

70 Essex Street, Unit 2C, Street, Mystic, CT 06355 ■ Phone: 860-536-7390

July 6, 2023

Montville Planning & Zoning Commission

Re: Stormwater Summary
2040 New London Turnpike, Montville, CT
Fedus Engineering, LLC Job # 001048

We offer the following summary of our stormwater analysis:

	2 year	10 year	25 year	50 year	100 year
Existing Rate	0.71 CFS	2.61 CFS	4.46 CFS	6.38 CFS	8.82 CFS
Proposed Rate	0.58 CFS	1.94 CFS	3.26 CFS	4.60 CFS	6.30 CFS
Existing Volume	0.107 af	0.292 af	0.470 af	0.653 af	0.887 af
Proposed Volume	0.094 af	0.261 af	0.421 af	0.587 af	0.801 af

Water Quality Volume – Volume of runoff generated by one inch of rainfall on the site

$$WQV = (1")(R)(A)/12$$

$R = 0.05 + 0.009 \cdot I = 0.05 + 0.009(31.6) = 0.3344$, I = Impervious Coverage = 31.6%,

$A = 2.66$ Acres

$$WQV = 1"(0.3344)(2.66)/12 = 0.0741 \text{ acre-ft.} \cdot (43,560 \text{ SF/1Acre}) = 3229 \text{ Cubic Feet}$$

The forebay area of the detention basin and the hydro-dynamic separator will ensure the TSS removal of 80% plus. The hydro-dynamic separator is sized to handle the majority of the parking and site prior to discharging to the forebay of the detention basin.

Conclusions:

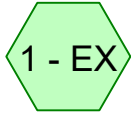
The post development flows and volumes are lower than pre-development conditions in all storms. There will be no adverse impact to the down-gradient wetlands. Additionally, it is our professional opinion that there will be no adverse impact to the adjacent downstream properties.

If you have any questions or require additional information please contact our office at (860) 536-7390.

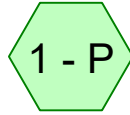
Sincerely,

Gregg Fedus, P.E.

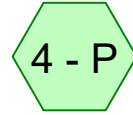




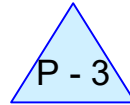
Ex. Area 1



Proposed Area 1, 2, and
3



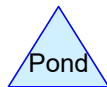
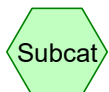
Proposed Area 4



Detention Basin



Analysis 1



Routing Diagram for 2040 NL Turnpike Montville Existing and Proposed Stormwater Analysis - July 2023

Prepared by Microsoft, Printed 7/6/2023

HydroCAD® 10.00-20 s/n 05120 © 2017 HydroCAD Software Solutions LLC

Summary for Subcatchment 1 - EX: Ex. Area 1

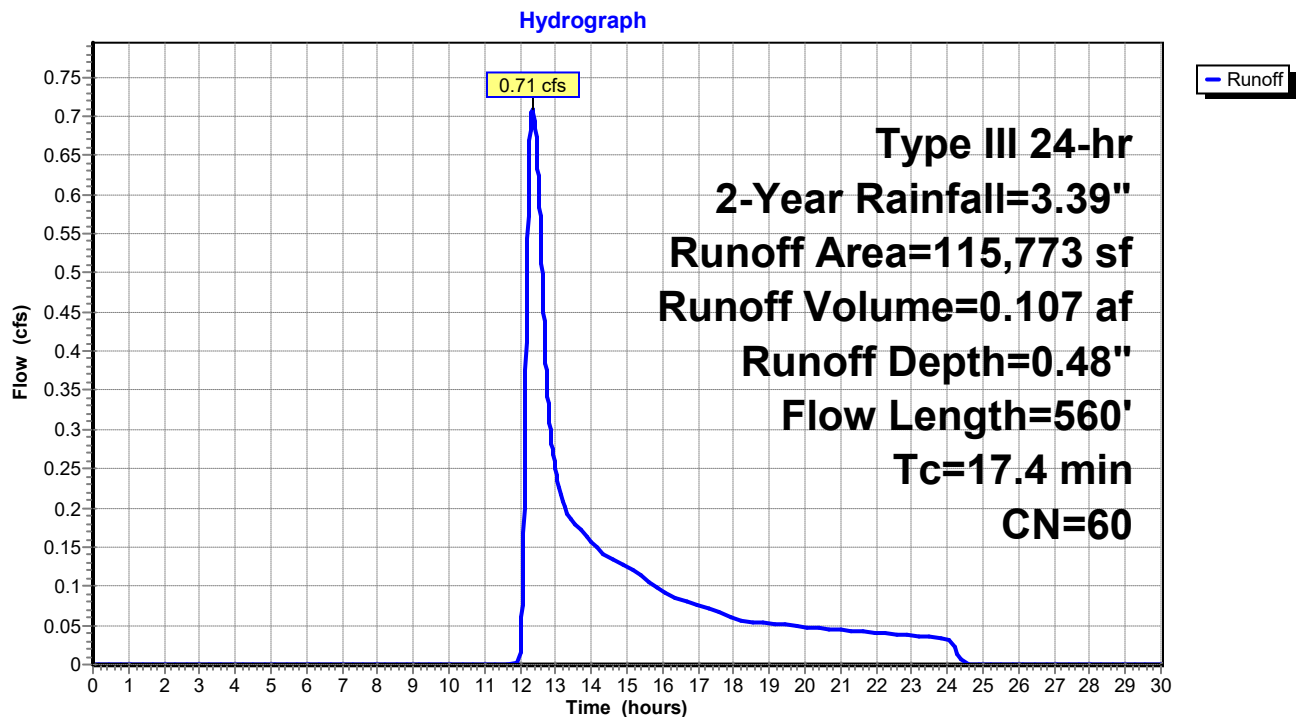
Runoff = 0.71 cfs @ 12.34 hrs, Volume= 0.107 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
115,773	60	Woods, Fair, HSG B
115,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0900	0.15		Sheet Flow, Wooded
					Woods: Light underbrush n= 0.400 P2= 3.39"
6.0	460	0.0643	1.27		Shallow Concentrated Flow, Balance of Flow
					Woodland Kv= 5.0 fps
17.4	560	Total			

Subcatchment 1 - EX: Ex. Area 1



Summary for Subcatchment 1 - P: Proposed Area 1, 2, and 3

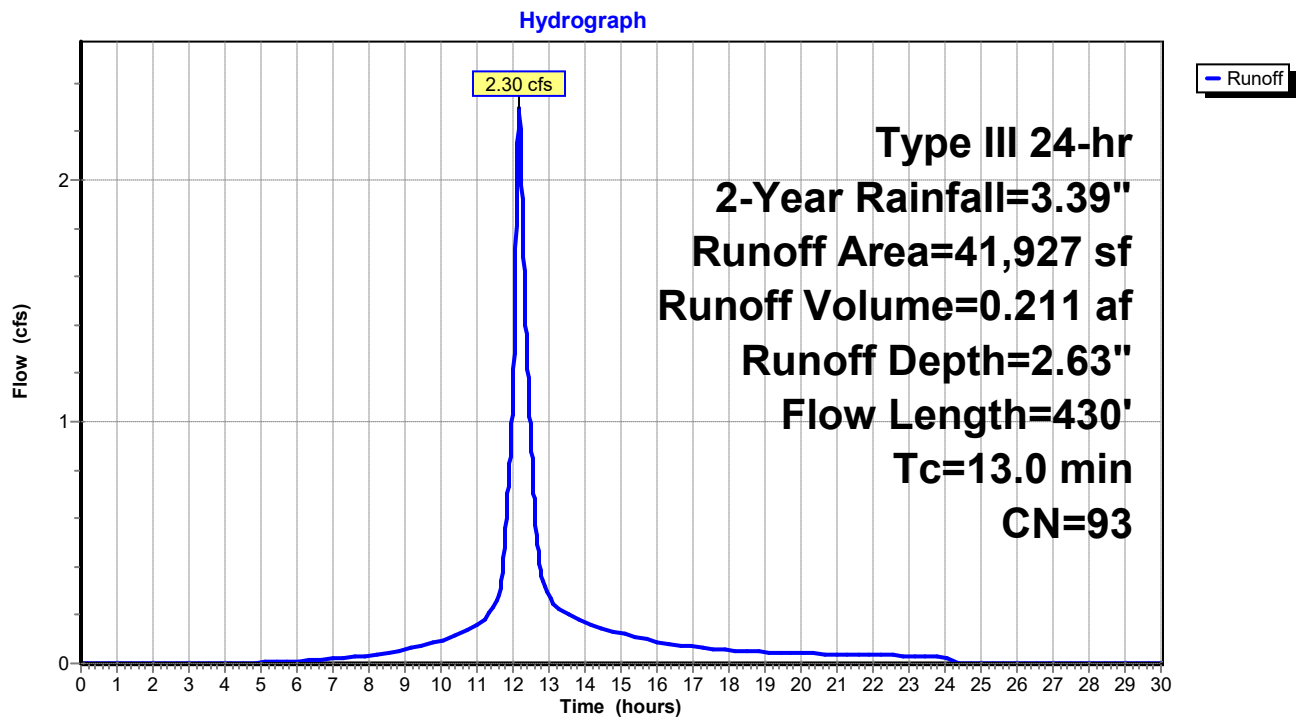
Runoff = 2.30 cfs @ 12.17 hrs, Volume= 0.211 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
5,376	60	Woods, Fair, HSG B
28,855	98	Paved parking, HSG B
7,696	98	Roofs, HSG B
41,927	93	Weighted Average
5,376		12.82% Pervious Area
36,551		87.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0900	0.14		Sheet Flow, Grass Grass: Bermuda n= 0.410 P2= 3.39"
0.5	38	0.0286	1.18		Shallow Concentrated Flow, Flow to Pavement Short Grass Pasture Kv= 7.0 fps
0.5	132	0.0423	4.18		Shallow Concentrated Flow, Balance of Flow Path to CB 2 Paved Kv= 20.3 fps
0.3	160	0.0300	9.12	11.19	Pipe Channel, HDPE_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
13.0	430	Total			

Subcatchment 1 - P: Proposed Area 1, 2, and 3



Summary for Subcatchment 4 - P: Proposed Area 4

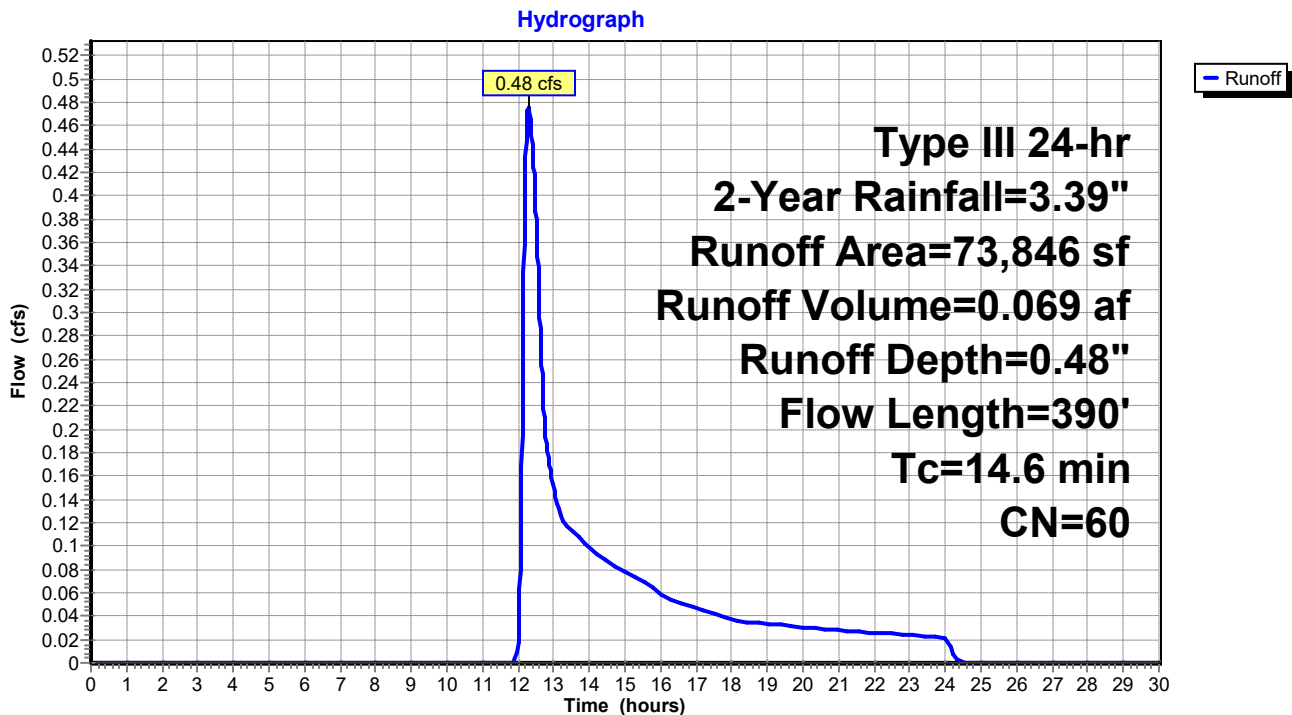
Runoff = 0.48 cfs @ 12.28 hrs, Volume= 0.069 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.39"

