

432 Cony Road
P.O. Box 4687
Augusta, ME 04330



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Fax (207) 623-0016
1-800-244-9475

February 06, 2015

City of Augusta
Mr. Lionel Cayer, City Engineer
One City Center
Augusta, Maine 04330

Subject: Stormwater Report
Elsie & William Viles Foundation
71 Stone Street
Augusta, Maine

Dear Lionel,

E.S. Coffin Engineering & Surveying has completed the hydrologic calculations for the proposed parking lot and site modifications for the Elsie & William Viles Foundation located at 71 Stone Street in Augusta, Maine. The applicant is proposing to install a 27 space parking lot along with modifying the entrance/exit into the site to allow two-way traffic.

The City of Augusta's Land Use Ordinance states that the amount of flow (stormwater) in the post-development condition must be equal to or less than the flow in the pre-development condition for any parcel of land having an increase in impervious area of more than 1,000 sf. It is necessary to detain a certain amount of stormwater to comply with the regulations mentioned above.

Modeling assumptions: The "Hydro-Cad" computer program was used to determine the peak storm water runoff for the pre- and post-development conditions. Hydro-Cad is a storm water modeling system, which utilizes the TR-20 method developed by the Soil Conservation Service (SCS).

The design assumptions used for this project are:

Design storm: 24 hour, Type III rainfall distribution.

Rainfall: 24-hour precipitation values from U.S. Weather Bureau Technical Release No. 40:

2-year storm = 3.0 inches
10-year storm = 4.4 inches
25-year storm = 5.1 inches

Professionals Delivering Quality Solutions

Site specific parameters for the project are listed below:

Soils: Soils information to determine the hydrologic soil group for the site, are derived from the Soil Survey of Kennebec County by the United States Department of Agriculture Soil Conservation Service. The soils and hydrologic group are listed below:

<u>Soil Classification</u>	<u>Hydrologic Group</u>
<i>Scio (SkB)</i>	"B"

Ground Cover:

Pre-Development: The existing watershed ground cover is modeled as impervious, lawn, meadow and woods.

Post-Development: The proposed watershed ground cover is impervious, lawn, meadow and woods.

<u>Cover Description</u>	<u>Curve Number:</u>
Impervious	98
Lawn	61
Woods	55
Meadow	58

Results:

The project will result in an 11,945 sf increase in impervious area and utilizing a small detention pond along the west side of the site will provide the necessary confinement needed to reduce post-development flows. These flows will be less than or equal to the pre-development flows for the three peak storm events. The results are shown on the Hydro Cad output sheets enclosed at the end of the report.

Pre-development:

The hydrologic study evaluates a portion of the parcel that includes: impervious (5,135 sf), lawn (35,645 sf), meadow (78,485 sf) and woods (78,275 sf) and is broken down into two drainage areas (see plan entitled "PRE"). The peak flows for the 2-, 10- and 25-year events (see node labeled "SP") in the pre-development condition are 0.62 cfs (cubic feet per second), 3.10 cfs and 4.85 cfs, respectively.

Post Development:

The proposed site (see plan entitled "C-1") will be comprised of impervious area (16,040 sf), lawn (34,590 sf), meadow (78,485 sf) and woods (68,425 sf). The post-development is broken down into three drainage areas and is shown on the plan entitled "POST". Summary tables showing the input values and resulting peak flows for subcatchments, reaches and ponds are also included at the end of the report. In the post development condition, the 2-, 10- and 25-year events yield 1.30 cfs, 4.47 cfs and 6.54 cfs, before storage is considered.

With the implementation of the detention pond and outlet control structure the pre- and post-development results in the following below:

<u>PRE- & POST-DEVELOPMENT HYDROLOGIC RESULTS</u>			
<u>Event</u>	<u>Pre-Develop.</u>	<u>Post-Develop.</u>	<u>Difference</u>
2 year	0.63 cfs	0.58 cfs	- 0.05 cfs
10 year	3.10 cfs	2.56 cfs	- 0.54 cfs
25 year	4.85 cfs	3.89 cfs	- 0.96 cfs

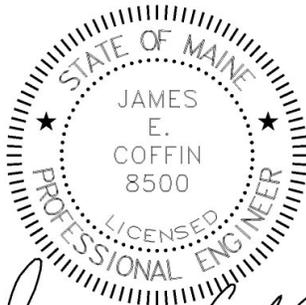
Conclusion:

By comparing the node labeled "SP" (study point) in the post-development condition and in the pre-development condition, the results show that there will be not be a reduction in flow for the 2-, 10- and 25-year peak storm events. The ordinance has been met in regard to stormwater runoff and if you should have any questions or concerns, please do not hesitate to contact me at 623-9475.

Respectfully submitted,



James E. Coffin, PE



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SOILS FOUND ON-SITE	
CLASSIFICATION	NAME / DESCRIPTION
HfC (B)	HARTLAND VERY FINE SANDY LOAM, 8% TO 15% SLOPES
HrB (C/D)	HOLLIS FINE SANDY LOAM, 3% TO 8% SLOPES
SkB (B)	SCIO VERY FINE SANDY LOAM, 3% TO 8% SLOPES

INFORMATION REFERENCED FROM U.S. DEPT. OF AGRICULTURE S.C.S.
 "SOIL SURVEY OF KENNEBEC COUNTY OF MAINE" MAP 52.

SOILS MAP
 SCALE: 1"=200'

GRAPHIC SCALE



(IN FEET)
 1 inch = 200 ft.

SOILS

CLIENT/PROJECT:
ELISIE & WILLIAM VILES FOUNDATION

LOCATION: 71 STONE STREET

TOWN: AUGUSTA COUNTY: KENNEBEC STATE: MAINE

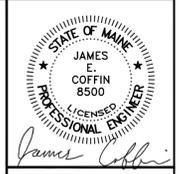
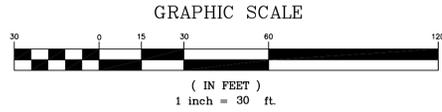
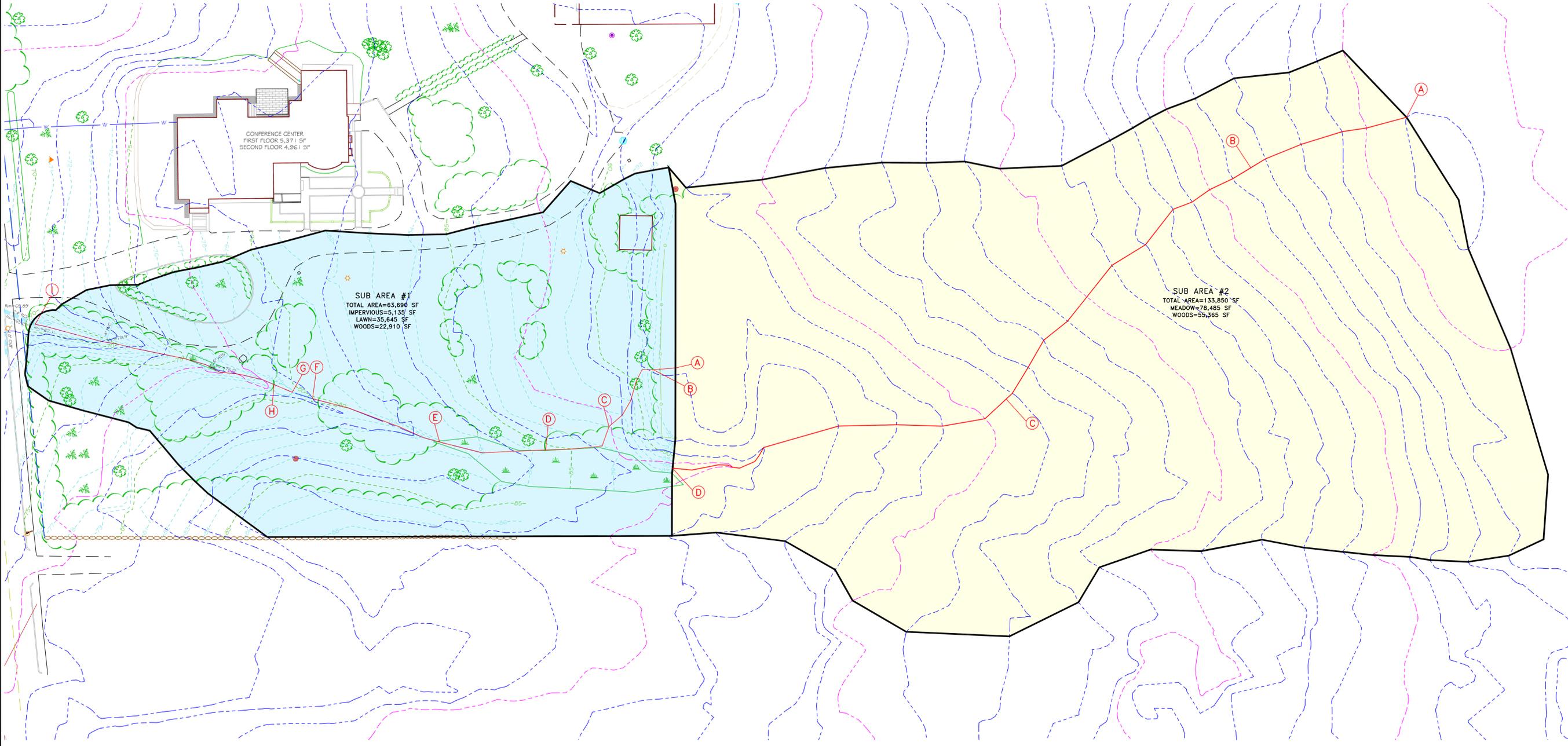
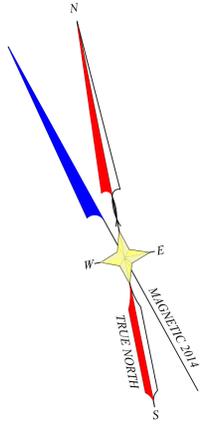
E.S. COFFIN
 ENGINEERING & SURVEYING, INC.
 431 Cony Road, P.O. Box 4687, Augusta, Maine 04338
 Ph. (207) 623-9474 Fax (207) 623-8916 Toll Free 1-800-344-9475

SHEET TITLE:
SOILS MAP

SCALE: 1" = 200'

DATE: FEBRUARY 06, 2015

PROJ. NO. 2014-013

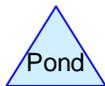
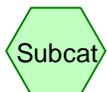
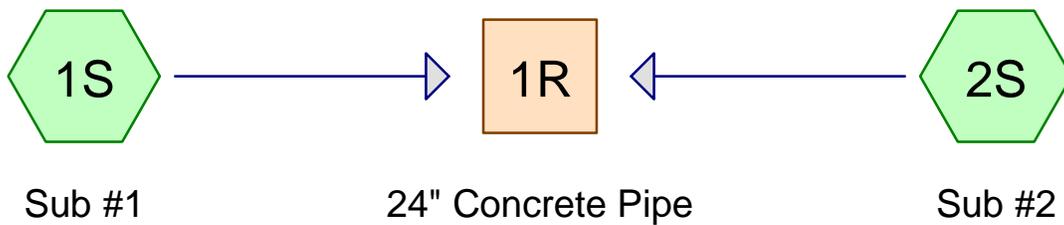


NO.	REVISIONS	DATE

CLIENT/PROJECT:	ELSIDIE & WILLIAM VILES FOUNDATION
LOCATION:	71 STONE STREET
TOWN:	AUGUSTA COUNTY: KENNEBEC STATE: MAINE
SHEET TITLE:	PRE-DEVELOPMENT PLAN
SCALE:	1 INCH=30 FEET
DRAWN BY:	TCH
CHECKED BY:	JEC
DATE:	FEBRUARY 06, 2015

PROJ. NO.	2014-013
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PRE



Viles Pre-Development

Type III 24-hr 2-Year Event Rainfall=3.00"

Prepared by Microsoft

Printed 2/6/2015

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Page 2

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub #1

Runoff Area=63,690 sf 8.06% Impervious Runoff Depth>0.35"
Flow Length=432' Tc=13.8 min CN=62 Runoff=0.32 cfs 0.042 af

Subcatchment 2S: Sub #2

Runoff Area=133,850 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=527' Tc=9.5 min CN=57 Runoff=0.31 cfs 0.053 af

Reach 1R: 24" Concrete Pipe

Avg. Flow Depth=0.13' Max Vel=7.04 fps Inflow=0.63 cfs 0.095 af
24.0" Round Pipe n=0.012 L=20.0' S=0.0855 '/ Capacity=71.66 cfs Outflow=0.62 cfs 0.095 af

Total Runoff Area = 4.535 ac Runoff Volume = 0.095 af Average Runoff Depth = 0.25"
97.40% Pervious = 4.417 ac 2.60% Impervious = 0.118 ac

Summary for Subcatchment 1S: Sub #1

Runoff = 0.32 cfs @ 12.29 hrs, Volume= 0.042 af, Depth> 0.35"

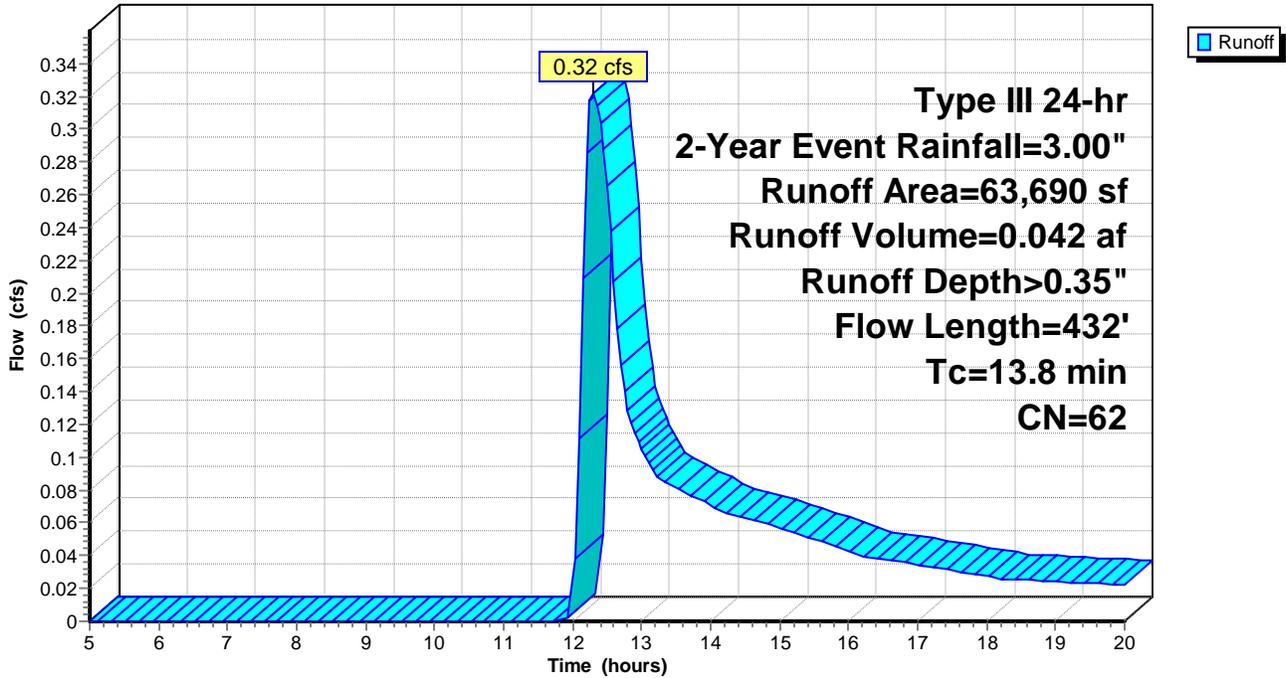
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Event Rainfall=3.00"

Area (sf)	CN	Description
5,135	98	Paved parking, HSG C
35,645	61	>75% Grass cover, Good, HSG B
22,910	55	Woods, Good, HSG B
63,690	62	Weighted Average
58,555		91.94% Pervious Area
5,135		8.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	13	0.3300	0.15		Sheet Flow, AB Woods: Light underbrush n= 0.400 P2= 3.00"
2.7	48	0.1250	0.30		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
8.2	47	0.0532	0.10		Sheet Flow, CD Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	66	0.0379	1.36		Shallow Concentrated Flow, DE Short Grass Pasture Kv= 7.0 fps
0.3	82	0.0305	4.56	18.23	Channel Flow, EF Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
0.0	13	0.1538	11.56	9.08	Pipe Channel, FG 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.0	12	0.0417	5.33	21.32	Channel Flow, GH Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
0.4	151	0.0695	6.88	27.52	Channel Flow, HI Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
13.8	432	Total			

