Twin Diamond Plaza

4717, Covington Hwy,
Decatour, GA 30035.
Dekalb County

Stormwater Management Report

Prepared By:

Date : 23th August 2006

1.0 Introduction

The proposed Twin Diamond Plaza is located on the west side of Covington Highway, Decatour, near to Lamar Street. The property has approximately 218 frontage on Covington Highway and area is 2,23 acres.The property is rezoned from C1(cond) to C1. It was also decided during the rezoning , that the developer shall provide a 50 foot transitional zone along the west and south property line as well as a retaining wall to be installed on 3 sides so as to avoid removing too many trees.

2.0 Existing Conditions

The existing site is currently of 2.23 acres of which 1.48 acres is being disturbed. The total coverage shall be 1.25 Acres which is 55% of the total area.

The Predevelopment condition consists of the site having good amount of trees and covered with dense grass. There is natural channel observed starting from the North Easter corner and coming up to the South West corner. The difference in existing grade between the NE corner at the road and SW corner at the back is 29 feet.

3.0 Sizing Criteria

For the storm water management design, Section 2.3 of the Dekalb County Storm water Management Manual was referred.

Stormwater Management Facility	**Design Frequency**
Culverts, Open Channels and Conveyance Systems	100-year
Storage Facilities	All intensities up to and including the 100-year using reservoir routing techniques
Inlets	10-year
Erosion & Sediment Control	25-year
Water Quality	1.2 inches of rain

24-hour Volumes (inches)

2-year	5-year	10-year	25-year	50-year	100-year
4.1	4.8	5.5	6.5	7.2	7.9

Note: All drainage system design shall be checked using the 100-year design rainfall frequency to be sure structures are not flooded or increased damage does not occur to the highway or adjacent property.

4.0 Post Development Stage

It was also decided during the rezoning, that the developer shall provide a 50 foot transitional zone along the west and south property line as well as a retaining wall to be installed on 3 sides so as to avoid removing too many trees. Also, sufficient landscaping is provided in the parking area. Since the existing natural channel is being disturbed, a 24" ADS pipe is proposed to take the Stormwater from the point where it is stopped to the point where the runoff can rejoin the existing channel. Sufficient care is taken to ensure no erosion takes place by having energy dissipaters and apron.

1 inlet structure from the road as well as 3 inlet structures in the parking area is provided. The run off is taken through a series of pipes, with size ranging from 15" ADS to 24" ADS, to a retention pond situated on the South West corner . The retention tank with vertical CMU retaining walls, has an area of approximately 2500 sft and ht of 6 ft total and retention ht of 2 feet.

Note: The runoff from adjacent lot, which was entering into the lot, is diverted using 24" ADS pipe as mentioned before. However this inflow is not taken into account as the discharge will remain same in both pre and post stage.

The routing and sizing is calculated using HydroCAD software. TR 20 method is adopted. The Rainfall taken is Type II 24 Hr.

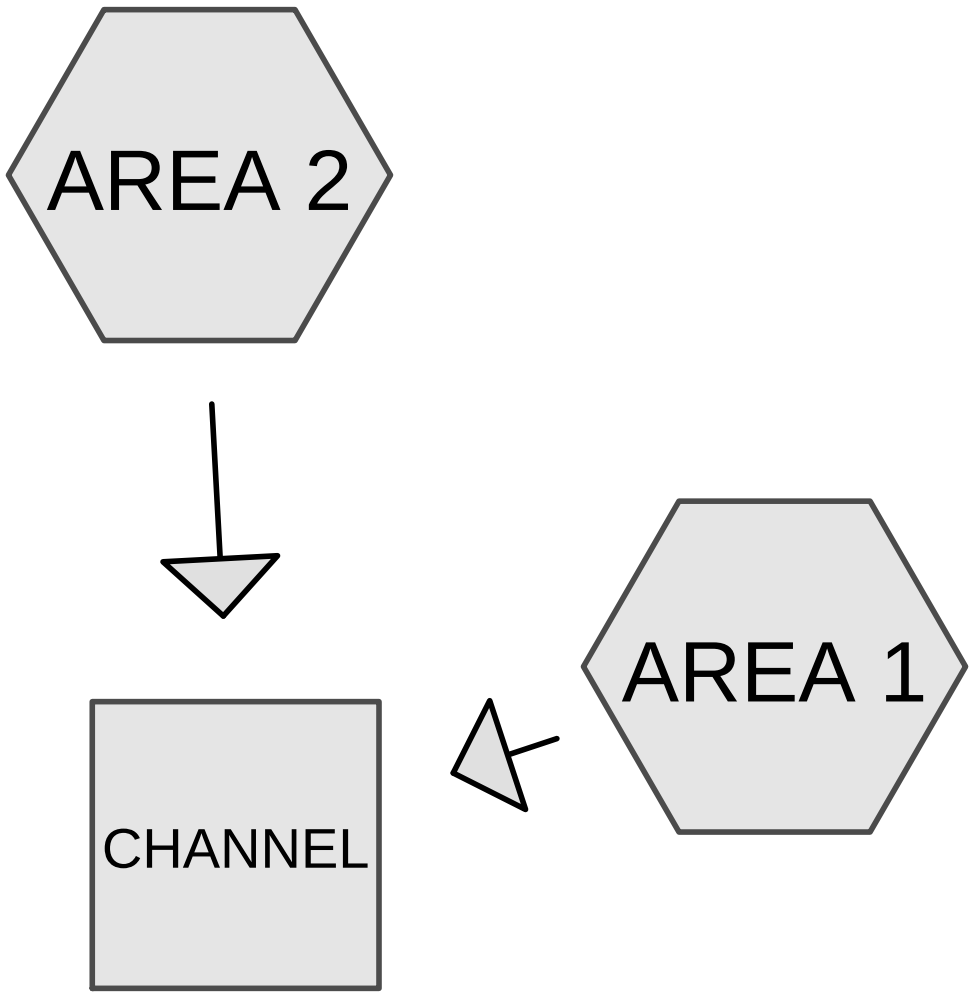
The reports of the HydroCAD calculations are provided.

5.0 Summary

This Site has been designed to meet all the requirements of Dekalb County, Georgia. The retention pond is designed for storing 1.2 inches of rainfall, as required for Water Quality and the reservoir routing was done for 100 year storm event. The end peak discharge in the Post Development is kept less than the Pre Development stage.

Pre Development Stage

Run off Calculations



Subcat Reach Pond Link

Drainage Diagram for Twin Diamond Plaza_ 100yr-Pre_Dev
Prepared by _____

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Type II 24-hr Rainfall=7.90"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment AREA 1: SETriangular Area of Site Runoff Area=62,533 sf Runoff Depth=3.93"
Length=200' Tc=12.6 min CN=69 Runoff= 8.52 cfs 0.470 af

Subcatchment AREA 2: NW Triangular Area of Site Runoff Area=34,605 sf Runoff Depth=3.93"
Length=150' Tc=10.0 min CN=69 Runoff= 5.12 cfs 0.260 af

Reach CHANNEL: R1 Peak Depth= 1.02' Max Vel= 7.8 fps Inflow= 13.50 cfs 0.731 af
n=0.025 L=451.0' S=0.0420 '/' Capacity=198.74 cfs Outflow= 13.08 cfs 0.730 af

Total Runoff Area = 2.230 ac Runoff Volume = 0.731 af Average Runoff Depth = 3.93"

Subcatchment AREA 1: SETriangular Area of Site

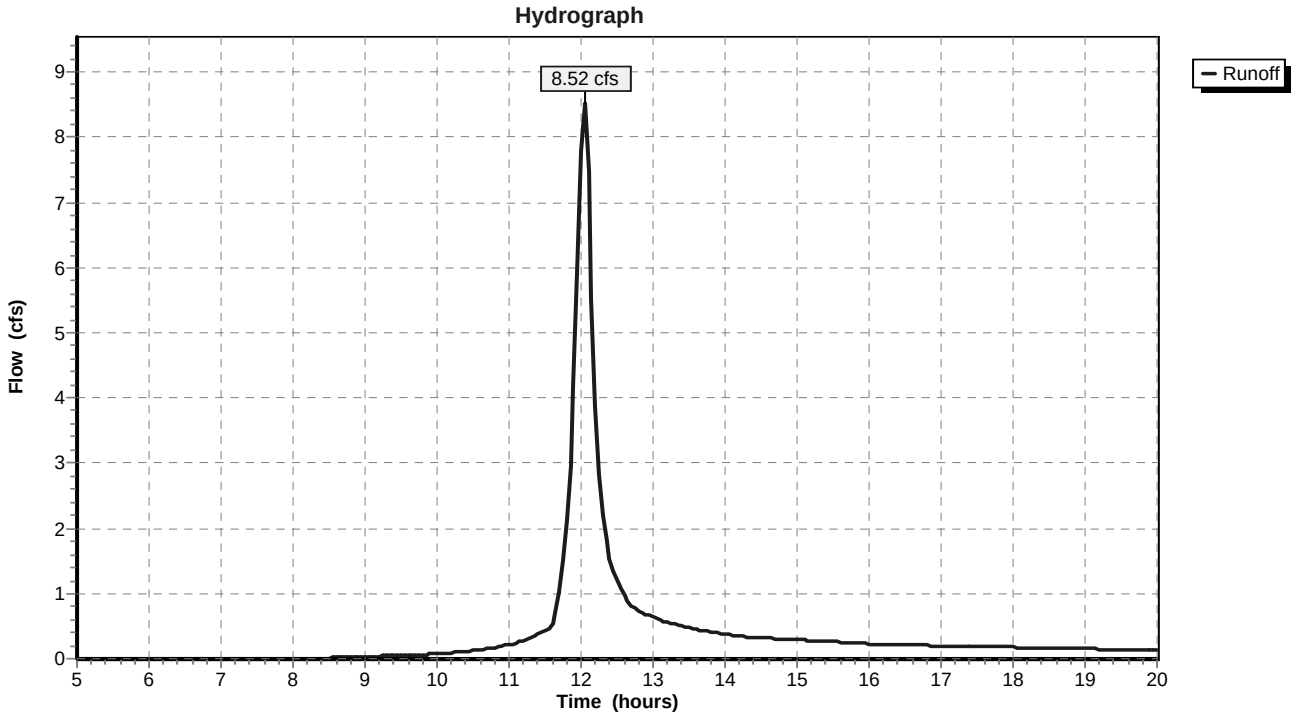
Runoff = 8.52 cfs @ 12.05 hrs, Volume= 0.470 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
62,533	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	200	0.0800	0.3		**Sheet Flow, AREA1** Grass: Dense n= 0.240 P2= 4.10"

