JDC RANCH MIXED USE DEVELOPMENT

CENTRAL BASIN DRAINAGE REPORT

Project Number: 9872

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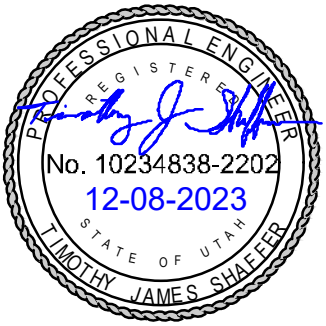

December 8, 2023

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EXECUTIVE SUMMARY

The JDC Ranch Mixed Use Development is bounded by single family subdivisions to the north, SR-134 (2600/2700 North) to the south, open agricultural fields on the west and a Drainage Slough on the east and is located within the county limits of Weber County, Utah. The development is a planned mixed-use development consisting of a mixture of commercial space, townhomes, and single-family lots that covers approximately 260 total acres divided into three main drainage basins. This report will focus on a small portion of the Central Drainage Basin (Basin 'C') consisting of approximately 4 acres of the commercial zone and 6 acres of the residential zone for a total of approximately 10 acres of the overall 125-acre drainage area. Approximately 27 acres are planned as part of the Leisure Villas Phase 1 development with a planned release entering into the Basin 'C' drainage system. The other drainage areas are planned to account for future development to be specified in following reports. The hydrology for the site has been analyzed utilizing the Rational Method for the 10-year storm for the storm drain conveyance system and the 100-year storm for the detention volume for the Central Basin to allow a discharge from the site of 0.10 cfs/acre. An on-site storm drain collection system will be constructed to convey the runoff of the 10-year storm event to detention basins prior to discharging into the drainage slough located on the east side of the property. The combination of the storm drain conveyance system and the public streets allow the safe conveyance of the 100-year storm event to the detention basins near the east side of the site prior to discharge into the slough.

Ensign Engineering

Timothy Shaffer, P.E.
Assistant Project Manager

1.0 PROJECT OVERVIEW/LOCATION

This drainage study was prepared to determine the pipe sizes and detention volumes for the JDC Ranch Mixed Use Development Central Basin (Basin 'C') located in Weber County, Utah. This Basin consists of approximately 125 acres surrounded by agricultural land on the north and west, a drainage slough on the east and JDC Ranch Mixed Use Development South Basin on the south. The completed JDC Ranch Mixed Use Development Central Basin will consist of 1 commercial lot, a 27-acre site for the Leisure Villas Phase 1 Development, a 50-

acre site for residential development west of the future extension of JDC Parkway potentially consisting of single-family homes and townhomes, site amenities, an open detention area located centrally within the basin on the east side of Aberdeen Drive, and residential development areas north and south of this open detention area on the east side of Aberdeen Drive. This narrative will discuss the drainage hydrology and hydraulics for the proposed improvements.

2.0 EXISTING AND PROPOSED CONDITIONS

The site consists of farmland with irrigation piping and channels used to facilitate typical farming operations through the site. The vegetation is a mixture of pasture vegetation and invasive weeds.

Site improvements consist of single-family lots, townhomes, and commercial space with roadway and utility infrastructure to service said development. Stormwater runoff will be intercepted by the curb and gutter and inlet boxes, routed through various detention basins and ultimately discharged to the slough located on the east side of the development. The irrigation system on-site will be modified to continue in service until such time as the site is no longer in need of the water.

3.0 RUNOFF ANALYSIS

Rainfall intensity-duration-frequency (IDF) information was obtained from the NOAA Atlas 14 precipitation data server for the location of the site and is shown in Table 3-1.

TABLE 3-1 – INTENSITY-DURATION-FREQUENCY DATA

IDF Data (in/hr)*		Frequency (years)	
		10	100
Time (min)	5	3.34	**6.62**
	10	2.54	**5.04**
	15	2.10	**4.16**
	30	1.41	**2.80**
	60	0.87	**1.74**
	360	0.23	**0.36**
	720	0.15	**0.22**
	1440	0.09	**0.12**

The Rational method of runoff analysis has been used to calculate runoff volumes from the site. Because the site utilizes various forms of residential and

commercial development, the site was divided into several drainage basins that would detain their respective sub-basins prior to discharging into the drainage slough on the east side of the project. As such, a runoff coefficient for each drainage basin was estimated based on the density (for residential) and the anticipated impervious area for typical commercial sites. The commercial sites were separated out and evaluated as their own detention area within this drainage basin. The area of each tributary basin and it's respective runoff coefficient are shown in Table 3-3. The base runoff coefficients that were used for each drainage basin are shown in Table 3-2.

TABLE 3-2 – RUNOFF COEFFICIENTS

Land Area Type	C-Value
Residential Area	0.45
Commercial Area	0.80

The proposed drainage basins were analyzed and divided into sub-basins with each sub-basin contributing its runoff to its respective node in the storm drain system, whether a yard drain, or inlet box connection to a storm drain junction. Time of concentrations were calculated using the SCS TR-55 method and are shown for each sub-basin with the exception being for the future catchments as well as CATCH LV-1 which uses an assumed time of concentration of 60 minutes to account for the typical time when peak detention occurs. Peak runoff for each sub-basin was calculated using the rational method, with the storm duration equal to the time of concentration. The 100-year storm was used for sub-basin detention calculations because as the storm frequency increases, the overflow for the pipe conveyance system would utilize the street to convey the remaining runoff toward the drainage slough. The Catchments for this project are identified in Table 3-3 and illustrated on Exhibit EX-A.

TABLE 3-3 – CATCHMENT FLOWS

Catchment #	Area (AC)	Coefficient C	Total Tc (min)	10-yr Rainfall depth (in)	Runoff (cfs)	Destination Node
CATCH C-1	0.74	0.4500	5.00	0.278	1.11	C-217
CATCH C-10	1.73	0.7500	5.00	0.278	4.34	C-212
CATCH C-2	4.06	0.8000	60.00	0.870	2.83	C-219
CATCH C-3	0.24	0.7500	5.00	0.278	0.61	C-218
CATCH C-4	0.43	0.7500	5.00	0.278	1.08	C-216
CATCH C-5	0.52	0.4500	5.00	0.278	0.78	C-215
CATCH C-6	0.28	0.4500	12.65	0.476	0.28	C-209
CATCH C-7	0.17	0.7500	5.00	0.278	0.44	C-210
CATCH C-8	0.12	0.4500	5.02	0.278	0.18	C-208
CATCH C-9	0.12	0.4500	6.97	0.338	0.16	C-207
CATCH LV-1	26.71	0.6000	60.00	0.870	13.94	C-213
FUTURE CATCH C-11	13.88					
FUTURE CATCH C-12	49.80					
FUTURE CATCH C-13	12.66					
FUTURE CATCH C-14	4.12					
FUTURE CATCH C-15	9.06					

4.0 PIPE DESIGN

Due to the size of the system, a storm water model was used to determine the required pipe sizes throughout the site. The software used to model the storm collection system was Autodesk Storm and Sanitary Analysis. This software uses a variety of analysis options to calculate the combined flow through the storm drainage system. The Rational method is one of these analysis options and was selected.

Each catchment identified in Table 3-3 above was assigned to be captured by a drainage structure (node) as would be the case based on the grading of the surface for the site. As the storm scenario processes, the flows from all of the catchments eventually end up at the furthest downstream node to discharge into the slough. The peak flows through each node of the system can be found in Table 4-1 and node locations are shown on Exhibit EX-A.

TABLE 4-1 – Node Flows

Node ID	Tributary Catchment	Peak Flow
C-202	#N/A	13.69
C-203	#N/A	13.69
C-204	#N/A	13.70
C-205	#N/A	13.73
C-206	#N/A	13.80
C-207	CATCH C-9	0.29
C-208	CATCH C-8	0.18
C-209	CATCH C-6	13.88
C-210	CATCH C-7	0.44
C-211	#N/A	14.01
C-212	CATCH C-10	4.33
C-214	#N/A	2.87
C-215	CATCH C-5	0.78
C-216	CATCH C-4	2.77
C-217	CATCH C-1	1.11
C-218	CATCH C-3	0.77

Pipe capacity was calculated using the Manning's equation, using N-values respective to the pipe material – 0.011 for HDPE, and 0.013 for RCP. Pipes were designed such that the full flow capacity of the pipe was not exceeded for the 10-year storm event. The resultant sizing of the pipes can be found in Table 4-2.

TABLE 4-2 – Pipe Flows & Capacity

Pipe ID	From Node (inlet)	To Node (outlet)	Pipe Slope (%)	Pipe Diameter (in)	Manning's Roughness	Peak Flow (cfs)	Design Capacity (cfs)	% of Full Capacity
SD-C201	C-202	C-201	0.04	36.00	0.0130	13.69	29.83	45.89%
SD-C202	C-203	C-202	0.05	36.00	0.0130	13.69	29.83	45.89%
SD-C203	C-204	C-203	0.04	36.00	0.0130	13.69	29.83	45.89%
SD-C204	C-205	C-204	0.04	36.00	0.0130	13.70	29.83	45.93%
SD-C205	C-206	C-205	0.04	36.00	0.0130	13.73	29.83	46.03%
SD-C206	C-209	C-206	0.04	36.00	0.0130	13.80	29.83	46.26%
SD-C207	C-207	C-206	0.50	15.00	0.0130	0.29	4.57	6.35%
SD-C208	C-208	C-207	0.50	15.00	0.0130	0.17	4.57	3.72%
SD-C209	C-211	C-209	0.05	36.00	0.0130	13.88	29.83	46.53%
SD-C210	C-210	C-209	0.50	15.00	0.0130	0.42	4.57	9.19%
SD-C211	C-214	C-211	0.08	24.00	0.0130	2.32	10.12	22.92%
SD-C212	C-212	C-211	0.08	24.00	0.0130	4.13	10.12	40.81%
SD-C214	C-216	C-214	0.08	24.00	0.0130	2.13	10.12	21.05%
SD-C215	C-215	C-214	1.00	12.23	0.0110	0.76	4.43	17.16%
SD-C216	C-218	C-216	0.15	18.00	0.0130	0.65	4.70	13.83%
SD-C217	C-217	C-216	1.00	12.23	0.0110	1.08	4.43	24.38%

5.0 DETENTION

Storm water runoff generated by the proposed improvements for this site will be routed through a series of detention basins onsite prior to discharge into the slough. The commercial site (Catch C-2) is anticipated to detain its respective storm runoff onsite and discharge a metered release equal to the required 0.10 cfs/acre rate. The Leisure Villas site (Catch LV-1) is anticipated to release a maximum of 27.88 cfs in the 100-yr storm event. The remaining catchment areas associated with this report are planned to free-release into the system and drain to a temporary retention basin. This temporary basin is to be constructed with the JDC Parkway construction plans with a provided volume as found in Table 5-1 below.

TABLE 5-1 – DETENTION BASINS

Detention Basin ID	Tributary Catchments	Orifice Diameter Size (inches)	Orifice Location	100-year Release (cfs)	Volume Required (Cu. Ft.)	Volume Provided (Cu. Ft.)	100-YR HWL
C-219	Catch C-2	TBD*	C-219	0.40	To Be Determined (TBD) by separate report*		
C-213	Catch LV-1	TBD*	C-213	27.88	TBD by separate report*		
Basin 'C'	All of Basin 'C'	N/A	N/A	N/A	N/A	61,983	4240.00

*Final orifice size, detention volume and high-water line to be established by others. These values are shown primarily to establish the anticipated release from the Basin into the storm drain system for sizing.

As shown in Table 5-1, tributary areas for each basin were determined based on the location of each basin. These areas are shown on Exhibit EX-A attached along with the location of each basin. Catchments C-2 and LV-1 are located upstream of Basin ‘C’ and have discharge restrictions to slow down the runoff prior to arriving at Basin ‘C’. Basin ‘C’ at this time is designed as a retention basin and will be revised in future reports to convert it to detention with further development of the drainage basin.

The orifice sizes for the upstream basins are to be designed and implemented in conjunction with the construction plans for their respective basins. The model uses a preliminary orifice size for the sole purpose of sizing the conveyance piping through the site.

6.0 CONCLUSIONS

The drainage system as outlined will safely convey storm water to the existing drainage slough on the east property line. The 100-year storm will be contained by the proposed storm drainage network and routed through the proposed surface improvements and detention basins prior to discharging into the drainage slough on the east side of the property.

APPENDIX A – EXHIBITS

Basin ‘C’ Drainage Model Exhibit

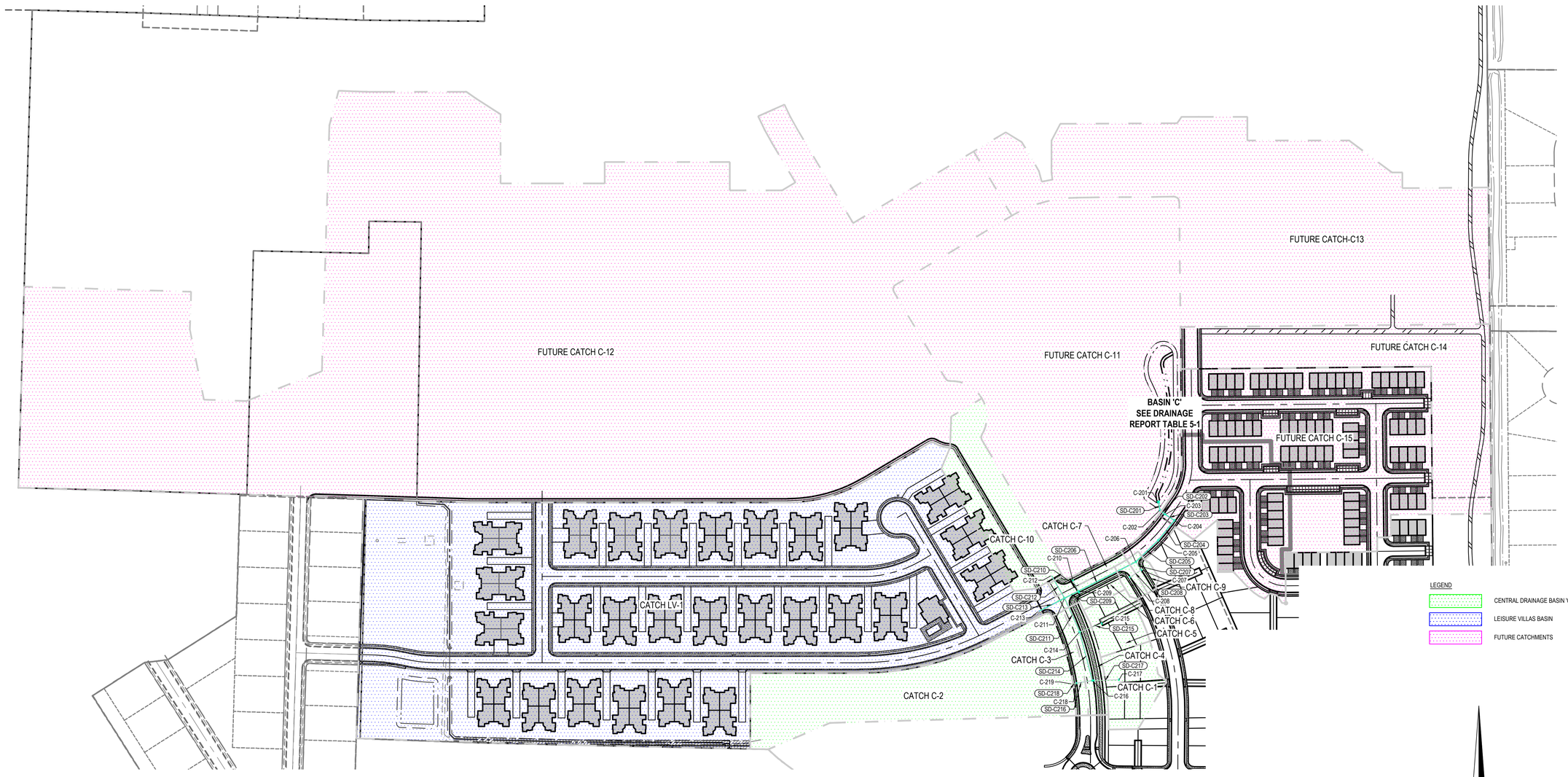
811 Know what's below. Call before you dig.

