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Stormwater Management Report

For:

Yarmouth Landing

57 Baywood Lane
Yarmouth, Maine

Prepared for:
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Stormwater Management Report Narrative

A. **Introduction**

This Stormwater Management Report has been prepared to present analyses performed to address the potential impacts associated with the project due to proposed modifications in stormwater runoff characteristics and land cover changes. The stormwater management controls that are outlined in this report have been designed to suit the proposed development and to comply with applicable regulatory requirements.

B. **Existing Conditions**

Located in Yarmouth Maine, the approximate 40.4-acre parcel is partially developed as a residential subdivision with a substantial amount of undeveloped land. The subdivision consists of 14 buildings with 56 total units. Residents currently park in surface-level parking lots located in front of the buildings. Baywood Lane extends from Pleasant St, providing access to the units. Approximately 31.4 acres of woods exist on site. The site is identified as Lot 21 on the Town of Yarmouth Tax Map 25. The site is bounded by residential homes to the north, Pleasant Street to the east, woods to the south, and I-295(N) to the west.

The project site is located within the Lower Royal River sub-watershed, which is a part of the Royal River watershed. Lower Royal River and Royal River are not classified as urban impaired, per the Maine Department of Environmental Protection (MDEP) Chapter 502. There is no existing stormwater detention or treatment located on site. Stormwater runoff drains southeast and offsite towards the Lower Royal River. The topography of the site ranges from flat to moderate in areas to be developed.

The proposed development of the site is not located in an identified flood zone per the FEMA Flood Insurance Rate Map for the Town of Yarmouth, Maine Cumberland County, Community Panel 2300550006B with an effective date of 11/15/1984.

C. **Soils**

Soil information for the site was obtained via the USDA United States Department of Agriculture and Natural Resources Conservation Service's Web Soil Survey. The Hydrologic Soil Group (HSG) of the site soils are classified by Technical Release TR-55 of the Soil Conservation Service as follows:

Soil Name	Soil Map Symbol	HSG	Slope (%)
Lamoine Silt Loam	BuB	C/D	3-8
Elmwood Fine sandy Loam	EmB	B	0-8
Lyman-Tunbridge Complex	HrB	C	0-8
Lyman-Abram Complex	HsC	C	8-15
Paxton Fine Sandy Loam	PbD	B	15-25
Scantic Silt Loam	Sn	D	0-3
Suffield Silt Loam	SuE2	D	25-45

Windsor Loamy Sand	WmB	A	0-8

D. Proposed Site and Stormwater Improvements

Proposed site improvements include the development of eight parking garage buildings and associated parking for the existing residential subdivision. Proposed improvements include both redeveloped and newly developed area, which total approximately 1.44 acres of disturbed area and 0.41 acres of new impervious area.

Stormwater infrastructure for the development is designed to accommodate proposed site improvements. The proposed drainage system includes a level-lip spreader, vegetated swales, a culvert, a stone bed, and check dams for purposes of conveyance and control of peak rates of runoff. The project's Stormwater Management Plan is designed so that the existing drainage patterns will not be significantly altered.

E. Methodology

Stormwater runoff analyses were developed using the "HydroCAD" computer modeling software, which incorporates the TR-55 and TR-20 methodologies as provided by the Soil Conservation Service of the U.S. Department of Agriculture.

The estimated peak runoff rates were calculated using a 24-hour duration storm event with a Type III rainfall distribution. The rainfall amounts for Cumberland County for the 2-year, 10-year and 25-year storm events are as follows:

Storm Frequency	24-hr Duration Rainfall (in.)
2-yr	3.1
10-yr	4.6
25-yr	5.8

F. Existing Conditions Model

The existing conditions HydroCAD model consists of seven (7) catchment areas labeled 1.1-1.2S, 2.0S, and 3.1-3.4S, and three (3) points of analysis (POA) for comparing peak runoff rates. There is no exiting stormwater treatment or detention on site.

POA-1: POA-1 is located on the northeast side of the site. Catchment area 1.2S contributes runoff to POA-1 with a total area of approximately 0.78 acres, including approximately 0.31 acres of impervious area. 1.2S consists of impervious, landscaped, and wooded land cover.

POA-2: POA-2 is located at the outlet of an existing drainage ditch in the middle of the site. Catchment areas 1.1S and 2.0S contribute runoff to POA-2 with a total area of approximately 2.56 acres, including approximately 0.88 acres of impervious area. 1.1S consists of impervious and landscaped land cover. 2.0S consists of impervious, landscaped, and wooded land cover.

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POA-3: POA-3 is located on the southeast side of the site. Catchment areas 3.1S-3.4S contribute runoff to POA-3 with a total area of approximately 0.8 acres, including approximately 0.29 acres of impervious area. 3.1S consists of impervious, landscaped, and wooded land cover. 3.2S and 3.3S consist of impervious and landscaped land cover. 3.4S consists of landscaped and wooded land cover.

G. **Proposed Conditions Model**

The post-developed condition HydroCAD model consists of ten (10) catchment areas labeled 1.1-1.2S, 2.1-2.4S, and 3.1-3.4S. The total proposed area is consistent with existing conditions.

POA-1: Proposed catchment areas 1.1S and 1.2S contribute runoff to POA-1 with a total area of approximately 0.78 acres, including approximately 0.37 acres of impervious area. Stormwater runoff from 1.1S is directed towards a level-lip spreader before discharging to the surrounding woods. Stormwater runoff from 1.2S flows directly to the surrounding woods.

POA-2: Proposed catchment areas 2.1S-2.4S contribute runoff to POA-2 with a total area of approximately 2.57 acres, including approximately 1.1 acres of impervious area. Runoff from 2.3S drains to a four-foot-wide stone bed with an underdrain that discharges to the existing drainage ditch. Catchment areas 2.1S, 2.2S, and 2.4S all drain towards the existing drainage ditch. A total of six check dams are being proposed to be placed within the existing drainage ditch to help mitigate flows.

POA-3: Proposed catchment areas 3.1S, 3.2S, 3.3S, and 3.4S contribute runoff to POA-3 with a total area of 0.80 acres, including 0.42 acres of impervious area. Stormwater runoff from catchment areas 3.2S and 3.3S drains to the existing closed drainage system that outlets directly to the Lower Royal River. Stormwater runoff from 3.1s and 3.4S flows directly to the surrounding woods.

H. **Regulatory Requirements**

MDEP Chapters 500 and 502 describe stormwater management requirements for new projects. The rules describe performance standards divided into five major categories: Basic Standard, General Standard, Phosphorous Standard, Urban Impaired Stream Standard, and Flooding Standard. The following sections describe how this project will address these stormwater management performance standards.

Basic Standard – Chapter 500, Section 4(B)

Since the project will disturb more than one (1) acre of land area, MDEP Basic Standards apply, requiring that grading or other construction activities on the site do not impede or otherwise alter drainage ways to have an unreasonable adverse impact. Adverse impacts are minimized by providing an Erosion and Sedimentation Control Plan, and an Inspection, Maintenance, and Housekeeping Plan (Attachment 2) to be implemented during construction and post-construction stabilization of the site. These construction requirements have been developed following Best Management Practice guidelines.

General Standard – Chapter 500, Section 4(C)

Since the project will create less than one (1) acre of impervious surface, MDEP General Standards do not apply, which require a project's stormwater management system to include treatment measures that will mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts.

Flooding Standard – Chapter 500, Section 4(F)

The project does not result in three acres or more of impervious area, however, the project requires a site law permit modification, so MDEP Flooding Standards apply. The flooding standard requires that a project's peak runoff rates under proposed conditions do not exceed the existing pre-developed condition rates for the 2-year, 10-year, and 25-year storm events.

The proposed improvements include a stormwater management system to control post-project peak runoff rates. Peak rates will be controlled by the implementation of a level-lip spreader, a stone bed, and 6 check dams to be placed within the existing drainage ditch. POA-1, POA-2, and POA-3 evaluate peak rates discharging to the existing woods surrounding the subdivision, where runoff drains to Lower Royal River.

A waiver from the flooding standard is being requested for POA-2 and POA-3 due to the stormwater runoff in these catchment areas discharging directly into the Lower Royal River in exclusively sheet flow, a manmade open channel, or a piped system. Runoff that is not captured within the existing closed drainage system flows across a significant amount of wooded land cover before reaching Lower Royal River, which acts16487 as a forested buffer. The Soil in this area is classified as Windsor Loamy Sand and has an HSG A rating, adding additional mitigation to the increase in flow. Lower Royal River is not a major river segment, but the increase in peak flow from the site is not expected to significantly affect the peak flow of the river. Additionally, Royal River, which Lower Royal River is tributary to, has the downstream capacity to mitigate the minor addition to flow.

The following table summarizes the peak rates of runoff for the existing and proposed conditions:

Stormwater Peak Discharge Summary Table									
Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm		
	Pre (cfs)	Post (cfs)	Diff. (cfs)	Pre (cfs)	Post (cfs)	Diff. (cfs)	Pre (cfs)	Post (cfs)	Diff. (cfs)
POA-1	1.59	1.59	0	2.64	2.63	0	3.49	3.47	0
POA-2	2.51	3.03	+0.52	4.03	4.41	+0.38	4.88	5.15	+0.27
POA-3	0.88	1.64	+0.76	1.35	2.49	+1.14	1.84	3.24	+1.40

The HydroCAD Data output sheets from this analysis are appended to this report under Attachments 1A and 1B, along with the existing condition and proposed condition stormwater management plans. The results of stormwater modeling at POA-1 indicate that peak rates of

runoff under proposed conditions will not exceed existing conditions for the 2-year, 10-year, and 25-year storm events.

I. Summary

The proposed project requires the use of stormwater management systems to control peak rates of runoff in accordance with the Town of Yarmouth standards. The proposed stormwater management system includes a level-lip spreader, a stone bed, and six check dams that control peak rates of runoff. The hydrologic analyses indicate that the peak rates of runoff in the proposed condition will not exceed existing conditions at POA-1 for the 2-year, 10-year, and 25-year storm events. The peak rates of runoff exceed existing conditions at POA-2 and POA-3 but drain directly to Lower Royal River without significantly affecting the peak flow of the river. Flows leaving the site from the points of analysis and converging at downstream locations follow the same drainage patterns as the existing condition. Based on the modeling data, it is anticipated that stormwater runoff from the proposed site development will not cause a significant adverse effect on off-site receiving channels or downstream areas.

Additionally, erosion and sedimentation controls along with associated maintenance and housekeeping procedures have been outlined to prevent unreasonable impacts on the site and t the surrounding environment.

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1-25-24

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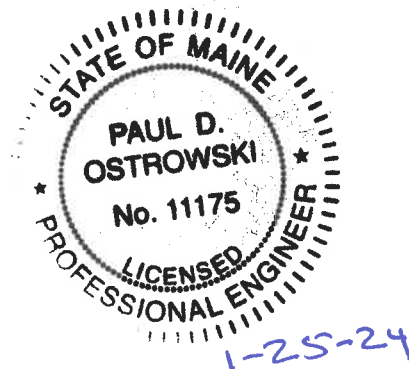
Attachment 1A
Existing Condition HydroCAD Summary

1.1S

1.2S

1L

POA-1

3.1S

3R

EXISTING 15"
CULVERT

3.2S

2.0S → 5P

3L

POA-3

DRAINAGE DITCH

3.3S

2L

POA 2

3.4S

Subcat   Reach   Pond   Link
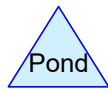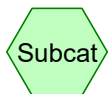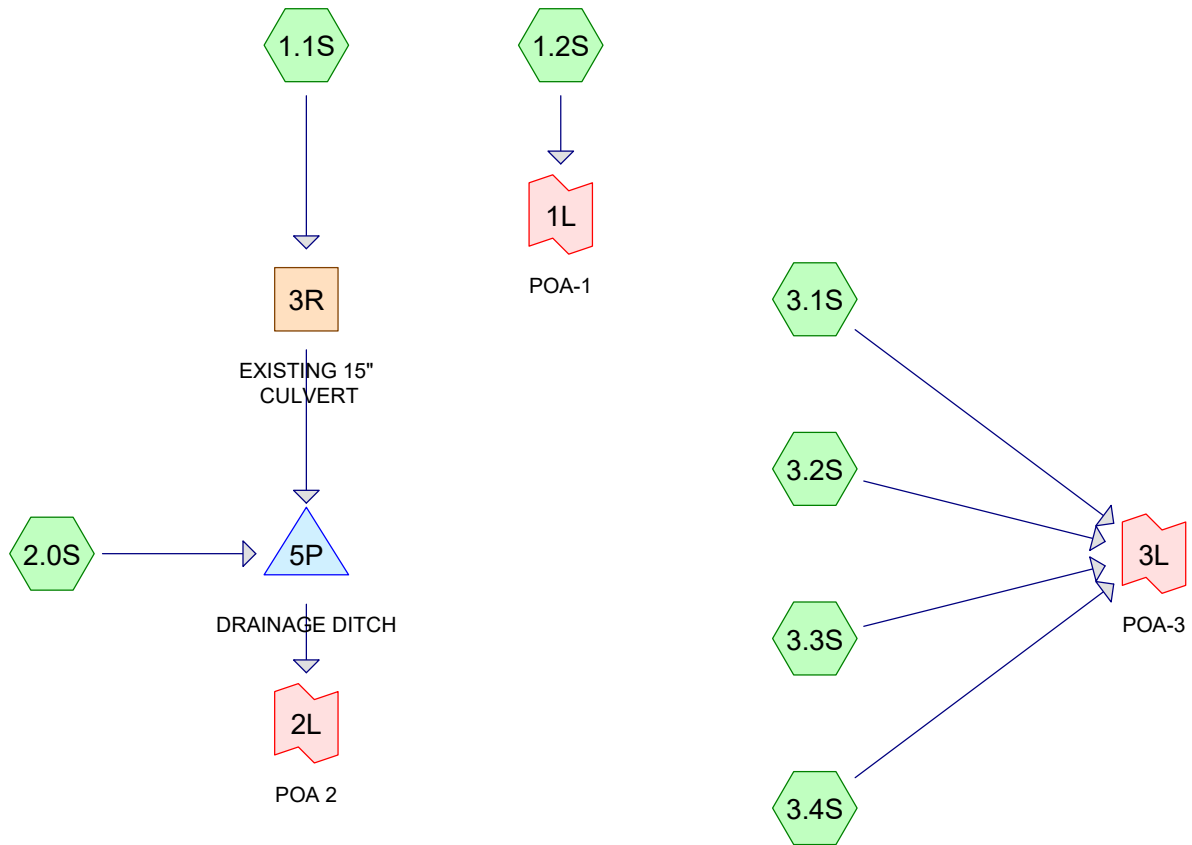
Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.23	49	50-75% Grass cover, Fair, HSG A (3.2S, 3.3S, 3.4S)
0.66	69	50-75% Grass cover, Fair, HSG B (2.0S)
0.70	84	50-75% Grass cover, Fair, HSG D (1.1S, 1.2S)
0.03	39	>75% Grass cover, Good, HSG A (3.1S)
0.20	98	Paved parking, HSG A (3.1S, 3.2S, 3.3S)
0.53	98	Paved parking, HSG B (2.0S)
0.40	98	Paved parking, HSG D (1.1S, 1.2S)
0.09	98	Roofs, HSG A (3.1S, 3.2S, 3.3S, 3.4S)
0.12	98	Roofs, HSG B (2.0S)
0.14	98	Roofs, HSG D (1.1S, 1.2S)
0.24	36	Woods, Fair, HSG A (3.1S, 3.4S)
0.63	60	Woods, Fair, HSG B (2.0S)
0.16	82	Woods/grass comb., Fair, HSG D (1.2S)
4.14	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.80	HSG A	3.1S, 3.2S, 3.3S, 3.4S
1.94	HSG B	2.0S
0.00	HSG C	
1.40	HSG D	1.1S, 1.2S
0.00	Other	
4.14		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.23	0.66	0.00	0.70	0.00	1.59	50-75% Grass cover, Fair	1.1S, 1.2S, 2.0S, 3.2S, 3.3S, 3.4S
0.03	0.00	0.00	0.00	0.00	0.03	>75% Grass cover, Good	3.1S
0.20	0.53	0.00	0.40	0.00	1.14	Paved parking	1.1S, 1.2S, 2.0S, 3.1S, 3.2S, 3.3S
0.09	0.12	0.00	0.14	0.00	0.35	Roofs	1.1S, 1.2S, 2.0S, 3.1S, 3.2S, 3.3S, 3.4S
0.24	0.63	0.00	0.00	0.00	0.88	Woods, Fair	2.0S, 3.1S, 3.4S
0.00	0.00	0.00	0.16	0.00	0.16	Woods/grass comb., Fair	1.2S
0.80	**1.94**	**0.00**	**1.40**	**0.00**	**4.14**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3R	117.50	114.50	55.0	0.0545	0.011	15.0	0.0	0.0
2	5P	109.00	108.50	50.0	0.0100	0.012	12.0	0.0	0.0

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Type III 24-hr 2-YR Rainfall=3.10"
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Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1S: Runoff Area=27,050 sf 37.52% Impervious   Runoff Depth=2.08"
Flow Length=209' Tc=6.0 min CN=WQ Runoff=1.43 cfs 0.107 af

Subcatchment 1.2S: Runoff Area=34,150 sf 39.39% Impervious   Runoff Depth=2.07"
Flow Length=284' Tc=9.5 min CN=WQ Runoff=1.59 cfs 0.135 af

Subcatchment 2.0S: Runoff Area=84,550 sf 33.41% Impervious   Runoff Depth=1.32"
Flow Length=224' Tc=18.0 min CN=WQ Runoff=1.80 cfs 0.214 af

Subcatchment 3.1S: Runoff Area=5,200 sf 20.19% Impervious   Runoff Depth=0.58"
Flow Length=74' Tc=6.0 min CN=WQ Runoff=0.07 cfs 0.006 af

Subcatchment 3.2S: Runoff Area=7,400 sf 72.97% Impervious   Runoff Depth=2.12"
Flow Length=96' Tc=6.0 min CN=WQ Runoff=0.37 cfs 0.030 af

Subcatchment 3.3S: Runoff Area=10,550 sf 52.61% Impervious   Runoff Depth=1.55"
Tc=6.0 min CN=WQ Runoff=0.38 cfs 0.031 af

Subcatchment 3.4S: Runoff Area=11,500 sf 6.09% Impervious   Runoff Depth=0.20"
Flow Length=106' Tc=6.0 min CN=WQ Runoff=0.05 cfs 0.004 af

Reach 3R: EXISTING 15" CULVERT   Avg. Flow Depth=0.24' Max Vel=8.70 fps Inflow=1.43 cfs 0.107 af
15.0" Round Pipe n=0.011 L=55.0' S=0.0545 '/' Capacity=17.83 cfs Outflow=1.43 cfs 0.107 af

Pond 5P: DRAINAGE DITCH   Peak Elev=110.21' Storage=221 cf Inflow=2.61 cfs 0.322 af
Discarded=0.02 cfs 0.007 af Primary=2.51 cfs 0.314 af Outflow=2.53 cfs 0.322 af

Link 1L: POA-1   Inflow=1.59 cfs 0.135 af
Primary=1.59 cfs 0.135 af

Link 2L: POA 2   Inflow=2.51 cfs 0.314 af
Primary=2.51 cfs 0.314 af

Link 3L: POA-3   Inflow=0.88 cfs 0.071 af
Primary=0.88 cfs 0.071 af

Total Runoff Area = 4.14 ac   Runoff Volume = 0.528 af   Average Runoff Depth = 1.53"
64.22% Pervious = 2.66 ac   35.78% Impervious = 1.48 ac

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 1.1S:

Runoff   =   1.43 cfs @ 12.09 hrs, Volume=   0.107 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
3,350	98	Roofs, HSG D
16,900	84	50-75% Grass cover, Fair, HSG D
6,800	98	Paved parking, HSG D
27,050		Weighted Average
16,900		62.48% Pervious Area
10,150		37.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	47	0.0400	0.19		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
0.0	4	0.0400	4.06		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.2	38	0.0400	3.22		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.5	90	0.0200	2.87		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
0.2	30	0.0300	2.79		**Shallow Concentrated Flow, E-F** Unpaved Kv= 16.1 fps
1.0					**Direct Entry, DIRECT**
6.0	209	Total			

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Type III 24-hr 2-YR Rainfall=3.10"
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Subcatchment 1.1S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=27,050 sf
Runoff Volume=0.107 af
Runoff Depth=2.08"
Flow Length=209'
Tc=6.0 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 1.2S:

Runoff = 1.59 cfs @ 12.13 hrs, Volume= 0.135 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
10,800	98	Paved parking, HSG D
7,050	82	Woods/grass comb., Fair, HSG D
13,650	84	50-75% Grass cover, Fair, HSG D
2,650	98	Roofs, HSG D
34,150		Weighted Average
20,700		60.61% Pervious Area
13,450		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	65	0.0200	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
0.4	69	0.0250	3.21		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.6	76	0.0200	2.28		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.1	20	0.0200	2.87		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
1.3	54	0.0200	0.71		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
9.5	284	Total			

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Type III 24-hr 2-YR Rainfall=3.10"
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Subcatchment 1.2S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=34,150 sf
Runoff Volume=0.135 af
Runoff Depth=2.07"
Flow Length=284'
Tc=9.5 min
CN=WQ

1.59 cfs

☐ Runoff

Flow (cfs)

Time (hours)

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 2.0S:

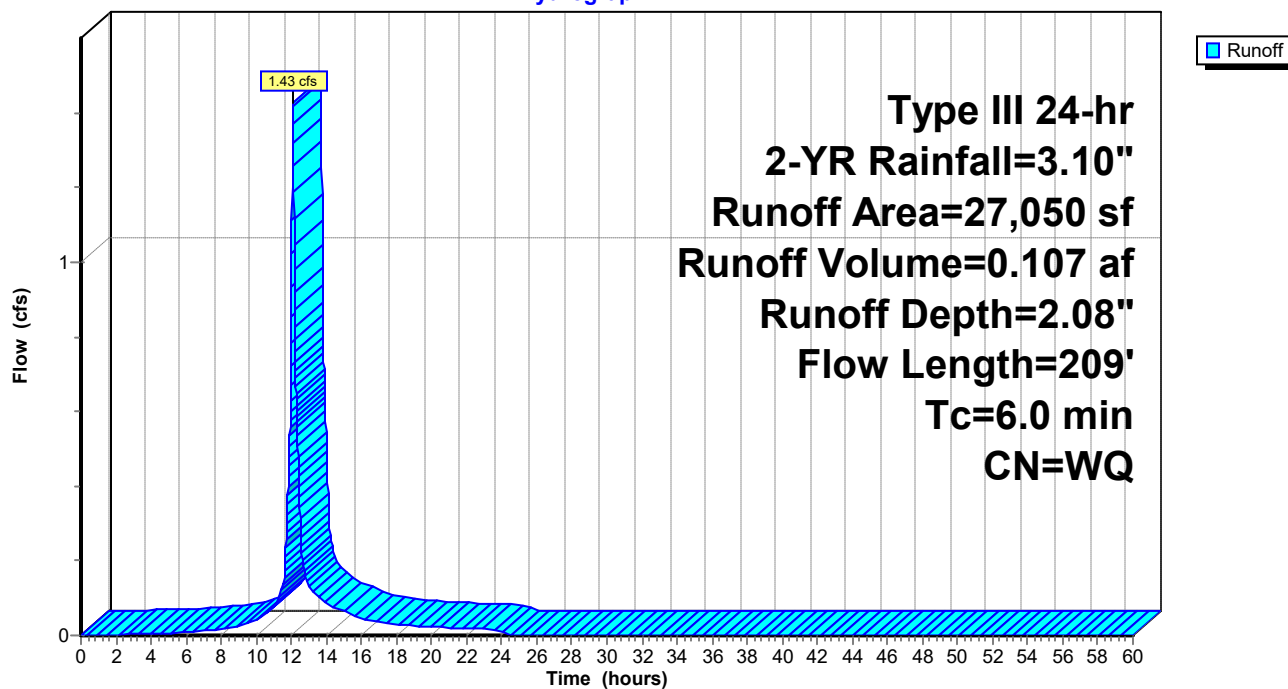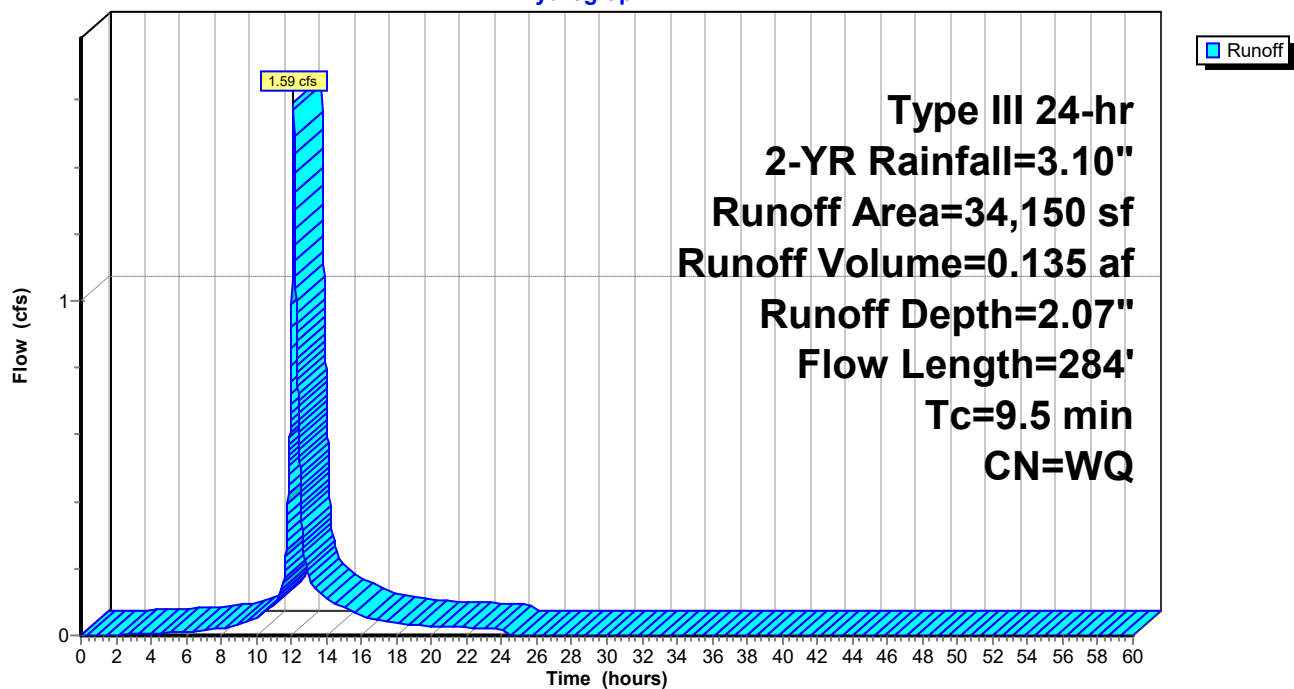Runoff   =   1.80 cfs @ 12.26 hrs, Volume=   0.214 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
27,650	60	Woods, Fair, HSG B
28,650	69	50-75% Grass cover, Fair, HSG B
23,100	98	Paved parking, HSG B
5,150	98	Roofs, HSG B
84,550		Weighted Average
56,300		66.59% Pervious Area
28,250		33.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	111	0.0450	0.11		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	33	0.0450	1.06		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.0	10	0.3300	9.25		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.4	70	0.0300	2.79		**Shallow Concentrated Flow, D-E**
					Unpaved Kv= 16.1 fps
18.0	224	Total			

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Type III 24-hr 2-YR Rainfall=3.10"
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Subcatchment 2.0S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=84,550 sf
Runoff Volume=0.214 af
Runoff Depth=1.32"
Flow Length=224'
Tc=18.0 min
CN=WQ

1.80 cfs

☐ Runoff

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 3.1S:

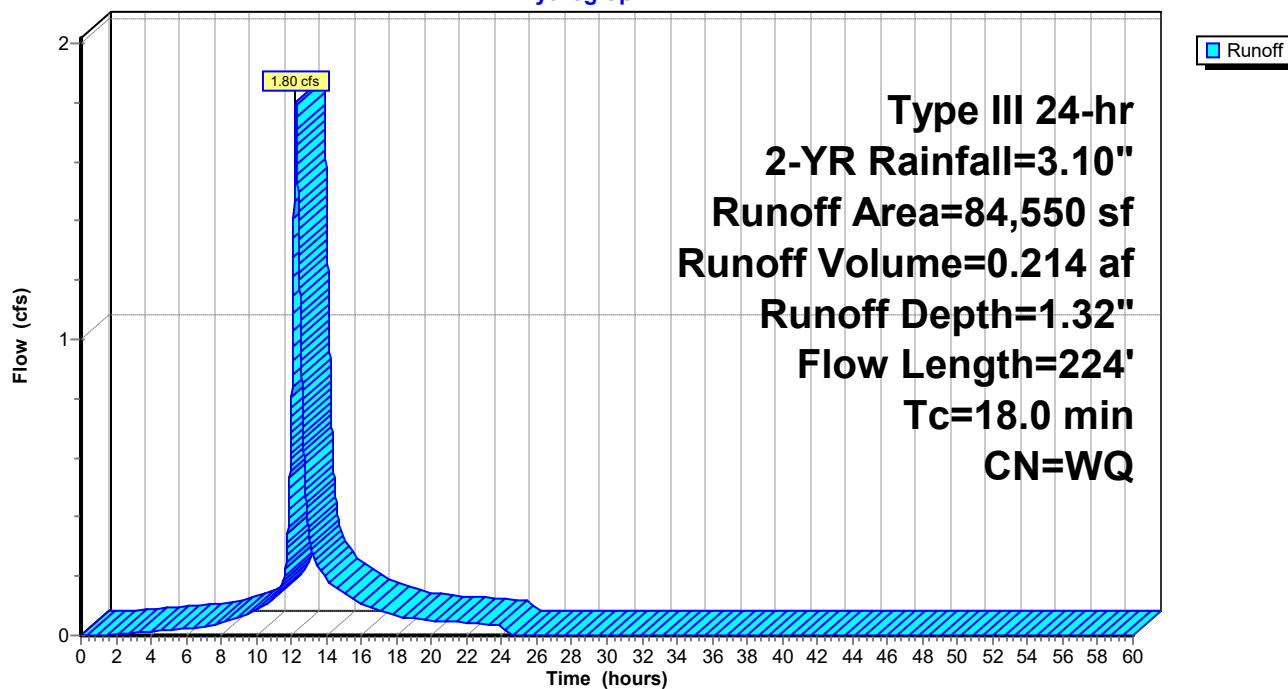Runoff   =   0.07 cfs @ 12.08 hrs, Volume=   0.006 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
2,700	36	Woods, Fair, HSG A
1,450	39	>75% Grass cover, Good, HSG A
650	98	Roofs, HSG A
400	98	Paved parking, HSG A
5,200		Weighted Average
4,150		79.81% Pervious Area
1,050		20.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	9	0.0830	0.18		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.6	40	0.0500	1.12		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
4.2					**Direct Entry, DIRECT**
6.0	74	Total			

Subcatchment 3.1S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=5,200 sf
Runoff Volume=0.006 af
Runoff Depth=0.58"
Flow Length=74'
Tc=6.0 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
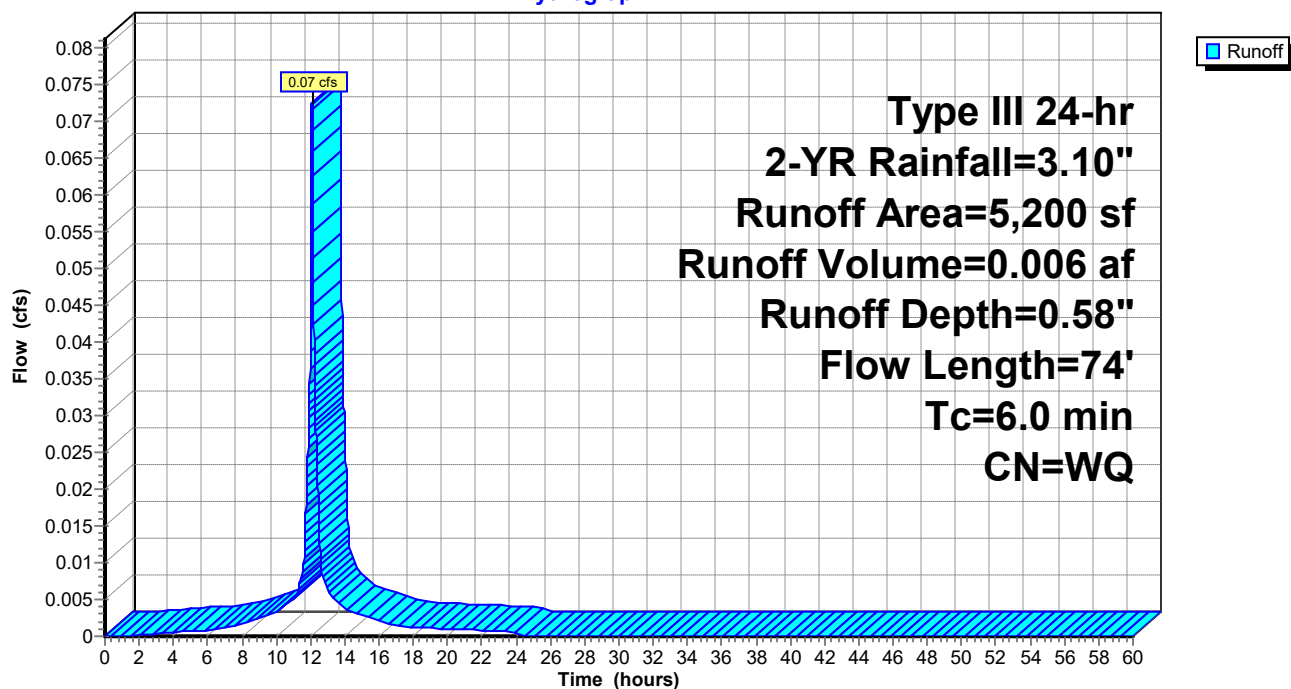Printed 1/25/2024
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Summary for Subcatchment 3.2S:

Runoff   =   0.37 cfs @ 12.08 hrs, Volume=   0.030 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
5,100	98	Paved parking, HSG A
300	98	Roofs, HSG A
2,000	49	50-75% Grass cover, Fair, HSG A
7,400		Weighted Average
2,000		27.03% Pervious Area
5,400		72.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	32	0.0480	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.3	64	0.0360	3.85		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
2.9					**Direct Entry, DIRECT**
6.0	96				Total

Subcatchment 3.2S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=7,400 sf
Runoff Volume=0.030 af
Runoff Depth=2.12"
Flow Length=96'
Tc=6.0 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 3.3S:

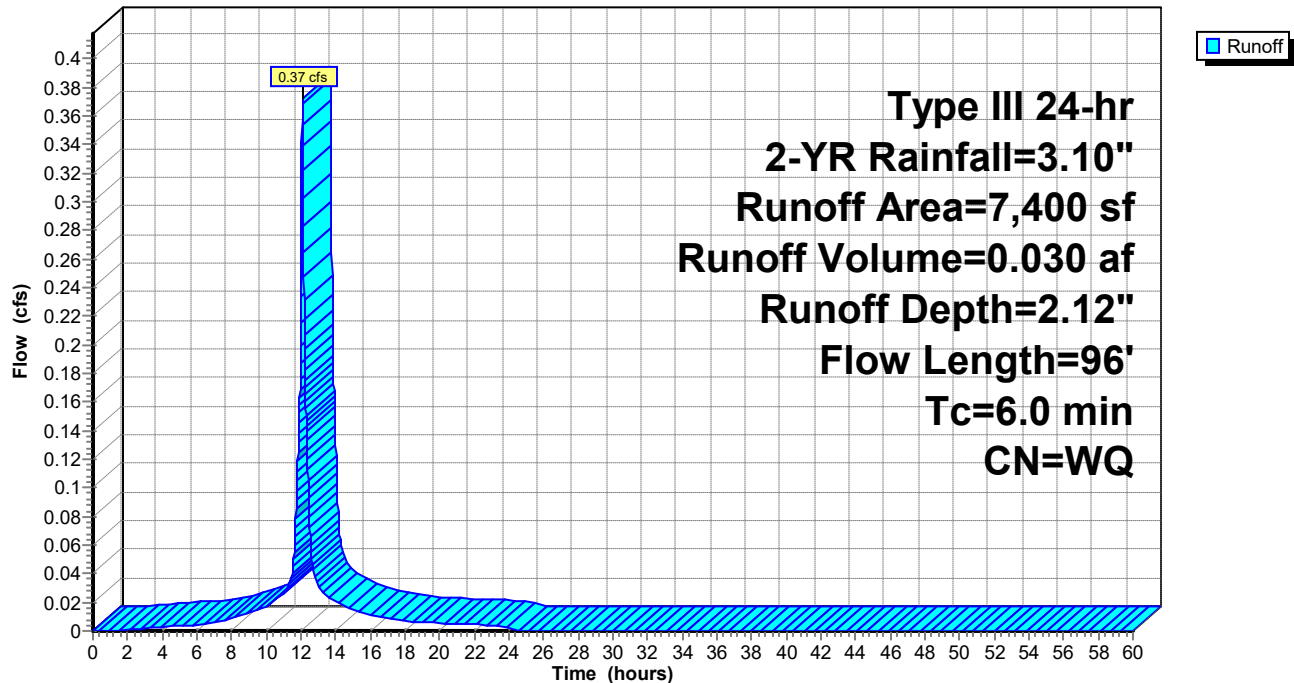Runoff   =   0.38 cfs @ 12.08 hrs, Volume=   0.031 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
2,250	98	Roofs, HSG A
3,300	98	Paved parking, HSG A
5,000	49	50-75% Grass cover, Fair, HSG A
10,550		Weighted Average
5,000		47.39% Pervious Area
5,550		52.61% Impervious Area

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

Subcatchment 3.3S:

Hydrograph

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 3.4S:

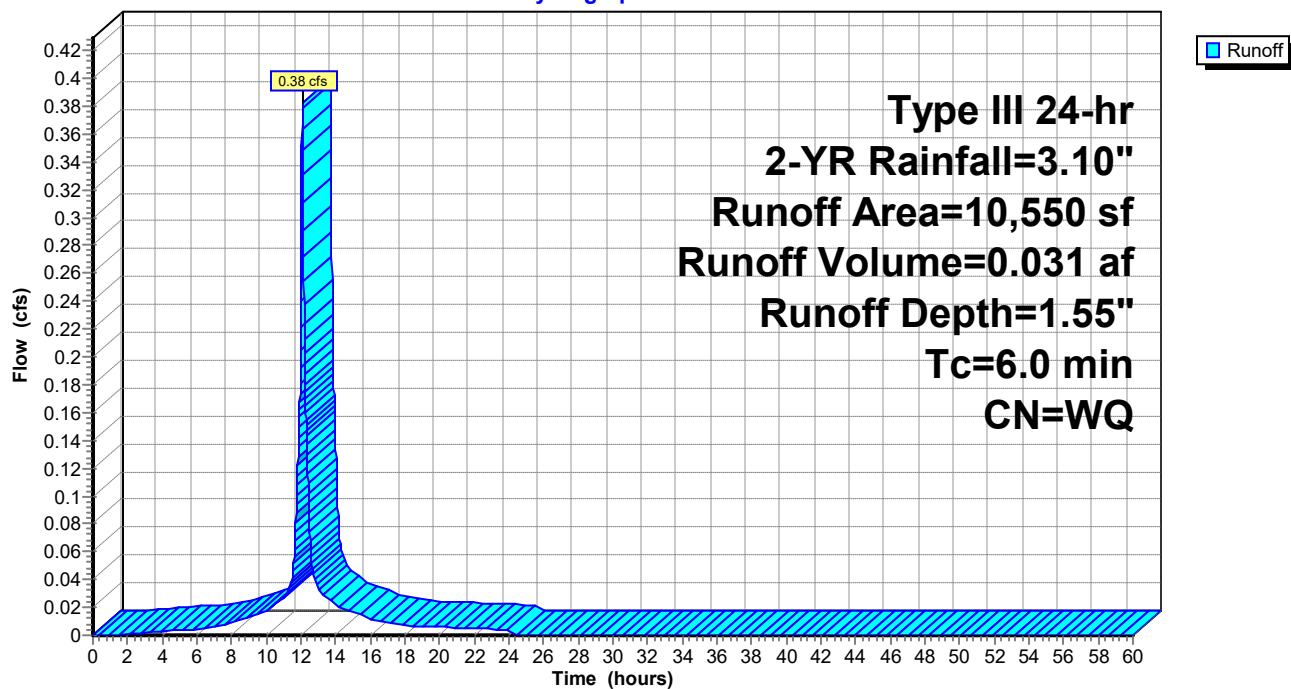Runoff   =   0.05 cfs @ 12.08 hrs, Volume=   0.004 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
7,850	36	Woods, Fair, HSG A
2,950	49	50-75% Grass cover, Fair, HSG A
700	98	Roofs, HSG A
11,500		Weighted Average
10,800		93.91% Pervious Area
700		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	26	0.0580	0.20		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.6	80	0.2300	2.40		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
3.2					**Direct Entry, DIRECT**
6.0	106				Total

Subcatchment 3.4S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=11,500 sf
Runoff Volume=0.004 af
Runoff Depth=0.20"
Flow Length=106'
Tc=6.0 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Reach 3R: EXISTING 15" CULVERT

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.62 ac, 37.52% Impervious, Inflow Depth = 2.08"   for 2-YR event
Inflow   =   1.43 cfs @   12.09 hrs, Volume=   0.107 af
Outflow   =   1.43 cfs @   12.09 hrs, Volume=   0.107 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.70 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.73 fps, Avg. Travel Time= 0.3 min

Peak Storage= 9 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.24'
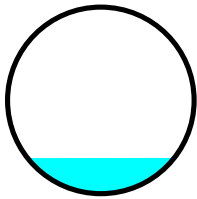Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.83 cfs
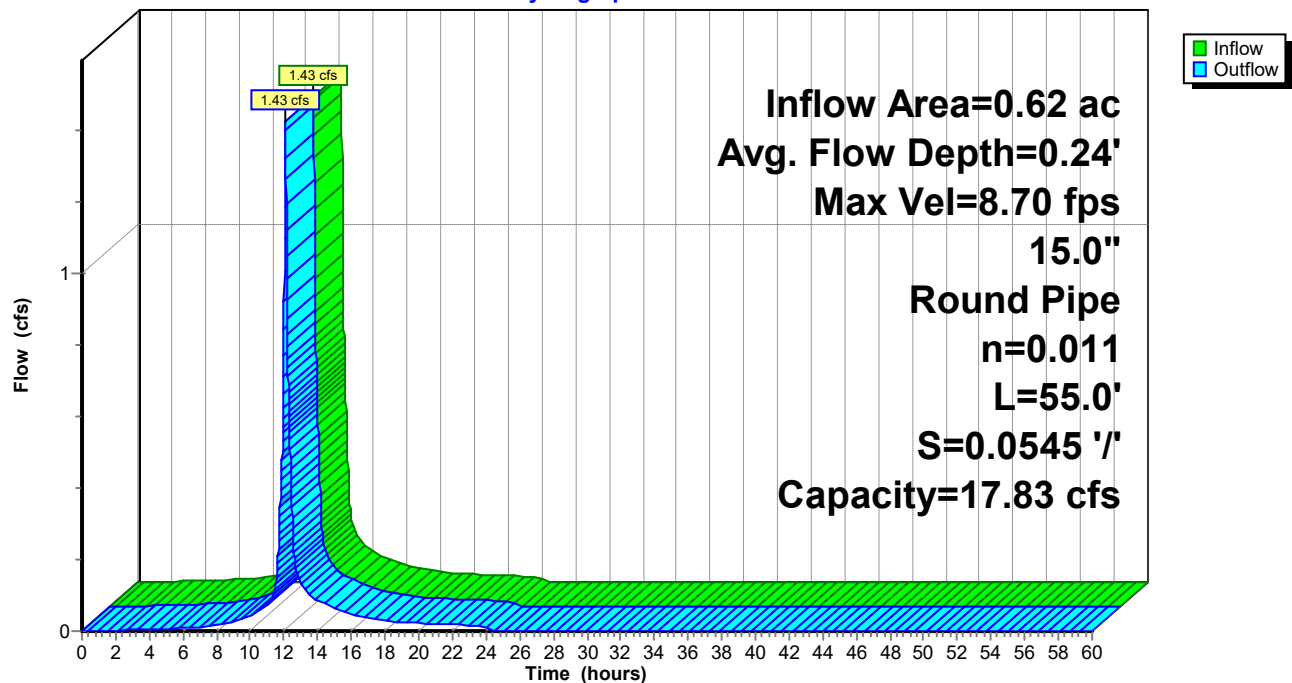
15.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 55.0'   Slope= 0.0545 '/'
Inlet Invert= 117.50', Outlet Invert= 114.50'

Reach 3R: EXISTING 15" CULVERT

Inflow Area=0.62 ac
Avg. Flow Depth=0.24'
Max Vel=8.70 fps
15.0"
Round Pipe
n=0.011
L=55.0'
S=0.0545 '/'
Capacity=17.83 cfs