Subcatchment 1S: Sub #1

Hydrograph



Summary for Subcatchment 2S: Sub #2

Runoff = 0.31 cfs @ 12.38 hrs, Volume= 0.053 af, Depth> 0.21"

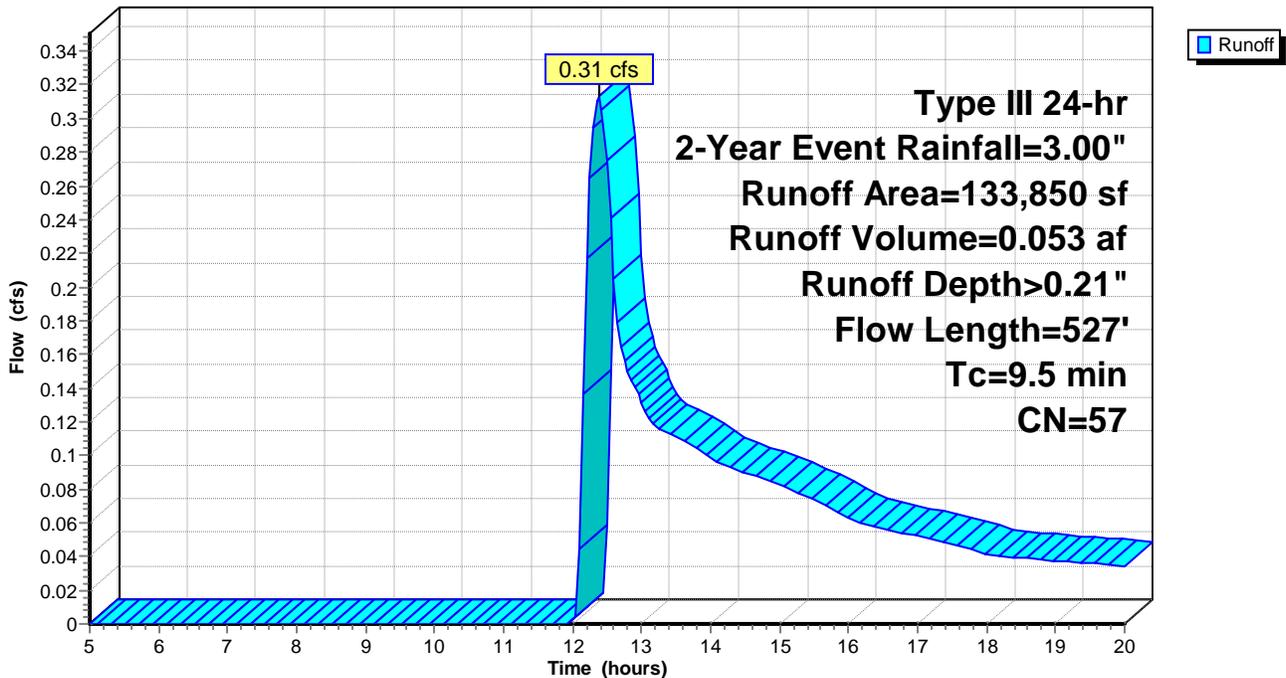
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Event Rainfall=3.00"

Area (sf)	CN	Description
78,485	58	Meadow, non-grazed, HSG B
55,365	55	Woods, Good, HSG B
133,850	57	Weighted Average
133,850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.0900	0.34		Sheet Flow, AB Range n= 0.130 P2= 3.00"
1.5	210	0.1048	2.27		Shallow Concentrated Flow, BC Short Grass Pasture Kv= 7.0 fps
3.1	217	0.0553	1.18		Shallow Concentrated Flow, CD Woodland Kv= 5.0 fps
9.5	527	Total			

Subcatchment 2S: Sub #2

Hydrograph



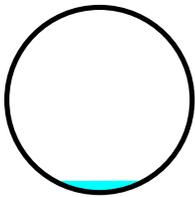
Summary for Reach 1R: 24" Concrete Pipe

Inflow Area = 4.535 ac, 2.60% Impervious, Inflow Depth > 0.25" for 2-Year Event event
 Inflow = 0.63 cfs @ 12.35 hrs, Volume= 0.095 af
 Outflow = 0.62 cfs @ 12.35 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.04 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 4.30 fps, Avg. Travel Time= 0.1 min

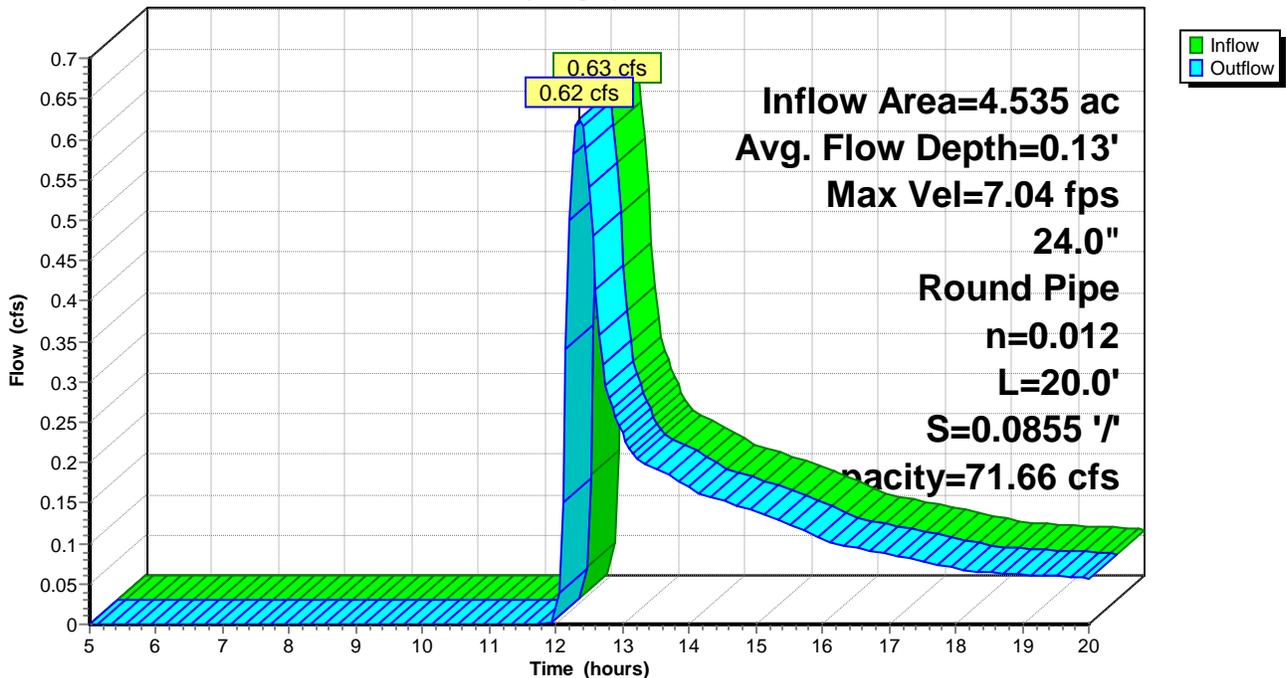
Peak Storage= 2 cf @ 12.35 hrs
 Average Depth at Peak Storage= 0.13'
 Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 71.66 cfs

24.0" Round Pipe
 n= 0.012 Concrete pipe, finished
 Length= 20.0' Slope= 0.0855 '/'
 Inlet Invert= 67.00', Outlet Invert= 65.29'



Reach 1R: 24" Concrete Pipe

Hydrograph



Viles Pre-Development

Type III 24-hr 10-Year Event Rainfall=4.40"

Prepared by Microsoft

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Page 7

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub #1

Runoff Area=63,690 sf 8.06% Impervious Runoff Depth>0.97"
Flow Length=432' Tc=13.8 min CN=62 Runoff=1.26 cfs 0.118 af

Subcatchment 2S: Sub #2

Runoff Area=133,850 sf 0.00% Impervious Runoff Depth>0.71"
Flow Length=527' Tc=9.5 min CN=57 Runoff=1.94 cfs 0.182 af

Reach 1R: 24" Concrete Pipe

Avg. Flow Depth=0.28' Max Vel=11.38 fps Inflow=3.10 cfs 0.300 af
24.0" Round Pipe n=0.012 L=20.0' S=0.0855 '/' Capacity=71.66 cfs Outflow=3.10 cfs 0.300 af

Total Runoff Area = 4.535 ac Runoff Volume = 0.300 af Average Runoff Depth = 0.79"
97.40% Pervious = 4.417 ac 2.60% Impervious = 0.118 ac

Summary for Subcatchment 1S: Sub #1

Runoff = 1.26 cfs @ 12.22 hrs, Volume= 0.118 af, Depth> 0.97"

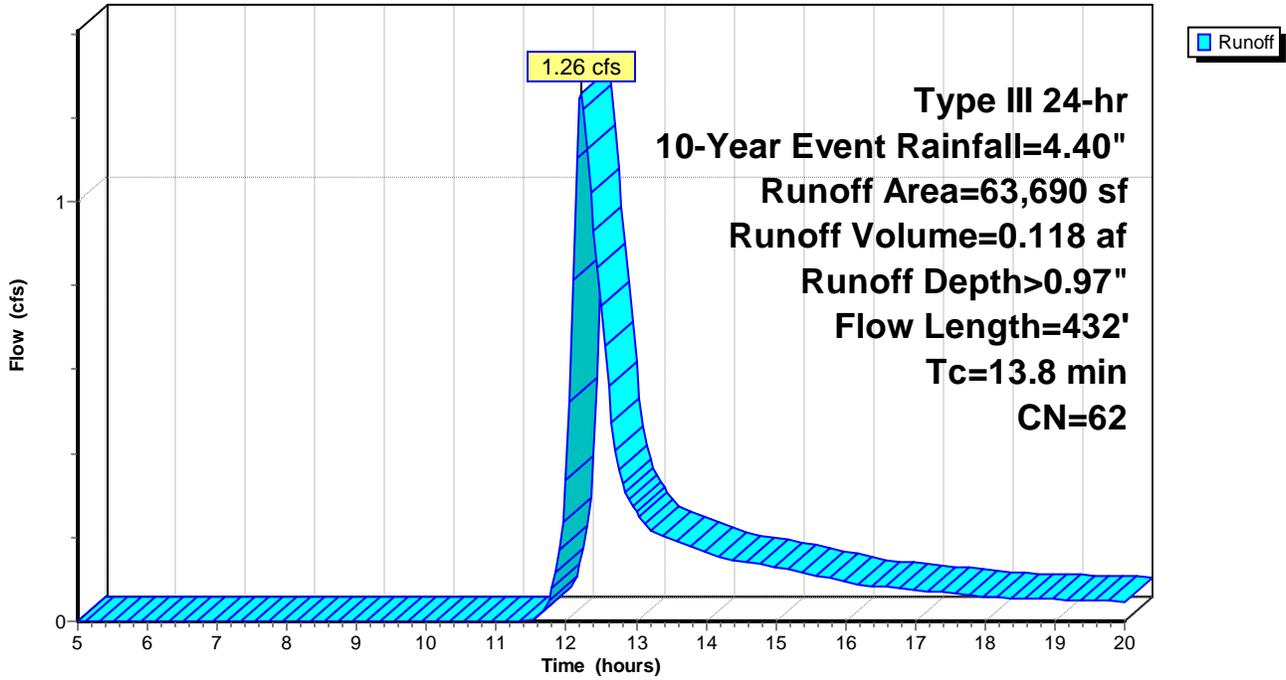
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Event Rainfall=4.40"

Area (sf)	CN	Description
5,135	98	Paved parking, HSG C
35,645	61	>75% Grass cover, Good, HSG B
22,910	55	Woods, Good, HSG B
63,690	62	Weighted Average
58,555		91.94% Pervious Area
5,135		8.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	13	0.3300	0.15		Sheet Flow, AB Woods: Light underbrush n= 0.400 P2= 3.00"
2.7	48	0.1250	0.30		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
8.2	47	0.0532	0.10		Sheet Flow, CD Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	66	0.0379	1.36		Shallow Concentrated Flow, DE Short Grass Pasture Kv= 7.0 fps
0.3	82	0.0305	4.56	18.23	Channel Flow, EF Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
0.0	13	0.1538	11.56	9.08	Pipe Channel, FG 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.0	12	0.0417	5.33	21.32	Channel Flow, GH Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
0.4	151	0.0695	6.88	27.52	Channel Flow, HI Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
13.8	432	Total			

Subcatchment 1S: Sub #1

Hydrograph



Viles Pre-Development

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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 10

Summary for Subcatchment 2S: Sub #2

Runoff = 1.94 cfs @ 12.17 hrs, Volume= 0.182 af, Depth> 0.71"

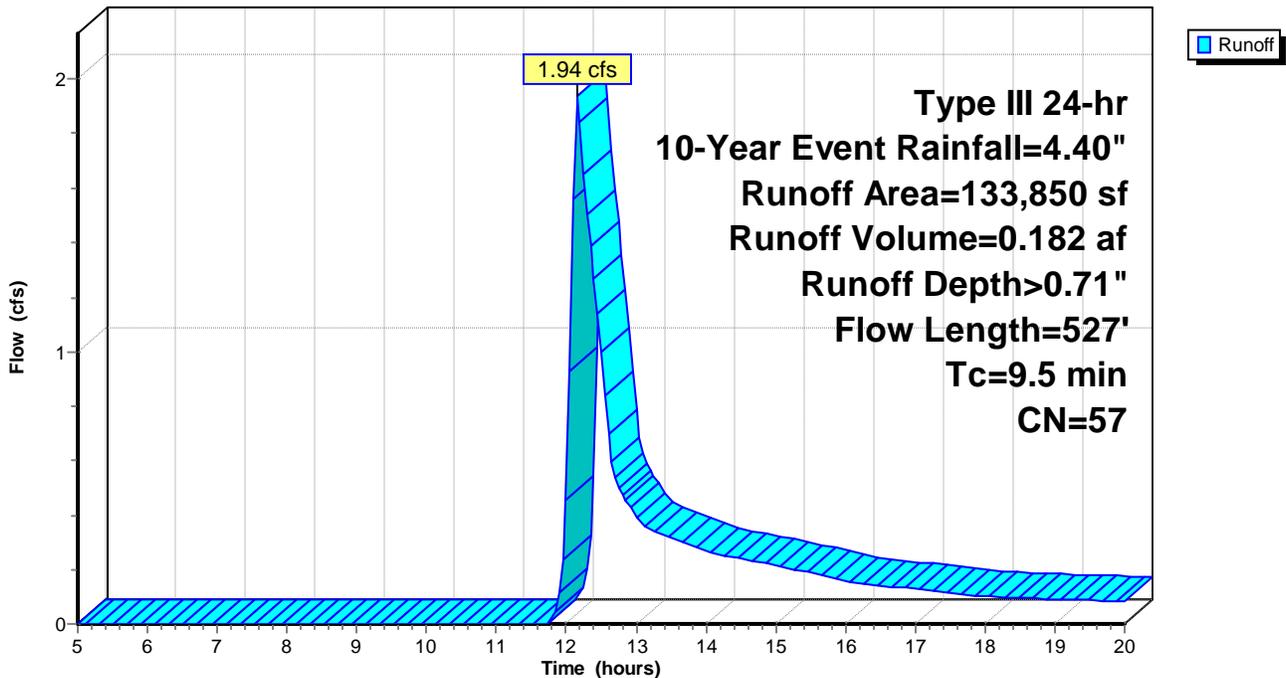
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Event Rainfall=4.40"

Area (sf)	CN	Description
78,485	58	Meadow, non-grazed, HSG B
55,365	55	Woods, Good, HSG B
133,850	57	Weighted Average
133,850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.0900	0.34		Sheet Flow, AB
					Range n= 0.130 P2= 3.00"
1.5	210	0.1048	2.27		Shallow Concentrated Flow, BC
					Short Grass Pasture Kv= 7.0 fps
3.1	217	0.0553	1.18		Shallow Concentrated Flow, CD
					Woodland Kv= 5.0 fps
9.5	527	Total			

Subcatchment 2S: Sub #2

Hydrograph



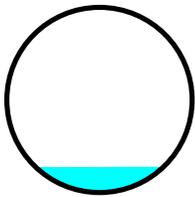
Summary for Reach 1R: 24" Concrete Pipe

Inflow Area = 4.535 ac, 2.60% Impervious, Inflow Depth > 0.79" for 10-Year Event event
 Inflow = 3.10 cfs @ 12.19 hrs, Volume= 0.300 af
 Outflow = 3.10 cfs @ 12.19 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 11.38 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 5.67 fps, Avg. Travel Time= 0.1 min

