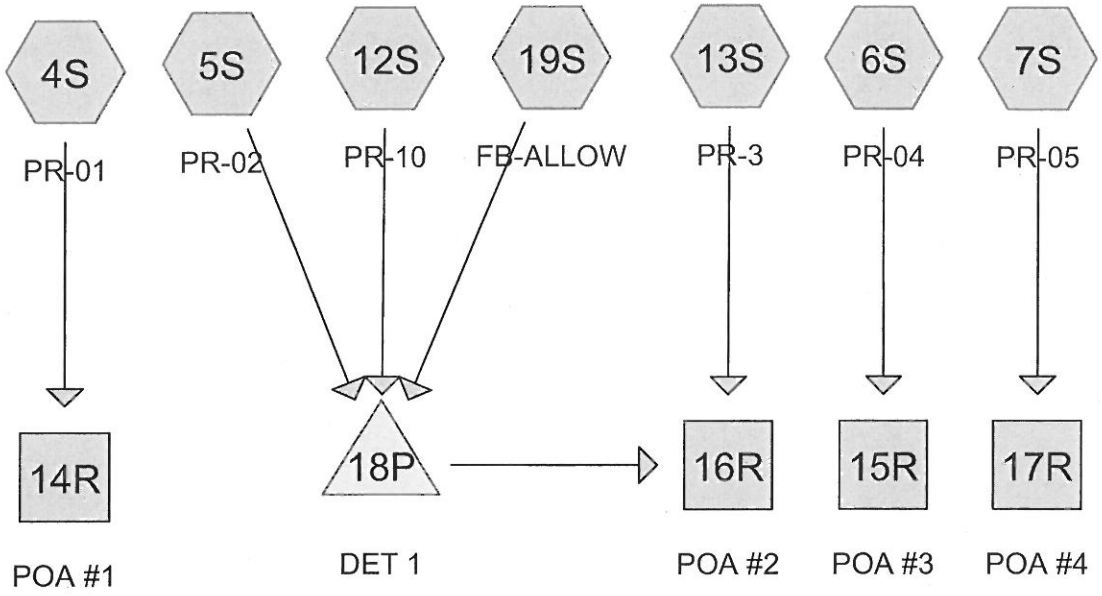
APPENDIX B

Proposed Hydrology Model



Subcat Reach Pond Link

Routing Diagram for BABSON-PR-COND
Prepared by Sasaki Associates, Printed 1/18/2013
HydroCAD® 10.00 s/n 04658 © 2011 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.154	74	(4S, 5S, 6S, 7S, 13S)
0.702	77	(4S, 5S)
1.558	98	(4S, 5S, 6S, 7S, 12S, 13S, 19S)
6.414	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
6.414	Other	4S, 5S, 6S, 7S, 12S, 13S, 19S
6.414		**TOTAL AREA**

Summary for Subcatchment 4S: PR-01

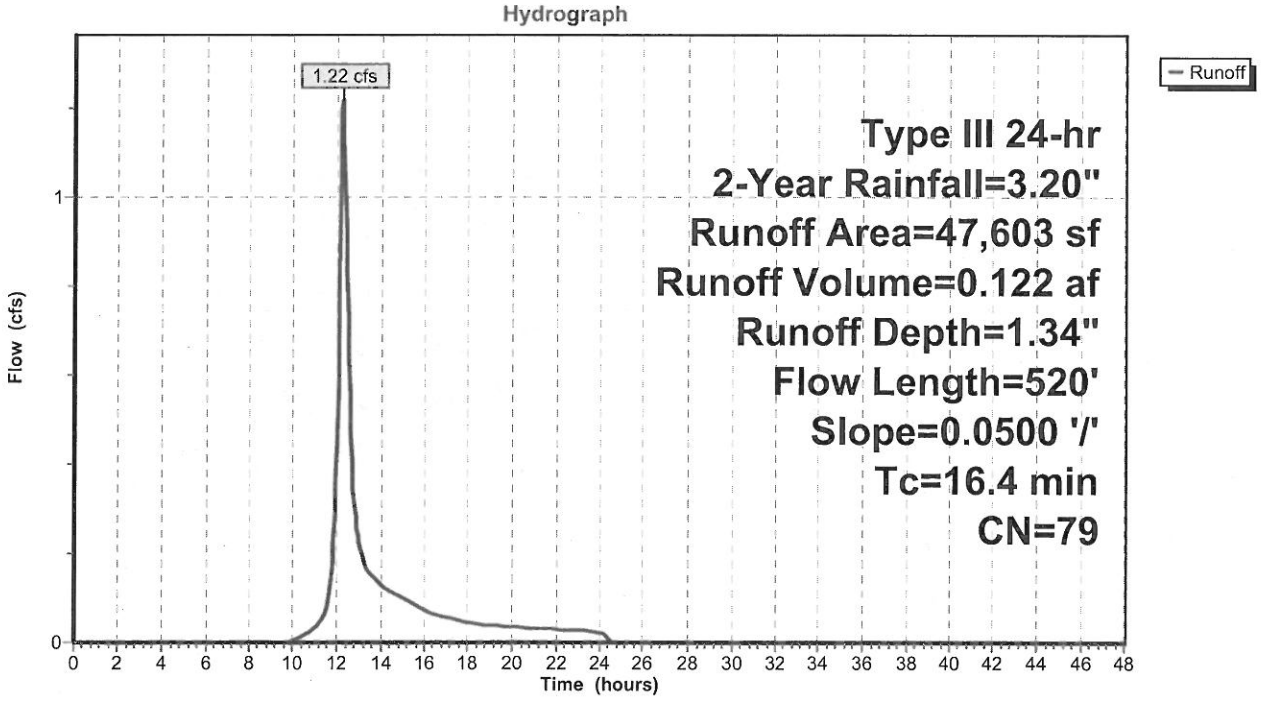
Runoff = 1.22 cfs @ 12.24 hrs, Volume= 0.122 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	9,093	98	
*	12,502	77	
*	26,008	74	
	47,603	79	Weighted Average
	38,510		80.90% Pervious Area
	9,093		19.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	240	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	180	0.0500	8.79	6.90	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.015 Concrete sewer w/manholes & inlets
16.4	520	Total			

Subcatchment 4S: PR-01



Summary for Subcatchment 5S: PR-02

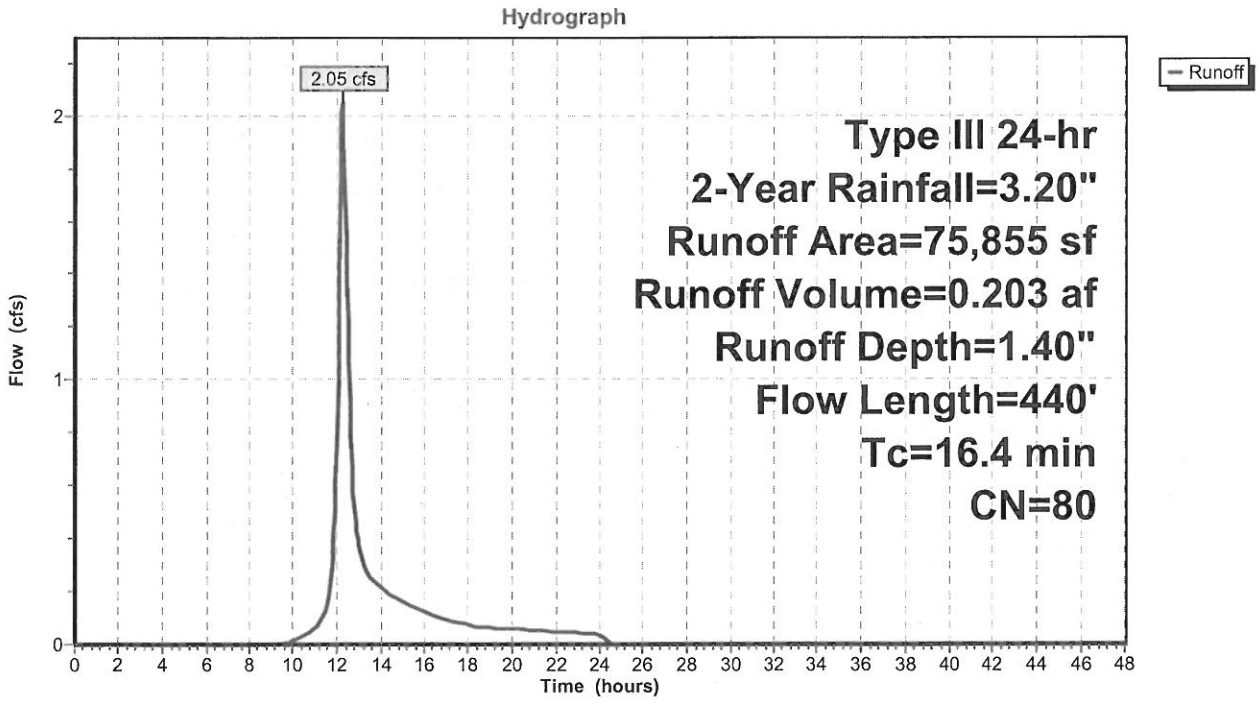
Runoff = 2.05 cfs @ 12.24 hrs, Volume= 0.203 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	16,599	98	
*	18,087	77	
*	41,169	74	
	75,855	80	Weighted Average
	59,256		78.12% Pervious Area
	16,599		21.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	280	0.0530	3.45		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	60	0.0500	6.71	2.34	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.015 Concrete sewer w/manholes & inlets
16.4	440	Total			

Subcatchment 5S: PR-02



Summary for Subcatchment 6S: PR-04

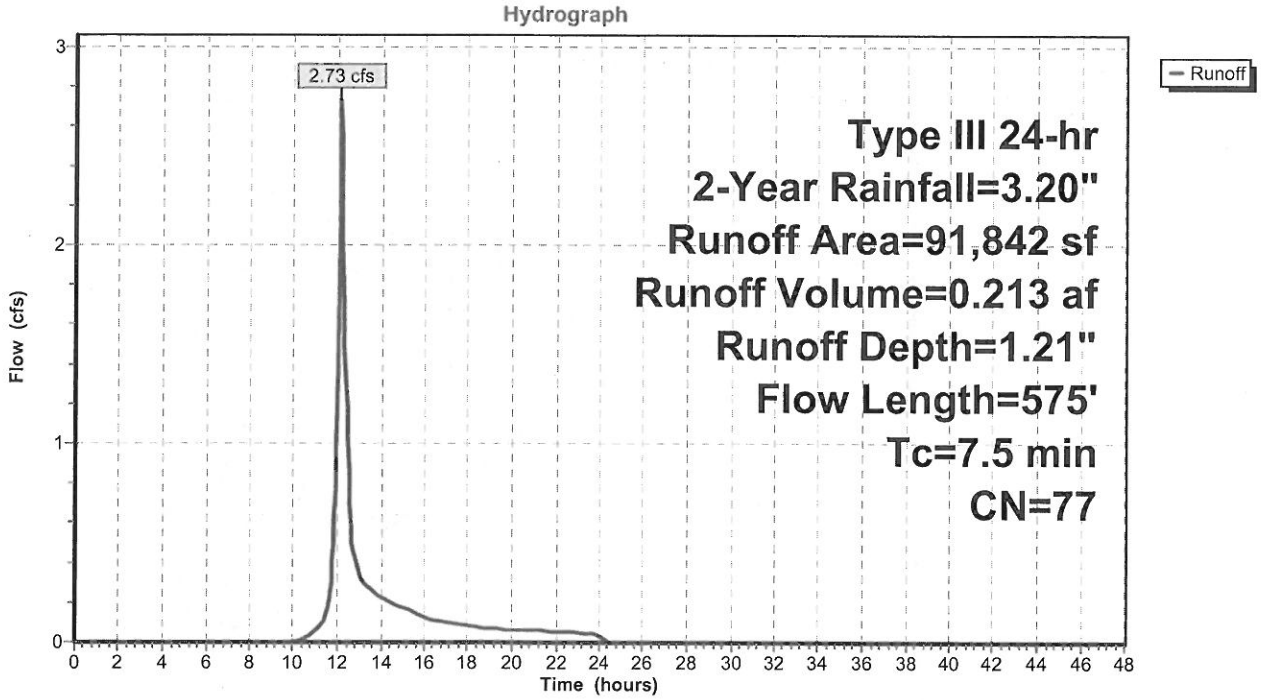
Runoff = 2.73 cfs @ 12.12 hrs, Volume= 0.213 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	12,670	98	
*	79,172	74	
	91,842	77	Weighted Average
	79,172		86.20% Pervious Area
	12,670		13.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	100	0.0500	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	475	0.5500	11.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	575	Total			

Subcatchment 6S: PR-04



Summary for Subcatchment 7S: PR-05

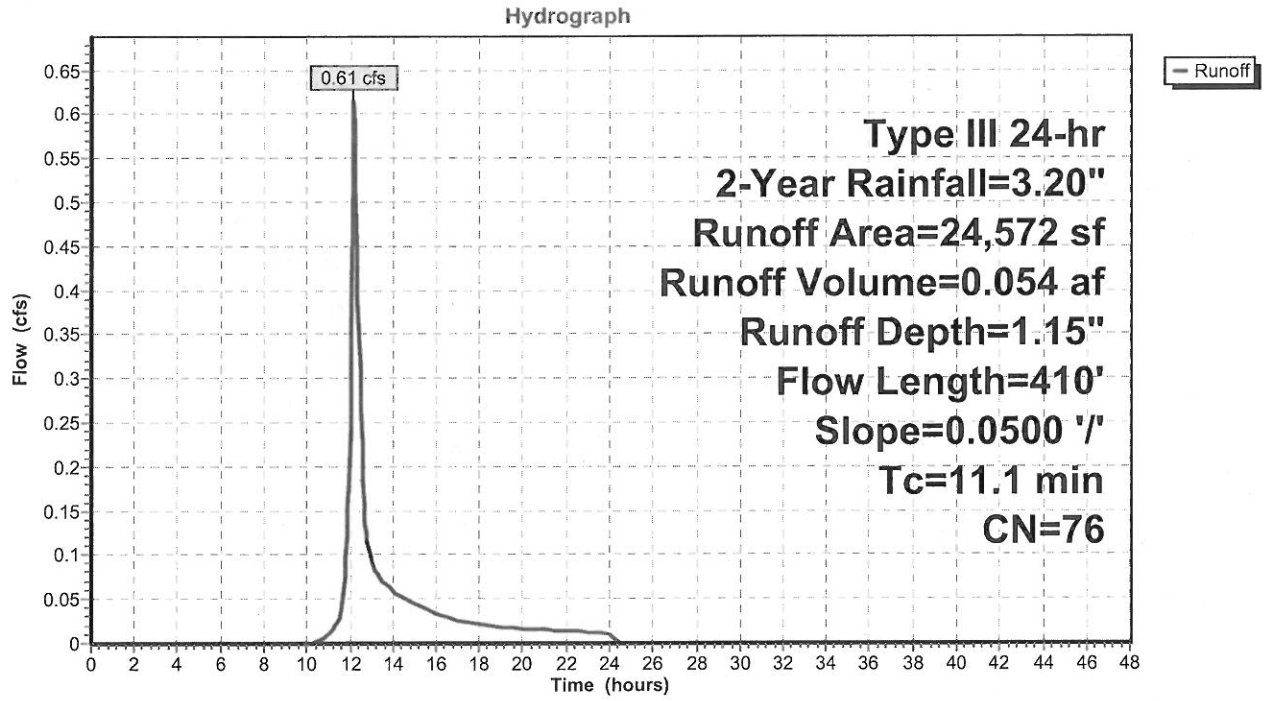
Runoff = 0.61 cfs @ 12.17 hrs, Volume= 0.054 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	2,483	98	
*	22,089	74	
	24,572	76	Weighted Average
	22,089		89.90% Pervious Area
	2,483		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0500	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	230	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	80	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
11.1	410	Total			

Subcatchment 7S: PR-05



Summary for Subcatchment 12S: PR-10

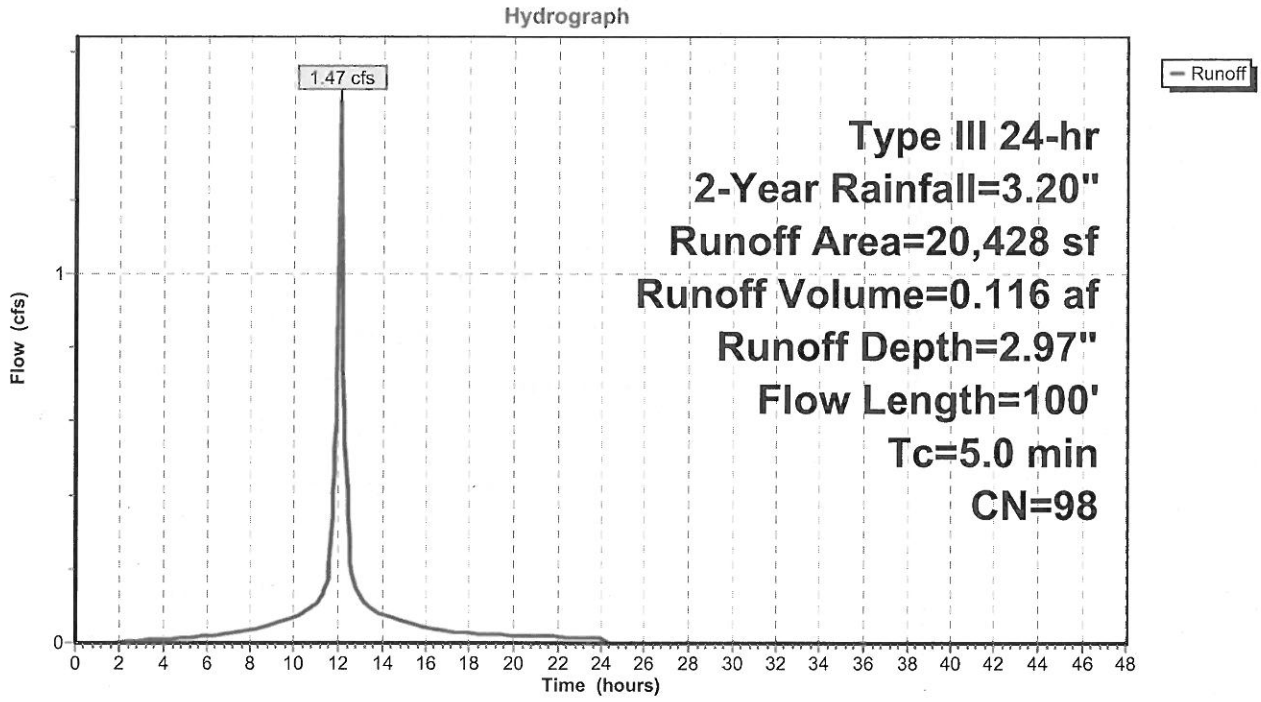
Runoff = 1.47 cfs @ 12.07 hrs, Volume= 0.116 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	20,428	98	
	20,428		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 12S: PR-10



