MEMO

TO: Jim Johnston, Winston Yang - WSP

FROM: Ben Worth

SUBJECT: **Algonquin College ARC – Stormwater Management Strategy**

DATE: **June 21, 2019**

INTRODUCTION

This memo is provided to document the proposed stormwater management (SWM) strategy for the Algonquin College Athletics and Recreation Centre (ARC) project.

The subject site is located on the Algonquin College campus, south off Navajo Drive, immediately east of the Student Commons Building.

EXISTING CONDITIONS

In existing conditions, the subject site consists of an asphalt-surfaced parking lot and grassed verge area adjacent to Navajo Drive. There is an existing storm sewer system draining northward along the western edge of the subject site, and westward within Navajo Drive. Surface grades currently drain runoff to the north and west, and there is an existing overland flow path running northward toward Navajo Drive along the west edge of the site.

Please refer to the Stantec topographic survey, 2019, for illustration of existing conditions.

The Geotechnical Engineer on the project (Paterson Group Consulting Engineers) has provided Subsoil Infiltration Review memo (appended for reference), which analyzes borehole results and geotechnical investigations, and concludes that a design infiltration rate for the soils on site would lie within the range of 7 to 26 mm/hour. This indicates design of an infiltration facility is feasible. As noted by Paterson though, WSP also recommends that these infiltration rates be tested onsite (via permeameter testing) to confirm the design values prior to finalizing design of the proposed system.

PROPOSED CONDITIONS

The proposed ARC facility includes a multi-level athletics and recreation building in the northern part of the site, surrounded by reconfigured hard and soft landscaped areas, and a re-graded parking lot area to the south.

The primary offsite storm drainage connection will be from the south-west corner of the site, to the existing storm sewer that runs northward within the access road. Several local CB connections

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are also proposed along the north side of the site from landscaped areas out to the existing storm sewer system. The existing storm sewers along the west and north sides of the building combine at the northwest corner of the building, and then discharge to a municipal storm trunk sewer located in an easement to the west of the proposed building site.

The existing overland flow path running northward along the western edge of the site will be maintained unaffected in post-development conditions.

DESIGN CRITERIA

As confirmed by City of Ottawa staff during the pre-consultation process, the project is subject to the requirements of the *SWM Guidelines for the Pinecrest Creek/Westboro Area* (JFSA, on behalf of the City of Ottawa, ref. June 2012 "Final Draft" document). Key criteria applicable to the ARC project are summarized below.

Excerpt from Table 3.1 (SWM Guidelines for the Pinecrest Creek/Westboro Area):

COMMERCIAL/INSTITUTIONAL AND INDUSTRIAL DEVELOPMENTS - DISCHARGING UPSTREAM OF THE OTTAWA RIVER PARKWAY PIPE (ORPP) INLET			
Runoff Volume Reduction	**Water Quality TSS Removal**	**Water Quantity Flood Flow Mgmt.**	**Water Quantity Erosion Control**
A minimum on-site retention of the 10 mm design storm; refer to LID references for guidance on prudent approach to planning infiltration-based LID best management practices.	*On-site removal of 80% of TSS; some of which would be accomplished by on-site retention of first 10 mm of rainfall and detention of the 25 mm design storm.*	*The more stringent of the following criteria will govern: (i) 1:100 year discharge from site not to exceed 33.5 L/s/ha) or; (ii) Requirements of City of Ottawa Sewer Design Guidelines.*	*Control (detain) the runoff from the 25 mm design storm such that the peak outflow from the site does not exceed 5.8 L/s/ha.*

PROPOSED SWM STRATEGY

OVERVIEW

Please refer to engineering drawings C04 and C05 for details of the SWM system proposed to achieve compliance with the applicable design criteria. Key features of the system include:

- Controlled flow rooftop drains (Watts Adjustable Accutrol units, or similar) to utilize storage available on the rooftop and limit discharge rates.
- Bio-retention features in soft landscaped areas surrounding the proposed building (CB overflows set 150 mm above base of depressed landscape area).
- A stormwater infiltration retention/detention chamber below the proposed parking lot area to achieve target flow controls and runoff retention targets.

It should be noted that as part of the College's sustainability strategy for the development, the proposed SWM system has been designed to achieve compliance with the Rainwater Management LEED credits (BD+C: New Construction, v4.1), which requires on-site retention and treatment beyond the requirements set out by the *SWM Guidelines for the Pinecrest Creek/Westboro Area* targets.

CATCHMENT ANALYSIS

The appended **Table 1** summarizes the sub-catchment area breakdown in proposed conditions. It should be read in conjunction with Drawing C05 (Post-Development Storm Drainage Area Plan).

Based on the total application site area of 1.549 ha, the applicable peak discharge targets are established as follows:

- Flood Flow Management: 100-year event controlled to 33.5 L/sec/ha: **51.9 l/sec**
- Erosion Control: 25mm design storm peak controlled to 5.8 l/sec/ha: **9.0 l/sec**

MODELLING & ANALYSIS

RUNOFF VOLUME REDUCTION

The runoff retention targets are achieved through provision of localized, depressed bio-retention features in soft landscaping areas in conjunction with a large, centralized sub-surface infiltration chamber below the parking lot, which provides sufficient retention volume for impervious surfaces across the site.

The rightmost columns in **Table 1** summarize the applicable retention volumes (for both the City's Pinecrest Creek/Westboro criteria, and the targeted LEED credits).

Target bio-retention volumes for each soft landscaped area are established; a total of 35.9 m^3 within catchments A4, A6, A9, A10, A12, and A13. These volumes will be provided by depressing the finished surface locally, and elevating CB grate outflows by 150 mm from the base elevation of the area. It is recommended that an amended topsoil mix be provided in each of these areas to promote infiltration.

The centralized infiltration chamber will provide a total retention volume of 308.8 m^3 below the level of the gravity outflow pipe. Additional volume will be provided as active storage (above the outflow elevation) to meet target peak flow control rates, as described further in subsequent sections of this memo. Please refer to Drawing C04 for proposed details of the chamber.

The total retention volume provided on site is 343.9 m^3. Minimum target to satisfy the *SWM Guidelines for the Pinecrest Creek/Westboro Area* is 154.9 m^3. As noted previously, the proposed strategy exceeds minimum requirements significantly given that LEED Rainwater Management credits are being targeted as part of the project's sustainability strategy.

WATER QUALITY

The target water quality criteria (on-site treatment/removal of 80% of total suspended solids, TSS) will be achieved via significant runoff retention on site (up to 22.2 mm per LEED strategy), supplemented by an Oil-Grit Separator (OGS) unit at the primary storm drainage outlet, downstream of the infiltration chamber.

As noted in the *SWM Guidelines for the Pinecrest Creek/Westboro Area*, meeting the required retention targets in conjunction with detention of the 25 mm storm event (per Water Quantity Erosion Control criteria, discussed in the subsequent section) will provide significant water quality benefits. Provision of an OGS unit (specified to provide 80% TSS removal) in addition to these features is considered sufficient to meet water quality treatment requirements.

WATER QUANTITY

As noted previously, the *SWM Guidelines for the Pinecrest Creek/Westboro Area* set two separate targets for control of peak runoff rates; 51.9 l/sec for 100-year flood flow management, and 9.0 l/sec for erosion control detention of a 25 mm storm event.

Proposed features to achieve these targets include;

- Rooftop flow control drains to utilize storage on roof areas.
- Active storage within infiltration retention/detention chamber below parking lot, with vortex flow control device on outlet.
- Additional vortex flow control devices on each local CB outlet to the surrounding storm sewer system.

A HydroCAD model has been developed to simulate performance of the proposed system, and establish the necessary storage volumes and flow control rates required to meet the applicable design criteria. Full model results for each storm analysed are appended to this memo.

In accordance with City requirements, the storms analysed were:

1. SCS Type II 100-year, 24-hour event (defined as per Ottawa Sewer Design Guidelines)
2. 4-hour, 25mm depth event (Chicago Storm distribution)

The HydroCAD model was set up using the SCS TR-20 method to generate runoff hydrographs from each sub-catchment. Sub-catchments were created as per area takeoffs described in Table 1, and all areas were defined using a Curve Number (CN) value of 98. This value represents an impervious surface, regardless of underlying Hydrologic Soil Group (HSG). Storage areas were defined using "pond" nodes in the model, with appropriate stage-storage relationships based on the volumes available in each area. Outflow controls (i.e. vortex flow devices) were defined using appropriate rating curves on the outlets of each storage node. Note that for the infiltration retention/detention chamber, an additional surface storage volume was included in the stage-storage definition, representing ponding available in the depressed, "amphitheatre" area in sub-catchment A-8. This ponding volume is directly linked via CB to the chamber, and grading has been designed to contain ponding up to 300 mm depth.

Rooftop storage has been defined based on the average area available per roof drain, up to a maximum depth of 150 mm. Rating curves based on the proposed rooftop flow control drains have been used, and the number of drain outlets has been coordinated with architectural plans (12 no. outlets within roof sub-catchment A-15, 20 no. within A-16, and 15 no. within A-17).

It is assumed that all storage volumes within the site are empty at the start of each storm event analysed.

Per Table 1, two uncontrolled drainage areas have been included in the model; A-18 and A-19. Given grading constraints it has not been possible to configure the drainage system to collect runoff at these locations around the edge of the site, and runoff from these areas will therefore drain directly offsite onto surrounding lands. These uncontrolled areas are accounted for in the analysis however, and the proposed system over-controls as required to reduce net runoff rates to the applicable targets.

The model was developed and tested in an iterative manner, to determine the necessary storage volumes and flow control rates from individual features. A summary of the requirements follows:

- The infiltration retention/detention chamber should provide a total minimum volume of 475 m^3 (configured with 308.8 m^3 below the level of the outlet, per runoff retention requirements) and the remainder as active storage above the outlet elevation.
- Outflow from the infiltration chamber shall be controlled with a Hydrovex 150-VHV-2 vortex flow control valve (or similar), to achieve peak discharge rate of 35 l/sec at a head of 1.80 m.
- Each local CB outlet to the surrounding system (from sub-catchments A-9, A-10, A-12, and A-13) shall be fitted with a Hydrovex 50-VHV-1 vortex flow control valve (or similar).
- Rooftop drainage outlets shall be Watts Adjustable Accutrol units (or similar), set to weir fully closed position for constant 5 GPM (0.32 l/sec) outflow, up to maximum head of 150 mm.

The model results demonstrate that a system configured as described above achieves a net 100-year peak runoff rate of 50.8 l/sec, which is within the target rate of 51.9 l/sec.

Results of the 4-hour, 25 mm event show a net peak runoff rate from the site of 9.8 l/sec. It is acknowledged that this is marginally above the target release rate of 9.0 l/sec, however in this situation the runoff leaving site is solely from the uncontrolled areas (A-18 and A-19). All other areas are providing full retention of the rainfall volume. On this basis, the system is considered compliant with the intent of the criteria, and the exceedance (of just 0.8 l/sec) results in a design that is functionally equivalent to the intended outcome.

CONCLUSIONS

The proposed SWM strategy for the Algonquin College ARC facility, as described above in this memo—and per modelling analysis appended—will meet (and exceed) the SWM requirements of the City of Ottawa (as defined in the *SWM Guidelines for the Pinecrest Creek/Westboro Area*) with regard to Runoff Volume Reduction, Water Quality, and Water Quantity (for both Flood Flow Management and Erosion Control Detention criteria).

Respectfully submitted,

Ben Worth, P.Eng.
Manager, Water Resources

Table 1 – Sub-Catchment Breakdown & Runoff Retention Summary

REF.	AREA BREAKDOWN (HA)			TOTAL AREA (HA)	DISCHARGE LOCATION	RUNOFF RETENTION VOLUME TARGETS (M^3)		RUNOFF RETENTION VOLUMES PROVIDED (M^3)	
	GRASS	ROOF	ASPHALT			10mm (City)	22.2mm (LEED)	Bio-Retention Features	Centralized Infiltration Chamber
A1	0.003		0.097	**0.100**	To infiltration retention/detention chamber	10.0	22.2		22.2
A2	0.015		0.131	**0.146**	To infiltration retention/detention chamber	14.6	32.4		32.4
A3			0.129	**0.129**	To infiltration retention/detention chamber	12.9	28.6		28.6
A4	0.014			**0.014**	Bio-retention, then to chamber	1.4	3.1	3.1	-
A5			0.076	**0.076**	To infiltration retention/detention chamber	7.6	16.9		16.9
A6	0.014			**0.014**	Bio-retention, then to chamber	1.4	3.1	3.1	-
A7	0.004		0.066	**0.070**	To infiltration retention/detention chamber	7.0	15.5		15.5
A8	0.062		0.028	**0.090**	To infiltration retention/detention chamber	9.0	20.0		20.0
A9	0.022			**0.022**	Bio-retention, then offsite	2.2	4.9	4.9	-
A10	0.017		0.004	**0.021**	Bio-retention, then offsite	2.1	4.7	16.9	-
A11			0.055	**0.055**	Offsite via A-10	5.5	12.2		-
A12	0.011			**0.011**	Bio-retention, then offsite	1.1	2.4	2.4	-
A13	0.016			**0.016**	Bio-retention, then offsite	1.6	3.6	4.7	-
A14			0.005	**0.005**	Offsite via A-13	0.5	1.1		-
A15		0.221		**0.221**	Rooftop control, then to chamber	22.1	49.1		49.1
A16		0.253		**0.253**	Rooftop control, then to chamber	25.3	56.2		56.2
A17		0.198		**0.198**	Rooftop control, then to chamber	19.8	44.0		44.0
A18	0.023		0.075	**0.098**	Uncontrolled offsite	9.8	21.8		21.8
A19	0.007		0.003	**0.010**	Uncontrolled offsite	1.0	2.2		2.2
	0.208	**0.672**	**0.669**	**1.549**		**154.9**	**343.9**	**35.1**	**308.8**
								343.9	

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patersongroup **memorandum**

consulting engineers

re: **Subsoil Infiltration Review**
Proposed Infiltration Gallery
Algonquin College - Woodroffe Campus - Ottawa

to: Colliers Project Leaders - **Mr. Philip Belanger** - philip.belanger@colliersprojectleaders.com

date: March 5, 2019

file: PG4624-MEMO.01

Paterson Group (Paterson) has prepared the current memorandum report to provide anticipated infiltration rates to be encountered within the subsoils below the proposed infiltration system based on Paterson's geotechnical investigation. The memo should be read in conjunction with Paterson Report PG4624-1 dated September 13, 2018.

Background Information

At the time of writing this report, it is understood that the development will consist of a one-storey slab-on-grade building. One level of underground parking may considered once the detailed design drawings are finalized. An infiltration gallery is also being considered in order to manage the stormwater accumulation at the subject site.

Paterson completed a geotechnical investigation at the subject site on August 16, 2018. At that time, a total of nine (9) boreholes were advanced to a maximum depth of 6.7 m below existing ground surface.

The results of the geotechnical investigation indicated that, in general, the subsurface profile at the borehole locations consisted of a pavement structure overlying a hard to stiff brown silty clay crust followed by a very stiff to stiff grey silty clay deposit. Glacial till was encountered at BH 4 consisting of grey silty clay with sand and gravel. A fill layer consisting of brown silty sand with crushed stone and/or brown silty clay with sand and gravel was encountered within BH 1, BH 2 and BH 4 where the former drainage ditch ran along the west portion of the site. It should be noted that a layer of topsoil and organics was encountered directly below the fill material in BH 1 and BH 2. Practical refusal to DCPT was encountered at a depth of 9.9, 8.5 and 9.1 m at BH 2, BH 3 and BH 4, respectively.

Based on the recovered soil samples' moisture levels, colouring and consistency, the long-term groundwater level at the subject site is anticipated at 4 to 5 m depth. Groundwater levels are subject to seasonal fluctuations and could vary at the time of construction.

Subsoil Infiltration Values

At the time of writing this report, details for the proposed infiltration system have not been provided for the subject site. However, it is anticipated that the subsoil below the proposed infiltration system will consist of a hard to stiff brown silty clay. It is recommended the infiltration gallery be placed above the long-term groundwater as it can limit water infiltration to the subsoil.

Hydraulic conductivity testing was not completed as part of the geotechnical investigation for the proposed development. However, based upon previous experience at similar sites in the area with similar stratigraphy and typical published values for hard to stiff brown silty clay, the hydraulic conductivity value was conservatively estimated to be in the order of 1×10^{-7} to 1×10^{-9} m/sec. Based on the above noted hydraulic conductivity values, the infiltration rates range from 7 to 26 mm/hr. It should be noted that a safety correction factor was not applied to the above noted infiltration rates for calculating the design infiltration rates.

To determine site specific design infiltration rates, it is recommended to complete a series of permeameter tests at the invert elevation of the proposed infiltration system prior to finalizing the design.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Nicholas Zulinski, P.Geo., géo.

David J. Gilbert, P.Eng.

