

PRINCIPALS

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Established 1945

Drainage Memorandum
Preliminary Plat
Metcon Addition
Mankato
Prepared by: John H. Schulte V, PE

August 13, 2026

Introduction

Metcon intends to construct a new commercial / industrial subdivision off Adam Avenue Mankato. The project will include a new cul-de-sac from Adams Avenue, a right turn lane on Adams Avenue, sanitary sewer and water main extensions, and a wet stormwater treatment basin.

Basis of Design

The modeling that follows in this report was performed utilizing HydroCAD software. Pipes were sized utilizing State Plumbing Code and/or Rational Method Design and Manning's Equation. Rainfall was modeling with Atlas 14 Rainfall events.

Onsite soils per the Web Soil Survey and on-site borings show Hydric Type C/D clay soils. Infiltration as a method of stormwater treatment is therefore unavailable. Filtration was considered as an alternate method of treatment but a wet stormwater pond was selected to eliminate the costs of importing filtration viable materials as none exist on site, and to reduce the footprint required of the treatment basin. A filtration system would have required a higher outflow elevation to make room for the filtration materials, reducing the dry storage elevations available and thus increasing the overall basin footprint.

Existing Conditions

The site is bounded by Adams Avenue on the north, agricultural ground and a farm site to the east, CSAH 12 on the west and Madison Avenue to the south. The existing site is undeveloped and is maintained as agricultural row crop.

General surface water flows through the site east to west, with three wetlands scattered across the site. The site in general is very flat, with the three very shallow wetland basins providing almost no surface water storage. The eventual site discharge point is a centerline culvert under CSAH 12 near Madison Avenue discharging east to west.

Required Treatment

This site is greater than 1 acre and is thus required to provide stormwater treatment per the NPDES Construction Stormwater Permit with its associated 1" infiltration goal; a 1.1" Water Quality Volume requirement, and discharge rates controlled to not exceed existing conditions.

Below is a table of the requirements:

Platted Area:	14.47 acres
Proposed Impervious Surface:	10.56 acres
1" Infiltration Goal:	10.56 acres x 1" = 38333 cf
1.1" Water Quality Volume:	10.56 acres x 1.1" = 42166 cf
Basin Watershed Area:	15.03 acres
Wet Pond Wet Storage Volume:	15.03 acres x 1800 cf / acre = 27054 cf

Discussion of Proposed Improvements

The development of this site initially includes construction of Ponderosa Court and its associated roadway and utility infrastructure, the addition of a turn lane to Adams Avenue, and construction of the subdivision's wet stormwater pond. Future development will include the full buildout of the site's commercial and industrial lots. Right of Way for Evergreen Drive is being dedicated with this project, but there are currently no plans to construct that roadway.

Conveyance of stormwater flows to the wet stormwater pond is achieved via swales on the southeast and west sides of the development, while storm sewer will be constructed within Ponderosa Court.

Discussion of Proposed Stormwater Treatment

The wet stormwater pond is designed to treat the entire subdivision and a small portion of the farm site to the southeast that drains into the site. The area of Evergreen Drive is considered industrial development for the purposes of this design since there are currently no plans to construct it as a roadway.

The wet stormwater pond is designed to provide at least 1800 cf of wet volume per acre drained, to provide a Water Quality Volume of at least 1.1" of volume over the new impervious surface areas that discharges no faster than 5.66 cfs per acre of Water Quality Volume, and to not discharge faster than existing conditions to CSAH 12. Since infiltration is not viable at this site, that goal is not met. A summary of the requirements and design is below:

	Required	Designed
Wet Volume	27054 cf	113212 cf
1.1" Water Quality Volume	42166 cf	46520 cf
Water Quality Volume Rate	6.91 cfs	3.30 cfs
2-year Discharge Rate	9.68 cfs	6.73 cfs
10-year Discharge Rate	23.98 cfs	11.06 cfs
100-year Discharge Rate	47.27 cfs	16.14 cfs

Other Pertinent Pond Data:

Pond Bottom Elevation	1007
Normal Water Level Elevation	1011
Water Quality Volume Elevation	1011.85
High Water Level	1014.51
Emergency Overflow Elevation	1015
Top of Bank Elevation	1016
Minimum FFE Draining to Basin	1016.75

Summary

In summary, the site's proposed wet stormwater pond provides the required treatment and attenuation that reduces flows leaving the site to less than existing.

Certification

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



John H. Schulte V Date: 8/13/26

License No. 44639

Attachments:

Watershed Map
Calculations
Web Soil Survey
HydroCAD Model
Geotechnical Report

WATERSHED MAP

METCON ADDITION

BLOCK 1

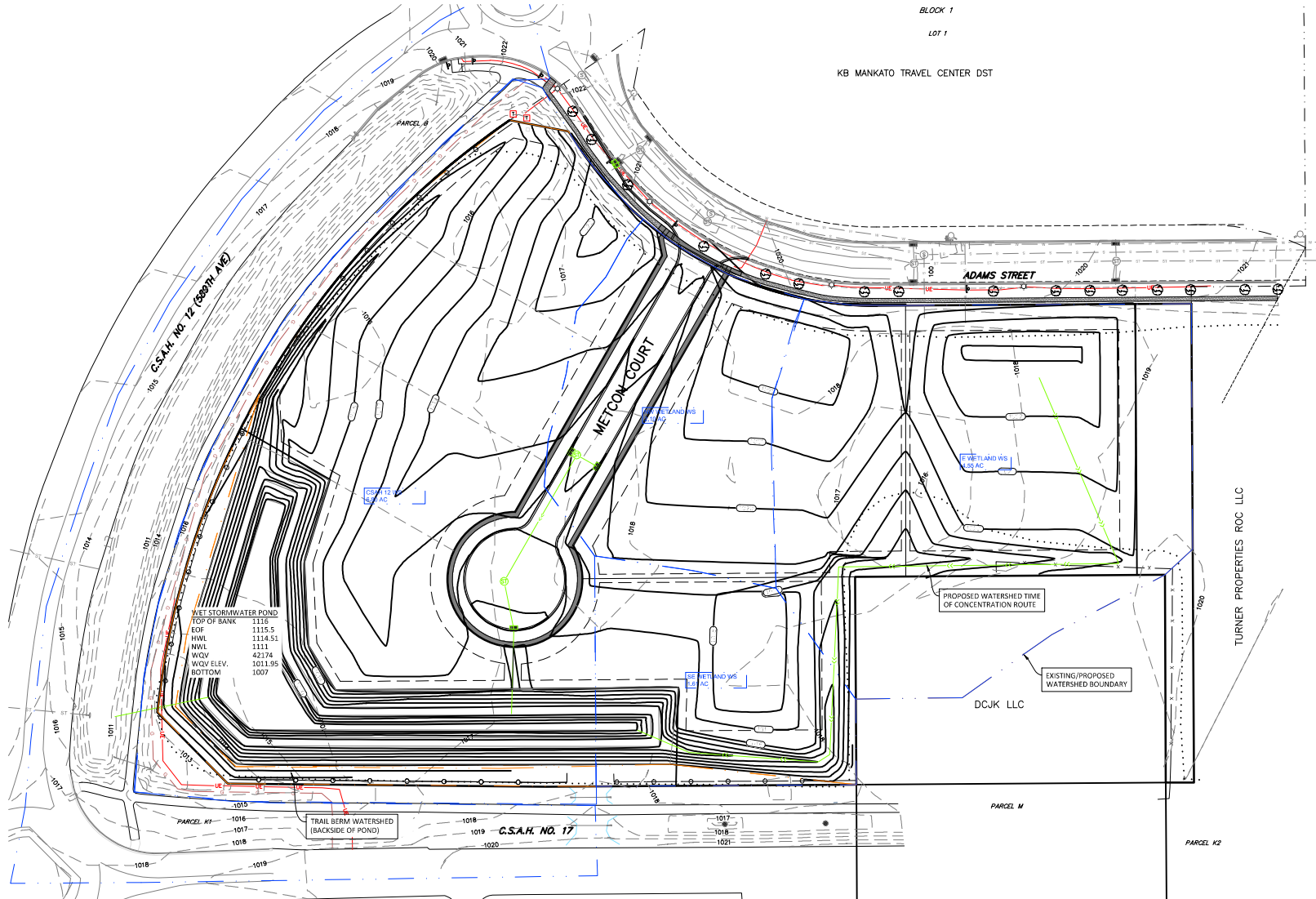
LOT 1

KB MANKATO TRAVEL CENTER DST



LEGEND

- W = Water Main
- S = Sanitary Sewer
- ST = Storm Sewer
- G = Gas Main
- UT = Underground Telephone
- OT = Overhead Telephone
- FO = Fiber-Optics
- UE = Underground Electric
- OE = Overhead Electric
- UTV = Underground TV
- JLM = Judicial Landmark
- X = Chain Link Fence
- O = Control Access
- Sign
- Stop Sign
- Light Pole
- Flood Lights
- Power Pole
- Guy Anchor
- Fire Hydrant
- Water Main Valve
- Culvert
- Catch Basin & Catch Basin Numbers
- Manholes & Manhole Numbers
- Elevation Contour Line
- Spot Elevation
- Rim Elevation
- Flow Line Elevation
- Deciduous Tree
- Coniferous Tree
- Bush



DRAWINGS ON 11x17 SHEETS ARE HALF SCALE

REV.	BY	DATE	REVISION DESCRIPTION



DESIGNED: JWS
 DRAWING: JWS
 CHECKED: BJ
 Date: 7/28/26
 DWG: 25-1234PP

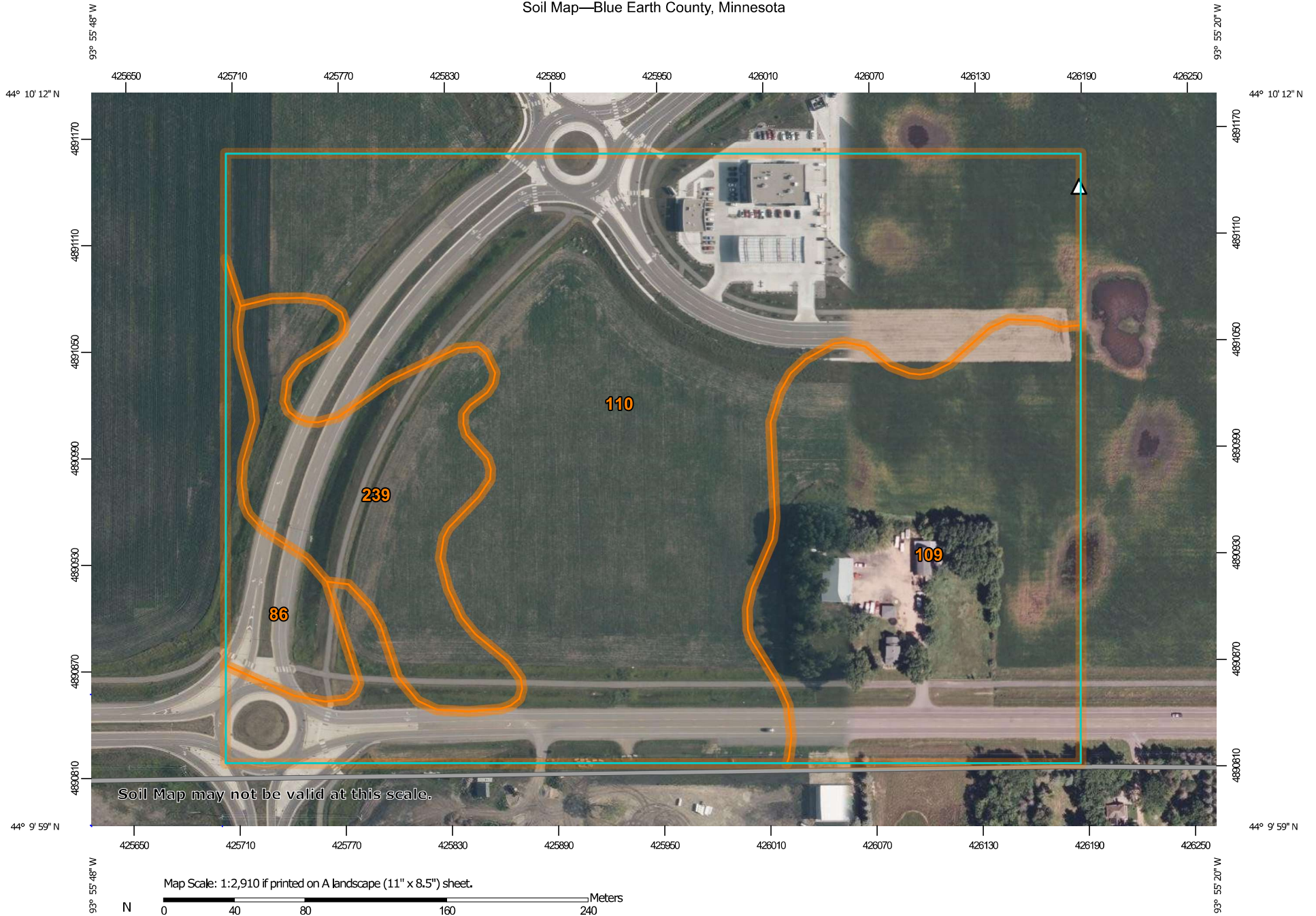
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
 John H. Schulte V
 License No. 44639 Date: 7/28/26

PRELIMINARY PLAT
 METCON ADDITION
 PART OF SW1/4 SECTION 11-T108N-R26W
 WATERSHEDS MAP

SHEET
 1 OF
 1

WEB SOIL SURVEY

Soil Map—Blue Earth County, Minnesota



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

7/20/2026
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Blue Earth County, Minnesota

Survey Area Data: Version 23, Sep 9, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 30, 2020—Aug 8, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
86	Canisteo clay loam, 0 to 2 percent slopes	1.7	4.1%
109	Cordova clay loam, 0 to 2 percent slopes	10.2	24.7%
110	Marna silty clay loam, 0 to 2 percent slopes	24.6	59.7%
239	Le Sueur loam, 1 to 3 percent slopes	4.7	11.5%
Totals for Area of Interest		41.2	100.0%

CALCULATIONS

25-1243

MSE 24-hr 3 100-Year Rainfall=7.41"

Prepared by Jones Haugh & Smith Inc

Printed 8/13/2026

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Stage-Area-Storage for Pond 23P: Metcon Addn Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,011.00	47,057	0	1,011.52	50,800	25,443
1,011.01	47,129	471	1,011.53	50,872	25,951
1,011.02	47,201	943	1,011.54	50,944	26,460
1,011.03	47,273	1,415	1,011.55	51,016	26,970
1,011.04	47,345	1,888	1,011.56	51,088	27,481
1,011.05	47,417	2,362	1,011.57	51,160	27,992
1,011.06	47,489	2,836	1,011.58	51,232	28,504
1,011.07	47,561	3,312	1,011.59	51,304	29,016
1,011.08	47,633	3,788	1,011.60	51,376	29,530
1,011.09	47,705	4,264	1,011.61	51,448	30,044
1,011.10	47,777	4,742	1,011.62	51,520	30,559
1,011.11	47,849	5,220	1,011.63	51,592	31,074
1,011.12	47,921	5,699	1,011.64	51,664	31,591
1,011.13	47,993	6,178	1,011.65	51,736	32,108
1,011.14	48,065	6,659	1,011.66	51,808	32,625
1,011.15	48,137	7,140	1,011.67	51,880	33,144
1,011.16	48,209	7,621	1,011.68	51,952	33,663
1,011.17	48,281	8,104	1,011.69	52,023	34,183
1,011.18	48,353	8,587	1,011.70	52,095	34,703
1,011.19	48,425	9,071	1,011.71	52,167	35,225
1,011.20	48,497	9,555	1,011.72	52,239	35,747
1,011.21	48,569	10,041	1,011.73	52,311	36,269
1,011.22	48,641	10,527	1,011.74	52,383	36,793
1,011.23	48,712	11,013	1,011.75	52,455	37,317
1,011.24	48,784	11,501	1,011.76	52,527	37,842
1,011.25	48,856	11,989	1,011.77	52,599	38,368
1,011.26	48,928	12,478	1,011.78	52,671	38,894
1,011.27	49,000	12,968	1,011.79	52,743	39,421
1,011.28	49,072	13,458	1,011.80	52,815	39,949
1,011.29	49,144	13,949	1,011.81	52,887	40,477
1,011.30	49,216	14,441	1,011.82	52,959	41,007
1,011.31	49,288	14,934	1,011.83	53,031	41,537
1,011.32	49,360	15,427	1,011.84	53,103	42,067
1,011.33	49,432	15,921	1,011.85	53,175	42,599
1,011.34	49,504	16,415	1,011.86	53,247	43,131
1,011.35	49,576	16,911	1,011.87	53,319	43,664
1,011.36	49,648	17,407	1,011.88	53,391	44,197
1,011.37	49,720	17,904	1,011.89	53,463	44,731
1,011.38	49,792	18,401	1,011.90	53,535	45,266
1,011.39	49,864	18,900	1,011.91	53,607	45,802
1,011.40	49,936	19,399	1,011.92	53,679	46,339
1,011.41	50,008	19,898	1,011.93	53,751	46,876
1,011.42	50,080	20,399	1,011.94	53,823	47,414
1,011.43	50,152	20,900	1,011.95	53,895	47,952
1,011.44	50,224	21,402	1,011.96	53,967	48,491
1,011.45	50,296	21,904	1,011.97	54,039	49,031
1,011.46	50,368	22,408	1,011.98	54,111	49,572
1,011.47	50,440	22,912	1,011.99	54,183	50,114
1,011.48	50,512	23,417	1,012.00	54,255	50,656
1,011.49	50,584	23,922	1,012.01	54,327	51,199
1,011.50	50,656	24,428	1,012.02	54,399	51,742
1,011.51	50,728	24,935	1,012.03	54,471	52,287

Rec'd
West
$$\frac{53247}{43540} \times 5.46 =$$

6.91 cfs

25-1243

MSE 24-hr 3 100-Year Rainfall=7.41"

Prepared by Jones Haugh & Smith Inc

Printed 8/13/2026

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Hydrograph for Pond 23P: Metcon Addn Pond (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
10.20	3.28	21,447	1,011.44	0.98
10.25	3.32	21,862	1,011.45	1.01
10.30	3.36	22,277	1,011.46	1.05
10.35	3.39	22,691	1,011.47	1.09
10.40	3.42	23,106	1,011.47	1.12
10.45	3.45	23,519	1,011.48	1.16
10.50	3.49	23,932	1,011.49	1.20
10.55	3.64	24,355	1,011.50	1.23
10.60	4.21	24,835	1,011.51	1.28
10.65	4.87	25,417	1,011.52	1.34
10.70	5.41	26,096	1,011.53	1.40
10.75	5.84	26,850	1,011.55	1.47
10.80	6.26	27,666	1,011.56	1.55
10.85	6.65	28,541	1,011.58	1.64
10.90	7.06	29,471	1,011.60	1.73
10.95	7.45	30,456	1,011.62	1.84
11.00	7.86	31,493	1,011.64	1.95
11.05	8.25	32,581	1,011.66	2.07
11.10	8.67	33,721	1,011.68	2.19
11.15	9.08	34,912	1,011.70	2.33
11.20	9.51	36,153	1,011.73	2.47
11.25	9.92	37,443	1,011.75	2.62
11.30	10.35	38,781	1,011.78	2.78
11.35	10.77	40,167	1,011.80	2.95
11.40	11.21	41,599	1,011.83	3.12
11.45	11.63	43,076	1,011.86	3.30
11.50	12.07	44,597	1,011.89	3.49
11.55	12.83	46,192	1,011.92	3.69
11.60	14.89	48,001	1,011.95	3.92
11.65	17.45	50,180	1,011.99	4.20
11.70	20.48	52,808	1,012.04	4.54
11.75	23.73	55,935	1,012.10	4.94
11.80	28.24	59,681	1,012.16	5.41
11.85	33.33	64,199	1,012.25	5.96
11.90	40.07	69,676	1,012.34	6.58
11.95	49.14	76,463	1,012.46	7.22
12.00	66.76	85,531	1,012.62	7.92
12.05	89.43	98,079	1,012.83	8.84
12.10	123.37	115,547	1,013.11	9.87
12.15	146.53	137,968	1,013.47	10.90
12.20	121.52	160,051	1,013.80	11.79
12.25	83.00	176,281	1,014.04	12.39
12.30	59.48	186,841	1,014.19	12.75
12.35	45.97	194,015	1,014.29	12.99
12.40	37.07	199,135	1,014.37	13.16
12.45	30.78	202,862	1,014.42	13.28
12.50	25.98	205,573	1,014.46	13.36
12.55	22.20	207,498	1,014.48	13.42
12.60	18.75	208,763	1,014.50	13.46
12.65	15.96	209,462	1,014.51	13.48
12.70	14.42	209,768	1,014.51	13.49
12.75	13.57	209,858	1,014.51	13.50

vs 6.91 cfs ✓

25-1243

MSE 24-hr 3 2-Year Rainfall=2.92"

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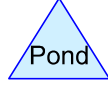
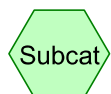
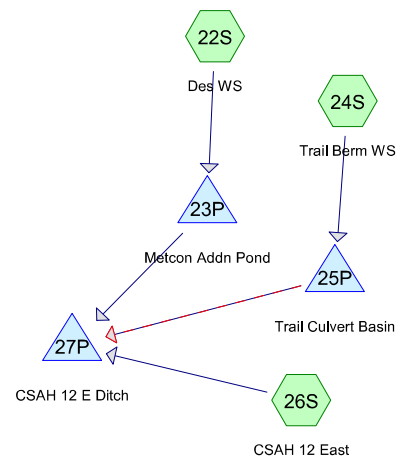
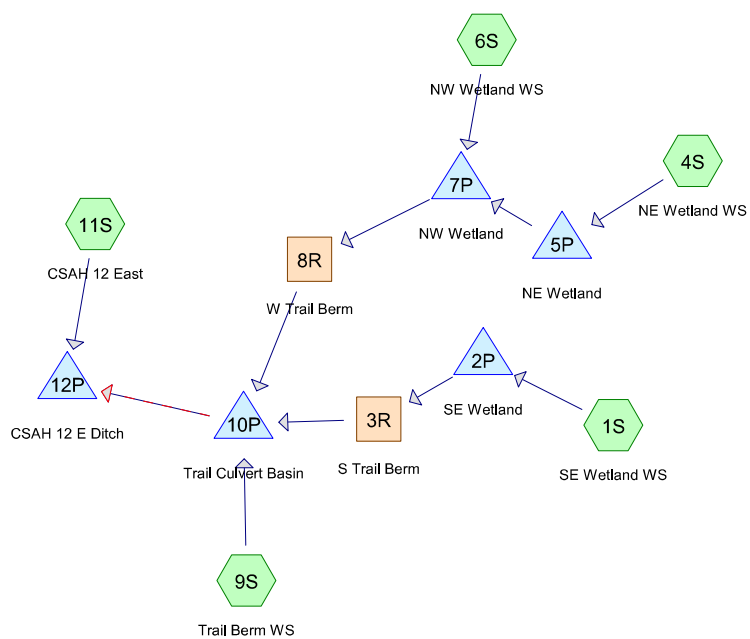
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Hydrograph for Pond 3P: (new Pond) (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
10.20	0.73	3,521	1,011.08	0.04
10.25	0.75	3,647	1,011.09	0.04
10.30	0.76	3,775	1,011.09	0.04
10.35	0.77	3,906	1,011.09	0.04
10.40	0.79	4,038	1,011.10	0.05
10.45	0.80	4,173	1,011.10	0.05
10.50	0.82	4,309	1,011.10	0.05
10.55	0.86	4,450	1,011.11	0.06
10.60	1.00	4,607	1,011.11	0.06
10.65	1.17	4,790	1,011.11	0.07
10.70	1.31	5,001	1,011.12	0.08
10.75	1.43	5,234	1,011.12	0.08
10.80	1.55	5,486	1,011.13	0.09
10.85	1.67	5,759	1,011.14	0.10
10.90	1.79	6,051	1,011.14	0.11
10.95	1.91	6,364	1,011.15	0.12
11.00	2.04	6,696	1,011.16	0.13
11.05	2.16	7,048	1,011.17	0.15
11.10	2.30	7,421	1,011.18	0.17
11.15	2.43	7,816	1,011.19	0.18
11.20	2.57	8,232	1,011.20	0.20
11.25	2.71	8,669	1,011.21	0.22
11.30	2.86	9,129	1,011.22	0.25
11.35	3.01	9,611	1,011.23	0.28
11.40	3.17	10,115	1,011.24	0.30
11.45	3.32	10,641	1,011.25	0.33
11.50	3.48	11,190	1,011.26	0.37
11.55	3.74	11,770	1,011.28	0.40
11.60	4.39	12,425	1,011.29	0.45
11.65	5.20	13,203	1,011.31	0.50
11.70	6.18	14,131	1,011.33	0.57
11.75	7.26	15,231	1,011.36	0.65
11.80	8.77	16,546	1,011.39	0.76
11.85	10.50	18,130	1,011.42	0.90
11.90	12.84	20,052	1,011.46	1.08
11.95	16.02	22,433	1,011.52	1.33
12.00	22.22	25,604	1,011.59	1.68
12.05	30.40	29,991	1,011.68	2.20
12.10	42.91	36,120	1,011.81	3.01
12.15	51.89	44,012	1,011.98	4.11
12.20	43.52	51,760	1,012.14	5.21
12.25	29.97	57,367	1,012.25	5.98
12.30	21.63	60,894	1,012.32	6.43
12.35	16.82	63,172	1,012.36	6.70
12.40	13.62	64,690	1,012.39	6.87
12.45	11.35	65,690	1,012.41	6.98
12.50	9.60	66,314	1,012.42	7.04
12.55	8.22	66,648	1,012.43	7.07
12.60	6.95	66,739	1,012.43	7.08
12.65	5.92	66,624	1,012.43	7.07
12.70	5.36	66,369	1,012.43	7.04
12.75	5.04	66,040	1,012.42	7.01

✓
vs 4.2

HYDROCAD MODEL



Routing Diagram for 25-1243

Prepared by Jones Haugh & Smith Inc, Printed 8/13/2026
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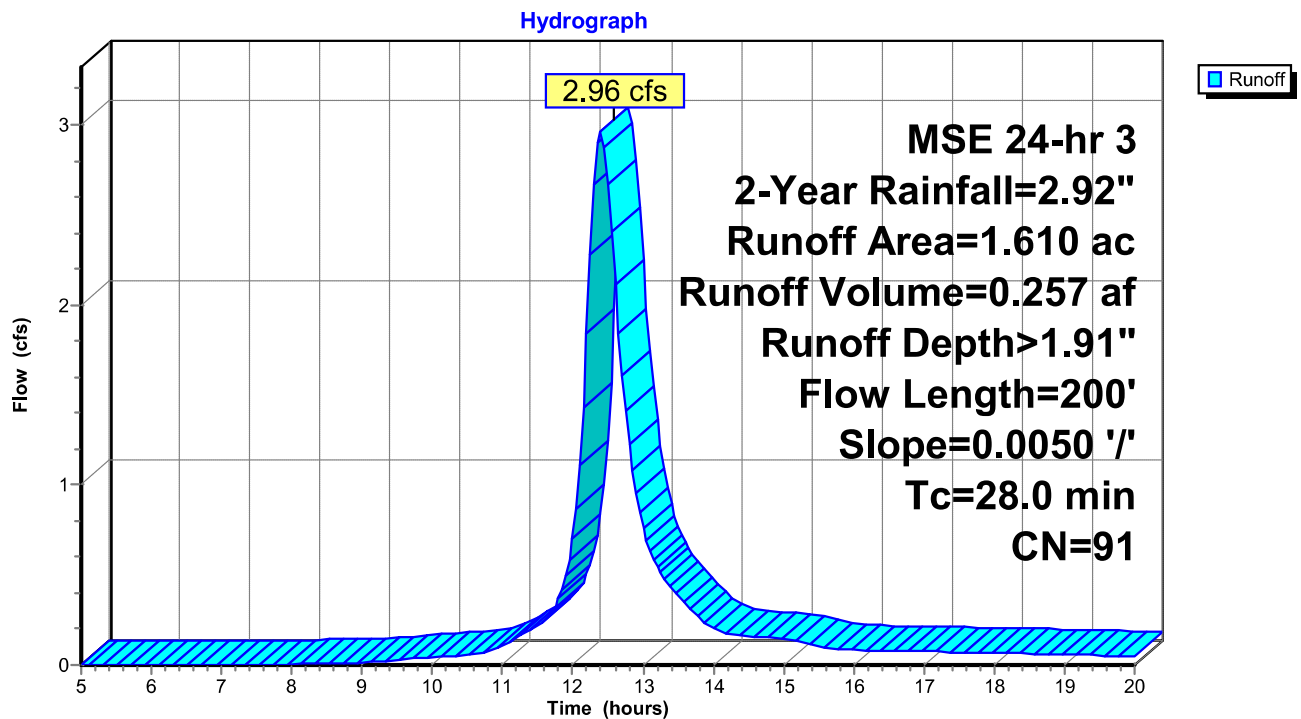
Summary for Subcatchment 1S: SE Wetland WS

Runoff = 2.96 cfs @ 12.40 hrs, Volume= 0.257 af, Depth> 1.91"
 Routed to Pond 2P : SE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
1.610	91	Row crops, straight row, Poor, HSG D
1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"

