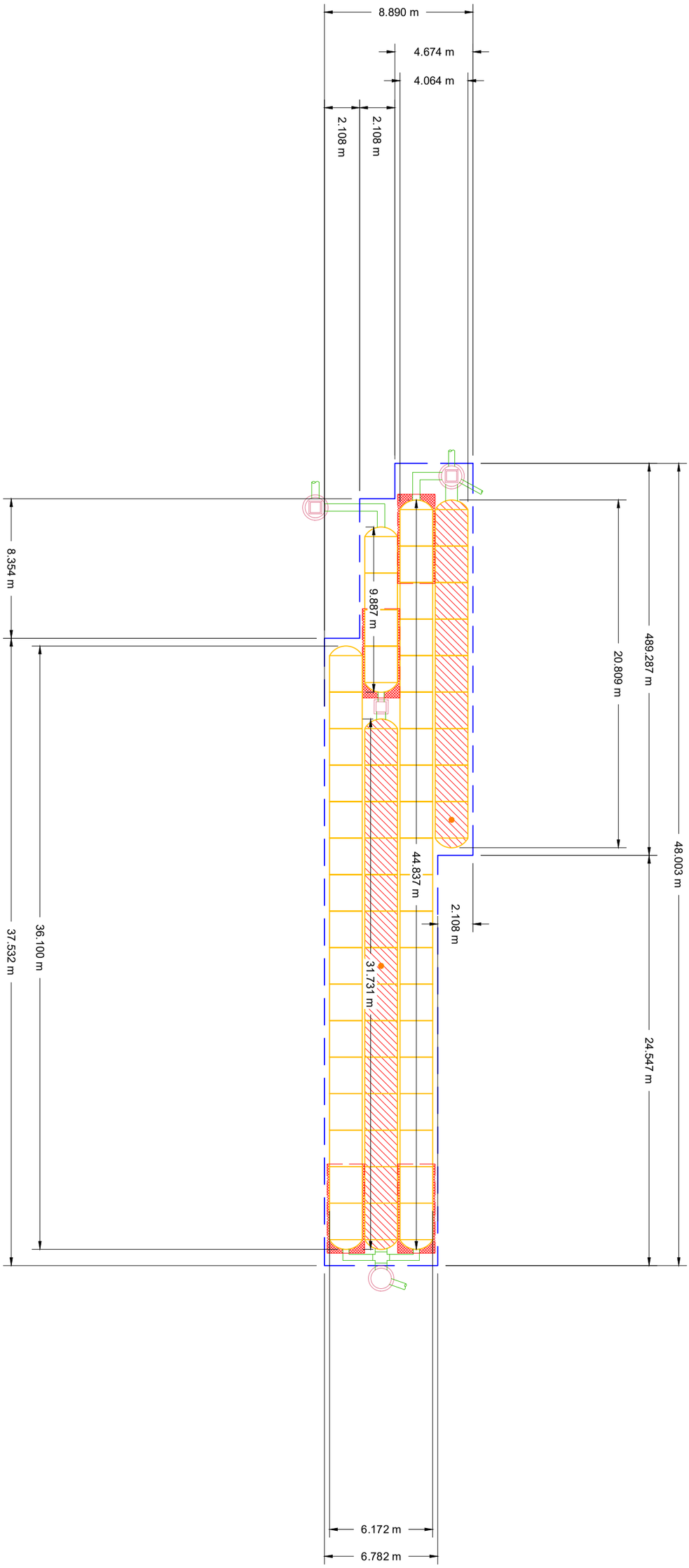
4640 TRUEMAN BLVD
HILLIARD, OH 43026

ADS

SCALE = 1 : 250



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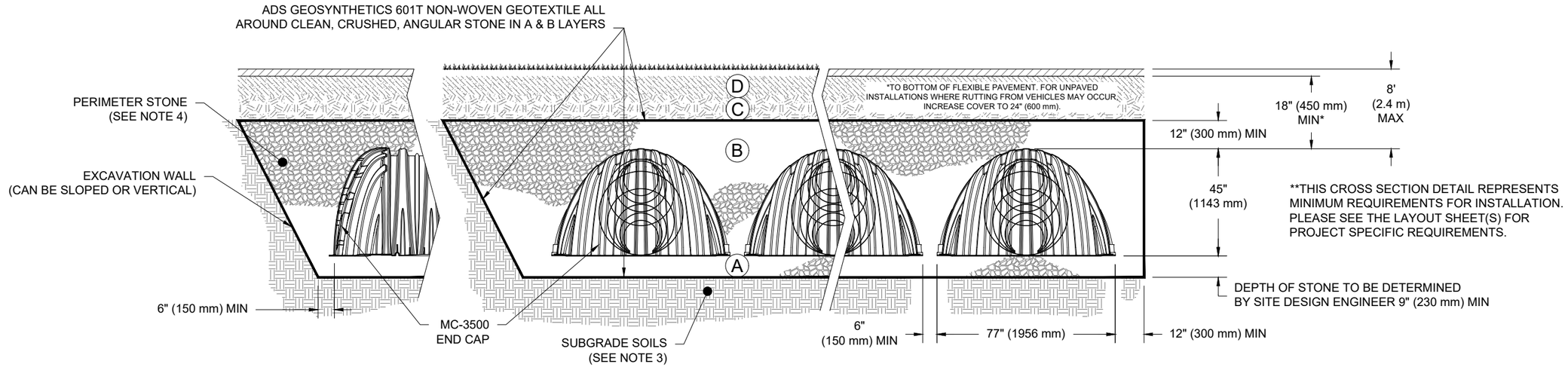
DATE:	01/25/23	DRAWN:	JR
PROJECT #:	S334625	CHECKED:	RWD

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 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 24" (600 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
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, 4	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, 4	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 9" (230 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" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 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 3".
   - 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 500 LBS/FT/%. 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.

112 MONTREAL ROAD
OTTAWA, ON.
DATE: 01/25/23 | DRAWN: JR
PROJECT #: S334625 | CHECKED: RWD

DATE	DESCRIPTION	DRWN	CHKD
2/23/23	VOLUME ABOVE OUTLET/ADD CHAMBERS	RCT	RCT
02/03/23	REVISED PER NEW PLAN	RCT	RCT

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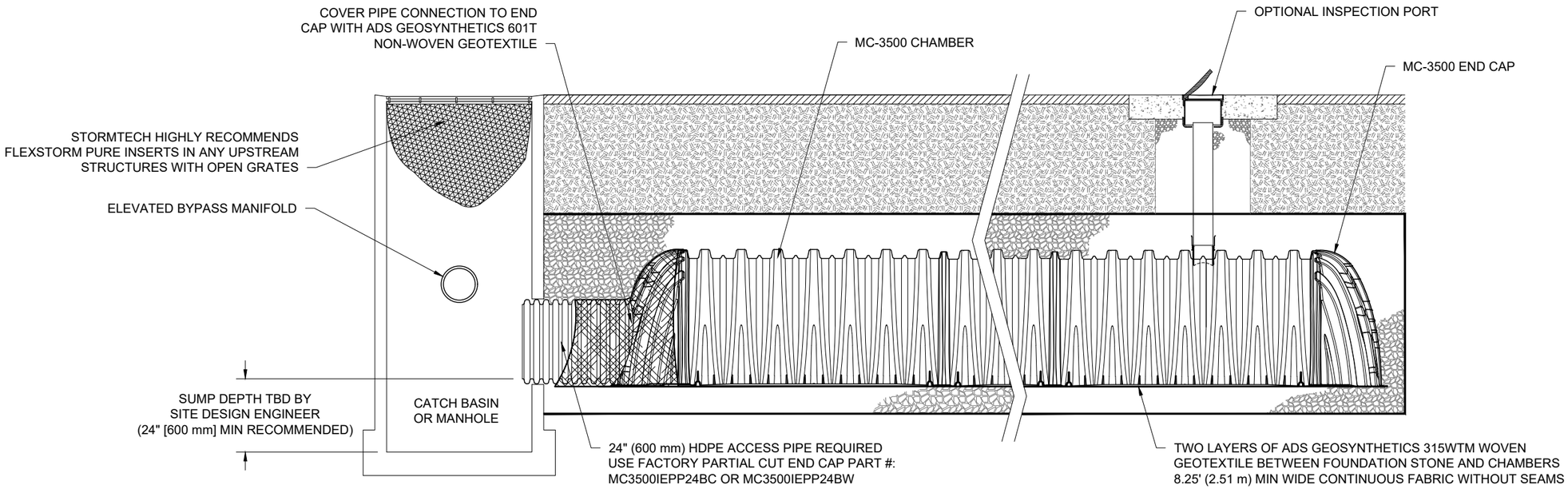


MC-3500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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 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

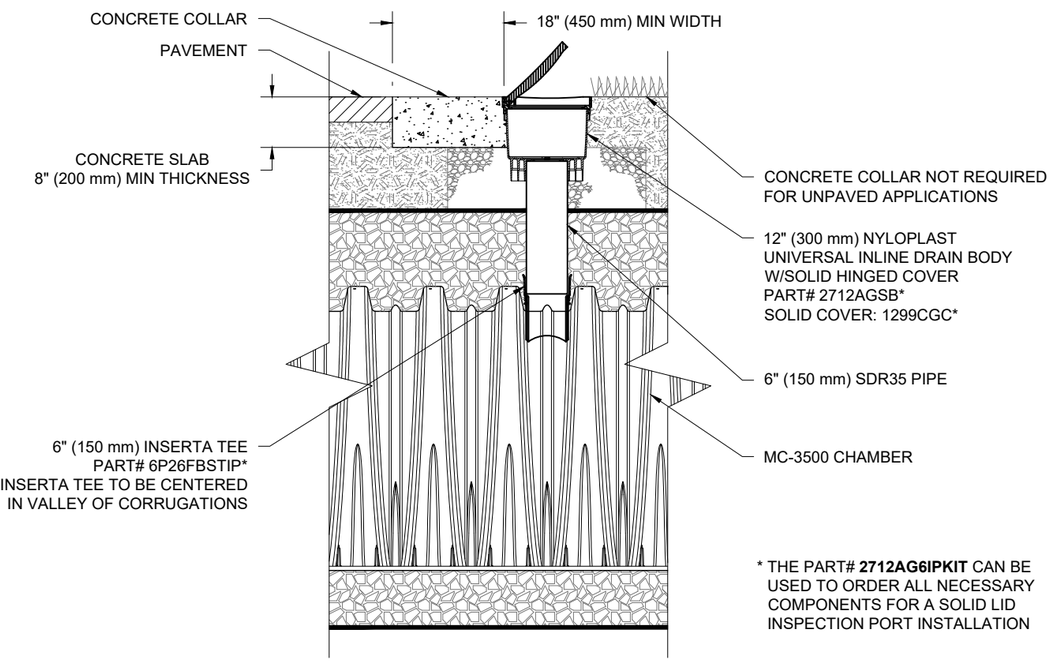
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

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.



MC-3500 6" (150 mm) INSPECTION PORT DETAIL
NTS

112 MONTREAL ROAD
OTTAWA, ON.

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MC-3500 TECHNICAL SPECIFICATION

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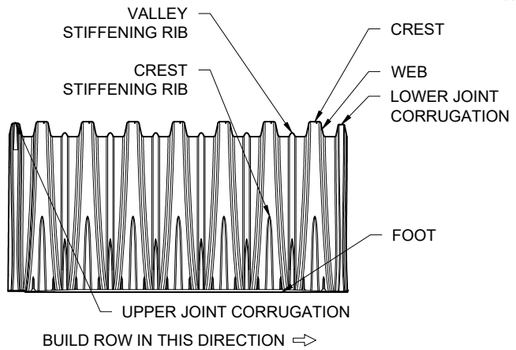
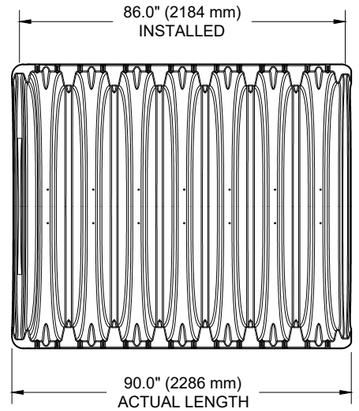
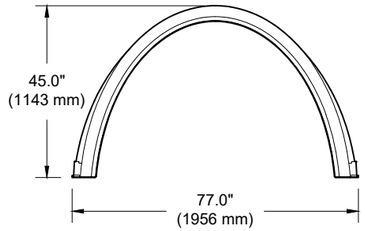
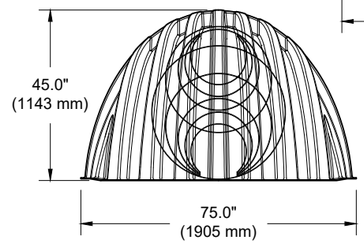
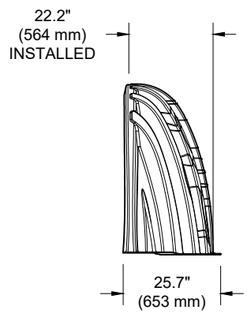










NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

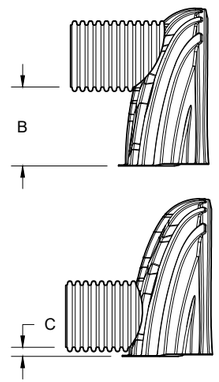
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" (152 mm) STONE BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

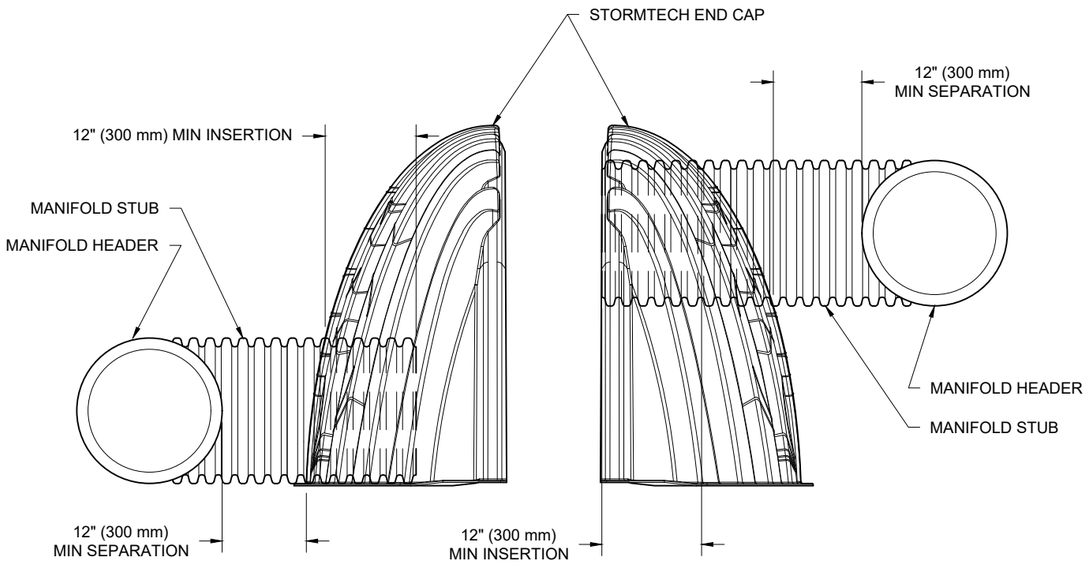
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

112 MONTREAL ROAD
OTTAWA, ON.

DATE: 01/25/23 | DRAWN: JR | PROJECT #: S334625 | CHECKED: RWD

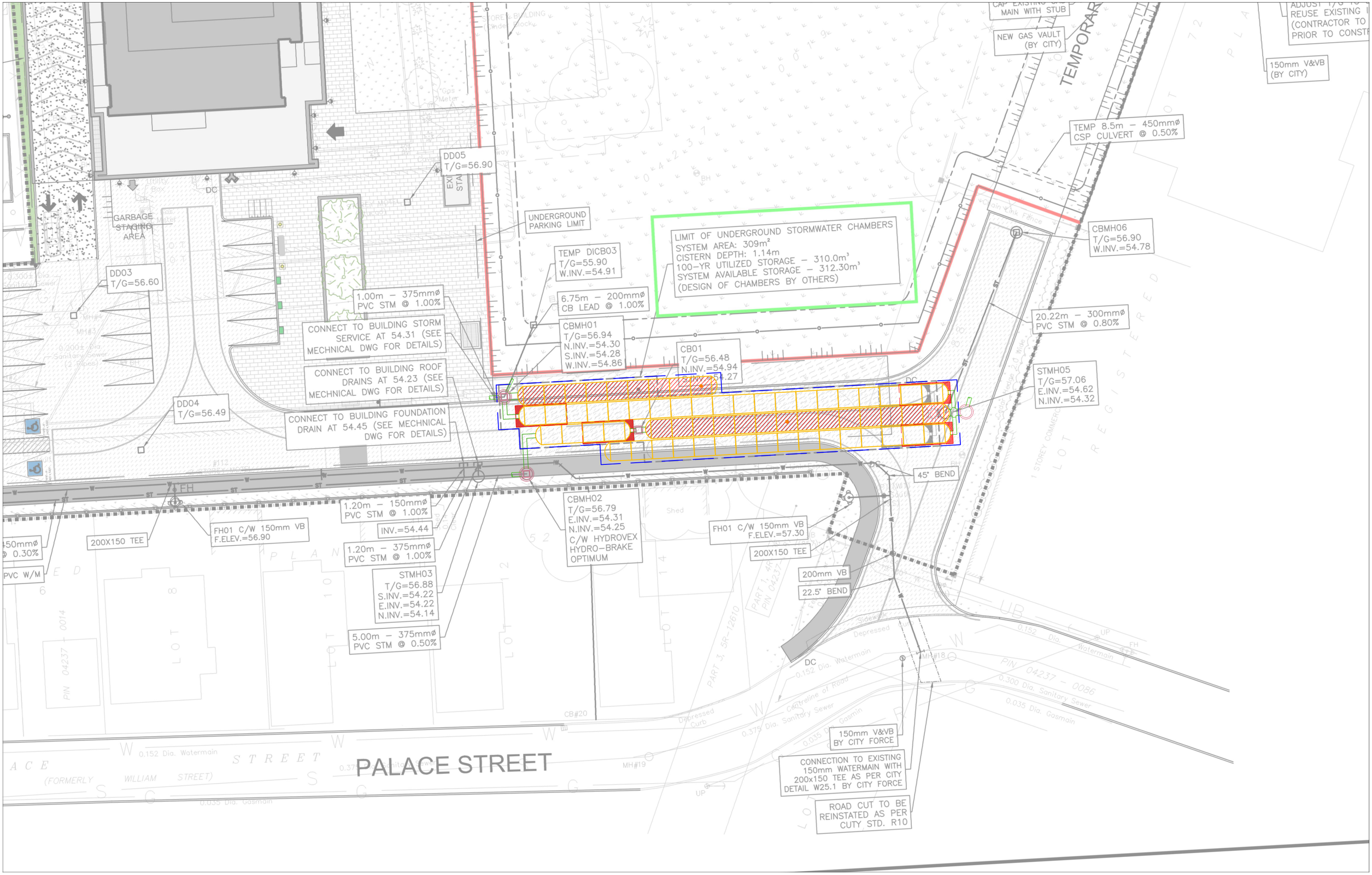
DATE	DRWN	CHKD	DESCRIPTION
2/23/23	RCT	RCT	VOLUME ABOVE OUTLET/ADD CHAMBERS
02/03/23	RCT	RCT	REVISED PER NEW PLAN

