

Plains Elementary School – South Hadley Stormwater Management Report

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1 Executive Summary

Pursuant to the Town of South Hadley Erosion and Sediment Control for Stormwater Management, this Stormwater Management Report describes the proposed work and stormwater management associated with the redevelopment of Plains Elementary School in South Hadley, Massachusetts. The proposed redevelopment includes demolition of the existing building, parking areas, concrete sidewalks and site amenities, and construction of a proposed elementary school building, parking areas, concrete sidewalks, paths and site amenities. The 9.3 acre site is identified on the USGS Site Location Map, *Figure 1*, and the proposed work is depicted on the Site Plans, *Appendix K*.

Existing and proposed hydrologic conditions for the redevelopment were evaluated to compare existing and proposed stormwater peak discharge. The evaluation demonstrates a net decrease in the stormwater peak discharge from the proposed site with occur for the 2-, 5-, 10-, 25-, and 100 year storm events as compared to the existing conditions. Additionally, the underground stormwater drainage system is adequately sized to manage the 10- year storm event.

2 Project Description

2.1 Existing Site Description

The 9.3 acre site is located at the corner of Granby Road (Route 202) and Lyman Street in South Hadley, Massachusetts. The site contains the existing Plains Elementary School, associated paved parking areas, concrete sidewalks and site amenities, as well as a ball field. There are no inland resource areas or impacts located within the project site. Newton Smith Brook is located approximately 275' west of the school property line, and no work is included in the riverfront area of the brook.

The majority of the stormwater runoff from the site flows to the west property line, off-site and ultimately to Newton Smith Brook. The existing ball field and play areas on the west side of the site sheet flow towards the brook. The school building and site impervious areas are collected and piped to the brook. In addition, runoff from a portion of Lyman Street and surrounding roadways are piped through the site to Newton Smith Brook via a 36" pipe. Newton Smith Brook is located off-site to the west of the property. A portion of the northern property area flows to the northern property line. A small portion of the north side of the site flows via sheet flow to the adjacent property.

2.2 Proposed Site Description

The proposed site development will consist of the demolition of the existing school and paved parking areas, and construction of a new Plains Elementary School, paved parking areas, and amenities, as well as new stormwater management facilities and utilities.

The proposed school consists of a one and two story structure with a footprint of 43,000 SF. The site will feature a paved bus loop and service area, as well as a paved parking lot with 137 spaces. Site

amenities will feature numerous play areas, walkways and outdoor educational elements.

The site storm drainage system was designed to utilize a number of LID and sustainable stormwater management design practices. A majority of the roof runoff from the proposed building will be collected and directed to underground infiltration units to infiltrate as much clean roof runoff as possible. In addition, two roof downspouts will be directed to above ground cisterns, which will serve as educational tools to promote stormwater awareness.

Paved parking and drive aisles will be collected in rain gardens located within the center of the site, as well as piped drainage systems to convey flow to rain gardens located on the west side of the site. Overall peak flow attenuation is attained by using the rain gardens, as well as a detention basin located along the western property line.

Peak flow leaving the site is maintained or reduced in all storm events through the 100 year design storm. Groundwater recharge is promoted through the use of underground infiltration units, as well as the numerous rain gardens located throughout the site.

3 Soil Erosion and Sedimentation Control

Erosion and sedimentation controls will be installed in accordance with the “Massachusetts Erosion and Sediment Control Guideline for Urban and Suburban Areas. Erosion and sedimentation controls will be installed prior to construction. The project will be constructed in phases. All sedimentation and erosion controls will be installed for each phase as shown on the Site Plans provided in *Appendix K*. Erosion and sedimentation control will be maintained for the duration of the project, until disturbed slopes have been stabilized or as instructed on the phasing.

4 Construction Sequence

The project will be constructed in three (3) main phases:

Phase 1 – New School Construction and construction of temporary parking on ball field.

Phase 2 – Construction of new bus loop and outer parking area.

Phase 3 – Construction of remainder of parking areas and site improvements, restoration of ball field.

Detailed descriptions of each phase are included below:

Phase 1: Phase 1 will commence with the construction of a temporary bus loop and parking lot on the existing ball field, located west of the existing school. The temporary bus loop and parking lot will serve the existing school while it remains in session during the construction of the new school building. Phase 1 will include the construction of the new school building and the utilities that serve it, as well as the two roof runoff infiltration systems.

Phase 2: Once the new school is completed, the demolition of the existing school will begin. Phase 2 will include the demolition of the existing school and paved parking areas east of the school. The

new bus loop and outer parking area will be constructed, as well as the main rain gardens serving the parking lots and bus loop. The temporary parking lot located on the ball field will remain in service until the new outer parking loop is constructed.

Phase 3: With Phase 2 complete, Phase 3 will consist of the construction of the remainder of the parking and site sidewalks and other amenities. The detention basin will be constructed at the time the parking lot is constructed. Once site construction has been completed, the ball field will be reconstructed by removing the temporary parking lot and rebuilding the ball field.

5 Hydrologic Analysis

5.1 Peak Flows

Peak flows for the existing and proposed conditions were determined by using the Natural Resources Conservation Service (NRCS) hydrologic methods. The HydroCAD computer program was used to conduct watershed modeling. Schematic watershed diagrams are provided for existing and proposed conditions in *Appendix A* and *Appendix B* respectively. Runoff curve numbers were developed based on a combination of land cover use and existing site soil types acquired from the Natural Resources Conservation Service web site. Time of concentration runs were developed based on the methods in the NRCS TR055 manual.

Peak flows for the 2-, 5-, 10-, 25-, and 100- year frequency storm events were determined by using a 24-hour type III storm, standard for the New England area. Rainfall depths were obtained from published rainfall records for Worcester County, Massachusetts. Existing and proposed conditions hydrologic models are included in *Appendix A* and *Appendix B*, respectively.

5.2 Site Soils

Appendix J provided soil mapping created from the NRCS website. The mapping indicates the site is comprised of the soils shown below:

Soil Description	Hydrologic Group
745C – Hinckley – Merrimac – Urban Land Complex	A
750C – Windsor – Scitico – Amostown Complex	A
255A – Windsor Sandy Loam	A

Hydrologic Group Soil A soils have a high infiltration rate even when thoroughly wetted. They consist of deep, well drained to excessively drained sands or gravels. They have a high rate of water transmission.

The following runoff curve numbers were used for the land cover characteristics as noted:

Ground Cover	Runoff Curve No.
Impervious/Roof Top	98
Wooded – Soil A	36

Grass Cover – Fair – 50%-75%	49
Dirt (Playscape Area)	72

Existing groundwater elevations and additional soil information can be found in the Geotechnical Report located in *Appendix C*.

5.3 Watershed Areas

For the purpose of assessing the pre- versus post-development hydrologic conditions, the site was evaluated with two (2) discharge points described as follows:

- DP#1 discharges to Newton Smith Brook located off-site to the west of the property.
- DP#2 discharges to the northern property line.

5.4 Existing Watershed Areas

For the purpose of assessing pre-development hydrologic conditions the existing site conditions was divided into six (6) watershed areas. *Figure 2* illustrates the existing watershed areas. A schematic watershed diagram showing discharge points for each watershed area is provided in *Appendix A*. Breakdown of ground cover characteristics for each area can be found in the hydrological calculation provided in *Appendix A*.

5.5 Proposed Watershed Areas

For the purpose of assessing post-development hydrologic conditions the proposed site conditions was divided into 14 watershed areas. *Figure 3* illustrates the proposed watershed areas. A schematic watershed diagram showing discharge points for each of the watershed areas is provided in *Appendix B*. Breakdown of ground cover characteristics for each area can be found in the hydrological calculations provided in *Appendix B*.

6 Underground Stormwater Drainage System

Haestad Methods' StormCAD computer model was used to analyze the underground storm drainage system. The modeling data and results are presented in *Appendix D*. Input information for the model was derived using the Rational Method. Times of concentration for paved areas were assumed to be a minimum time of 5 minutes. The StormCAD output indicates that the proposed underground storm drainage system will have adequate capacity to manage the 10-year storm event.

7 MassDEP Stormwater Management Guidelines

The project is considered a redevelopment project. The project site was previously developed with an existing school. The site will be redeveloped with a proposed school. The redevelopment will

improve site conditions. In accordance with the Town of South Hadley Erosion and Sediment Control for Stormwater Management and the Massachusetts Stormwater Handbook, being a redevelopment project, the project will meet the following standards to the maximum extent possible.

LID Measures

As required in the stormwater management standards, Low Impact Development (LID) measures were considered with the proposed site redevelopment to enhance stormwater quality. The project includes the installation of rain gardens.

Standard #1

There are no new conveyances proposed. Untreated stormwater will not discharge into the existing brook. Stormwater treatment will be provided by the use of a Vortech Stormwater Treatment System, deep sump hooded catch basins, rain gardens, infiltration basins and stormwater infiltration systems.

Standard #2

Post-development discharge rates will not increase as a result of the redevelopment. Stormwater Hydrologic Models demonstrating the reduction in peak discharge rates are provided in *Appendix A* and *Appendix B* with a summary of the pre- versus post-development discharge rates provided in *Table 1*.

Standard #3

The recharge volume is based on the existing soil conditions and the Recharge Target Depth by Hydrologic Soil Group (HSG) values provided in Volume 1 and 2 of the Massachusetts Stormwater Handbook.

Recharge Volume

$$Rv = F \times \text{Impervious Area}$$

Rv = Recharge Volume, expressed in cubic feet, cubic yards, or acre-feet

F = Target Depth Factor associated with each HSG = 0.6 inch for HGS A

Total Site Impervious Area = 102,200 square feet

$$Rv = 0.6 \text{ inch (1 foot/12 inch)} \times (102,200 \text{ square feet}) = 5,110 \text{ cubic feet}$$

Recharge Volumes Provided

Rain Garden #1	=1,124 cubic feet
Rain Garden #2	=3,791 cubic feet
Rain Garden #3	=868 cubic feet
Infiltration Basin #1	=5,282 cubic feet
Infiltration Basin #2	=14,732 cubic feet
Infiltration System #1	=2,500 cubic feet

Infiltration System #2 = 5,179 cubic feet
Total volume = 33,476 cubic feet > 5,110 cubic feet

Calculations for 72 hour drawdown are provided in *Appendix E*. As shown below each stormwater infiltration BMP will drawdown within 72 hours.

Rain Garden #1 Time drawdown = 6.5 hours < 72 hours
Rain Garden #2 Time drawdown = 36.5 hours < 72 hours
Rain Garden #3 Time drawdown = 18 hours < 72 hours
Infiltration Basin #1 Time drawdown = 24.5 hours < 72 hours
Infiltration Basin #2 Time drawdown = 5.5 hours < 72 hours
Infiltration System #1 Time drawdown = 3 hours < 72 hours
Infiltration System #2 Time drawdown = 4 hours < 72 hours

Standard #4

A Vortechnic Stormwater Treatment system, deep sump hooded catch basins, rain gardens, infiltration basins and stormwater infiltration systems will be provided to meet the required 80% total suspended solids (TSS) removal rates. The rain gardens and Infiltration Basin #1 will provide pretreatment for Infiltration Basin #2.

Standard #5

The project will not contain any area of higher pollutant loads as defined in the Massachusetts Stormwater Handbook.

Standard #6

This project does not contain critical areas as defined in the Massachusetts Stormwater Handbook.

Standard #7

This project is a redevelopment project and will comply with the standards set forth by the Massachusetts Stormwater Handbook.

Standard #8

It is anticipated that there will be no proposed pollution created during the construction of the proposed redevelopment. General erosion and sedimentation controls will be implemented and maintained during construction until all disturbed areas have been stabilized. This will be done in accordance with local, state, and federal requirements. Details of these erosion and sedimentation control measures are shown on the Site Plan located in *Appendix K*. The contractor will be responsible to insure the correct implementation of the erosion and sedimentation controls. The operation and maintenance for the erosion and sedimentation controls are included in the construction operation and maintenance plan described in Standard #9 below. An example Inspection and Maintenance Log Form is located in *Appendix H*. A detailed Stormwater Pollution Prevention Plan (SWPPP) will be submitted before land disturbance begins.

Standard #9

A construction operation and maintenance (O&M) plan to be implanted during construction for stormwater controls is described as follows:

- Owner shall be responsible for all operation and maintenance of the site.
- No earthwork activities shall commence until silt fence has been installed. Silt fence shall be installed as shown on the drawings.
- Areas left exposed to erosion for more than seven days shall be rough graded and temporarily stabilized. Areas disturbed but inactive for more than thirty days shall be temporarily seeded.
- Erosion and sedimentation controls shall be maintained until successful establishment of ground cover.
- Paved areas shall be kept free of sediment, and shall be cleaned periodically as required by construction activities.
- Catch basins shall be periodically inspected for the accumulation of sediment. All catch basins within the project shall be cleaned at the end of the project.
- Sediment stockpiles shall have a side slope of no greater than 2:1. Stockpiles shall be rough graded or maintain a roughened surface to prevent erosion. Stockpiles that are not to be used within 30 days shall be seeded after formation of stockpile as to prevent erosion. Straw bale barrier and silt fence shall be installed around stockpile area approximately 10 feet from toe of slope.
- The contractor is responsible to inspect and repair erosion and sedimentation control measures as required to prevent damage or sedimentation.
- Upon completion of construction and establishment of permanent ground cover, remove and dispose of temporary erosion control measures. Clean sediment and debris from temporary measures and from permanent storm drain and sanitary sewer systems.

A suggested operation and maintenance activities and proposed schedule for after construction as follows:

- The stormwater collection systems will be inspected a minimum of four (4) times per year to maintain proper operation. Sedimentation will be removed from each deep sump catch basin a minimum of four (4) times a year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe.
- The deep sump catch basins shall be cleaned at the end of the foliage and snow removal seasons.
- Paved surfaces will be swept twice annually, April and October, to remove sand and debris following winter months.
- Sediment forebays shall be inspected monthly, this will include checking for signs of rilling and gullyng. Also this will include checking for the accumulation of sediments and pollutants. Sediment forebays shall be cleaned at least four times per year and when sediment depth is between 3 to 6 feet. When mowing grasses, keep the grass height not

- greater than six (6) inches.
- At least twice per year, during the spring (April) and fall (November), outlet structures will be examined and cleaned, and all floatables and solids trapped will be removed.
 - Structures and pipes will be inspected each spring (April) and fall (November) for accumulation of sediment and debris. Clean as required.
 - Sediment basins shall have a drainage area of no more than 100 acres. Sediment basin volume is based on 0.5" of storage for each acre of drainage, which is equal to 67 cubic yards of storage for each acre of drainage area.
 - Vortech's stormwater treatment system shall be inspected in accordance with manufacturer's recommendations.
 - Subsurface infiltration systems will be inspected a minimum of twice annually for accumulation of silt and debris. Refer to the Cultec operation and maintenance guidelines for manufacturer's specifications on inspection and maintenance.
 - Water quality units shall be inspected every six months for the first year to determine the oil and sediment accumulation rate and inspected for subsequent years based on the first-year observations or local requirements. Cleaning is required once sediment depth reaches 15% of storage capacity or as required by local bylaws.
 - Refer to the Site Plans located in Appendix K for the location of stormwater BMPs and their access areas.
 - An example Operation and Maintenance Log Form can be found in *Appendix I*.

Standard #10

This project does not contain illicit discharges to Stormwater Management Systems as defined in the Massachusetts Stormwater Handbook.

Table

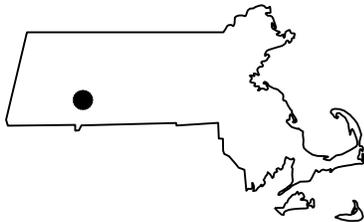
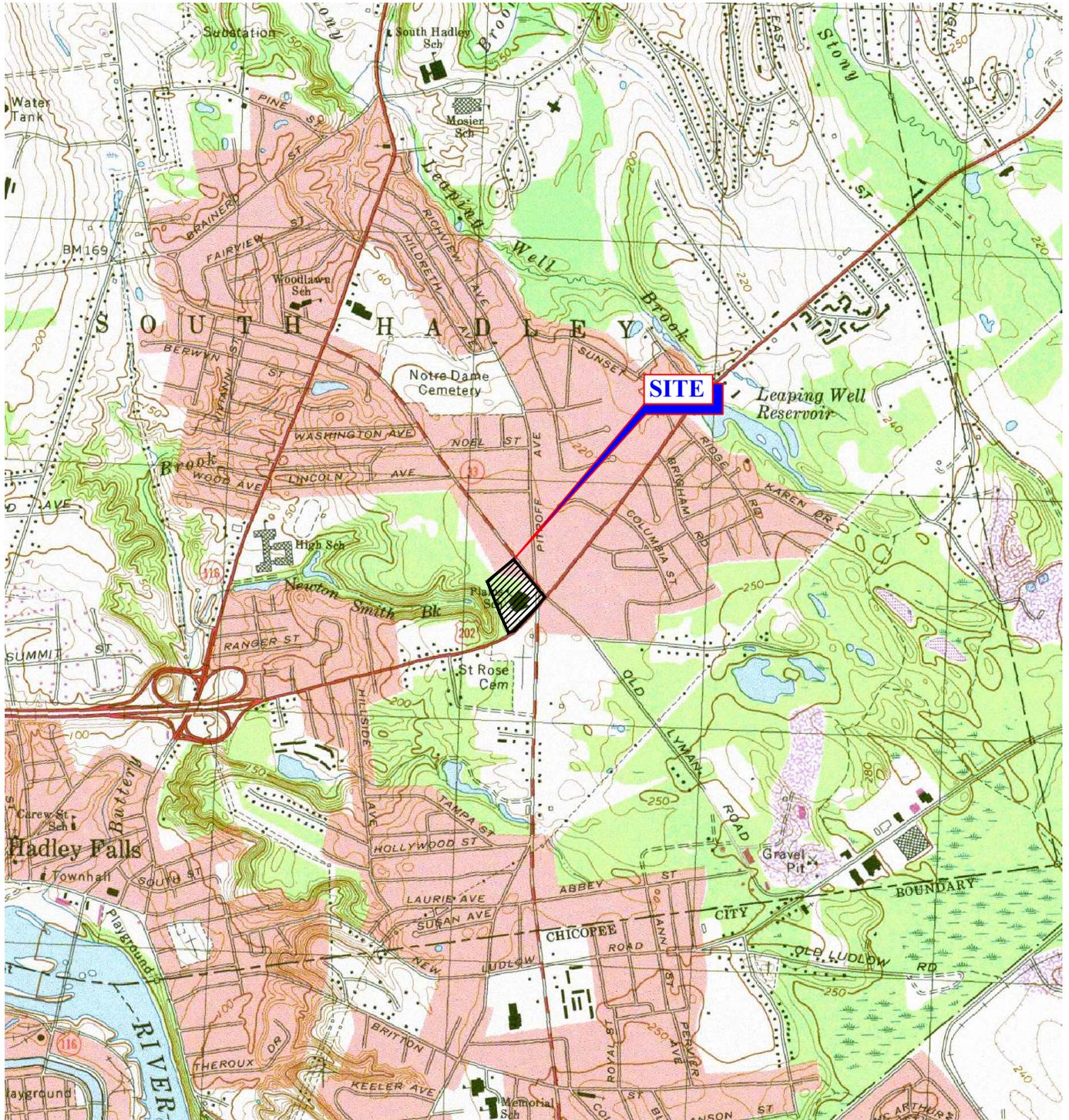
Table 1

Peak Discharge Summary

Table-1			
Peak Discharge Summary			
DP#1			
Yr	Existing	Proposed	Net Change
2	5.75	0.94	-4.81
10	10.47	2.24	-8.23
25	12.84	4.35	-8.49
50	15.27	8.73	-6.54
100	17.04	12.16	-4.88
DP#2			
Yr	Existing	Proposed	Net Change
2	0.00	0.00	0.00
10	0.10	0.10	0.00
25	0.23	0.22	-0.01
50	0.51	0.41	-0.10
100	0.78	0.57	-0.21

Figures

USGS Site Location Map
Existing Watershed Areas
Proposed Watershed Areas



MAP REFERENCE

SCANNED USGS TOPOGRAPHIC QUAD IMAGES FROM "OFFICE OF GEOGRAPHIC AND ENVIRONMENTAL INFORMATION (MassGIS), COMMONWEALTH OF MASSACHUSETTS EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS" DATED 1977-79. NOTE: ORIGINAL MAP UNITS IN METERS. THIS MAP WAS PREPARED FROM THE FOLLOWING SCANNED USGS TOPOGRAPHIC QUAD IMAGES: q113882, q113886, q117882, q117886

SCALE:
HORIZ.: 1"=2000'
VERT.:
DATUM:
HORIZ.:
VERT.:
0 1000 2000
GRAPHIC SCALE



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MARGO JONES ARCHITECTS
 USGS SITE LOCATION MAP
 PLAINS ELEMENTARY SCHOOL

SOUTH HADLEY

MASSACHUSETTS

PROJ. No.: 20110441.A20
 DATE: 05/24/2013

FIG. 1

File Path: J:\DWG\201112\B10\ChilPlan\201112\B10_STRM01.dwg Layout: EXISTING Plotted: Thu, May 23, 2013 - 7:39 PM User: abell
MS VIEW: PLOT:100 LAYER STATE: E-STROM



LEGEND

- 450 — EXISTING MAJOR CONTOUR
- 449 — EXISTING MINOR CONTOUR
- - - - - EXISTING WATERSHED AREA
- Tc — TIME OF CONCENTRATION RUN PATH (Tc)
- DP#2 DISCHARGE POINT

*MINIMUM Tc OF 6 MINUTES USED

SCALE: HORIZ.: 1"=100'
VERT.: 1"=50'
DATUM: NAD 83
GRAPHIC SCALE

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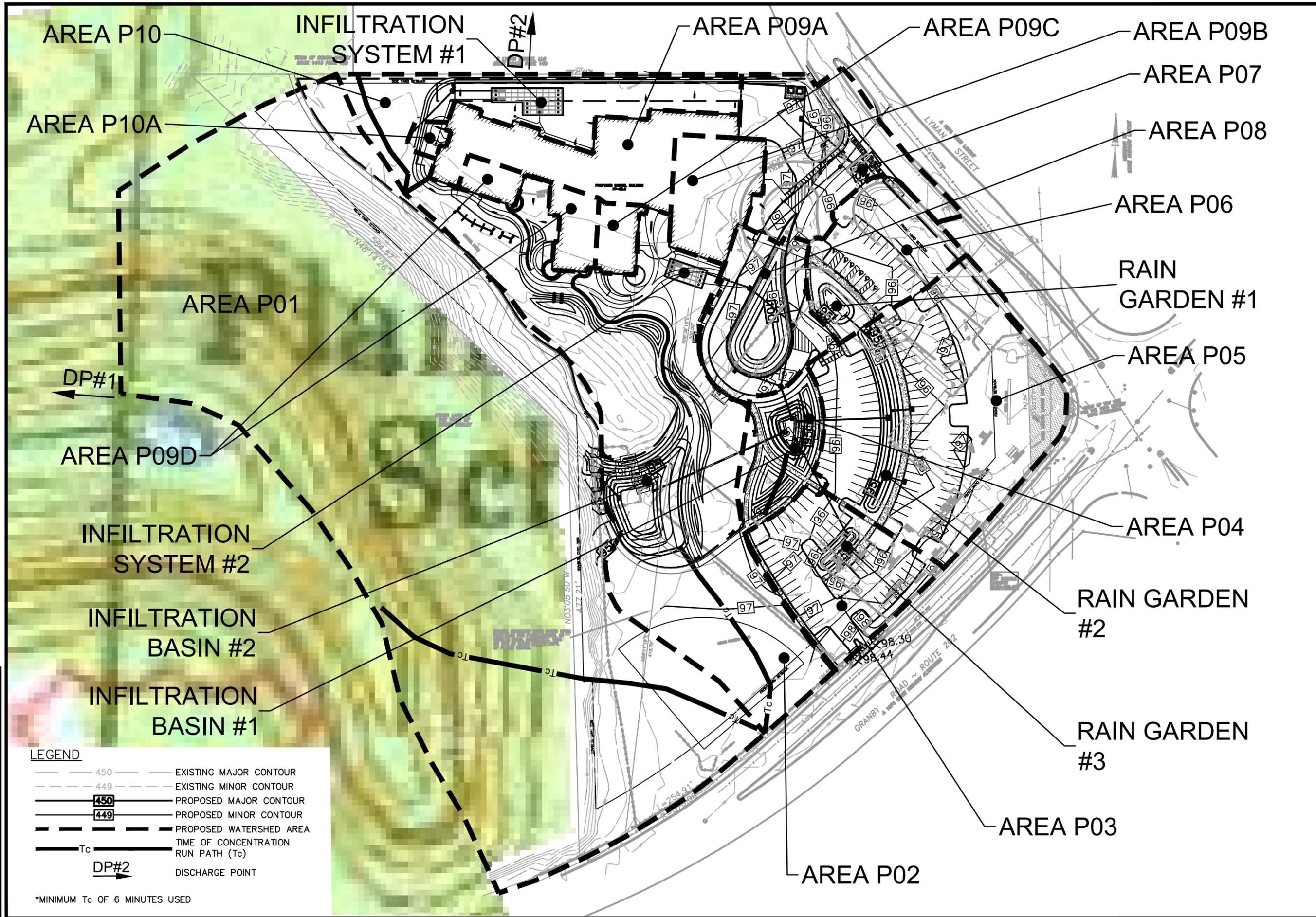
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EXISTING WATERSHED AREAS
PLAINS ELEMENTARY SCHOOL
MASSACHUSETTS

SOUTH HADLEY

PROJ. No.: 2011126.B10
DATE: 05/24/2013

FIG. 2

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 PLOTTER: DWG TO PDF-PC3 CTB File: FO.STB
 LAYER STATE: E-STROM
 MS VIEW: PLOT:100



LEGEND

— 450 —	— EXISTING MAJOR CONTOUR
— 449 —	— EXISTING MINOR CONTOUR
— 450 —	— PROPOSED MAJOR CONTOUR
— 449 —	— PROPOSED MINOR CONTOUR
— —	— PROPOSED WATERSHED AREA
— Tc —	— TIME OF CONCENTRATION RUN PATH (Tc)
DP#2	— DISCHARGE POINT

*MINIMUM Tc OF 6 MINUTES USED

SCALE:	HORIZ.: 1"=100'
	VERT.: 1"=20'
DATUM:	HORIZ.: NAD 83
	VERT.: NAVD 83
	GRAPHIC SCALE

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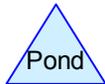
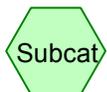
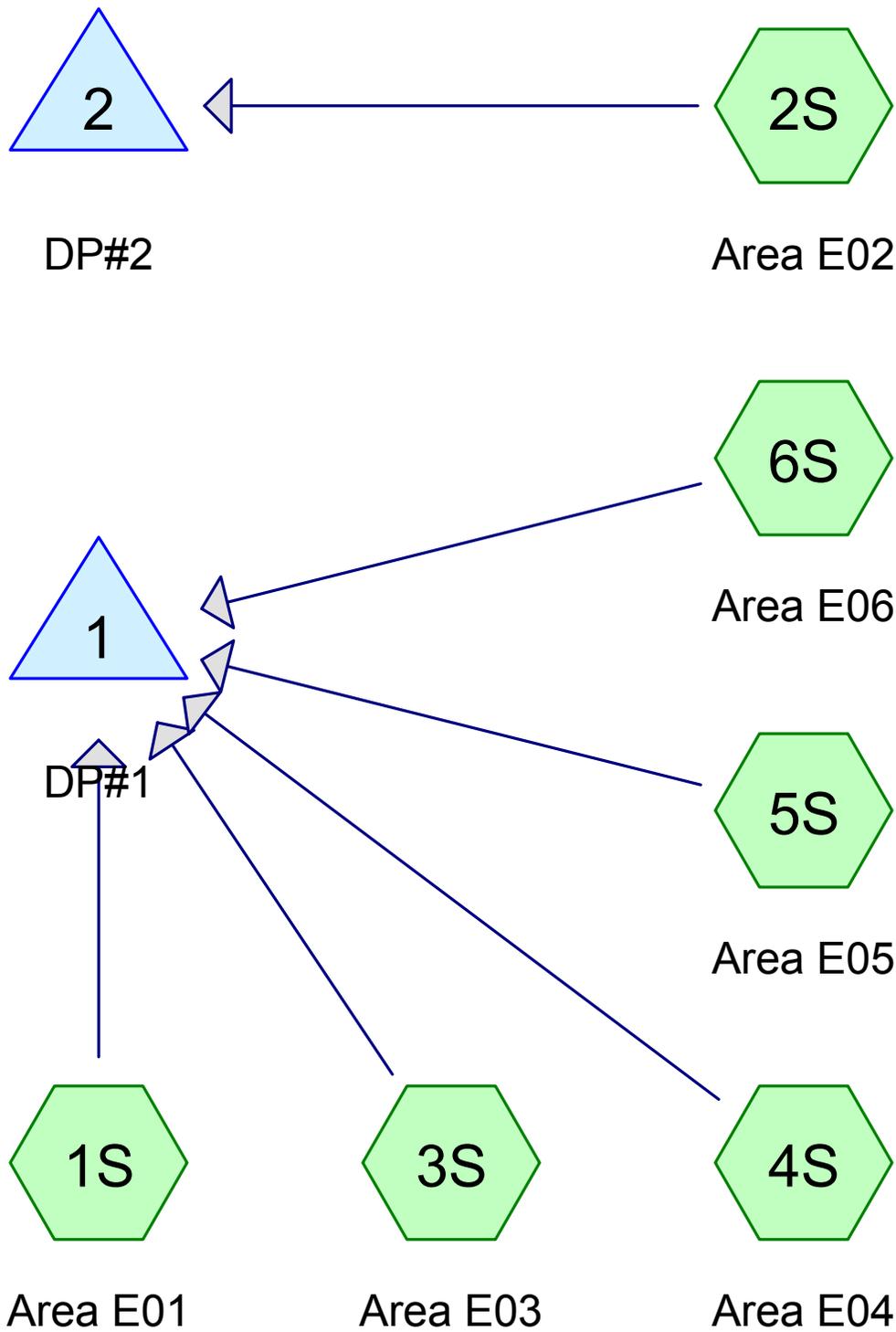
PROJ. No.: 2011126.B10
 DATE: 05/24/2013

FIG. 3

Appendix A

Existing Stormwater Hydrologic Model





Routing Diagram for 2011126A10_EX01
 Prepared by Fuss & O'Neill, Printed 5/23/2013
 HydroCAD® 10.00 s/n 05127 © 2012 HydroCAD Software Solutions LLC

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area E01 Runoff Area=6.670 ac 0.19% Impervious Runoff Depth=0.00"
Flow Length=452' Tc=19.4 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: Area E02 Runoff Area=3.062 ac 7.87% Impervious Runoff Depth=0.00"
Flow Length=483' Tc=33.2 min CN=41 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: Area E03 Runoff Area=1.018 ac 15.62% Impervious Runoff Depth=0.22"
Flow Length=298' Tc=21.6 min CN=56 Runoff=0.07 cfs 0.019 af

Subcatchment 4S: Area E04 Runoff Area=0.795 ac 43.02% Impervious Runoff Depth=1.07"
Flow Length=140' Tc=12.8 min CN=77 Runoff=0.76 cfs 0.071 af

Subcatchment 5S: Area E05 Runoff Area=0.955 ac 100.00% Impervious Runoff Depth=2.77"
Tc=6.0 min CN=98 Runoff=2.71 cfs 0.220 af

Subcatchment 6S: Area E06 Runoff Area=1.804 ac 50.89% Impervious Runoff Depth=1.25"
Flow Length=164' Tc=6.9 min CN=80 Runoff=2.49 cfs 0.188 af

Pond 1: DP#1 Inflow=5.75 cfs 0.498 af
Primary=5.75 cfs 0.498 af

Pond 2: DP#2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 14.304 ac Runoff Volume = 0.498 af Average Runoff Depth = 0.42"
81.63% Pervious = 11.676 ac 18.37% Impervious = 2.628 ac

Summary for Subcatchment 1S: Area E01

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

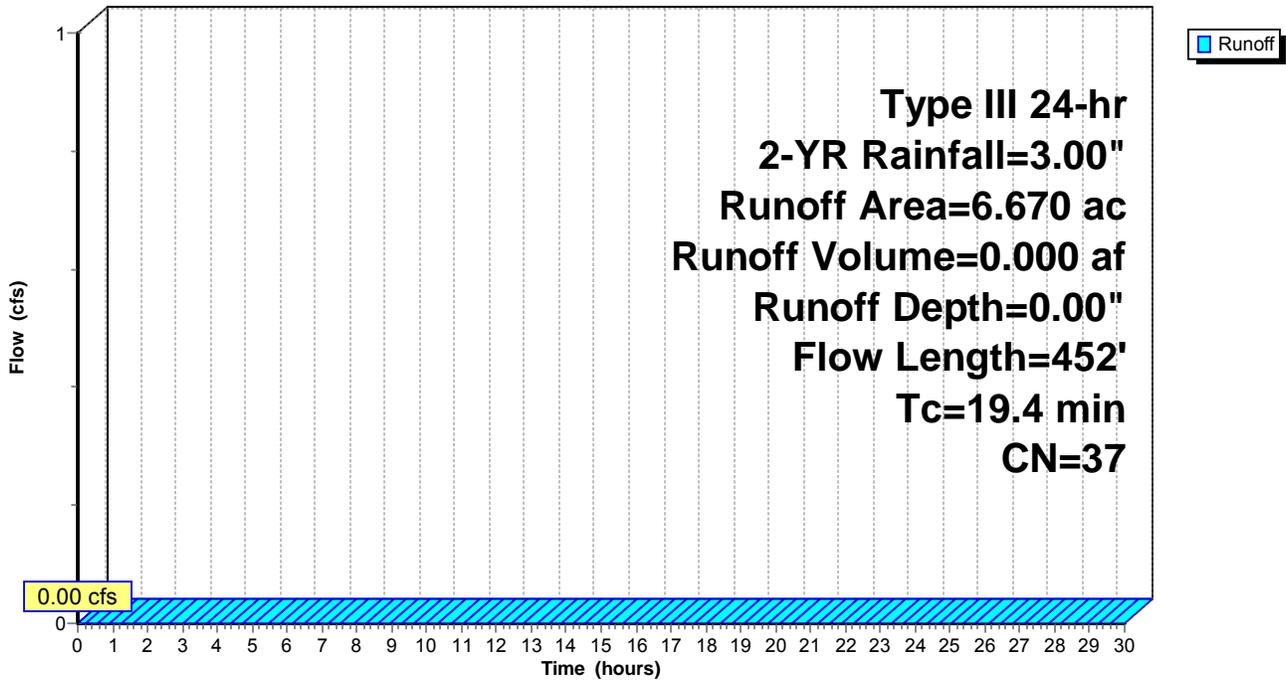
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.046	36	Woods, Fair, HSG A
0.611	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.670	37	Weighted Average
6.657		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area E01

Hydrograph



Summary for Subcatchment 2S: Area E02

Runoff = 0.00 cfs @ 24.08 hrs, Volume= 0.000 af, Depth= 0.00"

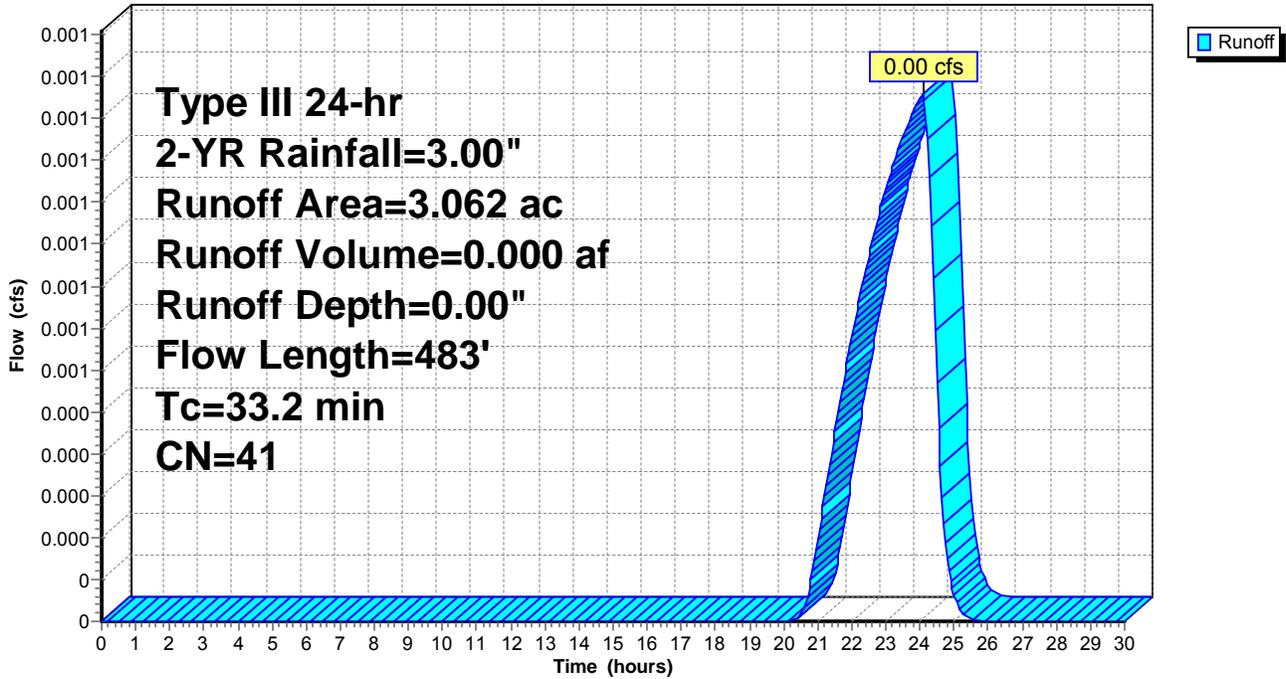
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.241	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
2.708	36	Woods, Fair, HSG A
0.113	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
3.062	41	Weighted Average
2.821		92.13% Pervious Area
0.241		7.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	72	0.0910	0.13		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.00"
4.4	150	0.0130	0.57		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
19.5	261	0.0020	0.22		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
33.2	483	Total			

Subcatchment 2S: Area E02

Hydrograph



Summary for Subcatchment 3S: Area E03

Runoff = 0.07 cfs @ 12.58 hrs, Volume= 0.019 af, Depth= 0.22"

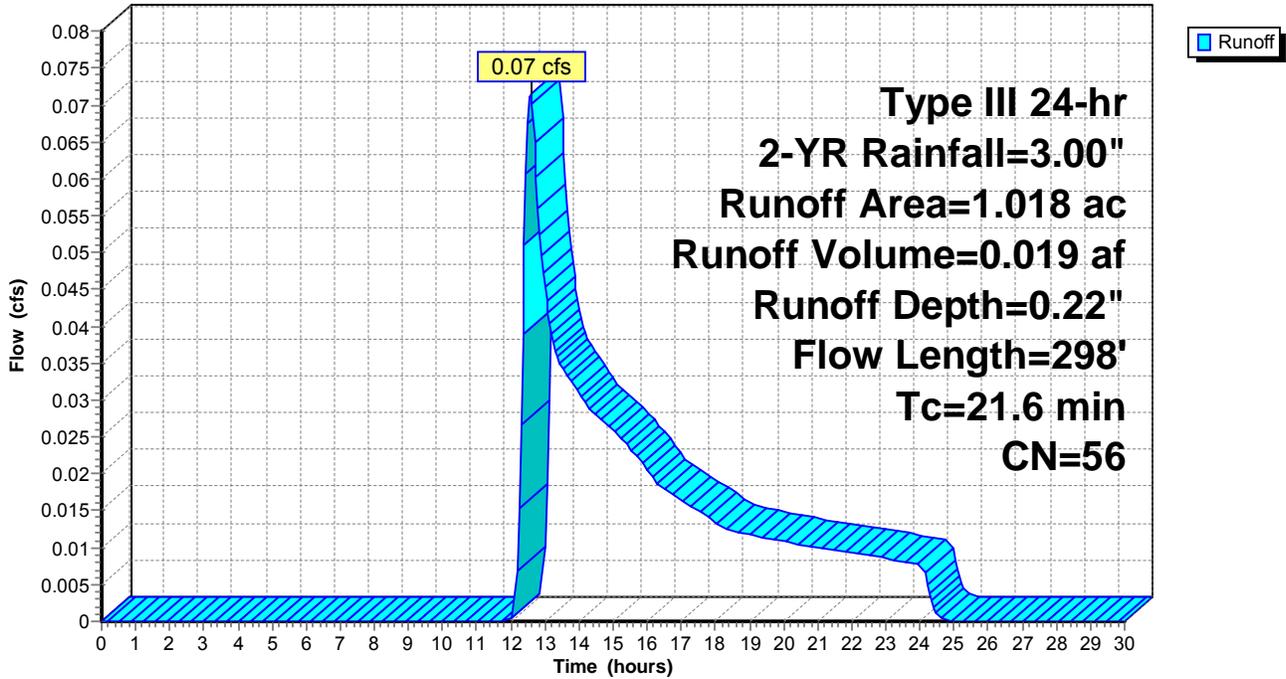
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.159	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.021	36	Woods, Fair, HSG A
0.838	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
1.018	56	Weighted Average
0.859		84.38% Pervious Area
0.159		15.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0050	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.3	118	0.0150	0.86		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.7	80	0.0120	0.77		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
21.6	298	Total			

Subcatchment 3S: Area E03

Hydrograph



Summary for Subcatchment 4S: Area E04

Runoff = 0.76 cfs @ 12.19 hrs, Volume= 0.071 af, Depth= 1.07"

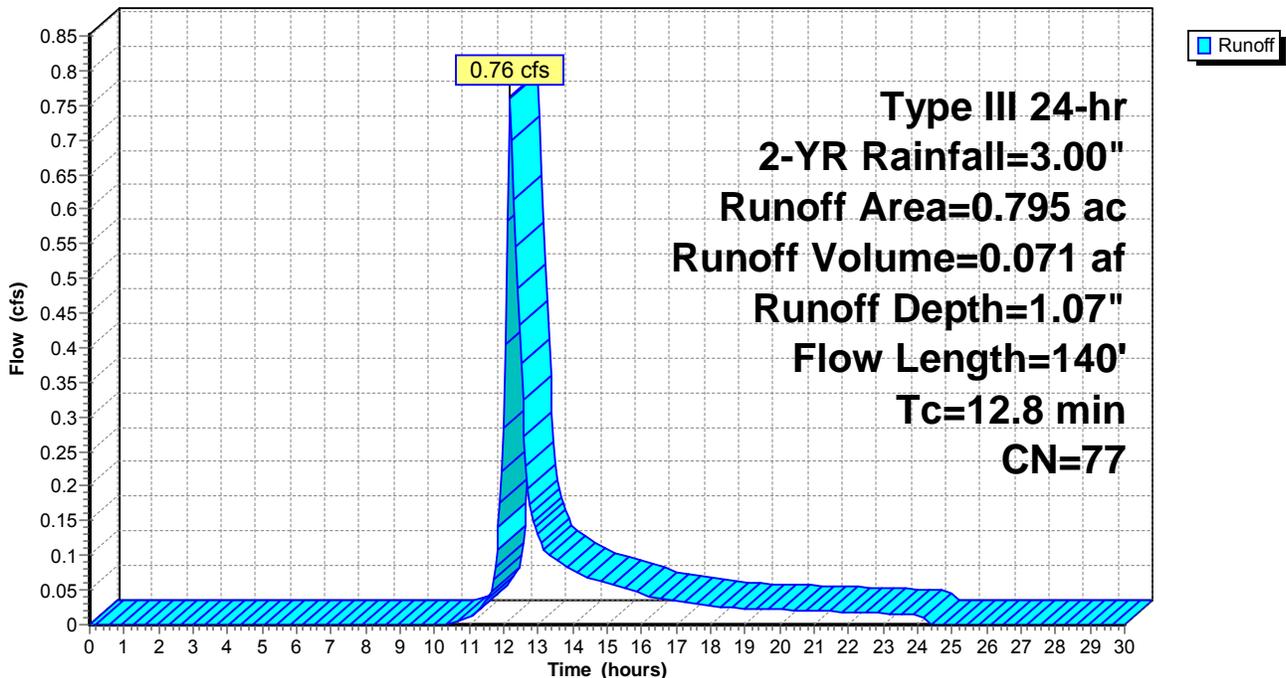
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.342	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.217	49	50-75% Grass cover, Fair, HSG A
* 0.236	72	Dirt, HSG A (Playscape)
0.795	77	Weighted Average
0.453		56.98% Pervious Area
0.342		43.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	107	0.0130	0.14		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
0.1	33	0.0470	4.40		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
12.8	140	Total			

Subcatchment 4S: Area E04

Hydrograph



Summary for Subcatchment 5S: Area E05

Runoff = 2.71 cfs @ 12.09 hrs, Volume= 0.220 af, Depth= 2.77"

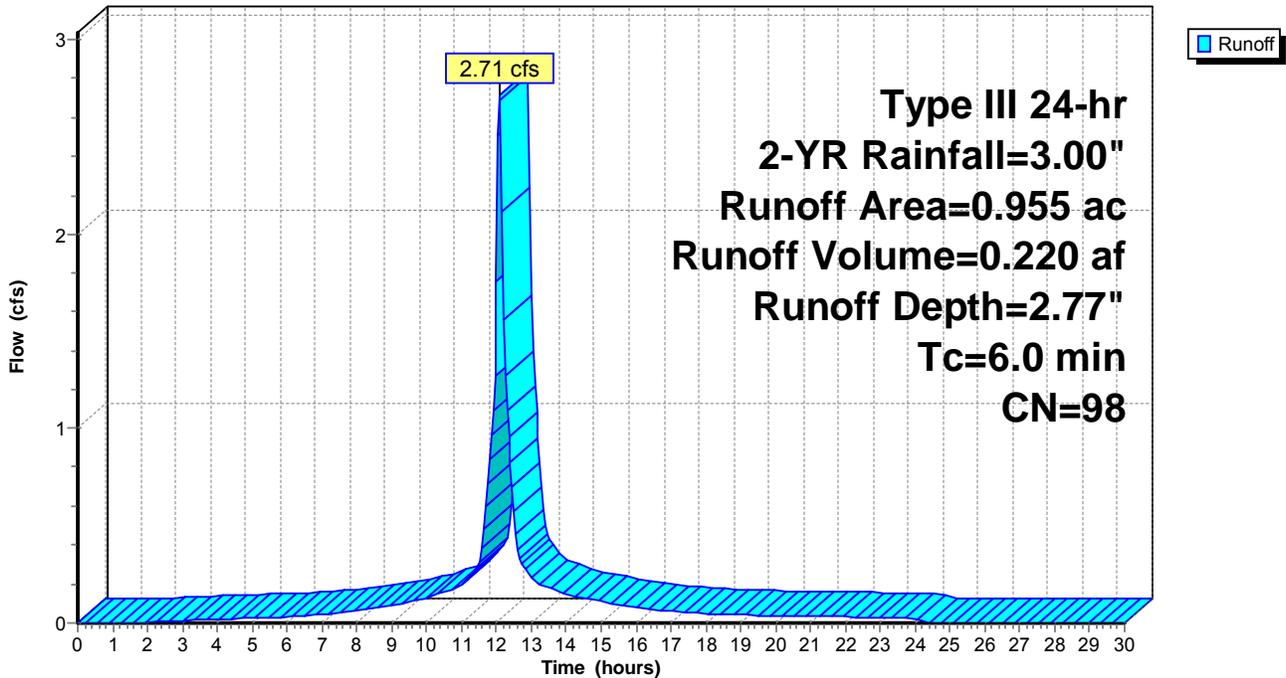
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG A
0.955	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.000	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.955	98	Weighted Average
0.955		100.00% Impervious Area

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

Subcatchment 5S: Area E05

Hydrograph



Summary for Subcatchment 6S: Area E06

Runoff = 2.49 cfs @ 12.11 hrs, Volume= 0.188 af, Depth= 1.25"

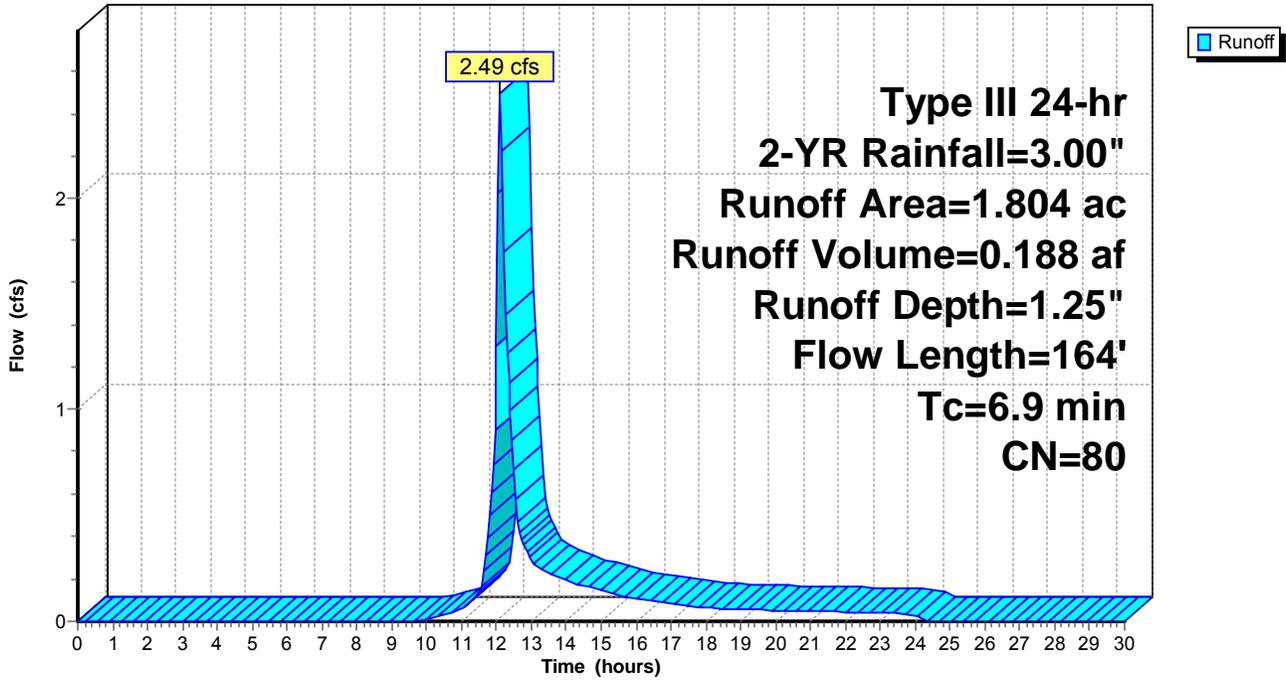
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.918	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.413	49	50-75% Grass cover, Fair, HSG A
* 0.473	72	Dirt, HSG A (Playscape)
1.804	80	Weighted Average
0.886		49.11% Pervious Area
0.918		50.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	27	0.0070	0.08		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.1	9	0.0160	2.57		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.4	128	0.0060	1.57		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
6.9	164	Total			

Subcatchment 6S: Area E06

Hydrograph



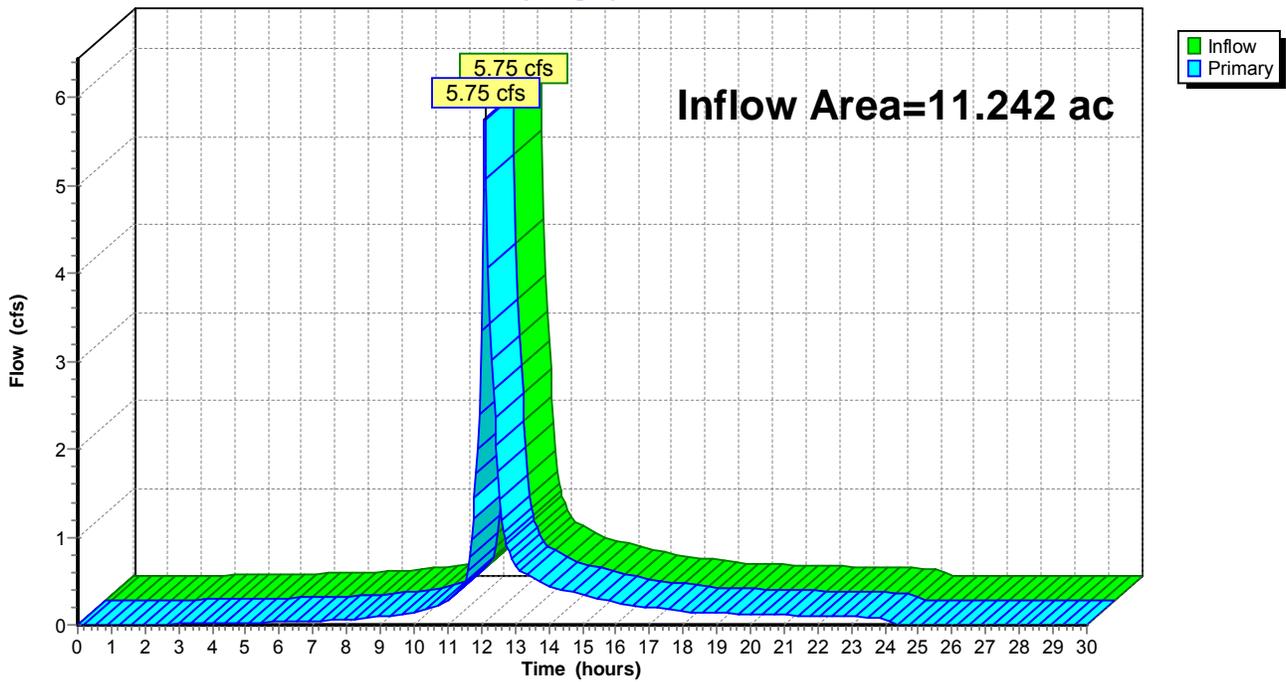
Summary for Pond 1: DP#1

Inflow Area = 11.242 ac, 21.23% Impervious, Inflow Depth = 0.53" for 2-YR event
Inflow = 5.75 cfs @ 12.10 hrs, Volume= 0.498 af
Primary = 5.75 cfs @ 12.10 hrs, Volume= 0.498 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



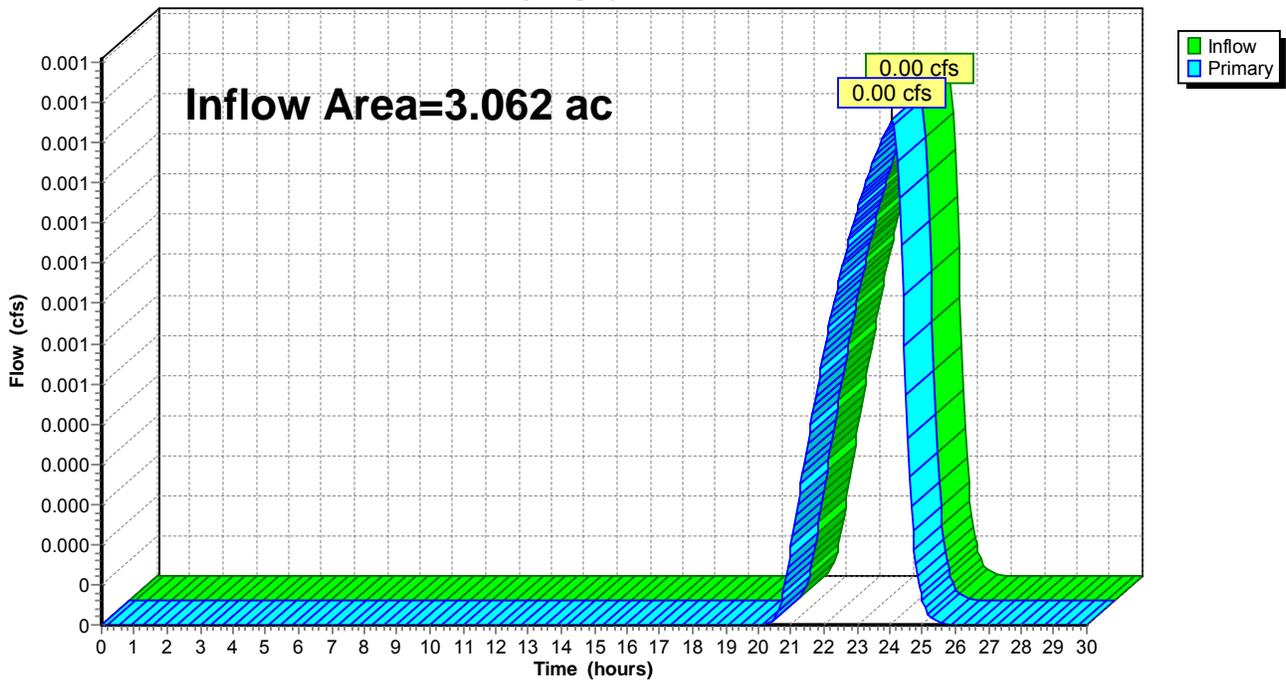
Summary for Pond 2: DP#2

Inflow Area = 3.062 ac, 7.87% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 24.08 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.08 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area E01 Runoff Area=6.670 ac 0.19% Impervious Runoff Depth=0.07"
Flow Length=452' Tc=19.4 min CN=37 Runoff=0.06 cfs 0.037 af

Subcatchment 2S: Area E02 Runoff Area=3.062 ac 7.87% Impervious Runoff Depth=0.16"
Flow Length=483' Tc=33.2 min CN=41 Runoff=0.07 cfs 0.042 af

Subcatchment 3S: Area E03 Runoff Area=1.018 ac 15.62% Impervious Runoff Depth=0.80"
Flow Length=298' Tc=21.6 min CN=56 Runoff=0.47 cfs 0.067 af

Subcatchment 4S: Area E04 Runoff Area=0.795 ac 43.02% Impervious Runoff Depth=2.21"
Flow Length=140' Tc=12.8 min CN=77 Runoff=1.63 cfs 0.146 af

Subcatchment 5S: Area E05 Runoff Area=0.955 ac 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=4.10 cfs 0.339 af

Subcatchment 6S: Area E06 Runoff Area=1.804 ac 50.89% Impervious Runoff Depth=2.46"
Flow Length=164' Tc=6.9 min CN=80 Runoff=4.98 cfs 0.370 af

Pond 1: DP#1 Inflow=10.47 cfs 0.960 af
Primary=10.47 cfs 0.960 af

Pond 2: DP#2 Inflow=0.07 cfs 0.042 af
Primary=0.07 cfs 0.042 af

Total Runoff Area = 14.304 ac Runoff Volume = 1.002 af Average Runoff Depth = 0.84"
81.63% Pervious = 11.676 ac 18.37% Impervious = 2.628 ac

Summary for Subcatchment 1S: Area E01

Runoff = 0.06 cfs @ 15.49 hrs, Volume= 0.037 af, Depth= 0.07"

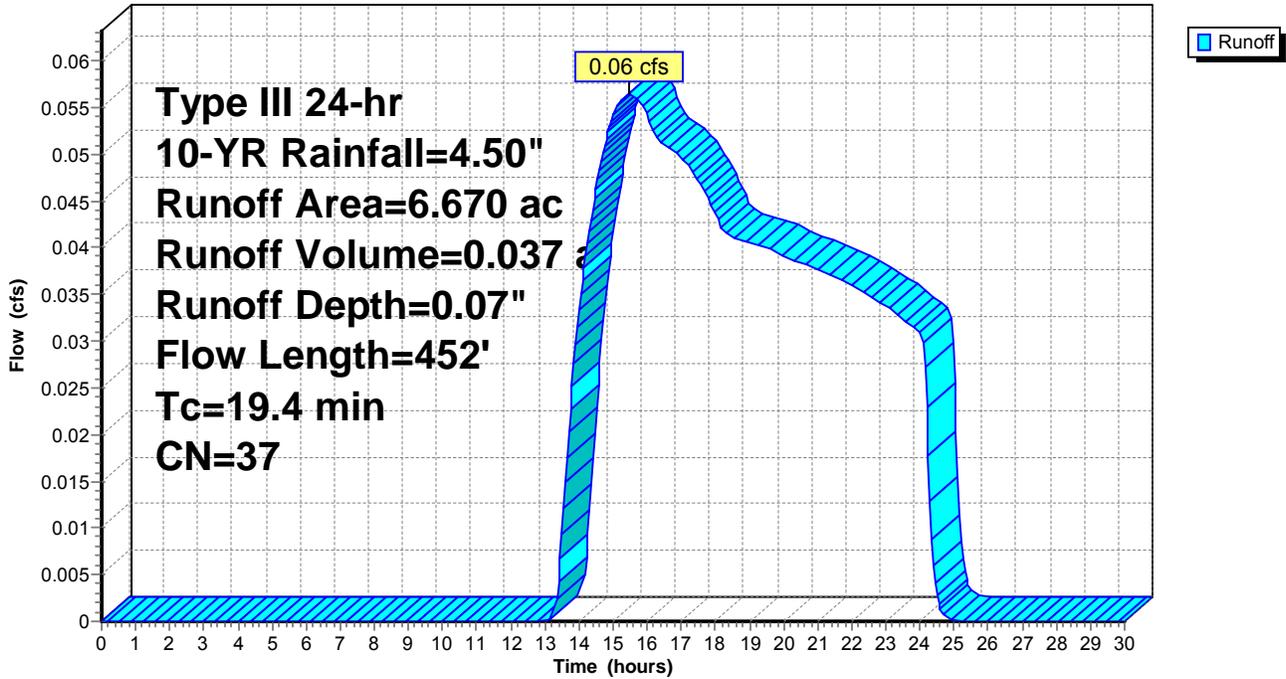
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.046	36	Woods, Fair, HSG A
0.611	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.670	37	Weighted Average
6.657		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area E01

Hydrograph



Summary for Subcatchment 2S: Area E02

Runoff = 0.07 cfs @ 14.00 hrs, Volume= 0.042 af, Depth= 0.16"

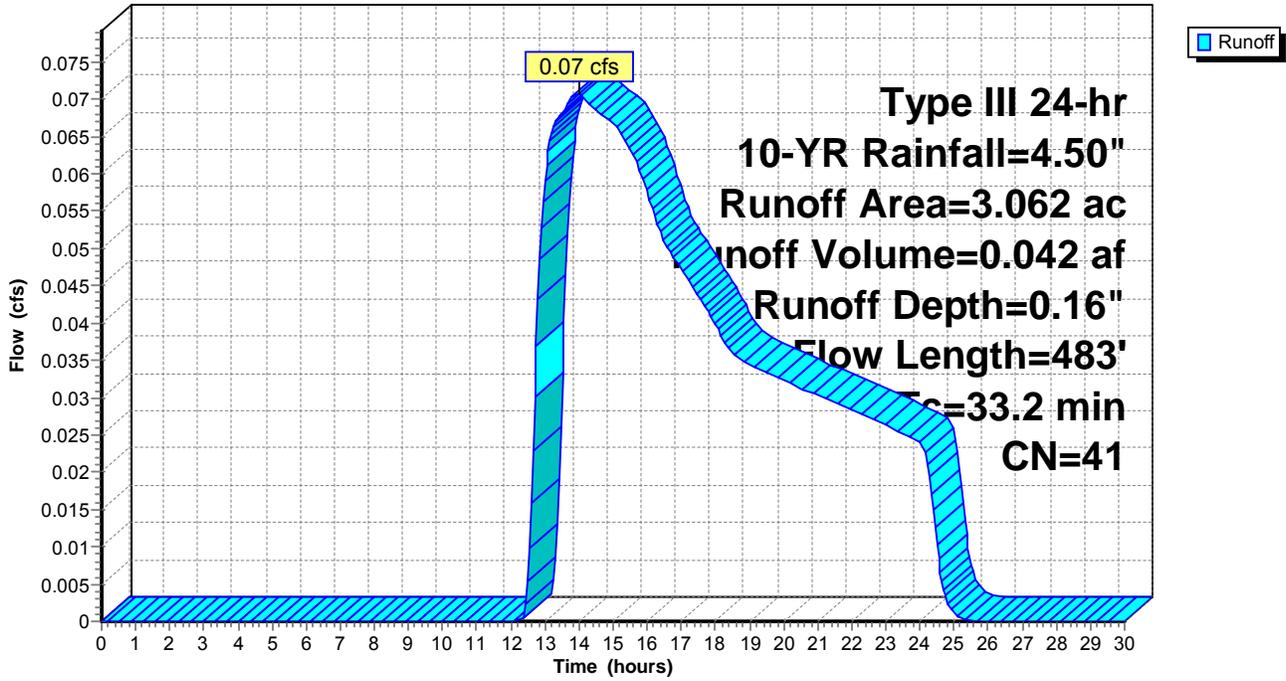
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.241	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
2.708	36	Woods, Fair, HSG A
0.113	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
3.062	41	Weighted Average
2.821		92.13% Pervious Area
0.241		7.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	72	0.0910	0.13		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.00"
4.4	150	0.0130	0.57		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
19.5	261	0.0020	0.22		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
33.2	483	Total			

Subcatchment 2S: Area E02

Hydrograph



Summary for Subcatchment 3S: Area E03

Runoff = 0.47 cfs @ 12.38 hrs, Volume= 0.067 af, Depth= 0.80"

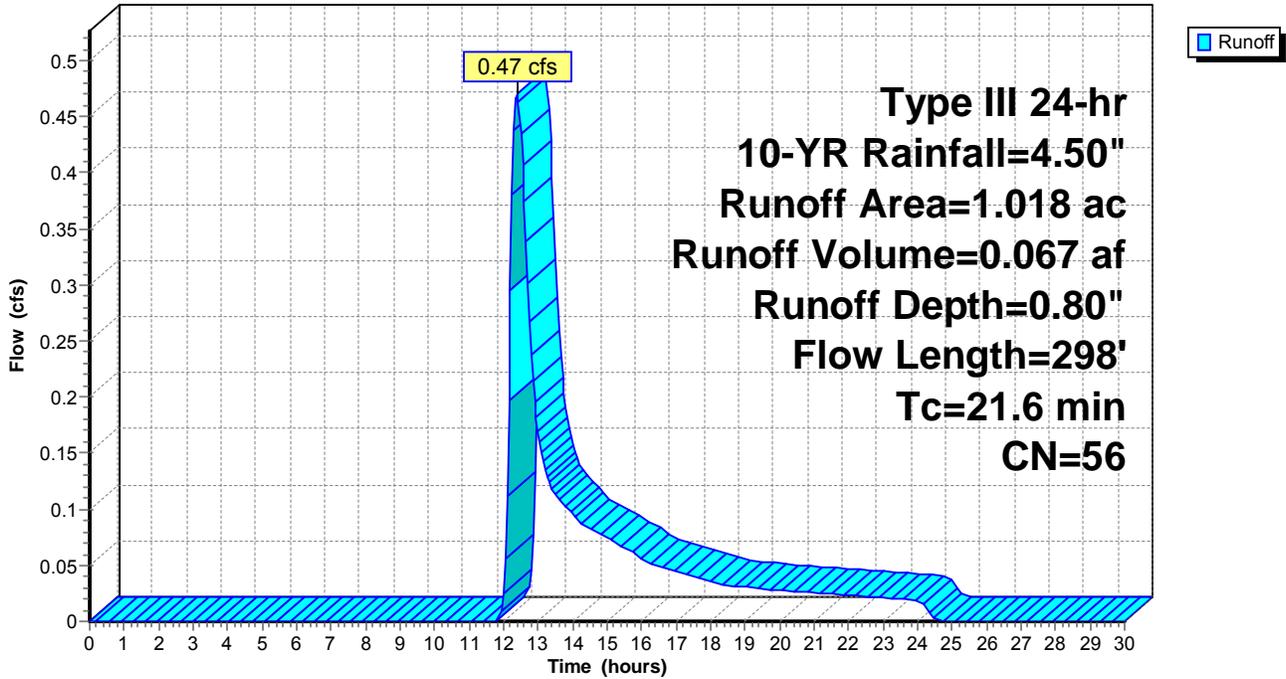
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.159	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.021	36	Woods, Fair, HSG A
0.838	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
1.018	56	Weighted Average
0.859		84.38% Pervious Area
0.159		15.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0050	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.3	118	0.0150	0.86		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.7	80	0.0120	0.77		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
21.6	298	Total			

Subcatchment 3S: Area E03

Hydrograph



20111126A10_EX01

Prepared by Fuss & O'Neill

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Type III 24-hr 10-YR Rainfall=4.50"

Printed 5/23/2013

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Summary for Subcatchment 4S: Area E04

Runoff = 1.63 cfs @ 12.18 hrs, Volume= 0.146 af, Depth= 2.21"

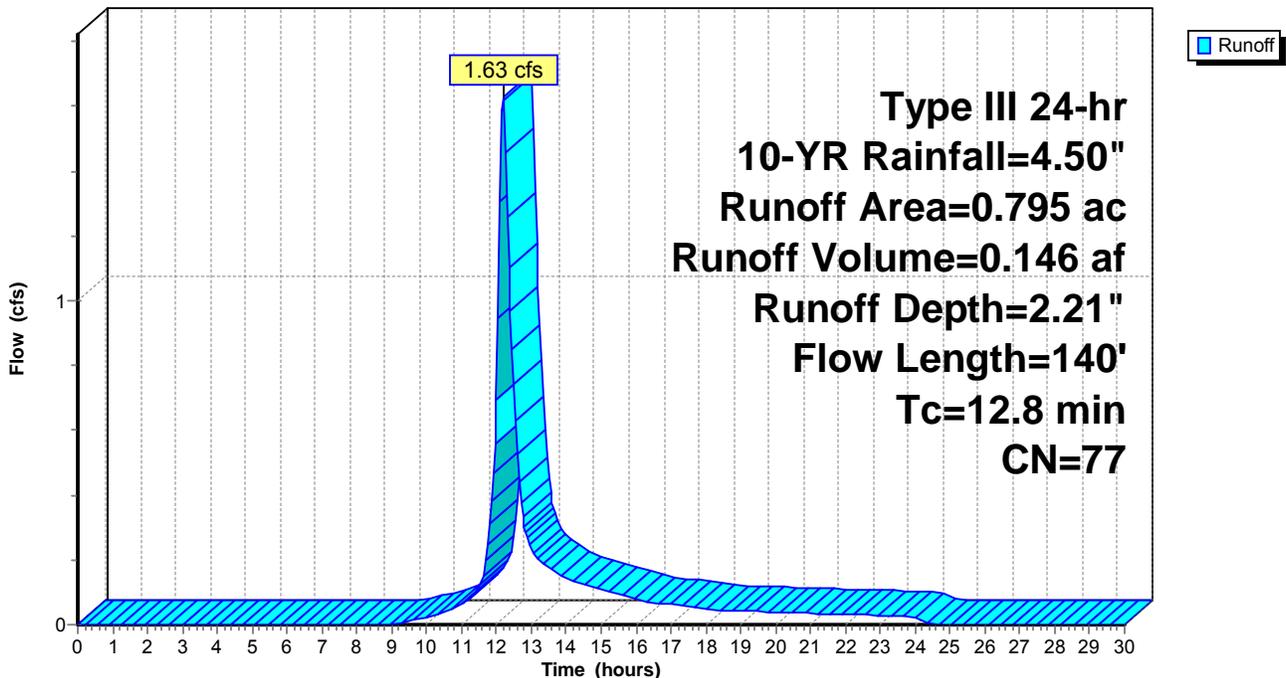
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.342	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.217	49	50-75% Grass cover, Fair, HSG A
* 0.236	72	Dirt, HSG A (Playscape)
0.795	77	Weighted Average
0.453		56.98% Pervious Area
0.342		43.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	107	0.0130	0.14		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
0.1	33	0.0470	4.40		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
12.8	140	Total			

Subcatchment 4S: Area E04

Hydrograph



Summary for Subcatchment 5S: Area E05

Runoff = 4.10 cfs @ 12.09 hrs, Volume= 0.339 af, Depth= 4.26"

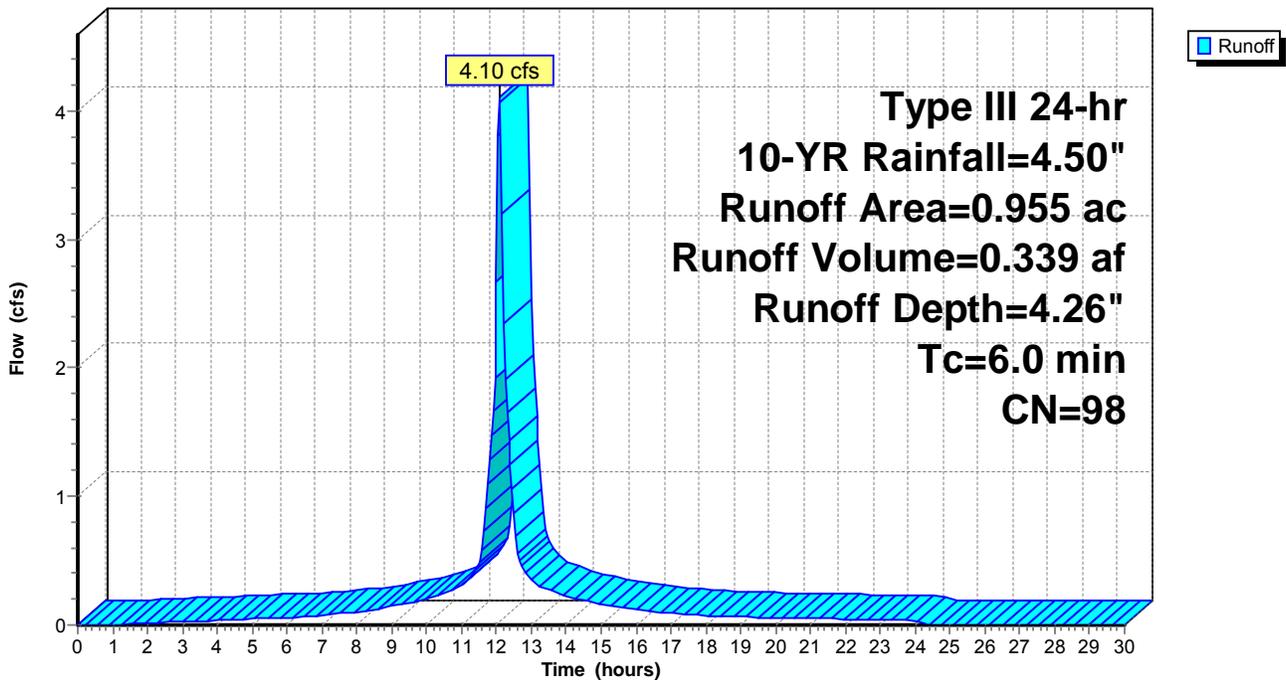
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG A
0.955	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.000	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.955	98	Weighted Average
0.955		100.00% Impervious Area

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

Subcatchment 5S: Area E05

Hydrograph



Summary for Subcatchment 6S: Area E06

Runoff = 4.98 cfs @ 12.10 hrs, Volume= 0.370 af, Depth= 2.46"

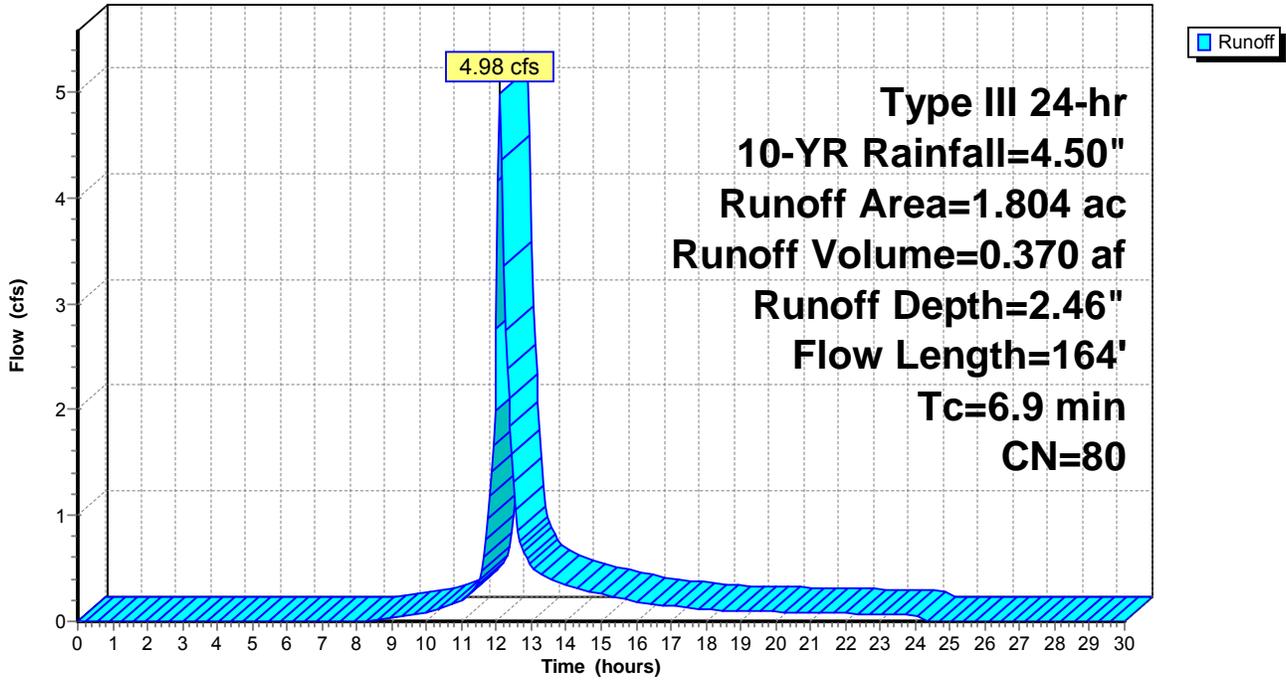
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.918	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.413	49	50-75% Grass cover, Fair, HSG A
* 0.473	72	Dirt, HSG A (Playscape)
1.804	80	Weighted Average
0.886		49.11% Pervious Area
0.918		50.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	27	0.0070	0.08		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.1	9	0.0160	2.57		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.4	128	0.0060	1.57		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
6.9	164	Total			

Subcatchment 6S: Area E06

Hydrograph



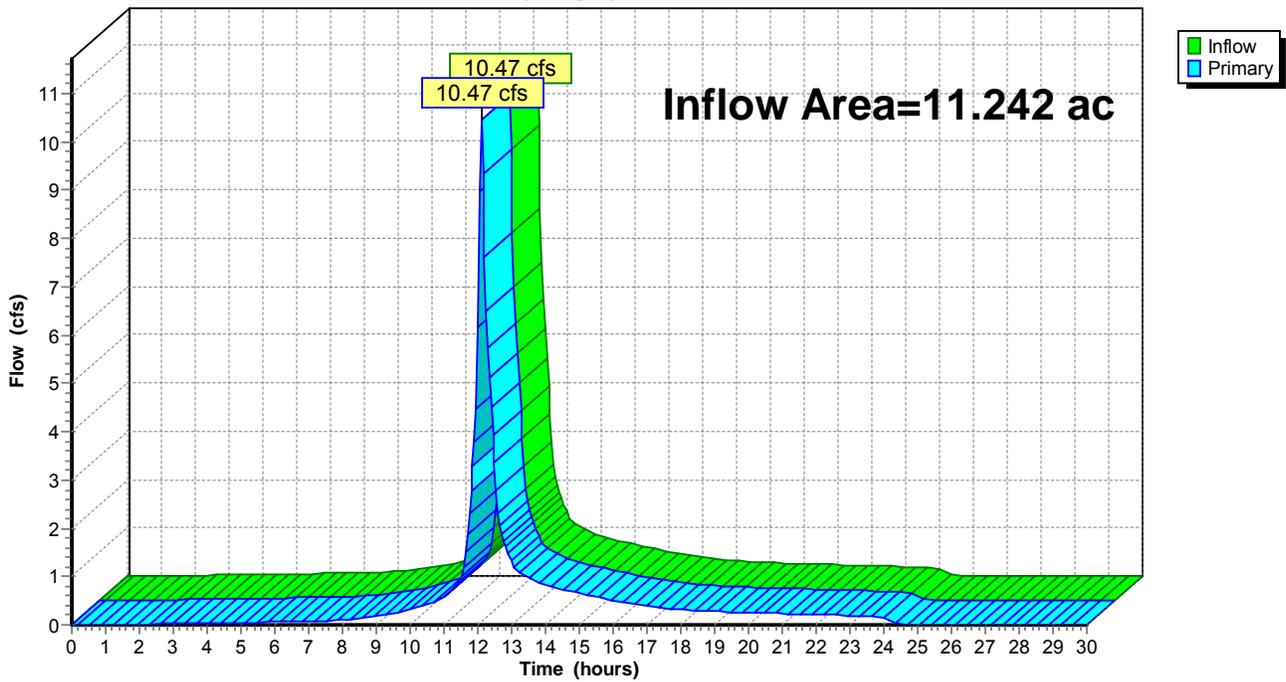
Summary for Pond 1: DP#1

Inflow Area = 11.242 ac, 21.23% Impervious, Inflow Depth = 1.02" for 10-YR event
Inflow = 10.47 cfs @ 12.10 hrs, Volume= 0.960 af
Primary = 10.47 cfs @ 12.10 hrs, Volume= 0.960 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



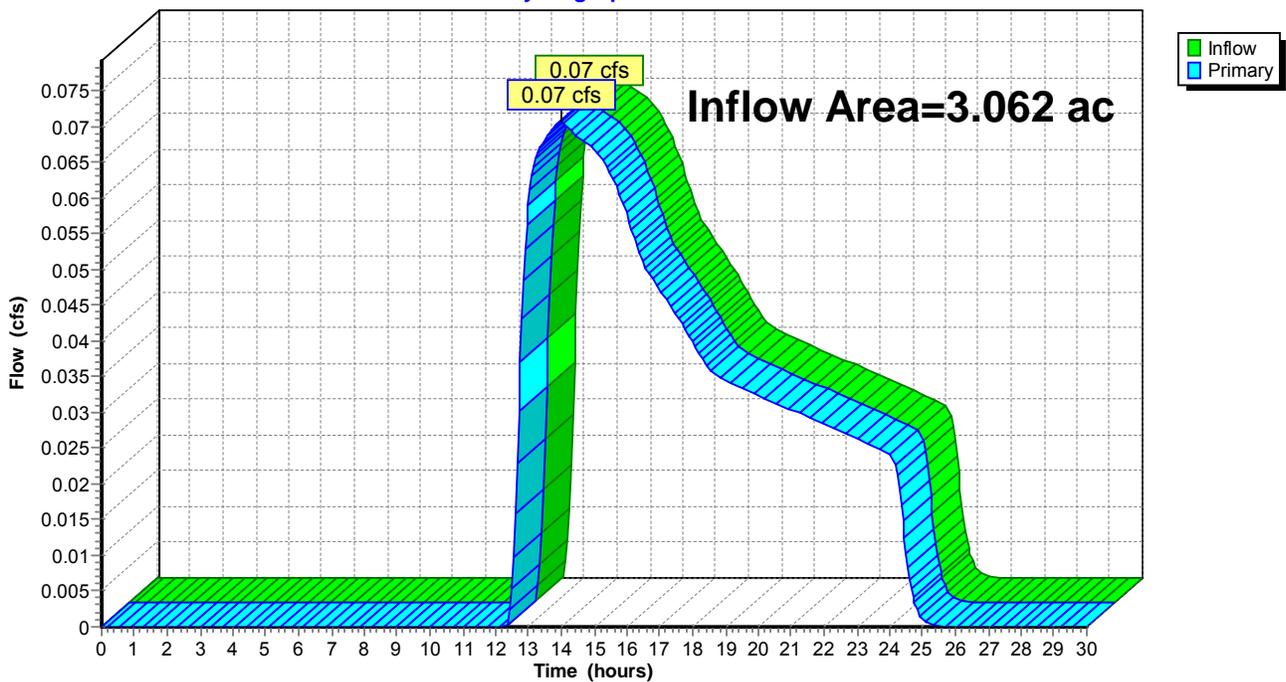
Summary for Pond 2: DP#2

Inflow Area = 3.062 ac, 7.87% Impervious, Inflow Depth = 0.16" for 10-YR event
Inflow = 0.07 cfs @ 14.00 hrs, Volume= 0.042 af
Primary = 0.07 cfs @ 14.00 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area E01 Runoff Area=6.670 ac 0.19% Impervious Runoff Depth=0.17"
Flow Length=452' Tc=19.4 min CN=37 Runoff=0.16 cfs 0.095 af