Subcatchment 1S: SE Wetland WS

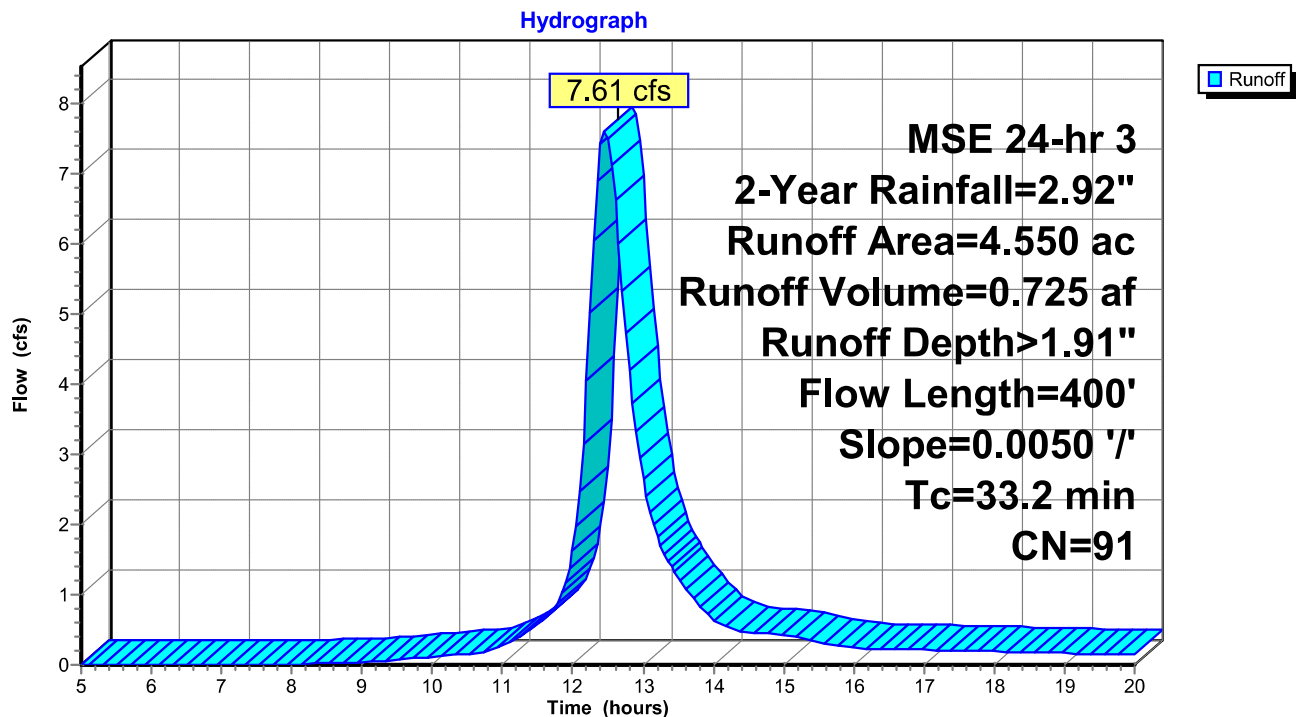
Summary for Subcatchment 4S: NE Wetland WS

Runoff = 7.61 cfs @ 12.46 hrs, Volume= 0.725 af, Depth> 1.91"
 Routed to Pond 5P : NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
4.190	91	Row crops, straight row, Poor, HSG D
0.360	86	Farmsteads, HSG D
4.550	91	Weighted Average
4.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"
5.2	200	0.0050	0.64		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
33.2	400	Total			

Subcatchment 4S: NE Wetland WS

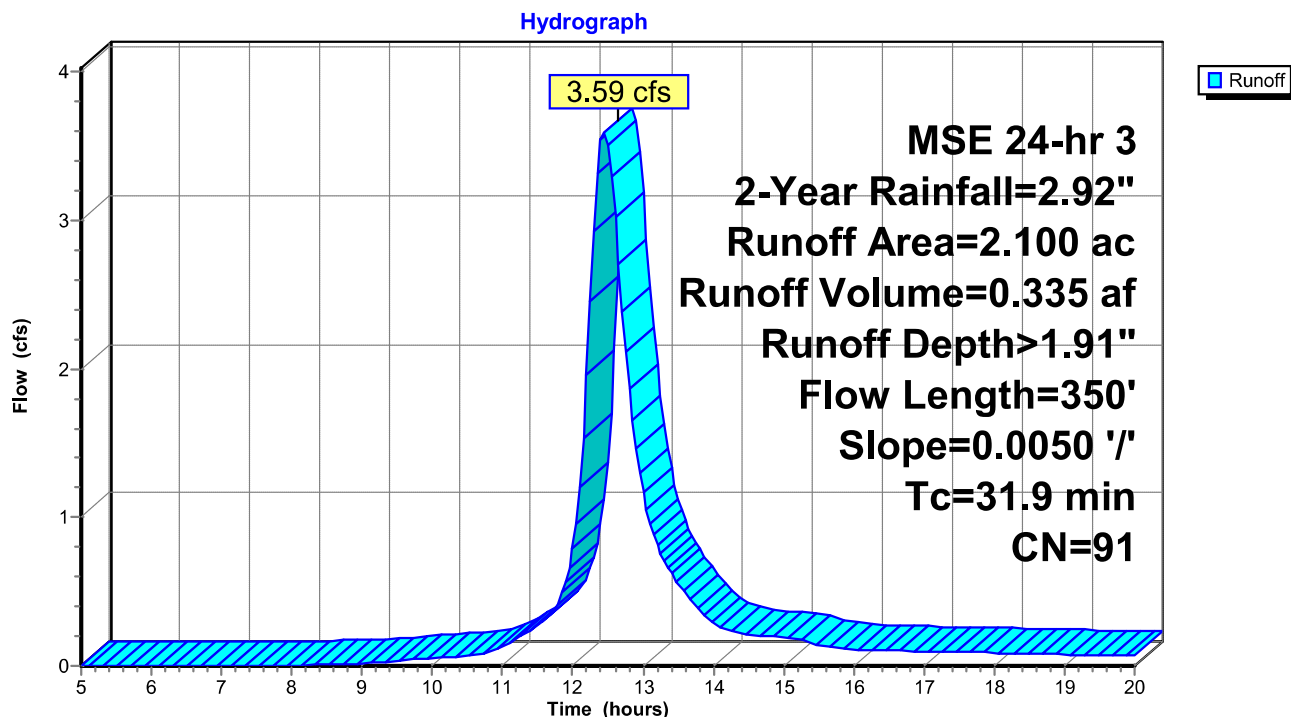
Summary for Subcatchment 6S: NW Wetland WS

Runoff = 3.59 cfs @ 12.44 hrs, Volume= 0.335 af, Depth> 1.91"
 Routed to Pond 7P : NW Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
2.100	91	Row crops, straight row, Poor, HSG D
2.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"
3.9	150	0.0050	0.64		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
31.9	350	Total			

Subcatchment 6S: NW Wetland WS

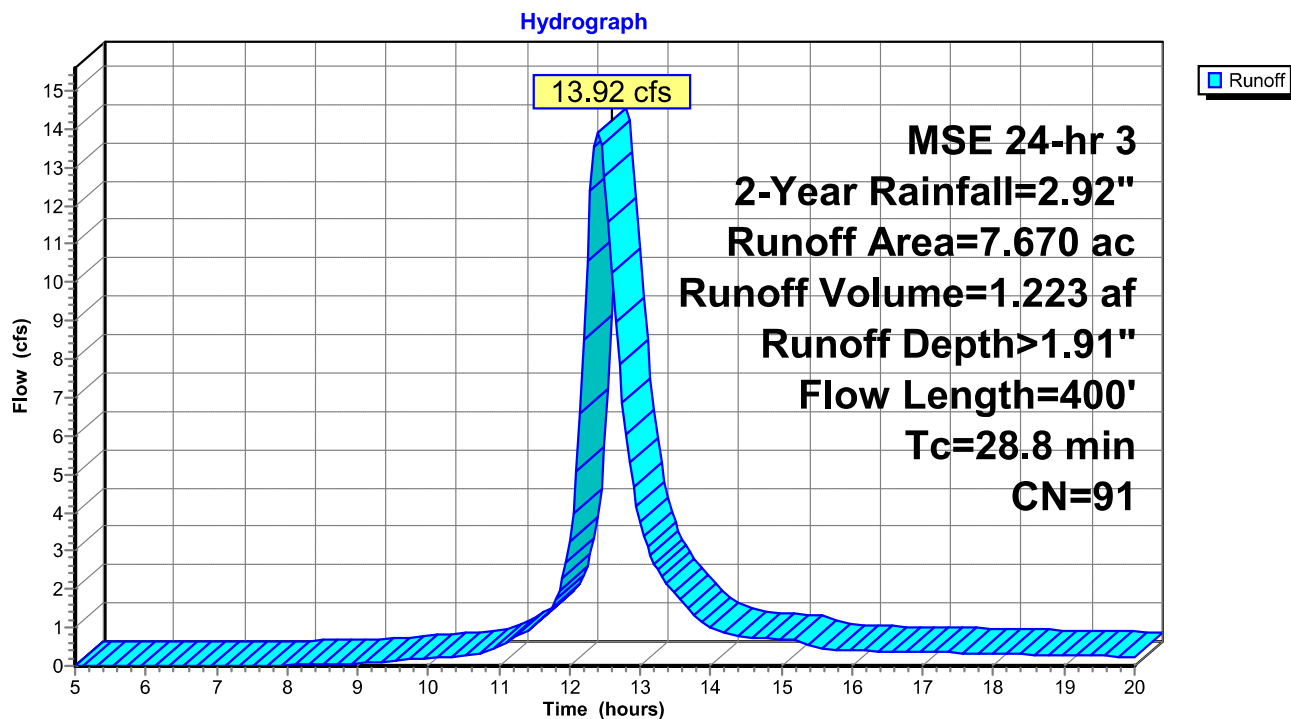
Summary for Subcatchment 9S: Trail Berm WS

Runoff = 13.92 cfs @ 12.40 hrs, Volume= 1.223 af, Depth> 1.91"
 Routed to Pond 10P : Trail Culvert Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
7.670	91	Row crops, straight row, Poor, HSG D
7.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	200	0.0050	0.27		Sheet Flow, Cultivated: Residue<=20% n= 0.060 P2= 4.40"
16.6	200	0.0005	0.20		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
28.8	400	Total			

Subcatchment 9S: Trail Berm WS

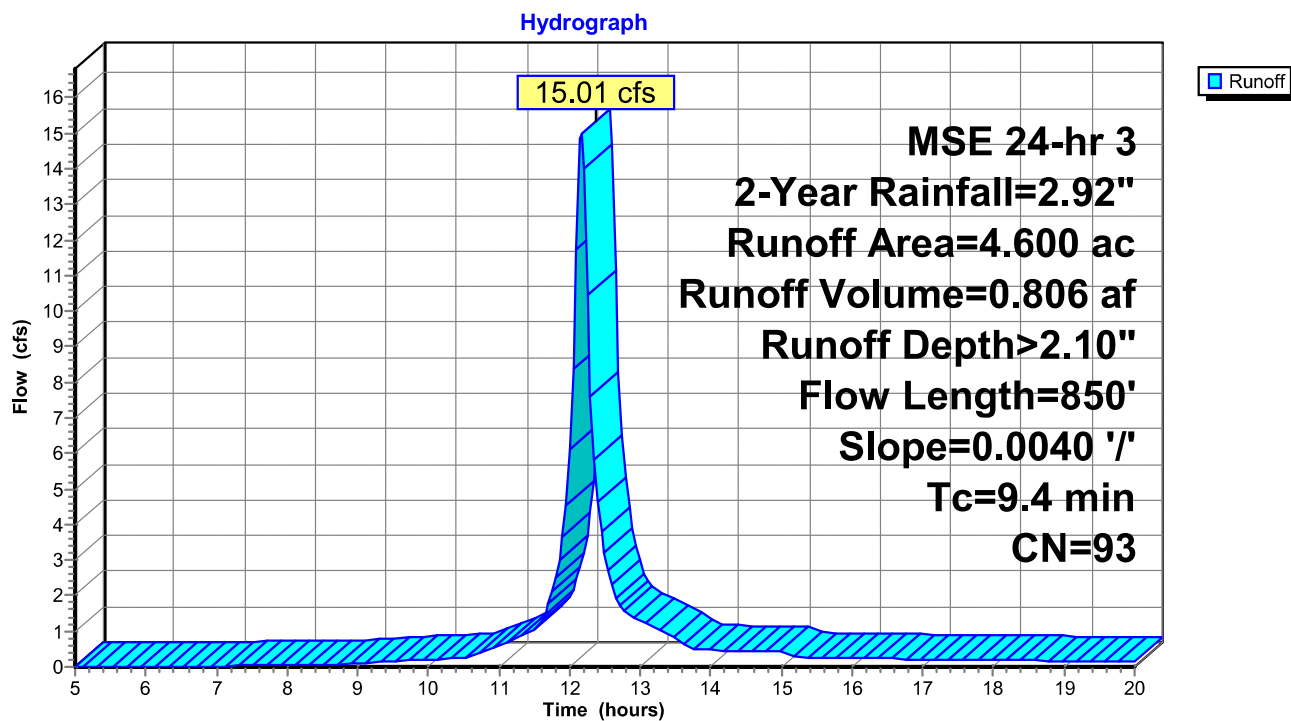
Summary for Subcatchment 11S: CSAH 12 East

Runoff = 15.01 cfs @ 12.16 hrs, Volume= 0.806 af, Depth> 2.10"
 Routed to Pond 12P : CSAH 12 E Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
4.600	93	Paved roads w/open ditches, 50% imp, HSG D
2.300		50.00% Pervious Area
2.300		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
2.4	450	0.0040	3.12	100.00	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=2.00' Z= 6.0 & 3.0 '/' Top.W=25.00' n= 0.035 Earth, dense weeds
9.4	850	Total			

Subcatchment 11S: CSAH 12 East

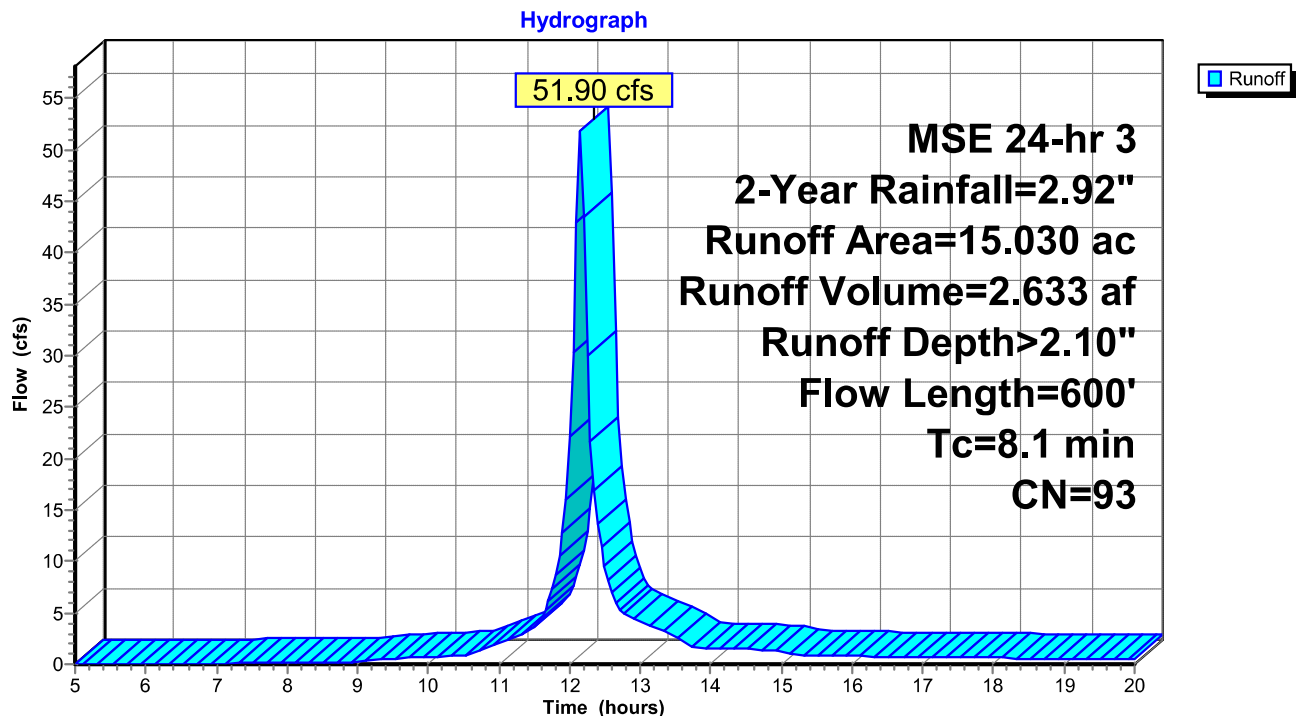
Summary for Subcatchment 22S: Des WS

Runoff = 51.90 cfs @ 12.15 hrs, Volume= 2.633 af, Depth> 2.10"
 Routed to Pond 23P : Metcon Addn Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
14.670	93	Urban industrial, 72% imp, HSG D
0.360	86	Farmsteads, HSG D
15.030	93	Weighted Average
4.468		29.72% Pervious Area
10.562		70.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	200	0.0200	1.85		Sheet Flow, Smooth surfaces n= 0.011 P2= 4.40"
6.3	400	0.0050	1.06		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
8.1	600	Total			

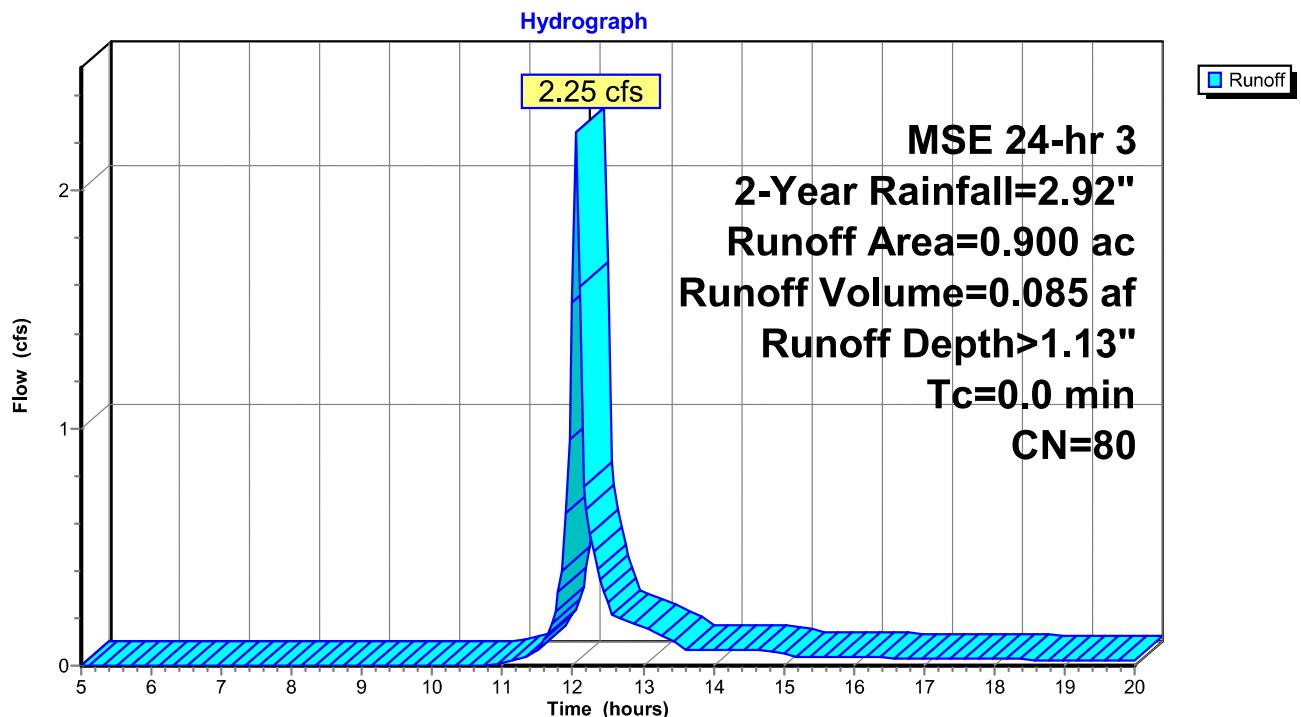
Subcatchment 22S: Des WS

Summary for Subcatchment 24S: Trail Berm WS

Runoff = 2.25 cfs @ 12.05 hrs, Volume= 0.085 af, Depth> 1.13"
 Routed to Pond 25P : Trail Culvert Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
0.900	80	>75% Grass cover, Good, HSG D
0.900		100.00% Pervious Area

Subcatchment 24S: Trail Berm WS

25-1243

Prepared by Jones Haugh & Smith Inc

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MSE 24-hr 3 2-Year Rainfall=2.92"

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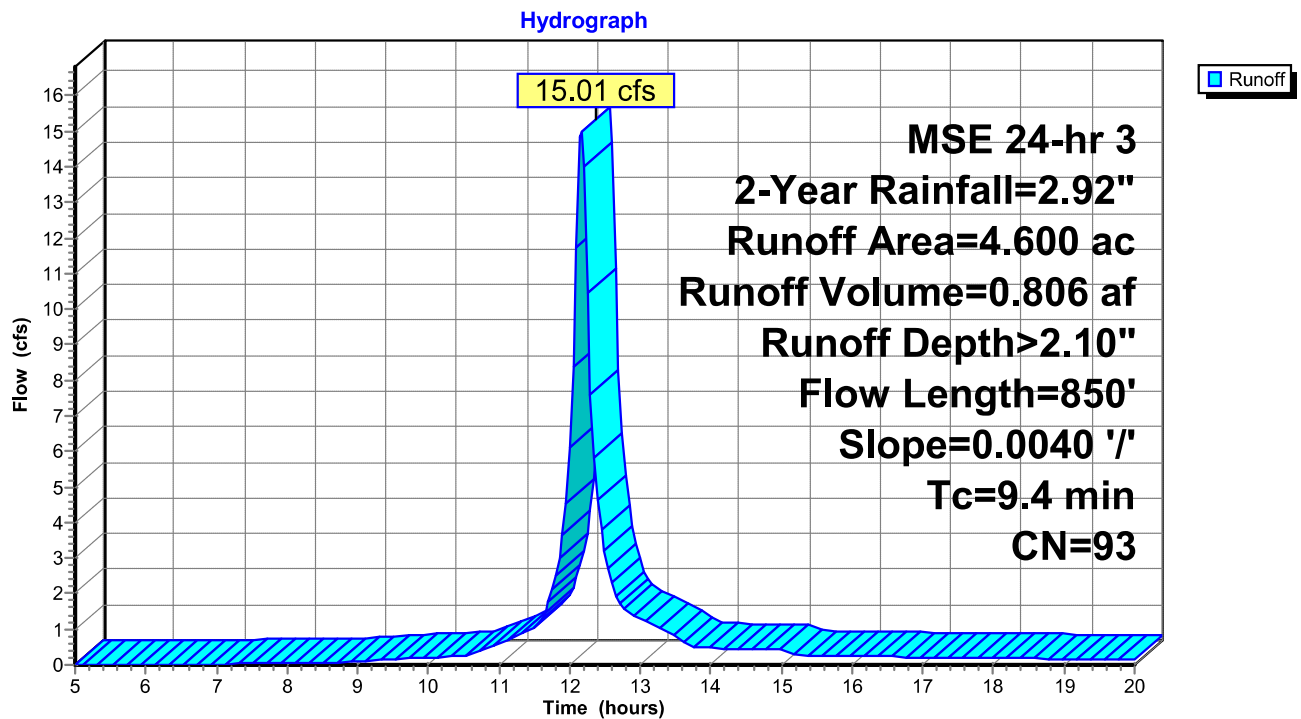
Summary for Subcatchment 26S: CSAH 12 East

Runoff = 15.01 cfs @ 12.16 hrs, Volume= 0.806 af, Depth> 2.10"
 Routed to Pond 27P : CSAH 12 E Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-Year Rainfall=2.92"

Area (ac)	CN	Description
4.600	93	Paved roads w/open ditches, 50% imp, HSG D
2.300		50.00% Pervious Area
2.300		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
2.4	450	0.0040	3.12	100.00	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=2.00' Z= 6.0 & 3.0 '/' Top.W=25.00' n= 0.035 Earth, dense weeds
9.4	850	Total			

Subcatchment 26S: CSAH 12 East

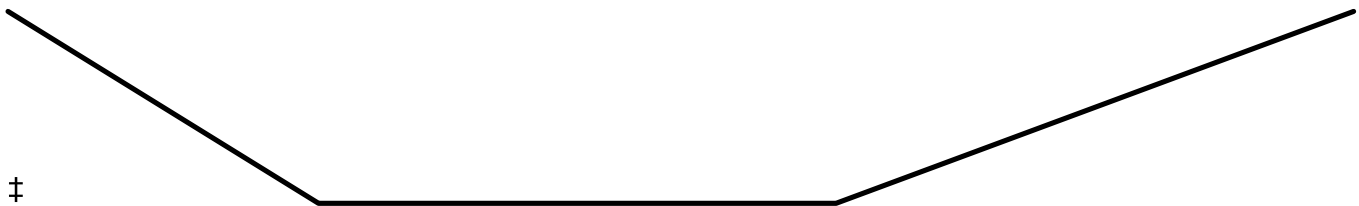
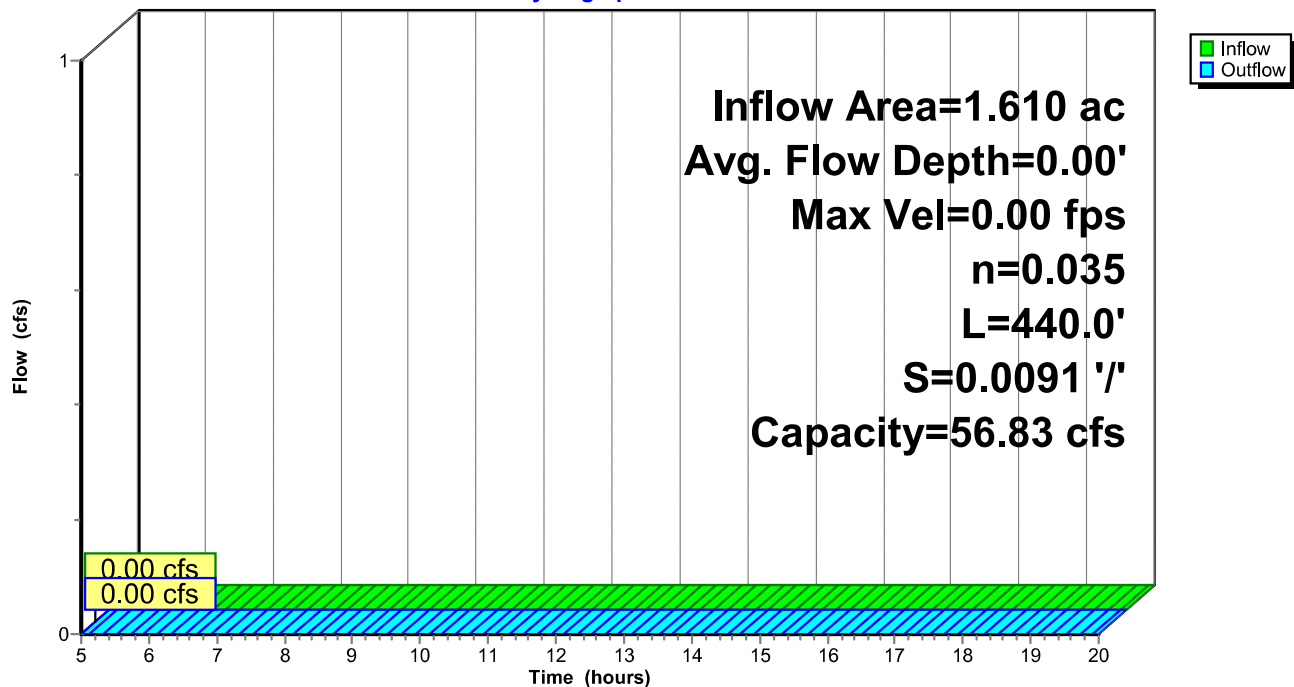
Summary for Reach 3R: S Trail Berm

Inflow Area = 1.610 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 10P : Trail Culvert Basin

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 56.83 cfs

10.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 6.0 10.0 '/' Top Width= 26.00'
Length= 440.0' Slope= 0.0091 '/'
Inlet Invert= 1,016.00', Outlet Invert= 1,012.00'

**Reach 3R: S Trail Berm****Hydrograph**

Summary for Reach 8R: W Trail Berm

Inflow Area = 6.650 ac, 0.00% Impervious, Inflow Depth > 0.55" for 2-Year event
 Inflow = 3.48 cfs @ 12.51 hrs, Volume= 0.303 af
 Outflow = 3.11 cfs @ 12.80 hrs, Volume= 0.299 af, Atten= 11%, Lag= 17.5 min
 Routed to Pond 10P : Trail Culvert Basin

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 1.30 fps, Min. Travel Time= 9.9 min

Avg. Velocity= 0.60 fps, Avg. Travel Time= 21.4 min

Peak Storage= 1,855 cf @ 12.63 hrs

Average Depth at Peak Storage= 0.35' , Surface Width= 9.62'