Subcatchment AREA 1: SETriangular Area of Site



Subcatchment AREA 2: NW Triangular Area of Site

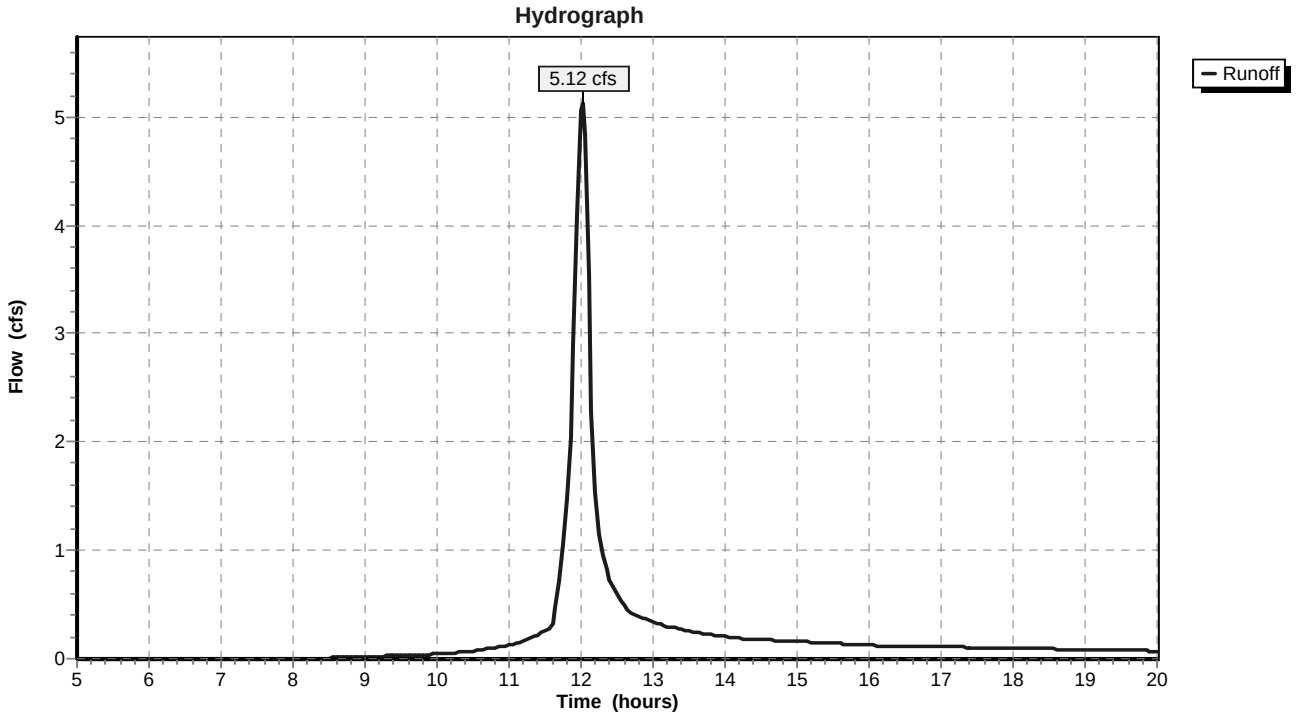
Runoff = 5.12 cfs @ 12.02 hrs, Volume= 0.260 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
34,605	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	150	0.0800	0.2		**Sheet Flow, AREA1** Grass: Dense n= 0.240 P2= 4.10"

Subcatchment AREA 2: NW Triangular Area of Site



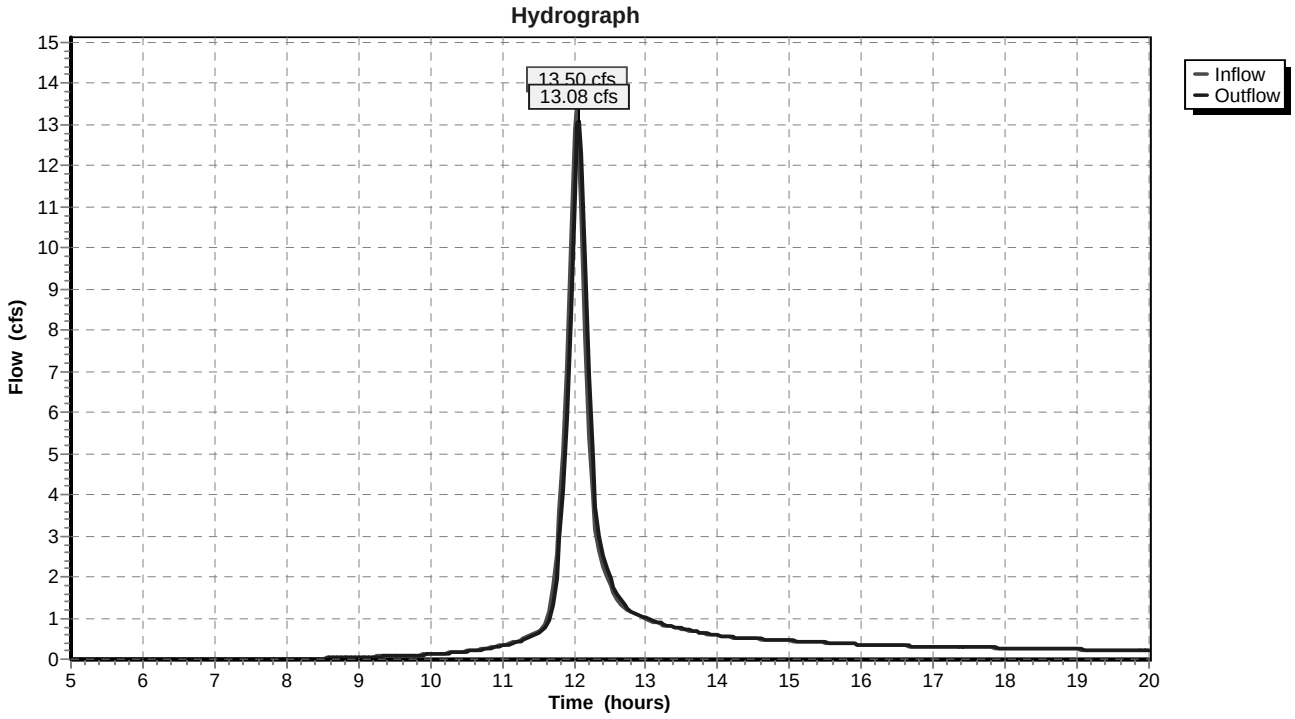
Reach CHANNEL: R1

Inflow Area = 2.230 ac, Inflow Depth = 3.93"
Inflow = 13.50 cfs @ 12.03 hrs, Volume= 0.731 af
Outflow = 13.08 cfs @ 12.06 hrs, Volume= 0.730 af, Atten= 3%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.8 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.9 fps, Avg. Travel Time= 2.6 min

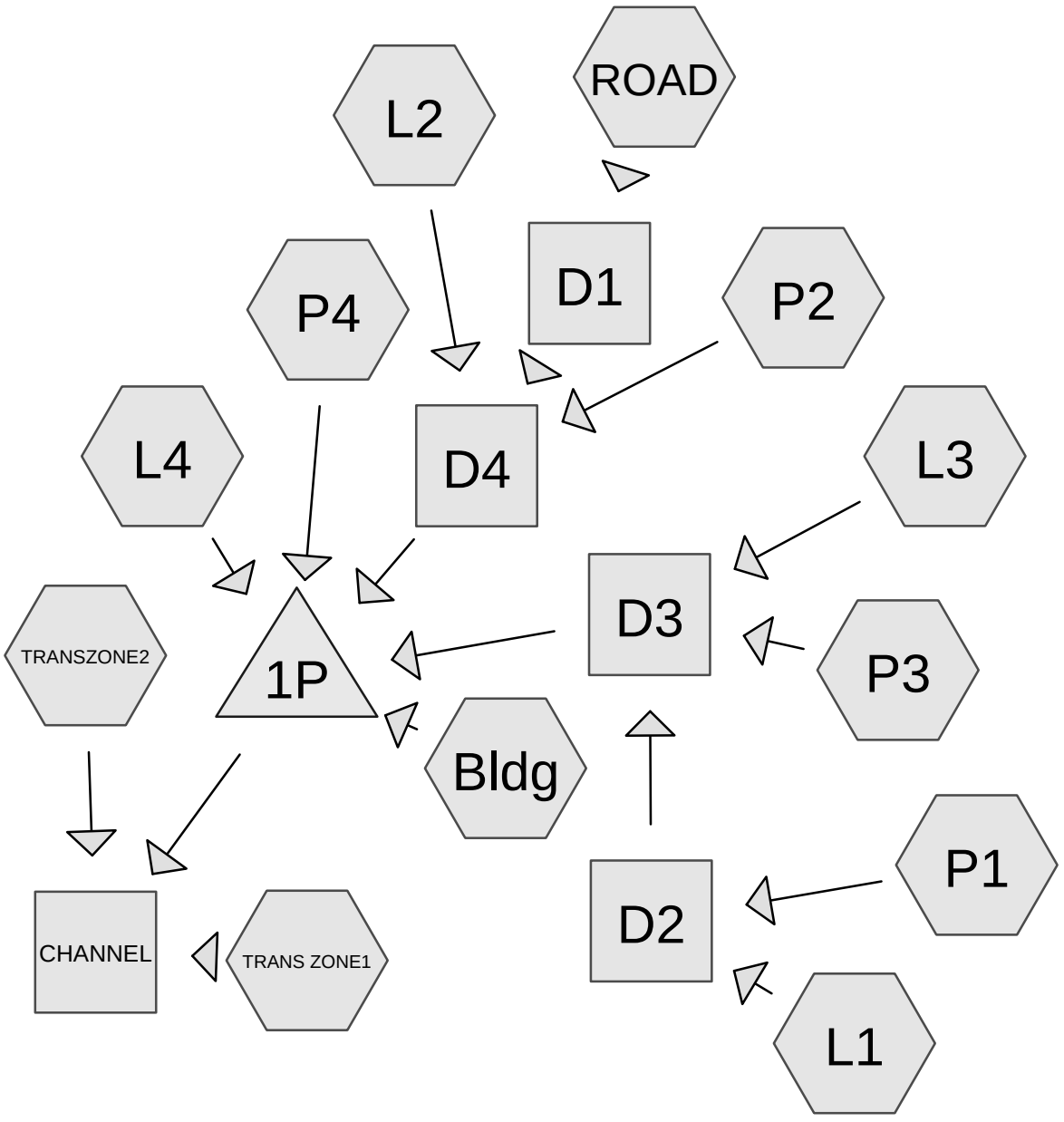
Peak Depth= 1.02'
Capacity at bank full= 198.74 cfs
Inlet Invert= 950.00', Outlet Invert= 931.06'
5.00' x 4.00' deep Parabolic Channel, n= 0.025 Length= 451.0' Slope= 0.0420 '/'

Reach CHANNEL: R1



Post Development Stage

Run off Calculations



Subcat Reach Pond Link

Drainage Diagram for KELLYS 100yr-Post

Prepared by _____

Time span=0.00-20.00 hrs, dt=0.01 hrs, 2001 points
Runoff by SCS TR-20 method, UH=SCS, Type II 24-hr Rainfall=7.90"
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Bldg: From Building Roof Runoff Area=10,780 sf Runoff Depth=7.28"
Length=180' Tc=2.3 min CN=98 Runoff= 3.13 cfs 0.150 af

Subcatchment L1: From 5' Landscape- South Boundary Runoff Area=1,609 sf Runoff Depth=3.94"
Length=200' Tc=1.1 min CN=69 Runoff= 0.33 cfs 0.012 af

Subcatchment L2: 5' wide Grass Strip at Front Runoff Area=2,545 sf Runoff Depth=3.94"
Length=200' Tc=1.1 min CN=69 Runoff= 0.53 cfs 0.019 af

Subcatchment L3: 5' Grass strip along Parking-South Runoff Area=1,610 sf Runoff Depth=3.94"
Length=120' Tc=0.9 min CN=69 Runoff= 0.34 cfs 0.012 af

Subcatchment L4: 5' Landscape at Rear area Runoff Area=3,398 sf Runoff Depth=3.94"
Length=120' Tc=1.2 min CN=69 Runoff= 0.70 cfs 0.026 af

Subcatchment P1: From Entrance Dway area Runoff Area=9,708 sf Runoff Depth=7.28"
Length=200' Tc=1.1 min CN=98 Runoff= 2.91 cfs 0.135 af