CALL BLUESTAKES @ 811 AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION.

BENCHMARK

NORTHWEST CORNER OF SECTION 27, TOWNSHIP 7 NORTH, RANGE 2 WEST SALT LAKE BASE AND MERIDIAN

ELEV = 4231.00'



LEGEND

- CENTRAL DRAINAGE BASIN 'C'
- LEISURE VILLAS BASIN
- FUTURE CATCHMENTS

NORTH

HORIZONTAL GRAPHIC SCALE

150 0 75 150 300

(IN FEET)

HORZ: 1 inch = 150 ft.

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JDC RANCH MIXED USE DEVELOPMENT
CENTRAL DRAINAGE BASIN (BASIN 'C')

2800 WEST 2600 NORTH STREET
WEBER COUNTY, UTAH

BASIN 'C' DRAINAGE MODEL EXHIBIT

PROJECT NUMBER	PRINT DATE
9872	2023-12-08
PROJECT MANAGER	DESIGNED BY
TS	CW

EX-A

APPENDIX B – STORM AND SANITARY SEWER ANALYSIS OUTPUT

10-year model output
100-year model output

Project Description

File Name	9872 South Rational - Basin Central JDC Parkway - 10-yr.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	11
Nodes	19
Junctions	16
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	2
Links	18
Channels	0
Pipes	16
Pumps	0
Orifices	2
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	10 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	CATCH C-1	0.74	0.4500	0.28	0.13	0.09	1.11	0 00:05:00
2	CATCH C-10	1.73	0.7500	0.28	0.21	0.36	4.34	0 00:05:00
3	CATCH C-2	4.06	0.8000	0.87	0.70	2.83	2.83	0 01:00:00
4	CATCH C-3	0.24	0.7500	0.28	0.21	0.05	0.61	0 00:05:00
5	CATCH C-4	0.43	0.7500	0.28	0.21	0.09	1.08	0 00:05:00
6	CATCH C-5	0.52	0.4500	0.28	0.13	0.06	0.78	0 00:05:00
7	CATCH C-6	0.28	0.4500	0.48	0.21	0.06	0.28	0 00:12:39
8	CATCH C-7	0.17	0.7500	0.28	0.21	0.04	0.44	0 00:05:00
9	CATCH C-8	0.12	0.4500	0.28	0.13	0.01	0.18	0 00:05:01
10	CATCH C-9	0.12	0.4500	0.34	0.15	0.02	0.16	0 00:06:58
11	CATCH LV-1	26.71	0.6000	0.87	0.52	13.94	13.94	0 01:00:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	C-202	Junction	4236.53	4240.36	4236.53	4240.36	0.00	13.69	4238.31	0.00	2.05	0 00:00	0.00	0.00
2	C-203	Junction	4236.54	4241.78	4236.54	4241.78	0.00	13.69	4238.50	0.00	3.29	0 00:00	0.00	0.00
3	C-204	Junction	4236.55	4241.77	4236.55	4241.77	0.00	13.70	4238.65	0.00	3.12	0 00:00	0.00	0.00
4	C-205	Junction	4236.59	4242.19	4236.59	4242.19	0.00	13.73	4238.80	0.00	3.39	0 00:00	0.00	0.00
5	C-206	Junction	4236.63	4242.51	4236.63	4242.51	0.00	13.80	4238.94	0.00	3.56	0 00:00	0.00	0.00
6	C-207	Junction	4239.25	4242.01	4239.25	4242.01	0.00	0.29	4239.48	0.00	2.53	0 00:00	0.00	0.00
7	C-208	Junction	4239.44	4242.01	4239.44	4242.01	0.00	0.18	4239.61	0.00	2.41	0 00:00	0.00	0.00
8	C-209	Junction	4236.71	4242.00	4236.71	4242.00	0.00	13.88	4239.11	0.00	2.89	0 00:00	0.00	0.00
9	C-210	Junction	4239.25	4241.86	4239.25	4241.86	0.00	0.44	4239.53	0.00	2.33	0 00:00	0.00	0.00
10	C-211	Junction	4236.73	4242.65	4236.73	4242.65	0.00	14.01	4239.21	0.00	3.44	0 00:00	0.00	0.00
11	C-212	Junction	4236.79	4241.87	4236.79	4241.87	0.00	4.33	4239.21	0.00	2.66	0 00:00	0.00	0.00
12	C-214	Junction	4236.82	4242.14	4236.82	4242.14	0.00	2.87	4239.21	0.00	2.92	0 00:00	0.00	0.00
13	C-215	Junction	4238.48	4243.34	4238.48	4243.34	0.00	0.78	4239.21	0.00	4.13	0 00:00	0.00	0.00
14	C-216	Junction	4236.93	4241.29	4236.93	4241.29	0.00	2.77	4239.21	0.00	2.07	0 00:00	0.00	0.00
15	C-217	Junction	4238.67	4243.34	4238.67	4243.34	0.00	1.11	4239.22	0.00	4.13	0 00:00	0.00	0.00
16	C-218	Junction	4237.00	4241.14	4237.00	4241.14	0.00	0.77	4239.21	0.00	1.93	0 00:00	0.00	0.00
17	C-201	Outfall	4236.50					13.69	4237.93					
18	C-213	Storage Node	4236.80	4242.97	4236.80		0.00	13.94	4239.38				0.00	0.00
19	C-219	Storage Node	4237.02	4239.36	4237.02		0.00	2.83	4239.36				2.31	104.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	SD-C201	Pipe	C-202	C-201	69.72	4236.53	4236.50	0.0400	36.000	0.0130	13.69	29.83	0.46	3.56	1.61	0.54	0.00	Calculated
2	SD-C202	Pipe	C-203	C-202	19.47	4236.54	4236.53	0.0500	36.000	0.0130	13.69	29.83	0.46	3.06	1.87	0.62	0.00	Calculated
3	SD-C203	Pipe	C-204	C-203	31.54	4236.55	4236.54	0.0400	36.000	0.0130	13.69	29.83	0.46	2.70	2.02	0.67	0.00	Calculated
4	SD-C204	Pipe	C-205	C-204	73.29	4236.59	4236.55	0.0400	36.000	0.0130	13.70	29.83	0.46	2.53	2.15	0.72	0.00	Calculated
5	SD-C205	Pipe	C-206	C-205	89.43	4236.63	4236.59	0.0400	36.000	0.0130	13.73	29.83	0.46	2.41	2.26	0.75	0.00	Calculated
6	SD-C206	Pipe	C-209	C-206	185.76	4236.71	4236.63	0.0400	36.000	0.0130	13.80	29.83	0.46	2.36	2.36	0.79	0.00	Calculated
7	SD-C207	Pipe	C-207	C-206	27.84	4239.25	4239.11	0.5000	15.000	0.0130	0.29	4.57	0.06	1.97	0.22	0.18	0.00	Calculated
8	SD-C208	Pipe	C-208	C-207	38.00	4239.44	4239.25	0.5000	15.000	0.0130	0.17	4.57	0.04	1.41	0.20	0.16	0.00	Calculated
9	SD-C209	Pipe	C-211	C-209	44.45	4236.73	4236.71	0.0500	36.000	0.0130	13.88	29.83	0.47	2.26	2.44	0.81	0.00	Calculated
10	SD-C210	Pipe	C-210	C-209	34.50	4239.25	4239.08	0.5000	15.000	0.0130	0.42	4.57	0.09	2.19	0.27	0.21	0.00	Calculated
11	SD-C211	Pipe	C-214	C-211	106.48	4236.82	4236.73	0.0800	24.000	0.0130	2.32	10.12	0.23	1.19	2.00	1.00	32.00	SURCHARGED
12	SD-C212	Pipe	C-212	C-211	75.17	4236.79	4236.73	0.0800	24.000	0.0130	4.13	10.12	0.41	3.11	2.00	1.00	34.00	SURCHARGED
13	SD-C214	Pipe	C-216	C-214	144.53	4236.93	4236.82	0.0800	24.000	0.0130	2.13	10.12	0.21	1.56	2.00	1.00	24.00	SURCHARGED
14	SD-C215	Pipe	C-215	C-214	68.12	4238.48	4237.80	1.0000	12.232	0.0110	0.76	4.43	0.17	3.79	0.88	0.86	0.00	Calculated
15	SD-C216	Pipe	C-218	C-216	45.50	4237.00	4236.93	0.1500	18.000	0.0130	0.65	4.70	0.14	0.73	1.50	1.00	55.00	SURCHARGED
16	SD-C217	Pipe	C-217	C-216	76.14	4238.67	4237.91	1.0000	12.232	0.0110	1.08	4.43	0.24	4.17	0.78	0.77	0.00	Calculated
17	SD-C213	Orifice	C-213	C-211		4236.80	4236.73		36.000		13.94							
18	SD-C218	Orifice	C-219	C-218		4237.02	4237.00		3.350		0.37							

Subbasin Hydrology

Subbasin : CATCH C-1

Input Data

Area (ac) 0.74
Weighted Runoff Coefficient 0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.74	-	0.45
Composite Area & Weighted Runoff Coeff.	0.74		0.45

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	10.22854745	0	0
Slope (%) :	1.87581042	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	0.22	0	0

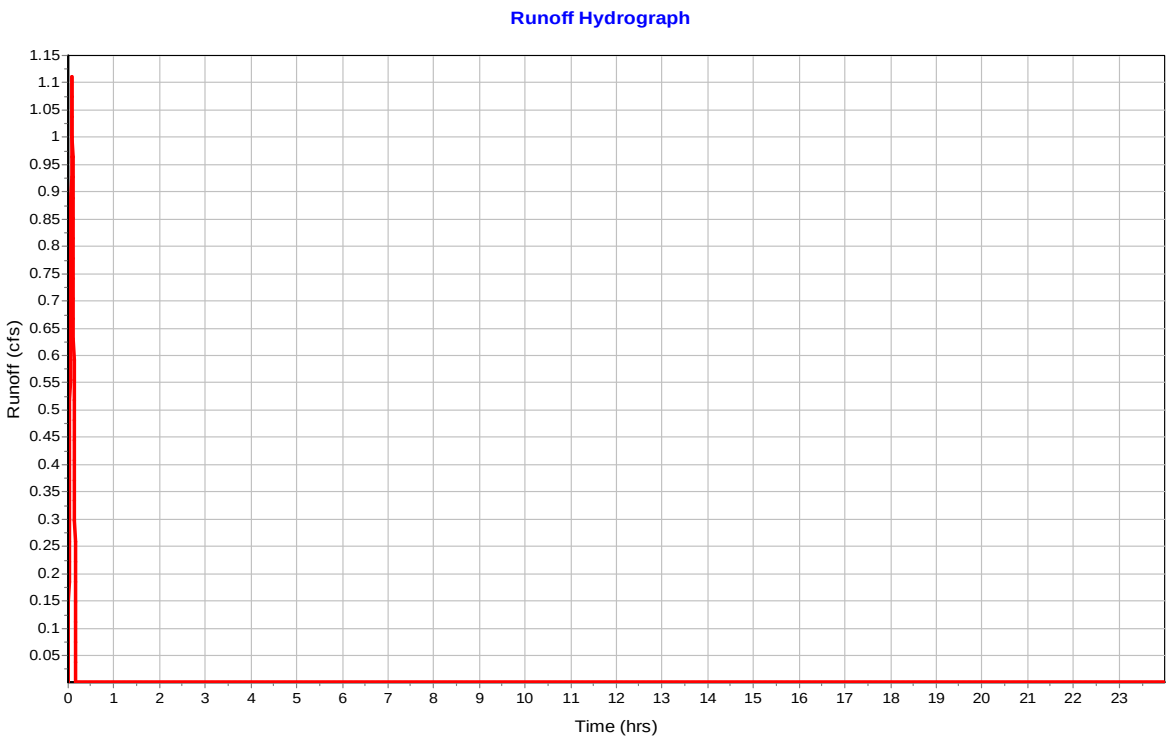
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	128.585951	0	0
Slope (%) :	0.5	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.44	0	0
Computed Flow Time (min) :	1.49	0	0

Total TOC (min) 1.71

Subbasin Runoff Results

Total Rainfall (in)	0.28
Total Runoff (in)	0.13
Peak Runoff (cfs)	1.11
Rainfall Intensity	3.34
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:01:43

Subbasin : CATCH C-1



Subbasin : CATCH C-10

Input Data

Area (ac)	1.73
Weighted Runoff Coefficient	0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.73	-	0.75
Composite Area & Weighted Runoff Coeff.	1.73		0.75

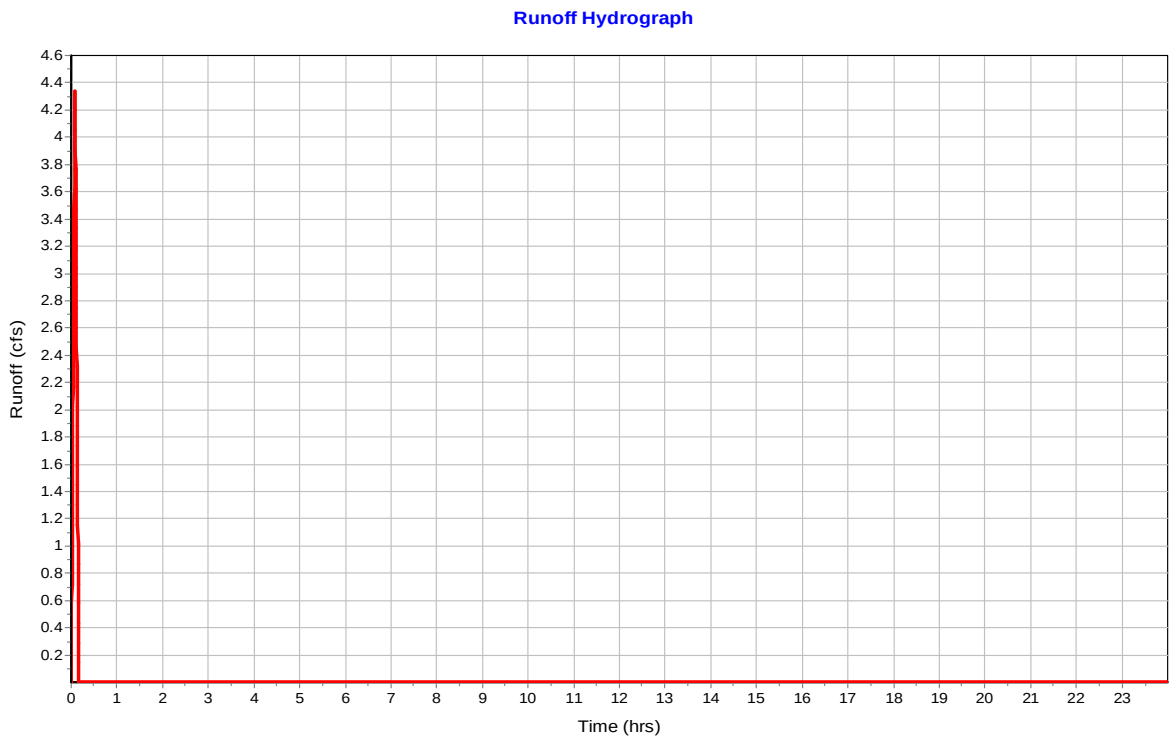
Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	0.28
Total Runoff (in)	0.21
Peak Runoff (cfs)	4.34
Rainfall Intensity	3.34
Weighted Runoff Coefficient	0.75
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : CATCH C-10



Subbasin : CATCH C-2

Input Data

Area (ac) 4.06
Weighted Runoff Coefficient 0.8

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	4.06	-	0.8
Composite Area & Weighted Runoff Coeff.	4.06		0.8

