
**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.

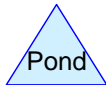
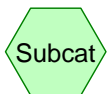
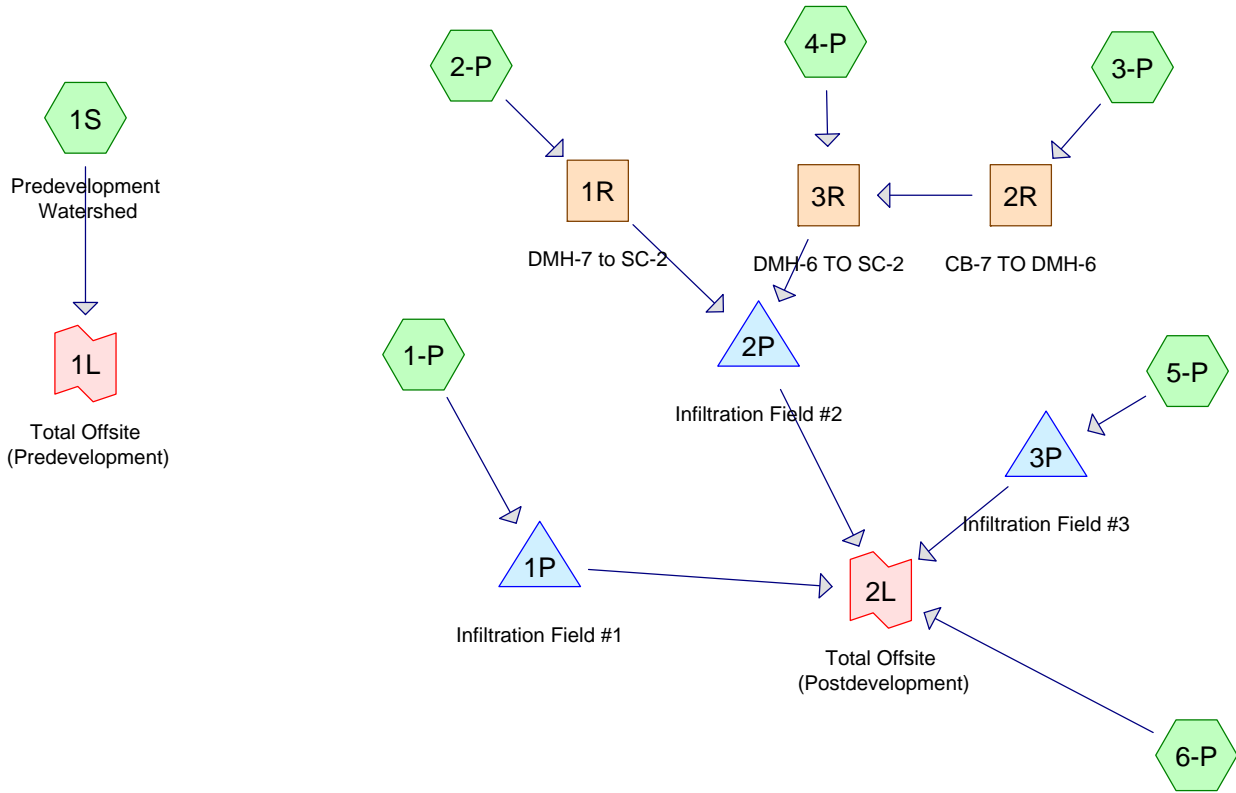
The HydroCAD report models the Predevelopment Condition vs. Postdevelopment Condition for the entire site area. The stormwater design reduces the peak rate of runoff and volume for the 2, 10, and 100 year storm event. The following is summary of the peak rate of runoff for various storm events:

	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	6.43	0.843
100 Year	24.95	2.36	21.17	2.21

Very Truly Yours,

Jack Sullivan, PE





Drainage Diagram for Definitive Jan 2017
 Prepared by {enter your company name here} 1/17/2017
 HydroCAD® 7.00 s/n 001433 © 1986-2003 Applied Microcomputer Systems

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"
Tc=6.0 min CN=90 Runoff=1.01 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"
Tc=6.0 min CN=89 Runoff=0.56 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"
Tc=6.0 min CN=94 Runoff=1.01 cfs 0.075 af

Subcatchment 5-P: Runoff Area=76,607 sf Runoff Depth=0.72"
Tc=6.0 min CN=69 Runoff=1.29 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

Reach 1R: DMH-7 to SC-2 Peak Depth=0.12' Max Vel=10.4 fps Inflow=0.56 cfs 0.040 af
D=12.0" n=0.011 L=12.0' S=0.1850 '/' Capacity=18.11 cfs Outflow=0.56 cfs 0.040 af

Reach 2R: CB-7 TO DMH-6 Peak Depth=0.32' Max Vel=4.3 fps Inflow=0.93 cfs 0.137 af
D=12.0" n=0.011 L=46.0' S=0.0100 '/' Capacity=4.21 cfs Outflow=0.93 cfs 0.137 af

Reach 3R: DMH-6 TO SC-2 Peak Depth=0.37' Max Vel=4.8 fps Inflow=1.46 cfs 0.212 af
D=15.0" n=0.011 L=108.0' S=0.0100 '/' Capacity=7.63 cfs Outflow=1.46 cfs 0.212 af

Pond 1P: Infiltration Field #1 Peak Elev=243.56' Storage=1,907 cf Inflow=1.01 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=222.68' Storage=7,083 cf Inflow=1.91 cfs 0.252 af
Discarded=0.07 cfs 0.162 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.162 af

Pond 3P: Infiltration Field #3 Peak Elev=223.77' Storage=2,433 cf Inflow=1.29 cfs 0.106 af
Discarded=0.06 cfs 0.106 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.106 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

Definitive_Jan 2017

Type III 24-hr 2 Year Storm Rainfall=3.10"

Prepared by {enter your company name here}

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1/17/2017

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

Subcatchment 1-P:

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 2.08"

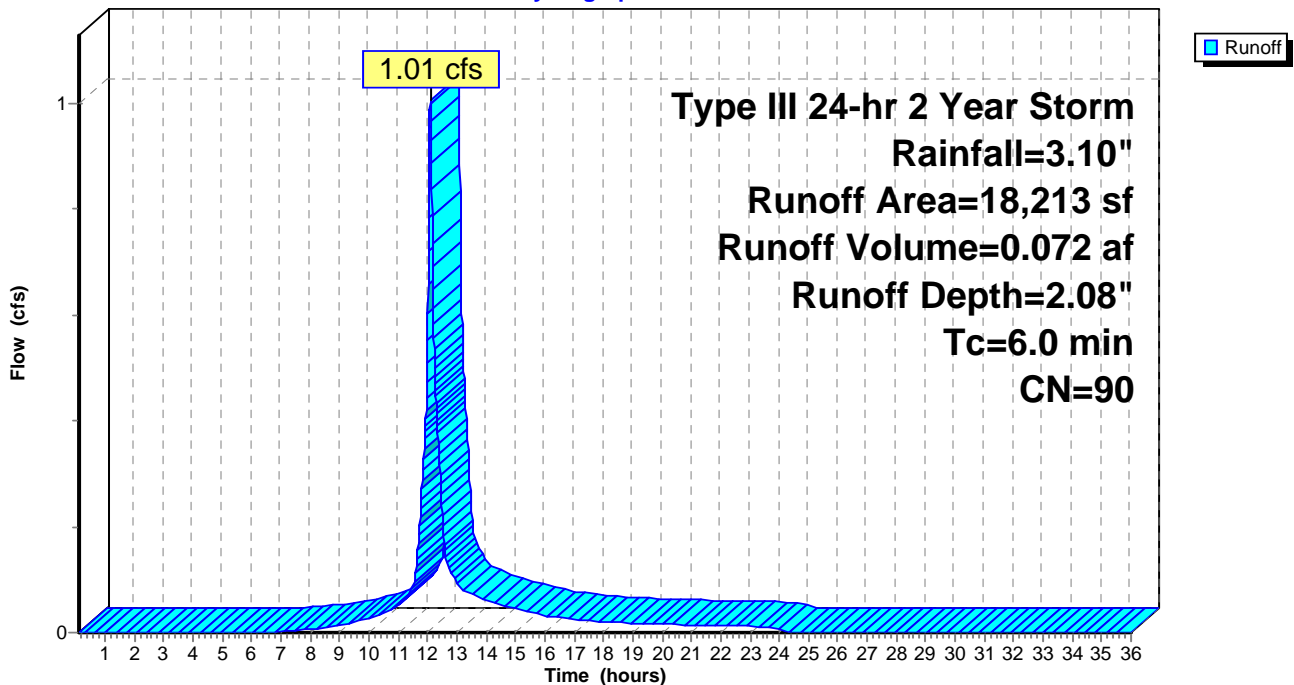
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

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
6.0					Direct Entry,

Subcatchment 1-P:

Hydrograph



Subcatchment 1S: Predevelopment Watershed

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

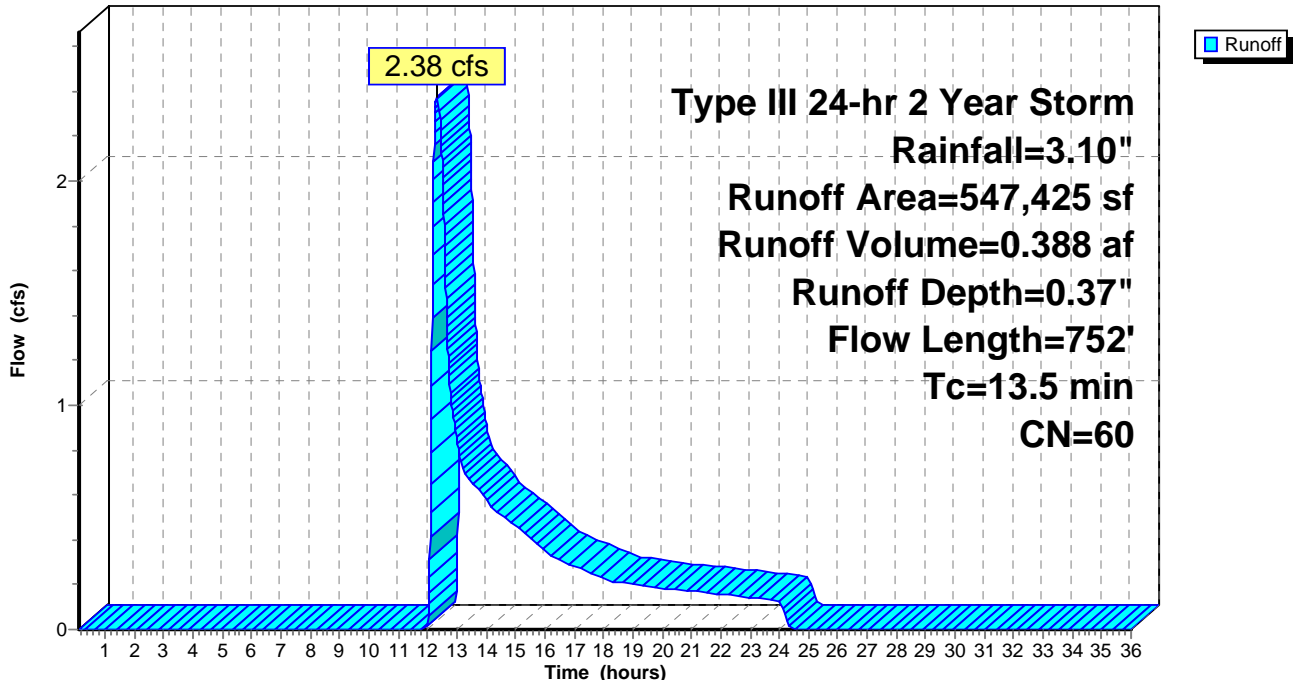
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

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 = 0.56 cfs @ 12.09 hrs, Volume= 0.040 af, Depth= 1.99"

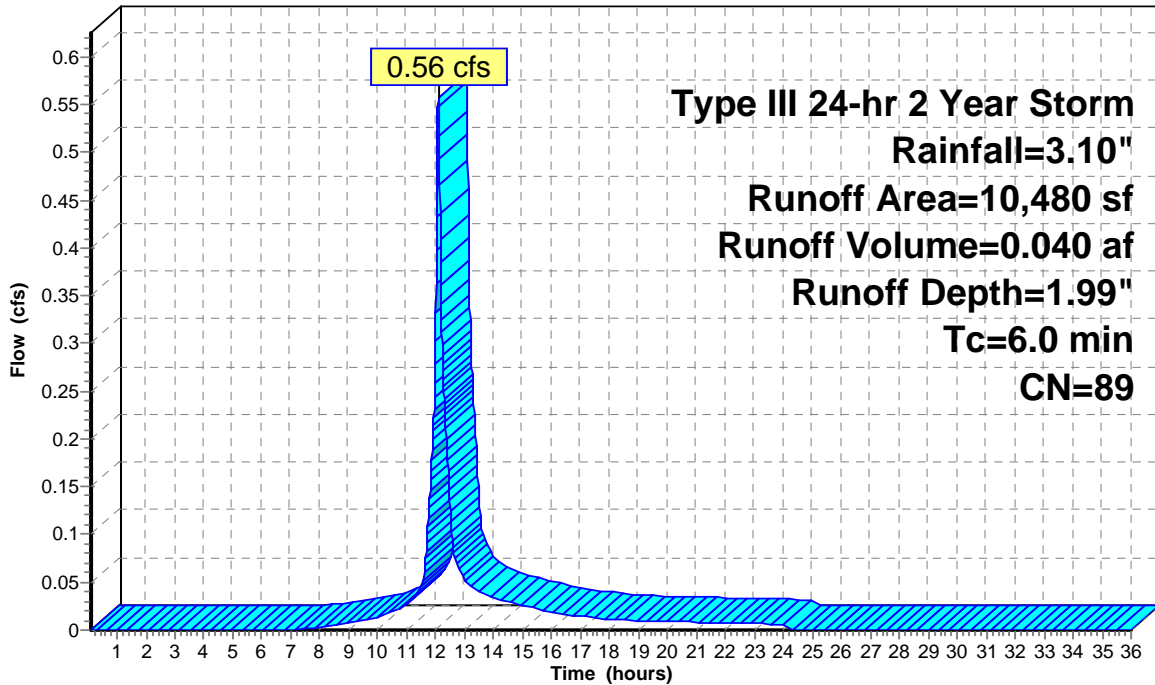
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

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
6.0					Direct Entry,

Subcatchment 2-P:

Hydrograph



Runoff

Type III 24-hr 2 Year Storm
 Rainfall=3.10"
 Runoff Area=10,480 sf
 Runoff Volume=0.040 af
 Runoff Depth=1.99"
 Tc=6.0 min
 CN=89

Subcatchment 3-P:

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

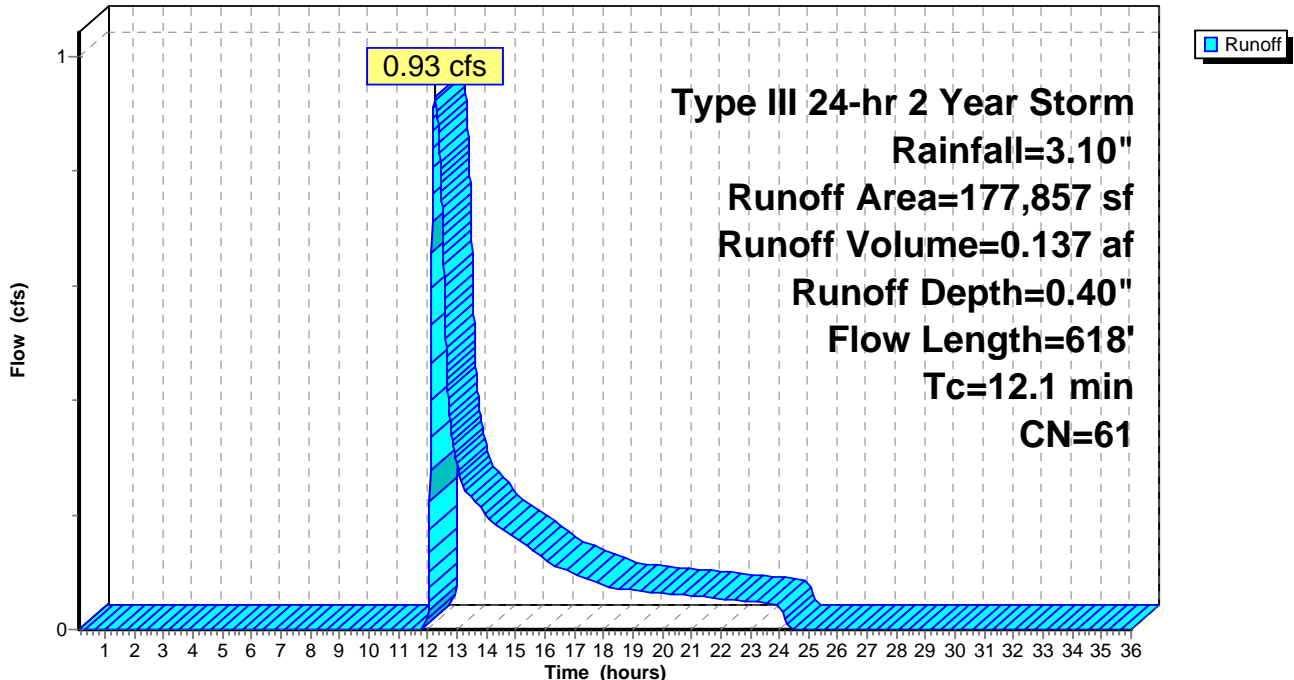
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.10"

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 = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af, Depth= 2.45"

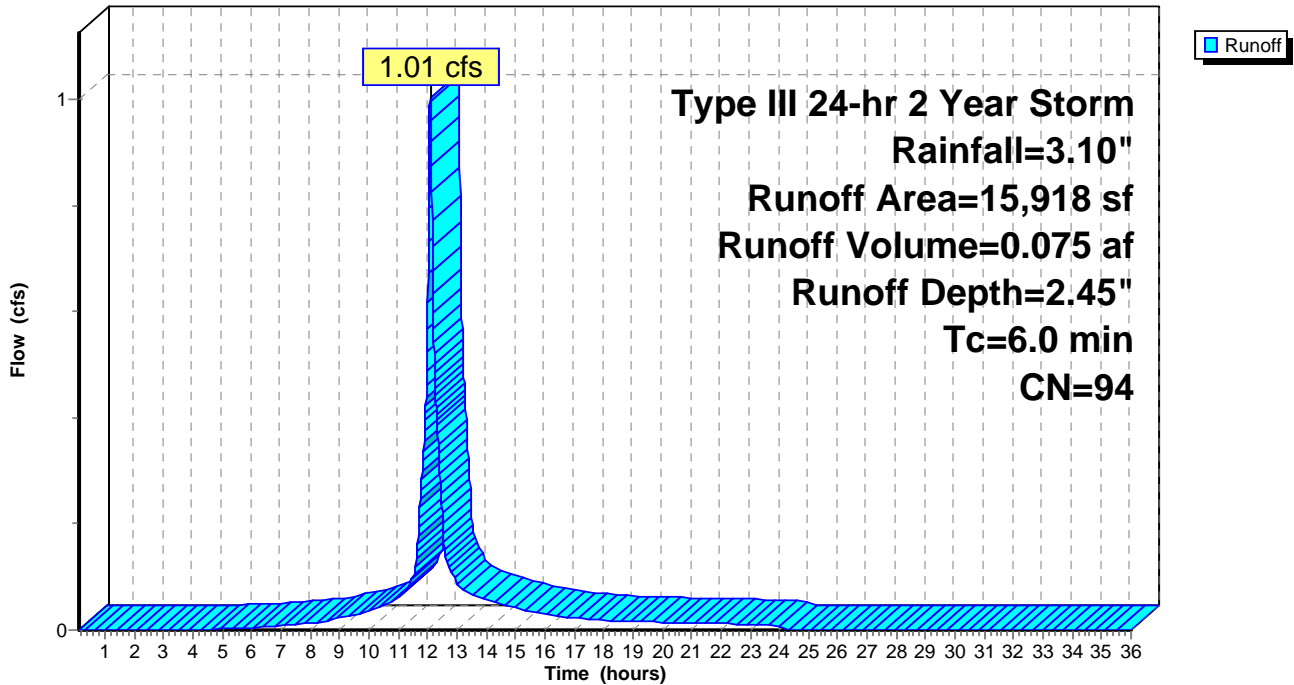
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

