

Drainage Calculations

*91-93 & 95 Lowell Road
Pepperell, Massachusetts*

October 29, 2020

J. A. Visniewski, LLC
P.O. Box 657 • Pepperell, MA 01463 • (978) 877-7198

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DRAINAGE CALCULATIONS

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Drainage Calculations

These drainage calculations are a supplement to Special Permit Applications for Two Family Dwellings proposed for 91, 93 & 95 Lowell Rd., Pepperell Mass.

METHOD

NRCS TR-20, Type III 24-hr

HydroCAD 10.00- REF.: Attached analysis.

PRE-DEVELOPMENT & POST DEVELOPMENT COMPARISON

The pre-development flow from site drains to the street. The un-managed post-development flow from site would also drain to the street. However, roof leaching chambers and retention basins within the drainage swales have been provided to allow runoff to be stored and exfiltrated into the sandy soils below. The following tables provide existing and proposed surface conditions and their related areas.

EXISTING CONDITIONS	
Surface Description	Area (sf)
Wooded, isolated	2,088
Wooded, isolated	4,847
Wooded. Perim	39,743
Structures, house	1,145
Structures, Garage	1,135
Structures, Trailer	925
Grass, poor	53,311
Grass, lawn	29,098
Driveway, bit	479
Total	132,771

PROPOSED CONDITIONS	Area (sf) within subcatchments			
	10S	20S	30S	40S
Wooded, isolated			3,367	
Wooded. Perim	13,331	9,701	3,359	613
Structure, Duplex	3,328		3,126	2,894
Grass, lawn	17,233	11,195	28,275	19,774
Driveway, bit	4,340	4,317		545
Driveway, bit				1,852
Driveway, bit				1,846
Driveway, bit				1,840
Driveway, bit				1,834
Total	38,232	25,213	38,127	31,198

The table below provides a summary of the pre- and post- development conditions that are shown in more detail in the following HydroCAD analysis.

PRE & POST DEVELOPMENT COMPARISON				
	2 yr	10 yr	25 yr	100 yr
Pre- Development				
Flow (cfs)	0.0	0.06	0.20	0.65
Volume (af)	0.000	0.035	0.078	0.160
Post-Development				
Flow (cfs)	0.19	0.29	0.35	0.43
Volume (af)	0.015	0.023	0.028	0.034
Difference				
Flow (cfs)	0.19	0.23	0.15	-0.22
Volume (af)	0.015	-0.012	-0.050	-0.126

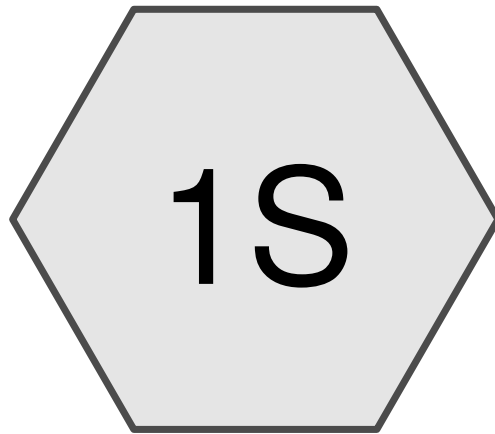
Therefore, this analysis shows that the peak rate and volume have been reduced greatly by the provision of these drainage control measures.

HYDROLOGIC ANALYSIS

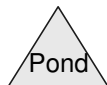
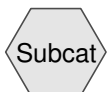
The following analysis is provided using the HydroCAD[®] Stormwater Modeling System software that models the hydrology and hydraulics of stormwater runoff. The calculations are based on the Natural Resources Conservation Service (NRCS) TR-20, Type III, 24-hr rainfall events. In the software drainage areas are referred to as "subcatchment" areas. All ponded areas, including infiltration chambers and retention basins are modeled as "ponds". When drainage components from different areas converge to a single location they may be joined by a "link".

Plans showing Pre-Development and Post-Development drainage areas are located at the end of the report.

PRE-DEVELOPMENT ANALYSIS



Site Flows to street



PostDevelopment

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91-95 Lowell Rd.
Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 1S: Site Flows to street

Runoff = 0.03 cfs @ 15.02 hrs, Volume= 0.014 af, Depth> 0.05"

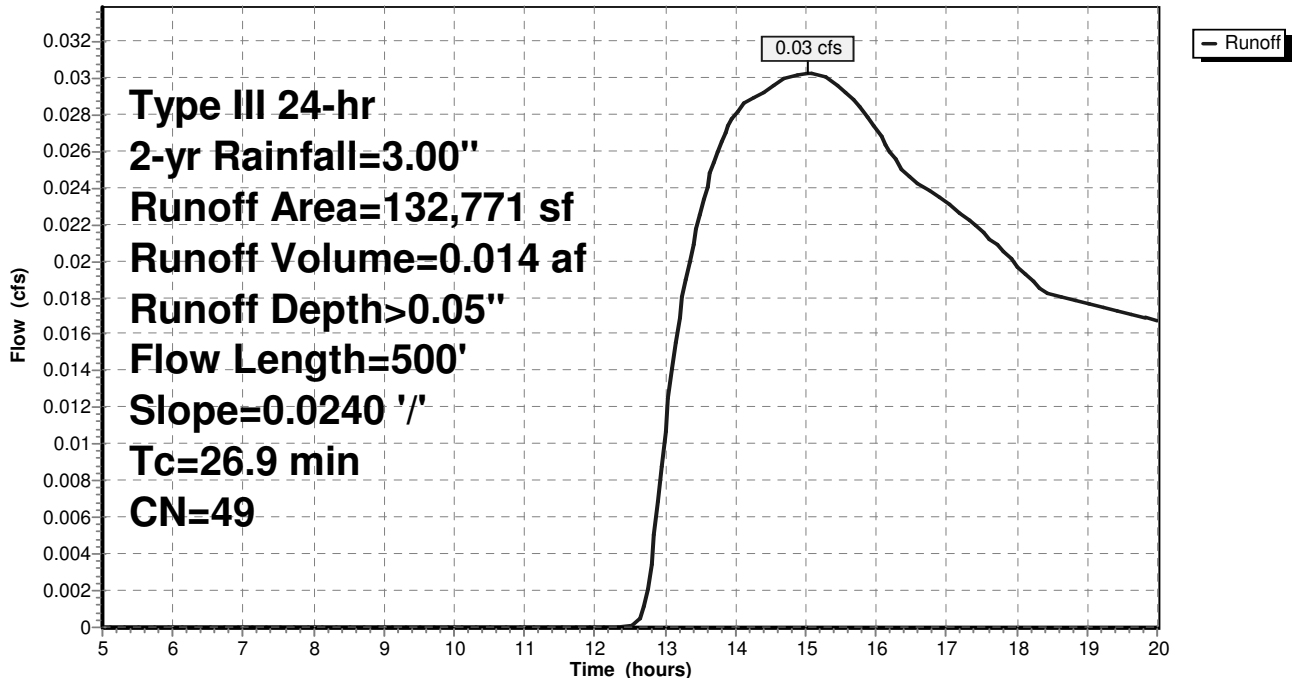
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
3,398	36	Woods, Fair, HSG A
30,197	36	Woods, Fair, HSG A
* 9,984	98	Buildings
23,625	35	Brush, Fair, HSG A
48,992	39	>75% Grass cover, Good, HSG A
* 9,203	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
132,771	49	Weighted Average
106,212		80.00% Pervious Area
26,559		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	500	0.0240	0.31		Lag/CN Method, Overland

Subcatchment 1S: Site Flows to street

Hydrograph



PostDevelopment

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91-95 Lowell Rd.
Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Subcatchment 1S: Site Flows to street

Runoff = 0.53 cfs @ 12.59 hrs, Volume= 0.098 af, Depth> 0.38"

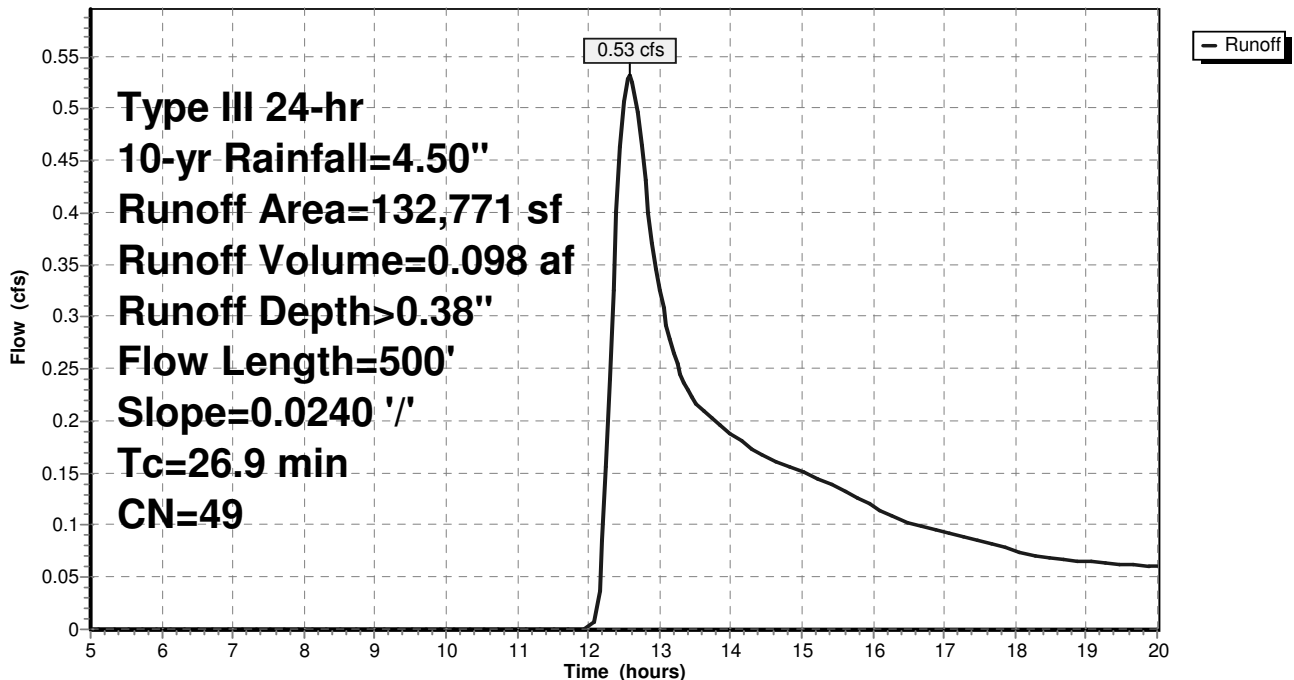
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
3,398	36	Woods, Fair, HSG A
30,197	36	Woods, Fair, HSG A
* 9,984	98	Buildings
23,625	35	Brush, Fair, HSG A
48,992	39	>75% Grass cover, Good, HSG A
* 9,203	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
132,771	49	Weighted Average
106,212		80.00% Pervious Area
26,559		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	500	0.0240	0.31		Lag/CN Method, Overland

Subcatchment 1S: Site Flows to street

Hydrograph



PostDevelopment

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Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 1S: Site Flows to street

Runoff = 1.11 cfs @ 12.51 hrs, Volume= 0.167 af, Depth> 0.66"

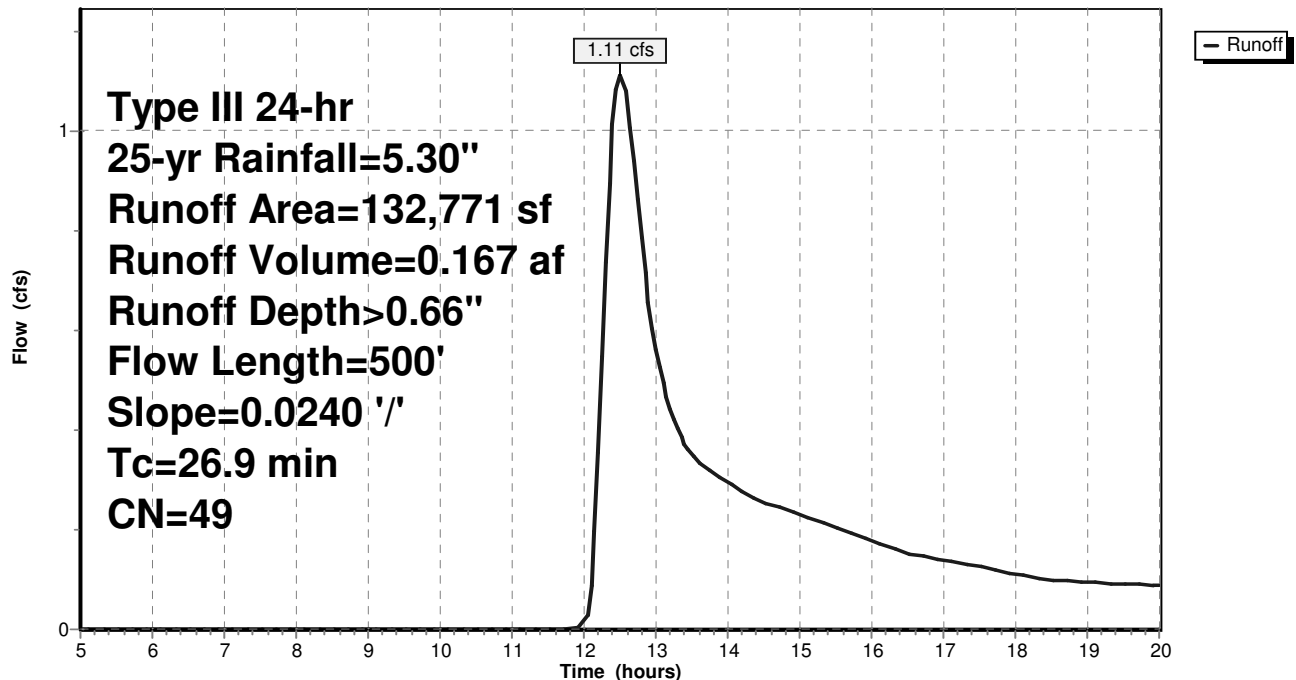
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
3,398	36	Woods, Fair, HSG A
30,197	36	Woods, Fair, HSG A
* 9,984	98	Buildings
23,625	35	Brush, Fair, HSG A
48,992	39	>75% Grass cover, Good, HSG A
* 9,203	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
132,771	49	Weighted Average
106,212		80.00% Pervious Area
26,559		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	500	0.0240	0.31		Lag/CN Method, Overland

Subcatchment 1S: Site Flows to street

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Subcatchment 1S: Site Flows to street

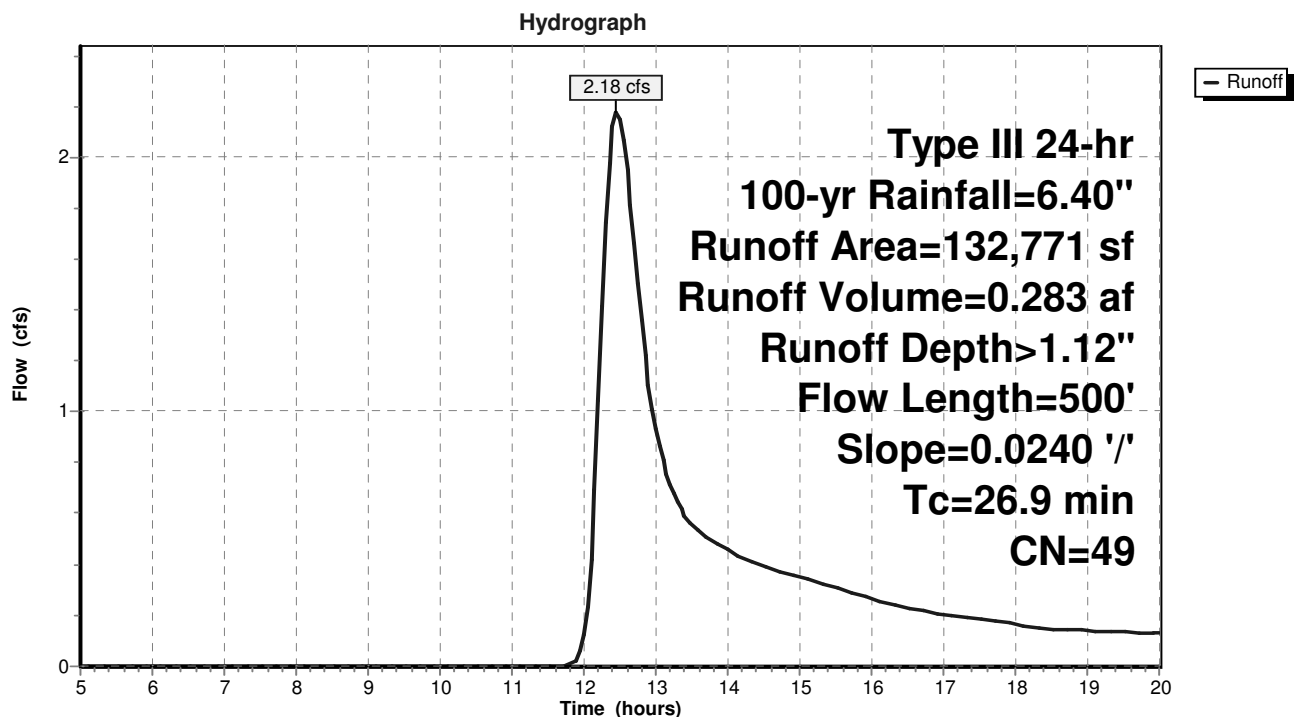
Runoff = 2.18 cfs @ 12.46 hrs, Volume= 0.283 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

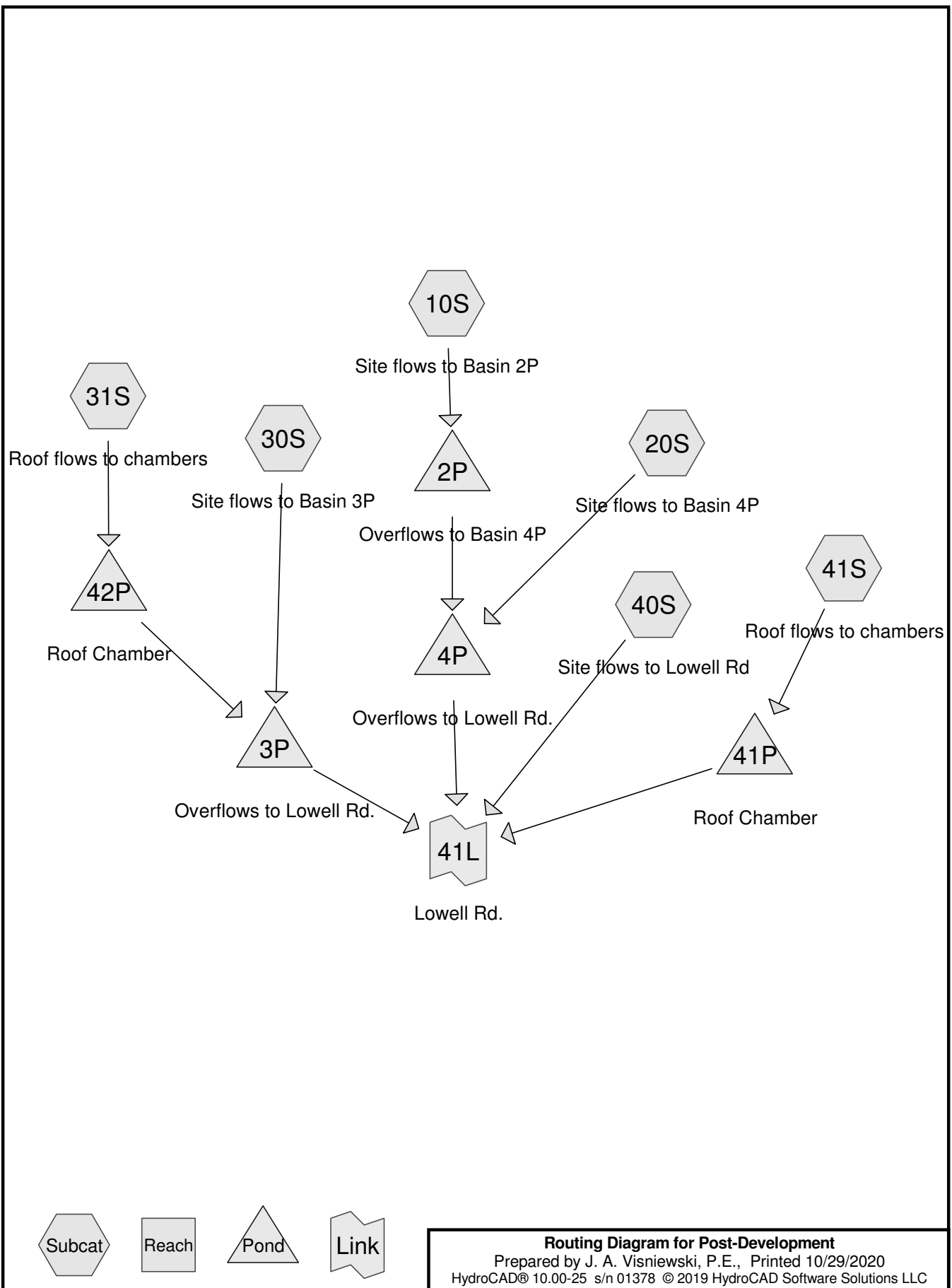
Area (sf)	CN	Description
3,398	36	Woods, Fair, HSG A
30,197	36	Woods, Fair, HSG A
* 9,984	98	Buildings
23,625	35	Brush, Fair, HSG A
48,992	39	>75% Grass cover, Good, HSG A
* 9,203	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
132,771	49	Weighted Average
106,212		80.00% Pervious Area
26,559		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	500	0.0240	0.31		Lag/CN Method, Overland

Subcatchment 1S: Site Flows to street



POST-DEVELOPMENT ANALYSIS



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91-95 Lowell Rd.
Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 10S: Site flows to Basin 2P

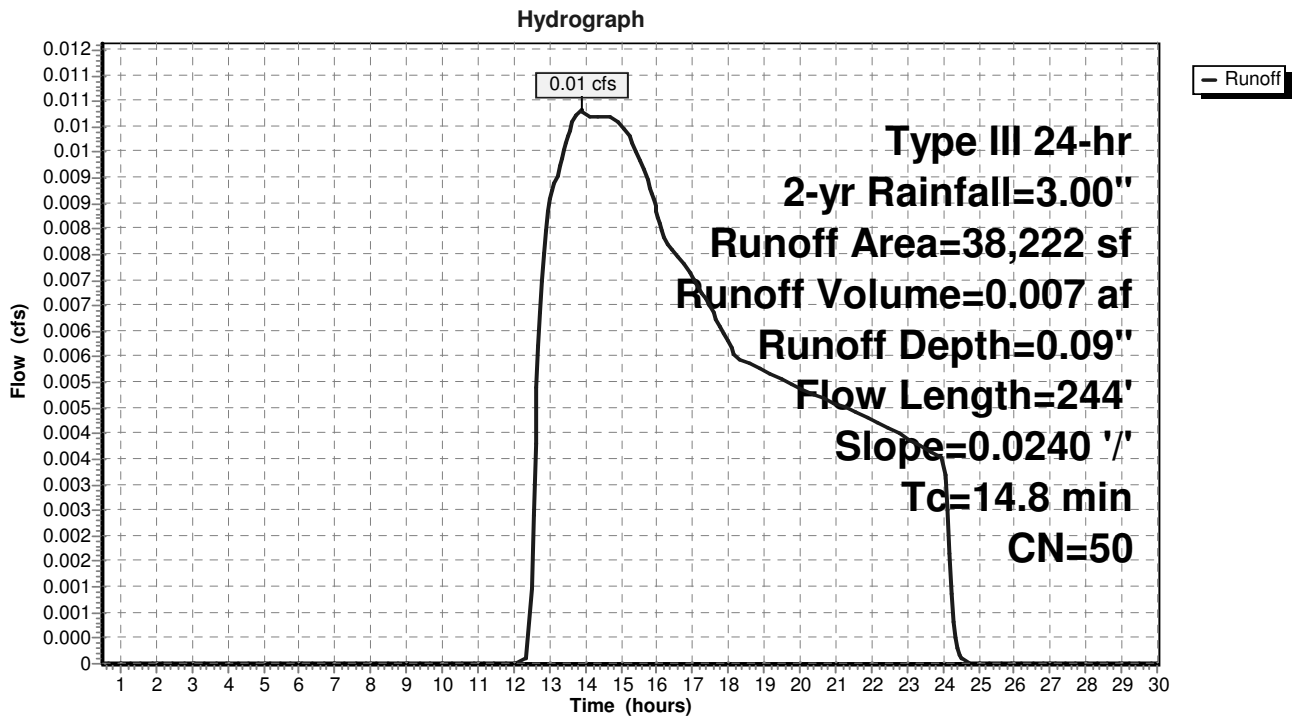
Runoff = 0.01 cfs @ 13.91 hrs, Volume= 0.007 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
13,331	36	Woods, Fair, HSG A
* 3,328	98	Buildings
17,223	39	>75% Grass cover, Good, HSG A
* 4,340	98	Driveway
38,222	50	Weighted Average
30,554		79.94% Pervious Area
7,668		20.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	244	0.0240	0.27		Lag/CN Method, Overland