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Pond 5P: DRAINAGE DITCH

Inflow Area =   2.56 ac, 34.41% Impervious, Inflow Depth = 1.51"   for 2-YR event
Inflow   =   2.61 cfs @ 12.13 hrs, Volume=   0.322 af
Outflow   =   2.53 cfs @ 12.22 hrs, Volume=   0.322 af, Atten= 3%, Lag= 5.4 min
Discarded =   0.02 cfs @ 12.22 hrs, Volume=   0.007 af
Primary   =   2.51 cfs @ 12.22 hrs, Volume=   0.314 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 110.21' @ 12.22 hrs   Surf.Area= 388 sf   Storage= 221 cf

Plug-Flow detention time= 1.4 min calculated for 0.322 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (803.5 - 802.1)

Volume	Invert	Avail.Storage	Storage Description
#1	109.00'	4,655 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
109.00	40	0	0
110.00	265	153	153
111.00	850	558	710
112.00	1,825	1,338	2,048
113.00	3,390	2,608	4,655

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	109.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 109.00' / 108.50' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.02 cfs @ 12.22 hrs HW=110.21'   (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=2.51 cfs @ 12.22 hrs HW=110.21' TW=0.00'   (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 2.51 cfs @ 3.20 fps)

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Type III 24-hr 2-YR Rainfall=3.10"
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Pond 5P: DRAINAGE DITCH

Hydrograph

Inflow Area=2.56 ac
Peak Elev=110.21'
Storage=221 cf

Legend:
- Inflow
- Outflow
- Discarded
- Primary

2.61 cfs
2.53 cfs
2.51 cfs

Flow (cfs)
Time (hours)

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Summary for Link 1L: POA-1

Inflow Area =   0.78 ac, 39.39% Impervious, Inflow Depth = 2.07"   for 2-YR event
Inflow   =   1.59 cfs @   12.13 hrs, Volume=   0.135 af
Primary   =   1.59 cfs @   12.13 hrs, Volume=   0.135 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 1L: POA-1

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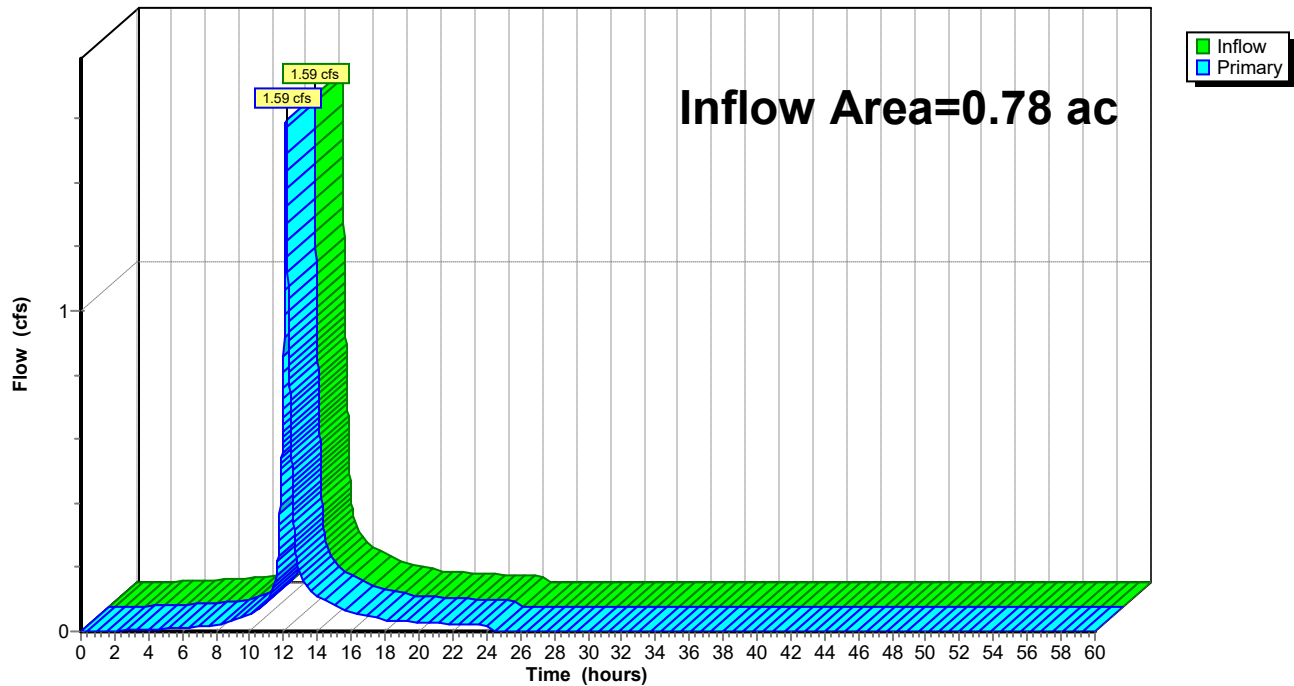
Type III 24-hr 2-YR Rainfall=3.10"
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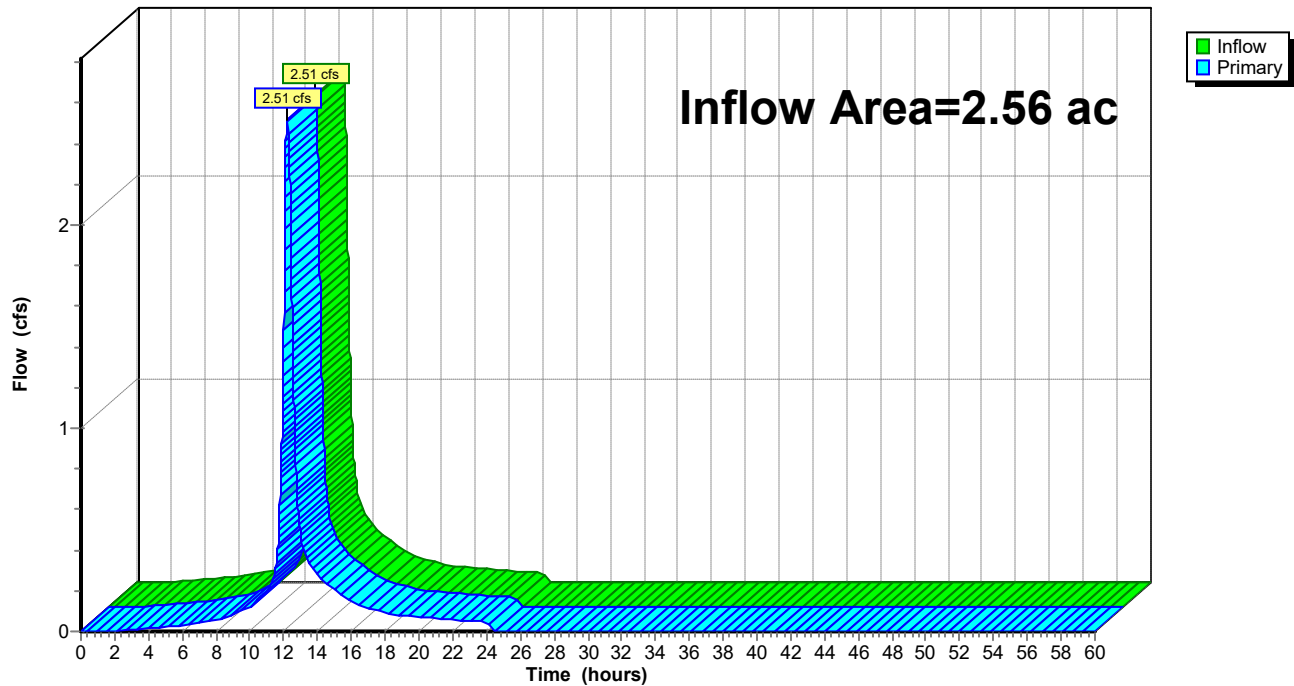## Summary for Link 2L: POA 2

Inflow Area =   2.56 ac, 34.41% Impervious, Inflow Depth =   1.47"   for 2-YR event
Inflow   =   2.51 cfs @   12.22 hrs, Volume=   0.314 af
Primary   =   2.51 cfs @   12.22 hrs, Volume=   0.314 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 2L: POA 2

Hydrograph

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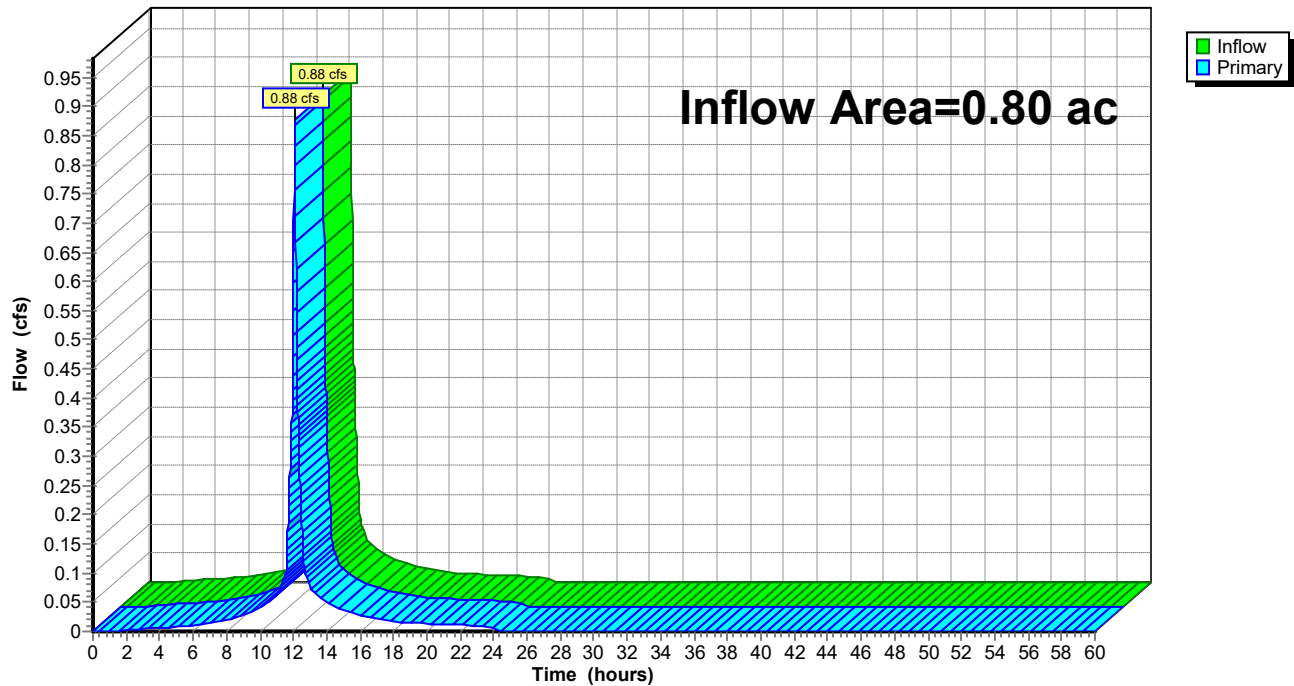## Summary for Link 3L: POA-3

Inflow Area =   0.80 ac, 36.65% Impervious, Inflow Depth =   1.08"   for 2-YR event
Inflow   =   0.88 cfs @   12.08 hrs, Volume=   0.071 af
Primary   =   0.88 cfs @   12.08 hrs, Volume=   0.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 3L: POA-3

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Type III 24-hr 10-YR Rainfall=4.60"
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Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1S:
Runoff Area=27,050 sf 37.52% Impervious Runoff Depth=3.45"
Flow Length=209' Tc=6.0 min CN=WQ Runoff=2.36 cfs 0.179 af

Subcatchment 1.2S:
Runoff Area=34,150 sf 39.39% Impervious Runoff Depth=3.44"
Flow Length=284' Tc=9.5 min CN=WQ Runoff=2.64 cfs 0.225 af

Subcatchment 2.0S:
Runoff Area=84,550 sf 33.41% Impervious Runoff Depth=2.38"
Flow Length=224' Tc=18.0 min CN=WQ Runoff=3.41 cfs 0.384 af

Subcatchment 3.1S:
Runoff Area=5,200 sf 20.19% Impervious Runoff Depth=0.95"
Flow Length=74' Tc=6.0 min CN=WQ Runoff=0.11 cfs 0.009 af

Subcatchment 3.2S:
Runoff Area=7,400 sf 72.97% Impervious Runoff Depth=3.32"
Flow Length=96' Tc=6.0 min CN=WQ Runoff=0.57 cfs 0.047 af

Subcatchment 3.3S:
Runoff Area=10,550 sf 52.61% Impervious Runoff Depth=2.53"
Tc=6.0 min CN=WQ Runoff=0.59 cfs 0.051 af

Subcatchment 3.4S:
Runoff Area=11,500 sf 6.09% Impervious Runoff Depth=0.43"
Flow Length=106' Tc=6.0 min CN=WQ Runoff=0.09 cfs 0.009 af

Reach 3R: EXISTING 15" CULVERT
Avg. Flow Depth=0.31' Max Vel=10.08 fps Inflow=2.36 cfs 0.179 af
15.0" Round Pipe n=0.011 L=55.0' S=0.0545 '/' Capacity=17.83 cfs Outflow=2.36 cfs 0.179 af

Pond 5P: DRAINAGE DITCH
Peak Elev=111.32' Storage=1,035 cf Inflow=4.65 cfs 0.563 af
Discarded=0.05 cfs 0.010 af Primary=4.03 cfs 0.553 af Outflow=4.08 cfs 0.563 af

Link 1L: POA-1
Inflow=2.64 cfs 0.225 af
Primary=2.64 cfs 0.225 af

Link 2L: POA 2
Inflow=4.03 cfs 0.553 af
Primary=4.03 cfs 0.553 af

Link 3L: POA-3
Inflow=1.35 cfs 0.117 af
Primary=1.35 cfs 0.117 af

Total Runoff Area = 4.14 ac   Runoff Volume = 0.905 af   Average Runoff Depth = 2.62"
64.22% Pervious = 2.66 ac   35.78% Impervious = 1.48 ac

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 1.1S:

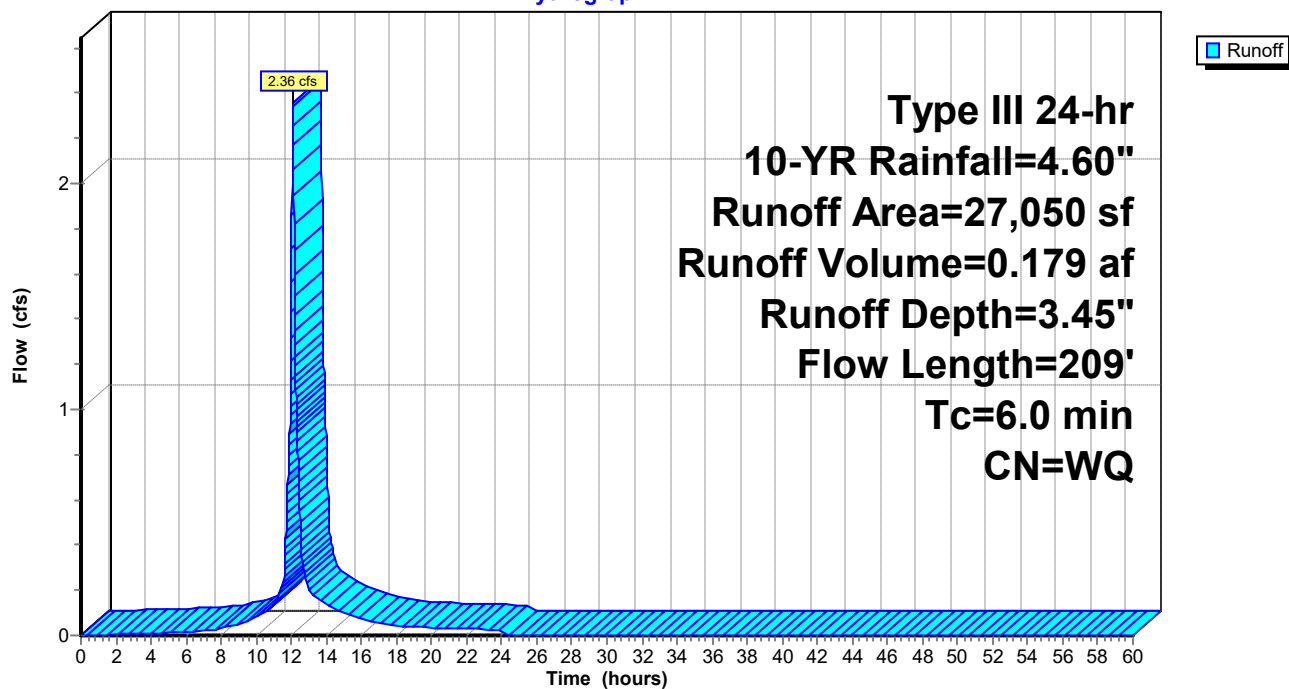Runoff   =   2.36 cfs @ 12.09 hrs, Volume=   0.179 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
3,350	98	Roofs, HSG D
16,900	84	50-75% Grass cover, Fair, HSG D
6,800	98	Paved parking, HSG D
27,050		Weighted Average
16,900		62.48% Pervious Area
10,150		37.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	47	0.0400	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.0	4	0.0400	4.06		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.2	38	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.5	90	0.0200	2.87		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
0.2	30	0.0300	2.79		**Shallow Concentrated Flow, E-F**
					Unpaved Kv= 16.1 fps
1.0					**Direct Entry, DIRECT**
6.0	209	Total			

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Type III 24-hr 10-YR Rainfall=4.60"
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Subcatchment 1.1S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=27,050 sf
Runoff Volume=0.179 af
Runoff Depth=3.45"
Flow Length=209'
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 1.2S:

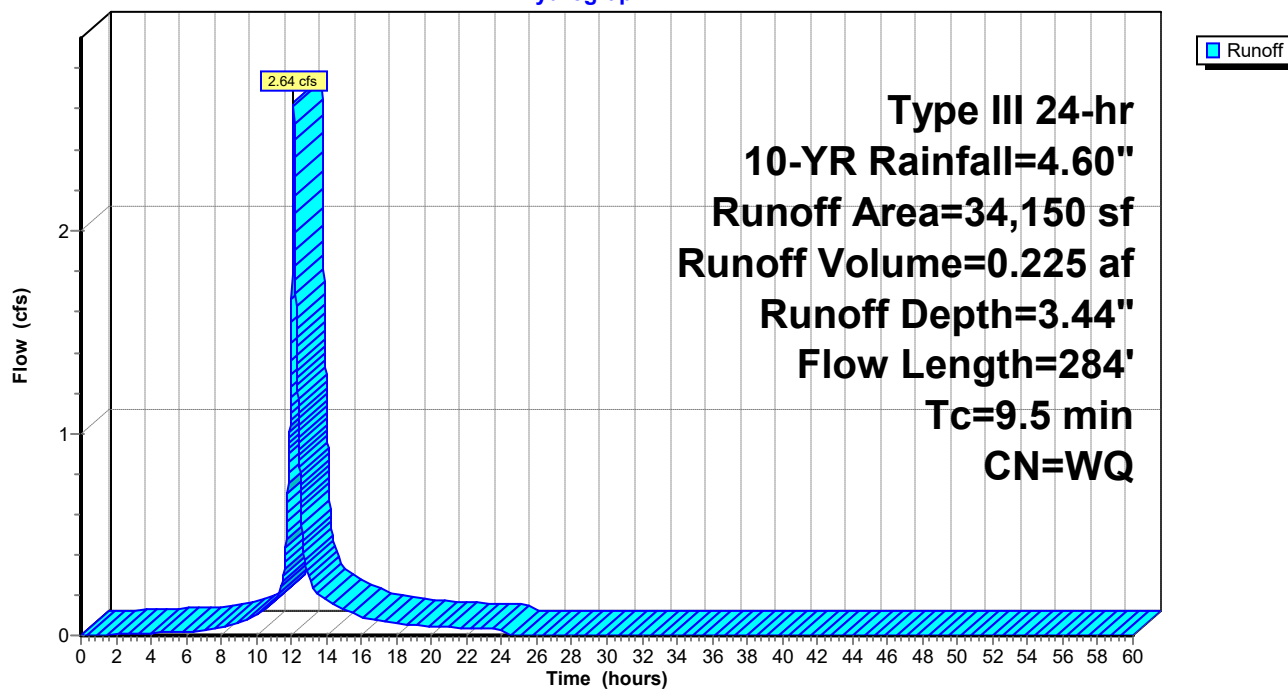Runoff   =   2.64 cfs @ 12.13 hrs, Volume=   0.225 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
10,800	98	Paved parking, HSG D
7,050	82	Woods/grass comb., Fair, HSG D
13,650	84	50-75% Grass cover, Fair, HSG D
2,650	98	Roofs, HSG D
34,150		Weighted Average
20,700		60.61% Pervious Area
13,450		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	65	0.0200	0.15		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.4	69	0.0250	3.21		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.6	76	0.0200	2.28		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.1	20	0.0200	2.87		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
1.3	54	0.0200	0.71		**Shallow Concentrated Flow, E-F**
					Woodland Kv= 5.0 fps
9.5	284	Total			

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Type III 24-hr 10-YR Rainfall=4.60"
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Subcatchment 1.2S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=34,150 sf
Runoff Volume=0.225 af
Runoff Depth=3.44"
Flow Length=284'
Tc=9.5 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 2.0S:

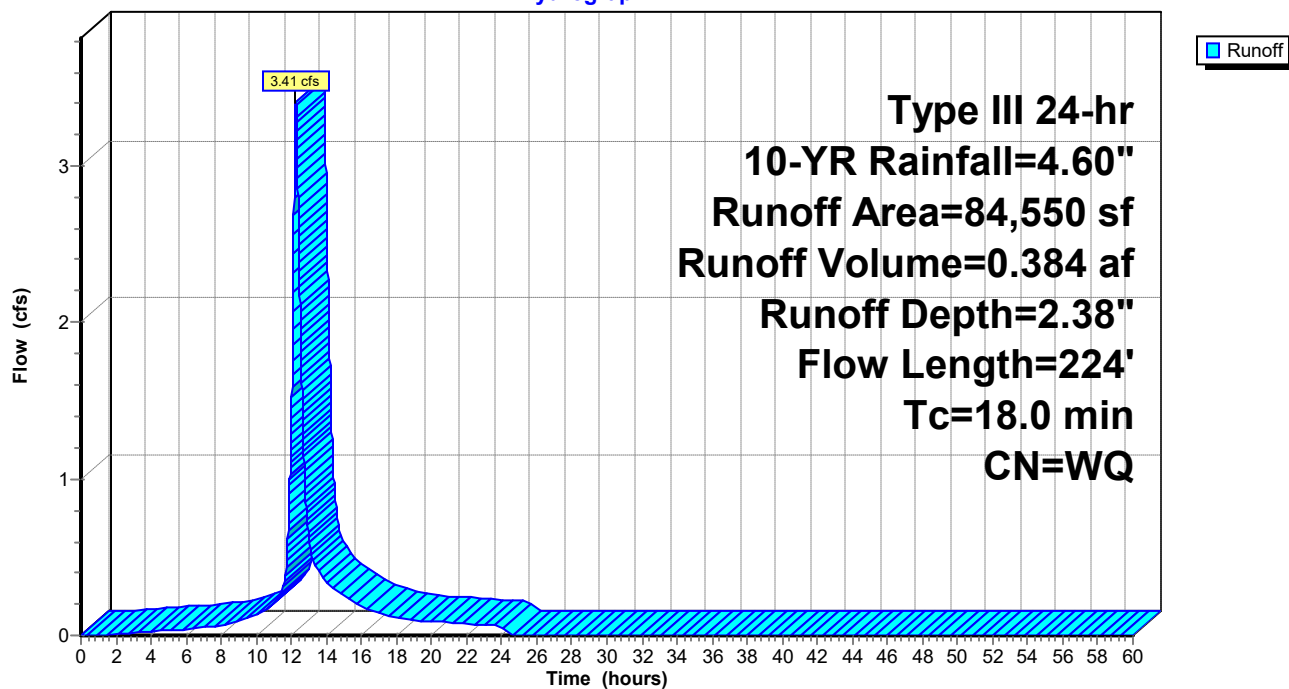Runoff   =   3.41 cfs @ 12.25 hrs, Volume=   0.384 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
27,650	60	Woods, Fair, HSG B
28,650	69	50-75% Grass cover, Fair, HSG B
23,100	98	Paved parking, HSG B
5,150	98	Roofs, HSG B
84,550		Weighted Average
56,300		66.59% Pervious Area
28,250		33.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	111	0.0450	0.11		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	33	0.0450	1.06		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.0	10	0.3300	9.25		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.4	70	0.0300	2.79		**Shallow Concentrated Flow, D-E**
					Unpaved Kv= 16.1 fps
18.0	224	Total			

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Type III 24-hr 10-YR Rainfall=4.60"
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Subcatchment 2.0S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=84,550 sf
Runoff Volume=0.384 af
Runoff Depth=2.38"
Flow Length=224'
Tc=18.0 min
CN=WQ

3.41 cfs

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Type III 24-hr 10-YR Rainfall=4.60"
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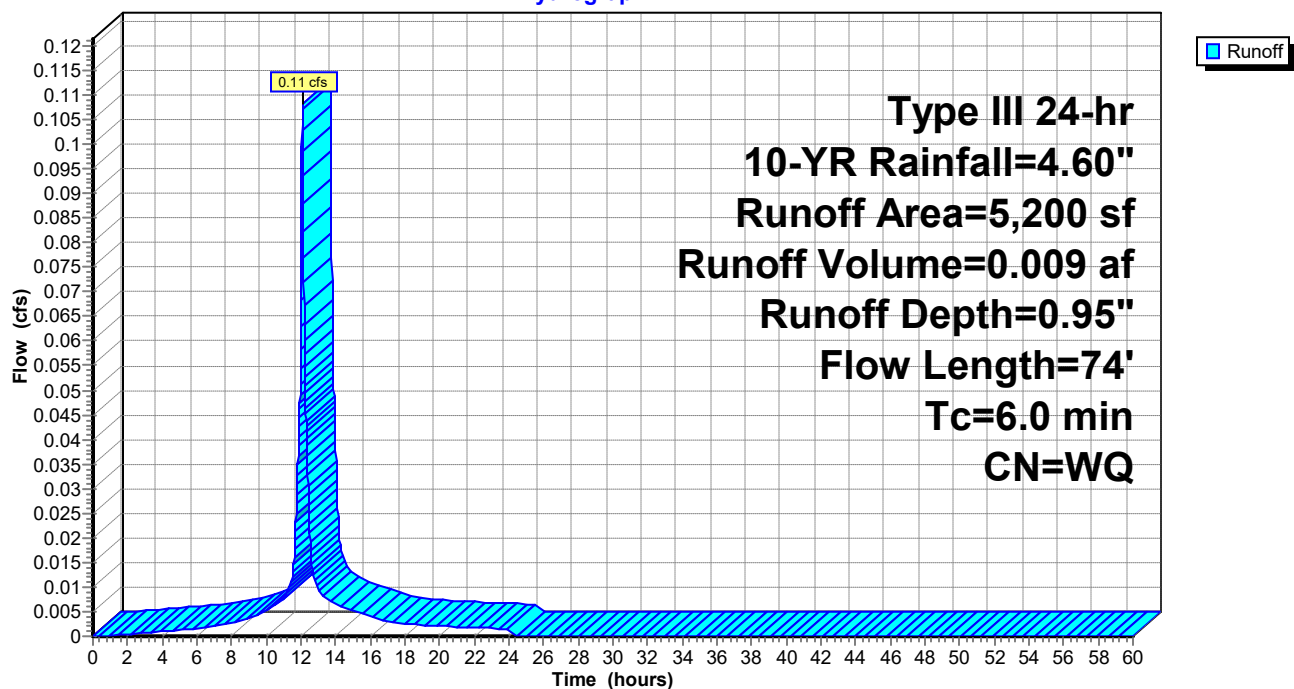Page 30

Summary for Subcatchment 3.1S:

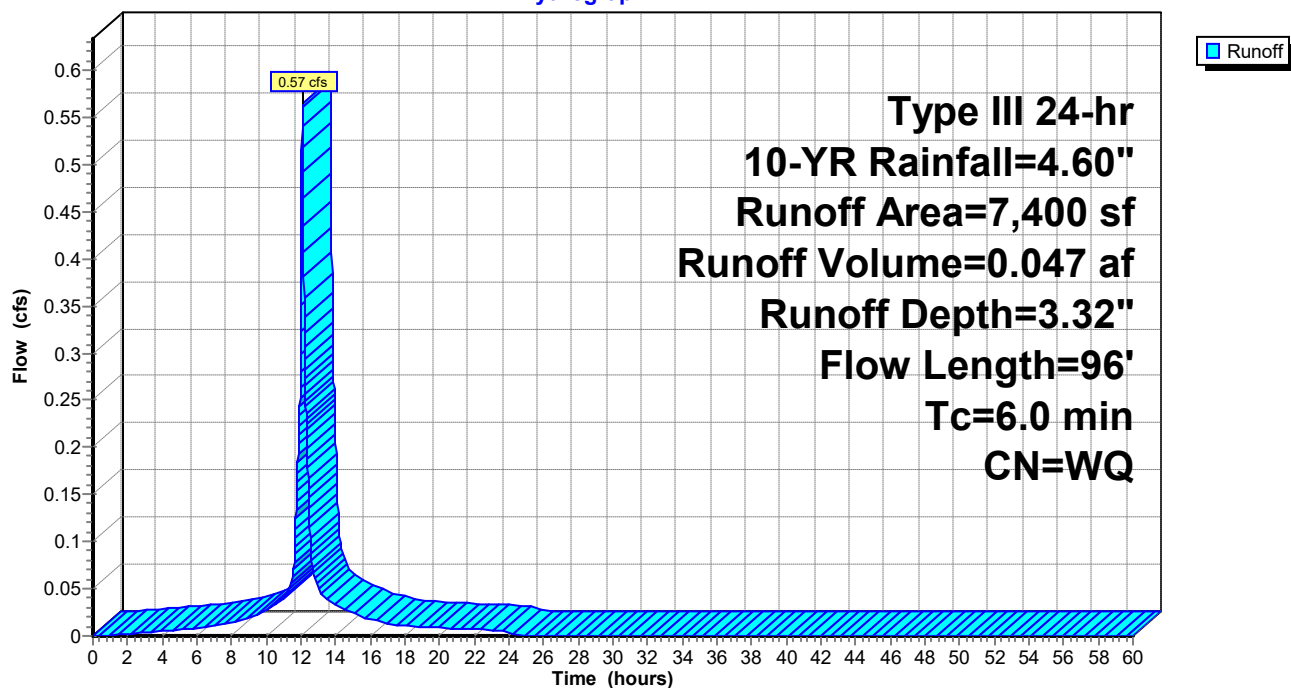Runoff   =   0.11 cfs @ 12.08 hrs, Volume=   0.009 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
2,700	36	Woods, Fair, HSG A
1,450	39	>75% Grass cover, Good, HSG A
650	98	Roofs, HSG A
400	98	Paved parking, HSG A
5,200		Weighted Average
4,150		79.81% Pervious Area
1,050		20.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	9	0.0830	0.18		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.6	40	0.0500	1.12		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
4.2					**Direct Entry, DIRECT**
6.0	74	Total			

Subcatchment 3.1S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=5,200 sf
Runoff Volume=0.009 af
Runoff Depth=0.95"
Flow Length=74'
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.2S:

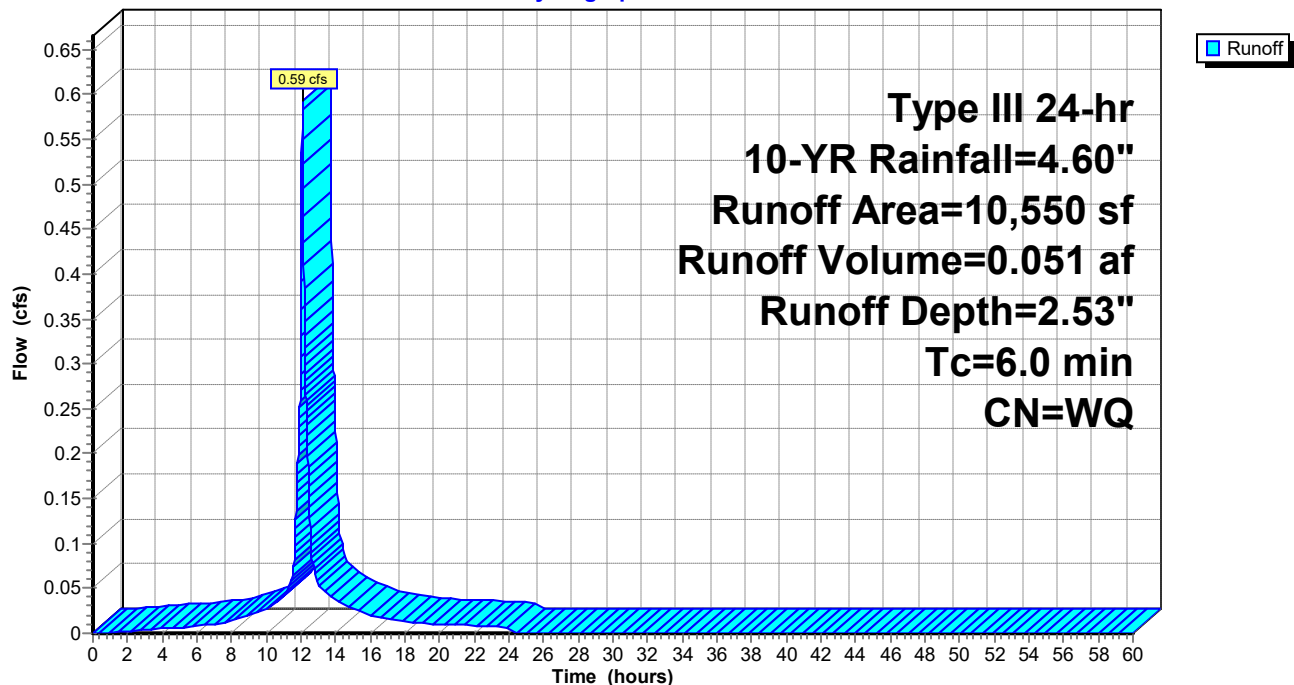Runoff   =   0.57 cfs @   12.08 hrs, Volume=   0.047 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
5,100	98	Paved parking, HSG A
300	98	Roofs, HSG A
2,000	49	50-75% Grass cover, Fair, HSG A
7,400		Weighted Average
2,000		27.03% Pervious Area
5,400		72.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	32	0.0480	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.3	64	0.0360	3.85		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
2.9					**Direct Entry, DIRECT**
6.0	96				Total

Subcatchment 3.2S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=7,400 sf
Runoff Volume=0.047 af
Runoff Depth=3.32"
Flow Length=96'
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.3S:

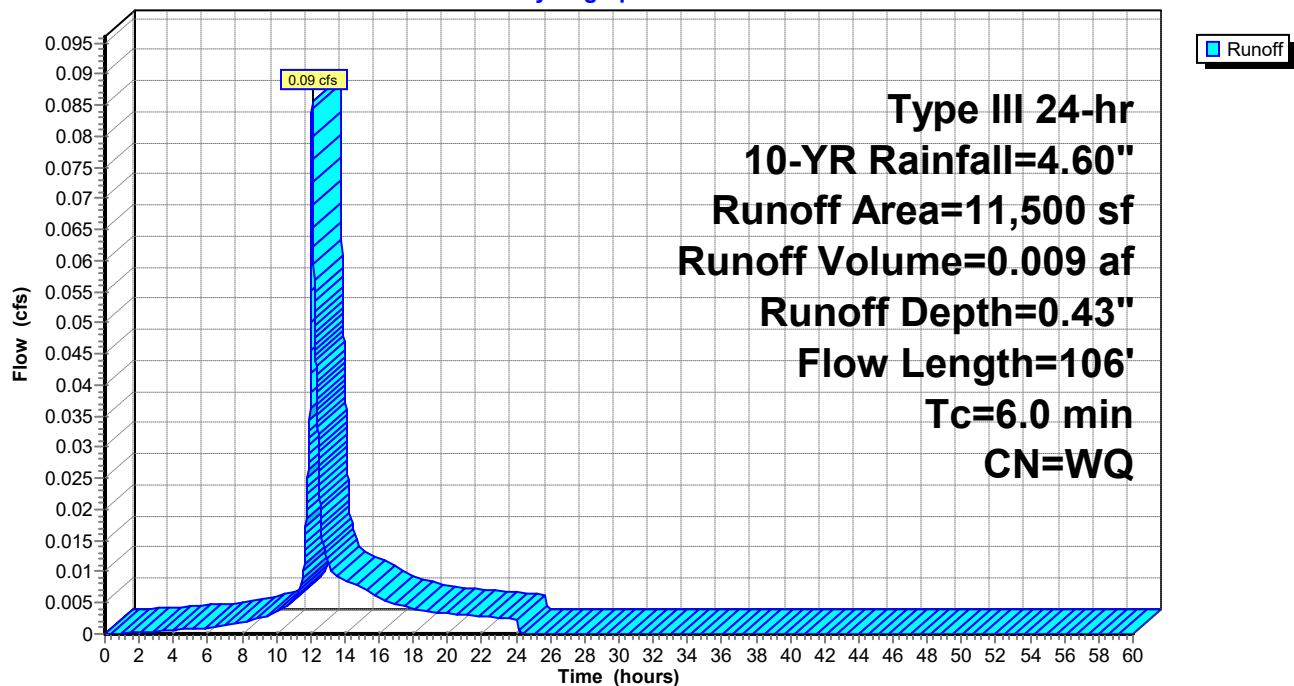Runoff   =   0.59 cfs @   12.09 hrs, Volume=   0.051 af, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
2,250	98	Roofs, HSG A
3,300	98	Paved parking, HSG A
5,000	49	50-75% Grass cover, Fair, HSG A
10,550		Weighted Average
5,000		47.39% Pervious Area
5,550		52.61% Impervious Area

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

Subcatchment 3.3S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=10,550 sf
Runoff Volume=0.051 af
Runoff Depth=2.53"
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.4S:

Runoff   =   0.09 cfs @ 12.10 hrs, Volume=   0.009 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
7,850	36	Woods, Fair, HSG A
2,950	49	50-75% Grass cover, Fair, HSG A
700	98	Roofs, HSG A
11,500		Weighted Average
10,800		93.91% Pervious Area
700		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	26	0.0580	0.20		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.6	80	0.2300	2.40		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
3.2					**Direct Entry, DIRECT**
6.0	106				Total

Subcatchment 3.4S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=11,500 sf
Runoff Volume=0.009 af
Runoff Depth=0.43"
Flow Length=106'
Tc=6.0 min
CN=WQ

0.09 cfs

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Reach 3R: EXISTING 15" CULVERT

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.62 ac, 37.52% Impervious, Inflow Depth =   3.45"   for 10-YR event
Inflow   =   2.36 cfs @   12.09 hrs, Volume=   0.179 af
Outflow   =   2.36 cfs @   12.09 hrs, Volume=   0.179 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.08 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.14 fps, Avg. Travel Time= 0.3 min

Peak Storage= 13 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.83 cfs

15.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 55.0'   Slope= 0.0545 '/'
Inlet Invert= 117.50', Outlet Invert= 114.50'

Reach 3R: EXISTING 15" CULVERT

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Type III 24-hr 10-YR Rainfall=4.60"
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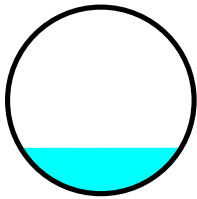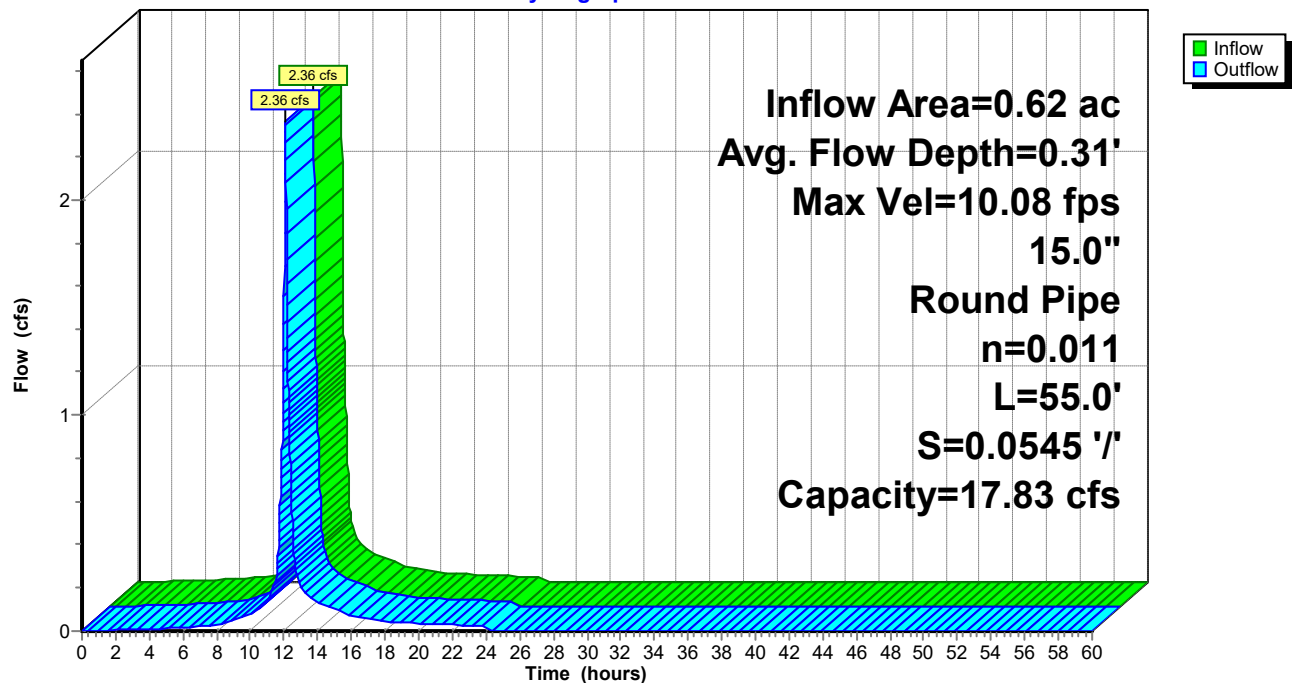
Summary for Pond 5P: DRAINAGE DITCH

Inflow Area =   2.56 ac, 34.41% Impervious, Inflow Depth = 2.64"   for 10-YR event
Inflow   =   4.65 cfs @ 12.14 hrs, Volume=   0.563 af
Outflow   =   4.08 cfs @ 12.32 hrs, Volume=   0.563 af, Atten= 12%, Lag= 10.8 min
Discarded =   0.05 cfs @ 12.32 hrs, Volume=   0.010 af
Primary   =   4.03 cfs @ 12.32 hrs, Volume=   0.553 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 111.32' @ 12.32 hrs   Surf.Area= 1,164 sf   Storage= 1,035 cf

Plug-Flow detention time= 1.9 min calculated for 0.563 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (800.3 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1	109.00'	4,655 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
109.00	40	0	0
110.00	265	153	153
111.00	850	558	710
112.00	1,825	1,338	2,048
113.00	3,390	2,608	4,655