Summary for Subcatchment 13S: PR-3

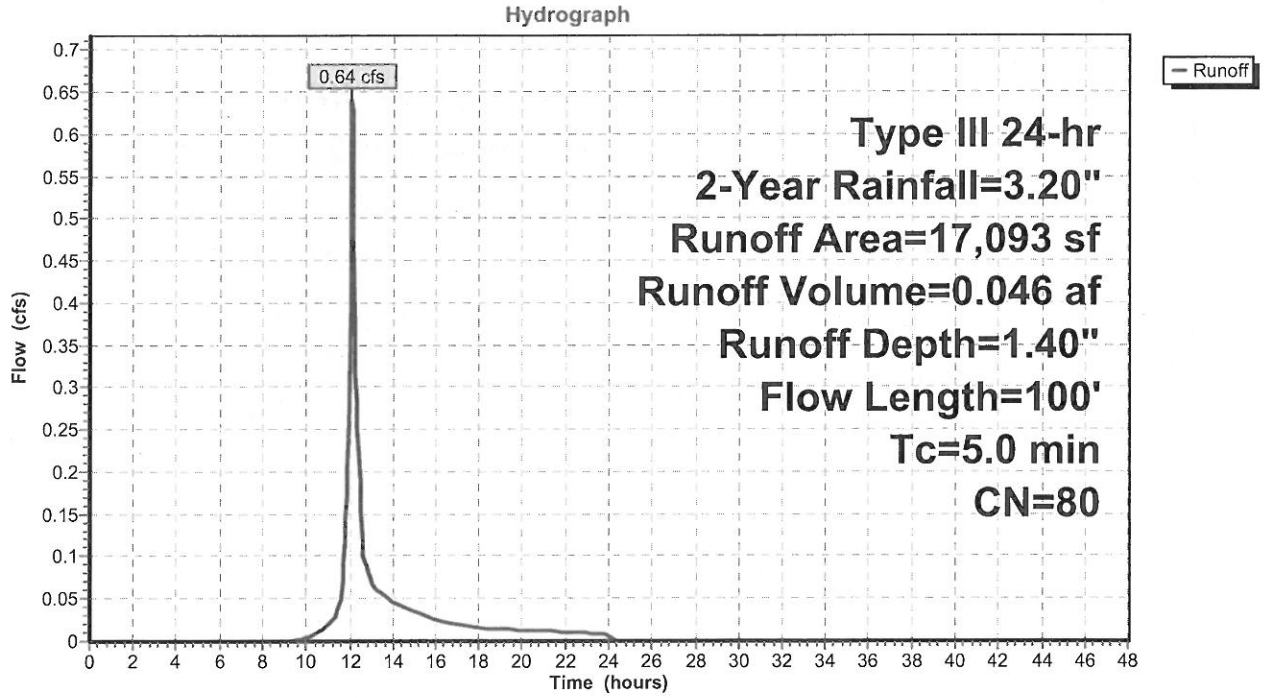
Runoff = 0.64 cfs @ 12.08 hrs, Volume= 0.046 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	4,572	98	
*	12,521	74	
	17,093	80	Weighted Average
	12,521		73.25% Pervious Area
	4,572		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 13S: PR-3



Summary for Subcatchment 19S: FB-ALLOW

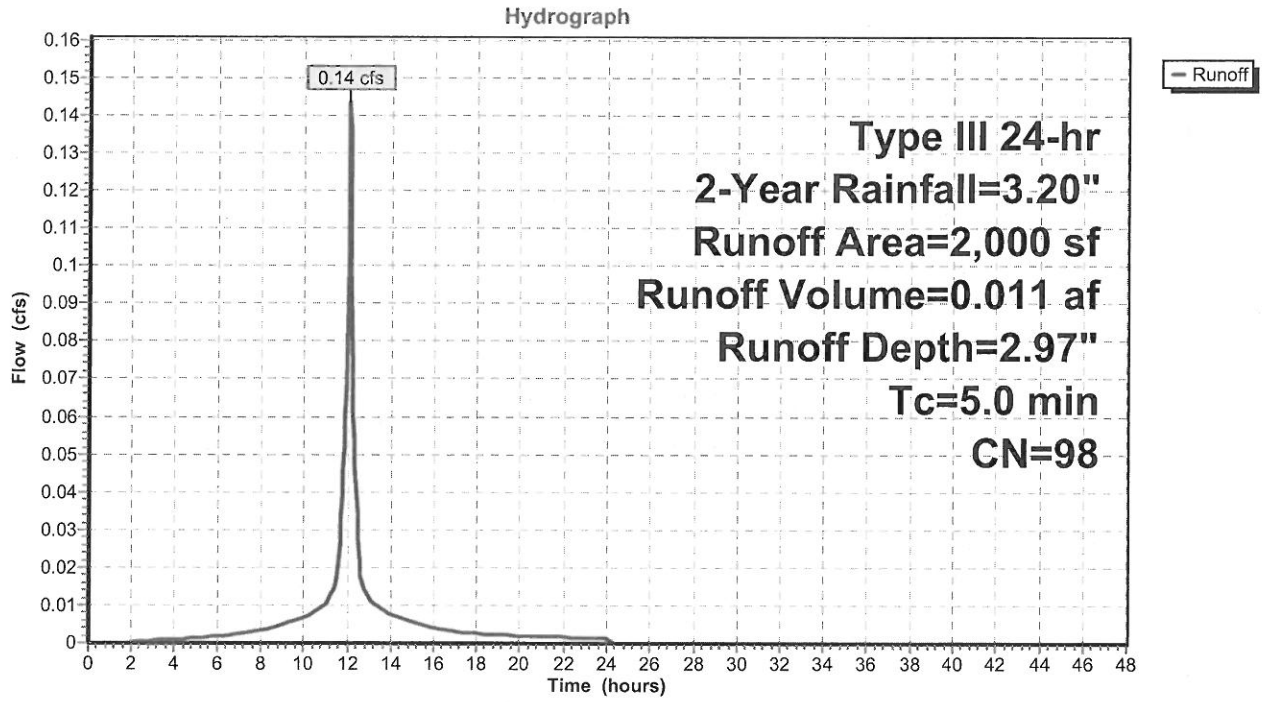
Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment 19S: FB-ALLOW

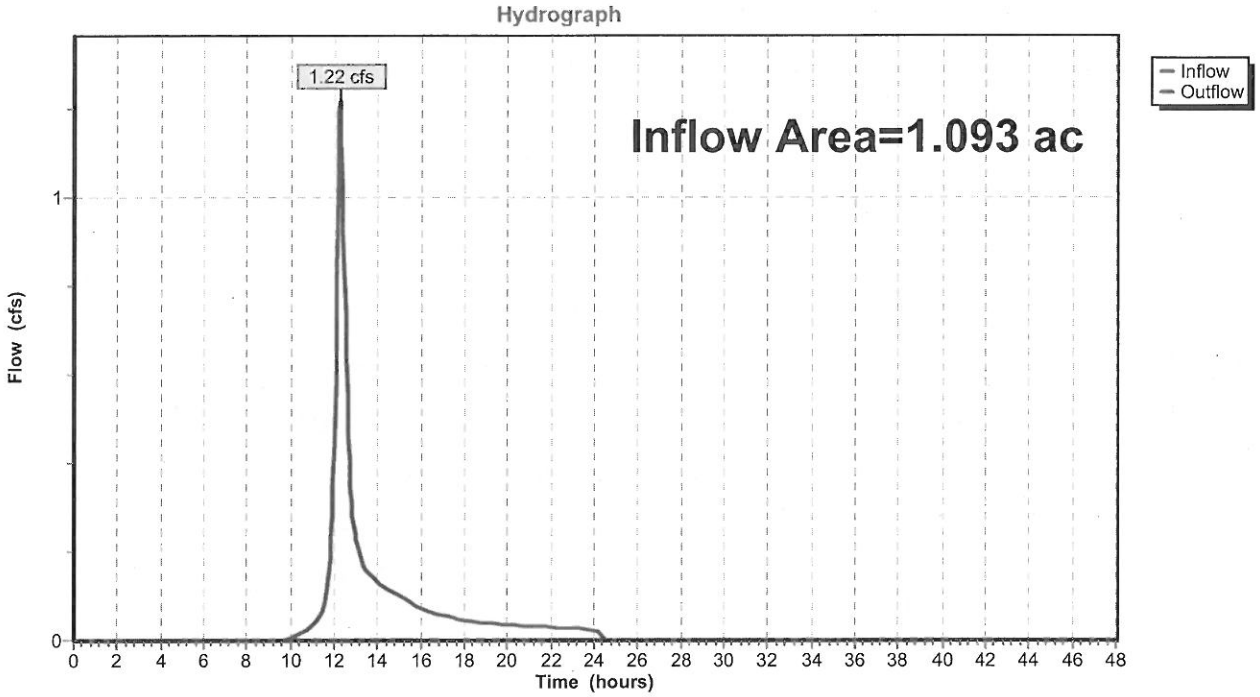


Summary for Reach 14R: POA #1

Inflow Area = 1.093 ac, 19.10% Impervious, Inflow Depth = 1.34" for 2-Year event
Inflow = 1.22 cfs @ 12.24 hrs, Volume= 0.122 af
Outflow = 1.22 cfs @ 12.24 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 14R: POA #1

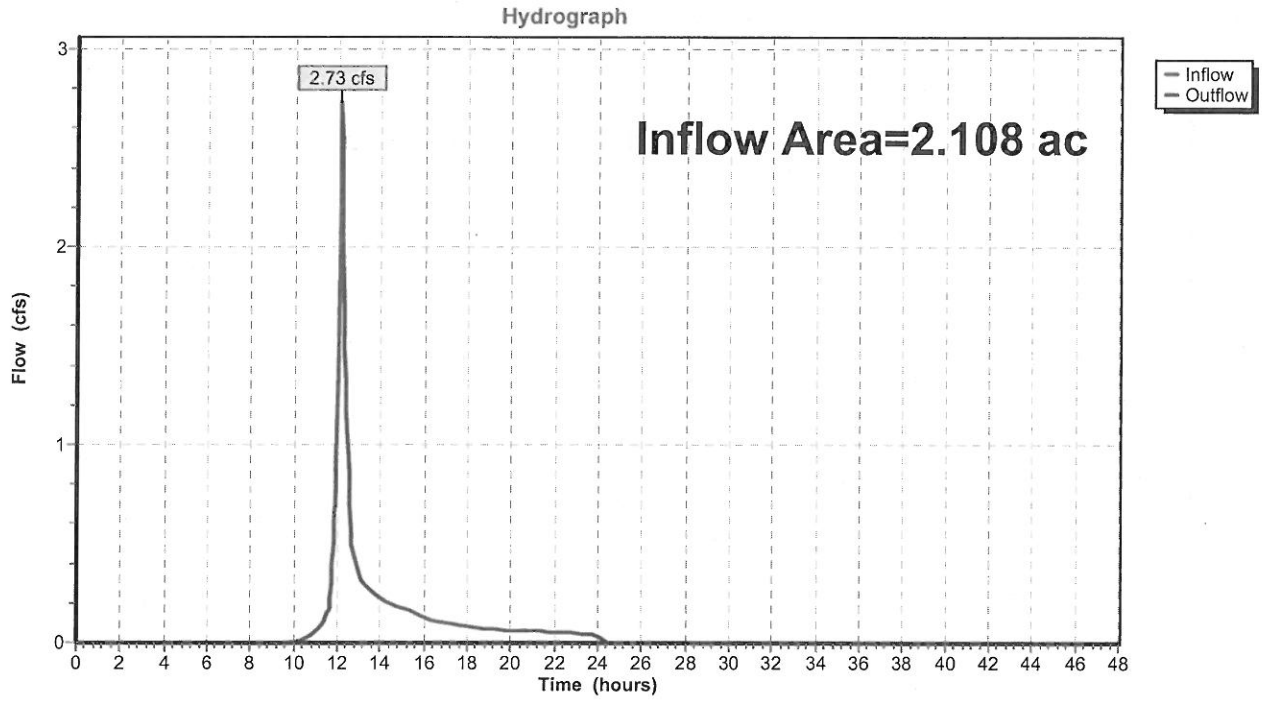


Summary for Reach 15R: POA #3

Inflow Area = 2.108 ac, 13.80% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 2.73 cfs @ 12.12 hrs, Volume= 0.213 af
Outflow = 2.73 cfs @ 12.12 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 15R: POA #3

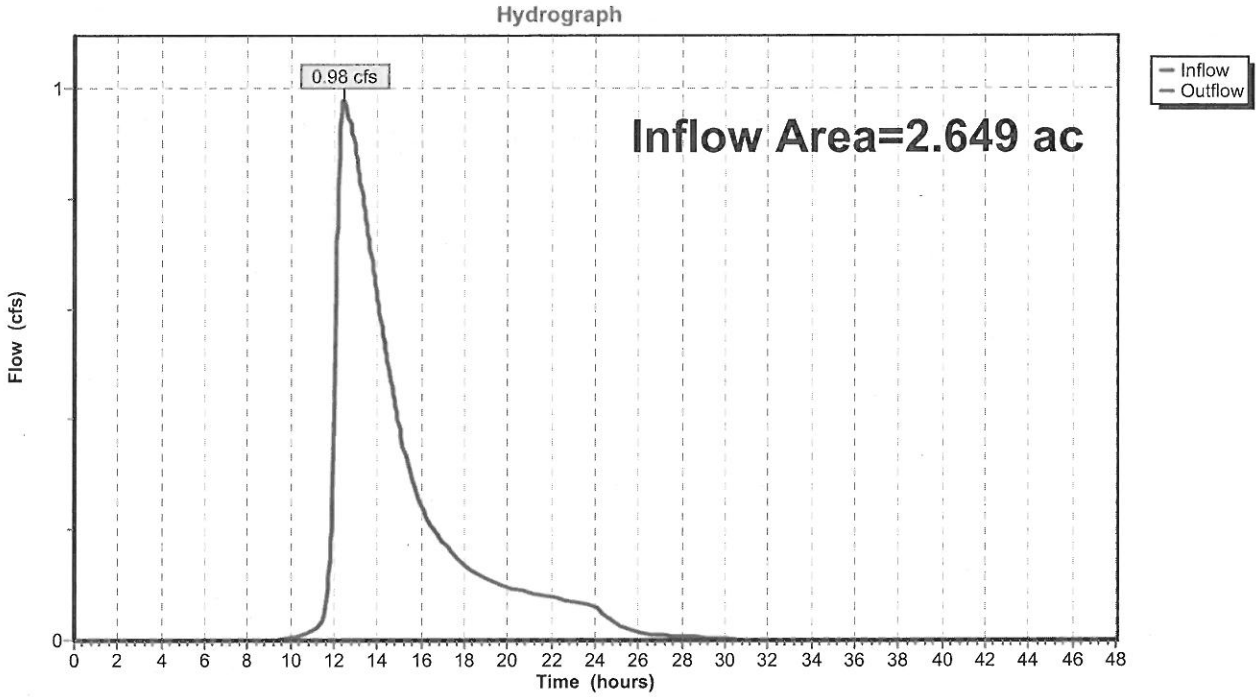


Summary for Reach 16R: POA #2

Inflow Area = 2.649 ac, 37.79% Impervious, Inflow Depth = 1.32" for 2-Year event
Inflow = 0.98 cfs @ 12.44 hrs, Volume= 0.290 af
Outflow = 0.98 cfs @ 12.44 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 16R: POA #2

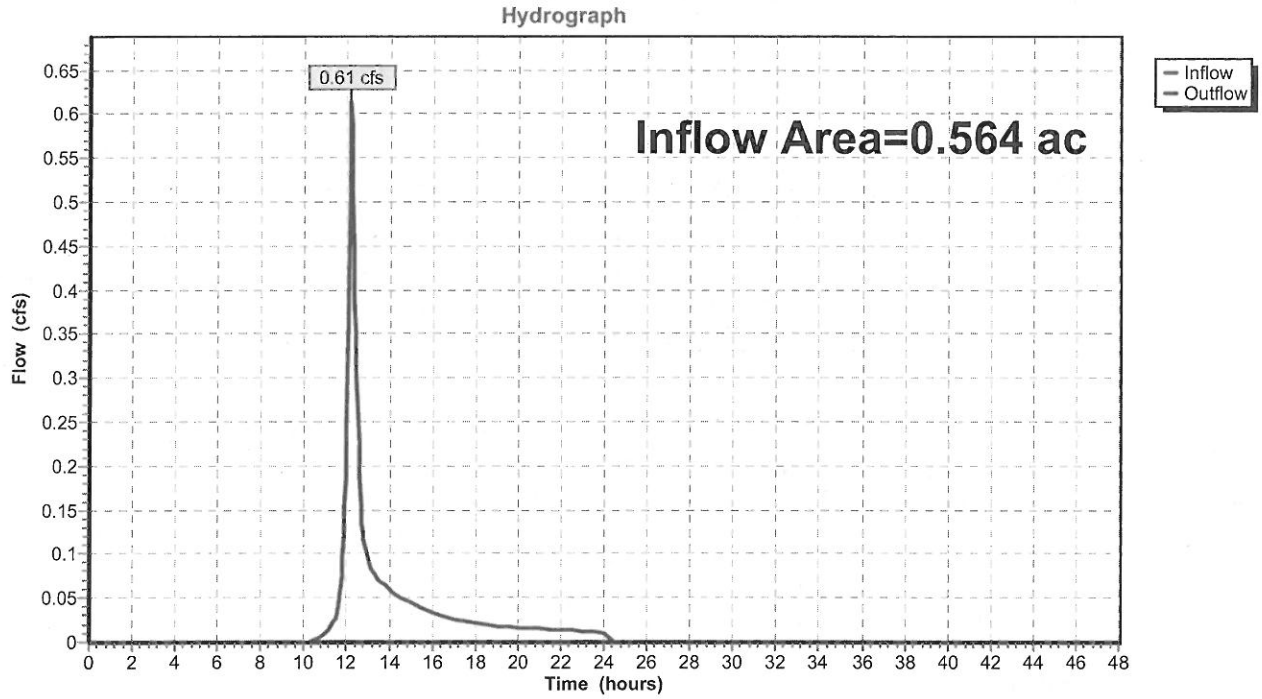


Summary for Reach 17R: POA #4

Inflow Area = 0.564 ac, 10.10% Impervious, Inflow Depth = 1.15" for 2-Year event
Inflow = 0.61 cfs @ 12.17 hrs, Volume= 0.054 af
Outflow = 0.61 cfs @ 12.17 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 17R: POA #4



Summary for Pond 18P: DET 1

Inflow Area = 2.256 ac, 39.71% Impervious, Inflow Depth = 1.76" for 2-Year event
Inflow = 2.87 cfs @ 12.10 hrs, Volume= 0.331 af
Outflow = 0.86 cfs @ 12.69 hrs, Volume= 0.266 af, Atten= 70%, Lag= 35.7 min
Discarded = 0.01 cfs @ 5.35 hrs, Volume= 0.021 af
Primary = 0.86 cfs @ 12.69 hrs, Volume= 0.245 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 145.57' @ 12.69 hrs Surf.Area= 0.088 ac Storage= 0.151 af

Plug-Flow detention time= 243.0 min calculated for 0.266 af (80% of inflow)
Center-of-Mass det. time= 163.6 min (978.7 - 815.1)

