

**PRELIMINARY DRAINAGE ANALYSIS
FOR**

**Bohlander Meadows Subdivision
Keizer, Oregon**

**Owner:
Trademark Enterprises
PO Box 5248
Salem, Or 97304**

October 23, 2023



renew date: 6.30.2025



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INTRODUCTION

This project is located between Oppek St NE and Camden St NE in Keizer Oregon. The proposal is to divide the existing parcel into a subdivision containing 10 new parcels, extend Oppek St, and create a small access road for some of the new parcels.



Figure 1: Aerial image of subject property

EXISTING CONDITIONS

The project site is 1.5 acres overall and rectangular in shape. The property slopes to the southeast with only about a 2 ft elevation difference over the full area. The surface conditions primarily include a variety of trees and short grass without any areas of specific concern.

The hydrologic soil group was determined using the Natural Resources Conservation Service (NRCS) Web Soil Survey. The survey identified only Amity silt loam and Woodburn silt loam in the project area. This means that soil group C will be used in all hydrologic calculations. The infiltration rate for the growing medium will be estimated for this design at 2 in/hr. The infiltration rate used for the preliminary design is based on field data collected for the Briar Rd project. That project recorded an average infiltration rate of 10.5 in/hr so, in accordance with the City of Keizer's guidelines, the design value will be one half the recorded value at 5.25 in/hr. Site specific testing will be completed prior to the final design.

AREA SUMMARY

Since this site has multiple infiltration planters, delineation of smaller basins is required for proper sizing. Runoff from the new road was attributed based on elevation and then an additional 600 sq-ft was added for each lot's driveway likely to drain to that planter. Under the current plans roofs would be handled separately per Oregon state law Chapter 340, Division 44, Section 18.

Table 1. Drainage Areas

Infiltration Planter	Roadway (ft ²)	Driveways Attributed	+ Driveways (ft ²)
1	4775	4	7175
2	2330	1	2930
3	2620	2	3820
4	1200	1	1800
5	2655	2	3855
Total Impervious Area:	13580	10	19580

EXPLANATION OF DESIGN

The current project proposal specifies 5 separate planter boxes along the new road. Infiltration planter boxes will treat water on site by forcing stormwater to seep through a growing medium, which reduces contamination, before detention and infiltration. The city's guidelines specify that these planter boxes contain a minimum of 12 inches of growing medium and that the maximum depth for the water quality storm does not exceed 4 inches.

STORMWATER ANALYSIS

Stormwater analysis is conducted using HydroCAD 10.20 and the unit hydrograph in SCS TR-20. The storm is a type 1A 24-hr based on the location and the City of Keizer specifies analysis up to the 100-yr storm event along with water quality considerations of the 24-hr rainfall depths, which are 4.4 inches and 1.38

inches for the 100 year and water quality events, respectively. A time of concentration of 5 minutes was used for this analysis.

WATER QUALITY

In this analysis the primary outflow shows water passing through the growing medium and the secondary outflow represents water passing through the overflow structure. For proper treatment the overflow structure should not be used during the water quality event.

Table 2. Water Quality Results

Planter Box	Peak Elevation (ft)	Peak Primary Outflow (cfs)	Peak Secondary Outflow (cfs)
1	182.22	0.02	0
2	182.11	0.01	0
3	182.19	0.01	0
4	182.07	0.01	0
5	182.12	0.01	0

This summary shows the maximum water height was 182.22 feet across the five planter boxes. Considering that the maximum water height allowed by the city is 4 inches above the growing medium or 182.33 feet, these planter boxes should have sufficient surface area to manage the water quality event. The hydrographs used to create this summary table can be found in Appendix C.

WATER QUANTITY

In this design the growing medium has a design infiltration rate less than half that of the natural underlying soil. For this reason, a bypass is required to prevent the upper section of the planter from being flooded while the bottom section isn't being fully utilized. To avoid this situation a 2.5 ft by 2.5 ft by 2 ft rock box will be set with its rim 4 inches above the top of the growing medium. Below the growing media is a small layer of open graded aggregate before a rock gallery between one and four feet thick. The top of the rock gallery is at an elevation of 180.50 ft and the water levels in each planter are shown below with this design.

Table 3. Water Quantity Results

Planter Box	Peak Elevation (ft)	Storage
1	180.43	360
2	180.12	97
3	180.43	176
4	180.32	37
5	180.32	137

This summary shows that during a 100-yr storm event the water level in each planter will near but not exceed the 180.50 ft height limit. The hydrographs from which this summary was created can be found in Appendix D.

OPERATIONS AND MAINTENANCE

These facilities will handle runoff from public streets and therefore the city of Keizer will be responsible for all maintenance. Since the city of Keizer does not have standard maintenance forms; the city of Salems standard forms have been included along with a maintenance plan for drywells and soakage trenches in Appendix E.

CONCLUSIONS

Based on the planter box dimensions shown in Table 4 and the contributing areas calculated draining to each facility, the proposed design is able to meet the City of Keizer Design standards for providing water quality treatment and complete infiltration of the 100 year storm event.

Table 4. Planter Dimensions

Infiltration Planter	Square Footage (ft ²)	Depth (ft)
1	350	3.5
2	200	2
3	200	3
4	150	1
5	250	2

These facilities should be adequate to meet both water quality and quantity design requirements as shown. If there are any questions, please contact Brenden Jack at BJack@mtengineering.net or Natalie Janney at NJanney@mtengineering.net.

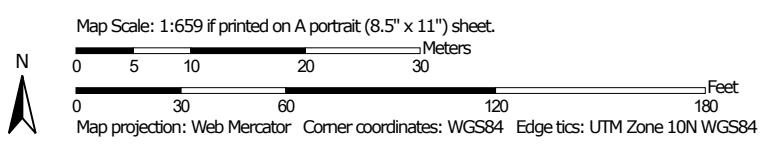


APPENDIX A: NRCS WEB SOIL SURVEY INFORMATION

Soil Map—Marion County Area, Oregon
(Bohlander)



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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 map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Marion County Area, Oregon

Survey Area Data: Version 21, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 1, 2018—Aug 31, 2018

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Am	Amity silt loam	0.5	31.7%
WuA	Woodburn silt loam, 0 to 3 percent slopes	1.1	68.3%
Totals for Area of Interest		1.6	100.0%

Marion County Area, Oregon

Am—Amity silt loam

Map Unit Setting

National map unit symbol: 24ns
Elevation: 120 to 350 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 190 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Amity and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amity

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Mixed silty alluvium

Typical profile

H1 - 0 to 24 inches: silt loam
H2 - 24 to 37 inches: silty clay loam
H3 - 37 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R002XC007OR - Valley Swale Group
Forage suitability group: Somewhat Poorly Drained (G002XY005OR)
Other vegetative classification: Somewhat Poorly Drained (G002XY005OR)

Hydric soil rating: No

Minor Components

Concord

Percent of map unit: 5 percent

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Poorly Drained (G002XY006OR)

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Marion County Area, Oregon

Survey Area Data: Version 21, Sep 8, 2023

Marion County Area, Oregon

WuA—Woodburn silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 24s3

Elevation: 150 to 350 feet

Mean annual precipitation: 40 to 45 inches

Mean annual air temperature: 52 to 54 degrees F

Frost-free period: 200 to 210 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Woodburn and similar soils: 85 percent

Minor components: 1 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Silty alluvium and mixed mineralogy loess

Typical profile

H1 - 0 to 17 inches: silt loam

H2 - 17 to 32 inches: silty clay loam

H3 - 32 to 68 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water

(Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 25 to 32 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2w

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C

Ecological site: R002XC008OR - Valley Terrace Group

Forage suitability group: Moderately Well Drained < 15% Slopes
(G002XY004OR)

Other vegetative classification: Moderately Well Drained < 15%
Slopes (G002XY004OR)

Hydric soil rating: No

Minor Components

Aquolls, somewhat poorly drained

Percent of map unit: 1 percent

Landform: Terraces

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Marion County Area, Oregon

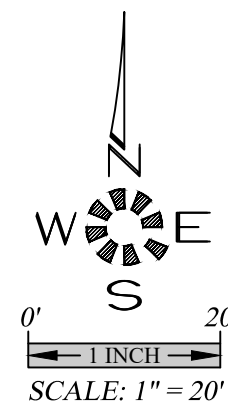
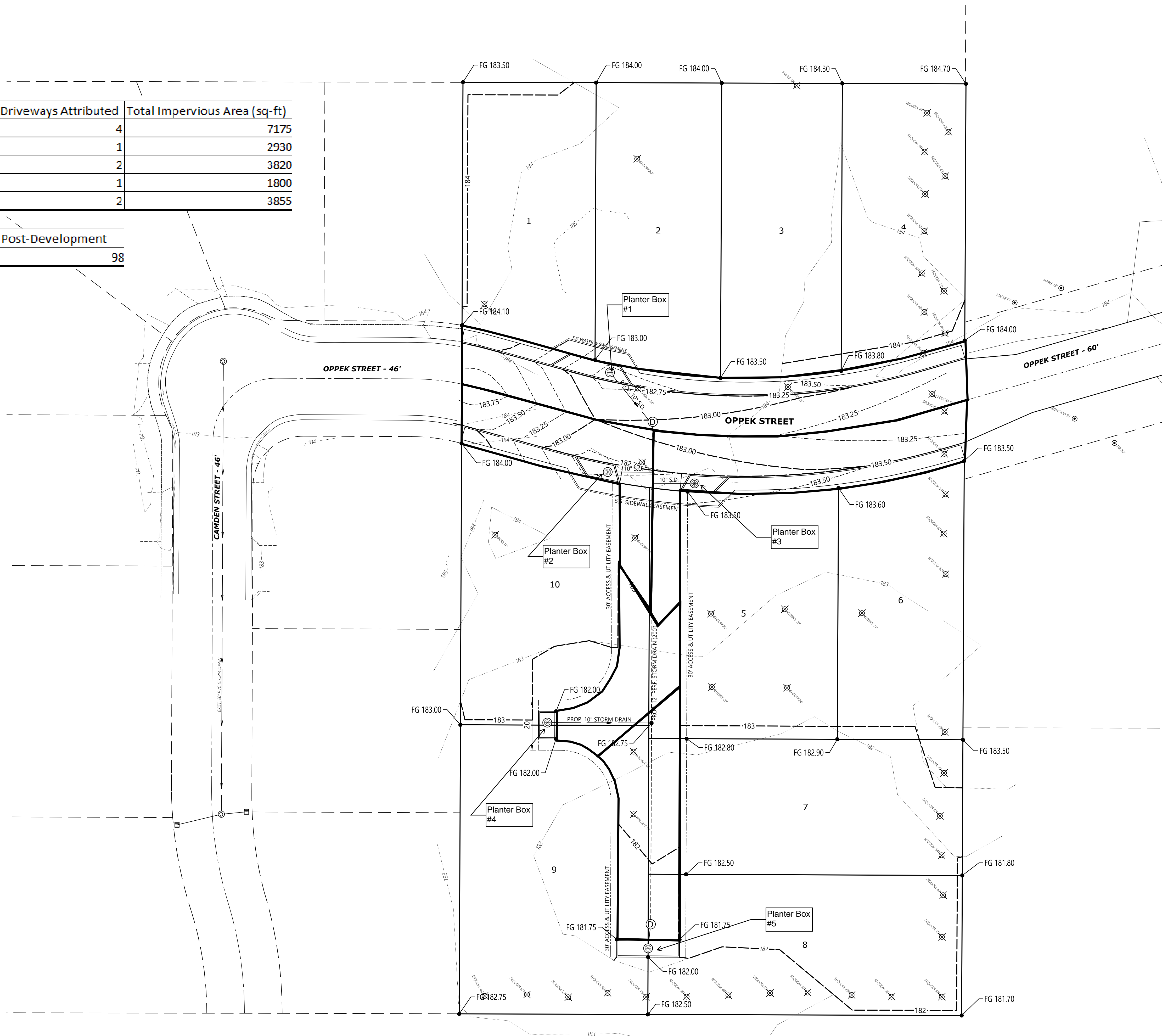
Survey Area Data: Version 21, Sep 8, 2023



APPENDIX B: BASIN MAPS

Area Summary	New Roadway (sq-ft)	Driveways Attributed	Total Impervious Area (sq-ft)
Planter Box #1	4775	4	7175
Planter Box #2	2330	1	2930
Planter Box #3	2620	2	3820
Planter Box #4	1200	1	1800
Planter Box #5	2655	2	3855

	Pre-Development	Post-Development
Curve Number	72	98

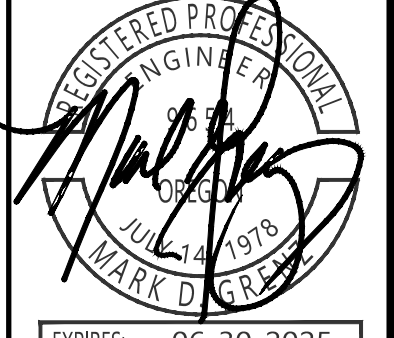


Basin Map

BOHLANDER PROPERTY

NO CHANGES, MODIFICATIONS OR REPRODUCTIONS TO BE MADE TO THESE DRAWINGS WITHOUT WRITTEN AUTHORIZATION FROM THE DESIGN ENGINEER.
DIMENSIONS & NOTES TAKE PRECEDENCE OVER GRAPHICAL REPRESENTATION.