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
6.0					Direct Entry,

Subcatchment 4-P:

Hydrograph



Subcatchment 5-P:

Runoff = 1.29 cfs @ 12.10 hrs, Volume= 0.106 af, Depth= 0.72"

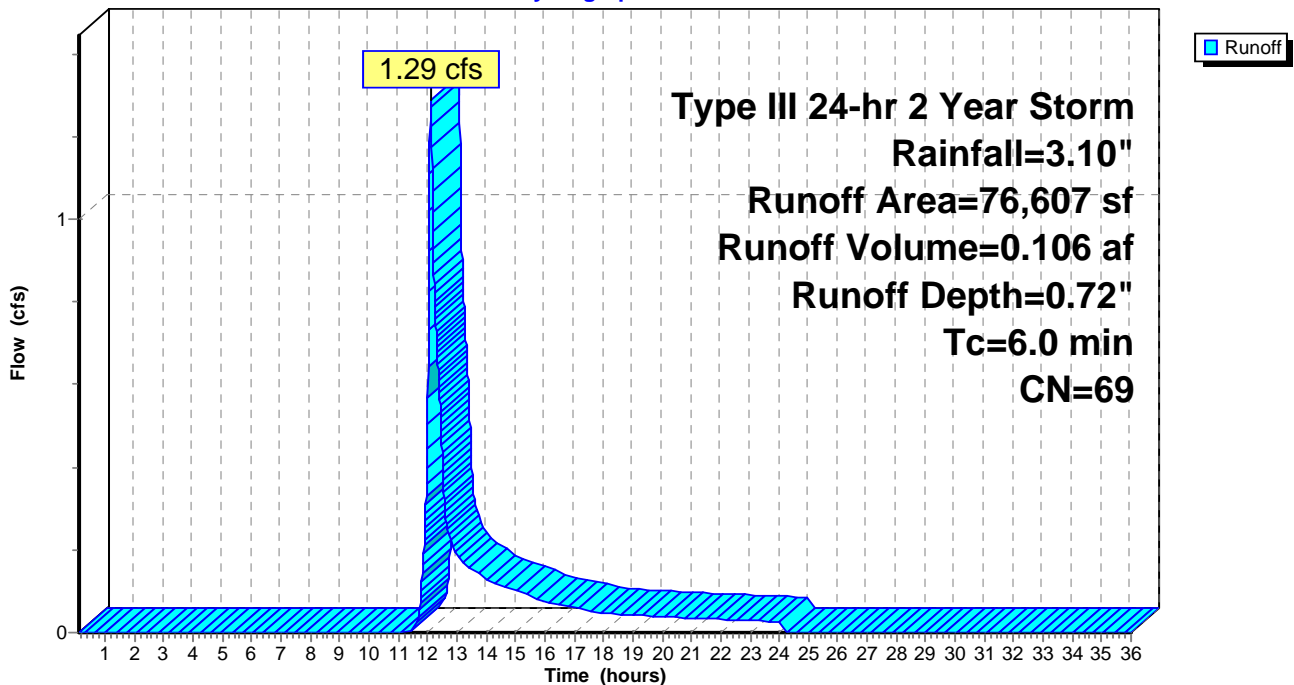
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

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
6.0					Direct Entry,

Subcatchment 5-P:

Hydrograph



Subcatchment 6-P:

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

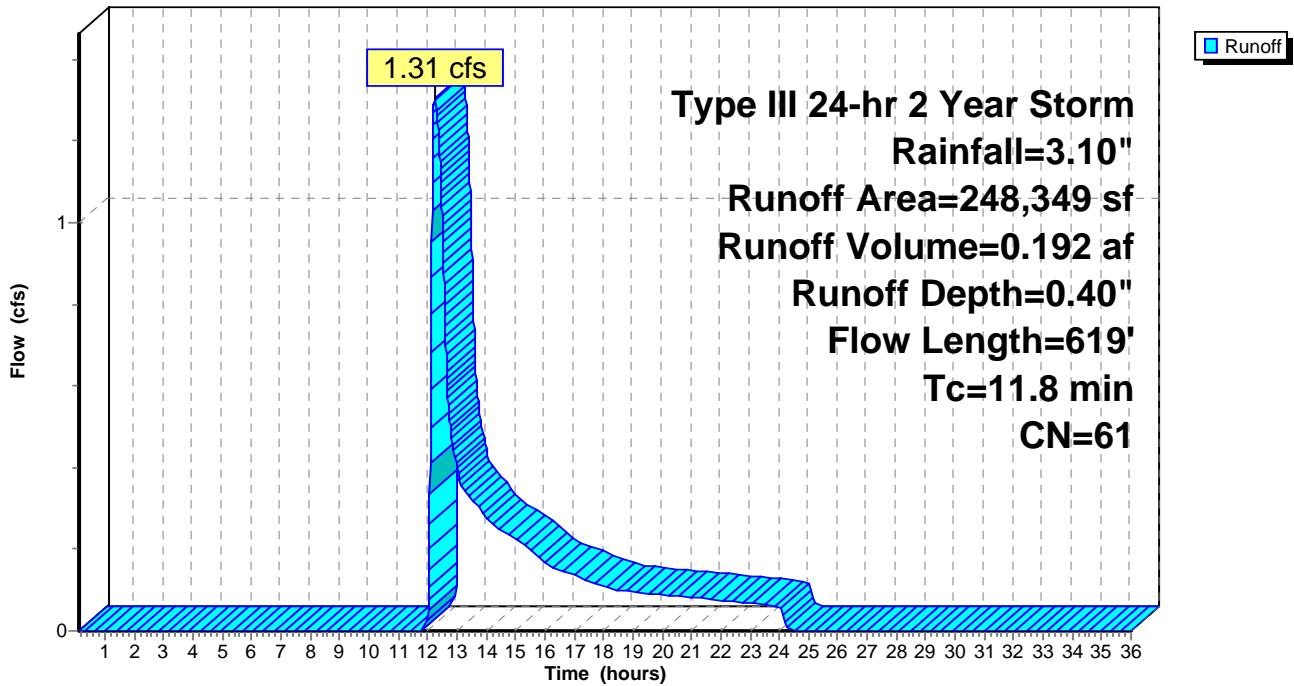
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.10"

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



Reach 1R: DMH-7 to SC-2

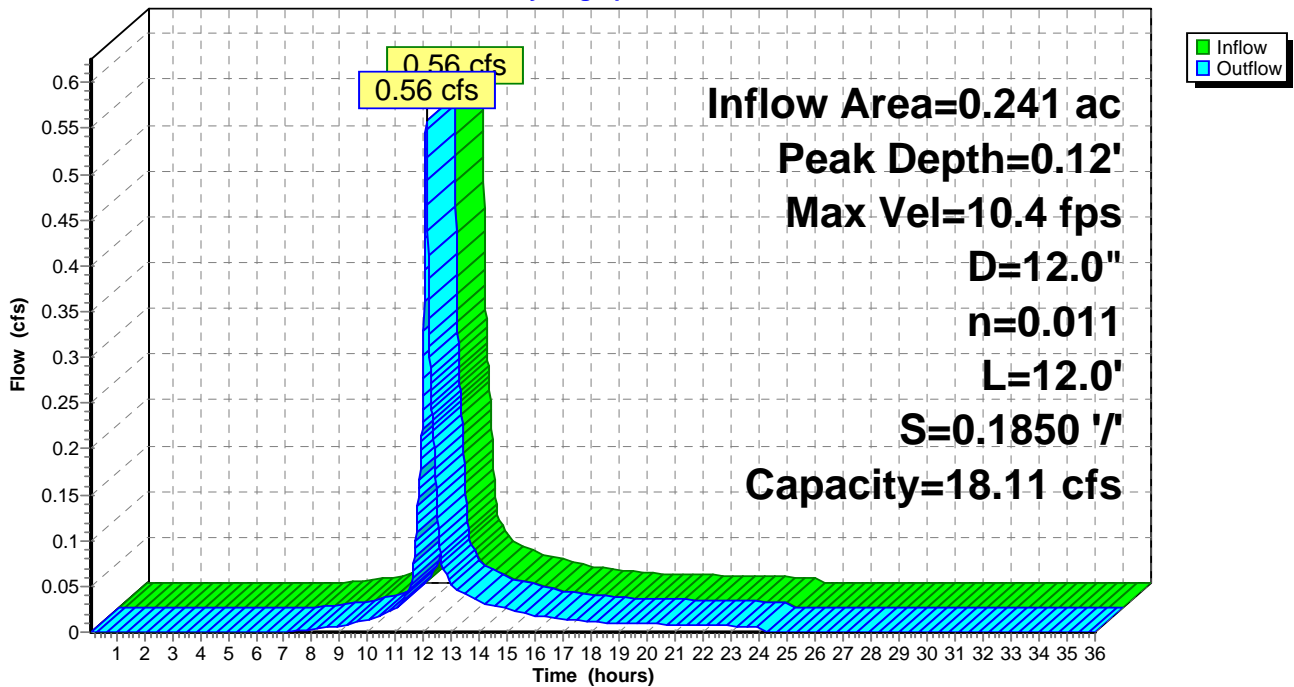
Inflow Area = 0.241 ac, Inflow Depth = 1.99" for 2 Year Storm event
 Inflow = 0.56 cfs @ 12.09 hrs, Volume= 0.040 af
 Outflow = 0.56 cfs @ 12.09 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 10.4 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 3.6 fps, Avg. Travel Time= 0.1 min

Peak Depth= 0.12' @ 12.09 hrs
 Capacity at bank full= 18.11 cfs
 Inlet Invert= 224.00', Outlet Invert= 221.78'
 12.0" Diameter Pipe n= 0.011 Length= 12.0' Slope= 0.1850 '/'

Reach 1R: DMH-7 to SC-2

Hydrograph



Reach 2R: CB-7 TO DMH-6

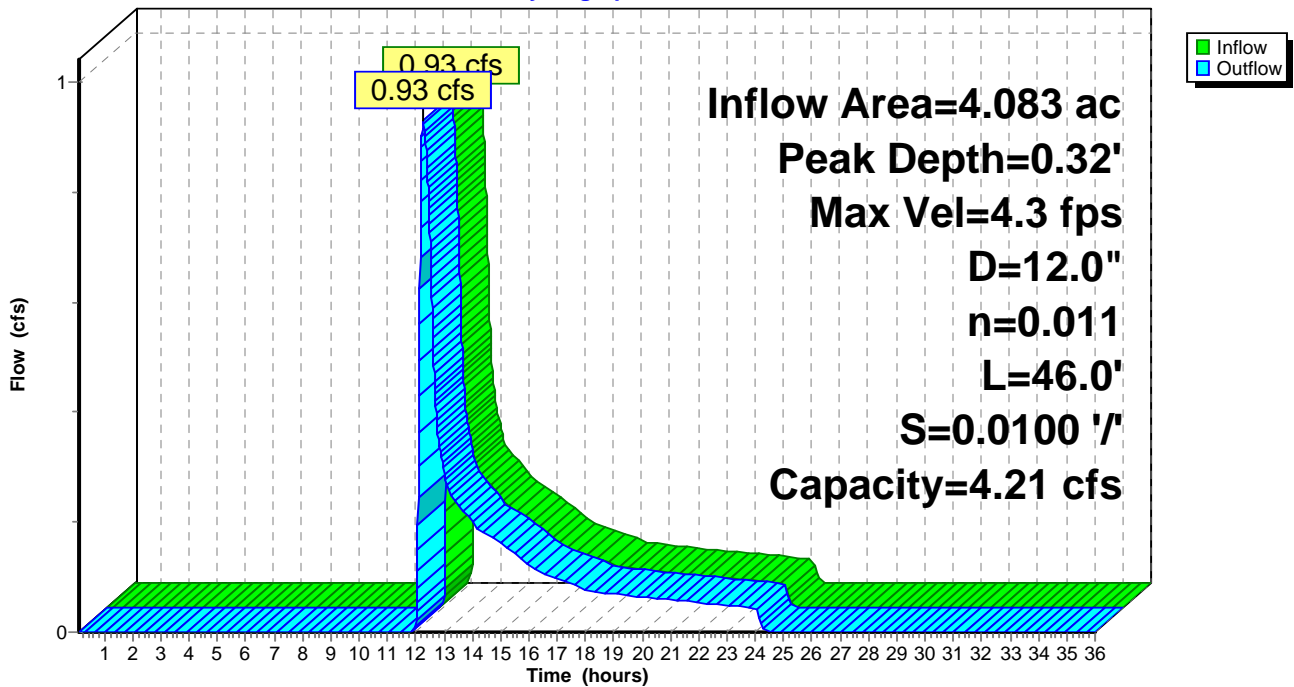
Inflow Area = 4.083 ac, Inflow Depth = 0.40" for 2 Year Storm event
 Inflow = 0.93 cfs @ 12.25 hrs, Volume= 0.137 af
 Outflow = 0.93 cfs @ 12.25 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.3 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.2 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.32' @ 12.25 hrs
 Capacity at bank full= 4.21 cfs
 Inlet Invert= 223.32', Outlet Invert= 222.86'
 12.0" Diameter Pipe n= 0.011 Length= 46.0' Slope= 0.0100 '/'

Reach 2R: CB-7 TO DMH-6

Hydrograph



Reach 3R: DMH-6 TO SC-2

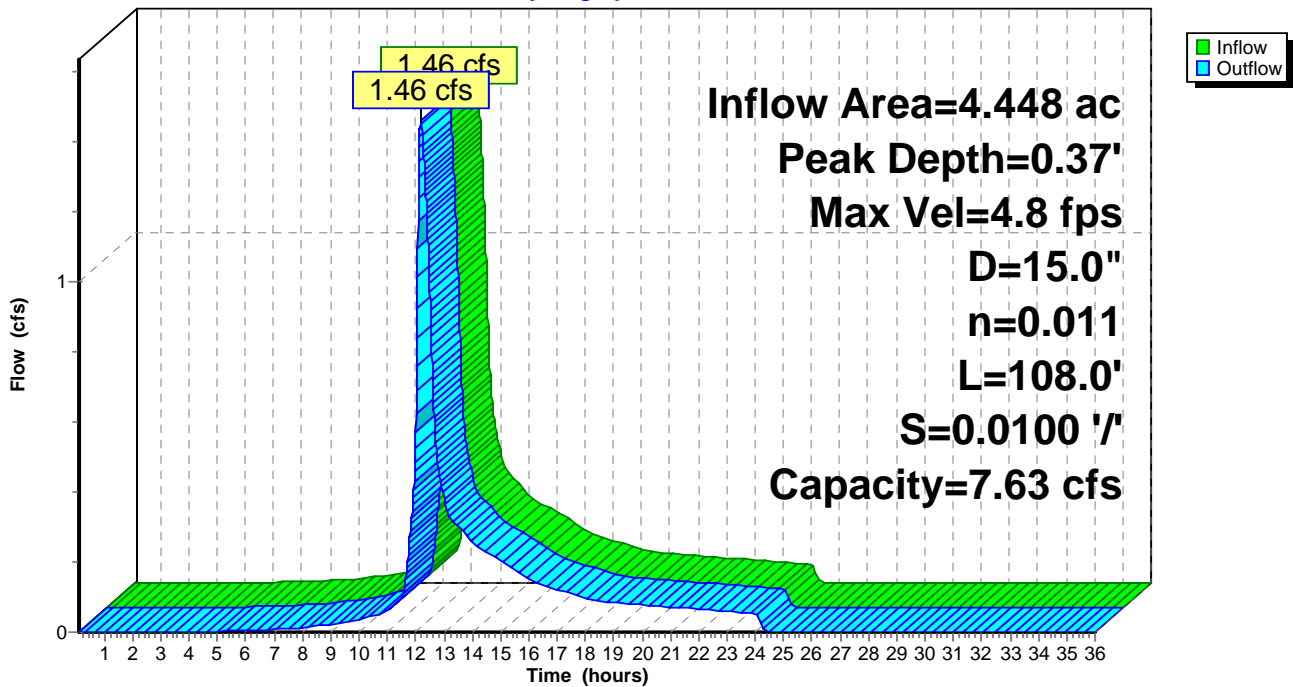
Inflow Area = 4.448 ac, Inflow Depth = 0.57" for 2 Year Storm event
 Inflow = 1.46 cfs @ 12.17 hrs, Volume= 0.212 af
 Outflow = 1.46 cfs @ 12.18 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.8 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.37' @ 12.17 hrs
 Capacity at bank full= 7.63 cfs
 Inlet Invert= 222.86', Outlet Invert= 221.78'
 15.0" Diameter Pipe n= 0.011 Length= 108.0' Slope= 0.0100 '/'

Reach 3R: DMH-6 TO SC-2

Hydrograph



Pond 1P: Infiltration Field #1

Inflow Area = 0.418 ac, Inflow Depth = 2.08" for 2 Year Storm event
 Inflow = 1.01 cfs @ 12.09 hrs, Volume= 0.072 af
 Outflow = 0.03 cfs @ 10.38 hrs, Volume= 0.066 af, Atten= 97%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 10.38 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= 243.56' @ 16.30 hrs Surf.Area= 1,268 sf Storage= 1,907 cf
 Plug-Flow detention time= 585.3 min calculated for 0.066 af (91% of inflow)
 Center-of-Mass det. time= 541.4 min (1,349.5 - 808.1)

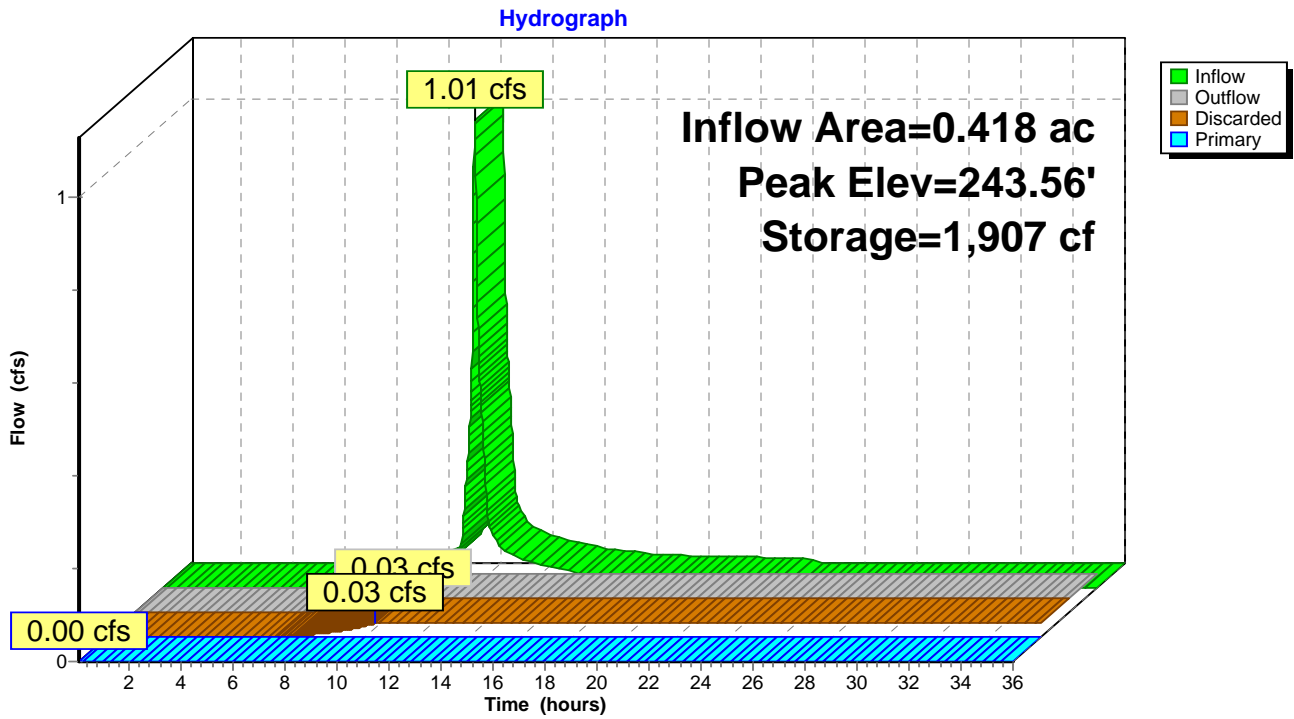
#	Invert	Avail.Storage	Storage Description
1	240.95'	1,634 cf	19.82'W x 64.00'L x 4.54'H Prismatic 5,759 cf Overall - 1,673 cf Embedded = 4,086 cf x 40.0% Voids
2	242.45'	1,673 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,307 cf	Total Available Storage