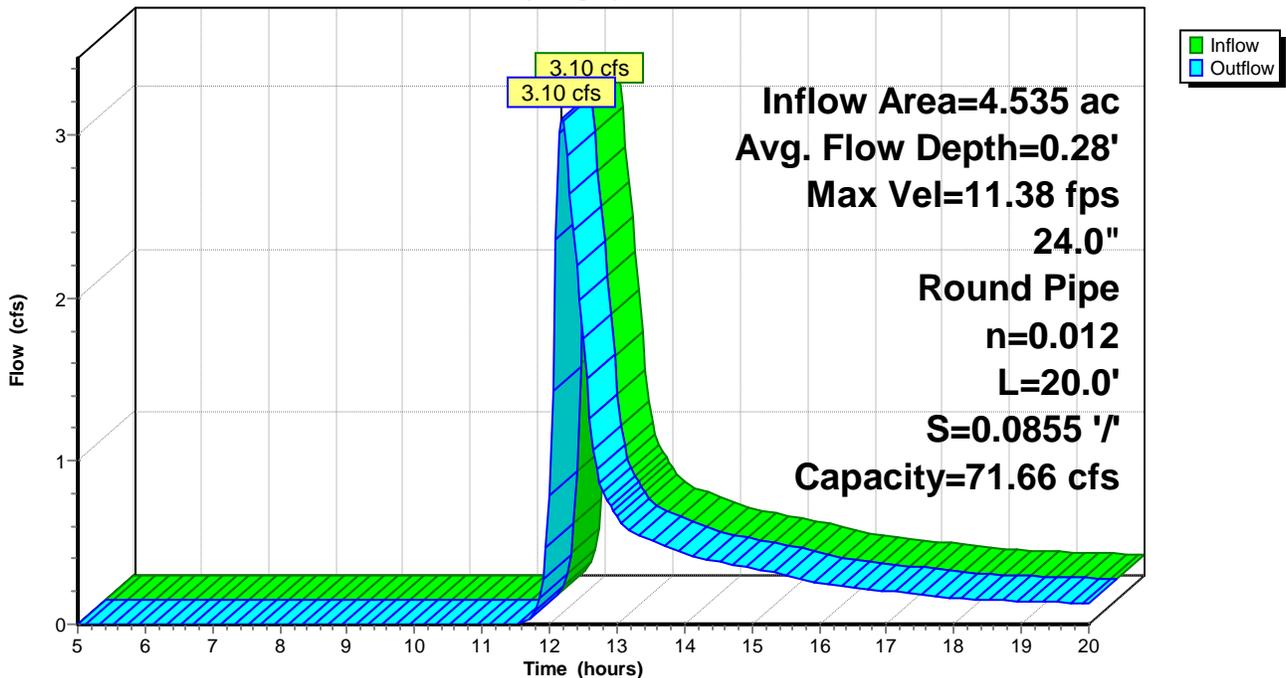
Peak Storage= 5 cf @ 12.19 hrs
 Average Depth at Peak Storage= 0.28'
 Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 71.66 cfs

24.0" Round Pipe
 n= 0.012 Concrete pipe, finished
 Length= 20.0' Slope= 0.0855 '/'
 Inlet Invert= 67.00', Outlet Invert= 65.29'



Reach 1R: 24" Concrete Pipe

Hydrograph



Viles Pre-Development

Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 12

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Sub #1

Runoff Area=63,690 sf 8.06% Impervious Runoff Depth>1.36"
Flow Length=432' Tc=13.8 min CN=62 Runoff=1.84 cfs 0.165 af

Subcatchment 2S: Sub #2

Runoff Area=133,850 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=527' Tc=9.5 min CN=57 Runoff=3.12 cfs 0.266 af

Reach 1R: 24" Concrete Pipe

Avg. Flow Depth=0.35' Max Vel=12.94 fps Inflow=4.85 cfs 0.431 af
24.0" Round Pipe n=0.012 L=20.0' S=0.0855 '/ Capacity=71.66 cfs Outflow=4.85 cfs 0.431 af

Total Runoff Area = 4.535 ac Runoff Volume = 0.431 af Average Runoff Depth = 1.14"
97.40% Pervious = 4.417 ac 2.60% Impervious = 0.118 ac

Summary for Subcatchment 1S: Sub #1

Runoff = 1.84 cfs @ 12.21 hrs, Volume= 0.165 af, Depth> 1.36"

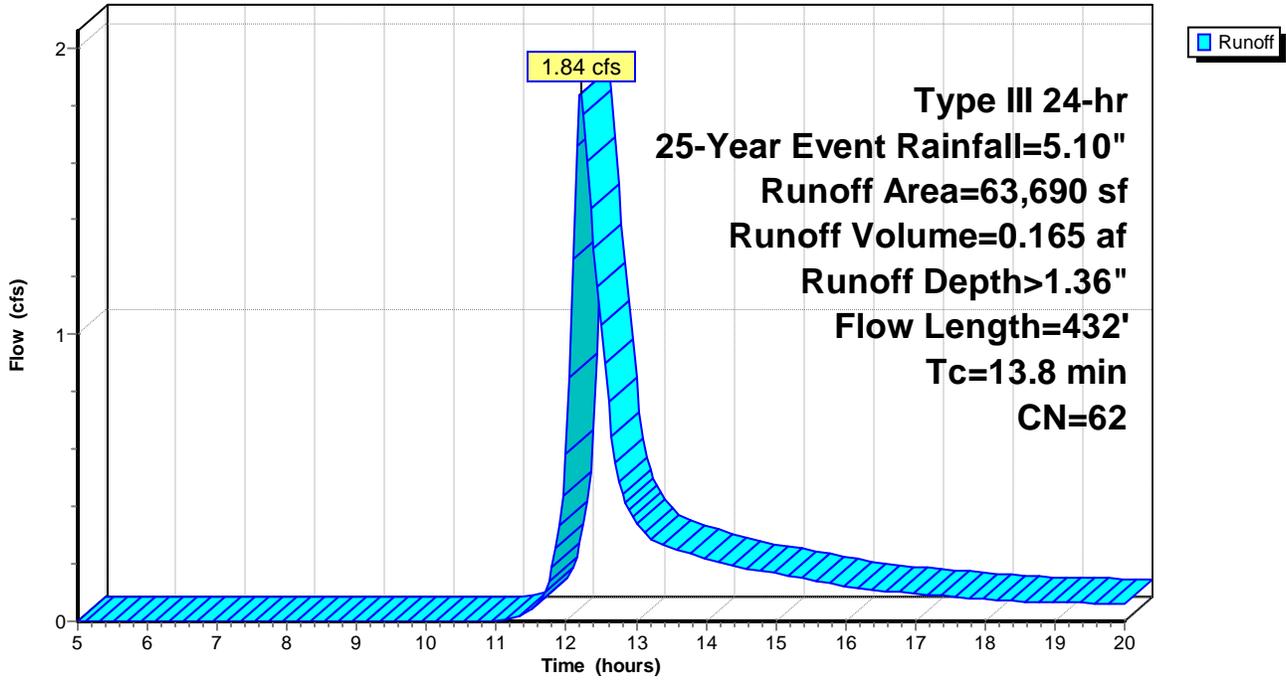
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Event Rainfall=5.10"

Area (sf)	CN	Description
5,135	98	Paved parking, HSG C
35,645	61	>75% Grass cover, Good, HSG B
22,910	55	Woods, Good, HSG B
63,690	62	Weighted Average
58,555		91.94% Pervious Area
5,135		8.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	13	0.3300	0.15		Sheet Flow, AB Woods: Light underbrush n= 0.400 P2= 3.00"
2.7	48	0.1250	0.30		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
8.2	47	0.0532	0.10		Sheet Flow, CD Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	66	0.0379	1.36		Shallow Concentrated Flow, DE Short Grass Pasture Kv= 7.0 fps
0.3	82	0.0305	4.56	18.23	Channel Flow, EF Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
0.0	13	0.1538	11.56	9.08	Pipe Channel, FG 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.0	12	0.0417	5.33	21.32	Channel Flow, GH Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
0.4	151	0.0695	6.88	27.52	Channel Flow, HI Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.035 Earth, dense weeds
13.8	432	Total			

Subcatchment 1S: Sub #1

Hydrograph



Viles Pre-Development

Prepared by Microsoft

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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 15

Summary for Subcatchment 2S: Sub #2

Runoff = 3.12 cfs @ 12.16 hrs, Volume= 0.266 af, Depth> 1.04"

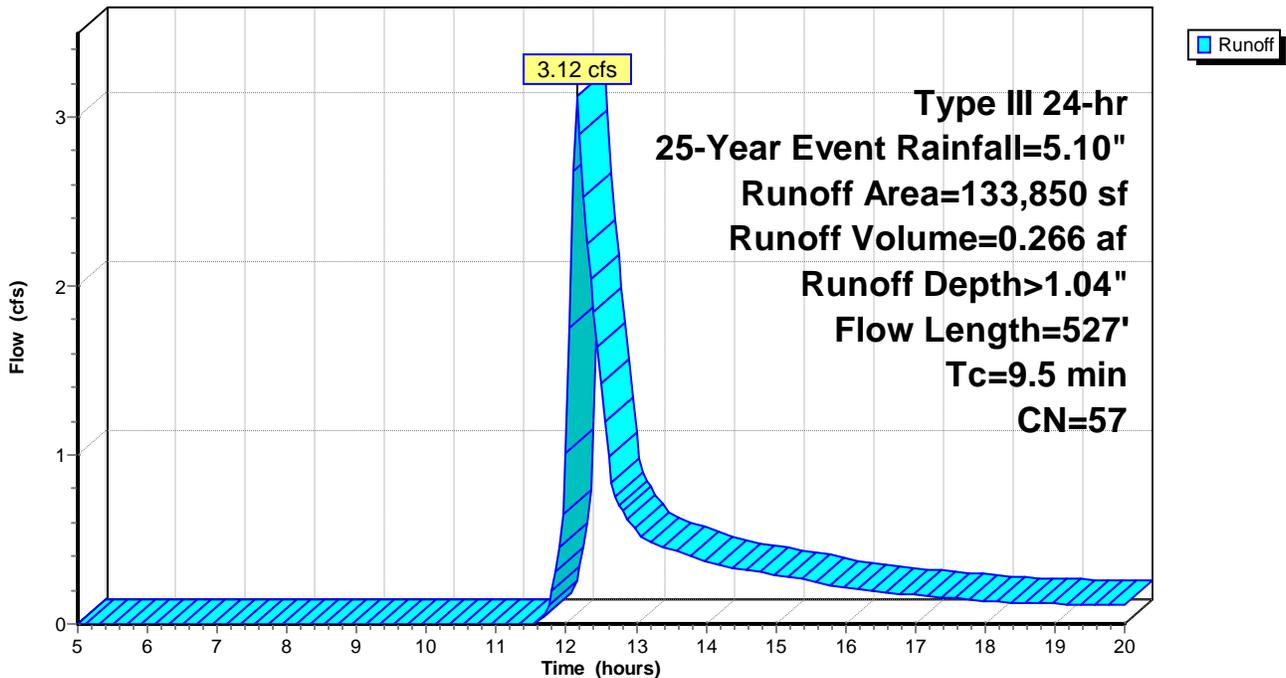
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Event Rainfall=5.10"

Area (sf)	CN	Description
78,485	58	Meadow, non-grazed, HSG B
55,365	55	Woods, Good, HSG B
133,850	57	Weighted Average
133,850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.0900	0.34		Sheet Flow, AB
					Range n= 0.130 P2= 3.00"
1.5	210	0.1048	2.27		Shallow Concentrated Flow, BC
					Short Grass Pasture Kv= 7.0 fps
3.1	217	0.0553	1.18		Shallow Concentrated Flow, CD
					Woodland Kv= 5.0 fps
9.5	527	Total			

Subcatchment 2S: Sub #2

Hydrograph



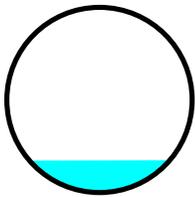
Summary for Reach 1R: 24" Concrete Pipe

Inflow Area = 4.535 ac, 2.60% Impervious, Inflow Depth > 1.14" for 25-Year Event event
Inflow = 4.85 cfs @ 12.17 hrs, Volume= 0.431 af
Outflow = 4.85 cfs @ 12.17 hrs, Volume= 0.431 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.94 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 6.10 fps, Avg. Travel Time= 0.1 min

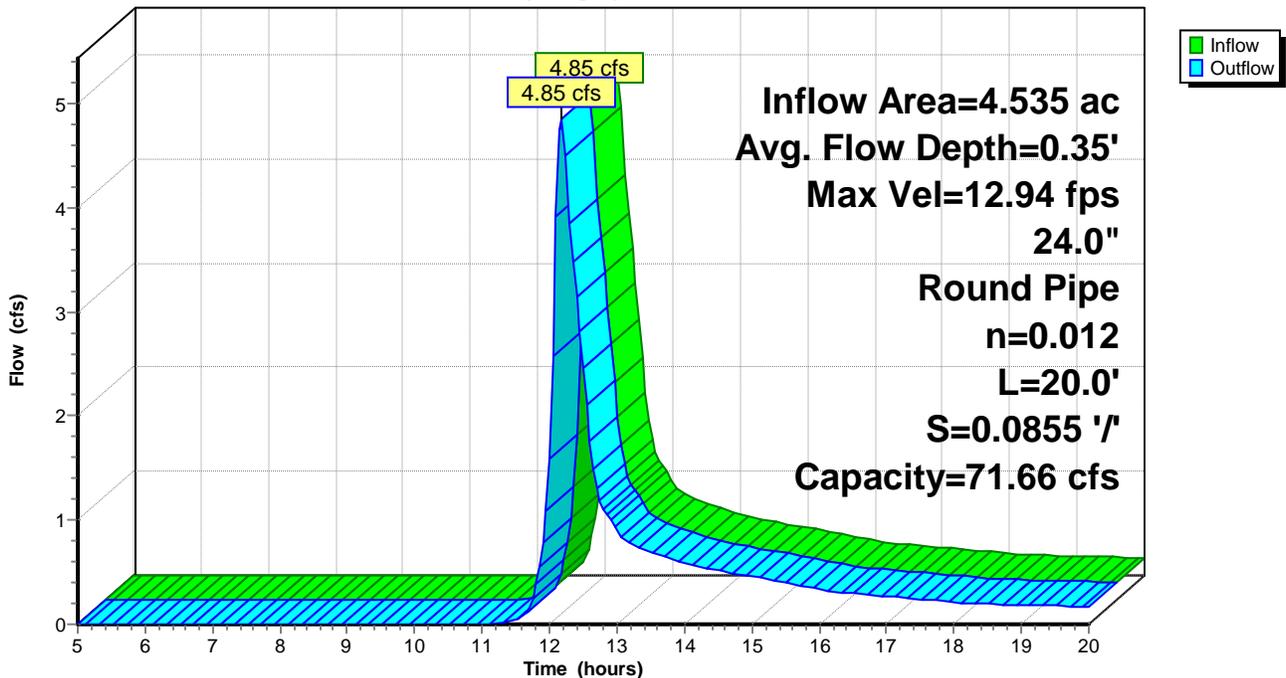
Peak Storage= 7 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 71.66 cfs

24.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 20.0' Slope= 0.0855 '/
Inlet Invert= 67.00', Outlet Invert= 65.29'