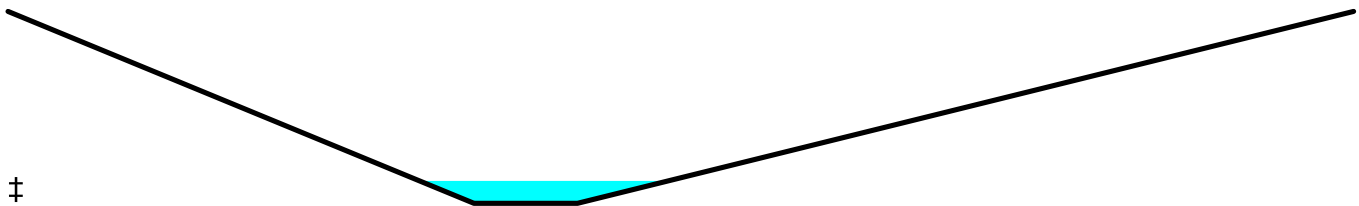
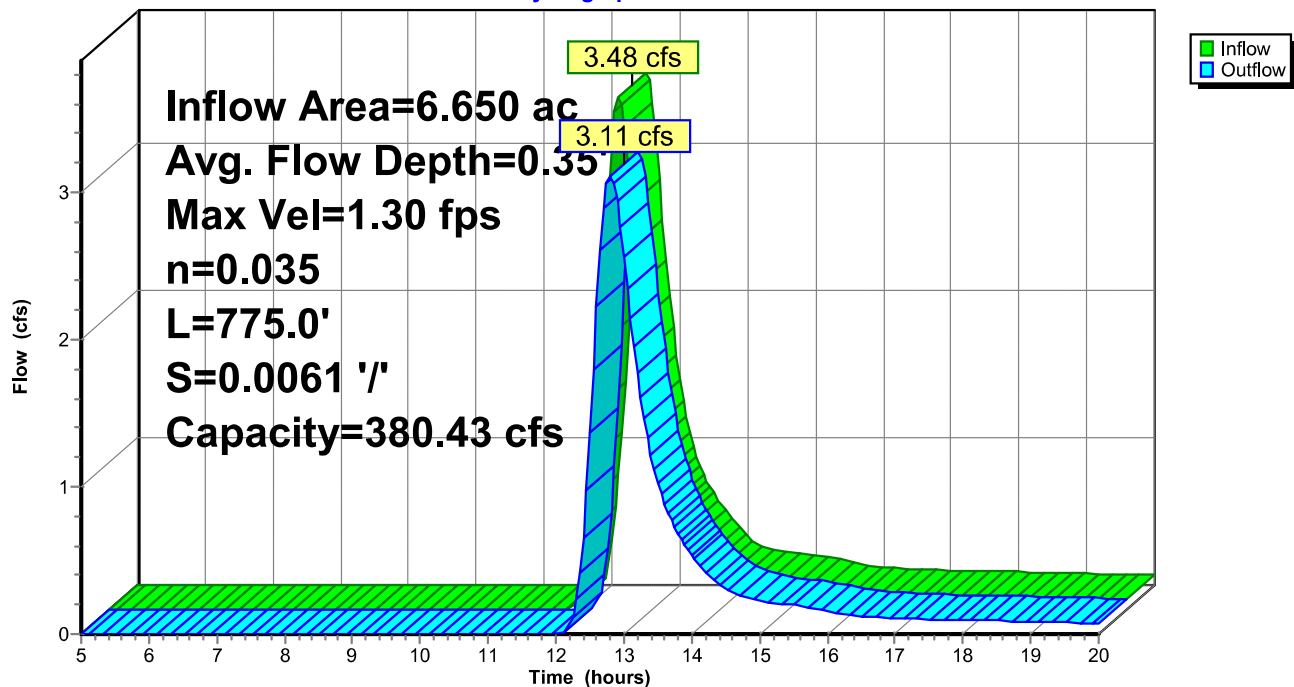
Bank-Full Depth= 3.00' Flow Area= 84.0 sf, Capacity= 380.43 cfs

4.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds

Side Slope Z-value= 6.0 10.0 '/' Top Width= 52.00'

Length= 775.0' Slope= 0.0061 '/'

Inlet Invert= 1,016.70', Outlet Invert= 1,012.00'

**Reach 8R: W Trail Berm****Hydrograph**

Summary for Pond 2P: SE Wetland

Inflow Area = 1.610 ac, 0.00% Impervious, Inflow Depth > 1.91" for 2-Year event
 Inflow = 2.96 cfs @ 12.40 hrs, Volume= 0.257 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Reach 3R : S Trail Berm

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.78' @ 20.00 hrs Surf.Area= 41,990 sf Storage= 11,182 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.25'	22,174 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

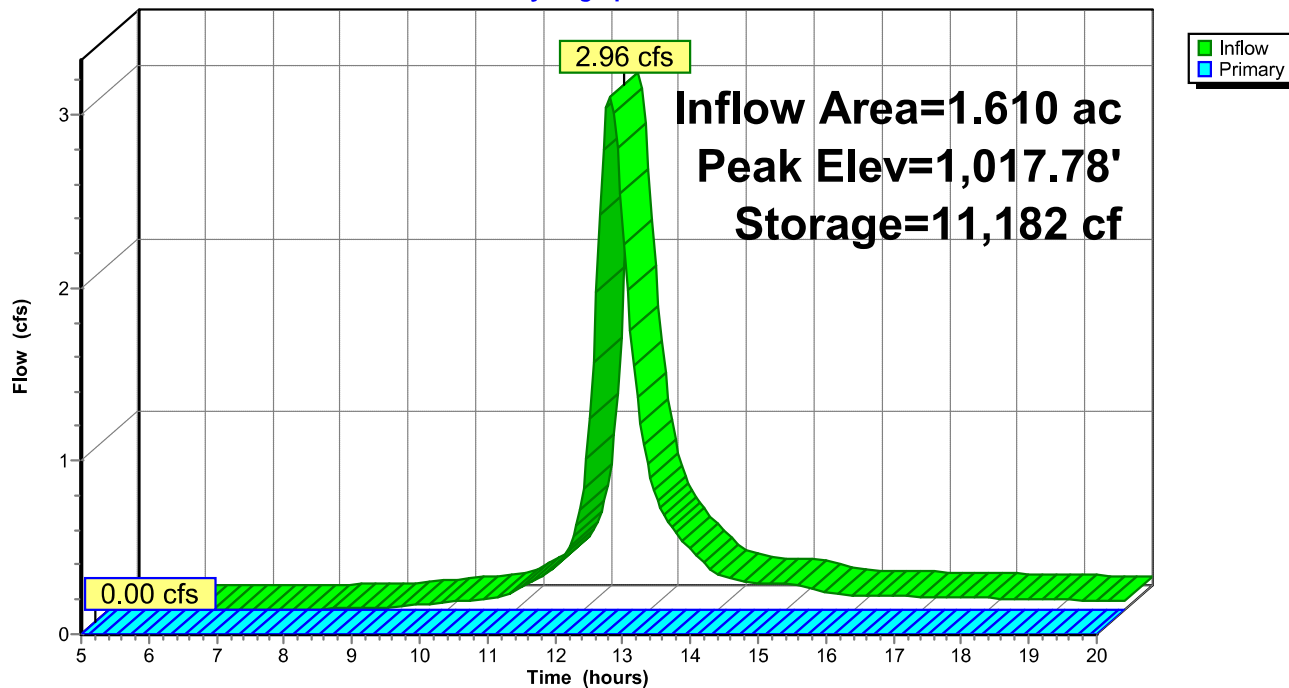
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.25	0	0	0
1,018.00	59,130	22,174	22,174

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.90'	100.0' long + 100.0 ' SideZ 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=0.00 cfs @ 5.00 hrs HW=1,017.25' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: SE Wetland

Hydrograph



Summary for Pond 5P: NE Wetland

Inflow Area = 4.550 ac, 0.00% Impervious, Inflow Depth > 1.91" for 2-Year event
 Inflow = 7.61 cfs @ 12.46 hrs, Volume= 0.725 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 7P : NW Wetland

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.48' @ 20.00 hrs Surf.Area= 51,399 sf Storage= 31,557 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	1,016.00'	65,093 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,016.00	0	0	0
1,017.00	25,742	12,871	12,871
1,018.00	78,702	52,222	65,093

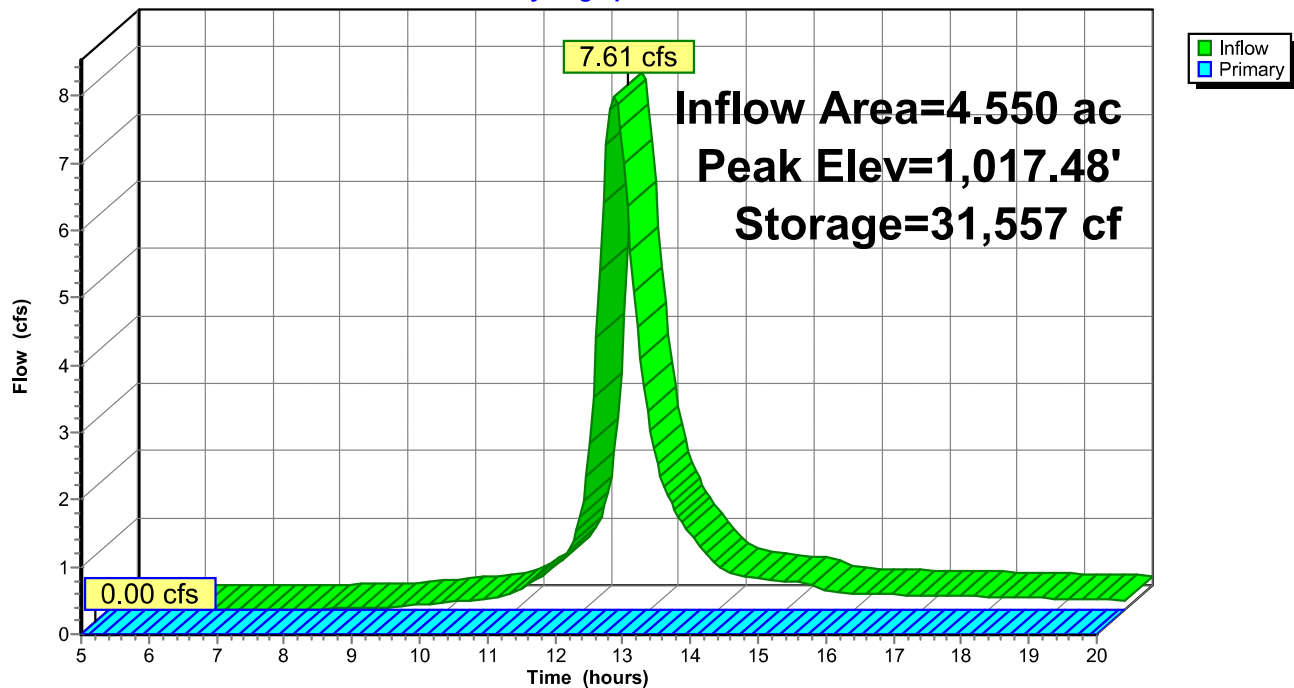
Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.56'	75.0' long + 100.0 ' SideZ x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,016.00' (Free Discharge)

↑ **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: NE Wetland

Hydrograph



Summary for Pond 7P: NW Wetland

Inflow Area = 6.650 ac, 0.00% Impervious, Inflow Depth > 0.60" for 2-Year event
 Inflow = 3.59 cfs @ 12.44 hrs, Volume= 0.335 af
 Outflow = 3.48 cfs @ 12.51 hrs, Volume= 0.303 af, Atten= 3%, Lag= 3.9 min
 Primary = 3.48 cfs @ 12.51 hrs, Volume= 0.303 af
 Routed to Reach 8R : W Trail Berm

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.23' @ 12.51 hrs Surf.Area= 20,885 sf Storage= 2,362 cf

Plug-Flow detention time= 45.5 min calculated for 0.302 af (90% of inflow)
 Center-of-Mass det. time= 18.3 min (808.8 - 790.5)

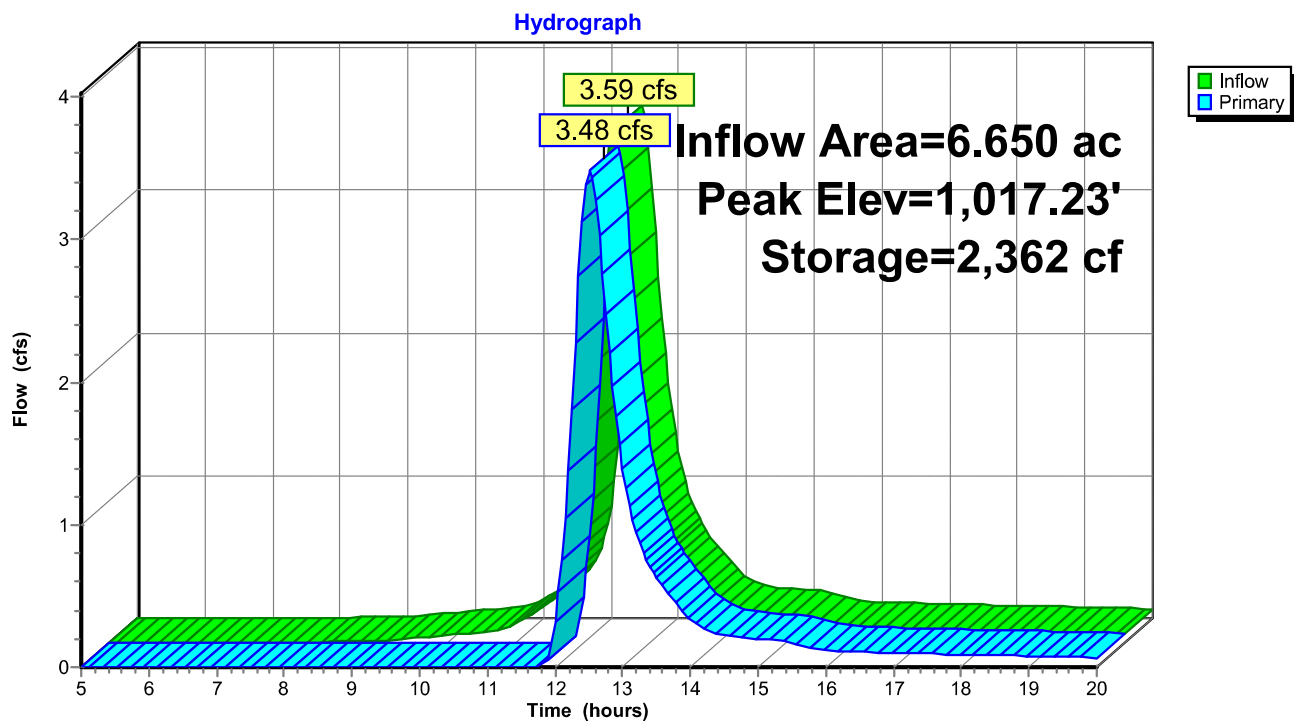
Volume	Invert	Avail.Storage	Storage Description
#1	1,017.00'	46,162 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.00	0	0	0
1,018.00	92,324	46,162	46,162

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.17'	100.0' long + 100.0 ' SideZ 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=3.46 cfs @ 12.51 hrs HW=1,017.23' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 3.46 cfs @ 0.58 fps)

Pond 7P: NW Wetland



Summary for Pond 10P: Trail Culvert Basin

Inflow Area = 15.930 ac, 0.00% Impervious, Inflow Depth > 1.15" for 2-Year event
 Inflow = 14.64 cfs @ 12.43 hrs, Volume= 1.522 af
 Outflow = 9.68 cfs @ 12.77 hrs, Volume= 1.520 af, Atten= 34%, Lag= 20.9 min
 Primary = 4.03 cfs @ 12.77 hrs, Volume= 1.323 af
 Routed to Pond 12P : CSAH 12 E Ditch
 Secondary = 5.65 cfs @ 12.77 hrs, Volume= 0.197 af
 Routed to Pond 12P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,014.61' @ 12.77 hrs Surf.Area= 23,929 sf Storage= 18,489 cf

Plug-Flow detention time= 34.2 min calculated for 1.520 af (100% of inflow)
 Center-of-Mass det. time= 33.7 min (829.6 - 795.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.30'	29,601 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.30	0	0	0
1,013.00	1,763	1,499	1,499
1,014.00	11,053	6,408	7,907
1,015.00	32,336	21,695	29,601

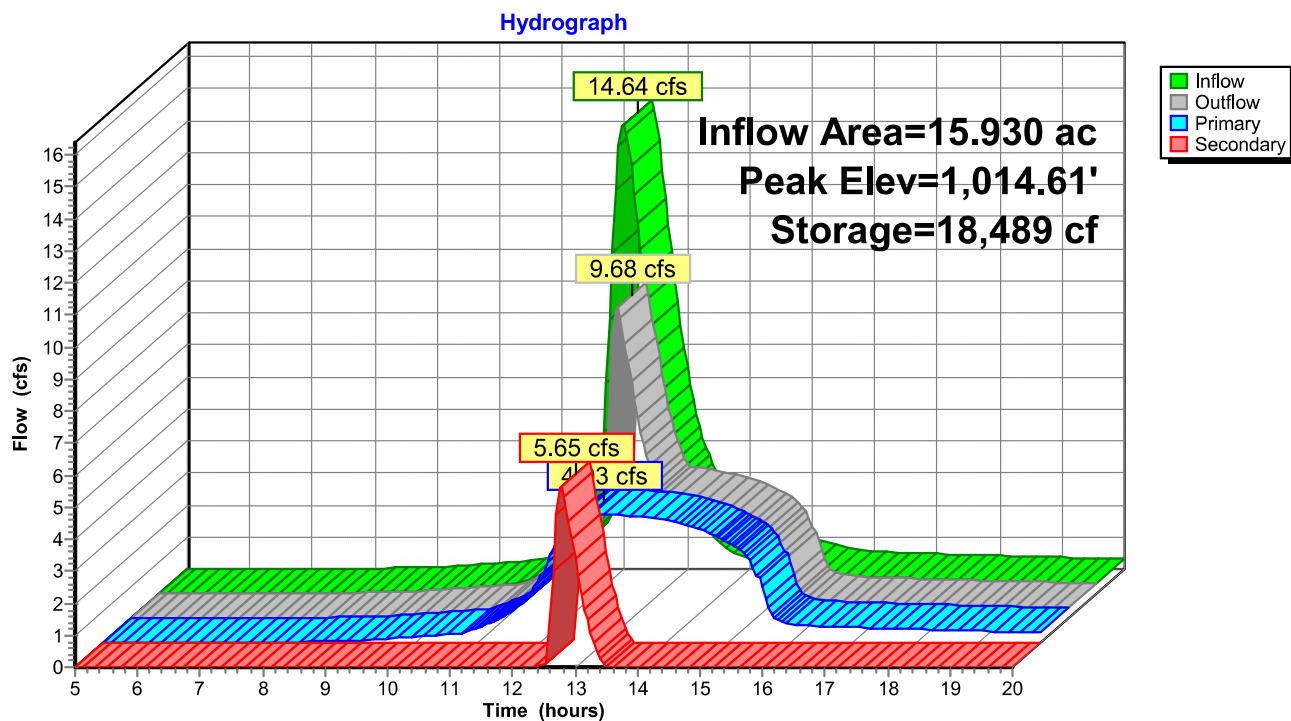
Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.30'	12.0" Round Culvert L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.30' / 1,011.00' S= 0.0071 ' / Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	1,014.50'	50.0' long + 100.0 ' SideZ x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.03 cfs @ 12.77 hrs HW=1,014.60' (Free Discharge)

↑**1=Culvert** (Barrel Controls 4.03 cfs @ 5.13 fps)

Secondary OutFlow Max=5.47 cfs @ 12.77 hrs HW=1,014.60' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 5.47 cfs @ 0.87 fps)

Pond 10P: Trail Culvert Basin

Summary for Pond 12P: CSAH 12 E Ditch

Inflow Area = 20.530 ac, 11.20% Impervious, Inflow Depth > 1.36" for 2-Year event
 Inflow = 17.83 cfs @ 12.17 hrs, Volume= 2.326 af
 Outflow = 8.60 cfs @ 13.01 hrs, Volume= 2.312 af, Atten= 52%, Lag= 50.6 min
 Primary = 8.60 cfs @ 13.01 hrs, Volume= 2.312 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,011.42' @ 13.01 hrs Surf.Area= 21,148 sf Storage= 16,510 cf

Plug-Flow detention time= 27.1 min calculated for 2.304 af (99% of inflow)
 Center-of-Mass det. time= 24.8 min (832.3 - 807.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,010.00'	152,598 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,010.00	0	0	0
1,011.00	17,095	8,548	8,548
1,012.00	26,827	21,961	30,509
1,013.00	37,445	32,136	62,645
1,014.00	38,000	37,723	100,367
1,015.00	66,462	52,231	152,598

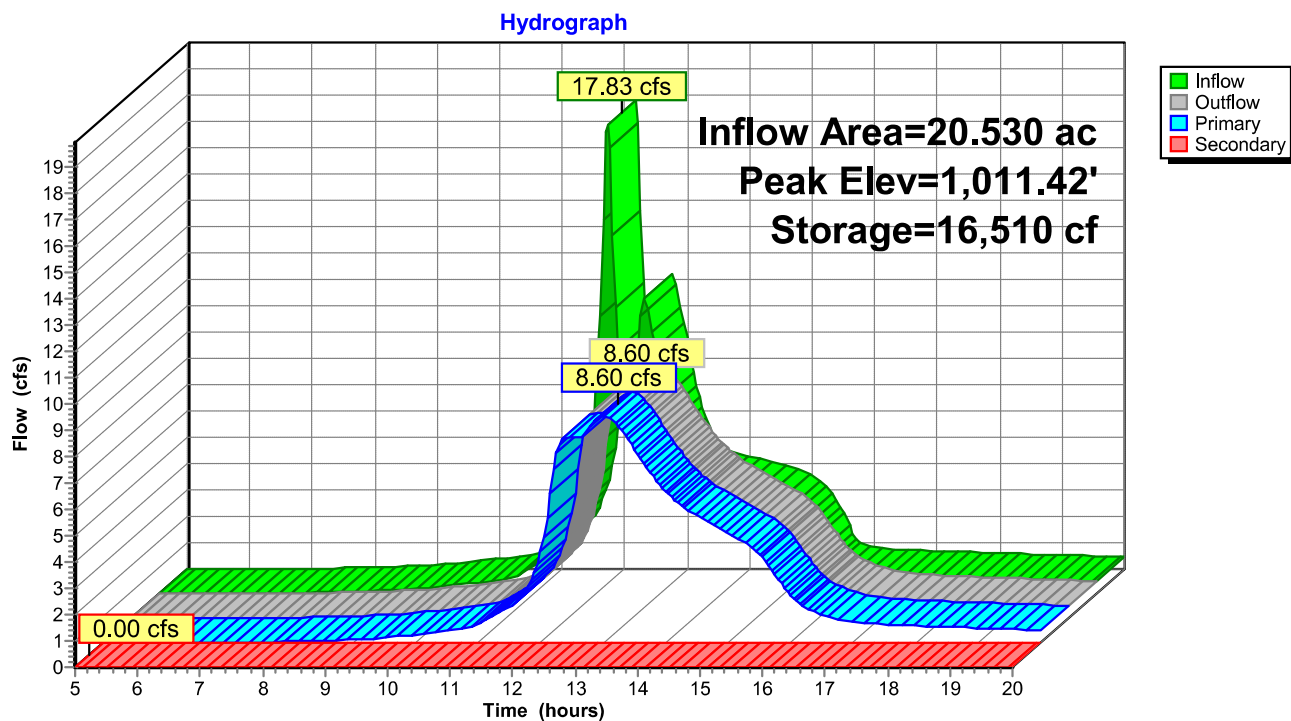
Device	Routing	Invert	Outlet Devices
#1	Primary	1,010.00'	28.0" W x 18.0" H, R=14.7"/40.7" Pipe Arch Culvert L= 148.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,010.00' / 1,009.60' S= 0.0027 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.76 sf
#2	Secondary	1,013.70'	10.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=8.60 cfs @ 13.01 hrs HW=1,011.42' (Free Discharge)

↑1=Culvert (Barrel Controls 8.60 cfs @ 3.93 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,010.00' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 12P: CSAH 12 E Ditch

Summary for Pond 23P: Metcon Addn Pond

Inflow Area = 15.030 ac, 70.28% Impervious, Inflow Depth > 2.10" for 2-Year event
 Inflow = 51.90 cfs @ 12.15 hrs, Volume= 2.633 af
 Outflow = 6.45 cfs @ 12.62 hrs, Volume= 2.118 af, Atten= 88%, Lag= 28.4 min
 Primary = 6.45 cfs @ 12.62 hrs, Volume= 2.118 af
 Routed to Pond 27P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,012.32' @ 12.62 hrs Surf.Area= 56,574 sf Storage= 68,509 cf

Plug-Flow detention time= 164.7 min calculated for 2.118 af (80% of inflow)
 Center-of-Mass det. time= 121.1 min (885.7 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.00'	325,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

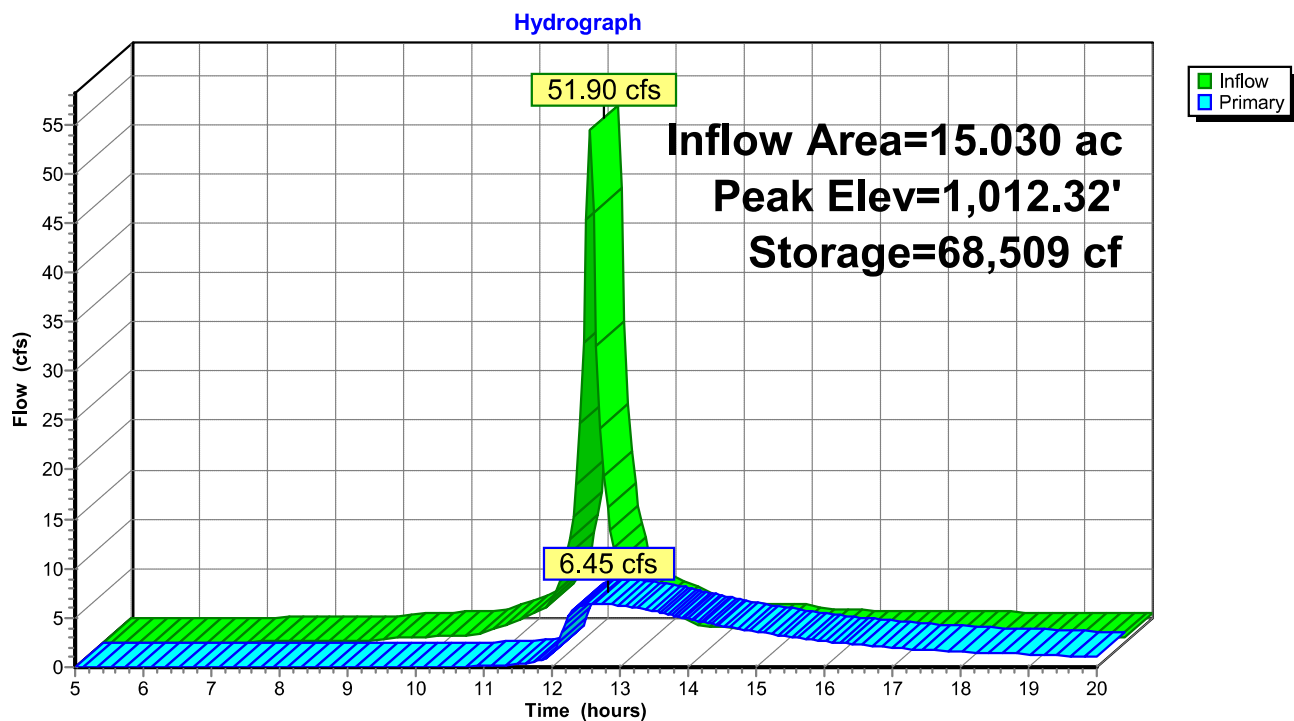
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.00	47,057	0	0
1,016.00	83,046	325,258	325,258

Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.00'	18.0" Round Culvert L= 100.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,010.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	1,008.00'	18.0" Round Culvert L= 30.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,008.00' / 1,008.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=6.45 cfs @ 12.62 hrs HW=1,012.32' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 6.45 cfs @ 3.91 fps)

↑ **2=Culvert** (Passes 6.45 cfs of 9.78 cfs potential flow)

Pond 23P: Metcon Addn Pond

Summary for Pond 25P: Trail Culvert Basin

Inflow Area = 0.900 ac, 0.00% Impervious, Inflow Depth > 1.13" for 2-Year event
 Inflow = 2.25 cfs @ 12.05 hrs, Volume= 0.085 af
 Outflow = 1.54 cfs @ 12.11 hrs, Volume= 0.085 af, Atten= 32%, Lag= 3.3 min
 Primary = 1.54 cfs @ 12.11 hrs, Volume= 0.085 af
 Routed to Pond 27P : CSAH 12 E Ditch
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 27P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,012.26' @ 12.11 hrs Surf.Area= 993 sf Storage= 476 cf

