STORMWATER MANAGEMENT REPORT

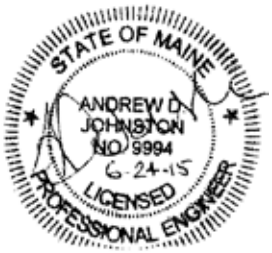
MOTHERHOUSE SENIOR HOUSING
605 STEVENS AVENUE
PORTLAND, MAINE

Prepared for:

MOTHERHOUSE ASSOCIATES LP
100 COMMERCIAL STREET
SUITE 414
PORTLAND ME 04101

Prepared by:

FAY, SPOFFORD &THORNDIKE
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, MAINE 04106
(207) 775-1121



JUNE 2015

STORMWATER MANAGEMENT REPORT

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STORMWATER MANAGEMENT REPORT

I. INTRODUCTION

Fay, Spofford &Thorndike (FST) has prepared the following stormwater management analysis for redevelopment of the Sisters of Mercy Motherhouse site at 605 Stevens Avenue in the City of Portland, Maine. The existing building will be renovated to provide senior living apartment units and updated to meet current residential standards. The site work associated with this project includes reconfiguration of the access and parking around the building, utility upgrades and the provision of new stormwater infrastructure.

This stormwater management analysis has been prepared in accordance with the City of Portland City of Portland Technical Manual, Section 5 and the Maine Department of Environmental Protection (MaineDEP) Chapter 500 Regulations, as applicable in order to ensure that the planned development will not result in a degradation of water quality or any other significant impacts to locations downstream of the development site as a result of stormwater runoff.

Runoff from the existing impervious areas on the site drains to two locations. The roof drainage from the existing building drains via downspouts and underground piping directly into the combined sewer system that serves the site. The remaining site area drains to a system of catch basins and storm drains that run across the property in an easterly direction. The system discharges to a wetland complex at the foot of the embankment located along the eastern property line. There is no provision for stormwater treatment or detention on the property. The project comprises redevelopment of the existing site, including repaving of existing parking lots and access roads, reconfiguration of vehicular circulation patterns, and updating of utility and stormwater infrastructure. The total area of the site that will be impacted by the project is approximately 3.10 acres. Of this area, 0.84 acres is the footprint of the building, which will remain u-disturbed, and 1.34 acres is repaving of existing parking lots and roadways, which is considered routine maintenance. This leaves a total disturbed area of just under one acre, which is below the threshold that requires a project to meet the General Standards under Chapter 500 Stormwater Law. The redevelopment of the site includes the removal of pavement to create landscaped islands and the addition of new pavement in existing landscaped areas to an almost equal degree. The net increase in pavement area as a result of the project will be approximately 2,000 square feet. This is negligible when considered in relation to the overall drainage area. Therefore, the stormwater management design for the project aims to meet the following key objectives:

- Removal of the existing roof drain inflow to the combined sewer system that serves the property;
- Water quality treatment of runoff from developed areas to the maximum extent practical;
- Detention, as necessary to ensure no increase in peak runoff from the site under design storm conditions; and
- The incorporation of Low Impact Design (LID) Best Management Practices (BMPs) to maximize groundwater recharge and ensure that there is no increase in surface runoff volume leaving the property.

II. EXISTING SITE CONDITIONS

The project site is approximately 4.5 acres in size and represents a lot to be subdivided from a larger overall parcel that totals approximately 19 acres and includes McAuley High School and

the associated facilities. The property is located on the east side of Stevens Avenue, just south of Walton Street.

The watershed area analyzed in this report includes the areas of the school and Motherhouse lot that drain towards the wetland at the eastern boundary of the property. The total area of the watershed is approximately 13.3 acres. The current impervious areas within the drainage area include the existing Motherhouse building, the High School building, and the associated paved access and circulation roads and paths, parking areas and courtyards. Other improvements include the current school playing fields, and landscaped and wooded areas around the perimeter of the property. It should be noted that the roof drains from the existing buildings at the site currently drain, via downspouts and underground piping, to the combined sewer system that serves the property. Site observations of the Motherhouse building indicate that approximately half of the downspouts are broken at, or above the ground surface, allowing roof runoff to drain directly to the ground adjacent to the building. For this reason, the existing conditions stormwater model includes half of the roof area from the Motherhouse building only in the subcatchment analysis. Roof runoff from the school building is excluded from the analysis as this drains to the sewer system in Walton Street.

The topography slopes in a generally easterly direction across the site, away from Stevens Avenue and towards the receiving wetland area. Slopes across most areas of the site are between 1% and 5%.

The existing project site is depicted on the drawings that are included in the Site Plan Review submission.

III. RECEIVING WATERS

The site drains in an easterly direction towards the wetland area located at the foot of the embankment, adjacent to the eastern property line. This entire area eventually drains into the municipal storm drain system in Forest Avenue.

IV. HISTORIC FLOODING

There are no reports of historic flooding on the project site. The site is within Flood Zone C, Areas of Minimal Flooding according to the FEMA Flood Insurance Rate Map for the area.

V. ALTERATIONS TO NATURAL DRAINAGE WAYS

There are no natural drainage ways on the site and therefore no alterations to natural drainage ways are proposed.

VI. METHODOLOGY AND MODELING ASSUMPTIONS

Runoff and routing calculations have been performed for the watershed areas affected by the proposed development under pre-development and post-development conditions scenarios. Time of concentration and runoff curve number calculations have been performed using the method described in Natural Resource Conservation Service (NRCS) Technical Release 55 (TR-55) – Urban Hydrology for Small Watersheds. The TR-20 based HydroCAD modeling software has been utilized to perform the more complex runoff and routing calculations, some of which are beyond the scope of the TR-55 method. Time of concentration calculations have been amended where the value given by the TR-55 method is less than six minutes (0.1 hour). In these cases a standard minimum value of six minutes has been used to keep this parameter within the acceptable working range of the model and prevent computational errors.

Design rainfall events have been modeled using the SCS Type III Hydrograph for 24-hour duration storms. The rainfall depth for each return period is taken from *Stormwater Management for Maine: Best Management Practices, Appendix A (Cumberland County)*. The rainfall depth values for standard design storm frequencies are shown in the table below:

TABLE 1				
24-Hour Rainfall Depths for Cumberland County at Design Storm Frequencies				
Stormwater Management for Maine: Best Management Practices, Appendix A				
Frequency	2-Year	10-Year	25-Year	100-Year
Rainfall Depth	3.0 in	4.7 in	5.5 in	6.7 in

Soil types in the area of the site have been identified using the Natural Resource Conservation Service (NRCS) Web Soil Survey. The soils mapped across most of the site are identified as Windsor series loamy sand soils. These are classified as Hydrologic Group "A". There is a small area of Paxton fine sandy loam soils towards the south end of the site. These soils are classified as Hydrologic Group "C". The Web Soil Survey information is supplemented by a more detailed geotechnical investigation of the site, undertaken by Summit GeoEngineering Services in March 2015. The investigations included a number of borings throughout the site, analysis and description of existing soil textures, and estimated infiltration rates for use in the design of stormwater Best Management Practices (BMPs). The report describes the subsurface conditions at the site as generally topsoil, or pavement overlying fill/reworked native soil, overlying marine fan deposits. The marine fan deposits consist of sandy, well drained soils that can be divided into two distinct layers. Groundwater was observed at elevations between 5.4 feet and 11.4 feet below the surface. Infiltration rates were estimated from grain size analysis results at boring locations B-6 (depth 5-7 feet) and B-8 (depth 10-12 feet). The hydraulic conductivity of the native soil material is stated as 60in/hr. For the purposes of design of stormwater BMPs that include an infiltration component, a conservative infiltration rate of 7.5in/hr has been used.

The existing topography of the site was determined by field survey and the existing vegetative cover was identified by site inspection. The following table includes a list of the surficial soil types that were identified on the project site, along with their associated Hydrologic Soil Group (HSG).

TABLE 2	
Soils	**Hydrologic Soil Group**
Windsor	A
Paxton	C

A stormwater management model has been developed for the project using the base information described above. In the pre-development conditions scenario the site is represented by a single subcatchment area that includes all areas that drain to the wetland located at the foot of the embankment, at the east end of the property. In the post-development conditions scenario the site has been divided further into several small subcatchment areas to allow the effects of localized storage and treatment Best Management Practices (BMPs) to be analyzed. Outflow from the post-development subcatchments is combined at a single design point that represent the same discharge location to the downstream wetland as that analyzed under the pre-development scenario. This allows direct comparison of pre-development and post-development runoff rates and volumes at this location.

The stormwater management system for the project has been designed to effectively capture, detain and treat runoff from developed areas of the site before allowing it to discharge in a non-erosive manner to downstream areas. NRCS Code 378, the Stormwater Management for Maine: Best Management Practices (MEDEP, 2006) and the Maine Erosion and Sedimentation Control Handbook for Construction: Best Management Practices (March 1991) have been used as guidelines in the design of the stormwater system.

VII. PROPOSED BMPS

The stormwater management system for the project has been designed to meet several key objectives. These are:

- Removal of the existing roof drain inflow to the combined sewer system that serves the property;
- Water quality treatment of runoff from developed areas to the maximum extent practical;
- Detention, as necessary to ensure no increase in peak runoff from the site under design storm conditions; and
- The incorporation of Low Impact Design (LID) Best Management Practices (BMPs) to maximize groundwater recharge and ensure that there is no increase in surface runoff volume leaving the property.

The proposed stormwater management BMPs include filtering roof drip strips, two small bioretention cells, and an infiltration trench that will capture, detain and treat runoff in accordance with the design standards described in Stormwater Management for Maine Technical BMPs Manual. The design aims to utilize the high infiltration rates associated with the granular onsite soils to maximize water quality treatment efficiency, promote groundwater recharge and reduce both the peak runoff rate and the volume of surface runoff leaving the property.

The filtering drip strips extend all around the perimeter of the building and will allow the downspouts that are still intact to be disconnected from the combined sewer system. The architectural program calls for excavation of the foundation walls and application of waterproofing and insulation. The addition of new foundation drainage will allow the installation of the drip strip material with a free drainage outlet to the new storm drain system. Runoff from small storm events will infiltrate directly to the underlying soils. The drip strips provide sufficient storage in the void space of the stone material to detain the Water Quality volume for the contributing roof area.

The two new bioretention cells are located on the east side of the new parking area adjacent to the rear entrance to the building. These will make use of existing green space surrounding several large trees that will be retained and incorporated into the project. Runoff from the parking area will drain by sheet flow to the bioretention cells, which are depressed below the surrounding pavement. A pea stone filter is provided at the edge of pavement to provide pre-treatment and removal of large suspended solids. The bioretention cell offers treatment by filtering runoff through a native soil media before allowing it infiltrate to the underlying soils. Underdrain piping is provided as an overflow for excess groundwater during large storm events. A secondary emergency overflow grate is also provided above the storage elevation with an outlet to the downstream storm drain system.

The bioretention cell provides storage and treatment for the Water Quality Volume (WQV) from the contributing area. This is defined as 1.0 inches of runoff from all contributing impervious areas and 0.4 inches of runoff from all landscaped areas.

The infiltration trench is located on the east side of the main access road, just west of the athletic field. A five foot wide grass filter strip is provided between the edge of pavement and the infiltration trench. This will allow pre-treatment and removal of gross solids from runoff entering the BMP from the adjacent paved area. The infiltration trench is designed to capture, treat and discharge runoff from the contributing area to the underlying soils. As in the example of the bioretention cells, an underdrain is provided above the base of the BMP as an overflow in case of large storm events.

The water quantity analysis performed for the development demonstrates that there will be no increase in peak flows at the design point, for design storms of 2-Year, 10-year and 25-year frequencies. Water quality treatment calculations demonstrate that the BMPs are adequately sized in accordance with current stormwater standards.

A maintenance schedule for the new storm water BMPs will ensure that the stormwater management system is kept in good order and continues to function as designed. A copy of the Stormwater System Maintenance Schedule is included in Attachment D of this report.

VIII. STORMWATER QUANTITY ANALYSIS

A. Predevelopment Conditions

Under the predevelopment conditions scenario the site is divided into a single subcatchment area, representing the watershed draining to the wetland located along the eastern property line. A summary of the subcatchment area included in the pre-development model is given in the table as follows:

TABLE 3
PREDEVELOPMENT SITE CONDITIONS

Subarea	Area (square feet)	CN	Time of Concentration (min.)
101	579,629	55	15.5

Full details pre-development subcatchment areas, cover conditions and time of concentration flow paths are described in detail in the supporting HydroCAD documentation included in Attachment C of this report. A Predevelopment Conditions Watershed Plan is included in Attachment A of this report.

B. Post-Development Conditions

Under the post–development conditions scenario, the site is divided into small subcatchment areas to allow the effect of the new stormwater BMPs to be accurately modeled. The total area of analysis remains the same as in the pre-development conditions, and runoff from all areas is combined at a Design Point at the same location as the pre-development discharge point to the receiving wetland.

A summary of the subcatchment areas included in the post-development model is given in the table as follows:

TABLE 4 POST-DEVELOPMENT SITE CONDITIONS			
Subarea	**Area (square feet)**	**CN**	**Time of Concentration (minutes)**
201	537,572	53	15.5
210	15,676	81	6.0
211	7,303	74	6.0
212	9,701	73	6.0
221	9,601	94	6.0
222	4,490	95	6.0
223	4,520	94	6.0
224	6,069	94	6.0

Full details of the post-development subcatchment areas, cover conditions and time of concentration flow paths are described in detail in the supporting HydroCAD documentation included in Attachment C of this report. A Post-Development Conditions Watershed Plan is included in Attachment A of this report.

IX. WATER QUANTITY ANALYSIS SUMMARY

The table below summarizes the peak runoff values and runoff volumes for pre-development and post-development conditions during each of the analyzed design storm events.

TABLE 5 SUMMARY OF PEAK RUNOFF VALUES (CFS) AND RUNOFF VOLUMES (AC-FT)				
Storm Event	**Peak Runoff Rate (cfs)**		**Runoff Volume (ac-ft)**	
	Pre-Development	**Post-Development**	**Pre-Development**	**Post-Development**
2-Year	0.81	**0.43**	0.216	**0.154**
10-Year	7.27	**6.21**	0.926	**0.771**
25-Year	12.10	**10.98**	1.374	**1.187**

X. STORM WATER QUALITY ANALYSIS

A. Water Quality Treatment Measures

The project has been designed in accordance to provide water quality treatment for runoff from the property to the extent practical. There is currently no provision for water quality treatment or detention of runoff from the property. The project will result in a minimal net increase in the paved area at the site (approximately 2,000sf). Runoff from the impervious area associated with the roof of the existing building will also be removed from the combined sewer system and will drain to the stormwater system after treatment in filtering drip strips. The proposed BMPs will provide treatment for over an acre of impervious area at the site, in accordance with current State Stormwater Standards. This will result in a significant benefit to runoff water quality from the site. Water quality computations are provided in Attachment B.

XI. EROSION AND SEDIMENTATION CONTROL

A comprehensive Erosion and Sediment Control Report has been prepared that includes Best Management Practices (BMPs) associated with the proposed construction activities.

The Erosion and Sediment Control Report outlines the required construction measures and techniques that will reduce potential degradation of the water quality at downstream locations. Temporary erosion control measures will be incorporated during construction, and long-term surface stabilization practices have been designed as part of the site development, thus minimizing the potential for erosion and sediment transport. These measures include the constructed BMPs for filtration of runoff from smaller storm events, riprap, permanent seeding and other vegetative stabilization measures. Detailed information on the specific erosion and sedimentation control practices that are to be used on the site are provided on the following plan sheet, which will be included as part of the construction documents for the project.

XII. MAINTENANCE OF FACILITIES

The effectiveness of water quality management provisions and other components of the stormwater management system are dependent on their design, upkeep, and maintenance to assure they meet their intended function over an extended period of time. It is critical that the stormwater management facilities are regularly inspected and that maintenance is performed on an as-needed basis.

A Stormwater Management Inspection and Maintenance Manual has been prepared specifically for the project and is included in Attachment D of this section.

XIII. CONCLUSIONS

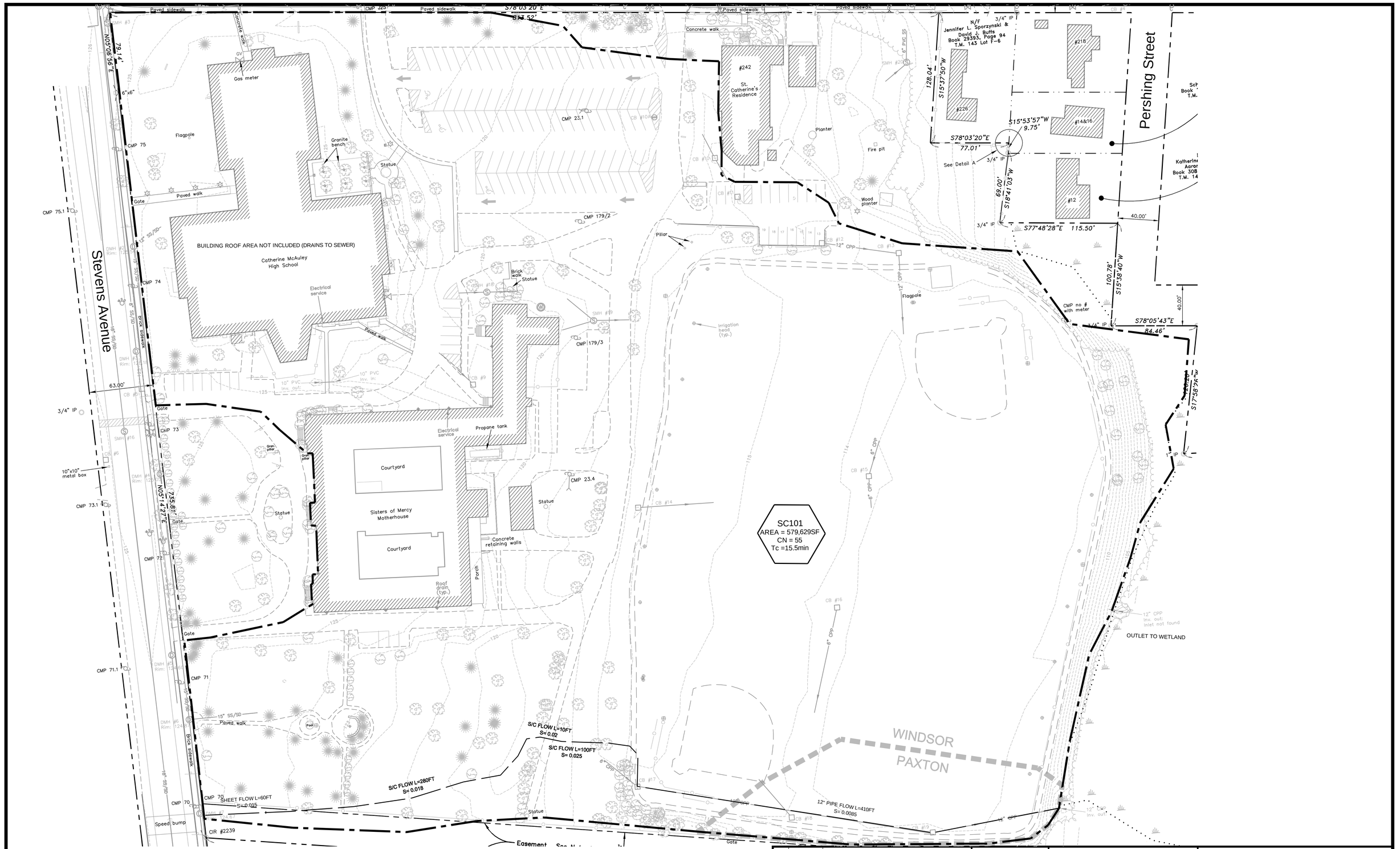
The stormwater management system designed for this project will mitigate impacts of development on stormwater runoff peak discharge rates and provide treatment of non-point source pollutants in the runoff in accordance with current State and local standards. Based on the analysis described herein, it is expected that runoff from the proposed development will not cause adverse impacts to downstream properties.

XIV. ATTACHMENTS

Attachment A – Predevelopment & Post-development Watershed Maps
Attachment B – Water Quality and Wet Pond Calculations
Attachment C – TR-20 Computations (HydroCAD)
Attachment D – Stormwater Operations and Maintenance Manual

ATTACHMENT A

Predevelopment & Post-development Watershed Maps



PRELIMINARY - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION
1	06.24.15	ISSUED FOR SITE PLAN REVIEW

REVISIONS

STATE OF MAINE
ANDREW D. JOHNSTON
NO. 9994
6-24-15
LICENSED PROFESSIONAL ENGINEER

P.E. ANDREW D. JOHNSTON
LIC. #9994

PROJECT
MOTHERHOUSE SENIOR HOUSING

SHEET TITLE
PRE-DEVELOPMENT WATERSHED PLAN

CLIENT
MOTHERHOUSE ASSOCIATES LP

FST 100 YEARS
FAY, SPOFFORD & THORNDIKE
ENGINEERS · PLANNERS · SCIENTISTS
778 MAIN ST, SUITE 8, SOUTH PORTLAND, ME 04106

DRAWN:	ADJ	DATE:	JUNE 2015
DESIGNED:	ADJ	SCALE:	1" = 40'
CHECKED:	ADJ	JOB NO.	SP-M162
FILE NAME:	WSHED-PRE		
SHEET	C 9.0		

40 0 20 40 80

(IN FEET)
1 inch = 40 ft.

PRELIMINARY - NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION
1	06.24.15	ISSUED FOR SITE PLAN REVIEW
		REVISIONS

STATE OF MAINE
ANDREW D. JOHNSTON
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LICENSED
PROFESSIONAL ENGINEER

P.E. ANDREW D. JOHNSTON
LIC. #9994

PROJECT
MOTHERHOUSE
SENIOR HOUSING

SHEET TITLE
POST-DEVELOPMENT
WATERSHED PLAN

CLIENT
MOTHERHOUSE
ASSOCIATES LP

FST
FAY, SPOFFORD & THORNDIKE
ENGINEERS · PLANNERS · SCIENTISTS
778 MAIN ST, SUITE 8, SOUTH PORTLAND, ME 04106

DRAWN:	ADJ	DATE:	JUNE 2015
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ATTACHMENT B

Water Quality Calculations

605 Stevens Avenue Stormwater Areas

Pre-Development Area Summary

Subcatchment 101

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	74	89	98	98	55	
Area	376618	22142	25724	23810	1860	112860	16615.5	579629.5	153477.5

TOTAL PRE-DEVELOPMENT AREA 579629.5 SF

TOTAL PRE-DEVELOPMENT IMPERVIOUS AREA 153477.5 SF

Post-Development Area Summary

Subcatchment 201

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	74	89	98	98	53	
Area	365759	17506	25724	23810	1860	92620	10293	537572	122279

Subcatchment 210

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	81	
Area	4452	0	0	0	0	11224	0	15676	11224
								WQV=	1084

Subcatchment 211

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	74	
Area	3004	0	0	0	0	4299	0	7303	4299
								WQV=	458

Subcatchment 212

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	73	
Area	4135	0	0	0	0	5566	0	9701	5566
								WQV=	602

Subcatchment 221

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	94	
Area	0	1600	0	0	0	0	8000	9600	9600
								WQV=	800

Subcatchment 222

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	95	
Area	0	600	0	0	0	0	3890	4490	4490
								WQV=	374

Subcatchment 223

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	94	
Area	0	720	0	0	0	0	3800	4520	4520
								WQV=	377

Subcatchment 224

Cover Condition	Grass (good) HSG A	Gravel HSG A	Woods /Grass HSG A	Grass (good) HSG C	Gravel HSG C	Pavement Concrete	Roof	TOTAL	IMPERVIOUS
CN	39	76	32	80	91	98	98	94	
Area	0	1120	0	0	0	0	4949	6069	6069
								WQV=	506

TOTAL POST-DEVELOPMENT AREA	594931	SF
TOTAL POST-DEVELOPMENT IMPERVIOUS AREA	168047	SF
TOTAL TREATED POST-DEVELOPMENT IMPERVIOUS AREA	45768	SF

Stage-Area-Storage for Pond DS-2: Drip Strip

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
115.00	**1,600**	0
115.05	1,600	32
115.10	1,600	64
115.15	1,600	96
115.20	1,600	128
115.25	1,600	160
115.30	1,600	192
115.35	1,600	224
115.40	1,600	256
115.45	1,600	288
115.50	1,600	320
115.55	1,600	352
115.60	1,600	384
115.65	1,600	416
115.70	1,600	448
115.75	1,600	480
115.80	1,600	512
115.85	1,600	544
115.90	1,600	576
115.95	1,600	608
116.00	1,600	640
116.05	1,600	664
116.10	1,600	688
116.15	1,600	712
116.20	1,600	736
116.25	1,600	760
116.30	1,600	784
116.35	1,600	808
116.40	1,600	832
116.45	1,600	856
116.50	1,600	880
116.55	1,600	904
116.60	1,600	928
116.65	1,600	952
116.70	1,600	976
116.75	1,600	1,000
116.80	1,600	1,024
116.85	1,600	1,048
116.90	1,600	1,072
116.95	1,600	1,096
117.00	1,600	1,120
117.05	1,600	1,152
117.10	1,600	1,184
117.15	1,600	1,216
117.20	1,600	1,248
117.25	1,600	1,280
117.30	1,600	1,312
117.35	1,600	1,344
117.40	1,600	1,376
117.45	1,600	1,408
117.50	1,600	1,440
117.55	1,600	1,472
117.60	1,600	1,504
117.65	1,600	1,536
117.70	1,600	1,568
117.75	1,600	1,600
117.80	1,600	1,632
117.85	1,600	1,664
117.90	1,600	1,696
117.95	1,600	1,728
118.00	1,600	1,760
118.05	1,600	1,792
118.10	1,600	1,824
118.15	1,600	1,856
118.20	1,600	1,888
118.25	1,600	1,920
118.30	1,600	1,952
118.35	1,600	1,984
118.40	1,600	2,016
118.45	1,600	2,048
118.50	1,600	2,080
118.55	1,600	2,112
118.60	1,600	2,144
118.65	1,600	2,176
118.70	1,600	2,208
118.75	1,600	2,240
118.80	1,600	2,272
118.85	1,600	2,304
118.90	1,600	2,336
118.95	1,600	2,368
119.00	1,600	2,400
119.05	1,600	2,432
119.10	1,600	2,464
119.15	1,600	2,496
119.20	1,600	2,528
119.25	1,600	2,560
119.30	1,600	2,592
119.35	1,600	2,624
119.40	1,600	2,656
119.45	1,600	2,688
119.50	1,600	2,720
119.55	1,600	2,752
119.60	1,600	2,784
119.65	1,600	2,816
119.70	1,600	2,848
119.75	1,600	2,880
119.80	1,600	2,912
119.85	1,600	2,944
119.90	1,600	2,976
119.95	1,600	3,008
120.00	1,600	**3,040**

Stage-Area-Storage for Pond DS-3: Drip Strip

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
115.00	**1,600**	0
115.05	1,600	32
115.10	1,600	64
115.15	1,600	96
115.20	1,600	128
115.25	1,600	160
115.30	1,600	192
115.35	1,600	224
115.40	1,600	256
115.45	1,600	288
115.50	1,600	320
115.55	1,600	352
115.60	1,600	384
115.65	1,600	416
115.70	1,600	448
115.75	1,600	480
115.80	1,600	512
115.85	1,600	544
115.90	1,600	576
115.95	1,600	608
116.00	1,600	640
116.05	1,600	664
116.10	1,600	688
116.15	1,600	712
116.20	1,600	736
116.25	1,600	760
116.30	1,600	784
116.35	1,600	808
116.40	1,600	832
116.45	1,600	856
116.50	1,600	880
116.55	1,600	904
116.60	1,600	928
116.65	1,600	952
116.70	1,600	976
116.75	1,600	1,000
116.80	1,600	1,024
116.85	1,600	1,048
116.90	1,600	1,072
116.95	1,600	1,096
117.00	1,600	1,120
117.05	1,600	1,152
117.10	1,600	1,184
117.15	1,600	1,216
117.20	1,600	1,248
117.25	1,600	1,280
117.30	1,600	1,312
117.35	1,600	1,344
117.40	1,600	1,376
117.45	1,600	1,408
117.50	1,600	1,440
117.55	1,600	1,472
117.60	1,600	1,504
117.65	1,600	1,536
117.70	1,600	1,568
117.75	1,600	1,600
117.80	1,600	1,632
117.85	1,600	1,664
117.90	1,600	1,696
117.95	1,600	1,728
118.00	1,600	1,760
118.05	1,600	1,792
118.10	1,600	1,824
118.15	1,600	1,856
118.20	1,600	1,888
118.25	1,600	1,920
118.30	1,600	1,952
118.35	1,600	1,984
118.40	1,600	2,016
118.45	1,600	2,048
118.50	1,600	2,080
118.55	1,600	2,112
118.60	1,600	2,144
118.65	1,600	2,176
118.70	1,600	2,208
118.75	1,600	2,240
118.80	1,600	2,272
118.85	1,600	2,304
118.90	1,600	2,336
118.95	1,600	2,368
119.00	1,600	2,400
119.05	1,600	2,432
119.10	1,600	2,464
119.15	1,600	2,496
119.20	1,600	2,528
119.25	1,600	2,560
119.30	1,600	2,592
119.35	1,600	2,624
119.40	1,600	2,656
119.45	1,600	2,688
119.50	1,600	2,720
119.55	1,600	2,752
119.60	1,600	2,784
119.65	1,600	2,816
119.70	1,600	2,848
119.75	1,600	2,880
119.80	1,600	2,912
119.85	1,600	2,944
119.90	1,600	2,976
119.95	1,600	3,008
120.00	1,600	**3,040**

Stage-Area-Storage for Pond DS-4: Drip Strip

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
115.00	**1,600**	0
115.05	1,600	32
115.10	1,600	64
115.15	1,600	96
115.20	1,600	128
115.25	1,600	160
115.30	1,600	192
115.35	1,600	224
115.40	1,600	256
115.45	1,600	288
115.50	1,600	320
115.55	1,600	352
115.60	1,600	384
115.65	1,600	416
115.70	1,600	448
115.75	1,600	480
115.80	1,600	512
115.85	1,600	544
115.90	1,600	576
115.95	1,600	608
116.00	1,600	640
116.05	1,600	664
116.10	1,600	688
116.15	1,600	712
116.20	1,600	736
116.25	1,600	760
116.30	1,600	784
116.35	1,600	808
116.40	1,600	832
116.45	1,600	856
116.50	1,600	880
116.55	1,600	904
116.60	1,600	928
116.65	1,600	952
116.70	1,600	976
116.75	1,600	1,000
116.80	1,600	1,024
116.85	1,600	1,048
116.90	1,600	1,072
116.95	1,600	1,096
117.00	1,600	1,120
117.05	1,600	1,152
117.10	1,600	1,184
117.15	1,600	1,216
117.20	1,600	1,248
117.25	1,600	1,280
117.30	1,600	1,312
117.35	1,600	1,344
117.40	1,600	1,376
117.45	1,600	1,408
117.50	1,600	1,440
117.55	1,600	1,472
117.60	1,600	1,504
117.65	1,600	1,536
117.70	1,600	1,568
117.75	1,600	1,600
117.80	1,600	1,632
117.85	1,600	1,664
117.90	1,600	1,696
117.95	1,600	1,728
118.00	1,600	1,760
118.05	1,600	1,792
118.10	1,600	1,824
118.15	1,600	1,856
118.20	1,600	1,888
118.25	1,600	1,920
118.30	1,600	1,952
118.35	1,600	1,984
118.40	1,600	2,016
118.45	1,600	2,048
118.50	1,600	2,080
118.55	1,600	2,112
118.60	1,600	2,144
118.65	1,600	2,176
118.70	1,600	2,208
118.75	1,600	2,240
118.80	1,600	2,272
118.85	1,600	2,304
118.90	1,600	2,336
118.95	1,600	2,368
119.00	1,600	2,400
119.05	1,600	2,432
119.10	1,600	2,464
119.15	1,600	2,496
119.20	1,600	2,528
119.25	1,600	2,560
119.30	1,600	2,592
119.35	1,600	2,624
119.40	1,600	2,656
119.45	1,600	2,688
119.50	1,600	2,720
119.55	1,600	2,752
119.60	1,600	2,784
119.65	1,600	2,816
119.70	1,600	2,848
119.75	1,600	2,880
119.80	1,600	2,912
119.85	1,600	2,944
119.90	1,600	2,976
119.95	1,600	3,008
120.00	1,600	**3,040**