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	109.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 109.00' / 108.50' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.05 cfs @ 12.32 hrs HW=111.32'   (Free Discharge)
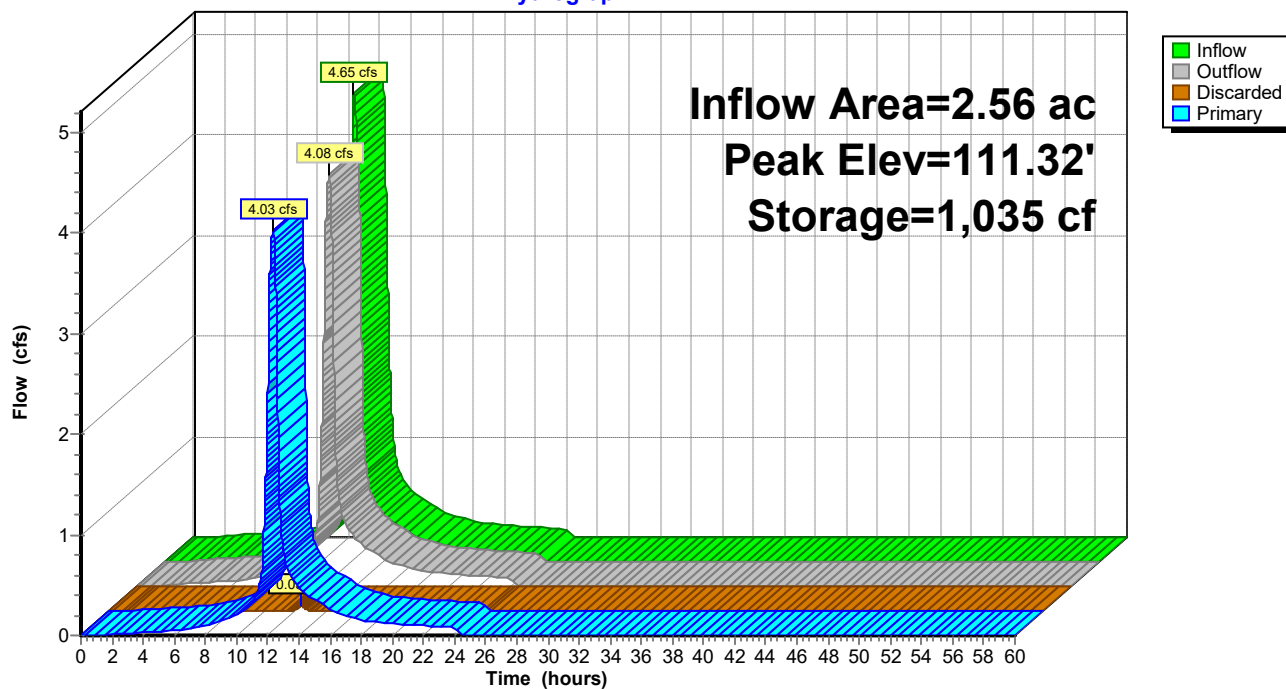└─**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=4.03 cfs @ 12.32 hrs HW=111.32' TW=0.00'   (Dynamic Tailwater)
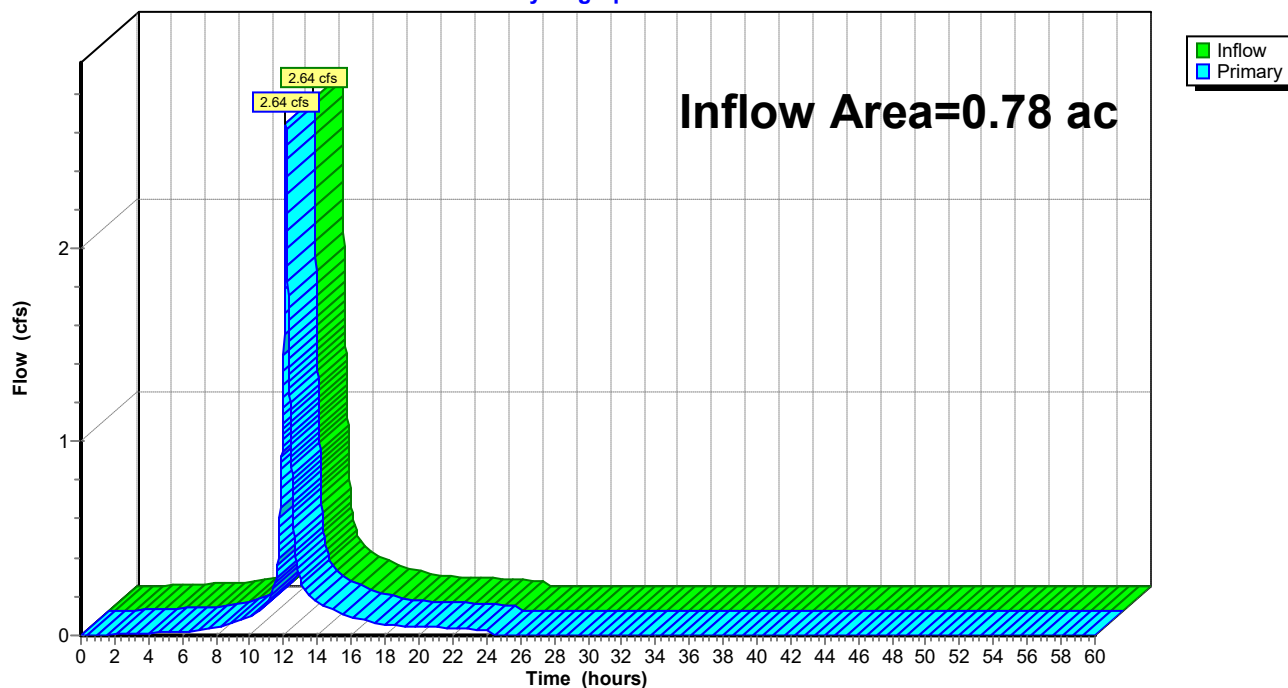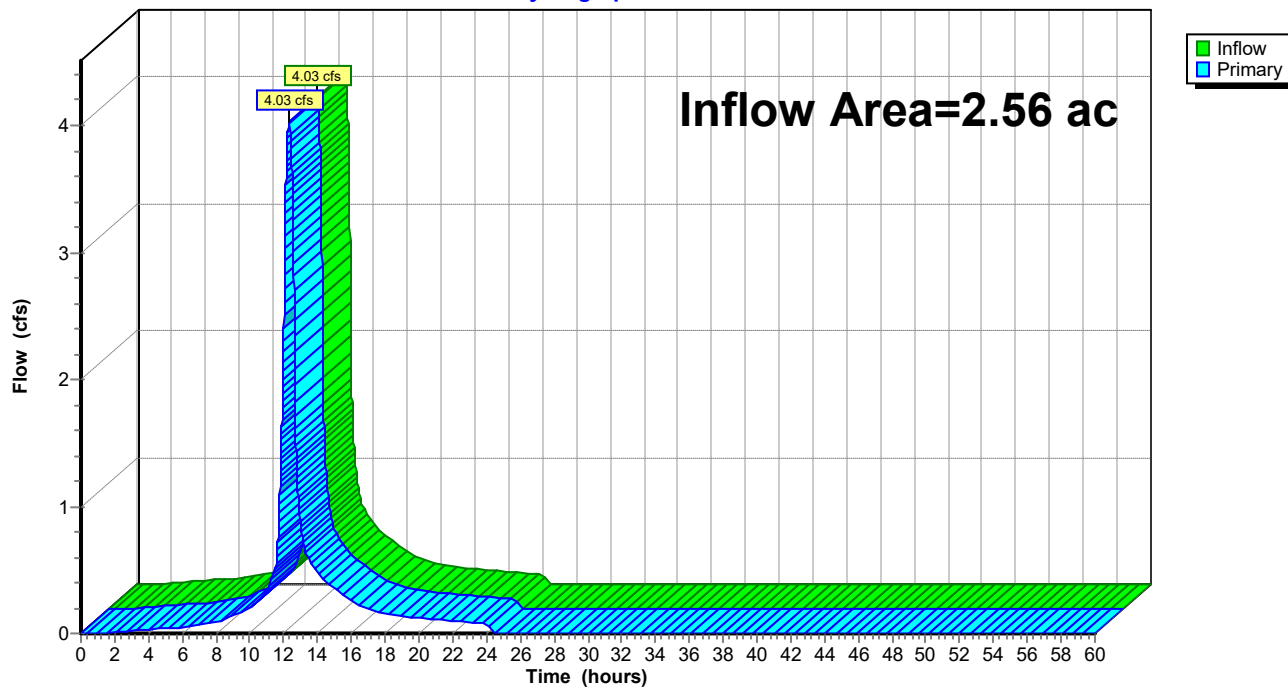└─**2=Culvert** (Inlet Controls 4.03 cfs @ 5.13 fps)

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Type III 24-hr 10-YR Rainfall=4.60"
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Pond 5P: DRAINAGE DITCH

Hydrograph

Inflow Area=2.56 ac
Peak Elev=111.32'
Storage=1,035 cf

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Summary for Link 1L: POA-1

Inflow Area =   0.78 ac, 39.39% Impervious, Inflow Depth = 3.44"   for 10-YR event
Inflow   =   2.64 cfs @ 12.13 hrs, Volume=   0.225 af
Primary   =   2.64 cfs @ 12.13 hrs, Volume=   0.225 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
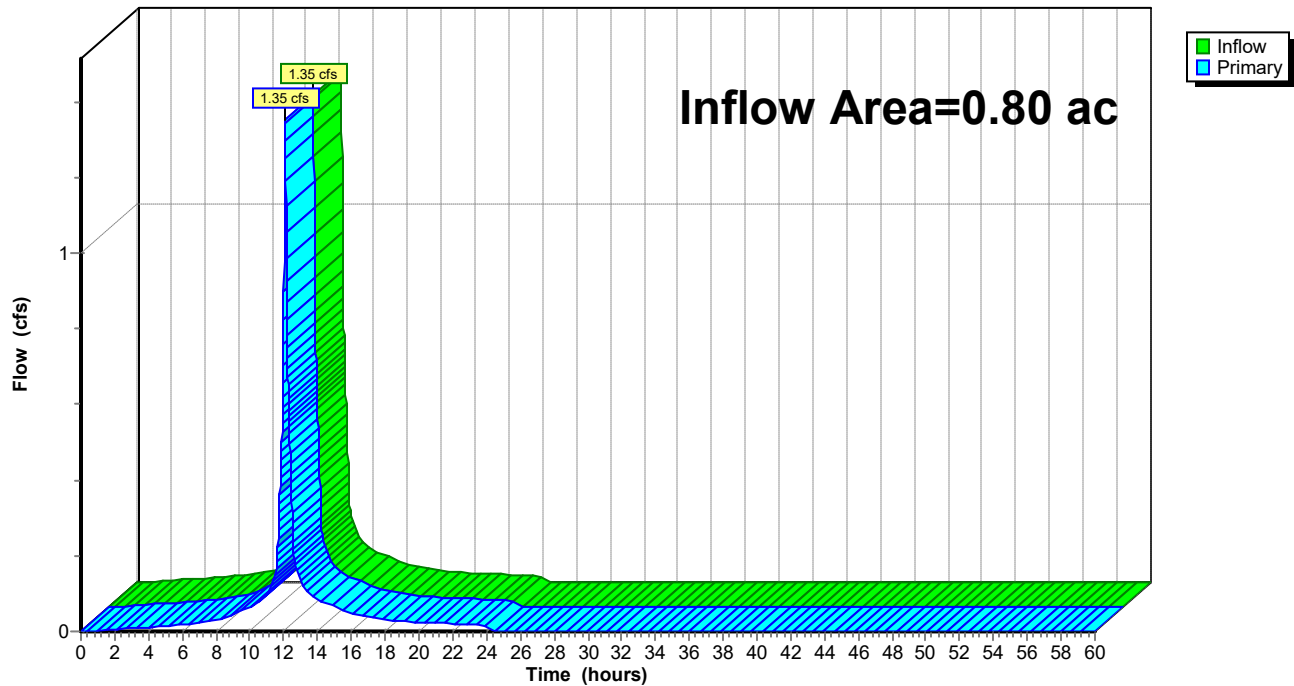
Link 1L: POA-1

Hydrograph

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Summary for Link 2L: POA 2

Inflow Area =   2.56 ac, 34.41% Impervious, Inflow Depth = 2.59"   for 10-YR event
Inflow   =   4.03 cfs @   12.32 hrs, Volume=   0.553 af
Primary   =   4.03 cfs @   12.32 hrs, Volume=   0.553 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 2L: POA 2

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Link 3L: POA-3

Inflow Area =   0.80 ac, 36.65% Impervious, Inflow Depth =   1.76"   for 10-YR event
Inflow   =   1.35 cfs @   12.09 hrs, Volume=   0.117 af
Primary   =   1.35 cfs @   12.09 hrs, Volume=   0.117 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 3L: POA-3

Hydrograph

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Type III 24-hr 25-YR Rainfall=5.80"
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Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1S: Runoff Area=27,050 sf 37.52% Impervious Runoff Depth=4.59"
Flow Length=209' Tc=6.0 min CN=WQ Runoff=3.12 cfs 0.238 af

Subcatchment 1.2S: Runoff Area=34,150 sf 39.39% Impervious Runoff Depth=4.58"
Flow Length=284' Tc=9.5 min CN=WQ Runoff=3.49 cfs 0.299 af

Subcatchment 2.0S: Runoff Area=84,550 sf 33.41% Impervious Runoff Depth=3.31"
Flow Length=224' Tc=18.0 min CN=WQ Runoff=4.85 cfs 0.536 af

Subcatchment 3.1S: Runoff Area=5,200 sf 20.19% Impervious Runoff Depth=1.36"
Flow Length=74' Tc=6.0 min CN=WQ Runoff=0.14 cfs 0.014 af

Subcatchment 3.2S: Runoff Area=7,400 sf 72.97% Impervious Runoff Depth=4.32"
Flow Length=96' Tc=6.0 min CN=WQ Runoff=0.74 cfs 0.061 af

Subcatchment 3.3S: Runoff Area=10,550 sf 52.61% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=WQ Runoff=0.81 cfs 0.068 af

Subcatchment 3.4S: Runoff Area=11,500 sf 6.09% Impervious Runoff Depth=0.76"
Flow Length=106' Tc=6.0 min CN=WQ Runoff=0.15 cfs 0.017 af

Reach 3R: EXISTING 15" CULVERT   Avg. Flow Depth=0.35' Max Vel=10.92 fps Inflow=3.12 cfs 0.238 af
15.0" Round Pipe n=0.011 L=55.0' S=0.0545 '/' Capacity=17.83 cfs Outflow=3.12 cfs 0.238 af

Pond 5P: DRAINAGE DITCH   Peak Elev=112.17' Storage=2,378 cf Inflow=6.45 cfs 0.773 af
Discarded=0.10 cfs 0.013 af Primary=4.88 cfs 0.760 af Outflow=4.97 cfs 0.773 af

Link 1L: POA-1   Inflow=3.49 cfs 0.299 af
Primary=3.49 cfs 0.299 af

Link 2L: POA 2   Inflow=4.88 cfs 0.760 af
Primary=4.88 cfs 0.760 af

Link 3L: POA-3   Inflow=1.84 cfs 0.160 af
Primary=1.84 cfs 0.160 af

Total Runoff Area = 4.14 ac   Runoff Volume = 1.232 af   Average Runoff Depth = 3.57"
64.22% Pervious = 2.66 ac   35.78% Impervious = 1.48 ac

Summary for Subcatchment 1.1S:

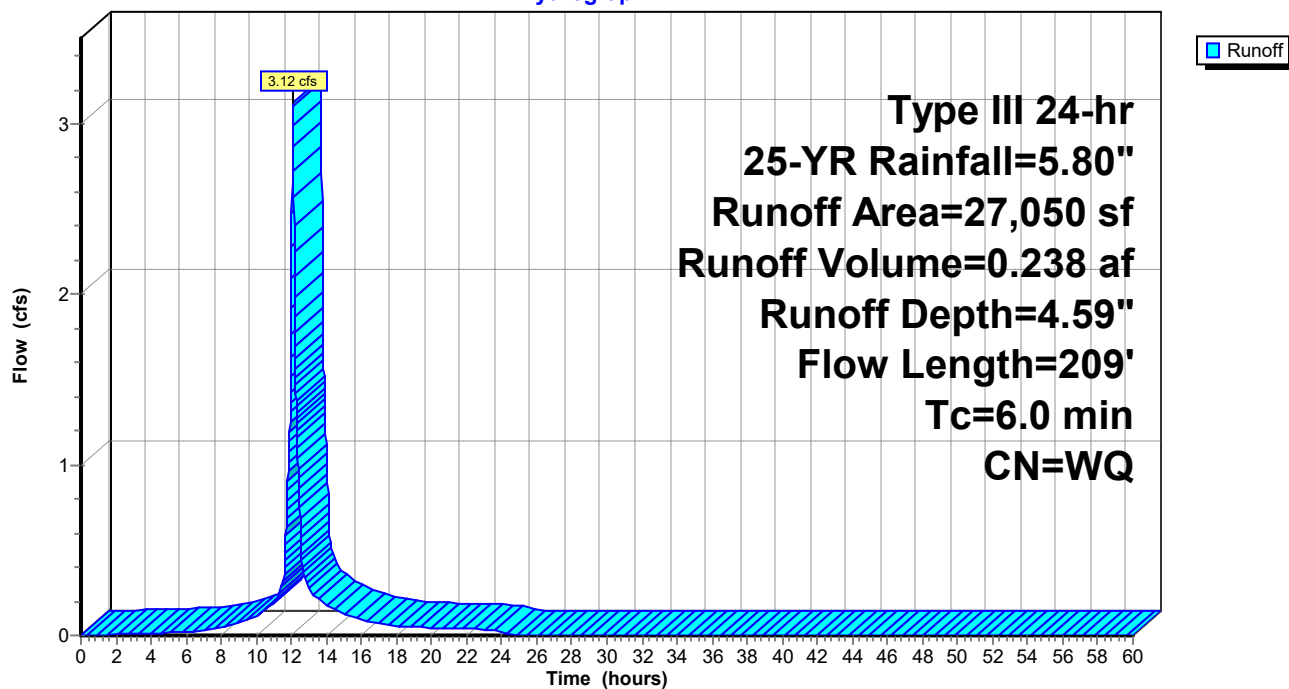Runoff   =   3.12 cfs @ 12.09 hrs, Volume=   0.238 af, Depth= 4.59"
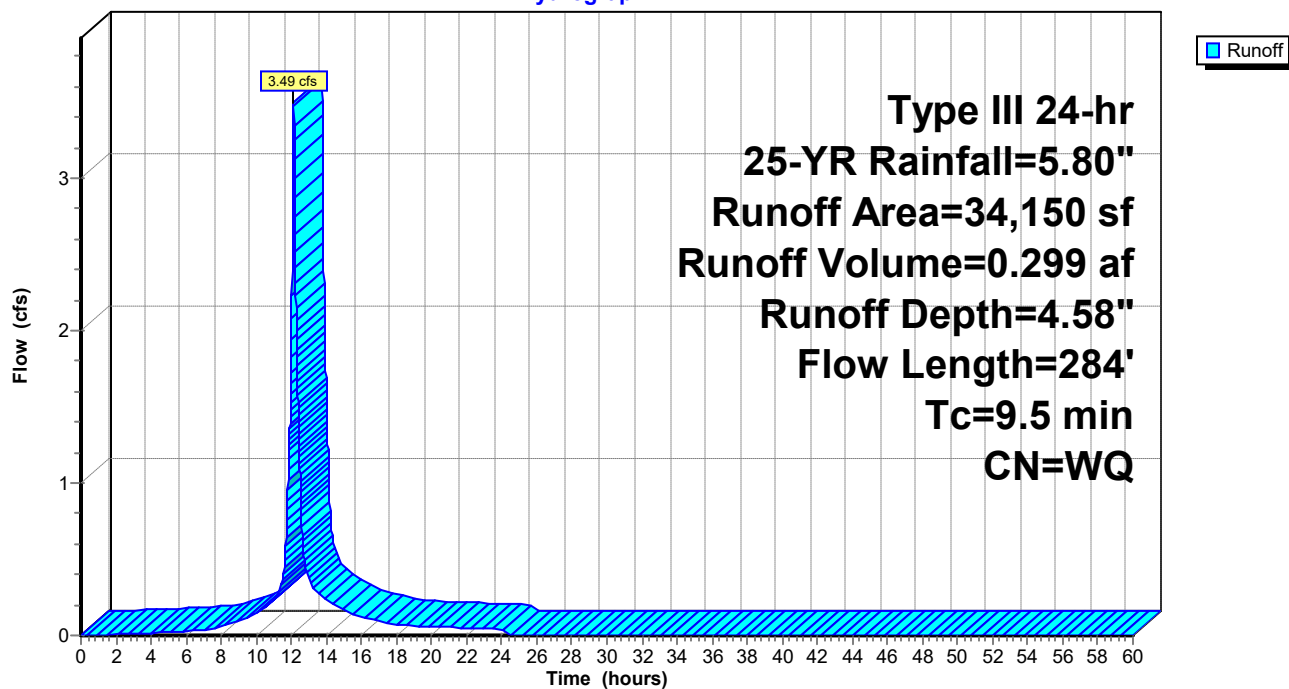
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
3,350	98	Roofs, HSG D
16,900	84	50-75% Grass cover, Fair, HSG D
6,800	98	Paved parking, HSG D
27,050		Weighted Average
16,900		62.48% Pervious Area
10,150		37.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	47	0.0400	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.0	4	0.0400	4.06		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.2	38	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.5	90	0.0200	2.87		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
0.2	30	0.0300	2.79		**Shallow Concentrated Flow, E-F**
					Unpaved Kv= 16.1 fps
1.0					**Direct Entry, DIRECT**
6.0	209	Total			

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Type III 24-hr 25-YR Rainfall=5.80"
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Subcatchment 1.1S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=27,050 sf
Runoff Volume=0.238 af
Runoff Depth=4.59"
Flow Length=209'
Tc=6.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 1.2S:

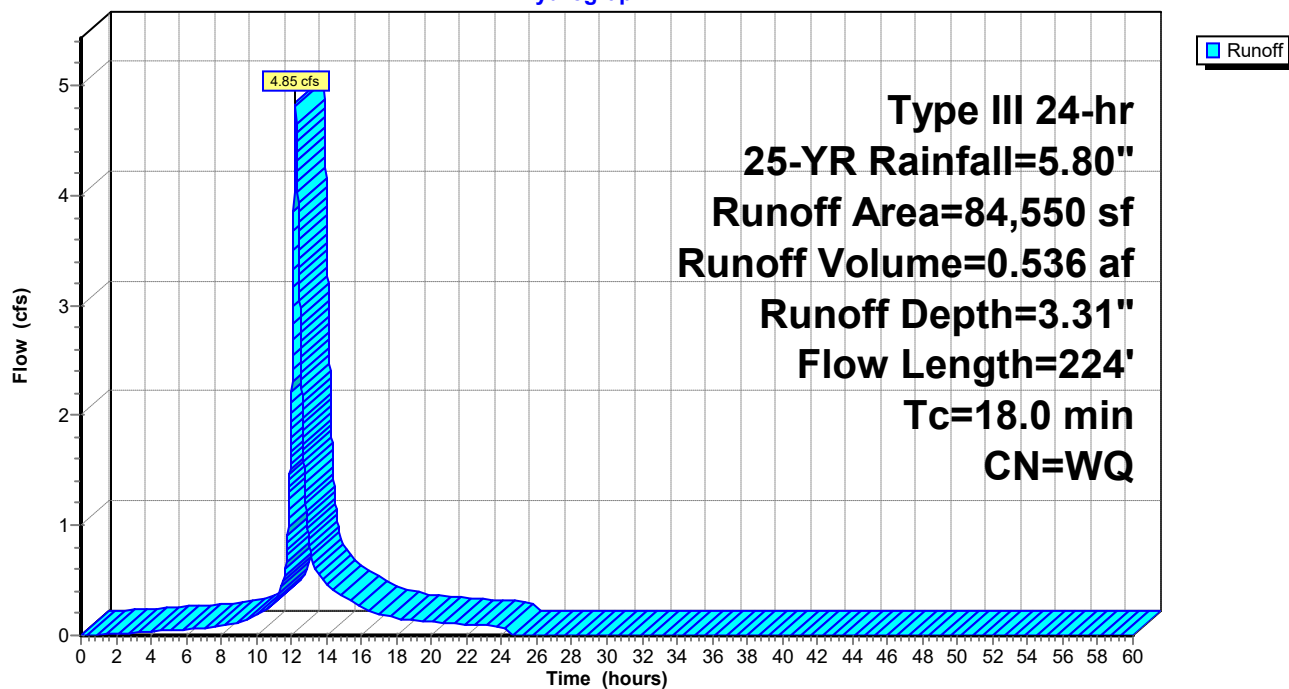Runoff   =   3.49 cfs @ 12.13 hrs, Volume=   0.299 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
10,800	98	Paved parking, HSG D
7,050	82	Woods/grass comb., Fair, HSG D
13,650	84	50-75% Grass cover, Fair, HSG D
2,650	98	Roofs, HSG D
34,150		Weighted Average
20,700		60.61% Pervious Area
13,450		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	65	0.0200	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
0.4	69	0.0250	3.21		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.6	76	0.0200	2.28		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.1	20	0.0200	2.87		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
1.3	54	0.0200	0.71		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
9.5	284	Total			

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Type III 24-hr 25-YR Rainfall=5.80"
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Subcatchment 1.2S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=34,150 sf
Runoff Volume=0.299 af
Runoff Depth=4.58"
Flow Length=284'
Tc=9.5 min
CN=WQ

3.49 cfs

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 2.0S:

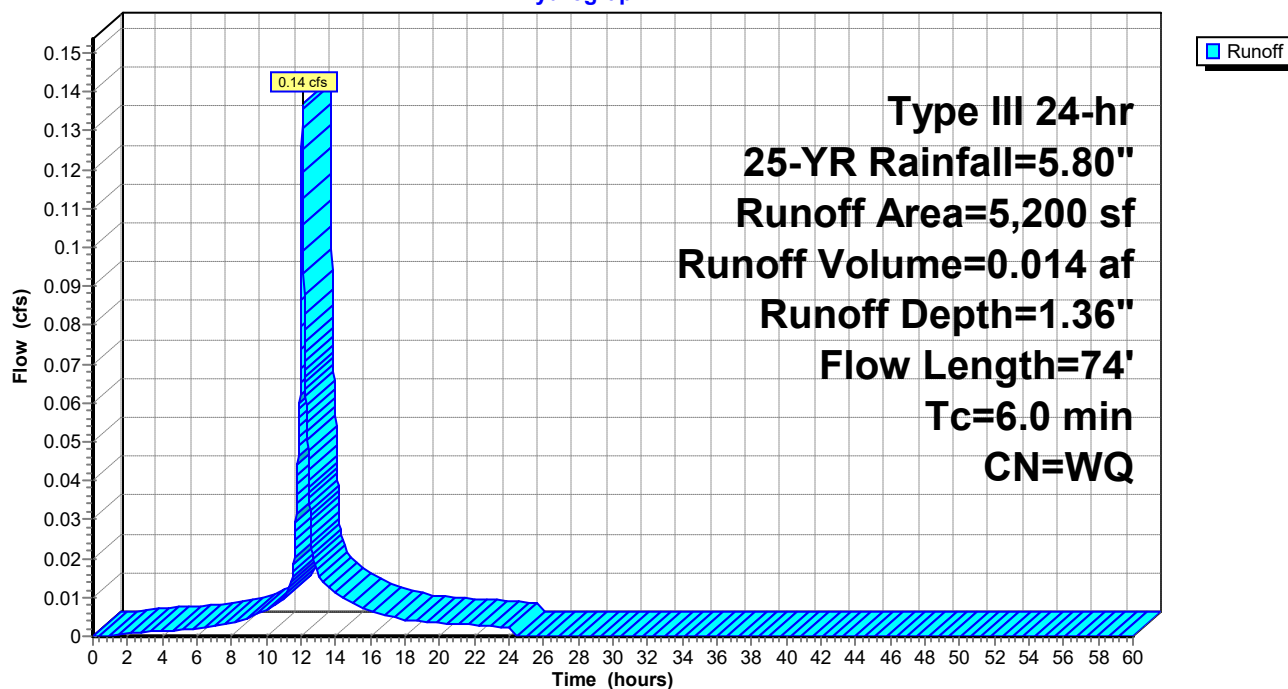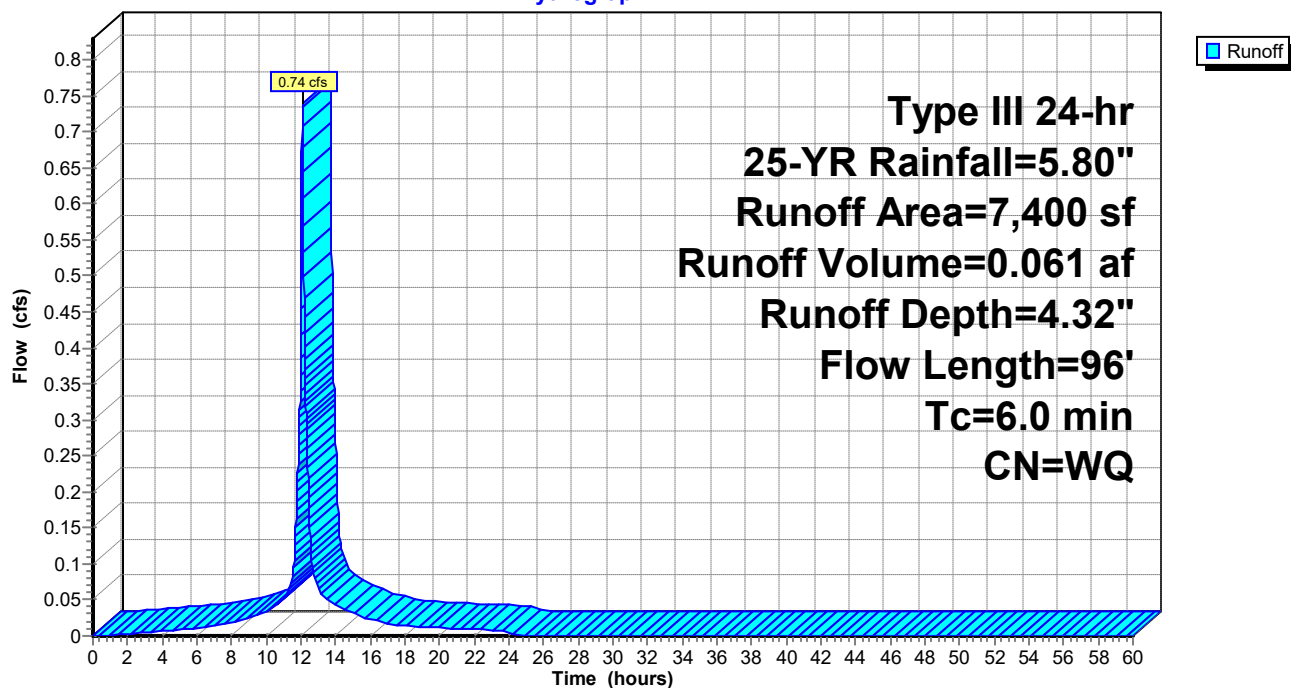Runoff   =   4.85 cfs @ 12.25 hrs, Volume=   0.536 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
27,650	60	Woods, Fair, HSG B
28,650	69	50-75% Grass cover, Fair, HSG B
23,100	98	Paved parking, HSG B
5,150	98	Roofs, HSG B
84,550		Weighted Average
56,300		66.59% Pervious Area
28,250		33.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	111	0.0450	0.11		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	33	0.0450	1.06		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.0	10	0.3300	9.25		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.4	70	0.0300	2.79		**Shallow Concentrated Flow, D-E**
					Unpaved Kv= 16.1 fps
18.0	224	Total			

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Subcatchment 2.0S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=84,550 sf
Runoff Volume=0.536 af
Runoff Depth=3.31"
Flow Length=224'
Tc=18.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.1S:

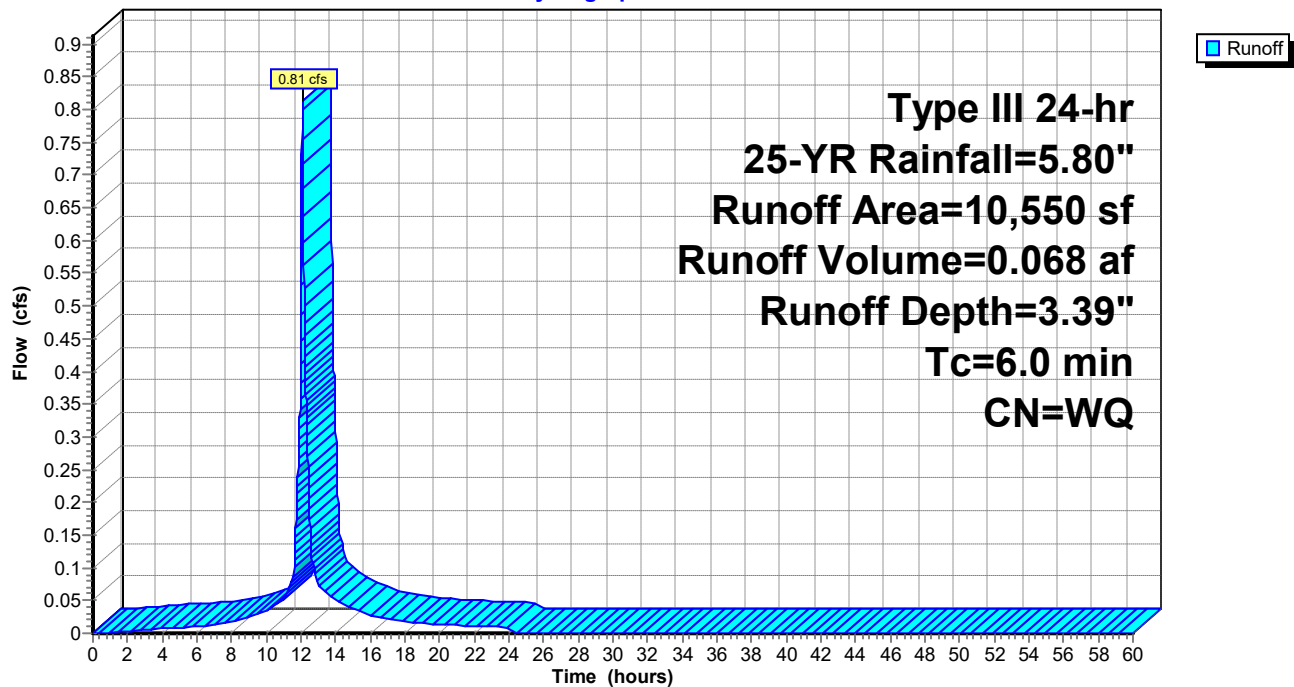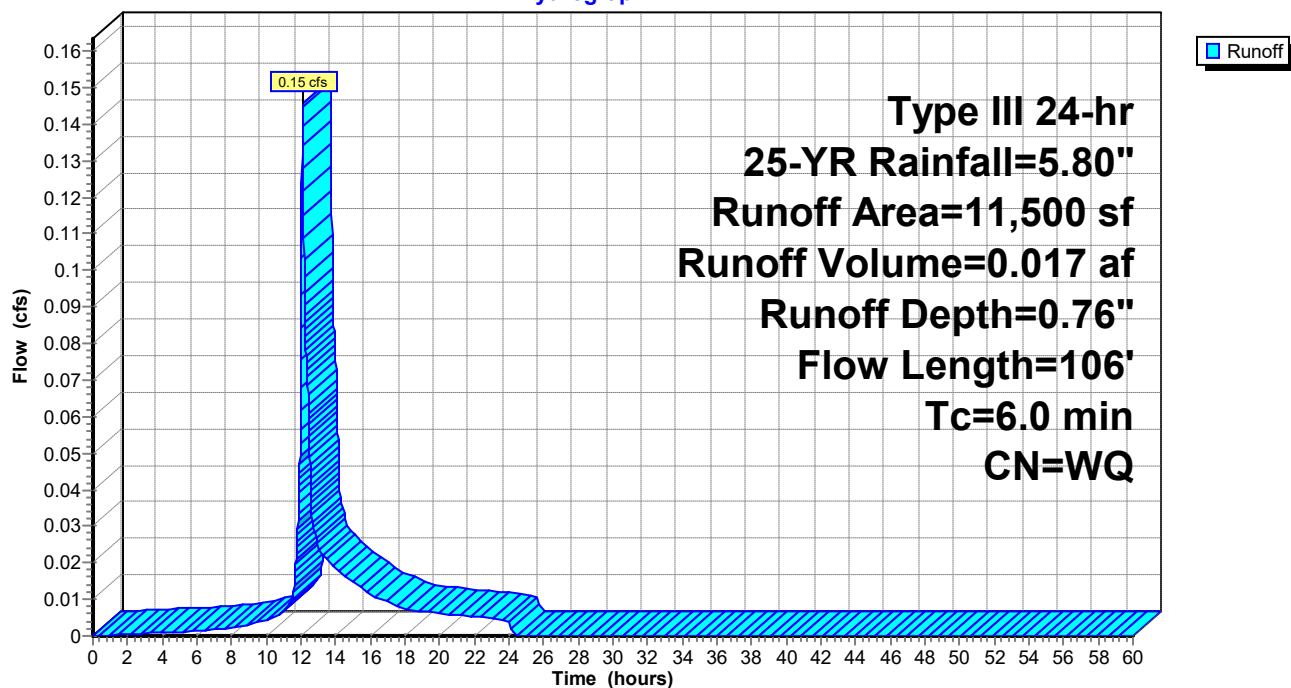Runoff   =   0.14 cfs @   12.08 hrs, Volume=   0.014 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
2,700	36	Woods, Fair, HSG A
1,450	39	>75% Grass cover, Good, HSG A
650	98	Roofs, HSG A
400	98	Paved parking, HSG A
5,200		Weighted Average
4,150		79.81% Pervious Area
1,050		20.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	9	0.0830	0.18		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.6	40	0.0500	1.12		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
4.2					**Direct Entry, DIRECT**
6.0	74	Total			

Subcatchment 3.1S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=5,200 sf
Runoff Volume=0.014 af
Runoff Depth=1.36"
Flow Length=74'
Tc=6.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.2S:

Runoff   =   0.74 cfs @   12.08 hrs, Volume=   0.061 af, Depth= 4.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
5,100	98	Paved parking, HSG A
300	98	Roofs, HSG A
2,000	49	50-75% Grass cover, Fair, HSG A
7,400		Weighted Average
2,000		27.03% Pervious Area
5,400		72.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	32	0.0480	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.3	64	0.0360	3.85		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
2.9					**Direct Entry, DIRECT**
6.0	96				Total

Subcatchment 3.2S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=7,400 sf
Runoff Volume=0.061 af
Runoff Depth=4.32"
Flow Length=96'
Tc=6.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.3S:

Runoff   =   0.81 cfs @ 12.09 hrs, Volume=   0.068 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
2,250	98	Roofs, HSG A
3,300	98	Paved parking, HSG A
5,000	49	50-75% Grass cover, Fair, HSG A
10,550		Weighted Average
5,000		47.39% Pervious Area
5,550		52.61% Impervious Area

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

Subcatchment 3.3S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=10,550 sf
Runoff Volume=0.068 af
Runoff Depth=3.39"
Tc=6.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.4S:

Runoff   =   0.15 cfs @ 12.10 hrs, Volume=   0.017 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
7,850	36	Woods, Fair, HSG A
2,950	49	50-75% Grass cover, Fair, HSG A
700	98	Roofs, HSG A
11,500		Weighted Average
10,800		93.91% Pervious Area
700		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	26	0.0580	0.20		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.6	80	0.2300	2.40		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
3.2					**Direct Entry, DIRECT**
6.0	106				Total

Subcatchment 3.4S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=11,500 sf
Runoff Volume=0.017 af
Runoff Depth=0.76"
Flow Length=106'
Tc=6.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Reach 3R: EXISTING 15" CULVERT

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.62 ac, 37.52% Impervious, Inflow Depth = 4.59"   for 25-YR event
Inflow   =   3.12 cfs @ 12.09 hrs, Volume=   0.238 af
Outflow   =   3.12 cfs @ 12.09 hrs, Volume=   0.238 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.92 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.41 fps, Avg. Travel Time= 0.3 min

Peak Storage= 16 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 17.83 cfs

15.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 55.0'   Slope= 0.0545 '/'
Inlet Invert= 117.50', Outlet Invert= 114.50'

Reach 3R: EXISTING 15" CULVERT

**Inflow Area=0.62 ac
Avg. Flow Depth=0.35'
Max Vel=10.92 fps
15.0"
Round Pipe
n=0.011
L=55.0'
S=0.0545 '/'
Capacity=17.83 cfs**

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Type III 24-hr 25-YR Rainfall=5.80"
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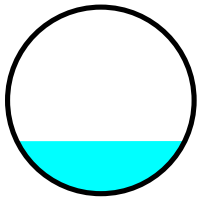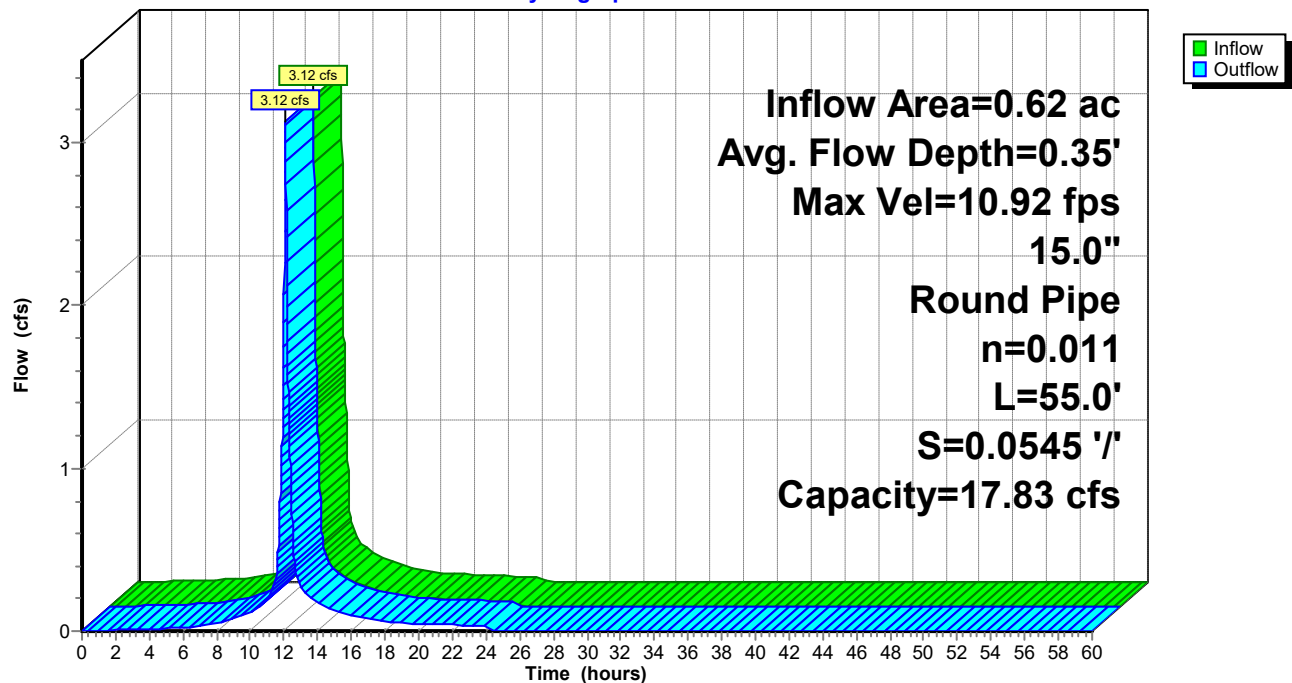
Summary for Pond 5P: DRAINAGE DITCH
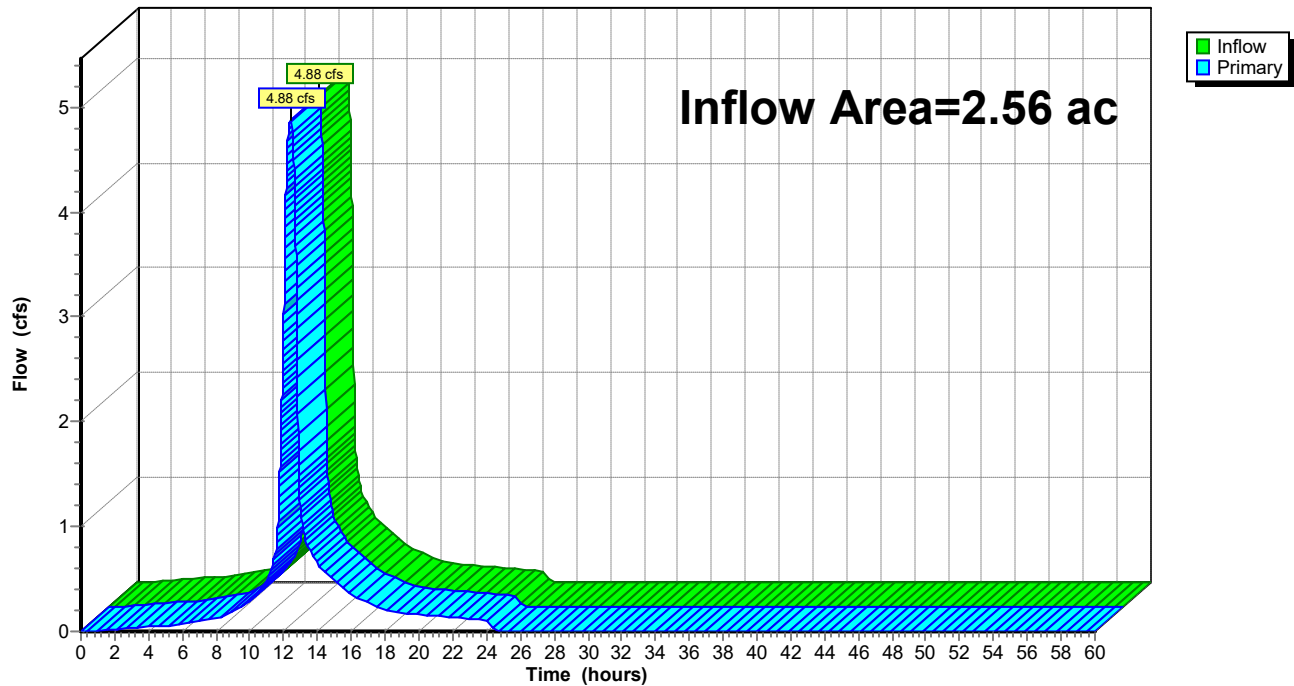
Inflow Area =   2.56 ac, 34.41% Impervious, Inflow Depth = 3.62"   for 25-YR event
Inflow   =   6.45 cfs @ 12.18 hrs, Volume=   0.773 af
Outflow   =   4.97 cfs @ 12.38 hrs, Volume=   0.773 af, Atten= 23%, Lag= 12.0 min
Discarded =   0.10 cfs @ 12.38 hrs, Volume=   0.013 af
Primary   =   4.88 cfs @ 12.38 hrs, Volume=   0.760 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 112.17' @ 12.38 hrs   Surf.Area= 2,089 sf   Storage= 2,378 cf

Plug-Flow detention time= 3.0 min calculated for 0.773 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (798.4 - 795.5)

Volume	Invert	Avail.Storage	Storage Description
#1	109.00'	4,655 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
109.00	40	0	0
110.00	265	153	153
111.00	850	558	710
112.00	1,825	1,338	2,048
113.00	3,390	2,608	4,655

