

Routing Diagram for CEC-Williamsburg
 Prepared by SK Design Group, Inc, Printed 6/12/2019
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
7,200	96	Gravel surface, HSG A (E)
18,615	96	Gravel surface, HSG C (1A, 2A, 3A, E)
90	96	Gravel surface, HSG D (E)
13,410	30	Meadow, non-grazed, HSG A (2A)
871,885	71	Meadow, non-grazed, HSG C (1A, 2A, 3A, E)
35,365	78	Meadow, non-grazed, HSG D (1A, 2A)
5,135	39	Pasture/grassland/range, Good, HSG A (1A)
7,500	98	Paved parking, HSG C (2A)
3,055	83	Paved roads w/open ditches, 50% imp, HSG A (1A)
1,430	92	Paved roads w/open ditches, 50% imp, HSG C (1A)
10,500	98	Water Surface, HSG A (1A, E)
6,800	98	Water Surface, HSG C (1A, E)
25,580	98	Water Surface, HSG D (1A, E)
110,345	30	Woods, Good, HSG A (1A, 2A, E)
1,398,385	70	Woods, Good, HSG C (1A, 2A, 3A, E)
456,725	77	Woods, Good, HSG D (1A, 2A, E)
70,765	77	Woods, Poor, HSG C (3A)
3,042,785	71	TOTAL AREA

CEC-Williamsburg

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
149,645	HSG A	1A, 2A, E
0	HSG B	
2,375,380	HSG C	1A, 2A, 3A, E
517,760	HSG D	1A, 2A, E
0	Other	
3,042,785		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
7,200	0	18,615	90	0	25,905	Gravel surface
13,410	0	871,885	35,365	0	920,660	Meadow, non-grazed
5,135	0	0	0	0	5,135	Pasture/grassland /range, Good
0	0	7,500	0	0	7,500	Paved parking
3,055	0	1,430	0	0	4,485	Paved roads w/open ditches, 50% imp
10,500	0	6,800	25,580	0	42,880	Water Surface
110,345	0	1,398,385	456,725	0	1,965,455	Woods, Good
0	0	70,765	0	0	70,765	Woods, Poor
149,645	0	2,375,380	517,760	0	3,042,785	TOTAL AREA

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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	2P	534.25	526.00	30.0	0.2750	0.012	12.0	0.0	0.0
2	2P	534.00	526.00	302.0	0.0265	0.012	4.0	0.0	0.0
3	3P	546.25	545.00	30.0	0.0417	0.012	15.0	0.0	0.0
4	3P	546.00	545.00	30.0	0.0333	0.012	6.0	0.0	0.0

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Type III 24-hr 2 Year Rainfall=3.07"

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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 1A: Post Dev

Runoff Area=633,680 sf 3.74% Impervious Runoff Depth>0.72"
 Flow Length=2,345' Tc=17.6 min CN=71 Runoff=8.60 cfs 37,985 cf

Subcatchment 2A: Post Dev

Runoff Area=348,535 sf 2.15% Impervious Runoff Depth>0.72"
 Flow Length=835' Tc=17.7 min CN=71 Runoff=4.70 cfs 20,891 cf

Subcatchment 3A: Post Dev

Runoff Area=539,180 sf 0.00% Impervious Runoff Depth>0.77"
 Flow Length=825' Tc=16.9 min CN=72 Runoff=8.03 cfs 34,410 cf

Subcatchment E: Pre-Development

Runoff Area=1,521,390 sf 1.41% Impervious Runoff Depth>0.67"
 Flow Length=3,145' Tc=34.6 min CN=70 Runoff=14.38 cfs 84,768 cf

Reach DP1.E: Pre Dev

Inflow=14.38 cfs 84,768 cf
 Outflow=14.38 cfs 84,768 cf

Reach DP1.P: Post Dev

Inflow=13.36 cfs 89,312 cf
 Outflow=13.36 cfs 89,312 cf

Pond 2P: Pond West

Peak Elev=534.82' Storage=5,863 cf Inflow=4.70 cfs 20,891 cf
 Outflow=2.43 cfs 18,604 cf

Pond 3P:

Peak Elev=547.17' Storage=5,312 cf Inflow=8.03 cfs 34,410 cf
 Outflow=6.35 cfs 33,047 cf

Link 4L: Post Dev

delayed by 13.6 min Inflow=6.35 cfs 33,047 cf
 Primary=6.33 cfs 32,789 cf

Link 5L: Post Dev

delayed by 5.1 min Inflow=2.43 cfs 18,604 cf
 Primary=2.42 cfs 18,538 cf

Total Runoff Area = 3,042,785 sf Runoff Volume = 178,053 cf Average Runoff Depth = 0.70"
98.27% Pervious = 2,990,163 sf 1.73% Impervious = 52,623 sf

Summary for Subcatchment 1A: Post Dev

Runoff = 8.60 cfs @ 12.27 hrs, Volume= 37,985 cf, Depth> 0.72"

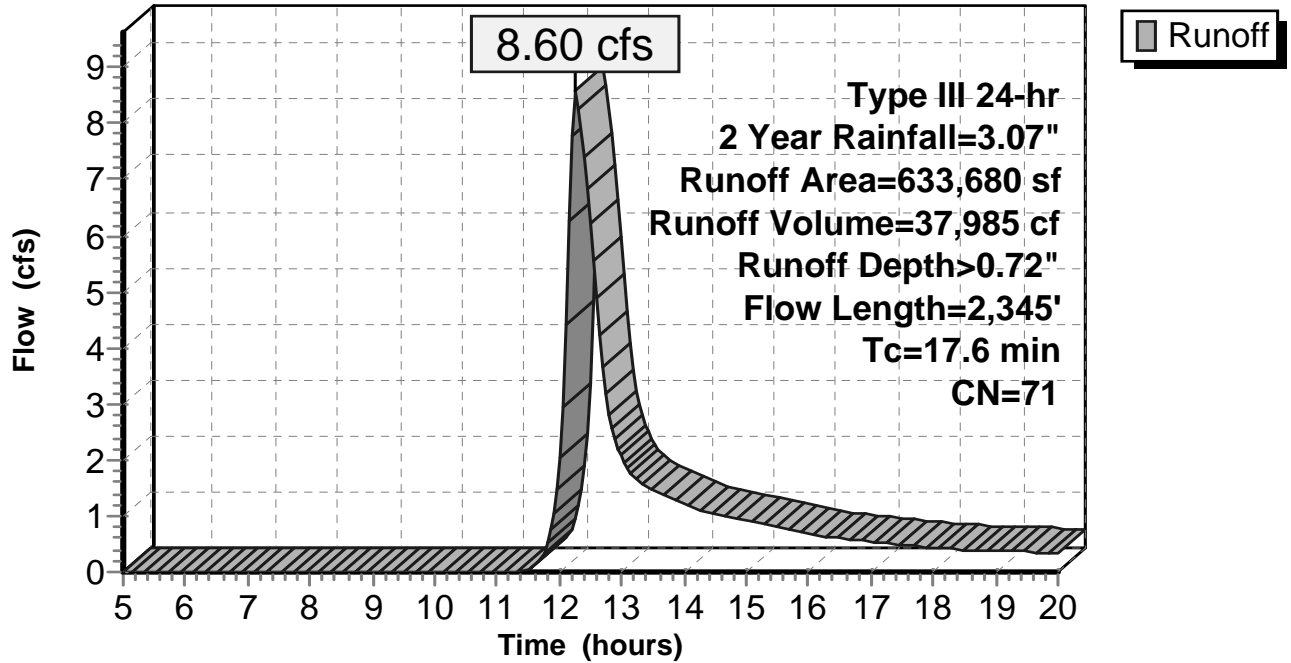
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.07"

Area (sf)	CN	Description
45,205	30	Woods, Good, HSG A
5,135	39	Pasture/grassland/range, Good, HSG A
5,250	98	Water Surface, HSG A
3,055	83	Paved roads w/open ditches, 50% imp, HSG A
995	96	Gravel surface, HSG C
215,820	70	Woods, Good, HSG C
117,515	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
1,430	92	Paved roads w/open ditches, 50% imp, HSG C
208,025	77	Woods, Good, HSG D
15,060	78	Meadow, non-grazed, HSG D
12,790	98	Water Surface, HSG D
633,680	71	Weighted Average
609,998		96.26% Pervious Area
23,683		3.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	25	0.0650	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
3.3	385	0.0780	1.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	235	0.2300	2.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,700		3.50		Direct Entry,
17.6	2,345	Total			

Subcatchment 1A: Post Dev

Hydrograph



Summary for Subcatchment 2A: Post Dev

Runoff = 4.70 cfs @ 12.28 hrs, Volume= 20,891 cf, Depth> 0.72"

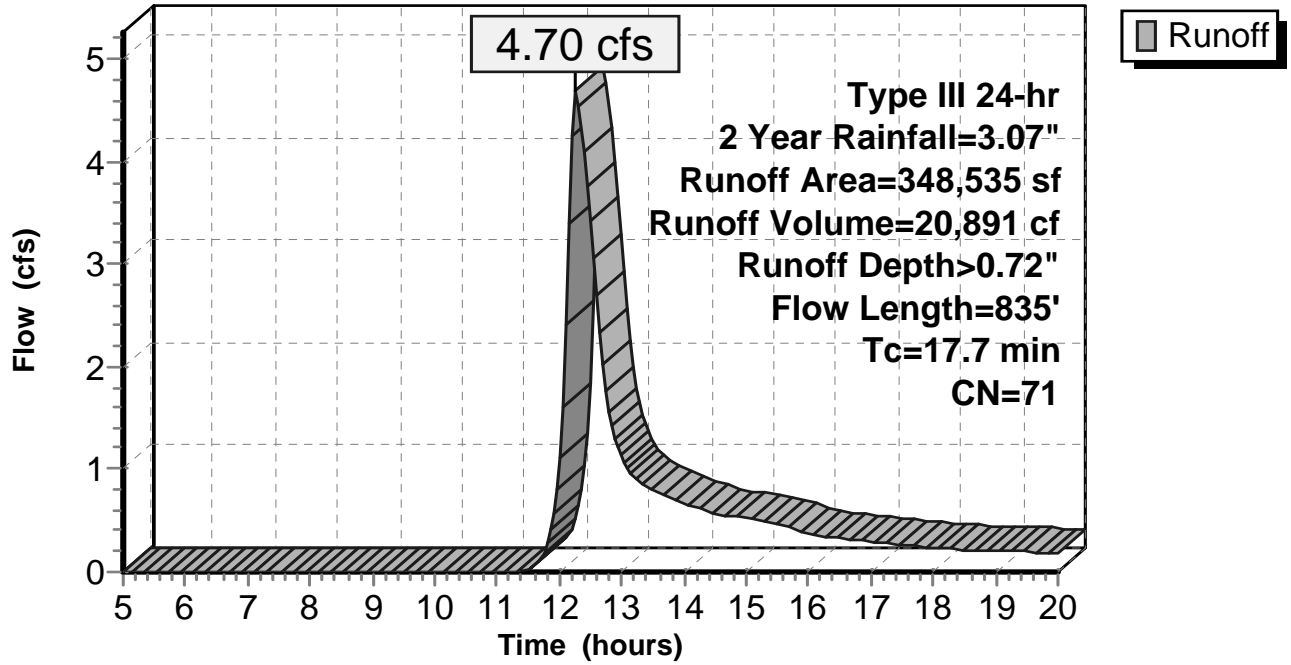
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.07"

Area (sf)	CN	Description
1,815	30	Woods, Good, HSG A
13,410	30	Meadow, non-grazed, HSG A
9,940	96	Gravel surface, HSG C
10,130	70	Woods, Good, HSG C
284,145	71	Meadow, non-grazed, HSG C
7,500	98	Paved parking, HSG C
1,290	77	Woods, Good, HSG D
20,305	78	Meadow, non-grazed, HSG D
348,535	71	Weighted Average
341,035		97.85% Pervious Area
7,500		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
8.0	785	0.0550	1.64		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.7	835	Total			

Subcatchment 2A: Post Dev

Hydrograph



Summary for Subcatchment 3A: Post Dev

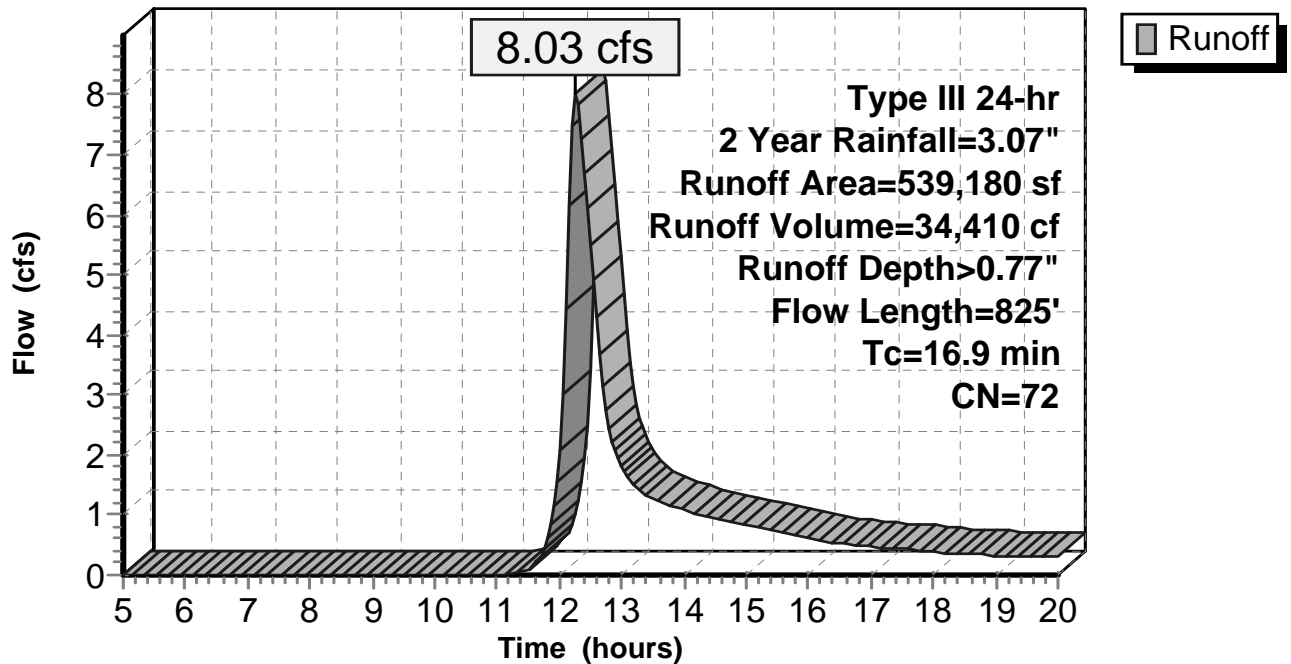
Runoff = 8.03 cfs @ 12.26 hrs, Volume= 34,410 cf, Depth> 0.77"

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 Rainfall=3.07"

Area (sf)	CN	Description
4,910	96	Gravel surface, HSG C
13,940	70	Woods, Good, HSG C
449,565	71	Meadow, non-grazed, HSG C
70,765	77	Woods, Poor, HSG C
539,180	72	Weighted Average
539,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
7.2	775	0.0650	1.78		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.9	825	Total			

**Subcatchment 3A: Post Dev
Hydrograph**



Summary for Subcatchment E: Pre-Development

Runoff = 14.38 cfs @ 12.55 hrs, Volume= 84,768 cf, Depth> 0.67"