Subcatchment 2S: Area E02 Runoff Area=3.062 ac 7.87% Impervious Runoff Depth=0.32"
Flow Length=483' Tc=33.2 min CN=41 Runoff=0.23 cfs 0.082 af

Subcatchment 3S: Area E03 Runoff Area=1.018 ac 15.62% Impervious Runoff Depth=1.15"
Flow Length=298' Tc=21.6 min CN=56 Runoff=0.75 cfs 0.097 af

Subcatchment 4S: Area E04 Runoff Area=0.795 ac 43.02% Impervious Runoff Depth=2.79"
Flow Length=140' Tc=12.8 min CN=77 Runoff=2.06 cfs 0.185 af

Subcatchment 5S: Area E05 Runoff Area=0.955 ac 100.00% Impervious Runoff Depth=4.96"
Tc=6.0 min CN=98 Runoff=4.75 cfs 0.395 af

Subcatchment 6S: Area E06 Runoff Area=1.804 ac 50.89% Impervious Runoff Depth=3.07"
Flow Length=164' Tc=6.9 min CN=80 Runoff=6.20 cfs 0.461 af

Pond 1: DP#1 Inflow=12.84 cfs 1.233 af
Primary=12.84 cfs 1.233 af

Pond 2: DP#2 Inflow=0.23 cfs 0.082 af
Primary=0.23 cfs 0.082 af

Total Runoff Area = 14.304 ac Runoff Volume = 1.316 af Average Runoff Depth = 1.10"
81.63% Pervious = 11.676 ac 18.37% Impervious = 2.628 ac

Summary for Subcatchment 1S: Area E01

Runoff = 0.16 cfs @ 13.90 hrs, Volume= 0.095 af, Depth= 0.17"

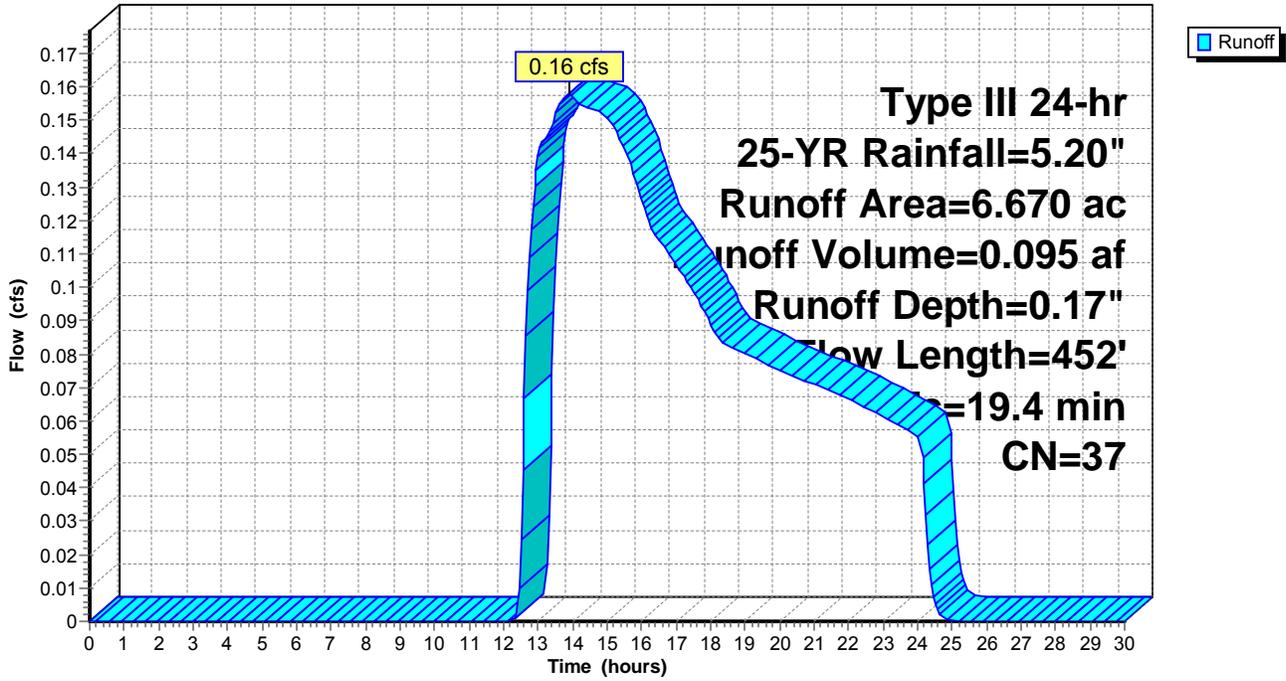
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.046	36	Woods, Fair, HSG A
0.611	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.670	37	Weighted Average
6.657		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area E01

Hydrograph



Summary for Subcatchment 2S: Area E02

Runoff = 0.23 cfs @ 12.81 hrs, Volume= 0.082 af, Depth= 0.32"

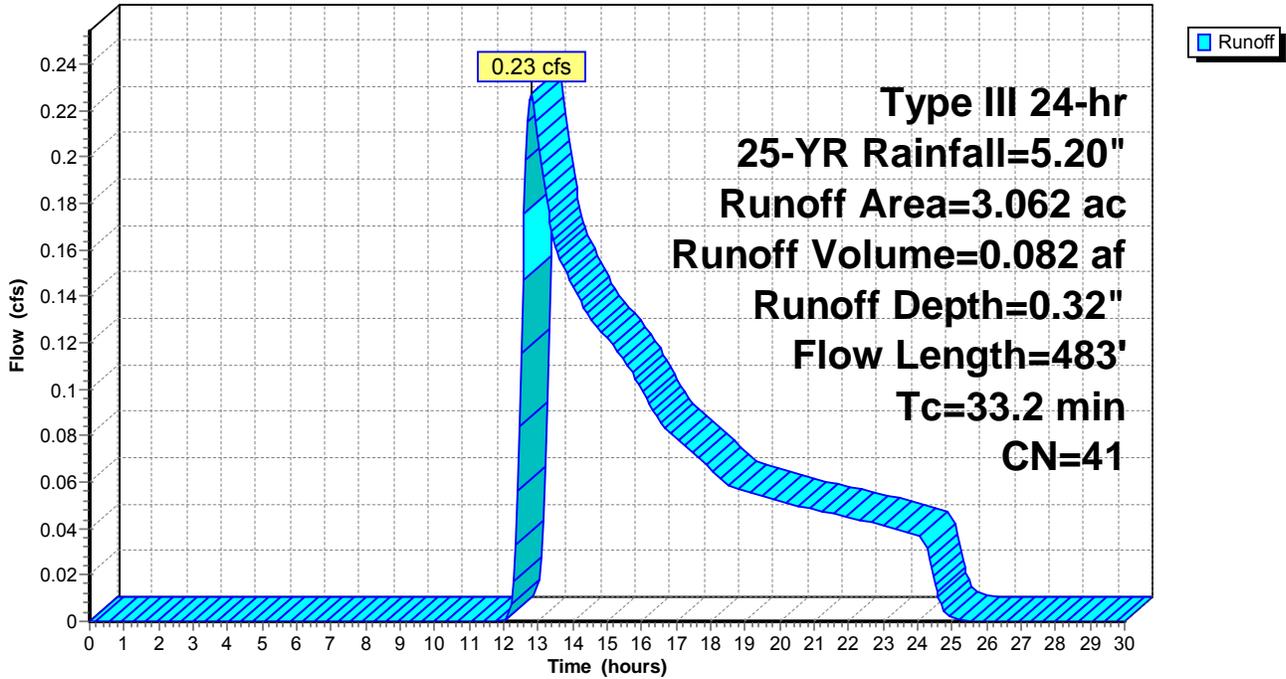
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.241	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
2.708	36	Woods, Fair, HSG A
0.113	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
3.062	41	Weighted Average
2.821		92.13% Pervious Area
0.241		7.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	72	0.0910	0.13		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.00"
4.4	150	0.0130	0.57		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
19.5	261	0.0020	0.22		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
33.2	483	Total			

Subcatchment 2S: Area E02

Hydrograph



Summary for Subcatchment 3S: Area E03

Runoff = 0.75 cfs @ 12.36 hrs, Volume= 0.097 af, Depth= 1.15"

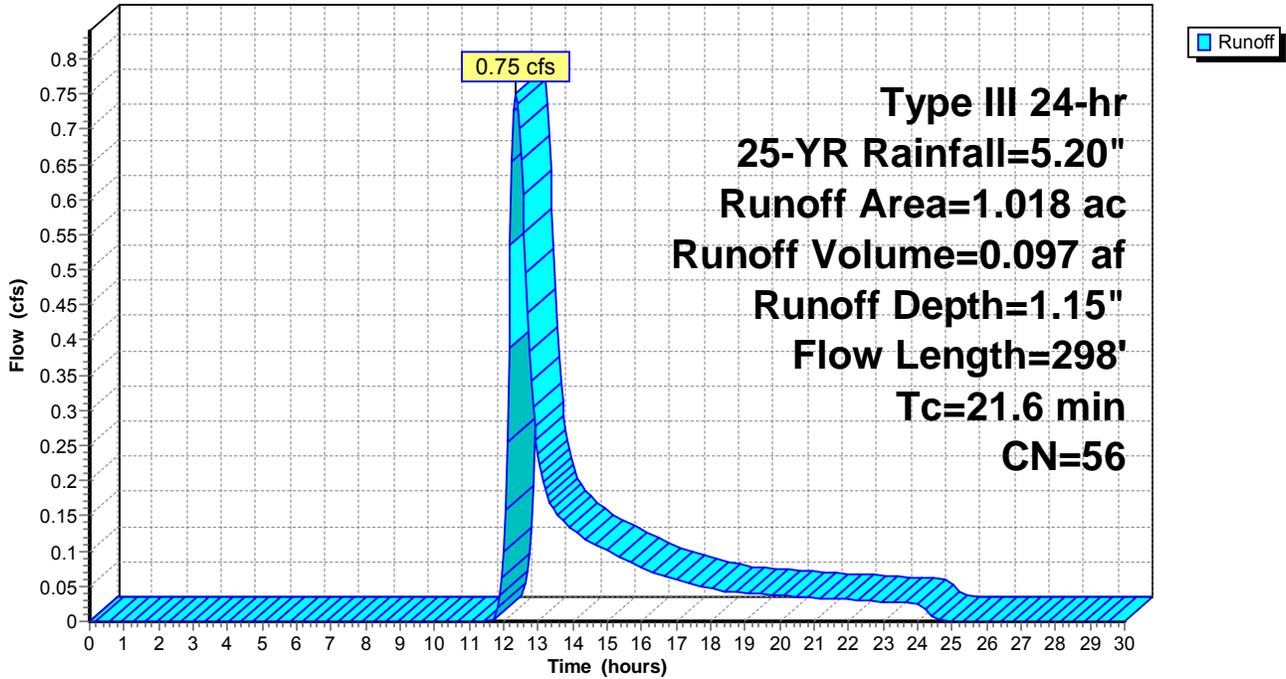
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.159	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.021	36	Woods, Fair, HSG A
0.838	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
1.018	56	Weighted Average
0.859		84.38% Pervious Area
0.159		15.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0050	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.3	118	0.0150	0.86		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.7	80	0.0120	0.77		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
21.6	298	Total			

Subcatchment 3S: Area E03

Hydrograph



Summary for Subcatchment 4S: Area E04

Runoff = 2.06 cfs @ 12.18 hrs, Volume= 0.185 af, Depth= 2.79"

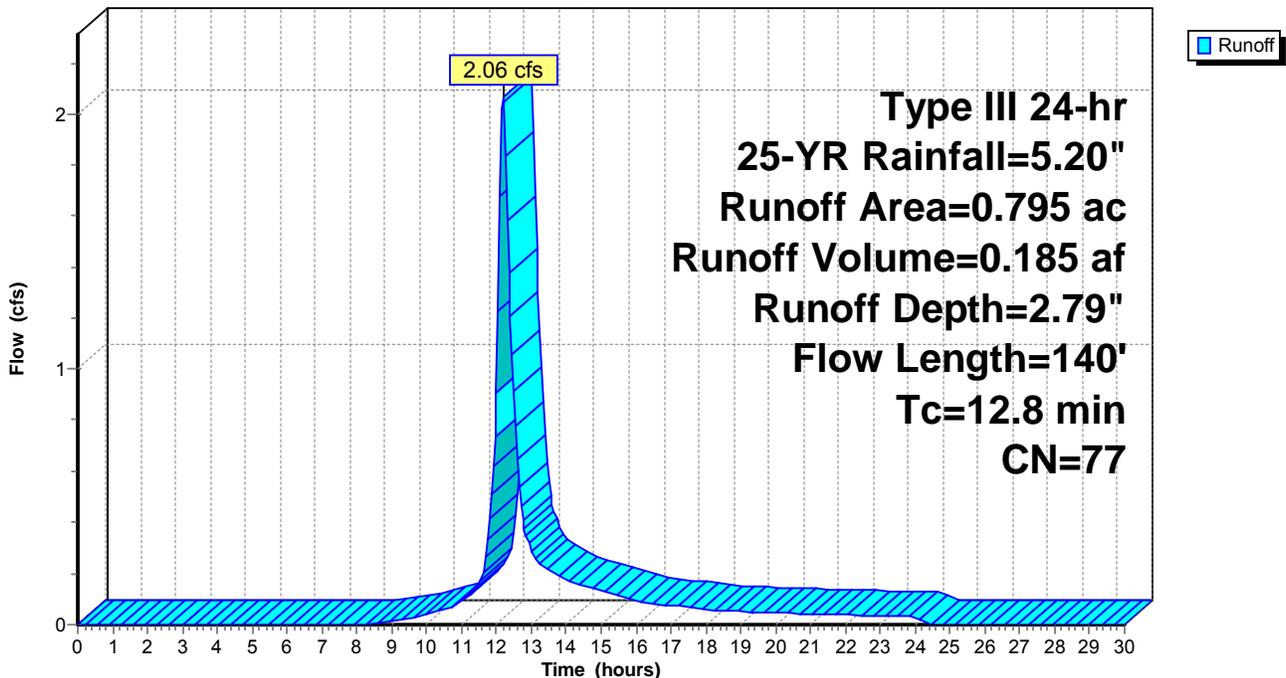
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.342	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.217	49	50-75% Grass cover, Fair, HSG A
* 0.236	72	Dirt, HSG A (Playscape)
0.795	77	Weighted Average
0.453		56.98% Pervious Area
0.342		43.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	107	0.0130	0.14		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
0.1	33	0.0470	4.40		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
12.8	140	Total			

Subcatchment 4S: Area E04

Hydrograph



Summary for Subcatchment 5S: Area E05

Runoff = 4.75 cfs @ 12.09 hrs, Volume= 0.395 af, Depth= 4.96"

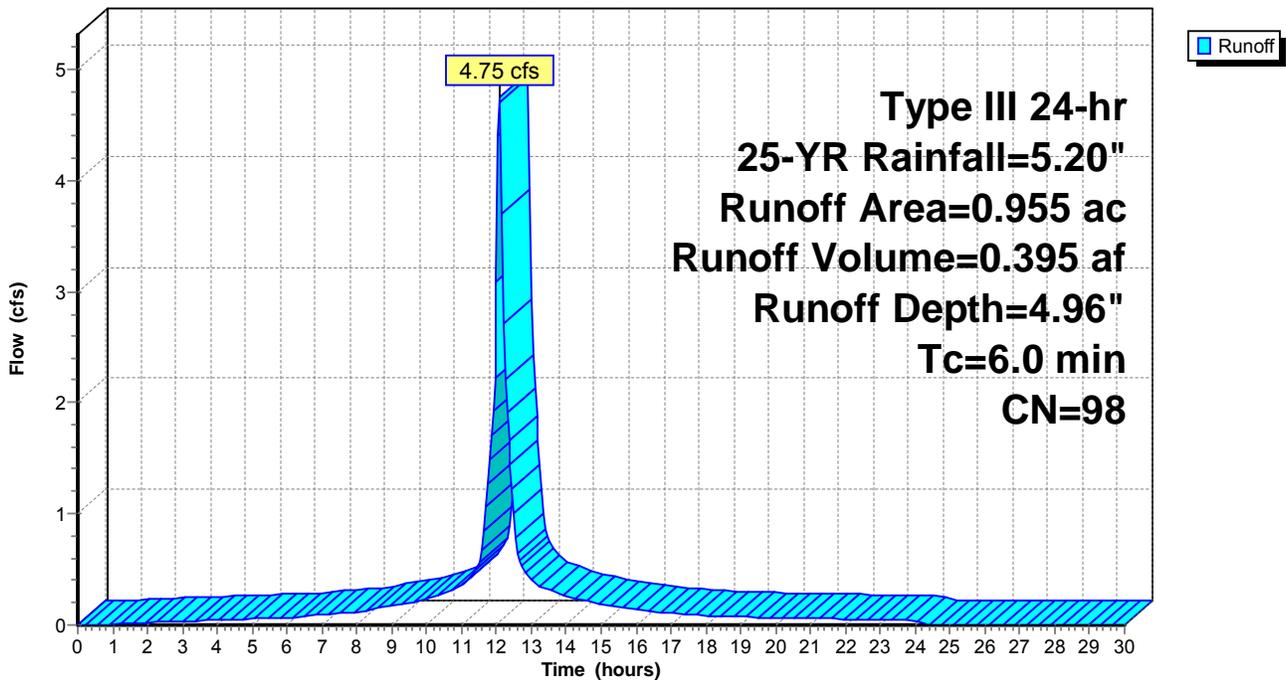
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG A
0.955	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.000	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.955	98	Weighted Average
0.955		100.00% Impervious Area

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

Subcatchment 5S: Area E05

Hydrograph



Summary for Subcatchment 6S: Area E06

Runoff = 6.20 cfs @ 12.10 hrs, Volume= 0.461 af, Depth= 3.07"

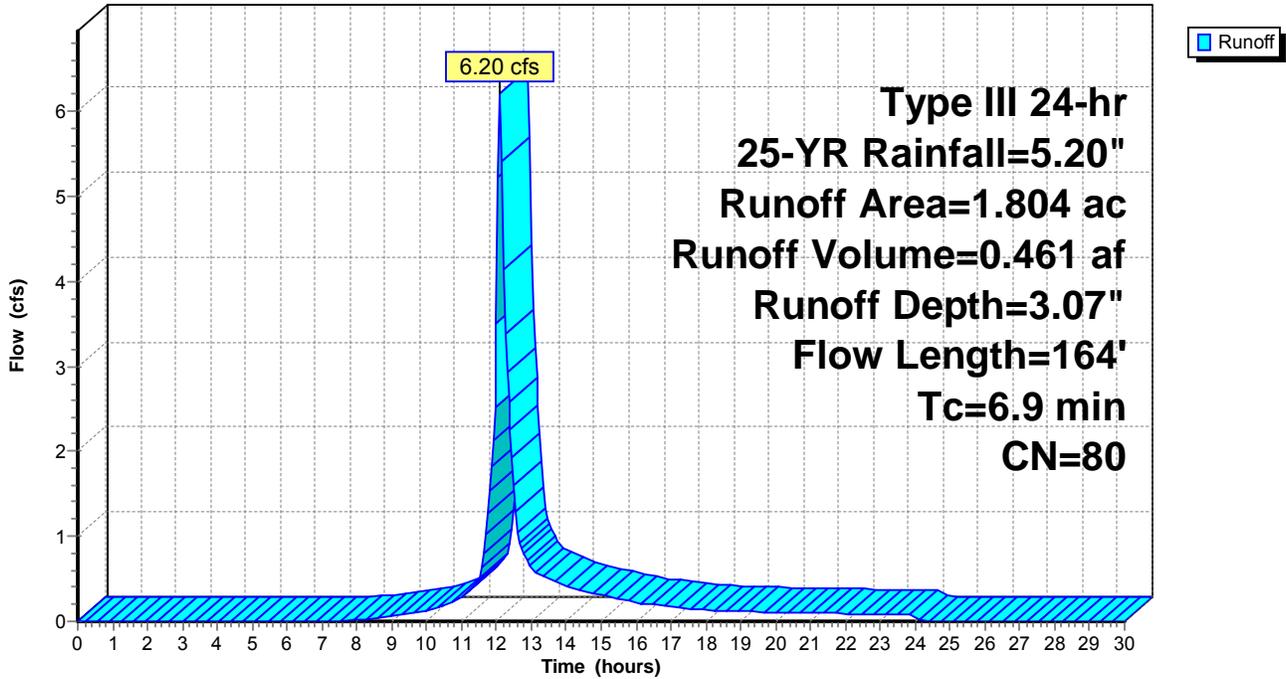
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.918	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.413	49	50-75% Grass cover, Fair, HSG A
* 0.473	72	Dirt, HSG A (Playscape)
1.804	80	Weighted Average
0.886		49.11% Pervious Area
0.918		50.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	27	0.0070	0.08		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.1	9	0.0160	2.57		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.4	128	0.0060	1.57		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
6.9	164	Total			

Subcatchment 6S: Area E06

Hydrograph



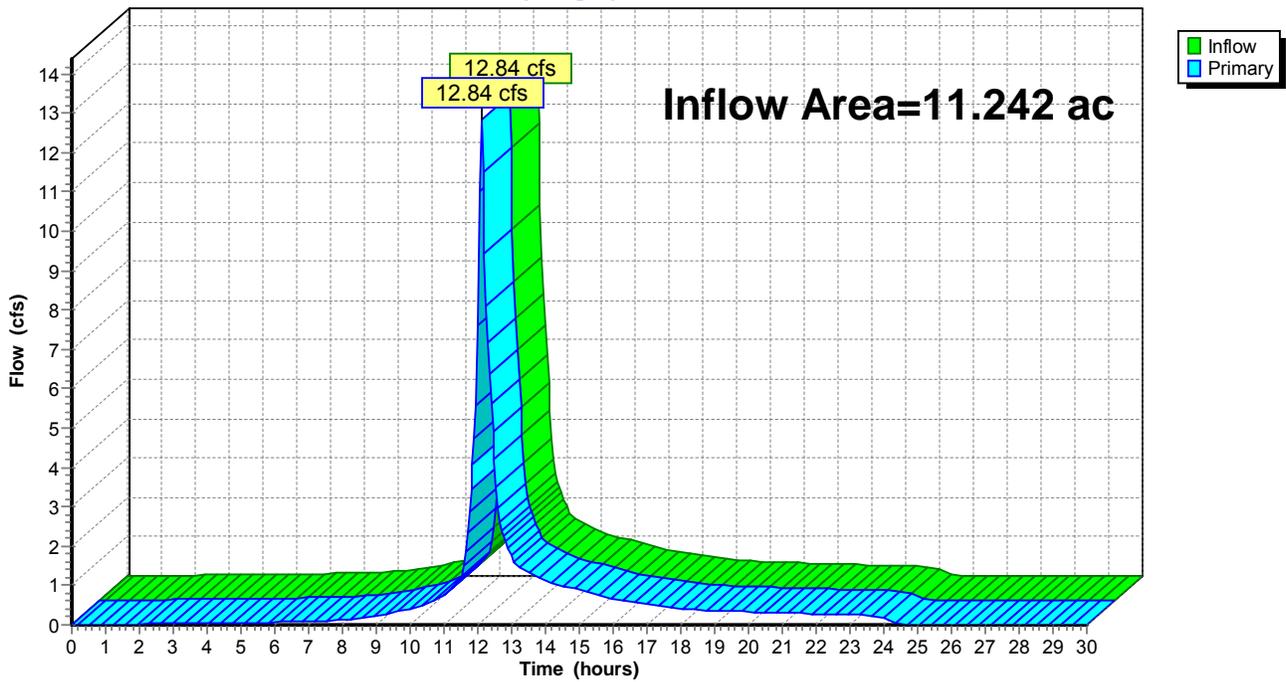
Summary for Pond 1: DP#1

Inflow Area = 11.242 ac, 21.23% Impervious, Inflow Depth = 1.32" for 25-YR event
Inflow = 12.84 cfs @ 12.10 hrs, Volume= 1.233 af
Primary = 12.84 cfs @ 12.10 hrs, Volume= 1.233 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



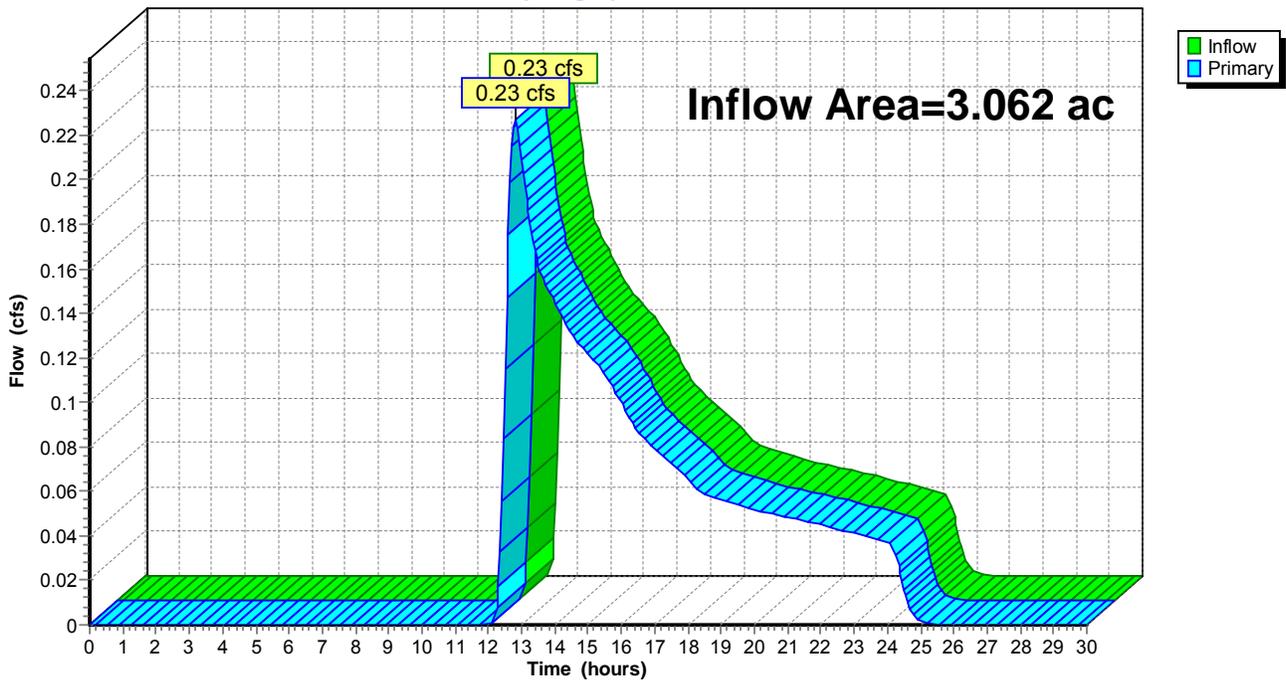
Summary for Pond 2: DP#2

Inflow Area = 3.062 ac, 7.87% Impervious, Inflow Depth = 0.32" for 25-YR event
Inflow = 0.23 cfs @ 12.81 hrs, Volume= 0.082 af
Primary = 0.23 cfs @ 12.81 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area E01 Runoff Area=6.670 ac 0.19% Impervious Runoff Depth=0.32"
Flow Length=452' Tc=19.4 min CN=37 Runoff=0.51 cfs 0.177 af

Subcatchment 2S: Area E02 Runoff Area=3.062 ac 7.87% Impervious Runoff Depth=0.52"
Flow Length=483' Tc=33.2 min CN=41 Runoff=0.51 cfs 0.134 af

Subcatchment 3S: Area E03 Runoff Area=1.018 ac 15.62% Impervious Runoff Depth=1.54"
Flow Length=298' Tc=21.6 min CN=56 Runoff=1.06 cfs 0.130 af

Subcatchment 4S: Area E04 Runoff Area=0.795 ac 43.02% Impervious Runoff Depth=3.39"
Flow Length=140' Tc=12.8 min CN=77 Runoff=2.51 cfs 0.225 af

Subcatchment 5S: Area E05 Runoff Area=0.955 ac 100.00% Impervious Runoff Depth=5.66"
Tc=6.0 min CN=98 Runoff=5.39 cfs 0.451 af

Subcatchment 6S: Area E06 Runoff Area=1.804 ac 50.89% Impervious Runoff Depth=3.69"
Flow Length=164' Tc=6.9 min CN=80 Runoff=7.44 cfs 0.555 af

Pond 1: DP#1 Inflow=15.27 cfs 1.538 af
Primary=15.27 cfs 1.538 af

Pond 2: DP#2 Inflow=0.51 cfs 0.134 af
Primary=0.51 cfs 0.134 af

Total Runoff Area = 14.304 ac Runoff Volume = 1.672 af Average Runoff Depth = 1.40"
81.63% Pervious = 11.676 ac 18.37% Impervious = 2.628 ac

Summary for Subcatchment 1S: Area E01

Runoff = 0.51 cfs @ 12.61 hrs, Volume= 0.177 af, Depth= 0.32"

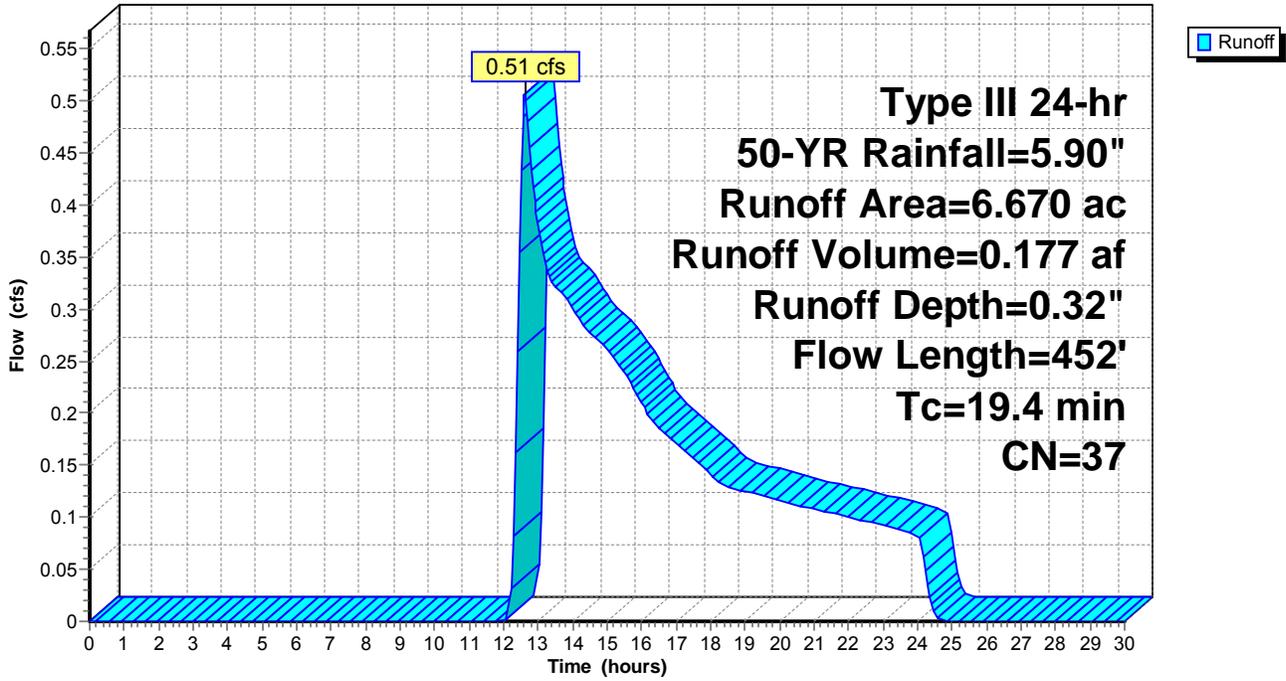
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.046	36	Woods, Fair, HSG A
0.611	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.670	37	Weighted Average
6.657		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area E01

Hydrograph



Summary for Subcatchment 2S: Area E02

Runoff = 0.51 cfs @ 12.70 hrs, Volume= 0.134 af, Depth= 0.52"

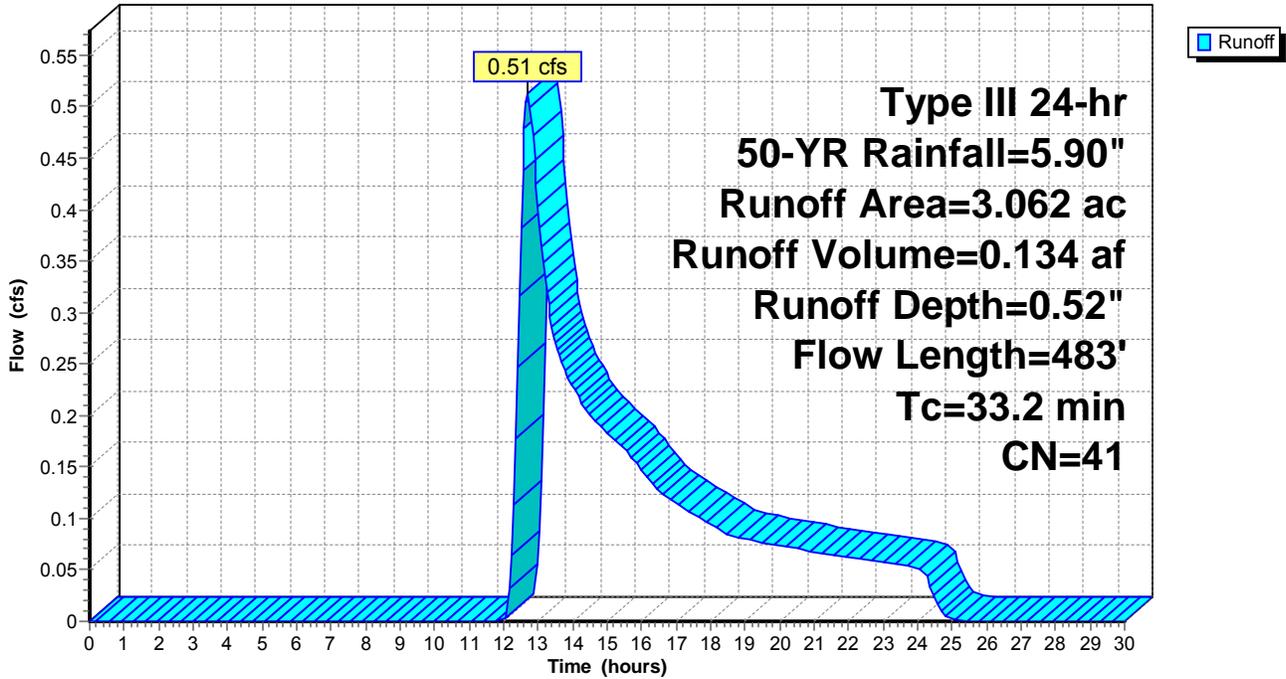
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.241	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
2.708	36	Woods, Fair, HSG A
0.113	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
3.062	41	Weighted Average
2.821		92.13% Pervious Area
0.241		7.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	72	0.0910	0.13		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.00"
4.4	150	0.0130	0.57		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
19.5	261	0.0020	0.22		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
33.2	483	Total			

Subcatchment 2S: Area E02

Hydrograph



Summary for Subcatchment 3S: Area E03

Runoff = 1.06 cfs @ 12.34 hrs, Volume= 0.130 af, Depth= 1.54"

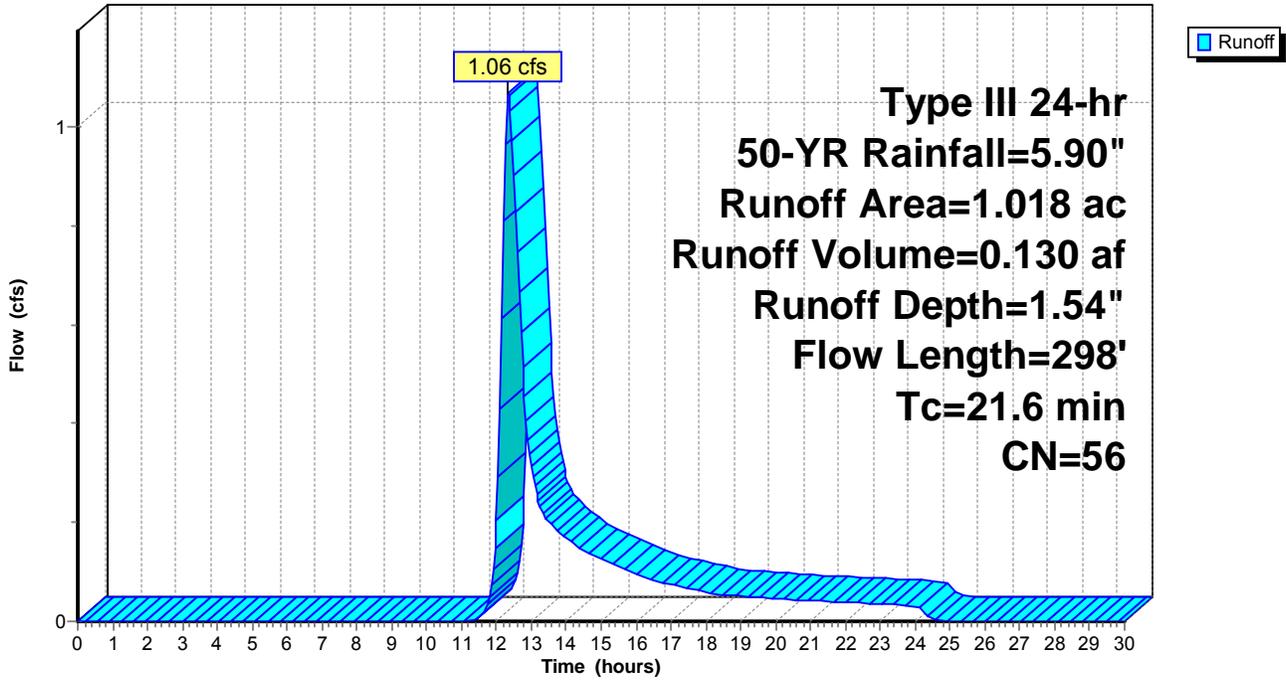
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.159	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.021	36	Woods, Fair, HSG A
0.838	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
1.018	56	Weighted Average
0.859		84.38% Pervious Area
0.159		15.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0050	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.3	118	0.0150	0.86		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.7	80	0.0120	0.77		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
21.6	298	Total			

Subcatchment 3S: Area E03

Hydrograph



Summary for Subcatchment 4S: Area E04

Runoff = 2.51 cfs @ 12.18 hrs, Volume= 0.225 af, Depth= 3.39"

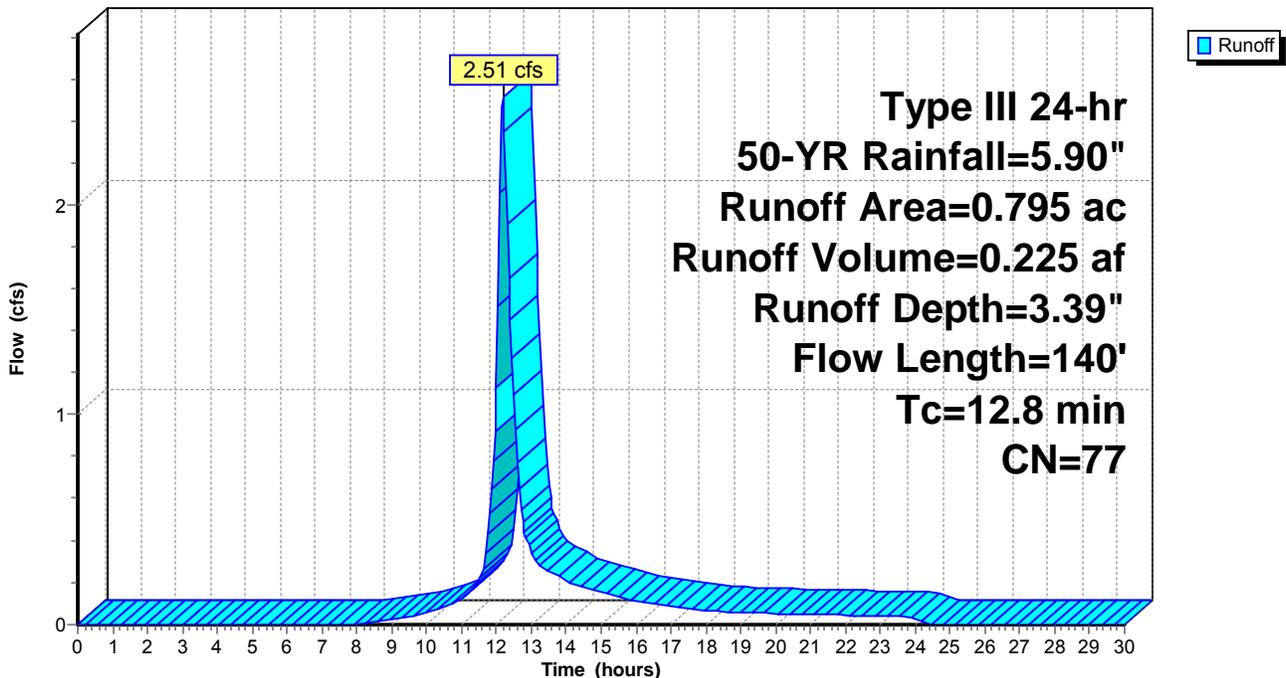
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.342	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.217	49	50-75% Grass cover, Fair, HSG A
* 0.236	72	Dirt, HSG A (Playscape)
0.795	77	Weighted Average
0.453		56.98% Pervious Area
0.342		43.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	107	0.0130	0.14		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
0.1	33	0.0470	4.40		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
12.8	140	Total			

Subcatchment 4S: Area E04

Hydrograph



Summary for Subcatchment 5S: Area E05

Runoff = 5.39 cfs @ 12.09 hrs, Volume= 0.451 af, Depth= 5.66"

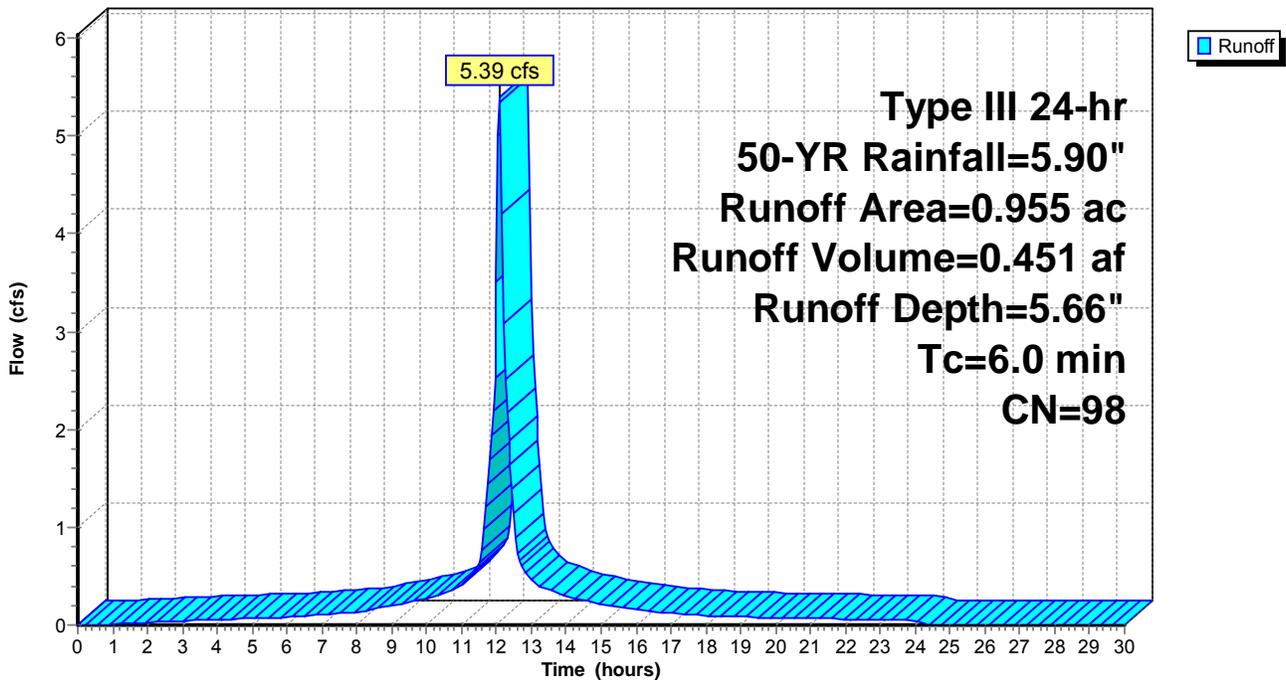
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG A
0.955	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.000	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.955	98	Weighted Average
0.955		100.00% Impervious Area

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

Subcatchment 5S: Area E05

Hydrograph



Summary for Subcatchment 6S: Area E06

Runoff = 7.44 cfs @ 12.10 hrs, Volume= 0.555 af, Depth= 3.69"

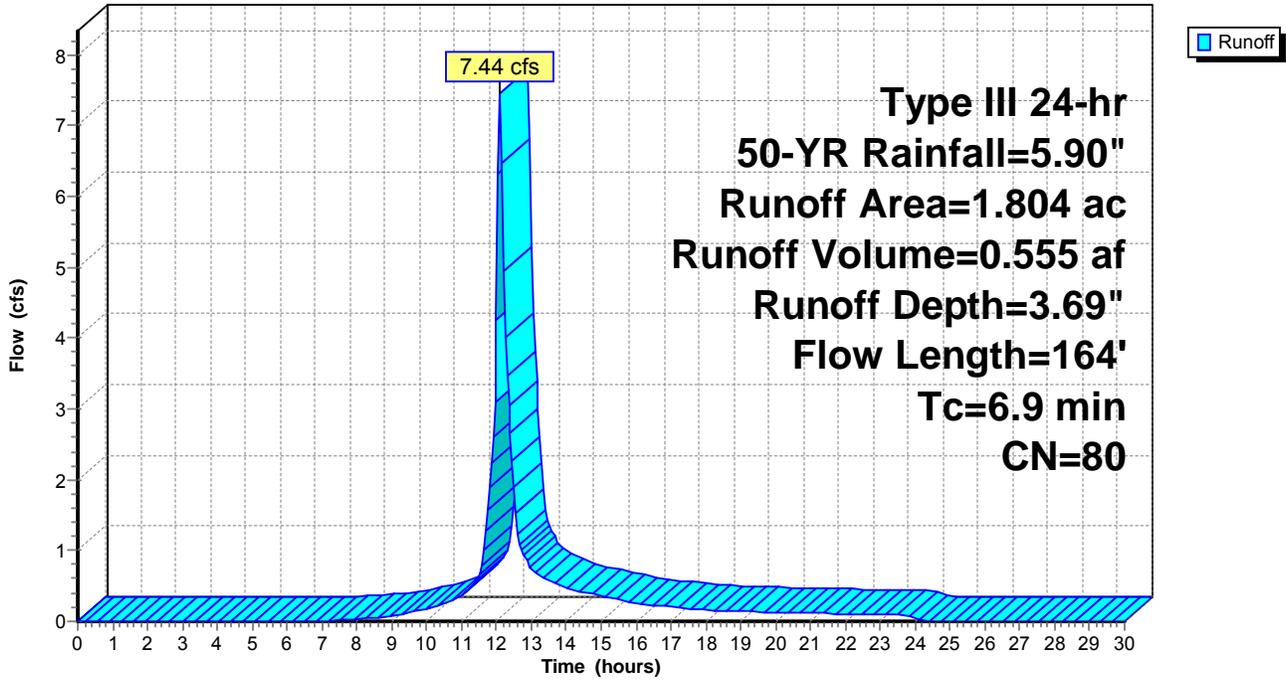
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.918	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.413	49	50-75% Grass cover, Fair, HSG A
* 0.473	72	Dirt, HSG A (Playscape)
1.804	80	Weighted Average
0.886		49.11% Pervious Area
0.918		50.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	27	0.0070	0.08		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.1	9	0.0160	2.57		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.4	128	0.0060	1.57		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
6.9	164	Total			

Subcatchment 6S: Area E06

Hydrograph



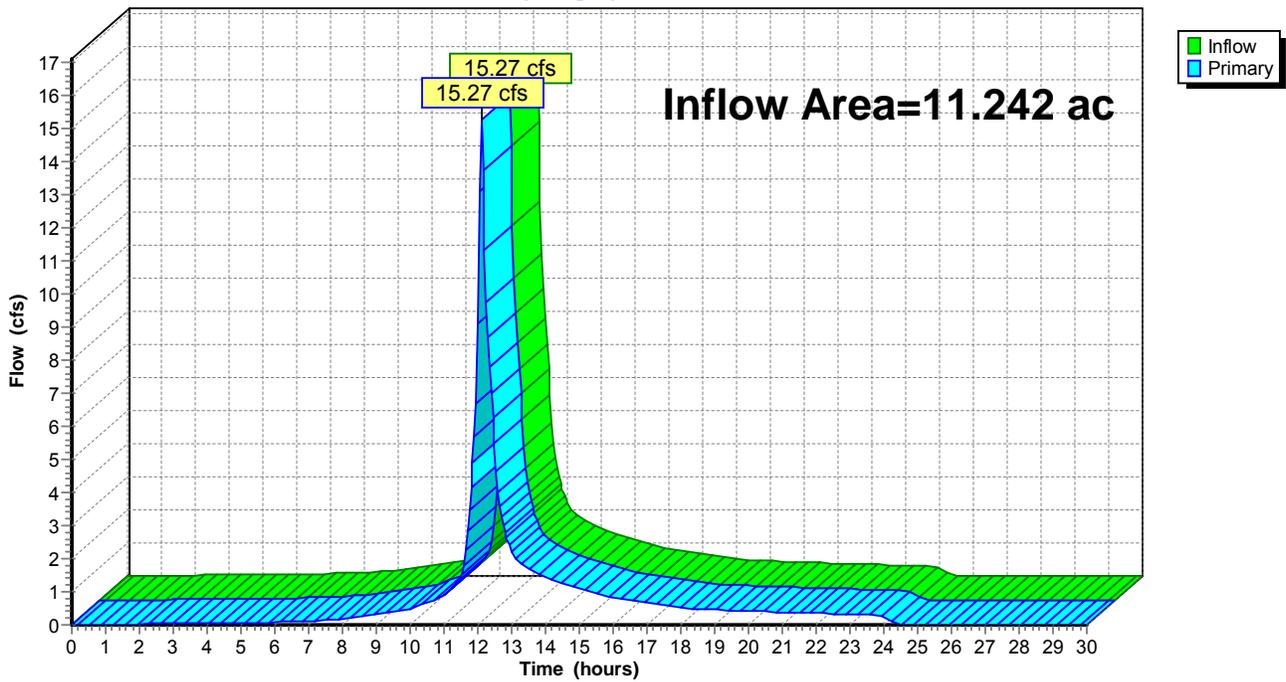
Summary for Pond 1: DP#1

Inflow Area = 11.242 ac, 21.23% Impervious, Inflow Depth = 1.64" for 50-YR event
Inflow = 15.27 cfs @ 12.10 hrs, Volume= 1.538 af
Primary = 15.27 cfs @ 12.10 hrs, Volume= 1.538 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



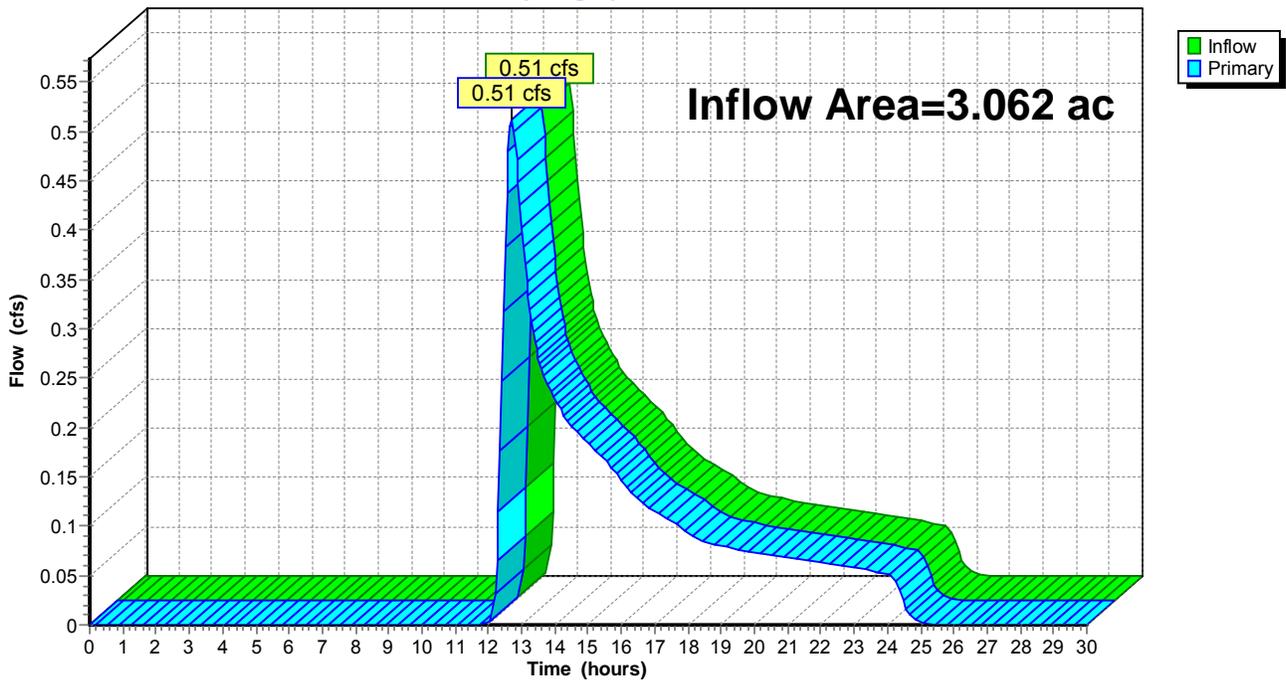
Summary for Pond 2: DP#2

Inflow Area = 3.062 ac, 7.87% Impervious, Inflow Depth = 0.52" for 50-YR event
Inflow = 0.51 cfs @ 12.70 hrs, Volume= 0.134 af
Primary = 0.51 cfs @ 12.70 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area E01

Runoff Area=6.670 ac 0.19% Impervious Runoff Depth=0.45"
Flow Length=452' Tc=19.4 min CN=37 Runoff=0.95 cfs 0.249 af

Subcatchment 2S: Area E02

Runoff Area=3.062 ac 7.87% Impervious Runoff Depth=0.69"
Flow Length=483' Tc=33.2 min CN=41 Runoff=0.78 cfs 0.177 af

Subcatchment 3S: Area E03

Runoff Area=1.018 ac 15.62% Impervious Runoff Depth=1.84"
Flow Length=298' Tc=21.6 min CN=56 Runoff=1.31 cfs 0.156 af

Subcatchment 4S: Area E04

Runoff Area=0.795 ac 43.02% Impervious Runoff Depth=3.83"
Flow Length=140' Tc=12.8 min CN=77 Runoff=2.83 cfs 0.254 af

Subcatchment 5S: Area E05

Runoff Area=0.955 ac 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=5.85 cfs 0.490 af

Subcatchment 6S: Area E06

Runoff Area=1.804 ac 50.89% Impervious Runoff Depth=4.14"
Flow Length=164' Tc=6.9 min CN=80 Runoff=8.33 cfs 0.623 af

Pond 1: DP#1

Inflow=17.04 cfs 1.772 af
Primary=17.04 cfs 1.772 af

Pond 2: DP#2

Inflow=0.78 cfs 0.177 af
Primary=0.78 cfs 0.177 af

Total Runoff Area = 14.304 ac Runoff Volume = 1.949 af Average Runoff Depth = 1.63"
81.63% Pervious = 11.676 ac 18.37% Impervious = 2.628 ac

Summary for Subcatchment 1S: Area E01

Runoff = 0.95 cfs @ 12.56 hrs, Volume= 0.249 af, Depth= 0.45"

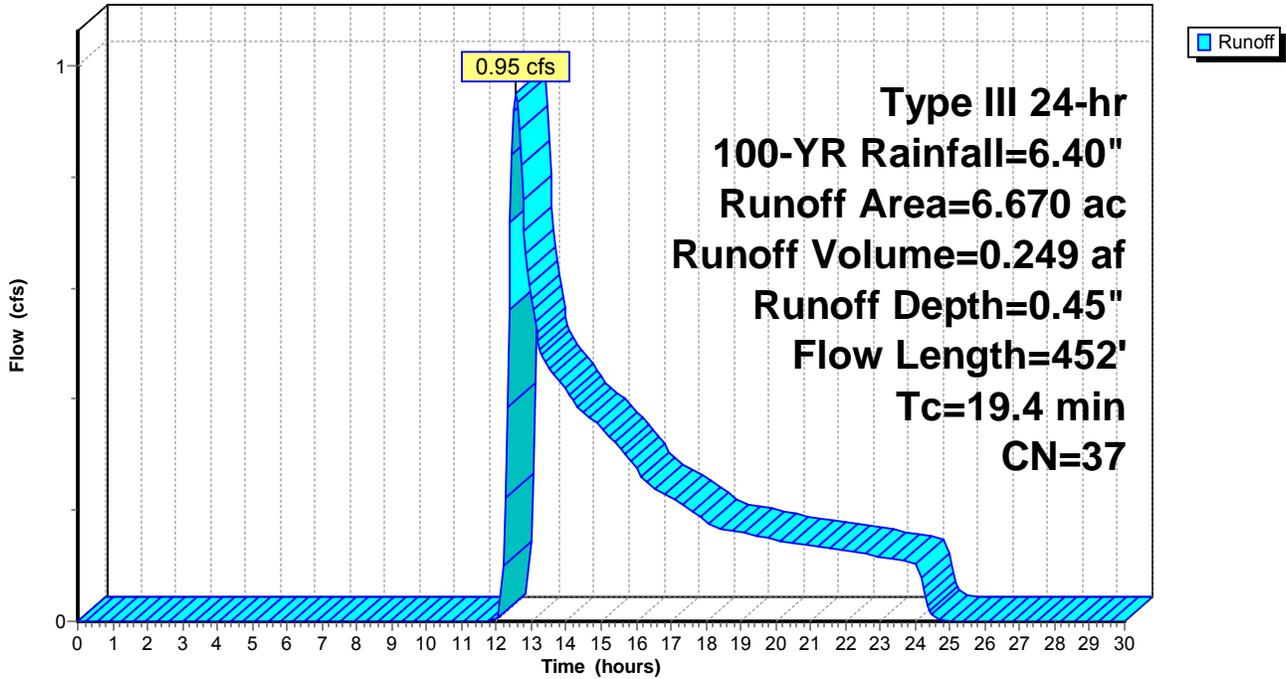
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.046	36	Woods, Fair, HSG A
0.611	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.670	37	Weighted Average
6.657		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area E01

Hydrograph



Summary for Subcatchment 2S: Area E02

Runoff = 0.78 cfs @ 12.66 hrs, Volume= 0.177 af, Depth= 0.69"

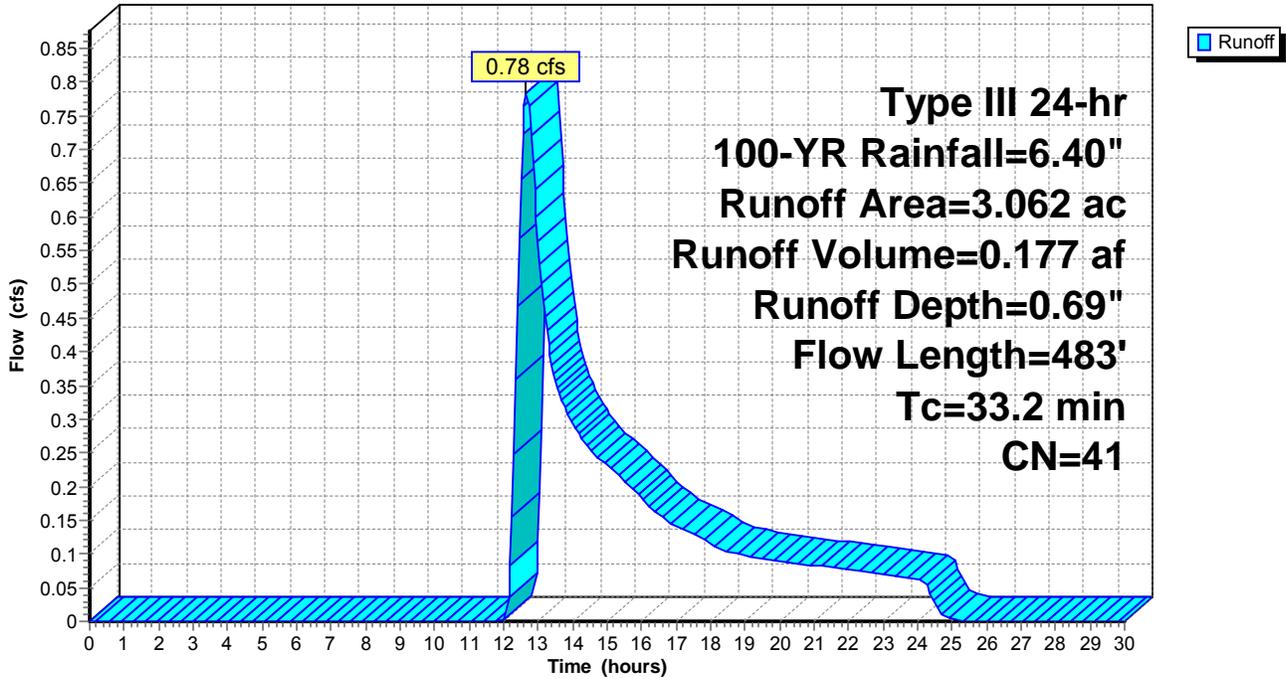
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.241	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
2.708	36	Woods, Fair, HSG A
0.113	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
3.062	41	Weighted Average
2.821		92.13% Pervious Area
0.241		7.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	72	0.0910	0.13		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.00"
4.4	150	0.0130	0.57		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
19.5	261	0.0020	0.22		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
33.2	483	Total			

Subcatchment 2S: Area E02

Hydrograph



Summary for Subcatchment 3S: Area E03

Runoff = 1.31 cfs @ 12.33 hrs, Volume= 0.156 af, Depth= 1.84"

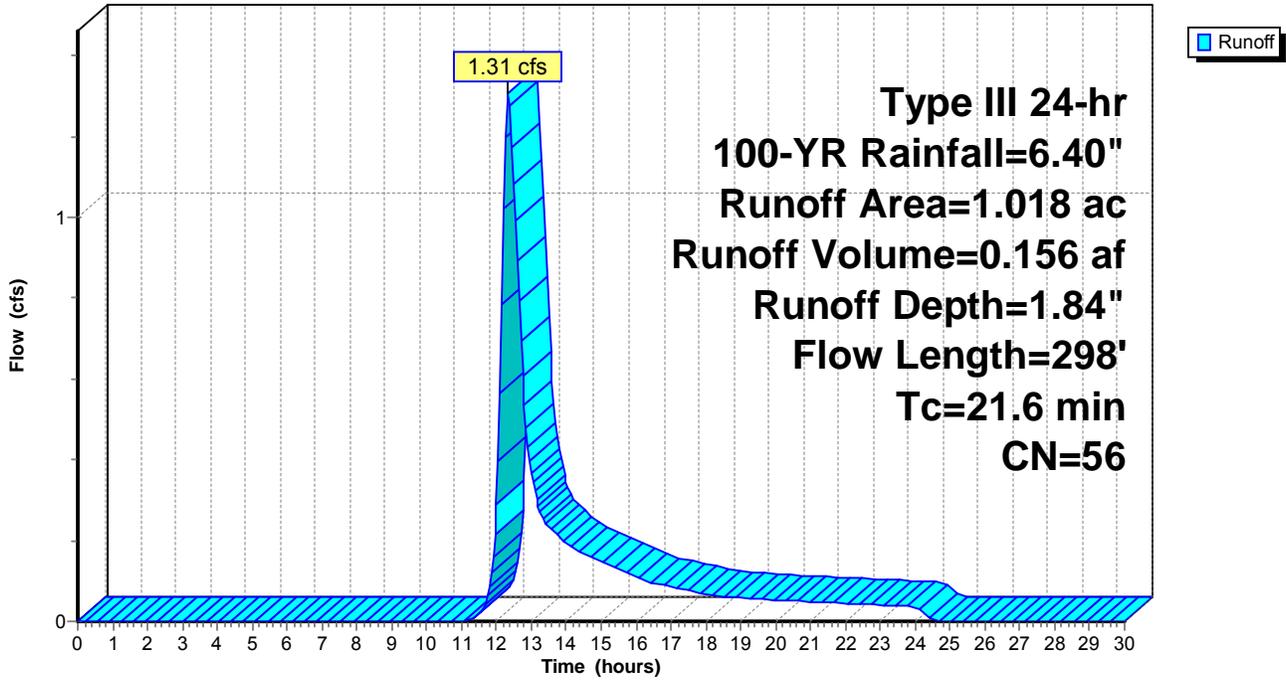
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.159	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.021	36	Woods, Fair, HSG A
0.838	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
1.018	56	Weighted Average
0.859		84.38% Pervious Area
0.159		15.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	100	0.0050	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.3	118	0.0150	0.86		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.7	80	0.0120	0.77		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
21.6	298	Total			

Subcatchment 3S: Area E03

Hydrograph



Summary for Subcatchment 4S: Area E04

Runoff = 2.83 cfs @ 12.18 hrs, Volume= 0.254 af, Depth= 3.83"

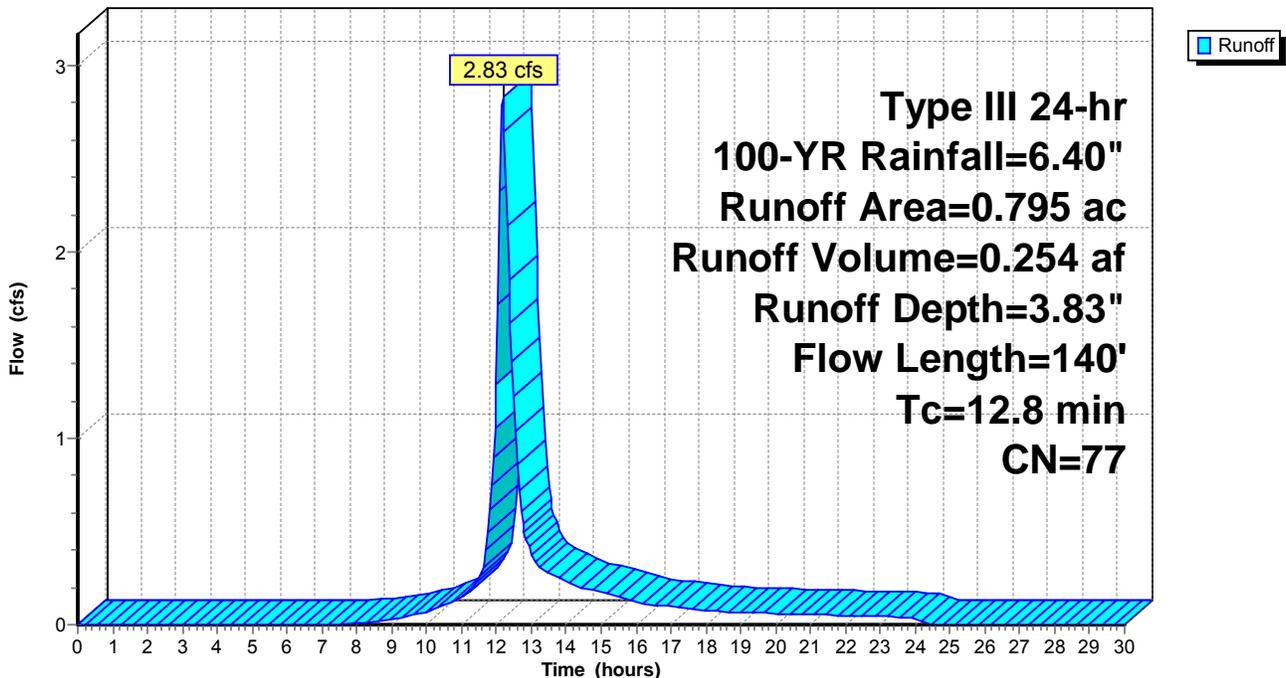
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.342	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.217	49	50-75% Grass cover, Fair, HSG A
* 0.236	72	Dirt, HSG A (Playscape)
0.795	77	Weighted Average
0.453		56.98% Pervious Area
0.342		43.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	107	0.0130	0.14		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
0.1	33	0.0470	4.40		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
12.8	140	Total			

Subcatchment 4S: Area E04

Hydrograph



Summary for Subcatchment 5S: Area E05

Runoff = 5.85 cfs @ 12.09 hrs, Volume= 0.490 af, Depth= 6.16"

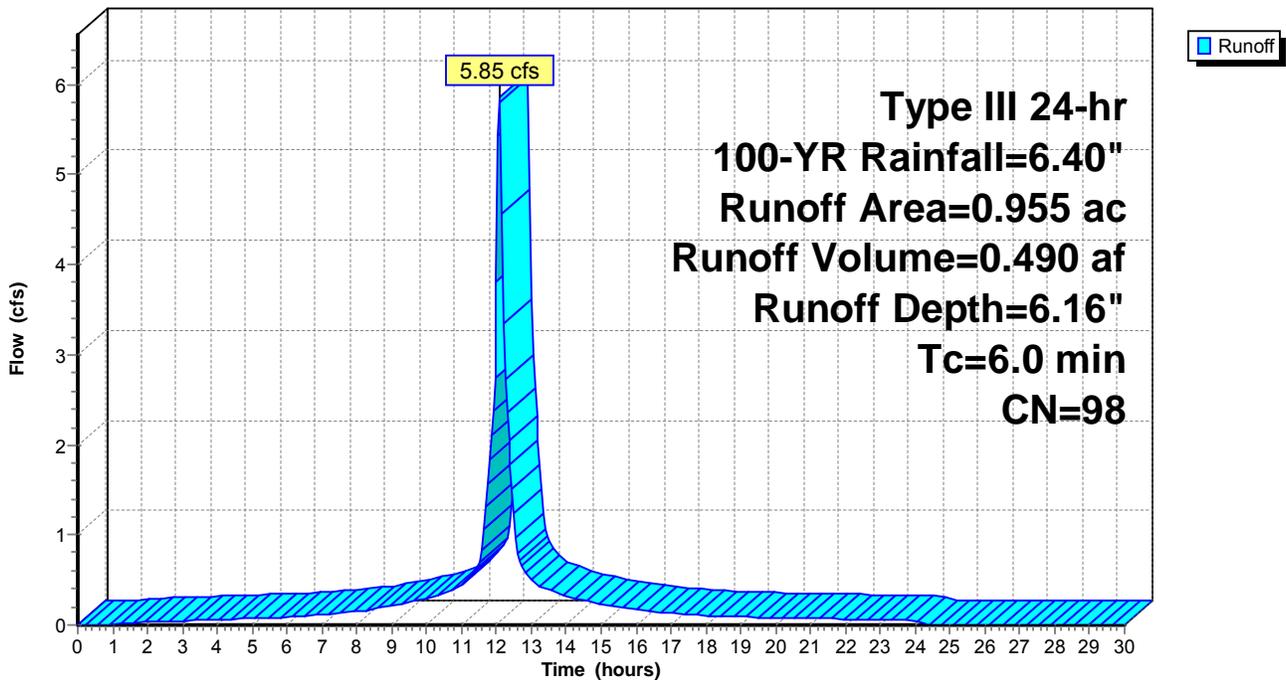
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG A
0.955	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.000	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.955	98	Weighted Average
0.955		100.00% Impervious Area

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

Subcatchment 5S: Area E05

Hydrograph



Summary for Subcatchment 6S: Area E06

Runoff = 8.33 cfs @ 12.10 hrs, Volume= 0.623 af, Depth= 4.14"

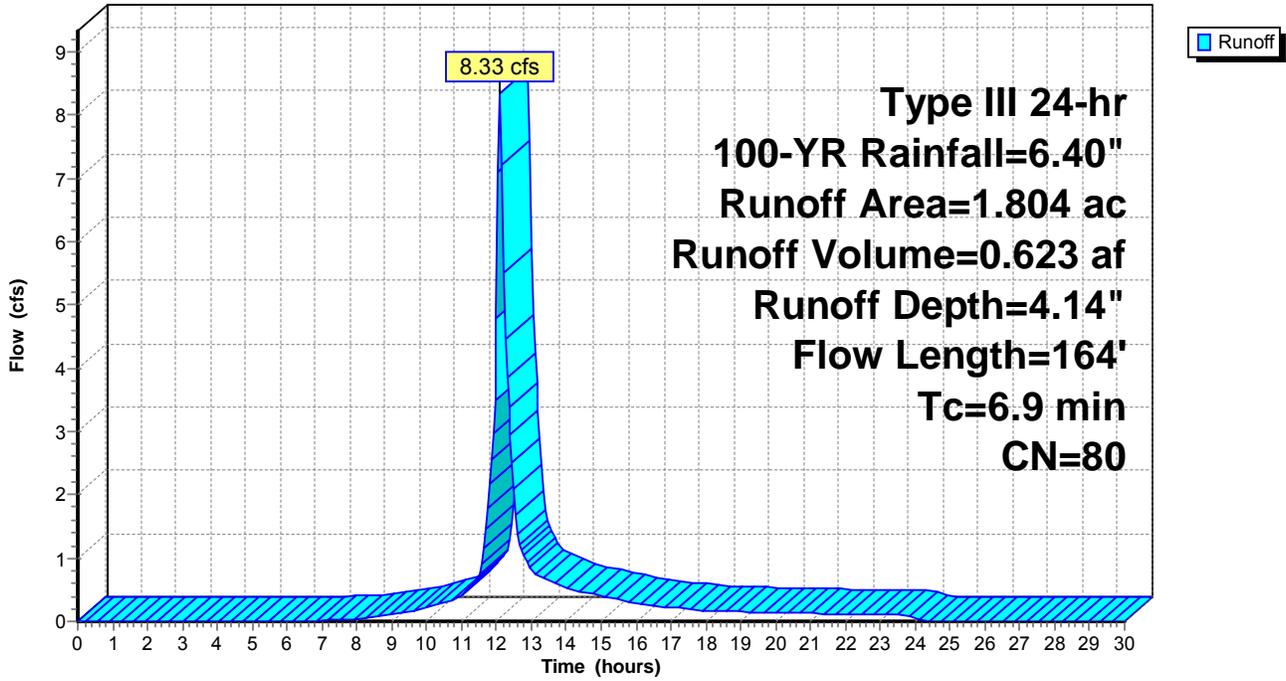
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.918	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.413	49	50-75% Grass cover, Fair, HSG A
* 0.473	72	Dirt, HSG A (Playscape)
1.804	80	Weighted Average
0.886		49.11% Pervious Area
0.918		50.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	27	0.0070	0.08		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.1	9	0.0160	2.57		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
1.4	128	0.0060	1.57		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
6.9	164	Total			

Subcatchment 6S: Area E06

Hydrograph



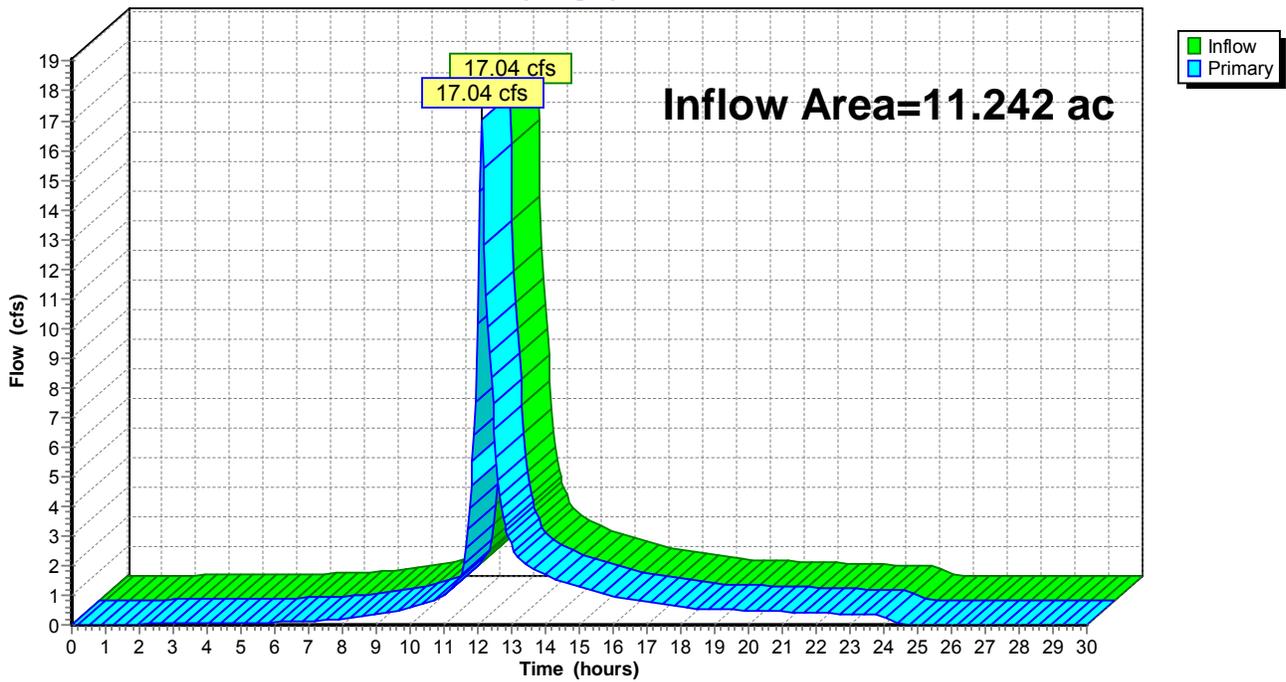
Summary for Pond 1: DP#1

Inflow Area = 11.242 ac, 21.23% Impervious, Inflow Depth = 1.89" for 100-YR event
Inflow = 17.04 cfs @ 12.10 hrs, Volume= 1.772 af
Primary = 17.04 cfs @ 12.10 hrs, Volume= 1.772 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



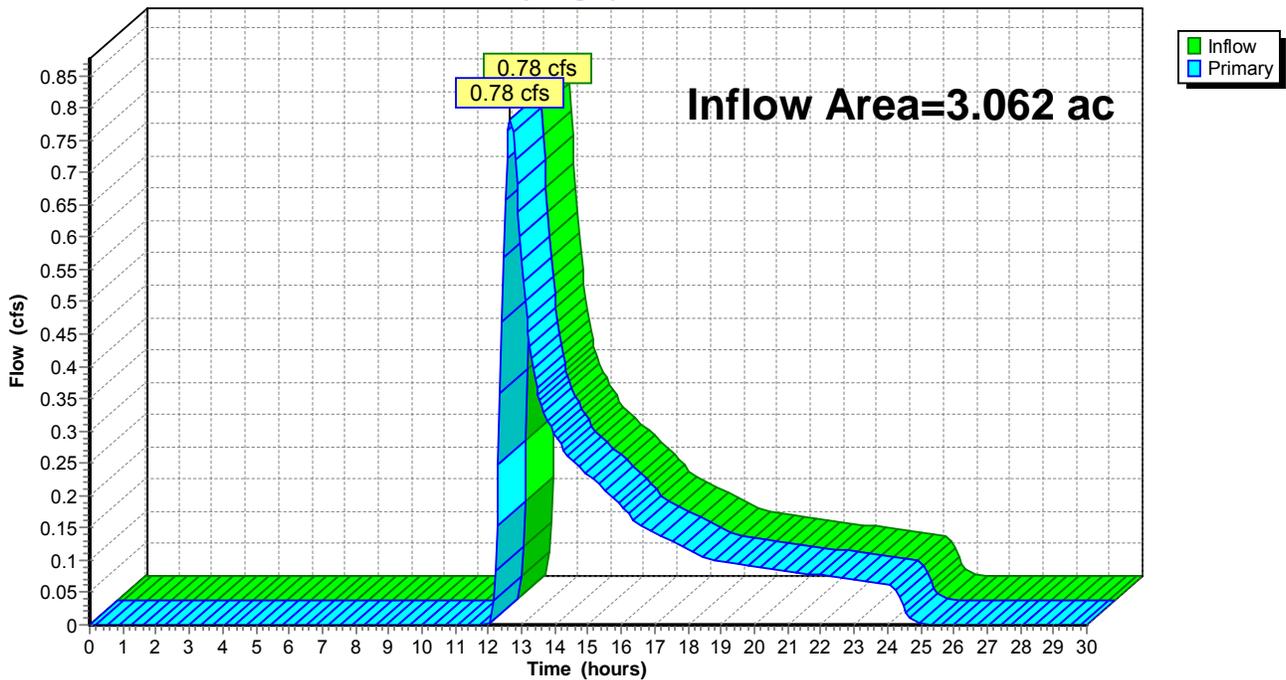
Summary for Pond 2: DP#2

Inflow Area = 3.062 ac, 7.87% Impervious, Inflow Depth = 0.69" for 100-YR event
Inflow = 0.78 cfs @ 12.66 hrs, Volume= 0.177 af
Primary = 0.78 cfs @ 12.66 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

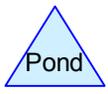
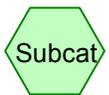
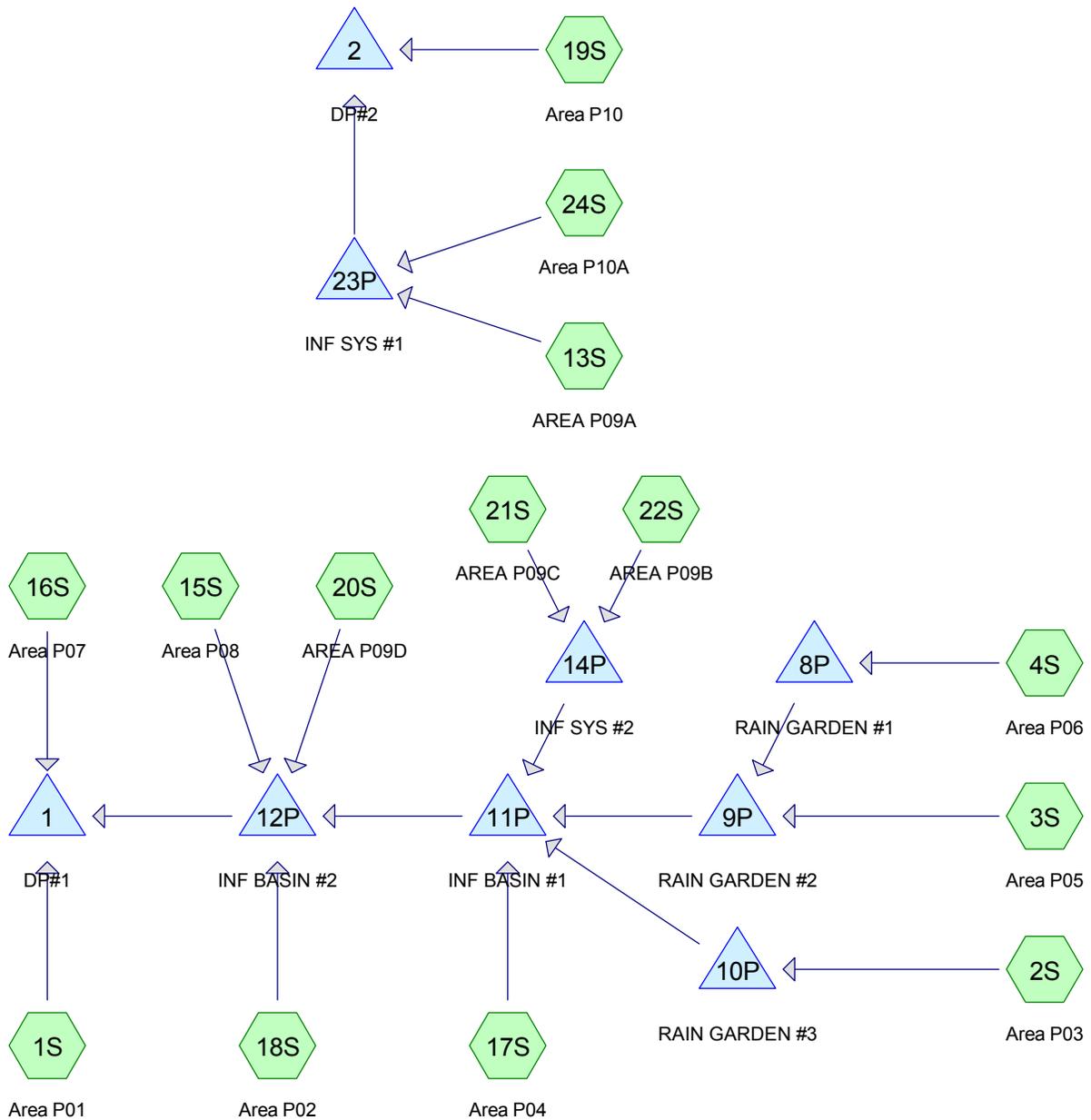
Hydrograph