Subcatchment P2: From Front parking area Runoff Area=10,772 sf Runoff Depth=7.28"
Length=200' Tc=1.1 min CN=98 Runoff= 3.23 cfs 0.150 af

Subcatchment P3: From Mid-Parking area at S boundary Runoff Area=12,990 sf Runoff Depth=7.28"
Length=200' Tc=1.6 min CN=98 Runoff= 3.85 cfs 0.181 af

Subcatchment P4: From paved Area around pond Runoff Area=7,404 sf Runoff Depth=7.28"
Length=150' Tc=1.5 min CN=98 Runoff= 2.20 cfs 0.103 af

Subcatchment ROAD: From Curb Inlet at Road Runoff Area=2,576 sf Runoff Depth=7.28"
Length=170' Tc=1.6 min CN=98 Runoff= 0.76 cfs 0.036 af

Subcatchment TRANS ZONE1: Along Trans.Zone from Hway Runoff Area=23,178 sf Runoff Depth=3.92"
Length=450' Tc=19.7 min CN=69 Runoff= 2.55 cfs 0.174 af

Subcatchment TRANSZONE2: From NW Transitional Zone Runoff Area=9,423 sf Runoff Depth=3.93"
Length=200' Tc=13.3 min CN=69 Runoff= 1.27 cfs 0.071 af

Reach CHANNEL: Natural Channel Peak Depth= 0.65' Max Vel= 7.9 fps Inflow= 12.31 cfs 0.934 af
n=0.025 L=75.0' S=0.0600 '/' Capacity=834.29 cfs Outflow= 12.30 cfs 0.934 af

Reach D1: 15" Pipe From Road Peak Depth= 0.21' Max Vel= 5.5 fps Inflow= 0.76 cfs 0.036 af
D=15.0" n=0.019 L=200.0' S=0.0750 '/' Capacity=12.10 cfs Outflow= 0.75 cfs 0.036 af

Reach D2: 18" from Dway Entrance area Peak Depth= 1.08' Max Vel= 2.3 fps Inflow= 3.24 cfs 0.147 af
D=18.0" n=0.019 L=115.0' S=0.0026 '/' Capacity=3.67 cfs Outflow= 3.15 cfs 0.147 af

Reach D3: 24" pipe Near Ramp to Pond Peak Depth= 0.79' Max Vel= 6.2 fps Inflow= 7.23 cfs 0.340 af
D=24.0" n=0.019 L=140.0' S=0.0196 '/' Capacity=21.69 cfs Outflow= 7.17 cfs 0.340 af

Reach D4: 18" from mid-parkway on N- Boundary Peak Depth= 0.71' Max Vel= 4.4 fps Inflow= 4.46 cfs 0.205 af
D=24.0" n=0.019 L=250.0' S=0.0112 '/' Capacity=16.38 cfs Outflow= 4.35 cfs 0.205 af

Pond 1P: Detention Pond Peak Storage= 12,961 cf @ 951.28' Inflow= 17.35 cfs 0.824 af
Primary= 9.26 cfs 0.690 af Outflow= 9.26 cfs 0.690 af

Total Runoff Area = 2.204 ac Runoff Volume = 1.069 af Average Runoff Depth = 5.82"

Subcatchment Bldg: From Building Roof

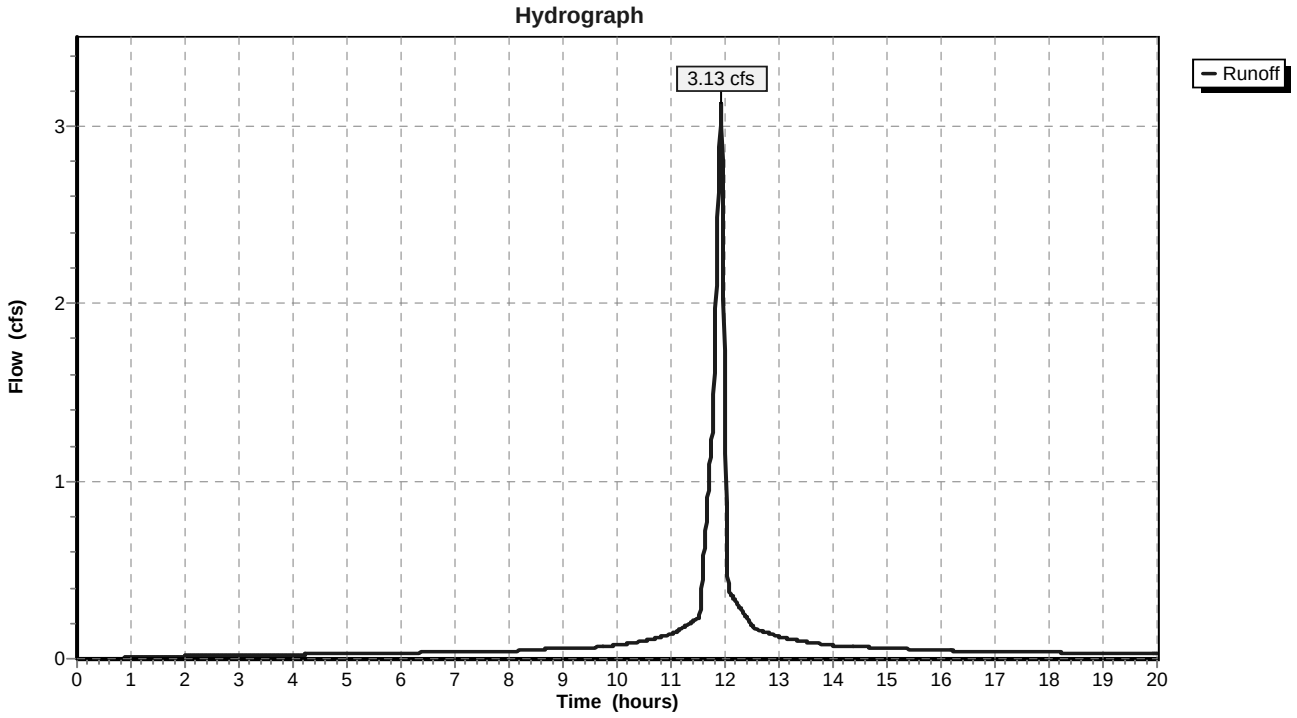
Runoff = 3.13 cfs @ 11.93 hrs, Volume= 0.150 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
10,780	98	Paved roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	180	0.0100	1.3		**Sheet Flow, From Roof** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment Bldg: From Building Roof



Subcatchment L1: From 5' Landscape- South Boundary

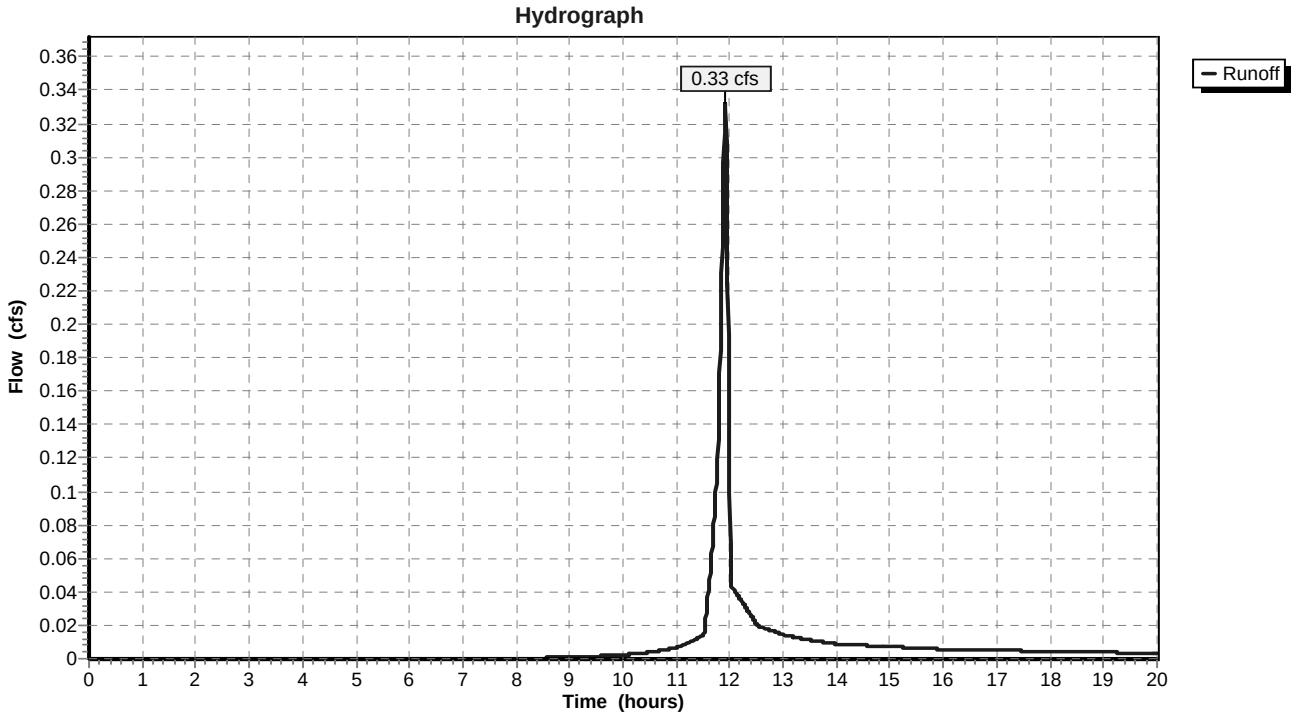
Runoff = 0.33 cfs @ 11.91 hrs, Volume= 0.012 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
1,609	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	200	0.0700	3.0		**Sheet Flow, L4** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment L1: From 5' Landscape- South Boundary



Subcatchment L2: 5' wide Grass Strip at Front

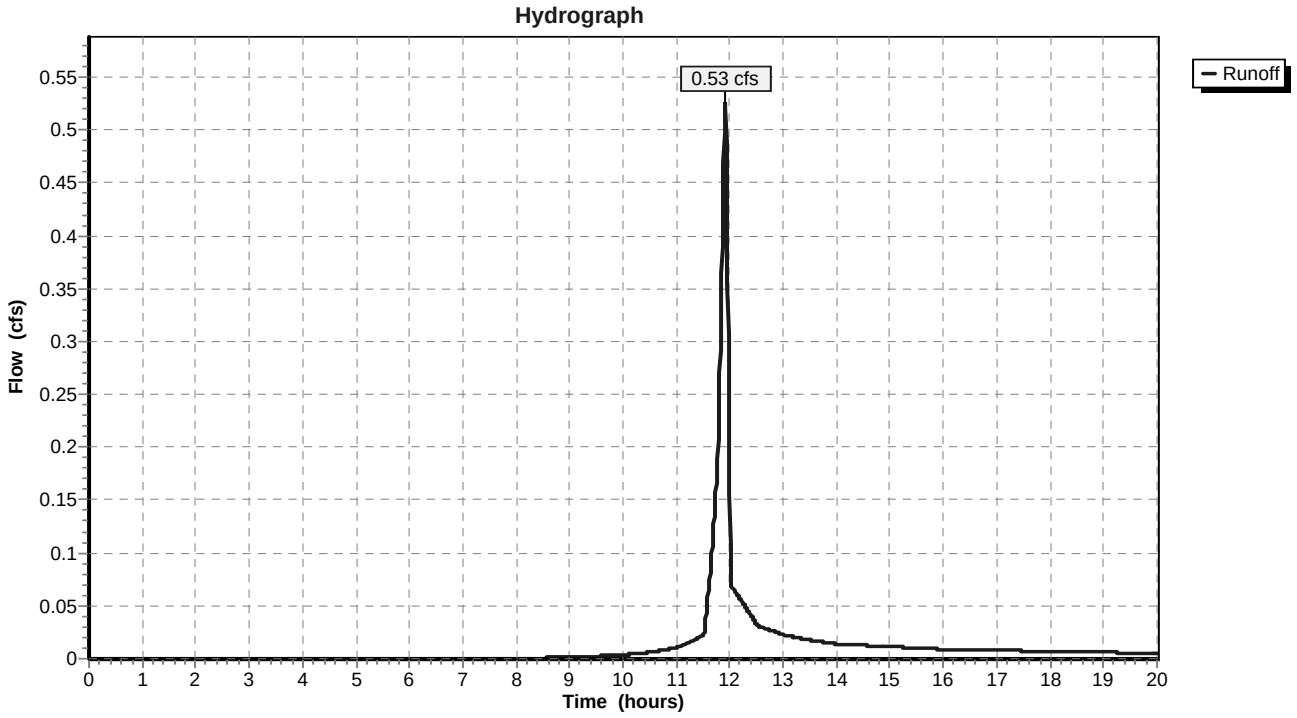
Runoff = 0.53 cfs @ 11.91 hrs, Volume= 0.019 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
2,545	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	200	0.0750	3.0		**Sheet Flow, L2** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment L2: 5' wide Grass Strip at Front