Plug-Flow detention time= 4.5 min calculated for 0.085 af (100% of inflow)
 Center-of-Mass det. time= 3.9 min (792.4 - 788.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.30'	12,717 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.30	0	0	0
1,013.00	1,763	1,499	1,499
1,014.00	5,033	3,398	4,897
1,015.00	10,608	7,821	12,717

Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.30'	12.0" Round Culvert L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.30' / 1,011.00' S= 0.0071 ' / Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	1,014.50'	50.0' long + 100.0 ' / SideZ x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

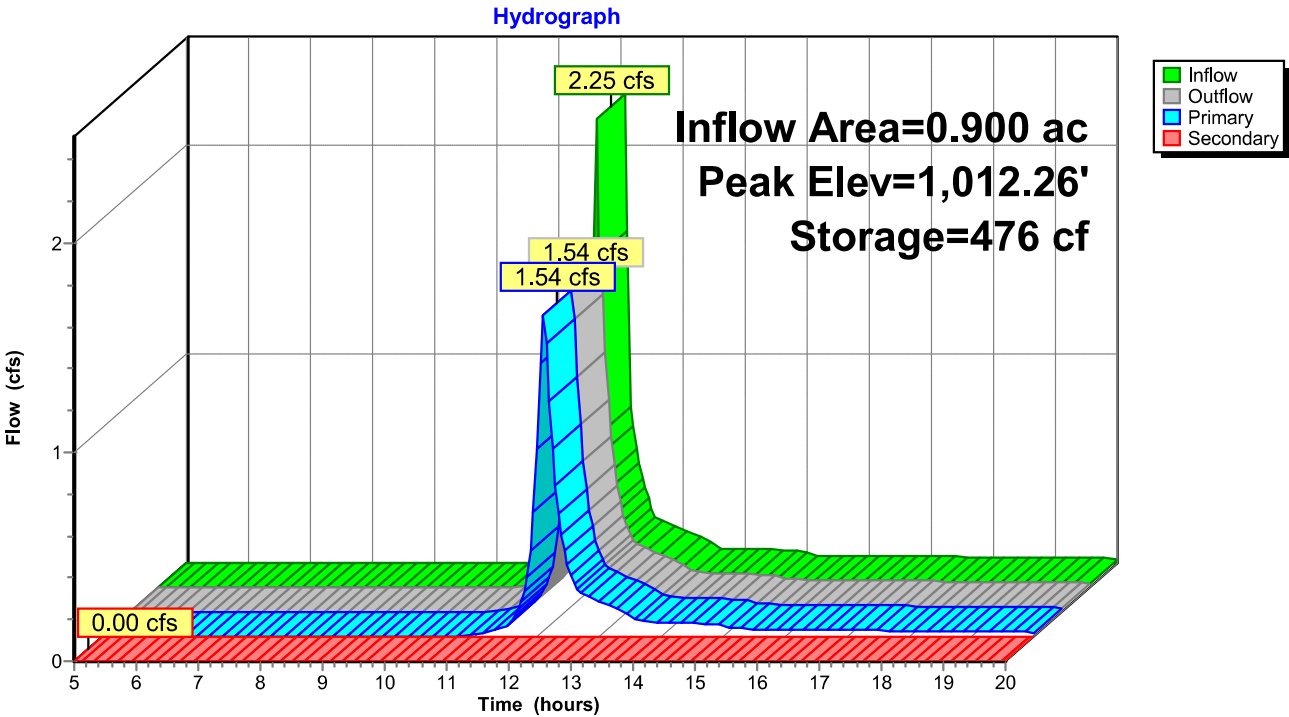
Primary OutFlow Max=1.52 cfs @ 12.11 hrs HW=1,012.25' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 1.52 cfs @ 2.54 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,011.30' (Free Discharge)

↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: Trail Culvert Basin



Summary for Pond 27P: CSAH 12 E Ditch

Inflow Area = 20.530 ac, 62.65% Impervious, Inflow Depth > 1.76" for 2-Year event
 Inflow = 20.20 cfs @ 12.17 hrs, Volume= 3.009 af
 Outflow = 8.94 cfs @ 12.61 hrs, Volume= 2.970 af, Atten= 56%, Lag= 26.1 min
 Primary = 8.94 cfs @ 12.61 hrs, Volume= 2.970 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,011.46' @ 12.61 hrs Surf.Area= 21,602 sf Storage= 17,509 cf

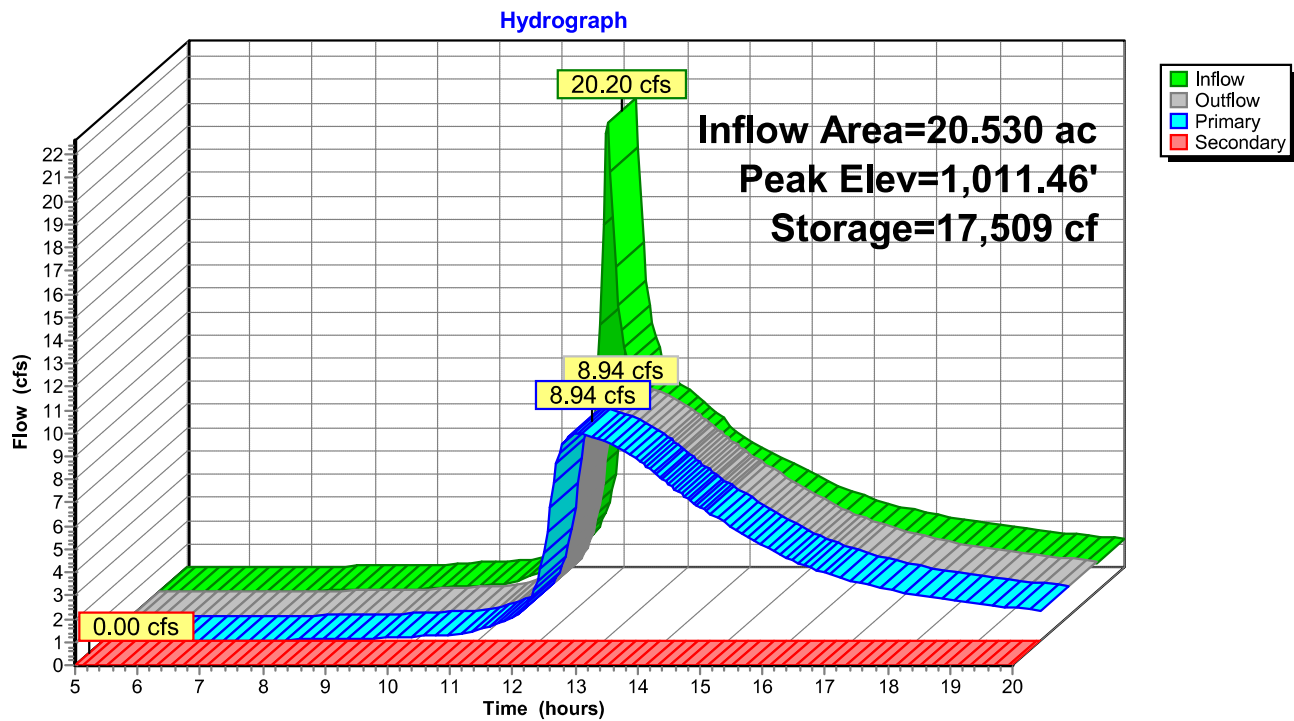
Plug-Flow detention time= 27.3 min calculated for 2.970 af (99% of inflow)
 Center-of-Mass det. time= 22.9 min (873.8 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,010.00'	152,598 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,010.00	0	0	0
1,011.00	17,095	8,548	8,548
1,012.00	26,827	21,961	30,509
1,013.00	37,445	32,136	62,645
1,014.00	38,000	37,723	100,367
1,015.00	66,462	52,231	152,598

Device	Routing	Invert	Outlet Devices
#1	Primary	1,010.00'	28.0" W x 18.0" H, R=14.7"/40.7" Pipe Arch Culvert L= 148.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,010.00' / 1,009.60' S= 0.0027 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.76 sf
#2	Secondary	1,013.70'	10.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=8.94 cfs @ 12.61 hrs HW=1,011.46' (Free Discharge)
 ↑1=Culvert (Barrel Controls 8.94 cfs @ 3.97 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,010.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 27P: CSAH 12 E Ditch

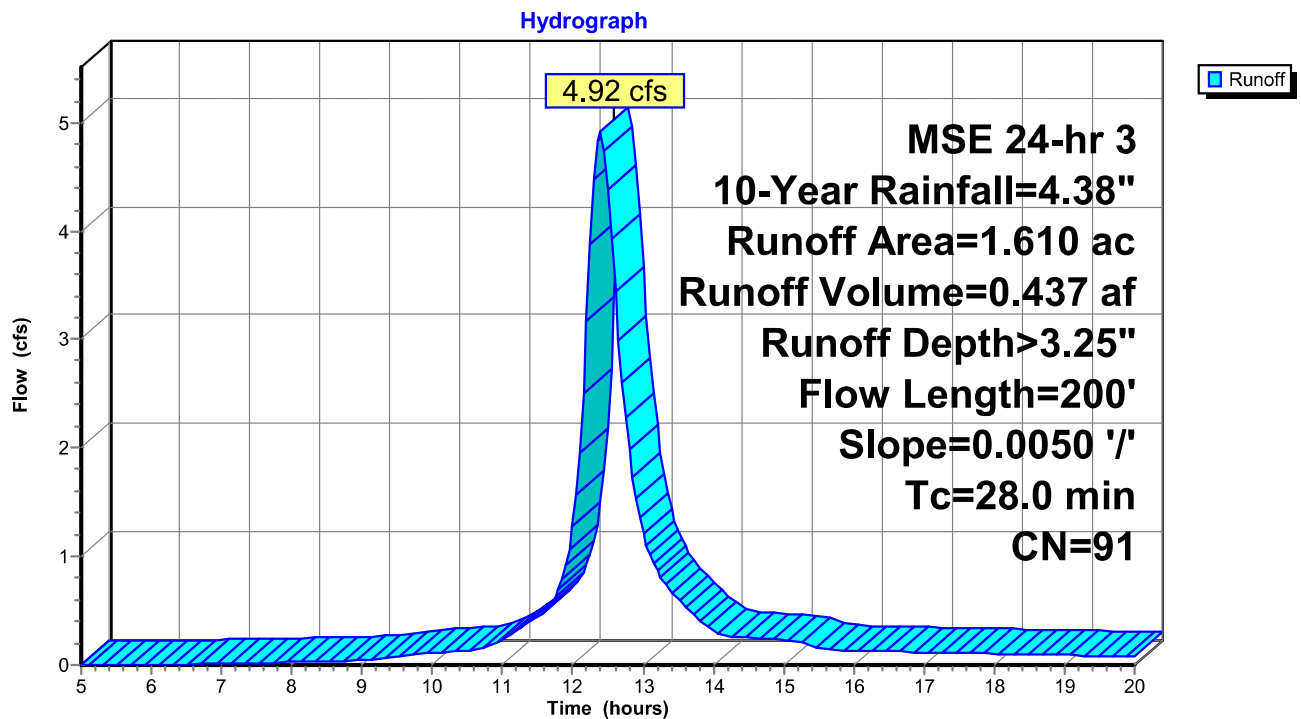
Summary for Subcatchment 1S: SE Wetland WS

Runoff = 4.92 cfs @ 12.39 hrs, Volume= 0.437 af, Depth> 3.25"
 Routed to Pond 2P : SE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
1.610	91	Row crops, straight row, Poor, HSG D
1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"

Subcatchment 1S: SE Wetland WS

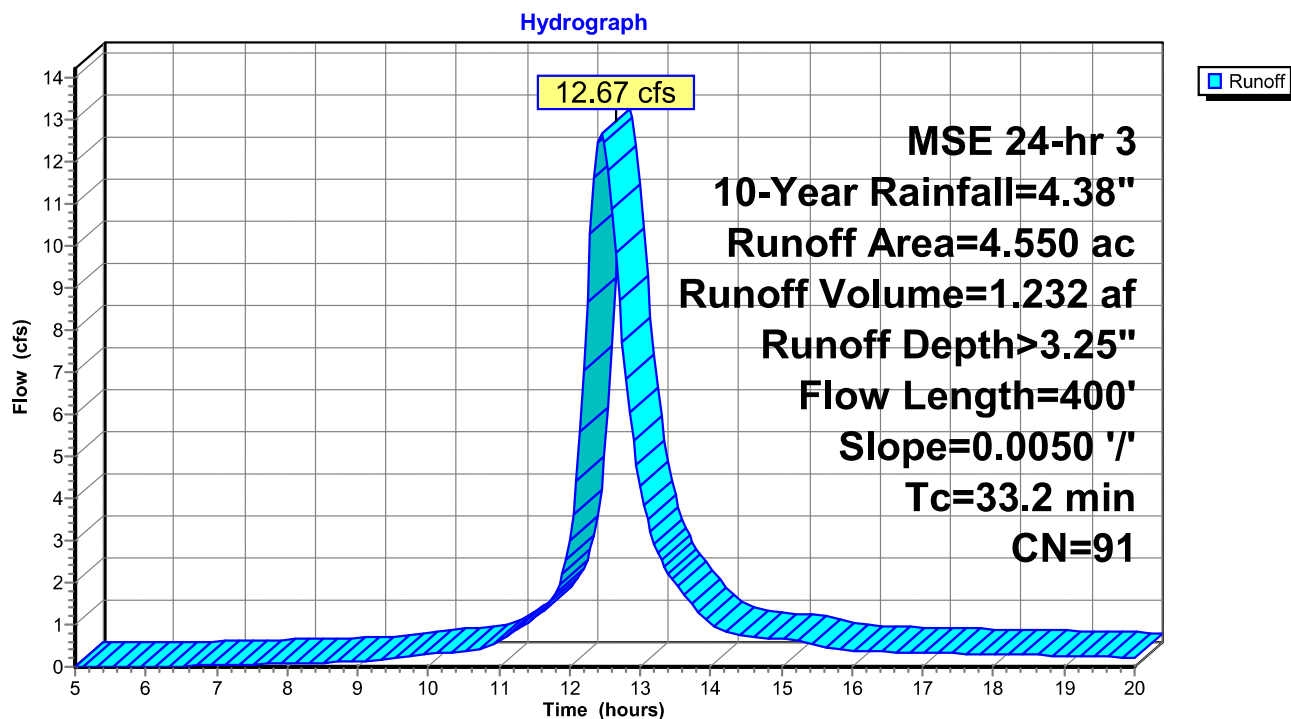
Summary for Subcatchment 4S: NE Wetland WS

Runoff = 12.67 cfs @ 12.45 hrs, Volume= 1.232 af, Depth> 3.25"
 Routed to Pond 5P : NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
4.190	91	Row crops, straight row, Poor, HSG D
0.360	86	Farmsteads, HSG D
4.550	91	Weighted Average
4.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"
5.2	200	0.0050	0.64		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
33.2	400	Total			

Subcatchment 4S: NE Wetland WS

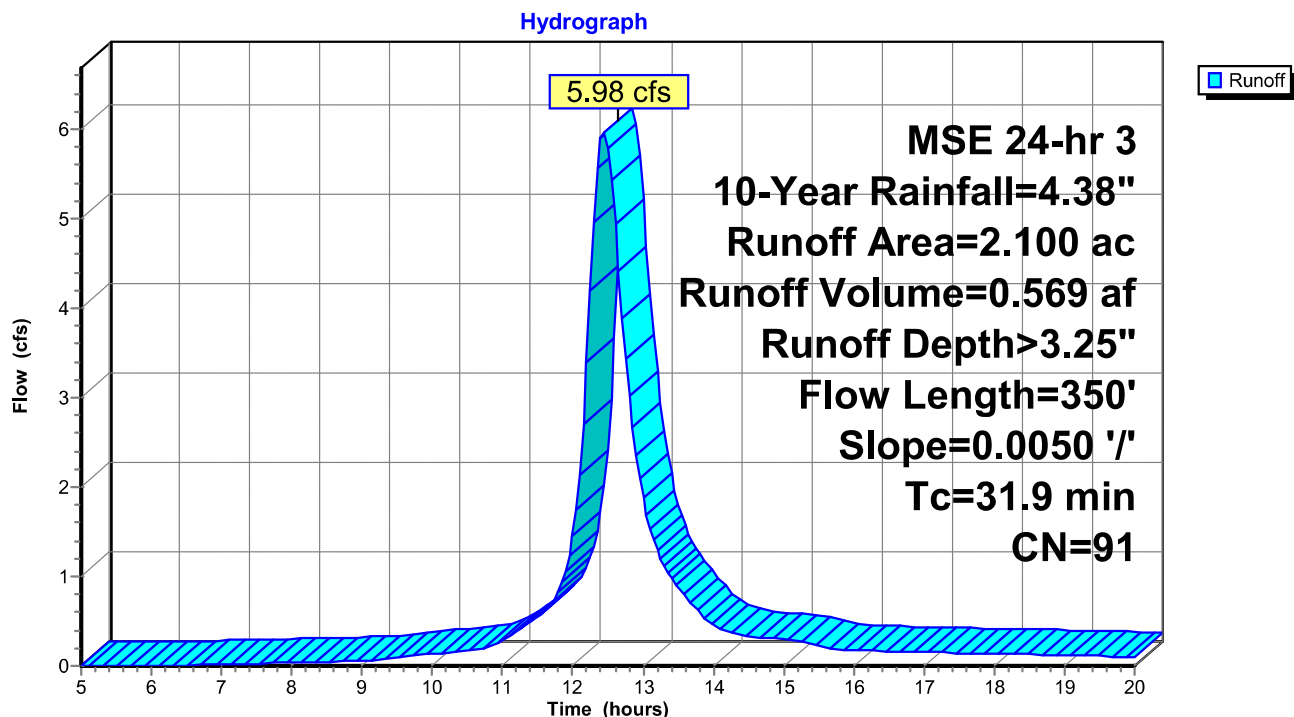
Summary for Subcatchment 6S: NW Wetland WS

Runoff = 5.98 cfs @ 12.44 hrs, Volume= 0.569 af, Depth> 3.25"
 Routed to Pond 7P : NW Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
2.100	91	Row crops, straight row, Poor, HSG D
2.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"
3.9	150	0.0050	0.64		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
31.9	350	Total			

Subcatchment 6S: NW Wetland WS

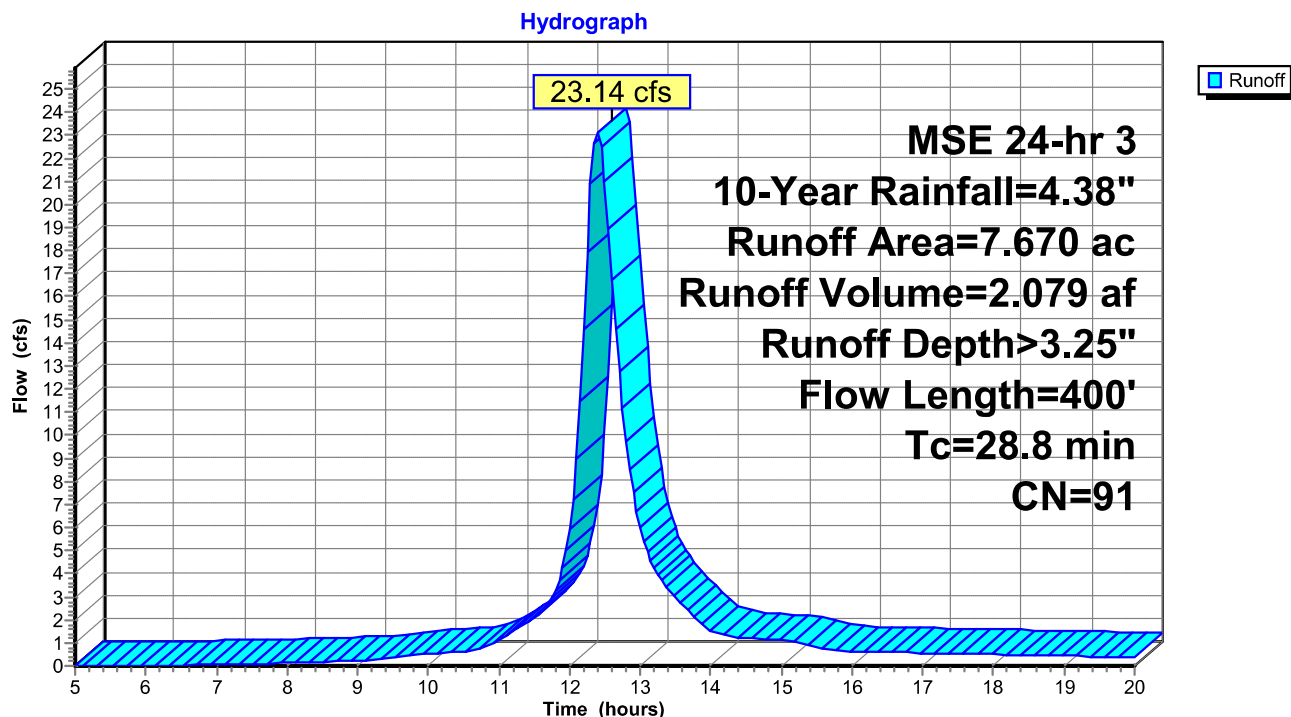
Summary for Subcatchment 9S: Trail Berm WS

Runoff = 23.14 cfs @ 12.40 hrs, Volume= 2.079 af, Depth> 3.25"
 Routed to Pond 10P : Trail Culvert Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
7.670	91	Row crops, straight row, Poor, HSG D
7.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	200	0.0050	0.27		Sheet Flow, Cultivated: Residue<=20% n= 0.060 P2= 4.40"
16.6	200	0.0005	0.20		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
28.8	400	Total			

Subcatchment 9S: Trail Berm WS

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MSE 24-hr 3 10-Year Rainfall=4.38"

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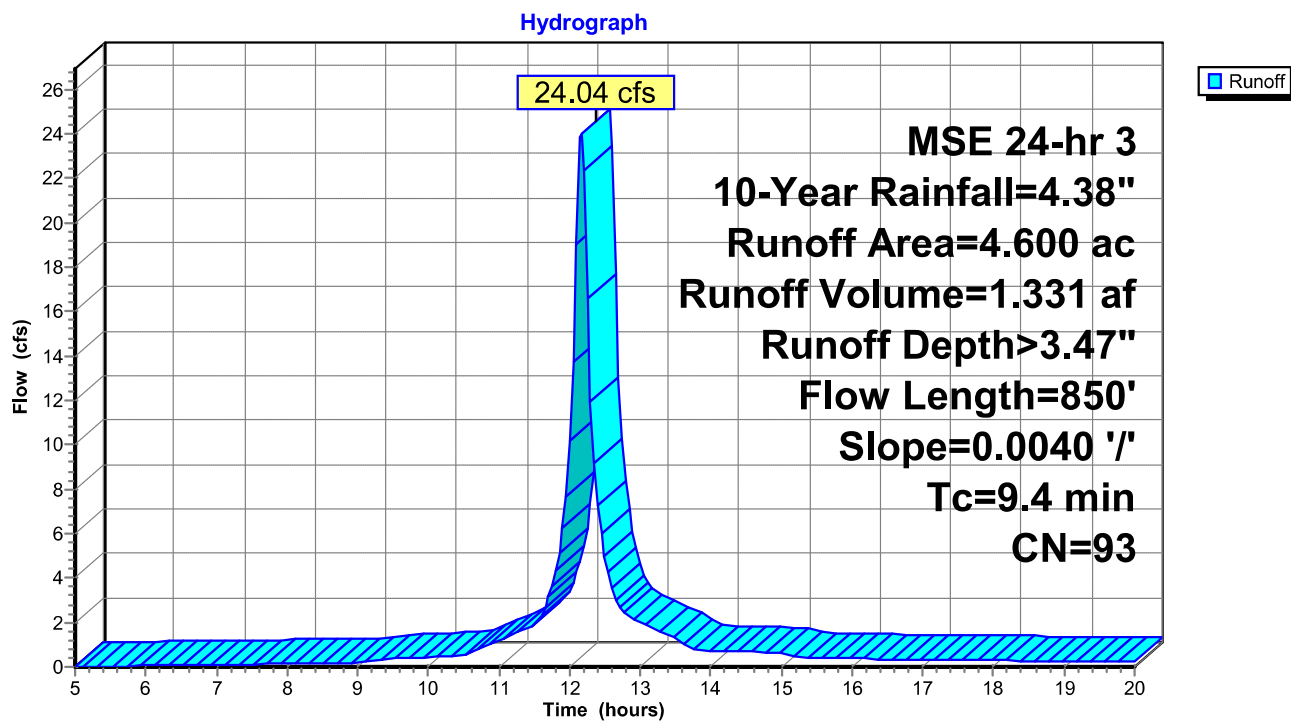
Summary for Subcatchment 11S: CSAH 12 East

Runoff = 24.04 cfs @ 12.16 hrs, Volume= 1.331 af, Depth> 3.47"
 Routed to Pond 12P : CSAH 12 E Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
4.600	93	Paved roads w/open ditches, 50% imp, HSG D
2.300		50.00% Pervious Area
2.300		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
2.4	450	0.0040	3.12	100.00	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=2.00' Z= 6.0 & 3.0 '/' Top.W=25.00' n= 0.035 Earth, dense weeds
9.4	850	Total			

Subcatchment 11S: CSAH 12 East

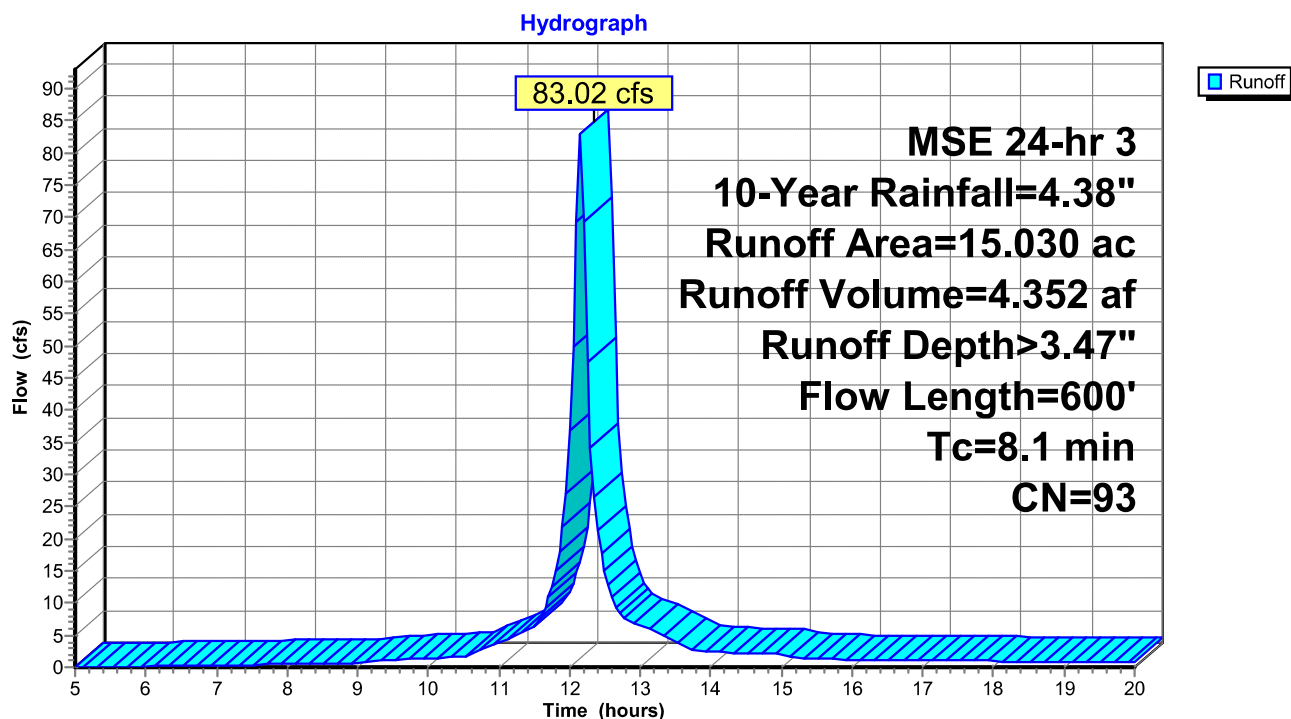
Summary for Subcatchment 22S: Des WS

Runoff = 83.02 cfs @ 12.15 hrs, Volume= 4.352 af, Depth> 3.47"
 Routed to Pond 23P : Metcon Addn Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
14.670	93	Urban industrial, 72% imp, HSG D
0.360	86	Farmsteads, HSG D
15.030	93	Weighted Average
4.468		29.72% Pervious Area
10.562		70.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	200	0.0200	1.85		Sheet Flow, Smooth surfaces n= 0.011 P2= 4.40"
6.3	400	0.0050	1.06		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
8.1	600	Total			

