PRELIMINARY STORMWATER MANAGEMENT SUMMARY
for:
FARMSTEAD – SUB AREA H

CITY OF GROVE CITY
FRANKLIN COUNTY, OHIO

Prepared for:

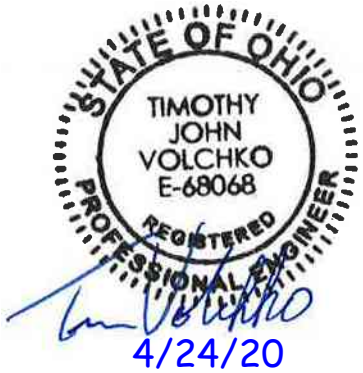
GRAND COMMUNITIES, LLC.

Prepared by:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
COLUMBUS, OHIO

CEC PROJECT 300-277

APRIL 2020



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APPENDICES

Civil and Environmental Consultants, Inc. (CEC) has evaluated the current site conditions and the proposed site plan of the Farmstead and offers the following for stormwater management design considerations to the City of Grove City.

1.0 EXISTING CONDITIONS STORM CALCULATIONS

CEC studied the existing site drainage conditions for the overall proposed Farmstead development including the proposed Sub Area H under a master drainage study which was approved by Grove City as part of the Phase 1 & 2 Street, Storm Sewer, and Water Improvement Plan in November 2019. Sub Area H total onsite area is 21.52 acres and is comprised of primarily row crops with some wooded areas. The offsite watershed is 0.22 acres and is comprised of primarily existing wooded areas and meadows.

The soils are predominantly Type C with some Type B & Type D soils. The site is comprised of two watersheds, which are labeled Watersheds A2 & B3. Approximately half of the site drains to the east via and existing Culvert A which drains east across Jackson Pike and then south to Plum Run. The other half of the site flows west and into an existing wetland which then discharges north into Grant Run. Both Grant Run & Plum Run drain to the Scioto River.

2.0 STORMWATER MANAGEMENT

The following narrative and calculations show that the proposed stormwater management plan is sufficient for this project. CEC proposes to construct one (1) wet basin on the proposed 21.52 acre development. This proposed Basin Z was previously designed under the master drainage study for the Farmstead Development. This proposed basin will outlet via storm infrastructure west to the existing wetland, where a 48" culvert will pick it up and discharge the wetland into Basin W at the northwest corner of the overall development. The spillway was designed to discharge only the 50-Year and 100-Year flows east towards Culvert A under Jackson Pike. Please refer to the approved Jackson Pike calculations and Farmstead master drainage study for further details.

The proposed development will discharge more area to the existing wetland increasing the runoff volume to Basin W. Basin W has been analyzed to determine the changes due to the increased runoff. Please see the tables below for the revised discharge rate and water elevations for each corresponding storm event.

Basin Z will outlet via a modified catch basin. The proposed outlet structure will consist of various orifices and windows to ensure the release rate shall not exceed the allowable release for the site.

CEC will meet or exceed the requirements of the stormwater regulations and will hold the release rate of the critical year post developed storm event to the existing release rate. CEC will design the basin to provide water quality treatment for the onsite and offsite areas tributary to it. The cumulative release from the basins and undetained areas will be less than the allowable release rate for the overall development.

Table 1: Basin Z Discharge				
Storm Event	$Q_{proposed}$	$*Q_{allowable\ spillway}$	$Q_{proposed\ spillway}$	Max WSE
(Year)	(CFS)	(CFS)	(CFS)	(ELEV)
1	0.52	0.00	0.00	716.31
2	0.77	0.00	0.00	716.77
5	1.05	0.00	0.00	717.58
10	1.64	0.00	0.00	718.16
25	2.35	0.00	0.00	718.96
50	5.44	2.20	1.01	719.42
100	13.81	9.34	4.92	719.63

$*Q_{allowable}$ per approved Jackson Pike Calculations

Table 2: Basin W Allowable Discharge Summary (Per Farmstead approved SWMR)								
Storm Event	$Q_{existing\ onsite}$	$Q_{allowable\ onsite}$	$*Q_{offsite}$	$*Q_{onsite + offsite\ allowable}$	$*Q_{proposed}$	$*Q_{proposed}$ (Revised)	Max WSE	Max WSE (Revised)
(Year)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(ELEV)	(ELEV)
1	13.51	13.51	2.08	15.59	2.11	2.11	710.50	710.50
2	22.19	13.51	3.10	16.61	2.66	2.66	711.10	711.10
5	37.17	13.51	4.76	18.27	3.53	3.49	712.35	712.29
10	51.14	51.14	6.23	57.37	11.26	11.42	712.63	712.63
25	72.57	72.57	8.43	81.00	30.17	30.17	712.80	712.80
50	91.75	91.75	10.35	102.10	66.22	66.22	713.03	713.03
100	113.13	113.13	12.46	125.59	110.25	110.25	713.27	713.27

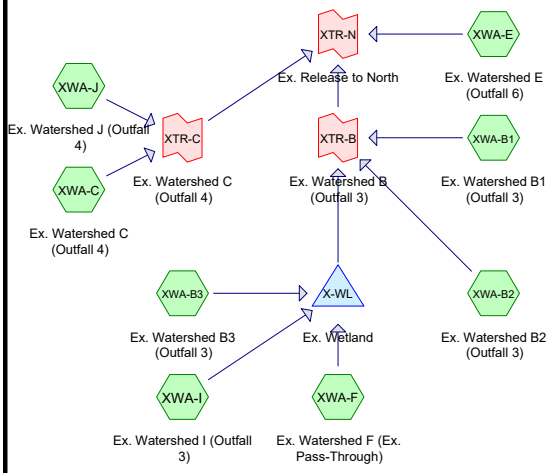
$*Q_{allowable}$ 1-5 Year Storm = Q 1 Year Storm

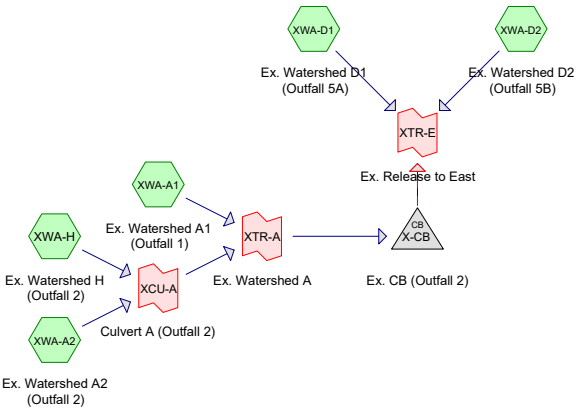
$*Q_{allowable}$ 10-100 Year Storm = Existing for each corresponding event

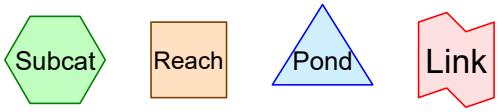
$*Q_{proposed}$ = PB-W (Revised)

APPENDIX A

PRE-DEVELOPED TRIBUTARY MAP AND FLOWS







Routing Diagram for 174-158 Farmstead Phases 1&2 HYD
Prepared by CEC, Inc., Printed 10/29/2019

NORTH

SCALE IN FEET

0 200 400

STREAM CORRIDOR PROTECTION ZONE (SCPZ)

WATERSHED B1 (OUTFALL 3) 11.84 AC.
10.28 AGR AC.
1.56 WOODED AC.

SHALLOW CONCENTRATED FLOW DIST=928' ELEV=723.0'–714.8'=8.2' SLOPE=8.2'/928'=0.88%

SHEET FLOW DIST=100' ELEV=723.8'–722.5'=1.3' SLOPE=1.3'/100'=1.3%

WATERSHED E 3.55 AC. (OUTFALL 6)
3.55 AGR AC.

SHEET FLOW DIST=100' ELEV=724.0'–722.4'=1.6' SLOPE=1.6'/100'=1.6%

CHANNEL FLOW DIST=374' ELEV=719.1'–714.0'=5.1' SLOPE=5.1'/374'=1.4%

SHALLOW CONCENTRATED FLOW DIST=152' ELEV=722.4'–719.1'=3.3' SLOPE=3.3'/152'=2.17%

WATERSHED D2 (OUTFALL 5B) 11.36 AC.
11.36 AGR AC.

SHALLOW CONCENTRATED FLOW DIST=844' ELEV=722.5'–718.7'=3.8' SLOPE=3.8'/844'=0.45%

CULVERT D

SHEET FLOW DIST=100' ELEV=723.7'–723.0'=0.7' SLOPE=0.7'/100'=0.7%

WATERSHED D1 (OUTFALL 5A) 4.58 AC.
4.58 AGR AC.

SHALLOW CONCENTRATED FLOW DIST=1378' ELEV=712.4'–707.4'=5.0' SLOPE=5.0'/1378'=0.36%

SHEET FLOW DIST=100' ELEV=723.3'–723.2'=0.1' SLOPE=0.1'/100'=0.1%

CULVERT C

SHALLOW CONCENTRATED FLOW DIST=607' ELEV=723.2'–719.3'=3.9' SLOPE=3.9'/607'=0.64%

SHEET FLOW DIST=100' ELEV=723.3'–723.2'=0.1' SLOPE=0.1'/100'=0.1%

WATERSHED B2 (OUTFALL 3) 22.83 AC.
16.07 AGR AC.
3.08 CLASS "D" SOIL AGR AC.
1.59 WOODED AC.
2.09 CLASS "D" SOIL WOODED AC.

SHEET FLOW DIST=100' ELEV=724.1'–723.4'=0.7' SLOPE=0.7'/100'=0.7%

SHALLOW CONCENTRATED FLOW DIST=194' ELEV=723.4'–720.1'=3.3' SLOPE=3.3'/194'=1.7%

CULVERT B

TRIBUTARY BOUNDARY

WATERSHED A1 (OUTFALL 1) 1.61 AC.
1.61 AGR AC.

SHEET FLOW DIST=100' ELEV=726.1'–724.9'=1.2' SLOPE=1.2'/100'=1.2%

WATERSHED C (OUTFALL 4) 76.26 AC.
58.64 AGR AC.
17.62 WOODED AC.

SHALLOW CONCENTRATED FLOW DIST=474' ELEV=724.9'–712.4'=12.5' SLOPE=12.5'/474'=2.64%

SHALLOW CONCENTRATED FLOW DIST=2418' ELEV=713.0'–707.4'=5.6' SLOPE=5.6'/2418'=0.23%

SHALLOW CONCENTRATED FLOW DIST=1616' ELEV=723.2'–717.2'=6.0' SLOPE=6.0'/1616'=0.37%

WATERSHED B3 (OUTFALL 3) 24.60 AC.
13.49 AGR AC.
5.62 CLASS "D" SOIL AGR AC.
4.47 WOODED AC.
1.02 CLASS "D" SOIL WOODED AC.

WATERSHED A2 (OUTFALL 2) 22.42 AC.
22.42 AGR AC.

CULVERT A

SHALLOW CONCENTRATED FLOW DIST=2290' ELEV=730.0'–710.0'=20.0' SLOPE=20.0'/2290'=0.87%

SHEET FLOW DIST=100' ELEV=748.5'–746.0'=2.5' SLOPE=2.5'/100'=2.5%

SHALLOW CONCENTRATED FLOW DIST=825' ELEV=746.0'–730.0'=16.0' SLOPE=16.0'/825'=1.9%

SHALLOW CONCENTRATED FLOW DIST=239' ELEV=723.1'–713.0'=10.1' SLOPE=10.1'/239'=4.23%

SHEET FLOW (OFFSITE) DIST=100' ELEV=751.0'–748.8'=2.2' SLOPE=2.2'/100'=2.2%

SHALLOW CONCENTRATED FLOW (OFFSITE) DIST=16' ELEV=748.8'–748.5'=0.3' SLOPE=0.3'/16'=1.9%

WATERSHED J (OUTFALL 4) 7.98 AC.
7.28 AC. LOT AC.
0.70 WOODED AC.

WATERSHED I (OUTFALL 3) 0.12 AC.
0.12 WOODED AC.

WATERSHED H (OUTFALL 2) 0.15 AC.
0.15 WOODED AC.

SHEET FLOW DIST=100' ELEV=723.3'–723.2'=0.1' SLOPE=0.1'/100'=0.1%

SHEET FLOW (OFFSITE) DIST=59' ELEV=723.3'–723.0'=0.3' SLOPE=0.3'/59'=0.51%

SHALLOW CONCENTRATED FLOW DIST=3252' ELEV=714.0'–707.4'=6.6' SLOPE=6.6'/3252'=0.20%

WATERSHED F EXISTING PASS-THROUGH 38.63 AC.
3.19 AC. LOT AC.
16.90 GRASS AC.
2.42 CLASS "D" SOIL GRASS AC.
11.41 WOODED AC.
1.47 CLASS "D" SOIL WOODED AC.
3.24 WETLAND AC.
ONSITE 0.00 AC.
OFFSITE 38.63 AC.

SHALLOW CONCENTRATED FLOW DIST=1555' ELEV=723.6'–714.0'=9.3' SLOPE=9.3'/1555'=0.62%

MATCHLINE (THIS SHEET)

MATCHLINE (THIS SHEET)

TRIBUTARY BOUNDARY

SHEET FLOW DIST=100' ELEV=726.5'–723.6'=2.9' SLOPE=2.9'/100'=2.9%

LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING EASEMENT
- EXISTING SUBJECT PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING RIGHT-OF-WAY
- EXISTING CENTERLINE
- EXISTING EDGE OF PAVEMENT
- EXISTING WATER BODY
- EXISTING FEMA FLOODWAY
- EXISTING FEMA FLOODPLAIN
- EXISTING FEMA ZONE "X"
- EXISTING DRAINAGE SWALE
- EXISTING WETLAND
- EXISTING SANITARY SEWER LINE
- EXISTING SANITARY MANHOLE
- EXISTING STORM SEWER LINE
- EXISTING STORM STRUCTURE
- EXISTING WATER LINE
- EXISTING FIRE HYDRANT

FEMA NOTE

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD INSURANCE RATE MAP NO. 39049C0408K (DATED JUNE 17, 2008), A PORTION OF THE SUBJECT TRACT SHOWN HEREON LIES WITHIN ZONE AE.

ZONE X – AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

ZONE "X" – AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH THE DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD.

ZONE AE – THE 1% ANNUAL CHANCE FLOOD (100 YEAR FLOOD), ALSO KNOW AS THE BASE FLOOD, IS THE FLOOD THAT HAS A 1% CHANCE OF BEING EQUALED OR EXCEED IN ANY GIVEN YEAR. THE SPECIAL FLOOD HAZARD AREA IS THE AREA SUBJECT TO FLOODING BY THE 1% ANNUAL CHANCE FLOOD. BASE FLOOD ELEVATIONS HAVE BEEN DETERMINED IN THIS AREA.

REFERENCES

1. EXISTING TOPOGRAPHY SHOWN OBTAINED FROM SURVEY PERFORMED BY CEC FEBRUARY, 2018.
2. EXISTING BASE MAP INFORMATION OBTAINED FROM FRANKLIN COUNTY AUDITORS ACCESSED NOVEMBER 2017, AND SURVEY COMPLETED BY CEC IN FEBRUARY 2018.

REVISION RECORD

NO	DATE	DESCRIPTION

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GRAND COMMUNITIES, LLC.
FARMSTEAD
CITY OF GROVE CITY
FRANKLIN COUNTY, OHIO

PRE-DEVELOPMENT TRIBUTARY MAP

DATE:	SEPTEMBER 2019
DRAWN BY:	TJV
DWG SCALE:	1" = 200'
CHECKED BY:	
PROJECT NO:	174-158
APPROVED BY:	DRAFT

DRAWING NO.:

SWM-1

SHEET 1 OF 3

\\Srv—columbus\projects\2017\174–158\–CAD\Dwg\Exhibits\Tributary Maps\Phase 1&2\174158–SWM1–Pre Development Tributary Maps.dwg[LAYOUT1] LS:[10/29/2019 – jhammond] – LY: 10/29/2019 8:39 AM

Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

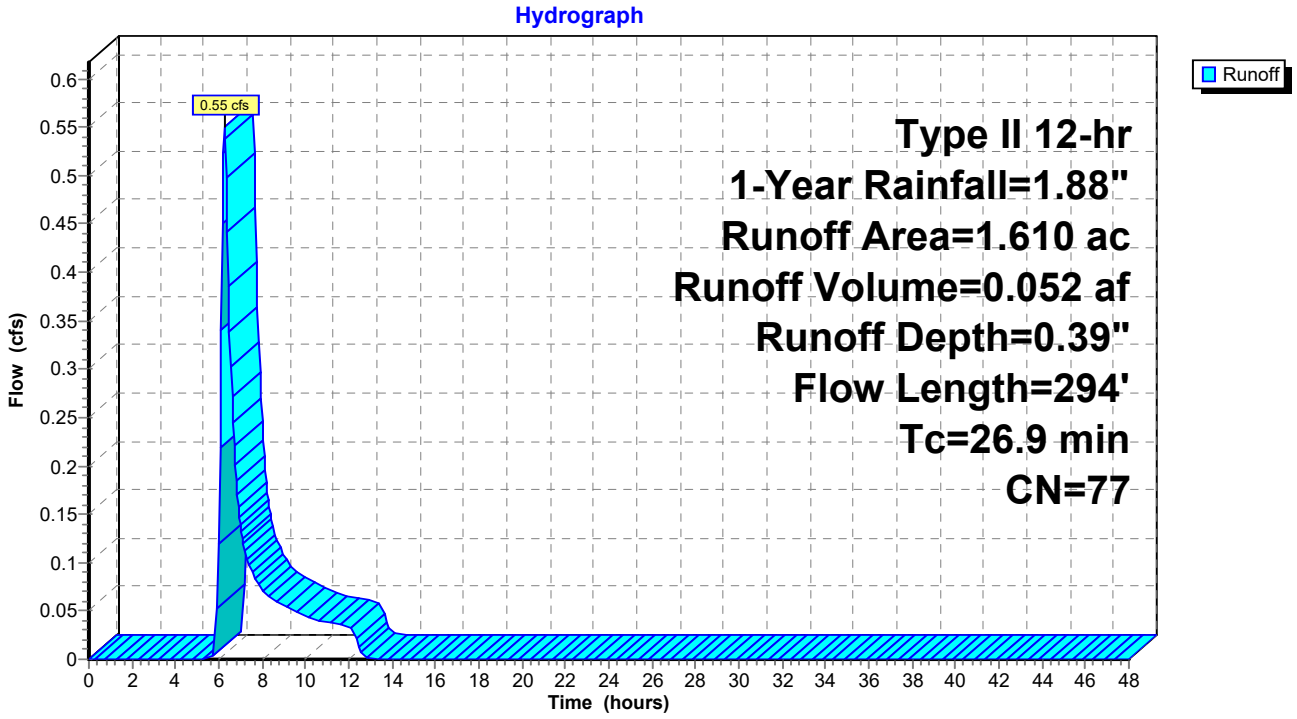
Runoff = 0.55 cfs @ 6.26 hrs, Volume= 0.052 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 1-Year Rainfall=1.88"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

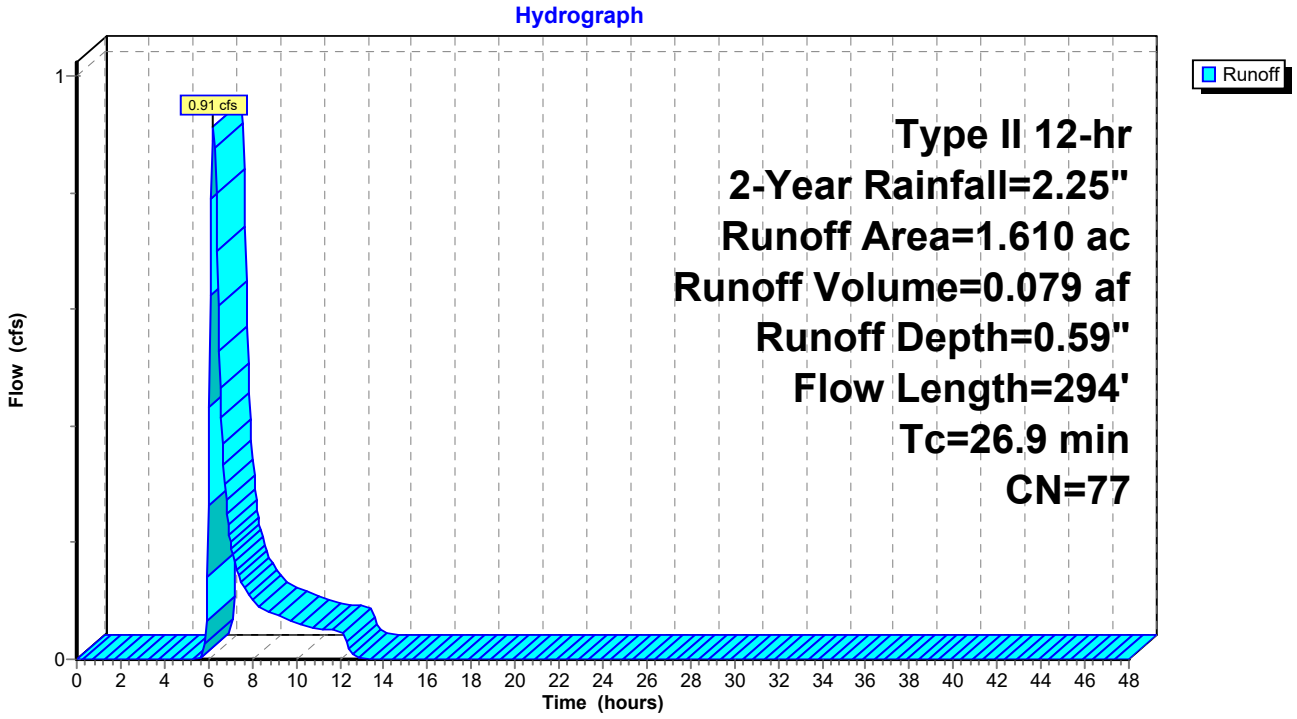
Runoff = 0.91 cfs @ 6.24 hrs, Volume= 0.079 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 2-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

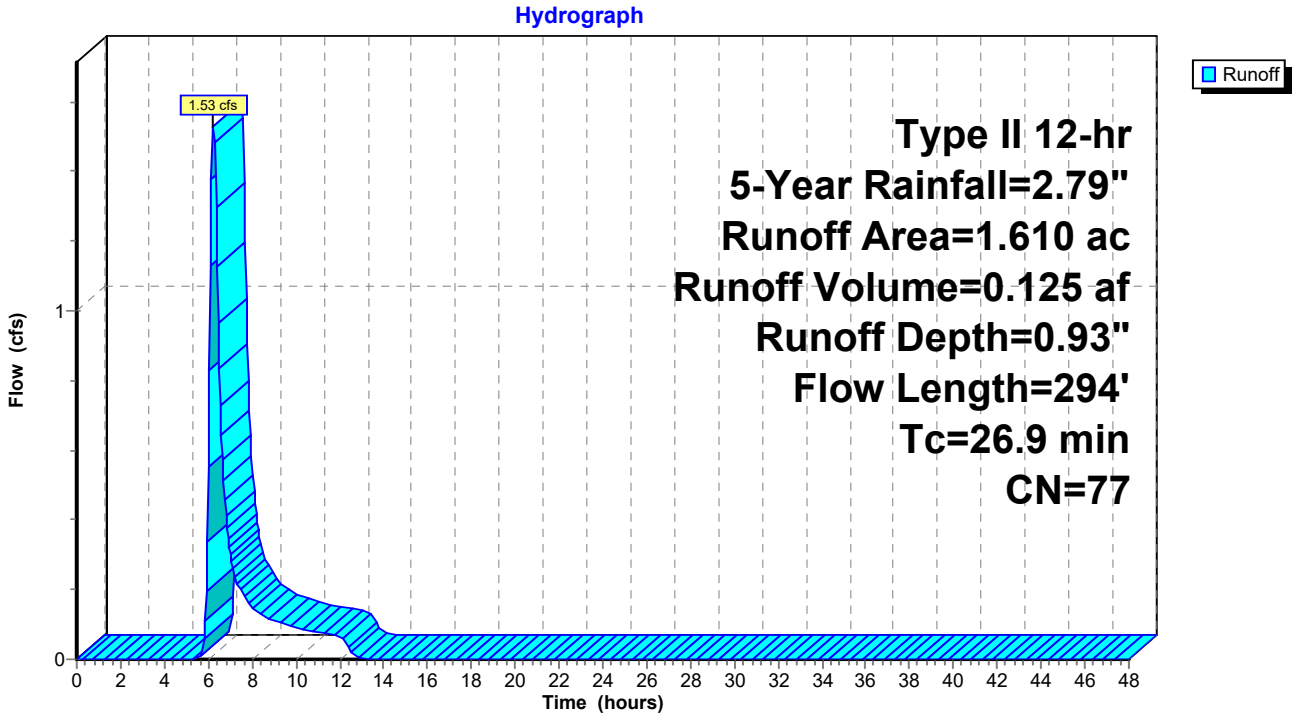
Runoff = 1.53 cfs @ 6.23 hrs, Volume= 0.125 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 5-Year Rainfall=2.79"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

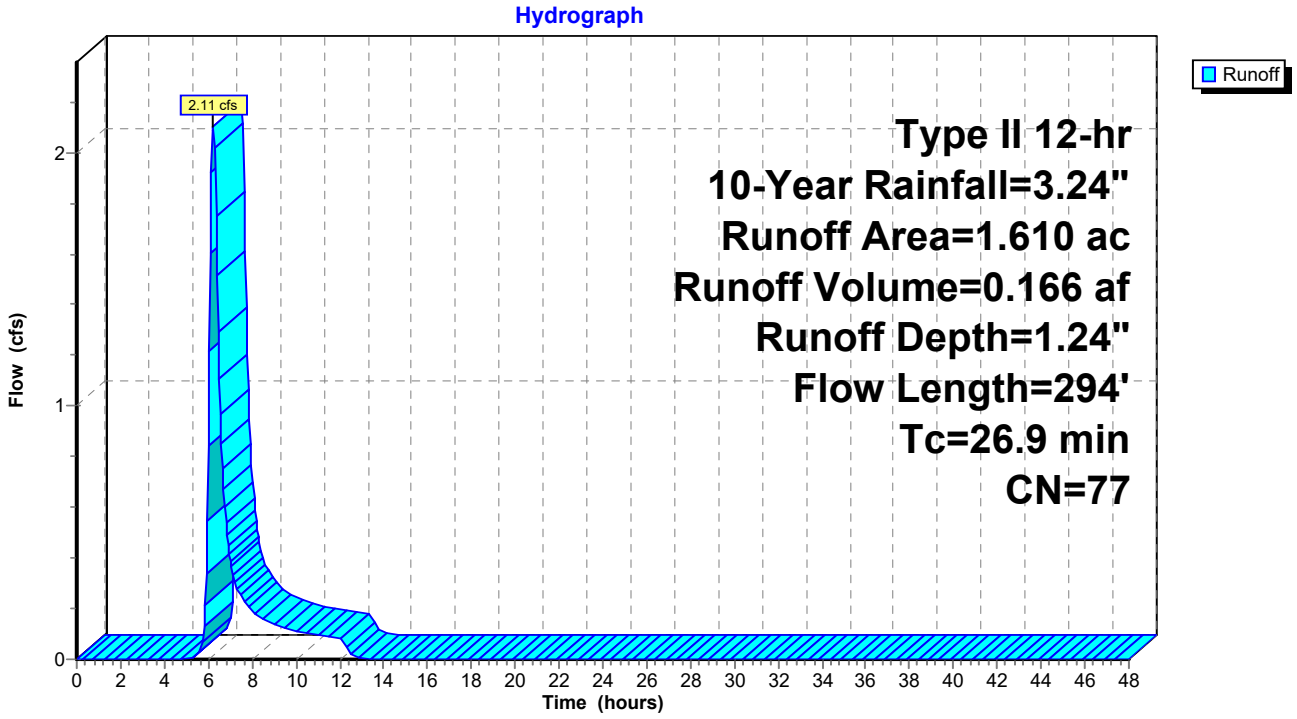
Runoff = 2.11 cfs @ 6.22 hrs, Volume= 0.166 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 10-Year Rainfall=3.24"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

