

VERA LANE
13 LOT DEFINITIVE SUBDIVISION
DRAINAGE REPORT

This drainage report is intended to accompany Definitive Subdivision Plans prepared by Sullivan Engineering Group, LLC. The existing site is just over 12 acres of undeveloped land with a wetland resource area to the extreme rear of the site. An ORAD has been issued by the Lexington Conservation Commission which establishes the wetland boundaries and associated protective buffers shown. Soil testing was done onsite in areas of the proposed infiltration fields and also along the 100 foot stations of the proposed roadway. All the testholes demonstrated a similar parent material being classified as a “Sandy Loam”. For the purpose of the drainage modeling the Rawl’s Rate for infiltration for a Class B – Sandy Loam (1.02 in/hr) was used as a conservative approach in the design.

The proposed stormwater system will consist of deep sump catchbasins with gas hoods, HDPE drainage pipe, concrete drain manholes, stormceptors, Cultec Infiltration recharge chambers (330 XLHD units), and outlet control structures. All drainage pipe has been designed to have a minimum of 2.5 feet of cover. Additionally, the bottom of all infiltration field areas have the bed bottom a minimum of 2 feet above the seasonal high groundwater table..

This drainage analysis is for the roadway, sidewalk, driveway aprons, and site grading only. Future development of the individual lots will require a separate stormwater analysis to demonstrate mitigation measures for impervious surfaces.

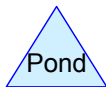
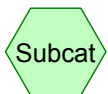
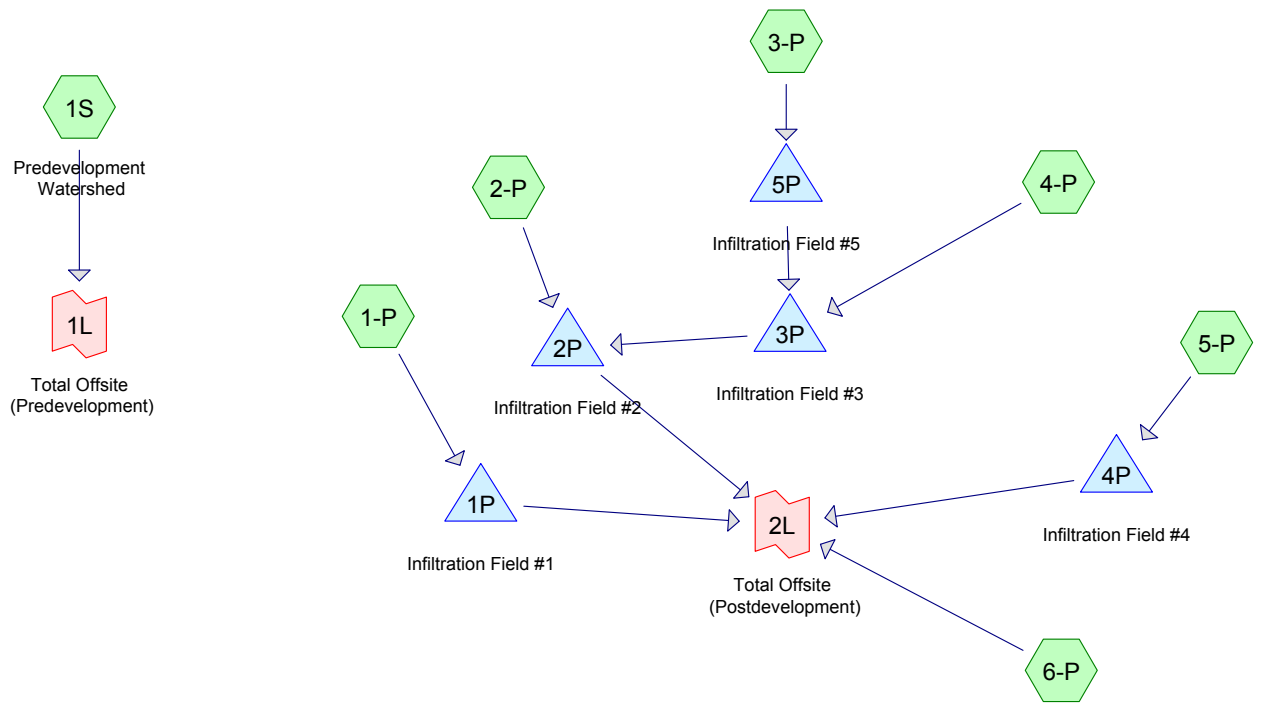
Attached is the HydroCAD report for the Predevelopment & Postdevelopment analysis and the drainage plans for both scenarios.

The HydroCAD report models the Predevelopment Condition vs. Postdevelopment Condition for the entire site area. The stormwater design reduces the peak rate of runoff and volume for the 2, 10, and 100 year storm event. The following is summary of the peak rate of runoff for various storm events:

	Predevelopment (cfs)	Volume (AF)	Postdevelopment (cfs)	Volume (AF)
<u>Storm Event</u>				
2 Year	2.38	0.388	1.31	0.192
10 Year	10.29	1.09	5.31	0.746
100 Year	24.95	2.36	24.49	2.10

Very Truly Yours,

Jack Sullivan, PE



Time span=0.10-36.00 hrs, dt=0.01 hrs, 3591 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1-P: Runoff Area=18,213 sf Runoff Depth=2.08"
Flow Length=417' Tc=1.9 min CN=90 Runoff=1.17 cfs 0.072 af

Subcatchment 1S: Predevelopment Watershed Runoff Area=547,425 sf Runoff Depth=0.37"
Flow Length=752' Tc=13.5 min CN=60 Runoff=2.38 cfs 0.388 af

Subcatchment 2-P: Runoff Area=10,480 sf Runoff Depth=1.99"
Flow Length=237' Tc=1.0 min CN=89 Runoff=0.67 cfs 0.040 af

Subcatchment 3-P: Runoff Area=177,857 sf Runoff Depth=0.40"
Flow Length=618' Tc=12.1 min CN=61 Runoff=0.93 cfs 0.137 af

Subcatchment 4-P: Runoff Area=15,918 sf Runoff Depth=2.45"
Flow Length=254' Tc=1.4 min CN=94 Runoff=1.19 cfs 0.075 af

Subcatchment 5-P: Runoff Area=76,607 sf Runoff Depth=0.72"
Flow Length=493' Tc=2.1 min CN=69 Runoff=1.48 cfs 0.106 af

Subcatchment 6-P: Runoff Area=248,349 sf Runoff Depth=0.40"
Flow Length=619' Tc=11.8 min CN=61 Runoff=1.31 cfs 0.192 af

Pond 1P: Infiltration Field #1 Peak Elev=243.50' Storage=1,907 cf Inflow=1.17 cfs 0.072 af
Discarded=0.03 cfs 0.066 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.066 af

Pond 2P: Infiltration Field #2 Peak Elev=220.52' Storage=845 cf Inflow=0.67 cfs 0.041 af
Discarded=0.03 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.041 af

Pond 3P: Infiltration Field #3 Peak Elev=224.30' Storage=2,139 cf Inflow=1.19 cfs 0.075 af
Discarded=0.02 cfs 0.047 af Primary=0.01 cfs 0.001 af Outflow=0.03 cfs 0.049 af

Pond 4P: Infiltration Field #4 Peak Elev=224.26' Storage=2,744 cf Inflow=1.48 cfs 0.106 af
Discarded=0.05 cfs 0.098 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.098 af

Pond 5P: Infiltration Field #5 Peak Elev=225.12' Storage=3,328 cf Inflow=0.93 cfs 0.137 af
Discarded=0.06 cfs 0.129 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.129 af

Link 1L: Total Offsite (Predevelopment) Inflow=2.38 cfs 0.388 af
Primary=2.38 cfs 0.388 af

Link 2L: Total Offsite (Postdevelopment) Inflow=1.31 cfs 0.192 af
Primary=1.31 cfs 0.192 af

Total Runoff Area = 25.134 ac Runoff Volume = 1.010 af Average Runoff Depth = 0.48"

Subcatchment 1-P:

Runoff = 1.17 cfs @ 12.03 hrs, Volume= 0.072 af, Depth= 2.08"

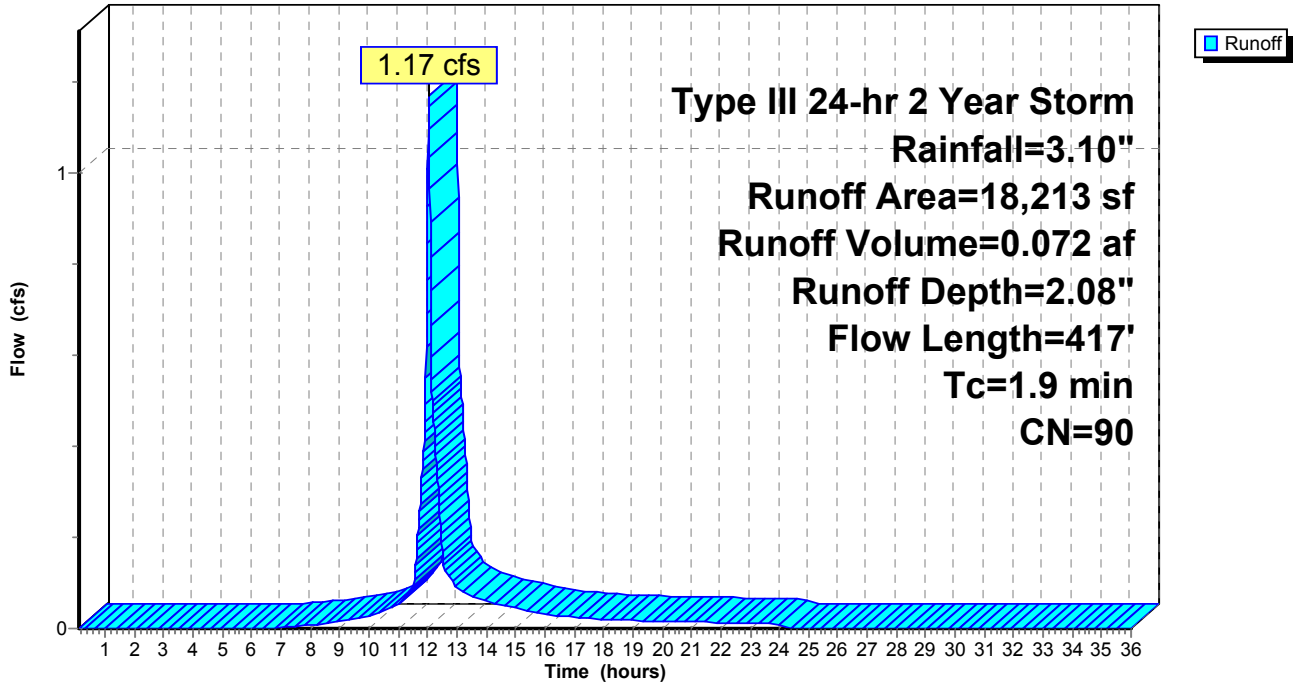
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
9,720	98	Roadway
2,025	98	Paved Sidewalk
465	98	Driveway Aprons
381	98	Vertical Granite Curb
674	98	Retaining Wall
4,948	69	50-75% Grass cover, Fair, HSG B
18,213	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.1	25	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	330	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9	417	Total			

Subcatchment 1-P:

Hydrograph



Subcatchment 1S: Predevelopment Watershed

Runoff = 2.38 cfs @ 12.32 hrs, Volume= 0.388 af, Depth= 0.37"

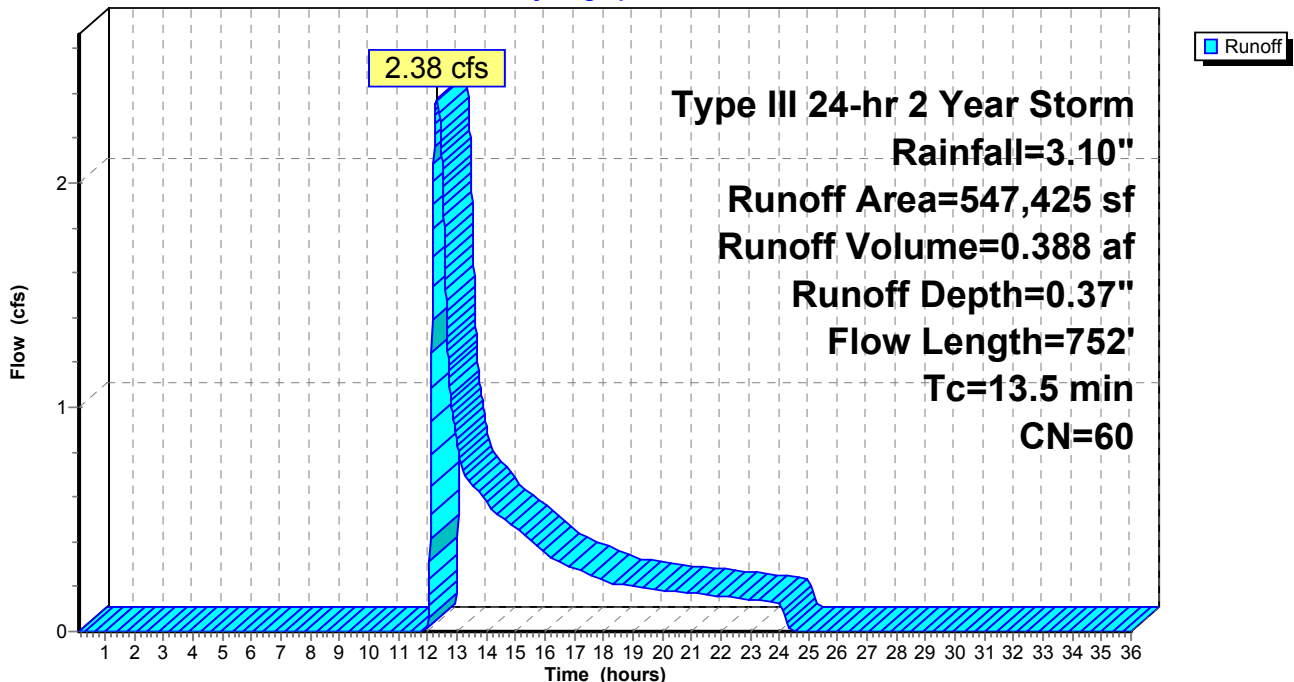
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
544,225	60	Woods, Fair, HSG B
2,625	98	House Roof (#223)
575	85	Gravel roads, HSG B
547,425	60	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0940	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
3.4	340	0.1100	1.7		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	90	0.1200	1.7		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.0	134	0.1900	2.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.5	138	0.0900	1.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.5	752	Total			

Subcatchment 1S: Predevelopment Watershed

Hydrograph



Subcatchment 2-P:

Runoff = 0.67 cfs @ 12.02 hrs, Volume= 0.040 af, Depth= 1.99"

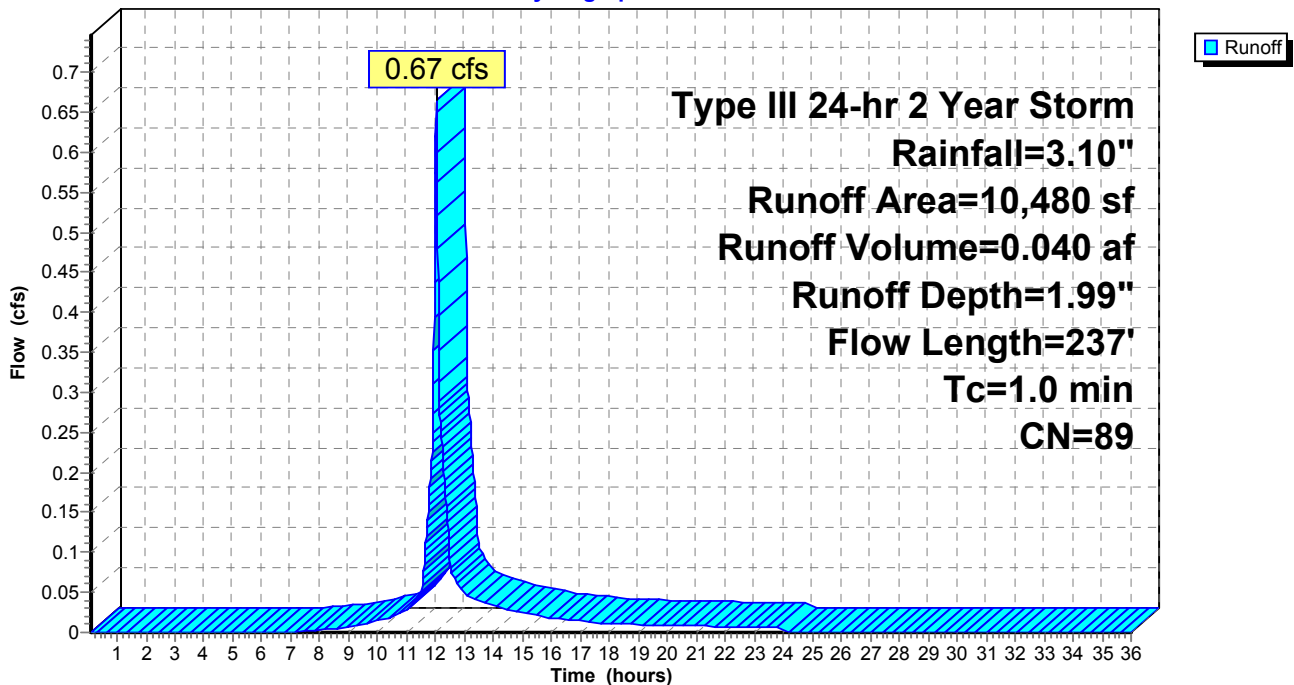
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
5,400	98	Paved Roadway
1,125	98	Paved Sidewalk
465	98	Driveway Apron
201	98	Vertical Granite Curb
3,289	69	50-75% Grass cover, Fair, HSG B
10,480	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.5	175	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	237	Total			

Subcatchment 2-P:

Hydrograph



Subcatchment 3-P:

Runoff = 0.93 cfs @ 12.25 hrs, Volume= 0.137 af, Depth= 0.40"

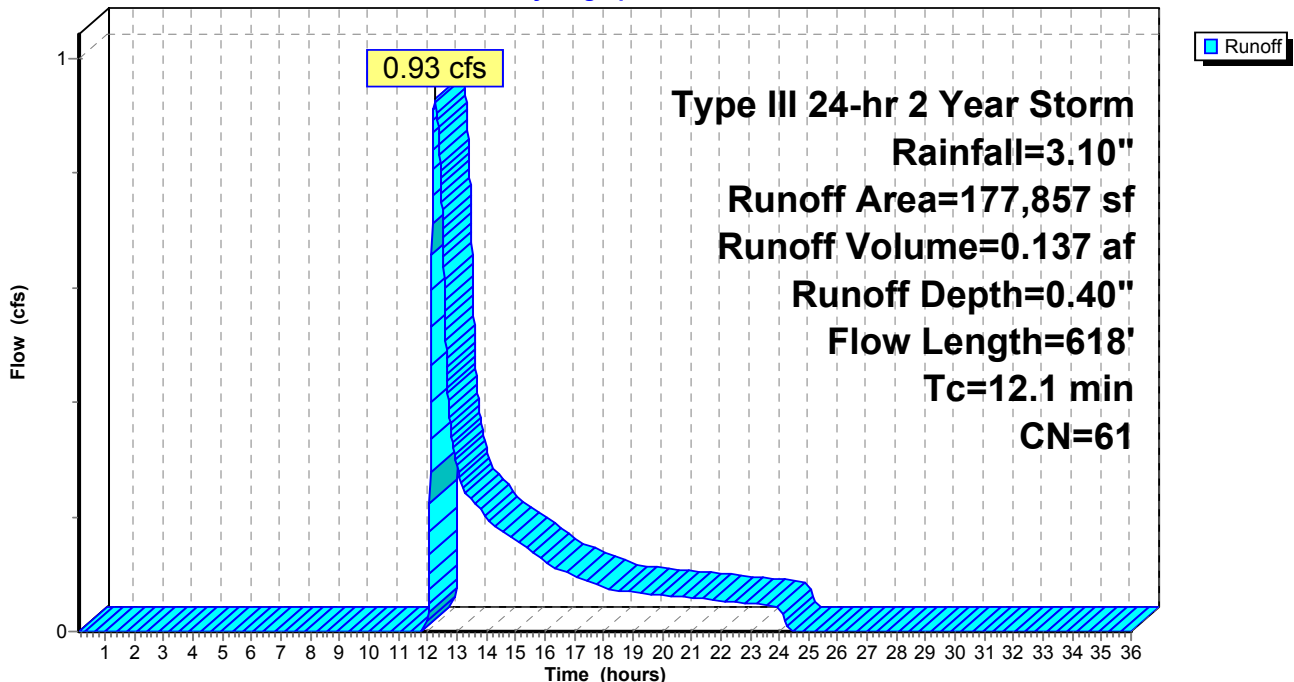
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
2,624	98	House Roof #223
9,420	69	50-75% Grass cover, Fair, HSG B
165,813	60	Woods, Fair, HSG B
177,857	61	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1200	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
0.6	63	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.9	332	0.0800	1.4		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	106	0.1900	2.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.7	67	0.0900	1.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	618	Total			