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	109.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 109.00' / 108.50' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 12.38 hrs HW=112.17'   (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=4.88 cfs @ 12.38 hrs HW=112.17' TW=0.00'   (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 4.88 cfs @ 6.21 fps)

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Pond 5P: DRAINAGE DITCH

Inflow Area=2.56 ac
Peak Elev=112.17'
Storage=2,378 cf

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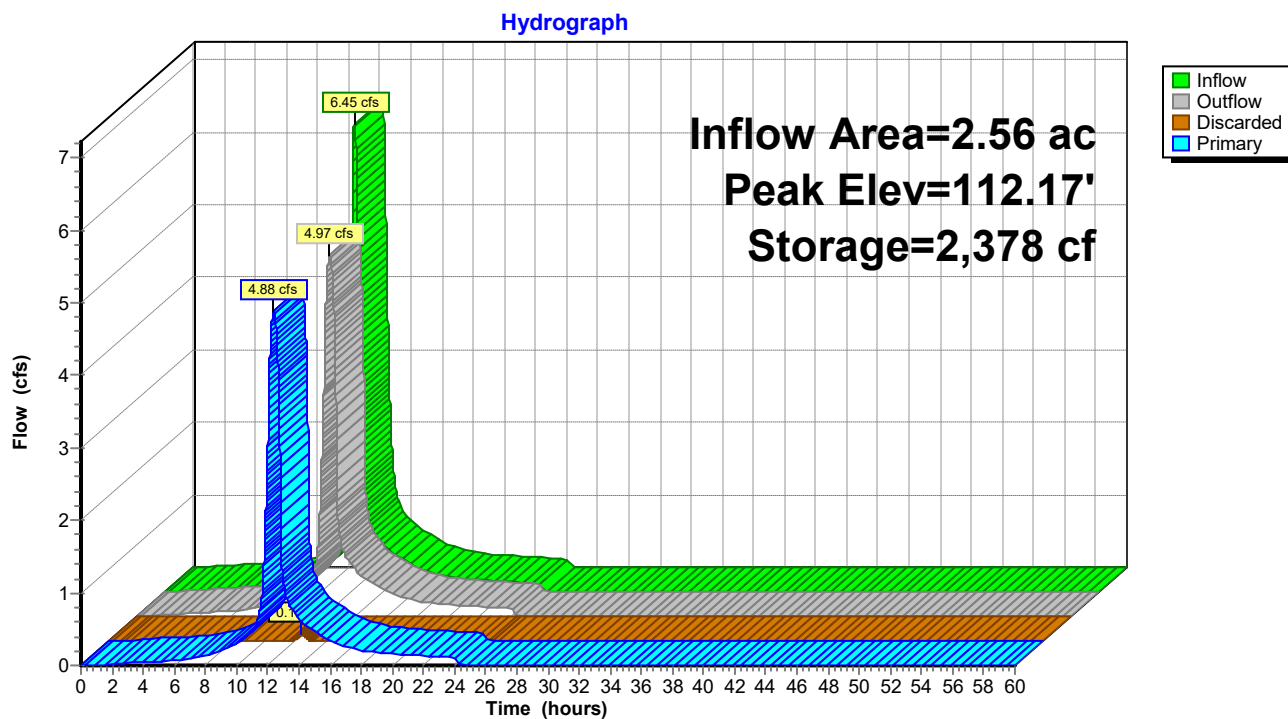
Summary for Link 1L: POA-1

Inflow Area =   0.78 ac, 39.39% Impervious, Inflow Depth =   4.58"   for 25-YR event
Inflow   =   3.49 cfs @   12.13 hrs, Volume=   0.299 af
Primary   =   3.49 cfs @   12.13 hrs, Volume=   0.299 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 1L: POA-1

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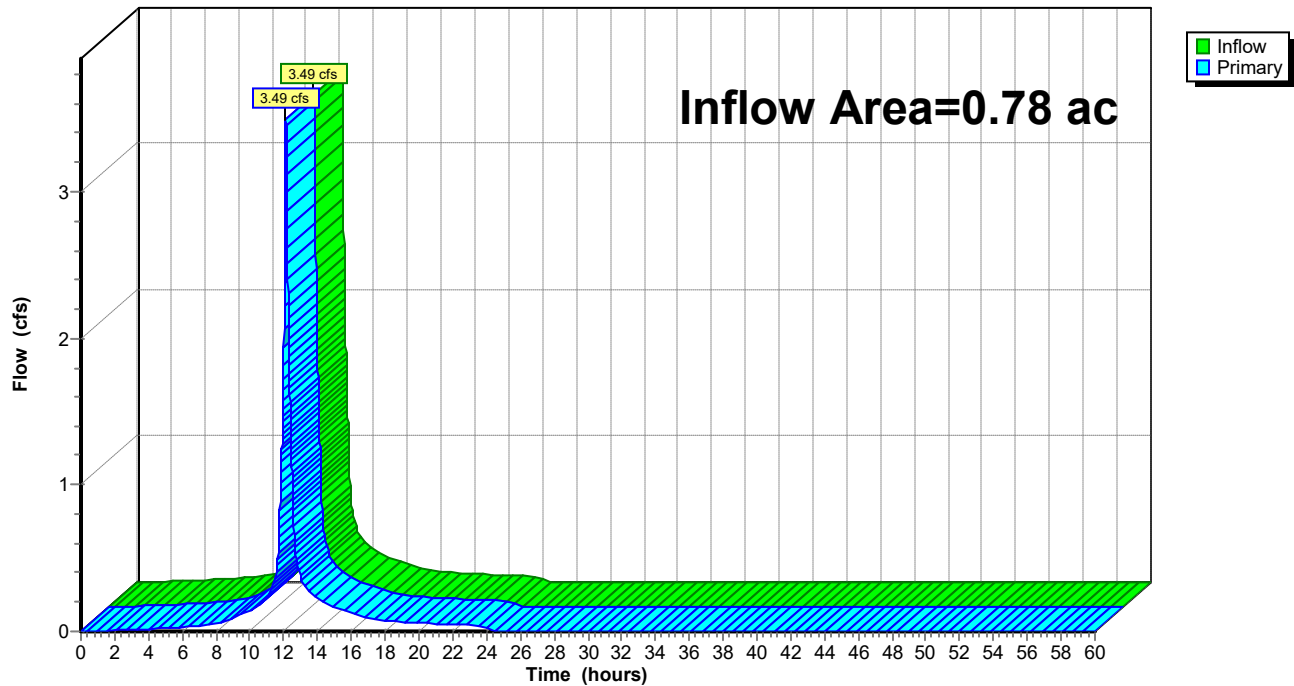
Summary for Link 2L: POA 2

Inflow Area =   2.56 ac, 34.41% Impervious, Inflow Depth = 3.56"   for 25-YR event
Inflow   =   4.88 cfs @   12.38 hrs, Volume=   0.760 af
Primary   =   4.88 cfs @   12.38 hrs, Volume=   0.760 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 2L: POA 2

Hydrograph

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Summary for Link 3L: POA-3

Inflow Area =   0.80 ac, 36.65% Impervious, Inflow Depth = 2.41"   for 25-YR event
Inflow   =   1.84 cfs @   12.09 hrs, Volume=   0.160 af
Primary   =   1.84 cfs @   12.09 hrs, Volume=   0.160 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 3L: POA-3

Hydrograph
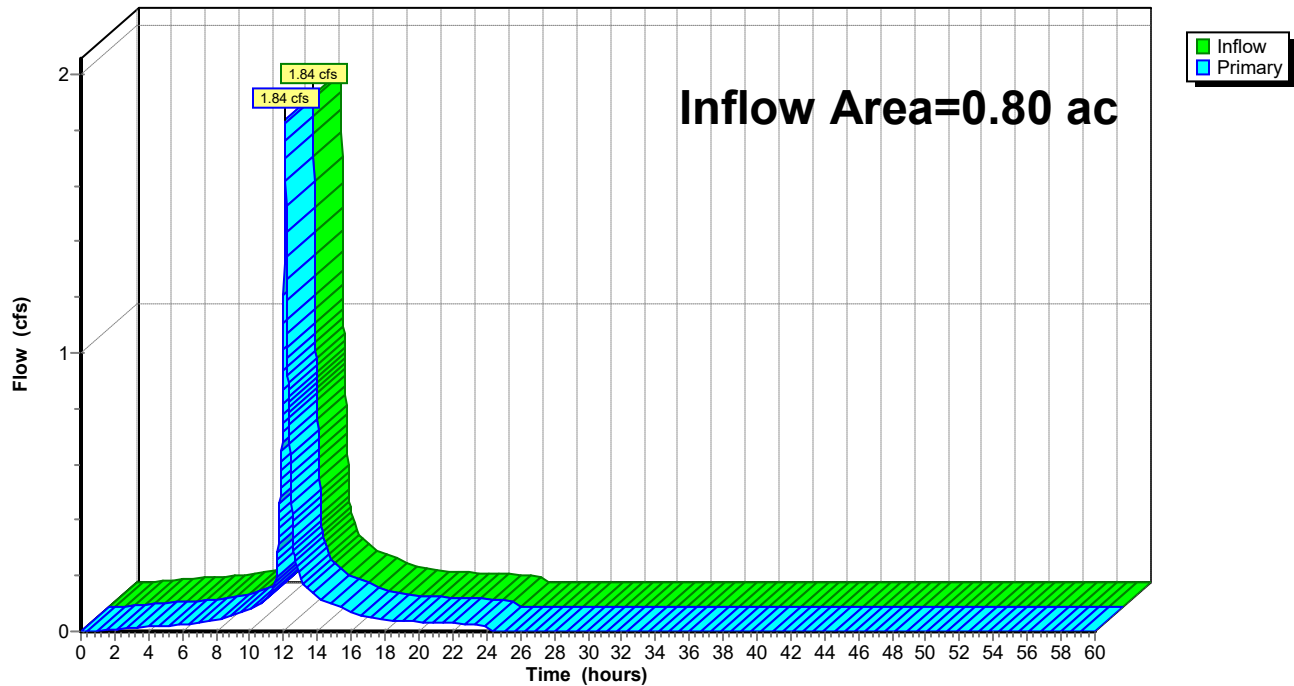
Attachment 1B

Proposed Condition HydroCAD Summary
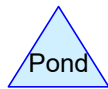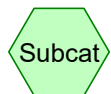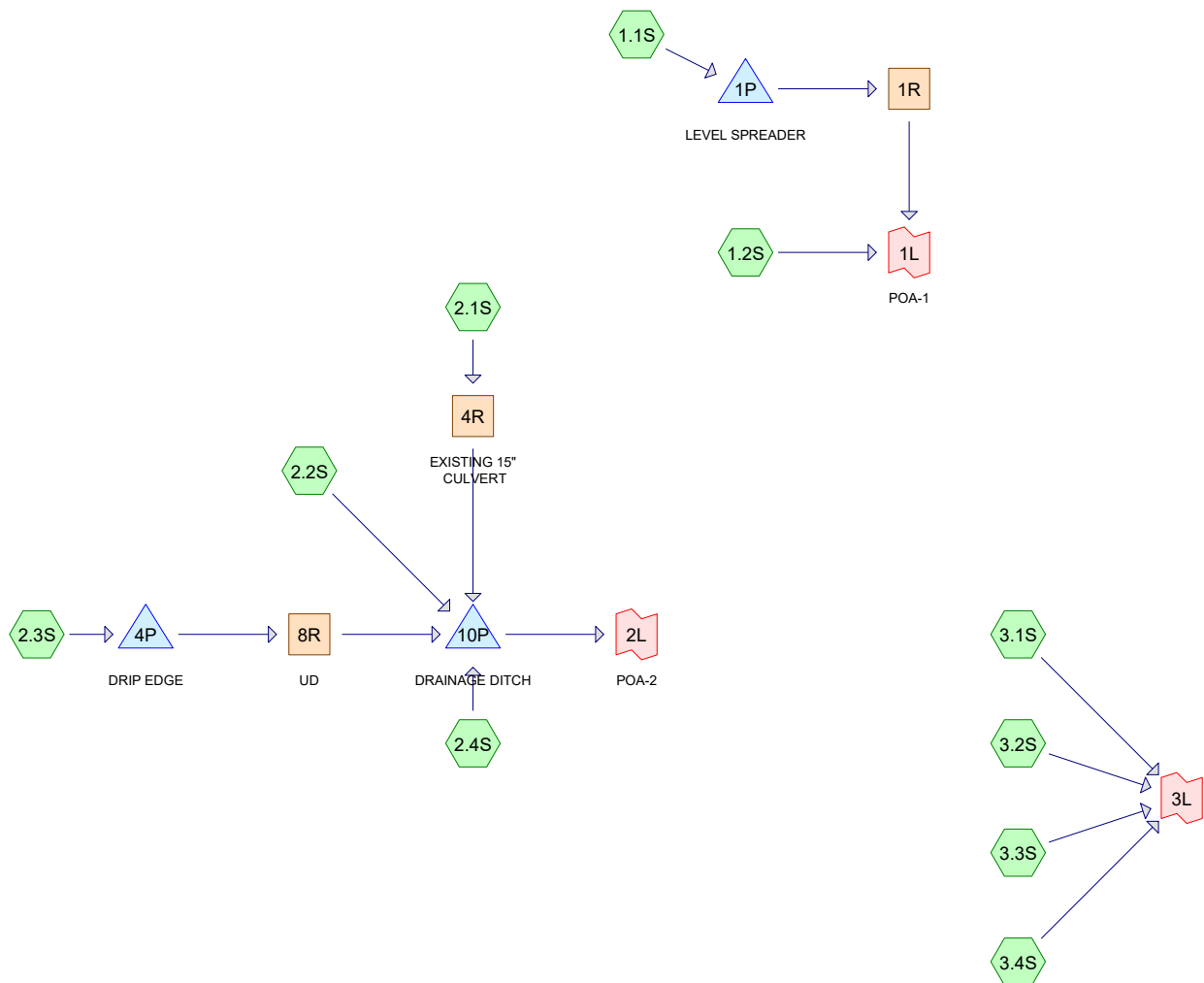
1.1S → 1P → 1R
LEVEL SPREADER

1.2S → 1L
POA-1

2.1S → 4R
EXISTING 15"
CULVERT

2.2S

2.3S → 4P → 8R → 10P → 2L
DRIP EDGE   UD   DRAINAGE DITCH   POA-2

2.4S

3.1S
3.2S → 3L
3.3S
3.4S

Subcat   Reach   Pond   Link

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.17	49	50-75% Grass cover, Fair, HSG A (3.1S, 3.2S, 3.3S)
0.74	69	50-75% Grass cover, Fair, HSG B (2.2S, 2.3S, 2.4S)
0.79	84	50-75% Grass cover, Fair, HSG D (1.1S, 1.2S, 2.1S)
0.41	98	Paved parking, HSG A (3.2S, 3.3S, 3.4S)
0.59	98	Paved parking, HSG B (2.2S, 2.3S, 2.4S)
0.41	98	Paved parking, HSG D (1.1S, 1.2S, 2.1S)
0.14	98	Roofs, HSG A (3.1S, 3.2S, 3.3S, 3.4S)
0.28	98	Roofs, HSG B (2.2S, 2.3S, 2.4S)
0.20	98	Roofs, HSG D (1.1S, 1.2S, 2.1S)
0.07	36	Woods, Fair, HSG A (3.1S, 3.4S)
0.34	60	Woods, Fair, HSG B (2.2S, 2.3S, 2.4S)
4.14	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.80	HSG A	3.1S, 3.2S, 3.3S, 3.4S
1.94	HSG B	2.2S, 2.3S, 2.4S
0.00	HSG C	
1.40	HSG D	1.1S, 1.2S, 2.1S
0.00	Other	
4.14		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.17	0.74	0.00	0.79	0.00	1.71	50-75% Grass cover, Fair	1.1S, 1.2S, 2.1S, 2.2S, 2.3S, 2.4S, 3.1S, 3.2S, 3.3S
0.41	0.59	0.00	0.41	0.00	1.40	Paved parking	1.1S, 1.2S, 2.1S, 2.2S, 2.3S, 2.4S, 3.2S, 3.3S, 3.4S
0.14	0.28	0.00	0.20	0.00	0.62	Roofs	1.1S, 1.2S, 2.1S, 2.2S, 2.3S, 2.4S, 3.1S, 3.2S, 3.3S, 3.4S
0.07	0.34	0.00	0.00	0.00	0.41	Woods, Fair	2.2S, 2.3S, 2.4S, 3.1S, 3.4S
0.80	**1.94**	**0.00**	**1.40**	**0.00**	**4.14**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4R	117.50	114.39	55.0	0.0565	0.011	15.0	0.0	0.0
2	8R	114.38	110.70	20.0	0.1840	0.013	6.0	0.0	0.0
3	4P	115.68	114.38	257.0	0.0051	0.013	6.0	0.0	0.0
4	10P	109.00	108.50	50.0	0.0100	0.012	12.0	0.0	0.0

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Time span=0.00-60.00 hrs, dt=0.03 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1S:
Runoff Area=24,450 sf 51.53% Impervious Runoff Depth=2.25"
Flow Length=238' Tc=7.9 min CN=WQ Runoff=1.29 cfs 0.105 af

Subcatchment 1.2S:
Runoff Area=9,450 sf 38.10% Impervious Runoff Depth=2.08"
Flow Length=256' Tc=8.1 min CN=WQ Runoff=0.46 cfs 0.038 af

Subcatchment 2.1S:
Runoff Area=27,300 sf 38.46% Impervious Runoff Depth=2.09"
Flow Length=209' Tc=6.0 min CN=WQ Runoff=1.44 cfs 0.109 af

Subcatchment 2.2S:
Runoff Area=22,350 sf 24.61% Impervious Runoff Depth=1.14"
Flow Length=195' Tc=17.7 min CN=WQ Runoff=0.41 cfs 0.049 af

Subcatchment 2.3S:
Runoff Area=9,200 sf 18.48% Impervious Runoff Depth=0.93"
Tc=6.0 min CN=WQ Runoff=0.18 cfs 0.016 af

Subcatchment 2.4S:
Runoff Area=53,000 sf 57.17% Impervious Runoff Depth=1.93"
Flow Length=120' Tc=15.4 min CN=WQ Runoff=1.83 cfs 0.196 af

Subcatchment 3.1S:
Runoff Area=2,050 sf 21.95% Impervious Runoff Depth=0.68"
Flow Length=27' Tc=6.0 min CN=WQ Runoff=0.03 cfs 0.003 af

Subcatchment 3.2S:
Runoff Area=15,250 sf 81.64% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=WQ Runoff=0.85 cfs 0.069 af

Subcatchment 3.3S:
Runoff Area=8,100 sf 53.70% Impervious Runoff Depth=1.58"
Tc=6.0 min CN=WQ Runoff=0.30 cfs 0.025 af

Subcatchment 3.4S:
Runoff Area=9,300 sf 72.04% Impervious Runoff Depth=2.07"
Flow Length=71' Tc=6.0 min CN=WQ Runoff=0.46 cfs 0.037 af

Reach 1R:
Avg. Flow Depth=0.26' Max Vel=0.24 fps Inflow=1.28 cfs 0.101 af
n=0.400 L=67.0' S=0.0299 '/' Capacity=3.68 cfs Outflow=1.16 cfs 0.101 af

Reach 4R: EXISTING 15" CULVERT
Avg. Flow Depth=0.24' Max Vel=8.84 fps Inflow=1.44 cfs 0.109 af
15.0" Round Pipe n=0.011 L=55.0' S=0.0565 '/' Capacity=18.15 cfs Outflow=1.44 cfs 0.109 af

Reach 8R: UD
Avg. Flow Depth=0.08' Max Vel=6.37 fps Inflow=0.12 cfs 0.016 af
6.0" Round Pipe n=0.013 L=20.0' S=0.1840 '/' Capacity=2.41 cfs Outflow=0.12 cfs 0.016 af

Pond 1P: LEVEL SPREADER
Peak Elev=118.30' Storage=211 cf Inflow=1.29 cfs 0.105 af
Outflow=1.28 cfs 0.101 af

Pond 4P: DRIP EDGE
Peak Elev=115.93' Storage=0.002 af Inflow=0.18 cfs 0.016 af
6.0" Round Culvert n=0.013 L=257.0' S=0.0051 '/' Outflow=0.12 cfs 0.016 af

Pond 10P: DRAINAGE DITCH
Peak Elev=110.53' Storage=374 cf Inflow=3.26 cfs 0.370 af
Discarded=0.03 cfs 0.008 af Primary=3.03 cfs 0.362 af Outflow=3.05 cfs 0.370 af

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Link 1L: POA-1

Inflow=1.59 cfs 0.138 af
Primary=1.59 cfs 0.138 af

Link 2L: POA-2

Inflow=3.03 cfs 0.362 af
Primary=3.03 cfs 0.362 af

Link 3L:

Inflow=1.64 cfs 0.133 af
Primary=1.64 cfs 0.133 af

Total Runoff Area = 4.14 ac   Runoff Volume = 0.646 af   Average Runoff Depth = 1.87"
51.15% Pervious = 2.12 ac   48.85% Impervious = 2.02 ac

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 1.1S:

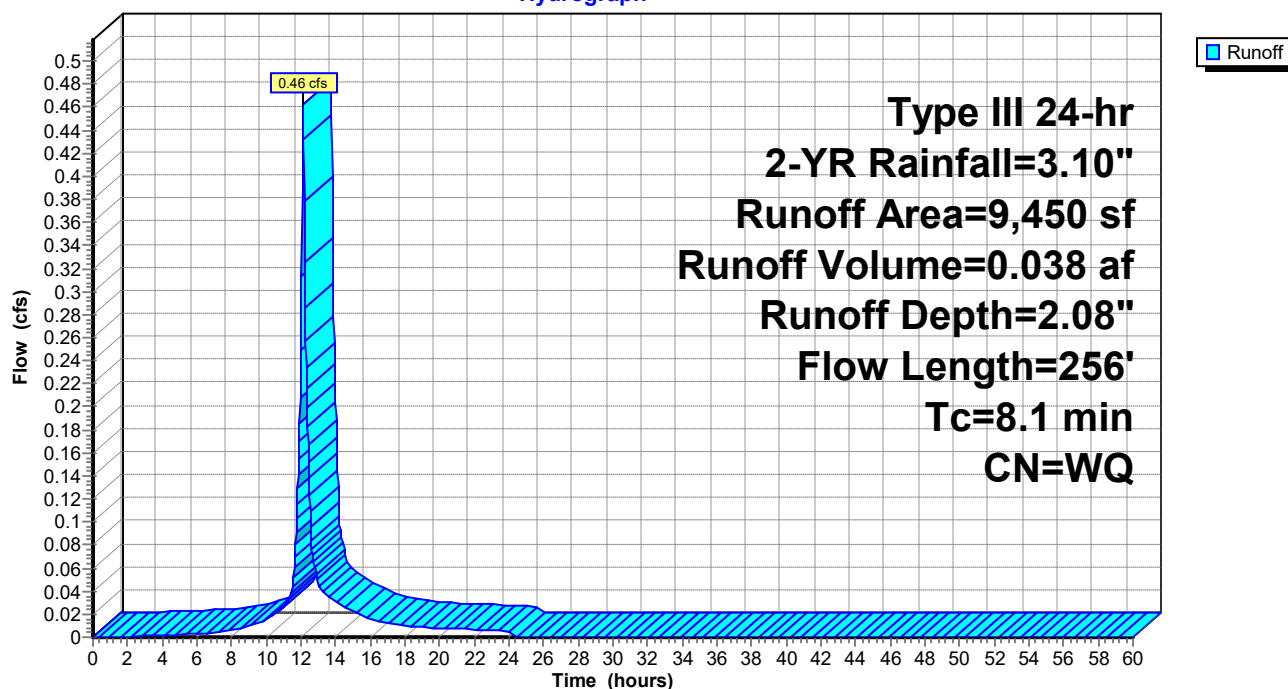Runoff   =   1.29 cfs @ 12.11 hrs, Volume=   0.105 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
9,000	98	Paved parking, HSG D
3,600	98	Roofs, HSG D
11,850	84	50-75% Grass cover, Fair, HSG D
24,450		Weighted Average
11,850		48.47% Pervious Area
12,600		51.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	70	0.0250	0.17		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
1.0	134	0.0130	2.31		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.1	34	0.1000	5.09		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
7.9	238				Total

Subcatchment 1.1S:

Hydrograph

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 1.2S:

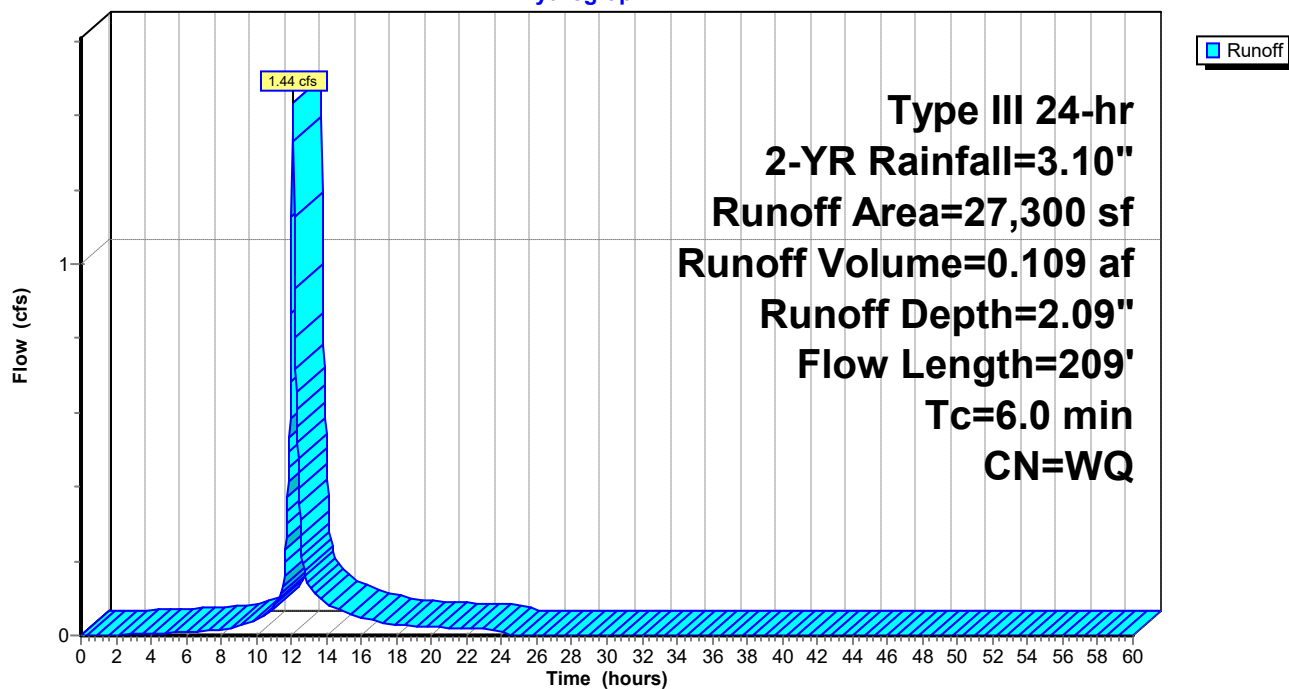Runoff   =   0.46 cfs @ 12.11 hrs, Volume=   0.038 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
1,650	98	Paved parking, HSG D
1,950	98	Roofs, HSG D
5,850	84	50-75% Grass cover, Fair, HSG D
9,450		Weighted Average
5,850		61.90% Pervious Area
3,600		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	70	0.0250	0.17		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
1.0	134	0.0130	2.31		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.3	52	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
8.1	256				Total

Subcatchment 1.2S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=9,450 sf
Runoff Volume=0.038 af
Runoff Depth=2.08"
Flow Length=256'
Tc=8.1 min
CN=WQ

Summary for Subcatchment 2.1S:

Runoff   =   1.44 cfs @ 12.09 hrs, Volume=   0.109 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
7,250	98	Paved parking, HSG D
3,250	98	Roofs, HSG D
16,800	84	50-75% Grass cover, Fair, HSG D
27,300		Weighted Average
16,800		61.54% Pervious Area
10,500		38.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	47	0.0400	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.0	4	0.0400	4.06		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.2	38	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.5	90	0.0200	2.87		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
0.2	30	0.0300	2.79		**Shallow Concentrated Flow, E-F**
					Unpaved Kv= 16.1 fps
1.0					**Direct Entry, DIRECT**
6.0	209	Total			

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Type III 24-hr 2-YR Rainfall=3.10"
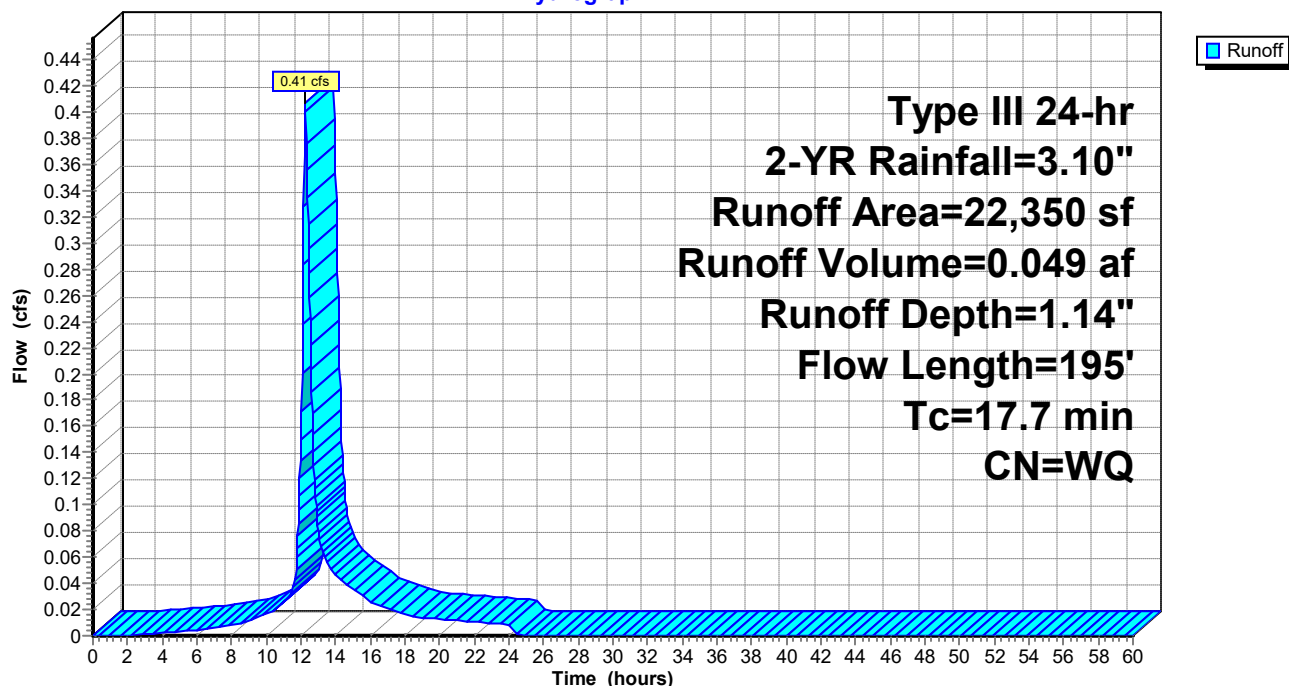Printed 1/25/2024
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Subcatchment 2.1S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=27,300 sf
Runoff Volume=0.109 af
Runoff Depth=2.09"
Flow Length=209'
Tc=6.0 min
CN=WQ

1.44 cfs

Runoff

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 2.2S:

Runoff   =   0.41 cfs @ 12.25 hrs, Volume=   0.049 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
3,700	98	Paved parking, HSG B
1,800	98	Roofs, HSG B
9,900	69	50-75% Grass cover, Fair, HSG B
6,950	60	Woods, Fair, HSG B
22,350		Weighted Average
16,850		75.39% Pervious Area
5,500		24.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	72	0.0400	1.00		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.0	23	0.2500	8.05		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
17.7	195				Total

Subcatchment 2.2S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=22,350 sf
Runoff Volume=0.049 af
Runoff Depth=1.14"
Flow Length=195'
Tc=17.7 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 2.3S:

Runoff   =   0.18 cfs @ 12.10 hrs, Volume=   0.016 af, Depth= 0.93"
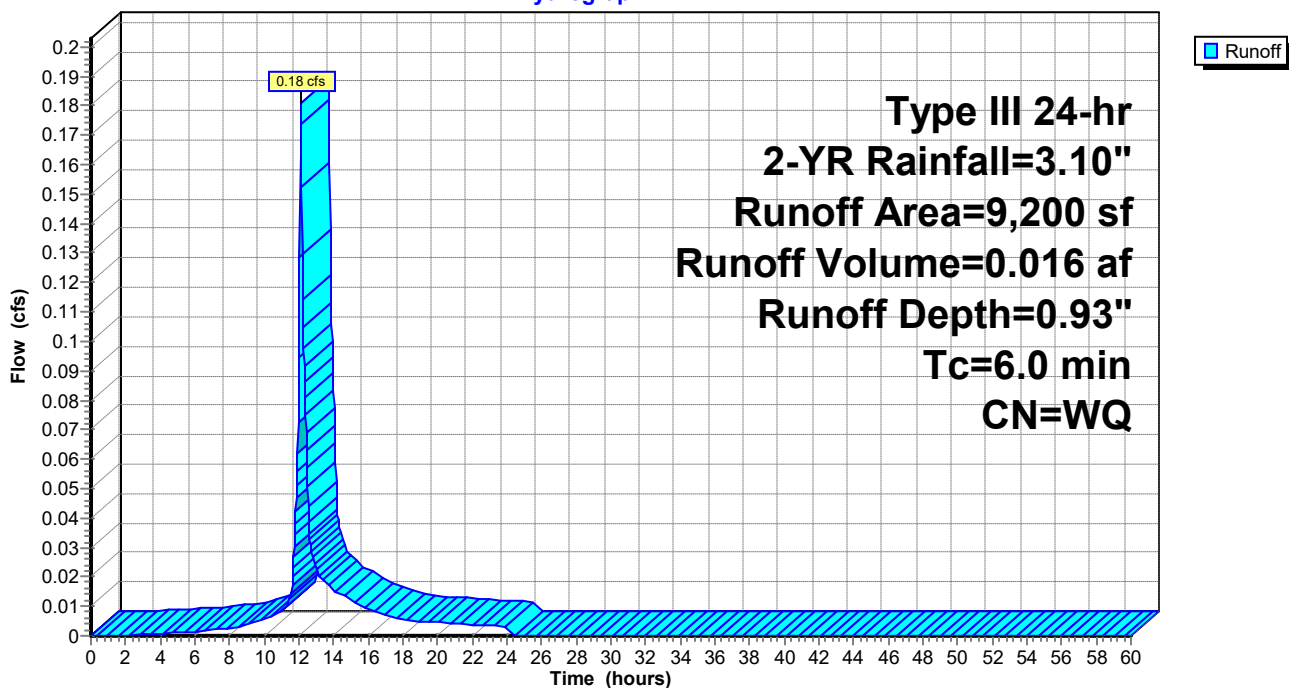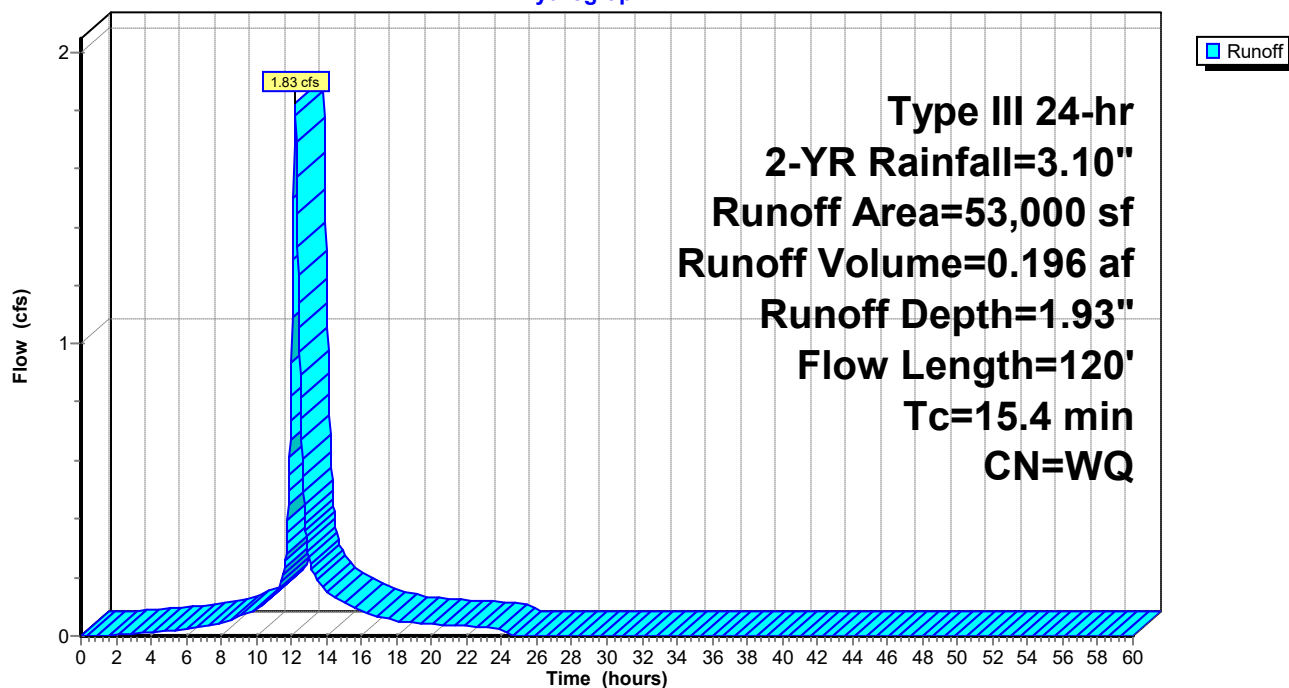
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
200	98	Paved parking, HSG B
1,500	98	Roofs, HSG B
2,550	69	50-75% Grass cover, Fair, HSG B
4,950	60	Woods, Fair, HSG B
9,200		Weighted Average
7,500		81.52% Pervious Area
1,700		18.48% Impervious Area

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

Subcatchment 2.3S:

Hydrograph

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 2.4S:

Runoff   =   1.83 cfs @ 12.21 hrs, Volume=   0.196 af, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
21,600	98	Paved parking, HSG B
8,700	98	Roofs, HSG B
19,750	69	50-75% Grass cover, Fair, HSG B
2,950	60	Woods, Fair, HSG B
53,000		Weighted Average
22,700		42.83% Pervious Area
30,300		57.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	85	0.0350	0.09		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	35	0.1400	6.02		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
15.4	120				Total

Subcatchment 2.4S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=53,000 sf
Runoff Volume=0.196 af
Runoff Depth=1.93"
Flow Length=120'
Tc=15.4 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
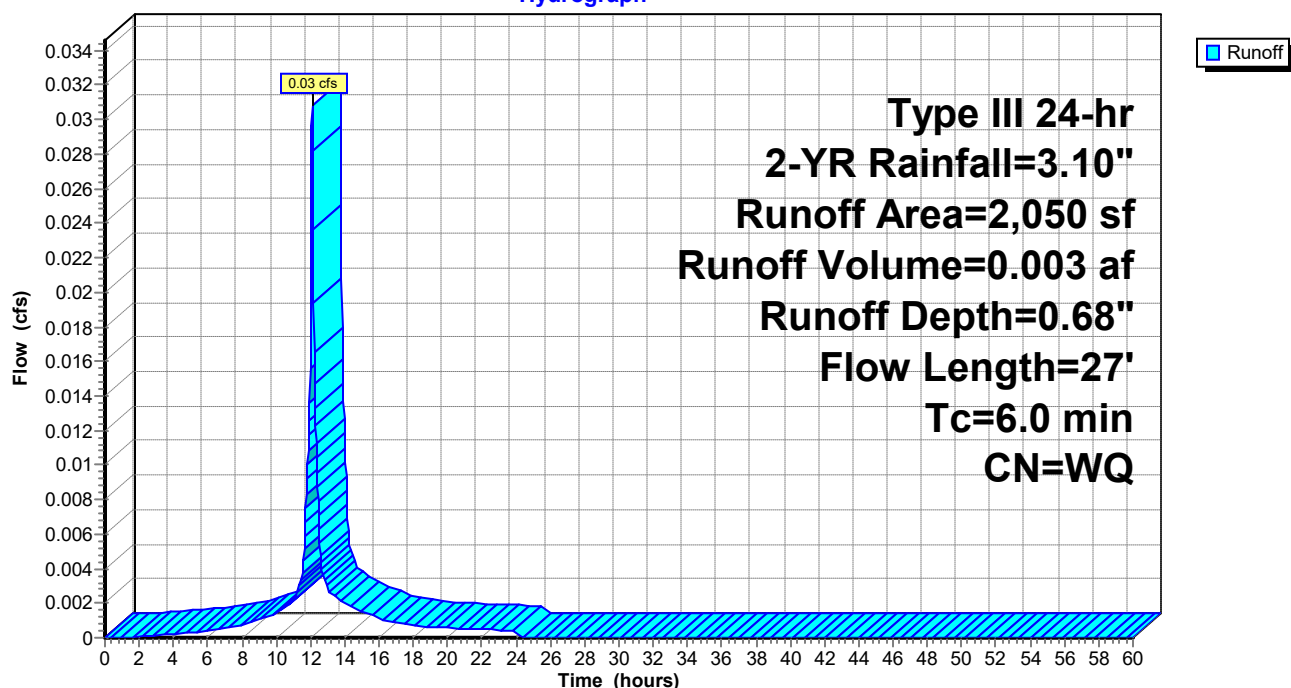Printed 1/25/2024
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Summary for Subcatchment 3.1S:

Runoff   =   0.03 cfs @ 12.08 hrs, Volume=   0.003 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
450	98	Roofs, HSG A
1,050	49	50-75% Grass cover, Fair, HSG A
550	36	Woods, Fair, HSG A
2,050		Weighted Average
1,600		78.05% Pervious Area
450		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0500	1.28		**Sheet Flow, A-B**
					Smooth surfaces n= 0.011 P2= 3.10"
0.0	10	0.1500	6.24		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
0.1	5	0.1000	1.58		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
5.7					**Direct Entry, DIRECT**
6.0	27				Total

Subcatchment 3.1S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=2,050 sf
Runoff Volume=0.003 af
Runoff Depth=0.68"
Flow Length=27'
Tc=6.0 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 3.2S:

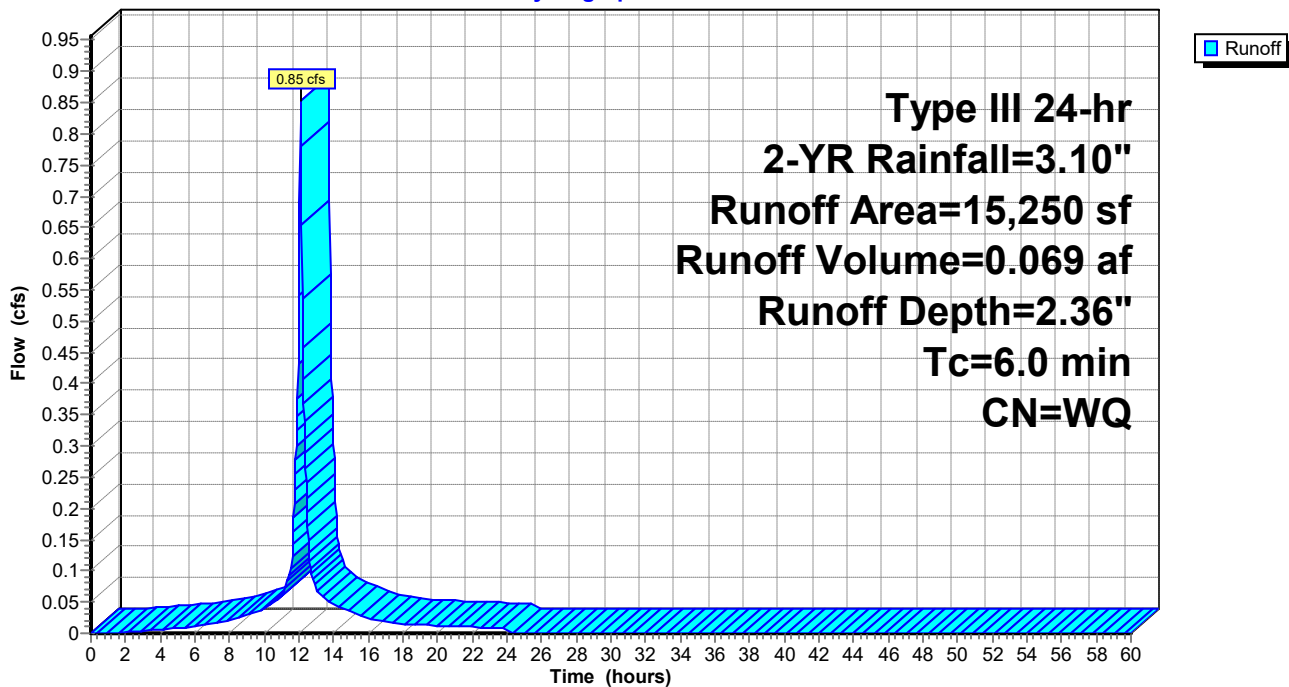Runoff   =   0.85 cfs @   12.08 hrs, Volume=   0.069 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
8,650	98	Paved parking, HSG A
3,800	98	Roofs, HSG A
2,800	49	50-75% Grass cover, Fair, HSG A
15,250		Weighted Average
2,800		18.36% Pervious Area
12,450		81.64% Impervious Area