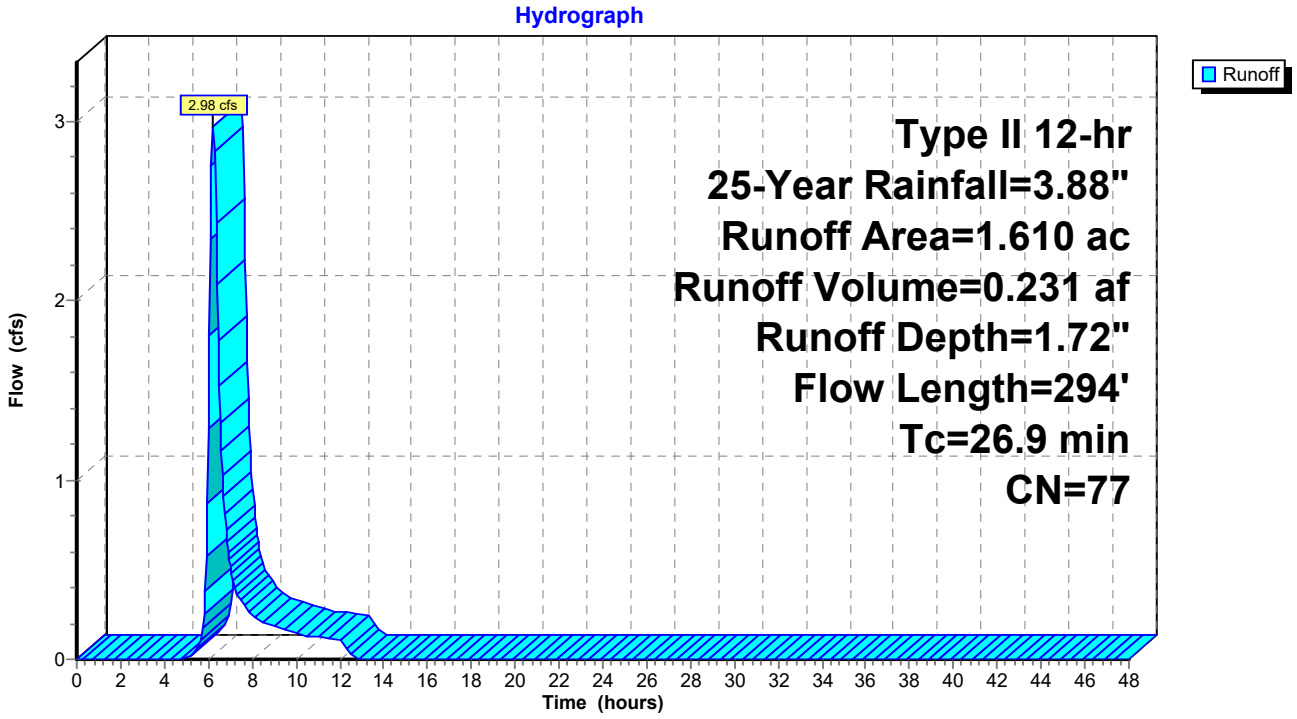
Runoff = 2.98 cfs @ 6.22 hrs, Volume= 0.231 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 25-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

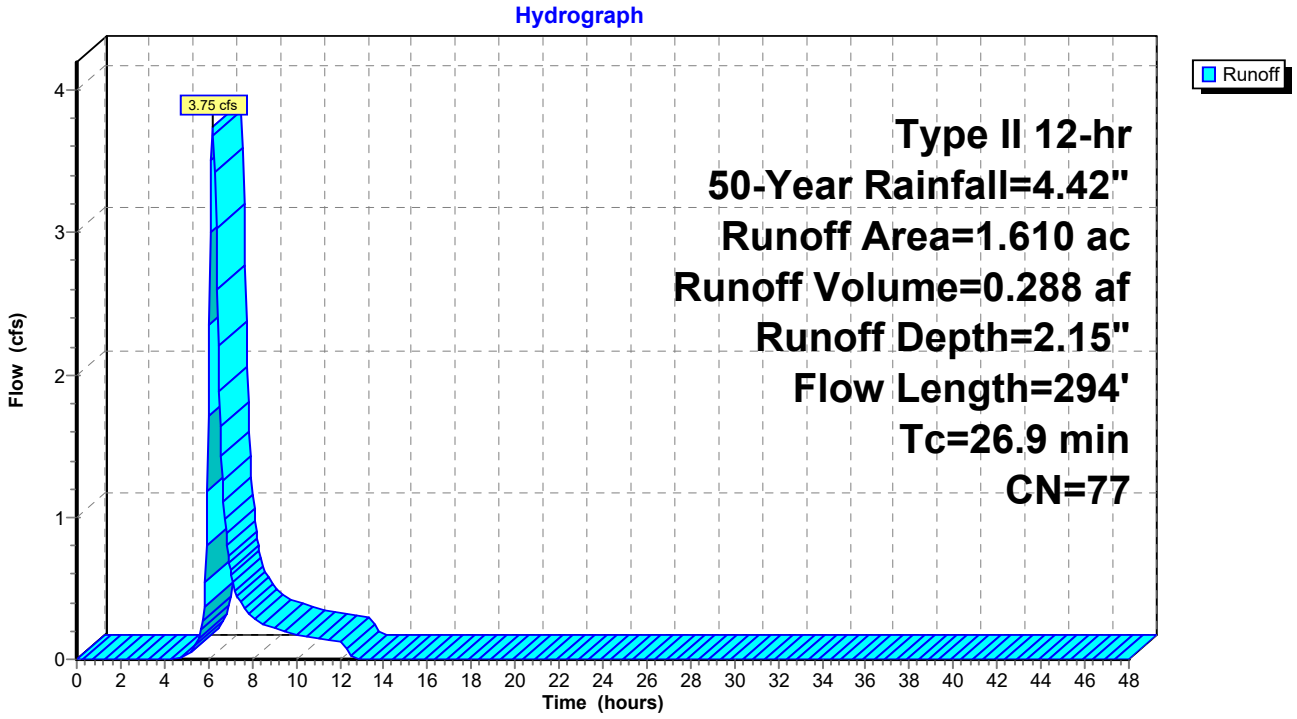
Runoff = 3.75 cfs @ 6.22 hrs, Volume= 0.288 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 50-Year Rainfall=4.42"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)

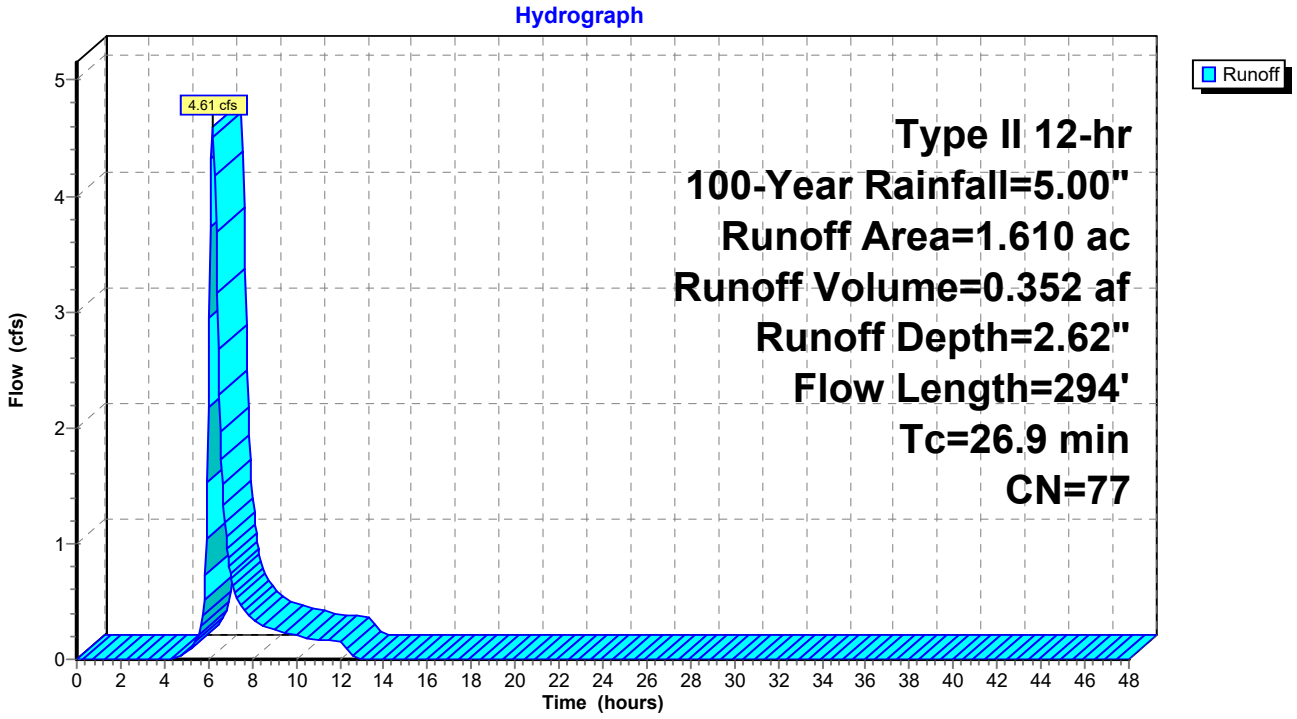
Runoff = 4.61 cfs @ 6.21 hrs, Volume= 0.352 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 100-Year Rainfall=5.00"

	Area (ac)	CN	Description
*	1.610	77	Row crops, straight row, Good, HSG C
	1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	100	0.0070	0.09		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
8.7	194	0.0017	0.37		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.9	294	Total			

Subcatchment XWA-A1: Ex. Watershed A1 (Outfall 1)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

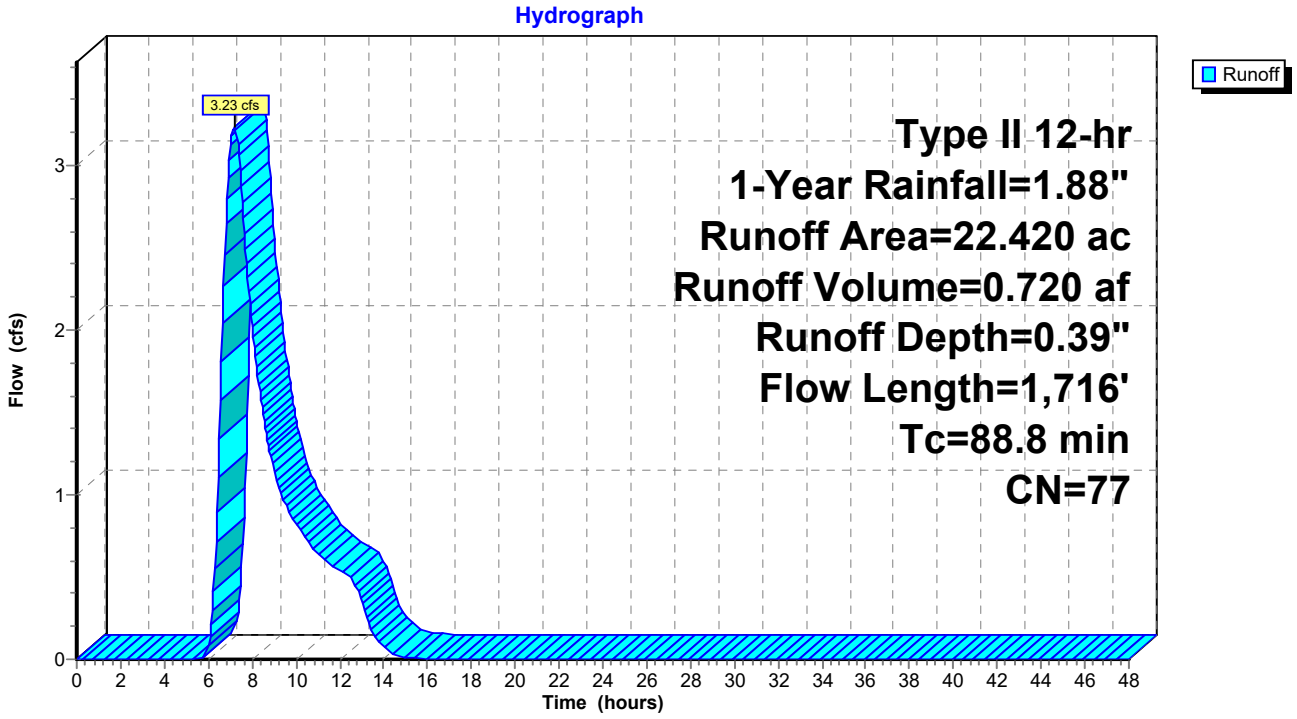
Runoff = 3.23 cfs @ 7.19 hrs, Volume= 0.720 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 1-Year Rainfall=1.88"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

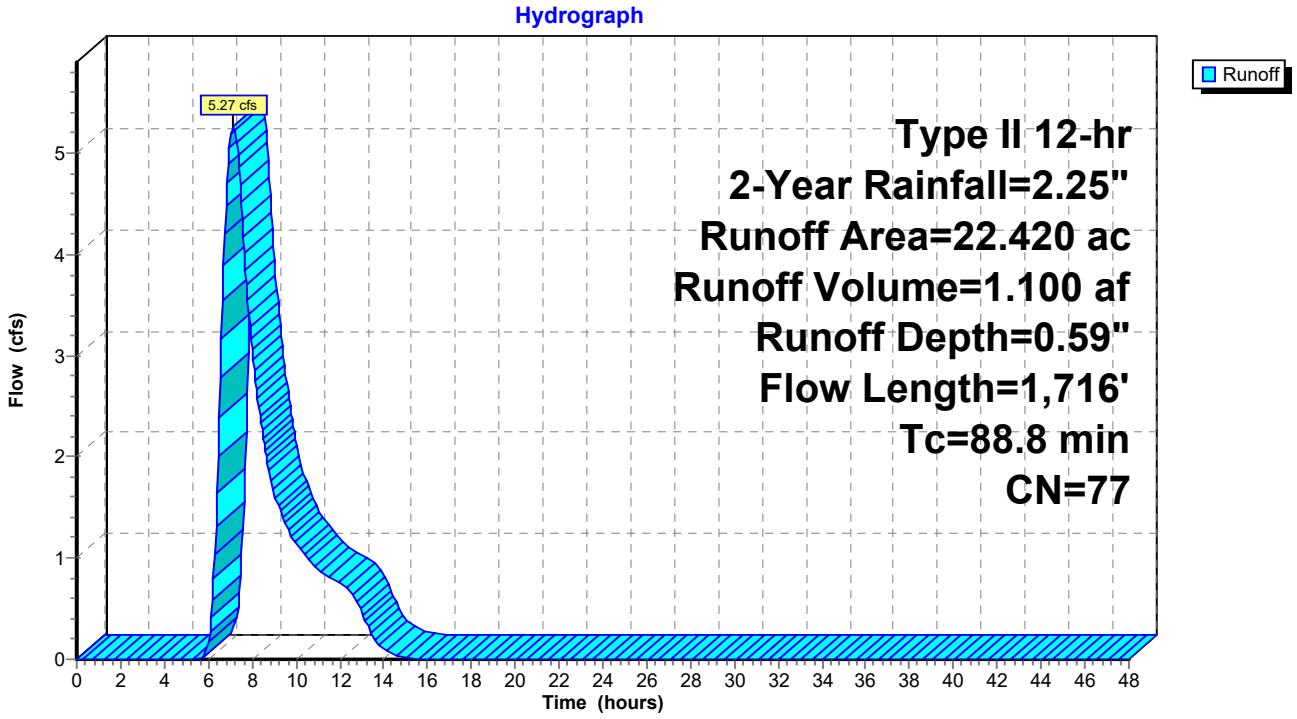
Runoff = 5.27 cfs @ 7.12 hrs, Volume= 1.100 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 2-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

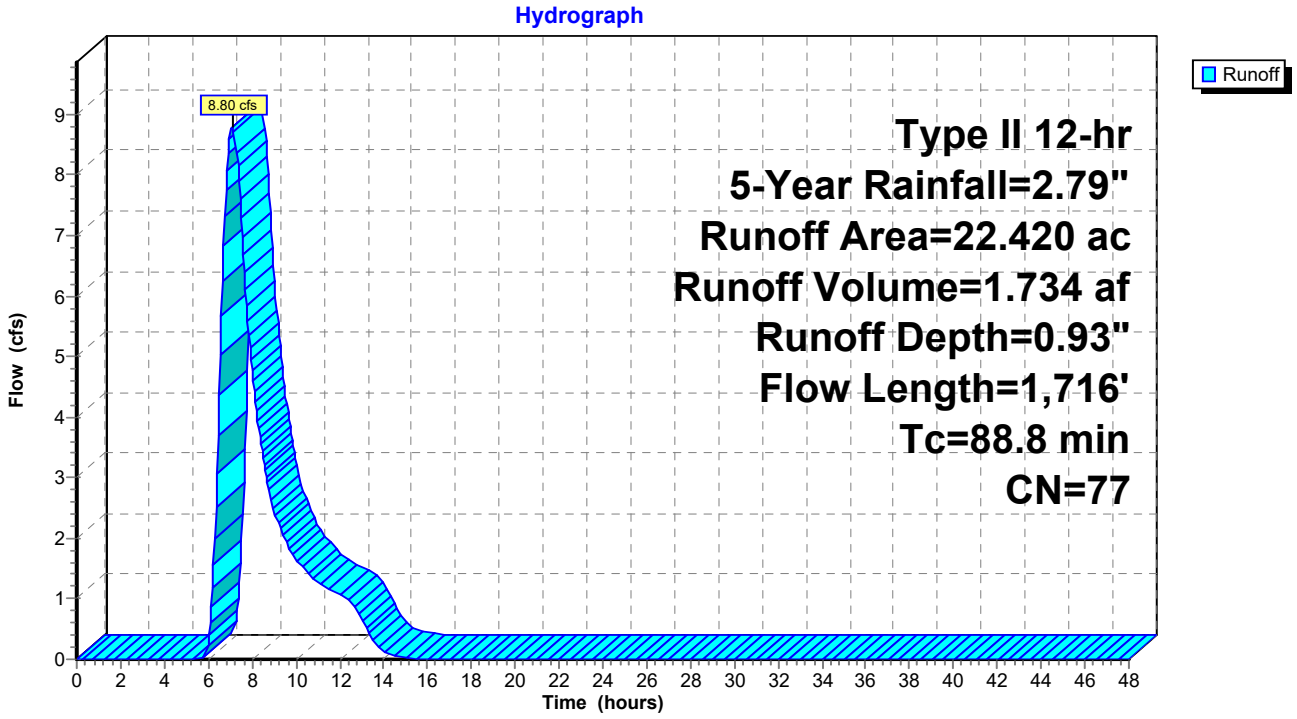
Runoff = 8.80 cfs @ 7.08 hrs, Volume= 1.734 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 5-Year Rainfall=2.79"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

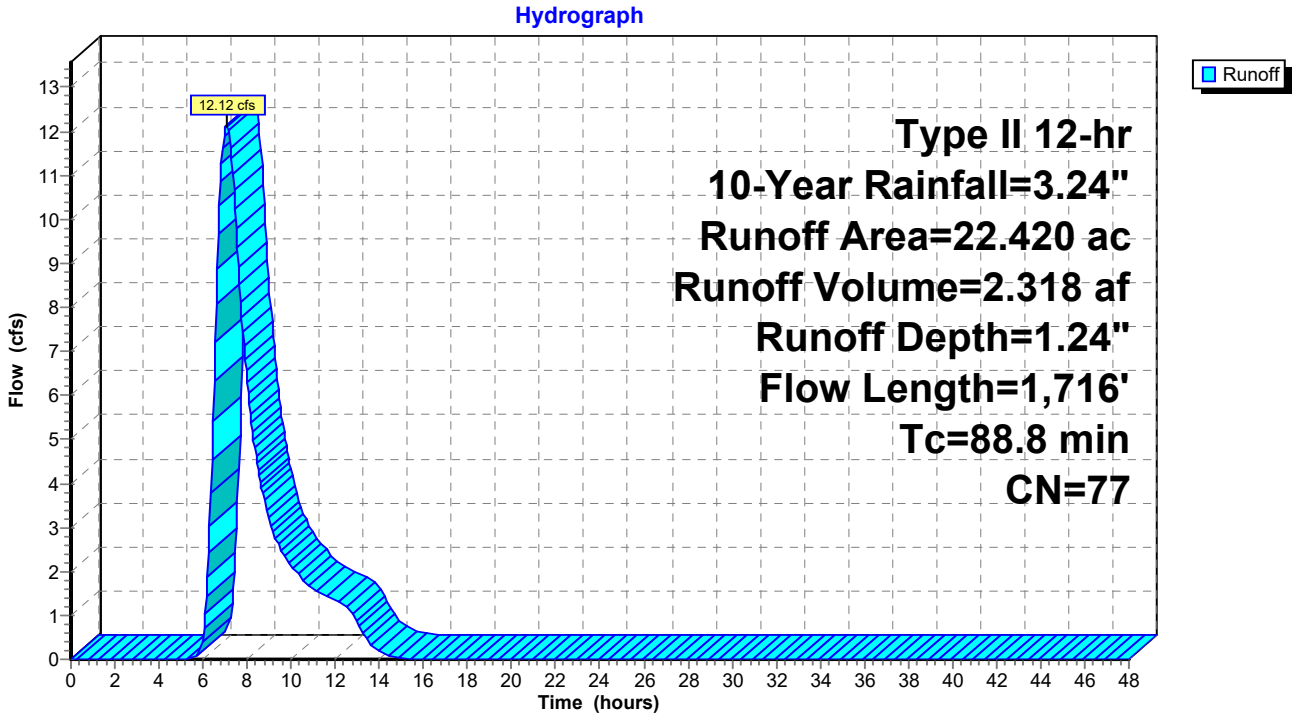
Runoff = 12.12 cfs @ 7.05 hrs, Volume= 2.318 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 10-Year Rainfall=3.24"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

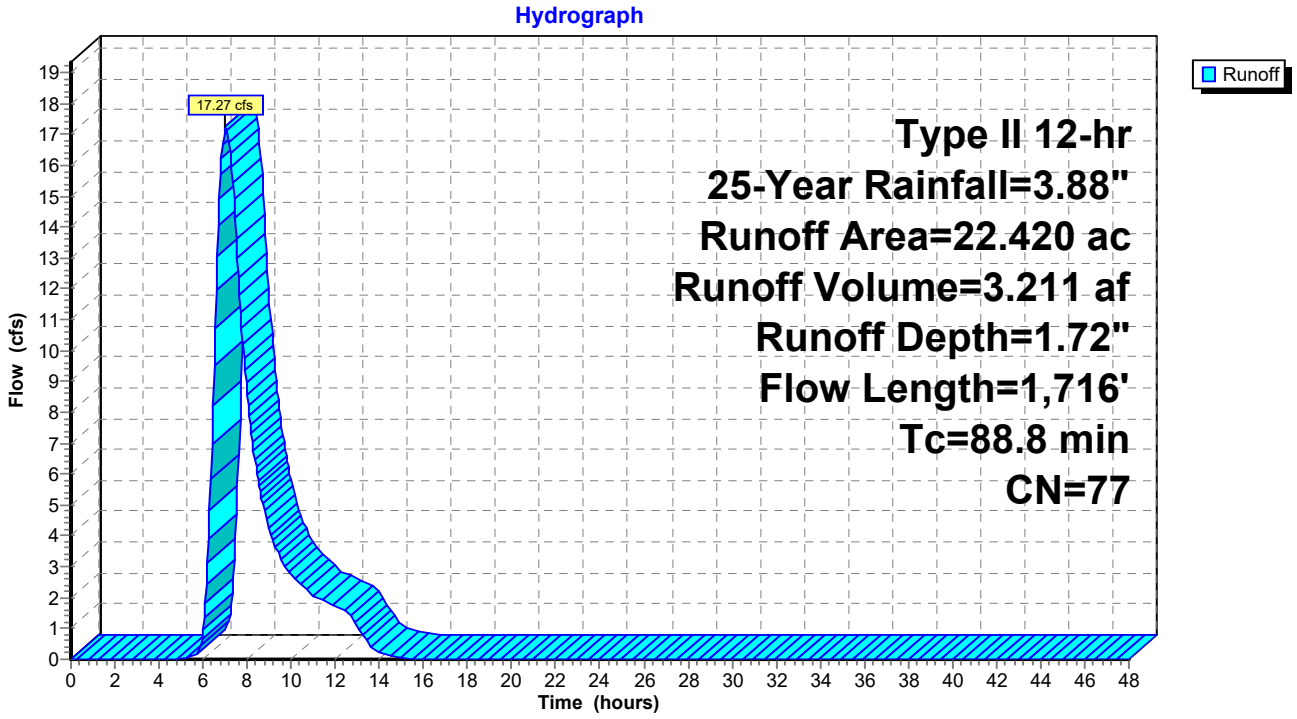
Runoff = 17.27 cfs @ 7.02 hrs, Volume= 3.211 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 25-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

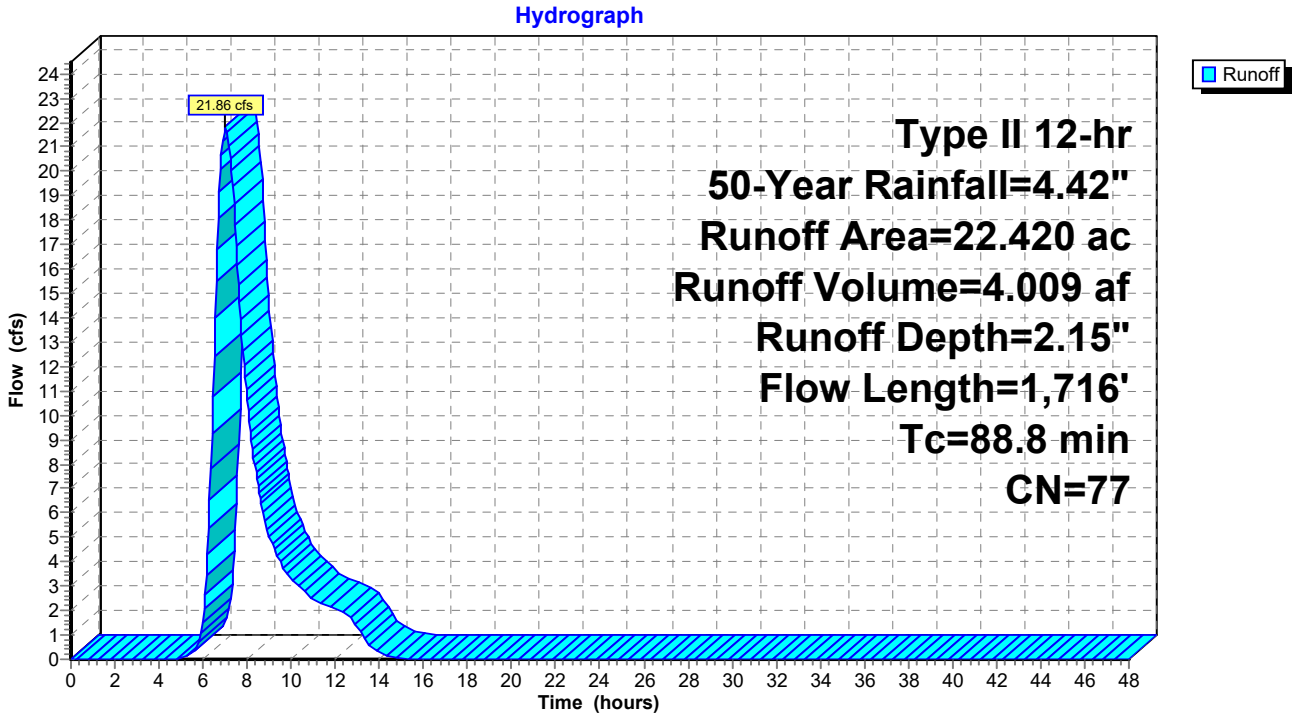
Runoff = 21.86 cfs @ 7.02 hrs, Volume= 4.009 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 50-Year Rainfall=4.42"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)