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

SHEET 6 OF 6


DD05
T/G=56.90
UNDERGROUND
PARKING LIMIT
LIMIT OF UNDERGROUND STORMWATER CHAMBERS
SYSTEM AREA: 309m²
CISTERN DEPTH: 1.14m
100-YR UTILIZED STORAGE - 310.0m³
SYSTEM AVAILABLE STORAGE - 312.30m³
(DESIGN OF CHAMBERS BY OTHERS)
TEMP DICB03
T/G=55.90
W.INV.=54.91
6.75m - 200mmø
CB LEAD @ 1.00%
CBMH01
T/G=56.94
N.INV.=54.30
S.INV.=54.28
W.INV.=54.86
CB01
T/G=56.48
N.INV.=54.94
W.INV.=54.27
DD03
T/G=56.60
DD04
T/G=56.49
1.00m - 375mmø
PVC STM @ 1.00%
CONNECT TO BUILDING STORM
SERVICE AT 54.31 (SEE
MECHNICAL DWG FOR DETAILS)
CONNECT TO BUILDING ROOF
DRAINS AT 54.23 (SEE
MECHNICAL DWG FOR DETAILS)
CONNECT TO BUILDING FOUNDATION
DRAIN AT 54.45 (SEE MECHNICAL
DWG FOR DETAILS)
GARBAGE
STAGING
AREA
CAP EXISTING
MAIN WITH STUB
NEW GAS VAULT
(BY CITY)
TEMPORARY
150mm V&VB
(BY CITY)
TEMP 8.5m - 450mmø
CSP CULVERT @ 0.50%
CBMH06
T/G=56.90
W.INV.=54.78
20.22m - 300mmø
PVC STM @ 0.80%
STMH05
T/G=57.06
E.INV.=54.62
N.INV.=54.32
45° BEND
1.20m - 150mmø
PVC STM @ 1.00%
INV.=54.44
1.20m - 375mmø
PVC STM @ 1.00%
STMH03
T/G=56.88
S.INV.=54.22
E.INV.=54.22
N.INV.=54.14
5.00m - 375mmø
PVC STM @ 0.50%
CBMH02
T/G=56.79
E.INV.=54.31
N.INV.=54.25
C/W HYDROVEX
HYDRO-BRAKE
OPTIMUM
FH01 C/W 150mm VB
F.ELEV.=56.90
200X150 TEE
FH01 C/W 150mm VB
F.ELEV.=57.30
200X150 TEE
200mm VB
22.5° BEND
150mm V&VB
BY CITY FORCE
CONNECTION TO EXISTING
150mm WATERMAIN WITH
200x150 TEE AS PER CITY
DETAIL W25.1 BY CITY FORCE
ROAD CUT TO BE
REINSTATED AS PER
CUTY STD. R10
PALACE STREET
(FORMERLY WILLIAM STREET)
PIN 04237 - 0014
PIN 04237 - 0086
PART 3, 5R-12610
PART 1, 45R-04237
LOT 8
LOT 10
LOT 12
LOT 14
0.152 Dia. Watermain
0.300 Dia. Sanitary Sewer
0.035 Dia. Gasmain
0.375 Dia. Sanitary Sewer
Centreline of Road
Depressed Curb
Sidewalk
Shed
MH#18
MH#19
CB#20
DC
FH
UP

Project: 112 Montreal Road Rev2

Chamber Model -	MC-3500	
Units -	**Metric**	
Number of Chambers -	63	
Number of End Caps -	10	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	54.00	m
Amount of Stone Above Chambers -	305	mm
Amount of Stone Below Chambers -	229	mm
	348.4	sq.meters

Min. Area - 305.14 sq.meters

☑ Include Perimeter Stone in Calculations

☐ Click for Stage Area Data

☐ Click to Invert Stage Area Data

Click Here for Imperial

StormTech MC-3500 Cumulative Storage Volumes

Height of System (mm)	Incremental Single Chamber (cubic meters)	Incremental Single End Cap (cubic meters)	Incremental Chambers (cubic meters)	Incremental End Cap (cubic meters)	Incremental Stone (cubic meters)	Incremental Ch, EC and Stone (cubic meters)	Cumulative System (cubic meters)	Elevation (meters)
1676	0.00	0.00	0.00	0.00	3.538	3.54	353.73	55.68
1651	0.00	0.00	0.00	0.00	3.538	3.54	350.19	55.65
1626	0.00	0.00	0.00	0.00	3.538	3.54	346.66	55.62
1600	0.00	0.00	0.00	0.00	3.538	3.54	343.12	55.60
1575	0.00	0.00	0.00	0.00	3.538	3.54	339.58	55.57
1549	0.00	0.00	0.00	0.00	3.538	3.54	336.04	55.55
1524	0.00	0.00	0.00	0.00	3.538	3.54	332.50	55.52
1499	0.00	0.00	0.00	0.00	3.538	3.54	328.97	55.50
1473	0.00	0.00	0.00	0.00	3.538	3.54	325.43	55.47
1448	0.00	0.00	0.00	0.00	3.538	3.54	321.89	55.45
1422	0.00	0.00	0.00	0.00	3.538	3.54	318.35	55.42
1397	0.00	0.00	0.00	0.00	3.538	3.54	314.82	55.40
1372	0.00	0.00	0.10	0.00	3.497	3.60	311.28	55.37
1346	0.01	0.00	0.35	0.01	3.397	3.75	307.68	55.35
1321	0.01	0.00	0.52	0.01	3.324	3.86	303.93	55.32
1295	0.01	0.00	0.72	0.01	3.244	3.98	300.07	55.29
1270	0.02	0.00	1.23	0.02	3.040	4.28	296.09	55.27
1245	0.03	0.00	1.83	0.02	2.794	4.65	291.80	55.24
1219	0.04	0.00	2.23	0.03	2.634	4.89	287.15	55.22
1194	0.04	0.00	2.54	0.04	2.509	5.08	282.26	55.19
1168	0.04	0.00	2.81	0.04	2.399	5.25	277.18	55.17
1143	0.05	0.00	3.05	0.05	2.301	5.39	271.93	55.14
1118	0.05	0.01	3.26	0.05	2.213	5.53	266.54	55.12
1092	0.05	0.01	3.46	0.06	2.132	5.65	261.01	55.09
1067	0.06	0.01	3.64	0.06	2.057	5.76	255.36	55.07
1041	0.06	0.01	3.81	0.07	1.988	5.86	249.60	55.04
1016	0.06	0.01	3.97	0.07	1.922	5.96	243.74	55.02
991	0.07	0.01	4.12	0.08	1.862	6.05	237.78	54.99
965	0.07	0.01	4.25	0.08	1.805	6.14	231.73	54.96
940	0.07	0.01	4.39	0.08	1.750	6.22	225.59	54.94
914	0.07	0.01	4.51	0.09	1.699	6.30	219.37	54.91
889	0.07	0.01	4.63	0.09	1.651	6.37	213.07	54.89
864	0.08	0.01	4.74	0.09	1.605	6.44	206.70	54.86
838	0.08	0.01	4.84	0.10	1.561	6.50	200.27	54.84
813	0.08	0.01	4.94	0.10	1.520	6.57	193.76	54.81
787	0.08	0.01	5.04	0.11	1.480	6.62	187.20	54.79
762	0.08	0.01	5.13	0.11	1.443	6.68	180.57	54.76
737	0.08	0.01	5.22	0.11	1.406	6.74	173.89	54.74
711	0.08	0.01	5.30	0.12	1.373	6.79	167.16	54.71
686	0.09	0.01	5.37	0.12	1.341	6.83	160.37	54.68
660	0.09	0.01	5.45	0.12	1.311	6.88	153.54	54.66
635	0.09	0.01	5.52	0.12	1.280	6.92	146.66	54.63
610	0.09	0.01	5.58	0.13	1.253	6.97	139.73	54.61
584	0.09	0.01	5.65	0.13	1.227	7.00	132.77	54.58
559	0.09	0.01	5.71	0.13	1.202	7.04	125.76	54.56
533	0.09	0.01	5.76	0.14	1.178	7.08	118.72	54.53
508	0.09	0.01	5.82	0.14	1.155	7.11	111.64	54.51
483	0.09	0.01	5.87	0.14	1.134	7.14	104.53	54.48
457	0.09	0.01	5.92	0.14	1.113	7.18	97.39	54.46
432	0.09	0.01	5.97	0.15	1.093	7.20	90.21	54.43
406	0.10	0.01	6.01	0.15	1.075	7.23	83.01	54.41
381	0.10	0.01	6.05	0.15	1.057	7.26	75.77	54.38
356	0.10	0.02	6.09	0.15	1.041	7.28	68.51	54.35
330	0.10	0.02	6.13	0.15	1.024	7.31	61.23	54.33
305	0.10	0.02	6.17	0.16	1.008	7.33	53.92	54.30
279	0.10	0.02	6.21	0.16	0.993	7.36	46.59	54.28
254	0.10	0.02	6.25	0.17	0.969	7.39	39.23	54.25
229	0.00	0.00	0.00	0.00	3.538	3.54	31.84	54.23
203	0.00	0.00	0.00	0.00	3.538	3.54	28.30	54.20
178	0.00	0.00	0.00	0.00	3.538	3.54	24.77	54.18
152	0.00	0.00	0.00	0.00	3.538	3.54	21.23	54.15
127	0.00	0.00	0.00	0.00	3.538	3.54	17.69	54.13
102	0.00	0.00	0.00	0.00	3.538	3.54	14.15	54.10
76	0.00	0.00	0.00	0.00	3.538	3.54	10.61	54.08
51	0.00	0.00	0.00	0.00	3.538	3.54	7.08	54.05
25	0.00	0.00	0.00	0.00	3.538	3.54	3.54	54.02

310.09m^3 above elevation 54.268

APPENDIX

G HYDROCAD MODEL OUTPUT

	Stormwater Management Calculations	Project: 112 Montreal Road	No.: 19M-01935-00	
	HydroCAD Model Build	By: KK Checked: AJ	Date: 2023-03-02	Page: 1

Catchment Information

Catchment ID	Status	Area (ha.)	Area (m^2)	C_5-year	C_100-year	Routing	HydroCAD Node
S01	Controlled	0.05	500	0.9	1.00	Cistern	11S/10S
S02	Controlled	0.081	810	0.9	1.00	Cistern	12S/10S
S03	Controlled	0.379	3,790	0.71	0.89	Cistern	9S
S04	Controlled	0.072	720	0.74	0.93	Cistern	9S
S05	Controlled	0.025	250	0.61	0.76	Cistern	9S
S06	Controlled	0.52	5,200	0.8	1.00	Cistern	9S
S07	Controlled	0.069	690	0.8	1.00	Cistern	9S
S08	Uncontrolled	0.011	110	0.9	1.00	Outlet	14S
S09	Uncontrolled	0.01	100	0.58	0.73	Outlet	14S
	TOTAL	*1.22*	*12,170*	*0.77*	*0.95*		

Total Site Area 1.217 ha

100-yr Runoff C C_100 = C+5 x 1.25

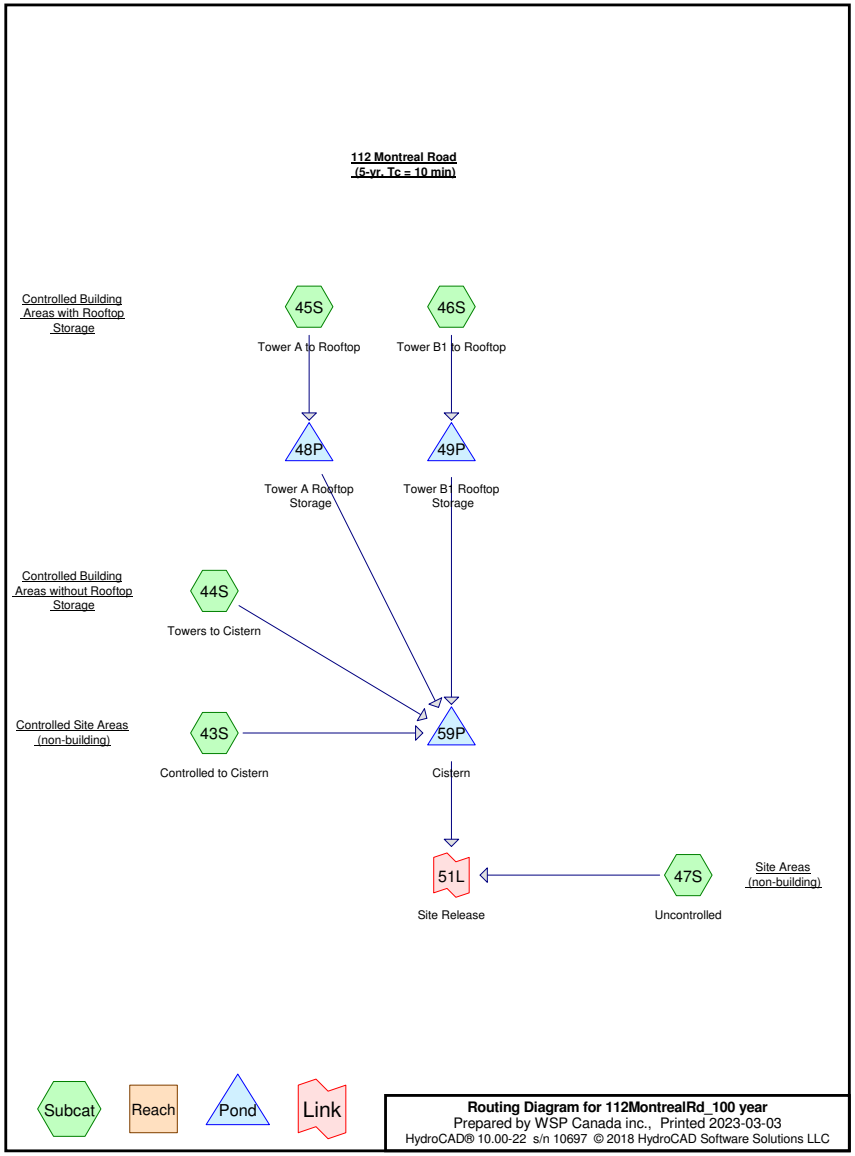
Roof Drains

							WATT Drains		
Catchment ID	Status	Common Name	Area (ha.)	Area (m^2)	Area to Cistern 1 (m^2)	Area controlled by Rooftop (m^2)	Number of Drains Req. (~1 Drain / 150 m2)	Area Per Drain	Width / Length (m)
S01	Controlled	Building A	0.05	500	190	**310**	5	62.00	7.87
S02	Controlled	Building B1	0.081	810	447	**363**	4	90.75	9.53

METRIC	Flow Rate (m3/sec)					
Weir opening	**25.4**	**50.8**	**76.2**	**101.6**	**127.0**	**152.4**
	0.02540	**0.05080**	**0.07620**	**0.10160**	**0.12700**	**0.15240**
Fully Exposed	0.000315451	0.000630902	0.000946353	0.001261804	0.001577255	0.001892706
3/4	0.000315451	0.000630902	0.00086749	0.001104079	0.001340667	0.001577255
1/2	0.000315451	0.000630902	0.000788628	0.000946353	0.001104079	0.001261804
1/4	0.000315451	0.000630902	0.000709765	0.000788628	0.00086749	0.000946353
Closed	0.000315451	0.000315451	0.000315451	0.000315451	0.000315451	0.000315451

APPENDIX

G-1 *5-YEAR ANALYSIS (PEAK DISCHARGE)*



Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
3,790.0	0.71	S03 (43S)
720.0	0.74	S04 (43S)
250.0	0.61	S05 (43S)
5,200.0	0.80	S06 (43S)
690.0	0.80	S07 (43S)
105.0	0.90	S08 (47S)
99.0	0.58	S09 (47S)
500.0	0.90	Tower A (44S, 45S)
810.0	0.90	Tower B1 (44S, 46S)
12,164.0	**0.77**	**TOTAL AREA**

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 43S: Controlled to Cistern Runoff Area=10,650.0 m² Runoff Depth=18 mm
Tc=10.0 min C=0.76 Runoff=0.1532 m³/s 193.0 m³

Subcatchment 44S: Towers to Cistern Runoff Area=637.0 m² Runoff Depth=21 mm
Tc=10.0 min C=0.90 Runoff=0.0108 m³/s 13.7 m³

Subcatchment 45S: Tower A to Rooftop Runoff Area=310.0 m² Runoff Depth=21 mm
Tc=10.0 min C=0.90 Runoff=0.0053 m³/s 6.7 m³

Subcatchment 46S: Tower B1 to Rooftop Runoff Area=363.0 m² Runoff Depth=21 mm
Tc=10.0 min C=0.90 Runoff=0.0062 m³/s 7.8 m³

Subcatchment 47S: Uncontrolled Runoff Area=204.0 m² Runoff Depth=18 mm
Tc=10.0 min C=0.74 Runoff=0.0029 m³/s 3.6 m³

Pond 48P: Tower A Rooftop Storage Peak Elev=100.053 m Storage=4.3 m³ Inflow=0.0053 m³/s 6.7 m³
Outflow=0.0015 m³/s 6.7 m³

Pond 49P: Tower B1 Rooftop Storage Peak Elev=100.069 m Storage=5.8 m³ Inflow=0.0062 m³/s 7.8 m³
Outflow=0.0012 m³/s 7.8 m³

Pond 59P: Cistern Peak Elev=54.660 m Storage=114.2 m³ Inflow=0.1668 m³/s 221.1 m³
Primary=0.1076 m³/s 216.4 m³ Secondary=0.0000 m³/s 0.0 m³ Outflow=0.1076 m³/s 216.4 m³

Link 51L: Site Release Inflow=0.1097 m³/s 220.0 m³
Primary=0.1097 m³/s 220.0 m³

Total Runoff Area = 12,164.0 m² Runoff Volume = 224.7 m³ Average Runoff Depth = 18 mm

Summary for Subcatchment 43S: Controlled to Cistern

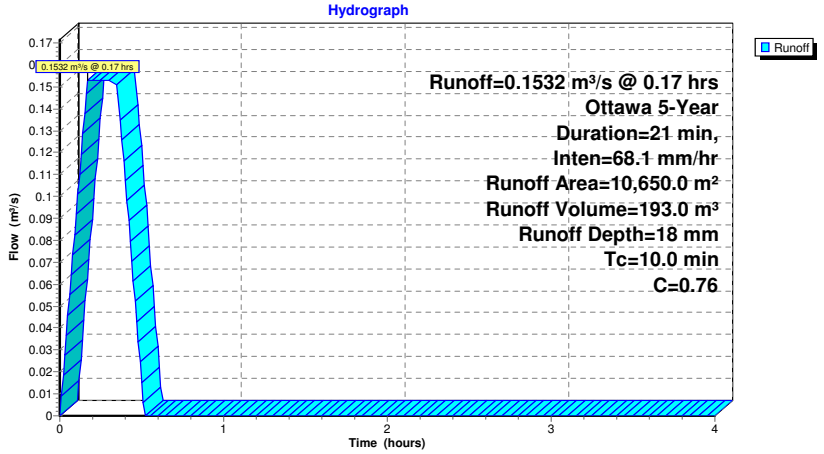
Runoff = 0.1532 m³/s @ 0.17 hrs, Volume= 193.0 m³, Depth= 18 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=21 min, Inten=68.1 mm/hr

Area (m²)	C	Description
3,790.0	0.71	S03
5,200.0	0.80	S06
720.0	0.74	S04
250.0	0.61	S05
690.0	0.80	S07
10,650.0	0.76	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 43S: Controlled to Cistern



Summary for Subcatchment 44S: Towers to Cistern

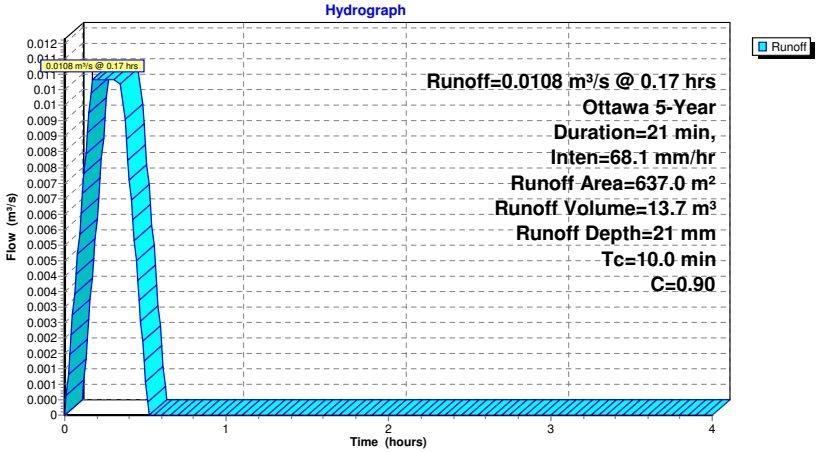
Runoff = 0.0108 m³/s @ 0.17 hrs, Volume= 13.7 m³, Depth= 21 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=21 min, Inten=68.1 mm/hr