Area (sf)	CN	Description
73,846	60	Woods, Fair, HSG B
73,846		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0700	0.13		Sheet Flow, Existing Wooded Area Woods: Light underbrush n= 0.400 P2= 3.39"
1.6	130	0.0692	1.32		Shallow Concentrated Flow, Concentrated to Channel Woodland Kv= 5.0 fps
0.4	160	0.0825	6.51	26.06	Channel Flow, Balance of Flow to Analysis Point Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.050 Mountain streams w/large boulders
14.6	390	Total			

Subcatchment 4 - P: Proposed Area 4



Summary for Pond P - 3: Detention Basin

Inflow Area = 0.963 ac, 87.18% Impervious, Inflow Depth = 2.63" for 2-Year event
 Inflow = 2.30 cfs @ 12.17 hrs, Volume= 0.211 af
 Outflow = 0.43 cfs @ 12.72 hrs, Volume= 0.211 af, Atten= 81%, Lag= 32.8 min
 Discarded = 0.29 cfs @ 11.74 hrs, Volume= 0.185 af
 Primary = 0.15 cfs @ 12.72 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 158.76' @ 12.72 hrs Surf.Area= 4,131 sf Storage= 3,124 cf

Plug-Flow detention time= 62.3 min calculated for 0.211 af (100% of inflow)
 Center-of-Mass det. time= 62.3 min (859.4 - 797.2)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	22,721 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

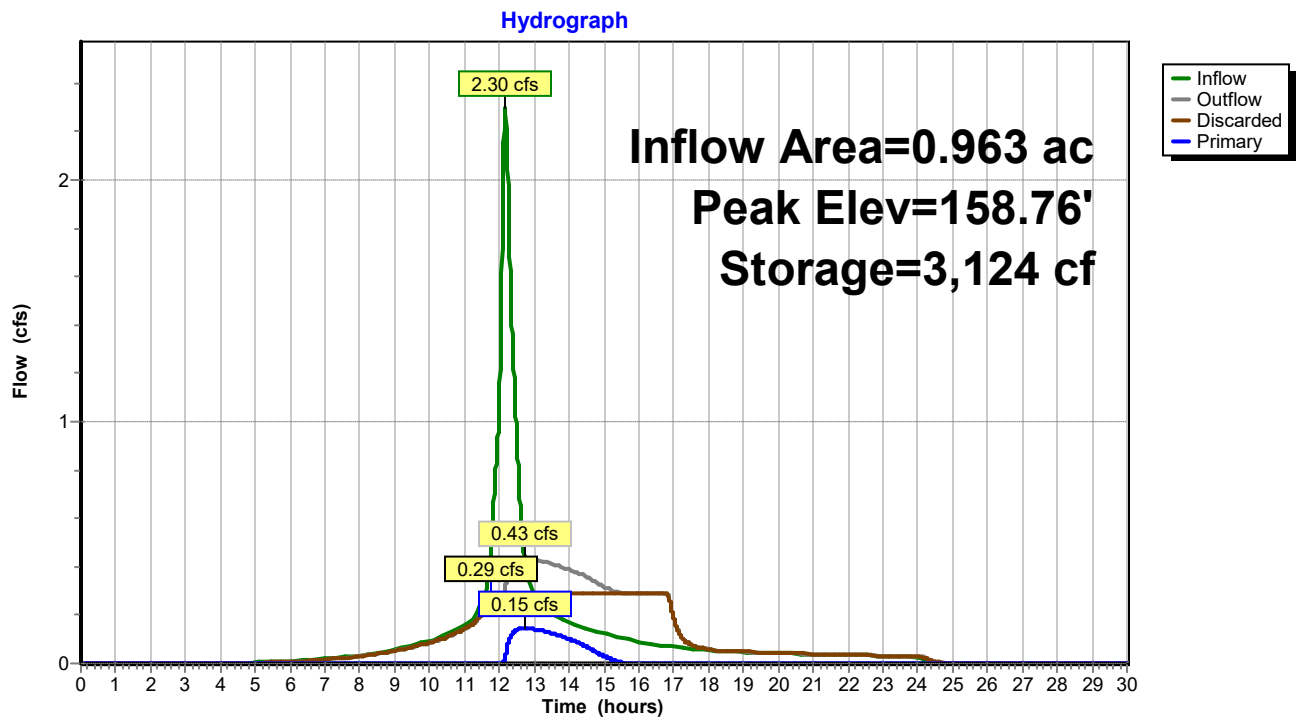
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	4,131	0	0
159.00	4,131	4,131	4,131
160.00	4,131	4,131	8,262
161.00	4,131	4,131	12,393
162.00	4,131	4,131	16,524
163.00	4,131	4,131	20,655
163.50	4,131	2,066	22,721

Device	Routing	Invert	Outlet Devices
#1	Primary	158.25'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	161.00'	4.0" Vert. Orifice/Grate C= 0.600
#3	Primary	163.50'	24.0" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Discarded	158.00'	3.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.74 hrs HW=158.06' (Free Discharge)
 ↑ **4=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.15 cfs @ 12.72 hrs HW=158.76' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.15 cfs @ 2.97 fps)
 ↓ **2=Orifice/Grate** (Controls 0.00 cfs)
 ↓ **3=Orifice/Grate** (Controls 0.00 cfs)

Pond P - 3: Detention Basin

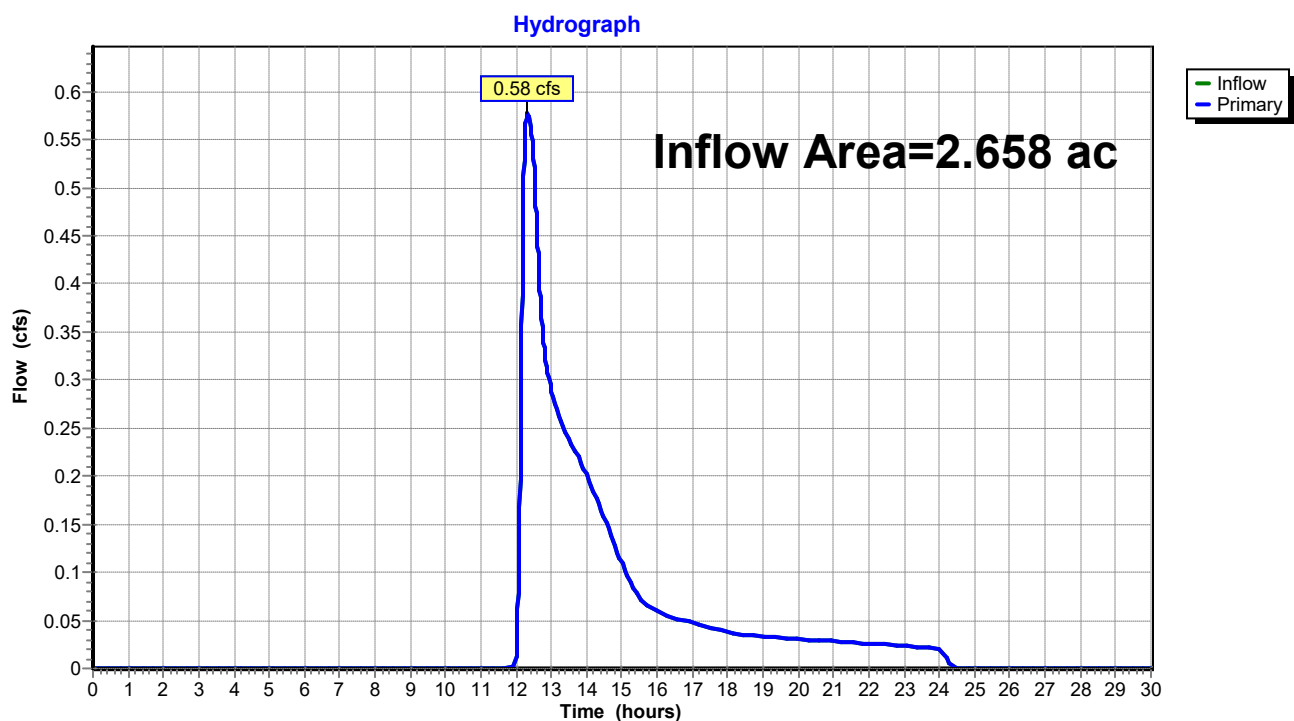


Summary for Link Analysis 1: Analysis 1

Inflow Area = 2.658 ac, 31.57% Impervious, Inflow Depth = 0.42" for 2-Year event
Inflow = 0.58 cfs @ 12.32 hrs, Volume= 0.094 af
Primary = 0.58 cfs @ 12.32 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link Analysis 1: Analysis 1



Summary for Subcatchment 1 - EX: Ex. Area 1

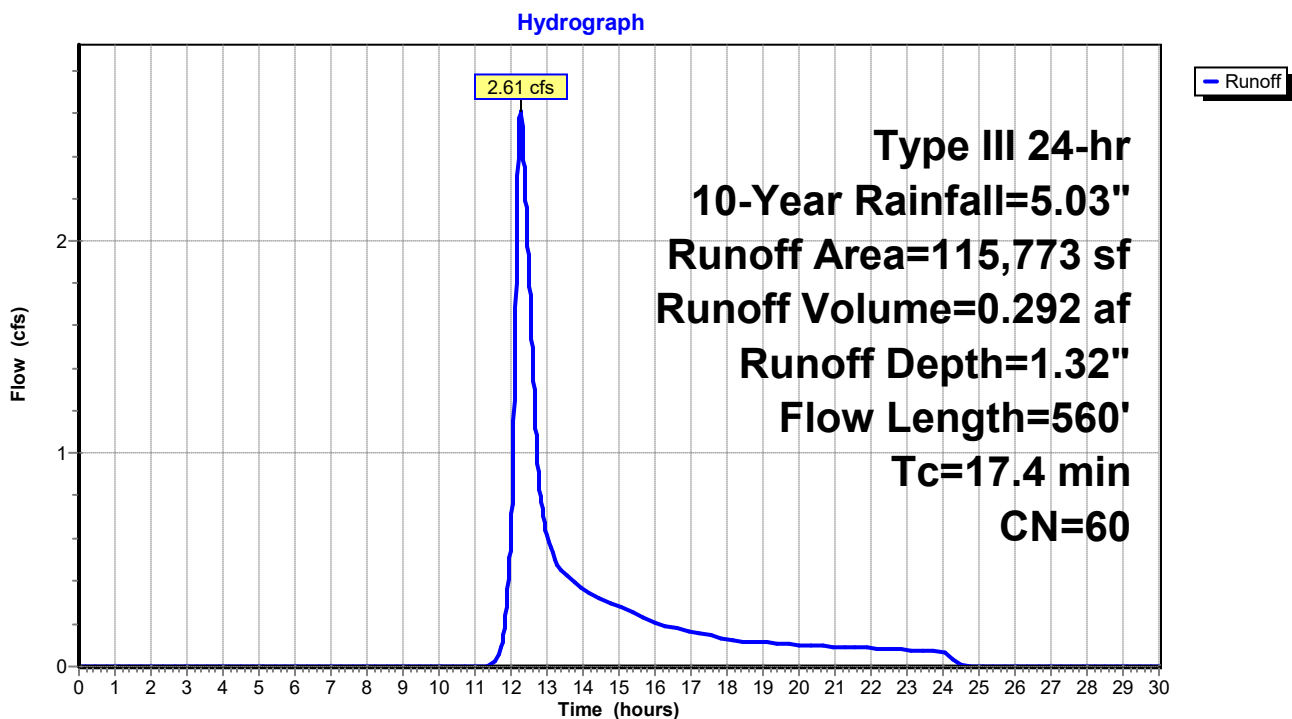
Runoff = 2.61 cfs @ 12.27 hrs, Volume= 0.292 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=5.03"