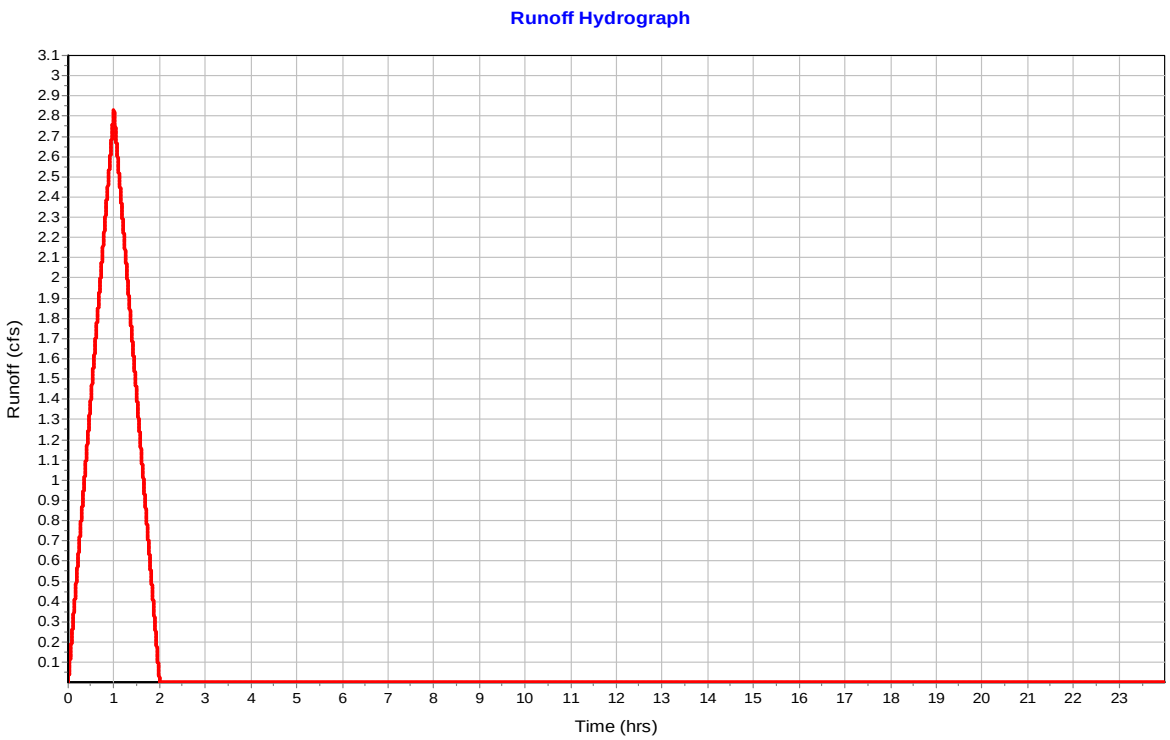
Time of Concentration

User-Defined TOC override (minutes): 60

Subbasin Runoff Results

Total Rainfall (in) 0.87
Total Runoff (in) 0.7
Peak Runoff (cfs) 2.83
Rainfall Intensity 0.87
Weighted Runoff Coefficient 0.8
Time of Concentration (days hh:mm:ss) 0 01:00:00

Subbasin : CATCH C-2



Subbasin : CATCH C-3

Input Data

Area (ac)	0.24
Weighted Runoff Coefficient	0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.24	-	0.75
Composite Area & Weighted Runoff Coeff.	0.24		0.75

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	28.68054639	0	0
Slope (%) :	1.99116093	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.99	0	0
Computed Flow Time (min) :	0.48	0	0

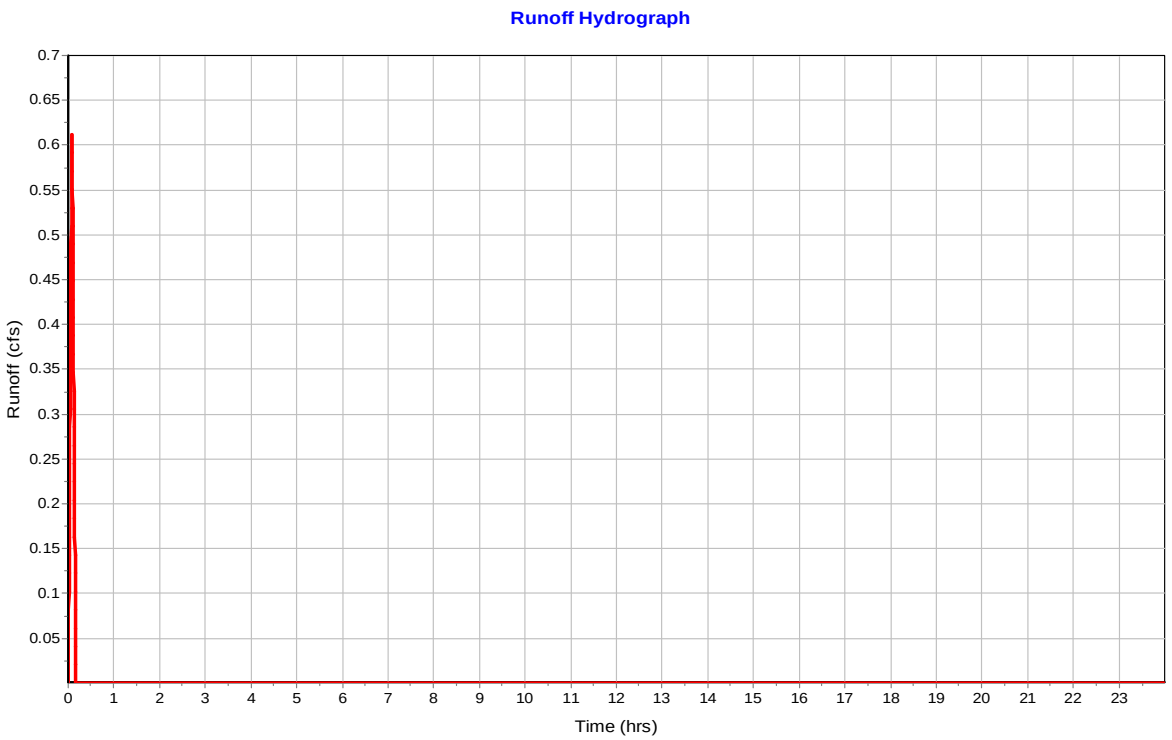
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	191.1139756	0	0
Slope (%) :	0.62502804	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.61	0	0
Computed Flow Time (min) :	1.98	0	0

Total TOC (min) 2.46

Subbasin Runoff Results

Total Rainfall (in)	0.28
Total Runoff (in)	0.21
Peak Runoff (cfs)	0.61
Rainfall Intensity	3.34
Weighted Runoff Coefficient	0.75
Time of Concentration (days hh:mm:ss)	0 00:02:28

Subbasin : CATCH C-3



Subbasin : CATCH C-4

Input Data

Area (ac) 0.43
Weighted Runoff Coefficient 0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.43	-	0.75
Composite Area & Weighted Runoff Coeff.	0.43		0.75

Time of Concentration

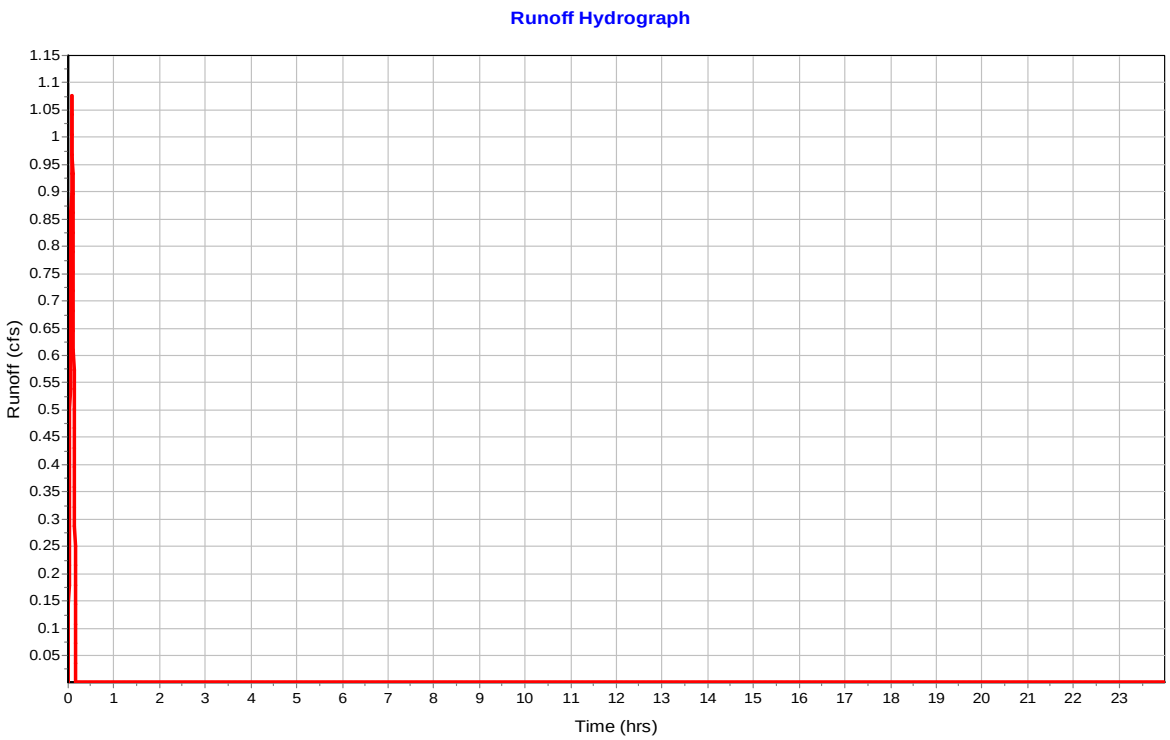
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	24.18743217	0	0
Slope (%) :	2.05908821	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	0.41	0	0

Total TOC (min) 0.41

Subbasin Runoff Results

Total Rainfall (in) 0.28
Total Runoff (in) 0.21
Peak Runoff (cfs) 1.08
Rainfall Intensity 3.34
Weighted Runoff Coefficient 0.75
Time of Concentration (days hh:mm:ss) 0 00:00:25

Subbasin : CATCH C-4



Subbasin : CATCH C-5

Input Data

Area (ac)	0.52
Weighted Runoff Coefficient	0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.52	-	0.45
Composite Area & Weighted Runoff Coeff.	0.52		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	9.34212361	0	0
Slope (%) :	1.97088194	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	0.2	0	0

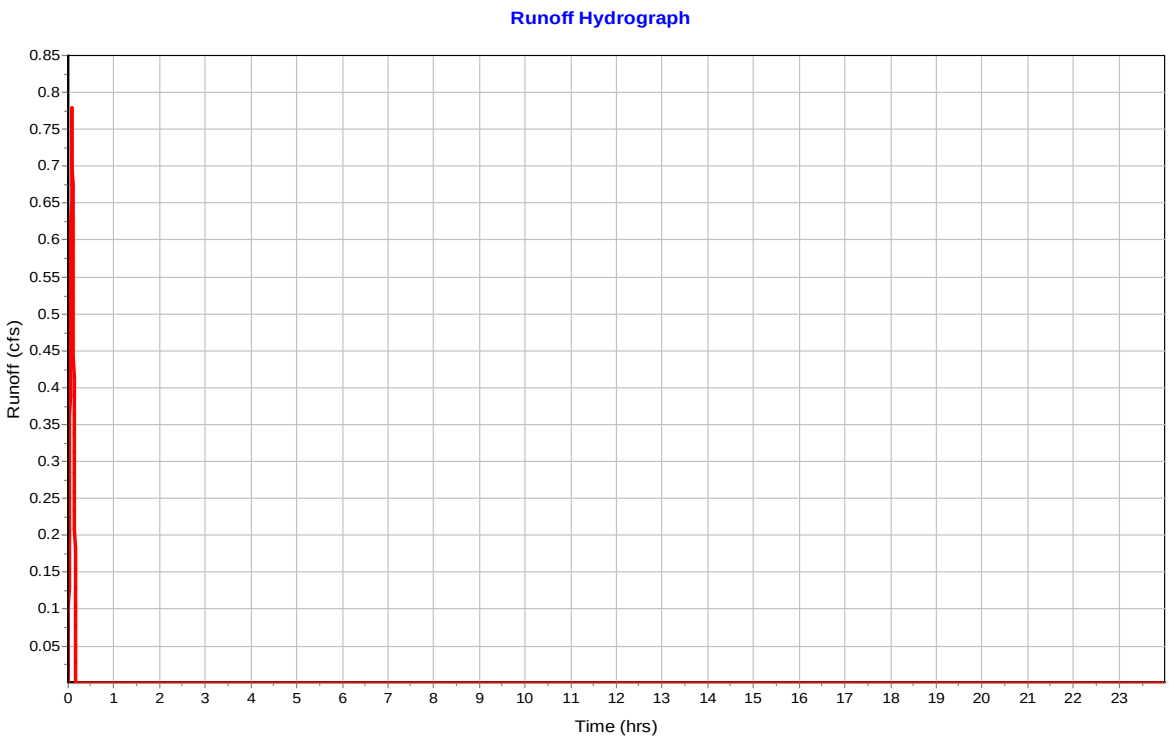
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	121.5165439	0	0
Slope (%) :	0.5	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.44	0	0
Computed Flow Time (min) :	1.41	0	0

Total TOC (min) 1.61

Subbasin Runoff Results

Total Rainfall (in)	0.28
Total Runoff (in)	0.13
Peak Runoff (cfs)	0.78
Rainfall Intensity	3.34
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:01:37

Subbasin : CATCH C-5



Subbasin : CATCH C-6

Input Data

Area (ac)	0.28
Weighted Runoff Coefficient	0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.28	-	0.45
Composite Area & Weighted Runoff Coeff.	0.28		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0	0
Flow Length (ft) :	58.95704634	0	0
Slope (%) :	0.97787038	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.74	0	0

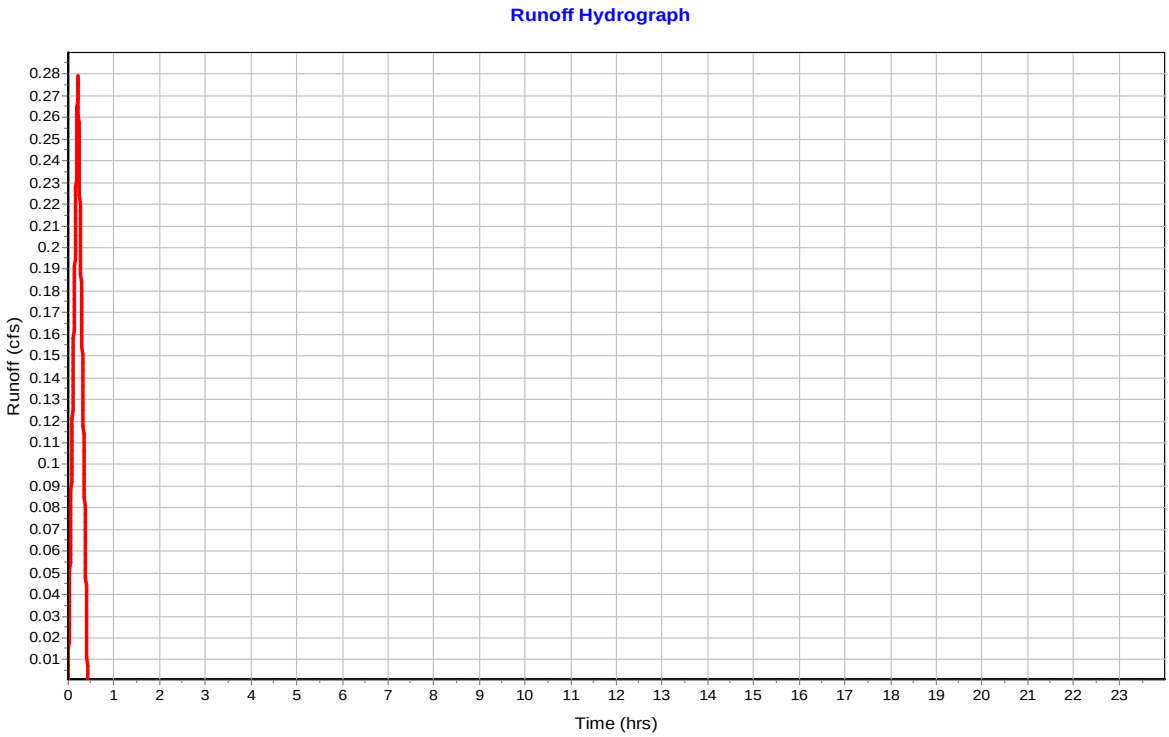
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	96.40076757	0	0
Slope (%) :	0.74543229	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.76	0	0
Computed Flow Time (min) :	0.92	0	0