Area (m²)	C	Description
190.0	0.90	Tower A
447.0	0.90	Tower B1
637.0	0.90	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 44S: Towers to Cistern



Summary for Subcatchment 45S: Tower A to Rooftop

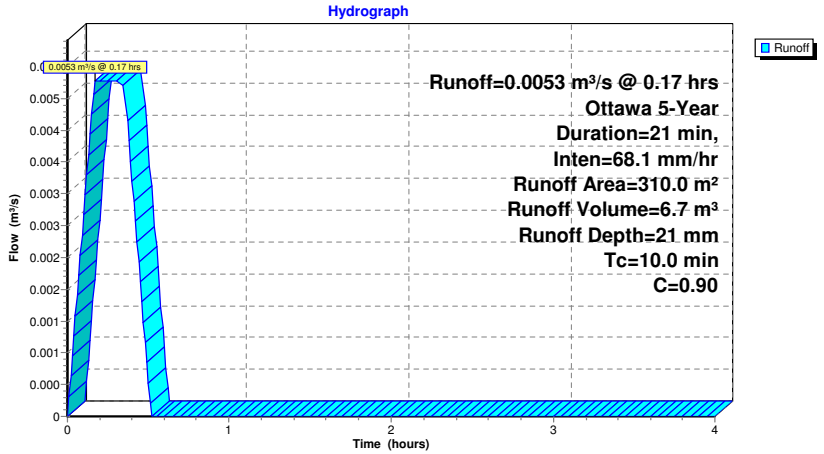
Runoff = 0.0053 m³/s @ 0.17 hrs, Volume= 6.7 m³, Depth= 21 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=21 min, Inten=68.1 mm/hr

Area (m²)	C	Description
310.0	0.90	Tower A

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 45S: Tower A to Rooftop



Summary for Subcatchment 46S: Tower B1 to Rooftop

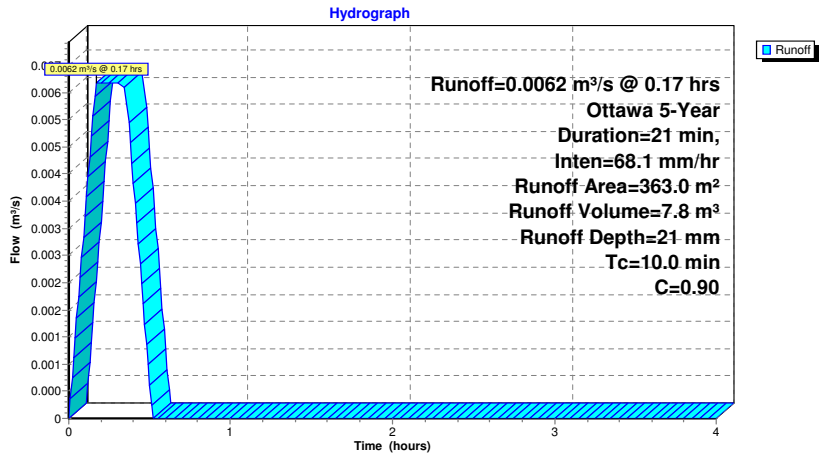
Runoff = 0.0062 m³/s @ 0.17 hrs, Volume= 7.8 m³, Depth= 21 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=21 min, Inten=68.1 mm/hr

Area (m²)	C	Description
363.0	0.90	Tower B1

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 46S: Tower B1 to Rooftop



Summary for Subcatchment 47S: Uncontrolled

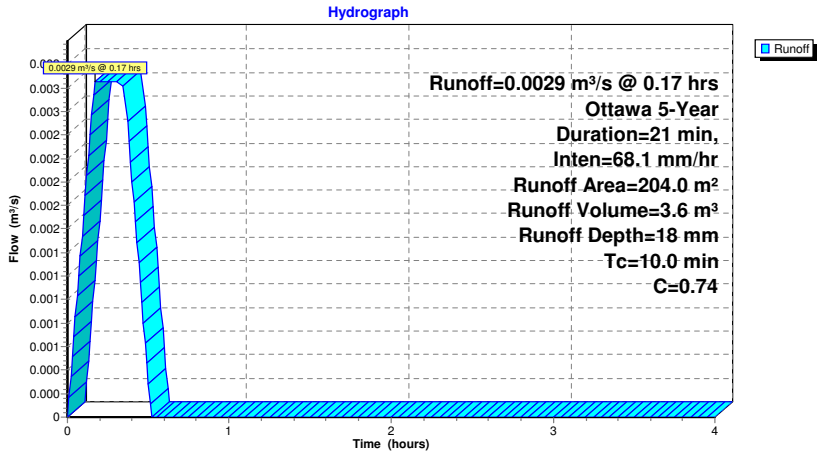
Runoff = 0.0029 m³/s @ 0.17 hrs, Volume= 3.6 m³, Depth= 18 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=21 min, Inten=68.1 mm/hr

Area (m²)	C	Description
99.0	0.58	S09
105.0	0.90	S08
204.0	0.74	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 47S: Uncontrolled



Summary for Pond 48P: Tower A Rooftop Storage

Inflow Area = 310.0 m², Inflow Depth = 21 mm for 5-Year event
Inflow = 0.0053 m³/s @ 0.17 hrs, Volume= 6.7 m³
Outflow = 0.0015 m³/s @ 0.16 hrs, Volume= 6.7 m³, Atten= 71%, Lag= 0.0 min
Primary = 0.0015 m³/s @ 0.16 hrs, Volume= 6.7 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.053 m @ 0.47 hrs Surf.Area= 164.1 m² Storage= 4.3 m³

Plug-Flow detention time= 25.2 min calculated for 6.7 m³ (100% of inflow)
Center-of-Mass det. time= 25.2 min (40.7 - 15.5)

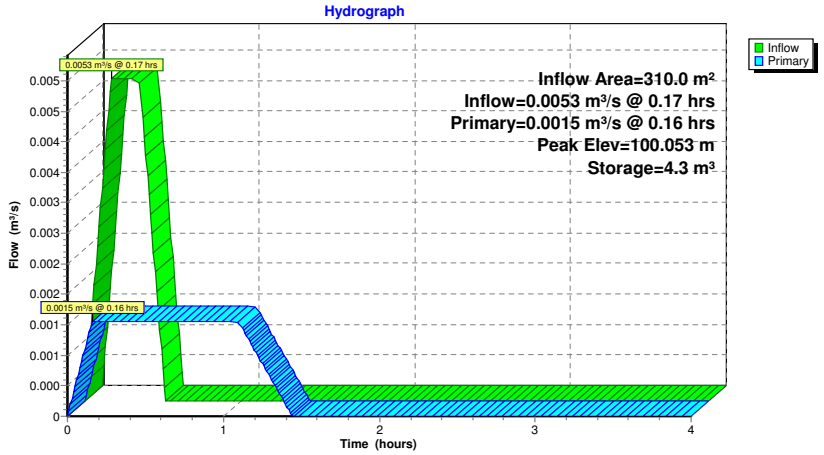
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	15.5 m³	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.100	62.0	3.1	3.1

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 5.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0015 m³/s @ 0.16 hrs HW=100.025 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0015 m³/s)

Pond 48P: Tower A Rooftop Storage



Summary for Pond 49P: Tower B1 Rooftop Storage

Inflow Area = 363.0 m², Inflow Depth = 21 mm for 5-Year event
Inflow = 0.0062 m³/s @ 0.17 hrs, Volume= 7.8 m³
Outflow = 0.0012 m³/s @ 0.13 hrs, Volume= 7.8 m³, Atten= 80%, Lag= 0.0 min
Primary = 0.0012 m³/s @ 0.13 hrs, Volume= 7.8 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.069 m @ 0.48 hrs Surf.Area= 168.0 m² Storage= 5.8 m³

Plug-Flow detention time= 40.6 min calculated for 7.8 m³ (100% of inflow)
Center-of-Mass det. time= 40.7 min (56.2 - 15.5)

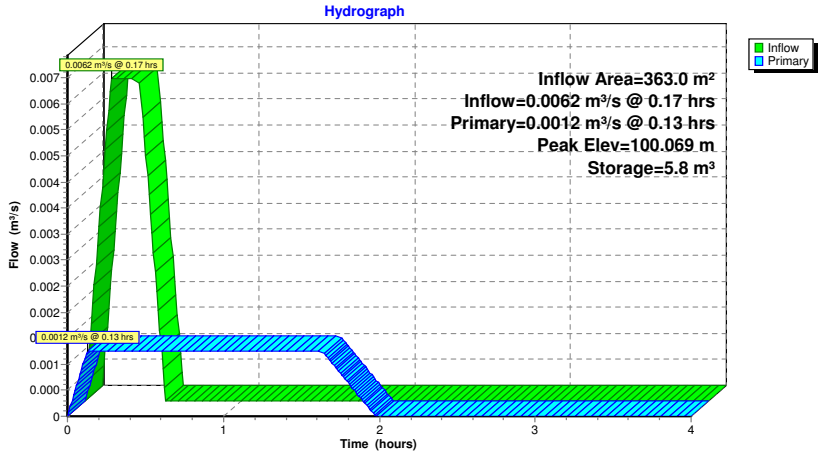
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	27.2 m³	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 4

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	90.7	6.8	6.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 4.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0012 m³/s @ 0.13 hrs HW=100.026 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0012 m³/s)

Pond 49P: Tower B1 Rooftop Storage



Summary for Pond 59P: Cistern

Inflow Area = 11,960.0 m², Inflow Depth = 18 mm for 5-Year event
Inflow = 0.1668 m³/s @ 0.17 hrs, Volume= 221.1 m³
Outflow = 0.1076 m³/s @ 0.41 hrs, Volume= 216.4 m³, Atten= 35%, Lag= 14.4 min
Primary = 0.1076 m³/s @ 0.41 hrs, Volume= 216.4 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 54.660 m @ 0.41 hrs Surf.Area= 0.0 m² Storage= 114.2 m³

Plug-Flow detention time= 24.1 min calculated for 216.4 m³ (98% of inflow)
Center-of-Mass det. time= 22.7 min (40.4 - 17.7)

Volume	Invert	Avail.Storage	Storage Description
#1	54.250 m	314.5 m³	**Custom Stage Data** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
54.250	0.0
54.280	7.4
54.350	29.3
54.460	58.2
54.560	86.5
54.660	114.3
54.760	141.3
54.860	167.5
54.960	192.5
55.070	216.1
55.170	238.0
55.270	256.9
55.370	272.1
55.470	286.2
55.570	300.4
55.680	314.5

Device	Routing	Invert	Outlet Devices
#1	Primary	54.250 m	**SHE-0408-1120-1430-1120_HydroBrake**

Head (meters) 0.000 0.014 0.029 0.043 0.058 0.072 0.087 0.101 0.116 0.130 0.144 0.159 0.173 0.188 0.202 0.217 0.231 0.246 0.260 0.274 0.289 0.303 0.318 0.332 0.347 0.361 0.376 0.390 0.404 0.419 0.433 0.448 0.462 0.477 0.491 0.506 0.520 0.534 0.549 0.563 0.578 0.592 0.607 0.621 0.636 0.650 0.664 0.679 0.693 0.708 0.722 0.737 0.751 0.766 0.780 0.794 0.809 0.823 0.838 0.852 0.867 0.881 0.896 0.910 0.924 0.939 0.953 0.968 0.982 0.997 1.011 1.026 1.040 1.054 1.069 1.083 1.098 1.112 1.127 1.141 1.156 1.170 1.184 1.199 1.213 1.228 1.242 1.257 1.271 1.286 1.300 1.314 1.329 1.343 1.358 1.372 1.387 1.401 1.416 1.430 1.459 1.487 1.516 1.544 1.573 1.602 1.630 1.659 1.687 1.716
Disch. (m³/s) 0.00000 0.00025 0.00099 0.00220 0.00386 0.00596

0.00847 0.01137 0.01465 0.01827 0.02221 0.02646 0.03097 0.03574 0.04072 0.04588 0.05120 0.05663 0.06214 0.06769 0.07323 0.07874 0.08430 0.08953 0.09447 0.09917 0.10365 0.10677 0.10741 0.10800 0.10853 0.10901 0.10944 0.10982 0.11016 0.11045 0.11070 0.11092 0.11109 0.11123 0.11134 0.11142 0.11146 0.11148 0.11147 0.11144 0.11138 0.11131 0.11121 0.11109 0.11095 0.11080 0.11062 0.11043 0.11022 0.11000 0.10976 0.10950 0.10923 0.10893 0.10862 0.10829 0.10793 0.10755 0.10715 0.10672 0.10626 0.10577 0.10525 0.10469 0.10408 0.10344 0.10275 0.10200 0.10121 0.10035 0.09943 0.09904 0.09966 0.10028 0.10089 0.10150 0.10211 0.10271 0.10331 0.10390 0.10450 0.10508 0.10567 0.10625 0.10683 0.10740 0.10797 0.10854 0.10911 0.10967 0.11023 0.11078 0.11134 0.11189 0.11292 0.11396 0.11500 0.11604 0.11707 0.11811 0.11915 0.12018 0.12122 0.12226

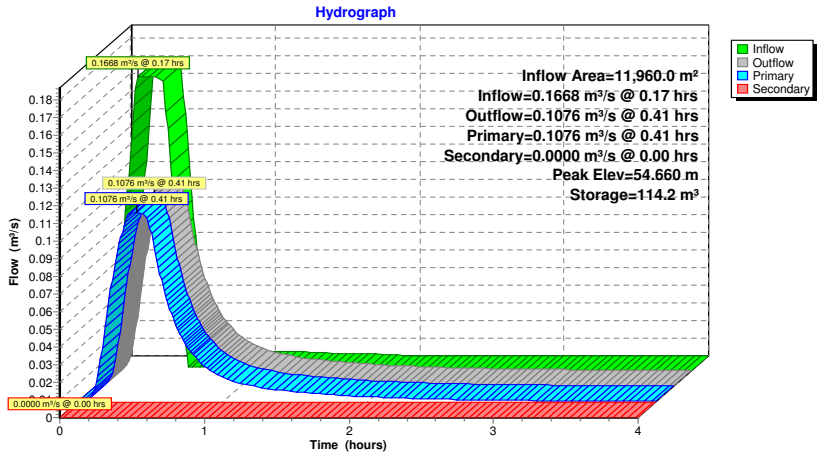
#2	Secondary	56.480 m	***Overflow Check**

Head (meters) 0.000 0.010
Disch. (m³/s) 0.00000 10.00000

Primary OutFlow Max=0.1076 m³/s @ 0.41 hrs HW=54.660 m (Free Discharge)
└**1=SHE-0408-1120-1430-1120_HydroBrake** (Custom Controls 0.1076 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=54.250 m (Free Discharge)
└**2=***Overflow Check** (Controls 0.0000 m³/s)

Pond 59P: Cistern

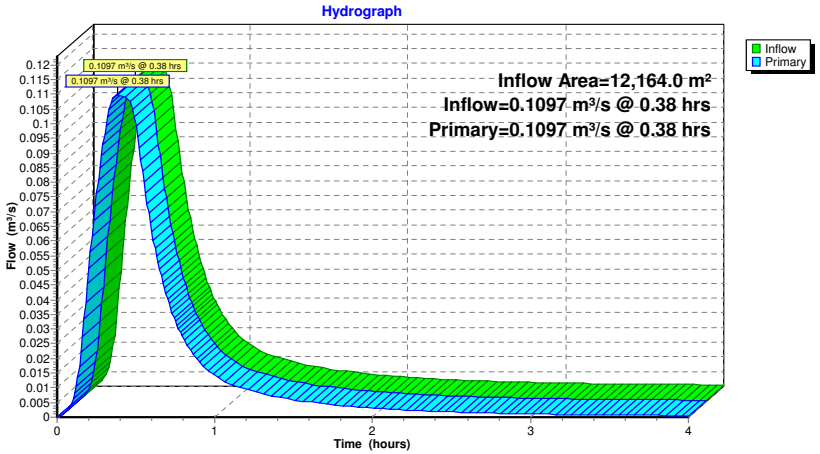


Summary for Link 51L: Site Release

Inflow Area = 12,164.0 m², Inflow Depth > 18 mm for 5-Year event
Inflow = 0.1097 m³/s @ 0.38 hrs, Volume= 220.0 m³
Primary = 0.1097 m³/s @ 0.38 hrs, Volume= 220.0 m³, Atten= 0%, Lag= 0.0 min

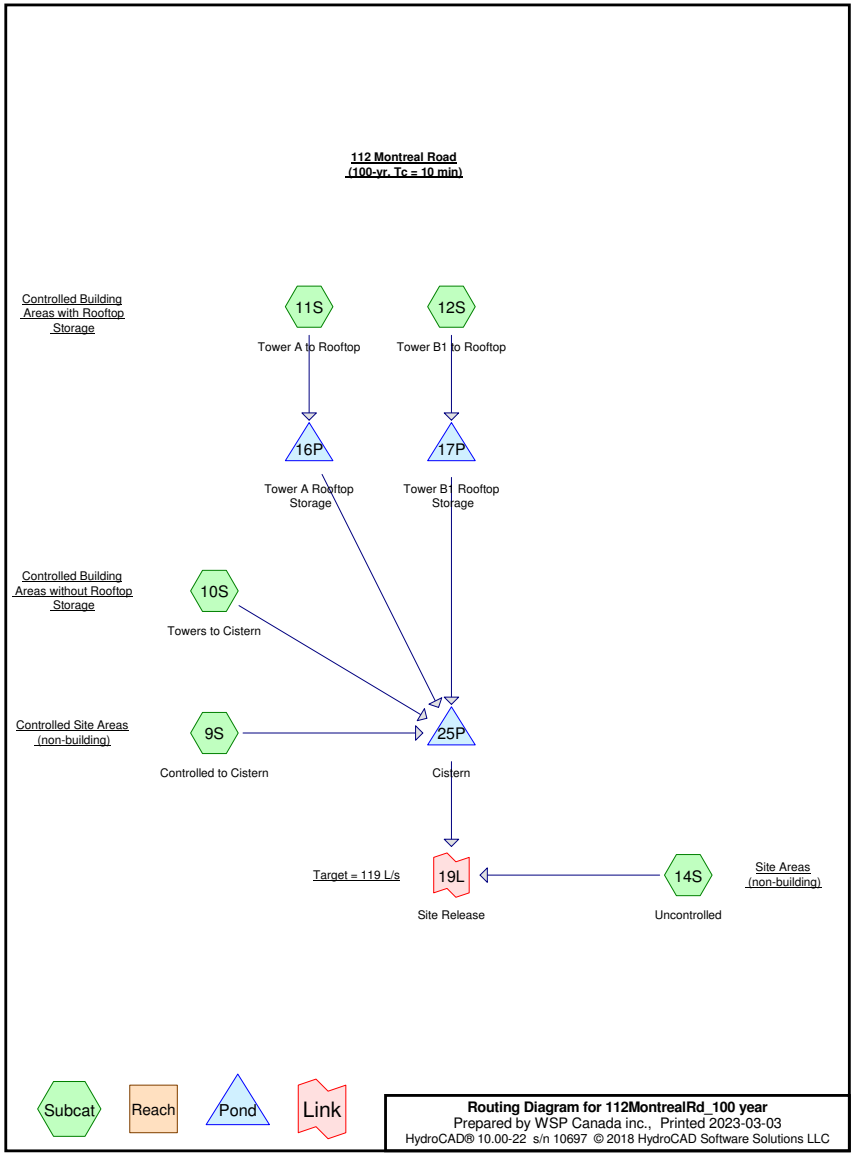
Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 51L: Site Release