Stage-Area-Storage for Pond DS1: Drip Strip

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
115.00	**1,600**	0
115.05	1,600	32
115.10	1,600	64
115.15	1,600	96
115.20	1,600	128
115.25	1,600	160
115.30	1,600	192
115.35	1,600	224
115.40	1,600	256
115.45	1,600	288
115.50	1,600	320
115.55	1,600	352
115.60	1,600	384
115.65	1,600	416
115.70	1,600	448
115.75	1,600	480
115.80	1,600	512
115.85	1,600	544
115.90	1,600	576
115.95	1,600	608
116.00	1,600	640
116.05	1,600	664
116.10	1,600	688
116.15	1,600	712
116.20	1,600	736
116.25	1,600	760
116.30	1,600	784
116.35	1,600	808
116.40	1,600	832
116.45	1,600	856
116.50	1,600	880
116.55	1,600	904
116.60	1,600	928
116.65	1,600	952
116.70	1,600	976
116.75	1,600	1,000
116.80	1,600	1,024
116.85	1,600	1,048
116.90	1,600	1,072
116.95	1,600	1,096
117.00	1,600	1,120
117.05	1,600	1,152
117.10	1,600	1,184
117.15	1,600	1,216
117.20	1,600	1,248
117.25	1,600	1,280
117.30	1,600	1,312
117.35	1,600	1,344
117.40	1,600	1,376
117.45	1,600	1,408
117.50	1,600	1,440
117.55	1,600	1,472
117.60	1,600	1,504
117.65	1,600	1,536
117.70	1,600	1,568
117.75	1,600	1,600
117.80	1,600	1,632
117.85	1,600	1,664
117.90	1,600	1,696
117.95	1,600	1,728
118.00	1,600	1,760
118.05	1,600	1,792
118.10	1,600	1,824
118.15	1,600	1,856
118.20	1,600	1,888
118.25	1,600	1,920
118.30	1,600	1,952
118.35	1,600	1,984
118.40	1,600	2,016
118.45	1,600	2,048
118.50	1,600	2,080
118.55	1,600	2,112
118.60	1,600	2,144
118.65	1,600	2,176
118.70	1,600	2,208
118.75	1,600	2,240
118.80	1,600	2,272
118.85	1,600	2,304
118.90	1,600	2,336
118.95	1,600	2,368
119.00	1,600	2,400
119.05	1,600	2,432
119.10	1,600	2,464
119.15	1,600	2,496
119.20	1,600	2,528
119.25	1,600	2,560
119.30	1,600	2,592
119.35	1,600	2,624
119.40	1,600	2,656
119.45	1,600	2,688
119.50	1,600	2,720
119.55	1,600	2,752
119.60	1,600	2,784
119.65	1,600	2,816
119.70	1,600	2,848
119.75	1,600	2,880
119.80	1,600	2,912
119.85	1,600	2,944
119.90	1,600	2,976
119.95	1,600	3,008
120.00	1,600	**3,040**

Stage-Area-Storage for Pond IT-1: Infiltration Trench

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
112.00	**1,250**	0
112.05	1,250	19
112.10	1,250	37
112.15	1,250	56
112.20	1,250	75
112.25	1,250	94
112.30	1,250	112
112.35	1,250	131
112.40	1,250	150
112.45	1,250	169
112.50	1,250	188
112.55	1,250	206
112.60	1,250	225
112.65	1,250	244
112.70	1,250	263
112.75	1,250	281
112.80	1,250	300
112.85	1,250	319
112.90	1,250	338
112.95	1,250	356
113.00	1,250	375
113.05	1,250	394
113.10	1,250	412
113.15	1,250	431
113.20	1,250	450
113.25	1,250	469
113.30	1,250	487
113.35	1,250	506
113.40	1,250	525
113.45	1,250	544
113.50	1,250	563
113.55	1,250	581
113.60	1,250	600
113.65	1,250	619
113.70	1,250	638
113.75	1,250	656
113.80	1,250	675
113.85	1,250	694
113.90	1,250	713
113.95	1,250	731
114.00	1,250	750
114.05	1,250	775
114.10	1,250	800
114.15	1,250	825
114.20	1,250	850
114.25	1,250	875
114.30	1,250	900
114.35	1,250	925
114.40	1,250	950
114.45	1,250	975
114.50	1,250	1,000
114.55	1,250	1,025
114.60	1,250	1,050
114.65	1,250	1,075
114.70	1,250	1,100
114.75	1,250	1,125
114.80	1,250	1,150
114.85	1,250	1,175
114.90	1,250	1,200
114.95	1,250	1,225
115.00	1,250	1,250
115.05	1,250	1,275
115.10	1,250	1,300
115.15	1,250	1,325
115.20	1,250	1,350
115.25	1,250	1,375
115.30	1,250	1,400
115.35	1,250	1,425
115.40	1,250	1,450
115.45	1,250	1,475
115.50	1,250	1,500
115.55	1,250	1,525
115.60	1,250	1,550
115.65	1,250	1,575
115.70	1,250	1,600
115.75	1,250	1,625
115.80	1,250	1,650
115.85	1,250	1,675
115.90	1,250	1,700
115.95	1,250	1,725
116.00	1,250	1,750
116.05	1,250	1,775
116.10	1,250	1,800
116.15	1,250	1,825
116.20	1,250	1,850
116.25	1,250	1,875
116.30	1,250	1,900
116.35	1,250	1,925
116.40	1,250	1,950
116.45	1,250	1,975
116.50	1,250	2,000
116.55	1,250	2,025
116.60	1,250	2,050
116.65	1,250	2,075
116.70	1,250	2,100
116.75	1,250	2,125
116.80	1,250	2,150
116.85	1,250	2,175
116.90	1,250	2,200
116.95	1,250	2,225
117.00	1,250	**2,250**

Stage-Area-Storage for Pond RG-1: Rain Garden

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.50	460	0
114.55	460	8
114.60	460	15
114.65	460	23
114.70	460	30
114.75	460	38
114.80	460	46
114.85	460	53
114.90	460	61
114.95	460	68
115.00	460	76
115.05	460	83
115.10	460	91
115.15	460	99
115.20	460	106
115.25	460	114
115.30	460	121
115.35	460	129
115.40	460	137
115.45	460	144
115.50	460	152
115.55	460	159
115.60	460	167
115.65	460	175
115.70	460	182
115.75	460	190
115.80	460	197
115.85	460	205
115.90	460	213
115.95	460	220
116.00	460	228
116.05	460	251
116.10	460	274
116.15	460	297
116.20	460	320
116.25	460	343
116.30	460	366
116.35	460	389
116.40	460	412
116.45	460	435
116.50	460	458
116.55	460	481
116.60	460	504
116.65	460	527
116.70	460	550
116.75	460	573
116.80	460	596
116.85	460	619
116.90	460	642
116.95	460	665
117.00	460	688
117.05	464	711
117.10	469	734
117.15	474	758
117.20	478	782
117.25	483	806
117.30	487	830
117.35	491	854
117.40	496	879
117.45	501	904
117.50	505	929
117.55	506	954
117.60	508	980
117.65	510	1,005
117.70	511	1,031
117.75	513	1,056
117.80	514	1,082
117.85	515	1,108
117.90	517	1,133
117.95	519	1,159
118.00	**520**	**1,185**

Stage-Area-Storage for Pond RG-2: Rain Garden

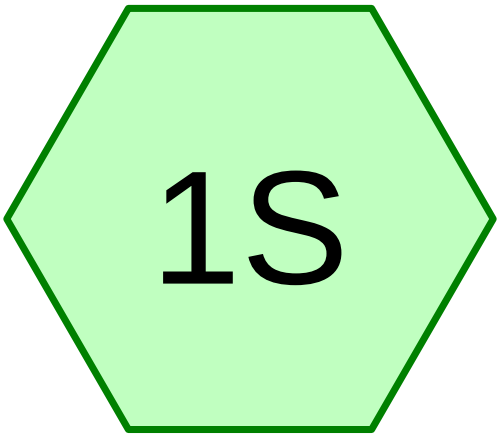
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
114.50	960	0
114.55	960	16
114.60	960	32
114.65	960	48
114.70	960	63
114.75	960	79
114.80	960	95
114.85	960	111
114.90	960	127
114.95	960	143
115.00	960	158
115.05	960	174
115.10	960	190
115.15	960	206
115.20	960	222
115.25	960	238
115.30	960	253
115.35	960	269
115.40	960	285
115.45	960	301
115.50	960	317
115.55	960	333
115.60	960	348
115.65	960	364
115.70	960	380
115.75	960	396
115.80	960	412
115.85	960	428
115.90	960	444
115.95	960	459
116.00	960	475
116.05	960	491
116.10	960	507
116.15	960	523
116.20	960	539
116.25	960	554
116.30	960	570
116.35	960	586
116.40	960	602
116.45	960	618
116.50	960	634
116.55	960	682
116.60	960	730
116.65	960	778
116.70	960	826
116.75	960	874
116.80	960	922
116.85	960	970
116.90	960	1,018
116.95	960	1,066
117.00	960	1,114
117.05	968	1,162
117.10	976	1,210
117.15	984	1,259
117.20	992	1,309
117.25	1,000	1,359
117.30	1,008	1,409
117.35	1,016	1,459
117.40	1,024	1,510
117.45	1,032	1,562
117.50	1,040	1,614
117.55	1,056	1,666
117.60	1,072	1,719
117.65	1,088	1,773
117.70	1,104	1,828
117.75	1,120	1,884
117.80	1,136	1,940
117.85	1,152	1,997
117.90	1,168	2,055
117.95	1,184	2,114
118.00	**1,200**	**2,174**

ATTACHMENT C

TR-20 Computations (HydroCAD)

- **Predevelopment Model**
- **Postdevelopment Model**

Pre-development Calculations



Existing Area to Wetland

Subcat Reach Pond Link

Drainage Diagram for 605 Stevens Ave - Pre-Development
Prepared by FST, Inc., Printed 6/24/2015

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Area to Wetland Runoff Area=579,629 sf 22.03% Impervious Runoff Depth=0.19"
Flow Length=860' Tc=15.5 min CN=55 Runoff=0.81 cfs 0.216 af

Total Runoff Area = 13.306 ac Runoff Volume = 0.216 af Average Runoff Depth = 0.19"
77.97% Pervious = 10.375 ac 22.03% Impervious = 2.932 ac

Summary for Subcatchment 1S: Existing Area to Wetland

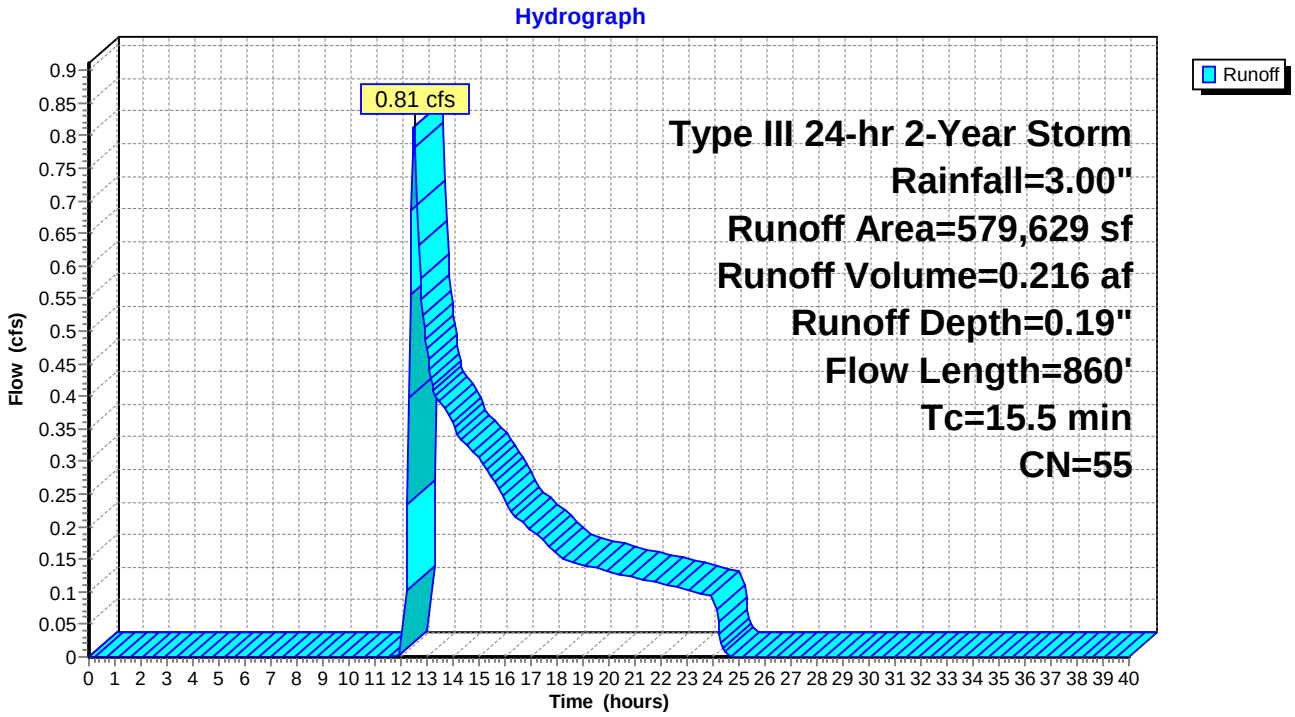
Runoff = 0.81 cfs @ 12.52 hrs, Volume= 0.216 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

	Area (sf)	CN	Description
	378,378	39	>75% Grass cover, Good, HSG A
	22,142	76	Gravel roads, HSG A
	25,724	32	Woods/grass comb., Good, HSG A
	23,810	74	>75% Grass cover, Good, HSG C
	1,860	89	Gravel roads, HSG C
	111,100	98	Paved parking
*	16,615	98	Roof
	579,629	55	Weighted Average
	451,914		Pervious Area
	127,715		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	60	0.0150	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.00"
2.2	280	0.0180	2.16		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
0.1	10	0.0200	2.87		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps
0.7	100	0.0250	2.55		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
1.5	410	0.0085	4.53	3.56	**Circular Channel (pipe), Pipe** Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
15.5	860	Total			

Subcatchment 1S: Existing Area to Wetland



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Area to Wetland Runoff Area=579,629 sf 22.03% Impervious Runoff Depth=0.83"
Flow Length=860' Tc=15.5 min CN=55 Runoff=7.27 cfs 0.926 af

Total Runoff Area = 13.306 ac Runoff Volume = 0.926 af Average Runoff Depth = 0.83"
77.97% Pervious = 10.375 ac 22.03% Impervious = 2.932 ac

Summary for Subcatchment 1S: Existing Area to Wetland

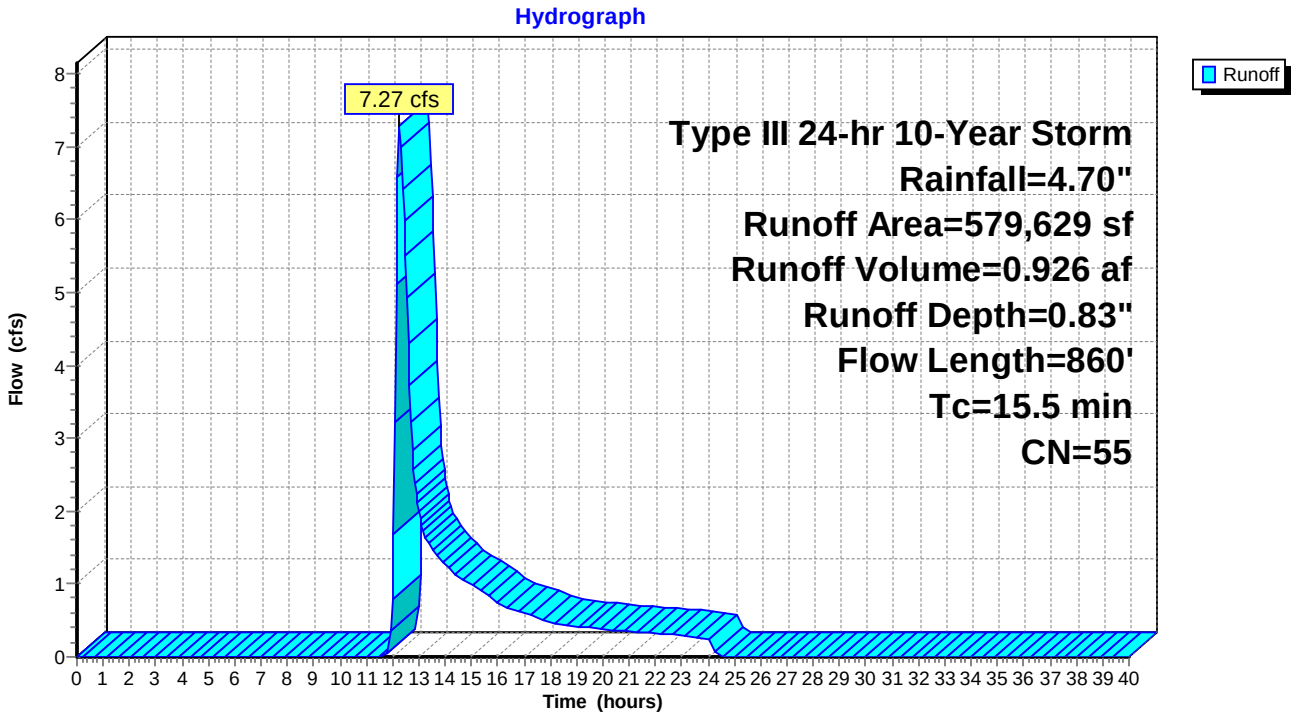
Runoff = 7.27 cfs @ 12.27 hrs, Volume= 0.926 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
	378,378	39	>75% Grass cover, Good, HSG A
	22,142	76	Gravel roads, HSG A
	25,724	32	Woods/grass comb., Good, HSG A
	23,810	74	>75% Grass cover, Good, HSG C
	1,860	89	Gravel roads, HSG C
	111,100	98	Paved parking
*	16,615	98	Roof
	579,629	55	Weighted Average
	451,914		Pervious Area
	127,715		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	60	0.0150	0.09		**Sheet Flow, Grass**
					Grass: Dense n= 0.240 P2= 3.00"
2.2	280	0.0180	2.16		**Shallow Concentrated Flow, Grass**
					Unpaved Kv= 16.1 fps
0.1	10	0.0200	2.87		**Shallow Concentrated Flow, Paved**
					Paved Kv= 20.3 fps
0.7	100	0.0250	2.55		**Shallow Concentrated Flow, Grass**
					Unpaved Kv= 16.1 fps
1.5	410	0.0085	4.53	3.56	**Circular Channel (pipe), Pipe**
					Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
15.5	860	Total			

Subcatchment 1S: Existing Area to Wetland



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Area to Wetland Runoff Area=579,629 sf 22.03% Impervious Runoff Depth=1.24"
Flow Length=860' Tc=15.5 min CN=55 Runoff=12.10 cfs 1.374 af

Total Runoff Area = 13.306 ac Runoff Volume = 1.374 af Average Runoff Depth = 1.24"
77.97% Pervious = 10.375 ac 22.03% Impervious = 2.932 ac

Summary for Subcatchment 1S: Existing Area to Wetland

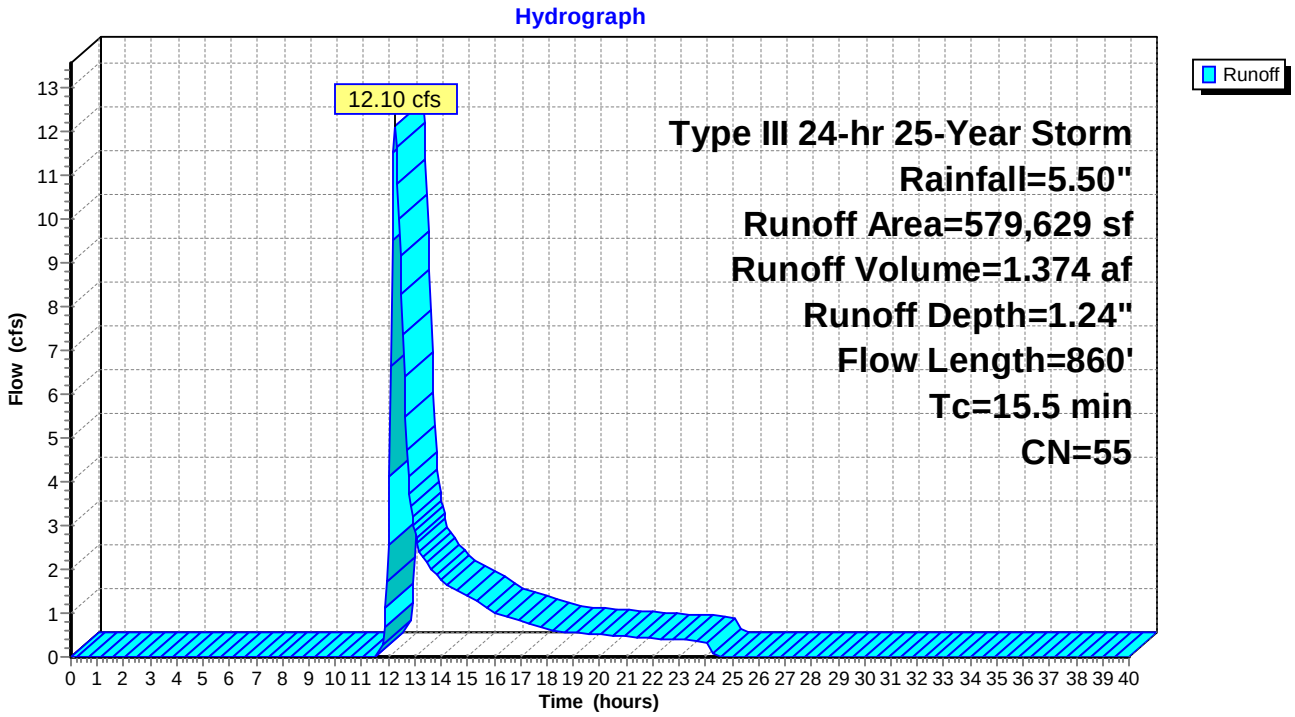
Runoff = 12.10 cfs @ 12.25 hrs, Volume= 1.374 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

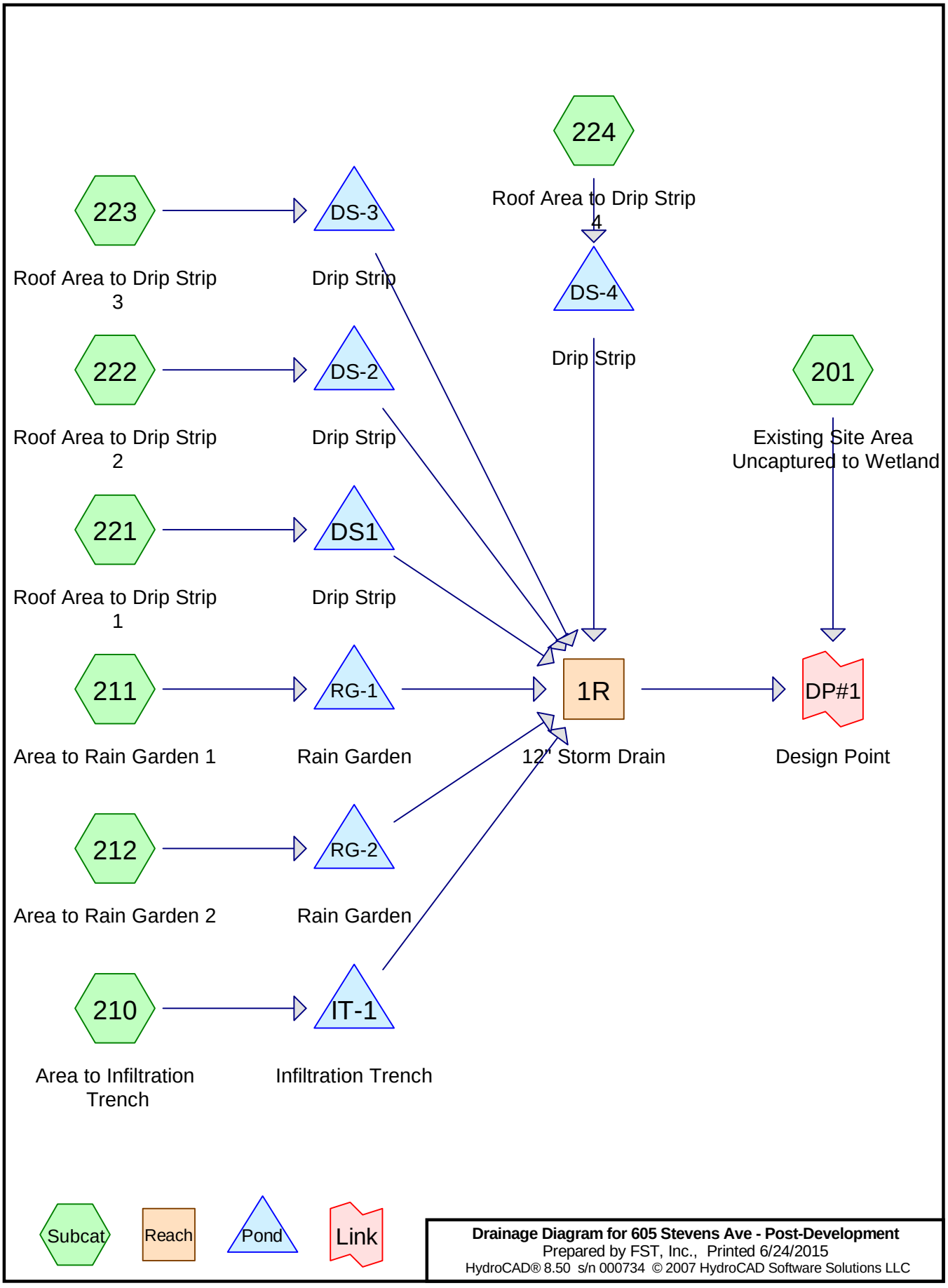
	Area (sf)	CN	Description
	378,378	39	>75% Grass cover, Good, HSG A
	22,142	76	Gravel roads, HSG A
	25,724	32	Woods/grass comb., Good, HSG A
	23,810	74	>75% Grass cover, Good, HSG C
	1,860	89	Gravel roads, HSG C
	111,100	98	Paved parking
*	16,615	98	Roof
	579,629	55	Weighted Average
	451,914		Pervious Area
	127,715		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	60	0.0150	0.09		**Sheet Flow, Grass**
					Grass: Dense n= 0.240 P2= 3.00"
2.2	280	0.0180	2.16		**Shallow Concentrated Flow, Grass**
					Unpaved Kv= 16.1 fps
0.1	10	0.0200	2.87		**Shallow Concentrated Flow, Paved**
					Paved Kv= 20.3 fps
0.7	100	0.0250	2.55		**Shallow Concentrated Flow, Grass**
					Unpaved Kv= 16.1 fps
1.5	410	0.0085	4.53	3.56	**Circular Channel (pipe), Pipe**
					Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
15.5	860	Total			

Subcatchment 1S: Existing Area to Wetland



Post-development Calculations



Drainage Diagram for 605 Stevens Ave - Post-Development
Prepared by FST, Inc., Printed 6/24/2015

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 201: Existing Site Area Runoff Area=537,572 sf 19.14% Impervious Runoff Depth=0.15"
Tc=15.5 min CN=53 Runoff=0.42 cfs 0.153 af

Subcatchment 210: Area to Infiltration Trench Runoff Area=15,676 sf 71.60% Impervious Runoff Depth=1.31"
Tc=6.0 min CN=81 Runoff=0.54 cfs 0.039 af

Subcatchment 211: Area to Rain Garden 1 Runoff Area=7,303 sf 58.87% Impervious Runoff Depth=0.91"
Tc=6.0 min CN=74 Runoff=0.16 cfs 0.013 af

Subcatchment 212: Area to Rain Garden 2 Runoff Area=9,701 sf 57.38% Impervious Runoff Depth=0.86"
Tc=6.0 min CN=73 Runoff=0.20 cfs 0.016 af

Subcatchment 221: Roof Area to Drip Strip 1 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=93 Runoff=0.55 cfs 0.041 af

Subcatchment 222: Roof Area to Drip Strip 2 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=93 Runoff=0.55 cfs 0.041 af

Subcatchment 223: Roof Area to Drip Strip 3 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=93 Runoff=0.55 cfs 0.041 af

Subcatchment 224: Roof Area to Drip Strip 4 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=93 Runoff=0.55 cfs 0.041 af

Reach 1R: 12" Storm Drain Avg. Depth=0.04' Max Vel=1.20 fps Inflow=0.02 cfs 0.000 af
D=12.0" n=0.012 L=440.0' S=0.0107 '/' Capacity=3.99 cfs Outflow=0.01 cfs 0.000 af

Pond DS-2: Drip Strip Peak Elev=115.26' Storage=167 cf Inflow=0.55 cfs 0.041 af
Discarded=0.28 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.041 af

Pond DS-3: Drip Strip Peak Elev=115.26' Storage=167 cf Inflow=0.55 cfs 0.041 af
Discarded=0.28 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.041 af

Pond DS-4: Drip Strip Peak Elev=115.26' Storage=167 cf Inflow=0.55 cfs 0.041 af
Discarded=0.28 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.041 af

Pond DS1: Drip Strip Peak Elev=115.26' Storage=167 cf Inflow=0.55 cfs 0.041 af
Discarded=0.28 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.041 af

Pond IT-1: Infiltration Trench Peak Elev=112.57' Storage=214 cf Inflow=0.54 cfs 0.039 af
Discarded=0.22 cfs 0.039 af Primary=0.02 cfs 0.000 af Outflow=0.24 cfs 0.039 af

Pond RG-1: Rain Garden Peak Elev=114.84' Storage=51 cf Inflow=0.16 cfs 0.013 af
Discarded=0.08 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.013 af

Pond RG-2: Rain Garden Peak Elev=114.56' Storage=19 cf Inflow=0.20 cfs 0.016 af
Discarded=0.17 cfs 0.016 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.016 af

Link DP#1: Design Point

Inflow=0.43 cfs 0.154 af
Primary=0.43 cfs 0.154 af

Total Runoff Area = 13.973 ac Runoff Volume = 0.387 af Average Runoff Depth = 0.33"
74.63% Pervious = 10.428 ac 25.37% Impervious = 3.545 ac

Summary for Subcatchment 201: Existing Site Area Uncaptured to Wetland

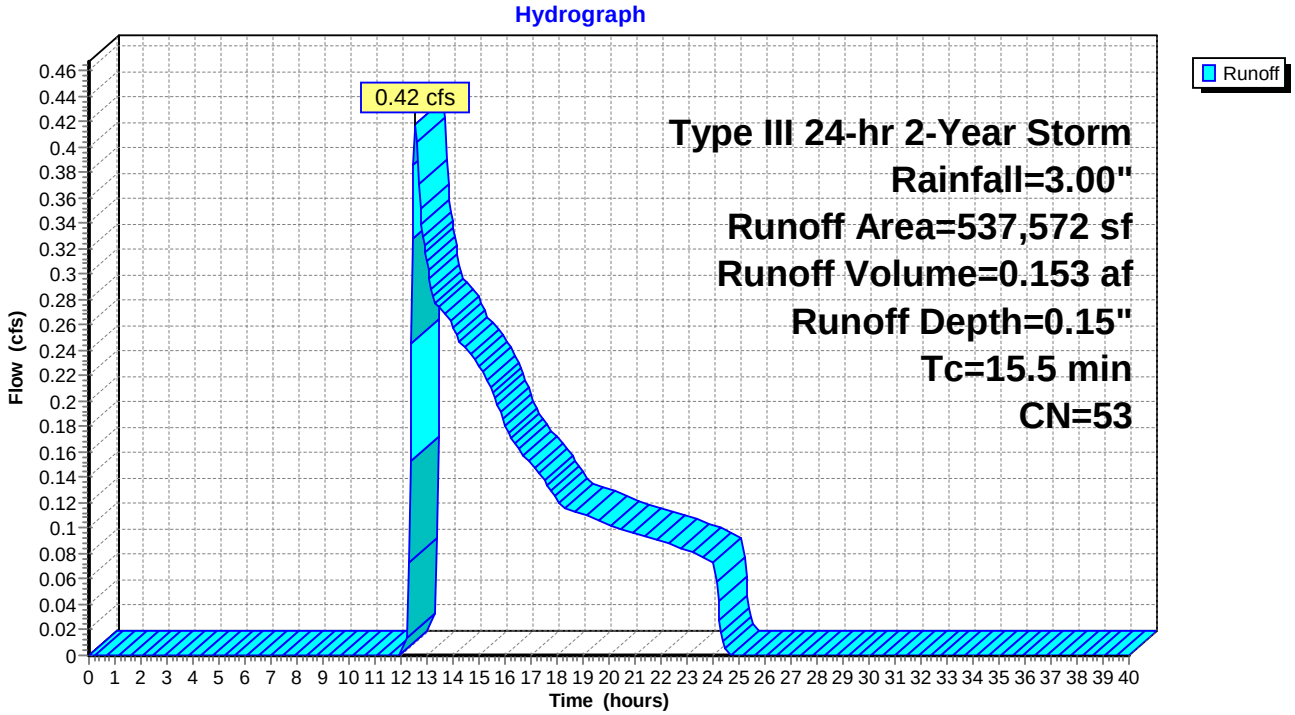
Runoff = 0.42 cfs @ 12.57 hrs, Volume= 0.153 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

	Area (sf)	CN	Description
	365,759	39	>75% Grass cover, Good, HSG A
	17,506	76	Gravel roads, HSG A
	25,724	32	Woods/grass comb., Good, HSG A
	23,810	74	>75% Grass cover, Good, HSG C
	1,860	89	Gravel roads, HSG C
*	92,620	98	Pavement
*	10,293	98	Roofs
	537,572	53	Weighted Average
	434,659		Pervious Area
	102,913		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5					**Direct Entry,**