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Drawn: M.K.D.
Checked: J.J.G.
Date: ---
Scale: AS SHOWN
As-Built: ---



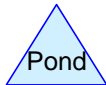
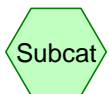
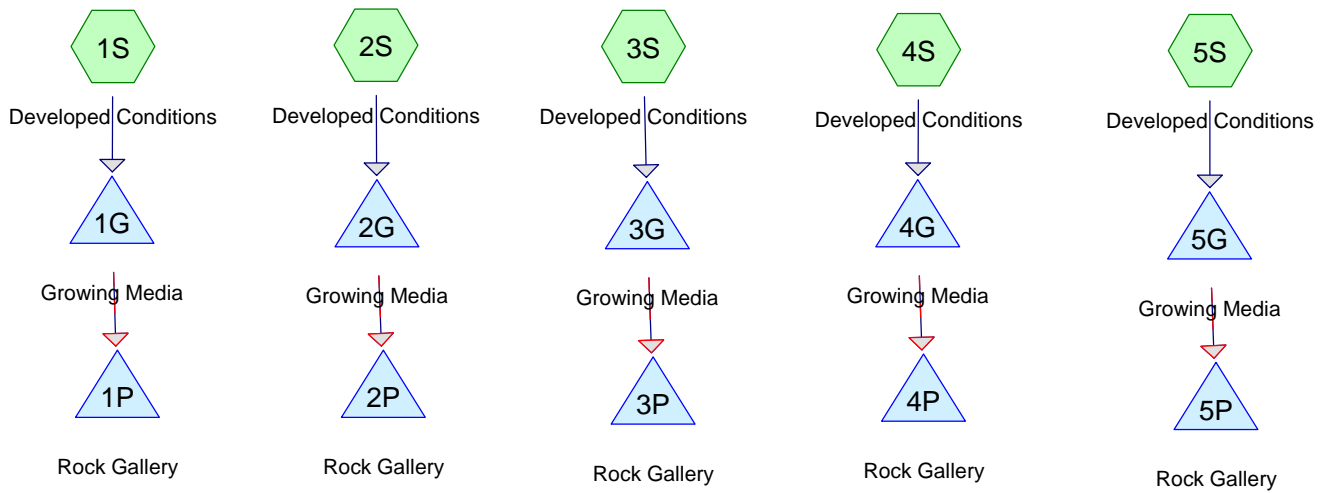
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APPENDIX C: WATER QUALITY HYDROGRAPHS



Routing Diagram for Preliminary Stormwater 2
 Prepared by Multi/Tech Engineering Service, Printed 10/23/2023
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Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Page 2

Summary for Subcatchment 1S: Developed Conditions

Runoff = 0.05 cfs @ 7.87 hrs, Volume= 0.016 af, Depth= 1.16"

Routed to Pond 1G : Growing Media

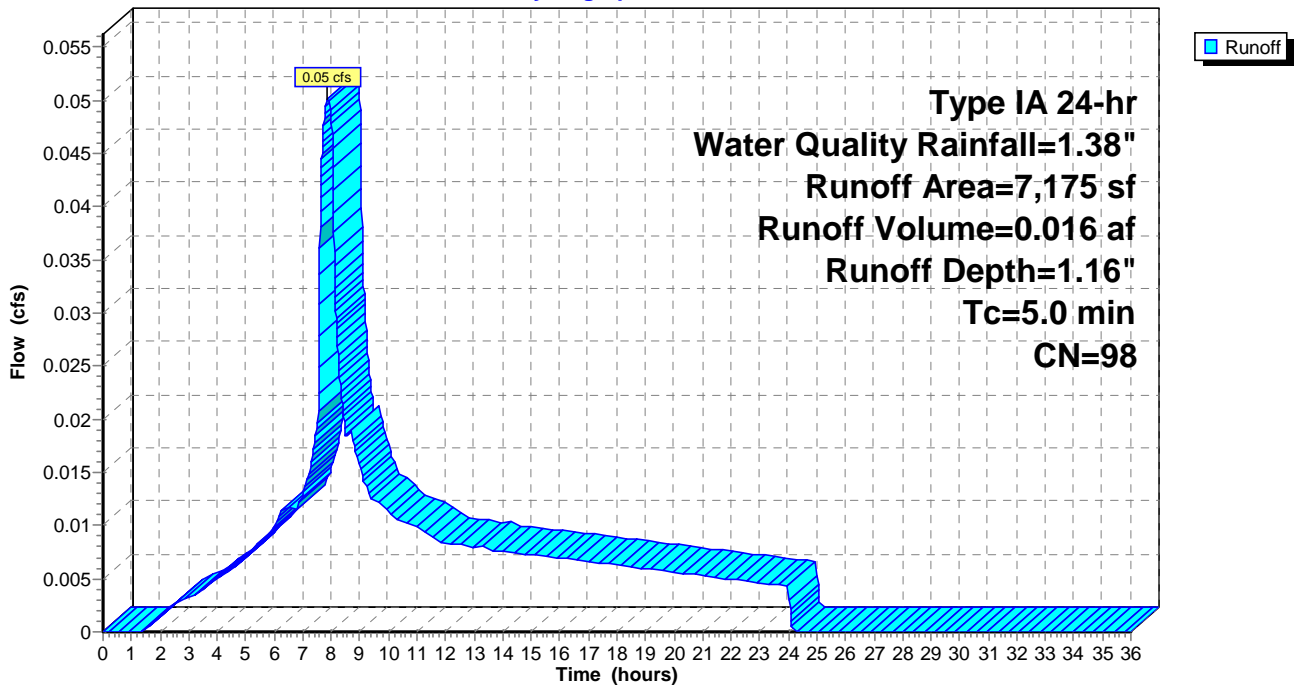
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type IA 24-hr Water Quality Rainfall=1.38"

Area (sf)	CN	Description
7,175	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
7,175	98	Weighted Average
7,175		100.00% Impervious Area

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

Subcatchment 1S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 1G: Growing Media

Inflow Area = 0.165 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
Inflow = 0.05 cfs @ 7.87 hrs, Volume= 0.016 af
Outflow = 0.02 cfs @ 7.35 hrs, Volume= 0.016 af, Atten= 68%, Lag= 0.0 min
Primary = 0.02 cfs @ 7.35 hrs, Volume= 0.016 af
Routed to Pond 1P : Rock Gallery
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 1P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.22' @ 8.93 hrs Surf.Area= 350 sf Storage= 77 cf

Plug-Flow detention time= 22.8 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 22.8 min (718.2 - 695.4)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	263 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	350	0	0
182.75	350	263	263

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 7.35 hrs HW=182.01' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)

↑2=Orifice/Grate (Controls 0.00 cfs)

Preliminary Stormwater 2

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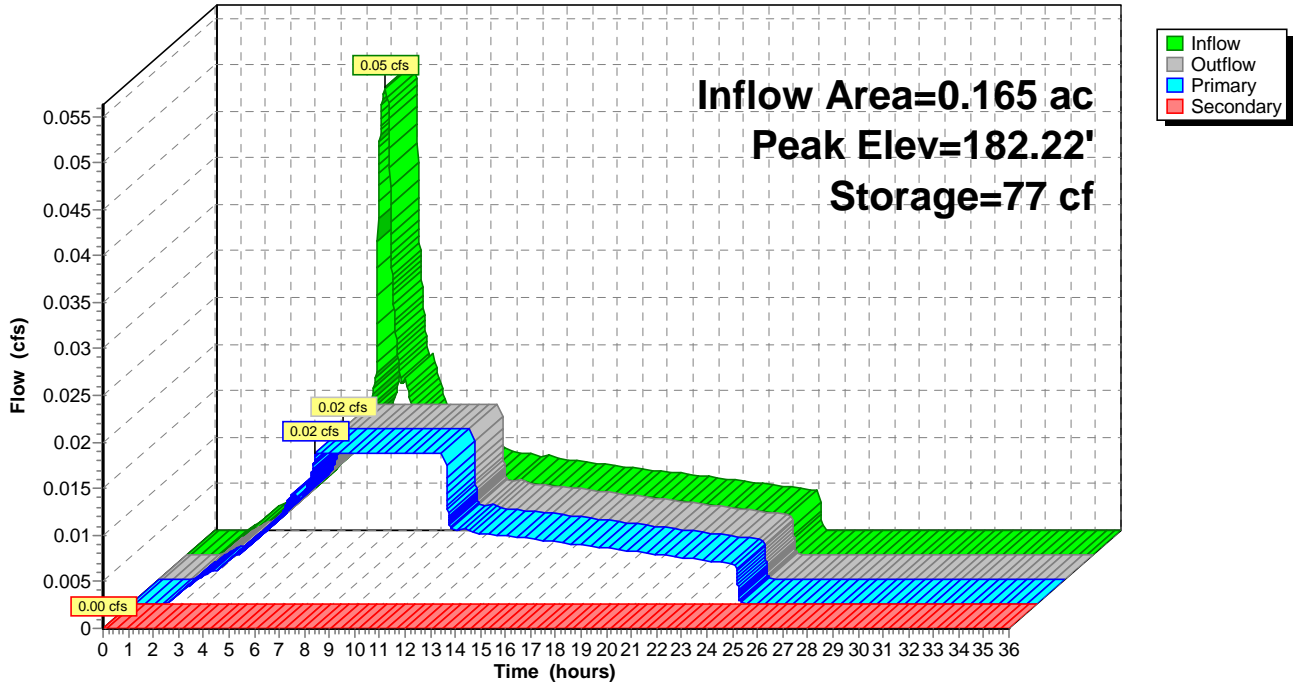
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 1G: Growing Media

Hydrograph



Preliminary Stormwater 2

Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 1P: Rock Gallery

Inflow Area = 0.165 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
 Inflow = 0.02 cfs @ 7.35 hrs, Volume= 0.016 af
 Outflow = 0.02 cfs @ 8.11 hrs, Volume= 0.016 af, Atten= 0%, Lag= 45.6 min
 Discarded = 0.02 cfs @ 8.11 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 177.01' @ 7.90 hrs Surf.Area= 350 sf Storage= 1 cf

Plug-Flow detention time= 1.4 min calculated for 0.016 af (100% of inflow)
 Center-of-Mass det. time= 1.4 min (719.6 - 718.2)

Volume	Invert	Avail.Storage	Storage Description
#1	177.00'	368 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 1,225 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
177.00	350	0	0
180.50	350	1,225	1,225

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 8.11 hrs HW=177.01' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Preliminary Stormwater 2

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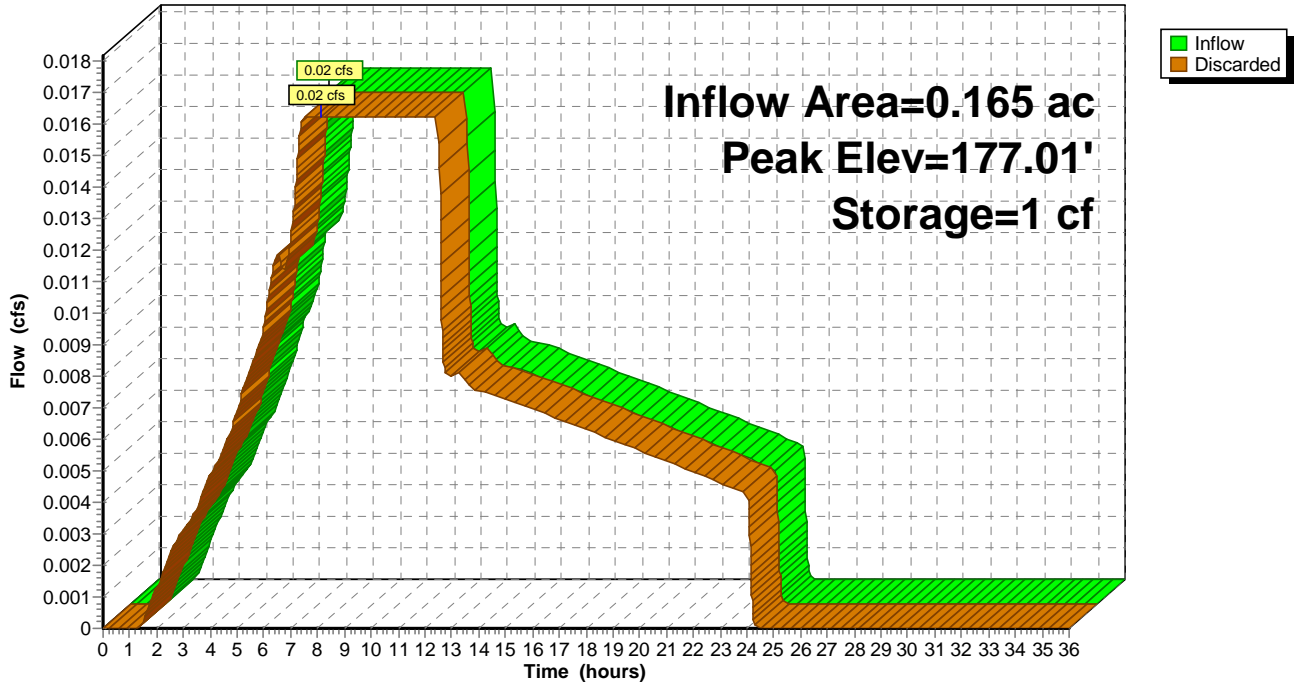
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 1P: Rock Gallery

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Page 3

Summary for Subcatchment 2S: Developed Conditions

Runoff = 0.02 cfs @ 7.87 hrs, Volume= 0.007 af, Depth= 1.16"

Routed to Pond 2G : Growing Media

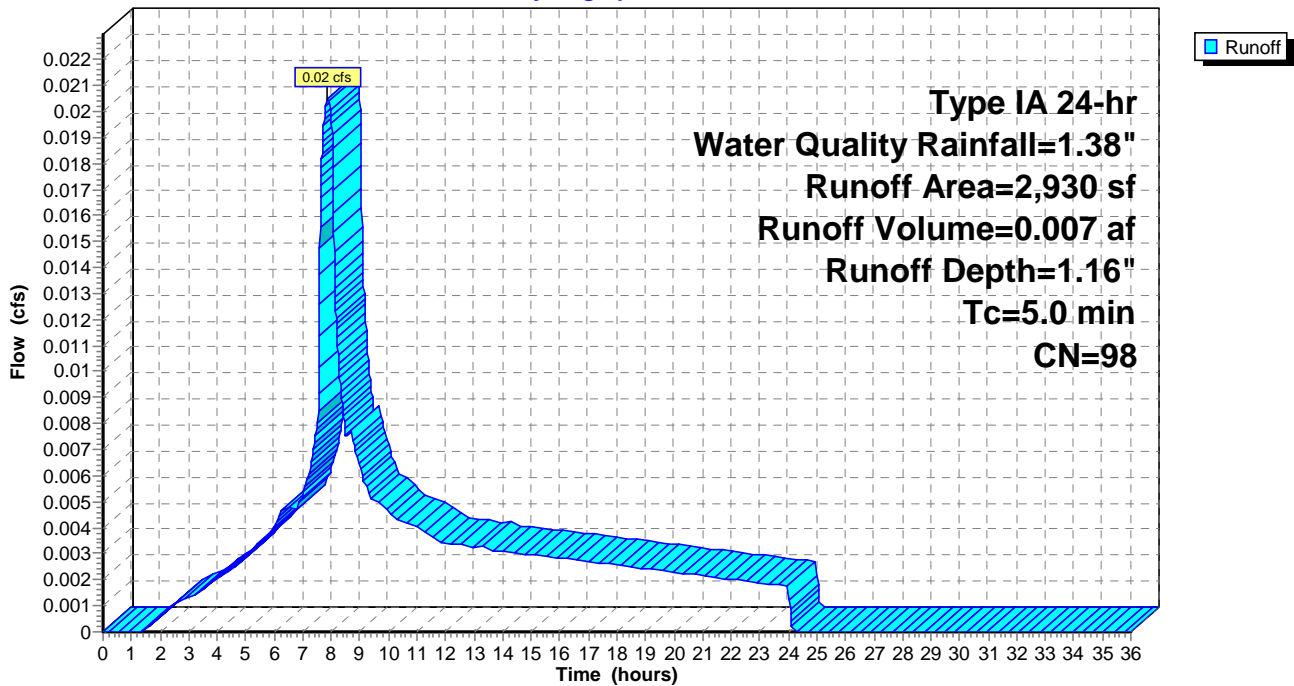
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type IA 24-hr Water Quality Rainfall=1.38"

Area (sf)	CN	Description
2,930	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
2,930	98	Weighted Average
2,930		100.00% Impervious Area

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

Subcatchment 2S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 2G: Growing Media

Inflow Area = 0.067 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
Inflow = 0.02 cfs @ 7.87 hrs, Volume= 0.007 af
Outflow = 0.01 cfs @ 7.57 hrs, Volume= 0.007 af, Atten= 55%, Lag= 0.0 min
Primary = 0.01 cfs @ 7.57 hrs, Volume= 0.007 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.11' @ 8.33 hrs Surf.Area= 200 sf Storage= 21 cf

Plug-Flow detention time= 9.1 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 9.1 min (704.5 - 695.4)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	200	0	0
182.75	200	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 7.57 hrs HW=182.01' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)

↑2=Orifice/Grate (Controls 0.00 cfs)