Subcatchment 10S: Site flows to Basin 2P



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Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 20S: Site flows to Basin 4P

Runoff = 0.00 cfs @ 15.20 hrs, Volume= 0.003 af, Depth= 0.06"

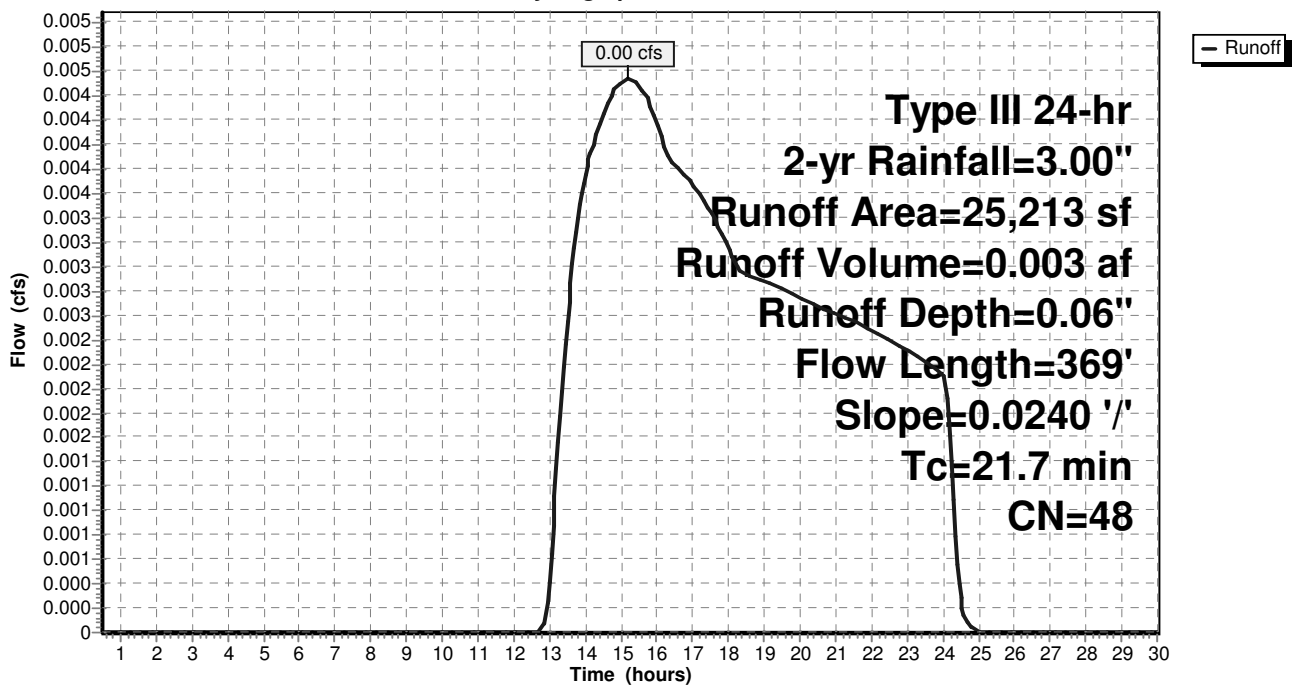
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
9,701	36	Woods, Fair, HSG A
11,195	39	>75% Grass cover, Good, HSG A
* 4,317	98	Driveway
25,213	48	Weighted Average
20,896		82.88% Pervious Area
4,317		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	369	0.0240	0.28		Lag/CN Method, Overland

Subcatchment 20S: Site flows to Basin 4P

Hydrograph



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 Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 30S: Site flows to Basin 3P

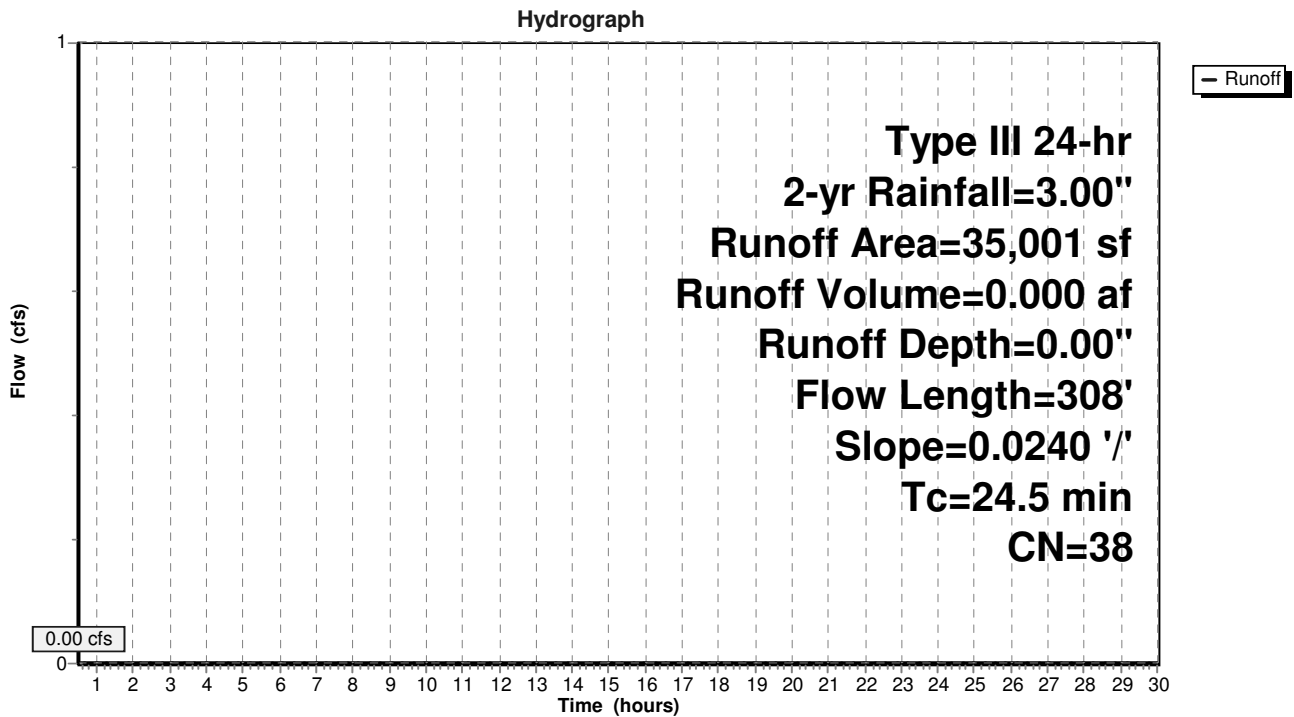
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
3,367	36	Woods, Fair, HSG A
3,359	36	Woods, Fair, HSG A
* 0	98	Buildiing
28,275	39	>75% Grass cover, Good, HSG A
35,001	38	Weighted Average
35,001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	308	0.0240	0.21		Lag/CN Method, Overland

Subcatchment 30S: Site flows to Basin 3P



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 Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 31S: Roof flows to chambers

Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af, Depth= 2.77"

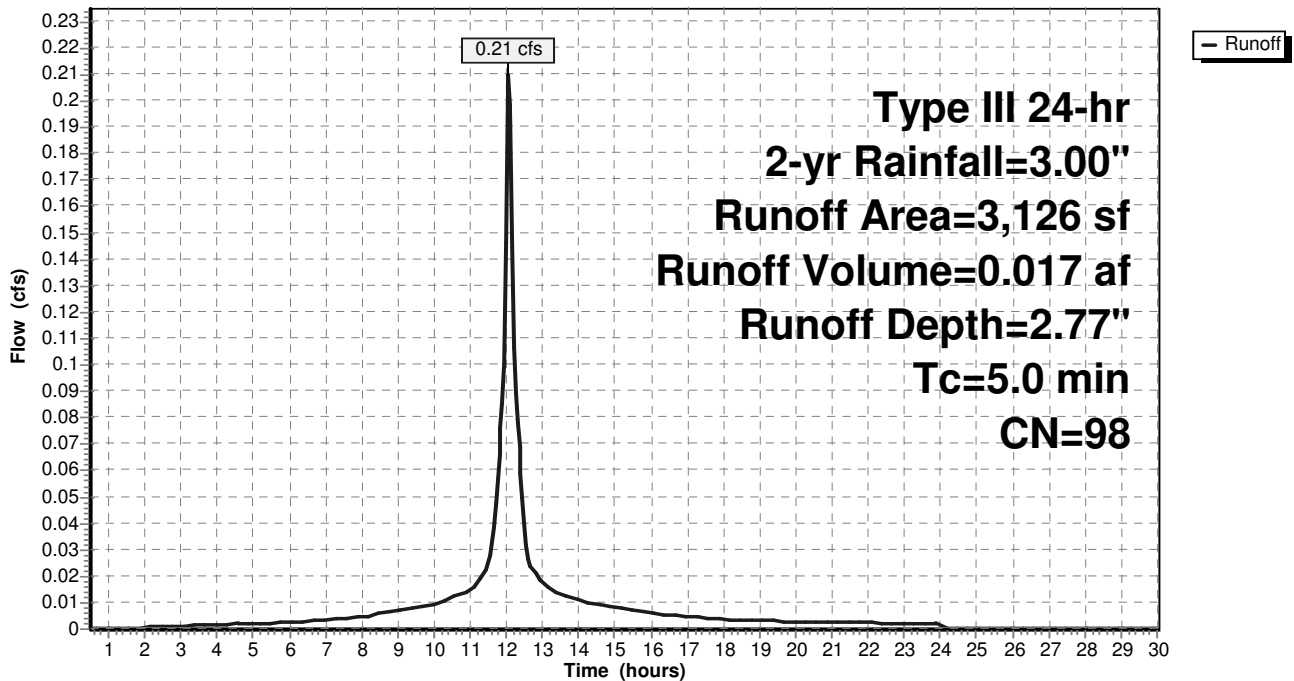
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
* 3,126	98	Building
3,126		100.00% Impervious Area

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

Subcatchment 31S: Roof flows to chambers

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 40S: Site flows to Lowell Rd

Runoff = 0.04 cfs @ 12.47 hrs, Volume= 0.011 af, Depth= 0.19"

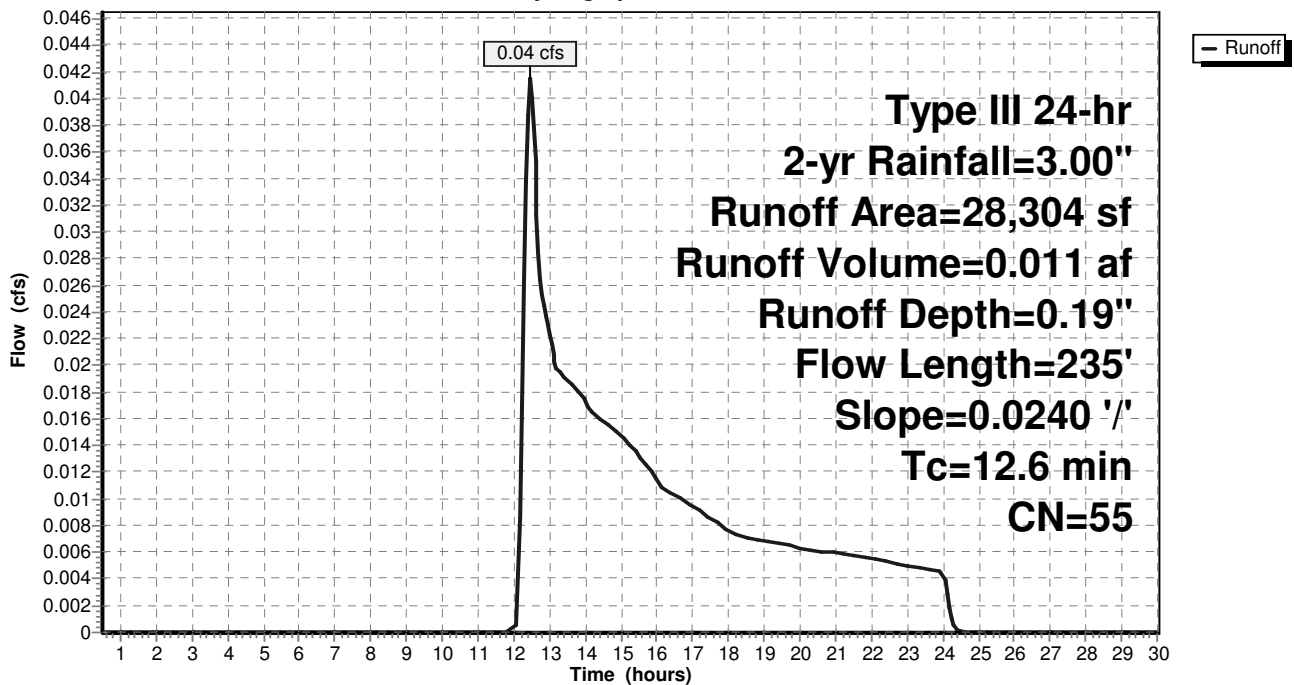
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
613	36	Woods, Fair, HSG A
* 0	98	Building
19,774	39	>75% Grass cover, Good, HSG A
* 545	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
28,304	55	Weighted Average
20,387		72.03% Pervious Area
7,917		27.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	235	0.0240	0.31		Lag/CN Method, overland

Subcatchment 40S: Site flows to Lowell Rd

Hydrograph



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 Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Subcatchment 41S: Roof flows to chambers

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 2.77"

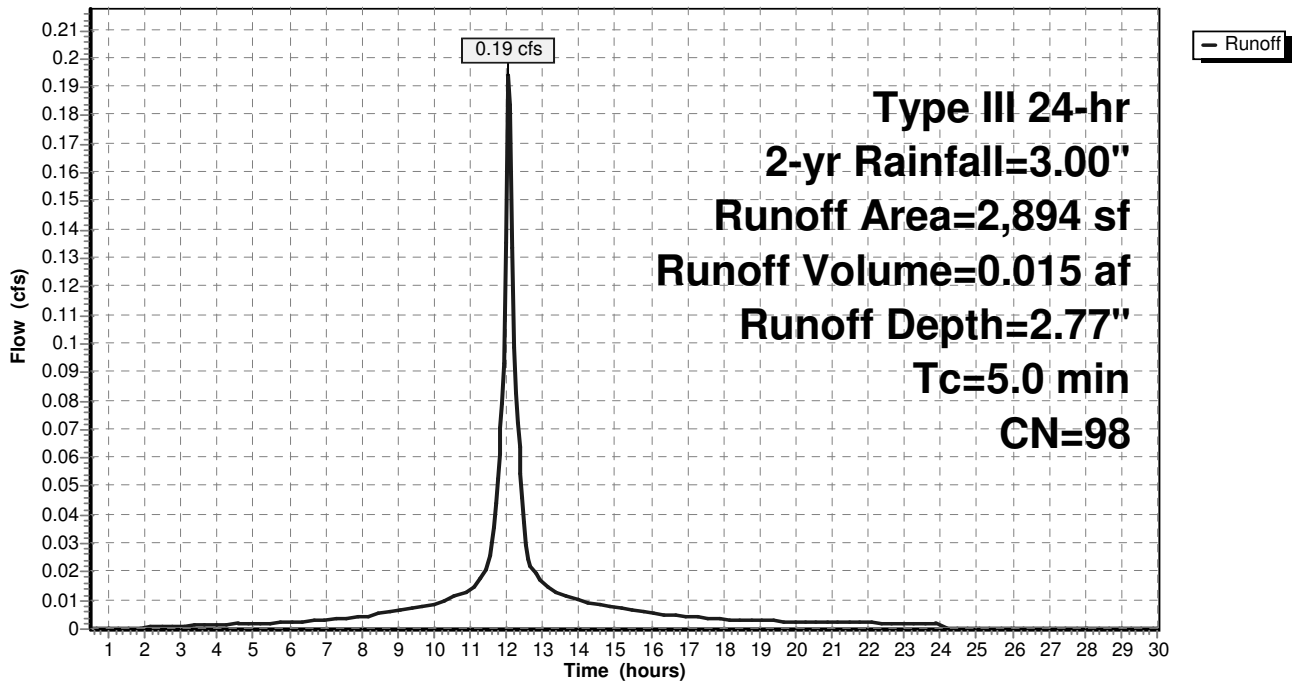
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
* 2,894	98	Building
2,894		100.00% Impervious Area

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

Subcatchment 41S: Roof flows to chambers

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 2-yr Rainfall=3.00"

Post-Development

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Summary for Pond 2P: Overflows to Basin 4P

Inflow Area = 0.877 ac, 20.06% Impervious, Inflow Depth = 0.09" for 2-yr event
 Inflow = 0.01 cfs @ 13.91 hrs, Volume= 0.007 af
 Outflow = 0.01 cfs @ 13.94 hrs, Volume= 0.007 af, Atten= 0%, Lag= 1.7 min
 Discarded = 0.01 cfs @ 13.94 hrs, Volume= 0.007 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.00' @ 13.94 hrs Surf.Area= 557 sf Storage= 1 cf

Plug-Flow detention time= 1.8 min calculated for 0.007 af (100% of inflow)
 Center-of-Mass det. time= 1.8 min (1,044.8 - 1,043.0)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.00'	3,152 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.00	556	120.0	0	0	556	
208.00	2,902	227.5	3,152	3,152	3,549	

Device	Routing	Invert	Outlet Devices											
#1	Primary	207.00'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32											
#2	Discarded	206.00'	8.000 in/hr Exfiltration over Surface area											

Discarded OutFlow Max=0.10 cfs @ 13.94 hrs HW=206.00' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=206.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development

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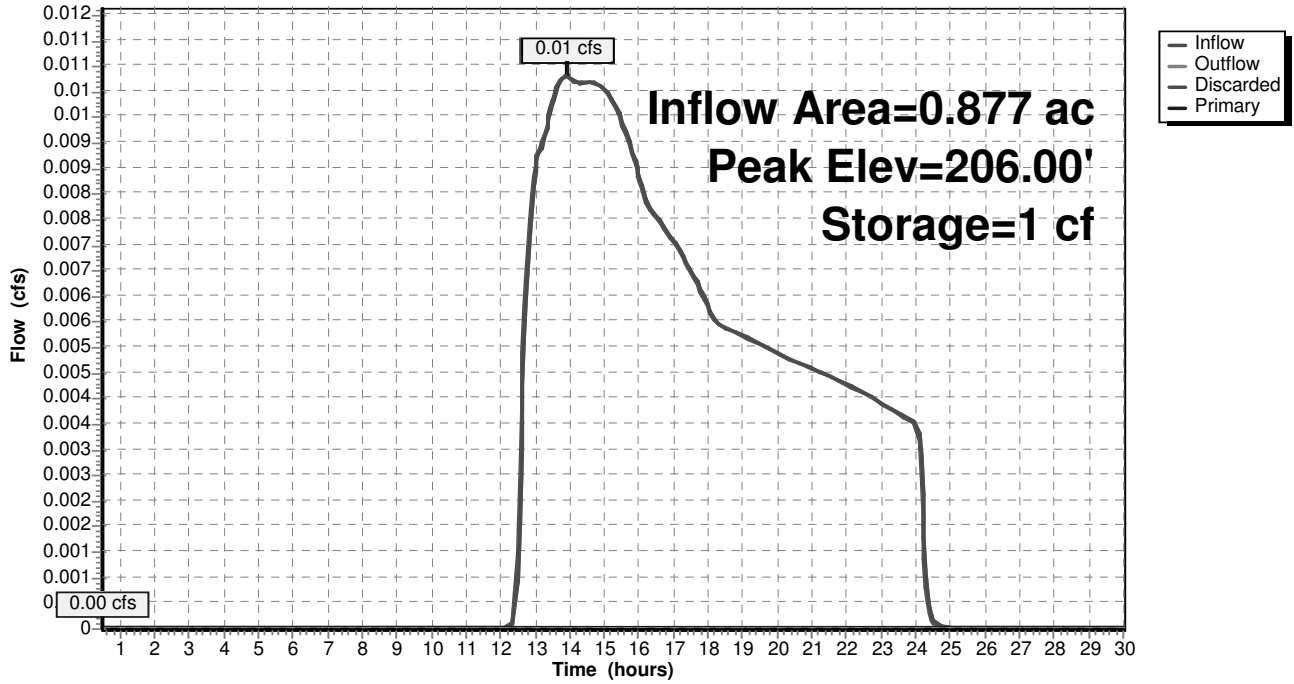
91-95 Lowell Rd.
Type III 24-hr 2-yr Rainfall=3.00"

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Pond 2P: Overflows to Basin 4P

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 2-yr Rainfall=3.00"

Post-Development

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Summary for Pond 3P: Overflows to Lowell Rd.