#	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 @ 10.38 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 = 0.64" for 2 Year Storm event
 Inflow = 1.91 cfs @ 12.13 hrs, Volume= 0.252 af
 Outflow = 0.07 cfs @ 10.90 hrs, Volume= 0.162 af, Atten= 96%, Lag= 0.0 min
 Discarded = 0.07 cfs @ 10.90 hrs, Volume= 0.162 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= 222.68' @ 22.04 hrs Surf.Area= 3,131 sf Storage= 7,083 cf
 Plug-Flow detention time= 609.7 min calculated for 0.162 af (64% of inflow)
 Center-of-Mass det. time= 485.8 min (1,353.4 - 867.6)

#	Invert	Avail.Storage	Storage Description
1	218.95'	4,012 cf	24.65'W x 127.00'L x 4.54'H Prismatoid 14,213 cf Overall - 4,182 cf Embedded = 10,030 cf x 40.0% Voids
2	220.45'	4,182 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 90 Inside #1
		8,195 cf	Total Available Storage

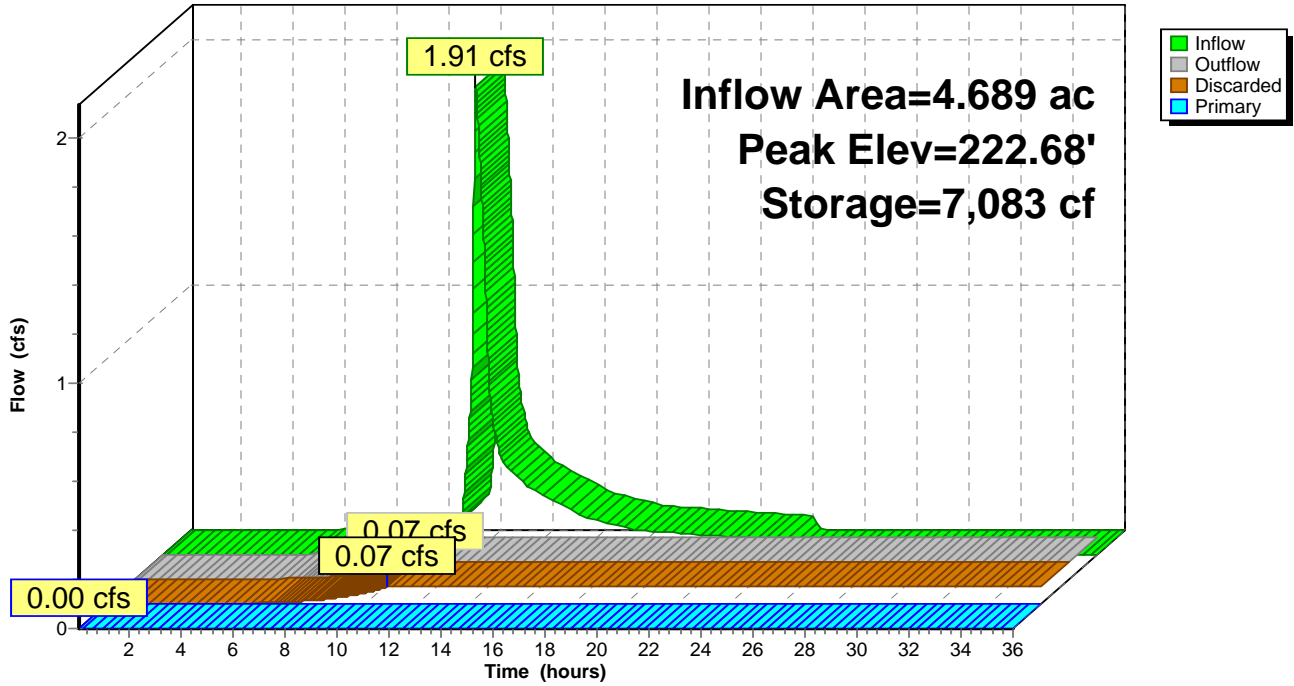
#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	223.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.07 cfs @ 10.90 hrs HW=219.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.07 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 = 1.759 ac, Inflow Depth = 0.72" for 2 Year Storm event
 Inflow = 1.29 cfs @ 12.10 hrs, Volume= 0.106 af
 Outflow = 0.06 cfs @ 11.87 hrs, Volume= 0.106 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.06 cfs @ 11.87 hrs, Volume= 0.106 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= 223.77' @ 16.60 hrs Surf.Area= 2,785 sf Storage= 2,433 cf
 Plug-Flow detention time= 417.0 min calculated for 0.106 af (100% of inflow)
 Center-of-Mass det. time= 417.0 min (1,298.9 - 881.9)

#	Invert	Avail.Storage	Storage Description
1	221.95'	3,571 cf	24.65'W x 113.00'L x 4.54'H Prismatic 12,646 cf Overall - 3,718 cf Embedded = 8,928 cf x 40.0% Voids
2	223.46'	3,718 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 80 Inside #1
		7,289 cf	Total Available Storage

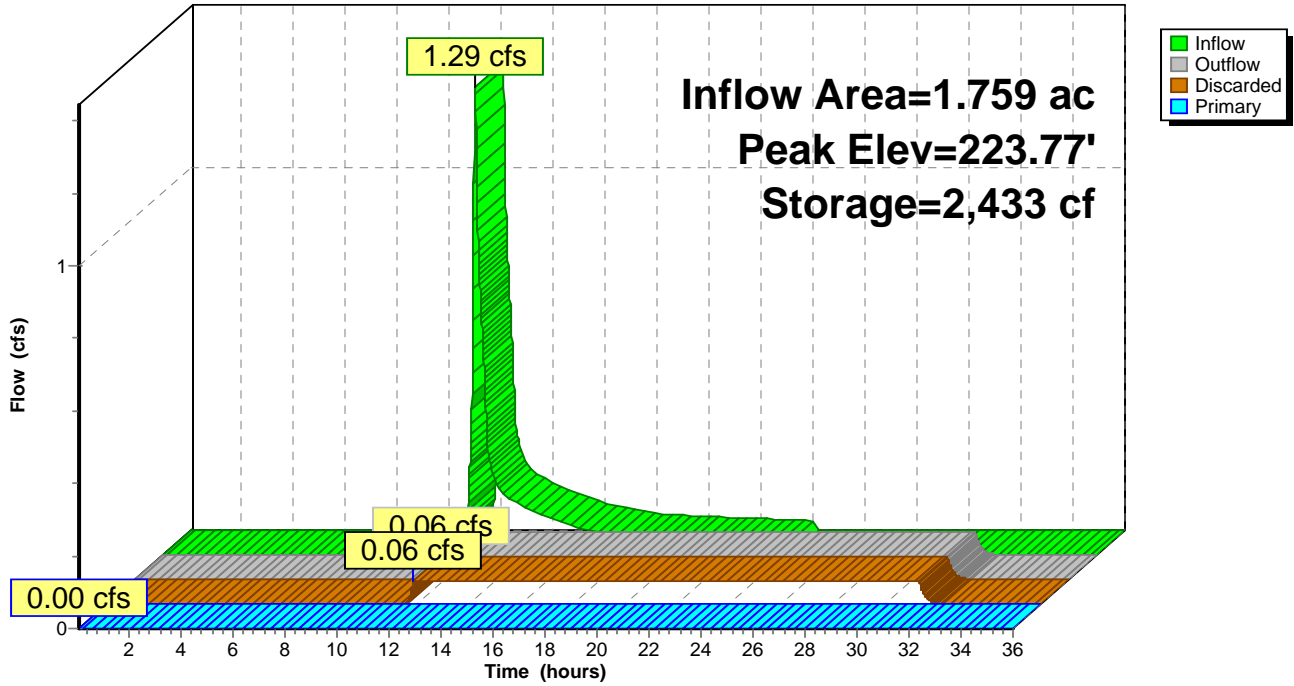
#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.001400 fpm Exfiltration over entire Surface area
2	Primary	226.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Discarded OutFlow Max=0.06 cfs @ 11.87 hrs HW=222.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

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

Pond 3P: Infiltration Field #3

Hydrograph

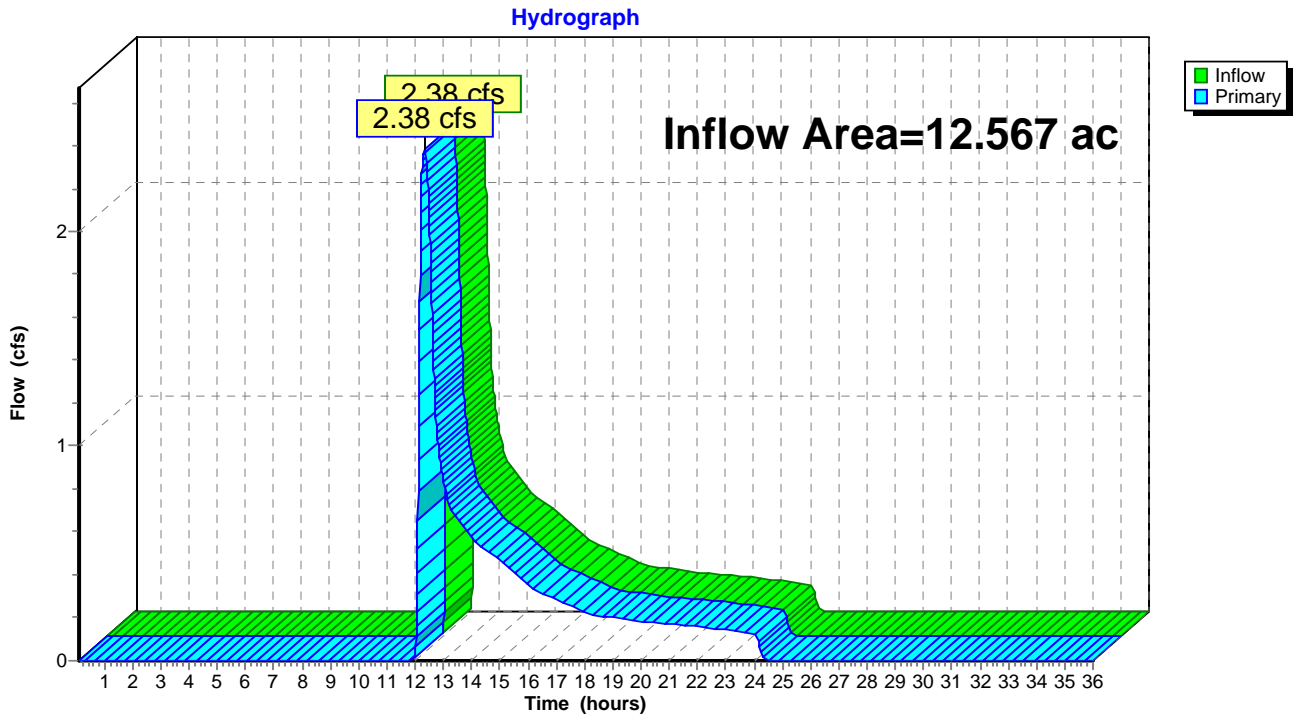


Link 1L: Total Offsite (Predevelopment)

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)

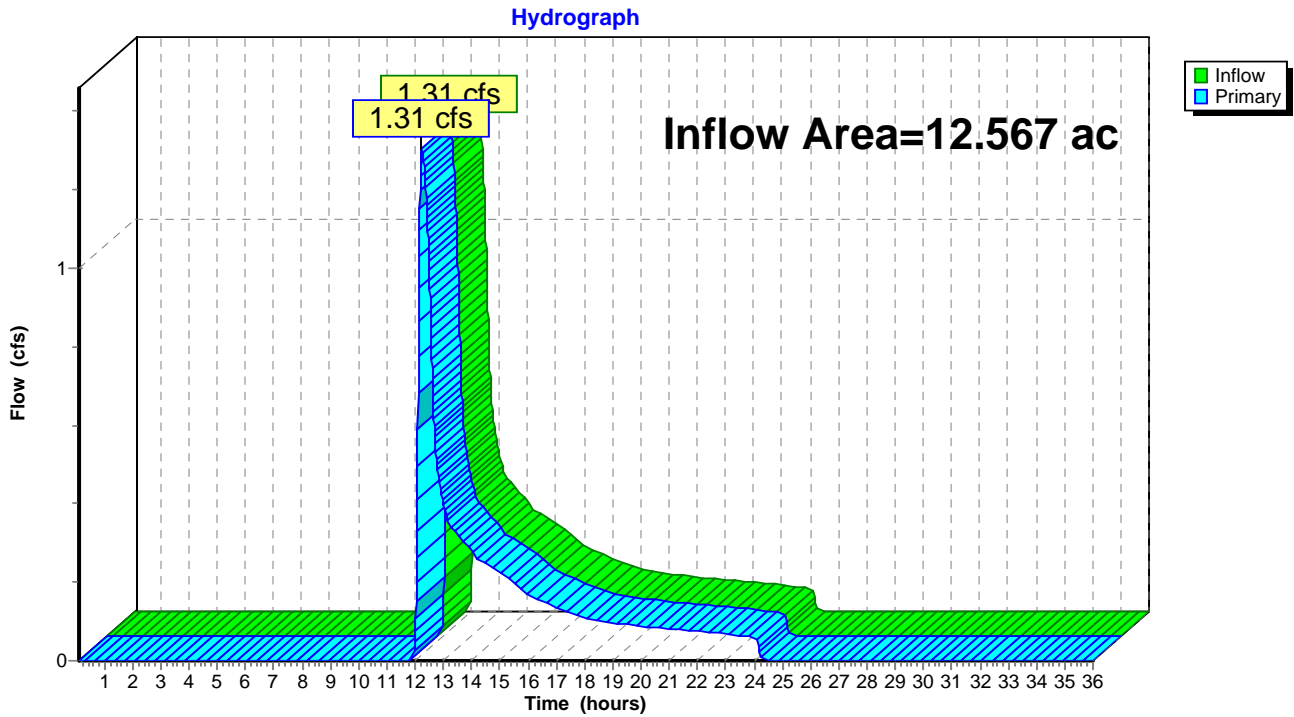


Link 2L: Total Offsite (Postdevelopment)

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)



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"
Tc=6.0 min CN=90 Runoff=1.64 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"
Tc=6.0 min CN=89 Runoff=0.92 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"
Tc=6.0 min CN=94 Runoff=1.55 cfs 0.118 af

Subcatchment 5-P: Runoff Area=76,607 sf Runoff Depth=1.64"
Tc=6.0 min CN=69 Runoff=3.26 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

Reach 1R: DMH-7 to SC-2 Peak Depth=0.15' Max Vel=12.1 fps Inflow=0.92 cfs 0.067 af
D=12.0" n=0.011 L=12.0' S=0.1850 '/' Capacity=18.11 cfs Outflow=0.92 cfs 0.067 af

Reach 2R: CB-7 TO DMH-6 Peak Depth=0.74' Max Vel=6.1 fps Inflow=3.76 cfs 0.377 af
D=12.0" n=0.011 L=46.0' S=0.0100 '/' Capacity=4.21 cfs Outflow=3.76 cfs 0.377 af

Reach 3R: DMH-6 TO SC-2 Peak Depth=0.71' Max Vel=6.6 fps Inflow=4.74 cfs 0.494 af
D=15.0" n=0.011 L=108.0' S=0.0100 '/' Capacity=7.63 cfs Outflow=4.73 cfs 0.494 af

Pond 1P: Infiltration Field #1 Peak Elev=245.02' Storage=3,068 cf Inflow=1.64 cfs 0.120 af
Discarded=0.03 cfs 0.070 af Primary=0.09 cfs 0.013 af Outflow=0.12 cfs 0.083 af

Pond 2P: Infiltration Field #2 Peak Elev=223.24' Storage=7,881 cf Inflow=5.38 cfs 0.561 af
Discarded=0.07 cfs 0.171 af Primary=3.08 cfs 0.288 af Outflow=3.15 cfs 0.458 af

Pond 3P: Infiltration Field #3 Peak Elev=226.02' Storage=6,767 cf Inflow=3.26 cfs 0.240 af
Discarded=0.06 cfs 0.135 af Primary=0.10 cfs 0.017 af Outflow=0.17 cfs 0.151 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=6.43 cfs 0.843 af
Primary=6.43 cfs 0.843 af

Definitive_Jan 2017

Type III 24-hr 10 Year Storm Rainfall=4.55"

Prepared by {enter your company name here}

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1/17/2017

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

Subcatchment 1-P:

Runoff = 1.64 cfs @ 12.09 hrs, Volume= 0.120 af, Depth= 3.44"

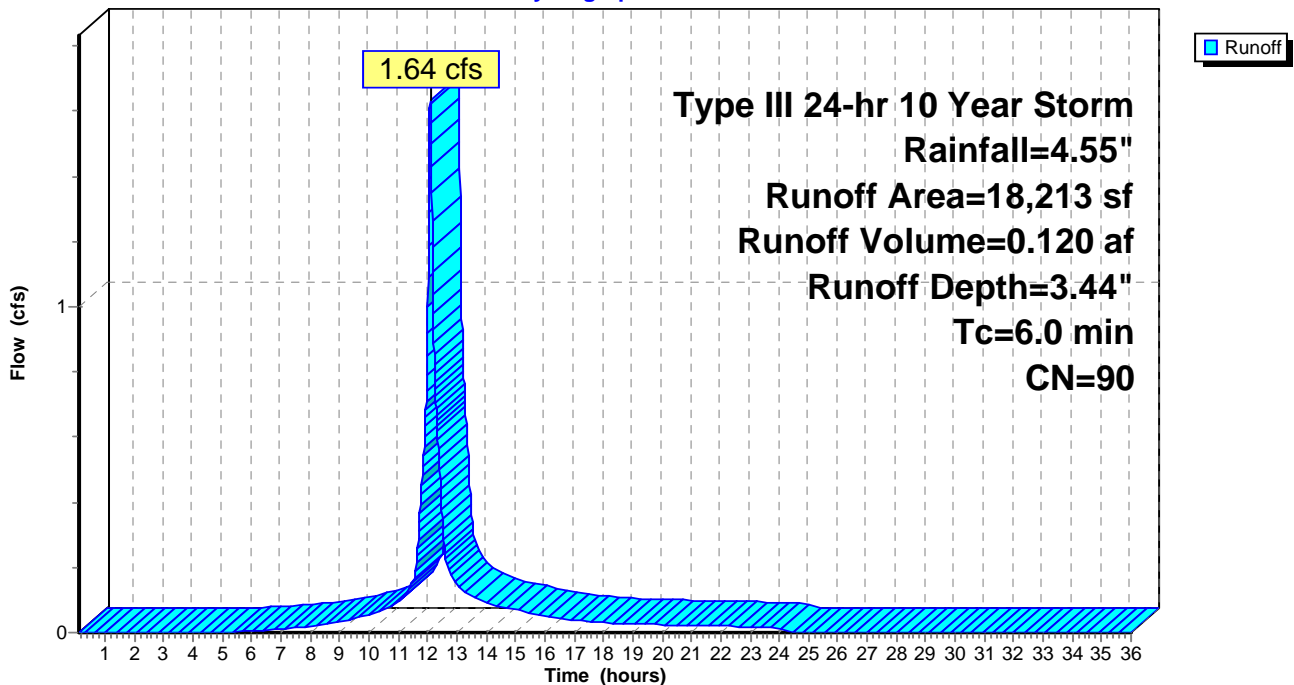
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