Area (sf)	CN	Description
115,773	60	Woods, Fair, HSG B
115,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0900	0.15		Sheet Flow, Wooded
					Woods: Light underbrush n= 0.400 P2= 3.39"
6.0	460	0.0643	1.27		Shallow Concentrated Flow, Balance of Flow
					Woodland Kv= 5.0 fps
17.4	560	Total			

Subcatchment 1 - EX: Ex. Area 1



Summary for Subcatchment 1 - P: Proposed Area 1, 2, and 3

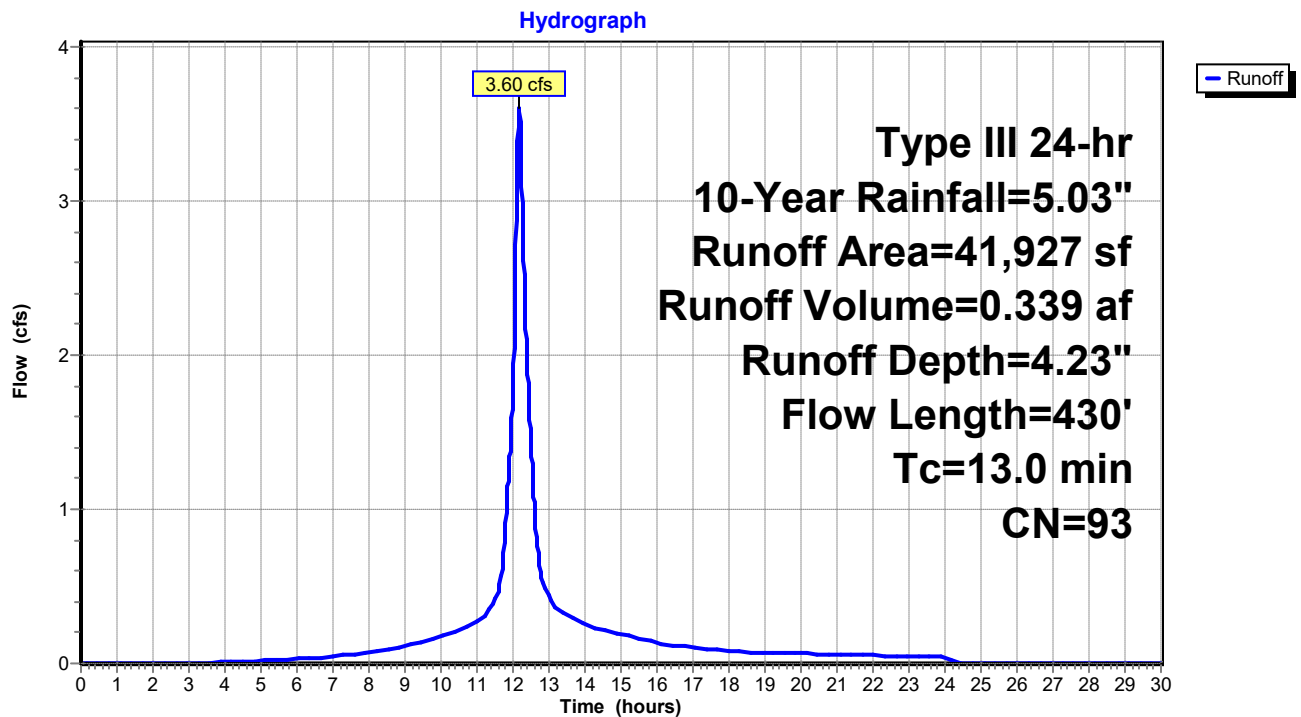
Runoff = 3.60 cfs @ 12.17 hrs, Volume= 0.339 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.03"

Area (sf)	CN	Description
5,376	60	Woods, Fair, HSG B
28,855	98	Paved parking, HSG B
7,696	98	Roofs, HSG B
41,927	93	Weighted Average
5,376		12.82% Pervious Area
36,551		87.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0900	0.14		Sheet Flow, Grass Grass: Bermuda n= 0.410 P2= 3.39"
0.5	38	0.0286	1.18		Shallow Concentrated Flow, Flow to Pavement Short Grass Pasture Kv= 7.0 fps
0.5	132	0.0423	4.18		Shallow Concentrated Flow, Balance of Flow Path to CB 2 Paved Kv= 20.3 fps
0.3	160	0.0300	9.12	11.19	Pipe Channel, HDPE_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
13.0	430	Total			

Subcatchment 1 - P: Proposed Area 1, 2, and 3



Summary for Subcatchment 4 - P: Proposed Area 4

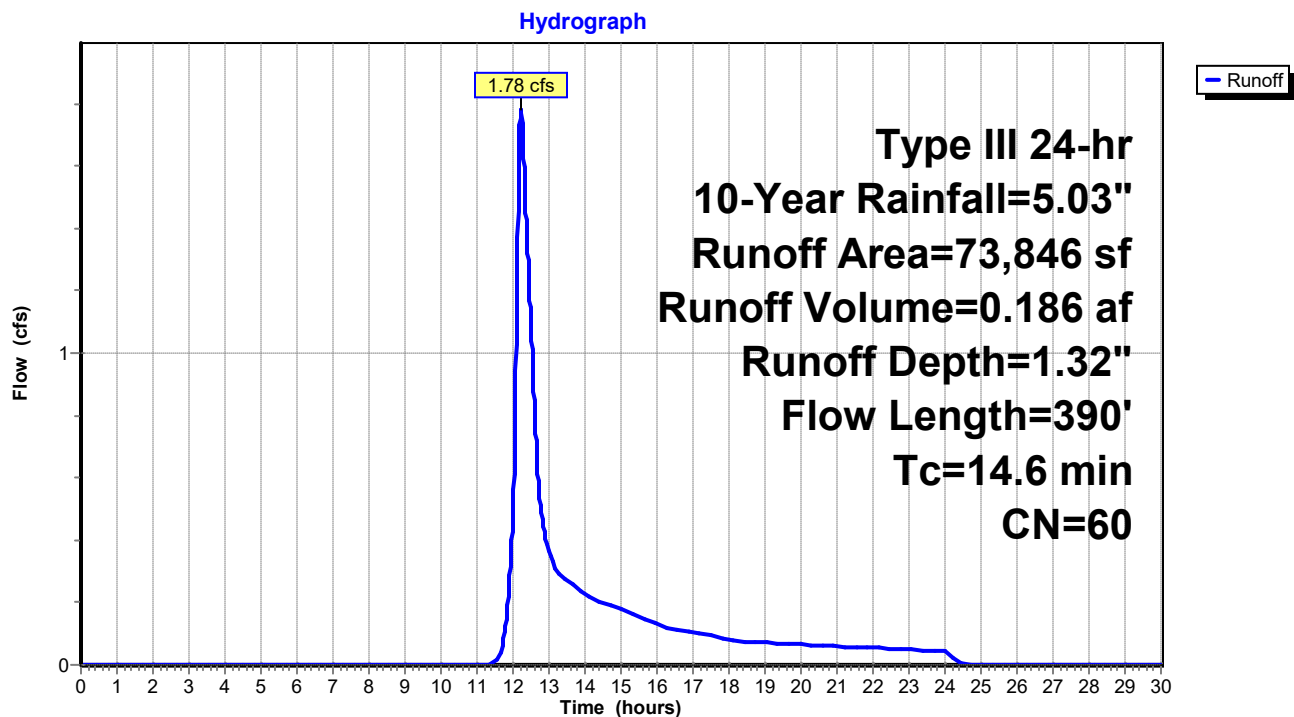
Runoff = 1.78 cfs @ 12.22 hrs, Volume= 0.186 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=5.03"

Area (sf)	CN	Description
73,846	60	Woods, Fair, HSG B
73,846		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0700	0.13		Sheet Flow, Existing Wooded Area Woods: Light underbrush n= 0.400 P2= 3.39"
1.6	130	0.0692	1.32		Shallow Concentrated Flow, Concentrated to Channel Woodland Kv= 5.0 fps
0.4	160	0.0825	6.51	26.06	Channel Flow, Balance of Flow to Analysis Point Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.050 Mountain streams w/large boulders
14.6	390	Total			

Subcatchment 4 - P: Proposed Area 4



Summary for Pond P - 3: Detention Basin

Inflow Area = 0.963 ac, 87.18% Impervious, Inflow Depth = 4.23" for 10-Year event
 Inflow = 3.60 cfs @ 12.17 hrs, Volume= 0.339 af
 Outflow = 0.52 cfs @ 12.85 hrs, Volume= 0.339 af, Atten= 86%, Lag= 40.7 min
 Discarded = 0.29 cfs @ 11.28 hrs, Volume= 0.264 af
 Primary = 0.23 cfs @ 12.85 hrs, Volume= 0.075 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 159.35' @ 12.85 hrs Surf.Area= 4,131 sf Storage= 5,581 cf

Plug-Flow detention time= 94.9 min calculated for 0.339 af (100% of inflow)
 Center-of-Mass det. time= 94.9 min (879.5 - 784.6)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	22,721 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

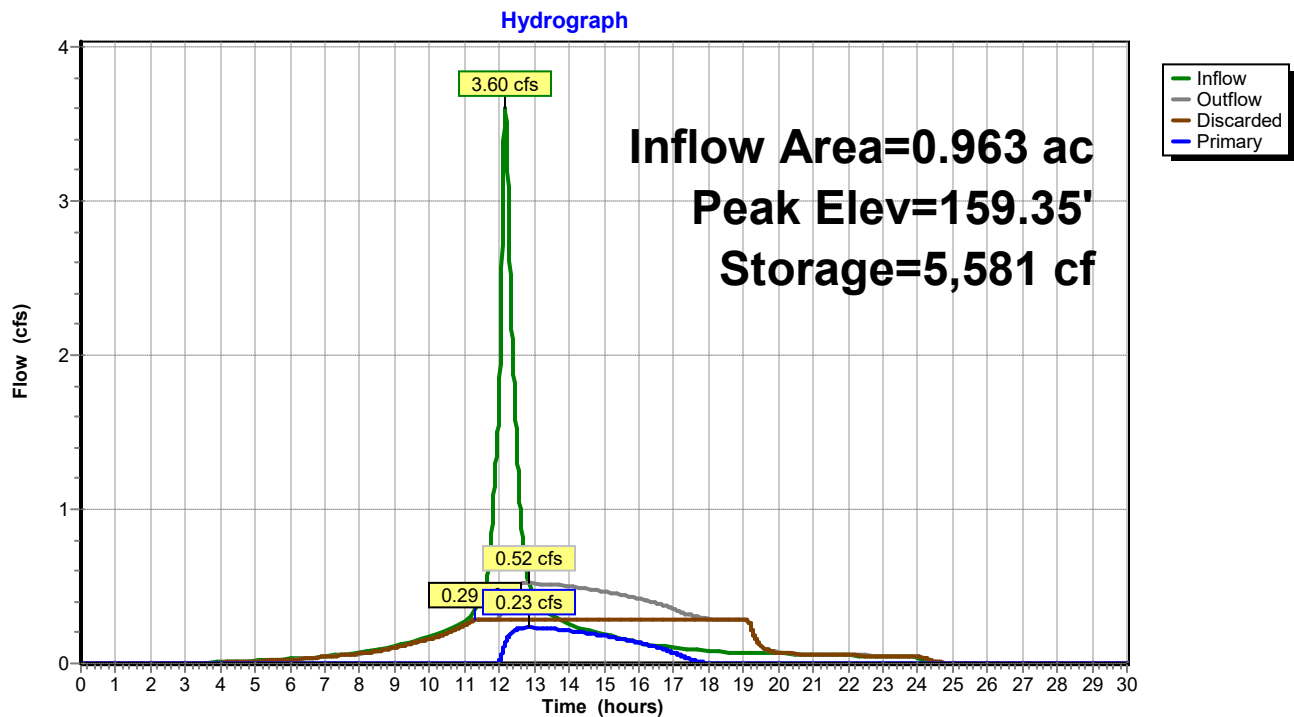
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	4,131	0	0
159.00	4,131	4,131	4,131
160.00	4,131	4,131	8,262
161.00	4,131	4,131	12,393
162.00	4,131	4,131	16,524
163.00	4,131	4,131	20,655
163.50	4,131	2,066	22,721