Inflow Area = 0.875 ac, 8.20% Impervious, Inflow Depth = 0.21" for 2-yr event
 Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af
 Outflow = 0.10 cfs @ 12.20 hrs, Volume= 0.015 af, Atten= 47%, Lag= 7.9 min
 Discarded = 0.10 cfs @ 12.20 hrs, Volume= 0.015 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.09' @ 12.20 hrs Surf.Area= 545 sf Storage= 49 cf

Plug-Flow detention time= 2.2 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 2.2 min (759.2 - 756.9)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	770 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	500	100.0	0	0	500	
200.00	1,077	195.0	770	770	2,735	

Device	Routing	Invert	Outlet Devices											
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32											
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area											

Discarded OutFlow Max=0.10 cfs @ 12.20 hrs HW=199.09' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development

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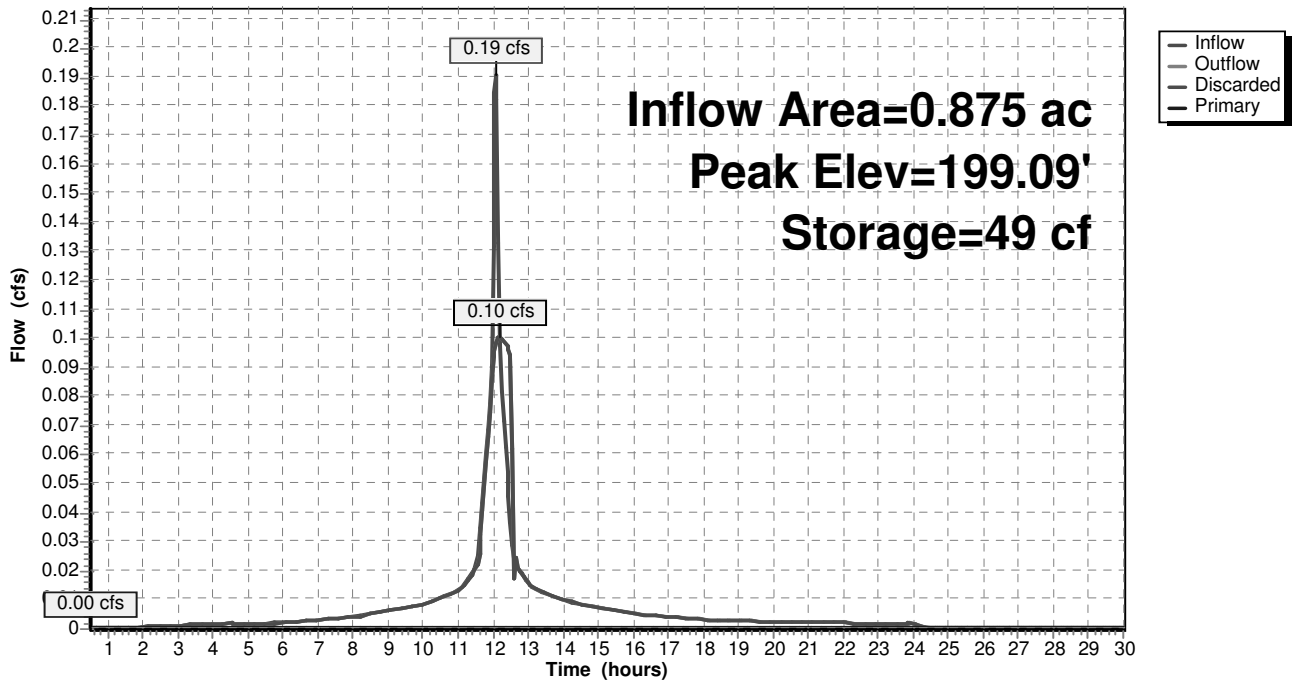
91-95 Lowell Rd.
Type III 24-hr 2-yr Rainfall=3.00"

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Pond 3P: Overflows to Lowell Rd.

Hydrograph



Post-Development

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91-95 Lowell Rd.
Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Pond 4P: Overflows to Lowell Rd.

Inflow Area = 1.456 ac, 18.89% Impervious, Inflow Depth = 0.02" for 2-yr event
 Inflow = 0.00 cfs @ 15.20 hrs, Volume= 0.003 af
 Outflow = 0.00 cfs @ 15.21 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.9 min
 Discarded = 0.00 cfs @ 15.21 hrs, Volume= 0.003 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.00' @ 15.21 hrs Surf.Area= 300 sf Storage= 0 cf

Plug-Flow detention time= 0.9 min calculated for 0.003 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (1,088.8 - 1,088.0)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	472 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	300	75.0	0	0	300	
200.00	668	151.0	472	472	1,671	

Device	Routing	Invert	Outlet Devices											
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32											
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area											

Discarded OutFlow Max=0.06 cfs @ 15.21 hrs HW=199.00' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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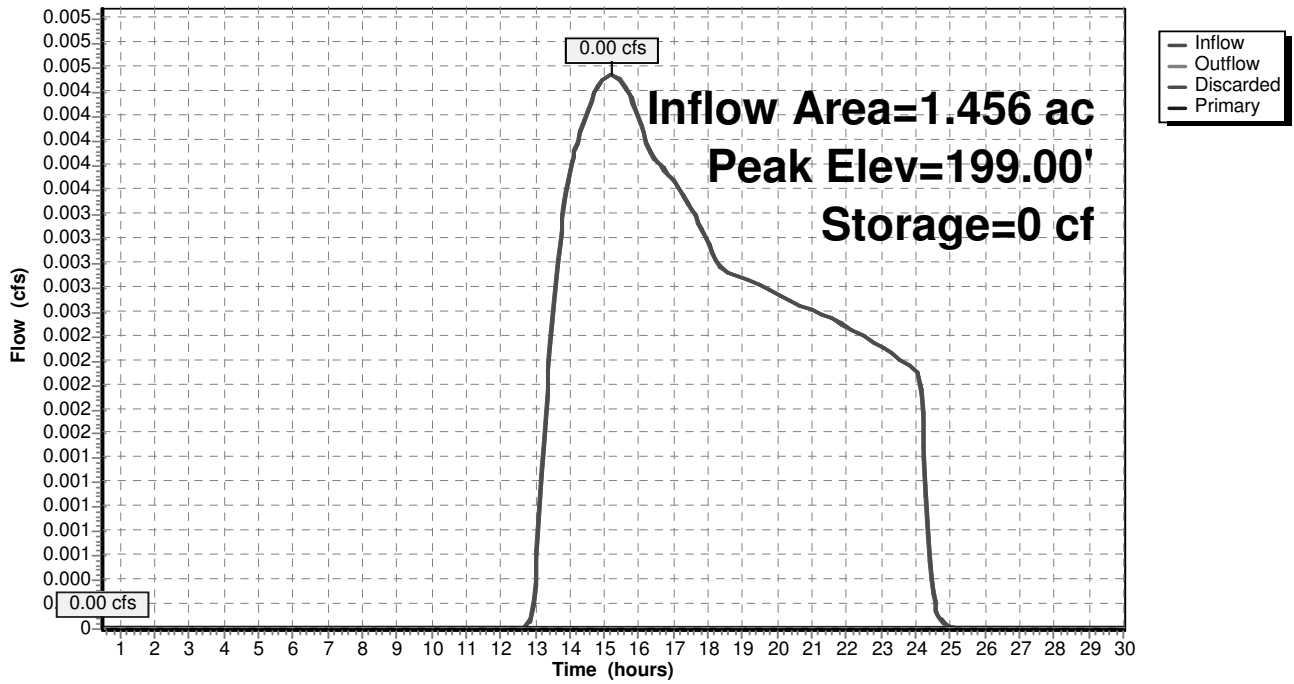
91-95 Lowell Rd.
Type III 24-hr 2-yr Rainfall=3.00"

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Pond 4P: Overflows to Lowell Rd.

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.00"

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Summary for Pond 41P: Roof Chamber

Inflow Area = 0.066 ac, 100.00% Impervious, Inflow Depth = 2.77" for 2-yr event
 Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af
 Outflow = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.02 cfs @ 12.07 hrs, Volume= 0.001 af
 Primary = 0.18 cfs @ 12.07 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.02' @ 12.07 hrs Surf.Area= 142 sf Storage= 1 cf

Plug-Flow detention time= 0.1 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (756.9 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.07 hrs HW=202.02' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.14 cfs @ 12.07 hrs HW=202.02' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.14 cfs @ 0.33 fps)

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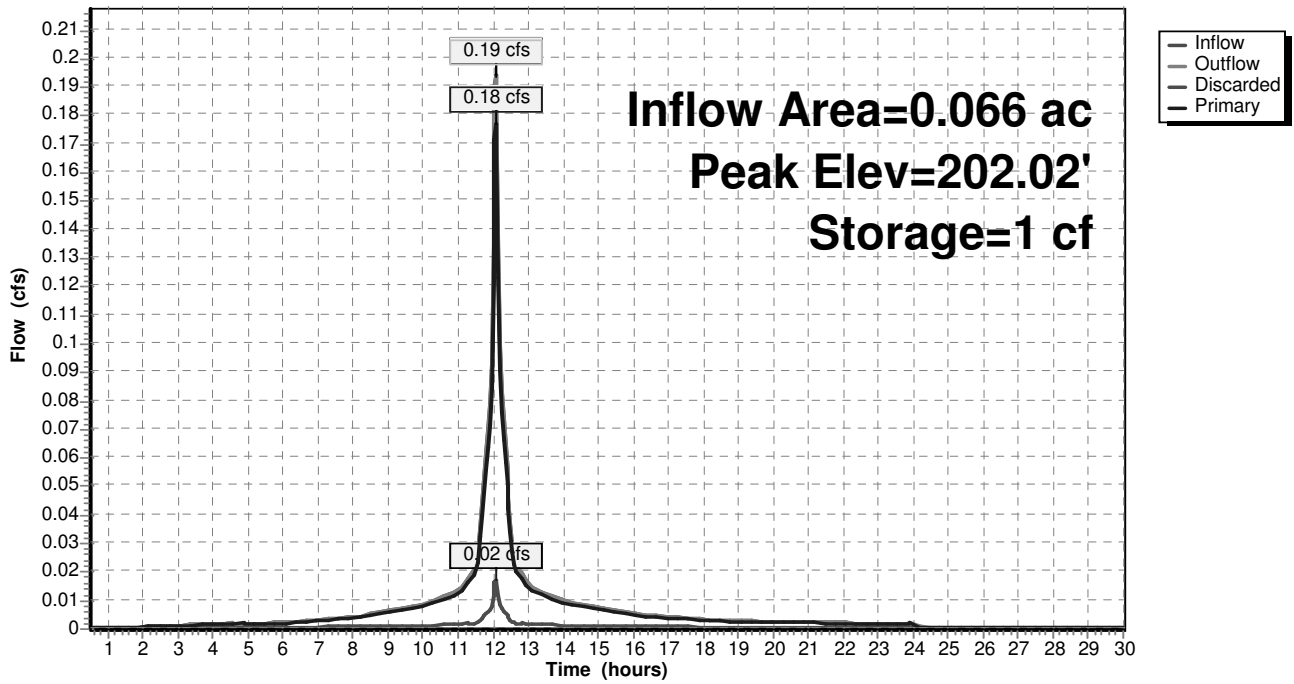
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Pond 41P: Roof Chamber

Hydrograph



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Summary for Pond 42P: Roof Chamber

Inflow Area = 0.072 ac, 100.00% Impervious, Inflow Depth = 2.77" for 2-yr event
 Inflow = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af
 Outflow = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.02 cfs @ 12.07 hrs, Volume= 0.001 af
 Primary = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.02' @ 12.07 hrs Surf.Area= 142 sf Storage= 1 cf

Plug-Flow detention time= 0.1 min calculated for 0.017 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (756.9 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.07 hrs HW=202.02' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.15 cfs @ 12.07 hrs HW=202.02' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.15 cfs @ 0.34 fps)

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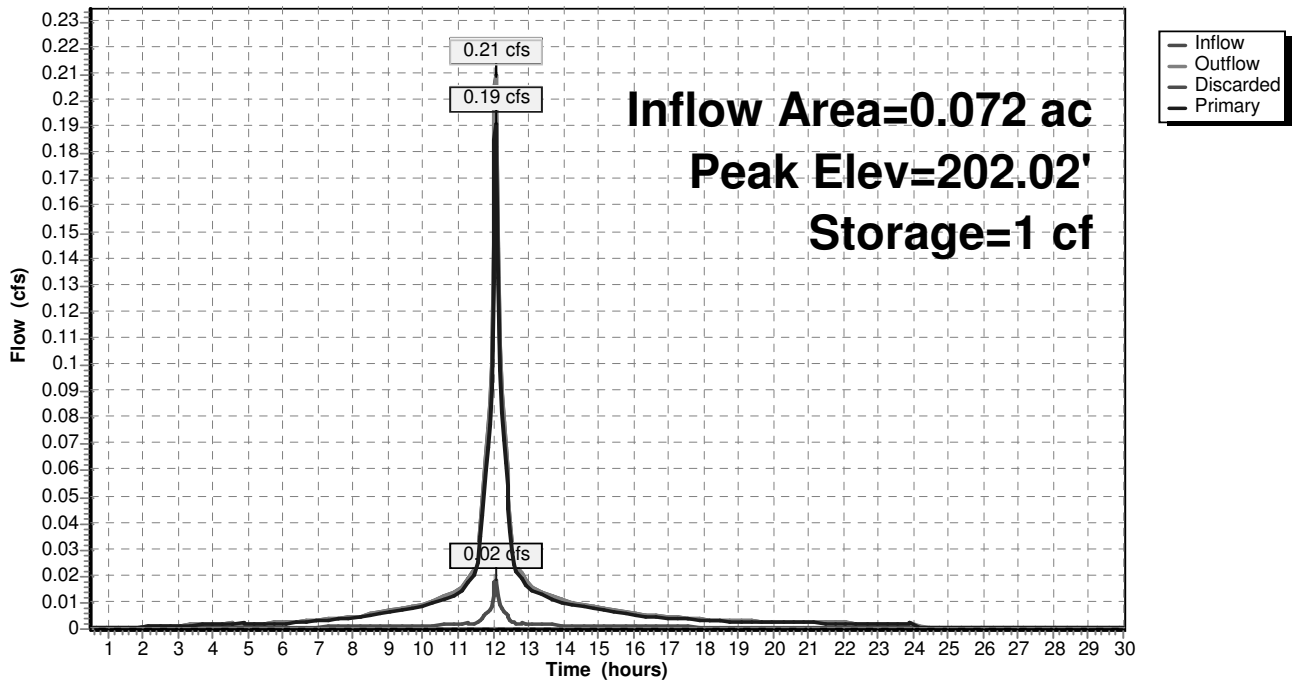
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Type III 24-hr 2-yr Rainfall=3.00"

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Pond 42P: Roof Chamber

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.00"

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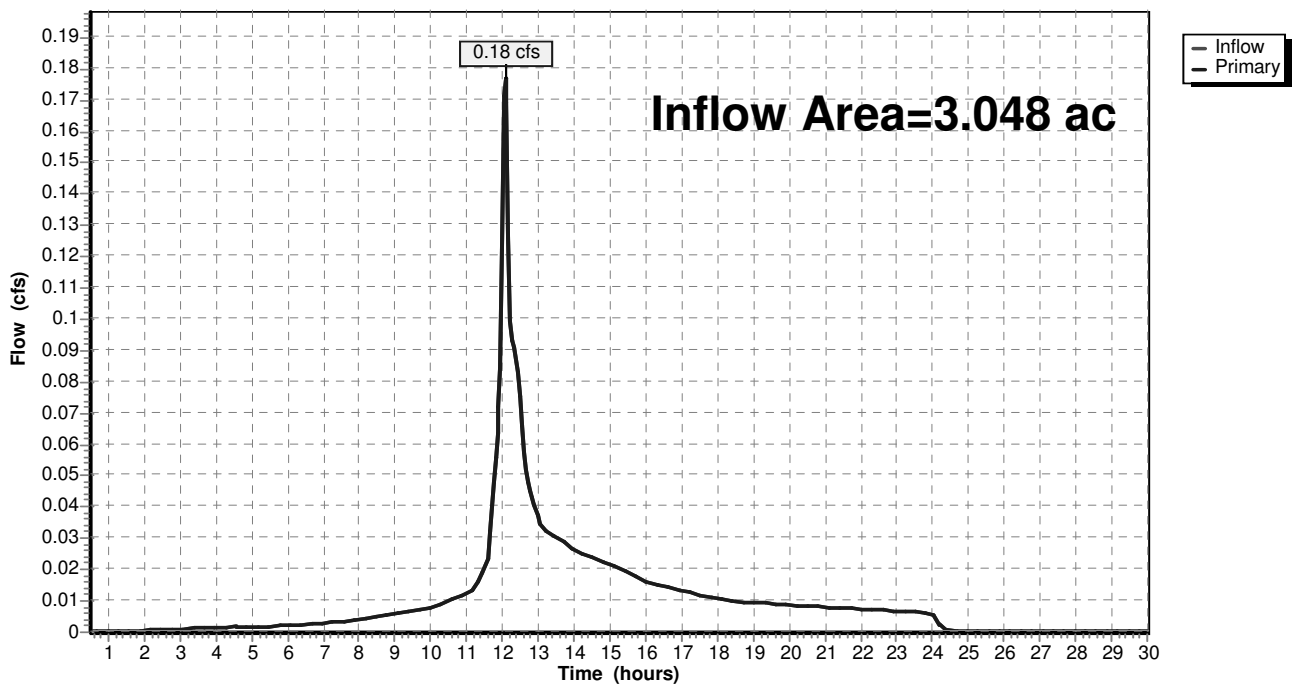
Summary for Link 41L: Lowell Rd.

Inflow Area = 3.048 ac, 19.53% Impervious, Inflow Depth = 0.10" for 2-yr event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 0.025 af
Primary = 0.18 cfs @ 12.07 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs

Link 41L: Lowell Rd.

Hydrograph



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91-95 Lowell Rd.
Type III 24-hr 10-yr Rainfall=4.50"

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Summary for Subcatchment 10S: Site flows to Basin 2P

Runoff = 0.21 cfs @ 12.38 hrs, Volume= 0.037 af, Depth= 0.50"

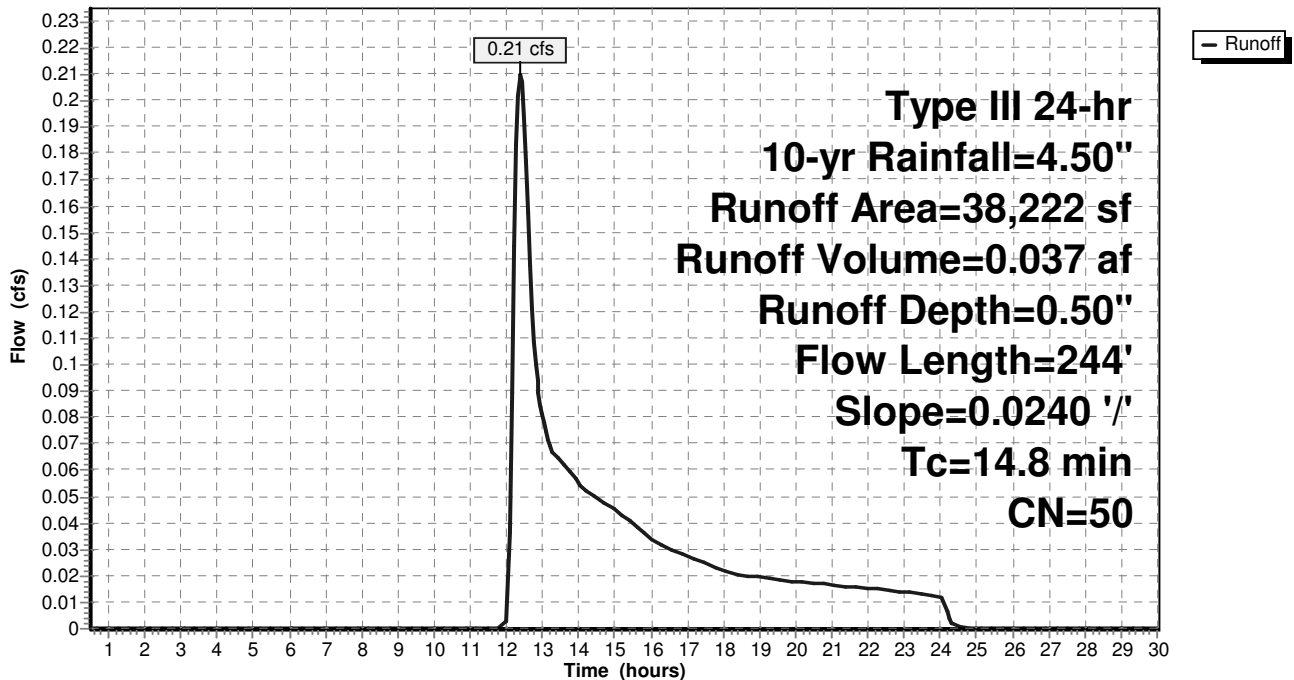
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
13,331	36	Woods, Fair, HSG A
* 3,328	98	Buildings
17,223	39	>75% Grass cover, Good, HSG A
* 4,340	98	Driveway
38,222	50	Weighted Average
30,554		79.94% Pervious Area
7,668		20.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	244	0.0240	0.27		Lag/CN Method, Overland

Subcatchment 10S: Site flows to Basin 2P

Hydrograph



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

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Summary for Subcatchment 20S: Site flows to Basin 4P

Runoff = 0.09 cfs @ 12.53 hrs, Volume= 0.020 af, Depth= 0.41"

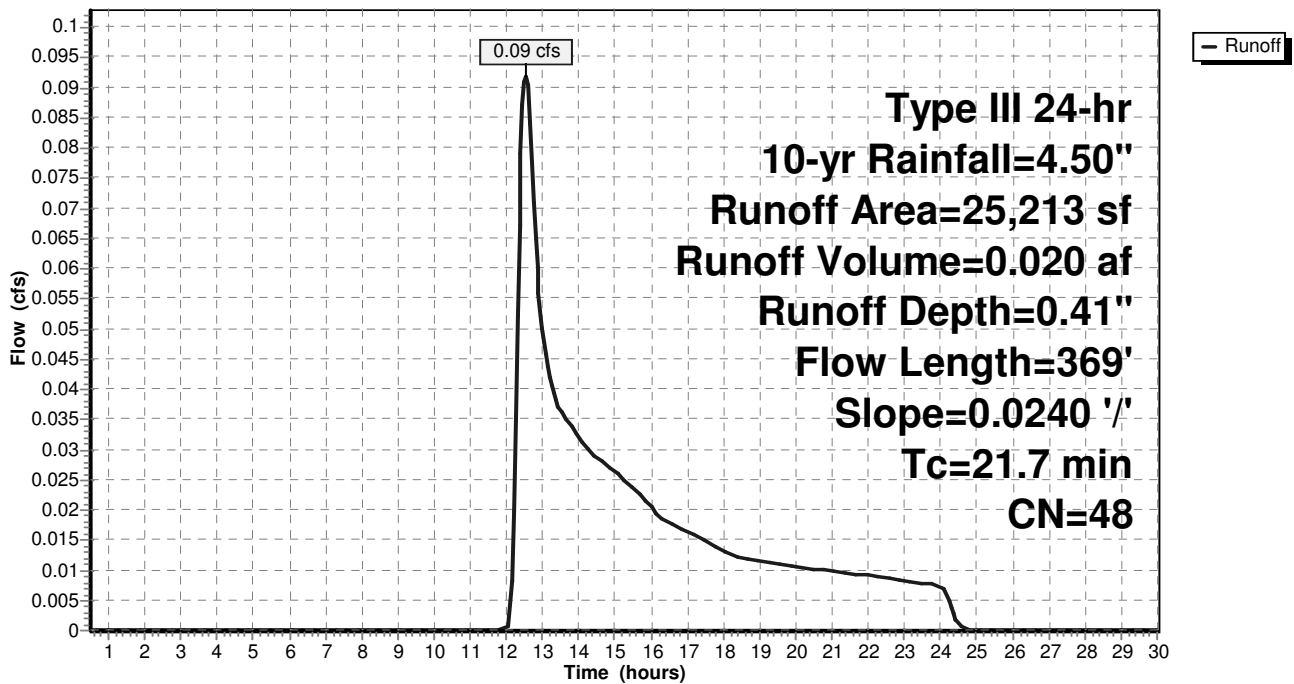
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
9,701	36	Woods, Fair, HSG A
11,195	39	>75% Grass cover, Good, HSG A
* 4,317	98	Driveway
25,213	48	Weighted Average
20,896		82.88% Pervious Area
4,317		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	369	0.0240	0.28		Lag/CN Method, Overland

Subcatchment 20S: Site flows to Basin 4P

Hydrograph



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

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Summary for Subcatchment 30S: Site flows to Basin 3P