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
6.0					Direct Entry,

Subcatchment 1-P:

Hydrograph



Subcatchment 1S: Predevelopment Watershed

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

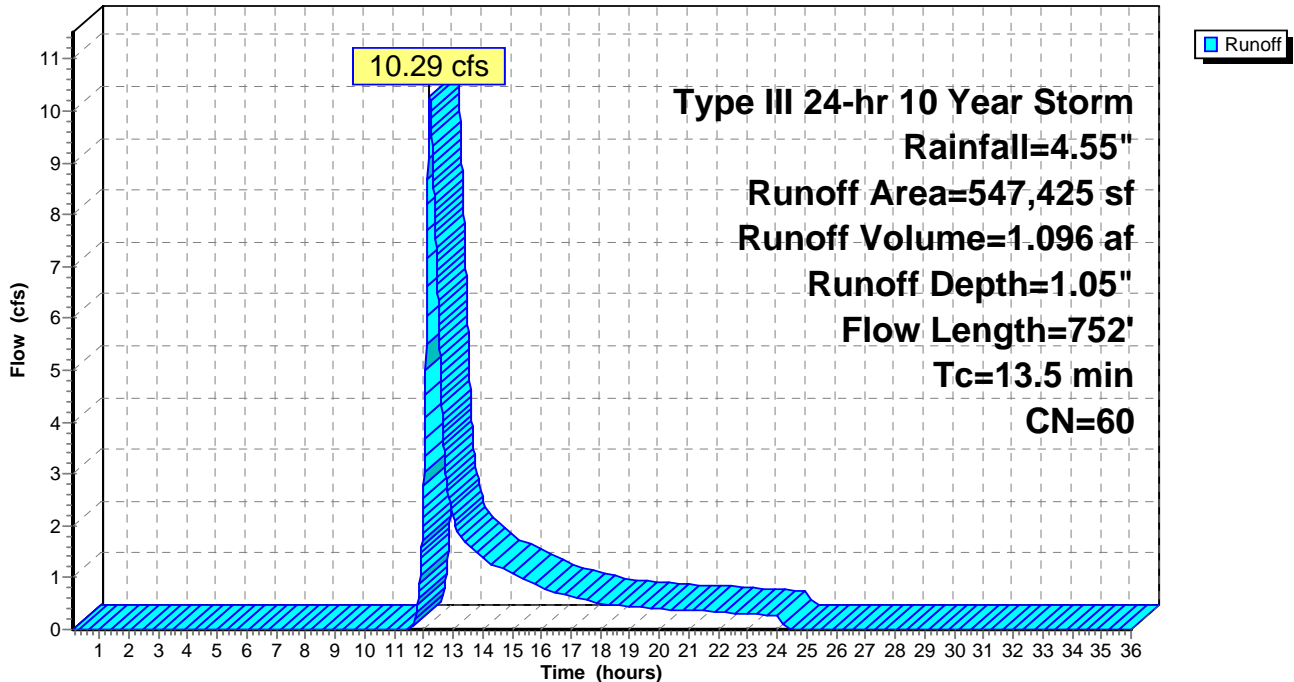
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=4.55"

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 = 0.92 cfs @ 12.09 hrs, Volume= 0.067 af, Depth= 3.34"

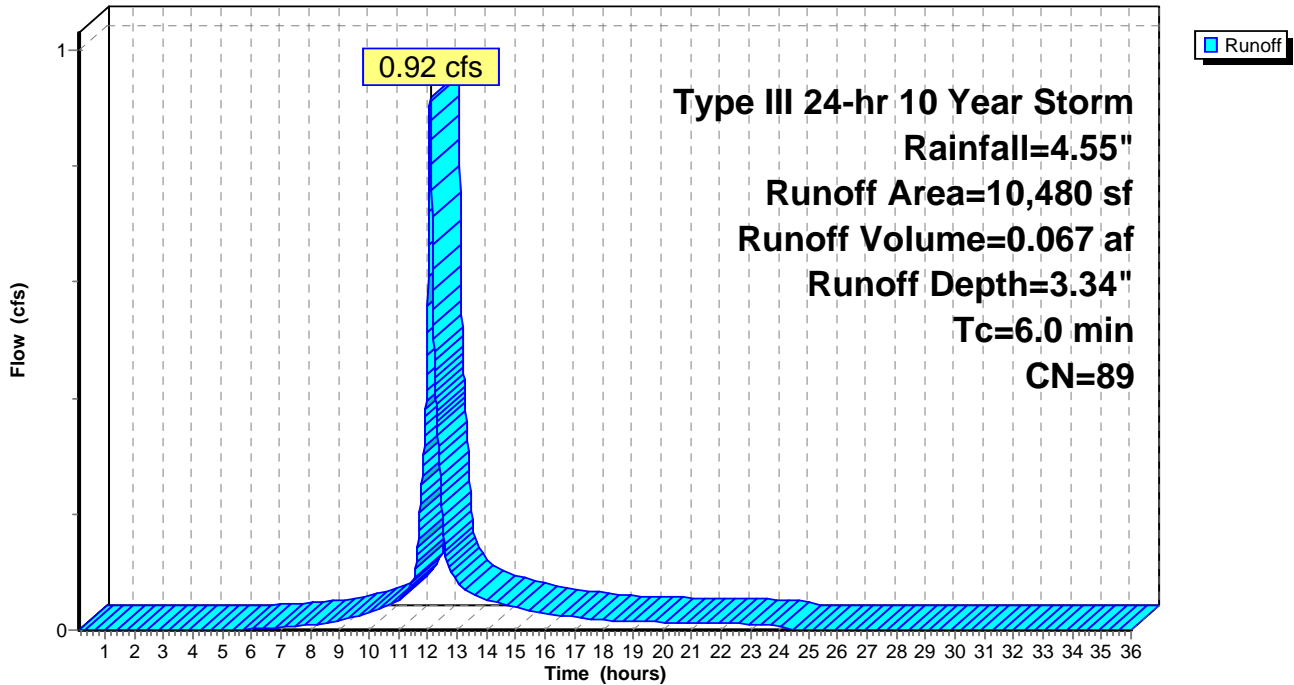
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

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
6.0					Direct Entry,

Subcatchment 2-P:

Hydrograph



Subcatchment 3-P:

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

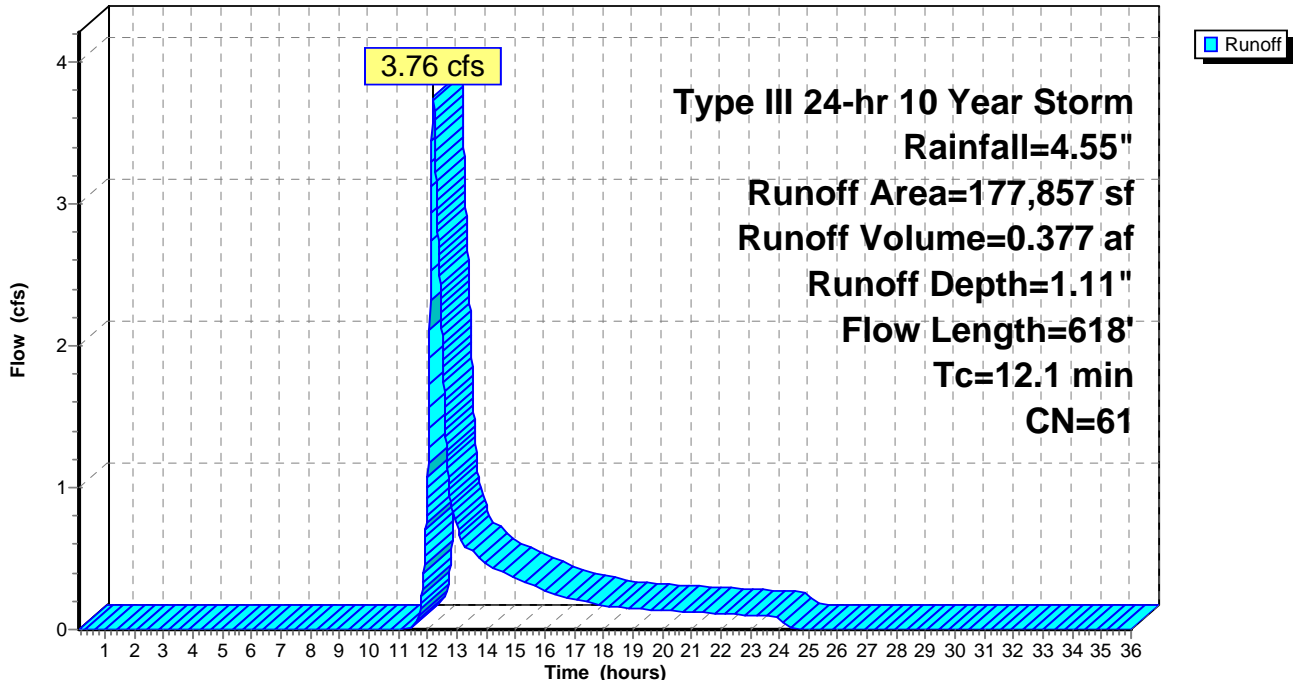
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

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 = 1.55 cfs @ 12.08 hrs, Volume= 0.118 af, Depth= 3.86"

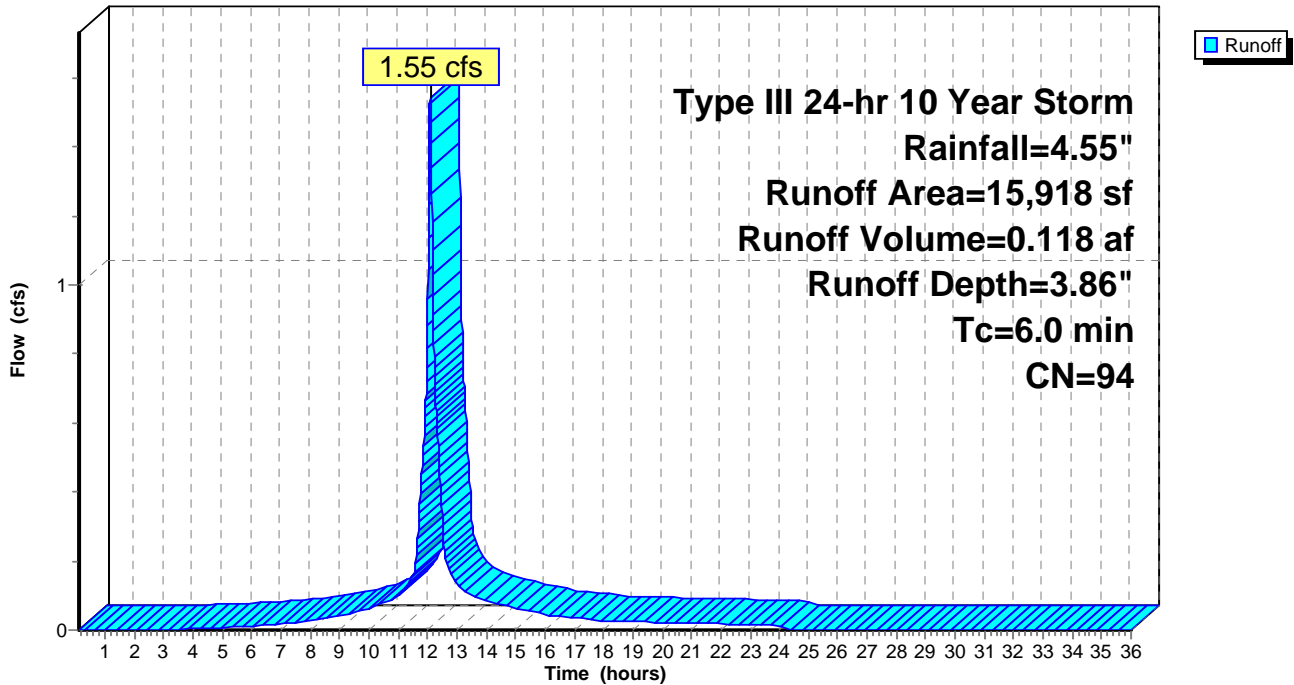
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

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
6.0					Direct Entry,

Subcatchment 4-P:

Hydrograph



Subcatchment 5-P:

Runoff = 3.26 cfs @ 12.09 hrs, Volume= 0.240 af, Depth= 1.64"

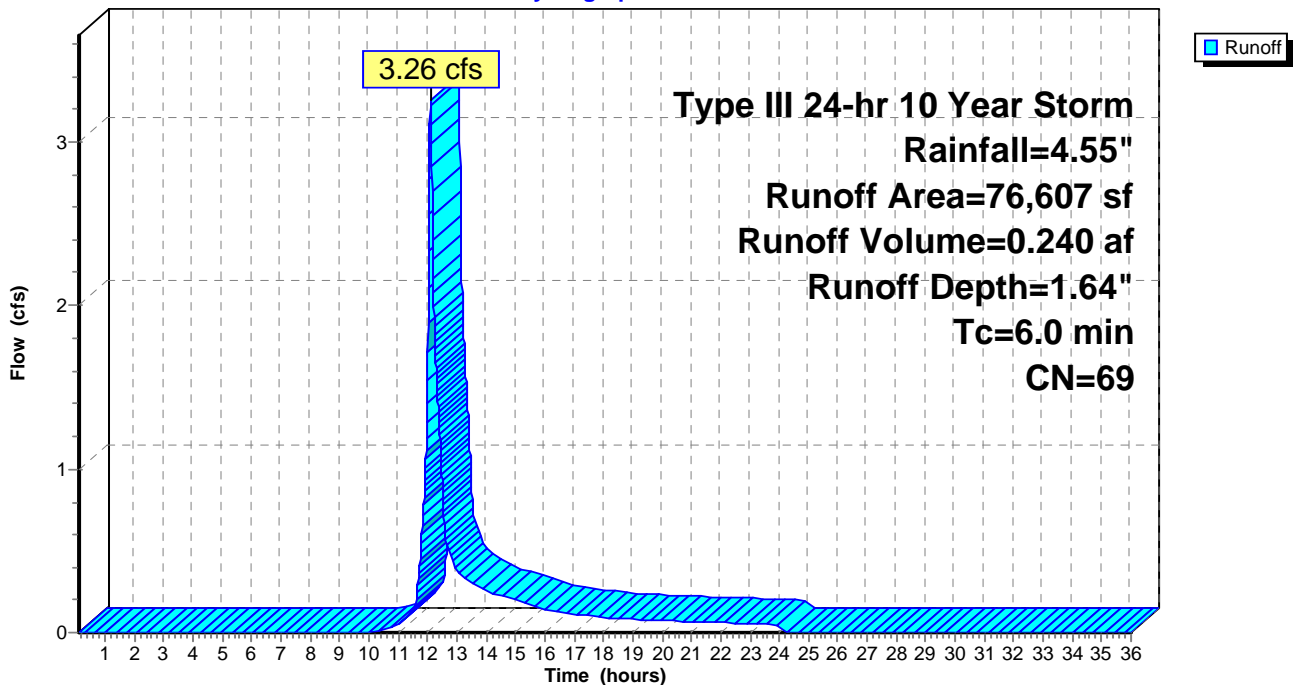
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

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
6.0					Direct Entry,

Subcatchment 5-P:

Hydrograph



Subcatchment 6-P:

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

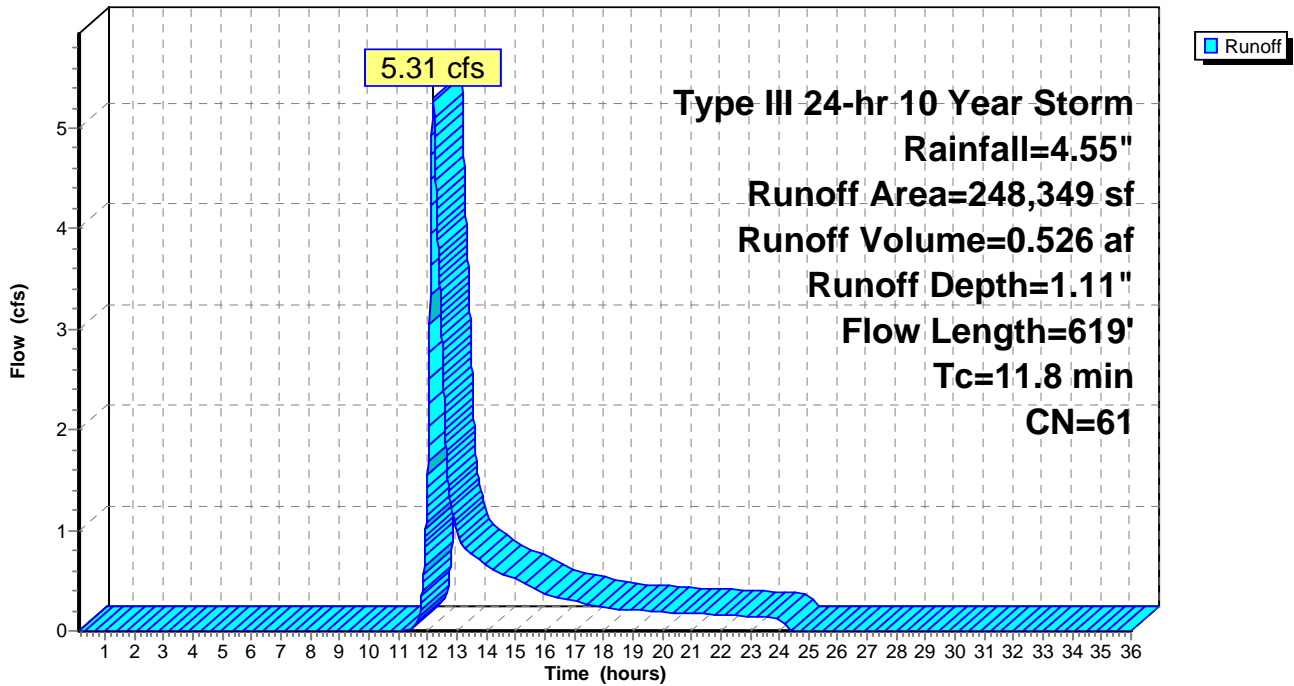
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.55"