Subcatchment 3-P:

Hydrograph



Subcatchment 4-P:

Runoff = 1.19 cfs @ 12.02 hrs, Volume= 0.075 af, Depth= 2.45"

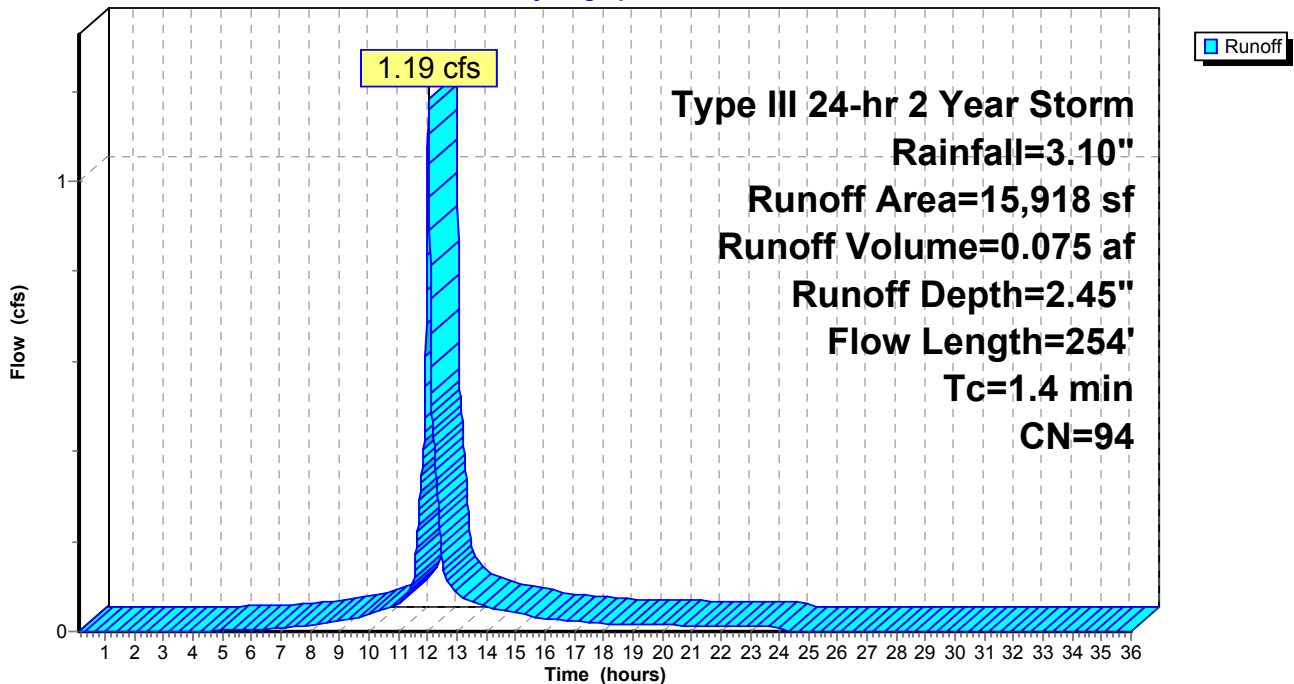
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
10,512	98	Roadway Pavement
2,190	98	Sidewalk
620	98	driveway aprons
2,190	69	50-75% Grass cover, Fair, HSG B
406	98	vertical granite curb
15,918	94	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.4	129	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	63	0.0100	2.0		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.4	254	Total			

Subcatchment 4-P:

Hydrograph



Subcatchment 5-P:

Runoff = 1.48 cfs @ 12.04 hrs, Volume= 0.106 af, Depth= 0.72"

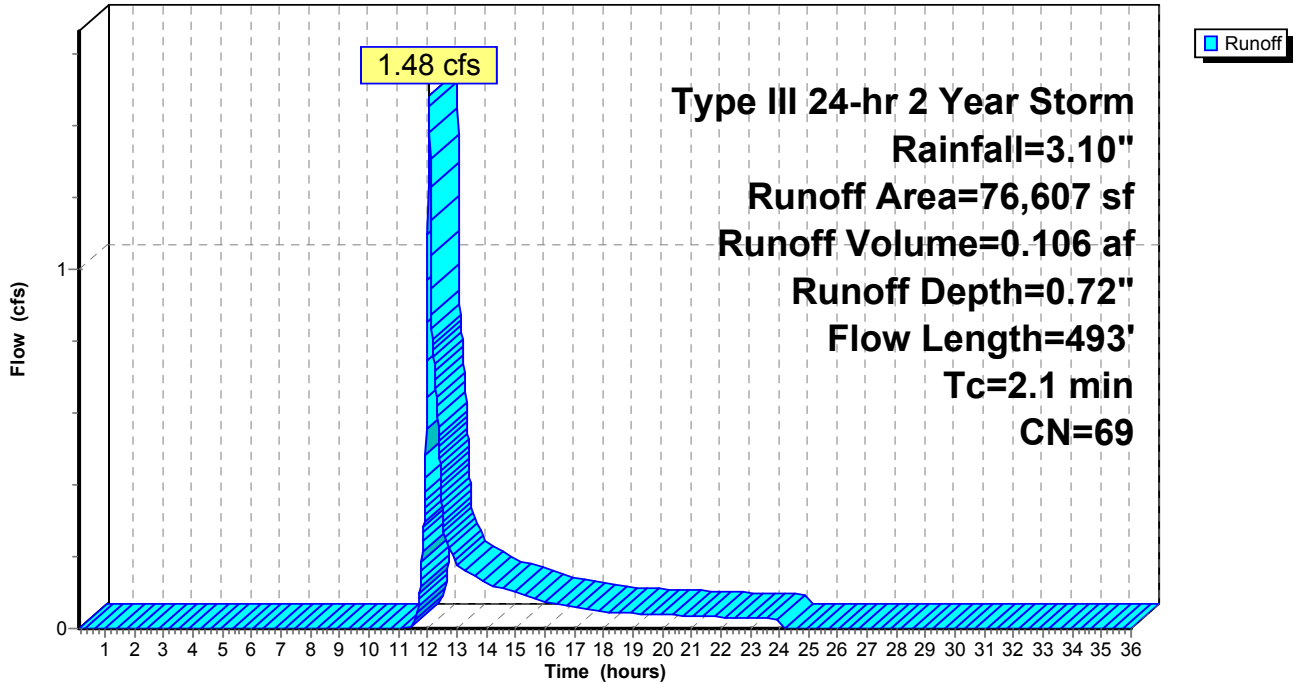
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
11,544	98	Paved Roadway
2,405	98	Paved Sidewalk
620	98	Driveway Aprons
449	98	vertical granite curb
17,390	69	50-75% Grass cover, Fair, HSG B
44,199	60	Woods, Fair, HSG B
76,607	69	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.1	25	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	406	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	493	Total			

Subcatchment 5-P:

Hydrograph



Subcatchment 6-P:

Runoff = 1.31 cfs @ 12.24 hrs, Volume= 0.192 af, Depth= 0.40"

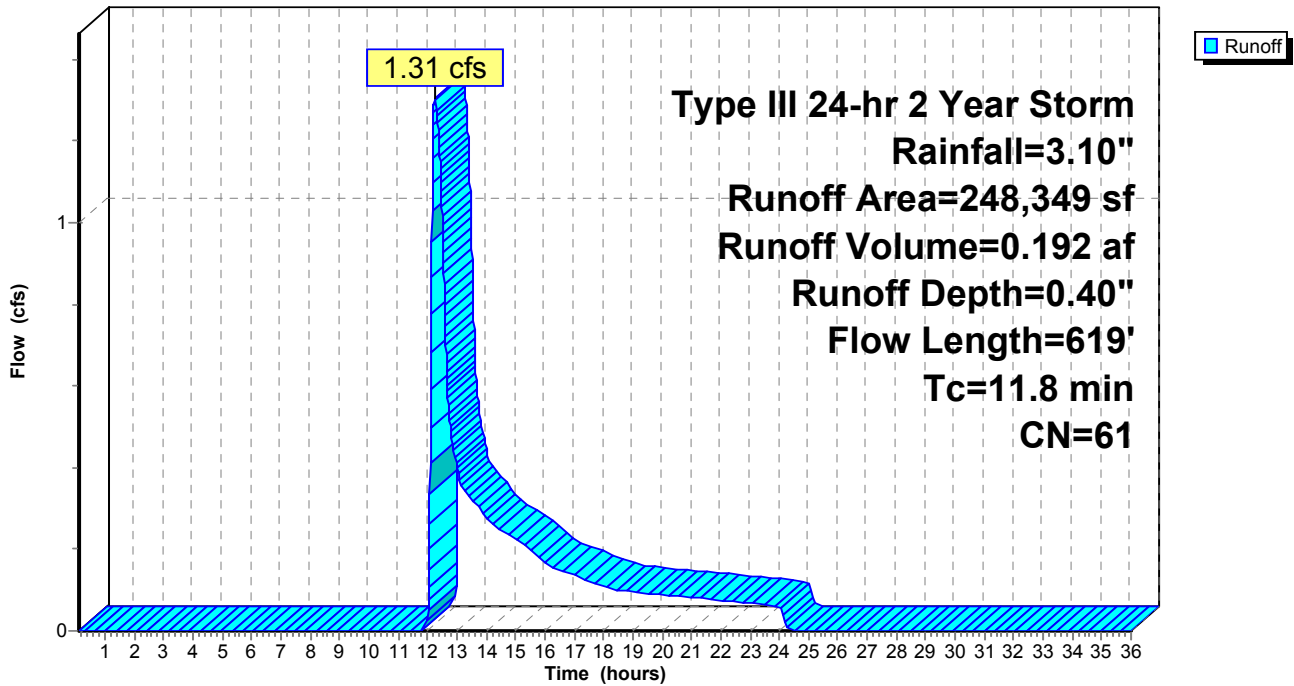
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
32,458	69	50-75% Grass cover, Fair, HSG B
215,891	60	Woods, Fair, HSG B
248,349	61	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1200	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
4.3	469	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	100	0.0600	1.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	619	Total			

Subcatchment 6-P:

Hydrograph



Pond 1P: Infiltration Field #1

Inflow Area = 0.418 ac, Inflow Depth = 2.08" for 2 Year Storm event
 Inflow = 1.17 cfs @ 12.03 hrs, Volume= 0.072 af
 Outflow = 0.03 cfs @ 10.31 hrs, Volume= 0.066 af, Atten= 97%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 10.31 hrs, Volume= 0.066 af
 Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 243.50' @ 16.24 hrs Surf.Area= 1,268 sf Storage= 1,907 cf
 Plug-Flow detention time= 586.4 min calculated for 0.066 af (91% of inflow)
 Center-of-Mass det. time= 543.3 min (1,347.6 - 804.3)

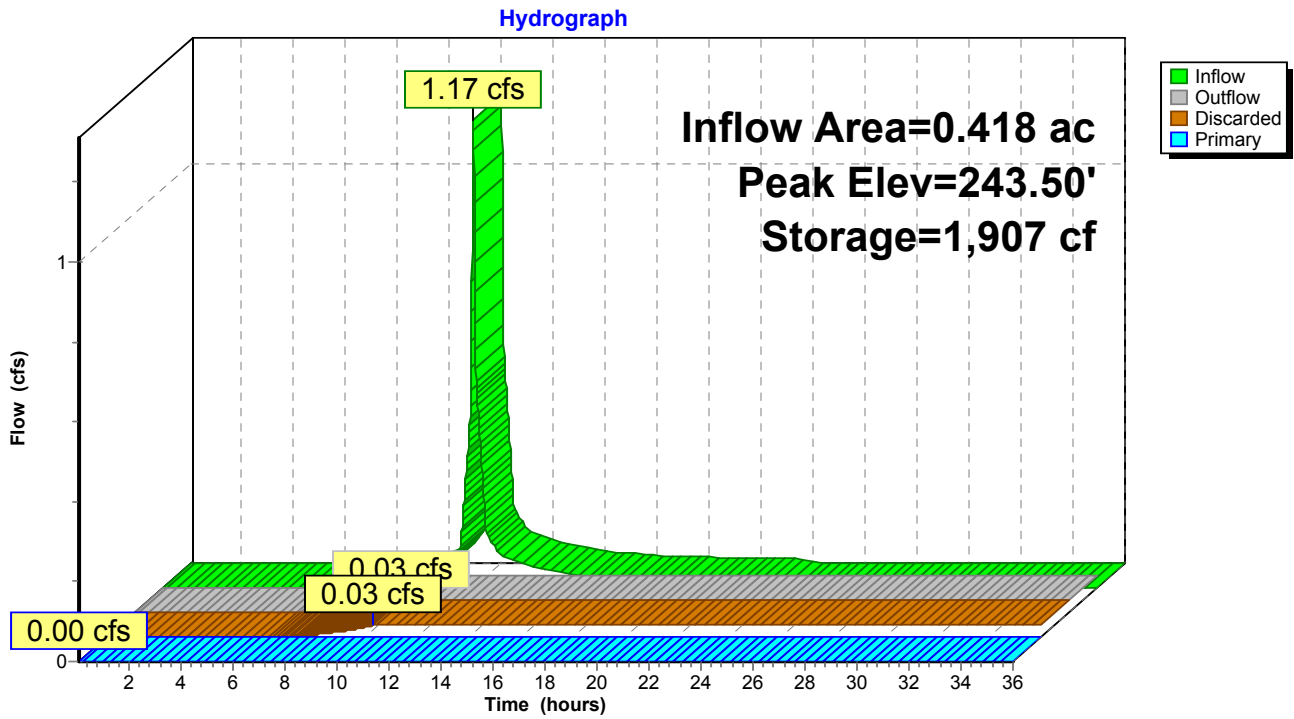
#	Invert	Avail.Storage	Storage Description
1	240.95'	1,563 cf	19.82'W x 64.00'L x 4.54'H Prismatic 5,759 cf Overall - 1,850 cf Embedded = 3,909 cf x 40.0% Voids
2	242.45'	1,850 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,414 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	245.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.03 cfs @ 10.31 hrs HW=241.00' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=240.95' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Infiltration Field #1



Pond 2P: Infiltration Field #2

Inflow Area = 4.689 ac, Inflow Depth = 0.11" for 2 Year Storm event
 Inflow = 0.67 cfs @ 12.02 hrs, Volume= 0.041 af
 Outflow = 0.03 cfs @ 11.22 hrs, Volume= 0.041 af, Atten= 96%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 11.22 hrs, Volume= 0.041 af
 Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 220.52' @ 14.37 hrs Surf.Area= 1,274 sf Storage= 845 cf
 Plug-Flow detention time= 284.8 min calculated for 0.041 af (100% of inflow)
 Center-of-Mass det. time= 284.8 min (1,098.7 - 813.9)

#	Invert	Avail.Storage	Storage Description
1	218.95'	1,574 cf	14.99'W x 85.00'L x 4.54'H Prismatic 5,785 cf Overall - 1,850 cf Embedded = 3,934 cf x 40.0% Voids
2	220.45'	1,850 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,424 cf	Total Available Storage

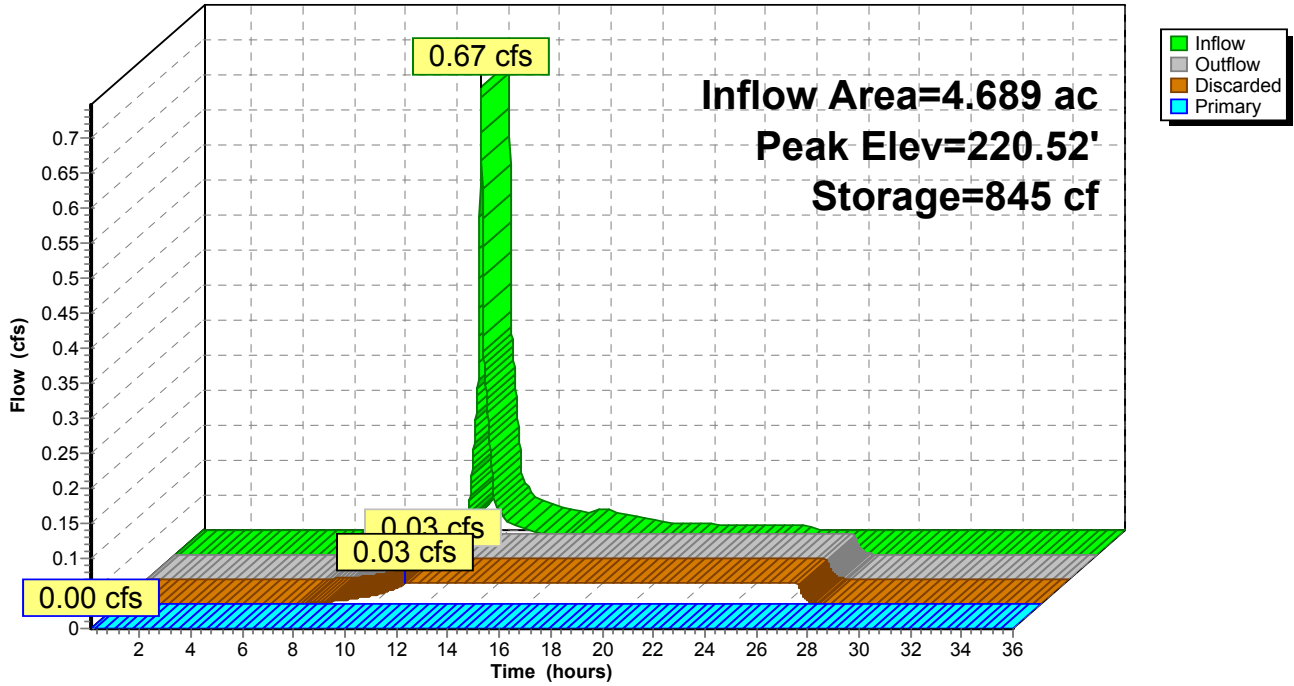
#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	223.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.03 cfs @ 11.22 hrs HW=219.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=218.95' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 2P: Infiltration Field #2

Hydrograph



Pond 3P: Infiltration Field #3

Inflow Area = 4.448 ac, Inflow Depth = 0.20" for 2 Year Storm event
 Inflow = 1.19 cfs @ 12.02 hrs, Volume= 0.075 af
 Outflow = 0.03 cfs @ 15.75 hrs, Volume= 0.049 af, Atten= 97%, Lag= 224.0 min
 Discarded = 0.02 cfs @ 8.90 hrs, Volume= 0.047 af
 Primary = 0.01 cfs @ 15.75 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 224.30' @ 15.75 hrs Surf.Area= 854 sf Storage= 2,139 cf
 Plug-Flow detention time= 600.2 min calculated for 0.049 af (66% of inflow)
 Center-of-Mass det. time= 502.7 min (1,286.6 - 783.9)