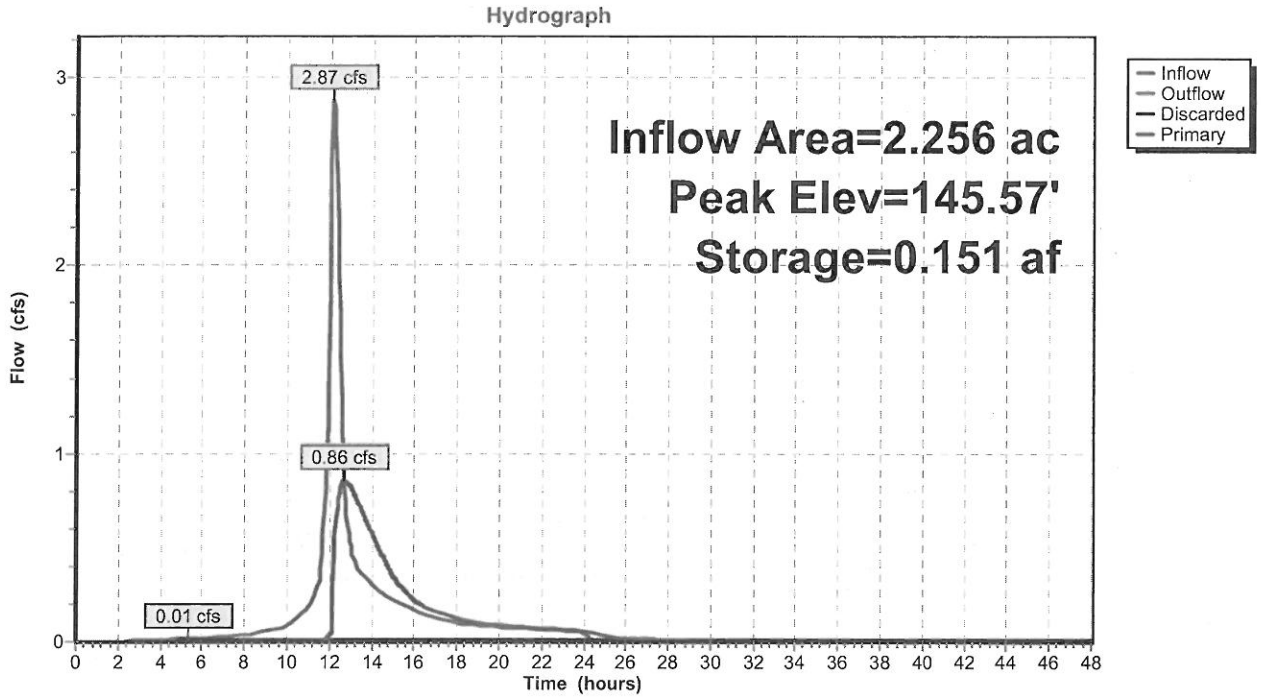
Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	0.137 af	**37.08'W x 103.00'L x 6.00'H Stone Volume** 0.526 af Overall - 0.185 af Embedded = 0.342 af x 40.0% Voids
#2	144.00'	0.185 af	**StormTech MC-3500 b +Cap @ 500.00' L** Inside #1 Effective Size= 71.0"W x 45.0"H => 15.77 sf x 500.00'L = 7,883.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= +15.6 cf x 2 x 5 rows = 156.0 cf
		0.321 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**0.065 in/hr Exfiltration over Surface area**
#2	Primary	143.00'	**12.0" W x 12.0" H Box Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 143.00' / 142.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.00 sf
#3	Device 2	144.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	146.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 5.35 hrs HW=143.06' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.86 cfs @ 12.69 hrs HW=145.57' (Free Discharge)
└**2=Culvert** (Passes 0.86 cfs of 6.29 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.86 cfs @ 4.36 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 18P: DET 1



Summary for Subcatchment 4S: PR-01

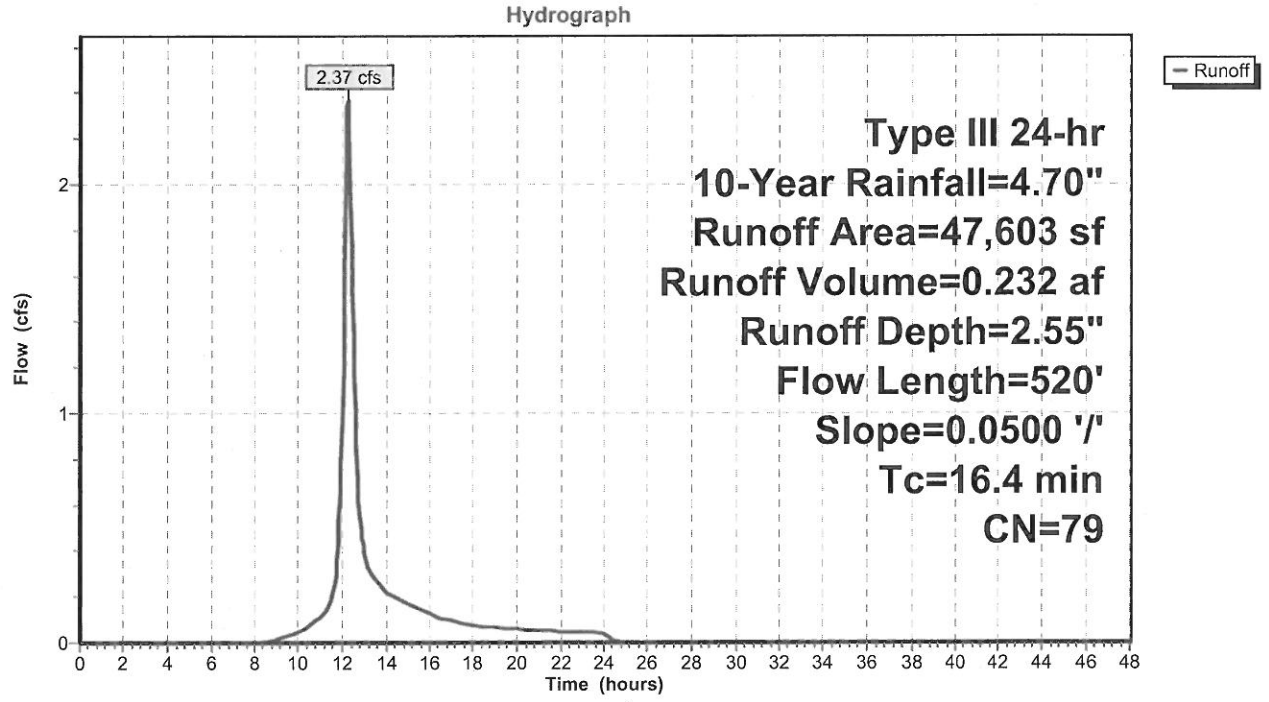
Runoff = 2.37 cfs @ 12.23 hrs, Volume= 0.232 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	9,093	98	
*	12,502	77	
*	26,008	74	
	47,603	79	Weighted Average
	38,510		80.90% Pervious Area
	9,093		19.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	240	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	180	0.0500	8.79	6.90	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.015 Concrete sewer w/manholes & inlets
16.4	520	Total			

Subcatchment 4S: PR-01



Summary for Subcatchment 5S: PR-02

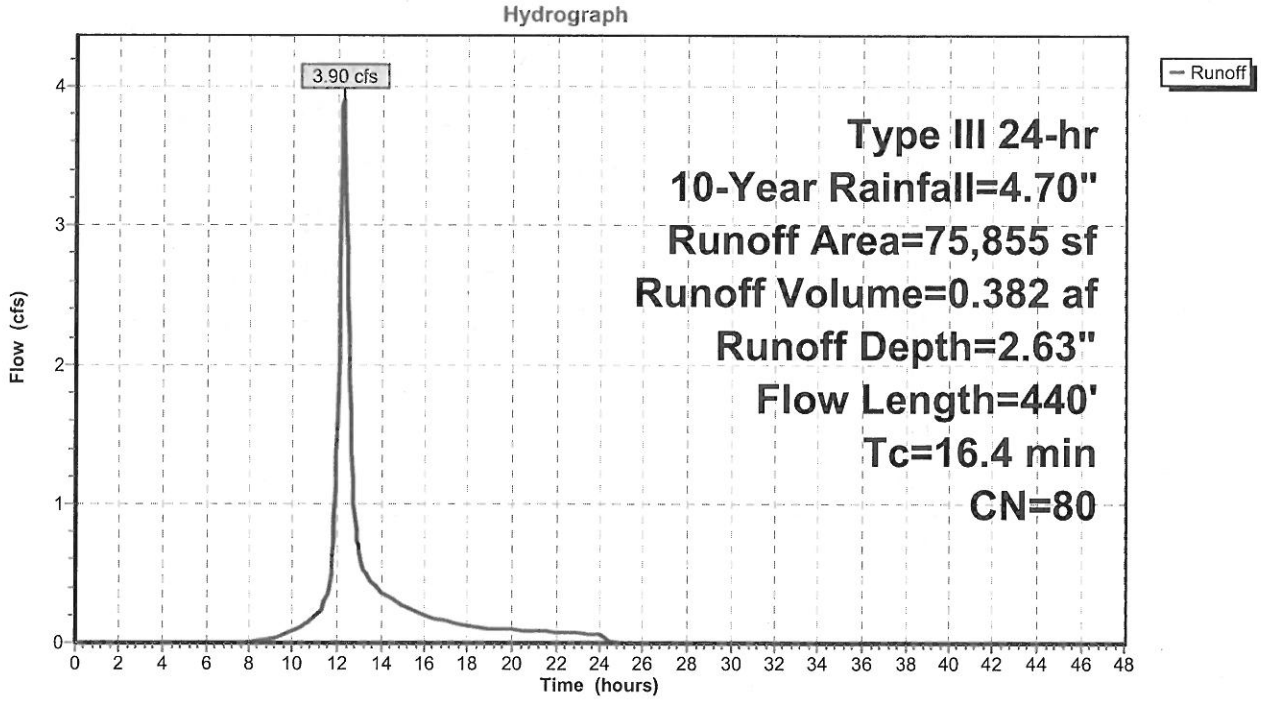
Runoff = 3.90 cfs @ 12.23 hrs, Volume= 0.382 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	16,599	98	
*	18,087	77	
*	41,169	74	
	75,855	80	Weighted Average
	59,256		78.12% Pervious Area
	16,599		21.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	280	0.0530	3.45		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	60	0.0500	6.71	2.34	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.015 Concrete sewer w/manholes & inlets
16.4	440	Total			

Subcatchment 5S: PR-02



Summary for Subcatchment 6S: PR-04

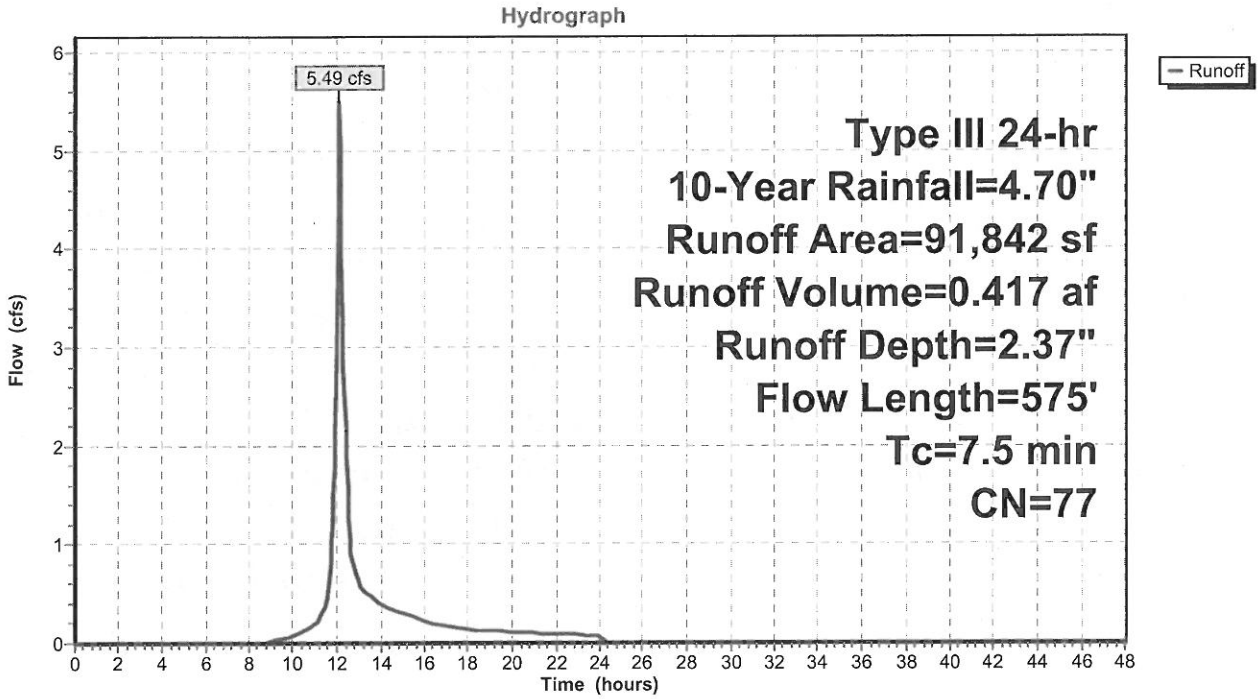
Runoff = 5.49 cfs @ 12.11 hrs, Volume= 0.417 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	12,670	98	
*	79,172	74	
	91,842	77	Weighted Average
	79,172		86.20% Pervious Area
	12,670		13.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	100	0.0500	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	475	0.5500	11.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	575	Total			

Subcatchment 6S: PR-04



Summary for Subcatchment 7S: PR-05

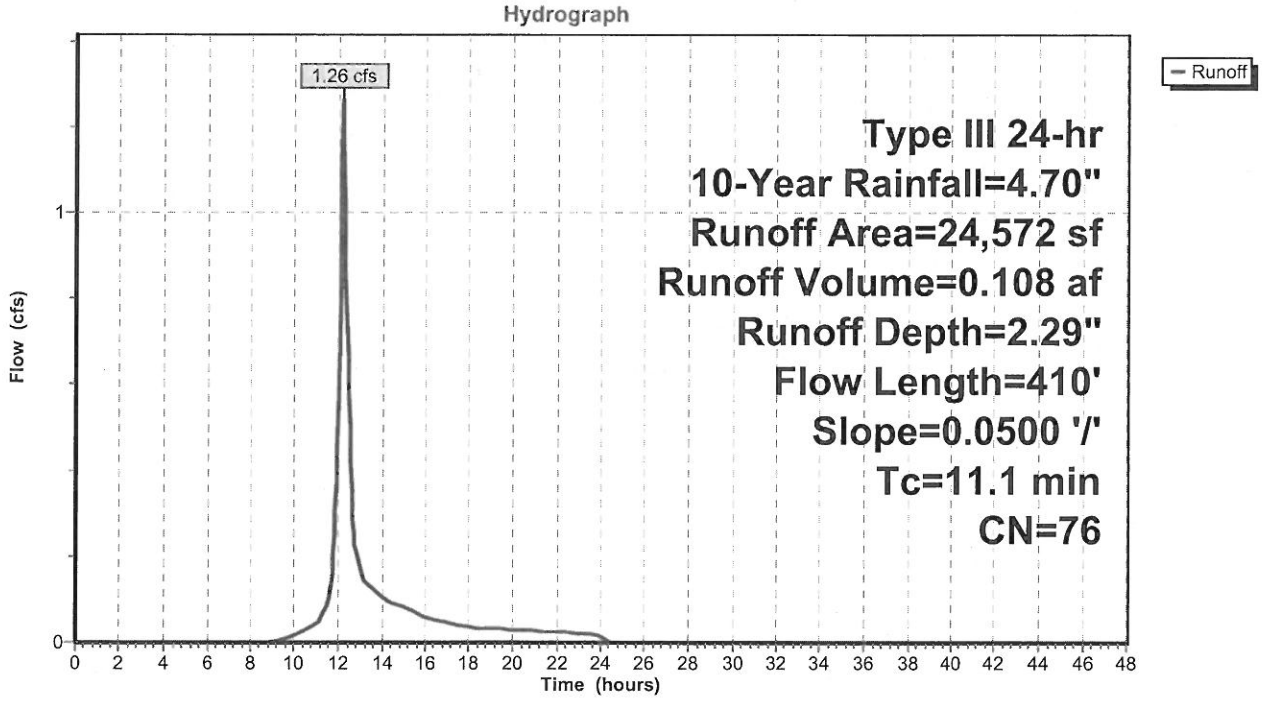
Runoff = 1.26 cfs @ 12.16 hrs, Volume= 0.108 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	2,483	98	
*	22,089	74	
	24,572	76	Weighted Average
	22,089		89.90% Pervious Area
	2,483		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0500	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	230	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	80	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
11.1	410	Total			

Subcatchment 7S: PR-05



Summary for Subcatchment 12S: PR-10

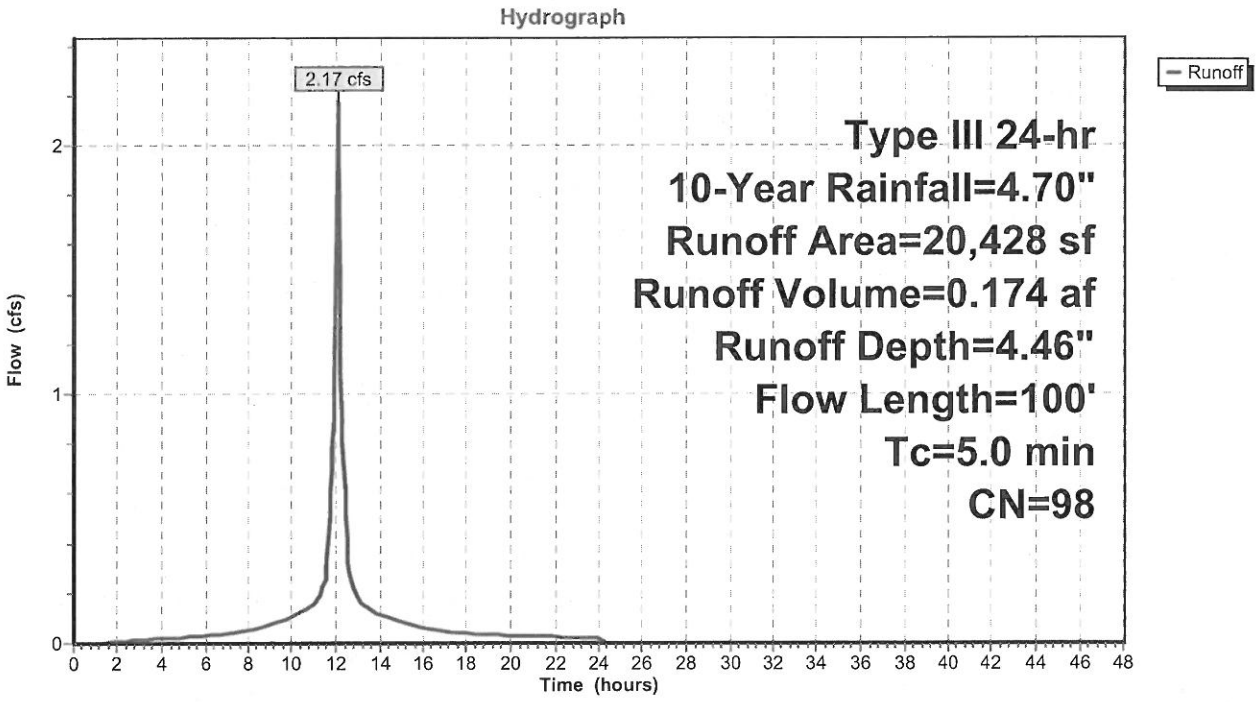
Runoff = 2.17 cfs @ 12.07 hrs, Volume= 0.174 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	20,428	98	
	20,428		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 12S: PR-10



Summary for Subcatchment 13S: PR-3

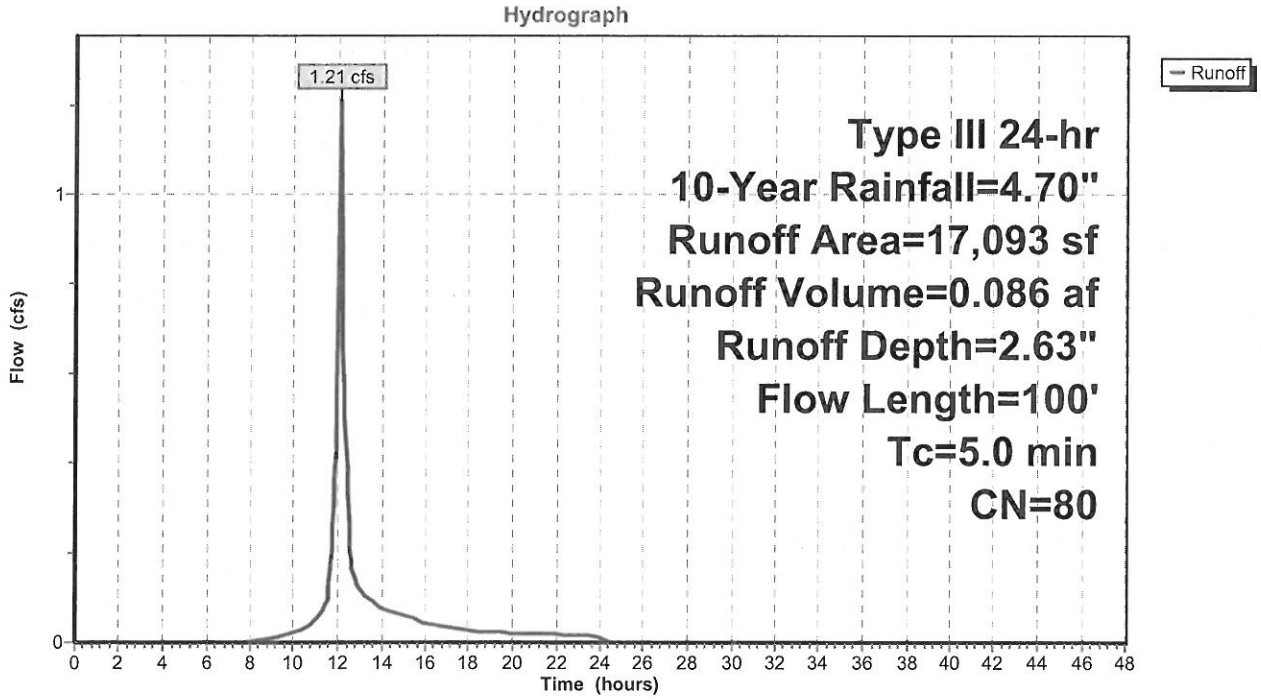
Runoff = 1.21 cfs @ 12.08 hrs, Volume= 0.086 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	4,572	98	
*	12,521	74	
	17,093	80	Weighted Average
	12,521		73.25% Pervious Area
	4,572		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 13S: PR-3