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



Reach 1R: DMH-7 to SC-2

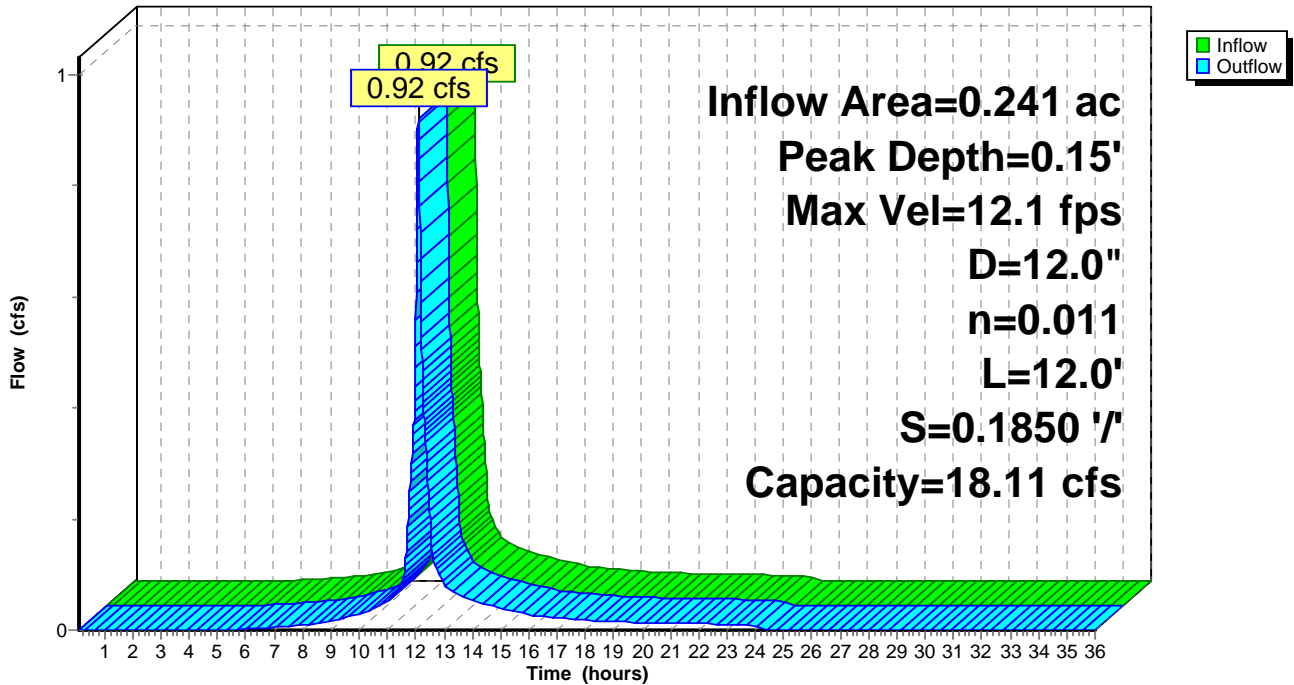
Inflow Area = 0.241 ac, Inflow Depth = 3.34" for 10 Year Storm event
 Inflow = 0.92 cfs @ 12.09 hrs, Volume= 0.067 af
 Outflow = 0.92 cfs @ 12.09 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 12.1 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 4.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.15' @ 12.09 hrs
 Capacity at bank full= 18.11 cfs
 Inlet Invert= 224.00', Outlet Invert= 221.78'
 12.0" Diameter Pipe n= 0.011 Length= 12.0' Slope= 0.1850 '/'

Reach 1R: DMH-7 to SC-2

Hydrograph



Reach 2R: CB-7 TO DMH-6

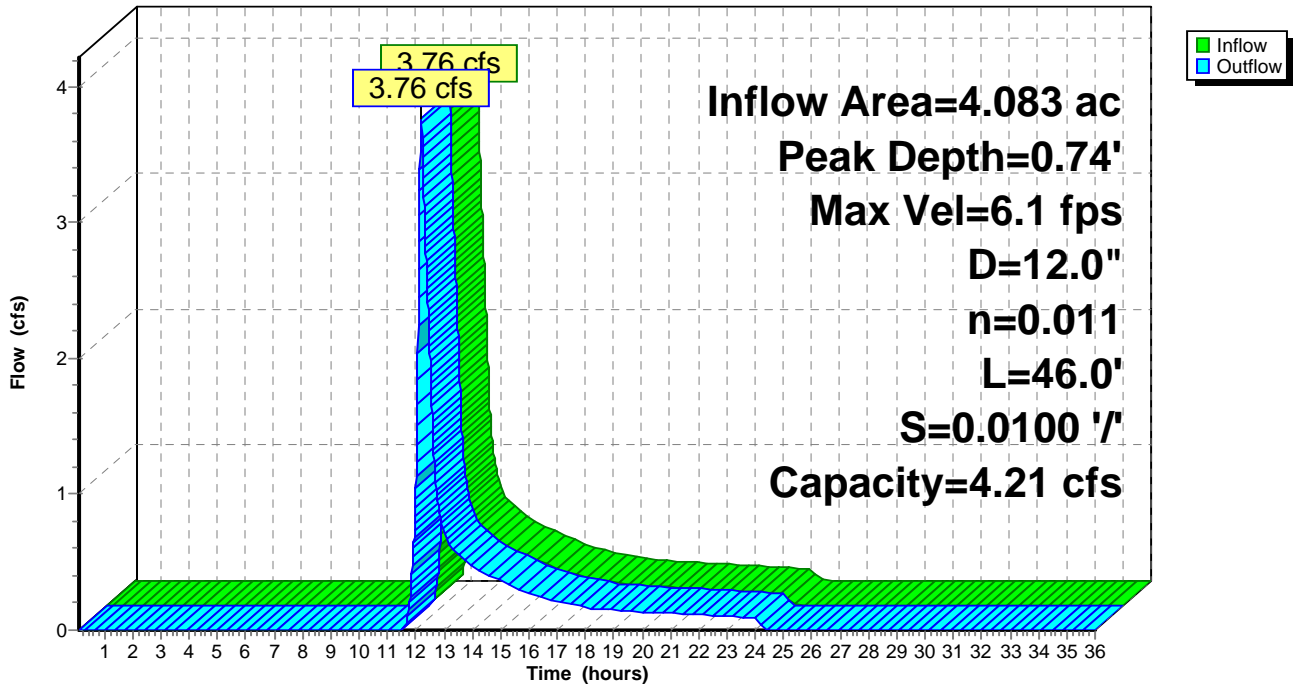
Inflow Area = 4.083 ac, Inflow Depth = 1.11" for 10 Year Storm event
 Inflow = 3.76 cfs @ 12.19 hrs, Volume= 0.377 af
 Outflow = 3.76 cfs @ 12.19 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.1 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 2.8 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.74' @ 12.19 hrs
 Capacity at bank full= 4.21 cfs
 Inlet Invert= 223.32', Outlet Invert= 222.86'
 12.0" Diameter Pipe n= 0.011 Length= 46.0' Slope= 0.0100 '/'

Reach 2R: CB-7 TO DMH-6

Hydrograph



Reach 3R: DMH-6 TO SC-2

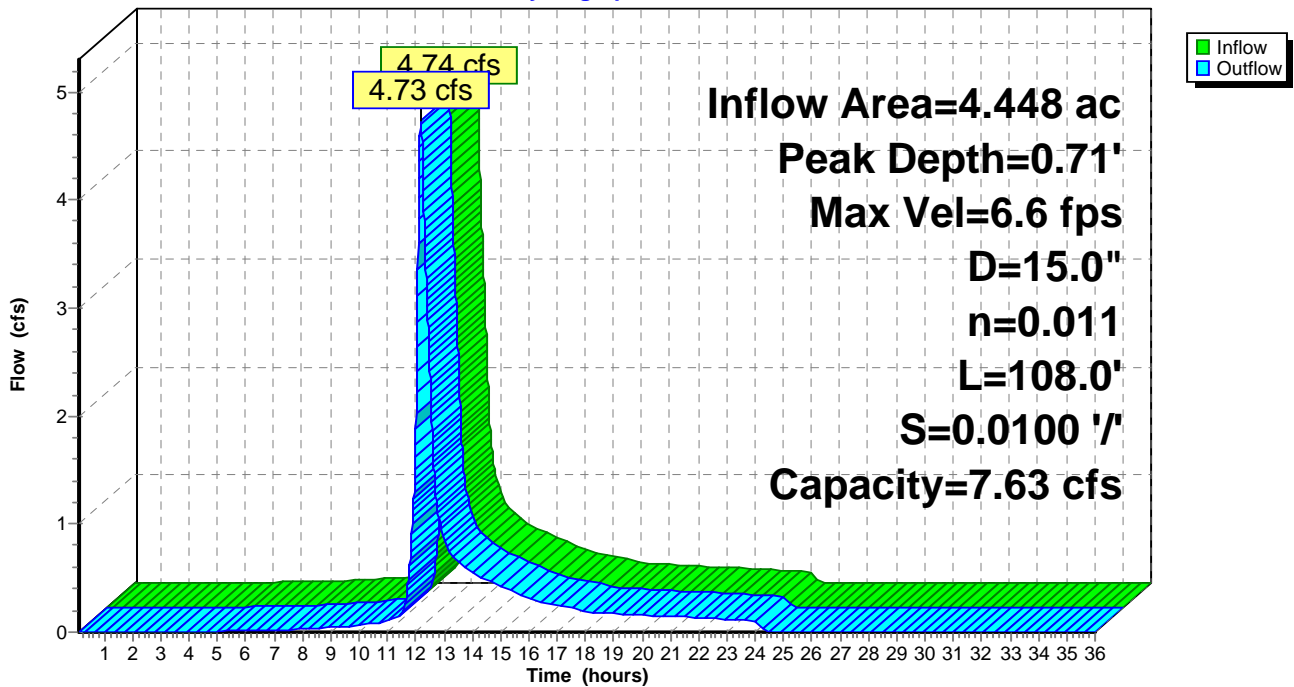
Inflow Area = 4.448 ac, Inflow Depth = 1.33" for 10 Year Storm event
 Inflow = 4.74 cfs @ 12.17 hrs, Volume= 0.494 af
 Outflow = 4.73 cfs @ 12.17 hrs, Volume= 0.494 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.6 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.3 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.71' @ 12.17 hrs
 Capacity at bank full= 7.63 cfs
 Inlet Invert= 222.86', Outlet Invert= 221.78'
 15.0" Diameter Pipe n= 0.011 Length= 108.0' Slope= 0.0100 '/'

Reach 3R: DMH-6 TO SC-2

Hydrograph



Pond 1P: Infiltration Field #1

Inflow Area = 0.418 ac, Inflow Depth = 3.44" for 10 Year Storm event
 Inflow = 1.64 cfs @ 12.09 hrs, Volume= 0.120 af
 Outflow = 0.12 cfs @ 13.39 hrs, Volume= 0.083 af, Atten= 93%, Lag= 78.0 min
 Discarded = 0.03 cfs @ 9.00 hrs, Volume= 0.070 af
 Primary = 0.09 cfs @ 13.39 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 245.02' @ 13.39 hrs Surf.Area= 1,268 sf Storage= 3,068 cf
 Plug-Flow detention time= 537.3 min calculated for 0.083 af (69% of inflow)
 Center-of-Mass det. time= 443.6 min (1,237.5 - 794.0)

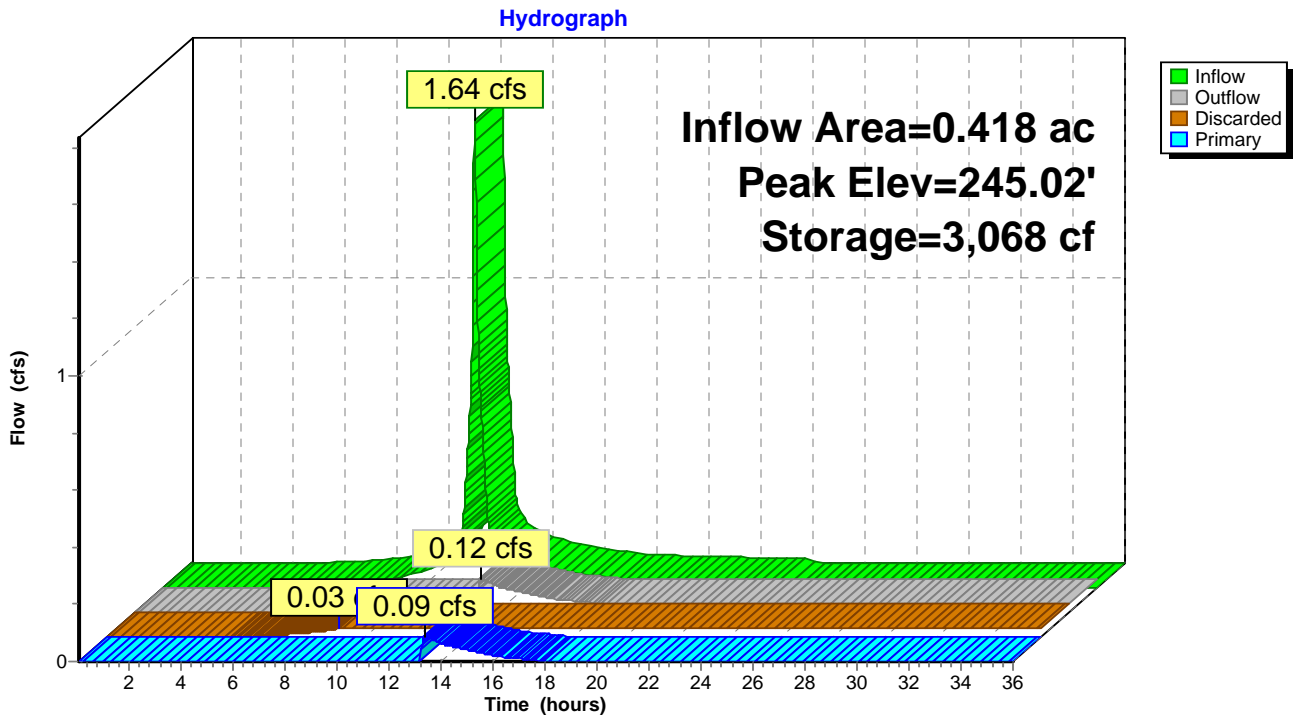
#	Invert	Avail.Storage	Storage Description
1	240.95'	1,634 cf	19.82'W x 64.00'L x 4.54'H Prismatic 5,759 cf Overall - 1,673 cf Embedded = 4,086 cf x 40.0% Voids
2	242.45'	1,673 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,307 cf	Total Available Storage

#	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 @ 9.00 hrs HW=241.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.06 cfs @ 13.39 hrs HW=245.02' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 0.06 cfs @ 0.4 fps)

Pond 1P: Infiltration Field #1



Pond 2P: Infiltration Field #2

Inflow Area = 4.689 ac, Inflow Depth = 1.44" for 10 Year Storm event
 Inflow = 5.38 cfs @ 12.15 hrs, Volume= 0.561 af
 Outflow = 3.15 cfs @ 12.43 hrs, Volume= 0.458 af, Atten= 41%, Lag= 16.6 min
 Discarded = 0.07 cfs @ 9.67 hrs, Volume= 0.171 af
 Primary = 3.08 cfs @ 12.43 hrs, Volume= 0.288 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 223.24' @ 12.43 hrs Surf.Area= 3,131 sf Storage= 7,881 cf
 Plug-Flow detention time= 278.0 min calculated for 0.458 af (82% of inflow)
 Center-of-Mass det. time= 199.5 min (1,052.3 - 852.8)

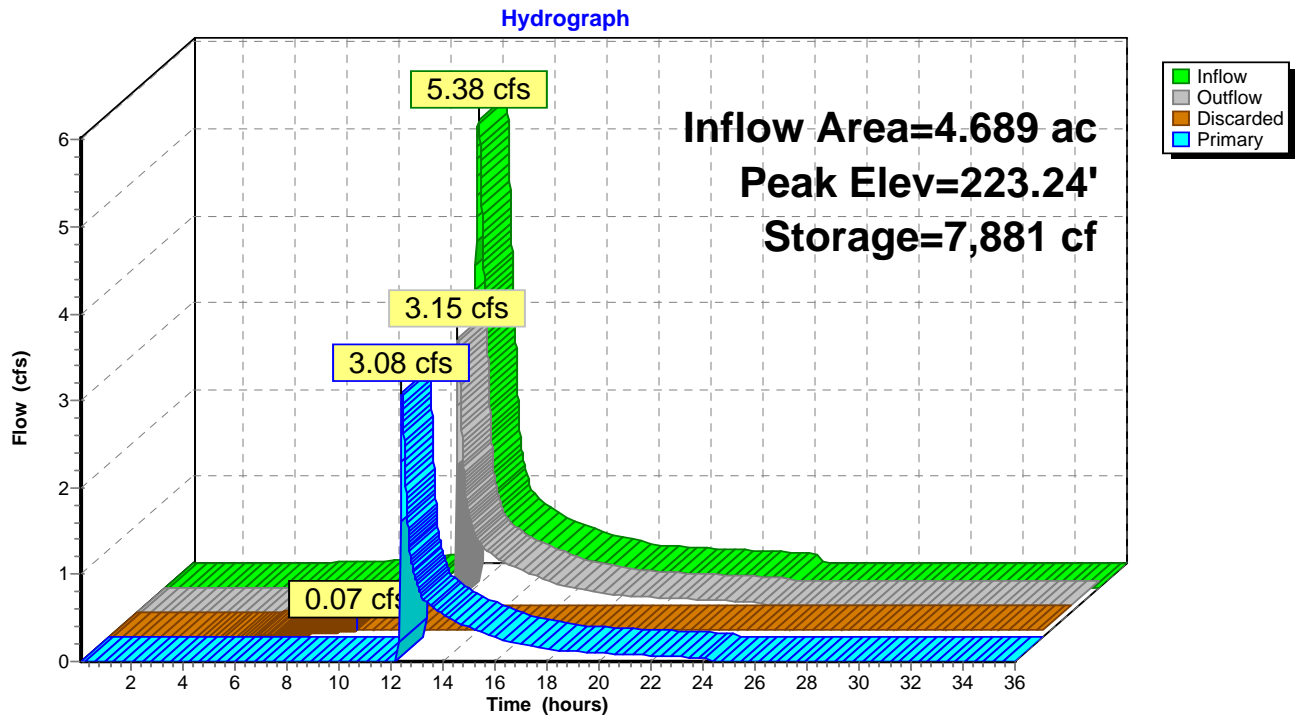
#	Invert	Avail.Storage	Storage Description
1	218.95'	4,012 cf	24.65'W x 127.00'L x 4.54'H Prismatic 14,213 cf Overall - 4,182 cf Embedded = 10,030 cf x 40.0% Voids
2	220.45'	4,182 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 90 Inside #1
		8,195 cf	Total Available Storage

#	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=0.07 cfs @ 9.67 hrs HW=219.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=3.07 cfs @ 12.43 hrs HW=223.24' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 3.07 cfs @ 1.6 fps)

Pond 2P: Infiltration Field #2



Pond 3P: Infiltration Field #3

Inflow Area = 1.759 ac, Inflow Depth = 1.64" for 10 Year Storm event
 Inflow = 3.26 cfs @ 12.09 hrs, Volume= 0.240 af
 Outflow = 0.17 cfs @ 15.53 hrs, Volume= 0.151 af, Atten= 95%, Lag= 206.0 min
 Discarded = 0.06 cfs @ 11.31 hrs, Volume= 0.135 af
 Primary = 0.10 cfs @ 15.53 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 226.02' @ 15.53 hrs Surf.Area= 2,785 sf Storage= 6,767 cf
 Plug-Flow detention time= 623.4 min calculated for 0.151 af (63% of inflow)
 Center-of-Mass det. time= 509.3 min (1,364.9 - 855.6)