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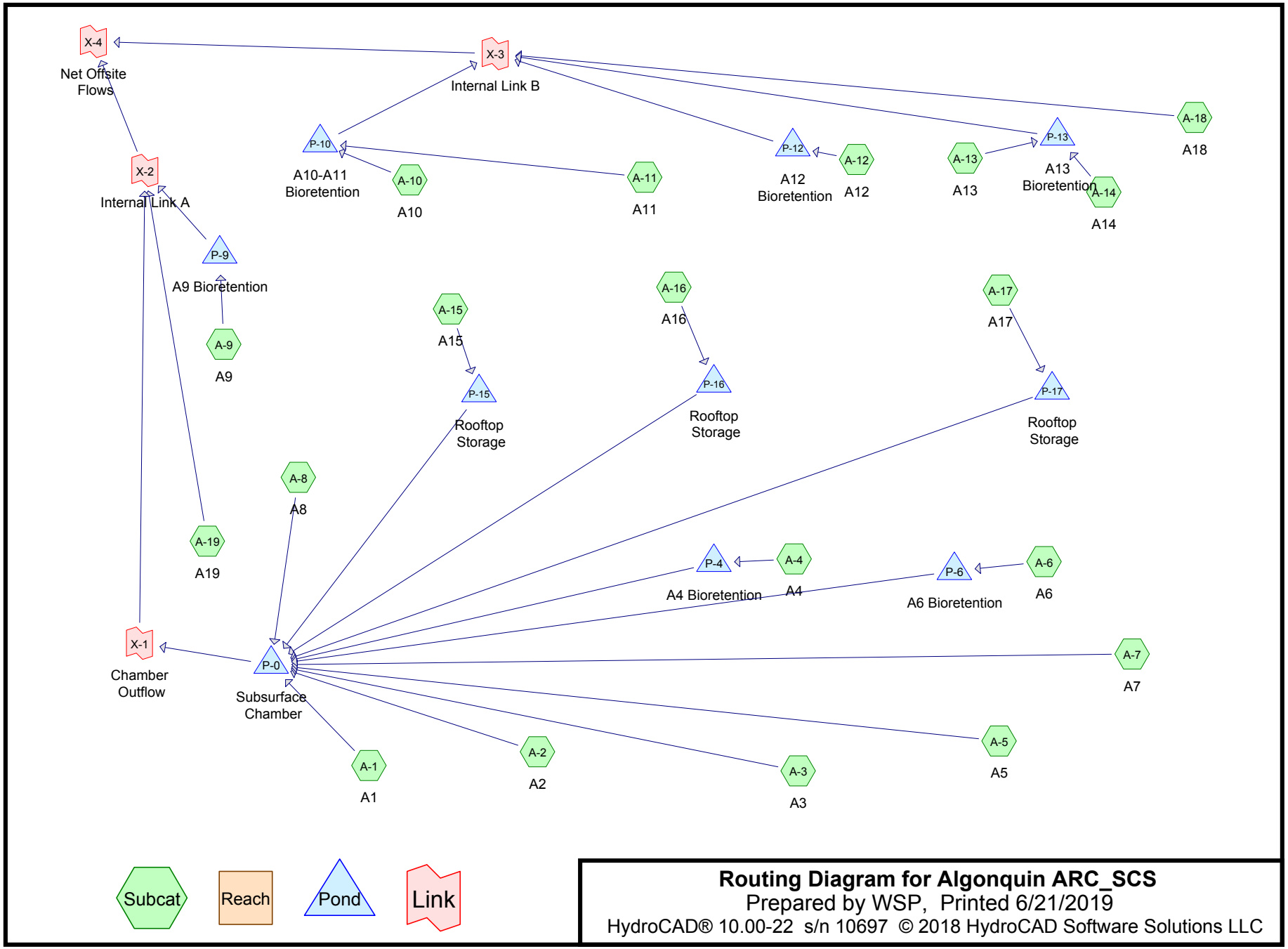
X-4
Net Offsite Flows
X-3
Internal Link B
A-18
A18
P-10
A10-A11 Bioretention
A-10
A10
A-11
A11
P-12
A12 Bioretention
A-12
A12
A-13
A13
P-13
A13 Bioretention
A-14
A14
X-2
Internal Link A
P-9
A9 Bioretention
A-9
A9
A-15
A15
P-15
Rooftop Storage
A-16
A16
P-16
Rooftop Storage
A-17
A17
P-17
Rooftop Storage
A-8
A8
A-19
A19
P-4
A4 Bioretention
A-4
A4
P-6
A6 Bioretention
A-6
A6
X-1
Chamber Outflow
P-0
Subsurface Chamber
A-7
A7
A-1
A1
A-2
A2
A-3
A3
A-5
A5
Subcat
Reach
Pond
Link
Routing Diagram for Algonquin ARC_SCS
Prepared by WSP, Printed 6/21/2019
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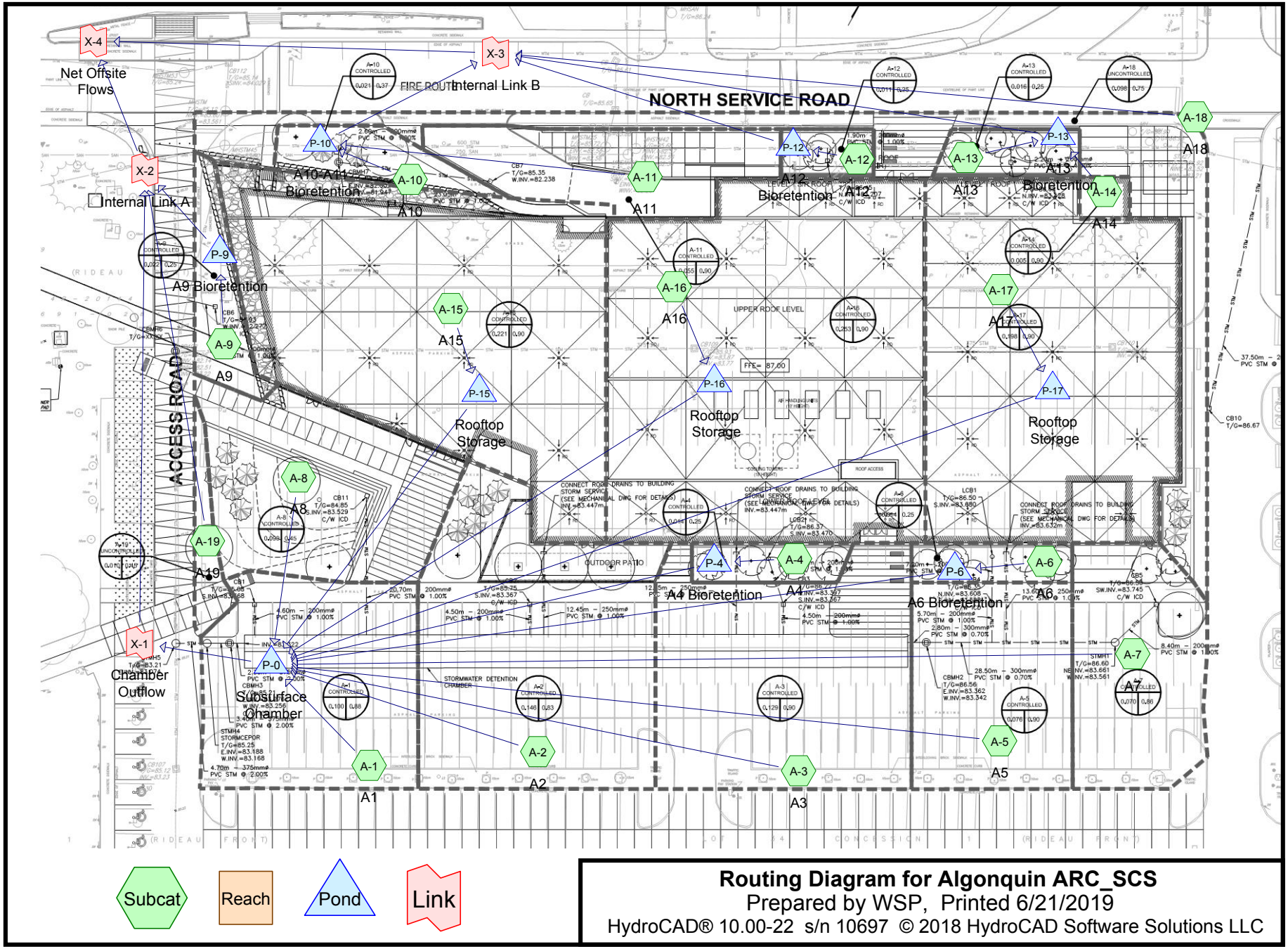


Routing Diagram for Algonquin ARC_SCS

Prepared by WSP, Printed 6/21/2019

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA-1: A1 Runoff Area=0.1000 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01208 m³/s 101.0 m³

SubcatchmentA-10: A10 Runoff Area=0.0210 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00254 m³/s 21.2 m³

SubcatchmentA-11: A11 Runoff Area=0.0550 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00664 m³/s 55.6 m³

SubcatchmentA-12: A12 Runoff Area=0.0110 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00133 m³/s 11.1 m³

SubcatchmentA-13: A13 Runoff Area=0.0160 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00193 m³/s 16.2 m³

SubcatchmentA-14: A14 Runoff Area=0.0050 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00060 m³/s 5.1 m³

SubcatchmentA-15: A15 Runoff Area=0.2210 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.02669 m³/s 223.3 m³

SubcatchmentA-16: A16 Runoff Area=0.2530 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.03055 m³/s 255.6 m³

SubcatchmentA-17: A17 Runoff Area=0.1980 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.02391 m³/s 200.0 m³

SubcatchmentA-18: A18 Runoff Area=0.0980 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01183 m³/s 99.0 m³

SubcatchmentA-19: A19 Runoff Area=0.0100 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00121 m³/s 10.1 m³

SubcatchmentA-2: A2 Runoff Area=0.1460 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01763 m³/s 147.5 m³

SubcatchmentA-3: A3 Runoff Area=0.1290 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01558 m³/s 130.3 m³

SubcatchmentA-4: A4 Runoff Area=0.0140 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00169 m³/s 14.1 m³

SubcatchmentA-5: A5 Runoff Area=0.0760 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00918 m³/s 76.8 m³

SubcatchmentA-6: A6 Runoff Area=0.0140 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00169 m³/s 14.1 m³

SubcatchmentA-7: A7 Runoff Area=0.0700 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00845 m³/s 70.7 m³

SubcatchmentA-8: A8 Runoff Area=0.0900 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01087 m³/s 90.9 m³

SubcatchmentA-9: A9 Runoff Area=0.0220 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00266 m³/s 22.2 m³

Pond P-0: Subsurface Chamber Peak Elev=1.651 m Storage=543.1 m³ Inflow=0.09192 m³/s 1,317.4 m³
Outflow=0.03381 m³/s 987.1 m³

Pond P-10: A10-A11 Bioretention Peak Elev=10.185 m Storage=38.8 m³ Inflow=0.00918 m³/s 76.8 m³
Outflow=0.00582 m³/s 45.3 m³

Pond P-12: A12 Bioretention Peak Elev=10.101 m Storage=11.1 m³ Inflow=0.00133 m³/s 11.1 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-13: A13 Bioretention Peak Elev=10.133 m Storage=21.2 m³ Inflow=0.00254 m³/s 21.2 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-15: Rooftop Storage Peak Elev=100.144 m Storage=97.8 m³ Inflow=0.02669 m³/s 223.3 m³
Outflow=0.00378 m³/s 223.3 m³

Pond P-16: Rooftop Storage Peak Elev=100.136 m Storage=93.5 m³ Inflow=0.03055 m³/s 255.6 m³
Outflow=0.00630 m³/s 255.5 m³

Pond P-17: Rooftop Storage Peak Elev=100.137 m Storage=74.9 m³ Inflow=0.02391 m³/s 200.0 m³
Outflow=0.00473 m³/s 200.0 m³

Pond P-4: A4 Bioretention Peak Elev=10.160 m Storage=3.7 m³ Inflow=0.00169 m³/s 14.1 m³
Outflow=0.00168 m³/s 10.6 m³

Pond P-6: A6 Bioretention Peak Elev=10.160 m Storage=3.7 m³ Inflow=0.00169 m³/s 14.1 m³
Outflow=0.00168 m³/s 10.6 m³

Pond P-9: A9 Bioretention Peak Elev=10.182 m Storage=6.7 m³ Inflow=0.00266 m³/s 22.2 m³
Outflow=0.00252 m³/s 16.7 m³

Link X-1: Chamber Outflow Inflow=0.03381 m³/s 987.1 m³
Primary=0.03381 m³/s 987.1 m³

Link X-2: Internal Link A Inflow=0.03577 m³/s 1,013.9 m³
Primary=0.03577 m³/s 1,013.9 m³

Link X-3: Internal Link B Inflow=0.01482 m³/s 144.3 m³
Primary=0.01482 m³/s 144.3 m³

Link X-4: Net Offsite Flows Inflow=0.05077 m³/s 1,158.2 m³
Primary=0.05077 m³/s 1,158.2 m³

Total Runoff Area = 15,490.0 m² Runoff Volume = 1,564.8 m³ Average Runoff Depth = 101 mm
0.00% Pervious = 0.0 m² 100.00% Impervious = 15,490.0 m²

Summary for Subcatchment A-1: A1

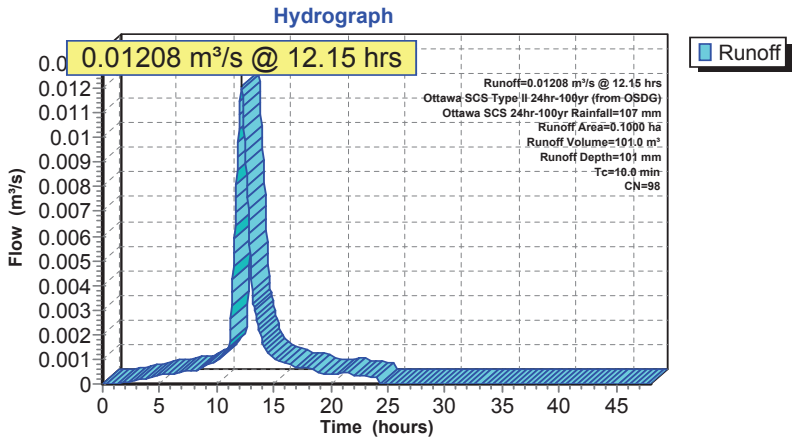
Runoff = 0.01208 m³/s @ 12.15 hrs, Volume= 101.0 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1000	98	
	0.1000		100.00% Impervious Area

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

Subcatchment A-1: A1



Summary for Subcatchment A-10: A10

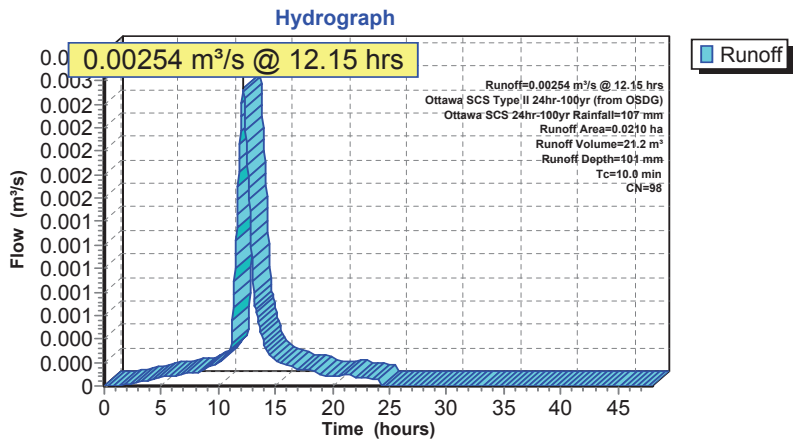
Runoff = 0.00254 m³/s @ 12.15 hrs, Volume= 21.2 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0210	98	
	0.0210		100.00% Impervious Area

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

Subcatchment A-10: A10



Summary for Subcatchment A-11: A11

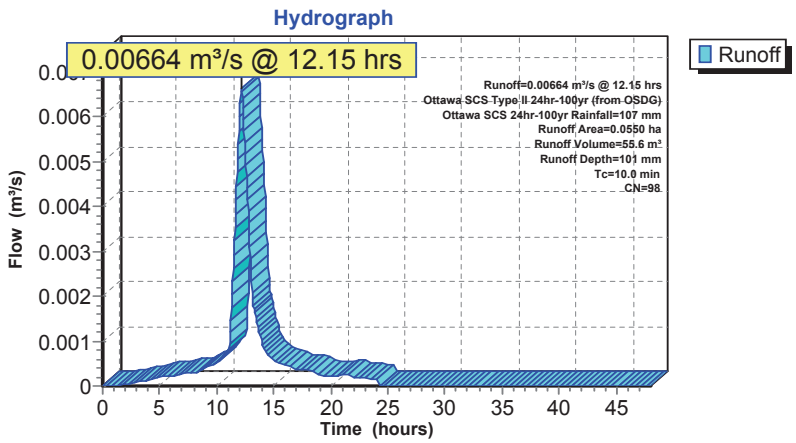
Runoff = 0.00664 m³/s @ 12.15 hrs, Volume= 55.6 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0550	98	
	0.0550		100.00% Impervious Area

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

Subcatchment A-11: A11



Summary for Subcatchment A-12: A12

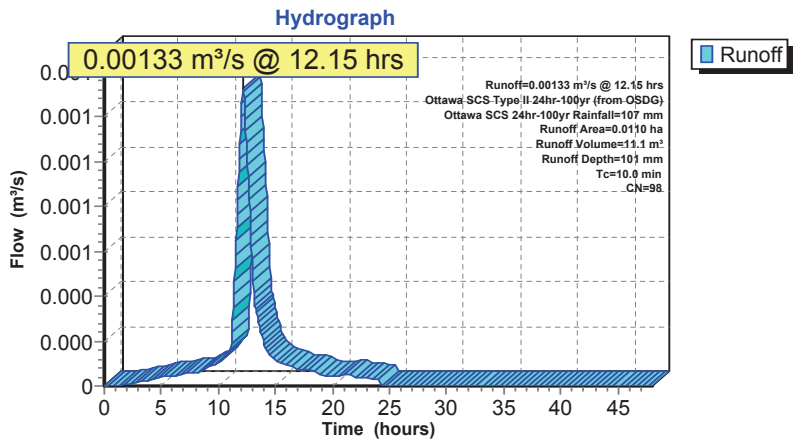
Runoff = 0.00133 m³/s @ 12.15 hrs, Volume= 11.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0110	98	
	0.0110		100.00% Impervious Area