Runoff = 0.01 cfs @ 15.27 hrs, Volume= 0.006 af, Depth= 0.09"

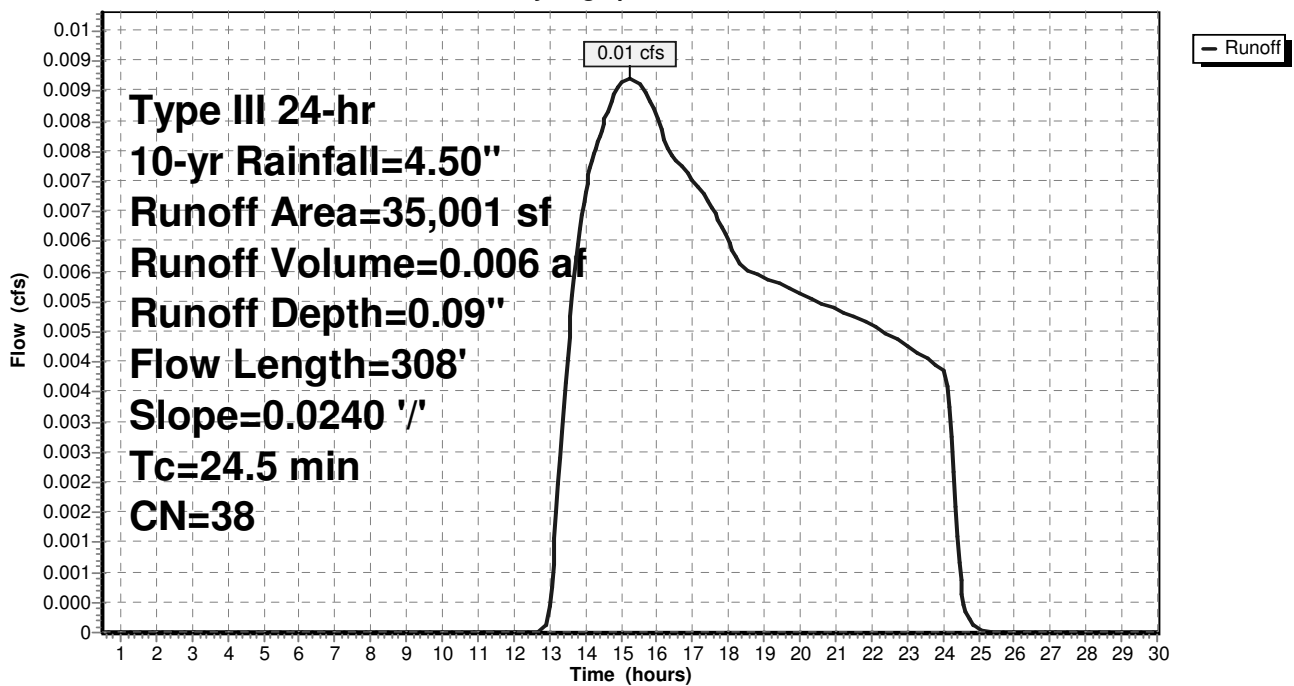
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
3,367	36	Woods, Fair, HSG A
3,359	36	Woods, Fair, HSG A
* 0	98	Buildiing
28,275	39	>75% Grass cover, Good, HSG A
35,001	38	Weighted Average
35,001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	308	0.0240	0.21		Lag/CN Method, Overland

Subcatchment 30S: Site flows to Basin 3P

Hydrograph



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

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Summary for Subcatchment 31S: Roof flows to chambers

Runoff = 0.32 cfs @ 12.07 hrs, Volume= 0.026 af, Depth= 4.26"

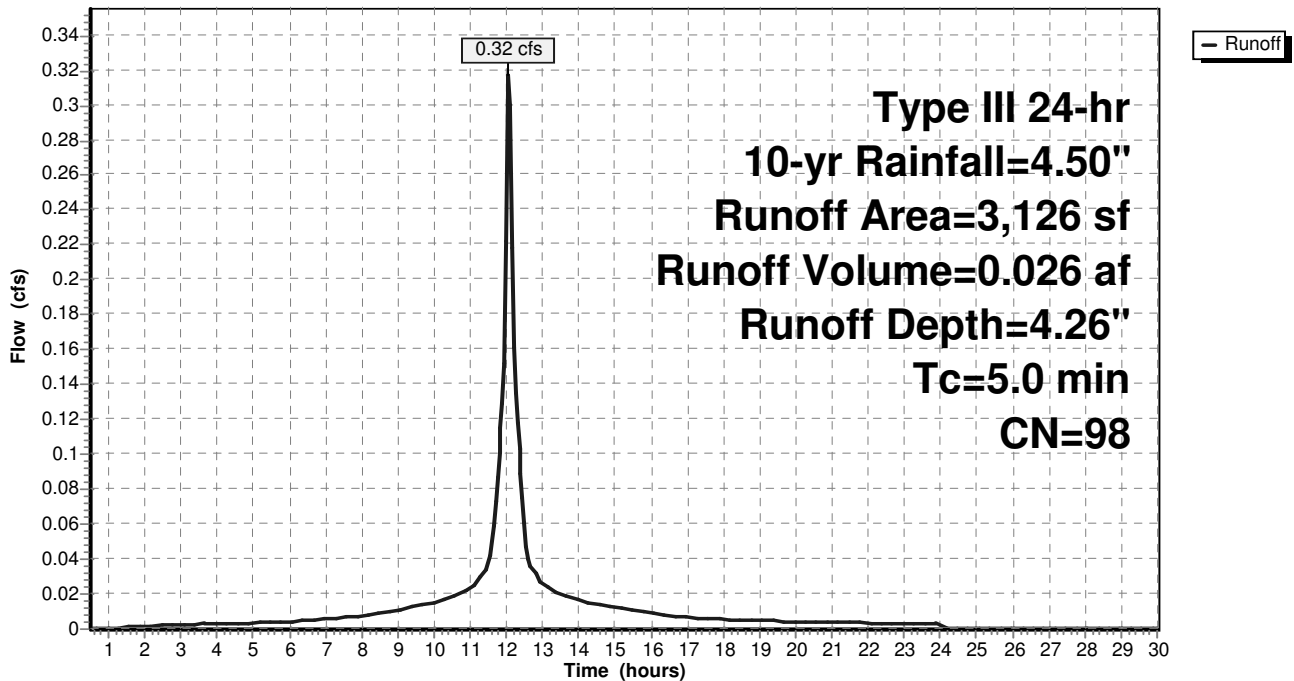
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
* 3,126	98	Building
3,126		100.00% Impervious Area

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

Subcatchment 31S: Roof flows to chambers

Hydrograph



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

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Summary for Subcatchment 40S: Site flows to Lowell Rd

Runoff = 0.32 cfs @ 12.22 hrs, Volume= 0.040 af, Depth= 0.74"

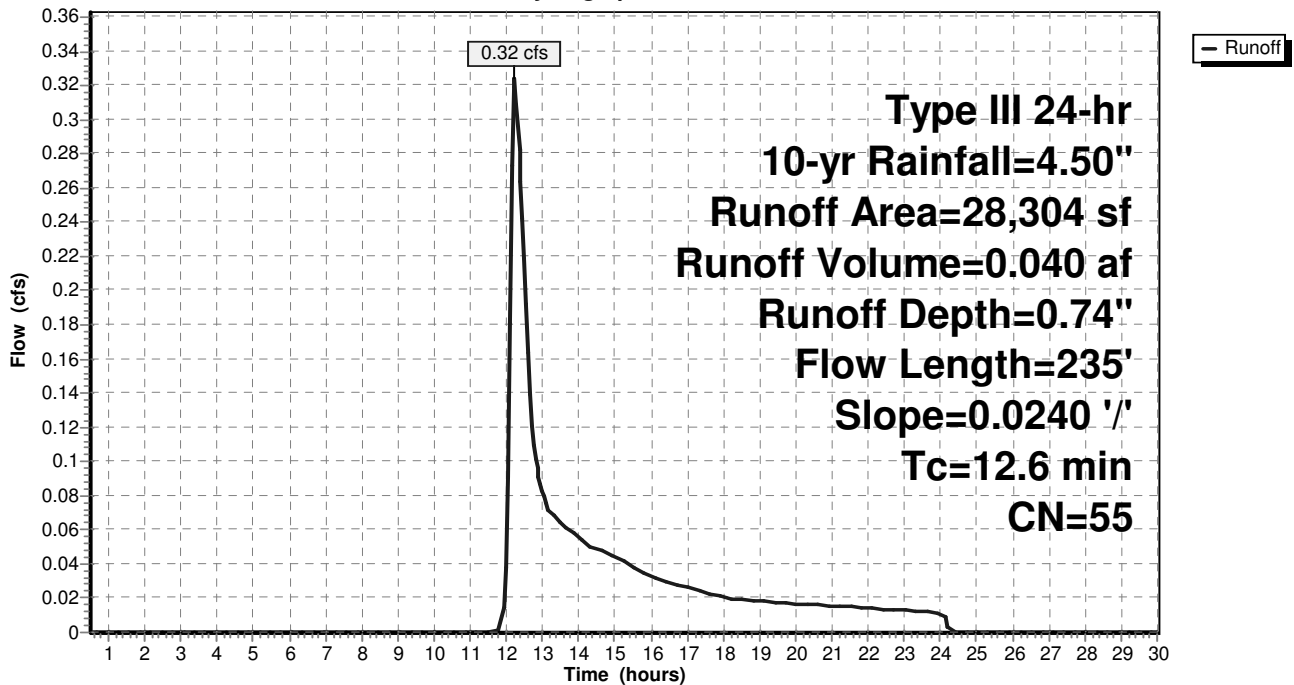
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
613	36	Woods, Fair, HSG A
* 0	98	Building
19,774	39	>75% Grass cover, Good, HSG A
* 545	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
28,304	55	Weighted Average
20,387		72.03% Pervious Area
7,917		27.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	235	0.0240	0.31		Lag/CN Method, overland

Subcatchment 40S: Site flows to Lowell Rd

Hydrograph



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

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Summary for Subcatchment 41S: Roof flows to chambers

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.024 af, Depth= 4.26"

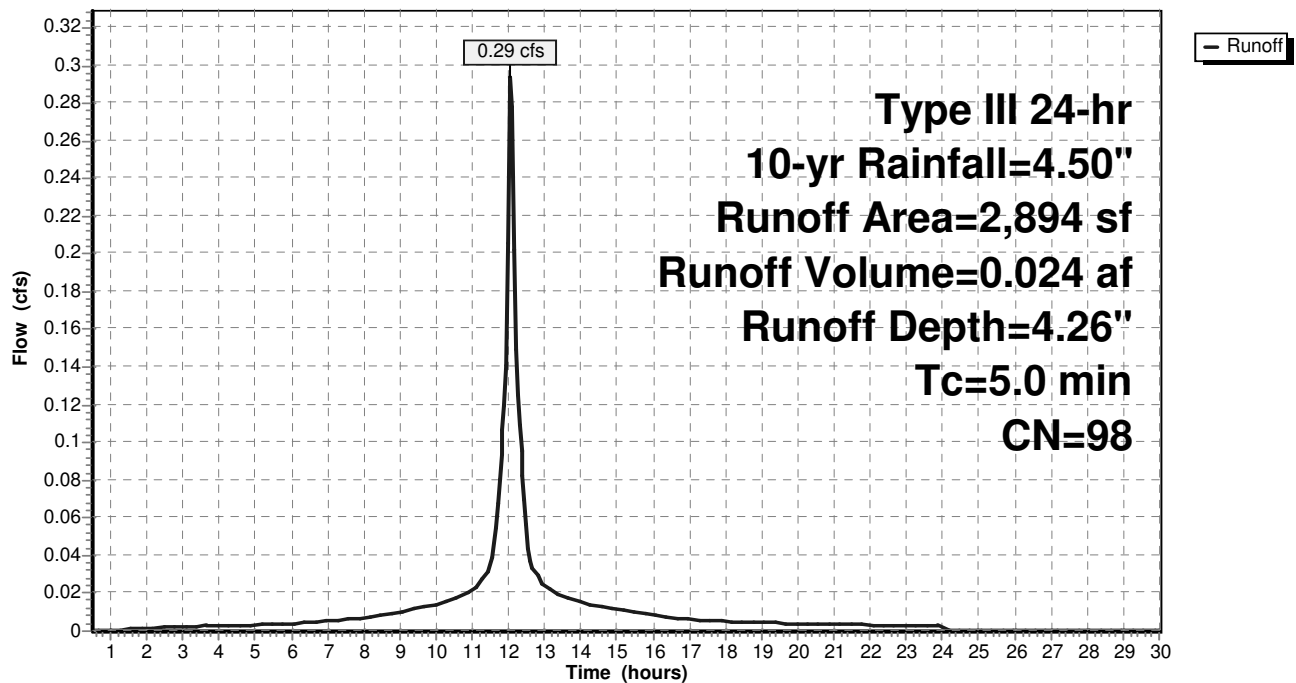
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
* 2,894	98	Building
2,894		100.00% Impervious Area

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

Subcatchment 41S: Roof flows to chambers

Hydrograph



91-95 Lowell Rd.

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

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Summary for Pond 2P: Overflows to Basin 4P

Inflow Area = 0.877 ac, 20.06% Impervious, Inflow Depth = 0.50" for 10-yr event
 Inflow = 0.21 cfs @ 12.38 hrs, Volume= 0.037 af
 Outflow = 0.13 cfs @ 12.67 hrs, Volume= 0.037 af, Atten= 38%, Lag= 17.6 min
 Discarded = 0.13 cfs @ 12.67 hrs, Volume= 0.037 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.19' @ 12.67 hrs Surf.Area= 703 sf Storage= 121 cf

Plug-Flow detention time= 4.8 min calculated for 0.036 af (100% of inflow)
 Center-of-Mass det. time= 4.7 min (942.8 - 938.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.00'	3,152 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.00	556	120.0	0	0	556	
208.00	2,902	227.5	3,152	3,152	3,549	

Device	Routing	Invert	Outlet Devices													
#1	Primary	207.00'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	206.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.13 cfs @ 12.67 hrs HW=206.19' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=206.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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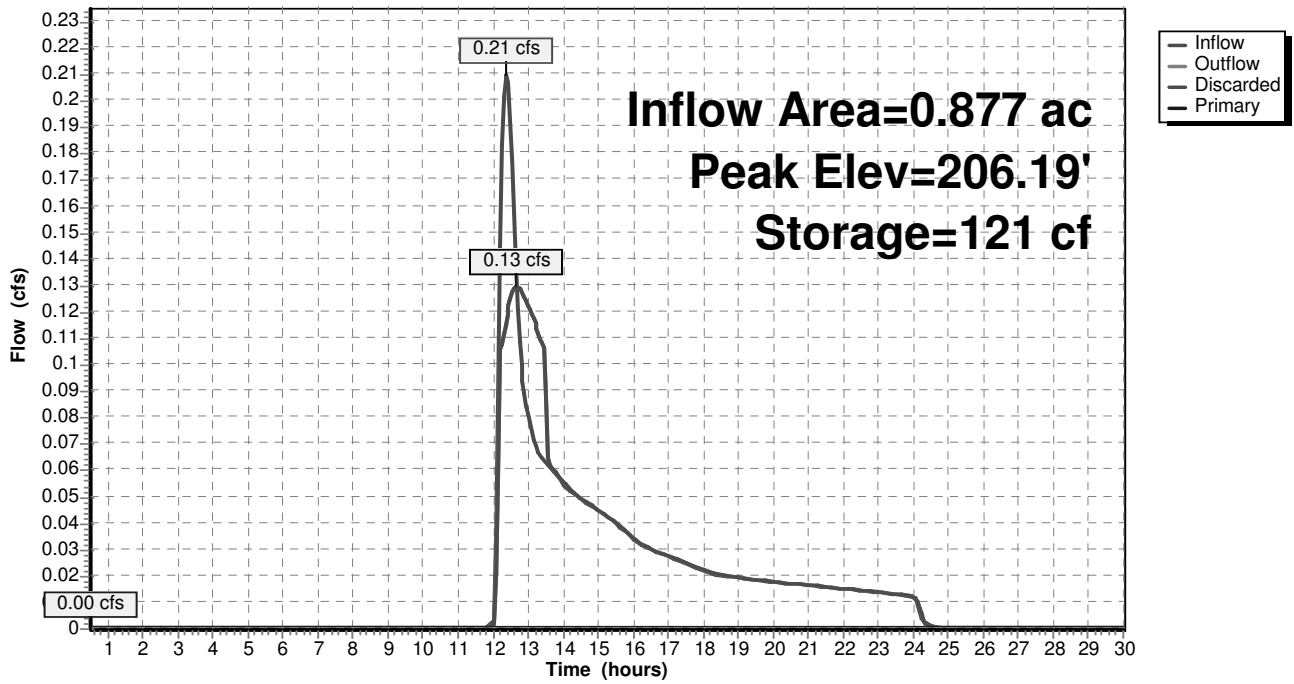
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Type III 24-hr 10-yr Rainfall=4.50"

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Pond 2P: Overflows to Basin 4P

Hydrograph



91-95 Lowell Rd.

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

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Summary for Pond 3P: Overflows to Lowell Rd.

Inflow Area = 0.875 ac, 8.20% Impervious, Inflow Depth = 0.40" for 10-yr event
 Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.029 af
 Outflow = 0.11 cfs @ 12.29 hrs, Volume= 0.029 af, Atten= 61%, Lag= 12.8 min
 Discarded = 0.11 cfs @ 12.29 hrs, Volume= 0.029 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.23' @ 12.29 hrs Surf.Area= 611 sf Storage= 125 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 4.2 min (822.1 - 817.9)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	770 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	500	100.0	0	0	500	
200.00	1,077	195.0	770	770	2,735	

Device	Routing	Invert	Outlet Devices													
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.11 cfs @ 12.29 hrs HW=199.22' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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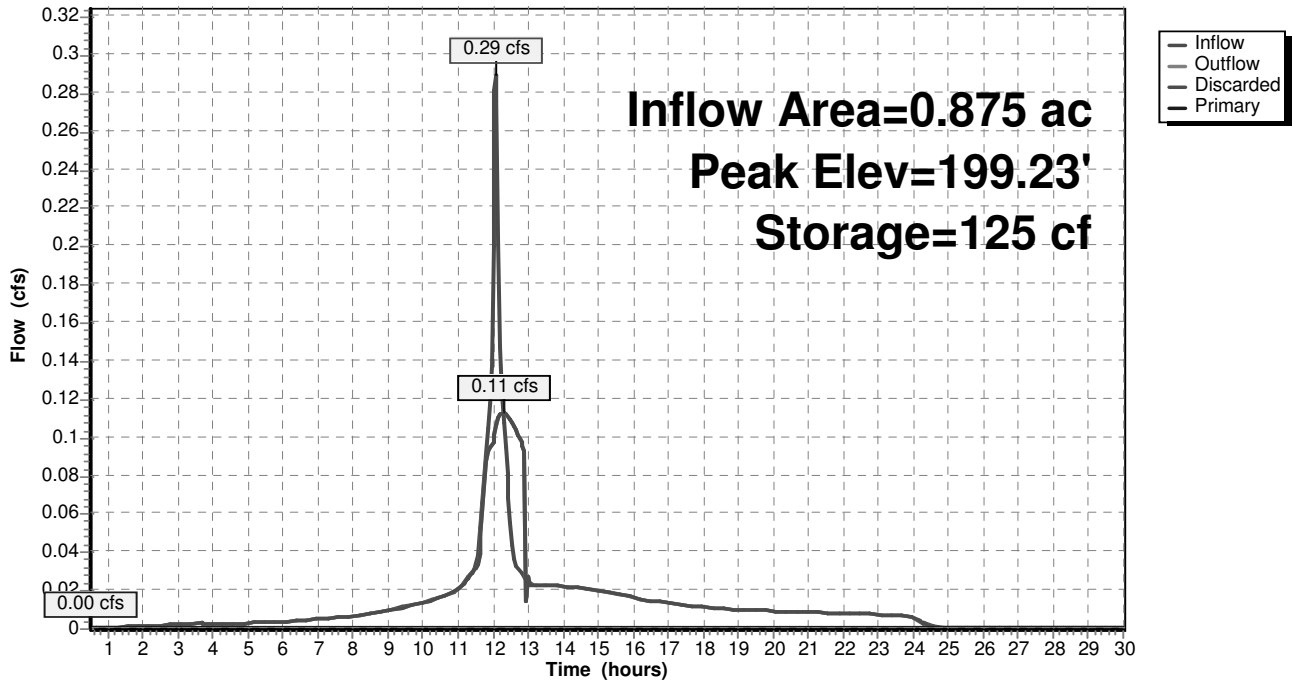
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Type III 24-hr 10-yr Rainfall=4.50"

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Pond 3P: Overflows to Lowell Rd.

Hydrograph



91-95 Lowell Rd.

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

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Summary for Pond 4P: Overflows to Lowell Rd.

Inflow Area = 1.456 ac, 18.89% Impervious, Inflow Depth = 0.16" for 10-yr event
 Inflow = 0.09 cfs @ 12.53 hrs, Volume= 0.020 af
 Outflow = 0.06 cfs @ 12.82 hrs, Volume= 0.020 af, Atten= 32%, Lag= 17.4 min
 Discarded = 0.06 cfs @ 12.82 hrs, Volume= 0.020 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.12' @ 12.82 hrs Surf.Area= 338 sf Storage= 40 cf

Plug-Flow detention time= 2.6 min calculated for 0.020 af (100% of inflow)
 Center-of-Mass det. time= 2.6 min (960.7 - 958.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	472 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	300	75.0	0	0	300	
200.00	668	151.0	472	472	1,671	

Device	Routing	Invert	Outlet Devices													
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.06 cfs @ 12.82 hrs HW=199.12' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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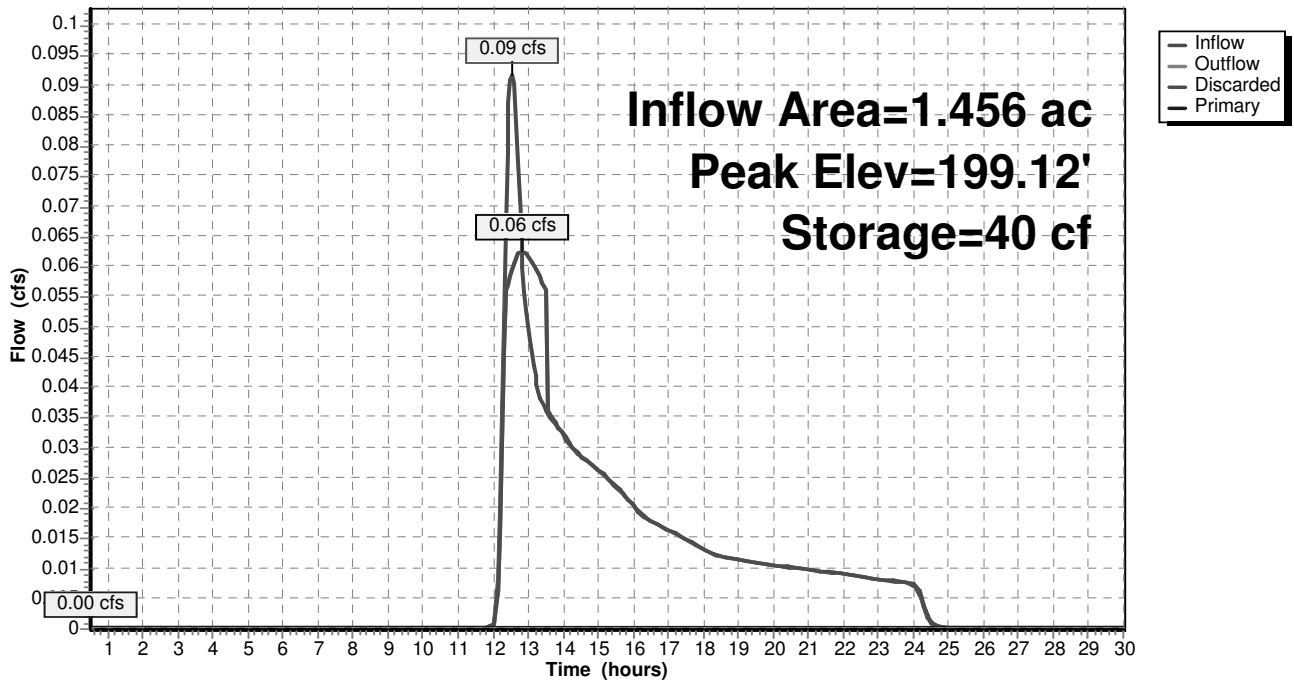
91-95 Lowell Rd.
Type III 24-hr 10-yr Rainfall=4.50"

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Pond 4P: Overflows to Lowell Rd.