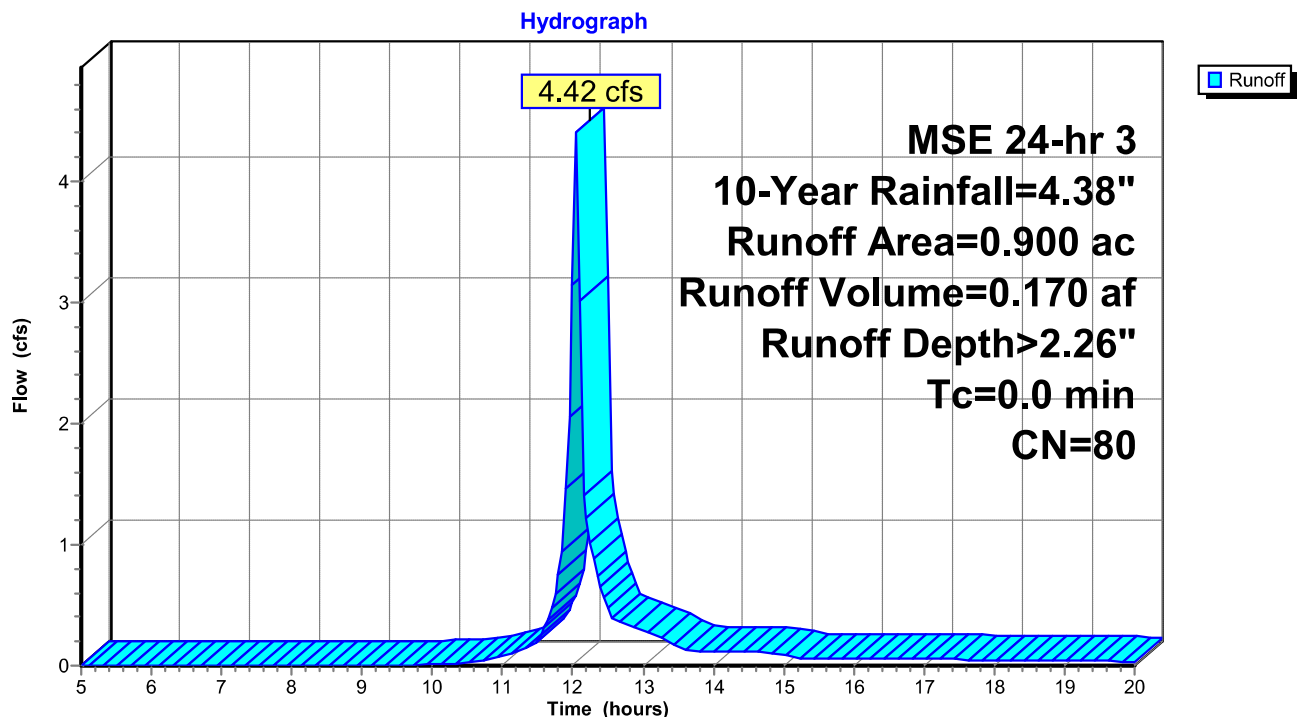
Subcatchment 22S: Des WS

Summary for Subcatchment 24S: Trail Berm WS

Runoff = 4.42 cfs @ 12.05 hrs, Volume= 0.170 af, Depth> 2.26"
 Routed to Pond 25P : Trail Culvert Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
0.900	80	>75% Grass cover, Good, HSG D
0.900		100.00% Pervious Area

Subcatchment 24S: Trail Berm WS

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MSE 24-hr 3 10-Year Rainfall=4.38"

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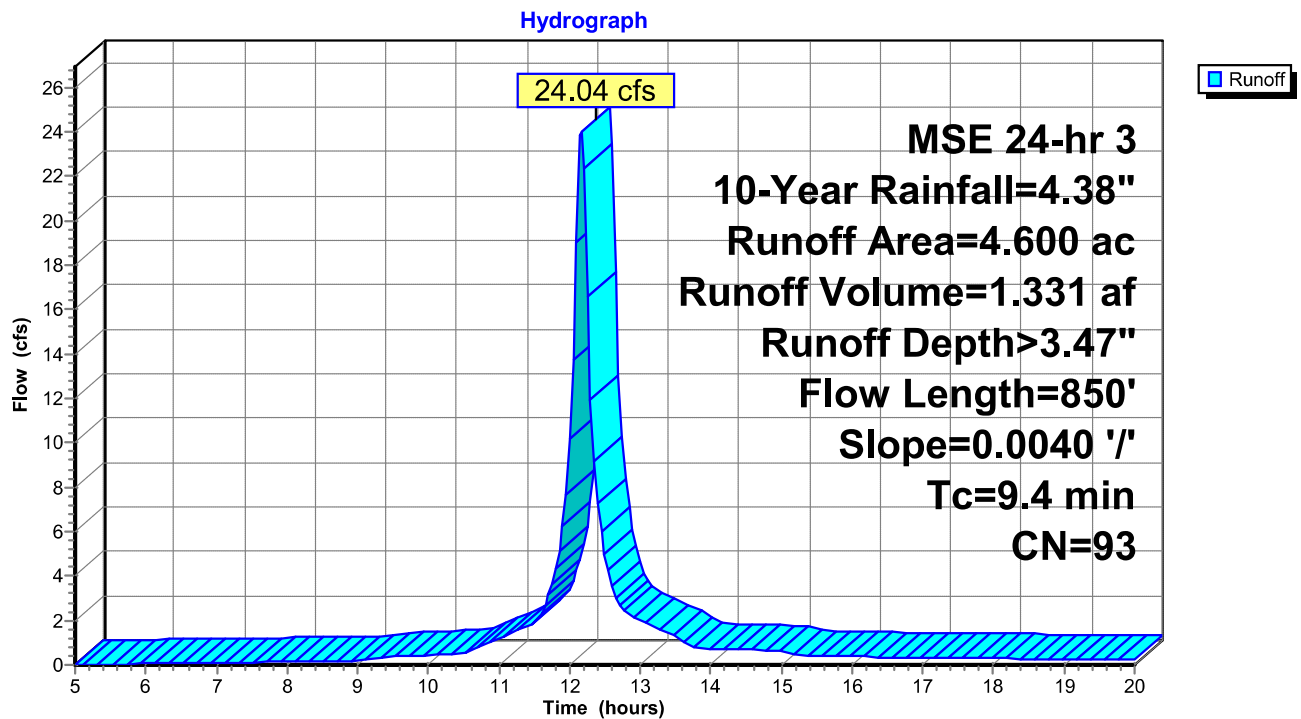
Summary for Subcatchment 26S: CSAH 12 East

Runoff = 24.04 cfs @ 12.16 hrs, Volume= 1.331 af, Depth> 3.47"
 Routed to Pond 27P : CSAH 12 E Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-Year Rainfall=4.38"

Area (ac)	CN	Description
4.600	93	Paved roads w/open ditches, 50% imp, HSG D
2.300		50.00% Pervious Area
2.300		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
2.4	450	0.0040	3.12	100.00	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=2.00' Z= 6.0 & 3.0 ' /' Top.W=25.00' n= 0.035 Earth, dense weeds
9.4	850	Total			

Subcatchment 26S: CSAH 12 East

Summary for Reach 3R: S Trail Berm

Inflow Area = 1.610 ac, 0.00% Impervious, Inflow Depth > 0.37" for 10-Year event
 Inflow = 0.15 cfs @ 15.57 hrs, Volume= 0.049 af
 Outflow = 0.15 cfs @ 16.20 hrs, Volume= 0.044 af, Atten= 4%, Lag= 37.9 min
 Routed to Pond 10P : Trail Culvert Basin

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 0.42 fps, Min. Travel Time= 17.4 min

Avg. Velocity= 0.37 fps, Avg. Travel Time= 20.0 min

Peak Storage= 153 cf @ 15.91 hrs

Average Depth at Peak Storage= 0.03' , Surface Width= 10.54'

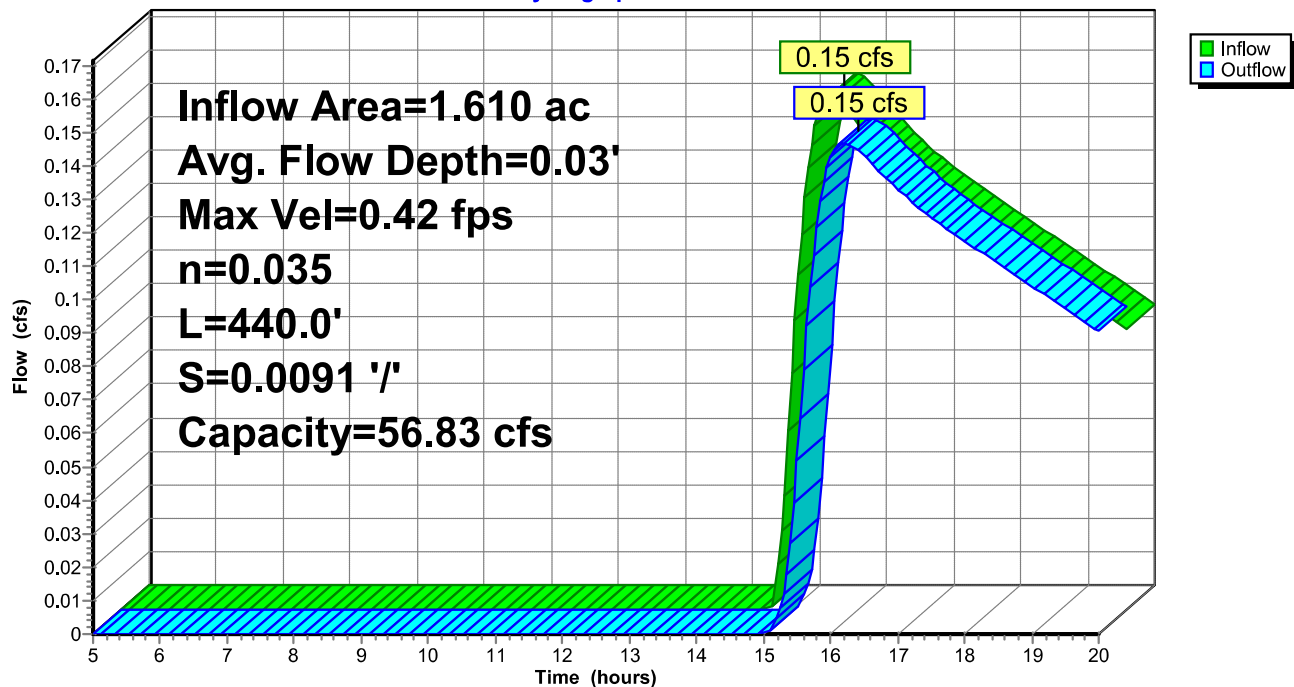
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 56.83 cfs

10.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds

Side Slope Z-value= 6.0 10.0 '/' Top Width= 26.00'

Length= 440.0' Slope= 0.0091 '/'

Inlet Invert= 1,016.00', Outlet Invert= 1,012.00'

**Reach 3R: S Trail Berm****Hydrograph**

Summary for Reach 8R: W Trail Berm

Inflow Area = 6.650 ac, 0.00% Impervious, Inflow Depth > 1.69" for 10-Year event
 Inflow = 5.82 cfs @ 12.50 hrs, Volume= 0.937 af
 Outflow = 5.36 cfs @ 12.75 hrs, Volume= 0.923 af, Atten= 8%, Lag= 14.9 min
 Routed to Pond 10P : Trail Culvert Basin

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 1.52 fps, Min. Travel Time= 8.5 min

Avg. Velocity= 0.91 fps, Avg. Travel Time= 14.2 min

Peak Storage= 2,749 cf @ 12.60 hrs

Average Depth at Peak Storage= 0.46' , Surface Width= 11.38'

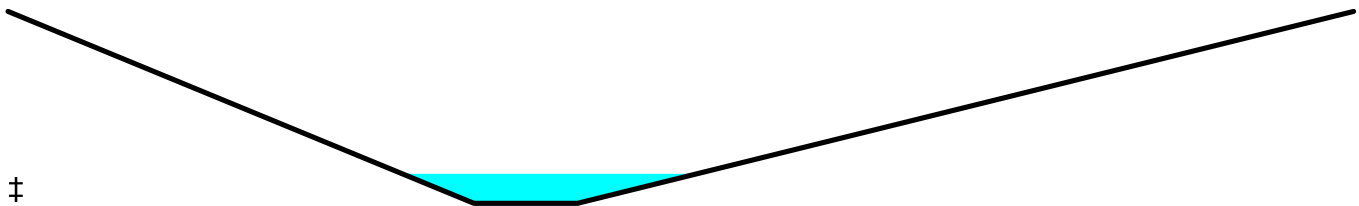
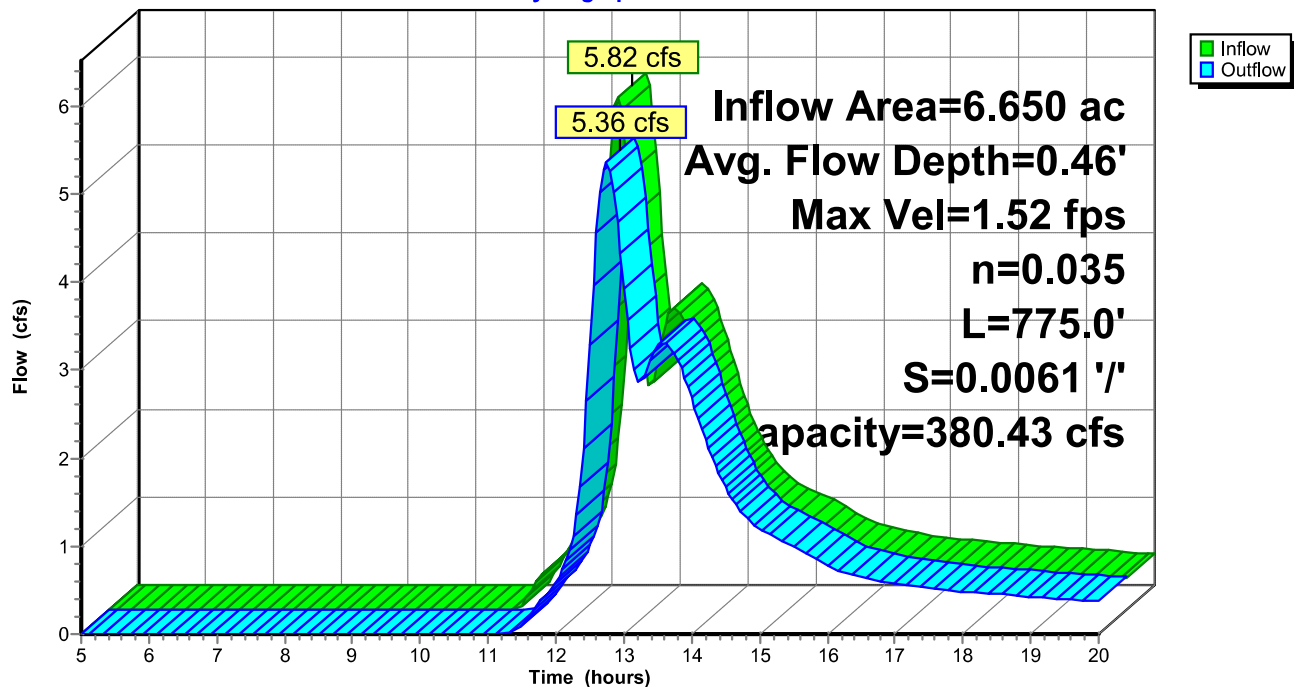
Bank-Full Depth= 3.00' Flow Area= 84.0 sf, Capacity= 380.43 cfs

4.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds

Side Slope Z-value= 6.0 10.0 ' ' Top Width= 52.00'

Length= 775.0' Slope= 0.0061 ' '

Inlet Invert= 1,016.70', Outlet Invert= 1,012.00'

**Reach 8R: W Trail Berm****Hydrograph**

Summary for Pond 2P: SE Wetland

Inflow Area = 1.610 ac, 0.00% Impervious, Inflow Depth > 3.25" for 10-Year event
 Inflow = 4.92 cfs @ 12.39 hrs, Volume= 0.437 af
 Outflow = 0.15 cfs @ 15.57 hrs, Volume= 0.049 af, Atten= 97%, Lag= 191.0 min
 Primary = 0.15 cfs @ 15.57 hrs, Volume= 0.049 af
 Routed to Reach 3R : S Trail Berm

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.91' @ 15.57 hrs Surf.Area= 51,771 sf Storage= 16,998 cf

Plug-Flow detention time= 397.6 min calculated for 0.049 af (11% of inflow)
 Center-of-Mass det. time= 257.7 min (1,035.9 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.25'	22,174 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.25	0	0	0
1,018.00	59,130	22,174	22,174

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.90'	100.0' long + 100.0 ' SideZ 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=0.14 cfs @ 15.57 hrs HW=1,017.91' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.14 cfs @ 0.20 fps)

25-1243

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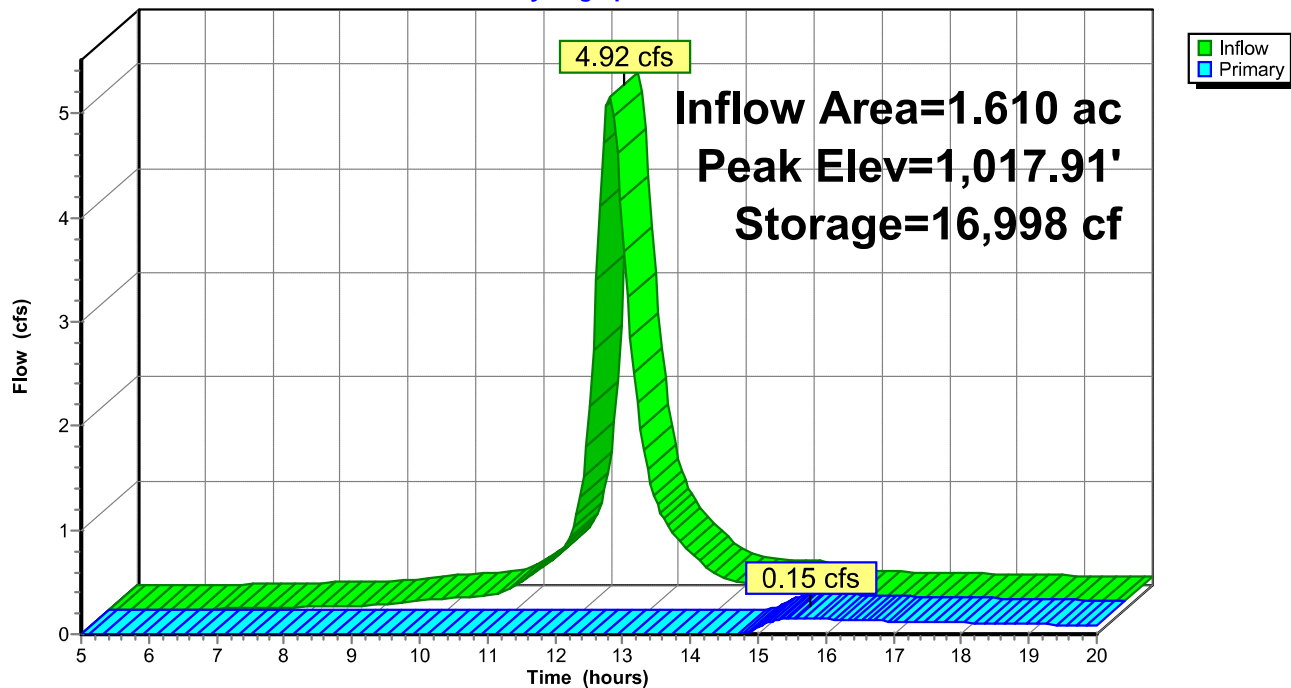
MSE 24-hr 3 10-Year Rainfall=4.38"

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Pond 2P: SE Wetland

Hydrograph



Summary for Pond 5P: NE Wetland

Inflow Area = 4.550 ac, 0.00% Impervious, Inflow Depth > 3.25" for 10-Year event
 Inflow = 12.67 cfs @ 12.45 hrs, Volume= 1.232 af
 Outflow = 2.36 cfs @ 13.36 hrs, Volume= 0.404 af, Atten= 81%, Lag= 54.3 min
 Primary = 2.36 cfs @ 13.36 hrs, Volume= 0.404 af
 Routed to Pond 7P : NW Wetland

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.61' @ 13.36 hrs Surf.Area= 58,140 sf Storage= 38,528 cf

Plug-Flow detention time= 204.5 min calculated for 0.404 af (33% of inflow)
 Center-of-Mass det. time= 123.8 min (906.3 - 782.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,016.00'	65,093 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,016.00	0	0	0
1,017.00	25,742	12,871	12,871
1,018.00	78,702	52,222	65,093

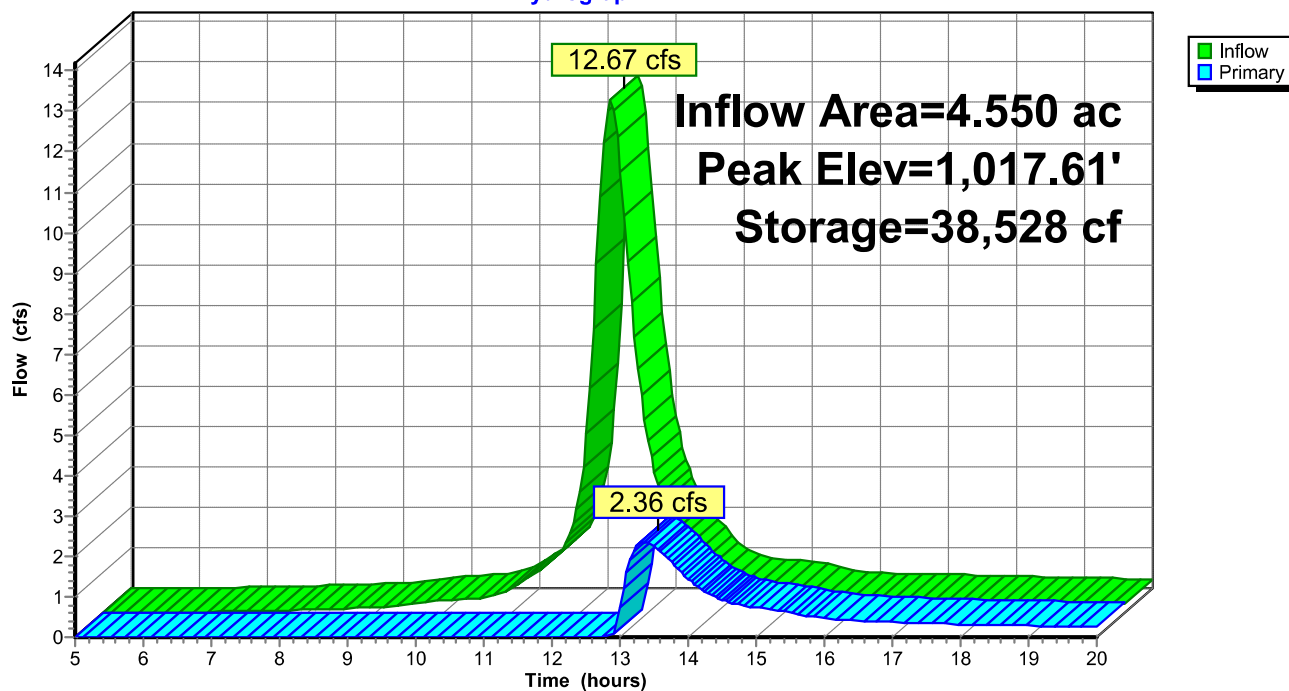
Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.56'	75.0' long + 100.0 ' SideZ x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.32 cfs @ 13.36 hrs HW=1,017.61' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 2.32 cfs @ 0.56 fps)

Pond 5P: NE Wetland

Hydrograph



Summary for Pond 7P: NW Wetland

Inflow Area = 6.650 ac, 0.00% Impervious, Inflow Depth > 1.75" for 10-Year event
 Inflow = 5.98 cfs @ 12.44 hrs, Volume= 0.972 af
 Outflow = 5.82 cfs @ 12.50 hrs, Volume= 0.937 af, Atten= 3%, Lag= 3.5 min
 Primary = 5.82 cfs @ 12.50 hrs, Volume= 0.937 af
 Routed to Reach 8R : W Trail Berm

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.25' @ 12.50 hrs Surf.Area= 22,937 sf Storage= 2,849 cf

Plug-Flow detention time= 24.4 min calculated for 0.937 af (96% of inflow)
 Center-of-Mass det. time= 12.3 min (845.5 - 833.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.00'	46,162 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

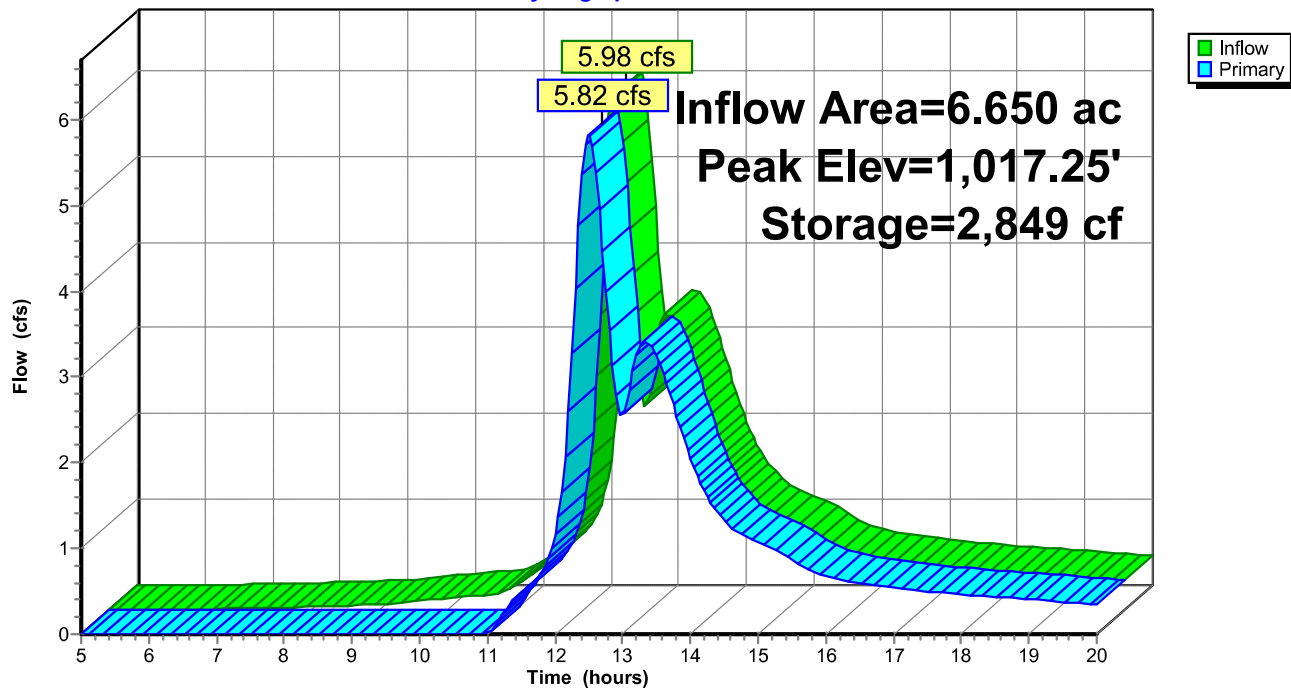
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.00	0	0	0
1,018.00	92,324	46,162	46,162

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.17'	100.0' long + 100.0 ' SideZ 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=5.81 cfs @ 12.50 hrs HW=1,017.25' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 5.81 cfs @ 0.69 fps)

Pond 7P: NW Wetland

Hydrograph



Summary for Pond 10P: Trail Culvert Basin

Inflow Area = 15.930 ac, 0.00% Impervious, Inflow Depth > 2.30" for 10-Year event
 Inflow = 25.33 cfs @ 12.42 hrs, Volume= 3.047 af
 Outflow = 23.98 cfs @ 12.52 hrs, Volume= 3.042 af, Atten= 5%, Lag= 6.2 min
 Primary = 4.12 cfs @ 12.52 hrs, Volume= 2.057 af
 Routed to Pond 12P : CSAH 12 E Ditch
 Secondary = 19.87 cfs @ 12.52 hrs, Volume= 0.985 af
 Routed to Pond 12P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,014.72' @ 12.52 hrs Surf.Area= 26,395 sf Storage= 21,404 cf

Plug-Flow detention time= 29.3 min calculated for 3.032 af (99% of inflow)
 Center-of-Mass det. time= 28.6 min (836.3 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.30'	29,601 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.30	0	0	0
1,013.00	1,763	1,499	1,499
1,014.00	11,053	6,408	7,907
1,015.00	32,336	21,695	29,601