Subcatchment L3: 5' Grass strip along Parking-South

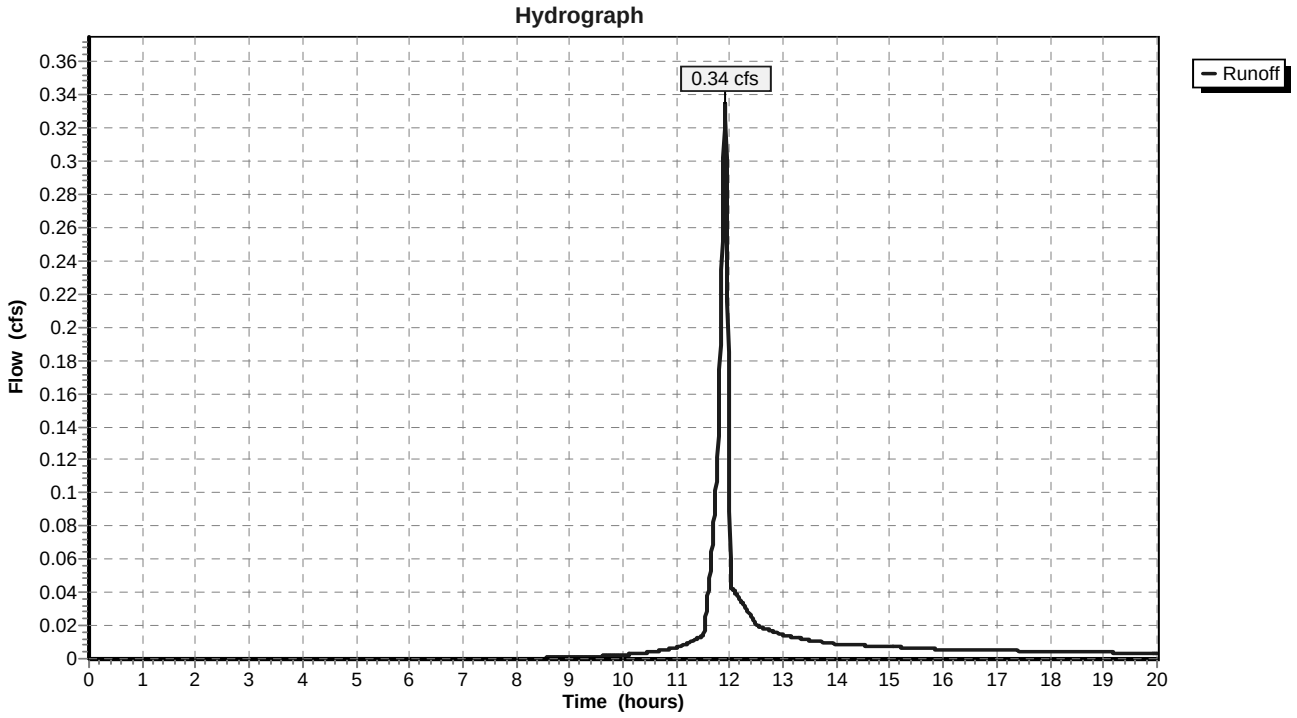
Runoff = 0.34 cfs @ 11.91 hrs, Volume= 0.012 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
1,610	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	120	0.0400	2.1		**Sheet Flow, L3** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment L3: 5' Grass strip along Parking-South



Subcatchment L4: 5' Landscape at Rear area

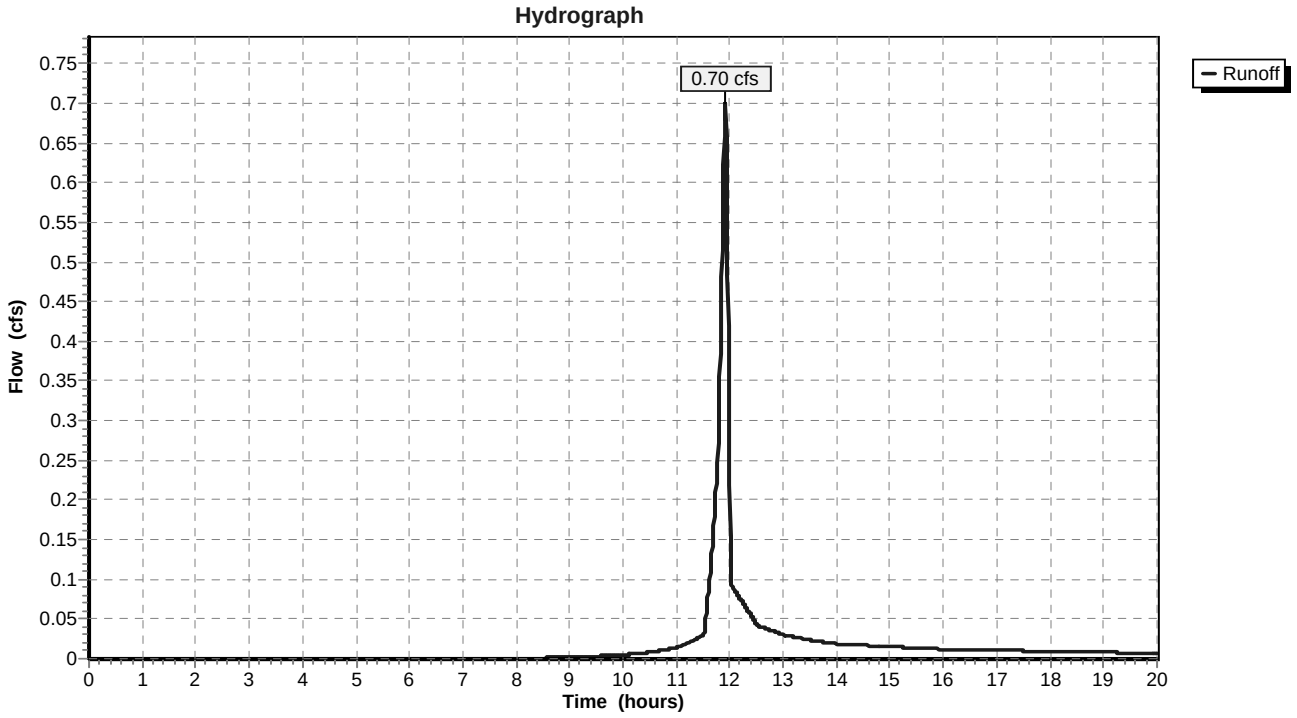
Runoff = 0.70 cfs @ 11.92 hrs, Volume= 0.026 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
3,398	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	120	0.0200	1.6		**Sheet Flow, L5** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment L4: 5' Landscape at Rear area



Subcatchment P1: From Entrance Dway area

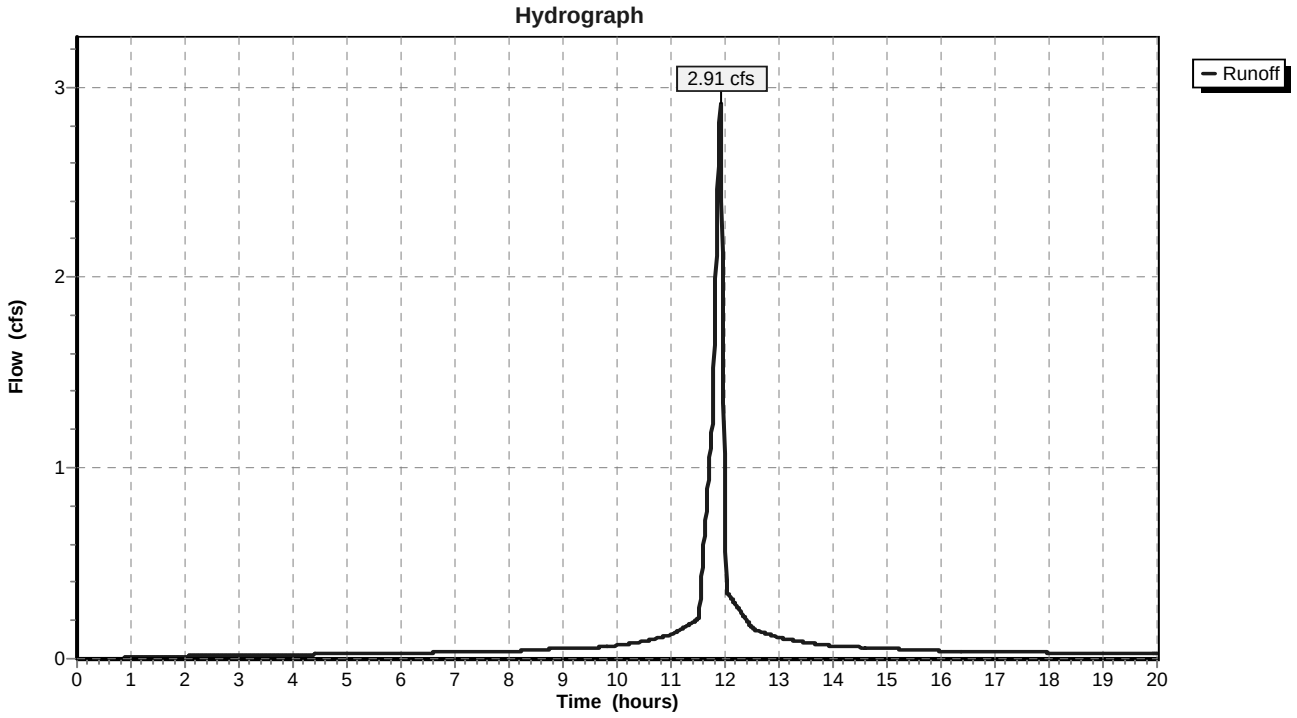
Runoff = 2.91 cfs @ 11.91 hrs, Volume= 0.135 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
9,708	98	Paved parking

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	200	0.0750	3.0		**Sheet Flow, P4** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment P1: From Entrance Dway area