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

Subcatchment 3.2S:

Hydrograph

Type III 24-hr
2-YR Rainfall=3.10"
Runoff Area=15,250 sf
Runoff Volume=0.069 af
Runoff Depth=2.36"
Tc=6.0 min
CN=WQ

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Subcatchment 3.3S:

Runoff   =   0.30 cfs @ 12.08 hrs, Volume=   0.025 af, Depth= 1.58"
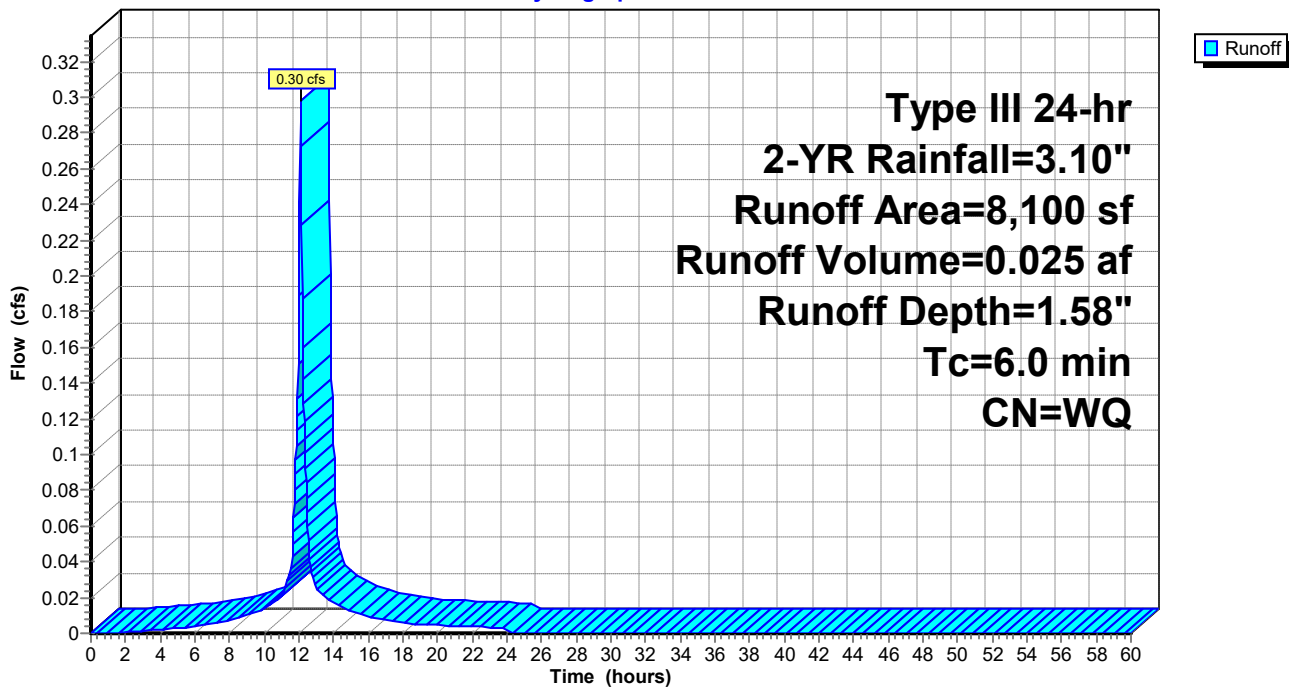
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
3,100	98	Paved parking, HSG A
1,250	98	Roofs, HSG A
3,750	49	50-75% Grass cover, Fair, HSG A
8,100		Weighted Average
3,750		46.30% Pervious Area
4,350		53.70% Impervious Area

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

Subcatchment 3.3S:

Hydrograph

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Summary for Subcatchment 3.4S:

Runoff   =   0.46 cfs @ 12.08 hrs, Volume=   0.037 af, Depth= 2.07"
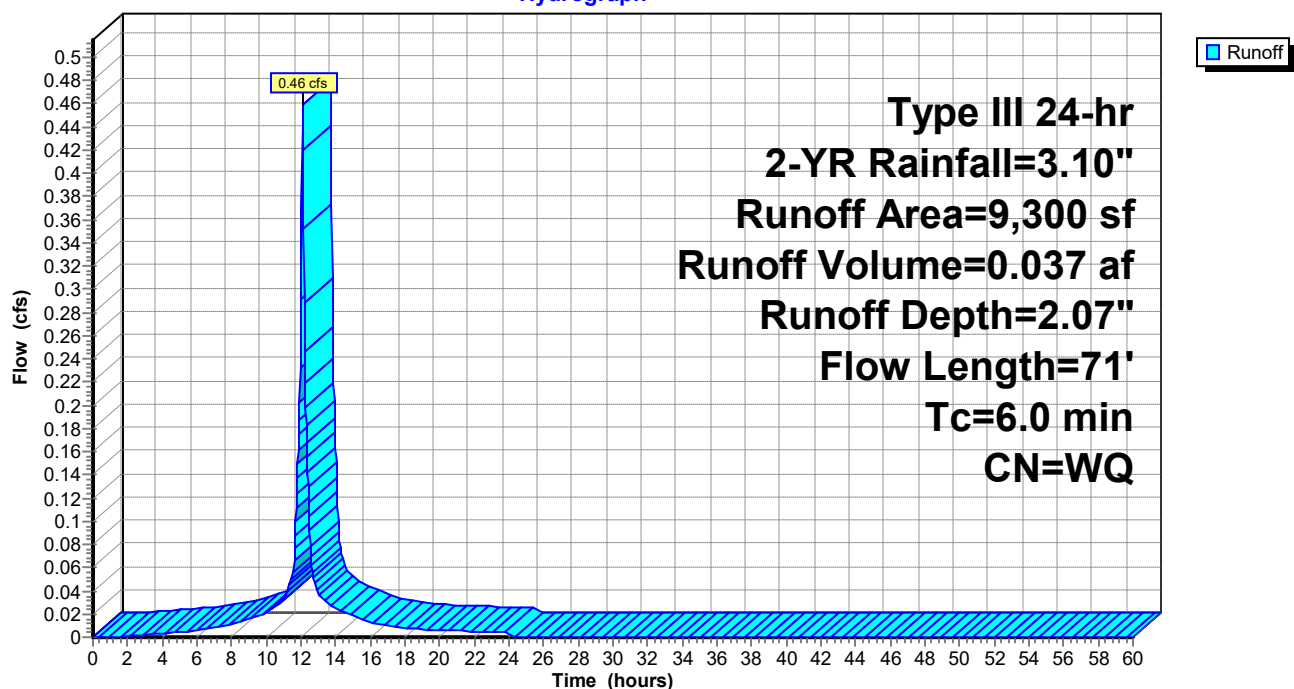
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
200	98	Paved parking, HSG A
650	98	Roofs, HSG A
5,850	98	Paved parking, HSG A
2,600	36	Woods, Fair, HSG A
9,300		Weighted Average
2,600		27.96% Pervious Area
6,700		72.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	25	0.0680	0.21		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.4	46	0.1400	1.87		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
3.6					**Direct Entry, DIRECT**
6.0	71				Total

Subcatchment 3.4S:

Hydrograph

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Reach 1R:

Inflow Area =   0.56 ac, 51.53% Impervious, Inflow Depth = 2.15"   for 2-YR event
Inflow   =   1.28 cfs @   12.11 hrs, Volume=   0.101 af
Outflow   =   1.16 cfs @   12.16 hrs, Volume=   0.101 af, Atten= 10%, Lag= 2.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 0.24 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 19.7 min

Peak Storage= 324 cf @ 12.16 hrs
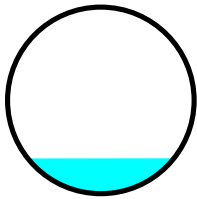Average Depth at Peak Storage= 0.26'
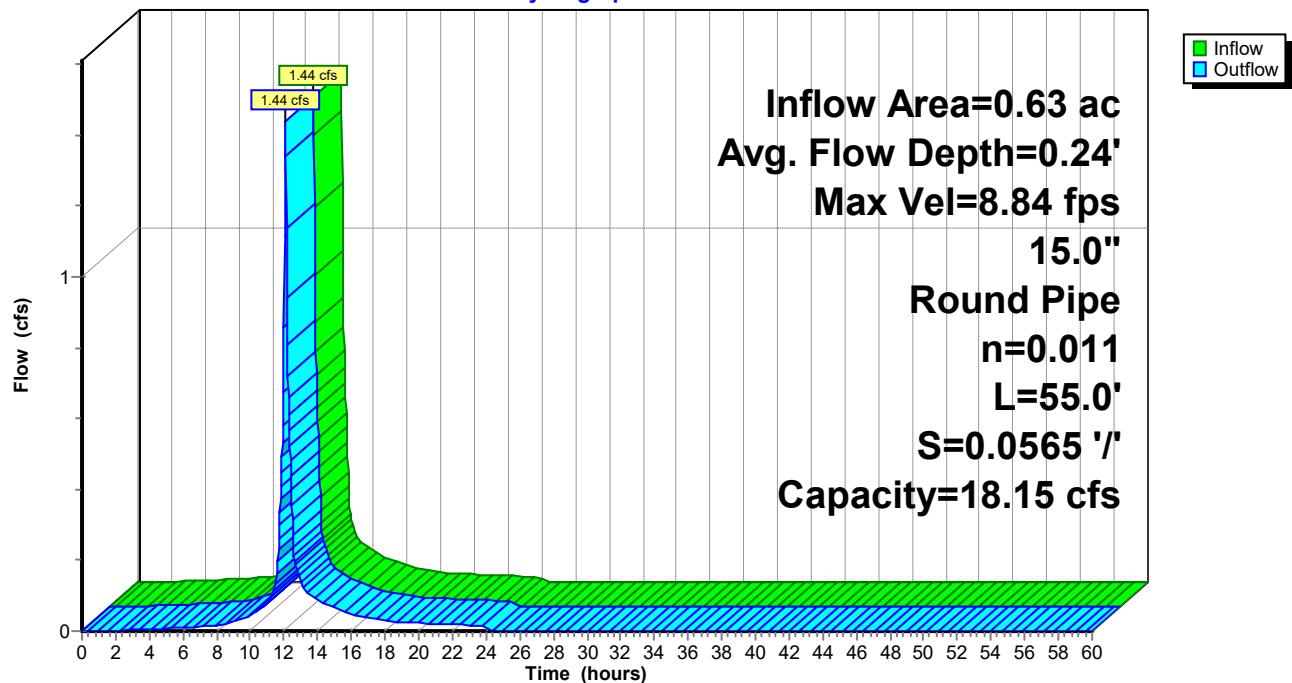Bank-Full Depth= 0.50' Flow Area= 10.5 sf, Capacity= 3.68 cfs

16.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 '/' Top Width= 26.00'
Length= 67.0' Slope= 0.0299 '/'
Inlet Invert= 117.00', Outlet Invert= 115.00'

‡

Reach 1R:

Hydrograph

Inflow Area=0.56 ac
Avg. Flow Depth=0.26'
Max Vel=0.24 fps
n=0.400
L=67.0'
S=0.0299 '/'
Capacity=3.68 cfs

1.28 cfs
1.16 cfs

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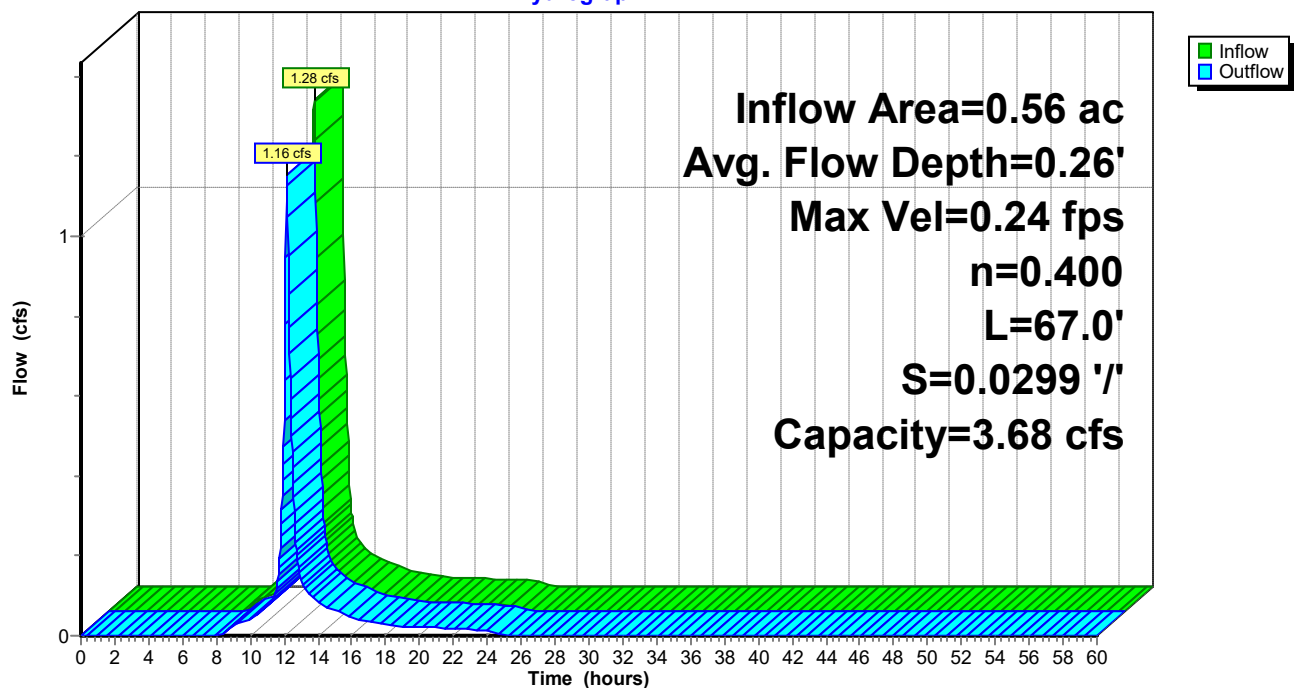
Summary for Reach 4R: EXISTING 15" CULVERT

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =		0.63 ac, 38.46% Impervious,	Inflow Depth = 2.09"	for 2-YR event	
Inflow	=	1.44 cfs @ 12.09 hrs,	Volume=	0.109 af	
Outflow	=	1.44 cfs @ 12.09 hrs,	Volume=	0.109 af,	Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 8.84 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.78 fps, Avg. Travel Time= 0.3 min

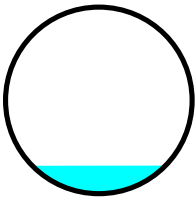Peak Storage= 9 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 18.15 cfs

15.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 55.0'   Slope= 0.0565 '/'
Inlet Invert= 117.50', Outlet Invert= 114.39'

Reach 4R: EXISTING 15" CULVERT

Hydrograph

Inflow Area=0.63 ac
Avg. Flow Depth=0.24'
Max Vel=8.84 fps
15.0"
Round Pipe
n=0.011
L=55.0'
S=0.0565 '/'
Capacity=18.15 cfs

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Summary for Reach 8R: UD

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.21 ac, 18.48% Impervious, Inflow Depth = 0.93"   for 2-YR event
Inflow   =   0.12 cfs @ 12.20 hrs, Volume=   0.016 af
Outflow   =   0.12 cfs @ 12.20 hrs, Volume=   0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 6.37 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.24 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 2.41 cfs

6.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 20.0'   Slope= 0.1840 '/'
Inlet Invert= 114.38', Outlet Invert= 110.70'

Reach 8R: UD

Hydrograph

Inflow Area=0.21 ac
Avg. Flow Depth=0.08'
Max Vel=6.37 fps
6.0"
Round Pipe
n=0.013
L=20.0'
S=0.1840 '/'
Capacity=2.41 cfs
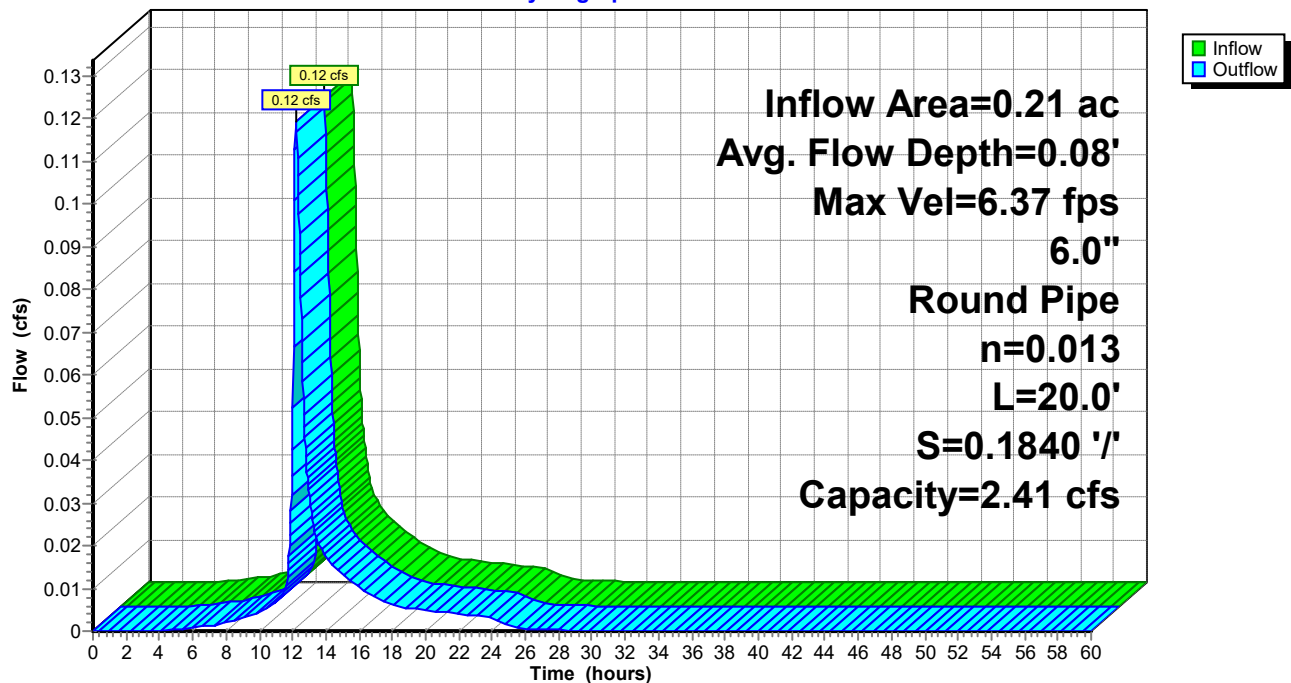
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Summary for Pond 1P: LEVEL SPREADER

[92] Warning: Device #1 is above defined storage
[93] Warning: Storage range exceeded by 0.10'

Inflow Area =		0.56 ac, 51.53% Impervious, Inflow Depth = 2.25" for 2-YR event			
Inflow	=	1.29 cfs @ 12.11 hrs, Volume=	0.105 af		
Outflow	=	1.28 cfs @ 12.11 hrs, Volume=	0.101 af, Atten= 0%, Lag= 0.0 min		
Primary	=	1.28 cfs @ 12.11 hrs, Volume=	0.101 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 118.30' @ 12.11 hrs   Surf.Area= 192 sf   Storage= 211 cf

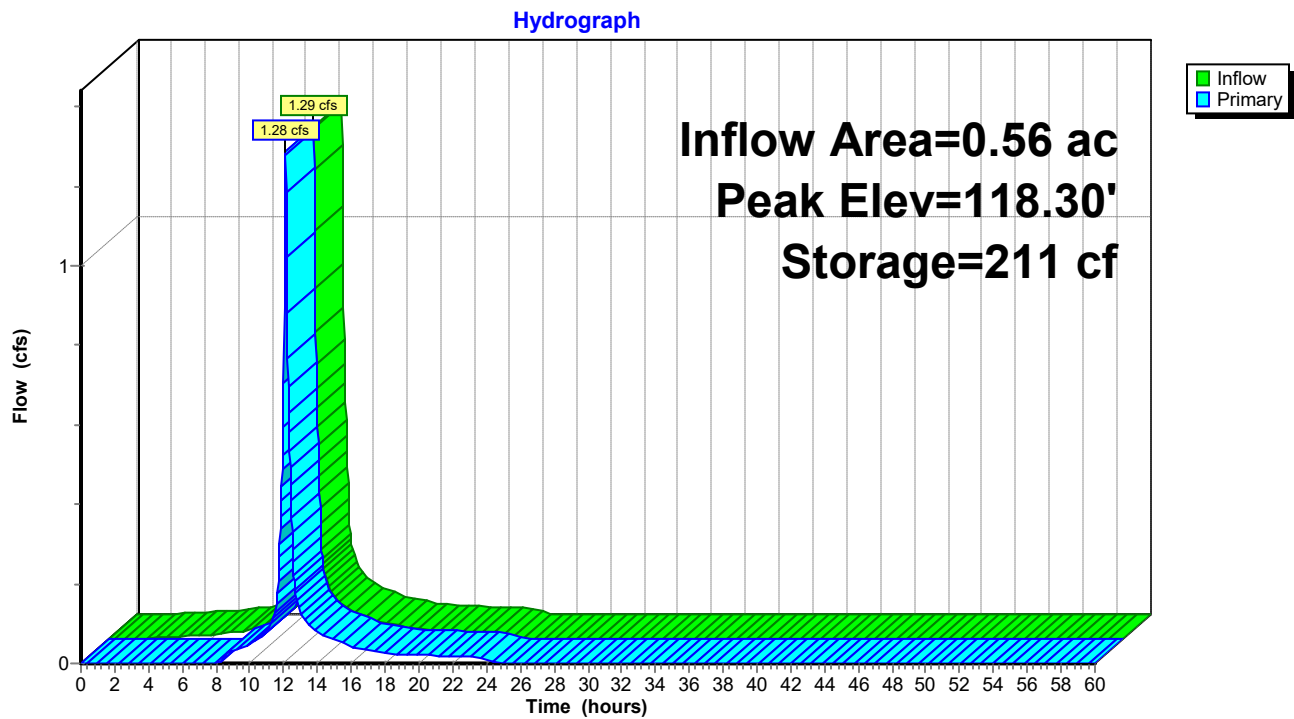Plug-Flow detention time= 46.5 min calculated for 0.100 af (95% of inflow)
Center-of-Mass det. time= 20.1 min (804.4 - 784.3)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	211 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
116.50	68	0	0
117.00	112	45	45
118.00	152	132	177
118.20	192	34	211

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	**16.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.27 cfs @ 12.11 hrs HW=118.30' TW=117.24' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.27 cfs @ 0.78 fps)

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Type III 24-hr 2-YR Rainfall=3.10"
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Pond 1P: LEVEL SPREADER

Hydrograph

Inflow Area=0.56 ac
Peak Elev=118.30'
Storage=211 cf

1.29 cfs
1.28 cfs

Legend: Inflow (green), Primary (blue)

Flow (cfs)

Time (hours)

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Summary for Pond 4P: DRIP EDGE

Inflow Area =   0.21 ac, 18.48% Impervious, Inflow Depth = 0.93"   for 2-YR event
Inflow   =   0.18 cfs @   12.10 hrs, Volume=   0.016 af
Outflow   =   0.12 cfs @   12.20 hrs, Volume=   0.016 af, Atten= 34%, Lag= 6.4 min
Primary   =   0.12 cfs @   12.20 hrs, Volume=   0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 115.93' @ 12.20 hrs   Surf.Area= 0.03 ac   Storage= 0.002 af

Plug-Flow detention time= 46.6 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 46.7 min (866.6 - 820.0)

Volume	Invert	Avail.Storage	Storage Description
#1	115.68'	0.024 af	**4.00'W x 257.00'L x 2.00'H Prismatoid Z=0.5** 0.059 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	115.68'	**6.0" Round Culvert** L= 257.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 115.68' / 114.38' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.12 cfs @ 12.20 hrs HW=115.93' TW=114.46'   (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.12 cfs @ 1.76 fps)

Pond 4P: DRIP EDGE

Hydrograph

Inflow Area=0.21 ac
Peak Elev=115.93'
Storage=0.002 af
6.0"
Round Culvert
n=0.013
L=257.0'
S=0.0051 '/'

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Type III 24-hr 2-YR Rainfall=3.10"
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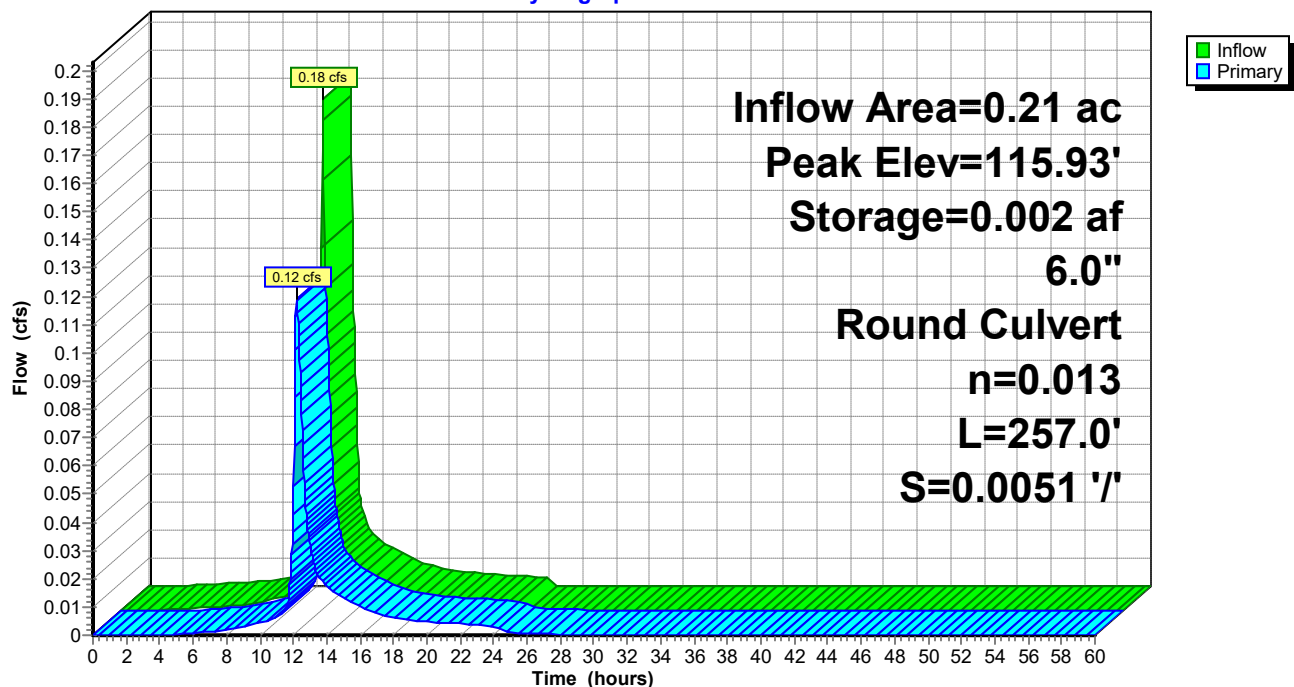
Summary for Pond 10P: DRAINAGE DITCH

Inflow Area =   2.57 ac, 42.91% Impervious, Inflow Depth = 1.73"   for 2-YR event
Inflow   =   3.26 cfs @ 12.15 hrs, Volume=   0.370 af
Outflow   =   3.05 cfs @ 12.23 hrs, Volume=   0.370 af, Atten= 6%, Lag= 5.0 min
Discarded = 0.03 cfs @ 12.23 hrs, Volume=   0.008 af
Primary   =   3.03 cfs @ 12.23 hrs, Volume=   0.362 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 110.53' @ 12.23 hrs   Surf.Area= 574 sf   Storage= 374 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.5 min (796.8 - 795.3)

Volume	Invert	Avail.Storage	Storage Description
#1	109.00'	4,655 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
109.00	40	0	0
110.00	265	153	153
111.00	850	558	710
112.00	1,825	1,338	2,048
113.00	3,390	2,608	4,655

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	109.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 109.00' / 108.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.03 cfs @ 12.23 hrs HW=110.53'   (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=3.03 cfs @ 12.23 hrs HW=110.53' TW=0.00'   (Dynamic Tailwater)
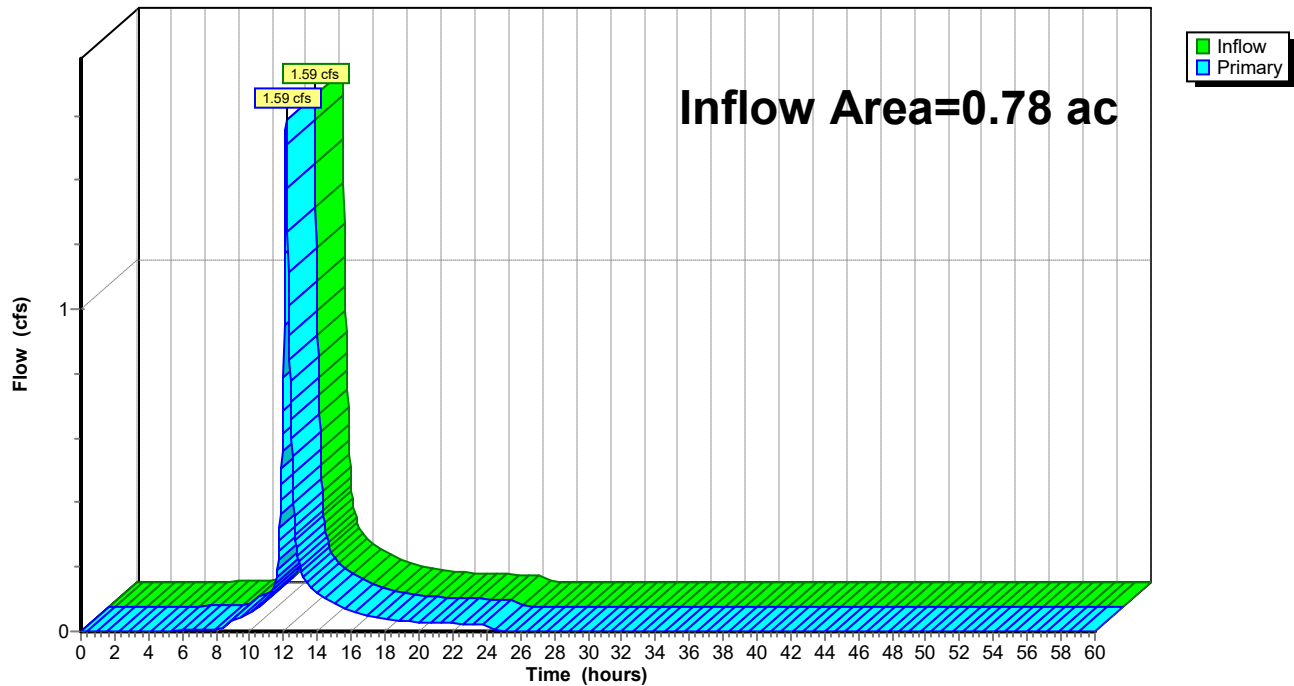└─**2=Culvert** (Inlet Controls 3.03 cfs @ 3.85 fps)

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Pond 10P: DRAINAGE DITCH

Inflow Area=2.57 ac
Peak Elev=110.53'
Storage=374 cf

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Type III 24-hr 2-YR Rainfall=3.10"
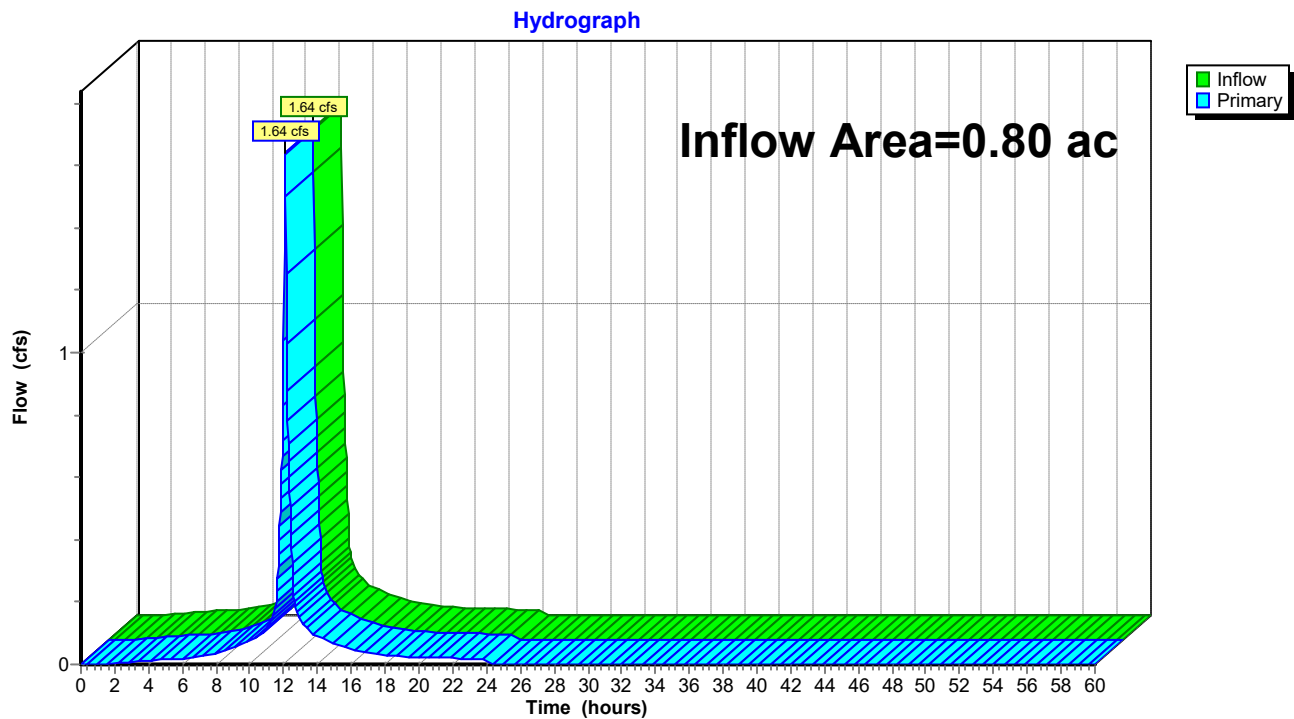Printed 1/25/2024
Page 27
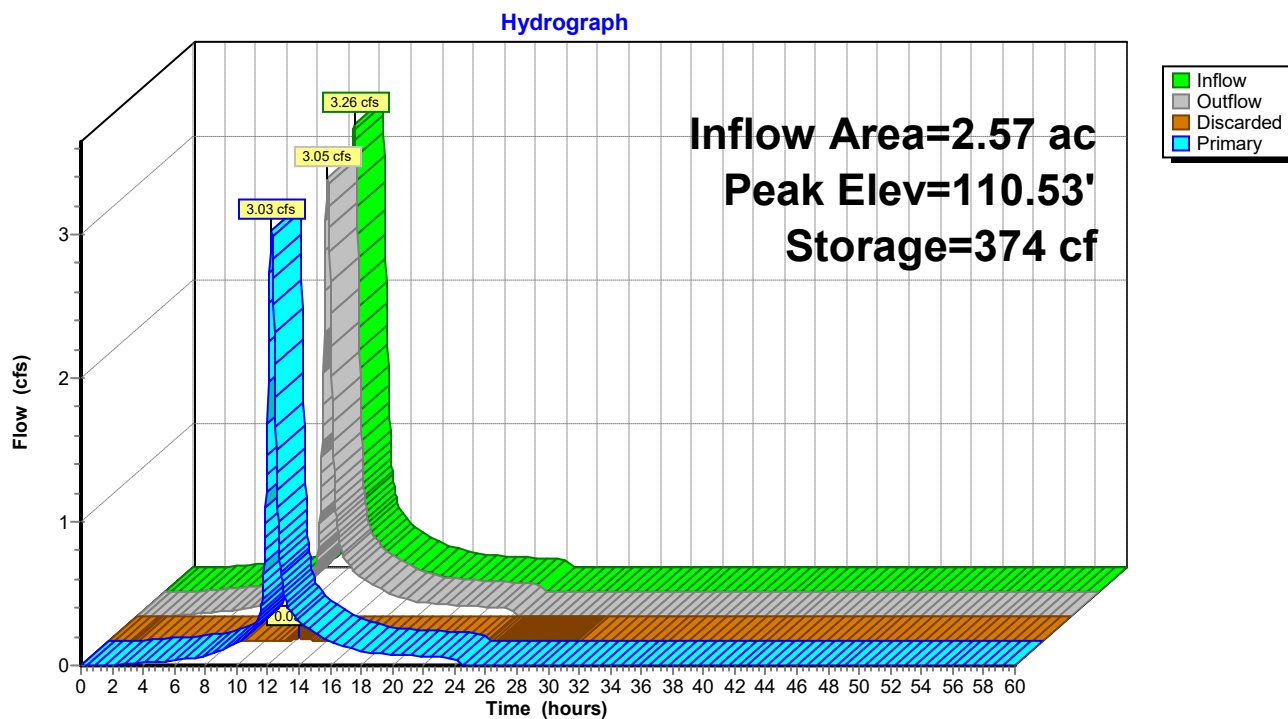
Summary for Link 1L: POA-1

Inflow Area =   0.78 ac, 47.79% Impervious, Inflow Depth =   2.13"   for 2-YR event
Inflow   =   1.59 cfs @   12.14 hrs, Volume=   0.138 af
Primary   =   1.59 cfs @   12.14 hrs, Volume=   0.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 1L: POA-1

Hydrograph

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Type III 24-hr 2-YR Rainfall=3.10"
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Summary for Link 2L: POA-2

Inflow Area =   2.57 ac, 42.91% Impervious, Inflow Depth =   1.69"   for 2-YR event
Inflow   =   3.03 cfs @   12.23 hrs, Volume=   0.362 af
Primary   =   3.03 cfs @   12.23 hrs, Volume=   0.362 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 2L: POA-2

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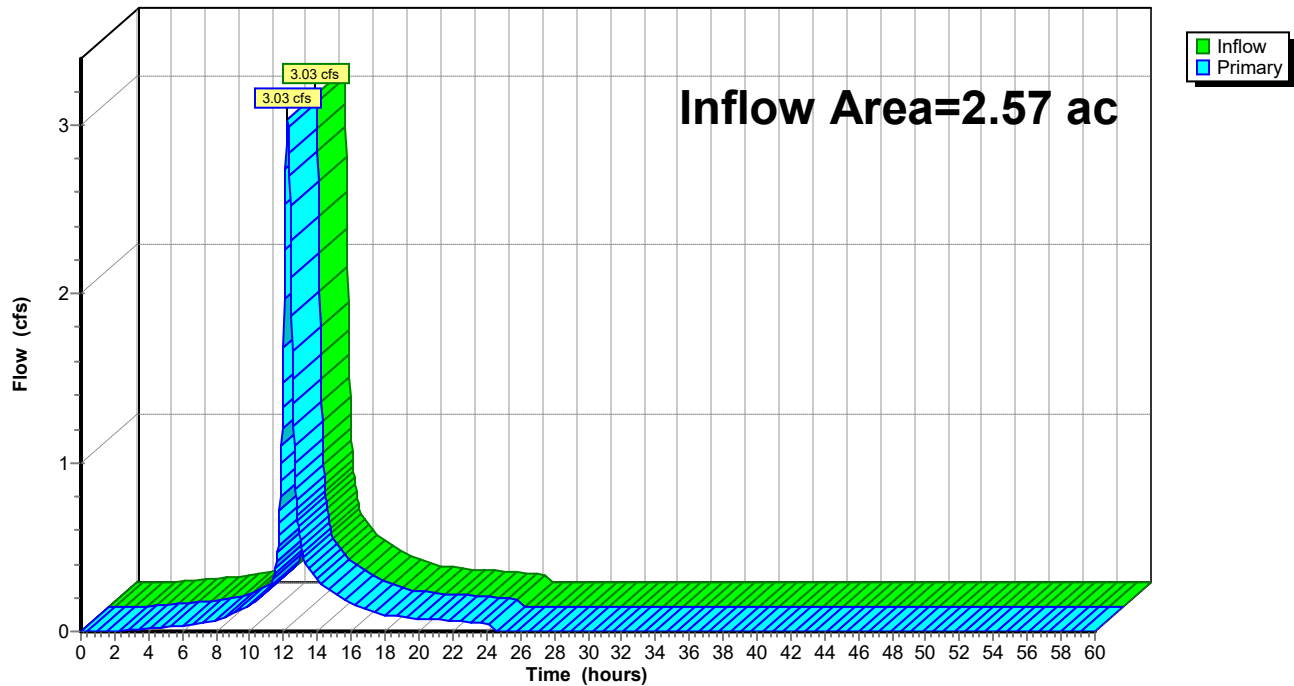
Summary for Link 3L:

Inflow Area =   0.80 ac, 69.02% Impervious, Inflow Depth = 2.00"   for 2-YR event
Inflow   =   1.64 cfs @   12.08 hrs, Volume=   0.133 af
Primary   =   1.64 cfs @   12.08 hrs, Volume=   0.133 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 3L:

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Type III 24-hr 10-YR Rainfall=4.60"
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Time span=0.00-60.00 hrs, dt=0.03 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1S: Runoff Area=24,450 sf 51.53% Impervious Runoff Depth=3.66"
Flow Length=238' Tc=7.9 min CN=WQ Runoff=2.07 cfs 0.171 af

Subcatchment 1.2S: Runoff Area=9,450 sf 38.10% Impervious Runoff Depth=3.46"
Flow Length=256' Tc=8.1 min CN=WQ Runoff=0.77 cfs 0.063 af

Subcatchment 2.1S: Runoff Area=27,300 sf 38.46% Impervious Runoff Depth=3.47"
Flow Length=209' Tc=6.0 min CN=WQ Runoff=2.38 cfs 0.181 af

Subcatchment 2.2S: Runoff Area=22,350 sf 24.61% Impervious Runoff Depth=2.15"
Flow Length=195' Tc=17.7 min CN=WQ Runoff=0.83 cfs 0.092 af

Subcatchment 2.3S: Runoff Area=9,200 sf 18.48% Impervious Runoff Depth=1.85"
Tc=6.0 min CN=WQ Runoff=0.41 cfs 0.033 af

Subcatchment 2.4S: Runoff Area=53,000 sf 57.17% Impervious Runoff Depth=3.18"
Flow Length=120' Tc=15.4 min CN=WQ Runoff=3.05 cfs 0.322 af

Subcatchment 3.1S: Runoff Area=2,050 sf 21.95% Impervious Runoff Depth=1.22"
Flow Length=27' Tc=6.0 min CN=WQ Runoff=0.05 cfs 0.005 af

Subcatchment 3.2S: Runoff Area=15,250 sf 81.64% Impervious Runoff Depth=3.65"
Tc=6.0 min CN=WQ Runoff=1.29 cfs 0.107 af

Subcatchment 3.3S: Runoff Area=8,100 sf 53.70% Impervious Runoff Depth=2.57"
Tc=6.0 min CN=WQ Runoff=0.46 cfs 0.040 af

Subcatchment 3.4S: Runoff Area=9,300 sf 72.04% Impervious Runoff Depth=3.16"
Flow Length=71' Tc=6.0 min CN=WQ Runoff=0.69 cfs 0.056 af

Reach 1R: Avg. Flow Depth=0.35' Max Vel=0.28 fps Inflow=2.07 cfs 0.166 af
n=0.400 L=67.0' S=0.0299 '/' Capacity=3.68 cfs Outflow=1.90 cfs 0.166 af

Reach 4R: EXISTING 15" CULVERT   Avg. Flow Depth=0.31' Max Vel=10.23 fps Inflow=2.38 cfs 0.181 af
15.0" Round Pipe n=0.011 L=55.0' S=0.0565 '/' Capacity=18.15 cfs Outflow=2.38 cfs 0.181 af

Reach 8R: UD   Avg. Flow Depth=0.12' Max Vel=8.28 fps Inflow=0.29 cfs 0.032 af
6.0" Round Pipe n=0.013 L=20.0' S=0.1840 '/' Capacity=2.41 cfs Outflow=0.29 cfs 0.032 af

Pond 1P: LEVEL SPREADER   Peak Elev=118.34' Storage=211 cf Inflow=2.07 cfs 0.171 af
Outflow=2.07 cfs 0.166 af

Pond 4P: DRIP EDGE   Peak Elev=116.11' Storage=0.004 af Inflow=0.41 cfs 0.033 af
6.0" Round Culvert n=0.013 L=257.0' S=0.0051 '/' Outflow=0.29 cfs 0.032 af

Pond 10P: DRAINAGE DITCH   Peak Elev=111.68' Storage=1,513 cf Inflow=5.64 cfs 0.628 af
Discarded=0.07 cfs 0.011 af Primary=4.41 cfs 0.617 af Outflow=4.48 cfs 0.628 af

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Type III 24-hr 10-YR Rainfall=4.60"
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Link 1L: POA-1

Inflow=2.63 cfs 0.229 af
Primary=2.63 cfs 0.229 af

Link 2L: POA-2

Inflow=4.41 cfs 0.617 af
Primary=4.41 cfs 0.617 af

Link 3L:

Inflow=2.49 cfs 0.207 af
Primary=2.49 cfs 0.207 af

Total Runoff Area = 4.14 ac   Runoff Volume = 1.069 af   Average Runoff Depth = 3.10"
51.15% Pervious = 2.12 ac   48.85% Impervious = 2.02 ac