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

Subcatchment A-12: A12



Summary for Subcatchment A-13: A13

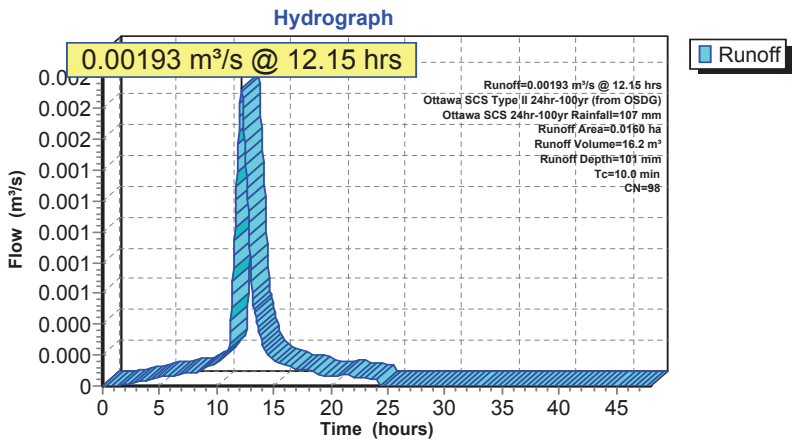
Runoff = 0.00193 m³/s @ 12.15 hrs, Volume= 16.2 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0160	98	
	0.0160		100.00% Impervious Area

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

Subcatchment A-13: A13



Summary for Subcatchment A-14: A14

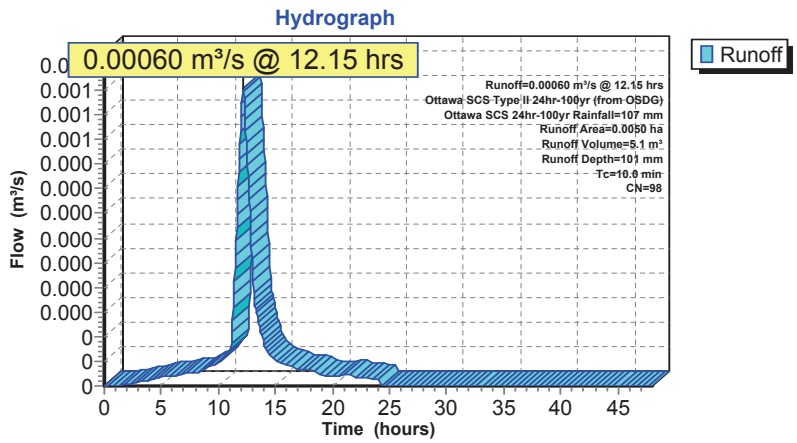
Runoff = 0.00060 m³/s @ 12.15 hrs, Volume= 5.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0050	98	
	0.0050		100.00% Impervious Area

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

Subcatchment A-14: A14



Summary for Subcatchment A-15: A15

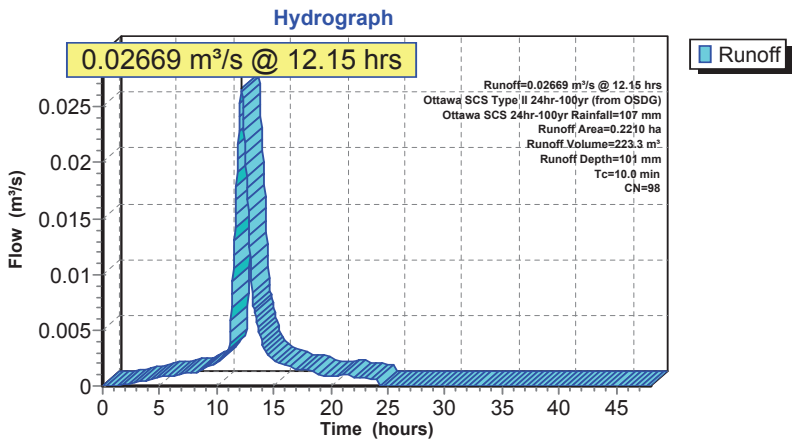
Runoff = 0.02669 m³/s @ 12.15 hrs, Volume= 223.3 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.2210	98	
	0.2210		100.00% Impervious Area

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

Subcatchment A-15: A15



Summary for Subcatchment A-16: A16

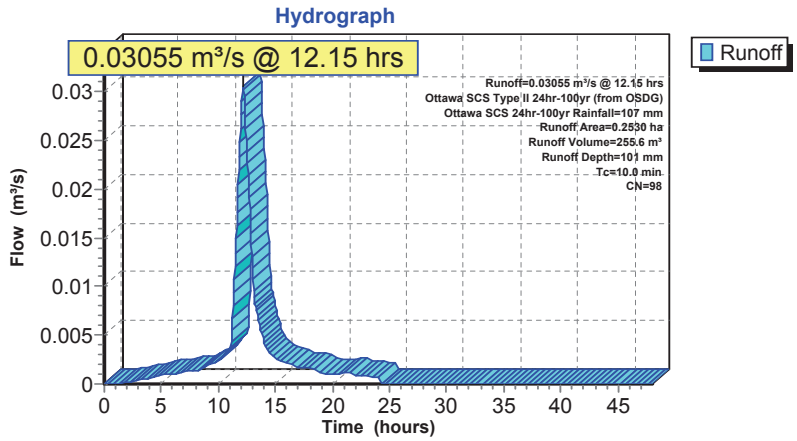
Runoff = 0.03055 m³/s @ 12.15 hrs, Volume= 255.6 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.2530	98	
	0.2530		100.00% Impervious Area

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

Subcatchment A-16: A16



Summary for Subcatchment A-17: A17

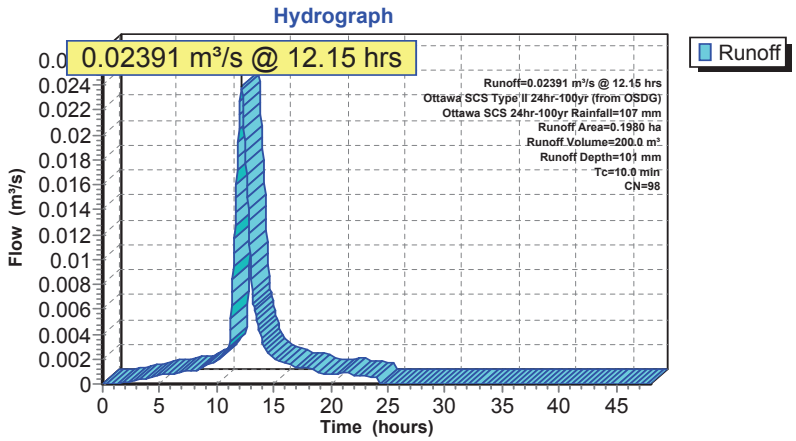
Runoff = 0.02391 m³/s @ 12.15 hrs, Volume= 200.0 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1980	98	
	0.1980		100.00% Impervious Area

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

Subcatchment A-17: A17



Summary for Subcatchment A-18: A18

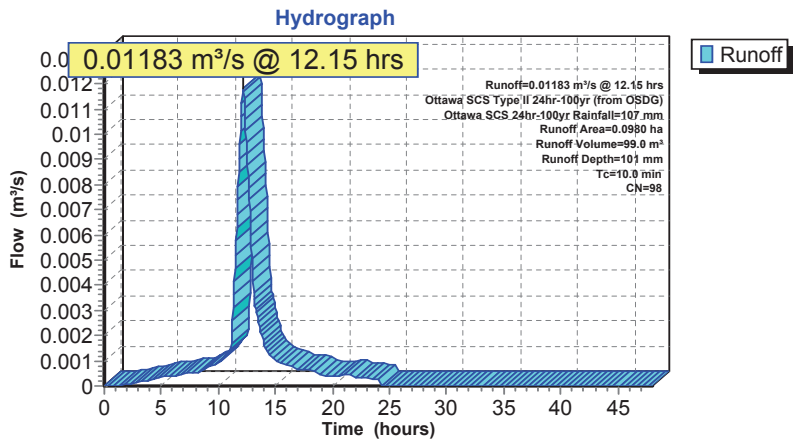
Runoff = 0.01183 m³/s @ 12.15 hrs, Volume= 99.0 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0980	98	
	0.0980		100.00% Impervious Area

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

Subcatchment A-18: A18



Summary for Subcatchment A-19: A19

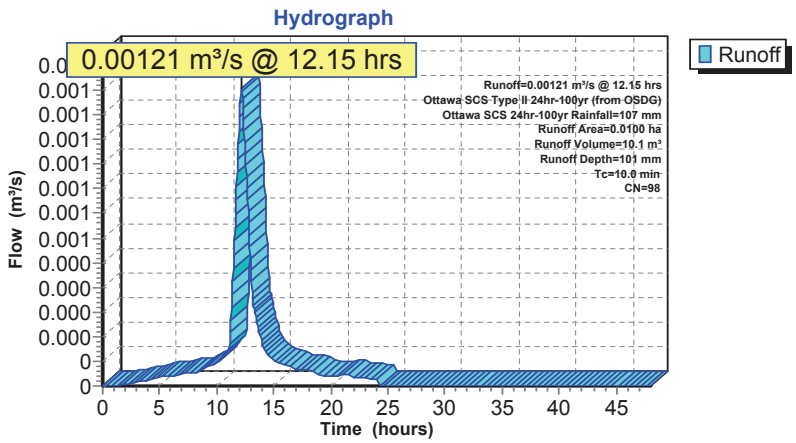
Runoff = 0.00121 m³/s @ 12.15 hrs, Volume= 10.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0100	98	
	0.0100		100.00% Impervious Area

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

Subcatchment A-19: A19



Summary for Subcatchment A-2: A2

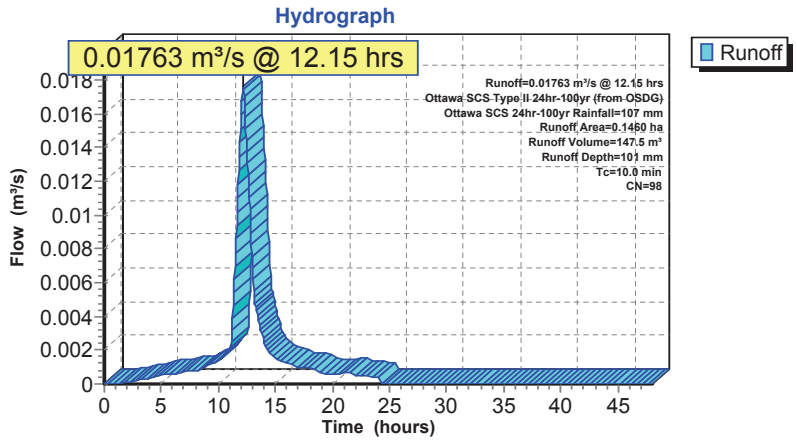
Runoff = 0.01763 m³/s @ 12.15 hrs, Volume= 147.5 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1460	98	
	0.1460		100.00% Impervious Area

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

Subcatchment A-2: A2



Summary for Subcatchment A-3: A3

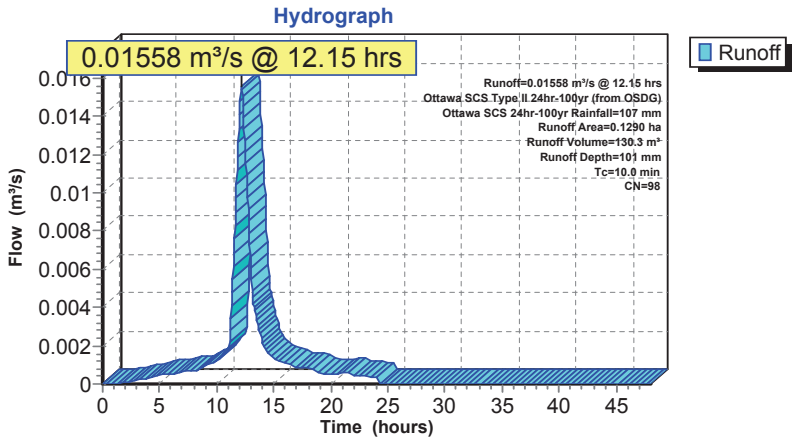
Runoff = 0.01558 m³/s @ 12.15 hrs, Volume= 130.3 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1290	98	
	0.1290		100.00% Impervious Area

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

Subcatchment A-3: A3



Summary for Subcatchment A-4: A4

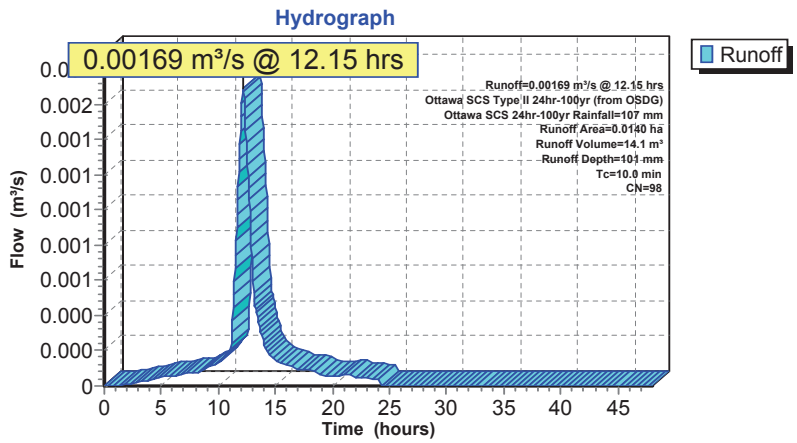
Runoff = 0.00169 m³/s @ 12.15 hrs, Volume= 14.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0140	98	
	0.0140		100.00% Impervious Area

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

Subcatchment A-4: A4



Summary for Subcatchment A-5: A5

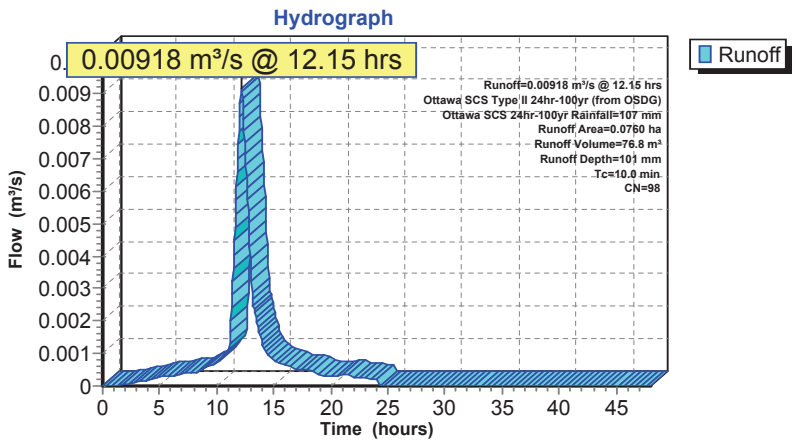
Runoff = 0.00918 m³/s @ 12.15 hrs, Volume= 76.8 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0760	98	
	0.0760		100.00% Impervious Area

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

Subcatchment A-5: A5



Summary for Subcatchment A-6: A6

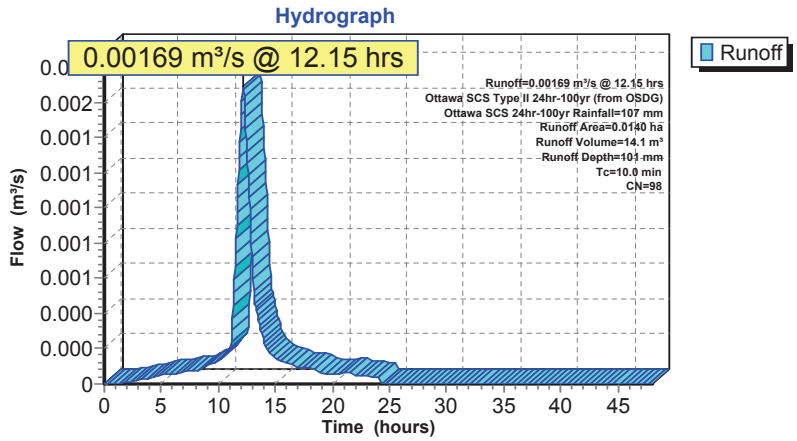
Runoff = 0.00169 m³/s @ 12.15 hrs, Volume= 14.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0140	98	
	0.0140		100.00% Impervious Area

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

Subcatchment A-6: A6



Summary for Subcatchment A-7: A7

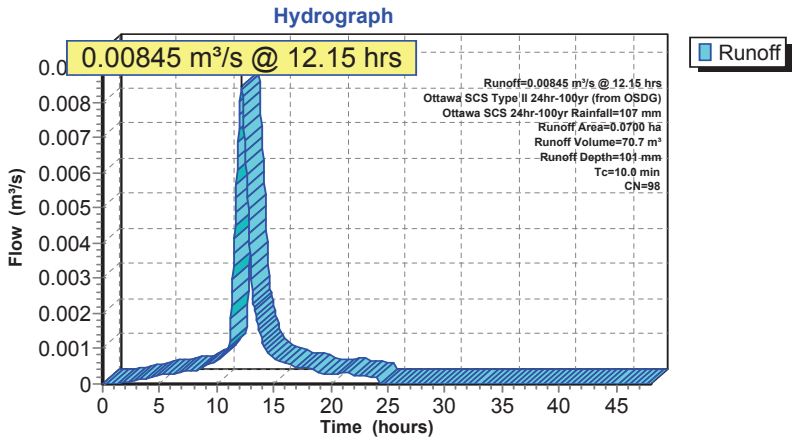
Runoff = 0.00845 m³/s @ 12.15 hrs, Volume= 70.7 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0700	98	
	0.0700		100.00% Impervious Area