Subcatchment 201: Existing Site Area Uncaptured to Wetland



Summary for Subcatchment 210: Area to Infiltration Trench

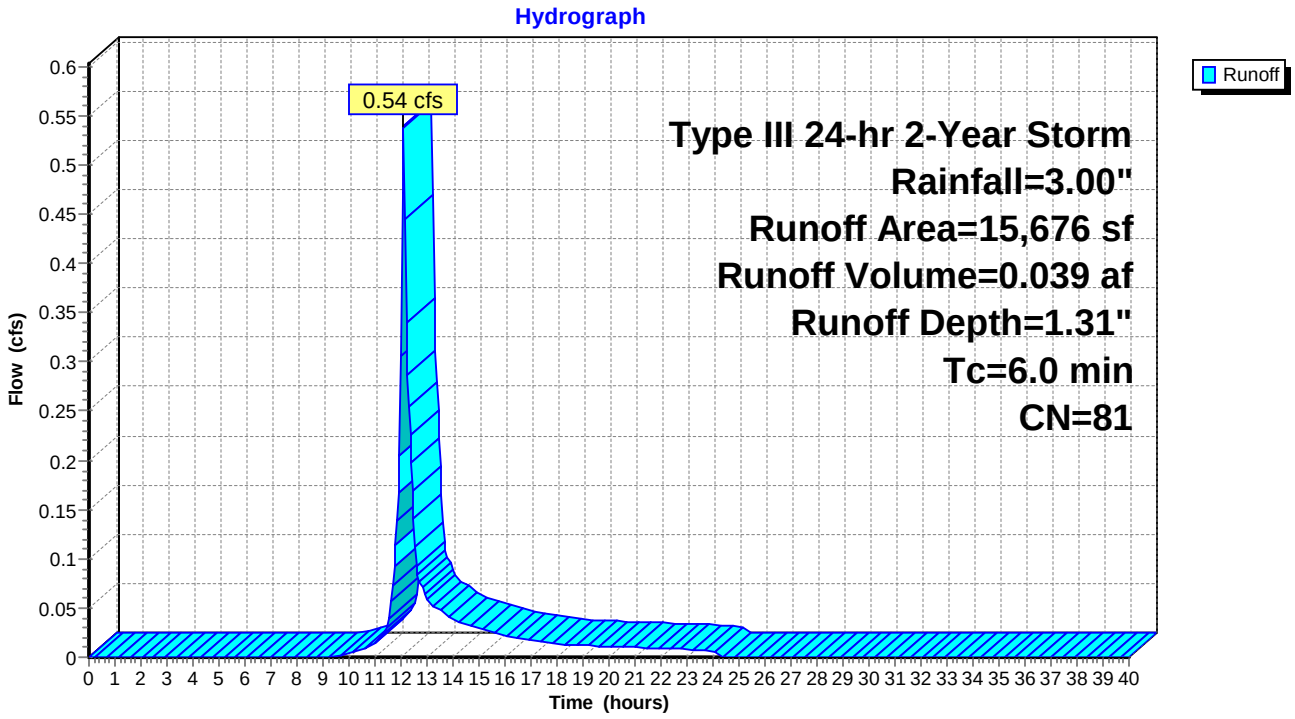
Runoff = 0.54 cfs @ 12.10 hrs, Volume= 0.039 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
11,224	98	Paved parking & roofs
4,452	39	>75% Grass cover, Good, HSG A
15,676	81	Weighted Average
4,452		Pervious Area
11,224		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 210: Area to Infiltration Trench



Summary for Subcatchment 211: Area to Rain Garden 1

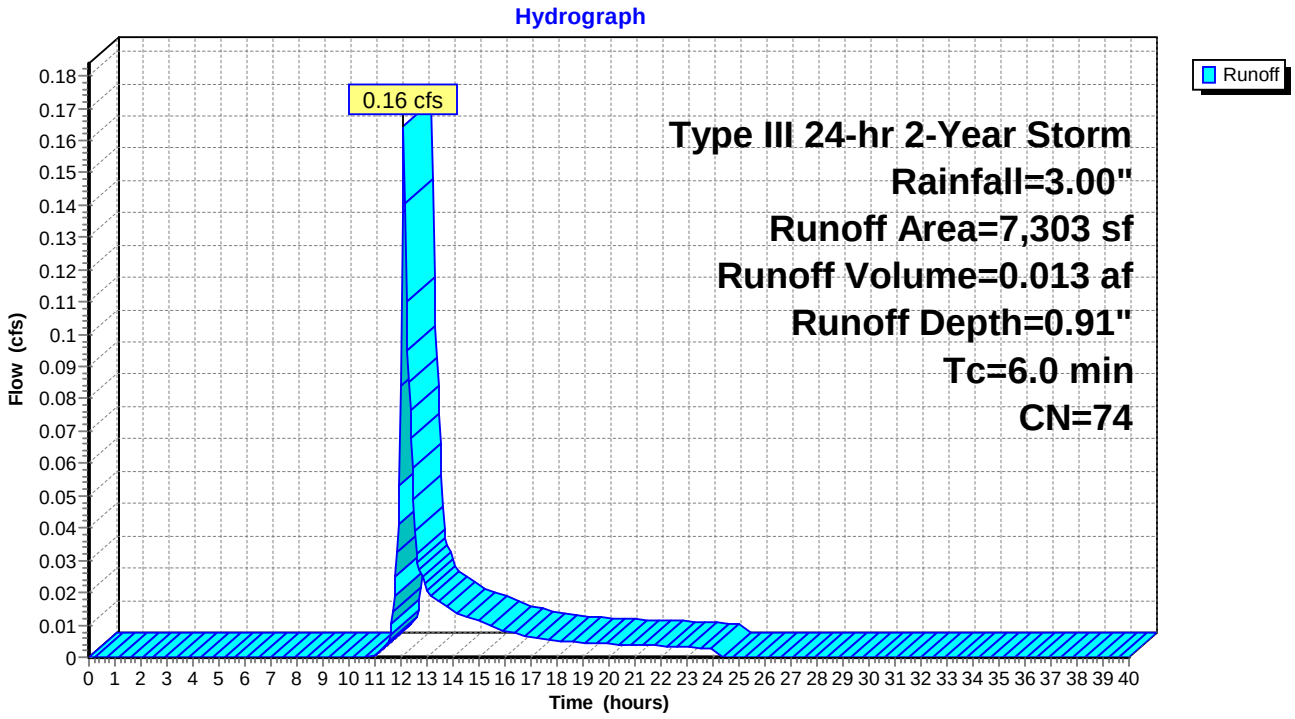
Runoff = 0.16 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
4,299	98	Paved parking & roofs
3,004	39	>75% Grass cover, Good, HSG A
7,303	74	Weighted Average
3,004		Pervious Area
4,299		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 211: Area to Rain Garden 1



Summary for Subcatchment 212: Area to Rain Garden 2

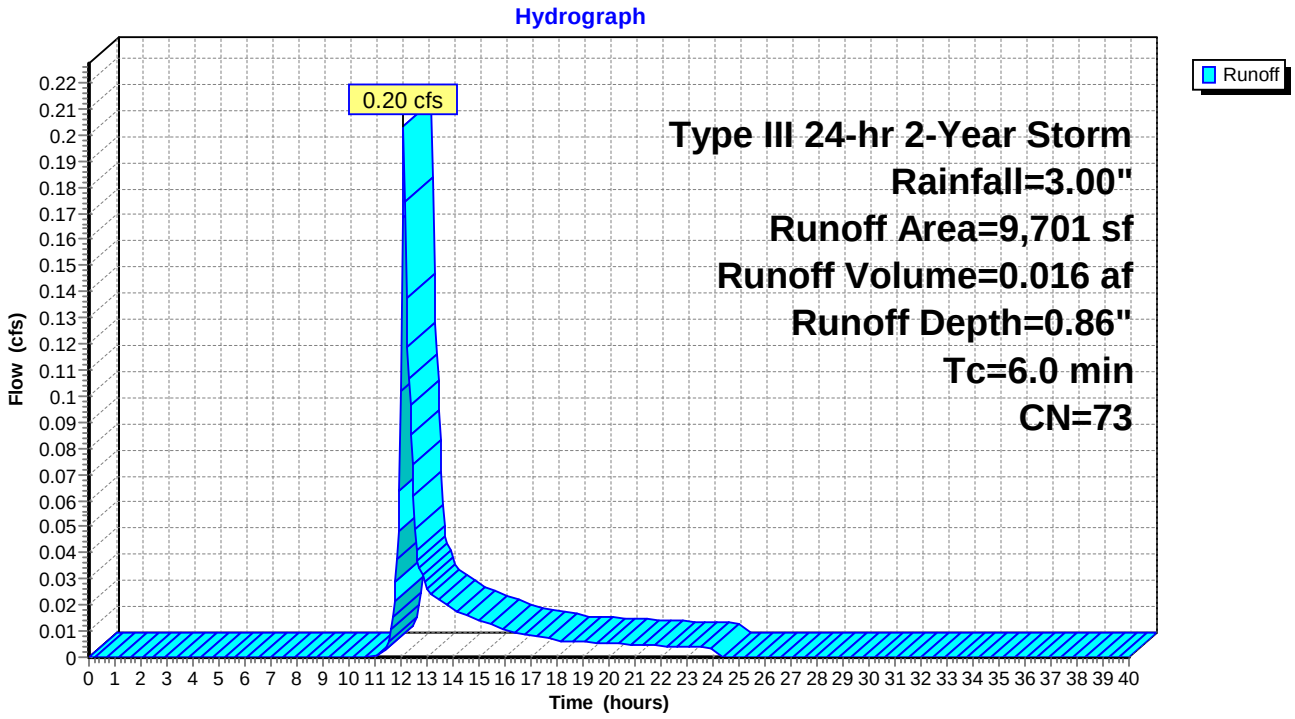
Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

Area (sf)	CN	Description
5,566	98	Paved parking & roofs
4,135	39	>75% Grass cover, Good, HSG A
9,701	73	Weighted Average
4,135		Pervious Area
5,566		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 212: Area to Rain Garden 2



Summary for Subcatchment 221: Roof Area to Drip Strip 1

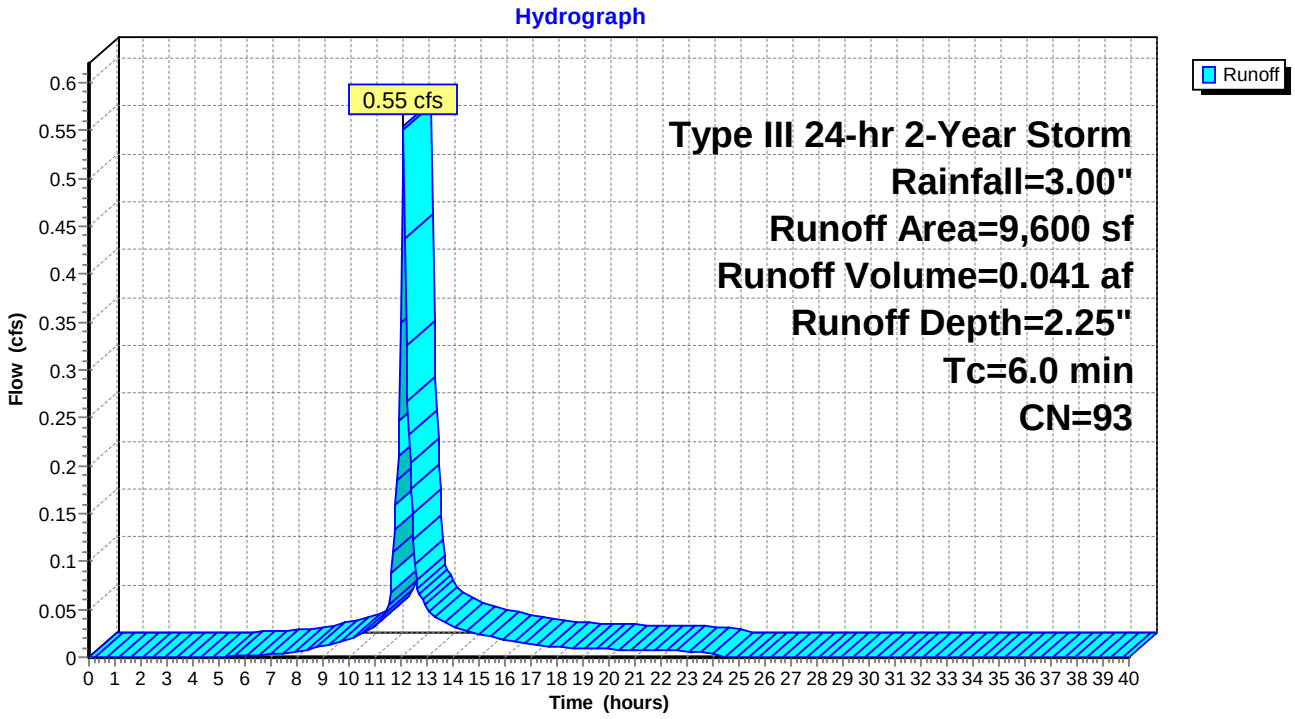
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 221: Roof Area to Drip Strip 1



Summary for Subcatchment 222: Roof Area to Drip Strip 2

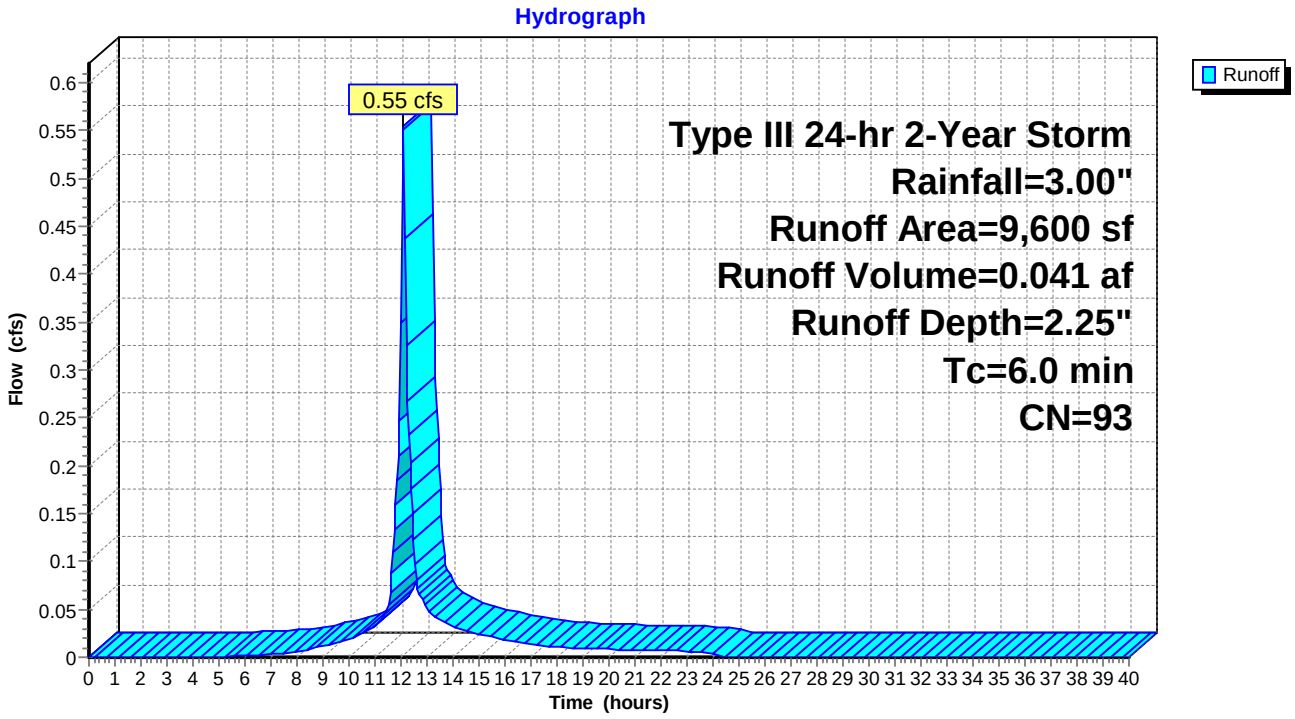
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 222: Roof Area to Drip Strip 2



Summary for Subcatchment 223: Roof Area to Drip Strip 3

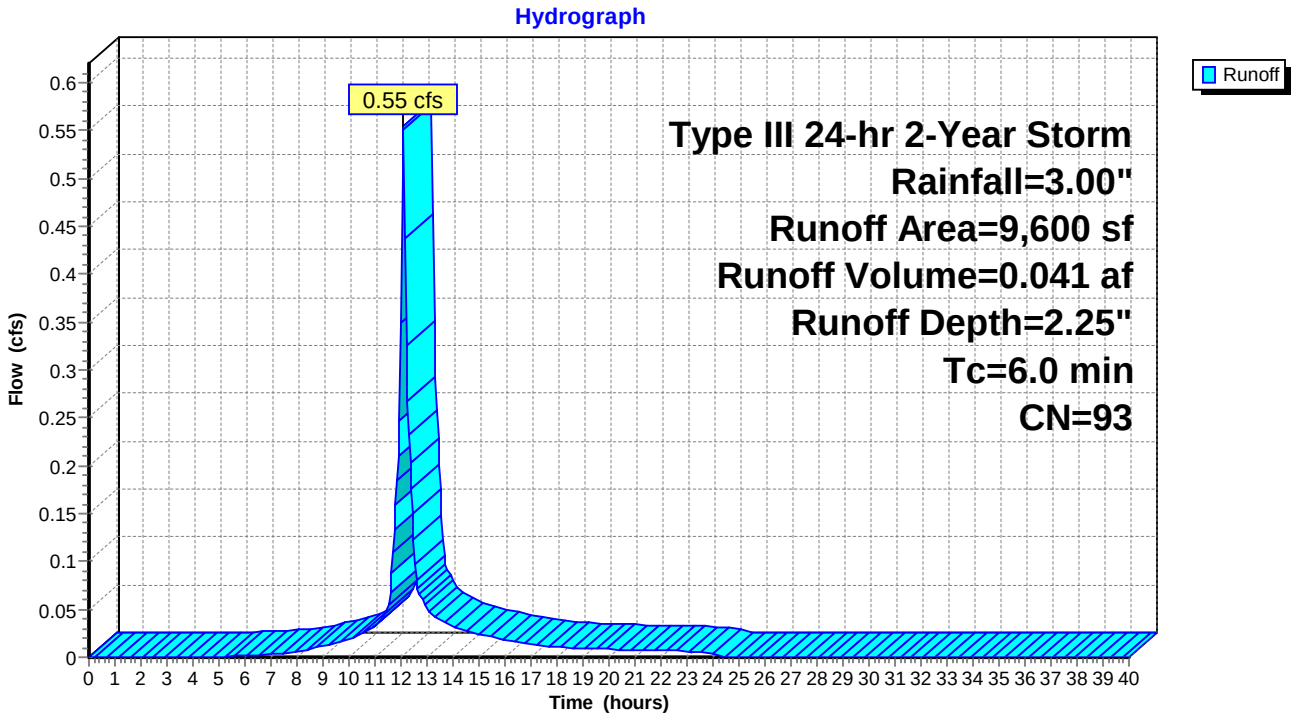
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 223: Roof Area to Drip Strip 3



Summary for Subcatchment 224: Roof Area to Drip Strip 4

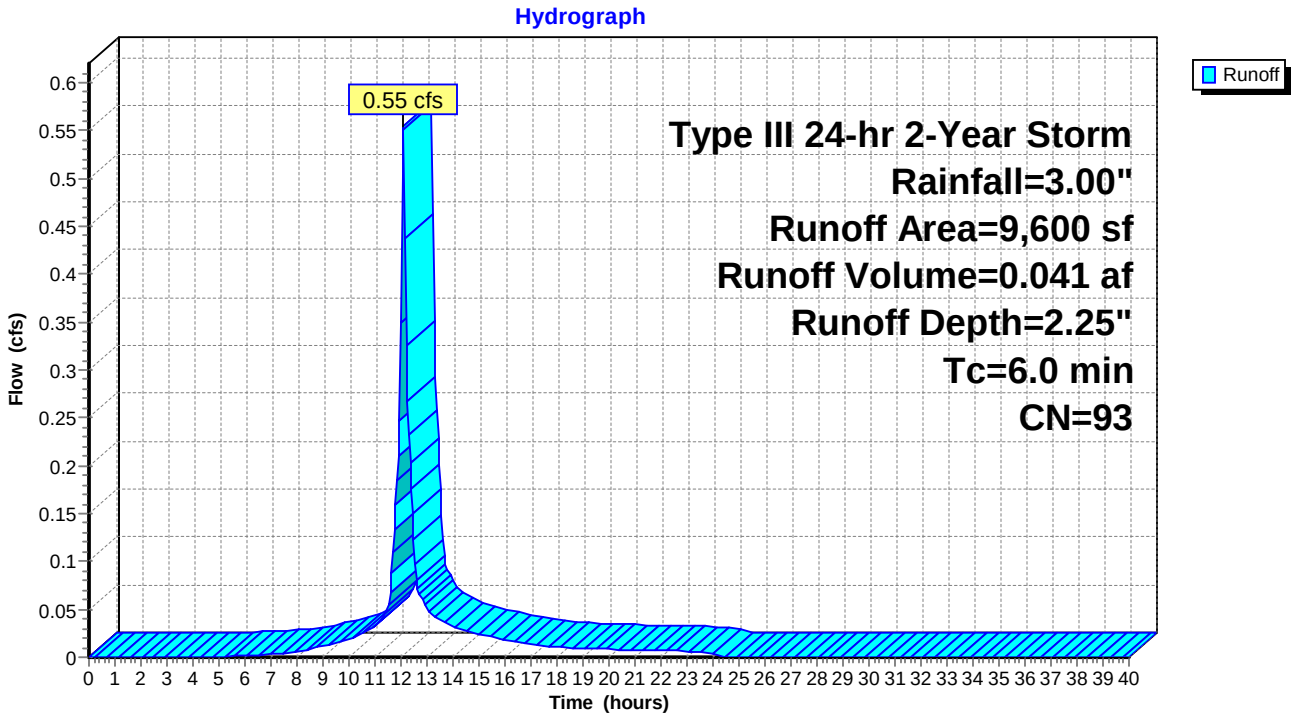
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.00"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 224: Roof Area to Drip Strip 4



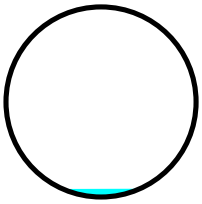
Summary for Reach 1R: 12" Storm Drain

Inflow Area = 1.632 ac, 72.44% Impervious, Inflow Depth = 0.00" for 2-Year Storm event
Inflow = 0.02 cfs @ 12.33 hrs, Volume= 0.000 af
Outflow = 0.01 cfs @ 12.50 hrs, Volume= 0.000 af, Atten= 28%, Lag= 10.3 min

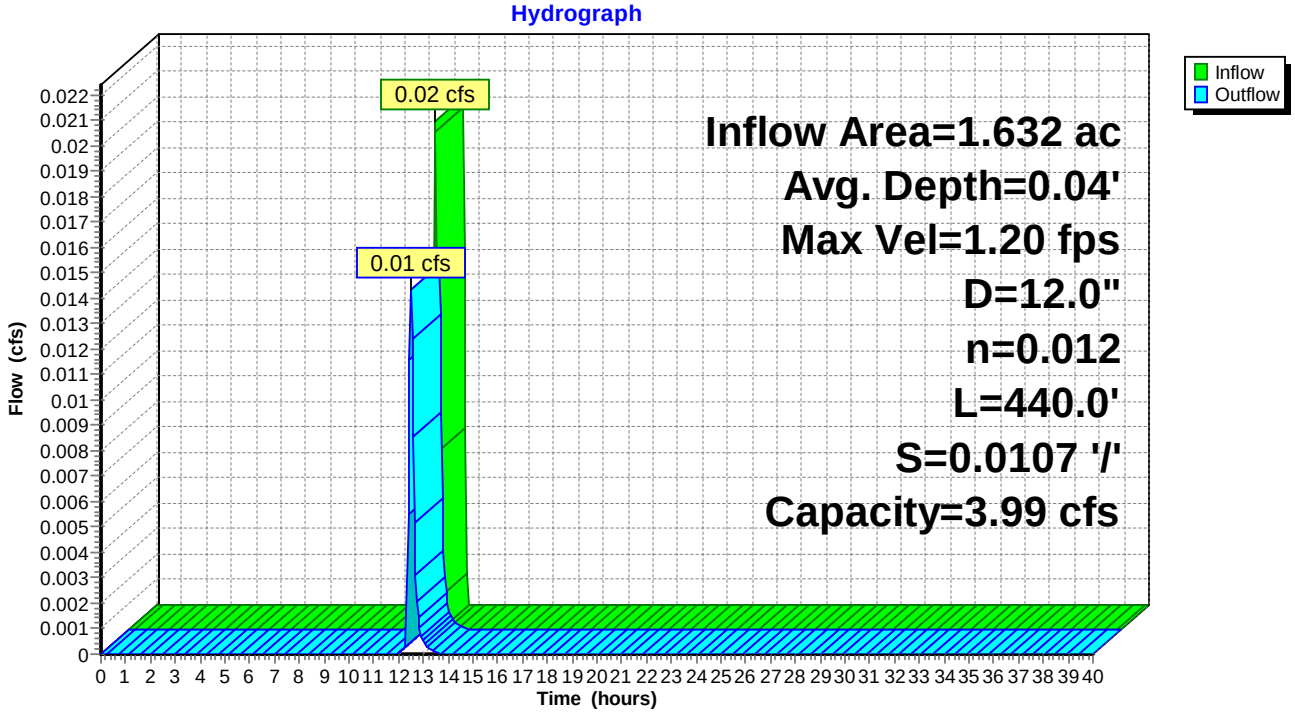
Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 6.1 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 11.8 min

Peak Storage= 5 cf @ 12.40 hrs, Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.99 cfs

12.0" Diameter Pipe, n= 0.012
Length= 440.0' Slope= 0.0107 '/'
Inlet Invert= 111.20', Outlet Invert= 106.50'



Reach 1R: 12" Storm Drain



Summary for Pond DS-2: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 2.25" for 2-Year Storm event
Inflow = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af, Atten= 50%, Lag= 0.0 min
Discarded = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.26' @ 12.24 hrs Surf.Area= 1,600 sf Storage= 167 cf

Plug-Flow detention time= 3.6 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (798.5 - 794.9)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

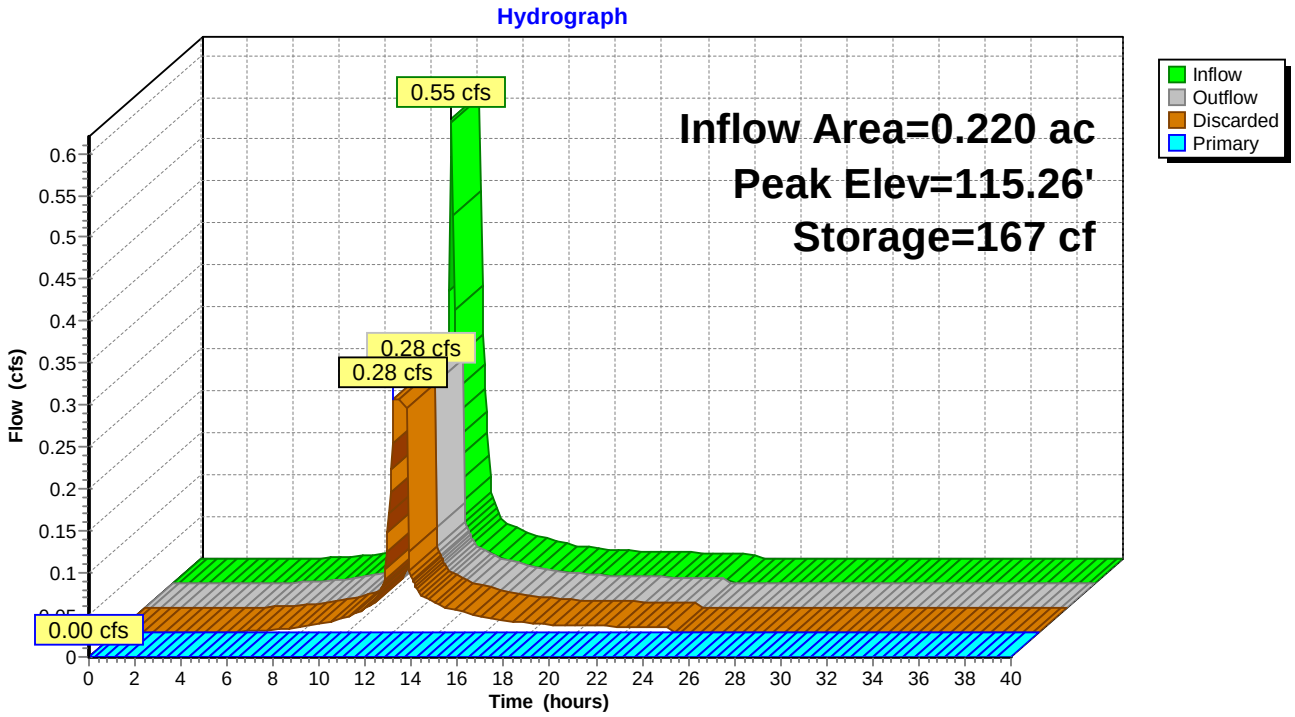
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 12.00 hrs HW=115.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS-2: Drip Strip



Summary for Pond DS-3: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 2.25" for 2-Year Storm event
Inflow = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af, Atten= 50%, Lag= 0.0 min
Discarded = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.26' @ 12.24 hrs Surf.Area= 1,600 sf Storage= 167 cf

Plug-Flow detention time= 3.6 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (798.5 - 794.9)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

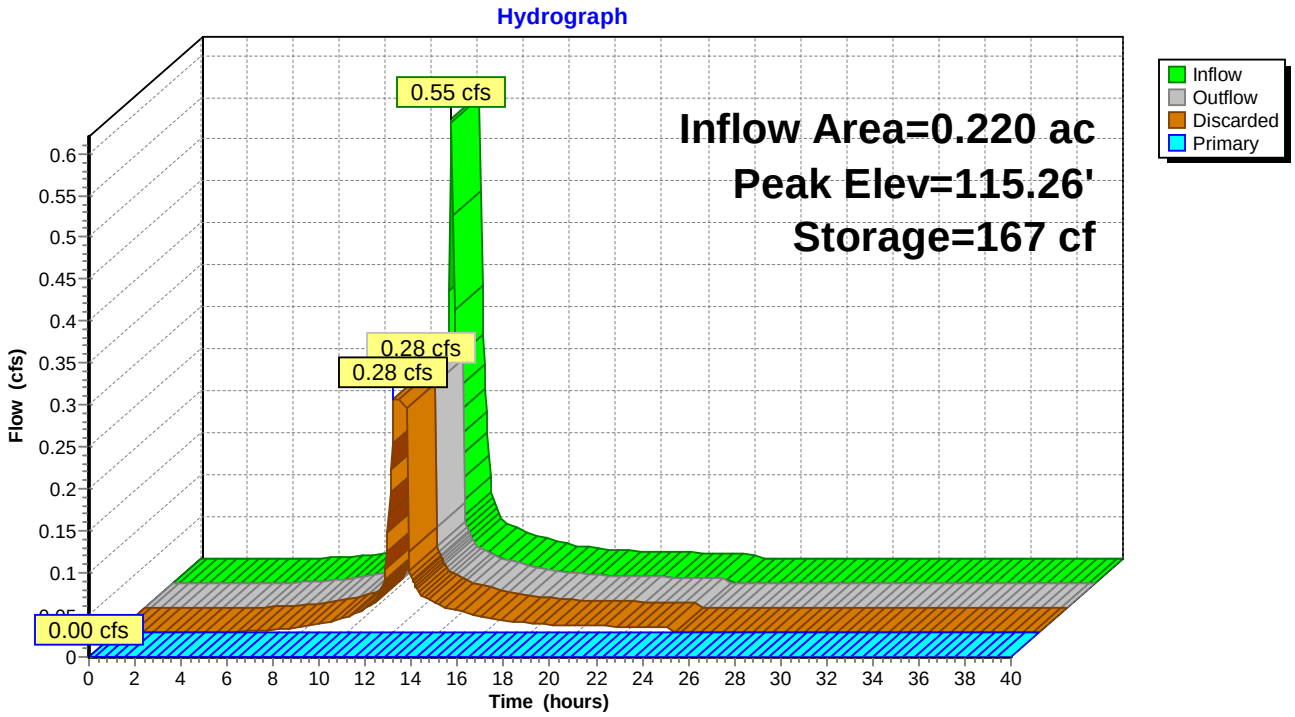
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 12.00 hrs HW=115.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS-3: Drip Strip



Summary for Pond DS-4: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 2.25" for 2-Year Storm event
Inflow = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af, Atten= 50%, Lag= 0.0 min
Discarded = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.26' @ 12.24 hrs Surf.Area= 1,600 sf Storage= 167 cf

Plug-Flow detention time= 3.6 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (798.5 - 794.9)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