Summary for Subcatchment 19S: FB-ALLOW

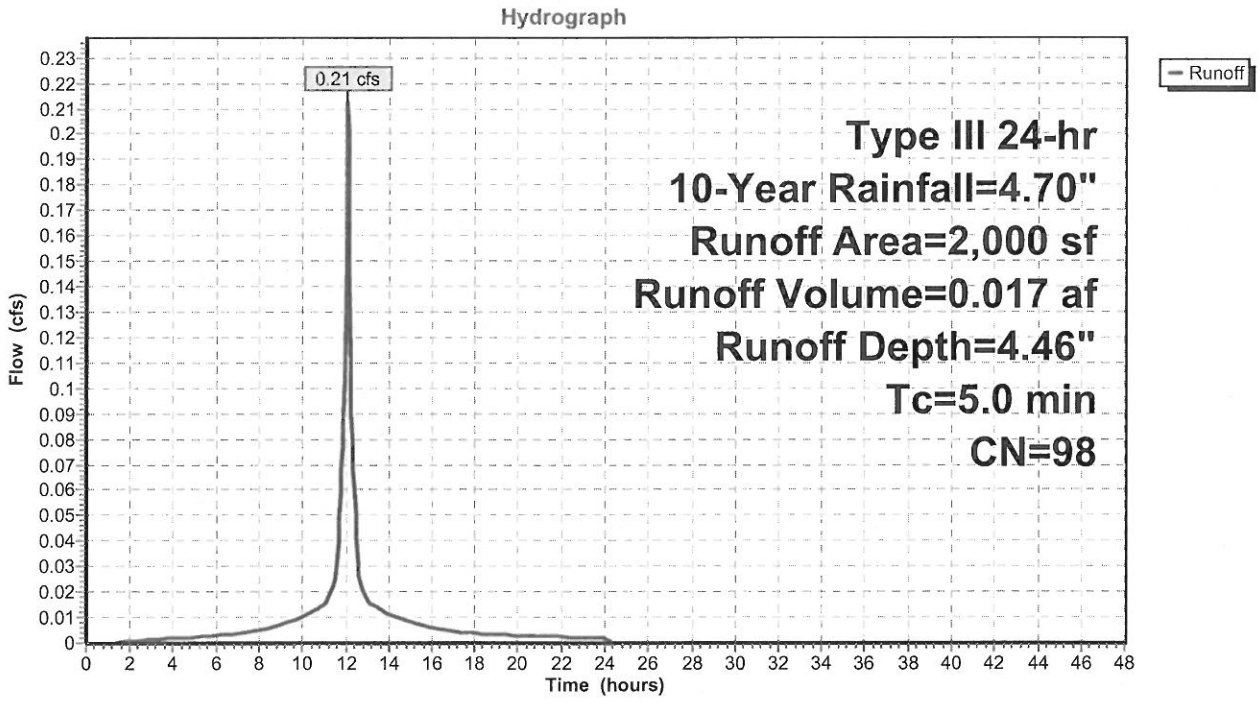
Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment 19S: FB-ALLOW

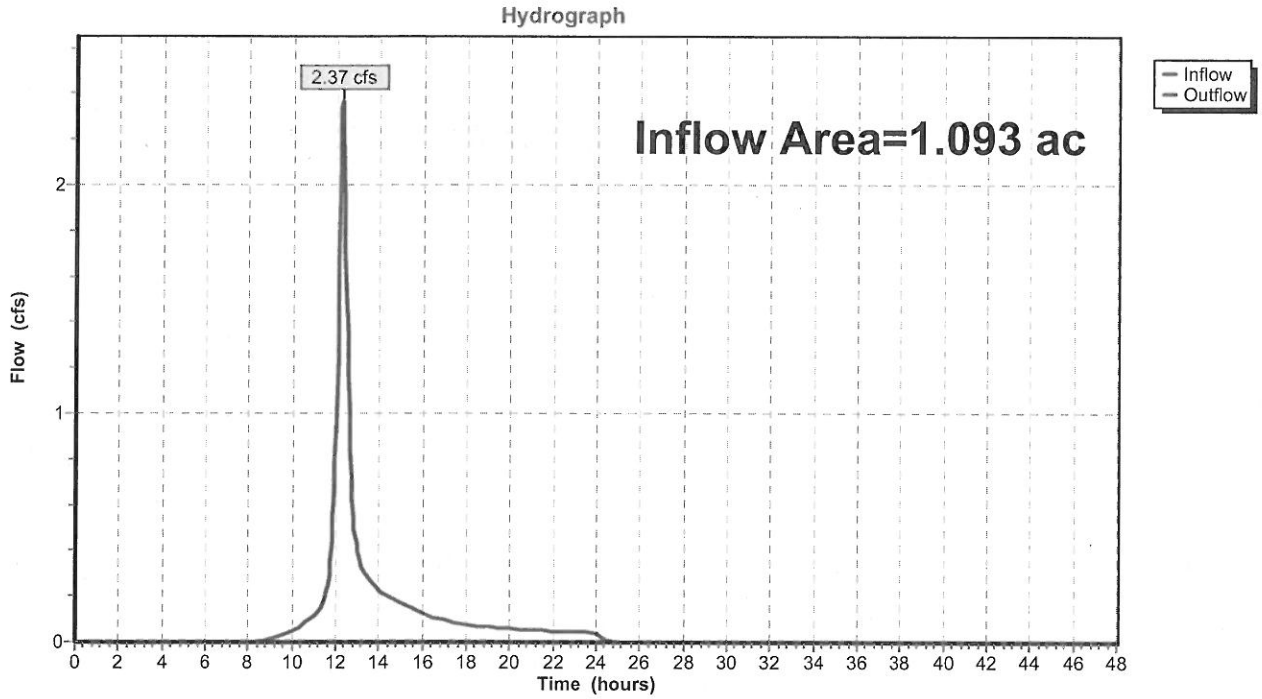


Summary for Reach 14R: POA #1

Inflow Area = 1.093 ac, 19.10% Impervious, Inflow Depth = 2.55" for 10-Year event
Inflow = 2.37 cfs @ 12.23 hrs, Volume= 0.232 af
Outflow = 2.37 cfs @ 12.23 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 14R: POA #1

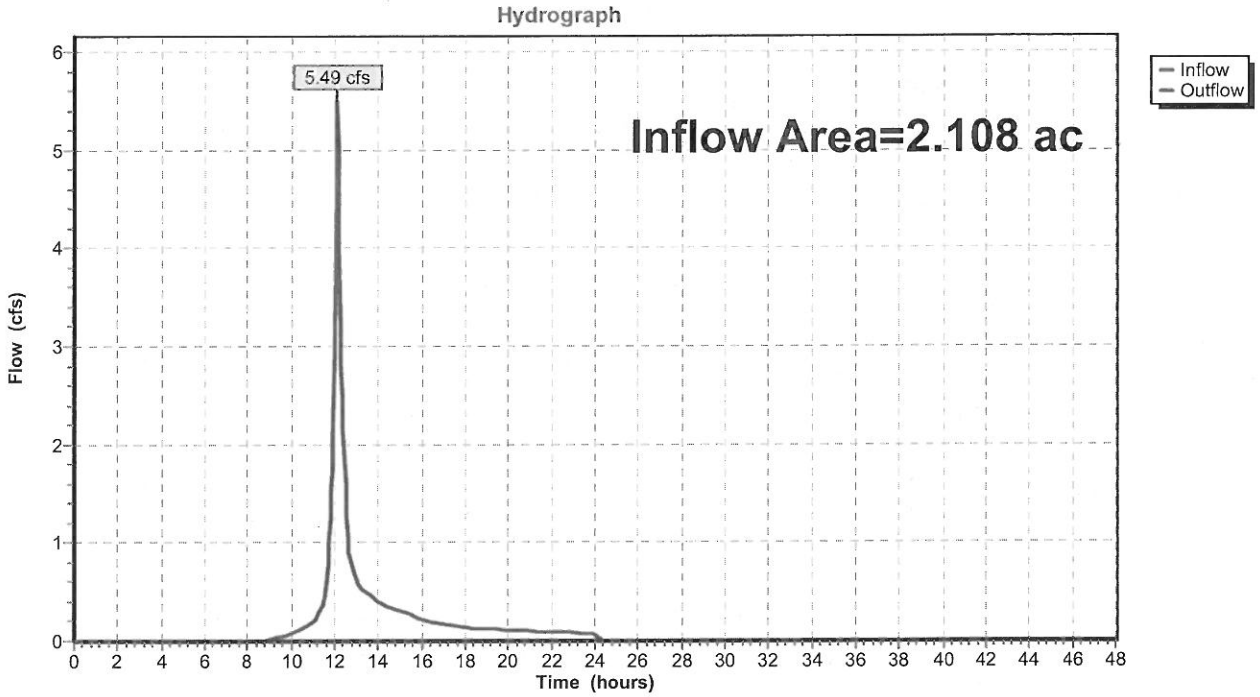


Summary for Reach 15R: POA #3

Inflow Area = 2.108 ac, 13.80% Impervious, Inflow Depth = 2.37" for 10-Year event
Inflow = 5.49 cfs @ 12.11 hrs, Volume= 0.417 af
Outflow = 5.49 cfs @ 12.11 hrs, Volume= 0.417 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 15R: POA #3

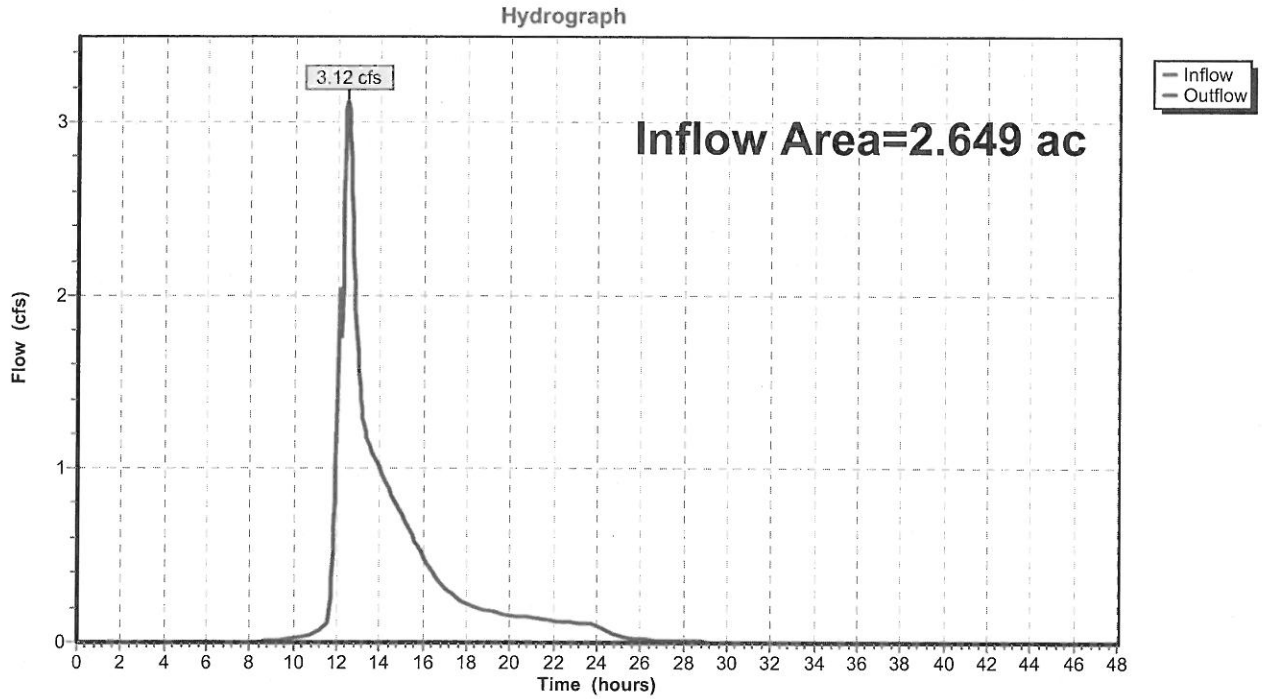


Summary for Reach 16R: POA #2

Inflow Area = 2.649 ac, 37.79% Impervious, Inflow Depth = 2.59" for 10-Year event
Inflow = 3.12 cfs @ 12.45 hrs, Volume= 0.573 af
Outflow = 3.12 cfs @ 12.45 hrs, Volume= 0.573 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 16R: POA #2

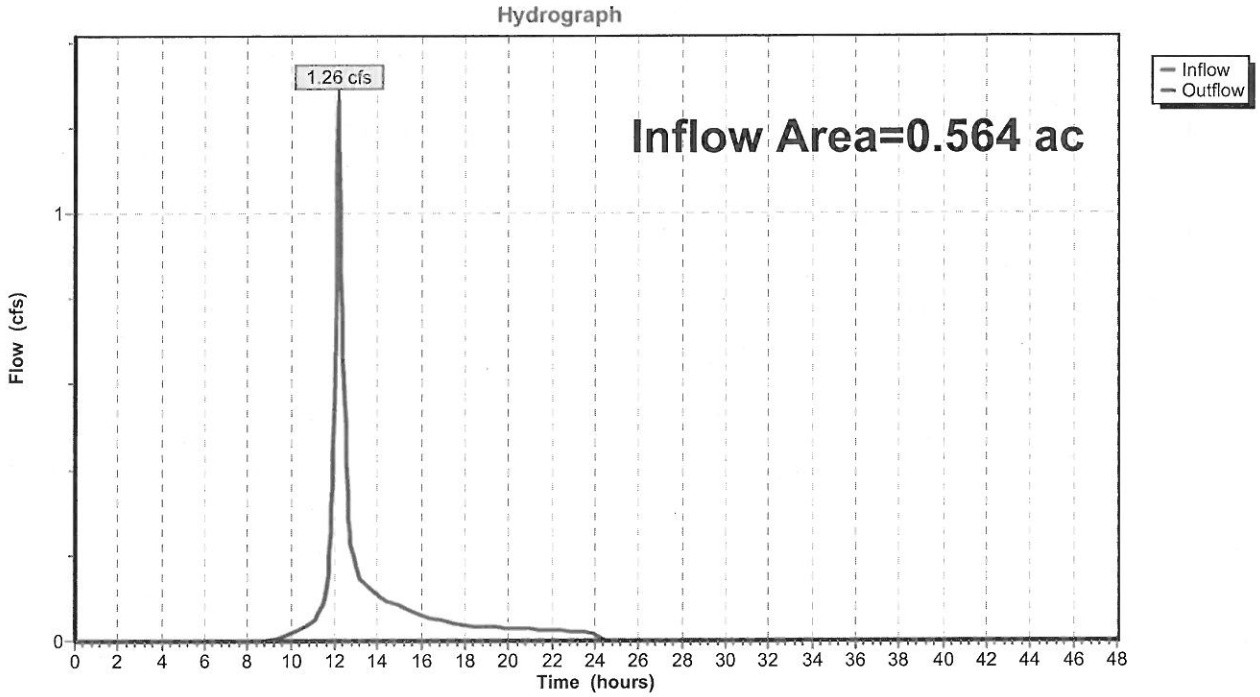


Summary for Reach 17R: POA #4

Inflow Area = 0.564 ac, 10.10% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 1.26 cfs @ 12.16 hrs, Volume= 0.108 af
Outflow = 1.26 cfs @ 12.16 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 17R: POA #4



Summary for Pond 18P: DET 1

Inflow Area = 2.256 ac, 39.71% Impervious, Inflow Depth = 3.05" for 10-Year event
Inflow = 5.08 cfs @ 12.18 hrs, Volume= 0.574 af
Outflow = 2.81 cfs @ 12.48 hrs, Volume= 0.508 af, Atten= 45%, Lag= 18.4 min
Discarded = 0.01 cfs @ 3.85 hrs, Volume= 0.022 af
Primary = 2.80 cfs @ 12.48 hrs, Volume= 0.487 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 146.73' @ 12.48 hrs Surf.Area= 0.088 ac Storage= 0.228 af

Plug-Flow detention time= 173.2 min calculated for 0.508 af (88% of inflow)
Center-of-Mass det. time= 120.2 min (925.7 - 805.4)

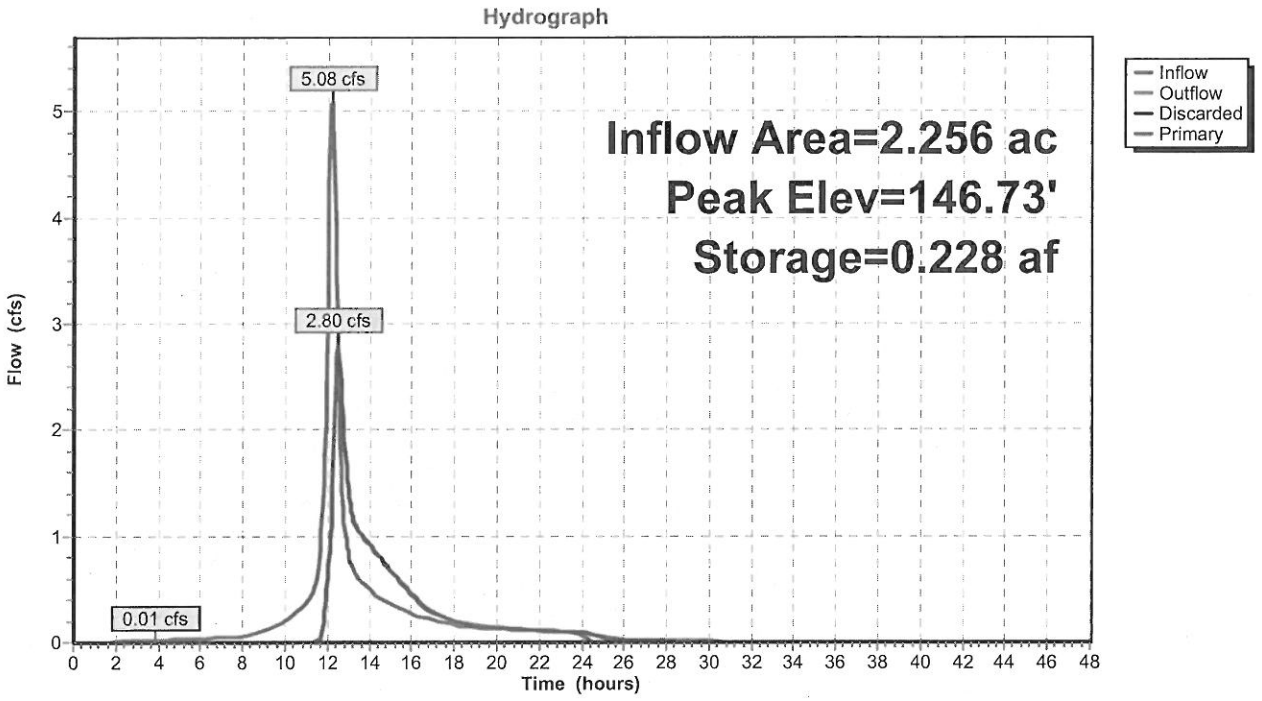
Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	0.137 af	**37.08'W x 103.00'L x 6.00'H Stone Volume** 0.526 af Overall - 0.185 af Embedded = 0.342 af x 40.0% Voids
#2	144.00'	0.185 af	**StormTech MC-3500 b +Cap @ 500.00' L** Inside #1 Effective Size= 71.0"W x 45.0"H => 15.77 sf x 500.00'L = 7,883.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= +15.6 cf x 2 x 5 rows = 156.0 cf
		0.321 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**0.065 in/hr Exfiltration over Surface area**
#2	Primary	143.00'	**12.0" W x 12.0" H Box Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 143.00' / 142.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.00 sf
#3	Device 2	144.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	146.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 3.85 hrs HW=143.06' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.80 cfs @ 12.48 hrs HW=146.73' (Free Discharge)
└**2=Culvert** (Passes 2.80 cfs of 7.58 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.33 cfs @ 6.77 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.47 cfs @ 2.90 fps)