APPENDIX

G-2 *100-YEAR ANALYSIS (PEAK DISCHARGE)*



Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
3,790.0	0.89	S03 (9S)
720.0	0.93	S04 (9S)
250.0	0.76	S05 (9S)
5,200.0	1.00	S06 (9S)
690.0	1.00	S07 (9S)
105.0	1.00	S08 (14S)
99.0	0.72	S09 (14S)
500.0	1.00	Tower A (10S, 11S)
810.0	1.00	Tower B1 (10S, 12S)
12,164.0	**0.95**	**TOTAL AREA**

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 9S: Controlled to Cistern Runoff Area=10,650.0 m² Runoff Depth=30 mm
Tc=10.0 min C=0.95 Runoff=0.4799 m³/s 314.9 m³

Subcatchment 10S: Towers to Cistern Runoff Area=637.0 m² Runoff Depth=31 mm
Tc=10.0 min C=1.00 Runoff=0.0302 m³/s 19.8 m³

Subcatchment 11S: Tower A to Rooftop Runoff Area=310.0 m² Runoff Depth=31 mm
Tc=10.0 min C=1.00 Runoff=0.0147 m³/s 9.6 m³

Subcatchment 12S: Tower B1 to Rooftop Runoff Area=363.0 m² Runoff Depth=31 mm
Tc=10.0 min C=1.00 Runoff=0.0172 m³/s 11.3 m³

Subcatchment 14S: Uncontrolled Runoff Area=204.0 m² Runoff Depth=27 mm
Tc=10.0 min C=0.86 Runoff=0.0083 m³/s 5.5 m³

Pond 16P: Tower A Rooftop Storage Peak Elev=100.072 m Storage=8.0 m³ Inflow=0.0147 m³/s 9.6 m³
Outflow=0.0015 m³/s 9.6 m³

Pond 17P: Tower B1 Rooftop Storage Peak Elev=100.122 m Storage=9.8 m³ Inflow=0.0172 m³/s 11.3 m³
Outflow=0.0012 m³/s 11.3 m³

Pond 25P: Cistern Peak Elev=55.237 m Storage=250.6 m³ Inflow=0.5129 m³/s 355.7 m³
Primary=0.1115 m³/s 350.0 m³ Secondary=0.0000 m³/s 0.0 m³ Outflow=0.1115 m³/s 350.0 m³

Link 19L: Site Release Inflow=0.1194 m³/s 355.5 m³
Primary=0.1194 m³/s 355.5 m³

Total Runoff Area = 12,164.0 m² Runoff Volume = 361.2 m³ Average Runoff Depth = 30 mm

Summary for Subcatchment 9S: Controlled to Cistern

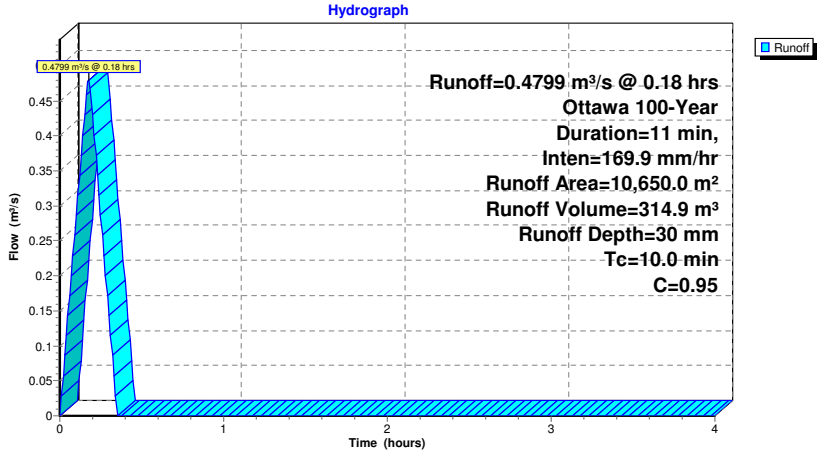
Runoff = 0.4799 m³/s @ 0.18 hrs, Volume= 314.9 m³, Depth= 30 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=11 min, Inten=169.9 mm/hr

Area (m²)	C	Description
3,790.0	0.89	S03
5,200.0	1.00	S06
720.0	0.93	S04
250.0	0.76	S05
690.0	1.00	S07
10,650.0	0.95	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Controlled to Cistern



Summary for Subcatchment 10S: Towers to Cistern

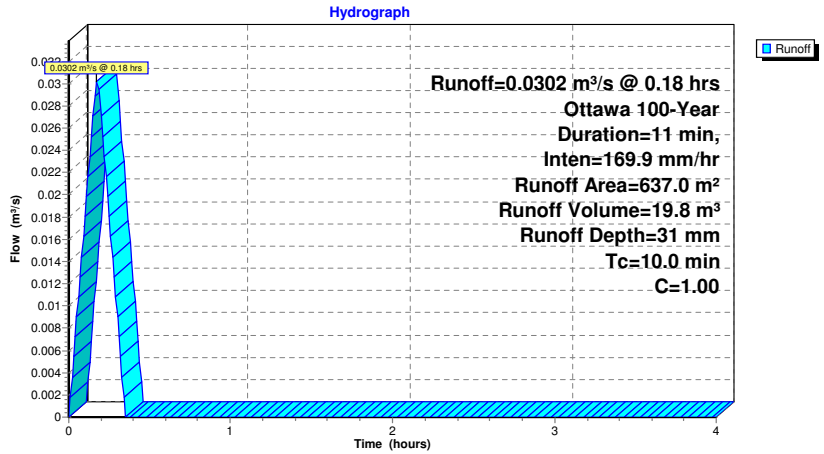
Runoff = 0.0302 m³/s @ 0.18 hrs, Volume= 19.8 m³, Depth= 31 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=11 min, Inten=169.9 mm/hr

Area (m²)	C	Description
190.0	1.00	Tower A
447.0	1.00	Tower B1
637.0	1.00	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Towers to Cistern



Summary for Subcatchment 11S: Tower A to Rooftop

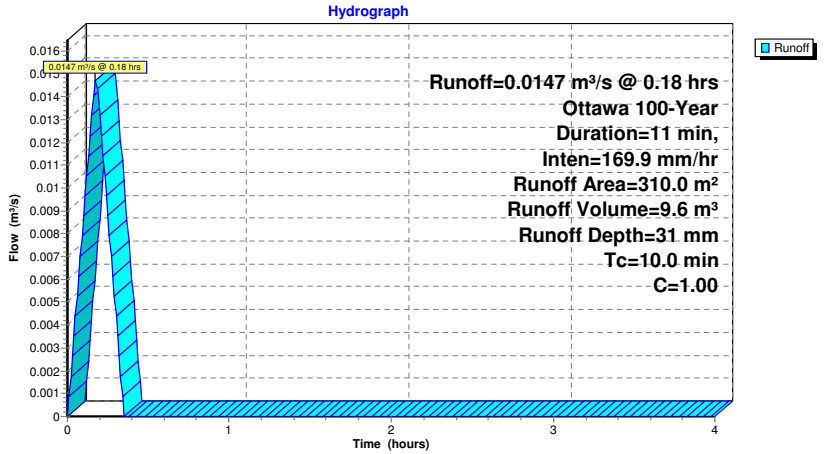
Runoff = 0.0147 m³/s @ 0.18 hrs, Volume= 9.6 m³, Depth= 31 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=11 min, Inten=169.9 mm/hr

Area (m²)	C	Description
310.0	1.00	Tower A

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 11S: Tower A to Rooftop



Summary for Subcatchment 12S: Tower B1 to Rooftop

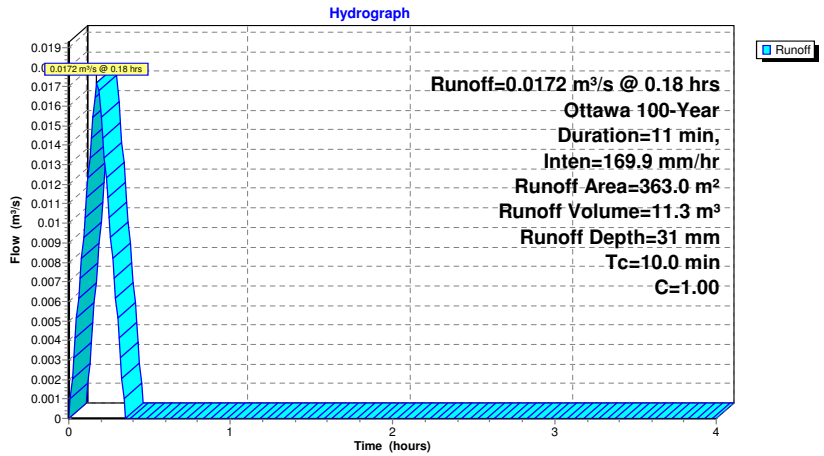
Runoff = 0.0172 m³/s @ 0.18 hrs, Volume= 11.3 m³, Depth= 31 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=11 min, Inten=169.9 mm/hr

Area (m²)	C	Description
363.0	1.00	Tower B1

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 12S: Tower B1 to Rooftop



Summary for Subcatchment 14S: Uncontrolled

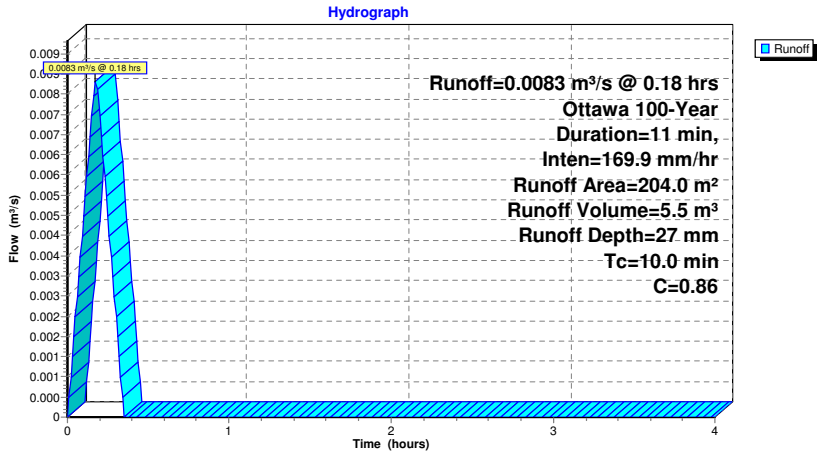
Runoff = 0.0083 m³/s @ 0.18 hrs, Volume= 5.5 m³, Depth= 27 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=11 min, Inten=169.9 mm/hr

Area (m²)	C	Description
99.0	0.72	S09
105.0	1.00	S08
204.0	0.86	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 14S: Uncontrolled



Summary for Pond 16P: Tower A Rooftop Storage

Inflow Area = 310.0 m², Inflow Depth = 31 mm for 100-Year event
Inflow = 0.0147 m³/s @ 0.18 hrs, Volume= 9.6 m³
Outflow = 0.0015 m³/s @ 0.09 hrs, Volume= 9.6 m³, Atten= 89%, Lag= 0.0 min
Primary = 0.0015 m³/s @ 0.09 hrs, Volume= 9.6 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.072 m @ 0.33 hrs Surf.Area= 222.6 m² Storage= 8.0 m³

Plug-Flow detention time= 44.1 min calculated for 9.6 m³ (100% of inflow)
Center-of-Mass det. time= 44.2 min (54.7 - 10.5)

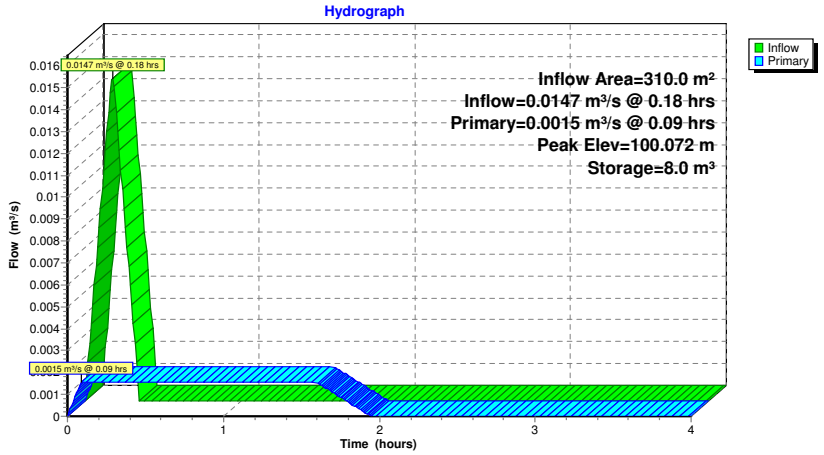
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	15.5 m³	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.100	62.0	3.1	3.1

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 5.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0015 m³/s @ 0.09 hrs HW=100.026 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0015 m³/s)

Pond 16P: Tower A Rooftop Storage



Summary for Pond 17P: Tower B1 Rooftop Storage

Inflow Area = 363.0 m², Inflow Depth = 31 mm for 100-Year event
Inflow = 0.0172 m³/s @ 0.18 hrs, Volume= 11.3 m³
Outflow = 0.0012 m³/s @ 0.03 hrs, Volume= 11.3 m³, Atten= 93%, Lag= 0.0 min
Primary = 0.0012 m³/s @ 0.03 hrs, Volume= 11.3 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.122 m @ 0.34 hrs Surf.Area= 241.0 m² Storage= 9.8 m³

Plug-Flow detention time= 66.1 min calculated for 11.3 m³ (100% of inflow)
Center-of-Mass det. time= 66.2 min (76.7 - 10.5)

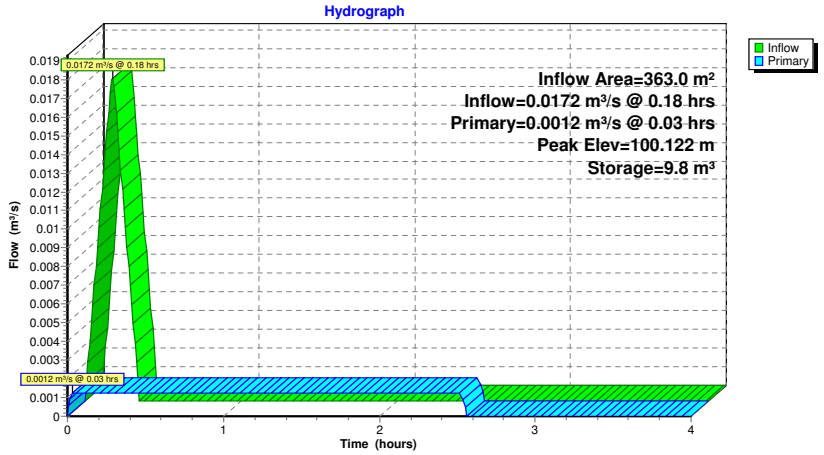
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	18.1 m³	**Custom Stage Data (Pyramidal)** Listed below (Recalc) x 4

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
100.000	0.0	0.0	0.0	0.0
100.150	90.7	4.5	4.5	90.7

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 4.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0012 m³/s @ 0.03 hrs HW=100.026 m (Free Discharge)
↳**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0012 m³/s)

Pond 17P: Tower B1 Rooftop Storage



Summary for Pond 25P: Cistern

Inflow Area = 11,960.0 m², Inflow Depth = 30 mm for 100-Year event
Inflow = 0.5129 m³/s @ 0.18 hrs, Volume= 355.7 m³
Outflow = 0.1115 m³/s @ 0.54 hrs, Volume= 350.0 m³, Atten= 78%, Lag= 21.9 min
Primary = 0.1115 m³/s @ 0.54 hrs, Volume= 350.0 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 55.237 m @ 0.32 hrs Surf.Area= 0.0 m² Storage= 250.6 m³

Plug-Flow detention time= 28.7 min calculated for 350.0 m³ (98% of inflow)
Center-of-Mass det. time= 27.0 min (40.8 - 13.8)

Volume	Invert	Avail.Storage	Storage Description
#1	54.250 m	314.5 m³	**Custom Stage Data** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
54.250	0.0
54.280	7.4
54.350	29.3
54.460	58.2
54.560	86.5
54.660	114.3
54.760	141.3
54.860	167.5
54.960	192.5
55.070	216.1
55.170	238.0
55.270	256.9
55.370	272.1
55.470	286.2
55.570	300.4
55.680	314.5

Device	Routing	Invert	Outlet Devices
#1	Primary	54.250 m	**SHE-0408-1120-1430-1120_HydroBrake**

Head (meters) 0.000 0.014 0.029 0.043 0.058 0.072 0.087 0.101 0.116 0.130 0.144 0.159 0.173 0.188 0.202 0.217 0.231 0.246 0.260 0.274 0.289 0.303 0.318 0.332 0.347 0.361 0.376 0.390 0.404 0.419 0.433 0.448 0.462 0.477 0.491 0.506 0.520 0.534 0.549 0.563 0.578 0.592 0.607 0.621 0.636 0.650 0.664 0.679 0.693 0.708 0.722 0.737 0.751 0.766 0.780 0.794 0.809 0.823 0.838 0.852 0.867 0.881 0.896 0.910 0.924 0.939 0.953 0.968 0.982 0.997 1.011 1.026 1.040 1.054 1.069 1.083 1.098 1.112 1.127 1.141 1.156 1.170 1.184 1.199 1.213 1.228 1.242 1.257 1.271 1.286 1.300 1.314 1.329 1.343 1.358 1.372 1.387 1.401 1.416 1.430 1.459 1.487 1.516 1.544 1.573 1.602 1.630 1.659 1.687 1.716
Disch. (m³/s) 0.00000 0.00025 0.00099 0.00220 0.00386 0.00596

0.00847 0.01137 0.01465 0.01827 0.02221 0.02646 0.03097 0.03574 0.04072 0.04588 0.05120 0.05663 0.06214 0.06769 0.07323 0.07874 0.08430 0.08953 0.09447 0.09917 0.10365 0.10677 0.10741 0.10800 0.10853 0.10901 0.10944 0.10982 0.11016 0.11045 0.11070 0.11092 0.11109 0.11123 0.11134 0.11142 0.11146 0.11148 0.11147 0.11144 0.11138 0.11131 0.11121 0.11109 0.11095 0.11080 0.11062 0.11043 0.11022 0.11000 0.10976 0.10950 0.10923 0.10893 0.10862 0.10829 0.10793 0.10755 0.10715 0.10672 0.10626 0.10577 0.10525 0.10469 0.10408 0.10344 0.10275 0.10200 0.10121 0.10035 0.09943 0.09904 0.09966 0.10028 0.10089 0.10150 0.10211 0.10271 0.10331 0.10390 0.10450 0.10508 0.10567 0.10625 0.10683 0.10740 0.10797 0.10854 0.10911 0.10967 0.11023 0.11078 0.11134 0.11189 0.11292 0.11396 0.11500 0.11604 0.11707 0.11811 0.11915 0.12018 0.12122 0.12226

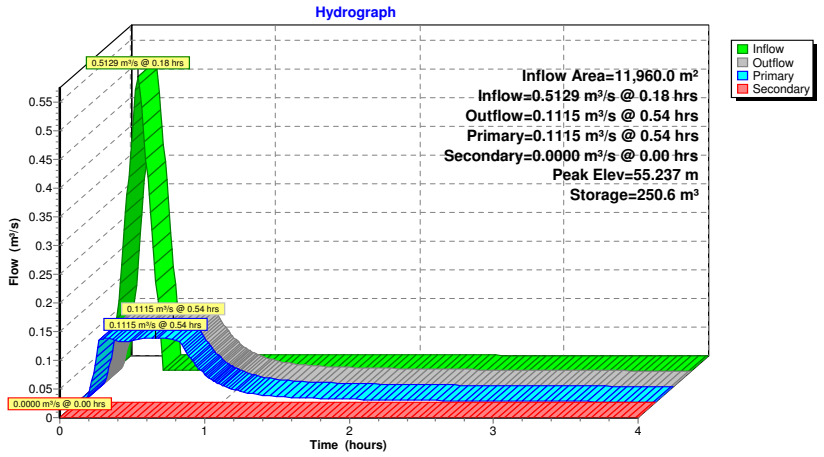
#2	Secondary	56.480 m	***Overflow Check**