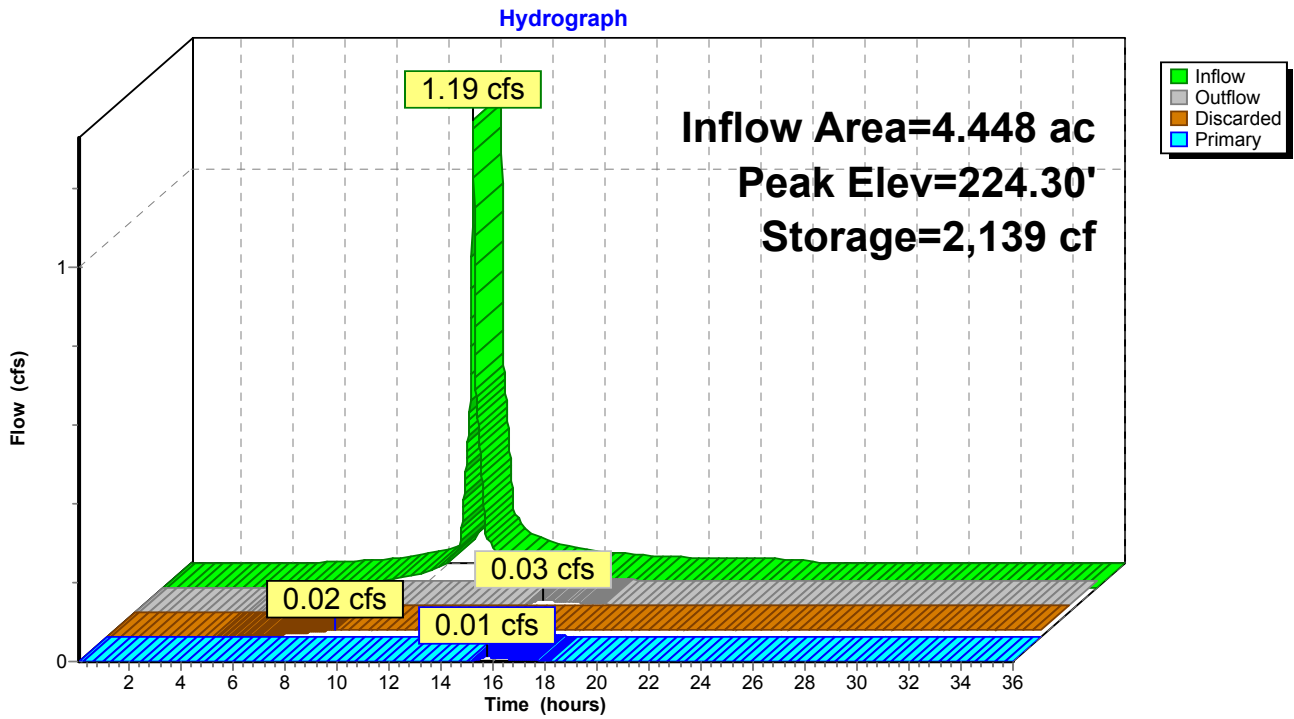
#	Invert	Avail.Storage	Storage Description
1	220.21'	1,058 cf	14.99'W x 57.00'L x 4.54'H Prismatic 3,879 cf Overall - 1,234 cf Embedded = 2,646 cf x 40.0% Voids
2	221.71'	1,234 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 24 Inside #1
		2,292 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	224.25'	12.0" x 130.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 222.25' S= 0.0154 '/' n= 0.011 Cc= 0.900

Discarded OutFlow Max=0.02 cfs @ 8.90 hrs HW=220.26' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.01 cfs @ 15.75 hrs HW=224.30' (Free Discharge)
 ↑**2=Culvert** (Inlet Controls 0.01 cfs @ 0.6 fps)

Pond 3P: Infiltration Field #3



Pond 4P: Infiltration Field #4

Inflow Area = 1.759 ac, Inflow Depth = 0.72" for 2 Year Storm event
 Inflow = 1.48 cfs @ 12.04 hrs, Volume= 0.106 af
 Outflow = 0.05 cfs @ 11.78 hrs, Volume= 0.098 af, Atten= 97%, Lag= 0.0 min
 Discarded = 0.05 cfs @ 11.78 hrs, Volume= 0.098 af
 Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 224.26' @ 17.78 hrs Surf.Area= 2,101 sf Storage= 2,744 cf
 Plug-Flow detention time= 588.7 min calculated for 0.098 af (93% of inflow)
 Center-of-Mass det. time= 552.7 min (1,431.0 - 878.3)

#	Invert	Avail.Storage	Storage Description
1	221.95'	2,582 cf	19.82'W x 106.00'L x 4.54'H Prismatoid 9,538 cf Overall - 3,084 cf Embedded = 6,454 cf x 40.0% Voids
2	223.46'	3,084 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 60 Inside #1
		5,666 cf	Total Available Storage

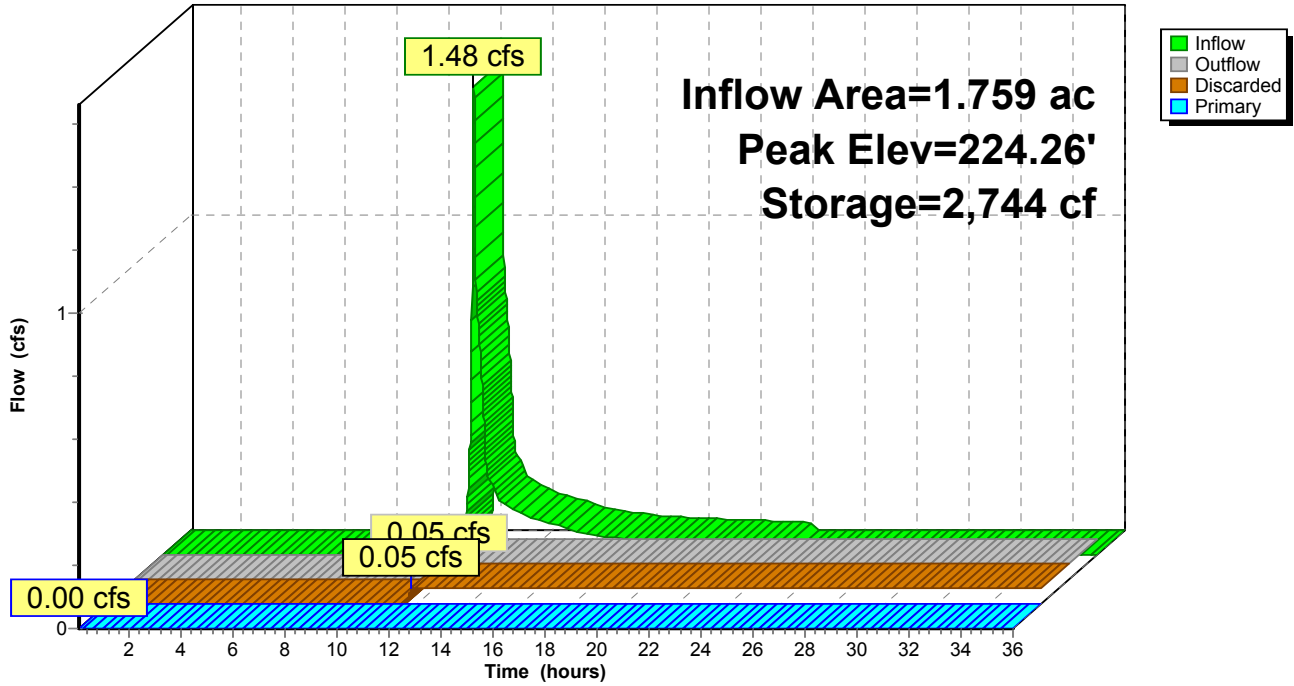
#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	226.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.05 cfs @ 11.78 hrs HW=222.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=221.95' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Infiltration Field #4

Hydrograph



Pond 5P: Infiltration Field #5

Inflow Area = 4.083 ac, Inflow Depth = 0.40" for 2 Year Storm event
 Inflow = 0.93 cfs @ 12.25 hrs, Volume= 0.137 af
 Outflow = 0.06 cfs @ 12.10 hrs, Volume= 0.129 af, Atten= 93%, Lag= 0.0 min
 Discarded = 0.06 cfs @ 12.10 hrs, Volume= 0.129 af
 Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 225.12' @ 19.70 hrs Surf.Area= 2,785 sf Storage= 3,328 cf
 Plug-Flow detention time= 548.8 min calculated for 0.129 af (94% of inflow)
 Center-of-Mass det. time= 517.5 min (1,442.1 - 924.6)

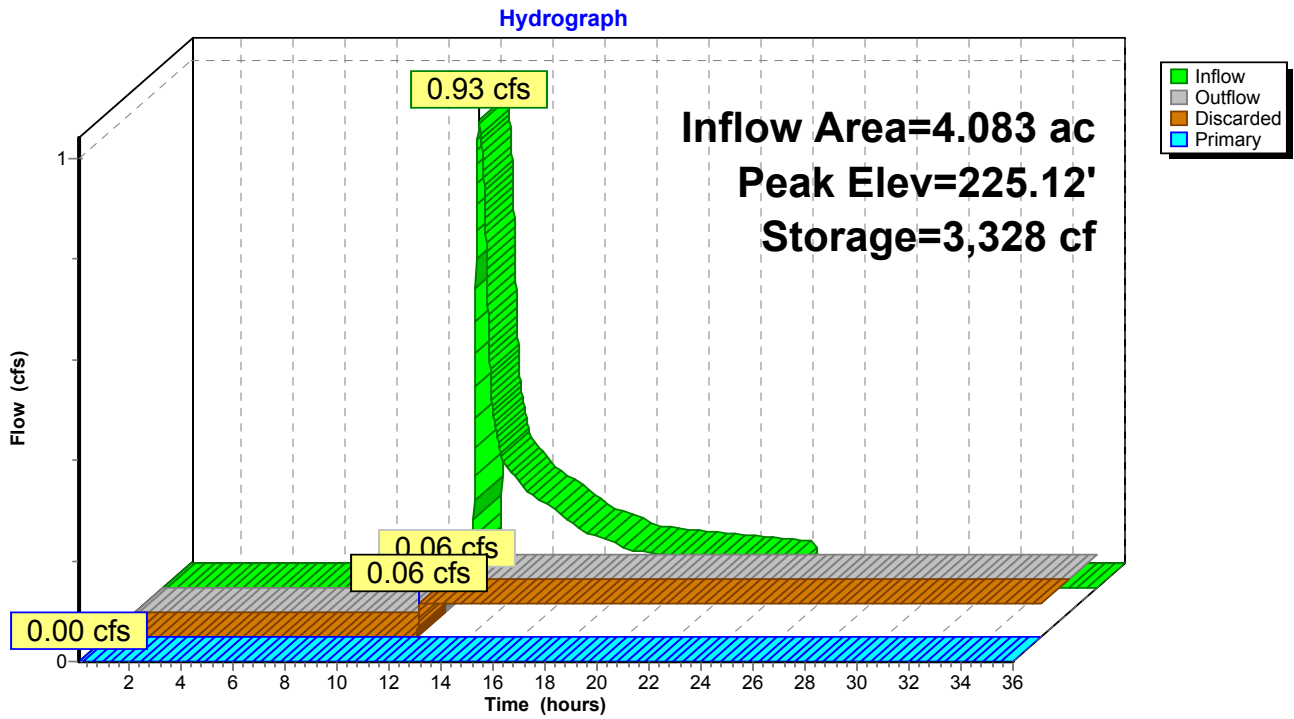
#	Invert	Avail.Storage	Storage Description
1	222.95'	3,414 cf	24.65'W x 113.00'L x 4.54'H Prismatoid 12,646 cf Overall - 4,112 cf Embedded = 8,534 cf x 40.0% Voids
2	224.45'	4,112 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 80 Inside #1
		7,525 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	227.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.06 cfs @ 12.10 hrs HW=223.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=222.95' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 5P: Infiltration Field #5



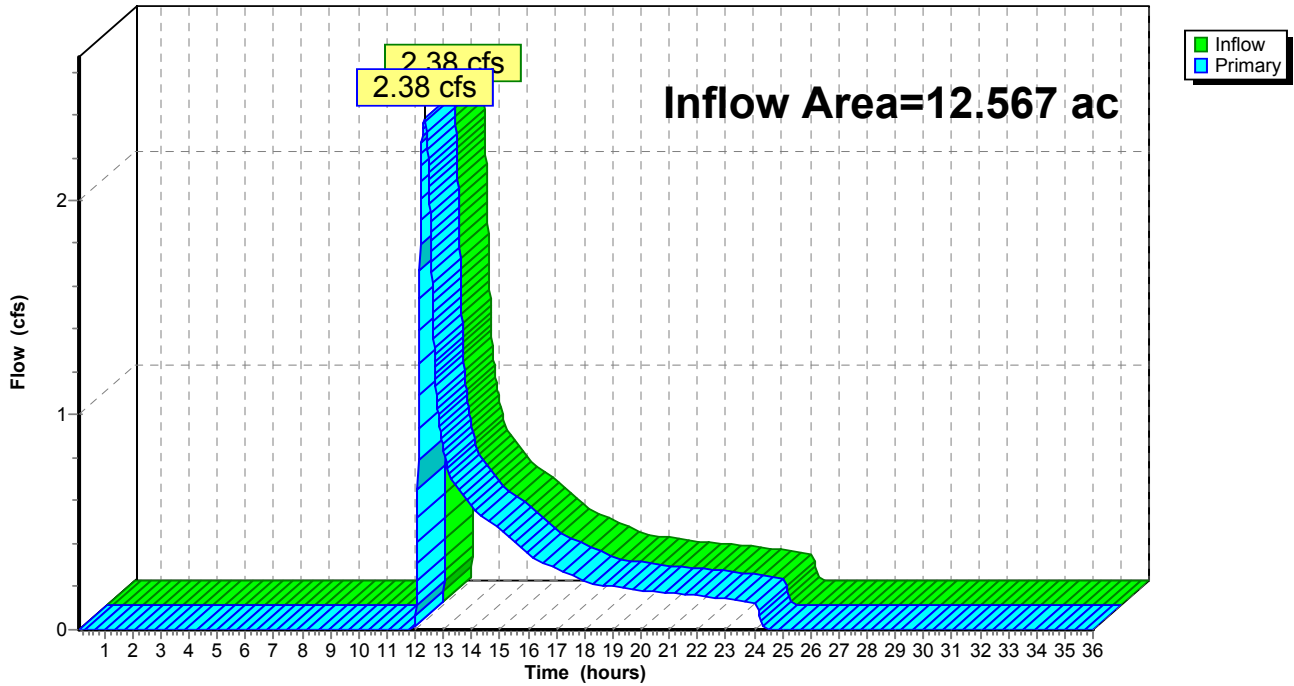
Link 1L: Total Offsite (Predevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 0.37" for 2 Year Storm event
Inflow = 2.38 cfs @ 12.32 hrs, Volume= 0.388 af
Primary = 2.38 cfs @ 12.32 hrs, Volume= 0.388 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs

Link 1L: Total Offsite (Predevelopment)

Hydrograph



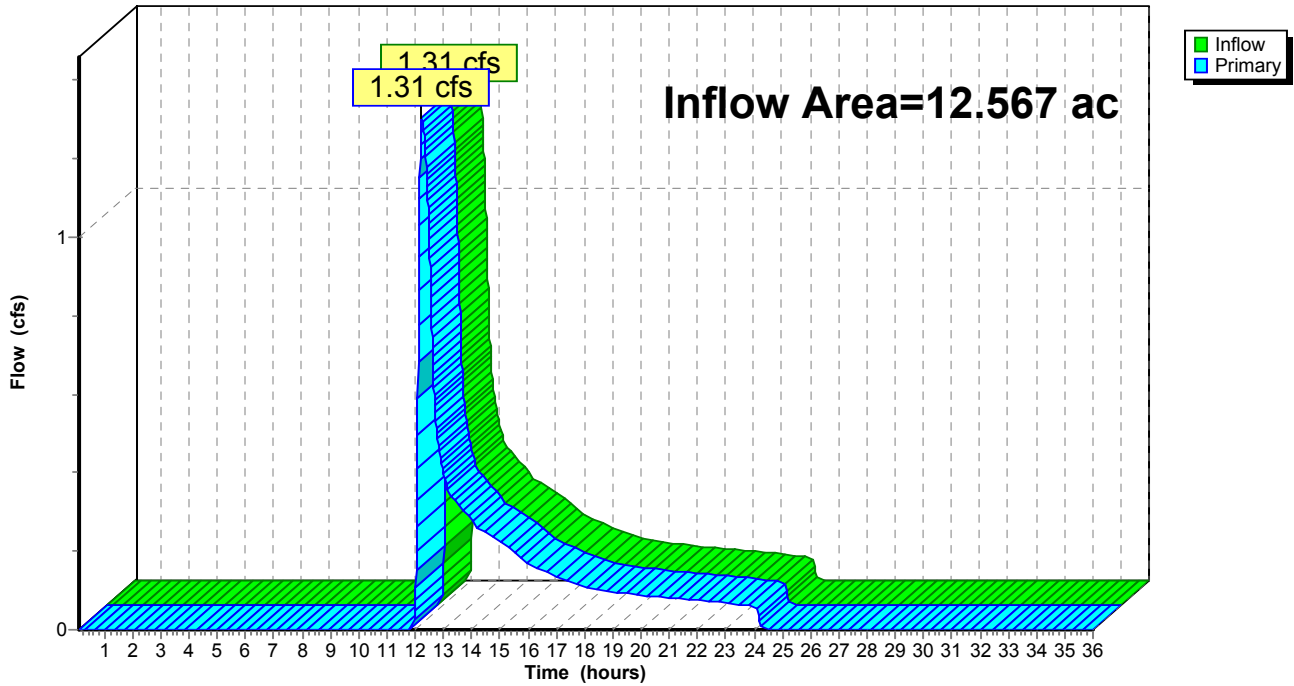
Link 2L: Total Offsite (Postdevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 0.18" for 2 Year Storm event
Inflow = 1.31 cfs @ 12.24 hrs, Volume= 0.192 af
Primary = 1.31 cfs @ 12.24 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs

Link 2L: Total Offsite (Postdevelopment)

Hydrograph



Time span=0.10-36.00 hrs, dt=0.01 hrs, 3591 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1-P: Runoff Area=18,213 sf Runoff Depth=3.44"
Flow Length=417' Tc=1.9 min CN=90 Runoff=1.90 cfs 0.120 af

Subcatchment 1S: Predevelopment Watershed Runoff Area=547,425 sf Runoff Depth=1.05"
Flow Length=752' Tc=13.5 min CN=60 Runoff=10.29 cfs 1.096 af

Subcatchment 2-P: Runoff Area=10,480 sf Runoff Depth=3.34"
Flow Length=237' Tc=1.0 min CN=89 Runoff=1.10 cfs 0.067 af

Subcatchment 3-P: Runoff Area=177,857 sf Runoff Depth=1.11"
Flow Length=618' Tc=12.1 min CN=61 Runoff=3.76 cfs 0.377 af

Subcatchment 4-P: Runoff Area=15,918 sf Runoff Depth=3.86"
Flow Length=254' Tc=1.4 min CN=94 Runoff=1.83 cfs 0.118 af

Subcatchment 5-P: Runoff Area=76,607 sf Runoff Depth=1.64"
Flow Length=493' Tc=2.1 min CN=69 Runoff=3.75 cfs 0.240 af

Subcatchment 6-P: Runoff Area=248,349 sf Runoff Depth=1.11"
Flow Length=619' Tc=11.8 min CN=61 Runoff=5.31 cfs 0.526 af

Pond 1P: Infiltration Field #1 Peak Elev=245.02' Storage=3,173 cf Inflow=1.90 cfs 0.120 af
Discarded=0.03 cfs 0.070 af Primary=0.07 cfs 0.011 af Outflow=0.10 cfs 0.080 af

Pond 2P: Infiltration Field #2 Peak Elev=223.08' Storage=3,218 cf Inflow=1.10 cfs 0.254 af
Discarded=0.03 cfs 0.067 af Primary=0.65 cfs 0.143 af Outflow=0.68 cfs 0.211 af

Pond 3P: Infiltration Field #3 Peak Elev=224.73' Storage=2,285 cf Inflow=1.83 cfs 0.267 af
Discarded=0.02 cfs 0.050 af Primary=0.70 cfs 0.187 af Outflow=0.72 cfs 0.237 af

Pond 4P: Infiltration Field #4 Peak Elev=226.05' Storage=5,295 cf Inflow=3.75 cfs 0.240 af
Discarded=0.05 cfs 0.102 af Primary=0.30 cfs 0.066 af Outflow=0.35 cfs 0.168 af

Pond 5P: Infiltration Field #5 Peak Elev=227.08' Storage=7,072 cf Inflow=3.76 cfs 0.377 af
Discarded=0.06 cfs 0.131 af Primary=0.63 cfs 0.149 af Outflow=0.69 cfs 0.280 af

Link 1L: Total Offsite (Predevelopment) Inflow=10.29 cfs 1.096 af
Primary=10.29 cfs 1.096 af

Link 2L: Total Offsite (Postdevelopment) Inflow=5.31 cfs 0.746 af
Primary=5.31 cfs 0.746 af

Total Runoff Area = 25.134 ac Runoff Volume = 2.544 af Average Runoff Depth = 1.21"

Subcatchment 1-P:

Runoff = 1.90 cfs @ 12.03 hrs, Volume= 0.120 af, Depth= 3.44"