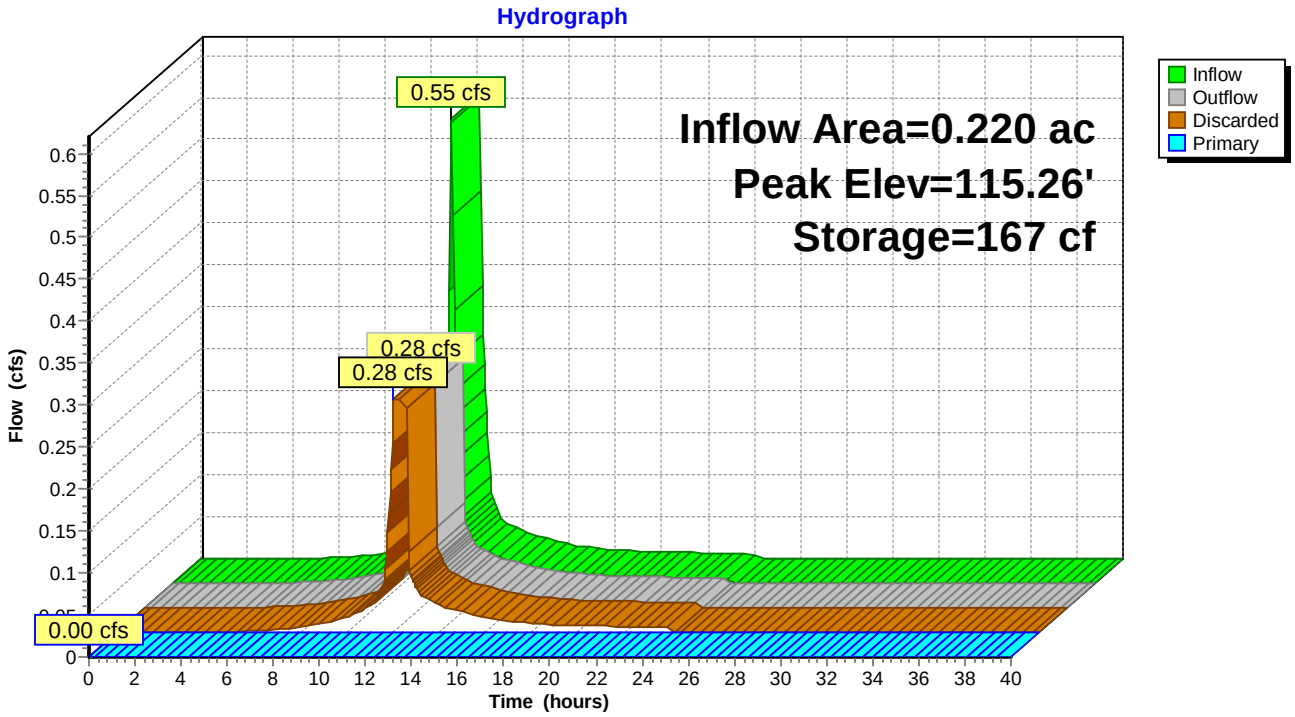
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 12.00 hrs HW=115.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS-4: Drip Strip



Summary for Pond DS1: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 2.25" for 2-Year Storm event
Inflow = 0.55 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af, Atten= 50%, Lag= 0.0 min
Discarded = 0.28 cfs @ 12.00 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.26' @ 12.24 hrs Surf.Area= 1,600 sf Storage= 167 cf

Plug-Flow detention time= 3.6 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 3.6 min (798.5 - 794.9)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

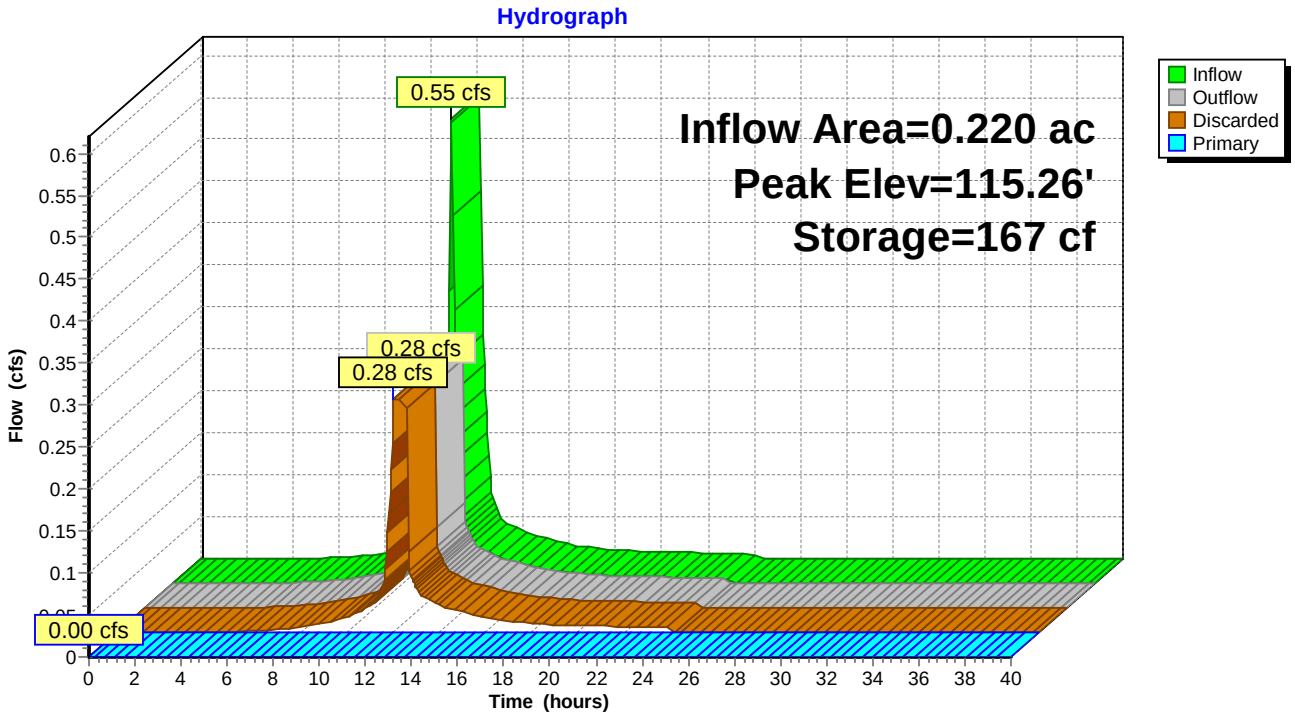
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 12.00 hrs HW=115.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS1: Drip Strip



Summary for Pond IT-1: Infiltration Trench

Inflow Area = 0.360 ac, 71.60% Impervious, Inflow Depth = 1.31" for 2-Year Storm event
Inflow = 0.54 cfs @ 12.10 hrs, Volume= 0.039 af
Outflow = 0.24 cfs @ 12.33 hrs, Volume= 0.039 af, Atten= 56%, Lag= 14.2 min
Discarded = 0.22 cfs @ 12.00 hrs, Volume= 0.039 af
Primary = 0.02 cfs @ 12.33 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 112.57' @ 12.33 hrs Surf.Area= 1,250 sf Storage= 214 cf

Plug-Flow detention time= 5.2 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 5.2 min (848.0 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	2,250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

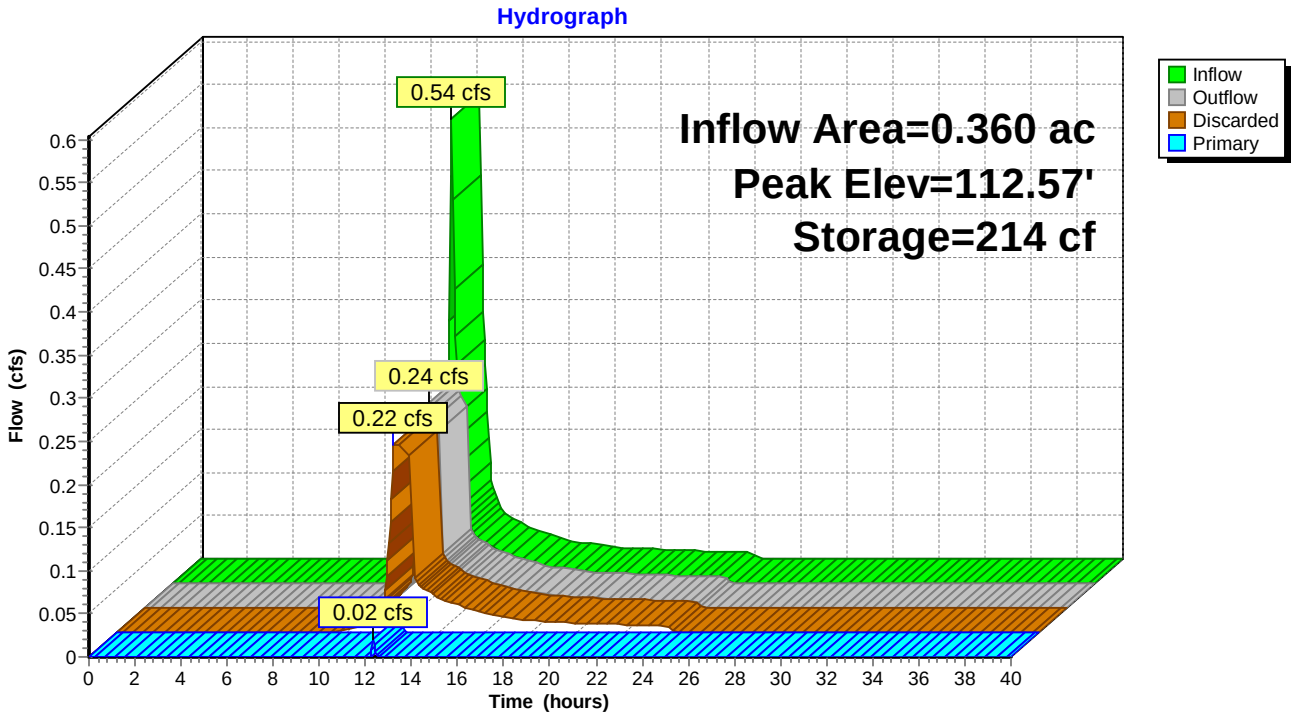
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
112.00	1,250	0.0	0	0
113.00	1,250	30.0	375	375
114.00	1,250	30.0	375	750
115.00	1,250	40.0	500	1,250
116.00	1,250	40.0	500	1,750
117.00	1,250	40.0	500	2,250

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	112.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.22 cfs @ 12.00 hrs HW=112.07' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.02 cfs @ 12.33 hrs HW=112.57' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 0.90 fps)

Pond IT-1: Infiltration Trench



Summary for Pond RG-1: Rain Garden

Inflow Area = 0.168 ac, 58.87% Impervious, Inflow Depth = 0.91" for 2-Year Storm event
Inflow = 0.16 cfs @ 12.10 hrs, Volume= 0.013 af
Outflow = 0.08 cfs @ 12.05 hrs, Volume= 0.013 af, Atten= 51%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.05 hrs, Volume= 0.013 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 114.84' @ 12.33 hrs Surf.Area= 460 sf Storage= 51 cf

Plug-Flow detention time= 3.4 min calculated for 0.013 af (100% of inflow)
Center-of-Mass det. time= 3.4 min (869.7 - 866.3)

Volume	Invert	Avail.Storage	Storage Description
#1	114.50'	1,185 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

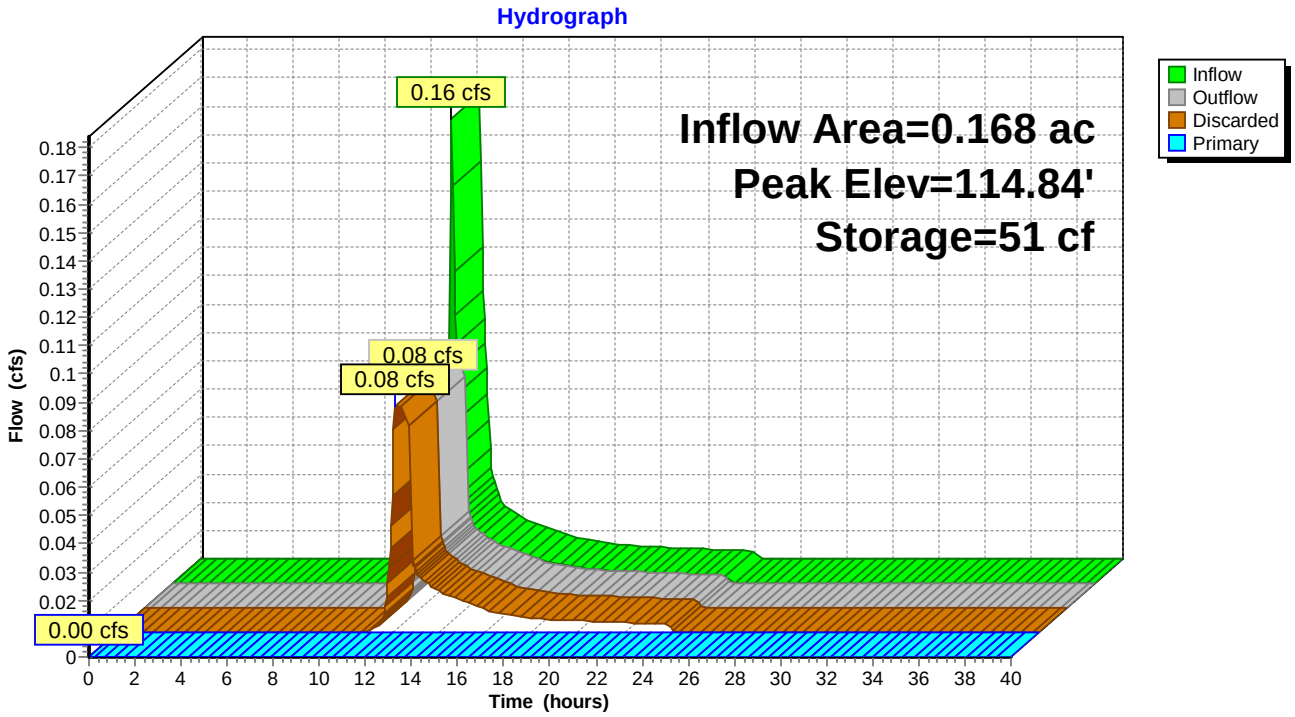
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.50	460	33.0	0	0
115.00	460	33.0	76	76
115.50	460	33.0	76	152
116.00	460	33.0	76	228
116.50	460	100.0	230	458
117.00	460	100.0	230	688
117.50	505	100.0	241	929
118.00	520	100.0	256	1,185

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	**7.500 in/hr Exfiltration over Surface area**
#2	Device 3	115.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	114.50'	**8.0" x 150.0' long Culvert** Ke= 0.500
			Outlet Invert= 111.00' S= 0.0233 '/' Cc= 0.900 n= 0.012
#4	Device 3	117.50'	**10.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.08 cfs @ 12.05 hrs HW=114.57' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.50' (Free Discharge)
↑—**3=Culvert** (Controls 0.00 cfs)
  ↑—**2=Orifice/Grate** (Controls 0.00 cfs)
  —**4=Orifice/Grate** (Controls 0.00 cfs)

Pond RG-1: Rain Garden



Summary for Pond RG-2: Rain Garden

Inflow Area = 0.223 ac, 57.38% Impervious, Inflow Depth = 0.86" for 2-Year Storm event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.17 cfs @ 12.10 hrs, Volume= 0.016 af, Atten= 18%, Lag= 0.0 min
Discarded = 0.17 cfs @ 12.10 hrs, Volume= 0.016 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 114.56' @ 12.16 hrs Surf.Area= 960 sf Storage= 19 cf

Plug-Flow detention time= 1.2 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (870.9 - 869.8)

Volume	Invert	Avail.Storage	Storage Description
#1	114.50'	2,174 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

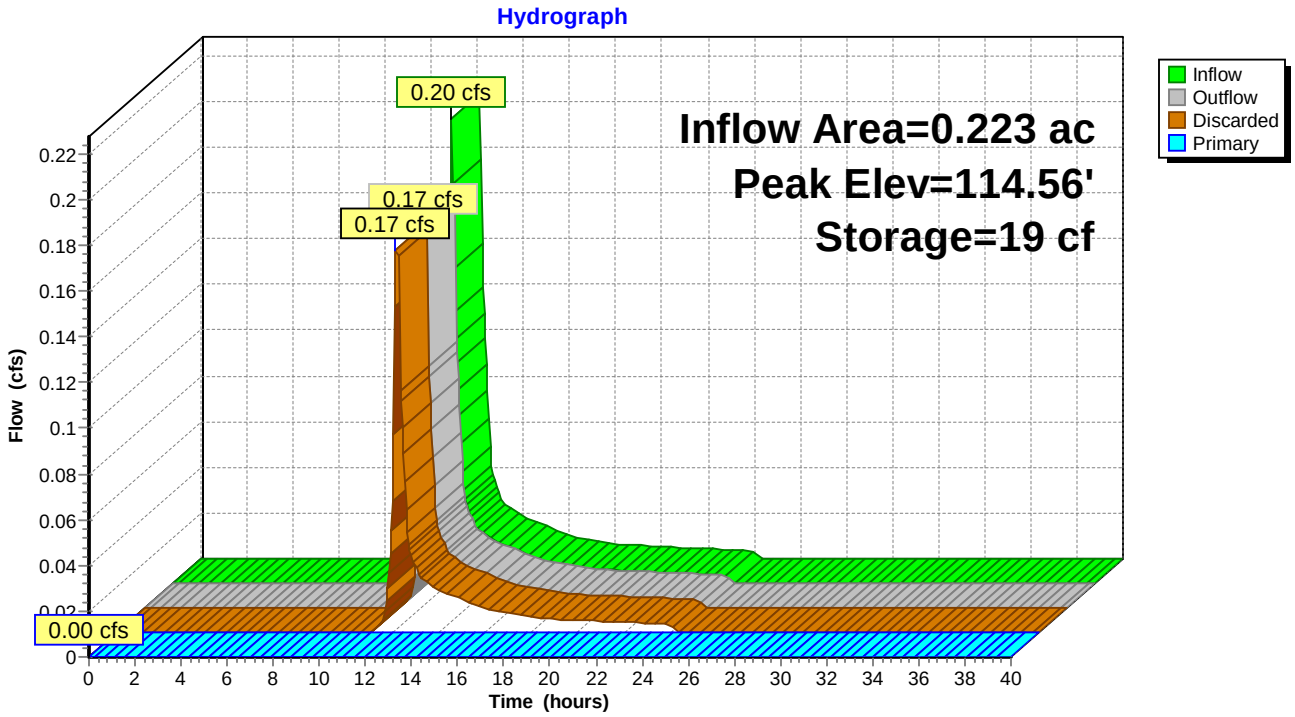
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.50	960	33.0	0	0
115.00	960	33.0	158	158
115.50	960	33.0	158	317
116.00	960	33.0	158	475
116.50	960	33.0	158	634
117.00	960	100.0	480	1,114
117.50	1,040	100.0	500	1,614
118.00	1,200	100.0	560	2,174

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	**7.500 in/hr Exfiltration over Surface area**
#2	Device 3	115.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	114.50'	**8.0" x 150.0' long Culvert** Ke= 0.500
			Outlet Invert= 111.00' S= 0.0233 '/' Cc= 0.900 n= 0.012
#4	Device 3	117.50'	**10.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.17 cfs @ 12.10 hrs HW=114.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.50' (Free Discharge)
└**3=Culvert** (Controls 0.00 cfs)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond RG-2: Rain Garden

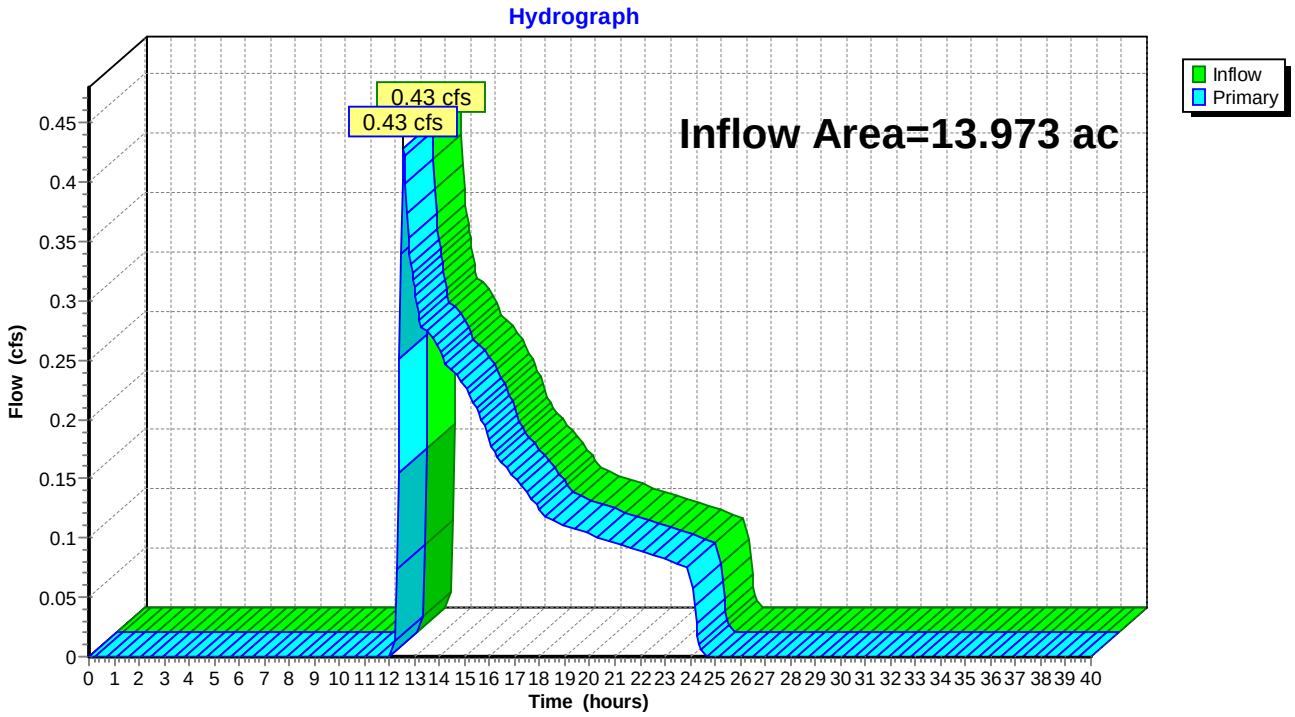


Summary for Link DP#1: Design Point

Inflow Area = 13.973 ac, 25.37% Impervious, Inflow Depth = 0.13" for 2-Year Storm event
Inflow = 0.43 cfs @ 12.57 hrs, Volume= 0.154 af
Primary = 0.43 cfs @ 12.57 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link DP#1: Design Point



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 201: Existing Site Area Runoff Area=537,572 sf 19.14% Impervious Runoff Depth=0.73"
Tc=15.5 min CN=53 Runoff=5.35 cfs 0.747 af

Subcatchment 210: Area to Infiltration Trench Runoff Area=15,676 sf 71.60% Impervious Runoff Depth=2.72"
Tc=6.0 min CN=81 Runoff=1.12 cfs 0.082 af

Subcatchment 211: Area to Rain Garden 1 Runoff Area=7,303 sf 58.87% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=74 Runoff=0.41 cfs 0.030 af

Subcatchment 212: Area to Rain Garden 2 Runoff Area=9,701 sf 57.38% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=73 Runoff=0.52 cfs 0.038 af

Subcatchment 221: Roof Area to Drip Strip 1 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=3.90"
Tc=6.0 min CN=93 Runoff=0.93 cfs 0.072 af

Subcatchment 222: Roof Area to Drip Strip 2 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=3.90"
Tc=6.0 min CN=93 Runoff=0.93 cfs 0.072 af

Subcatchment 223: Roof Area to Drip Strip 3 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=3.90"
Tc=6.0 min CN=93 Runoff=0.93 cfs 0.072 af

Subcatchment 224: Roof Area to Drip Strip 4 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=3.90"
Tc=6.0 min CN=93 Runoff=0.93 cfs 0.072 af

Reach 1R: 12" Storm Drain Avg. Depth=0.33' Max Vel=4.14 fps Inflow=0.96 cfs 0.024 af
D=12.0" n=0.012 L=440.0' S=0.0107 '/' Capacity=3.99 cfs Outflow=0.90 cfs 0.024 af

Pond DS-2: Drip Strip Peak Elev=115.86' Storage=548 cf Inflow=0.93 cfs 0.072 af
Discarded=0.28 cfs 0.072 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.072 af

Pond DS-3: Drip Strip Peak Elev=115.86' Storage=548 cf Inflow=0.93 cfs 0.072 af
Discarded=0.28 cfs 0.072 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.072 af

Pond DS-4: Drip Strip Peak Elev=115.86' Storage=548 cf Inflow=0.93 cfs 0.072 af
Discarded=0.28 cfs 0.072 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.072 af

Pond DS1: Drip Strip Peak Elev=115.86' Storage=548 cf Inflow=0.93 cfs 0.072 af
Discarded=0.28 cfs 0.072 af Primary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.072 af

Pond IT-1: Infiltration Trench Peak Elev=113.02' Storage=384 cf Inflow=1.12 cfs 0.082 af
Discarded=0.22 cfs 0.065 af Primary=0.72 cfs 0.016 af Outflow=0.94 cfs 0.082 af

Pond RG-1: Rain Garden Peak Elev=115.45' Storage=144 cf Inflow=0.41 cfs 0.030 af
Discarded=0.08 cfs 0.024 af Primary=0.23 cfs 0.006 af Outflow=0.30 cfs 0.030 af

Pond RG-2: Rain Garden Peak Elev=115.21' Storage=223 cf Inflow=0.52 cfs 0.038 af
Discarded=0.17 cfs 0.036 af Primary=0.09 cfs 0.002 af Outflow=0.25 cfs 0.038 af

Link DP#1: Design Point

Inflow=6.21 cfs 0.771 af
Primary=6.21 cfs 0.771 af

Total Runoff Area = 13.973 ac Runoff Volume = 1.183 af Average Runoff Depth = 1.02"
74.63% Pervious = 10.428 ac 25.37% Impervious = 3.545 ac

Summary for Subcatchment 201: Existing Site Area Uncaptured to Wetland

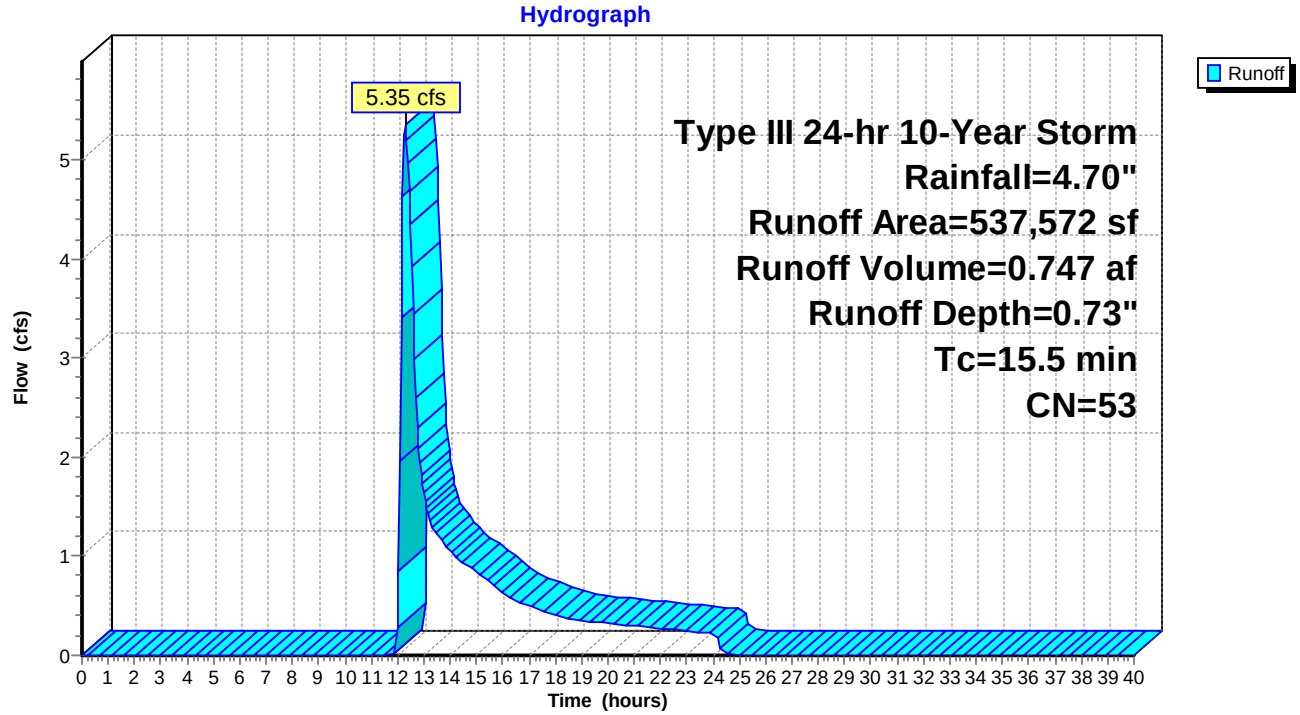
Runoff = 5.35 cfs @ 12.29 hrs, Volume= 0.747 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
	365,759	39	>75% Grass cover, Good, HSG A
	17,506	76	Gravel roads, HSG A
	25,724	32	Woods/grass comb., Good, HSG A
	23,810	74	>75% Grass cover, Good, HSG C
	1,860	89	Gravel roads, HSG C
*	92,620	98	Pavement
*	10,293	98	Roofs
	537,572	53	Weighted Average
	434,659		Pervious Area
	102,913		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5					**Direct Entry,**

Subcatchment 201: Existing Site Area Uncaptured to Wetland



Summary for Subcatchment 210: Area to Infiltration Trench

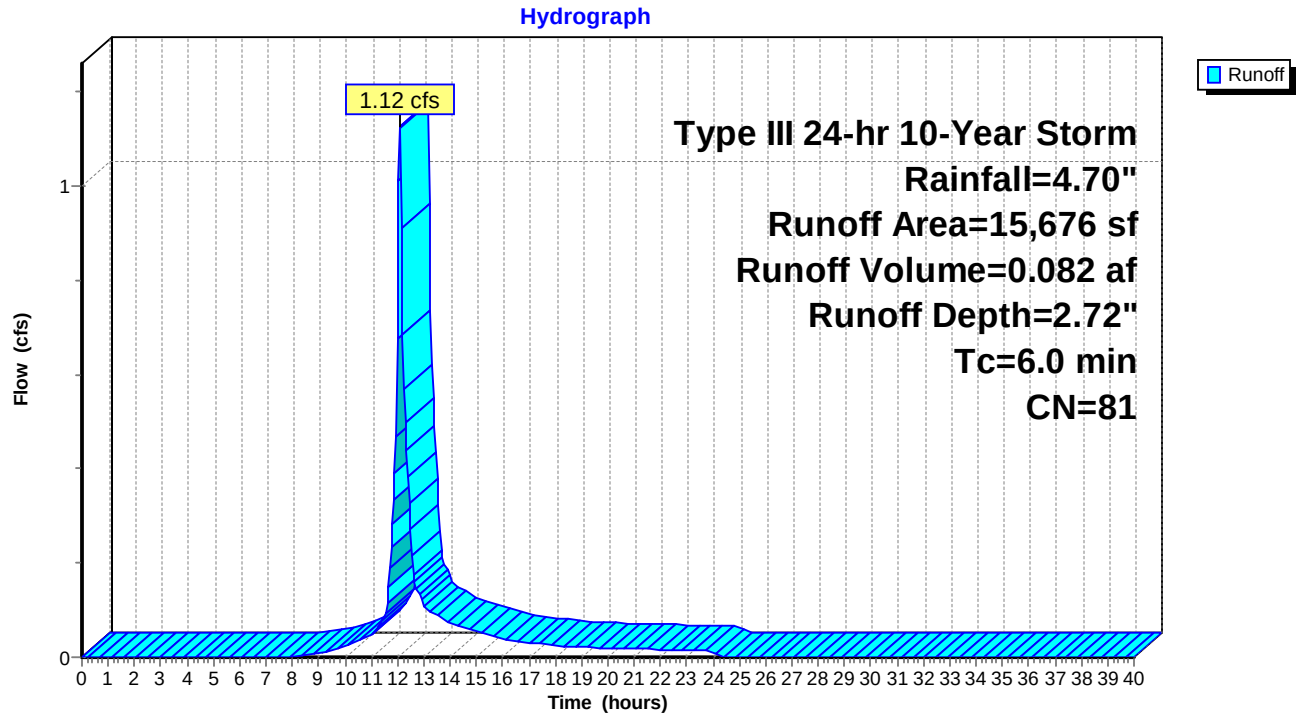
Runoff = 1.12 cfs @ 12.09 hrs, Volume= 0.082 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
11,224	98	Paved parking & roofs
4,452	39	>75% Grass cover, Good, HSG A
15,676	81	Weighted Average
4,452		Pervious Area
11,224		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 210: Area to Infiltration Trench