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

Subcatchment A-7: A7



Summary for Subcatchment A-8: A8

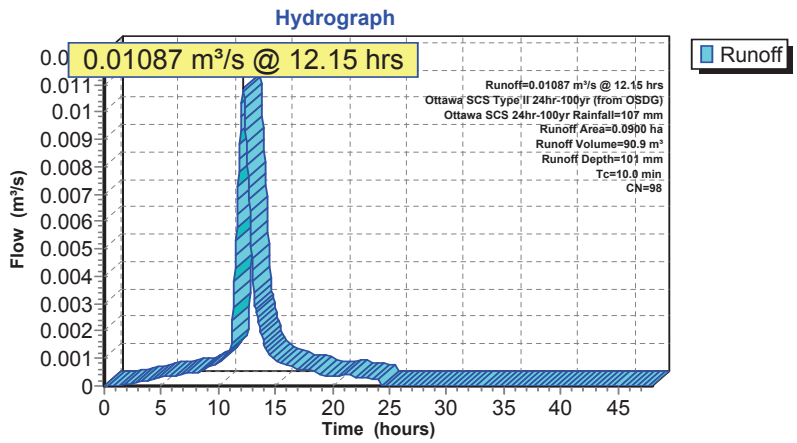
Runoff = 0.01087 m³/s @ 12.15 hrs, Volume= 90.9 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0900	98	
	0.0900		100.00% Impervious Area

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

Subcatchment A-8: A8



Summary for Subcatchment A-9: A9

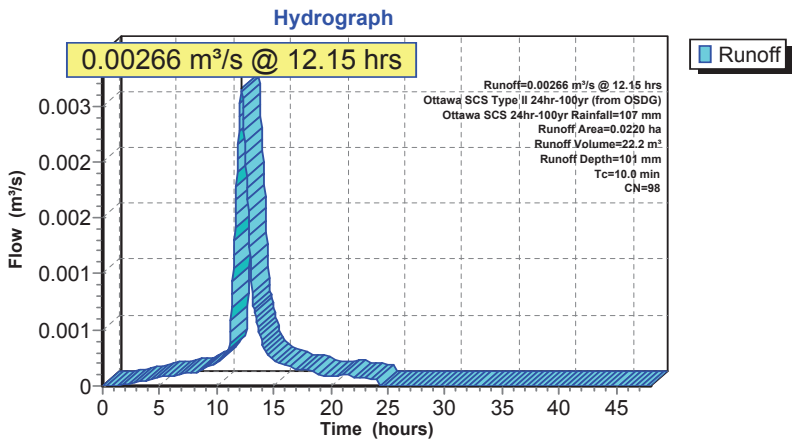
Runoff = 0.00266 m³/s @ 12.15 hrs, Volume= 22.2 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0220	98	
	0.0220		100.00% Impervious Area

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

Subcatchment A-9: A9



Summary for Pond P-0: Subsurface Chamber

Inflow Area = 13,110.0 m², 100.00% Impervious, Inflow Depth = 100 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.09192 m³/s @ 12.15 hrs, Volume= 1,317.4 m³
Outflow = 0.03381 m³/s @ 13.32 hrs, Volume= 987.1 m³, Atten= 63%, Lag= 69.7 min
Primary = 0.03381 m³/s @ 13.32 hrs, Volume= 987.1 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1.651 m @ 13.32 hrs Surf.Area= 0.0 m² Storage= 543.1 m³

Plug-Flow detention time= 293.9 min calculated for 986.0 m³ (75% of inflow)
Center-of-Mass det. time= 179.7 min (1,025.1 - 845.4)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.500 m	475.0 m³	**Subsurface Chamber**Listed below
#2	1.500 m	135.0 m³	**A8 Surface Ponding**Listed below
		610.0 m³	Total Available Storage

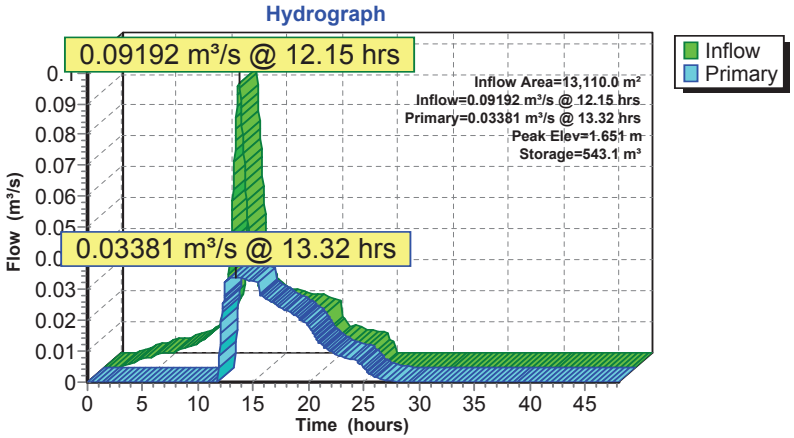
Elevation (meters)	Cum.Store (cubic-meters)
-0.500	0.0
0.000	308.8
1.200	475.0

Elevation (meters)	Cum.Store (cubic-meters)
1.500	0.0
1.800	135.0

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**HYDROVEX 150-VHV-2** Elev. (meters) 0.000 0.200 0.750 1.000 1.500 2.000 3.000 4.500 6.000 Disch. (m³/s) 0.000000 0.000100 0.022000 0.026000 0.032000 0.038000 0.047000 0.057000 0.067000

Primary OutFlow Max=0.03381 m³/s @ 13.32 hrs HW=1.651 m (Free Discharge)
↑—**1=HYDROVEX 150-VHV-2** (Custom Controls 0.03381 m³/s)

Pond P-0: Subsurface Chamber



Summary for Pond P-10: A10-A11 Bioretention

Inflow Area = 760.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00918 m³/s @ 12.15 hrs, Volume= 76.8 m³
Outflow = 0.00582 m³/s @ 12.69 hrs, Volume= 45.3 m³, Atten= 37%, Lag= 32.3 min
Primary = 0.00582 m³/s @ 12.69 hrs, Volume= 45.3 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.185 m @ 12.69 hrs Surf.Area= 0.0 m² Storage= 38.8 m³

Plug-Flow detention time= 243.7 min calculated for 45.3 m³ (59% of inflow)
Center-of-Mass det. time= 127.8 min (897.6 - 769.9)

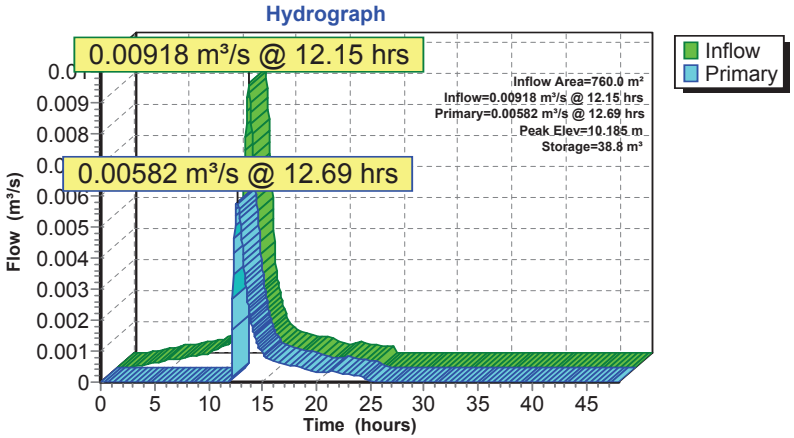
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	63.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	31.5
10.300	63.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag) X 3.00** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 75-VHV-1** Head (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00703 m³/s @ 12.69 hrs HW=10.185 m (Free Discharge)
↑—**2=HYDROVEX 75-VHV-1** (Custom Controls 0.00703 m³/s)
↑—**1=CB inlet (Sag)** (Passes 0.00703 m³/s of 0.02081 m³/s potential flow)

Pond P-10: A10-A11 Bioretention



Summary for Pond P-12: A12 Bioretention

Inflow Area = 110.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00133 m³/s @ 12.15 hrs, Volume= 11.1 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.101 m @ 24.60 hrs Surf.Area= 0.0 m² Storage= 11.1 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

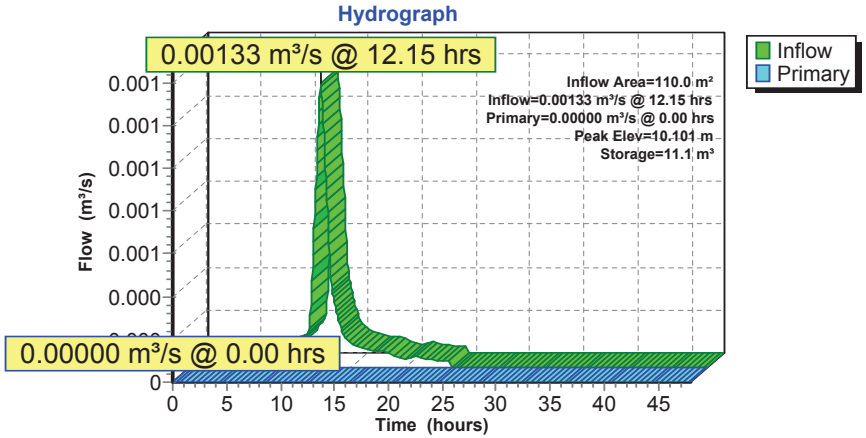
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	33.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	16.5
10.300	33.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 50-VHV-1** Head (meters) 0.000 0.300 0.500 1.000 2.000 3.000 6.000 Disch. (m³/s) 0.000000 0.001400 0.001850 0.002800 0.004100 0.005000 0.007000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑—**2=HYDROVEX 50-VHV-1** (Passes 0.00000 m³/s of 0.00306 m³/s potential flow)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-12: A12 Bioretention



Summary for Pond P-13: A13 Bioretention

Inflow Area = 210.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00254 m³/s @ 12.15 hrs, Volume= 21.2 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.133 m @ 24.60 hrs Surf.Area= 0.0 m² Storage= 21.2 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

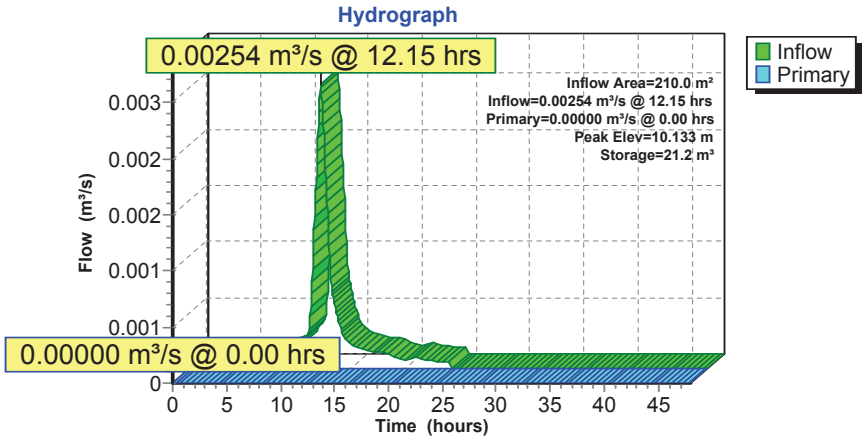
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	48.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	24.0
10.300	48.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 50-VHV-1** Head (meters) 0.000 0.300 0.500 1.000 2.000 3.000 6.000 Disch. (m³/s) 0.000000 0.001400 0.001850 0.002800 0.004100 0.005000 0.007000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑—**2=HYDROVEX 50-VHV-1** (Passes 0.00000 m³/s of 0.00306 m³/s potential flow)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-13: A13 Bioretention



Summary for Pond P-15: Rooftop Storage

Inflow Area = 2,210.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.02669 m³/s @ 12.15 hrs, Volume= 223.3 m³
Outflow = 0.00378 m³/s @ 11.20 hrs, Volume= 223.3 m³, Atten= 86%, Lag= 0.0 min
Primary = 0.00378 m³/s @ 11.20 hrs, Volume= 223.3 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.144 m @ 14.00 hrs Surf.Area= 2,036.5 m² Storage= 97.8 m³

Plug-Flow detention time= 209.4 min calculated for 223.1 m³ (100% of inflow)
Center-of-Mass det. time= 209.4 min (979.3 - 769.9)

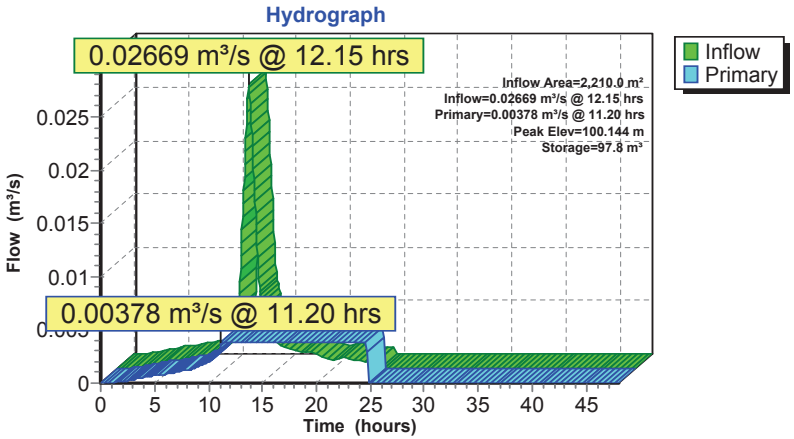
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	110.4 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 12

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	184.0	9.2	9.2	184.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 12.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00378 m³/s @ 11.20 hrs HW=100.026 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00378 m³/s)

Pond P-15: Rooftop Storage



Summary for Pond P-16: Rooftop Storage

Inflow Area = 2,530.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.03055 m³/s @ 12.15 hrs, Volume= 255.6 m³
Outflow = 0.00630 m³/s @ 11.30 hrs, Volume= 255.5 m³, Atten= 79%, Lag= 0.0 min
Primary = 0.00630 m³/s @ 11.30 hrs, Volume= 255.5 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.136 m @ 13.57 hrs Surf.Area= 2,067.9 m² Storage= 93.5 m³

Plug-Flow detention time= 108.7 min calculated for 255.3 m³ (100% of inflow)
Center-of-Mass det. time= 108.5 min (878.4 - 769.9)

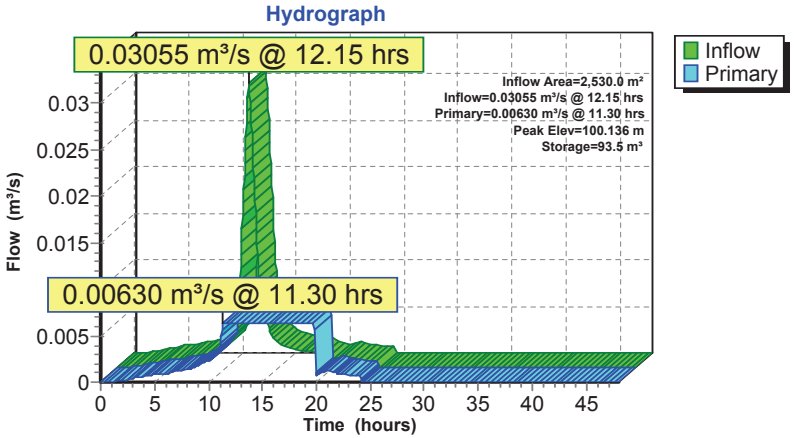
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	126.5 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 20

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	126.5	6.3	6.3	126.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 20.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00630 m³/s @ 11.30 hrs HW=100.026 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00630 m³/s)

Pond P-16: Rooftop Storage



Summary for Pond P-17: Rooftop Storage

Inflow Area = 1,980.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.02391 m³/s @ 12.15 hrs, Volume= 200.0 m³
Outflow = 0.00473 m³/s @ 11.30 hrs, Volume= 200.0 m³, Atten= 80%, Lag= 0.0 min
Primary = 0.00473 m³/s @ 11.30 hrs, Volume= 200.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.137 m @ 13.63 hrs Surf.Area= 1,644.1 m² Storage= 74.9 m³

Plug-Flow detention time= 117.4 min calculated for 200.0 m³ (100% of inflow)
Center-of-Mass det. time= 117.3 min (887.2 - 769.9)

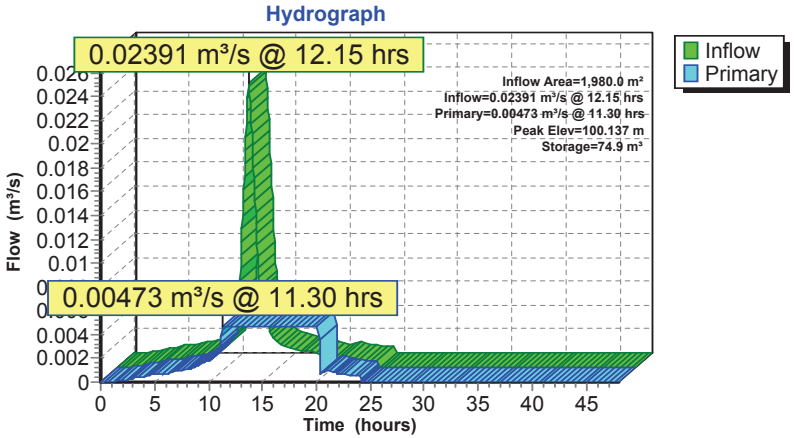
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	99.0 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 15

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	132.0	6.6	6.6	132.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 15.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00473 m³/s @ 11.30 hrs HW=100.027 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00473 m³/s)

Pond P-17: Rooftop Storage



Summary for Pond P-4: A4 Bioretention

Inflow Area = 140.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00169 m³/s @ 12.15 hrs, Volume= 14.1 m³
Outflow = 0.00168 m³/s @ 12.19 hrs, Volume= 10.6 m³, Atten= 1%, Lag= 2.4 min
Primary = 0.00168 m³/s @ 12.19 hrs, Volume= 10.6 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.160 m @ 12.19 hrs Surf.Area= 0.0 m² Storage= 3.7 m³