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 1.1S:

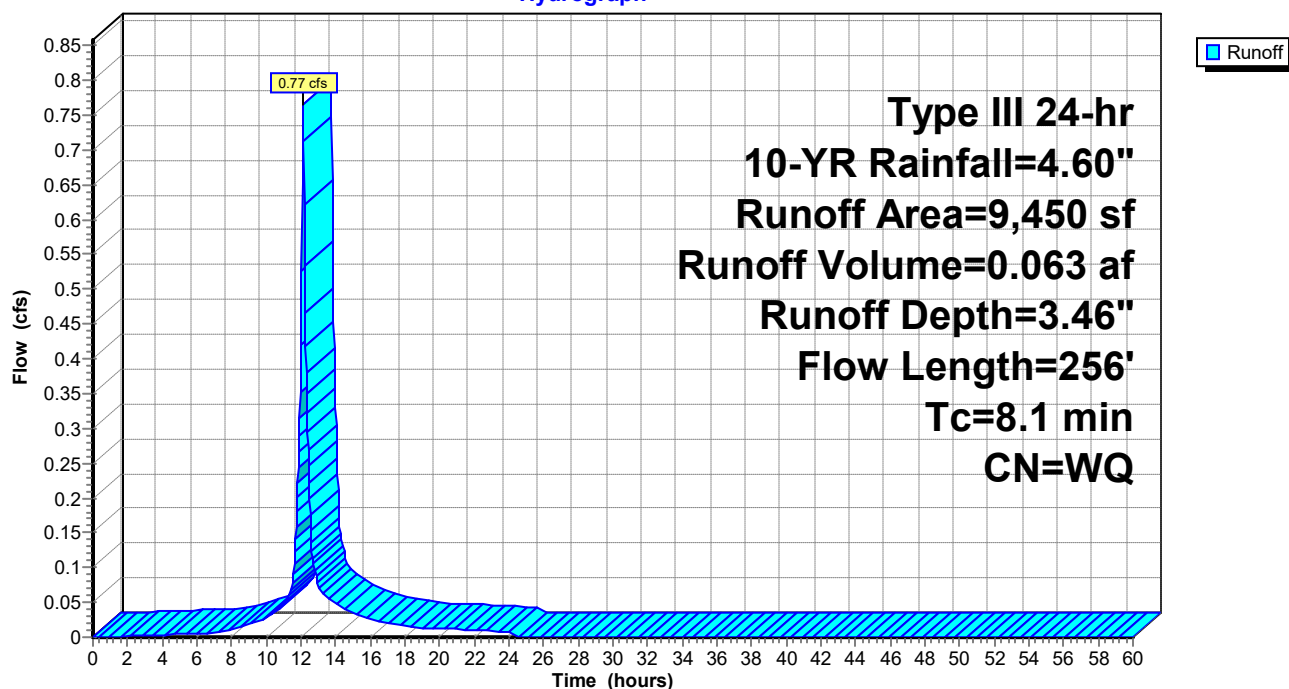Runoff   =   2.07 cfs @   12.11 hrs, Volume=   0.171 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
9,000	98	Paved parking, HSG D
3,600	98	Roofs, HSG D
11,850	84	50-75% Grass cover, Fair, HSG D
24,450		Weighted Average
11,850		48.47% Pervious Area
12,600		51.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	70	0.0250	0.17		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
1.0	134	0.0130	2.31		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.1	34	0.1000	5.09		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
7.9	238				Total

Subcatchment 1.1S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=24,450 sf
Runoff Volume=0.171 af
Runoff Depth=3.66"
Flow Length=238'
Tc=7.9 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 1.2S:

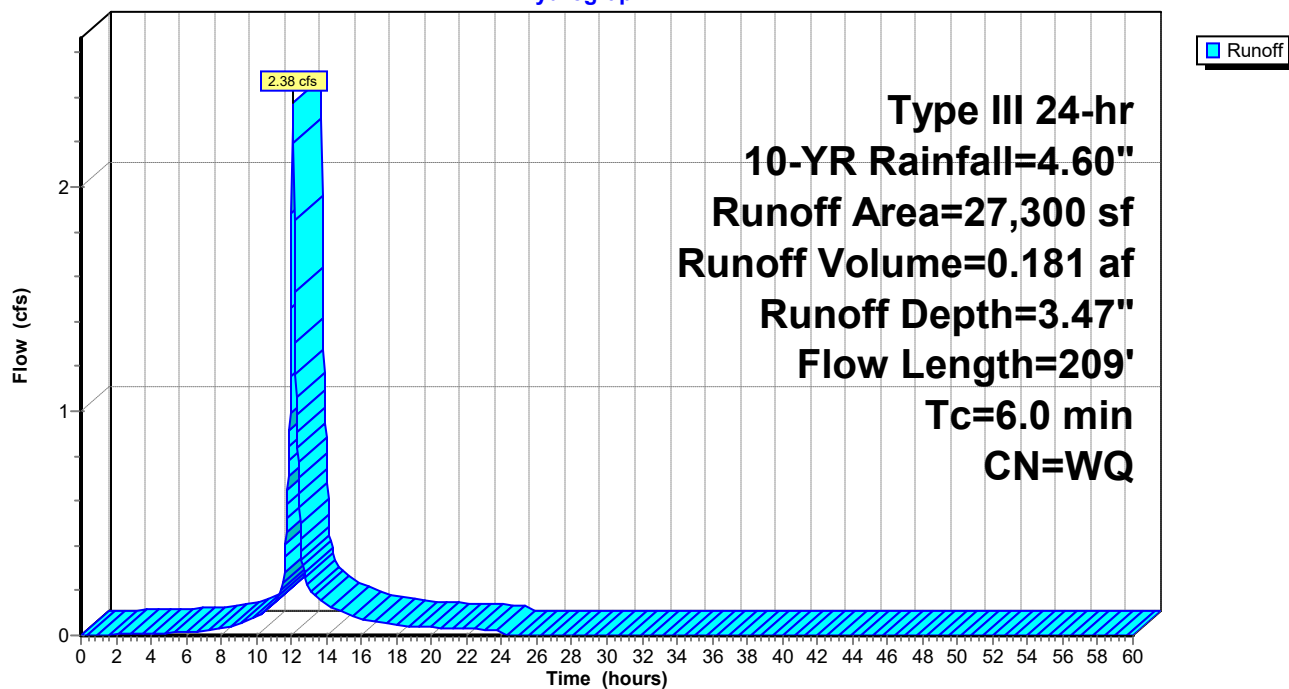Runoff   =   0.77 cfs @ 12.11 hrs, Volume=   0.063 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
1,650	98	Paved parking, HSG D
1,950	98	Roofs, HSG D
5,850	84	50-75% Grass cover, Fair, HSG D
9,450		Weighted Average
5,850		61.90% Pervious Area
3,600		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	70	0.0250	0.17		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
1.0	134	0.0130	2.31		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.3	52	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
8.1	256				Total

Subcatchment 1.2S:

Hydrograph

Summary for Subcatchment 2.1S:

Runoff   =   2.38 cfs @ 12.09 hrs, Volume=   0.181 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
7,250	98	Paved parking, HSG D
3,250	98	Roofs, HSG D
16,800	84	50-75% Grass cover, Fair, HSG D
27,300		Weighted Average
16,800		61.54% Pervious Area
10,500		38.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	47	0.0400	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.0	4	0.0400	4.06		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.2	38	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.5	90	0.0200	2.87		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
0.2	30	0.0300	2.79		**Shallow Concentrated Flow, E-F**
					Unpaved Kv= 16.1 fps
1.0					**Direct Entry, DIRECT**
6.0	209	Total			

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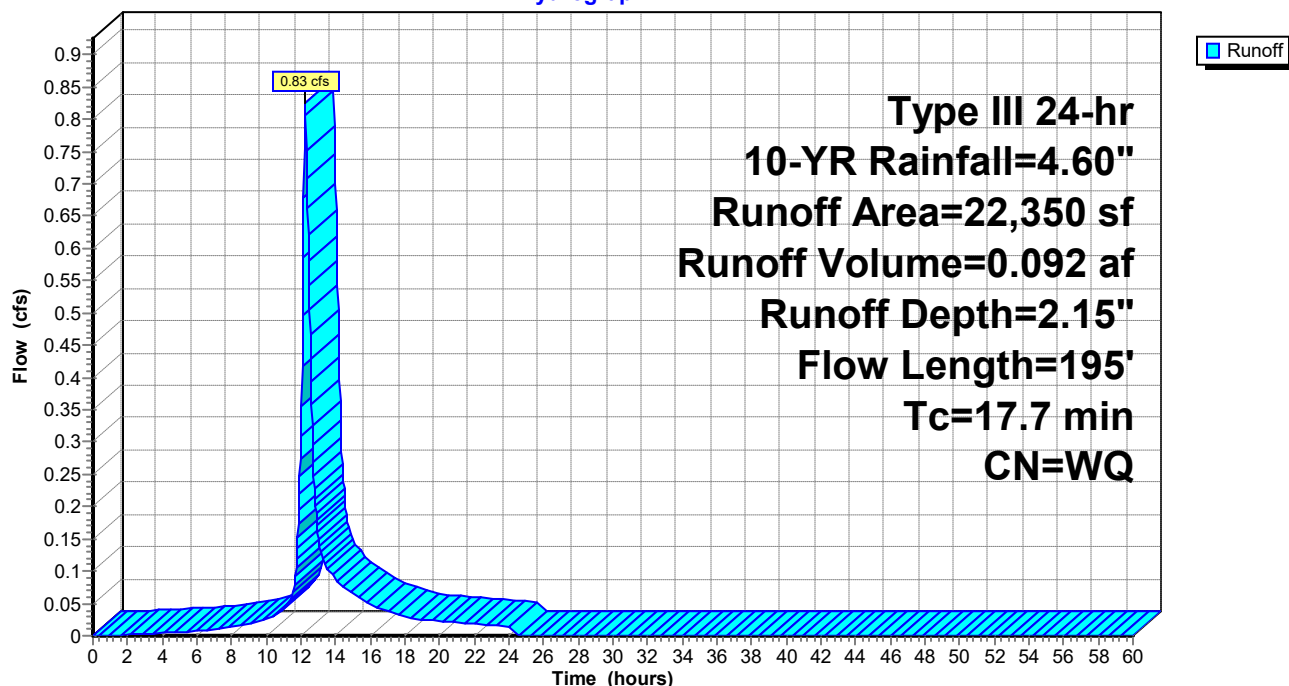*Type III 24-hr 10-YR Rainfall=4.60"*
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Subcatchment 2.1S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=27,300 sf
Runoff Volume=0.181 af
Runoff Depth=3.47"
Flow Length=209'
Tc=6.0 min
CN=WQ

2.38 cfs

Runoff

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 2.2S:

Runoff   =   0.83 cfs @ 12.25 hrs, Volume=   0.092 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
3,700	98	Paved parking, HSG B
1,800	98	Roofs, HSG B
9,900	69	50-75% Grass cover, Fair, HSG B
6,950	60	Woods, Fair, HSG B
22,350		Weighted Average
16,850		75.39% Pervious Area
5,500		24.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	72	0.0400	1.00		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.0	23	0.2500	8.05		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
17.7	195				Total

Subcatchment 2.2S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=22,350 sf
Runoff Volume=0.092 af
Runoff Depth=2.15"
Flow Length=195'
Tc=17.7 min
CN=WQ

Summary for Subcatchment 2.3S:

Runoff   =   0.41 cfs @   12.09 hrs, Volume=   0.033 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
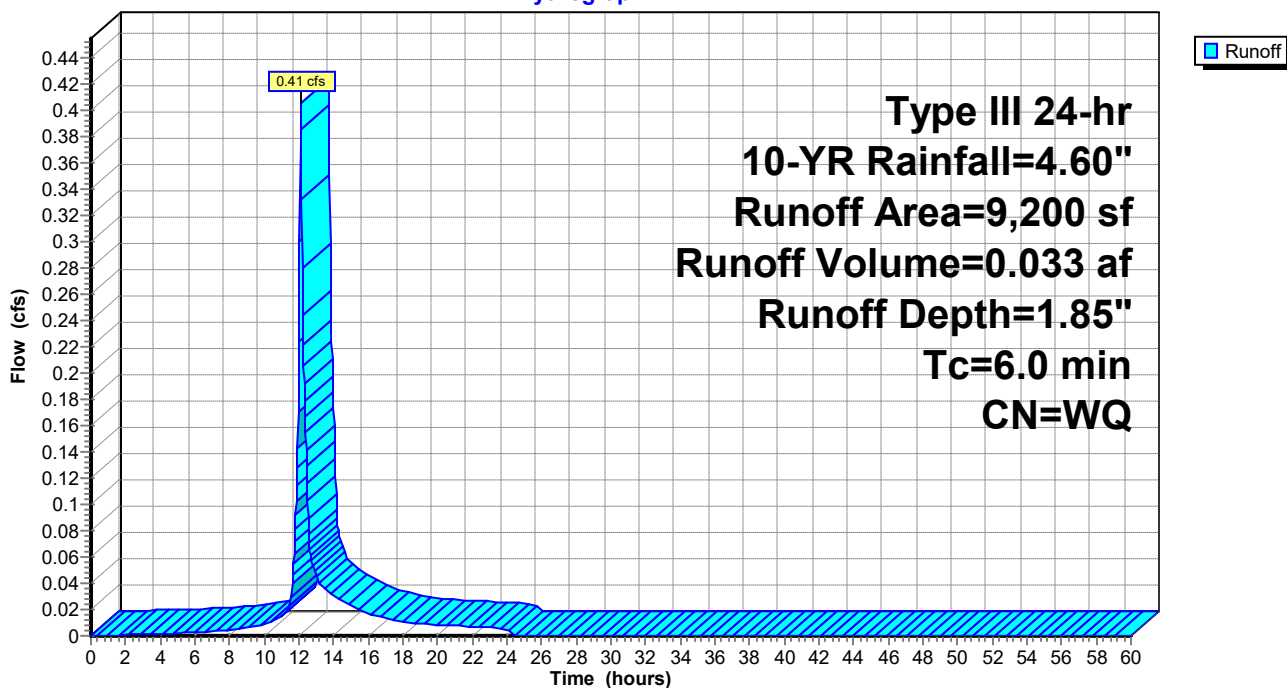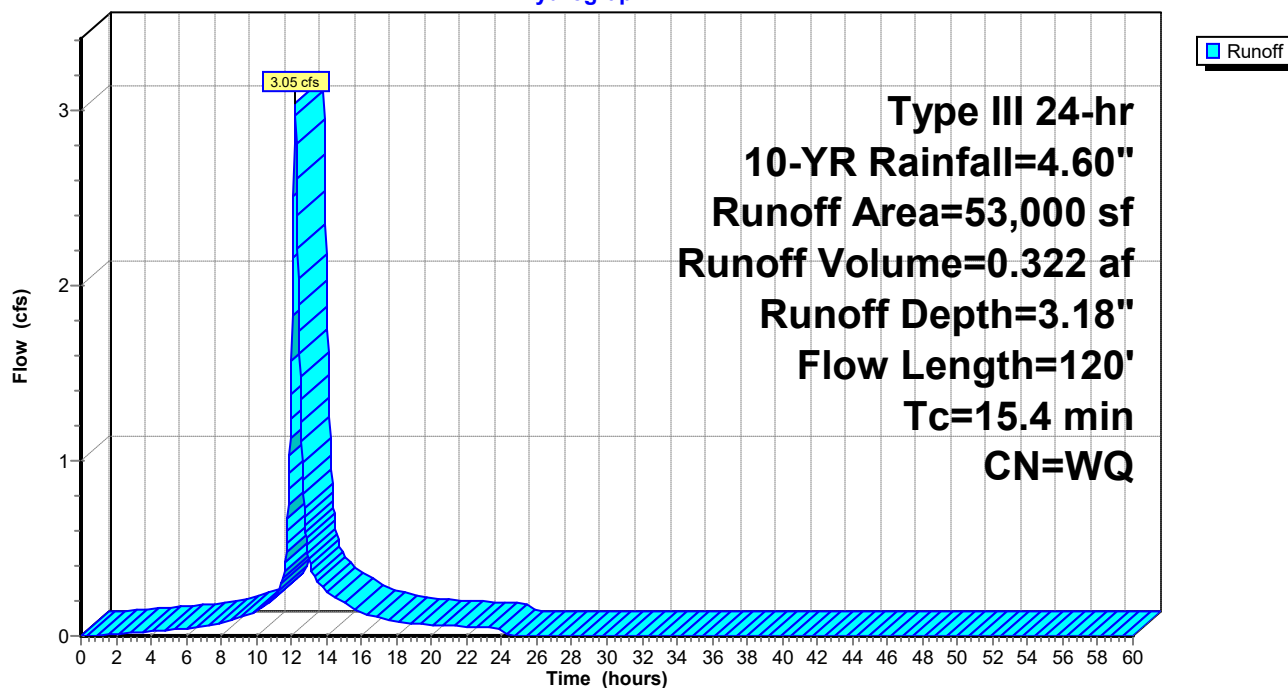Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
200	98	Paved parking, HSG B
1,500	98	Roofs, HSG B
2,550	69	50-75% Grass cover, Fair, HSG B
4,950	60	Woods, Fair, HSG B
9,200		Weighted Average
7,500		81.52% Pervious Area
1,700		18.48% Impervious Area

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

Subcatchment 2.3S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=9,200 sf
Runoff Volume=0.033 af
Runoff Depth=1.85"
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 2.4S:

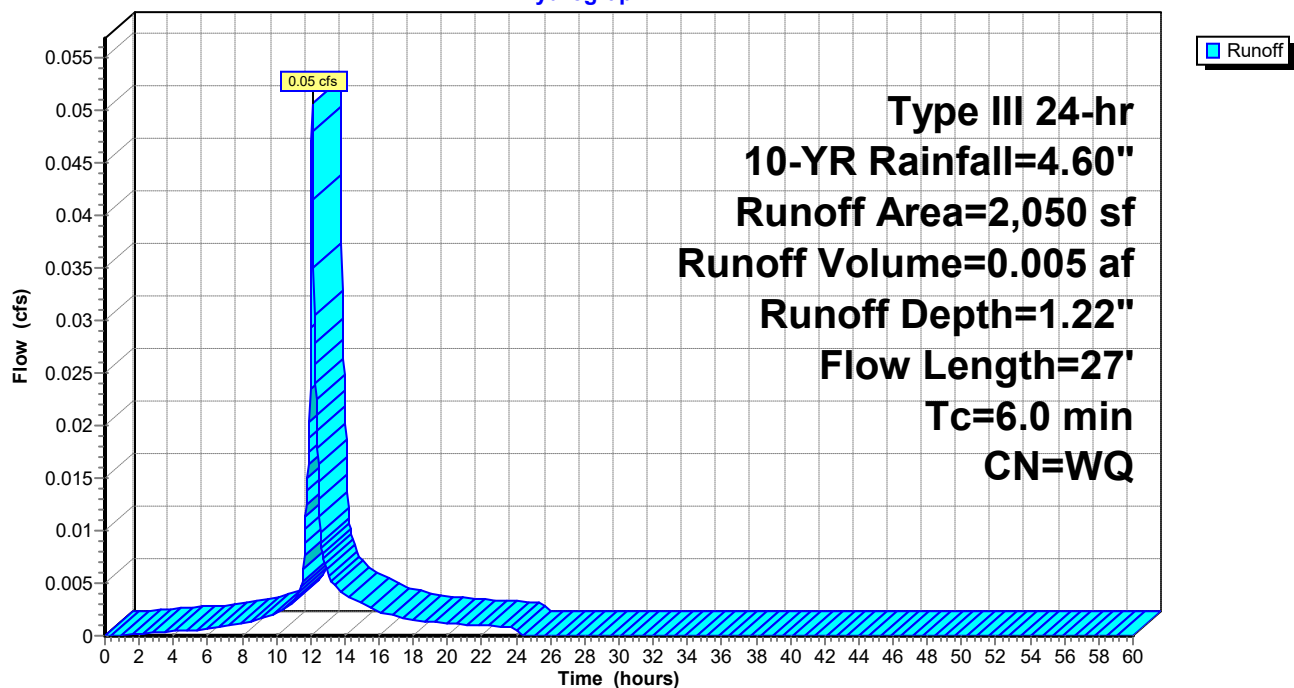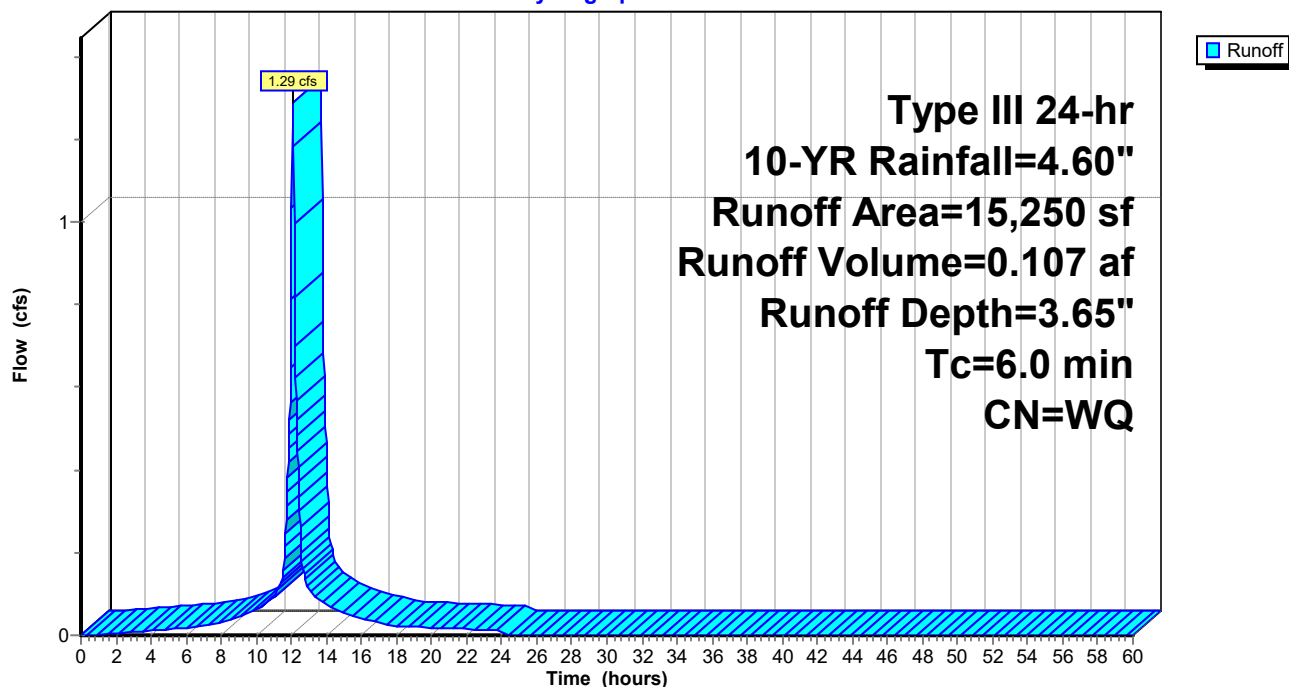Runoff   =   3.05 cfs @ 12.21 hrs, Volume=   0.322 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
21,600	98	Paved parking, HSG B
8,700	98	Roofs, HSG B
19,750	69	50-75% Grass cover, Fair, HSG B
2,950	60	Woods, Fair, HSG B
53,000		Weighted Average
22,700		42.83% Pervious Area
30,300		57.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	85	0.0350	0.09		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	35	0.1400	6.02		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
15.4	120				Total

Subcatchment 2.4S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=53,000 sf
Runoff Volume=0.322 af
Runoff Depth=3.18"
Flow Length=120'
Tc=15.4 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.1S:

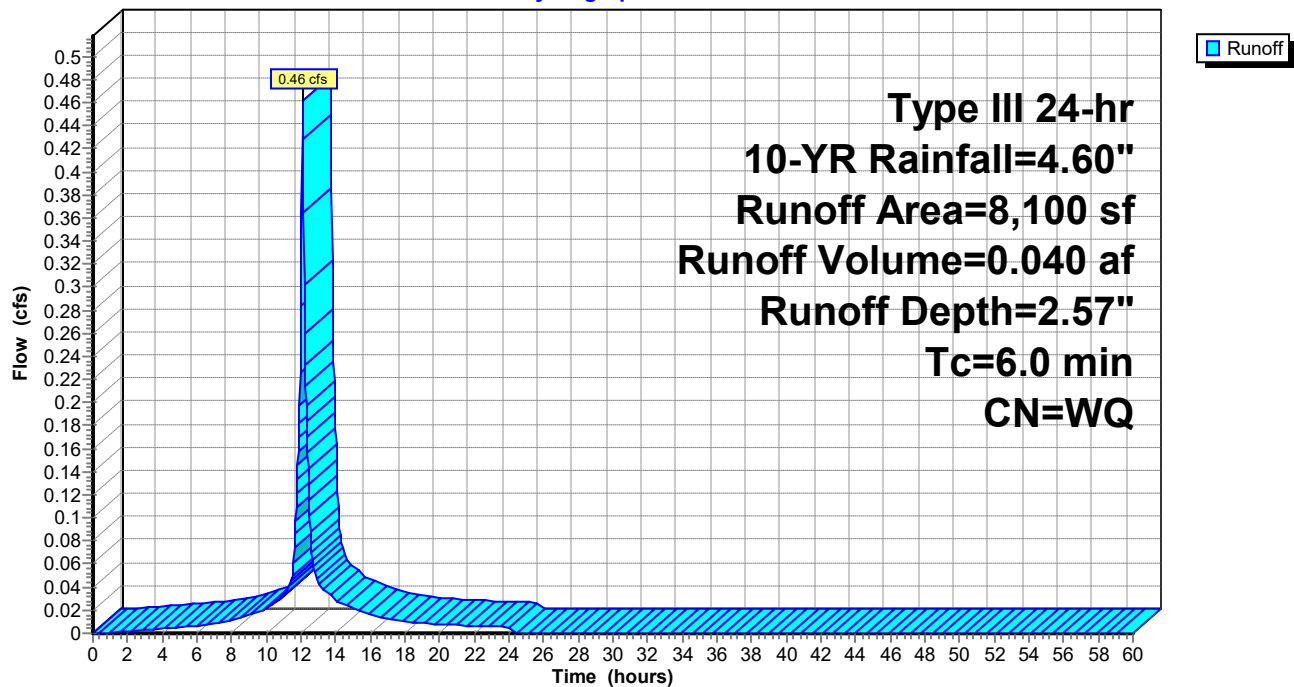Runoff   =   0.05 cfs @   12.09 hrs, Volume=   0.005 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
450	98	Roofs, HSG A
1,050	49	50-75% Grass cover, Fair, HSG A
550	36	Woods, Fair, HSG A
2,050		Weighted Average
1,600		78.05% Pervious Area
450		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0500	1.28		**Sheet Flow, A-B**
					Smooth surfaces n= 0.011 P2= 3.10"
0.0	10	0.1500	6.24		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
0.1	5	0.1000	1.58		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
5.7					**Direct Entry, DIRECT**
6.0	27				Total

Subcatchment 3.1S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=2,050 sf
Runoff Volume=0.005 af
Runoff Depth=1.22"
Flow Length=27'
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.2S:

Runoff   =   1.29 cfs @   12.09 hrs, Volume=   0.107 af, Depth= 3.65"
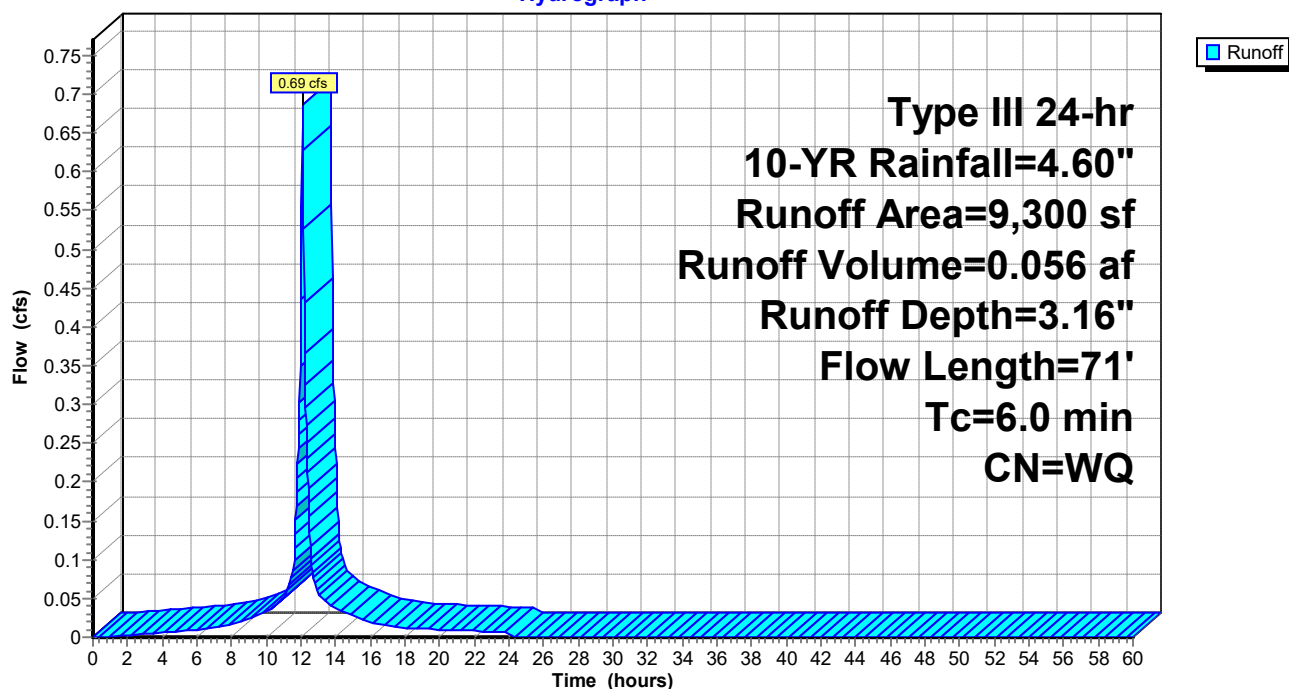
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
8,650	98	Paved parking, HSG A
3,800	98	Roofs, HSG A
2,800	49	50-75% Grass cover, Fair, HSG A
15,250		Weighted Average
2,800		18.36% Pervious Area
12,450		81.64% Impervious Area

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

Subcatchment 3.2S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=15,250 sf
Runoff Volume=0.107 af
Runoff Depth=3.65"
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.3S:

Runoff   =   0.46 cfs @   12.09 hrs, Volume=   0.040 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
3,100	98	Paved parking, HSG A
1,250	98	Roofs, HSG A
3,750	49	50-75% Grass cover, Fair, HSG A
8,100		Weighted Average
3,750		46.30% Pervious Area
4,350		53.70% Impervious Area

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

Subcatchment 3.3S:

Hydrograph

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Subcatchment 3.4S:

Runoff   =   0.69 cfs @ 12.08 hrs, Volume=   0.056 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
200	98	Paved parking, HSG A
650	98	Roofs, HSG A
5,850	98	Paved parking, HSG A
2,600	36	Woods, Fair, HSG A
9,300		Weighted Average
2,600		27.96% Pervious Area
6,700		72.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	25	0.0680	0.21		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.4	46	0.1400	1.87		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
3.6					**Direct Entry, DIRECT**
6.0	71				Total

Subcatchment 3.4S:

Hydrograph

Type III 24-hr
10-YR Rainfall=4.60"
Runoff Area=9,300 sf
Runoff Volume=0.056 af
Runoff Depth=3.16"
Flow Length=71'
Tc=6.0 min
CN=WQ

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Type III 24-hr 10-YR Rainfall=4.60"
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Summary for Reach 1R:

Inflow Area =   0.56 ac, 51.53% Impervious, Inflow Depth = 3.55"   for 10-YR event
Inflow   =   2.07 cfs @   12.11 hrs, Volume=   0.166 af
Outflow   =   1.90 cfs @   12.15 hrs, Volume=   0.166 af, Atten= 8%, Lag= 2.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 0.28 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 16.9 min

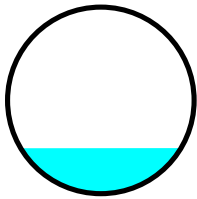Peak Storage= 451 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.35'
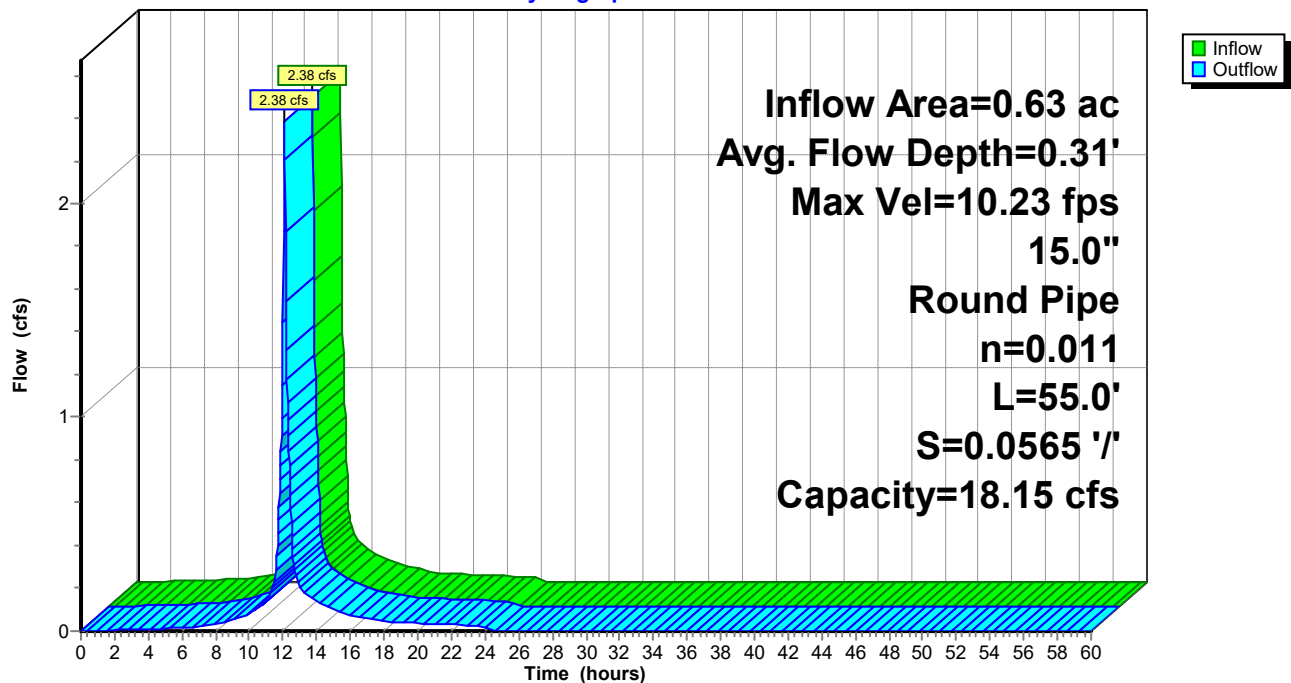Bank-Full Depth= 0.50' Flow Area= 10.5 sf, Capacity= 3.68 cfs

16.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 '/'   Top Width= 26.00'
Length= 67.0'   Slope= 0.0299 '/'
Inlet Invert= 117.00', Outlet Invert= 115.00'

‡

Reach 1R:

Hydrograph

Inflow Area=0.56 ac
Avg. Flow Depth=0.35'
Max Vel=0.28 fps
n=0.400
L=67.0'
S=0.0299 '/'
Capacity=3.68 cfs

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Type III 24-hr 10-YR Rainfall=4.60"
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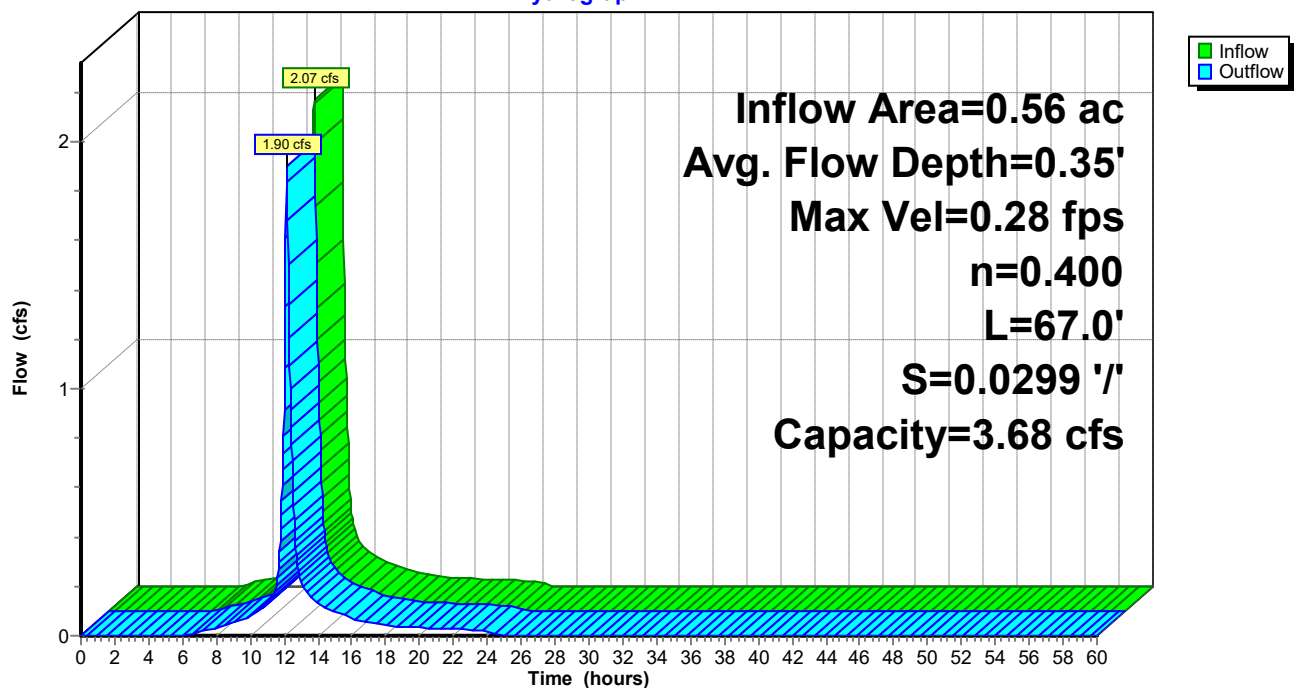
Summary for Reach 4R: EXISTING 15" CULVERT

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.63 ac, 38.46% Impervious, Inflow Depth =   3.47"   for 10-YR event
Inflow   =   2.38 cfs @   12.09 hrs, Volume=   0.181 af
Outflow   =   2.38 cfs @   12.09 hrs, Volume=   0.181 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 10.23 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.19 fps, Avg. Travel Time= 0.3 min

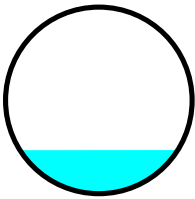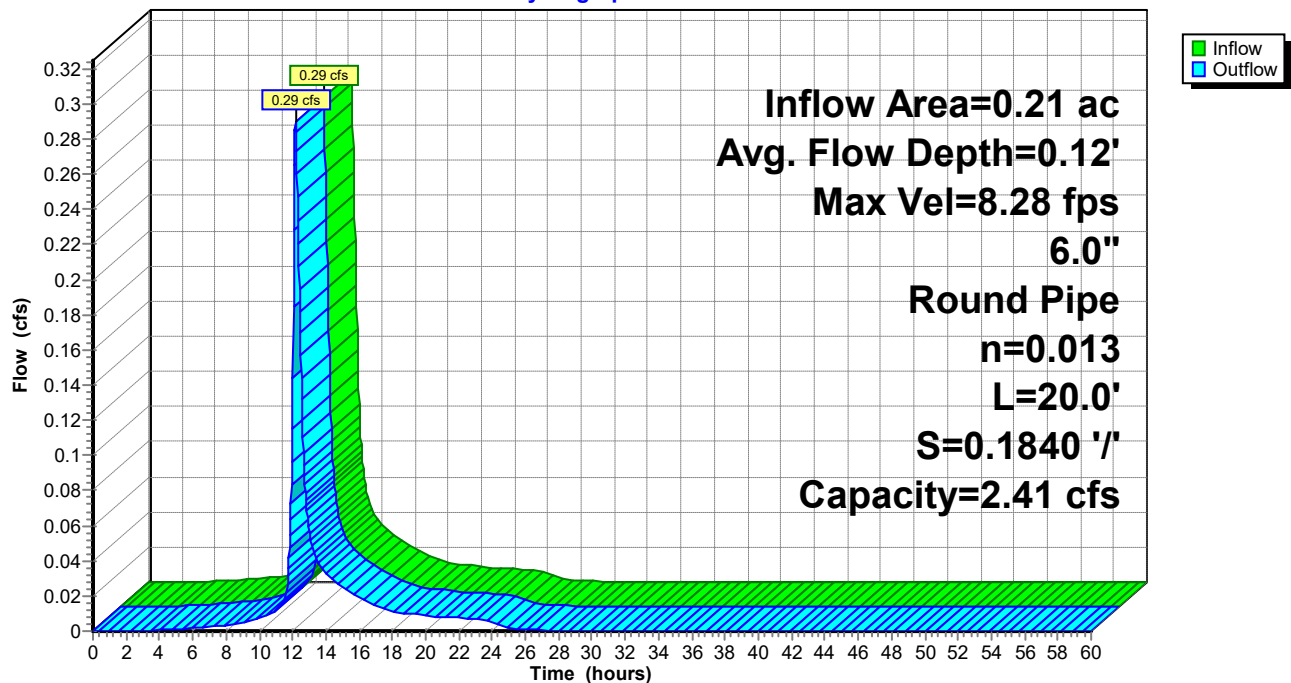Peak Storage= 13 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 18.15 cfs

15.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 55.0'   Slope= 0.0565 '/'
Inlet Invert= 117.50', Outlet Invert= 114.39'

Reach 4R: EXISTING 15" CULVERT

Hydrograph

Inflow Area=0.63 ac
Avg. Flow Depth=0.31'
Max Vel=10.23 fps
15.0"
Round Pipe
n=0.011
L=55.0'
S=0.0565 '/'
Capacity=18.15 cfs

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Summary for Reach 8R: UD

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =	0.21 ac,	18.48% Impervious,	Inflow Depth =	1.85"	for 10-YR event
Inflow =	0.29 cfs @	12.18 hrs,	Volume=	0.032 af	
Outflow =	0.29 cfs @	12.18 hrs,	Volume=	0.032 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 8.28 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.59 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 2.41 cfs

6.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 20.0'   Slope= 0.1840 '/'
Inlet Invert= 114.38', Outlet Invert= 110.70'

Reach 8R: UD

Hydrograph

Inflow Area=0.21 ac
Avg. Flow Depth=0.12'
Max Vel=8.28 fps
6.0"
Round Pipe
n=0.013
L=20.0'
S=0.1840 '/'
Capacity=2.41 cfs

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Summary for Pond 1P: LEVEL SPREADER

[92] Warning: Device #1 is above defined storage
[93] Warning: Storage range exceeded by 0.14'

Inflow Area =		0.56 ac, 51.53% Impervious,	Inflow Depth =	3.66"	for 10-YR event
Inflow	=	2.07 cfs @ 12.11 hrs,	Volume=	0.171 af	
Outflow	=	2.07 cfs @ 12.11 hrs,	Volume=	0.166 af,	Atten= 0%, Lag= 0.0 min
Primary	=	2.07 cfs @ 12.11 hrs,	Volume=	0.166 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 118.34' @ 12.11 hrs   Surf.Area= 192 sf   Storage= 211 cf

Plug-Flow detention time= 31.9 min calculated for 0.166 af (97% of inflow)
Center-of-Mass det. time= 14.5 min (790.6 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	211 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
116.50	68	0	0
117.00	112	45	45
118.00	152	132	177
118.20	192	34	211