Device	Routing	Invert	Outlet Devices
#1	Primary	158.25'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	161.00'	4.0" Vert. Orifice/Grate C= 0.600
#3	Primary	163.50'	24.0" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Discarded	158.00'	3.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 11.28 hrs HW=158.06' (Free Discharge)
 ↑ **4=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.23 cfs @ 12.85 hrs HW=159.35' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.23 cfs @ 4.76 fps)
 ↓ **2=Orifice/Grate** (Controls 0.00 cfs)
 ↓ **3=Orifice/Grate** (Controls 0.00 cfs)

Pond P - 3: Detention Basin

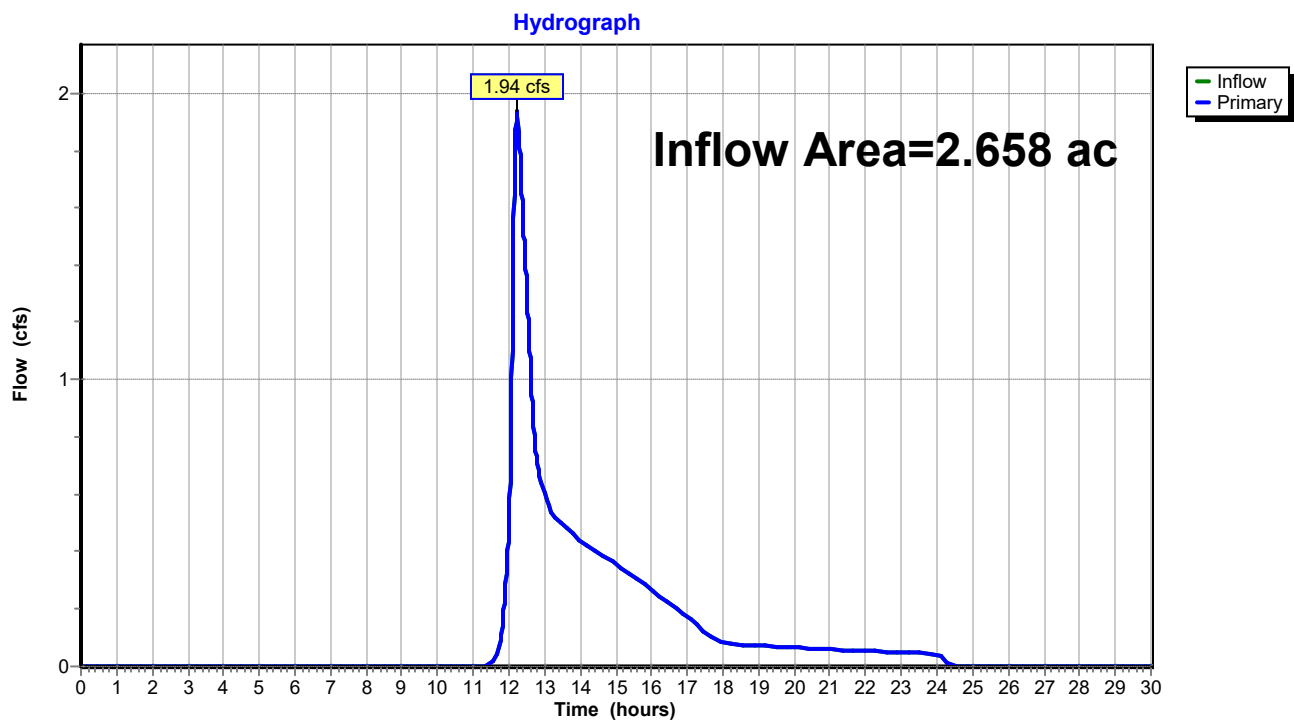


Summary for Link Analysis 1: Analysis 1

Inflow Area = 2.658 ac, 31.57% Impervious, Inflow Depth = 1.18" for 10-Year event
Inflow = 1.94 cfs @ 12.23 hrs, Volume= 0.261 af
Primary = 1.94 cfs @ 12.23 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link Analysis 1: Analysis 1



Summary for Subcatchment 1 - EX: Ex. Area 1

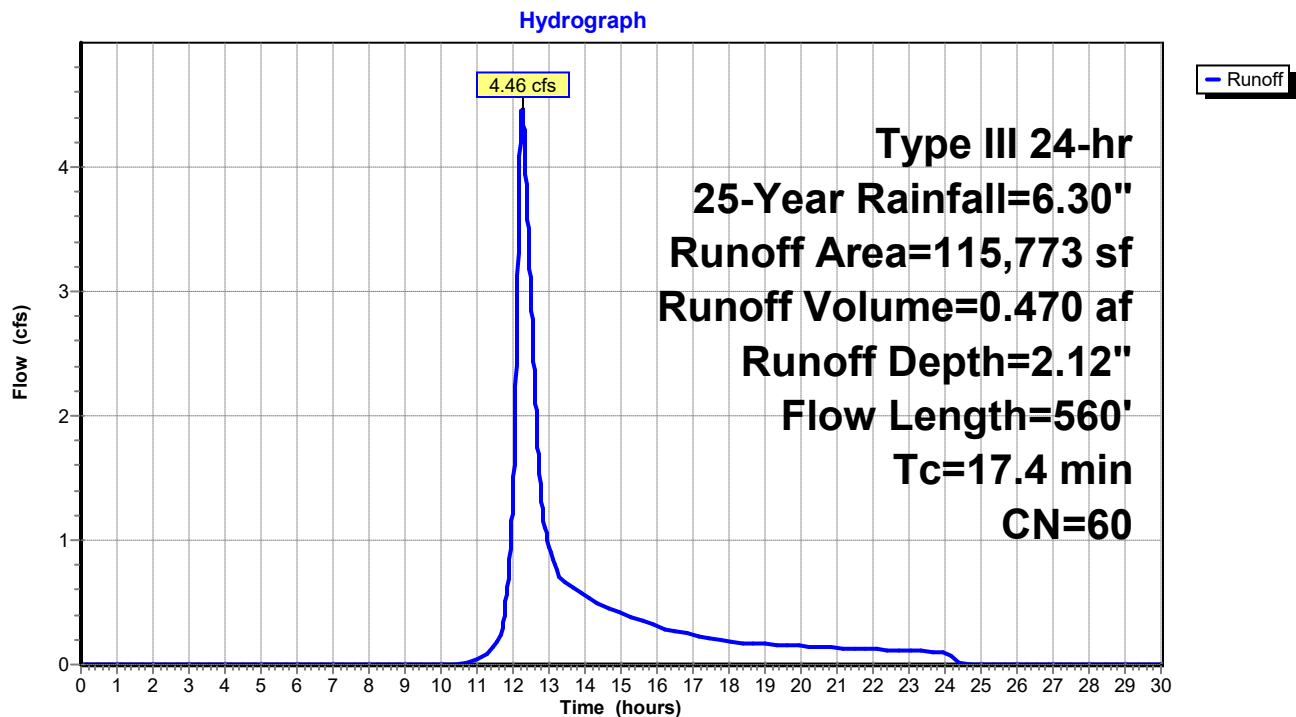
Runoff = 4.46 cfs @ 12.26 hrs, Volume= 0.470 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.30"

Area (sf)	CN	Description
115,773	60	Woods, Fair, HSG B
115,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0900	0.15		Sheet Flow, Wooded
					Woods: Light underbrush n= 0.400 P2= 3.39"
6.0	460	0.0643	1.27		Shallow Concentrated Flow, Balance of Flow
					Woodland Kv= 5.0 fps
17.4	560	Total			

Subcatchment 1 - EX: Ex. Area 1



Summary for Subcatchment 1 - P: Proposed Area 1, 2, and 3

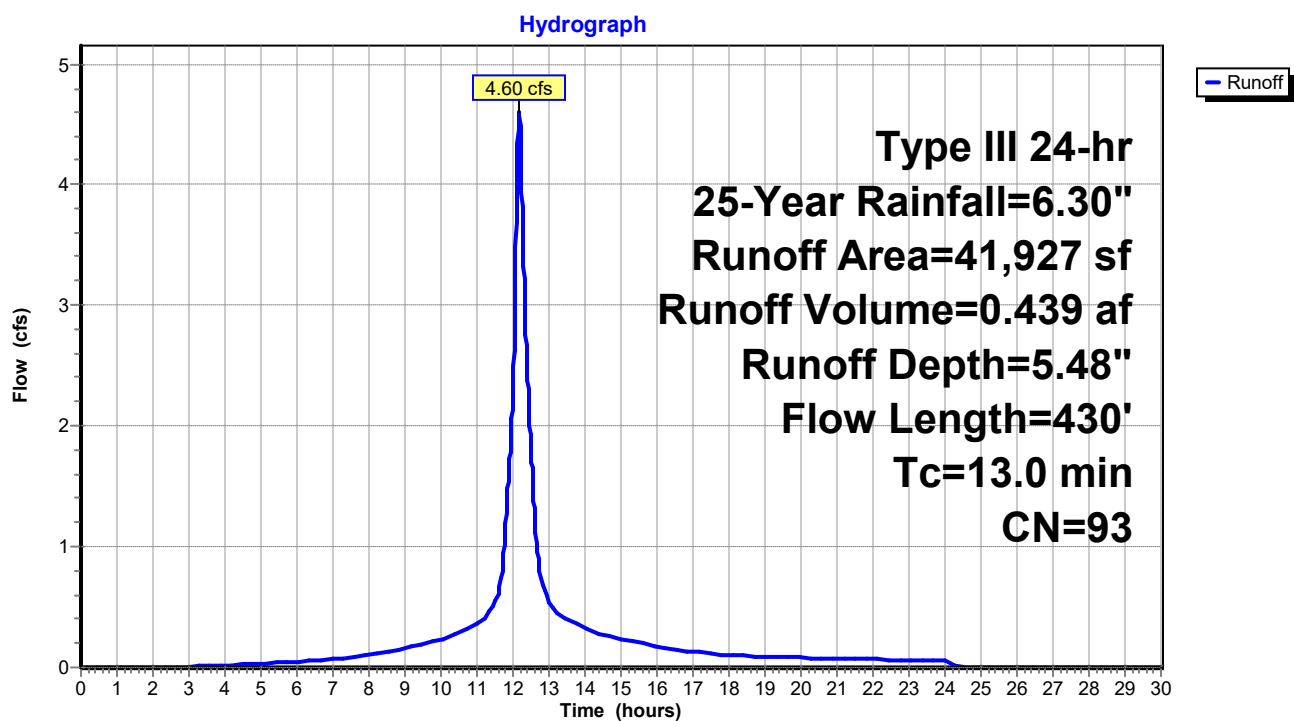
Runoff = 4.60 cfs @ 12.17 hrs, Volume= 0.439 af, Depth= 5.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.30"