Plug-Flow detention time= 161.8 min calculated for 10.6 m³ (75% of inflow)
Center-of-Mass det. time= 74.2 min (844.0 - 769.9)

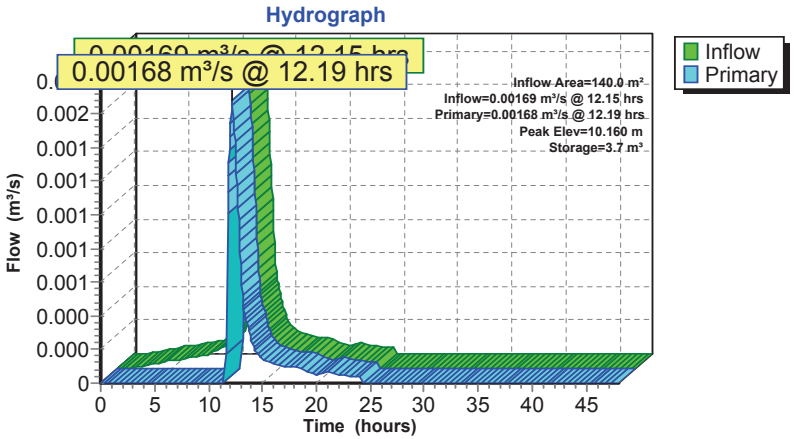
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	14.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	3.5
10.300	7.0
10.600	14.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 75-VHV-1** Head (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00200 m³/s @ 12.19 hrs HW=10.160 m (Free Discharge)
↑**2=HYDROVEX 75-VHV-1** (Passes 0.00200 m³/s of 0.00696 m³/s potential flow)
↑**1=CB inlet (Sag)** (Custom Controls 0.00200 m³/s)

Pond P-4: A4 Bioretention



Summary for Pond P-6: A6 Bioretention

Inflow Area = 140.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00169 m³/s @ 12.15 hrs, Volume= 14.1 m³
Outflow = 0.00168 m³/s @ 12.19 hrs, Volume= 10.6 m³, Atten= 1%, Lag= 2.4 min
Primary = 0.00168 m³/s @ 12.19 hrs, Volume= 10.6 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.160 m @ 12.19 hrs Surf.Area= 0.0 m² Storage= 3.7 m³

Plug-Flow detention time= 161.8 min calculated for 10.6 m³ (75% of inflow)
Center-of-Mass det. time= 74.2 min (844.0 - 769.9)

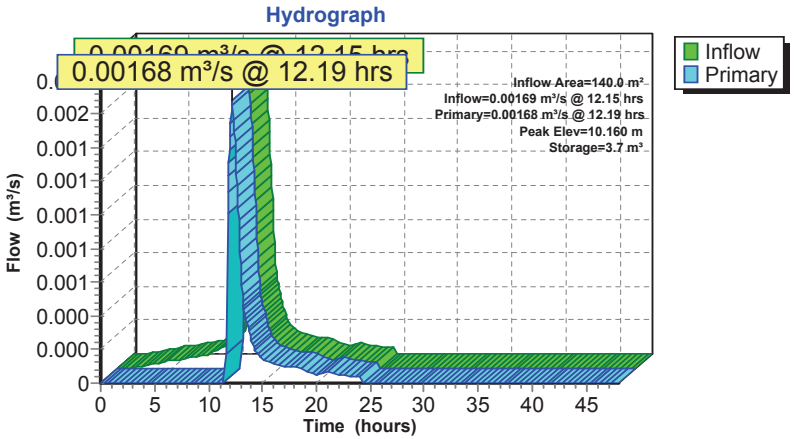
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	14.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	3.5
10.300	7.0
10.600	14.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 75-VHV-1** Head (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00200 m³/s @ 12.19 hrs HW=10.160 m (Free Discharge)
↑**2=HYDROVEX 75-VHV-1** (Passes 0.00200 m³/s of 0.00696 m³/s potential flow)
↑**1=CB inlet (Sag)** (Custom Controls 0.00200 m³/s)

Pond P-6: A6 Bioretention



Summary for Pond P-9: A9 Bioretention

Inflow Area = 220.0 m², 100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00266 m³/s @ 12.15 hrs, Volume= 22.2 m³
Outflow = 0.00252 m³/s @ 12.28 hrs, Volume= 16.7 m³, Atten= 5%, Lag= 7.4 min
Primary = 0.00252 m³/s @ 12.28 hrs, Volume= 16.7 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.182 m @ 12.28 hrs Surf.Area= 0.0 m² Storage= 6.7 m³

Plug-Flow detention time= 167.8 min calculated for 16.7 m³ (75% of inflow)
Center-of-Mass det. time= 79.6 min (849.5 - 769.9)

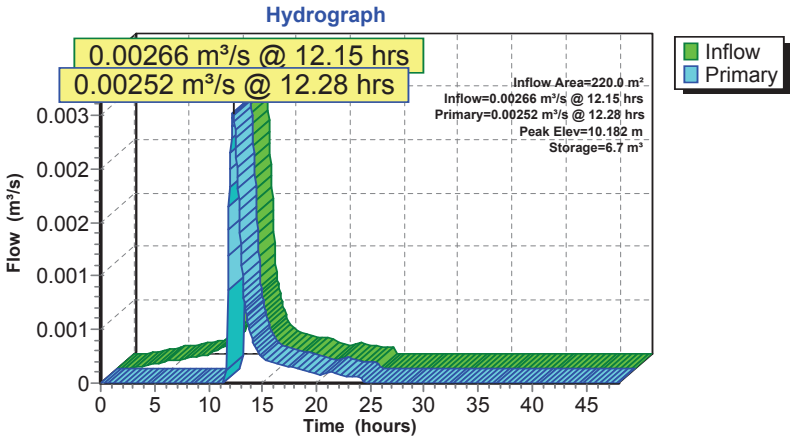
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	11.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	5.5
10.300	11.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 50-VHV-1** Head (meters) 0.000 0.300 0.500 1.000 2.000 3.000 6.000 Disch. (m³/s) 0.000000 0.001400 0.001850 0.002800 0.004100 0.005000 0.007000

Primary OutFlow Max=0.00330 m³/s @ 12.28 hrs HW=10.182 m (Free Discharge)
↑—**2=HYDROVEX 50-VHV-1** (Custom Controls 0.00330 m³/s)
↑—**1=CB inlet (Sag)** (Passes 0.00330 m³/s of 0.00639 m³/s potential flow)

Pond P-9: A9 Bioretention

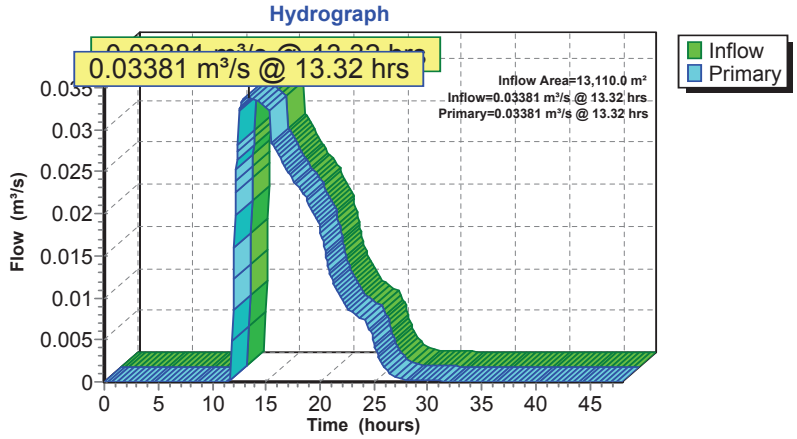


Summary for Link X-1: Chamber Outflow

Inflow Area = 13,110.0 m²,100.00% Impervious, Inflow Depth > 75 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.03381 m³/s @ 13.32 hrs, Volume= 987.1 m³
Primary = 0.03381 m³/s @ 13.32 hrs, Volume= 987.1 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-1: Chamber Outflow

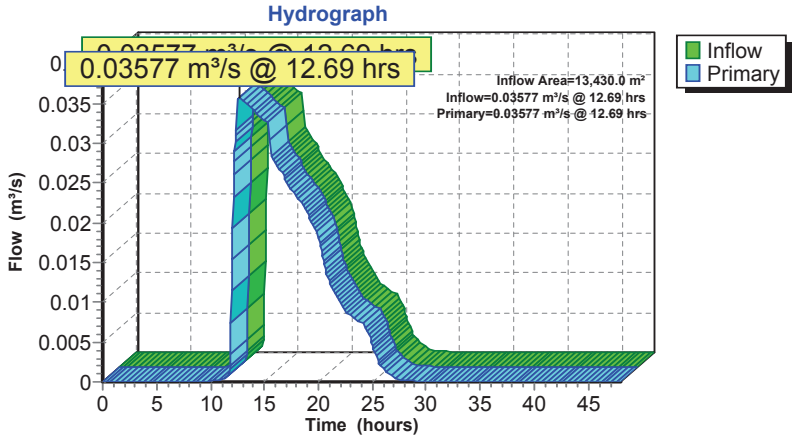


Summary for Link X-2: Internal Link A

Inflow Area = 13,430.0 m²,100.00% Impervious, Inflow Depth > 75 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.03577 m³/s @ 12.69 hrs, Volume= 1,013.9 m³
Primary = 0.03577 m³/s @ 12.69 hrs, Volume= 1,013.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-2: Internal Link A

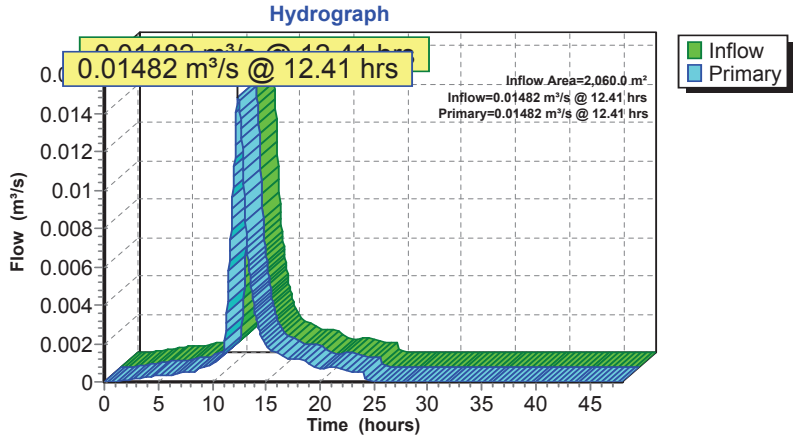


Summary for Link X-3: Internal Link B

Inflow Area = 2,060.0 m²,100.00% Impervious, Inflow Depth = 70 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.01482 m³/s @ 12.41 hrs, Volume= 144.3 m³
Primary = 0.01482 m³/s @ 12.41 hrs, Volume= 144.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-3: Internal Link B

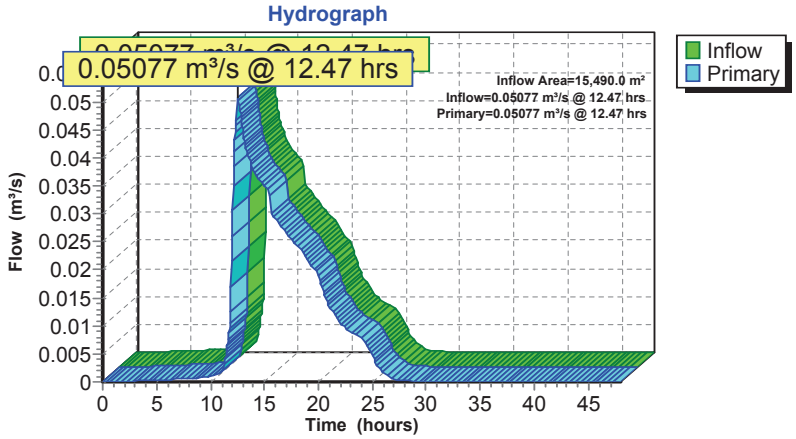


Summary for Link X-4: Net Offsite Flows

Inflow Area = 15,490.0 m²,100.00% Impervious, Inflow Depth > 75 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.05077 m³/s @ 12.47 hrs, Volume= 1,158.2 m³
Primary = 0.05077 m³/s @ 12.47 hrs, Volume= 1,158.2 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-4: Net Offsite Flows



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A-1: A1	Runoff Area=0.1000 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00910 m³/s 19.7 m³
Subcatchment A-10: A10	Runoff Area=0.0210 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00191 m³/s 4.1 m³
Subcatchment A-11: A11	Runoff Area=0.0550 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00501 m³/s 10.8 m³
Subcatchment A-12: A12	Runoff Area=0.0110 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00100 m³/s 2.2 m³
Subcatchment A-13: A13	Runoff Area=0.0160 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00146 m³/s 3.2 m³
Subcatchment A-14: A14	Runoff Area=0.0050 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00046 m³/s 1.0 m³
Subcatchment A-15: A15	Runoff Area=0.2210 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.02012 m³/s 43.5 m³
Subcatchment A-16: A16	Runoff Area=0.2530 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.02304 m³/s 49.8 m³
Subcatchment A-17: A17	Runoff Area=0.1980 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.01803 m³/s 39.0 m³
Subcatchment A-18: A18	Runoff Area=0.0980 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00892 m³/s 19.3 m³
Subcatchment A-19: A19	Runoff Area=0.0100 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00091 m³/s 2.0 m³
Subcatchment A-2: A2	Runoff Area=0.1460 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.01329 m³/s 28.8 m³
Subcatchment A-3: A3	Runoff Area=0.1290 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.01175 m³/s 25.4 m³
Subcatchment A-4: A4	Runoff Area=0.0140 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00127 m³/s 2.8 m³
Subcatchment A-5: A5	Runoff Area=0.0760 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00692 m³/s 15.0 m³
Subcatchment A-6: A6	Runoff Area=0.0140 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00127 m³/s 2.8 m³

Subcatchment A-7: A7	Runoff Area=0.0700 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00637 m³/s 13.8 m³
Subcatchment A-8: A8	Runoff Area=0.0900 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00819 m³/s 17.7 m³
Subcatchment A-9: A9	Runoff Area=0.0220 ha 100.00% Impervious Runoff Depth=20 mm Tc=10.0 min CN=98 Runoff=0.00200 m³/s 4.3 m³
Pond P-0: Subsurface Chamber	Peak Elev=-0.091 m Storage=252.7 m³ Inflow=0.07044 m³/s 252.7 m³ Outflow=0.00000 m³/s 0.0 m³
Pond P-10: A10-A11 Bioretention	Peak Elev=10.071 m Storage=15.0 m³ Inflow=0.00692 m³/s 15.0 m³ Outflow=0.00000 m³/s 0.0 m³
Pond P-12: A12 Bioretention	Peak Elev=10.020 m Storage=2.2 m³ Inflow=0.00100 m³/s 2.2 m³ Outflow=0.00000 m³/s 0.0 m³
Pond P-13: A13 Bioretention	Peak Elev=10.026 m Storage=4.1 m³ Inflow=0.00191 m³/s 4.1 m³ Outflow=0.00000 m³/s 0.0 m³
Pond P-15: Rooftop Storage	Peak Elev=100.085 m Storage=20.1 m³ Inflow=0.02012 m³/s 43.5 m³ Outflow=0.00378 m³/s 43.6 m³
Pond P-16: Rooftop Storage	Peak Elev=100.079 m Storage=18.2 m³ Inflow=0.02304 m³/s 49.8 m³ Outflow=0.00630 m³/s 49.8 m³
Pond P-17: Rooftop Storage	Peak Elev=100.079 m Storage=14.7 m³ Inflow=0.01803 m³/s 39.0 m³ Outflow=0.00473 m³/s 39.0 m³
Pond P-4: A4 Bioretention	Peak Elev=10.118 m Storage=2.8 m³ Inflow=0.00127 m³/s 2.8 m³ Outflow=0.00000 m³/s 0.0 m³
Pond P-6: A6 Bioretention	Peak Elev=10.118 m Storage=2.8 m³ Inflow=0.00127 m³/s 2.8 m³ Outflow=0.00000 m³/s 0.0 m³
Pond P-9: A9 Bioretention	Peak Elev=10.118 m Storage=4.3 m³ Inflow=0.00200 m³/s 4.3 m³ Outflow=0.00000 m³/s 0.0 m³
Link X-1: Chamber Outflow	Inflow=0.00000 m³/s 0.0 m³ Primary=0.00000 m³/s 0.0 m³
Link X-2: Internal Link A	Inflow=0.00091 m³/s 2.0 m³ Primary=0.00091 m³/s 2.0 m³
Link X-3: Internal Link B	Inflow=0.00892 m³/s 19.3 m³ Primary=0.00892 m³/s 19.3 m³
Link X-4: Net Offsite Flows	Inflow=0.00983 m³/s 21.3 m³ Primary=0.00983 m³/s 21.3 m³

Total Runoff Area = 15,490.0 m² Runoff Volume = 305.2 m³ Average Runoff Depth = 20 mm
0.00% Pervious = 0.0 m² 100.00% Impervious = 15,490.0 m²