Hydrograph



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Summary for Pond 41P: Roof Chamber

Inflow Area = 0.066 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10-yr event
 Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.024 af
 Outflow = 0.29 cfs @ 12.07 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.03 cfs @ 12.07 hrs, Volume= 0.002 af
 Primary = 0.27 cfs @ 12.07 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.03' @ 12.07 hrs Surf.Area= 142 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.024 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (749.0 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.25 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.25 cfs @ 0.41 fps)

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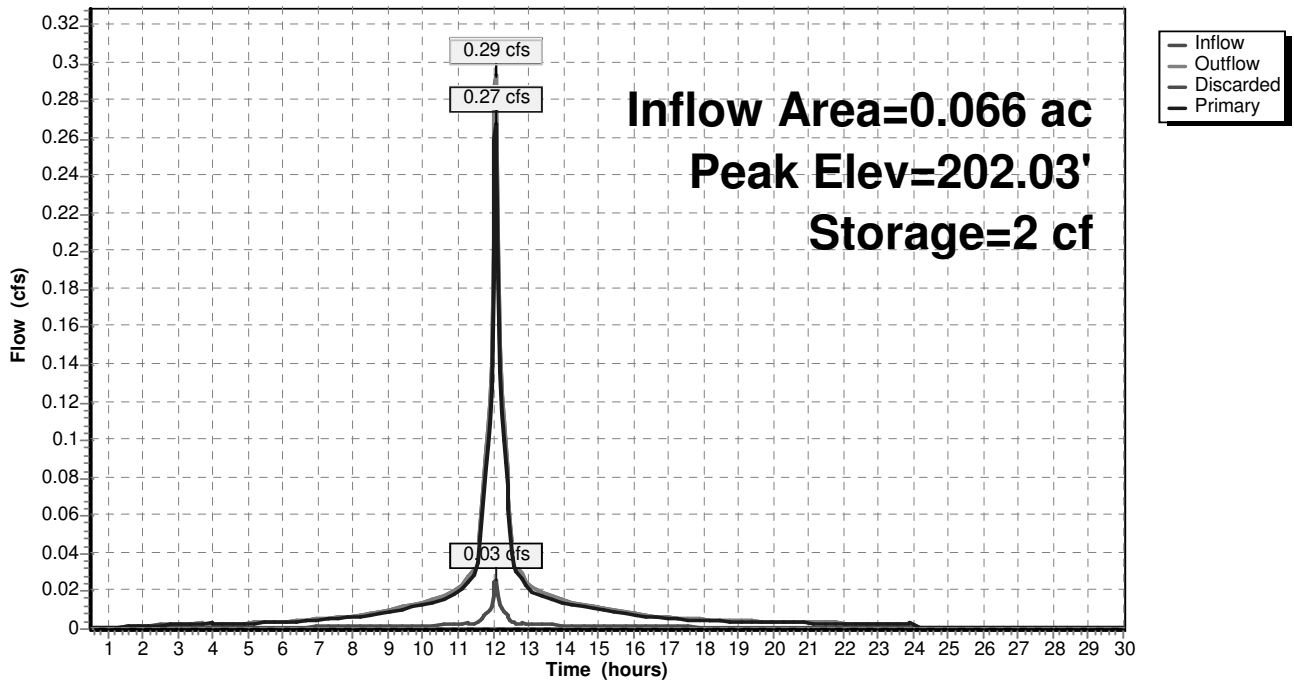
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Type III 24-hr 10-yr Rainfall=4.50"

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Pond 41P: Roof Chamber

Hydrograph



91-95 Lowell Rd.

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

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Summary for Pond 42P: Roof Chamber

Inflow Area = 0.072 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10-yr event
 Inflow = 0.32 cfs @ 12.07 hrs, Volume= 0.026 af
 Outflow = 0.32 cfs @ 12.07 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af
 Primary = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.03' @ 12.07 hrs Surf.Area= 142 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.025 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (749.0 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.08 hrs HW=202.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.28 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.28 cfs @ 0.42 fps)

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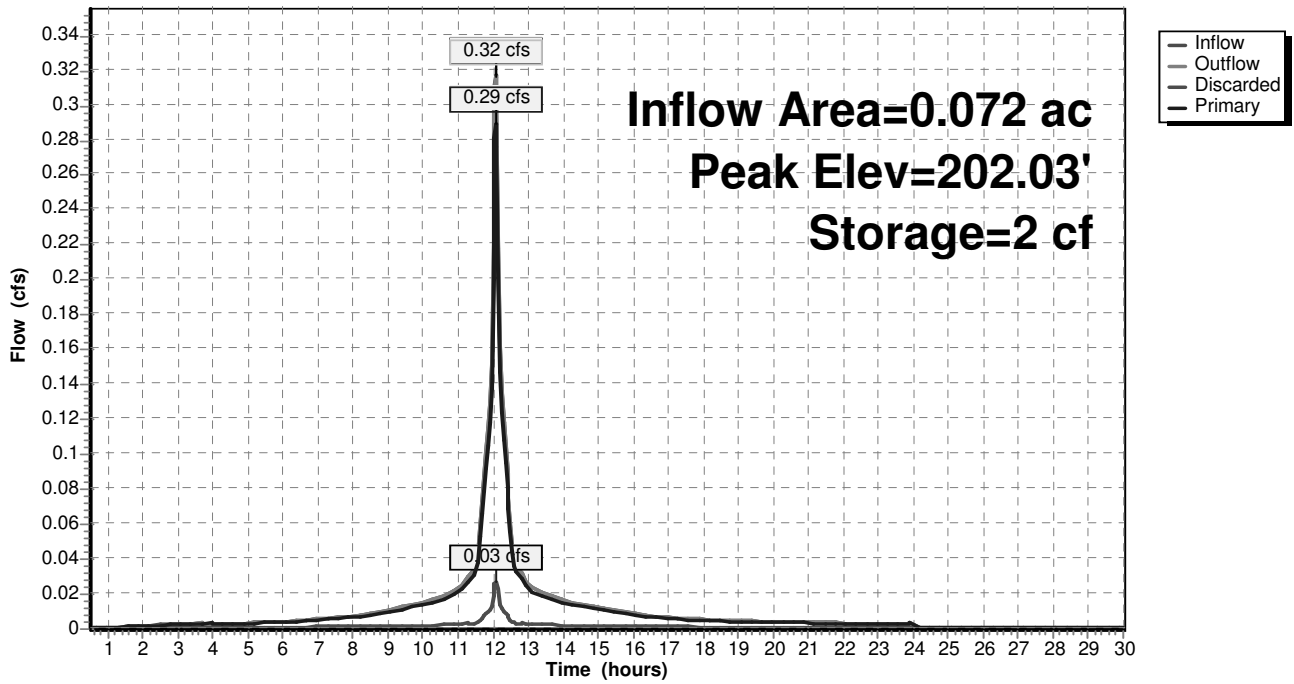
91-95 Lowell Rd.
Type III 24-hr 10-yr Rainfall=4.50"

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Pond 42P: Roof Chamber

Hydrograph



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

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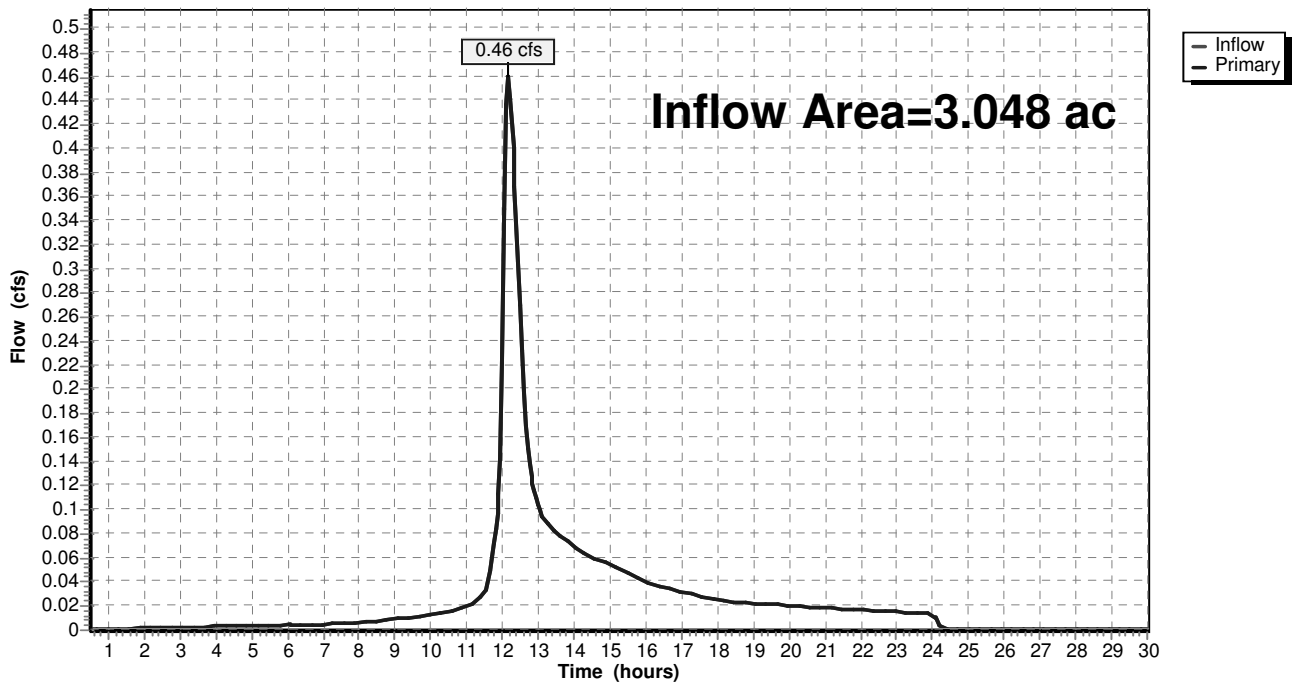
Summary for Link 41L: Lowell Rd.

Inflow Area = 3.048 ac, 19.53% Impervious, Inflow Depth = 0.24" for 10-yr event
Inflow = 0.46 cfs @ 12.17 hrs, Volume= 0.062 af
Primary = 0.46 cfs @ 12.17 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs

Link 41L: Lowell Rd.

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 10S: Site flows to Basin 2P

Runoff = 0.43 cfs @ 12.28 hrs, Volume= 0.060 af, Depth= 0.82"

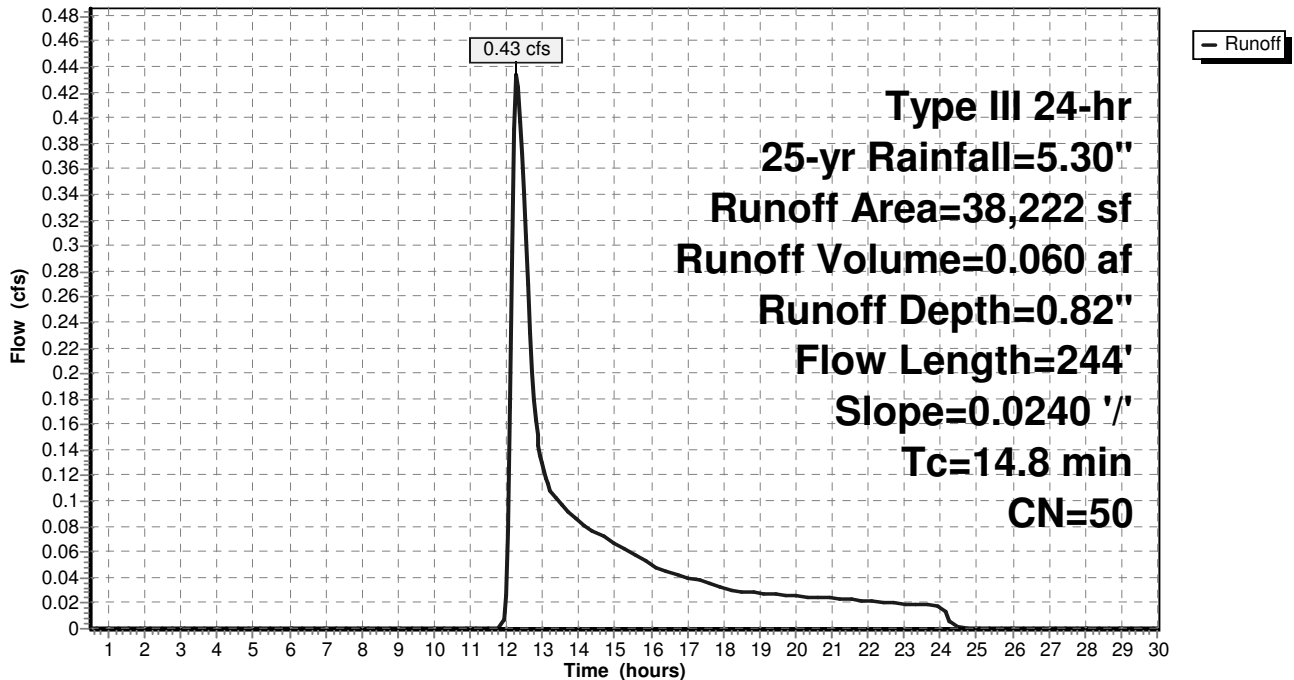
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
13,331	36	Woods, Fair, HSG A
* 3,328	98	Buildings
17,223	39	>75% Grass cover, Good, HSG A
* 4,340	98	Driveway
38,222	50	Weighted Average
30,554		79.94% Pervious Area
7,668		20.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	244	0.0240	0.27		Lag/CN Method, Overland

Subcatchment 10S: Site flows to Basin 2P

Hydrograph



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Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 20S: Site flows to Basin 4P

Runoff = 0.20 cfs @ 12.44 hrs, Volume= 0.034 af, Depth= 0.70"

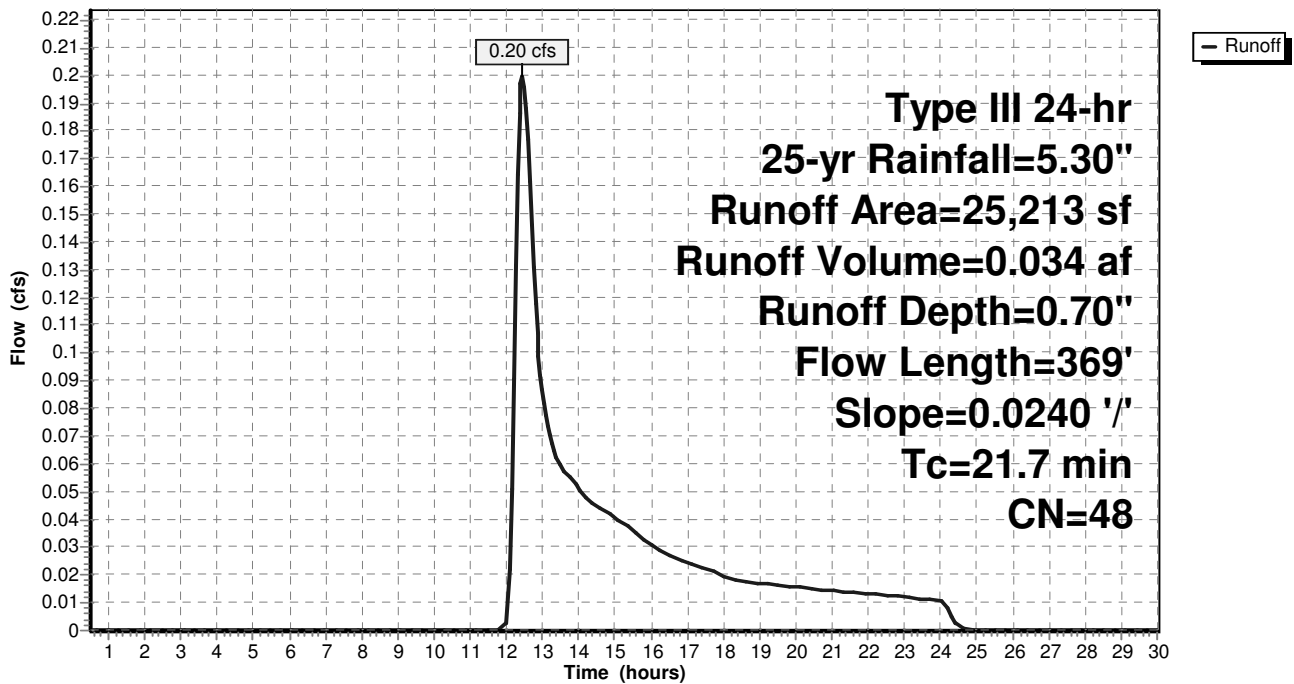
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
9,701	36	Woods, Fair, HSG A
11,195	39	>75% Grass cover, Good, HSG A
* 4,317	98	Driveway
25,213	48	Weighted Average
20,896		82.88% Pervious Area
4,317		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	369	0.0240	0.28		Lag/CN Method, Overland

Subcatchment 20S: Site flows to Basin 4P

Hydrograph



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Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 30S: Site flows to Basin 3P

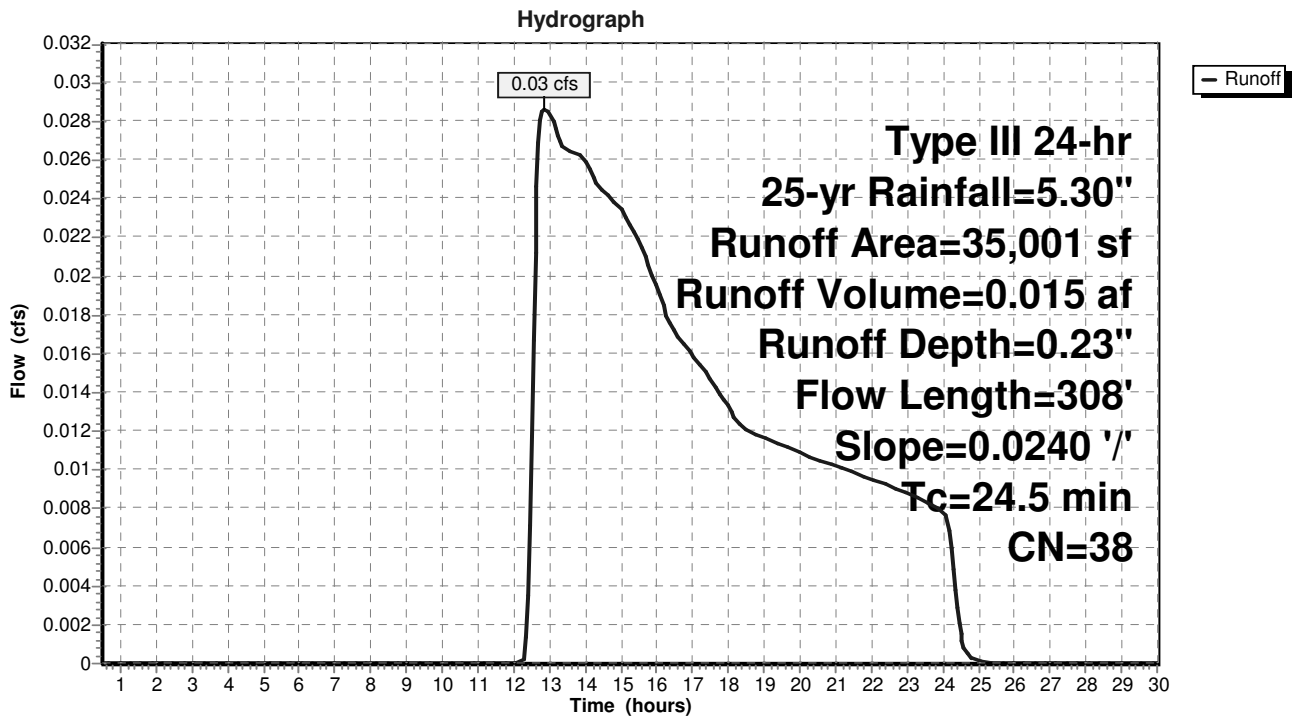
Runoff = 0.03 cfs @ 12.85 hrs, Volume= 0.015 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
3,367	36	Woods, Fair, HSG A
3,359	36	Woods, Fair, HSG A
* 0	98	Buildiing
28,275	39	>75% Grass cover, Good, HSG A
35,001	38	Weighted Average
35,001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	308	0.0240	0.21		Lag/CN Method, Overland

Subcatchment 30S: Site flows to Basin 3P



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Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 31S: Roof flows to chambers

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.030 af, Depth= 5.06"

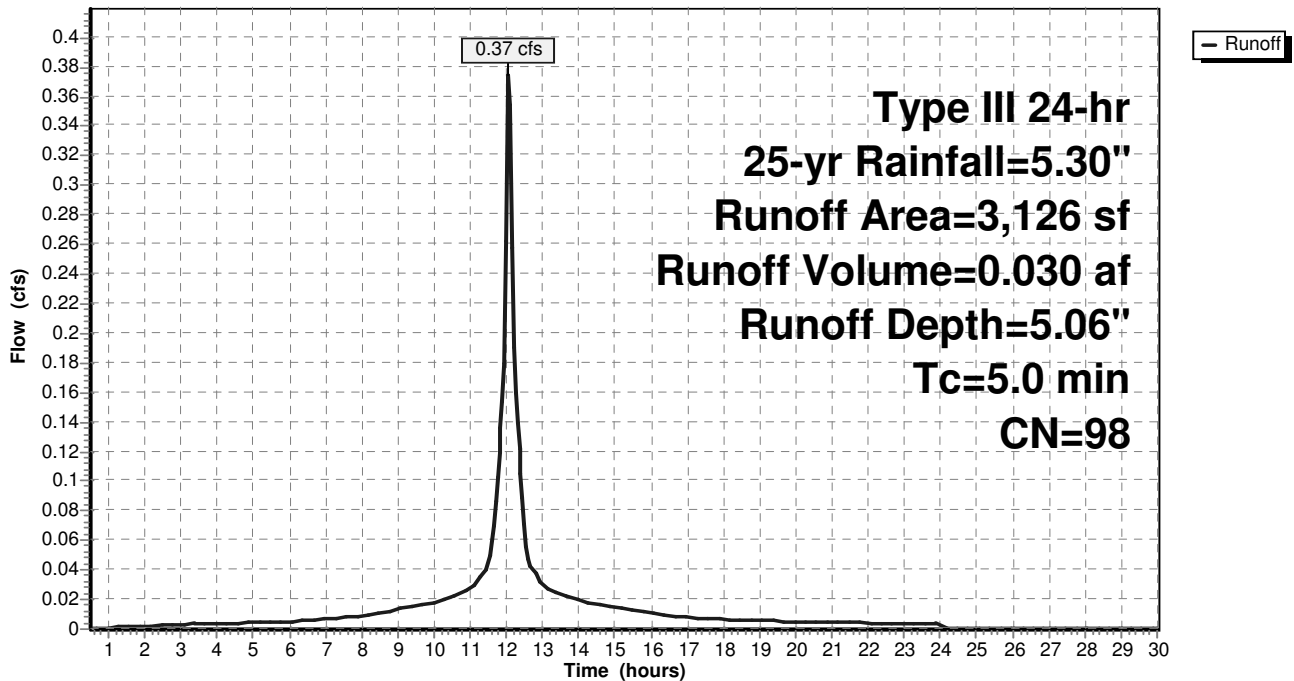
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
* 3,126	98	Building
3,126		100.00% Impervious Area