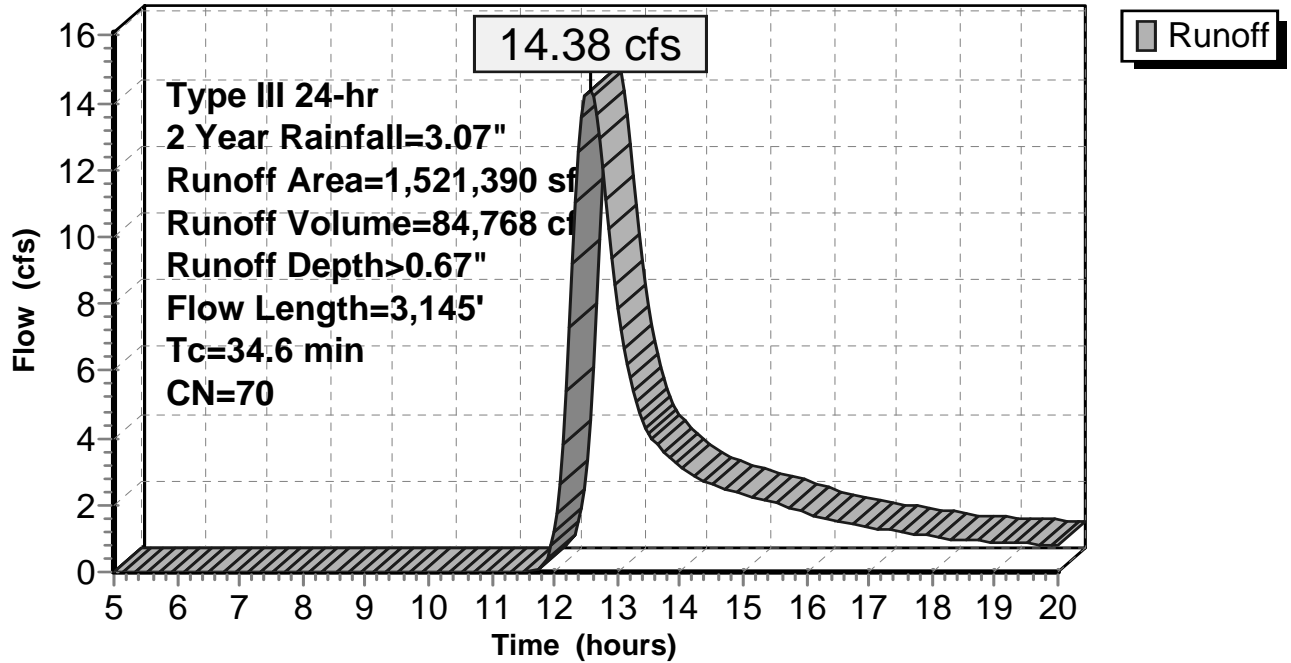
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.07"

Area (sf)	CN	Description
7,200	96	Gravel surface, HSG A
63,325	30	Woods, Good, HSG A
5,250	98	Water Surface, HSG A
2,770	96	Gravel surface, HSG C
1,158,495	70	Woods, Good, HSG C
20,660	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
90	96	Gravel surface, HSG D
247,410	77	Woods, Good, HSG D
12,790	98	Water Surface, HSG D
1,521,390	70	Weighted Average
1,499,950		98.59% Pervious Area
21,440		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
3.9	300	0.0670	1.29		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.8	420	0.0430	1.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.4	300	0.1670	2.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	175	0.0570	0.60		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
9.0	1,900		3.50		Direct Entry, Unquomonk Brook-Small Tributary
34.6	3,145	Total			

Subcatchment E: Pre-Development

Hydrograph

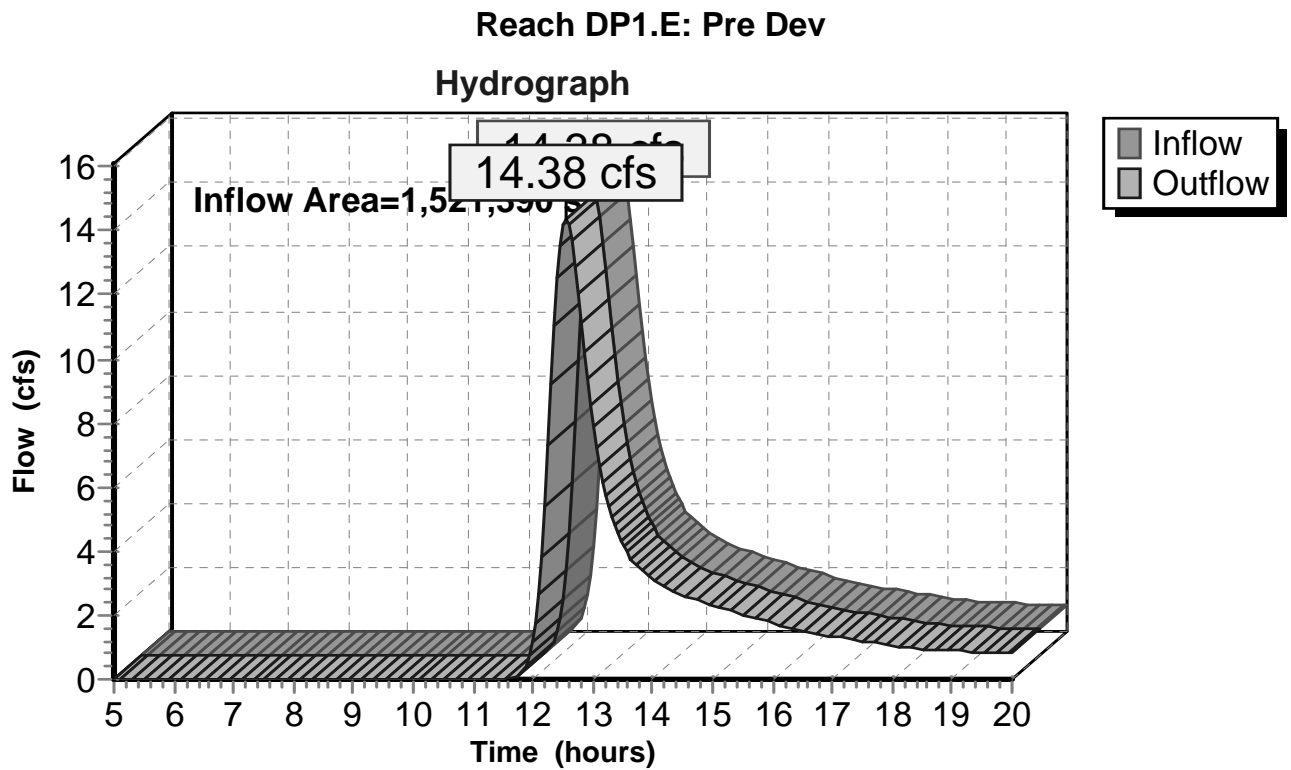


Summary for Reach DP1.E: Pre Dev

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,390 sf, 1.41% Impervious, Inflow Depth > 0.67" for 2 Year event
Inflow = 14.38 cfs @ 12.55 hrs, Volume= 84,768 cf
Outflow = 14.38 cfs @ 12.55 hrs, Volume= 84,768 cf, Atten= 0%, Lag= 0.0 min

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

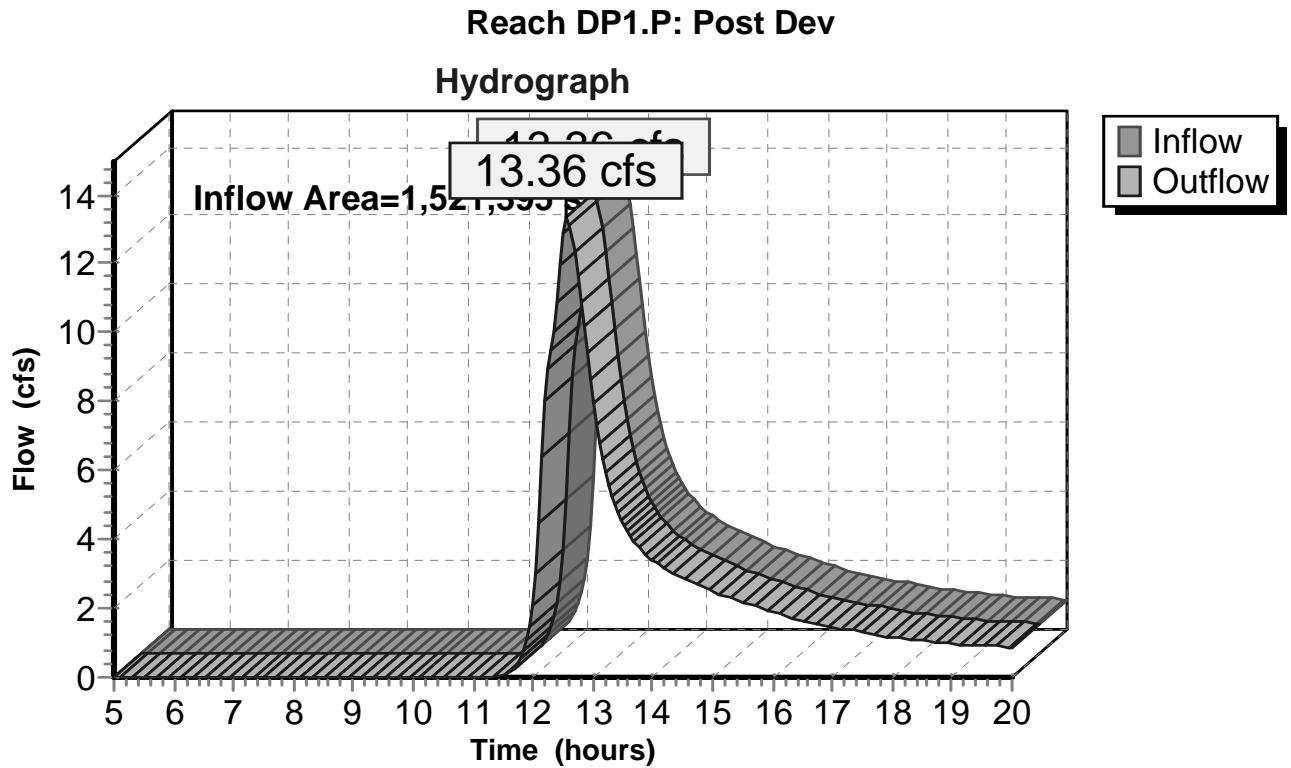


Summary for Reach DP1.P: Post Dev

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,395 sf, 2.05% Impervious, Inflow Depth > 0.70" for 2 Year event
Inflow = 13.36 cfs @ 12.57 hrs, Volume= 89,312 cf
Outflow = 13.36 cfs @ 12.57 hrs, Volume= 89,312 cf, Atten= 0%, Lag= 0.0 min

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



Summary for Pond 2P: Pond West

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 0.72" for 2 Year event
 Inflow = 4.70 cfs @ 12.28 hrs, Volume= 20,891 cf
 Outflow = 2.43 cfs @ 12.64 hrs, Volume= 18,604 cf, Atten= 48%, Lag= 21.8 min
 Primary = 2.43 cfs @ 12.64 hrs, Volume= 18,604 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 534.82' @ 12.64 hrs Surf.Area= 7,638 sf Storage= 5,863 cf

Plug-Flow detention time= 71.6 min calculated for 18,542 cf (89% of inflow)
 Center-of-Mass det. time= 38.3 min (875.1 - 836.7)

Volume	Invert	Avail.Storage	Storage Description
#1	534.00'	37,008 cf	40.00'W x 165.00'L x 4.00'H Prismatic Z=3.0

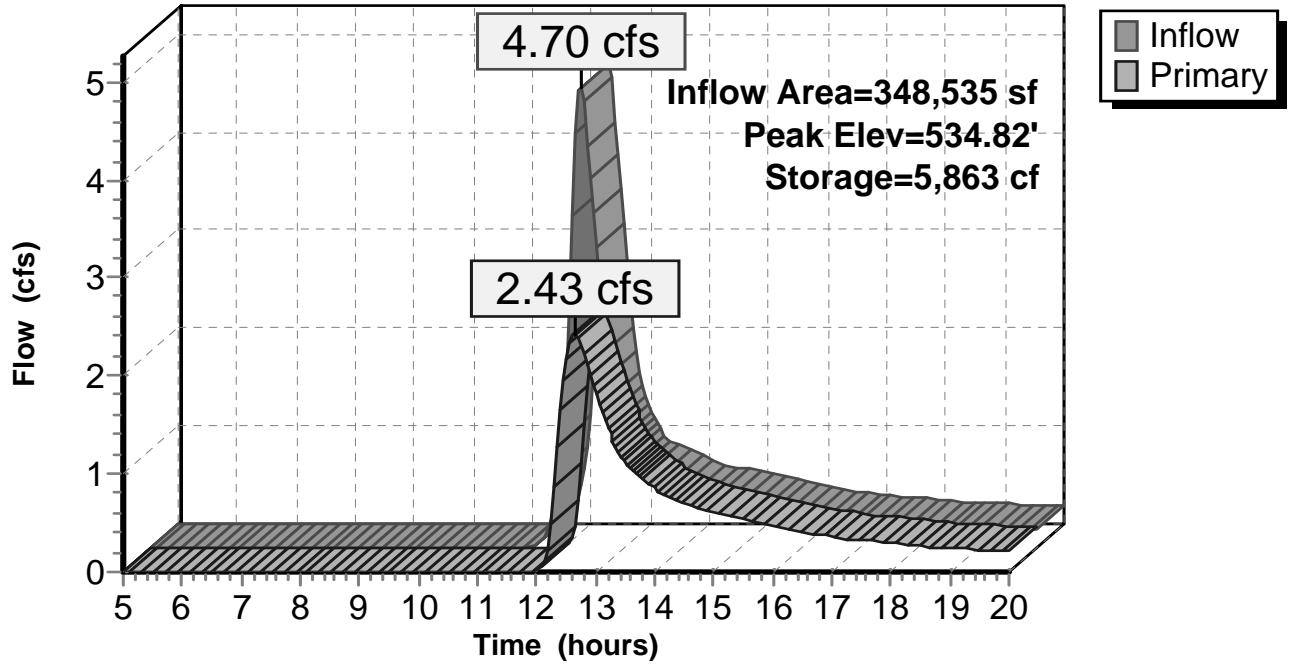
Device	Routing	Invert	Outlet Devices
#1	Primary	537.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	534.25'	12.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.25' / 526.00' S= 0.2750 1/ S= 0.2750 1/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Primary	534.00'	4.0" Round Culvert L= 302.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.00' / 526.00' S= 0.0265 1/ S= 0.0265 1/ Cc= 0.900 n= 0.012, Flow Area= 0.09 sf

Primary OutFlow Max=2.42 cfs @ 12.64 hrs HW=534.82' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Culvert (Inlet Controls 2.12 cfs @ 2.27 fps)
- 3=Culvert (Inlet Controls 0.30 cfs @ 3.44 fps)

Pond 2P: Pond West

Hydrograph



Summary for Pond 3P:

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 0.77" for 2 Year event
 Inflow = 8.03 cfs @ 12.26 hrs, Volume= 34,410 cf
 Outflow = 6.35 cfs @ 12.43 hrs, Volume= 33,047 cf, Atten= 21%, Lag= 10.1 min
 Primary = 6.35 cfs @ 12.43 hrs, Volume= 33,047 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 547.17' @ 12.43 hrs Surf.Area= 5,251 sf Storage= 5,312 cf

Plug-Flow detention time= 29.3 min calculated for 33,047 cf (96% of inflow)
 Center-of-Mass det. time= 15.6 min (849.2 - 833.6)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	25,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	3,850	0	0
550.00	8,650	25,000	25,000