Appendix B

Proposed Stormwater Hydrologic Model





Routing Diagram for 2011126A10_PROP01
 Prepared by Fuss & O'Neill, Printed 5/23/2013
 HydroCAD® 10.00 s/n 05127 © 2012 HydroCAD Software Solutions LLC

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area P01	Runoff Area=6.682 ac 0.19% Impervious Runoff Depth=0.00" Flow Length=452' Tc=19.4 min CN=37 Runoff=0.00 cfs 0.000 af
Subcatchment 2S: Area P03	Runoff Area=0.539 ac 69.76% Impervious Runoff Depth=1.45" Tc=6.0 min CN=83 Runoff=0.89 cfs 0.065 af
Subcatchment 3S: Area P05	Runoff Area=1.439 ac 46.77% Impervious Runoff Depth=1.13" Tc=6.0 min CN=78 Runoff=1.82 cfs 0.135 af
Subcatchment 4S: Area P06	Runoff Area=0.451 ac 47.67% Impervious Runoff Depth=0.81" Tc=6.0 min CN=72 Runoff=0.38 cfs 0.030 af
Subcatchment 13S: AREA P09A	Runoff Area=0.470 ac 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=1.33 cfs 0.108 af
Subcatchment 15S: Area P08	Runoff Area=0.546 ac 66.48% Impervious Runoff Depth=1.38" Tc=6.0 min CN=82 Runoff=0.86 cfs 0.063 af
Subcatchment 16S: Area P07	Runoff Area=0.514 ac 73.54% Impervious Runoff Depth=1.59" Tc=6.0 min CN=85 Runoff=0.94 cfs 0.068 af
Subcatchment 17S: Area P04	Runoff Area=0.281 ac 24.56% Impervious Runoff Depth=0.37" Flow Length=73' Tc=6.7 min CN=61 Runoff=0.06 cfs 0.009 af
Subcatchment 18S: Area P02	Runoff Area=2.211 ac 11.31% Impervious Runoff Depth=0.19" Flow Length=240' Tc=21.7 min CN=55 Runoff=0.12 cfs 0.036 af
Subcatchment 19S: Area P10	Runoff Area=0.632 ac 0.95% Impervious Runoff Depth=0.05" Flow Length=144' Tc=7.2 min CN=47 Runoff=0.00 cfs 0.002 af
Subcatchment 20S: AREA P09D	Runoff Area=0.162 ac 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.46 cfs 0.037 af
Subcatchment 21S: AREA P09C	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af
Subcatchment 22S: AREA P09B	Runoff Area=0.277 ac 100.00% Impervious Runoff Depth=2.77" Tc=6.0 min CN=98 Runoff=0.79 cfs 0.064 af
Subcatchment 24S: Area P10A	Runoff Area=0.033 ac 48.48% Impervious Runoff Depth=0.86" Tc=6.0 min CN=73 Runoff=0.03 cfs 0.002 af
Pond 1: DP#1	Inflow=0.94 cfs 0.124 af Primary=0.94 cfs 0.124 af
Pond 2: DP#2	Inflow=0.00 cfs 0.002 af Primary=0.00 cfs 0.002 af

Pond 8P: RAIN GARDEN #1 Peak Elev=94.33' Storage=0.011 af Inflow=0.38 cfs 0.030 af
Discarded=0.04 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.030 af

Pond 9P: RAIN GARDEN #2 Peak Elev=94.53' Storage=0.052 af Inflow=1.82 cfs 0.135 af
Discarded=0.16 cfs 0.126 af Primary=0.26 cfs 0.009 af Outflow=0.42 cfs 0.135 af

Pond 10P: RAIN GARDEN #3 Peak Elev=94.60' Storage=0.012 af Inflow=0.89 cfs 0.065 af
Discarded=0.04 cfs 0.039 af Primary=0.85 cfs 0.026 af Outflow=0.89 cfs 0.065 af

Pond 11P: INF BASIN #1 Peak Elev=92.86' Storage=0.010 af Inflow=0.91 cfs 0.044 af
Discarded=0.04 cfs 0.017 af Primary=0.38 cfs 0.027 af Outflow=0.42 cfs 0.044 af

Pond 12P: INF BASIN #2 Peak Elev=91.98' Storage=0.043 af Inflow=1.32 cfs 0.163 af
Discarded=0.13 cfs 0.107 af Primary=0.46 cfs 0.056 af Outflow=0.58 cfs 0.163 af

Pond 14P: INF SYS #2 Peak Elev=91.47' Storage=0.038 af Inflow=1.02 cfs 0.083 af
Discarded=0.05 cfs 0.083 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.083 af

Pond 23P: INF SYS #1 Peak Elev=89.99' Storage=0.042 af Inflow=1.36 cfs 0.111 af
Discarded=0.11 cfs 0.111 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.111 af

Total Runoff Area = 14.321 ac Runoff Volume = 0.640 af Average Runoff Depth = 0.54"
76.59% Pervious = 10.969 ac 23.41% Impervious = 3.352 ac

Summary for Subcatchment 1S: Area P01

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

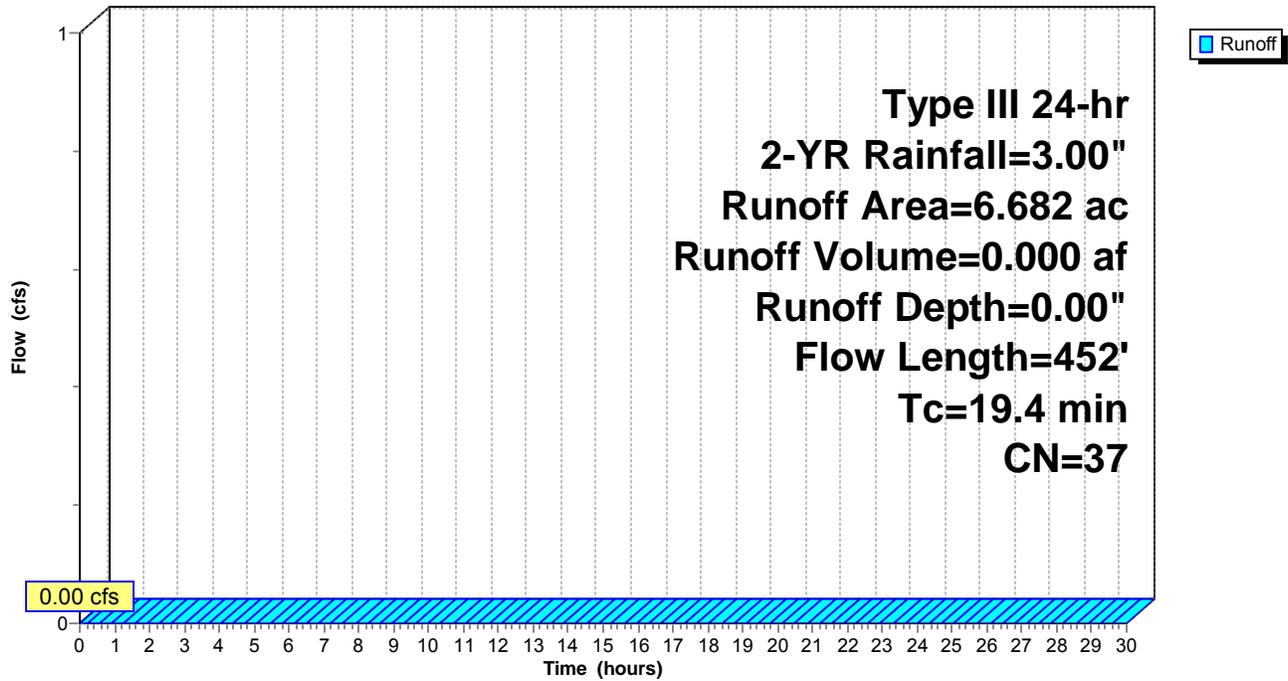
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.032	36	Woods, Fair, HSG A
0.637	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.682	37	Weighted Average
6.669		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area P01

Hydrograph



Summary for Subcatchment 2S: Area P03

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.065 af, Depth= 1.45"

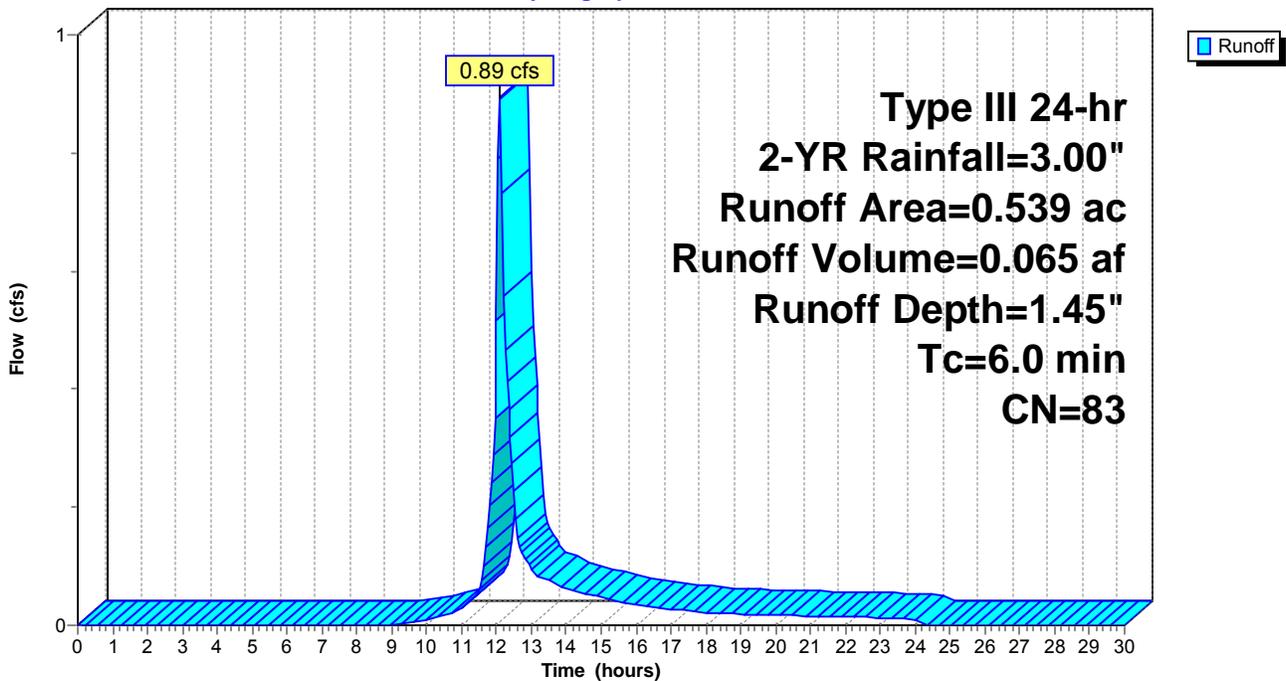
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.376	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.163	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.539	83	Weighted Average
0.163		30.24% Pervious Area
0.376		69.76% Impervious Area

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

Subcatchment 2S: Area P03

Hydrograph



Summary for Subcatchment 3S: Area P05

Runoff = 1.82 cfs @ 12.10 hrs, Volume= 0.135 af, Depth= 1.13"

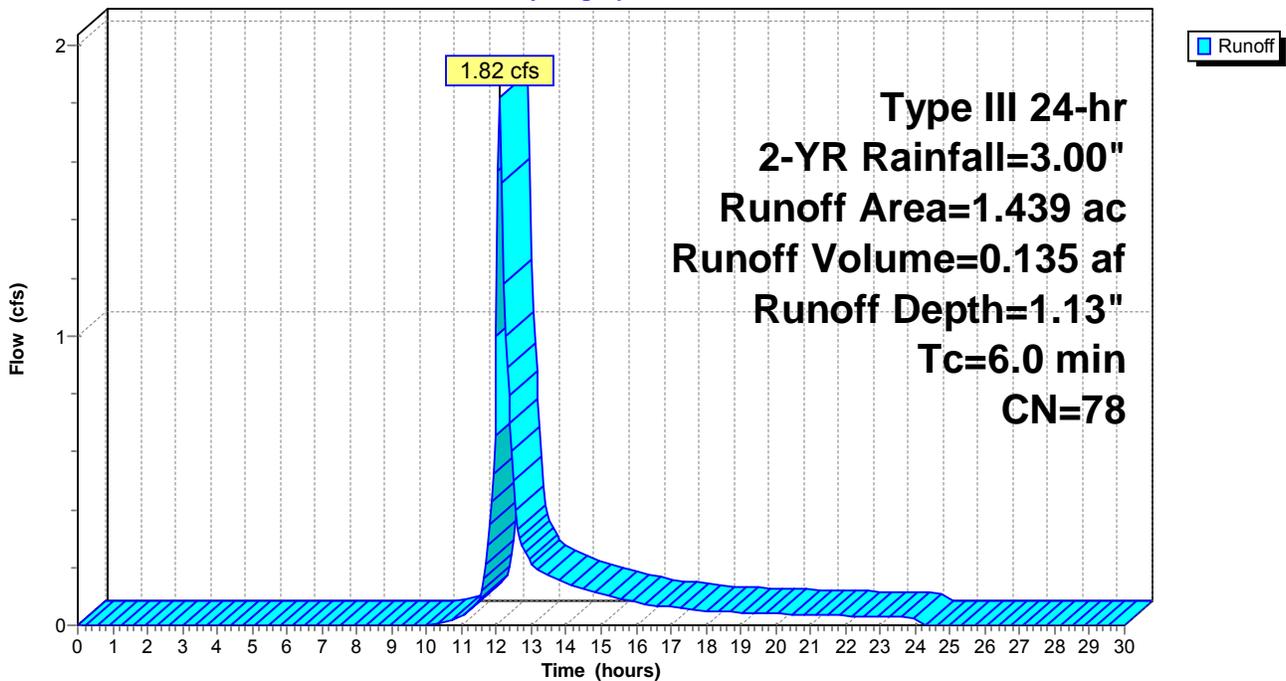
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.673	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.386	49	50-75% Grass cover, Fair, HSG A
* 0.380	72	Dirt, HSG A (Playscape)
1.439	78	Weighted Average
0.766		53.23% Pervious Area
0.673		46.77% Impervious Area

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

Subcatchment 3S: Area P05

Hydrograph



Summary for Subcatchment 4S: Area P06

Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.030 af, Depth= 0.81"

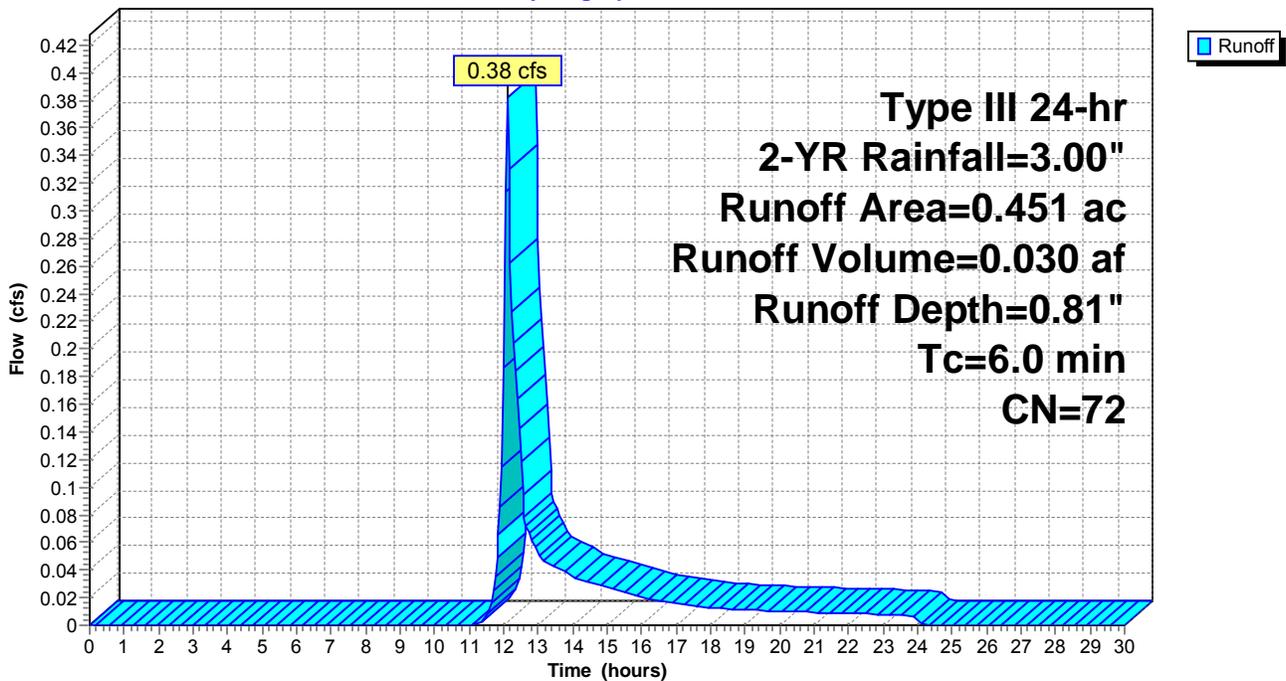
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.215	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.236	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.451	72	Weighted Average
0.236		52.33% Pervious Area
0.215		47.67% Impervious Area

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

Subcatchment 4S: Area P06

Hydrograph



Summary for Subcatchment 13S: AREA P09A

Runoff = 1.33 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 2.77"

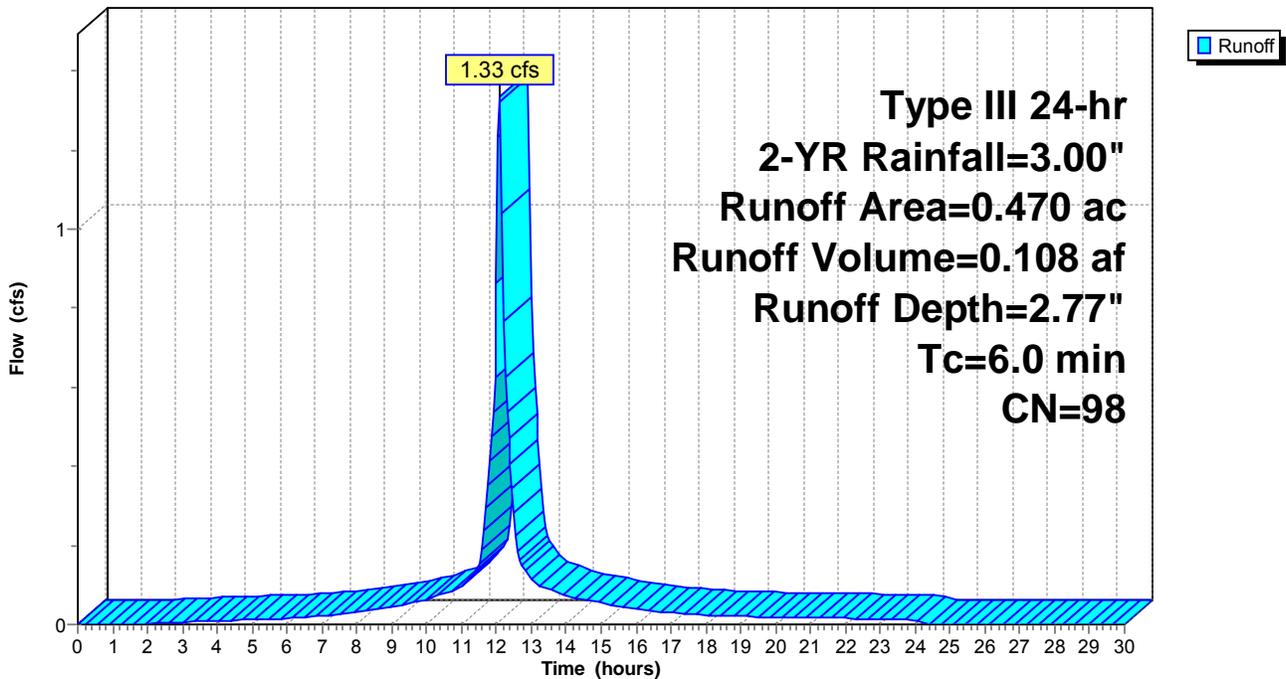
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.470	98	Roofs, HSG A
0.470		100.00% Impervious Area

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

Subcatchment 13S: AREA P09A

Hydrograph



Summary for Subcatchment 15S: Area P08

Runoff = 0.86 cfs @ 12.10 hrs, Volume= 0.063 af, Depth= 1.38"

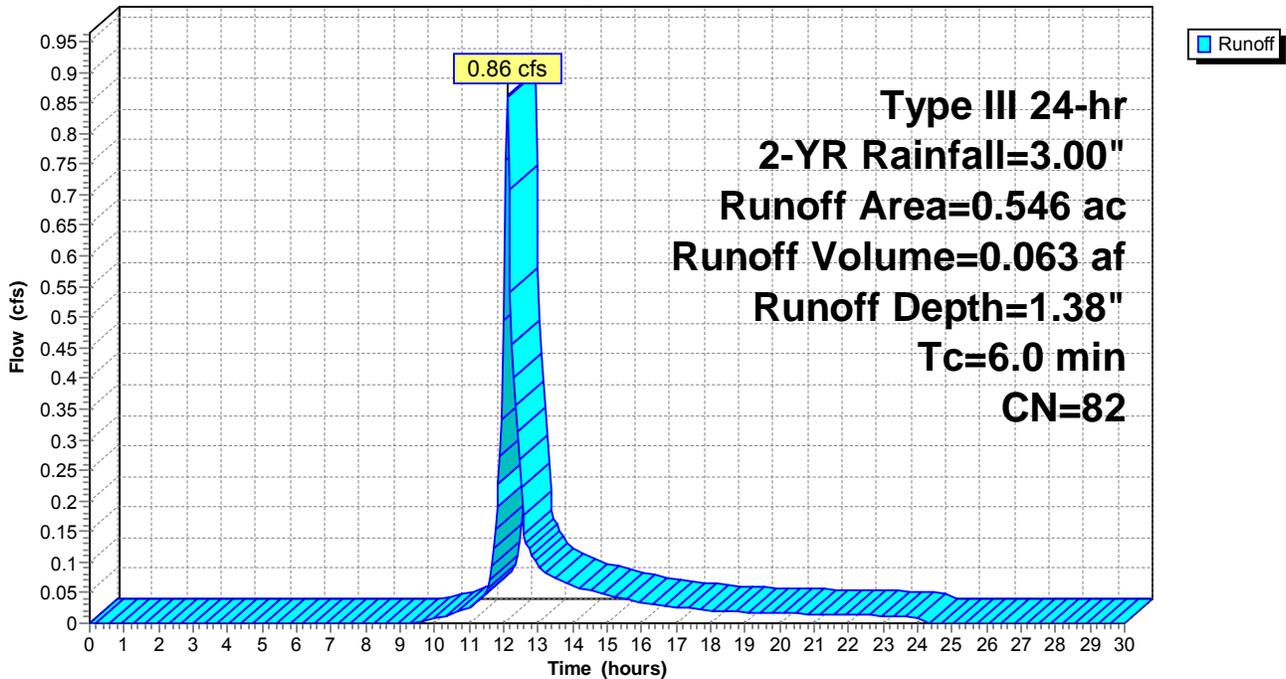
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.363	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.183	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.546	82	Weighted Average
0.183		33.52% Pervious Area
0.363		66.48% Impervious Area

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

Subcatchment 15S: Area P08

Hydrograph



Summary for Subcatchment 16S: Area P07

Runoff = 0.94 cfs @ 12.09 hrs, Volume= 0.068 af, Depth= 1.59"

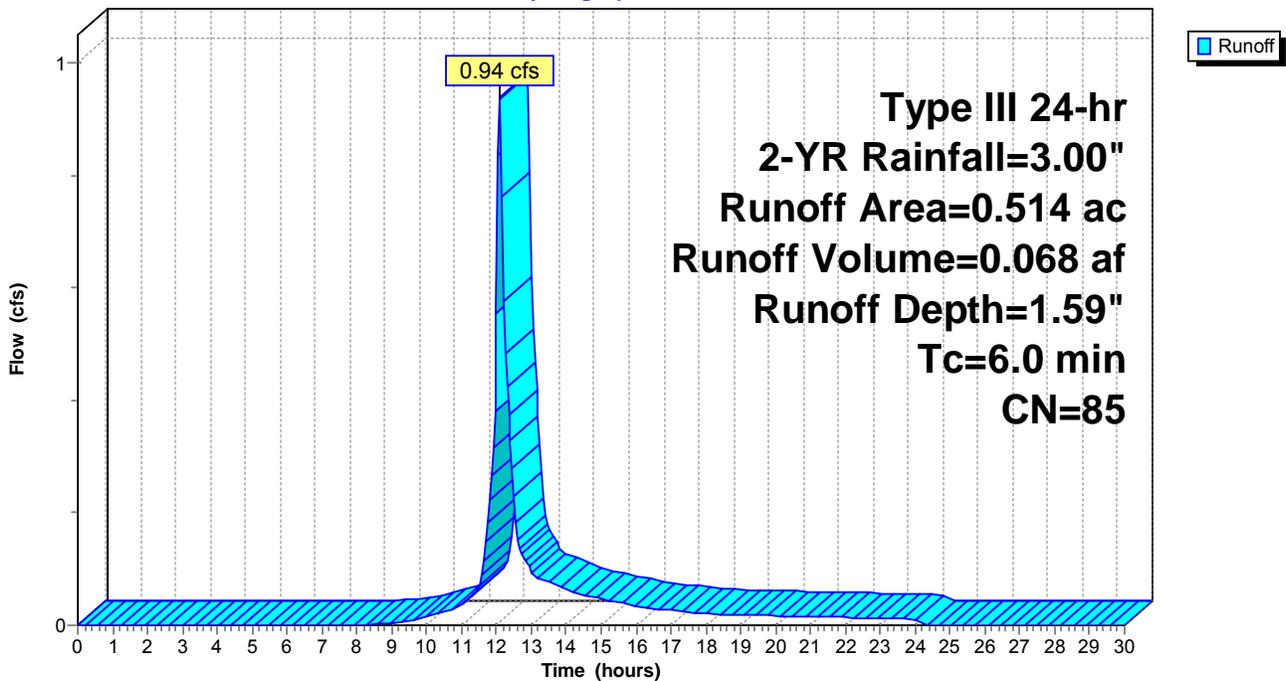
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.378	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.136	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.514	85	Weighted Average
0.136		26.46% Pervious Area
0.378		73.54% Impervious Area

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

Subcatchment 16S: Area P07

Hydrograph



Summary for Subcatchment 17S: Area P04

Runoff = 0.06 cfs @ 12.16 hrs, Volume= 0.009 af, Depth= 0.37"

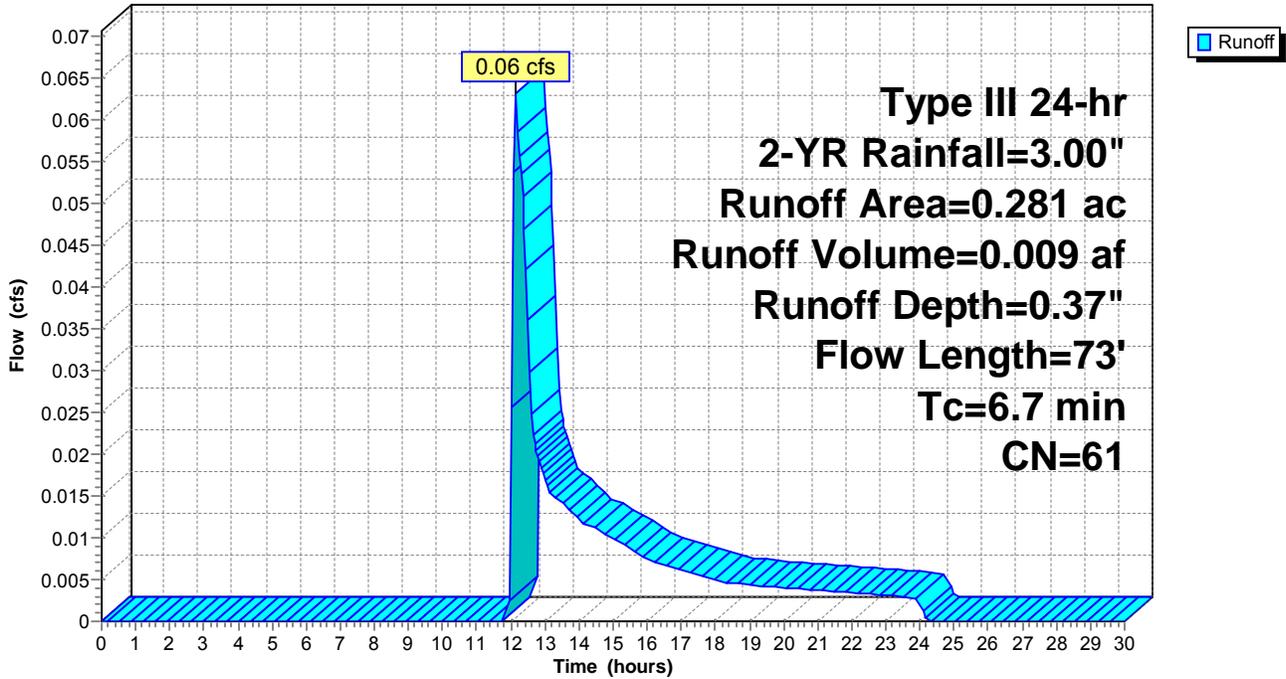
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.069	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.212	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.281	61	Weighted Average
0.212		75.44% Pervious Area
0.069		24.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	57	0.0200	0.15		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.0	5	0.0100	2.03		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
0.2	11	0.0300	1.21		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
6.7	73	Total			

Subcatchment 17S: Area P04

Hydrograph



Summary for Subcatchment 18S: Area P02

Runoff = 0.12 cfs @ 12.61 hrs, Volume= 0.036 af, Depth= 0.19"

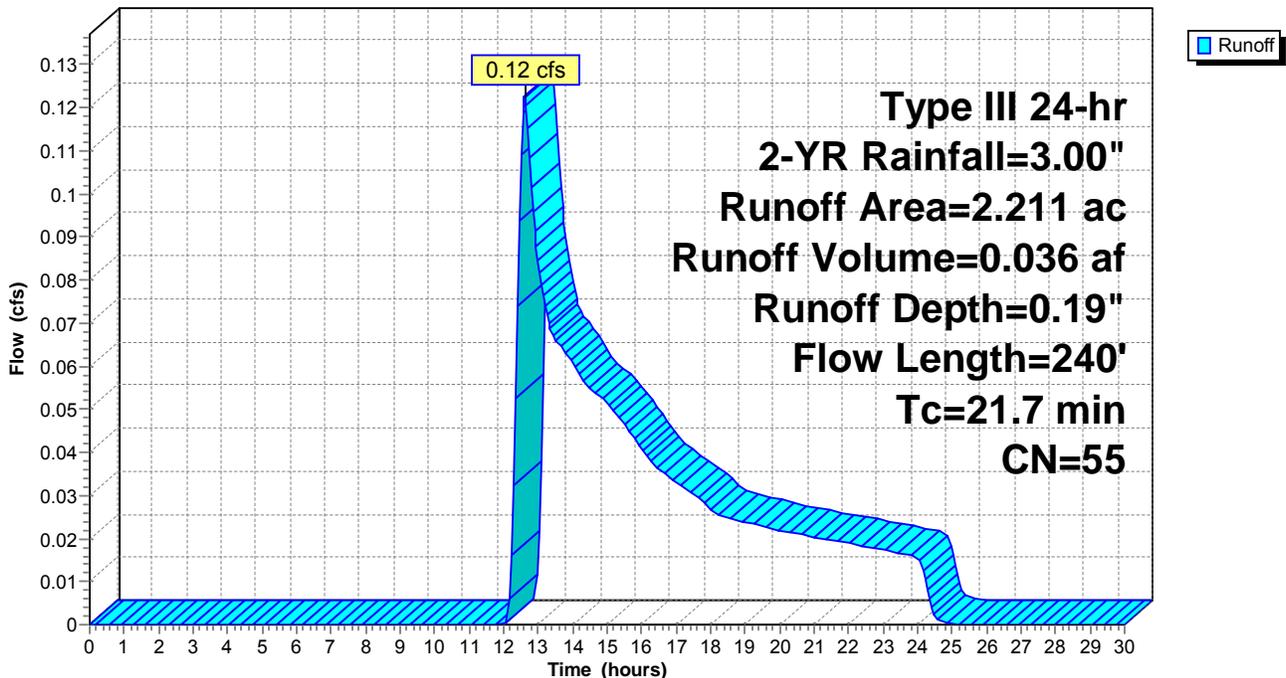
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
1.961	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
2.211	55	Weighted Average
1.961		88.69% Pervious Area
0.250		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0040	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.4	140	0.0200	0.99		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
21.7	240	Total			

Subcatchment 18S: Area P02

Hydrograph



Summary for Subcatchment 19S: Area P10

Runoff = 0.00 cfs @ 15.25 hrs, Volume= 0.002 af, Depth= 0.05"

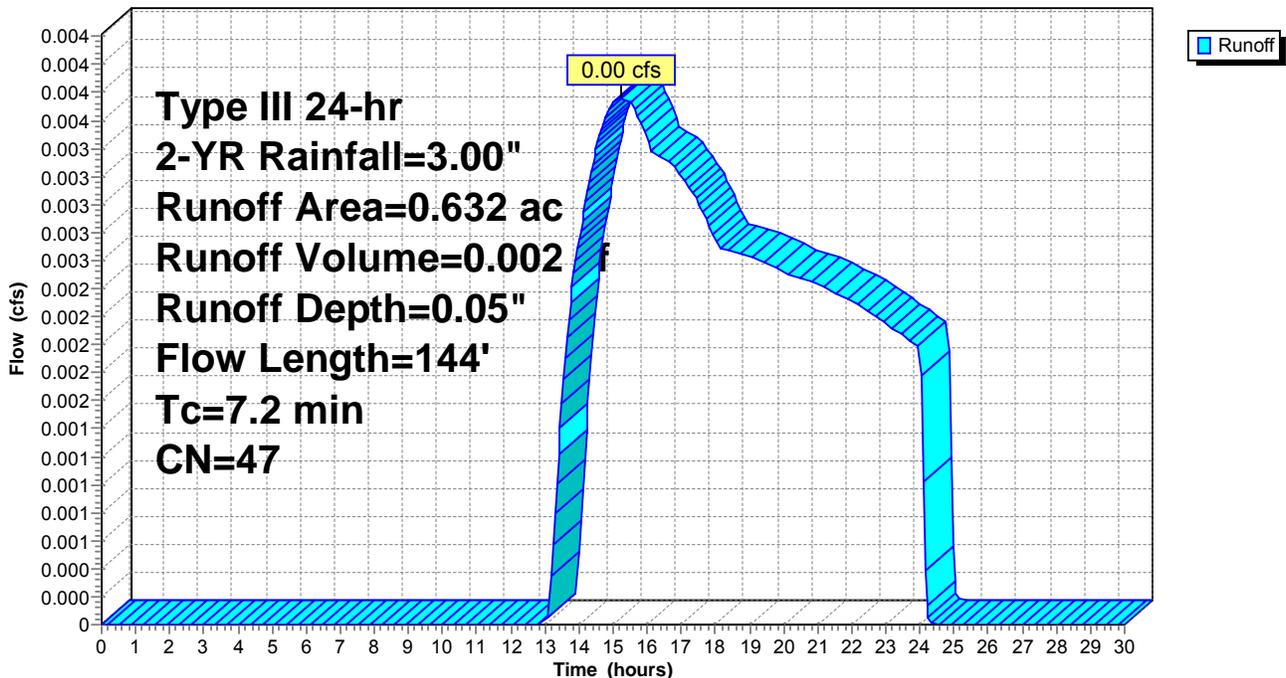
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.111	36	Woods, Fair, HSG A
0.515	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.632	47	Weighted Average
0.626		99.05% Pervious Area
0.006		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	46	0.0350	0.18		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.9	98	0.0130	0.57		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
7.2	144	Total			

Subcatchment 19S: Area P10

Hydrograph



Summary for Subcatchment 20S: AREA P09D

Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 2.77"

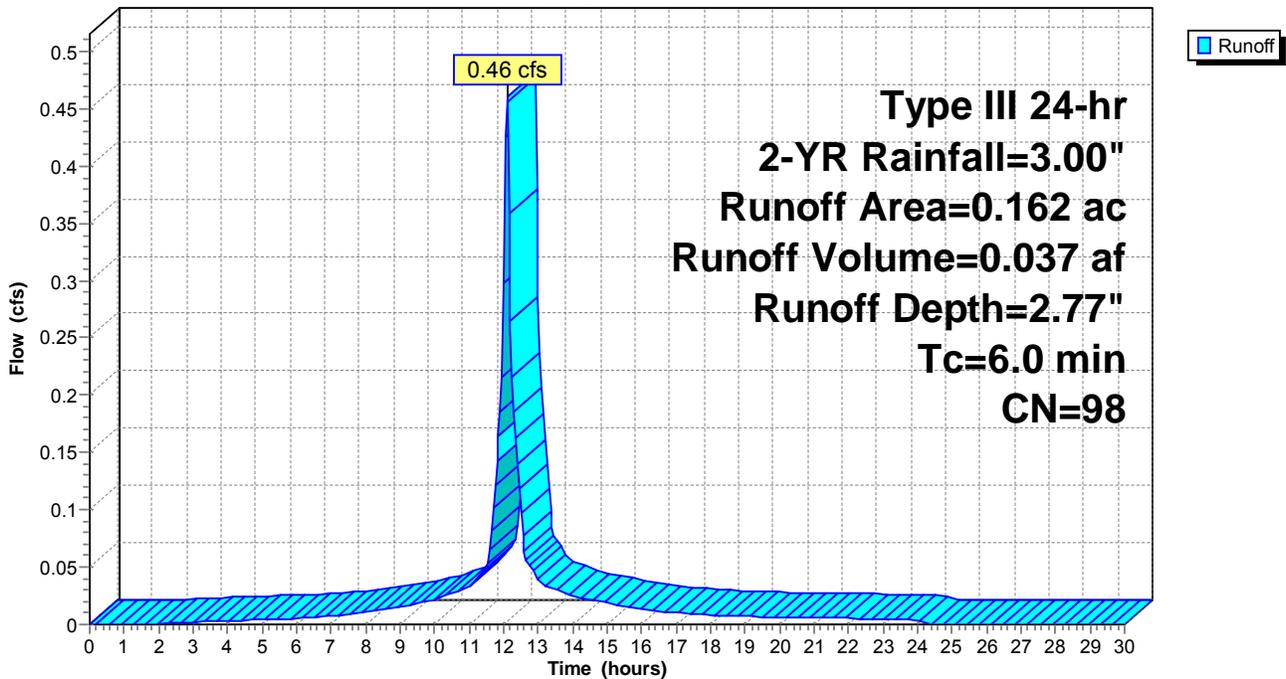
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.162	98	Roofs, HSG A
0.162		100.00% Impervious Area

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

Subcatchment 20S: AREA P09D

Hydrograph



Summary for Subcatchment 21S: AREA P09C

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.019 af, Depth= 2.77"

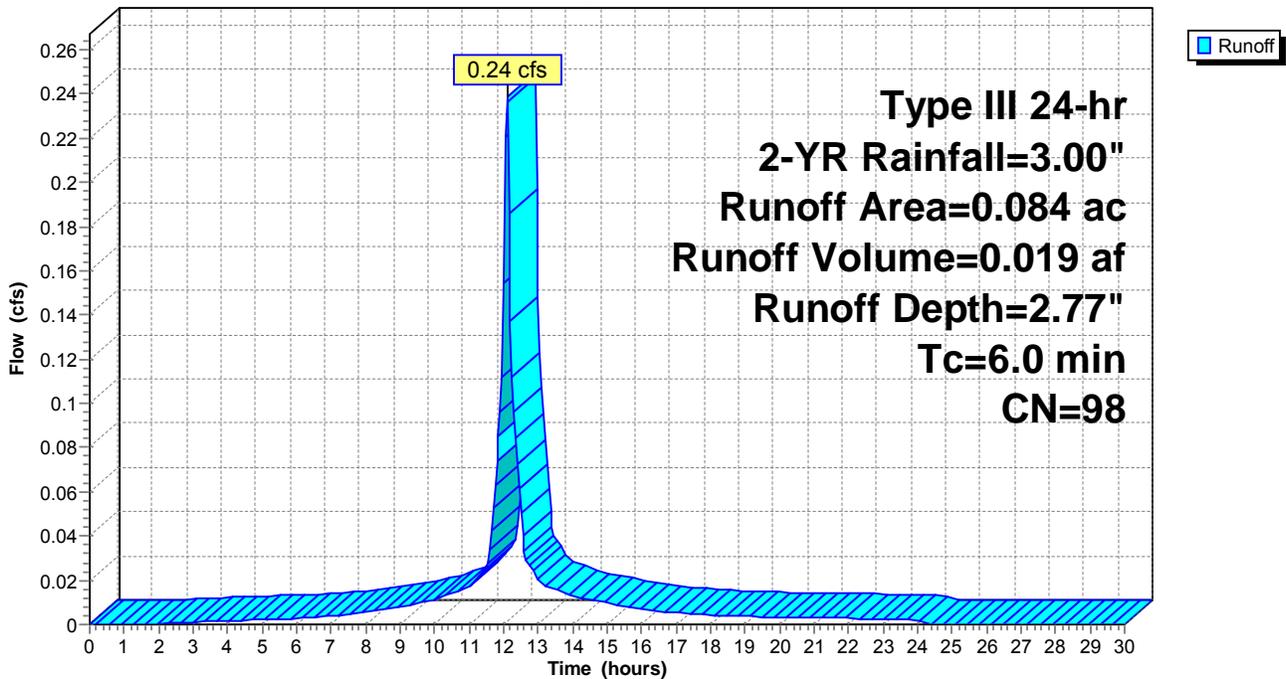
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.084	98	Roofs, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 21S: AREA P09C

Hydrograph



Summary for Subcatchment 22S: AREA P09B

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 2.77"

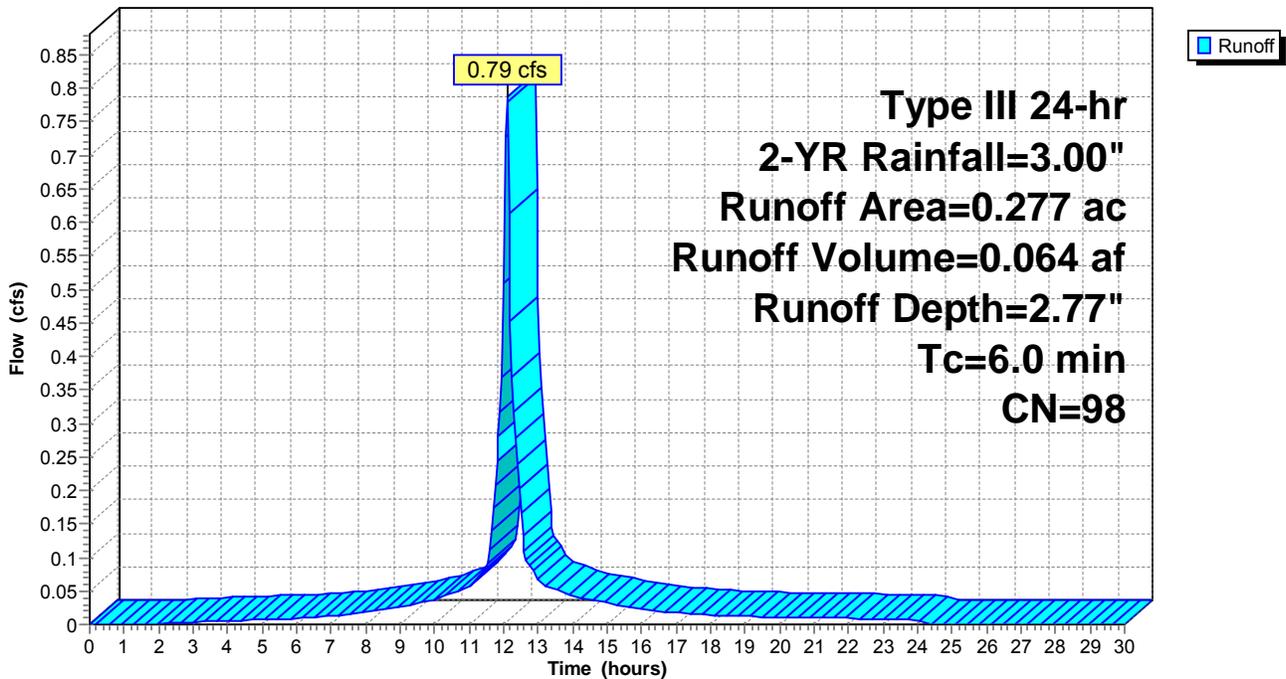
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.277	98	Roofs, HSG A
0.277		100.00% Impervious Area

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

Subcatchment 22S: AREA P09B

Hydrograph



Summary for Subcatchment 24S: Area P10A

Runoff = 0.03 cfs @ 12.10 hrs, Volume= 0.002 af, Depth= 0.86"

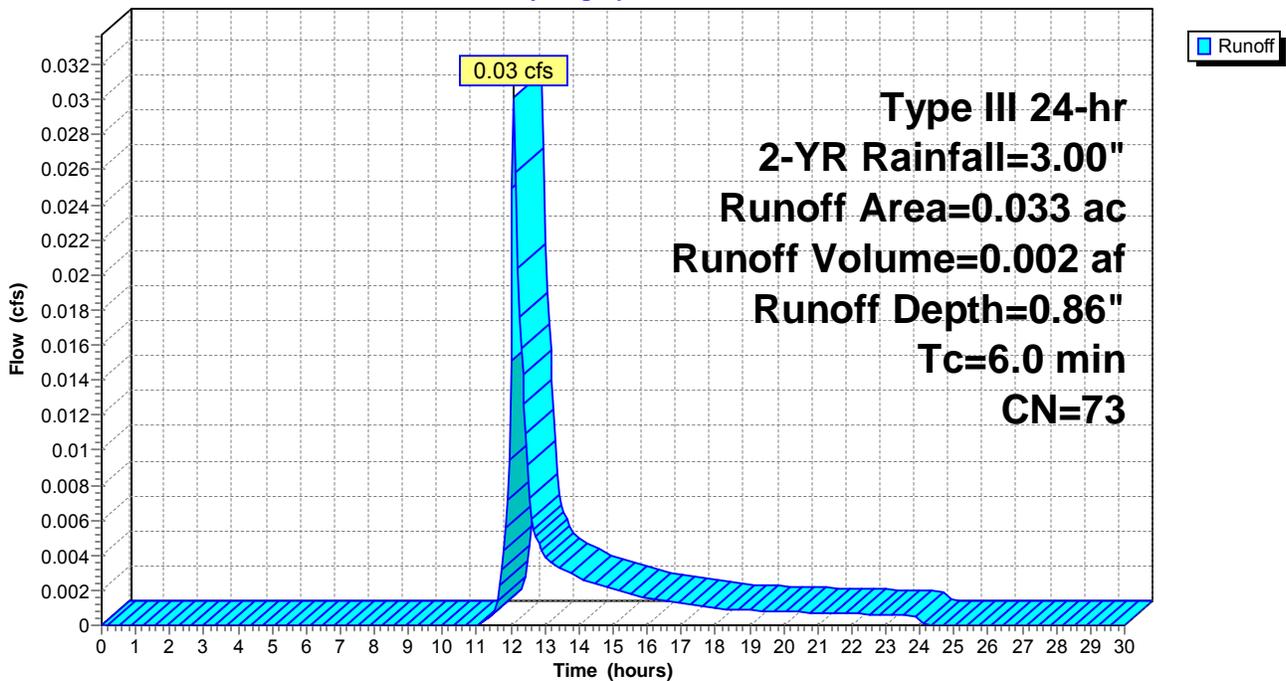
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-YR Rainfall=3.00"

Area (ac)	CN	Description
0.016	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.017	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.033	73	Weighted Average
0.017		51.52% Pervious Area
0.016		48.48% Impervious Area

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

Subcatchment 24S: Area P10A

Hydrograph



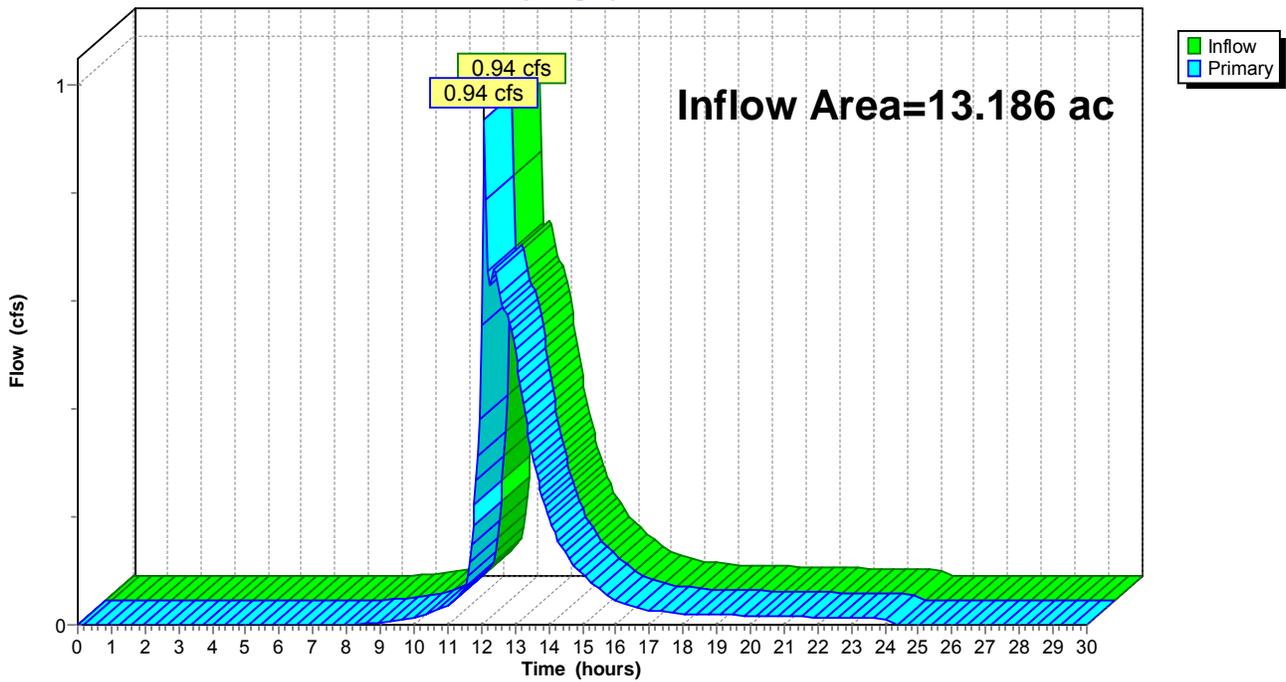
Summary for Pond 1: DP#1

Inflow Area = 13.186 ac, 21.69% Impervious, Inflow Depth = 0.11" for 2-YR event
Inflow = 0.94 cfs @ 12.10 hrs, Volume= 0.124 af
Primary = 0.94 cfs @ 12.10 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



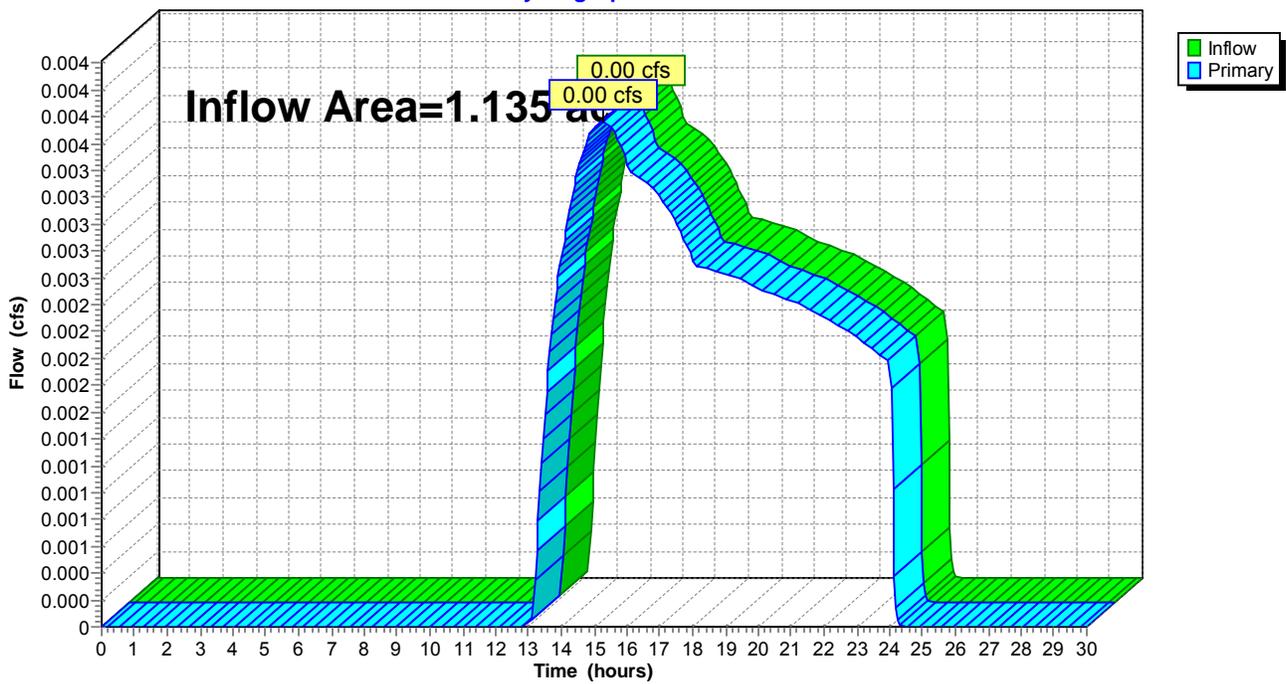
Summary for Pond 2: DP#2

Inflow Area = 1.135 ac, 43.35% Impervious, Inflow Depth = 0.03" for 2-YR event
Inflow = 0.00 cfs @ 15.25 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 15.25 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Summary for Pond 8P: RAIN GARDEN #1

Inflow Area = 0.451 ac, 47.67% Impervious, Inflow Depth = 0.81" for 2-YR event
 Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.030 af
 Outflow = 0.04 cfs @ 13.32 hrs, Volume= 0.030 af, Atten= 88%, Lag= 72.8 min
 Discarded = 0.04 cfs @ 13.32 hrs, Volume= 0.030 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.33' @ 13.32 hrs Surf.Area= 0.018 ac Storage= 0.011 af

Plug-Flow detention time= 119.4 min calculated for 0.030 af (100% of inflow)
 Center-of-Mass det. time= 119.2 min (992.5 - 873.3)

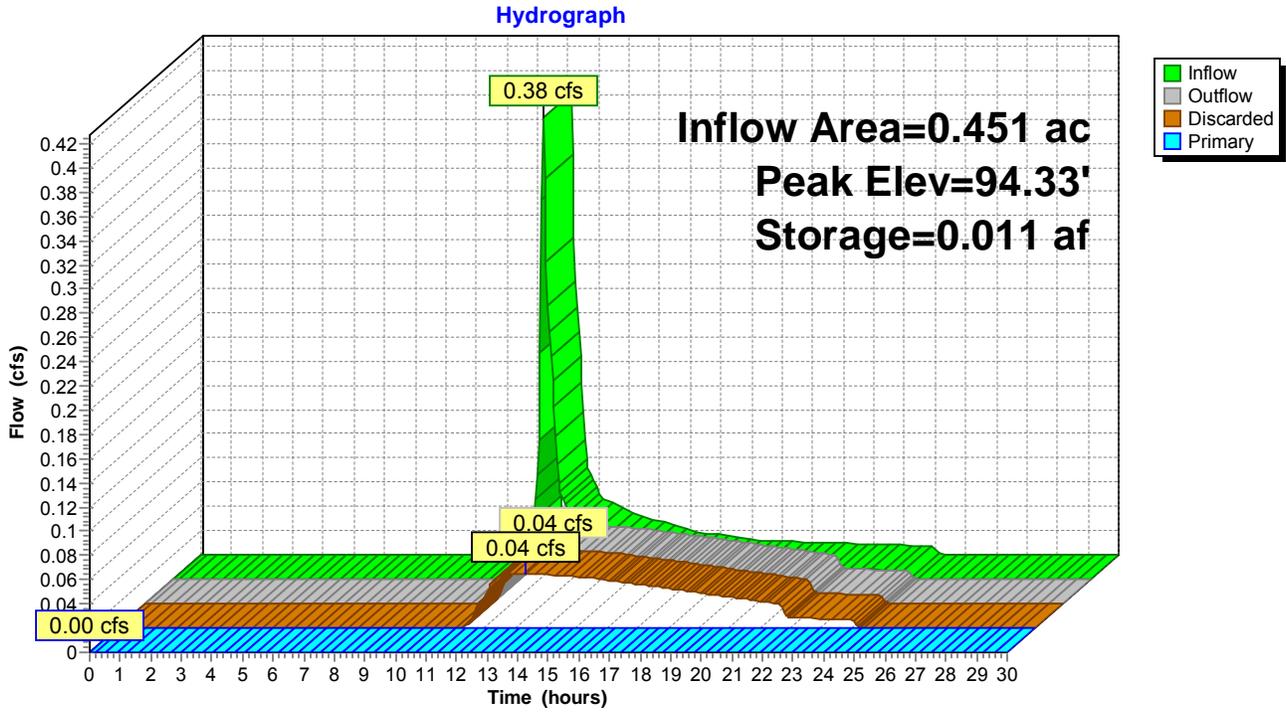
Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.026 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.008	0.000	0.000
94.00	0.014	0.006	0.006
95.00	0.027	0.020	0.026

Device	Routing	Invert	Outlet Devices
#1	Primary	93.13'	12.0" Round Culvert L= 25.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.13' / 93.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	12.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 13.32 hrs HW=94.33' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.50' (Free Discharge)
 ↑**1=Culvert** (Passes 0.00 cfs of 0.42 cfs potential flow)
 ↑**2=Grate** (Controls 0.00 cfs)

Pond 8P: RAIN GARDEN #1



Summary for Pond 9P: RAIN GARDEN #2

Inflow Area = 1.890 ac, 46.98% Impervious, Inflow Depth = 0.86" for 2-YR event
 Inflow = 1.82 cfs @ 12.10 hrs, Volume= 0.135 af
 Outflow = 0.42 cfs @ 12.55 hrs, Volume= 0.135 af, Atten= 77%, Lag= 27.3 min
 Discarded = 0.16 cfs @ 12.55 hrs, Volume= 0.126 af
 Primary = 0.26 cfs @ 12.55 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.53' @ 12.55 hrs Surf.Area= 0.065 ac Storage= 0.052 af

Plug-Flow detention time= 170.5 min calculated for 0.135 af (100% of inflow)
 Center-of-Mass det. time= 170.4 min (1,023.2 - 852.8)

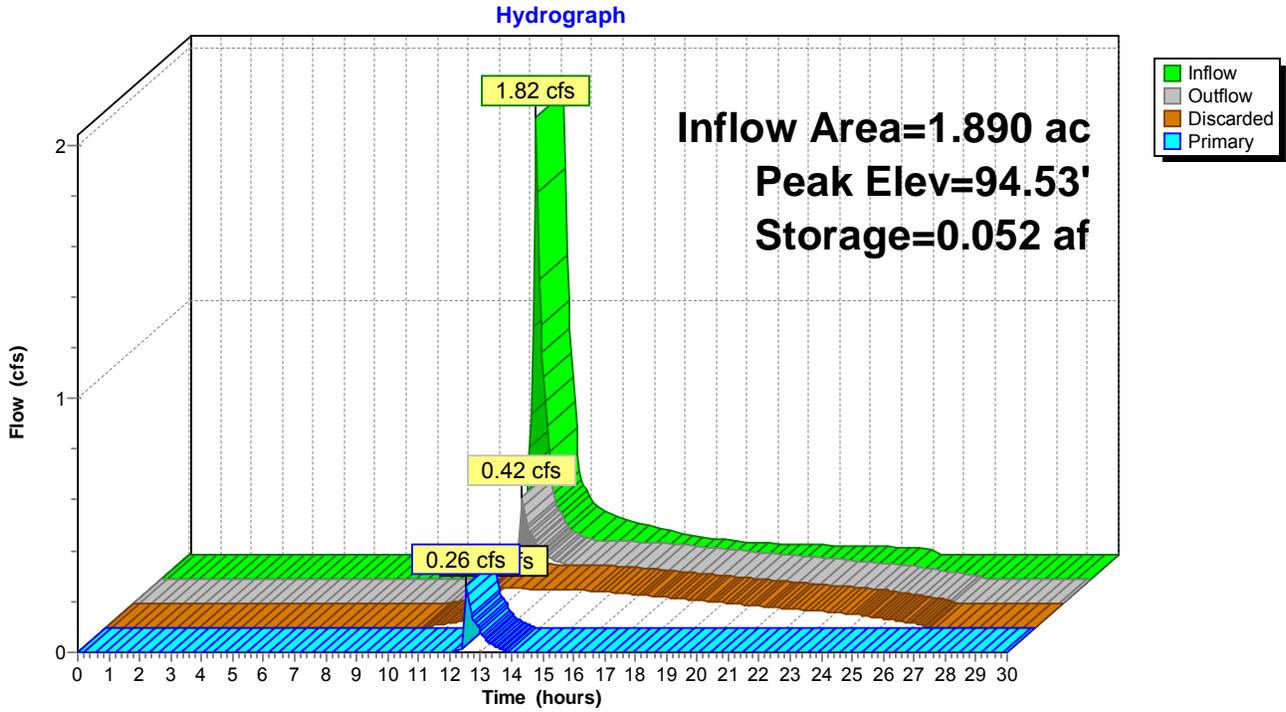
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	0.087 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	0.005	0.000	0.000
94.00	0.043	0.024	0.024
95.00	0.084	0.063	0.087

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	18.0" Round Culvert L= 100.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.16 cfs @ 12.55 hrs HW=94.53' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.25 cfs @ 12.55 hrs HW=94.53' (Free Discharge)
 ↑**1=Culvert** (Passes 0.25 cfs of 4.77 cfs potential flow)
 ↑**2=Grate** (Weir Controls 0.25 cfs @ 0.55 fps)

Pond 9P: RAIN GARDEN #2



Summary for Pond 10P: RAIN GARDEN #3

Inflow Area = 0.539 ac, 69.76% Impervious, Inflow Depth = 1.45" for 2-YR event
 Inflow = 0.89 cfs @ 12.09 hrs, Volume= 0.065 af
 Outflow = 0.89 cfs @ 12.12 hrs, Volume= 0.065 af, Atten= 0%, Lag= 1.6 min
 Discarded = 0.04 cfs @ 12.12 hrs, Volume= 0.039 af
 Primary = 0.85 cfs @ 12.12 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 94.60' @ 12.12 hrs Surf.Area= 0.017 ac Storage= 0.012 af

Plug-Flow detention time= 91.1 min calculated for 0.065 af (100% of inflow)
 Center-of-Mass det. time= 89.9 min (925.9 - 836.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.020 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.005	0.000	0.000
94.00	0.010	0.004	0.004
95.00	0.022	0.016	0.020

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	12.0" Round Culvert L= 120.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0083 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.12 hrs HW=94.60' (Free Discharge)

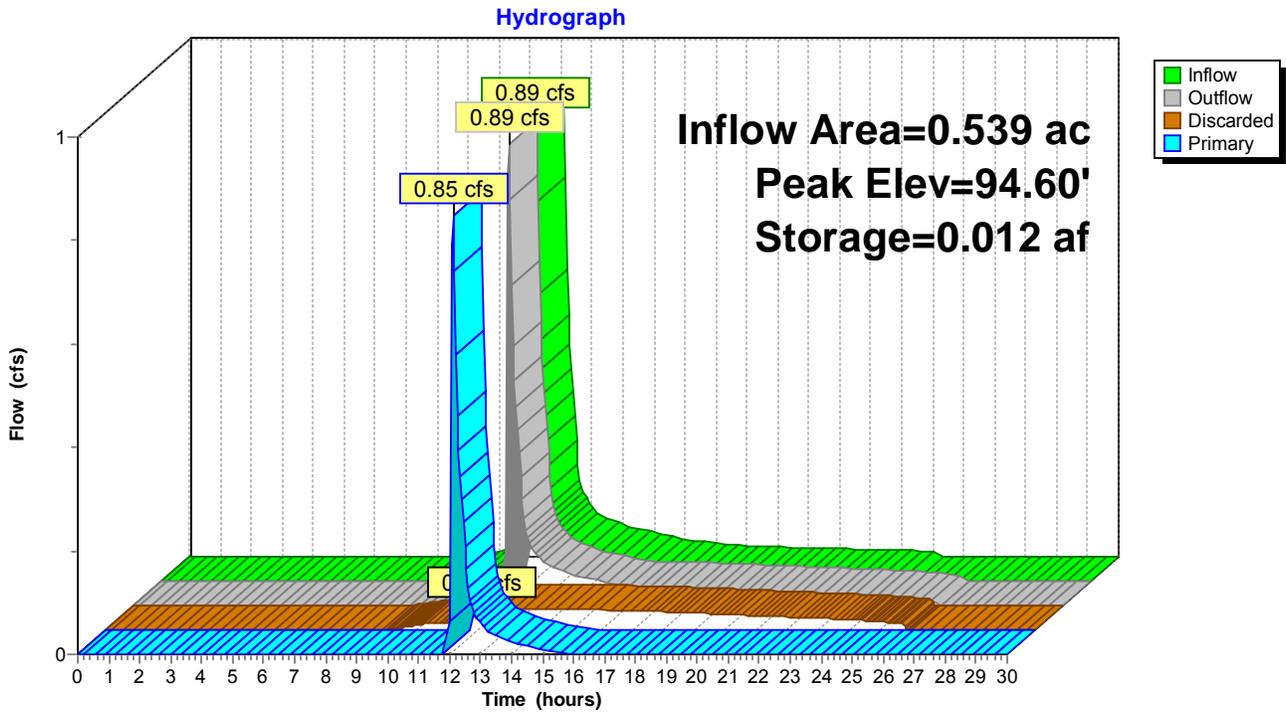
↑**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.77 cfs @ 12.12 hrs HW=94.60' (Free Discharge)

↑**1=Culvert** (Passes 0.77 cfs of 3.09 cfs potential flow)

↑**2=Grate** (Weir Controls 0.77 cfs @ 1.01 fps)

Pond 10P: RAIN GARDEN #3



Summary for Pond 11P: INF BASIN #1

Inflow Area = 3.071 ac, 55.16% Impervious, Inflow Depth = 0.17" for 2-YR event
 Inflow = 0.91 cfs @ 12.12 hrs, Volume= 0.044 af
 Outflow = 0.42 cfs @ 12.57 hrs, Volume= 0.044 af, Atten= 54%, Lag= 27.0 min
 Discarded = 0.04 cfs @ 12.57 hrs, Volume= 0.017 af
 Primary = 0.38 cfs @ 12.57 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 92.86' @ 12.57 hrs Surf.Area= 0.016 ac Storage= 0.010 af

Plug-Flow detention time= 41.3 min calculated for 0.044 af (100% of inflow)
 Center-of-Mass det. time= 41.1 min (832.4 - 791.3)

Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	0.119 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
92.00	0.008	0.000	0.000
93.00	0.017	0.012	0.012
94.00	0.028	0.022	0.035
95.00	0.041	0.035	0.069
96.00	0.057	0.049	0.119

Device	Routing	Invert	Outlet Devices
#1	Primary	91.80'	18.0" Round Culvert L= 161.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.80' / 91.00' S= 0.0050 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	95.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.50'	8.0" Vert. Orifice C= 0.600
#4	Discarded	92.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.57 hrs HW=92.85' (Free Discharge)

↑ **4=Exfiltration** (Exfiltration Controls 0.04 cfs)

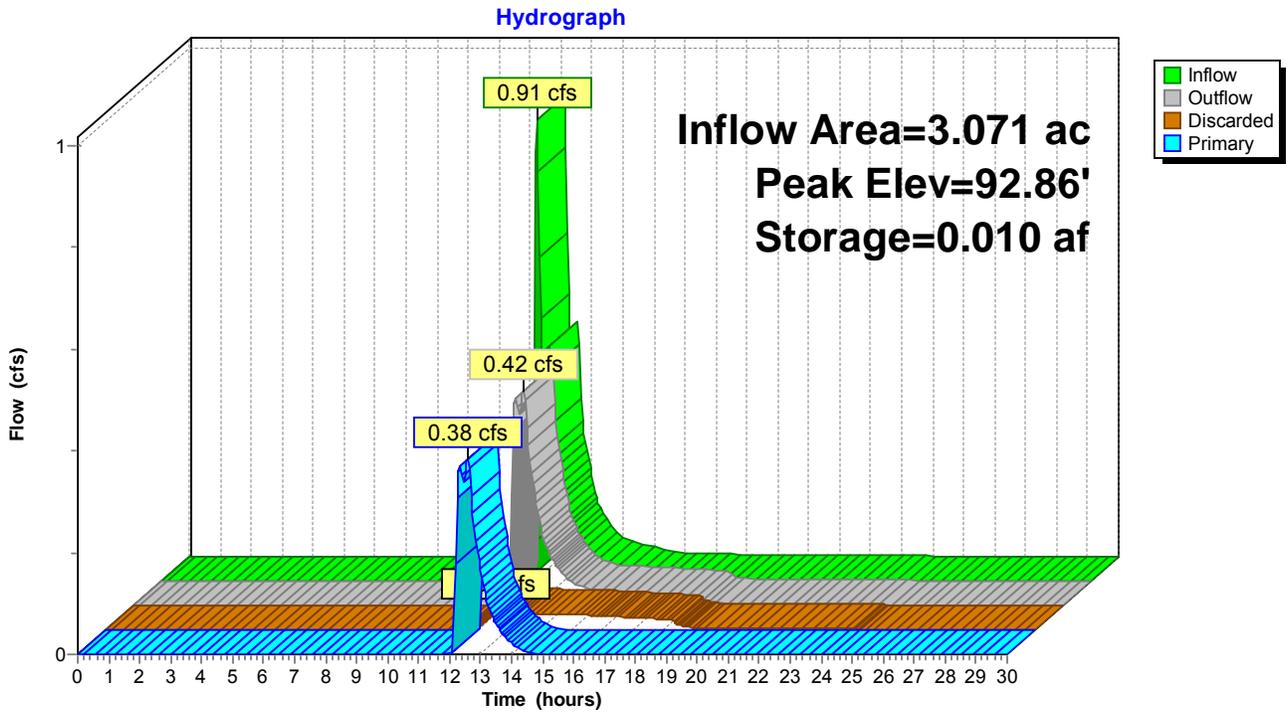
Primary OutFlow Max=0.38 cfs @ 12.57 hrs HW=92.85' (Free Discharge)

↑ **1=Culvert** (Passes 0.38 cfs of 3.76 cfs potential flow)

↑ **2=Grate** (Controls 0.00 cfs)

↑ **3=Orifice** (Orifice Controls 0.38 cfs @ 2.02 fps)

Pond 11P: INF BASIN #1



Summary for Pond 12P: INF BASIN #2

Inflow Area = 5.990 ac, 41.22% Impervious, Inflow Depth = 0.33" for 2-YR event
 Inflow = 1.32 cfs @ 12.09 hrs, Volume= 0.163 af
 Outflow = 0.58 cfs @ 12.72 hrs, Volume= 0.163 af, Atten= 56%, Lag= 37.9 min
 Discarded = 0.13 cfs @ 12.72 hrs, Volume= 0.107 af
 Primary = 0.46 cfs @ 12.72 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 91.98' @ 12.72 hrs Surf.Area= 0.052 ac Storage= 0.043 af

Plug-Flow detention time= 72.8 min calculated for 0.163 af (100% of inflow)
 Center-of-Mass det. time= 72.7 min (913.3 - 840.6)

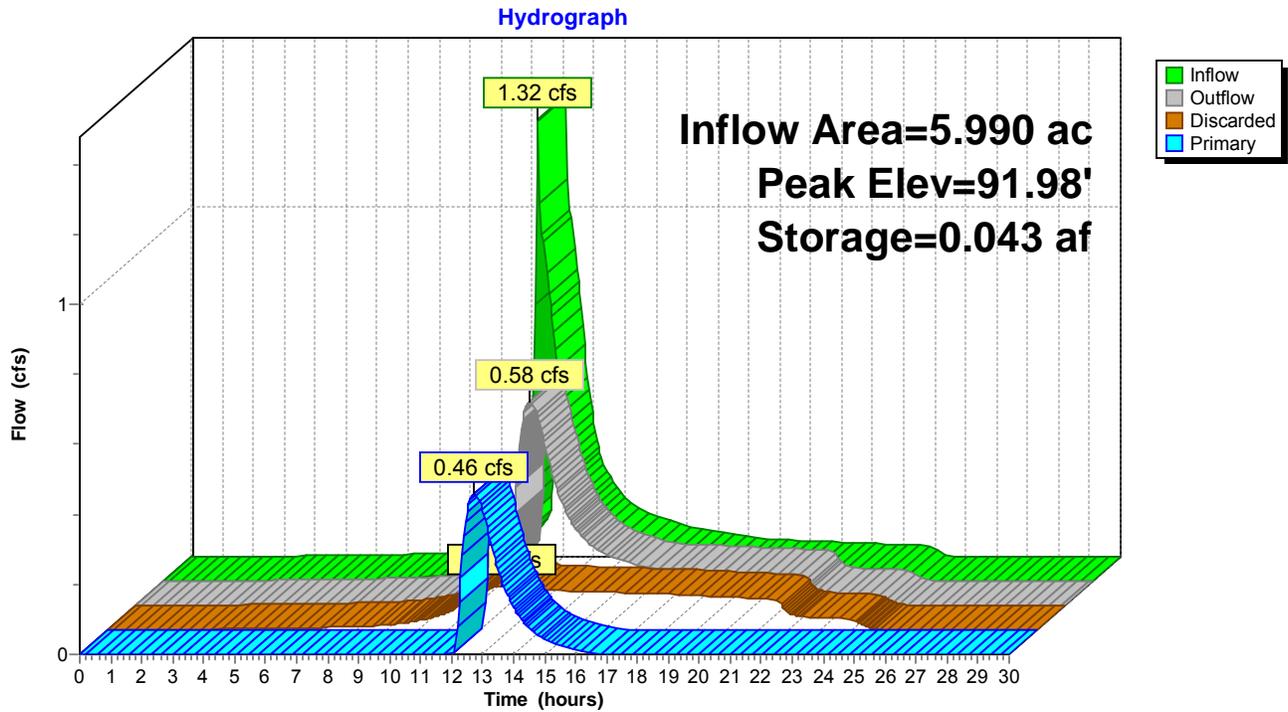
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	0.339 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
91.00	0.035	0.000	0.000
92.00	0.052	0.043	0.043
93.00	0.072	0.062	0.105
94.00	0.113	0.093	0.198
95.00	0.168	0.141	0.339

Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	18.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.00' / 90.10' S= 0.0300 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.00'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	91.50'	6.0" Vert. Orifice C= 0.600
#4	Primary	94.50'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	91.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.13 cfs @ 12.72 hrs HW=91.98' (Free Discharge)
 ↑ **5=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.46 cfs @ 12.72 hrs HW=91.98' (Free Discharge)
 ↑ **1=Culvert** (Passes 0.46 cfs of 4.13 cfs potential flow)
 ↑ **2=Grate** (Controls 0.00 cfs)
 ↑ **3=Orifice** (Orifice Controls 0.46 cfs @ 2.36 fps)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: INF BASIN #2



Summary for Pond 14P: INF SYS #2

Inflow Area = 0.361 ac, 100.00% Impervious, Inflow Depth = 2.77" for 2-YR event
 Inflow = 1.02 cfs @ 12.09 hrs, Volume= 0.083 af
 Outflow = 0.05 cfs @ 10.35 hrs, Volume= 0.083 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.05 cfs @ 10.35 hrs, Volume= 0.083 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 91.47' @ 14.13 hrs Surf.Area= 0.022 ac Storage= 0.038 af

Plug-Flow detention time= 260.1 min calculated for 0.083 af (100% of inflow)
 Center-of-Mass det. time= 259.9 min (1,017.7 - 757.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.79'	0.028 af	20.83'W x 45.50'L x 4.54'H Field A 0.099 af Overall - 0.030 af Embedded = 0.069 af x 40.0% Voids
#2A	89.79'	0.030 af	Cultec R-330XL x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.057 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	92.83'	12.0" Round Culvert L= 41.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 92.83' / 92.62' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	88.79'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 10.35 hrs HW=88.84' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.79' (Free Discharge)
 ↑**1=Culvert** (Controls 0.00 cfs)

Pond 14P: INF SYS #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

4,305.1 cf Field - 1,296.5 cf Chambers = 3,008.6 cf Stone x 40.0% Voids = 1,203.5 cf Stone Storage

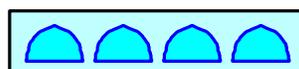
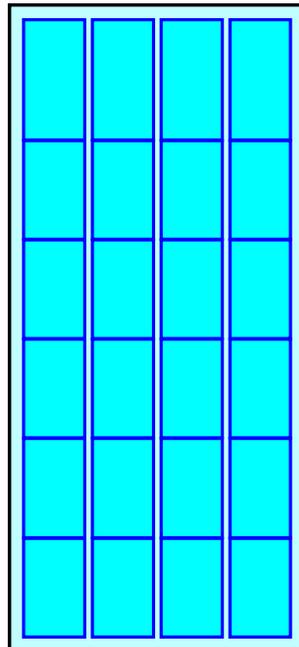
Chamber Storage + Stone Storage = 2,499.9 cf = 0.057 af

Overall Storage Efficiency = 58.1%

24 Chambers

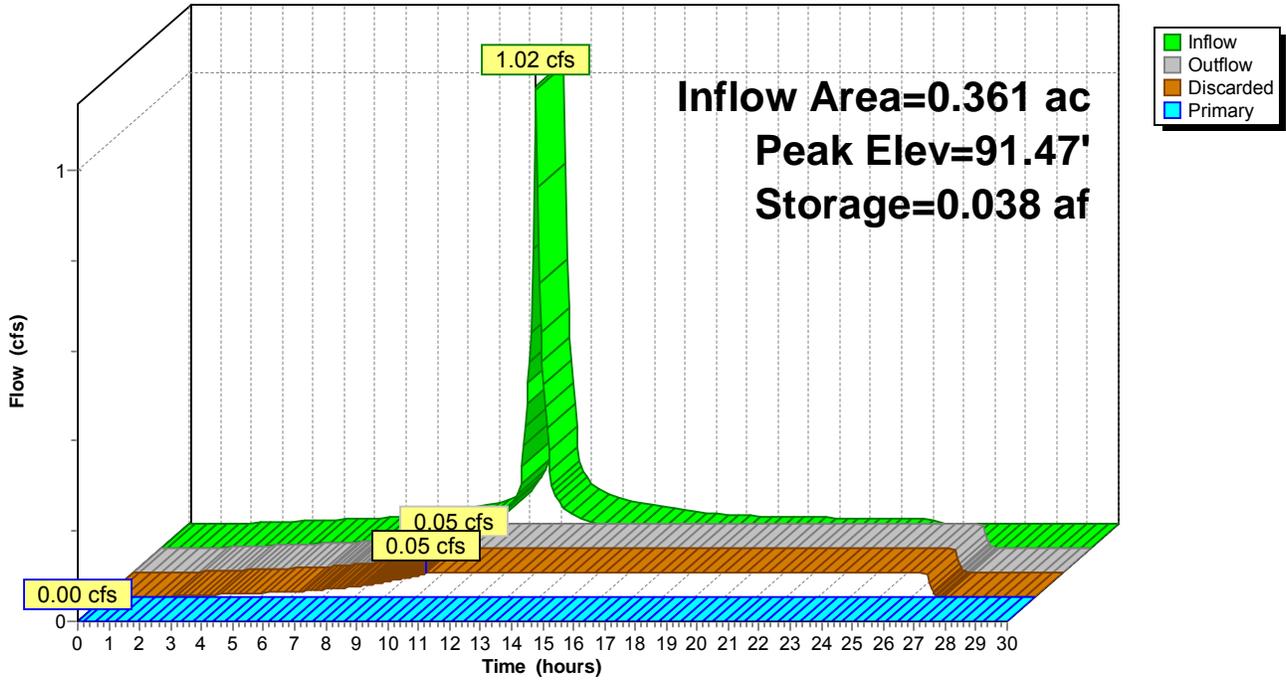
159.4 cy Field

111.4 cy Stone



Pond 14P: INF SYS #2

Hydrograph



Summary for Pond 23P: INF SYS #1

Inflow Area = 0.503 ac, 96.62% Impervious, Inflow Depth = 2.64" for 2-YR event
 Inflow = 1.36 cfs @ 12.09 hrs, Volume= 0.111 af
 Outflow = 0.11 cfs @ 11.30 hrs, Volume= 0.111 af, Atten= 92%, Lag= 0.0 min
 Discarded = 0.11 cfs @ 11.30 hrs, Volume= 0.111 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 89.99' @ 13.09 hrs Surf.Area= 0.045 ac Storage= 0.042 af

Plug-Flow detention time= 124.2 min calculated for 0.111 af (100% of inflow)
 Center-of-Mass det. time= 124.1 min (884.3 - 760.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.36'	0.057 af	16.00'W x 122.50'L x 4.54'H Field A 0.204 af Overall - 0.062 af Embedded = 0.143 af x 40.0% Voids
#2A	89.36'	0.062 af	Cultec R-330XL x 51 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.36'	2.410 in/hr Exfiltration over Surface area
#2	Primary	92.10'	12.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.10' / 90.60' S= 0.0500 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.11 cfs @ 11.30 hrs HW=88.41' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.36' (Free Discharge)
 ↑2=Culvert (Controls 0.00 cfs)