Preliminary Stormwater 2

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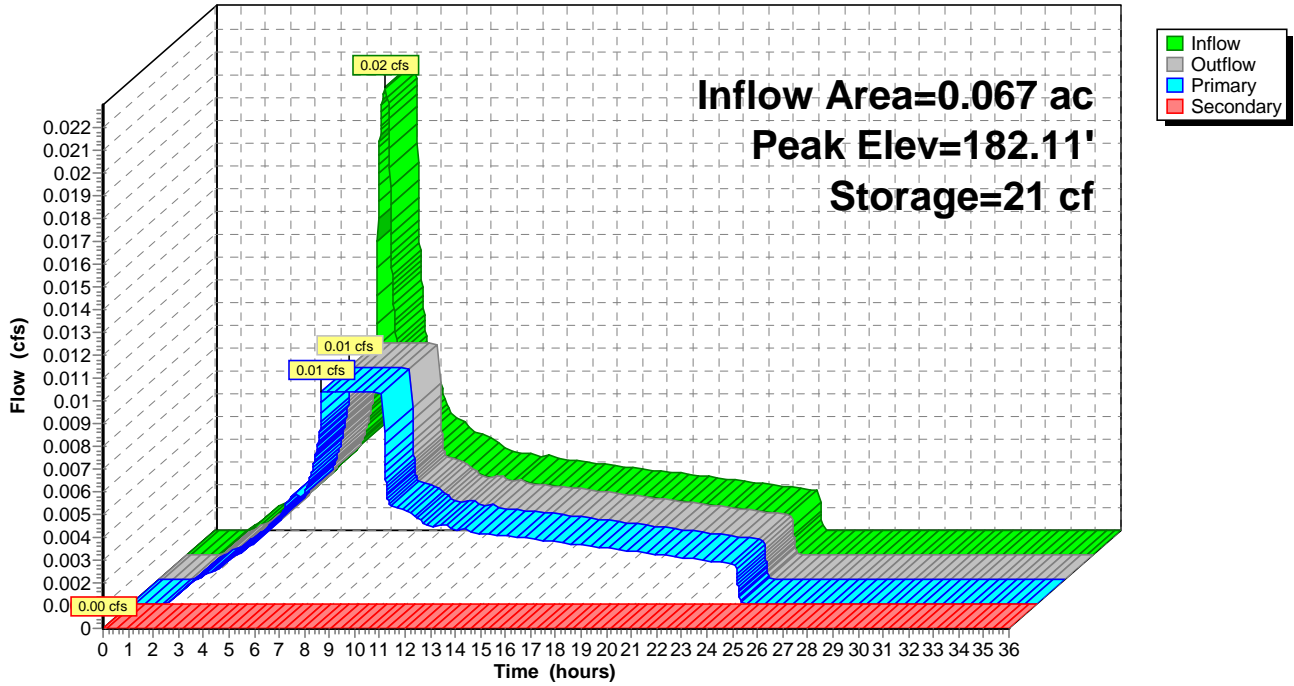
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 2G: Growing Media

Hydrograph



Preliminary Stormwater 2

Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 2P: Rock Gallery

Inflow Area = 0.067 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
 Inflow = 0.01 cfs @ 7.57 hrs, Volume= 0.007 af
 Outflow = 0.01 cfs @ 8.02 hrs, Volume= 0.007 af, Atten= 0%, Lag= 27.0 min
 Discarded = 0.01 cfs @ 8.02 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 178.51' @ 7.89 hrs Surf.Area= 200 sf Storage= 0 cf

Plug-Flow detention time= 0.8 min calculated for 0.007 af (100% of inflow)
 Center-of-Mass det. time= 0.8 min (705.3 - 704.5)

Volume	Invert	Avail.Storage	Storage Description
#1	178.50'	120 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 400 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.50	200	0	0
180.50	200	400	400

Device	Routing	Invert	Outlet Devices
#1	Discarded	178.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 8.02 hrs HW=178.51' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Preliminary Stormwater 2

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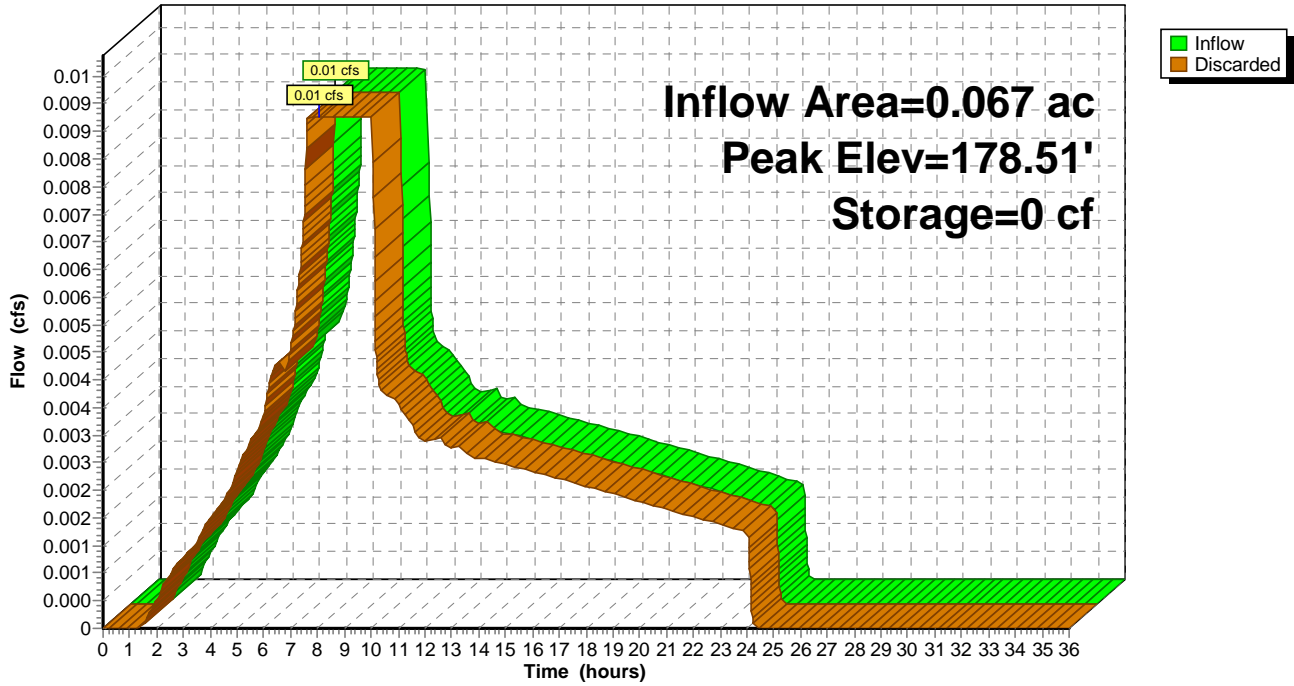
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 2P: Rock Gallery

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Page 4

Summary for Subcatchment 3S: Developed Conditions

Runoff = 0.03 cfs @ 7.87 hrs, Volume= 0.008 af, Depth= 1.16"

Routed to Pond 3G : Growing Media

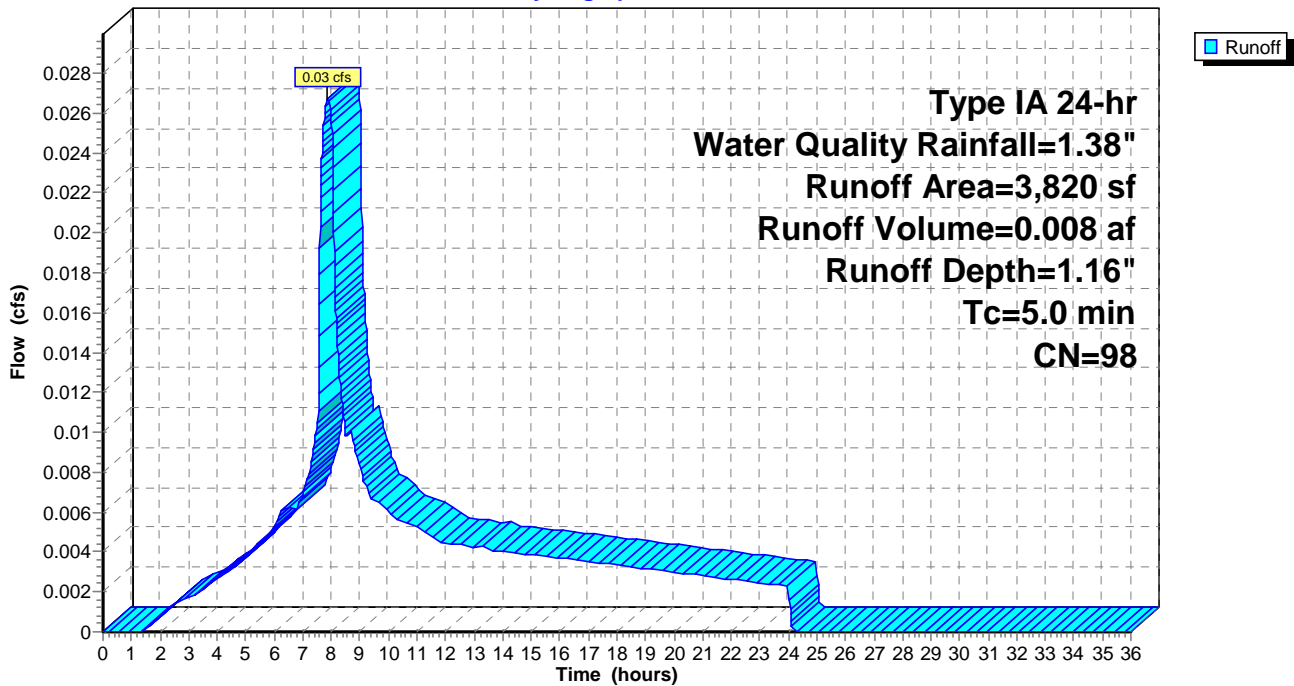
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type IA 24-hr Water Quality Rainfall=1.38"

Area (sf)	CN	Description
3,820	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
3,820	98	Weighted Average
3,820		100.00% Impervious Area

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

Subcatchment 3S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 3G: Growing Media

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
Inflow = 0.03 cfs @ 7.87 hrs, Volume= 0.008 af
Outflow = 0.01 cfs @ 7.44 hrs, Volume= 0.008 af, Atten= 65%, Lag= 0.0 min
Primary = 0.01 cfs @ 7.44 hrs, Volume= 0.008 af
Routed to Pond 3P : Rock Gallery
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 3P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.19' @ 8.81 hrs Surf.Area= 200 sf Storage= 38 cf

Plug-Flow detention time= 18.5 min calculated for 0.008 af (100% of inflow)
Center-of-Mass det. time= 18.5 min (713.9 - 695.4)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	200	0	0
182.75	200	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 7.44 hrs HW=182.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)

↑**2=Orifice/Grate** (Controls 0.00 cfs)

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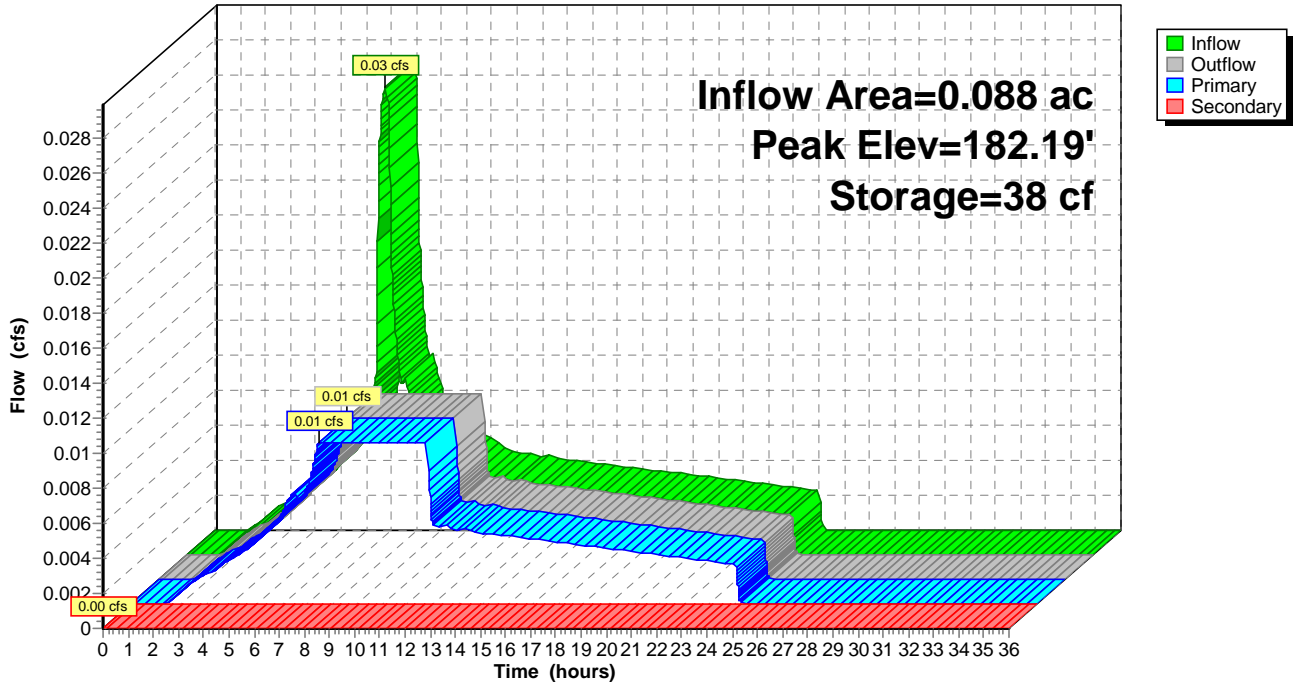
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 3G: Growing Media

Hydrograph



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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 3P: Rock Gallery

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
Inflow = 0.01 cfs @ 7.44 hrs, Volume= 0.008 af
Outflow = 0.01 cfs @ 8.10 hrs, Volume= 0.008 af, Atten= 0%, Lag= 39.6 min
Discarded = 0.01 cfs @ 8.10 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 177.51' @ 7.93 hrs Surf.Area= 200 sf Storage= 1 cf

Plug-Flow detention time= 1.2 min calculated for 0.008 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (715.1 - 713.9)

Volume	Invert	Avail.Storage	Storage Description
#1	177.50'	180 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 600 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
177.50	200	0	0
180.50	200	600	600

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 8.10 hrs HW=177.51' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Preliminary Stormwater 2