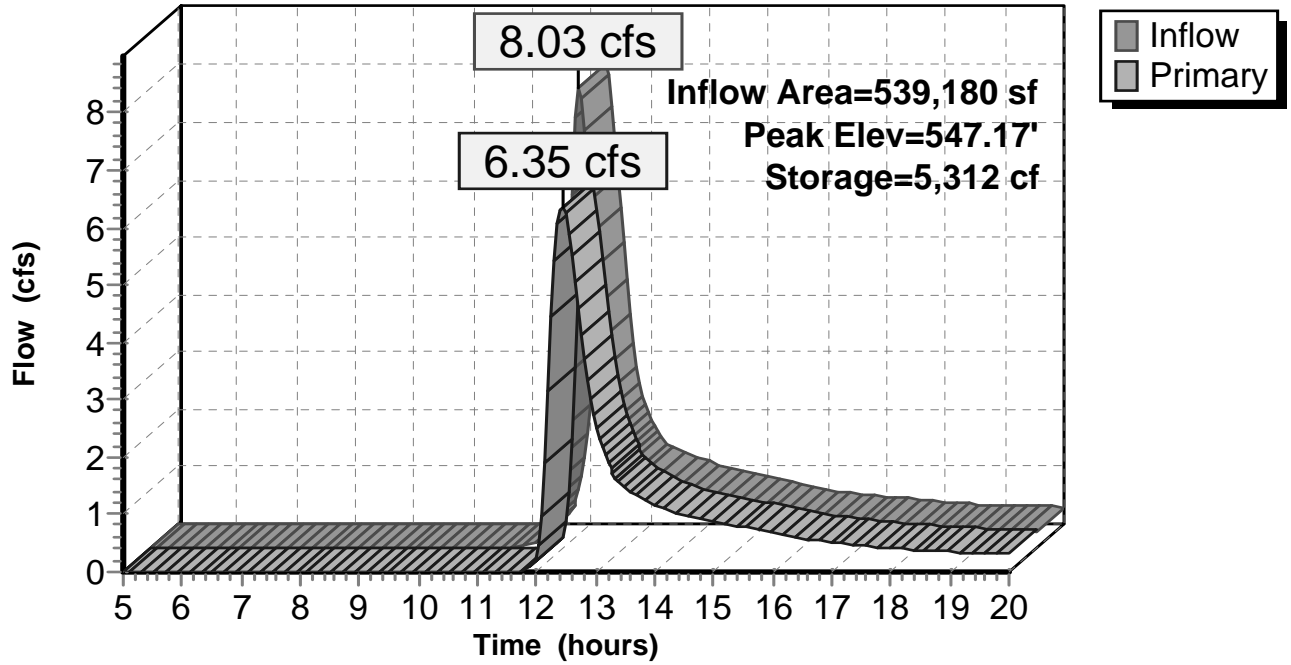
Device	Routing	Invert	Outlet Devices
#1	Primary	549.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	546.25'	15.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.25' / 545.00' S= 0.0417 '/ Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Primary	546.00'	6.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.00' / 545.00' S= 0.0333 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=6.33 cfs @ 12.43 hrs HW=547.17' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Culvert (Inlet Controls 5.53 cfs @ 2.87 fps)
- 3=Culvert (Inlet Controls 0.80 cfs @ 4.06 fps)

Pond 3P:

Hydrograph



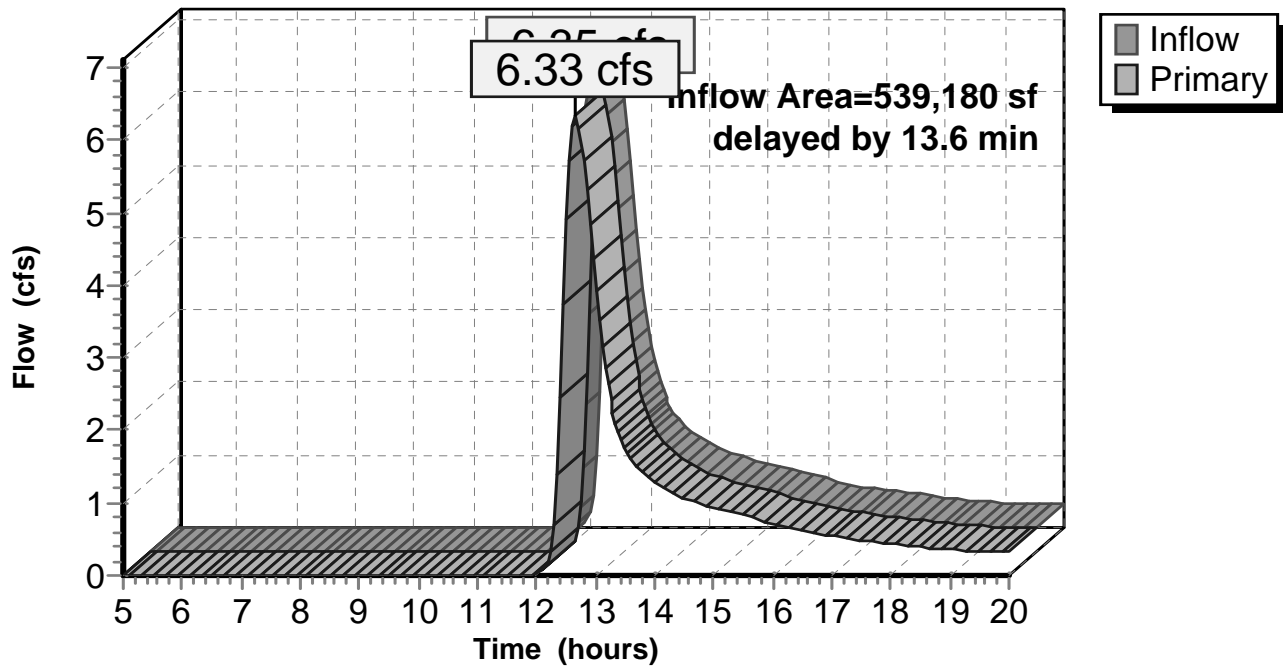
Summary for Link 4L: Post Dev

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 0.74" for 2 Year event
Inflow = 6.35 cfs @ 12.43 hrs, Volume= 33,047 cf
Primary = 6.33 cfs @ 12.66 hrs, Volume= 32,789 cf, Atten= 0%, Lag= 13.8 min

Primary outflow = Inflow delayed by 13.6 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: Post Dev

Hydrograph



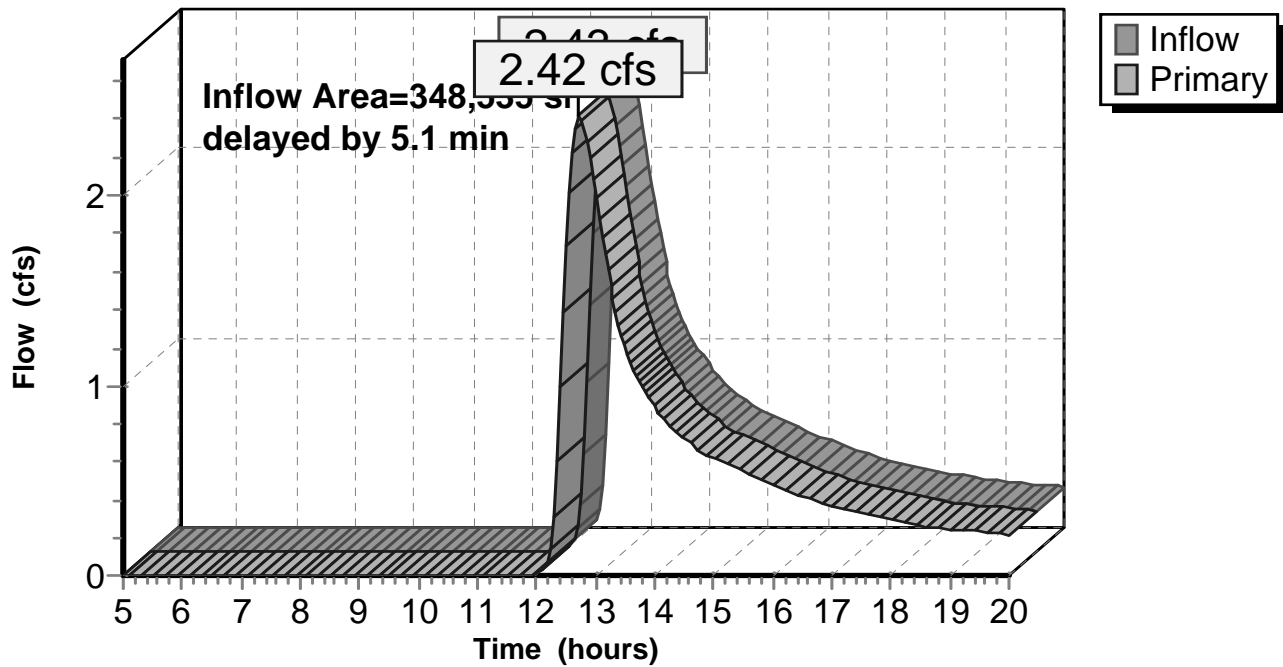
Summary for Link 5L: Post Dev

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 0.64" for 2 Year event
Inflow = 2.43 cfs @ 12.64 hrs, Volume= 18,604 cf
Primary = 2.42 cfs @ 12.72 hrs, Volume= 18,538 cf, Atten= 0%, Lag= 5.1 min

Primary outflow = Inflow delayed by 5.1 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Post Dev

Hydrograph



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Type III 24-hr 10 Year Rainfall=4.46"

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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 1A: Post Dev

Runoff Area=633,680 sf 3.74% Impervious Runoff Depth>1.57"
 Flow Length=2,345' Tc=17.6 min CN=71 Runoff=20.12 cfs 82,926 cf

Subcatchment 2A: Post Dev

Runoff Area=348,535 sf 2.15% Impervious Runoff Depth>1.57"
 Flow Length=835' Tc=17.7 min CN=71 Runoff=11.04 cfs 45,609 cf

Subcatchment 3A: Post Dev

Runoff Area=539,180 sf 0.00% Impervious Runoff Depth>1.64"
 Flow Length=825' Tc=16.9 min CN=72 Runoff=18.22 cfs 73,730 cf

Subcatchment E: Pre-Development

Runoff Area=1,521,390 sf 1.41% Impervious Runoff Depth>1.49"
 Flow Length=3,145' Tc=34.6 min CN=70 Runoff=34.43 cfs 188,986 cf

Reach DP1.E: Pre Dev

Inflow=34.43 cfs 188,986 cf
 Outflow=34.43 cfs 188,986 cf

Reach DP1.P: Post Dev

Inflow=30.82 cfs 197,236 cf
 Outflow=30.82 cfs 197,236 cf

Pond 2P: Pond West

Peak Elev=535.54' Storage=11,682 cf Inflow=11.04 cfs 45,609 cf
 Outflow=6.29 cfs 42,829 cf

Pond 3P:

Peak Elev=548.18' Storage=11,271 cf Inflow=18.22 cfs 73,730 cf
 Outflow=13.09 cfs 72,051 cf

Link 4L: Post Dev

delayed by 13.6 min Inflow=13.09 cfs 72,051 cf
 Primary=13.07 cfs 71,594 cf

Link 5L: Post Dev

delayed by 5.1 min Inflow=6.29 cfs 42,829 cf
 Primary=6.28 cfs 42,716 cf

Total Runoff Area = 3,042,785 sf Runoff Volume = 391,251 cf Average Runoff Depth = 1.54"
98.27% Pervious = 2,990,163 sf 1.73% Impervious = 52,623 sf

Summary for Subcatchment 1A: Post Dev

Runoff = 20.12 cfs @ 12.26 hrs, Volume= 82,926 cf, Depth> 1.57"

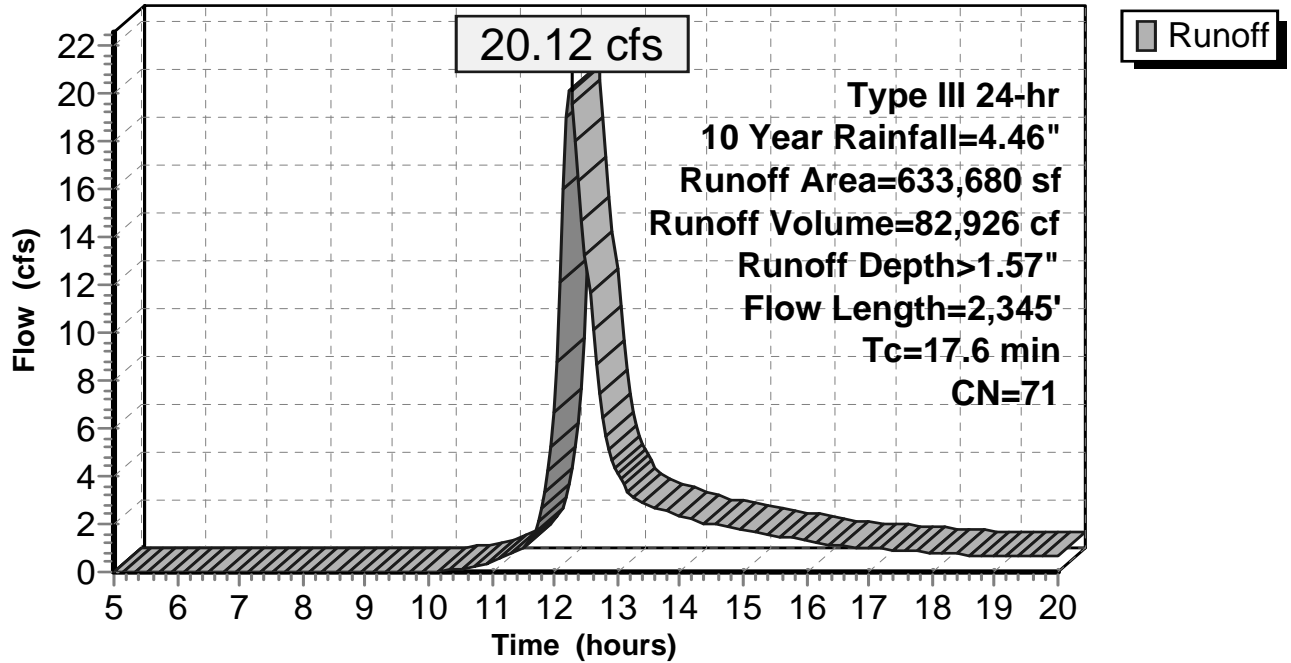
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.46"

Area (sf)	CN	Description
45,205	30	Woods, Good, HSG A
5,135	39	Pasture/grassland/range, Good, HSG A
5,250	98	Water Surface, HSG A
3,055	83	Paved roads w/open ditches, 50% imp, HSG A
995	96	Gravel surface, HSG C
215,820	70	Woods, Good, HSG C
117,515	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
1,430	92	Paved roads w/open ditches, 50% imp, HSG C
208,025	77	Woods, Good, HSG D
15,060	78	Meadow, non-grazed, HSG D
12,790	98	Water Surface, HSG D
633,680	71	Weighted Average
609,998		96.26% Pervious Area
23,683		3.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	25	0.0650	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
3.3	385	0.0780	1.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	235	0.2300	2.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,700		3.50		Direct Entry,
17.6	2,345	Total			

Subcatchment 1A: Post Dev

Hydrograph



Summary for Subcatchment 2A: Post Dev

Runoff = 11.04 cfs @ 12.26 hrs, Volume= 45,609 cf, Depth> 1.57"

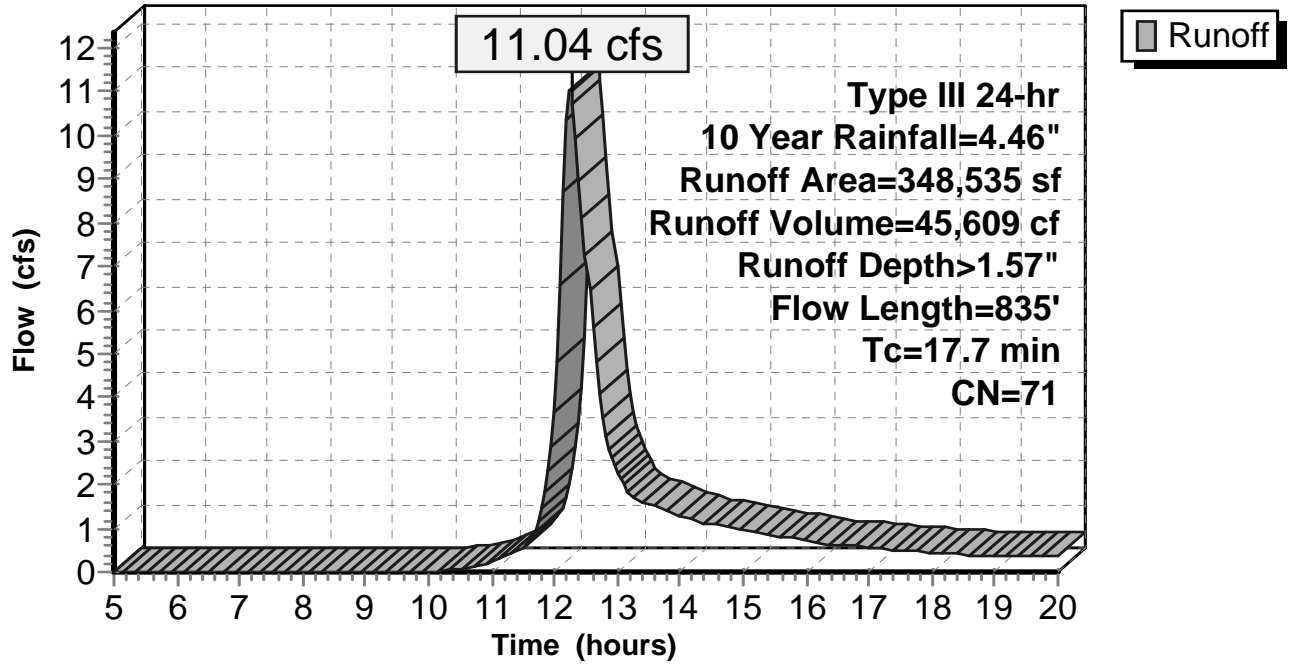
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10 Year Rainfall=4.46"