Pond 18P: DET 1



Summary for Subcatchment 4S: PR-01

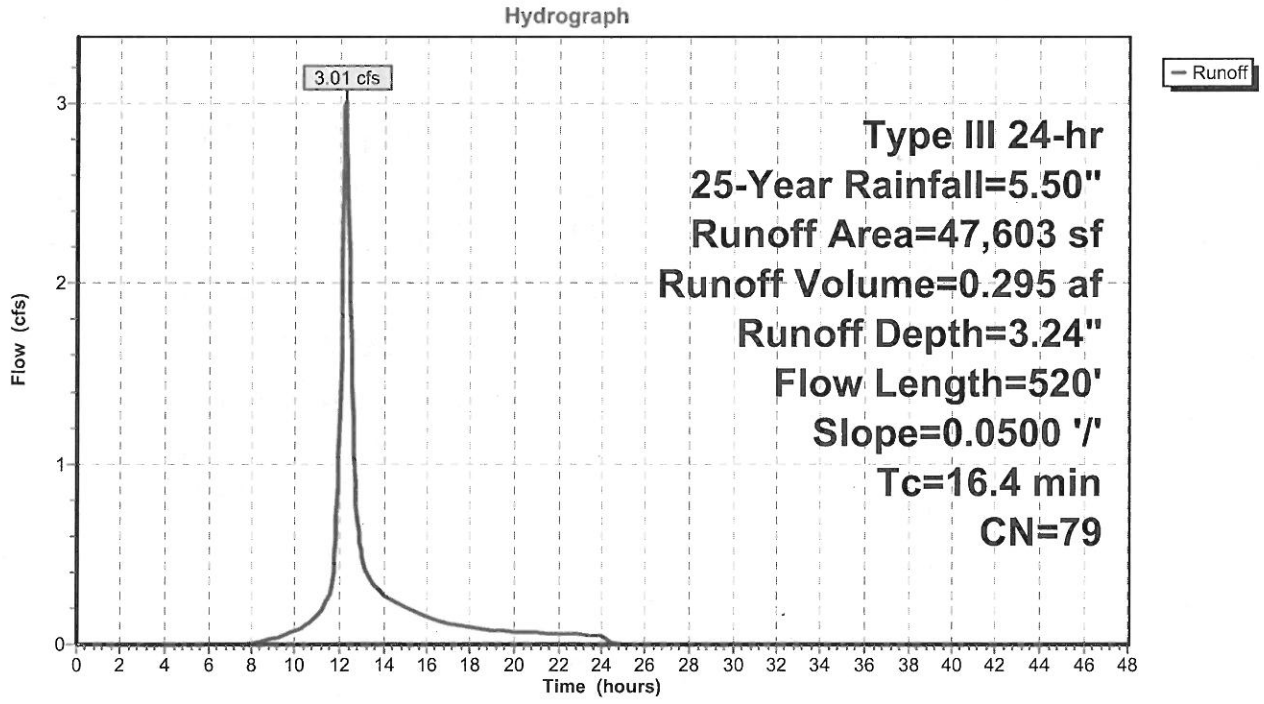
Runoff = 3.01 cfs @ 12.23 hrs, Volume= 0.295 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	9,093	98	
*	12,502	77	
*	26,008	74	
	47,603	79	Weighted Average
	38,510		80.90% Pervious Area
	9,093		19.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	240	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	180	0.0500	8.79	6.90	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.015 Concrete sewer w/manholes & inlets
16.4	520	Total			

Subcatchment 4S: PR-01



Summary for Subcatchment 5S: PR-02

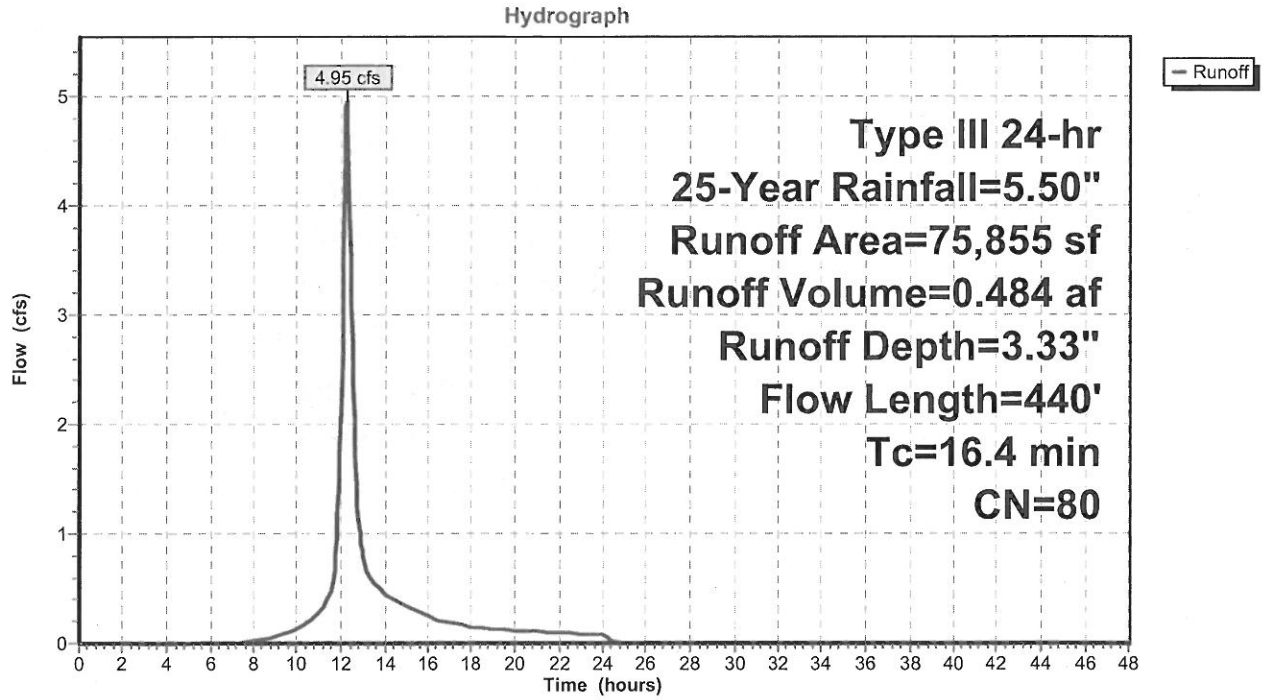
Runoff = 4.95 cfs @ 12.22 hrs, Volume= 0.484 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	16,599	98	
*	18,087	77	
*	41,169	74	
	75,855	80	Weighted Average
	59,256		78.12% Pervious Area
	16,599		21.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	280	0.0530	3.45		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	60	0.0500	6.71	2.34	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.015 Concrete sewer w/manholes & inlets
16.4	440	Total			

Subcatchment 5S: PR-02



Summary for Subcatchment 6S: PR-04

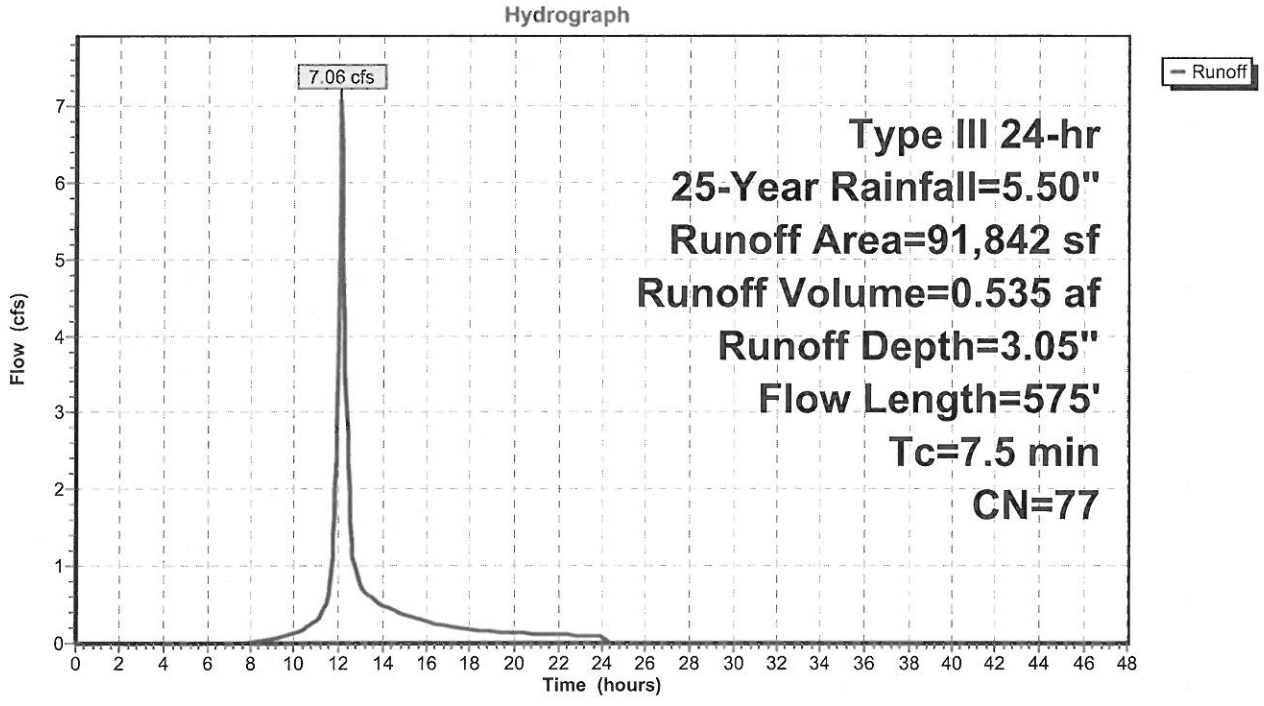
Runoff = 7.06 cfs @ 12.11 hrs, Volume= 0.535 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	12,670	98	
*	79,172	74	
	91,842	77	Weighted Average
	79,172		86.20% Pervious Area
	12,670		13.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	100	0.0500	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	475	0.5500	11.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	575	Total			

Subcatchment 6S: PR-04



Summary for Subcatchment 7S: PR-05

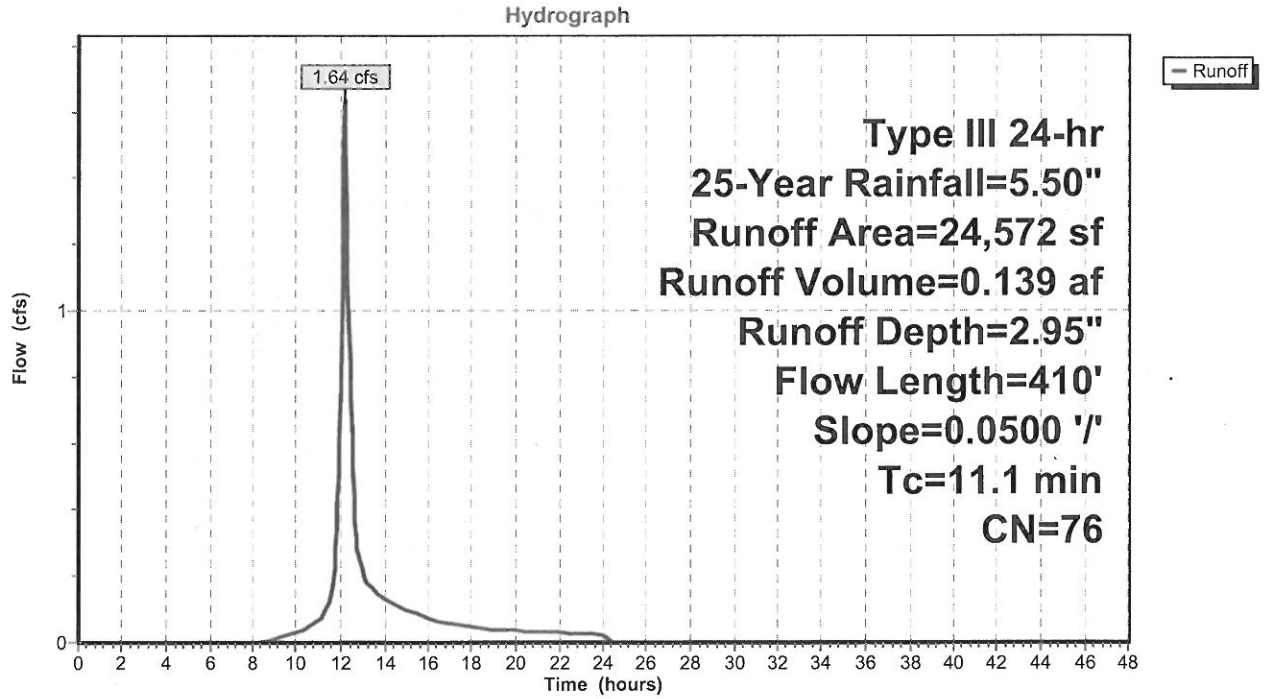
Runoff = 1.64 cfs @ 12.16 hrs, Volume= 0.139 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	2,483	98	
*	22,089	74	
	24,572	76	Weighted Average
	22,089		89.90% Pervious Area
	2,483		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0500	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	230	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	80	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
11.1	410	Total			

Subcatchment 7S: PR-05



Summary for Subcatchment 12S: PR-10

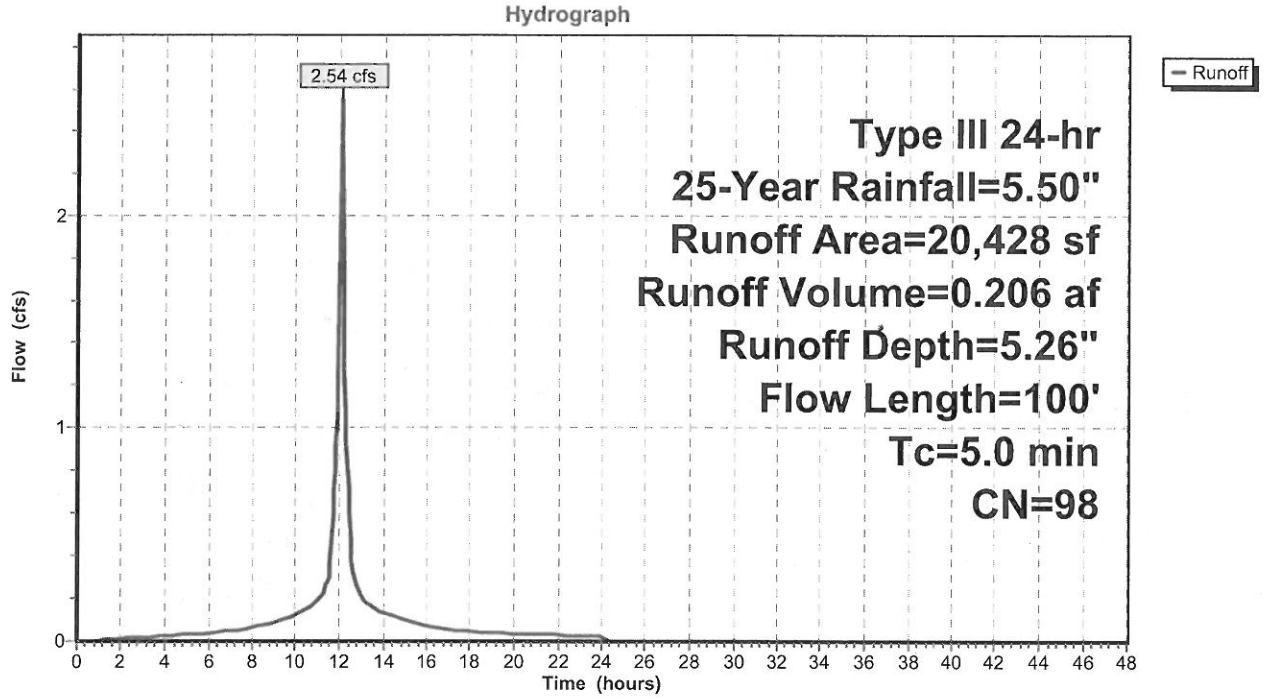
Runoff = 2.54 cfs @ 12.07 hrs, Volume= 0.206 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	20,428	98	
	20,428		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 12S: PR-10



Summary for Subcatchment 13S: PR-3

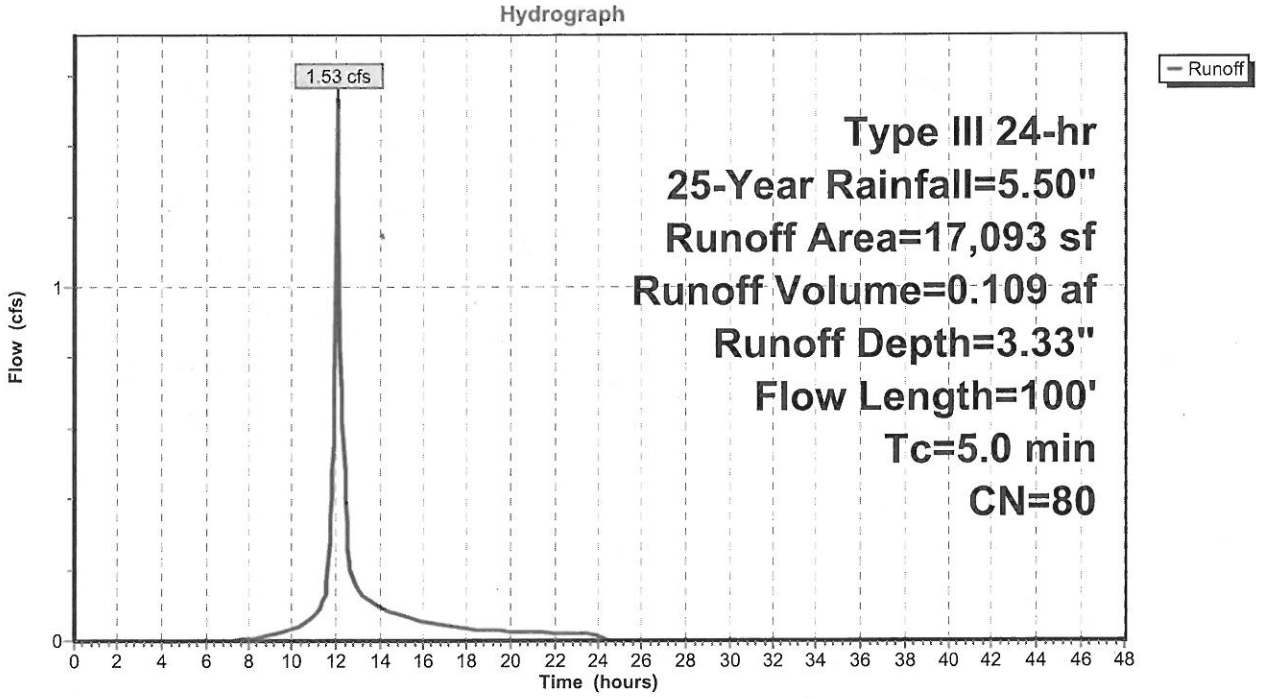
Runoff = 1.53 cfs @ 12.08 hrs, Volume= 0.109 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	4,572	98	
*	12,521	74	
	17,093	80	Weighted Average
	12,521		73.25% Pervious Area
	4,572		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 13S: PR-3