Area (sf)	CN	Description
5,376	60	Woods, Fair, HSG B
28,855	98	Paved parking, HSG B
7,696	98	Roofs, HSG B
41,927	93	Weighted Average
5,376		12.82% Pervious Area
36,551		87.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0900	0.14		Sheet Flow, Grass Grass: Bermuda n= 0.410 P2= 3.39"
0.5	38	0.0286	1.18		Shallow Concentrated Flow, Flow to Pavement Short Grass Pasture Kv= 7.0 fps
0.5	132	0.0423	4.18		Shallow Concentrated Flow, Balance of Flow Path to CB 2 Paved Kv= 20.3 fps
0.3	160	0.0300	9.12	11.19	Pipe Channel, HDPE_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
13.0	430	Total			

Subcatchment 1 - P: Proposed Area 1, 2, and 3



Summary for Subcatchment 4 - P: Proposed Area 4

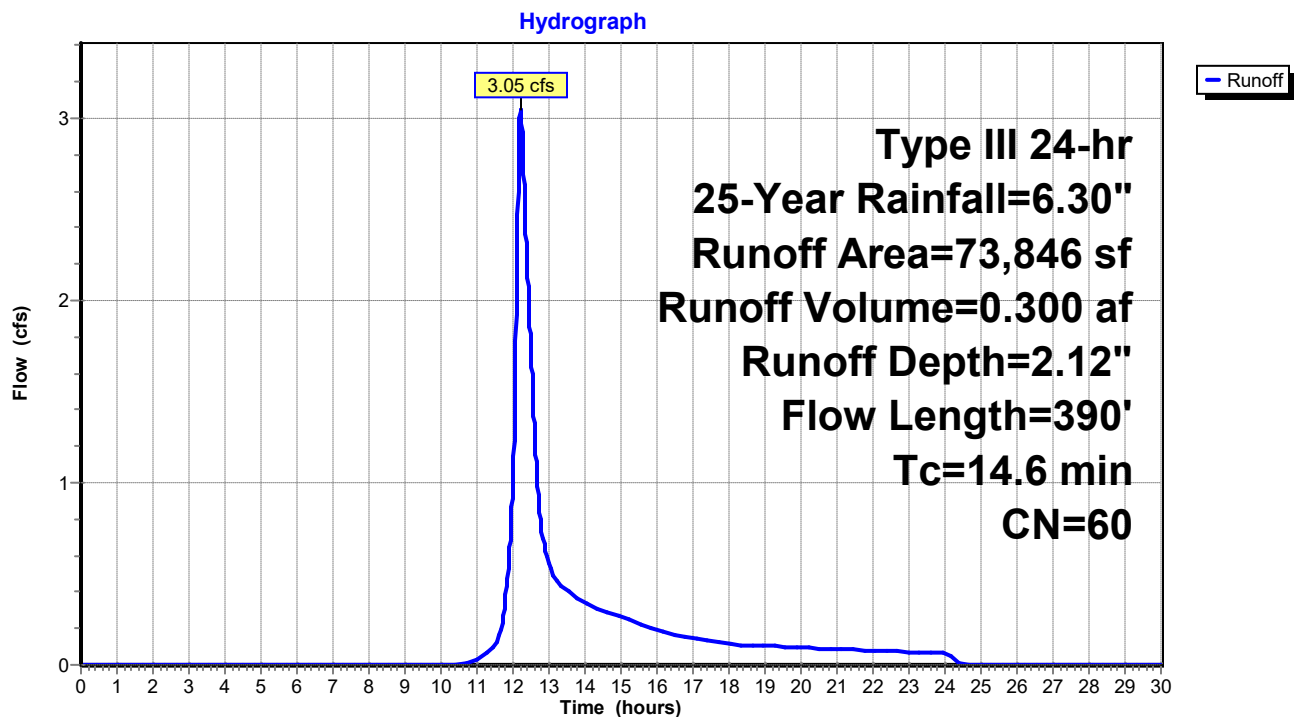
Runoff = 3.05 cfs @ 12.21 hrs, Volume= 0.300 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=6.30"

Area (sf)	CN	Description
73,846	60	Woods, Fair, HSG B
73,846		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0700	0.13		Sheet Flow, Existing Wooded Area Woods: Light underbrush n= 0.400 P2= 3.39"
1.6	130	0.0692	1.32		Shallow Concentrated Flow, Concentrated to Channel Woodland Kv= 5.0 fps
0.4	160	0.0825	6.51	26.06	Channel Flow, Balance of Flow to Analysis Point Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.050 Mountain streams w/large boulders
14.6	390	Total			

Subcatchment 4 - P: Proposed Area 4



Summary for Pond P - 3: Detention Basin

Inflow Area = 0.963 ac, 87.18% Impervious, Inflow Depth = 5.48" for 25-Year event
 Inflow = 4.60 cfs @ 12.17 hrs, Volume= 0.439 af
 Outflow = 0.58 cfs @ 12.96 hrs, Volume= 0.439 af, Atten= 88%, Lag= 47.4 min
 Discarded = 0.29 cfs @ 10.69 hrs, Volume= 0.318 af
 Primary = 0.29 cfs @ 12.96 hrs, Volume= 0.121 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 159.86' @ 12.96 hrs Surf.Area= 4,131 sf Storage= 7,696 cf

Plug-Flow detention time= 121.7 min calculated for 0.439 af (100% of inflow)
 Center-of-Mass det. time= 121.6 min (899.8 - 778.1)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	22,721 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

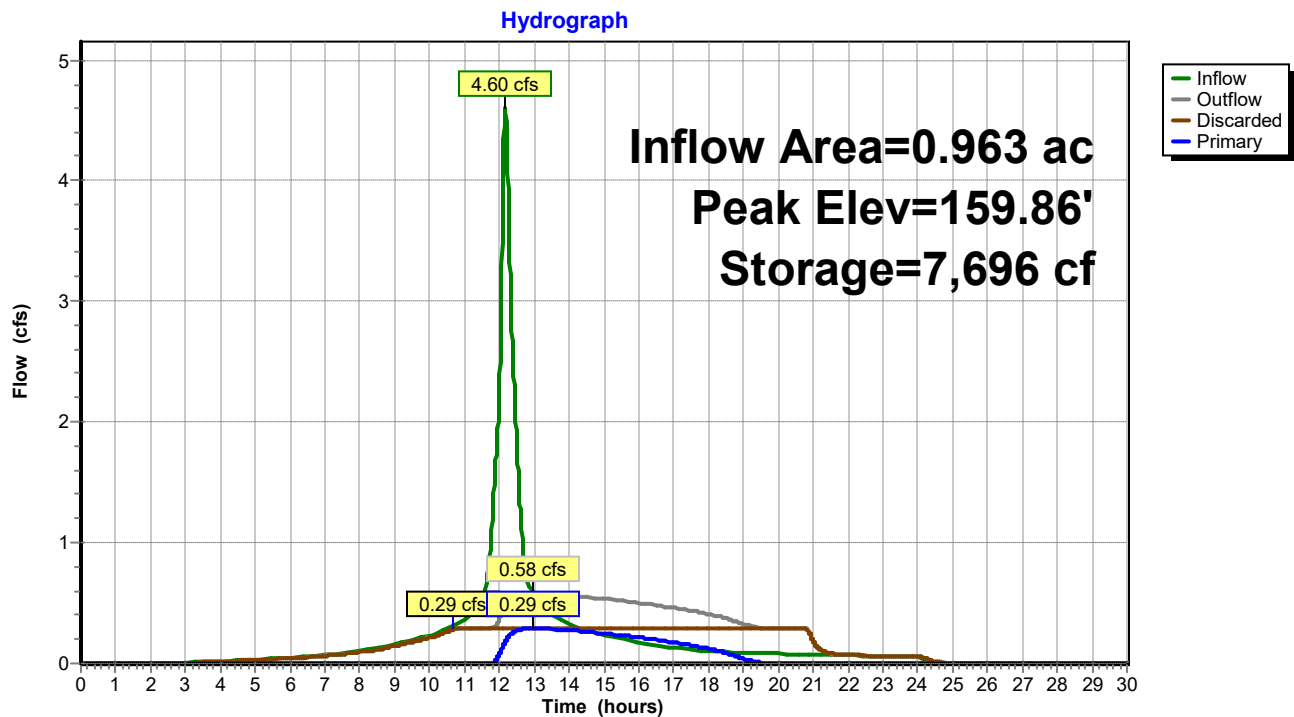
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	4,131	0	0
159.00	4,131	4,131	4,131
160.00	4,131	4,131	8,262
161.00	4,131	4,131	12,393
162.00	4,131	4,131	16,524
163.00	4,131	4,131	20,655
163.50	4,131	2,066	22,721

Device	Routing	Invert	Outlet Devices
#1	Primary	158.25'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	161.00'	4.0" Vert. Orifice/Grate C= 0.600
#3	Primary	163.50'	24.0" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Discarded	158.00'	3.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 10.69 hrs HW=158.06' (Free Discharge)
 ↑ **4=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.29 cfs @ 12.96 hrs HW=159.86' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.29 cfs @ 5.87 fps)
 ↓ **2=Orifice/Grate** (Controls 0.00 cfs)
 ↓ **3=Orifice/Grate** (Controls 0.00 cfs)

Pond P - 3: Detention Basin

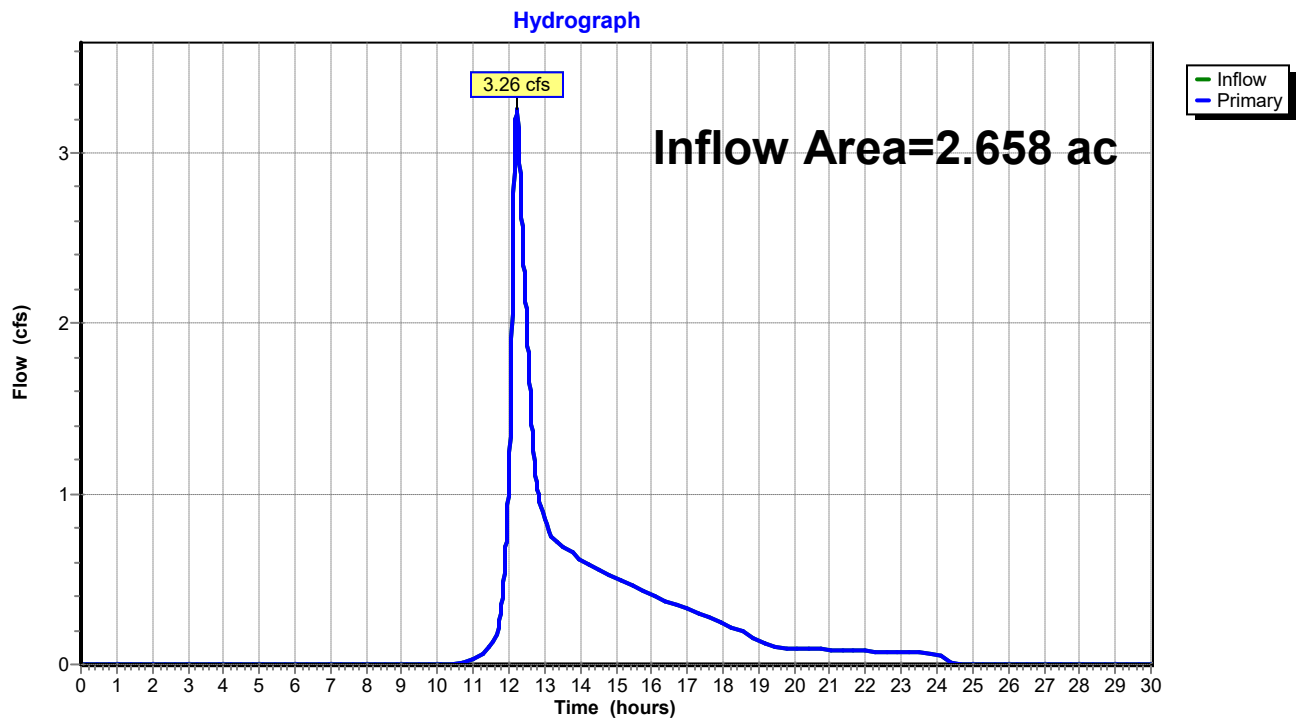


Summary for Link Analysis 1: Analysis 1

Inflow Area = 2.658 ac, 31.57% Impervious, Inflow Depth = 1.90" for 25-Year event
Inflow = 3.26 cfs @ 12.22 hrs, Volume= 0.421 af
Primary = 3.26 cfs @ 12.22 hrs, Volume= 0.421 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link Analysis 1: Analysis 1