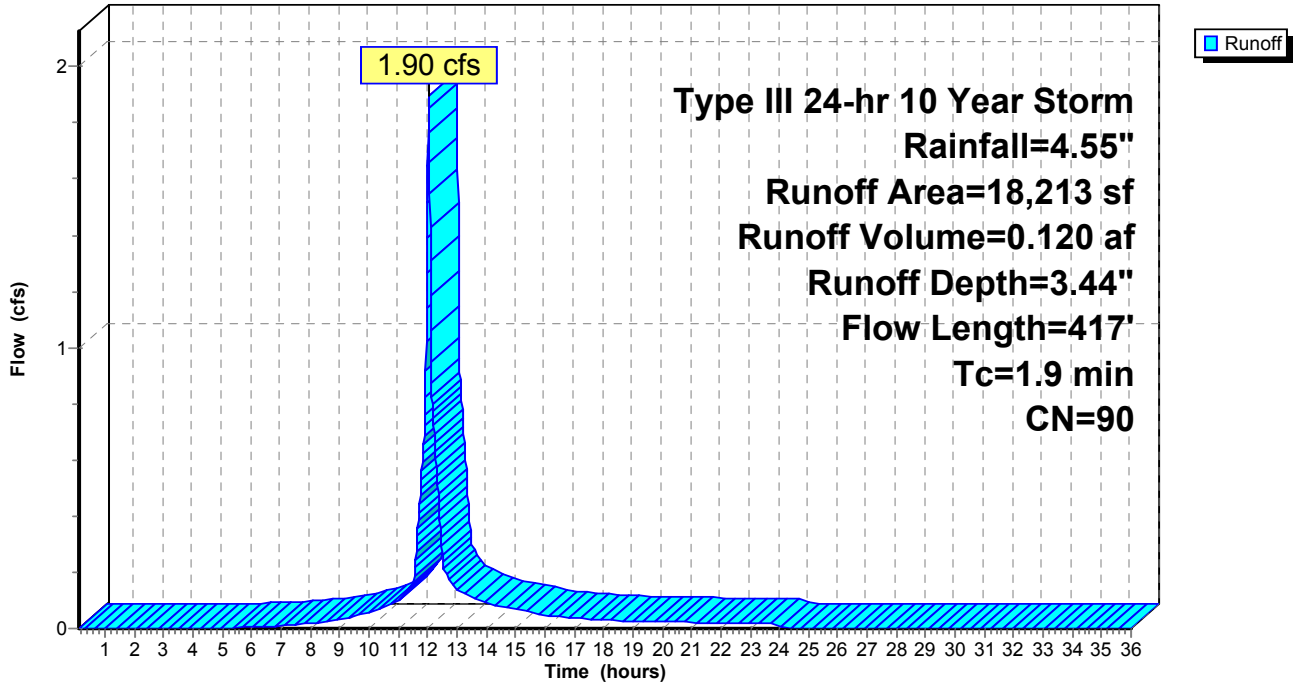
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
9,720	98	Roadway
2,025	98	Paved Sidewalk
465	98	Driveway Aprons
381	98	Vertical Granite Curb
674	98	Retaining Wall
4,948	69	50-75% Grass cover, Fair, HSG B
18,213	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.1	25	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	330	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9	417	Total			

Subcatchment 1-P:

Hydrograph



Subcatchment 1S: Predevelopment Watershed

Runoff = 10.29 cfs @ 12.21 hrs, Volume= 1.096 af, Depth= 1.05"

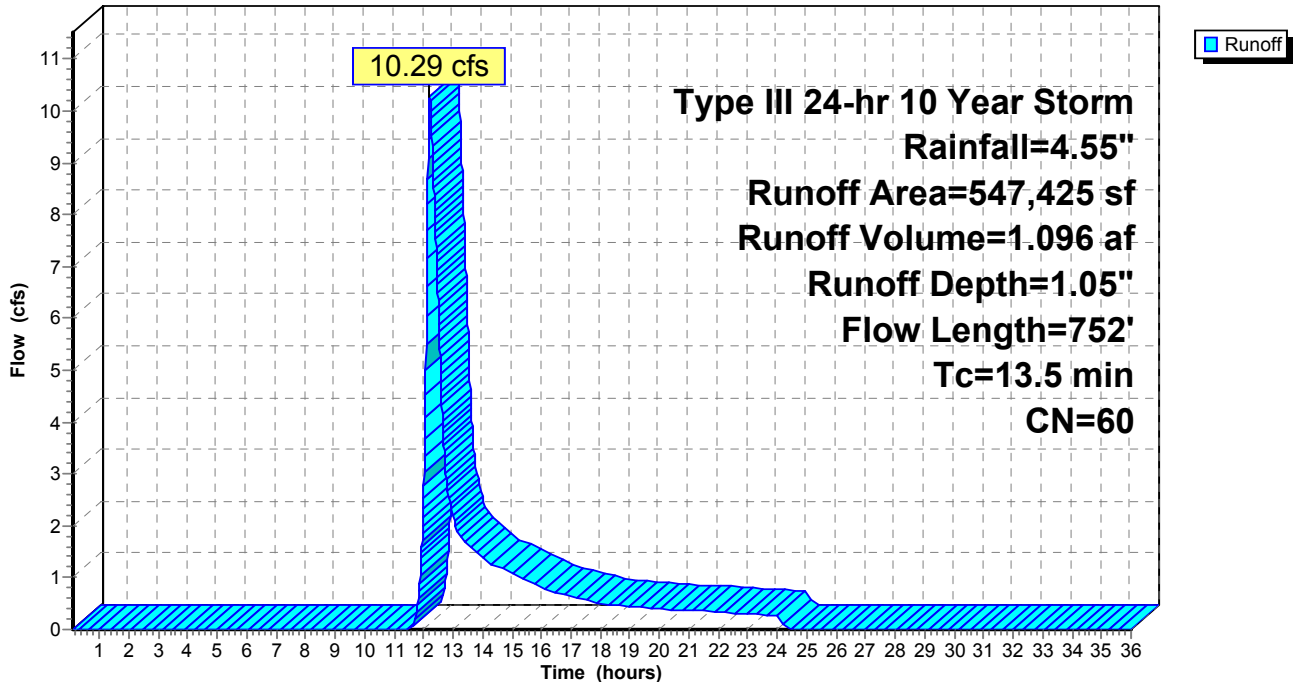
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
544,225	60	Woods, Fair, HSG B
2,625	98	House Roof (#223)
575	85	Gravel roads, HSG B
547,425	60	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0940	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
3.4	340	0.1100	1.7		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	90	0.1200	1.7		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.0	134	0.1900	2.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.5	138	0.0900	1.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.5	752	Total			

Subcatchment 1S: Predevelopment Watershed

Hydrograph



Subcatchment 2-P:

Runoff = 1.10 cfs @ 12.02 hrs, Volume= 0.067 af, Depth= 3.34"

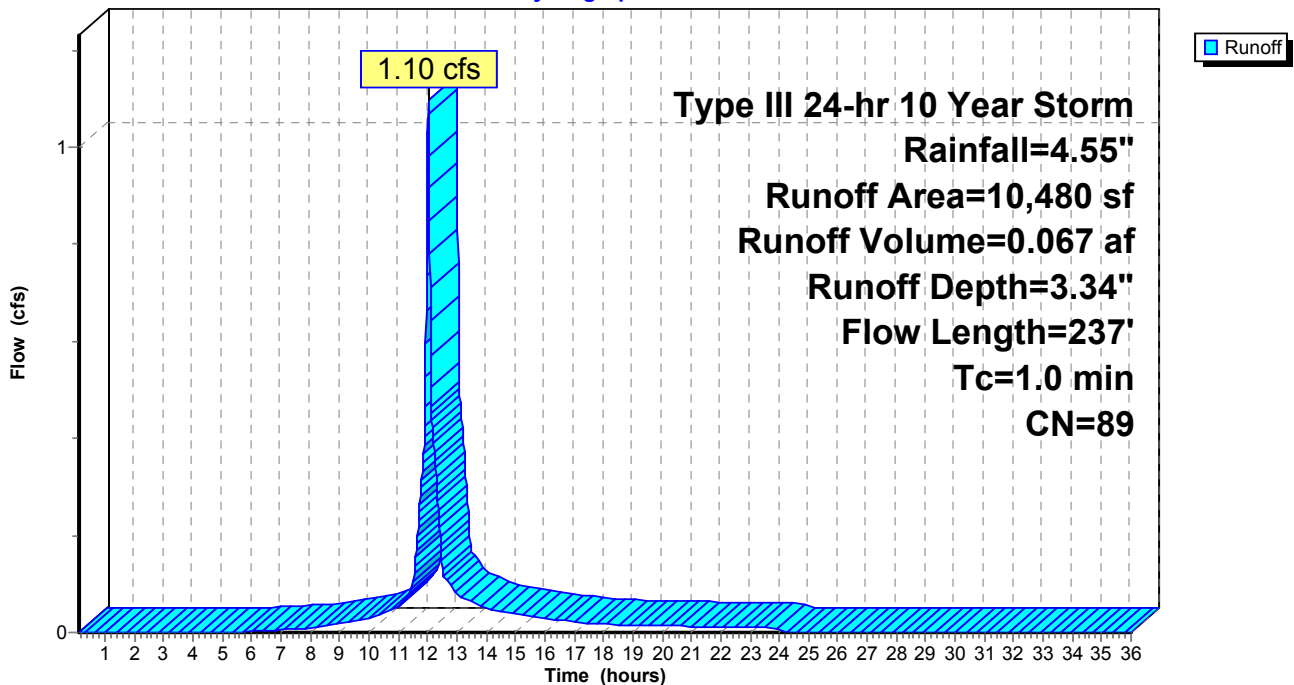
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
5,400	98	Paved Roadway
1,125	98	Paved Sidewalk
465	98	Driveway Apron
201	98	Vertical Granite Curb
3,289	69	50-75% Grass cover, Fair, HSG B
10,480	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.5	175	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	237	Total			

Subcatchment 2-P:

Hydrograph



Subcatchment 3-P:

Runoff = 3.76 cfs @ 12.19 hrs, Volume= 0.377 af, Depth= 1.11"

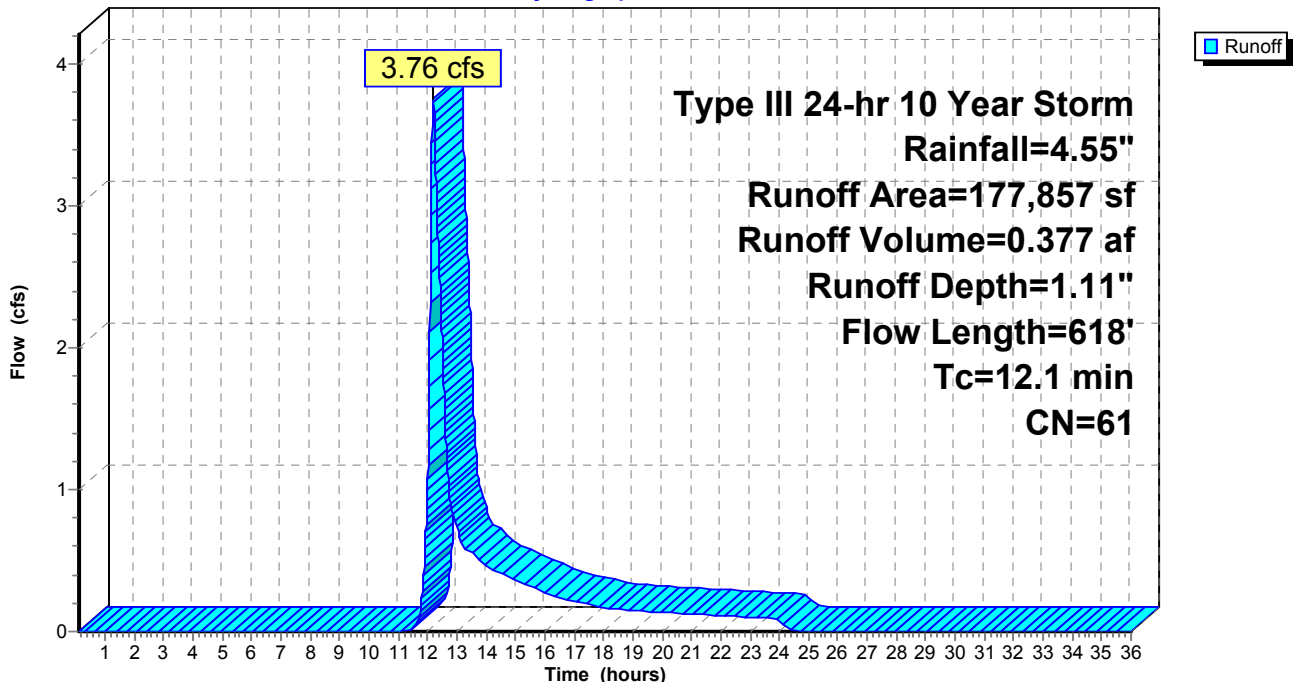
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
2,624	98	House Roof #223
9,420	69	50-75% Grass cover, Fair, HSG B
165,813	60	Woods, Fair, HSG B
177,857	61	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1200	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
0.6	63	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.9	332	0.0800	1.4		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	106	0.1900	2.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.7	67	0.0900	1.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	618	Total			

Subcatchment 3-P:

Hydrograph



Subcatchment 4-P:

Runoff = 1.83 cfs @ 12.02 hrs, Volume= 0.118 af, Depth= 3.86"

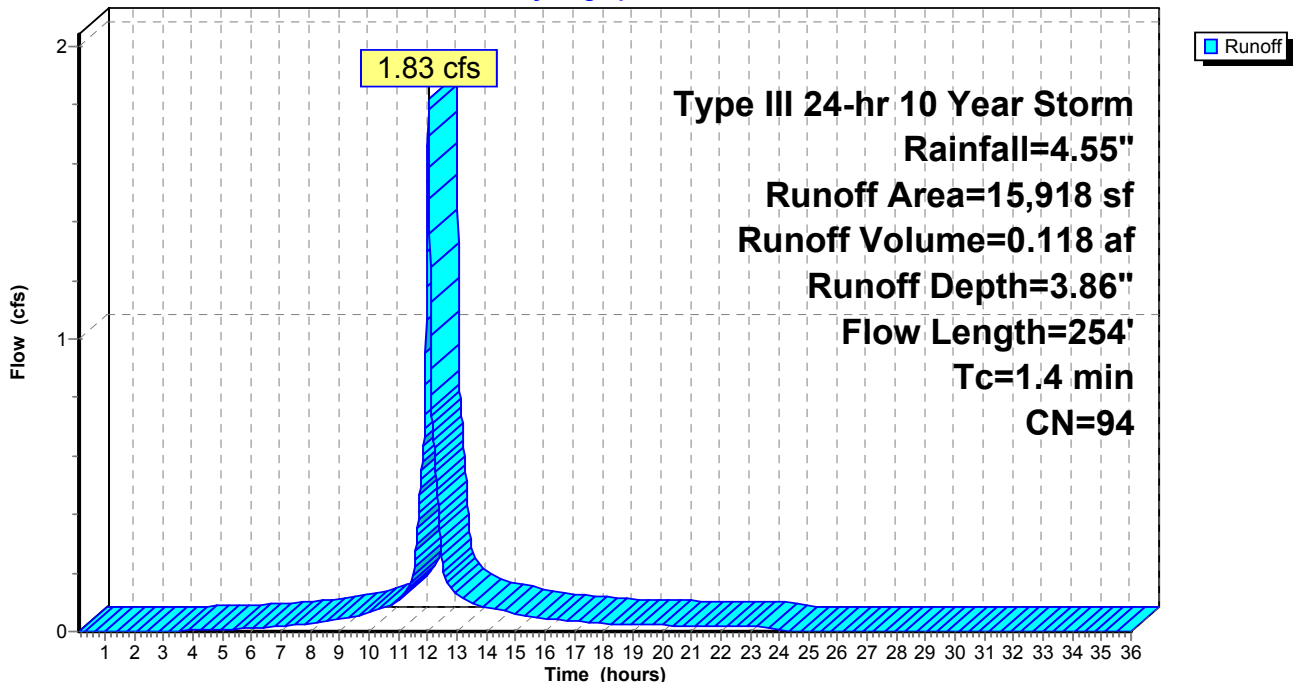
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
10,512	98	Roadway Pavement
2,190	98	Sidewalk
620	98	driveway aprons
2,190	69	50-75% Grass cover, Fair, HSG B
406	98	vertical granite curb
15,918	94	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.4	129	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	63	0.0100	2.0		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.4	254	Total			

Subcatchment 4-P:

Hydrograph



Subcatchment 5-P:

Runoff = 3.75 cfs @ 12.04 hrs, Volume= 0.240 af, Depth= 1.64"

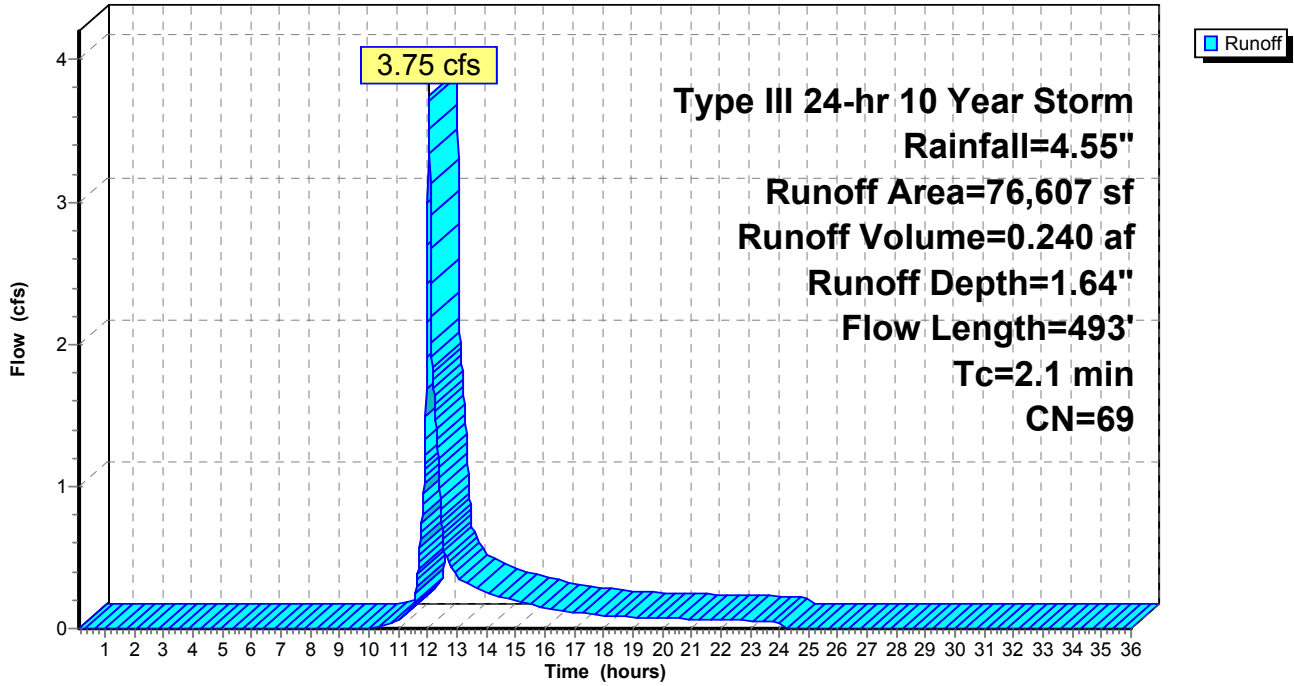
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
11,544	98	Paved Roadway
2,405	98	Paved Sidewalk
620	98	Driveway Aprons
449	98	vertical granite curb
17,390	69	50-75% Grass cover, Fair, HSG B
44,199	60	Woods, Fair, HSG B
76,607	69	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.1	25	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	406	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	493	Total			

Subcatchment 5-P:

Hydrograph



Subcatchment 6-P:

Runoff = 5.31 cfs @ 12.18 hrs, Volume= 0.526 af, Depth= 1.11"