Total TOC (min) 12.65

Subbasin Runoff Results

Total Rainfall (in)	0.48
Total Runoff (in)	0.21
Peak Runoff (cfs)	0.28
Rainfall Intensity	2.257
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:12:39

Subbasin : CATCH C-6



Subbasin : CATCH C-7

Input Data

Area (ac) 0.17
Weighted Runoff Coefficient 0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.17	-	0.75
Composite Area & Weighted Runoff Coeff.	0.17		0.75

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	14.37561683	0	0
Slope (%) :	3.98964073	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	1.14	0	0
Computed Flow Time (min) :	0.21	0	0

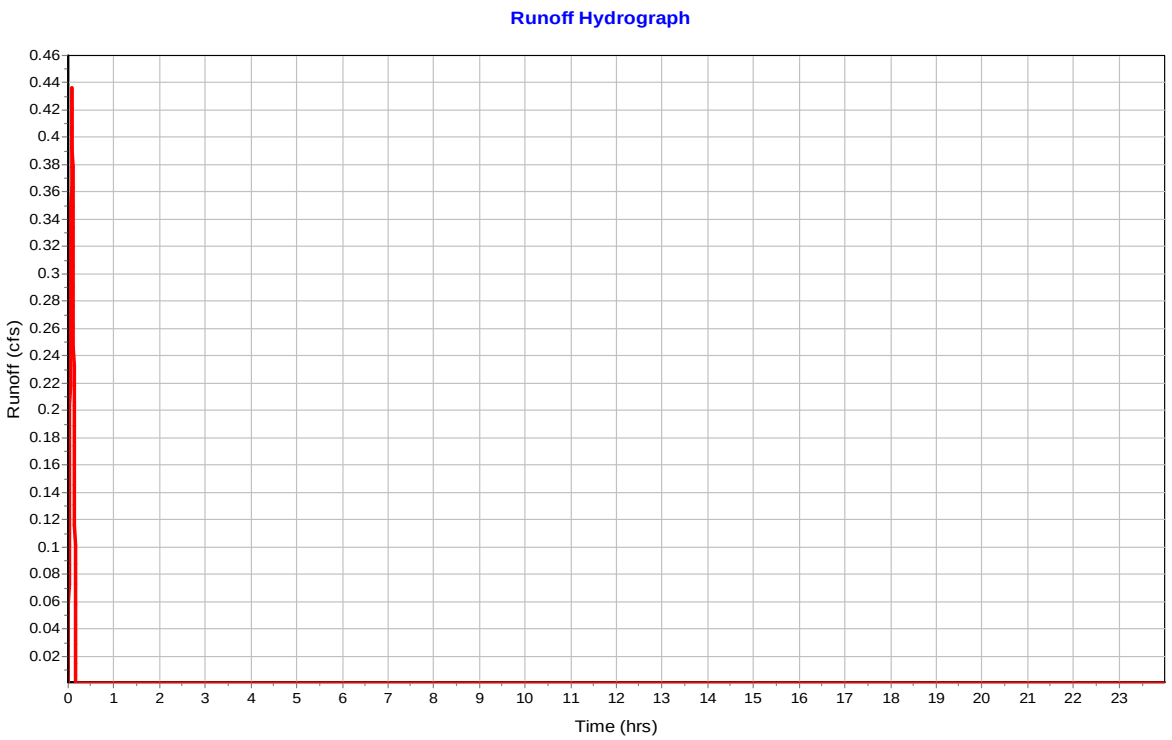
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	155.0952776	0	0
Slope (%) :	0.49088845	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.42	0	0
Computed Flow Time (min) :	1.81	0	0

Total TOC (min) 2.02

Subbasin Runoff Results

Total Rainfall (in) 0.28
Total Runoff (in) 0.21
Peak Runoff (cfs) 0.44
Rainfall Intensity 3.34
Weighted Runoff Coefficient 0.75
Time of Concentration (days hh:mm:ss) 0 00:02:01

Subbasin : CATCH C-7



Subbasin : CATCH C-8

Input Data

Area (ac)	0.12
Weighted Runoff Coefficient	0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.45
Composite Area & Weighted Runoff Coeff.	0.12		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0	0
Flow Length (ft) :	31	0	0
Slope (%) :	3.04713812	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.12	0	0
Computed Flow Time (min) :	4.45	0	0

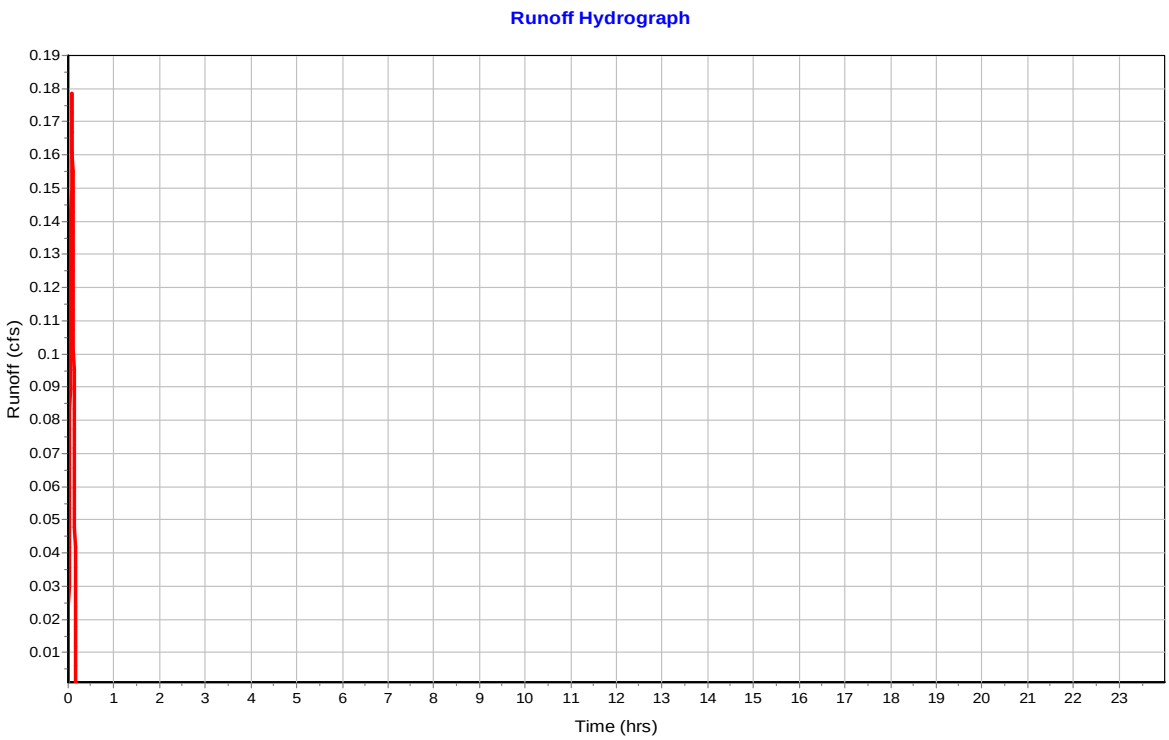
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	48.13918316	0	0
Slope (%) :	0.4838276	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.41	0	0
Computed Flow Time (min) :	0.57	0	0

Total TOC (min) 5.02

Subbasin Runoff Results

Total Rainfall (in)	0.28
Total Runoff (in)	0.13
Peak Runoff (cfs)	0.18
Rainfall Intensity	3.334
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:05:01

Subbasin : CATCH C-8



Subbasin : CATCH C-9

Input Data

Area (ac) 0.12
Weighted Runoff Coefficient 0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.45
Composite Area & Weighted Runoff Coeff.	0.12		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0	0
Flow Length (ft) :	30.31418849	0	0
Slope (%) :	1.05898887	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	6.68	0	0

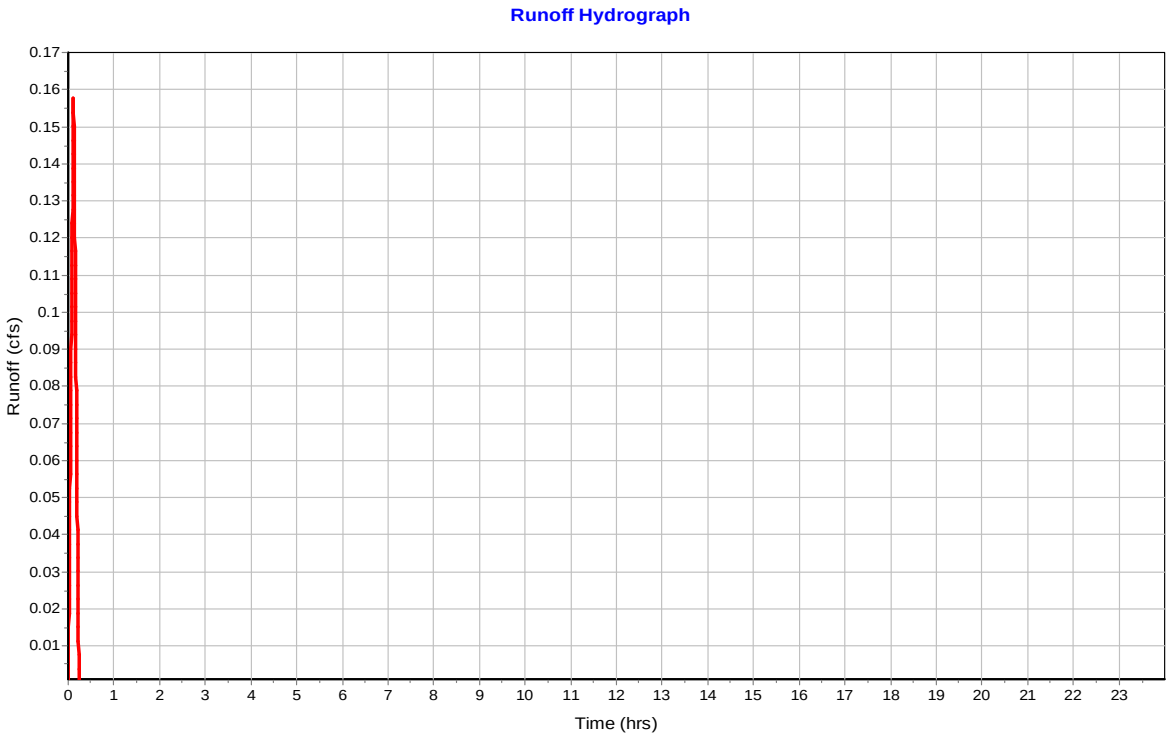
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	41.06876486	0	0
Slope (%) :	1.22140455	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	2.25	0	0
Computed Flow Time (min) :	0.3	0	0

Total TOC (min) 6.98

Subbasin Runoff Results

Total Rainfall (in) 0.34
Total Runoff (in) 0.15
Peak Runoff (cfs) 0.16
Rainfall Intensity 2.901
Weighted Runoff Coefficient 0.45
Time of Concentration (days hh:mm:ss) 0 00:06:59

Subbasin : CATCH C-9



Subbasin : CATCH LV-1

Input Data

Area (ac)	26.71
Weighted Runoff Coefficient	0.6

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	26.71	-	0.6
Composite Area & Weighted Runoff Coeff.	26.71		0.6

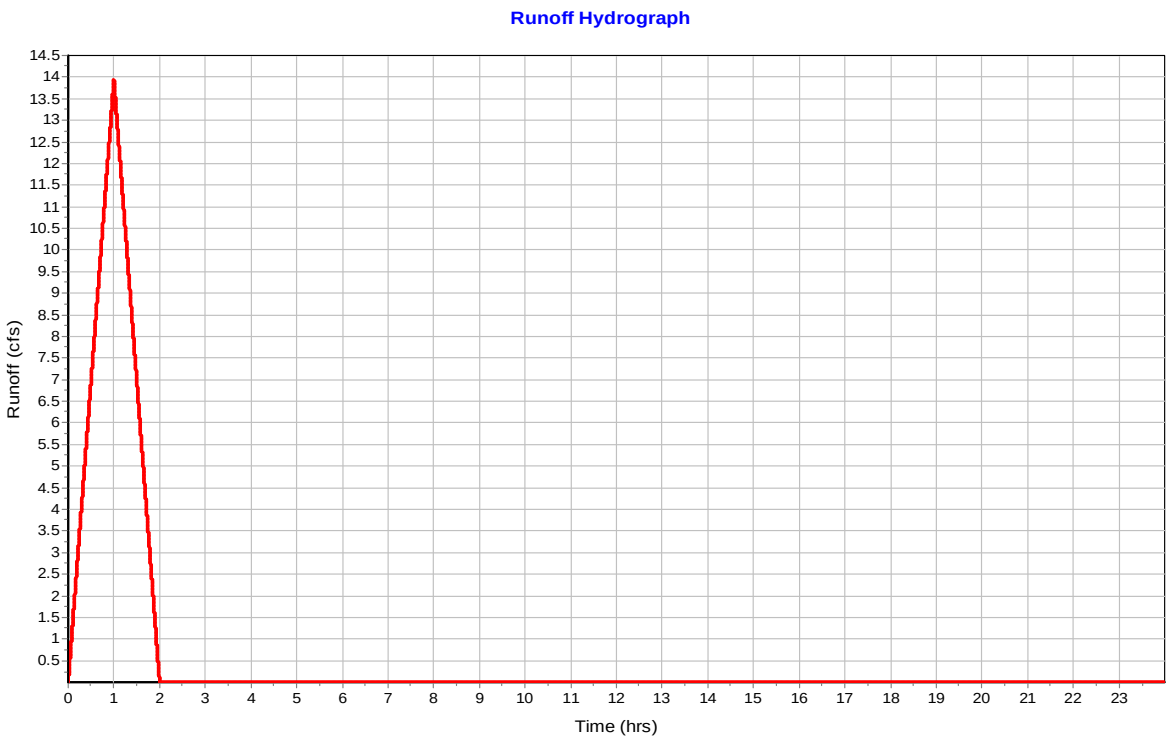
Time of Concentration

User-Defined TOC override (minutes): 60

Subbasin Runoff Results

Total Rainfall (in)	0.87
Total Runoff (in)	0.52
Peak Runoff (cfs)	13.94
Rainfall Intensity	0.87
Weighted Runoff Coefficient	0.6
Time of Concentration (days hh:mm:ss)	0 01:00:00