Summary for Subcatchment 1 - EX: Ex. Area 1

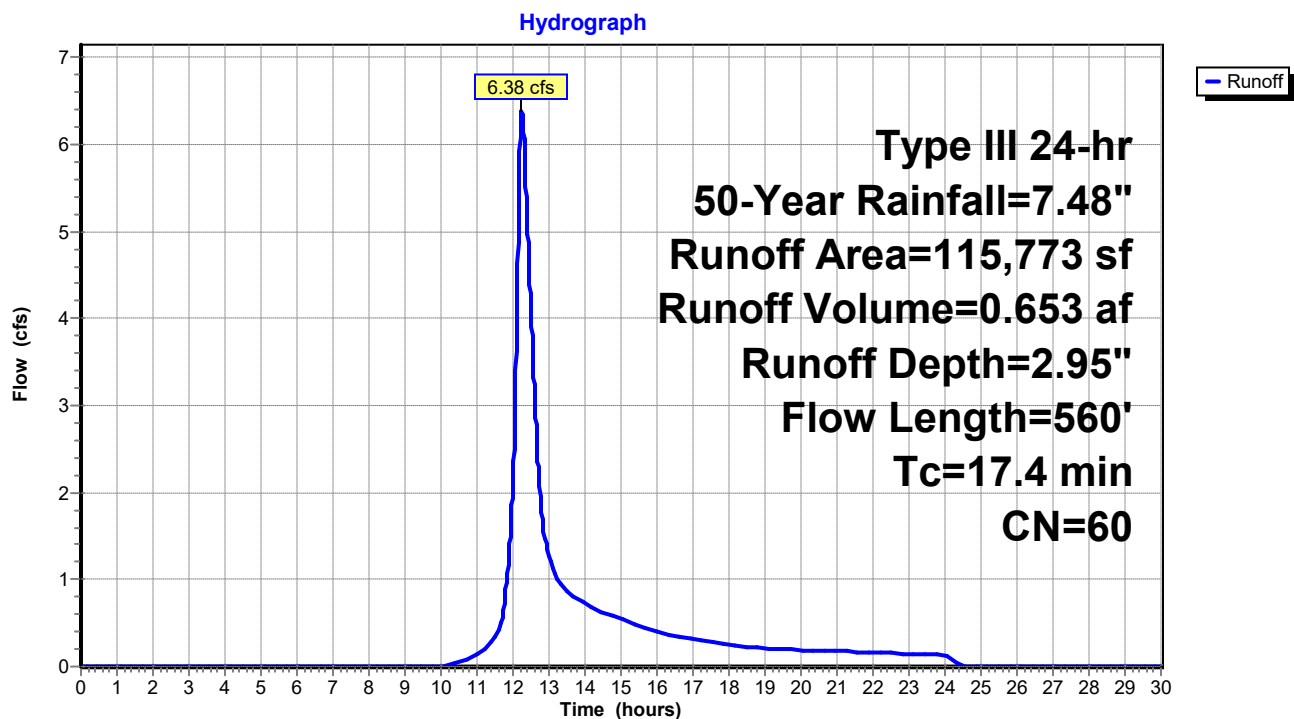
Runoff = 6.38 cfs @ 12.24 hrs, Volume= 0.653 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=7.48"

Area (sf)	CN	Description
115,773	60	Woods, Fair, HSG B
115,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0900	0.15		Sheet Flow, Wooded
					Woods: Light underbrush n= 0.400 P2= 3.39"
6.0	460	0.0643	1.27		Shallow Concentrated Flow, Balance of Flow
					Woodland Kv= 5.0 fps
17.4	560	Total			

Subcatchment 1 - EX: Ex. Area 1



Summary for Subcatchment 1 - P: Proposed Area 1, 2, and 3

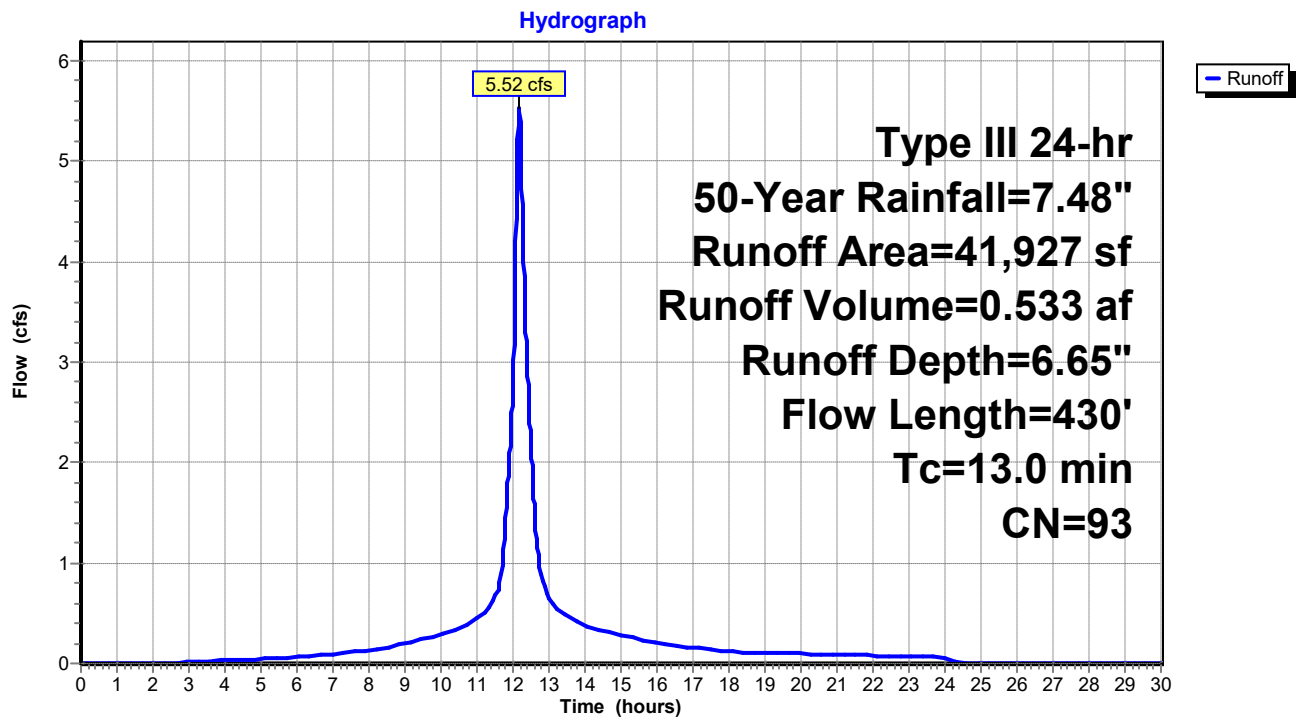
Runoff = 5.52 cfs @ 12.17 hrs, Volume= 0.533 af, Depth= 6.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=7.48"

Area (sf)	CN	Description
5,376	60	Woods, Fair, HSG B
28,855	98	Paved parking, HSG B
7,696	98	Roofs, HSG B
41,927	93	Weighted Average
5,376		12.82% Pervious Area
36,551		87.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0900	0.14		Sheet Flow, Grass Grass: Bermuda n= 0.410 P2= 3.39"
0.5	38	0.0286	1.18		Shallow Concentrated Flow, Flow to Pavement Short Grass Pasture Kv= 7.0 fps
0.5	132	0.0423	4.18		Shallow Concentrated Flow, Balance of Flow Path to CB 2 Paved Kv= 20.3 fps
0.3	160	0.0300	9.12	11.19	Pipe Channel, HDPE_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
13.0	430	Total			

Subcatchment 1 - P: Proposed Area 1, 2, and 3



Summary for Subcatchment 4 - P: Proposed Area 4

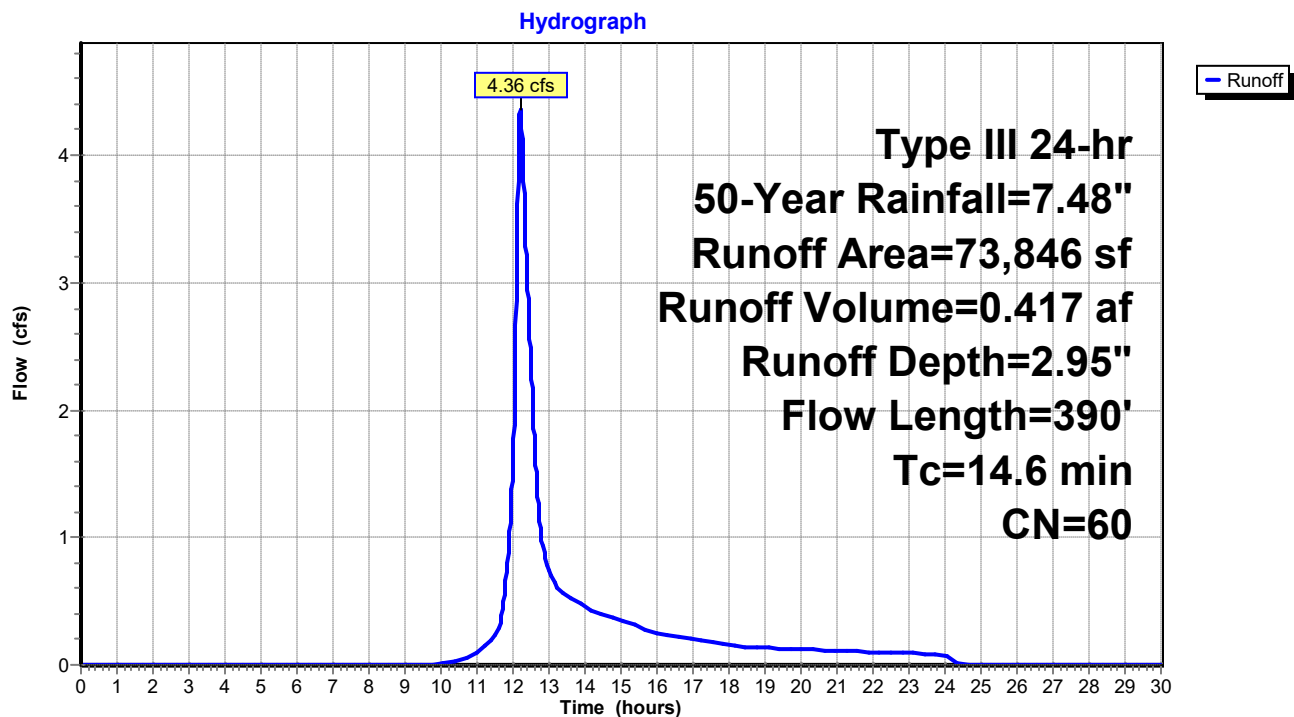
Runoff = 4.36 cfs @ 12.21 hrs, Volume= 0.417 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=7.48"

Area (sf)	CN	Description
73,846	60	Woods, Fair, HSG B
73,846		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0700	0.13		Sheet Flow, Existing Wooded Area Woods: Light underbrush n= 0.400 P2= 3.39"
1.6	130	0.0692	1.32		Shallow Concentrated Flow, Concentrated to Channel Woodland Kv= 5.0 fps
0.4	160	0.0825	6.51	26.06	Channel Flow, Balance of Flow to Analysis Point Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.050 Mountain streams w/large boulders
14.6	390	Total			

Subcatchment 4 - P: Proposed Area 4



Summary for Pond P - 3: Detention Basin

Inflow Area = 0.963 ac, 87.18% Impervious, Inflow Depth = 6.65" for 50-Year event
 Inflow = 5.52 cfs @ 12.17 hrs, Volume= 0.533 af
 Outflow = 0.62 cfs @ 13.05 hrs, Volume= 0.533 af, Atten= 89%, Lag= 52.9 min
 Discarded = 0.29 cfs @ 10.20 hrs, Volume= 0.363 af
 Primary = 0.33 cfs @ 13.05 hrs, Volume= 0.170 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 160.37' @ 13.05 hrs Surf.Area= 4,131 sf Storage= 9,798 cf