Pond 23P: INF SYS #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

51 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 2,693.5 cf Chamber Storage

8,901.7 cf Field - 2,693.5 cf Chambers = 6,208.1 cf Stone x 40.0% Voids = 2,483.3 cf Stone Storage

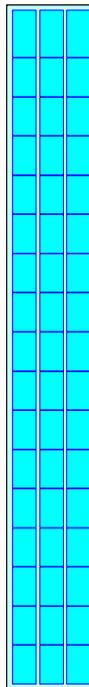
Chamber Storage + Stone Storage = 5,176.8 cf = 0.119 af

Overall Storage Efficiency = 58.2%

51 Chambers

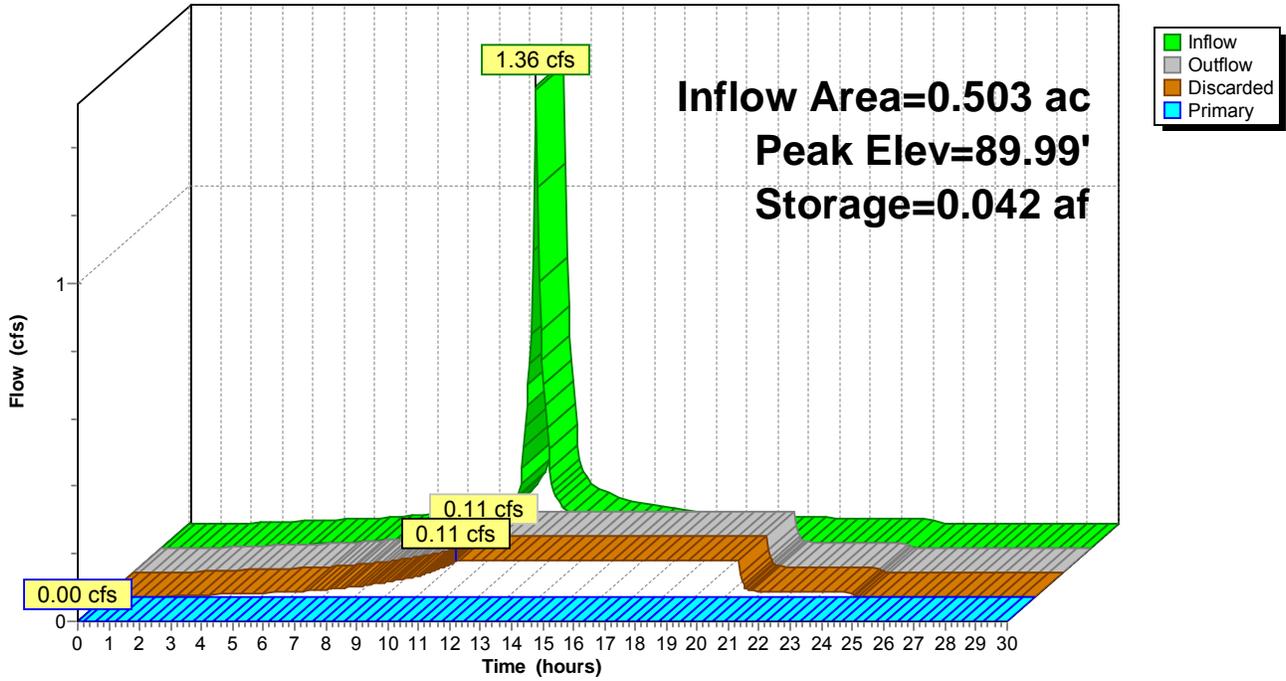
329.7 cy Field

229.9 cy Stone



Pond 23P: INF SYS #1

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area P01	Runoff Area=6.682 ac 0.19% Impervious Runoff Depth=0.07" Flow Length=452' Tc=19.4 min CN=37 Runoff=0.06 cfs 0.037 af
Subcatchment 2S: Area P03	Runoff Area=0.539 ac 69.76% Impervious Runoff Depth=2.73" Tc=6.0 min CN=83 Runoff=1.68 cfs 0.122 af
Subcatchment 3S: Area P05	Runoff Area=1.439 ac 46.77% Impervious Runoff Depth=2.29" Tc=6.0 min CN=78 Runoff=3.79 cfs 0.275 af
Subcatchment 4S: Area P06	Runoff Area=0.451 ac 47.67% Impervious Runoff Depth=1.82" Tc=6.0 min CN=72 Runoff=0.93 cfs 0.068 af
Subcatchment 13S: AREA P09A	Runoff Area=0.470 ac 100.00% Impervious Runoff Depth=4.26" Tc=6.0 min CN=98 Runoff=2.02 cfs 0.167 af
Subcatchment 15S: Area P08	Runoff Area=0.546 ac 66.48% Impervious Runoff Depth=2.64" Tc=6.0 min CN=82 Runoff=1.65 cfs 0.120 af
Subcatchment 16S: Area P07	Runoff Area=0.514 ac 73.54% Impervious Runoff Depth=2.91" Tc=6.0 min CN=85 Runoff=1.71 cfs 0.125 af
Subcatchment 17S: Area P04	Runoff Area=0.281 ac 24.56% Impervious Runoff Depth=1.08" Flow Length=73' Tc=6.7 min CN=61 Runoff=0.30 cfs 0.025 af
Subcatchment 18S: Area P02	Runoff Area=2.211 ac 11.31% Impervious Runoff Depth=0.74" Flow Length=240' Tc=21.7 min CN=55 Runoff=0.92 cfs 0.137 af
Subcatchment 19S: Area P10	Runoff Area=0.632 ac 0.95% Impervious Runoff Depth=0.37" Flow Length=144' Tc=7.2 min CN=47 Runoff=0.10 cfs 0.020 af
Subcatchment 20S: AREA P09D	Runoff Area=0.162 ac 100.00% Impervious Runoff Depth=4.26" Tc=6.0 min CN=98 Runoff=0.70 cfs 0.058 af
Subcatchment 21S: AREA P09C	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth=4.26" Tc=6.0 min CN=98 Runoff=0.36 cfs 0.030 af
Subcatchment 22S: AREA P09B	Runoff Area=0.277 ac 100.00% Impervious Runoff Depth=4.26" Tc=6.0 min CN=98 Runoff=1.19 cfs 0.098 af
Subcatchment 24S: Area P10A	Runoff Area=0.033 ac 48.48% Impervious Runoff Depth=1.90" Tc=6.0 min CN=73 Runoff=0.07 cfs 0.005 af
Pond 1: DP#1	Inflow=2.24 cfs 0.519 af Primary=2.24 cfs 0.519 af
Pond 2: DP#2	Inflow=0.10 cfs 0.020 af Primary=0.10 cfs 0.020 af

Pond 8P: RAIN GARDEN #1 Peak Elev=94.63' Storage=0.017 af Inflow=0.93 cfs 0.068 af
Discarded=0.05 cfs 0.047 af Primary=0.50 cfs 0.021 af Outflow=0.55 cfs 0.068 af

Pond 9P: RAIN GARDEN #2 Peak Elev=94.66' Storage=0.061 af Inflow=3.78 cfs 0.296 af
Discarded=0.17 cfs 0.165 af Primary=3.35 cfs 0.131 af Outflow=3.52 cfs 0.296 af

Pond 10P: RAIN GARDEN #3 Peak Elev=94.65' Storage=0.013 af Inflow=1.68 cfs 0.122 af
Discarded=0.04 cfs 0.049 af Primary=1.59 cfs 0.073 af Outflow=1.63 cfs 0.122 af

Pond 11P: INF BASIN #1 Peak Elev=94.75' Storage=0.060 af Inflow=5.05 cfs 0.246 af
Discarded=0.09 cfs 0.029 af Primary=2.33 cfs 0.217 af Outflow=2.42 cfs 0.246 af

Pond 12P: INF BASIN #2 Peak Elev=93.92' Storage=0.189 af Inflow=4.13 cfs 0.531 af
Discarded=0.27 cfs 0.173 af Primary=1.39 cfs 0.358 af Outflow=1.66 cfs 0.531 af

Pond 14P: INF SYS #2 Peak Elev=93.13' Storage=0.056 af Inflow=1.55 cfs 0.128 af
Discarded=0.05 cfs 0.105 af Primary=0.28 cfs 0.016 af Outflow=0.33 cfs 0.121 af

Pond 23P: INF SYS #1 Peak Elev=90.99' Storage=0.077 af Inflow=2.09 cfs 0.172 af
Discarded=0.11 cfs 0.172 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.172 af

Total Runoff Area = 14.321 ac Runoff Volume = 1.287 af Average Runoff Depth = 1.08"
76.59% Pervious = 10.969 ac 23.41% Impervious = 3.352 ac

Summary for Subcatchment 1S: Area P01

Runoff = 0.06 cfs @ 15.49 hrs, Volume= 0.037 af, Depth= 0.07"

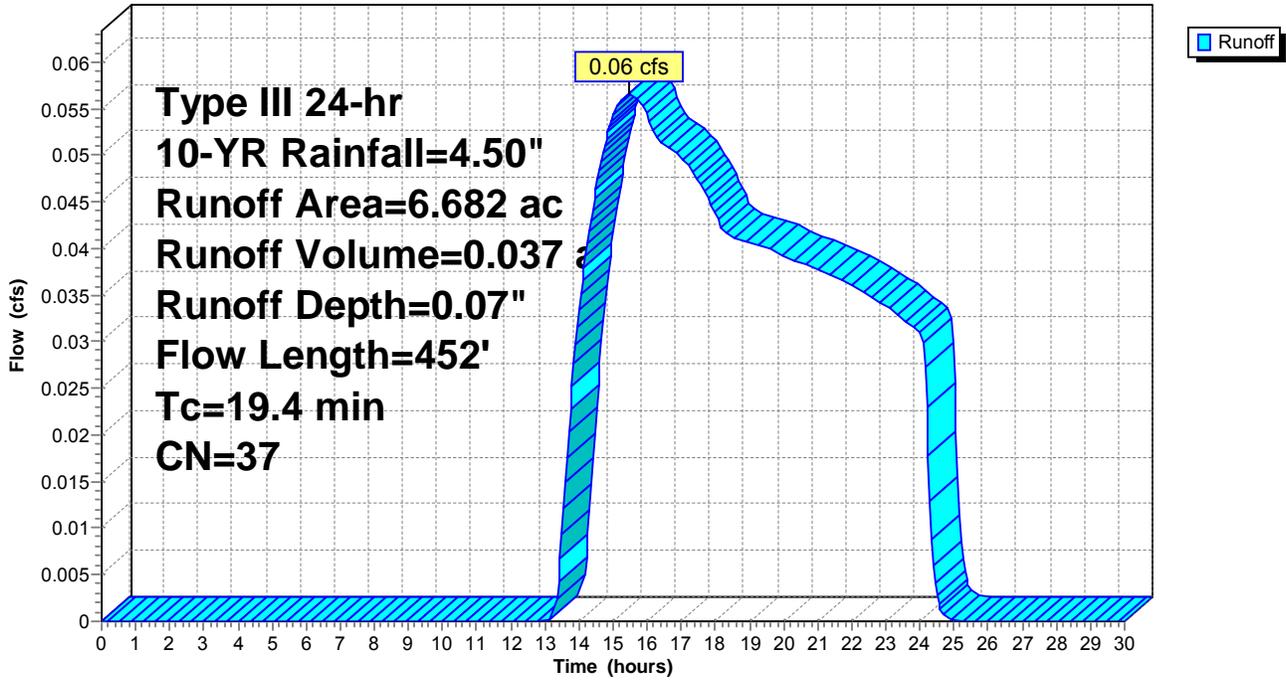
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.032	36	Woods, Fair, HSG A
0.637	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.682	37	Weighted Average
6.669		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area P01

Hydrograph



Summary for Subcatchment 2S: Area P03

Runoff = 1.68 cfs @ 12.09 hrs, Volume= 0.122 af, Depth= 2.73"

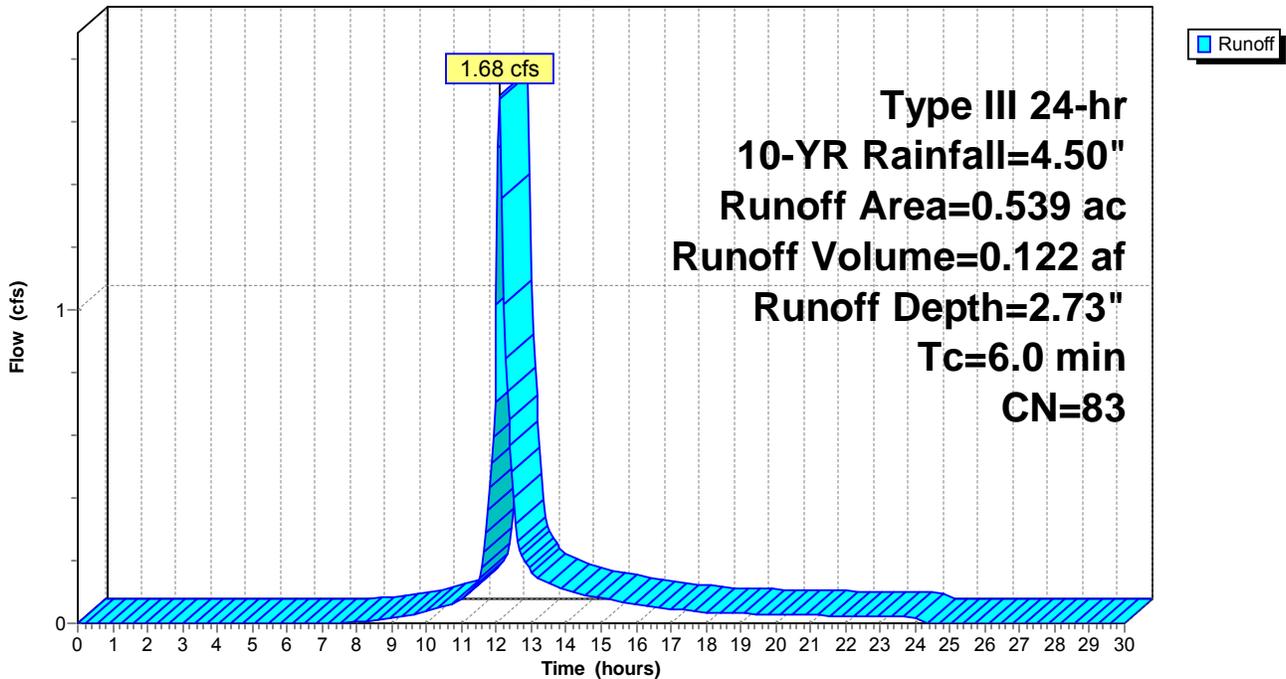
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.376	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.163	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.539	83	Weighted Average
0.163		30.24% Pervious Area
0.376		69.76% Impervious Area

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

Subcatchment 2S: Area P03

Hydrograph



Summary for Subcatchment 3S: Area P05

Runoff = 3.79 cfs @ 12.09 hrs, Volume= 0.275 af, Depth= 2.29"

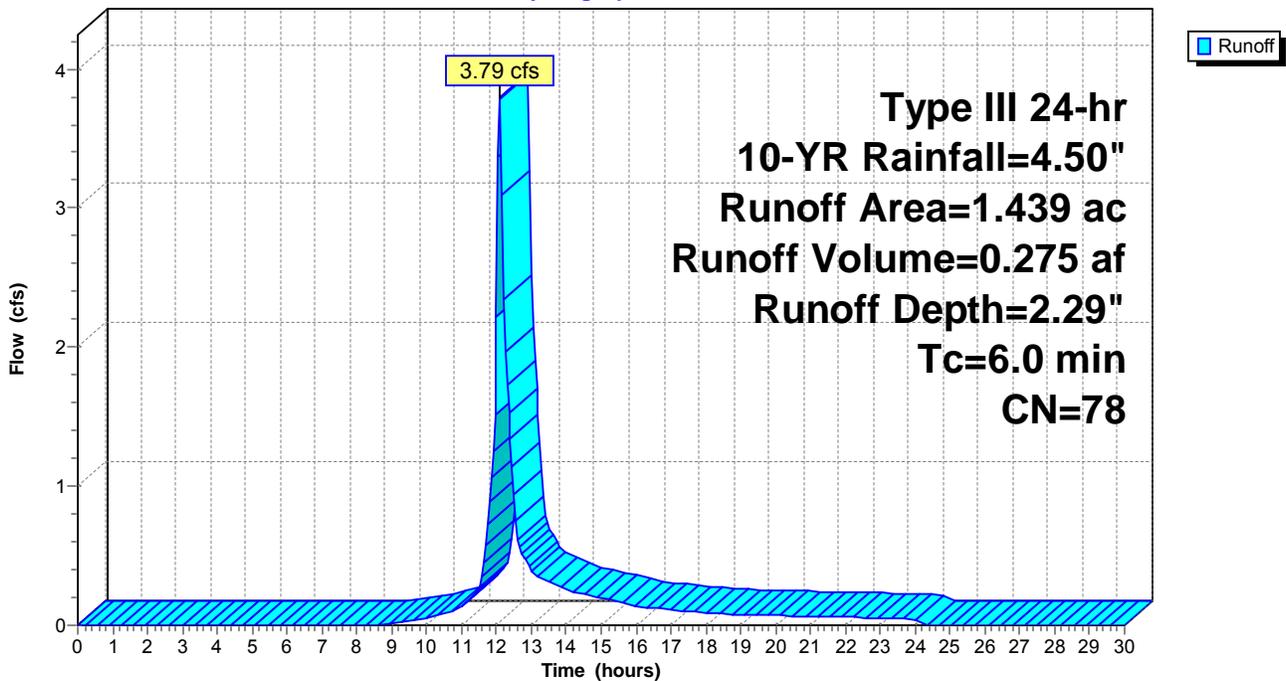
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.673	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.386	49	50-75% Grass cover, Fair, HSG A
* 0.380	72	Dirt, HSG A (Playscape)
1.439	78	Weighted Average
0.766		53.23% Pervious Area
0.673		46.77% Impervious Area

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

Subcatchment 3S: Area P05

Hydrograph



Summary for Subcatchment 4S: Area P06

Runoff = 0.93 cfs @ 12.10 hrs, Volume= 0.068 af, Depth= 1.82"

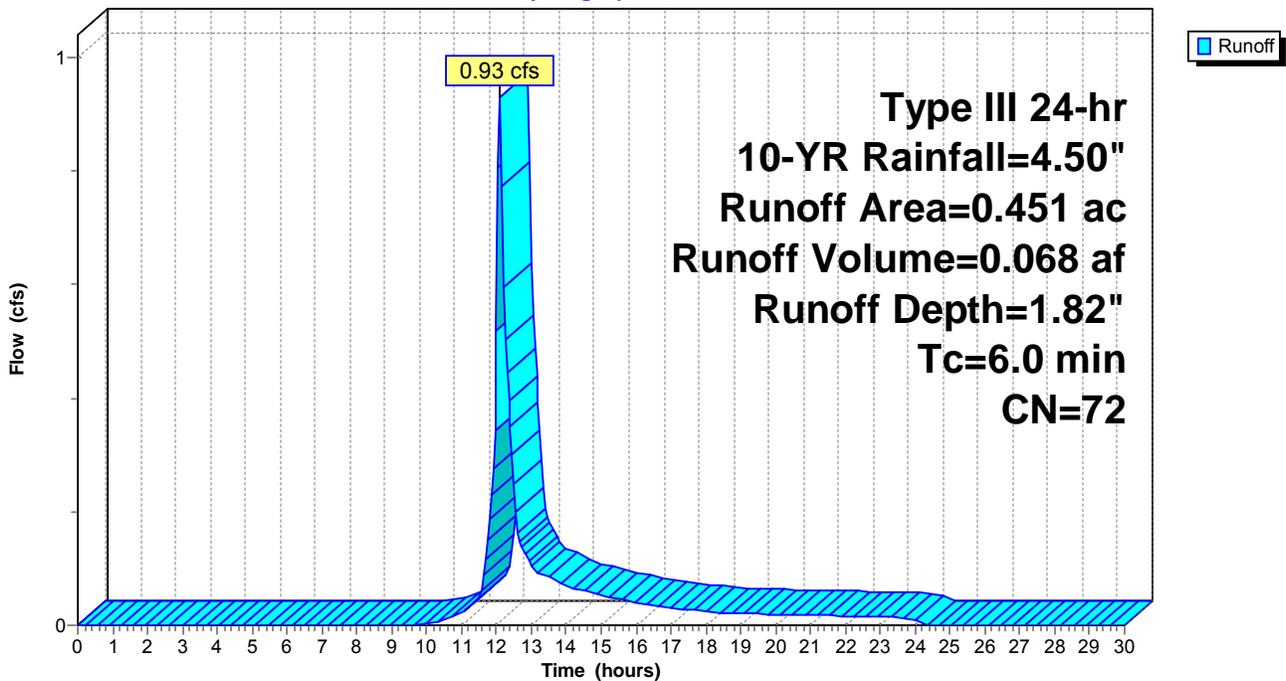
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.215	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.236	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.451	72	Weighted Average
0.236		52.33% Pervious Area
0.215		47.67% Impervious Area

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

Subcatchment 4S: Area P06

Hydrograph



Summary for Subcatchment 13S: AREA P09A

Runoff = 2.02 cfs @ 12.09 hrs, Volume= 0.167 af, Depth= 4.26"

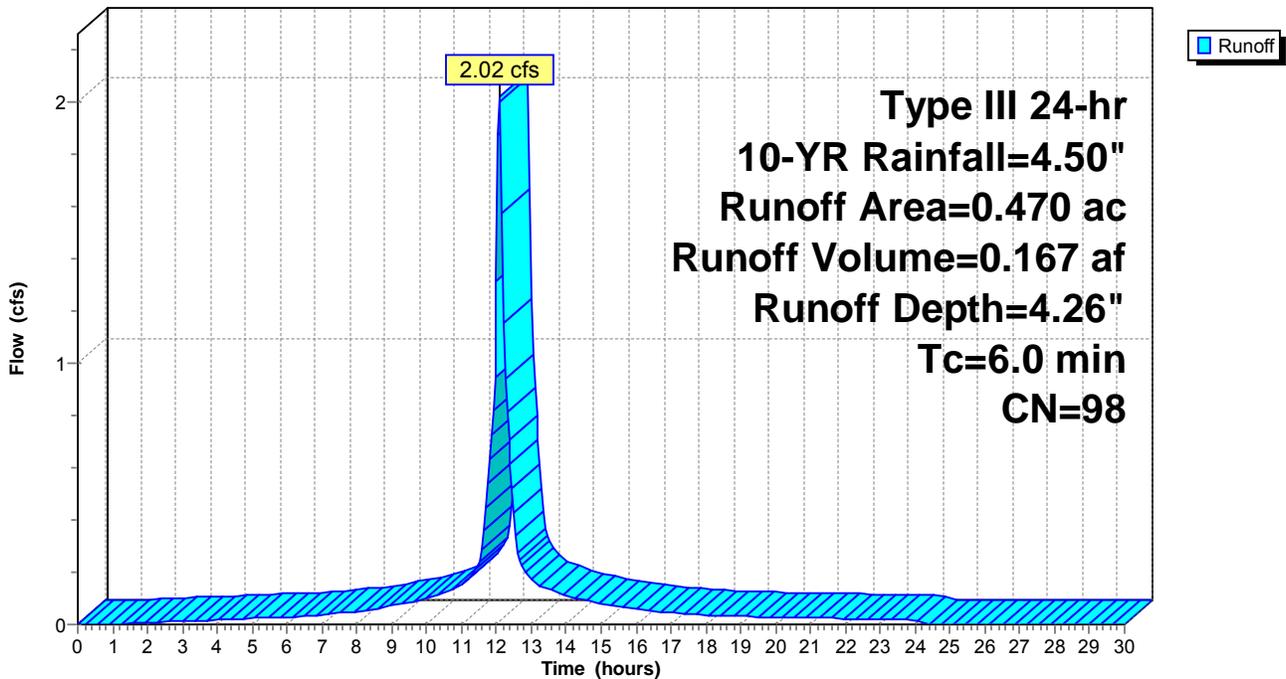
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.470	98	Roofs, HSG A
0.470		100.00% Impervious Area

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

Subcatchment 13S: AREA P09A

Hydrograph



Summary for Subcatchment 15S: Area P08

Runoff = 1.65 cfs @ 12.09 hrs, Volume= 0.120 af, Depth= 2.64"

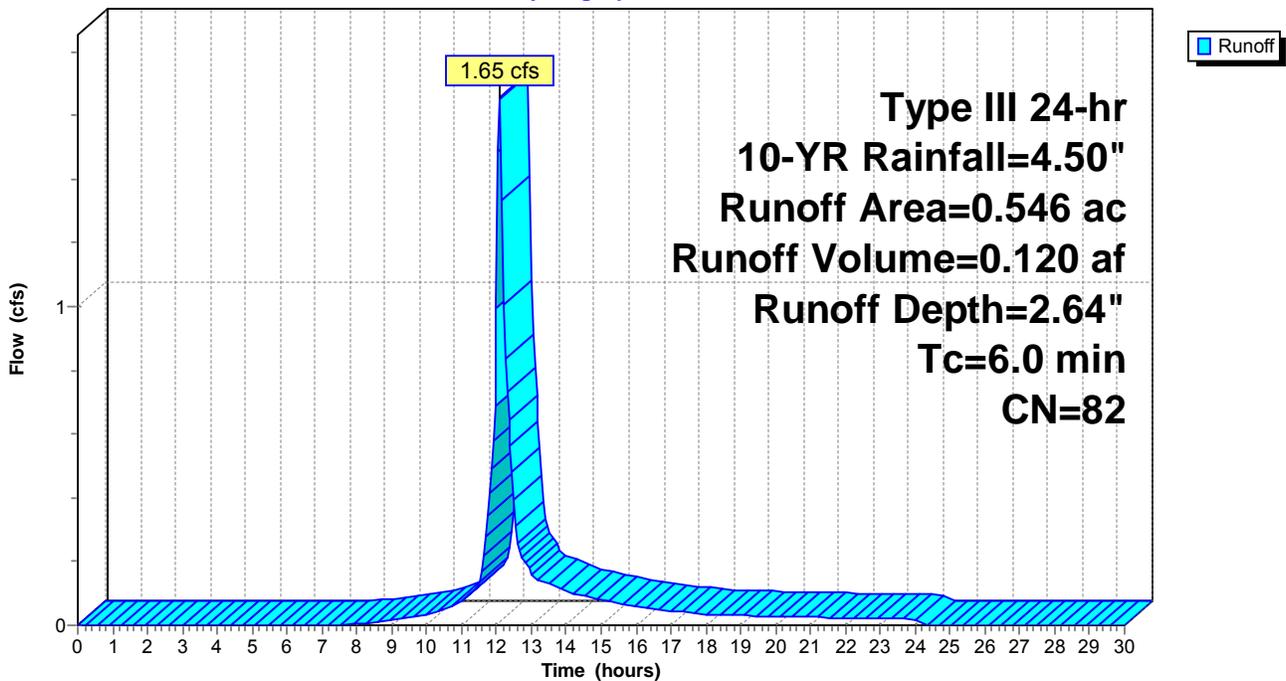
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.363	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.183	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.546	82	Weighted Average
0.183		33.52% Pervious Area
0.363		66.48% Impervious Area

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

Subcatchment 15S: Area P08

Hydrograph



Summary for Subcatchment 16S: Area P07

Runoff = 1.71 cfs @ 12.09 hrs, Volume= 0.125 af, Depth= 2.91"

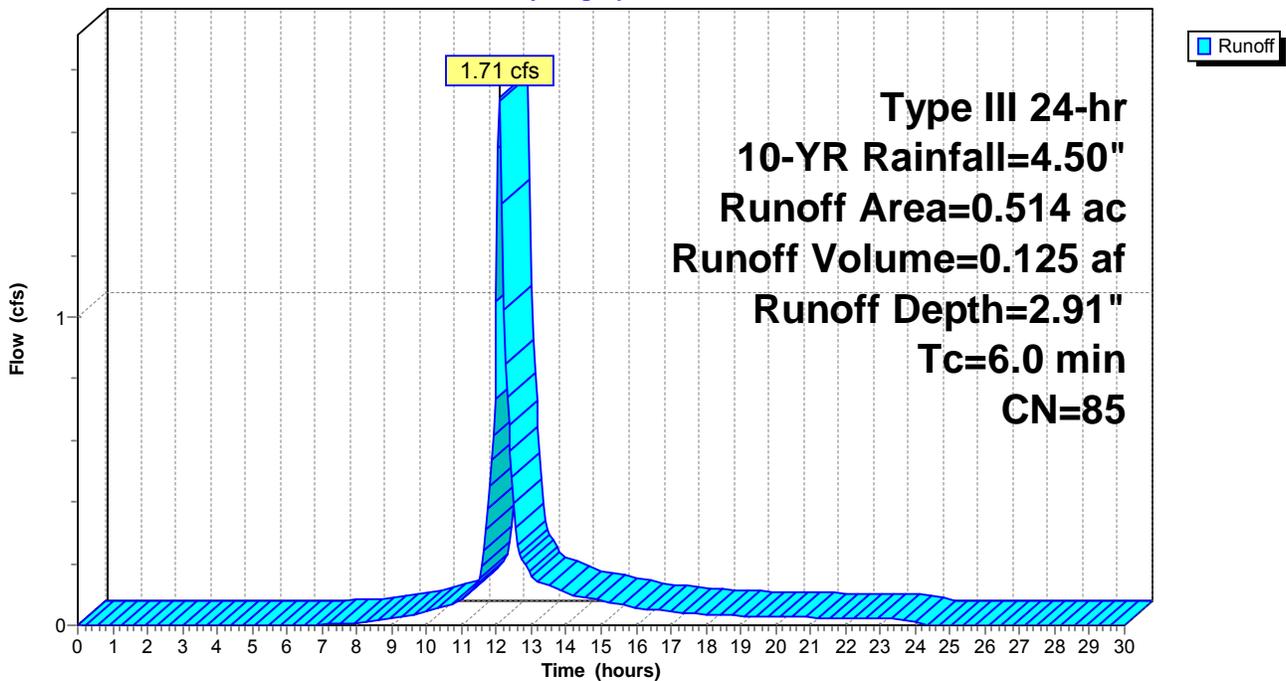
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.378	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.136	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.514	85	Weighted Average
0.136		26.46% Pervious Area
0.378		73.54% Impervious Area

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

Subcatchment 16S: Area P07

Hydrograph



Summary for Subcatchment 17S: Area P04

Runoff = 0.30 cfs @ 12.11 hrs, Volume= 0.025 af, Depth= 1.08"

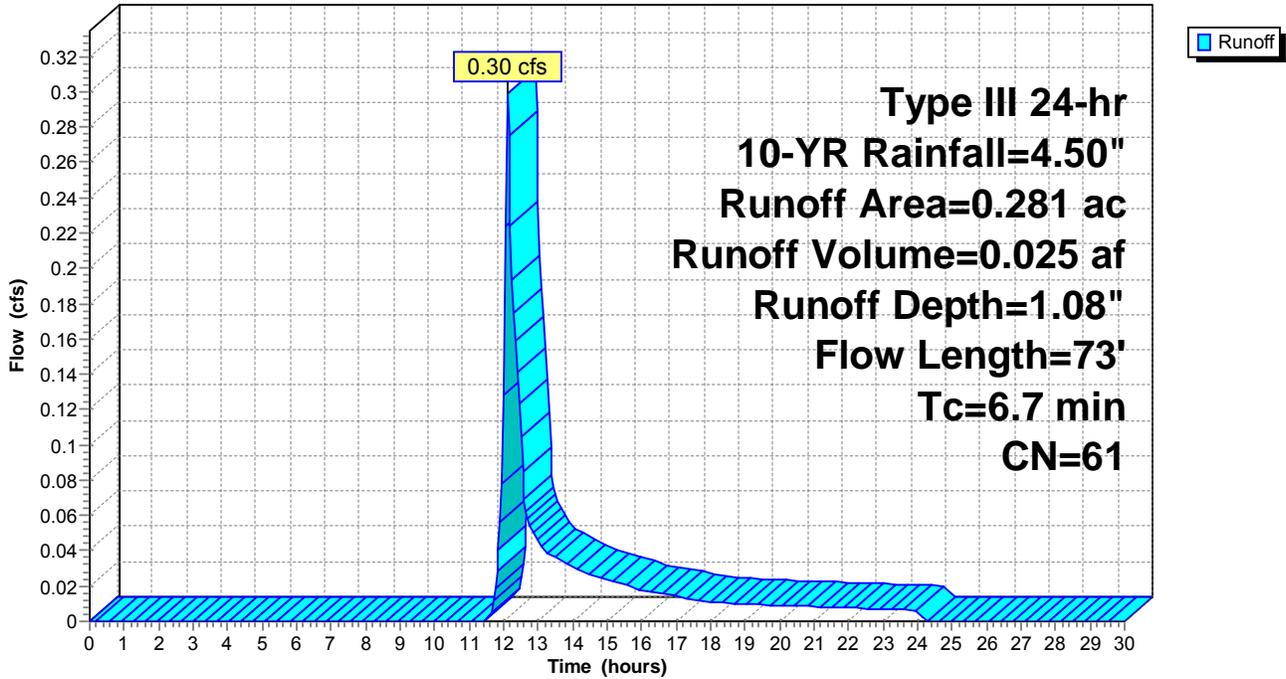
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.069	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.212	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.281	61	Weighted Average
0.212		75.44% Pervious Area
0.069		24.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	57	0.0200	0.15		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.0	5	0.0100	2.03		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
0.2	11	0.0300	1.21		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
6.7	73	Total			

Subcatchment 17S: Area P04

Hydrograph



20111126A10_PROP01

Prepared by Fuss & O'Neill

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Type III 24-hr 10-YR Rainfall=4.50"

Printed 5/23/2013

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Summary for Subcatchment 18S: Area P02

Runoff = 0.92 cfs @ 12.40 hrs, Volume= 0.137 af, Depth= 0.74"

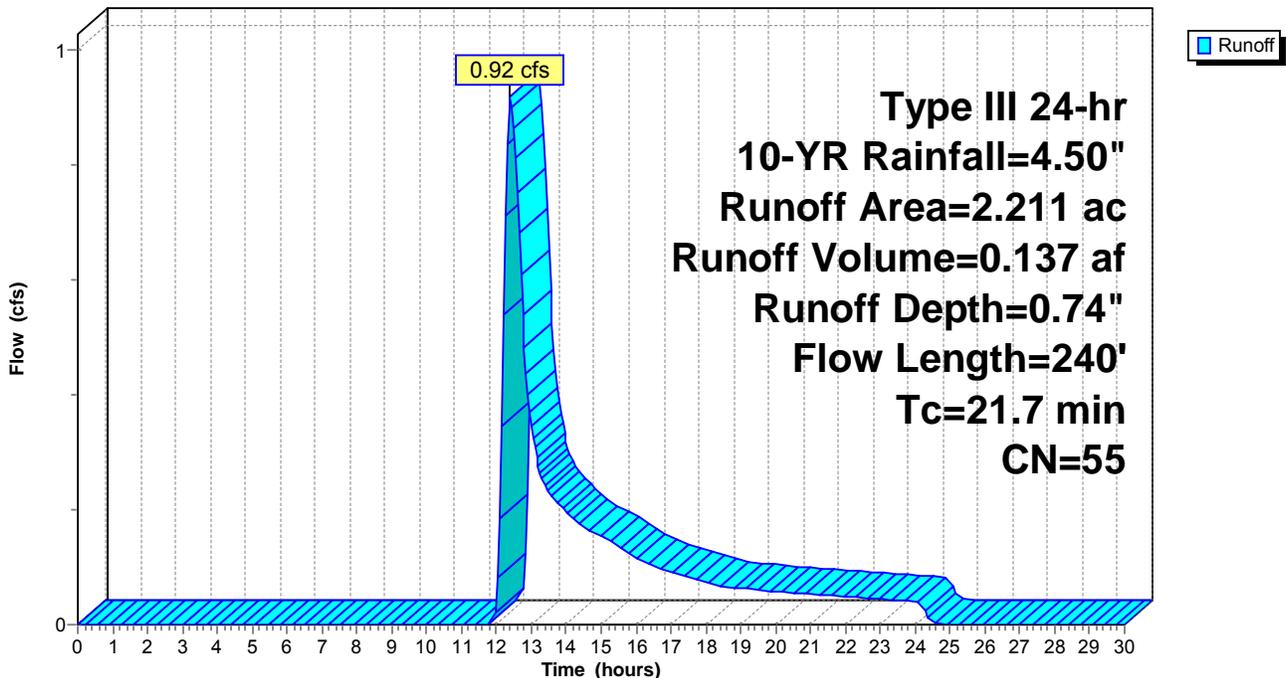
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
1.961	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
2.211	55	Weighted Average
1.961		88.69% Pervious Area
0.250		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0040	0.09		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.4	140	0.0200	0.99		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
21.7	240	Total			

Subcatchment 18S: Area P02

Hydrograph



Summary for Subcatchment 19S: Area P10

Runoff = 0.10 cfs @ 12.34 hrs, Volume= 0.020 af, Depth= 0.37"

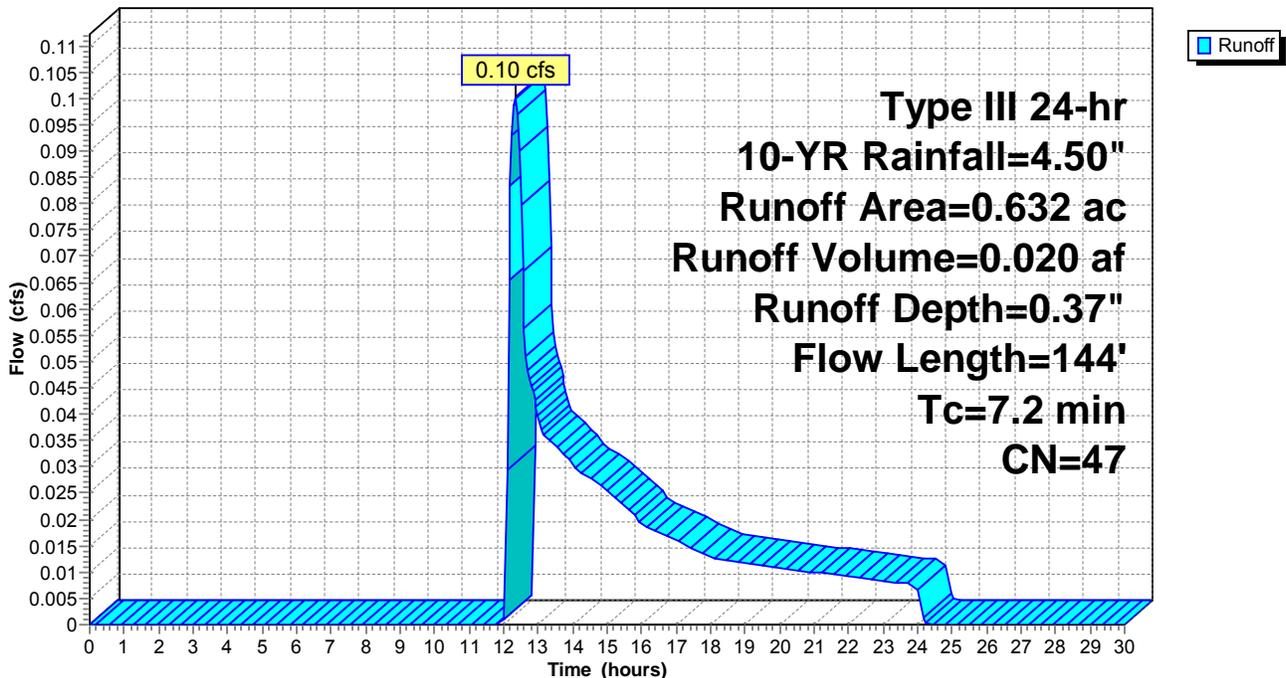
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.111	36	Woods, Fair, HSG A
0.515	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.632	47	Weighted Average
0.626		99.05% Pervious Area
0.006		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	46	0.0350	0.18		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.9	98	0.0130	0.57		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
7.2	144	Total			

Subcatchment 19S: Area P10

Hydrograph



Summary for Subcatchment 20S: AREA P09D

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.058 af, Depth= 4.26"

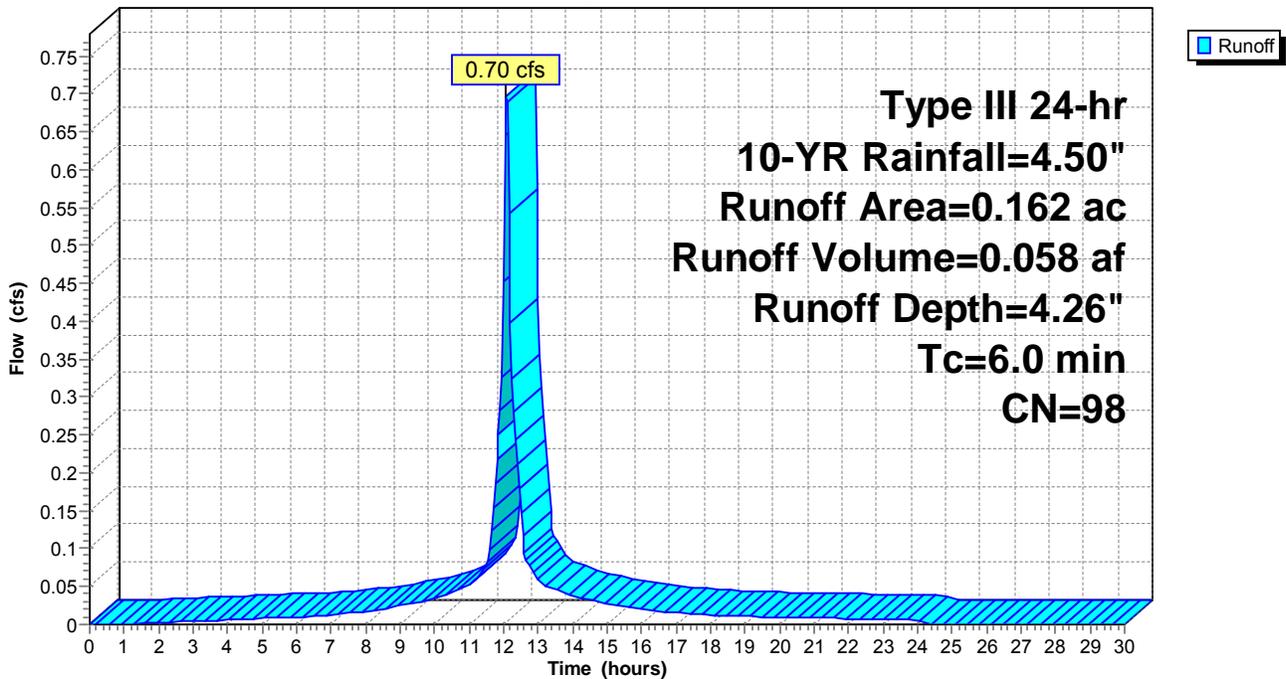
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.162	98	Roofs, HSG A
0.162		100.00% Impervious Area

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

Subcatchment 20S: AREA P09D

Hydrograph



Summary for Subcatchment 21S: AREA P09C

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 4.26"

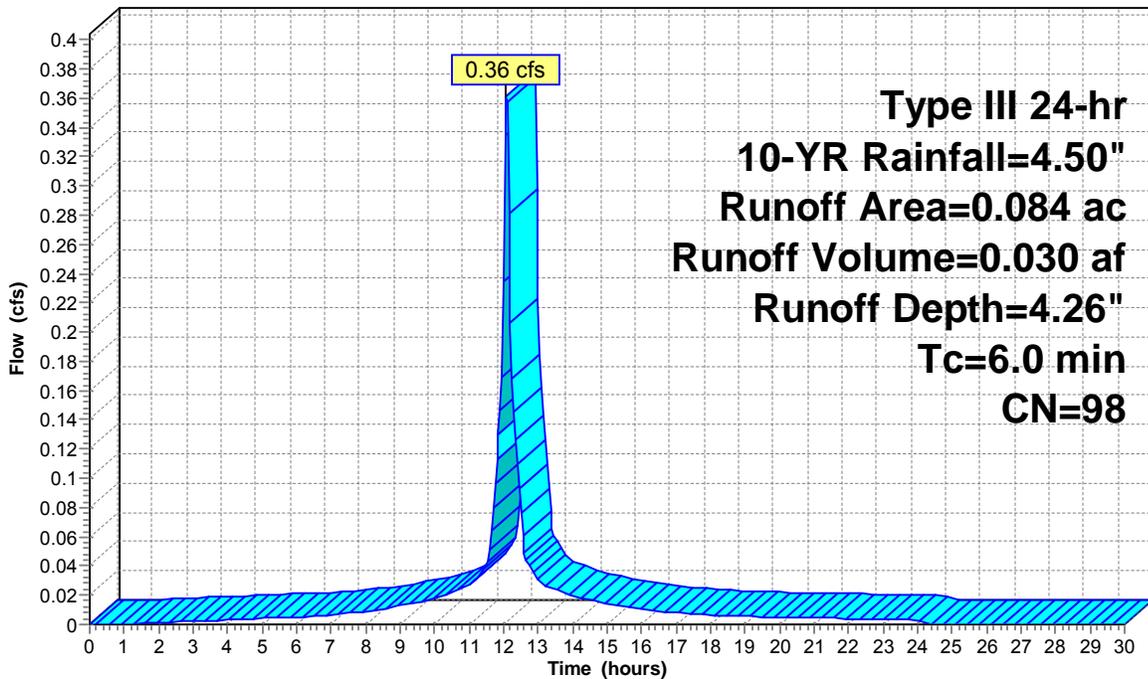
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.084	98	Roofs, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 21S: AREA P09C

Hydrograph



**Type III 24-hr
 10-YR Rainfall=4.50"
 Runoff Area=0.084 ac
 Runoff Volume=0.030 af
 Runoff Depth=4.26"
 Tc=6.0 min
 CN=98**

Summary for Subcatchment 22S: AREA P09B

Runoff = 1.19 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 4.26"

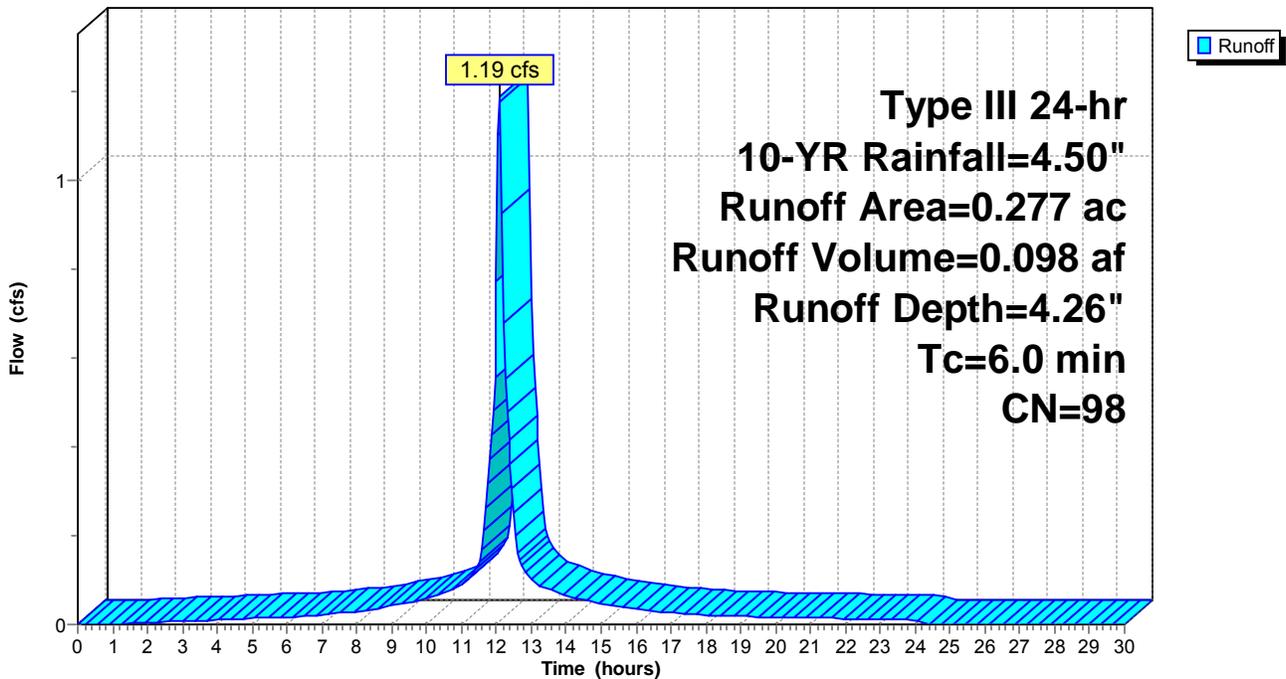
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.277	98	Roofs, HSG A
0.277		100.00% Impervious Area

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

Subcatchment 22S: AREA P09B

Hydrograph



Summary for Subcatchment 24S: Area P10A

Runoff = 0.07 cfs @ 12.10 hrs, Volume= 0.005 af, Depth= 1.90"

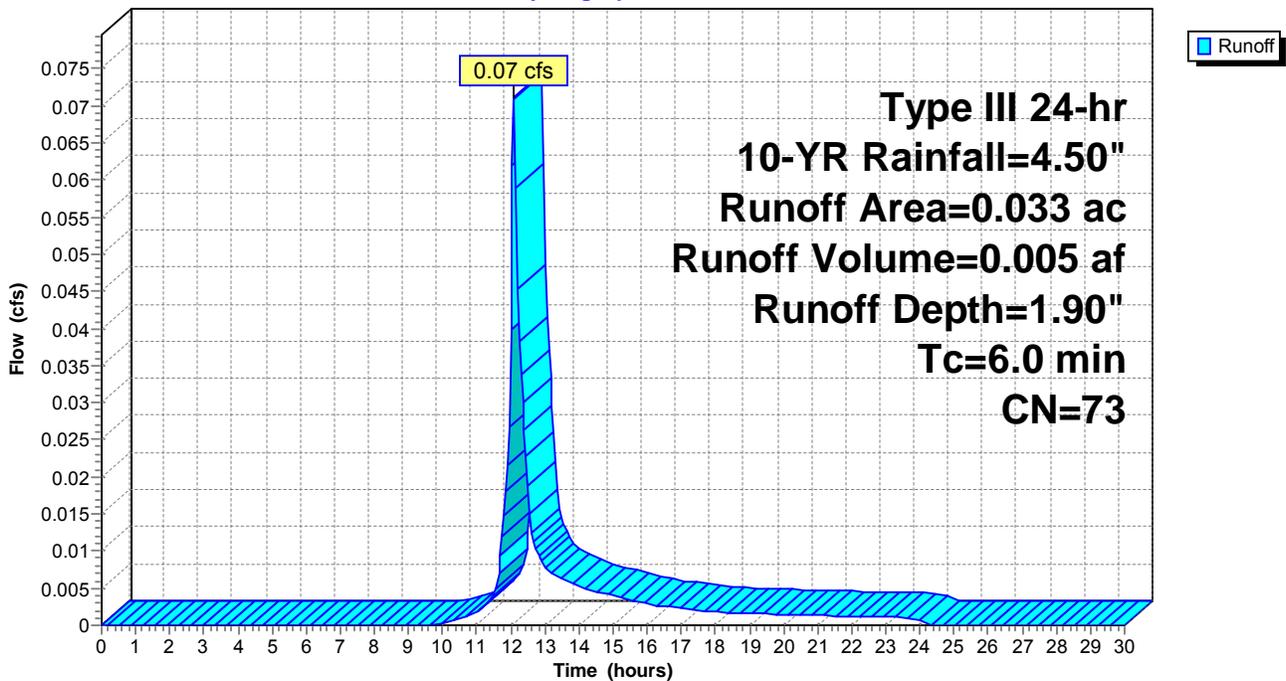
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-YR Rainfall=4.50"

Area (ac)	CN	Description
0.016	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.017	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.033	73	Weighted Average
0.017		51.52% Pervious Area
0.016		48.48% Impervious Area

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

Subcatchment 24S: Area P10A

Hydrograph



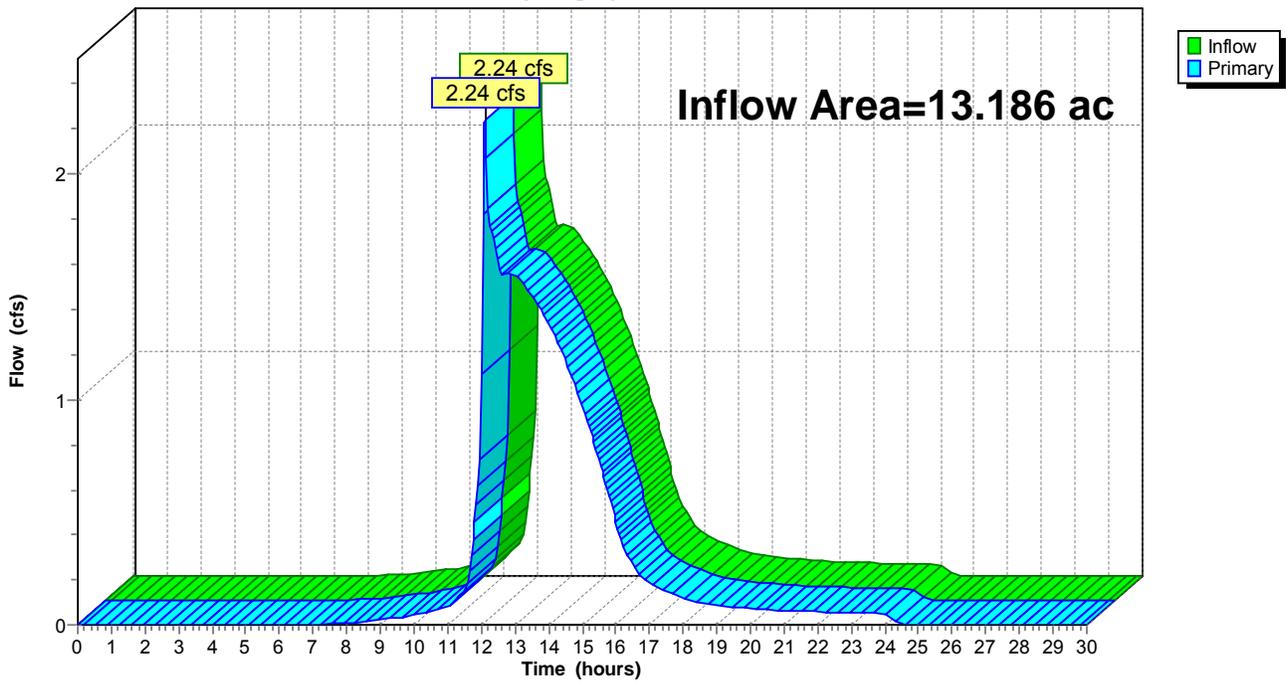
Summary for Pond 1: DP#1

Inflow Area = 13.186 ac, 21.69% Impervious, Inflow Depth = 0.47" for 10-YR event
Inflow = 2.24 cfs @ 12.11 hrs, Volume= 0.519 af
Primary = 2.24 cfs @ 12.11 hrs, Volume= 0.519 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



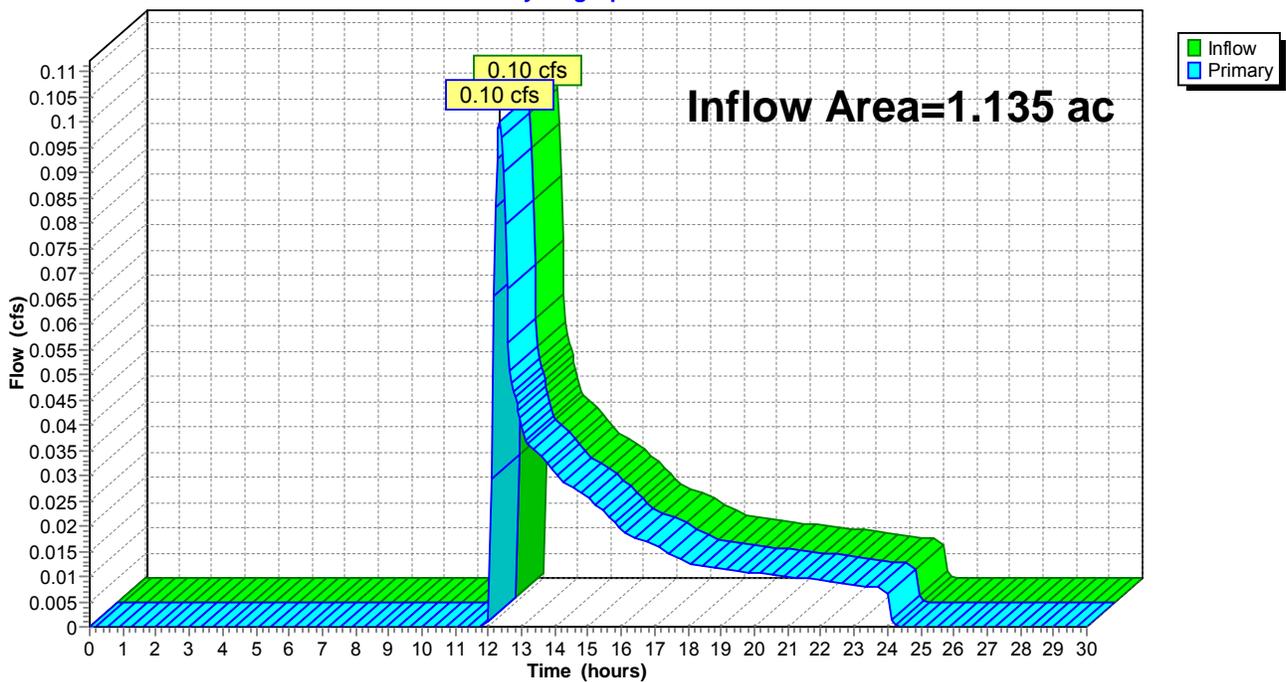
Summary for Pond 2: DP#2

Inflow Area = 1.135 ac, 43.35% Impervious, Inflow Depth = 0.21" for 10-YR event
Inflow = 0.10 cfs @ 12.34 hrs, Volume= 0.020 af
Primary = 0.10 cfs @ 12.34 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Summary for Pond 8P: RAIN GARDEN #1

Inflow Area = 0.451 ac, 47.67% Impervious, Inflow Depth = 1.82" for 10-YR event
 Inflow = 0.93 cfs @ 12.10 hrs, Volume= 0.068 af
 Outflow = 0.55 cfs @ 12.23 hrs, Volume= 0.068 af, Atten= 41%, Lag= 8.0 min
 Discarded = 0.05 cfs @ 12.23 hrs, Volume= 0.047 af
 Primary = 0.50 cfs @ 12.23 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.63' @ 12.23 hrs Surf.Area= 0.022 ac Storage= 0.017 af

Plug-Flow detention time= 109.6 min calculated for 0.068 af (100% of inflow)
 Center-of-Mass det. time= 109.5 min (957.6 - 848.1)

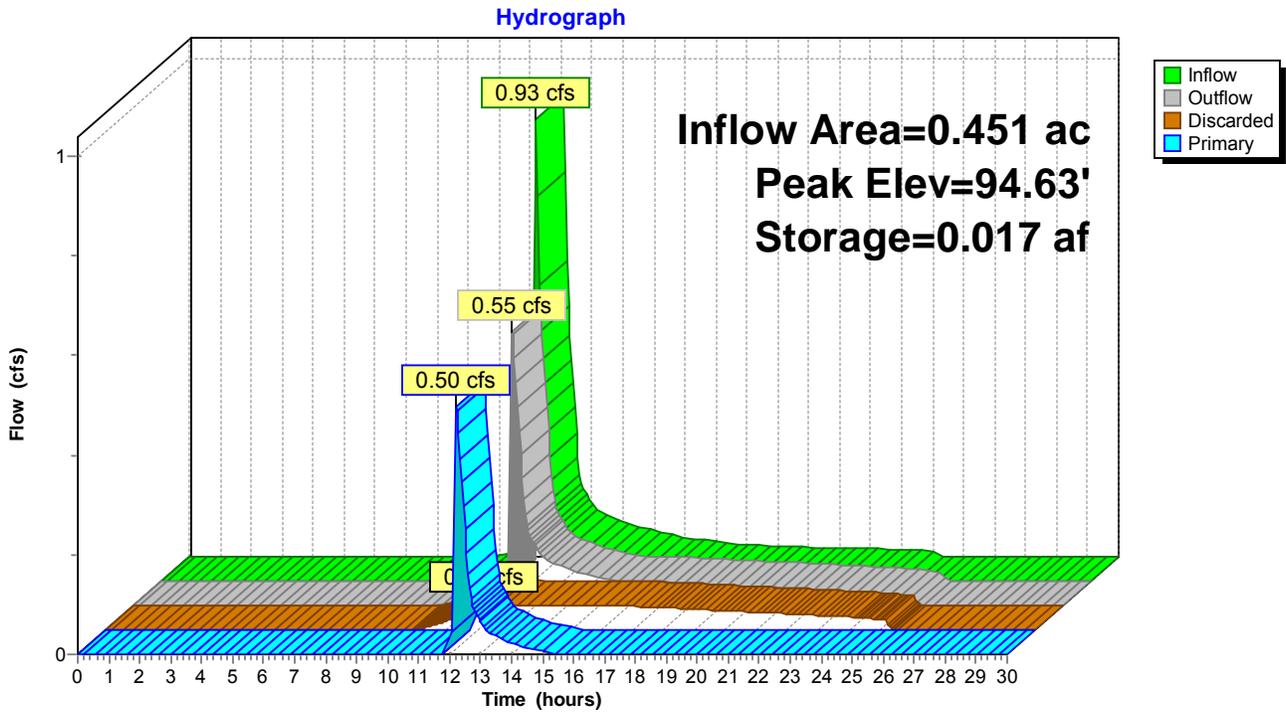
Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.026 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.008	0.000	0.000
94.00	0.014	0.006	0.006
95.00	0.027	0.020	0.026

Device	Routing	Invert	Outlet Devices
#1	Primary	93.13'	12.0" Round Culvert L= 25.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.13' / 93.00' S= 0.0052 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	12.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 12.23 hrs HW=94.63' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.49 cfs @ 12.23 hrs HW=94.63' (Free Discharge)
 ↑**1=Culvert** (Passes 0.49 cfs of 3.55 cfs potential flow)
 ↑**2=Grate** (Weir Controls 0.49 cfs @ 1.18 fps)

Pond 8P: RAIN GARDEN #1



Summary for Pond 9P: RAIN GARDEN #2

Inflow Area = 1.890 ac, 46.98% Impervious, Inflow Depth = 1.88" for 10-YR event
 Inflow = 3.78 cfs @ 12.10 hrs, Volume= 0.296 af
 Outflow = 3.52 cfs @ 12.15 hrs, Volume= 0.296 af, Atten= 7%, Lag= 3.3 min
 Discarded = 0.17 cfs @ 12.15 hrs, Volume= 0.165 af
 Primary = 3.35 cfs @ 12.15 hrs, Volume= 0.131 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.66' @ 12.15 hrs Surf.Area= 0.070 ac Storage= 0.061 af

Plug-Flow detention time= 108.6 min calculated for 0.296 af (100% of inflow)
 Center-of-Mass det. time= 108.6 min (935.6 - 827.0)

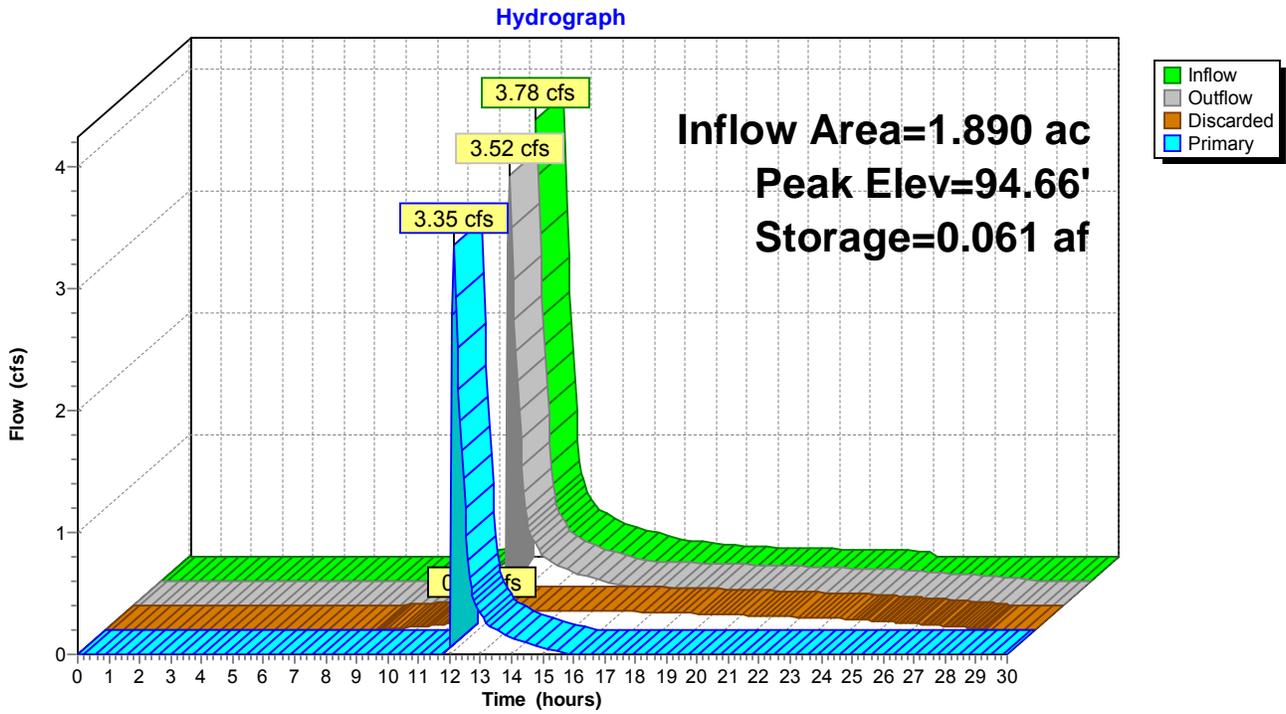
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	0.087 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	0.005	0.000	0.000
94.00	0.043	0.024	0.024
95.00	0.084	0.063	0.087

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	18.0" Round Culvert L= 100.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0100 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.17 cfs @ 12.15 hrs HW=94.66' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=3.32 cfs @ 12.15 hrs HW=94.66' (Free Discharge)
 ↑**1=Culvert** (Passes 3.32 cfs of 5.75 cfs potential flow)
 ↑**2=Grate** (Weir Controls 3.32 cfs @ 1.30 fps)

Pond 9P: RAIN GARDEN #2



Summary for Pond 10P: RAIN GARDEN #3

Inflow Area = 0.539 ac, 69.76% Impervious, Inflow Depth = 2.73" for 10-YR event
 Inflow = 1.68 cfs @ 12.09 hrs, Volume= 0.122 af
 Outflow = 1.63 cfs @ 12.10 hrs, Volume= 0.122 af, Atten= 3%, Lag= 0.8 min
 Discarded = 0.04 cfs @ 12.10 hrs, Volume= 0.049 af
 Primary = 1.59 cfs @ 12.10 hrs, Volume= 0.073 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 94.65' @ 12.10 hrs Surf.Area= 0.018 ac Storage= 0.013 af

Plug-Flow detention time= 64.5 min calculated for 0.122 af (100% of inflow)
 Center-of-Mass det. time= 65.0 min (882.8 - 817.8)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.020 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.005	0.000	0.000
94.00	0.010	0.004	0.004
95.00	0.022	0.016	0.020

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	12.0" Round Culvert L= 120.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0083 ' S= 0.0083 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.10 hrs HW=94.65' (Free Discharge)

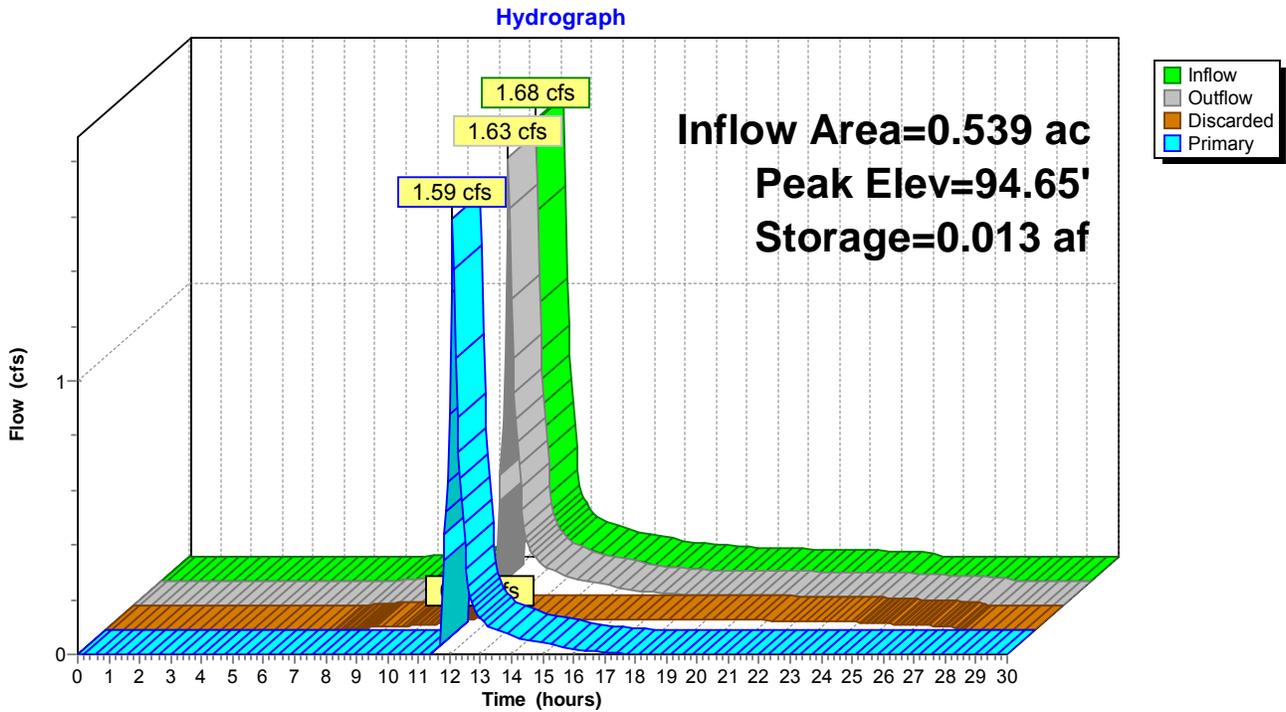
↑**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.57 cfs @ 12.10 hrs HW=94.65' (Free Discharge)

↑**1=Culvert** (Passes 1.57 cfs of 3.24 cfs potential flow)

↑**2=Grate** (Weir Controls 1.57 cfs @ 1.28 fps)

Pond 10P: RAIN GARDEN #3



Summary for Pond 11P: INF BASIN #1

Inflow Area = 3.071 ac, 55.16% Impervious, Inflow Depth = 0.96" for 10-YR event
 Inflow = 5.05 cfs @ 12.14 hrs, Volume= 0.246 af
 Outflow = 2.42 cfs @ 12.42 hrs, Volume= 0.246 af, Atten= 52%, Lag= 16.5 min
 Discarded = 0.09 cfs @ 12.42 hrs, Volume= 0.029 af
 Primary = 2.33 cfs @ 12.42 hrs, Volume= 0.217 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 94.75' @ 12.42 hrs Surf.Area= 0.038 ac Storage= 0.060 af

Plug-Flow detention time= 20.9 min calculated for 0.245 af (100% of inflow)
 Center-of-Mass det. time= 20.9 min (795.4 - 774.5)

Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	0.119 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
92.00	0.008	0.000	0.000
93.00	0.017	0.012	0.012
94.00	0.028	0.022	0.035
95.00	0.041	0.035	0.069
96.00	0.057	0.049	0.119

Device	Routing	Invert	Outlet Devices
#1	Primary	91.80'	18.0" Round Culvert L= 161.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.80' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	95.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.50'	8.0" Vert. Orifice C= 0.600
#4	Discarded	92.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.09 cfs @ 12.42 hrs HW=94.75' (Free Discharge)

↑ **4=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=2.32 cfs @ 12.42 hrs HW=94.75' (Free Discharge)

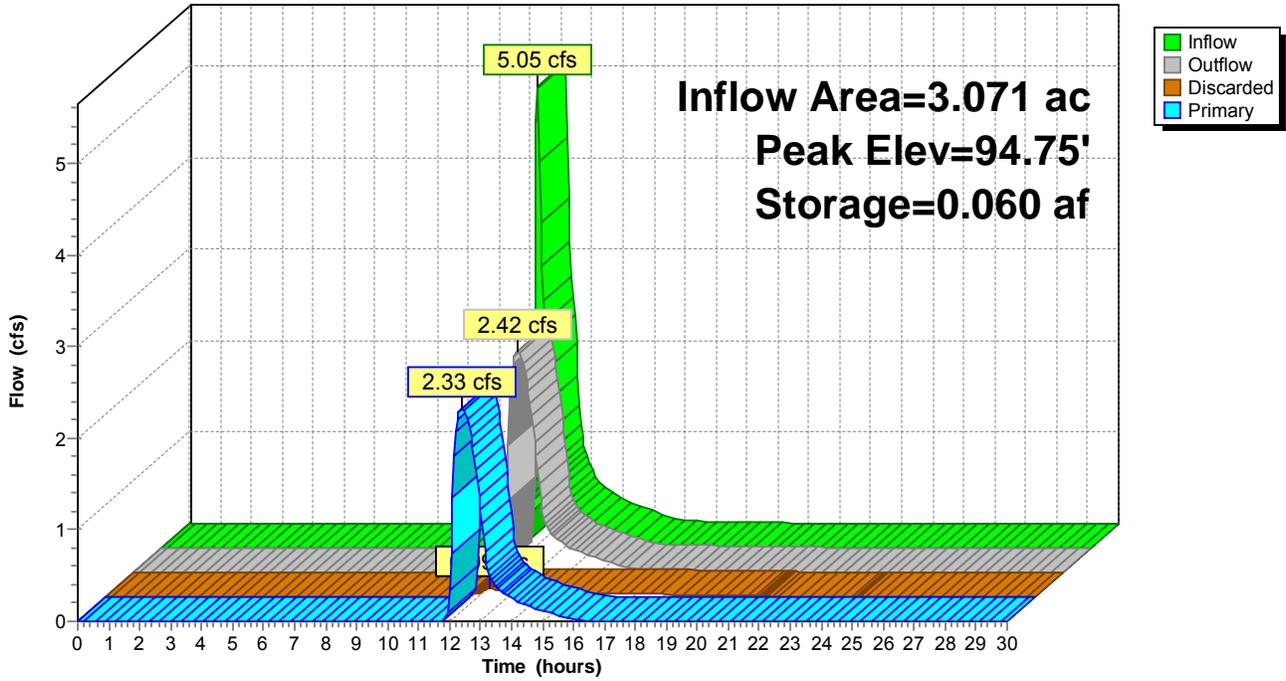
↑ **1=Culvert** (Passes 2.32 cfs of 10.08 cfs potential flow)

↑ **2=Grate** (Controls 0.00 cfs)

↑ **3=Orifice** (Orifice Controls 2.32 cfs @ 6.66 fps)

Pond 11P: INF BASIN #1

Hydrograph



Summary for Pond 12P: INF BASIN #2

Inflow Area = 5.990 ac, 41.22% Impervious, Inflow Depth = 1.06" for 10-YR event
 Inflow = 4.13 cfs @ 12.31 hrs, Volume= 0.531 af
 Outflow = 1.66 cfs @ 13.04 hrs, Volume= 0.531 af, Atten= 60%, Lag= 43.7 min
 Discarded = 0.27 cfs @ 13.04 hrs, Volume= 0.173 af
 Primary = 1.39 cfs @ 13.04 hrs, Volume= 0.358 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 93.92' @ 13.04 hrs Surf.Area= 0.110 ac Storage= 0.189 af

Plug-Flow detention time= 73.5 min calculated for 0.530 af (100% of inflow)
 Center-of-Mass det. time= 73.6 min (892.2 - 818.6)

Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	0.339 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
91.00	0.035	0.000	0.000
92.00	0.052	0.043	0.043
93.00	0.072	0.062	0.105
94.00	0.113	0.093	0.198
95.00	0.168	0.141	0.339

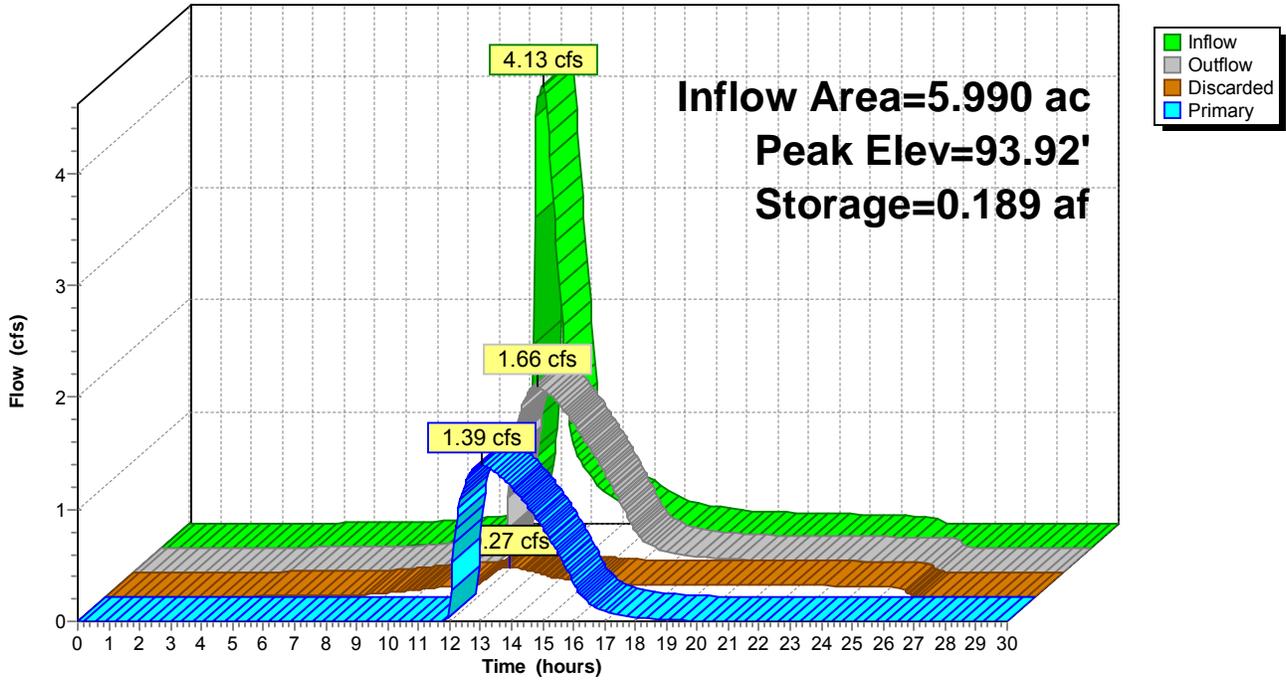
Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	18.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.00' / 90.10' S= 0.0300 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.00'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	91.50'	6.0" Vert. Orifice C= 0.600
#4	Primary	94.50'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	91.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.27 cfs @ 13.04 hrs HW=93.92' (Free Discharge)
 ↑ **5=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=1.39 cfs @ 13.04 hrs HW=93.92' (Free Discharge)
 ↑ **1=Culvert** (Passes 1.39 cfs of 12.54 cfs potential flow)
 ↑ **2=Grate** (Controls 0.00 cfs)
 ↑ **3=Orifice** (Orifice Controls 1.39 cfs @ 7.10 fps)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: INF BASIN #2

Hydrograph



Summary for Pond 14P: INF SYS #2

Inflow Area = 0.361 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10-YR event
 Inflow = 1.55 cfs @ 12.09 hrs, Volume= 0.128 af
 Outflow = 0.33 cfs @ 12.51 hrs, Volume= 0.121 af, Atten= 79%, Lag= 25.2 min
 Discarded = 0.05 cfs @ 8.95 hrs, Volume= 0.105 af
 Primary = 0.28 cfs @ 12.51 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 93.13' @ 12.51 hrs Surf.Area= 0.022 ac Storage= 0.056 af

Plug-Flow detention time= 320.5 min calculated for 0.121 af (94% of inflow)
 Center-of-Mass det. time= 287.1 min (1,037.0 - 749.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.79'	0.028 af	20.83'W x 45.50'L x 4.54'H Field A 0.099 af Overall - 0.030 af Embedded = 0.069 af x 40.0% Voids
#2A	89.79'	0.030 af	Cultec R-330XL x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.057 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	92.83'	12.0" Round Culvert L= 41.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 92.83' / 92.62' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	88.79'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 8.95 hrs HW=88.84' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.27 cfs @ 12.51 hrs HW=93.13' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 0.27 cfs @ 2.09 fps)

Pond 14P: INF SYS #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

4,305.1 cf Field - 1,296.5 cf Chambers = 3,008.6 cf Stone x 40.0% Voids = 1,203.5 cf Stone Storage

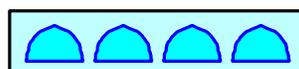
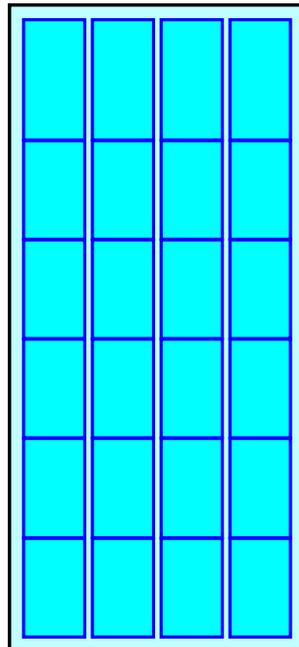
Chamber Storage + Stone Storage = 2,499.9 cf = 0.057 af

Overall Storage Efficiency = 58.1%

24 Chambers

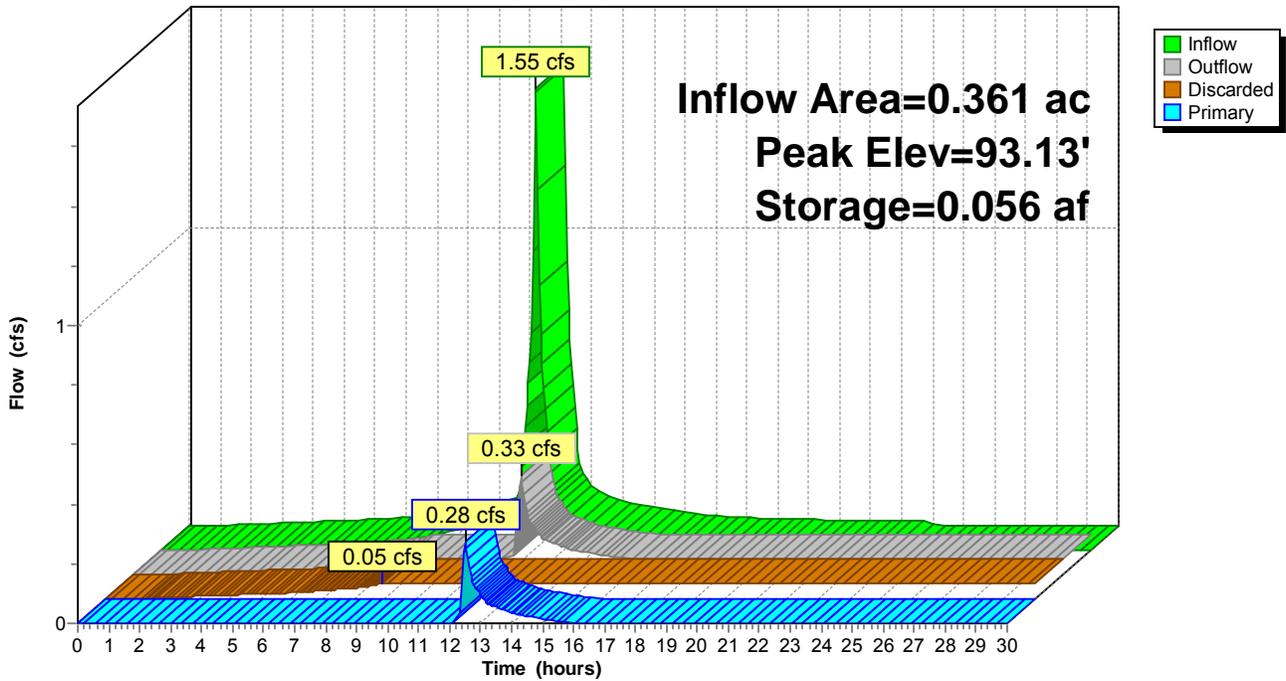
159.4 cy Field

111.4 cy Stone



Pond 14P: INF SYS #2

Hydrograph



Summary for Pond 23P: INF SYS #1

Inflow Area = 0.503 ac, 96.62% Impervious, Inflow Depth = 4.11" for 10-YR event
 Inflow = 2.09 cfs @ 12.09 hrs, Volume= 0.172 af
 Outflow = 0.11 cfs @ 10.35 hrs, Volume= 0.172 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.11 cfs @ 10.35 hrs, Volume= 0.172 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 90.99' @ 14.11 hrs Surf.Area= 0.045 ac Storage= 0.077 af