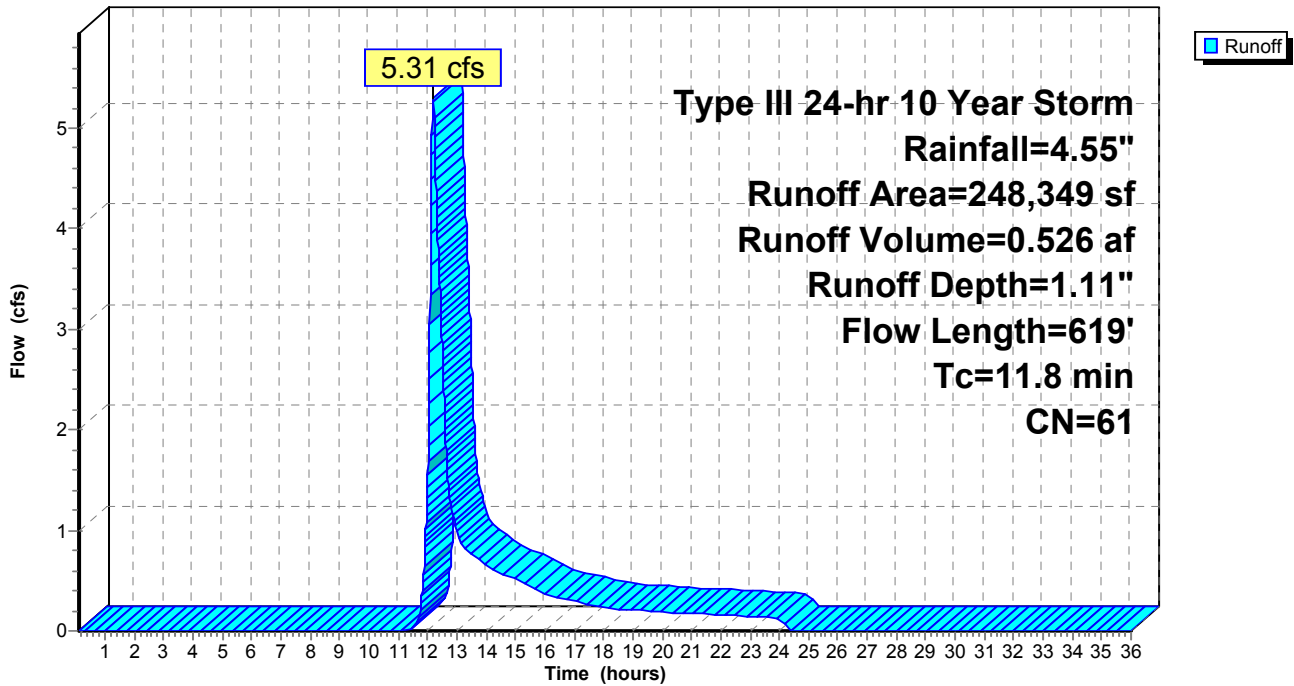
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

Area (sf)	CN	Description
32,458	69	50-75% Grass cover, Fair, HSG B
215,891	60	Woods, Fair, HSG B
248,349	61	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1200	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
4.3	469	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	100	0.0600	1.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	619	Total			

Subcatchment 6-P:

Hydrograph



Pond 1P: Infiltration Field #1

Inflow Area = 0.418 ac, Inflow Depth = 3.44" for 10 Year Storm event
 Inflow = 1.90 cfs @ 12.03 hrs, Volume= 0.120 af
 Outflow = 0.10 cfs @ 13.66 hrs, Volume= 0.080 af, Atten= 95%, Lag= 97.7 min
 Discarded = 0.03 cfs @ 8.94 hrs, Volume= 0.070 af
 Primary = 0.07 cfs @ 13.66 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 245.02' @ 13.66 hrs Surf.Area= 1,268 sf Storage= 3,173 cf
 Plug-Flow detention time= 554.4 min calculated for 0.080 af (67% of inflow)
 Center-of-Mass det. time= 458.4 min (1,248.6 - 790.2)

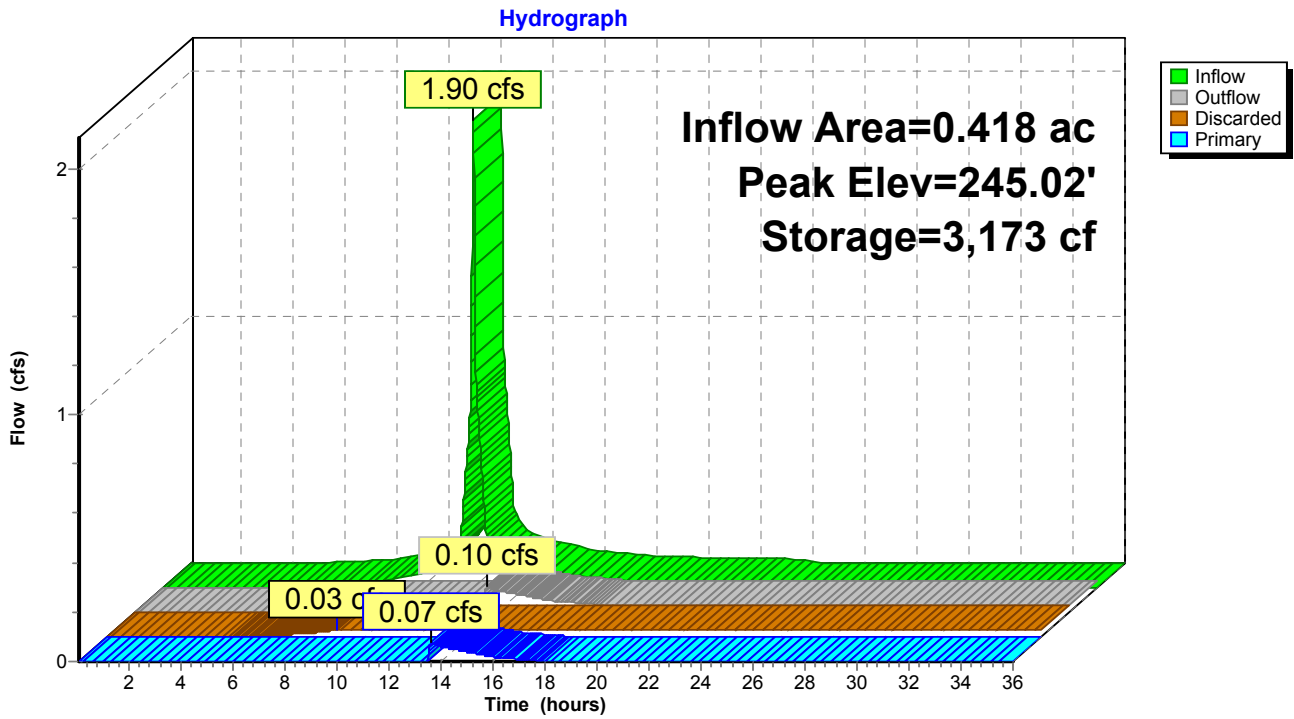
#	Invert	Avail.Storage	Storage Description
1	240.95'	1,563 cf	19.82'W x 64.00'L x 4.54'H Prismatic 5,759 cf Overall - 1,850 cf Embedded = 3,909 cf x 40.0% Voids
2	242.45'	1,850 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,414 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	245.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.03 cfs @ 8.94 hrs HW=241.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.05 cfs @ 13.66 hrs HW=245.02' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 0.05 cfs @ 0.4 fps)

Pond 1P: Infiltration Field #1



Pond 2P: Infiltration Field #2

Inflow Area = 4.689 ac, Inflow Depth = 0.65" for 10 Year Storm event
 Inflow = 1.10 cfs @ 12.02 hrs, Volume= 0.254 af
 Outflow = 0.68 cfs @ 13.36 hrs, Volume= 0.211 af, Atten= 38%, Lag= 80.6 min
 Discarded = 0.03 cfs @ 10.19 hrs, Volume= 0.067 af
 Primary = 0.65 cfs @ 13.36 hrs, Volume= 0.143 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 223.08' @ 13.36 hrs Surf.Area= 1,274 sf Storage= 3,218 cf
 Plug-Flow detention time= 243.7 min calculated for 0.211 af (83% of inflow)
 Center-of-Mass det. time= 179.1 min (1,071.4 - 892.3)

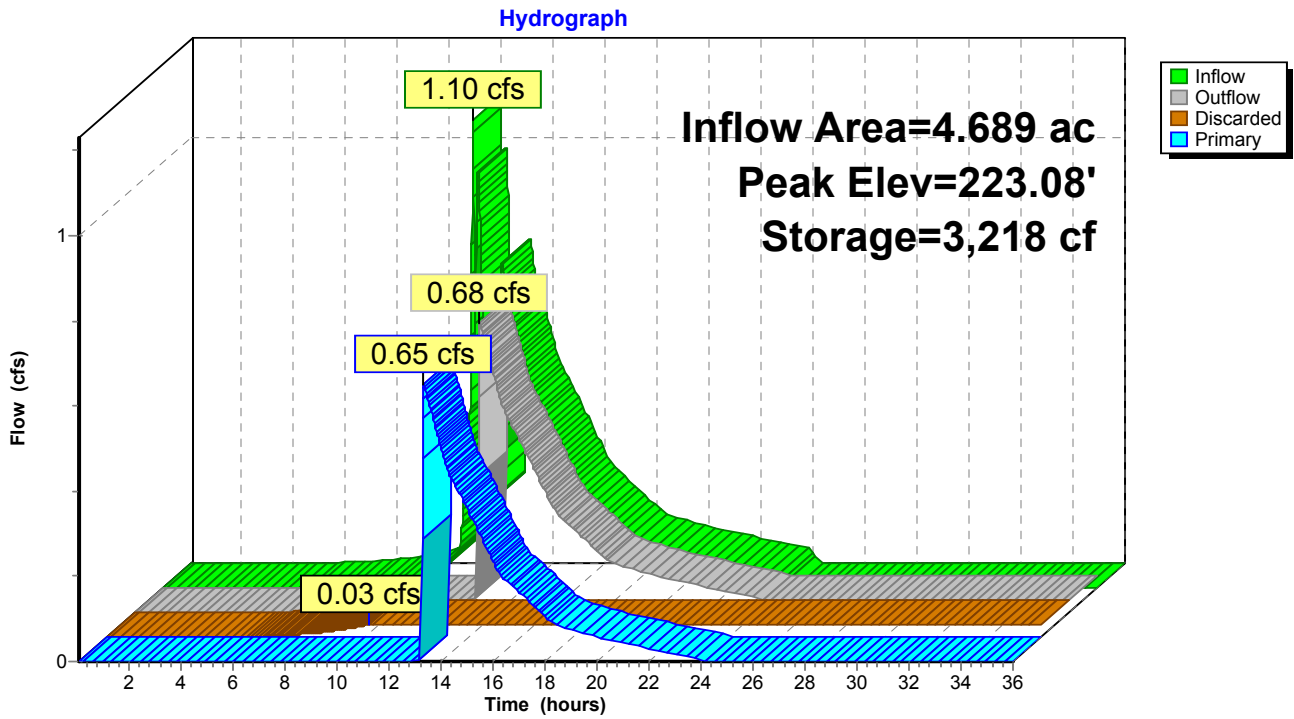
#	Invert	Avail.Storage	Storage Description
1	218.95'	1,574 cf	14.99'W x 85.00'L x 4.54'H Prismatic 5,785 cf Overall - 1,850 cf Embedded = 3,934 cf x 40.0% Voids
2	220.45'	1,850 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,424 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	223.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.03 cfs @ 10.19 hrs HW=219.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.65 cfs @ 13.36 hrs HW=223.08' (Free Discharge)
 ↑2=Orifice/Grate (Weir Controls 0.65 cfs @ 1.0 fps)

Pond 2P: Infiltration Field #2



Pond 3P: Infiltration Field #3

Inflow Area = 4.448 ac, Inflow Depth = 0.72" for 10 Year Storm event
 Inflow = 1.83 cfs @ 12.02 hrs, Volume= 0.267 af
 Outflow = 0.72 cfs @ 13.12 hrs, Volume= 0.237 af, Atten= 61%, Lag= 65.9 min
 Discarded = 0.02 cfs @ 7.46 hrs, Volume= 0.050 af
 Primary = 0.70 cfs @ 13.12 hrs, Volume= 0.187 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 224.73' @ 13.12 hrs Surf.Area= 854 sf Storage= 2,285 cf
 Plug-Flow detention time= 169.3 min calculated for 0.237 af (89% of inflow)
 Center-of-Mass det. time= 119.8 min (995.2 - 875.4)

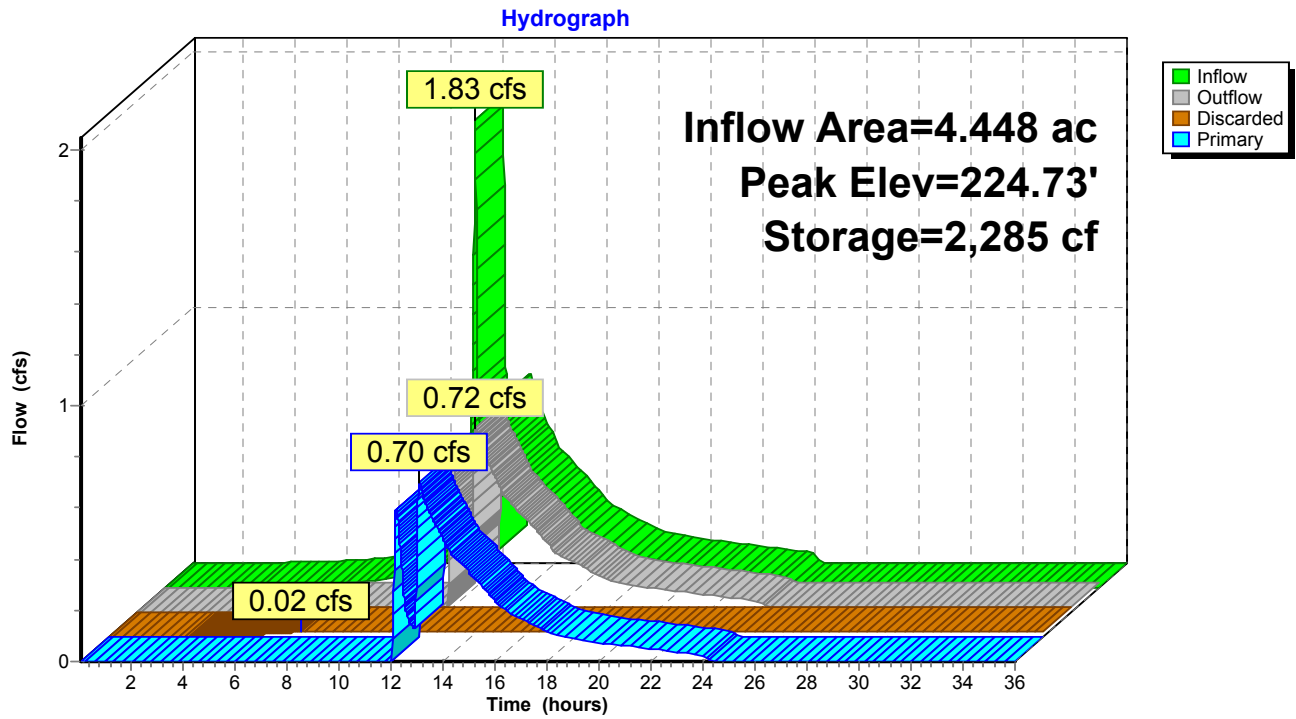
#	Invert	Avail.Storage	Storage Description
1	220.21'	1,058 cf	14.99'W x 57.00'L x 4.54'H Prismatic 3,879 cf Overall - 1,234 cf Embedded = 2,646 cf x 40.0% Voids
2	221.71'	1,234 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 24 Inside #1
		2,292 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	224.25'	12.0" x 130.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 222.25' S= 0.0154 '/' n= 0.011 Cc= 0.900

Discarded OutFlow Max=0.02 cfs @ 7.46 hrs HW=220.26' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.69 cfs @ 13.12 hrs HW=224.73' (Free Discharge)
 ↳2=Culvert (Inlet Controls 0.69 cfs @ 1.9 fps)

Pond 3P: Infiltration Field #3



Pond 4P: Infiltration Field #4

Inflow Area = 1.759 ac, Inflow Depth = 1.64" for 10 Year Storm event
 Inflow = 3.75 cfs @ 12.04 hrs, Volume= 0.240 af
 Outflow = 0.35 cfs @ 13.06 hrs, Volume= 0.168 af, Atten= 91%, Lag= 61.2 min
 Discarded = 0.05 cfs @ 11.13 hrs, Volume= 0.102 af
 Primary = 0.30 cfs @ 13.06 hrs, Volume= 0.066 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 226.05' @ 13.06 hrs Surf.Area= 2,101 sf Storage= 5,295 cf
 Plug-Flow detention time= 467.1 min calculated for 0.168 af (70% of inflow)
 Center-of-Mass det. time= 364.1 min (1,216.1 - 852.0)

#	Invert	Avail.Storage	Storage Description
1	221.95'	2,582 cf	19.82'W x 106.00'L x 4.54'H Prismatic 9,538 cf Overall - 3,084 cf Embedded = 6,454 cf x 40.0% Voids
2	223.46'	3,084 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 60 Inside #1
		5,666 cf	Total Available Storage

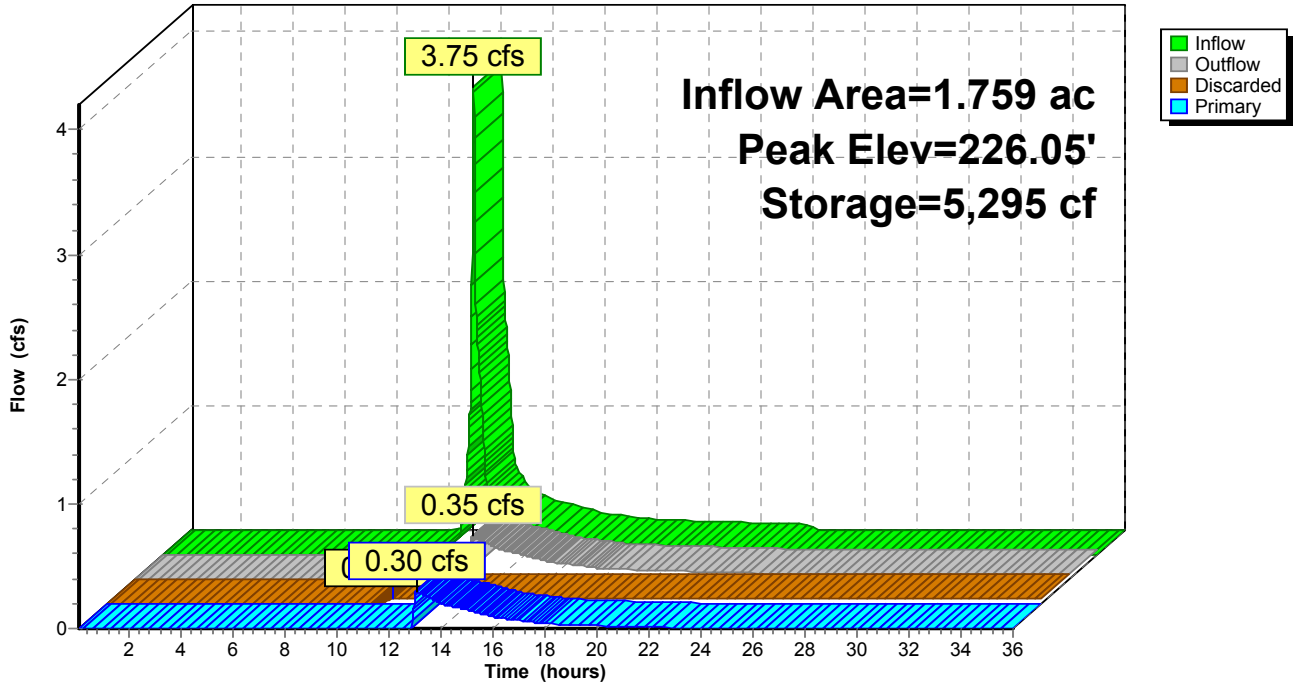
#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	226.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.05 cfs @ 11.13 hrs HW=222.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.28 cfs @ 13.06 hrs HW=226.05' (Free Discharge)
 ↑2=Orifice/Grate (Weir Controls 0.28 cfs @ 0.7 fps)

Pond 4P: Infiltration Field #4

Hydrograph



Pond 5P: Infiltration Field #5

Inflow Area = 4.083 ac, Inflow Depth = 1.11" for 10 Year Storm event
 Inflow = 3.76 cfs @ 12.19 hrs, Volume= 0.377 af
 Outflow = 0.69 cfs @ 13.05 hrs, Volume= 0.280 af, Atten= 82%, Lag= 51.6 min
 Discarded = 0.06 cfs @ 11.79 hrs, Volume= 0.131 af
 Primary = 0.63 cfs @ 13.05 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 227.08' @ 13.05 hrs Surf.Area= 2,785 sf Storage= 7,072 cf
 Plug-Flow detention time= 391.3 min calculated for 0.280 af (74% of inflow)
 Center-of-Mass det. time= 293.2 min (1,178.3 - 885.1)