Head (meters) 0.000 0.010
Disch. (m³/s) 0.00000 10.00000

Primary OutFlow Max=0.1115 m³/s @ 0.54 hrs HW=54.874 m (Free Discharge)
└**1=SHE-0408-1120-1430-1120_HydroBrake** (Custom Controls 0.1115 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=54.250 m (Free Discharge)
└**2=***Overflow Check** (Controls 0.0000 m³/s)

Pond 25P: Cistern

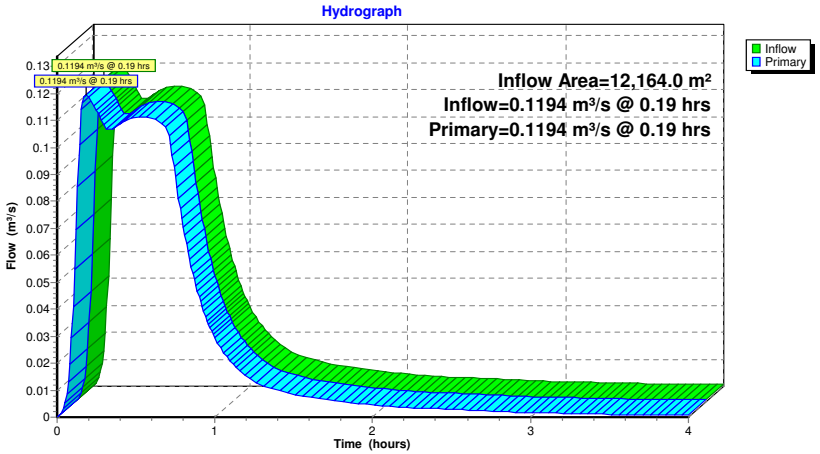


Summary for Link 19L: Site Release

Inflow Area = 12,164.0 m², Inflow Depth > 29 mm for 100-Year event
Inflow = 0.1194 m³/s @ 0.19 hrs, Volume= 355.5 m³
Primary = 0.1194 m³/s @ 0.19 hrs, Volume= 355.5 m³, Atten= 0%, Lag= 0.0 min

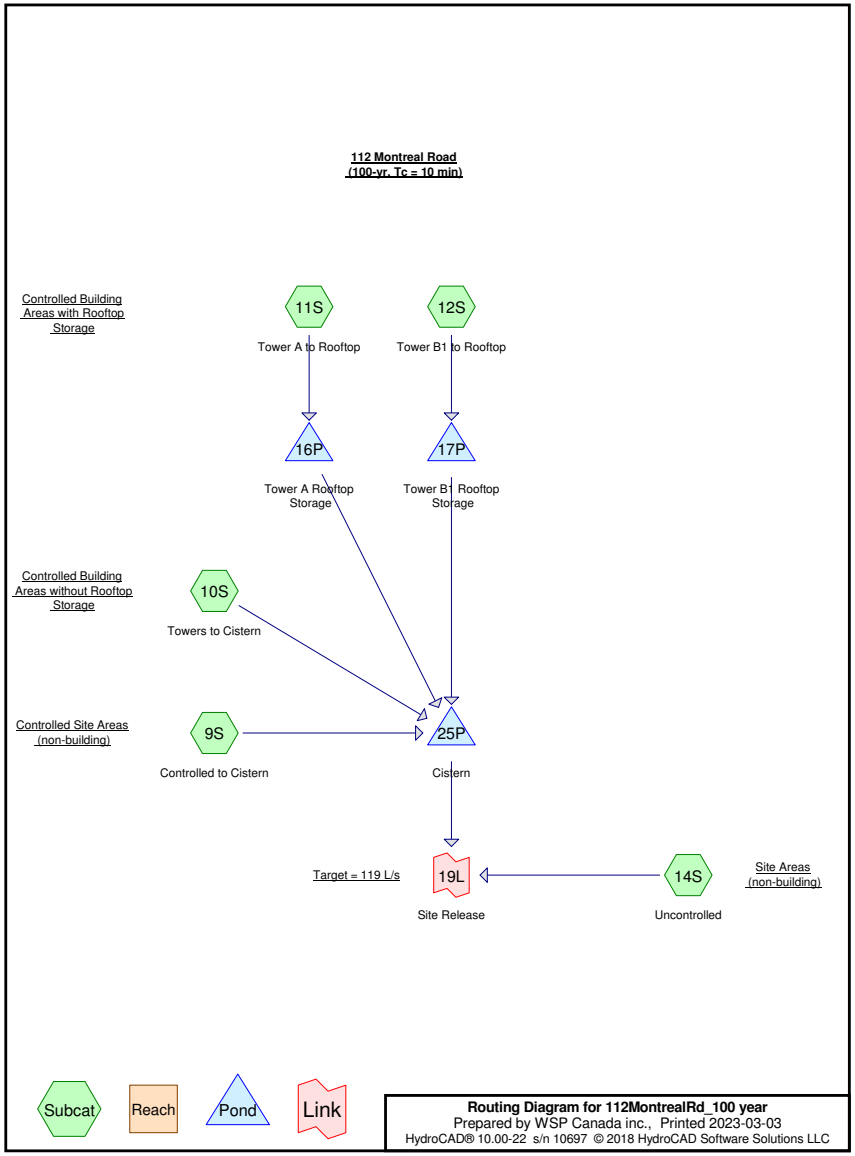
Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 19L: Site Release



APPENDIX

G-3 *100-YEAR ANALYSIS (PEAK CHAMBER STORAGE)*



Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
3,790.0	0.89	S03 (9S)
720.0	0.93	S04 (9S)
250.0	0.76	S05 (9S)
5,200.0	1.00	S06 (9S)
690.0	1.00	S07 (9S)
105.0	1.00	S08 (14S)
99.0	0.72	S09 (14S)
500.0	1.00	Tower A (10S, 11S)
810.0	1.00	Tower B1 (10S, 12S)
12,164.0	**0.95**	**TOTAL AREA**

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 9S: Controlled to Cistern Runoff Area=10,650.0 m² Runoff Depth=44 mm
Tc=10.0 min C=0.95 Runoff=0.2582 m³/s 464.7 m³

Subcatchment 10S: Towers to Cistern Runoff Area=637.0 m² Runoff Depth=46 mm
Tc=10.0 min C=1.00 Runoff=0.0163 m³/s 29.3 m³

Subcatchment 11S: Tower A to Rooftop Runoff Area=310.0 m² Runoff Depth=46 mm
Tc=10.0 min C=1.00 Runoff=0.0079 m³/s 14.2 m³

Subcatchment 12S: Tower B1 to Rooftop Runoff Area=363.0 m² Runoff Depth=46 mm
Tc=10.0 min C=1.00 Runoff=0.0093 m³/s 16.7 m³

Subcatchment 14S: Uncontrolled Runoff Area=204.0 m² Runoff Depth=40 mm
Tc=10.0 min C=0.86 Runoff=0.0045 m³/s 8.1 m³

Pond 16P: Tower A Rooftop Storage Peak Elev=100.084 m Storage=11.0 m³ Inflow=0.0079 m³/s 14.2 m³
Outflow=0.0015 m³/s 14.2 m³

Pond 17P: Tower B1 Rooftop Storage Peak Elev=100.137 m Storage=13.8 m³ Inflow=0.0093 m³/s 16.7 m³
Outflow=0.0012 m³/s 16.7 m³

Pond 25P: Cistern Peak Elev=55.660 m Storage=311.9 m³ Inflow=0.2772 m³/s 524.9 m³
Primary=0.1115 m³/s 515.7 m³ Secondary=0.0000 m³/s 0.0 m³ Outflow=0.1115 m³/s 515.7 m³

Link 19L: Site Release Inflow=0.1160 m³/s 523.8 m³
Primary=0.1160 m³/s 523.8 m³

Total Runoff Area = 12,164.0 m² Runoff Volume = 533.0 m³ Average Runoff Depth = 44 mm

Summary for Subcatchment 9S: Controlled to Cistern

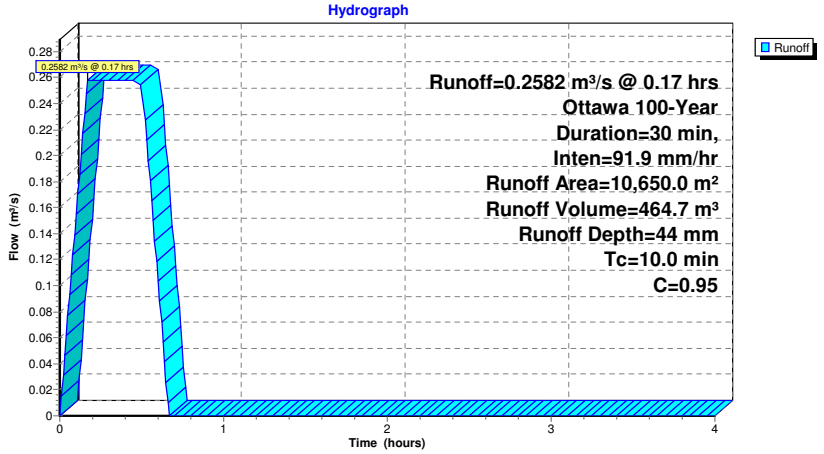
Runoff = 0.2582 m³/s @ 0.17 hrs, Volume= 464.7 m³, Depth= 44 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
3,790.0	0.89	S03
5,200.0	1.00	S06
720.0	0.93	S04
250.0	0.76	S05
690.0	1.00	S07
10,650.0	0.95	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Controlled to Cistern



Summary for Subcatchment 10S: Towers to Cistern

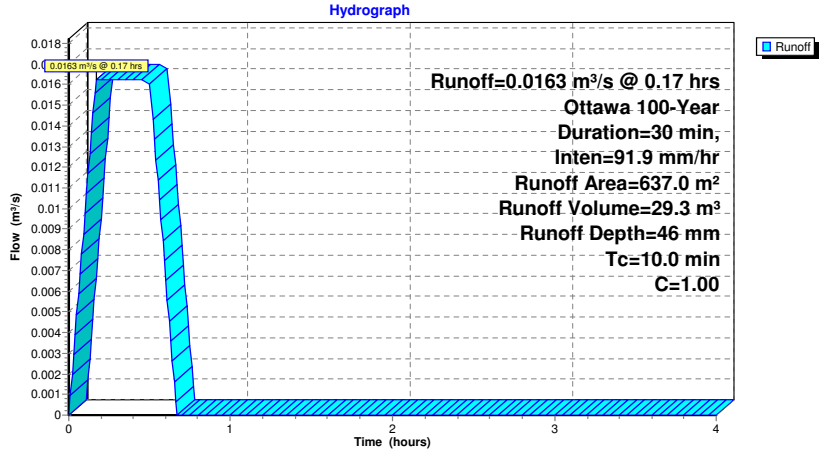
Runoff = 0.0163 m³/s @ 0.17 hrs, Volume= 29.3 m³, Depth= 46 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
190.0	1.00	Tower A
447.0	1.00	Tower B1
637.0	1.00	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Towers to Cistern



Summary for Subcatchment 11S: Tower A to Rooftop

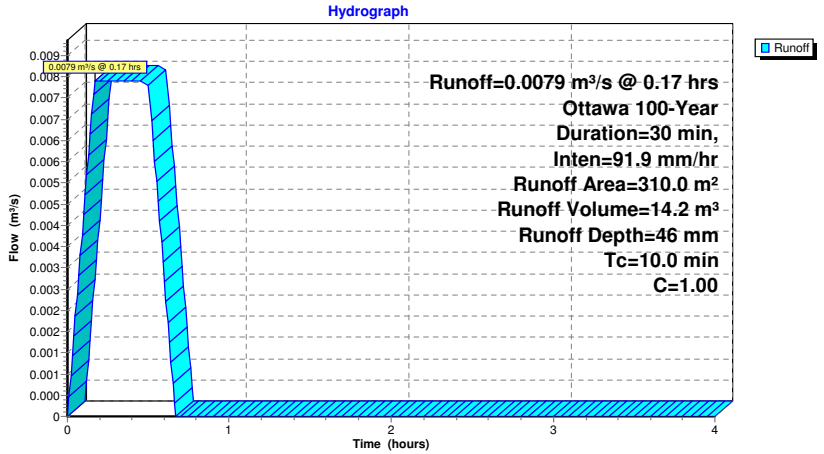
Runoff = 0.0079 m³/s @ 0.17 hrs, Volume= 14.2 m³, Depth= 46 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
310.0	1.00	Tower A

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 11S: Tower A to Rooftop



Summary for Subcatchment 12S: Tower B1 to Rooftop

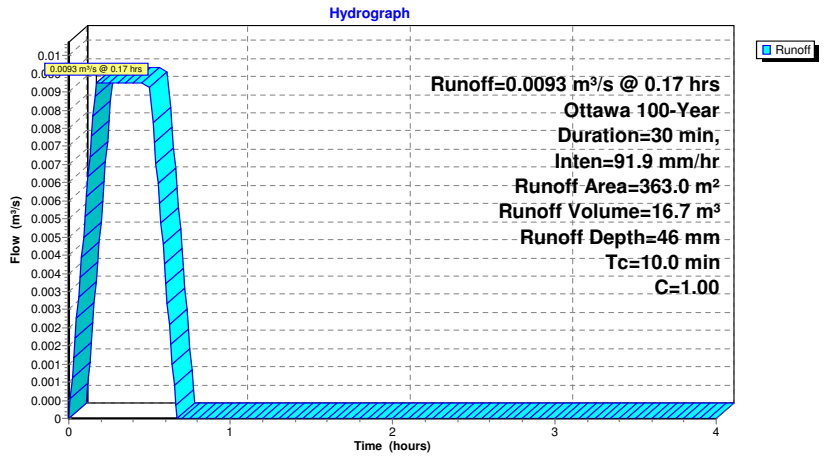
Runoff = 0.0093 m³/s @ 0.17 hrs, Volume= 16.7 m³, Depth= 46 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
363.0	1.00	Tower B1

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 12S: Tower B1 to Rooftop



Summary for Subcatchment 14S: Uncontrolled

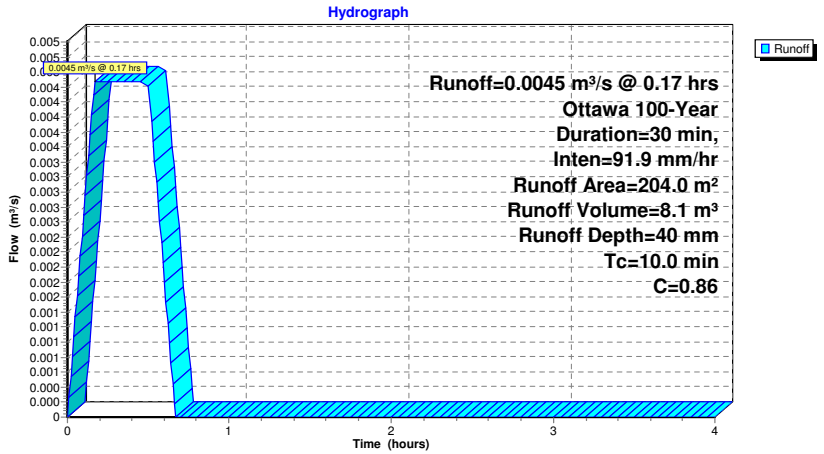
Runoff = 0.0045 m³/s @ 0.17 hrs, Volume= 8.1 m³, Depth= 40 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
99.0	0.72	S09
105.0	1.00	S08
204.0	0.86	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 14S: Uncontrolled



Summary for Pond 16P: Tower A Rooftop Storage

Inflow Area = 310.0 m², Inflow Depth = 46 mm for 100-Year event
Inflow = 0.0079 m³/s @ 0.17 hrs, Volume= 14.2 m³
Outflow = 0.0015 m³/s @ 0.13 hrs, Volume= 14.2 m³, Atten= 80%, Lag= 0.0 min
Primary = 0.0015 m³/s @ 0.13 hrs, Volume= 14.2 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.084 m @ 0.63 hrs Surf.Area= 260.6 m² Storage= 11.0 m³

Plug-Flow detention time= 60.2 min calculated for 14.2 m³ (100% of inflow)
Center-of-Mass det. time= 60.4 min (80.4 - 20.0)

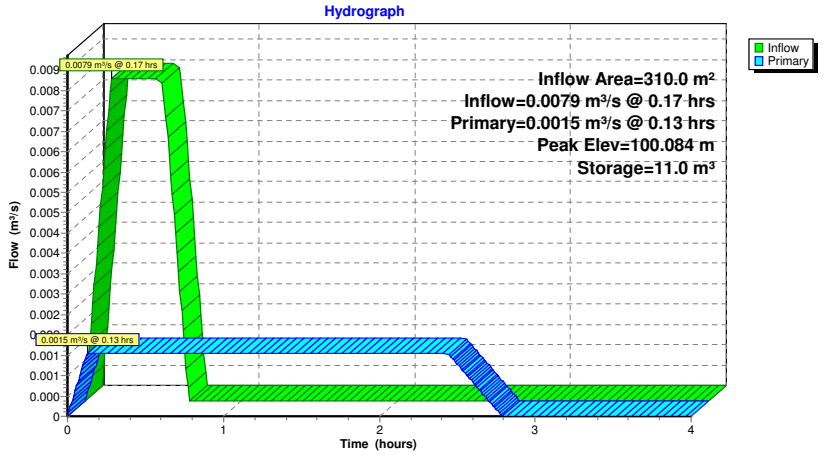
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	15.5 m³	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.100	62.0	3.1	3.1

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 5.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0015 m³/s @ 0.13 hrs HW=100.026 m (Free Discharge)
↳**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0015 m³/s)

Pond 16P: Tower A Rooftop Storage



Summary for Pond 17P: Tower B1 Rooftop Storage

Inflow Area = 363.0 m², Inflow Depth = 46 mm for 100-Year event
Inflow = 0.0093 m³/s @ 0.17 hrs, Volume= 16.7 m³
Outflow = 0.0012 m³/s @ 0.05 hrs, Volume= 16.7 m³, Atten= 87%, Lag= 0.0 min
Primary = 0.0012 m³/s @ 0.05 hrs, Volume= 16.7 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.137 m @ 0.64 hrs Surf.Area= 302.8 m² Storage= 13.8 m³

Plug-Flow detention time= 93.0 min calculated for 16.6 m³ (100% of inflow)
Center-of-Mass det. time= 93.3 min (113.3 - 20.0)

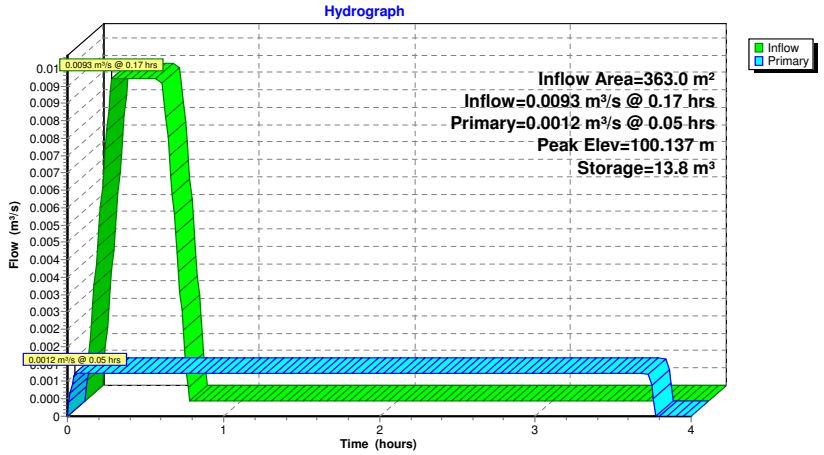
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	18.1 m³	**Custom Stage Data (Pyramidal)** Listed below (Recalc) x 4

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
100.000	0.0	0.0	0.0	0.0
100.150	90.7	4.5	4.5	90.7

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 4.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0012 m³/s @ 0.05 hrs HW=100.028 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0012 m³/s)