Plug-Flow detention time= 251.3 min calculated for 0.172 af (100% of inflow)
 Center-of-Mass det. time= 251.2 min (1,003.9 - 752.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.36'	0.057 af	16.00'W x 122.50'L x 4.54'H Field A 0.204 af Overall - 0.062 af Embedded = 0.143 af x 40.0% Voids
#2A	89.36'	0.062 af	Cultec R-330XL x 51 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.36'	2.410 in/hr Exfiltration over Surface area
#2	Primary	92.10'	12.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.10' / 90.60' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.11 cfs @ 10.35 hrs HW=88.41' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.36' (Free Discharge)
 ↑2=Culvert (Controls 0.00 cfs)

Pond 23P: INF SYS #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

51 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 2,693.5 cf Chamber Storage

8,901.7 cf Field - 2,693.5 cf Chambers = 6,208.1 cf Stone x 40.0% Voids = 2,483.3 cf Stone Storage

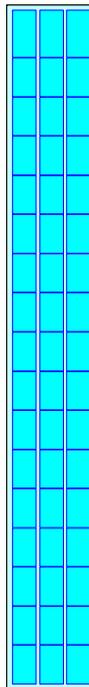
Chamber Storage + Stone Storage = 5,176.8 cf = 0.119 af

Overall Storage Efficiency = 58.2%

51 Chambers

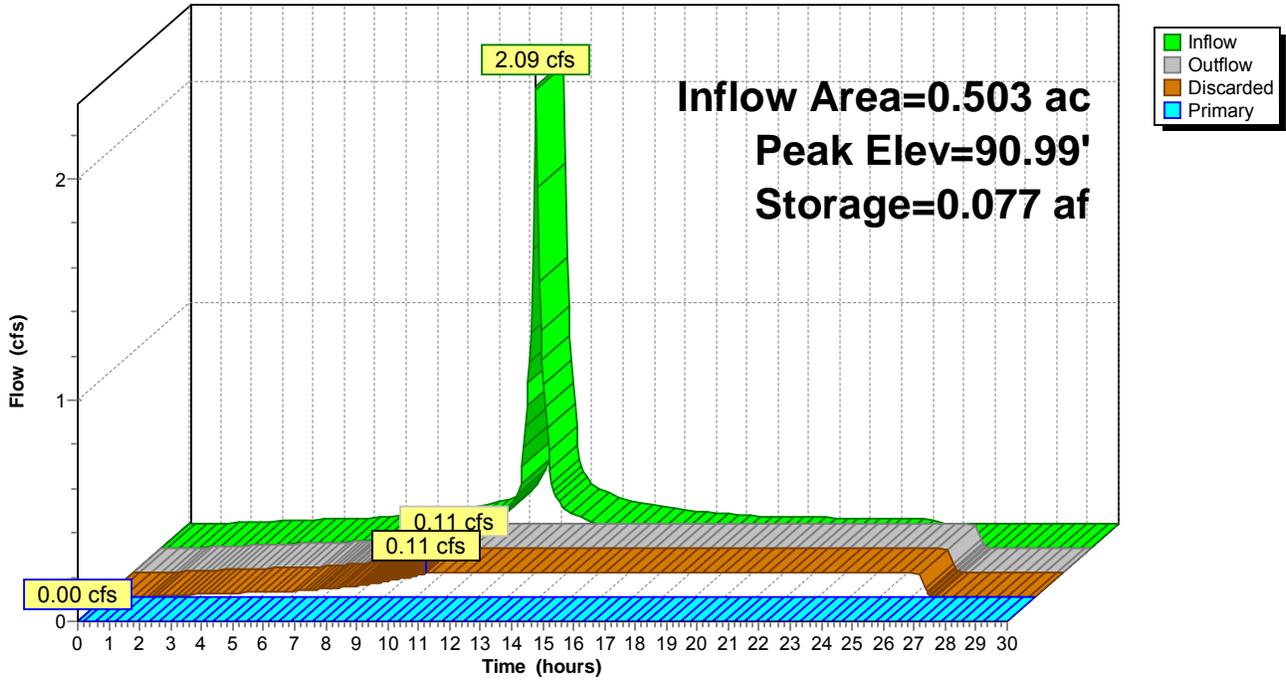
329.7 cy Field

229.9 cy Stone



Pond 23P: INF SYS #1

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area P01	Runoff Area=6.682 ac 0.19% Impervious Runoff Depth=0.17" Flow Length=452' Tc=19.4 min CN=37 Runoff=0.16 cfs 0.095 af
Subcatchment 2S: Area P03	Runoff Area=0.539 ac 69.76% Impervious Runoff Depth=3.36" Tc=6.0 min CN=83 Runoff=2.06 cfs 0.151 af
Subcatchment 3S: Area P05	Runoff Area=1.439 ac 46.77% Impervious Runoff Depth=2.88" Tc=6.0 min CN=78 Runoff=4.77 cfs 0.346 af
Subcatchment 4S: Area P06	Runoff Area=0.451 ac 47.67% Impervious Runoff Depth=2.35" Tc=6.0 min CN=72 Runoff=1.21 cfs 0.088 af
Subcatchment 13S: AREA P09A	Runoff Area=0.470 ac 100.00% Impervious Runoff Depth=4.96" Tc=6.0 min CN=98 Runoff=2.34 cfs 0.194 af
Subcatchment 15S: Area P08	Runoff Area=0.546 ac 66.48% Impervious Runoff Depth=3.26" Tc=6.0 min CN=82 Runoff=2.03 cfs 0.148 af
Subcatchment 16S: Area P07	Runoff Area=0.514 ac 73.54% Impervious Runoff Depth=3.55" Tc=6.0 min CN=85 Runoff=2.07 cfs 0.152 af
Subcatchment 17S: Area P04	Runoff Area=0.281 ac 24.56% Impervious Runoff Depth=1.49" Flow Length=73' Tc=6.7 min CN=61 Runoff=0.44 cfs 0.035 af
Subcatchment 18S: Area P02	Runoff Area=2.211 ac 11.31% Impervious Runoff Depth=1.08" Flow Length=240' Tc=21.7 min CN=55 Runoff=1.50 cfs 0.199 af
Subcatchment 19S: Area P10	Runoff Area=0.632 ac 0.95% Impervious Runoff Depth=0.61" Flow Length=144' Tc=7.2 min CN=47 Runoff=0.22 cfs 0.032 af
Subcatchment 20S: AREA P09D	Runoff Area=0.162 ac 100.00% Impervious Runoff Depth=4.96" Tc=6.0 min CN=98 Runoff=0.81 cfs 0.067 af
Subcatchment 21S: AREA P09C	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth=4.96" Tc=6.0 min CN=98 Runoff=0.42 cfs 0.035 af
Subcatchment 22S: AREA P09B	Runoff Area=0.277 ac 100.00% Impervious Runoff Depth=4.96" Tc=6.0 min CN=98 Runoff=1.38 cfs 0.115 af
Subcatchment 24S: Area P10A	Runoff Area=0.033 ac 48.48% Impervious Runoff Depth=2.44" Tc=6.0 min CN=73 Runoff=0.09 cfs 0.007 af
Pond 1: DP#1	Inflow=4.35 cfs 0.798 af Primary=4.35 cfs 0.798 af
Pond 2: DP#2	Inflow=0.22 cfs 0.032 af Primary=0.22 cfs 0.032 af

Pond 8P: RAIN GARDEN #1 Peak Elev=94.71' Storage=0.019 af Inflow=1.21 cfs 0.088 af
Discarded=0.06 cfs 0.052 af Primary=0.95 cfs 0.036 af Outflow=1.01 cfs 0.088 af

Pond 9P: RAIN GARDEN #2 Peak Elev=94.71' Storage=0.065 af Inflow=5.38 cfs 0.382 af
Discarded=0.17 cfs 0.179 af Primary=4.94 cfs 0.202 af Outflow=5.11 cfs 0.382 af

Pond 10P: RAIN GARDEN #3 Peak Elev=94.68' Storage=0.013 af Inflow=2.06 cfs 0.151 af
Discarded=0.04 cfs 0.054 af Primary=1.96 cfs 0.097 af Outflow=2.01 cfs 0.151 af

Pond 11P: INF BASIN #1 Peak Elev=95.59' Storage=0.096 af Inflow=7.16 cfs 0.366 af
Discarded=0.12 cfs 0.035 af Primary=4.13 cfs 0.331 af Outflow=4.25 cfs 0.366 af

Pond 12P: INF BASIN #2 Peak Elev=94.13' Storage=0.213 af Inflow=6.72 cfs 0.746 af
Discarded=0.29 cfs 0.196 af Primary=3.98 cfs 0.550 af Outflow=4.27 cfs 0.746 af

Pond 14P: INF SYS #2 Peak Elev=93.31' Storage=0.057 af Inflow=1.79 cfs 0.149 af
Discarded=0.05 cfs 0.107 af Primary=0.68 cfs 0.032 af Outflow=0.73 cfs 0.139 af

Pond 23P: INF SYS #1 Peak Elev=91.64' Storage=0.095 af Inflow=2.43 cfs 0.201 af
Discarded=0.11 cfs 0.201 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.201 af

Total Runoff Area = 14.321 ac Runoff Volume = 1.664 af Average Runoff Depth = 1.39"
76.59% Pervious = 10.969 ac 23.41% Impervious = 3.352 ac

Summary for Subcatchment 1S: Area P01

Runoff = 0.16 cfs @ 13.90 hrs, Volume= 0.095 af, Depth= 0.17"

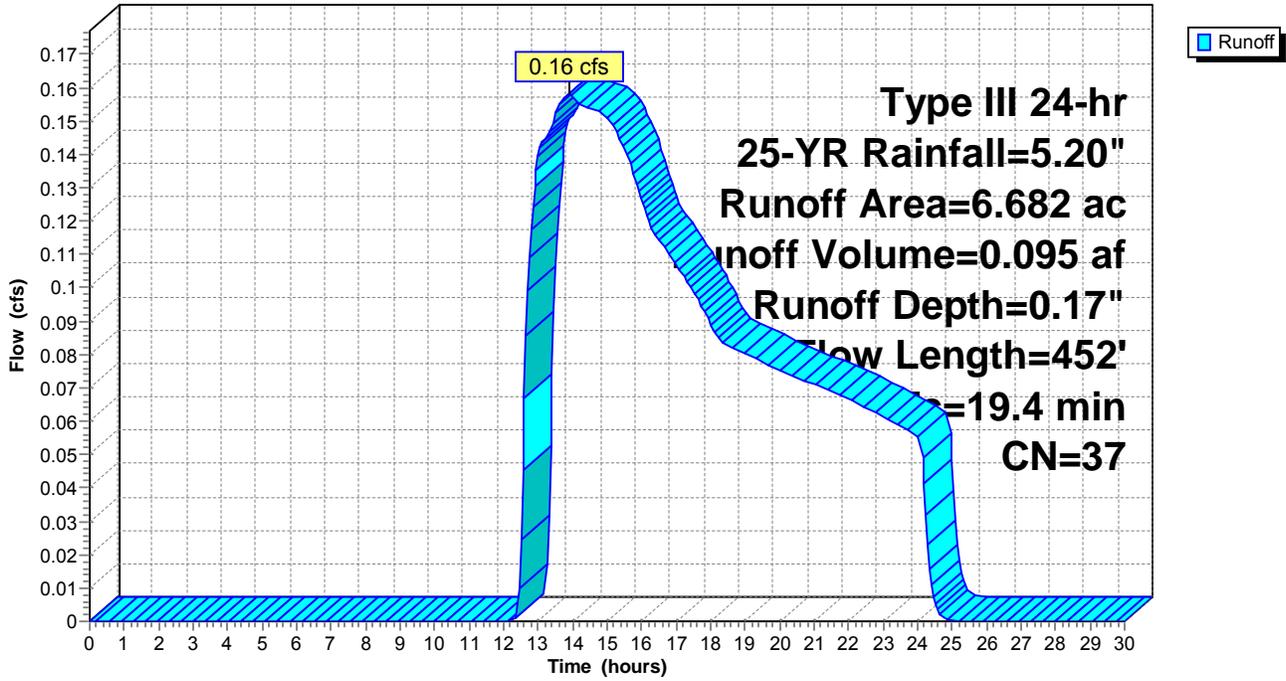
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.032	36	Woods, Fair, HSG A
0.637	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.682	37	Weighted Average
6.669		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area P01

Hydrograph



Summary for Subcatchment 2S: Area P03

Runoff = 2.06 cfs @ 12.09 hrs, Volume= 0.151 af, Depth= 3.36"

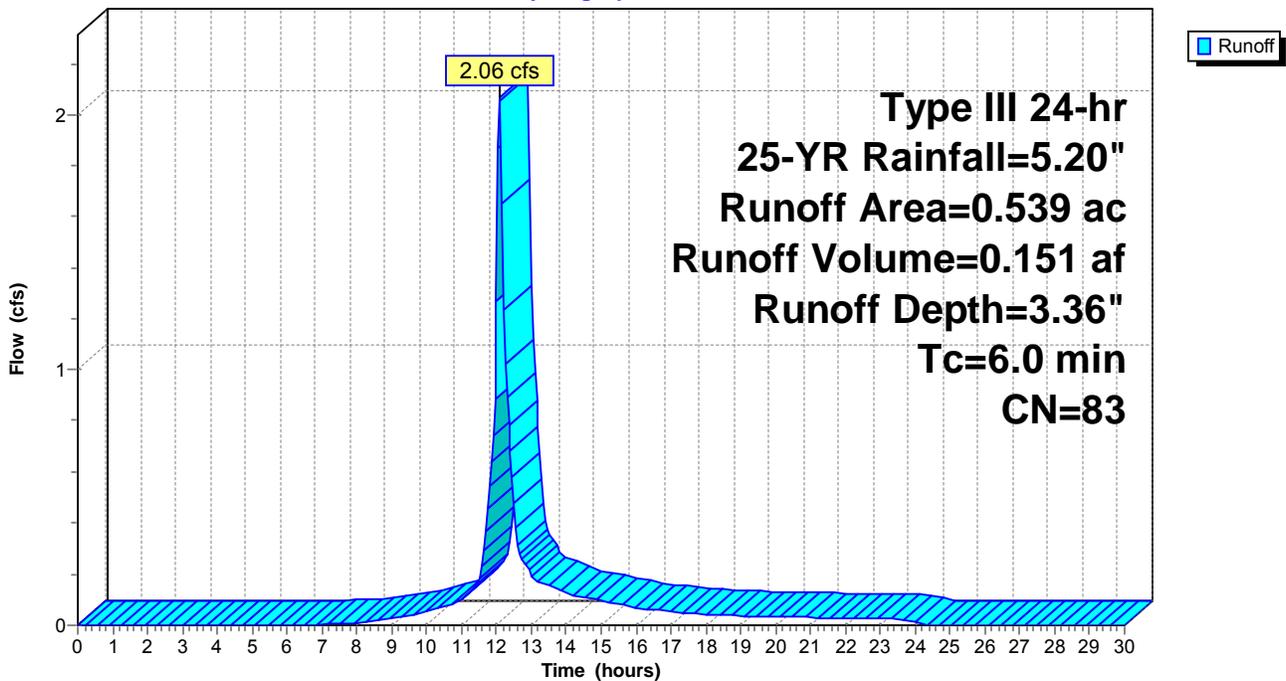
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.376	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.163	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.539	83	Weighted Average
0.163		30.24% Pervious Area
0.376		69.76% Impervious Area

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

Subcatchment 2S: Area P03

Hydrograph



Summary for Subcatchment 3S: Area P05

Runoff = 4.77 cfs @ 12.09 hrs, Volume= 0.346 af, Depth= 2.88"

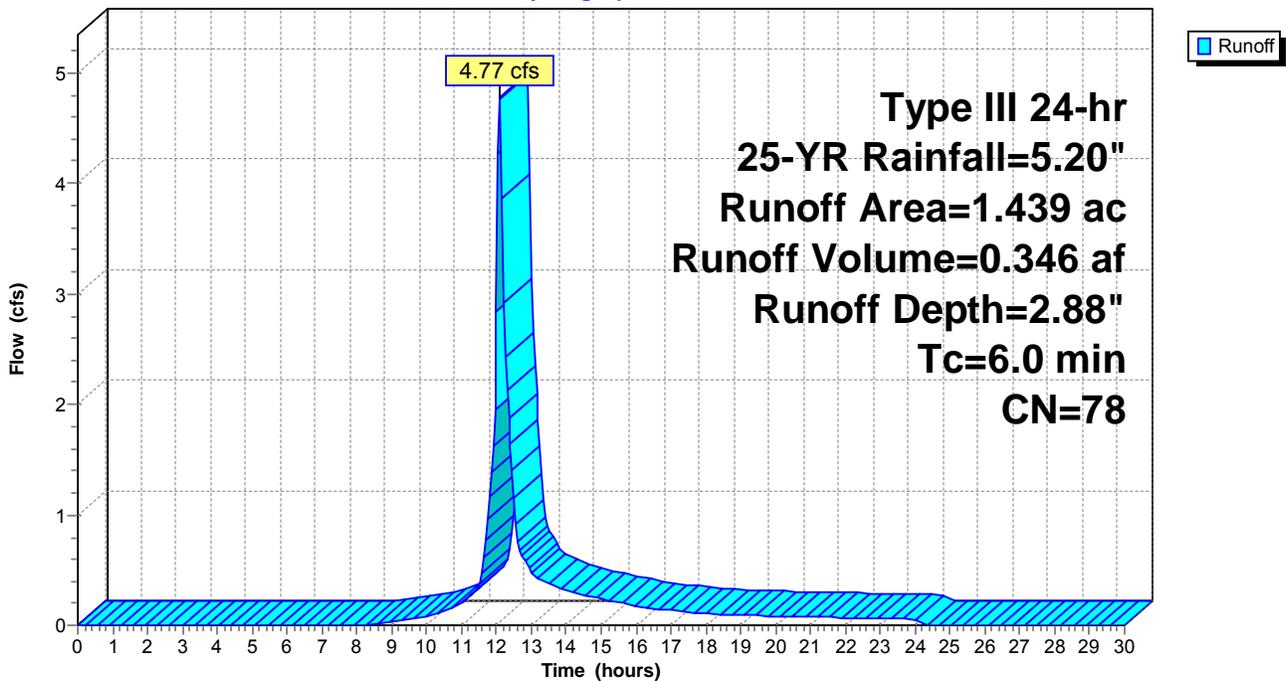
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.673	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.386	49	50-75% Grass cover, Fair, HSG A
* 0.380	72	Dirt, HSG A (Playscape)
1.439	78	Weighted Average
0.766		53.23% Pervious Area
0.673		46.77% Impervious Area

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

Subcatchment 3S: Area P05

Hydrograph



Summary for Subcatchment 4S: Area P06

Runoff = 1.21 cfs @ 12.10 hrs, Volume= 0.088 af, Depth= 2.35"

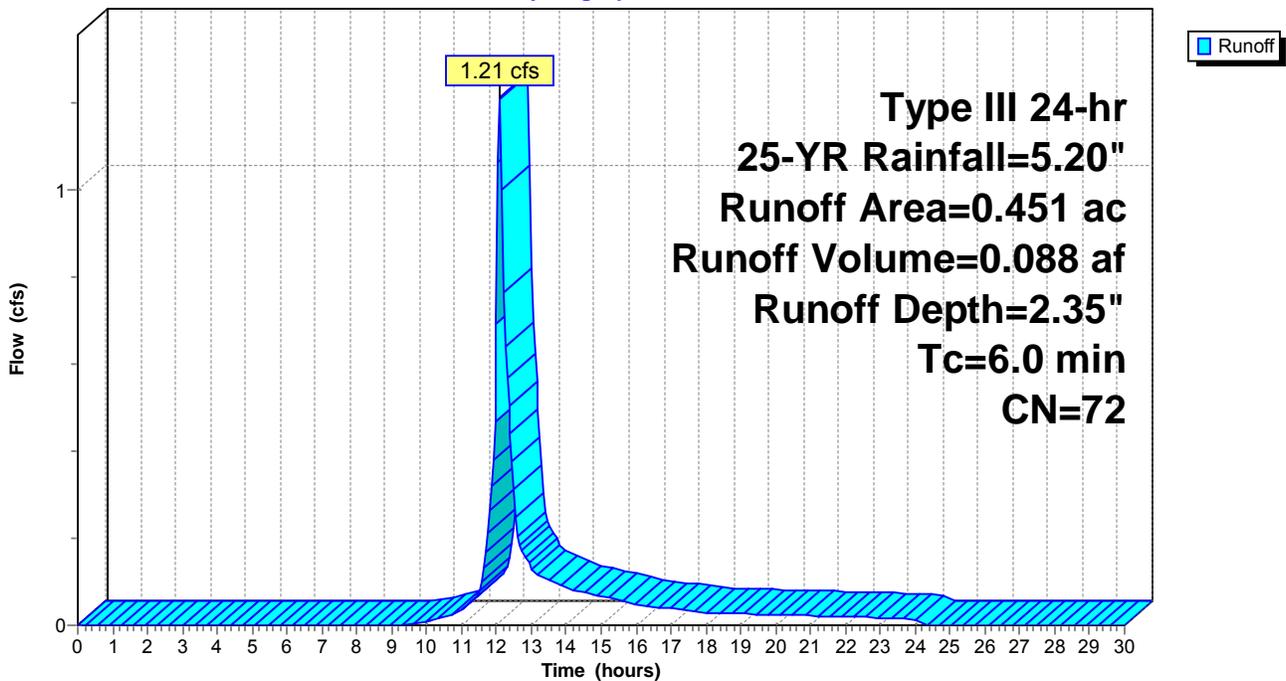
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.215	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.236	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.451	72	Weighted Average
0.236		52.33% Pervious Area
0.215		47.67% Impervious Area

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

Subcatchment 4S: Area P06

Hydrograph



Summary for Subcatchment 13S: AREA P09A

Runoff = 2.34 cfs @ 12.09 hrs, Volume= 0.194 af, Depth= 4.96"

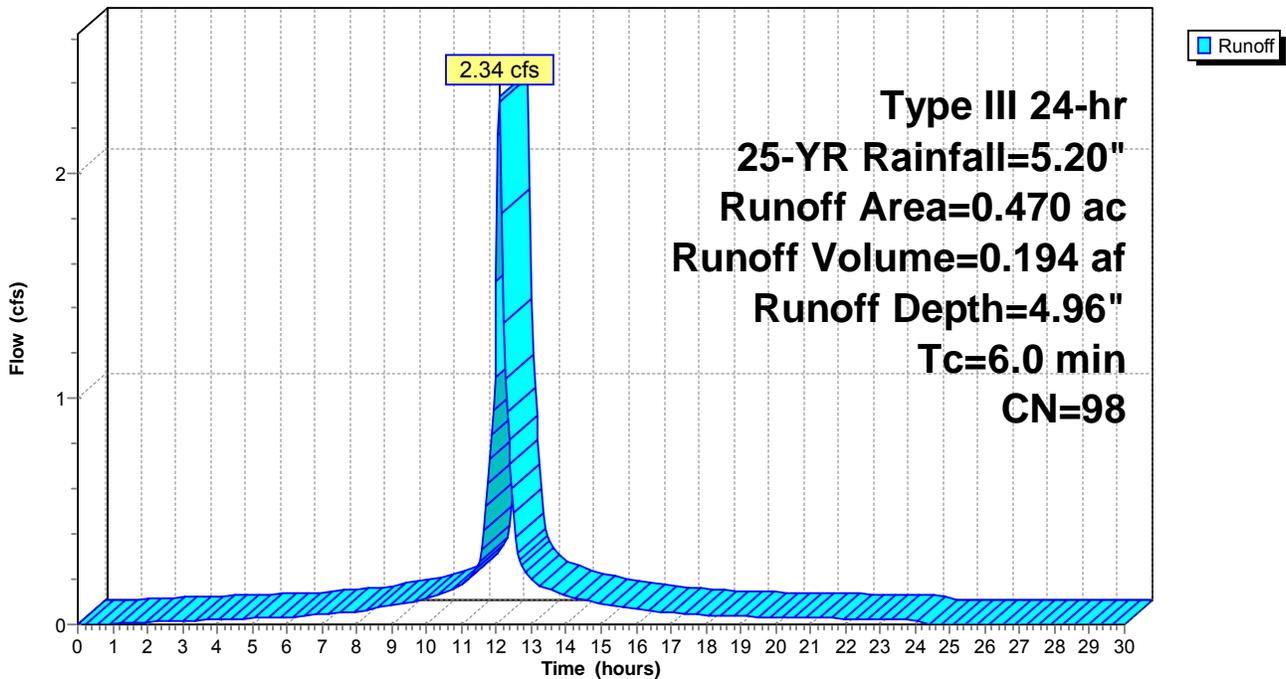
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.470	98	Roofs, HSG A
0.470		100.00% Impervious Area

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

Subcatchment 13S: AREA P09A

Hydrograph



Summary for Subcatchment 15S: Area P08

Runoff = 2.03 cfs @ 12.09 hrs, Volume= 0.148 af, Depth= 3.26"

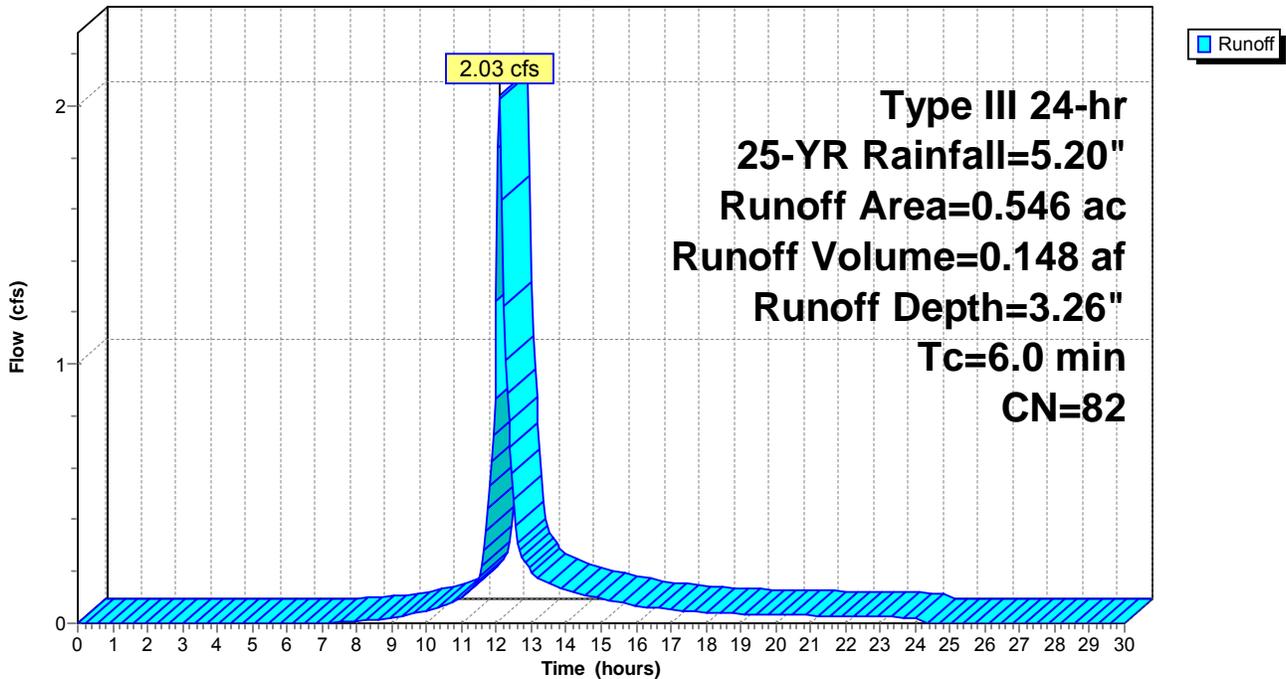
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.363	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.183	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.546	82	Weighted Average
0.183		33.52% Pervious Area
0.363		66.48% Impervious Area

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

Subcatchment 15S: Area P08

Hydrograph



Summary for Subcatchment 16S: Area P07

Runoff = 2.07 cfs @ 12.09 hrs, Volume= 0.152 af, Depth= 3.55"

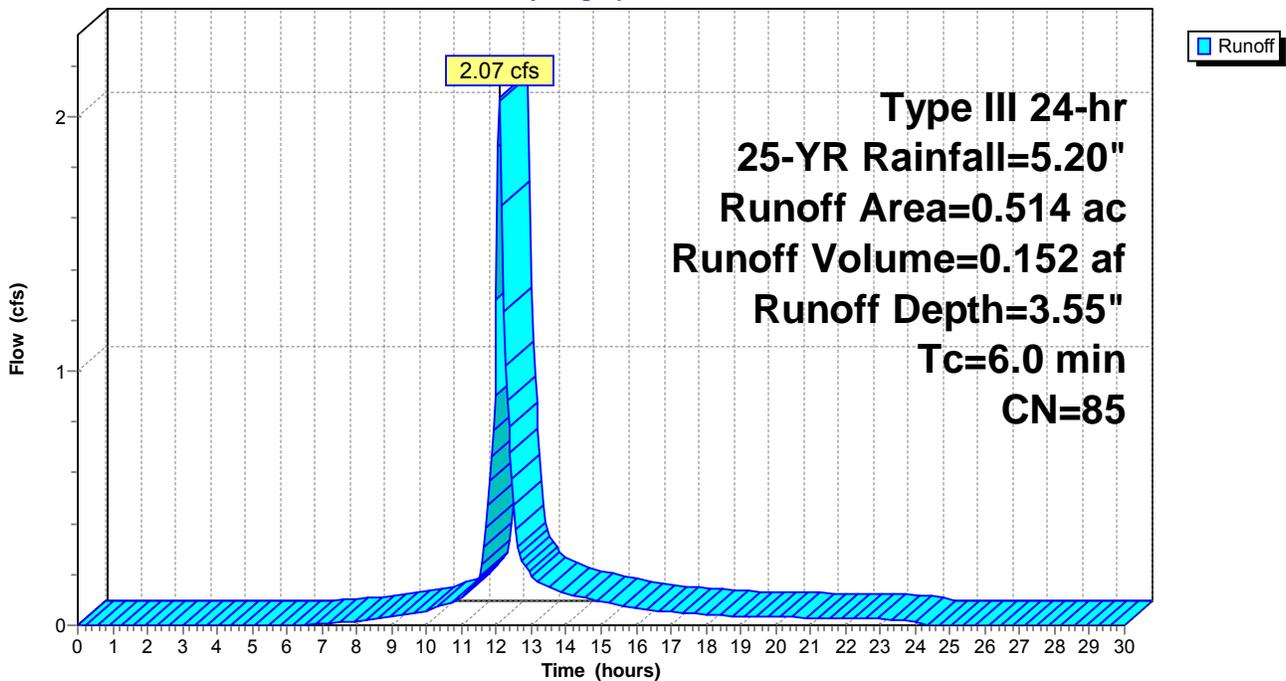
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.378	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.136	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.514	85	Weighted Average
0.136		26.46% Pervious Area
0.378		73.54% Impervious Area

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

Subcatchment 16S: Area P07

Hydrograph



Summary for Subcatchment 17S: Area P04

Runoff = 0.44 cfs @ 12.11 hrs, Volume= 0.035 af, Depth= 1.49"

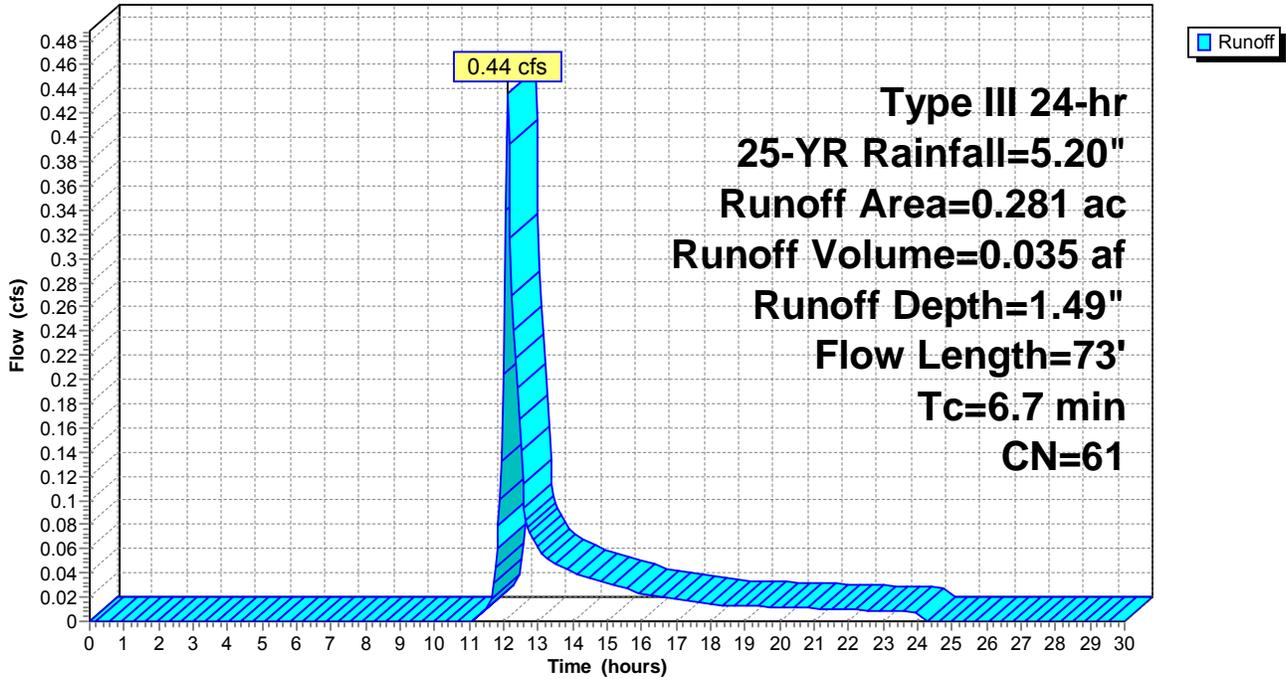
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.069	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.212	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.281	61	Weighted Average
0.212		75.44% Pervious Area
0.069		24.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	57	0.0200	0.15		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.0	5	0.0100	2.03		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
0.2	11	0.0300	1.21		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
6.7	73	Total			

Subcatchment 17S: Area P04

Hydrograph



Summary for Subcatchment 18S: Area P02

Runoff = 1.50 cfs @ 12.36 hrs, Volume= 0.199 af, Depth= 1.08"

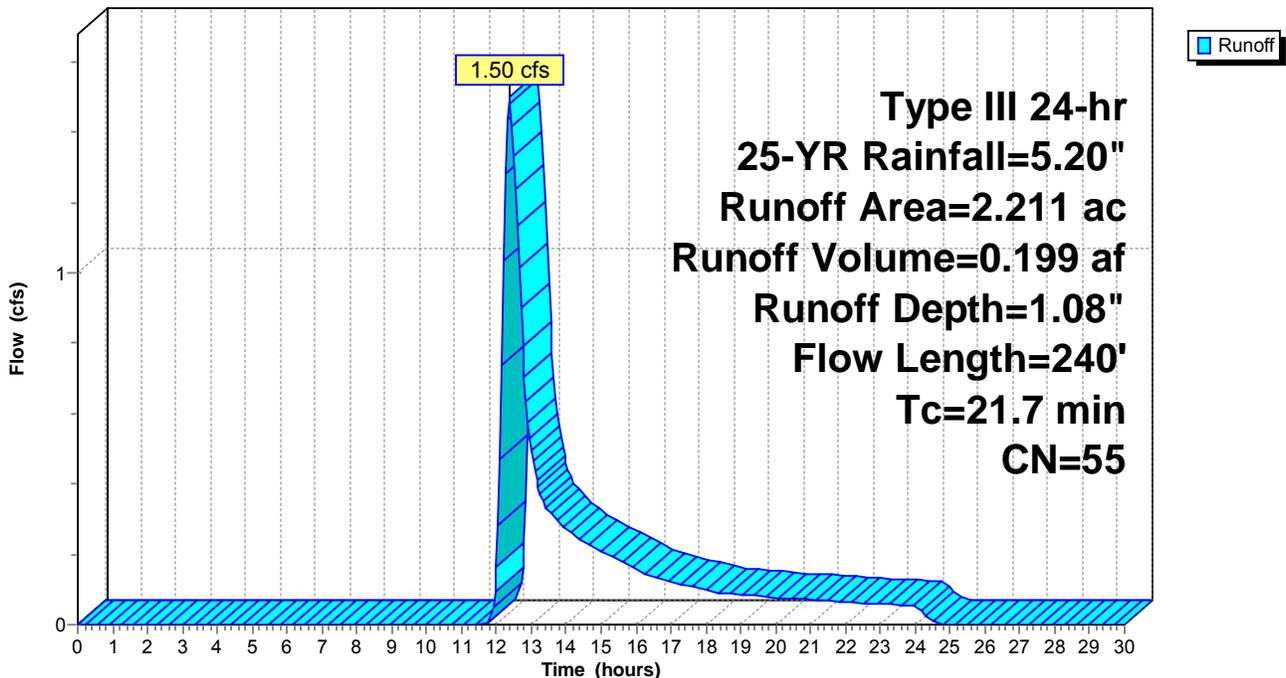
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
1.961	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
2.211	55	Weighted Average
1.961		88.69% Pervious Area
0.250		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0040	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.4	140	0.0200	0.99		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
21.7	240	Total			

Subcatchment 18S: Area P02

Hydrograph



Summary for Subcatchment 19S: Area P10

Runoff = 0.22 cfs @ 12.17 hrs, Volume= 0.032 af, Depth= 0.61"

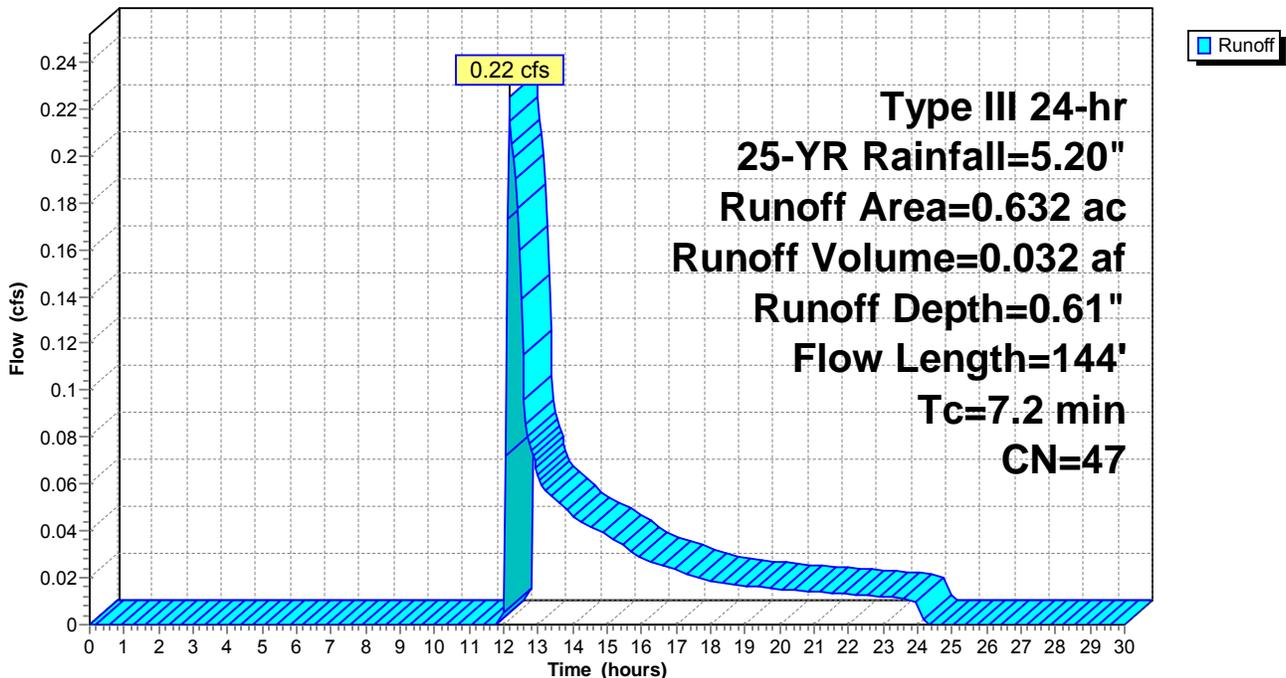
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.111	36	Woods, Fair, HSG A
0.515	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.632	47	Weighted Average
0.626		99.05% Pervious Area
0.006		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	46	0.0350	0.18		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.9	98	0.0130	0.57		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
7.2	144	Total			

Subcatchment 19S: Area P10

Hydrograph



Summary for Subcatchment 20S: AREA P09D

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.067 af, Depth= 4.96"

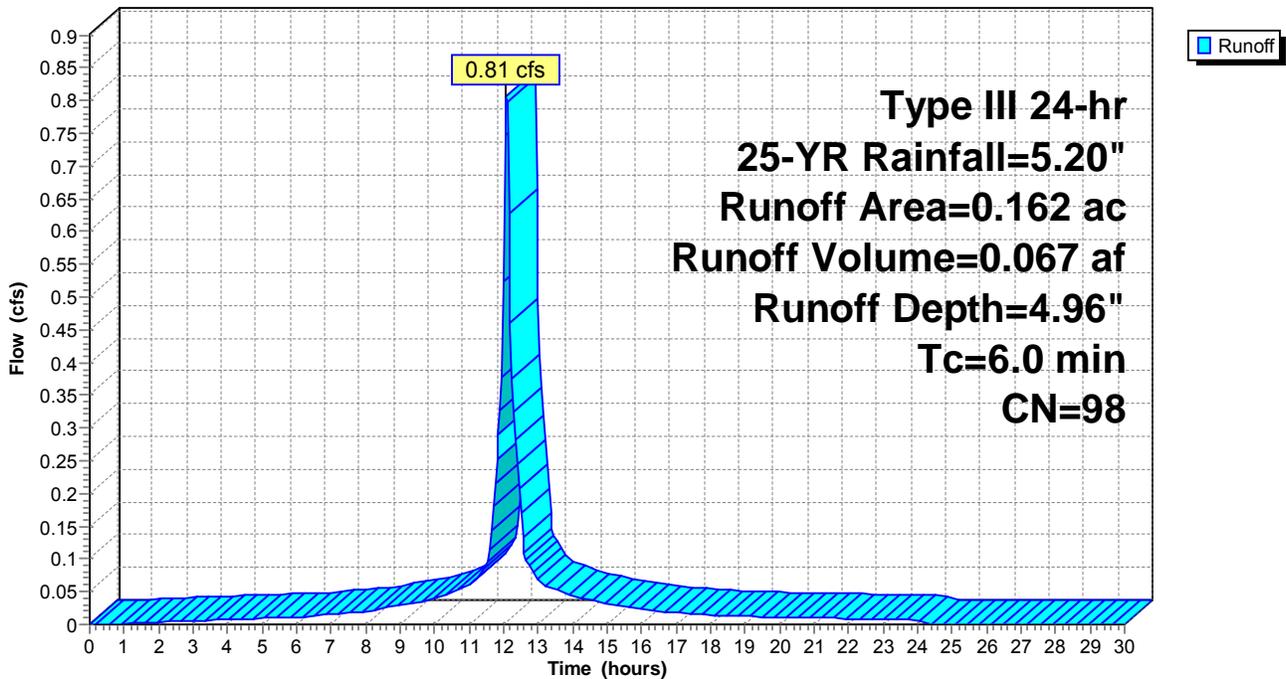
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.162	98	Roofs, HSG A
0.162		100.00% Impervious Area

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

Subcatchment 20S: AREA P09D

Hydrograph



Summary for Subcatchment 21S: AREA P09C

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 4.96"

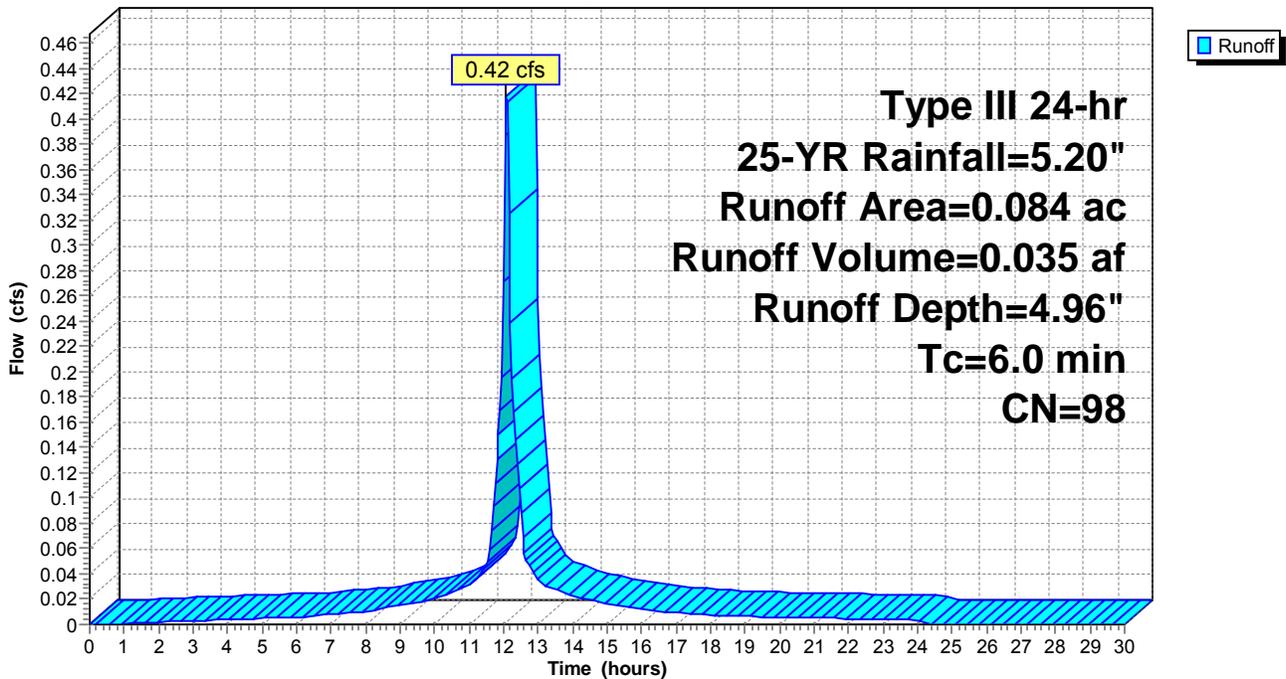
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.084	98	Roofs, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 21S: AREA P09C

Hydrograph



Summary for Subcatchment 22S: AREA P09B

Runoff = 1.38 cfs @ 12.09 hrs, Volume= 0.115 af, Depth= 4.96"

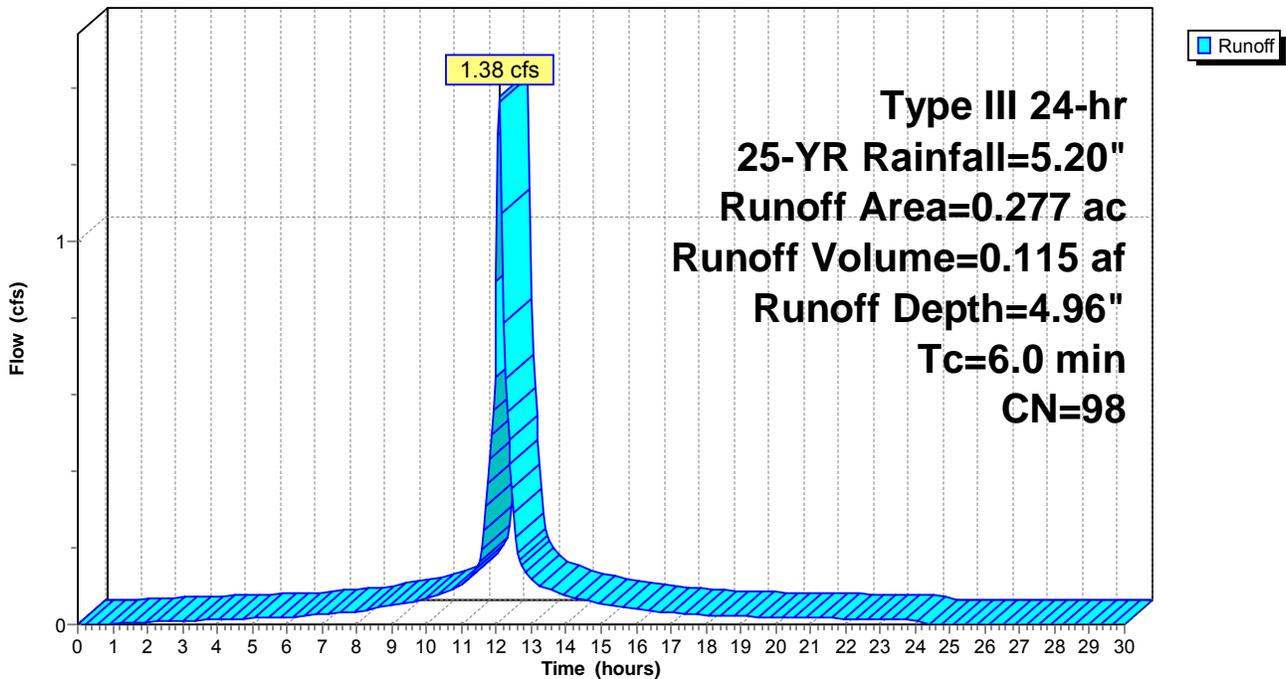
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.277	98	Roofs, HSG A
0.277		100.00% Impervious Area

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

Subcatchment 22S: AREA P09B

Hydrograph



Summary for Subcatchment 24S: Area P10A

Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 2.44"

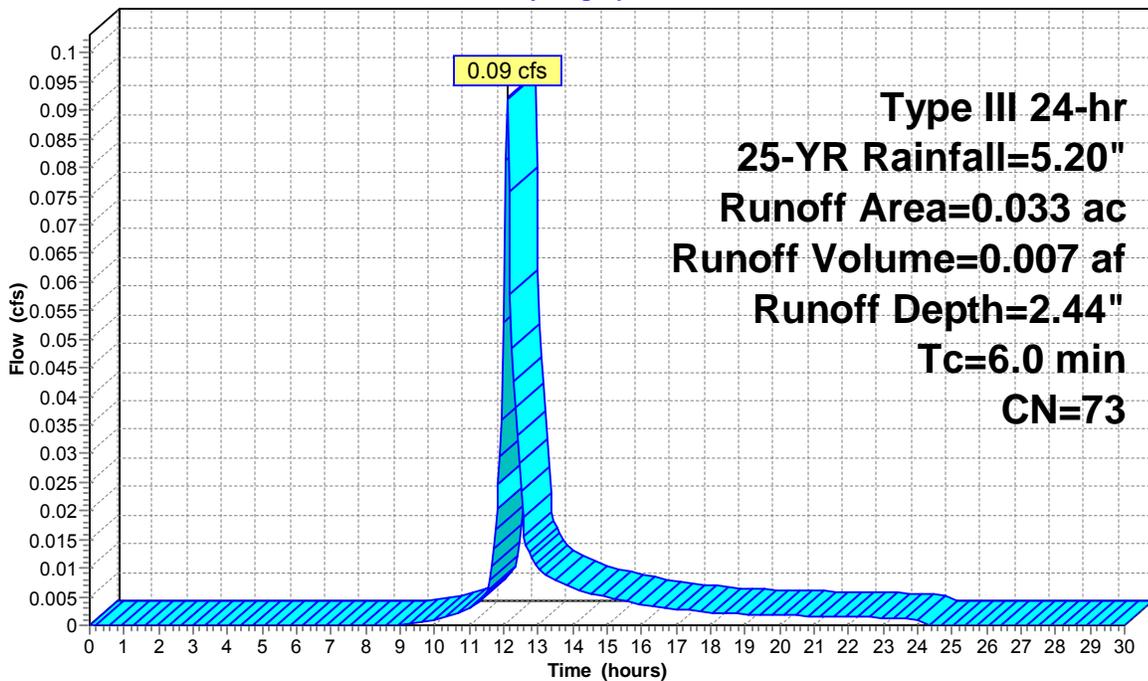
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-YR Rainfall=5.20"

Area (ac)	CN	Description
0.016	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.017	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.033	73	Weighted Average
0.017		51.52% Pervious Area
0.016		48.48% Impervious Area

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

Subcatchment 24S: Area P10A

Hydrograph



Runoff

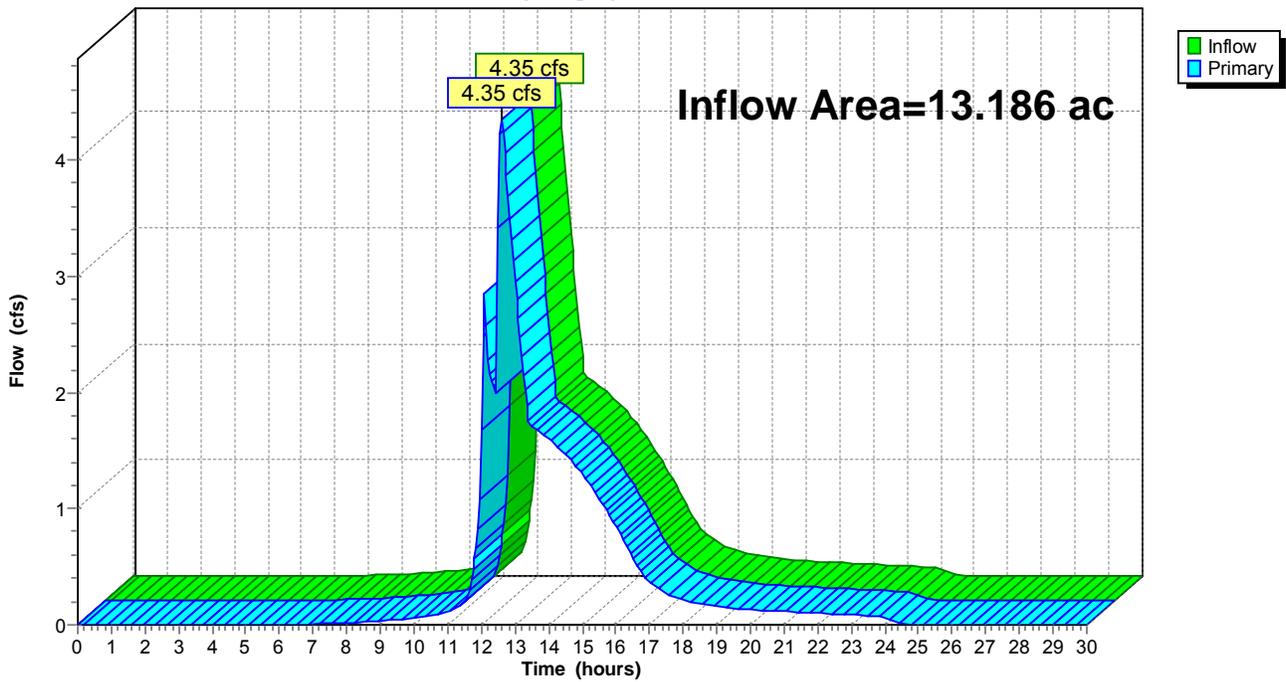
Summary for Pond 1: DP#1

Inflow Area = 13.186 ac, 21.69% Impervious, Inflow Depth = 0.73" for 25-YR event
Inflow = 4.35 cfs @ 12.60 hrs, Volume= 0.798 af
Primary = 4.35 cfs @ 12.60 hrs, Volume= 0.798 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



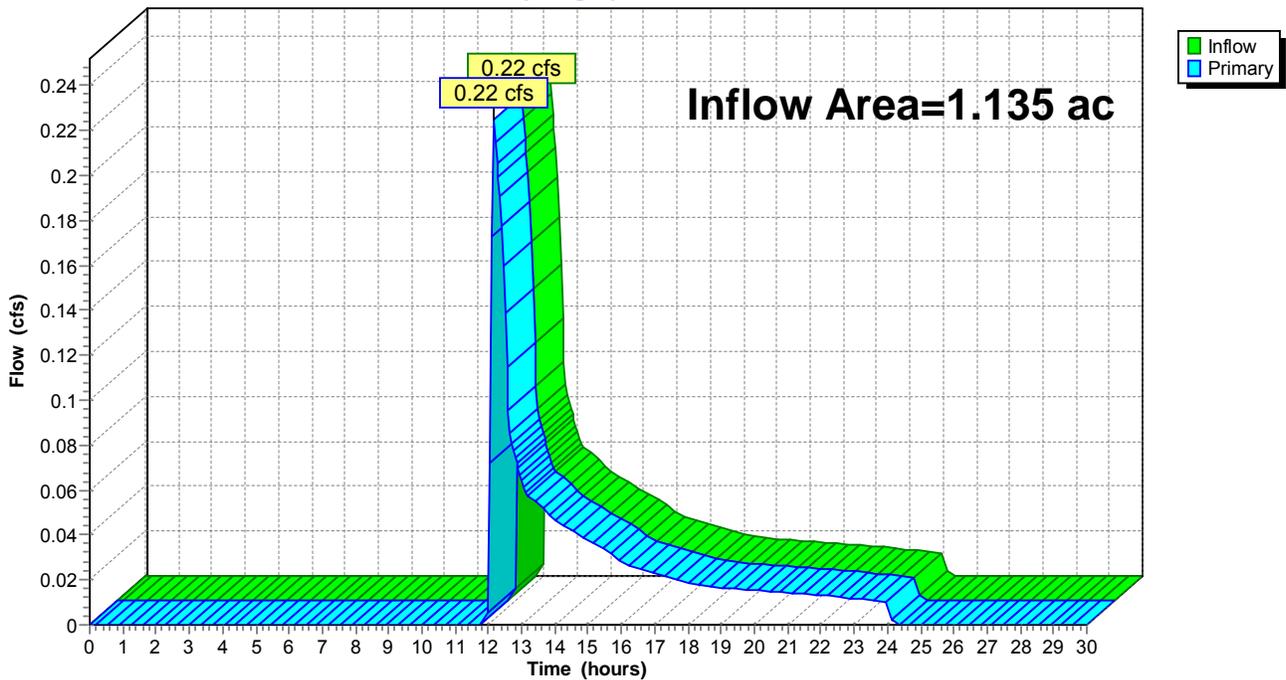
Summary for Pond 2: DP#2

Inflow Area = 1.135 ac, 43.35% Impervious, Inflow Depth = 0.34" for 25-YR event
Inflow = 0.22 cfs @ 12.17 hrs, Volume= 0.032 af
Primary = 0.22 cfs @ 12.17 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Summary for Pond 8P: RAIN GARDEN #1

Inflow Area = 0.451 ac, 47.67% Impervious, Inflow Depth = 2.35" for 25-YR event
 Inflow = 1.21 cfs @ 12.10 hrs, Volume= 0.088 af
 Outflow = 1.01 cfs @ 12.16 hrs, Volume= 0.088 af, Atten= 17%, Lag= 4.2 min
 Discarded = 0.06 cfs @ 12.17 hrs, Volume= 0.052 af
 Primary = 0.95 cfs @ 12.16 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.71' @ 12.17 hrs Surf.Area= 0.023 ac Storage= 0.019 af

Plug-Flow detention time= 96.1 min calculated for 0.088 af (100% of inflow)
 Center-of-Mass det. time= 96.0 min (936.6 - 840.5)

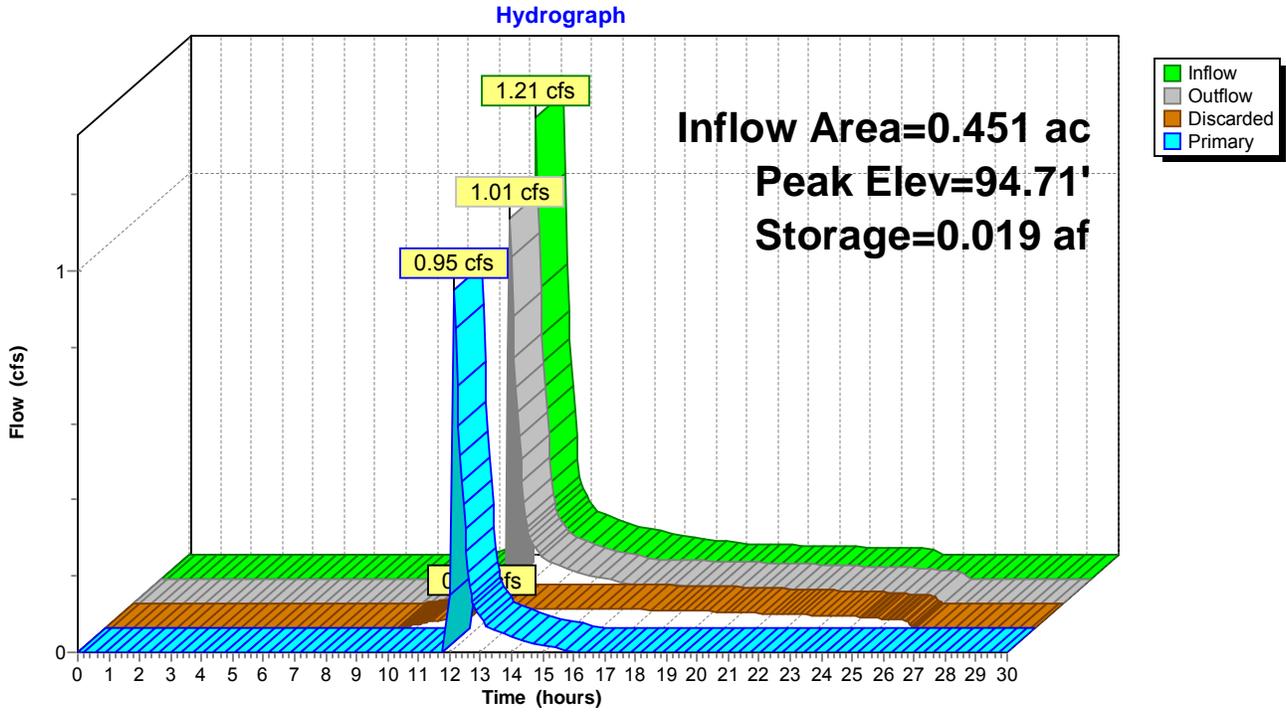
Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.026 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.008	0.000	0.000
94.00	0.014	0.006	0.006
95.00	0.027	0.020	0.026

Device	Routing	Invert	Outlet Devices
#1	Primary	93.13'	12.0" Round Culvert L= 25.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.13' / 93.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	12.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.06 cfs @ 12.17 hrs HW=94.70' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.91 cfs @ 12.16 hrs HW=94.70' (Free Discharge)
 ↑ **1=Culvert** (Passes 0.91 cfs of 3.74 cfs potential flow)
 ↑ **2=Grate** (Weir Controls 0.91 cfs @ 1.46 fps)

Pond 8P: RAIN GARDEN #1



Summary for Pond 9P: RAIN GARDEN #2

Inflow Area = 1.890 ac, 46.98% Impervious, Inflow Depth = 2.42" for 25-YR event
 Inflow = 5.38 cfs @ 12.11 hrs, Volume= 0.382 af
 Outflow = 5.11 cfs @ 12.14 hrs, Volume= 0.382 af, Atten= 5%, Lag= 1.8 min
 Discarded = 0.17 cfs @ 12.14 hrs, Volume= 0.179 af
 Primary = 4.94 cfs @ 12.14 hrs, Volume= 0.202 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.71' @ 12.14 hrs Surf.Area= 0.072 ac Storage= 0.065 af

Plug-Flow detention time= 93.2 min calculated for 0.381 af (100% of inflow)
 Center-of-Mass det. time= 93.5 min (913.0 - 819.4)

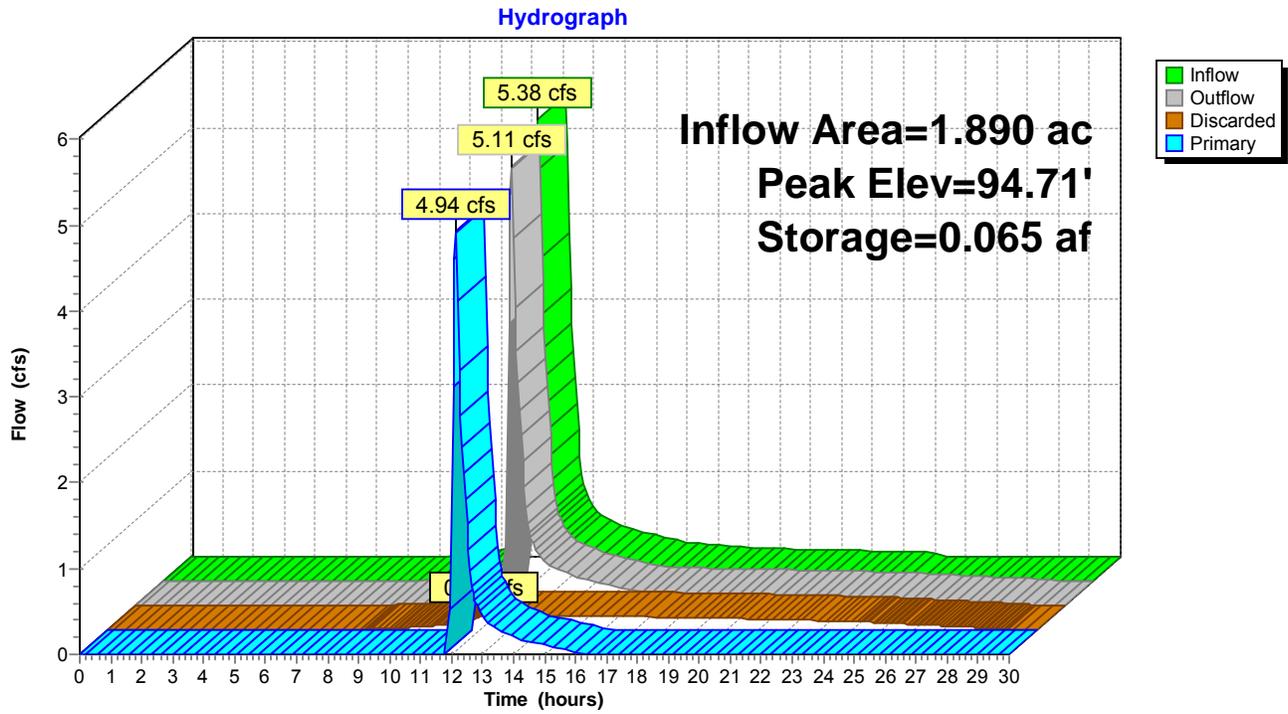
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	0.087 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	0.005	0.000	0.000
94.00	0.043	0.024	0.024
95.00	0.084	0.063	0.087

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	18.0" Round Culvert L= 100.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0100 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.17 cfs @ 12.14 hrs HW=94.70' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=4.84 cfs @ 12.14 hrs HW=94.70' (Free Discharge)
 ↑**1=Culvert** (Passes 4.84 cfs of 6.10 cfs potential flow)
 ↑**2=Grate** (Weir Controls 4.84 cfs @ 1.48 fps)

Pond 9P: RAIN GARDEN #2



Summary for Pond 10P: RAIN GARDEN #3

Inflow Area = 0.539 ac, 69.76% Impervious, Inflow Depth = 3.36" for 25-YR event
 Inflow = 2.06 cfs @ 12.09 hrs, Volume= 0.151 af
 Outflow = 2.01 cfs @ 12.10 hrs, Volume= 0.151 af, Atten= 3%, Lag= 0.7 min
 Discarded = 0.04 cfs @ 12.10 hrs, Volume= 0.054 af
 Primary = 1.96 cfs @ 12.10 hrs, Volume= 0.097 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 94.68' @ 12.10 hrs Surf.Area= 0.018 ac Storage= 0.013 af

Plug-Flow detention time= 58.3 min calculated for 0.150 af (100% of inflow)
 Center-of-Mass det. time= 58.6 min (870.5 - 811.9)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.020 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.005	0.000	0.000
94.00	0.010	0.004	0.004
95.00	0.022	0.016	0.020

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	12.0" Round Culvert L= 120.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0083 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.10 hrs HW=94.68' (Free Discharge)

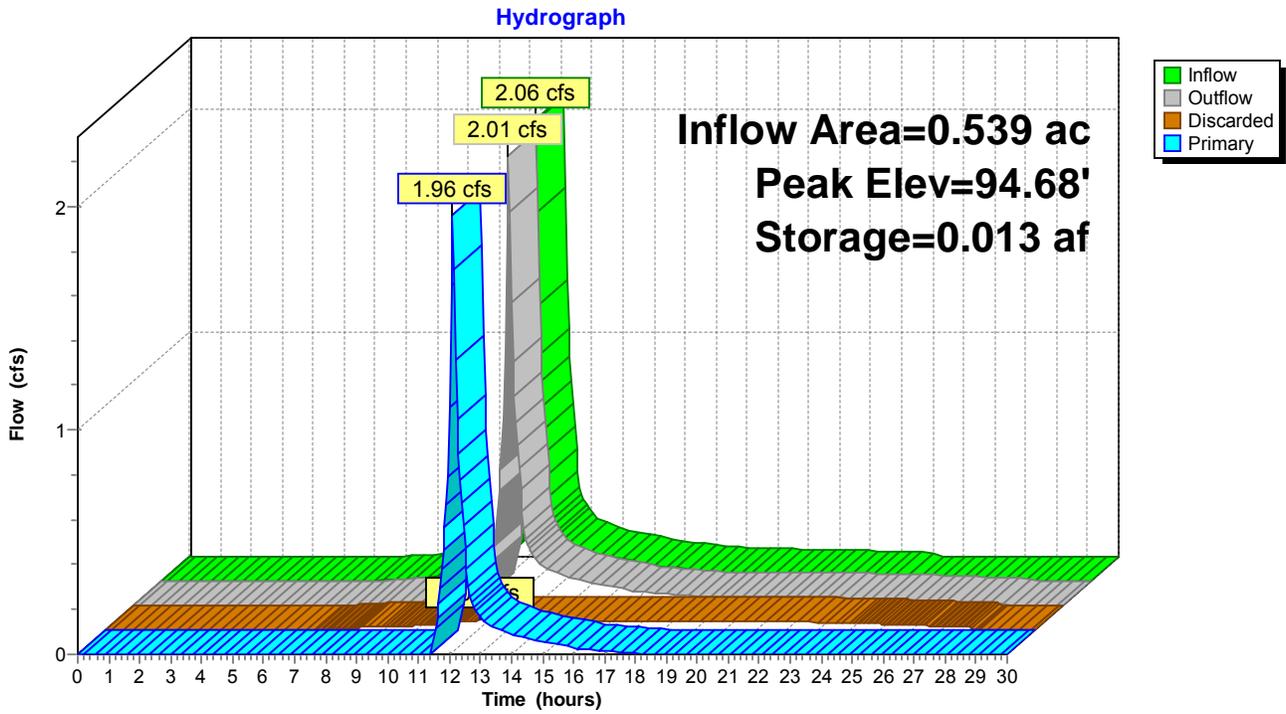
↑**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.94 cfs @ 12.10 hrs HW=94.68' (Free Discharge)

↑**1=Culvert** (Passes 1.94 cfs of 3.29 cfs potential flow)

↑**2=Grate** (Weir Controls 1.94 cfs @ 1.37 fps)

Pond 10P: RAIN GARDEN #3



Summary for Pond 11P: INF BASIN #1

Inflow Area = 3.071 ac, 55.16% Impervious, Inflow Depth = 1.43" for 25-YR event
 Inflow = 7.16 cfs @ 12.13 hrs, Volume= 0.366 af
 Outflow = 4.25 cfs @ 12.34 hrs, Volume= 0.366 af, Atten= 41%, Lag= 12.8 min
 Discarded = 0.12 cfs @ 12.34 hrs, Volume= 0.035 af
 Primary = 4.13 cfs @ 12.34 hrs, Volume= 0.331 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 95.59' @ 12.34 hrs Surf.Area= 0.050 ac Storage= 0.096 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 21.3 min (794.3 - 773.0)

Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	0.119 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
92.00	0.008	0.000	0.000
93.00	0.017	0.012	0.012
94.00	0.028	0.022	0.035
95.00	0.041	0.035	0.069
96.00	0.057	0.049	0.119

Device	Routing	Invert	Outlet Devices
#1	Primary	91.80'	18.0" Round Culvert L= 161.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.80' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	95.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.50'	8.0" Vert. Orifice C= 0.600
#4	Discarded	92.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.12 cfs @ 12.34 hrs HW=95.58' (Free Discharge)

↑ **4=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=4.05 cfs @ 12.34 hrs HW=95.58' (Free Discharge)

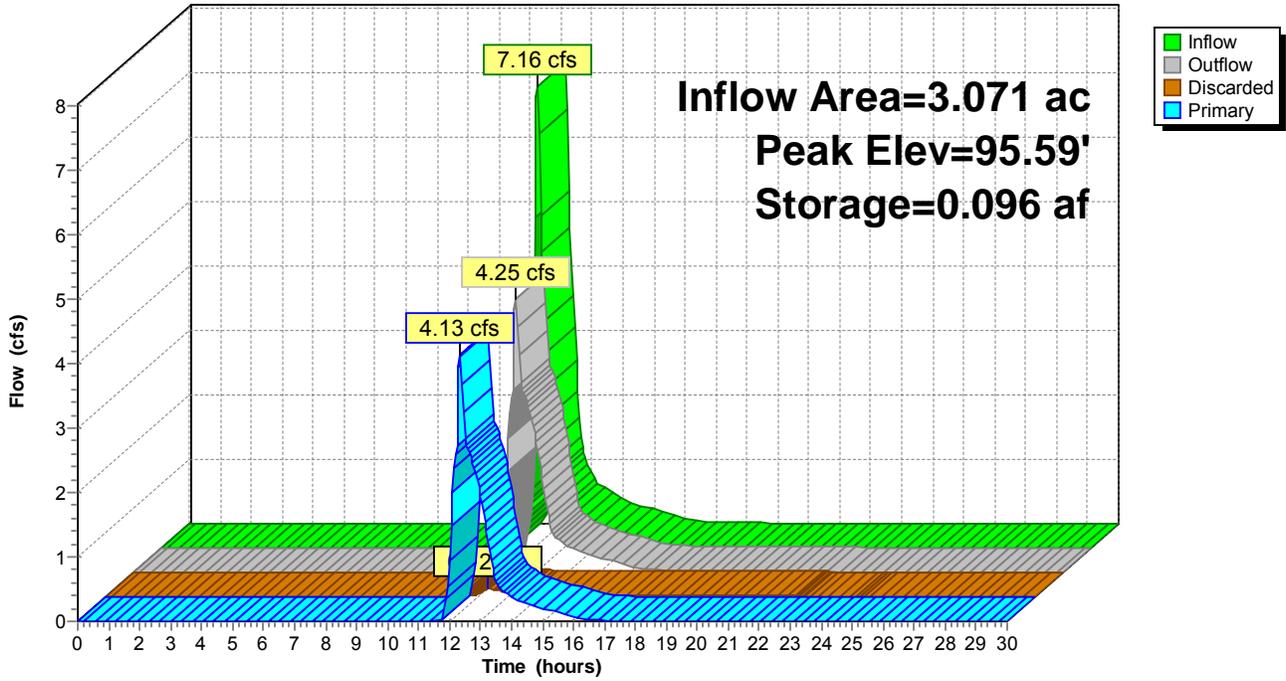
↑ **1=Culvert** (Passes 4.05 cfs of 11.81 cfs potential flow)

↑ **2=Grate** (Weir Controls 1.26 cfs @ 0.94 fps)

↑ **3=Orifice** (Orifice Controls 2.79 cfs @ 7.98 fps)

Pond 11P: INF BASIN #1

Hydrograph



Summary for Pond 12P: INF BASIN #2

Inflow Area = 5.990 ac, 41.22% Impervious, Inflow Depth = 1.49" for 25-YR event
 Inflow = 6.72 cfs @ 12.33 hrs, Volume= 0.746 af
 Outflow = 4.27 cfs @ 12.61 hrs, Volume= 0.746 af, Atten= 36%, Lag= 16.5 min
 Discarded = 0.29 cfs @ 12.61 hrs, Volume= 0.196 af
 Primary = 3.98 cfs @ 12.61 hrs, Volume= 0.550 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.13' @ 12.61 hrs Surf.Area= 0.120 ac Storage= 0.213 af

Plug-Flow detention time= 66.3 min calculated for 0.746 af (100% of inflow)
 Center-of-Mass det. time= 66.2 min (881.5 - 815.3)

Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	0.339 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
91.00	0.035	0.000	0.000
92.00	0.052	0.043	0.043
93.00	0.072	0.062	0.105
94.00	0.113	0.093	0.198
95.00	0.168	0.141	0.339

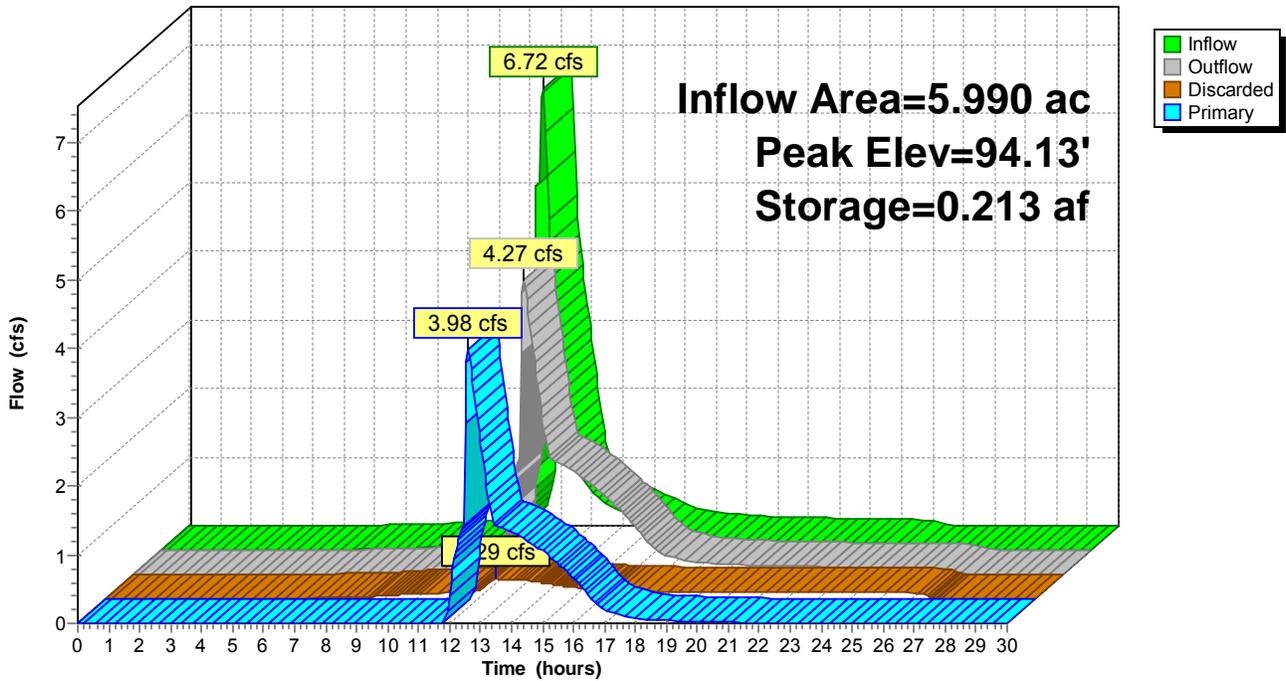
Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	18.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.00' / 90.10' S= 0.0300 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.00'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	91.50'	6.0" Vert. Orifice C= 0.600
#4	Primary	94.50'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	91.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 12.61 hrs HW=94.13' (Free Discharge)
 ↑ **5=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=3.95 cfs @ 12.61 hrs HW=94.13' (Free Discharge)
 ↑ **1=Culvert** (Passes 3.95 cfs of 13.13 cfs potential flow)
 ↑ **2=Grate** (Weir Controls 2.49 cfs @ 1.19 fps)
 ↑ **3=Orifice** (Orifice Controls 1.46 cfs @ 7.43 fps)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: INF BASIN #2

Hydrograph



Summary for Pond 14P: INF SYS #2

Inflow Area = 0.361 ac, 100.00% Impervious, Inflow Depth = 4.96" for 25-YR event
 Inflow = 1.79 cfs @ 12.09 hrs, Volume= 0.149 af
 Outflow = 0.73 cfs @ 12.31 hrs, Volume= 0.139 af, Atten= 59%, Lag= 13.6 min
 Discarded = 0.05 cfs @ 8.55 hrs, Volume= 0.107 af
 Primary = 0.68 cfs @ 12.31 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 93.31' @ 12.31 hrs Surf.Area= 0.022 ac Storage= 0.057 af

Plug-Flow detention time= 283.7 min calculated for 0.139 af (93% of inflow)
 Center-of-Mass det. time= 246.0 min (993.3 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.79'	0.028 af	20.83'W x 45.50'L x 4.54'H Field A 0.099 af Overall - 0.030 af Embedded = 0.069 af x 40.0% Voids
#2A	89.79'	0.030 af	Cultec R-330XL x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.057 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	92.83'	12.0" Round Culvert L= 41.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 92.83' / 92.62' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	88.79'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 8.55 hrs HW=88.84' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.66 cfs @ 12.31 hrs HW=93.30' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 0.66 cfs @ 2.66 fps)

Pond 14P: INF SYS #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

4,305.1 cf Field - 1,296.5 cf Chambers = 3,008.6 cf Stone x 40.0% Voids = 1,203.5 cf Stone Storage

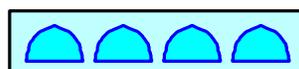
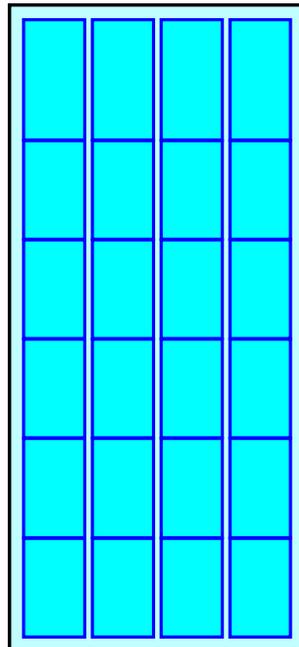
Chamber Storage + Stone Storage = 2,499.9 cf = 0.057 af