Subcatchment P2: From Front parking area

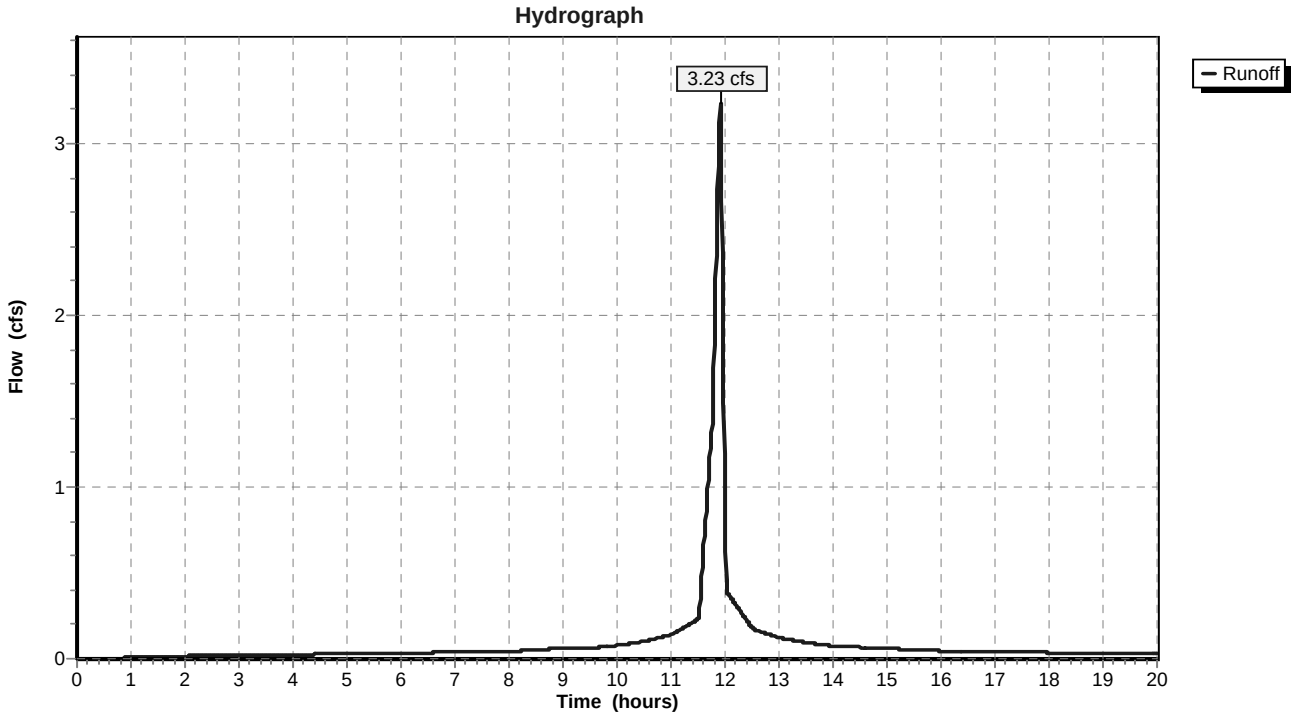
Runoff = 3.23 cfs @ 11.91 hrs, Volume= 0.150 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
10,772	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	200	0.0750	3.0		**Sheet Flow, P2** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment P2: From Front parking area



Subcatchment P3: From Mid-Parking area at S boundary

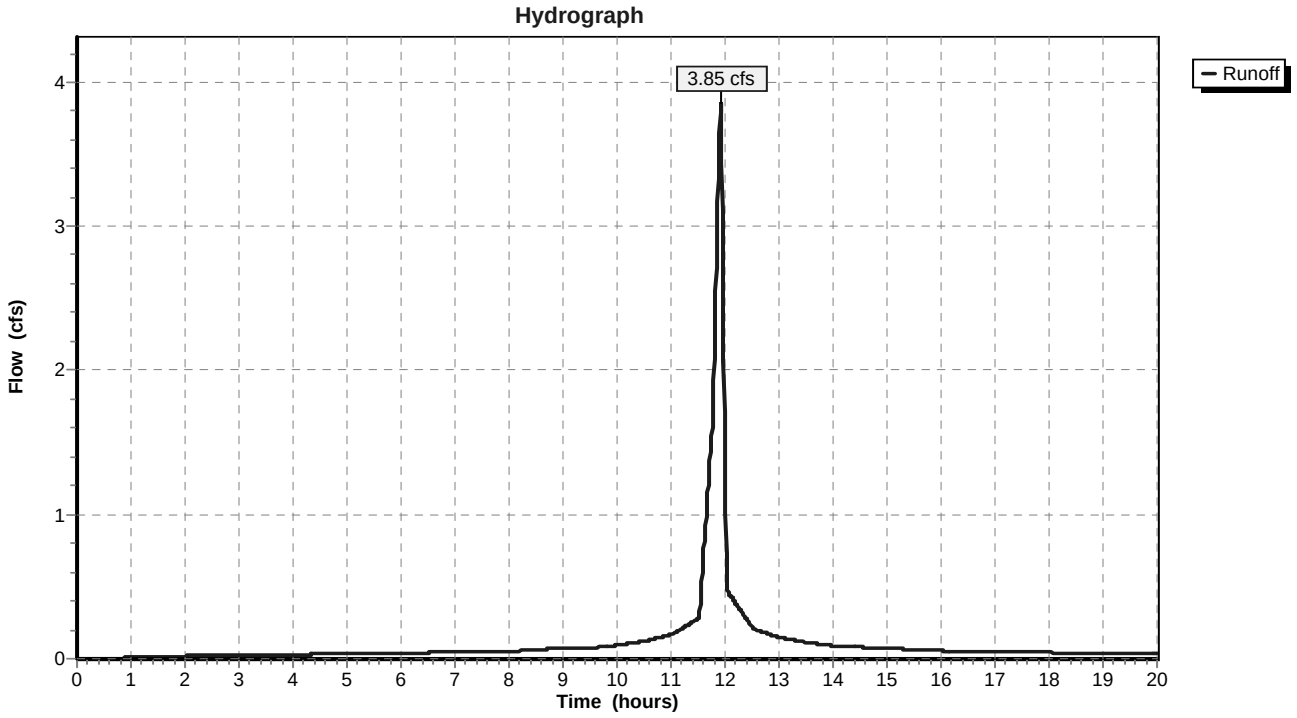
Runoff = 3.85 cfs @ 11.92 hrs, Volume= 0.181 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
12,990	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	200	0.0300	2.1		**Sheet Flow, P3** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment P3: From Mid-Parking area at S boundary



Subcatchment P4: From paved Area around pond

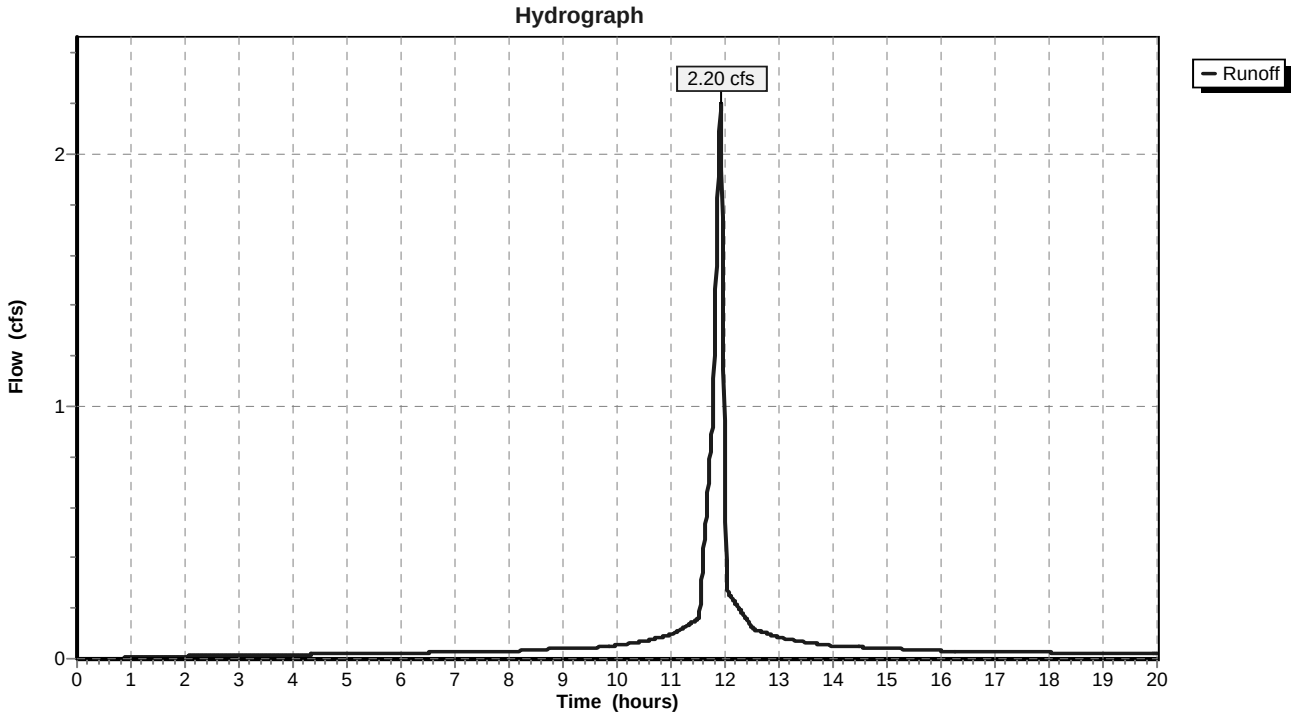
Runoff = 2.20 cfs @ 11.92 hrs, Volume= 0.103 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
7,404	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0200	1.7		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment P4: From paved Area around pond



Subcatchment ROAD: From Curb Inlet at Road

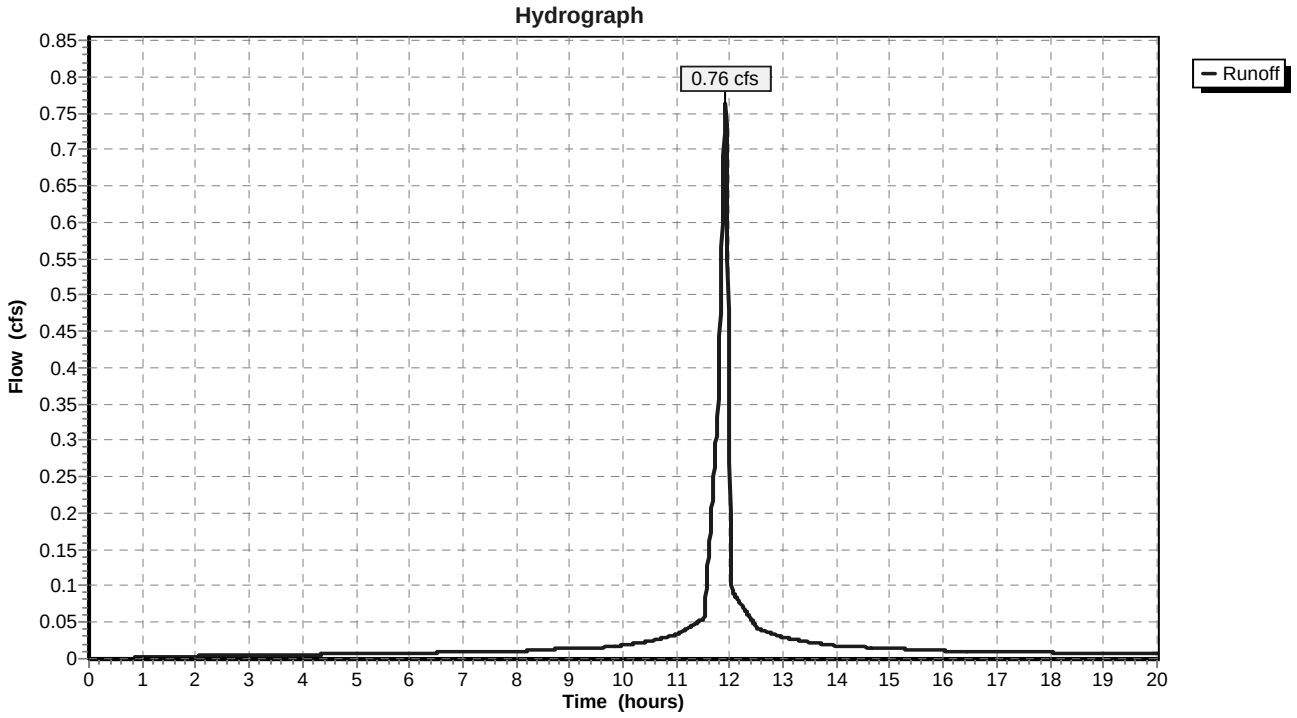
Runoff = 0.76 cfs @ 11.92 hrs, Volume= 0.036 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
2,576	98	Paved roads w/curbs & sewers