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

Subcatchment 31S: Roof flows to chambers

Hydrograph



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Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 40S: Site flows to Lowell Rd

Runoff = 0.57 cfs @ 12.21 hrs, Volume= 0.061 af, Depth= 1.13"

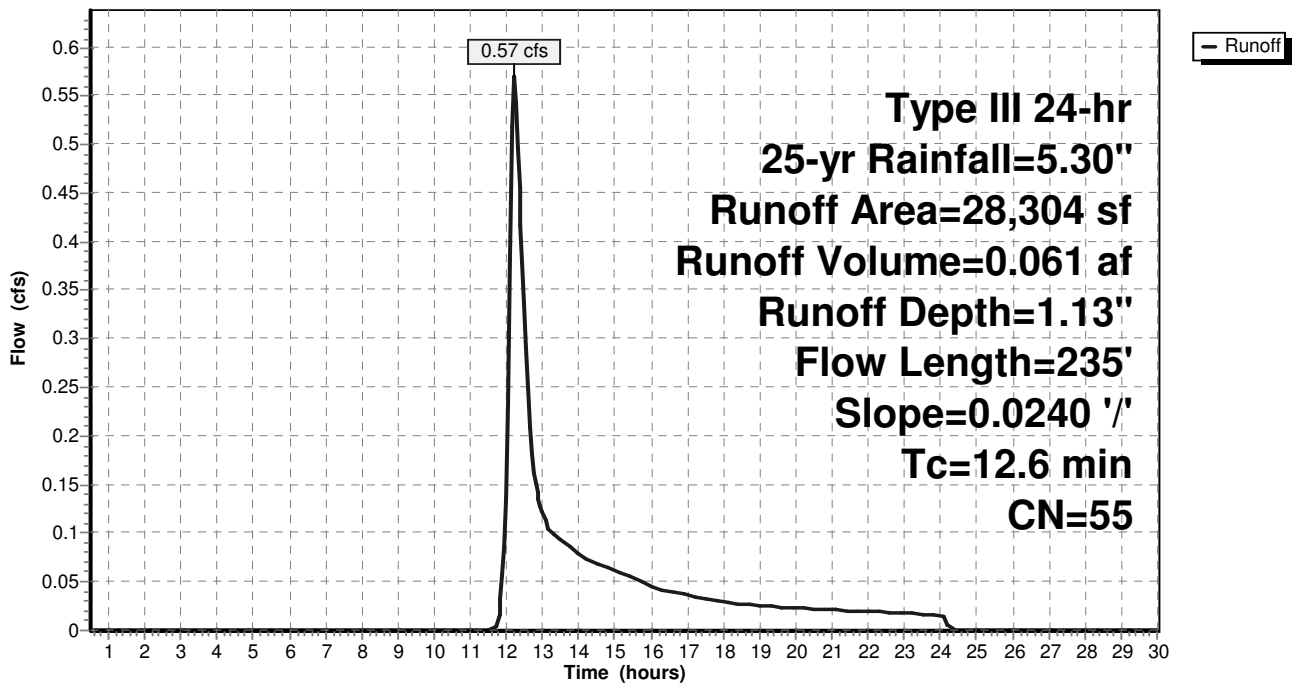
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
613	36	Woods, Fair, HSG A
* 0	98	Building
19,774	39	>75% Grass cover, Good, HSG A
* 545	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
28,304	55	Weighted Average
20,387		72.03% Pervious Area
7,917		27.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	235	0.0240	0.31		Lag/CN Method, overland

Subcatchment 40S: Site flows to Lowell Rd

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Subcatchment 41S: Roof flows to chambers

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 0.028 af, Depth= 5.06"

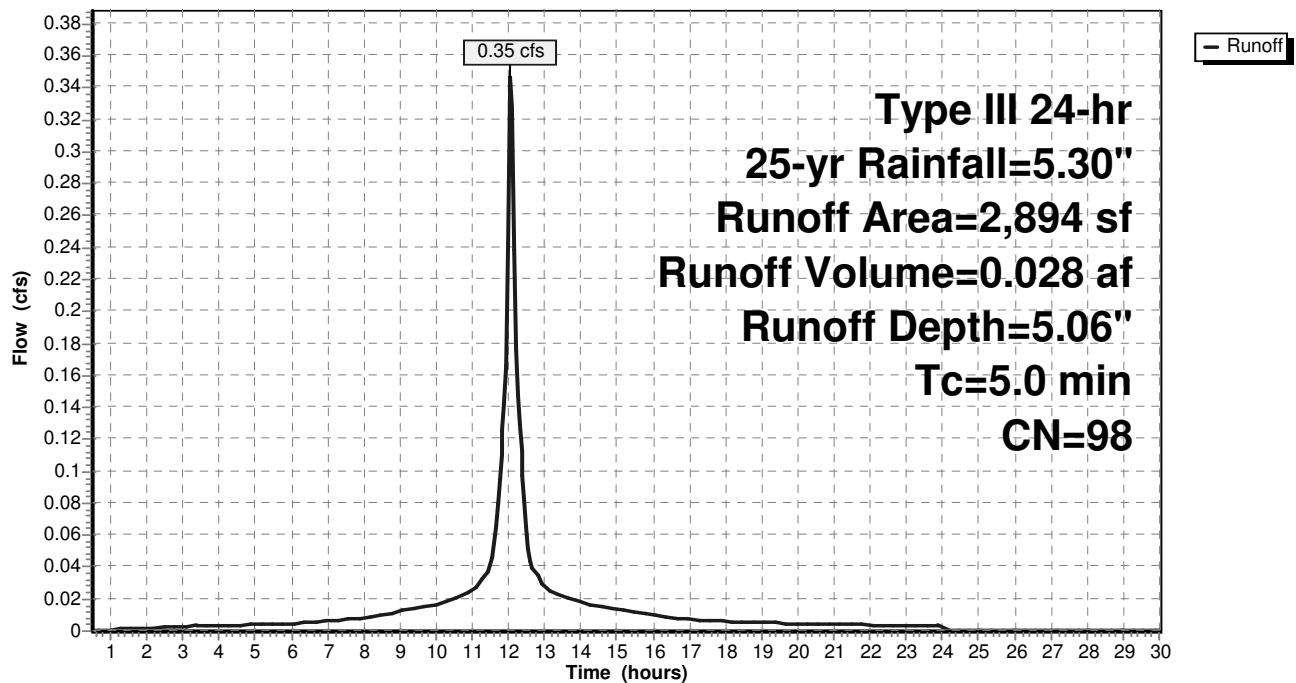
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=5.30"

Area (sf)	CN	Description
* 2,894	98	Building
2,894		100.00% Impervious Area

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

Subcatchment 41S: Roof flows to chambers

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Pond 2P: Overflows to Basin 4P

Inflow Area = 0.877 ac, 20.06% Impervious, Inflow Depth = 0.82" for 25-yr event
 Inflow = 0.43 cfs @ 12.28 hrs, Volume= 0.060 af
 Outflow = 0.19 cfs @ 12.74 hrs, Volume= 0.060 af, Atten= 57%, Lag= 27.6 min
 Discarded = 0.19 cfs @ 12.74 hrs, Volume= 0.060 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.54' @ 12.74 hrs Surf.Area= 1,007 sf Storage= 415 cf

Plug-Flow detention time= 15.1 min calculated for 0.060 af (100% of inflow)
 Center-of-Mass det. time= 15.1 min (931.0 - 915.9)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.00'	3,152 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.00	556	120.0	0	0	556	
208.00	2,902	227.5	3,152	3,152	3,549	

Device	Routing	Invert	Outlet Devices													
#1	Primary	207.00'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	206.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.19 cfs @ 12.74 hrs HW=206.54' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=206.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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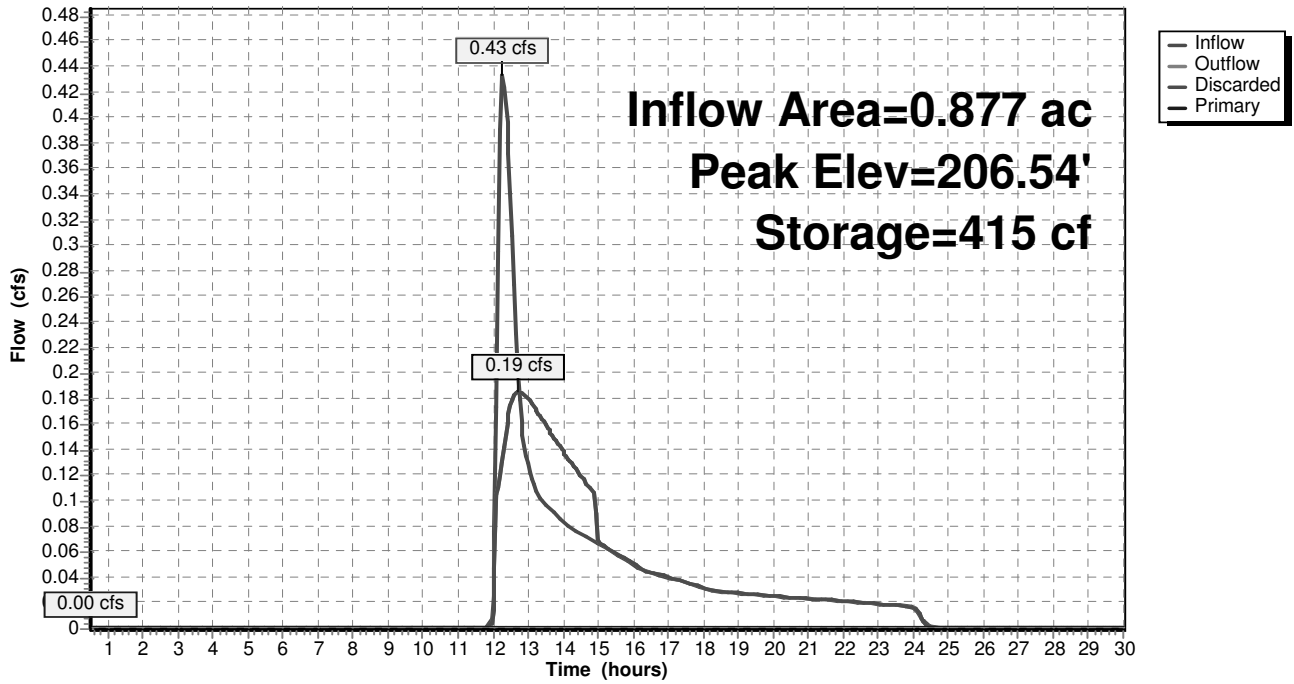
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Type III 24-hr 25-yr Rainfall=5.30"

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Pond 2P: Overflows to Basin 4P

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Pond 3P: Overflows to Lowell Rd.

Inflow Area = 0.875 ac, 8.20% Impervious, Inflow Depth = 0.59" for 25-yr event
 Inflow = 0.35 cfs @ 12.07 hrs, Volume= 0.043 af
 Outflow = 0.12 cfs @ 12.32 hrs, Volume= 0.043 af, Atten= 65%, Lag= 15.2 min
 Discarded = 0.12 cfs @ 12.32 hrs, Volume= 0.043 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.31' @ 12.32 hrs Surf.Area= 653 sf Storage= 176 cf

Plug-Flow detention time= 5.5 min calculated for 0.043 af (100% of inflow)
 Center-of-Mass det. time= 5.5 min (849.2 - 843.7)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	770 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	500	100.0	0	0	500	
200.00	1,077	195.0	770	770	2,735	

Device	Routing	Invert	Outlet Devices													
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.12 cfs @ 12.32 hrs HW=199.30' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=199.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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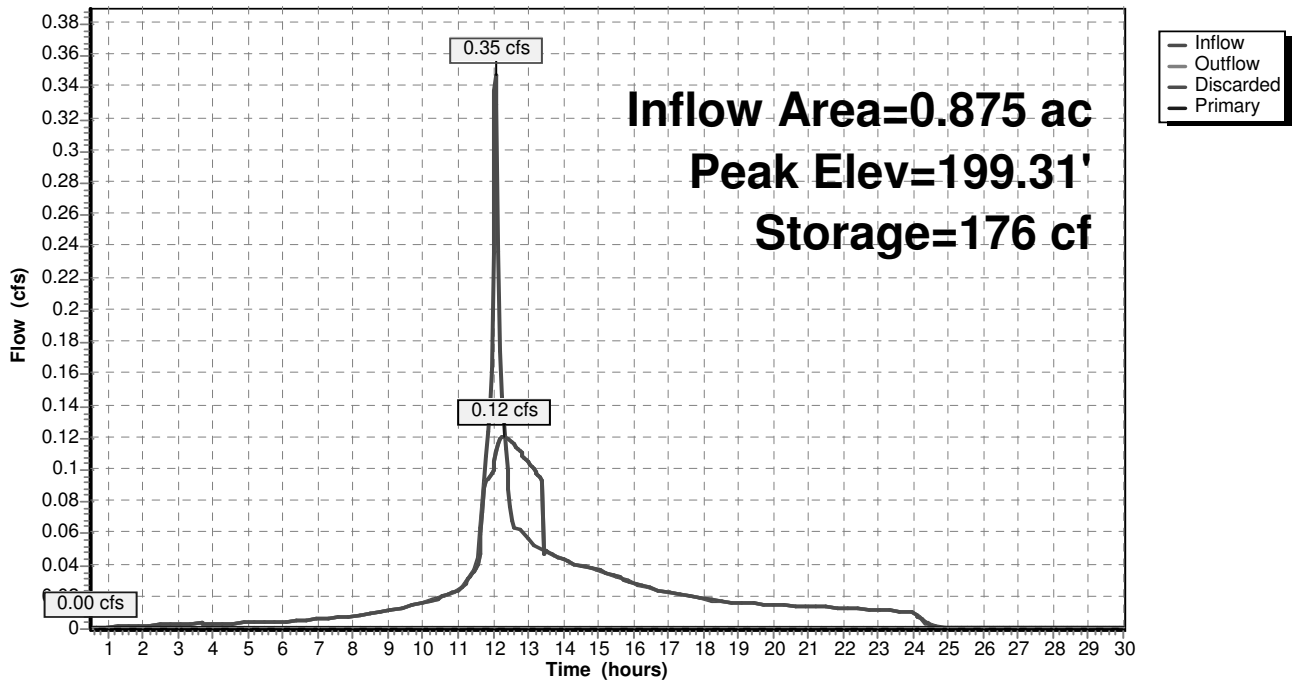
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Type III 24-hr 25-yr Rainfall=5.30"

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Pond 3P: Overflows to Lowell Rd.

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Pond 4P: Overflows to Lowell Rd.

Inflow Area = 1.456 ac, 18.89% Impervious, Inflow Depth = 0.28" for 25-yr event
 Inflow = 0.20 cfs @ 12.44 hrs, Volume= 0.034 af
 Outflow = 0.12 cfs @ 12.82 hrs, Volume= 0.034 af, Atten= 42%, Lag= 22.7 min
 Discarded = 0.09 cfs @ 12.82 hrs, Volume= 0.033 af
 Primary = 0.03 cfs @ 12.82 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.52' @ 12.82 hrs Surf.Area= 473 sf Storage= 199 cf

Plug-Flow detention time= 14.8 min calculated for 0.034 af (100% of inflow)
 Center-of-Mass det. time= 14.8 min (947.1 - 932.3)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	472 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	300	75.0	0	0	300	
200.00	668	151.0	472	472	1,671	

Device	Routing	Invert	Outlet Devices											
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32											
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area											

Discarded OutFlow Max=0.09 cfs @ 12.82 hrs HW=199.52' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.03 cfs @ 12.82 hrs HW=199.52' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.35 fps)

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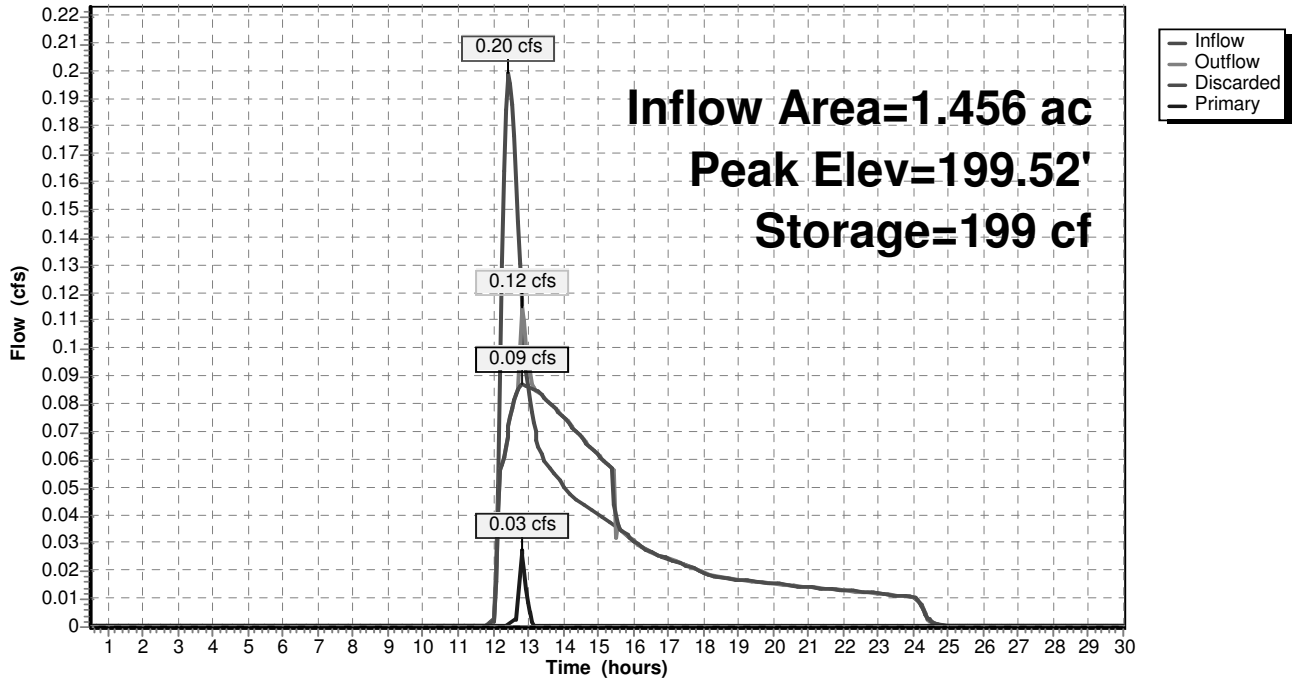
91-95 Lowell Rd.
Type III 24-hr 25-yr Rainfall=5.30"

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Pond 4P: Overflows to Lowell Rd.

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

Post-Development

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Summary for Pond 41P: Roof Chamber

Inflow Area = 0.066 ac, 100.00% Impervious, Inflow Depth = 5.06" for 25-yr event
 Inflow = 0.35 cfs @ 12.07 hrs, Volume= 0.028 af
 Outflow = 0.35 cfs @ 12.07 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af
 Primary = 0.32 cfs @ 12.07 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.03' @ 12.07 hrs Surf.Area= 142 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.028 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (746.2 - 746.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.08 hrs HW=202.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.30 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.30 cfs @ 0.43 fps)

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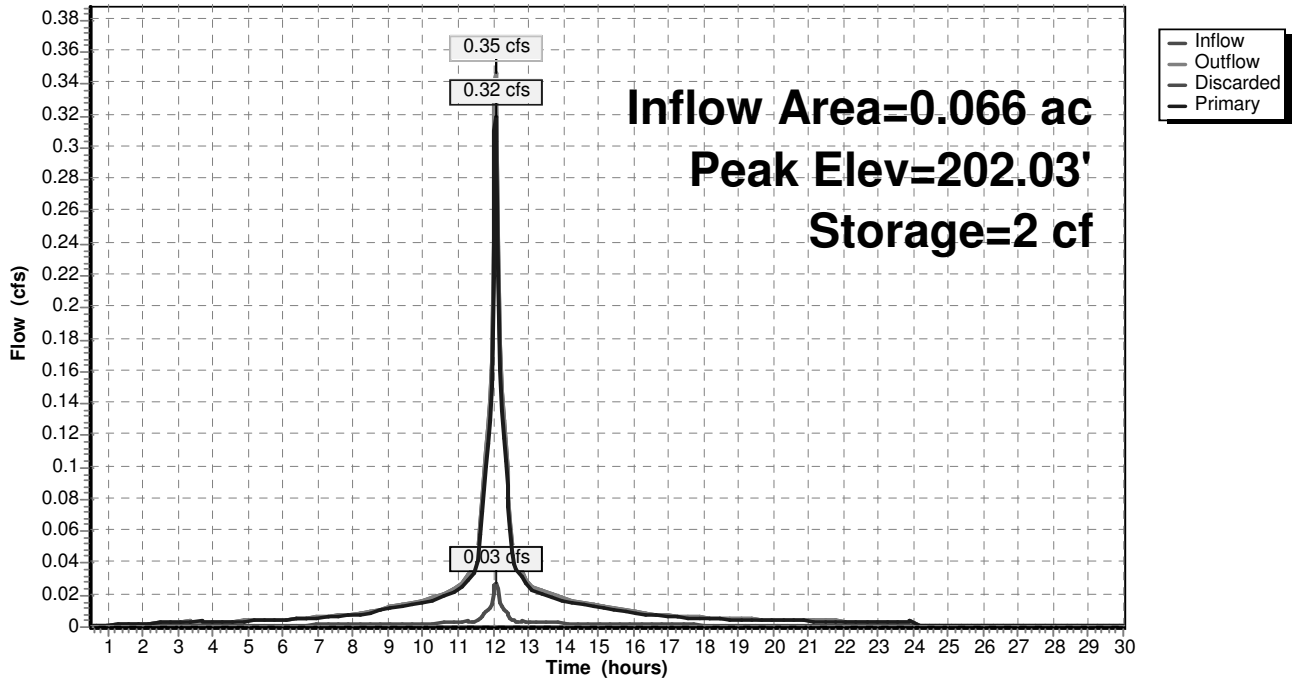
91-95 Lowell Rd.
Type III 24-hr 25-yr Rainfall=5.30"

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Pond 41P: Roof Chamber

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 25-yr Rainfall=5.30"

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Summary for Pond 42P: Roof Chamber

Inflow Area = 0.072 ac, 100.00% Impervious, Inflow Depth = 5.06" for 25-yr event
 Inflow = 0.37 cfs @ 12.07 hrs, Volume= 0.030 af
 Outflow = 0.37 cfs @ 12.07 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.1 min
 Discarded = 0.03 cfs @ 12.08 hrs, Volume= 0.003 af
 Primary = 0.35 cfs @ 12.07 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.03' @ 12.07 hrs Surf.Area= 142 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.030 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (746.2 - 746.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.08 hrs HW=202.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.32 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.32 cfs @ 0.44 fps)