Summary for Subcatchment 19S: FB-ALLOW

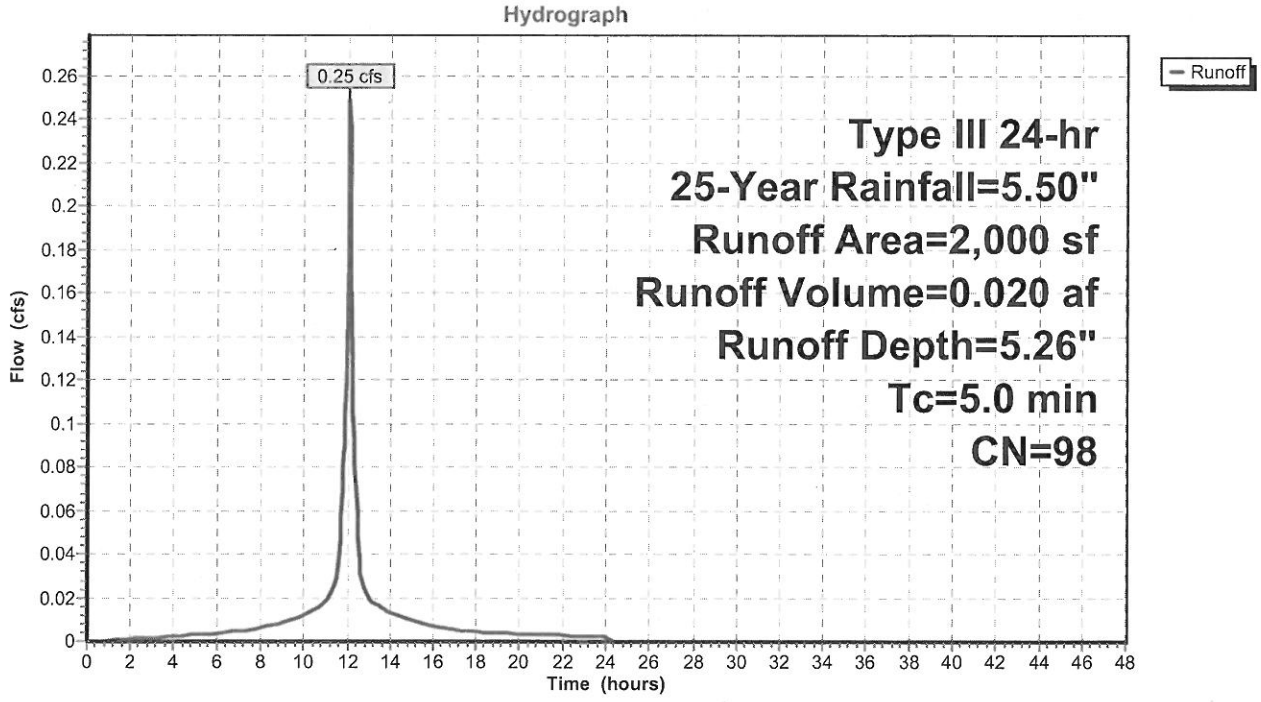
Runoff = 0.25 cfs @ 12.07 hrs, Volume= 0.020 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment 19S: FB-ALLOW

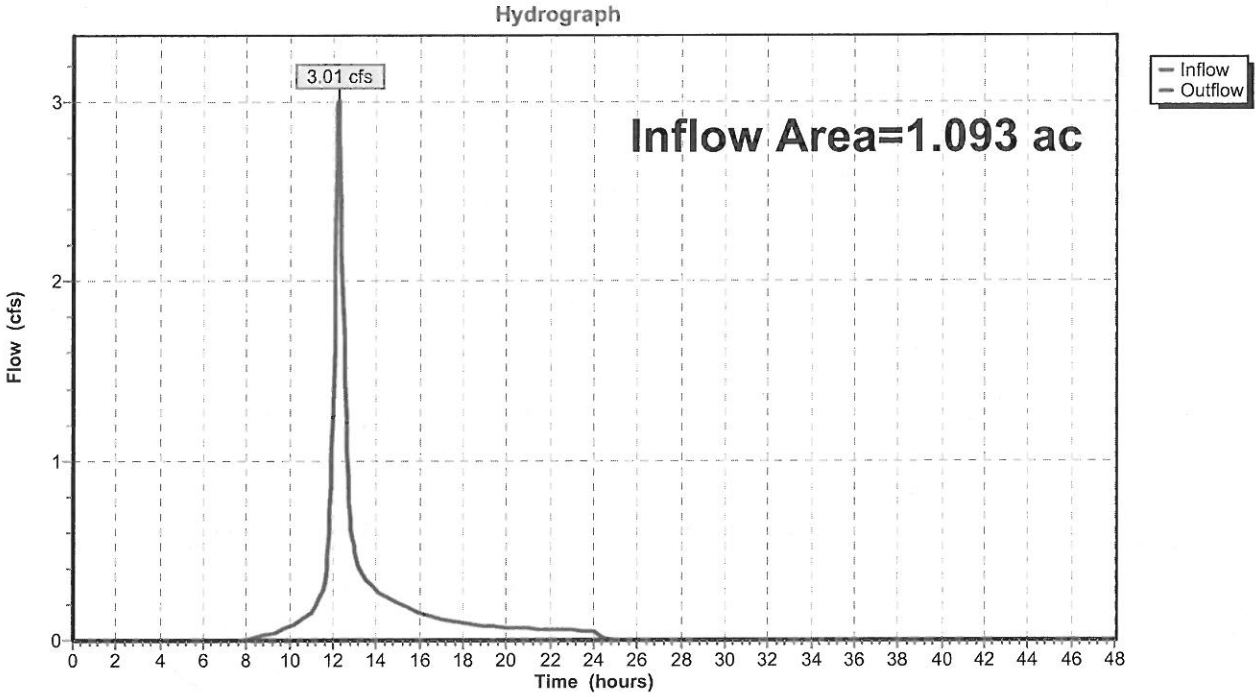


Summary for Reach 14R: POA #1

Inflow Area = 1.093 ac, 19.10% Impervious, Inflow Depth = 3.24" for 25-Year event
Inflow = 3.01 cfs @ 12.23 hrs, Volume= 0.295 af
Outflow = 3.01 cfs @ 12.23 hrs, Volume= 0.295 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 14R: POA #1

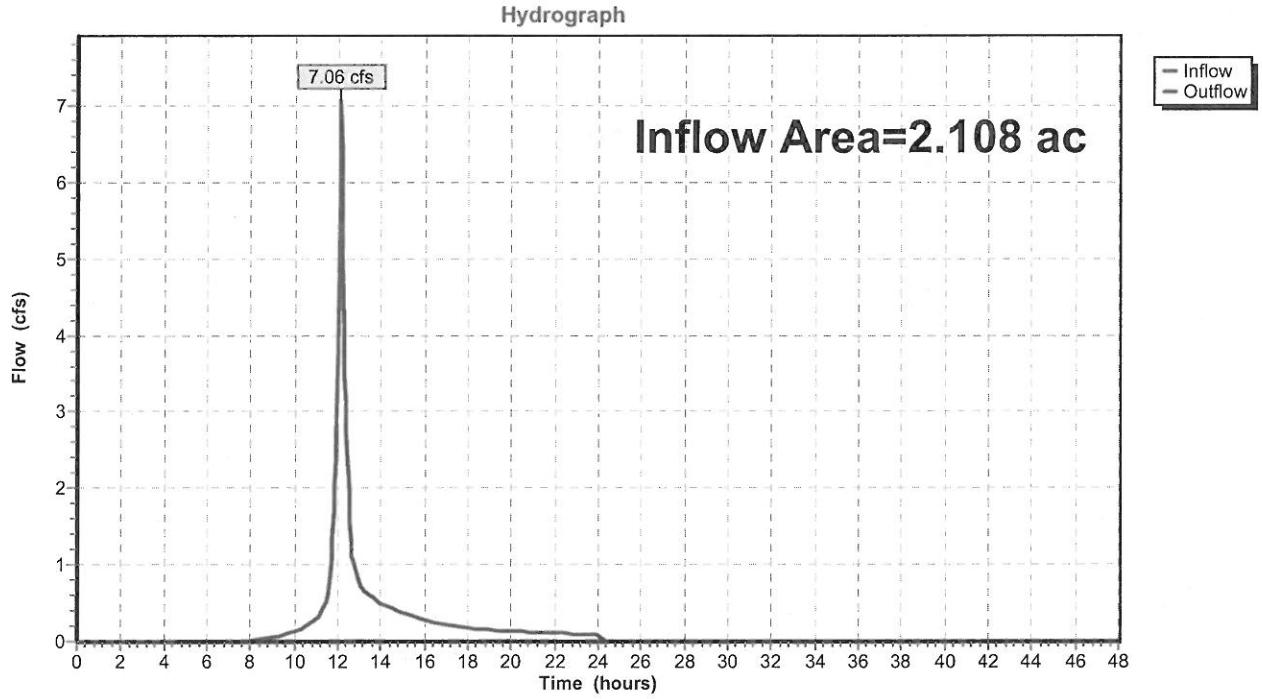


Summary for Reach 15R: POA #3

Inflow Area = 2.108 ac, 13.80% Impervious, Inflow Depth = 3.05" for 25-Year event
Inflow = 7.06 cfs @ 12.11 hrs, Volume= 0.535 af
Outflow = 7.06 cfs @ 12.11 hrs, Volume= 0.535 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 15R: POA #3

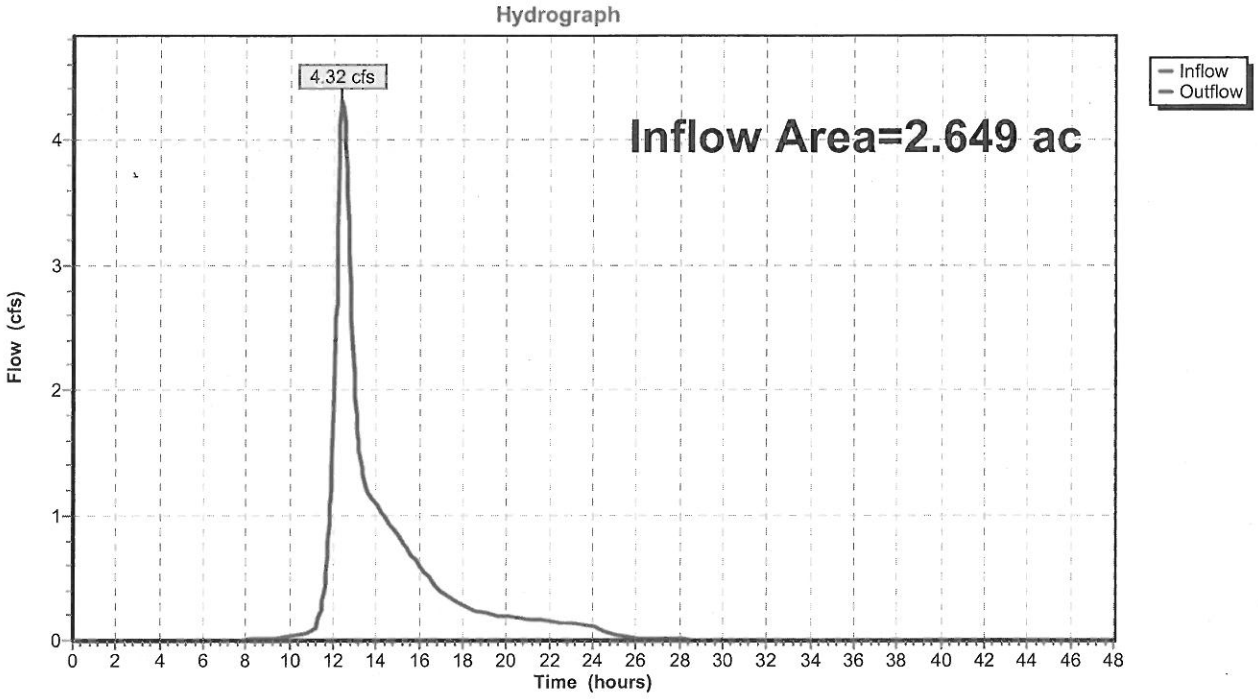


Summary for Reach 16R: POA #2

Inflow Area = 2.649 ac, 37.79% Impervious, Inflow Depth = 3.31" for 25-Year event
Inflow = 4.32 cfs @ 12.40 hrs, Volume= 0.731 af
Outflow = 4.32 cfs @ 12.40 hrs, Volume= 0.731 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 16R: POA #2

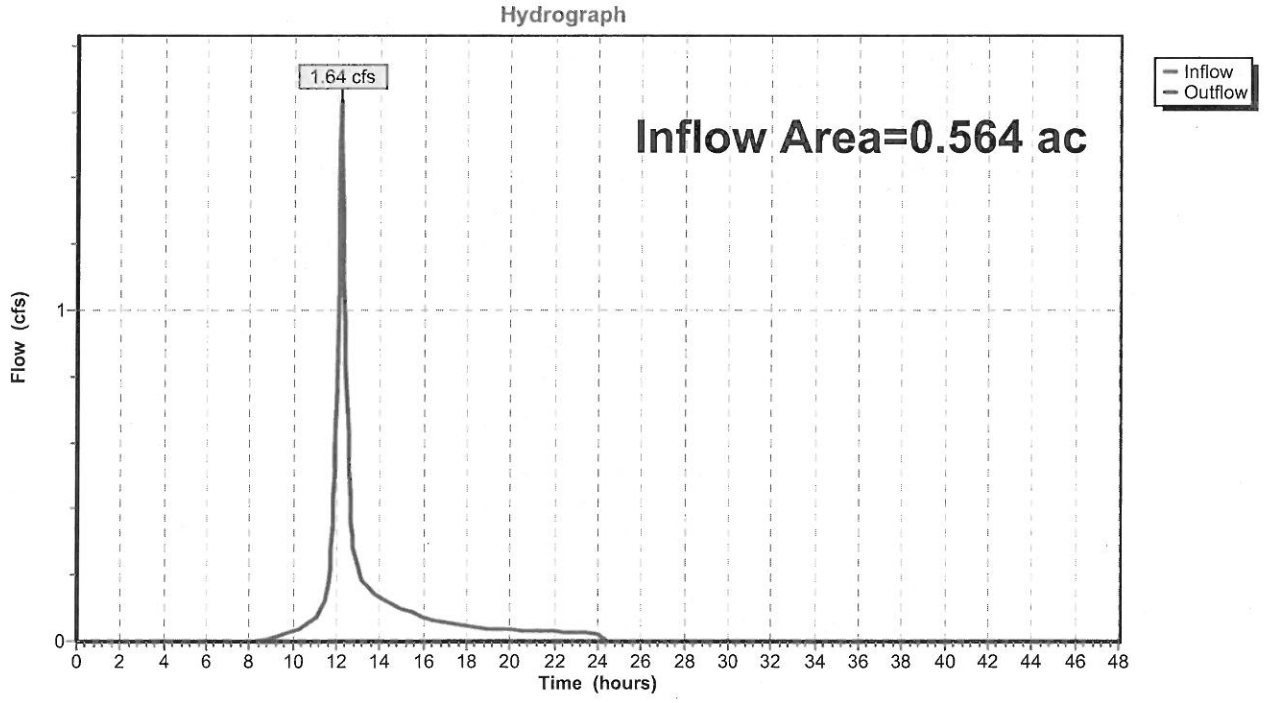


Summary for Reach 17R: POA #4

Inflow Area = 0.564 ac, 10.10% Impervious, Inflow Depth = 2.95" for 25-Year event
Inflow = 1.64 cfs @ 12.16 hrs, Volume= 0.139 af
Outflow = 1.64 cfs @ 12.16 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 17R: POA #4



Summary for Pond 18P: DET 1

Inflow Area = 2.256 ac, 39.71% Impervious, Inflow Depth = 3.77" for 25-Year event
Inflow = 6.32 cfs @ 12.18 hrs, Volume= 0.710 af
Outflow = 3.87 cfs @ 12.44 hrs, Volume= 0.644 af, Atten= 39%, Lag= 15.8 min
Discarded = 0.01 cfs @ 3.35 hrs, Volume= 0.022 af
Primary = 3.86 cfs @ 12.44 hrs, Volume= 0.622 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 147.23' @ 12.44 hrs Surf.Area= 0.088 ac Storage= 0.256 af

Plug-Flow detention time= 153.3 min calculated for 0.644 af (91% of inflow)
Center-of-Mass det. time= 106.7 min (908.0 - 801.3)

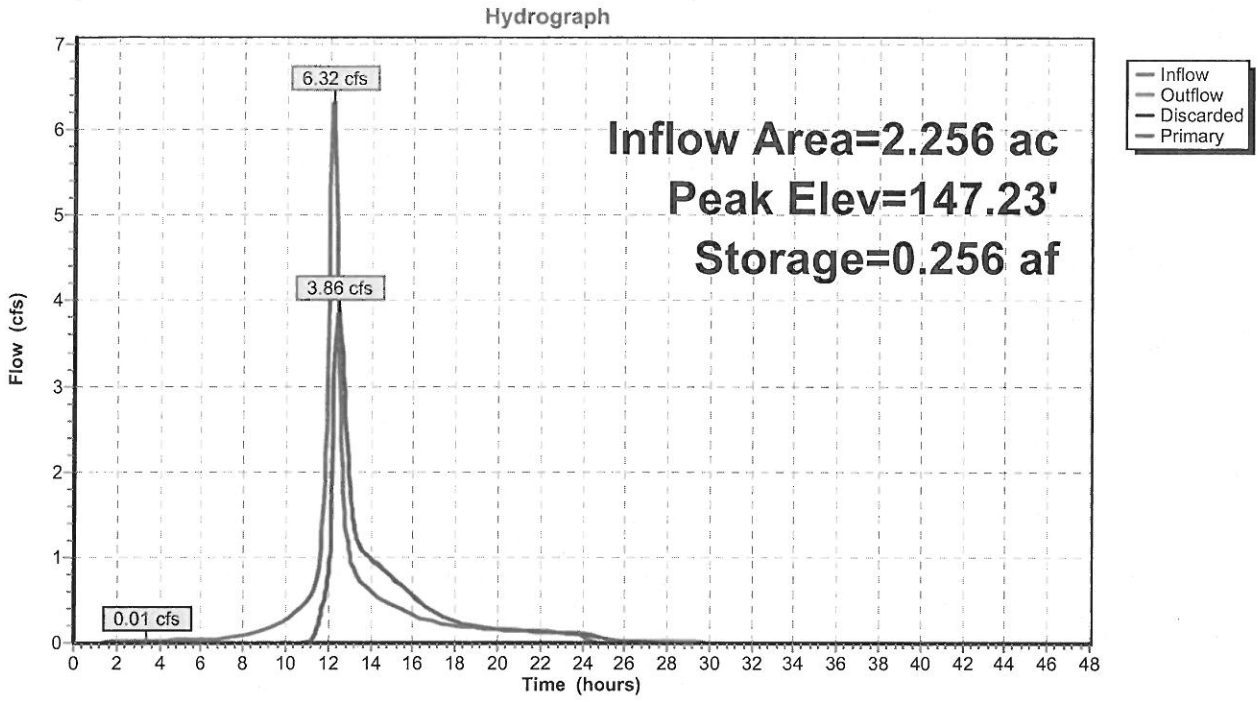
Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	0.137 af	**37.08'W x 103.00'L x 6.00'H Stone Volume** 0.526 af Overall - 0.185 af Embedded = 0.342 af x 40.0% Voids
#2	144.00'	0.185 af	**StormTech MC-3500 b +Cap @ 500.00' L** Inside #1 Effective Size= 71.0"W x 45.0"H => 15.77 sf x 500.00'L = 7,883.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= +15.6 cf x 2 x 5 rows = 156.0 cf
		0.321 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**0.065 in/hr Exfiltration over Surface area**
#2	Primary	143.00'	**12.0" W x 12.0" H Box Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 143.00' / 142.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.00 sf
#3	Device 2	144.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	146.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 3.35 hrs HW=143.06' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.86 cfs @ 12.44 hrs HW=147.23' (Free Discharge)
└**2=Culvert** (Passes 3.86 cfs of 8.08 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.49 cfs @ 7.58 fps)
  └**4=Orifice/Grate** (Orifice Controls 2.37 cfs @ 4.34 fps)