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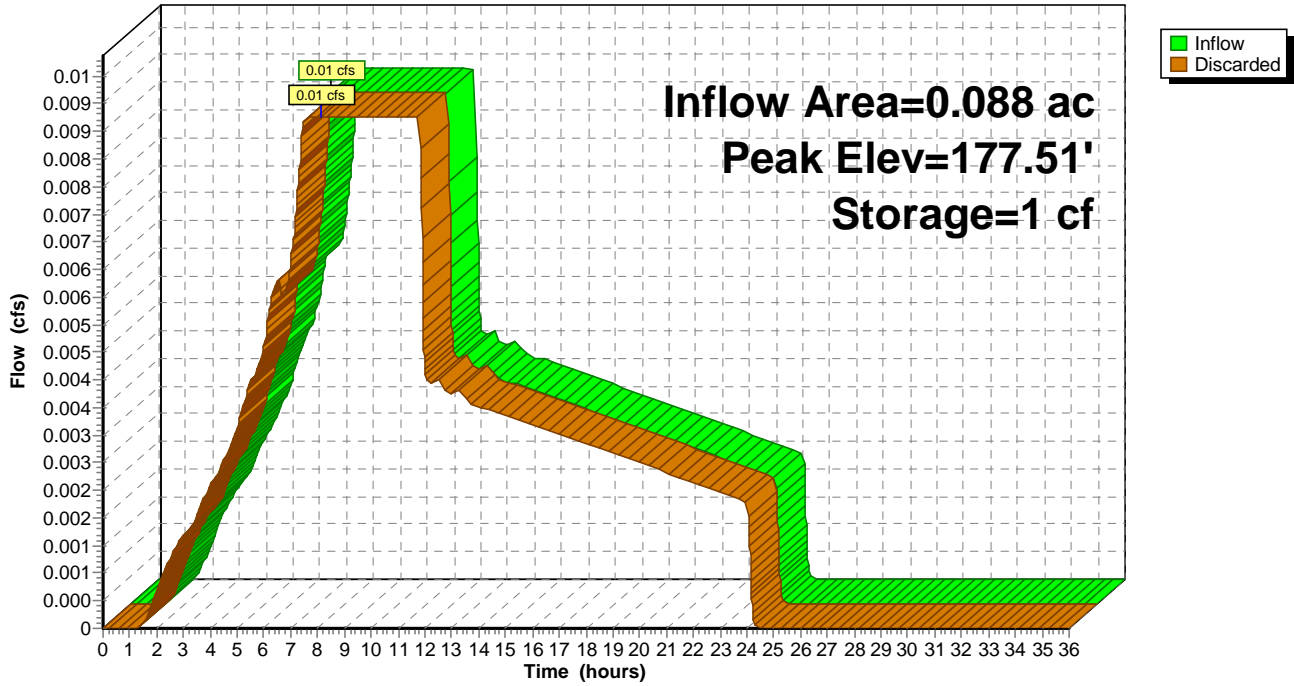
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 3P: Rock Gallery

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Subcatchment 4S: Developed Conditions

Runoff = 0.01 cfs @ 7.87 hrs, Volume= 0.004 af, Depth= 1.16"

Routed to Pond 4G : Growing Media

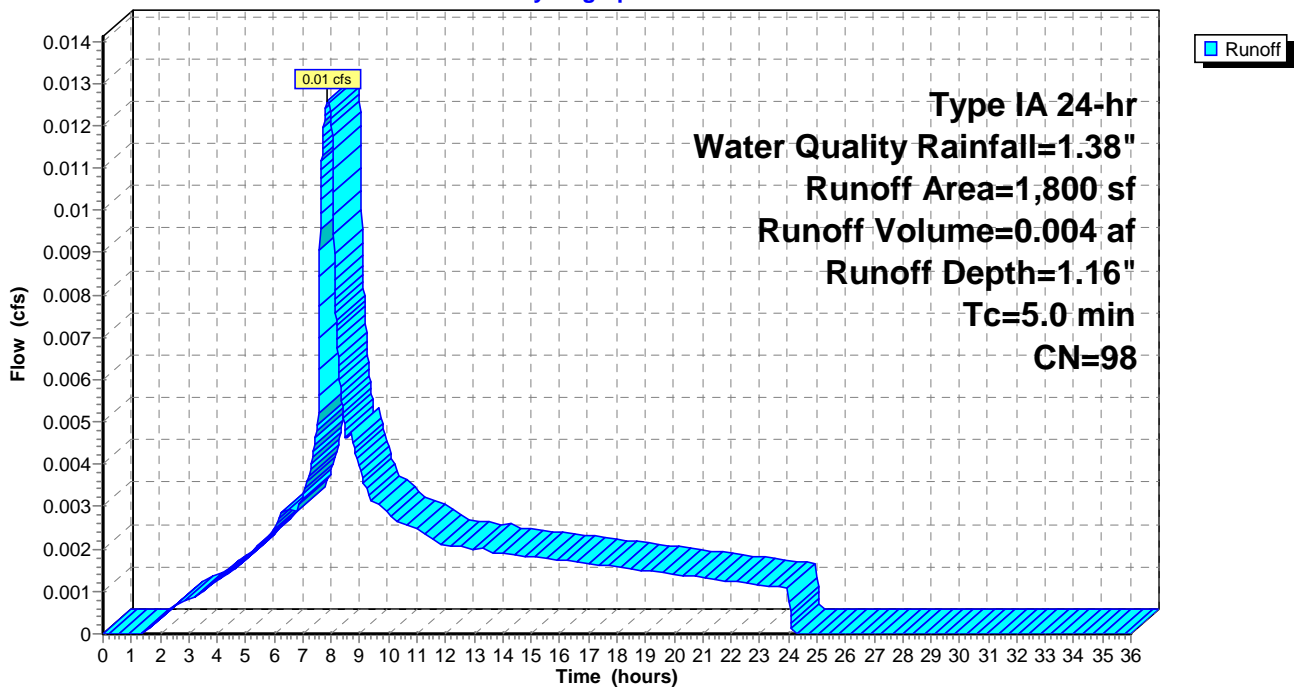
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr Water Quality Rainfall=1.38"

Area (sf)	CN	Description
1,800	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
1,800	98	Weighted Average
1,800		100.00% Impervious Area

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

Subcatchment 4S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 4G: Growing Media

Inflow Area = 0.041 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
Inflow = 0.01 cfs @ 7.87 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 7.60 hrs, Volume= 0.004 af, Atten= 45%, Lag= 0.0 min
Primary = 0.01 cfs @ 7.60 hrs, Volume= 0.004 af
Routed to Pond 4P : Rock Gallery
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 4P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.07' @ 8.20 hrs Surf.Area= 150 sf Storage= 10 cf

Plug-Flow detention time= 5.7 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 5.7 min (701.1 - 695.4)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	113 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	150	0	0
182.75	150	113	113

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 7.60 hrs HW=182.01' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)

↑2=Orifice/Grate (Controls 0.00 cfs)

Preliminary Stormwater 2

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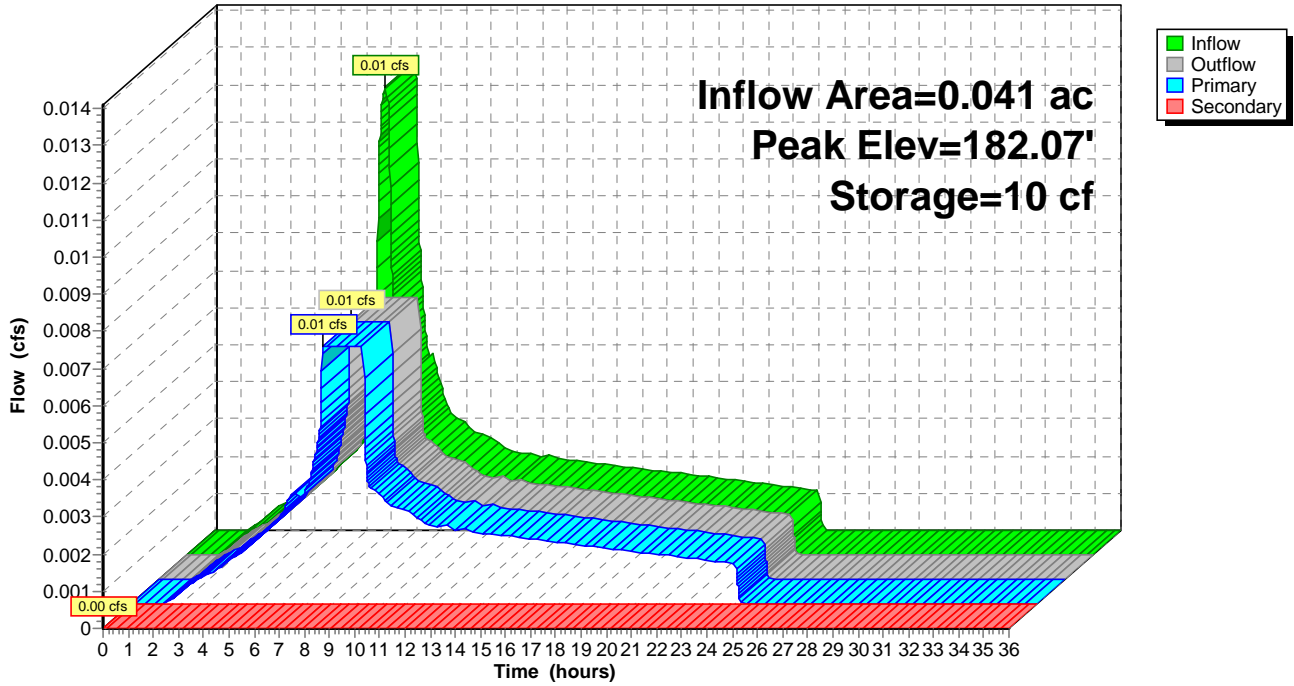
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 4G: Growing Media

Hydrograph



Preliminary Stormwater 2

Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 4P: Rock Gallery

Inflow Area = 0.041 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
 Inflow = 0.01 cfs @ 7.60 hrs, Volume= 0.004 af
 Outflow = 0.01 cfs @ 7.78 hrs, Volume= 0.004 af, Atten= 0%, Lag= 10.8 min
 Discarded = 0.01 cfs @ 7.78 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 179.50' @ 7.72 hrs Surf.Area= 150 sf Storage= 0 cf

Plug-Flow detention time= 0.4 min calculated for 0.004 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (701.5 - 701.1)

Volume	Invert	Avail.Storage	Storage Description
#1	179.50'	45 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 150 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.50	150	0	0
180.50	150	150	150

Device	Routing	Invert	Outlet Devices
#1	Discarded	179.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 7.78 hrs HW=179.50' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Preliminary Stormwater 2

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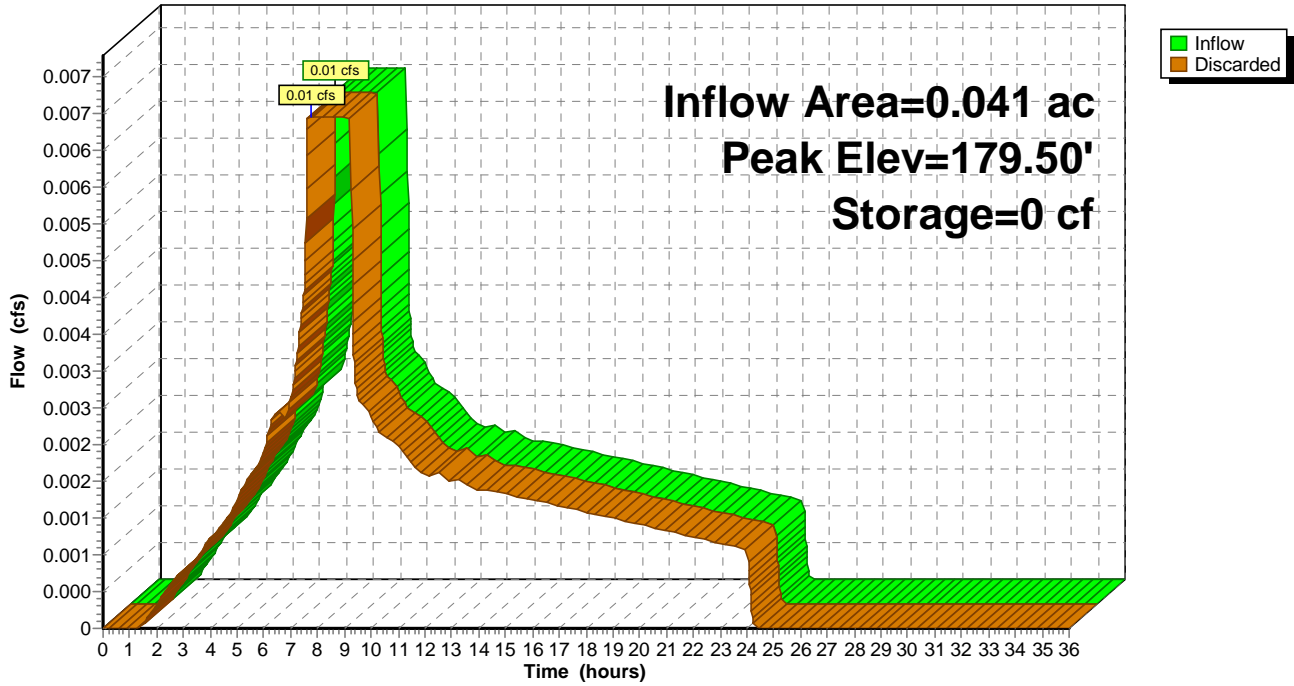
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 4P: Rock Gallery

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Subcatchment 5S: Developed Conditions

Runoff = 0.03 cfs @ 7.87 hrs, Volume= 0.009 af, Depth= 1.16"

Routed to Pond 5G : Growing Media

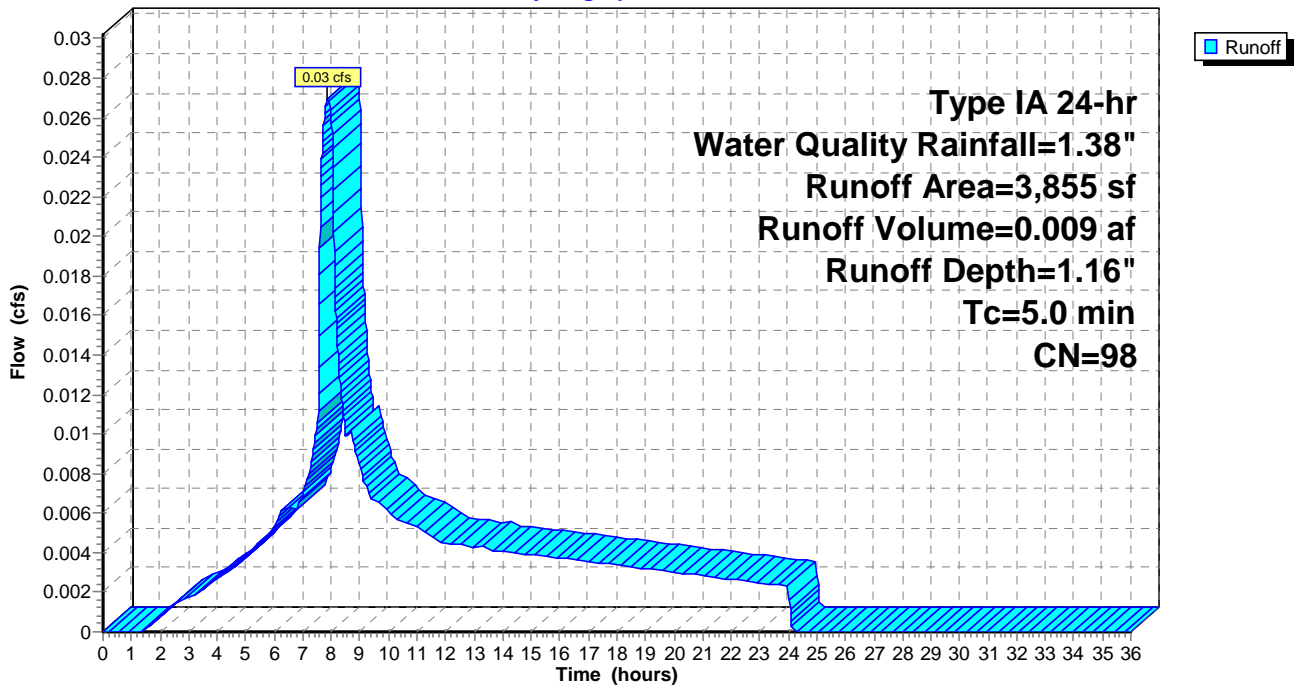
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type IA 24-hr Water Quality Rainfall=1.38"

Area (sf)	CN	Description
3,855	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
3,855	98	Weighted Average
3,855		100.00% Impervious Area