Subbasin : CATCH LV-1



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	C-202	4236.53	4240.36	3.83	4236.53	0.00	4240.36	0.00	0.00	0.00
2	C-203	4236.54	4241.78	5.24	4236.54	0.00	4241.78	0.00	0.00	0.00
3	C-204	4236.55	4241.77	5.22	4236.55	0.00	4241.77	0.00	0.00	0.00
4	C-205	4236.59	4242.19	5.60	4236.59	0.00	4242.19	0.00	0.00	0.00
5	C-206	4236.63	4242.51	5.88	4236.63	0.00	4242.51	0.00	0.00	0.00
6	C-207	4239.25	4242.01	2.76	4239.25	0.00	4242.01	0.00	0.00	0.00
7	C-208	4239.44	4242.01	2.57	4239.44	0.00	4242.01	0.00	0.00	0.00
8	C-209	4236.71	4242.00	5.29	4236.71	0.00	4242.00	0.00	0.00	0.00
9	C-210	4239.25	4241.86	2.61	4239.25	0.00	4241.86	0.00	0.00	0.00
10	C-211	4236.73	4242.65	5.92	4236.73	0.00	4242.65	0.00	0.00	0.00
11	C-212	4236.79	4241.87	5.08	4236.79	0.00	4241.87	0.00	0.00	0.00
12	C-214	4236.82	4242.14	5.32	4236.82	0.00	4242.14	0.00	0.00	0.00
13	C-215	4238.48	4243.34	4.86	4238.48	0.00	4243.34	0.00	0.00	0.00
14	C-216	4236.93	4241.29	4.35	4236.93	0.00	4241.29	0.00	0.00	0.00
15	C-217	4238.67	4243.34	4.67	4238.67	0.00	4243.34	0.00	0.00	0.00
16	C-218	4237.00	4241.14	4.14	4237.00	0.00	4241.14	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	C-202	13.69	0.00	4238.31	1.78	0.00	2.05	4236.65	0.12	0 01:02	0 00:00	0.00	0.00
2	C-203	13.69	0.00	4238.50	1.96	0.00	3.29	4236.66	0.12	0 01:02	0 00:00	0.00	0.00
3	C-204	13.70	0.00	4238.65	2.10	0.00	3.12	4236.69	0.14	0 01:02	0 00:00	0.00	0.00
4	C-205	13.73	0.00	4238.80	2.21	0.00	3.39	4236.73	0.14	0 01:02	0 00:00	0.00	0.00
5	C-206	13.80	0.00	4238.94	2.31	0.00	3.56	4236.77	0.14	0 01:01	0 00:00	0.00	0.00
6	C-207	0.29	0.16	4239.48	0.23	0.00	2.53	4239.25	0.00	0 00:06	0 00:00	0.00	0.00
7	C-208	0.18	0.18	4239.61	0.17	0.00	2.41	4239.44	0.00	0 00:05	0 00:00	0.00	0.00
8	C-209	13.88	0.28	4239.11	2.40	0.00	2.89	4236.86	0.15	0 01:01	0 00:00	0.00	0.00
9	C-210	0.44	0.44	4239.53	0.28	0.00	2.33	4239.25	0.00	0 00:05	0 00:00	0.00	0.00
10	C-211	14.01	0.00	4239.21	2.48	0.00	3.44	4236.88	0.15	0 01:01	0 00:00	0.00	0.00
11	C-212	4.33	4.33	4239.21	2.42	0.00	2.66	4236.93	0.14	0 01:01	0 00:00	0.00	0.00
12	C-214	2.87	0.00	4239.21	2.39	0.00	2.92	4236.96	0.14	0 01:01	0 00:00	0.00	0.00
13	C-215	0.78	0.78	4239.21	0.73	0.00	4.13	4238.50	0.02	0 01:00	0 00:00	0.00	0.00
14	C-216	2.77	1.07	4239.21	2.28	0.00	2.07	4237.06	0.13	0 01:01	0 00:00	0.00	0.00
15	C-217	1.11	1.11	4239.22	0.55	0.00	4.13	4238.69	0.02	0 01:01	0 00:00	0.00	0.00
16	C-218	0.77	0.61	4239.21	2.21	0.00	1.93	4237.12	0.12	0 01:01	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	SD-C201	69.72	4236.53	0.00	4236.50	0.00	0.03	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	SD-C202	19.47	4236.54	0.00	4236.53	0.00	0.01	0.0500	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	SD-C203	31.54	4236.55	0.00	4236.54	0.00	0.01	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	SD-C204	73.29	4236.59	0.00	4236.55	0.00	0.03	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	SD-C205	89.43	4236.63	0.00	4236.59	0.00	0.04	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	SD-C206	185.76	4236.71	0.00	4236.63	0.00	0.08	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	SD-C207	27.84	4239.25	0.00	4239.11	2.48	0.14	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	SD-C208	38.00	4239.44	0.00	4239.25	0.00	0.19	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	SD-C209	44.45	4236.73	0.00	4236.71	0.00	0.02	0.0500	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	SD-C210	34.50	4239.25	0.00	4239.08	2.37	0.17	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	SD-C211	106.48	4236.82	0.00	4236.73	0.00	0.09	0.0800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	SD-C212	75.17	4236.79	0.00	4236.73	0.00	0.06	0.0800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	SD-C214	144.53	4236.93	0.00	4236.82	0.00	0.12	0.0800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	SD-C215	68.12	4238.48	0.00	4237.80	0.98	0.68	1.0000	CIRCULAR	12.240	12.240	0.0110	0.5000	0.5000	0.0000	0.00	No	1
15	SD-C216	45.50	4237.00	0.00	4236.93	0.00	0.07	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	SD-C217	76.14	4238.67	0.00	4237.91	0.98	0.76	1.0000	CIRCULAR	12.240	12.240	0.0110	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	SD-C201	13.69	0 01:02	29.83	0.46	3.56	0.33	1.61	0.54	0.00		Calculated
2	SD-C202	13.69	0 01:02	29.83	0.46	3.06	0.11	1.87	0.62	0.00		Calculated
3	SD-C203	13.69	0 01:02	29.83	0.46	2.70	0.19	2.02	0.67	0.00		Calculated
4	SD-C204	13.70	0 01:01	29.83	0.46	2.53	0.48	2.15	0.72	0.00		Calculated
5	SD-C205	13.73	0 01:01	29.83	0.46	2.41	0.62	2.26	0.75	0.00		Calculated
6	SD-C206	13.80	0 01:00	29.83	0.46	2.36	1.31	2.36	0.79	0.00		Calculated
7	SD-C207	0.29	0 00:06	4.57	0.06	1.97	0.24	0.22	0.18	0.00		Calculated
8	SD-C208	0.17	0 00:05	4.57	0.04	1.41	0.45	0.20	0.16	0.00		Calculated
9	SD-C209	13.88	0 01:00	29.83	0.47	2.26	0.33	2.44	0.81	0.00		Calculated
10	SD-C210	0.42	0 00:05	4.57	0.09	2.19	0.26	0.27	0.21	0.00		Calculated
11	SD-C211	2.32	0 00:07	10.12	0.23	1.19	1.49	2.00	1.00	32.00		SURCHARGED
12	SD-C212	4.13	0 00:05	10.12	0.41	3.11	0.40	2.00	1.00	34.00		SURCHARGED
13	SD-C214	2.13	0 00:06	10.12	0.21	1.56	1.54	2.00	1.00	24.00		SURCHARGED
14	SD-C215	0.76	0 00:05	4.43	0.17	3.79	0.30	0.88	0.86	0.00		Calculated
15	SD-C216	0.65	0 00:05	4.70	0.14	0.73	1.04	1.50	1.00	55.00		SURCHARGED
16	SD-C217	1.08	0 00:05	4.43	0.24	4.17	0.30	0.78	0.77	0.00		Calculated

Storage Nodes

Storage Node : C-213

Input Data

Invert Elevation (ft)	4236.80
Max (Rim) Elevation (ft)	4242.97
Max (Rim) Offset (ft)	6.17
Initial Water Elevation (ft)	4236.80
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	SD-C213	Side	CIRCULAR	No	36.00			4236.80	0.61

Output Summary Results

Peak Inflow (cfs)	13.94
Peak Lateral Inflow (cfs)	13.94
Peak Outflow (cfs)	13.94
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	4239.38
Max HGL Depth Attained (ft)	2.58
Average HGL Elevation Attained (ft)	4236.95
Average HGL Depth Attained (ft)	0.15
Time of Max HGL Occurrence (days hh:mm)	0 01:00
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Storage Node : C-219

Input Data

Invert Elevation (ft)	4237.02
Max (Rim) Elevation (ft)	4239.36
Max (Rim) Offset (ft)	2.33
Initial Water Elevation (ft)	4237.02
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	SD-C218	Side	CIRCULAR	No	3.35			4237.02	0.61

Output Summary Results

Peak Inflow (cfs)	2.83
Peak Lateral Inflow (cfs)	2.83
Peak Outflow (cfs)	0.37
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	4239.36
Max HGL Depth Attained (ft)	2.34
Average HGL Elevation Attained (ft)	4237.21
Average HGL Depth Attained (ft)	0.19
Time of Max HGL Occurrence (days hh:mm)	0 00:08
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	2.31
Total Time Flooded (min)	104
Total Retention Time (sec)	0

Project Description

File Name	9872 South Rational - Basin Central JDC Parkway.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	11
Nodes	19
Junctions	16
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	2
Links	18
Channels	0
Pipes	16
Pumps	0
Orifices	2
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	CATCH C-1	0.74	0.4500	0.55	0.25	0.18	2.20	0 00:05:00
2	CATCH C-10	1.73	0.7500	0.55	0.41	0.72	8.60	0 00:05:00
3	CATCH C-2	4.06	0.8000	1.74	1.39	5.66	5.66	0 01:00:00
4	CATCH C-3	0.24	0.7500	0.55	0.41	0.10	1.21	0 00:05:00
5	CATCH C-4	0.43	0.7500	0.55	0.41	0.18	2.13	0 00:05:00
6	CATCH C-5	0.52	0.4500	0.55	0.25	0.13	1.54	0 00:05:00
7	CATCH C-6	0.28	0.4500	0.94	0.43	0.12	0.55	0 00:12:39
8	CATCH C-7	0.17	0.7500	0.55	0.41	0.07	0.86	0 00:05:00
9	CATCH C-8	0.12	0.4500	0.55	0.25	0.03	0.35	0 00:05:01
10	CATCH C-9	0.12	0.4500	0.67	0.30	0.04	0.31	0 00:06:58
11	CATCH LV-1	26.71	0.6000	1.74	1.04	27.89	27.89	0 01:00:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	C-202	Junction	4236.53	4240.36	4236.53	4240.36	0.00	26.26	4239.19	0.00	1.17	0 00:00	0.00	0.00
2	C-203	Junction	4236.54	4241.78	4236.54	4241.78	0.00	26.27	4239.48	0.00	2.31	0 00:00	0.00	0.00
3	C-204	Junction	4236.55	4241.77	4236.55	4241.77	0.00	26.27	4239.74	0.00	2.03	0 00:00	0.00	0.00
4	C-205	Junction	4236.59	4242.19	4236.59	4242.19	0.00	26.27	4240.07	0.00	2.12	0 00:00	0.00	0.00
5	C-206	Junction	4236.63	4242.51	4236.63	4242.51	0.00	26.29	4240.42	0.00	2.09	0 00:00	0.00	0.00
6	C-207	Junction	4239.25	4242.01	4239.25	4242.01	0.00	0.58	4240.42	0.00	1.59	0 00:00	0.00	0.00
7	C-208	Junction	4239.44	4242.01	4239.44	4242.01	0.00	0.35	4240.42	0.00	1.59	0 00:00	0.00	0.00
8	C-209	Junction	4236.71	4242.00	4236.71	4242.00	0.00	26.29	4240.92	0.00	1.08	0 00:00	0.00	0.00
9	C-210	Junction	4239.25	4241.86	4239.25	4241.86	0.00	0.86	4240.92	0.00	0.94	0 00:00	0.00	0.00
10	C-211	Junction	4236.73	4242.65	4236.73	4242.65	0.00	27.88	4241.21	0.00	1.44	0 00:00	0.00	0.00
11	C-212	Junction	4236.79	4241.87	4236.79	4241.87	0.00	8.59	4241.21	0.00	0.67	0 00:00	0.00	0.00
12	C-214	Junction	4236.82	4242.14	4236.82	4242.14	0.00	6.30	4241.19	0.00	0.95	0 00:00	0.00	0.00
13	C-215	Junction	4238.48	4243.34	4238.48	4243.34	0.00	1.54	4241.19	0.00	2.15	0 00:00	0.00	0.00
14	C-216	Junction	4236.93	4241.29	4236.93	4241.29	0.00	5.76	4241.17	0.00	0.11	0 00:00	0.00	0.00
15	C-217	Junction	4238.67	4243.34	4238.67	4243.34	0.00	2.20	4241.17	0.00	2.17	0 00:00	0.00	0.00
16	C-218	Junction	4237.00	4241.14	4237.00	4241.14	0.00	1.63	4241.14	0.00	0.00	0 01:00	0.07	6.00
17	C-201	Outfall	4236.50					26.26	4238.69					
18	C-213	Storage Node	4236.80	4242.97	4236.80		0.00	27.89	4241.85				0.00	0.00
19	C-219	Storage Node	4237.02	4239.36	4237.02		0.00	6.06	4239.36				5.62	111.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	SD-C201	Pipe	C-202	C-201	69.72	4236.53	4236.50	0.0400	36.000	0.0130	26.26	29.83	0.88	4.29	2.42	0.81	0.00	Calculated
2	SD-C202	Pipe	C-203	C-202	19.47	4236.54	4236.53	0.0500	36.000	0.0130	26.26	29.83	0.88	3.83	2.80	0.93	0.00	Calculated
3	SD-C203	Pipe	C-204	C-203	31.54	4236.55	4236.54	0.0400	36.000	0.0130	26.27	29.83	0.88	3.73	2.97	0.99	0.00	Calculated
4	SD-C204	Pipe	C-205	C-204	73.29	4236.59	4236.55	0.0400	36.000	0.0130	26.27	29.83	0.88	3.72	3.00	1.00	14.00	SURCHARGED
5	SD-C205	Pipe	C-206	C-205	89.43	4236.63	4236.59	0.0400	36.000	0.0130	26.27	29.83	0.88	3.72	3.00	1.00	24.00	SURCHARGED
6	SD-C206	Pipe	C-209	C-206	185.76	4236.71	4236.63	0.0400	36.000	0.0130	26.29	29.83	0.88	3.72	3.00	1.00	32.00	SURCHARGED
7	SD-C207	Pipe	C-207	C-206	27.84	4239.25	4239.11	0.5000	15.000	0.0130	0.58	4.57	0.13	2.34	1.21	0.97	0.00	Calculated
8	SD-C208	Pipe	C-208	C-207	38.00	4239.44	4239.25	0.5000	15.000	0.0130	0.35	4.57	0.08	1.61	1.08	0.86	0.00	Calculated
9	SD-C209	Pipe	C-211	C-209	44.45	4236.73	4236.71	0.0500	36.000	0.0130	26.29	29.83	0.88	3.72	3.00	1.00	38.00	SURCHARGED
10	SD-C210	Pipe	C-210	C-209	34.50	4239.25	4239.08	0.5000	15.000	0.0130	0.84	4.57	0.18	2.61	1.25	1.00	16.00	SURCHARGED
11	SD-C211	Pipe	C-214	C-211	106.48	4236.82	4236.73	0.0800	24.000	0.0130	6.27	10.12	0.62	2.00	2.00	1.00	80.00	SURCHARGED
12	SD-C212	Pipe	C-212	C-211	75.17	4236.79	4236.73	0.0800	24.000	0.0130	8.39	10.12	0.83	3.70	2.00	1.00	81.00	SURCHARGED
13	SD-C214	Pipe	C-216	C-214	144.53	4236.93	4236.82	0.0800	24.000	0.0130	5.07	10.12	0.50	1.83	2.00	1.00	74.00	SURCHARGED
14	SD-C215	Pipe	C-215	C-214	68.12	4238.48	4237.80	1.0000	12.232	0.0110	1.62	4.43	0.36	4.19	1.02	1.00	50.00	SURCHARGED
15	SD-C216	Pipe	C-218	C-216	45.50	4237.00	4236.93	0.1500	18.000	0.0130	1.63	4.70	0.35	0.92	1.50	1.00	98.00	SURCHARGED
16	SD-C217	Pipe	C-217	C-216	76.14	4238.67	4237.91	1.0000	12.232	0.0110	2.24	4.43	0.50	4.67	1.02	1.00	43.00	SURCHARGED
17	SD-C213	Orifice	C-213	C-211		4236.80	4236.73		36.000		27.88							
18	SD-C218	Orifice	C-219	C-218		4237.02	4237.00		3.350		0.40							