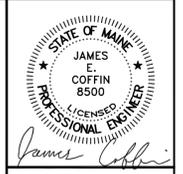
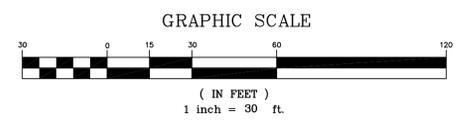
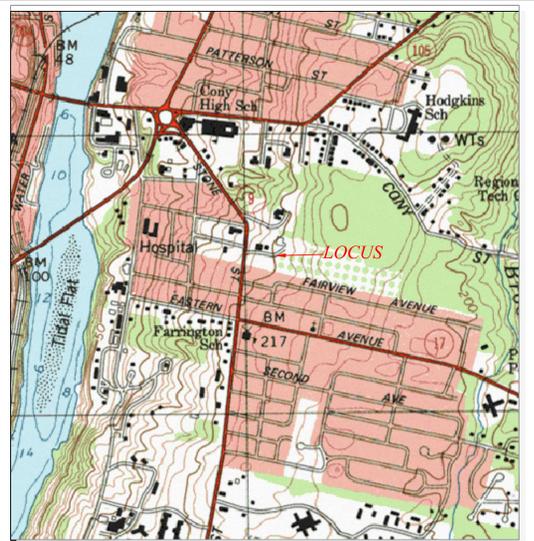
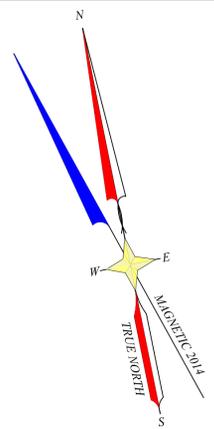
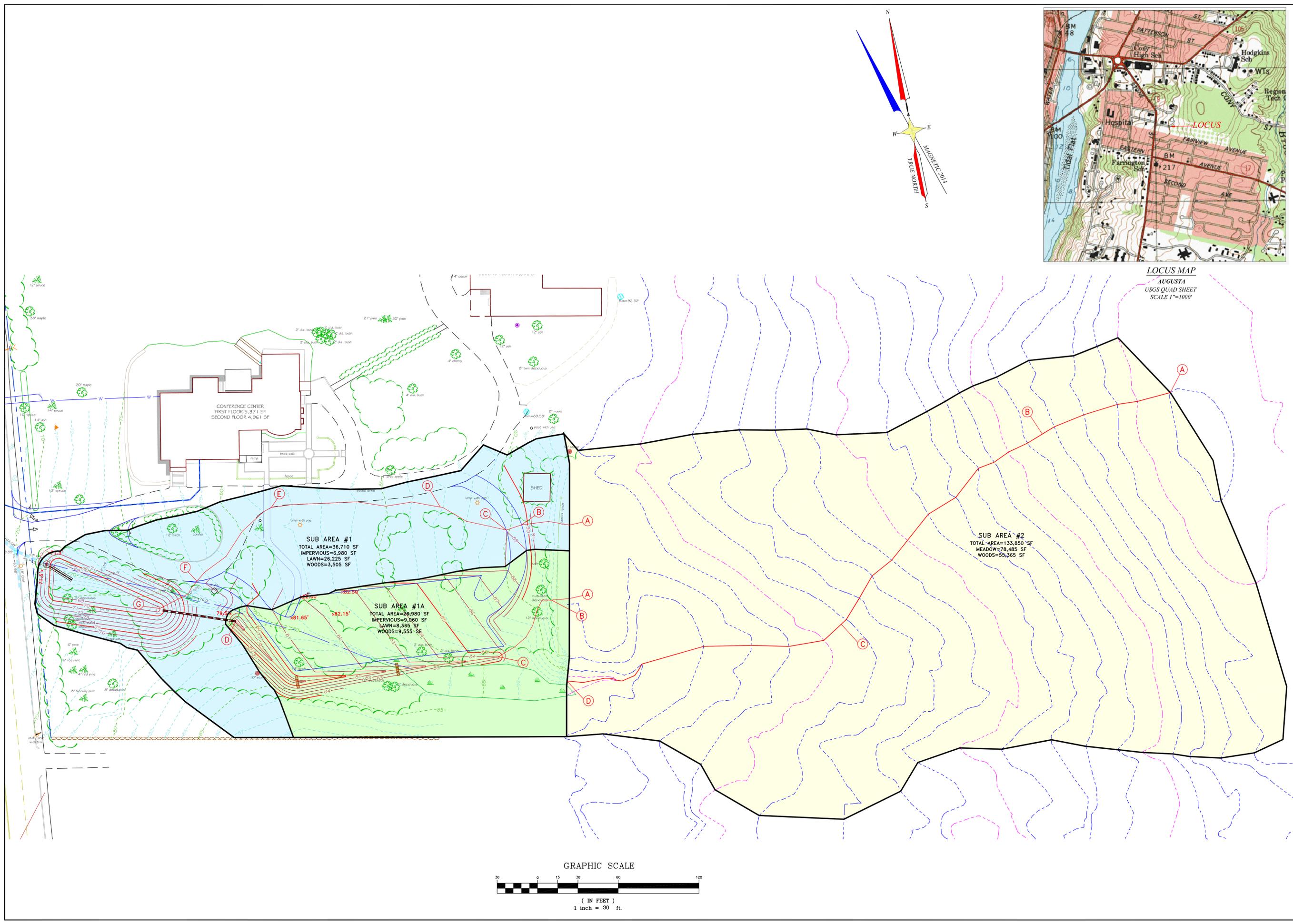


Reach 1R: 24" Concrete Pipe

Hydrograph



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NO.	REVISIONS	DATE

CLIENT/PROJECT: **ELSIE & WILLIAM VILES FOUNDATION
THE VILES HOUSE**

LOCATION: 71 STONE STREET

TOWN: AUGUSTA COUNTY: KENNEBEC STATE: MAINE

PROJ. NO. 2014-013

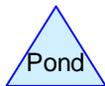
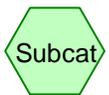
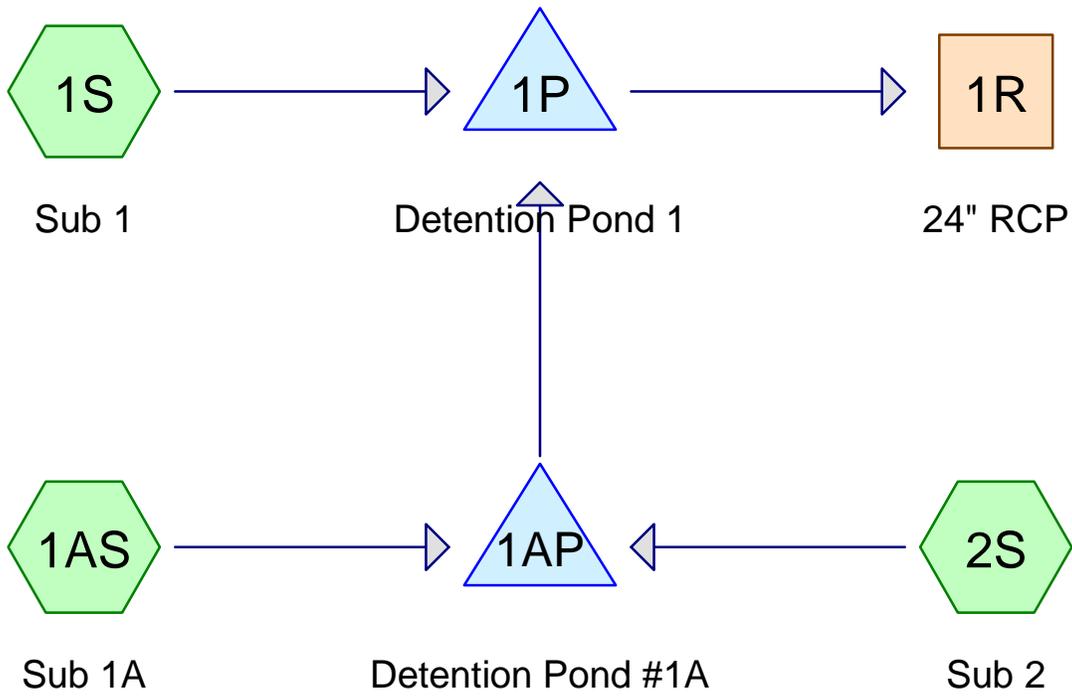
SHEET TITLE: **POST-DEVELOPMENT PLAN**

SCALE: 1 INCH=30 FEET

DATE: FEBRUARY 06, 2015

DRAWN BY: TCH
CHECKED BY: JEC

POST



Viles Post-Development

Type III 24-hr 2-Year Event Rainfall=3.00"

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Page 2

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Sub 1A

Runoff Area=26,980 sf 33.58% Impervious Runoff Depth>0.69"
Flow Length=290' Tc=5.4 min CN=71 Runoff=0.49 cfs 0.035 af

Subcatchment 1S: Sub 1

Runoff Area=36,710 sf 19.01% Impervious Runoff Depth>0.52"
Flow Length=340' Tc=9.2 min CN=67 Runoff=0.41 cfs 0.037 af

Subcatchment 2S: Sub 2

Runoff Area=133,850 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=527' Tc=9.5 min CN=57 Runoff=0.31 cfs 0.053 af

Reach 1R: 24" RCP

Avg. Flow Depth=0.13' Max Vel=6.88 fps Inflow=0.58 cfs 0.121 af
24.0" Round Pipe n=0.012 L=20.0' S=0.0855 '/ Capacity=71.66 cfs Outflow=0.58 cfs 0.121 af

Pond 1AP: Detention Pond #1A

Peak Elev=76.93' Storage=6 cf Inflow=0.55 cfs 0.088 af
10.0" Round Culvert n=0.013 L=55.0' S=0.1182 '/ Outflow=0.55 cfs 0.088 af

Pond 1P: Detention Pond 1

Peak Elev=69.63' Storage=869 cf Inflow=0.95 cfs 0.125 af
Outflow=0.58 cfs 0.121 af

Total Runoff Area = 4.535 ac Runoff Volume = 0.125 af Average Runoff Depth = 0.33"
91.88% Pervious = 4.167 ac 8.12% Impervious = 0.368 ac

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Type III 24-hr 2-Year Event Rainfall=3.00"

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Page 3

Summary for Subcatchment 1AS: Sub 1A

Runoff = 0.49 cfs @ 12.10 hrs, Volume= 0.035 af, Depth> 0.69"

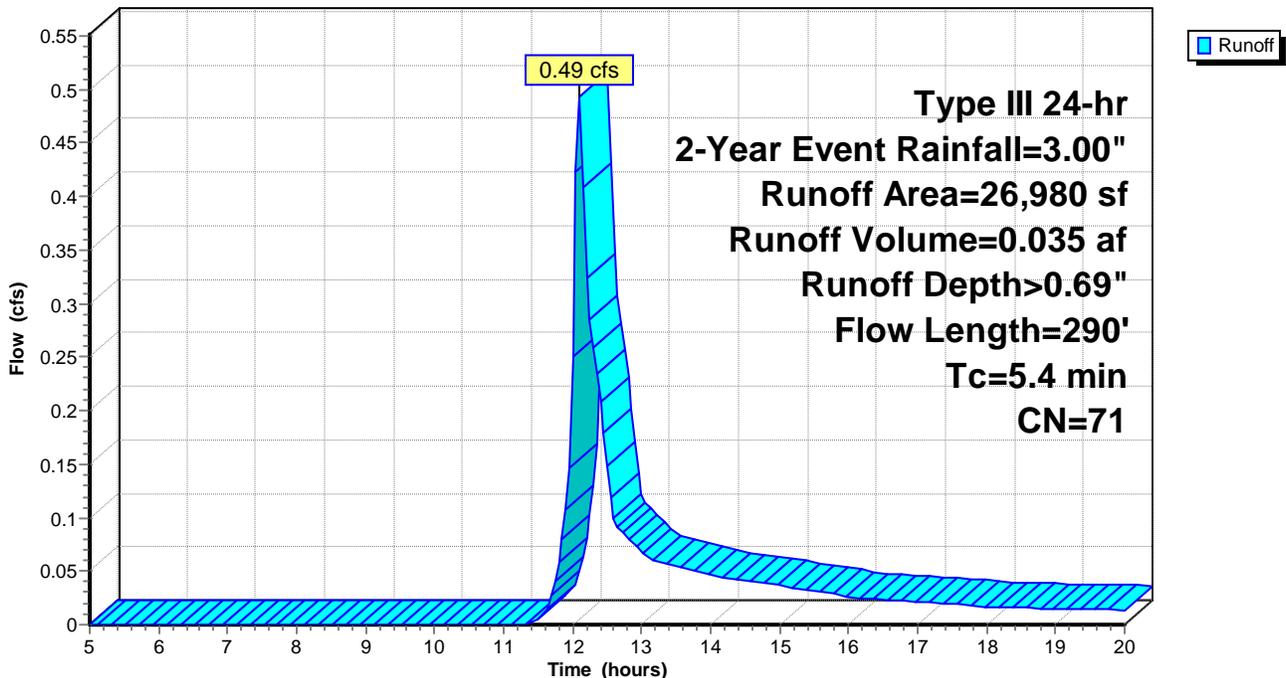
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

Area (sf)	CN	Description
9,060	98	Paved parking, HSG C
8,365	61	>75% Grass cover, Good, HSG B
9,555	55	Woods, Good, HSG B
26,980	71	Weighted Average
17,920		66.42% Pervious Area
9,060		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	13	0.3300	0.15		Sheet Flow, AB Woods: Light underbrush n= 0.400 P2= 3.00"
3.3	62	0.1290	0.32		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
0.7	215	0.0326	5.50	21.99	Channel Flow, CD Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.030 Earth, grassed & winding
5.4	290	Total			

Subcatchment 1AS: Sub 1A

Hydrograph



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Type III 24-hr 2-Year Event Rainfall=3.00"

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Page 4

Summary for Subcatchment 1S: Sub 1

Runoff = 0.41 cfs @ 12.16 hrs, Volume= 0.037 af, Depth> 0.52"

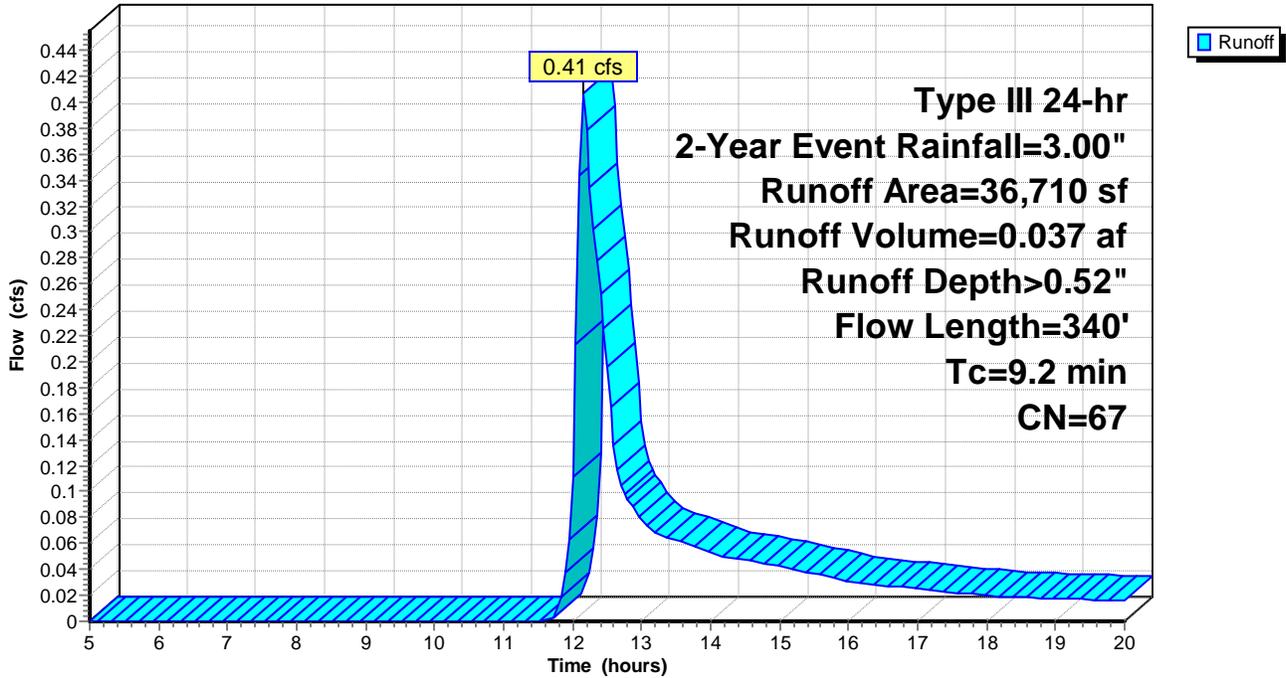
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

Area (sf)	CN	Description
6,980	98	Water Surface, HSG C
26,225	61	>75% Grass cover, Good, HSG B
3,505	55	Woods, Good, HSG B
36,710	67	Weighted Average
29,730		80.99% Pervious Area
6,980		19.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	36	0.1111	0.18		Sheet Flow, AB Grass: Dense n= 0.240 P2= 3.00"
0.2	12	0.0200	0.87		Sheet Flow, BC Smooth surfaces n= 0.011 P2= 3.00"
4.6	52	0.0385	0.19		Sheet Flow, CD Grass: Short n= 0.150 P2= 3.00"
0.7	127	0.0433	3.12		Shallow Concentrated Flow, DE Grassed Waterway Kv= 15.0 fps
0.3	78	0.0513	4.60		Shallow Concentrated Flow, EF Paved Kv= 20.3 fps
0.1	35	0.2429	7.39		Shallow Concentrated Flow, FG Grassed Waterway Kv= 15.0 fps
9.2	340	Total			