#	Invert	Avail.Storage	Storage Description
1	222.95'	3,414 cf	24.65'W x 113.00'L x 4.54'H Prismatic 12,646 cf Overall - 4,112 cf Embedded = 8,534 cf x 40.0% Voids
2	224.45'	4,112 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 80 Inside #1
		7,525 cf	Total Available Storage

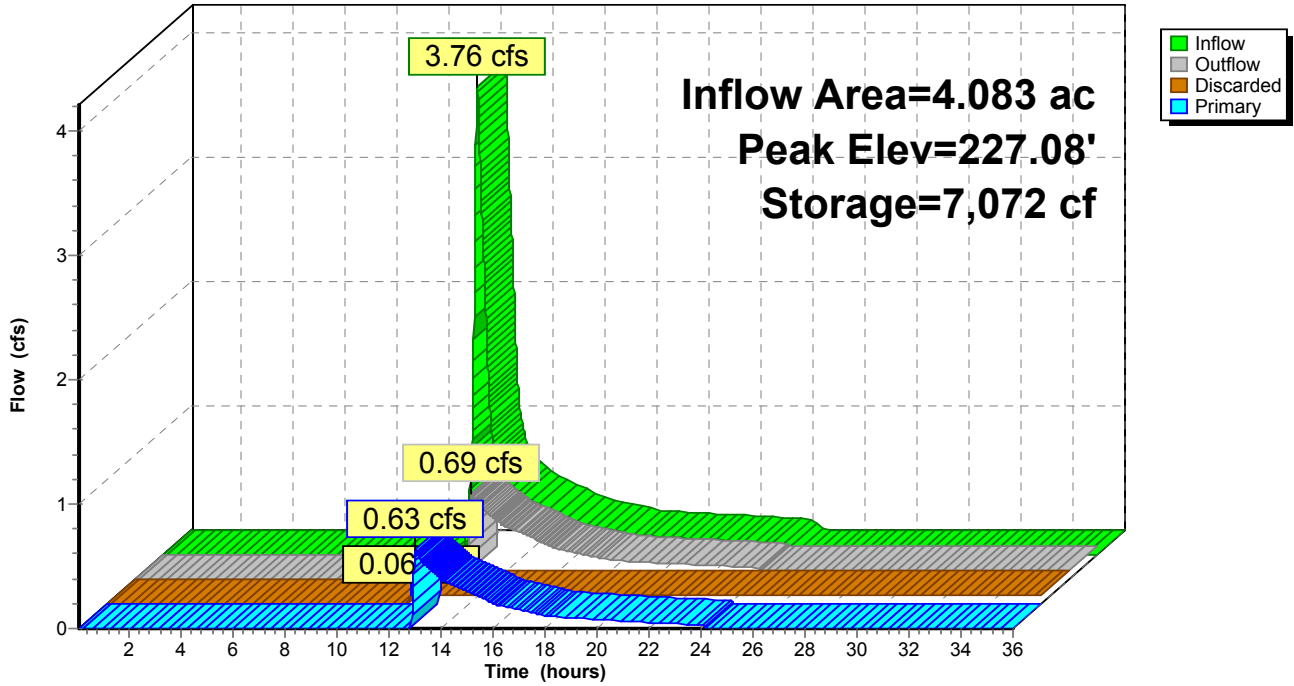
#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	227.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.06 cfs @ 11.79 hrs HW=223.00' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.63 cfs @ 13.05 hrs HW=227.08' (Free Discharge)
 ↑**2=Orifice/Grate** (Weir Controls 0.63 cfs @ 0.9 fps)

Pond 5P: Infiltration Field #5

Hydrograph



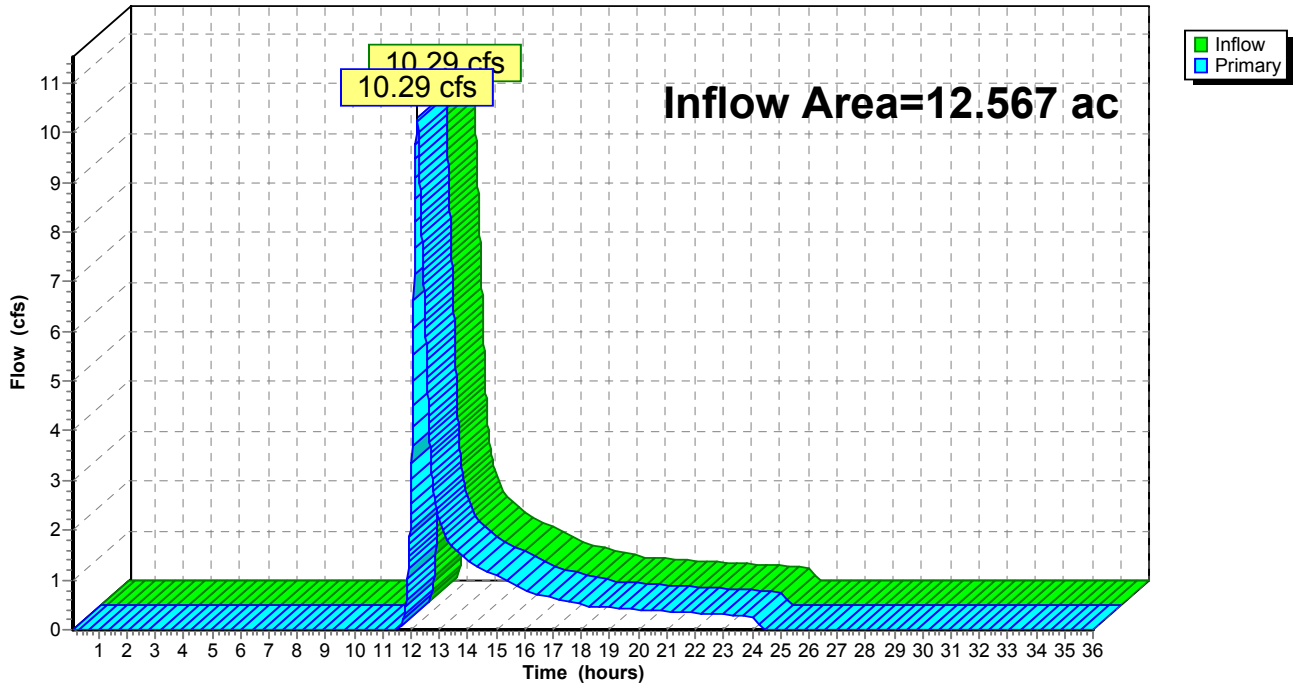
Link 1L: Total Offsite (Predevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 1.05" for 10 Year Storm event
Inflow = 10.29 cfs @ 12.21 hrs, Volume= 1.096 af
Primary = 10.29 cfs @ 12.21 hrs, Volume= 1.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs

Link 1L: Total Offsite (Predevelopment)

Hydrograph



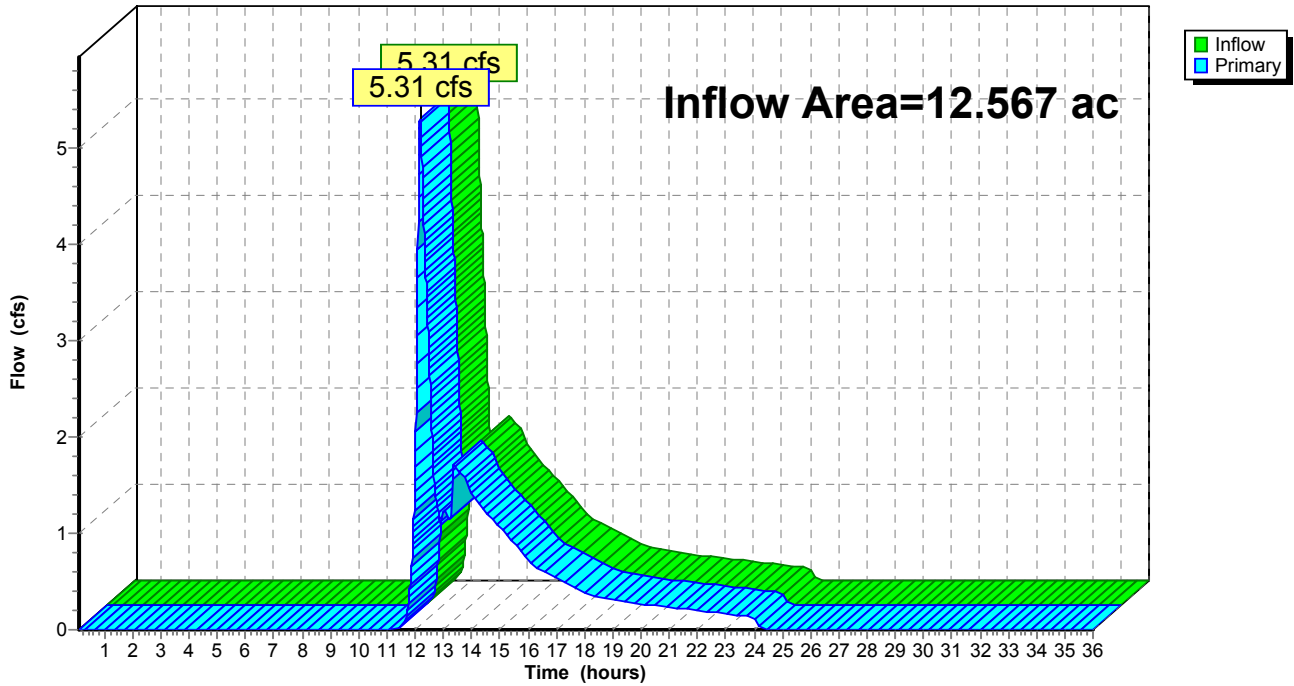
Link 2L: Total Offsite (Postdevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 0.71" for 10 Year Storm event
Inflow = 5.31 cfs @ 12.18 hrs, Volume= 0.746 af
Primary = 5.31 cfs @ 12.18 hrs, Volume= 0.746 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs

Link 2L: Total Offsite (Postdevelopment)

Hydrograph



Time span=0.10-36.00 hrs, dt=0.01 hrs, 3591 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1-P: Runoff Area=18,213 sf Runoff Depth=5.33"
Flow Length=417' Tc=1.9 min CN=90 Runoff=2.87 cfs 0.186 af

Subcatchment 1S: Predevelopment Watershed Runoff Area=547,425 sf Runoff Depth=2.26"
Flow Length=752' Tc=13.5 min CN=60 Runoff=24.95 cfs 2.362 af

Subcatchment 2-P: Runoff Area=10,480 sf Runoff Depth=5.22"
Flow Length=237' Tc=1.0 min CN=89 Runoff=1.68 cfs 0.105 af

Subcatchment 3-P: Runoff Area=177,857 sf Runoff Depth=2.35"
Flow Length=618' Tc=12.1 min CN=61 Runoff=8.85 cfs 0.799 af

Subcatchment 4-P: Runoff Area=15,918 sf Runoff Depth=5.79"
Flow Length=254' Tc=1.4 min CN=94 Runoff=2.67 cfs 0.176 af

Subcatchment 5-P: Runoff Area=76,607 sf Runoff Depth=3.11"
Flow Length=493' Tc=2.1 min CN=69 Runoff=7.36 cfs 0.456 af

Subcatchment 6-P: Runoff Area=248,349 sf Runoff Depth=2.35"
Flow Length=619' Tc=11.8 min CN=61 Runoff=12.46 cfs 1.115 af

Pond 1P: Infiltration Field #1 Peak Elev=245.16' Storage=3,245 cf Inflow=2.87 cfs 0.186 af
Discarded=0.03 cfs 0.073 af Primary=1.65 cfs 0.070 af Outflow=1.68 cfs 0.143 af

Pond 2P: Infiltration Field #2 Peak Elev=223.51' Storage=3,424 cf Inflow=9.45 cfs 0.764 af
Discarded=0.03 cfs 0.071 af Primary=9.50 cfs 0.649 af Outflow=9.52 cfs 0.720 af

Pond 3P: Infiltration Field #3 Peak Elev=233.66' Storage=2,292 cf Inflow=8.82 cfs 0.742 af
Discarded=0.02 cfs 0.053 af Primary=8.91 cfs 0.659 af Outflow=8.93 cfs 0.712 af

Pond 4P: Infiltration Field #4 Peak Elev=226.36' Storage=5,557 cf Inflow=7.36 cfs 0.456 af
Discarded=0.05 cfs 0.107 af Primary=5.66 cfs 0.276 af Outflow=5.71 cfs 0.383 af

Pond 5P: Infiltration Field #5 Peak Elev=227.45' Storage=7,483 cf Inflow=8.85 cfs 0.799 af
Discarded=0.06 cfs 0.136 af Primary=7.96 cfs 0.565 af Outflow=8.02 cfs 0.701 af

Link 1L: Total Offsite (Predevelopment) Inflow=24.95 cfs 2.362 af
Primary=24.95 cfs 2.362 af

Link 2L: Total Offsite (Postdevelopment) Inflow=24.49 cfs 2.109 af
Primary=24.49 cfs 2.109 af

Total Runoff Area = 25.134 ac Runoff Volume = 5.199 af Average Runoff Depth = 2.48"

Subcatchment 1-P:

Runoff = 2.87 cfs @ 12.03 hrs, Volume= 0.186 af, Depth= 5.33"

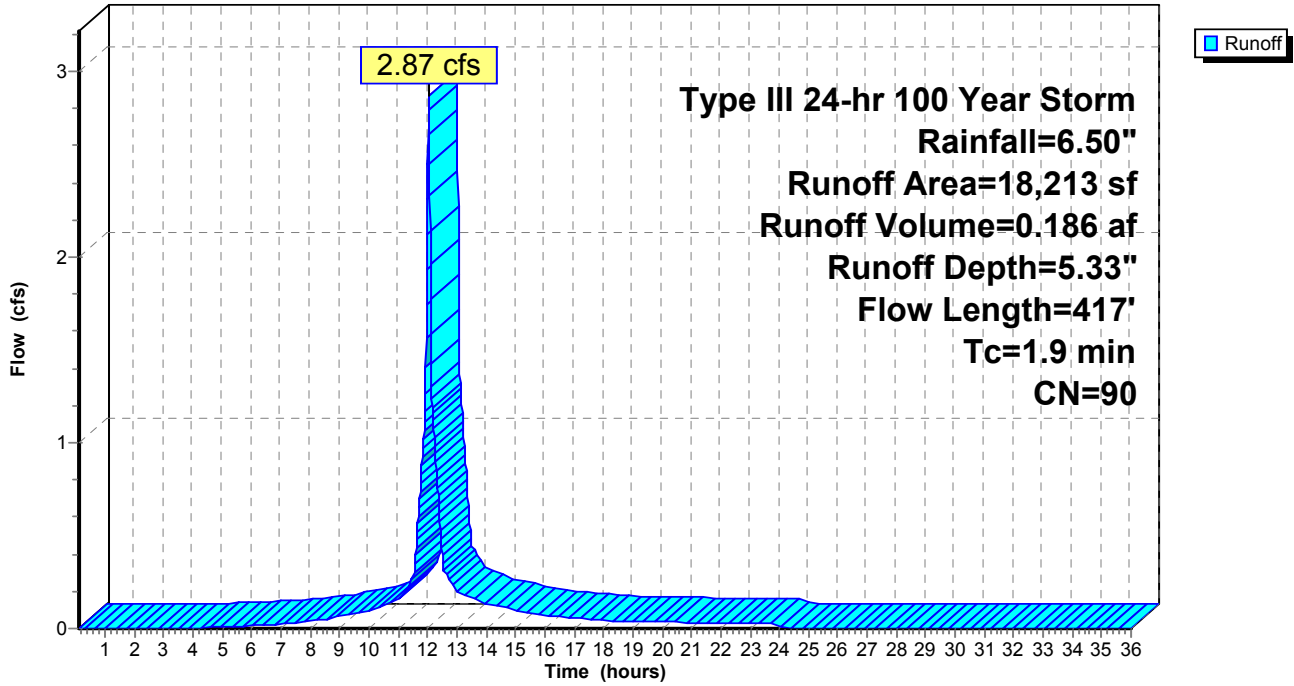
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
9,720	98	Roadway
2,025	98	Paved Sidewalk
465	98	Driveway Aprons
381	98	Vertical Granite Curb
674	98	Retaining Wall
4,948	69	50-75% Grass cover, Fair, HSG B
18,213	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.1	25	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	330	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9	417	Total			

Subcatchment 1-P:

Hydrograph



Subcatchment 1S: Predevelopment Watershed

Runoff = 24.95 cfs @ 12.20 hrs, Volume= 2.362 af, Depth= 2.26"

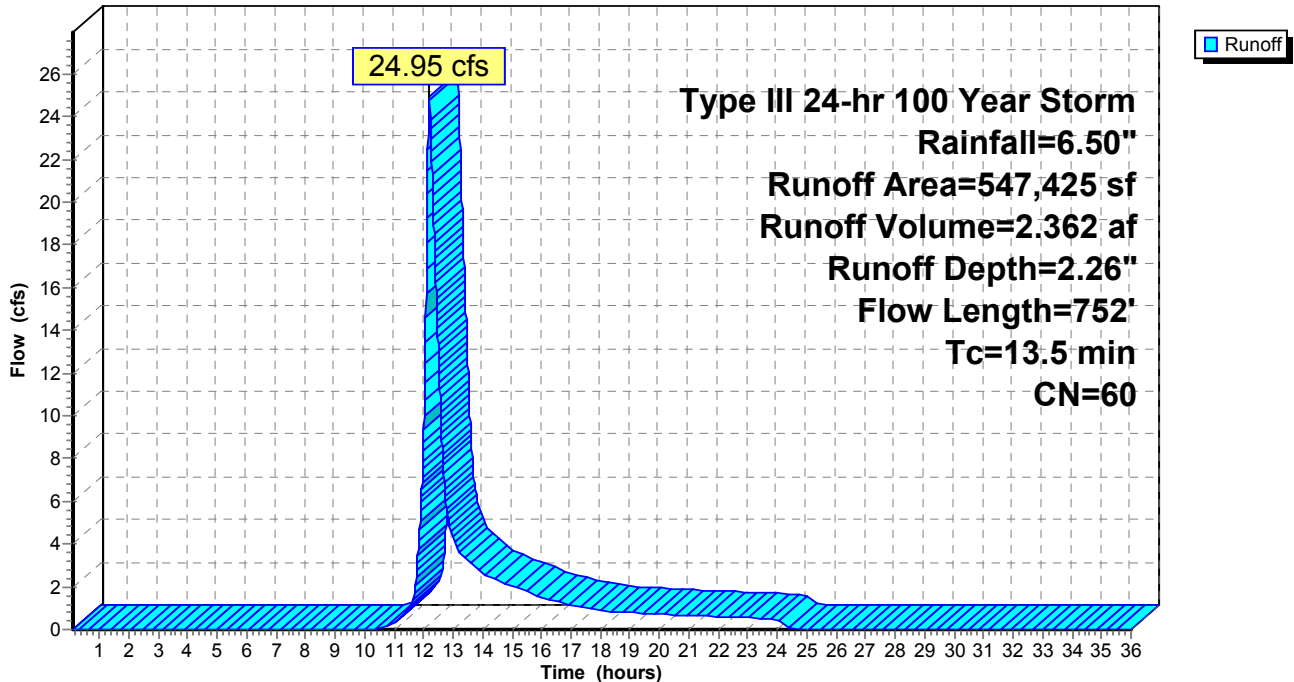
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
544,225	60	Woods, Fair, HSG B
2,625	98	House Roof (#223)
575	85	Gravel roads, HSG B
547,425	60	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0940	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
3.4	340	0.1100	1.7		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	90	0.1200	1.7		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.0	134	0.1900	2.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.5	138	0.0900	1.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.5	752	Total			

Subcatchment 1S: Predevelopment Watershed

Hydrograph



Subcatchment 2-P:

Runoff = 1.68 cfs @ 12.01 hrs, Volume= 0.105 af, Depth= 5.22"