Area (sf)	CN	Description
1,815	30	Woods, Good, HSG A
13,410	30	Meadow, non-grazed, HSG A
9,940	96	Gravel surface, HSG C
10,130	70	Woods, Good, HSG C
284,145	71	Meadow, non-grazed, HSG C
7,500	98	Paved parking, HSG C
1,290	77	Woods, Good, HSG D
20,305	78	Meadow, non-grazed, HSG D
348,535	71	Weighted Average
341,035		97.85% Pervious Area
7,500		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
8.0	785	0.0550	1.64		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.7	835	Total			

Subcatchment 2A: Post Dev

Hydrograph



Summary for Subcatchment 3A: Post Dev

Runoff = 18.22 cfs @ 12.25 hrs, Volume= 73,730 cf, Depth> 1.64"

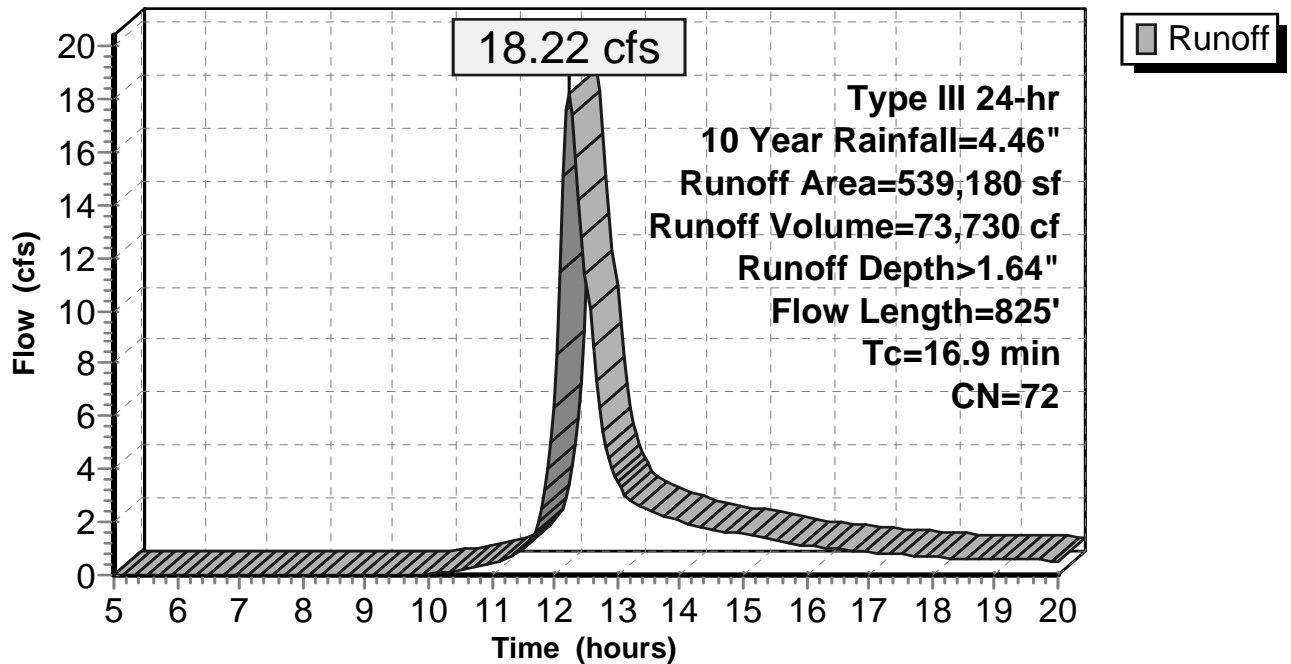
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.46"

Area (sf)	CN	Description
4,910	96	Gravel surface, HSG C
13,940	70	Woods, Good, HSG C
449,565	71	Meadow, non-grazed, HSG C
70,765	77	Woods, Poor, HSG C
539,180	72	Weighted Average
539,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
7.2	775	0.0650	1.78		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.9	825	Total			

Subcatchment 3A: Post Dev

Hydrograph



Summary for Subcatchment E: Pre-Development

Runoff = 34.43 cfs @ 12.51 hrs, Volume= 188,986 cf, Depth> 1.49"

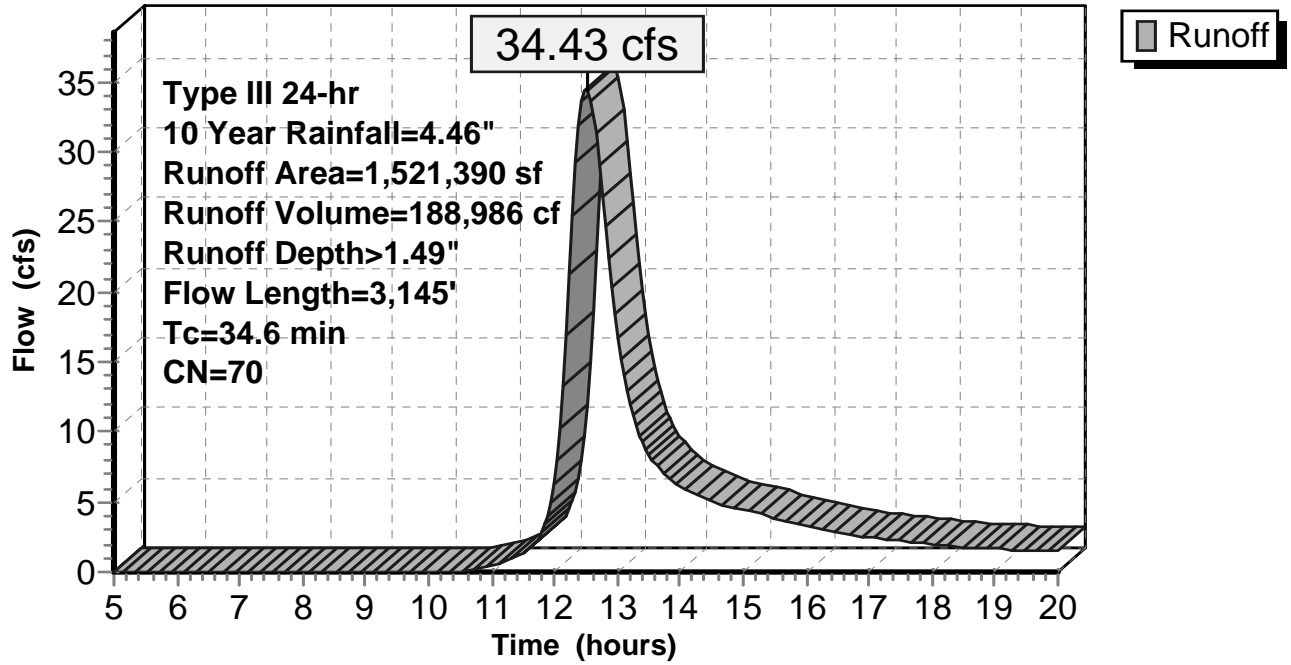
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10 Year Rainfall=4.46"

Area (sf)	CN	Description
7,200	96	Gravel surface, HSG A
63,325	30	Woods, Good, HSG A
5,250	98	Water Surface, HSG A
2,770	96	Gravel surface, HSG C
1,158,495	70	Woods, Good, HSG C
20,660	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
90	96	Gravel surface, HSG D
247,410	77	Woods, Good, HSG D
12,790	98	Water Surface, HSG D
1,521,390	70	Weighted Average
1,499,950		98.59% Pervious Area
21,440		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
3.9	300	0.0670	1.29		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.8	420	0.0430	1.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.4	300	0.1670	2.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	175	0.0570	0.60		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
9.0	1,900		3.50		Direct Entry, Unquomonk Brook-Small Tributary
34.6	3,145	Total			

Subcatchment E: Pre-Development

Hydrograph

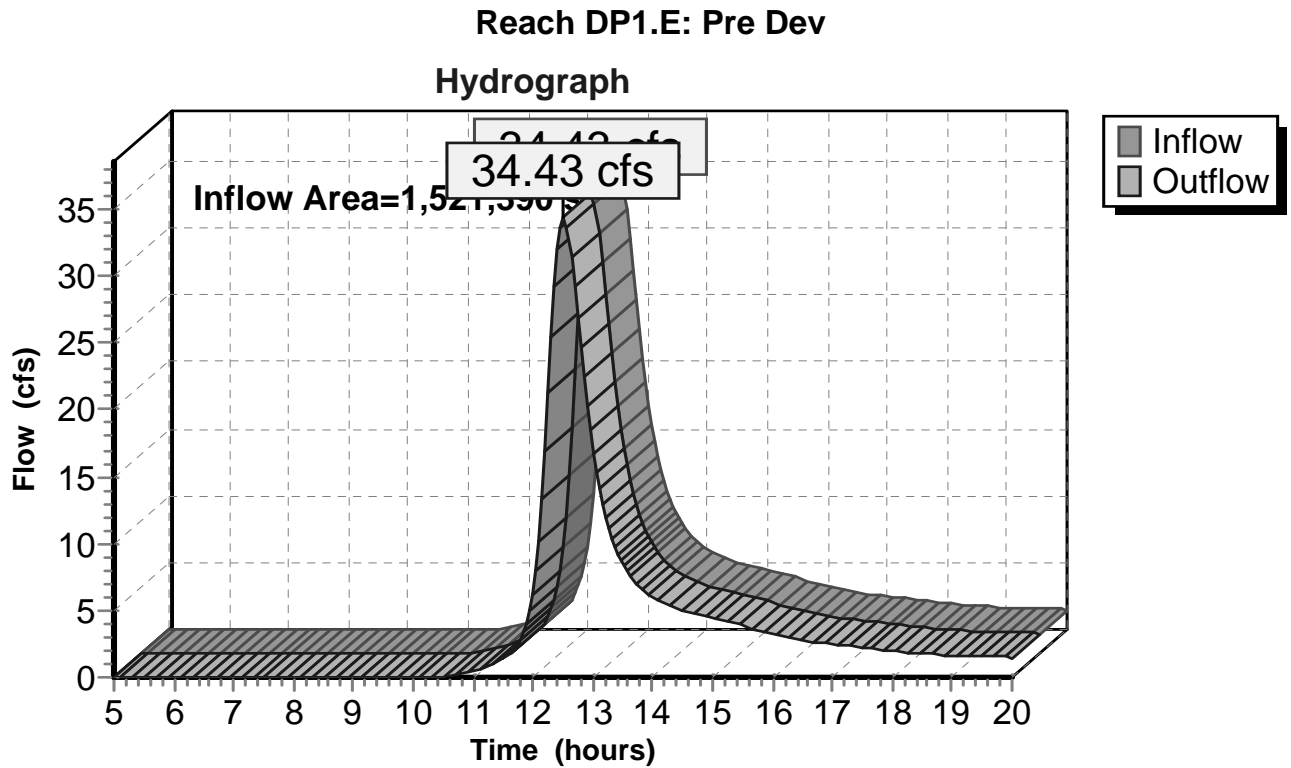


Summary for Reach DP1.E: Pre Dev

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,390 sf, 1.41% Impervious, Inflow Depth > 1.49" for 10 Year event
Inflow = 34.43 cfs @ 12.51 hrs, Volume= 188,986 cf
Outflow = 34.43 cfs @ 12.51 hrs, Volume= 188,986 cf, Atten= 0%, Lag= 0.0 min

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



Summary for Reach DP1.P: Post Dev

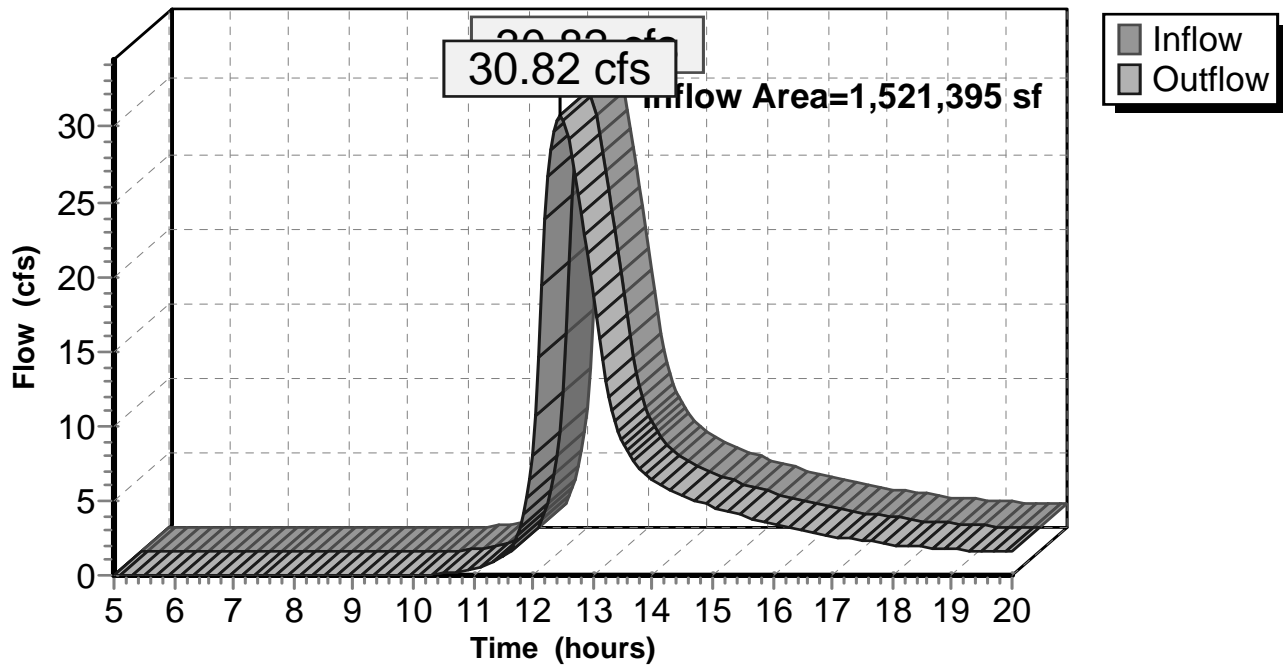
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,395 sf, 2.05% Impervious, Inflow Depth > 1.56" for 10 Year event
Inflow = 30.82 cfs @ 12.47 hrs, Volume= 197,236 cf
Outflow = 30.82 cfs @ 12.47 hrs, Volume= 197,236 cf, Atten= 0%, Lag= 0.0 min

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

Reach DP1.P: Post Dev

Hydrograph



Summary for Pond 2P: Pond West

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 1.57" for 10 Year event
 Inflow = 11.04 cfs @ 12.26 hrs, Volume= 45,609 cf
 Outflow = 6.29 cfs @ 12.56 hrs, Volume= 42,829 cf, Atten= 43%, Lag= 18.0 min
 Primary = 6.29 cfs @ 12.56 hrs, Volume= 42,829 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 535.54' @ 12.56 hrs Surf.Area= 8,582 sf Storage= 11,682 cf

Plug-Flow detention time= 48.2 min calculated for 42,686 cf (94% of inflow)
 Center-of-Mass det. time= 27.8 min (847.0 - 819.2)

Volume	Invert	Avail.Storage	Storage Description
#1	534.00'	37,008 cf	40.00'W x 165.00'L x 4.00'H Prismatic Z=3.0