Subbasin Hydrology

Subbasin : CATCH C-1

Input Data

Area (ac) 0.74
Weighted Runoff Coefficient 0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.74	-	0.45
Composite Area & Weighted Runoff Coeff.	0.74		0.45

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	10.22854745	0	0
Slope (%) :	1.87581042	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	0.22	0	0

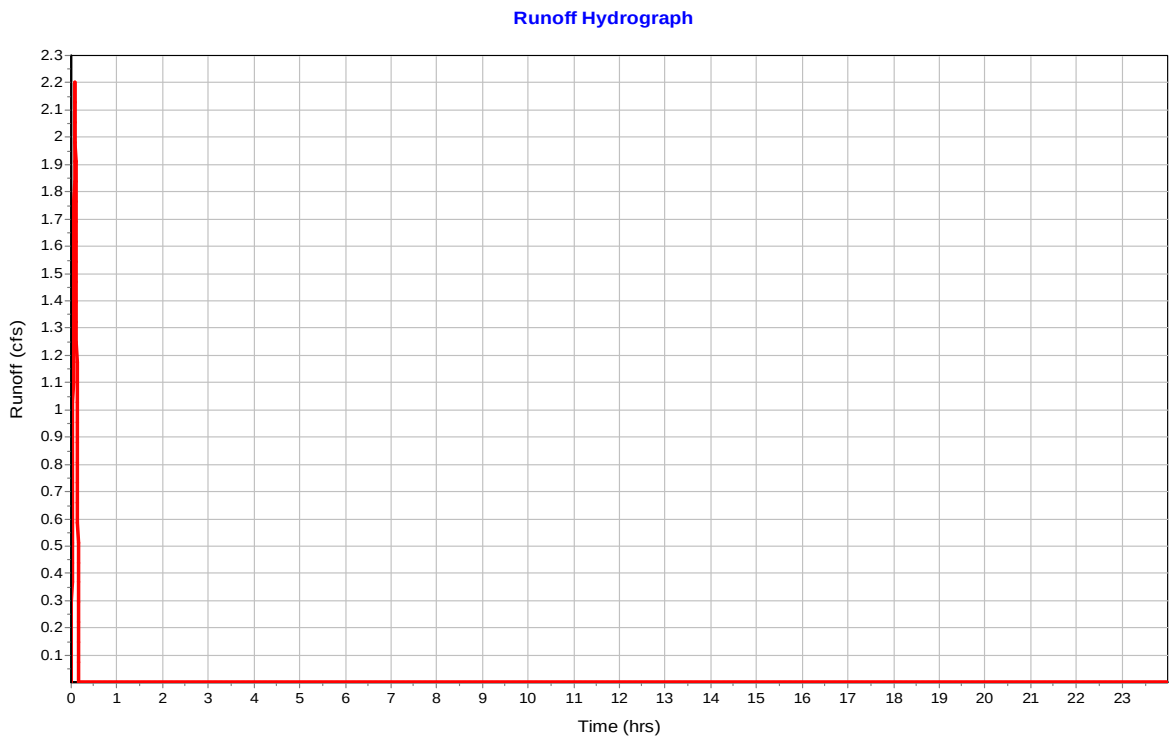
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	128.585951	0	0
Slope (%) :	0.5	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.44	0	0
Computed Flow Time (min) :	1.49	0	0

Total TOC (min) 1.71

Subbasin Runoff Results

Total Rainfall (in)	0.55
Total Runoff (in)	0.25
Peak Runoff (cfs)	2.2
Rainfall Intensity	6.62
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:01:43

Subbasin : CATCH C-1



Subbasin : CATCH C-10

Input Data

Area (ac)	1.73
Weighted Runoff Coefficient	0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.73	-	0.75
Composite Area & Weighted Runoff Coeff.	1.73		0.75

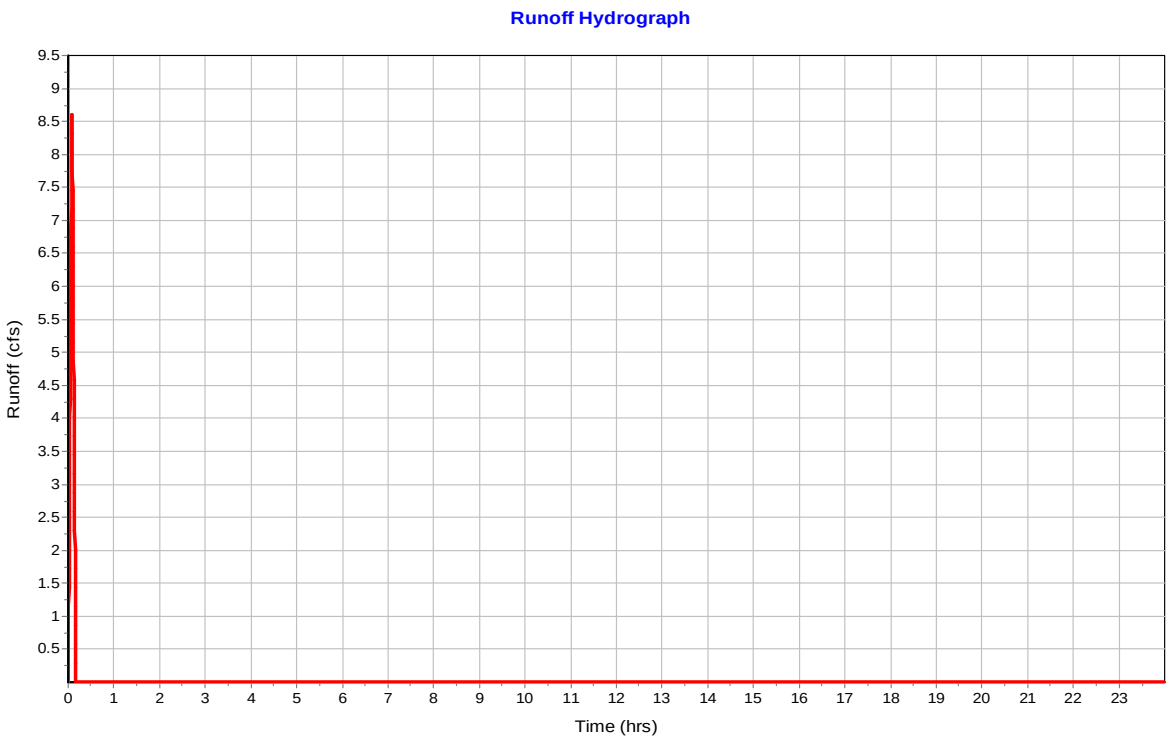
Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	0.55
Total Runoff (in)	0.41
Peak Runoff (cfs)	8.6
Rainfall Intensity	6.62
Weighted Runoff Coefficient	0.75
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : CATCH C-10



Subbasin : CATCH C-2

Input Data

Area (ac) 4.06
Weighted Runoff Coefficient 0.8

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	4.06	-	0.8
Composite Area & Weighted Runoff Coeff.	4.06		0.8

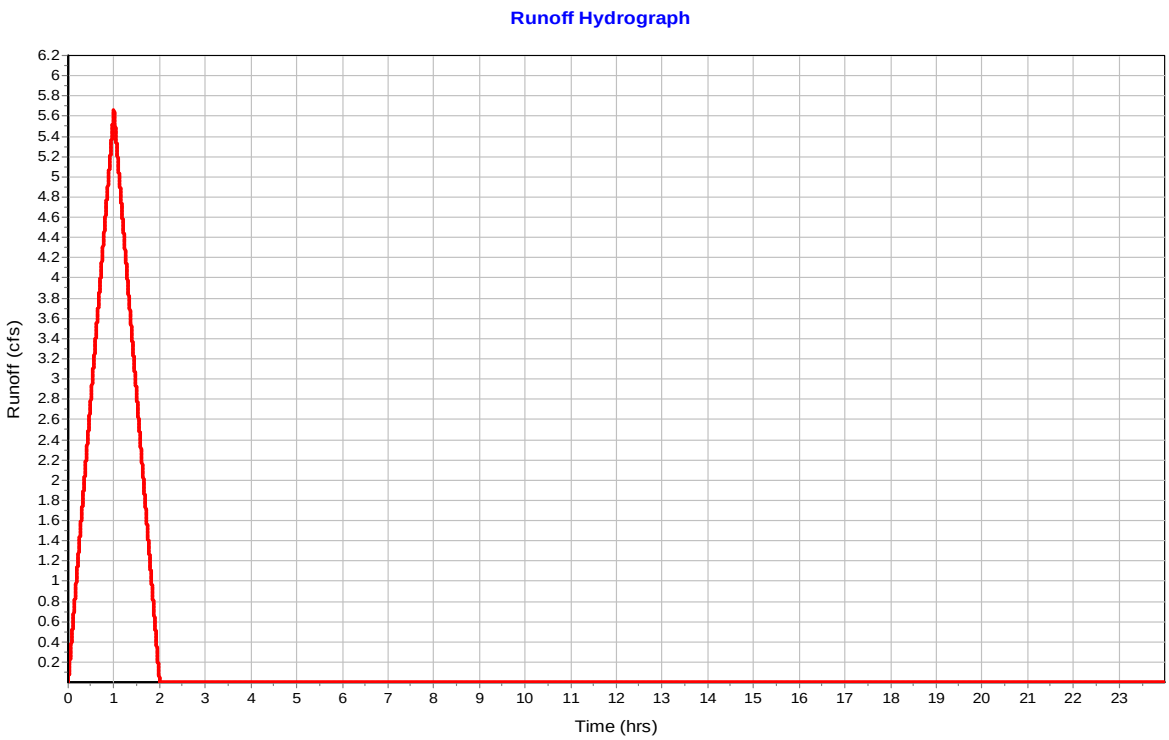
Time of Concentration

User-Defined TOC override (minutes): 60

Subbasin Runoff Results

Total Rainfall (in) 1.74
Total Runoff (in) 1.39
Peak Runoff (cfs) 5.66
Rainfall Intensity 1.74
Weighted Runoff Coefficient 0.8
Time of Concentration (days hh:mm:ss) 0 01:00:00

Subbasin : CATCH C-2



Subbasin : CATCH C-3

Input Data

Area (ac)	0.24
Weighted Runoff Coefficient	0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.24	-	0.75
Composite Area & Weighted Runoff Coeff.	0.24		0.75

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	28.68054639	0	0
Slope (%) :	1.99116093	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.99	0	0
Computed Flow Time (min) :	0.48	0	0

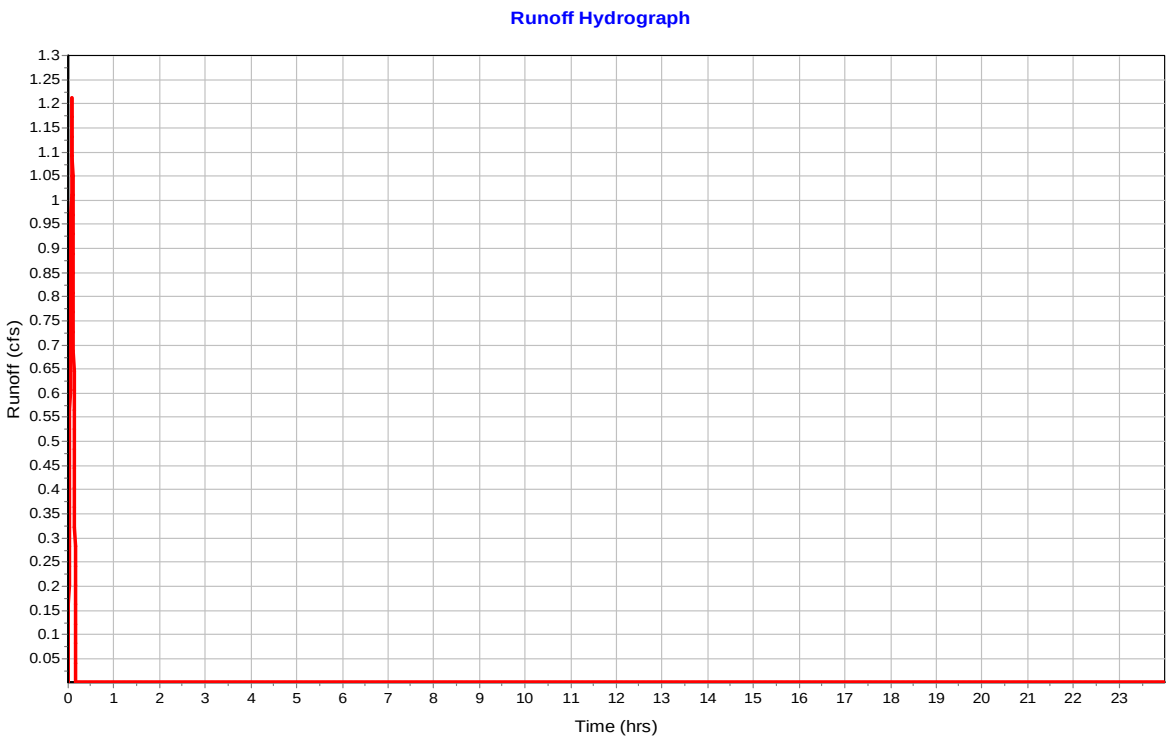
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	191.1139756	0	0
Slope (%) :	0.62502804	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.61	0	0
Computed Flow Time (min) :	1.98	0	0

Total TOC (min) 2.46

Subbasin Runoff Results

Total Rainfall (in)	0.55
Total Runoff (in)	0.41
Peak Runoff (cfs)	1.21
Rainfall Intensity	6.62
Weighted Runoff Coefficient	0.75
Time of Concentration (days hh:mm:ss)	0 00:02:28

Subbasin : CATCH C-3



Subbasin : CATCH C-4

Input Data

Area (ac) 0.43
Weighted Runoff Coefficient 0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.43	-	0.75
Composite Area & Weighted Runoff Coeff.	0.43		0.75

Time of Concentration

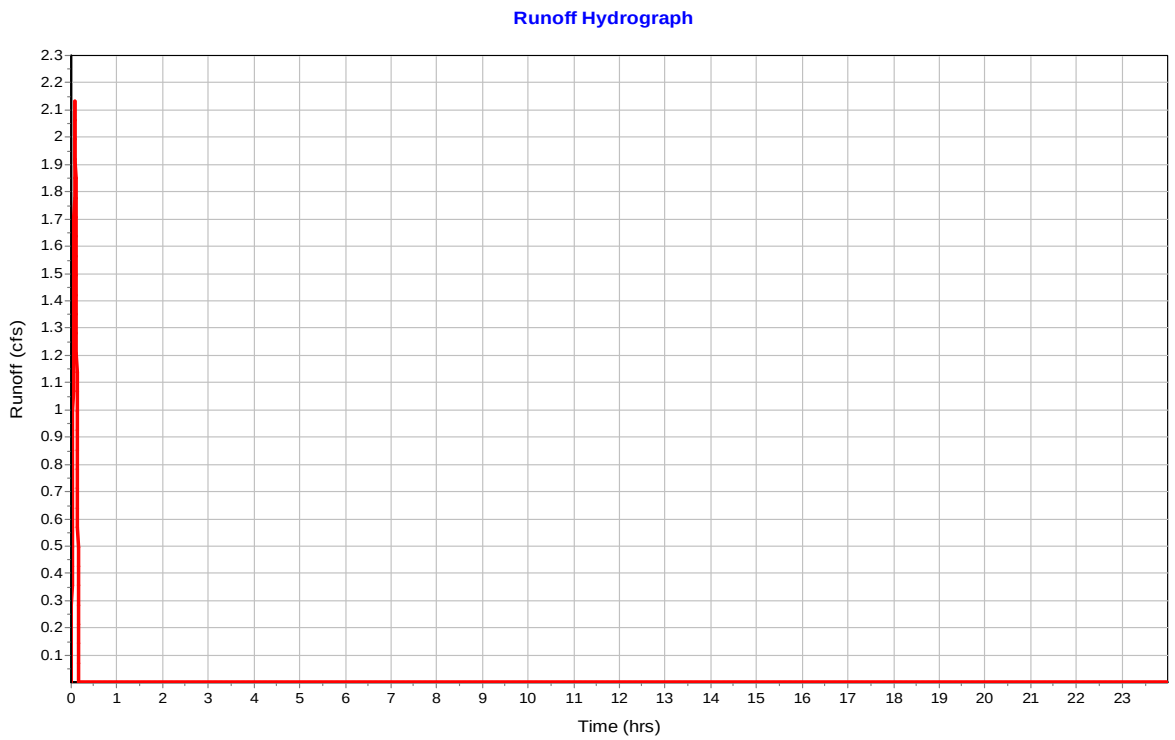
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	24.18743217	0	0
Slope (%) :	2.05908821	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.97	0	0
Computed Flow Time (min) :	0.41	0	0