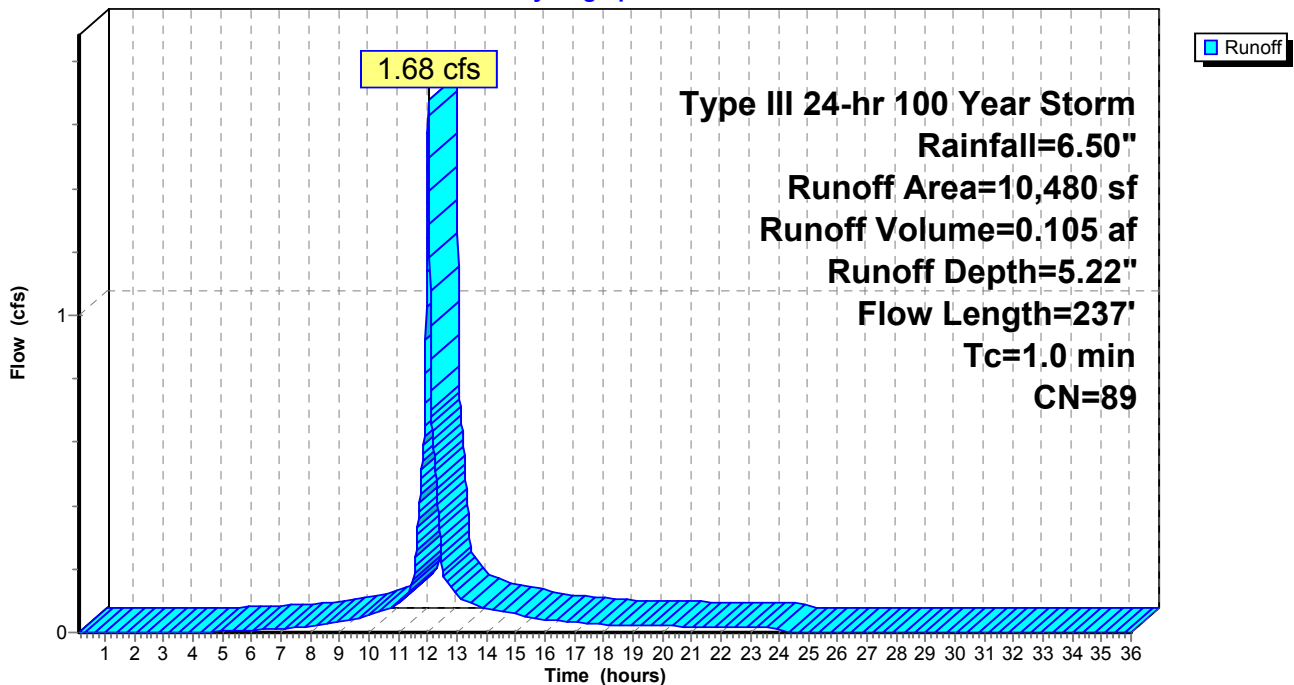
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
5,400	98	Paved Roadway
1,125	98	Paved Sidewalk
465	98	Driveway Apron
201	98	Vertical Granite Curb
3,289	69	50-75% Grass cover, Fair, HSG B
10,480	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.5	175	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	237	Total			

Subcatchment 2-P:

Hydrograph



Subcatchment 3-P:

Runoff = 8.85 cfs @ 12.17 hrs, Volume= 0.799 af, Depth= 2.35"

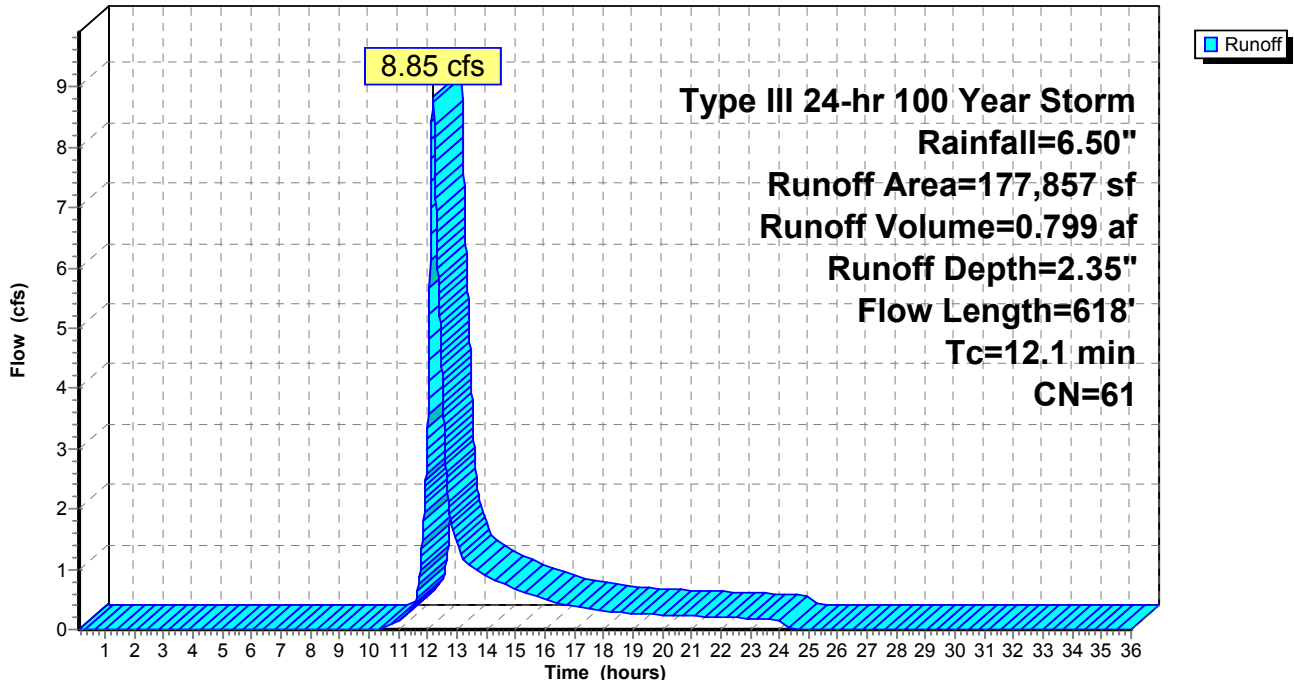
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
2,624	98	House Roof #223
9,420	69	50-75% Grass cover, Fair, HSG B
165,813	60	Woods, Fair, HSG B
177,857	61	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1200	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
0.6	63	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.9	332	0.0800	1.4		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	106	0.1900	2.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.7	67	0.0900	1.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	618	Total			

Subcatchment 3-P:

Hydrograph



Subcatchment 4-P:

Runoff = 2.67 cfs @ 12.02 hrs, Volume= 0.176 af, Depth= 5.79"

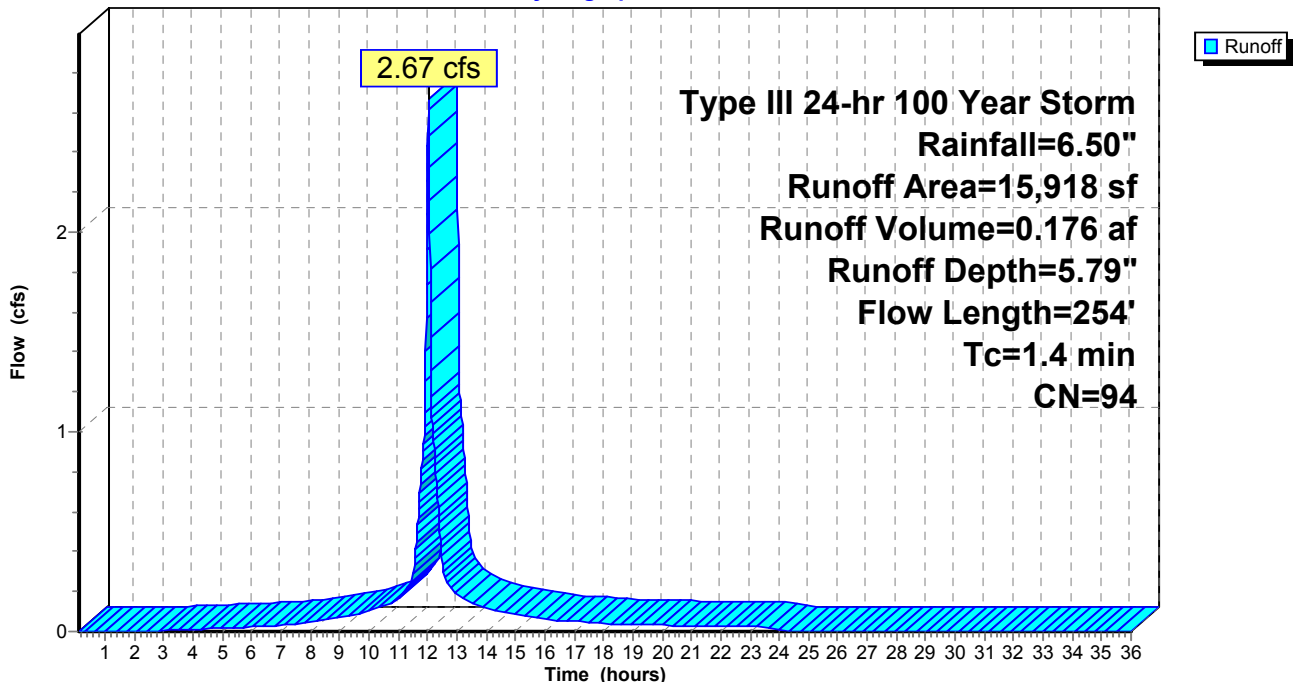
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
10,512	98	Roadway Pavement
2,190	98	Sidewalk
620	98	driveway aprons
2,190	69	50-75% Grass cover, Fair, HSG B
406	98	vertical granite curb
15,918	94	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.4	129	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	63	0.0100	2.0		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.4	254	Total			

Subcatchment 4-P:

Hydrograph



Subcatchment 5-P:

Runoff = 7.36 cfs @ 12.03 hrs, Volume= 0.456 af, Depth= 3.11"

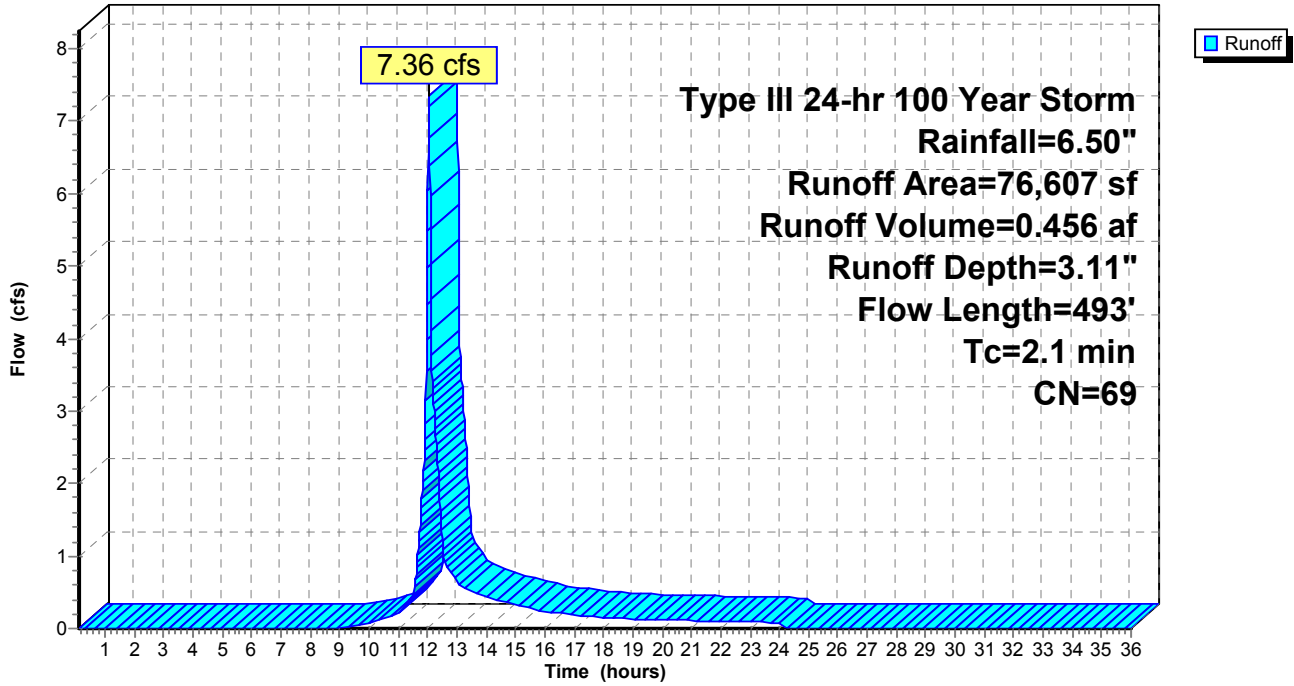
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
11,544	98	Paved Roadway
2,405	98	Paved Sidewalk
620	98	Driveway Aprons
449	98	vertical granite curb
17,390	69	50-75% Grass cover, Fair, HSG B
44,199	60	Woods, Fair, HSG B
76,607	69	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.10"
0.1	25	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2	406	0.0800	5.7		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	12	0.0300	3.5		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	493	Total			

Subcatchment 5-P:

Hydrograph



Subcatchment 6-P:

Runoff = 12.46 cfs @ 12.17 hrs, Volume= 1.115 af, Depth= 2.35"

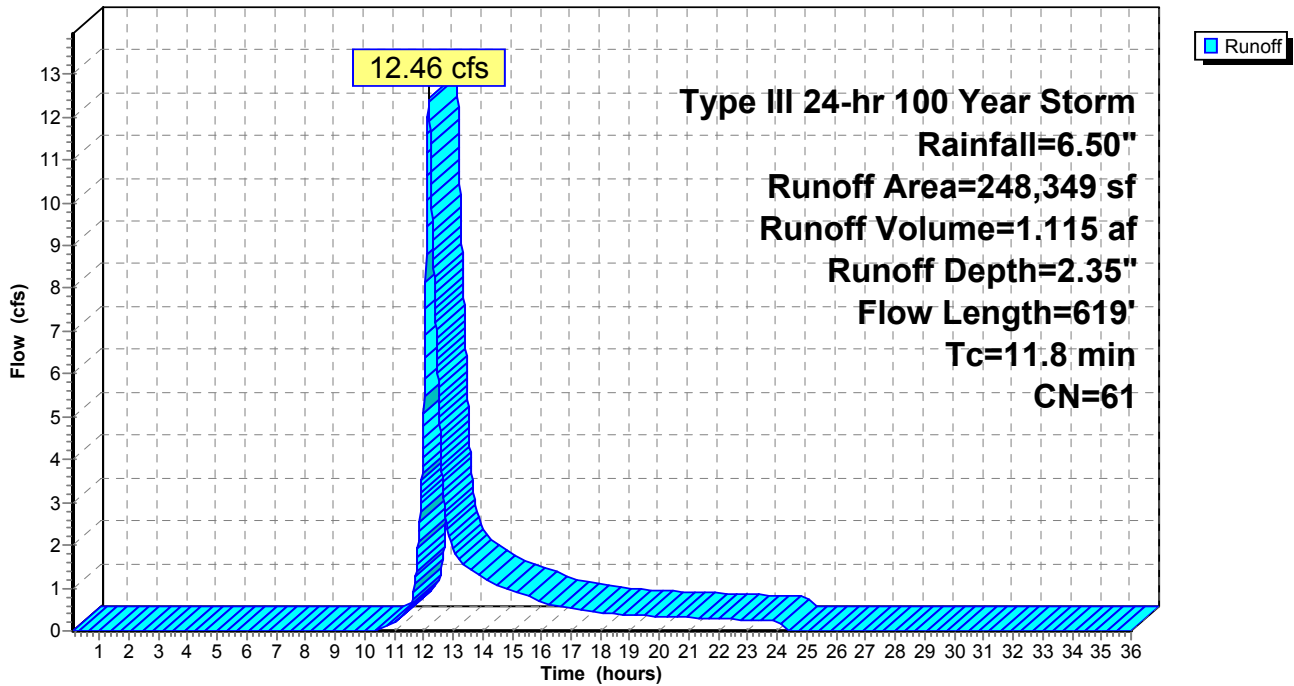
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
32,458	69	50-75% Grass cover, Fair, HSG B
215,891	60	Woods, Fair, HSG B
248,349	61	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1200	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
4.3	469	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	100	0.0600	1.2		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	619	Total			

Subcatchment 6-P:

Hydrograph



Pond 1P: Infiltration Field #1

Inflow Area = 0.418 ac, Inflow Depth = 5.33" for 100 Year Storm event
 Inflow = 2.87 cfs @ 12.03 hrs, Volume= 0.186 af
 Outflow = 1.68 cfs @ 12.11 hrs, Volume= 0.143 af, Atten= 41%, Lag= 4.7 min
 Discarded = 0.03 cfs @ 7.62 hrs, Volume= 0.073 af
 Primary = 1.65 cfs @ 12.11 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 245.16' @ 12.11 hrs Surf.Area= 1,268 sf Storage= 3,245 cf
 Plug-Flow detention time= 340.8 min calculated for 0.143 af (77% of inflow)
 Center-of-Mass det. time= 260.0 min (1,038.4 - 778.4)

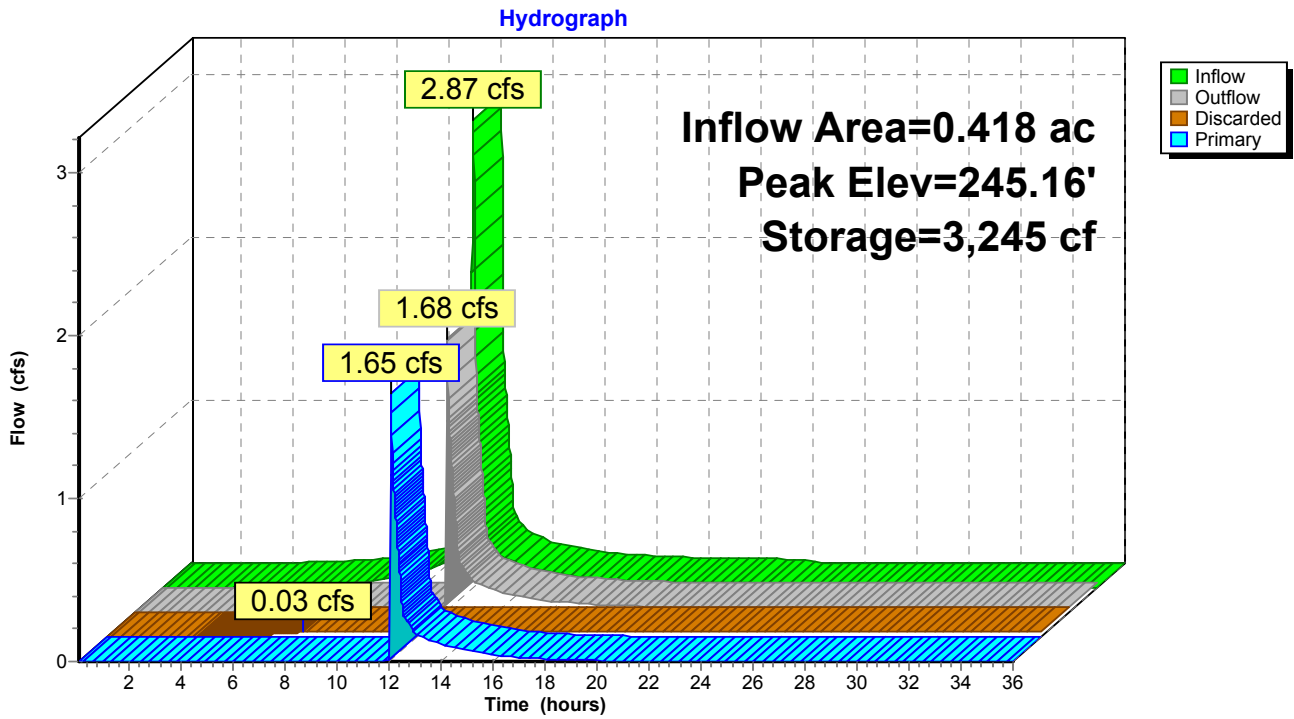
#	Invert	Avail.Storage	Storage Description
1	240.95'	1,563 cf	19.82'W x 64.00'L x 4.54'H Prismatic 5,759 cf Overall - 1,850 cf Embedded = 3,909 cf x 40.0% Voids
2	242.45'	1,850 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,414 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	245.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.03 cfs @ 7.62 hrs HW=241.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.62 cfs @ 12.11 hrs HW=245.16' (Free Discharge)
 ↑2=Orifice/Grate (Weir Controls 1.62 cfs @ 1.3 fps)