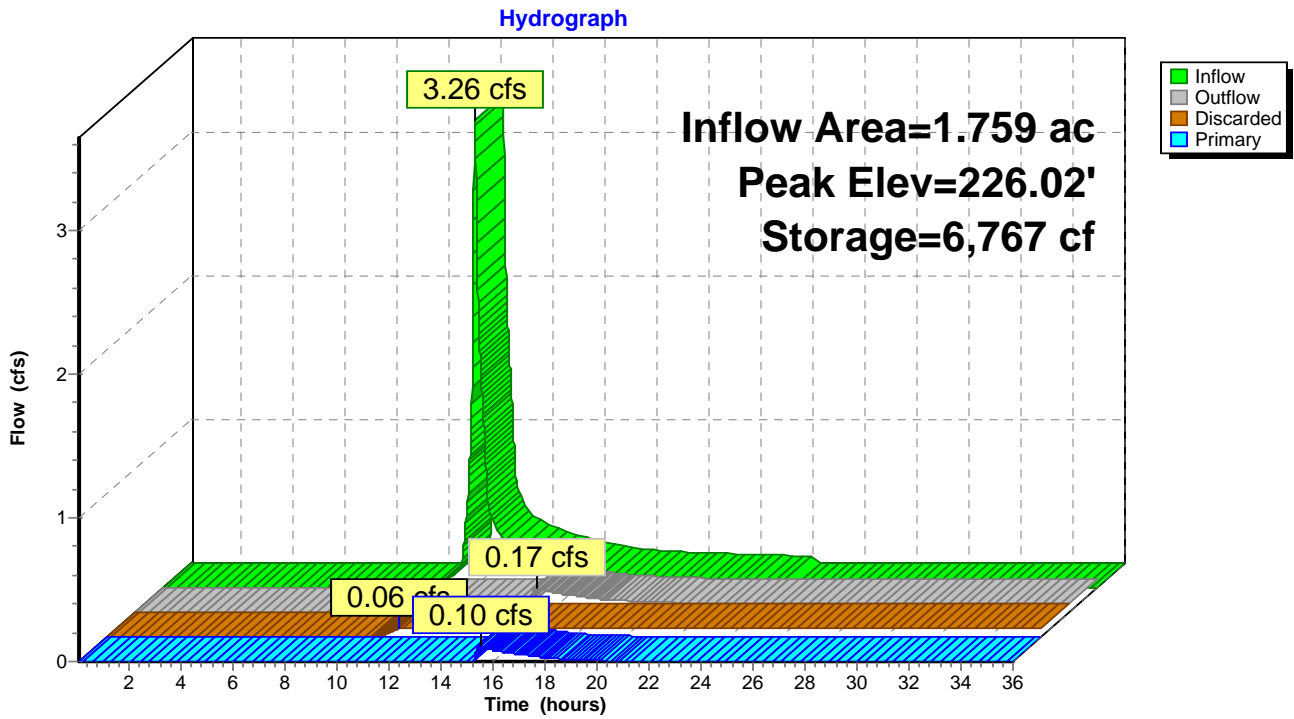
#	Invert	Avail.Storage	Storage Description
1	221.95'	3,571 cf	24.65'W x 113.00'L x 4.54'H Prismatic 12,646 cf Overall - 3,718 cf Embedded = 8,928 cf x 40.0% Voids
2	223.46'	3,718 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 80 Inside #1
		7,289 cf	Total Available Storage

#	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=0.06 cfs @ 11.31 hrs HW=222.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.08 cfs @ 15.53 hrs HW=226.02' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 0.08 cfs @ 0.5 fps)

Pond 3P: Infiltration Field #3



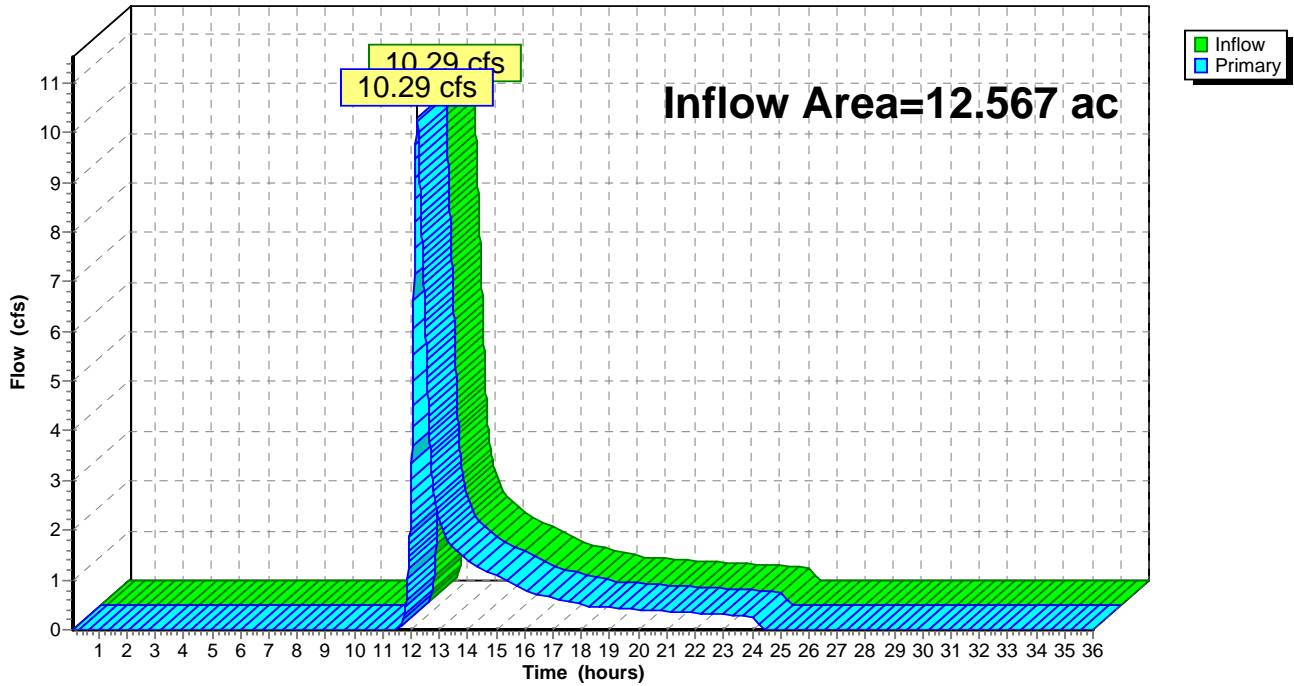
Link 1L: Total Offsite (Predevelopment)

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



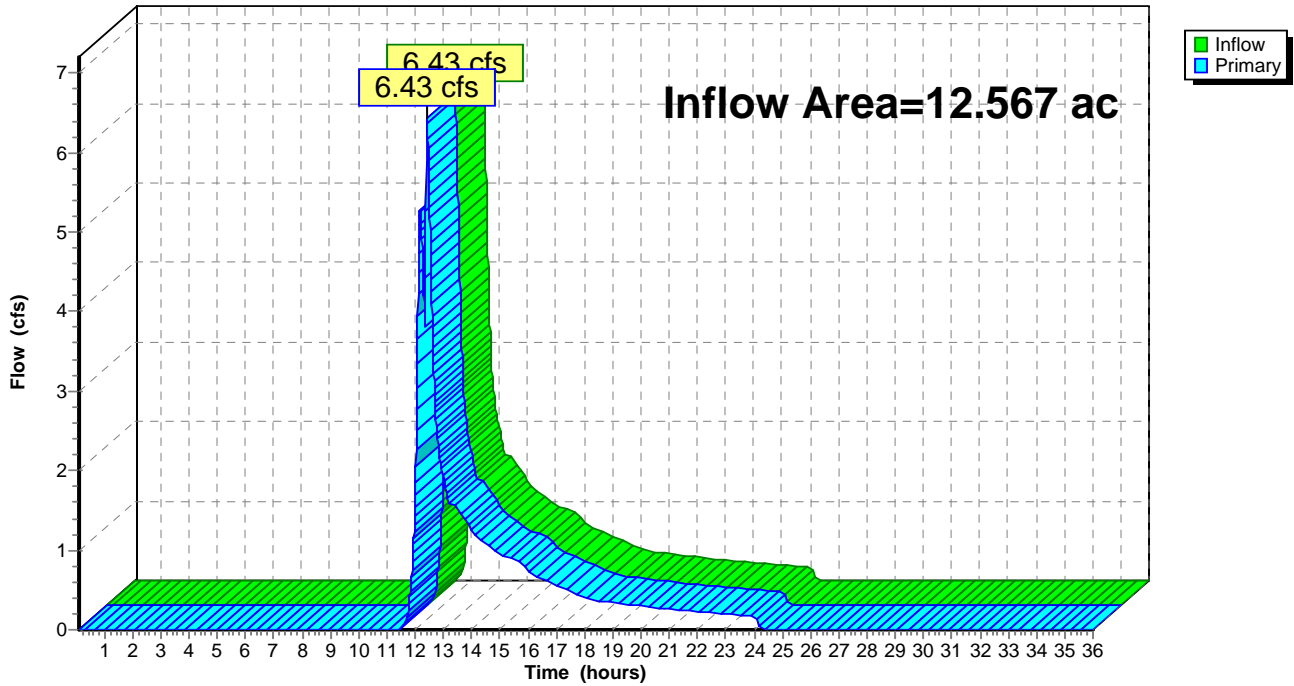
Link 2L: Total Offsite (Postdevelopment)

Inflow Area = 12.567 ac, Inflow Depth = 0.81" for 10 Year Storm event
Inflow = 6.43 cfs @ 12.42 hrs, Volume= 0.843 af
Primary = 6.43 cfs @ 12.42 hrs, Volume= 0.843 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"
Tc=6.0 min CN=90 Runoff=2.48 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"
Tc=6.0 min CN=89 Runoff=1.41 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"
Tc=6.0 min CN=94 Runoff=2.27 cfs 0.176 af

Subcatchment 5-P: Runoff Area=76,607 sf Runoff Depth=3.11"
Tc=6.0 min CN=69 Runoff=6.39 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

Reach 1R: DMH-7 to SC-2 Peak Depth=0.19' Max Vel=13.7 fps Inflow=1.41 cfs 0.105 af
D=12.0" n=0.011 L=12.0' S=0.1850 '/' Capacity=18.11 cfs Outflow=1.41 cfs 0.105 af

Reach 2R: CB-7 TO DMH-6 Peak Depth=1.00' Max Vel=6.1 fps Inflow=8.85 cfs 0.799 af
D=12.0" n=0.011 L=46.0' S=0.0100 '/' Capacity=4.21 cfs Outflow=4.34 cfs 0.799 af

Reach 3R: DMH-6 TO SC-2 Peak Depth=0.88' Max Vel=7.0 fps Inflow=6.48 cfs 0.975 af
D=15.0" n=0.011 L=108.0' S=0.0100 '/' Capacity=7.63 cfs Outflow=6.47 cfs 0.975 af

Pond 1P: Infiltration Field #1 Peak Elev=245.16' Storage=3,142 cf Inflow=2.48 cfs 0.186 af
Discarded=0.03 cfs 0.073 af Primary=1.74 cfs 0.072 af Outflow=1.77 cfs 0.145 af

Pond 2P: Infiltration Field #2 Peak Elev=223.42' Storage=8,111 cf Inflow=7.88 cfs 1.080 af
Discarded=0.07 cfs 0.179 af Primary=7.21 cfs 0.797 af Outflow=7.29 cfs 0.976 af

Pond 3P: Infiltration Field #3 Peak Elev=226.24' Storage=7,010 cf Inflow=6.39 cfs 0.456 af
Discarded=0.06 cfs 0.141 af Primary=3.07 cfs 0.223 af Outflow=3.14 cfs 0.365 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=21.17 cfs 2.208 af
Primary=21.17 cfs 2.208 af

Definitive_Jan 2017

Type III 24-hr 100 Year Storm Rainfall=6.50"

Prepared by {enter your company name here}

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1/17/2017

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

Subcatchment 1-P:

Runoff = 2.48 cfs @ 12.08 hrs, Volume= 0.186 af, Depth= 5.33"

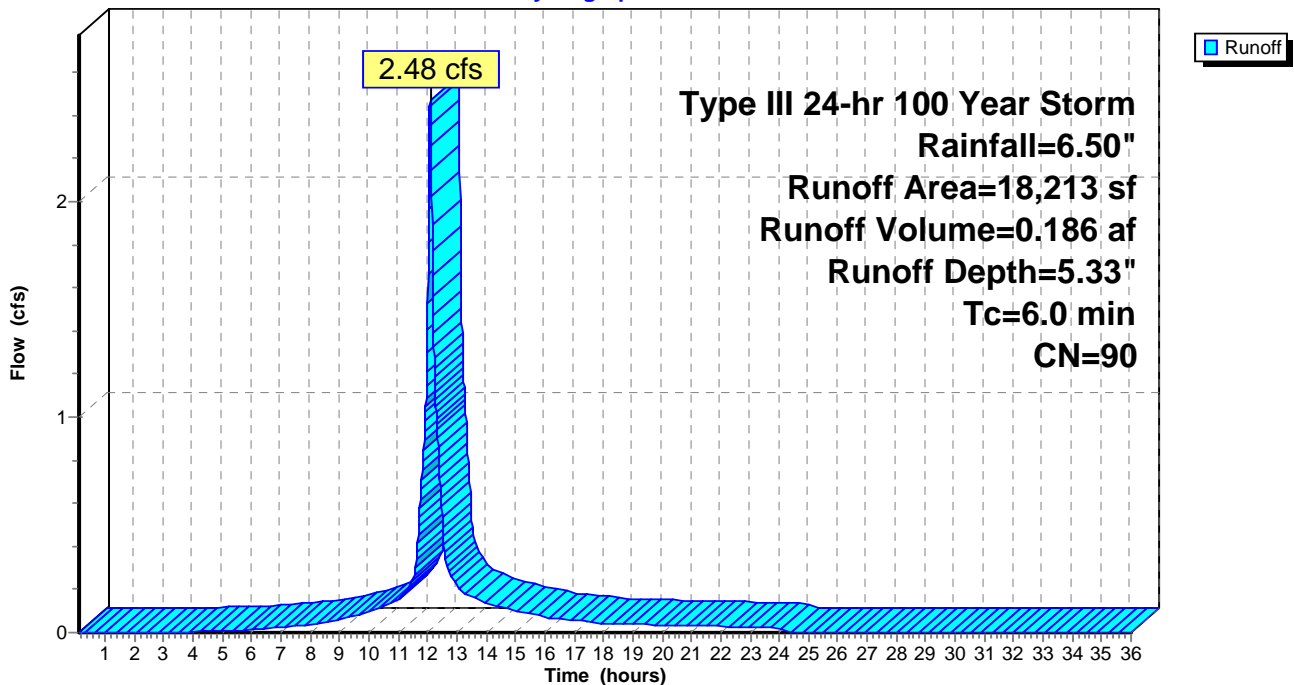
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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
6.0					Direct Entry,

Subcatchment 1-P:

Hydrograph



Subcatchment 1S: Predevelopment Watershed

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

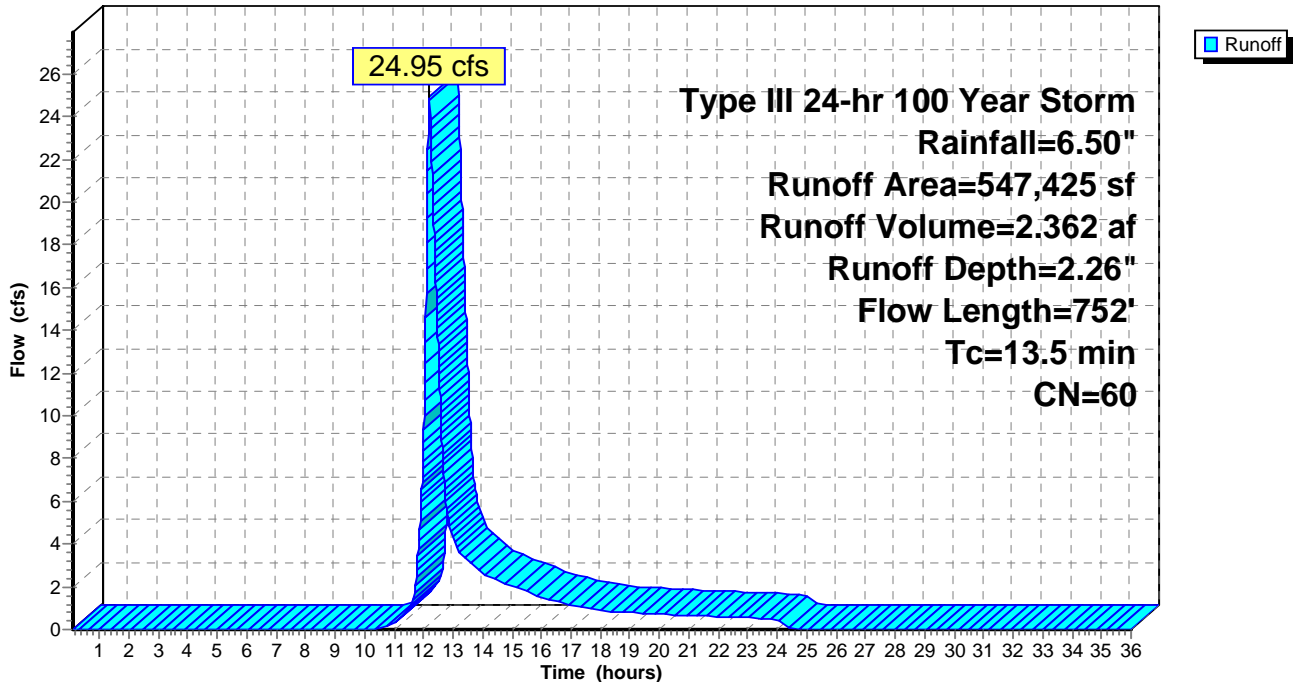
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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 = 1.41 cfs @ 12.08 hrs, Volume= 0.105 af, Depth= 5.22"

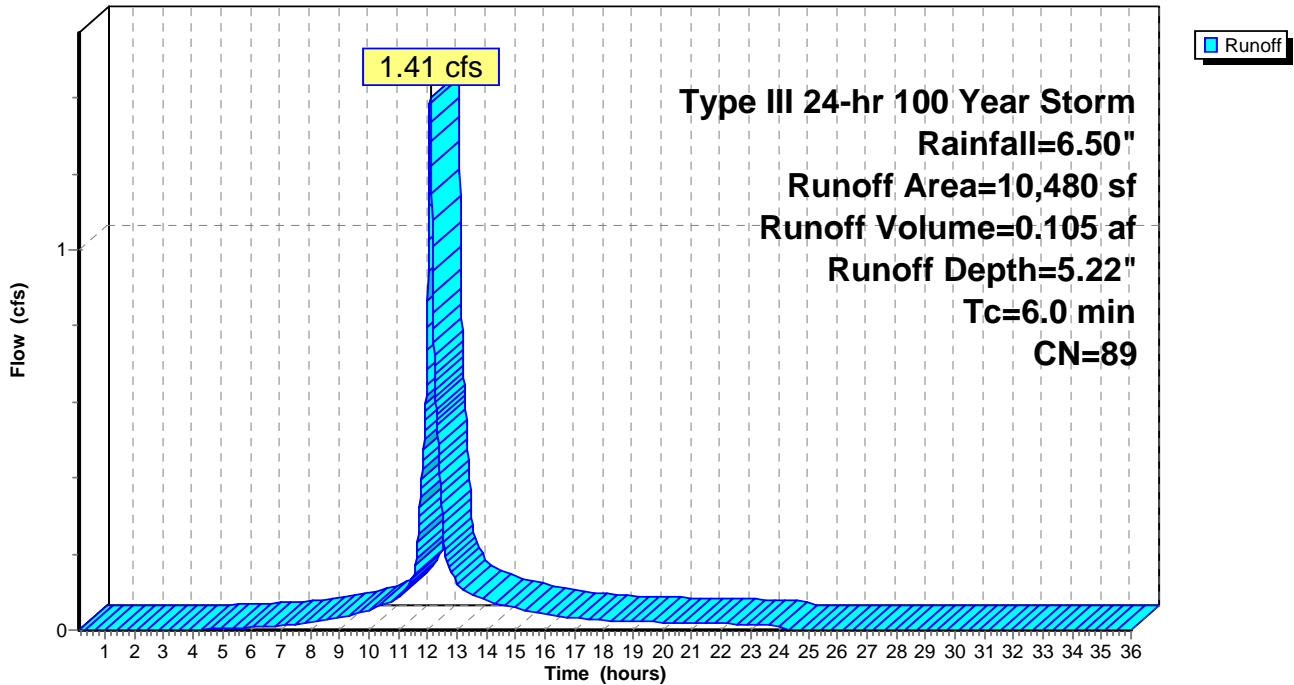
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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
6.0					Direct Entry,