Total TOC (min) 0.41

Subbasin Runoff Results

Total Rainfall (in) 0.55
Total Runoff (in) 0.41
Peak Runoff (cfs) 2.13
Rainfall Intensity 6.62
Weighted Runoff Coefficient 0.75
Time of Concentration (days hh:mm:ss) 0 00:00:25

Subbasin : CATCH C-4



Subbasin : CATCH C-5

Input Data

Area (ac)	0.52
Weighted Runoff Coefficient	0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.52	-	0.45
Composite Area & Weighted Runoff Coeff.	0.52		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	9.34212361	0	0
Slope (%) :	1.97088194	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	0.2	0	0

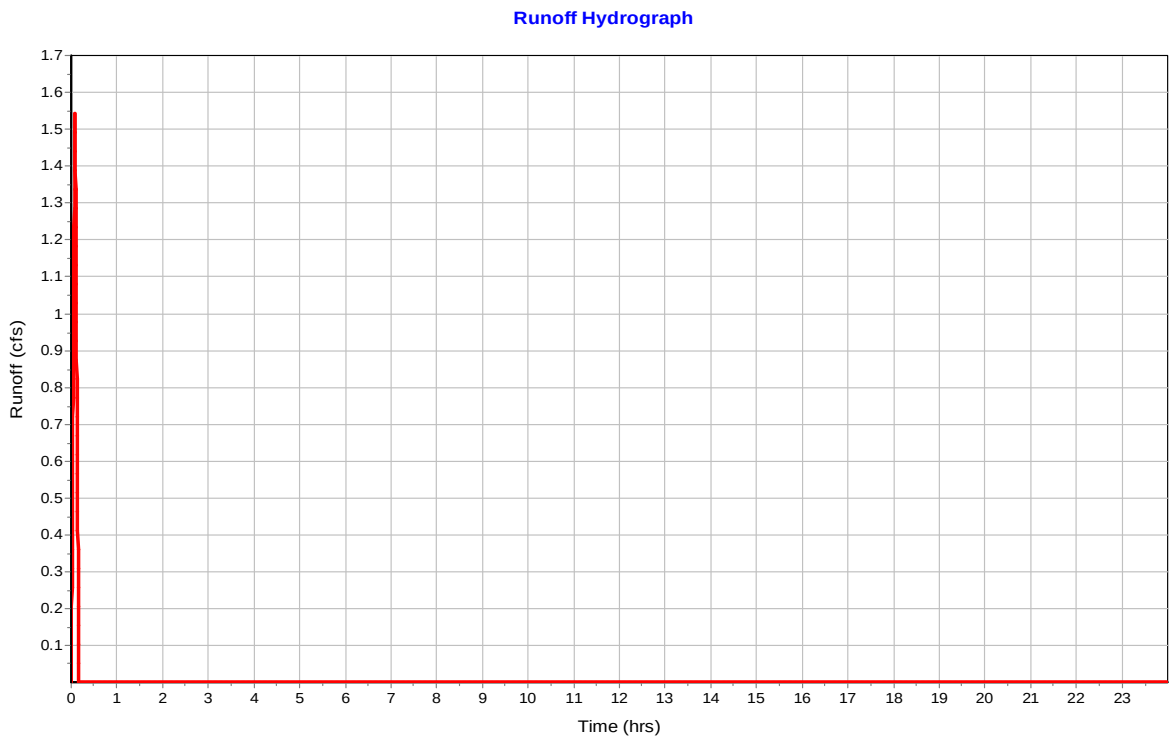
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	121.5165439	0	0
Slope (%) :	0.5	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.44	0	0
Computed Flow Time (min) :	1.41	0	0

Total TOC (min) 1.61

Subbasin Runoff Results

Total Rainfall (in)	0.55
Total Runoff (in)	0.25
Peak Runoff (cfs)	1.54
Rainfall Intensity	6.62
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:01:37

Subbasin : CATCH C-5



Subbasin : CATCH C-6

Input Data

Area (ac)	0.28
Weighted Runoff Coefficient	0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.28	-	0.45
Composite Area & Weighted Runoff Coeff.	0.28		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0	0
Flow Length (ft) :	58.95704634	0	0
Slope (%) :	0.97787038	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.74	0	0

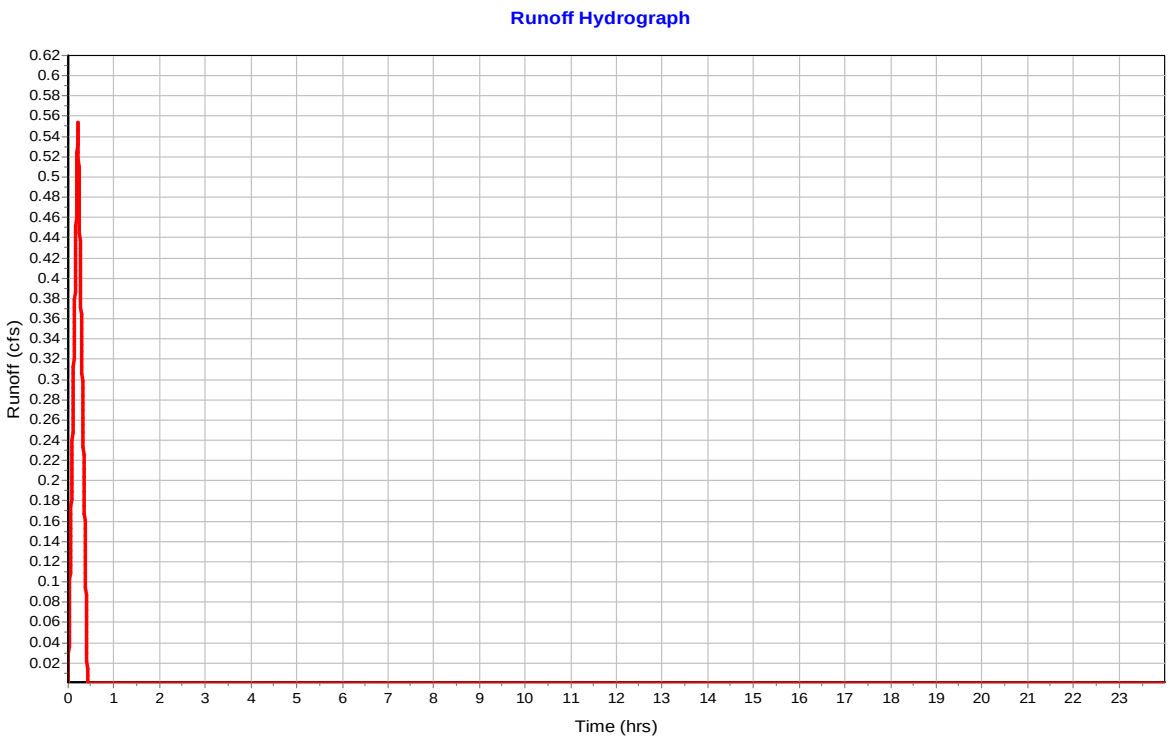
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	96.40076757	0	0
Slope (%) :	0.74543229	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.76	0	0
Computed Flow Time (min) :	0.92	0	0

Total TOC (min) 12.65

Subbasin Runoff Results

Total Rainfall (in)	0.94
Total Runoff (in)	0.43
Peak Runoff (cfs)	0.55
Rainfall Intensity	4.471
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:12:39

Subbasin : CATCH C-6



Subbasin : CATCH C-7

Input Data

Area (ac)	0.17
Weighted Runoff Coefficient	0.75

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.17	-	0.75
Composite Area & Weighted Runoff Coeff.	0.17		0.75

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	14.37561683	0	0
Slope (%) :	3.98964073	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	1.14	0	0
Computed Flow Time (min) :	0.21	0	0

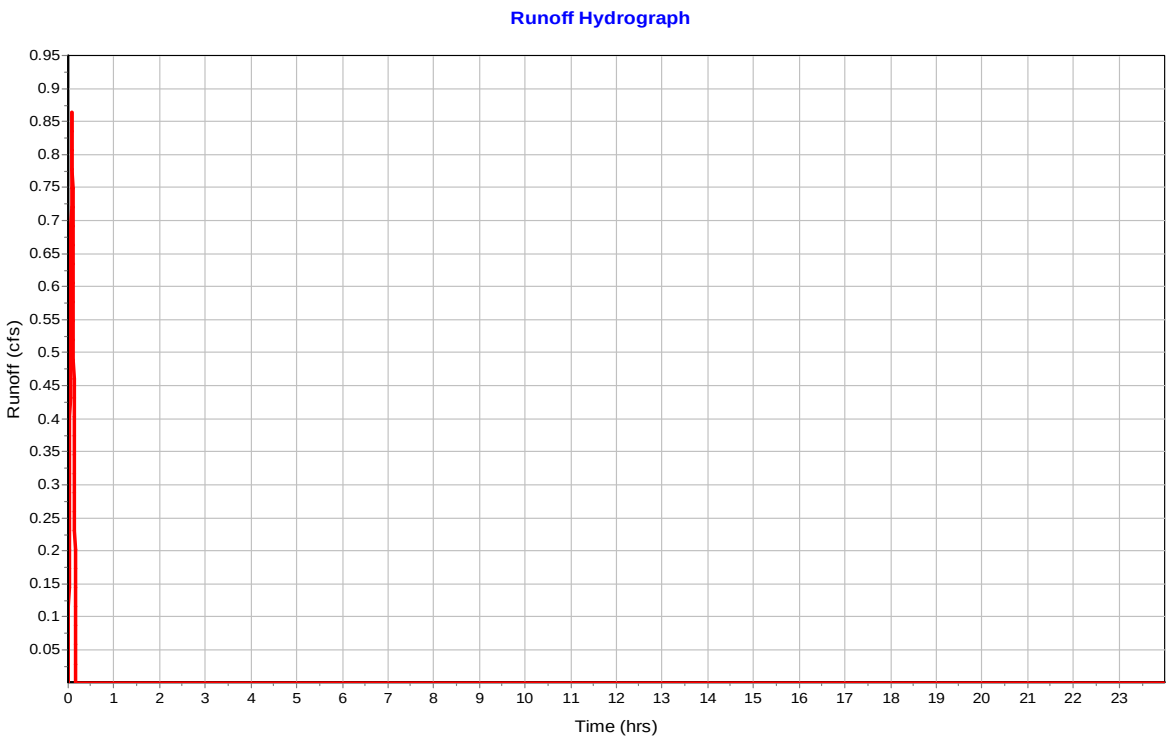
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	155.0952776	0	0
Slope (%) :	0.49088845	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.42	0	0
Computed Flow Time (min) :	1.81	0	0

Total TOC (min) 2.02

Subbasin Runoff Results

Total Rainfall (in)	0.55
Total Runoff (in)	0.41
Peak Runoff (cfs)	0.86
Rainfall Intensity	6.62
Weighted Runoff Coefficient	0.75
Time of Concentration (days hh:mm:ss)	0 00:02:01

Subbasin : CATCH C-7



Subbasin : CATCH C-8

Input Data

Area (ac)	0.12
Weighted Runoff Coefficient	0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.45
Composite Area & Weighted Runoff Coeff.	0.12		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0	0
Flow Length (ft) :	31	0	0
Slope (%) :	3.04713812	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.12	0	0
Computed Flow Time (min) :	4.45	0	0

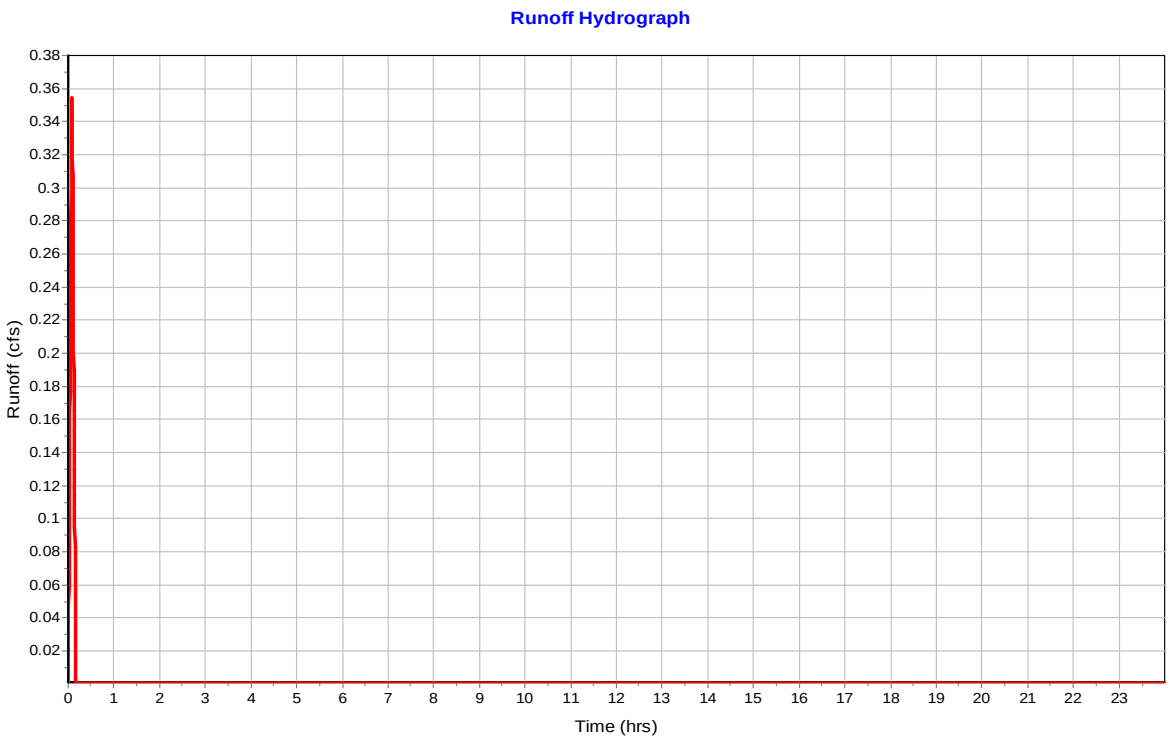
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	48.13918316	0	0
Slope (%) :	0.4838276	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	1.41	0	0
Computed Flow Time (min) :	0.57	0	0

Total TOC (min) 5.02

Subbasin Runoff Results

Total Rainfall (in)	0.55
Total Runoff (in)	0.25
Peak Runoff (cfs)	0.35
Rainfall Intensity	6.609
Weighted Runoff Coefficient	0.45
Time of Concentration (days hh:mm:ss)	0 00:05:01

Subbasin : CATCH C-8



Subbasin : CATCH C-9

Input Data

Area (ac) 0.12
Weighted Runoff Coefficient 0.45

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.45
Composite Area & Weighted Runoff Coeff.	0.12		0.45

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.24	0	0
Flow Length (ft) :	30.31418849	0	0
Slope (%) :	1.05898887	0	0
2 yr, 24 hr Rainfall (in) :	3.6	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	6.68	0	0