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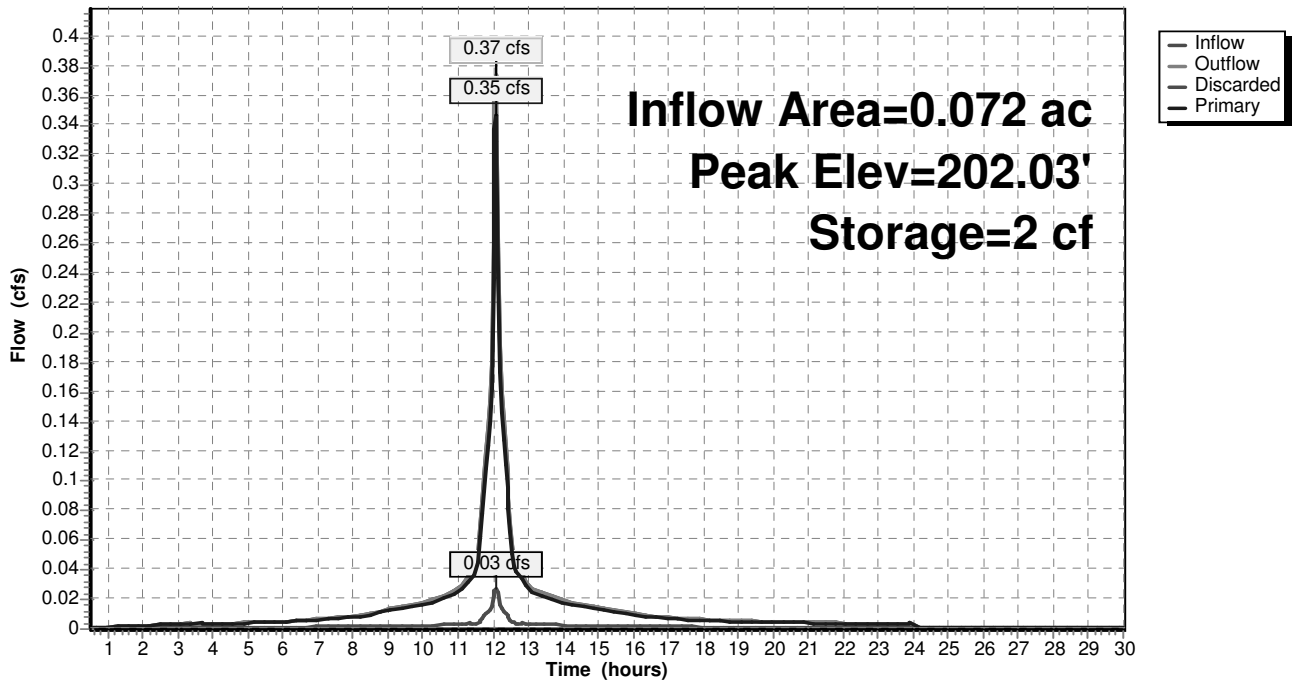
91-95 Lowell Rd.
Type III 24-hr 25-yr Rainfall=5.30"

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Pond 42P: Roof Chamber

Hydrograph



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Type III 24-hr 25-yr Rainfall=5.30"

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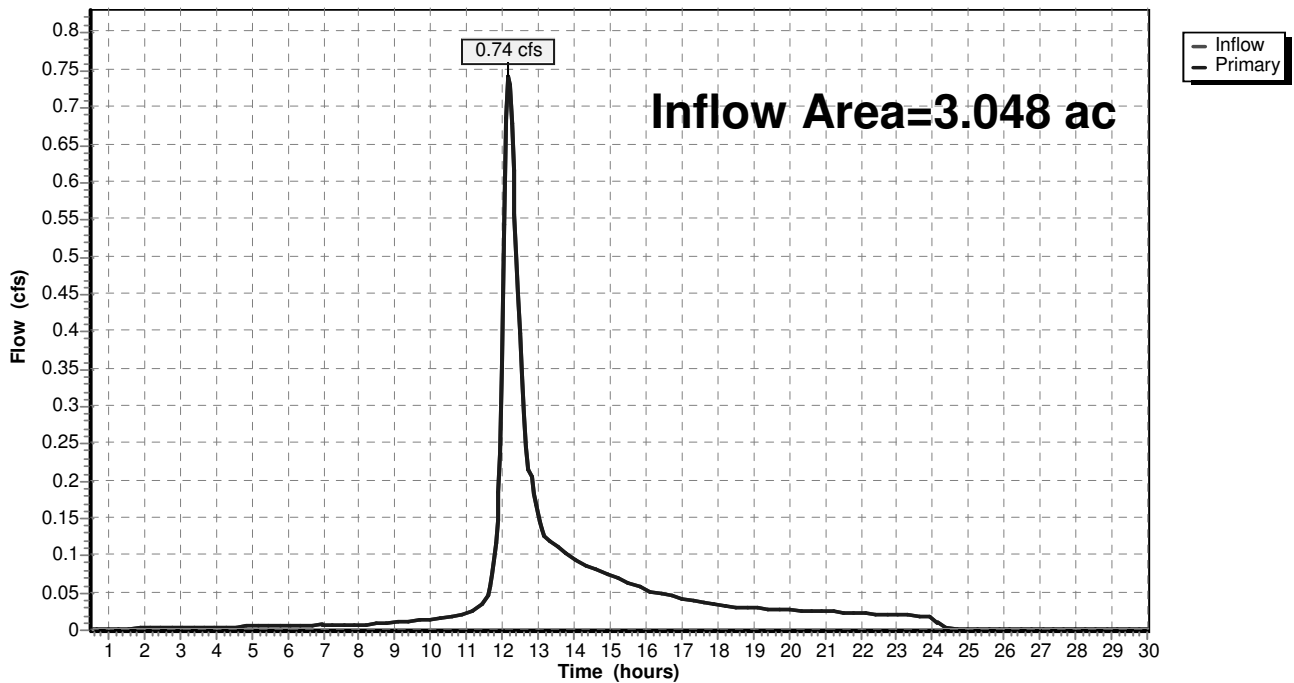
Summary for Link 41L: Lowell Rd.

Inflow Area = 3.048 ac, 19.53% Impervious, Inflow Depth = 0.34" for 25-yr event
Inflow = 0.74 cfs @ 12.17 hrs, Volume= 0.087 af
Primary = 0.74 cfs @ 12.17 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs

Link 41L: Lowell Rd.

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

Post-Development

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Summary for Subcatchment 10S: Site flows to Basin 2P

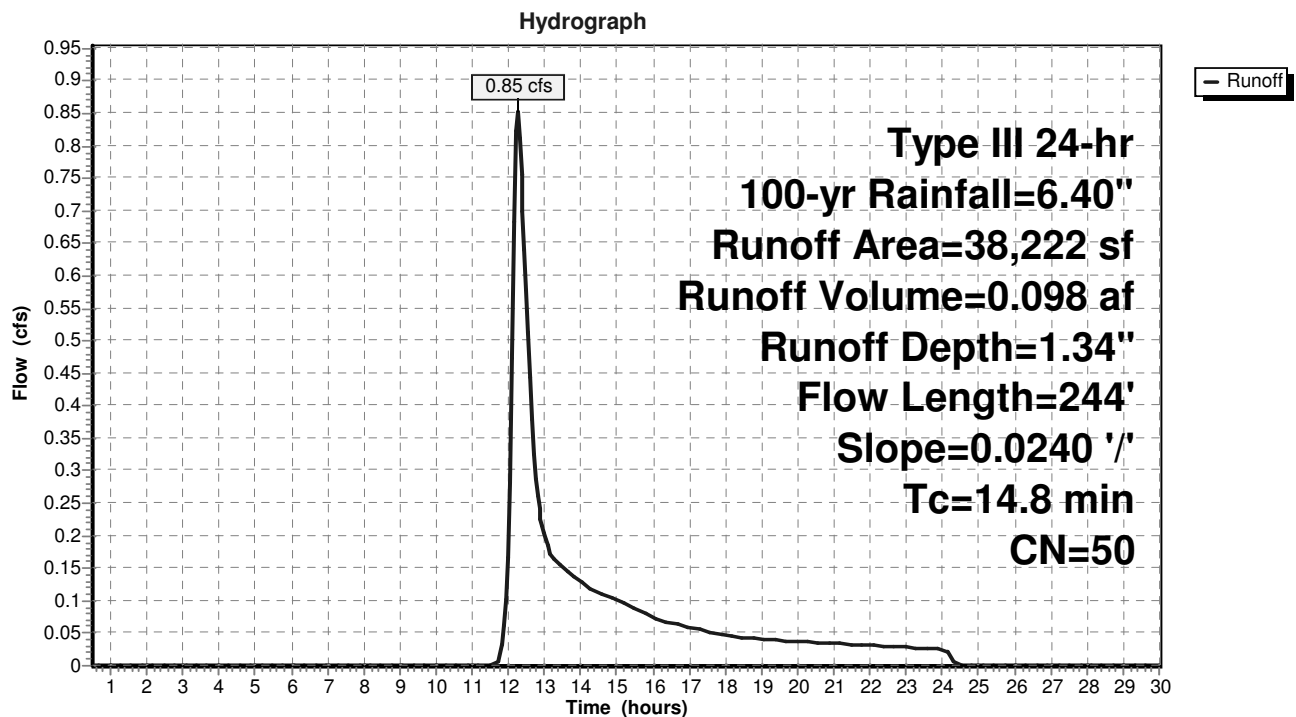
Runoff = 0.85 cfs @ 12.25 hrs, Volume= 0.098 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
13,331	36	Woods, Fair, HSG A
* 3,328	98	Buildings
17,223	39	>75% Grass cover, Good, HSG A
* 4,340	98	Driveway
38,222	50	Weighted Average
30,554		79.94% Pervious Area
7,668		20.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	244	0.0240	0.27		Lag/CN Method, Overland

Subcatchment 10S: Site flows to Basin 2P



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91-95 Lowell Rd.
Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Subcatchment 20S: Site flows to Basin 4P

Runoff = 0.41 cfs @ 12.38 hrs, Volume= 0.057 af, Depth= 1.19"

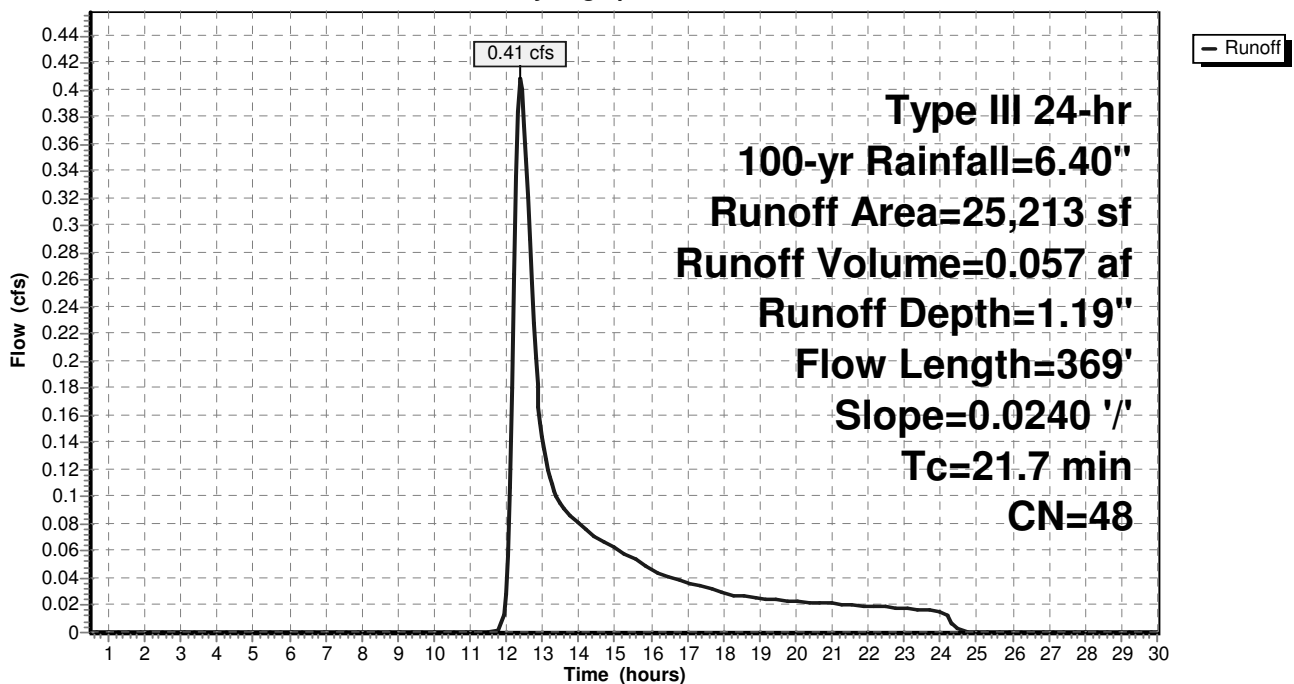
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
9,701	36	Woods, Fair, HSG A
11,195	39	>75% Grass cover, Good, HSG A
* 4,317	98	Driveway
25,213	48	Weighted Average
20,896		82.88% Pervious Area
4,317		17.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	369	0.0240	0.28		Lag/CN Method, Overland

Subcatchment 20S: Site flows to Basin 4P

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

Post-Development

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Summary for Subcatchment 30S: Site flows to Basin 3P

Runoff = 0.13 cfs @ 12.61 hrs, Volume= 0.034 af, Depth= 0.51"

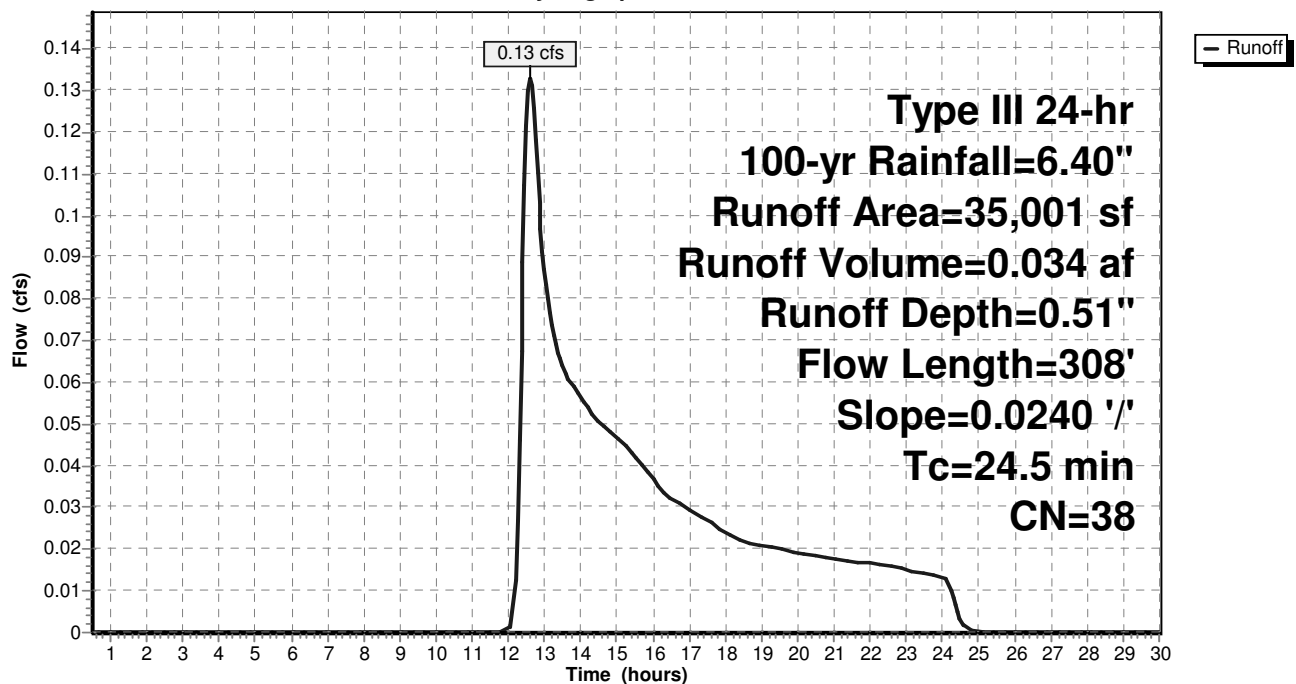
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
3,367	36	Woods, Fair, HSG A
3,359	36	Woods, Fair, HSG A
* 0	98	Buildiing
28,275	39	>75% Grass cover, Good, HSG A
35,001	38	Weighted Average
35,001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	308	0.0240	0.21		Lag/CN Method, Overland

Subcatchment 30S: Site flows to Basin 3P

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Subcatchment 31S: Roof flows to chambers

Runoff = 0.45 cfs @ 12.07 hrs, Volume= 0.037 af, Depth= 6.16"

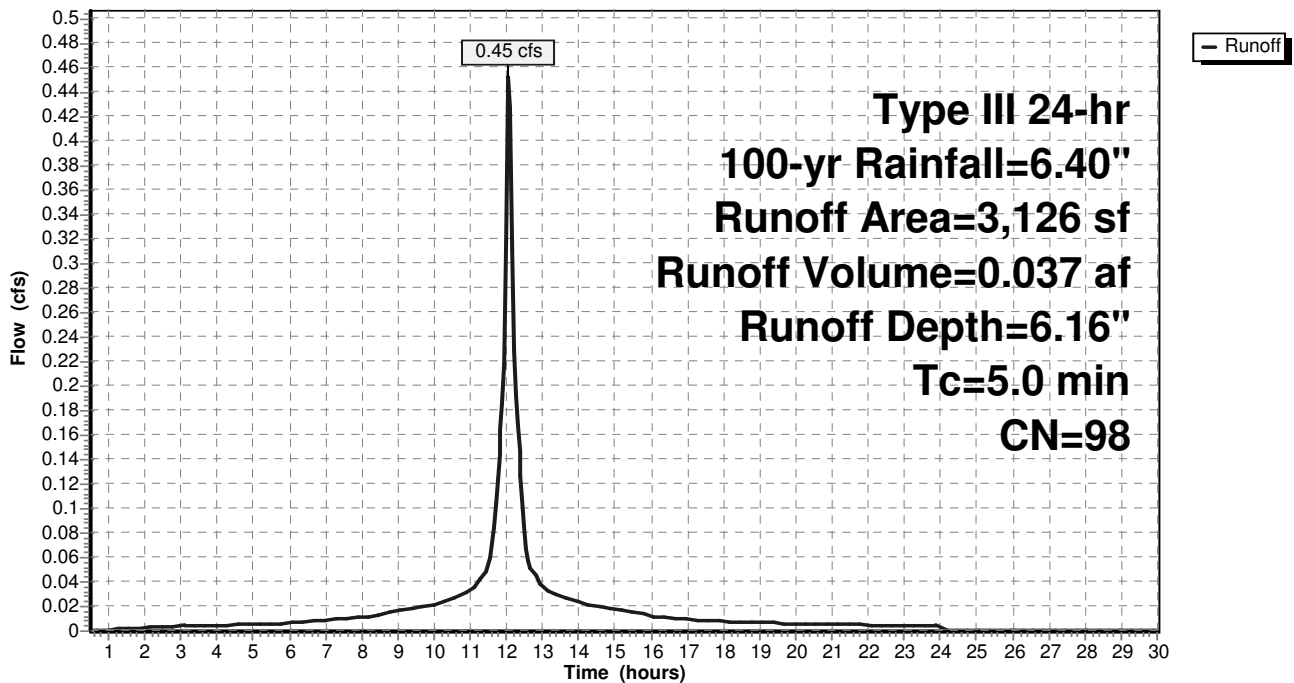
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
* 3,126	98	Building
3,126		100.00% Impervious Area

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

Subcatchment 31S: Roof flows to chambers

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Subcatchment 40S: Site flows to Lowell Rd

Runoff = 0.96 cfs @ 12.20 hrs, Volume= 0.095 af, Depth= 1.75"

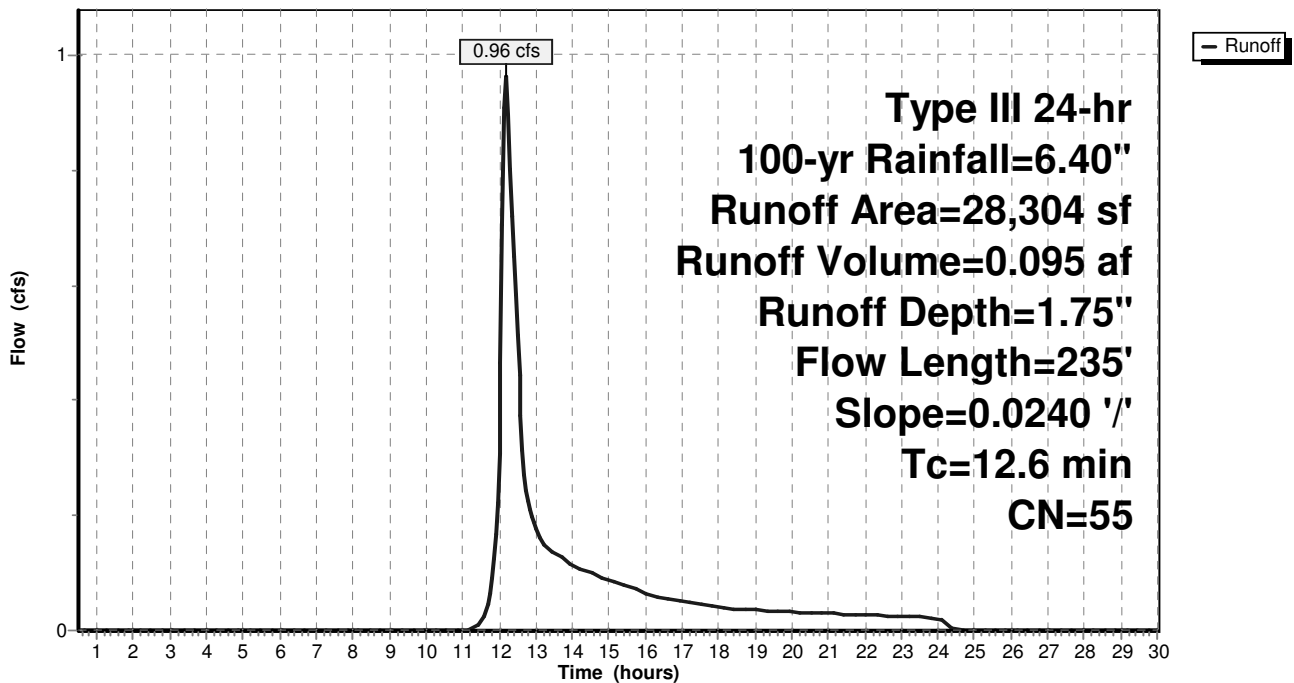
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
613	36	Woods, Fair, HSG A
* 0	98	Building
19,774	39	>75% Grass cover, Good, HSG A
* 545	98	Driveway
* 1,852	98	Driveway
* 1,846	98	Driveway
* 1,840	98	Driveway
* 1,834	98	Driveway
28,304	55	Weighted Average
20,387		72.03% Pervious Area
7,917		27.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	235	0.0240	0.31		Lag/CN Method, overland

Subcatchment 40S: Site flows to Lowell Rd

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Subcatchment 41S: Roof flows to chambers

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.034 af, Depth= 6.16"