Summary for Subcatchment A-1: A1

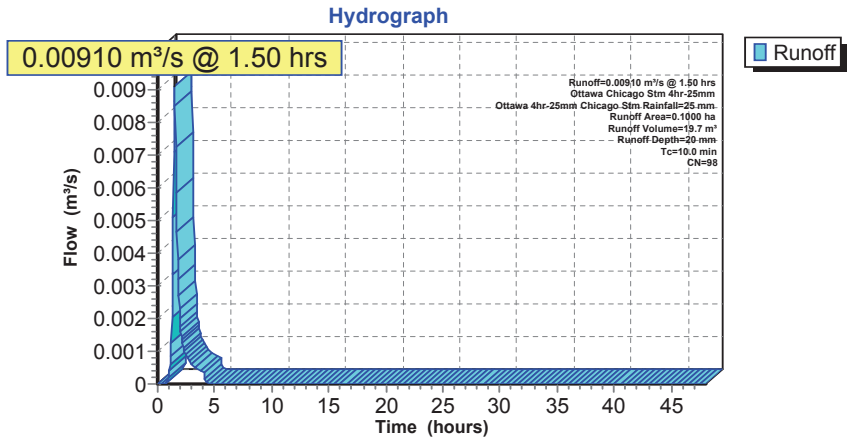
Runoff = 0.00910 m³/s @ 1.50 hrs, Volume= 19.7 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1000	98	
	0.1000		100.00% Impervious Area

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

Subcatchment A-1: A1



Summary for Subcatchment A-10: A10

Runoff = 0.00191 m³/s @ 1.50 hrs, Volume= 4.1 m³, Depth= 20 mm

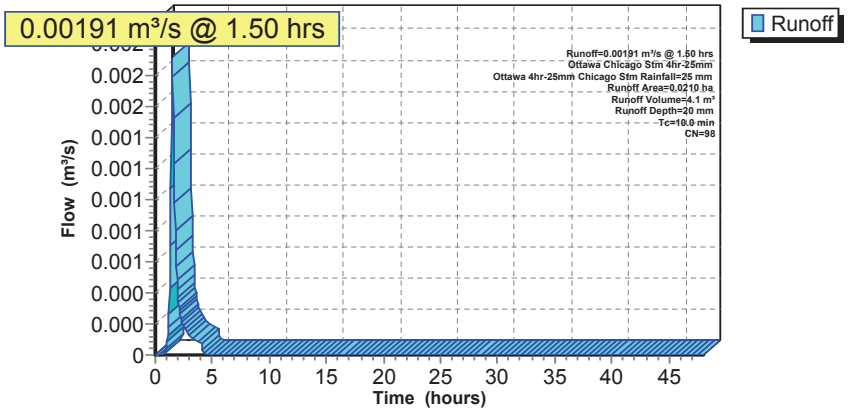
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0210	98	
	0.0210		100.00% Impervious Area

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

Subcatchment A-10: A10

Hydrograph



Summary for Subcatchment A-11: A11

Runoff = 0.00501 m³/s @ 1.50 hrs, Volume= 10.8 m³, Depth= 20 mm

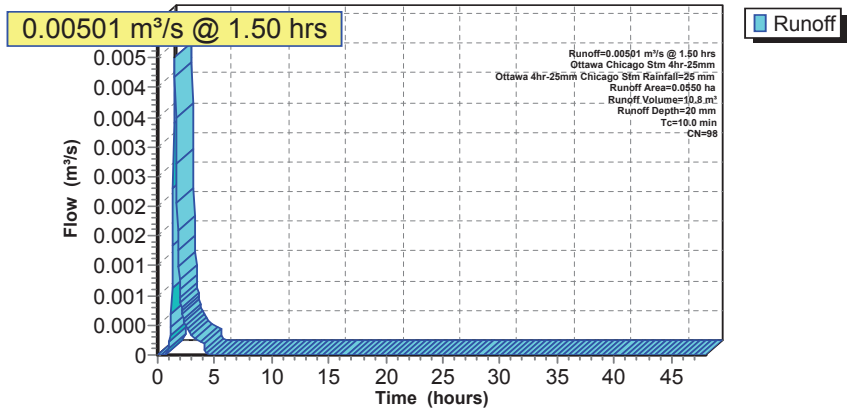
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0550	98	
	0.0550		100.00% Impervious Area

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

Subcatchment A-11: A11

Hydrograph



Summary for Subcatchment A-12: A12

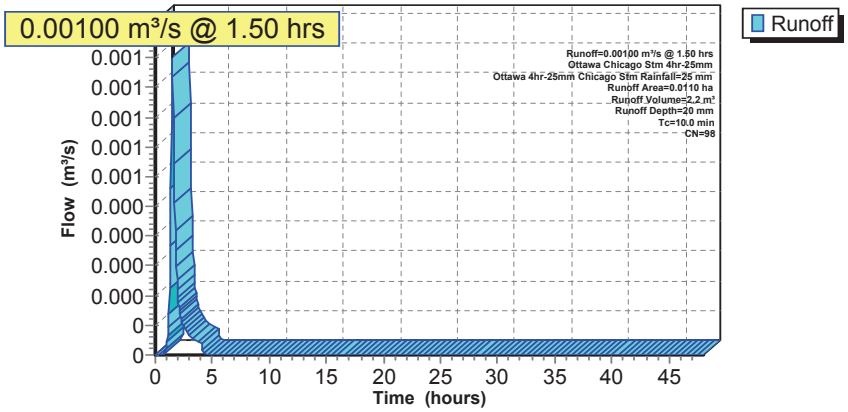
Runoff = 0.00100 m³/s @ 1.50 hrs, Volume= 2.2 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0110	98	
	0.0110		100.00% Impervious Area

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

Subcatchment A-12: A12



Summary for Subcatchment A-13: A13

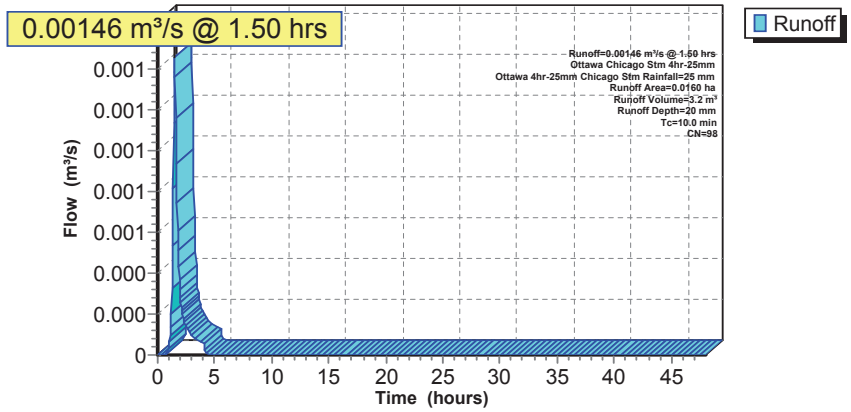
Runoff = 0.00146 m³/s @ 1.50 hrs, Volume= 3.2 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0160	98	
	0.0160		100.00% Impervious Area

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

Subcatchment A-13: A13



Summary for Subcatchment A-14: A14

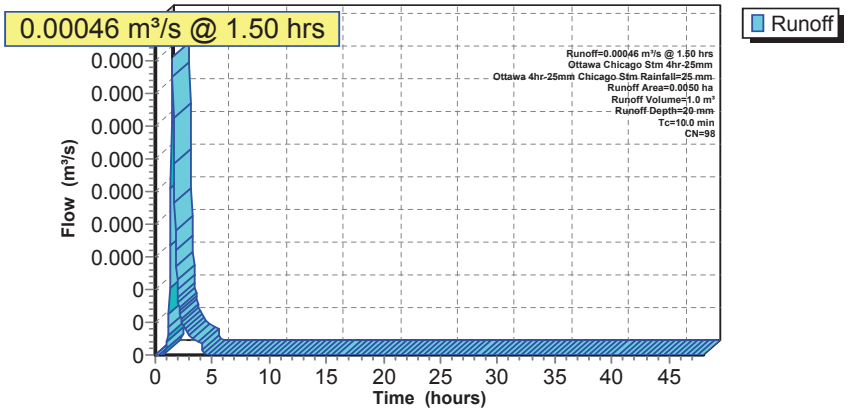
Runoff = 0.00046 m³/s @ 1.50 hrs, Volume= 1.0 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0050	98	
	0.0050		100.00% Impervious Area

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

Subcatchment A-14: A14



Summary for Subcatchment A-15: A15

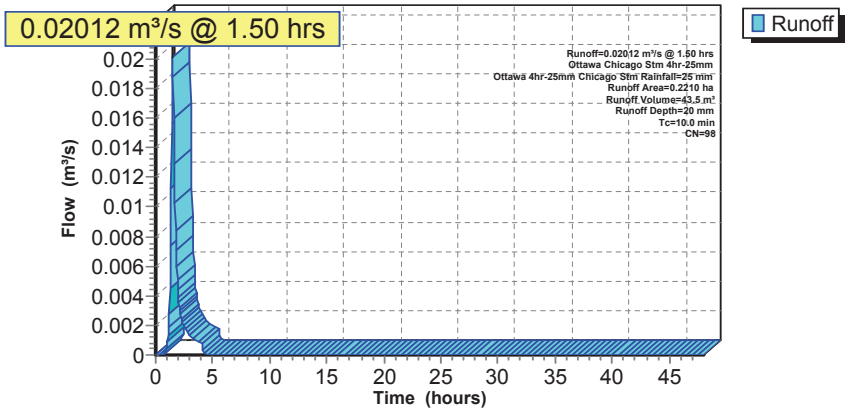
Runoff = 0.02012 m³/s @ 1.50 hrs, Volume= 43.5 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.2210	98	
	0.2210		100.00% Impervious Area

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

Subcatchment A-15: A15



Summary for Subcatchment A-16: A16

Runoff = 0.02304 m³/s @ 1.50 hrs, Volume= 49.8 m³, Depth= 20 mm

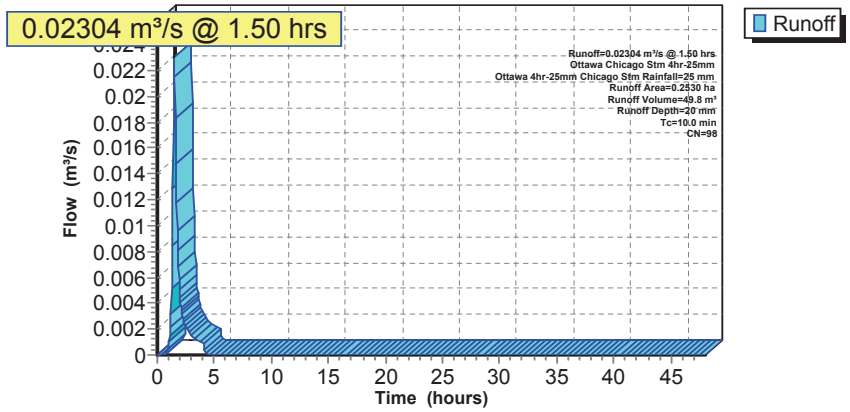
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.2530	98	
	0.2530		100.00% Impervious Area

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

Subcatchment A-16: A16

Hydrograph



Summary for Subcatchment A-17: A17

Runoff = 0.01803 m³/s @ 1.50 hrs, Volume= 39.0 m³, Depth= 20 mm

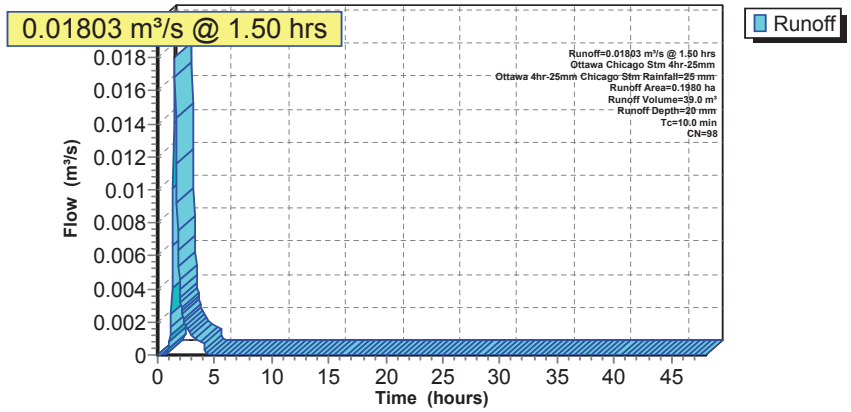
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1980	98	
	0.1980		100.00% Impervious Area

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

Subcatchment A-17: A17

Hydrograph



Summary for Subcatchment A-18: A18

Runoff = 0.00892 m³/s @ 1.50 hrs, Volume= 19.3 m³, Depth= 20 mm

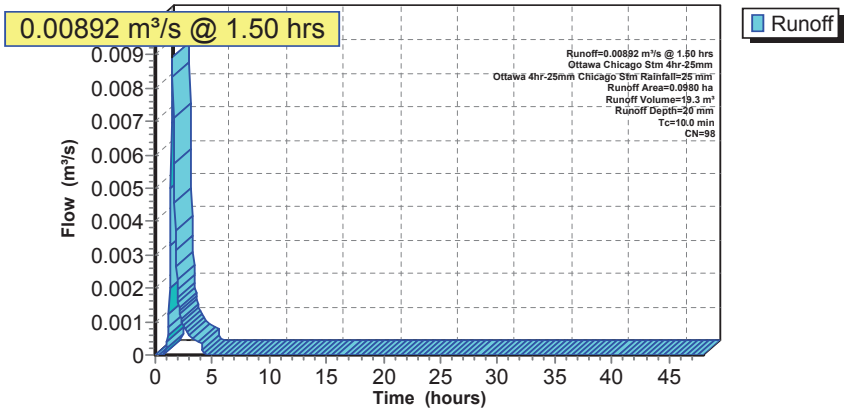
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0980	98	
	0.0980		100.00% Impervious Area

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

Subcatchment A-18: A18

Hydrograph



Summary for Subcatchment A-19: A19

Runoff = 0.00091 m³/s @ 1.50 hrs, Volume= 2.0 m³, Depth= 20 mm

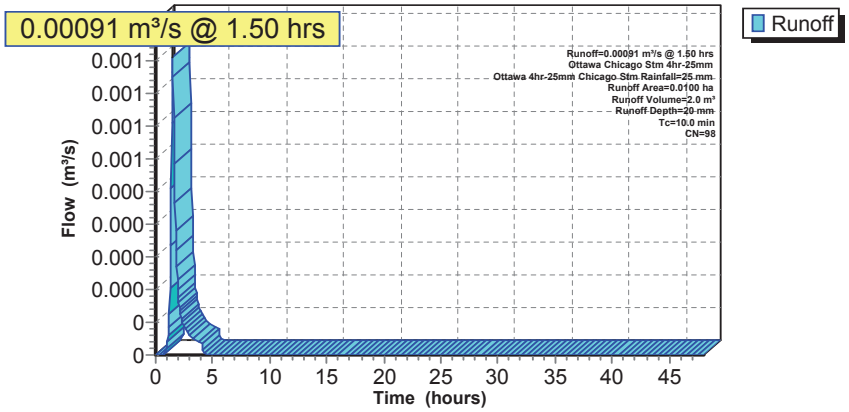
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0100	98	
	0.0100		100.00% Impervious Area

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

Subcatchment A-19: A19

Hydrograph



Summary for Subcatchment A-2: A2

Runoff = 0.01329 m³/s @ 1.50 hrs, Volume= 28.8 m³, Depth= 20 mm

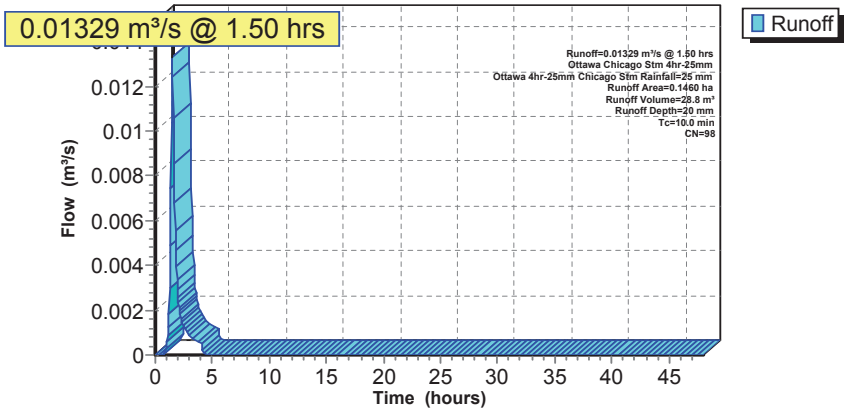
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1460	98	
	0.1460		100.00% Impervious Area

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

Subcatchment A-2: A2

Hydrograph



Summary for Subcatchment A-3: A3

Runoff = 0.01175 m³/s @ 1.50 hrs, Volume= 25.4 m³, Depth= 20 mm

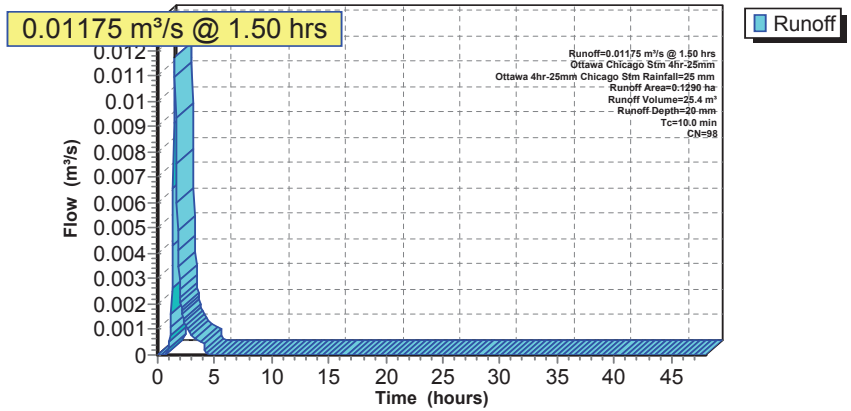
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1290	98	
	0.1290		100.00% Impervious Area