Pond 17P: Tower B1 Rooftop Storage



Summary for Pond 25P: Cistern

Inflow Area = 11,960.0 m², Inflow Depth = 44 mm for 100-Year event
Inflow = 0.2772 m³/s @ 0.17 hrs, Volume= 524.9 m³
Outflow = 0.1115 m³/s @ 0.32 hrs, Volume= 515.7 m³, Atten= 60%, Lag= 9.0 min
Primary = 0.1115 m³/s @ 0.32 hrs, Volume= 515.7 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 55.660 m @ 0.60 hrs Surf.Area= 0.0 m² Storage= 311.9 m³

Plug-Flow detention time= 31.9 min calculated for 514.4 m³ (98% of inflow)
Center-of-Mass det. time= 29.5 min (54.1 - 24.6)

Volume	Invert	Avail.Storage	Storage Description
#1	54.250 m	314.5 m³	**Custom Stage Data** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
54.250	0.0
54.280	7.4
54.350	29.3
54.460	58.2
54.560	86.5
54.660	114.3
54.760	141.3
54.860	167.5
54.960	192.5
55.070	216.1
55.170	238.0
55.270	256.9
55.370	272.1
55.470	286.2
55.570	300.4
55.680	314.5

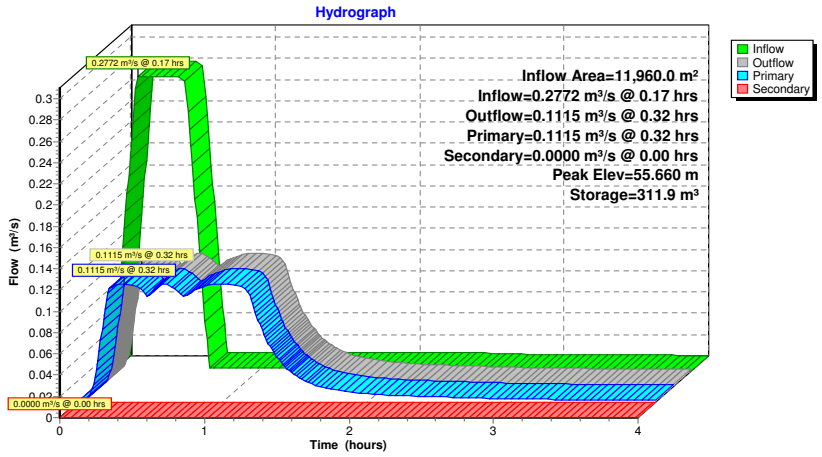
Device	Routing	Invert	Outlet Devices
#1	Primary	54.250 m	**SHE-0408-1120-1430-1120_HydroBrake**
			Head (meters) 0.000 0.014 0.029 0.043 0.058 0.072 0.087 0.101
			0.116 0.130 0.144 0.159 0.173 0.188 0.202 0.217 0.231 0.246
			0.260 0.274 0.289 0.303 0.318 0.332 0.347 0.361 0.376 0.390
			0.404 0.419 0.433 0.448 0.462 0.477 0.491 0.506 0.520 0.534
			0.549 0.563 0.578 0.592 0.607 0.621 0.636 0.650 0.664 0.679
			0.693 0.708 0.722 0.737 0.751 0.766 0.780 0.794 0.809 0.823
			0.838 0.852 0.867 0.881 0.896 0.910 0.924 0.939 0.953 0.968
			0.982 0.997 1.011 1.026 1.040 1.054 1.069 1.083 1.098 1.112
			1.127 1.141 1.156 1.170 1.184 1.199 1.213 1.228 1.242 1.257
			1.271 1.286 1.300 1.314 1.329 1.343 1.358 1.372 1.387 1.401
			1.416 1.430 1.459 1.487 1.516 1.544 1.573 1.602 1.630 1.659
			1.687 1.716
			Disch. (m³/s) 0.00000 0.00025 0.00099 0.00220 0.00386 0.00596

			0.00847 0.01137 0.01465 0.01827 0.02221 0.02646 0.03097
			0.03574 0.04072 0.04588 0.05120 0.05663 0.06214 0.06769
			0.07323 0.07874 0.08430 0.08953 0.09447 0.09917 0.10365
			0.10677 0.10741 0.10800 0.10853 0.10901 0.10944 0.10982
			0.11016 0.11045 0.11070 0.11092 0.11109 0.11123 0.11134
			0.11142 0.11146 0.11148 0.11147 0.11144 0.11138 0.11131
			0.11121 0.11109 0.11095 0.11080 0.11062 0.11043 0.11022
			0.11000 0.10976 0.10950 0.10923 0.10893 0.10862 0.10829
			0.10793 0.10755 0.10715 0.10672 0.10626 0.10577 0.10525
			0.10469 0.10408 0.10344 0.10275 0.10200 0.10121 0.10035
			0.09943 0.09904 0.09966 0.10028 0.10089 0.10150 0.10211
			0.10271 0.10331 0.10390 0.10450 0.10508 0.10567 0.10625
			0.10683 0.10740 0.10797 0.10854 0.10911 0.10967 0.11023
			0.11078 0.11134 0.11189 0.11292 0.11396 0.11500 0.11604
			0.11707 0.11811 0.11915 0.12018 0.12122 0.12226
#2	Secondary	56.480 m	***Overflow Check
			Head (meters) 0.000 0.010
			Disch. (m³/s) 0.00000 10.00000

Primary OutFlow Max=0.1115 m³/s @ 0.32 hrs HW=54.874 m (Free Discharge)
└**1=SHE-0408-1120-1430-1120_HydroBrake** (Custom Controls 0.1115 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=54.250 m (Free Discharge)
└**2=***Overflow Check** (Controls 0.0000 m³/s)

Pond 25P: Cistern

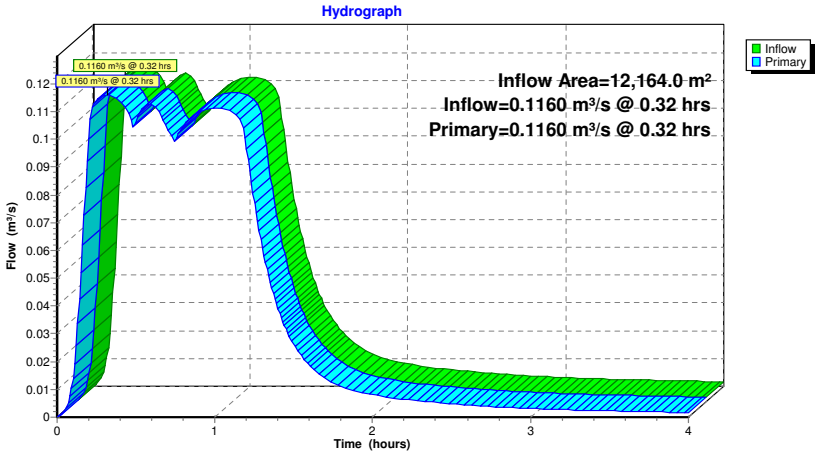


Summary for Link 19L: Site Release

Inflow Area = 12,164.0 m², Inflow Depth > 43 mm for 100-Year event
Inflow = 0.1160 m³/s @ 0.32 hrs, Volume= 523.8 m³
Primary = 0.1160 m³/s @ 0.32 hrs, Volume= 523.8 m³, Atten= 0%, Lag= 0.0 min

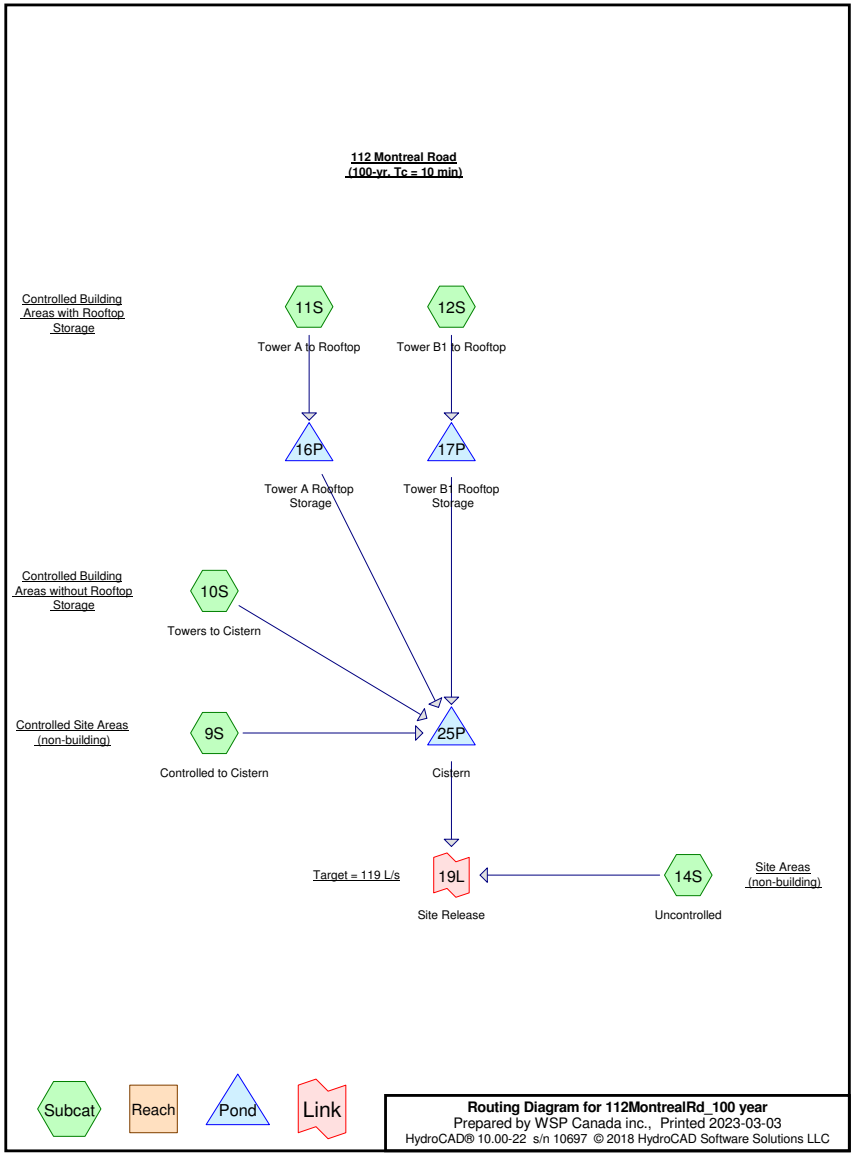
Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 19L: Site Release



APPENDIX

G-4 *100-YEAR ANALYSIS (PEAK ROOF STORAGE)*



Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
3,790.0	0.89	S03 (9S)
720.0	0.93	S04 (9S)
250.0	0.76	S05 (9S)
5,200.0	1.00	S06 (9S)
690.0	1.00	S07 (9S)
105.0	1.00	S08 (14S)
99.0	0.72	S09 (14S)
500.0	1.00	Tower A (10S, 11S)
810.0	1.00	Tower B1 (10S, 12S)
12,164.0	**0.95**	**TOTAL AREA**

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 9S: Controlled to Cistern Runoff Area=10,650.0 m² Runoff Depth=51 mm
Tc=10.0 min C=0.95 Runoff=0.1771 m³/s 542.1 m³

Subcatchment 10S: Towers to Cistern Runoff Area=637.0 m² Runoff Depth=54 mm
Tc=10.0 min C=1.00 Runoff=0.0112 m³/s 34.1 m³

Subcatchment 11S: Tower A to Rooftop Runoff Area=310.0 m² Runoff Depth=54 mm
Tc=10.0 min C=1.00 Runoff=0.0054 m³/s 16.6 m³

Subcatchment 12S: Tower B1 to Rooftop Runoff Area=363.0 m² Runoff Depth=54 mm
Tc=10.0 min C=1.00 Runoff=0.0064 m³/s 19.4 m³

Subcatchment 14S: Uncontrolled Runoff Area=204.0 m² Runoff Depth=46 mm
Tc=10.0 min C=0.86 Runoff=0.0031 m³/s 9.4 m³

Pond 16P: Tower A Rooftop Storage Peak Elev=100.086 m Storage=11.5 m³ Inflow=0.0054 m³/s 16.6 m³
Outflow=0.0015 m³/s 16.6 m³

Pond 17P: Tower B1 Rooftop Storage Peak Elev=100.141 m Storage=15.1 m³ Inflow=0.0064 m³/s 19.4 m³
Outflow=0.0012 m³/s 17.8 m³

Pond 25P: Cistern Peak Elev=55.451 m Storage=283.5 m³ Inflow=0.1911 m³/s 610.6 m³
Primary=0.1115 m³/s 599.5 m³ Secondary=0.0000 m³/s 0.0 m³ Outflow=0.1115 m³/s 599.5 m³

Link 19L: Site Release Inflow=0.1145 m³/s 608.9 m³
Primary=0.1145 m³/s 608.9 m³

Total Runoff Area = 12,164.0 m² Runoff Volume = 621.7 m³ Average Runoff Depth = 51 mm

Summary for Subcatchment 9S: Controlled to Cistern

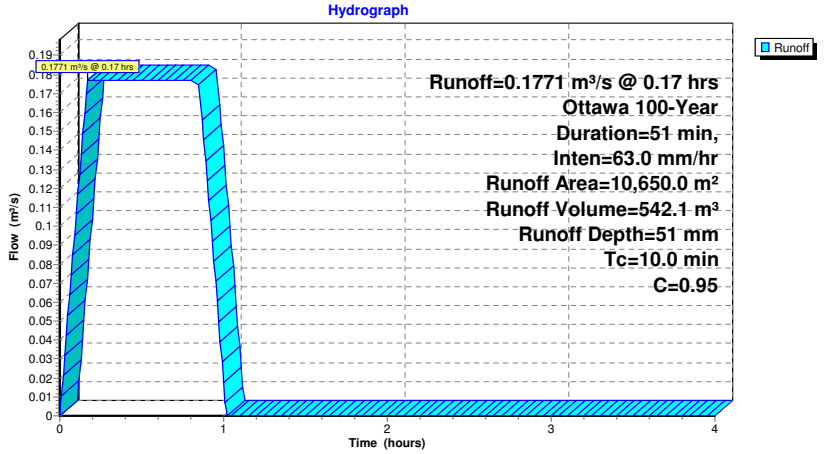
Runoff = 0.1771 m³/s @ 0.17 hrs, Volume= 542.1 m³, Depth= 51 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=51 min, Inten=63.0 mm/hr

Area (m²)	C	Description
3,790.0	0.89	S03
5,200.0	1.00	S06
720.0	0.93	S04
250.0	0.76	S05
690.0	1.00	S07
10,650.0	0.95	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Controlled to Cistern



Summary for Subcatchment 10S: Towers to Cistern

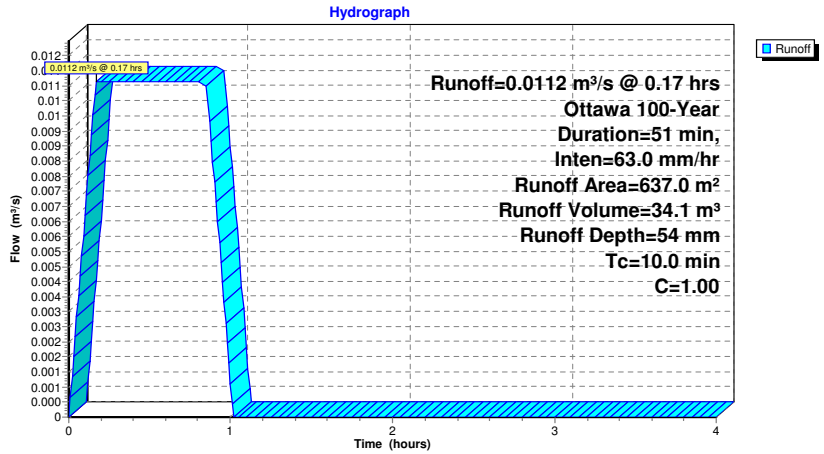
Runoff = 0.0112 m³/s @ 0.17 hrs, Volume= 34.1 m³, Depth= 54 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=51 min, Inten=63.0 mm/hr

Area (m²)	C	Description
190.0	1.00	Tower A
447.0	1.00	Tower B1
637.0	1.00	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Towers to Cistern



Summary for Subcatchment 11S: Tower A to Rooftop

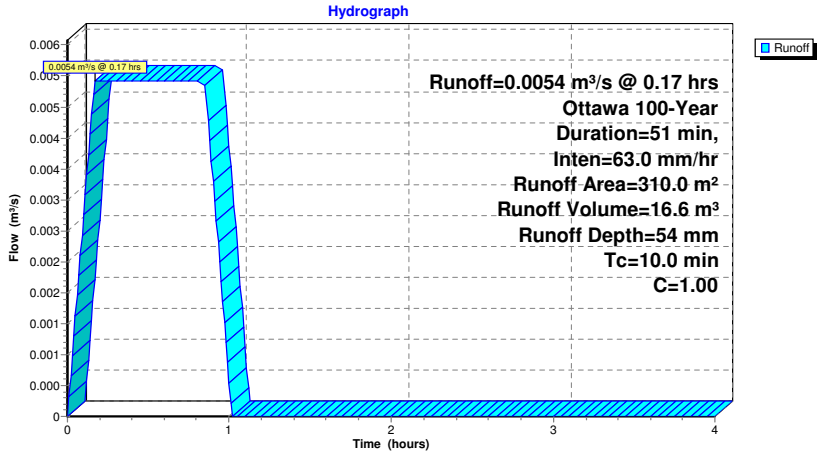
Runoff = 0.0054 m³/s @ 0.17 hrs, Volume= 16.6 m³, Depth= 54 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=51 min, Inten=63.0 mm/hr

Area (m²)	C	Description
310.0	1.00	Tower A

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 11S: Tower A to Rooftop



Summary for Subcatchment 12S: Tower B1 to Rooftop

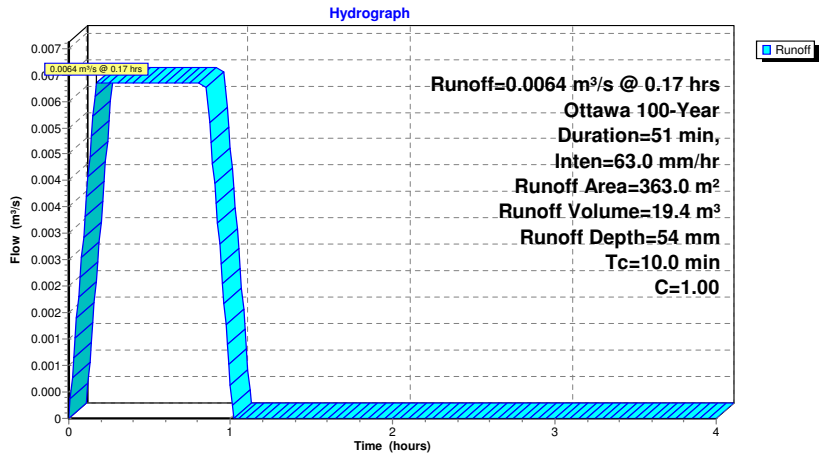
Runoff = 0.0064 m³/s @ 0.17 hrs, Volume= 19.4 m³, Depth= 54 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=51 min, Inten=63.0 mm/hr

Area (m²)	C	Description
363.0	1.00	Tower B1

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 12S: Tower B1 to Rooftop



Summary for Subcatchment 14S: Uncontrolled

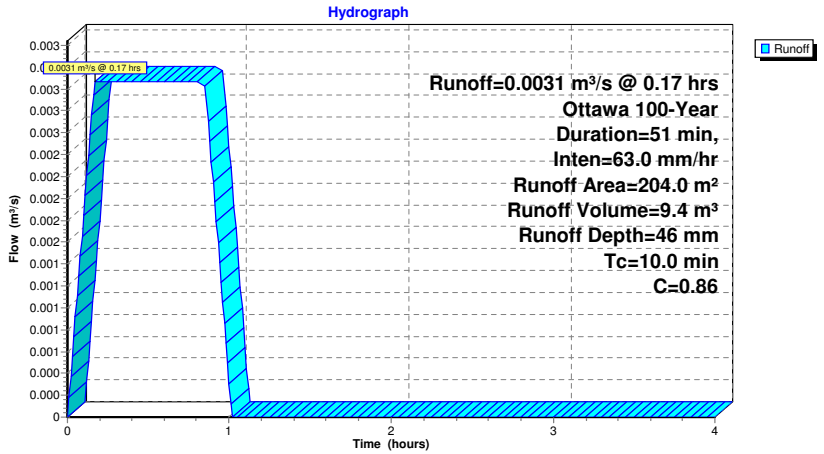
Runoff = 0.0031 m³/s @ 0.17 hrs, Volume= 9.4 m³, Depth= 46 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=51 min, Inten=63.0 mm/hr