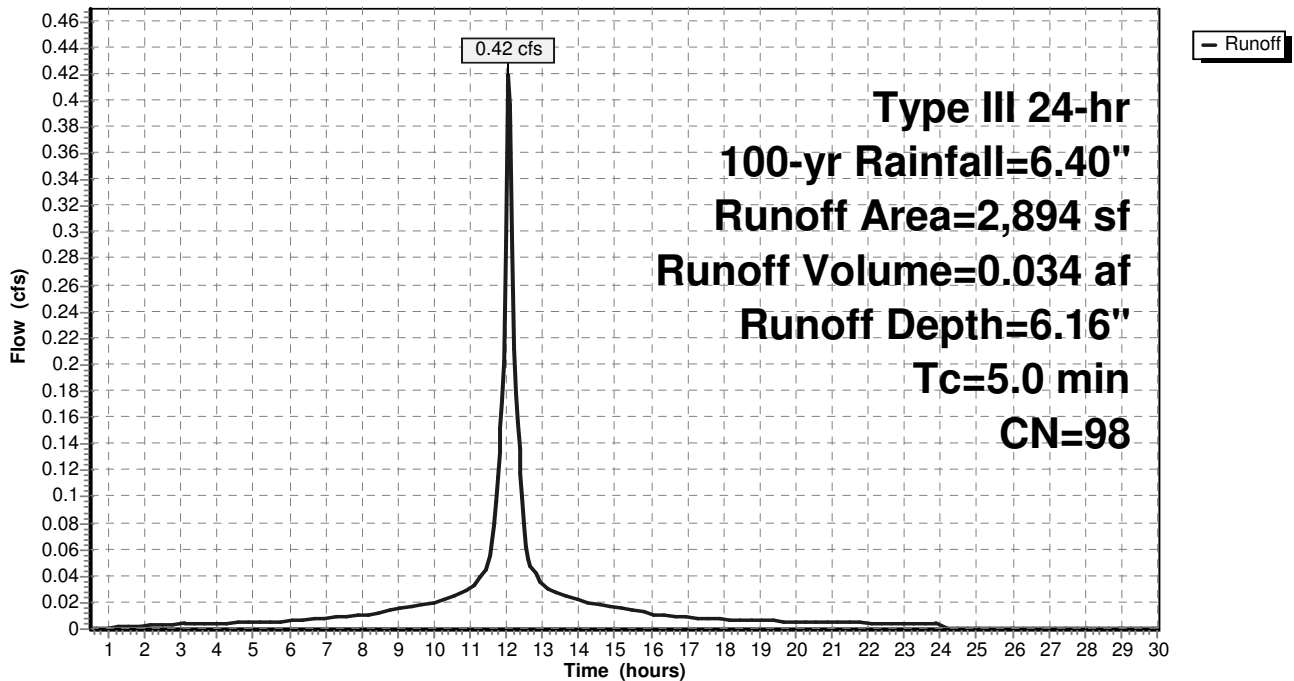
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
* 2,894	98	Building
2,894		100.00% Impervious Area

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

Subcatchment 41S: Roof flows to chambers

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Pond 2P: Overflows to Basin 4P

Inflow Area = 0.877 ac, 20.06% Impervious, Inflow Depth = 1.34" for 100-yr event
 Inflow = 0.85 cfs @ 12.25 hrs, Volume= 0.098 af
 Outflow = 0.28 cfs @ 12.77 hrs, Volume= 0.098 af, Atten= 68%, Lag= 31.6 min
 Discarded = 0.28 cfs @ 12.77 hrs, Volume= 0.098 af
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.99' @ 12.77 hrs Surf.Area= 1,491 sf Storage= 978 cf

Plug-Flow detention time= 30.8 min calculated for 0.098 af (100% of inflow)
 Center-of-Mass det. time= 30.7 min (927.3 - 896.5)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.00'	3,152 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.00	556	120.0	0	0	556	
208.00	2,902	227.5	3,152	3,152	3,549	

Device	Routing	Invert	Outlet Devices											
#1	Primary	207.00'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32											
#2	Discarded	206.00'	8.000 in/hr Exfiltration over Surface area											

Discarded OutFlow Max=0.28 cfs @ 12.77 hrs HW=206.99' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=206.00' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development

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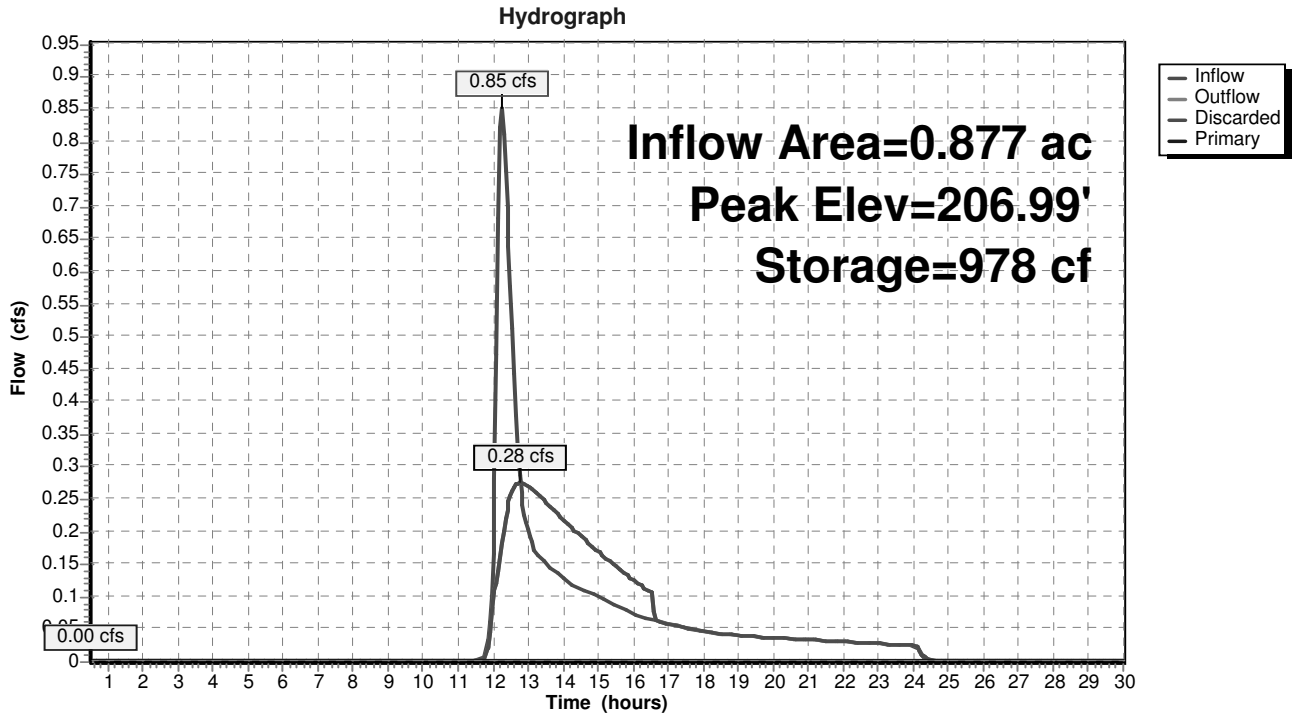
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Type III 24-hr 100-yr Rainfall=6.40"

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Pond 2P: Overflows to Basin 4P



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

Post-Development

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Summary for Pond 3P: Overflows to Lowell Rd.

Inflow Area = 0.875 ac, 8.20% Impervious, Inflow Depth = 0.93" for 100-yr event
 Inflow = 0.43 cfs @ 12.07 hrs, Volume= 0.068 af
 Outflow = 0.17 cfs @ 12.71 hrs, Volume= 0.068 af, Atten= 60%, Lag= 38.1 min
 Discarded = 0.14 cfs @ 12.71 hrs, Volume= 0.067 af
 Primary = 0.03 cfs @ 12.71 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.52' @ 12.71 hrs Surf.Area= 772 sf Storage= 328 cf

Plug-Flow detention time= 13.4 min calculated for 0.067 af (100% of inflow)
 Center-of-Mass det. time= 13.4 min (871.2 - 857.9)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	770 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	500	100.0	0	0	500	
200.00	1,077	195.0	770	770	2,735	

Device	Routing	Invert	Outlet Devices													
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.14 cfs @ 12.71 hrs HW=199.52' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.03 cfs @ 12.71 hrs HW=199.52' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.35 fps)

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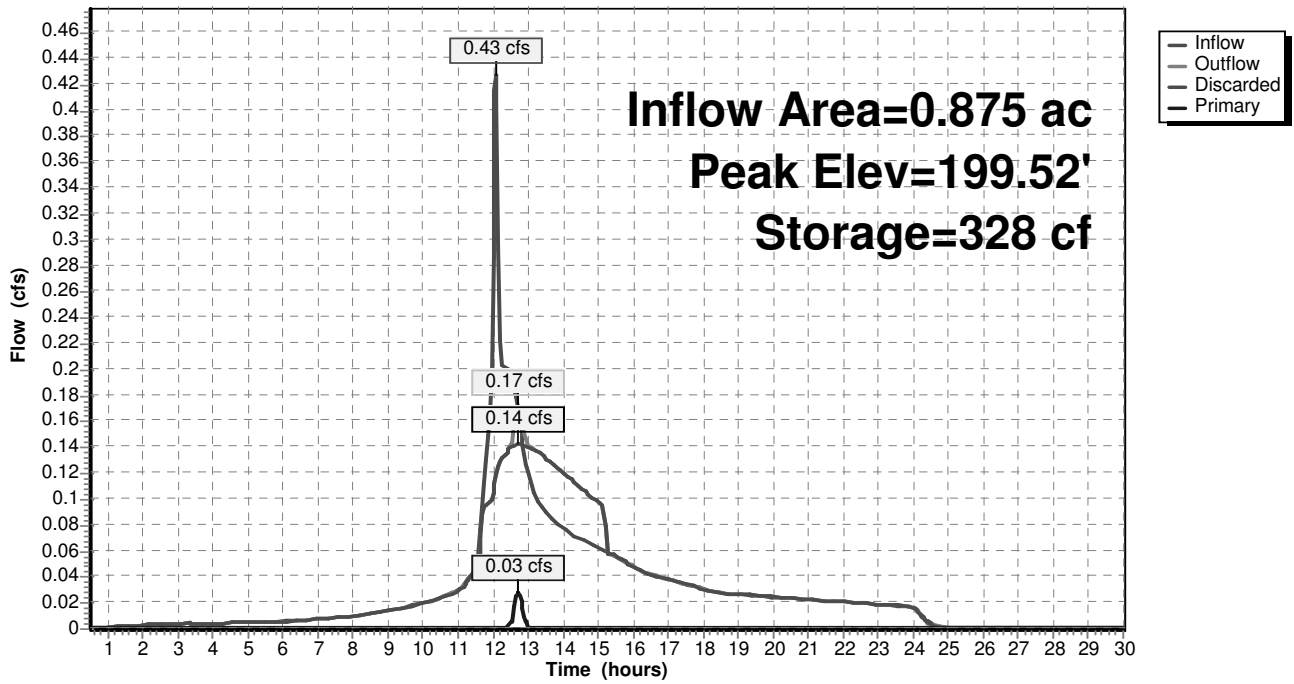
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Type III 24-hr 100-yr Rainfall=6.40"

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Pond 3P: Overflows to Lowell Rd.

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Pond 4P: Overflows to Lowell Rd.

Inflow Area = 1.456 ac, 18.89% Impervious, Inflow Depth = 0.47" for 100-yr event
 Inflow = 0.41 cfs @ 12.38 hrs, Volume= 0.057 af
 Outflow = 0.40 cfs @ 12.47 hrs, Volume= 0.057 af, Atten= 2%, Lag= 5.3 min
 Discarded = 0.09 cfs @ 12.47 hrs, Volume= 0.046 af
 Primary = 0.31 cfs @ 12.47 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 199.60' @ 12.47 hrs Surf.Area= 502 sf Storage= 237 cf

Plug-Flow detention time= 16.5 min calculated for 0.057 af (100% of inflow)
 Center-of-Mass det. time= 16.4 min (926.9 - 910.5)

Volume	Invert	Avail.Storage	Storage Description			
#1	199.00'	472 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
199.00	300	75.0	0	0	300	
200.00	668	151.0	472	472	1,671	

Device	Routing	Invert	Outlet Devices													
#1	Primary	199.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	199.00'	8.000 in/hr Exfiltration over Surface area													

Discarded OutFlow Max=0.09 cfs @ 12.47 hrs HW=199.60' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.30 cfs @ 12.47 hrs HW=199.60' (Free Discharge)
 ↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 0.30 cfs @ 0.78 fps)

Post-Development

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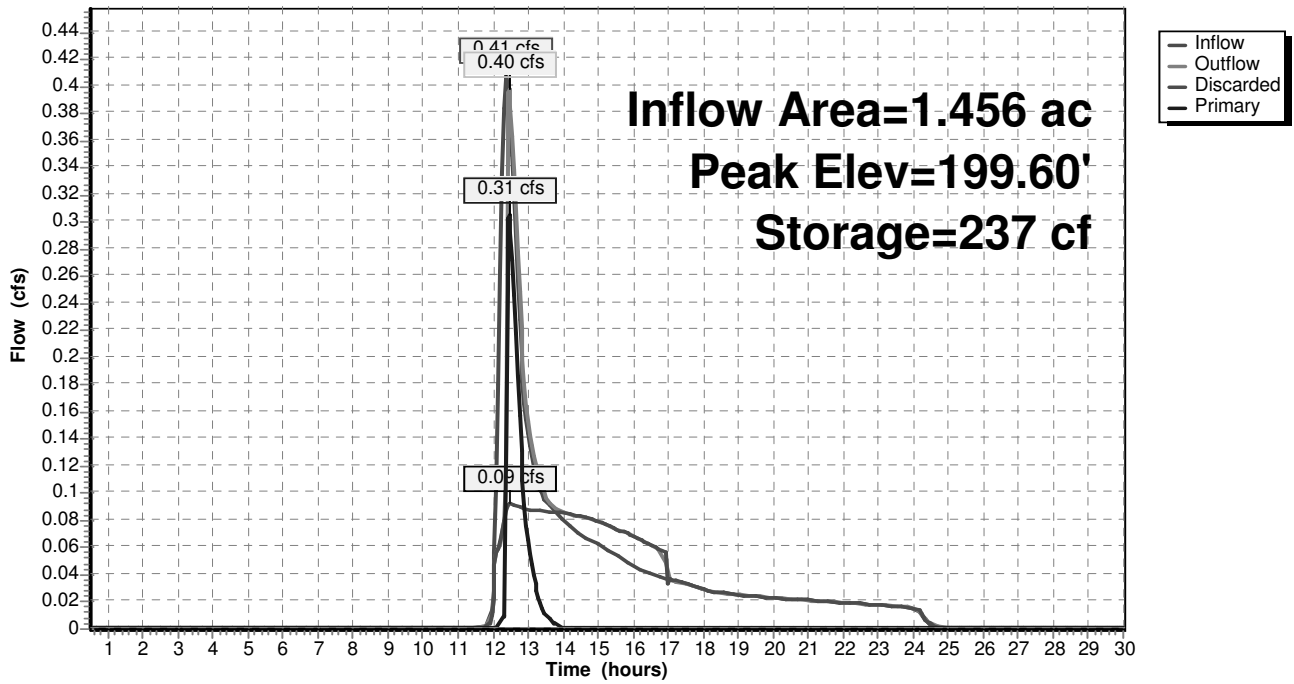
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Type III 24-hr 100-yr Rainfall=6.40"

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Pond 4P: Overflows to Lowell Rd.

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Pond 41P: Roof Chamber

Inflow Area = 0.066 ac, 100.00% Impervious, Inflow Depth = 6.16" for 100-yr event
 Inflow = 0.42 cfs @ 12.07 hrs, Volume= 0.034 af
 Outflow = 0.42 cfs @ 12.07 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 12.08 hrs, Volume= 0.003 af
 Primary = 0.39 cfs @ 12.07 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.03' @ 12.07 hrs Surf.Area= 142 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.034 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (743.4 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.08 hrs HW=202.03' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.36 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.36 cfs @ 0.46 fps)

Post-Development

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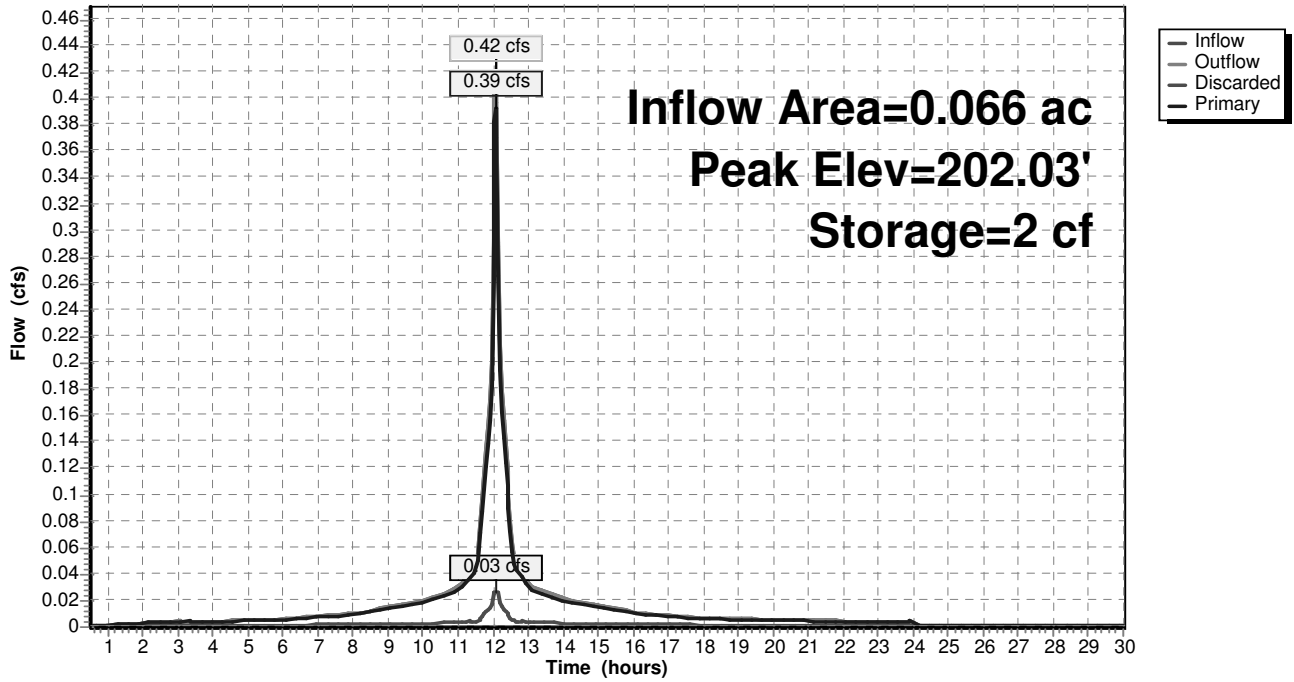
91-95 Lowell Rd.
Type III 24-hr 100-yr Rainfall=6.40"

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Pond 41P: Roof Chamber

Hydrograph



91-95 Lowell Rd.

Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Pond 42P: Roof Chamber

Inflow Area = 0.072 ac, 100.00% Impervious, Inflow Depth = 6.16" for 100-yr event
 Inflow = 0.45 cfs @ 12.07 hrs, Volume= 0.037 af
 Outflow = 0.45 cfs @ 12.07 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 12.00 hrs, Volume= 0.003 af
 Primary = 0.43 cfs @ 12.07 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 202.04' @ 12.07 hrs Surf.Area= 142 sf Storage= 2 cf

Plug-Flow detention time= 0.1 min calculated for 0.037 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (743.4 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.00'	117 cf	5.00'W x 28.32'L x 2.71'H Field A 383 cf Overall - 91 cf Embedded = 293 cf x 40.0% Voids
#2A	202.50'	91 cf	Cultec R-180 x 4 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 1 rows
		208 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.00'	8.000 in/hr Exfiltration over Surface area
#2	Primary	202.00'	24.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.00 hrs HW=202.03' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.39 cfs @ 12.07 hrs HW=202.03' (Free Discharge)

↑2=**Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.47 fps)

Post-Development

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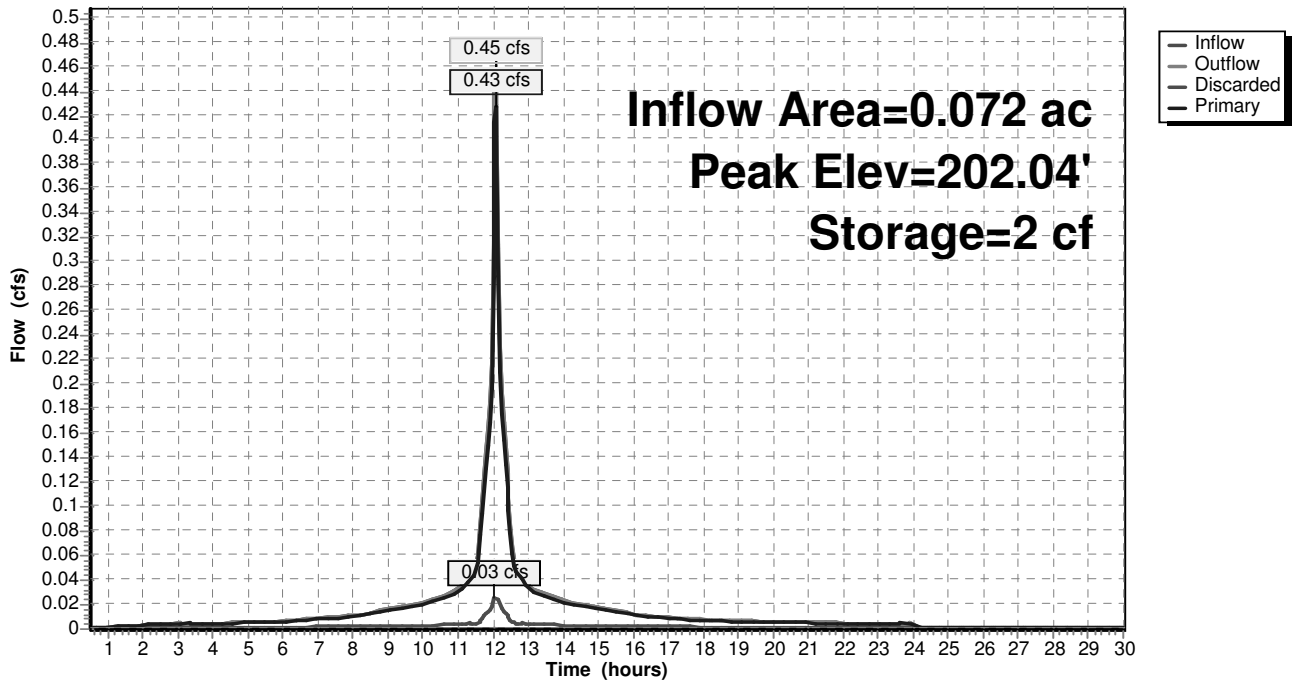
91-95 Lowell Rd.
Type III 24-hr 100-yr Rainfall=6.40"

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Pond 42P: Roof Chamber

Hydrograph



Post-Development

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91-95 Lowell Rd.
Type III 24-hr 100-yr Rainfall=6.40"

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Summary for Link 41L: Lowell Rd.

Inflow Area = 3.048 ac, 19.53% Impervious, Inflow Depth = 0.54" for 100-yr event
Inflow = 1.18 cfs @ 12.17 hrs, Volume= 0.138 af
Primary = 1.18 cfs @ 12.17 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-30.00 hrs, dt= 0.05 hrs

Link 41L: Lowell Rd.

Hydrograph