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

Subcatchment A-3: A3

Hydrograph



Summary for Subcatchment A-4: A4

Runoff = 0.00127 m³/s @ 1.50 hrs, Volume= 2.8 m³, Depth= 20 mm

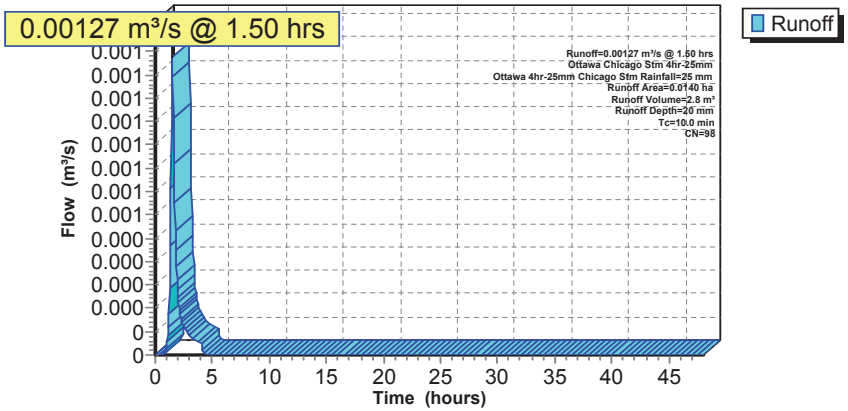
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0140	98	
	0.0140		100.00% Impervious Area

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

Subcatchment A-4: A4

Hydrograph



Summary for Subcatchment A-5: A5

Runoff = 0.00692 m³/s @ 1.50 hrs, Volume= 15.0 m³, Depth= 20 mm

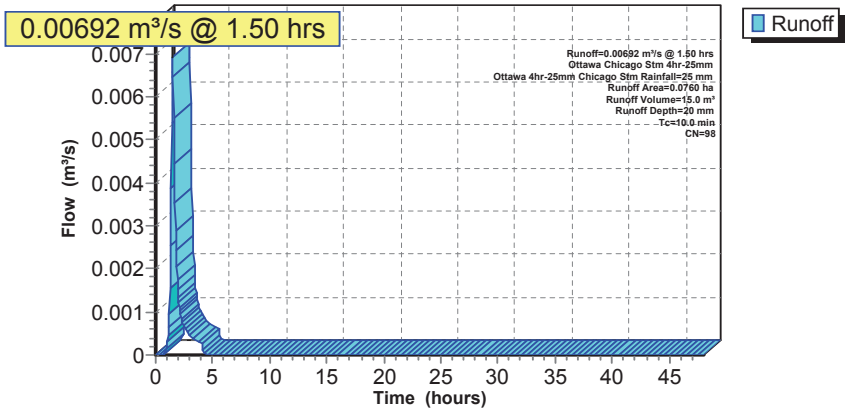
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0760	98	
	0.0760		100.00% Impervious Area

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

Subcatchment A-5: A5

Hydrograph



Summary for Subcatchment A-6: A6

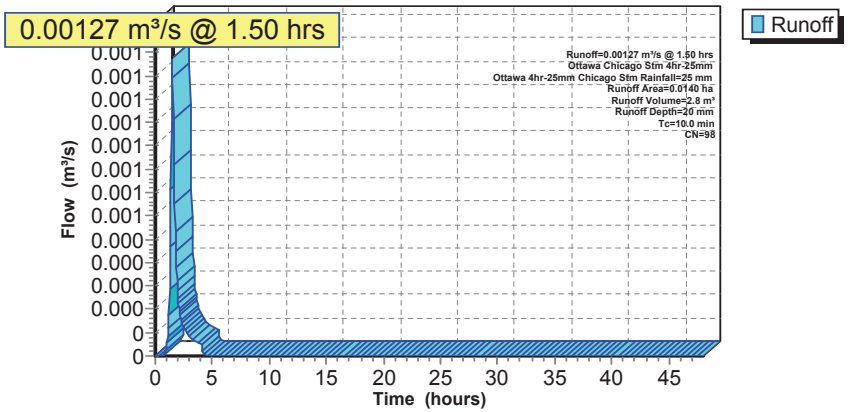
Runoff = 0.00127 m³/s @ 1.50 hrs, Volume= 2.8 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0140	98	
	0.0140		100.00% Impervious Area

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

Subcatchment A-6: A6



Summary for Subcatchment A-7: A7

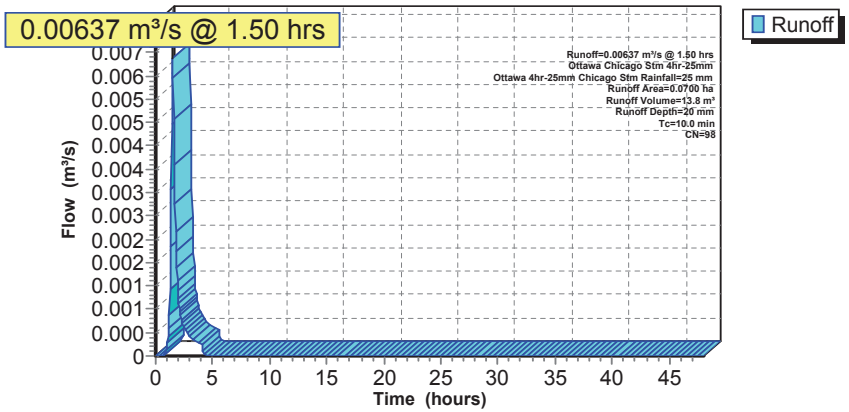
Runoff = 0.00637 m³/s @ 1.50 hrs, Volume= 13.8 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0700	98	
	0.0700		100.00% Impervious Area

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

Subcatchment A-7: A7



Summary for Subcatchment A-8: A8

Runoff = 0.00819 m³/s @ 1.50 hrs, Volume= 17.7 m³, Depth= 20 mm

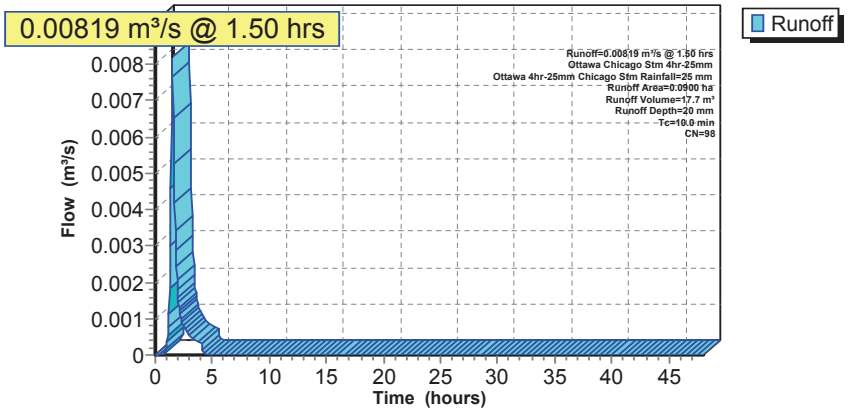
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0900	98	
	0.0900		100.00% Impervious Area

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

Subcatchment A-8: A8

Hydrograph



Summary for Subcatchment A-9: A9

Runoff = 0.00200 m³/s @ 1.50 hrs, Volume= 4.3 m³, Depth= 20 mm

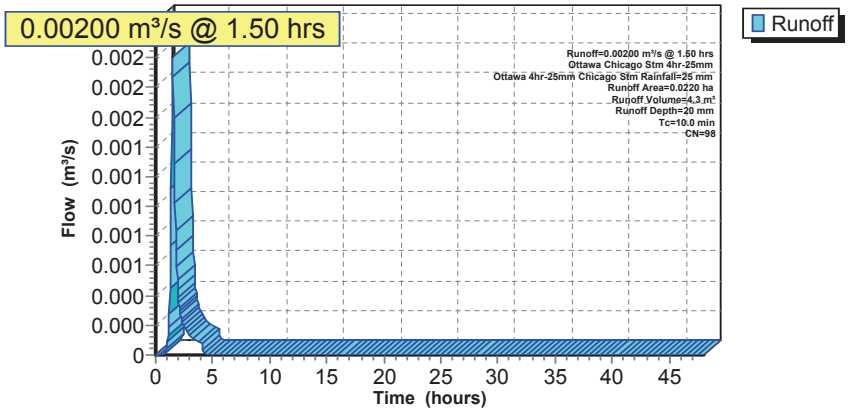
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0220	98	
	0.0220		100.00% Impervious Area

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

Subcatchment A-9: A9

Hydrograph



Summary for Pond P-0: Subsurface Chamber

Inflow Area = 13,110.0 m², 100.00% Impervious, Inflow Depth = 19 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.07044 m³/s @ 1.50 hrs, Volume= 252.7 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= -0.091 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 252.7 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.500 m	475.0 m³	**Subsurface Chamber** Listed below
#2	1.500 m	135.0 m³	**A8 Surface Ponding** Listed below
		610.0 m³	Total Available Storage

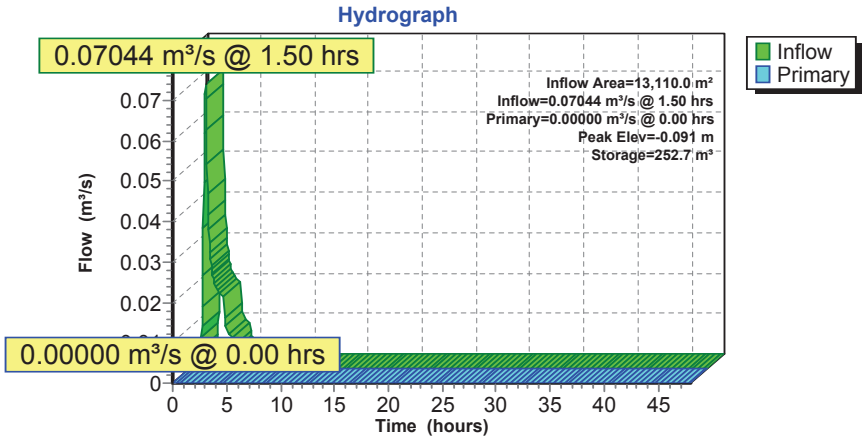
Elevation (meters)	Cum.Store (cubic-meters)
-0.500	0.0
0.000	308.8
1.200	475.0

Elevation (meters)	Cum.Store (cubic-meters)
1.500	0.0
1.800	135.0

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**HYDROVEX 150-VHV-2** Elev. (meters) 0.000 0.200 0.750 1.000 1.500 2.000 3.000 4.500 6.000 Disch. (m³/s) 0.000000 0.000100 0.022000 0.026000 0.032000 0.038000 0.047000 0.057000 0.067000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=-0.500 m (Free Discharge)
↑—**1=HYDROVEX 150-VHV-2** (Controls 0.00000 m³/s)

Pond P-0: Subsurface Chamber



Summary for Pond P-10: A10-A11 Bioretention

Inflow Area = 760.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.00692 m³/s @ 1.50 hrs, Volume= 15.0 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.071 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 15.0 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

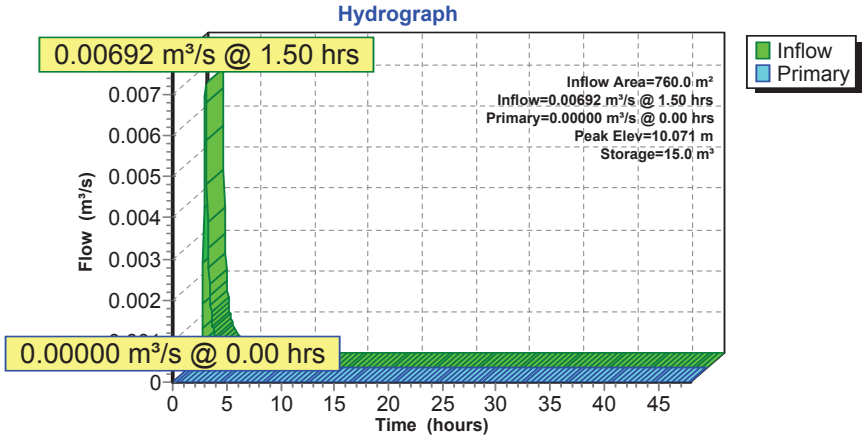
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	63.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	31.5
10.300	63.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag) X 3.00** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 75-VHV-1** Head (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑—**2=HYDROVEX 75-VHV-1** (Passes 0.00000 m³/s of 0.00653 m³/s potential flow)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-10: A10-A11 Bioretention



Summary for Pond P-12: A12 Bioretention

Inflow Area = 110.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.00100 m³/s @ 1.50 hrs, Volume= 2.2 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.020 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 2.2 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

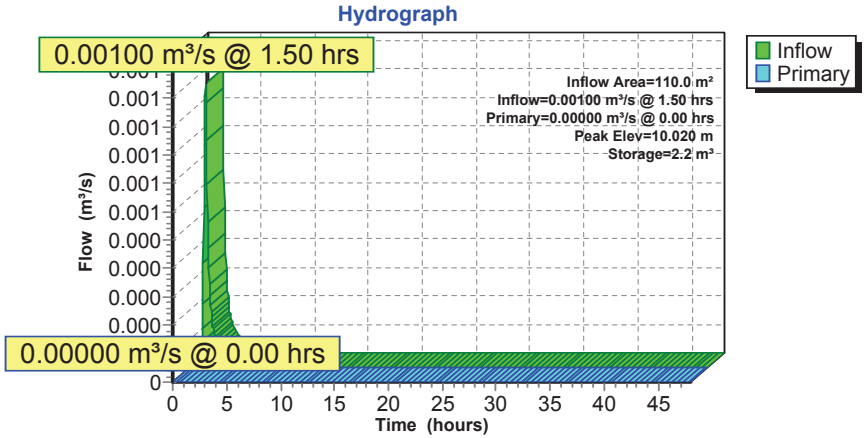
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	33.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	16.5
10.300	33.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 50-VHV-1** Head (meters) 0.000 0.300 0.500 1.000 2.000 3.000 6.000 Disch. (m³/s) 0.000000 0.001400 0.001850 0.002800 0.004100 0.005000 0.007000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑—**2=HYDROVEX 50-VHV-1** (Passes 0.00000 m³/s of 0.00306 m³/s potential flow)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-12: A12 Bioretention



Summary for Pond P-13: A13 Bioretention

Inflow Area = 210.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.00191 m³/s @ 1.50 hrs, Volume= 4.1 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.026 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 4.1 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

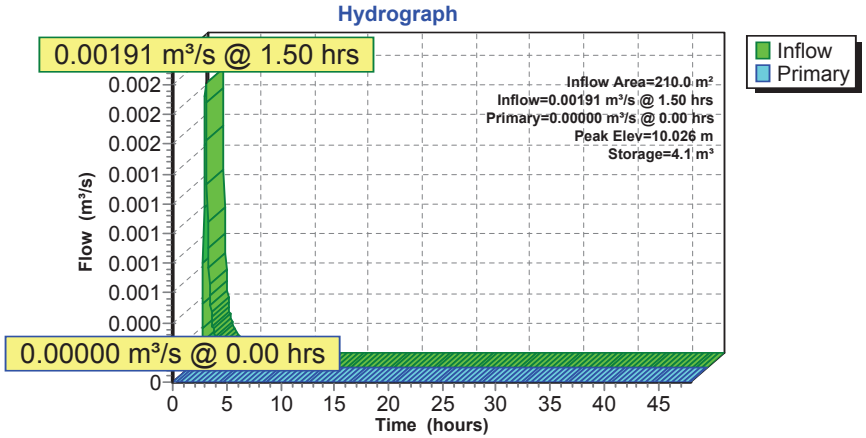
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	48.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	24.0
10.300	48.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 50-VHV-1** Head (meters) 0.000 0.300 0.500 1.000 2.000 3.000 6.000 Disch. (m³/s) 0.000000 0.001400 0.001850 0.002800 0.004100 0.005000 0.007000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑—**2=HYDROVEX 50-VHV-1** (Passes 0.00000 m³/s of 0.00306 m³/s potential flow)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-13: A13 Bioretention



Summary for Pond P-15: Rooftop Storage

Inflow Area = 2,210.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stn
Inflow = 0.02012 m³/s @ 1.50 hrs, Volume= 43.5 m³
Outflow = 0.00378 m³/s @ 1.30 hrs, Volume= 43.6 m³, Atten= 81%, Lag= 0.0 min
Primary = 0.00378 m³/s @ 1.30 hrs, Volume= 43.6 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.085 m @ 2.02 hrs Surf.Area= 709.9 m² Storage= 20.1 m³

Plug-Flow detention time= 51.2 min calculated for 43.5 m³ (100% of inflow)
Center-of-Mass det. time= 51.3 min (164.1 - 112.8)

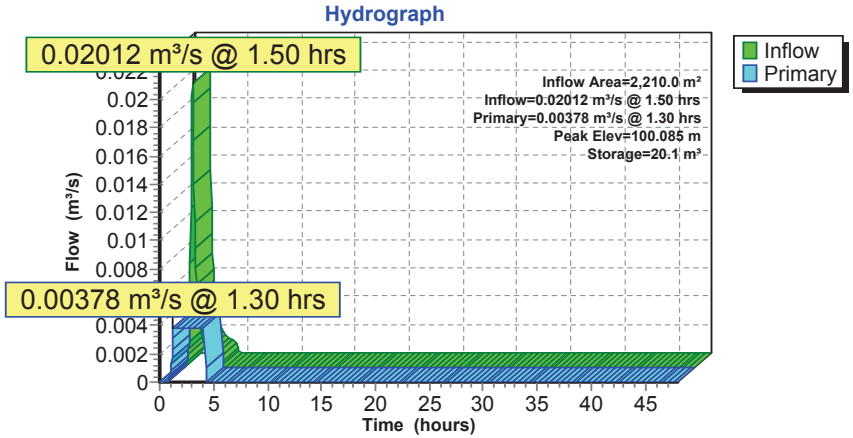
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	110.4 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 12