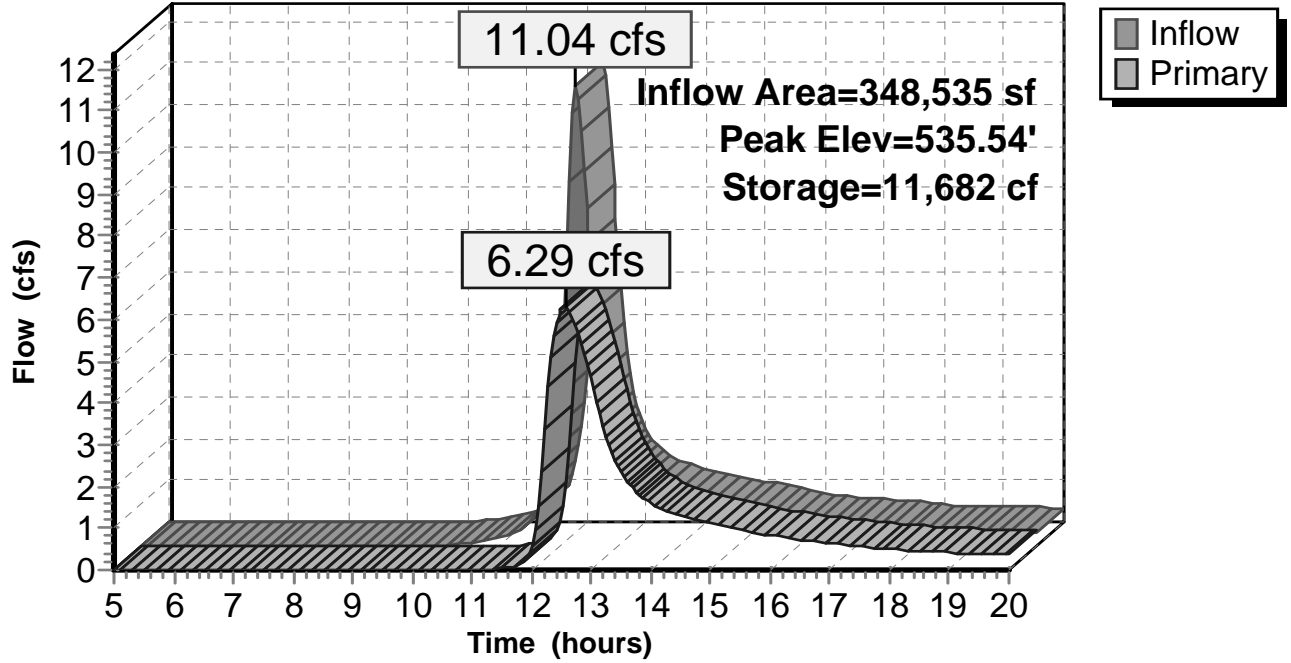
Device	Routing	Invert	Outlet Devices
#1	Primary	537.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	534.25'	12.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.25' / 526.00' S= 0.2750 1/ S= 0.2750 1/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Primary	534.00'	4.0" Round Culvert L= 302.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.00' / 526.00' S= 0.0265 1/ S= 0.0265 1/ Cc= 0.900 n= 0.012, Flow Area= 0.09 sf

Primary OutFlow Max=6.28 cfs @ 12.56 hrs HW=535.54' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Culvert (Inlet Controls 5.93 cfs @ 3.78 fps)
- 3=Culvert (Barrel Controls 0.35 cfs @ 4.02 fps)

Pond 2P: Pond West

Hydrograph



Summary for Pond 3P:

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 1.64" for 10 Year event
 Inflow = 18.22 cfs @ 12.25 hrs, Volume= 73,730 cf
 Outflow = 13.09 cfs @ 12.44 hrs, Volume= 72,051 cf, Atten= 28%, Lag= 11.6 min
 Primary = 13.09 cfs @ 12.44 hrs, Volume= 72,051 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 548.18' @ 12.44 hrs Surf.Area= 6,471 sf Storage= 11,271 cf

Plug-Flow detention time= 21.4 min calculated for 72,051 cf (98% of inflow)
 Center-of-Mass det. time= 13.1 min (829.6 - 816.6)

Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	25,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	3,850	0	0
550.00	8,650	25,000	25,000

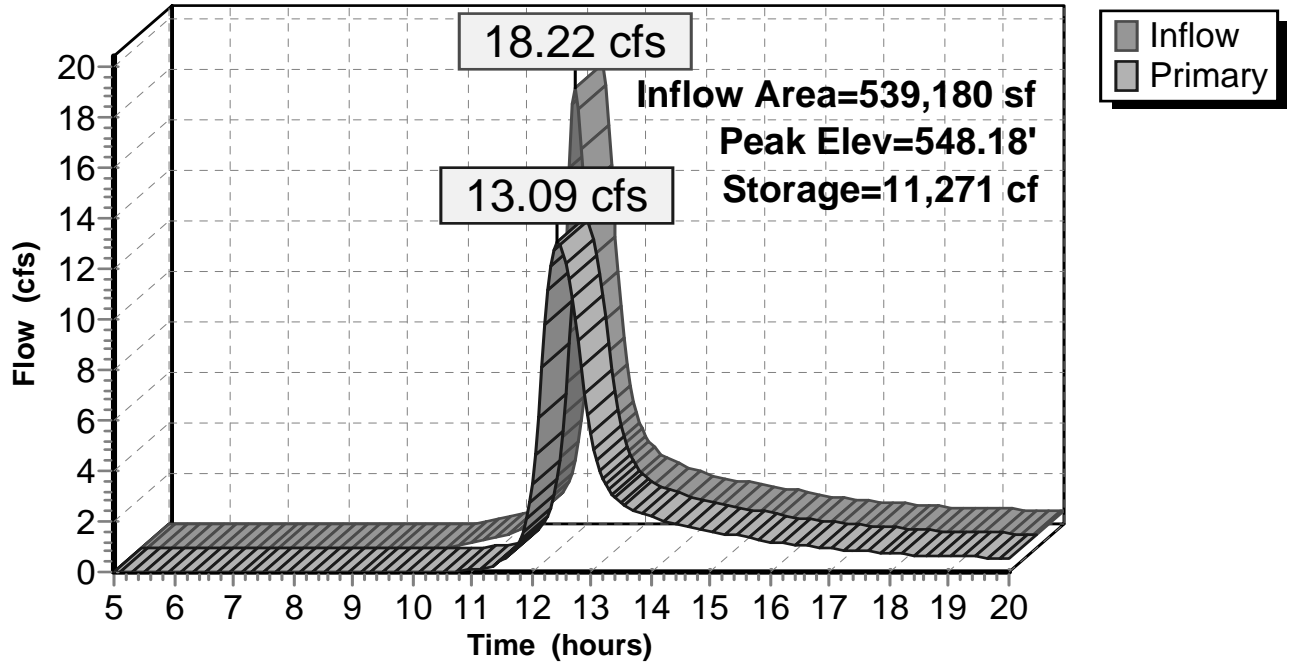
Device	Routing	Invert	Outlet Devices
#1	Primary	549.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	546.25'	15.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.25' / 545.00' S= 0.0417 '/ Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Primary	546.00'	6.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.00' / 545.00' S= 0.0333 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=13.08 cfs @ 12.44 hrs HW=548.18' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Culvert (Inlet Controls 11.92 cfs @ 4.86 fps)
- 3=Culvert (Inlet Controls 1.16 cfs @ 5.90 fps)

Pond 3P:

Hydrograph



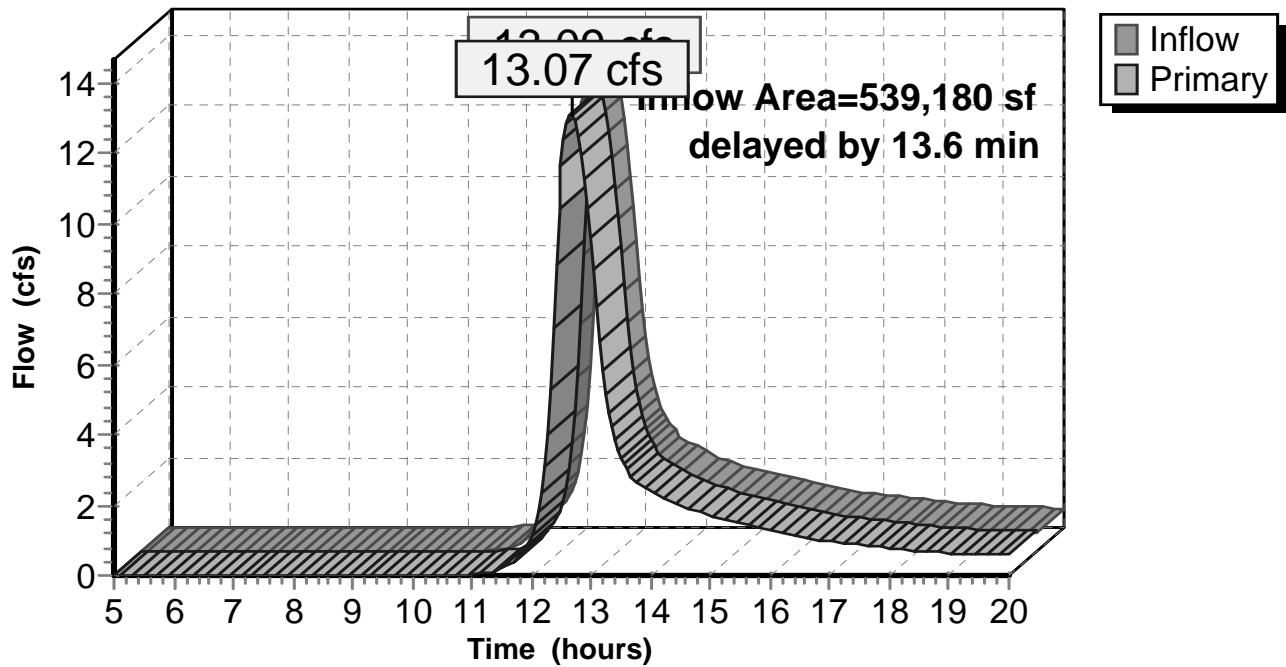
Summary for Link 4L: Post Dev

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 1.60" for 10 Year event
Inflow = 13.09 cfs @ 12.44 hrs, Volume= 72,051 cf
Primary = 13.07 cfs @ 12.67 hrs, Volume= 71,594 cf, Atten= 0%, Lag= 13.7 min

Primary outflow = Inflow delayed by 13.6 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: Post Dev

Hydrograph



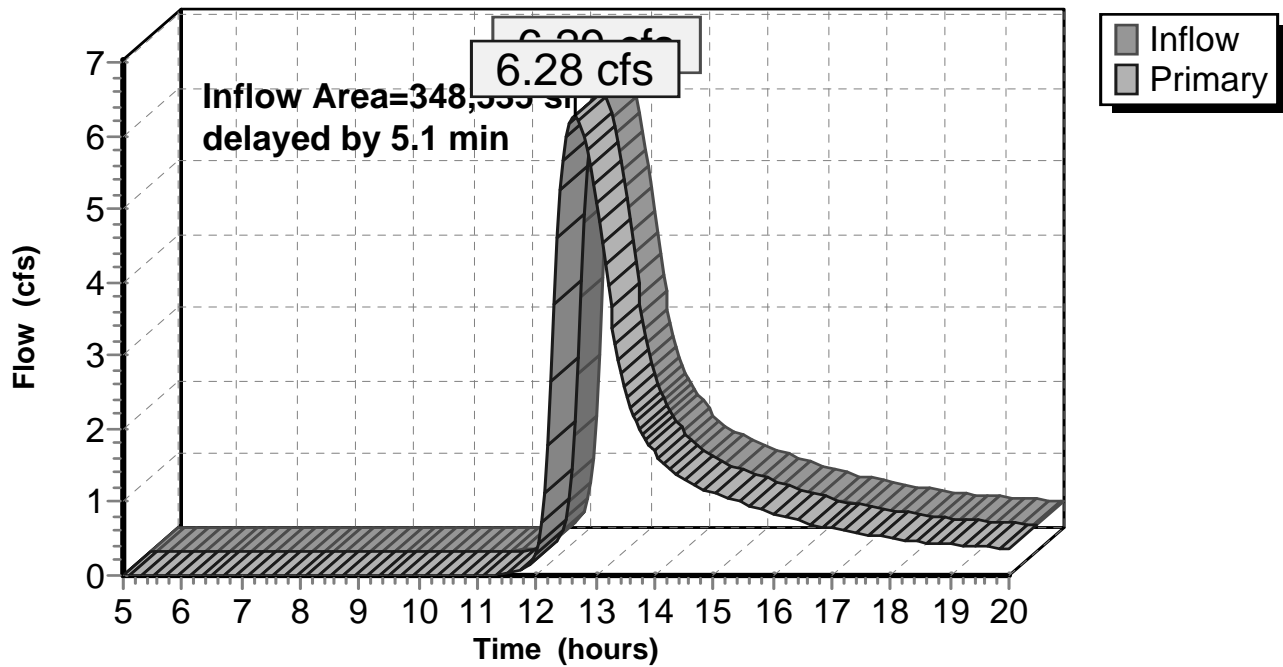
Summary for Link 5L: Post Dev

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 1.47" for 10 Year event
Inflow = 6.29 cfs @ 12.56 hrs, Volume= 42,829 cf
Primary = 6.28 cfs @ 12.64 hrs, Volume= 42,716 cf, Atten= 0%, Lag= 5.1 min

Primary outflow = Inflow delayed by 5.1 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Post Dev

Hydrograph



CEC-Williamsburg

Prepared by SK Design Group, Inc

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Type III 24-hr 25 Year Rainfall=5.52"

Printed 6/12/2019

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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 1A: Post Dev

Runoff Area=633,680 sf 3.74% Impervious Runoff Depth>2.32"
 Flow Length=2,345' Tc=17.6 min CN=71 Runoff=30.06 cfs 122,433 cf

Subcatchment 2A: Post Dev

Runoff Area=348,535 sf 2.15% Impervious Runoff Depth>2.32"
 Flow Length=835' Tc=17.7 min CN=71 Runoff=16.50 cfs 67,338 cf

Subcatchment 3A: Post Dev

Runoff Area=539,180 sf 0.00% Impervious Runoff Depth>2.40"
 Flow Length=825' Tc=16.9 min CN=72 Runoff=26.96 cfs 108,024 cf

Subcatchment E: Pre-Development

Runoff Area=1,521,390 sf 1.41% Impervious Runoff Depth>2.22"
 Flow Length=3,145' Tc=34.6 min CN=70 Runoff=51.93 cfs 281,401 cf

Reach DP1.E: Pre Dev

Inflow=51.93 cfs 281,401 cf
 Outflow=51.93 cfs 281,401 cf

Reach DP1.P: Post Dev

Inflow=43.42 cfs 292,076 cf
 Outflow=43.42 cfs 292,076 cf

Pond 2P: Pond West

Peak Elev=536.23' Storage=17,940 cf Inflow=16.50 cfs 67,338 cf
 Outflow=8.49 cfs 64,263 cf

Pond 3P:

Peak Elev=549.15' Storage=18,055 cf Inflow=26.96 cfs 108,024 cf
 Outflow=18.19 cfs 106,144 cf

Link 4L: Post Dev

delayed by 13.6 min Inflow=18.19 cfs 106,144 cf
 Primary=18.09 cfs 105,531 cf

Link 5L: Post Dev

delayed by 5.1 min Inflow=8.49 cfs 64,263 cf
 Primary=8.49 cfs 64,112 cf

Total Runoff Area = 3,042,785 sf Runoff Volume = 579,196 cf Average Runoff Depth = 2.28"
98.27% Pervious = 2,990,163 sf 1.73% Impervious = 52,623 sf

Summary for Subcatchment 1A: Post Dev

Runoff = 30.06 cfs @ 12.25 hrs, Volume= 122,433 cf, Depth> 2.32"