Subcatchment 1S: Sub 1

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Page 6

Summary for Subcatchment 2S: Sub 2

Runoff = 0.31 cfs @ 12.38 hrs, Volume= 0.053 af, Depth> 0.21"

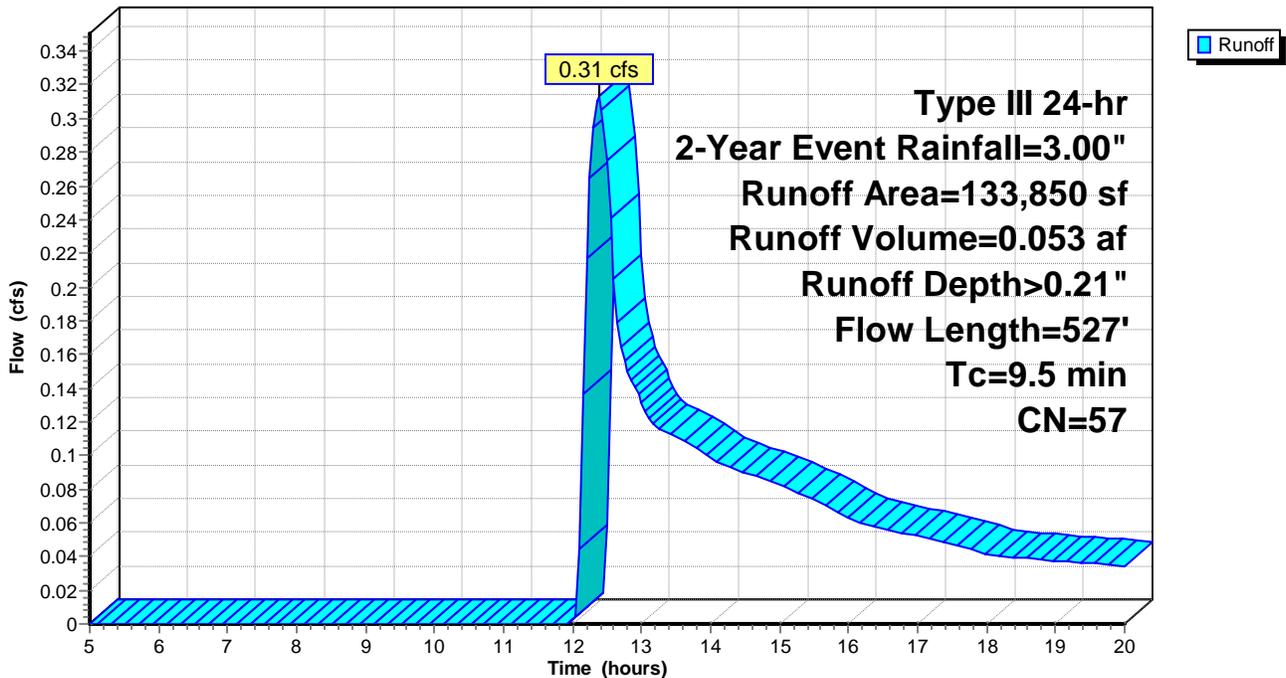
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

Area (sf)	CN	Description
78,485	58	Meadow, non-grazed, HSG B
55,365	55	Woods, Good, HSG B
133,850	57	Weighted Average
133,850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.0900	0.34		Sheet Flow, AB Range n= 0.130 P2= 3.00"
1.5	210	0.1048	2.27		Shallow Concentrated Flow, BC Short Grass Pasture Kv= 7.0 fps
3.1	217	0.0553	1.18		Shallow Concentrated Flow, CD Woodland Kv= 5.0 fps
9.5	527	Total			

Subcatchment 2S: Sub 2

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Type III 24-hr 2-Year Event Rainfall=3.00"

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Page 7

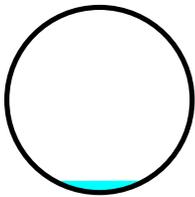
Summary for Reach 1R: 24" RCP

Inflow Area = 4.535 ac, 8.12% Impervious, Inflow Depth > 0.32" for 2-Year Event event
Inflow = 0.58 cfs @ 12.52 hrs, Volume= 0.121 af
Outflow = 0.58 cfs @ 12.52 hrs, Volume= 0.121 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.88 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 4.51 fps, Avg. Travel Time= 0.1 min

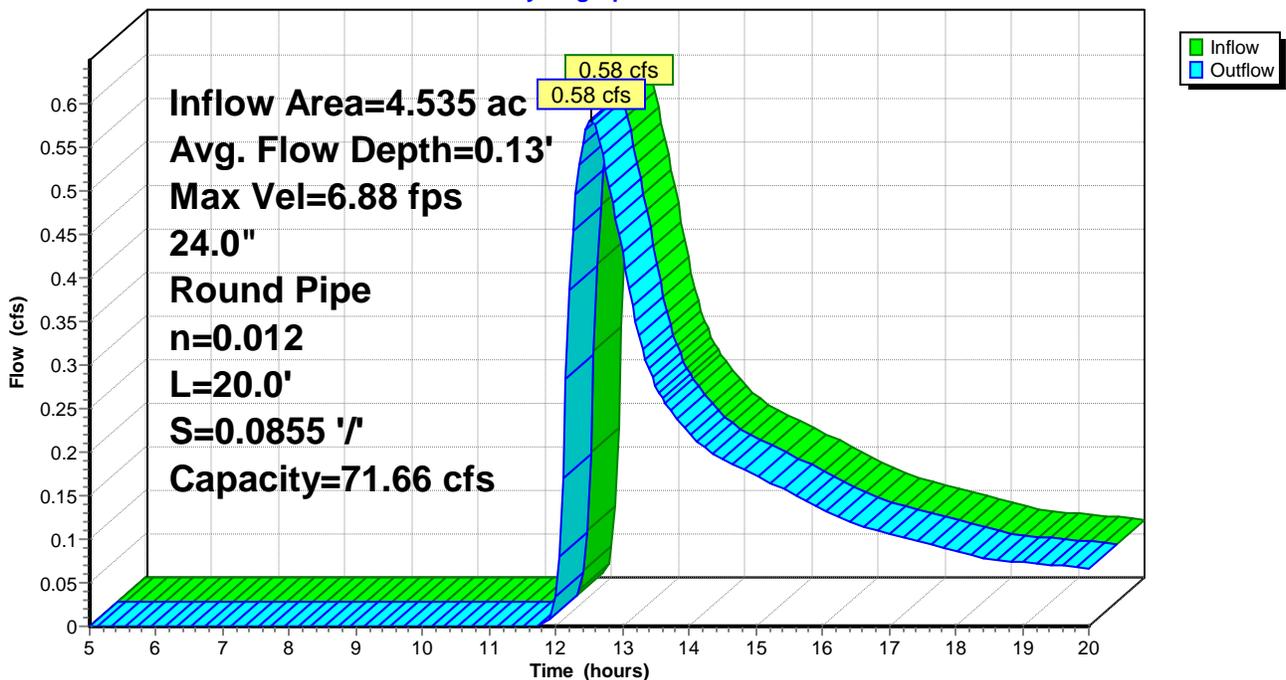
Peak Storage= 2 cf @ 12.52 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 71.66 cfs

24.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 20.0' Slope= 0.0855 '/'
Inlet Invert= 67.00', Outlet Invert= 65.29'



Reach 1R: 24" RCP

Hydrograph



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Type III 24-hr 2-Year Event Rainfall=3.00"

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Page 8

Summary for Pond 1AP: Detention Pond #1A

Inflow Area = 3.692 ac, 5.63% Impervious, Inflow Depth > 0.29" for 2-Year Event event
 Inflow = 0.55 cfs @ 12.29 hrs, Volume= 0.088 af
 Outflow = 0.55 cfs @ 12.29 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.1 min
 Primary = 0.55 cfs @ 12.29 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 76.93' @ 12.29 hrs Surf.Area= 18 sf Storage= 6 cf

Plug-Flow detention time= 0.3 min calculated for 0.088 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (863.7 - 863.5)

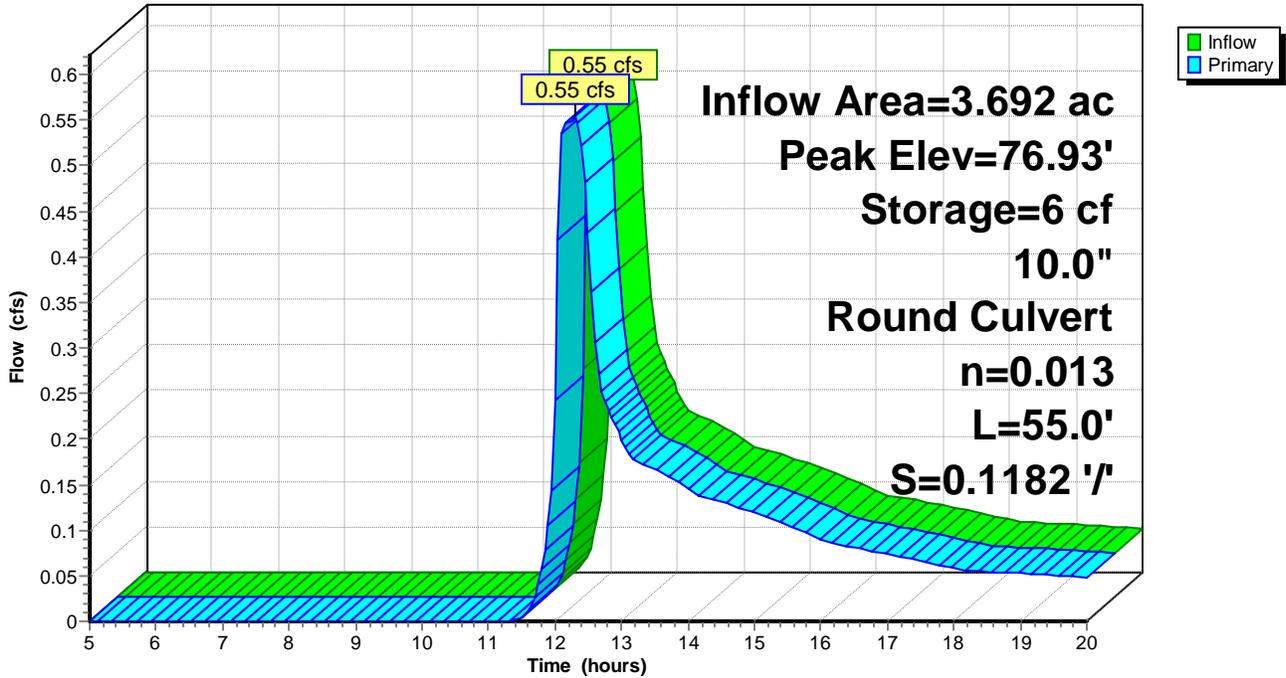
Volume	Invert	Avail.Storage	Storage Description		
#1	76.50'	751 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
76.50	10	0	0	10	
77.00	20	7	7	22	
78.00	185	89	96	190	
79.00	520	338	434	531	
79.50	755	317	751	770	

Device	Routing	Invert	Outlet Devices		
#1	Primary	76.50'	10.0" Round Culvert L= 55.0' Ke= 0.700 Inlet / Outlet Invert= 76.50' / 70.00' S= 0.1182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf		

Primary OutFlow Max=0.55 cfs @ 12.29 hrs HW=76.93' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 0.55 cfs @ 1.96 fps)

Pond 1AP: Detention Pond #1A

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Type III 24-hr 2-Year Event Rainfall=3.00"

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Page 10

Summary for Pond 1P: Detention Pond 1

Inflow Area = 4.535 ac, 8.12% Impervious, Inflow Depth > 0.33" for 2-Year Event event
 Inflow = 0.95 cfs @ 12.16 hrs, Volume= 0.125 af
 Outflow = 0.58 cfs @ 12.52 hrs, Volume= 0.121 af, Atten= 39%, Lag= 21.8 min
 Primary = 0.58 cfs @ 12.52 hrs, Volume= 0.121 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 69.63' @ 12.52 hrs Surf.Area= 1,574 sf Storage= 869 cf

Plug-Flow detention time= 29.9 min calculated for 0.121 af (97% of inflow)
 Center-of-Mass det. time= 18.4 min (876.1 - 857.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	69.00'	4,977 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
69.00	1,210	0	0	1,210	
70.00	1,815	1,502	1,502	1,830	
71.00	2,475	2,136	3,639	2,510	
71.50	2,885	1,339	4,977	2,930	

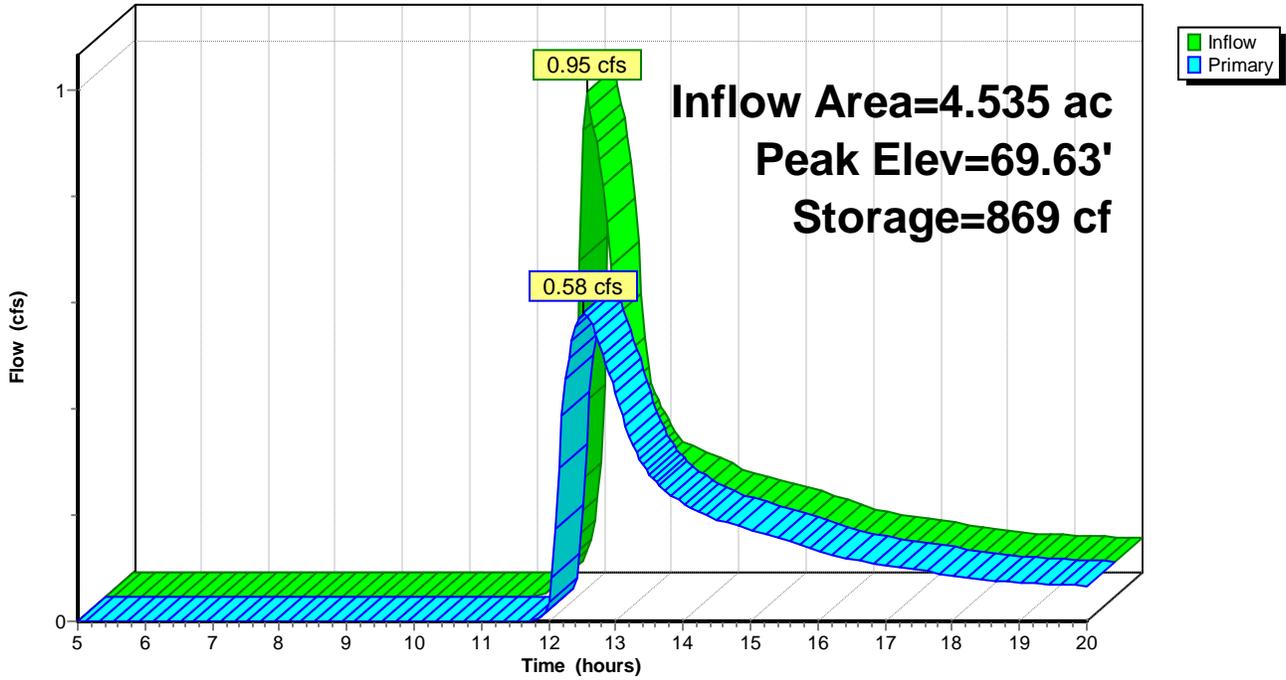
Device	Routing	Invert	Outlet Devices	
#1	Primary	67.00'	24.0" Round Culvert L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 67.00' / 65.29' S= 0.0855 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf	
#2	Device 1	69.00'	6.0" Vert. Orifice/Grate C= 0.600	
#3	Device 1	70.00'	12.0" Vert. Orifice/Grate C= 0.600	

Primary OutFlow Max=0.58 cfs @ 12.52 hrs HW=69.62' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.58 cfs of 19.28 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.58 cfs @ 2.95 fps)
- ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Detention Pond 1

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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 12

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Sub 1A

Runoff Area=26,980 sf 33.58% Impervious Runoff Depth>1.54"
Flow Length=290' Tc=5.4 min CN=71 Runoff=1.18 cfs 0.079 af

Subcatchment 1S: Sub 1

Runoff Area=36,710 sf 19.01% Impervious Runoff Depth>1.27"
Flow Length=340' Tc=9.2 min CN=67 Runoff=1.15 cfs 0.089 af

Subcatchment 2S: Sub 2

Runoff Area=133,850 sf 0.00% Impervious Runoff Depth>0.71"
Flow Length=527' Tc=9.5 min CN=57 Runoff=1.94 cfs 0.182 af