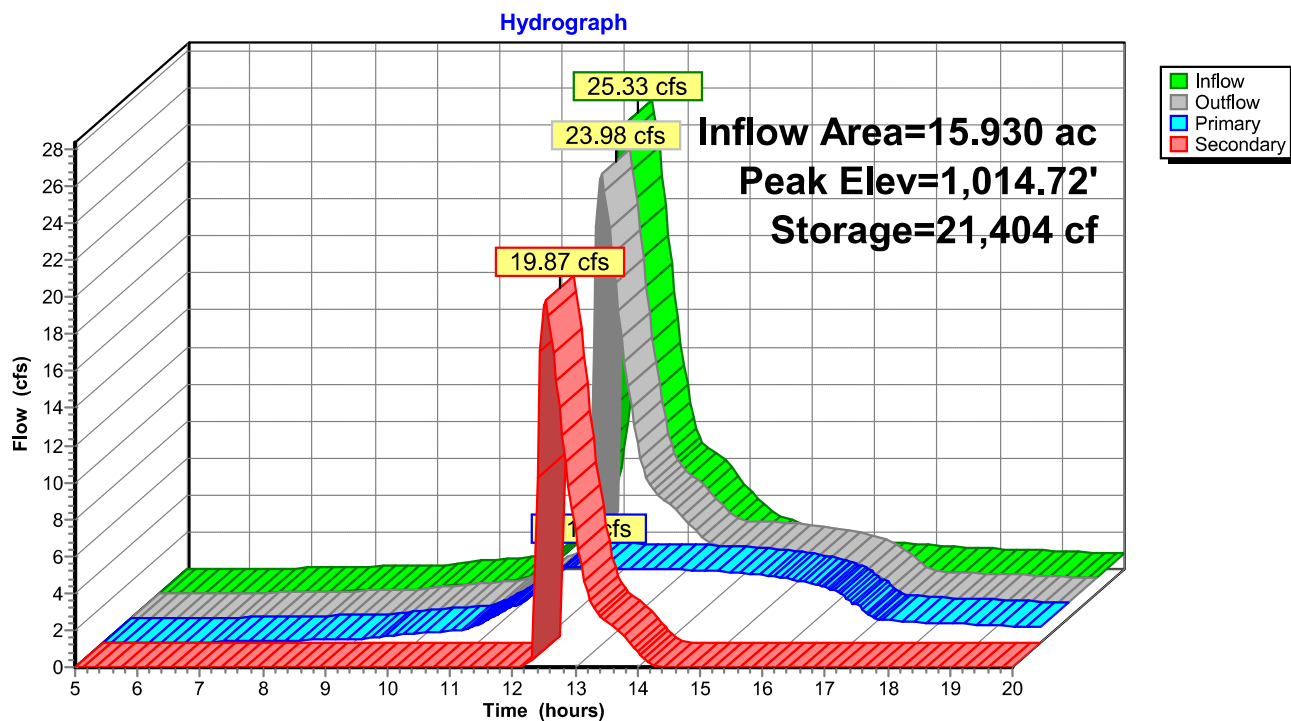
Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.30'	12.0" Round Culvert L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.30' / 1,011.00' S= 0.0071 ' / Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	1,014.50'	50.0' long + 100.0 ' / SideZ x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.12 cfs @ 12.52 hrs HW=1,014.72' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 4.12 cfs @ 5.24 fps)

Secondary OutFlow Max=19.43 cfs @ 12.52 hrs HW=1,014.72' (Free Discharge)

↑ **2=Broad-Crested Rectangular Weir** (Weir Controls 19.43 cfs @ 1.24 fps)

Pond 10P: Trail Culvert Basin

Summary for Pond 12P: CSAH 12 E Ditch

Inflow Area = 20.530 ac, 11.20% Impervious, Inflow Depth > 2.56" for 10-Year event
 Inflow = 28.72 cfs @ 12.51 hrs, Volume= 4.373 af
 Outflow = 13.68 cfs @ 12.99 hrs, Volume= 4.340 af, Atten= 52%, Lag= 29.0 min
 Primary = 13.68 cfs @ 12.99 hrs, Volume= 4.340 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,012.49' @ 12.99 hrs Surf.Area= 31,981 sf Storage= 44,780 cf

Plug-Flow detention time= 36.8 min calculated for 4.340 af (99% of inflow)
 Center-of-Mass det. time= 34.0 min (846.1 - 812.1)

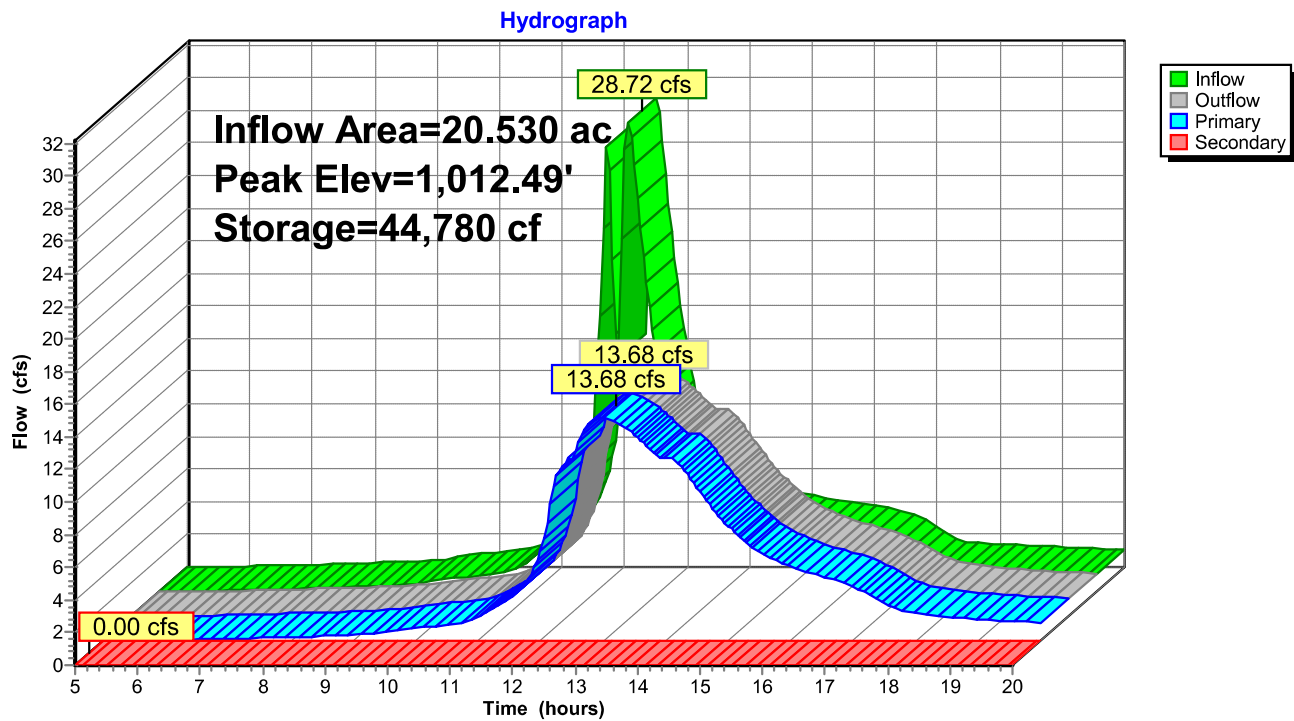
Volume	Invert	Avail.Storage	Storage Description
#1	1,010.00'	152,598 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,010.00	0	0	0
1,011.00	17,095	8,548	8,548
1,012.00	26,827	21,961	30,509
1,013.00	37,445	32,136	62,645
1,014.00	38,000	37,723	100,367
1,015.00	66,462	52,231	152,598

Device	Routing	Invert	Outlet Devices
#1	Primary	1,010.00'	28.0" W x 18.0" H, R=14.7"/40.7" Pipe Arch Culvert L= 148.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,010.00' / 1,009.60' S= 0.0027 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.76 sf
#2	Secondary	1,013.70'	10.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=13.67 cfs @ 12.99 hrs HW=1,012.48' (Free Discharge)
 ↑1=Culvert (Barrel Controls 13.67 cfs @ 4.96 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,010.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 12P: CSAH 12 E Ditch



Summary for Pond 23P: Metcon Addn Pond

Inflow Area = 15.030 ac, 70.28% Impervious, Inflow Depth > 3.47" for 10-Year event
 Inflow = 83.02 cfs @ 12.15 hrs, Volume= 4.352 af
 Outflow = 9.75 cfs @ 12.64 hrs, Volume= 3.697 af, Atten= 88%, Lag= 29.2 min
 Primary = 9.75 cfs @ 12.64 hrs, Volume= 3.697 af
 Routed to Pond 27P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,013.07' @ 12.64 hrs Surf.Area= 61,990 sf Storage= 113,121 cf

Plug-Flow detention time= 165.0 min calculated for 3.685 af (85% of inflow)
 Center-of-Mass det. time= 127.4 min (883.2 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.00'	325,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.00	47,057	0	0
1,016.00	83,046	325,258	325,258

Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.00'	18.0" Round Culvert L= 100.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,010.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	1,008.00'	18.0" Round Culvert L= 30.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,008.00' / 1,008.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=9.75 cfs @ 12.64 hrs HW=1,013.07' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 9.75 cfs @ 5.52 fps)

↑ **2=Culvert** (Passes 9.75 cfs of 12.25 cfs potential flow)

25-1243

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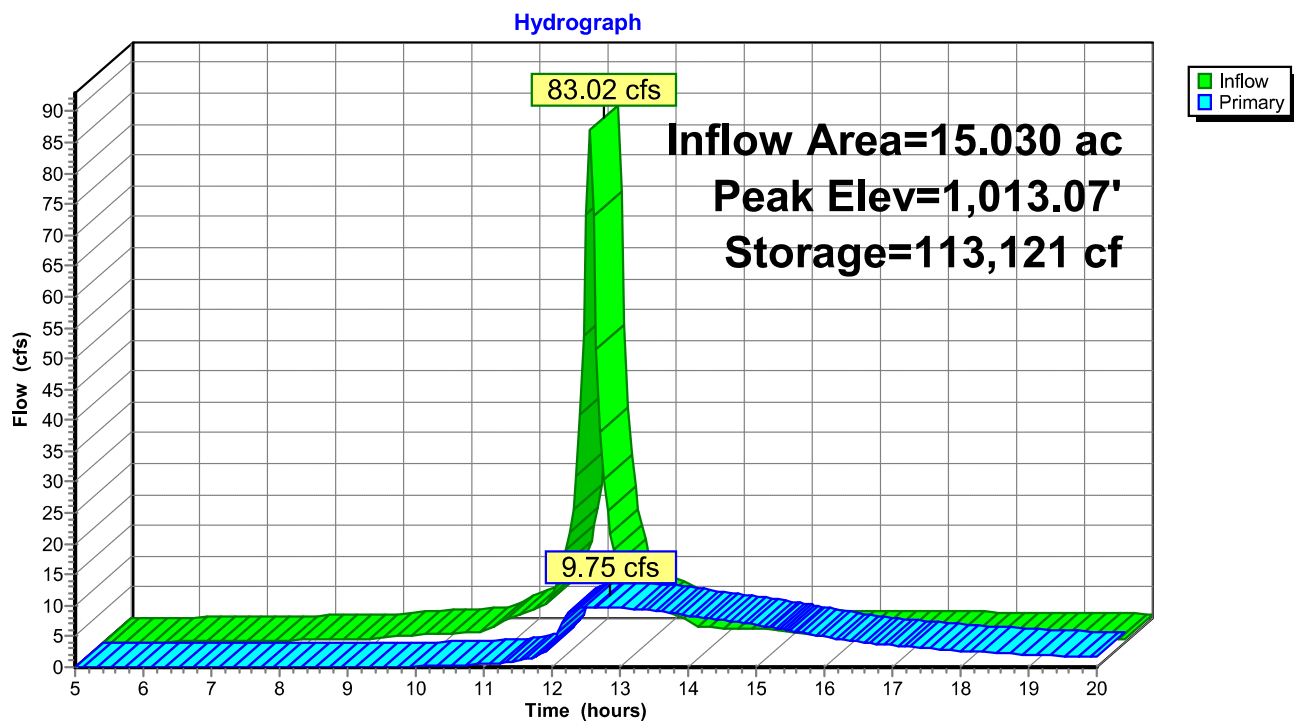
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MSE 24-hr 3 10-Year Rainfall=4.38"

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Pond 23P: Metcon Addn Pond



Summary for Pond 25P: Trail Culvert Basin

Inflow Area = 0.900 ac, 0.00% Impervious, Inflow Depth > 2.26" for 10-Year event
 Inflow = 4.42 cfs @ 12.05 hrs, Volume= 0.170 af
 Outflow = 2.29 cfs @ 12.12 hrs, Volume= 0.170 af, Atten= 48%, Lag= 4.5 min
 Primary = 2.29 cfs @ 12.12 hrs, Volume= 0.170 af
 Routed to Pond 27P : CSAH 12 E Ditch
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 27P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,012.84' @ 12.12 hrs Surf.Area= 1,600 sf Storage= 1,235 cf

Plug-Flow detention time= 5.5 min calculated for 0.169 af (100% of inflow)
 Center-of-Mass det. time= 5.0 min (782.0 - 777.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.30'	12,717 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.30	0	0	0
1,013.00	1,763	1,499	1,499
1,014.00	5,033	3,398	4,897
1,015.00	10,608	7,821	12,717

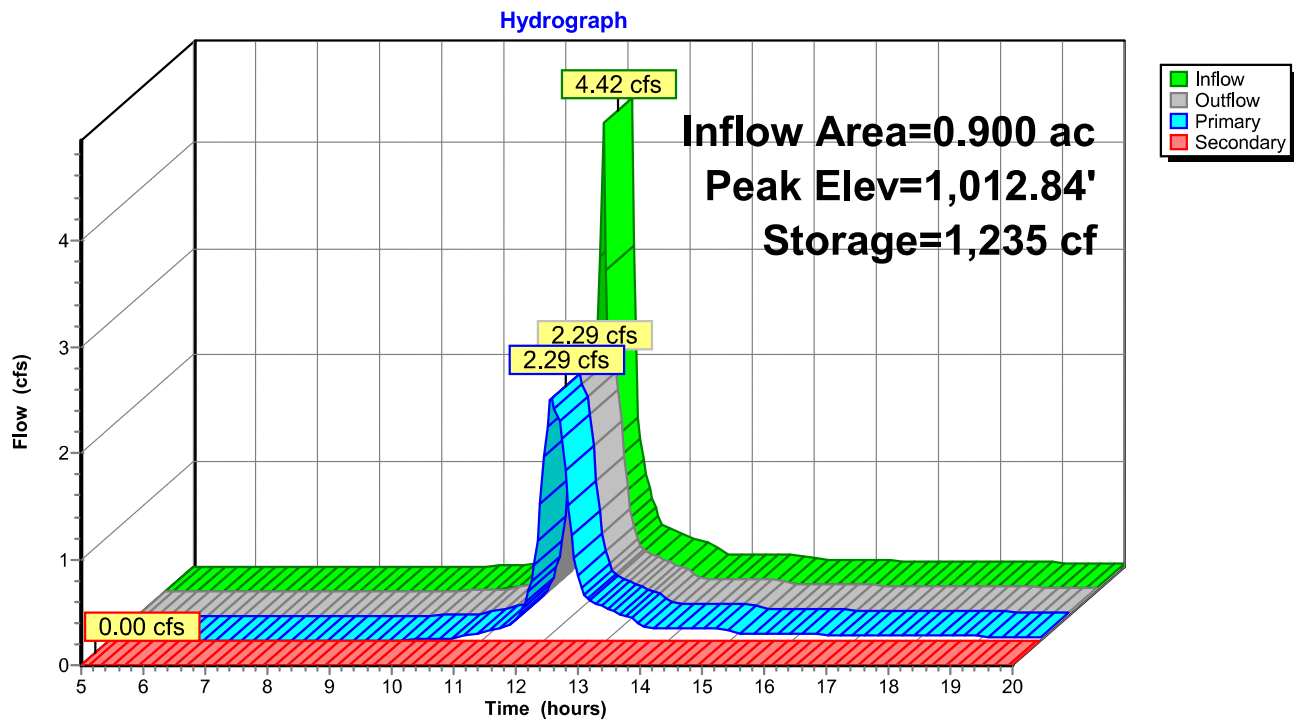
Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.30'	12.0" Round Culvert L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.30' / 1,011.00' S= 0.0071 ' S= 0.0071 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	1,014.50'	50.0' long + 100.0 ' SideZ x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.26 cfs @ 12.12 hrs HW=1,012.82' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 2.26 cfs @ 2.88 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,011.30' (Free Discharge)

↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: Trail Culvert Basin

Summary for Pond 27P: CSAH 12 E Ditch

Inflow Area = 20.530 ac, 62.65% Impervious, Inflow Depth > 3.04" for 10-Year event
 Inflow = 33.76 cfs @ 12.17 hrs, Volume= 5.198 af
 Outflow = 12.04 cfs @ 12.95 hrs, Volume= 5.134 af, Atten= 64%, Lag= 47.0 min
 Primary = 12.04 cfs @ 12.95 hrs, Volume= 5.134 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,012.17' @ 12.95 hrs Surf.Area= 28,677 sf Storage= 35,343 cf

Plug-Flow detention time= 36.6 min calculated for 5.134 af (99% of inflow)
 Center-of-Mass det. time= 32.3 min (879.9 - 847.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,010.00'	152,598 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,010.00	0	0	0
1,011.00	17,095	8,548	8,548
1,012.00	26,827	21,961	30,509
1,013.00	37,445	32,136	62,645
1,014.00	38,000	37,723	100,367
1,015.00	66,462	52,231	152,598

Device	Routing	Invert	Outlet Devices
#1	Primary	1,010.00'	28.0" W x 18.0" H, R=14.7"/40.7" Pipe Arch Culvert L= 148.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,010.00' / 1,009.60' S= 0.0027 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.76 sf
#2	Secondary	1,013.70'	10.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=12.04 cfs @ 12.95 hrs HW=1,012.17' (Free Discharge)
 ↑1=Culvert (Barrel Controls 12.04 cfs @ 4.36 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,010.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

25-1243

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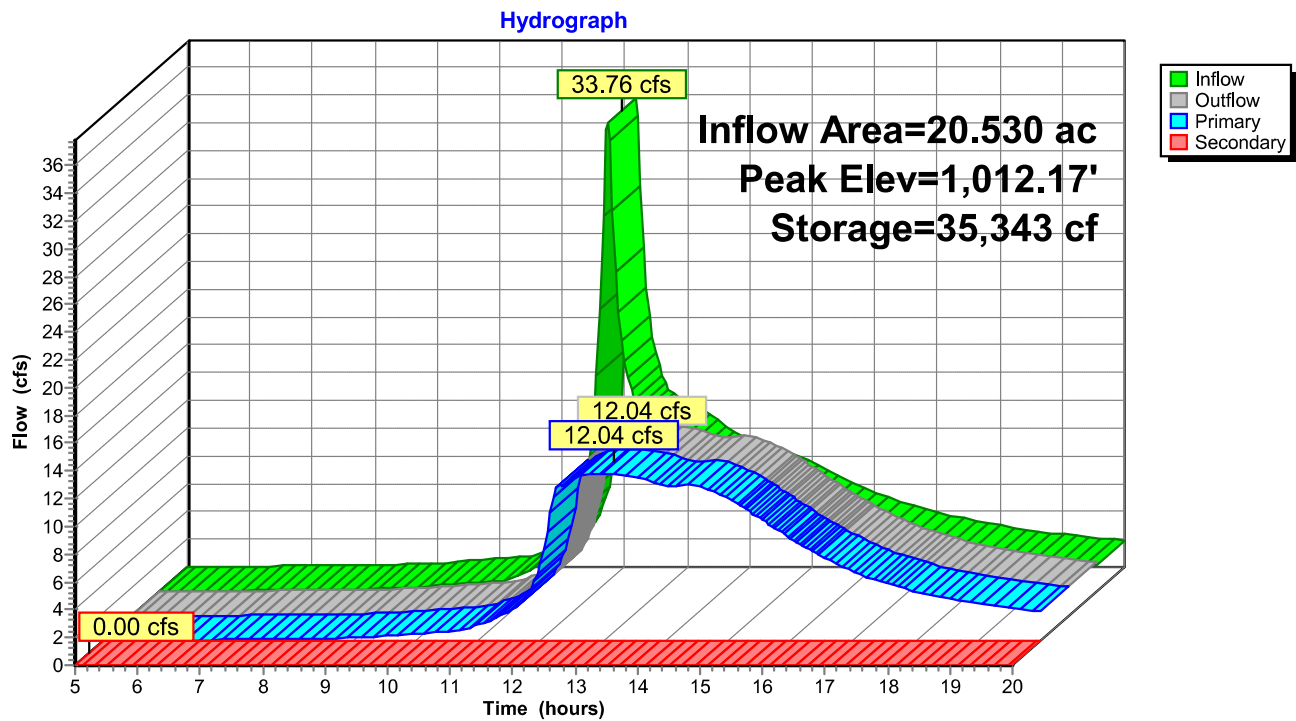
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MSE 24-hr 3 10-Year Rainfall=4.38"

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Pond 27P: CSAH 12 E Ditch



Summary for Subcatchment 1S: SE Wetland WS

Runoff = 8.95 cfs @ 12.39 hrs, Volume= 0.821 af, Depth> 6.12"
 Routed to Pond 2P : SE Wetland

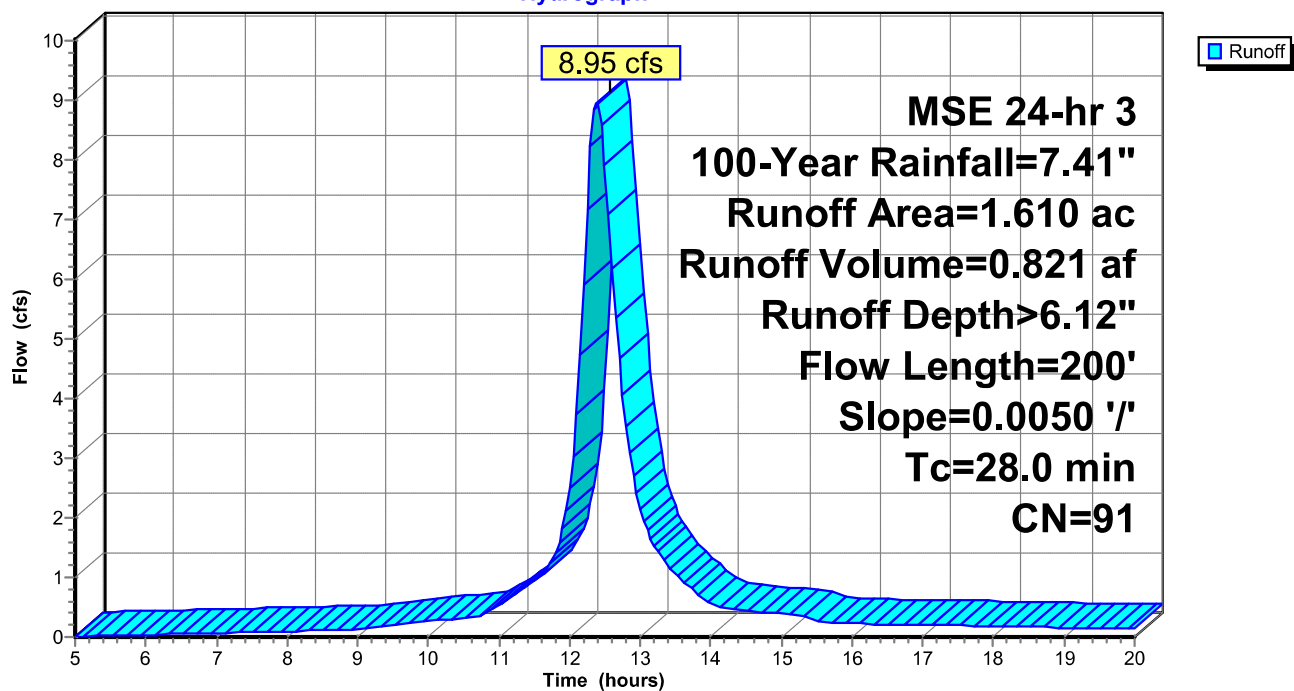
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
1.610	91	Row crops, straight row, Poor, HSG D
1.610		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"

Subcatchment 1S: SE Wetland WS

Hydrograph



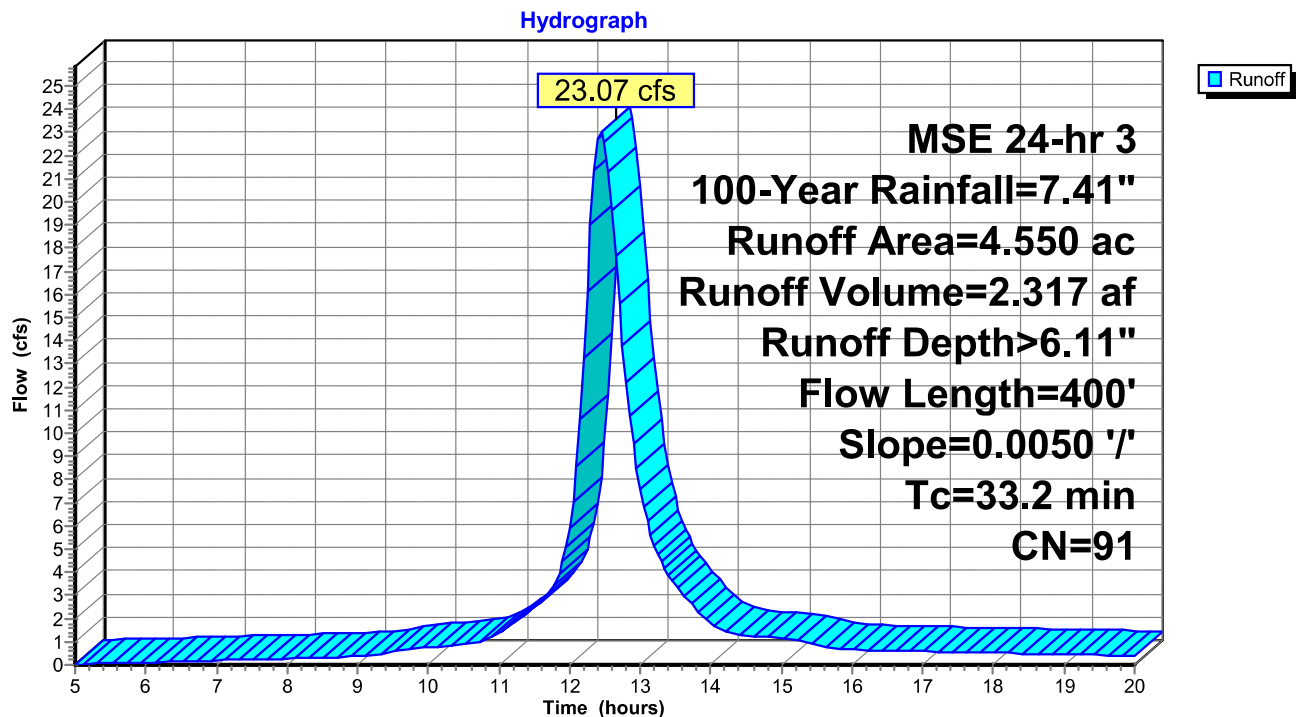
Summary for Subcatchment 4S: NE Wetland WS

Runoff = 23.07 cfs @ 12.45 hrs, Volume= 2.317 af, Depth> 6.11"
 Routed to Pond 5P : NE Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
4.190	91	Row crops, straight row, Poor, HSG D
0.360	86	Farmsteads, HSG D
4.550	91	Weighted Average
4.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"
5.2	200	0.0050	0.64		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
33.2	400	Total			

Subcatchment 4S: NE Wetland WS

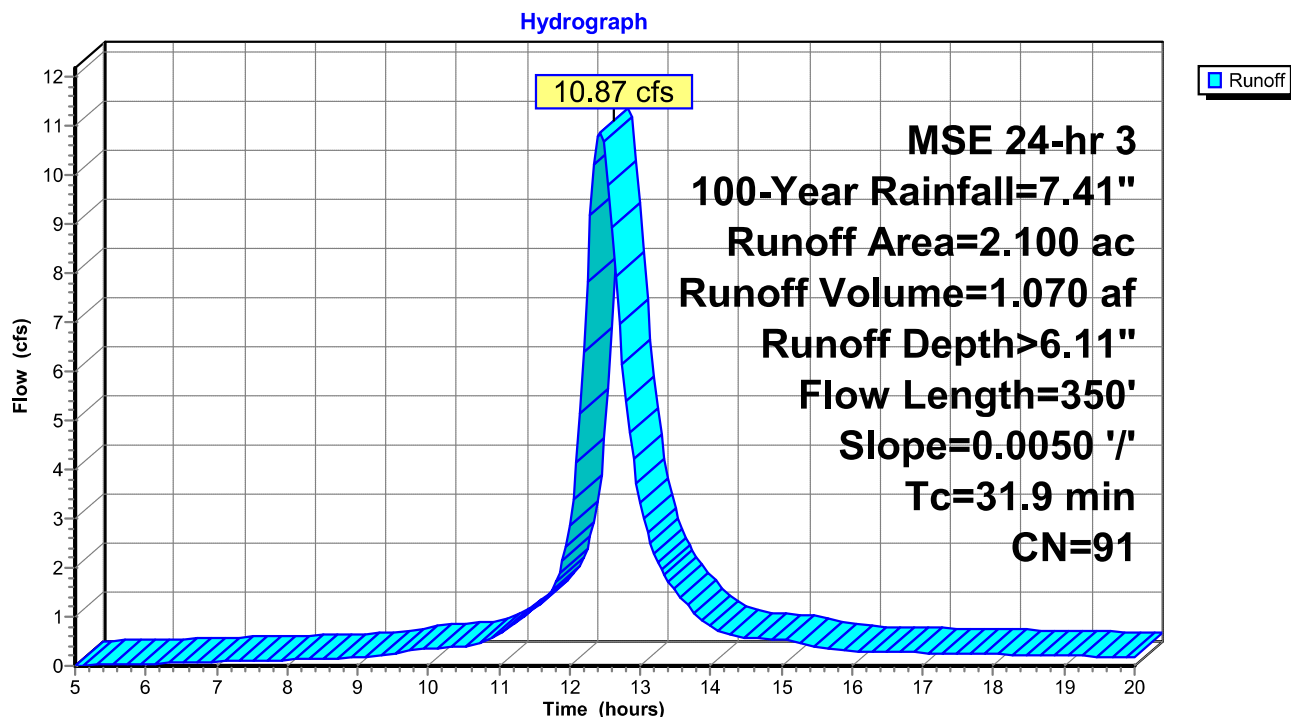
Summary for Subcatchment 6S: NW Wetland WS