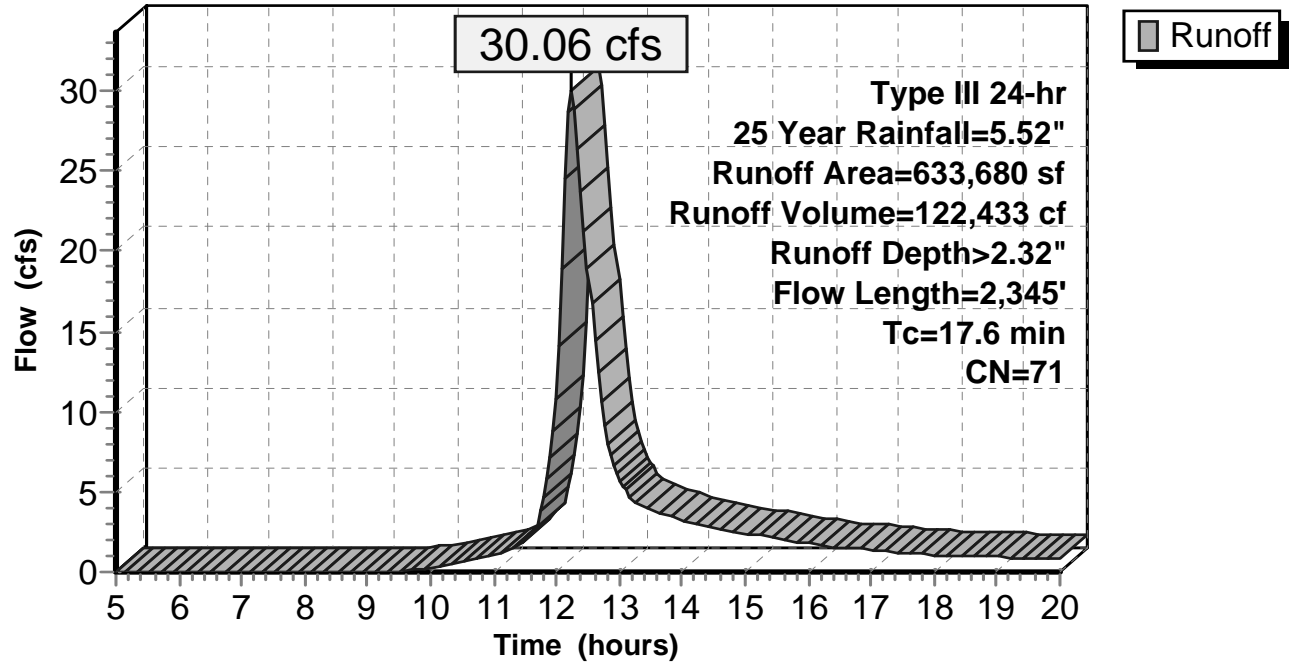
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.52"

Area (sf)	CN	Description
45,205	30	Woods, Good, HSG A
5,135	39	Pasture/grassland/range, Good, HSG A
5,250	98	Water Surface, HSG A
3,055	83	Paved roads w/open ditches, 50% imp, HSG A
995	96	Gravel surface, HSG C
215,820	70	Woods, Good, HSG C
117,515	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
1,430	92	Paved roads w/open ditches, 50% imp, HSG C
208,025	77	Woods, Good, HSG D
15,060	78	Meadow, non-grazed, HSG D
12,790	98	Water Surface, HSG D
633,680	71	Weighted Average
609,998		96.26% Pervious Area
23,683		3.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	25	0.0650	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
3.3	385	0.0780	1.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	235	0.2300	2.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,700		3.50		Direct Entry,
17.6	2,345	Total			

Subcatchment 1A: Post Dev

Hydrograph



Summary for Subcatchment 2A: Post Dev

Runoff = 16.50 cfs @ 12.25 hrs, Volume= 67,338 cf, Depth> 2.32"

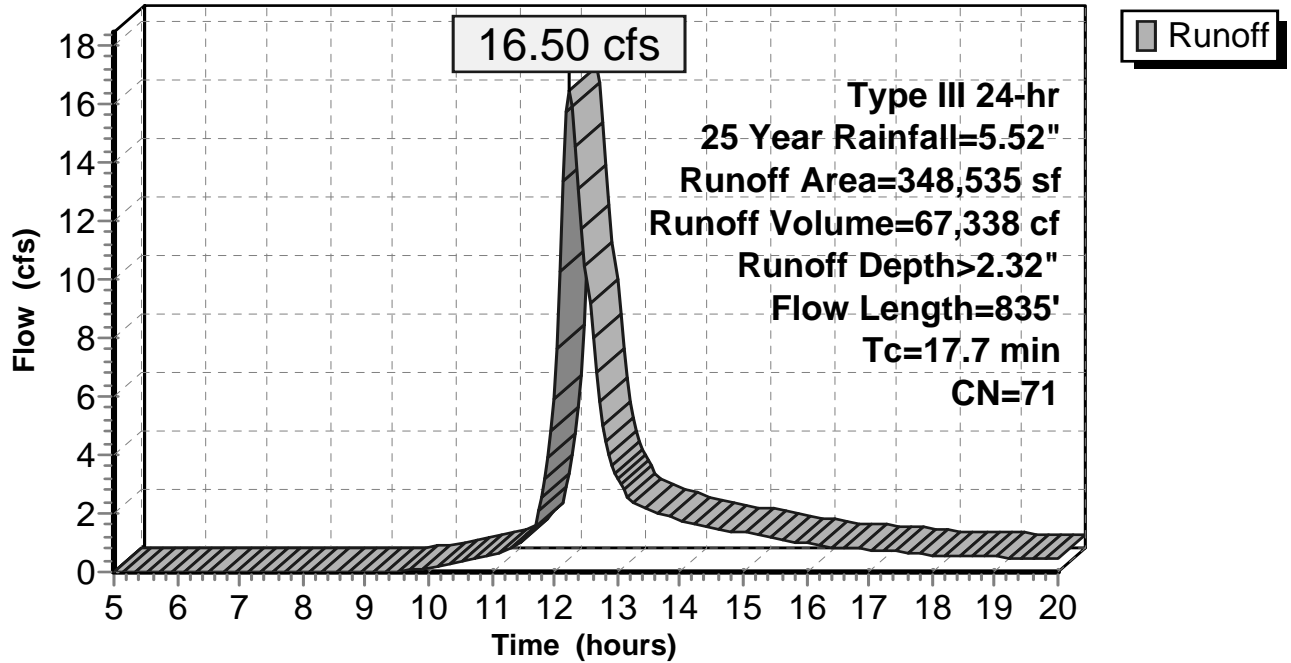
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 Year Rainfall=5.52"

Area (sf)	CN	Description
1,815	30	Woods, Good, HSG A
13,410	30	Meadow, non-grazed, HSG A
9,940	96	Gravel surface, HSG C
10,130	70	Woods, Good, HSG C
284,145	71	Meadow, non-grazed, HSG C
7,500	98	Paved parking, HSG C
1,290	77	Woods, Good, HSG D
20,305	78	Meadow, non-grazed, HSG D
348,535	71	Weighted Average
341,035		97.85% Pervious Area
7,500		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
8.0	785	0.0550	1.64		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.7	835	Total			

Subcatchment 2A: Post Dev

Hydrograph



Summary for Subcatchment 3A: Post Dev

Runoff = 26.96 cfs @ 12.24 hrs, Volume= 108,024 cf, Depth> 2.40"

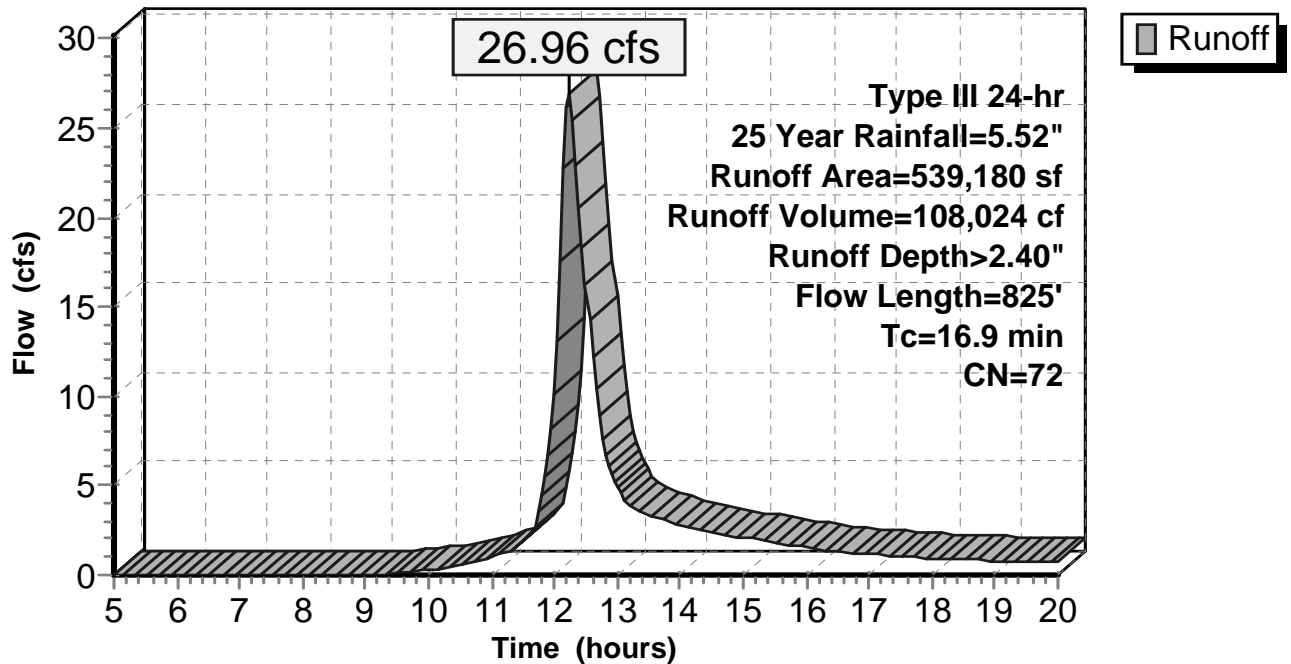
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.52"

Area (sf)	CN	Description
4,910	96	Gravel surface, HSG C
13,940	70	Woods, Good, HSG C
449,565	71	Meadow, non-grazed, HSG C
70,765	77	Woods, Poor, HSG C
539,180	72	Weighted Average
539,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
7.2	775	0.0650	1.78		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.9	825	Total			

Subcatchment 3A: Post Dev

Hydrograph



Summary for Subcatchment E: Pre-Development

Runoff = 51.93 cfs @ 12.50 hrs, Volume= 281,401 cf, Depth> 2.22"

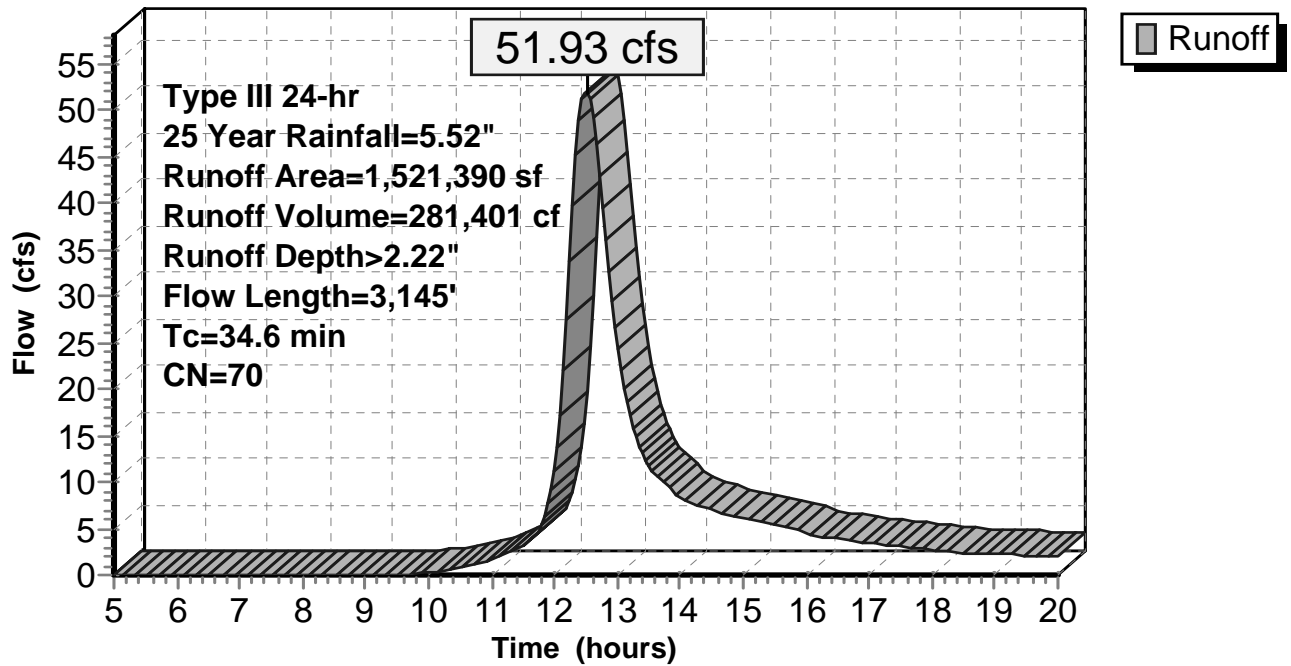
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.52"

Area (sf)	CN	Description
7,200	96	Gravel surface, HSG A
63,325	30	Woods, Good, HSG A
5,250	98	Water Surface, HSG A
2,770	96	Gravel surface, HSG C
1,158,495	70	Woods, Good, HSG C
20,660	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
90	96	Gravel surface, HSG D
247,410	77	Woods, Good, HSG D
12,790	98	Water Surface, HSG D
1,521,390	70	Weighted Average
1,499,950		98.59% Pervious Area
21,440		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
3.9	300	0.0670	1.29		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.8	420	0.0430	1.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.4	300	0.1670	2.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	175	0.0570	0.60		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
9.0	1,900		3.50		Direct Entry, Unquomonk Brook-Small Tributary
34.6	3,145	Total			

Subcatchment E: Pre-Development

Hydrograph

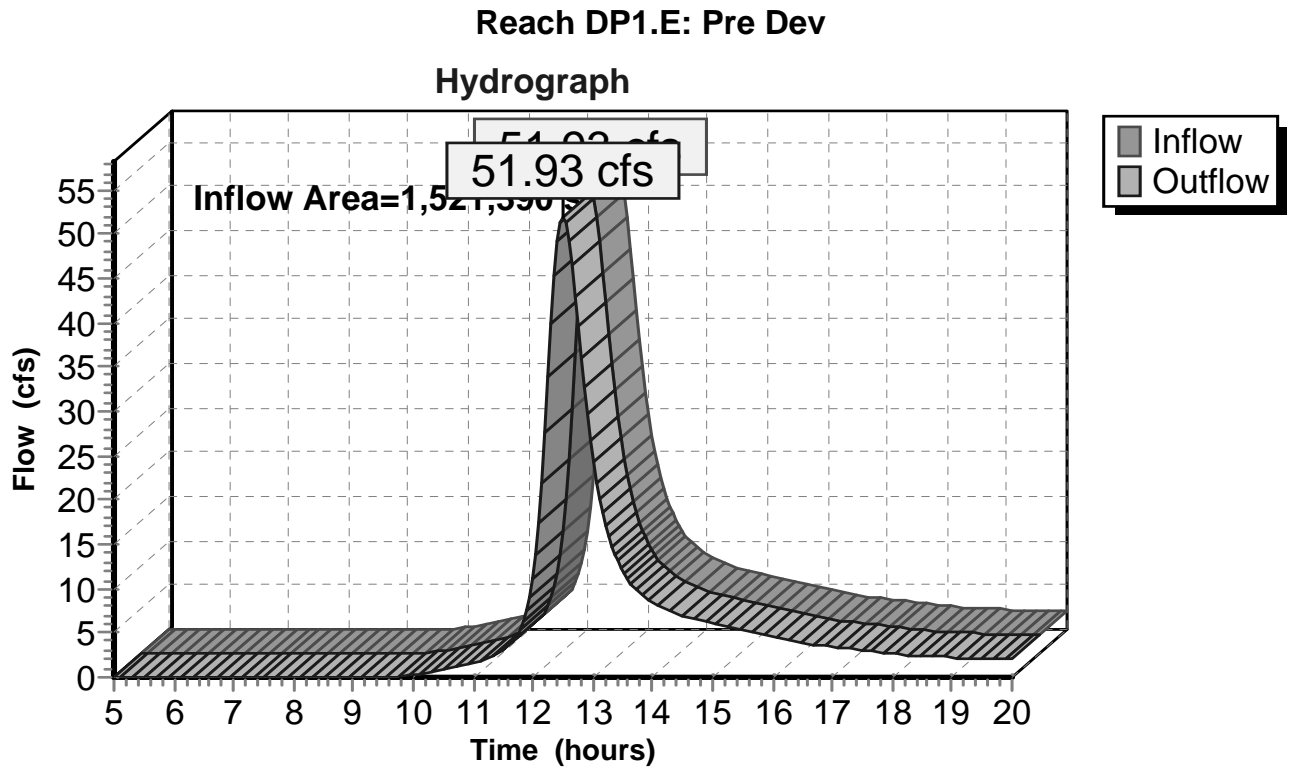


Summary for Reach DP1.E: Pre Dev

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,390 sf, 1.41% Impervious, Inflow Depth > 2.22" for 25 Year event
Inflow = 51.93 cfs @ 12.50 hrs, Volume= 281,401 cf
Outflow = 51.93 cfs @ 12.50 hrs, Volume= 281,401 cf, Atten= 0%, Lag= 0.0 min