Subcatchment 2-P:

Hydrograph



Subcatchment 3-P:

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

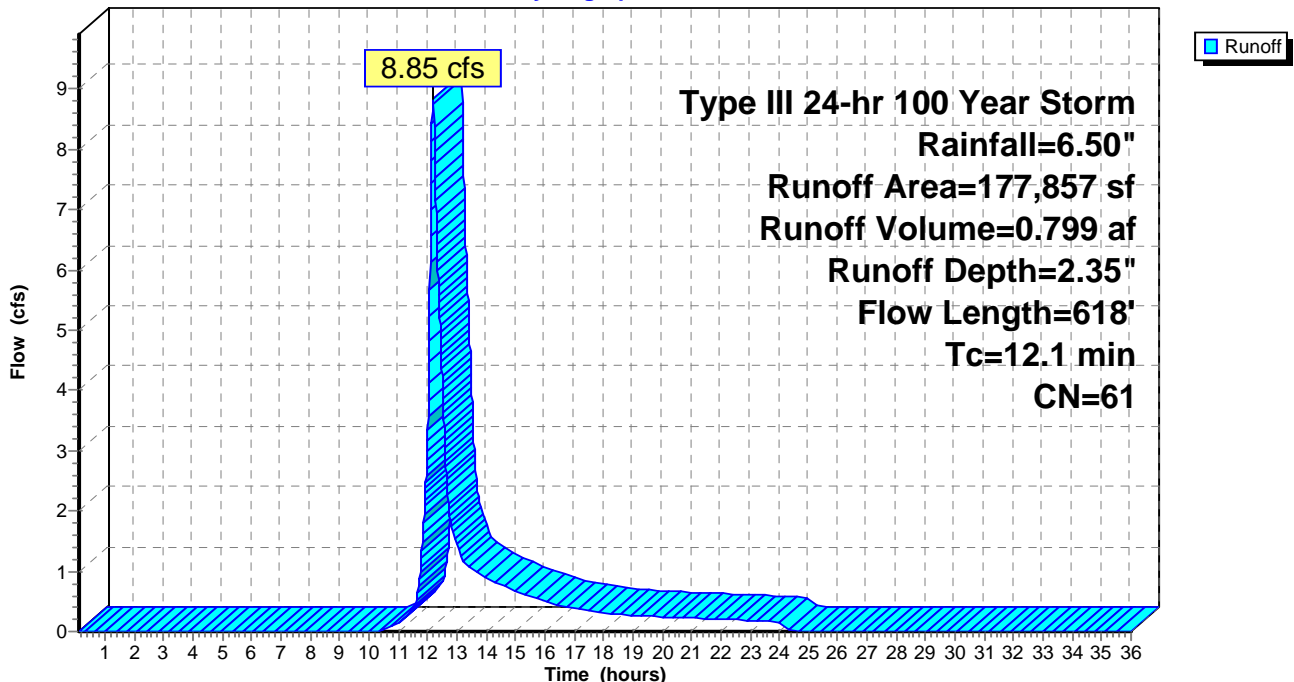
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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 = 2.27 cfs @ 12.08 hrs, Volume= 0.176 af, Depth= 5.79"

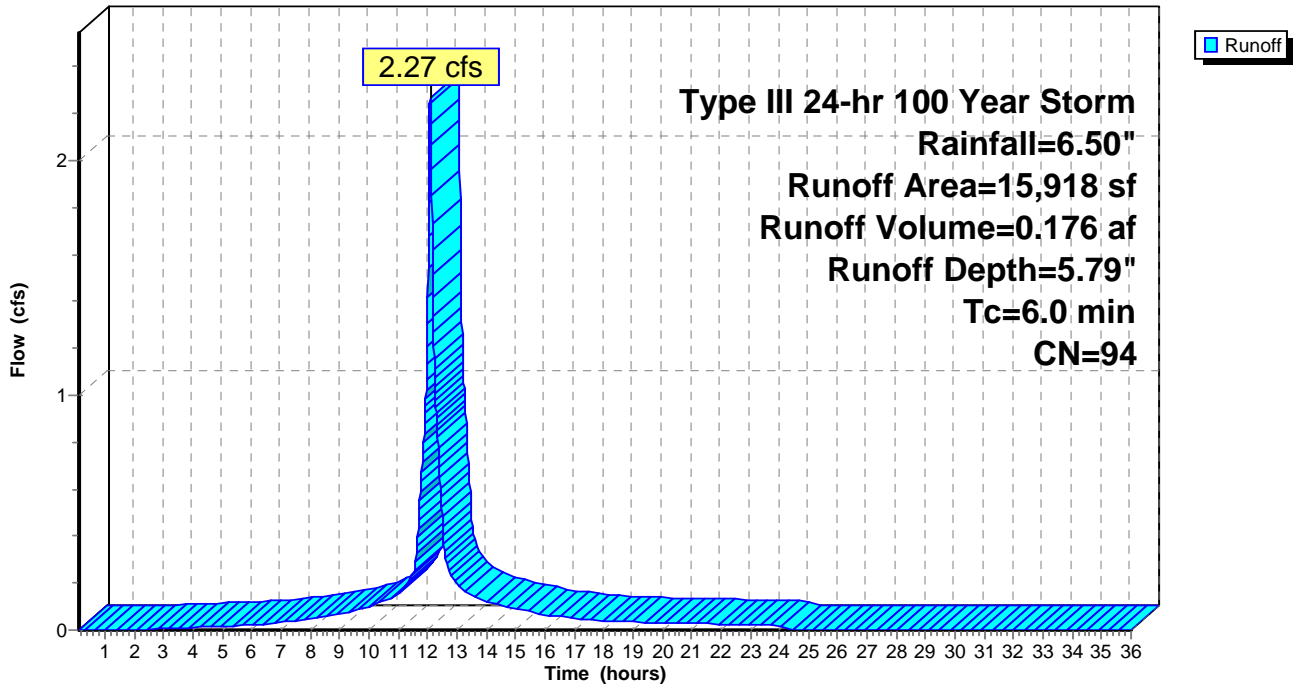
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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
6.0					Direct Entry,

Subcatchment 4-P:

Hydrograph



Subcatchment 5-P:

Runoff = 6.39 cfs @ 12.09 hrs, Volume= 0.456 af, Depth= 3.11"

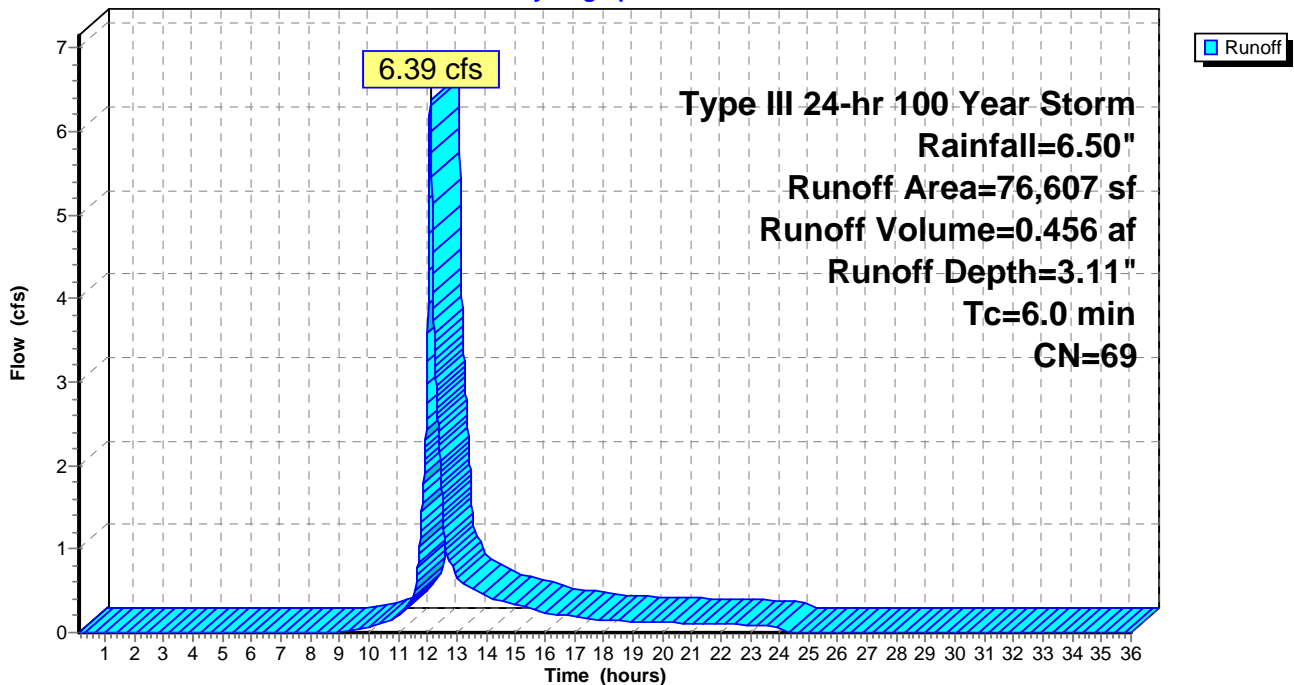
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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
6.0					Direct Entry,

Subcatchment 5-P:

Hydrograph



Subcatchment 6-P:

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

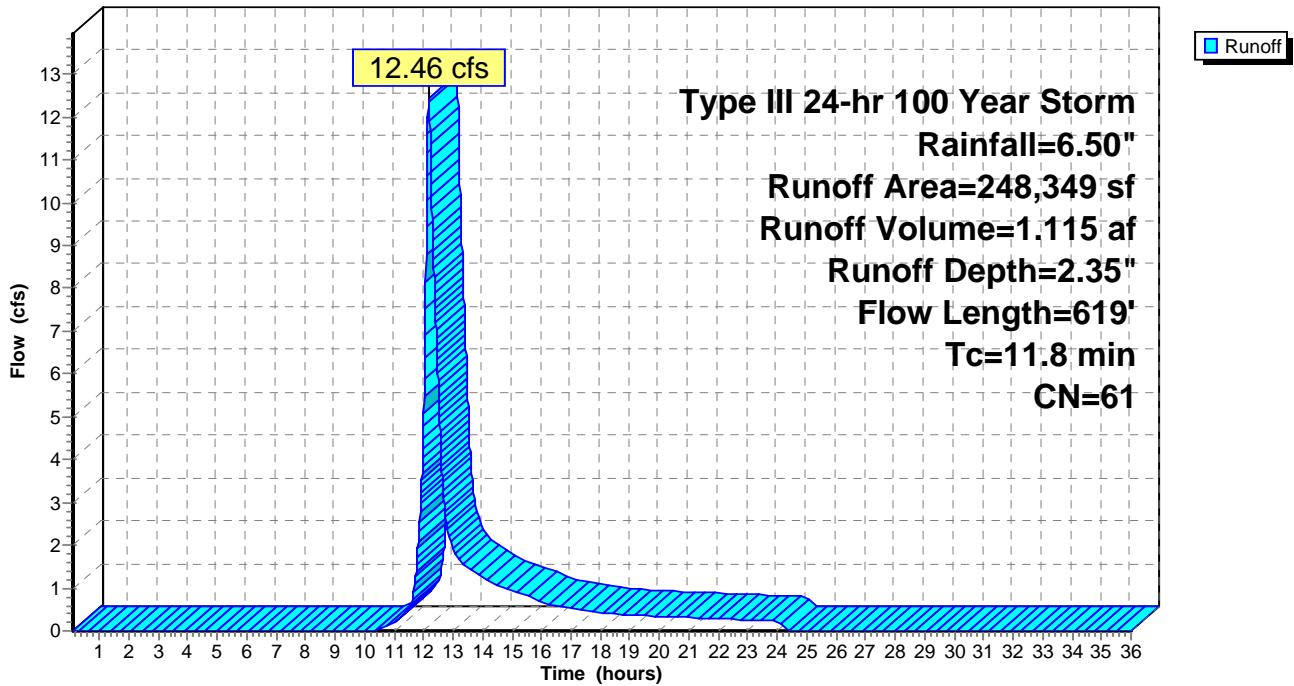
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Year Storm Rainfall=6.50"

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



Reach 1R: DMH-7 to SC-2

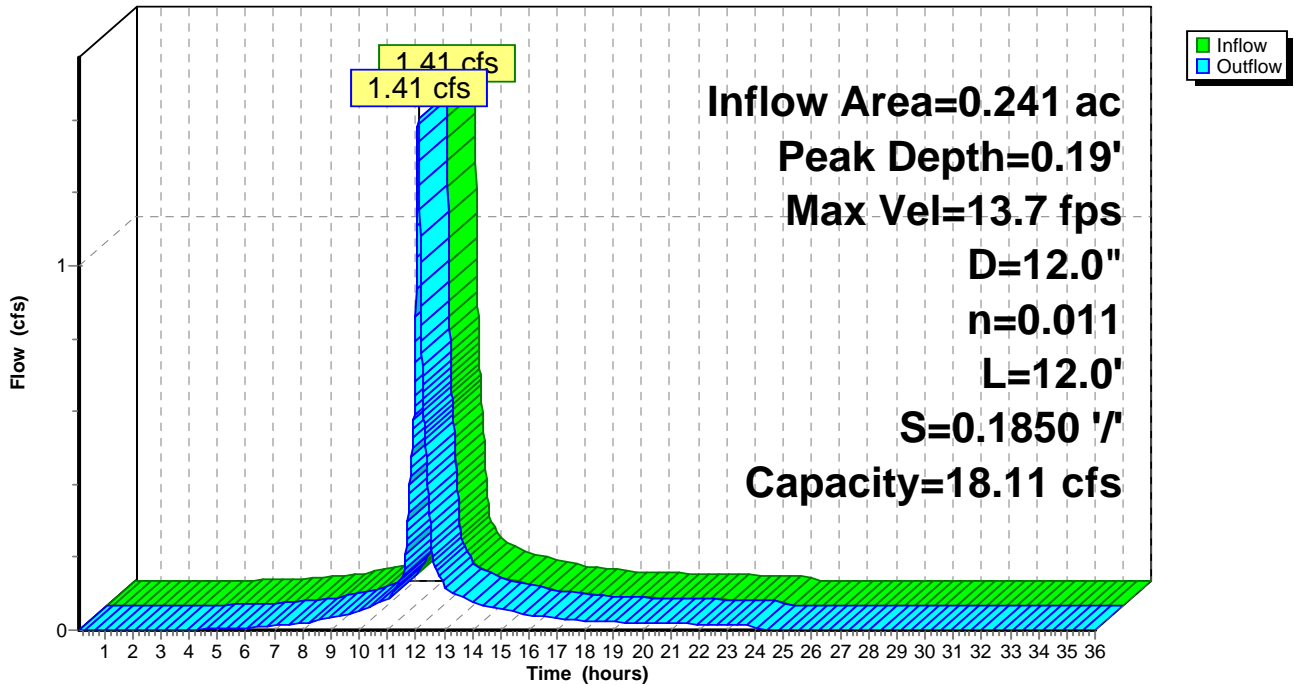
Inflow Area = 0.241 ac, Inflow Depth = 5.22" for 100 Year Storm event
 Inflow = 1.41 cfs @ 12.08 hrs, Volume= 0.105 af
 Outflow = 1.41 cfs @ 12.09 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 13.7 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 4.5 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.19' @ 12.08 hrs
 Capacity at bank full= 18.11 cfs
 Inlet Invert= 224.00', Outlet Invert= 221.78'
 12.0" Diameter Pipe n= 0.011 Length= 12.0' Slope= 0.1850 '/'

Reach 1R: DMH-7 to SC-2

Hydrograph



Reach 2R: CB-7 TO DMH-6

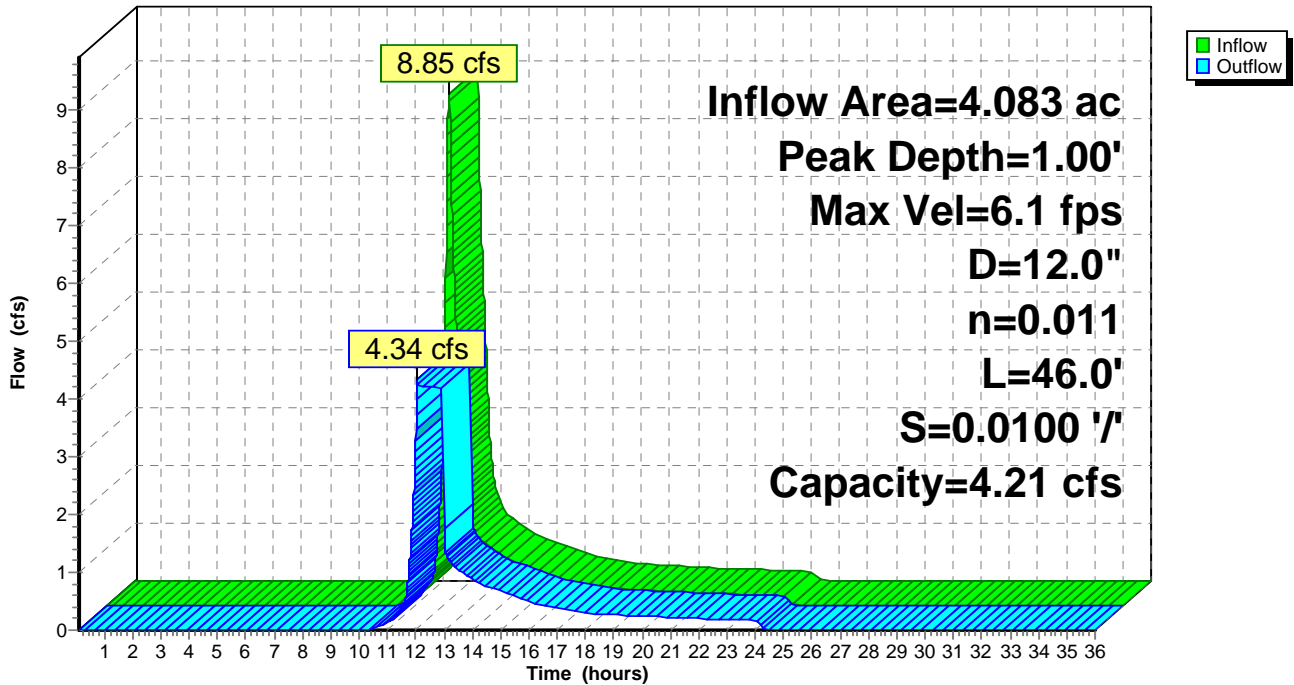
Inflow Area = 4.083 ac, Inflow Depth = 2.35" for 100 Year Storm event
 Inflow = 8.85 cfs @ 12.17 hrs, Volume= 0.799 af
 Outflow = 4.34 cfs @ 12.04 hrs, Volume= 0.799 af, Atten= 51%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.1 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.3 fps, Avg. Travel Time= 0.2 min

Peak Depth= 1.00' @ 12.05 hrs
 Capacity at bank full= 4.21 cfs
 Inlet Invert= 223.32', Outlet Invert= 222.86'
 12.0" Diameter Pipe n= 0.011 Length= 46.0' Slope= 0.0100 '/'