Plug-Flow detention time= 147.4 min calculated for 0.533 af (100% of inflow)
 Center-of-Mass det. time= 147.4 min (920.9 - 773.6)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	22,721 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

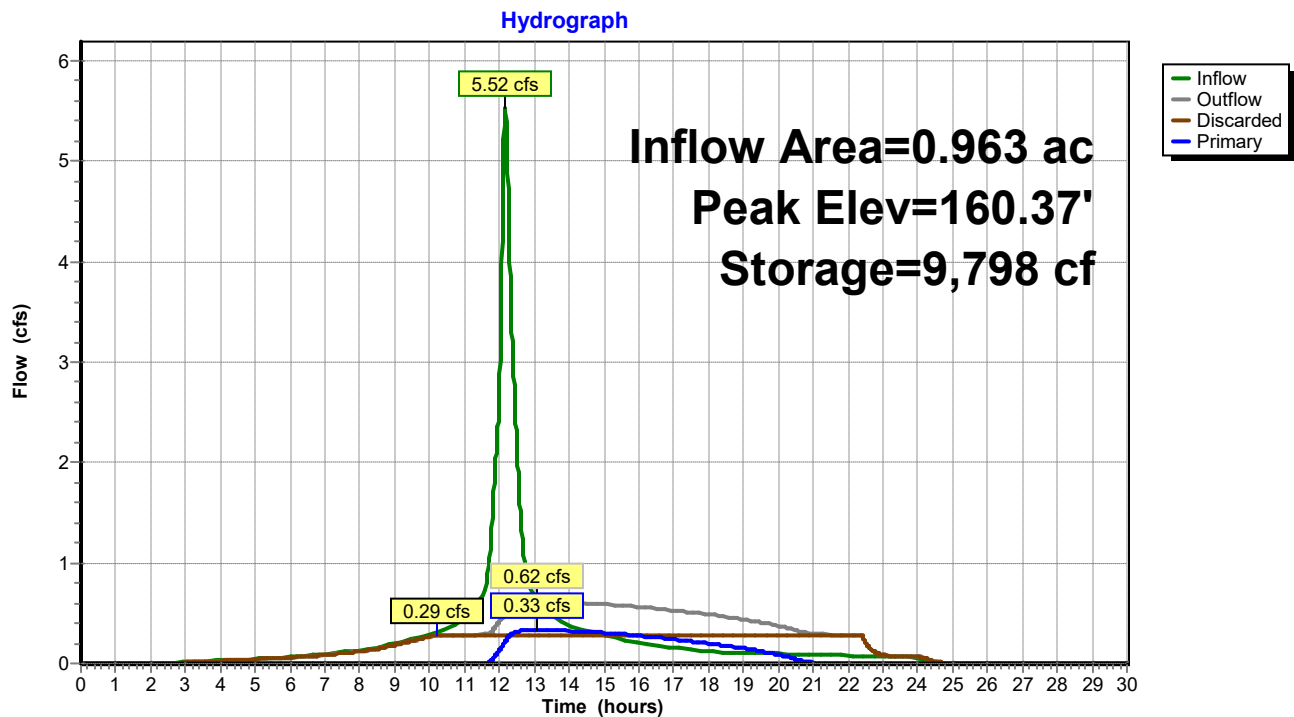
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	4,131	0	0
159.00	4,131	4,131	4,131
160.00	4,131	4,131	8,262
161.00	4,131	4,131	12,393
162.00	4,131	4,131	16,524
163.00	4,131	4,131	20,655
163.50	4,131	2,066	22,721

Device	Routing	Invert	Outlet Devices
#1	Primary	158.25'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	161.00'	4.0" Vert. Orifice/Grate C= 0.600
#3	Primary	163.50'	24.0" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Discarded	158.00'	3.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 10.20 hrs HW=158.06' (Free Discharge)
 ↑ **4=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.33 cfs @ 13.05 hrs HW=160.37' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.33 cfs @ 6.80 fps)
 ↓ **2=Orifice/Grate** (Controls 0.00 cfs)
 ↓ **3=Orifice/Grate** (Controls 0.00 cfs)

Pond P - 3: Detention Basin

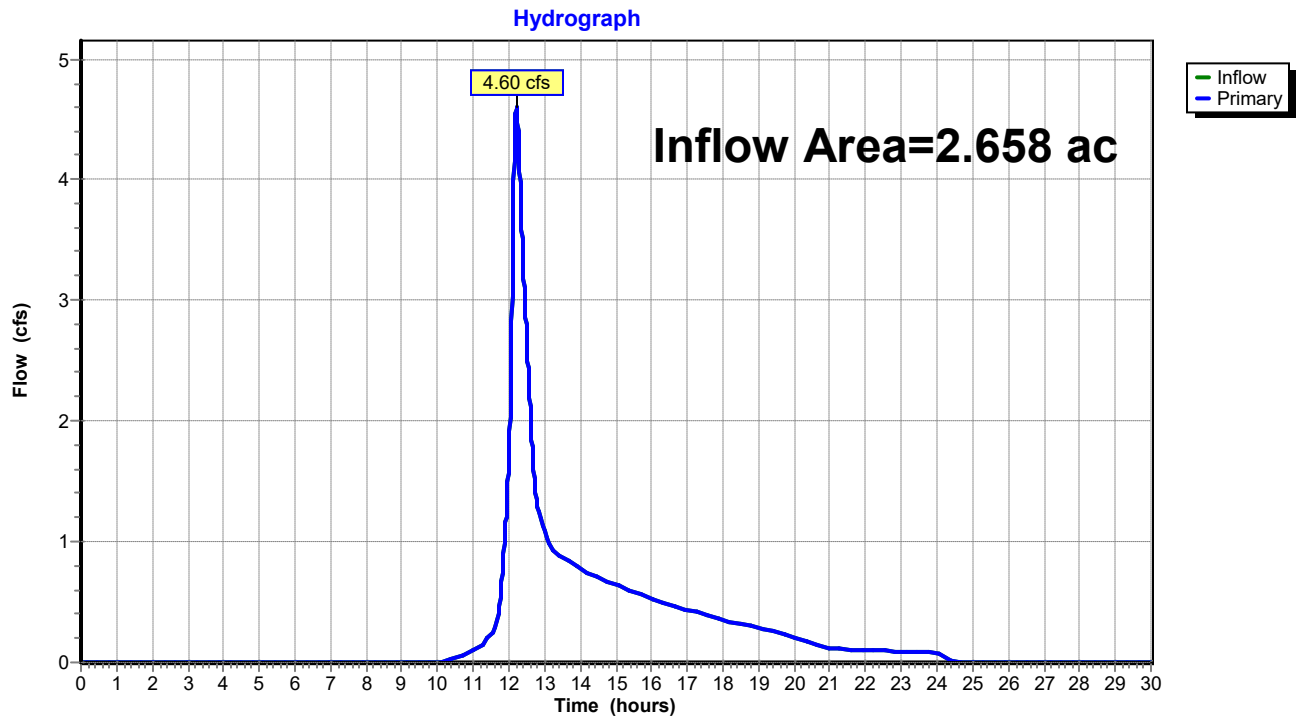


Summary for Link Analysis 1: Analysis 1

Inflow Area = 2.658 ac, 31.57% Impervious, Inflow Depth = 2.65" for 50-Year event
Inflow = 4.60 cfs @ 12.21 hrs, Volume= 0.587 af
Primary = 4.60 cfs @ 12.21 hrs, Volume= 0.587 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link Analysis 1: Analysis 1



Summary for Subcatchment 1 - EX: Ex. Area 1

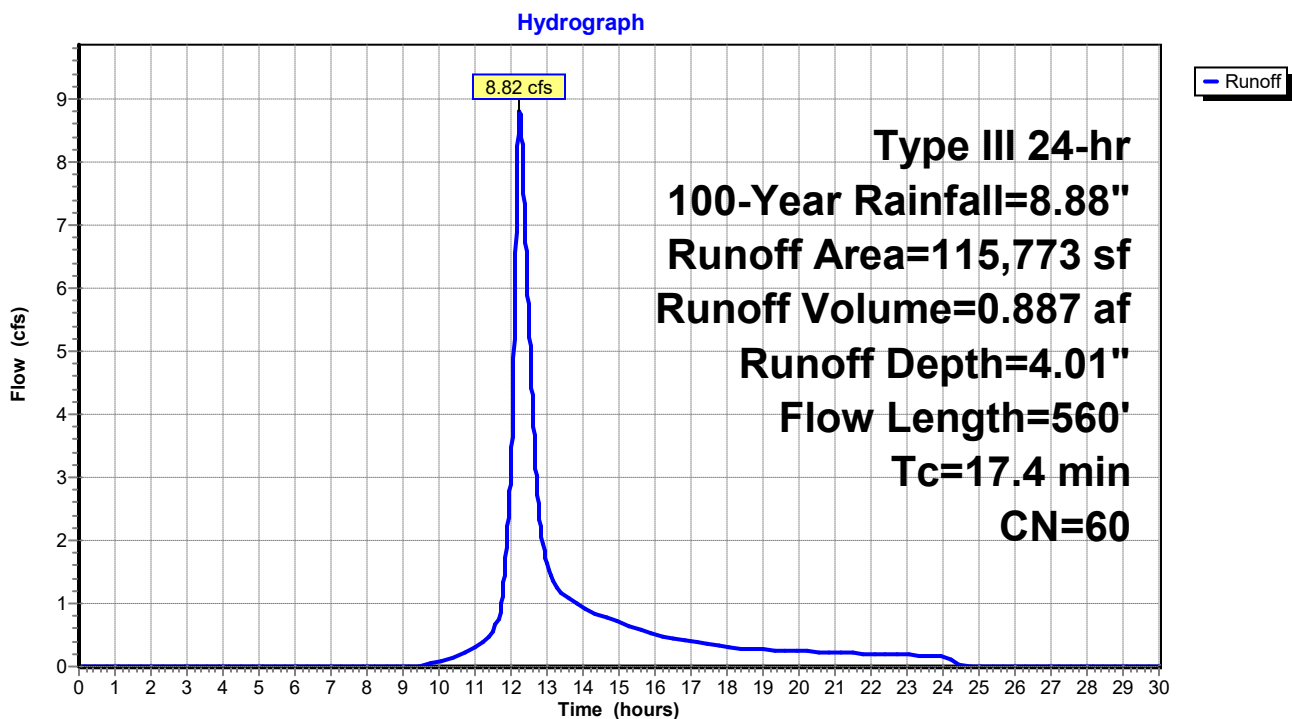
Runoff = 8.82 cfs @ 12.24 hrs, Volume= 0.887 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.88"

Area (sf)	CN	Description
115,773	60	Woods, Fair, HSG B
115,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0900	0.15		Sheet Flow, Wooded
					Woods: Light underbrush n= 0.400 P2= 3.39"
6.0	460	0.0643	1.27		Shallow Concentrated Flow, Balance of Flow
					Woodland Kv= 5.0 fps
17.4	560	Total			