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

Subcatchment 5S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr Water Quality Rainfall=1.38"

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Summary for Pond 5G: Growing Media

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
Inflow = 0.03 cfs @ 7.87 hrs, Volume= 0.009 af
Outflow = 0.01 cfs @ 7.56 hrs, Volume= 0.009 af, Atten= 57%, Lag= 0.0 min
Primary = 0.01 cfs @ 7.56 hrs, Volume= 0.009 af
Routed to Pond 5P : Rock Gallery
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 5P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.12' @ 8.37 hrs Surf.Area= 250 sf Storage= 30 cf

Plug-Flow detention time= 10.3 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 10.3 min (705.7 - 695.4)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	188 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	250	0	0
182.75	250	188	188

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 7.56 hrs HW=182.01' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)

↑2=Orifice/Grate (Controls 0.00 cfs)

Preliminary Stormwater 2

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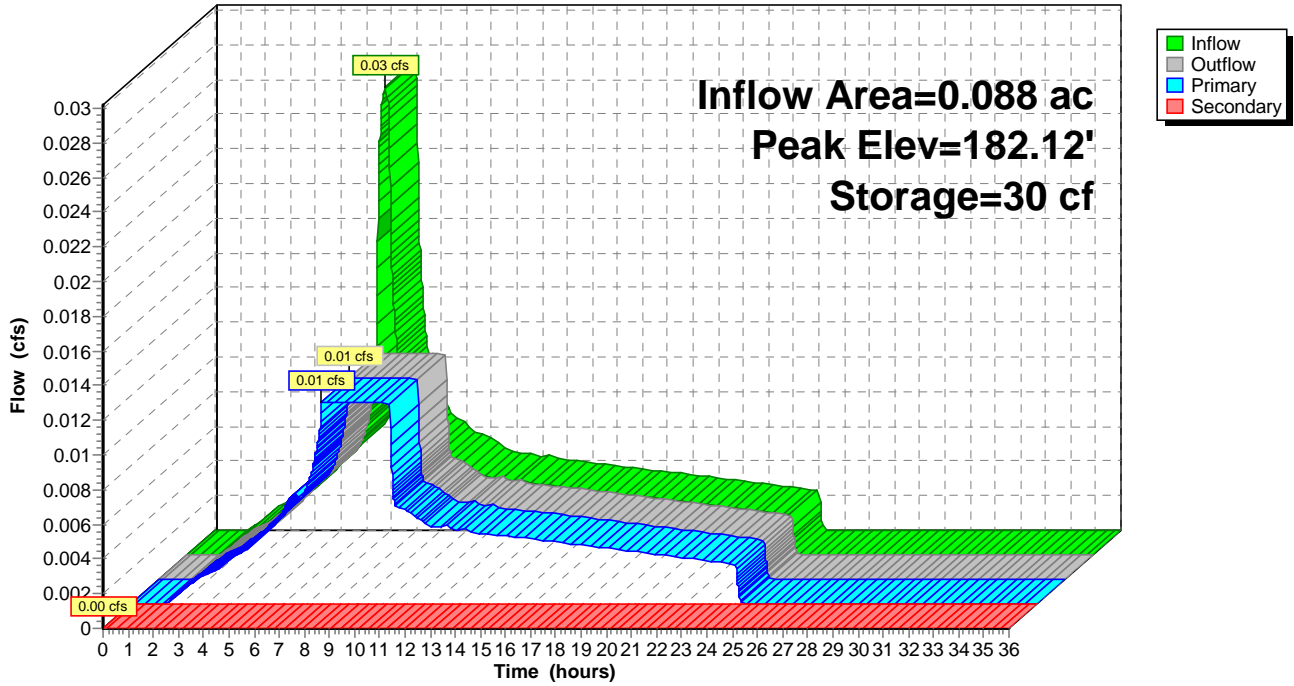
Type IA 24-hr Water Quality Rainfall=1.38"

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Pond 5G: Growing Media

Hydrograph



Preliminary Stormwater 2

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Summary for Pond 5P: Rock Gallery

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 1.16" for Water Quality event
 Inflow = 0.01 cfs @ 7.56 hrs, Volume= 0.009 af
 Outflow = 0.01 cfs @ 8.00 hrs, Volume= 0.009 af, Atten= 0%, Lag= 26.4 min
 Discarded = 0.01 cfs @ 8.00 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 178.51' @ 7.88 hrs Surf.Area= 250 sf Storage= 1 cf

Plug-Flow detention time= 0.8 min calculated for 0.009 af (100% of inflow)
 Center-of-Mass det. time= 0.8 min (706.5 - 705.7)

Volume	Invert	Avail.Storage	Storage Description
#1	178.50'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 500 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.50	250	0	0
180.50	250	500	500

Device	Routing	Invert	Outlet Devices
#1	Discarded	178.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 8.00 hrs HW=178.51' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Preliminary Stormwater 2

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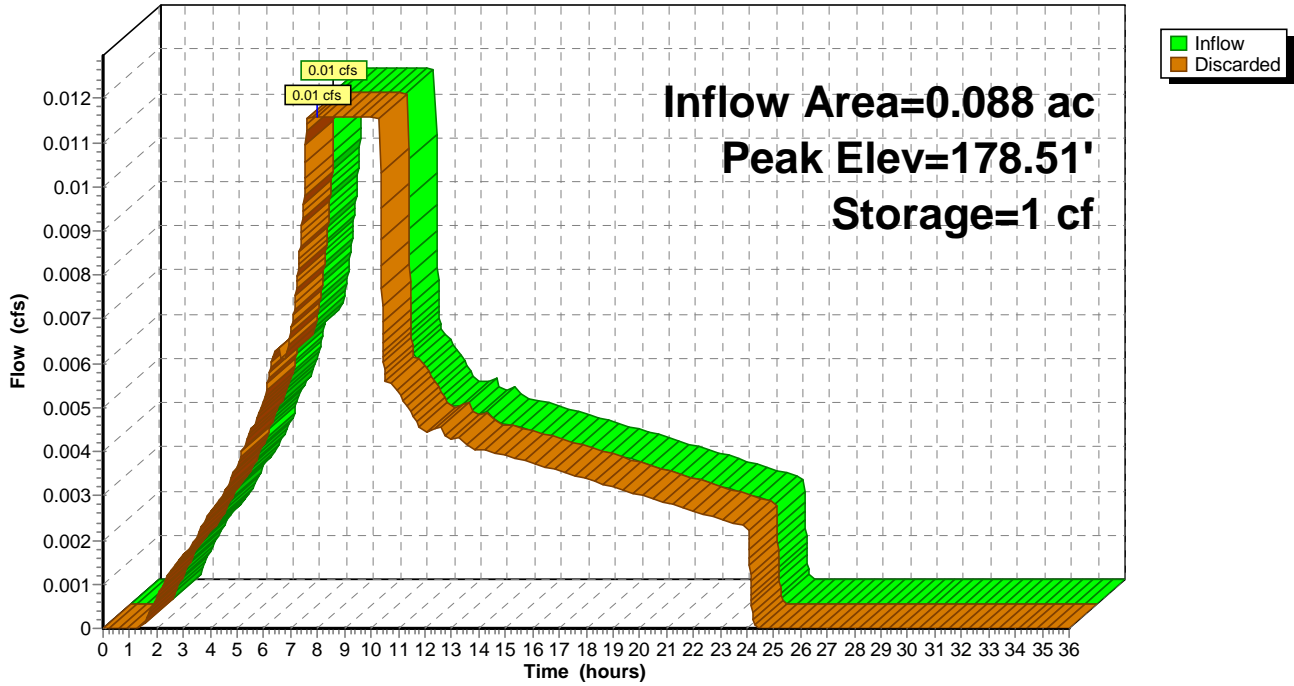
Type IA 24-hr Water Quality Rainfall=1.38"

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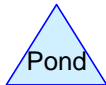
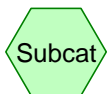
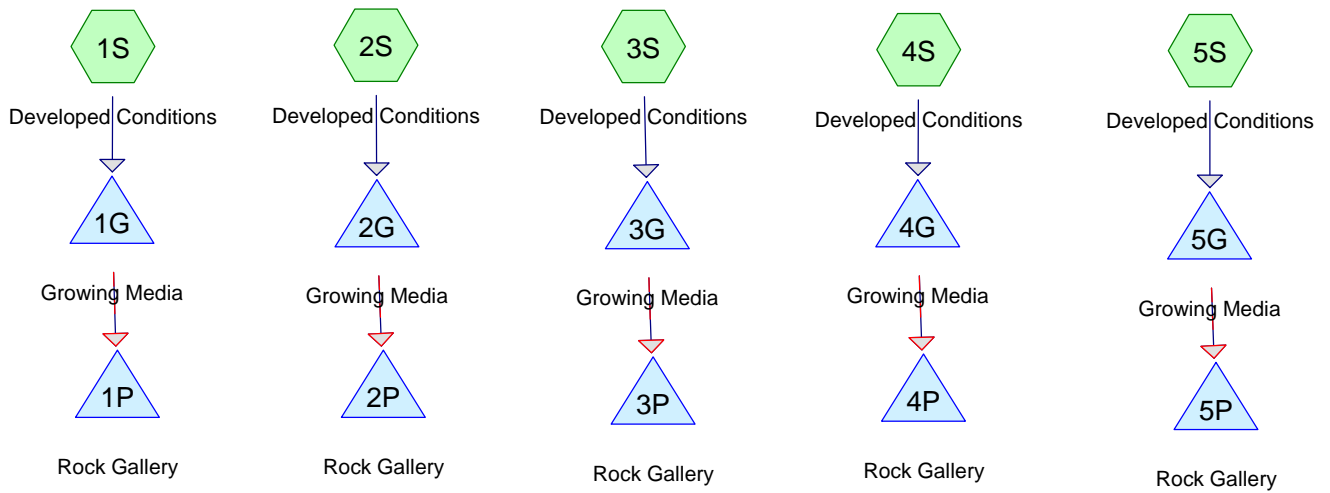
Pond 5P: Rock Gallery

Hydrograph





APPENDIX D: WATER QUANTITY HYDROGRAPHS



Preliminary Stormwater 2

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Type IA 24-hr 100-year Rainfall=4.40"

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Page 2

Summary for Subcatchment 1S: Developed Conditions

Runoff = 0.17 cfs @ 7.85 hrs, Volume= 0.057 af, Depth= 4.16"

Routed to Pond 1G : Growing Media

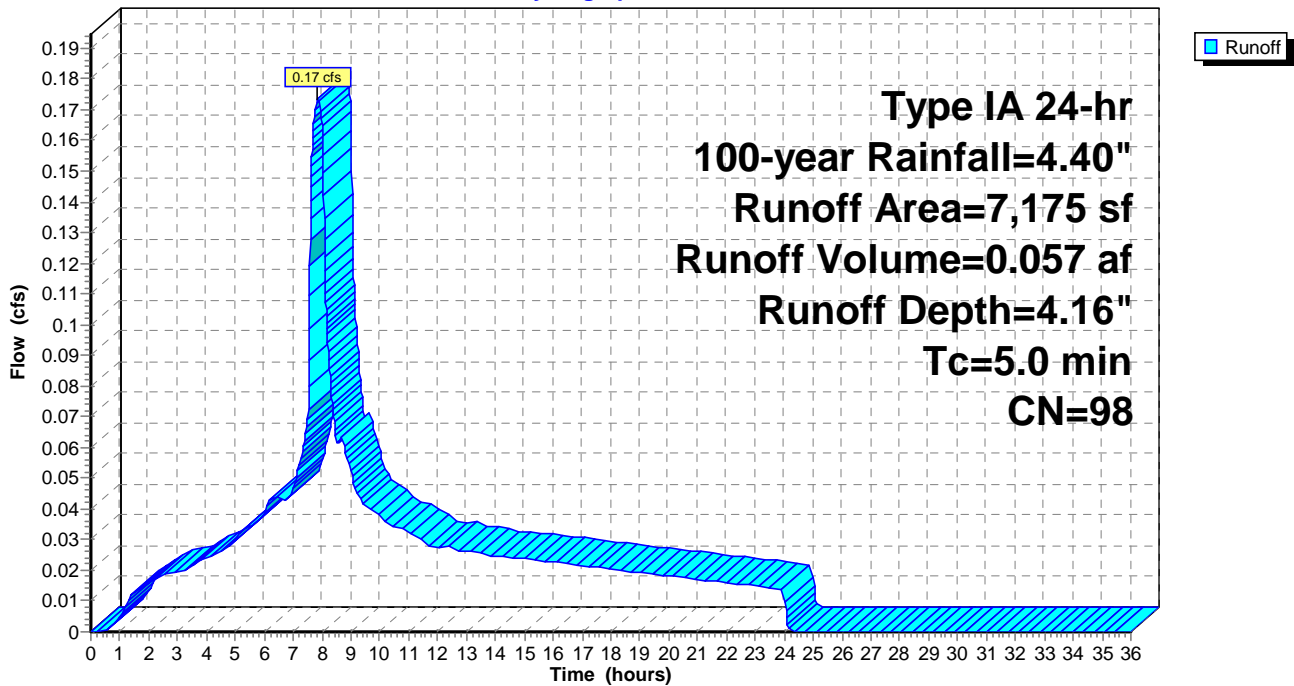
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type IA 24-hr 100-year Rainfall=4.40"

Area (sf)	CN	Description
7,175	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
7,175	98	Weighted Average
7,175		100.00% Impervious Area

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

Subcatchment 1S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 1G: Growing Media

Inflow Area = 0.165 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.17 cfs @ 7.85 hrs, Volume= 0.057 af
Outflow = 0.17 cfs @ 7.90 hrs, Volume= 0.057 af, Atten= 1%, Lag= 2.9 min
Primary = 0.02 cfs @ 2.12 hrs, Volume= 0.033 af
Routed to Pond 1P : Rock Gallery
Secondary = 0.16 cfs @ 7.90 hrs, Volume= 0.024 af
Routed to Pond 1P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.44' @ 7.90 hrs Surf.Area= 350 sf Storage= 153 cf

Plug-Flow detention time= 59.4 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 59.4 min (716.1 - 656.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	263 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	350	0	0
182.75	350	263	263

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 2.12 hrs HW=182.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.16 cfs @ 7.90 hrs HW=182.44' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.07 fps)