Reach 2R: CB-7 TO DMH-6

Hydrograph



Reach 3R: DMH-6 TO SC-2

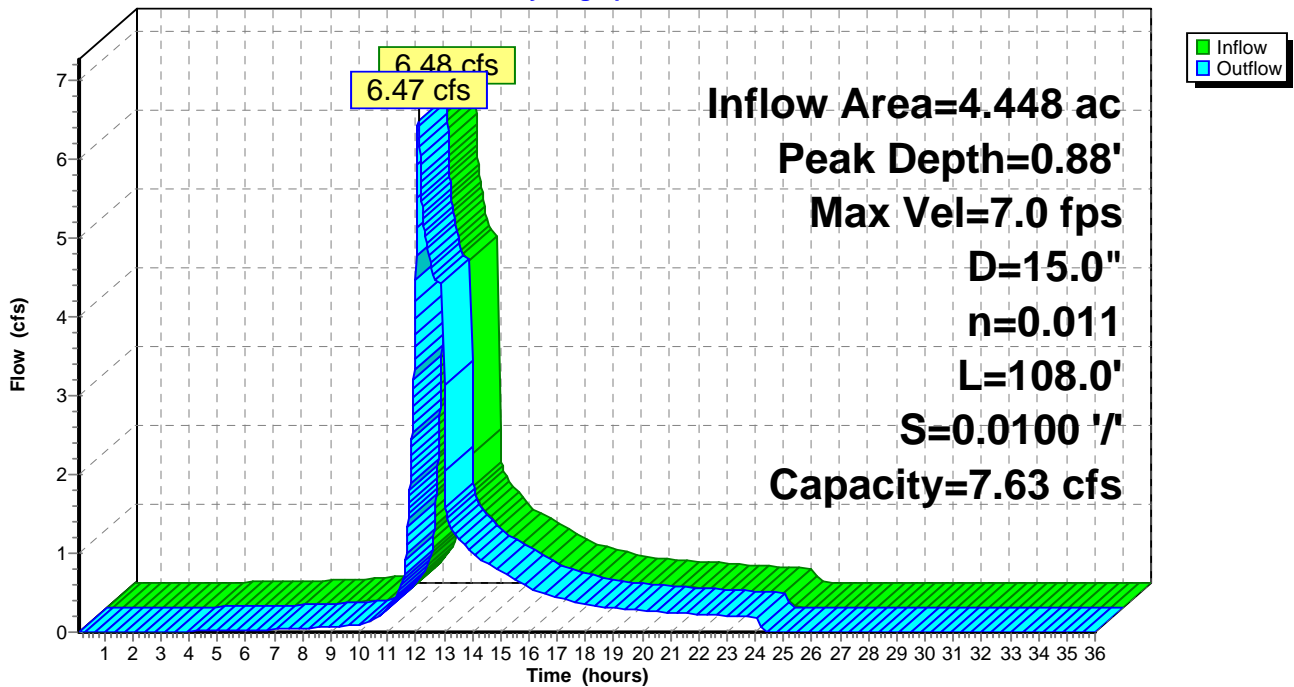
Inflow Area = 4.448 ac, Inflow Depth = 2.63" for 100 Year Storm event
 Inflow = 6.48 cfs @ 12.08 hrs, Volume= 0.975 af
 Outflow = 6.47 cfs @ 12.09 hrs, Volume= 0.975 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.0 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.7 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.88' @ 12.09 hrs
 Capacity at bank full= 7.63 cfs
 Inlet Invert= 222.86', Outlet Invert= 221.78'
 15.0" Diameter Pipe n= 0.011 Length= 108.0' Slope= 0.0100 1/

Reach 3R: DMH-6 TO SC-2

Hydrograph



Pond 1P: Infiltration Field #1

Inflow Area = 0.418 ac, Inflow Depth = 5.33" for 100 Year Storm event
 Inflow = 2.48 cfs @ 12.08 hrs, Volume= 0.186 af
 Outflow = 1.77 cfs @ 12.16 hrs, Volume= 0.145 af, Atten= 29%, Lag= 4.8 min
 Discarded = 0.03 cfs @ 7.68 hrs, Volume= 0.073 af
 Primary = 1.74 cfs @ 12.16 hrs, Volume= 0.072 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 245.16' @ 12.16 hrs Surf.Area= 1,268 sf Storage= 3,142 cf
 Plug-Flow detention time= 332.2 min calculated for 0.145 af (78% of inflow)
 Center-of-Mass det. time= 253.6 min (1,035.8 - 782.2)

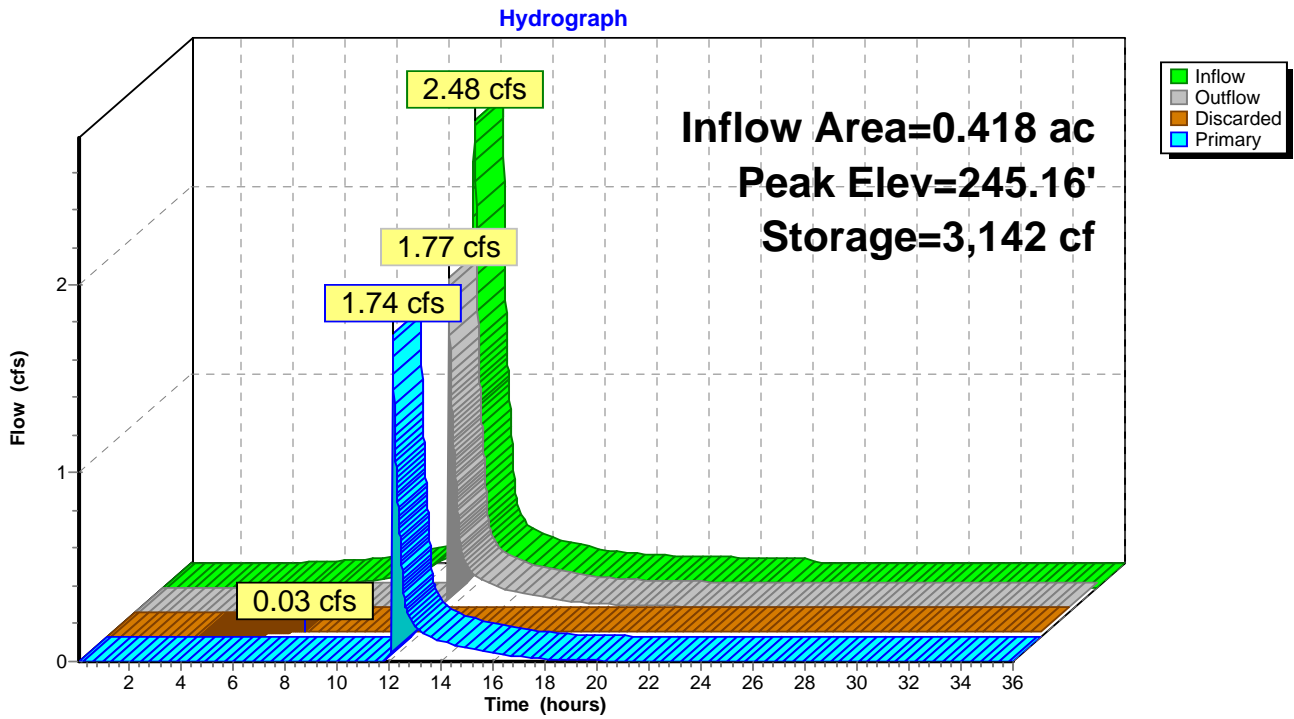
#	Invert	Avail.Storage	Storage Description
1	240.95'	1,634 cf	19.82'W x 64.00'L x 4.54'H Prismatic 5,759 cf Overall - 1,673 cf Embedded = 4,086 cf x 40.0% Voids
2	242.45'	1,673 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 36 Inside #1
		3,307 cf	Total Available Storage

#	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 @ 7.68 hrs HW=241.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.71 cfs @ 12.16 hrs HW=245.16' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 1.71 cfs @ 1.3 fps)

Pond 1P: Infiltration Field #1



Pond 2P: Infiltration Field #2

Inflow Area = 4.689 ac, Inflow Depth = 2.76" for 100 Year Storm event
 Inflow = 7.88 cfs @ 12.09 hrs, Volume= 1.080 af
 Outflow = 7.29 cfs @ 12.14 hrs, Volume= 0.976 af, Atten= 8%, Lag= 3.2 min
 Discarded = 0.07 cfs @ 8.48 hrs, Volume= 0.179 af
 Primary = 7.21 cfs @ 12.14 hrs, Volume= 0.797 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 223.42' @ 12.14 hrs Surf.Area= 3,131 sf Storage= 8,111 cf
 Plug-Flow detention time= 144.7 min calculated for 0.976 af (90% of inflow)
 Center-of-Mass det. time= 97.4 min (939.5 - 842.1)

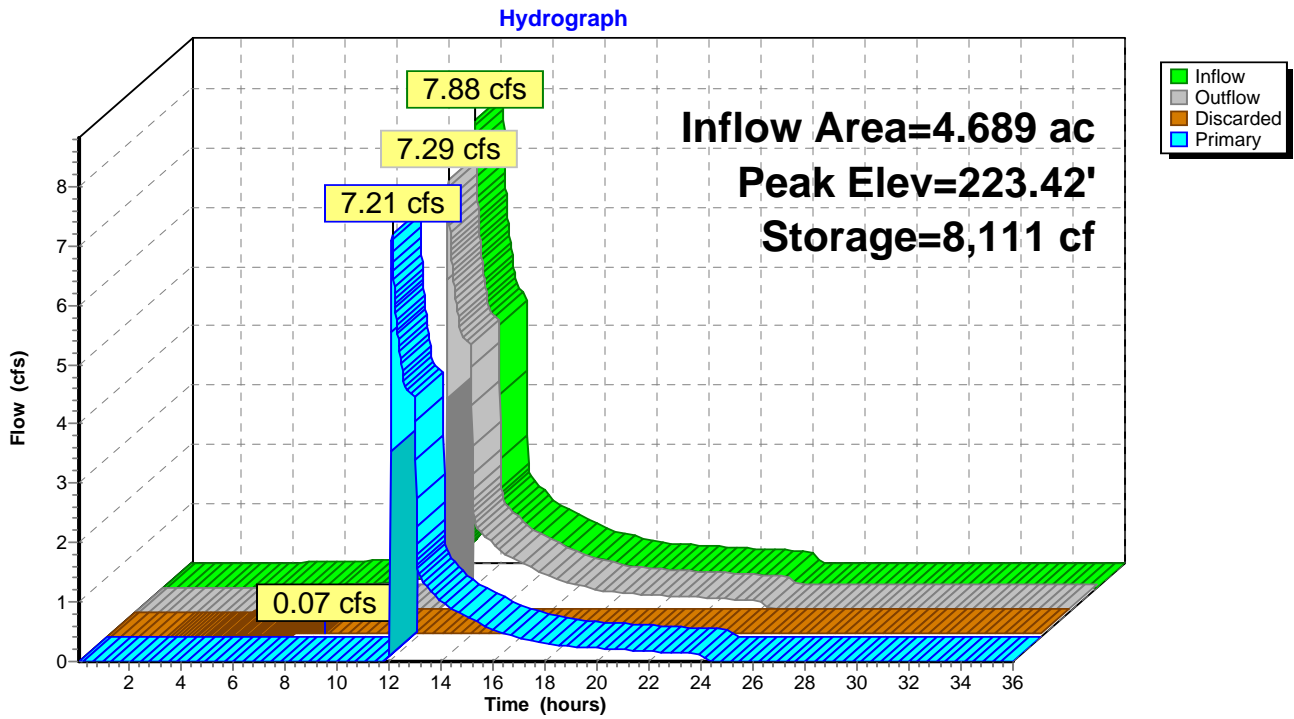
#	Invert	Avail.Storage	Storage Description
1	218.95'	4,012 cf	24.65'W x 127.00'L x 4.54'H Prismatic 14,213 cf Overall - 4,182 cf Embedded = 10,030 cf x 40.0% Voids
2	220.45'	4,182 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 90 Inside #1
		8,195 cf	Total Available Storage

#	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=0.07 cfs @ 8.48 hrs HW=219.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=7.19 cfs @ 12.14 hrs HW=223.42' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 7.19 cfs @ 2.1 fps)

Pond 2P: Infiltration Field #2



Pond 3P: Infiltration Field #3

Inflow Area = 1.759 ac, Inflow Depth = 3.11" for 100 Year Storm event
 Inflow = 6.39 cfs @ 12.09 hrs, Volume= 0.456 af
 Outflow = 3.14 cfs @ 12.27 hrs, Volume= 0.365 af, Atten= 51%, Lag= 10.6 min
 Discarded = 0.06 cfs @ 10.18 hrs, Volume= 0.141 af
 Primary = 3.07 cfs @ 12.27 hrs, Volume= 0.223 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 226.24' @ 12.27 hrs Surf.Area= 2,785 sf Storage= 7,010 cf
 Plug-Flow detention time= 301.6 min calculated for 0.365 af (80% of inflow)
 Center-of-Mass det. time= 223.0 min (1,059.6 - 836.6)

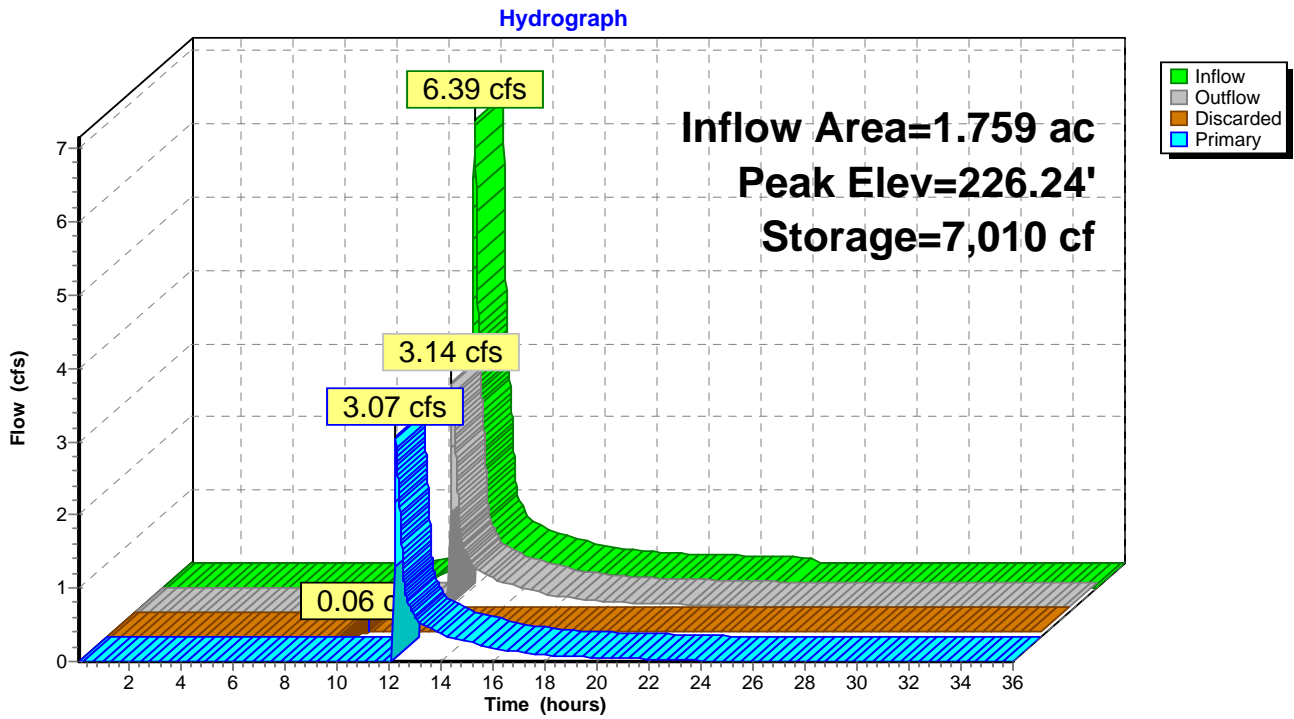
#	Invert	Avail.Storage	Storage Description
1	221.95'	3,571 cf	24.65'W x 113.00'L x 4.54'H Prismatic 12,646 cf Overall - 3,718 cf Embedded = 8,928 cf x 40.0% Voids
2	223.46'	3,718 cf	47.8"W x 30.0"H x 7.00'L Parabolic Arch x 80 Inside #1
		7,289 cf	Total Available Storage

#	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=0.06 cfs @ 10.18 hrs HW=222.00' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=3.06 cfs @ 12.27 hrs HW=226.24' (Free Discharge)
 ↳2=Orifice/Grate (Weir Controls 3.06 cfs @ 1.6 fps)

Pond 3P: Infiltration Field #3



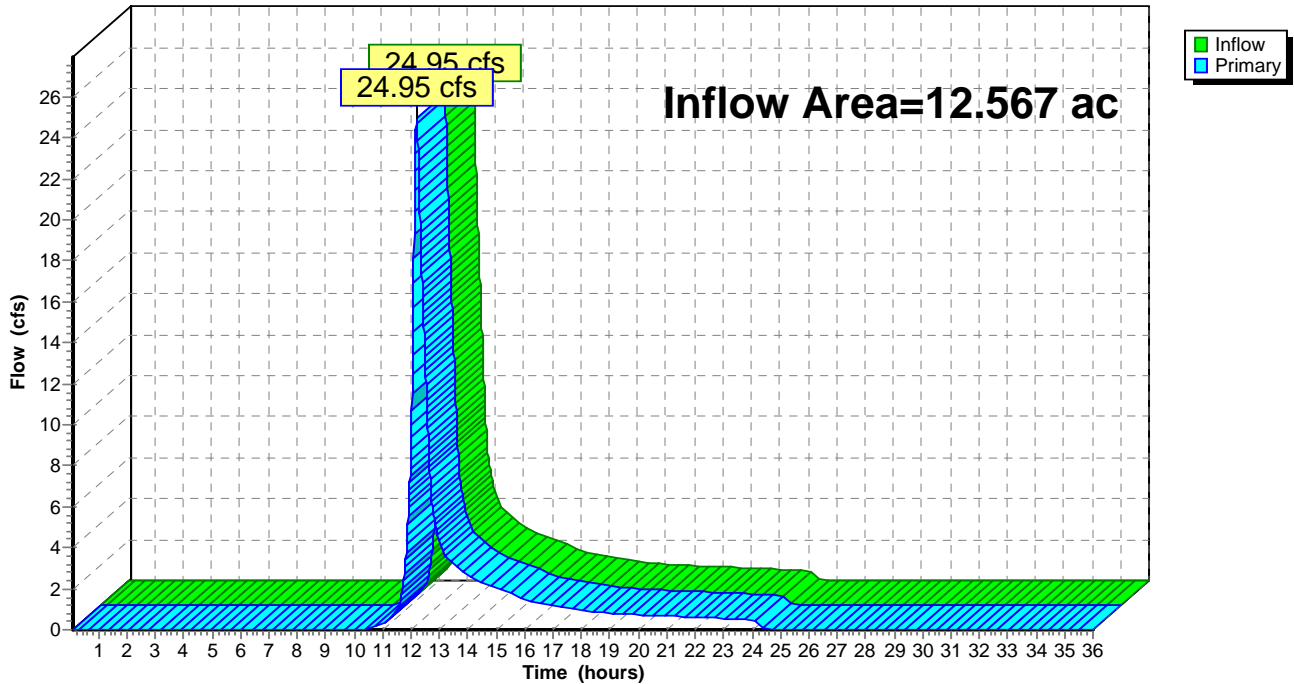
Link 1L: Total Offsite (Predevelopment)

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 = 2.11" for 100 Year Storm event
Inflow = 21.17 cfs @ 12.16 hrs, Volume= 2.208 af
Primary = 21.17 cfs @ 12.16 hrs, Volume= 2.208 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