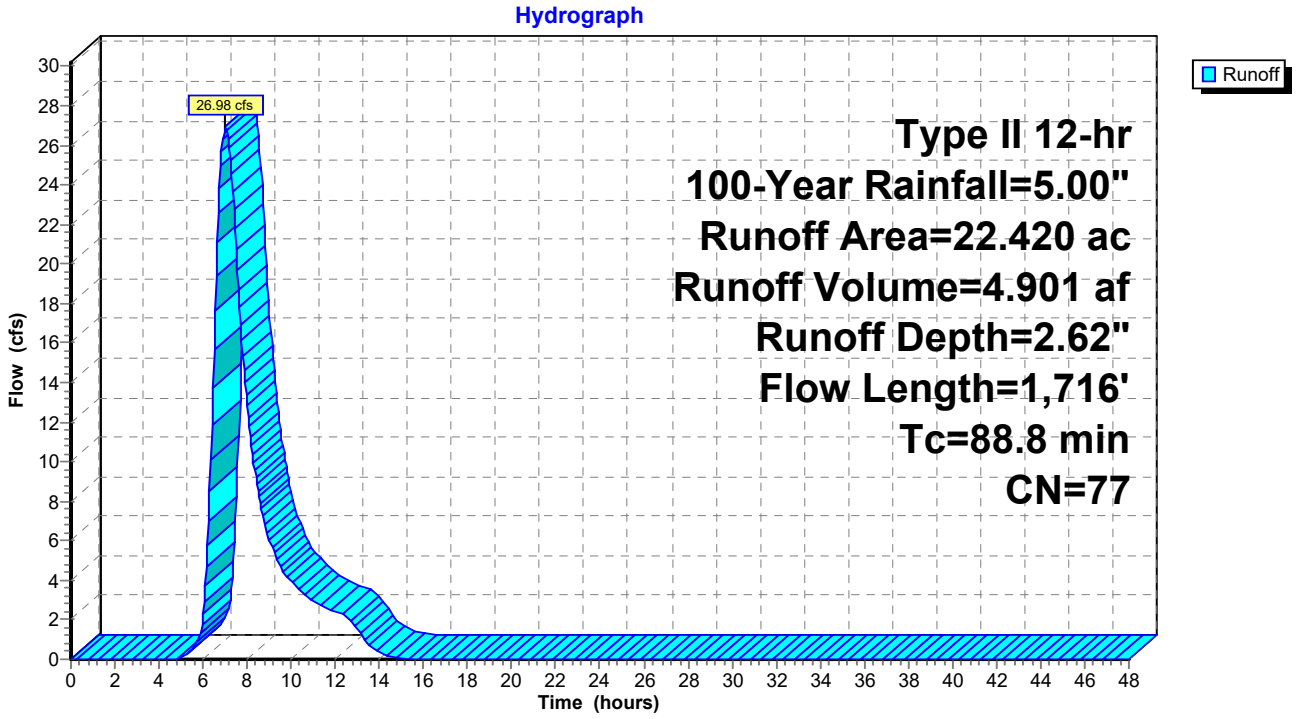
Runoff = 26.98 cfs @ 7.01 hrs, Volume= 4.901 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 100-Year Rainfall=5.00"

	Area (ac)	CN	Description
*	22.420	77	Row crops, straight row, Good, HSG C
	22.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.6	100	0.0010	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
49.2	1,616	0.0037	0.55		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
88.8	1,716	Total			

Subcatchment XWA-A2: Ex. Watershed A2 (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

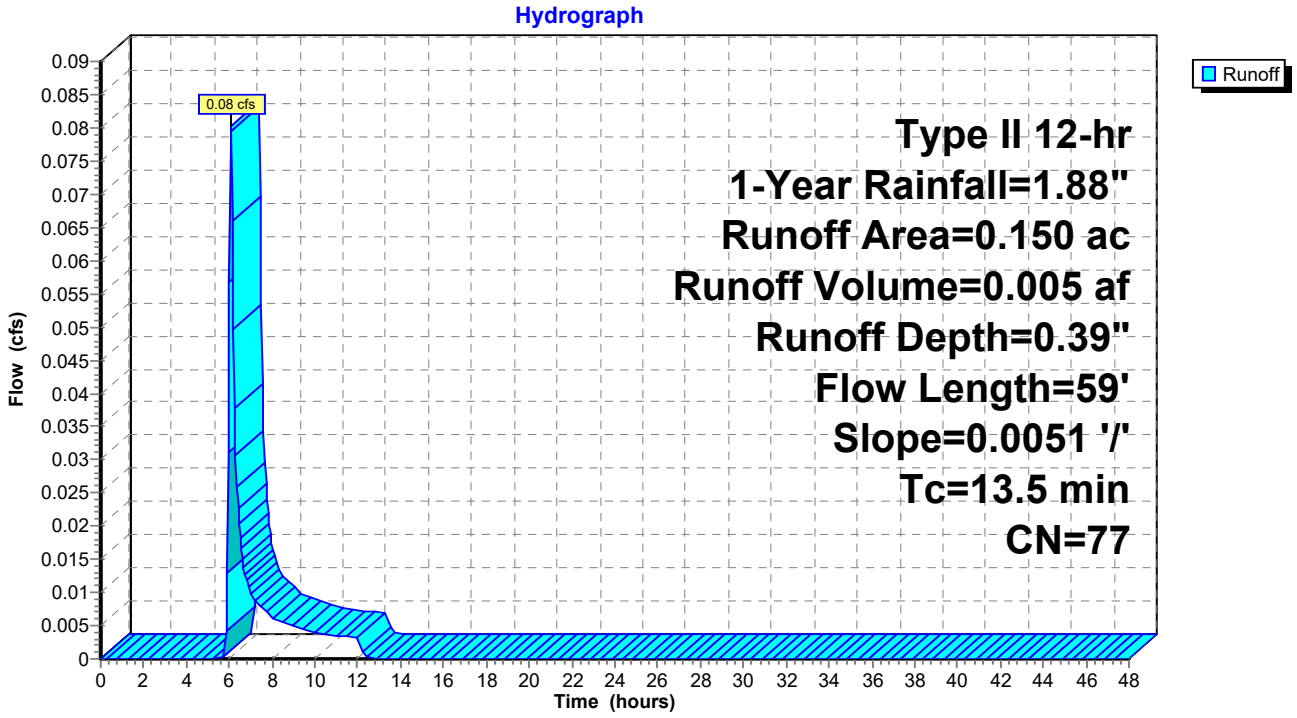
Runoff = 0.08 cfs @ 6.08 hrs, Volume= 0.005 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 1-Year Rainfall=1.88"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

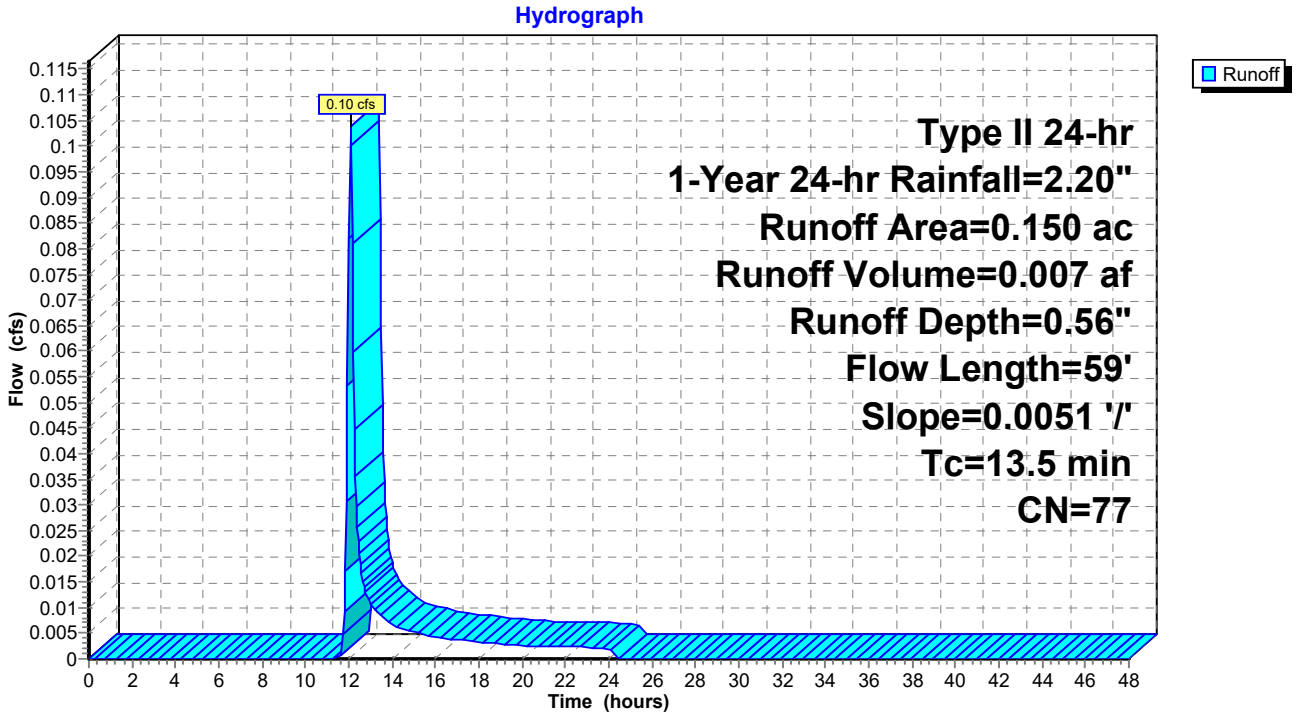
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year 24-hr Rainfall=2.20"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

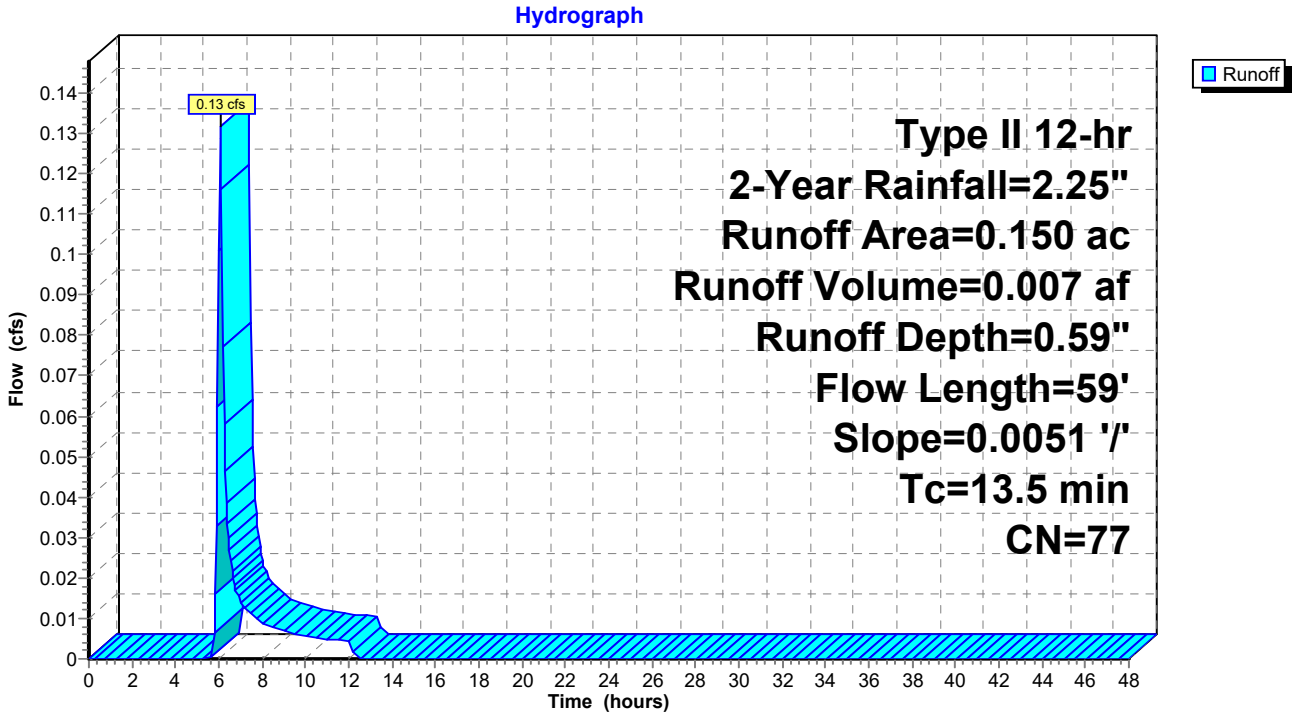
Runoff = 0.13 cfs @ 6.07 hrs, Volume= 0.007 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 2-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

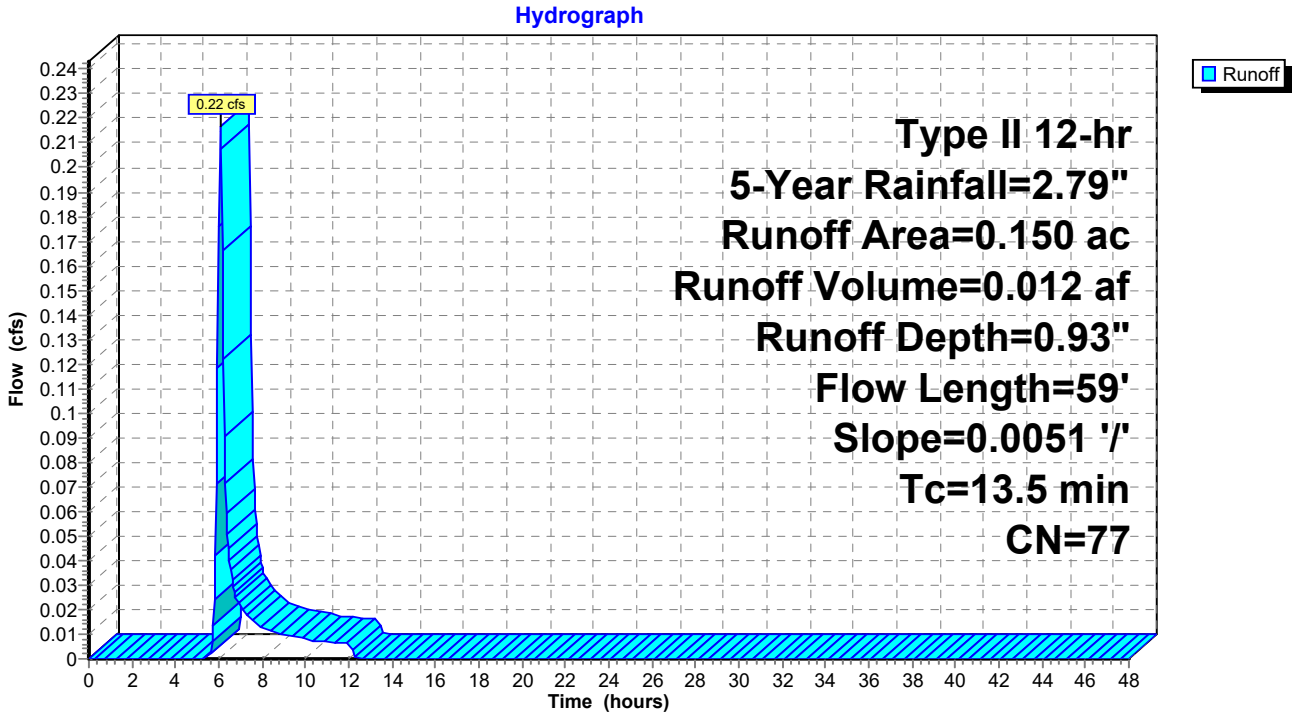
Runoff = 0.22 cfs @ 6.07 hrs, Volume= 0.012 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 5-Year Rainfall=2.79"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

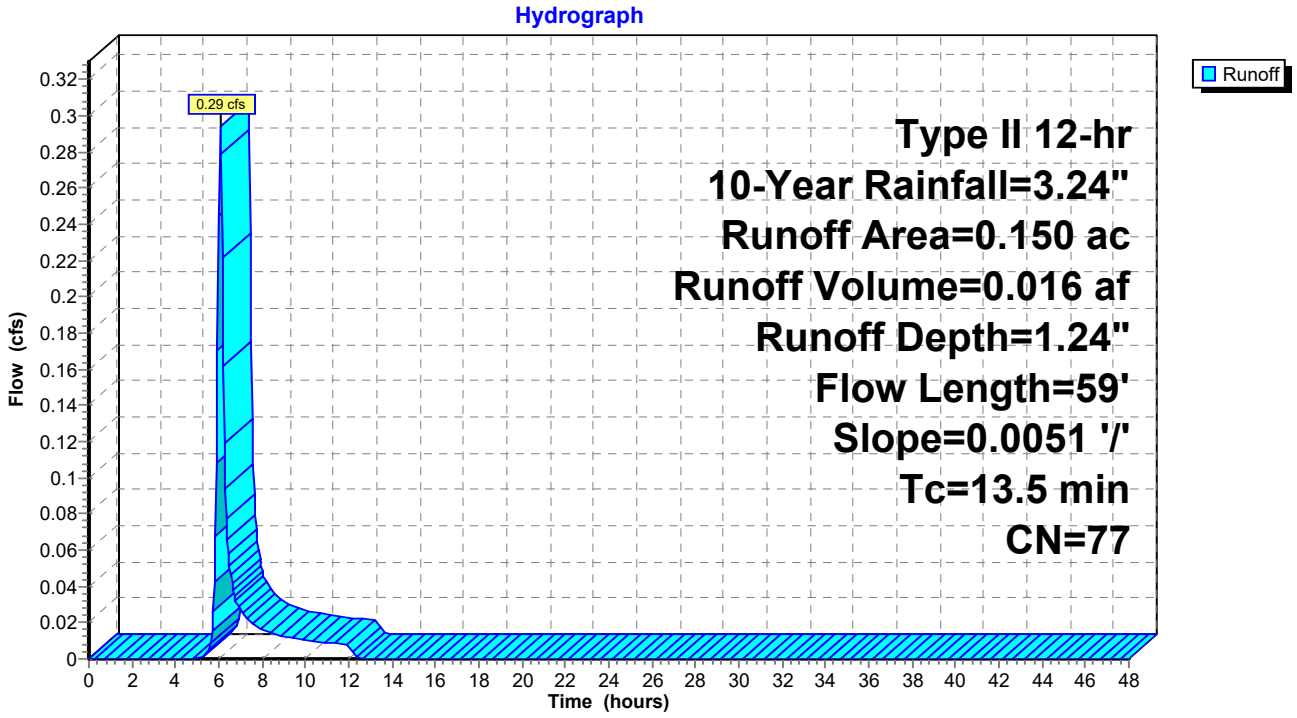
Runoff = 0.29 cfs @ 6.06 hrs, Volume= 0.016 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 10-Year Rainfall=3.24"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

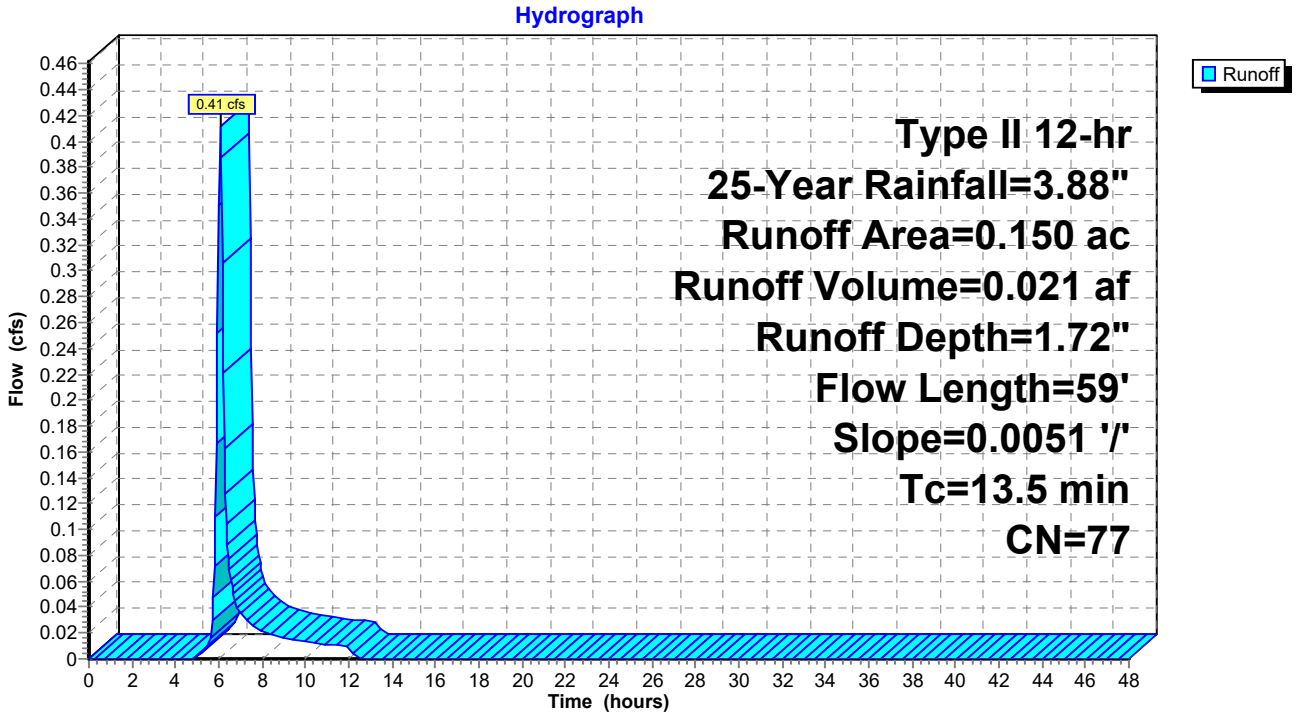
Runoff = 0.41 cfs @ 6.06 hrs, Volume= 0.021 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 25-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

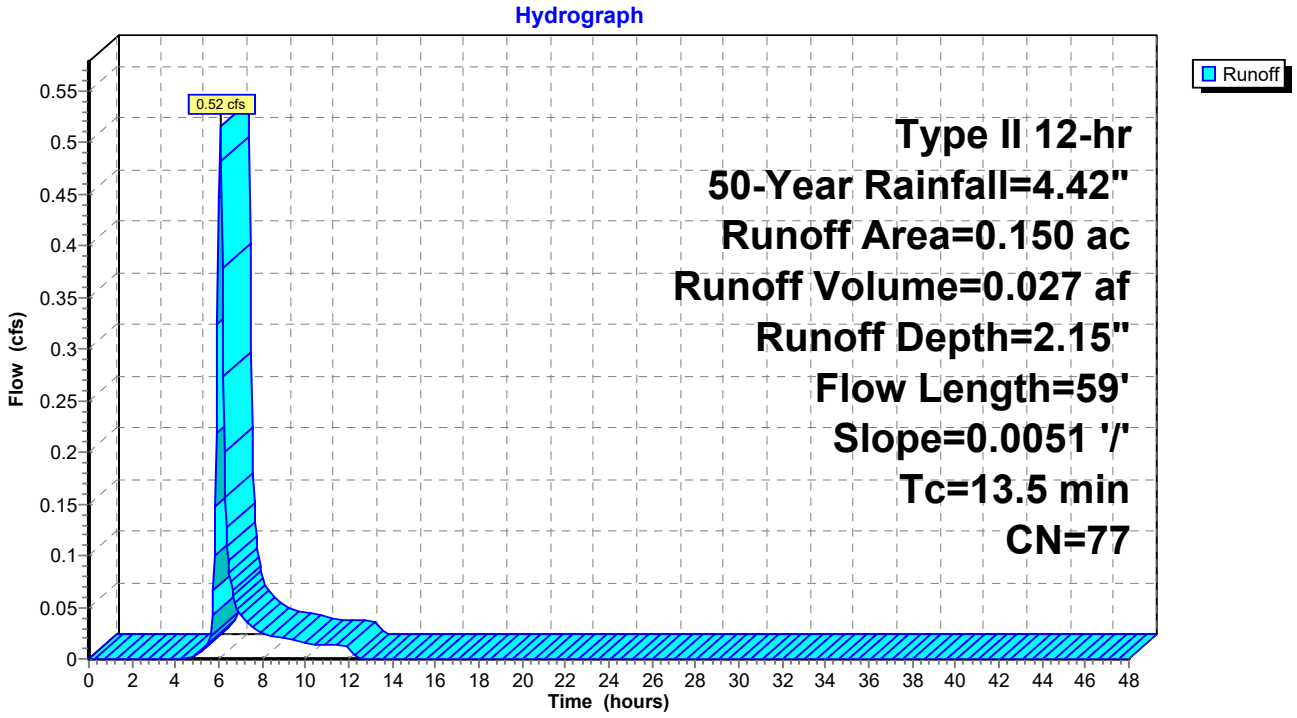
Runoff = 0.52 cfs @ 6.06 hrs, Volume= 0.027 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 50-Year Rainfall=4.42"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-H: Ex. Watershed H (Outfall 2)

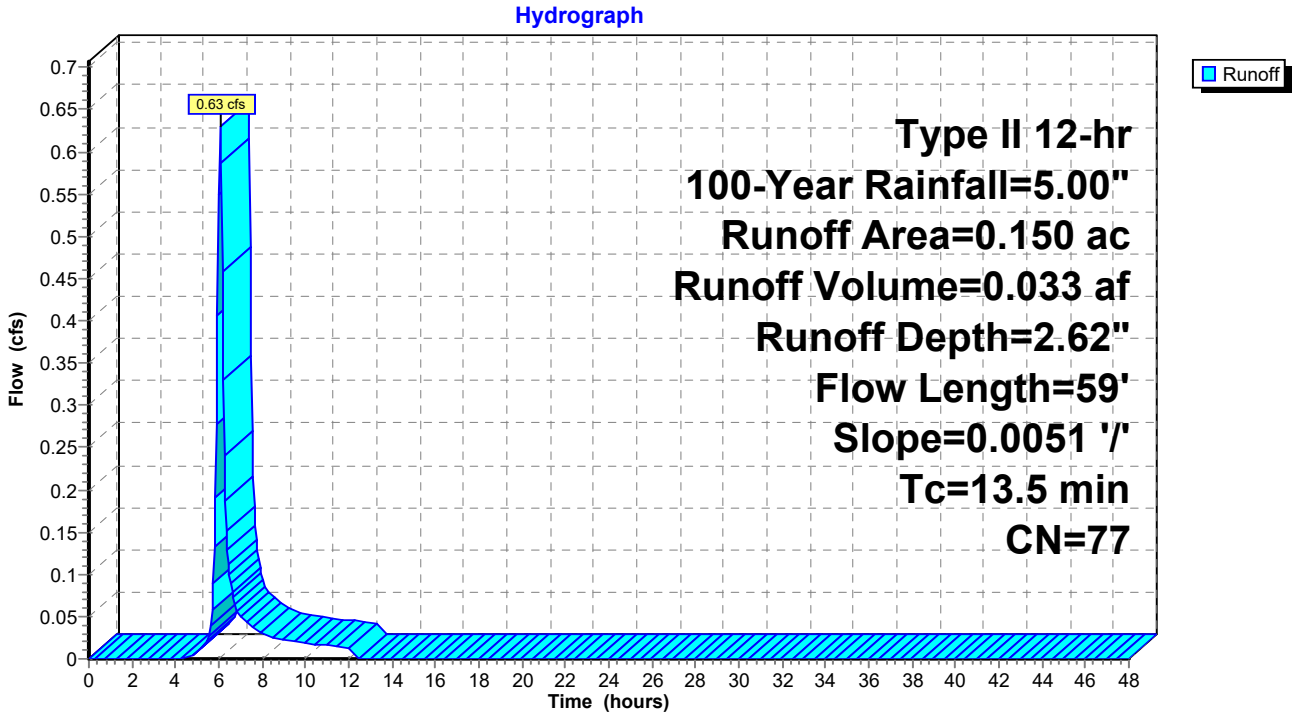
Runoff = 0.63 cfs @ 6.06 hrs, Volume= 0.033 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 100-Year Rainfall=5.00"

	Area (ac)	CN	Description
*	0.150	77	Woods, Fair, HSG C
	0.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	59	0.0051	0.07		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"

Subcatchment XWA-H: Ex. Watershed H (Outfall 2)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