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



Summary for Reach DP1.P: Post Dev

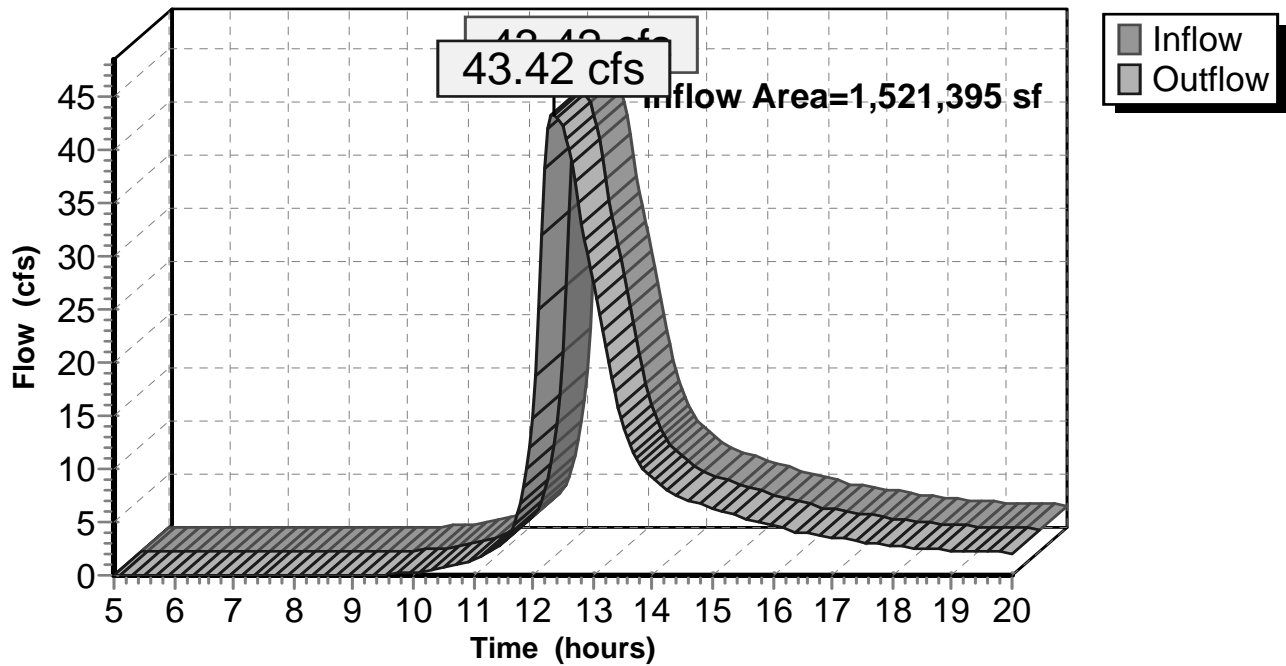
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,395 sf, 2.05% Impervious, Inflow Depth > 2.30" for 25 Year event
Inflow = 43.42 cfs @ 12.33 hrs, Volume= 292,076 cf
Outflow = 43.42 cfs @ 12.33 hrs, Volume= 292,076 cf, Atten= 0%, Lag= 0.0 min

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

Reach DP1.P: Post Dev

Hydrograph



Summary for Pond 2P: Pond West

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 2.32" for 25 Year event
 Inflow = 16.50 cfs @ 12.25 hrs, Volume= 67,338 cf
 Outflow = 8.49 cfs @ 12.58 hrs, Volume= 64,263 cf, Atten= 49%, Lag= 19.6 min
 Primary = 8.49 cfs @ 12.58 hrs, Volume= 64,263 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 536.23' @ 12.58 hrs Surf.Area= 9,526 sf Storage= 17,940 cf

Plug-Flow detention time= 43.8 min calculated for 64,263 cf (95% of inflow)
 Center-of-Mass det. time= 27.7 min (838.4 - 810.6)

Volume	Invert	Avail.Storage	Storage Description
#1	534.00'	37,008 cf	40.00'W x 165.00'L x 4.00'H Prismatic Z=3.0

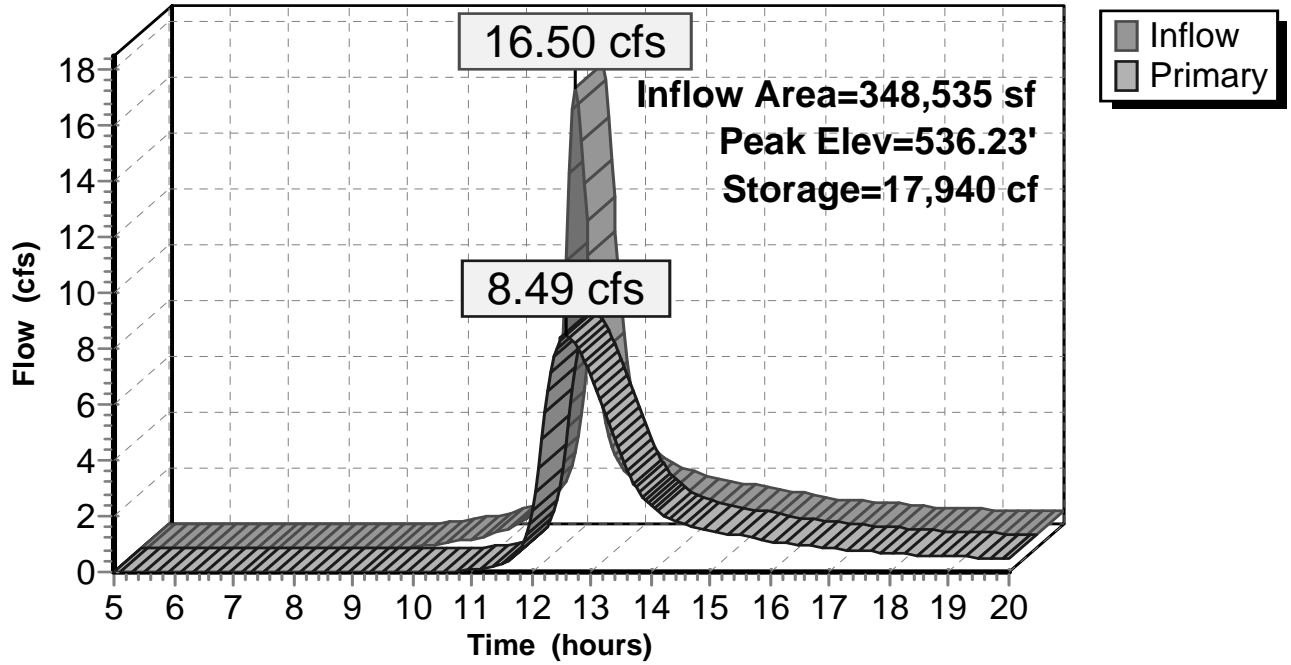
Device	Routing	Invert	Outlet Devices
#1	Primary	537.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	534.25'	12.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.25' / 526.00' S= 0.2750 1/ S= 0.2750 1/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Primary	534.00'	4.0" Round Culvert L= 302.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.00' / 526.00' S= 0.0265 1/ S= 0.0265 1/ Cc= 0.900 n= 0.012, Flow Area= 0.09 sf

Primary OutFlow Max=8.48 cfs @ 12.58 hrs HW=536.23' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Culvert (Inlet Controls 8.12 cfs @ 5.17 fps)
- 3=Culvert (Barrel Controls 0.36 cfs @ 4.17 fps)

Pond 2P: Pond West

Hydrograph



Summary for Pond 3P:

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 2.40" for 25 Year event
 Inflow = 26.96 cfs @ 12.24 hrs, Volume= 108,024 cf
 Outflow = 18.19 cfs @ 12.46 hrs, Volume= 106,144 cf, Atten= 33%, Lag= 13.0 min
 Primary = 18.19 cfs @ 12.46 hrs, Volume= 106,144 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 549.15' @ 12.46 hrs Surf.Area= 7,626 sf Storage= 18,055 cf

Plug-Flow detention time= 20.0 min calculated for 106,144 cf (98% of inflow)
 Center-of-Mass det. time= 13.4 min (821.6 - 808.1)

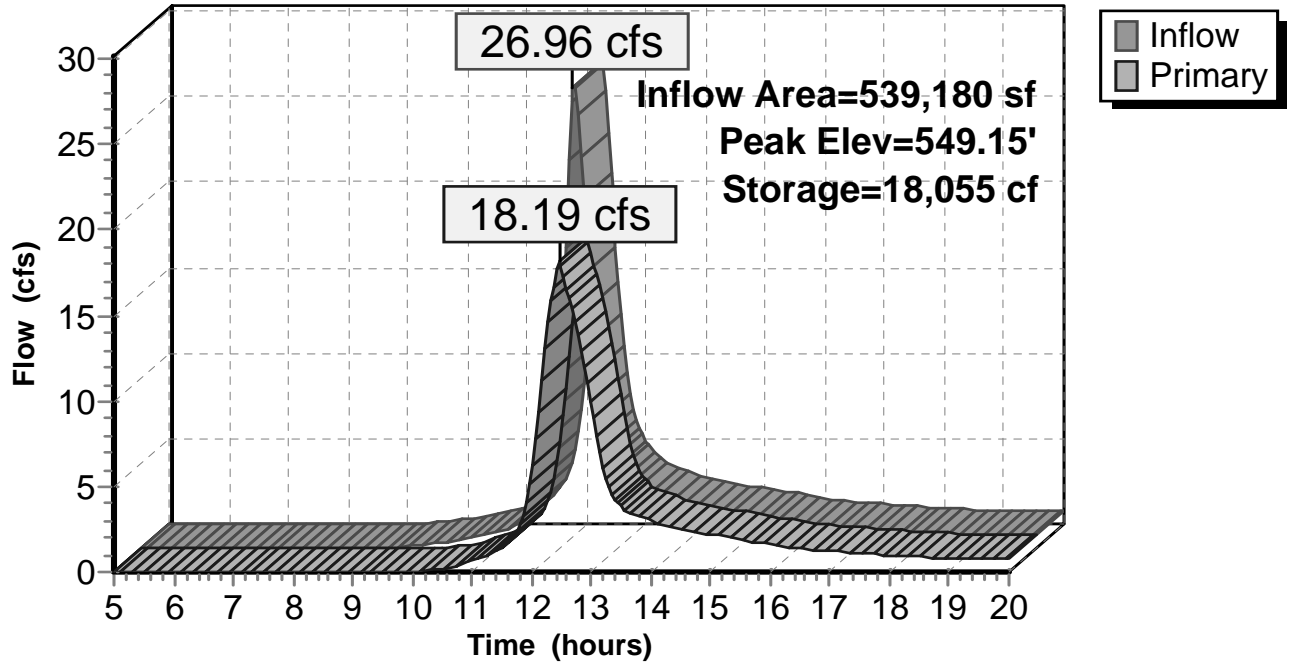
Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	25,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	3,850	0	0
550.00	8,650	25,000	25,000

Device	Routing	Invert	Outlet Devices
#1	Primary	549.00'	8.0' long x 5.0' 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 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	546.25'	15.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.25' / 545.00' S= 0.0417 '/ Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Primary	546.00'	6.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.00' / 545.00' S= 0.0333 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=18.14 cfs @ 12.46 hrs HW=549.14' (Free Discharge)
 1=Broad-Crested Rectangular Weir (Weir Controls 1.02 cfs @ 0.89 fps)
 2=Culvert (Inlet Controls 15.70 cfs @ 6.40 fps)
 3=Culvert (Inlet Controls 1.42 cfs @ 7.23 fps)

Pond 3P:

Hydrograph



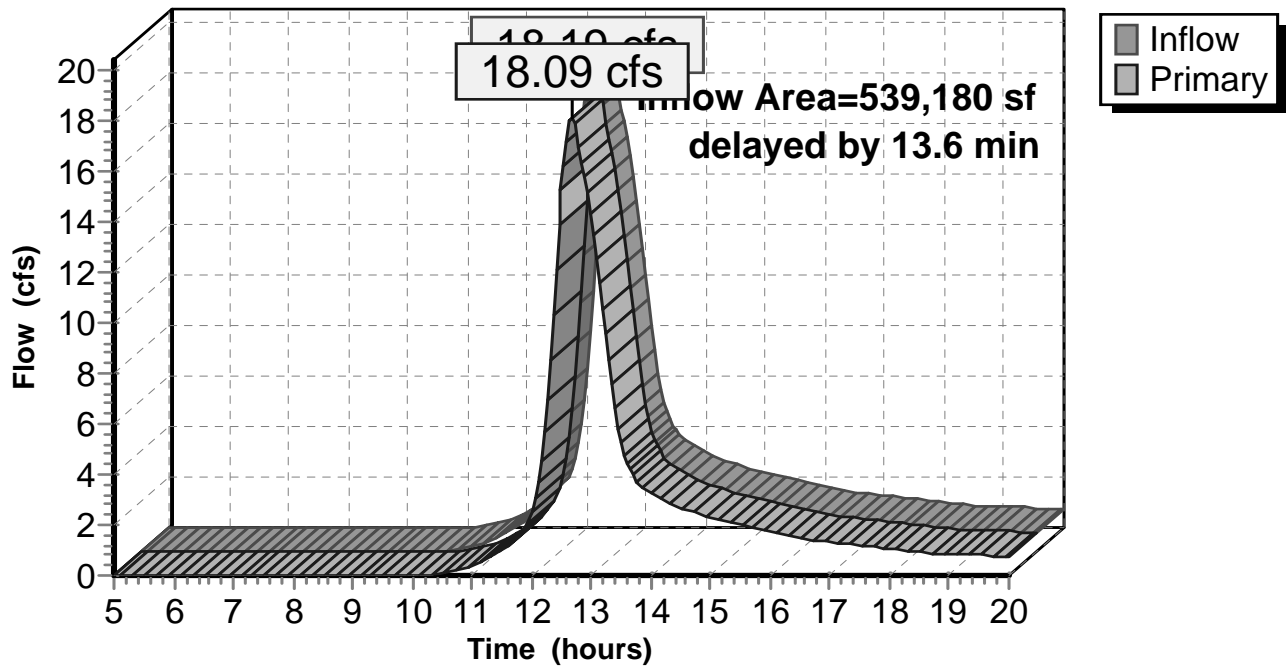
Summary for Link 4L: Post Dev

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 2.36" for 25 Year event
Inflow = 18.19 cfs @ 12.46 hrs, Volume= 106,144 cf
Primary = 18.09 cfs @ 12.69 hrs, Volume= 105,531 cf, Atten= 1%, Lag= 13.7 min

Primary outflow = Inflow delayed by 13.6 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: Post Dev