Summary for Subcatchment 211: Area to Rain Garden 1

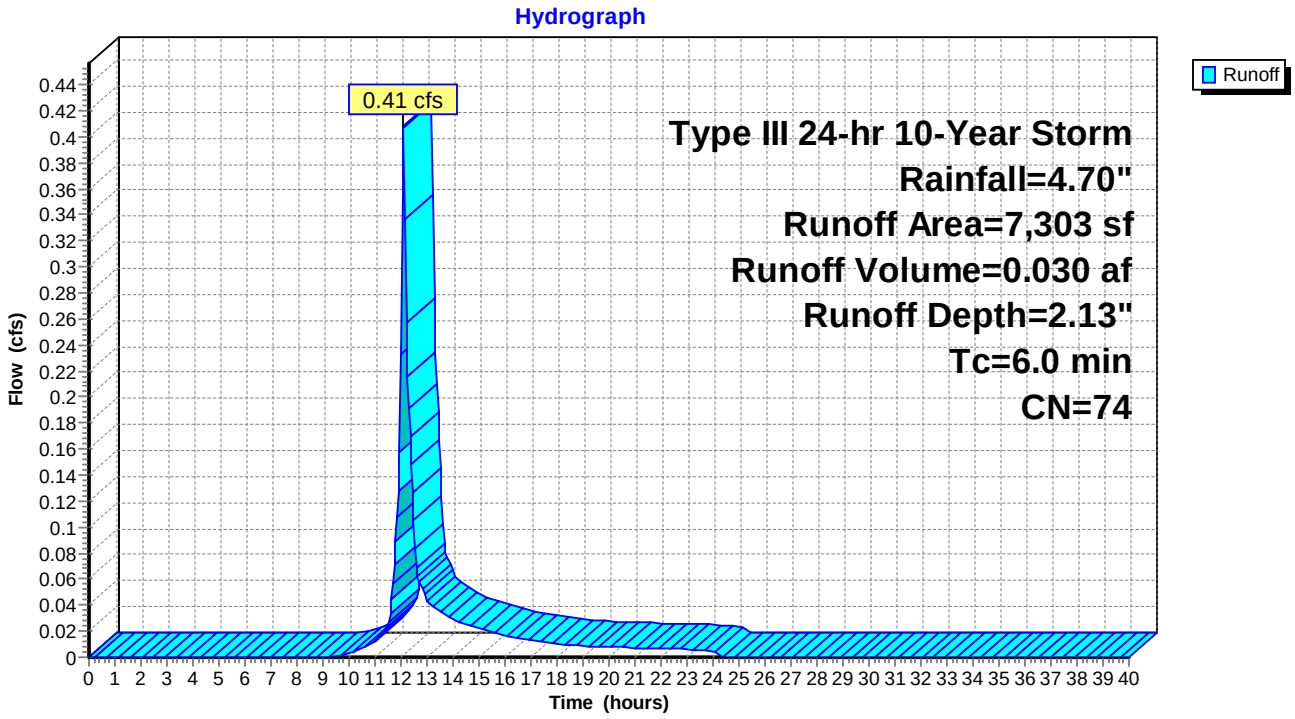
Runoff = 0.41 cfs @ 12.10 hrs, Volume= 0.030 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
4,299	98	Paved parking & roofs
3,004	39	>75% Grass cover, Good, HSG A
7,303	74	Weighted Average
3,004		Pervious Area
4,299		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 211: Area to Rain Garden 1



Summary for Subcatchment 212: Area to Rain Garden 2

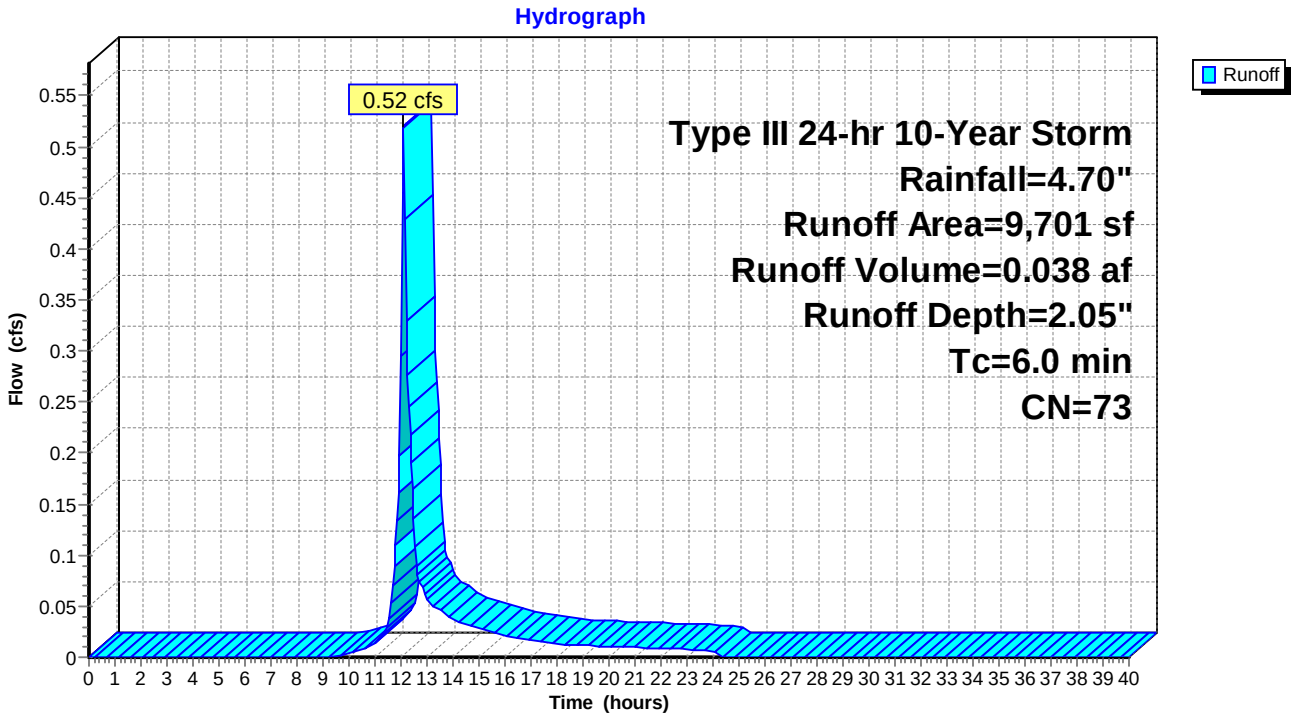
Runoff = 0.52 cfs @ 12.10 hrs, Volume= 0.038 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
5,566	98	Paved parking & roofs
4,135	39	>75% Grass cover, Good, HSG A
9,701	73	Weighted Average
4,135		Pervious Area
5,566		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 212: Area to Rain Garden 2



Summary for Subcatchment 221: Roof Area to Drip Strip 1

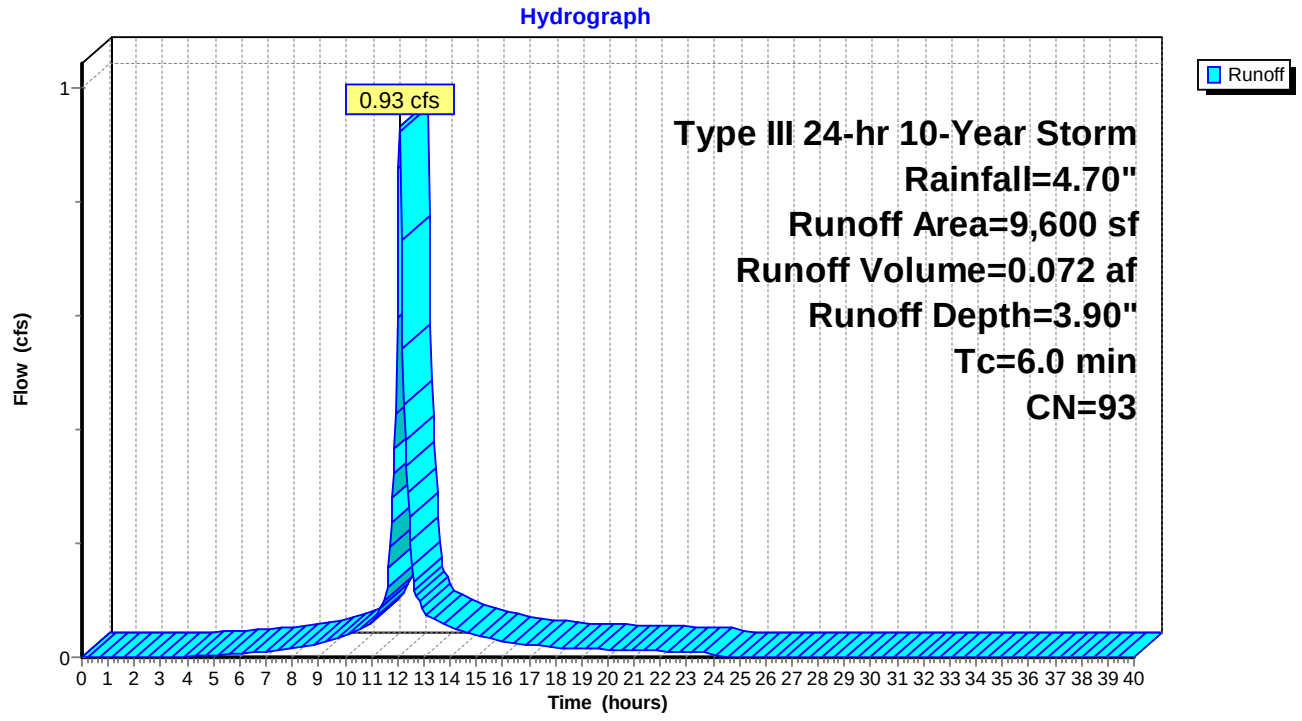
Runoff = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 221: Roof Area to Drip Strip 1



Summary for Subcatchment 222: Roof Area to Drip Strip 2

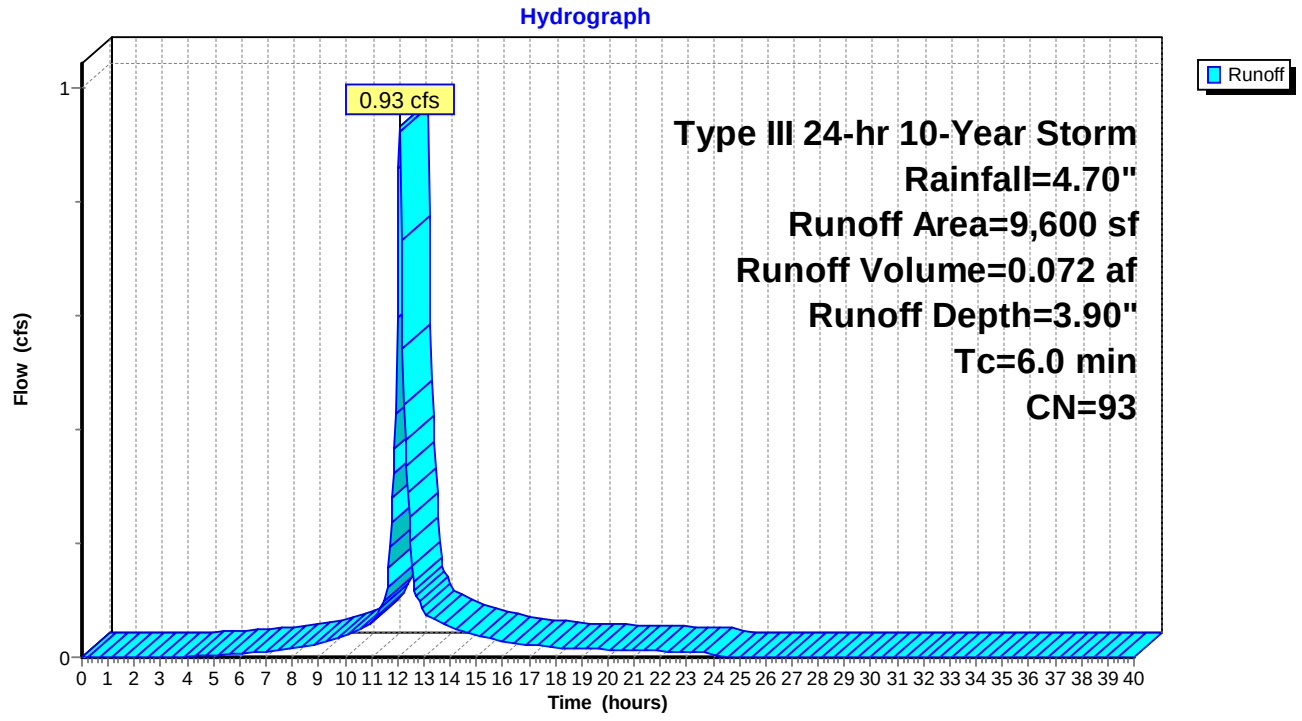
Runoff = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 222: Roof Area to Drip Strip 2



Summary for Subcatchment 223: Roof Area to Drip Strip 3

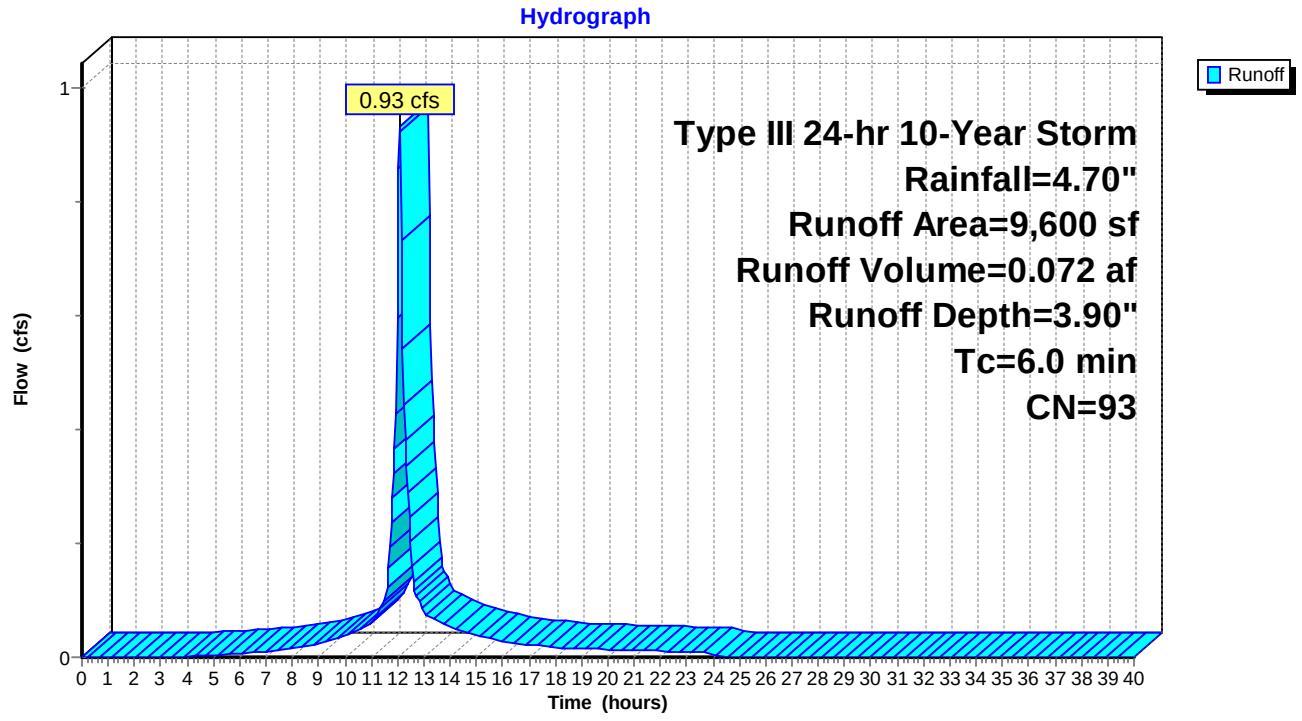
Runoff = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 223: Roof Area to Drip Strip 3



Summary for Subcatchment 224: Roof Area to Drip Strip 4

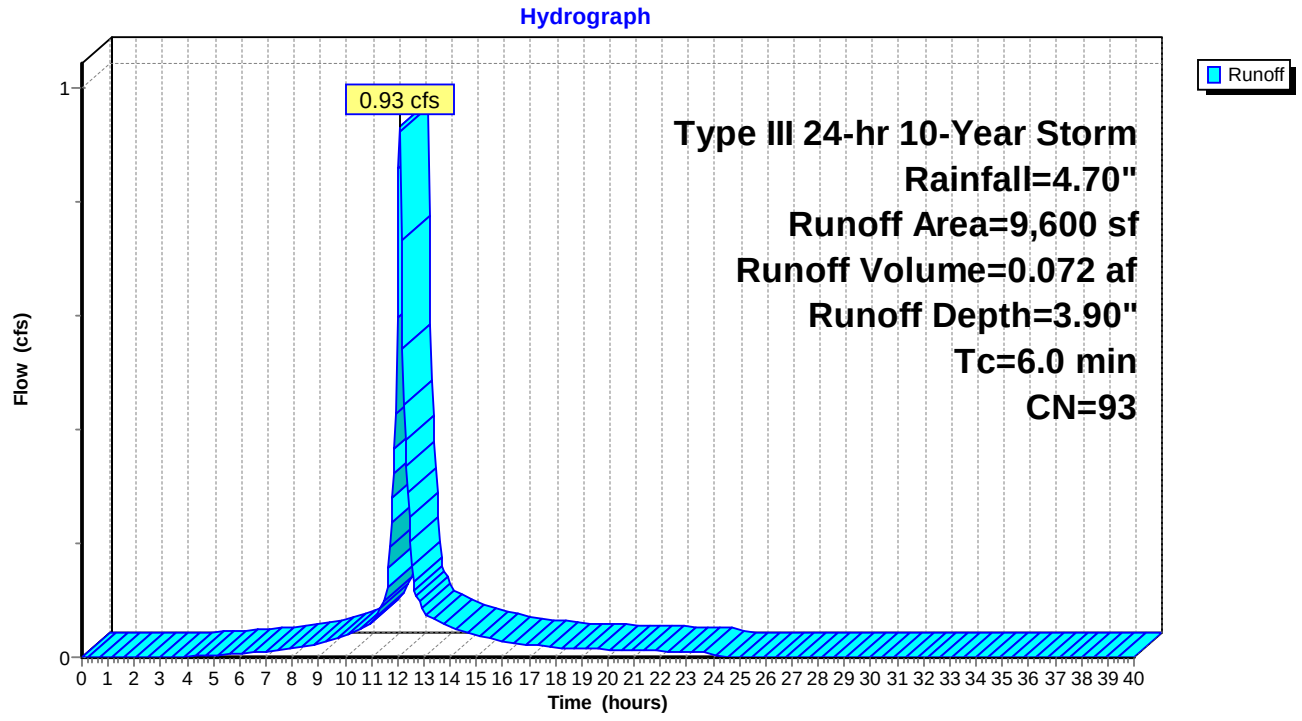
Runoff = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 224: Roof Area to Drip Strip 4



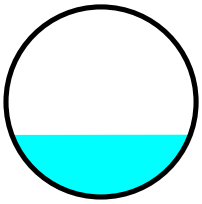
Summary for Reach 1R: 12" Storm Drain

Inflow Area = 1.632 ac, 72.44% Impervious, Inflow Depth = 0.18" for 10-Year Storm event
Inflow = 0.96 cfs @ 12.17 hrs, Volume= 0.024 af
Outflow = 0.90 cfs @ 12.23 hrs, Volume= 0.024 af, Atten= 6%, Lag= 3.6 min

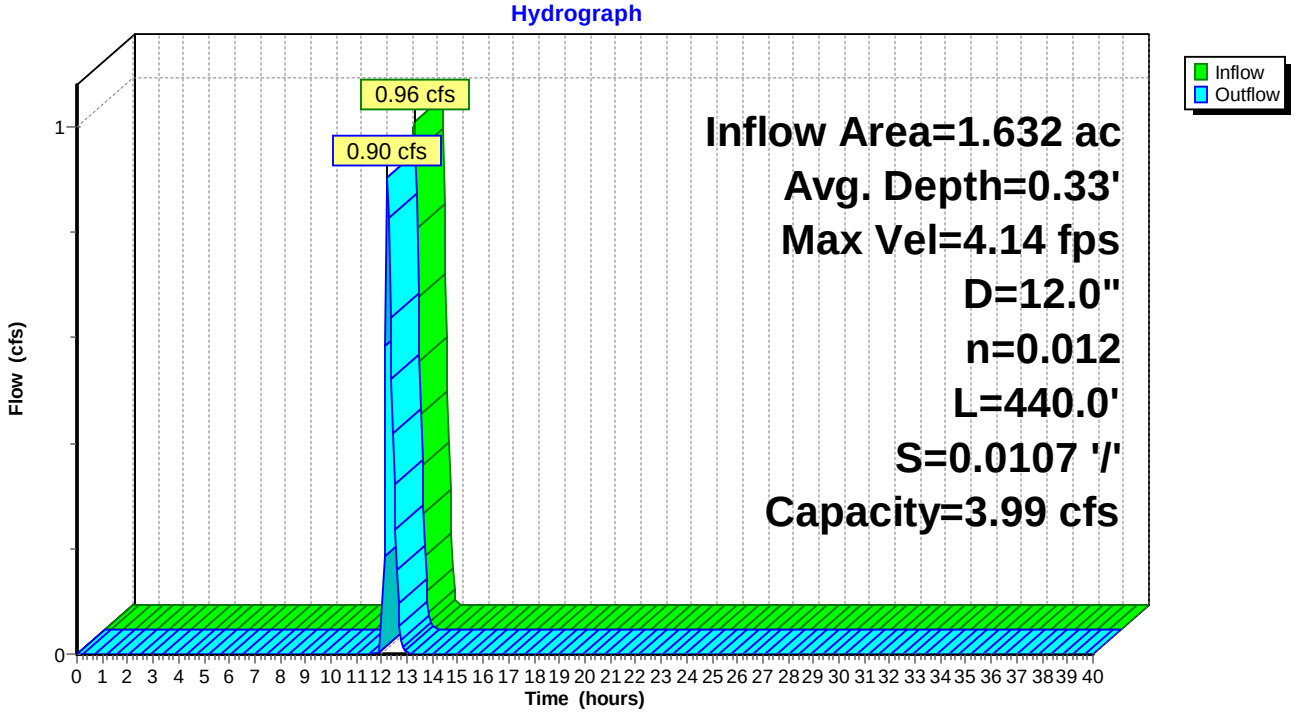
Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.14 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 1.52 fps, Avg. Travel Time= 4.8 min

Peak Storage= 99 cf @ 12.20 hrs, Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.99 cfs

12.0" Diameter Pipe, n= 0.012
Length= 440.0' Slope= 0.0107 '/'
Inlet Invert= 111.20', Outlet Invert= 106.50'



Reach 1R: 12" Storm Drain



Summary for Pond DS-2: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 3.90" for 10-Year Storm event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af, Atten= 70%, Lag= 0.0 min
Discarded = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.86' @ 12.41 hrs Surf.Area= 1,600 sf Storage= 548 cf

Plug-Flow detention time= 10.0 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (790.2 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

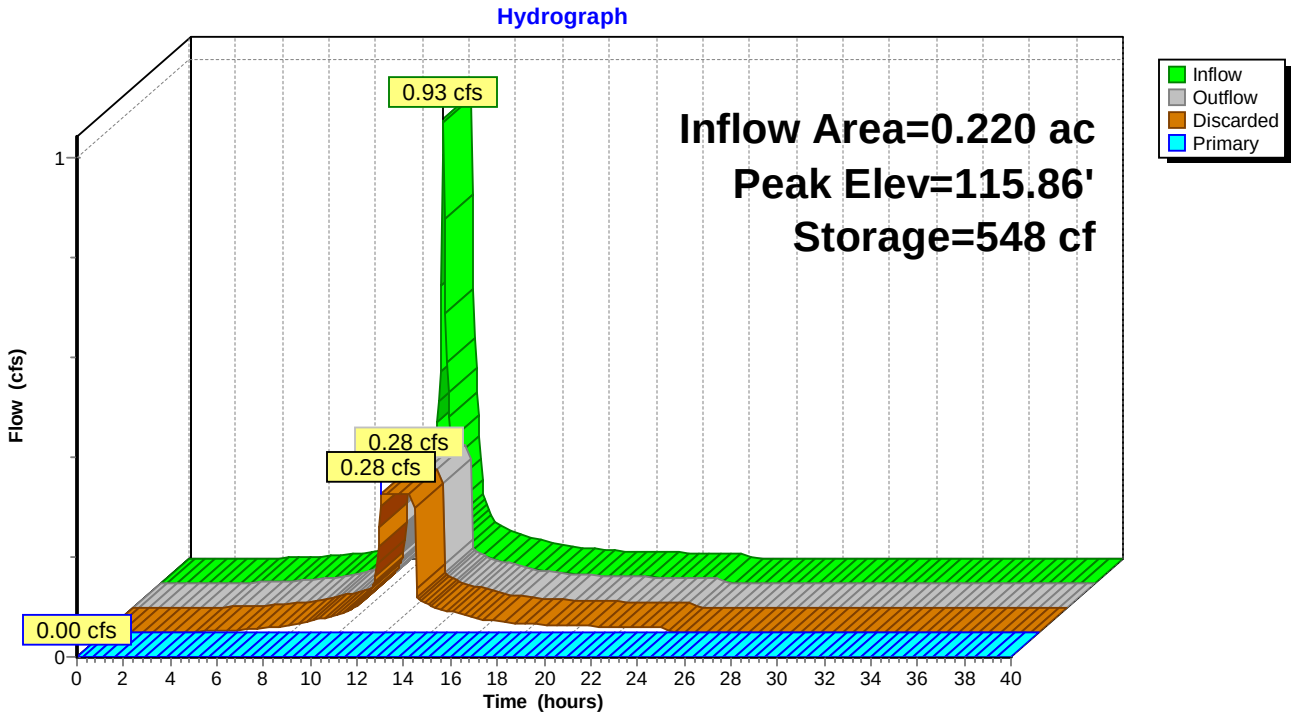
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.85 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS-2: Drip Strip



Summary for Pond DS-3: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 3.90" for 10-Year Storm event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af, Atten= 70%, Lag= 0.0 min
Discarded = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.86' @ 12.41 hrs Surf.Area= 1,600 sf Storage= 548 cf

Plug-Flow detention time= 10.0 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (790.2 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

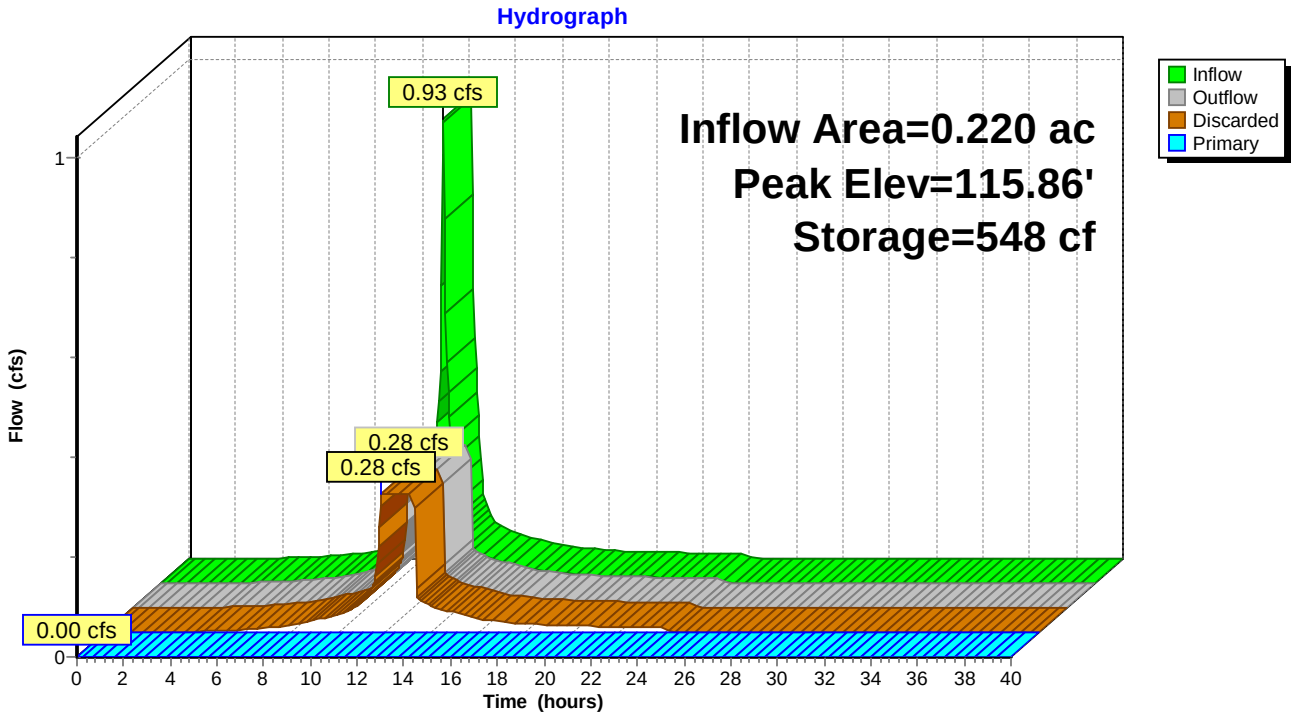
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.85 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS-3: Drip Strip



Summary for Pond DS-4: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 3.90" for 10-Year Storm event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af, Atten= 70%, Lag= 0.0 min
Discarded = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.86' @ 12.41 hrs Surf.Area= 1,600 sf Storage= 548 cf

Plug-Flow detention time= 10.0 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (790.2 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

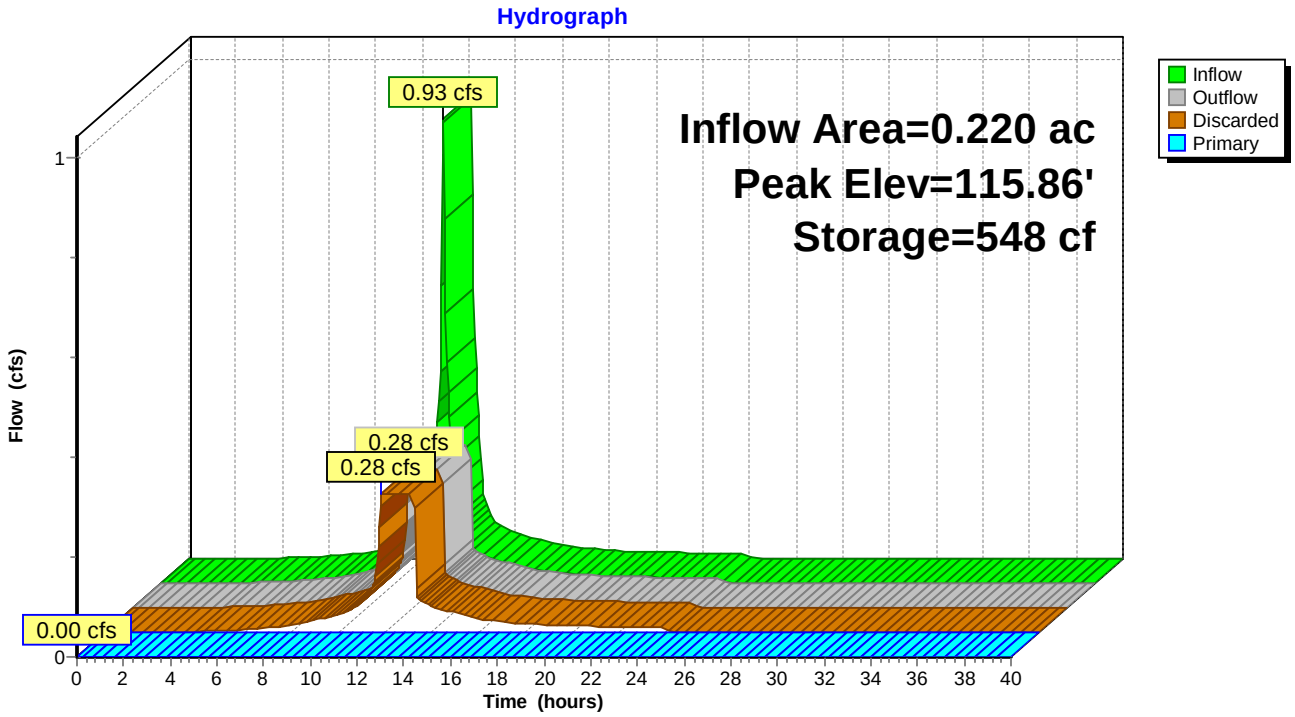
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.85 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS-4: Drip Strip



Summary for Pond DS1: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 3.90" for 10-Year Storm event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af, Atten= 70%, Lag= 0.0 min
Discarded = 0.28 cfs @ 11.85 hrs, Volume= 0.072 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.86' @ 12.41 hrs Surf.Area= 1,600 sf Storage= 548 cf

Plug-Flow detention time= 10.0 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (790.2 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

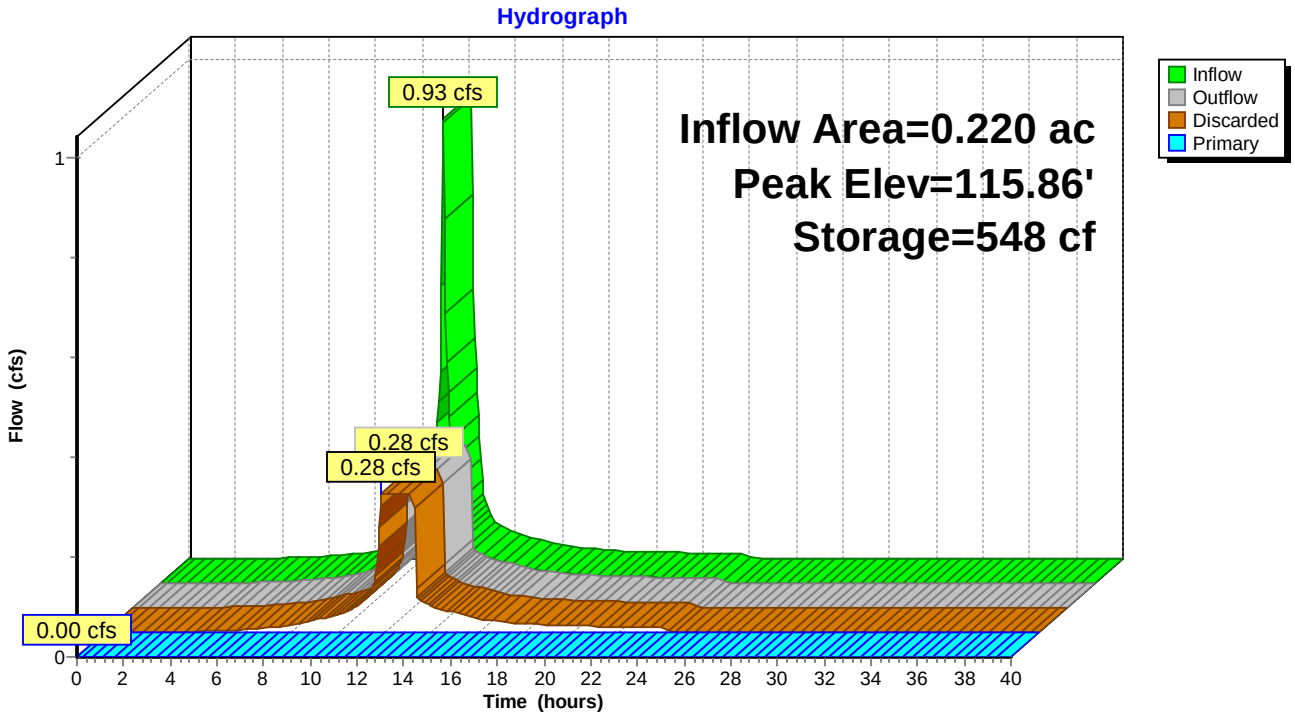
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.85 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DS1: Drip Strip