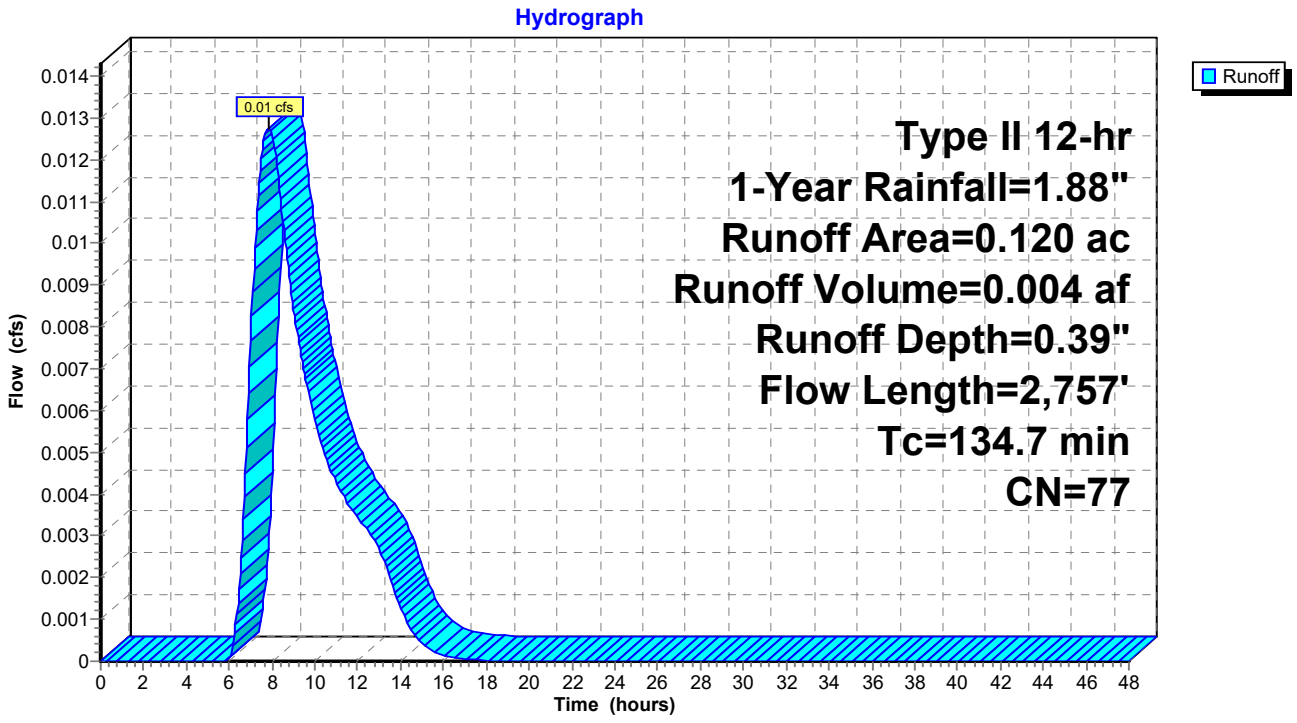
Runoff = 0.01 cfs @ 7.82 hrs, Volume= 0.004 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 1-Year Rainfall=1.88"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

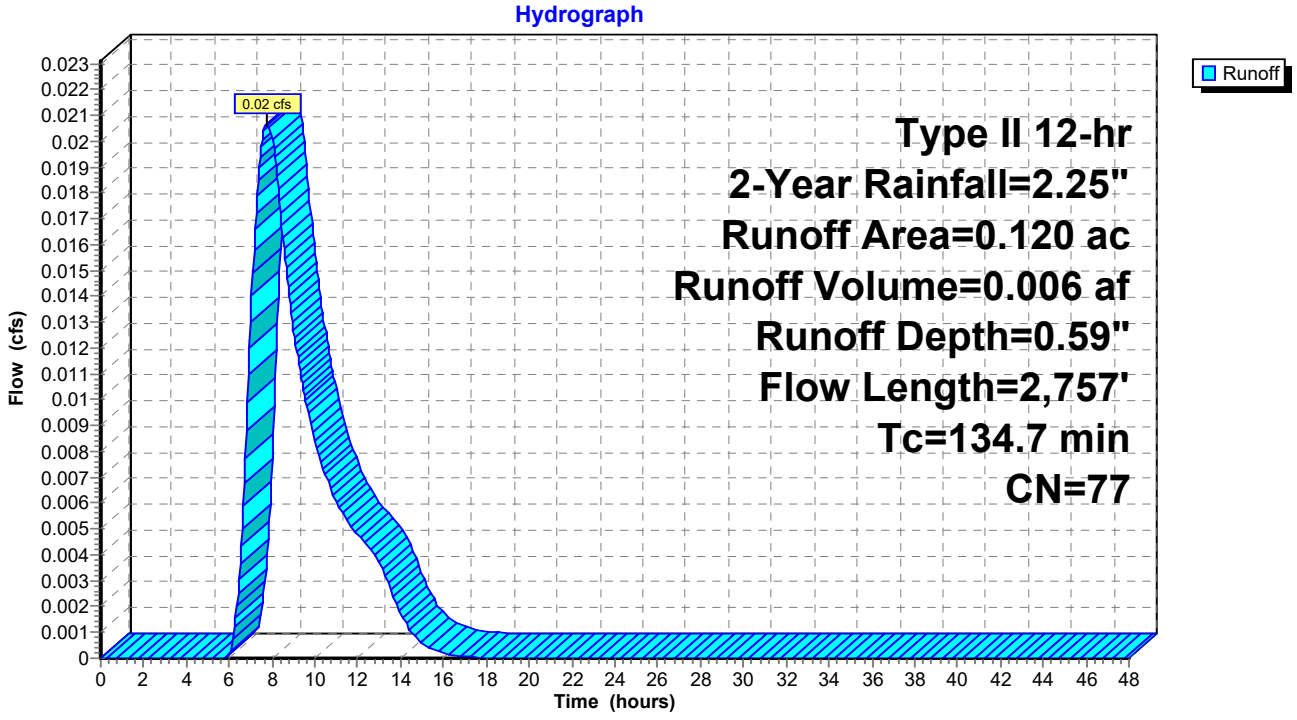
Runoff = 0.02 cfs @ 7.76 hrs, Volume= 0.006 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 2-Year Rainfall=2.25"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

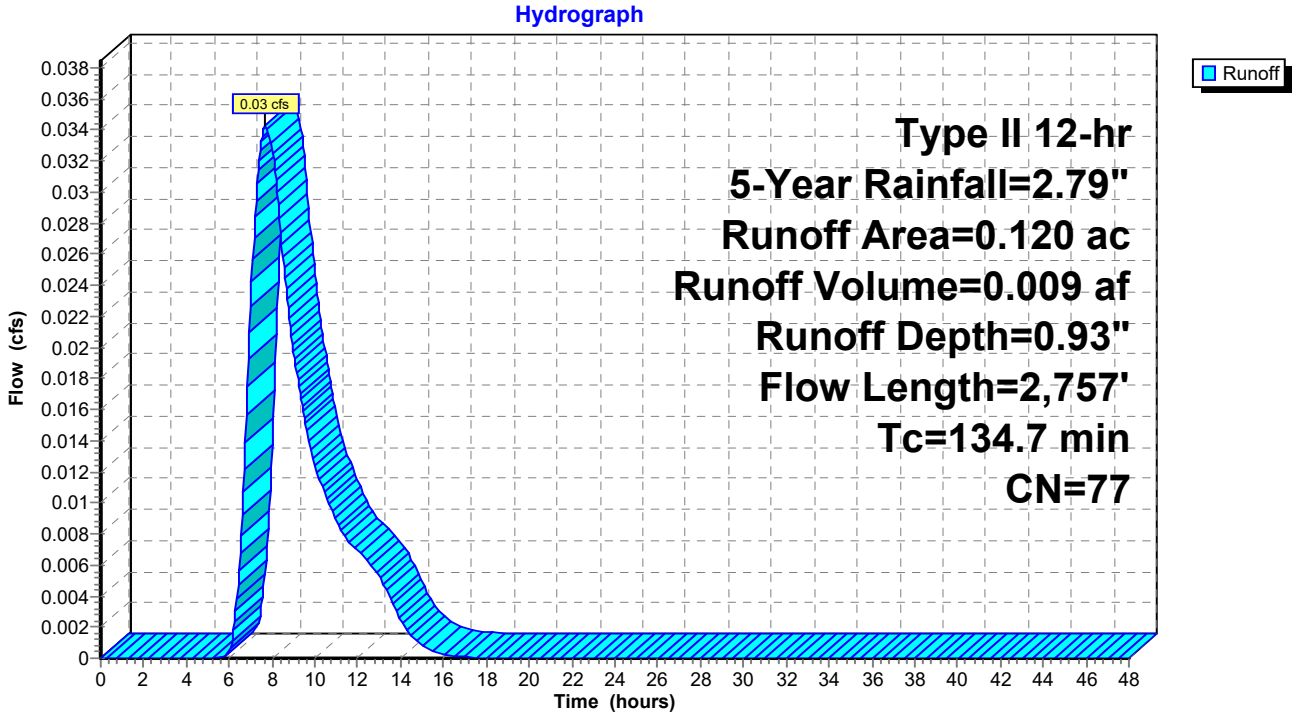
Runoff = 0.03 cfs @ 7.67 hrs, Volume= 0.009 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 5-Year Rainfall=2.79"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

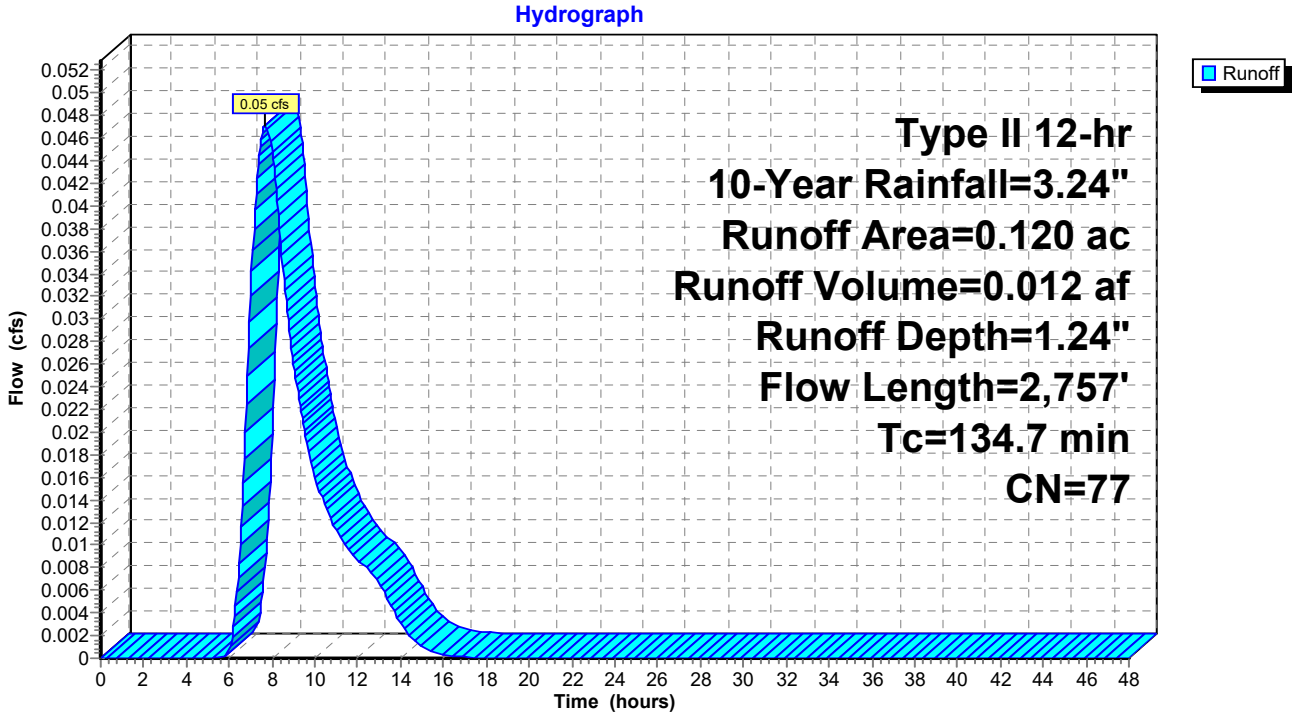
Runoff = 0.05 cfs @ 7.66 hrs, Volume= 0.012 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 10-Year Rainfall=3.24"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

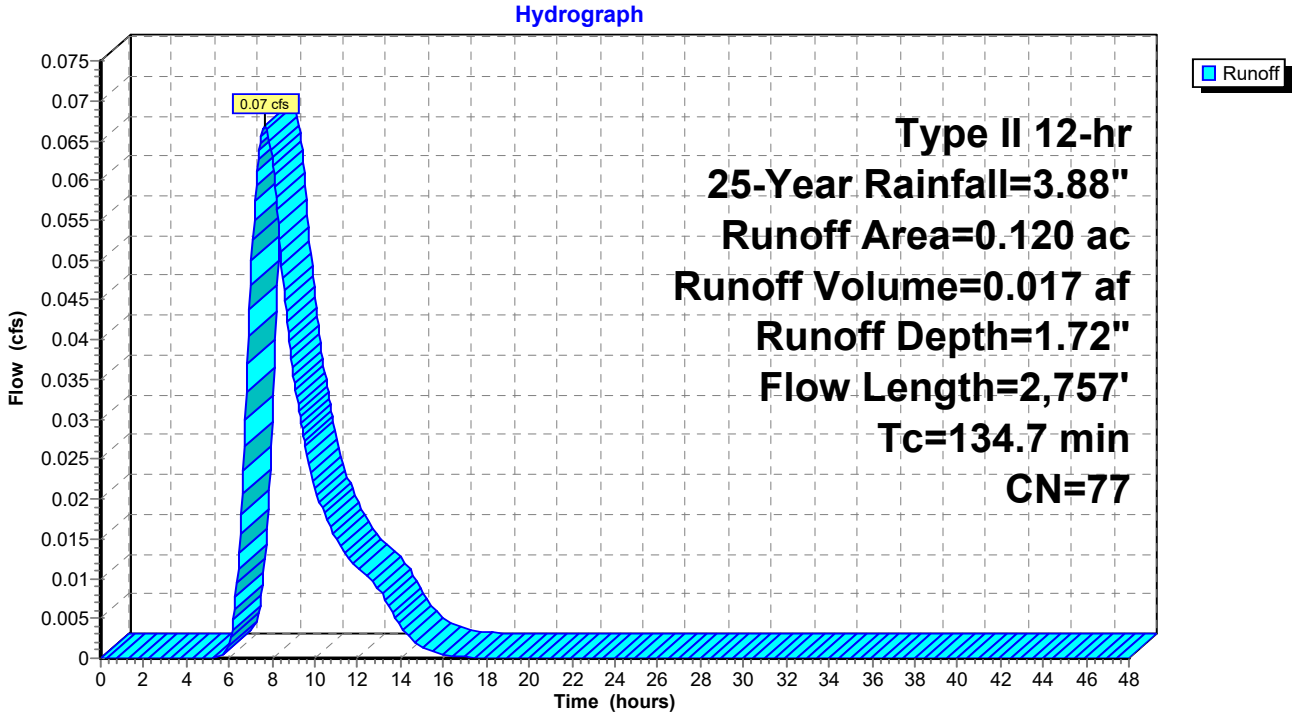
Runoff = 0.07 cfs @ 7.65 hrs, Volume= 0.017 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 25-Year Rainfall=3.88"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

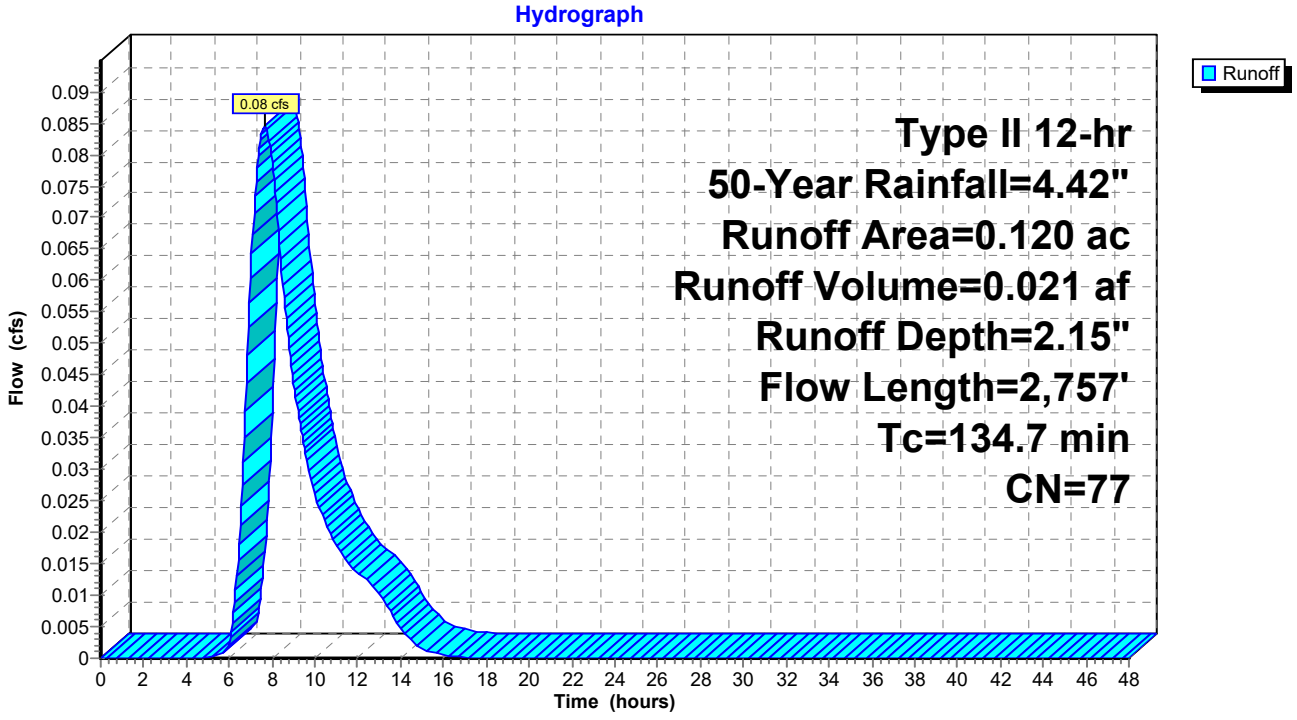
Runoff = 0.08 cfs @ 7.64 hrs, Volume= 0.021 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 50-Year Rainfall=4.42"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



Summary for Subcatchment XWA-I: Ex. Watershed I (Outfall 3)

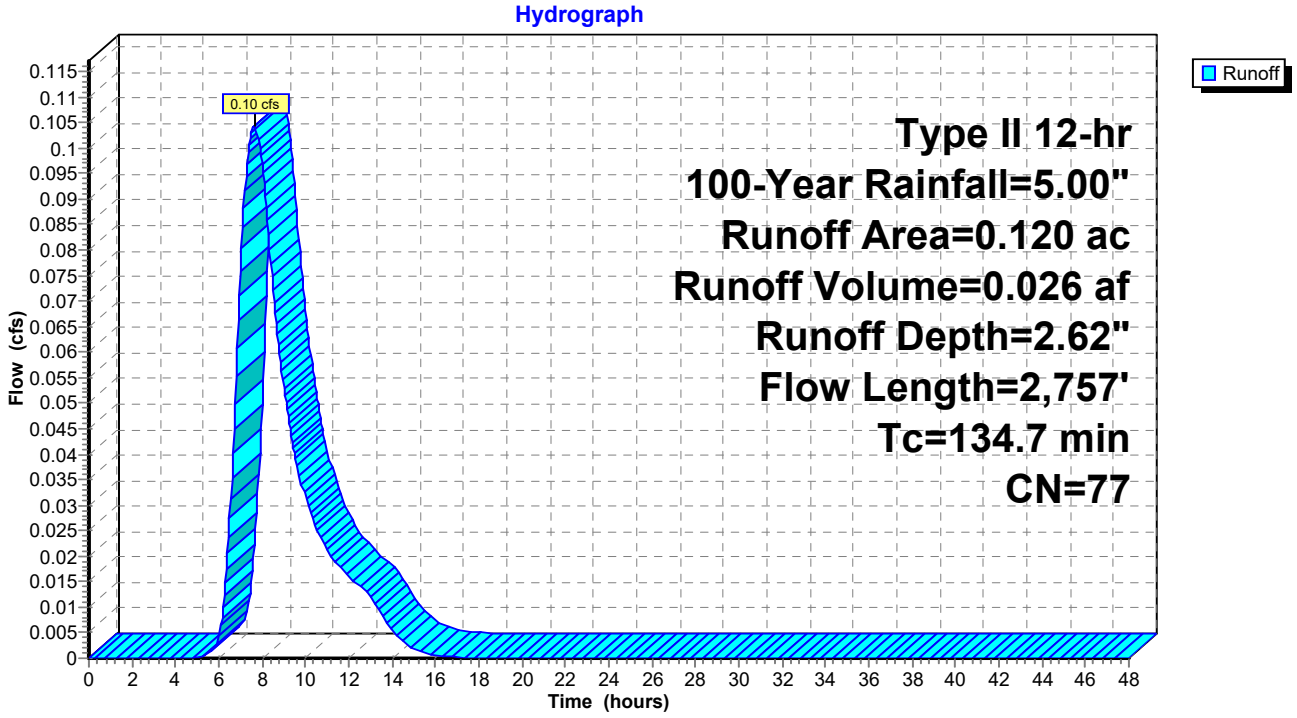
Runoff = 0.10 cfs @ 7.63 hrs, Volume= 0.026 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 100-Year Rainfall=5.00"

	Area (ac)	CN	Description
*	0.120	77	Woods, Fair, HSG C
	0.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	100	0.0180	0.13		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.63"
2.2	239	0.0423	1.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
120.0	2,418	0.0023	0.34		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
134.7	2,757	Total			

Subcatchment XWA-I: Ex. Watershed I (Outfall 3)



APPENDIX B

WATER QUALITY CALCULATIONS

Water Quality Calculations

Farmstead - Sub Area H (CEC 300-277)
Basin Z
4/7/2020

Designed By: JTH
Checked By: TJV

WQv=Rv*P*A/12
WQV= water quality volume in acre-feet
Rv= Volumetric runoff coefficient Rv=0.05+0.9i i=fraction of post construction impervious

RV=	0.36			i=	0.3495
P=	0.9	inch precipitation depth			
A=	18.88	area draining to BMP in acres			

WQv=	0.52	ac-ft	22,486	cu-ft
20% WQv=	0.10	ac-ft	4,497	cu-ft (sediment storage)

1/2 WQv=	11,243	cu-ft	(the first 1/2 WQv must not discharge
1/3 Draw Down=	8	hours	in less than 1/3 minimum required drain time)

BMP Type: Wet Extended Detention Basin
Draw Down: 24 hours (hrs)

Elevation	Surface area	Inc. Storage	Cumulative Storage
715.00	20,396	0	0
716.00	22,682	21,539	21,539
717.00	25,068	23,875	45,414
718.00	27,555	26,312	71,726
719.00	30,143	28,849	100,575
720.00	37,052	33,598	134,172

WQ Orifice Invert Elevation=	715.00	ft		
Top of WQv Elevation=	716.04	ft		
Resulting WQv Provided=	22,494	cu-ft	≥	22,486 cu-ft
Hydraulic Head (Hmax)=	1.04	ft		
Orifice Coefficient (C)=	0.60			
Draw Down=	24	hrs		
Ave. Discharge (Qavg)=	0.26	cfs		
Ave. Hydraulic Head (Havg)=	0.52	ft		
Orifice Area (A)=	0.07	ft ^2	A=Qavg/[C(2gHavg)^0.5]	
Max. Orifice Diameter=	3.71	in		
Used Orifice Diamter=	**3.7**	in		

Hydrograph for Pond WQ-Z: P. Basin Z

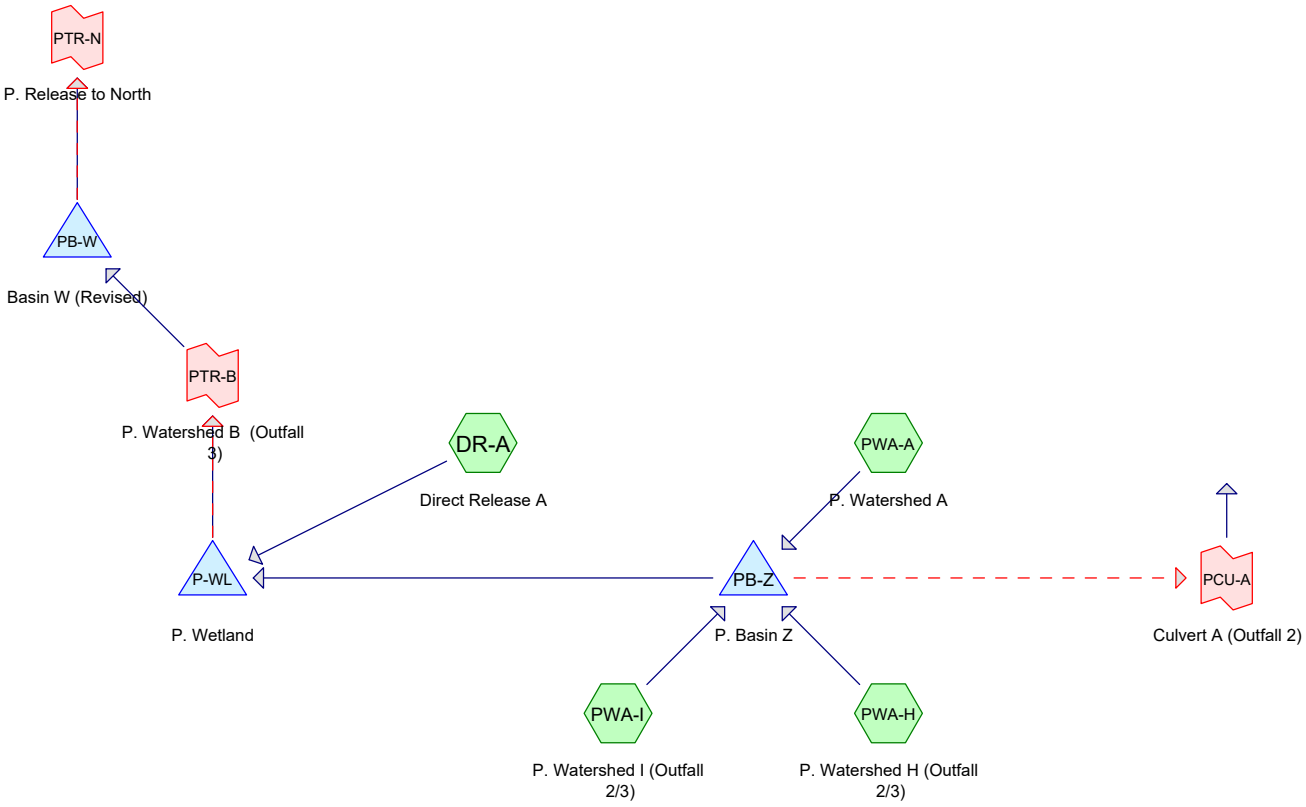
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	**0.00**	**22,438**	**716.04**	**0.34**	**0.34**	**0.00**
1.00	0.00	21,238	715.99	0.33	0.33	0.00
2.00	0.00	20,076	715.94	0.32	0.32	0.00
3.00	0.00	18,950	715.89	0.31	0.31	0.00
4.00	0.00	17,862	715.84	0.30	0.30	0.00
5.00	0.00	16,812	715.79	0.29	0.29	0.00
6.00	0.00	15,799	715.74	0.28	0.28	0.00
7.00	0.00	14,824	715.70	0.27	0.27	0.00
8.00	0.00	13,887	715.66	0.25	0.25	0.00
9.00	0.00	12,989	715.62	0.24	0.24	0.00
10.00	0.00	12,129	715.58	0.23	0.23	0.00
11.00	0.00	11,307	715.54	0.22	0.22	0.00
12.00	0.00	10,525	715.50	0.21	0.21	0.00
13.00	0.00	9,781	715.47	0.20	0.20	0.00
14.00	0.00	9,077	715.43	0.19	0.19	0.00
15.00	0.00	8,411	715.40	0.18	0.18	0.00
16.00	0.00	7,785	715.37	0.17	0.17	0.00
17.00	0.00	7,199	715.35	0.16	0.16	0.00
18.00	0.00	6,651	715.32	0.15	0.15	0.00
19.00	0.00	6,142	715.30	0.14	0.14	0.00
20.00	0.00	5,674	715.27	0.12	0.12	0.00
21.00	0.00	5,249	715.25	0.11	0.11	0.00
22.00	0.00	4,865	715.24	0.10	0.10	0.00
23.00	0.00	4,521	715.22	0.09	0.09	0.00
24.00	0.00	4,213	715.20	0.08	0.08	0.00
25.00	0.00	3,937	715.19	0.07	0.07	0.00
26.00	0.00	3,689	715.18	0.07	0.07	0.00
27.00	0.00	3,466	715.17	0.06	0.06	0.00
28.00	0.00	3,266	715.16	0.05	0.05	0.00
29.00	0.00	3,085	715.15	0.05	0.05	0.00
30.00	0.00	2,921	715.14	0.04	0.04	0.00
31.00	0.00	2,771	715.13	0.04	0.04	0.00
32.00	0.00	2,633	715.13	0.04	0.04	0.00
33.00	0.00	2,507	715.12	0.03	0.03	0.00
34.00	0.00	2,391	715.12	0.03	0.03	0.00
35.00	0.00	2,285	715.11	0.03	0.03	0.00
36.00	0.00	2,187	715.11	0.03	0.03	0.00
37.00	0.00	2,098	715.10	0.02	0.02	0.00
38.00	0.00	2,016	715.10	0.02	0.02	0.00
39.00	0.00	1,939	715.09	0.02	0.02	0.00
40.00	0.00	1,866	715.09	0.02	0.02	0.00
41.00	0.00	1,798	715.09	0.02	0.02	0.00
42.00	0.00	1,733	715.08	0.02	0.02	0.00
43.00	0.00	1,672	715.08	0.02	0.02	0.00
44.00	0.00	1,614	715.08	0.02	0.02	0.00
45.00	0.00	1,560	715.08	0.01	0.01	0.00
46.00	0.00	1,509	715.07	0.01	0.01	0.00
47.00	0.00	1,460	715.07	0.01	0.01	0.00
48.00	0.00	1,415	715.07	0.01	0.01	0.00