Runoff = 10.87 cfs @ 12.43 hrs, Volume= 1.070 af, Depth> 6.11"
 Routed to Pond 7P : NW Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
2.100	91	Row crops, straight row, Poor, HSG D
2.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	200	0.0050	0.12		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 4.40"
3.9	150	0.0050	0.64		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
31.9	350	Total			

Subcatchment 6S: NW Wetland WS

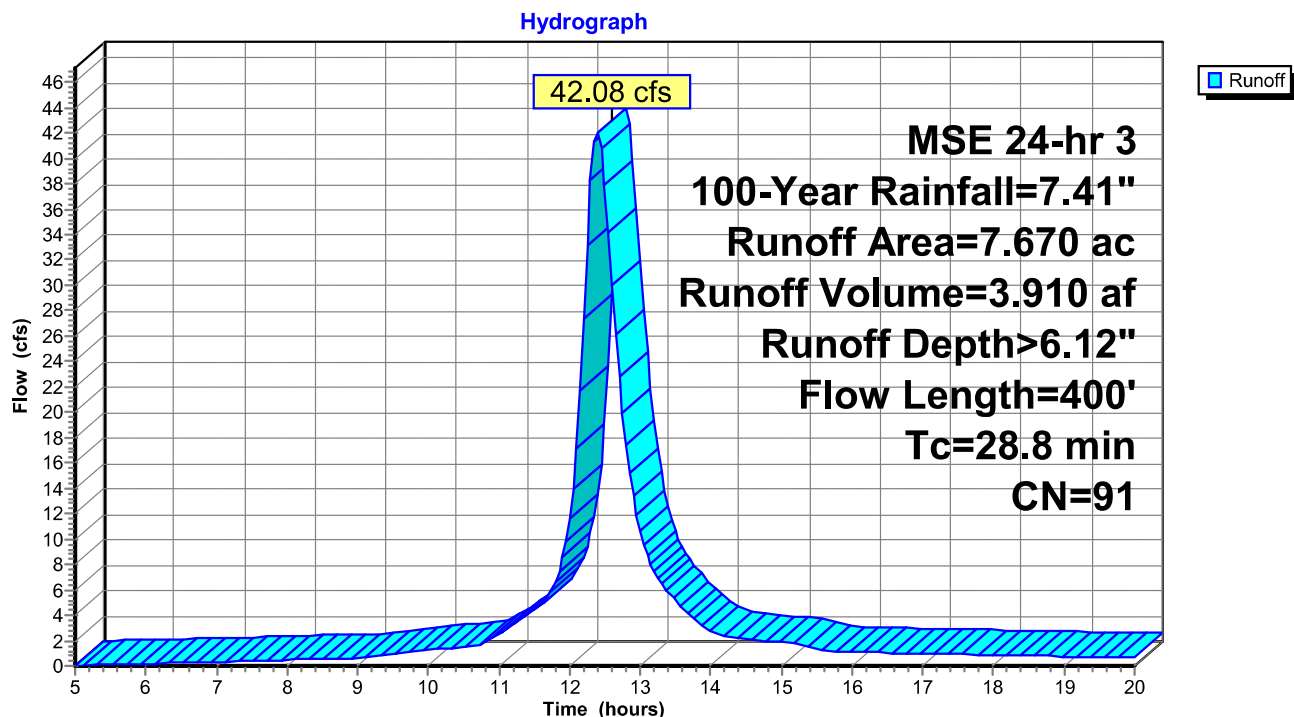
Summary for Subcatchment 9S: Trail Berm WS

Runoff = 42.08 cfs @ 12.39 hrs, Volume= 3.910 af, Depth> 6.12"
 Routed to Pond 10P : Trail Culvert Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
7.670	91	Row crops, straight row, Poor, HSG D
7.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	200	0.0050	0.27		Sheet Flow, Cultivated: Residue<=20% n= 0.060 P2= 4.40"
16.6	200	0.0005	0.20		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
28.8	400	Total			

Subcatchment 9S: Trail Berm WS

25-1243

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MSE 24-hr 3 100-Year Rainfall=7.41"

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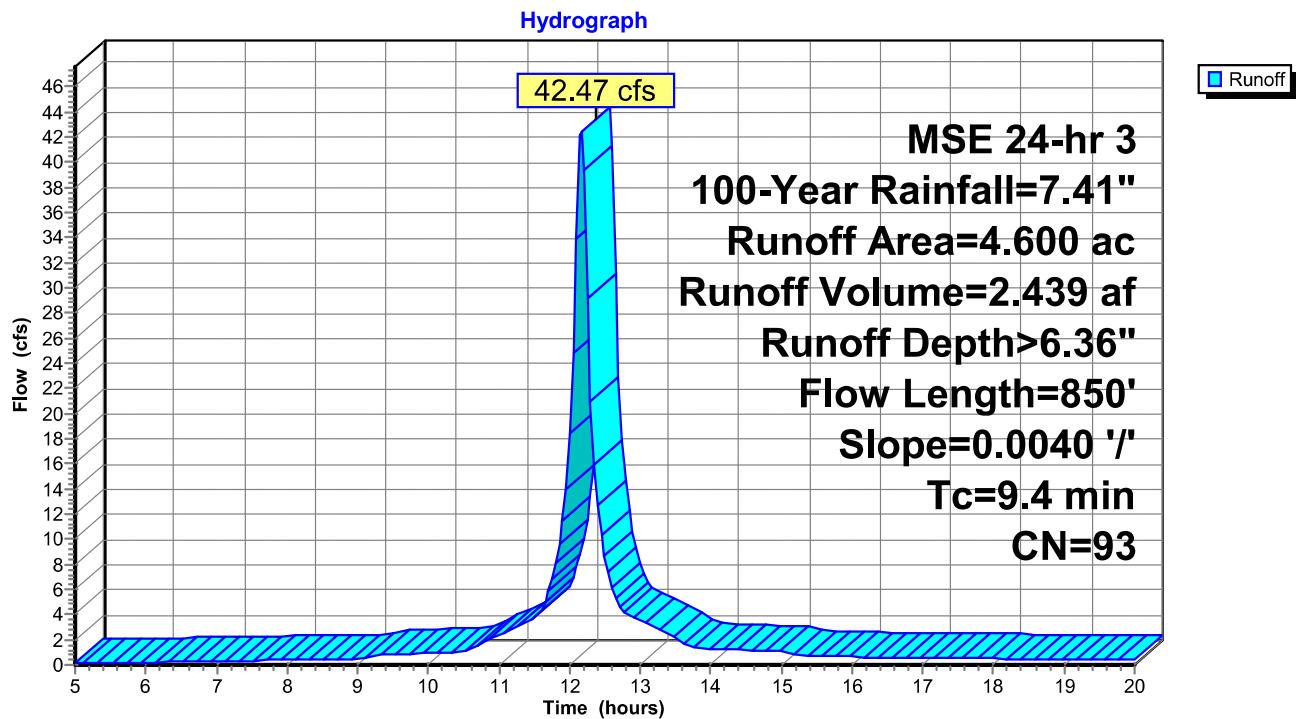
Summary for Subcatchment 11S: CSAH 12 East

Runoff = 42.47 cfs @ 12.16 hrs, Volume= 2.439 af, Depth> 6.36"
 Routed to Pond 12P : CSAH 12 E Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
4.600	93	Paved roads w/open ditches, 50% imp, HSG D
2.300		50.00% Pervious Area
2.300		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
2.4	450	0.0040	3.12	100.00	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=2.00' Z= 6.0 & 3.0 ' /' Top.W=25.00' n= 0.035 Earth, dense weeds
9.4	850	Total			

Subcatchment 11S: CSAH 12 East

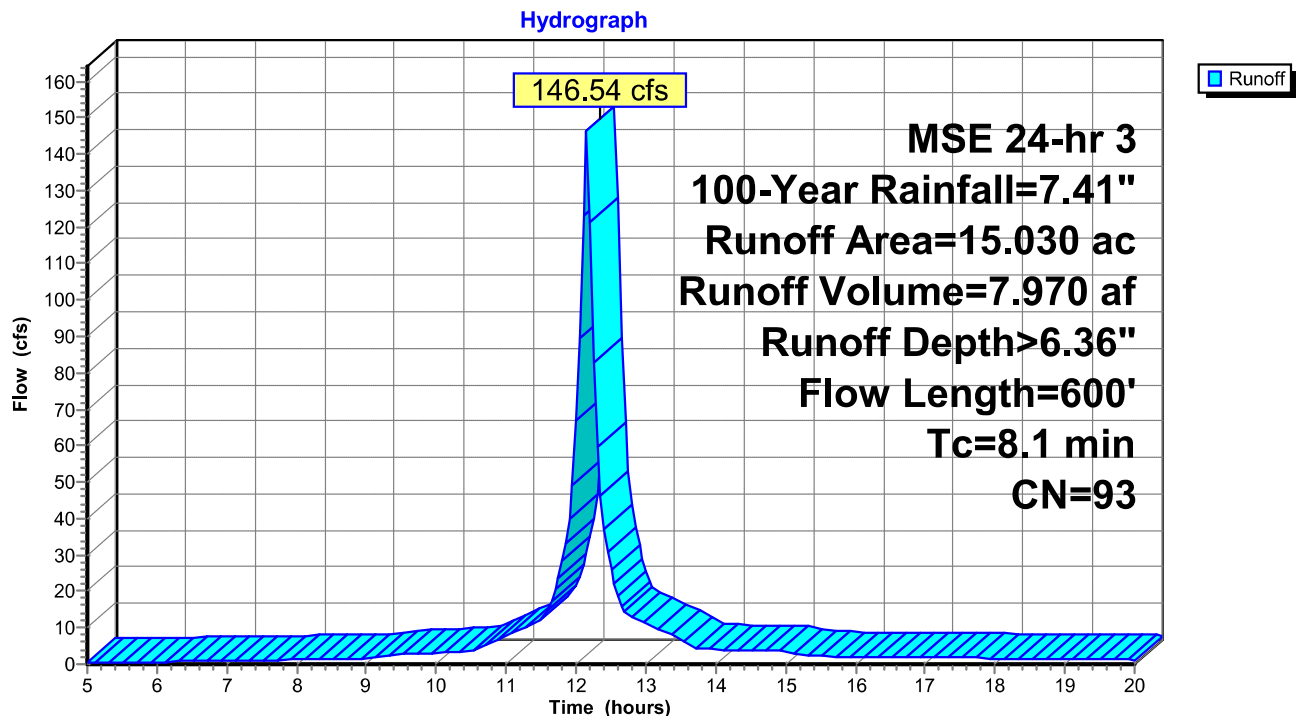
Summary for Subcatchment 22S: Des WS

Runoff = 146.54 cfs @ 12.15 hrs, Volume= 7.970 af, Depth> 6.36"
 Routed to Pond 23P : Metcon Addn Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
14.670	93	Urban industrial, 72% imp, HSG D
0.360	86	Farmsteads, HSG D
15.030	93	Weighted Average
4.468		29.72% Pervious Area
10.562		70.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	200	0.0200	1.85		Sheet Flow, Smooth surfaces n= 0.011 P2= 4.40"
6.3	400	0.0050	1.06		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
8.1	600	Total			

Subcatchment 22S: Des WS

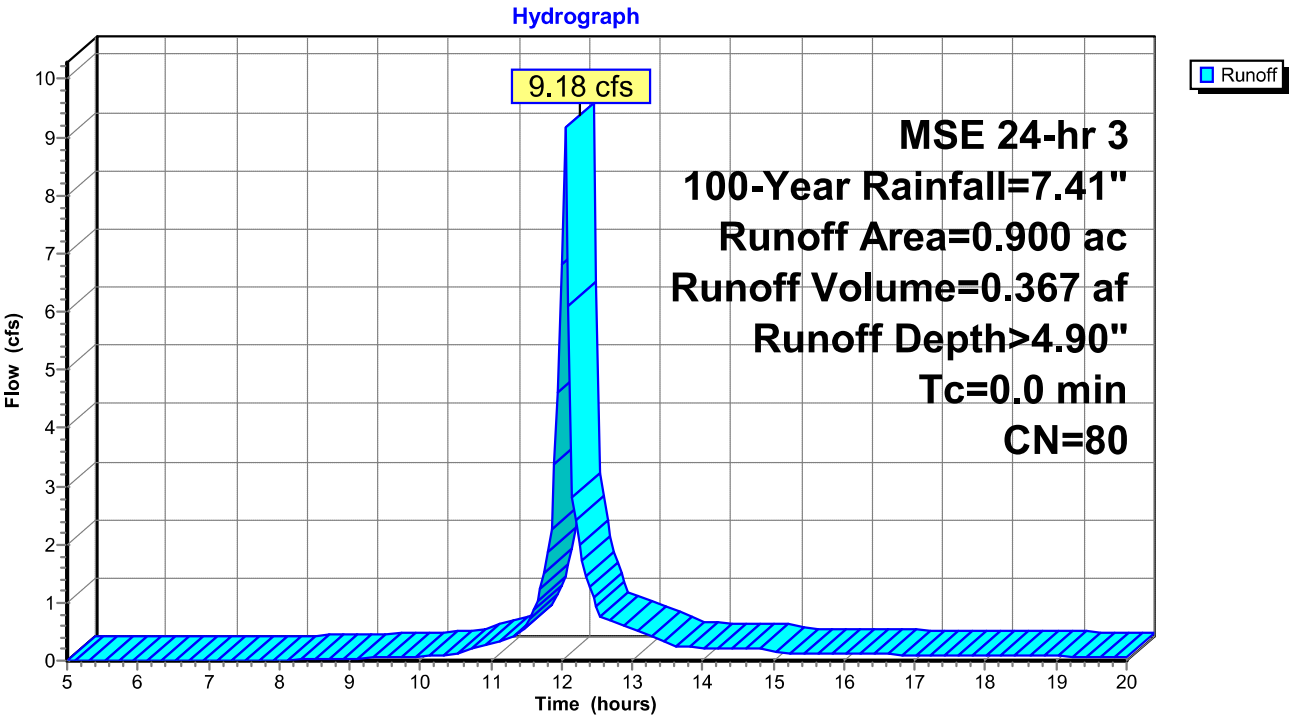
Summary for Subcatchment 24S: Trail Berm WS

Runoff = 9.18 cfs @ 12.05 hrs, Volume= 0.367 af, Depth> 4.90"
Routed to Pond 25P : Trail Culvert Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
0.900	80	>75% Grass cover, Good, HSG D
0.900		100.00% Pervious Area

Subcatchment 24S: Trail Berm WS



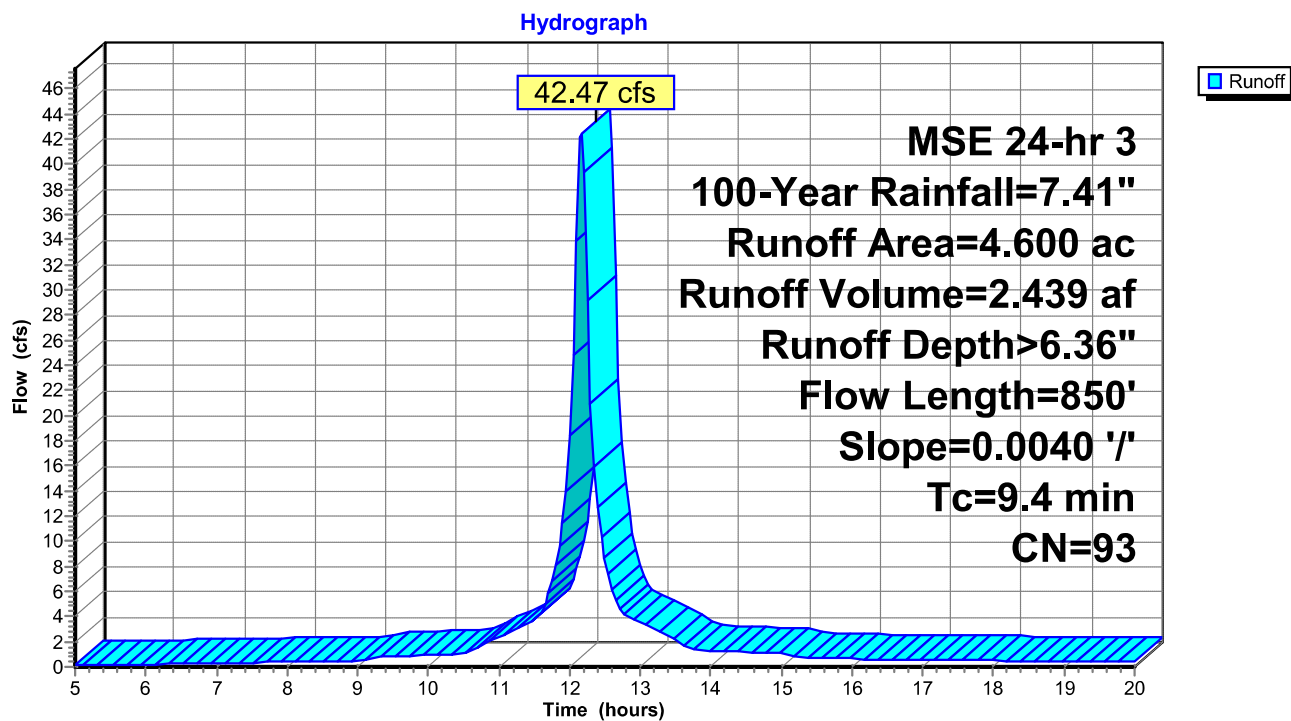
Summary for Subcatchment 26S: CSAH 12 East

Runoff = 42.47 cfs @ 12.16 hrs, Volume= 2.439 af, Depth> 6.36"
 Routed to Pond 27P : CSAH 12 E Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-Year Rainfall=7.41"

Area (ac)	CN	Description
4.600	93	Paved roads w/open ditches, 50% imp, HSG D
2.300		50.00% Pervious Area
2.300		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
3.5	200	0.0040	0.95		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
2.4	450	0.0040	3.12	100.00	Trap/Vee/Rect Channel Flow, Bot.W=7.00' D=2.00' Z= 6.0 & 3.0 ' Top.W=25.00' n= 0.035 Earth, dense weeds
9.4	850	Total			

Subcatchment 26S: CSAH 12 East

Summary for Reach 3R: S Trail Berm

Inflow Area = 1.610 ac, 0.00% Impervious, Inflow Depth > 3.21" for 100-Year event
 Inflow = 4.54 cfs @ 12.71 hrs, Volume= 0.431 af
 Outflow = 4.32 cfs @ 12.88 hrs, Volume= 0.426 af, Atten= 5%, Lag= 9.9 min
 Routed to Pond 10P : Trail Culvert Basin

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 1.45 fps, Min. Travel Time= 5.1 min

Avg. Velocity= 0.65 fps, Avg. Travel Time= 11.4 min

Peak Storage= 1,319 cf @ 12.79 hrs

Average Depth at Peak Storage= 0.25' , Surface Width= 14.00'

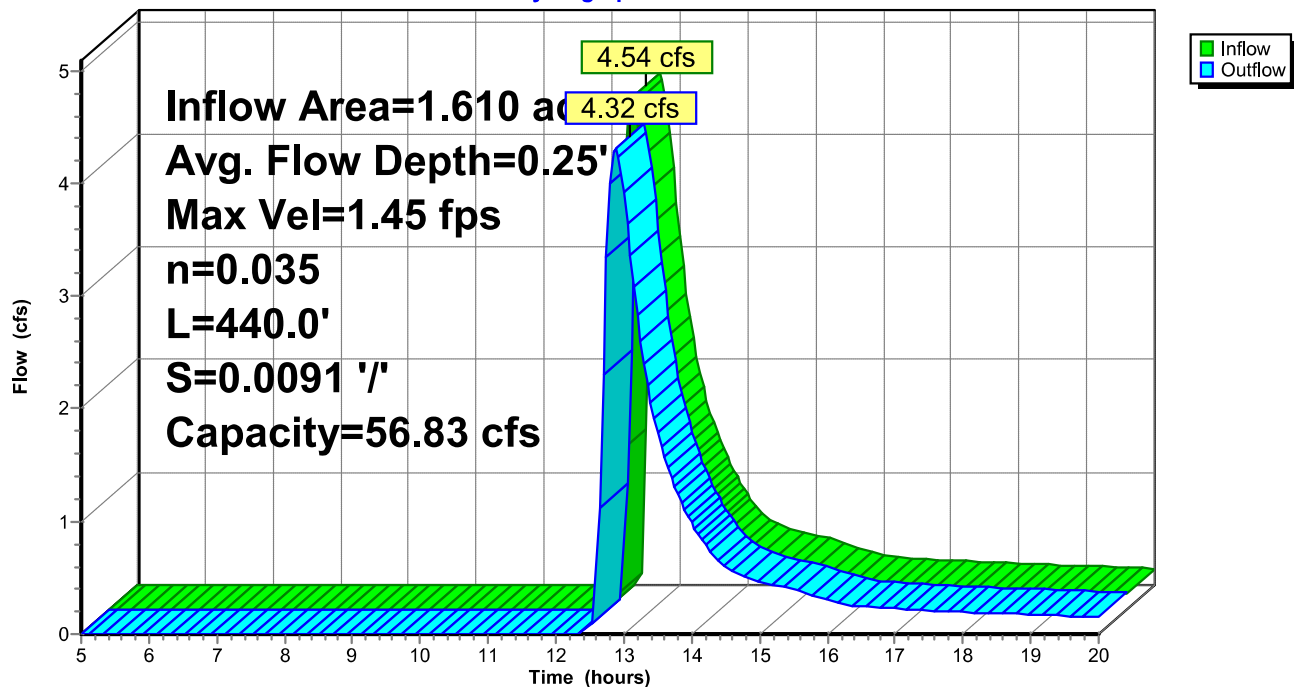
Bank-Full Depth= 1.00' Flow Area= 18.0 sf, Capacity= 56.83 cfs

10.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds

Side Slope Z-value= 6.0 10.0 '/' Top Width= 26.00'

Length= 440.0' Slope= 0.0091 '/'

Inlet Invert= 1,016.00', Outlet Invert= 1,012.00'

**Reach 3R: S Trail Berm****Hydrograph**

Summary for Reach 8R: W Trail Berm

Inflow Area = 6.650 ac, 0.00% Impervious, Inflow Depth > 4.53" for 100-Year event
 Inflow = 24.95 cfs @ 12.67 hrs, Volume= 2.513 af
 Outflow = 23.66 cfs @ 12.85 hrs, Volume= 2.494 af, Atten= 5%, Lag= 10.8 min
 Routed to Pond 10P : Trail Culvert Basin

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 2.24 fps, Min. Travel Time= 5.8 min

Avg. Velocity= 1.04 fps, Avg. Travel Time= 12.5 min

Peak Storage= 8,194 cf @ 12.75 hrs

Average Depth at Peak Storage= 0.93' , Surface Width= 18.82'

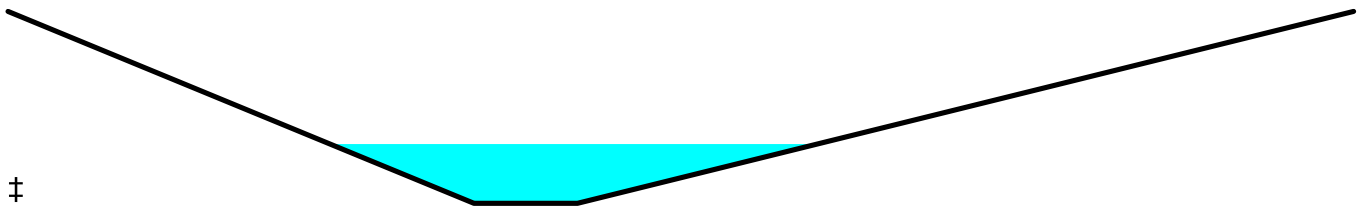
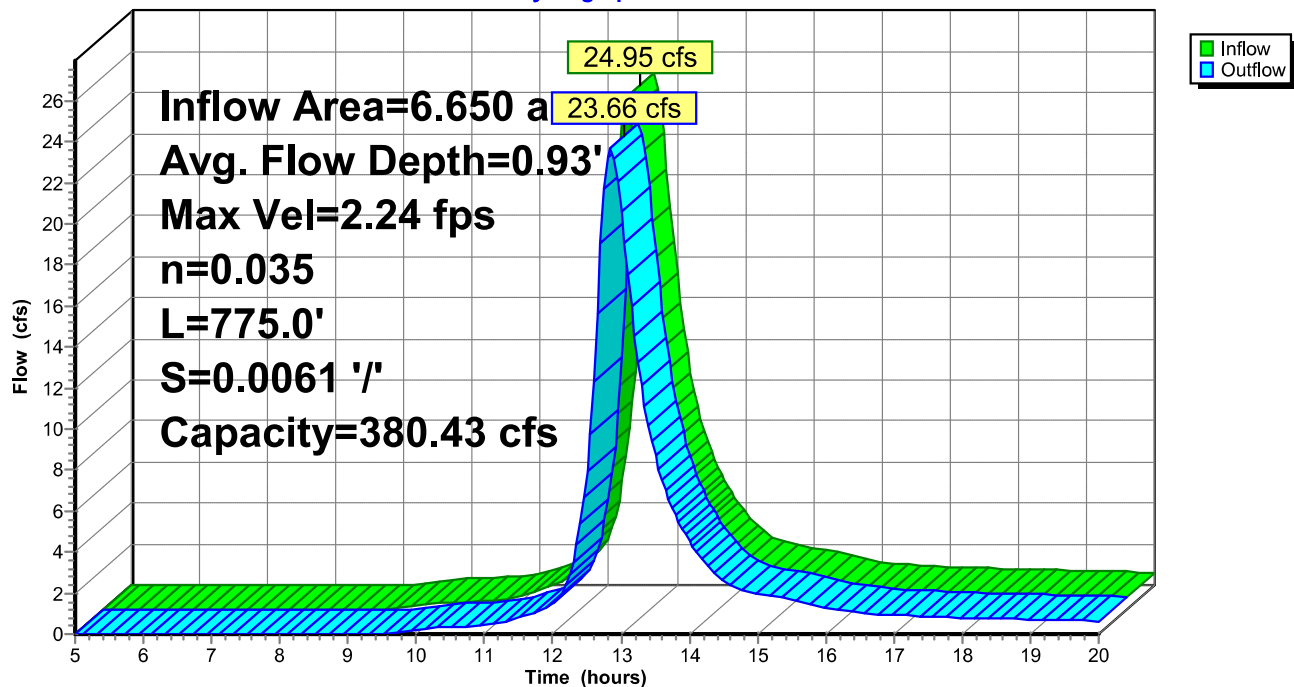
Bank-Full Depth= 3.00' Flow Area= 84.0 sf, Capacity= 380.43 cfs

4.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds

Side Slope Z-value= 6.0 10.0 ' Top Width= 52.00'

Length= 775.0' Slope= 0.0061 ' /'

Inlet Invert= 1,016.70', Outlet Invert= 1,012.00'

**Reach 8R: W Trail Berm****Hydrograph**

Summary for Pond 2P: SE Wetland

Inflow Area = 1.610 ac, 0.00% Impervious, Inflow Depth > 6.12" for 100-Year event
 Inflow = 8.95 cfs @ 12.39 hrs, Volume= 0.821 af
 Outflow = 4.54 cfs @ 12.71 hrs, Volume= 0.431 af, Atten= 49%, Lag= 19.7 min
 Primary = 4.54 cfs @ 12.71 hrs, Volume= 0.431 af
 Routed to Reach 3R : S Trail Berm

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.97' @ 12.71 hrs Surf.Area= 56,519 sf Storage= 20,259 cf

Plug-Flow detention time= 142.0 min calculated for 0.429 af (52% of inflow)
 Center-of-Mass det. time= 77.1 min (844.6 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.25'	22,174 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