Preliminary Stormwater 2

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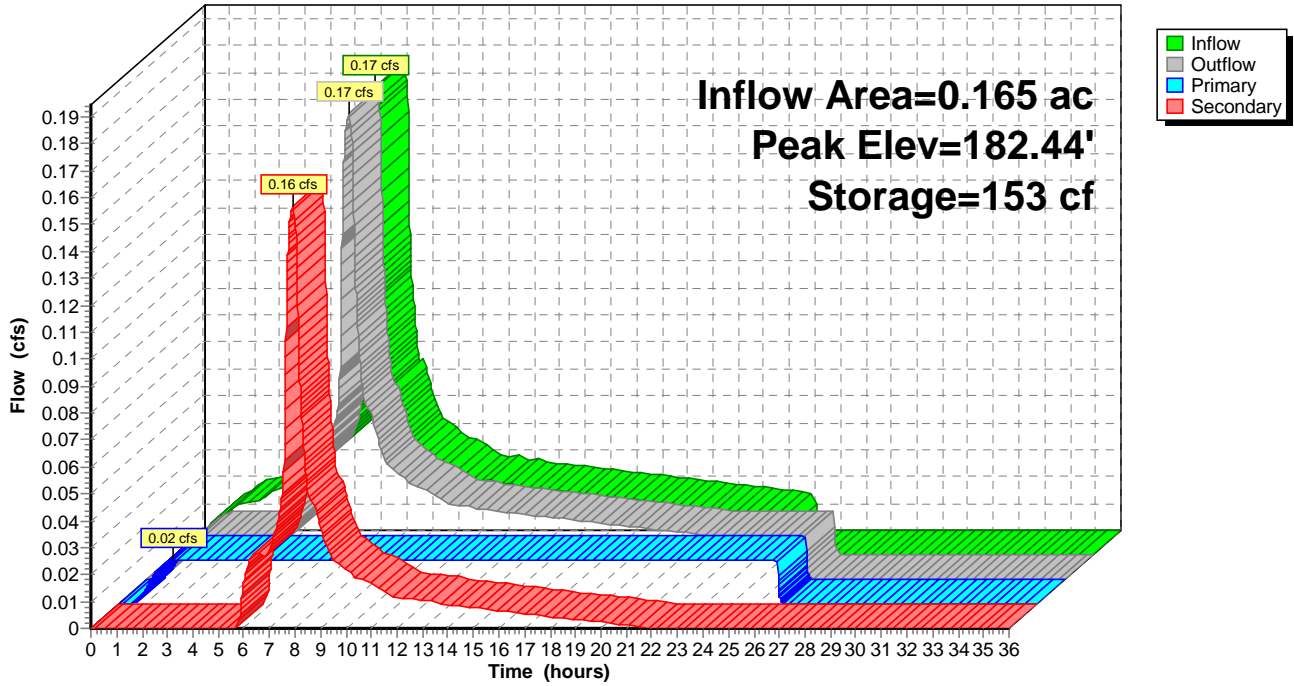
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 1G: Growing Media

Hydrograph



Preliminary Stormwater 2

Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 1P: Rock Gallery

Inflow Area = 0.165 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
 Inflow = 0.17 cfs @ 7.90 hrs, Volume= 0.057 af
 Outflow = 0.04 cfs @ 6.31 hrs, Volume= 0.057 af, Atten= 75%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 6.31 hrs, Volume= 0.057 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 180.43' @ 9.45 hrs Surf.Area= 350 sf Storage= 360 cf

Plug-Flow detention time= 49.8 min calculated for 0.057 af (100% of inflow)
 Center-of-Mass det. time= 49.8 min (765.9 - 716.1)

Volume	Invert	Avail.Storage	Storage Description
#1	177.00'	368 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 1,225 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
177.00	350	0	0
180.50	350	1,225	1,225

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 6.31 hrs HW=177.04' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Preliminary Stormwater 2

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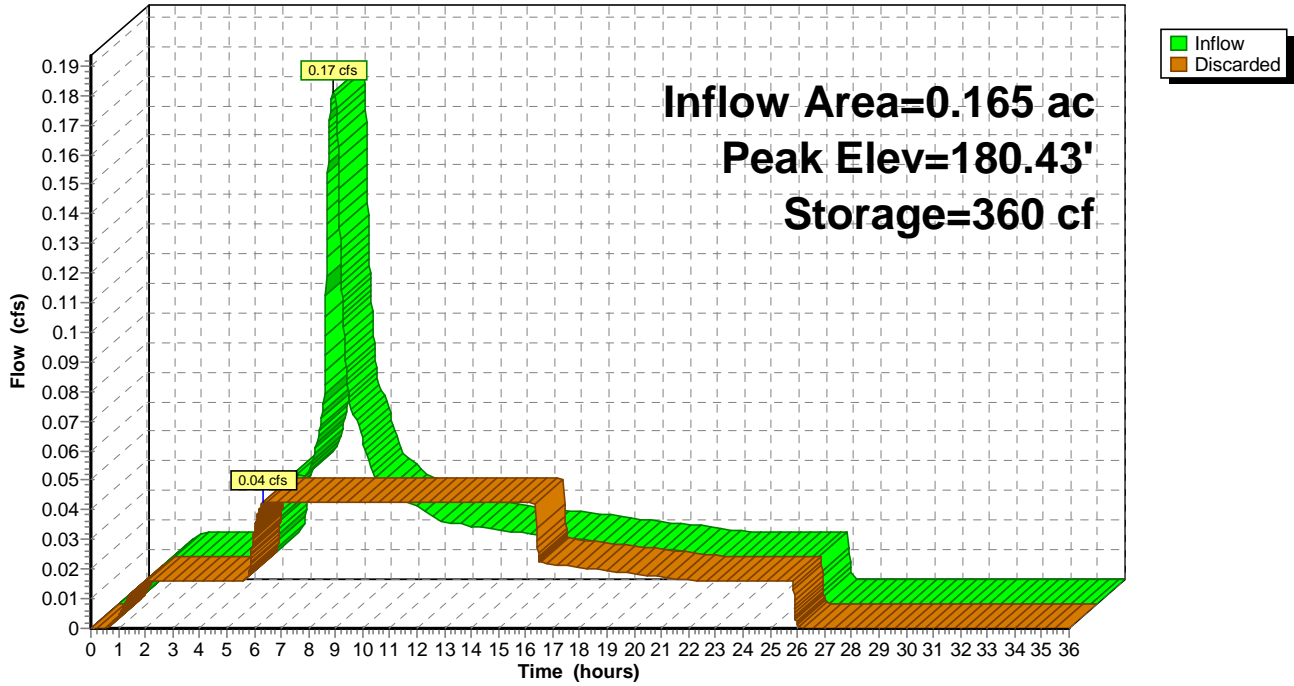
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 1P: Rock Gallery

Hydrograph



Preliminary Stormwater 2

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Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 2G: Growing Media

Inflow Area = 0.067 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.07 cfs @ 7.85 hrs, Volume= 0.023 af
Outflow = 0.07 cfs @ 7.89 hrs, Volume= 0.023 af, Atten= 0%, Lag= 2.2 min
Primary = 0.01 cfs @ 3.72 hrs, Volume= 0.017 af
Routed to Pond 2P : Rock Gallery
Secondary = 0.06 cfs @ 7.89 hrs, Volume= 0.006 af
Routed to Pond 2P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.39' @ 7.89 hrs Surf.Area= 200 sf Storage= 77 cf

Plug-Flow detention time= 63.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 63.0 min (719.7 - 656.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	200	0	0
182.75	200	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 3.72 hrs HW=182.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.06 cfs @ 7.89 hrs HW=182.39' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 0.06 cfs @ 0.78 fps)

Preliminary Stormwater 2

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Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Subcatchment 2S: Developed Conditions

Runoff = 0.07 cfs @ 7.85 hrs, Volume= 0.023 af, Depth= 4.16"

Routed to Pond 2G : Growing Media

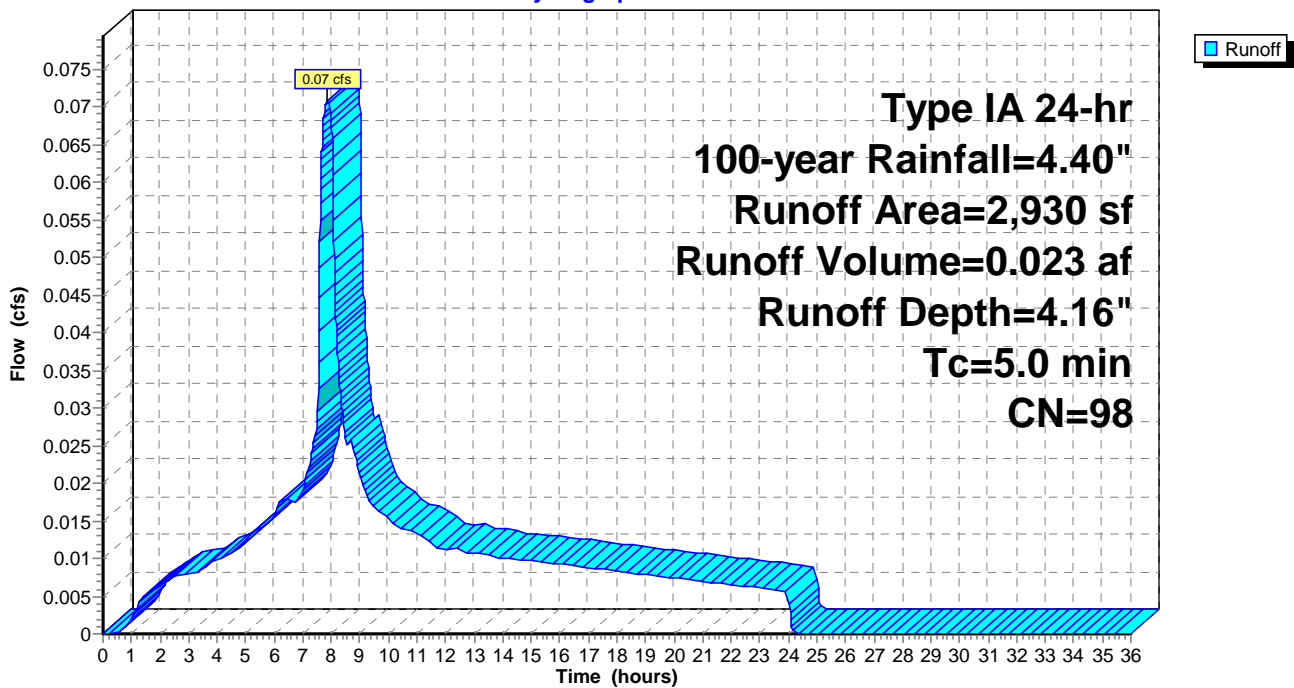
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-year Rainfall=4.40"

Area (sf)	CN	Description
2,930	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
2,930	98	Weighted Average
2,930		100.00% Impervious Area

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

Subcatchment 2S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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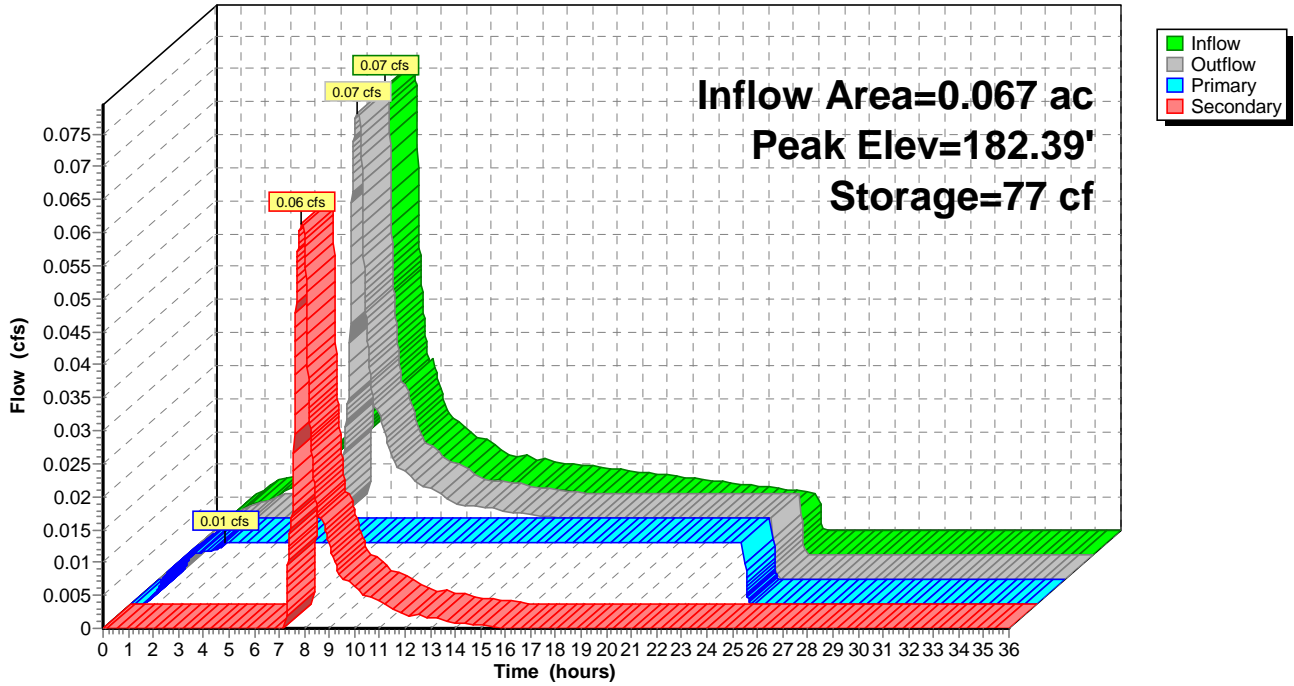
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 2G: Growing Media

Hydrograph



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Summary for Pond 2P: Rock Gallery

Inflow Area = 0.067 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.07 cfs @ 7.89 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 7.46 hrs, Volume= 0.023 af, Atten= 66%, Lag= 0.0 min
Discarded = 0.02 cfs @ 7.46 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 180.12' @ 8.83 hrs Surf.Area= 200 sf Storage= 97 cf

Plug-Flow detention time= 16.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 15.9 min (735.6 - 719.7)

Volume	Invert	Avail.Storage	Storage Description
#1	178.50'	120 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 400 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.50	200	0	0
180.50	200	400	400

Device	Routing	Invert	Outlet Devices
#1	Discarded	178.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 7.46 hrs HW=178.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Preliminary Stormwater 2

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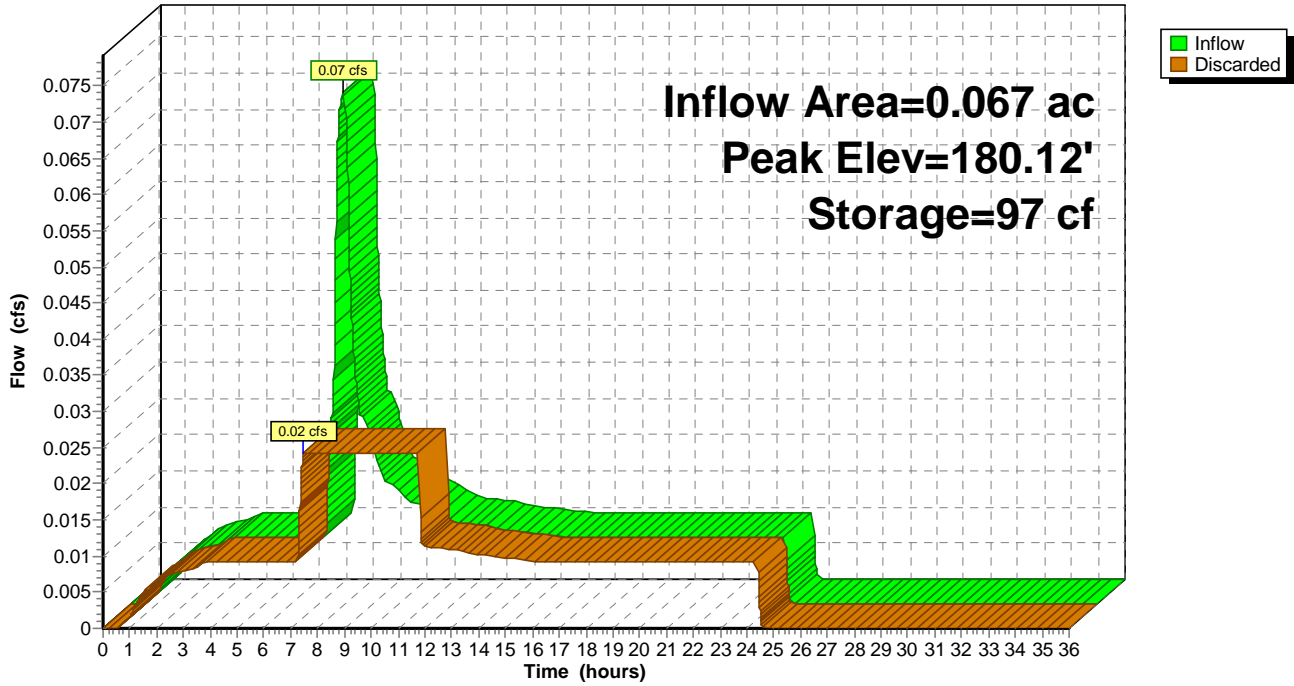
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 2P: Rock Gallery