Stage-Area-Storage for Pond WQ-Z: P. Basin Z

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
715.00	20,396	0
715.05	20,507	1,023
715.10	20,619	2,051
715.15	20,731	3,085
715.20	20,843	4,124
715.25	20,956	5,169
715.30	21,069	6,219
715.35	21,182	7,276
715.40	21,296	8,338
715.45	21,410	9,405
715.50	21,524	10,479
715.55	21,638	11,558
715.60	21,753	12,643
715.65	21,868	13,733
715.70	21,983	14,829
715.75	22,099	15,931
715.80	22,215	17,039
715.85	22,331	18,153
715.90	22,448	19,272
715.95	22,565	20,398
716.00	22,682	21,529
716.05	22,798	22,666
716.10	22,915	23,809
716.15	23,032	24,957
716.20	23,150	26,112
716.25	23,267	27,272
716.30	23,385	28,439
716.35	23,504	29,611
716.40	23,622	30,789
716.45	23,741	31,973
716.50	23,860	33,163
716.55	23,980	34,359
716.60	24,099	35,561
716.65	24,219	36,769
716.70	24,340	37,983
716.75	24,460	39,203
716.80	24,581	40,429
716.85	24,702	41,661
716.90	24,824	42,899
716.95	24,946	44,144
717.00	25,068	45,394
717.05	25,190	46,650
717.10	25,311	47,913
717.15	25,434	49,182
717.20	25,556	50,456
717.25	25,679	51,737
717.30	25,802	53,024
717.35	25,925	54,317
717.40	26,049	55,617
717.45	26,173	56,922
717.50	26,297	58,234
717.55	26,421	59,552
717.60	26,546	60,876
717.65	26,671	62,206
717.70	26,797	63,543
717.75	26,922	64,886
717.80	27,048	66,235
717.85	27,174	67,591
717.90	27,301	68,953
717.95	27,428	70,321
718.00	27,555	71,696
718.05	27,682	73,077
718.10	27,809	74,464
718.15	27,936	75,857
718.20	28,063	77,257
718.25	28,191	78,664
718.30	28,319	80,077
718.35	28,448	81,496
718.40	28,576	82,921
718.45	28,705	84,353
718.50	28,834	85,792
718.55	28,964	87,237
718.60	29,094	88,688
718.65	29,224	90,146
718.70	29,354	91,611
718.75	29,485	93,082
718.80	29,616	94,559
718.85	29,747	96,043
718.90	29,879	97,534
718.95	30,011	99,031
719.00	30,143	100,535
719.05	30,472	102,050
719.10	30,802	103,582
719.15	31,134	105,131
719.20	31,468	106,696
719.25	31,803	108,277
719.30	32,141	109,876
719.35	32,480	111,491
719.40	32,821	113,124
719.45	33,164	114,774
719.50	33,508	116,440
719.55	33,855	118,124
719.60	34,203	119,826
719.65	34,553	121,545
719.70	34,905	123,281
719.75	35,258	125,035
719.80	35,613	126,807
719.85	35,970	128,597
719.90	36,329	130,404
719.95	36,690	132,230
720.00	**37,052**	**134,073**

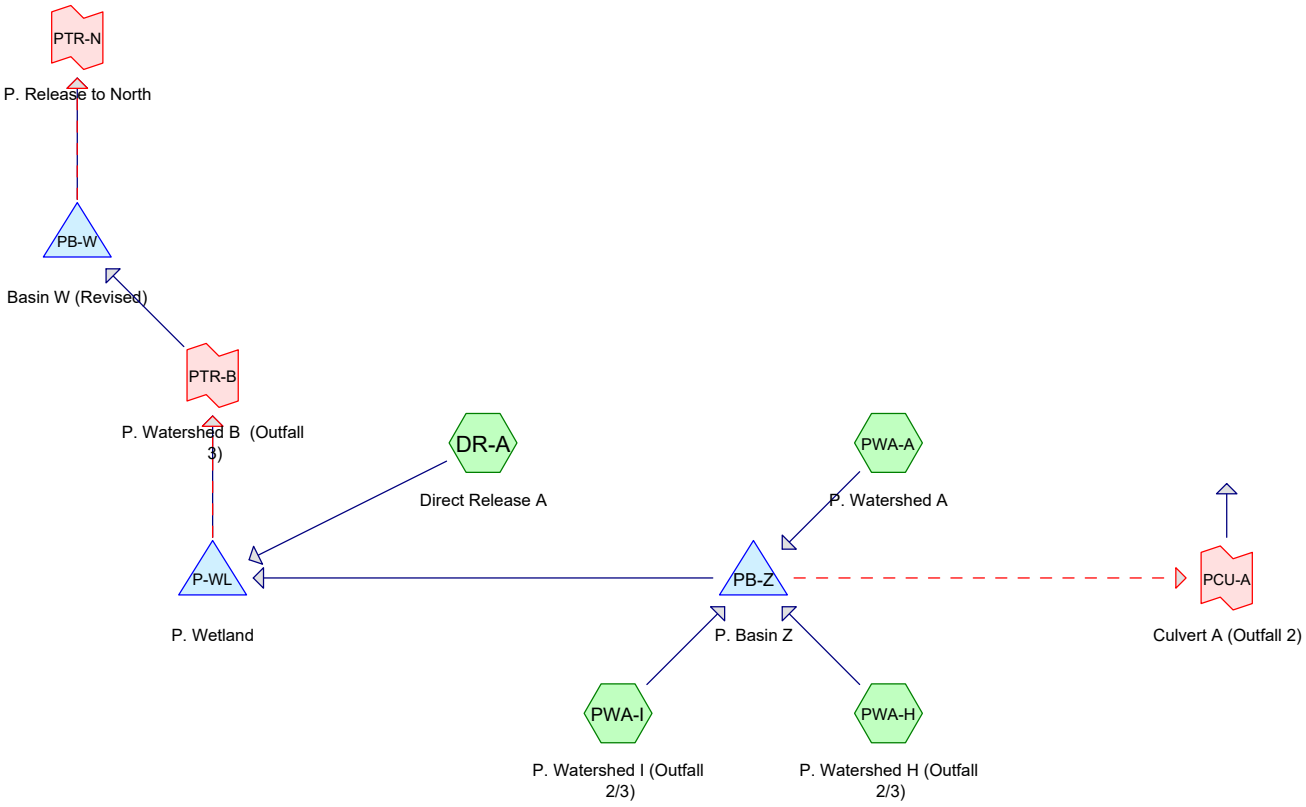
APPENDIX C

POST-DEVELOPED TRIBUTARY MAP AND FLOWS



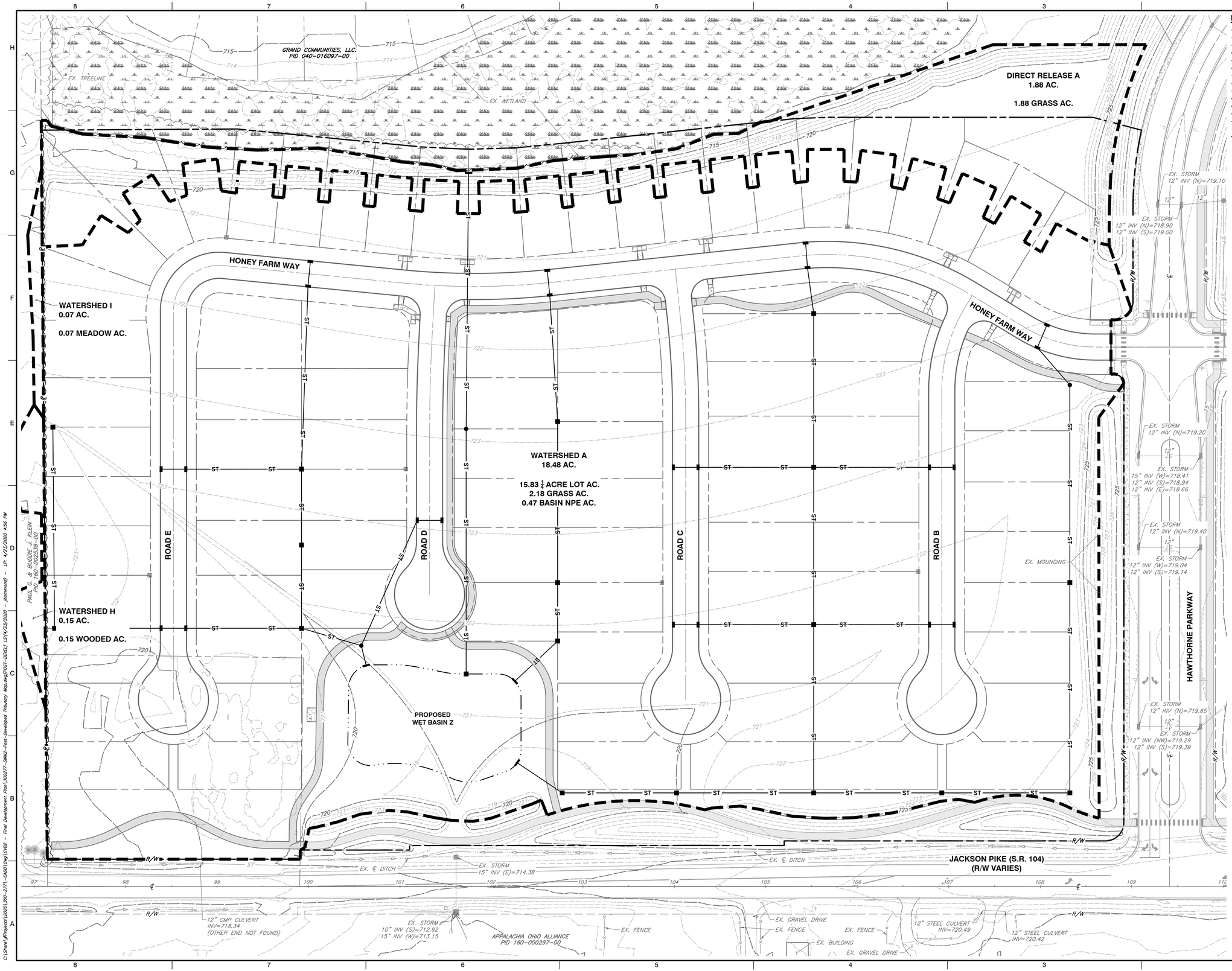
Subcat Reach Pond Link

Routing Diagram for 300277-Farmstead HYD_Revised
Prepared by CEC, Inc., Printed 3/4/2020



Subcat Reach Pond Link

Routing Diagram for 300277-Farmstead HYD_Revised
Prepared by CEC, Inc., Printed 3/4/2020



LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING EASEMENT
- EXISTING SUBJECT PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- EXISTING RIGHT-OF-WAY
- EXISTING CENTERLINE
- EXISTING EDGE OF PAVEMENT
- EXISTING WATER BODY
- EXISTING FEMA FLOODWAY
- EXISTING FEMA FLOODPLAIN
- EXISTING FEMA ZONE "X"
- EXISTING DRAINAGE SWALE
- EXISTING WETLAND
- PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED STORM SEWER INLET
- PROPOSED HEADWALL

NORTH
SCALE IN FEET
0 50 100

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
250 Old Wilson Bridge Road · Suite 250 · Worthington, OH 43085
614-540-6633 · 888-598-6808
www.cecinc.com

GRAND COMMUNITIES, LLC.
FARMSTEAD - SUB AREA H
FINAL DEVELOPMENT PLAN
CITY OF GROVE CITY
FRANKLIN COUNTY, OHIO

POST-DEVELOPED TRIBUTARY MAP

DATE:	APRIL 2020
DWG SCALE:	1"=50'
PROJECT NO:	300-277
DRAWN BY:	JTH
CHECKED BY:	TJV
APPROVED BY:	DRAFT

DRAWING NO.:
SWM-2
SHEET 2 OF 2

G:\Shared Projects\2020\300-277\-CAD\Dwg\C102 - Final Development Plan\300277-SWM2-Post-Developed Tributary Map.dwg[POST-DEVEL] LS(4/23/2020 - jhammond) - LP: 4/23/2020 4:56 PM

Summary for Subcatchment PWA-A: P. Watershed A

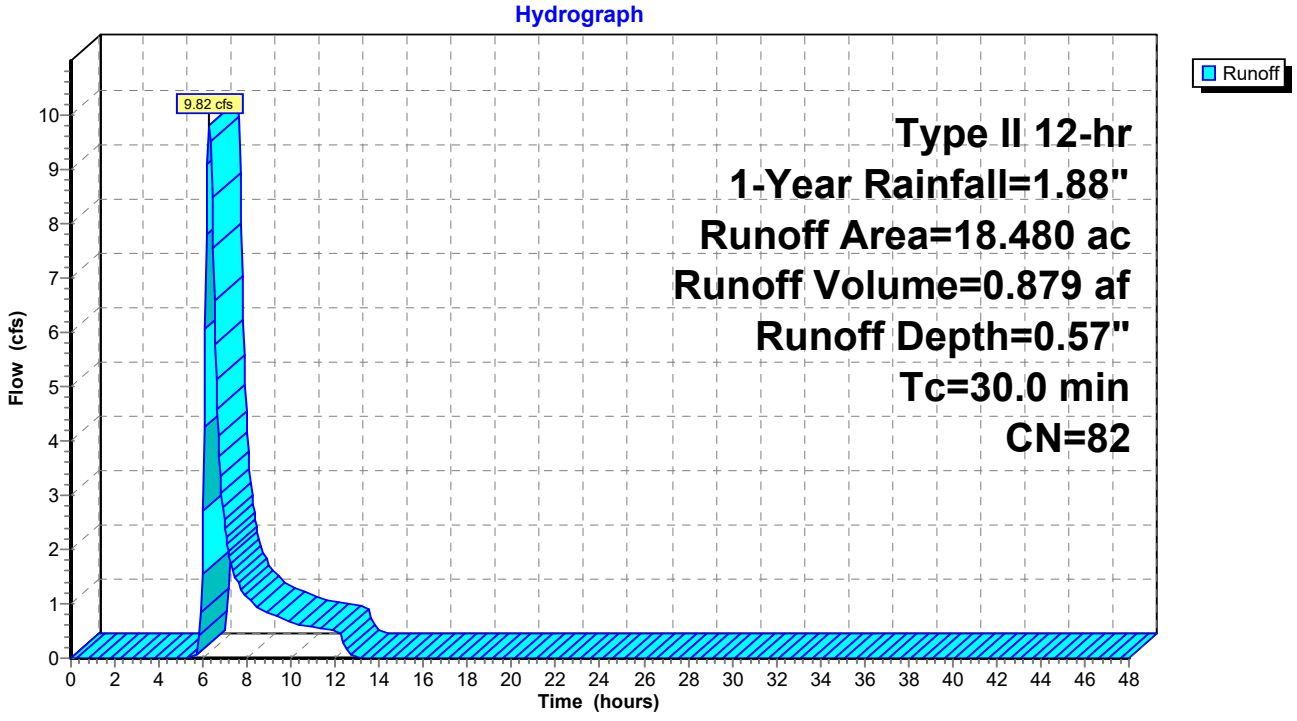
Runoff = 9.82 cfs @ 6.28 hrs, Volume= 0.879 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 1-Year Rainfall=1.88"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment PWA-A: P. Watershed A

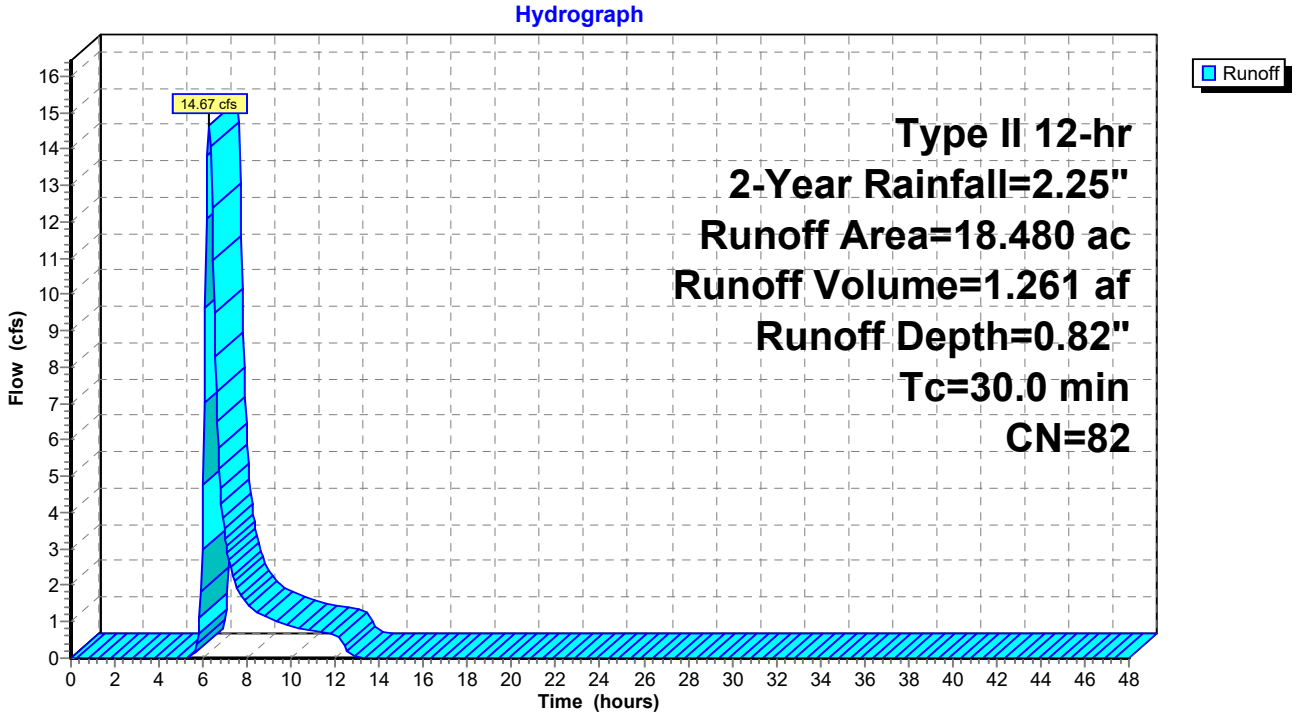
Runoff = 14.67 cfs @ 6.27 hrs, Volume= 1.261 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 2-Year Rainfall=2.25"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment PWA-A: P. Watershed A

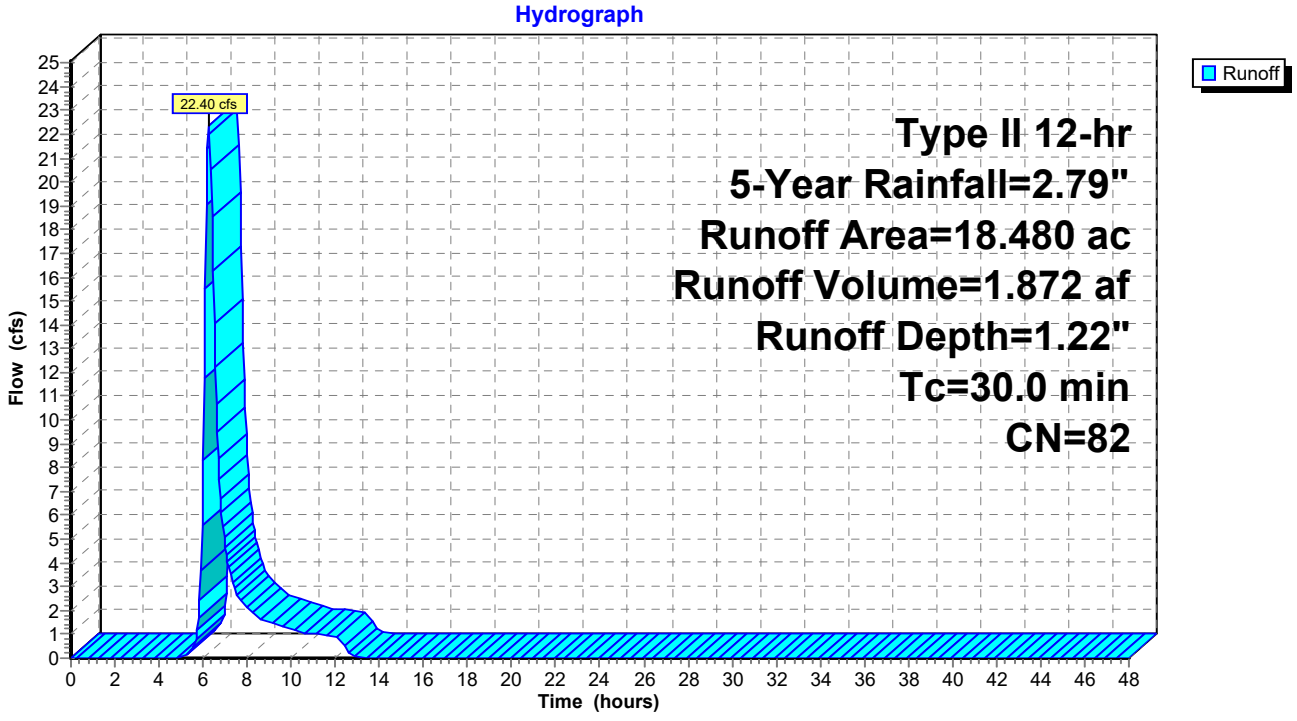
Runoff = 22.40 cfs @ 6.26 hrs, Volume= 1.872 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 5-Year Rainfall=2.79"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment PWA-A: P. Watershed A

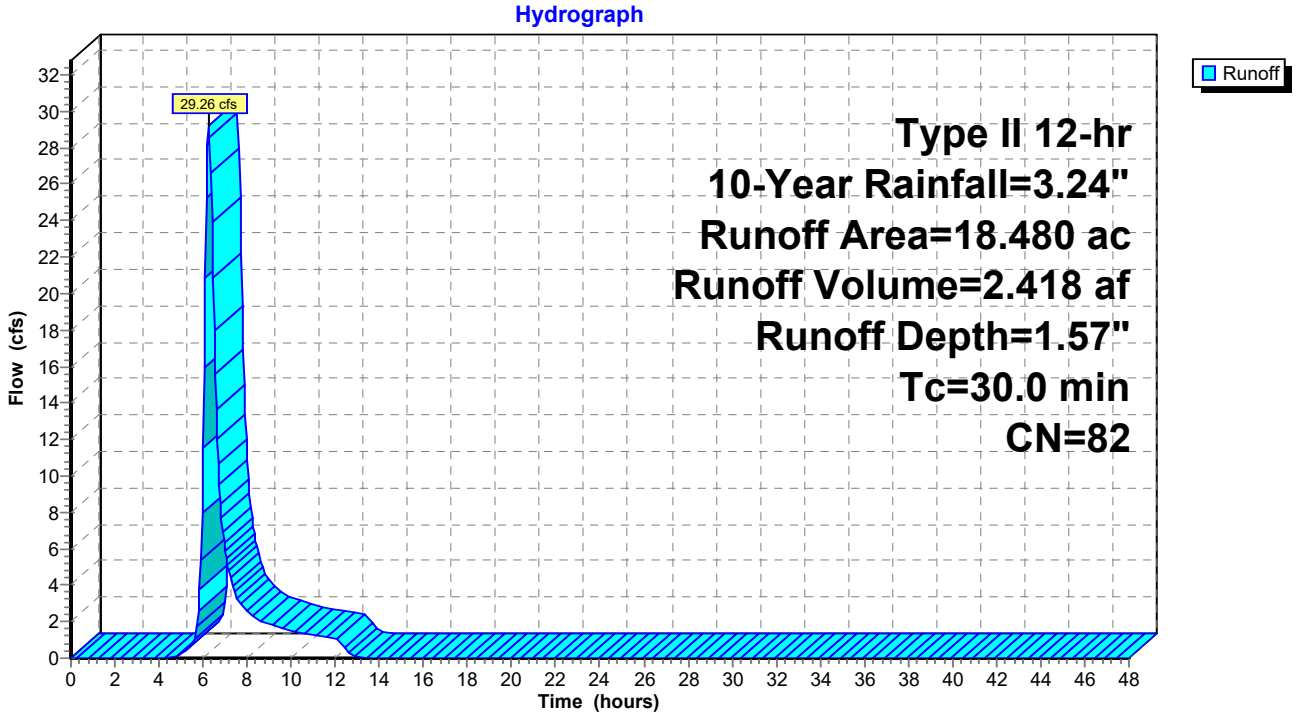
Runoff = 29.26 cfs @ 6.26 hrs, Volume= 2.418 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 10-Year Rainfall=3.24"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment PWA-A: P. Watershed A

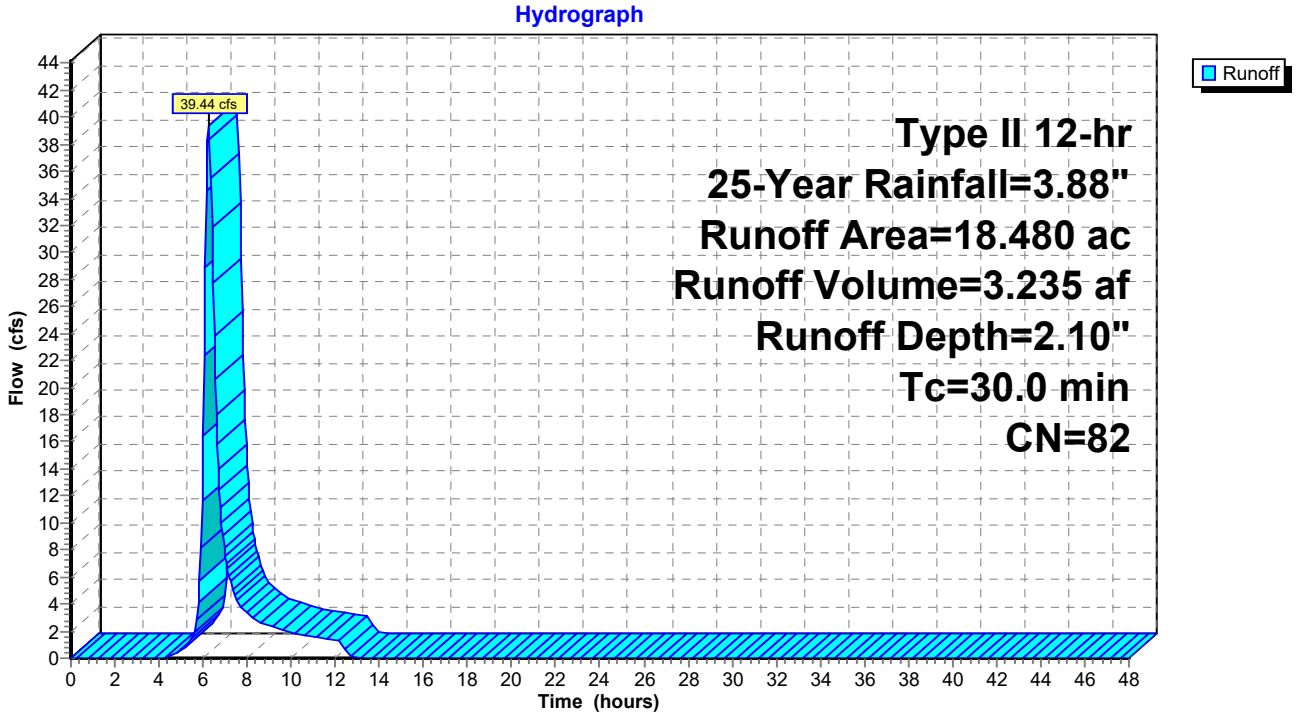
Runoff = 39.44 cfs @ 6.25 hrs, Volume= 3.235 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 25-Year Rainfall=3.88"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment PWA-A: P. Watershed A