Summary for Pond IT-1: Infiltration Trench

Inflow Area = 0.360 ac, 71.60% Impervious, Inflow Depth = 2.72" for 10-Year Storm event
Inflow = 1.12 cfs @ 12.09 hrs, Volume= 0.082 af
Outflow = 0.94 cfs @ 12.16 hrs, Volume= 0.082 af, Atten= 16%, Lag= 3.8 min
Discarded = 0.22 cfs @ 11.80 hrs, Volume= 0.065 af
Primary = 0.72 cfs @ 12.16 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 113.02' @ 12.16 hrs Surf.Area= 1,250 sf Storage= 384 cf

Plug-Flow detention time= 5.4 min calculated for 0.082 af (100% of inflow)
Center-of-Mass det. time= 5.4 min (827.1 - 821.7)

Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	2,250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

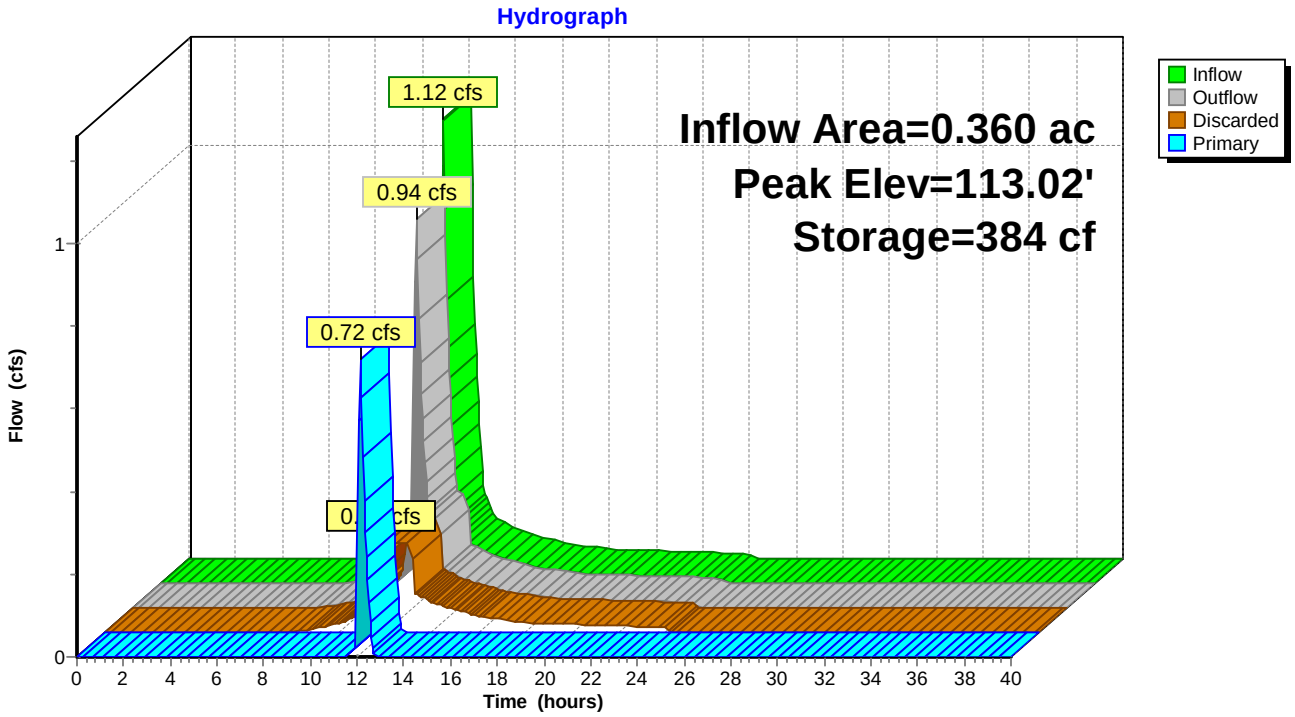
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
112.00	1,250	0.0	0	0
113.00	1,250	30.0	375	375
114.00	1,250	30.0	375	750
115.00	1,250	40.0	500	1,250
116.00	1,250	40.0	500	1,750
117.00	1,250	40.0	500	2,250

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	112.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.22 cfs @ 11.80 hrs HW=112.07' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.71 cfs @ 12.16 hrs HW=113.02' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.71 cfs @ 2.45 fps)

Pond IT-1: Infiltration Trench



Summary for Pond RG-1: Rain Garden

Inflow Area = 0.168 ac, 58.87% Impervious, Inflow Depth = 2.13" for 10-Year Storm event
Inflow = 0.41 cfs @ 12.10 hrs, Volume= 0.030 af
Outflow = 0.30 cfs @ 12.17 hrs, Volume= 0.030 af, Atten= 25%, Lag= 4.7 min
Discarded = 0.08 cfs @ 11.80 hrs, Volume= 0.024 af
Primary = 0.23 cfs @ 12.17 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.45' @ 12.17 hrs Surf.Area= 460 sf Storage= 144 cf

Plug-Flow detention time= 5.5 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 5.5 min (846.0 - 840.5)

Volume	Invert	Avail.Storage	Storage Description
#1	114.50'	1,185 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

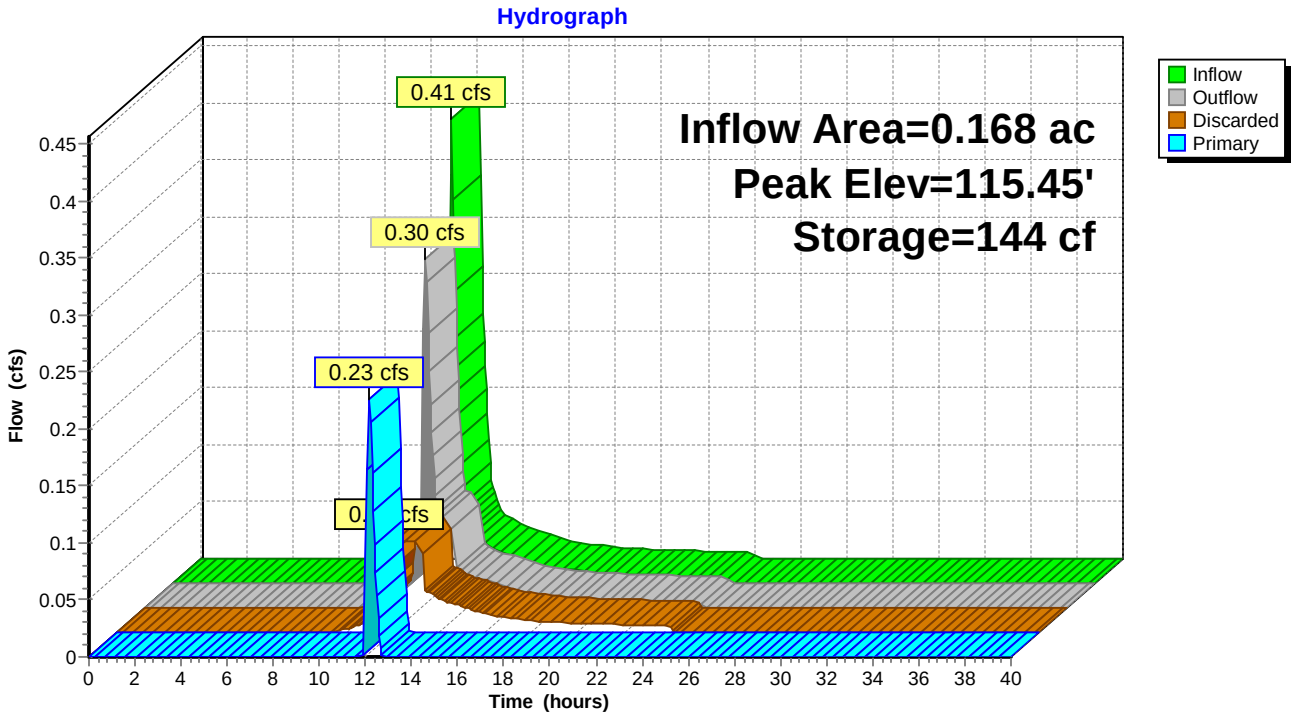
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.50	460	33.0	0	0
115.00	460	33.0	76	76
115.50	460	33.0	76	152
116.00	460	33.0	76	228
116.50	460	100.0	230	458
117.00	460	100.0	230	688
117.50	505	100.0	241	929
118.00	520	100.0	256	1,185

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	**7.500 in/hr Exfiltration over Surface area**
#2	Device 3	115.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	114.50'	**8.0" x 150.0' long Culvert** Ke= 0.500
			Outlet Invert= 111.00' S= 0.0233 '/' Cc= 0.900 n= 0.012
#4	Device 3	117.50'	**10.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.08 cfs @ 11.80 hrs HW=114.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.22 cfs @ 12.17 hrs HW=115.44' (Free Discharge)
└**3=Culvert** (Passes 0.22 cfs of 1.31 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.22 cfs @ 2.50 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond RG-1: Rain Garden



Summary for Pond RG-2: Rain Garden

Inflow Area = 0.223 ac, 57.38% Impervious, Inflow Depth = 2.05" for 10-Year Storm event
Inflow = 0.52 cfs @ 12.10 hrs, Volume= 0.038 af
Outflow = 0.25 cfs @ 12.29 hrs, Volume= 0.038 af, Atten= 51%, Lag= 11.8 min
Discarded = 0.17 cfs @ 11.95 hrs, Volume= 0.036 af
Primary = 0.09 cfs @ 12.29 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.21' @ 12.29 hrs Surf.Area= 960 sf Storage= 223 cf

Plug-Flow detention time= 6.0 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 6.0 min (849.2 - 843.1)

Volume	Invert	Avail.Storage	Storage Description
#1	114.50'	2,174 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

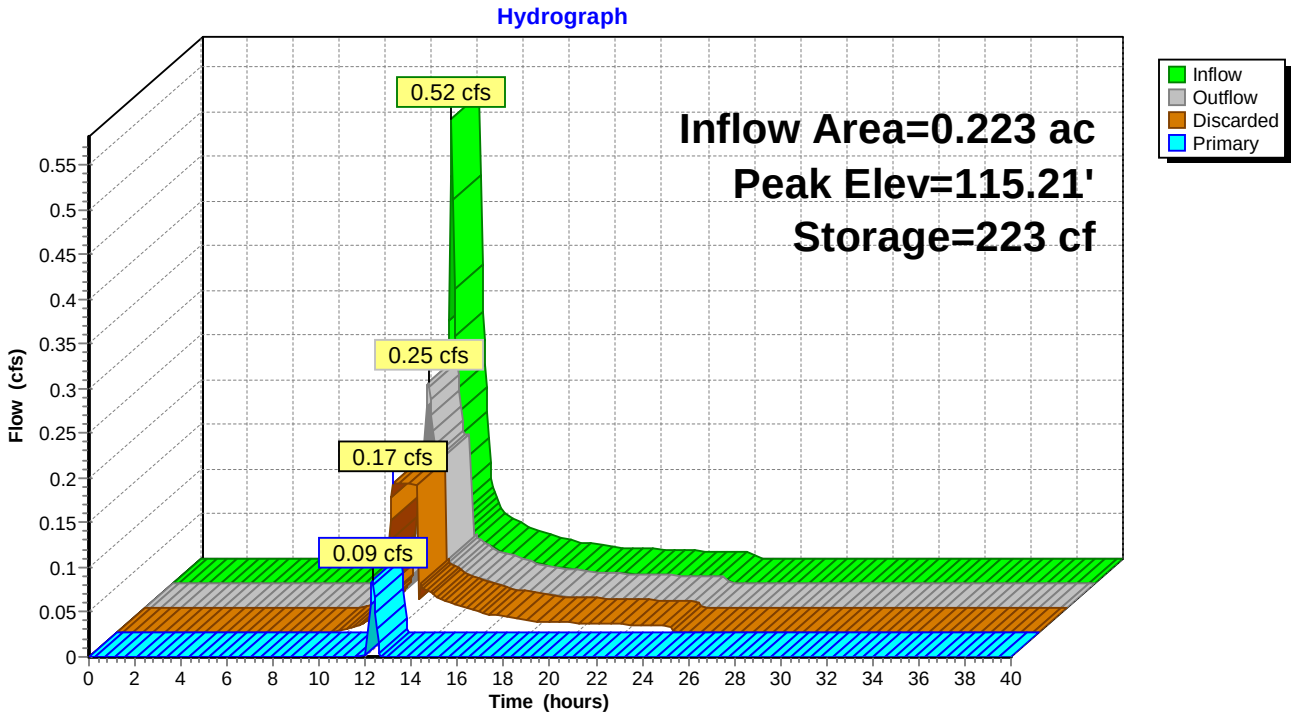
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.50	960	33.0	0	0
115.00	960	33.0	158	158
115.50	960	33.0	158	317
116.00	960	33.0	158	475
116.50	960	33.0	158	634
117.00	960	100.0	480	1,114
117.50	1,040	100.0	500	1,614
118.00	1,200	100.0	560	2,174

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	**7.500 in/hr Exfiltration over Surface area**
#2	Device 3	115.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	114.50'	**8.0" x 150.0' long Culvert** Ke= 0.500
			Outlet Invert= 111.00' S= 0.0233 '/' Cc= 0.900 n= 0.012
#4	Device 3	117.50'	**10.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.17 cfs @ 11.95 hrs HW=114.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.09 cfs @ 12.29 hrs HW=115.20' (Free Discharge)
└**3=Culvert** (Passes 0.09 cfs of 1.02 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.54 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond RG-2: Rain Garden

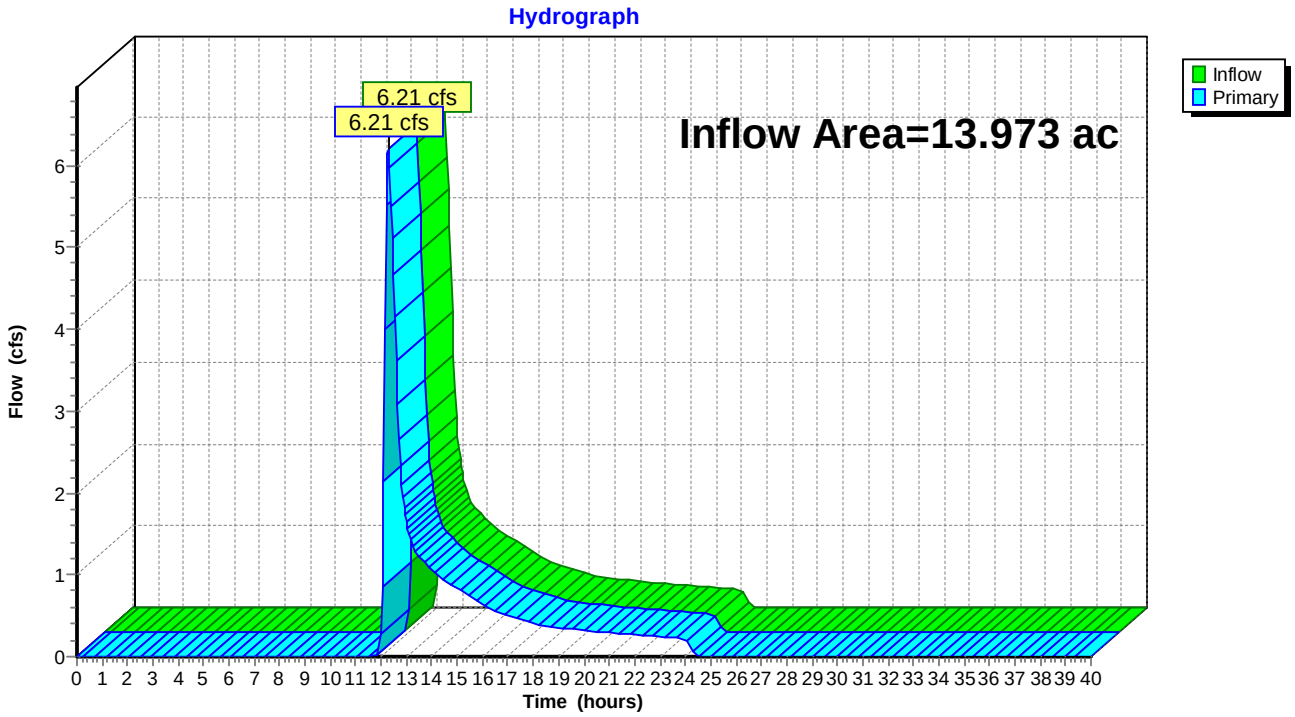


Summary for Link DP#1: Design Point

Inflow Area = 13.973 ac, 25.37% Impervious, Inflow Depth = 0.66" for 10-Year Storm event
Inflow = 6.21 cfs @ 12.27 hrs, Volume= 0.771 af
Primary = 6.21 cfs @ 12.27 hrs, Volume= 0.771 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link DP#1: Design Point



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 201: Existing Site Area Runoff Area=537,572 sf 19.14% Impervious Runoff Depth=1.10"
Tc=15.5 min CN=53 Runoff=9.49 cfs 1.134 af

Subcatchment 210: Area to Infiltration Trench Runoff Area=15,676 sf 71.60% Impervious Runoff Depth=3.43"
Tc=6.0 min CN=81 Runoff=1.41 cfs 0.103 af

Subcatchment 211: Area to Rain Garden 1 Runoff Area=7,303 sf 58.87% Impervious Runoff Depth=2.77"
Tc=6.0 min CN=74 Runoff=0.53 cfs 0.039 af

Subcatchment 212: Area to Rain Garden 2 Runoff Area=9,701 sf 57.38% Impervious Runoff Depth=2.68"
Tc=6.0 min CN=73 Runoff=0.68 cfs 0.050 af

Subcatchment 221: Roof Area to Drip Strip 1 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=4.69"
Tc=6.0 min CN=93 Runoff=1.11 cfs 0.086 af

Subcatchment 222: Roof Area to Drip Strip 2 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=4.69"
Tc=6.0 min CN=93 Runoff=1.11 cfs 0.086 af

Subcatchment 223: Roof Area to Drip Strip 3 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=4.69"
Tc=6.0 min CN=93 Runoff=1.11 cfs 0.086 af

Subcatchment 224: Roof Area to Drip Strip 4 Runoff Area=9,600 sf 79.17% Impervious Runoff Depth=4.69"
Tc=6.0 min CN=93 Runoff=1.11 cfs 0.086 af

Reach 1R: 12" Storm Drain Avg. Depth=0.44' Max Vel=4.82 fps Inflow=1.65 cfs 0.053 af
D=12.0" n=0.012 L=440.0' S=0.0107 '/' Capacity=3.99 cfs Outflow=1.59 cfs 0.053 af

Pond DS-2: Drip Strip Peak Elev=116.10' Storage=689 cf Inflow=1.11 cfs 0.086 af
Discarded=0.28 cfs 0.083 af Primary=0.17 cfs 0.003 af Outflow=0.45 cfs 0.086 af

Pond DS-3: Drip Strip Peak Elev=116.10' Storage=689 cf Inflow=1.11 cfs 0.086 af
Discarded=0.28 cfs 0.083 af Primary=0.17 cfs 0.003 af Outflow=0.45 cfs 0.086 af

Pond DS-4: Drip Strip Peak Elev=116.10' Storage=689 cf Inflow=1.11 cfs 0.086 af
Discarded=0.28 cfs 0.083 af Primary=0.17 cfs 0.003 af Outflow=0.45 cfs 0.086 af

Pond DS1: Drip Strip Peak Elev=116.10' Storage=689 cf Inflow=1.11 cfs 0.086 af
Discarded=0.28 cfs 0.083 af Primary=0.17 cfs 0.003 af Outflow=0.45 cfs 0.086 af

Pond IT-1: Infiltration Trench Peak Elev=113.18' Storage=442 cf Inflow=1.41 cfs 0.103 af
Discarded=0.22 cfs 0.077 af Primary=0.99 cfs 0.026 af Outflow=1.21 cfs 0.103 af

Pond RG-1: Rain Garden Peak Elev=115.73' Storage=187 cf Inflow=0.53 cfs 0.039 af
Discarded=0.08 cfs 0.029 af Primary=0.32 cfs 0.010 af Outflow=0.40 cfs 0.039 af

Pond RG-2: Rain Garden Peak Elev=115.43' Storage=294 cf Inflow=0.68 cfs 0.050 af
Discarded=0.17 cfs 0.043 af Primary=0.21 cfs 0.006 af Outflow=0.38 cfs 0.050 af

Link DP#1: Design Point

Inflow=10.98 cfs 1.187 af
Primary=10.98 cfs 1.187 af

Total Runoff Area = 13.973 ac Runoff Volume = 1.670 af Average Runoff Depth = 1.43"
74.63% Pervious = 10.428 ac 25.37% Impervious = 3.545 ac

Summary for Subcatchment 201: Existing Site Area Uncaptured to Wetland

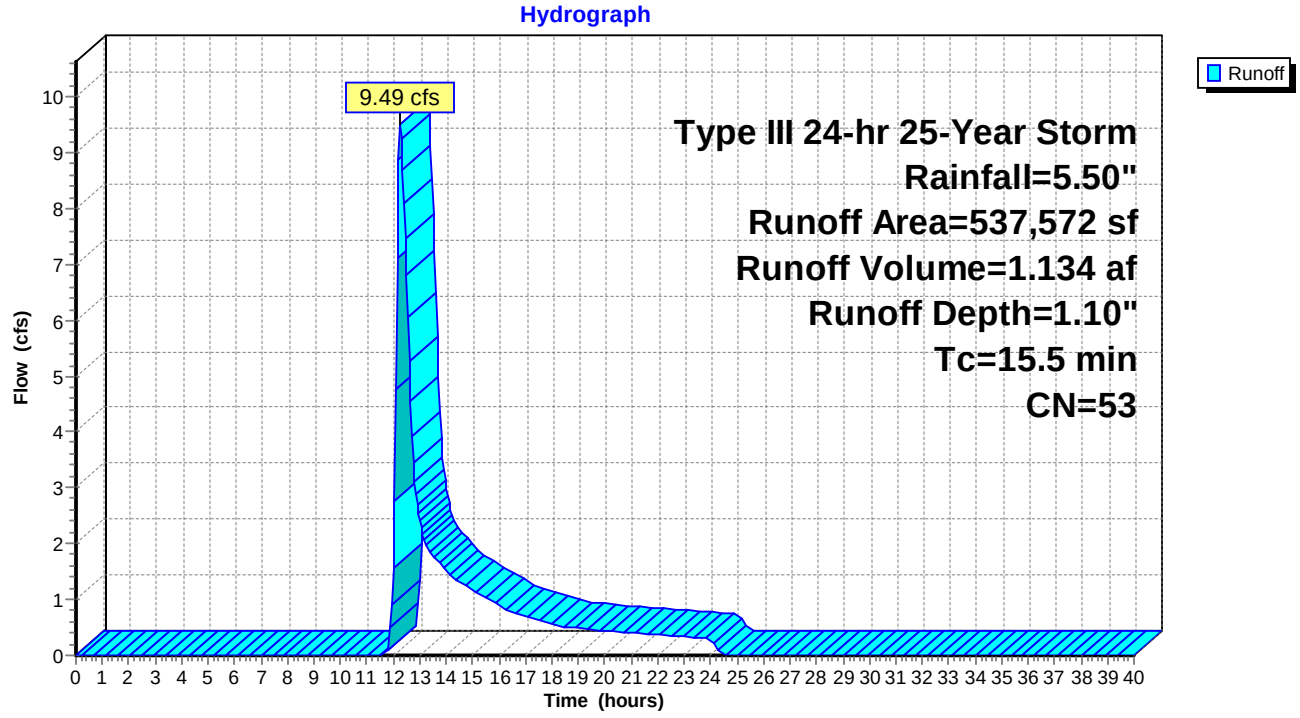
Runoff = 9.49 cfs @ 12.26 hrs, Volume= 1.134 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

	Area (sf)	CN	Description
	365,759	39	>75% Grass cover, Good, HSG A
	17,506	76	Gravel roads, HSG A
	25,724	32	Woods/grass comb., Good, HSG A
	23,810	74	>75% Grass cover, Good, HSG C
	1,860	89	Gravel roads, HSG C
*	92,620	98	Pavement
*	10,293	98	Roofs
	537,572	53	Weighted Average
	434,659		Pervious Area
	102,913		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5					**Direct Entry,**

Subcatchment 201: Existing Site Area Uncaptured to Wetland



Summary for Subcatchment 210: Area to Infiltration Trench

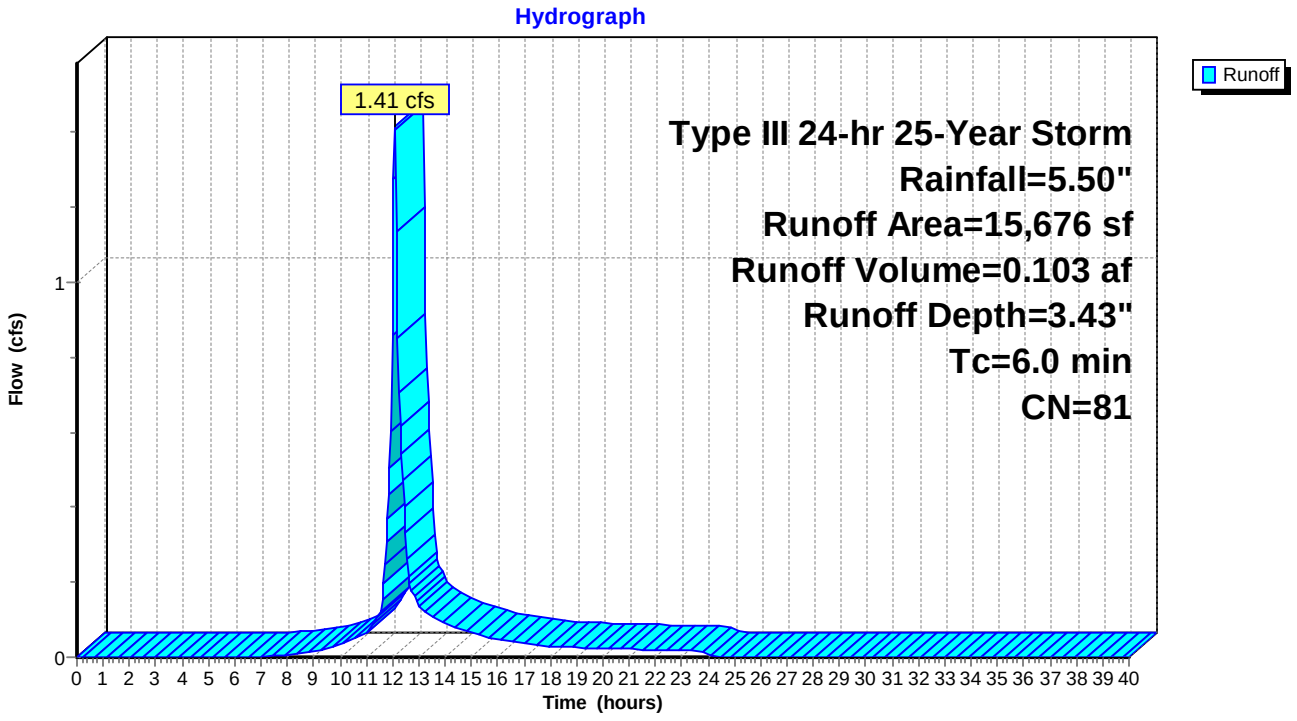
Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.103 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
11,224	98	Paved parking & roofs
4,452	39	>75% Grass cover, Good, HSG A
15,676	81	Weighted Average
4,452		Pervious Area
11,224		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 210: Area to Infiltration Trench



Summary for Subcatchment 211: Area to Rain Garden 1

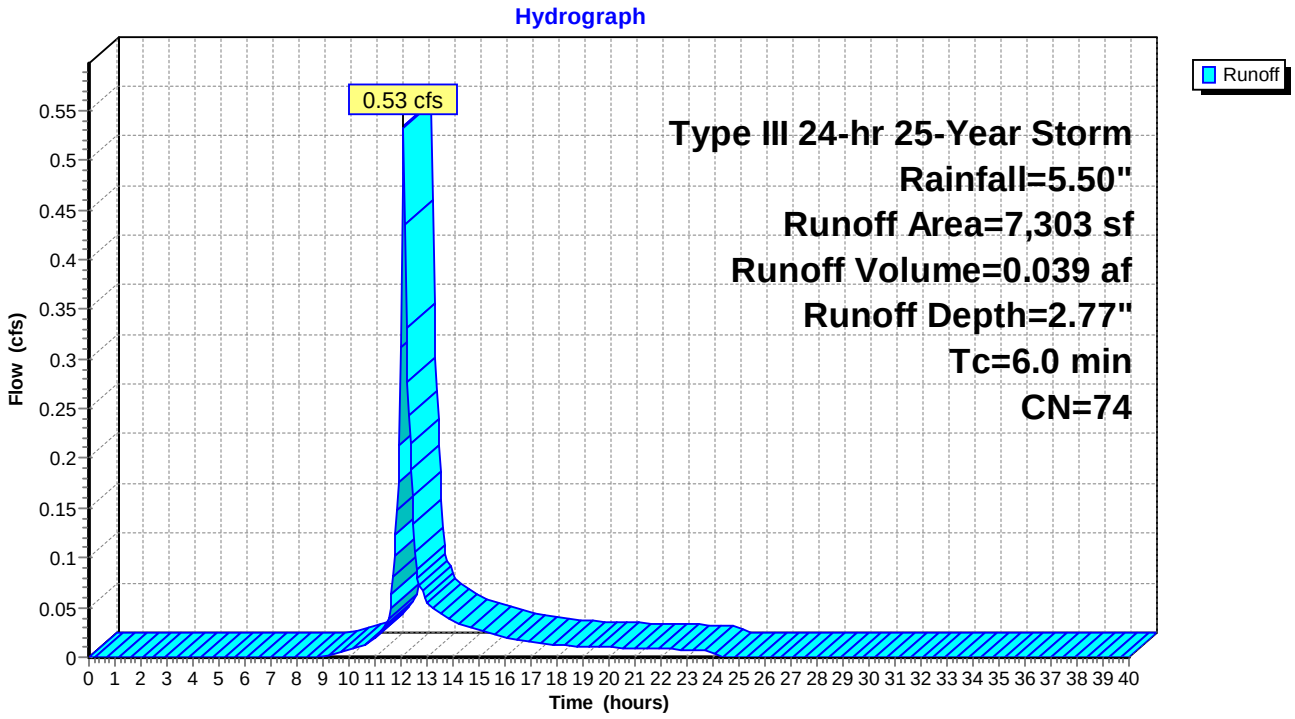
Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
4,299	98	Paved parking & roofs
3,004	39	>75% Grass cover, Good, HSG A
7,303	74	Weighted Average
3,004		Pervious Area
4,299		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 211: Area to Rain Garden 1



Summary for Subcatchment 212: Area to Rain Garden 2

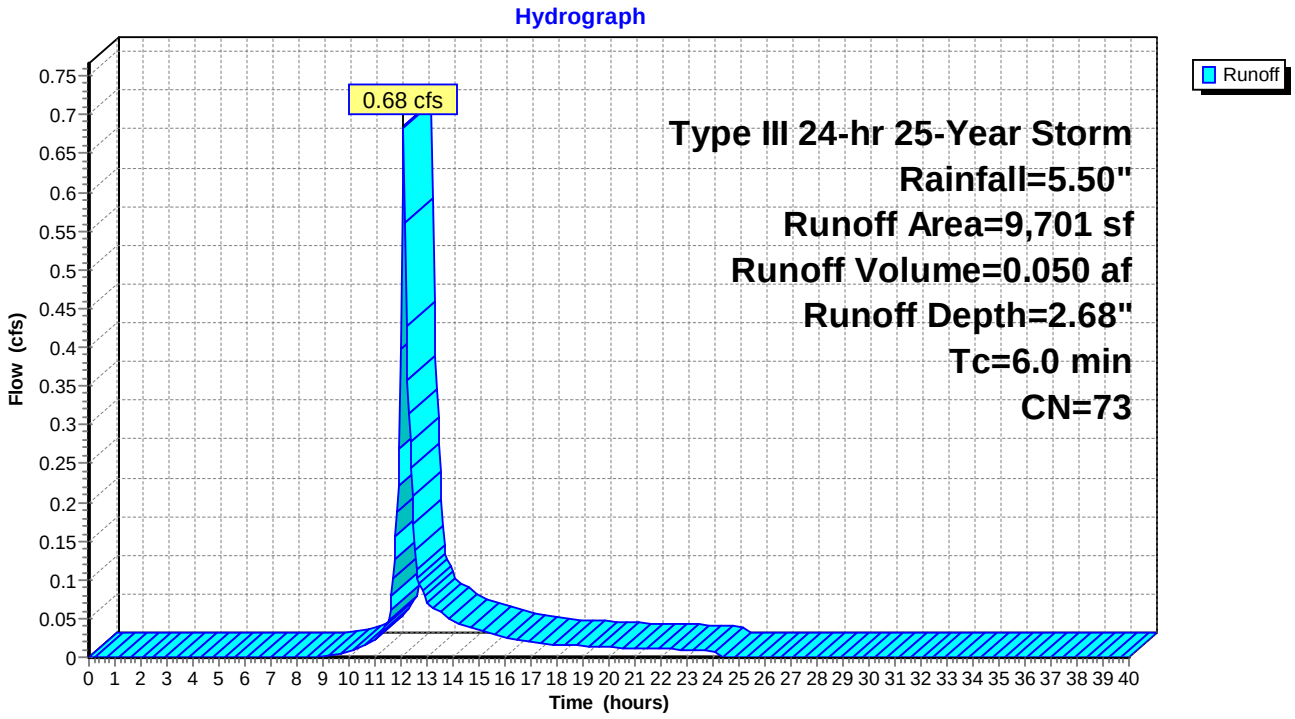
Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
5,566	98	Paved parking & roofs
4,135	39	>75% Grass cover, Good, HSG A
9,701	73	Weighted Average
4,135		Pervious Area
5,566		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 212: Area to Rain Garden 2