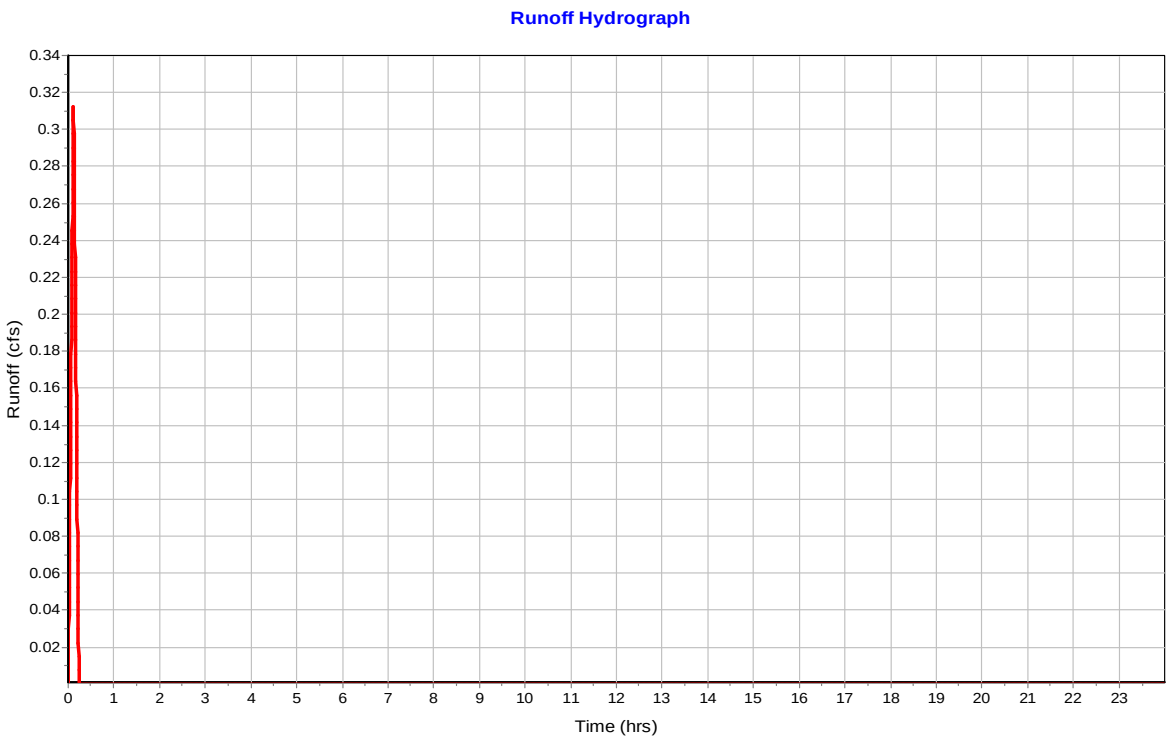
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	41.06876486	0	0
Slope (%) :	1.22140455	0	0
Surface Type :	Paved	Paved	Paved
Velocity (ft/sec) :	2.25	0	0
Computed Flow Time (min) :	0.3	0	0

Total TOC (min) 6.98

Subbasin Runoff Results

Total Rainfall (in) 0.67
Total Runoff (in) 0.3
Peak Runoff (cfs) 0.31
Rainfall Intensity 5.749
Weighted Runoff Coefficient 0.45
Time of Concentration (days hh:mm:ss) 0 00:06:59

Subbasin : CATCH C-9



Subbasin : CATCH LV-1

Input Data

Area (ac) 26.71
Weighted Runoff Coefficient 0.6

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	26.71	-	0.6
Composite Area & Weighted Runoff Coeff.	26.71		0.6

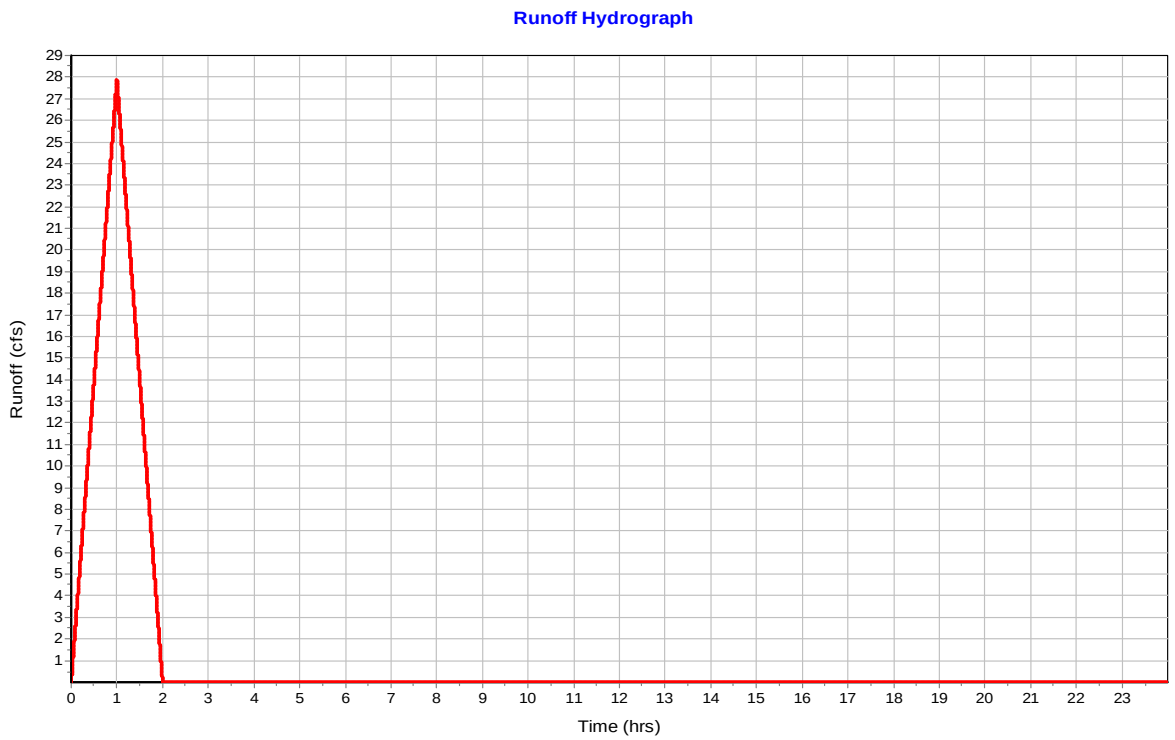
Time of Concentration

User-Defined TOC override (minutes): 60

Subbasin Runoff Results

Total Rainfall (in) 1.74
Total Runoff (in) 1.04
Peak Runoff (cfs) 27.89
Rainfall Intensity 1.74
Weighted Runoff Coefficient 0.6
Time of Concentration (days hh:mm:ss) 0 01:00:00

Subbasin : CATCH LV-1



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	C-202	4236.53	4240.36	3.83	4236.53	0.00	4240.36	0.00	0.00	0.00
2	C-203	4236.54	4241.78	5.24	4236.54	0.00	4241.78	0.00	0.00	0.00
3	C-204	4236.55	4241.77	5.22	4236.55	0.00	4241.77	0.00	0.00	0.00
4	C-205	4236.59	4242.19	5.60	4236.59	0.00	4242.19	0.00	0.00	0.00
5	C-206	4236.63	4242.51	5.88	4236.63	0.00	4242.51	0.00	0.00	0.00
6	C-207	4239.25	4242.01	2.76	4239.25	0.00	4242.01	0.00	0.00	0.00
7	C-208	4239.44	4242.01	2.57	4239.44	0.00	4242.01	0.00	0.00	0.00
8	C-209	4236.71	4242.00	5.29	4236.71	0.00	4242.00	0.00	0.00	0.00
9	C-210	4239.25	4241.86	2.61	4239.25	0.00	4241.86	0.00	0.00	0.00
10	C-211	4236.73	4242.65	5.92	4236.73	0.00	4242.65	0.00	0.00	0.00
11	C-212	4236.79	4241.87	5.08	4236.79	0.00	4241.87	0.00	0.00	0.00
12	C-214	4236.82	4242.14	5.32	4236.82	0.00	4242.14	0.00	0.00	0.00
13	C-215	4238.48	4243.34	4.86	4238.48	0.00	4243.34	0.00	0.00	0.00
14	C-216	4236.93	4241.29	4.35	4236.93	0.00	4241.29	0.00	0.00	0.00
15	C-217	4238.67	4243.34	4.67	4238.67	0.00	4243.34	0.00	0.00	0.00
16	C-218	4237.00	4241.14	4.14	4237.00	0.00	4241.14	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	C-202	26.26	0.00	4239.19	2.66	0.00	1.17	4236.70	0.17	0 01:00	0 00:00	0.00	0.00
2	C-203	26.27	0.00	4239.48	2.94	0.00	2.31	4236.72	0.18	0 01:00	0 00:00	0.00	0.00
3	C-204	26.27	0.00	4239.74	3.19	0.00	2.03	4236.75	0.20	0 01:00	0 00:00	0.00	0.00
4	C-205	26.27	0.00	4240.07	3.48	0.00	2.12	4236.79	0.20	0 01:00	0 00:00	0.00	0.00
5	C-206	26.29	0.00	4240.42	3.79	0.00	2.09	4236.84	0.21	0 01:00	0 00:00	0.00	0.00
6	C-207	0.58	0.31	4240.42	1.17	0.00	1.59	4239.27	0.02	0 01:00	0 00:00	0.00	0.00
7	C-208	0.35	0.35	4240.42	0.98	0.00	1.59	4239.46	0.02	0 01:00	0 00:00	0.00	0.00
8	C-209	26.29	0.55	4240.92	4.21	0.00	1.08	4236.94	0.23	0 01:00	0 00:00	0.00	0.00
9	C-210	0.86	0.86	4240.92	1.67	0.00	0.94	4239.29	0.04	0 01:00	0 00:00	0.00	0.00
10	C-211	27.88	0.00	4241.21	4.48	0.00	1.44	4236.97	0.24	0 01:00	0 00:00	0.00	0.00
11	C-212	8.59	8.59	4241.21	4.42	0.00	0.67	4237.02	0.23	0 01:00	0 00:00	0.00	0.00
12	C-214	6.30	0.00	4241.19	4.37	0.00	0.95	4237.04	0.22	0 01:00	0 00:00	0.00	0.00
13	C-215	1.54	1.54	4241.19	2.71	0.00	2.15	4238.56	0.08	0 01:00	0 00:00	0.00	0.00
14	C-216	5.76	2.13	4241.17	4.24	0.00	0.11	4237.15	0.22	0 01:00	0 00:00	0.00	0.00
15	C-217	2.20	2.20	4241.17	2.50	0.00	2.17	4238.75	0.08	0 01:00	0 00:00	0.00	0.00
16	C-218	1.63	1.21	4241.14	4.14	0.00	0.00	4237.21	0.21	0 00:57	0 01:00	0.07	6.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	SD-C201	69.72	4236.53	0.00	4236.50	0.00	0.03	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	SD-C202	19.47	4236.54	0.00	4236.53	0.00	0.01	0.0500	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	SD-C203	31.54	4236.55	0.00	4236.54	0.00	0.01	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	SD-C204	73.29	4236.59	0.00	4236.55	0.00	0.03	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	SD-C205	89.43	4236.63	0.00	4236.59	0.00	0.04	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	SD-C206	185.76	4236.71	0.00	4236.63	0.00	0.08	0.0400	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	SD-C207	27.84	4239.25	0.00	4239.11	2.48	0.14	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	SD-C208	38.00	4239.44	0.00	4239.25	0.00	0.19	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	SD-C209	44.45	4236.73	0.00	4236.71	0.00	0.02	0.0500	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	SD-C210	34.50	4239.25	0.00	4239.08	2.37	0.17	0.5000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	SD-C211	106.48	4236.82	0.00	4236.73	0.00	0.09	0.0800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	SD-C212	75.17	4236.79	0.00	4236.73	0.00	0.06	0.0800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	SD-C214	144.53	4236.93	0.00	4236.82	0.00	0.12	0.0800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	SD-C215	68.12	4238.48	0.00	4237.80	0.98	0.68	1.0000	CIRCULAR	12.240	12.240	0.0110	0.5000	0.5000	0.0000	0.00	No	1
15	SD-C216	45.50	4237.00	0.00	4236.93	0.00	0.07	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	SD-C217	76.14	4238.67	0.00	4237.91	0.98	0.76	1.0000	CIRCULAR	12.240	12.240	0.0110	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	SD-C201	26.26	0 01:00	29.83	0.88	4.29	0.27	2.42	0.81	0.00		Calculated
2	SD-C202	26.26	0 01:00	29.83	0.88	3.83	0.08	2.80	0.93	0.00		Calculated
3	SD-C203	26.27	0 01:00	29.83	0.88	3.73	0.14	2.97	0.99	0.00		Calculated
4	SD-C204	26.27	0 01:00	29.83	0.88	3.72	0.33	3.00	1.00	14.00		SURCHARGED
5	SD-C205	26.27	0 01:00	29.83	0.88	3.72	0.40	3.00	1.00	24.00		SURCHARGED
6	SD-C206	26.29	0 01:00	29.83	0.88	3.72	0.83	3.00	1.00	32.00		SURCHARGED
7	SD-C207	0.58	0 00:06	4.57	0.13	2.34	0.20	1.21	0.97	0.00		Calculated
8	SD-C208	0.35	0 00:05	4.57	0.08	1.61	0.39	1.08	0.86	0.00		Calculated
9	SD-C209	26.29	0 01:00	29.83	0.88	3.72	0.20	3.00	1.00	38.00		SURCHARGED
10	SD-C210	0.84	0 00:05	4.57	0.18	2.61	0.22	1.25	1.00	16.00		SURCHARGED
11	SD-C211	6.27	0 00:05	10.12	0.62	2.00	0.89	2.00	1.00	80.00		SURCHARGED
12	SD-C212	8.39	0 00:05	10.12	0.83	3.70	0.34	2.00	1.00	81.00		SURCHARGED
13	SD-C214	5.07	0 00:05	10.12	0.50	1.83	1.32	2.00	1.00	74.00		SURCHARGED
14	SD-C215	1.62	0 00:05	4.43	0.36	4.19	0.27	1.02	1.00	50.00		SURCHARGED
15	SD-C216	1.63	0 01:00	4.70	0.35	0.92	0.82	1.50	1.00	98.00		SURCHARGED
16	SD-C217	2.24	0 00:05	4.43	0.50	4.67	0.27	1.02	1.00	43.00		SURCHARGED

Storage Nodes

Storage Node : C-213

Input Data

Invert Elevation (ft)	4236.80
Max (Rim) Elevation (ft)	4242.97
Max (Rim) Offset (ft)	6.17
Initial Water Elevation (ft)	4236.80
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	SD-C213	Side	CIRCULAR	No	36.00			4236.80	0.61

Output Summary Results

Peak Inflow (cfs)	27.89
Peak Lateral Inflow (cfs)	27.89
Peak Outflow (cfs)	27.88
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	4241.85
Max HGL Depth Attained (ft)	5.05
Average HGL Elevation Attained (ft)	4237.04
Average HGL Depth Attained (ft)	0.24
Time of Max HGL Occurrence (days hh:mm)	0 01:00
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Storage Node : C-219

Input Data

Invert Elevation (ft)	4237.02
Max (Rim) Elevation (ft)	4239.36
Max (Rim) Offset (ft)	2.33
Initial Water Elevation (ft)	4237.02
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	SD-C218	Side	CIRCULAR	No	3.35			4237.02	0.61

Output Summary Results

Peak Inflow (cfs)	6.06
Peak Lateral Inflow (cfs)	5.66
Peak Outflow (cfs)	0.35
Peak Exfiltration Flow Rate (cfm)	0
Max HGL Elevation Attained (ft)	4239.36
Max HGL Depth Attained (ft)	2.34
Average HGL Elevation Attained (ft)	4237.22
Average HGL Depth Attained (ft)	0.2
Time of Max HGL Occurrence (days hh:mm)	0 00:04
Total Exfiltration Volume (1000-ft³)	0
Total Flooded Volume (ac-in)	5.62
Total Time Flooded (min)	111
Total Retention Time (sec)	0