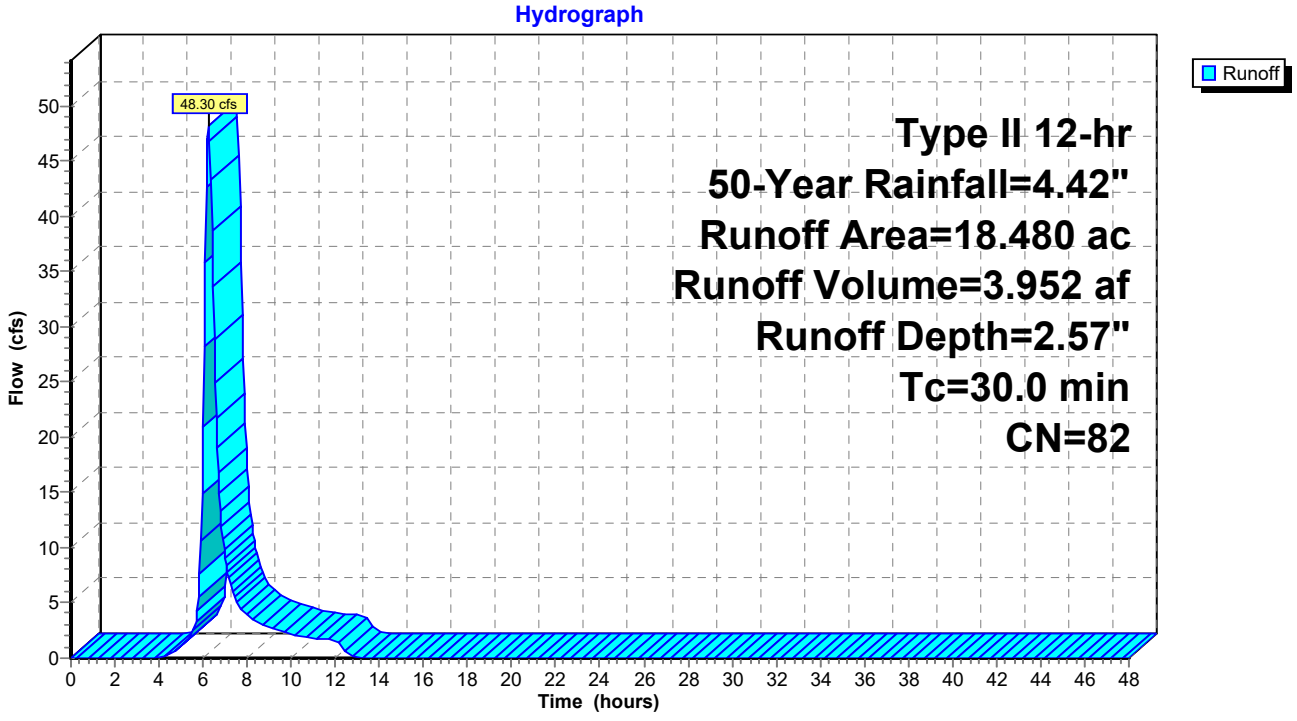
Runoff = 48.30 cfs @ 6.25 hrs, Volume= 3.952 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 50-Year Rainfall=4.42"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment PWA-A: P. Watershed A

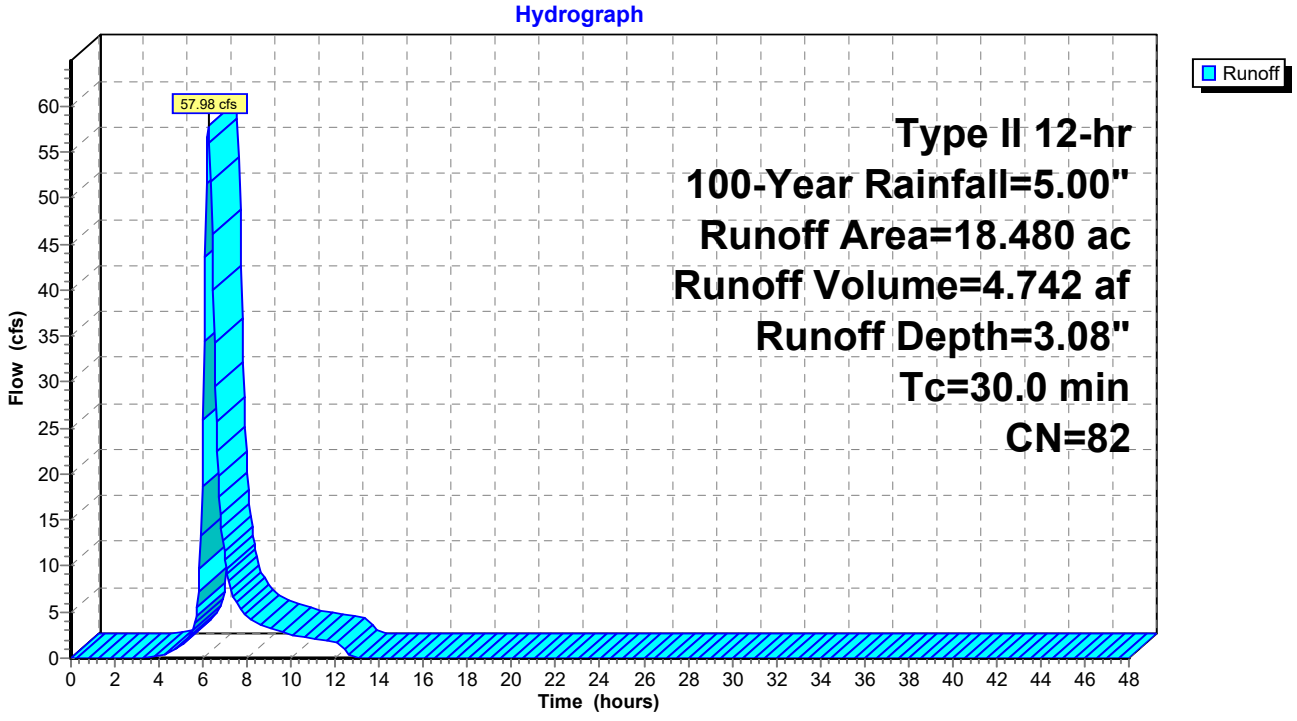
Runoff = 57.98 cfs @ 6.25 hrs, Volume= 4.742 af, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 100-Year Rainfall=5.00"

Area (ac)	CN	Description
15.830	83	1/4 acre lots, 38% imp, HSG C
2.180	74	>75% Grass cover, Good, HSG C
0.470	98	Water Surface, HSG C
18.480	82	Weighted Average
11.995		64.91% Pervious Area
6.485		35.09% Impervious Area

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

Subcatchment PWA-A: P. Watershed A



Summary for Subcatchment DR-A: Direct Release A

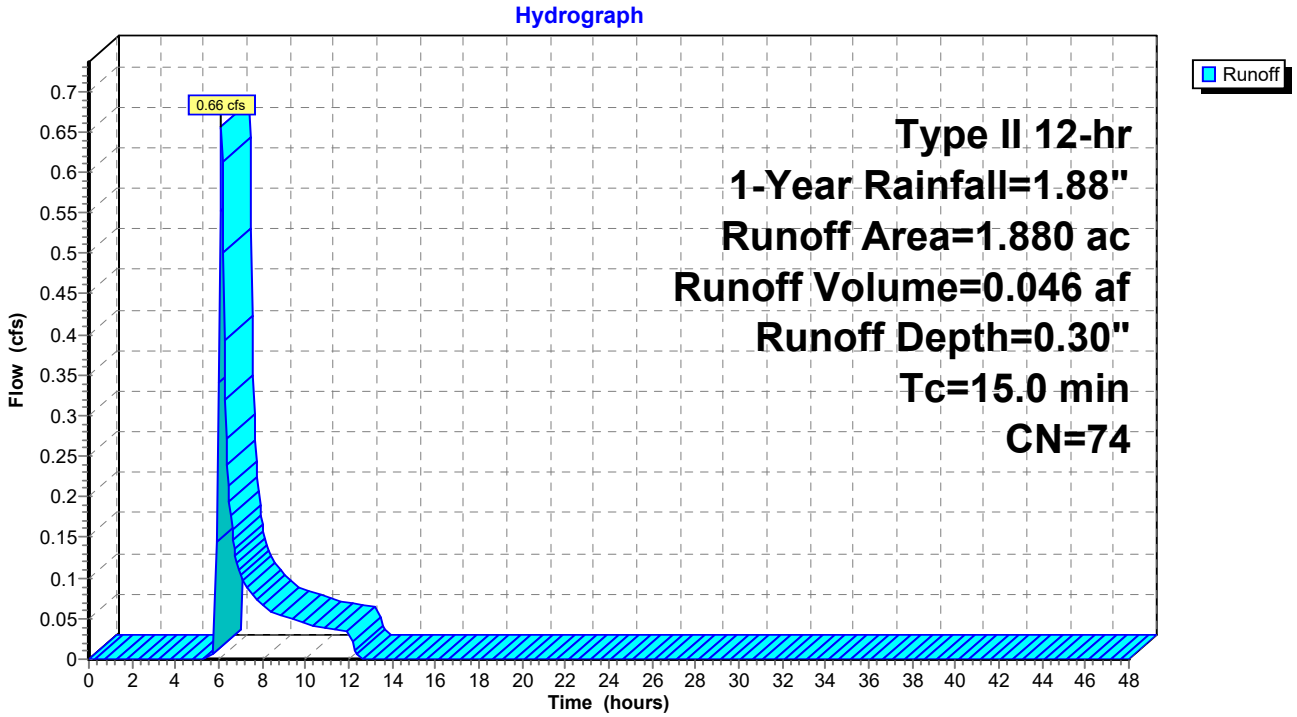
Runoff = 0.66 cfs @ 6.11 hrs, Volume= 0.046 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 1-Year Rainfall=1.88"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Subcatchment DR-A: Direct Release A

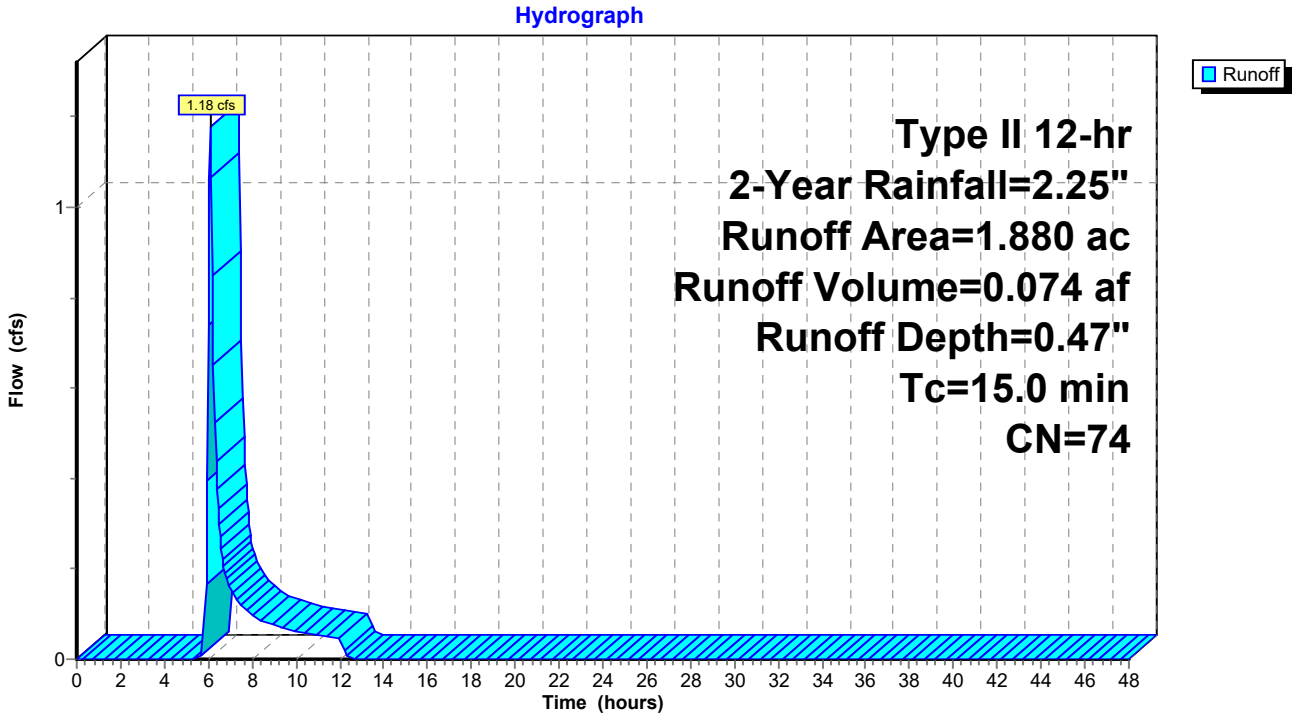
Runoff = 1.18 cfs @ 6.10 hrs, Volume= 0.074 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 2-Year Rainfall=2.25"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Subcatchment DR-A: Direct Release A

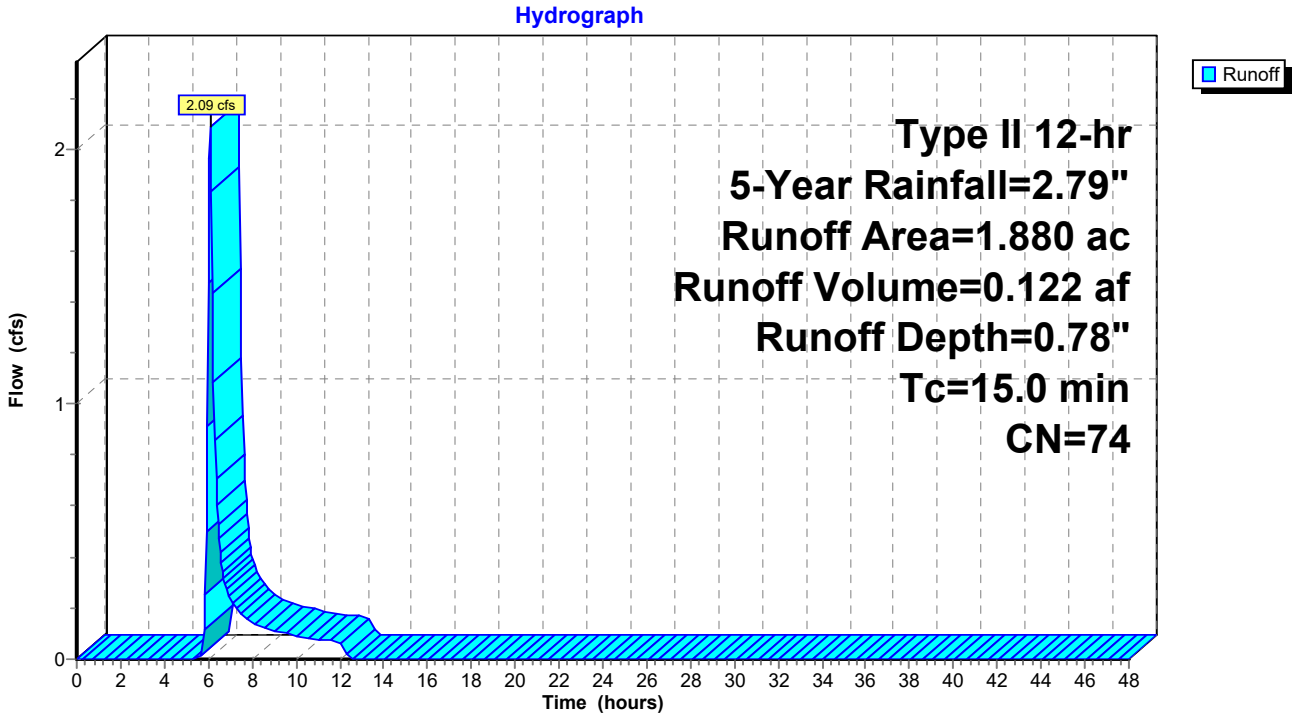
Runoff = 2.09 cfs @ 6.09 hrs, Volume= 0.122 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 5-Year Rainfall=2.79"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Subcatchment DR-A: Direct Release A

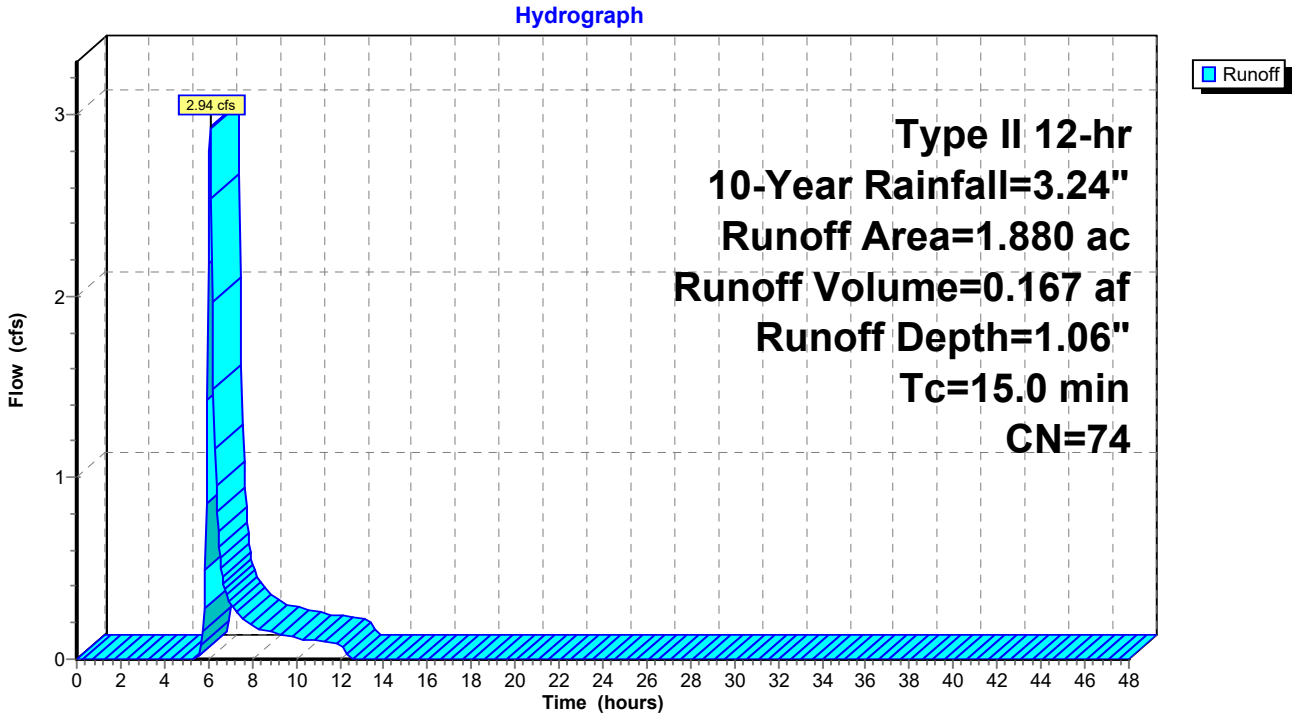
Runoff = 2.94 cfs @ 6.09 hrs, Volume= 0.167 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 10-Year Rainfall=3.24"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Subcatchment DR-A: Direct Release A

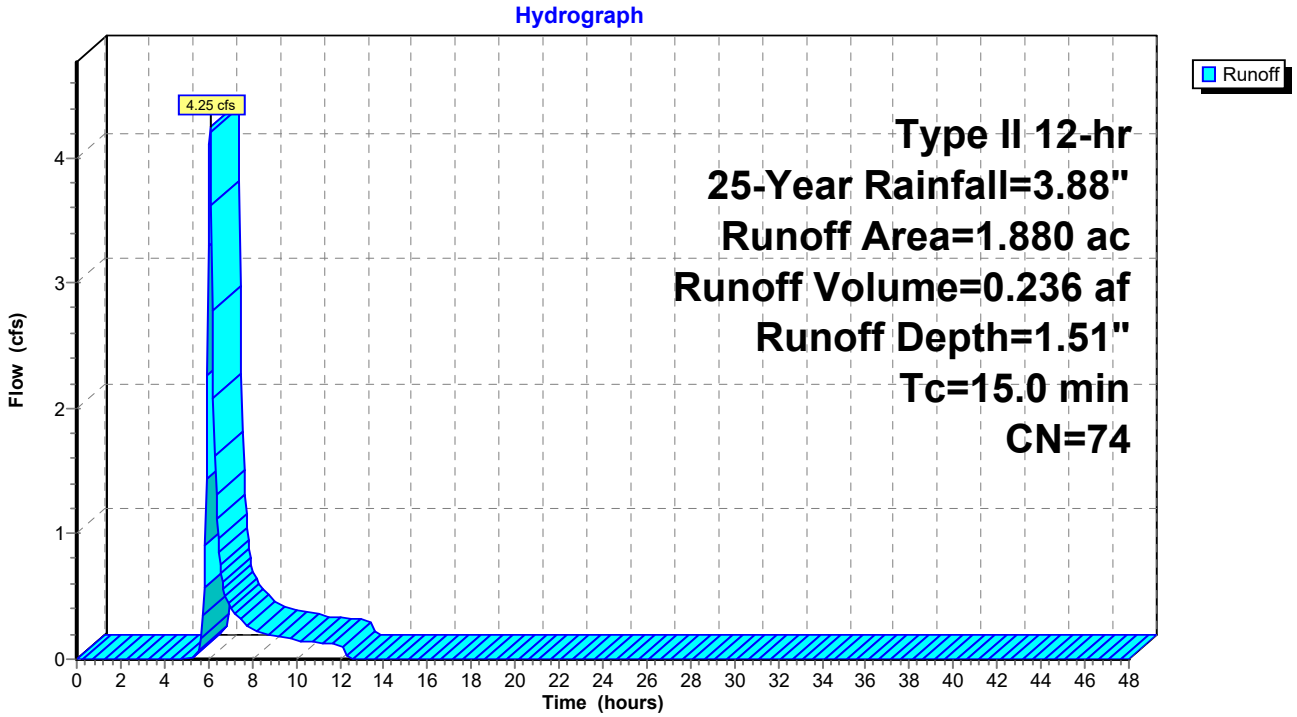
Runoff = 4.25 cfs @ 6.08 hrs, Volume= 0.236 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 25-Year Rainfall=3.88"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Subcatchment DR-A: Direct Release A

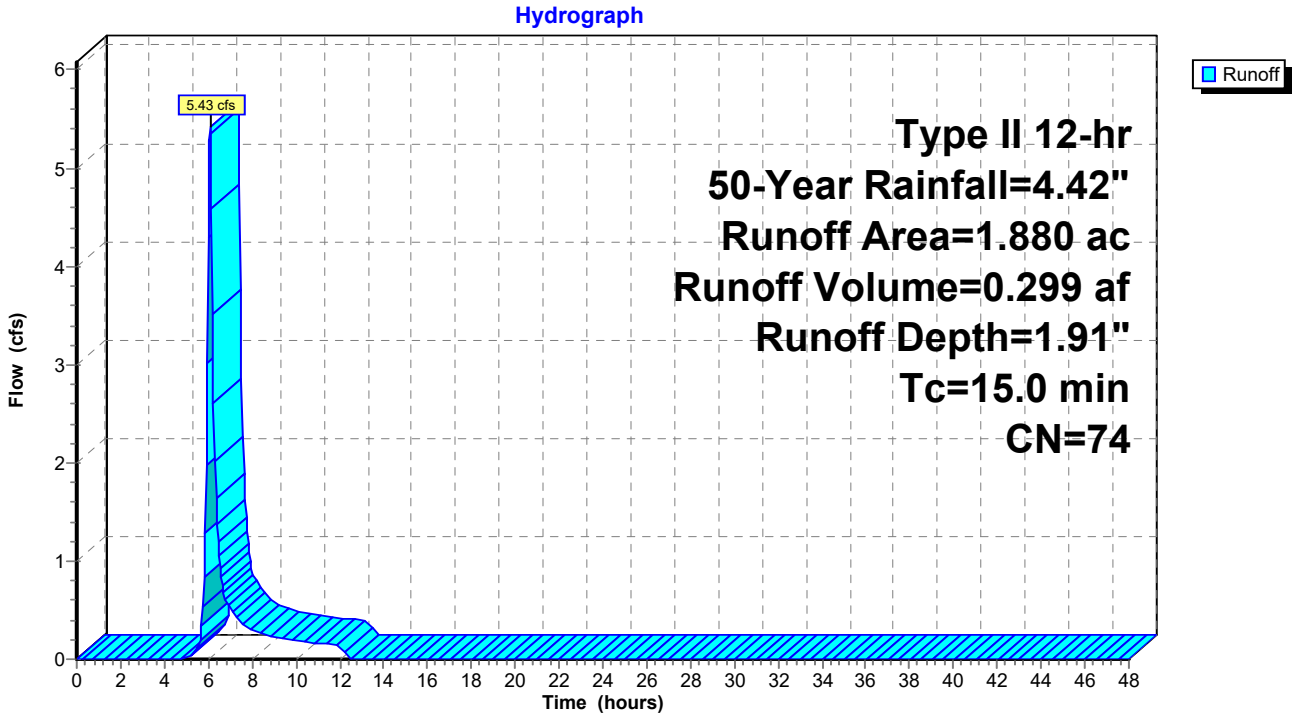
Runoff = 5.43 cfs @ 6.08 hrs, Volume= 0.299 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 50-Year Rainfall=4.42"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Subcatchment DR-A: Direct Release A

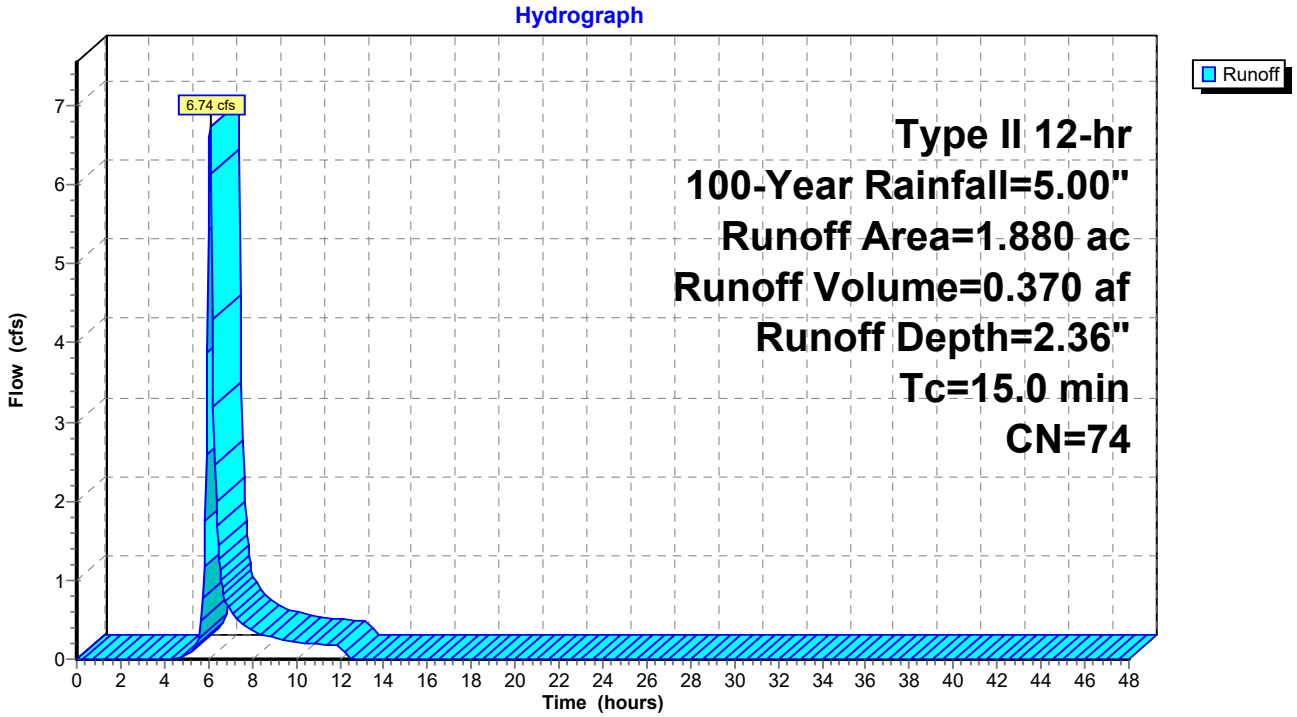
Runoff = 6.74 cfs @ 6.08 hrs, Volume= 0.370 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 12-hr 100-Year Rainfall=5.00"