Overall Storage Efficiency = 58.1%

24 Chambers

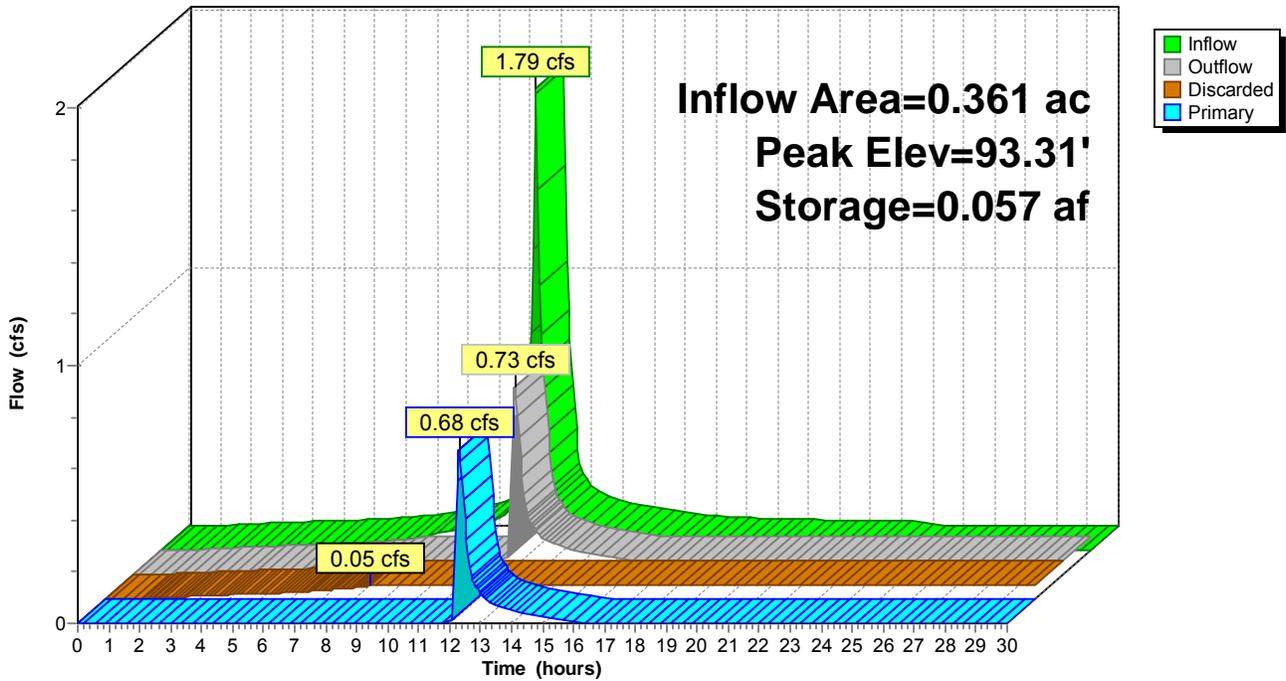
159.4 cy Field

111.4 cy Stone



Pond 14P: INF SYS #2

Hydrograph



Summary for Pond 23P: INF SYS #1

Inflow Area = 0.503 ac, 96.62% Impervious, Inflow Depth = 4.80" for 25-YR event
 Inflow = 2.43 cfs @ 12.09 hrs, Volume= 0.201 af
 Outflow = 0.11 cfs @ 9.95 hrs, Volume= 0.201 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.11 cfs @ 9.95 hrs, Volume= 0.201 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 91.64' @ 14.68 hrs Surf.Area= 0.045 ac Storage= 0.095 af

Plug-Flow detention time= 317.8 min calculated for 0.201 af (100% of inflow)
 Center-of-Mass det. time= 317.8 min (1,068.2 - 750.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.36'	0.057 af	16.00'W x 122.50'L x 4.54'H Field A 0.204 af Overall - 0.062 af Embedded = 0.143 af x 40.0% Voids
#2A	89.36'	0.062 af	Cultec R-330XL x 51 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.36'	2.410 in/hr Exfiltration over Surface area
#2	Primary	92.10'	12.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.10' / 90.60' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.11 cfs @ 9.95 hrs HW=88.41' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=88.36' (Free Discharge)
 ↑2=Culvert (Controls 0.00 cfs)

Pond 23P: INF SYS #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

51 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 2,693.5 cf Chamber Storage

8,901.7 cf Field - 2,693.5 cf Chambers = 6,208.1 cf Stone x 40.0% Voids = 2,483.3 cf Stone Storage

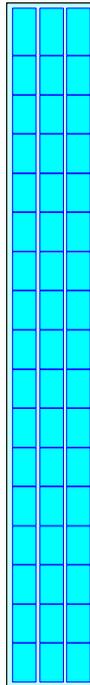
Chamber Storage + Stone Storage = 5,176.8 cf = 0.119 af

Overall Storage Efficiency = 58.2%

51 Chambers

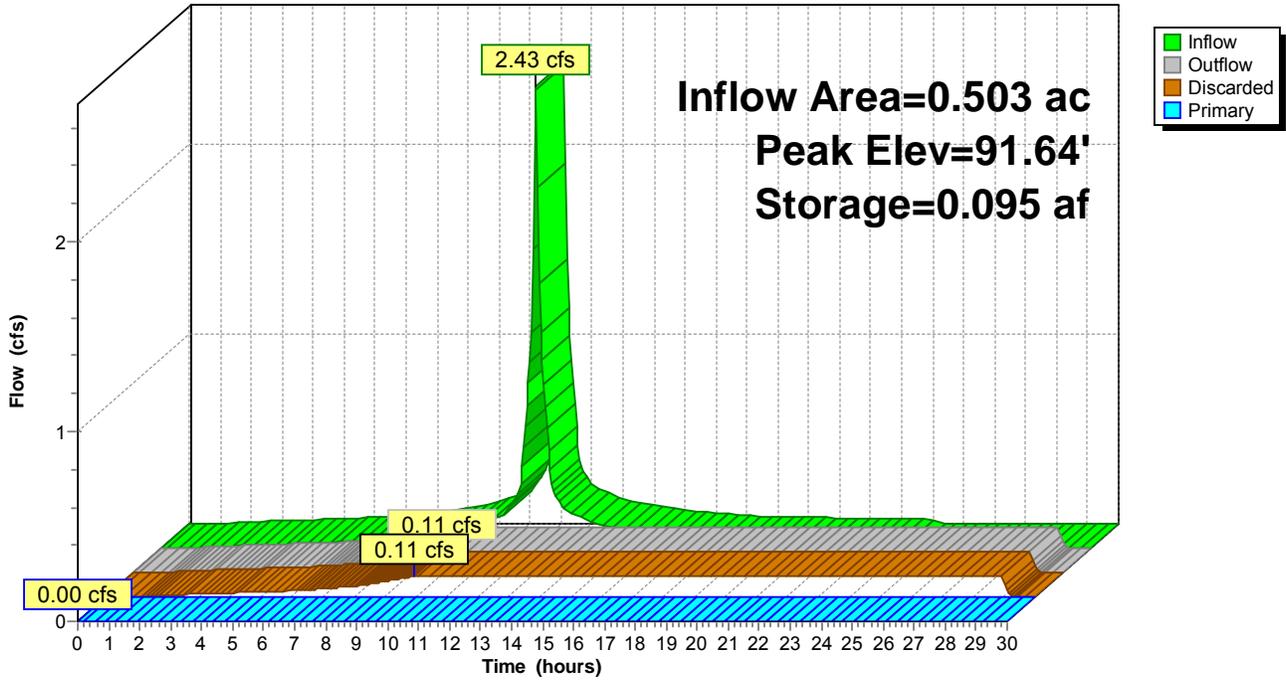
329.7 cy Field

229.9 cy Stone



Pond 23P: INF SYS #1

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area P01	Runoff Area=6.682 ac 0.19% Impervious Runoff Depth=0.32" Flow Length=452' Tc=19.4 min CN=37 Runoff=0.51 cfs 0.178 af
Subcatchment 2S: Area P03	Runoff Area=0.539 ac 69.76% Impervious Runoff Depth=4.00" Tc=6.0 min CN=83 Runoff=2.45 cfs 0.180 af
Subcatchment 3S: Area P05	Runoff Area=1.439 ac 46.77% Impervious Runoff Depth=3.49" Tc=6.0 min CN=78 Runoff=5.76 cfs 0.419 af
Subcatchment 4S: Area P06	Runoff Area=0.451 ac 47.67% Impervious Runoff Depth=2.91" Tc=6.0 min CN=72 Runoff=1.51 cfs 0.109 af
Subcatchment 13S: AREA P09A	Runoff Area=0.470 ac 100.00% Impervious Runoff Depth=5.66" Tc=6.0 min CN=98 Runoff=2.65 cfs 0.222 af
Subcatchment 15S: Area P08	Runoff Area=0.546 ac 66.48% Impervious Runoff Depth=3.90" Tc=6.0 min CN=82 Runoff=2.42 cfs 0.177 af
Subcatchment 16S: Area P07	Runoff Area=0.514 ac 73.54% Impervious Runoff Depth=4.21" Tc=6.0 min CN=85 Runoff=2.44 cfs 0.180 af
Subcatchment 17S: Area P04	Runoff Area=0.281 ac 24.56% Impervious Runoff Depth=1.94" Flow Length=73' Tc=6.7 min CN=61 Runoff=0.58 cfs 0.045 af
Subcatchment 18S: Area P02	Runoff Area=2.211 ac 11.31% Impervious Runoff Depth=1.46" Flow Length=240' Tc=21.7 min CN=55 Runoff=2.16 cfs 0.269 af
Subcatchment 19S: Area P10	Runoff Area=0.632 ac 0.95% Impervious Runoff Depth=0.89" Flow Length=144' Tc=7.2 min CN=47 Runoff=0.41 cfs 0.047 af
Subcatchment 20S: AREA P09D	Runoff Area=0.162 ac 100.00% Impervious Runoff Depth=5.66" Tc=6.0 min CN=98 Runoff=0.91 cfs 0.076 af
Subcatchment 21S: AREA P09C	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth=5.66" Tc=6.0 min CN=98 Runoff=0.47 cfs 0.040 af
Subcatchment 22S: AREA P09B	Runoff Area=0.277 ac 100.00% Impervious Runoff Depth=5.66" Tc=6.0 min CN=98 Runoff=1.56 cfs 0.131 af
Subcatchment 24S: Area P10A	Runoff Area=0.033 ac 48.48% Impervious Runoff Depth=3.01" Tc=6.0 min CN=73 Runoff=0.11 cfs 0.008 af
Pond 1: DP#1	Inflow=8.73 cfs 1.119 af Primary=8.73 cfs 1.119 af
Pond 2: DP#2	Inflow=0.41 cfs 0.057 af Primary=0.41 cfs 0.057 af

Pond 8P: RAIN GARDEN #1 Peak Elev=94.75' Storage=0.020 af Inflow=1.51 cfs 0.109 af
Discarded=0.06 cfs 0.057 af Primary=1.30 cfs 0.053 af Outflow=1.35 cfs 0.109 af

Pond 9P: RAIN GARDEN #2 Peak Elev=94.75' Storage=0.068 af Inflow=6.95 cfs 0.471 af
Discarded=0.18 cfs 0.193 af Primary=6.39 cfs 0.279 af Outflow=6.57 cfs 0.471 af

Pond 10P: RAIN GARDEN #3 Peak Elev=94.70' Storage=0.014 af Inflow=2.45 cfs 0.180 af
Discarded=0.04 cfs 0.057 af Primary=2.33 cfs 0.123 af Outflow=2.38 cfs 0.180 af

Pond 11P: INF BASIN #1 Peak Elev=95.73' Storage=0.103 af Inflow=10.01 cfs 0.492 af
Discarded=0.13 cfs 0.040 af Primary=8.33 cfs 0.449 af Outflow=8.46 cfs 0.489 af

Pond 12P: INF BASIN #2 Peak Elev=94.24' Storage=0.227 af Inflow=11.87 cfs 0.972 af
Discarded=0.31 cfs 0.211 af Primary=7.67 cfs 0.761 af Outflow=7.98 cfs 0.972 af

Pond 14P: INF SYS #2 Peak Elev=93.52' Storage=0.057 af Inflow=2.04 cfs 0.170 af
Discarded=0.05 cfs 0.110 af Primary=1.17 cfs 0.045 af Outflow=1.22 cfs 0.155 af

Pond 23P: INF SYS #1 Peak Elev=92.25' Storage=0.107 af Inflow=2.77 cfs 0.230 af
Discarded=0.11 cfs 0.214 af Primary=0.10 cfs 0.010 af Outflow=0.20 cfs 0.224 af

Total Runoff Area = 14.321 ac Runoff Volume = 2.081 af Average Runoff Depth = 1.74"
76.59% Pervious = 10.969 ac 23.41% Impervious = 3.352 ac

Summary for Subcatchment 1S: Area P01

Runoff = 0.51 cfs @ 12.61 hrs, Volume= 0.178 af, Depth= 0.32"

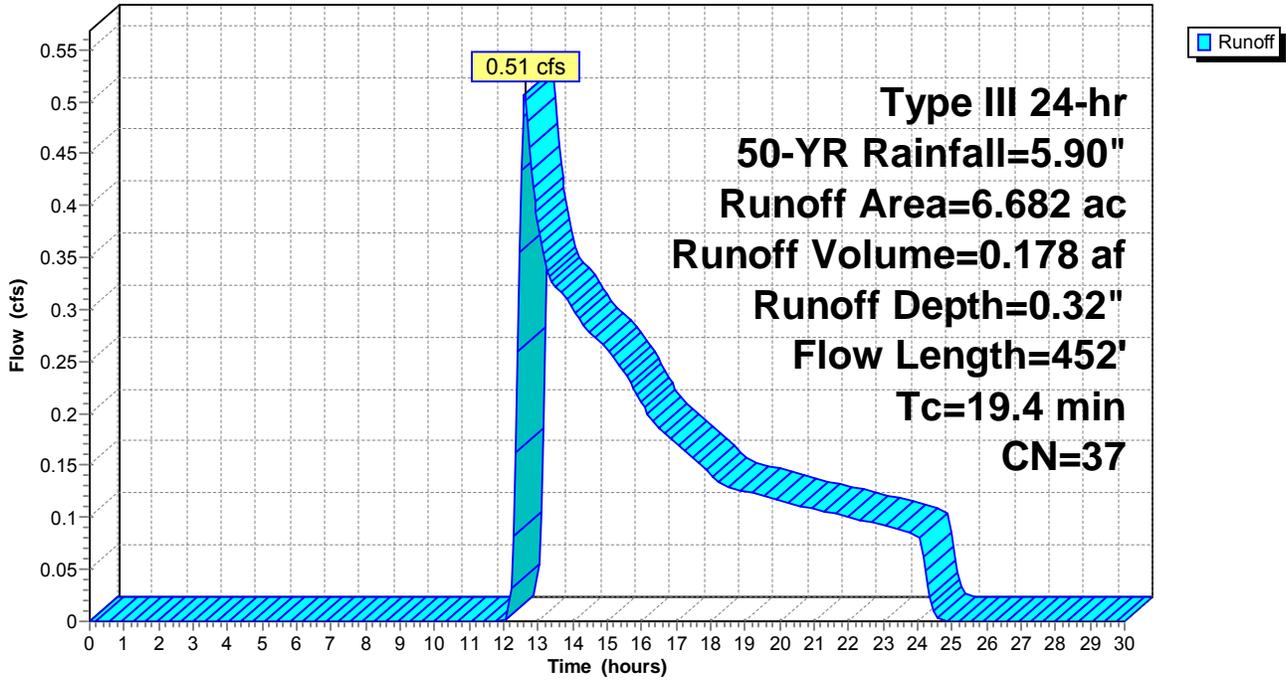
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.032	36	Woods, Fair, HSG A
0.637	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.682	37	Weighted Average
6.669		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area P01

Hydrograph



Summary for Subcatchment 2S: Area P03

Runoff = 2.45 cfs @ 12.09 hrs, Volume= 0.180 af, Depth= 4.00"

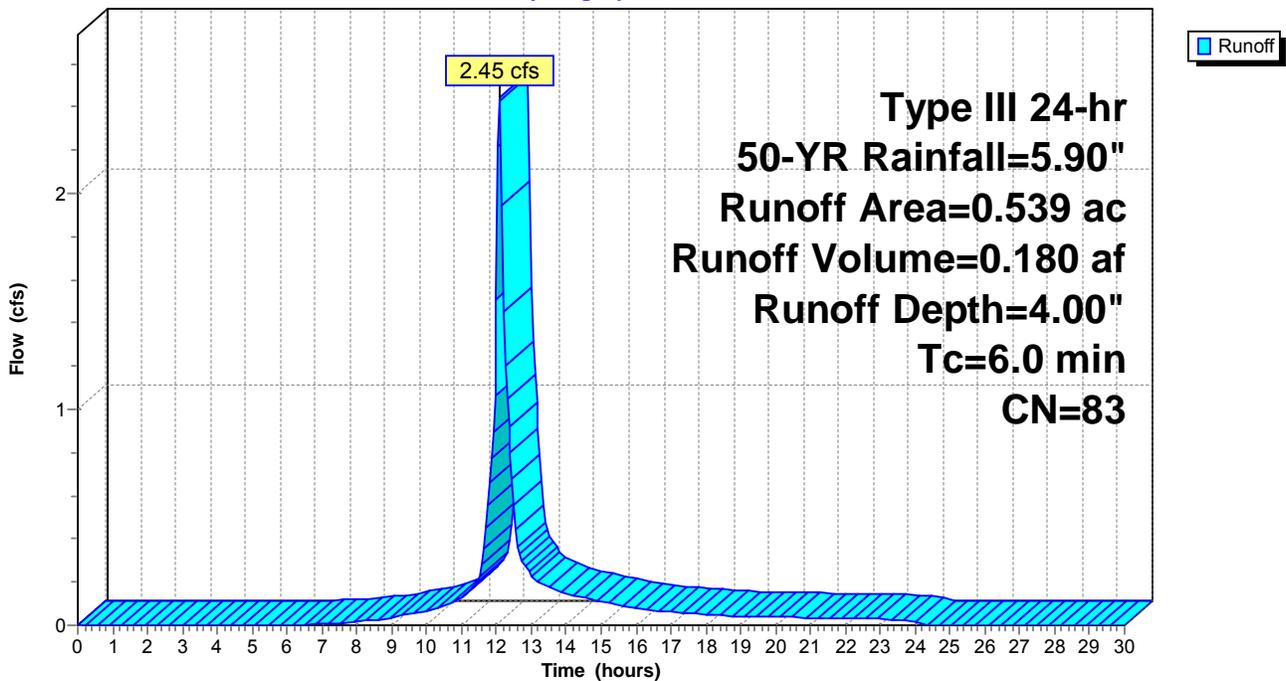
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.376	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.163	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.539	83	Weighted Average
0.163		30.24% Pervious Area
0.376		69.76% Impervious Area

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

Subcatchment 2S: Area P03

Hydrograph



Summary for Subcatchment 3S: Area P05

Runoff = 5.76 cfs @ 12.09 hrs, Volume= 0.419 af, Depth= 3.49"

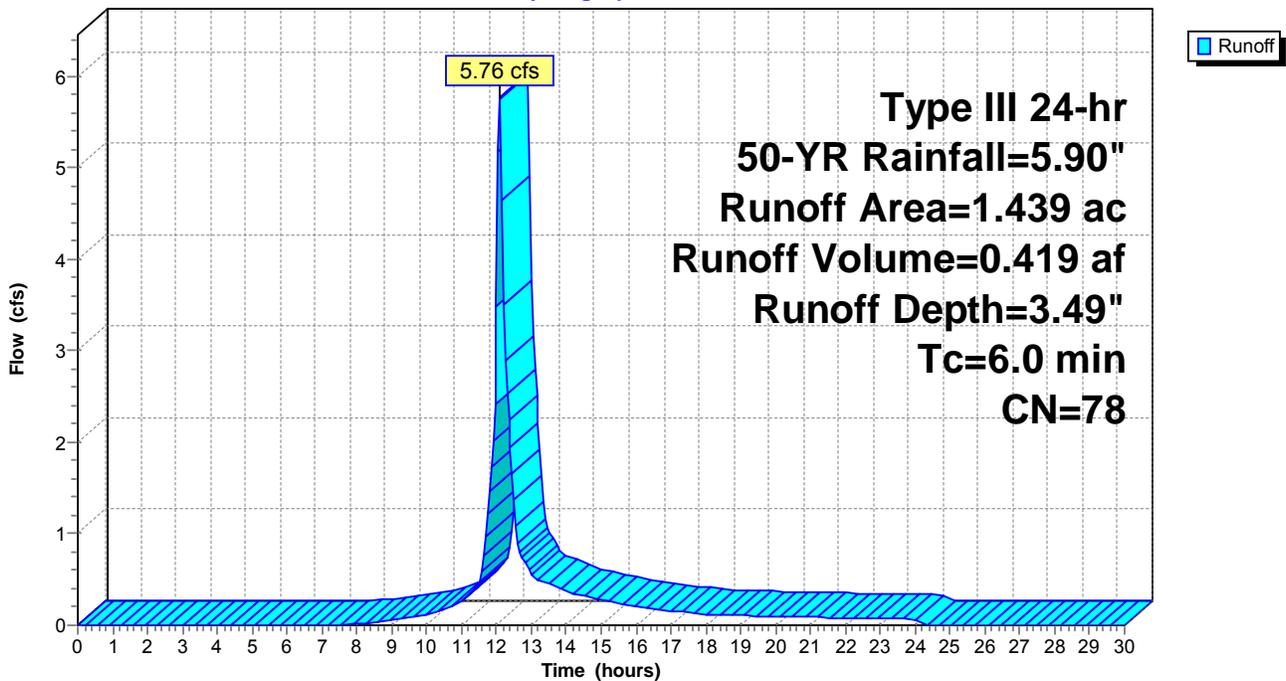
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.673	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.386	49	50-75% Grass cover, Fair, HSG A
* 0.380	72	Dirt, HSG A (Playscape)
1.439	78	Weighted Average
0.766		53.23% Pervious Area
0.673		46.77% Impervious Area

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

Subcatchment 3S: Area P05

Hydrograph



Summary for Subcatchment 4S: Area P06

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.109 af, Depth= 2.91"

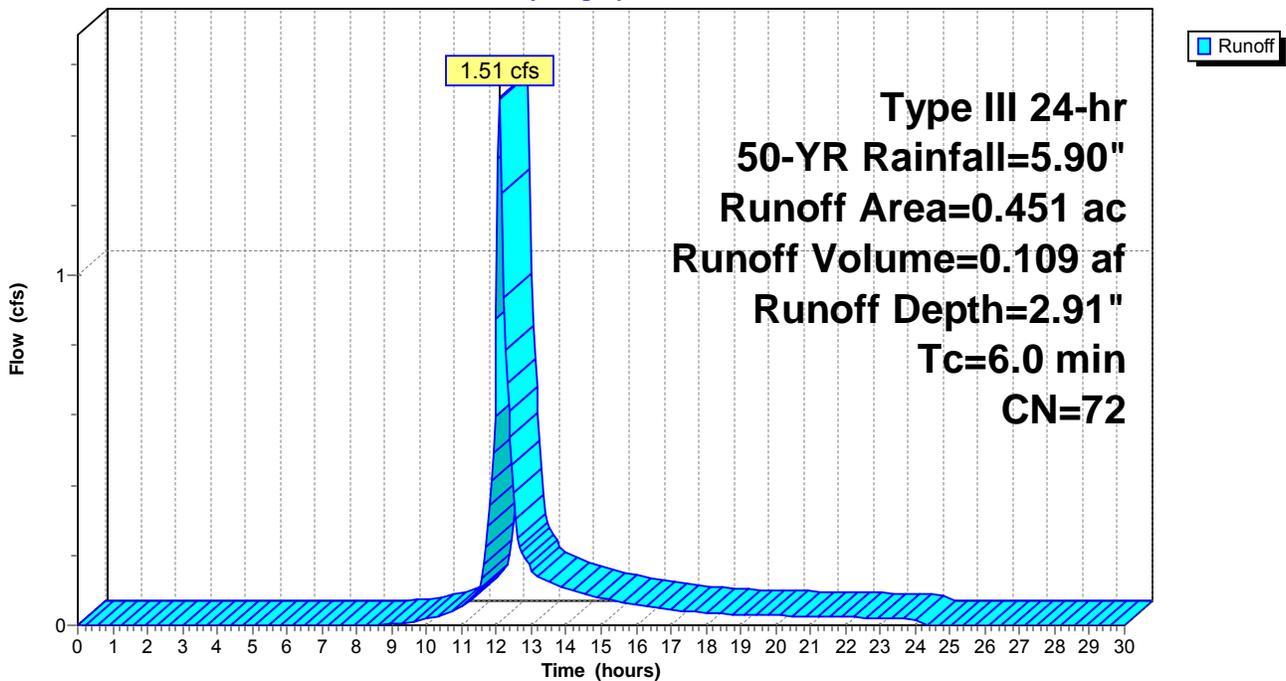
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.215	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.236	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.451	72	Weighted Average
0.236		52.33% Pervious Area
0.215		47.67% Impervious Area

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

Subcatchment 4S: Area P06

Hydrograph



Summary for Subcatchment 13S: AREA P09A

Runoff = 2.65 cfs @ 12.09 hrs, Volume= 0.222 af, Depth= 5.66"

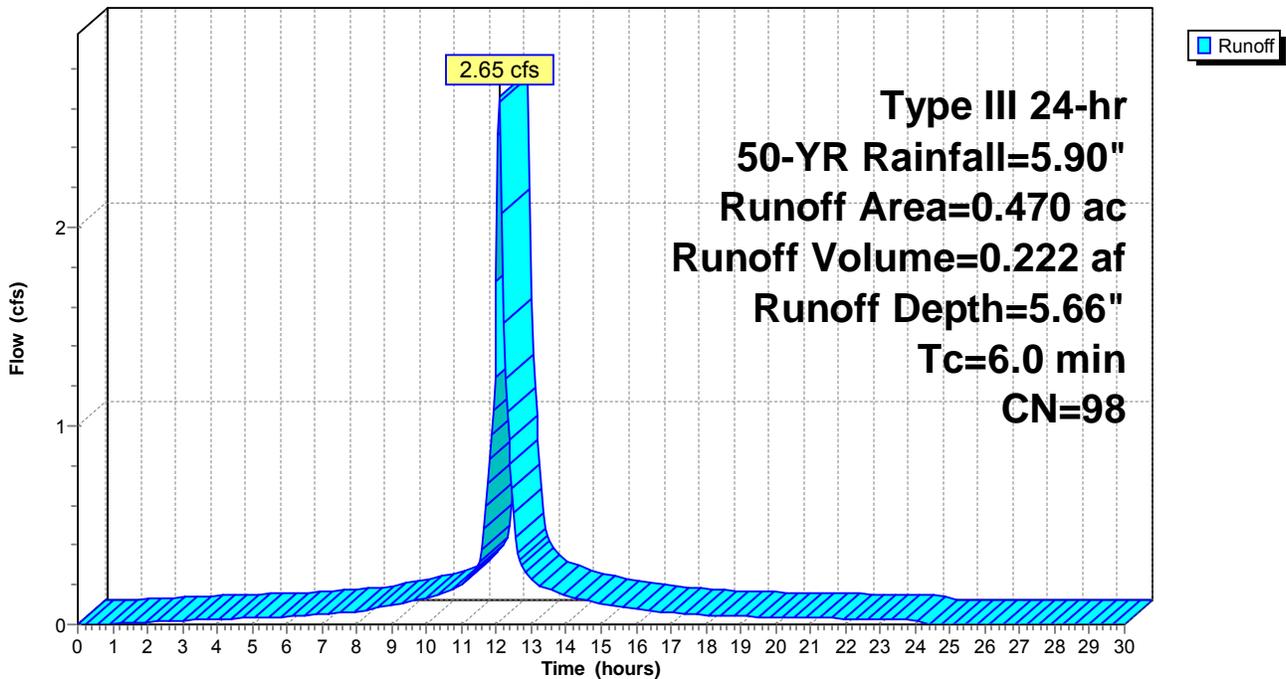
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.470	98	Roofs, HSG A
0.470		100.00% Impervious Area

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

Subcatchment 13S: AREA P09A

Hydrograph



Summary for Subcatchment 15S: Area P08

Runoff = 2.42 cfs @ 12.09 hrs, Volume= 0.177 af, Depth= 3.90"

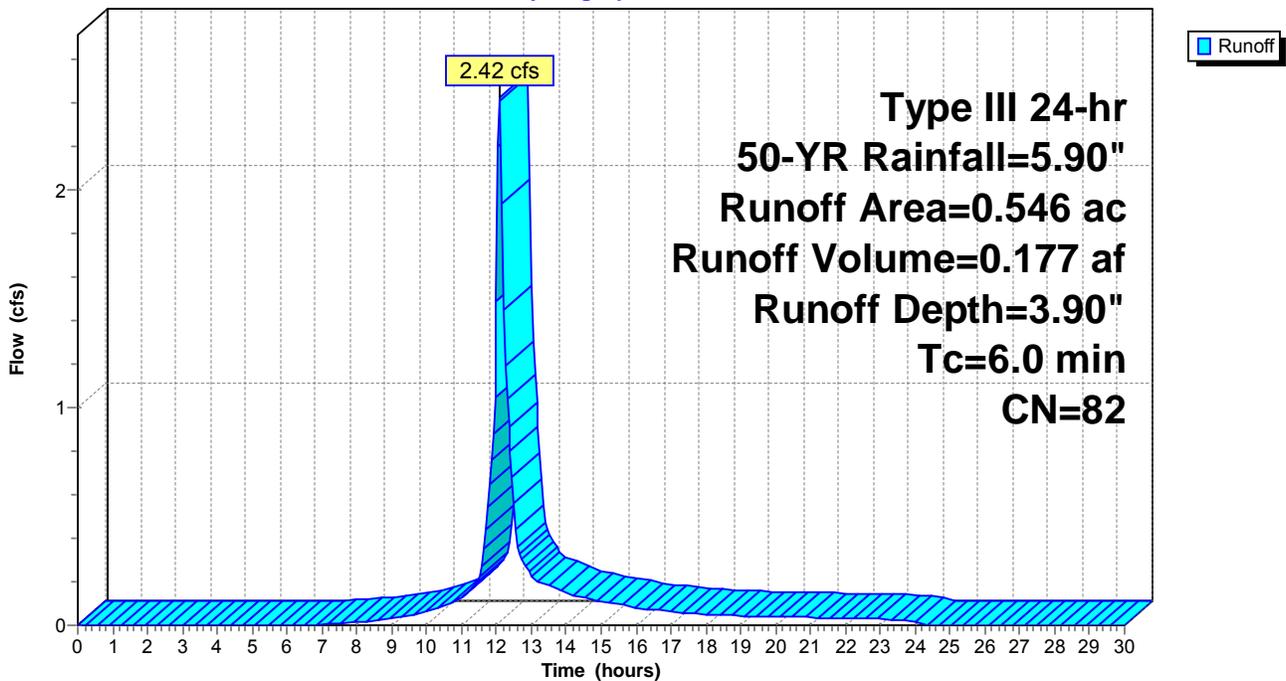
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.363	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.183	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.546	82	Weighted Average
0.183		33.52% Pervious Area
0.363		66.48% Impervious Area

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

Subcatchment 15S: Area P08

Hydrograph



Summary for Subcatchment 16S: Area P07

Runoff = 2.44 cfs @ 12.09 hrs, Volume= 0.180 af, Depth= 4.21"

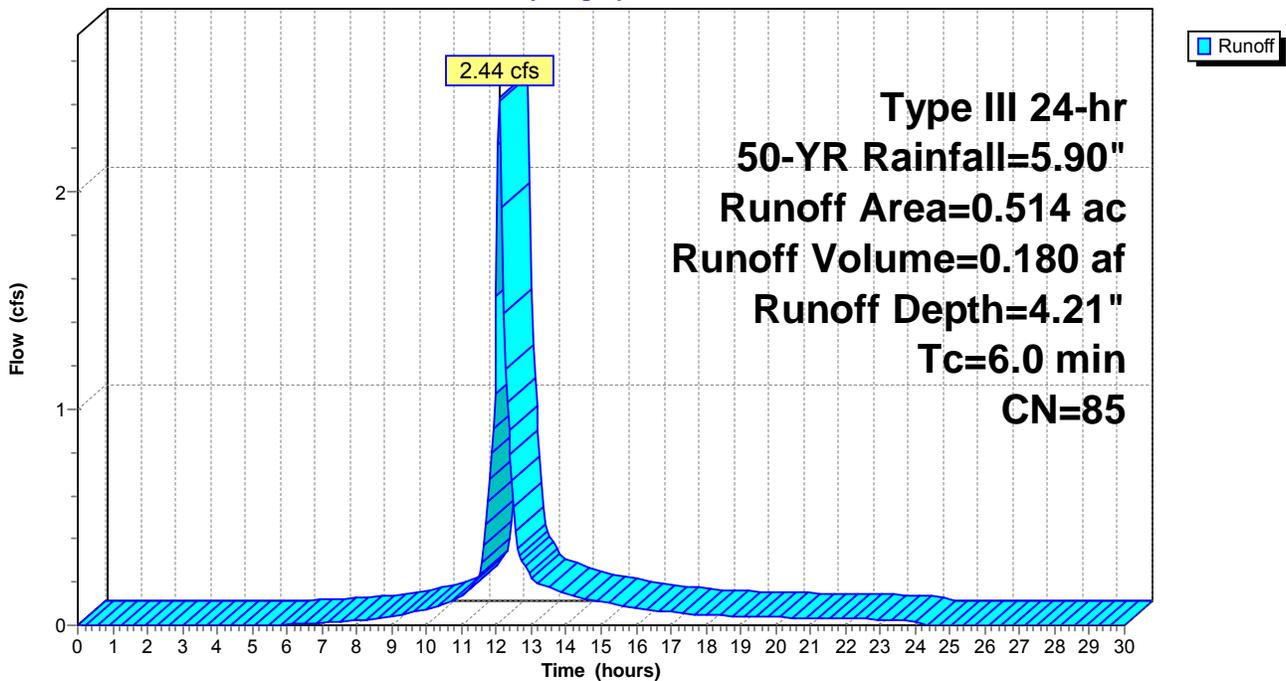
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.378	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.136	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.514	85	Weighted Average
0.136		26.46% Pervious Area
0.378		73.54% Impervious Area

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

Subcatchment 16S: Area P07

Hydrograph



Summary for Subcatchment 17S: Area P04

Runoff = 0.58 cfs @ 12.11 hrs, Volume= 0.045 af, Depth= 1.94"

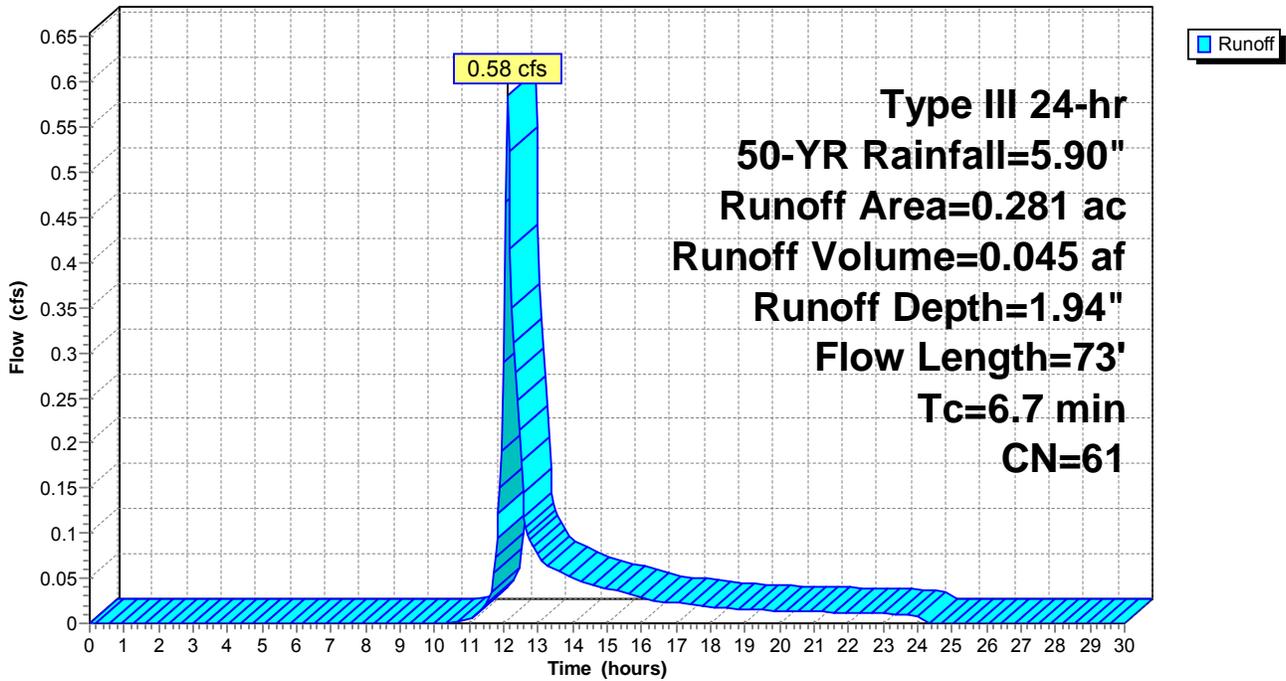
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.069	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.212	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.281	61	Weighted Average
0.212		75.44% Pervious Area
0.069		24.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	57	0.0200	0.15		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.0	5	0.0100	2.03		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
0.2	11	0.0300	1.21		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
6.7	73	Total			

Subcatchment 17S: Area P04

Hydrograph



Summary for Subcatchment 18S: Area P02

Runoff = 2.16 cfs @ 12.35 hrs, Volume= 0.269 af, Depth= 1.46"

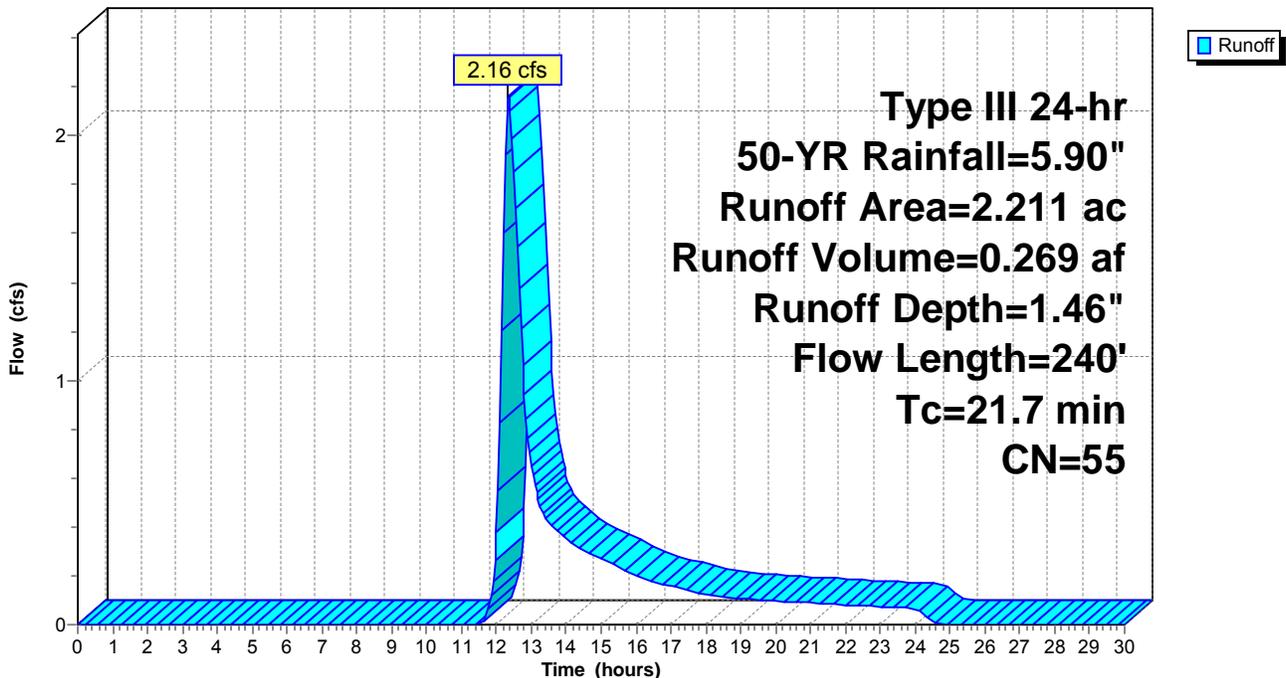
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
1.961	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
2.211	55	Weighted Average
1.961		88.69% Pervious Area
0.250		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0040	0.09		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
2.4	140	0.0200	0.99		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
21.7	240	Total			

Subcatchment 18S: Area P02

Hydrograph



Summary for Subcatchment 19S: Area P10

Runoff = 0.41 cfs @ 12.15 hrs, Volume= 0.047 af, Depth= 0.89"

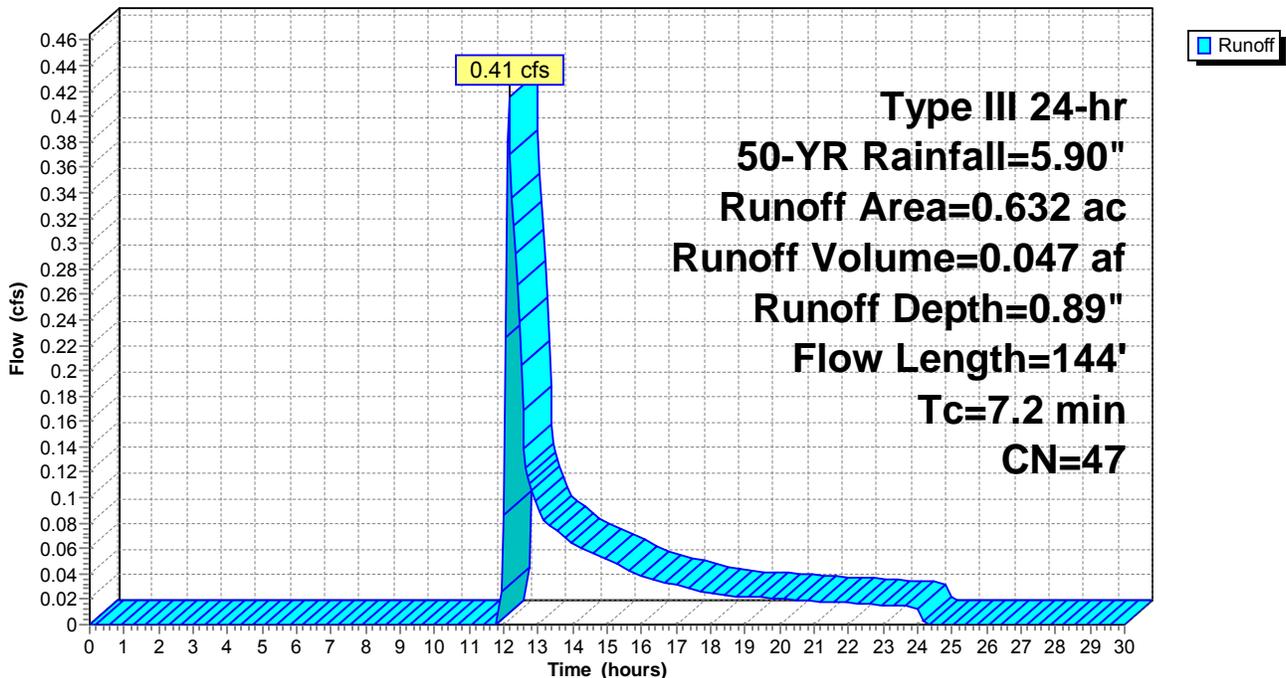
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.111	36	Woods, Fair, HSG A
0.515	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.632	47	Weighted Average
0.626		99.05% Pervious Area
0.006		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	46	0.0350	0.18		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.9	98	0.0130	0.57		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
7.2	144	Total			

Subcatchment 19S: Area P10

Hydrograph



Summary for Subcatchment 20S: AREA P09D

Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.076 af, Depth= 5.66"

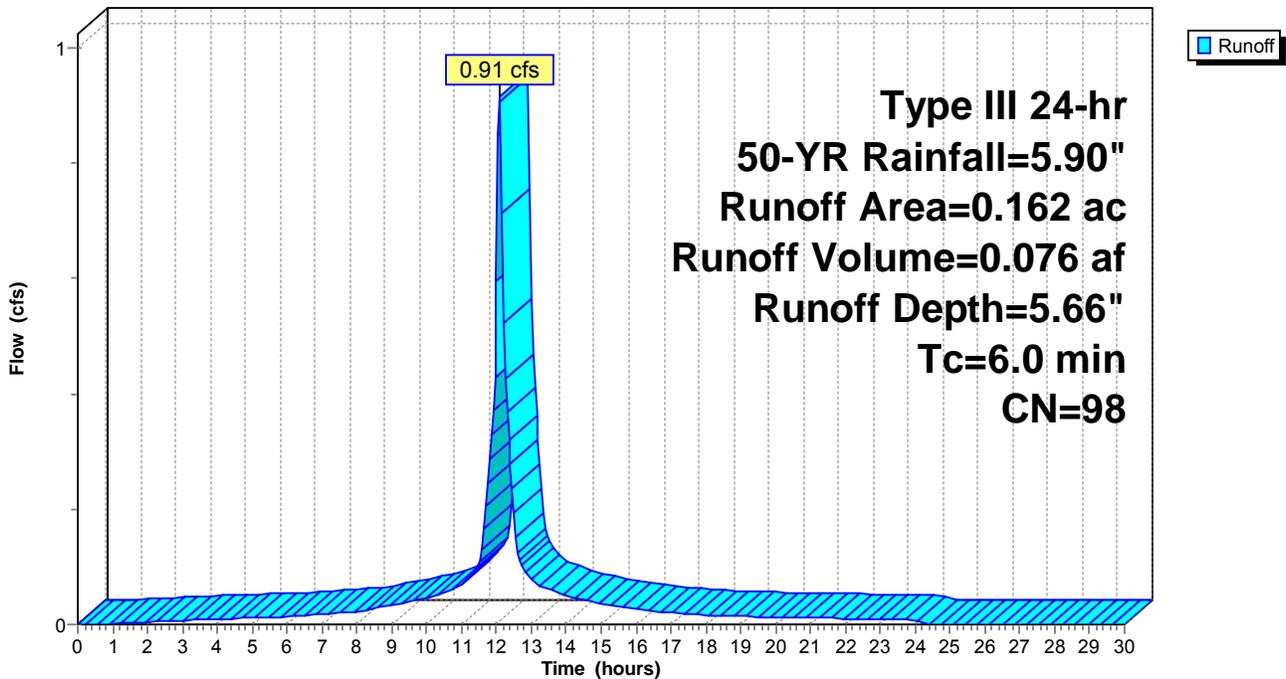
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.162	98	Roofs, HSG A
0.162		100.00% Impervious Area

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

Subcatchment 20S: AREA P09D

Hydrograph



Summary for Subcatchment 21S: AREA P09C

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.040 af, Depth= 5.66"

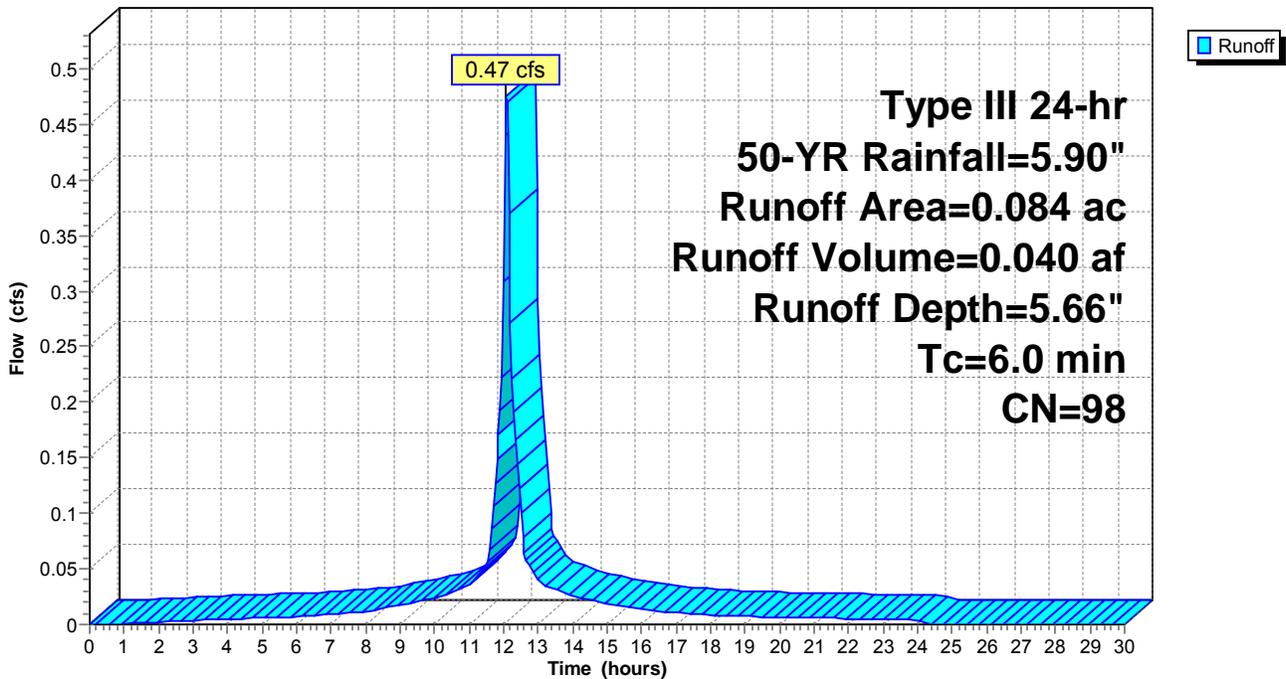
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.084	98	Roofs, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 21S: AREA P09C

Hydrograph



Summary for Subcatchment 22S: AREA P09B

Runoff = 1.56 cfs @ 12.09 hrs, Volume= 0.131 af, Depth= 5.66"

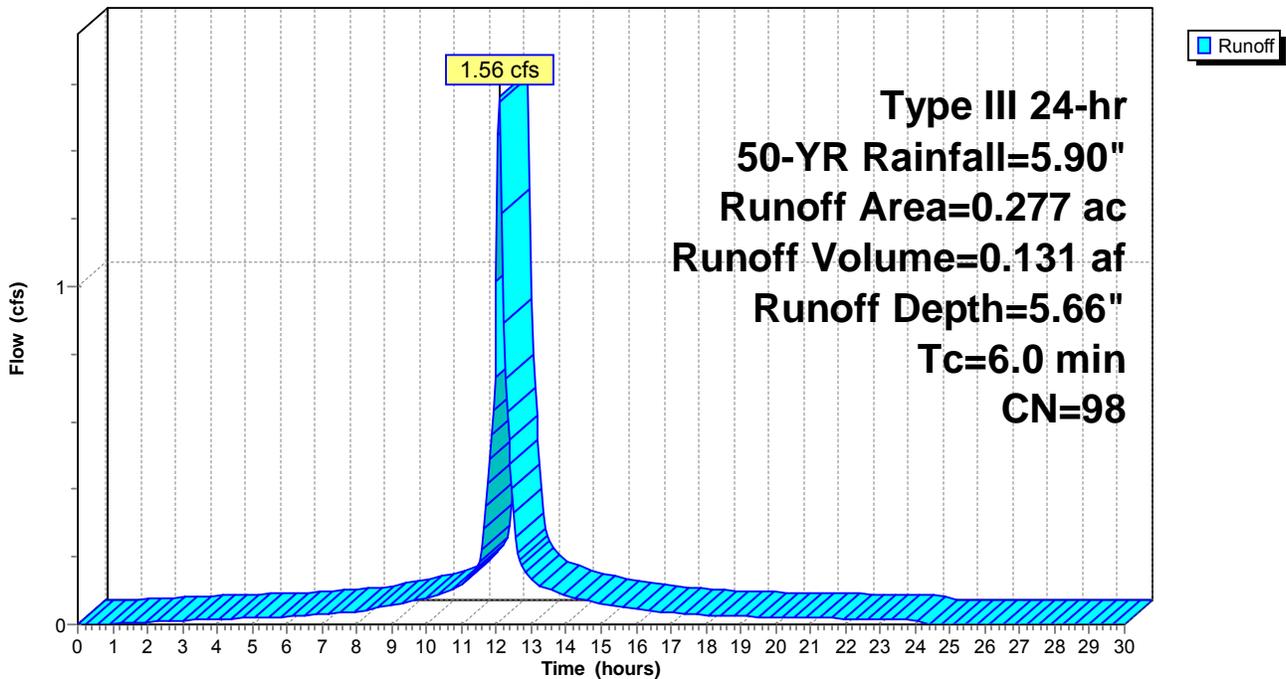
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.277	98	Roofs, HSG A
0.277		100.00% Impervious Area

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

Subcatchment 22S: AREA P09B

Hydrograph



Summary for Subcatchment 24S: Area P10A

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 3.01"

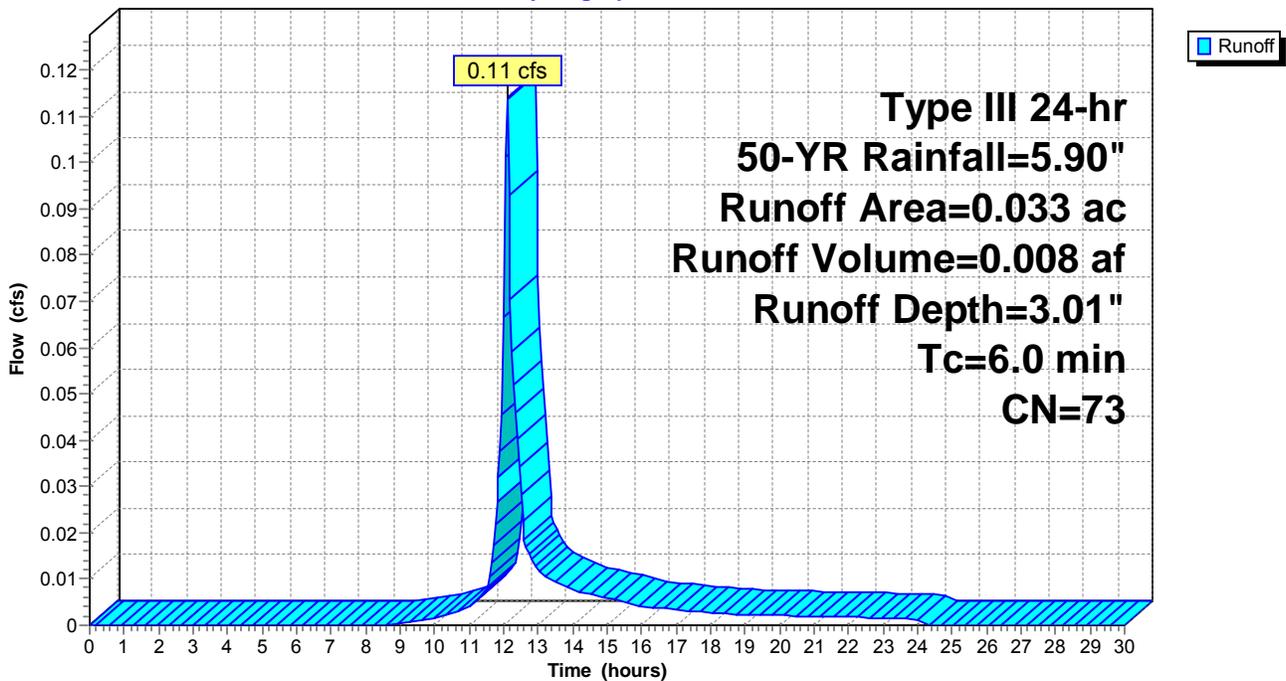
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50-YR Rainfall=5.90"

Area (ac)	CN	Description
0.016	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.017	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.033	73	Weighted Average
0.017		51.52% Pervious Area
0.016		48.48% Impervious Area

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

Subcatchment 24S: Area P10A

Hydrograph



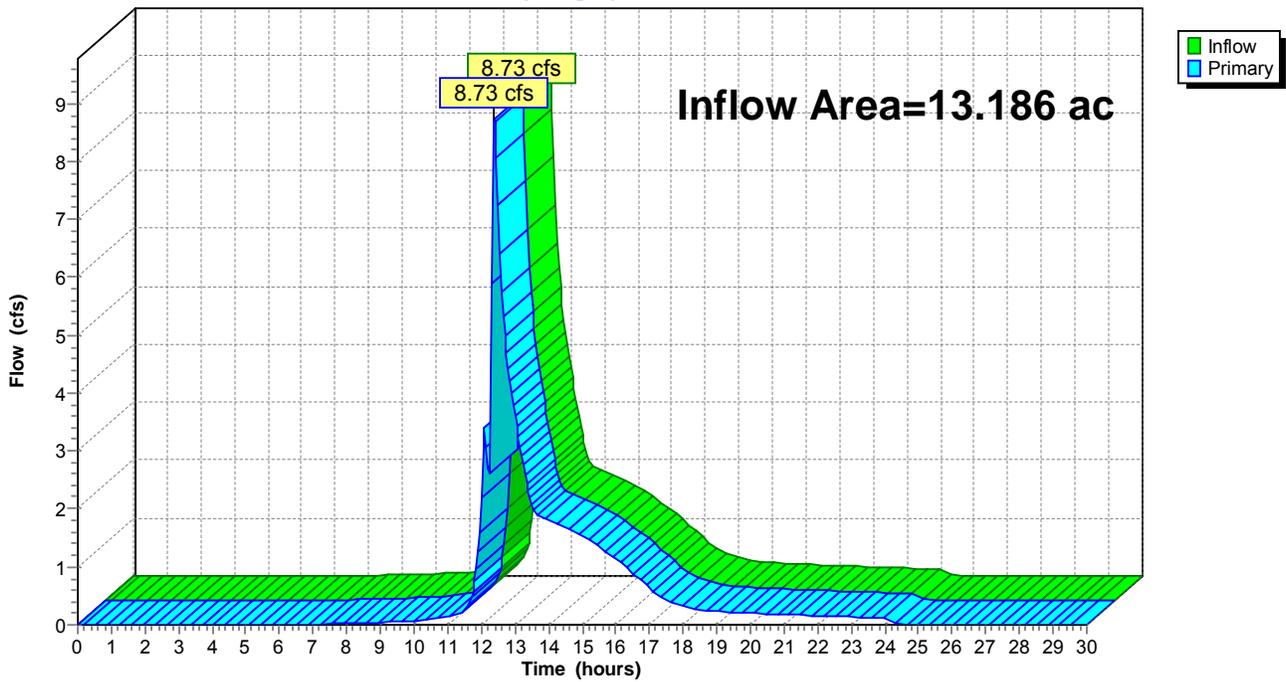
Summary for Pond 1: DP#1

Inflow Area = 13.186 ac, 21.69% Impervious, Inflow Depth = 1.02" for 50-YR event
Inflow = 8.73 cfs @ 12.38 hrs, Volume= 1.119 af
Primary = 8.73 cfs @ 12.38 hrs, Volume= 1.119 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



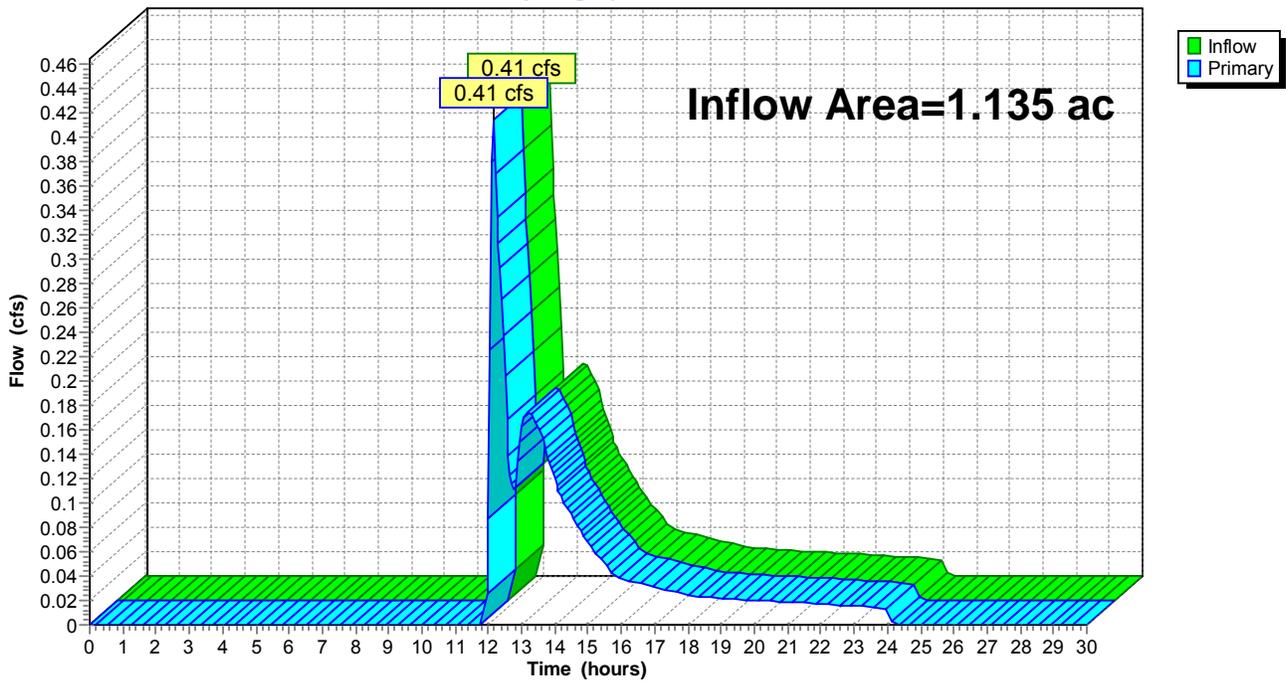
Summary for Pond 2: DP#2

Inflow Area = 1.135 ac, 43.35% Impervious, Inflow Depth = 0.61" for 50-YR event
Inflow = 0.41 cfs @ 12.15 hrs, Volume= 0.057 af
Primary = 0.41 cfs @ 12.15 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Summary for Pond 8P: RAIN GARDEN #1

Inflow Area = 0.451 ac, 47.67% Impervious, Inflow Depth = 2.91" for 50-YR event
 Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.109 af
 Outflow = 1.35 cfs @ 12.14 hrs, Volume= 0.109 af, Atten= 10%, Lag= 2.7 min
 Discarded = 0.06 cfs @ 12.14 hrs, Volume= 0.057 af
 Primary = 1.30 cfs @ 12.14 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.75' @ 12.14 hrs Surf.Area= 0.024 ac Storage= 0.020 af

Plug-Flow detention time= 86.1 min calculated for 0.109 af (100% of inflow)
 Center-of-Mass det. time= 86.2 min (920.5 - 834.3)

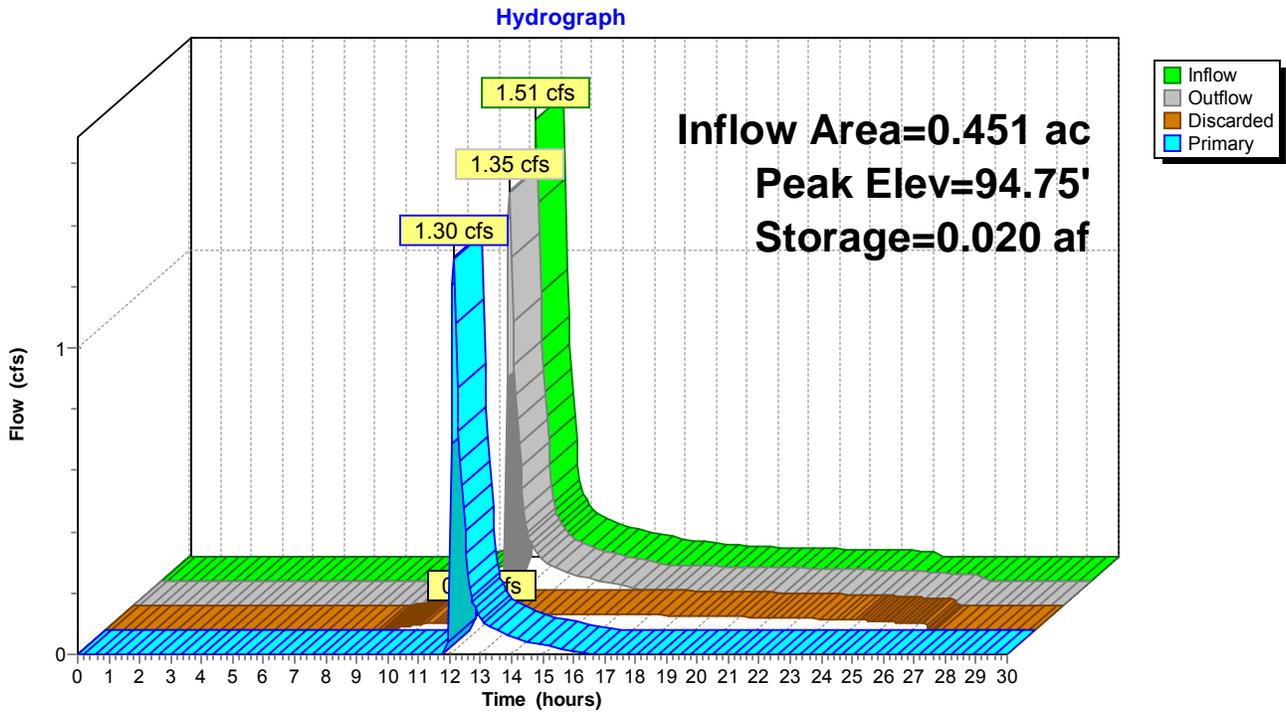
Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.026 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.008	0.000	0.000
94.00	0.014	0.006	0.006
95.00	0.027	0.020	0.026

Device	Routing	Invert	Outlet Devices
#1	Primary	93.13'	12.0" Round Culvert L= 25.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.13' / 93.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	12.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.06 cfs @ 12.14 hrs HW=94.75' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.27 cfs @ 12.14 hrs HW=94.75' (Free Discharge)
 ↑ **1=Culvert** (Passes 1.27 cfs of 3.87 cfs potential flow)
 ↑ **2=Grate** (Weir Controls 1.27 cfs @ 1.63 fps)

Pond 8P: RAIN GARDEN #1



Summary for Pond 9P: RAIN GARDEN #2

Inflow Area = 1.890 ac, 46.98% Impervious, Inflow Depth = 2.99" for 50-YR event
 Inflow = 6.95 cfs @ 12.10 hrs, Volume= 0.471 af
 Outflow = 6.57 cfs @ 12.13 hrs, Volume= 0.471 af, Atten= 5%, Lag= 1.5 min
 Discarded = 0.18 cfs @ 12.13 hrs, Volume= 0.193 af
 Primary = 6.39 cfs @ 12.13 hrs, Volume= 0.279 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.75' @ 12.13 hrs Surf.Area= 0.074 ac Storage= 0.068 af

Plug-Flow detention time= 82.4 min calculated for 0.471 af (100% of inflow)
 Center-of-Mass det. time= 82.7 min (896.3 - 813.6)

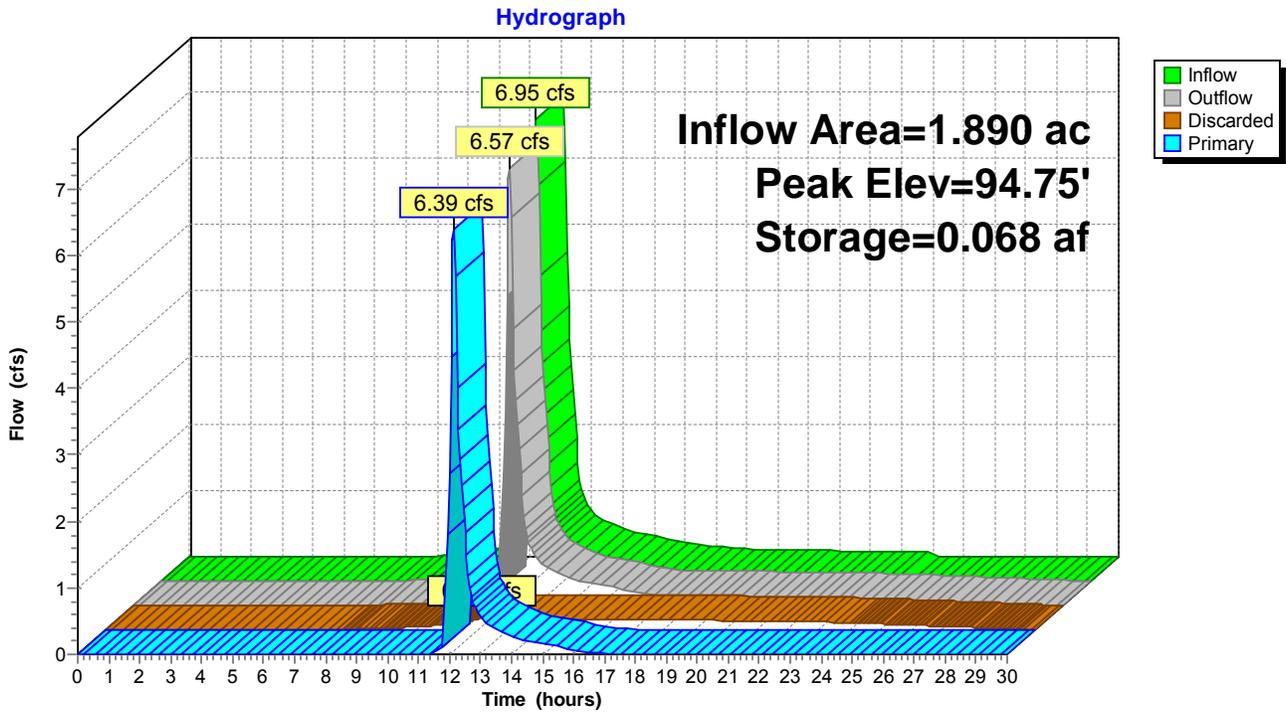
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	0.087 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	0.005	0.000	0.000
94.00	0.043	0.024	0.024
95.00	0.084	0.063	0.087

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	18.0" Round Culvert L= 100.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0100 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.18 cfs @ 12.13 hrs HW=94.74' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=6.34 cfs @ 12.13 hrs HW=94.74' (Free Discharge)
 ↑**1=Culvert** (Passes 6.34 cfs of 6.40 cfs potential flow)
 ↑**2=Grate** (Weir Controls 6.34 cfs @ 1.62 fps)

Pond 9P: RAIN GARDEN #2



Summary for Pond 10P: RAIN GARDEN #3

Inflow Area = 0.539 ac, 69.76% Impervious, Inflow Depth = 4.00" for 50-YR event
 Inflow = 2.45 cfs @ 12.09 hrs, Volume= 0.180 af
 Outflow = 2.38 cfs @ 12.10 hrs, Volume= 0.180 af, Atten= 3%, Lag= 0.7 min
 Discarded = 0.04 cfs @ 12.10 hrs, Volume= 0.057 af
 Primary = 2.33 cfs @ 12.10 hrs, Volume= 0.123 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 94.70' @ 12.10 hrs Surf.Area= 0.018 ac Storage= 0.014 af

Plug-Flow detention time= 52.8 min calculated for 0.179 af (100% of inflow)
 Center-of-Mass det. time= 53.1 min (860.0 - 806.9)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.020 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.005	0.000	0.000
94.00	0.010	0.004	0.004
95.00	0.022	0.016	0.020

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	12.0" Round Culvert L= 120.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0083 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.10 hrs HW=94.70' (Free Discharge)

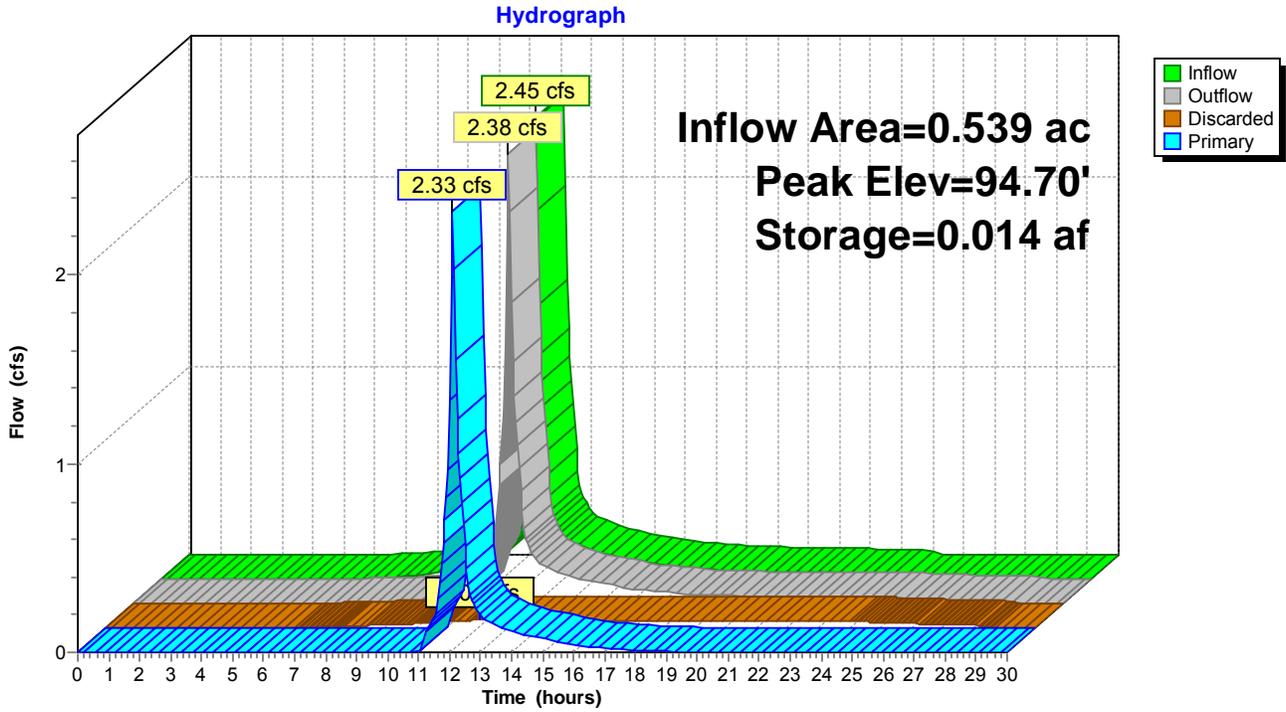
↑**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=2.32 cfs @ 12.10 hrs HW=94.70' (Free Discharge)

↑**1=Culvert** (Passes 2.32 cfs of 3.33 cfs potential flow)

↑**2=Grate** (Weir Controls 2.32 cfs @ 1.46 fps)

Pond 10P: RAIN GARDEN #3



Summary for Pond 11P: INF BASIN #1

Inflow Area = 3.071 ac, 55.16% Impervious, Inflow Depth = 1.92" for 50-YR event
 Inflow = 10.01 cfs @ 12.14 hrs, Volume= 0.492 af
 Outflow = 8.46 cfs @ 12.21 hrs, Volume= 0.489 af, Atten= 16%, Lag= 4.5 min
 Discarded = 0.13 cfs @ 12.22 hrs, Volume= 0.040 af
 Primary = 8.33 cfs @ 12.21 hrs, Volume= 0.449 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 95.73' @ 12.22 hrs Surf.Area= 0.053 ac Storage= 0.103 af

Plug-Flow detention time= 22.8 min calculated for 0.489 af (99% of inflow)
 Center-of-Mass det. time= 19.2 min (792.0 - 772.8)

Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	0.119 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
92.00	0.008	0.000	0.000
93.00	0.017	0.012	0.012
94.00	0.028	0.022	0.035
95.00	0.041	0.035	0.069
96.00	0.057	0.049	0.119

Device	Routing	Invert	Outlet Devices
#1	Primary	91.80'	18.0" Round Culvert L= 161.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.80' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	95.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.50'	8.0" Vert. Orifice C= 0.600
#4	Discarded	92.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.13 cfs @ 12.22 hrs HW=95.70' (Free Discharge)

↑ **4=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=7.71 cfs @ 12.21 hrs HW=95.71' (Free Discharge)

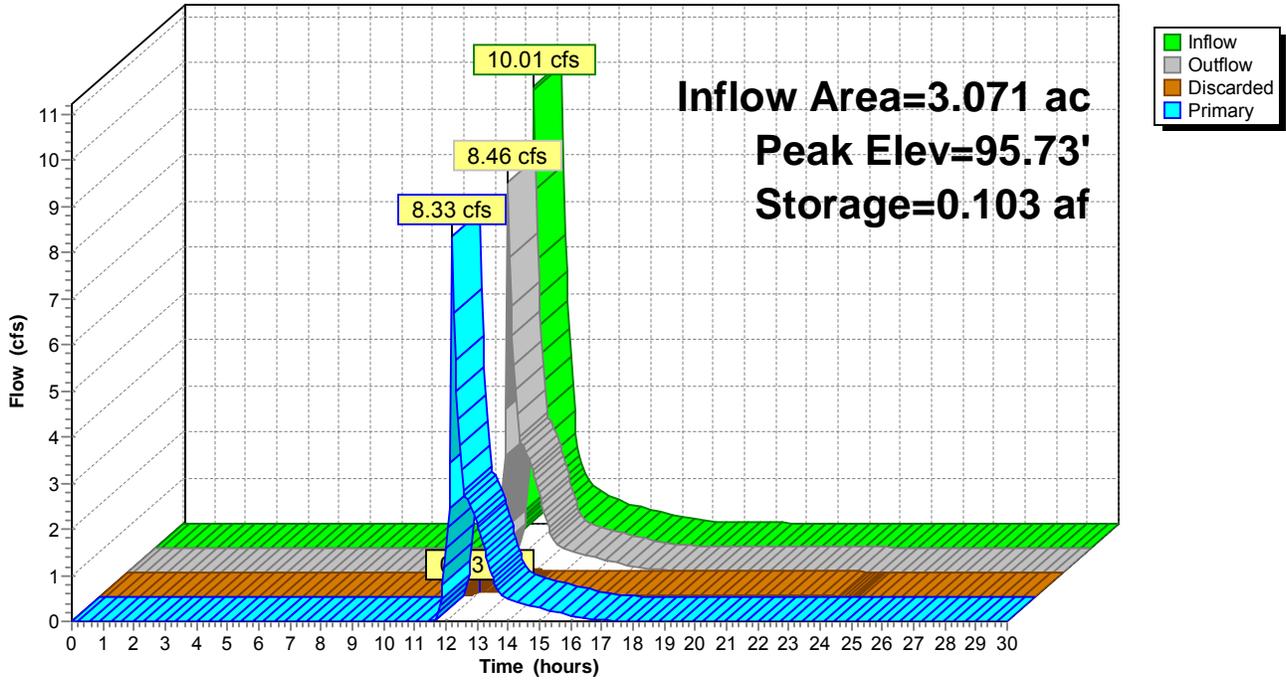
↑ **1=Culvert** (Passes 7.71 cfs of 12.04 cfs potential flow)

↑ **2=Grate** (Weir Controls 4.86 cfs @ 1.48 fps)

↑ **3=Orifice** (Orifice Controls 2.85 cfs @ 8.16 fps)

Pond 11P: INF BASIN #1

Hydrograph



Summary for Pond 12P: INF BASIN #2

Inflow Area = 5.990 ac, 41.22% Impervious, Inflow Depth = 1.95" for 50-YR event
 Inflow = 11.87 cfs @ 12.21 hrs, Volume= 0.972 af
 Outflow = 7.98 cfs @ 12.38 hrs, Volume= 0.972 af, Atten= 33%, Lag= 10.2 min
 Discarded = 0.31 cfs @ 12.38 hrs, Volume= 0.211 af
 Primary = 7.67 cfs @ 12.38 hrs, Volume= 0.761 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.24' @ 12.38 hrs Surf.Area= 0.126 ac Storage= 0.227 af

Plug-Flow detention time= 57.8 min calculated for 0.971 af (100% of inflow)
 Center-of-Mass det. time= 58.0 min (870.1 - 812.1)

Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	0.339 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
91.00	0.035	0.000	0.000
92.00	0.052	0.043	0.043
93.00	0.072	0.062	0.105
94.00	0.113	0.093	0.198
95.00	0.168	0.141	0.339

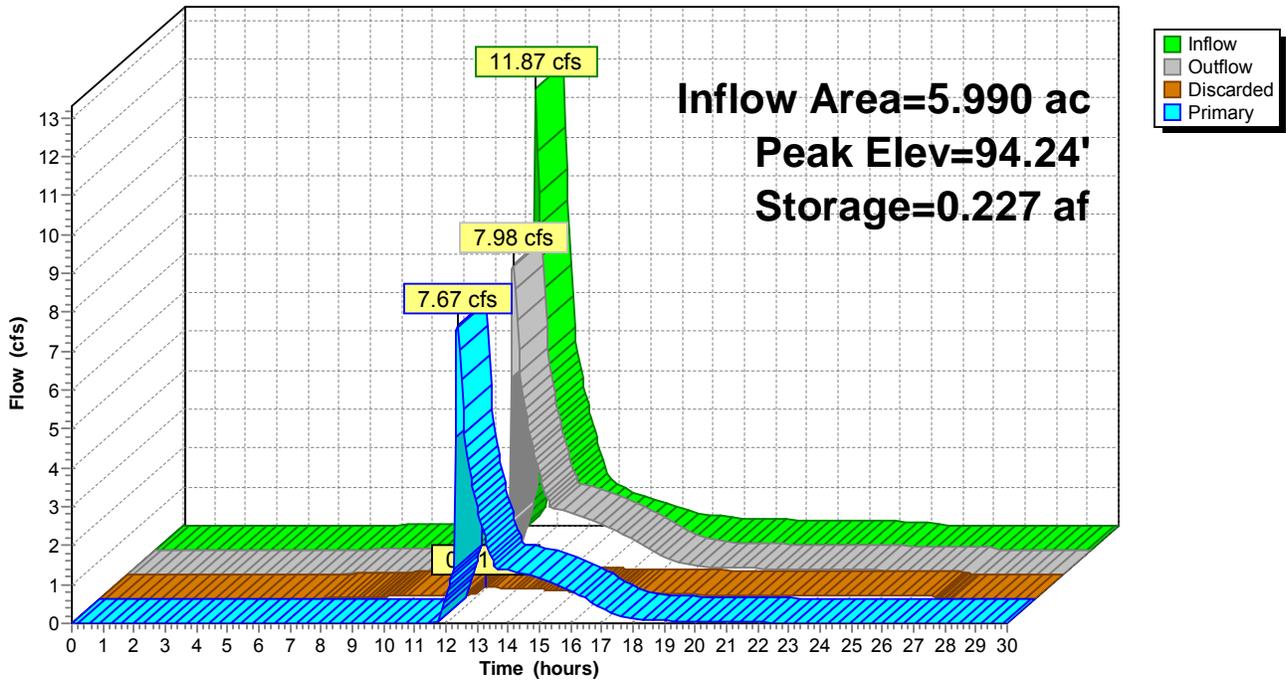
Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	18.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.00' / 90.10' S= 0.0300 ' ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.00'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	91.50'	6.0" Vert. Orifice C= 0.600
#4	Primary	94.50'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	91.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.31 cfs @ 12.38 hrs HW=94.24' (Free Discharge)
 ↑5=Exfiltration (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=7.59 cfs @ 12.38 hrs HW=94.24' (Free Discharge)
 ↑1=Culvert (Passes 7.59 cfs of 13.42 cfs potential flow)
 ↑2=Grate (Weir Controls 6.10 cfs @ 1.60 fps)
 ↑3=Orifice (Orifice Controls 1.49 cfs @ 7.60 fps)
 ↑4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 12P: INF BASIN #2