Pond 18P: DET 1



Summary for Subcatchment 4S: PR-01

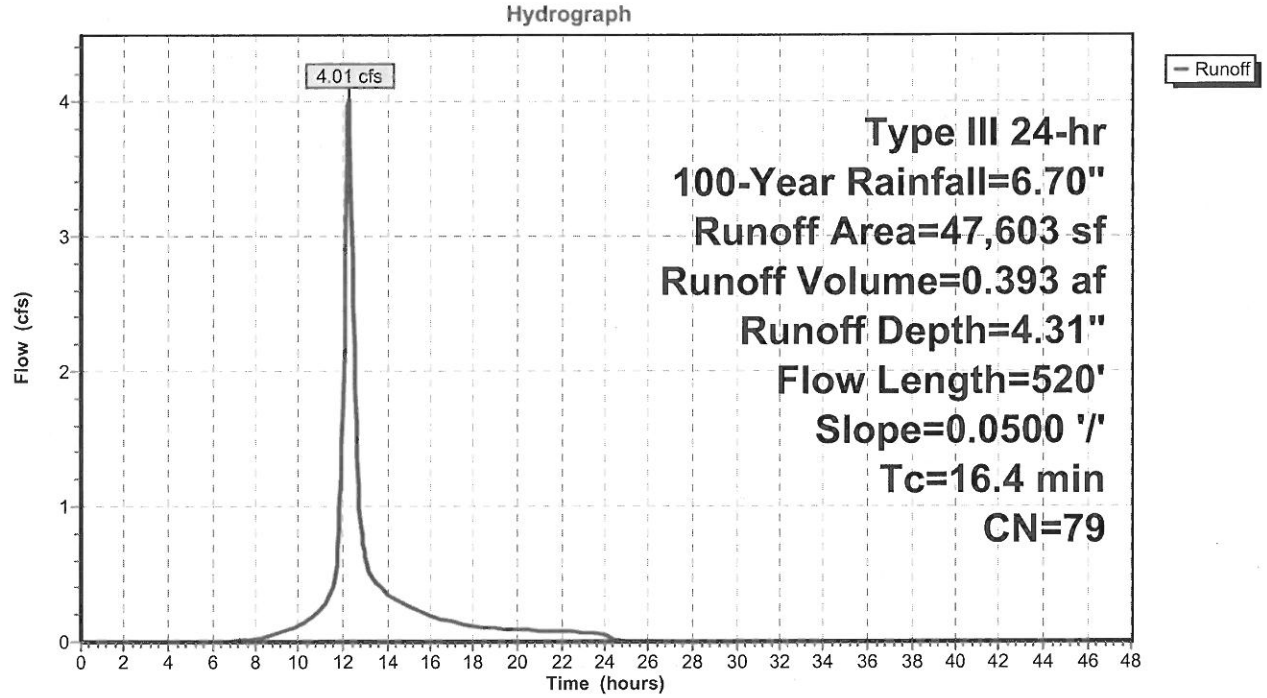
Runoff = 4.01 cfs @ 12.22 hrs, Volume= 0.393 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	9,093	98	
*	12,502	77	
*	26,008	74	
	47,603	79	Weighted Average
	38,510		80.90% Pervious Area
	9,093		19.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	240	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	180	0.0500	8.79	6.90	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.015 Concrete sewer w/manholes & inlets
16.4	520	Total			

Subcatchment 4S: PR-01



Summary for Subcatchment 5S: PR-02

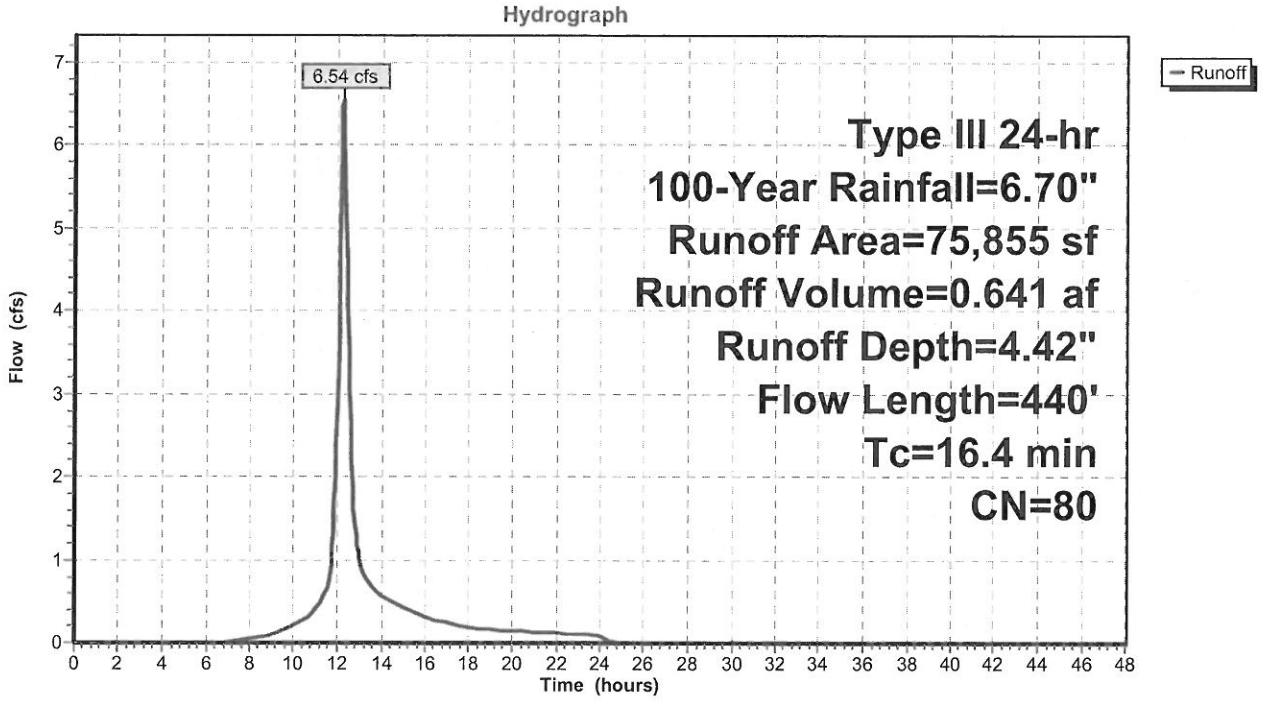
Runoff = 6.54 cfs @ 12.22 hrs, Volume= 0.641 af, Depth= 4.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	16,599	98	
*	18,087	77	
*	41,169	74	
	75,855	80	Weighted Average
	59,256		78.12% Pervious Area
	16,599		21.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0500	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	280	0.0530	3.45		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	60	0.0500	6.71	2.34	**Pipe Channel,** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.015 Concrete sewer w/manholes & inlets
16.4	440	Total			

Subcatchment 5S: PR-02



Summary for Subcatchment 6S: PR-04

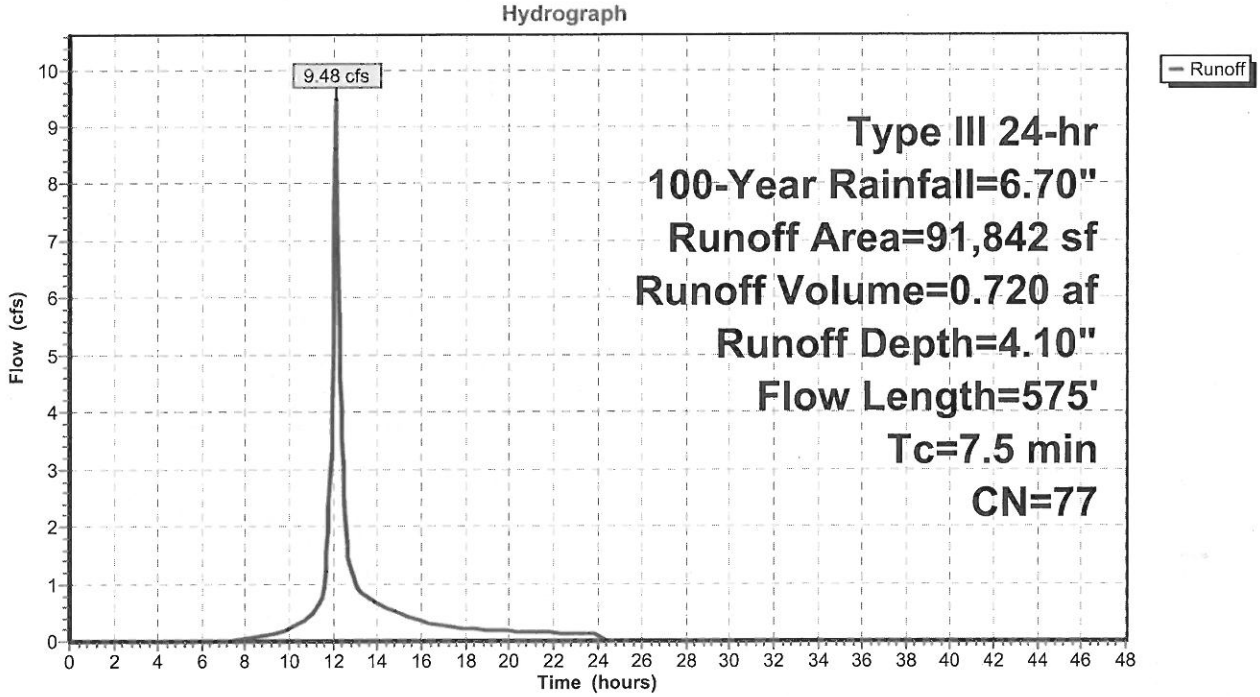
Runoff = 9.48 cfs @ 12.11 hrs, Volume= 0.720 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	12,670	98	
*	79,172	74	
	91,842	77	Weighted Average
	79,172		86.20% Pervious Area
	12,670		13.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	100	0.0500	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	475	0.5500	11.12		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	575	Total			

Subcatchment 6S: PR-04



Summary for Subcatchment 7S: PR-05

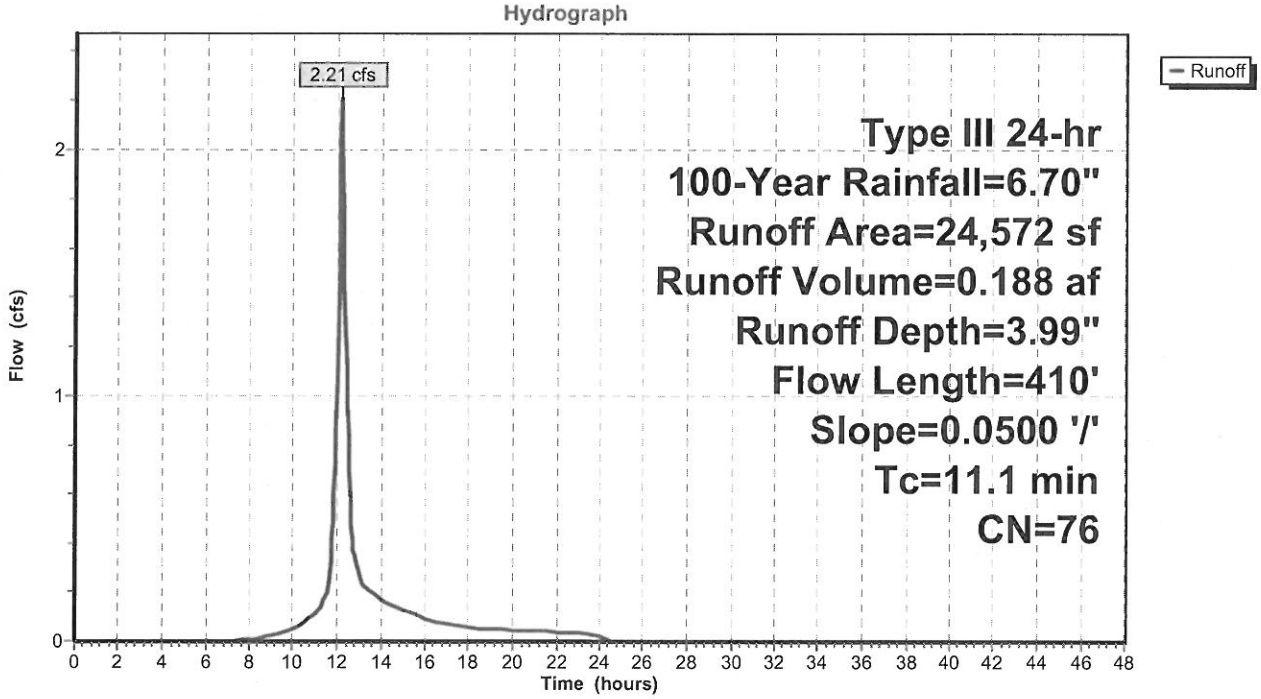
Runoff = 2.21 cfs @ 12.16 hrs, Volume= 0.188 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	2,483	98	
*	22,089	74	
	24,572	76	Weighted Average
	22,089		89.90% Pervious Area
	2,483		10.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.0500	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	230	0.0500	3.35		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	80	0.0500	10.14	7.97	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
11.1	410	Total			

Subcatchment 7S: PR-05



Summary for Subcatchment 12S: PR-10

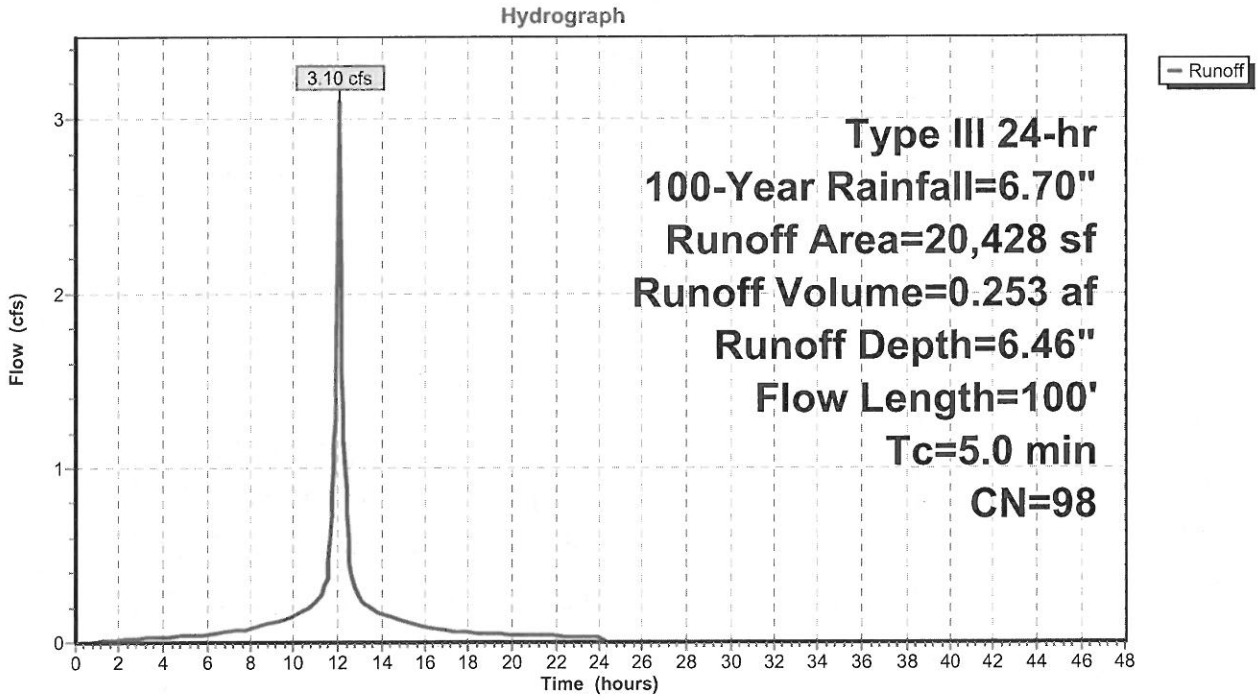
Runoff = 3.10 cfs @ 12.07 hrs, Volume= 0.253 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	20,428	98	
	20,428		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 12S: PR-10



Summary for Subcatchment 13S: PR-3

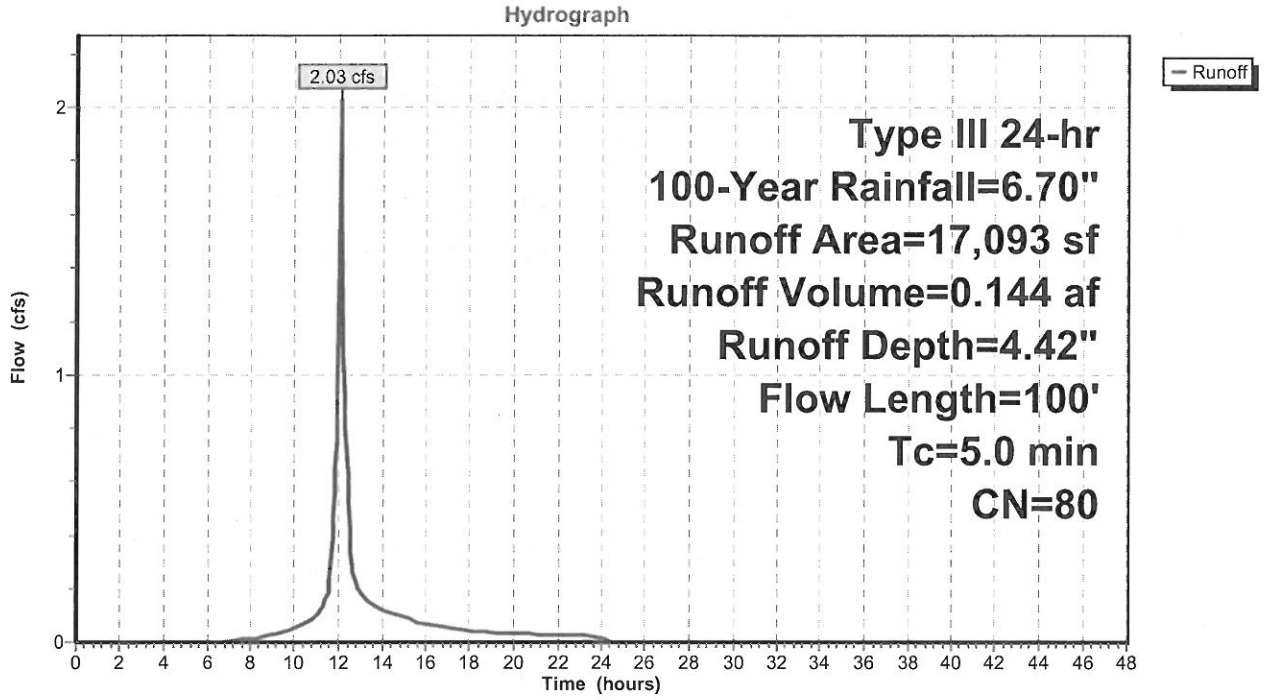
Runoff = 2.03 cfs @ 12.07 hrs, Volume= 0.144 af, Depth= 4.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	4,572	98	
*	12,521	74	
	17,093	80	Weighted Average
	12,521		73.25% Pervious Area
	4,572		26.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	100		0.33		**Direct Entry,**