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	170	0.0200	1.7		**Sheet Flow, From ROad** Smooth surfaces n= 0.011 P2= 4.10"

Subcatchment ROAD: From Curb Inlet at Road



Subcatchment TRANS ZONE1: Along Trans.Zone from Hway

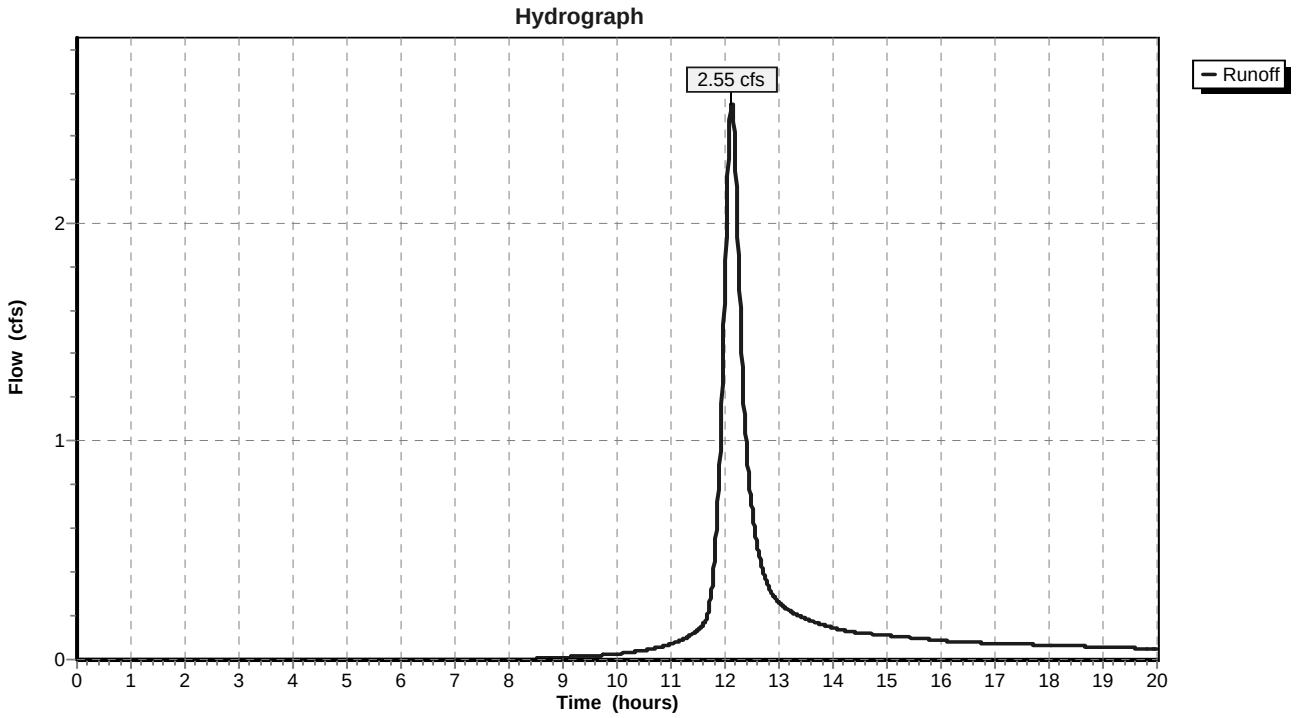
Runoff = 2.55 cfs @ 12.12 hrs, Volume= 0.174 af, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
23,178	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	300	0.0700	0.3		**Sheet Flow, From Hway Entrance** Grass: Dense n= 0.240 P2= 4.10"
1.3	150	0.0700	1.9		**Shallow Concentrated Flow, Mid of Souther Trans.zone** Short Grass Pasture Kv= 7.0 fps
19.7	450	Total			

Subcatchment TRANS ZONE1: Along Trans.Zone from Hway



Subcatchment TRANSZONE2: From NW Transitional Zone

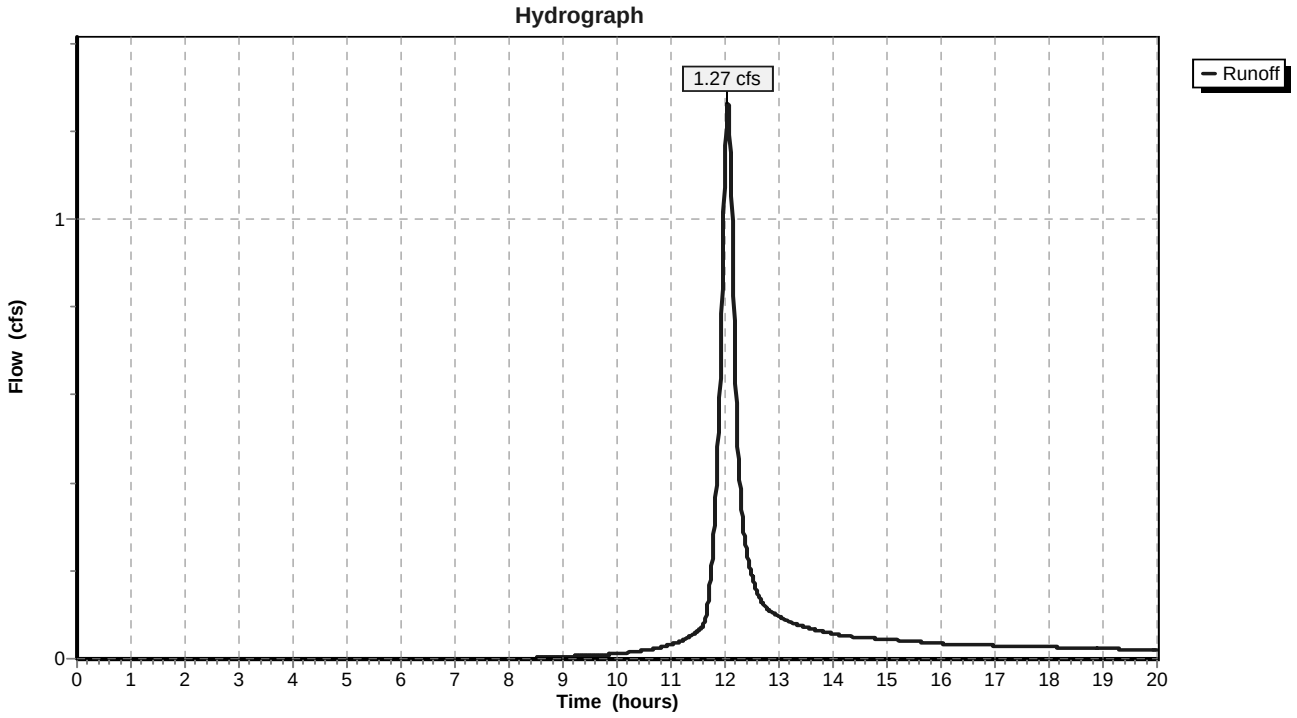
Runoff = 1.27 cfs @ 12.05 hrs, Volume= 0.071 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=7.90"

Area (sf)	CN	Description
9,423	69	50-75% Grass cover, Fair, HSG B

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	200	0.0700	0.3		**Sheet Flow, ZONE** Grass: Dense n= 0.240 P2= 4.10"

Subcatchment TRANSZONE2: From NW Transitional Zone



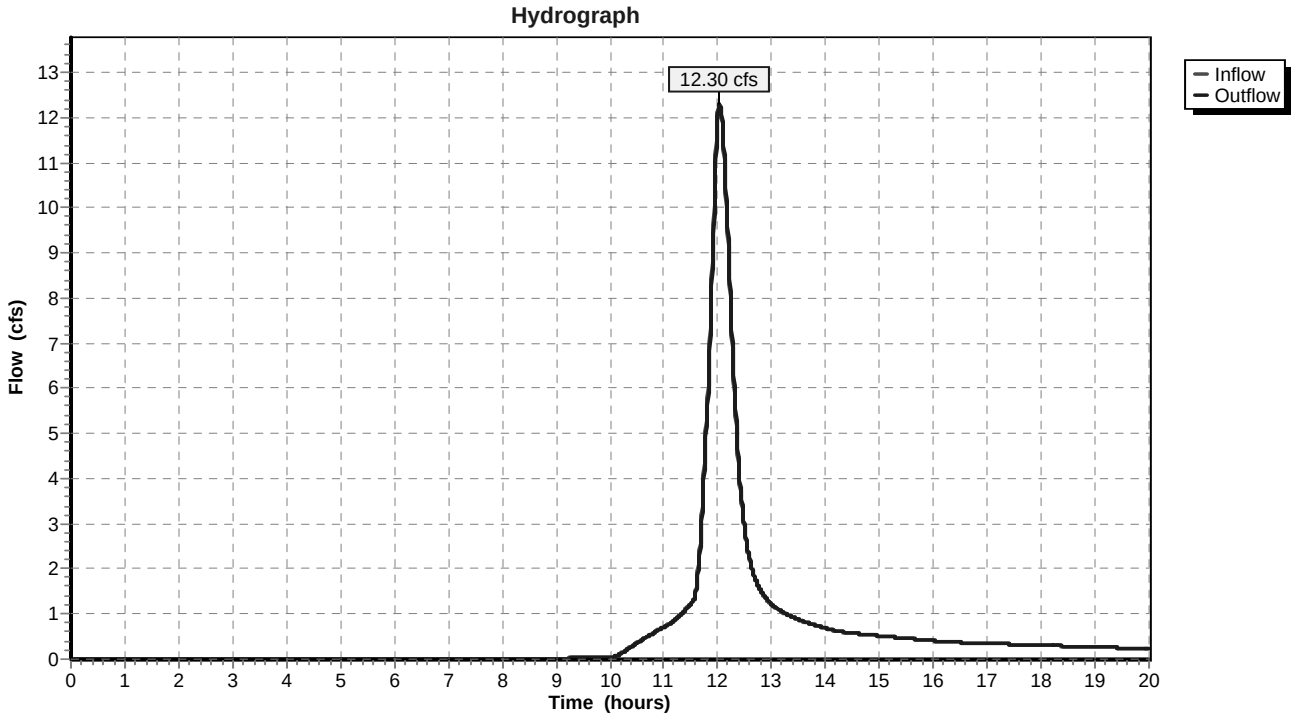
Reach CHANNEL: Natural Channel

Inflow Area = 2.204 ac, Inflow Depth = 5.09"
Inflow = 12.31 cfs @ 12.03 hrs, Volume= 0.934 af
Outflow = 12.30 cfs @ 12.03 hrs, Volume= 0.934 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.65'
Capacity at bank full= 834.29 cfs
Inlet Invert= 944.00', Outlet Invert= 939.50'
10.00' x 5.00' deep Parabolic Channel, n= 0.025 Length= 75.0' Slope= 0.0600 '/'