Area (ac)	CN	Description
1.880	74	>75% Grass cover, Good, HSG C
1.880		100.00% Pervious Area

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

Subcatchment DR-A: Direct Release A



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 0.57" for 1-Year event
Inflow = 9.86 cfs @ 6.28 hrs, Volume= 0.884 af
Outflow = 0.52 cfs @ 11.84 hrs, Volume= 0.822 af, Atten= 95%, Lag= 333.8 min
Primary = 0.52 cfs @ 11.84 hrs, Volume= 0.822 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 716.31' @ 11.84 hrs Surf.Area= 23,402 sf Storage= 28,600 cf

Plug-Flow detention time= 782.9 min calculated for 0.821 af (93% of inflow)
Center-of-Mass det. time= 765.4 min (1,219.4 - 454.1)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

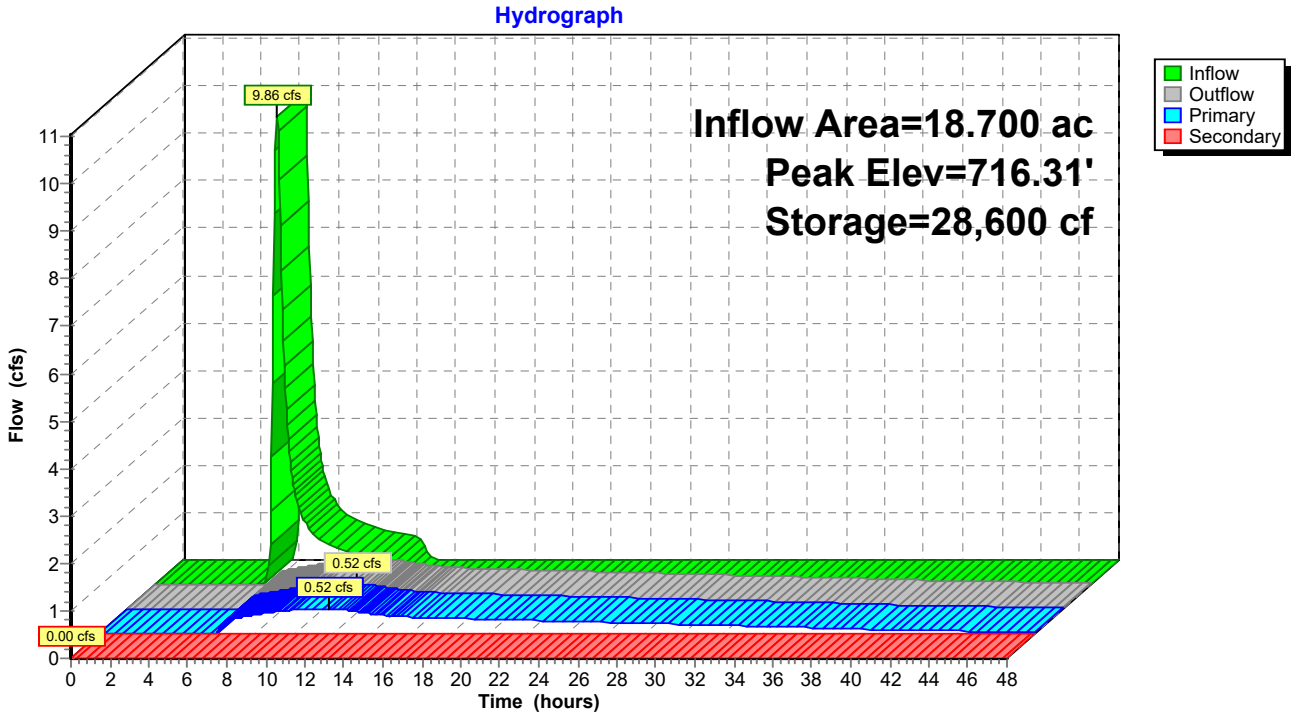
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.52 cfs @ 11.84 hrs HW=716.31' (Free Discharge)
└**1=Culvert** (Passes 0.52 cfs of 4.26 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.39 cfs @ 5.17 fps)
  ├**3=Orifice 1** (Orifice Controls 0.13 cfs @ 1.76 fps)
  ├**4=Orifice 2** (Controls 0.00 cfs)
  └**5=TC** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=715.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-Z: P. Basin Z



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 0.81" for 2-Year event
Inflow = 14.75 cfs @ 6.27 hrs, Volume= 1.268 af
Outflow = 0.77 cfs @ 10.74 hrs, Volume= 1.188 af, Atten= 95%, Lag= 268.3 min
Primary = 0.77 cfs @ 10.74 hrs, Volume= 1.188 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 716.77' @ 10.74 hrs Surf.Area= 24,512 sf Storage= 39,724 cf

Plug-Flow detention time= 751.7 min calculated for 1.188 af (94% of inflow)
Center-of-Mass det. time= 734.3 min (1,182.5 - 448.3)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

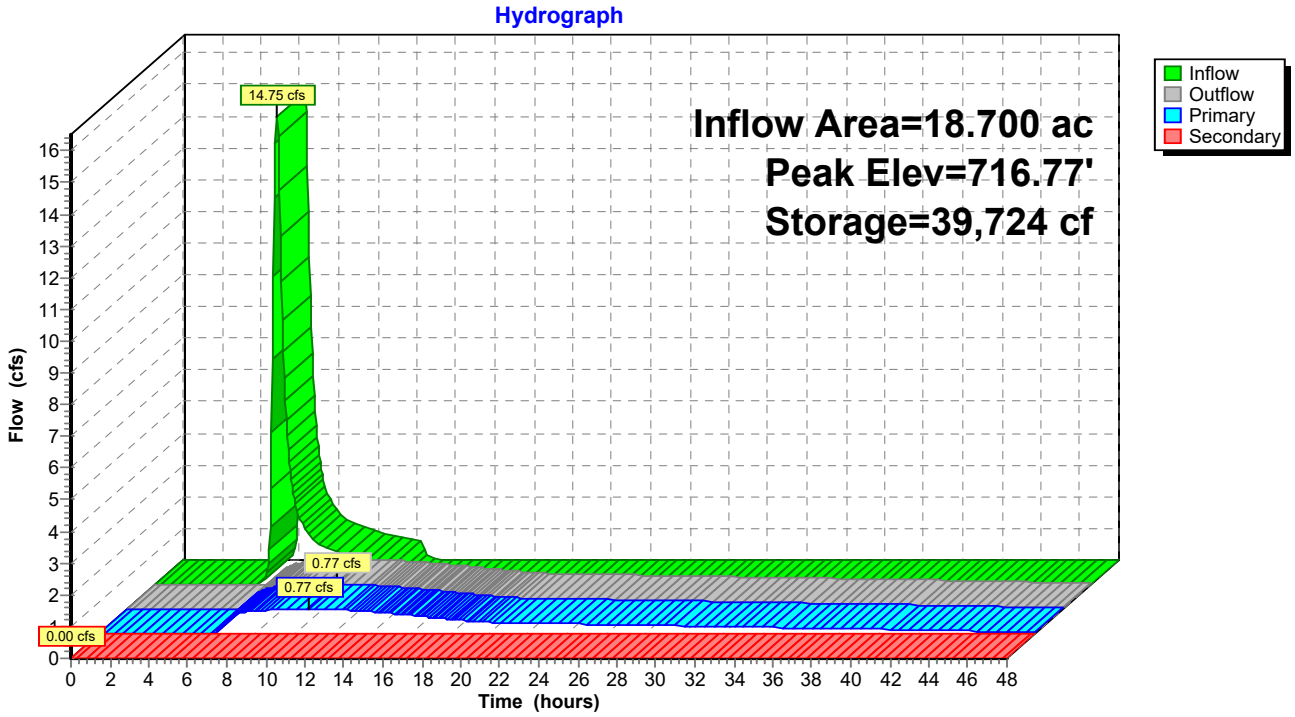
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.77 cfs @ 10.74 hrs HW=716.77' (Free Discharge)
└**1=Culvert** (Passes 0.77 cfs of 6.09 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.46 cfs @ 6.12 fps)
  ├**3=Orifice 1** (Orifice Controls 0.32 cfs @ 3.62 fps)
  ├**4=Orifice 2** (Controls 0.00 cfs)
  └**5=TC** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=715.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-Z: P. Basin Z



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 1.21" for 5-Year event
Inflow = 22.54 cfs @ 6.26 hrs, Volume= 1.885 af
Outflow = 1.05 cfs @ 10.77 hrs, Volume= 1.760 af, Atten= 95%, Lag= 270.6 min
Primary = 1.05 cfs @ 10.77 hrs, Volume= 1.760 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 717.58' @ 10.77 hrs Surf.Area= 26,490 sf Storage= 60,282 cf

Plug-Flow detention time= 765.1 min calculated for 1.760 af (93% of inflow)
Center-of-Mass det. time= 746.9 min (1,189.1 - 442.2)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

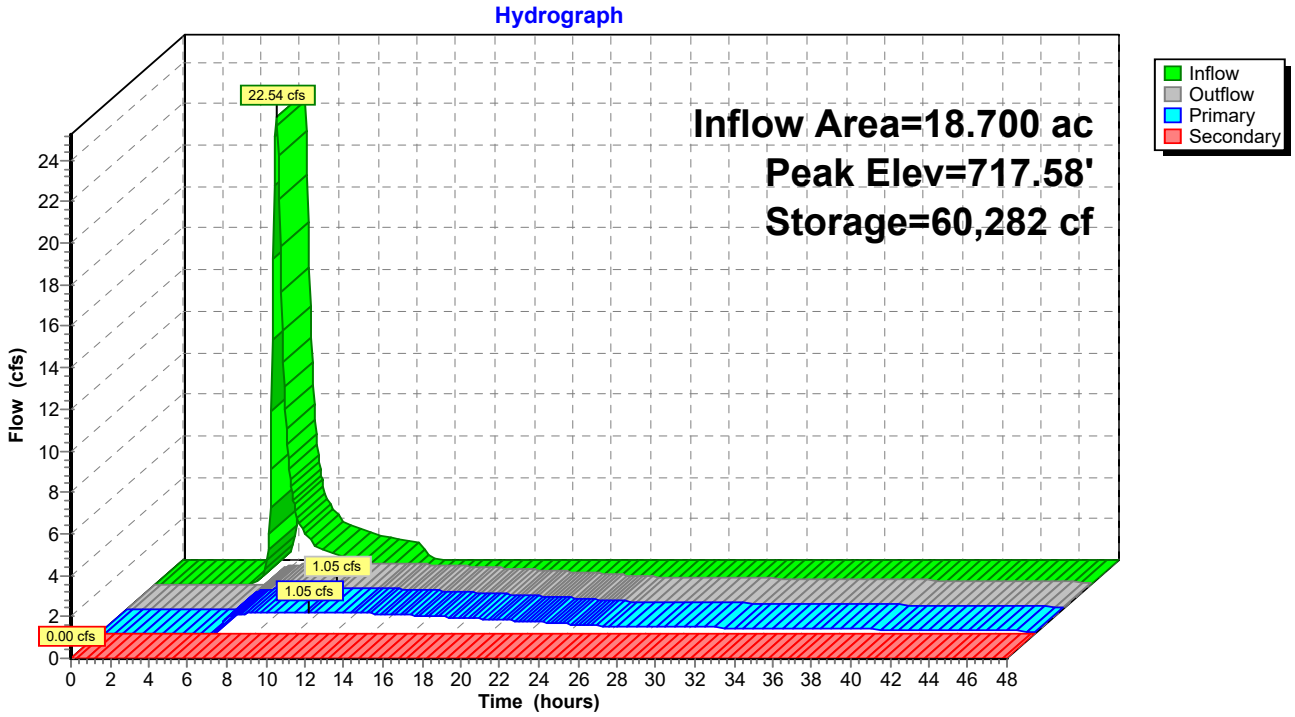
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.05 cfs @ 10.77 hrs HW=717.58' (Free Discharge)
└**1=Culvert** (Passes 1.05 cfs of 6.80 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.56 cfs @ 7.50 fps)
  ├**3=Orifice 1** (Orifice Controls 0.49 cfs @ 5.64 fps)
  ├**4=Orifice 2** (Controls 0.00 cfs)
  └**5=TC** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=715.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-Z: P. Basin Z



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 1.56" for 10-Year event
Inflow = 29.46 cfs @ 6.25 hrs, Volume= 2.436 af
Outflow = 1.64 cfs @ 9.64 hrs, Volume= 2.276 af, Atten= 94%, Lag= 203.0 min
Primary = 1.64 cfs @ 9.64 hrs, Volume= 2.276 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 718.16' @ 9.64 hrs Surf.Area= 27,950 sf Storage= 76,010 cf

Plug-Flow detention time= 729.0 min calculated for 2.273 af (93% of inflow)
Center-of-Mass det. time= 712.4 min (1,150.9 - 438.5)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

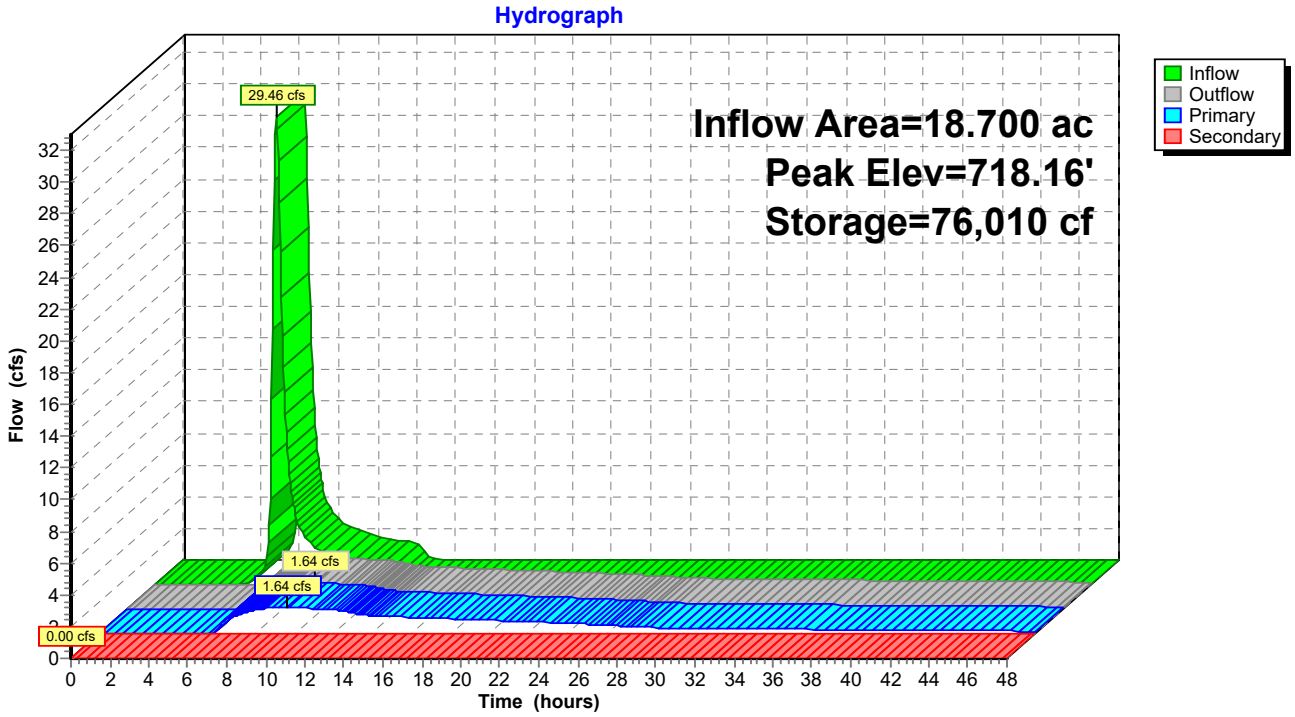
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.64 cfs @ 9.64 hrs HW=718.16' (Free Discharge)
└**1=Culvert** (Passes 1.64 cfs of 7.55 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.62 cfs @ 8.34 fps)
  ├**3=Orifice 1** (Orifice Controls 0.59 cfs @ 6.72 fps)
  ├**4=Orifice 2** (Orifice Controls 0.43 cfs @ 2.30 fps)
  └**5=TC** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=715.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-Z: P. Basin Z



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 2.09" for 25-Year event
Inflow = 39.75 cfs @ 6.25 hrs, Volume= 3.261 af
Outflow = 2.35 cfs @ 9.07 hrs, Volume= 3.060 af, Atten= 94%, Lag= 169.5 min
Primary = 2.35 cfs @ 9.07 hrs, Volume= 3.060 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 718.96' @ 9.07 hrs Surf.Area= 30,039 sf Storage= 99,352 cf

Plug-Flow detention time= 673.9 min calculated for 3.057 af (94% of inflow)
Center-of-Mass det. time= 658.3 min (1,092.5 - 434.2)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

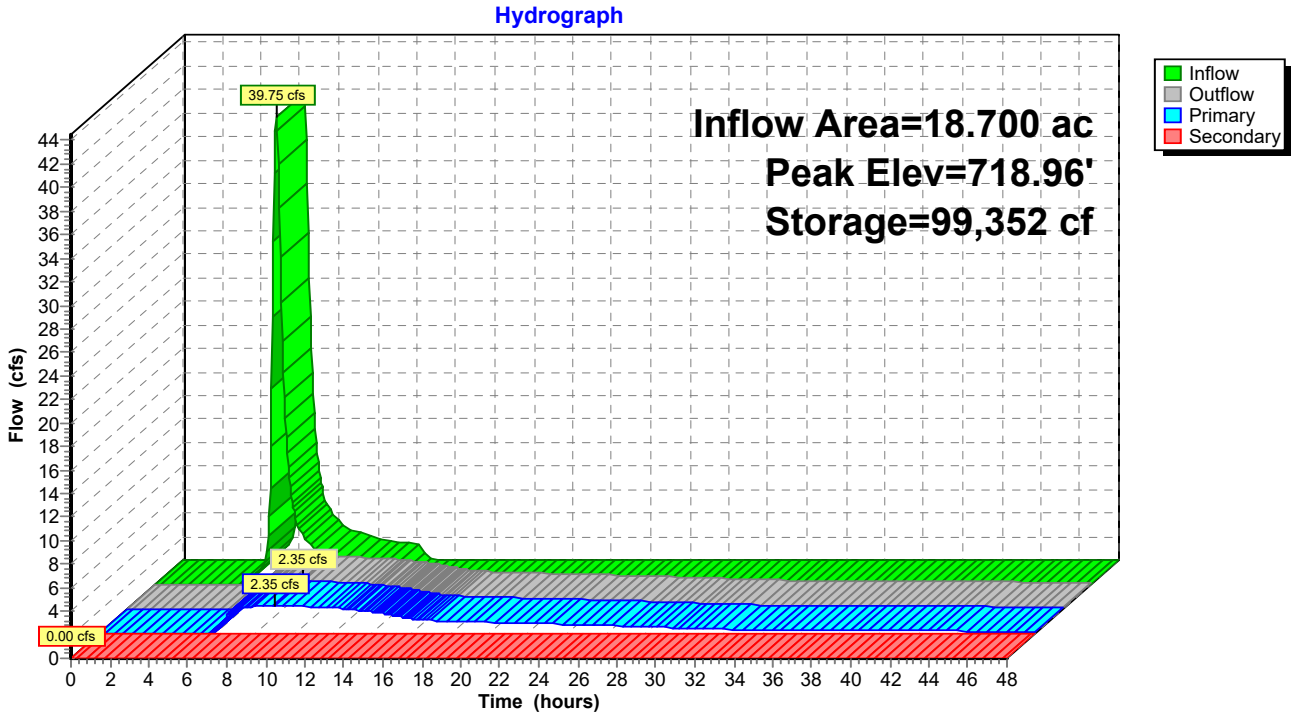
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.35 cfs @ 9.07 hrs HW=718.96' (Free Discharge)
└**1=Culvert** (Passes 2.35 cfs of 8.49 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.70 cfs @ 9.39 fps)
  ├**3=Orifice 1** (Orifice Controls 0.70 cfs @ 7.99 fps)
  ├**4=Orifice 2** (Orifice Controls 0.95 cfs @ 4.84 fps)
  └**5=TC** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=715.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-Z: P. Basin Z



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 2.56" for 50-Year event
Inflow = 48.69 cfs @ 6.25 hrs, Volume= 3.985 af
Outflow = 5.44 cfs @ 7.46 hrs, Volume= 3.763 af, Atten= 89%, Lag= 72.5 min
Primary = 4.43 cfs @ 7.46 hrs, Volume= 3.670 af
Secondary = 1.01 cfs @ 7.46 hrs, Volume= 0.093 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 719.42' @ 7.46 hrs Surf.Area= 32,935 sf Storage= 113,669 cf

Plug-Flow detention time= 609.0 min calculated for 3.759 af (94% of inflow)
Center-of-Mass det. time= 594.9 min (1,026.2 - 431.3)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

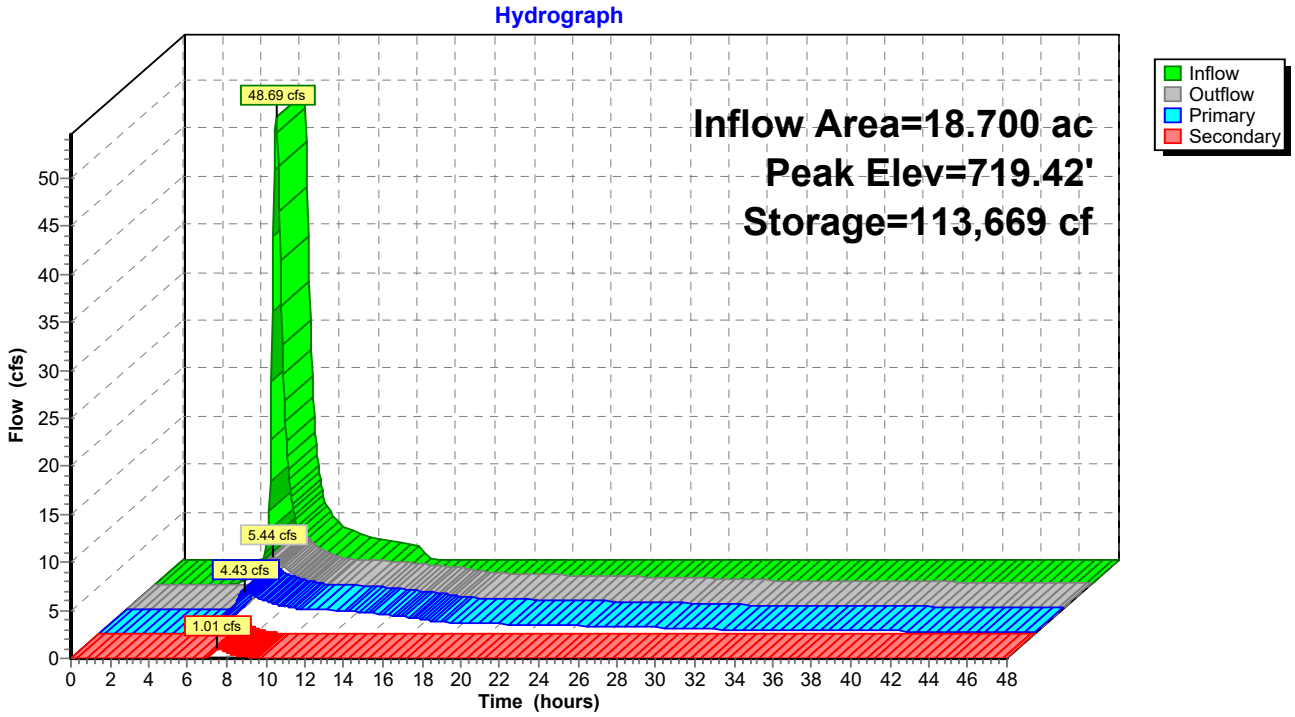
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.42 cfs @ 7.46 hrs HW=719.42' (Free Discharge)
└**1=Culvert** (Passes 4.42 cfs of 8.98 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.74 cfs @ 9.94 fps)
  ├**3=Orifice 1** (Orifice Controls 0.75 cfs @ 8.63 fps)
  ├**4=Orifice 2** (Orifice Controls 1.14 cfs @ 5.83 fps)
  └**5=TC** (Weir Controls 1.78 cfs @ 1.33 fps)

Secondary OutFlow Max=0.99 cfs @ 7.46 hrs HW=719.42' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Weir Controls 0.99 cfs @ 0.85 fps)

Pond PB-Z: P. Basin Z



Summary for Pond PB-Z: P. Basin Z

Inflow Area = 18.700 ac, 34.68% Impervious, Inflow Depth = 3.07" for 100-Year event
Inflow = 58.47 cfs @ 6.24 hrs, Volume= 4.783 af
Outflow = 13.81 cfs @ 6.87 hrs, Volume= 4.556 af, Atten= 76%, Lag= 37.3 min
Primary = 8.89 cfs @ 6.87 hrs, Volume= 4.168 af
Secondary = 4.92 cfs @ 6.87 hrs, Volume= 0.389 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 719.63' @ 6.87 hrs Surf.Area= 34,444 sf Storage= 121,010 cf

Plug-Flow detention time= 517.2 min calculated for 4.552 af (95% of inflow)
Center-of-Mass det. time= 505.2 min (933.9 - 428.7)

Volume	Invert	Avail.Storage	Storage Description
#1	715.00'	134,073 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

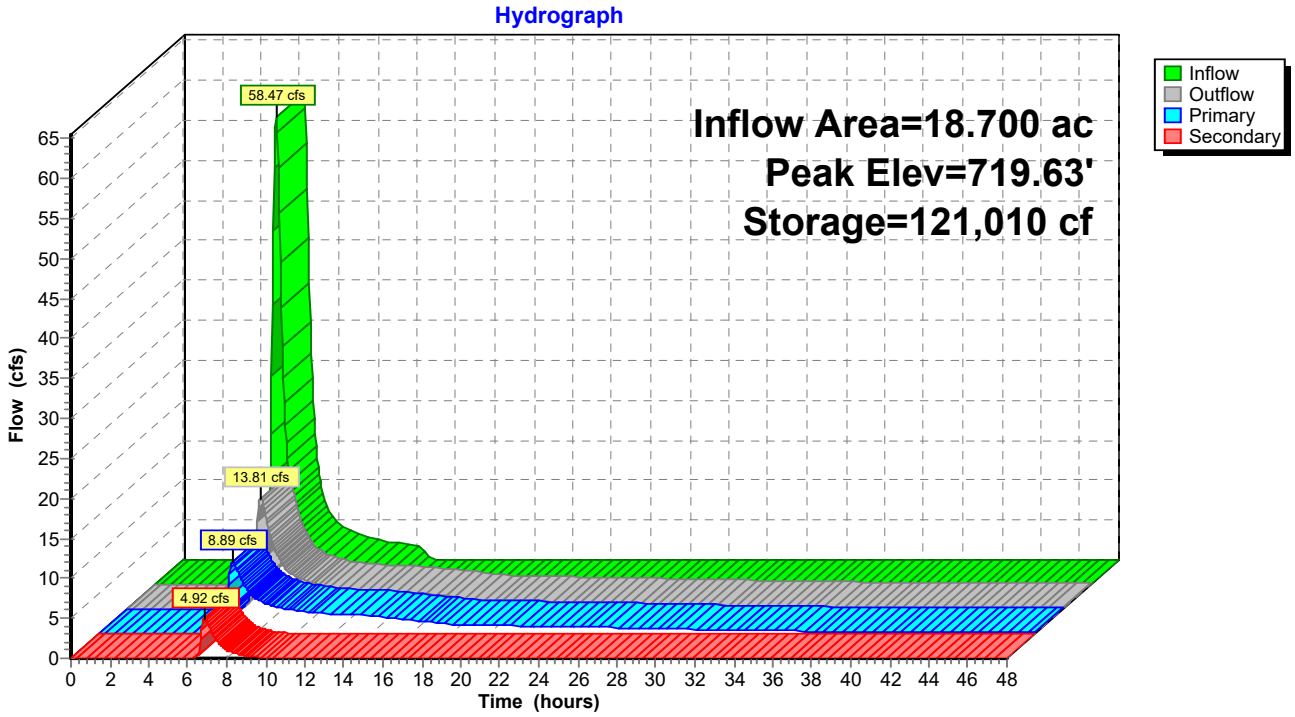
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
715.00	20,396	0	0	20,396
716.00	22,682	21,529	21,529	22,740
717.00	25,068	23,865	45,394	25,188
718.00	27,555	26,302	71,696	27,741
719.00	30,143	28,839	100,535	30,398
720.00	37,052	33,538	134,073	37,338