Pond 1P: Infiltration Field #1



Pond 2P: Infiltration Field #2

Inflow Area = 4.689 ac, Inflow Depth = 1.95" for 100 Year Storm event
 Inflow = 9.45 cfs @ 12.24 hrs, Volume= 0.764 af
 Outflow = 9.52 cfs @ 12.24 hrs, Volume= 0.720 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 8.90 hrs, Volume= 0.071 af
 Primary = 9.50 cfs @ 12.24 hrs, Volume= 0.649 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 223.51' @ 12.24 hrs Surf.Area= 1,274 sf Storage= 3,424 cf
 Plug-Flow detention time= 83.3 min calculated for 0.720 af (94% of inflow)
 Center-of-Mass det. time= 53.8 min (911.0 - 857.2)

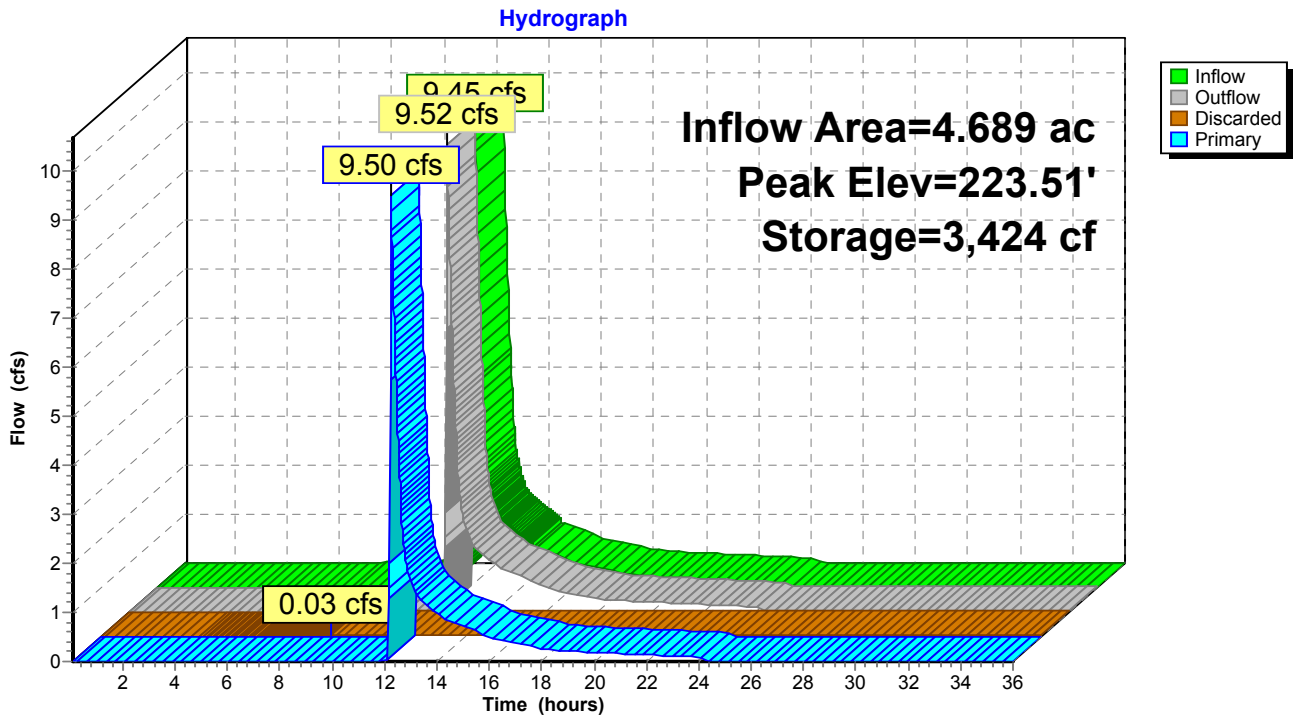
#	Invert	Avail.Storage	Storage Description
1	218.95'	1,574 cf	14.99'W x 85.00'L x 4.54'H Prismatoid 5,785 cf Overall - 1,850 cf Embedded = 3,934 cf x 40.0% Voids
2	220.45'	1,850 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,424 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	223.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.03 cfs @ 8.90 hrs HW=219.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=9.47 cfs @ 12.24 hrs HW=223.51' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 9.47 cfs @ 2.3 fps)

Pond 2P: Infiltration Field #2



Pond 3P: Infiltration Field #3

Inflow Area = 4.448 ac, Inflow Depth = 2.00" for 100 Year Storm event
 Inflow = 8.82 cfs @ 12.24 hrs, Volume= 0.742 af
 Outflow = 8.93 cfs @ 12.24 hrs, Volume= 0.712 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.02 cfs @ 5.89 hrs, Volume= 0.053 af
 Primary = 8.91 cfs @ 12.24 hrs, Volume= 0.659 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 233.66' @ 12.24 hrs Surf.Area= 854 sf Storage= 2,292 cf
 Plug-Flow detention time= 64.1 min calculated for 0.712 af (96% of inflow)
 Center-of-Mass det. time= 42.4 min (893.9 - 851.4)

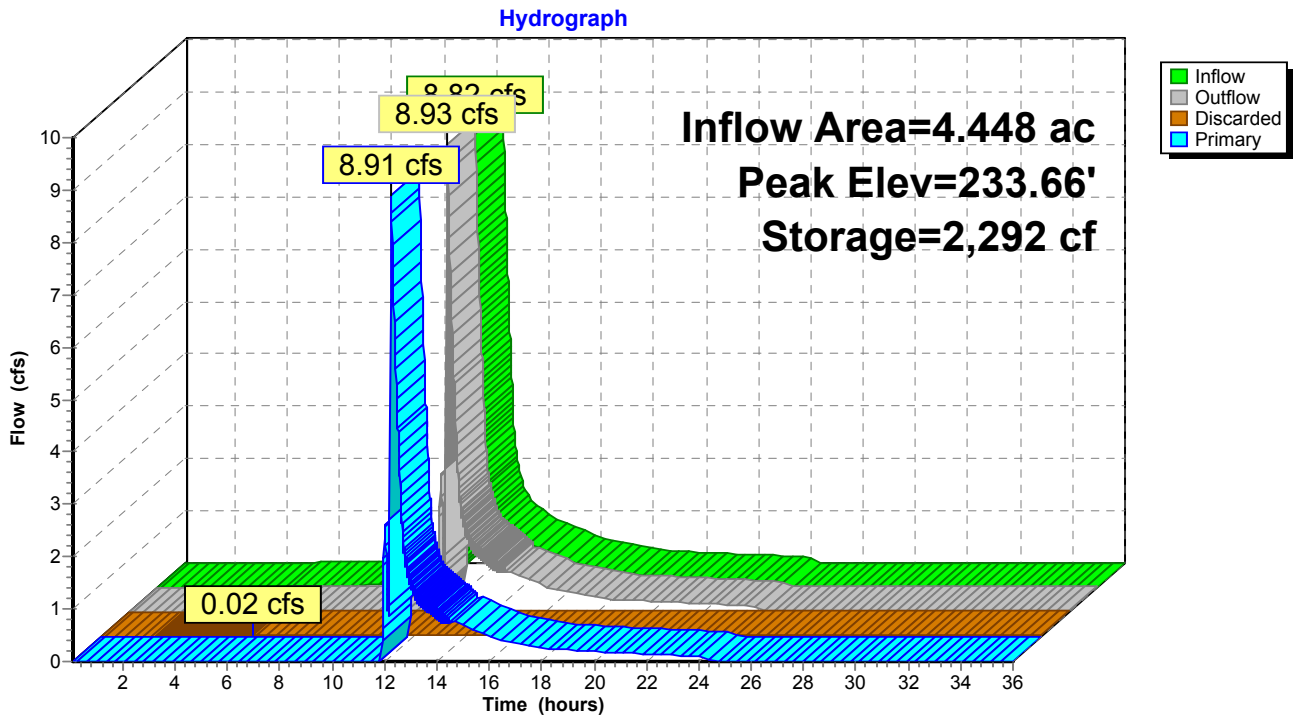
#	Invert	Avail.Storage	Storage Description
1	220.21'	1,058 cf	14.99'W x 57.00'L x 4.54'H Prismatic 3,879 cf Overall - 1,234 cf Embedded = 2,646 cf x 40.0% Voids
2	221.71'	1,234 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 24 Inside #1
		2,292 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	224.25'	12.0" x 130.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 222.25' S= 0.0154 '/' n= 0.011 Cc= 0.900

Discarded OutFlow Max=0.02 cfs @ 5.89 hrs HW=220.31' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=8.90 cfs @ 12.24 hrs HW=233.63' (Free Discharge)
 ↳2=Culvert (Inlet Controls 8.90 cfs @ 11.3 fps)

Pond 3P: Infiltration Field #3



Pond 4P: Infiltration Field #4

Inflow Area = 1.759 ac, Inflow Depth = 3.11" for 100 Year Storm event
 Inflow = 7.36 cfs @ 12.03 hrs, Volume= 0.456 af
 Outflow = 5.71 cfs @ 12.09 hrs, Volume= 0.383 af, Atten= 22%, Lag= 3.2 min
 Discarded = 0.05 cfs @ 9.91 hrs, Volume= 0.107 af
 Primary = 5.66 cfs @ 12.09 hrs, Volume= 0.276 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 226.36' @ 12.09 hrs Surf.Area= 2,101 sf Storage= 5,557 cf
 Plug-Flow detention time= 231.8 min calculated for 0.383 af (84% of inflow)
 Center-of-Mass det. time= 164.0 min (997.0 - 833.0)

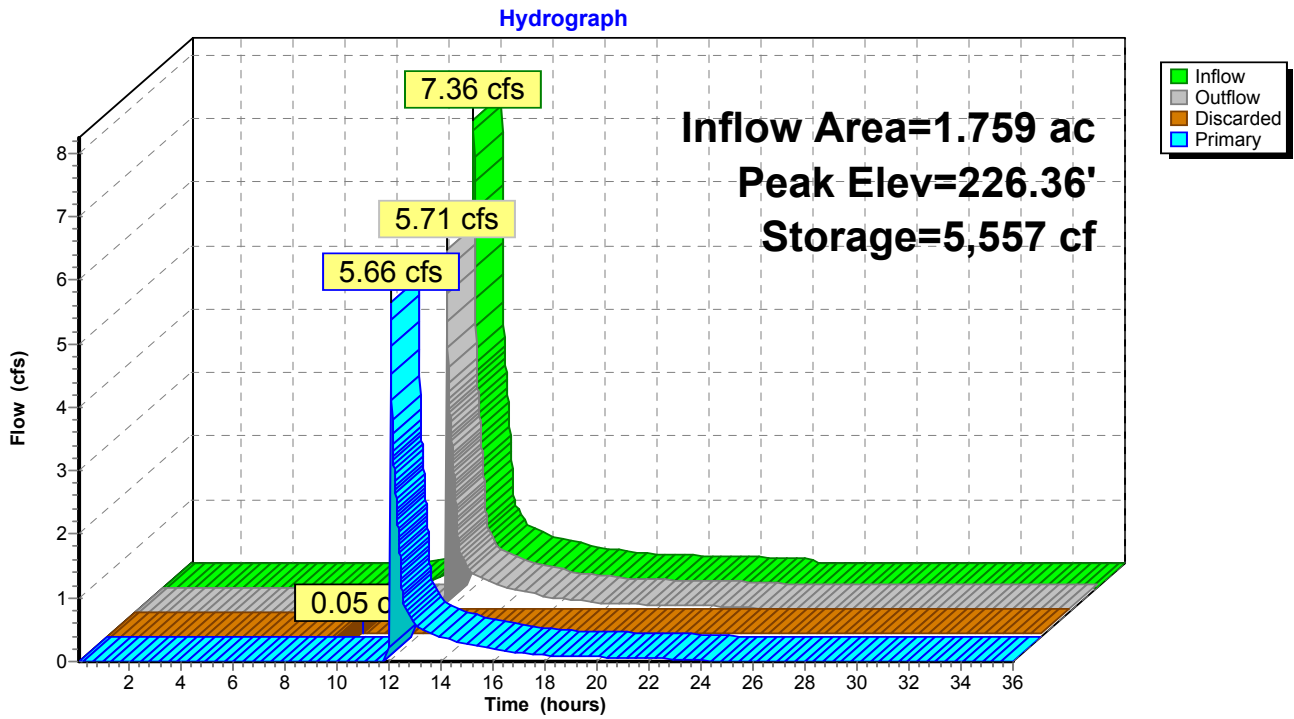
#	Invert	Avail.Storage	Storage Description
1	221.95'	2,582 cf	19.82'W x 106.00'L x 4.54'H Prismatic 9,538 cf Overall - 3,084 cf Embedded = 6,454 cf x 40.0% Voids
2	223.46'	3,084 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 60 Inside #1
		5,666 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	226.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.05 cfs @ 9.91 hrs HW=222.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=5.62 cfs @ 12.09 hrs HW=226.36' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 5.62 cfs @ 2.0 fps)

Pond 4P: Infiltration Field #4



Pond 5P: Infiltration Field #5

Inflow Area = 4.083 ac, Inflow Depth = 2.35" for 100 Year Storm event
 Inflow = 8.85 cfs @ 12.17 hrs, Volume= 0.799 af
 Outflow = 8.02 cfs @ 12.24 hrs, Volume= 0.701 af, Atten= 9%, Lag= 3.9 min
 Discarded = 0.06 cfs @ 10.88 hrs, Volume= 0.136 af
 Primary = 7.96 cfs @ 12.24 hrs, Volume= 0.565 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 227.45' @ 12.24 hrs Surf.Area= 2,785 sf Storage= 7,483 cf
 Plug-Flow detention time= 176.1 min calculated for 0.701 af (88% of inflow)
 Center-of-Mass det. time= 119.3 min (980.4 - 861.0)

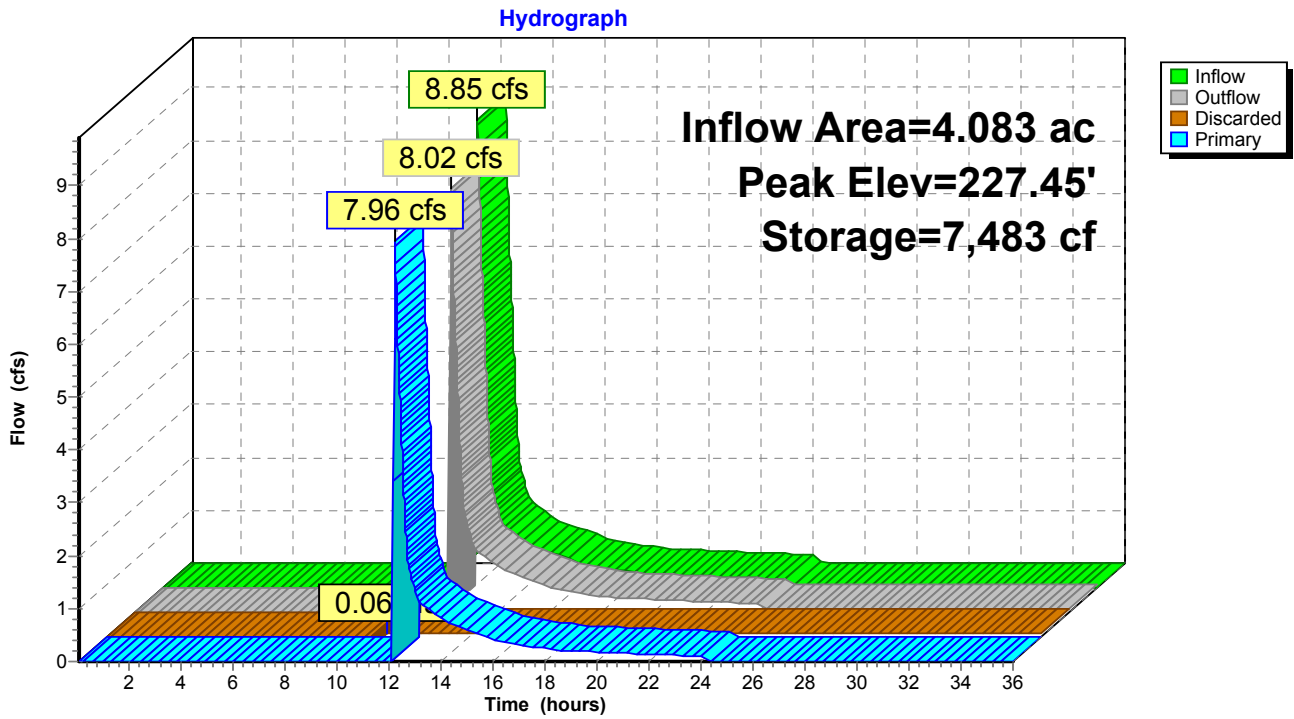
#	Invert	Avail.Storage	Storage Description
1	222.95'	3,414 cf	24.65'W x 113.00'L x 4.54'H Prismatoid 12,646 cf Overall - 4,112 cf Embedded = 8,534 cf x 40.0% Voids
2	224.45'	4,112 cf	52.0"W x 30.5"H x 7.00'L Parabolic Arch x 80 Inside #1
		7,525 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	227.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.06 cfs @ 10.88 hrs HW=223.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=7.95 cfs @ 12.24 hrs HW=227.45' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 7.95 cfs @ 2.2 fps)

Pond 5P: Infiltration Field #5



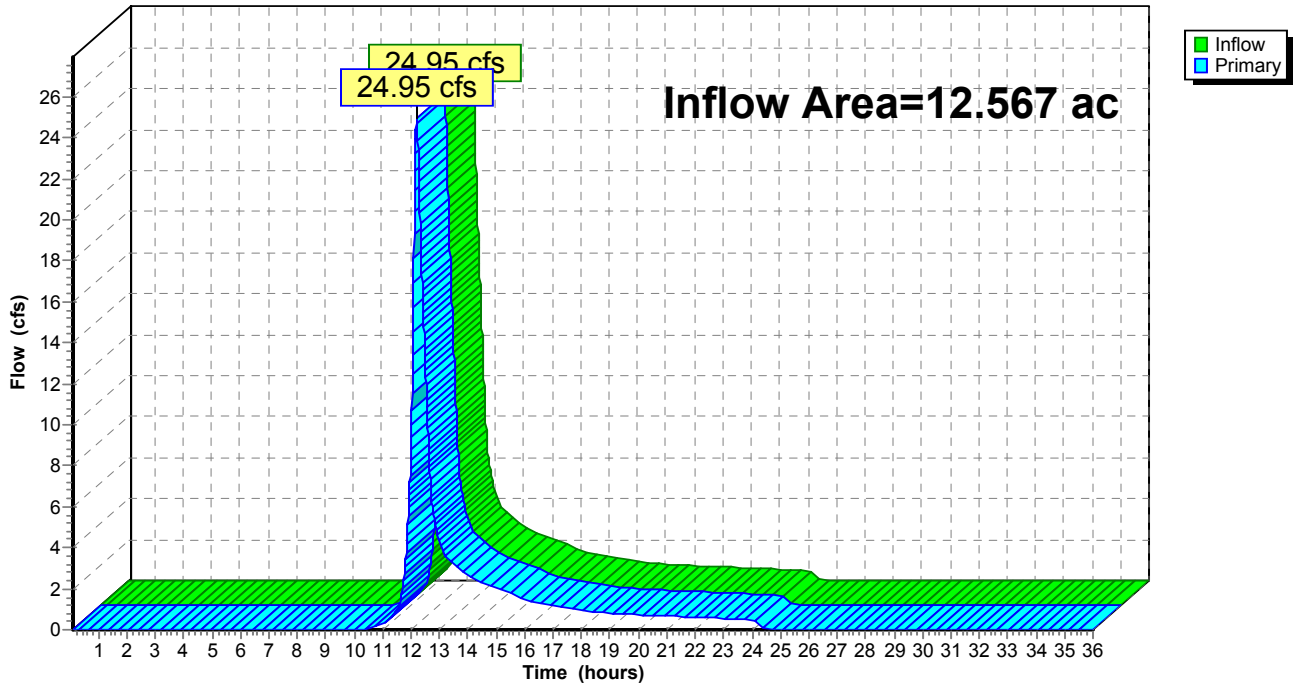
Link 1L: Total Offsite (Predevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 2.26" for 100 Year Storm event
Inflow = 24.95 cfs @ 12.20 hrs, Volume= 2.362 af
Primary = 24.95 cfs @ 12.20 hrs, Volume= 2.362 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs

Link 1L: Total Offsite (Predevelopment)

Hydrograph



Link 2L: Total Offsite (Postdevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 2.01" for 100 Year Storm event
Inflow = 24.49 cfs @ 12.24 hrs, Volume= 2.109 af
Primary = 24.49 cfs @ 12.24 hrs, Volume= 2.109 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs

Link 2L: Total Offsite (Postdevelopment)

Hydrograph