Summary for Subcatchment 221: Roof Area to Drip Strip 1

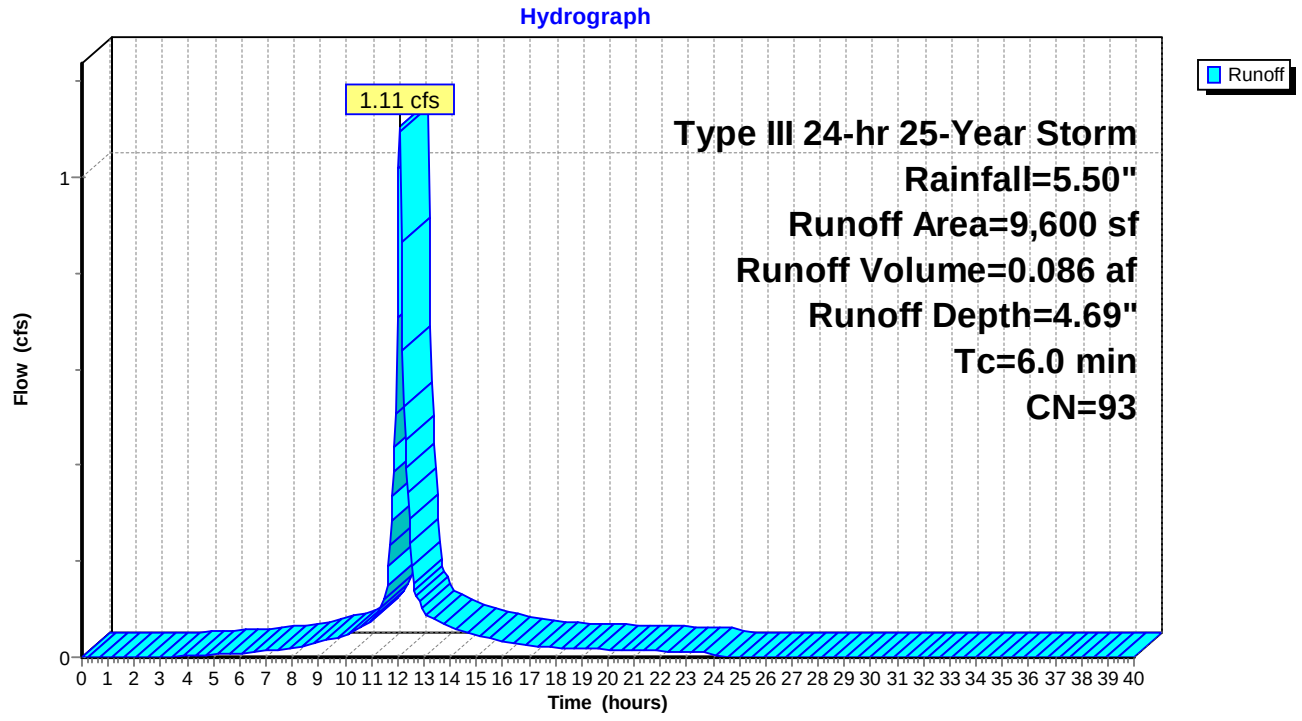
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 221: Roof Area to Drip Strip 1



Summary for Subcatchment 222: Roof Area to Drip Strip 2

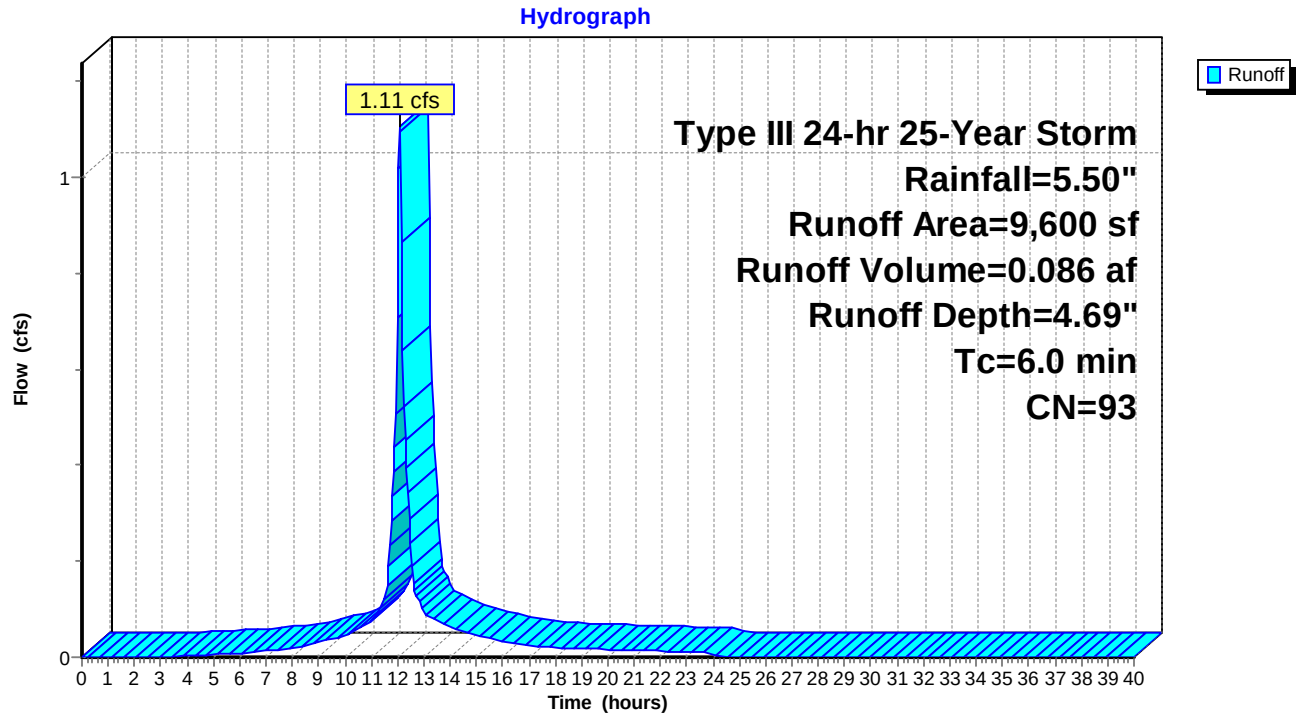
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 222: Roof Area to Drip Strip 2



Summary for Subcatchment 223: Roof Area to Drip Strip 3

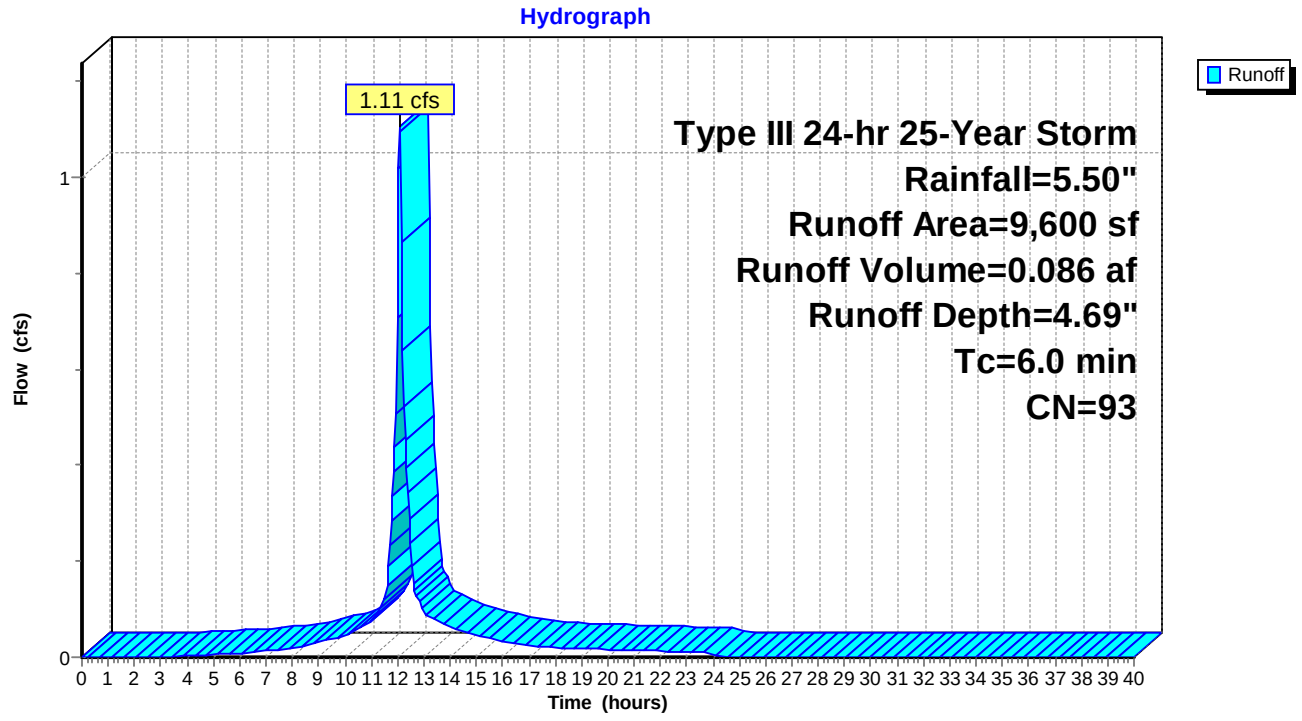
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 223: Roof Area to Drip Strip 3



Summary for Subcatchment 224: Roof Area to Drip Strip 4

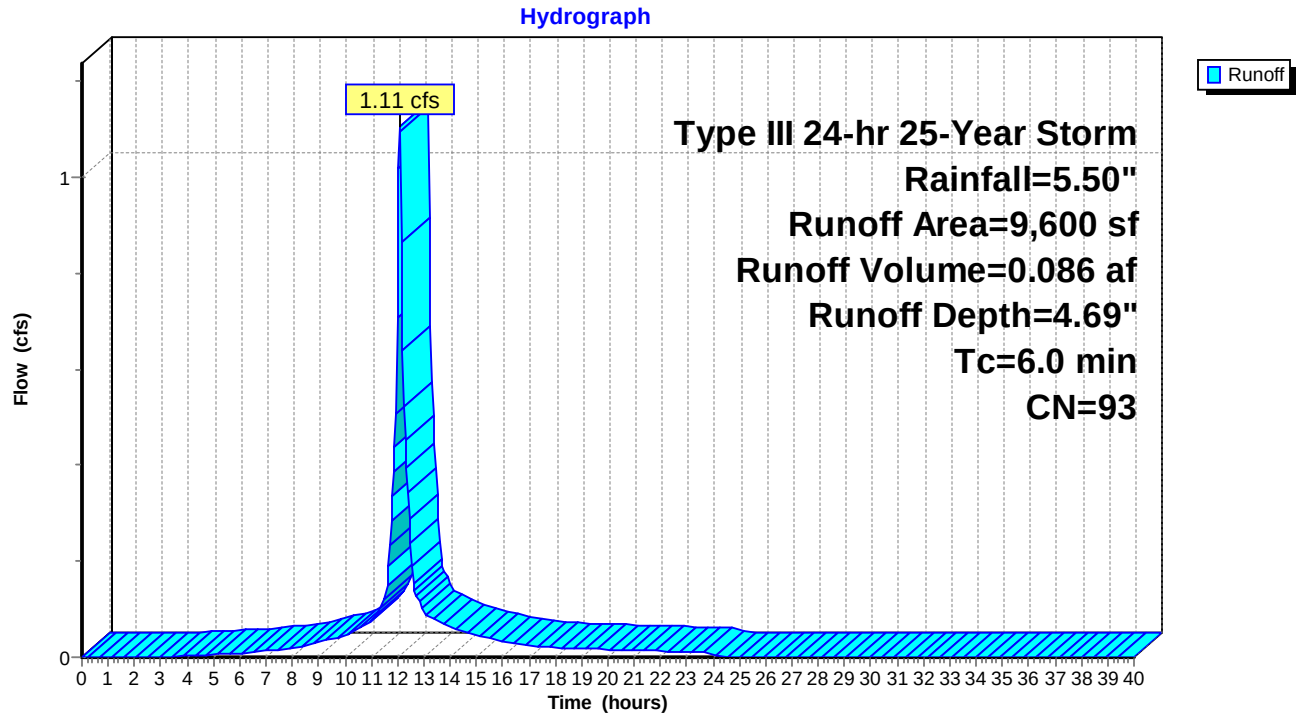
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

	Area (sf)	CN	Description
*	7,600	98	Roofs
*	2,000	76	Drip stone, HSG A
	9,600	93	Weighted Average
	2,000		Pervious Area
	7,600		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum Tc**

Subcatchment 224: Roof Area to Drip Strip 4



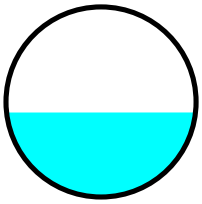
Summary for Reach 1R: 12" Storm Drain

Inflow Area = 1.632 ac, 72.44% Impervious, Inflow Depth = 0.39" for 25-Year Storm event
Inflow = 1.65 cfs @ 12.28 hrs, Volume= 0.053 af
Outflow = 1.59 cfs @ 12.33 hrs, Volume= 0.053 af, Atten= 3%, Lag= 2.7 min

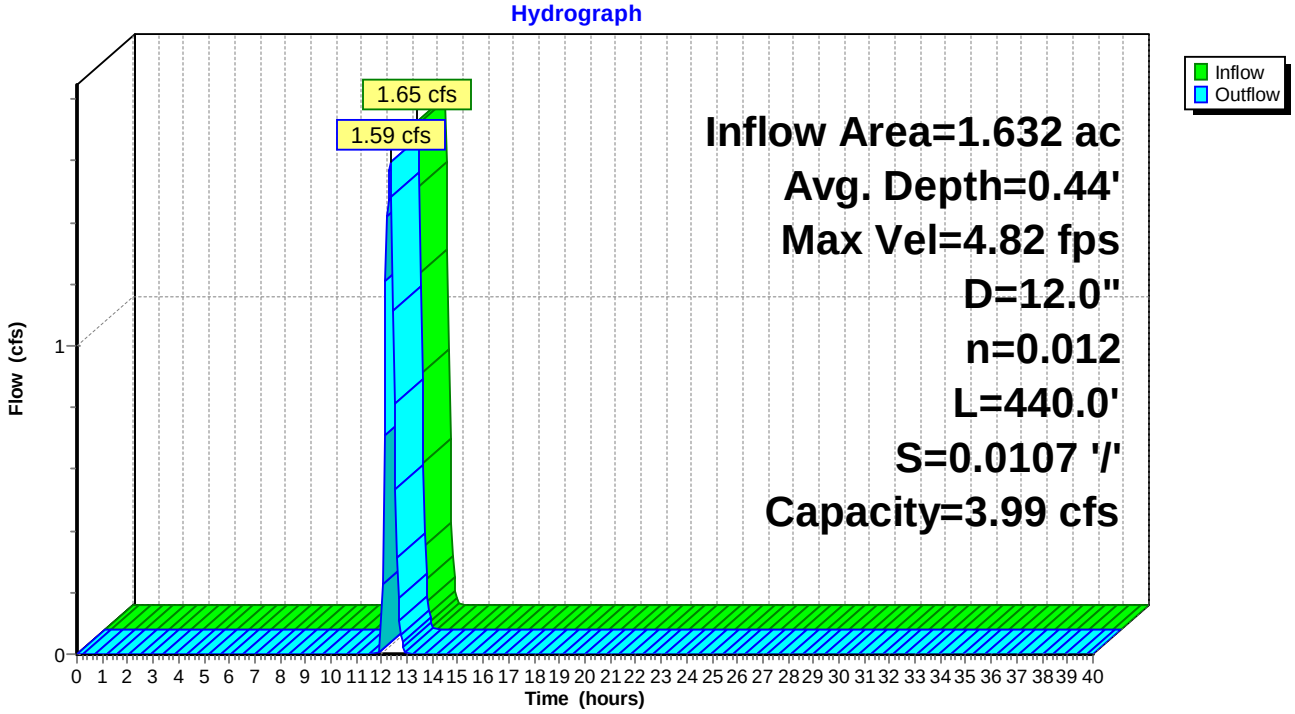
Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 4.1 min

Peak Storage= 149 cf @ 12.30 hrs, Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.99 cfs

12.0" Diameter Pipe, n= 0.012
Length= 440.0' Slope= 0.0107 '/'
Inlet Invert= 111.20', Outlet Invert= 106.50'



Reach 1R: 12" Storm Drain



Summary for Pond DS-2: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 4.69" for 25-Year Storm event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 0.45 cfs @ 12.32 hrs, Volume= 0.086 af, Atten= 60%, Lag= 13.8 min
Discarded = 0.28 cfs @ 11.80 hrs, Volume= 0.083 af
Primary = 0.17 cfs @ 12.32 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 116.10' @ 12.32 hrs Surf.Area= 1,600 sf Storage= 689 cf

Plug-Flow detention time= 11.9 min calculated for 0.086 af (100% of inflow)
Center-of-Mass det. time= 11.9 min (787.4 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

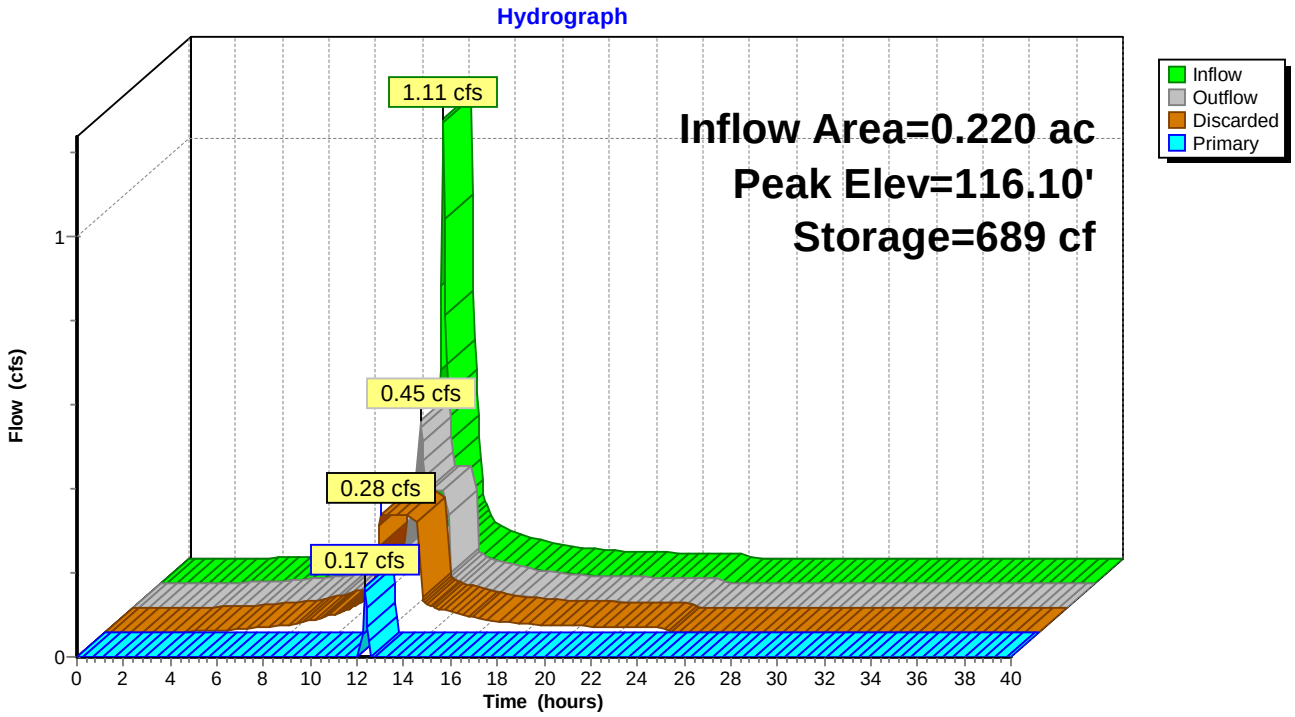
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.80 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.16 cfs @ 12.32 hrs HW=116.10' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.03 fps)

Pond DS-2: Drip Strip



Summary for Pond DS-3: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 4.69" for 25-Year Storm event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 0.45 cfs @ 12.32 hrs, Volume= 0.086 af, Atten= 60%, Lag= 13.8 min
Discarded = 0.28 cfs @ 11.80 hrs, Volume= 0.083 af
Primary = 0.17 cfs @ 12.32 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 116.10' @ 12.32 hrs Surf.Area= 1,600 sf Storage= 689 cf

Plug-Flow detention time= 11.9 min calculated for 0.086 af (100% of inflow)
Center-of-Mass det. time= 11.9 min (787.4 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

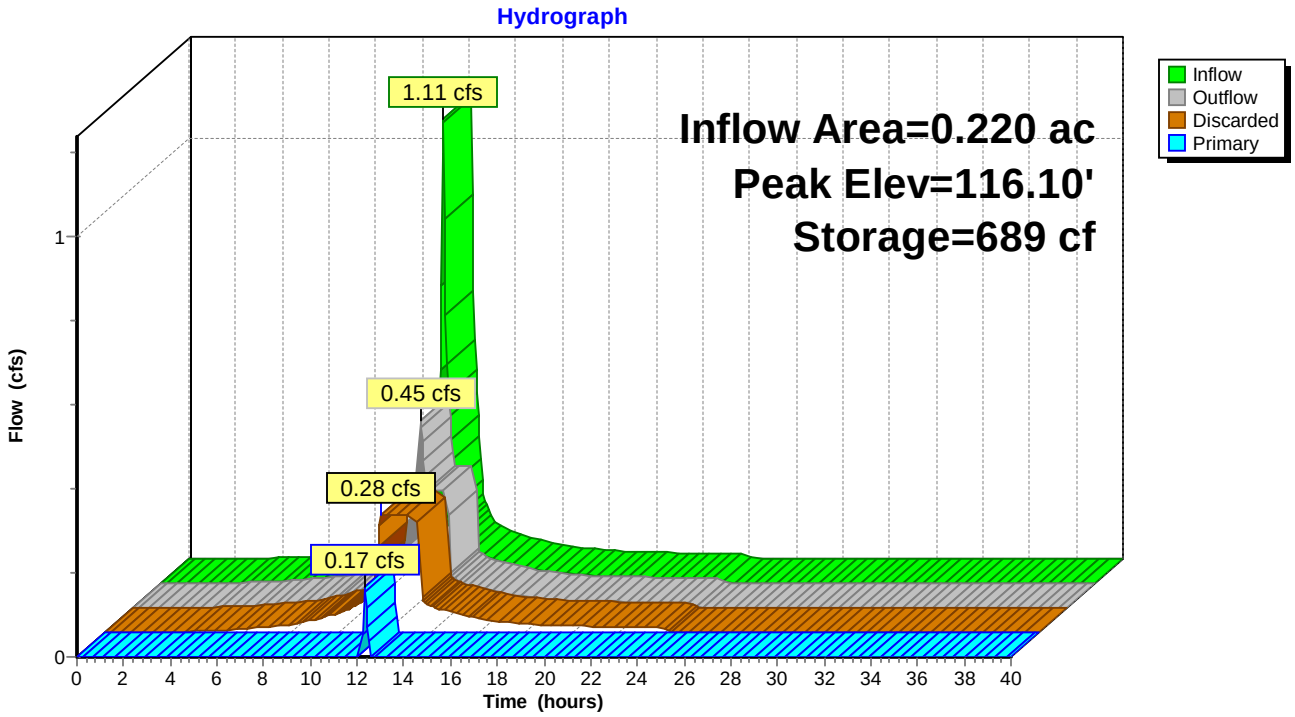
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.80 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.16 cfs @ 12.32 hrs HW=116.10' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.03 fps)

Pond DS-3: Drip Strip



Summary for Pond DS-4: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 4.69" for 25-Year Storm event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 0.45 cfs @ 12.32 hrs, Volume= 0.086 af, Atten= 60%, Lag= 13.8 min
Discarded = 0.28 cfs @ 11.80 hrs, Volume= 0.083 af
Primary = 0.17 cfs @ 12.32 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 116.10' @ 12.32 hrs Surf.Area= 1,600 sf Storage= 689 cf

Plug-Flow detention time= 11.9 min calculated for 0.086 af (100% of inflow)
Center-of-Mass det. time= 11.9 min (787.4 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

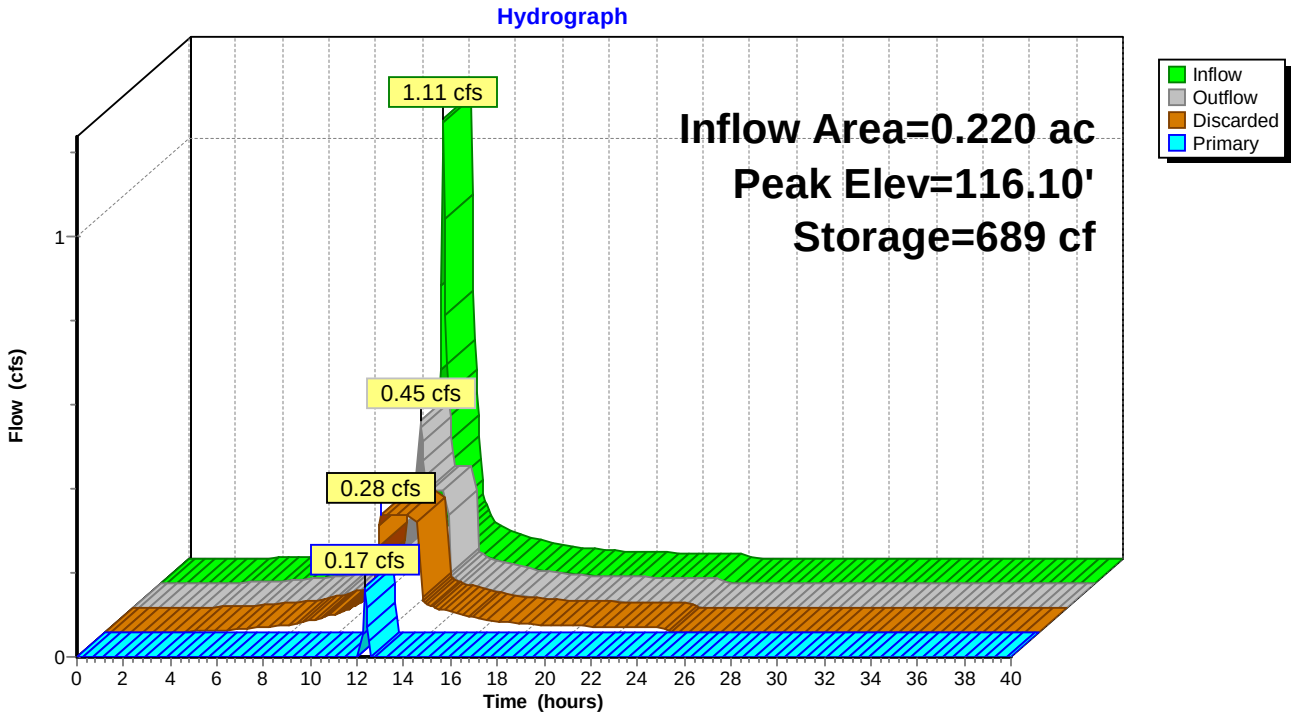
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.80 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.16 cfs @ 12.32 hrs HW=116.10' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.03 fps)

Pond DS-4: Drip Strip



Summary for Pond DS1: Drip Strip

Inflow Area = 0.220 ac, 79.17% Impervious, Inflow Depth = 4.69" for 25-Year Storm event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 0.45 cfs @ 12.32 hrs, Volume= 0.086 af, Atten= 60%, Lag= 13.8 min
Discarded = 0.28 cfs @ 11.80 hrs, Volume= 0.083 af
Primary = 0.17 cfs @ 12.32 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 116.10' @ 12.32 hrs Surf.Area= 1,600 sf Storage= 689 cf

Plug-Flow detention time= 11.9 min calculated for 0.086 af (100% of inflow)
Center-of-Mass det. time= 11.9 min (787.4 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1	115.00'	3,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

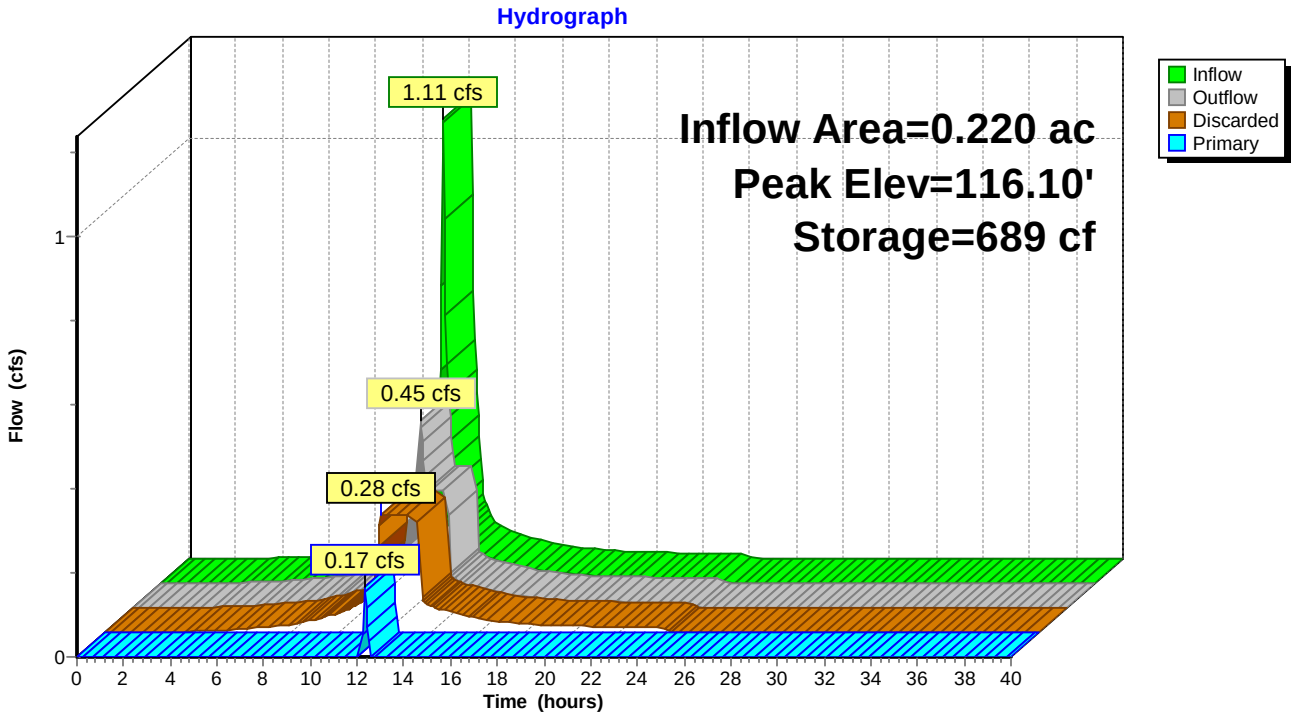
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.00	1,600	0.0	0	0
116.00	1,600	40.0	640	640
117.00	1,600	30.0	480	1,120
118.00	1,600	40.0	640	1,760
119.00	1,600	40.0	640	2,400
120.00	1,600	40.0	640	3,040

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	116.00'	**6.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.28 cfs @ 11.80 hrs HW=115.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.16 cfs @ 12.32 hrs HW=116.10' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.03 fps)

Pond DS1: Drip Strip



Summary for Pond IT-1: Infiltration Trench

Inflow Area = 0.360 ac, 71.60% Impervious, Inflow Depth = 3.43" for 25-Year Storm event
Inflow = 1.41 cfs @ 12.09 hrs, Volume= 0.103 af
Outflow = 1.21 cfs @ 12.14 hrs, Volume= 0.103 af, Atten= 15%, Lag= 3.1 min
Discarded = 0.22 cfs @ 11.70 hrs, Volume= 0.077 af
Primary = 0.99 cfs @ 12.14 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 113.18' @ 12.14 hrs Surf.Area= 1,250 sf Storage= 442 cf

Plug-Flow detention time= 5.4 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 5.3 min (820.4 - 815.1)

Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	2,250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