Reach 1R: 24" RCP

Avg. Flow Depth=0.26' Max Vel=10.74 fps Inflow=2.56 cfs 0.344 af
24.0" Round Pipe n=0.012 L=20.0' S=0.0855 '/ Capacity=71.66 cfs Outflow=2.56 cfs 0.344 af

Pond 1AP: Detention Pond #1A

Peak Elev=78.25' Storage=151 cf Inflow=2.86 cfs 0.261 af
10.0" Round Culvert n=0.013 L=55.0' S=0.1182 '/ Outflow=2.68 cfs 0.261 af

Pond 1P: Detention Pond 1

Peak Elev=70.64' Storage=2,793 cf Inflow=3.80 cfs 0.350 af
Outflow=2.56 cfs 0.344 af

Total Runoff Area = 4.535 ac Runoff Volume = 0.350 af Average Runoff Depth = 0.93"
91.88% Pervious = 4.167 ac 8.12% Impervious = 0.368 ac

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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 13

Summary for Subcatchment 1AS: Sub 1A

Runoff = 1.18 cfs @ 12.09 hrs, Volume= 0.079 af, Depth> 1.54"

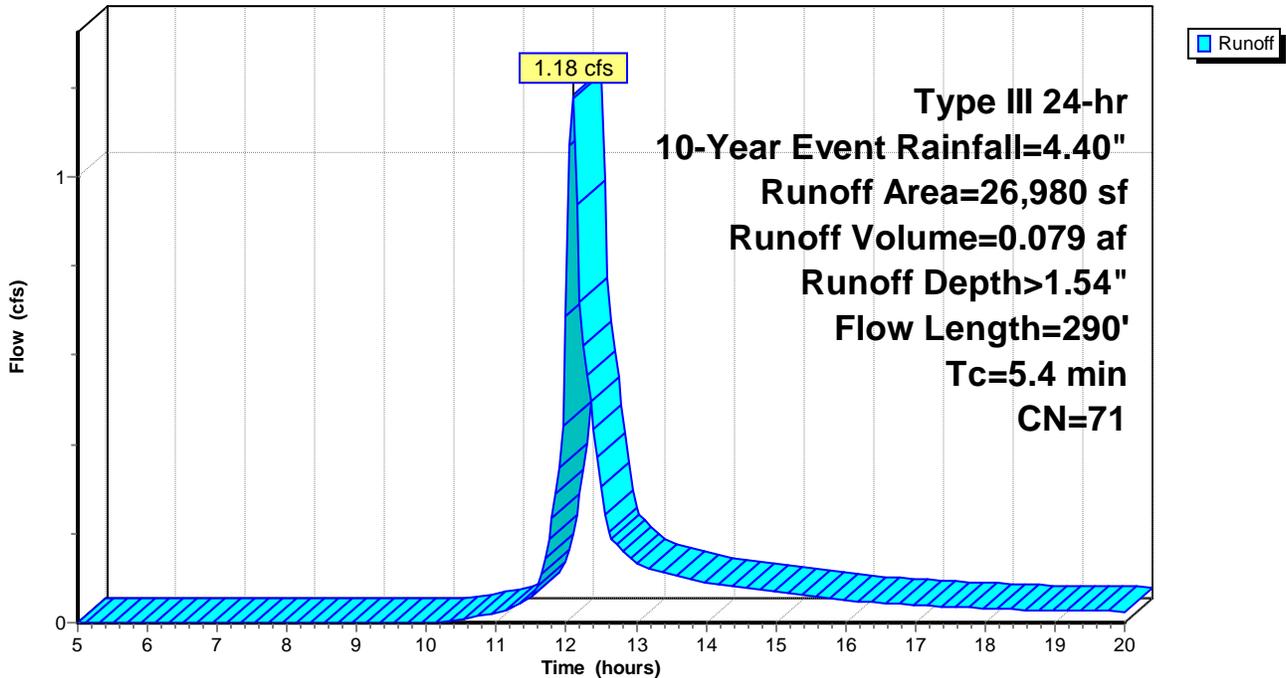
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Event Rainfall=4.40"

Area (sf)	CN	Description
9,060	98	Paved parking, HSG C
8,365	61	>75% Grass cover, Good, HSG B
9,555	55	Woods, Good, HSG B
26,980	71	Weighted Average
17,920		66.42% Pervious Area
9,060		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	13	0.3300	0.15		Sheet Flow, AB Woods: Light underbrush n= 0.400 P2= 3.00"
3.3	62	0.1290	0.32		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
0.7	215	0.0326	5.50	21.99	Channel Flow, CD Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.030 Earth, grassed & winding
5.4	290	Total			

Subcatchment 1AS: Sub 1A

Hydrograph



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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 14

Summary for Subcatchment 1S: Sub 1

Runoff = 1.15 cfs @ 12.14 hrs, Volume= 0.089 af, Depth> 1.27"

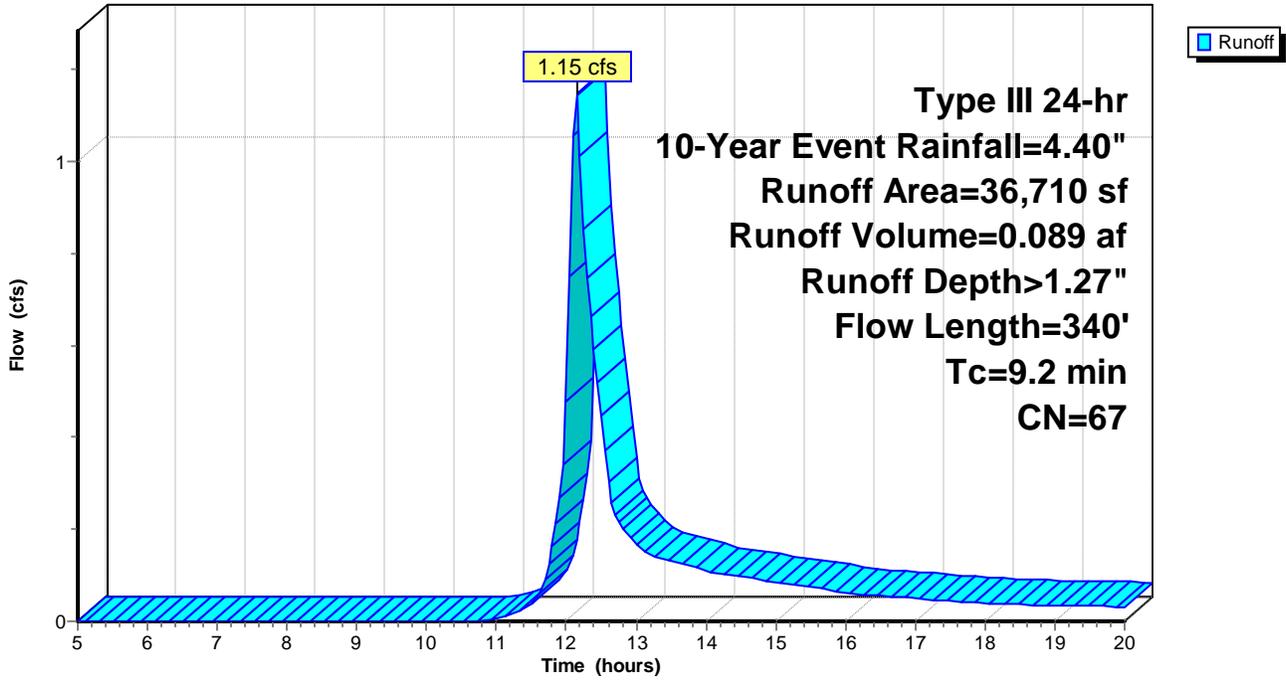
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Event Rainfall=4.40"

Area (sf)	CN	Description
6,980	98	Water Surface, HSG C
26,225	61	>75% Grass cover, Good, HSG B
3,505	55	Woods, Good, HSG B
36,710	67	Weighted Average
29,730		80.99% Pervious Area
6,980		19.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	36	0.1111	0.18		Sheet Flow, AB Grass: Dense n= 0.240 P2= 3.00"
0.2	12	0.0200	0.87		Sheet Flow, BC Smooth surfaces n= 0.011 P2= 3.00"
4.6	52	0.0385	0.19		Sheet Flow, CD Grass: Short n= 0.150 P2= 3.00"
0.7	127	0.0433	3.12		Shallow Concentrated Flow, DE Grassed Waterway Kv= 15.0 fps
0.3	78	0.0513	4.60		Shallow Concentrated Flow, EF Paved Kv= 20.3 fps
0.1	35	0.2429	7.39		Shallow Concentrated Flow, FG Grassed Waterway Kv= 15.0 fps
9.2	340	Total			

Subcatchment 1S: Sub 1

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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 16

Summary for Subcatchment 2S: Sub 2

Runoff = 1.94 cfs @ 12.17 hrs, Volume= 0.182 af, Depth> 0.71"

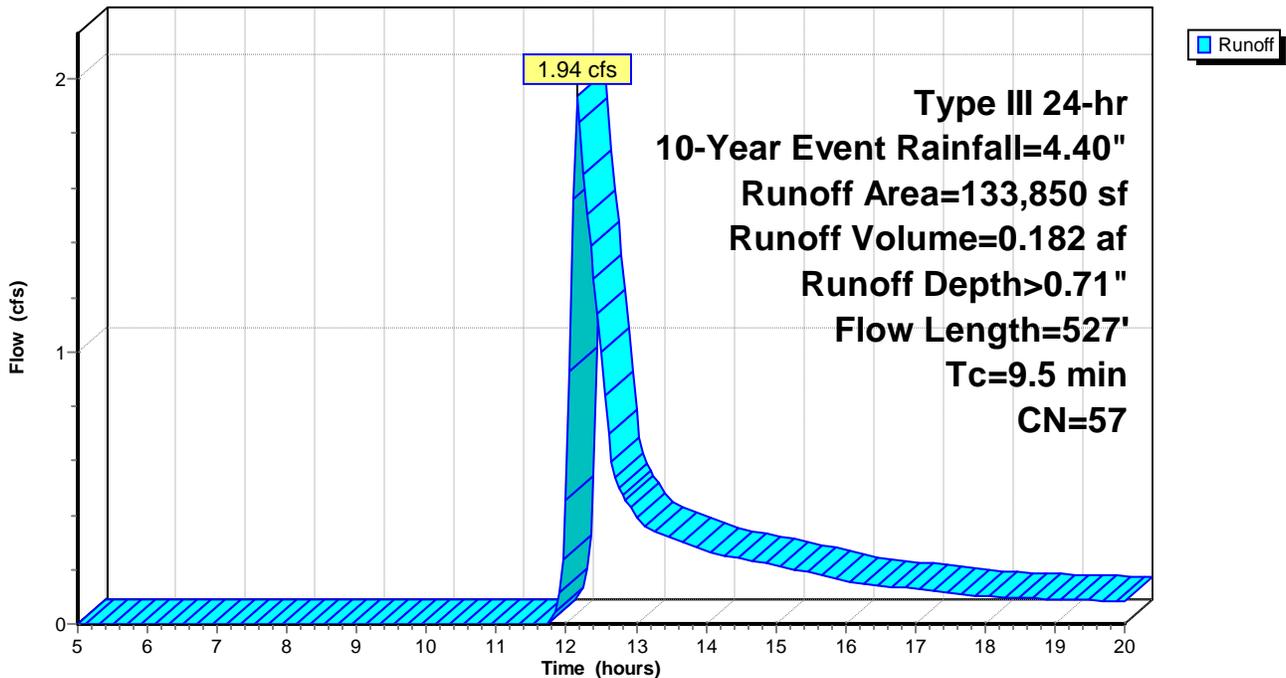
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Event Rainfall=4.40"

Area (sf)	CN	Description
78,485	58	Meadow, non-grazed, HSG B
55,365	55	Woods, Good, HSG B
133,850	57	Weighted Average
133,850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.0900	0.34		Sheet Flow, AB
1.5	210	0.1048	2.27		Range n= 0.130 P2= 3.00" Shallow Concentrated Flow, BC
3.1	217	0.0553	1.18		Short Grass Pasture Kv= 7.0 fps Shallow Concentrated Flow, CD
9.5	527	Total			Woodland Kv= 5.0 fps

Subcatchment 2S: Sub 2

Hydrograph



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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 17

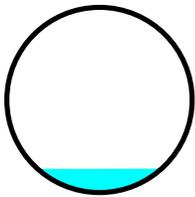
Summary for Reach 1R: 24" RCP

Inflow Area = 4.535 ac, 8.12% Impervious, Inflow Depth > 0.91" for 10-Year Event event
Inflow = 2.56 cfs @ 12.37 hrs, Volume= 0.344 af
Outflow = 2.56 cfs @ 12.37 hrs, Volume= 0.344 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.74 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.57 fps, Avg. Travel Time= 0.1 min

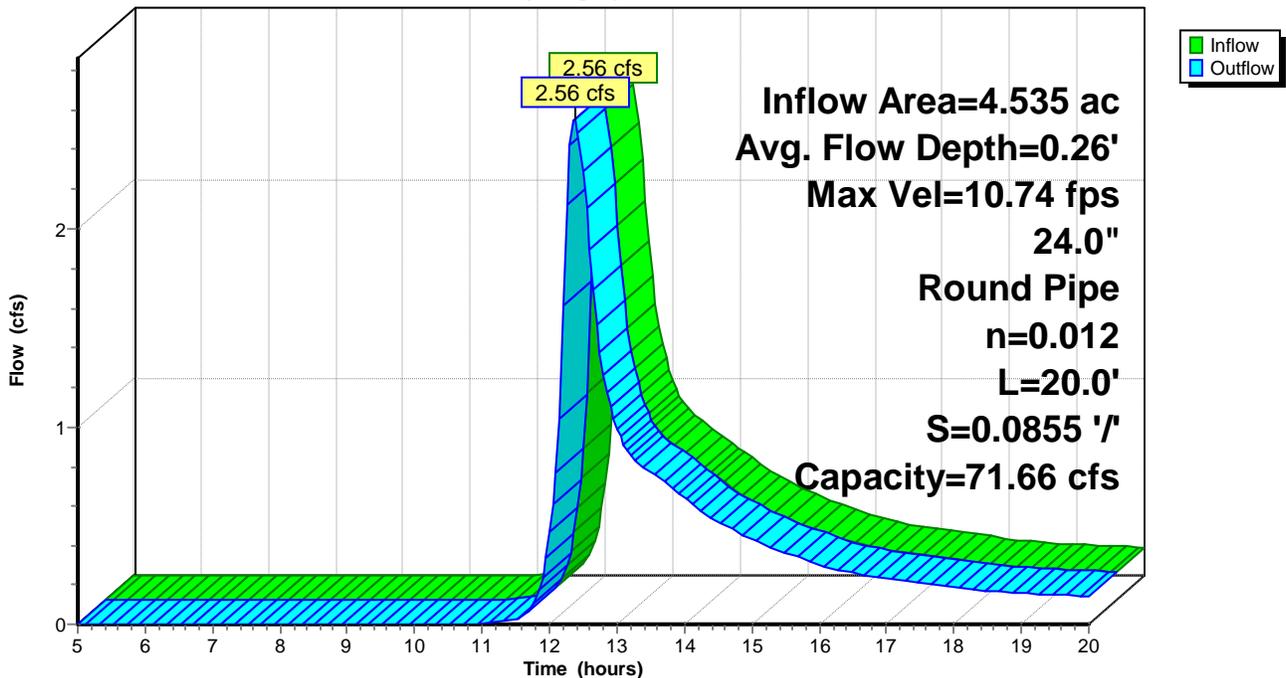
Peak Storage= 5 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 71.66 cfs

24.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 20.0' Slope= 0.0855 '/'
Inlet Invert= 67.00', Outlet Invert= 65.29'



Reach 1R: 24" RCP

Hydrograph



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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 18

Summary for Pond 1AP: Detention Pond #1A

Inflow Area = 3.692 ac, 5.63% Impervious, Inflow Depth > 0.85" for 10-Year Event event
 Inflow = 2.86 cfs @ 12.14 hrs, Volume= 0.261 af
 Outflow = 2.68 cfs @ 12.19 hrs, Volume= 0.261 af, Atten= 6%, Lag= 2.8 min
 Primary = 2.68 cfs @ 12.19 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 78.25' @ 12.19 hrs Surf.Area= 254 sf Storage= 151 cf

Plug-Flow detention time= 0.3 min calculated for 0.261 af (100% of inflow)
 Center-of-Mass det. time= 0.3 min (835.9 - 835.6)