Hydrograph



Summary for Pond 14P: INF SYS #2

Inflow Area = 0.361 ac, 100.00% Impervious, Inflow Depth = 5.66" for 50-YR event
 Inflow = 2.04 cfs @ 12.09 hrs, Volume= 0.170 af
 Outflow = 1.22 cfs @ 12.16 hrs, Volume= 0.155 af, Atten= 40%, Lag= 4.5 min
 Discarded = 0.05 cfs @ 8.20 hrs, Volume= 0.110 af
 Primary = 1.17 cfs @ 12.16 hrs, Volume= 0.045 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 93.52' @ 12.17 hrs Surf.Area= 0.022 ac Storage= 0.057 af

Plug-Flow detention time= 263.3 min calculated for 0.155 af (91% of inflow)
 Center-of-Mass det. time= 217.9 min (963.3 - 745.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.79'	0.028 af	20.83'W x 45.50'L x 4.54'H Field A 0.099 af Overall - 0.030 af Embedded = 0.069 af x 40.0% Voids
#2A	89.79'	0.030 af	Cultec R-330XL x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.057 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	92.83'	12.0" Round Culvert L= 41.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 92.83' / 92.62' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	88.79'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 8.20 hrs HW=88.84' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.03 cfs @ 12.16 hrs HW=93.43' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 1.03 cfs @ 2.98 fps)

Pond 14P: INF SYS #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

4,305.1 cf Field - 1,296.5 cf Chambers = 3,008.6 cf Stone x 40.0% Voids = 1,203.5 cf Stone Storage

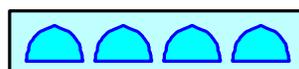
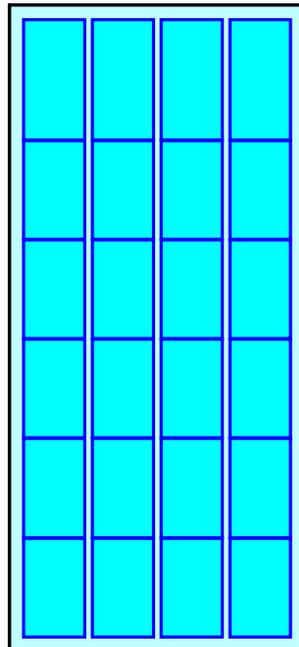
Chamber Storage + Stone Storage = 2,499.9 cf = 0.057 af

Overall Storage Efficiency = 58.1%

24 Chambers

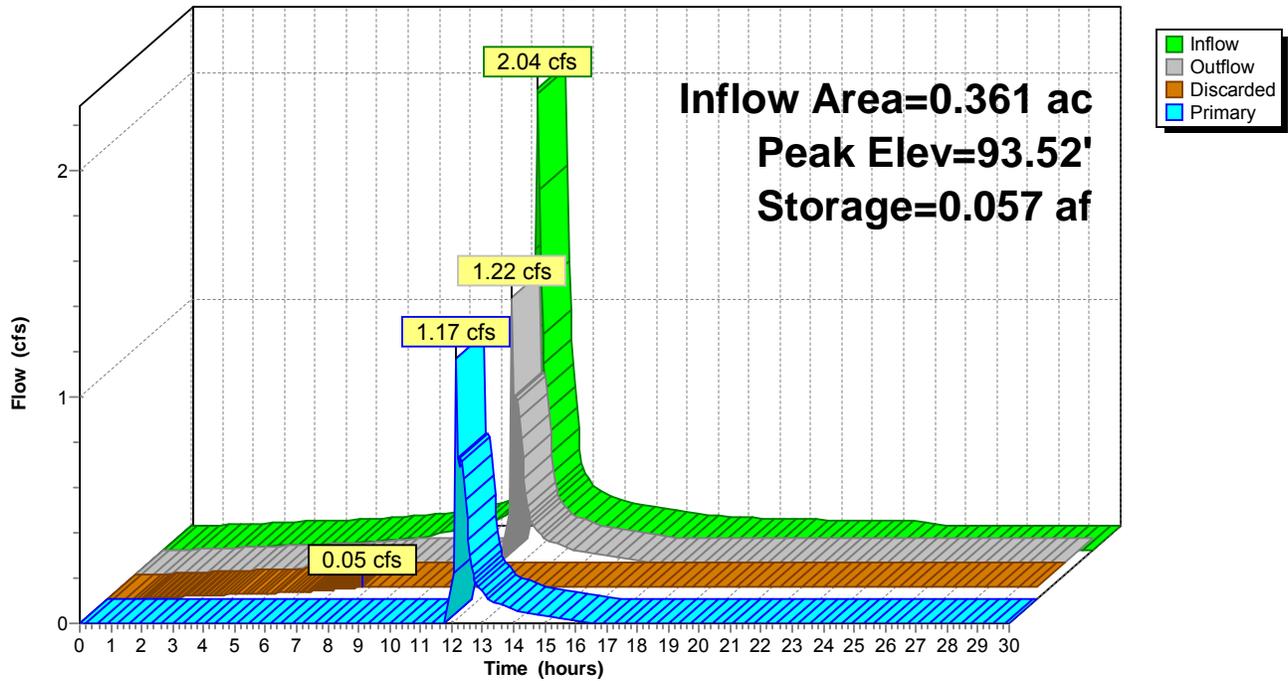
159.4 cy Field

111.4 cy Stone



Pond 14P: INF SYS #2

Hydrograph



Summary for Pond 23P: INF SYS #1

Inflow Area = 0.503 ac, 96.62% Impervious, Inflow Depth = 5.49" for 50-YR event
 Inflow = 2.77 cfs @ 12.09 hrs, Volume= 0.230 af
 Outflow = 0.20 cfs @ 13.24 hrs, Volume= 0.224 af, Atten= 93%, Lag= 69.2 min
 Discarded = 0.11 cfs @ 9.45 hrs, Volume= 0.214 af
 Primary = 0.10 cfs @ 13.24 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 92.25' @ 13.24 hrs Surf.Area= 0.045 ac Storage= 0.107 af

Plug-Flow detention time= 337.3 min calculated for 0.224 af (98% of inflow)
 Center-of-Mass det. time= 321.7 min (1,070.3 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.36'	0.057 af	16.00'W x 122.50'L x 4.54'H Field A 0.204 af Overall - 0.062 af Embedded = 0.143 af x 40.0% Voids
#2A	89.36'	0.062 af	Cultec R-330XL x 51 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.36'	2.410 in/hr Exfiltration over Surface area
#2	Primary	92.10'	12.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.10' / 90.60' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.11 cfs @ 9.45 hrs HW=88.41' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.09 cfs @ 13.24 hrs HW=92.25' (Free Discharge)
 ↑**2=Culvert** (Inlet Controls 0.09 cfs @ 1.31 fps)

Pond 23P: INF SYS #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

51 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 2,693.5 cf Chamber Storage

8,901.7 cf Field - 2,693.5 cf Chambers = 6,208.1 cf Stone x 40.0% Voids = 2,483.3 cf Stone Storage

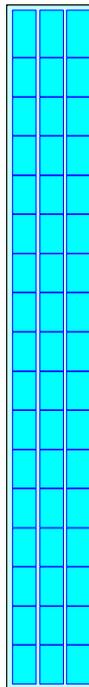
Chamber Storage + Stone Storage = 5,176.8 cf = 0.119 af

Overall Storage Efficiency = 58.2%

51 Chambers

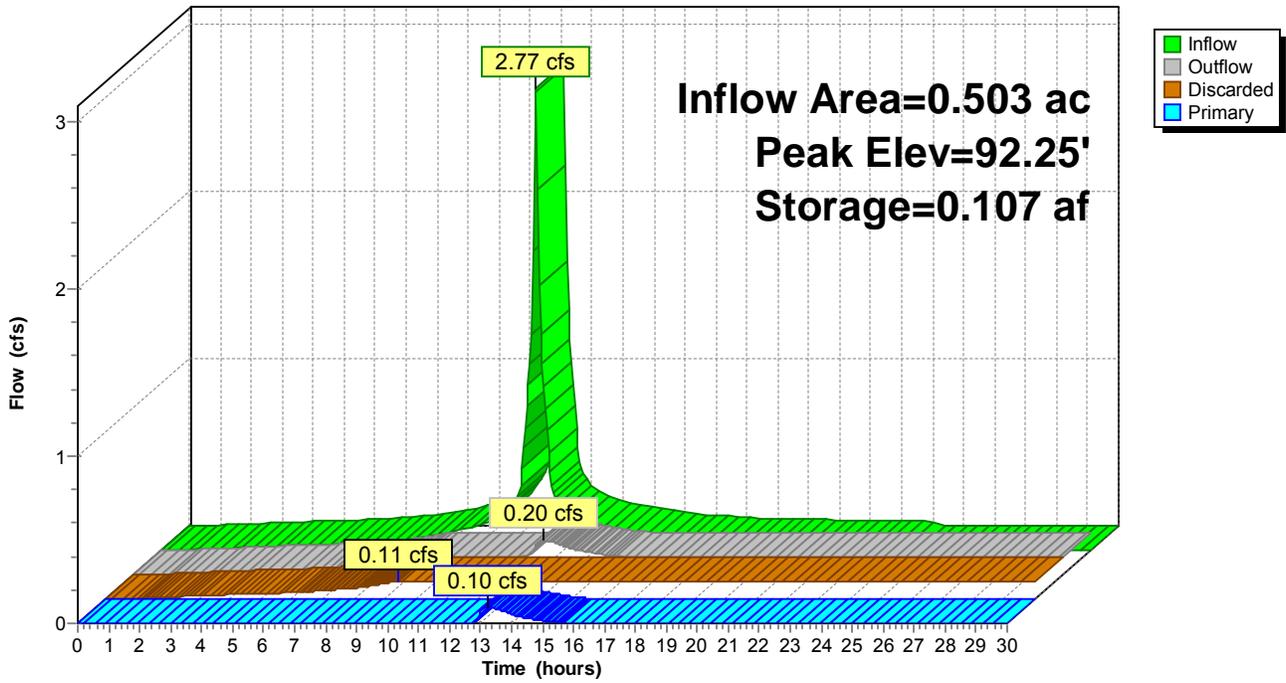
329.7 cy Field

229.9 cy Stone



Pond 23P: INF SYS #1

Hydrograph



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
 Runoff by SCS TR-20 method, UH=SCS
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Area P01	Runoff Area=6.682 ac 0.19% Impervious Runoff Depth=0.45" Flow Length=452' Tc=19.4 min CN=37 Runoff=0.95 cfs 0.249 af
Subcatchment 2S: Area P03	Runoff Area=0.539 ac 69.76% Impervious Runoff Depth=4.46" Tc=6.0 min CN=83 Runoff=2.72 cfs 0.201 af
Subcatchment 3S: Area P05	Runoff Area=1.439 ac 46.77% Impervious Runoff Depth=3.93" Tc=6.0 min CN=78 Runoff=6.48 cfs 0.472 af
Subcatchment 4S: Area P06	Runoff Area=0.451 ac 47.67% Impervious Runoff Depth=3.32" Tc=6.0 min CN=72 Runoff=1.72 cfs 0.125 af
Subcatchment 13S: AREA P09A	Runoff Area=0.470 ac 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=2.88 cfs 0.241 af
Subcatchment 15S: Area P08	Runoff Area=0.546 ac 66.48% Impervious Runoff Depth=4.36" Tc=6.0 min CN=82 Runoff=2.70 cfs 0.198 af
Subcatchment 16S: Area P07	Runoff Area=0.514 ac 73.54% Impervious Runoff Depth=4.68" Tc=6.0 min CN=85 Runoff=2.70 cfs 0.201 af
Subcatchment 17S: Area P04	Runoff Area=0.281 ac 24.56% Impervious Runoff Depth=2.28" Flow Length=73' Tc=6.7 min CN=61 Runoff=0.70 cfs 0.053 af
Subcatchment 18S: Area P02	Runoff Area=2.211 ac 11.31% Impervious Runoff Depth=1.75" Flow Length=240' Tc=21.7 min CN=55 Runoff=2.67 cfs 0.323 af
Subcatchment 19S: Area P10	Runoff Area=0.632 ac 0.95% Impervious Runoff Depth=1.11" Flow Length=144' Tc=7.2 min CN=47 Runoff=0.57 cfs 0.059 af
Subcatchment 20S: AREA P09D	Runoff Area=0.162 ac 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=0.99 cfs 0.083 af
Subcatchment 21S: AREA P09C	Runoff Area=0.084 ac 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=0.51 cfs 0.043 af
Subcatchment 22S: AREA P09B	Runoff Area=0.277 ac 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=1.70 cfs 0.142 af
Subcatchment 24S: Area P10A	Runoff Area=0.033 ac 48.48% Impervious Runoff Depth=3.42" Tc=6.0 min CN=73 Runoff=0.13 cfs 0.009 af
Pond 1: DP#1	Inflow=12.16 cfs 1.372 af Primary=12.16 cfs 1.372 af
Pond 2: DP#2	Inflow=0.57 cfs 0.084 af Primary=0.57 cfs 0.084 af

Pond 8P: RAIN GARDEN #1 Peak Elev=94.78' Storage=0.020 af Inflow=1.72 cfs 0.125 af
Discarded=0.06 cfs 0.060 af Primary=1.52 cfs 0.065 af Outflow=1.58 cfs 0.125 af

Pond 9P: RAIN GARDEN #2 Peak Elev=94.81' Storage=0.072 af Inflow=7.92 cfs 0.537 af
Discarded=0.18 cfs 0.201 af Primary=6.87 cfs 0.336 af Outflow=7.05 cfs 0.537 af

Pond 10P: RAIN GARDEN #3 Peak Elev=94.71' Storage=0.014 af Inflow=2.72 cfs 0.201 af
Discarded=0.05 cfs 0.059 af Primary=2.60 cfs 0.142 af Outflow=2.65 cfs 0.200 af

Pond 11P: INF BASIN #1 Peak Elev=95.75' Storage=0.105 af Inflow=10.88 cfs 0.580 af
Discarded=0.13 cfs 0.043 af Primary=10.36 cfs 0.538 af Outflow=10.49 cfs 0.581 af

Pond 12P: INF BASIN #2 Peak Elev=94.31' Storage=0.236 af Inflow=14.72 cfs 1.142 af
Discarded=0.32 cfs 0.220 af Primary=10.64 cfs 0.922 af Outflow=10.95 cfs 1.142 af

Pond 14P: INF SYS #2 Peak Elev=93.33' Storage=0.057 af Inflow=2.21 cfs 0.185 af
Discarded=0.05 cfs 0.111 af Primary=0.72 cfs 0.050 af Outflow=0.78 cfs 0.161 af

Pond 23P: INF SYS #1 Peak Elev=92.38' Storage=0.109 af Inflow=3.01 cfs 0.251 af
Discarded=0.11 cfs 0.217 af Primary=0.33 cfs 0.025 af Outflow=0.44 cfs 0.242 af

Total Runoff Area = 14.321 ac Runoff Volume = 2.400 af Average Runoff Depth = 2.01"
76.59% Pervious = 10.969 ac 23.41% Impervious = 3.352 ac

Summary for Subcatchment 1S: Area P01

Runoff = 0.95 cfs @ 12.56 hrs, Volume= 0.249 af, Depth= 0.45"

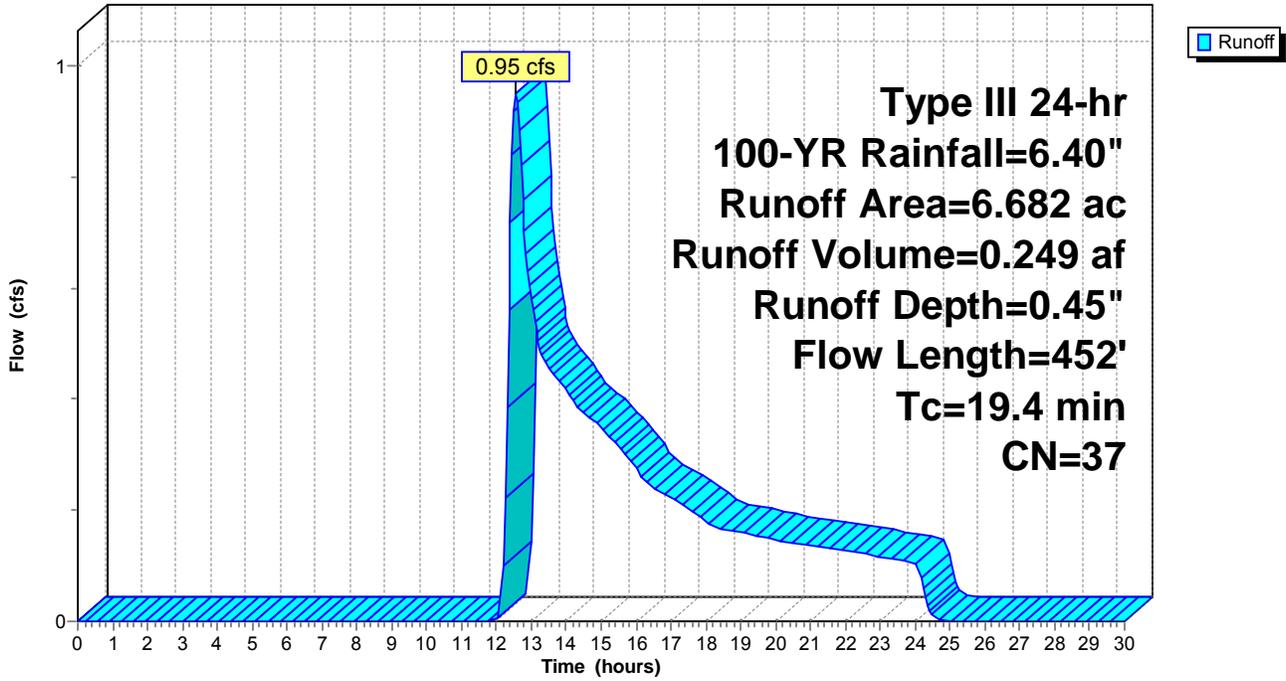
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.013	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
6.032	36	Woods, Fair, HSG A
0.637	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
6.682	37	Weighted Average
6.669		99.81% Pervious Area
0.013		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0060	0.10		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
1.2	77	0.0220	1.04		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
1.8	275	0.2600	2.55		Shallow Concentrated Flow, C-D
					Woodland Kv= 5.0 fps
19.4	452	Total			

Subcatchment 1S: Area P01

Hydrograph



Summary for Subcatchment 2S: Area P03

Runoff = 2.72 cfs @ 12.09 hrs, Volume= 0.201 af, Depth= 4.46"

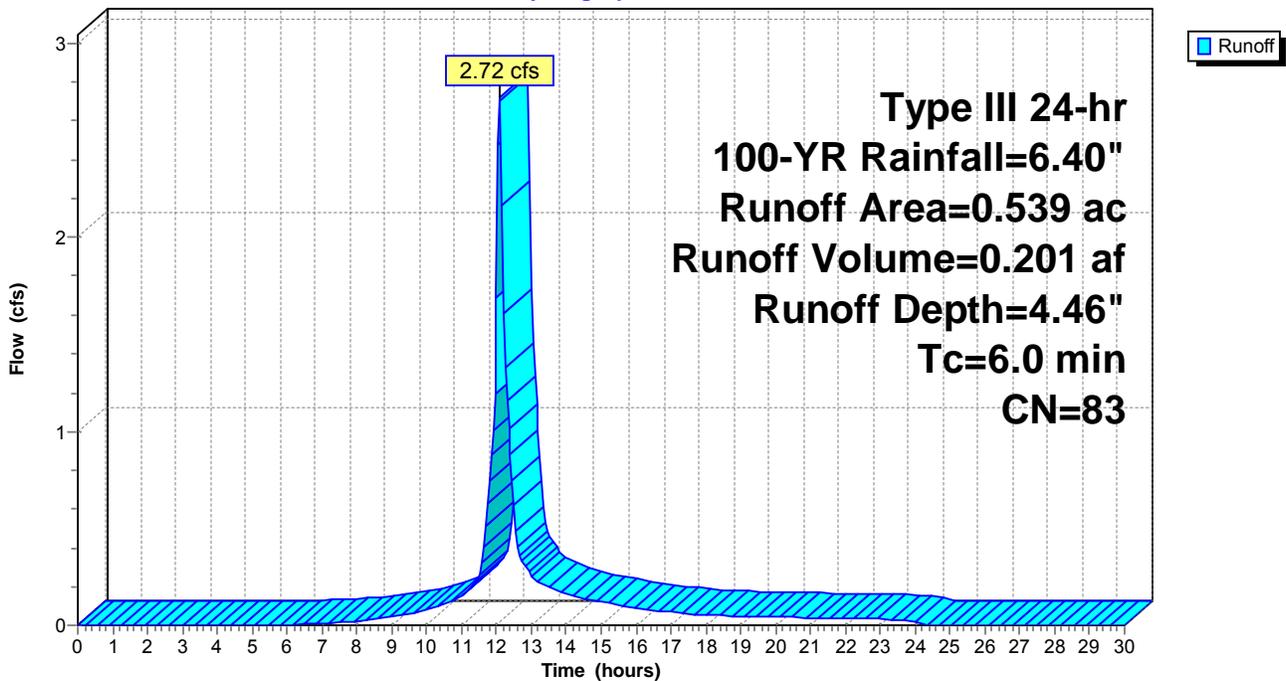
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.376	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.163	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.539	83	Weighted Average
0.163		30.24% Pervious Area
0.376		69.76% Impervious Area

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

Subcatchment 2S: Area P03

Hydrograph



Summary for Subcatchment 3S: Area P05

Runoff = 6.48 cfs @ 12.09 hrs, Volume= 0.472 af, Depth= 3.93"

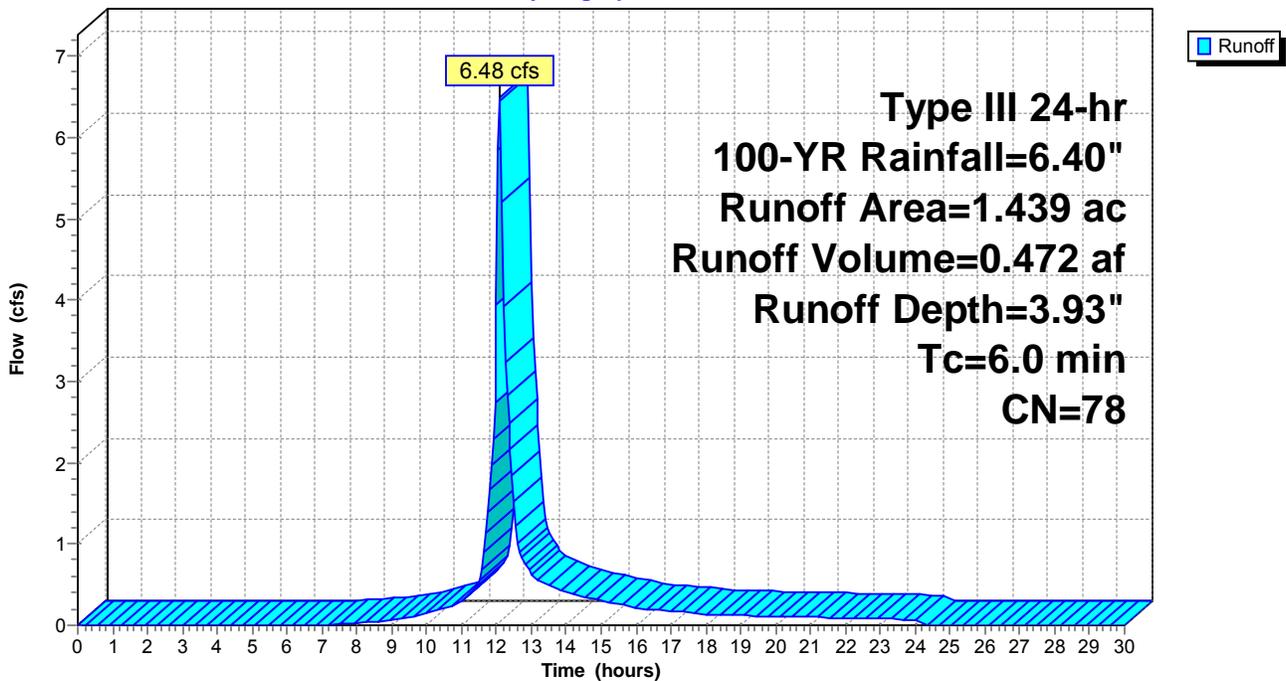
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.673	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.386	49	50-75% Grass cover, Fair, HSG A
* 0.380	72	Dirt, HSG A (Playscape)
1.439	78	Weighted Average
0.766		53.23% Pervious Area
0.673		46.77% Impervious Area

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

Subcatchment 3S: Area P05

Hydrograph



Summary for Subcatchment 4S: Area P06

Runoff = 1.72 cfs @ 12.09 hrs, Volume= 0.125 af, Depth= 3.32"

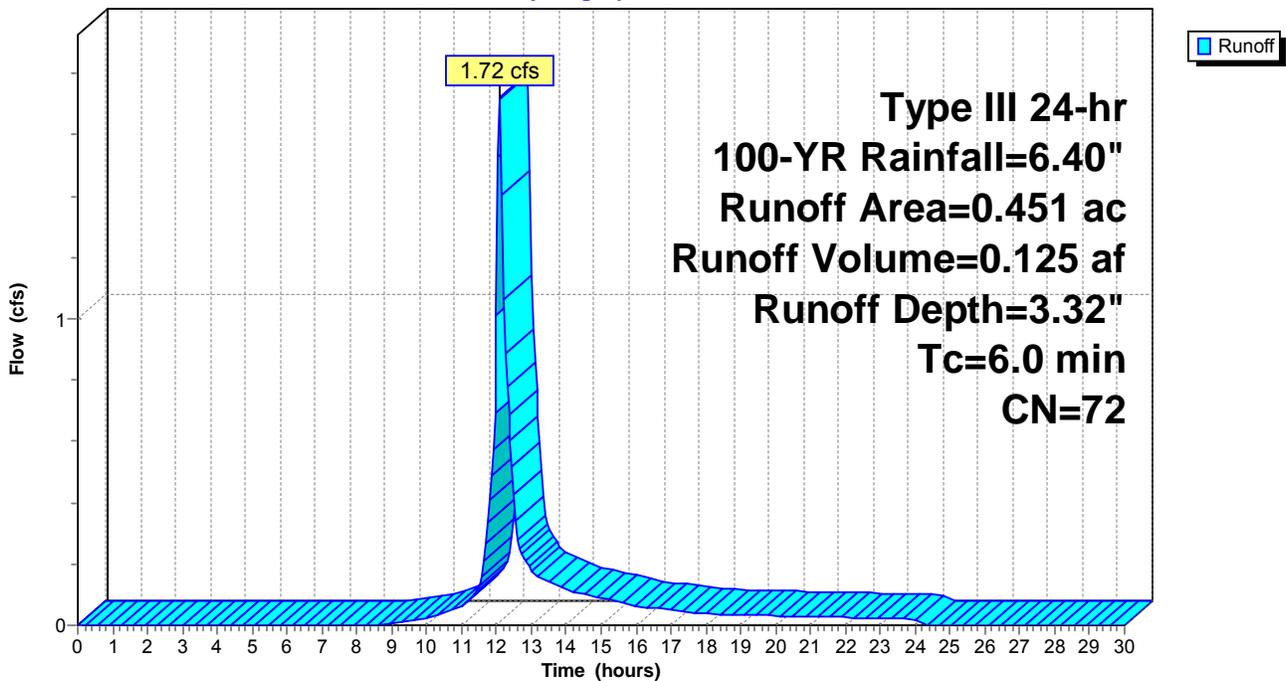
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.215	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.236	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.451	72	Weighted Average
0.236		52.33% Pervious Area
0.215		47.67% Impervious Area

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

Subcatchment 4S: Area P06

Hydrograph



Summary for Subcatchment 13S: AREA P09A

Runoff = 2.88 cfs @ 12.09 hrs, Volume= 0.241 af, Depth= 6.16"

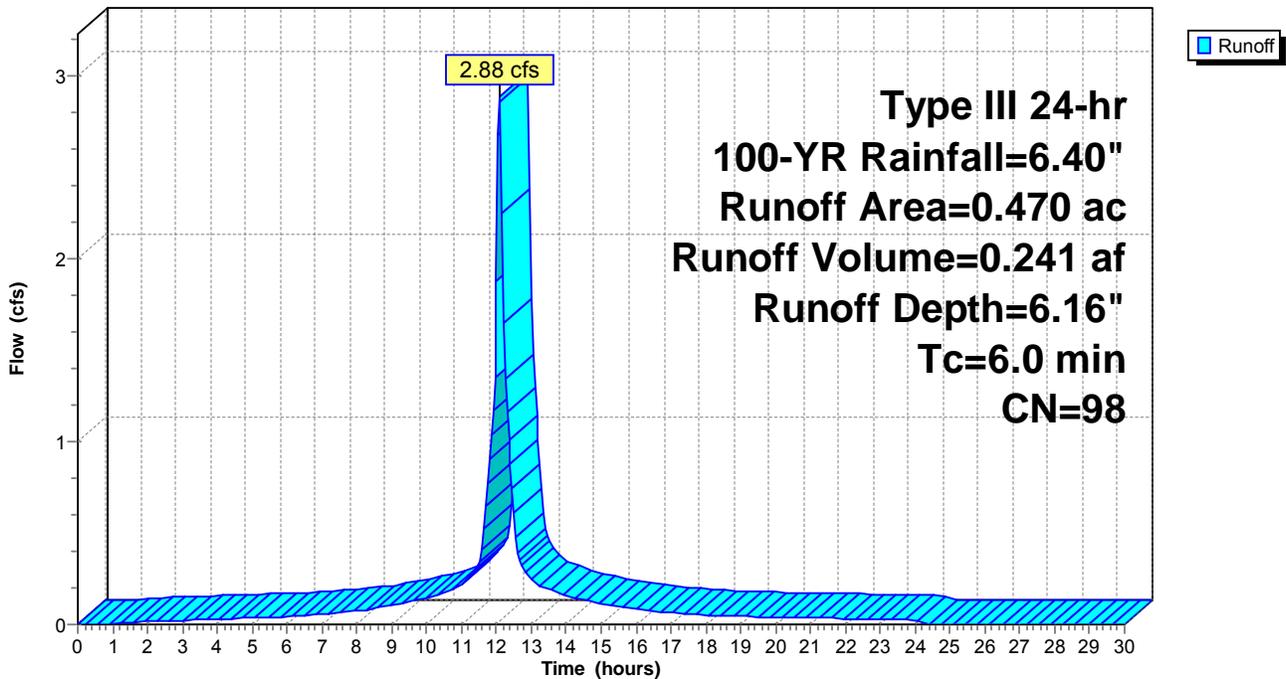
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.470	98	Roofs, HSG A
0.470		100.00% Impervious Area

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

Subcatchment 13S: AREA P09A

Hydrograph



Summary for Subcatchment 15S: Area P08

Runoff = 2.70 cfs @ 12.09 hrs, Volume= 0.198 af, Depth= 4.36"

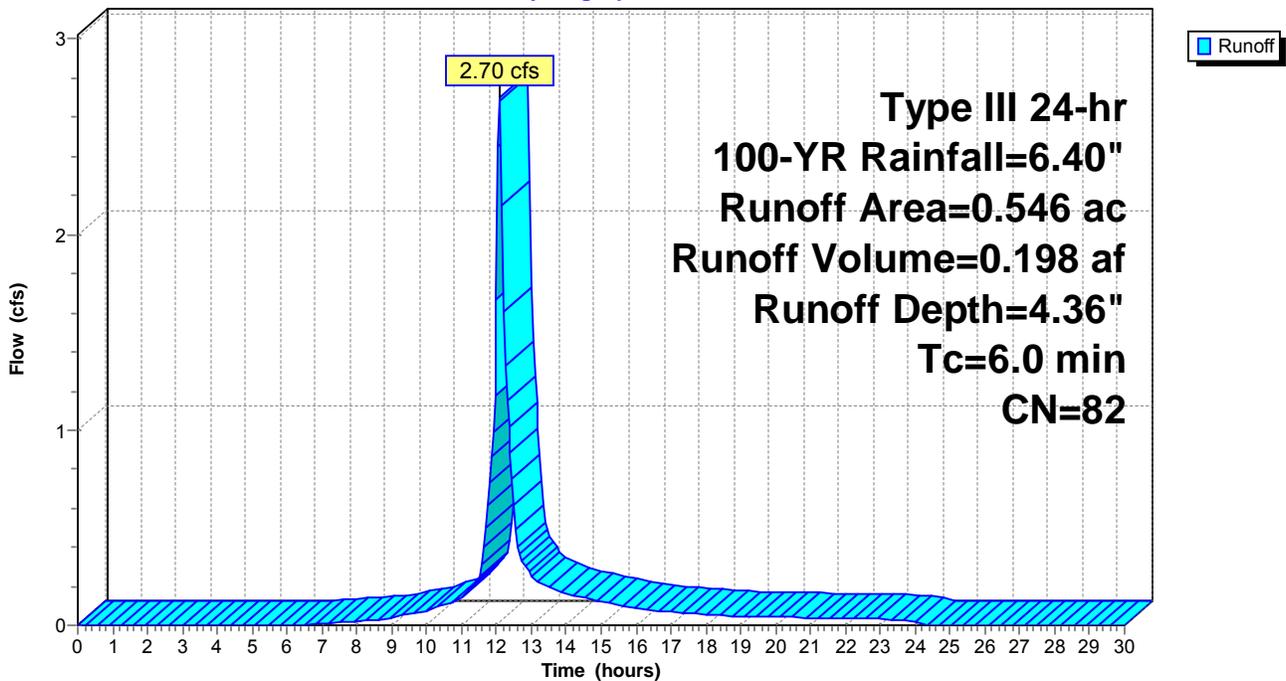
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.363	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.183	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.546	82	Weighted Average
0.183		33.52% Pervious Area
0.363		66.48% Impervious Area

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

Subcatchment 15S: Area P08

Hydrograph



Summary for Subcatchment 16S: Area P07

Runoff = 2.70 cfs @ 12.09 hrs, Volume= 0.201 af, Depth= 4.68"

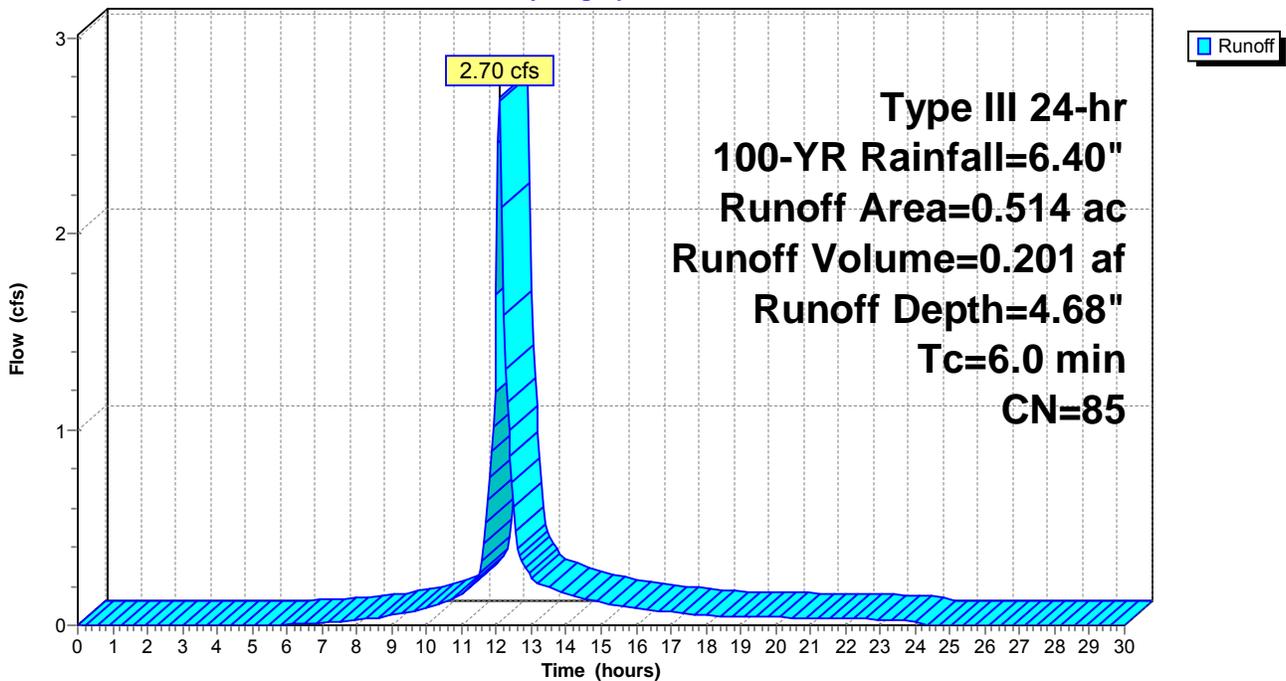
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.378	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.136	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.514	85	Weighted Average
0.136		26.46% Pervious Area
0.378		73.54% Impervious Area

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

Subcatchment 16S: Area P07

Hydrograph



Summary for Subcatchment 17S: Area P04

Runoff = 0.70 cfs @ 12.11 hrs, Volume= 0.053 af, Depth= 2.28"

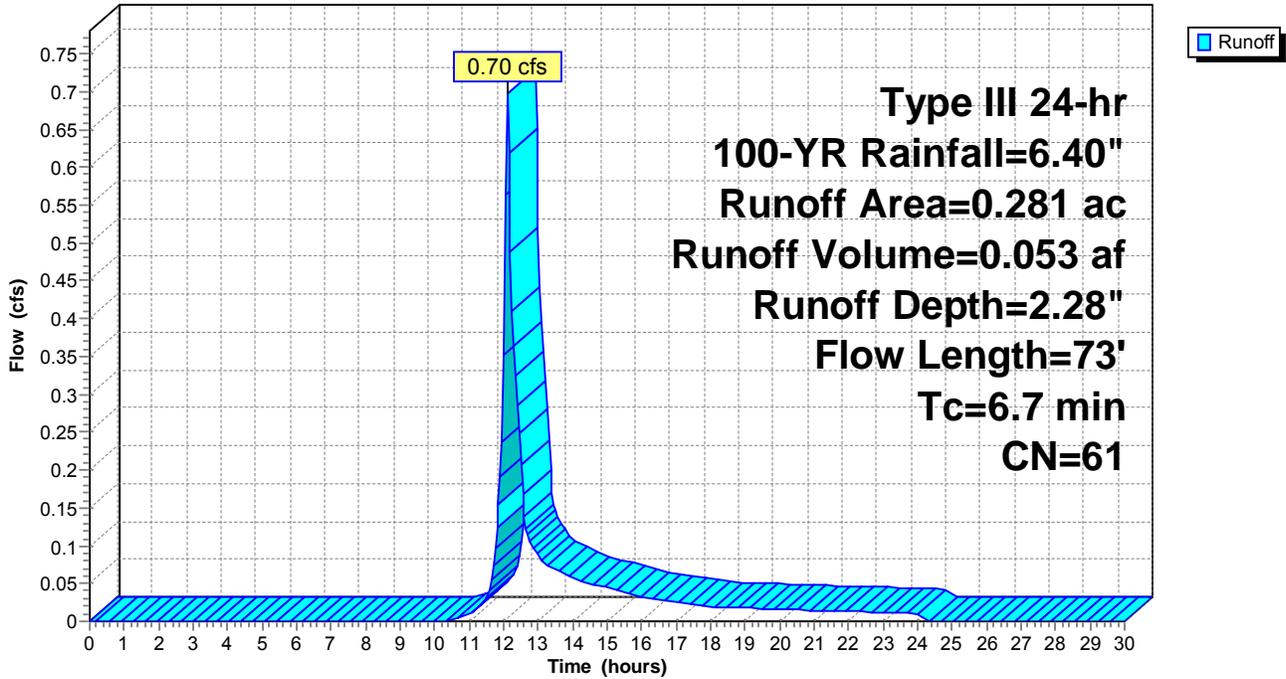
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.069	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.212	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.281	61	Weighted Average
0.212		75.44% Pervious Area
0.069		24.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	57	0.0200	0.15		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.00"
0.0	5	0.0100	2.03		Shallow Concentrated Flow, B-C Paved Kv= 20.3 fps
0.2	11	0.0300	1.21		Shallow Concentrated Flow, C-D Short Grass Pasture Kv= 7.0 fps
6.7	73	Total			

Subcatchment 17S: Area P04

Hydrograph



Summary for Subcatchment 18S: Area P02

Runoff = 2.67 cfs @ 12.34 hrs, Volume= 0.323 af, Depth= 1.75"

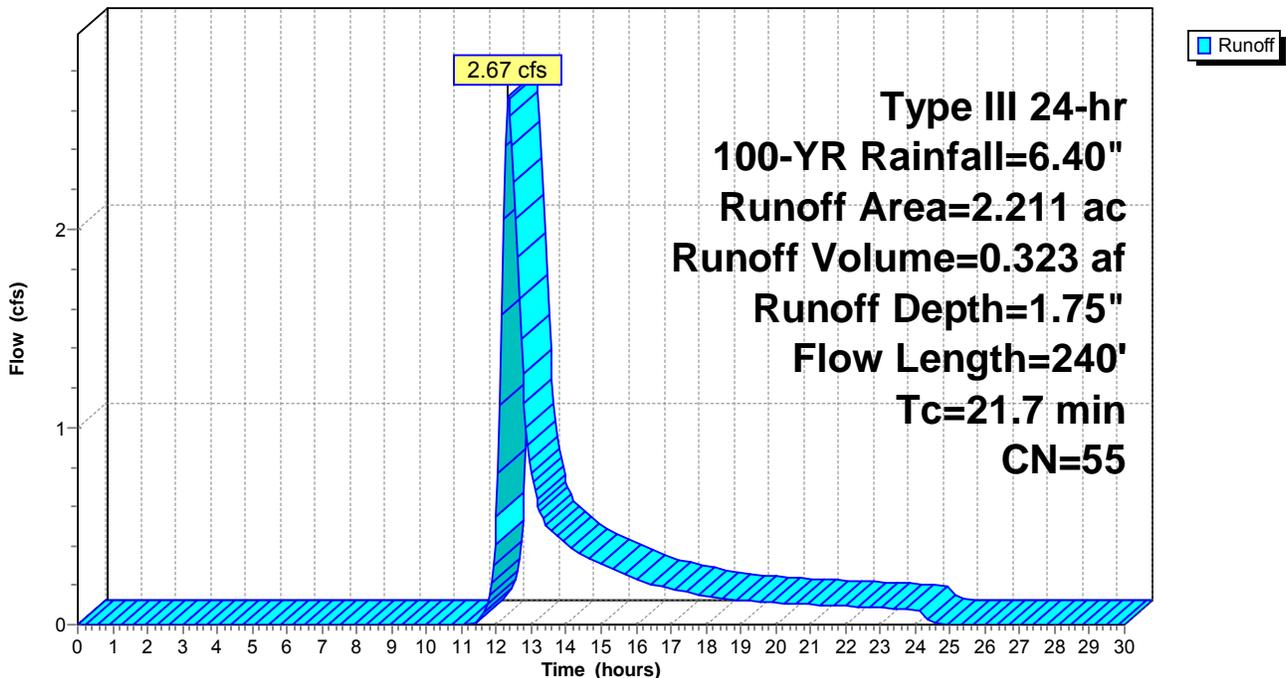
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.250	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
1.961	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
2.211	55	Weighted Average
1.961		88.69% Pervious Area
0.250		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	100	0.0040	0.09		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.4	140	0.0200	0.99		Shallow Concentrated Flow, B-C
					Short Grass Pasture Kv= 7.0 fps
21.7	240	Total			

Subcatchment 18S: Area P02

Hydrograph



Summary for Subcatchment 19S: Area P10

Runoff = 0.57 cfs @ 12.14 hrs, Volume= 0.059 af, Depth= 1.11"

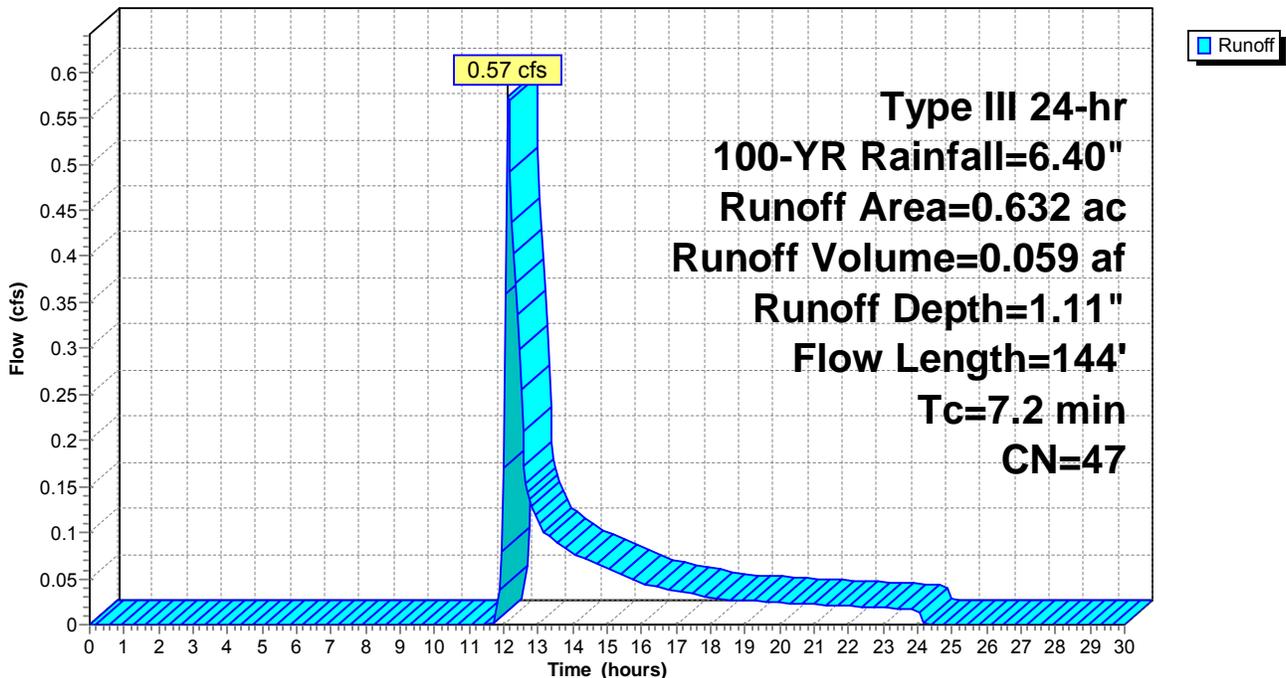
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.111	36	Woods, Fair, HSG A
0.515	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.632	47	Weighted Average
0.626		99.05% Pervious Area
0.006		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	46	0.0350	0.18		Sheet Flow, A-B
					Grass: Short n= 0.150 P2= 3.00"
2.9	98	0.0130	0.57		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
7.2	144	Total			

Subcatchment 19S: Area P10

Hydrograph



Summary for Subcatchment 20S: AREA P09D

Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.083 af, Depth= 6.16"

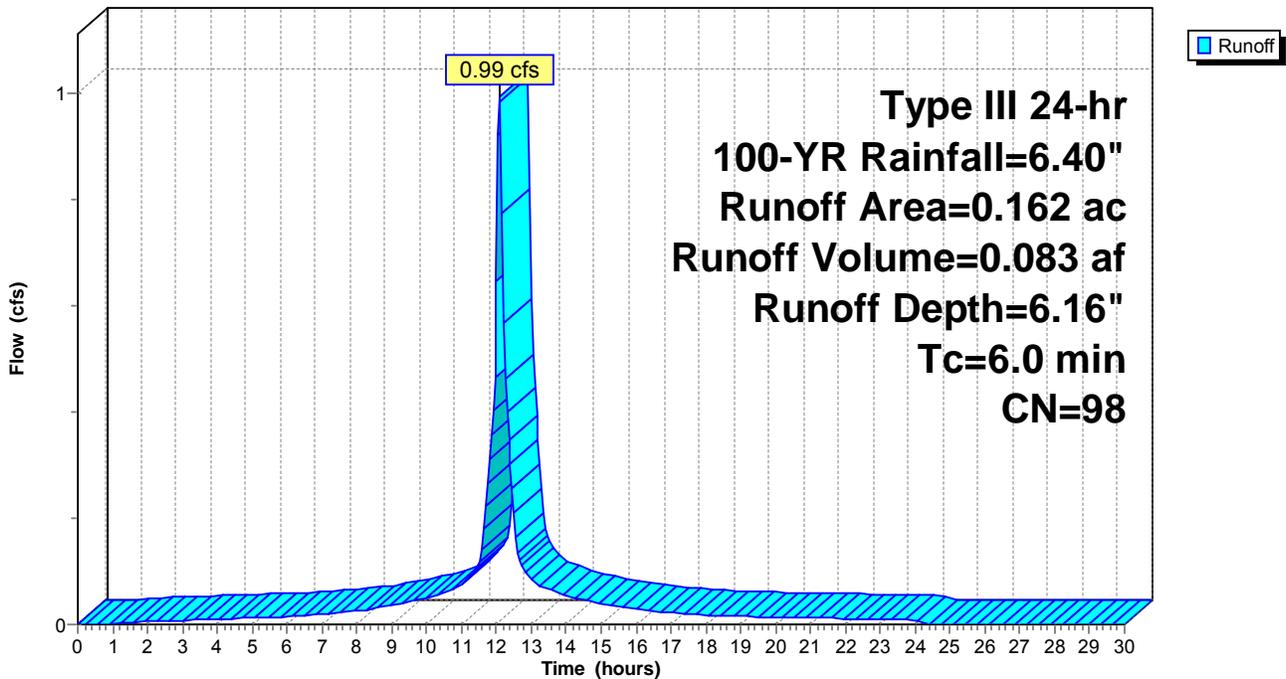
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.162	98	Roofs, HSG A
0.162		100.00% Impervious Area

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

Subcatchment 20S: AREA P09D

Hydrograph



Summary for Subcatchment 21S: AREA P09C

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.043 af, Depth= 6.16"

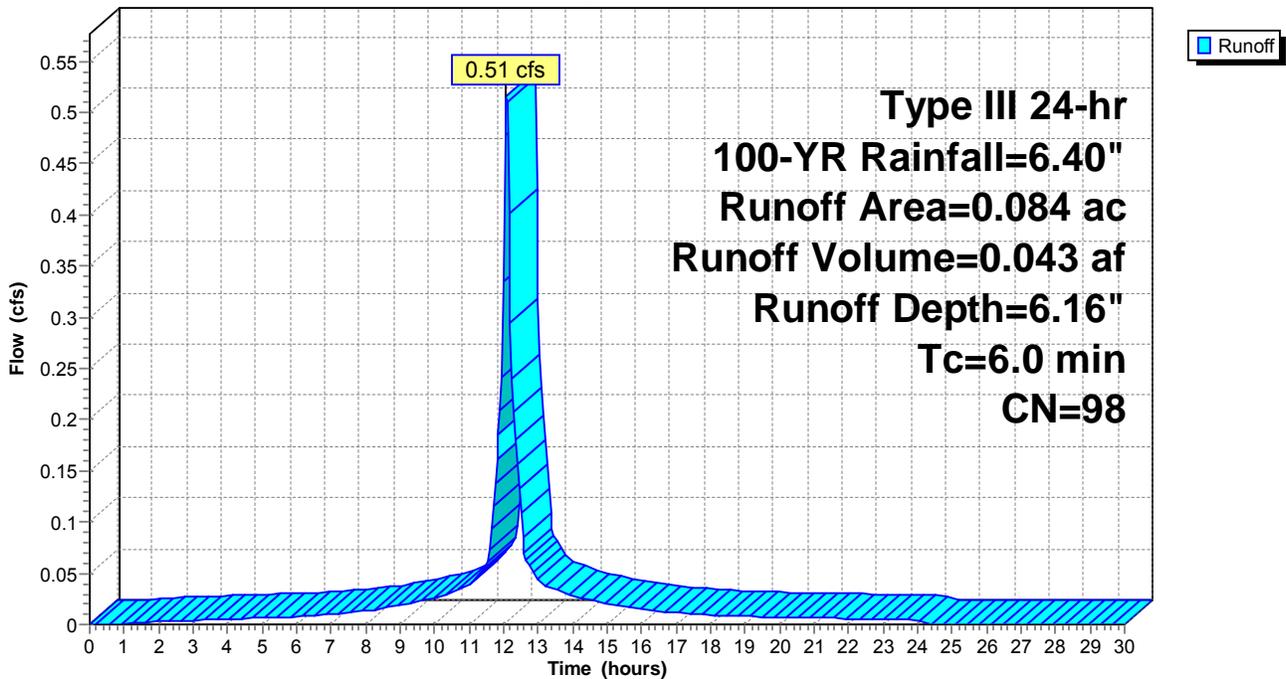
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.084	98	Roofs, HSG A
0.084		100.00% Impervious Area

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

Subcatchment 21S: AREA P09C

Hydrograph



Summary for Subcatchment 22S: AREA P09B

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 0.142 af, Depth= 6.16"

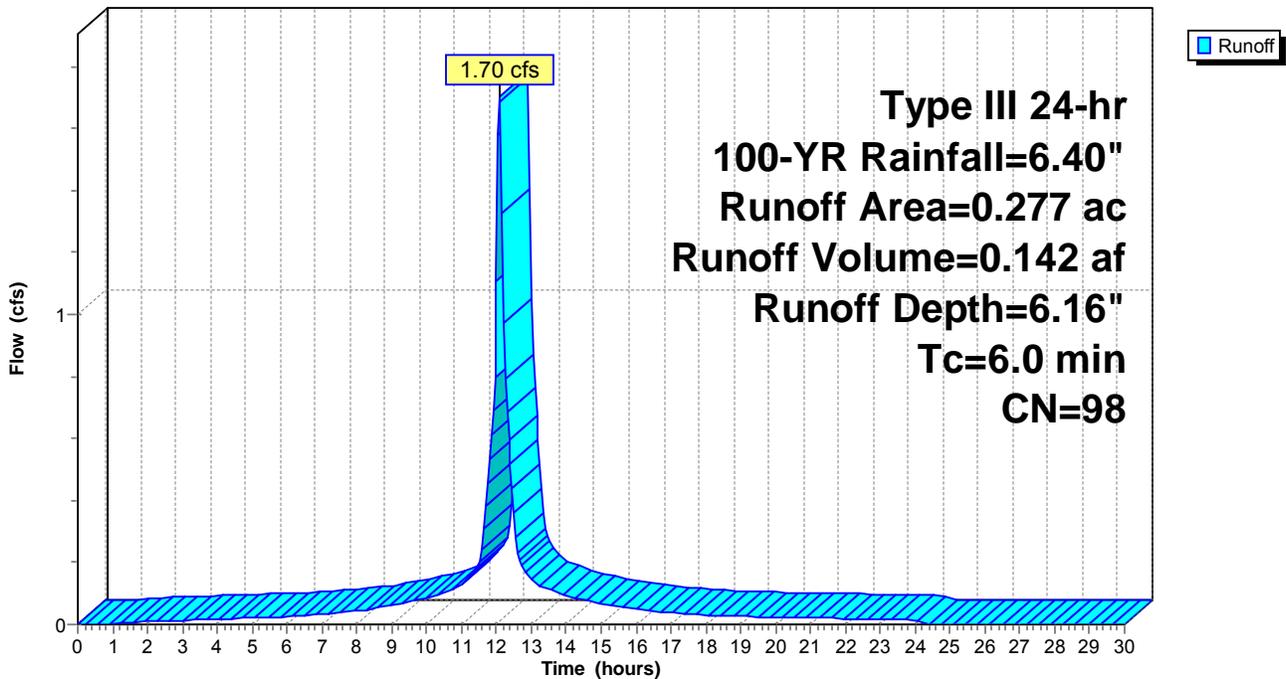
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.277	98	Roofs, HSG A
0.277		100.00% Impervious Area

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

Subcatchment 22S: AREA P09B

Hydrograph



Summary for Subcatchment 24S: Area P10A

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 3.42"

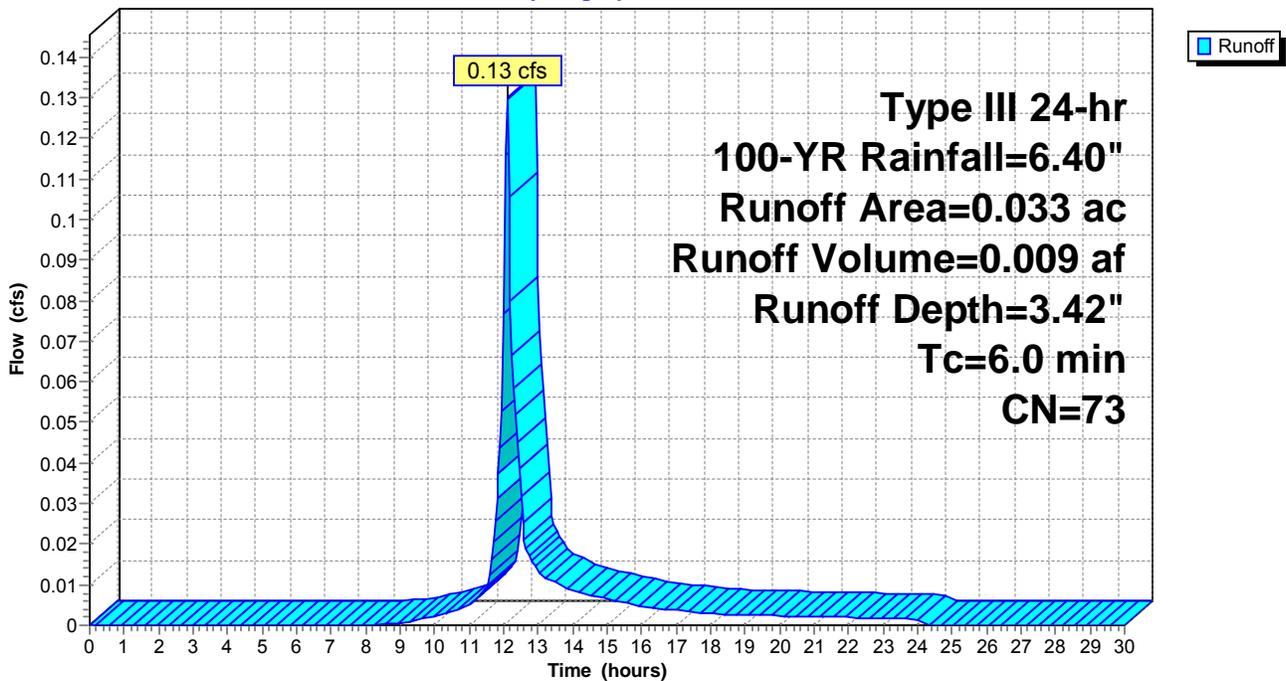
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-YR Rainfall=6.40"

Area (ac)	CN	Description
0.016	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.000	36	Woods, Fair, HSG A
0.017	49	50-75% Grass cover, Fair, HSG A
* 0.000	72	Dirt, HSG A (Playscape)
0.033	73	Weighted Average
0.017		51.52% Pervious Area
0.016		48.48% Impervious Area

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

Subcatchment 24S: Area P10A

Hydrograph



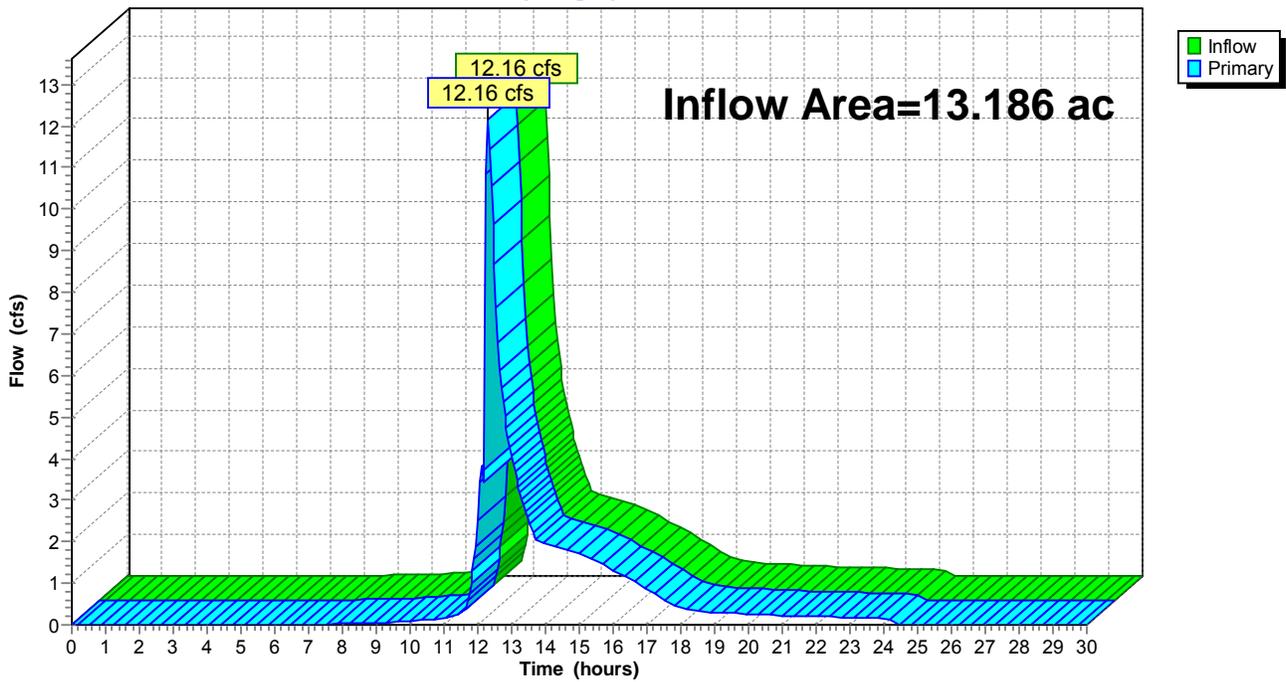
Summary for Pond 1: DP#1

Inflow Area = 13.186 ac, 21.69% Impervious, Inflow Depth = 1.25" for 100-YR event
Inflow = 12.16 cfs @ 12.31 hrs, Volume= 1.372 af
Primary = 12.16 cfs @ 12.31 hrs, Volume= 1.372 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 1: DP#1

Hydrograph



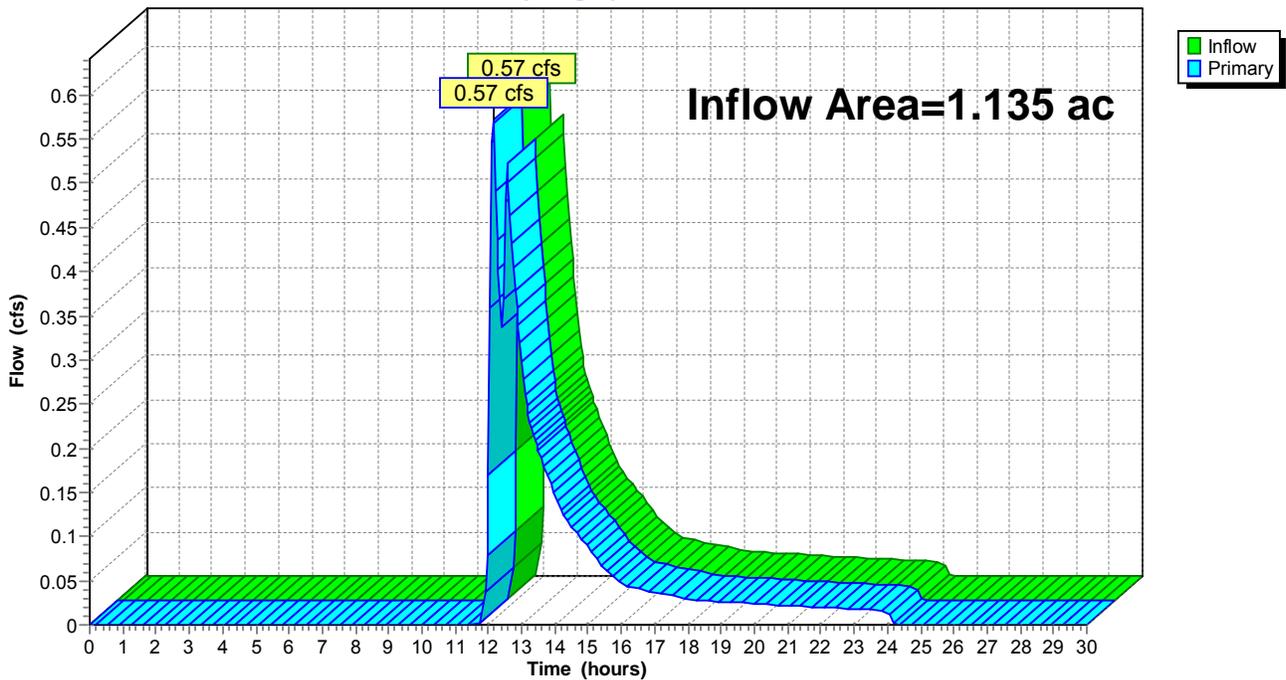
Summary for Pond 2: DP#2

Inflow Area = 1.135 ac, 43.35% Impervious, Inflow Depth = 0.89" for 100-YR event
Inflow = 0.57 cfs @ 12.14 hrs, Volume= 0.084 af
Primary = 0.57 cfs @ 12.14 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 2: DP#2

Hydrograph



Summary for Pond 8P: RAIN GARDEN #1

Inflow Area = 0.451 ac, 47.67% Impervious, Inflow Depth = 3.32" for 100-YR event
 Inflow = 1.72 cfs @ 12.09 hrs, Volume= 0.125 af
 Outflow = 1.58 cfs @ 12.13 hrs, Volume= 0.125 af, Atten= 9%, Lag= 2.2 min
 Discarded = 0.06 cfs @ 12.13 hrs, Volume= 0.060 af
 Primary = 1.52 cfs @ 12.13 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.78' @ 12.13 hrs Surf.Area= 0.024 ac Storage= 0.020 af

Plug-Flow detention time= 80.3 min calculated for 0.125 af (100% of inflow)
 Center-of-Mass det. time= 80.5 min (911.0 - 830.5)

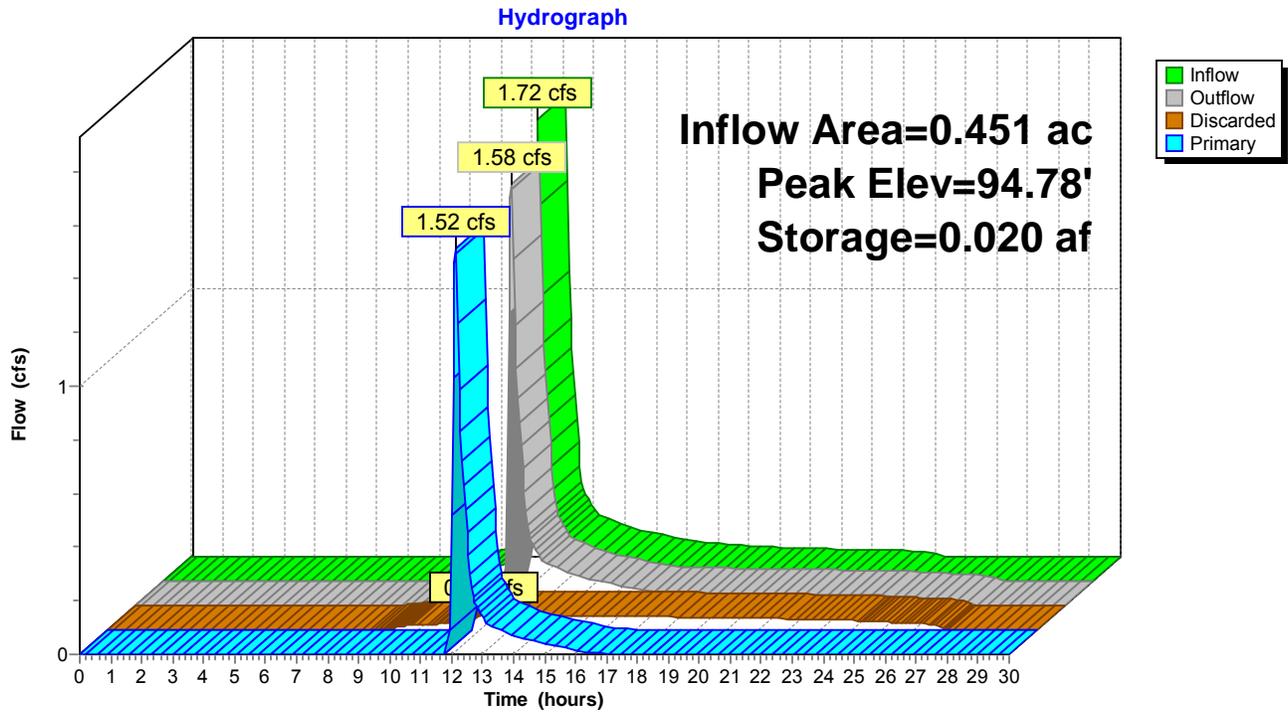
Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.026 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.008	0.000	0.000
94.00	0.014	0.006	0.006
95.00	0.027	0.020	0.026

Device	Routing	Invert	Outlet Devices
#1	Primary	93.13'	12.0" Round Culvert L= 25.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.13' / 93.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	12.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.06 cfs @ 12.13 hrs HW=94.78' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.48 cfs @ 12.13 hrs HW=94.78' (Free Discharge)
 ↑**1=Culvert** (Passes 1.48 cfs of 3.94 cfs potential flow)
 ↑**2=Grate** (Weir Controls 1.48 cfs @ 1.71 fps)

Pond 8P: RAIN GARDEN #1



Summary for Pond 9P: RAIN GARDEN #2

Inflow Area = 1.890 ac, 46.98% Impervious, Inflow Depth = 3.41" for 100-YR event
 Inflow = 7.92 cfs @ 12.10 hrs, Volume= 0.537 af
 Outflow = 7.05 cfs @ 12.14 hrs, Volume= 0.537 af, Atten= 11%, Lag= 2.4 min
 Discarded = 0.18 cfs @ 12.14 hrs, Volume= 0.201 af
 Primary = 6.87 cfs @ 12.14 hrs, Volume= 0.336 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.81' @ 12.14 hrs Surf.Area= 0.076 ac Storage= 0.072 af

Plug-Flow detention time= 76.3 min calculated for 0.536 af (100% of inflow)
 Center-of-Mass det. time= 76.7 min (886.9 - 810.2)

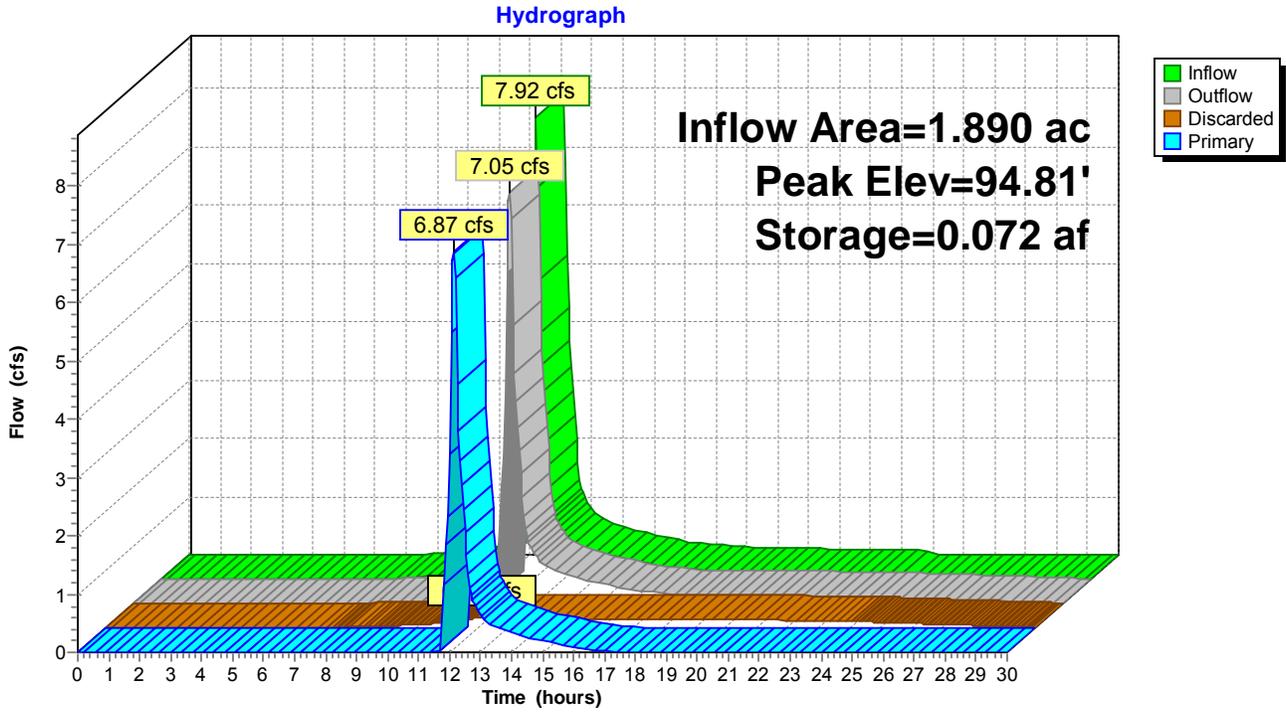
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	0.087 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.00	0.005	0.000	0.000
94.00	0.043	0.024	0.024
95.00	0.084	0.063	0.087

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	18.0" Round Culvert L= 100.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.18 cfs @ 12.14 hrs HW=94.80' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=6.82 cfs @ 12.14 hrs HW=94.80' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 6.82 cfs @ 5.61 fps)
 ↑**2=Grate** (Passes 6.82 cfs of 8.58 cfs potential flow)

Pond 9P: RAIN GARDEN #2



Summary for Pond 10P: RAIN GARDEN #3

Inflow Area = 0.539 ac, 69.76% Impervious, Inflow Depth = 4.46" for 100-YR event
 Inflow = 2.72 cfs @ 12.09 hrs, Volume= 0.201 af
 Outflow = 2.65 cfs @ 12.10 hrs, Volume= 0.200 af, Atten= 3%, Lag= 0.7 min
 Discarded = 0.05 cfs @ 12.10 hrs, Volume= 0.059 af
 Primary = 2.60 cfs @ 12.10 hrs, Volume= 0.142 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 94.71' @ 12.10 hrs Surf.Area= 0.019 ac Storage= 0.014 af

Plug-Flow detention time= 49.8 min calculated for 0.200 af (100% of inflow)
 Center-of-Mass det. time= 49.7 min (853.5 - 803.8)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	0.020 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
93.50	0.005	0.000	0.000
94.00	0.010	0.004	0.004
95.00	0.022	0.016	0.020

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	12.0" Round Culvert L= 120.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 93.50' / 92.50' S= 0.0083 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	94.50'	24.0" x 24.0" Horiz. Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	93.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 12.10 hrs HW=94.71' (Free Discharge)

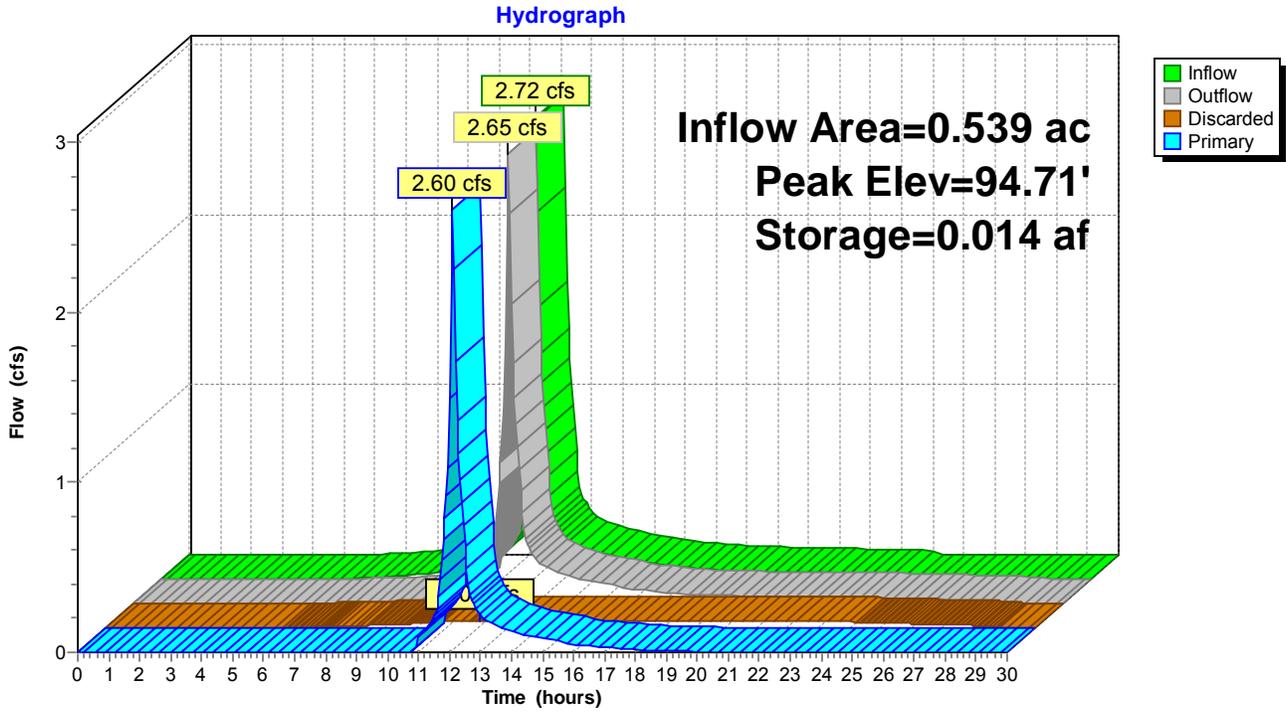
↑**3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=2.59 cfs @ 12.10 hrs HW=94.71' (Free Discharge)

↑**1=Culvert** (Passes 2.59 cfs of 3.35 cfs potential flow)

↑**2=Grate** (Weir Controls 2.59 cfs @ 1.51 fps)

Pond 10P: RAIN GARDEN #3



Summary for Pond 11P: INF BASIN #1

Inflow Area = 3.071 ac, 55.16% Impervious, Inflow Depth = 2.27" for 100-YR event
 Inflow = 10.88 cfs @ 12.12 hrs, Volume= 0.580 af
 Outflow = 10.49 cfs @ 12.17 hrs, Volume= 0.581 af, Atten= 4%, Lag= 3.3 min
 Discarded = 0.13 cfs @ 12.15 hrs, Volume= 0.043 af
 Primary = 10.36 cfs @ 12.17 hrs, Volume= 0.538 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 95.75' @ 12.15 hrs Surf.Area= 0.053 ac Storage= 0.105 af

Plug-Flow detention time= 17.3 min calculated for 0.580 af (100% of inflow)
 Center-of-Mass det. time= 17.7 min (791.2 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	0.119 af	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
92.00	0.008	0.000	0.000
93.00	0.017	0.012	0.012
94.00	0.028	0.022	0.035
95.00	0.041	0.035	0.069
96.00	0.057	0.049	0.119

Device	Routing	Invert	Outlet Devices
#1	Primary	91.80'	18.0" Round Culvert L= 161.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.80' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	95.50'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.50'	8.0" Vert. Orifice C= 0.600
#4	Discarded	92.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.13 cfs @ 12.15 hrs HW=95.75' (Free Discharge)

↑ **4=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=9.50 cfs @ 12.17 hrs HW=95.75' (Free Discharge)

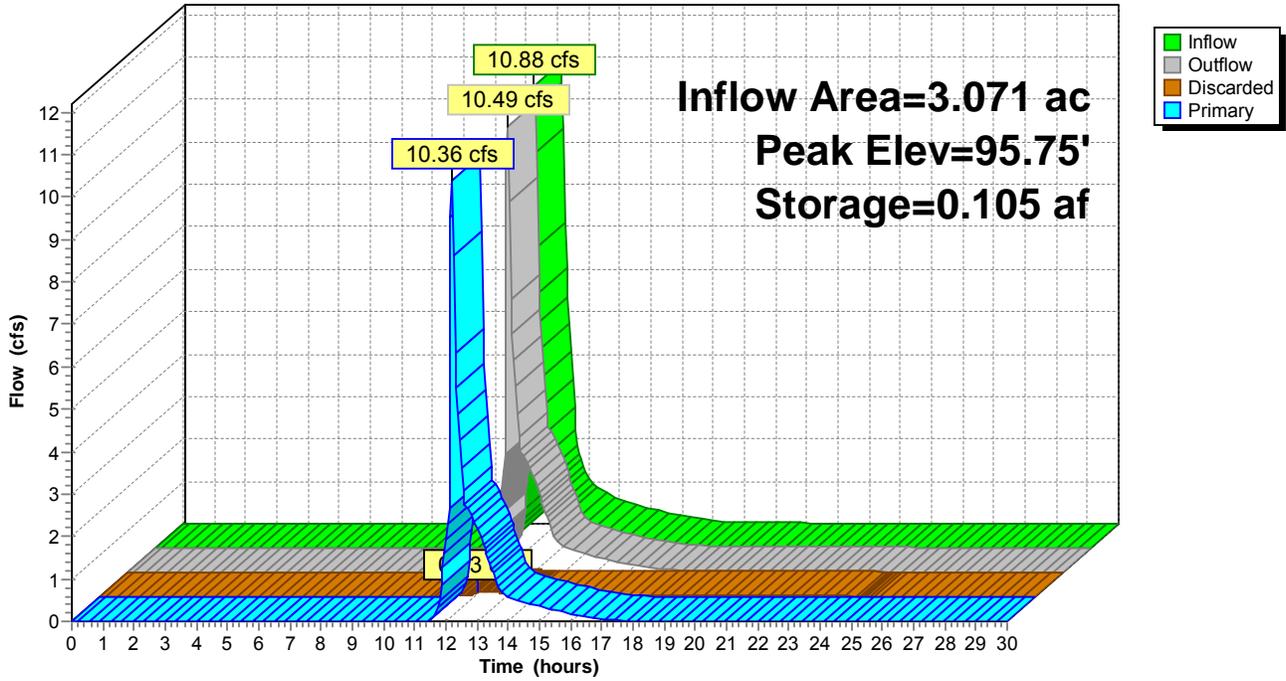
↑ **1=Culvert** (Passes 9.50 cfs of 12.13 cfs potential flow)

↑ **2=Grate** (Weir Controls 6.63 cfs @ 1.64 fps)

↑ **3=Orifice** (Orifice Controls 2.87 cfs @ 8.23 fps)

Pond 11P: INF BASIN #1

Hydrograph



Summary for Pond 12P: INF BASIN #2

Inflow Area = 5.990 ac, 41.22% Impervious, Inflow Depth = 2.29" for 100-YR event
 Inflow = 14.72 cfs @ 12.17 hrs, Volume= 1.142 af
 Outflow = 10.95 cfs @ 12.31 hrs, Volume= 1.142 af, Atten= 26%, Lag= 8.0 min
 Discarded = 0.32 cfs @ 12.31 hrs, Volume= 0.220 af
 Primary = 10.64 cfs @ 12.31 hrs, Volume= 0.922 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 94.31' @ 12.31 hrs Surf.Area= 0.130 ac Storage= 0.236 af

Plug-Flow detention time= 53.5 min calculated for 1.142 af (100% of inflow)
 Center-of-Mass det. time= 53.5 min (863.8 - 810.4)