Subcatchment 13S: PR-3



Summary for Subcatchment 19S: FB-ALLOW

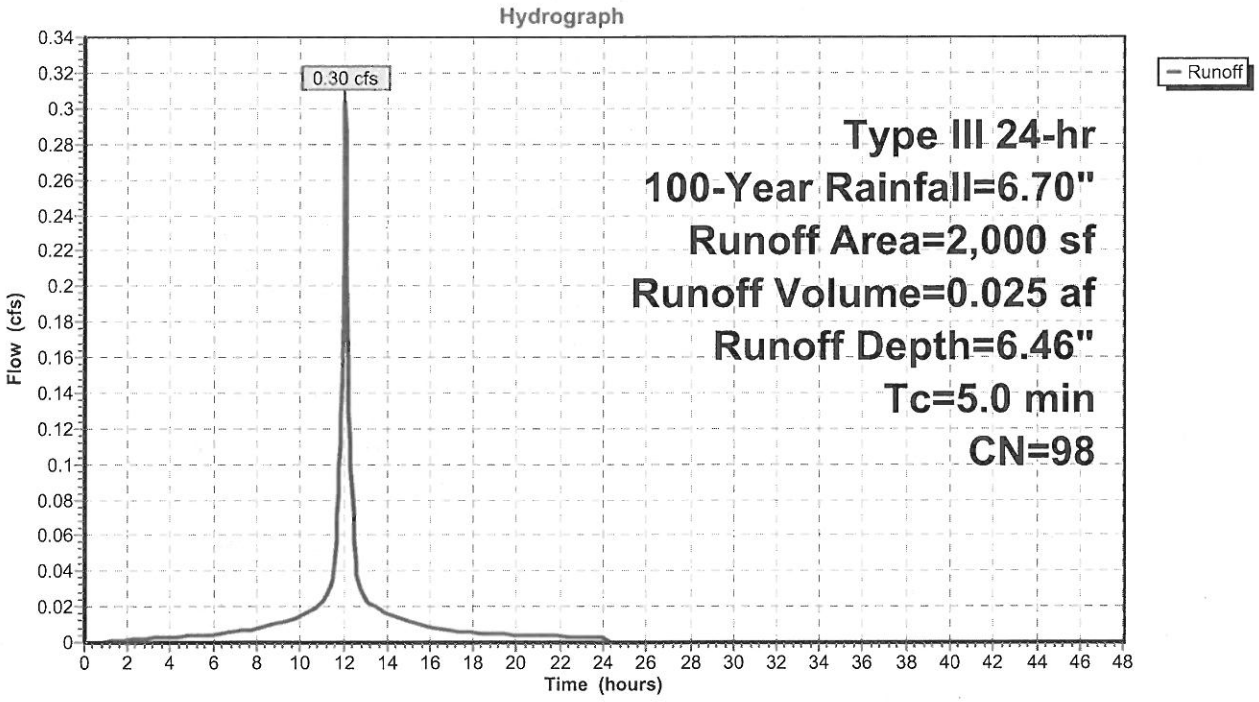
Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.025 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment 19S: FB-ALLOW

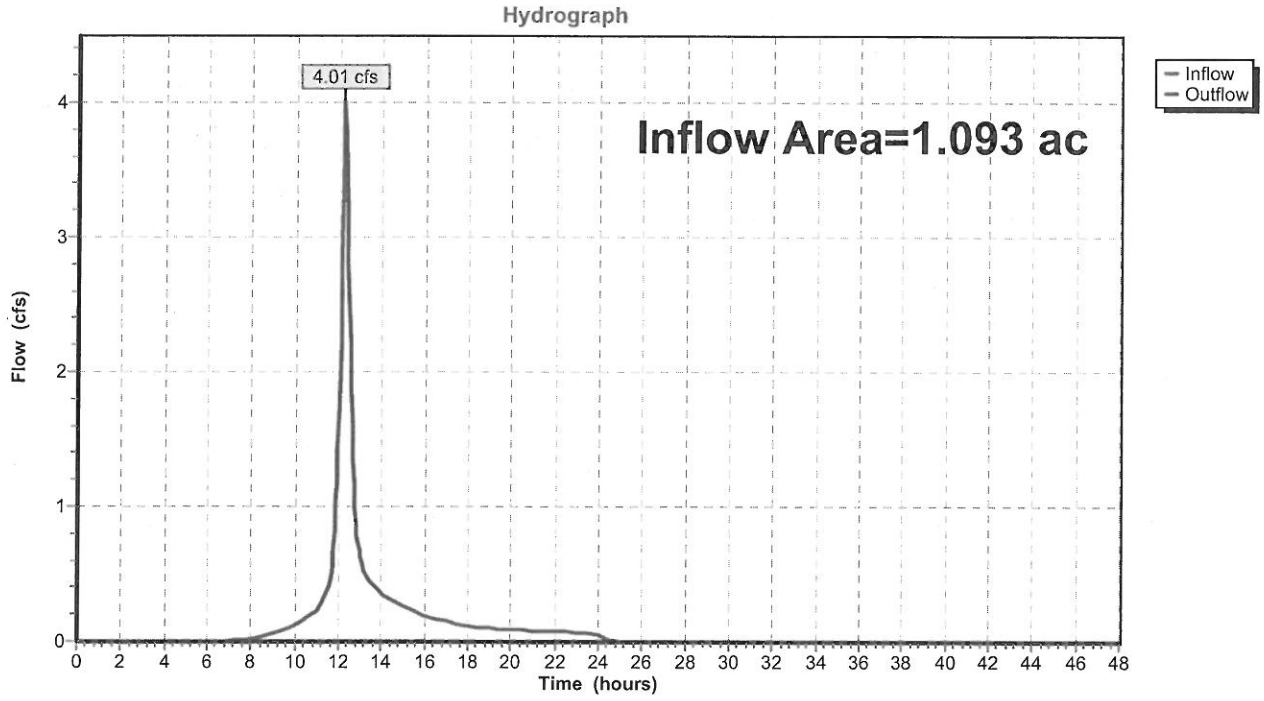


Summary for Reach 14R: POA #1

Inflow Area = 1.093 ac, 19.10% Impervious, Inflow Depth = 4.31" for 100-Year event
Inflow = 4.01 cfs @ 12.22 hrs, Volume= 0.393 af
Outflow = 4.01 cfs @ 12.22 hrs, Volume= 0.393 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 14R: POA #1

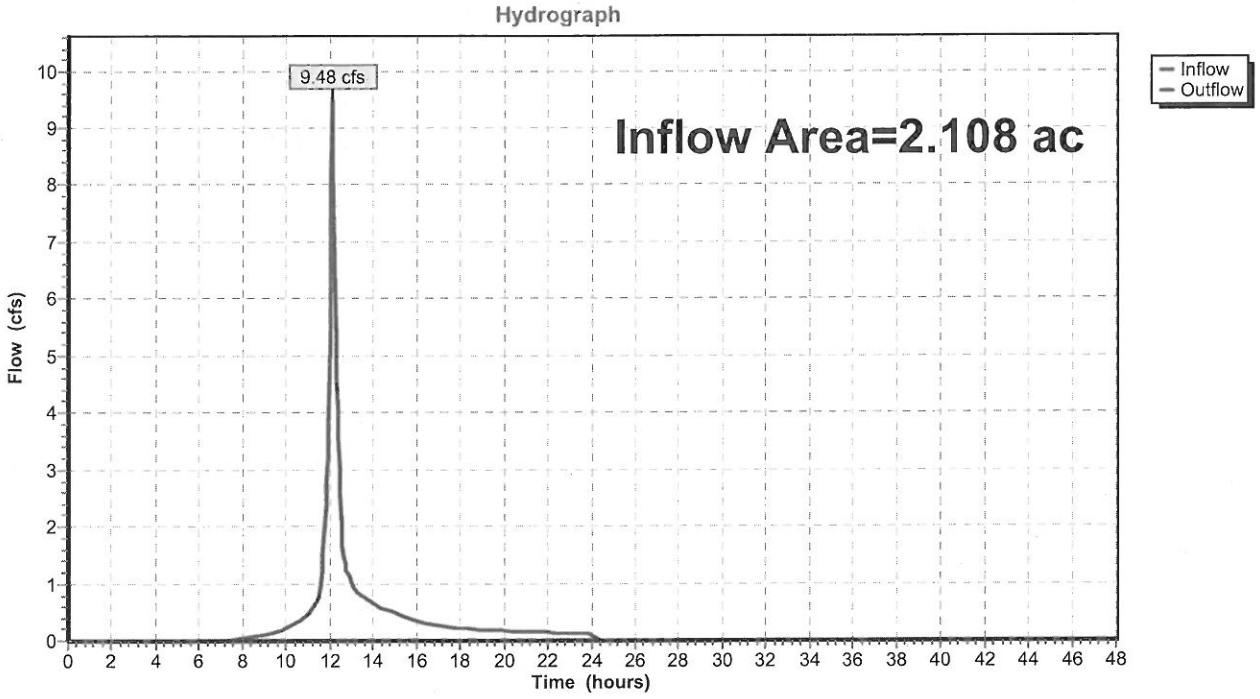


Summary for Reach 15R: POA #3

Inflow Area = 2.108 ac, 13.80% Impervious, Inflow Depth = 4.10" for 100-Year event
Inflow = 9.48 cfs @ 12.11 hrs, Volume= 0.720 af
Outflow = 9.48 cfs @ 12.11 hrs, Volume= 0.720 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 15R: POA #3

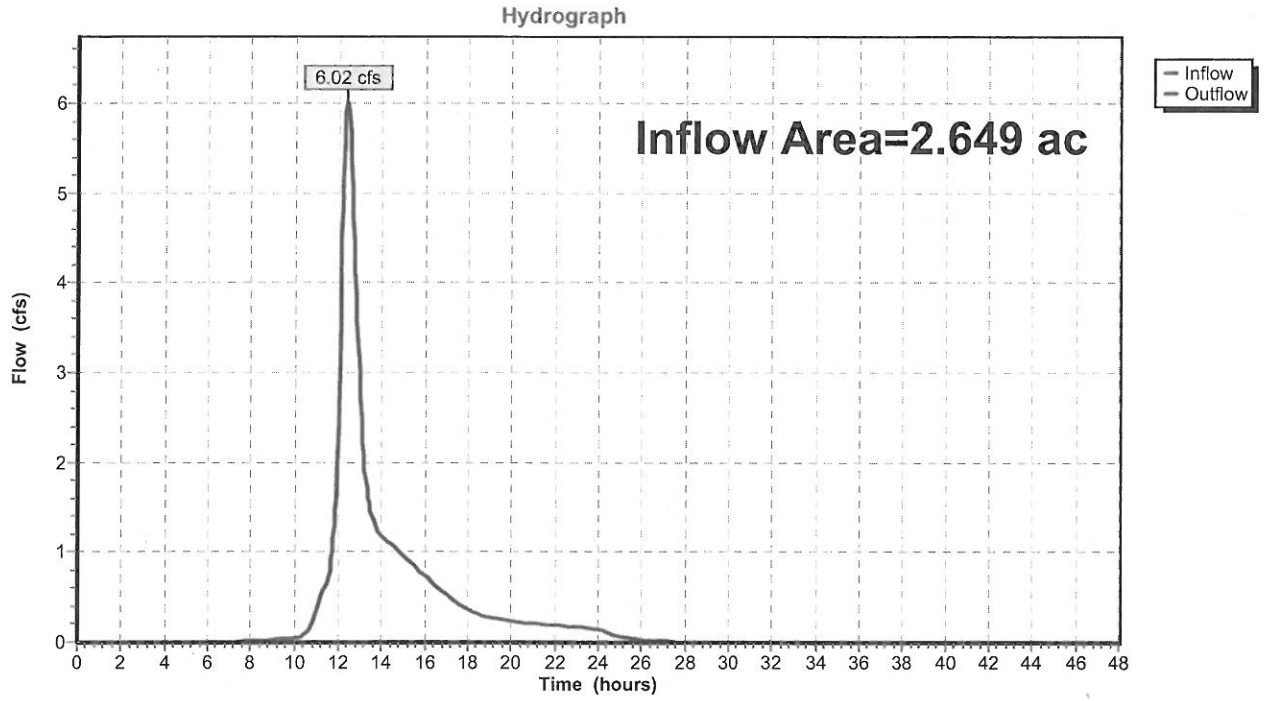


Summary for Reach 16R: POA #2

Inflow Area = 2.649 ac, 37.79% Impervious, Inflow Depth = 4.42" for 100-Year event
Inflow = 6.02 cfs @ 12.37 hrs, Volume= 0.975 af
Outflow = 6.02 cfs @ 12.37 hrs, Volume= 0.975 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 16R: POA #2

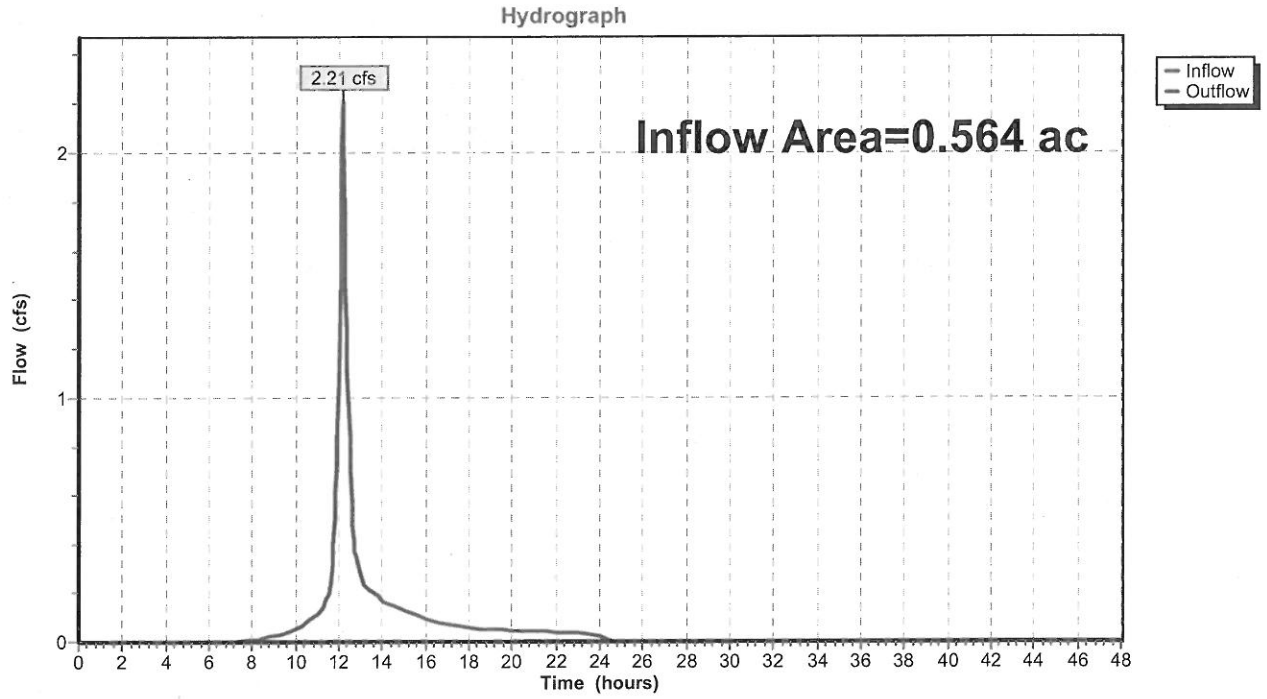


Summary for Reach 17R: POA #4

Inflow Area = 0.564 ac, 10.10% Impervious, Inflow Depth = 3.99" for 100-Year event
Inflow = 2.21 cfs @ 12.16 hrs, Volume= 0.188 af
Outflow = 2.21 cfs @ 12.16 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 17R: POA #4



Summary for Pond 18P: DET 1

Inflow Area = 2.256 ac, 39.71% Impervious, Inflow Depth = 4.88" for 100-Year event
Inflow = 8.21 cfs @ 12.18 hrs, Volume= 0.918 af
Outflow = 5.39 cfs @ 12.41 hrs, Volume= 0.853 af, Atten= 34%, Lag= 13.9 min
Discarded = 0.01 cfs @ 2.80 hrs, Volume= 0.022 af
Primary = 5.38 cfs @ 12.41 hrs, Volume= 0.831 af

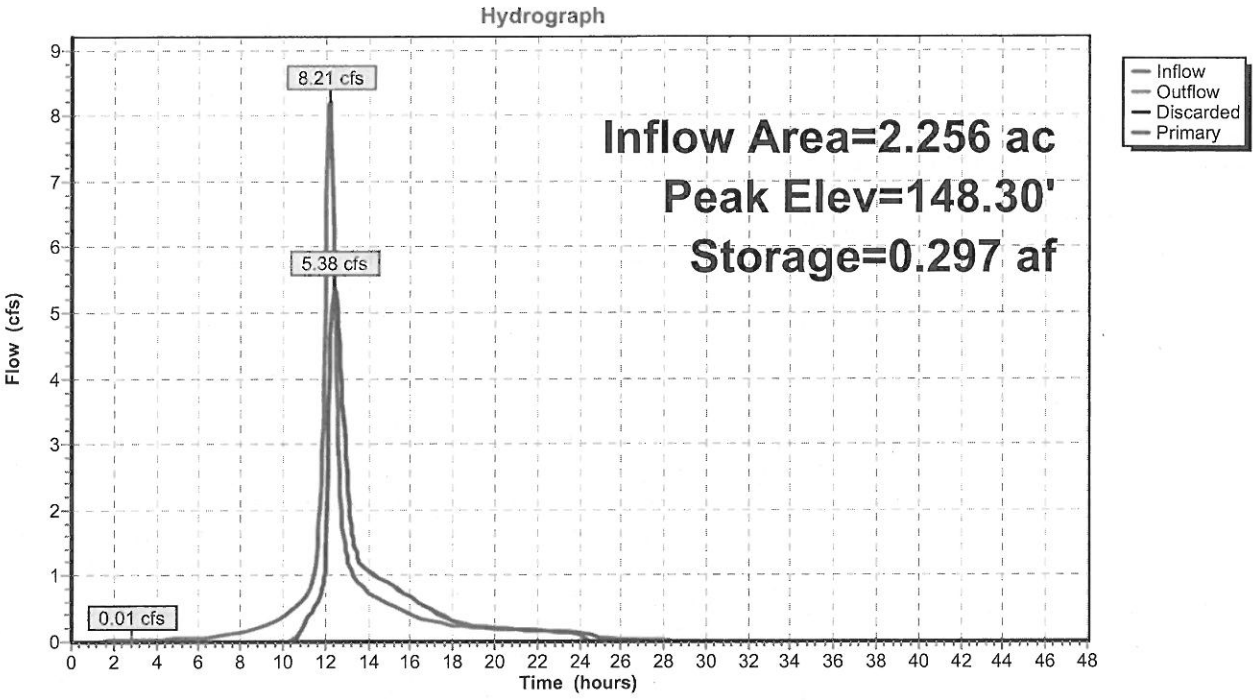
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 148.30' @ 12.41 hrs Surf.Area= 0.088 ac Storage= 0.297 af

Plug-Flow detention time= 130.1 min calculated for 0.852 af (93% of inflow)
Center-of-Mass det. time= 93.6 min (889.7 - 796.2)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	0.137 af	**37.08'W x 103.00'L x 6.00'H Stone Volume** 0.526 af Overall - 0.185 af Embedded = 0.342 af x 40.0% Voids
#2	144.00'	0.185 af	**StormTech MC-3500 b +Cap @ 500.00' L** Inside #1 Effective Size= 71.0"W x 45.0"H => 15.77 sf x 500.00'L = 7,883.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= +15.6 cf x 2 x 5 rows = 156.0 cf
		0.321 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**0.065 in/hr Exfiltration over Surface area**
#2	Primary	143.00'	**12.0" W x 12.0" H Box Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 143.00' / 142.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.00 sf
#3	Device 2	144.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	146.00'	**10.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 2.80 hrs HW=143.06' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=5.37 cfs @ 12.41 hrs HW=148.29' (Free Discharge)
└**2=Culvert** (Passes 5.37 cfs of 9.03 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 1.78 cfs @ 9.06 fps)
  └**4=Orifice/Grate** (Orifice Controls 3.59 cfs @ 6.59 fps)

Pond 18P: DET 1