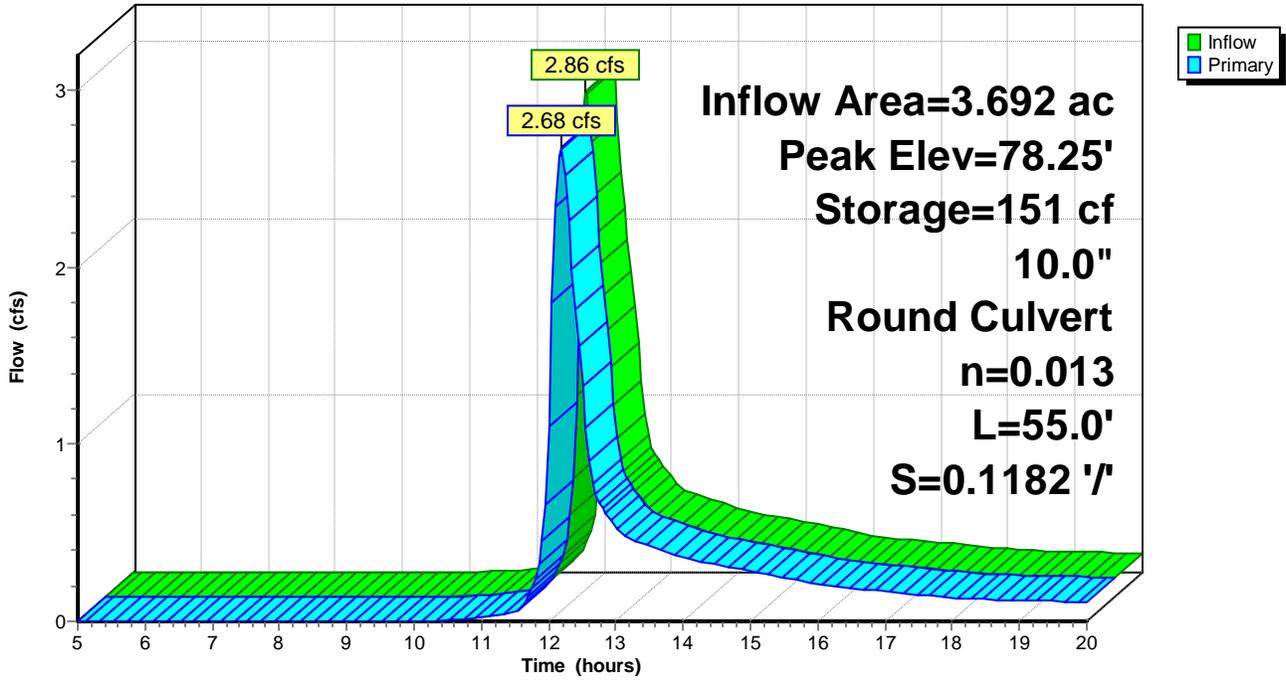
Volume	Invert	Avail.Storage	Storage Description		
#1	76.50'	751 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
76.50	10	0	0	10	
77.00	20	7	7	22	
78.00	185	89	96	190	
79.00	520	338	434	531	
79.50	755	317	751	770	

Device	Routing	Invert	Outlet Devices	
#1	Primary	76.50'	10.0" Round Culvert L= 55.0' Ke= 0.700 Inlet / Outlet Invert= 76.50' / 70.00' S= 0.1182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf	

Primary OutFlow Max=2.66 cfs @ 12.19 hrs HW=78.23' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 2.66 cfs @ 4.88 fps)

Pond 1AP: Detention Pond #1A

Hydrograph



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Type III 24-hr 10-Year Event Rainfall=4.40"

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Page 20

Summary for Pond 1P: Detention Pond 1

Inflow Area = 4.535 ac, 8.12% Impervious, Inflow Depth > 0.93" for 10-Year Event event
 Inflow = 3.80 cfs @ 12.16 hrs, Volume= 0.350 af
 Outflow = 2.56 cfs @ 12.37 hrs, Volume= 0.344 af, Atten= 33%, Lag= 12.3 min
 Primary = 2.56 cfs @ 12.37 hrs, Volume= 0.344 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 70.64' @ 12.37 hrs Surf.Area= 2,226 sf Storage= 2,793 cf

Plug-Flow detention time= 25.3 min calculated for 0.342 af (98% of inflow)
 Center-of-Mass det. time= 18.5 min (850.8 - 832.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	69.00'	4,977 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
69.00	1,210	0	0	1,210	
70.00	1,815	1,502	1,502	1,830	
71.00	2,475	2,136	3,639	2,510	
71.50	2,885	1,339	4,977	2,930	

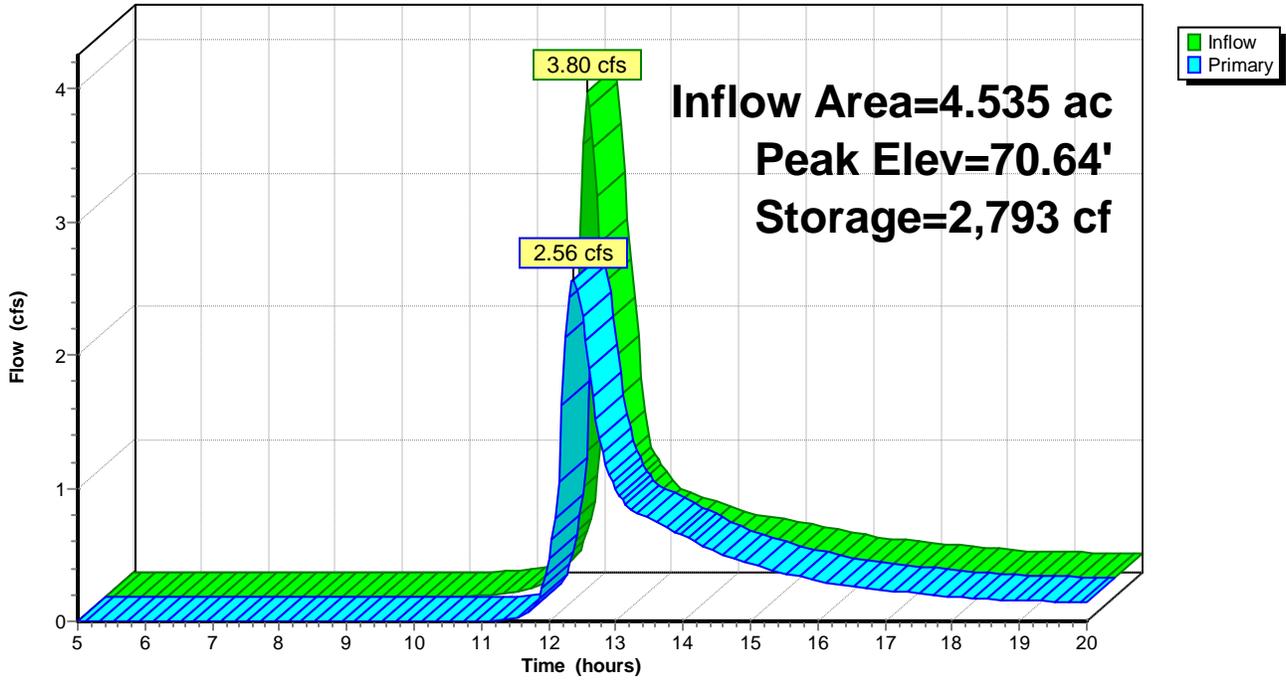
Device	Routing	Invert	Outlet Devices	
#1	Primary	67.00'	24.0" Round Culvert L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 67.00' / 65.29' S= 0.0855 ' /' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf	
#2	Device 1	69.00'	6.0" Vert. Orifice/Grate C= 0.600	
#3	Device 1	70.00'	12.0" Vert. Orifice/Grate C= 0.600	

Primary OutFlow Max=2.54 cfs @ 12.37 hrs HW=70.64' (Free Discharge)

- ↑ **1=Culvert** (Passes 2.54 cfs of 24.56 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 1.11 cfs @ 5.67 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.43 cfs @ 2.72 fps)

Pond 1P: Detention Pond 1

Hydrograph



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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 22

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1AS: Sub 1A

Runoff Area=26,980 sf 33.58% Impervious Runoff Depth>2.02"
Flow Length=290' Tc=5.4 min CN=71 Runoff=1.57 cfs 0.104 af

Subcatchment 1S: Sub 1

Runoff Area=36,710 sf 19.01% Impervious Runoff Depth>1.72"
Flow Length=340' Tc=9.2 min CN=67 Runoff=1.58 cfs 0.120 af

Subcatchment 2S: Sub 2

Runoff Area=133,850 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=527' Tc=9.5 min CN=57 Runoff=3.12 cfs 0.266 af

Reach 1R: 24" RCP

Avg. Flow Depth=0.32' Max Vel=12.19 fps Inflow=3.89 cfs 0.483 af
24.0" Round Pipe n=0.012 L=20.0' S=0.0855 '/ Capacity=71.66 cfs Outflow=3.89 cfs 0.483 af

Pond 1AP: Detention Pond #1A

Peak Elev=79.27' Storage=590 cf Inflow=4.37 cfs 0.370 af
10.0" Round Culvert n=0.013 L=55.0' S=0.1182 '/ Outflow=3.55 cfs 0.370 af

Pond 1P: Detention Pond 1

Peak Elev=70.99' Storage=3,605 cf Inflow=5.01 cfs 0.490 af
Outflow=3.89 cfs 0.483 af

Total Runoff Area = 4.535 ac Runoff Volume = 0.491 af Average Runoff Depth = 1.30"
91.88% Pervious = 4.167 ac 8.12% Impervious = 0.368 ac

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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 23

Summary for Subcatchment 1AS: Sub 1A

Runoff = 1.57 cfs @ 12.09 hrs, Volume= 0.104 af, Depth> 2.02"

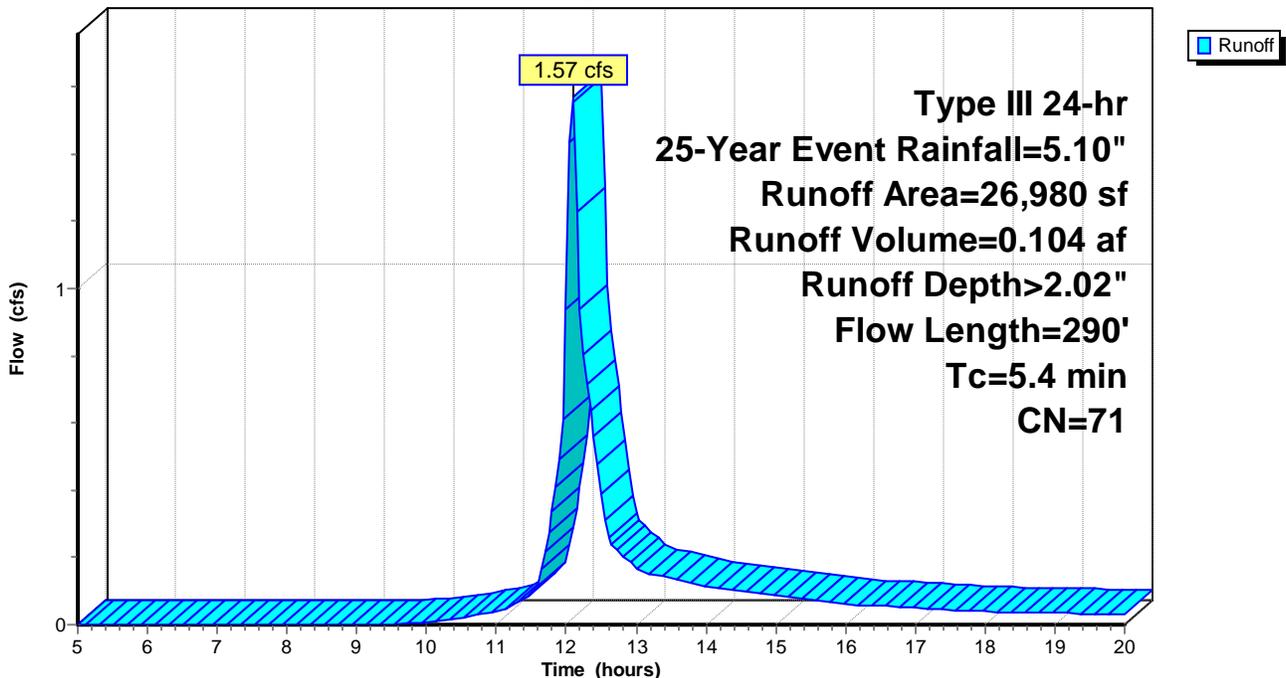
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Event Rainfall=5.10"

Area (sf)	CN	Description
9,060	98	Paved parking, HSG C
8,365	61	>75% Grass cover, Good, HSG B
9,555	55	Woods, Good, HSG B
26,980	71	Weighted Average
17,920		66.42% Pervious Area
9,060		33.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	13	0.3300	0.15		Sheet Flow, AB Woods: Light underbrush n= 0.400 P2= 3.00"
3.3	62	0.1290	0.32		Sheet Flow, BC Grass: Short n= 0.150 P2= 3.00"
0.7	215	0.0326	5.50	21.99	Channel Flow, CD Area= 4.0 sf Perim= 8.3' r= 0.48' n= 0.030 Earth, grassed & winding
5.4	290	Total			

Subcatchment 1AS: Sub 1A

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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 24

Summary for Subcatchment 1S: Sub 1

Runoff = 1.58 cfs @ 12.14 hrs, Volume= 0.120 af, Depth> 1.72"

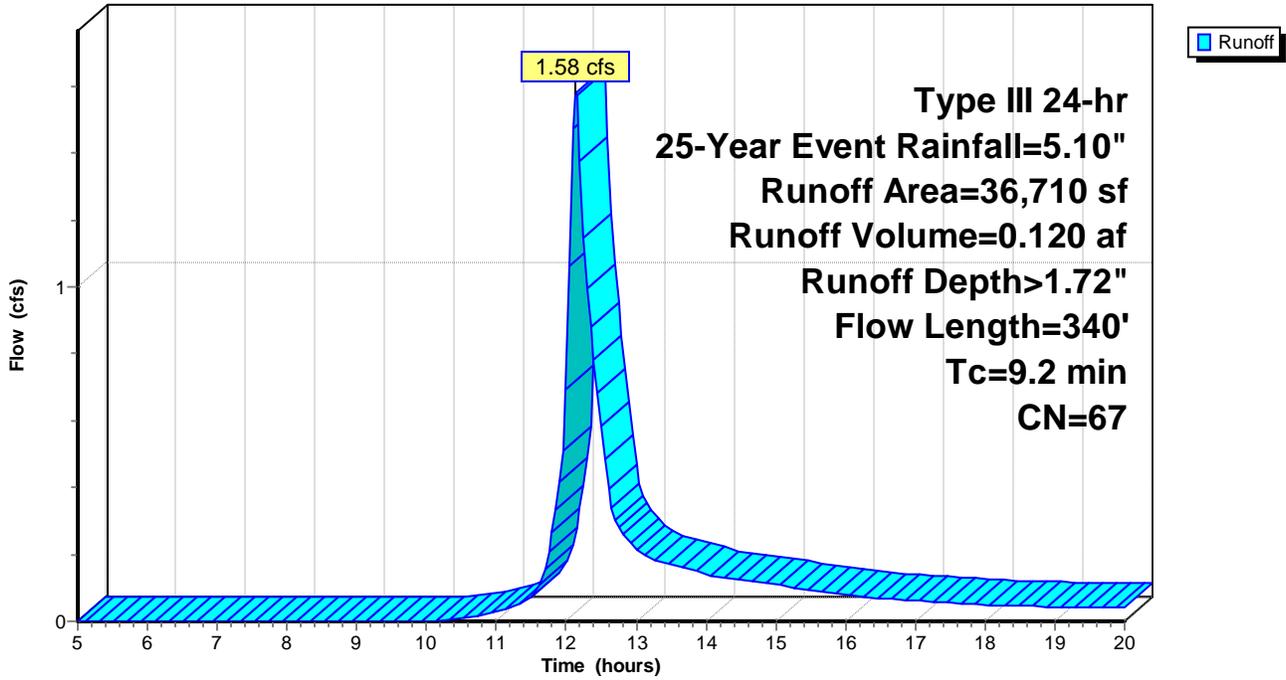
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Event Rainfall=5.10"