Device	Routing	Invert	Outlet Devices
#1	Primary	715.00'	**18.0" Round Culvert** L= 595.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 715.00' / 713.60' S= 0.0024 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	715.00'	**3.7" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	716.04'	**4.0" Vert. Orifice 1** C= 0.600
#4	Device 1	717.70'	**6.0" Vert. Orifice 2** C= 0.600
#5	Device 1	719.25'	**24.0" x 24.0" Horiz. TC** C= 0.600 Limited to weir flow at low heads
#6	Secondary	719.30'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=8.98 cfs @ 6.87 hrs HW=719.63' (Free Discharge)
└**1=Culvert** (Passes 8.98 cfs of 9.20 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 0.76 cfs @ 10.19 fps)
  ├**3=Orifice 1** (Orifice Controls 0.78 cfs @ 8.91 fps)
  ├**4=Orifice 2** (Orifice Controls 1.23 cfs @ 6.25 fps)
  └**5=TC** (Weir Controls 6.22 cfs @ 2.03 fps)

Secondary OutFlow Max=4.89 cfs @ 6.87 hrs HW=719.63' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Weir Controls 4.89 cfs @ 1.47 fps)

Pond PB-Z: P. Basin Z



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 0.30" for 1-Year event
Inflow = 44.00 cfs @ 6.26 hrs, Volume= 5.192 af
Outflow = 2.11 cfs @ 12.23 hrs, Volume= 4.312 af, Atten= 95%, Lag= 357.7 min
Primary = 2.11 cfs @ 12.23 hrs, Volume= 4.312 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 710.50' @ 12.23 hrs Surf.Area= 95,103 sf Storage= 127,910 cf

Plug-Flow detention time= 822.4 min calculated for 4.307 af (83% of inflow)
Center-of-Mass det. time= 532.6 min (1,347.3 - 814.7)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

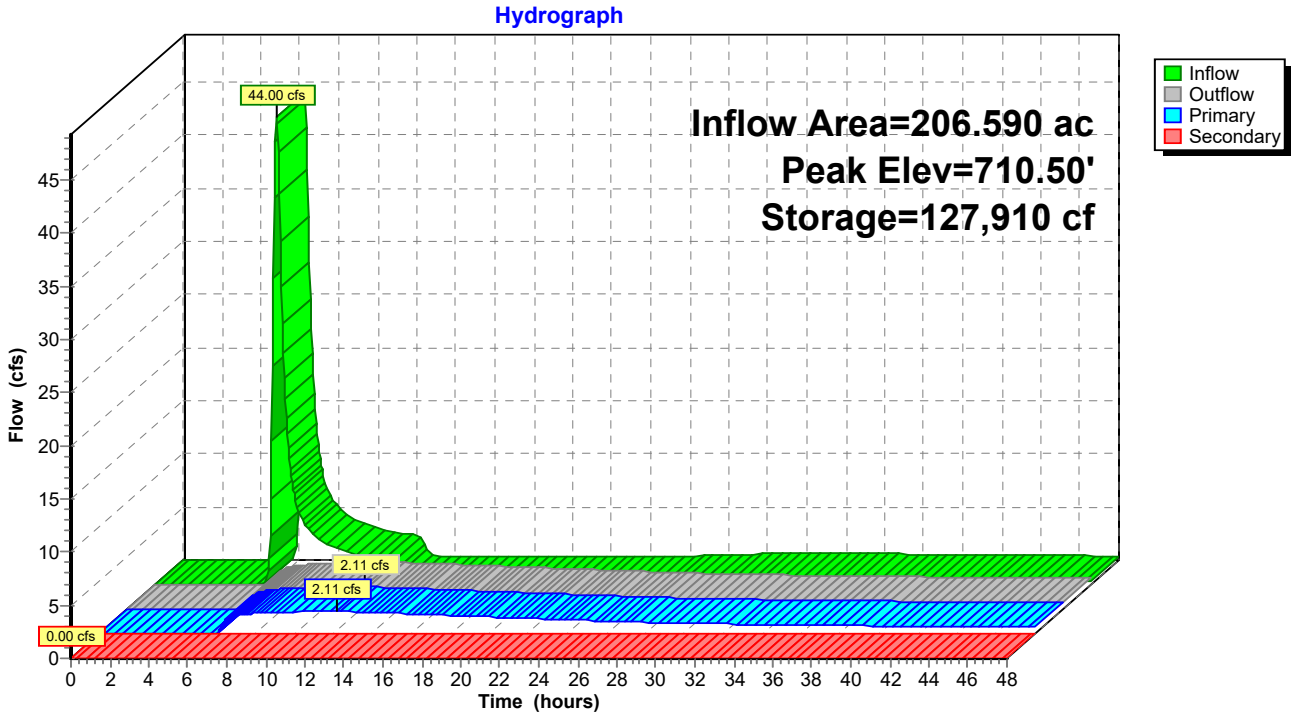
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.11 cfs @ 12.23 hrs HW=710.50' (Free Discharge)
└**1=Culvert** (Passes 2.11 cfs of 11.36 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 2.11 cfs @ 4.88 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=709.10' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-W: Basin W (Revised)



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 0.51" for 2-Year event
Inflow = 64.45 cfs @ 6.26 hrs, Volume= 8.708 af
Outflow = 2.66 cfs @ 12.24 hrs, Volume= 7.149 af, Atten= 96%, Lag= 359.2 min
Primary = 2.66 cfs @ 12.24 hrs, Volume= 7.149 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 711.10' @ 12.24 hrs Surf.Area= 98,239 sf Storage= 186,323 cf

Plug-Flow detention time= 879.8 min calculated for 7.149 af (82% of inflow)
Center-of-Mass det. time= 600.8 min (1,497.3 - 896.6)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

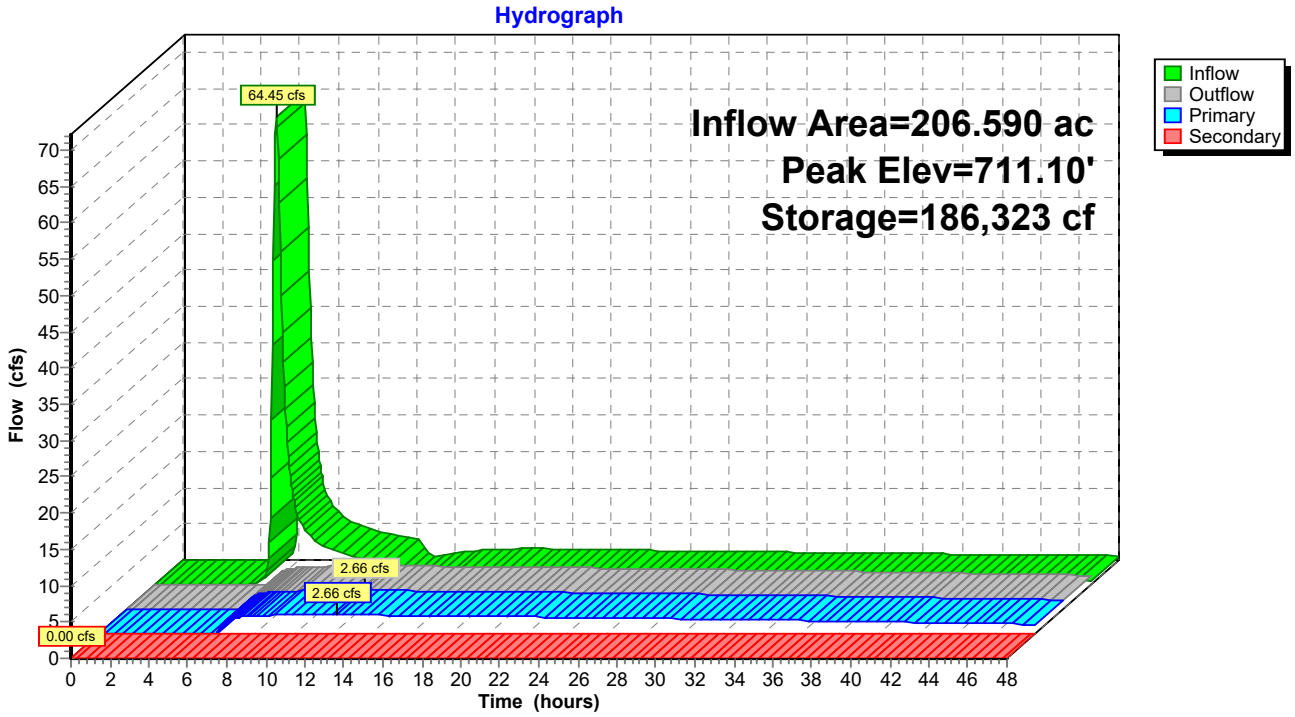
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.66 cfs @ 12.24 hrs HW=711.10' (Free Discharge)
└**1=Culvert** (Passes 2.66 cfs of 20.29 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 2.66 cfs @ 6.15 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=709.10' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-W: Basin W (Revised)



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 0.82" for 5-Year event
Inflow = 96.87 cfs @ 6.25 hrs, Volume= 14.155 af
Outflow = 3.49 cfs @ 16.84 hrs, Volume= 10.656 af, Atten= 96%, Lag= 635.7 min
Primary = 3.49 cfs @ 16.84 hrs, Volume= 10.656 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 712.29' @ 16.84 hrs Surf.Area= 104,509 sf Storage= 306,901 cf

Plug-Flow detention time= 1,008.1 min calculated for 10.645 af (75% of inflow)
Center-of-Mass det. time= 675.8 min (1,563.7 - 887.9)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

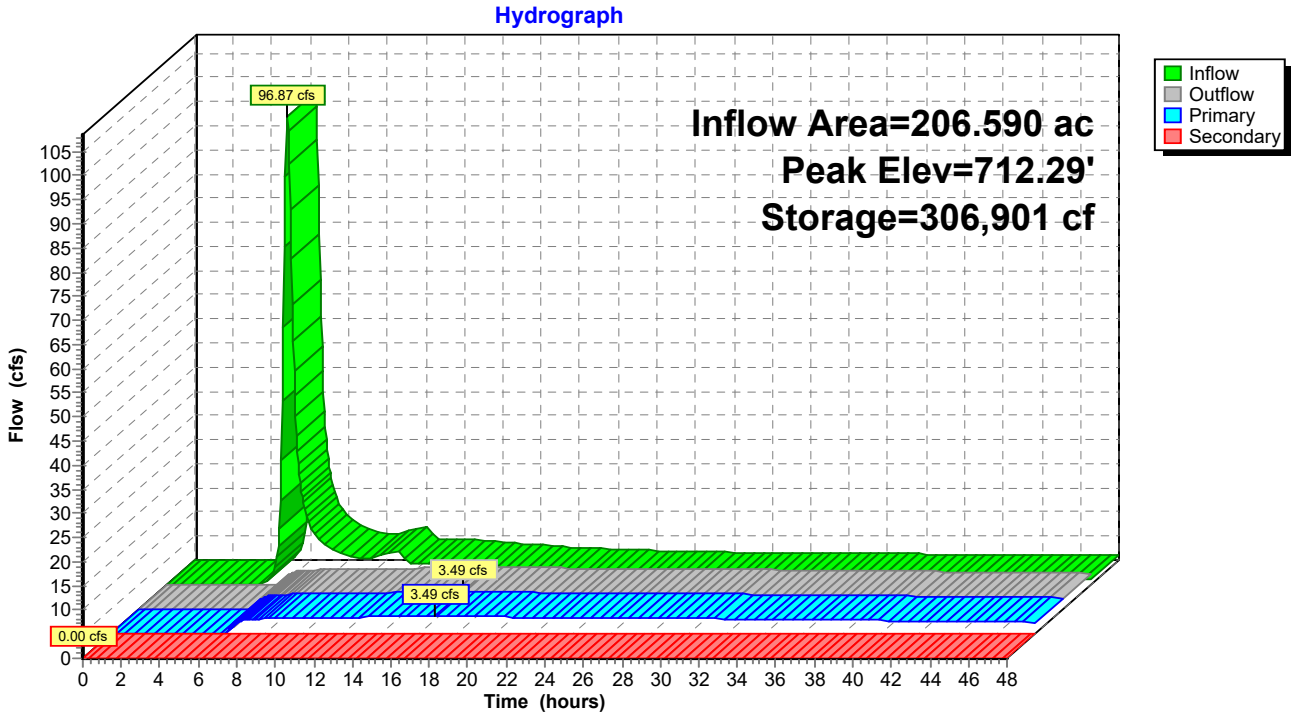
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.49 cfs @ 16.84 hrs HW=712.29' (Free Discharge)
└**1=Culvert** (Passes 3.49 cfs of 32.93 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 3.49 cfs @ 8.09 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=709.10' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PB-W: Basin W (Revised)



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 1.10" for 10-Year event
Inflow = 125.44 cfs @ 6.24 hrs, Volume= 18.892 af
Outflow = 11.42 cfs @ 12.14 hrs, Volume= 14.603 af, Atten= 91%, Lag= 353.8 min
Primary = 4.96 cfs @ 12.14 hrs, Volume= 12.038 af
Secondary = 6.46 cfs @ 12.14 hrs, Volume= 2.565 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 712.63' @ 12.14 hrs Surf.Area= 106,331 sf Storage= 342,852 cf

Plug-Flow detention time= 830.4 min calculated for 14.588 af (77% of inflow)
Center-of-Mass det. time= 527.7 min (1,391.5 - 863.8)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

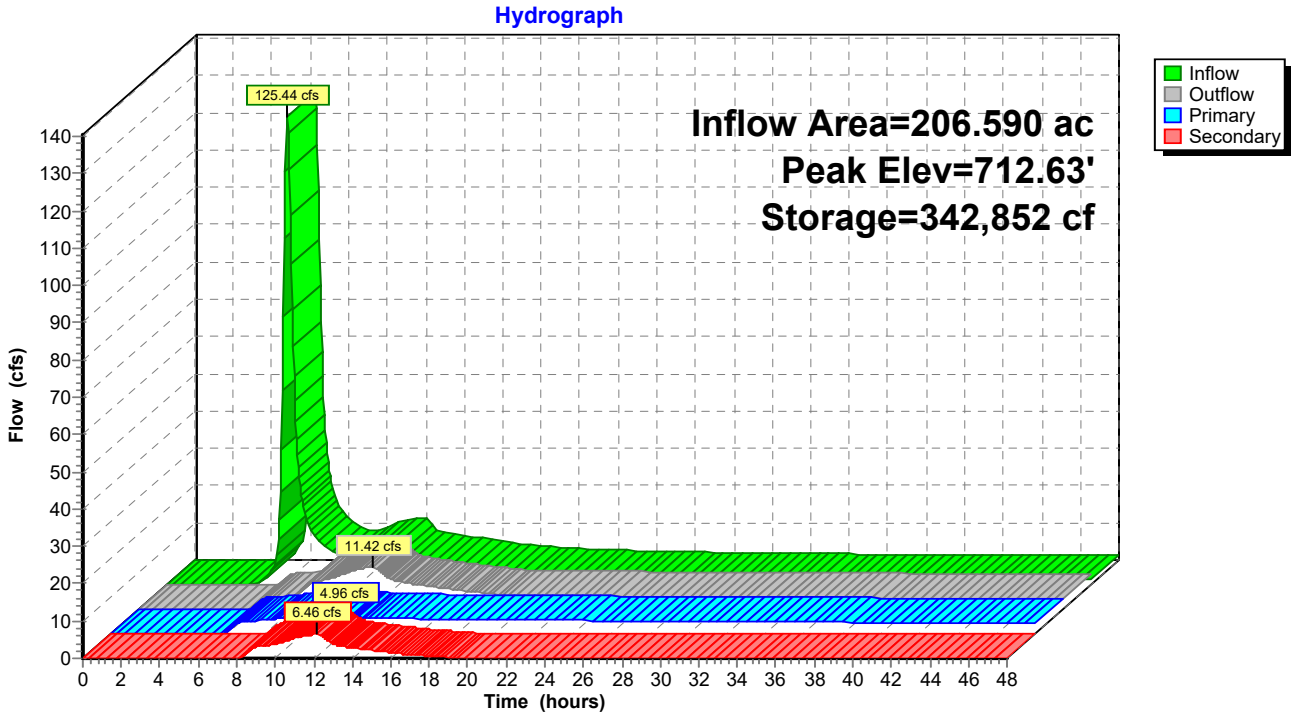
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.96 cfs @ 12.14 hrs HW=712.63' (Free Discharge)
└**1=Culvert** (Passes 4.96 cfs of 35.71 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 3.70 cfs @ 8.56 fps)
  └**3=Orifice/Grate** (Weir Controls 1.26 cfs @ 1.19 fps)

Secondary OutFlow Max=6.44 cfs @ 12.14 hrs HW=712.63' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 6.44 cfs @ 0.97 fps)

Pond PB-W: Basin W (Revised)



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 1.53" for 25-Year event
Inflow = 167.63 cfs @ 6.24 hrs, Volume= 26.359 af
Outflow = 30.17 cfs @ 7.02 hrs, Volume= 21.646 af, Atten= 82%, Lag= 46.8 min
Primary = 8.09 cfs @ 7.02 hrs, Volume= 13.456 af
Secondary = 22.08 cfs @ 7.02 hrs, Volume= 8.190 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 712.80' @ 7.02 hrs Surf.Area= 107,232 sf Storage= 360,731 cf

Plug-Flow detention time= 582.9 min calculated for 21.623 af (82% of inflow)
Center-of-Mass det. time= 342.6 min (1,157.1 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

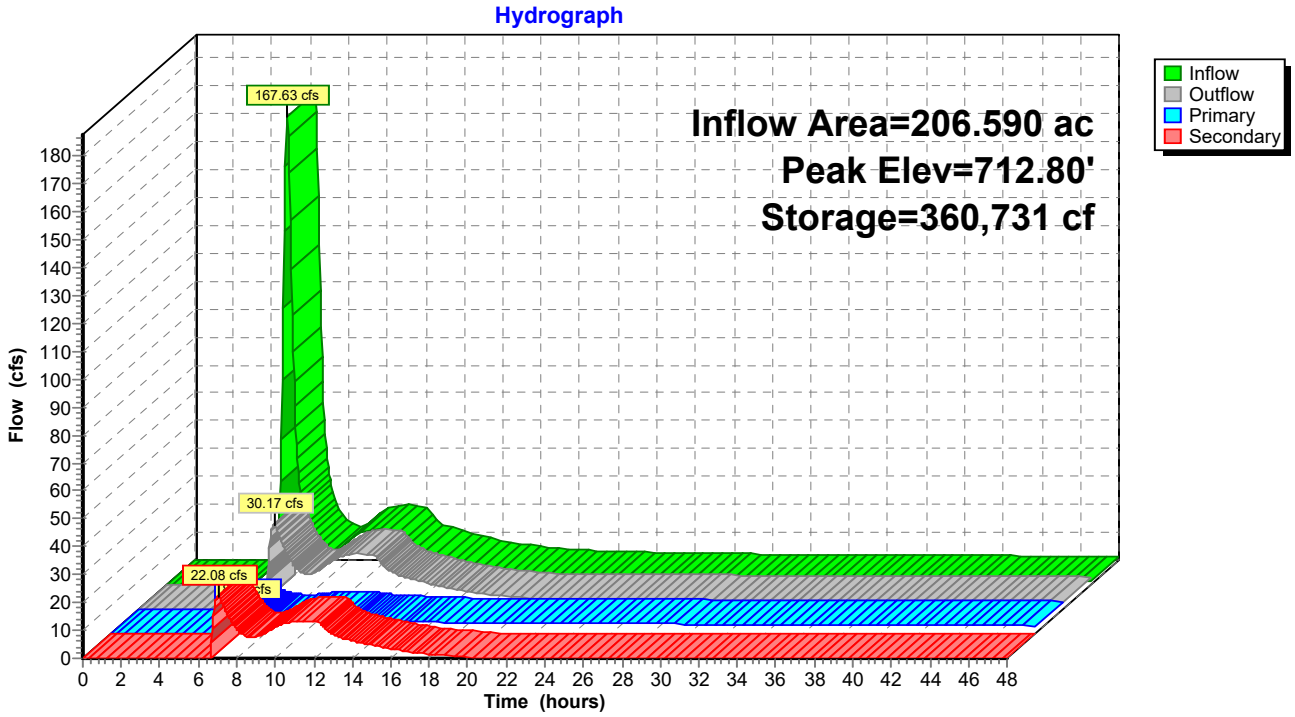
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=8.07 cfs @ 7.02 hrs HW=712.80' (Free Discharge)
└**1=Culvert** (Passes 8.07 cfs of 36.99 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 3.80 cfs @ 8.78 fps)
  └**3=Orifice/Grate** (Weir Controls 4.28 cfs @ 1.79 fps)

Secondary OutFlow Max=22.00 cfs @ 7.02 hrs HW=712.80' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 22.00 cfs @ 1.47 fps)

Pond PB-W: Basin W (Revised)



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 1.92" for 50-Year event
Inflow = 204.15 cfs @ 6.24 hrs, Volume= 32.984 af
Outflow = 66.22 cfs @ 6.71 hrs, Volume= 28.074 af, Atten= 68%, Lag= 28.7 min
Primary = 14.04 cfs @ 6.71 hrs, Volume= 14.628 af
Secondary = 52.19 cfs @ 6.71 hrs, Volume= 13.446 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 713.03' @ 6.71 hrs Surf.Area= 108,480 sf Storage= 385,623 cf

Plug-Flow detention time= 457.7 min calculated for 28.045 af (85% of inflow)
Center-of-Mass det. time= 256.2 min (1,031.7 - 775.5)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

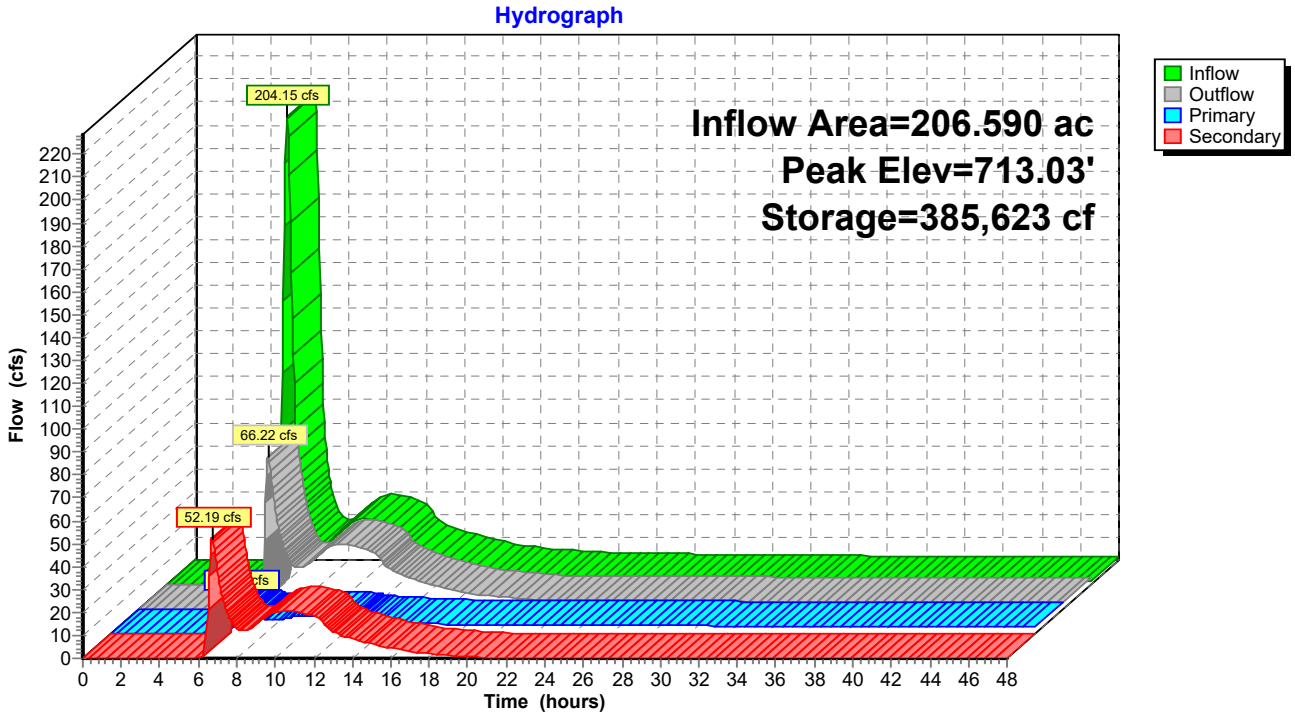
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.98 cfs @ 6.71 hrs HW=713.03' (Free Discharge)
└**1=Culvert** (Passes 13.98 cfs of 38.68 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 3.92 cfs @ 9.08 fps)
  └**3=Orifice/Grate** (Weir Controls 10.06 cfs @ 2.38 fps)

Secondary OutFlow Max=51.92 cfs @ 6.71 hrs HW=713.03' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 51.92 cfs @ 1.96 fps)

Pond PB-W: Basin W (Revised)



Summary for Pond PB-W: Basin W (Revised)

Inflow Area = 206.590 ac, 29.76% Impervious, Inflow Depth > 2.33" for 100-Year event
Inflow = 243.97 cfs @ 6.23 hrs, Volume= 40.056 af
Outflow = 110.25 cfs @ 6.58 hrs, Volume= 34.984 af, Atten= 55%, Lag= 20.7 min
Primary = 20.95 cfs @ 6.58 hrs, Volume= 15.855 af
Secondary = 89.30 cfs @ 6.58 hrs, Volume= 19.129 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 713.27' @ 6.58 hrs Surf.Area= 120,487 sf Storage= 412,525 cf

Plug-Flow detention time= 374.3 min calculated for 34.984 af (87% of inflow)
Center-of-Mass det. time= 200.4 min (946.8 - 746.4)

Volume	Invert	Avail.Storage	Storage Description
#1	709.10'	416,323 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
709.10	88,008	0	0	88,008
710.10	93,069	90,527	90,527	93,180
711.10	98,231	95,638	186,165	98,457
712.10	103,494	100,851	287,016	103,839
713.10	108,857	106,164	393,180	109,325
713.30	122,704	23,142	416,323	123,174

Device	Routing	Invert	Outlet Devices
#1	Primary	709.10'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 709.10' / 708.35' S= 0.0150 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	709.10'	**8.9" Vert. WQ Orifice/Grate** C= 0.600
#3	Device 1	712.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	712.50'	**50.0' long x 18.8' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=20.91 cfs @ 6.58 hrs HW=713.27' (Free Discharge)
└**1=Culvert** (Passes 20.91 cfs of 40.36 cfs potential flow)
  ├**2=WQ Orifice/Grate** (Orifice Controls 4.05 cfs @ 9.38 fps)
  └**3=Orifice/Grate** (Orifice Controls 16.86 cfs @ 4.22 fps)

Secondary OutFlow Max=88.92 cfs @ 6.58 hrs HW=713.27' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 88.92 cfs @ 2.32 fps)

Pond PB-W: Basin W (Revised)