Volume #1	Invert 91.00'	Avail.Storage 0.339 af	Storage Description Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
91.00	0.035	0.000	0.000
92.00	0.052	0.043	0.043
93.00	0.072	0.062	0.105
94.00	0.113	0.093	0.198
95.00	0.168	0.141	0.339

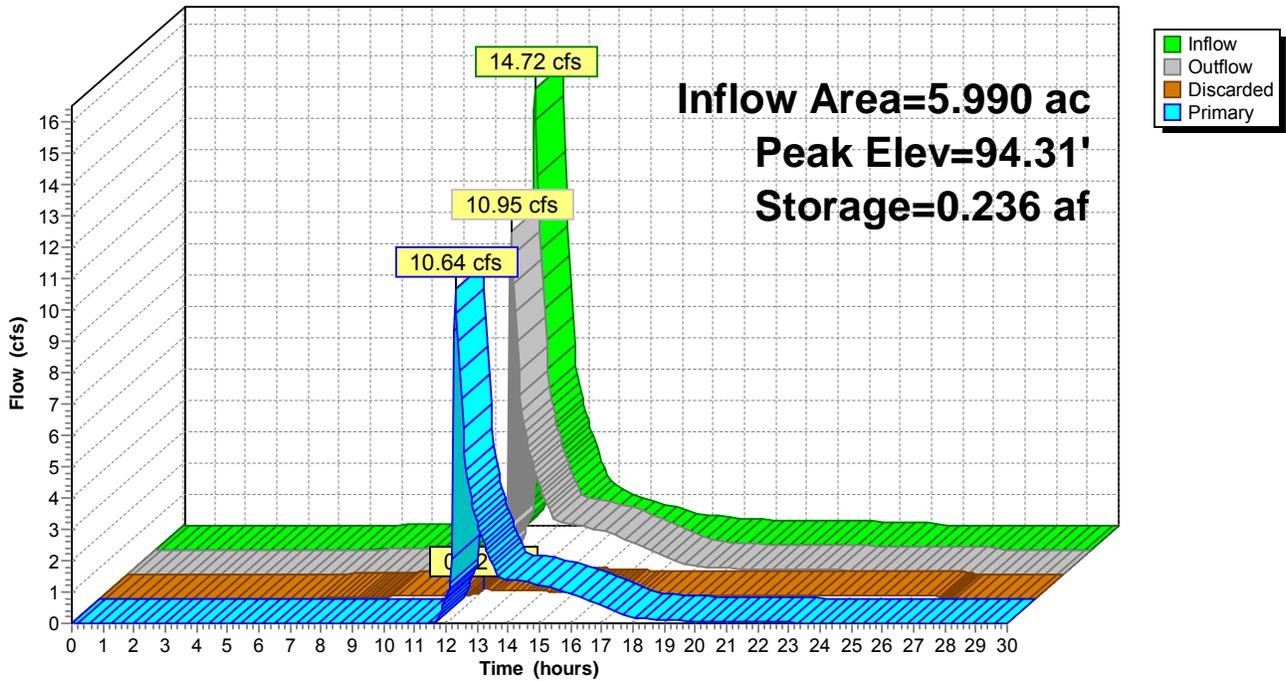
Device #	Routing	Invert	Outlet Devices
#1	Primary	91.00'	18.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.00' / 90.10' S= 0.0300 ' ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	94.00'	24.0" x 24.0" Horiz. Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	91.50'	6.0" Vert. Orifice C= 0.600
#4	Primary	94.50'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	91.00'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.32 cfs @ 12.31 hrs HW=94.31' (Free Discharge)
 ↑ **5=Exfiltration** (Exfiltration Controls 0.32 cfs)

Primary OutFlow Max=10.51 cfs @ 12.31 hrs HW=94.31' (Free Discharge)
 ↑ **1=Culvert** (Passes 10.51 cfs of 13.61 cfs potential flow)
 ↑ **2=Grate** (Weir Controls 8.99 cfs @ 1.82 fps)
 ↑ **3=Orifice** (Orifice Controls 1.51 cfs @ 7.70 fps)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: INF BASIN #2

Hydrograph



Summary for Pond 14P: INF SYS #2

Inflow Area = 0.361 ac, 100.00% Impervious, Inflow Depth = 6.16" for 100-YR event
 Inflow = 2.21 cfs @ 12.09 hrs, Volume= 0.185 af
 Outflow = 0.78 cfs @ 12.35 hrs, Volume= 0.161 af, Atten= 65%, Lag= 15.8 min
 Discarded = 0.05 cfs @ 7.85 hrs, Volume= 0.111 af
 Primary = 0.72 cfs @ 12.35 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 93.33' @ 12.35 hrs Surf.Area= 0.022 ac Storage= 0.057 af

Plug-Flow detention time= 267.7 min calculated for 0.161 af (87% of inflow)
 Center-of-Mass det. time= 208.6 min (952.8 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.79'	0.028 af	20.83'W x 45.50'L x 4.54'H Field A 0.099 af Overall - 0.030 af Embedded = 0.069 af x 40.0% Voids
#2A	89.79'	0.030 af	Cultec R-330XL x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		0.057 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	92.83'	12.0" Round Culvert L= 41.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 92.83' / 92.62' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	88.79'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 7.85 hrs HW=88.84' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.72 cfs @ 12.35 hrs HW=93.33' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 0.72 cfs @ 2.72 fps)

Pond 14P: INF SYS #2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

4,305.1 cf Field - 1,296.5 cf Chambers = 3,008.6 cf Stone x 40.0% Voids = 1,203.5 cf Stone Storage

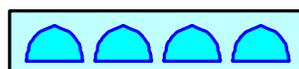
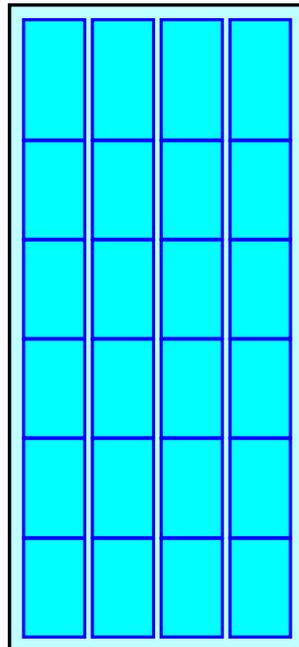
Chamber Storage + Stone Storage = 2,499.9 cf = 0.057 af

Overall Storage Efficiency = 58.1%

24 Chambers

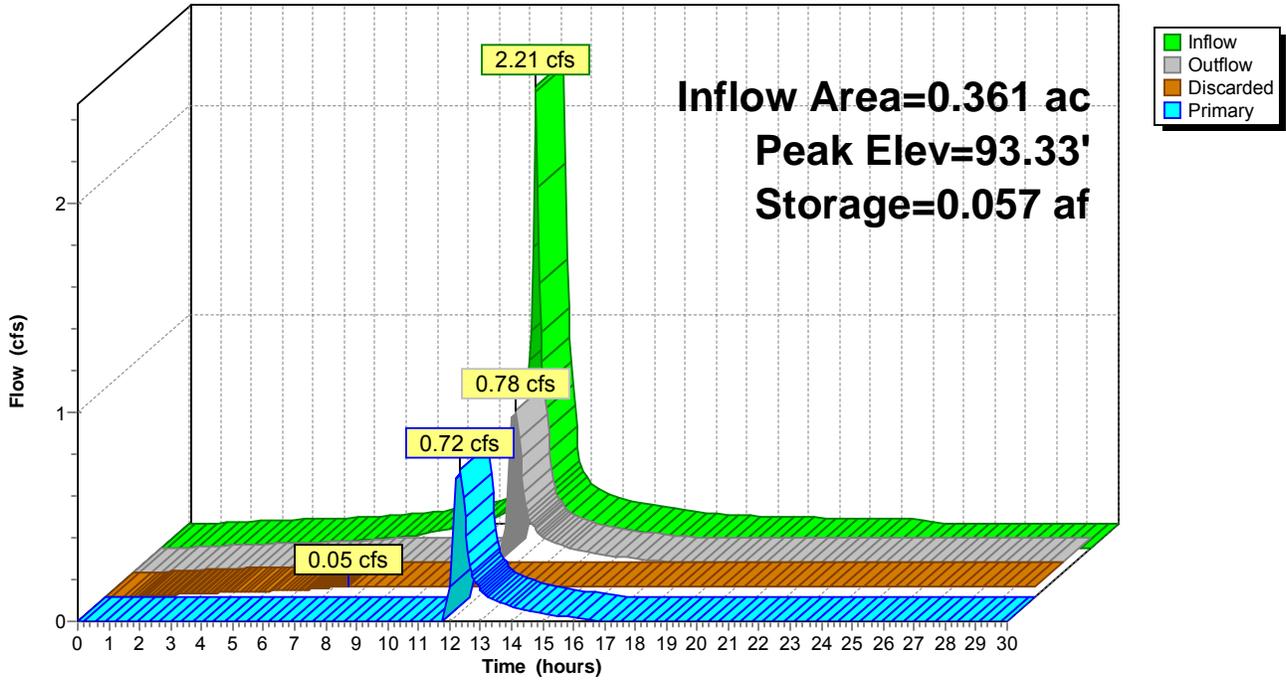
159.4 cy Field

111.4 cy Stone



Pond 14P: INF SYS #2

Hydrograph



Summary for Pond 23P: INF SYS #1

Inflow Area = 0.503 ac, 96.62% Impervious, Inflow Depth = 5.98" for 100-YR event
 Inflow = 3.01 cfs @ 12.09 hrs, Volume= 0.251 af
 Outflow = 0.44 cfs @ 12.60 hrs, Volume= 0.242 af, Atten= 85%, Lag= 30.7 min
 Discarded = 0.11 cfs @ 9.20 hrs, Volume= 0.217 af
 Primary = 0.33 cfs @ 12.60 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 92.38' @ 12.60 hrs Surf.Area= 0.045 ac Storage= 0.109 af

Plug-Flow detention time= 318.0 min calculated for 0.242 af (97% of inflow)
 Center-of-Mass det. time= 296.8 min (1,044.2 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.36'	0.057 af	16.00'W x 122.50'L x 4.54'H Field A 0.204 af Overall - 0.062 af Embedded = 0.143 af x 40.0% Voids
#2A	89.36'	0.062 af	Cultec R-330XL x 51 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.119 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.36'	2.410 in/hr Exfiltration over Surface area
#2	Primary	92.10'	12.0" Round Culvert L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.10' / 90.60' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.11 cfs @ 9.20 hrs HW=88.41' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.33 cfs @ 12.60 hrs HW=92.38' (Free Discharge)
 ↑2=Culvert (Inlet Controls 0.33 cfs @ 1.80 fps)

Pond 23P: INF SYS #1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XL

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

17 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 120.50' Row Length +12.0" End Stone x 2 = 122.50' Base Length

3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width

12.0" Base + 30.5" Chamber Height + 12.0" Cover = 4.54' Field Height

51 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 2,693.5 cf Chamber Storage

8,901.7 cf Field - 2,693.5 cf Chambers = 6,208.1 cf Stone x 40.0% Voids = 2,483.3 cf Stone Storage

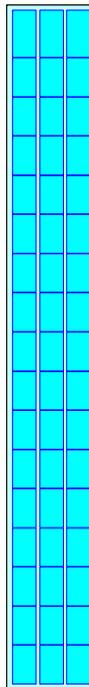
Chamber Storage + Stone Storage = 5,176.8 cf = 0.119 af

Overall Storage Efficiency = 58.2%

51 Chambers

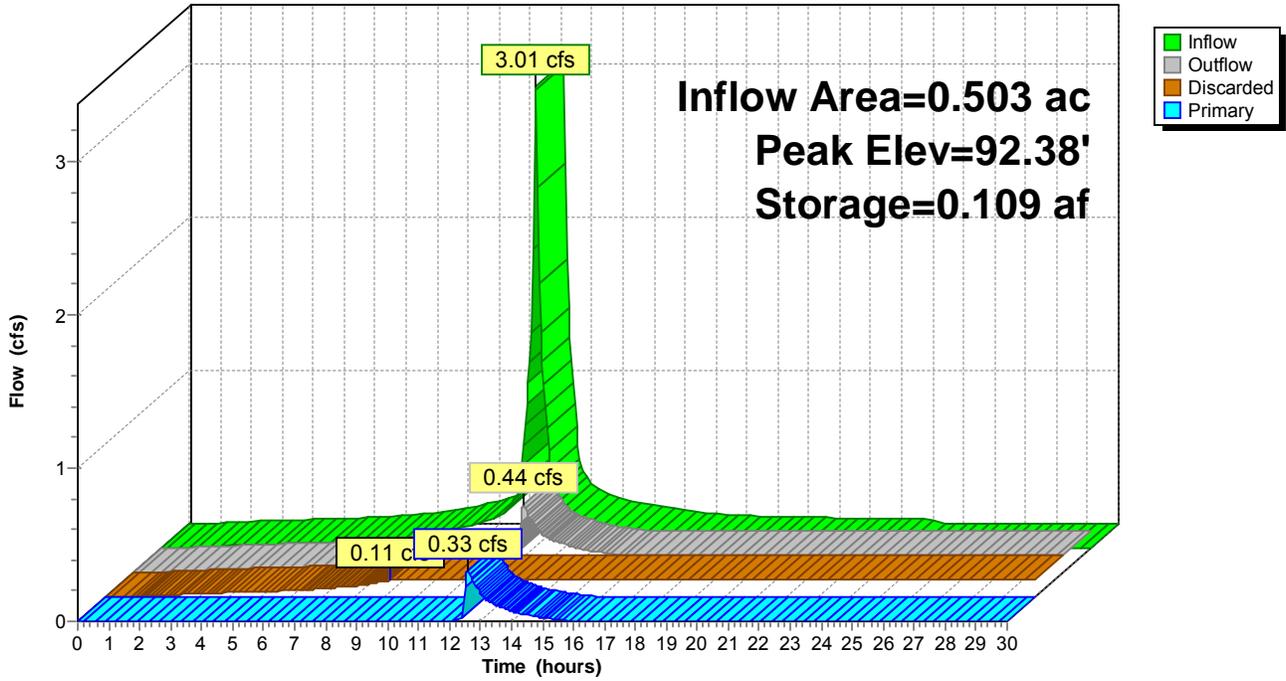
329.7 cy Field

229.9 cy Stone



Pond 23P: INF SYS #1

Hydrograph



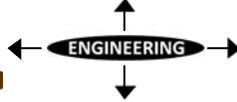
Appendix C

Geotechnical Report



Environmental Safety Health Geotechnical

O'Reilly, Talbot & Okun
[A S S O C I A T E S]



293 Bridge Street
Suite 500
Springfield, MA 01103
Tel 413 788 6222
Fax 413 788 8830
www.oto-env.com

J1843-06-01
July 13, 2012

Mr. Kristian Whitsett
Margo Jones Architects
308 Main Street
Greenfield, Massachusetts 01301

Re: Geotechnical Engineering Recommendations
Proposed Plains Elementary School
South Hadley, Massachusetts

Dear Mr. Whitsett:

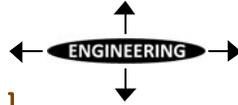
We are pleased to provide this letter report summarizing our geotechnical engineering recommendations for the proposed Plains Elementary School in South Hadley, Massachusetts. Preliminary plans call for the new school to be constructed north of the existing Plains Elementary School, which is located at the corner of Granby Road (Route 202) and Lyman Street. A Site Plan is provided as Figure 2.

Our geotechnical study is based upon eleven soil borings and four test pits. Our services consisted of the full-time observation of the borings and test pits, review of the logs and soil samples, engineering analyses, and preparation of this report. This report is subject to the attached limitations.

PROJECT DESCRIPTION

The Site is located at the intersection of Granby Road (Route 202) and Lyman Street in South Hadley, Massachusetts. The existing Plains Elementary School is located in the southern portion of the Site. The existing building consists of an approximately 40,000 square foot (approximate), single-story, brick building. A recreational field is located to the southwest of the existing school building. In addition, existing asphalt parking lots are located to the east and northeast of the existing school building. We understand that the existing building will be demolished after completion of the new school building. New parking areas will be constructed at the location of the existing school.

Preliminary project plans call for the construction of an approximately 42,000 square foot (footprint) structure. The structure will likely be one to two stories high, steel framed and slab-on-grade. Structural loads are unknown at this time; however, it is expected that maximum column loads will be on the order of 100 to 150 kips. We understand that three building layout options are presently being reviewed. The layouts are similar and



recommendations provided in this report are appropriate for each layout. However, our recommendations should be reviewed during final design. The proposed building layout “Option 1” is shown on Figure 2.

The northern portion of the Site, in the vicinity of the proposed building, is wooded with large pine trees. Site topography is relatively level, sloping slightly downwards from the west (elevation 98) to the east (elevation 94). We have assumed that the first floor slab elevation will be near existing grade. Therefore, we expect cuts and fills to be five feet or less to construct the building pad.

SUBSURFACE EXPLORATIONS

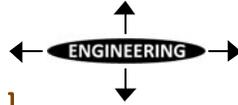
Subsurface explorations consisted of eleven soil borings (PS-1 through PS-11) and four test pits (TP-1 through TP-4). The borings were performed on June 14, 15 and 19, 2012 by Seaboard Drilling of Chicopee, Massachusetts. The borings were located within or near the footprint of the proposed building. The borings were performed using a track mounted rig equipped with hollow stem augers. Borings PS-1 through PS-4 and PS-6 through PS-11 were completed to a depth of 27 feet below ground surface. Boring PS-5 was performed to a depth of 67 feet below ground surface. An O'Reilly, Talbot & Okun Associates, Inc. (OTO) field engineer observed and logged each boring. Boring locations are shown on Figure 2. Boring logs are attached.

In general, soil samples were collected continuously from the ground surface to a depth of four feet below ground surface, at a depth of five feet, and every five feet thereafter. Soil samples were collected using a 2-inch diameter split spoon sampler driven 24-inches with a 140 pound hammer falling 30 inches (American Society for Testing and Materials Test Method D1586-99 “Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils”). The number of blows required to drive the sampler each 6 inches was recorded. The standard penetration resistance, or N-value, is the number of blows required to drive the sampler the middle 12 inches. Soil properties, such as strength and density, are related to the SPT blow count. After drilling, boreholes were backfilled with soil cuttings.

Four test pits were performed on June 19, 2012 by Seaboard Drilling of Chicopee, Massachusetts. Test pits TP-1 and TP-2 were performed in the area of two proposed underground infiltration basins located to the north of the proposed building. Test pits TP-3 and TP-4 were performed in the central and western portions of the proposed building, respectively, to observe the nature of the near surface soils. The test pits were performed using a Caterpillar 420 backhoe equipped with a ¼ cubic yard bucket. An OTO field engineer observed and logged each test pit. Test pit locations are shown on Figure 2. Test pit logs are attached.

IN-SITU HYDRAULIC CONDUCTIVITY TESTING

In-situ hydraulic conductivity (or permeability) tests were performed in two areas of proposed storm water management, both located to the north of the proposed building. The tests were performed in test pits TP-1 and TP-2 using a Guelph permeameter. The



Guelph permeameter allows the rate of water recharge into an unsaturated soil to be measured, while maintaining a constant water head. Calculations are then made to estimate the saturated permeability of the soil for storm water infiltration.

The permeability tests were performed by auguring a shallow hole into the soil, adding water to the apparatus and then recording the change in the rate of water flow from a reservoir over time. These data were then used to estimate the coefficient of permeability or hydraulic conductivity. Results are discussed below.

SUBSURFACE CONDITIONS

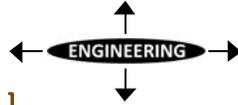
Subsurface conditions were interpreted based upon the soil borings and test pits. In general, subsurface conditions consisted of a surface layer of topsoil, underlain by the following, in order of increasing depth: a fine to medium sand; varved silt and clay; and glacial till. The soil conditions are favorable for the proposed construction.

Topsoil was present at the ground surface in each of the borings and test pits, and ranged in thickness from between four to eight inches. Beneath the topsoil layer in each of the borings, a loose to medium dense, fine and medium sand with varying amounts of silt and coarse sand was encountered. The fine to medium sand layer was on the order of 55 feet thick. Borings PS-1 through PS-4 and PS-6 through PS-11 terminated in this layer at a depth of 27 feet below ground surface. In the only boring to fully penetrate the sand layer (PS-5), the bottom elevation of the unit was at approximately elevation 41 feet. Given the thickness of the sand unit, it is the predominate soil layer impacting geotechnical design.

In the boring that fully penetrated the sand layer (PS-5), a five foot layer of soft varved clay was encountered between a depth of 55 and 60 feet below ground surface. Given the thickness and depth of this layer, it should not significantly impact the structure. Glacial till was encountered directly beneath the varved clay layer. Glacial till is a very dense, heterogeneous mixture of silt, clay, sand and gravel, and is generally present immediately above bedrock throughout New England. Boring PS-5 was terminated within the glacial till layer at a depth of 67 feet below ground surface, corresponding to an elevation of 29 feet.

At the time of drilling, groundwater was encountered in boring PS-5 at a depth of 55 feet below ground surface, corresponding to an elevation of 41 feet. Groundwater was not encountered in the other borings. Therefore, groundwater is not expected to be encountered during construction, nor is it expected to impact the building.

In addition, we reviewed three historic boring logs from investigations that were performed for the 1955 addition (southern portion) of the existing building. The soil description presented on these logs was limited and blow counts were not reported; however, the soils described appear to be consistent with the granular soils encountered during the recent investigations.



HYDRAULIC CONDUCTIVITY TESTING RESULTS

Hydraulic conductivity (K) testing, using a Guelph permeameter, was performed within the two proposed underground infiltration areas (located to the north of the proposed building). As described above, the subsurface conditions are similar across the site.

The tests were performed in test pits TP-1 and TP-2 at a depth of between 5 and 6 feet below ground surface, corresponding to an approximate elevation of between 88 and 89 feet. The soil encountered at the test interval consisted of medium sand with trace fine sand. As described above, this layer was observed across the Site, in the upper 50 feet. The saturated hydraulic conductivity values determined during these tests are presented in Table 1.

Table 1
Hydraulic Conductivity Test Results

Location	Test Depth/ Approximate Elevation (feet)	K Value (feet/day)
TP-1	6/88	100
TP-2	5/89	102

These results, along with the depth to ground water of 55 feet, are favorable for storm water infiltration. We recommend a conservative value of 75 feet/day be used for the design of infiltration systems.

GEOTECHNICAL ISSUES

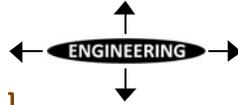
The significant geotechnical issues for the proposed construction addressed in this report are foundation bearing capacity and settlement, earthquake considerations, and the suitability of on-site materials for use in engineered fills.

PRELIMINARY DESIGN RECOMMENDATIONS

The following recommendations are provided for the assumed construction. These should be reviewed during final design of the building.

Foundations

The proposed building can be founded on normal spread footing foundations bearing on the densified native soils present in the upper ten feet, or compacted engineered fills. As described above, we recommend that footing subgrades should be densified immediately prior to placement of footing concrete. Provided these recommendations are followed, a maximum allowable bearing pressure of 3,000 pounds per square foot may be used for the design of exterior and isolated column footings.



The near surface soils at the site consist of a uniform fine to medium sand. These soils will tend to dry out quickly and become loose and disturbed under normal construction traffic. We recommend that the contractor apply water and compact footing subgrades immediately prior to footing construction. Otherwise, these soils should be removed and replaced with compacted sand and gravel.

We estimate that settlement of footings and slabs bearing on the densified native soils or compacted fill should be small and largely elastic in nature. Maximum settlements should be less than 1 inch, and should occur relatively quickly after load application (during construction).

We recommend that exterior footings be embedded a minimum of 48 inches below the lowest adjacent grade for frost protection. Interior footings should be embedded at least two feet below the surrounding floorslab. Strip footings beneath the bearing walls should be at least 18 inches wide. Isolated column footings should be at least 24 inches wide. All other applicable requirements of the Massachusetts State Building Code (MSBC) should be followed.

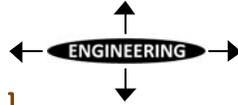
We recommend that the entire building footprint be thoroughly proof compacted to treat any loose areas. Proof compacting should be accomplished by a minimum of six passes with a 6,000 pound (or heavier) vibratory roller.

If winter construction occurs, footings should not be placed on frozen soils. Footing excavations should be free of loose or disturbed materials. Any boulders or cobbles larger than 4 inches in diameter should be removed from within one foot of the bottom of the footings and replaced with sand and gravel fill. As recommended above, the footing subgrades should be densified with at least three passes with a vibrating plate compactor. If loose materials are present in the excavations, they shall be recompacted to form a firm, dense, bearing surface.

Seismic Considerations

Earthquake loadings must be considered under requirements in Section 1613 and 1806 of the 8th Edition (February 2011) Massachusetts State Building Code (MSBC). The 8th Edition of the MSBC is based upon the International Code 2009 with Massachusetts amendments.

Section 1613 covers lateral forces imposed on structures from earthquake shaking. Per Table 1604.11, the maximum considered earthquake spectral response acceleration at short periods (S_s) and at 1-sec (S_1) was determined to be 0.23 and 0.066, respectively, for South Hadley, Massachusetts. In addition, the Site Class was determined to be Class E based upon soil data collected. Furthermore, the Site coefficients F_a and F_v were determined according to Tables 1613.5.3(1) and 1613.5.3(2), using both the S_s and S_v values and the Site Class. For this Site, F_a and F_v were determined to be 2.5 and 3.5, respectively.



Section 1806.4 relates to the liquefaction potential of the underlying soils. The liquefaction potential is evaluated for Site soils that are encountered below the water table, using Figure 1806.4b of the MSBC. Based upon the depth to groundwater, the soils at the Site would not be susceptible to liquefaction.

Concrete Slabs

We recommend that concrete floor slabs bear on at least 6 inches of compacted, imported sand and gravel or crushed stone to provide uniform support and a capillary moisture break. The subgrade should also be free of large boulders. The sand and gravel fill beneath the concrete slabs should meet the grain size distribution characteristics for sand and gravel outlined in Table 3.

The subgrade within the footprint of the proposed building should be stripped of topsoil. We recommend that the building footprint be thoroughly densified to treat any loose areas present. Fill supporting slabs should be placed in accordance with the recommendations for gradation and compaction provided below. The slab may be designed using a vertical subgrade modulus of 100 tons per cubic foot.

Pavement Recommendations

We understand that the project will involve the construction of parking areas for passenger vehicles and light trucks, and roadways which will experience heavy traffic loads from buses and delivery vehicles. The proposed flexible asphalt design sections are provided in Table 2.

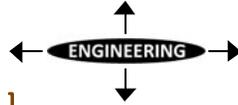
Table 2
Pavement Design Sections

Layer	Thickness	
	Parking Areas	Heavy Vehicles
Asphalt Finish Course	1 inch	1-1/2 inches
Asphalt Binder Course	1-1/2 inches	1-1/2 inches
Gravel Base Course	6 inches	8 inches
Sand & Gravel	6 inches	6 inches

Table 3 presents recommendations for gradation requirements for the gravel base course and sand and gravel sub-base materials. Please note that the Sand and Gravel specification approximately matches that for Massachusetts DPW M1-03.0, Type A Sand-Gravel.

Earthwork Considerations

We anticipate that earthwork for this project will include cuts and fills to form the building pad, excavations for footings, subgrade preparation and fills for pavements.



Three fill types are recommended: Sand and Gravel for use as engineered fill within 12 inches beneath footings (if needed), floor slabs and pavements; Gravel Base Course for use beneath pavements; and Granular Fill for use at depths greater than 12 inches and as miscellaneous fill. Grain size distribution requirements are presented in Table 3.

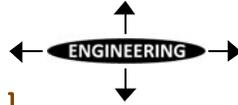
Table 3
Grain Size Distribution Requirements

Size	Sand and Gravel	Gravel Base Course	Granular Fill
Percent Finer by Weight			
4 inch	100	100	100
1/2 inch	50-85	50-80	---
No. 4	40-75	40-75	---
No. 10	---	30-60	30-90
No. 40	10-35	10-35	10-70
No. 100	---	5-20	---
No. 200	0-8	2-10	0-15

We recommend that the entire building footprint be thoroughly proof compacted to treat any loose areas. Proof compaction should be achieved with a minimum of six passes with a 6,000 pound (or heavier) vibratory roller. The contractor should expect that water will need to be applied to the granular soils found at the Site to achieve optimum moisture content.

The existing fine to medium sand present at the Site will likely not meet requirement for sand and gravel fill but may be suitable for re-use as granular fill, provided it is free of debris, organics and other unsuitable materials. We recommend that the contractor obtain a representative sample to perform grain size analysis for approval prior to use. If loose non-engineered fill or wet and disturbed soils are observed in footing excavations or beneath slabs and pavements, they should be removed or recompacted. Any organic soils found in excavations should not be re-used as fill beneath structures. To avoid point loads, any cobbles or boulders larger than 4 inch diameter encountered at the subgrade for slabs-on-grade should be removed and replaced with compacted sand and gravel fill.

Fill placed beneath footings, floor slabs and pavements should be densified to at least 95% of the Modified Proctor dry density as defined in ASTM D1557, Method C. Fill should be placed in lifts of no more than 12-inches and compacted with at least four passes with a vibrating drum roller (minimum of 6,000 pound weight). To facilitate compaction, the moisture content of the on-site material should be maintained at or near the optimum moisture content.



We appreciated the opportunity to be of service on this project. If you have any questions, please call the undersigned.

Sincerely yours,
O'Reilly, Talbot & Okun Associates, Inc.

Ashley L. Sullivan, P.E.
Sr. Project Manager

Michael J. Talbot, P.E.
Principal

Attachments: Limitations, Site Locus, Site Plan, Boring Logs, Test Pit Logs, Test Pit Photos

c: Ryan Hellwig

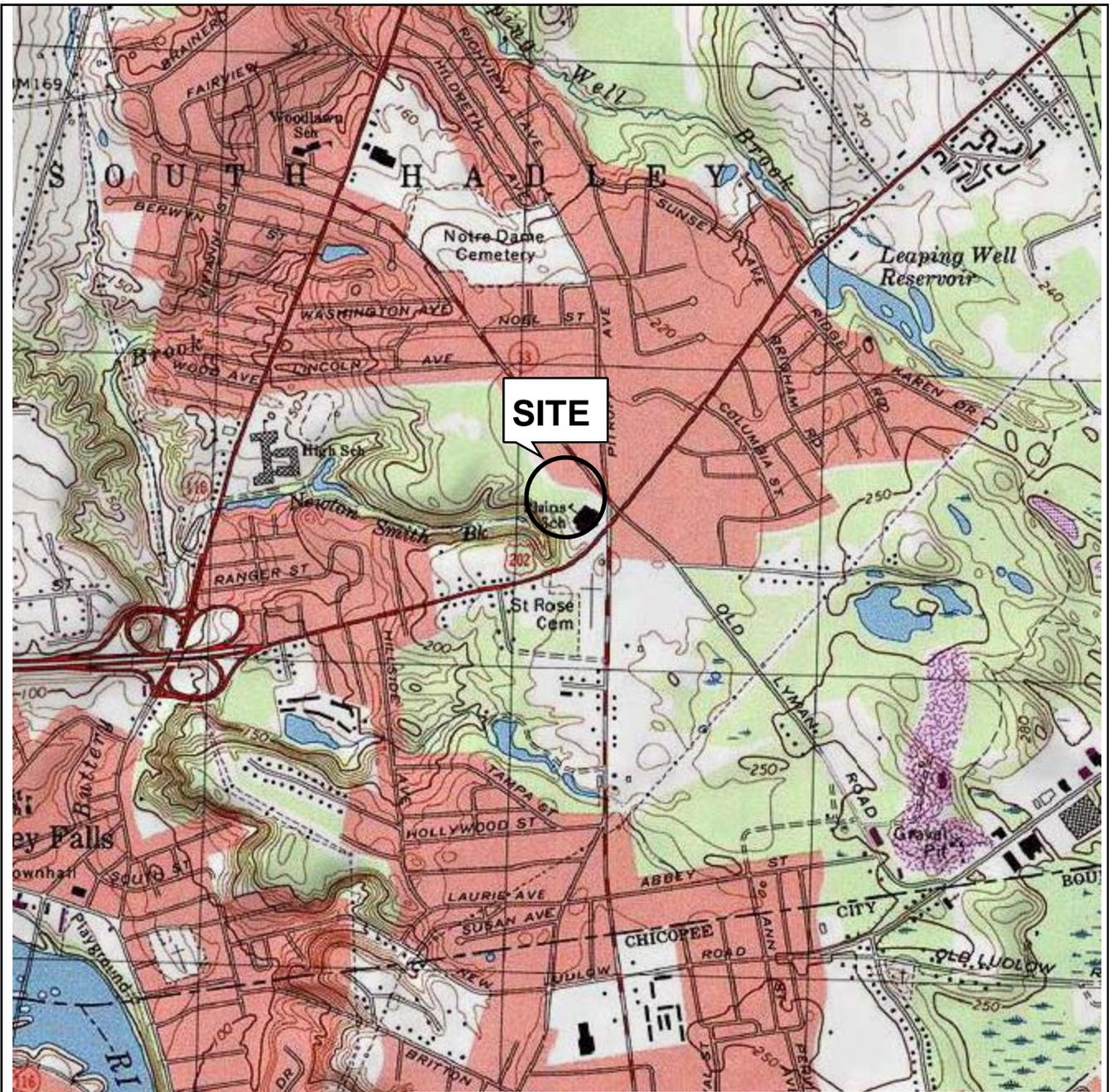
O:\J1800\1843 Margo Jones Architects\06-01 Plains Elementary School S Hadley MA-Geotech Study\Geotech Report 07-09-2012.doc

LIMITATIONS

LIMITATIONS

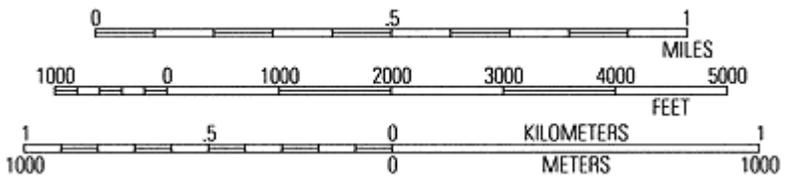
1. The observations presented in this report were made under the conditions described herein. The conclusions presented in this report were based solely upon the services described in the report and not on scientific tasks or procedures beyond the scope of the project or the time and budgetary constraints imposed by the client. The work described in this report was carried out in accordance with the Statement of Terms and Conditions attached to our proposal.
2. The analysis and recommendations submitted in this report are based in part upon the data obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate the recommendations of this report.
3. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.
4. In the event that any changes in the nature, design or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by O'Reilly, Talbot & Okun Associates Inc. It is recommended that we be retained to provide a general review of final plans and specifications.
5. Our report was prepared for the exclusive benefit of our client. Reliance upon the report and its conclusions is not made to third parties or future property owners.

FIGURES
(Site Locus & Site Plan)



Topographic Map Quadrant: Springfield North, MA
Map Version: 1975
Current as of: 1979

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O'Reilly, Talbot & Okun
[ASSOCIATES]



293 Bridge Street, Suite 500
Springfield, Massachusetts 01103

Phone: 413-788-6222
www.oto-env.com

Proposed Plains Elementary School
South Hadley, Massachusetts

SITE LOCUS

June, 2012

Figure 1



2 LYMAN STREET, LLC
BOOK 10430 PAGE 149

PROPOSED BUILDING

EXISTING PLAINS SCHOOL BUILDING

OTHER LAND OF THE TOWN OF SOUTH HADLEY

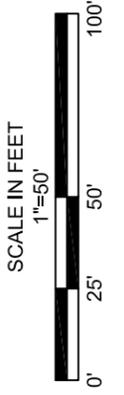


DESIGNED BY: ALS
CHECKED BY: MJT

DRAWN BY: CDA
DATE: JULY, 2012

O'REILLY, TALBOT & OKUN
ASSOCIATES
ENGINEERING

293 BRIDGE STREET
SPRINGFIELD, MA 01103
PHONE: (413) 786-6222
EMAIL: OTRPE@OTO-ENV.COM



LEGEND:

- SOIL BORING PERFORMED BY SEABOARD DRILLING ON 06/14, 06/15, AND 06/19/2012, OBSERVED BY OTO
- TEST PIT PERFORMED BY SEABOARD DRILLING ON 06/19/2012, OBSERVED BY OTO

NOTES:

1. BASE MAP PROVIDED TO OTO IN ELECTRONIC FORMAT. PLAN WAS FURTHER DEVELOPED BY REFERRING TO FIELD OBSERVATIONS AND TAPED MEASUREMENTS FROM EXISTING SITE FEATURES, AS WELL AS TO TOWN OF SOUTH HADLEY ASSESSORS INFORMATION.
2. ALL DATA IS TO BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD(S) USED IN DEVELOPING THIS PLAN.

NEW PLAINS ELEMENTARY SCHOOL

ROUTES 33 AND 202
SOUTH HADLEY, MASSACHUSETTS

SITE PLAN

PROJECT No.
J1843-06-01

FIGURE No.
2

BORING LOGS

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-1

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/14/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/14/2012	
TYPE BIT Hollow Stem Auger		SIZE &TYPE OF CORE BARREL		GROUND SURFACE ELEV. 94.5'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		DROP		FIRST	
SAMPLER HAMMER Auto		Rod A 1 5/8" O.D.		COMPL.	
WEIGHT 140 lbs.		DROP 30" (Wire Line)		HR.	
WATER LEVEL (FT.)		BORING Southeast portion of building			
ENGINEER/GEOLOGIST Steve McLaughlin		LOCATION			

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	2/3/3/3	12/24	S-1 (0-2')	Top 6": Loose, dark brown, fine SAND, little silt, moist (TOPSOIL) Bottom 6": Loose, brown, fine SAND, some medium sand, trace(+) silt, trace(-) coarse sand, moist	TOPSOIL FINE SAND	
X	5	3/3/3/3	12/24	S-2 (2'-4')	Loose, brown, fine to medium SAND, trace(+) coarse sand, trace silt, dry	↓	
X	10	2/3/4/3	18/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace fine sand, dry	5' ↓ MEDIUM SAND	
X	15	2/2/2/3	19/24	S-4 (10'-12')	Loose, light brown, medium SAND, trace fine sand, dry	↓	
X	20	2/2/4/3	20/24	S-5 (15'-17')	Loose, light brown, medium SAND, trace fine sand, dry	↓	
X	25	3/4/5/8	18/24	S-6 (20'-22')	Loose, light brown, medium SAND, trace fine sand, dry Little rust mottling in bottom 2"	↓	
X	27	5/6/6/7	16/24	S-7 (25'-27')	Top 6": Medium dense, light brown with rust mottling, medium SAND, trace fine sand, dry Bottom 10": Medium dense, light brown, medium SAND, some fine sand, trace(-) silt, dry End of exploration at 27'	↓	

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-2

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/14/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/14/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		GROUND SURFACE ELEV. DATUM 94'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		DROP		FIRST	
SAMPLER WEIGHT 140 lbs.		DROP 30" (Wire Line)		COMPL.	
SAMPLER HAMMER Auto		BORING Eastern side of building		HR.	
		LOCATION		WATER LEVEL (FT.)	
		ENGINEER/GEOLOGIST Steve McLaughlin		--	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1/1/1/1	12/24	S-1 (0-2')	Top 4": Very loose, dark brown, fine SAND, little silt, trace organics(roots), dry (TOPSOIL) Bottom 8": Very loose, brown, fine SAND, some medium sand, trace(+) silt, dry	TOPSOIL FINE SAND	
X	2	2/2/2/2	12/24	S-2 (2'-4')	Top 5": Loose, brown, fine SAND, some medium sand, trace(+) silt, dry Bottom 7": Loose, light brown, medium SAND, trace fine sand, trace(-) coarse sand, dry	3' MEDIUM SAND	
X	5	3/4/4/5	19/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	10	2/2/3/3	19/24	S-4 (10'-12')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	15	3/3/3/4	14/24	S-5 (15'-17')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	20	3/3/3/3	22/24	S-6 (20'-22')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	25	3/4/5/7	18/24	S-7 (25'-27')	Loose, light brown with rust mottling, medium SAND, trace(-) fine sand, dry		
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-3

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/14/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/14/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		GROUND SURFACE ELEV. 94'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		WATER LEVEL (FT.)	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		DROP 30" (Wire Line)	
				BORING Northeast corner of building	
				LOCATION	
				ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	5	1/1/1/1	14/24	S-1 (0-2')	Top 6": Very loose, dark brown, fine SAND, little silt, dry (TOPSOIL) Bottom 8": Very loose, brown, fine SAND, some medium sand, trace(+) silt, dry	TOPSOIL FINE SAND	
		2/2/2/2	14/24	S-2 (2'-4')	Loose, light brown, medium SAND, trace fine sand, trace(-) silt, trace(-) coarse sand, dry	↓ 2' MEDIUM SAND	
X	5	3/4/3/4	18/24	S-3 (5'-7')	Loose, light brown with rust mottling, medium SAND, trace(-) fine sand, dry		
X	10	3/2/3/4	16/24	S-4 (10'-12')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	15	2/3/4/3	18/24	S-5 (15'-17')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	20	3/2/3/3	20/24	S-6 (20'-22')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	25	3/3/4/5	14/24	S-7 (25'-27')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-4

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/14/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/14/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		GROUND SURFACE ELEV. 94'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		WATER LEVEL (FT.)	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		DROP 30" (Wire Line)	
				BORING LOCATION Central portion of building	
				ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	5	1/1/1/1	16/24	S-1 (0-2')	Top 5": Very loose, dark brown, fine SAND, some silt, trace medium sand, dry (TOPSOIL) Bottom 11": Very loose, brown, fine SAND, some medium sand, trace(+) silt, trace(-) coarse sand, dry	TOPSOIL FINE SAND	
		2/2/2/3	18/24	S-2 (2'-4')	Loose, light brown, medium SAND, trace(-) fine sand, trace(-) coarse sand, dry	2' MEDIUM SAND	
X	5	2/3/3/3	16/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
X	10	5/6/8/6	20/24	S-4 (10'-12')	Medium dense, brown with rust mottling, medium SAND, dry		
X	15	4/5/5/6	19/24	S-5 (15'-17')	Medium dense, light brown, fine SAND, trace(+) silt, dry	15' FINE SAND	
X	20	4/5/5/5	18/24	S-6 (20'-22')	Medium dense, light brown, medium SAND, little fine sand, trace(-) silt, dry	20' MEDIUM SAND	
X	25	2/3/4/4	22/24	S-7 (25'-27')	Loose, light brown, medium SAND, trace(-) fine sand, dry		
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-5

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/15/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 67'		DATE FINISHED 06/15/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		GROUND SURFACE ELEV. 96'	
CASING		No. Samples 15		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		WATER LEVEL (FT.) 55'	
SAMPLER HAMMER Auto		DROP 30" (Wire Line)		BORING Central western portion of building	
				LOCATION ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1/1/1/1	16/24	S-1 (0-2')	Top 8": Very loose, dark brown, fine SAND, some silt, trace(-) organics(roots), dry (TOPS Bottom 8": Very loose, brown, fine SAND, some medium sand, little silt, trace(-) coarse sand, dry	TOPSOIL FINE SAND ↓ 2'	
X	2	2/2/2/2	18/24	S-2 (2'-4')	Loose, brown to light brown, medium SAND, trace fine sand, dry	MEDIUM SAND ↓	
X	5	3/3/3/4	16/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace fine sand, dry	↓ 10'	
X	10	2/3/4/4	22/24	S-4 (10'-12')	Loose, light brown, fine SAND, trace silt, dry	FINE SAND ↓	
X	15	3/4/4/4	22/24	S-5 (15'-17')	Loose, light brown, fine SAND, trace silt, dry	↓ 20'	
X	20	3/4/5/7	18/24	S-6 (20'-22')	Loose, light brown with rust mottling, medium SAND, trace(+) fine sand, dry	MEDIUM SAND ↓	
X	25	4/3/4/5	22/24	S-7 (25'-27')	Loose, light brown, medium SAND, trace(-) fine sand, dry	↓	

Remarks:
 1. Auger grinding at 60'
 2. Rock in upper portion of sample
 3. Rock in tip

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-5

Sheet 2 of 3

Project No. 1843-06-01

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6IN.	REC. IN.	TYPE/ NO.			
X	30	3/5/6/7	16/24	S-8 (30'-32')	Medium dense, light brown, medium SAND, trace(-) fine sand, dry	MEDIUM SAND	
X	35	3/4/6/9	18/24	S-9 (35'-37')	Medium dense, light brown, medium SAND, trace fine sand, dry	MEDIUM SAND	
X	40	7/9/8/8	22/24	S-10 (40'-42')	Medium dense, light brown, fine SAND, trace(-) silt, dry	40' FINE SAND	
X	45	5/6/8/8	22/24	S-11 (45'-47')	Medium dense, light brown, fine SAND, trace(-) silt, dry	FINE SAND	
X	50	3/3/5/7	14/24	S-12 (50'-52')	Loose, light brown, medium SAND, trace(-) fine sand, dry	50' MEDIUM SAND	
X	55	2/2/2/3	24/24	S-13 (55'-57')	Top 2": Loose, light brown, medium SAND, trace(-) fine sand, wet Bottom 22": Soft, gray, varved SILT and CLAY, (varves approx. 1/8" thick), wet	55' VARVED SILT AND CLAY	
X	60	32/9/13/11	8/24	S-14 (60'-62')	Medium dense, brownish-red, fine SAND, little medium sand, little silt, trace(+) sub-angular gravel, trace(-) coarse sand, damp	60' GLACIAL TILL	1.,2.

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-5

Sheet 3 of 3

Project No. 1843-06-01

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6IN.	REC. IN.	TYPE/ NO.			
						GLACIAL TILL	
	65	18/41/ 50 for 4"	12/24	S-8 (65'-67')	Very dense, brownish-red, fine SAND, little silt, trace(+) medium sand, trace coarse sand, trace sub-angular gravel, trace(-) clay, moist	↓	3.
					End of exploration at 67'		
	70						
	75						
	80						
	85						
	90						
	95						

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-6

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/15/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/15/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		GROUND SURFACE ELEV. 94'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		WATER LEVEL (FT.)	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		DROP 30" (Wire Line)	
				BORING Northwest corner of building	
				LOCATION	
				ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1 for 1' 1/1	12/24	S-1 (0-2')	Top 5": Very loose, dark brown, fine SAND, some silt, trace(-) organics(roots), dry (TOPSOIL) Bottom 7": Very loose, brown, fine SAND, some medium sand, trace(+) silt, dry	TOPSOIL FINE SAND ↓ 2'	
X	2	2/2/2/2	18/24	S-2 (2'-4')	Loose, brown to light brown, medium SAND, trace fine sand, dry	MEDIUM SAND	
X	5	3/3/4/5	14/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace(-) fine sand, dry	↓	
X	10	2/2/2/4	16/24	S-4 (10'-12')	Loose, light brown, medium SAND, trace(-) fine sand, dry	↓	
X	15	2/3/4/4	20/24	S-5 (15'-17')	Loose, light brown, fine SAND, trace(+) silt, dry	15' ↓ FINE SAND	
X	20	3/4/5/5	19/24	S-6 (20'-22')	Loose, light brown with rust mottling, fine SAND, trace silt, dry	↓	
X	25	4/5/6/7	23/24	S-7 (25'-27')	Medium dense, light brown with rust mottling, fine SAND, trace silt, dry	↓	
					End of exploration at 27'	↓	

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-7

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/15/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/15/2012	
TYPE BIT Hollow Stem Auger		SIZE &TYPE OF CORE BARREL		GROUND SURFACE ELEV. 95'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		DROP		FIRST	
SAMPLER		WATER LEVEL (FT.)		COMPL.	
HAMMER Auto		BORING		HR.	
Rod A 1 5/8" O.D.		LOCATION		Southwest corner of building	
WEIGHT 140 lbs.		DROP 30" (Wire Line)		ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1/1/1/2	14/24	S-1 (0-2')	Top 4": Very loose, dark brown, fine SAND, some silt, trace organics(roots), dry (TOPSOIL) Bottom 10": Very loose, brown, fine SAND, little medium sand, trace(+) silt, dry	TOPSOIL FINE SAND	
X	2	2/1/2/2	18/24	S-2 (2'-4')	Very loose, light brown, fine SAND, little medium sand, trace silt, dry	↓	
X	5	3/2/3/3	18/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace fine sand, dry	5' ↓ MEDIUM SAND	
X	10	4/5/7/6	19/24	S-4 (10'-12')	Medium dense, light brown with rust mottling, medium SAND, trace(-) coarse sand, dry	↓	
X	15	4/5/6/6	19/24	S-5 (15'-17')	Medium dense, light brown with rust mottling, fine SAND, trace silt, dry	15' ↓ FINE SAND	
X	20	4/4/6/6	20/24	S-6 (20'-22')	Medium dense, light brown, fine SAND, trace silt, dry	↓	
X	25	3/4/5/6	20/24	S-7 (25'-27')	Top 15": Loose, light brown with rust mottling, fine SAND, trace silt, dry Bottom 5": Loose, gray, fine SAND, little silt, moist	↓	
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-8

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/19/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/19/2012	
TYPE BIT Hollow Stem Auger		SIZE &TYPE OF CORE BARREL		No. Samples 7	
CASING		CASING HAMM.		TIME	
CASING HAMM.		WEIGHT		DROP	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		WATER LEVEL (FT.)	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		DROP 30" (Wire Line)	
				BORING LOCATION Southern portion of building	
				ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1/1/1/1	19/24	S-1 (0-2')	Top 8": Very loose, dark brown, fine SAND, little silt, trace organics(roots), dry (TOPSOIL) Bottom 11": Very loose, brown, fine SAND, little medium sand, trace silt, dry	TOPSOIL FINE SAND	
X	2	2/2/3/3	15/24	S-2 (2'-4')	Loose, brown, fine to medium SAND, little coarse sand, trace silt, dry		
X	5	3/2/3/4	20/24	S-3 (5'-7')	Loose, brown, fine SAND, trace medium sand, trace silt, dry		
X	10	3/3/3/3	23/24	S-4 (10'-12')	Loose, light brown, fine SAND, trace silt, dry		
X	15	2/2/3/4	20/24	S-5 (15'-17')	Loose, light brown, fine SAND, trace silt, dry		
X	20	4/4/5/6	21/24	S-6 (20'-22')	Loose, light brown, fine SAND, trace silt, dry		
X	25	6/6/6/8	19/24	S-7 (25'-27')	Medium dense, light brown, fine SAND, trace silt, dry		
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-9

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/19/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/19/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		No. Samples 7	
CASING		WATER LEVEL (FT.)		GROUND SURFACE ELEV. 94'	
CASING HAMM.		WEIGHT		UNDIST.	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		TIME	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		FIRST	
		DROP 30" (Wire Line)		COMPL.	
				HR.	
				BORING Central portion of building	
				LOCATION	
				ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1/1/1/2	15/24	S-1 (0-2')	Top 4": Very loose, dark brown, fine SAND, little silt, trace organics(roots), dry (TOPSOIL) Bottom 11": Very loose, orange-brown, fine SAND, trace silt, dry	TOPSOIL FINE SAND	
X	2	2/2/2/2	16/24	S-2 (2'-4')	Loose, brown, fine SAND, little medium sand, trace silt, dry	↓	
X	5	2/3/3/3	19/24	S-3 (5'-7')	Loose, brown, fine SAND, little medium sand, trace coarse sand, trace silt, dry		
X	10	3/3/3/4	20/24	S-4 (10'-12')	Loose, light brown, fine SAND, trace silt, dry		
X	15	3/3/3/3	22/24	S-5 (15'-17')	Loose, light brown, fine SAND, little medium sand, trace silt, dry		
X	20	2/3/3/3	17/24	S-6 (20'-22')	Loose, light brown, fine SAND, little medium sand, trace silt, dry		
X	25	2/4/4/4	21/24	S-7 (25'-27')	Loose, light brown, fine SAND, trace silt, dry		
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-10

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/19/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/19/2012	
TYPE BIT Hollow Stem Auger		SIZE &TYPE OF CORE BARREL		GROUND SURFACE ELEV. 94'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		TIME	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		WATER LEVEL (FT.)	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		DROP 30" (Wire Line)	
				BORING LOCATION Northern portion of building	
				ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
	5	1/1/1/2	16/24	S-1 (0-2')	Top 5": Very loose, dark brown, fine SAND, little silt, trace organics(roots), dry (TOPSOIL) Bottom 11": Very loose, brown, fine SAND, trace medium sand, trace silt, dry	TOPSOIL FINE SAND	
		2/1/2/3	18/24	S-2 (2'-4')	Very loose, brown, fine SAND, little medium to coarse sand, trace silt, dry	↓	
	5	3/3/3/3	17/24	S-3 (5'-7')	Loose, light brown, fine to medium SAND, trace silt, dry	5' FINE TO MEDIUM SAND	
	10	2/3/2/3	20/24	S-4 (10'-12')	Loose, light brown, fine SAND, trace silt, dry	10' FINE SAND	
	15	3/5/4/4	22/24	S-5 (15'-17')	Loose, light brown, fine SAND, trace silt, dry	↓	
	20	2/3/2/3	23/24	S-6 (20'-22')	Loose, light brown, fine to medium SAND, trace silt, dry	20' FINE TO MEDIUM SAND	
	25	2/3/6/6	16/24	S-7 (25'-27')	Loose, light brown, fine to medium SAND, trace silt, dry	↓	
					End of exploration at 27'		

Remarks:

O'REILLY, TALBOT & OKUN ASSOCIATES, INC.
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

LOG OF BORING PS-11

PROJECT : Plains Elementary School		LOCATION: South Hadley, MA		PROJECT NO. : 1843-06-01	
DRILLING CONTRACTOR Seaboard Environmental Drilling		FOREMAN Mike HELPER Doug		DATE STARTED 06/19/2012	
DRILLING EQUIPMENT Track Mounted Rig		COMPLETION DEPTH 27'		DATE FINISHED 06/19/2012	
TYPE BIT Hollow Stem Auger		SIZE & TYPE OF CORE BARREL		GROUND SURFACE ELEV. 98'	
CASING		No. Samples 7		UNDIST.	
CASING HAMM.		WEIGHT		DROP	
SAMPLER: 2" O.D. Split Spoon		Rod A 1 5/8" O.D.		BORING Southern portion of building	
SAMPLER HAMMER Auto		WEIGHT 140 lbs.		DROP 30" (Wire Line)	
				LOCATION ENGINEER/GEOLOGIST Steve McLaughlin	

SAMPLES	DEPTH FT.	SAMPLES			DESCRIPTION	SOIL DESCRIPTION	REMARKS
		PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/ NO.			
X	0	1/1/1/2	18/24	S-1 (0-2')	Top 6": Very loose, dark brown, fine SAND, some silt, trace organics(roots), dry (TOPSOIL) Bottom 12": Very loose, light brown, fine SAND, little medium sand, trace(+) silt, dry	TOPSOIL FINE SAND ↓ 2'	
X	2	2/2/2/2	16/24	S-2 (2'-4')	Loose, light brown, medium SAND, trace fine sand, trace(-) coarse sand, dry	MEDIUM SAND	
X	5	3/4/4/6	16/24	S-3 (5'-7')	Loose, light brown, medium SAND, trace(-) coarse sand, dry	↓ 10'	
X	10	3/3/4/4	22/24	S-4 (10'-12')	Loose, light brown, fine SAND, trace silt, dry	FINE SAND	
X	15	4/4/4/4	23/24	S-5 (15'-17')	Top 20": Loose, light brown, fine SAND, trace(+) silt, dry Bottom 3": Loose, gray, fine SAND, little silt, dry	↓ 20'	
X	20	2/4/3/4	22/24	S-6 (20'-22')	Loose, light brown, medium SAND, trace fine sand, dry	MEDIUM SAND	
X	25	2/3/4/4	20/24	S-7 (25'-27')	Loose, light brown, medium SAND, trace fine sand, dry	↓	
End of exploration at 27'							

Remarks:

TEST PIT LOGS

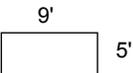
TEST PIT LOG

O'Reilly, Talbot & Okun Associates, Inc. 293 Bridge Street, Suite 500 Springfield, Massachusetts 01103 (413) 788-6222	PROJECT Description: Plains Elementary School Location: South Hadley, MA	Test Pit No. TP-1 Job No.: 1843-06-01 Date: June 19, 2012
---	---	---

Engineer/Geologist: Steve McLaughlin Weather: Partly Cloudy, 60s Operator: Chet	Contractor: Seaboard Env. Backhoe: CAT 420 Capacity: 1/4 yds ³	Ground Elev: 94' Start: 09:30 a.m. Finish: 10:00 a.m.
---	---	---

DEPTH (ft.)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT	REMARKS
8" (TOPSOIL)	Dark brown, fine SAND, some silt, little organics(roots), dry	E	0	
	Brown, fine SAND, little medium sand, trace(+) silt, trace(-) coarse sand, dry	E	0	
5	Light brown, medium SAND, trace fine sand, dry	E	0	
10	End of exploration at 9'			

REMARKS:

PLAN 	LEGEND 	EFFORT E = Easy M = Moderate D = Difficult
---	---	---

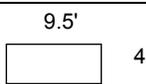
TEST PIT LOG

O'Reilly, Talbot & Okun Associates, Inc. 293 Bridge Street, Suite 500 Springfield, Massachusetts 01103 (413) 788-6222	PROJECT Description: Plains Elementary School Location: South Hadley, MA	Test Pit No. TP-2 Job No.: 1843-06-01 Date: June 19, 2012
--	---	---

Engineer/Geologist: Steve McLaughlin Weather: Partly Cloudy, 60s Operator: Chet	Contractor: Seaboard Env. Backhoe: CAT 420 Capacity: 1/4 yds ³	Ground Elev: 94' Start: 11:00 a.m. Finish: 11:30 a.m.
---	---	---

DEPTH (ft.)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT	REMARKS
8" (TOPSOIL)	Dark brown, fine SAND, some silt, trace(+) organics(roots), dry	E	0	
	Brown, fine SAND, little medium sand, trace(+) silt, trace coarse sand, dry	E	0	
5	Light brown, medium SAND, trace fine sand, dry	E	0	
10	End of exploration at 9.5'			

REMARKS:

PLAN 	LEGEND 	EFFORT E = Easy M = Moderate D = Difficult
---	---	---

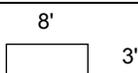
TEST PIT LOG

O'Reilly, Talbot & Okun Associates, Inc. 293 Bridge Street, Suite 500 Springfield, Massachusetts 01103 (413) 788-6222	PROJECT Description: Plains Elementary School Location: South Hadley, MA	Test Pit No. TP-4 Job No.: 1843-06-01 Date: June 19, 2012
--	---	---

Engineer/Geologist: Steve McLaughlin	Contractor: Seaboard Env.	Ground Elev: 96'
Weather: Partly Cloudy, 60s	Backhoe: CAT 420	Start: 12:29 p.m.
Operator: Chet	Capacity: 1/4 yds ³	Finish: 12:33 p.m.

DEPTH (ft.)	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT	REMARKS
8" (TOPSOIL)	Dark brown, fine SAND, some silt, trace organics(roots), dry	E	0	
	Brown, fine SAND, little medium sand, trace(+) silt, dry	E	0	
5	Light brown, medium SAND, trace(-) fine sand, dry	E	0	
10	End of exploration at 8'			

REMARKS:

PLAN 	LEGEND 	EFFORT E = Easy M = Moderate D = Difficult
---	---	---

TEST PIT PHOTOGRAPHS



Test Pit 1



Test Pit 2



Test Pit 3



Test Pit 4

4.1.2 - D BUILDING ANALYSIS AND NARRATIVES

Please see the following narratives included in this section focusing on the building.

Code Analysis:

Please see the attached updated report from *R.W. Sullivan*.

Massing Study:

Please see images included in the Introduction, as well as images contained in the Schematic Design Drawings.

Building Systems:

- Sustainable Design Elements: The building is designed to achieve a LEED Silver rating. Some of the key components include:
 - o Keeping as much of the building's structure and systems exposed to be used as a teaching element, with an emphasis on sustainability
 - o Utilizing steel with recycled content for the structure
 - o Utilizing rain gardens and bio-swales for storm-water treatment
 - o Providing adequate daylight and access to views
 - o The building envelope will be extremely well insulated
 - o Highly efficient HVAC systems
- Building Structure – *please see the narrative from Ryan Hellwig.*
- Plumbing, HVAC & Fire Protection – *please see the narrative from Hesnor Engineering.*
- Electrical and Information Technology – *please see the narrative from A.R.T. Engineering.*

LEED-S Documents:

This is an acknowledgement that the **South Hadley School District** has identified a goal of **2%** additional reimbursement from the MSBA High Efficiency Green School Program. As their Designer, I have submitted a completed **LEED** scorecard showing **50 - 88** attempted points, which will meet that goal.

LEED 2009 for Schools New Construction and Major Renovations		NEW SCHOOL AT PLAINS	
Project Checklist		Apr-12	
13	6	5	Sustainable Sites Possible Points: 24
Y	7	N	
Y			Prereq 1 Construction Activity Pollution Prevention
Y			Prereq 2 Environmental Site Assessment
		1	Credit 1 Site Selection 1
		4	Credit 2 Development Density and Community Connectivity 4
		1	Credit 3 Brownfield Redevelopment 1
4			Credit 4.1 Alternative Transportation—Public Transportation Access 4
		1	Credit 4.2 Alternative Transportation—Bicycle Storage and Changing Rooms 1
2			Credit 4.3 Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles 2
2			Credit 4.4 Alternative Transportation—Parking Capacity 2
1			Credit 5.1 Site Development—Protect or Restore Habitat 1
1			Credit 5.2 Site Development—Maximize Open Space 1
1			Credit 6.1 Stormwater Design—Quantity Control 1
1			Credit 6.2 Stormwater Design—Quality Control 1
1			Credit 7.1 Heat Island Effect—Non-roof 1
1			Credit 7.2 Heat Island Effect—Roof 1
1			Credit 8 Light Pollution Reduction 1
1			Credit 9 Site Master Plan 1
1			Credit 10 Joint Use of Facilities 1
4	7	0	Water Efficiency Possible Points: 11
Y			Prereq 1 Water Use Reduction—20% Reduction
2	2		Credit 1 Water Efficient Landscaping 2 to 4
2	2		Credit 2 Innovative Wastewater Technologies 2
2	2		Credit 3 Water Use Reduction 2 to 4
1			Credit 3 Process Water Use Reduction 1
12	11	10	Energy and Atmosphere Possible Points: 33
Y			Prereq 1 Fundamental Commissioning of Building Energy Systems
Y			Prereq 2 Minimum Energy Performance
Y			Prereq 3 Fundamental Refrigerant Management
9	5	5	Credit 1 Optimize Energy Performance 1 to 19
2	5		Credit 2 On-Site Renewable Energy 1 to 7
2			Credit 3 Enhanced Commissioning 2
1			Credit 4 Enhanced Refrigerant Management 1
2			Credit 5 Measurement and Verification 2
2			Credit 6 Green Power 2
3	5	5	Materials and Resources Possible Points: 13
Y			Prereq 1 Storage and Collection of Recyclables
		2	Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof 1 to 2
		1	Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements 1
		2	Credit 2 Construction Waste Management 1 to 2
16	1	2	Materials and Resources, Continued
Y			Prereq 1 Materials Reuse 1 to 2
1	1	2	Credit 3 Recycled Content 1 to 2
1	1		Credit 4 Regional Materials 1 to 2
1	1		Credit 5 Rapidly Renewable Materials 1
1	1		Credit 6 Certified Wood 1
16	1	2	Indoor Environmental Quality Possible Points: 19
Y			Prereq 1 Minimum Indoor Air Quality Performance
Y			Prereq 2 Environmental Tobacco Smoke (ETS) Control
Y			Prereq 3 Minimum Acoustical Performance
1			Credit 1 Outdoor Air Delivery Monitoring 1
1			Credit 2 Increased Ventilation 1
1			Credit 3.1 Construction IAQ Management Plan—During Construction 1
1			Credit 3.2 Construction IAQ Management Plan—Before Occupancy 1
4			Credit 4 Low-Emitting Materials 1 to 4
1			Credit 5 Indoor Chemical and Pollutant Source Control 1
1			Credit 6.1 Controllability of Systems—Lighting 1
1			Credit 6.2 Controllability of Systems—Thermal Comfort 1
1			Credit 7.1 Thermal Comfort—Design 1
1			Credit 7.2 Thermal Comfort—Verification 1
1	1	1	Credit 8.1 Daylight and Views—Daylight 1 to 3
1			Credit 8.2 Daylight and Views—Views 1
1			Credit 9 Enhanced Acoustical Performance 1
1			Credit 10 Mold Prevention 1
2	4	0	Innovation and Design Process Possible Points: 6
1			Credit 1.1 Innovation in Design: Specific Title 1
1			Credit 1.2 Innovation in Design: Specific Title 1
1			Credit 1.3 Innovation in Design: Specific Title 1
1			Credit 1.4 Innovation in Design: Specific Title 1
1			Credit 2 LEED Accredited Professional 1
1			Credit 3 The School as a Teaching Tool 1
4	0	0	Regional Priority Credits Possible Points: 4
1			Credit 1.1 Regional Priority: Specific Credit 1
1			Credit 1.2 Regional Priority: Specific Credit 1
1			Credit 1.3 Regional Priority: Specific Credit 1
1			Credit 1.4 Regional Priority: Specific Credit 1
50	38	22	Total Possible Points: 110
Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110			

The scope of work for this project will include the construction elements and performance tasks to achieve that goal, and all subsequent documents, including but not limited to, specifications, drawings and cost estimates will match the scope of work indicated in the submitted scorecard.

Margo Jones, AIA
Margo Jones Architects, Inc

ADA and MAAB Compliance:

Please see the attached Code Analysis provided by *R.W. Sullivan*.

Appendix D

Underground Storm Drainage System Sizing Calculations

**PROPOSED CONDITIONS
 PLAINS ELEMANTRY SCHOOL
 "C" COEFFICIENTS**

GRASS=	0.20
PAVEMENT=	0.90

INLET NO.	TOTAL AREA (SF)	IMPERVIOUS AREA (SF)	TOT. AREA (AC)	C
CB #1	5335	4396	0.12	0.78
CB #3	6824	6771	0.16	0.89
CB #4	14020	8716	0.32	0.64
CB #7	6889	4181	0.16	0.62
CB #8	7815	4787	0.18	0.63
CB #10	5257	3384	0.12	0.65

PIPE REPORT - 10-YEAR STORM

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Material	Manning's n	Diameter (in)	Upstream CA (acres)	System CA (acres)	System Intensity (in/h)	Flow (ft ³ /s)	Length (ft)	Slope (ft/ft)	Capacity (Full Flow) (ft ³ /s)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Velocity (Average) (ft/s)
CO-1	INF SYS #2	92.83	CB-7	92.62	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0	0	5.807	0.28	41	0.005	1.84	97	96.6	93.1	93.01	1.69
CO-2	CB-7	92.52	DMH-9	92.22	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.099	0.099	5.713	0.85	61	0.005	1.8	96.6	96.27	93.01	92.8	2.26
CO-3	CB-8	92.4	DMH-9	92.22	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.113	0.113	5.807	0.66	35	0.005	1.85	95.6	96.27	92.86	92.8	2.16
CO-4	DMH-9	92.12	DMH-10	91.79	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.213	0.213	5.608	1.48	66	0.005	1.82	96.27	97.15	92.8	92.34	2.58
CO-5	CB-10	93	DMH-10	92.49	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.078	0.078	5.807	0.46	51	0.01	2.57	96.35	97.15	93.28	92.77	2.47
CO-6	DMH-10	91.69	OF-1	91.5	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.02	18	0.291	0.291	5.509	1.89	38	0.005	4.83	97.15	93	92.34	92.02	2.57
CO-7	CB-1	92.56	DMH-2	91.9	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.094	0.094	5.807	0.55	33	0.02	3.64	96.64	96	92.87	92.16	3.34
CO-8	DMH-2	90.48	STS-5	90.38	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.441	0.441	5.755	2.56	5	0.02	3.64	96	96.15	91.17	91.01	5.02
CO-9	STS-5	90.28	DMH-6	89.76	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.441	0.441	5.751	2.56	26	0.02	3.64	96.15	95.63	90.97	90.38	5.02
CO-11	DMH-6	86.08	EXISTING PIPE	86.03	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	15	0.441	0.441	5.731	2.55	10	0.005	3.3	95.63	87.28	86.83	86.67	2.97
CO-12	CB-3	91.8	CB-4	90.96	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.142	0.142	5.807	0.83	37	0.023	3.88	94.8	94.8	92.18	91.57	3.93
CO-13	CB-4	90.96	DMH-2	90.58	Corrugated HDPE 12-15 inch (Corrugated Interior)	0.018	12	0.347	0.347	5.77	2.02	19	0.02	3.64	94.8	96	91.57	91.11	4.75

CATCH BASIN REPORT - 10-YEAR STORM

Label	Inlet Drainage Area (acres)	Inlet C	Local CA (acres)	External CA (acres)	System CA (acres)	Total Inlet Tc (min)	External Tc (min)	System Flow Time (min)	System Intensity (in/h)	System Rational Flow (ft ³ /s)	System Known Flow (ft ³ /s)	System Additional Flow (ft ³ /s)	Elevation (Rim) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Local Intensity (in/h)	Local Rational Flow (ft ³ /s)	Elevation (Invert) (ft)	Inlet	Inlet Location	Elevation (Inv In) (ft)	Elevation (Inv Out) (ft)
INF SYS #2	(N/A)	(N/A)	0	0	0	0	0	5	5.807	0	0.28	0	97	93.1	93.1	5.807	0	92.83	MA GRATE	On Grade	(N/A)	92.83
CB-7	0.16	0.62	0.099	0	0.099	5	0	5.404	5.713	0.57	0.28	0	96.6	93.01	93.01	5.807	0.58	88.52	MA GRATE	In Sag	92.62	92.52
CB-8	0.18	0.63	0.113	0	0.113	5	0	5	5.807	0.66	0	0	95.6	92.86	92.86	5.807	0.66	88.4	MA GRATE	In Sag	(N/A)	92.4
CB-10	0.12	0.65	0.078	0	0.078	5	0	5	5.807	0.46	0	0	96.35	93.28	93.28	5.807	0.46	89	MA GRATE	In Sag	(N/A)	93
CB-1	0.12	0.78	0.094	0	0.094	5	0	5	5.807	0.55	0	0	96.64	92.87	92.87	5.807	0.55	88.56	MA GRATE	In Sag	(N/A)	92.56
CB-3	0.16	0.89	0.142	0	0.142	5	0	5	5.807	0.83	0	0	94.8	92.18	92.18	5.807	0.83	87.8	MA GRATE	In Sag	(N/A)	91.8
CB-4	0.32	0.64	0.205	0	0.347	5	0	5.157	5.77	2.02	0	0	94.8	91.57	91.57	5.807	1.2	86.96	MA GRATE	In Sag	90.96	90.96

DRAINAGE MANHOLE REPORT - 10 YEAR STORM

Label	System CA (acres)	System Flow Time (min)	System Intensity (in/h)	System Rational Flow (ft ³ /s)	Elevation (Rim) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation (Invert In) (ft)	Elevation (Invert Out) (ft)
DMH-9	0.213	5.852	5.608	1.2	96.27	92.8	92.8	92.22	92.12
DMH-10	0.291	6.278	5.509	1.61	97.15	92.34	92.34	92.49	91.69
DMH-2	0.441	5.223	5.755	2.56	96	91.17	91.17	90.58	90.48
STS-5	0.441	5.24	5.751	2.56	96.15	90.97	90.97	90.38	90.28
DMH-6	0.441	5.326	5.731	2.55	95.63	86.83	86.83	89.76	86.08

Appendix E

72 Hour Drawdown Calculations



REQUIRED RECHARGE VOLUME

$$Rv = F * IMPERVIOUS AREA$$

$$F = 0.6 \text{ INCH}$$

TOTAL SITE

$$\text{TOTAL SITE IMPERVIOUS} = 102200.4 \text{ SF}$$

$$Rv = 5110.019 \text{ CF}$$

RAIN GARDEN #1

$$\text{CONTRIBUTING IMPERVIOUS} = 9374.99 \text{ SF}$$

$$Rv = 468.7495 \text{ CF}$$

RAIN GARDEN #2

$$\text{CONTRIBUTING IMPERVIOUS} = 29336.19 \text{ SF}$$

$$Rv = 1466.81 \text{ CF}$$

RAIN GARDEN #3

$$\text{CONTRIBUTING IMPERVIOUS} = 16383.48 \text{ SF}$$

$$Rv = 819.174 \text{ CF}$$

INFILTRATION BASIN #1

$$\text{CONTRIBUTING IMPERVIOUS} = 21170.16 \text{ SF}$$

$$Rv = 1058.508 \text{ CF}$$

INFILTRATION BASIN #2

$$\text{CONTRIBUTING IMPERVIOUS} = 33759 \text{ SF}$$

$$Rv = 1687.95 \text{ CF}$$

INFILTRATION SYSTEM #1

$$\text{CONTRIBUTING IMPERVIOUS} = 21170.16 \text{ SF}$$

$$Rv = 1058.508 \text{ CF}$$

INFILTRATION SYSTEM #2

$$\text{CONTRIBUTING IMPERVIOUS} = 13547.16 \text{ SF}$$

$$Rv = 677.358 \text{ CF}$$

72 HOUR DRAWDOWN

$$\text{Time drawdown} = \frac{Rv}{(K)(\text{Bottom Area})}$$

$$K = 2.41 \text{ inches/hour}$$

RAIN GARDEN #1

BOTTOM POND AREA= 369.1 SF
Rv= 468.7495 CF
T drawdown= 6.32355 hours

RAIN GARDEN #2

BOTTOM POND AREA= 200.63 SF
Rv= 1466.81 CF
T drawdown= 36.40341 hours

RAIN GARDEN #3

BOTTOM POND AREA= 231.2 SF
Rv= 819.174 CF
T drawdown= 17.64219 hours

INFILTRATION BASIN #1

BOTTOM POND AREA= 206.85 SF
Rv= 1058.508 CF
T drawdown= 25.4802 hours

INFILTRATION BASIN #2

BOTTOM POND AREA= 1529.08 SF
Rv= 1687.95 CF
T drawdown= 5.496593 hours

INFILTRATION SYSTEM #1

BOTTOM POND AREA= 1947.14 SF
Rv= 1058.508 CF
T drawdown= 2.706831 hours

INFILTRATION SYSTEM #2

BOTTOM POND AREA= 916.67 SF
Rv= 677.358 CF
T drawdown= 3.679336 hours

Appendix F

TSS Removal Calculations



INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	Infiltration Basin	0.80	0.75	0.60	0.15
		0.00	0.15	0.00	0.15
		0.00	0.15	0.00	0.15
		0.00	0.15	0.00	0.15

Total TSS Removal =

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
TSS Removal Calculation Worksheet	Subsurface Infiltration Structure	0.80	1.00	0.80	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20

Total TSS Removal =

**Separate Form Needs to
be Completed for Each
Outlet or BMP Train**

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E)
which enters the BMP

Appendix G

Required Water Quality Calculations



REQUIRED WATER QUALITY VOLUME

(V_{wq})

$$V_{wq} = (\text{Dwq}/12 \text{ inches/foot}) * (\text{Impervious Area} * 43560 \text{ SF/ACRE})$$

Dwq= 0.5

TOTAL SITE CONTRIBUTING IMPERVIOUS= 2.346 acre

REQUIRED V_{wq}= 4,258 CF

IMPERVIOUS AREA
CONTRIBUTING TO RAIN GARDEN #1= 0.215 acres

REQUIRED VWQ= 391 CF

IMPERVIOUS AREA
CONTRIBUTING TO RAIN GARDEN #2= 0.673 acres

REQUIRED VWQ= 1,222 CF

IMPERVIOUS AREA
CONTRIBUTING TO RAIN GARDEN #3= 0.376 acres

REQUIRED VWQ= 683 CF

IMPERVIOUS AREA
CONTRIBUTING TO INFILTRATION BASIN #1 0.486 acres

REQUIRED VWQ= 882 CF

IMPERVIOUS AREA
CONTRIBUTING TO INFILTRATION BASIN #2 0.775 acres

REQUIRED VWQ= 1,407 CF

IMPERVIOUS AREA
CONTRIBUTING INFILTRATION SYSTEM #1= 0.4859981 acres

REQUIRED VWQ= 882 CF

IMPERVIOUS AREA
CONTRIBUTING INFILTRATION SYSTEM #2= 0.3109988 acres

REQUIRED VWQ= 564 CF

Appendix H

Inspection and Maintenance Log Form



**Construction Administration Reporting Documents
Inspection and Maintenance Report Form**

To be completed every 7 calendar days

Inspector: _____ Report Date: _____

Inspector's Title: _____

1. Summary of Previous 7-day Rainfall:

Date	Saturday Date: _____	Sunday Date: _____	Monday Date: _____	Tuesday Date: _____	Wednesday Date: _____	Thursday Date: _____	Friday Date: _____
Total Daily Rainfall (in.)							

2. Stabilization Measures:

Area	Disturbed (Yes/No)	Stabilized (Yes/No)	Stabilized With	Condition
Parking Area & Sidewalk				
Building Areas				
Tank Farm Area				
Rain Garden #1				
Rain Garden #2				
Rain Garden #3				
Infiltration Basin #1				
Infiltration Basin #2				

Rain Garden #1

Depth of Rain Garden	Condition of Side Slopes	Evidence of Overtopping of Embankments	Condition of Outfall

Rain Garden #2

Depth of Rain Garden	Condition of Side Slopes	Evidence of Overtopping of Embankments	Condition of Basin Spillway & Outlet

**Construction Administration Reporting Documents
Inspection and Maintenance Report Form**

Rain Garden #3

Depth of Rain Garden	Condition of Side Slopes	Evidence of Overtopping of Embankments	Condition of Basin Spillway & Outlet

Infiltration Basin #1

Depth of Basin	Condition of Side Slopes	Evidence of Overtopping of Embankments	Condition of Basin Spillway & Outlet

Infiltration Basin #2

Depth of Basin	Condition of Side Slopes	Evidence of Overtopping of Embankments	Condition of Basin Spillway & Outlet

Remarks: _____

Maintenance Required for Sediment Forbay & Dry Detention Basin: _____

To be performed by: _____ On or before: _____

3. Construction Entrance:

General condition: _____

**Construction Administration Reporting Documents
Inspection and Maintenance Report Form**

Maintenance Required for Silt Fence: _____

To be performed by: _____ On or before: _____

6. Changes Required to the Erosion Control Plan:

Reasons for Changes:

7. General Remarks:

**Construction Administration Reporting Documents
Inspection and Maintenance Report Form**

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____

Date: _____

Appendix I

Operation and Maintenance Log Form



Operation and Maintenance Log Form

Project/Location: _____

“As Built” Plans Available? _____

Date/Time: _____

Days Since Previous Rainfall and Rainfall Amount: _____

Inspector: _____

Maintenance Item	Satisfactory	Unsatisfactory	Comments
1. Parking Area & Sidewalk Sweeping			
<ul style="list-style-type: none"> • Sand and debris been removed 			
2. Deep Sump Catch Basins			
<ul style="list-style-type: none"> • Sump clean of all sedimentation 			
3. Rain Garden #1			
<ul style="list-style-type: none"> • Vegetation coverage adequate • Undesirable vegetative growth • Undesirable woody vegetation • Mowing performed as necessary • Embankment in good repair • No evidence of erosion • Low flow channels clear of obstructions • Standing water or wet spots • Sediment and/or trash accumulation • Outlet Control Structure Good Condition • Fence and access points in good condition, no damage, and locks and gates function properly • Other (specify) 			
4. Rain Garden #2			
<ul style="list-style-type: none"> • Vegetation coverage adequate • Undesirable vegetative growth • Undesirable woody vegetation • Mowing performed as necessary • Embankment in good repair • No evidence of erosion • Low flow channels clear of obstructions • Standing water or wet spots • Sediment and/or trash accumulation 			

Maintenance Item	Satisfactory	Unsatisfactory	Comments
<ul style="list-style-type: none"> Outlet Control Structure Good Condition 			
<ul style="list-style-type: none"> Fence and access points in good condition, no damage, and locks and gates function properly 			
<ul style="list-style-type: none"> Other (specify) 			
5. Rain Garden #3			
<ul style="list-style-type: none"> Vegetation coverage adequate 			
<ul style="list-style-type: none"> Undesirable vegetative growth 			
<ul style="list-style-type: none"> Undesirable woody vegetation 			
<ul style="list-style-type: none"> Mowing performed as necessary 			
<ul style="list-style-type: none"> Embankment in good repair 			
<ul style="list-style-type: none"> No evidence of erosion 			
<ul style="list-style-type: none"> Low flow channels clear of obstructions 			
<ul style="list-style-type: none"> Standing water or wet spots 			
<ul style="list-style-type: none"> Sediment and/or trash accumulation 			
<ul style="list-style-type: none"> Outlet Control Structure Good Condition 			
<ul style="list-style-type: none"> Fence and access points in good condition, no damage, and locks and gates function properly 			
<ul style="list-style-type: none"> Other (specify) 			
6. Infiltration Basin #1			
<ul style="list-style-type: none"> Vegetation coverage adequate 			
<ul style="list-style-type: none"> Undesirable vegetative growth 			
<ul style="list-style-type: none"> Undesirable woody vegetation 			
<ul style="list-style-type: none"> Mowing performed as necessary 			
<ul style="list-style-type: none"> Embankment in good repair 			
<ul style="list-style-type: none"> No evidence of erosion 			
<ul style="list-style-type: none"> Standing water or wet spots 			
<ul style="list-style-type: none"> Sediment and/or trash accumulation 			
<ul style="list-style-type: none"> Outlet Control Structure Good Condition 			
<ul style="list-style-type: none"> Other (specify) 			
7. Infiltration Basin #2			
<ul style="list-style-type: none"> Vegetation coverage adequate 			
<ul style="list-style-type: none"> Undesirable vegetative growth 			
<ul style="list-style-type: none"> Undesirable woody vegetation 			
<ul style="list-style-type: none"> Mowing performed as necessary 			
<ul style="list-style-type: none"> Embankment in good repair 			
<ul style="list-style-type: none"> No evidence of erosion 			
<ul style="list-style-type: none"> Standing water or wet spots 			
<ul style="list-style-type: none"> Sediment and/or trash accumulation 			
<ul style="list-style-type: none"> Outlet Control Structure Good Condition 			
<ul style="list-style-type: none"> Other (specify) 			

Maintenance Item	Satisfactory	Unsatisfactory	Comments
8. Stormwater Infiltration System #1			
<ul style="list-style-type: none"> • Meet requirements of the Cultec O&M Guidelines 			
<ul style="list-style-type: none"> • Other (specify) 			
9. Stormwater Infiltration System #2			
<ul style="list-style-type: none"> • Meet requirements of the Cultec O&M Guidelines 			
<ul style="list-style-type: none"> • Other (specify) 			

Source: Adapted from Watershed Management Institute, Inc. 1997. *Operation, Maintenance, and Management of Stormwater Management Systems*. In cooperation with U.S. Environmental Protection Agency, Office of Water. Washington, D.C.

Appendix J

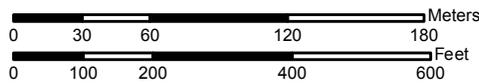
NRCS Soils Mapping



Custom Soil Resource Report Map—Hydrologic Soil Group



Map Scale: 1:3,270 if printed on A size (8.5" x 11") sheet.



72° 34' 12"

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Soil Ratings

 A

 A/D

 B

 B/D

 C

 C/D

 D

 Not rated or not available

Political Features

 Cities

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

MAP INFORMATION

Map Scale: 1:3,270 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 6, Jun 11, 2008

Date(s) aerial images were photographed: 7/30/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Appendix K

Site Plans (12 Sheets)