Reach CHANNEL: Natural Channel



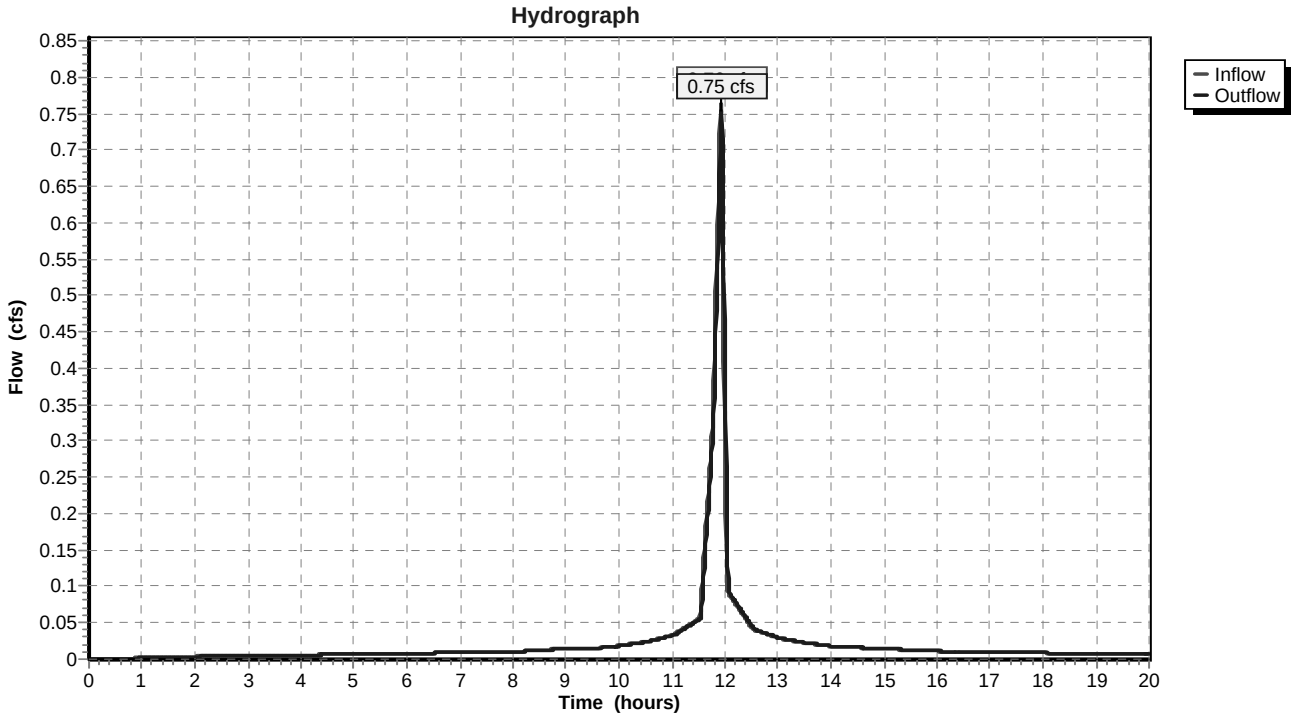
Reach D1: 15" Pipe From Road

Inflow Area = 0.059 ac, Inflow Depth = 7.28"
Inflow = 0.76 cfs @ 11.92 hrs, Volume= 0.036 af
Outflow = 0.75 cfs @ 11.93 hrs, Volume= 0.036 af, Atten= 1%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.5 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 2.1 min

Peak Depth= 0.21'
Capacity at bank full= 12.10 cfs
Inlet Invert= 968.00', Outlet Invert= 953.00'
15.0" Diameter Pipe n= 0.019 Length= 200.0' Slope= 0.0750 '/'

Reach D1: 15" Pipe From Road



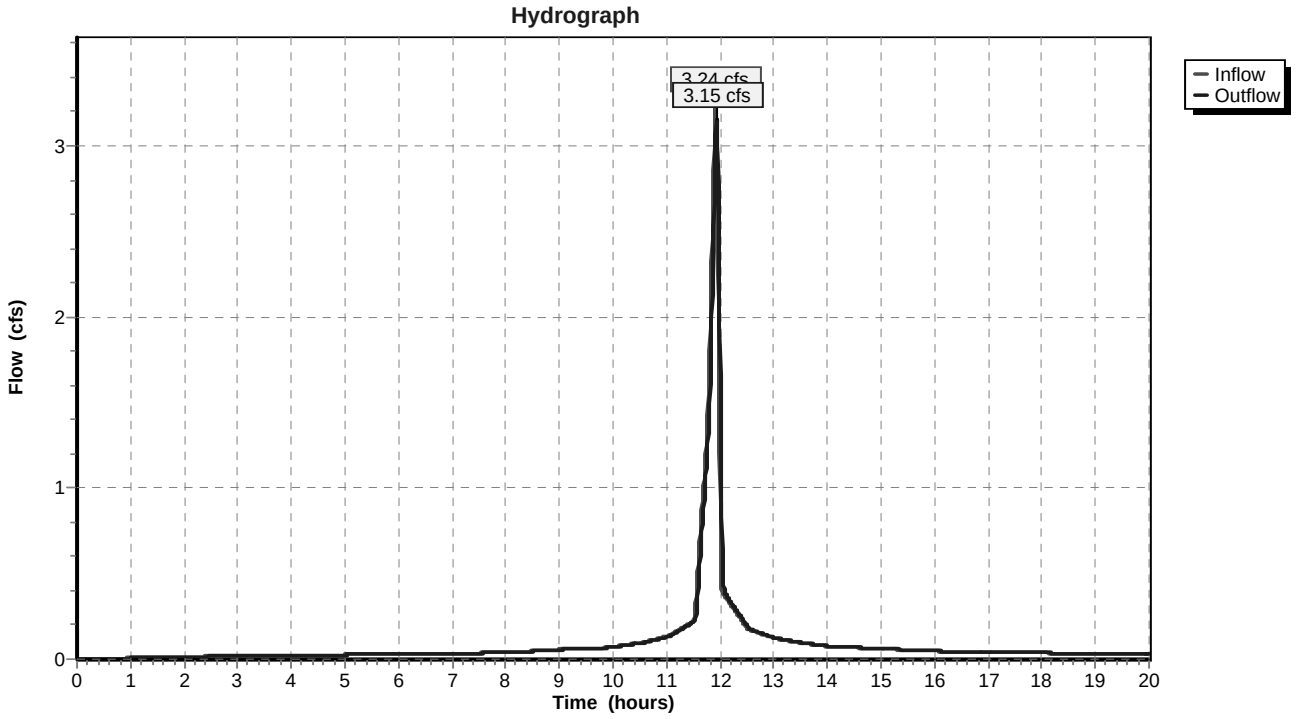
Reach D2: 18" from Dway Entrance area

Inflow Area = 0.260 ac, Inflow Depth = 6.81"
Inflow = 3.24 cfs @ 11.91 hrs, Volume= 0.147 af
Outflow = 3.15 cfs @ 11.93 hrs, Volume= 0.147 af, Atten= 3%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.3 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 2.6 min

Peak Depth= 1.08'
Capacity at bank full= 3.67 cfs
Inlet Invert= 953.50', Outlet Invert= 953.20'
18.0" Diameter Pipe n= 0.019 Length= 115.0' Slope= 0.0026 '/'

Reach D2: 18" from Dway Entrance area



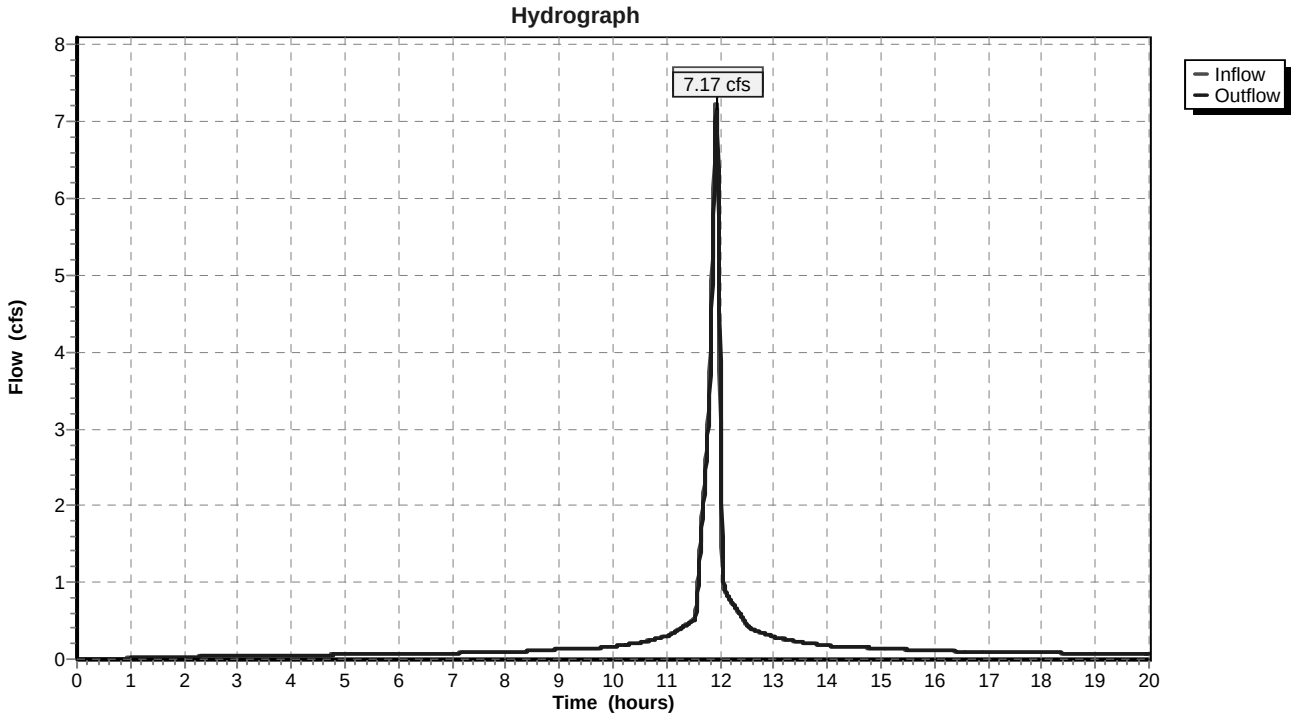
Reach D3: 24" pipe Near Ramp to Pond

Inflow Area = 0.595 ac, Inflow Depth = 6.86"
Inflow = 7.23 cfs @ 11.92 hrs, Volume= 0.340 af
Outflow = 7.17 cfs @ 11.93 hrs, Volume= 0.340 af, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.2 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.79'
Capacity at bank full= 21.69 cfs
Inlet Invert= 951.75', Outlet Invert= 949.00'
24.0" Diameter Pipe n= 0.019 Length= 140.0' Slope= 0.0196 '/'