Area (sf)	CN	Description
6,980	98	Water Surface, HSG C
26,225	61	>75% Grass cover, Good, HSG B
3,505	55	Woods, Good, HSG B
36,710	67	Weighted Average
29,730		80.99% Pervious Area
6,980		19.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	36	0.1111	0.18		Sheet Flow, AB Grass: Dense n= 0.240 P2= 3.00"
0.2	12	0.0200	0.87		Sheet Flow, BC Smooth surfaces n= 0.011 P2= 3.00"
4.6	52	0.0385	0.19		Sheet Flow, CD Grass: Short n= 0.150 P2= 3.00"
0.7	127	0.0433	3.12		Shallow Concentrated Flow, DE Grassed Waterway Kv= 15.0 fps
0.3	78	0.0513	4.60		Shallow Concentrated Flow, EF Paved Kv= 20.3 fps
0.1	35	0.2429	7.39		Shallow Concentrated Flow, FG Grassed Waterway Kv= 15.0 fps
9.2	340	Total			

Subcatchment 1S: Sub 1

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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 26

Summary for Subcatchment 2S: Sub 2

Runoff = 3.12 cfs @ 12.16 hrs, Volume= 0.266 af, Depth> 1.04"

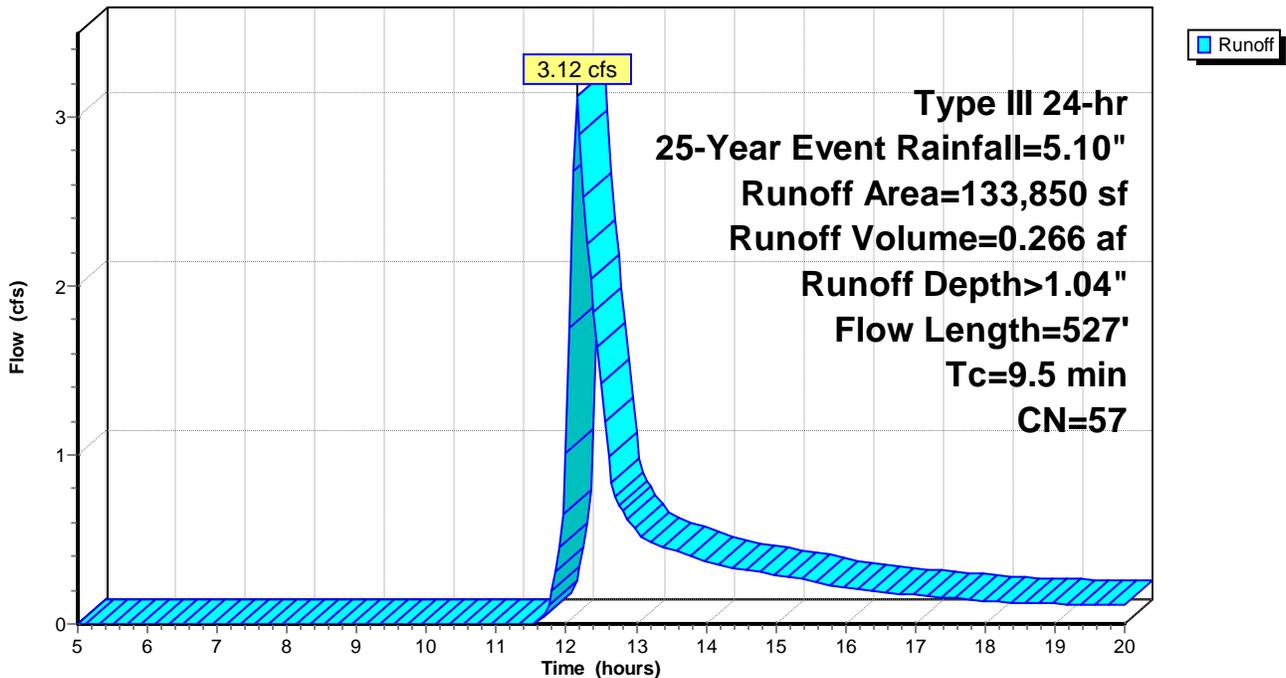
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Event Rainfall=5.10"

Area (sf)	CN	Description
78,485	58	Meadow, non-grazed, HSG B
55,365	55	Woods, Good, HSG B
133,850	57	Weighted Average
133,850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	100	0.0900	0.34		Sheet Flow, AB
1.5	210	0.1048	2.27		Range n= 0.130 P2= 3.00" Shallow Concentrated Flow, BC
3.1	217	0.0553	1.18		Short Grass Pasture Kv= 7.0 fps Shallow Concentrated Flow, CD
9.5	527	Total			Woodland Kv= 5.0 fps

Subcatchment 2S: Sub 2

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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 27

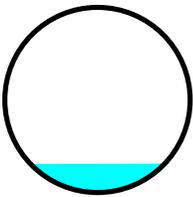
Summary for Reach 1R: 24" RCP

Inflow Area = 4.535 ac, 8.12% Impervious, Inflow Depth > 1.28" for 25-Year Event event
Inflow = 3.89 cfs @ 12.40 hrs, Volume= 0.483 af
Outflow = 3.89 cfs @ 12.40 hrs, Volume= 0.483 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.19 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.93 fps, Avg. Travel Time= 0.1 min

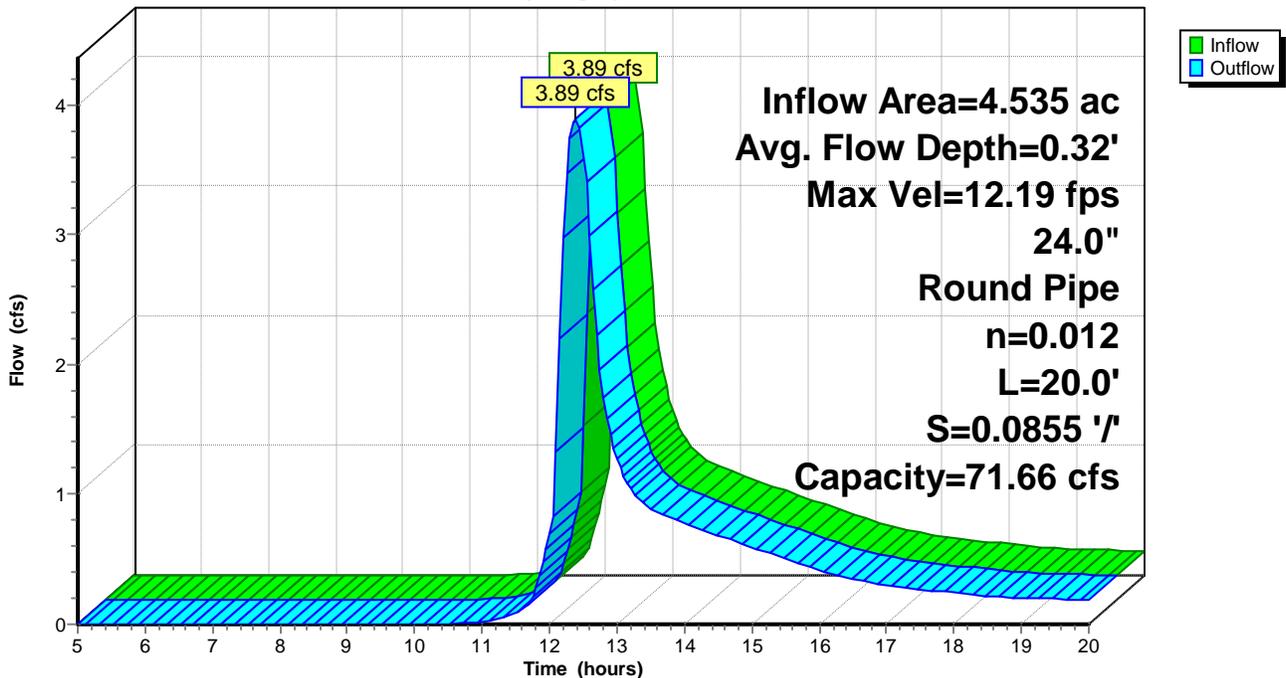
Peak Storage= 6 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 71.66 cfs

24.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 20.0' Slope= 0.0855 '/'
Inlet Invert= 67.00', Outlet Invert= 65.29'



Reach 1R: 24" RCP

Hydrograph



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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 28

Summary for Pond 1AP: Detention Pond #1A

Inflow Area = 3.692 ac, 5.63% Impervious, Inflow Depth > 1.20" for 25-Year Event event
 Inflow = 4.37 cfs @ 12.13 hrs, Volume= 0.370 af
 Outflow = 3.55 cfs @ 12.23 hrs, Volume= 0.370 af, Atten= 19%, Lag= 5.7 min
 Primary = 3.55 cfs @ 12.23 hrs, Volume= 0.370 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 79.27' @ 12.23 hrs Surf.Area= 641 sf Storage= 590 cf

Plug-Flow detention time= 0.8 min calculated for 0.369 af (100% of inflow)
 Center-of-Mass det. time= 0.7 min (828.3 - 827.6)

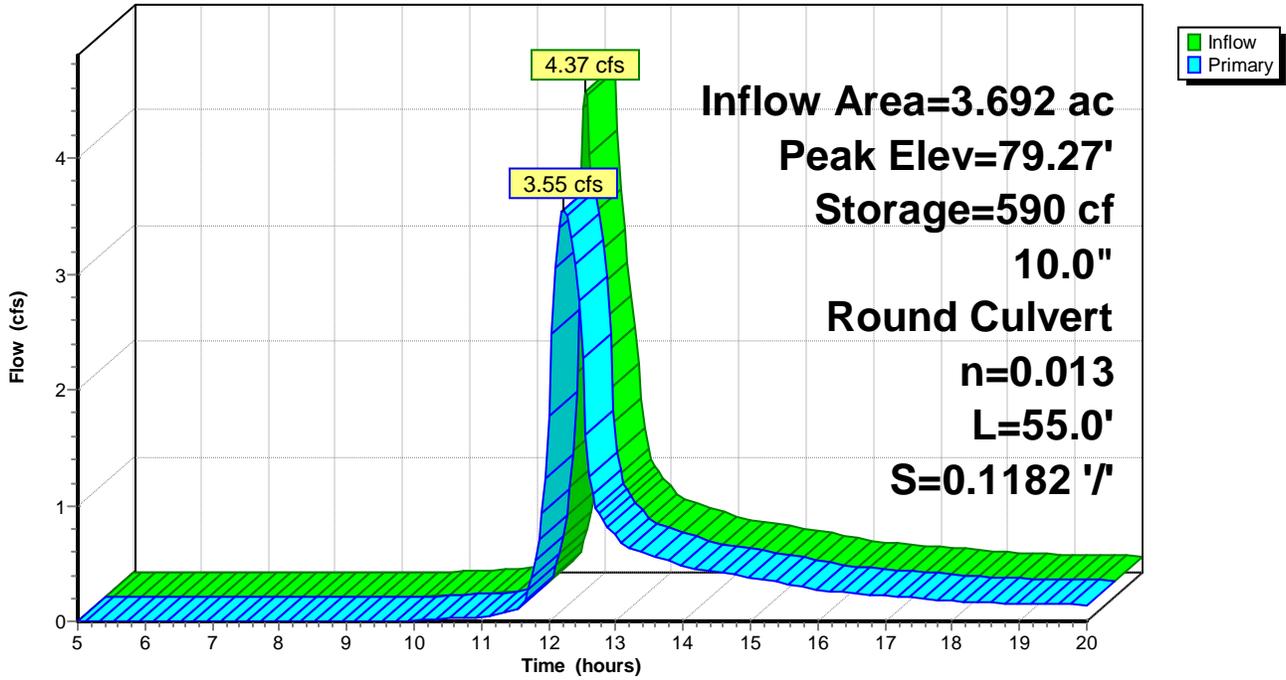
Volume	Invert	Avail.Storage	Storage Description		
#1	76.50'	751 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
76.50	10	0	0	10	
77.00	20	7	7	22	
78.00	185	89	96	190	
79.00	520	338	434	531	
79.50	755	317	751	770	

Device	Routing	Invert	Outlet Devices	
#1	Primary	76.50'	10.0" Round Culvert L= 55.0' Ke= 0.700 Inlet / Outlet Invert= 76.50' / 70.00' S= 0.1182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf	

Primary OutFlow Max=3.54 cfs @ 12.23 hrs HW=79.25' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 3.54 cfs @ 6.50 fps)

Pond 1AP: Detention Pond #1A

Hydrograph



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Type III 24-hr 25-Year Event Rainfall=5.10"

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Page 30

Summary for Pond 1P: Detention Pond 1

Inflow Area = 4.535 ac, 8.12% Impervious, Inflow Depth > 1.30" for 25-Year Event event
 Inflow = 5.01 cfs @ 12.17 hrs, Volume= 0.490 af
 Outflow = 3.89 cfs @ 12.40 hrs, Volume= 0.483 af, Atten= 22%, Lag= 13.6 min
 Primary = 3.89 cfs @ 12.40 hrs, Volume= 0.483 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 70.99' @ 12.40 hrs Surf.Area= 2,465 sf Storage= 3,605 cf

Plug-Flow detention time= 23.4 min calculated for 0.483 af (98% of inflow)
 Center-of-Mass det. time= 17.6 min (842.6 - 825.0)

Volume	Invert	Avail.Storage	Storage Description		
#1	69.00'	4,977 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
69.00	1,210	0	0	1,210	
70.00	1,815	1,502	1,502	1,830	
71.00	2,475	2,136	3,639	2,510	
71.50	2,885	1,339	4,977	2,930	

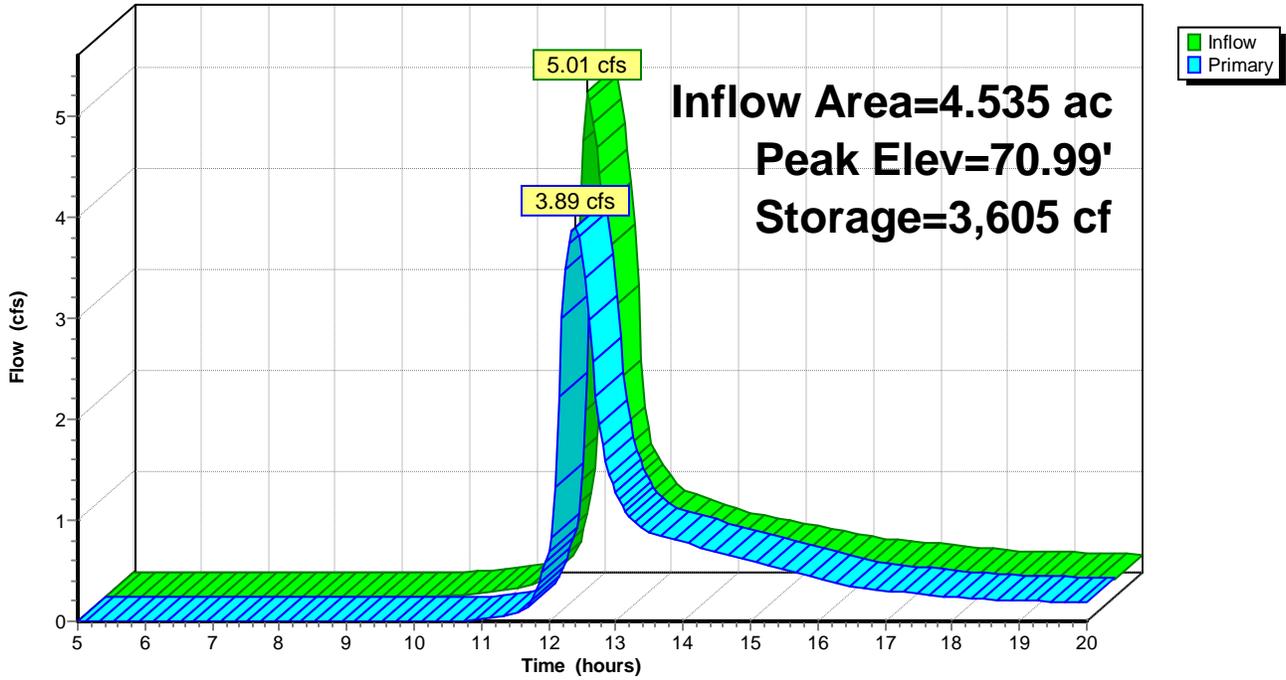
Device	Routing	Invert	Outlet Devices	
#1	Primary	67.00'	24.0" Round Culvert L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 67.00' / 65.29' S= 0.0855 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf	
#2	Device 1	69.00'	6.0" Vert. Orifice/Grate C= 0.600	
#3	Device 1	70.00'	12.0" Vert. Orifice/Grate C= 0.600	

Primary OutFlow Max=3.89 cfs @ 12.40 hrs HW=70.99' (Free Discharge)

- ↑ **1=Culvert** (Passes 3.89 cfs of 26.14 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 1.25 cfs @ 6.34 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 2.65 cfs @ 3.38 fps)

Pond 1P: Detention Pond 1

Hydrograph



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