Area (m²)	C	Description
99.0	0.72	S09
105.0	1.00	S08
204.0	0.86	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 14S: Uncontrolled



Summary for Pond 16P: Tower A Rooftop Storage

Inflow Area = 310.0 m², Inflow Depth = 54 mm for 100-Year event
Inflow = 0.0054 m³/s @ 0.17 hrs, Volume= 16.6 m³
Outflow = 0.0015 m³/s @ 0.16 hrs, Volume= 16.6 m³, Atten= 71%, Lag= 0.0 min
Primary = 0.0015 m³/s @ 0.16 hrs, Volume= 16.6 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.086 m @ 0.97 hrs Surf.Area= 267.0 m² Storage= 11.5 m³

Plug-Flow detention time= 63.5 min calculated for 16.6 m³ (100% of inflow)
Center-of-Mass det. time= 63.5 min (94.0 - 30.5)

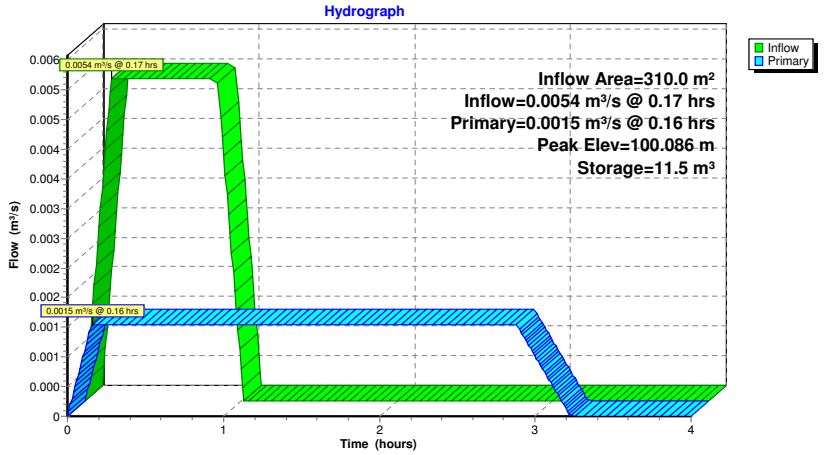
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	15.5 m³	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.100	62.0	3.1	3.1

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 5.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0015 m³/s @ 0.16 hrs HW=100.026 m (Free Discharge)
↳**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0015 m³/s)

Pond 16P: Tower A Rooftop Storage



Summary for Pond 17P: Tower B1 Rooftop Storage

Inflow Area = 363.0 m², Inflow Depth = 54 mm for 100-Year event
Inflow = 0.0064 m³/s @ 0.17 hrs, Volume= 19.4 m³
Outflow = 0.0012 m³/s @ 0.06 hrs, Volume= 17.8 m³, Atten= 80%, Lag= 0.0 min
Primary = 0.0012 m³/s @ 0.06 hrs, Volume= 17.8 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.141 m @ 0.98 hrs Surf.Area= 321.0 m² Storage= 15.1 m³

Plug-Flow detention time= 92.5 min calculated for 17.7 m³ (91% of inflow)
Center-of-Mass det. time= 90.4 min (120.9 - 30.5)

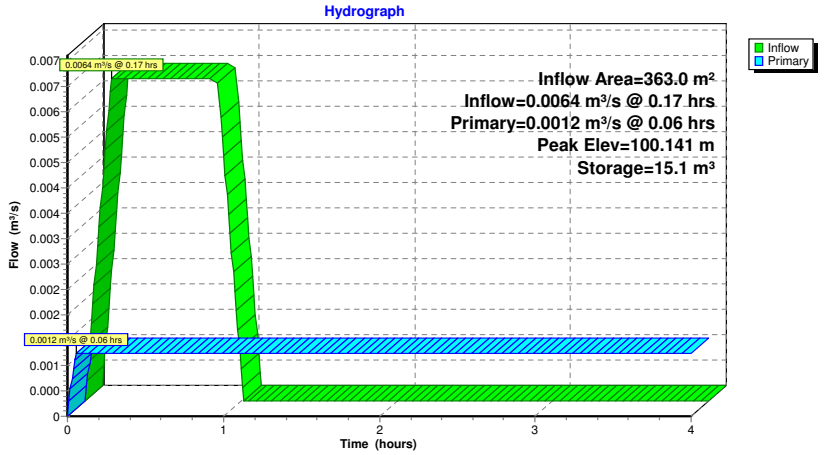
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	18.1 m³	**Custom Stage Data (Pyramidal)** Listed below (Recalc) x 4

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
100.000	0.0	0.0	0.0	0.0
100.150	90.7	4.5	4.5	90.7

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 4.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0012 m³/s @ 0.06 hrs HW=100.026 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0012 m³/s)

Pond 17P: Tower B1 Rooftop Storage



Summary for Pond 25P: Cistern

Inflow Area = 11,960.0 m², Inflow Depth > 51 mm for 100-Year event
Inflow = 0.1911 m³/s @ 0.17 hrs, Volume= 610.6 m³
Outflow = 0.1115 m³/s @ 1.27 hrs, Volume= 599.5 m³, Atten= 42%, Lag= 66.1 min
Primary = 0.1115 m³/s @ 1.27 hrs, Volume= 599.5 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 55.451 m @ 0.93 hrs Surf.Area= 0.0 m² Storage= 283.5 m³

Plug-Flow detention time= 29.9 min calculated for 599.5 m³ (98% of inflow)
Center-of-Mass det. time= 27.2 min (62.1 - 34.9)

Volume	Invert	Avail.Storage	Storage Description
#1	54.250 m	314.5 m³	**Custom Stage Data** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
54.250	0.0
54.280	7.4
54.350	29.3
54.460	58.2
54.560	86.5
54.660	114.3
54.760	141.3
54.860	167.5
54.960	192.5
55.070	216.1
55.170	238.0
55.270	256.9
55.370	272.1
55.470	286.2
55.570	300.4
55.680	314.5

Device	Routing	Invert	Outlet Devices
#1	Primary	54.250 m	**SHE-0408-1120-1430-1120_HydroBrake**

Head (meters) 0.000 0.014 0.029 0.043 0.058 0.072 0.087 0.101 0.116 0.130 0.144 0.159 0.173 0.188 0.202 0.217 0.231 0.246 0.260 0.274 0.289 0.303 0.318 0.332 0.347 0.361 0.376 0.390 0.404 0.419 0.433 0.448 0.462 0.477 0.491 0.506 0.520 0.534 0.549 0.563 0.578 0.592 0.607 0.621 0.636 0.650 0.664 0.679 0.693 0.708 0.722 0.737 0.751 0.766 0.780 0.794 0.809 0.823 0.838 0.852 0.867 0.881 0.896 0.910 0.924 0.939 0.953 0.968 0.982 0.997 1.011 1.026 1.040 1.054 1.069 1.083 1.098 1.112 1.127 1.141 1.156 1.170 1.184 1.199 1.213 1.228 1.242 1.257 1.271 1.286 1.300 1.314 1.329 1.343 1.358 1.372 1.387 1.401 1.416 1.430 1.459 1.487 1.516 1.544 1.573 1.602 1.630 1.659 1.687 1.716
Disch. (m³/s) 0.00000 0.00025 0.00099 0.00220 0.00386 0.00596

0.00847 0.01137 0.01465 0.01827 0.02221 0.02646 0.03097 0.03574 0.04072 0.04588 0.05120 0.05663 0.06214 0.06769 0.07323 0.07874 0.08430 0.08953 0.09447 0.09917 0.10365 0.10677 0.10741 0.10800 0.10853 0.10901 0.10944 0.10982 0.11016 0.11045 0.11070 0.11092 0.11109 0.11123 0.11134 0.11142 0.11146 0.11148 0.11147 0.11144 0.11138 0.11131 0.11121 0.11109 0.11095 0.11080 0.11062 0.11043 0.11022 0.11000 0.10976 0.10950 0.10923 0.10893 0.10862 0.10829 0.10793 0.10755 0.10715 0.10672 0.10626 0.10577 0.10525 0.10469 0.10408 0.10344 0.10275 0.10200 0.10121 0.10035 0.09943 0.09904 0.09966 0.10028 0.10089 0.10150 0.10211 0.10271 0.10331 0.10390 0.10450 0.10508 0.10567 0.10625 0.10683 0.10740 0.10797 0.10854 0.10911 0.10967 0.11023 0.11078 0.11134 0.11189 0.11292 0.11396 0.11500 0.11604 0.11707 0.11811 0.11915 0.12018 0.12122 0.12226

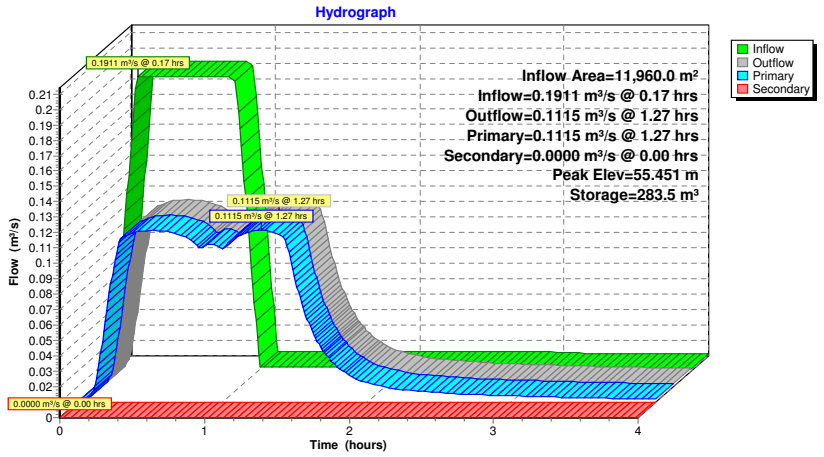
#2	Secondary	56.480 m	***Overflow Check**

Head (meters) 0.000 0.010
Disch. (m³/s) 0.00000 10.00000

Primary OutFlow Max=0.1115 m³/s @ 1.27 hrs HW=54.874 m (Free Discharge)
└**1=SHE-0408-1120-1430-1120_HydroBrake** (Custom Controls 0.1115 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=54.250 m (Free Discharge)
└**2=***Overflow Check** (Controls 0.0000 m³/s)

Pond 25P: Cistern

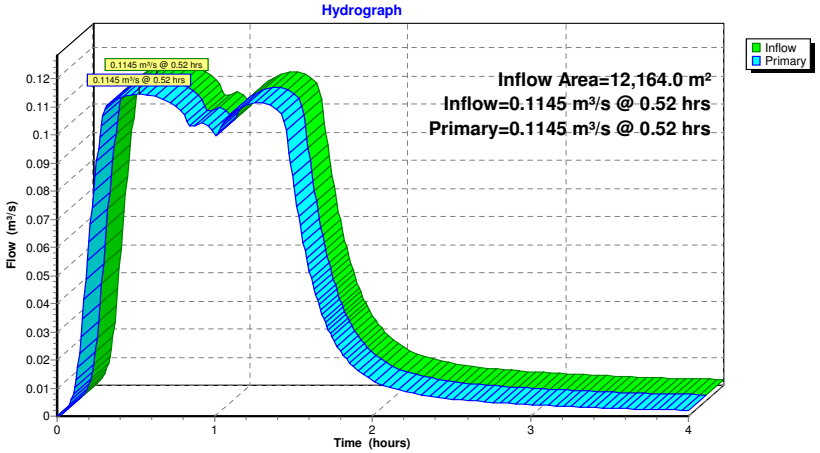


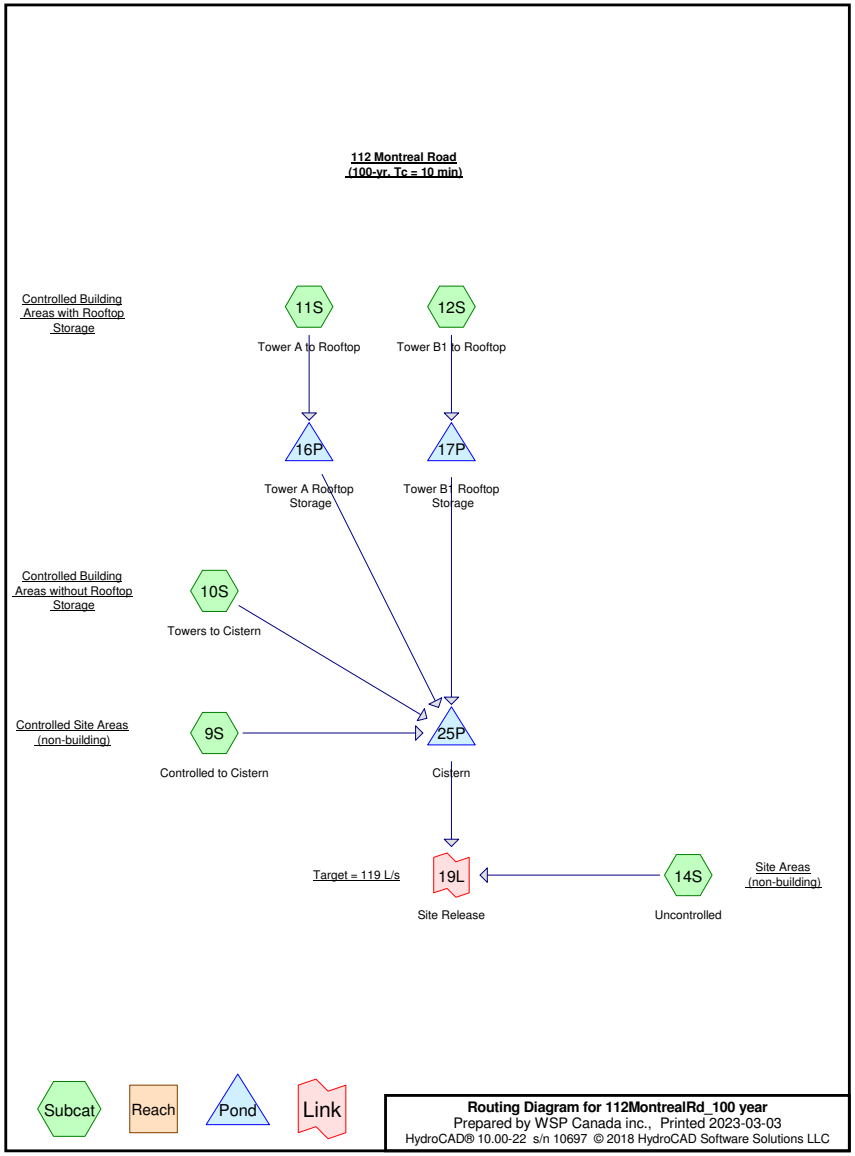
Summary for Link 19L: Site Release

Inflow Area = 12,164.0 m², Inflow Depth > 50 mm for 100-Year event
Inflow = 0.1145 m³/s @ 0.52 hrs, Volume= 608.9 m³
Primary = 0.1145 m³/s @ 0.52 hrs, Volume= 608.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 19L: Site Release





Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
3,790.0	0.89	S03 (9S)
720.0	0.93	S04 (9S)
250.0	0.76	S05 (9S)
5,200.0	1.00	S06 (9S)
690.0	1.00	S07 (9S)
105.0	1.00	S08 (14S)
99.0	0.72	S09 (14S)
500.0	1.00	Tower A (10S, 11S)
810.0	1.00	Tower B1 (10S, 12S)
12,164.0	**0.95**	**TOTAL AREA**

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 9S: Controlled to Cistern Runoff Area=10,650.0 m² Runoff Depth=56 mm
Tc=10.0 min C=0.95 Runoff=0.1370 m³/s 591.8 m³

Subcatchment 10S: Towers to Cistern Runoff Area=637.0 m² Runoff Depth=58 mm
Tc=10.0 min C=1.00 Runoff=0.0086 m³/s 37.3 m³

Subcatchment 11S: Tower A to Rooftop Runoff Area=310.0 m² Runoff Depth=58 mm
Tc=10.0 min C=1.00 Runoff=0.0042 m³/s 18.1 m³

Subcatchment 12S: Tower B1 to Rooftop Runoff Area=363.0 m² Runoff Depth=58 mm
Tc=10.0 min C=1.00 Runoff=0.0049 m³/s 21.2 m³

Subcatchment 14S: Uncontrolled Runoff Area=204.0 m² Runoff Depth=50 mm
Tc=10.0 min C=0.86 Runoff=0.0024 m³/s 10.3 m³

Pond 16P: Tower A Rooftop Storage Peak Elev=100.085 m Storage=11.2 m³ Inflow=0.0042 m³/s 18.1 m³
Outflow=0.0015 m³/s 18.1 m³

Pond 17P: Tower B1 Rooftop Storage Peak Elev=100.142 m Storage=15.4 m³ Inflow=0.0049 m³/s 21.2 m³
Outflow=0.0012 m³/s 17.7 m³

Pond 25P: Cistern Peak Elev=55.083 m Storage=218.9 m³ Inflow=0.1484 m³/s 664.9 m³
Primary=0.1115 m³/s 653.0 m³ Secondary=0.0000 m³/s 0.0 m³ Outflow=0.1115 m³/s 653.0 m³

Link 19L: Site Release Inflow=0.1139 m³/s 663.3 m³
Primary=0.1139 m³/s 663.3 m³

Total Runoff Area = 12,164.0 m² Runoff Volume = 678.6 m³ Average Runoff Depth = 56 mm

Summary for Subcatchment 9S: Controlled to Cistern

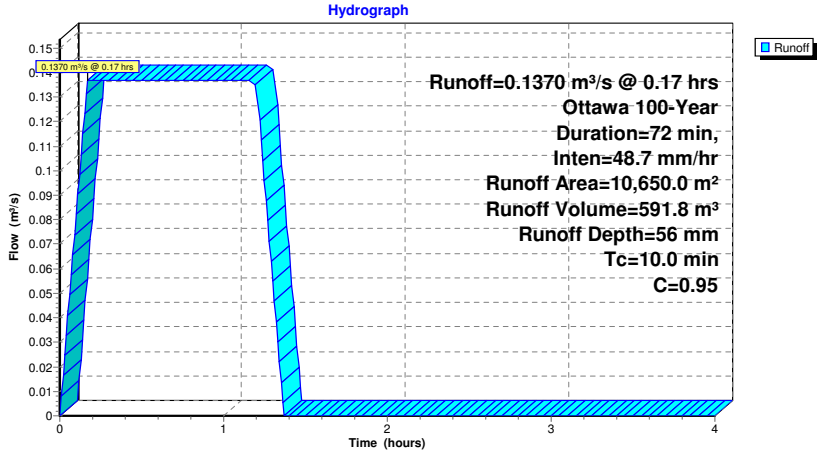
Runoff = 0.1370 m³/s @ 0.17 hrs, Volume= 591.8 m³, Depth= 56 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=72 min, Inten=48.7 mm/hr

Area (m²)	C	Description
3,790.0	0.89	S03
5,200.0	1.00	S06
720.0	0.93	S04
250.0	0.76	S05
690.0	1.00	S07
10,650.0	0.95	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 9S: Controlled to Cistern