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	184.0	9.2	9.2	184.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 12.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00378 m³/s @ 1.30 hrs HW=100.028 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00378 m³/s)

Pond P-15: Rooftop Storage



Summary for Pond P-16: Rooftop Storage

Inflow Area = 2,530.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.02304 m³/s @ 1.50 hrs, Volume= 49.8 m³
Outflow = 0.00630 m³/s @ 1.35 hrs, Volume= 49.8 m³, Atten= 73%, Lag= 0.0 min
Primary = 0.00630 m³/s @ 1.35 hrs, Volume= 49.8 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.079 m @ 1.87 hrs Surf.Area= 695.0 m² Storage= 18.2 m³

Plug-Flow detention time= 25.0 min calculated for 49.8 m³ (100% of inflow)
Center-of-Mass det. time= 24.8 min (137.6 - 112.8)

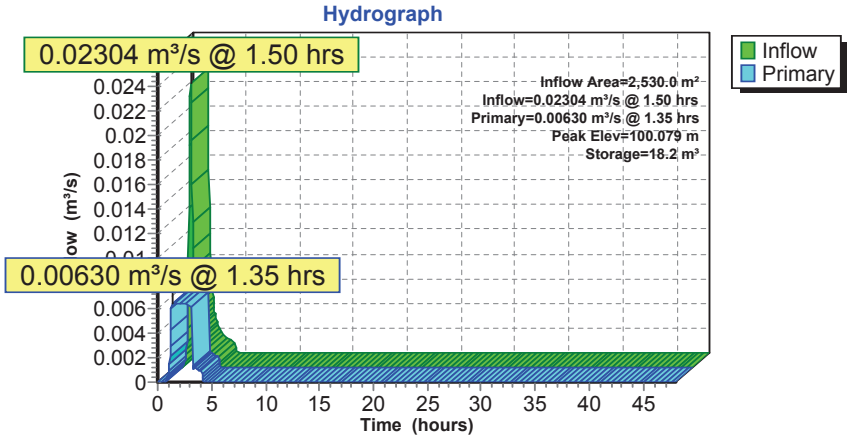
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	126.5 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 20

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	126.5	6.3	6.3	126.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 20.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00630 m³/s @ 1.35 hrs HW=100.033 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00630 m³/s)

Pond P-16: Rooftop Storage



Summary for Pond P-17: Rooftop Storage

Inflow Area = 1,980.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.01803 m³/s @ 1.50 hrs, Volume= 39.0 m³
Outflow = 0.00473 m³/s @ 1.35 hrs, Volume= 39.0 m³, Atten= 74%, Lag= 0.0 min
Primary = 0.00473 m³/s @ 1.35 hrs, Volume= 39.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.079 m @ 1.89 hrs Surf.Area= 555.2 m² Storage= 14.7 m³

Plug-Flow detention time= 27.2 min calculated for 39.0 m³ (100% of inflow)
Center-of-Mass det. time= 27.1 min (139.8 - 112.8)

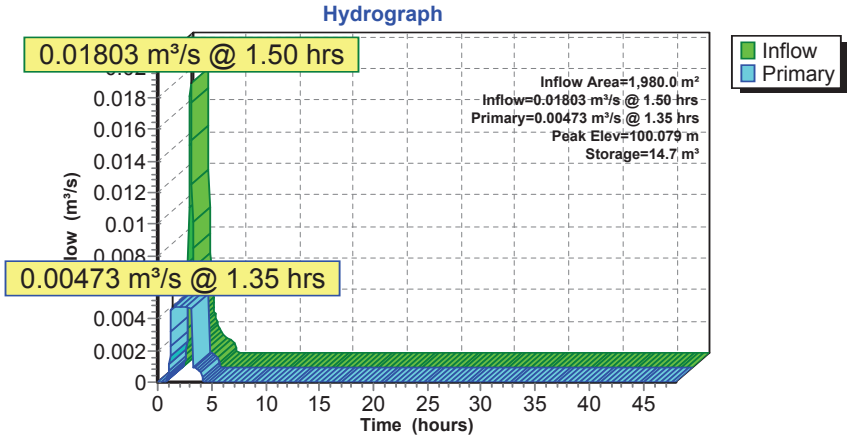
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	99.0 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 15

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	132.0	6.6	6.6	132.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 15.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00473 m³/s @ 1.35 hrs HW=100.033 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00473 m³/s)

Pond P-17: Rooftop Storage



Summary for Pond P-4: A4 Bioretention

Inflow Area = 140.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.00127 m³/s @ 1.50 hrs, Volume= 2.8 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.118 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 2.8 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

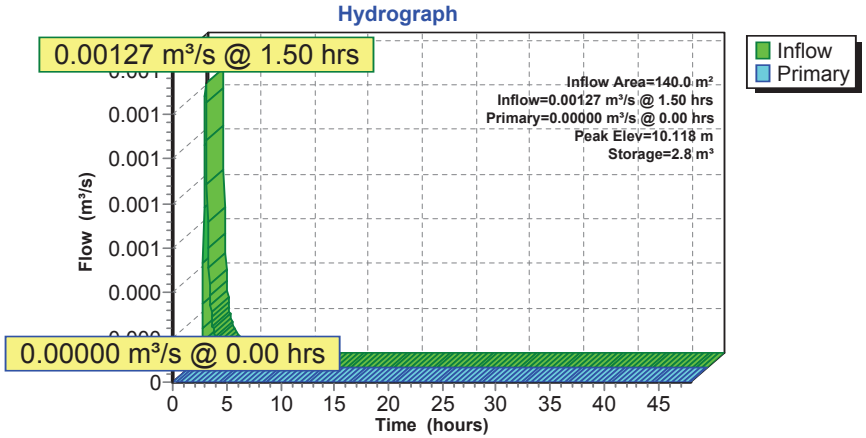
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	14.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	3.5
10.300	7.0
10.600	14.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 75-VHV-1** Head (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑**2=HYDROVEX 75-VHV-1** (Passes 0.00000 m³/s of 0.00653 m³/s potential flow)
↑**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-4: A4 Bioretention



Summary for Pond P-6: A6 Bioretention

Inflow Area = 140.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.00127 m³/s @ 1.50 hrs, Volume= 2.8 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.118 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 2.8 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

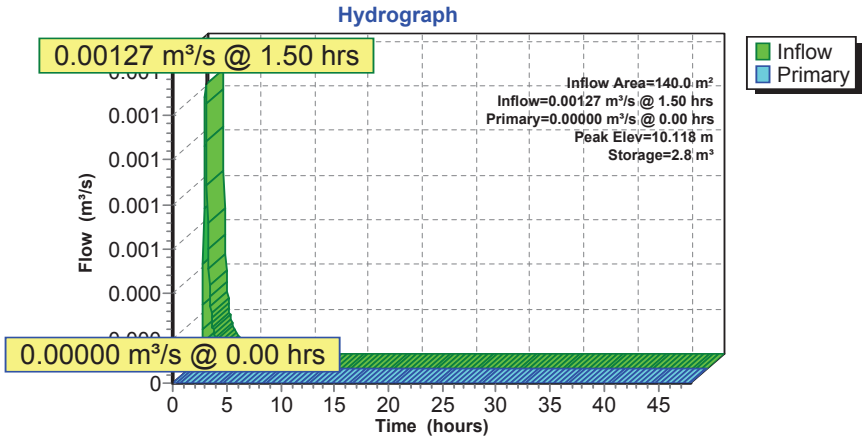
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	14.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	3.5
10.300	7.0
10.600	14.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 75-VHV-1** Head (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
└**2=HYDROVEX 75-VHV-1** (Passes 0.00000 m³/s of 0.00653 m³/s potential flow)
└**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-6: A6 Bioretention



Summary for Pond P-9: A9 Bioretention

Inflow Area = 220.0 m², 100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Str
Inflow = 0.00200 m³/s @ 1.50 hrs, Volume= 4.3 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 10.118 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 4.3 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

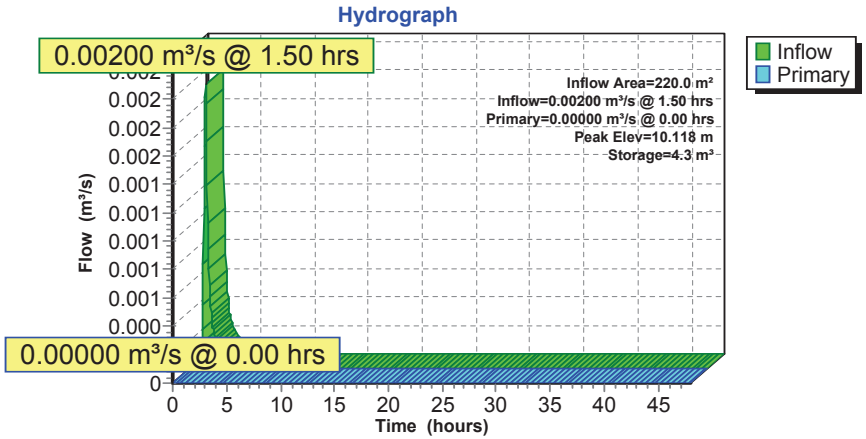
Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	11.0 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
10.000	0.0
10.150	5.5
10.300	11.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	10.150 m	**CB inlet (Sag)** Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000
#2	Primary	8.800 m	**HYDROVEX 50-VHV-1** Head (meters) 0.000 0.300 0.500 1.000 2.000 3.000 6.000 Disch. (m³/s) 0.000000 0.001400 0.001850 0.002800 0.004100 0.005000 0.007000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
↑—**2=HYDROVEX 50-VHV-1** (Passes 0.00000 m³/s of 0.00306 m³/s potential flow)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-9: A9 Bioretention

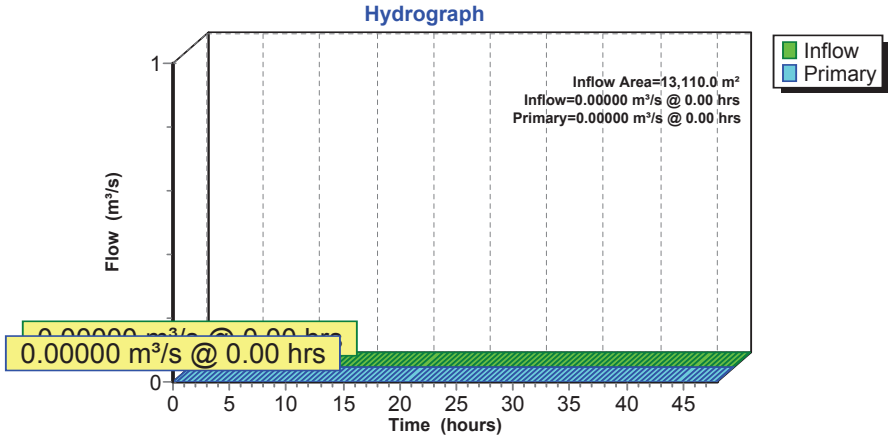


Summary for Link X-1: Chamber Outflow

Inflow Area = 13,110.0 m²,100.00% Impervious, Inflow Depth = 0 mm for Ottawa 4hr-25mm Chicago Stn
Inflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-1: Chamber Outflow

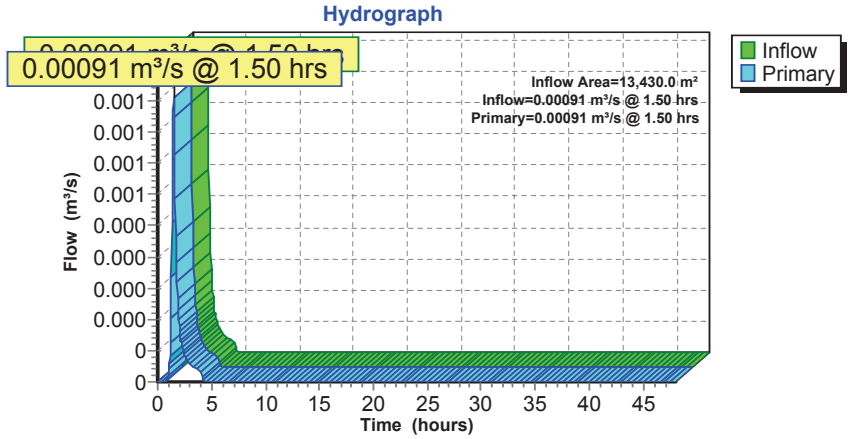


Summary for Link X-2: Internal Link A

Inflow Area = 13,430.0 m²,100.00% Impervious, Inflow Depth = 0 mm for Ottawa 4hr-25mm Chicago Stn
Inflow = 0.00091 m³/s @ 1.50 hrs, Volume= 2.0 m³
Primary = 0.00091 m³/s @ 1.50 hrs, Volume= 2.0 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-2: Internal Link A

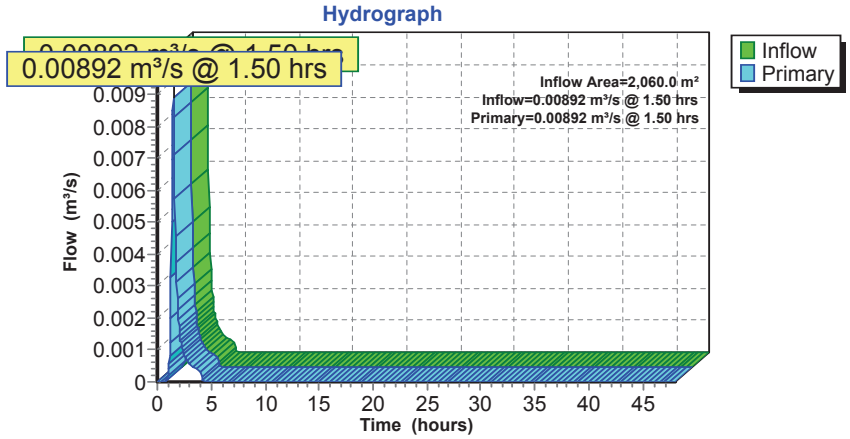


Summary for Link X-3: Internal Link B

Inflow Area = 2,060.0 m²,100.00% Impervious, Inflow Depth = 9 mm for Ottawa 4hr-25mm Chicago Stn
Inflow = 0.00892 m³/s @ 1.50 hrs, Volume= 19.3 m³
Primary = 0.00892 m³/s @ 1.50 hrs, Volume= 19.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-3: Internal Link B

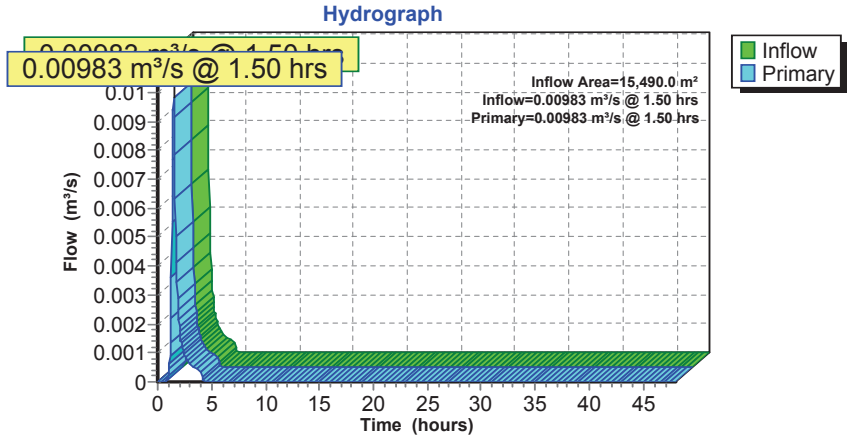


Summary for Link X-4: Net Offsite Flows

Inflow Area = 15,490.0 m²,100.00% Impervious, Inflow Depth = 1 mm for Ottawa 4hr-25mm Chicago Stn
Inflow = 0.00983 m³/s @ 1.50 hrs, Volume= 21.3 m³
Primary = 0.00983 m³/s @ 1.50 hrs, Volume= 21.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-4: Net Offsite Flows



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

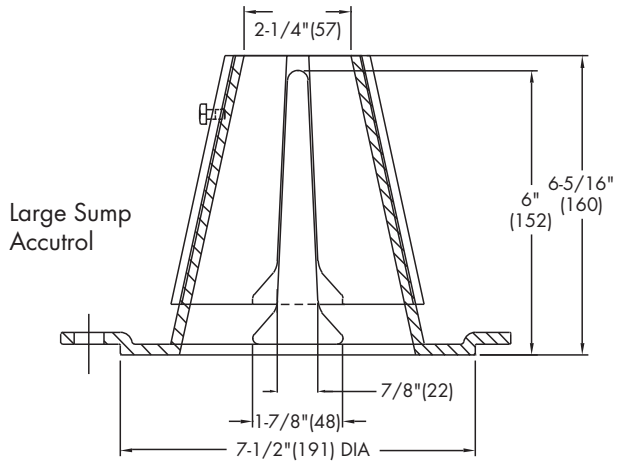
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

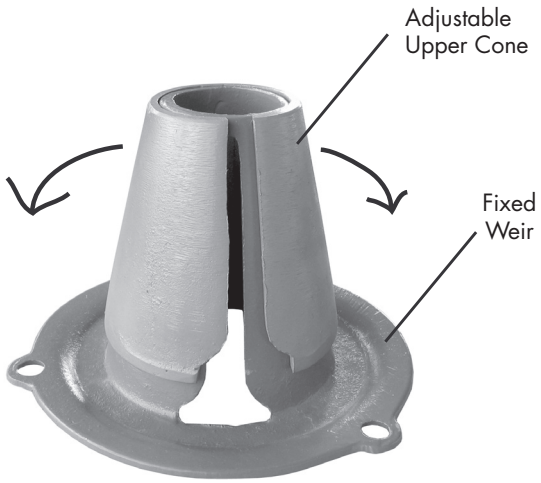
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 _____

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