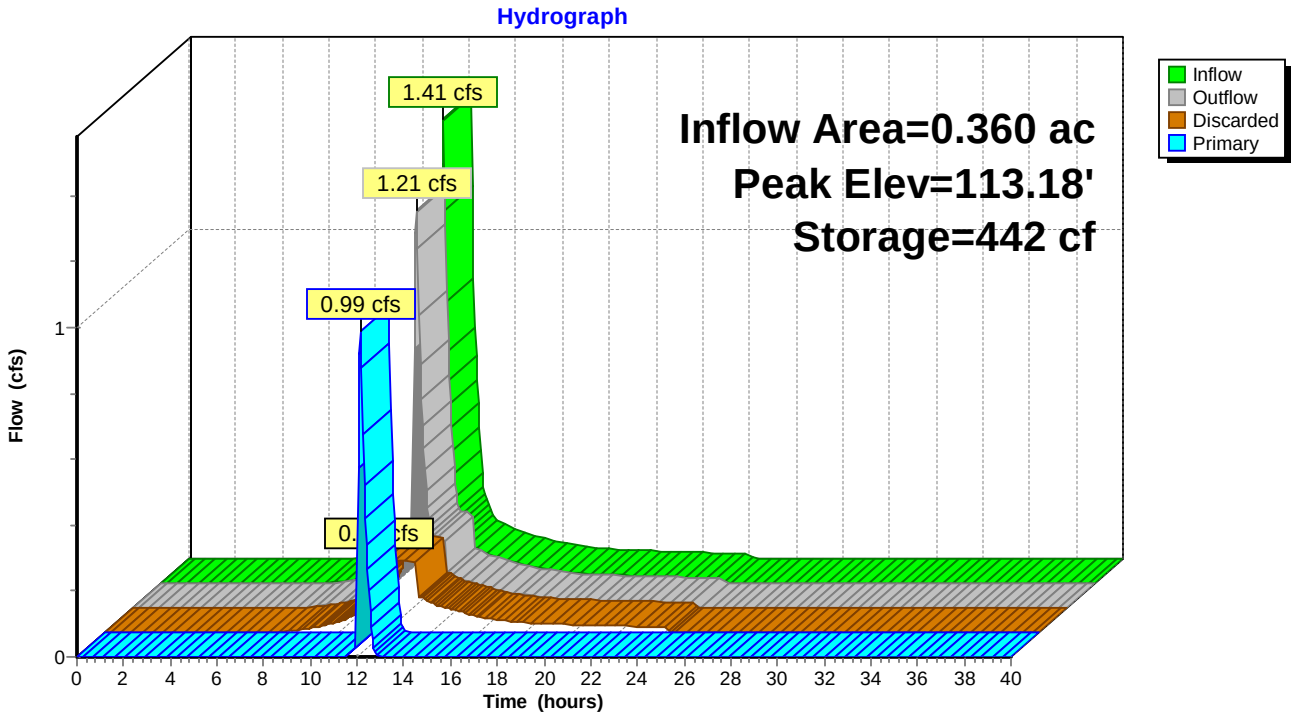
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
112.00	1,250	0.0	0	0
113.00	1,250	30.0	375	375
114.00	1,250	30.0	375	750
115.00	1,250	40.0	500	1,250
116.00	1,250	40.0	500	1,750
117.00	1,250	40.0	500	2,250

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**7.500 in/hr Exfiltration over Surface area**
#2	Primary	112.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.22 cfs @ 11.70 hrs HW=112.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.98 cfs @ 12.14 hrs HW=113.17' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.98 cfs @ 2.80 fps)

Pond IT-1: Infiltration Trench



Summary for Pond RG-1: Rain Garden

Inflow Area = 0.168 ac, 58.87% Impervious, Inflow Depth = 2.77" for 25-Year Storm event
Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.039 af
Outflow = 0.40 cfs @ 12.17 hrs, Volume= 0.039 af, Atten= 26%, Lag= 4.7 min
Discarded = 0.08 cfs @ 11.75 hrs, Volume= 0.029 af
Primary = 0.32 cfs @ 12.17 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.73' @ 12.17 hrs Surf.Area= 460 sf Storage= 187 cf

Plug-Flow detention time= 5.7 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 5.7 min (838.5 - 832.8)

Volume	Invert	Avail.Storage	Storage Description
#1	114.50'	1,185 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

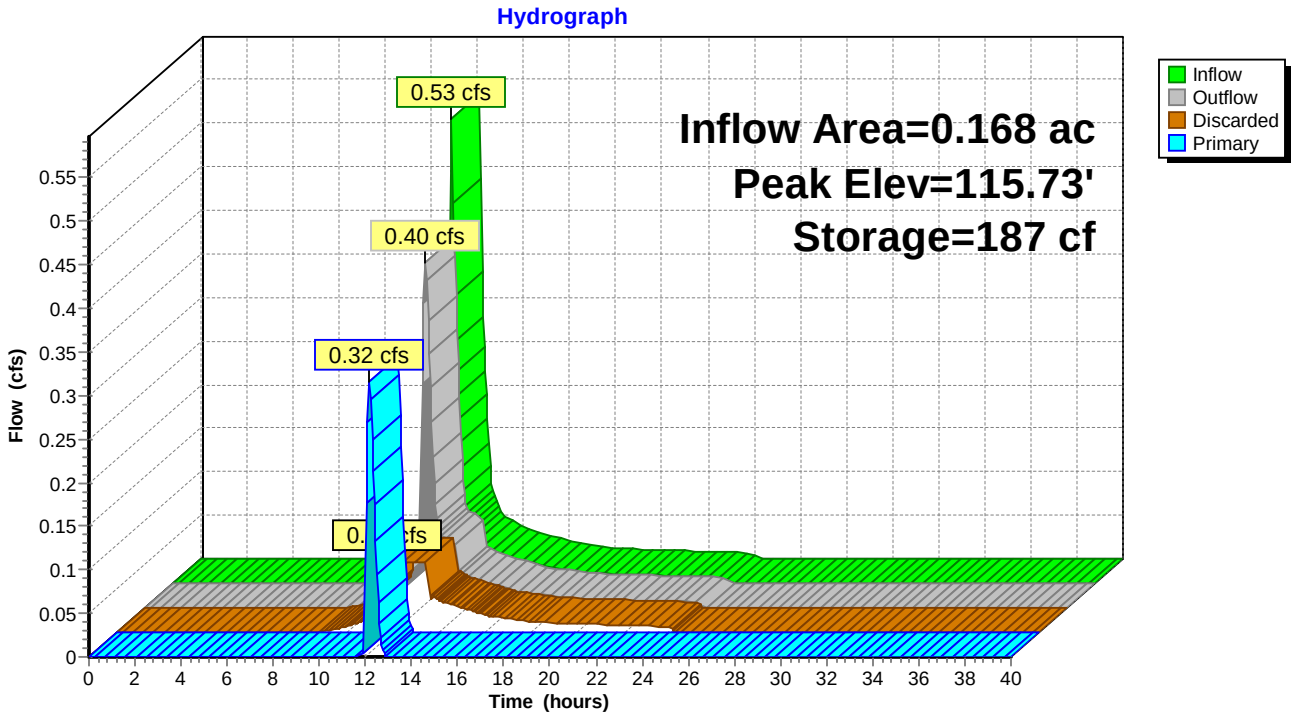
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.50	460	33.0	0	0
115.00	460	33.0	76	76
115.50	460	33.0	76	152
116.00	460	33.0	76	228
116.50	460	100.0	230	458
117.00	460	100.0	230	688
117.50	505	100.0	241	929
118.00	520	100.0	256	1,185

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	**7.500 in/hr Exfiltration over Surface area**
#2	Device 3	115.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	114.50'	**8.0" x 150.0' long Culvert** Ke= 0.500
			Outlet Invert= 111.00' S= 0.0233 '/' Cc= 0.900 n= 0.012
#4	Device 3	117.50'	**10.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.08 cfs @ 11.75 hrs HW=114.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.31 cfs @ 12.17 hrs HW=115.71' (Free Discharge)
└**3=Culvert** (Passes 0.31 cfs of 1.57 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.31 cfs @ 3.55 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond RG-1: Rain Garden



Summary for Pond RG-2: Rain Garden

Inflow Area = 0.223 ac, 57.38% Impervious, Inflow Depth = 2.68" for 25-Year Storm event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af
Outflow = 0.38 cfs @ 12.24 hrs, Volume= 0.050 af, Atten= 44%, Lag= 8.6 min
Discarded = 0.17 cfs @ 11.85 hrs, Volume= 0.043 af
Primary = 0.21 cfs @ 12.24 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 115.43' @ 12.24 hrs Surf.Area= 960 sf Storage= 294 cf

Plug-Flow detention time= 6.4 min calculated for 0.050 af (100% of inflow)
Center-of-Mass det. time= 6.4 min (841.7 - 835.3)

Volume	Invert	Avail.Storage	Storage Description
#1	114.50'	2,174 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

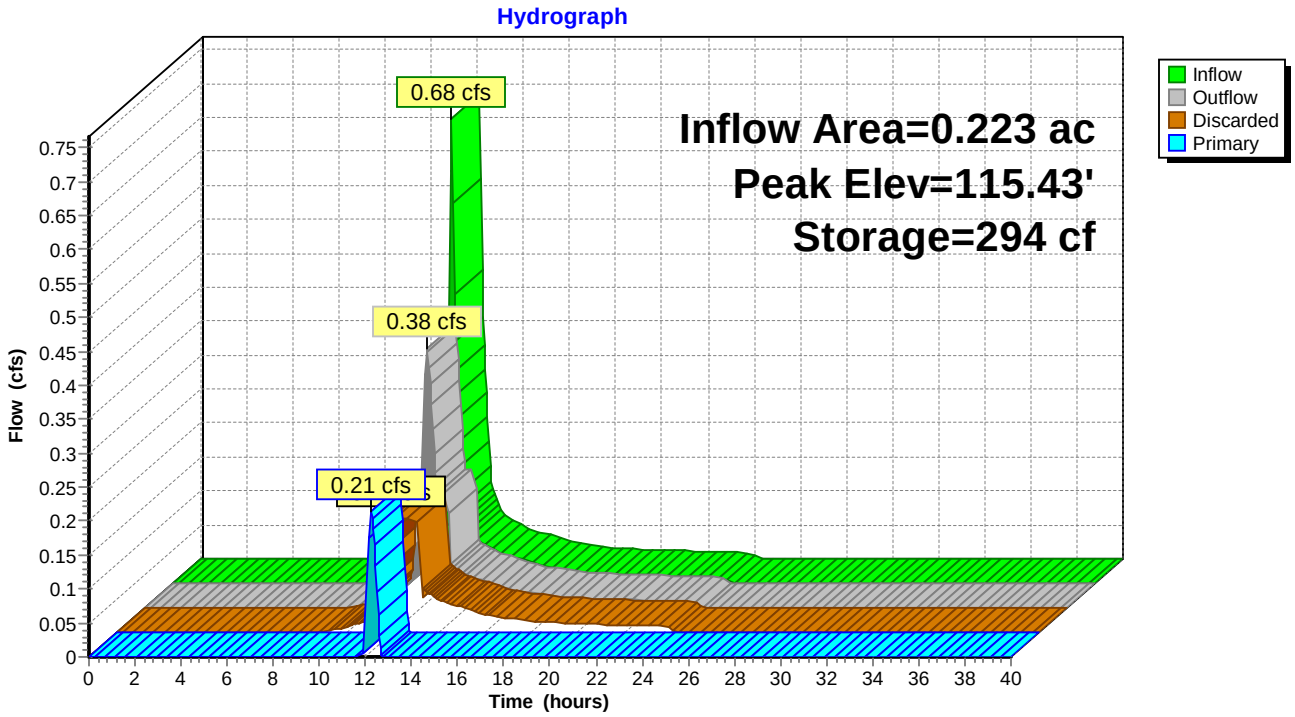
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.50	960	33.0	0	0
115.00	960	33.0	158	158
115.50	960	33.0	158	317
116.00	960	33.0	158	475
116.50	960	33.0	158	634
117.00	960	100.0	480	1,114
117.50	1,040	100.0	500	1,614
118.00	1,200	100.0	560	2,174

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.50'	**7.500 in/hr Exfiltration over Surface area**
#2	Device 3	115.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	114.50'	**8.0" x 150.0' long Culvert** Ke= 0.500
			Outlet Invert= 111.00' S= 0.0233 '/' Cc= 0.900 n= 0.012
#4	Device 3	117.50'	**10.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600

Discarded OutFlow Max=0.17 cfs @ 11.85 hrs HW=114.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.21 cfs @ 12.24 hrs HW=115.42' (Free Discharge)
└**3=Culvert** (Passes 0.21 cfs of 1.29 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.21 cfs @ 2.44 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond RG-2: Rain Garden

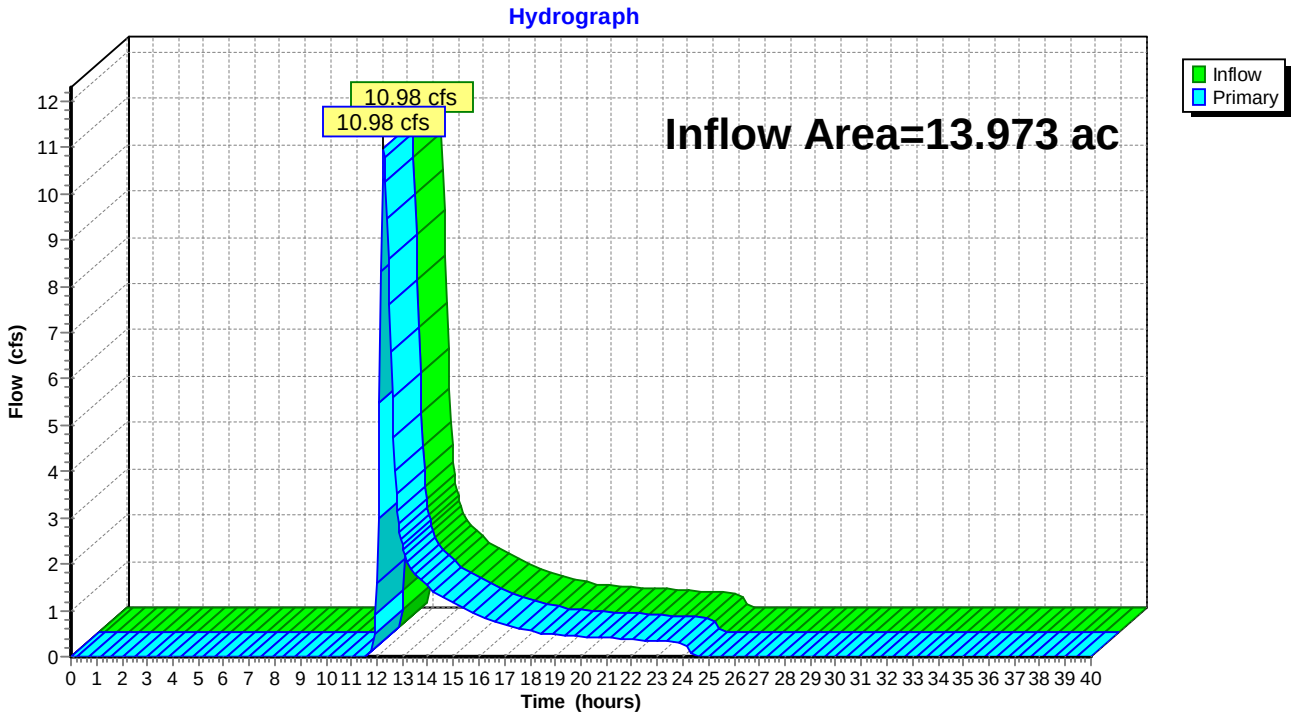


Summary for Link DP#1: Design Point

Inflow Area = 13.973 ac, 25.37% Impervious, Inflow Depth = 1.02" for 25-Year Storm event
Inflow = 10.98 cfs @ 12.27 hrs, Volume= 1.187 af
Primary = 10.98 cfs @ 12.27 hrs, Volume= 1.187 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link DP#1: Design Point



ATTACHMENT D

Stormwater Operations and Maintenance Manual

OPERATIONS AND MAINTENANCE MANUAL FOR STORMWATER MANAGEMENT AND RELATED STORMWATER FACILITIES

MOTHERHOUSE SENIOR HOUSING
605 STEVENS AVENUE
PORTLAND, MAINE

PREPARED FOR:

MOTHERHOUSE ASSOCIATES LP
100 COMMERCIAL STREET
SUITE 414
PORTLAND ME 04101

PREPARED BY

FAY, SPOFFORD & THORNDIKE, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, MAINE 04106
(207) 775-1121

JUNE 2015

TABLE OF CONTENTS

I. INTRODUCTION

Relatively complex stormwater management facilities are commonly installed in development projects including, commercial facilities, and many other developments. The complexity and goals of these systems vary with the nature of the receiving water, as well as the type of development. Runoff from developed areas of the project, including rooftops, paved, or lawn areas typically contain materials that can impact the receiving waters. Source control and the installation of wet ponds, infiltration galleries, and proprietary water quality units such as Filterra® and StormTreat™ units are often combined with pretreatment measures or vegetated buffer strips and other best management practices are also among the options that can significantly reduce the non-point pollution discharge from the developed area. These measures are particularly important to projects in the watersheds of sensitive water bodies, or projects with potential impacts to groundwater. With the increased cost of land and development, there is an increased tendency to construct portions of the stormwater management systems underground.

The effectiveness of water quality management provisions and other components of the stormwater management system are dependent on their design, upkeep, and maintenance to assure they meet their intended function over an extended period of years. It is critical that the stormwater management facilities are regularly inspected, and that maintenance is performed on an as-needed basis. It must also be recognized that the effectiveness of these facilities, and their maintenance requirements, are related to the stormwater drainage facilities that collect and transport the flow to the ponds, infiltration galleries, and other treatment measures. Thus, maintenance should be directed to the total system, not just the pond or primary stormwater management facility.

The purpose of this document is to define, in detail, the inspection and maintenance requirements deemed necessary to assure that the stormwater management facilities function as intended when they were designed. Subsequent sections identify individual maintenance items; give a brief commentary of the function and need for the item, a description of the work required, and a suggested frequency of accomplishment. While the suggested programs and schedules must be adapted to specific projects, the material presented should provide guidance for a successful long-term program for operation and maintenance. Certain facilities, specifically the potential water quality volume storage or treatment measures such as infiltration, Filterra®, and StormTreat® are not intended to be placed in service until the tributary catchment area has the permanent cover in place and any contributing turf areas have achieved a 90% catch of vegetation (i.e. established).

A. GUIDELINES OVERVIEW

A summary of the individual components of stormwater management facilities for this project has been prepared. The format used in the summary is as follows:

Preface: A general description of what function/benefit the element is intended to provide. This is a short summary and not intended to provide the design basis, which can be found in other sources.

Inspection: This section provides the inspection requirements for the individual component.

Maintenance: The section provides general information on the routine maintenance requirements of this element.

Frequency: This section outlines the best judgment of the designer on the system to the frequency of maintenance.

Comments: This section provides any particular comment on the site-specific features of this element. This is a summary only. The owner/operator should review the design drawings and documents carefully to understand the particular elements of the project. The end of this section should allow the owner/operator to make notes on the specific program. This may include the selected maintenance procedure, cross-references to applicable design drawings, etc.

A list of the individual inspection/maintenance elements is provided in the table of contents. The guidelines are proposed for initial use with adjustments made as appropriate based upon specific project experience.

This report includes the Operation and Maintenance requirements for any potential BMP identified in the Stormwater Management Report for this project. Many of these will not be required for the final stormwater management option selected for this project.

B. RESPONSIBLE PARTY

The responsible party for operation and maintenance of the stormwater and other site infrastructure is Motherhouse Associates, LP.

II. PROJECT OVERVIEW

Key permits issued (or applied for) on the project include:

· City of Portland Level III Site Plan Review

A copy of the permits and Stormwater Management Report should be appended to this manual as Appendix B. The Owner/Operator of the stormwater management system should review these permits for a general description and background of the project, as well as any specific permit conditions or requirements of the project.

The applicant has retained FST for civil engineering for the Motherhouse project. FST has prepared the design for the stormwater management facilities and may be contacted at:

FST
778 Main Street, Suite 8
South Portland, Maine 04106
(207) 775-1121

It is recommended the preparer of the plan be contacted with any particular questions on the design intent or similar issues.

The applicable plans and design documents, which apply to the project, are:

1. Civil Site Plans Prepared by FST
2. The Erosion Control/Sedimentation Control Plan for the project
3. The Stormwater Management Plan for the project

A copy of these documents should be retained with this manual.

The proposed design includes inlets, stormwater conveyance lines, bioswales, underdrained treatment swales, a wet detention pond, manholes, diversion structures, outlet control structures, and backwater isolation valves.

III. STANDARD INSPECTION/MAINTENANCE DESCRIPTIONS

The following narratives describe the inspection/maintenance provisions for the Stormwater Management system. These O&M procedures will complement scheduled sweeping of the parking deck which are anticipated to occur at least twice per year. Proper O&M is necessary to make sure the system will provide its intended purpose of conveying runoff, removing a substantial amount of the suspended solids, and other contaminants in the stormwater runoff.

A. STORMWATER INLETS

Preface: The success of any stormwater facility relies on the ability to intercept stormwater runoff at the design locations. Stormwater inlets may include catch basins, open culverts, culverts with bar screens, roof scuppers, plaza scuppers, trench drains, and field inlets. Inlets exist throughout the system.

Inspection: The inspection of inlet points will need to be coordinated with other maintenance items, these include:

- Landscape services
- Building maintenance areas
- Grounds maintenance

The key elements of the inspection are to assure the inlet entry point is clear of debris and will allow the intended water entry.

Maintenance: The key maintenance is the removal of any blockage which restricts the entry of stormwater to the inlet. The removed material should be taken out of the area of the inlet and placed where it will not reenter the runoff collection system. Snow should be removed from inlets on parking decks or plaza areas. Grass clippings and leaves should be bagged and removed particularly near the yard inlets near the building.

Frequency: All inlets should be inspected on a quarterly basis, and after/during significant storm events.

Maintenance/Inspection Responsibility:

Maintenance Personnel: The maintenance personnel will perform the normal maintenance/inspections of the inlets and tributary drainage system.

Comments: Maintenance of inlets is critical on this project.

POORLY STABILIZED INLET ALLOWS ENTRANCE OF DEBRIS AND REDUCED CAPACITY

STABILIZED INLETS REDUCE DEBRIS ACCUMULATION AND MAINTAIN DESIGN CAPACITY

B. TRIBUTARY DRAINAGE SYSTEM

Preface: The stormwater conveyance system will be principally overland flow discharging to piped drain systems. Most of the sediment is carried by the drainage system is intended to be trapped near the inlets or in pretreatment devices. Maintenance of this system can play a major role in the long-term maintenance costs and the effectiveness of the pond system.

Inspection: The tributary drainage system should be periodically inspected to assure that it is operating as intended, and that its carrying capacity has not been diminished by accumulations of debris and sediment or other hydraulic impediments. On piped systems, the inlets must be inspected to ensure the rims are set at the proper elevation to optimize flow entry and are not clogged with debris. The inlet catch basins are normally equipped with sumps and hooded outlets which will remove gross floatables and large sediment particles from the flow stream.

The level of sediment in the sumps should be checked to assure their effectiveness. Pipelines connecting the inlets should be checked to determine if siltation is occurring. This will be most critical on drain lines laid at minimal slopes. This can usually be accomplished by a light and mirror procedure.

In some projects most of the stormwater is carried in open swales, channels, or ditches. These conveyance channels may be rip rapped or vegetated, depending on the gradient and expected flow velocities. These facilities must be inspected to insure debris or sedimentation does not reduce their carrying capacity. Excess vegetative growth must also be noted. The surface protection for the channels, either stone or vegetation, must be inspected to insure its integrity. Any areas subject to erosion should be noted.

Maintenance: Maintenance of the storm drainage system must assure that it continues to serve its design function on a long-term basis, and that its operation does not transport excessive sedimentation to any downstream detention pond, or the receiving waters. Elevations on the rim of catch basins should be adjusted as needed to assure optimal water entry. Depending on the frost susceptibility of the soil, the rims may become elevated over time causing flow to circumvent the inlet. If a filter bag has been designated for the inlet silt or other deleterious materials, can significantly reduce

capacity and the bags should be removed with the sediment and replaced. Catch basin cleaning would normally be accomplished with vacuum trucks contracted as a maintenance service for the retail center. The removed material must be disposed of at an approved site for such materials.

If sediment in the pipeline is observed, it should be removed. This may be accomplished by hydraulic flushing, or by mechanical means. If hydraulic flushing is used the downstream conditions should be analyzed. The tidal influence can aggregate sedimentation since there are periods of no flow. Backwater valves and connection points are intended to reduce this occurrence.

Frequency: The piped drainage system should be inspected on an annual basis. Adjustment of inlet rim elevations should be on an as needed basis. Cleaning catch basin sumps and pipelines will depend on the rate of accumulation.

Maintenance/Inspection Responsibility:

Special Services: The owner will contract with an independent agent for cleaning of replacement of catch basins, sumps, and pipelines. Remedial source control measures may be performed by the owner or an outside service depending upon the nature of the particular situation.

Comments: Maintenance of inlets of utmost importance to the project to avoid unintended roof loading, ice accumulation, and cleanliness of the floors of the building.

A WELL-STABILIZED VEGETATED SWALE SHOWS LITTLE SIGNS OF EROSIVE VELOCITIES OR FLOWS. THIS SWALE ALSO FUNCTIONS AS A POND SPILLWAY

C. BIORETENTION CELLS

Preface: Bioretention cells offer efficient and effective treatment of runoff from small contributing pavement and impervious areas. They can be integrated into existing landscaping and are generally low-maintenance BMPs. It is, however, still important to monitor these areas for sediment build up an erosion to assure that capacity remains to accomplish the intended water quality function.

Inspection: Inspections of bioretention cells should be undertaken on an annual basis by a qualified stormwater professional. Sediment build up or erosion of the cell should be identified, as should any evidence of standing water, or prolonged saturation.

Maintenance: Routine maintenance will include inspection of soils and plantings, removal of dead vegetation and any accumulated sediments. Should the cell show signs of reduced drainage capacity it may be necessary to rototill or remove the top soil layer.

Frequency: Inspections should be undertaken at a minimum on a bi-annual basis.

Maintenance/Inspection Responsibility:

Special Services: The owner will contract with an independent stormwater system maintenance Contractor to undertake maintenance inspections of these BMPs.

D. DRIP EDGE FILTERS

Preface: Roof drip edge filters perform two critical functions. They control erosion by accepting roof runoff on a stable, highly pervious surface, and then store and infiltrate the runoff to underlying soils, or an underdrain system.

Inspection/Monitoring: The surface of the drip edge should be inspected periodically for debris accumulation and function.

Maintenance: Periodic maintenance of the drip edge will include removal of debris and fine sediment that may accumulate in the surface stone. Occasional raking or smoothing of the surface may be required.

Frequency: Inspections of the drip edge stone should be undertaken at a minimum on a bi-annual basis.

Maintenance/Inspection Responsibility:

Special Services: The owner will contract with an independent stormwater system maintenance Contractor to undertake maintenance inspections of these BMPs.

E. INFILTRATION TRENCH

Preface: The infiltration trench performs in a similar manner to the roof drip edge filters. However, due to the proximity of grass areas and the source of runoff to this area (from pavement as opposed to roof), it will be more susceptible to failure. Therefore, inspections of the infiltration trench should be more frequent and rigorous.

Inspection: The surface stone of the infiltration trench is the most critical inspection area. Debris or fine material accumulating in the surface should be removed immediately to prevent it from migrating lower into the stone section and clogging the trench.

Frequency: The surface of the infiltration trench will need to be inspected on a quarterly basis so that prompt action can be taken to remove any accumulated debris or sediment.

Maintenance/Inspection Responsibility:

Special Services: The owner will contract with an independent stormwater system maintenance Contractor to undertake maintenance inspections of these BMPs.

F. LITTER

Litter should be removed as a matter of course by workers and a part of the grounds maintenance contract.

G. SUMMARY CHECKLIST

The above described inspection and maintenance items have been summarized on a checklist attached hereto as Appendix C.

IV. PROGRAM ADMINISTRATION

A. GENERAL

A reliable administrative structure must be established to assure implementation of the maintenance programs described in the foregoing section. Key factors that must be considered in establishing a responsive administrative structure include:

1. Administrative body must be responsible for long-term operation and maintenance of the facilities.

2. Administrative body must have the financial resources to accomplish the inspection and maintenance program over the life of the facility.

3. The administrative body must have a responsible administrator to manage the inspection and maintenance programs.

4. The administrative body must have the staff to accomplish the inspection and maintenance programs, or must have authority to contract for the required services.

5. The administrative body must have a management information system sufficient to file, retain, and retrieve all inspection and maintenance records associated with the inspection and maintenance programs.

6. A qualified post construction inspector shall be retained by the Owner. His duties shall include preparing schedules for the Owner's maintenance, summarizing the results of this maintenance and preparing an annual report on the operation, maintenance, and repair of the stormwater system which must be copied to the Town. (The Owner shall be responsible for retaining a separate entity to perform maintenance which cannot be performed by the management of building and property grounds.) This person shall also participate in troubleshooting of the stormwater management system if a problem develops.

If any of the above criteria cannot be met by the entity assigned inspection and maintenance responsibilities, it is likely that the system will fail to meet its water quality objectives at some point during its life. While each of the above criteria may be met by a variety of formats, it is critical to clearly establish the assigned administrative body in a responsible and sustainable manner.

B. RECORD KEEPING

Records of all inspections and maintenance work accomplished must be kept and maintained to document facility operations. These records should be filed and retained for a minimum 5-year time span. The filing system should be capable of ready retrieval of data for periodic reviews by appropriate regulatory bodies. Where possible, copies of such records should also be filed with the designated primary regulatory agency for their review for compliance with permit conditions. Typical inspection and maintenance record forms are attached hereto as Appendix B.

C. CONTRACT SERVICES

In some instances or at specific times, the Maintenance Personnel may not have the staff to conduct the required inspection and/or maintenance programs as outlined in this document. In such cases, the work should be accomplished on a contractual basis with a firm or organization that has the staff and equipment to accomplish the required work.

The service contract for inspection and maintenance should be formal, well written legal document which clearly defines the services to be provided, the contractual conditions that will apply, and detailed payment schedules. Liability insurance should be required in all contracts.

APPENDIX A

Sample Inspection Logs

MOTHERHOUSE ASSOCIATES, LP
PORTLAND MAINE

STORMWATER MANAGEMENT
WATER QUALITY STORAGE OR WET POND
ANNUAL INSPECTION & MAINTENANCE LOG

FACILITY:		**YEAR:**	
LOCATION:		**CONTRACTOR:**	
FUNCTION:		**INSPECTOR:**	
DATE OF INSPECTION:			
ITEM IDENTIFICATION	**DESCRIPTION OF CONDITIONS**	**MAINTENANCE ACCOMPLISHED**	**DATE OF MAINTENANCE**
GENERAL COMMENTS:			

SAMPLE

MOTHERHOUSE ASSOCIATES, LP
PORTLAND MAINE

STORMWATER MANAGEMENT BMP
MONTHLY INSPECTION & MAINTENANCE LOG

FACILITY:			YEAR:			
LOCATION:			CONTRACTOR:			
FUNCTION:						
				OVERFLOW WEIR		
MONTH	DAY	INSPECTOR	WATER DEPTH	CLEAR	DEBRIS	WEIR CONDITION
JANUARY						
FEBRUARY						
MARCH						
APRIL						
MAY						
JUNE						
JULY						
AUGUST						
SEPTEMBER						
OCTOBER						
NOVEMBER						
DECEMBER						
LIST SPECIAL MAINTENANCE UNDERTAKEN:						

MOTHERHOUSE ASSOCIATES, LP
PORTLAND MAINE

STORMWATER MANAGEMENT BMP
SEMI-ANNUAL INSPECTION & MAINTENANCE LOG

SEMI-ANNUAL INSPECT 1.2	FACILITY:
DATE:	LOCATION:
INSPECTOR:	FUNCTION:
BMP CONDITION:	
OUTLET CONDITION	

DEBRIS PRESENT	EST. DEPTH SED.	REMOVED? Y/N	EST. VOL. CY	WHERE DISPOSED OF	STRUCTURAL CONDITION

CONTROL STRUCTURE:
DESCRIBE CONDITIONS FOUND & MAINTENANCE ACCOMPLISHED:

APPENDIX B

Permits for Project

(To be Added at a Subsequent Time)

APPENDIX C

Summary Checklist
Inspection and Maintenance

Stormwater Management System Maintenance Program Summary Checklist						
Item	**Commentary**	**Frequency**				
		Monthly	**Quarterly**	**Semi-Annual**	**Annual**	**Long Term**
Stormwater Inlets	Stormwater inlets allow flow entry from a surface swale to a piped system. Entry may or may not be equipped with a bar rack. Inspect entry for debris accumulation. Remove debris to allow unimpeded entry. Lawn clippings and leaves should be removed from yard areas.		X		X Clearing	
Tributary Drainage System	Inspect to assure that the carrying capacity has not been diminished by debris, sediment or other hydraulic impediments.				X	
Bioretention Cells	Inspect outlet control structure, remove dead vegetation, check for erosion, or evidence of standing water.			X		
Drip Edge Filters	Observe surface stone, rake, and remove debris as necessary.			X		
Infiltration Trench	Observe surface stone for accumulation of debris or sediment – remove immediately. Check groundwater level using inspection ports or cleanouts.		X		X	
Litter	Litter should be removed daily.					
Pavement Sweeping	Pavements should be swept at least twice annually, once in Spring			X		