Subcatchment 1 - EX: Ex. Area 1



Summary for Subcatchment 1 - P: Proposed Area 1, 2, and 3

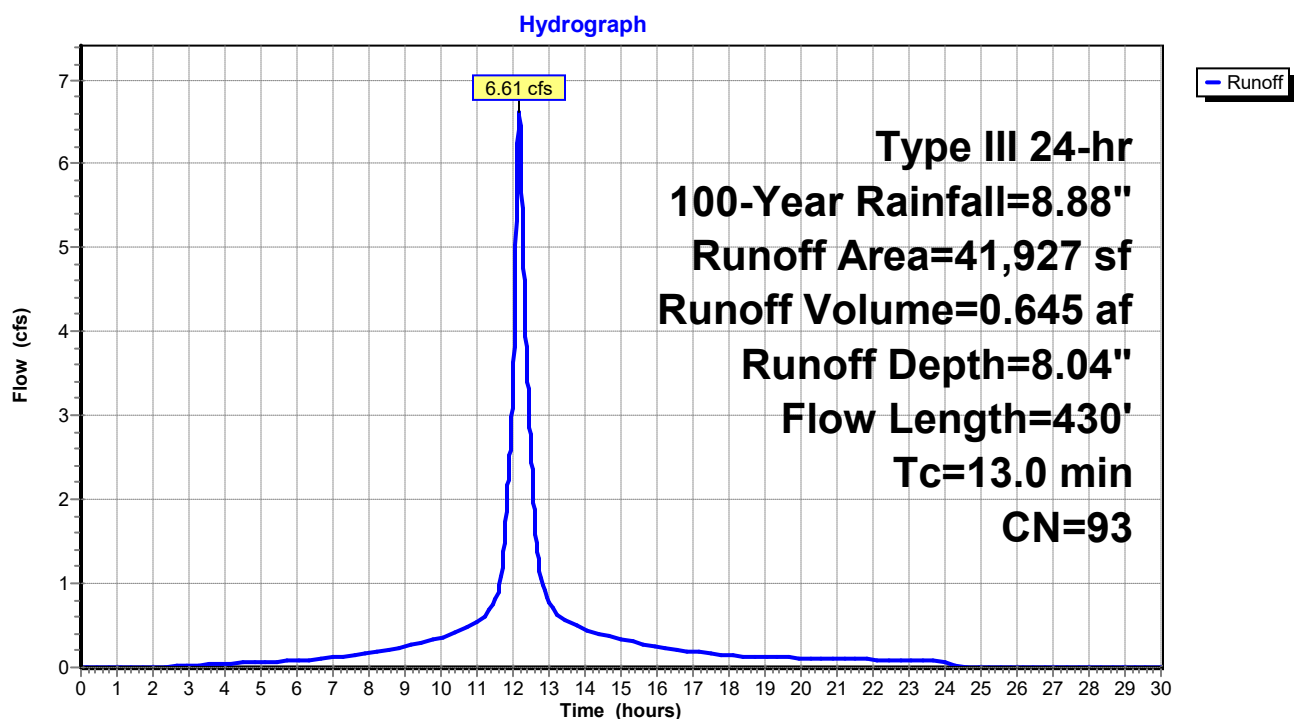
Runoff = 6.61 cfs @ 12.17 hrs, Volume= 0.645 af, Depth= 8.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.88"

Area (sf)	CN	Description
5,376	60	Woods, Fair, HSG B
28,855	98	Paved parking, HSG B
7,696	98	Roofs, HSG B
41,927	93	Weighted Average
5,376		12.82% Pervious Area
36,551		87.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0900	0.14		Sheet Flow, Grass Grass: Bermuda n= 0.410 P2= 3.39"
0.5	38	0.0286	1.18		Shallow Concentrated Flow, Flow to Pavement Short Grass Pasture Kv= 7.0 fps
0.5	132	0.0423	4.18		Shallow Concentrated Flow, Balance of Flow Path to CB 2 Paved Kv= 20.3 fps
0.3	160	0.0300	9.12	11.19	Pipe Channel, HDPE_Round 15" 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
13.0	430	Total			

Subcatchment 1 - P: Proposed Area 1, 2, and 3



Summary for Subcatchment 4 - P: Proposed Area 4

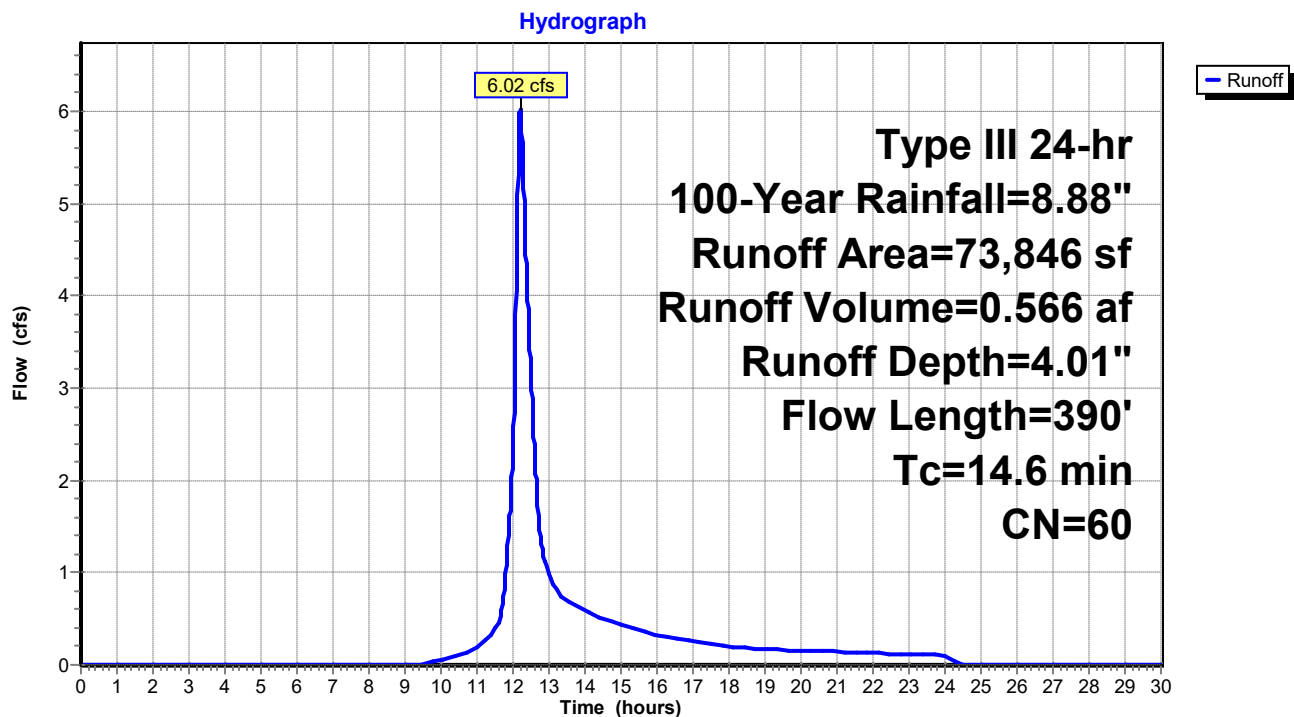
Runoff = 6.02 cfs @ 12.21 hrs, Volume= 0.566 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.88"

Area (sf)	CN	Description
73,846	60	Woods, Fair, HSG B
73,846		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0700	0.13		Sheet Flow, Existing Wooded Area Woods: Light underbrush n= 0.400 P2= 3.39"
1.6	130	0.0692	1.32		Shallow Concentrated Flow, Concentrated to Channel Woodland Kv= 5.0 fps
0.4	160	0.0825	6.51	26.06	Channel Flow, Balance of Flow to Analysis Point Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.050 Mountain streams w/large boulders
14.6	390	Total			

Subcatchment 4 - P: Proposed Area 4



Summary for Pond P - 3: Detention Basin

Inflow Area = 0.963 ac, 87.18% Impervious, Inflow Depth = 8.04" for 100-Year event
 Inflow = 6.61 cfs @ 12.17 hrs, Volume= 0.645 af
 Outflow = 0.67 cfs @ 13.15 hrs, Volume= 0.645 af, Atten= 90%, Lag= 58.6 min
 Discarded = 0.29 cfs @ 9.57 hrs, Volume= 0.410 af
 Primary = 0.38 cfs @ 13.15 hrs, Volume= 0.235 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 161.01' @ 13.15 hrs Surf.Area= 4,131 sf Storage= 12,415 cf

Plug-Flow detention time= 178.2 min calculated for 0.645 af (100% of inflow)
 Center-of-Mass det. time= 178.1 min (947.4 - 769.3)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	22,721 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

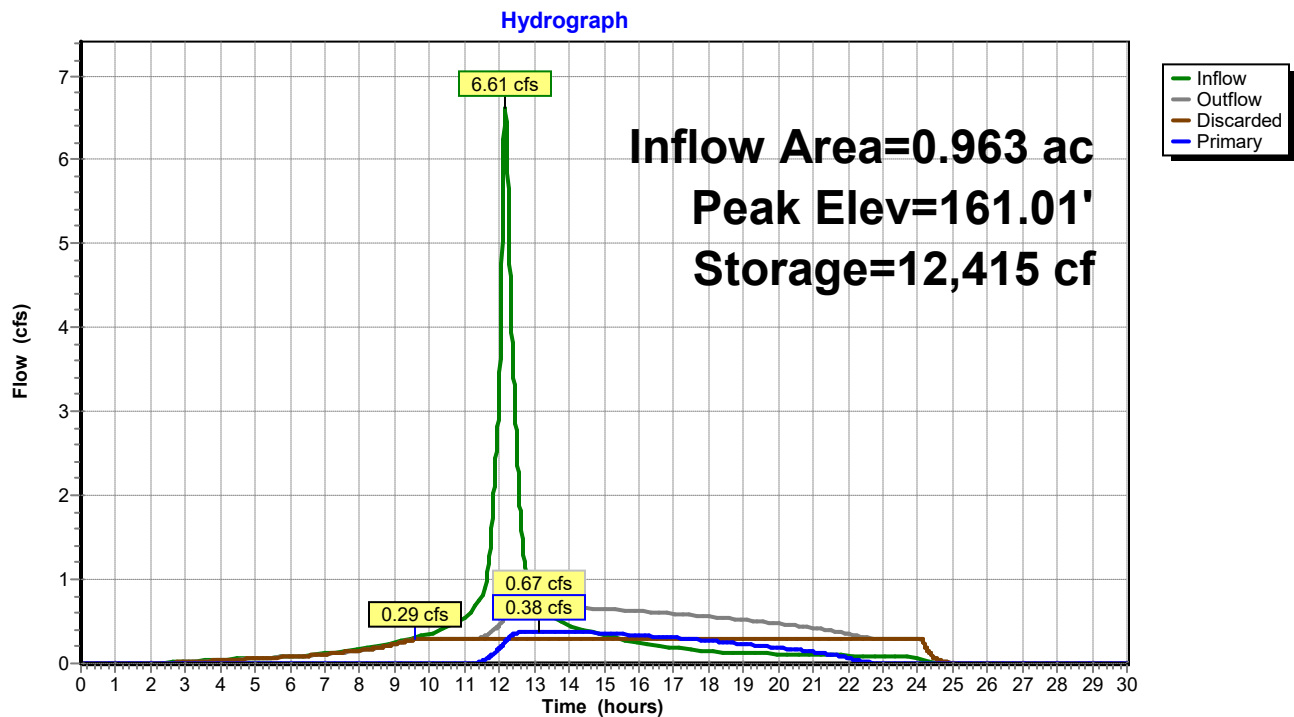
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	4,131	0	0
159.00	4,131	4,131	4,131
160.00	4,131	4,131	8,262
161.00	4,131	4,131	12,393
162.00	4,131	4,131	16,524
163.00	4,131	4,131	20,655
163.50	4,131	2,066	22,721

Device	Routing	Invert	Outlet Devices
#1	Primary	158.25'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	161.00'	4.0" Vert. Orifice/Grate C= 0.600
#3	Primary	163.50'	24.0" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Discarded	158.00'	3.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.29 cfs @ 9.57 hrs HW=158.06' (Free Discharge)
 ↑ **4=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.38 cfs @ 13.15 hrs HW=161.01' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.38 cfs @ 7.81 fps)
 ↑ **2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.25 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Pond P - 3: Detention Basin



Summary for Link Analysis 1: Analysis 1

Inflow Area = 2.658 ac, 31.57% Impervious, Inflow Depth = 3.62" for 100-Year event
Inflow = 6.30 cfs @ 12.21 hrs, Volume= 0.801 af
Primary = 6.30 cfs @ 12.21 hrs, Volume= 0.801 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link Analysis 1: Analysis 1