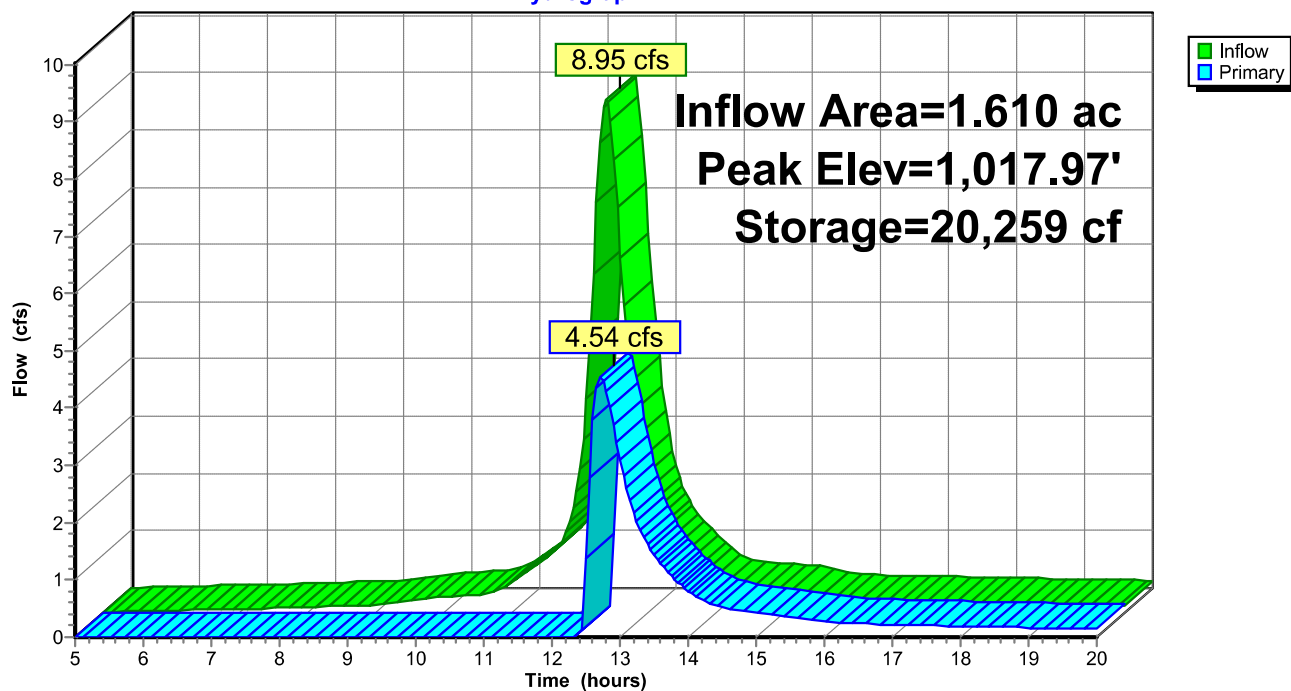
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.25	0	0	0
1,018.00	59,130	22,174	22,174

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.90'	100.0' long + 100.0 ' SideZ 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=4.51 cfs @ 12.71 hrs HW=1,017.97' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 4.51 cfs @ 0.63 fps)

Pond 2P: SE Wetland

Hydrograph



Summary for Pond 5P: NE Wetland

Inflow Area = 4.550 ac, 0.00% Impervious, Inflow Depth > 6.11" for 100-Year event
 Inflow = 23.07 cfs @ 12.45 hrs, Volume= 2.317 af
 Outflow = 17.30 cfs @ 12.66 hrs, Volume= 1.480 af, Atten= 25%, Lag= 13.1 min
 Primary = 17.30 cfs @ 12.66 hrs, Volume= 1.480 af
 Routed to Pond 7P : NW Wetland

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.74' @ 12.66 hrs Surf.Area= 65,030 sf Storage= 46,541 cf

Plug-Flow detention time= 116.2 min calculated for 1.480 af (64% of inflow)
 Center-of-Mass det. time= 59.8 min (831.5 - 771.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,016.00'	65,093 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,016.00	0	0	0
1,017.00	25,742	12,871	12,871
1,018.00	78,702	52,222	65,093

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.56'	75.0' long + 100.0 ' SideZ 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=17.19 cfs @ 12.66 hrs HW=1,017.74' (Free Discharge)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 17.19 cfs @ 1.02 fps)

25-1243

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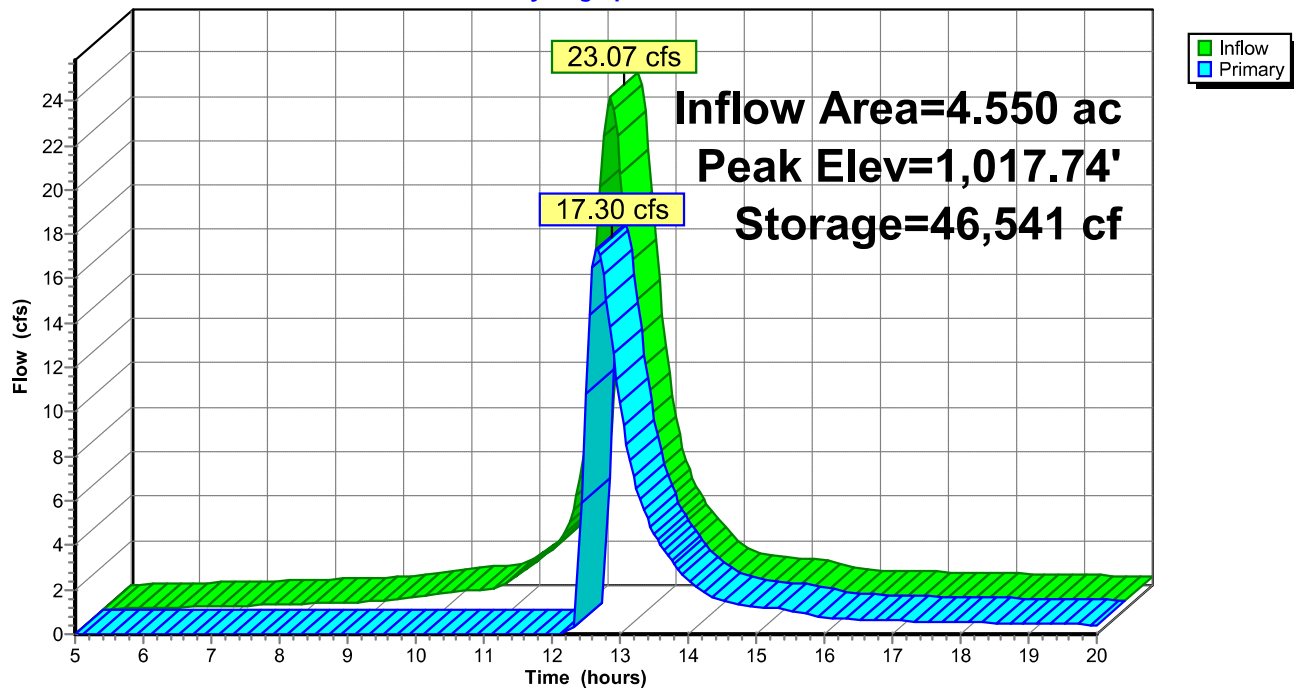
MSE 24-hr 3 100-Year Rainfall=7.41"

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Pond 5P: NE Wetland

Hydrograph



Summary for Pond 7P: NW Wetland

Inflow Area = 6.650 ac, 0.00% Impervious, Inflow Depth > 4.60" for 100-Year event
 Inflow = 25.51 cfs @ 12.62 hrs, Volume= 2.550 af
 Outflow = 24.95 cfs @ 12.67 hrs, Volume= 2.513 af, Atten= 2%, Lag= 3.1 min
 Primary = 24.95 cfs @ 12.67 hrs, Volume= 2.513 af
 Routed to Reach 8R : W Trail Berm

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,017.37' @ 12.67 hrs Surf.Area= 33,765 sf Storage= 6,174 cf

Plug-Flow detention time= 13.2 min calculated for 2.504 af (98% of inflow)
 Center-of-Mass det. time= 7.7 min (813.7 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.00'	46,162 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

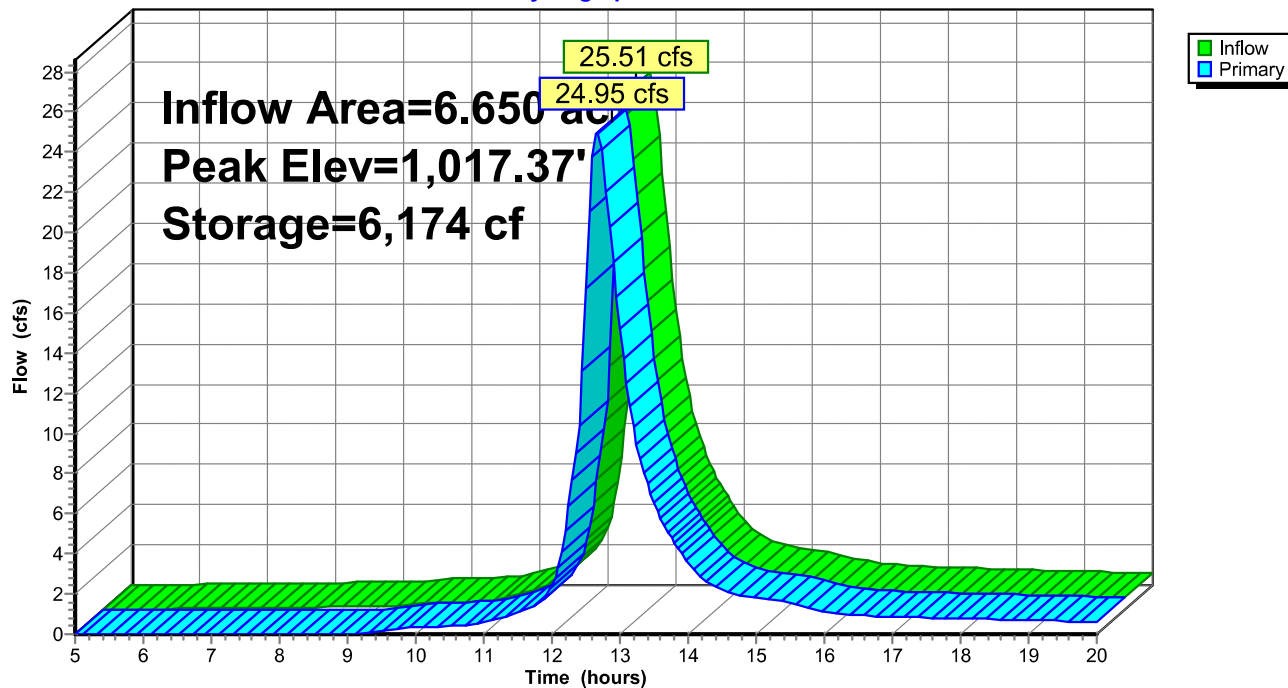
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.00	0	0	0
1,018.00	92,324	46,162	46,162

Device	Routing	Invert	Outlet Devices
#1	Primary	1,017.17'	100.0' long + 100.0 ' SideZ 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=24.78 cfs @ 12.67 hrs HW=1,017.36' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 24.78 cfs @ 1.06 fps)

Pond 7P: NW Wetland

Hydrograph



Summary for Pond 10P: Trail Culvert Basin

Inflow Area = 15.930 ac, 0.00% Impervious, Inflow Depth > 5.14" for 100-Year event
 Inflow = 47.66 cfs @ 12.42 hrs, Volume= 6.830 af
 Outflow = 47.27 cfs @ 12.46 hrs, Volume= 6.820 af, Atten= 1%, Lag= 2.2 min
 Primary = 4.20 cfs @ 12.46 hrs, Volume= 2.869 af
 Routed to Pond 12P : CSAH 12 E Ditch
 Secondary = 43.07 cfs @ 12.46 hrs, Volume= 3.951 af
 Routed to Pond 12P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,014.84' @ 12.46 hrs Surf.Area= 28,827 sf Storage= 24,559 cf

Plug-Flow detention time= 20.8 min calculated for 6.820 af (100% of inflow)
 Center-of-Mass det. time= 20.2 min (814.5 - 794.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.30'	29,601 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.30	0	0	0
1,013.00	1,763	1,499	1,499
1,014.00	11,053	6,408	7,907
1,015.00	32,336	21,695	29,601

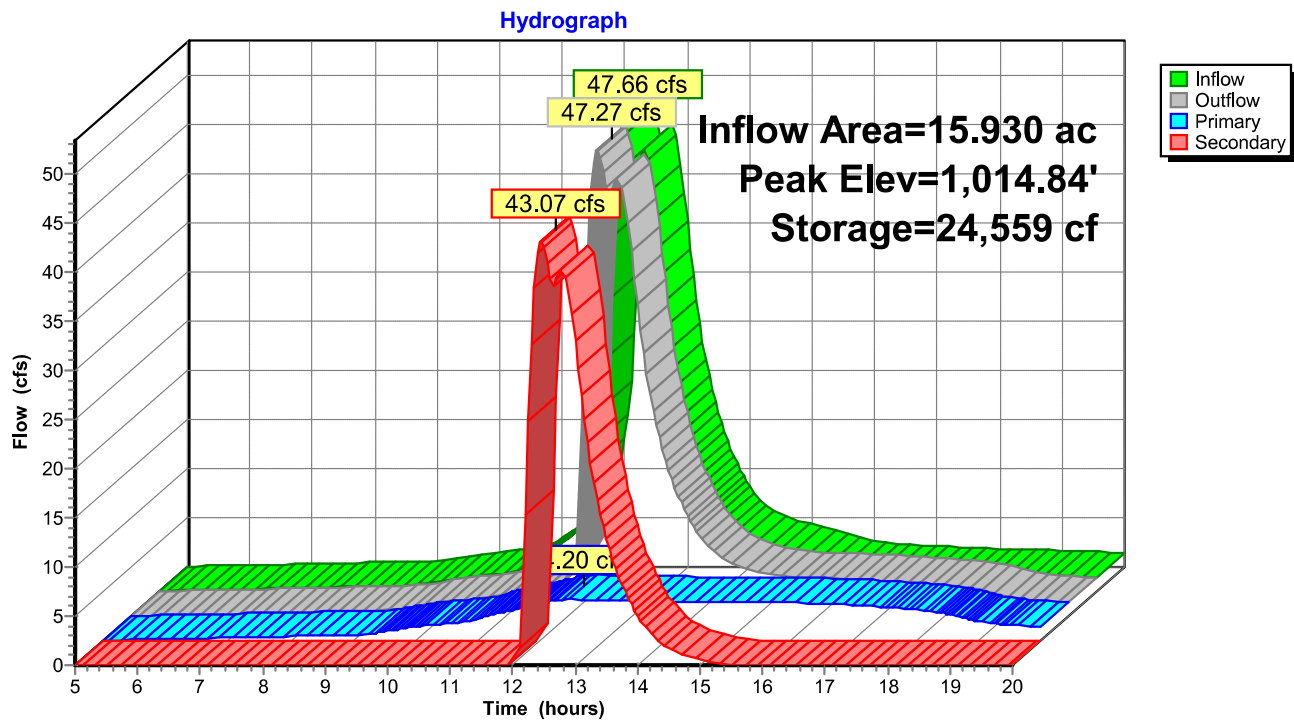
Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.30'	12.0" Round Culvert L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.30' / 1,011.00' S= 0.0071 ' / Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	1,014.50'	50.0' long + 100.0 ' / SideZ x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.20 cfs @ 12.46 hrs HW=1,014.83' (Free Discharge)

↑**1=Culvert** (Barrel Controls 4.20 cfs @ 5.35 fps)

Secondary OutFlow Max=42.81 cfs @ 12.46 hrs HW=1,014.83' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 42.81 cfs @ 1.53 fps)

Pond 10P: Trail Culvert Basin

Summary for Pond 12P: CSAH 12 E Ditch

Inflow Area = 20.530 ac, 11.20% Impervious, Inflow Depth > 5.41" for 100-Year event
 Inflow = 58.81 cfs @ 12.38 hrs, Volume= 9.258 af
 Outflow = 39.07 cfs @ 13.03 hrs, Volume= 9.195 af, Atten= 34%, Lag= 38.7 min
 Primary = 21.06 cfs @ 13.03 hrs, Volume= 8.092 af
 Secondary = 18.01 cfs @ 13.03 hrs, Volume= 1.103 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,014.39' @ 13.03 hrs Surf.Area= 48,961 sf Storage= 117,112 cf

Plug-Flow detention time= 51.3 min calculated for 9.195 af (99% of inflow)
 Center-of-Mass det. time= 48.6 min (845.5 - 796.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,010.00'	152,598 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,010.00	0	0	0
1,011.00	17,095	8,548	8,548
1,012.00	26,827	21,961	30,509
1,013.00	37,445	32,136	62,645
1,014.00	38,000	37,723	100,367
1,015.00	66,462	52,231	152,598

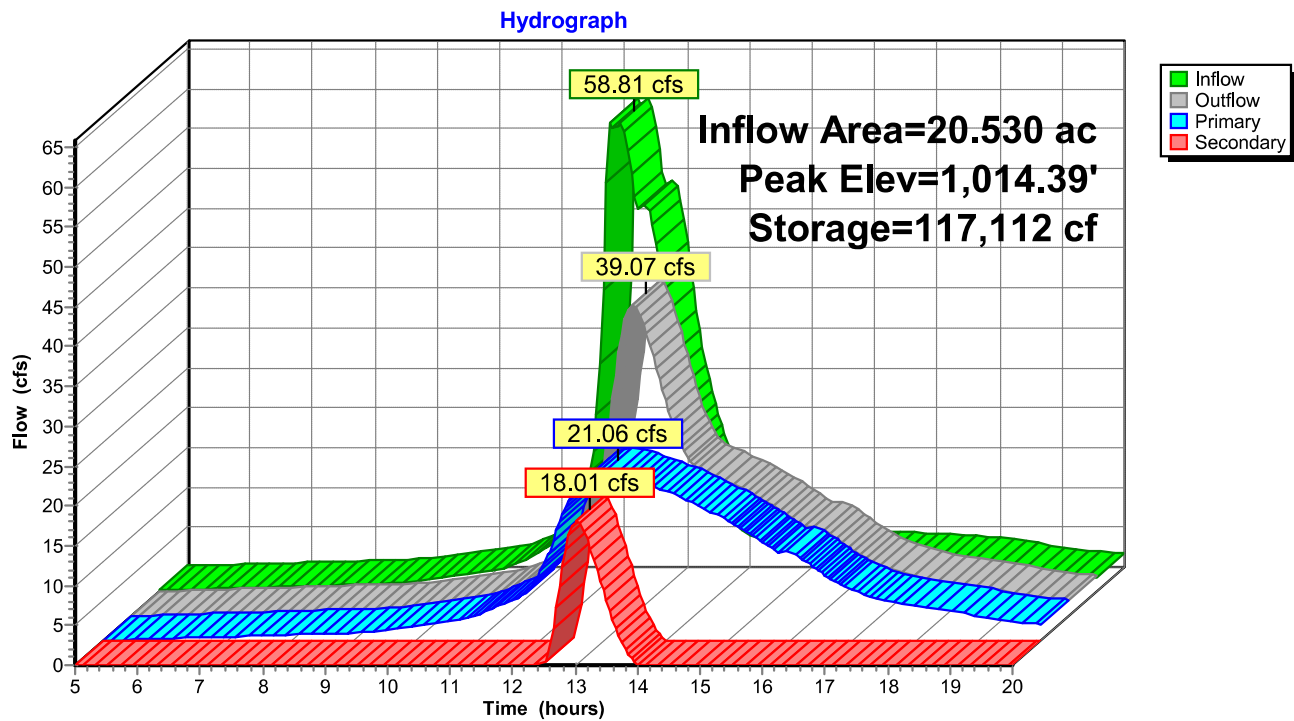
Device	Routing	Invert	Outlet Devices
#1	Primary	1,010.00'	28.0" W x 18.0" H, R=14.7"/40.7" Pipe Arch Culvert L= 148.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,010.00' / 1,009.60' S= 0.0027 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.76 sf
#2	Secondary	1,013.70'	10.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=21.06 cfs @ 13.03 hrs HW=1,014.38' (Free Discharge)

↑**1=Culvert** (Barrel Controls 21.06 cfs @ 7.63 fps)

Secondary OutFlow Max=17.94 cfs @ 13.03 hrs HW=1,014.38' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 17.94 cfs @ 2.62 fps)

Pond 12P: CSAH 12 E Ditch

Summary for Pond 23P: Metcon Addn Pond

Inflow Area = 15.030 ac, 70.28% Impervious, Inflow Depth > 6.36" for 100-Year event
 Inflow = 146.54 cfs @ 12.15 hrs, Volume= 7.970 af
 Outflow = 13.50 cfs @ 12.76 hrs, Volume= 6.895 af, Atten= 91%, Lag= 36.6 min
 Primary = 13.50 cfs @ 12.76 hrs, Volume= 6.895 af
 Routed to Pond 27P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,014.51' @ 12.76 hrs Surf.Area= 72,356 sf Storage= 209,859 cf

Plug-Flow detention time= 189.9 min calculated for 6.894 af (87% of inflow)
 Center-of-Mass det. time= 153.5 min (900.0 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.00'	325,258 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.00	47,057	0	0
1,016.00	83,046	325,258	325,258

Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.00'	18.0" Round Culvert L= 100.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.00' / 1,010.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf
#2	Device 1	1,008.00'	18.0" Round Culvert L= 30.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,008.00' / 1,008.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=13.50 cfs @ 12.76 hrs HW=1,014.51' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 13.50 cfs @ 7.64 fps)

↑ **2=Culvert** (Passes 13.50 cfs of 15.95 cfs potential flow)

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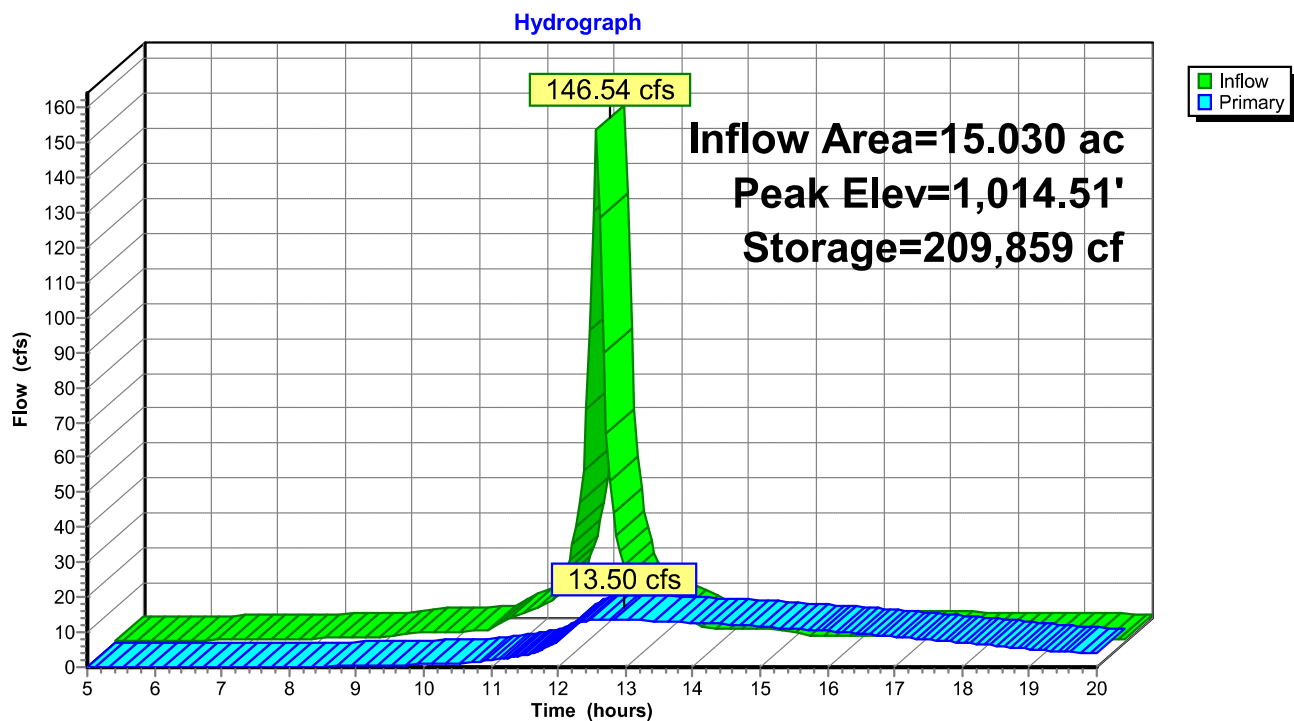
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Pond 23P: Metcon Addn Pond



Summary for Pond 25P: Trail Culvert Basin

Inflow Area = 0.900 ac, 0.00% Impervious, Inflow Depth > 4.90" for 100-Year event
 Inflow = 9.18 cfs @ 12.05 hrs, Volume= 0.367 af
 Outflow = 3.28 cfs @ 12.16 hrs, Volume= 0.367 af, Atten= 64%, Lag= 6.6 min
 Primary = 3.28 cfs @ 12.16 hrs, Volume= 0.367 af
 Routed to Pond 27P : CSAH 12 E Ditch
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Routed to Pond 27P : CSAH 12 E Ditch

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,013.72' @ 12.16 hrs Surf.Area= 4,123 sf Storage= 3,623 cf

Plug-Flow detention time= 9.0 min calculated for 0.367 af (100% of inflow)
 Center-of-Mass det. time= 8.6 min (772.7 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,011.30'	12,717 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,011.30	0	0	0
1,013.00	1,763	1,499	1,499
1,014.00	5,033	3,398	4,897
1,015.00	10,608	7,821	12,717

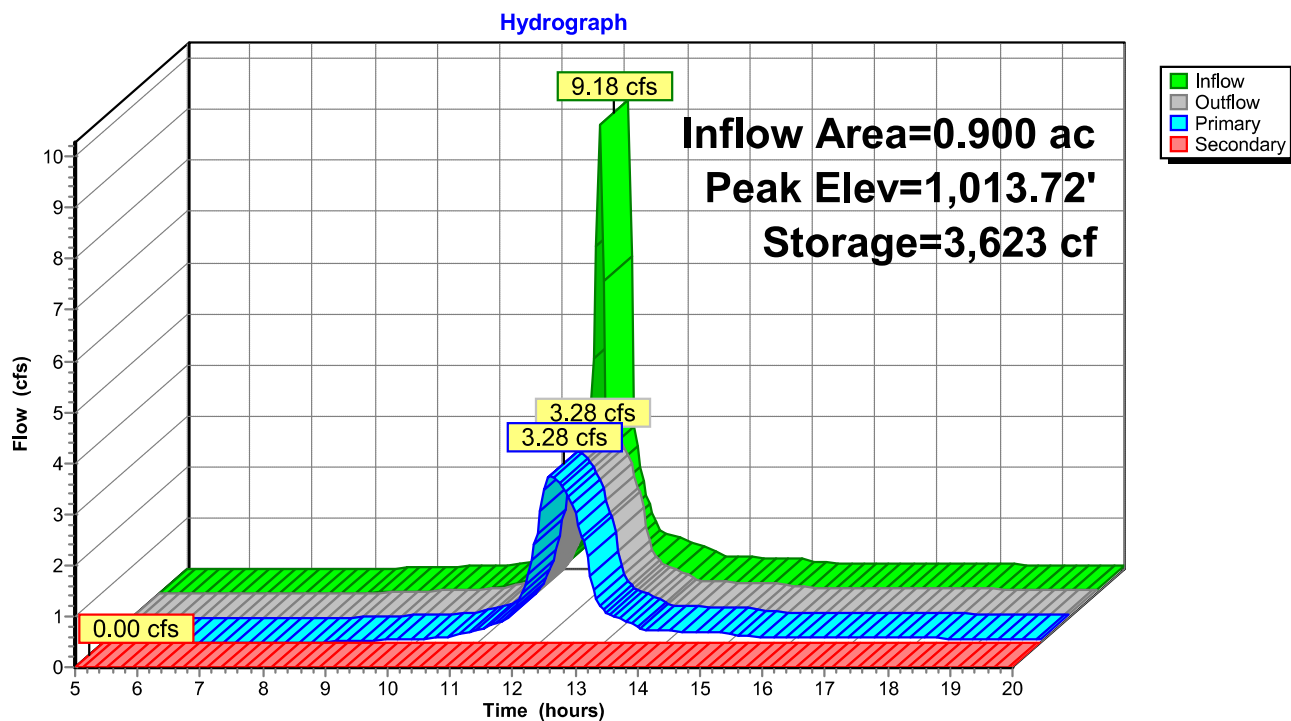
Device	Routing	Invert	Outlet Devices
#1	Primary	1,011.30'	12.0" Round Culvert L= 42.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,011.30' / 1,011.00' S= 0.0071 ' S= 0.0071 ' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	1,014.50'	50.0' long + 100.0 ' SideZ x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.27 cfs @ 12.16 hrs HW=1,013.72' (Free Discharge)

↑**1=Culvert** (Barrel Controls 3.27 cfs @ 4.16 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,011.30' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: Trail Culvert Basin

Summary for Pond 27P: CSAH 12 E Ditch

Inflow Area = 20.530 ac, 62.65% Impervious, Inflow Depth > 5.67" for 100-Year event
 Inflow = 56.91 cfs @ 12.17 hrs, Volume= 9.700 af
 Outflow = 17.07 cfs @ 13.14 hrs, Volume= 9.497 af, Atten= 70%, Lag= 58.6 min
 Primary = 17.07 cfs @ 13.14 hrs, Volume= 9.497 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 1,013.26' @ 13.14 hrs Surf.Area= 37,588 sf Storage= 72,305 cf

Plug-Flow detention time= 53.4 min calculated for 9.465 af (98% of inflow)
 Center-of-Mass det. time= 46.3 min (903.1 - 856.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,010.00'	152,598 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,010.00	0	0	0
1,011.00	17,095	8,548	8,548
1,012.00	26,827	21,961	30,509
1,013.00	37,445	32,136	62,645
1,014.00	38,000	37,723	100,367
1,015.00	66,462	52,231	152,598

Device	Routing	Invert	Outlet Devices
#1	Primary	1,010.00'	28.0" W x 18.0" H, R=14.7"/40.7" Pipe Arch Culvert L= 148.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 1,010.00' / 1,009.60' S= 0.0027 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.76 sf
#2	Secondary	1,013.70'	10.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=17.07 cfs @ 13.14 hrs HW=1,013.26' (Free Discharge)
 ↑1=Culvert (Barrel Controls 17.07 cfs @ 6.19 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,010.02' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Pond 27P: CSAH 12 E Ditch