Reach D3: 24" pipe Near Ramp to Pond



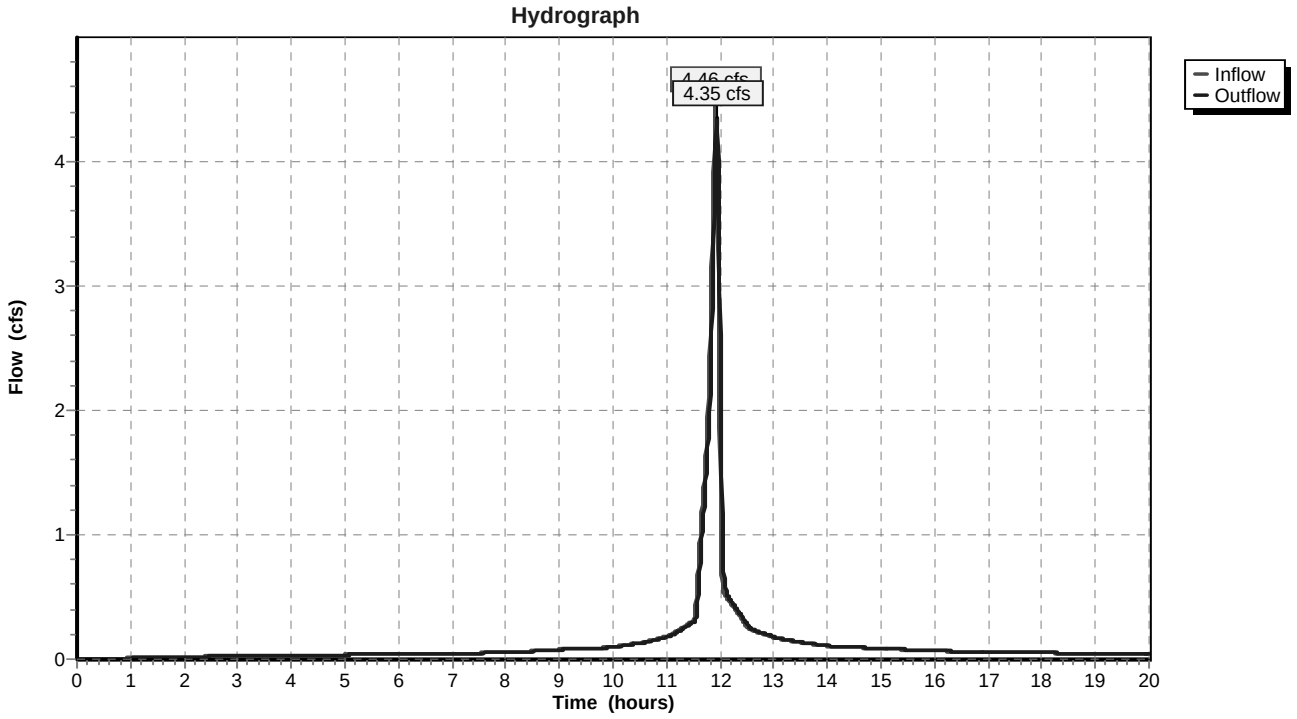
Reach D4: 18" from mid-parkway on N- Boundary

Inflow Area = 0.365 ac, Inflow Depth = 6.74"
Inflow = 4.46 cfs @ 11.91 hrs, Volume= 0.205 af
Outflow = 4.35 cfs @ 11.94 hrs, Volume= 0.205 af, Atten= 3%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.4 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 3.2 min

Peak Depth= 0.71'
Capacity at bank full= 16.38 cfs
Inlet Invert= 951.80', Outlet Invert= 949.00'
24.0" Diameter Pipe n= 0.019 Length= 250.0' Slope= 0.0112 '/'

Reach D4: 18" from mid-parkway on N- Boundary



Pond 1P: Detention Pond

Inflow Area = 1.455 ac, Inflow Depth = 6.79"
Inflow = 17.35 cfs @ 11.93 hrs, Volume= 0.824 af
Outflow = 9.26 cfs @ 12.00 hrs, Volume= 0.690 af, Atten= 47%, Lag= 4.1 min
Primary = 9.26 cfs @ 12.00 hrs, Volume= 0.690 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs

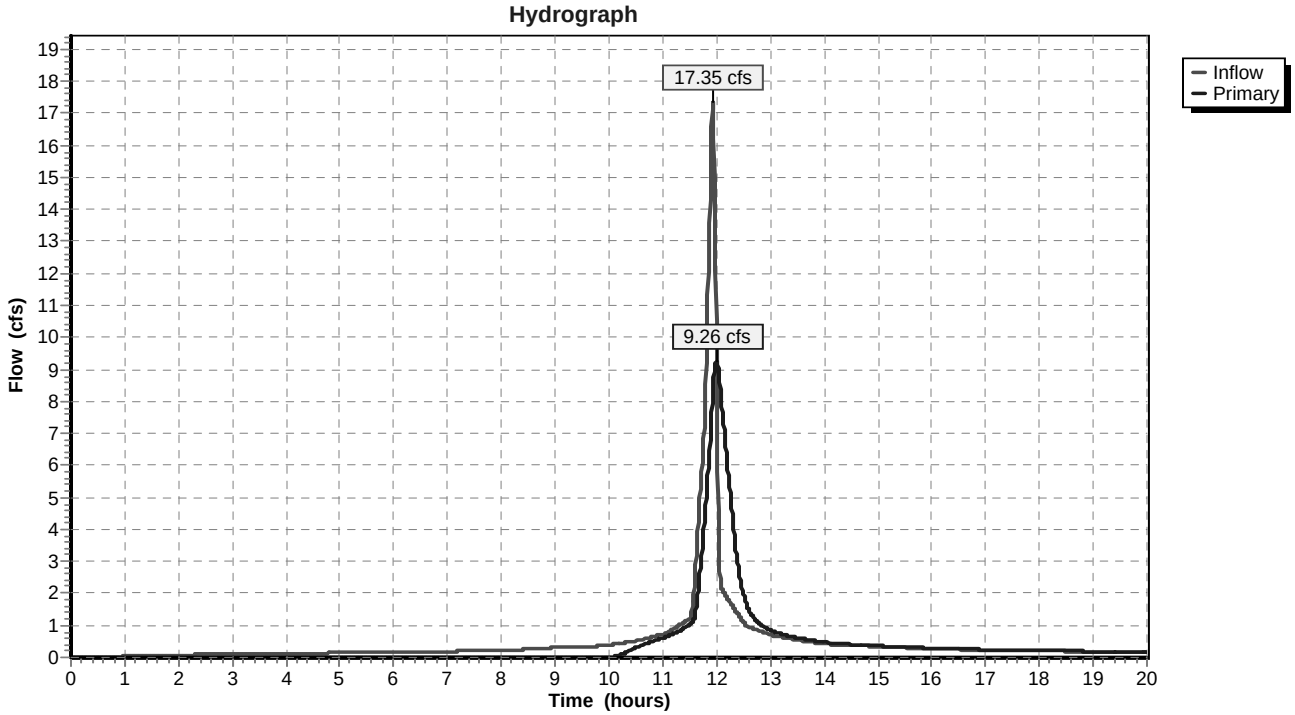
Peak Elev= 951.28' Surf.Area= 2,455 sf Storage= 12,961 cf
Plug-Flow detention time= 119.2 min calculated for 0.689 af (84% of inflow)
Storage and wetted areas determined by Prismatic sections

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	2,455	0	0
952.00	2,455	14,730	14,730

Primary OutFlow Max=9.25 cfs @ 12.00 hrs HW=951.28' (Free Discharge)
└**1=15" Pipe** (Controls 9.25 cfs)

#	Routing	Invert	Outlet Devices
1	Primary	948.20'	**15.0" Vert. 15" Pipe** C= 0.600

Pond 1P: Detention Pond



Summary of the Calculations

The peak discharge from the site onto the existing channel in the Pre- Development Stage = **13.50 cfs**

The peak discharge from the site onto the existing channel in the Post- Development Stage = **12.31 cfs**

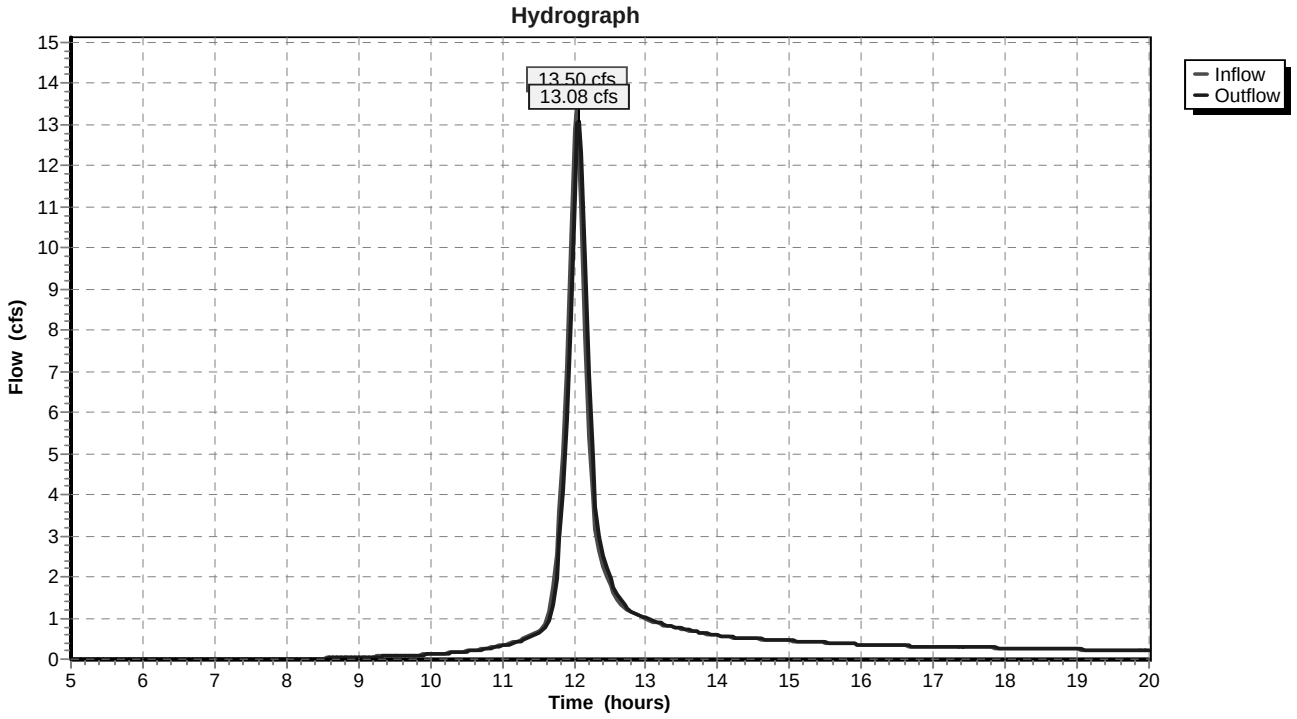
Reach CHANNEL: R1

Inflow Area = 2.230 ac, Inflow Depth = 3.93"
Inflow = 13.50 cfs @ 12.03 hrs, Volume= 0.731 af
Outflow = 13.08 cfs @ 12.06 hrs, Volume= 0.730 af, Atten= 3%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.8 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.9 fps, Avg. Travel Time= 2.6 min

Peak Depth= 1.02'
Capacity at bank full= 198.74 cfs
Inlet Invert= 950.00', Outlet Invert= 931.06'
5.00' x 4.00' deep Parabolic Channel, n= 0.025 Length= 451.0' Slope= 0.0420 '/'

Reach CHANNEL: R1



Reach CHANNEL: Natural Channel

Inflow Area = 2.204 ac, Inflow Depth = 5.09"
Inflow = 12.31 cfs @ 12.03 hrs, Volume= 0.934 af
Outflow = 12.30 cfs @ 12.03 hrs, Volume= 0.934 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.65'
Capacity at bank full= 834.29 cfs
Inlet Invert= 944.00', Outlet Invert= 939.50'
10.00' x 5.00' deep Parabolic Channel, n= 0.025 Length= 75.0' Slope= 0.0600 '/'

Reach CHANNEL: Natural Channel