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	**16.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.05 cfs @ 12.11 hrs HW=118.34' TW=117.33' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 2.05 cfs @ 0.91 fps)
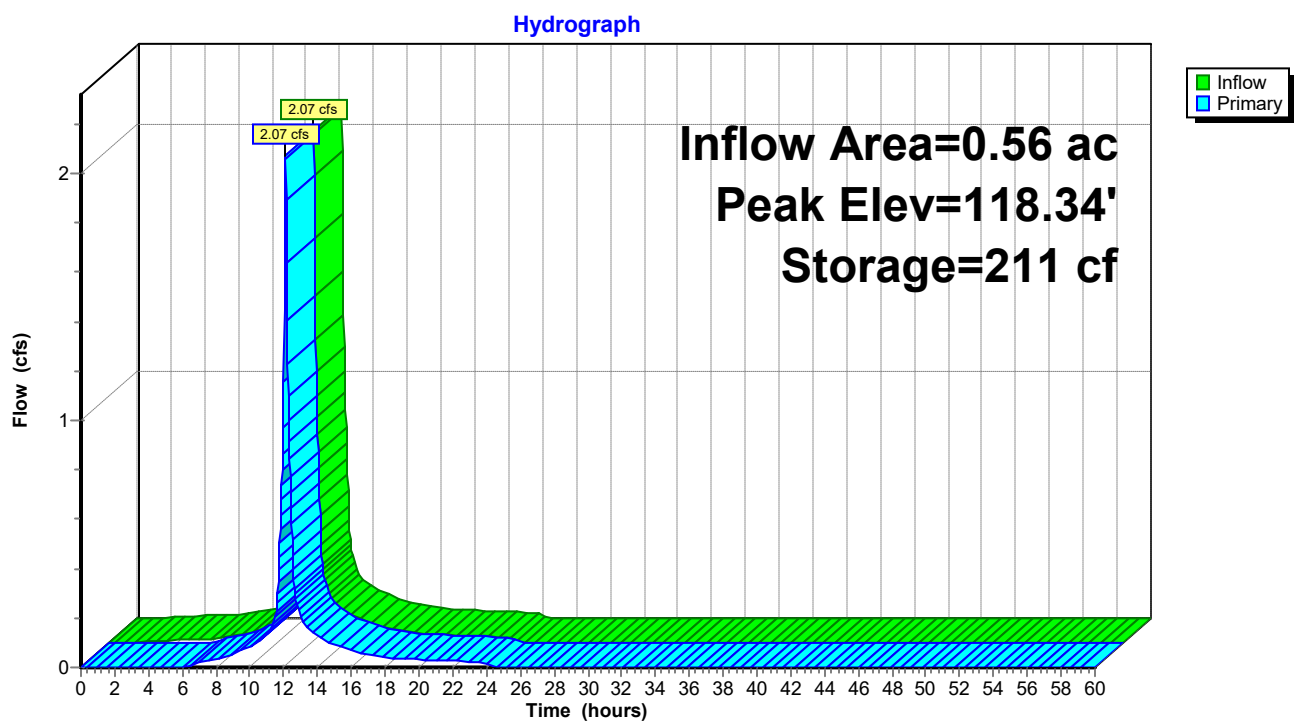
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Pond 1P: LEVEL SPREADER

Inflow Area=0.56 ac
Peak Elev=118.34'
Storage=211 cf

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Summary for Pond 4P: DRIP EDGE

Inflow Area =   0.21 ac, 18.48% Impervious, Inflow Depth = 1.85"   for 10-YR event
Inflow   =   0.41 cfs @   12.09 hrs, Volume=   0.033 af
Outflow   =   0.29 cfs @   12.18 hrs, Volume=   0.032 af, Atten= 29%, Lag= 5.1 min
Primary   =   0.29 cfs @   12.18 hrs, Volume=   0.032 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 116.11' @ 12.18 hrs   Surf.Area= 0.03 ac   Storage= 0.004 af

Plug-Flow detention time= 32.7 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 32.3 min (849.6 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1	115.68'	0.024 af	**4.00'W x 257.00'L x 2.00'H Prismatoid Z=0.5** 0.059 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	115.68'	**6.0" Round Culvert** L= 257.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 115.68' / 114.38' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.29 cfs @ 12.18 hrs HW=116.11' TW=114.50'   (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.29 cfs @ 2.19 fps)

Pond 4P: DRIP EDGE

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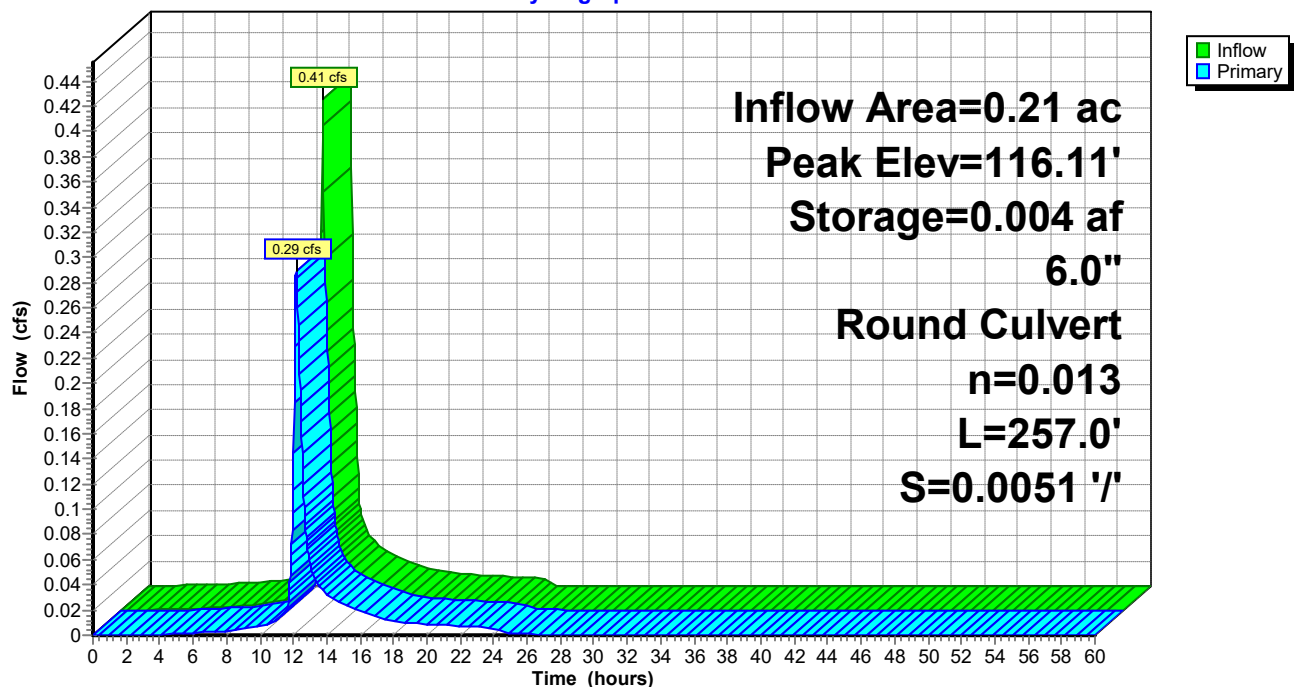
Summary for Pond 10P: DRAINAGE DITCH

[62] Hint: Exceeded Reach 8R OUTLET depth by 0.87' @ 12.33 hrs

Inflow Area =		2.57 ac, 42.91% Impervious, Inflow Depth = 2.93" for 10-YR event		
Inflow	=	5.64 cfs @ 12.15 hrs, Volume=	0.628 af	
Outflow	=	4.48 cfs @ 12.31 hrs, Volume=	0.628 af, Atten= 21%, Lag= 9.8 min	
Discarded	=	0.07 cfs @ 12.31 hrs, Volume=	0.011 af	
Primary	=	4.41 cfs @ 12.31 hrs, Volume=	0.617 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 111.68' @ 12.31 hrs   Surf.Area= 1,513 sf   Storage= 1,513 cf

Plug-Flow detention time= 2.3 min calculated for 0.627 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (792.9 - 790.6)

Volume	Invert	Avail.Storage	Storage Description
#1	109.00'	4,655 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
109.00	40	0	0
110.00	265	153	153
111.00	850	558	710
112.00	1,825	1,338	2,048
113.00	3,390	2,608	4,655

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	109.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 109.00' / 108.50' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 12.31 hrs HW=111.68'   (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=4.40 cfs @ 12.31 hrs HW=111.68' TW=0.00'   (Dynamic Tailwater)
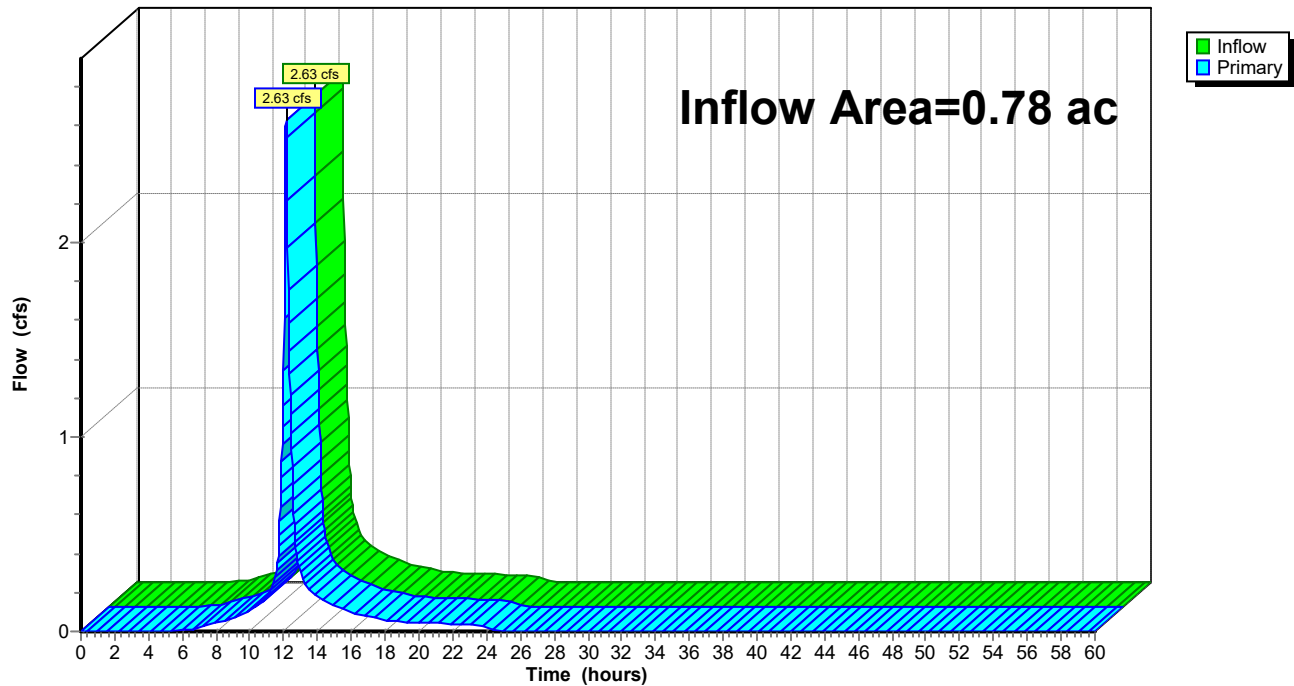└─**2=Culvert** (Inlet Controls 4.40 cfs @ 5.61 fps)

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Pond 10P: DRAINAGE DITCH

Hydrograph

Inflow Area=2.57 ac
Peak Elev=111.68'
Storage=1,513 cf

Legend:
- Inflow (green)
- Outflow (gray)
- Discarded (orange)
- Primary (cyan)

5.64 cfs
4.48 cfs
4.41 cfs

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Summary for Link 1L: POA-1

Inflow Area =   0.78 ac, 47.79% Impervious, Inflow Depth = 3.53"   for 10-YR event
Inflow   =   2.63 cfs @   12.14 hrs, Volume=   0.229 af
Primary   =   2.63 cfs @   12.14 hrs, Volume=   0.229 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 1L: POA-1

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Summary for Link 2L: POA-2

Inflow Area =   2.57 ac, 42.91% Impervious, Inflow Depth =   2.88"   for 10-YR event
Inflow   =   4.41 cfs @   12.31 hrs, Volume=   0.617 af
Primary   =   4.41 cfs @   12.31 hrs, Volume=   0.617 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 2L: POA-2

Hydrograph

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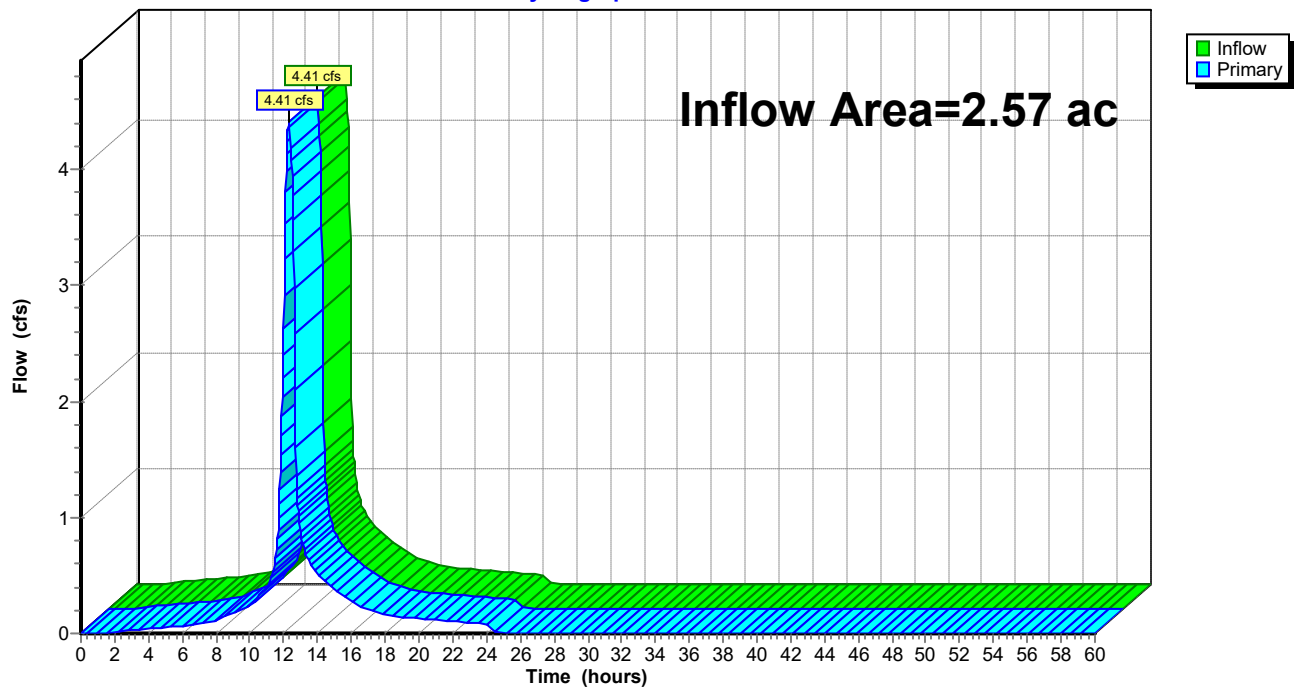
Summary for Link 3L:

Inflow Area =   0.80 ac, 69.02% Impervious, Inflow Depth =   3.12"   for 10-YR event
Inflow   =   2.49 cfs @   12.09 hrs, Volume=   0.207 af
Primary   =   2.49 cfs @   12.09 hrs, Volume=   0.207 af, Atten= 0%, Lag= 0.0 min
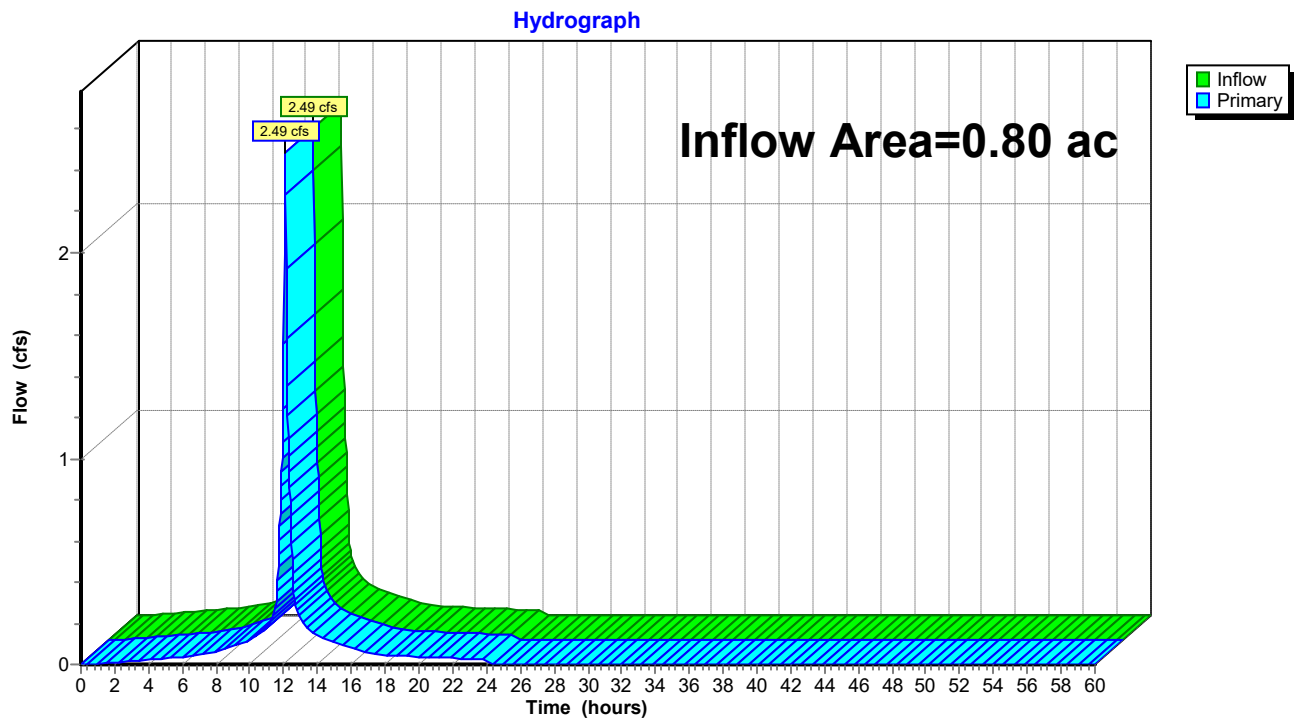
Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 3L:

Hydrograph

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Type III 24-hr 25-YR Rainfall=5.80"
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Time span=0.00-60.00 hrs, dt=0.03 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1.1S: Runoff Area=24,450 sf 51.53% Impervious Runoff Depth=4.81"
Flow Length=238' Tc=7.9 min CN=WQ Runoff=2.71 cfs 0.225 af

Subcatchment 1.2S: Runoff Area=9,450 sf 38.10% Impervious Runoff Depth=4.60"
Flow Length=256' Tc=8.1 min CN=WQ Runoff=1.01 cfs 0.083 af

Subcatchment 2.1S: Runoff Area=27,300 sf 38.46% Impervious Runoff Depth=4.61"
Flow Length=209' Tc=6.0 min CN=WQ Runoff=3.14 cfs 0.241 af

Subcatchment 2.2S: Runoff Area=22,350 sf 24.61% Impervious Runoff Depth=3.06"
Flow Length=195' Tc=17.7 min CN=WQ Runoff=1.21 cfs 0.131 af

Subcatchment 2.3S: Runoff Area=9,200 sf 18.48% Impervious Runoff Depth=2.70"
Tc=6.0 min CN=WQ Runoff=0.62 cfs 0.048 af

Subcatchment 2.4S: Runoff Area=53,000 sf 57.17% Impervious Runoff Depth=4.23"
Flow Length=120' Tc=15.4 min CN=WQ Runoff=4.08 cfs 0.429 af

Subcatchment 3.1S: Runoff Area=2,050 sf 21.95% Impervious Runoff Depth=1.79"
Flow Length=27' Tc=6.0 min CN=WQ Runoff=0.08 cfs 0.007 af

Subcatchment 3.2S: Runoff Area=15,250 sf 81.64% Impervious Runoff Depth=4.72"
Tc=6.0 min CN=WQ Runoff=1.66 cfs 0.138 af

Subcatchment 3.3S: Runoff Area=8,100 sf 53.70% Impervious Runoff Depth=3.44"
Tc=6.0 min CN=WQ Runoff=0.63 cfs 0.053 af

Subcatchment 3.4S: Runoff Area=9,300 sf 72.04% Impervious Runoff Depth=4.08"
Flow Length=71' Tc=6.0 min CN=WQ Runoff=0.87 cfs 0.073 af

Reach 1R: Avg. Flow Depth=0.40' Max Vel=0.31 fps Inflow=2.70 cfs 0.220 af
n=0.400 L=67.0' S=0.0299 '/' Capacity=3.68 cfs Outflow=2.51 cfs 0.220 af

Reach 4R: EXISTING 15" CULVERT Avg. Flow Depth=0.35' Max Vel=11.08 fps Inflow=3.14 cfs 0.241 af
15.0" Round Pipe n=0.011 L=55.0' S=0.0565 '/' Capacity=18.15 cfs Outflow=3.14 cfs 0.241 af

Reach 8R: UD Avg. Flow Depth=0.14' Max Vel=9.21 fps Inflow=0.42 cfs 0.048 af
6.0" Round Pipe n=0.013 L=20.0' S=0.1840 '/' Capacity=2.41 cfs Outflow=0.42 cfs 0.048 af

Pond 1P: LEVEL SPREADER Peak Elev=118.37' Storage=211 cf Inflow=2.71 cfs 0.225 af
Outflow=2.70 cfs 0.220 af

Pond 4P: DRIP EDGE Peak Elev=116.27' Storage=0.006 af Inflow=0.62 cfs 0.048 af
6.0" Round Culvert n=0.013 L=257.0' S=0.0051 '/' Outflow=0.42 cfs 0.048 af

Pond 10P: DRAINAGE DITCH Peak Elev=112.48' Storage=3,107 cf Inflow=7.64 cfs 0.848 af
Discarded=0.12 cfs 0.015 af Primary=5.15 cfs 0.833 af Outflow=5.27 cfs 0.848 af

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Type III 24-hr 25-YR Rainfall=5.80"
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Link 1L: POA-1

Inflow=3.47 cfs 0.303 af
Primary=3.47 cfs 0.303 af

Link 2L: POA-2

Inflow=5.15 cfs 0.833 af
Primary=5.15 cfs 0.833 af

Link 3L:

Inflow=3.24 cfs 0.271 af
Primary=3.24 cfs 0.271 af

Total Runoff Area = 4.14 ac   Runoff Volume = 1.427 af   Average Runoff Depth = 4.13"
51.15% Pervious = 2.12 ac   48.85% Impervious = 2.02 ac

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Summary for Subcatchment 1.1S:

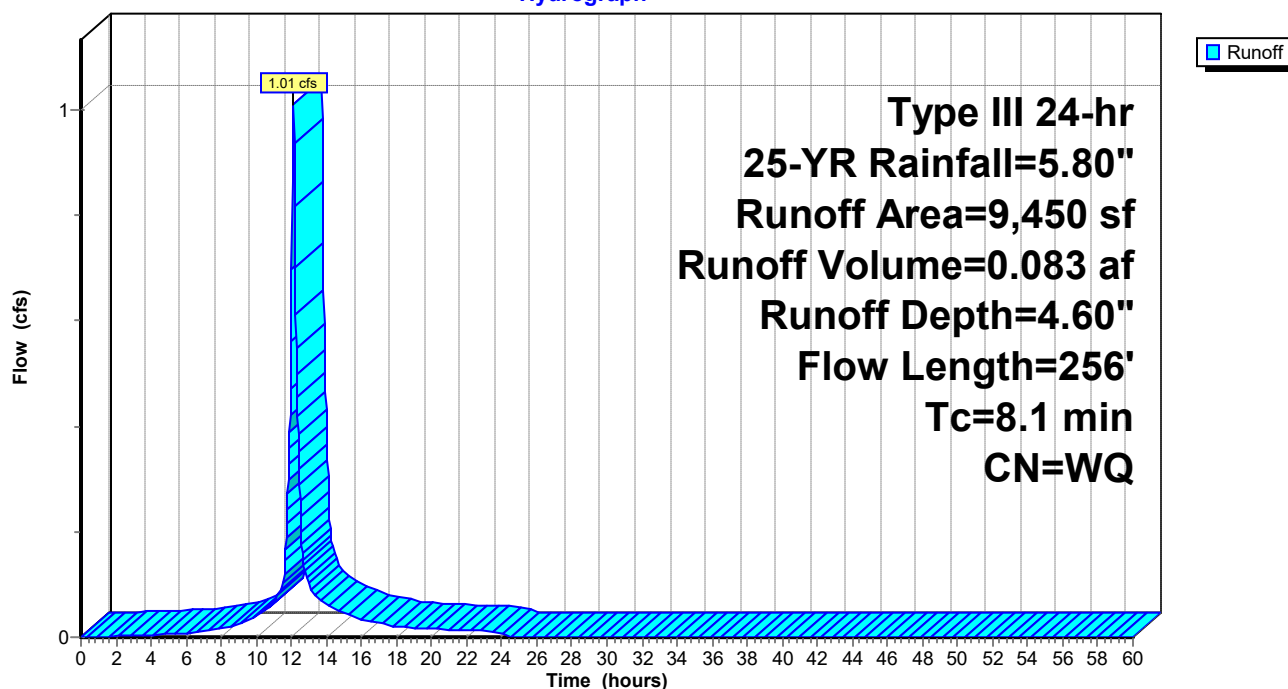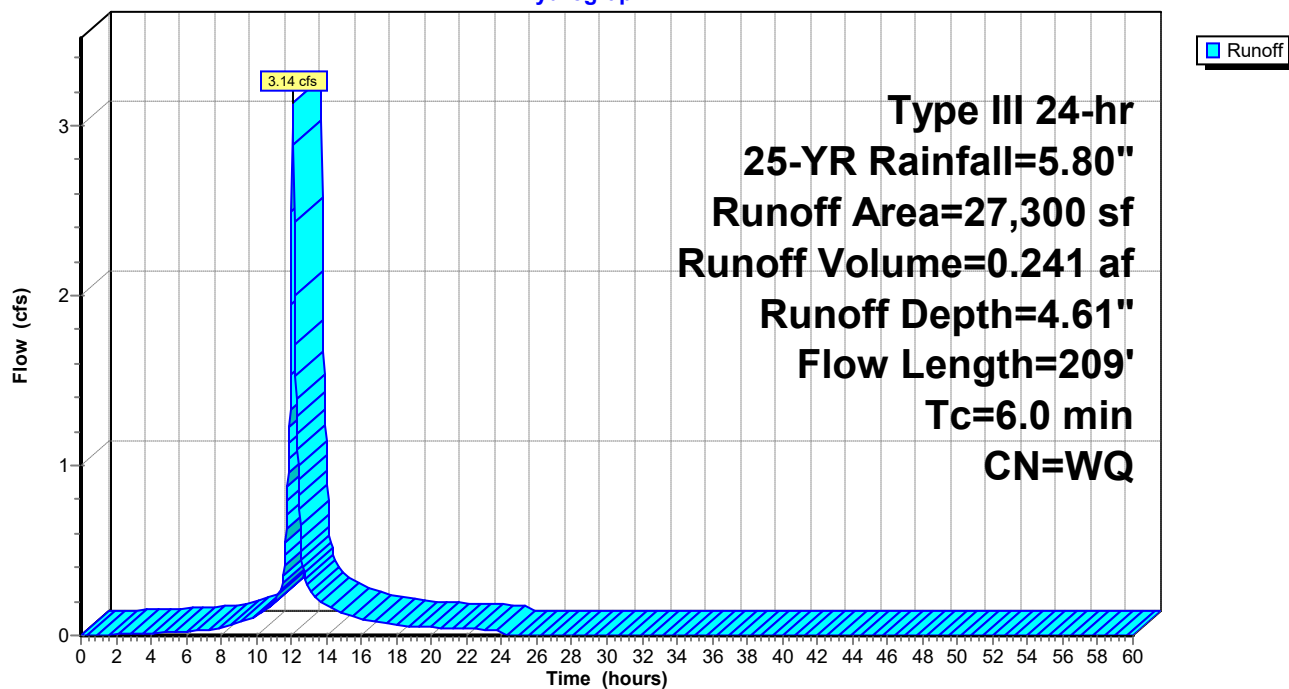Runoff   =   2.71 cfs @ 12.11 hrs, Volume=   0.225 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
9,000	98	Paved parking, HSG D
3,600	98	Roofs, HSG D
11,850	84	50-75% Grass cover, Fair, HSG D
24,450		Weighted Average
11,850		48.47% Pervious Area
12,600		51.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	70	0.0250	0.17		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
1.0	134	0.0130	2.31		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.1	34	0.1000	5.09		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
7.9	238	Total			

Subcatchment 1.1S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=24,450 sf
Runoff Volume=0.225 af
Runoff Depth=4.81"
Flow Length=238'
Tc=7.9 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 1.2S:

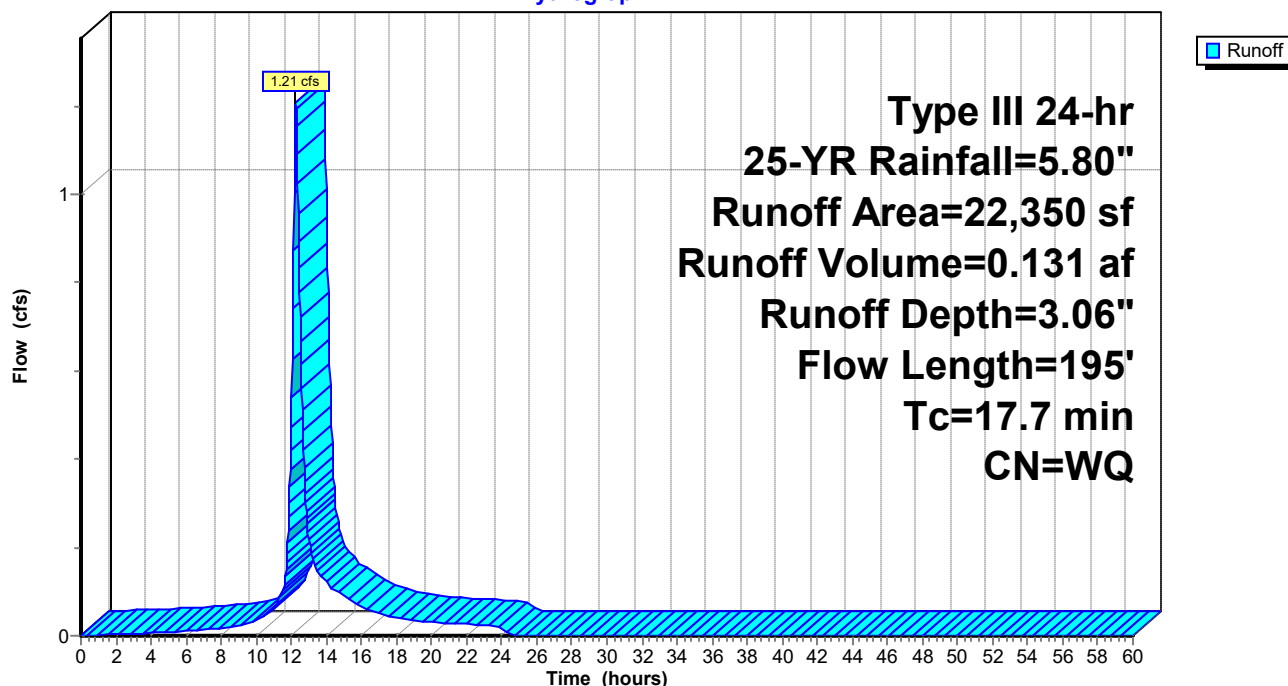Runoff   =   1.01 cfs @ 12.11 hrs, Volume=   0.083 af, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
1,650	98	Paved parking, HSG D
1,950	98	Roofs, HSG D
5,850	84	50-75% Grass cover, Fair, HSG D
9,450		Weighted Average
5,850		61.90% Pervious Area
3,600		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	70	0.0250	0.17		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
1.0	134	0.0130	2.31		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.3	52	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
8.1	256				Total

Subcatchment 1.2S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=9,450 sf
Runoff Volume=0.083 af
Runoff Depth=4.60"
Flow Length=256'
Tc=8.1 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 2.1S:

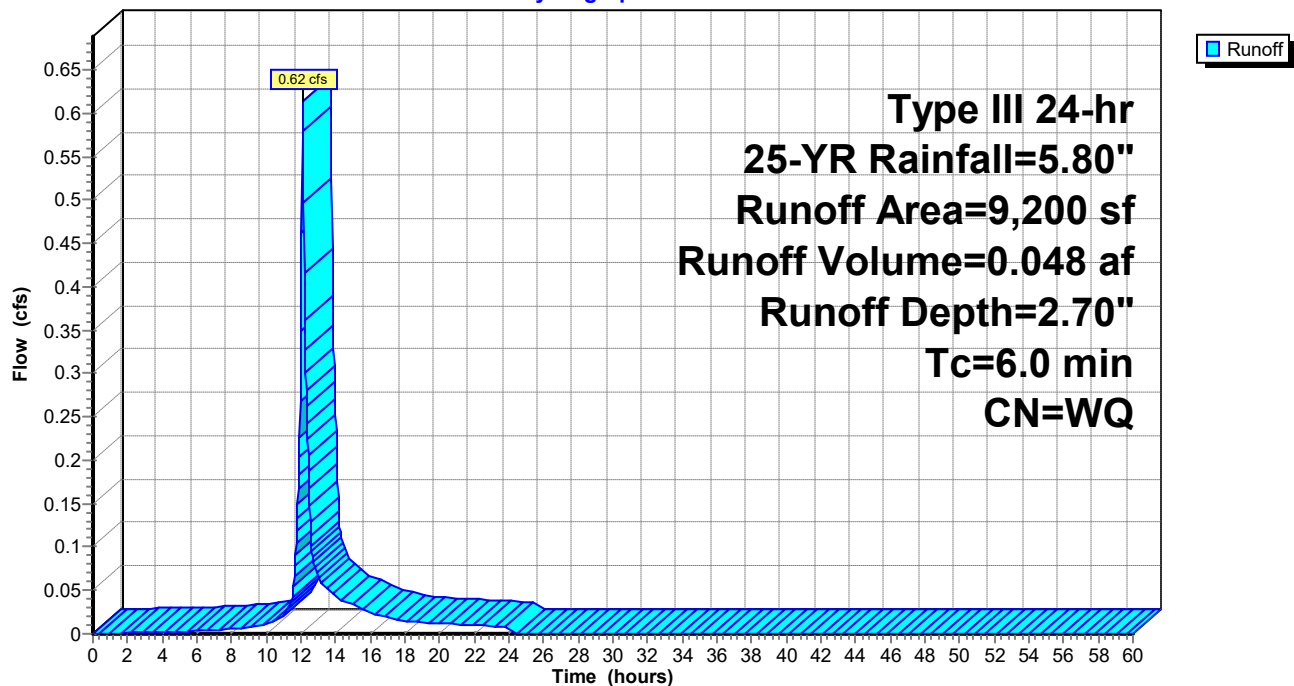Runoff   =   3.14 cfs @ 12.09 hrs, Volume=   0.241 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
7,250	98	Paved parking, HSG D
3,250	98	Roofs, HSG D
16,800	84	50-75% Grass cover, Fair, HSG D
27,300		Weighted Average
16,800		61.54% Pervious Area
10,500		38.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	47	0.0400	0.19		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.0	4	0.0400	4.06		**Shallow Concentrated Flow, B-C**
					Paved Kv= 20.3 fps
0.2	38	0.0400	3.22		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
0.5	90	0.0200	2.87		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
0.2	30	0.0300	2.79		**Shallow Concentrated Flow, E-F**
					Unpaved Kv= 16.1 fps
1.0					**Direct Entry, DIRECT**
6.0	209	Total			

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Type III 24-hr 25-YR Rainfall=5.80"
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Subcatchment 2.1S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=27,300 sf
Runoff Volume=0.241 af
Runoff Depth=4.61"
Flow Length=209'
Tc=6.0 min
CN=WQ

3.14 cfs

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 2.2S:

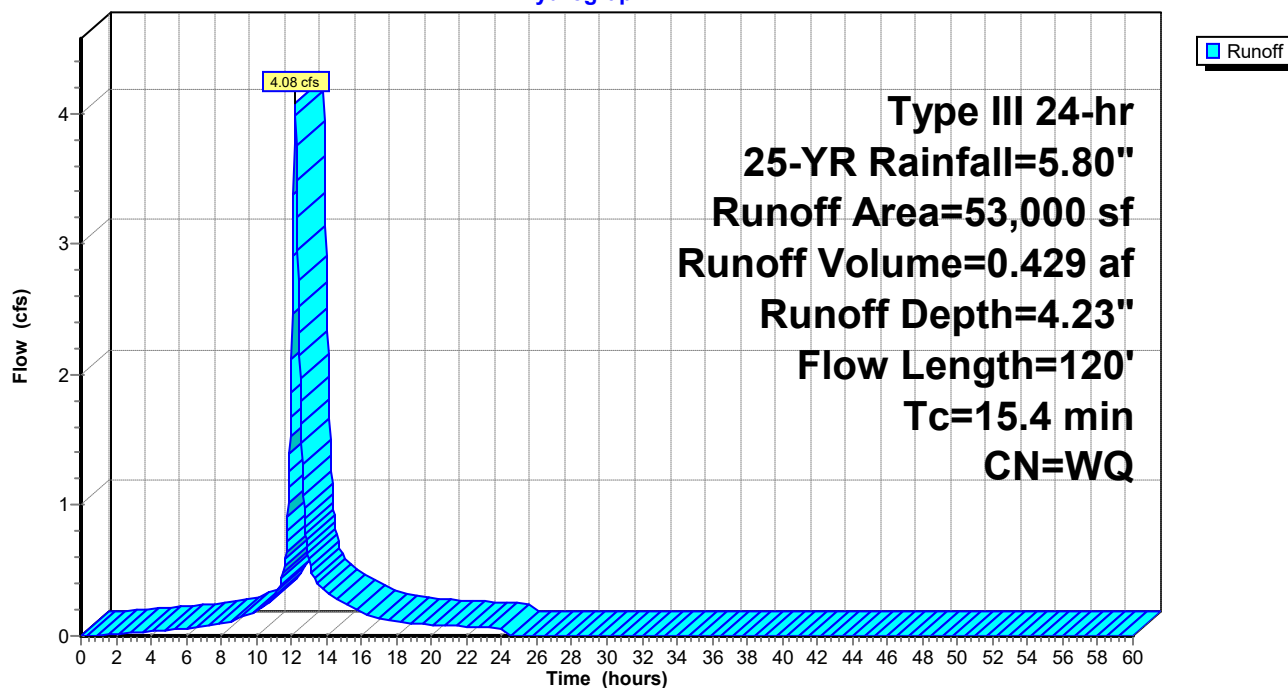Runoff   =   1.21 cfs @   12.25 hrs, Volume=   0.131 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
3,700	98	Paved parking, HSG B
1,800	98	Roofs, HSG B
9,900	69	50-75% Grass cover, Fair, HSG B
6,950	60	Woods, Fair, HSG B
22,350		Weighted Average
16,850		75.39% Pervious Area
5,500		24.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	72	0.0400	1.00		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.0	23	0.2500	8.05		**Shallow Concentrated Flow, C-D**
					Unpaved Kv= 16.1 fps
17.7	195	Total			

Subcatchment 2.2S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=22,350 sf
Runoff Volume=0.131 af
Runoff Depth=3.06"
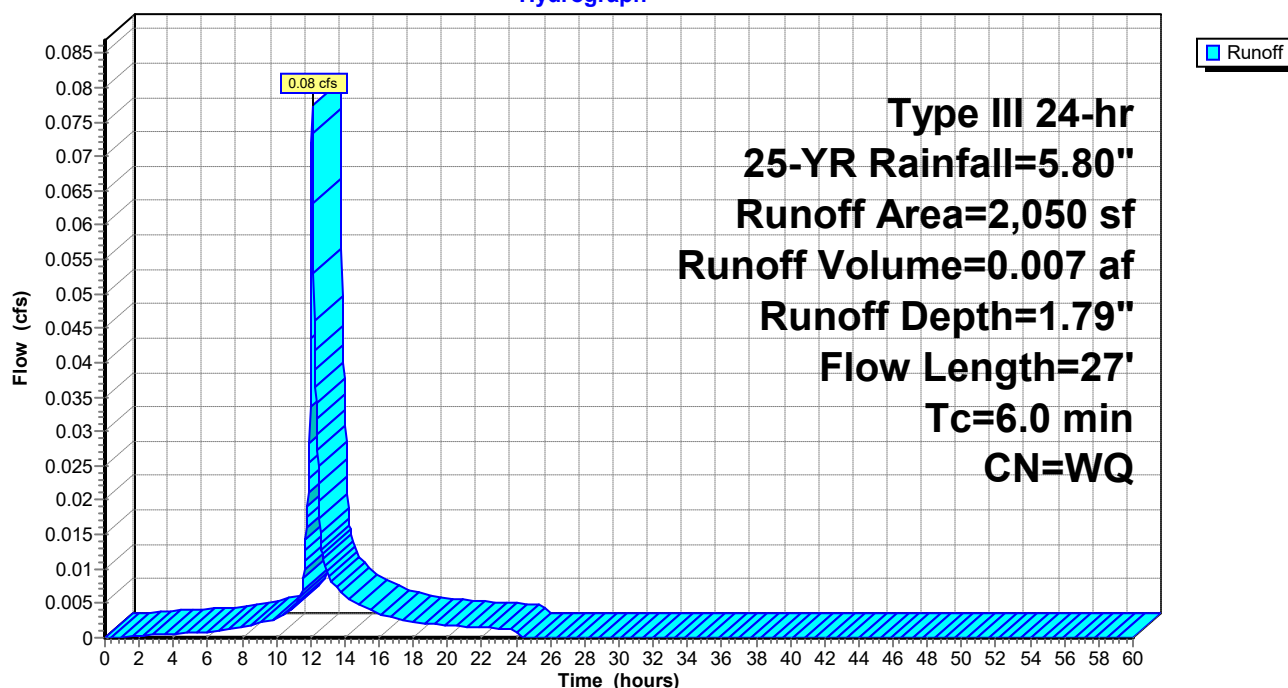Flow Length=195'
Tc=17.7 min
CN=WQ

Summary for Subcatchment 2.3S:

Runoff   =   0.62 cfs @   12.09 hrs, Volume=   0.048 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
200	98	Paved parking, HSG B
1,500	98	Roofs, HSG B
2,550	69	50-75% Grass cover, Fair, HSG B
4,950	60	Woods, Fair, HSG B
9,200		Weighted Average
7,500		81.52% Pervious Area
1,700		18.48% Impervious Area

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

Subcatchment 2.3S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=9,200 sf
Runoff Volume=0.048 af
Runoff Depth=2.70"
Tc=6.0 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 2.4S:

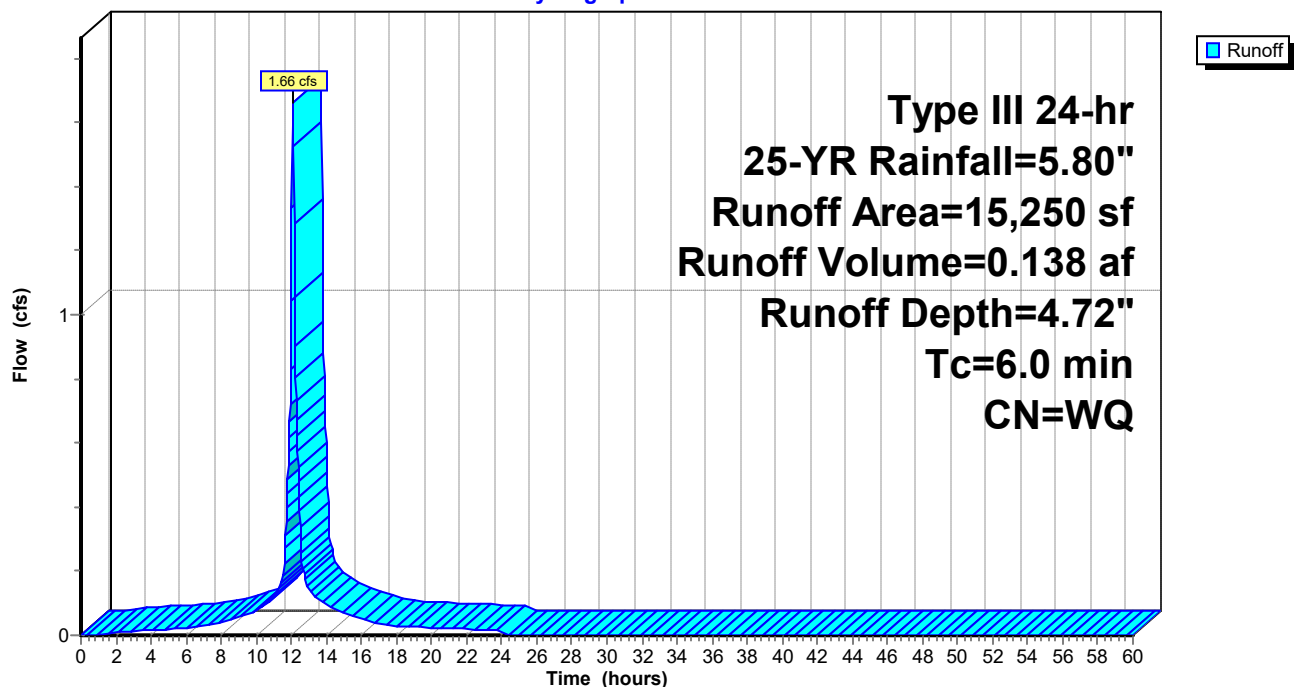Runoff   =   4.08 cfs @   12.21 hrs, Volume=   0.429 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
21,600	98	Paved parking, HSG B
8,700	98	Roofs, HSG B
19,750	69	50-75% Grass cover, Fair, HSG B
2,950	60	Woods, Fair, HSG B
53,000		Weighted Average
22,700		42.83% Pervious Area
30,300		57.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	85	0.0350	0.09		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	35	0.1400	6.02		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
15.4	120				Total

Subcatchment 2.4S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=53,000 sf
Runoff Volume=0.429 af
Runoff Depth=4.23"
Flow Length=120'
Tc=15.4 min
CN=WQ

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.1S:

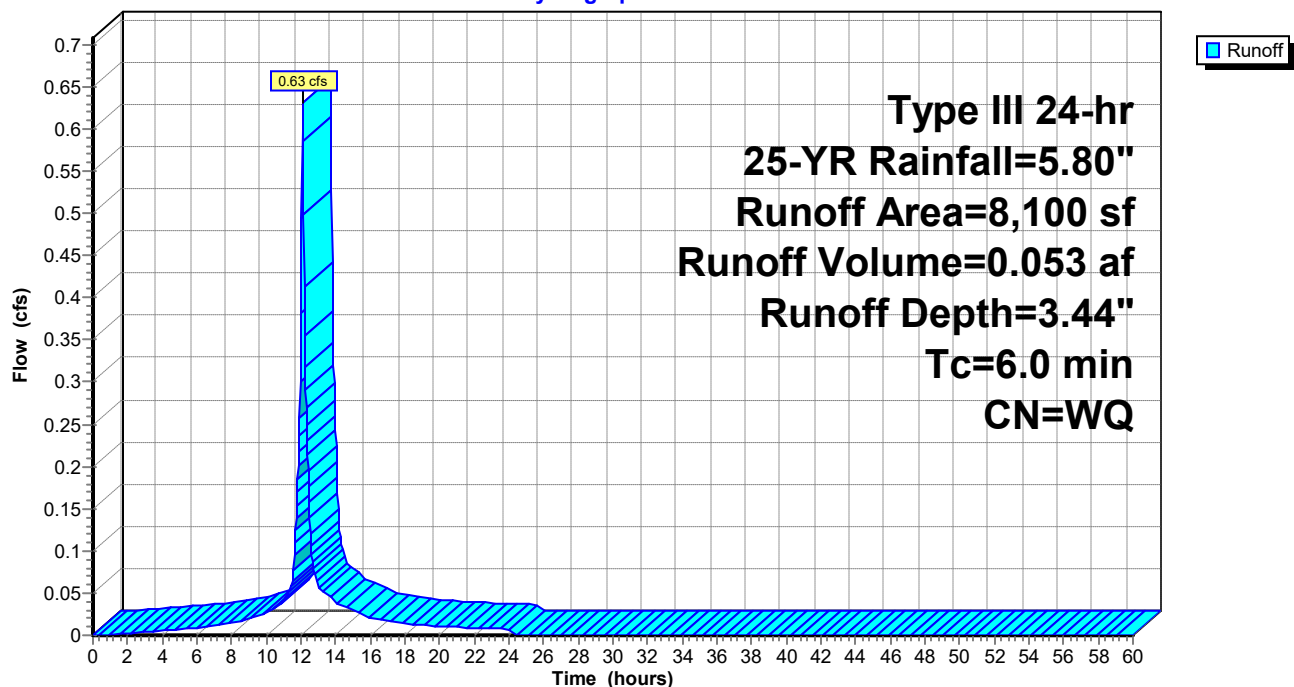Runoff   =   0.08 cfs @ 12.09 hrs, Volume=   0.007 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
450	98	Roofs, HSG A
1,050	49	50-75% Grass cover, Fair, HSG A
550	36	Woods, Fair, HSG A
2,050		Weighted Average
1,600		78.05% Pervious Area
450		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0500	1.28		**Sheet Flow, A-B**
					Smooth surfaces n= 0.011 P2= 3.10"
0.0	10	0.1500	6.24		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
0.1	5	0.1000	1.58		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
5.7					**Direct Entry, DIRECT**
6.0	27				Total

Subcatchment 3.1S:

**Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=2,050 sf
Runoff Volume=0.007 af
Runoff Depth=1.79"
Flow Length=27'
Tc=6.0 min
CN=WQ**

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.2S:

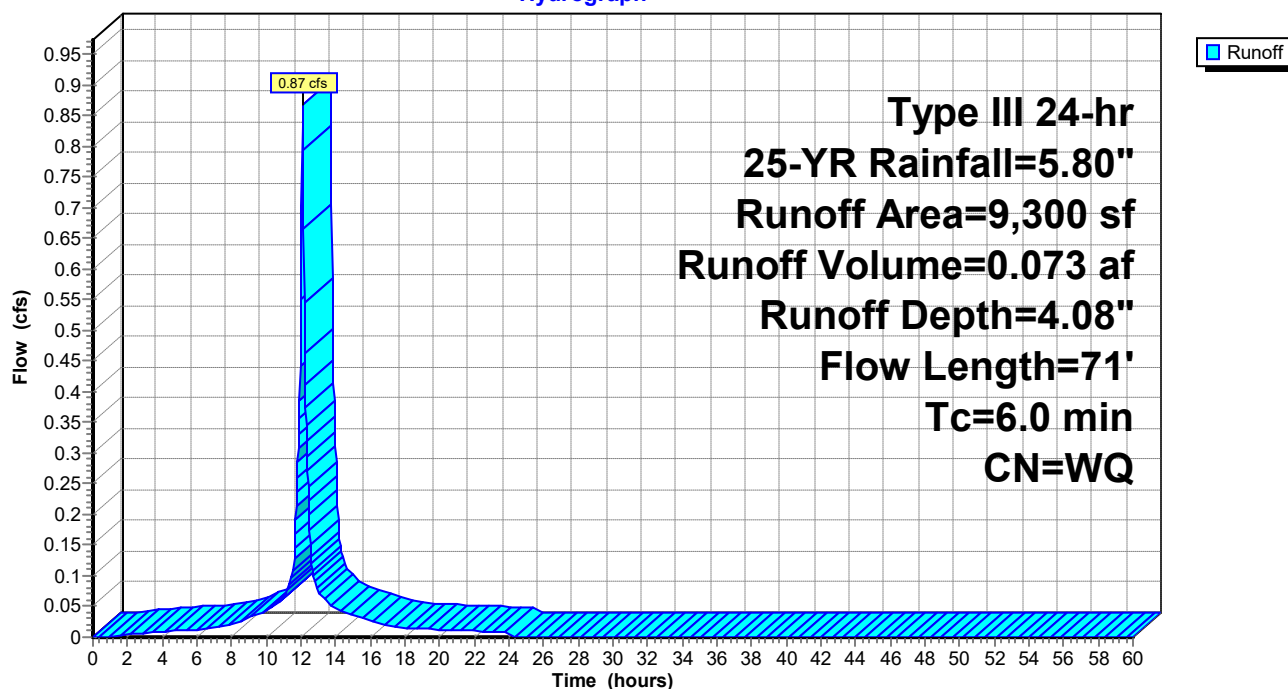Runoff   =   1.66 cfs @ 12.09 hrs, Volume=   0.138 af, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
8,650	98	Paved parking, HSG A
3,800	98	Roofs, HSG A
2,800	49	50-75% Grass cover, Fair, HSG A
15,250		Weighted Average
2,800		18.36% Pervious Area
12,450		81.64% Impervious Area

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

Subcatchment 3.2S:

Hydrograph

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Subcatchment 3.3S:

Runoff   =   0.63 cfs @ 12.09 hrs, Volume=   0.053 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
3,100	98	Paved parking, HSG A
1,250	98	Roofs, HSG A
3,750	49	50-75% Grass cover, Fair, HSG A
8,100		Weighted Average
3,750		46.30% Pervious Area
4,350		53.70% Impervious Area

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

Subcatchment 3.3S:

Hydrograph

Type III 24-hr
25-YR Rainfall=5.80"
Runoff Area=8,100 sf
Runoff Volume=0.053 af
Runoff Depth=3.44"
Tc=6.0 min
CN=WQ

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Summary for Subcatchment 3.4S:

Runoff   =   0.87 cfs @ 12.08 hrs, Volume=   0.073 af, Depth= 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR Rainfall=5.80"

Area (sf)	CN	Description
200	98	Paved parking, HSG A
650	98	Roofs, HSG A
5,850	98	Paved parking, HSG A
2,600	36	Woods, Fair, HSG A
9,300		Weighted Average
2,600		27.96% Pervious Area
6,700		72.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	25	0.0680	0.21		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.10"
0.4	46	0.1400	1.87		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
3.6					**Direct Entry, DIRECT**
6.0	71				Total

Subcatchment 3.4S:

Hydrograph

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Type III 24-hr 25-YR Rainfall=5.80"
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Summary for Reach 1R:

Inflow Area =   0.56 ac, 51.53% Impervious, Inflow Depth = 4.71"   for 25-YR event
Inflow   =   2.70 cfs @ 12.11 hrs, Volume=   0.220 af
Outflow   =   2.51 cfs @ 12.15 hrs, Volume=   0.220 af, Atten= 7%, Lag= 2.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 0.31 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 15.5 min

Peak Storage= 543 cf @ 12.15 hrs
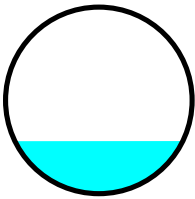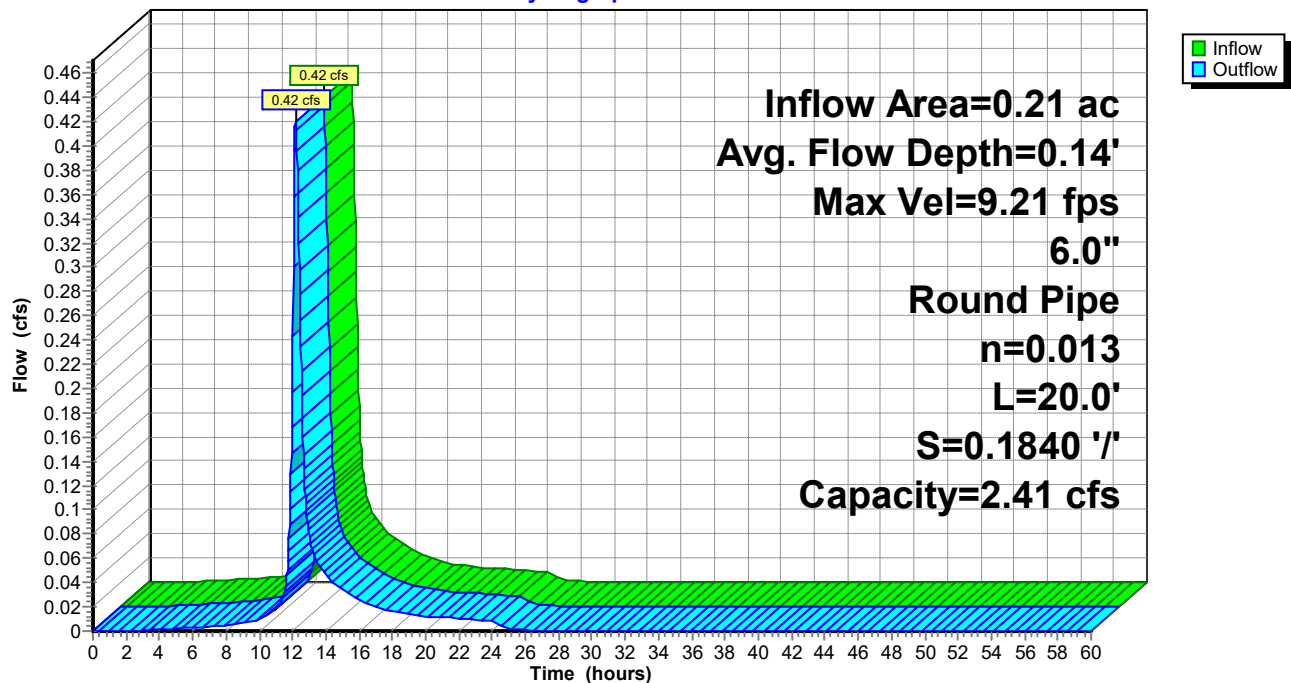Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 0.50' Flow Area= 10.5 sf, Capacity= 3.68 cfs

16.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 '/' Top Width= 26.00'
Length= 67.0' Slope= 0.0299 '/'
Inlet Invert= 117.00', Outlet Invert= 115.00'

‡

Reach 1R:

Inflow Area=0.56 ac
Avg. Flow Depth=0.40'
Max Vel=0.31 fps
n=0.400
L=67.0'
S=0.0299 '/'
Capacity=3.68 cfs

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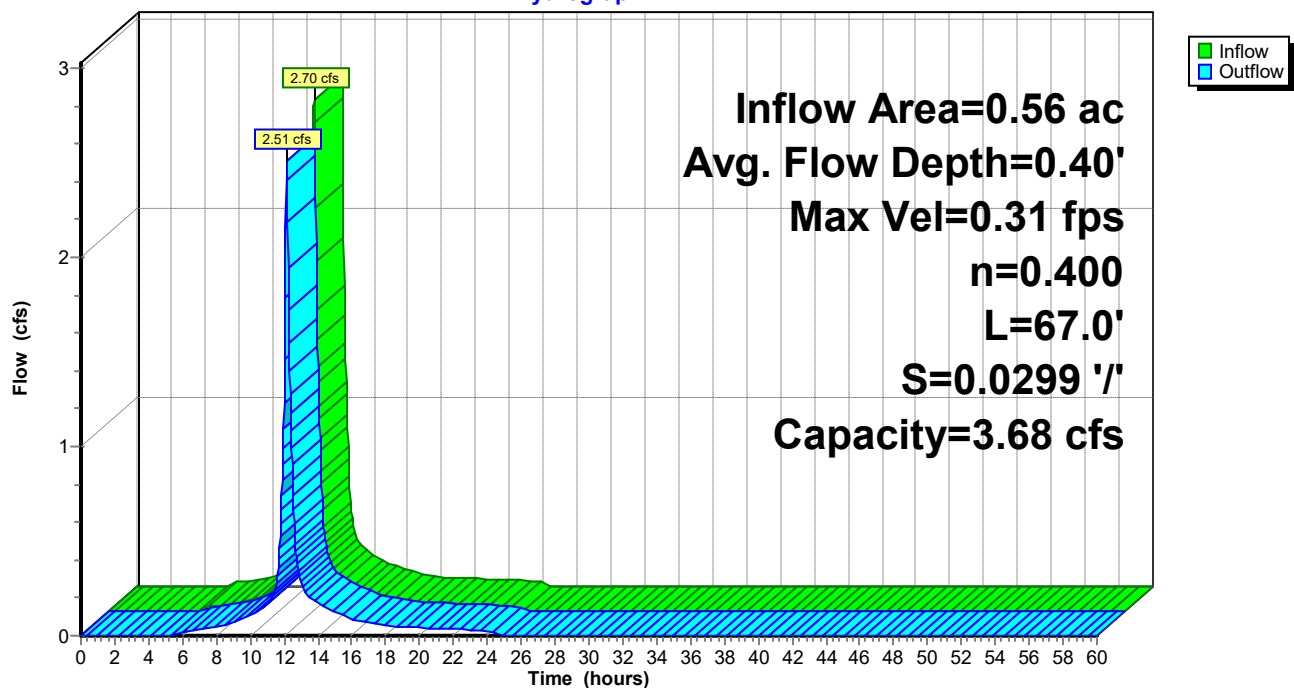
Summary for Reach 4R: EXISTING 15" CULVERT

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.63 ac, 38.46% Impervious, Inflow Depth = 4.61"   for 25-YR event
Inflow   =   3.14 cfs @ 12.09 hrs, Volume=   0.241 af
Outflow   =   3.14 cfs @ 12.09 hrs, Volume=   0.241 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 11.08 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.47 fps, Avg. Travel Time= 0.3 min

Peak Storage= 16 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 18.15 cfs

15.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 55.0'   Slope= 0.0565 '/'
Inlet Invert= 117.50', Outlet Invert= 114.39'

Reach 4R: EXISTING 15" CULVERT

Hydrograph

Inflow Area=0.63 ac
Avg. Flow Depth=0.35'
Max Vel=11.08 fps
15.0"
Round Pipe
n=0.011
L=55.0'
S=0.0565 '/'
Capacity=18.15 cfs

3.14 cfs
3.14 cfs

Inflow
Outflow

Flow (cfs)

Time (hours)

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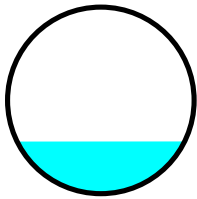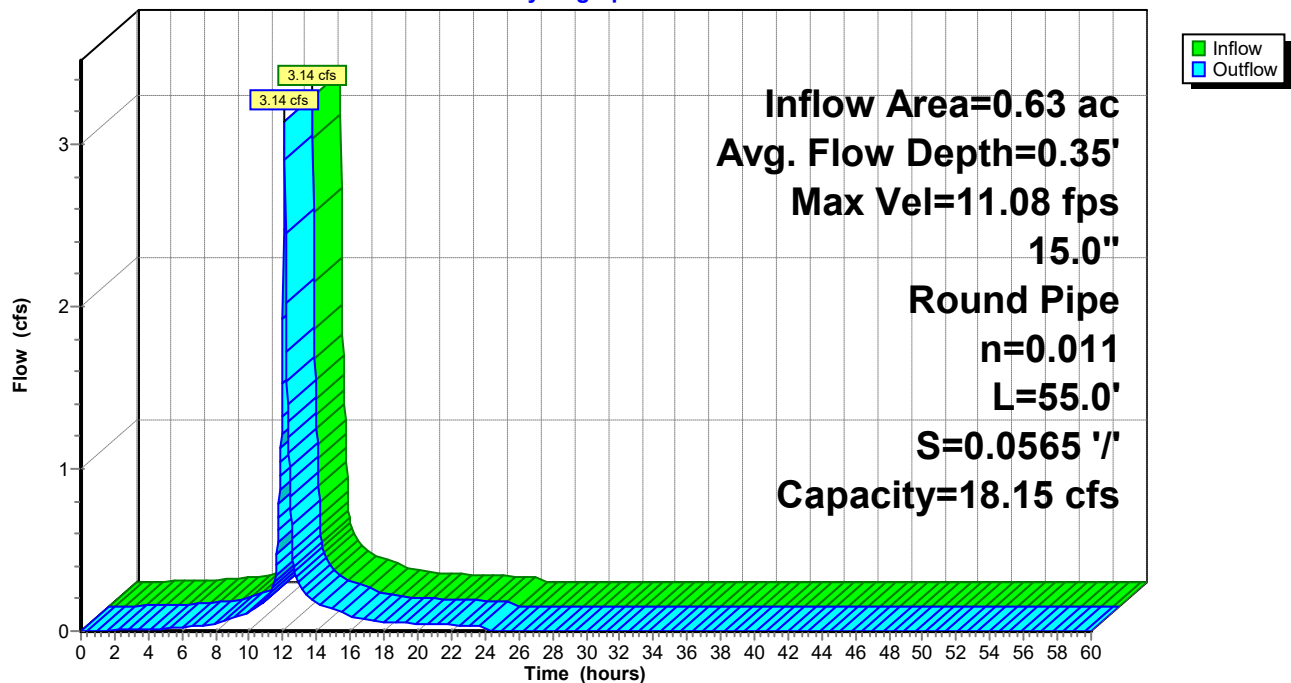
Summary for Reach 8R: UD

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =   0.21 ac, 18.48% Impervious, Inflow Depth = 2.70"   for 25-YR event
Inflow   =   0.42 cfs @   12.18 hrs, Volume=   0.048 af
Outflow   =   0.42 cfs @   12.18 hrs, Volume=   0.048 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Max. Velocity= 9.21 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.81 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 2.41 cfs

6.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 20.0'   Slope= 0.1840 '/'
Inlet Invert= 114.38', Outlet Invert= 110.70'

Reach 8R: UD

Hydrograph

Inflow Area=0.21 ac
Avg. Flow Depth=0.14'
Max Vel=9.21 fps
6.0"
Round Pipe
n=0.013
L=20.0'
S=0.1840 '/'
Capacity=2.41 cfs

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Summary for Pond 1P: LEVEL SPREADER

[92] Warning: Device #1 is above defined storage
[93] Warning: Storage range exceeded by 0.17'
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=272)

Inflow Area =	0.56 ac, 51.53% Impervious, Inflow Depth = 4.81" for 25-YR event			
Inflow =	2.71 cfs @ 12.11 hrs, Volume=	0.225 af		
Outflow =	2.70 cfs @ 12.11 hrs, Volume=	0.220 af, Atten= 0%, Lag= 0.0 min		
Primary =	2.70 cfs @ 12.11 hrs, Volume=	0.220 af		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 118.37' @ 12.11 hrs   Surf.Area= 192 sf   Storage= 211 cf

Plug-Flow detention time= 25.4 min calculated for 0.220 af (98% of inflow)
Center-of-Mass det. time= 11.9 min (783.2 - 771.3)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	211 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
116.50	68	0	0
117.00	112	45	45
118.00	152	132	177
118.20	192	34	211

Device	Routing	Invert	Outlet Devices
#1	Primary	118.20'	**16.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.68 cfs @ 12.11 hrs HW=118.37' TW=117.39' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 2.68 cfs @ 1.00 fps)
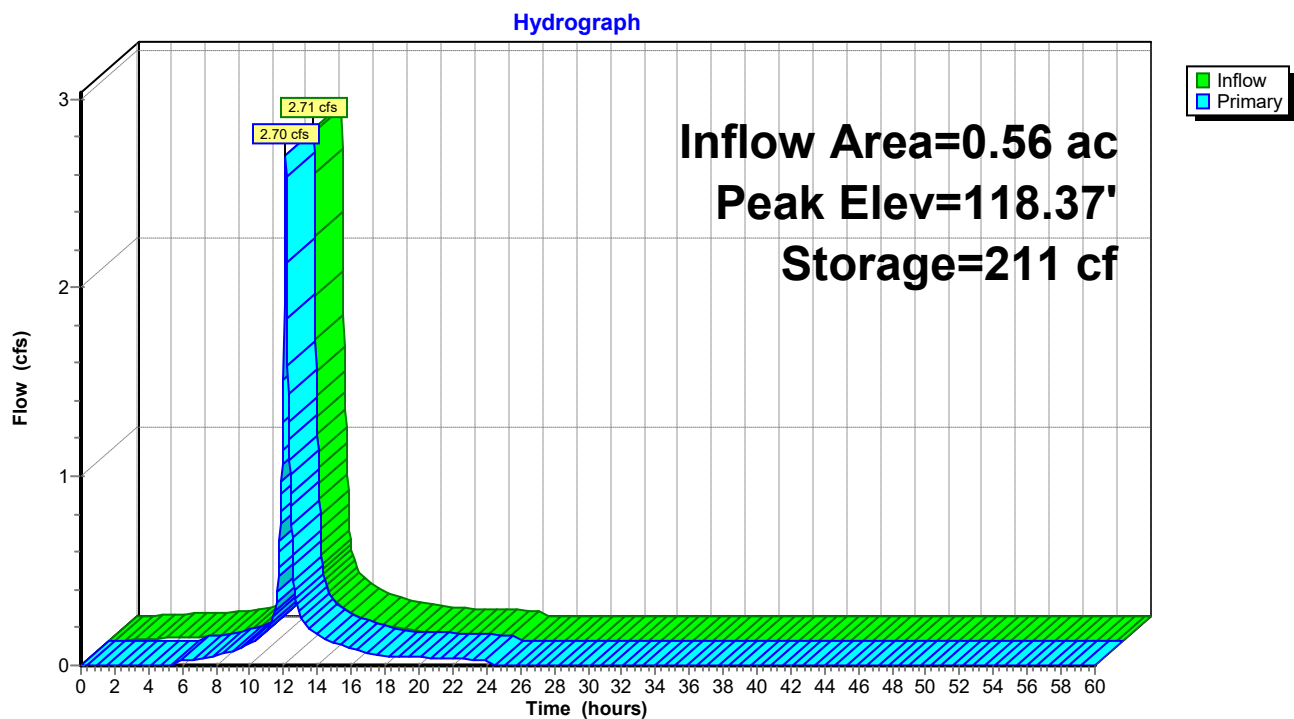
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Pond 1P: LEVEL SPREADER

Hydrograph

Inflow Area=0.56 ac
Peak Elev=118.37'
Storage=211 cf

2.71 cfs
2.70 cfs

Legend: Inflow (green), Primary (blue)

Flow (cfs) vs Time (hours)

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Summary for Pond 4P: DRIP EDGE

Inflow Area =   0.21 ac, 18.48% Impervious, Inflow Depth = 2.70"   for 25-YR event
Inflow   =   0.62 cfs @   12.09 hrs, Volume=   0.048 af
Outflow   =   0.42 cfs @   12.18 hrs, Volume=   0.048 af, Atten= 32%, Lag= 5.5 min
Primary   =   0.42 cfs @   12.18 hrs, Volume=   0.048 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 116.27' @ 12.18 hrs   Surf.Area= 0.03 ac   Storage= 0.006 af

Plug-Flow detention time= 27.0 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 26.6 min (840.3 - 813.6)

Volume	Invert	Avail.Storage	Storage Description
#1	115.68'	0.024 af	**4.00'W x 257.00'L x 2.00'H Prismatoid Z=0.5** 0.059 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	115.68'	**6.0" Round Culvert** L= 257.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 115.68' / 114.38' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.42 cfs @ 12.18 hrs HW=116.27' TW=114.52'   (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.42 cfs @ 2.29 fps)

Pond 4P: DRIP EDGE

Hydrograph

Inflow Area=0.21 ac
Peak Elev=116.27'
Storage=0.006 af
6.0"
Round Culvert
n=0.013
L=257.0'
S=0.0051 '/'

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Type III 24-hr 25-YR Rainfall=5.80"
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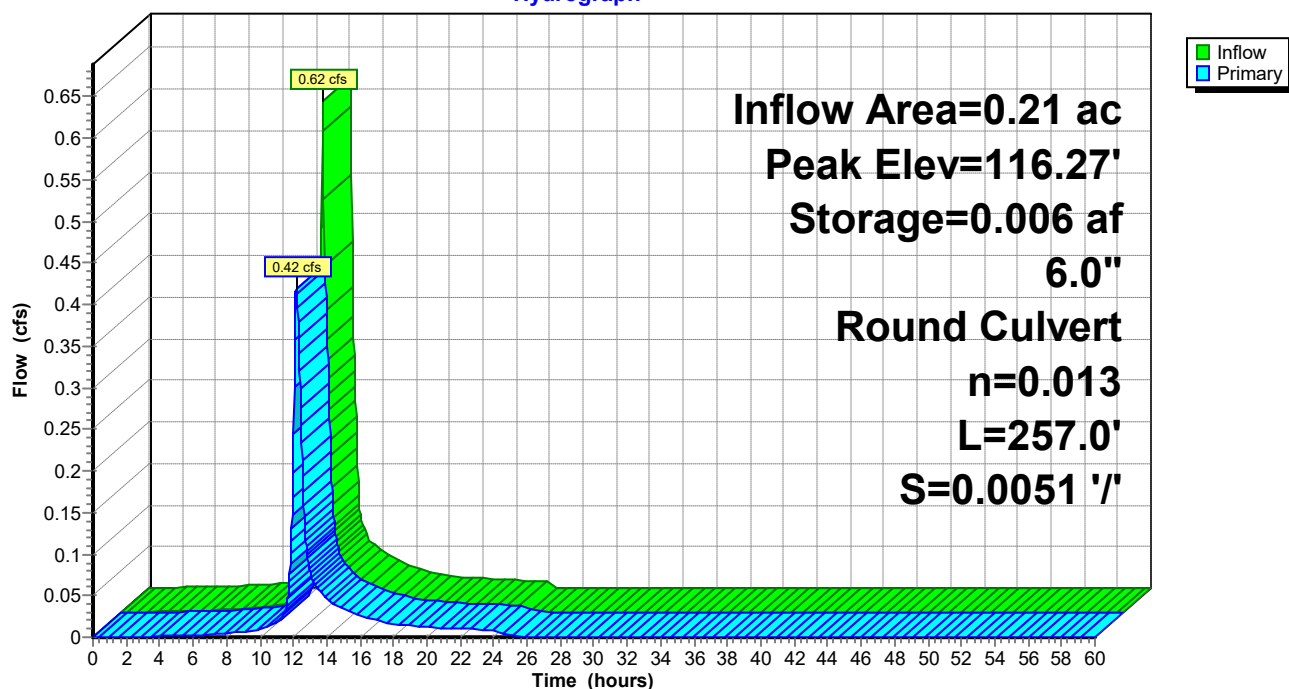
Summary for Pond 10P: DRAINAGE DITCH

[62] Hint: Exceeded Reach 8R OUTLET depth by 1.65' @ 12.39 hrs

Inflow Area =	2.57 ac, 42.91% Impervious,	Inflow Depth = 3.96"	for 25-YR event		
Inflow =	7.64 cfs @	12.15 hrs,	Volume=	0.848 af	
Outflow =	5.27 cfs @	12.37 hrs,	Volume=	0.848 af,	Atten= 31%, Lag= 13.1 min
Discarded =	0.12 cfs @	12.37 hrs,	Volume=	0.015 af	
Primary =	5.15 cfs @	12.37 hrs,	Volume=	0.833 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs / 2
Peak Elev= 112.48' @ 12.37 hrs   Surf.Area= 2,578 sf   Storage= 3,107 cf

Plug-Flow detention time= 3.5 min calculated for 0.848 af (100% of inflow)
Center-of-Mass det. time= 3.5 min (790.9 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	109.00'	4,655 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
109.00	40	0	0
110.00	265	153	153
111.00	850	558	710
112.00	1,825	1,338	2,048
113.00	3,390	2,608	4,655

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.000 in/hr Exfiltration over Surface area**
#2	Primary	109.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 109.00' / 108.50' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.12 cfs @ 12.37 hrs HW=112.48'   (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=5.15 cfs @ 12.37 hrs HW=112.48' TW=0.00'   (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 5.15 cfs @ 6.56 fps)

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Pond 10P: DRAINAGE DITCH

Hydrograph

Inflow Area=2.57 ac
Peak Elev=112.48'
Storage=3,107 cf

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Type III 24-hr 25-YR Rainfall=5.80"
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Page 75
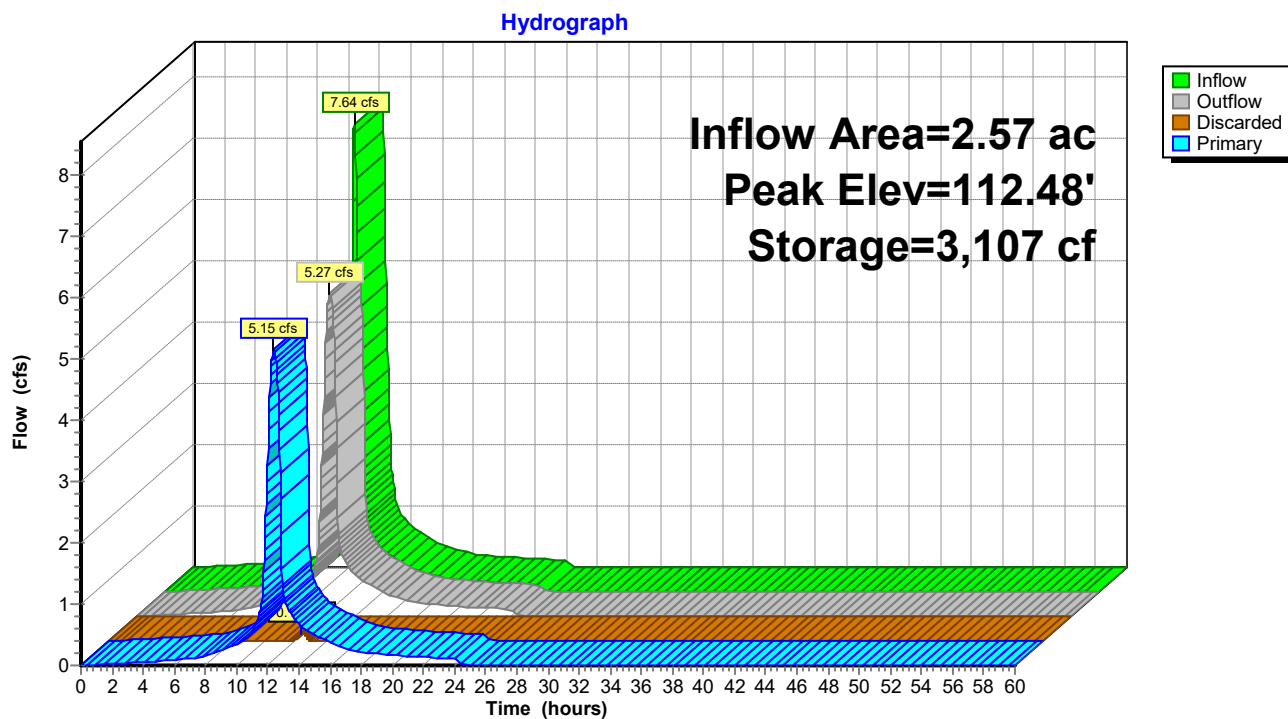
Summary for Link 1L: POA-1

Inflow Area =   0.78 ac, 47.79% Impervious, Inflow Depth =   4.68"   for 25-YR event
Inflow   =   3.47 cfs @   12.14 hrs, Volume=   0.303 af
Primary   =   3.47 cfs @   12.14 hrs, Volume=   0.303 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 1L: POA-1

Hydrograph
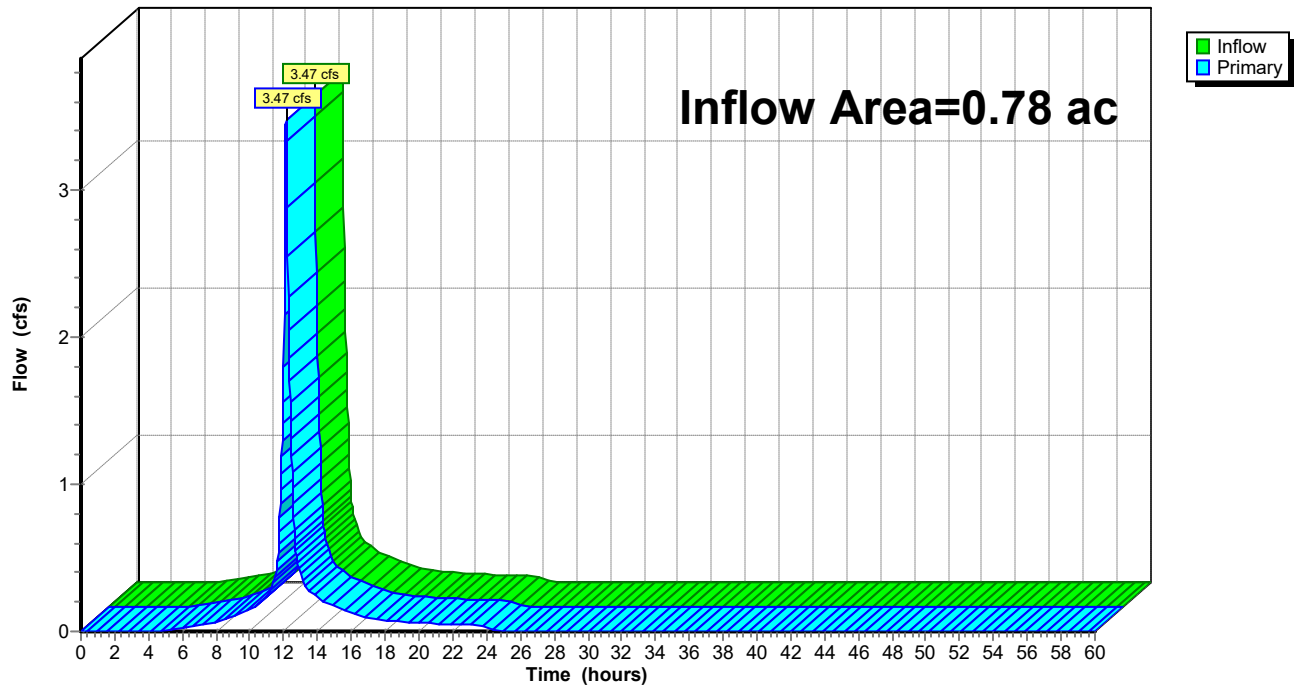
Summary for Link 2L: POA-2

Inflow Area =   2.57 ac, 42.91% Impervious, Inflow Depth =   3.89"   for 25-YR event
Inflow   =   5.15 cfs @   12.37 hrs, Volume=   0.833 af
Primary   =   5.15 cfs @   12.37 hrs, Volume=   0.833 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 2L: POA-2

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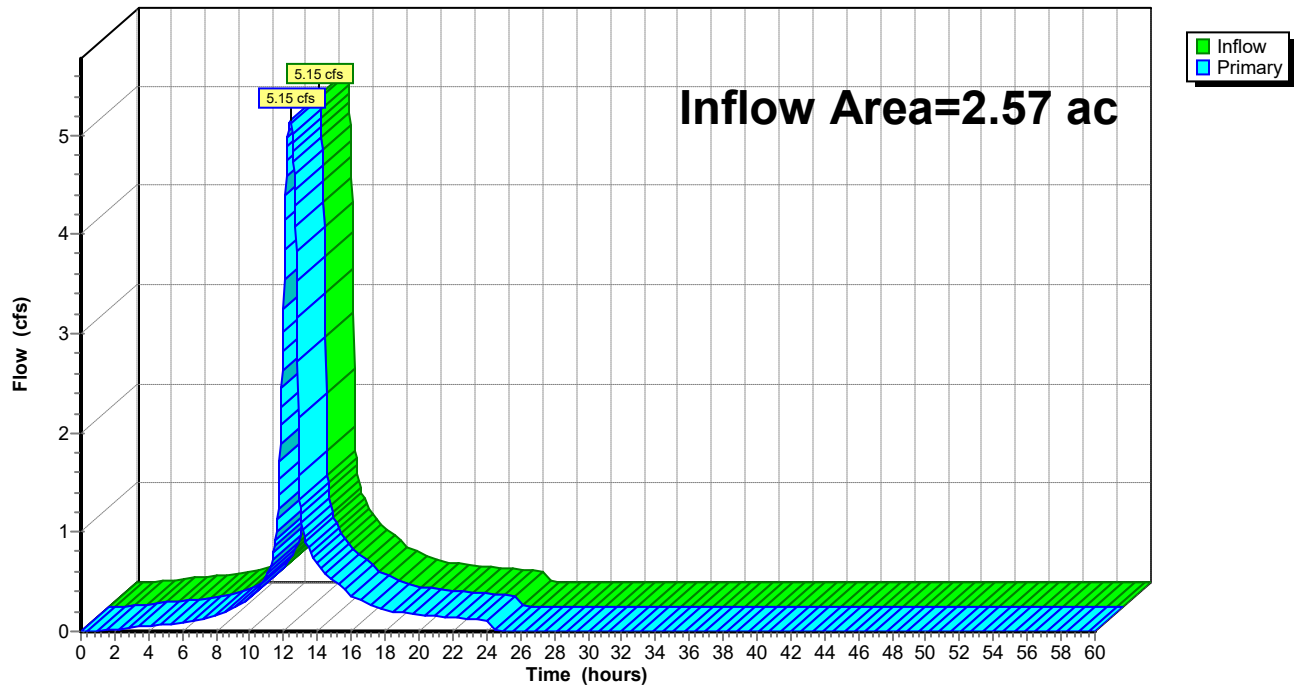
Summary for Link 3L:

Inflow Area =   0.80 ac, 69.02% Impervious, Inflow Depth =   4.08"   for 25-YR event
Inflow   =   3.24 cfs @   12.09 hrs, Volume=   0.271 af
Primary   =   3.24 cfs @   12.09 hrs, Volume=   0.271 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.03 hrs

Link 3L:

Hydrograph
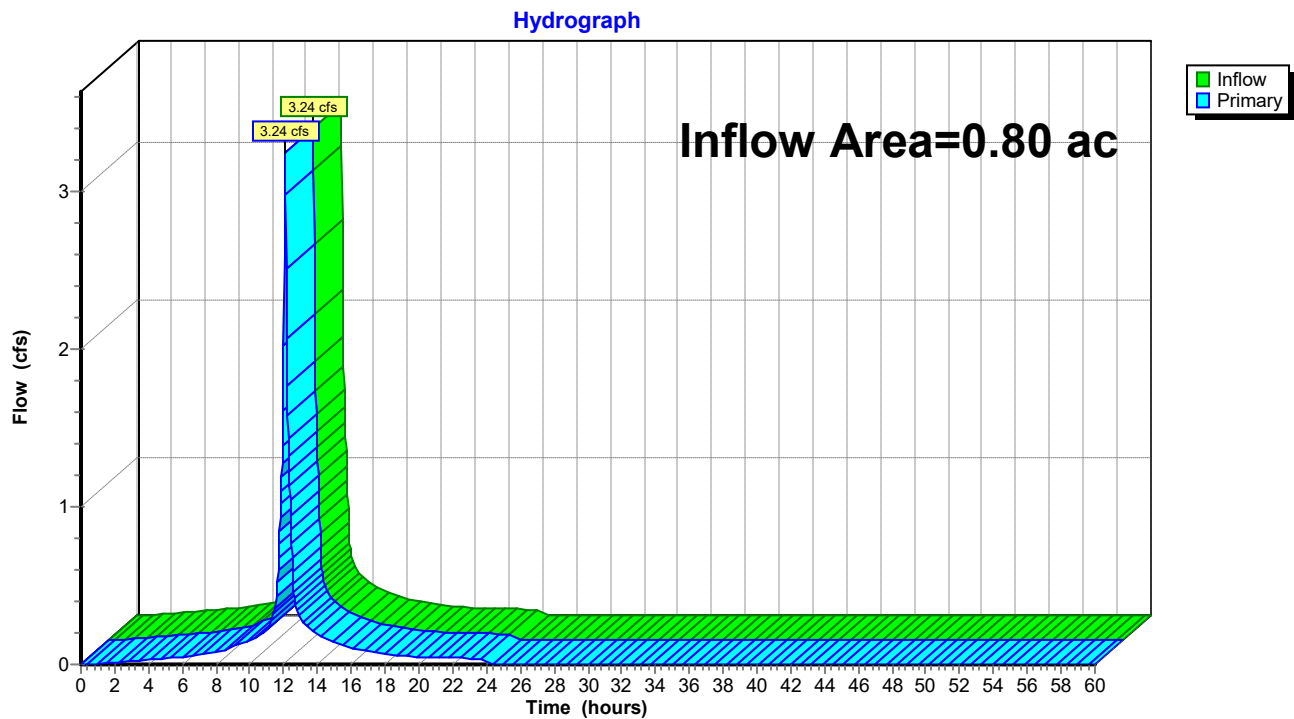
Attachment 2

Inspection, Maintenance, & Housekeeping Plan

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

For:
Yarmouth Landing Garages
Yarmouth, ME

By:
Sebago Technics, Inc.
75 John Roberts Road, Suite 4A
South Portland, Maine

Introduction

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation control measures as well as stormwater management facilities for the project. This plan also outlines several housekeeping requirements that shall be followed during and after construction. These procedures shall be followed in order to ensure the intended function of the designed measures and to prevent unreasonably adverse impacts to the surrounding environment.

The procedures outlined in this Inspection, Maintenance and Housekeeping Plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event (0.5" of rainfall), and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (0.5" of rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed

to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

    A.   <u>Sediment Barriers:</u>

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on a silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event (0.5" of rainfall). They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

    B.   <u>Riprap Materials:</u>

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

    C.   <u>Erosion Control Blankets:</u>

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

    D.   <u>Stabilized Construction Entrances/Exits:</u>

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains

into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

E.   Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

F.   Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5.   **Housekeeping:** The following general performance standards apply to the proposed project.

A.   Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

B.   Groundwater protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

C.   Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

D.   Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

E.   Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area

that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

Post-Construction

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. The owner shall inspect and maintain the BMPs, including but not limited to any parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.

2. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction. If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the local municipality in the annual report.

    A. Vegetated Areas:

        -   Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains (>0.5") to identify active or potential erosion problems.
        -   Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

    B. Ditches, Swales and Other Open Channels:

        -   Inspect ditches, swales, level spreaders and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
        -   Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
        -   Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
        -   If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. <u>Culverts:</u>

- Inspect culverts in the spring, in the late fall, and after heavy rains (>0.5") to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

D. <u>Removal of Winter Sand:</u>

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.
- Accumulations on pavement may be removed by pavement sweeping.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

E. <u>Vegetated Swales:</u>

- Grass should not be trimmed extremely short, as this will reduce the filtering effect of the swale. Cut vegetation should be removed to prevent decaying organic matter from adding pollutants to the swale discharge.
- Level of sediment deposition in the channel should be monitored regularly and removed from channels before damage to the channel and vegetation.
- Clear sediment if infiltration times are longer than 12 hours.

F. <u>Level Spreaders:</u>

- Sediment buildup should be removed when it has accumulated to approximately 25% of design volume or channel capacity.
- Remove debris such as leaf litter, branches, and tree growth from the spreader.
- Do not store snow within the level spreader.
- Reconstruction may be necessary when sheet flow channelizes in the embankments.

3. **Documentation:**

A. The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, as required by the local municipality, provide a completed and signed certification on a form provided by the local municipality, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they required maintenance or repair, including the record of the deficiency and corrective action(s) taken.

B. A log summarizing the inspections and any corrective action taken must be maintained. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 1 of this Inspection, Maintenance, and Housekeeping Plan.

4. **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

ATTACHMENT 1 – STORMWATER INSPECTION AND MAINTENANCE LOG

Yarmouth Landing Garages
Yarmouth, ME

This log is intended to accompany the Inspection, Maintenance, and Housekeeping Plan for the proposed development in Yarmouth, ME.   The following items shall be checked, cleaned, and maintained on a regular basis as specified in the Maintenance Plan and as described in the sections below. This log shall be kept on file for a minimum of five (5) years and shall be available for review by the Town of Wells and the Maine DEP. Qualified personnel familiar with the drainage systems and soils shall perform all inspections. A copy of the construction and post-construction maintenance logs are provided.

Attachment 3

Stormwater Management Plans