Hydrograph



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Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 3G: Growing Media

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.09 cfs @ 7.85 hrs, Volume= 0.030 af
Outflow = 0.09 cfs @ 7.89 hrs, Volume= 0.030 af, Atten= 0%, Lag= 1.9 min
Primary = 0.01 cfs @ 2.29 hrs, Volume= 0.019 af
Routed to Pond 3P : Rock Gallery
Secondary = 0.08 cfs @ 7.89 hrs, Volume= 0.012 af
Routed to Pond 3P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.40' @ 7.89 hrs Surf.Area= 200 sf Storage= 80 cf

Plug-Flow detention time= 60.6 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 60.6 min (717.3 - 656.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	200	0	0
182.75	200	150	150

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 2.29 hrs HW=182.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.08 cfs @ 7.89 hrs HW=182.40' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 0.08 cfs @ 0.87 fps)

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Summary for Subcatchment 3S: Developed Conditions

Runoff = 0.09 cfs @ 7.85 hrs, Volume= 0.030 af, Depth= 4.16"

Routed to Pond 3G : Growing Media

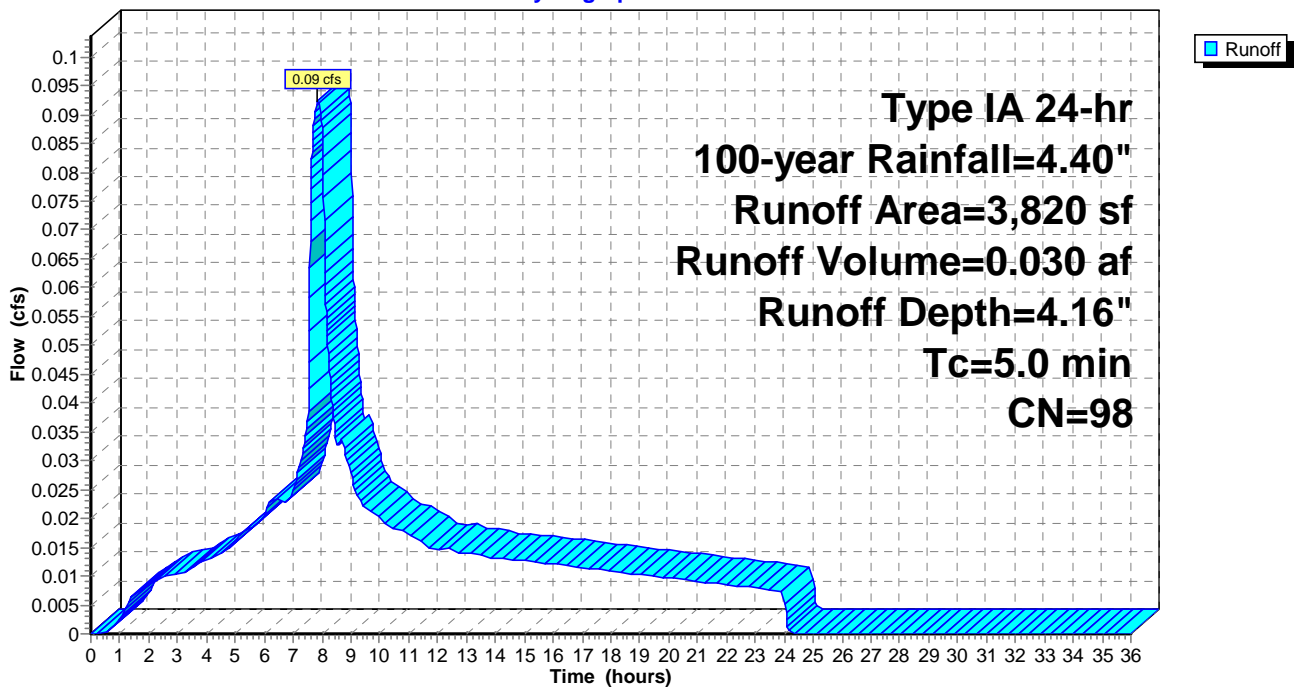
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-year Rainfall=4.40"

Area (sf)	CN	Description
3,820	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
3,820	98	Weighted Average
3,820		100.00% Impervious Area

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

Subcatchment 3S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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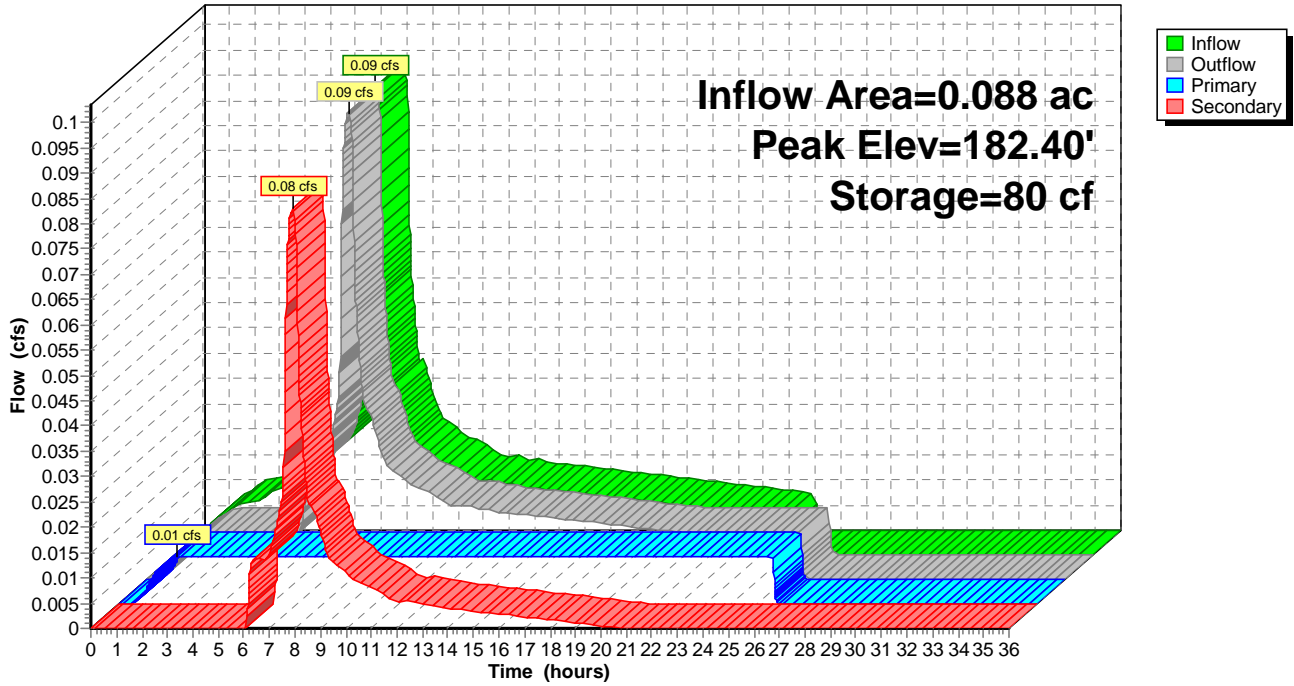
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 3G: Growing Media

Hydrograph



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Summary for Pond 3P: Rock Gallery

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.09 cfs @ 7.89 hrs, Volume= 0.030 af
Outflow = 0.02 cfs @ 7.01 hrs, Volume= 0.030 af, Atten= 74%, Lag= 0.0 min
Discarded = 0.02 cfs @ 7.01 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 180.43' @ 9.26 hrs Surf.Area= 200 sf Storage= 176 cf

Plug-Flow detention time= 38.6 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 38.6 min (755.9 - 717.3)

Volume	Invert	Avail.Storage	Storage Description
#1	177.50'	180 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 600 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
177.50	200	0	0
180.50	200	600	600

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 7.01 hrs HW=177.53' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Preliminary Stormwater 2

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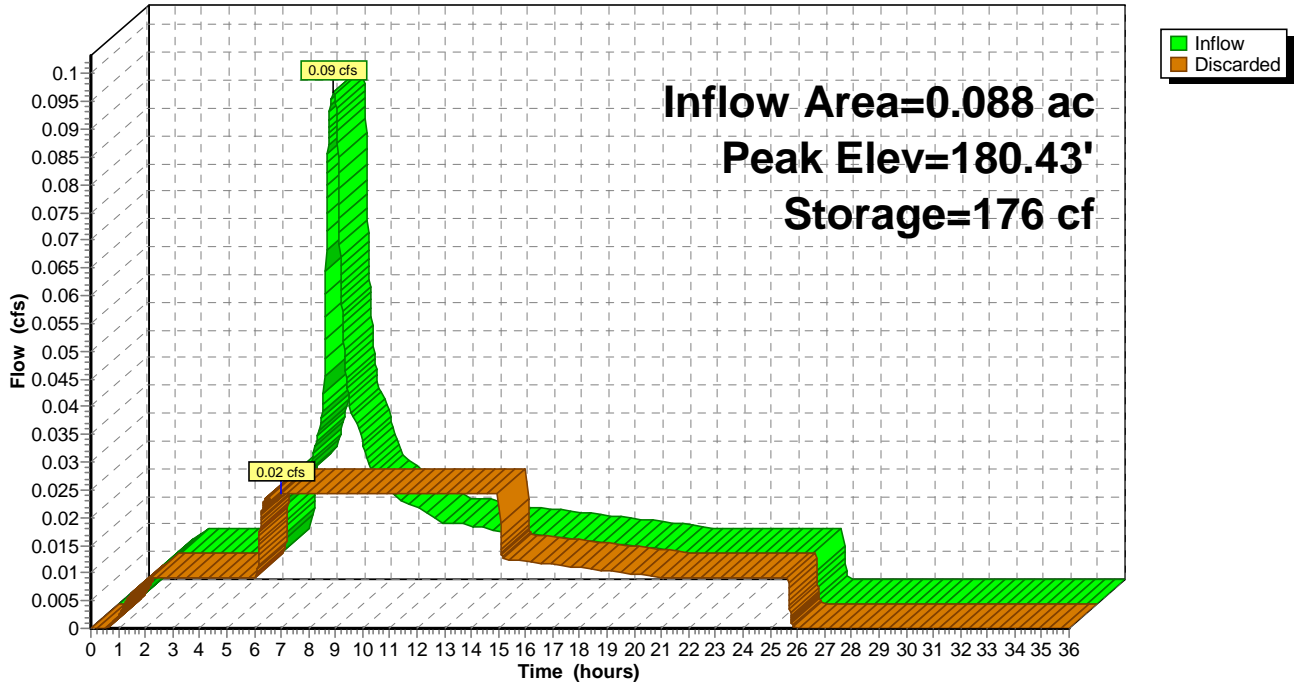
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 3P: Rock Gallery

Hydrograph



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Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 4G: Growing Media

Inflow Area = 0.041 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.04 cfs @ 7.85 hrs, Volume= 0.014 af
Outflow = 0.04 cfs @ 7.90 hrs, Volume= 0.014 af, Atten= 0%, Lag= 2.6 min
Primary = 0.01 cfs @ 4.75 hrs, Volume= 0.012 af
Routed to Pond 4P : Rock Gallery
Secondary = 0.04 cfs @ 7.90 hrs, Volume= 0.002 af
Routed to Pond 4P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.37' @ 7.90 hrs Surf.Area= 150 sf Storage= 56 cf

Plug-Flow detention time= 55.0 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 55.0 min (711.7 - 656.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	113 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	150	0	0
182.75	150	113	113

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 4.75 hrs HW=182.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.04 cfs @ 7.90 hrs HW=182.37' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 0.04 cfs @ 0.66 fps)

Preliminary Stormwater 2

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Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Subcatchment 4S: Developed Conditions

Runoff = 0.04 cfs @ 7.85 hrs, Volume= 0.014 af, Depth= 4.16"

Routed to Pond 4G : Growing Media

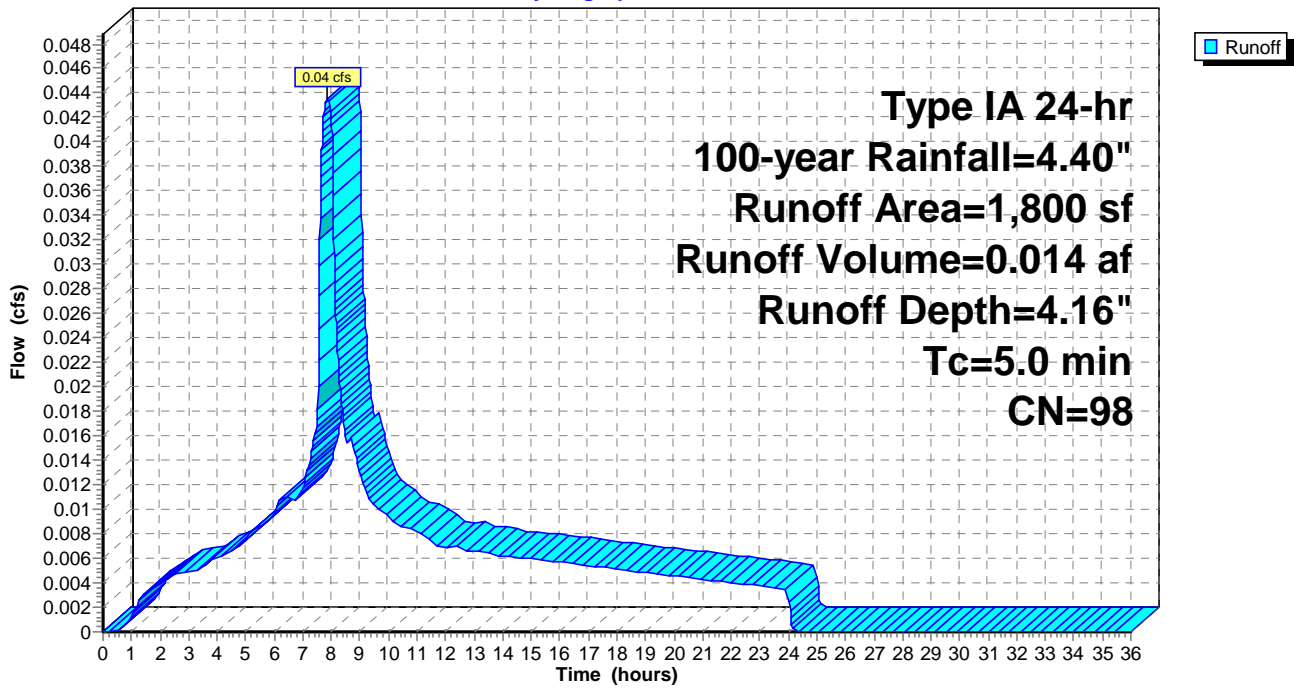
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type IA 24-hr 100-year Rainfall=4.40"