Summary for Subcatchment 10S: Towers to Cistern

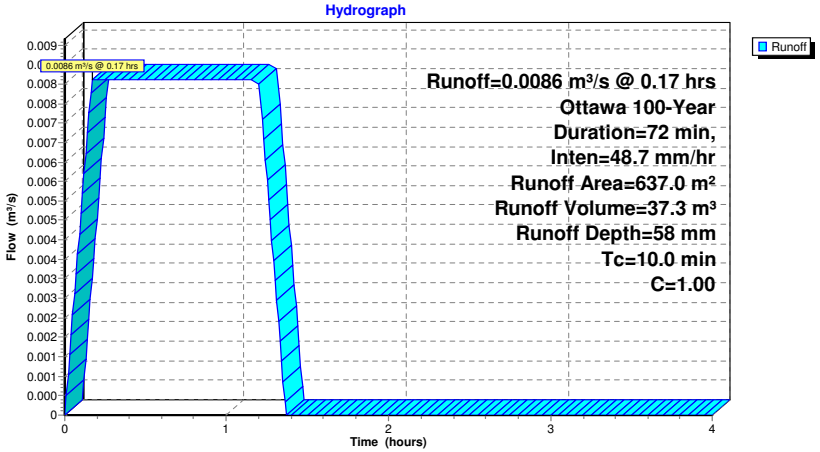
Runoff = 0.0086 m³/s @ 0.17 hrs, Volume= 37.3 m³, Depth= 58 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=72 min, Inten=48.7 mm/hr

Area (m²)	C	Description
190.0	1.00	Tower A
447.0	1.00	Tower B1
637.0	1.00	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 10S: Towers to Cistern



Summary for Subcatchment 11S: Tower A to Rooftop

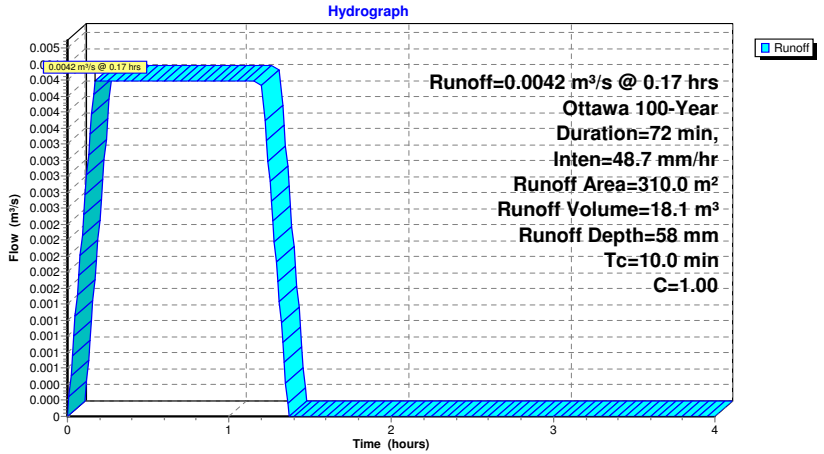
Runoff = 0.0042 m³/s @ 0.17 hrs, Volume= 18.1 m³, Depth= 58 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=72 min, Inten=48.7 mm/hr

Area (m²)	C	Description
310.0	1.00	Tower A

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 11S: Tower A to Rooftop



Summary for Subcatchment 12S: Tower B1 to Rooftop

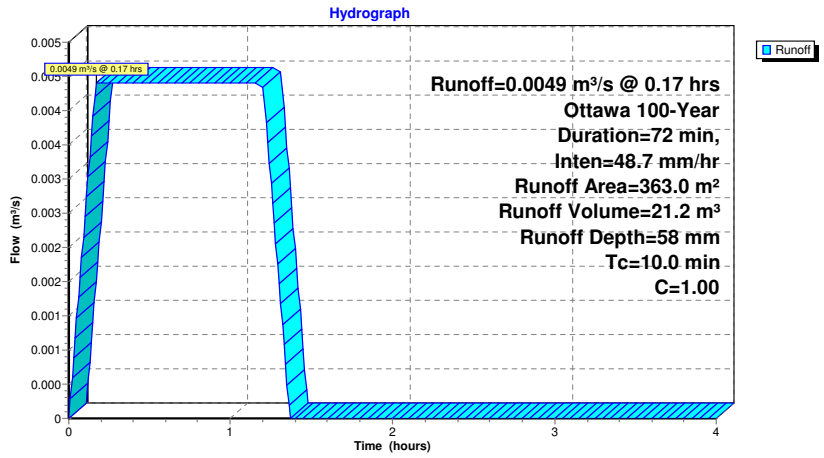
Runoff = 0.0049 m³/s @ 0.17 hrs, Volume= 21.2 m³, Depth= 58 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=72 min, Inten=48.7 mm/hr

Area (m²)	C	Description
363.0	1.00	Tower B1

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 12S: Tower B1 to Rooftop



Summary for Subcatchment 14S: Uncontrolled

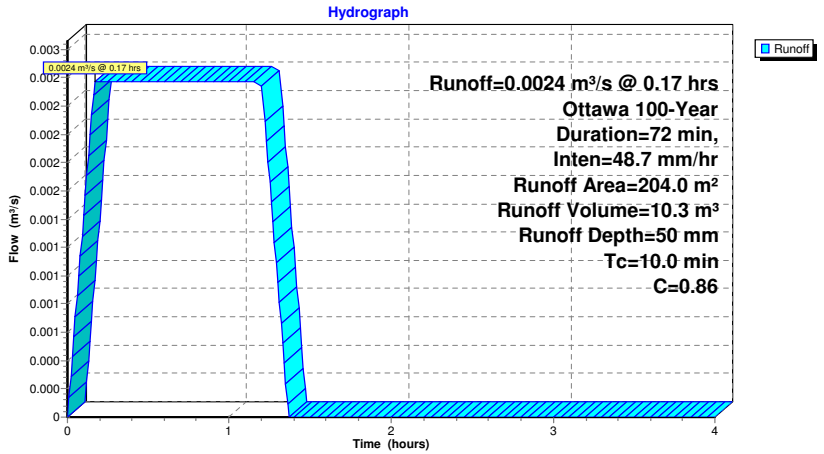
Runoff = 0.0024 m³/s @ 0.17 hrs, Volume= 10.3 m³, Depth= 50 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=72 min, Inten=48.7 mm/hr

Area (m²)	C	Description
99.0	0.72	S09
105.0	1.00	S08
204.0	0.86	Weighted Average

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 14S: Uncontrolled



Summary for Pond 16P: Tower A Rooftop Storage

Inflow Area = 310.0 m², Inflow Depth = 58 mm for 100-Year event
Inflow = 0.0042 m³/s @ 0.17 hrs, Volume= 18.1 m³
Outflow = 0.0015 m³/s @ 0.19 hrs, Volume= 18.1 m³, Atten= 63%, Lag= 1.2 min
Primary = 0.0015 m³/s @ 0.19 hrs, Volume= 18.1 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.085 m @ 1.31 hrs Surf.Area= 263.3 m² Storage= 11.2 m³

Plug-Flow detention time= 61.8 min calculated for 18.1 m³ (100% of inflow)
Center-of-Mass det. time= 62.0 min (103.0 - 41.0)

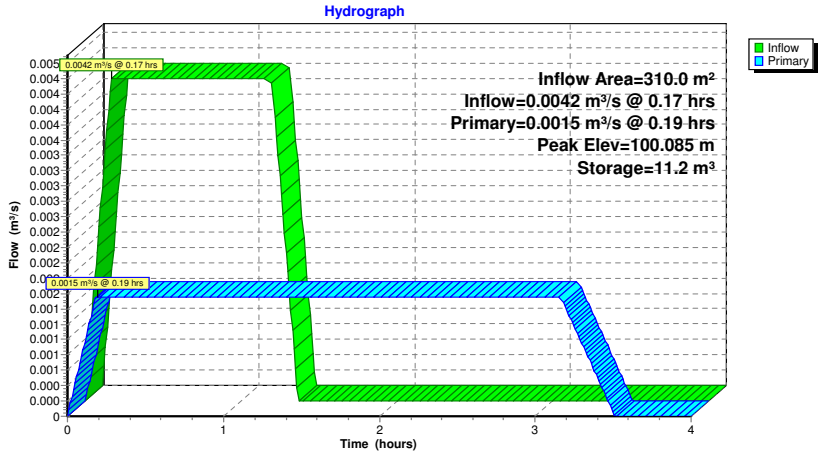
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	15.5 m³	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.100	62.0	3.1	3.1

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 5.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0015 m³/s @ 0.19 hrs HW=100.026 m (Free Discharge)
↳**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0015 m³/s)

Pond 16P: Tower A Rooftop Storage



Summary for Pond 17P: Tower B1 Rooftop Storage

Inflow Area = 363.0 m², Inflow Depth = 58 mm for 100-Year event
Inflow = 0.0049 m³/s @ 0.17 hrs, Volume= 21.2 m³
Outflow = 0.0012 m³/s @ 0.07 hrs, Volume= 17.7 m³, Atten= 75%, Lag= 0.0 min
Primary = 0.0012 m³/s @ 0.07 hrs, Volume= 17.7 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.142 m @ 1.32 hrs Surf.Area= 324.7 m² Storage= 15.4 m³

Plug-Flow detention time= 85.8 min calculated for 17.7 m³ (83% of inflow)
Center-of-Mass det. time= 80.1 min (121.1 - 41.0)

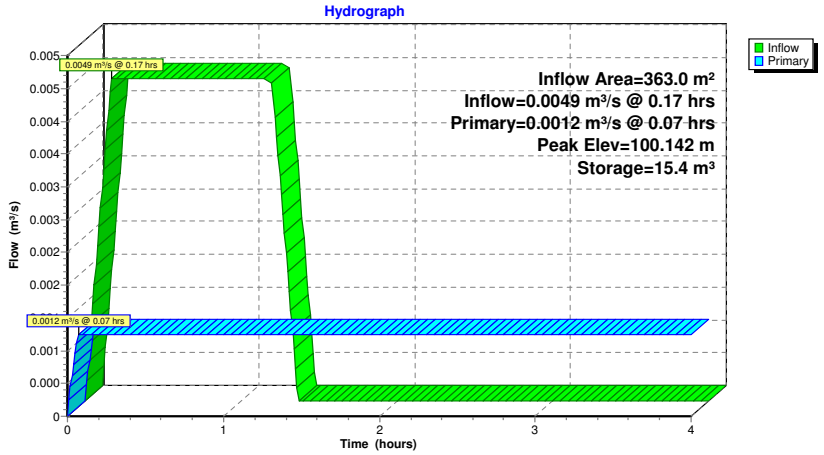
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	18.1 m³	**Custom Stage Data (Pyramidal)** Listed below (Recalc) x 4

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
100.000	0.0	0.0	0.0	0.0
100.150	90.7	4.5	4.5	90.7

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 4.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031

Primary OutFlow Max=0.0012 m³/s @ 0.07 hrs HW=100.025 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.0012 m³/s)

Pond 17P: Tower B1 Rooftop Storage



Summary for Pond 25P: Cistern

Inflow Area = 11,960.0 m², Inflow Depth > 56 mm for 100-Year event
Inflow = 0.1484 m³/s @ 0.19 hrs, Volume= 664.9 m³
Outflow = 0.1115 m³/s @ 1.43 hrs, Volume= 653.0 m³, Atten= 25%, Lag= 74.3 min
Primary = 0.1115 m³/s @ 1.43 hrs, Volume= 653.0 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 55.083 m @ 1.24 hrs Surf.Area= 0.0 m² Storage= 218.9 m³

Plug-Flow detention time= 25.0 min calculated for 651.4 m³ (98% of inflow)
Center-of-Mass det. time= 22.6 min (67.4 - 44.8)

Volume	Invert	Avail.Storage	Storage Description
#1	54.250 m	314.5 m³	**Custom Stage Data** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
54.250	0.0
54.280	7.4
54.350	29.3
54.460	58.2
54.560	86.5
54.660	114.3
54.760	141.3
54.860	167.5
54.960	192.5
55.070	216.1
55.170	238.0
55.270	256.9
55.370	272.1
55.470	286.2
55.570	300.4
55.680	314.5

Device	Routing	Invert	Outlet Devices
#1	Primary	54.250 m	**SHE-0408-1120-1430-1120_HydroBrake**

Head (meters) 0.000 0.014 0.029 0.043 0.058 0.072 0.087 0.101 0.116 0.130 0.144 0.159 0.173 0.188 0.202 0.217 0.231 0.246 0.260 0.274 0.289 0.303 0.318 0.332 0.347 0.361 0.376 0.390 0.404 0.419 0.433 0.448 0.462 0.477 0.491 0.506 0.520 0.534 0.549 0.563 0.578 0.592 0.607 0.621 0.636 0.650 0.664 0.679 0.693 0.708 0.722 0.737 0.751 0.766 0.780 0.794 0.809 0.823 0.838 0.852 0.867 0.881 0.896 0.910 0.924 0.939 0.953 0.968 0.982 0.997 1.011 1.026 1.040 1.054 1.069 1.083 1.098 1.112 1.127 1.141 1.156 1.170 1.184 1.199 1.213 1.228 1.242 1.257 1.271 1.286 1.300 1.314 1.329 1.343 1.358 1.372 1.387 1.401 1.416 1.430 1.459 1.487 1.516 1.544 1.573 1.602 1.630 1.659 1.687 1.716
Disch. (m³/s) 0.00000 0.00025 0.00099 0.00220 0.00386 0.00596

0.00847 0.01137 0.01465 0.01827 0.02221 0.02646 0.03097 0.03574 0.04072 0.04588 0.05120 0.05663 0.06214 0.06769 0.07323 0.07874 0.08430 0.08953 0.09447 0.09917 0.10365 0.10677 0.10741 0.10800 0.10853 0.10901 0.10944 0.10982 0.11016 0.11045 0.11070 0.11092 0.11109 0.11123 0.11134 0.11142 0.11146 0.11148 0.11147 0.11144 0.11138 0.11131 0.11121 0.11109 0.11095 0.11080 0.11062 0.11043 0.11022 0.11000 0.10976 0.10950 0.10923 0.10893 0.10862 0.10829 0.10793 0.10755 0.10715 0.10672 0.10626 0.10577 0.10525 0.10469 0.10408 0.10344 0.10275 0.10200 0.10121 0.10035 0.09943 0.09904 0.09966 0.10028 0.10089 0.10150 0.10211 0.10271 0.10331 0.10390 0.10450 0.10508 0.10567 0.10625 0.10683 0.10740 0.10797 0.10854 0.10911 0.10967 0.11023 0.11078 0.11134 0.11189 0.11292 0.11396 0.11500 0.11604 0.11707 0.11811 0.11915 0.12018 0.12122 0.12226

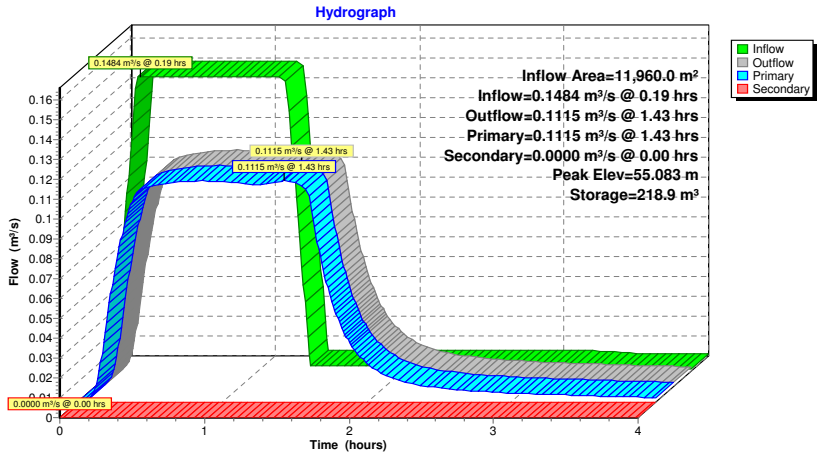
#2	Secondary	56.480 m	***Overflow Check**

Head (meters) 0.000 0.010
Disch. (m³/s) 0.00000 10.00000

Primary OutFlow Max=0.1115 m³/s @ 1.43 hrs HW=54.874 m (Free Discharge)
└**1=SHE-0408-1120-1430-1120_HydroBrake** (Custom Controls 0.1115 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=54.250 m (Free Discharge)
└**2=***Overflow Check** (Controls 0.0000 m³/s)

Pond 25P: Cistern

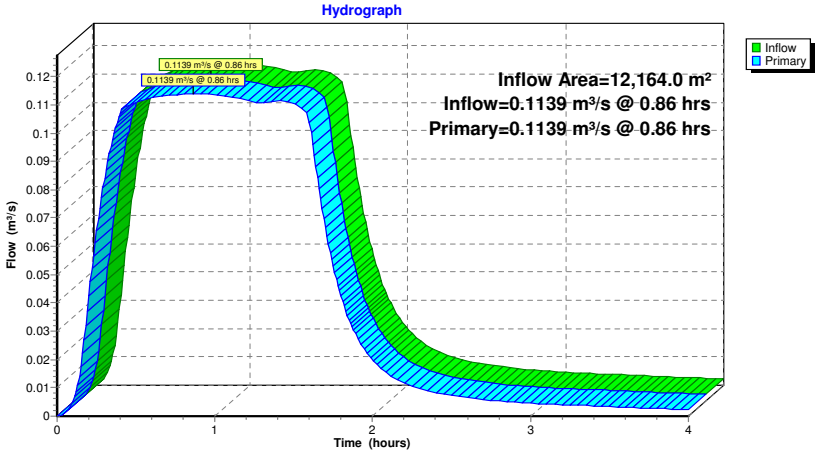


Summary for Link 19L: Site Release

Inflow Area = 12,164.0 m², Inflow Depth > 55 mm for 100-Year event
Inflow = 0.1139 m³/s @ 0.86 hrs, Volume= 663.3 m³
Primary = 0.1139 m³/s @ 0.86 hrs, Volume= 663.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 19L: Site Release



APPENDIX

H

FLOOD PLAIN MAPPING AND ELEVATIONS

Rideau River at Cumming Island

RIDEAU VALLEY CONSERVATION AUTHORITY

Legend

- OHN Watercourse
- RVCA Sub-Watersheds
- RVCA Catchments
- Floodplain Cross-sections
- Regulation Limit
- 100yr Floodline

Reg Limit Dominant Hazard

- Floodplain
- Geo-technical Hazard Limit
- Meander Belt
- Stable Slope
- Top of Slope
- Unstable Slope
- Wetland

- Township Municipal
- Geographic Township
- Conservation Authorities (Easte

Roads

- Freeway
- Expressway / Highway
- Arterial
- Local
- Ramp
- Rapid Transit
- Service

- Waterbody

Wetlands

- Evaluated-Provincial
- Evaluated-Other
- Not evaluated per OWES

DRAPE 2014

1: 15,084.78

Map Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere

766.3 0 383.15 766.3

Meters

Map created: 9/18/2015

Notes

Parcel data is owned by Teranet Enterprises Inc and its suppliers.

Data Received from RVCA September 2015

FPM_UNIQUE	PROFILE	Q_TOTAL__C	WS_ELEV__M	EG_ELEV__M
Rideau - Reach 1 - 2474	50 Year	626	56.44	56.52
Rideau - Reach 1 - 2474	5 Year	513	56.1	56.17
Rideau - Reach 1 - 2474	25 Year	598	56.36	56.44
Rideau - Reach 1 - 2474	100 Year	654	56.52	56.6
Rideau - Reach 1 - 2474	10 Year	552	56.22	56.29
Rideau - Reach 1 - 2490	50 Year	626	56.46	56.54
Rideau - Reach 1 - 2490	5 Year	513	56.12	56.18
Rideau - Reach 1 - 2490	25 Year	598	56.38	56.46
Rideau - Reach 1 - 2490	100 Year	654	56.54	56.63
Rideau - Reach 1 - 2490	10 Year	552	56.24	56.31
Rideau - Reach 1 - 2512	50 Year	626	56.47	56.55
Rideau - Reach 1 - 2512	5 Year	513	56.13	56.19
Rideau - Reach 1 - 2512	25 Year	598	56.39	56.47
Rideau - Reach 1 - 2512	100 Year	654	56.56	56.64
Rideau - Reach 1 - 2512	10 Year	552	56.25	56.32