Area (sf)	CN	Description
1,800	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
1,800	98	Weighted Average
1,800		100.00% Impervious Area

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

Subcatchment 4S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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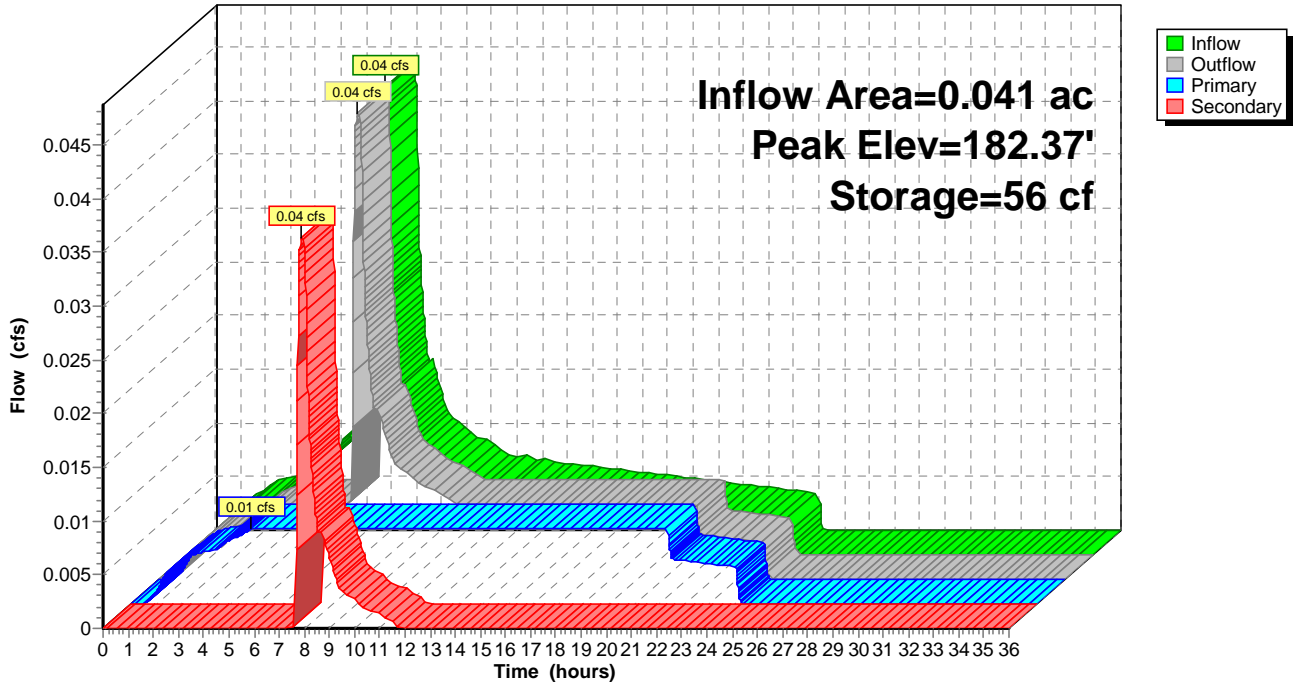
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 4G: Growing Media

Hydrograph



Preliminary Stormwater 2

Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 4P: Rock Gallery

Inflow Area = 0.041 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
 Inflow = 0.04 cfs @ 7.90 hrs, Volume= 0.014 af
 Outflow = 0.02 cfs @ 7.72 hrs, Volume= 0.014 af, Atten= 58%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 7.72 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 180.32' @ 8.42 hrs Surf.Area= 150 sf Storage= 37 cf

Plug-Flow detention time= 5.8 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 5.8 min (717.5 - 711.7)

Volume	Invert	Avail.Storage	Storage Description
#1	179.50'	45 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 150 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
179.50	150	0	0
180.50	150	150	150

Device	Routing	Invert	Outlet Devices
#1	Discarded	179.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 7.72 hrs HW=179.51' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Preliminary Stormwater 2

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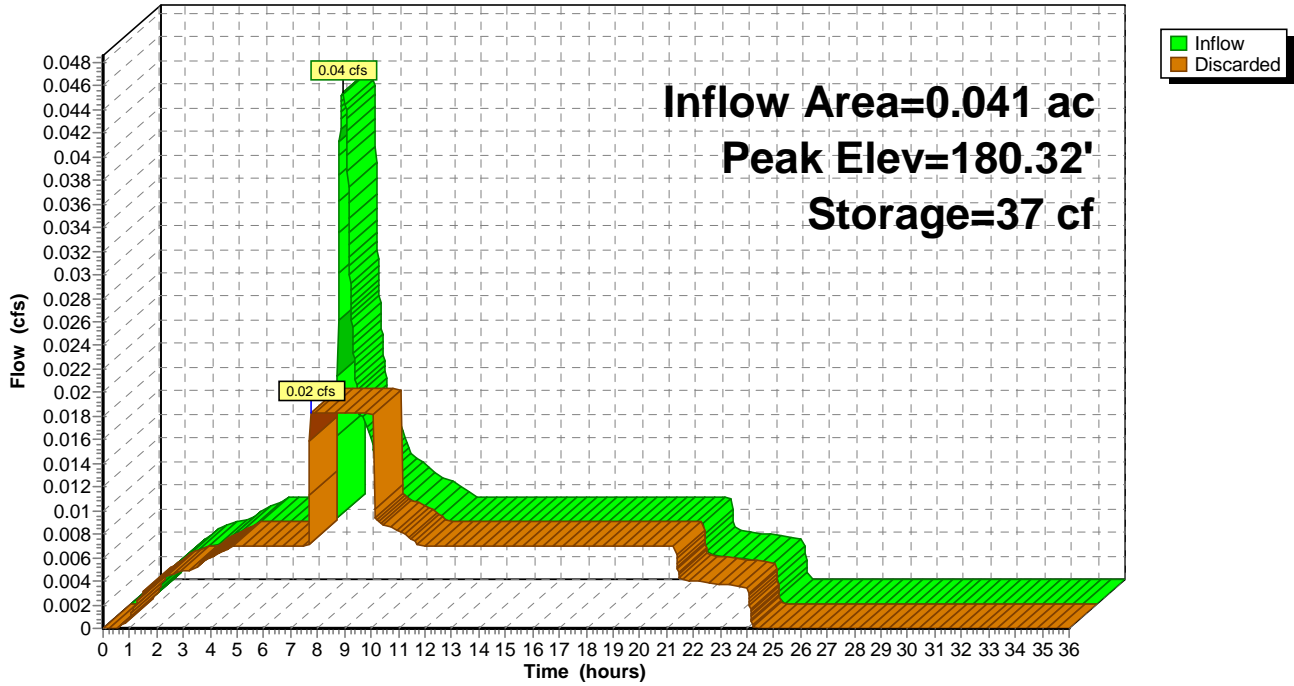
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 4P: Rock Gallery

Hydrograph



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Summary for Pond 5G: Growing Media

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
Inflow = 0.09 cfs @ 7.85 hrs, Volume= 0.031 af
Outflow = 0.09 cfs @ 7.90 hrs, Volume= 0.031 af, Atten= 0%, Lag= 2.5 min
Primary = 0.01 cfs @ 3.60 hrs, Volume= 0.022 af
Routed to Pond 5P : Rock Gallery
Secondary = 0.08 cfs @ 7.90 hrs, Volume= 0.009 af
Routed to Pond 5P : Rock Gallery

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 182.40' @ 7.90 hrs Surf.Area= 250 sf Storage= 100 cf

Plug-Flow detention time= 63.8 min calculated for 0.031 af (100% of inflow)
Center-of-Mass det. time= 63.8 min (720.5 - 656.7)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	188 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	250	0	0
182.75	250	188	188

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	2.000 in/hr Exfiltration over Surface area
#2	Secondary	182.33'	5.2" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 3.60 hrs HW=182.01' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.08 cfs @ 7.90 hrs HW=182.40' (Free Discharge)

↑**2=Orifice/Grate** (Weir Controls 0.08 cfs @ 0.86 fps)

Preliminary Stormwater 2

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Summary for Subcatchment 5S: Developed Conditions

Runoff = 0.09 cfs @ 7.85 hrs, Volume= 0.031 af, Depth= 4.16"

Routed to Pond 5G : Growing Media

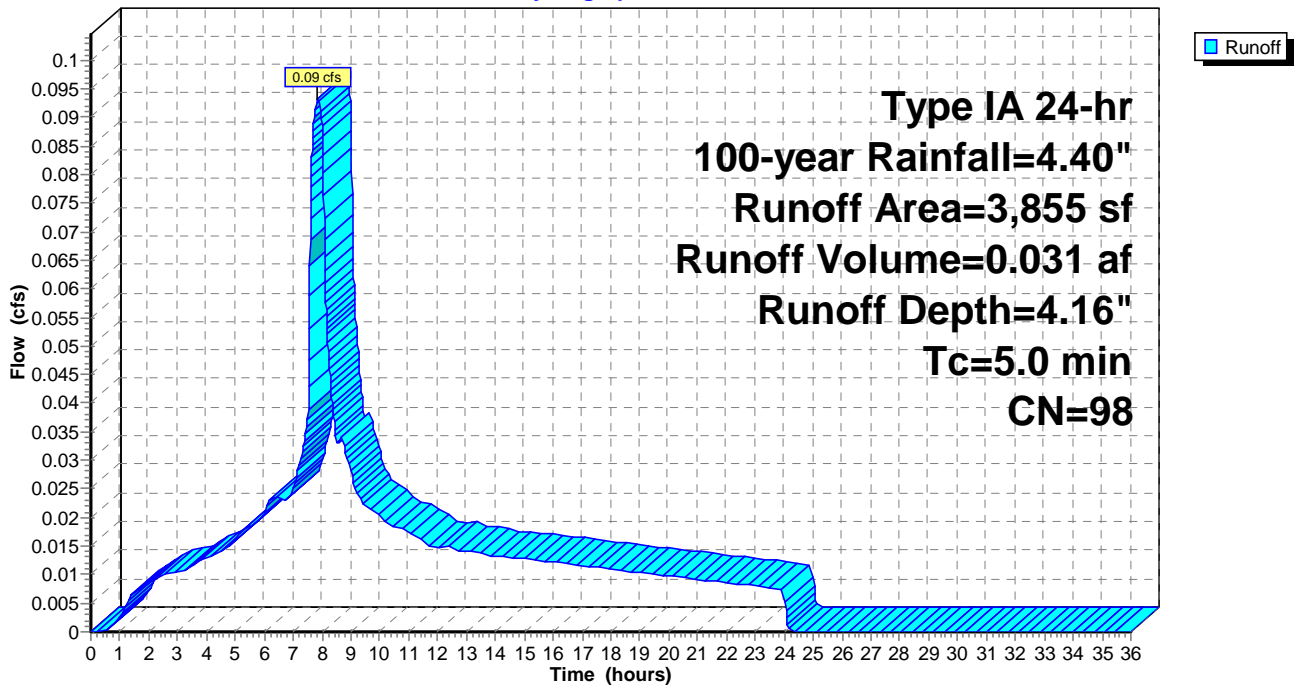
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-year Rainfall=4.40"

Area (sf)	CN	Description
3,855	98	Paved roads w/curbs & sewers, HSG C
0	79	1 acre lots, 20% imp, HSG C
3,855	98	Weighted Average
3,855		100.00% Impervious Area

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

Subcatchment 5S: Developed Conditions

Hydrograph



Preliminary Stormwater 2

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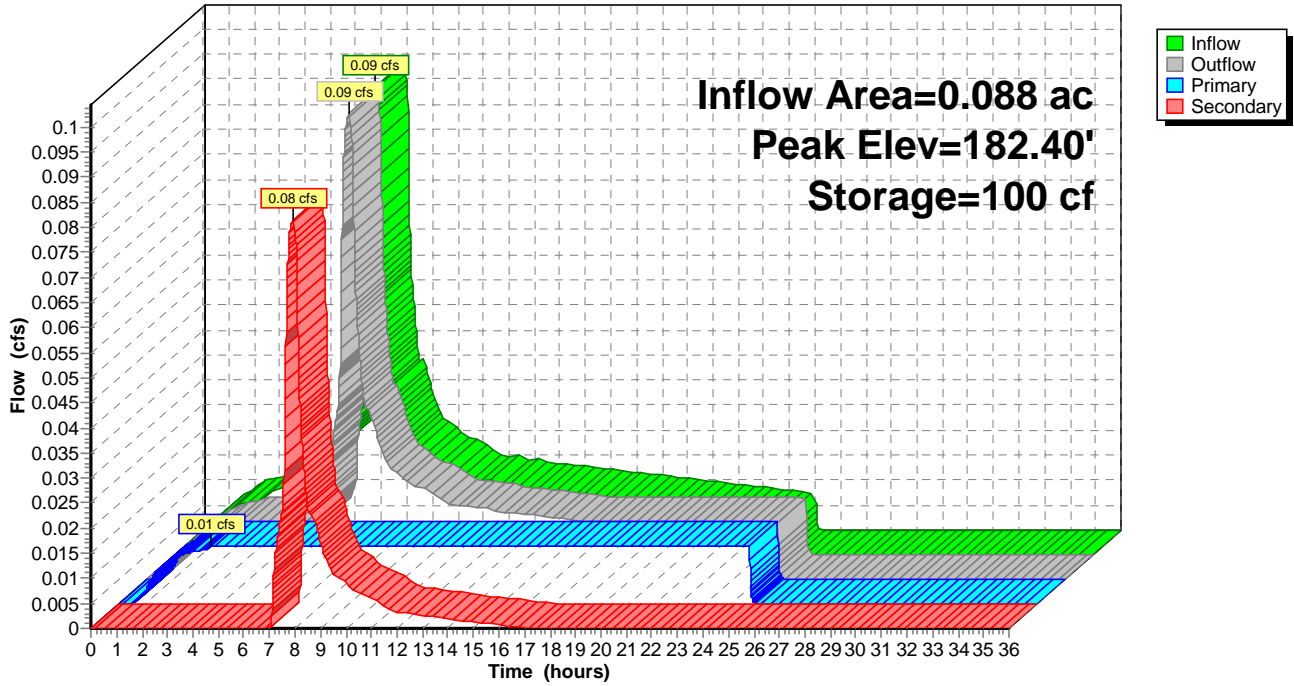
Type IA 24-hr 100-year Rainfall=4.40"

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Pond 5G: Growing Media

Hydrograph



Preliminary Stormwater 2

Type IA 24-hr 100-year Rainfall=4.40"

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Summary for Pond 5P: Rock Gallery

Inflow Area = 0.088 ac, 100.00% Impervious, Inflow Depth = 4.16" for 100-year event
 Inflow = 0.09 cfs @ 7.90 hrs, Volume= 0.031 af
 Outflow = 0.03 cfs @ 7.36 hrs, Volume= 0.031 af, Atten= 67%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 7.36 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 180.32' @ 8.93 hrs Surf.Area= 250 sf Storage= 137 cf

Plug-Flow detention time= 18.9 min calculated for 0.031 af (100% of inflow)
 Center-of-Mass det. time= 18.9 min (739.4 - 720.5)

Volume	Invert	Avail.Storage	Storage Description
#1	178.50'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 500 cf Overall x 30.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.50	250	0	0
180.50	250	500	500

Device	Routing	Invert	Outlet Devices
#1	Discarded	178.50'	5.250 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 7.36 hrs HW=178.52' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Preliminary Stormwater 2

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Pond 5P: Rock Gallery

Hydrograph