Hydrograph



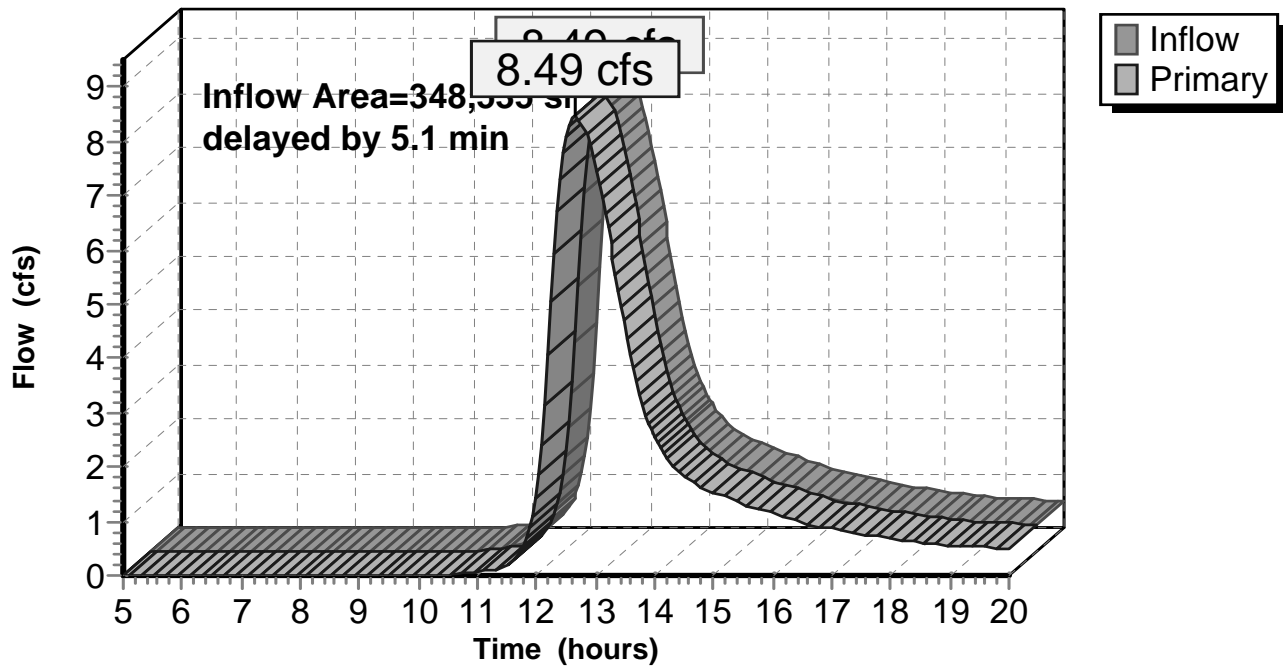
Summary for Link 5L: Post Dev

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 2.21" for 25 Year event
Inflow = 8.49 cfs @ 12.58 hrs, Volume= 64,263 cf
Primary = 8.49 cfs @ 12.67 hrs, Volume= 64,112 cf, Atten= 0%, Lag= 5.1 min

Primary outflow = Inflow delayed by 5.1 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Post Dev

Hydrograph



CEC-Williamsburg

Prepared by SK Design Group, Inc

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Type III 24-hr 100 Year Rainfall=7.62"

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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 1A: Post Dev

Runoff Area=633,680 sf 3.74% Impervious Runoff Depth>3.95"
 Flow Length=2,345' Tc=17.6 min CN=71 Runoff=51.29 cfs 208,566 cf

Subcatchment 2A: Post Dev

Runoff Area=348,535 sf 2.15% Impervious Runoff Depth>3.95"
 Flow Length=835' Tc=17.7 min CN=71 Runoff=28.15 cfs 114,711 cf

Subcatchment 3A: Post Dev

Runoff Area=539,180 sf 0.00% Impervious Runoff Depth>4.06"
 Flow Length=825' Tc=16.9 min CN=72 Runoff=45.47 cfs 182,373 cf

Subcatchment E: Pre-Development

Runoff Area=1,521,390 sf 1.41% Impervious Runoff Depth>3.82"
 Flow Length=3,145' Tc=34.6 min CN=70 Runoff=89.55 cfs 484,153 cf

Reach DP1.E: Pre Dev

Inflow=89.55 cfs 484,153 cf
 Outflow=89.55 cfs 484,153 cf

Reach DP1.P: Post Dev

Inflow=83.09 cfs 498,714 cf
 Outflow=83.09 cfs 498,714 cf

Pond 2P: Pond West

Peak Elev=537.42' Storage=30,212 cf Inflow=28.15 cfs 114,711 cf
 Outflow=16.71 cfs 111,155 cf

Pond 3P:

Peak Elev=549.95' Storage=24,574 cf Inflow=45.47 cfs 182,373 cf
 Outflow=39.76 cfs 180,145 cf

Link 4L: Post Dev

delayed by 13.6 min Inflow=39.76 cfs 180,145 cf
 Primary=39.54 cfs 179,220 cf

Link 5L: Post Dev

delayed by 5.1 min Inflow=16.71 cfs 111,155 cf
 Primary=16.62 cfs 110,928 cf

Total Runoff Area = 3,042,785 sf Runoff Volume = 989,803 cf Average Runoff Depth = 3.90"
98.27% Pervious = 2,990,163 sf 1.73% Impervious = 52,623 sf

Summary for Subcatchment 1A: Post Dev

Runoff = 51.29 cfs @ 12.25 hrs, Volume= 208,566 cf, Depth> 3.95"

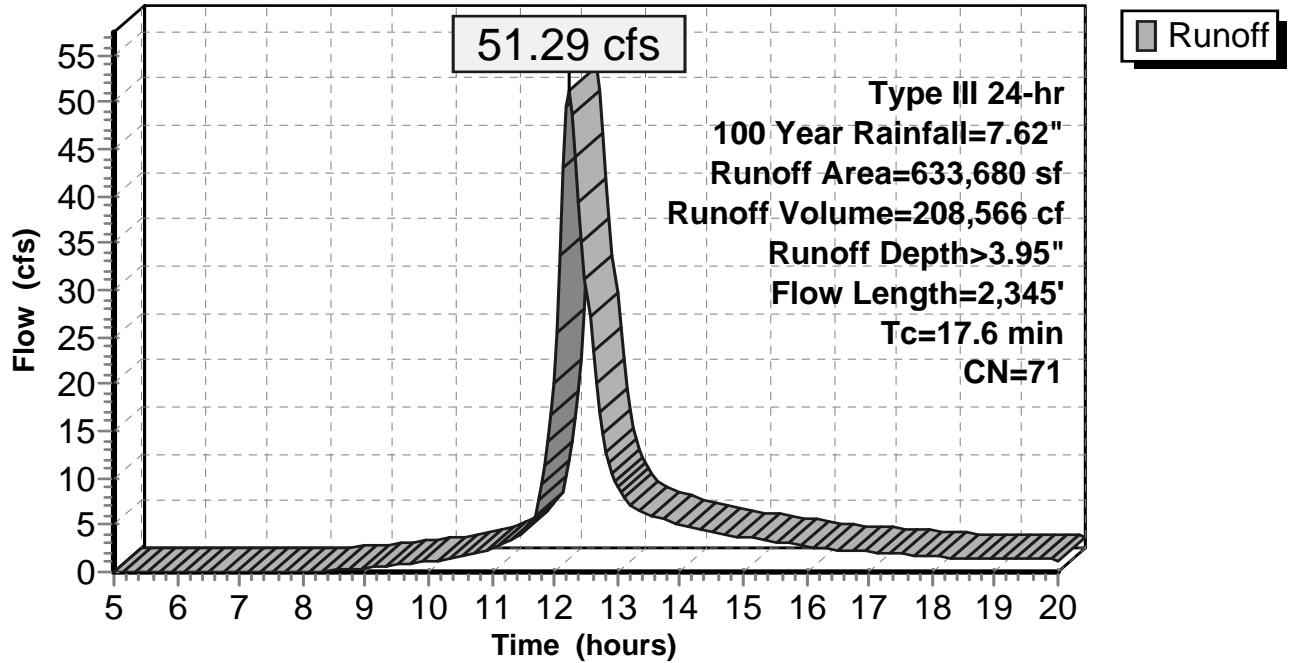
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=7.62"

Area (sf)	CN	Description
45,205	30	Woods, Good, HSG A
5,135	39	Pasture/grassland/range, Good, HSG A
5,250	98	Water Surface, HSG A
3,055	83	Paved roads w/open ditches, 50% imp, HSG A
995	96	Gravel surface, HSG C
215,820	70	Woods, Good, HSG C
117,515	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
1,430	92	Paved roads w/open ditches, 50% imp, HSG C
208,025	77	Woods, Good, HSG D
15,060	78	Meadow, non-grazed, HSG D
12,790	98	Water Surface, HSG D
633,680	71	Weighted Average
609,998		96.26% Pervious Area
23,683		3.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	25	0.0650	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
3.3	385	0.0780	1.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	235	0.2300	2.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.1	1,700		3.50		Direct Entry,
17.6	2,345	Total			

Subcatchment 1A: Post Dev

Hydrograph



Summary for Subcatchment 2A: Post Dev

Runoff = 28.15 cfs @ 12.25 hrs, Volume= 114,711 cf, Depth> 3.95"

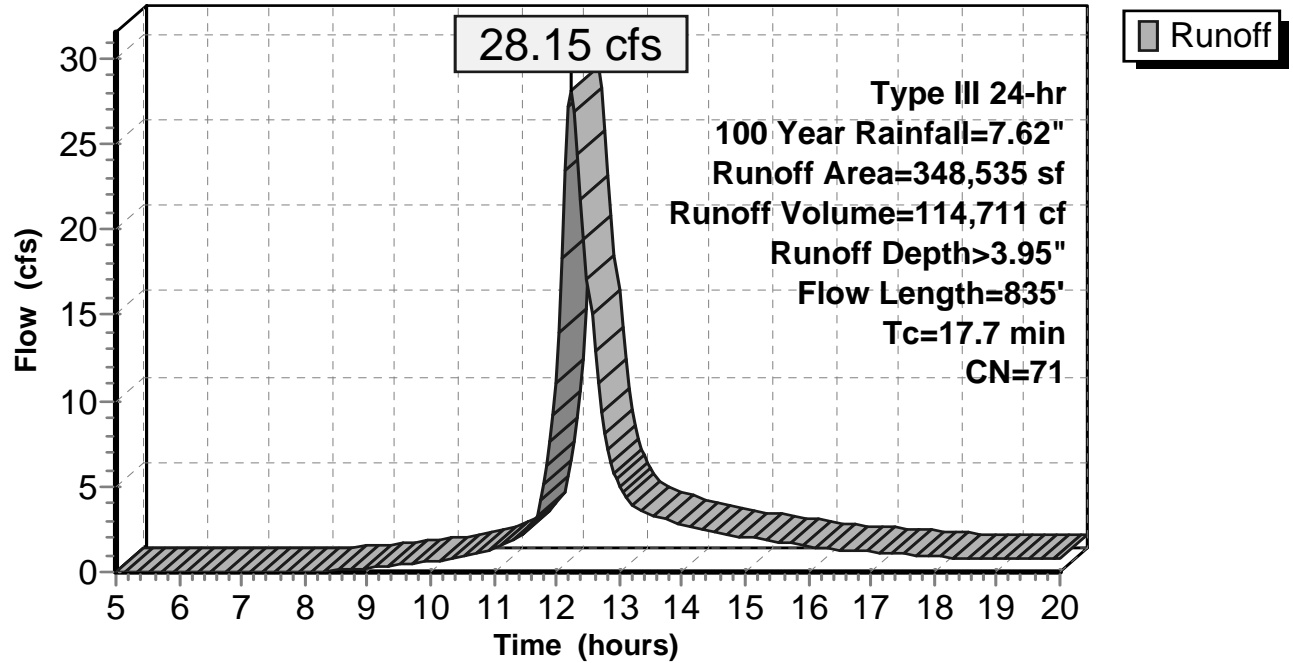
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Rainfall=7.62"

Area (sf)	CN	Description
1,815	30	Woods, Good, HSG A
13,410	30	Meadow, non-grazed, HSG A
9,940	96	Gravel surface, HSG C
10,130	70	Woods, Good, HSG C
284,145	71	Meadow, non-grazed, HSG C
7,500	98	Paved parking, HSG C
1,290	77	Woods, Good, HSG D
20,305	78	Meadow, non-grazed, HSG D
348,535	71	Weighted Average
341,035		97.85% Pervious Area
7,500		2.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
8.0	785	0.0550	1.64		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.7	835	Total			

Subcatchment 2A: Post Dev

Hydrograph



Summary for Subcatchment 3A: Post Dev

Runoff = 45.47 cfs @ 12.23 hrs, Volume= 182,373 cf, Depth> 4.06"

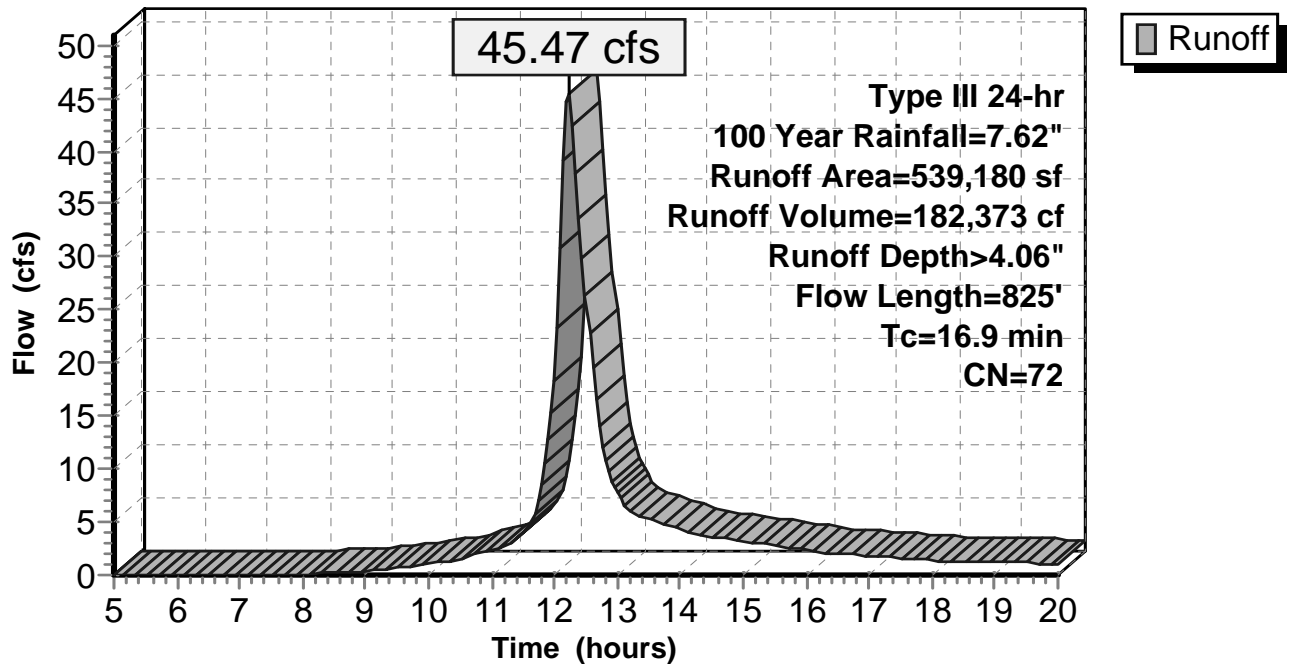
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=7.62"

Area (sf)	CN	Description
4,910	96	Gravel surface, HSG C
13,940	70	Woods, Good, HSG C
449,565	71	Meadow, non-grazed, HSG C
70,765	77	Woods, Poor, HSG C
539,180	72	Weighted Average
539,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, Grass: Bermuda n= 0.410 P2= 3.07"
7.2	775	0.0650	1.78		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
16.9	825	Total			

Subcatchment 3A: Post Dev

Hydrograph



Summary for Subcatchment E: Pre-Development

Runoff = 89.55 cfs @ 12.49 hrs, Volume= 484,153 cf, Depth> 3.82"

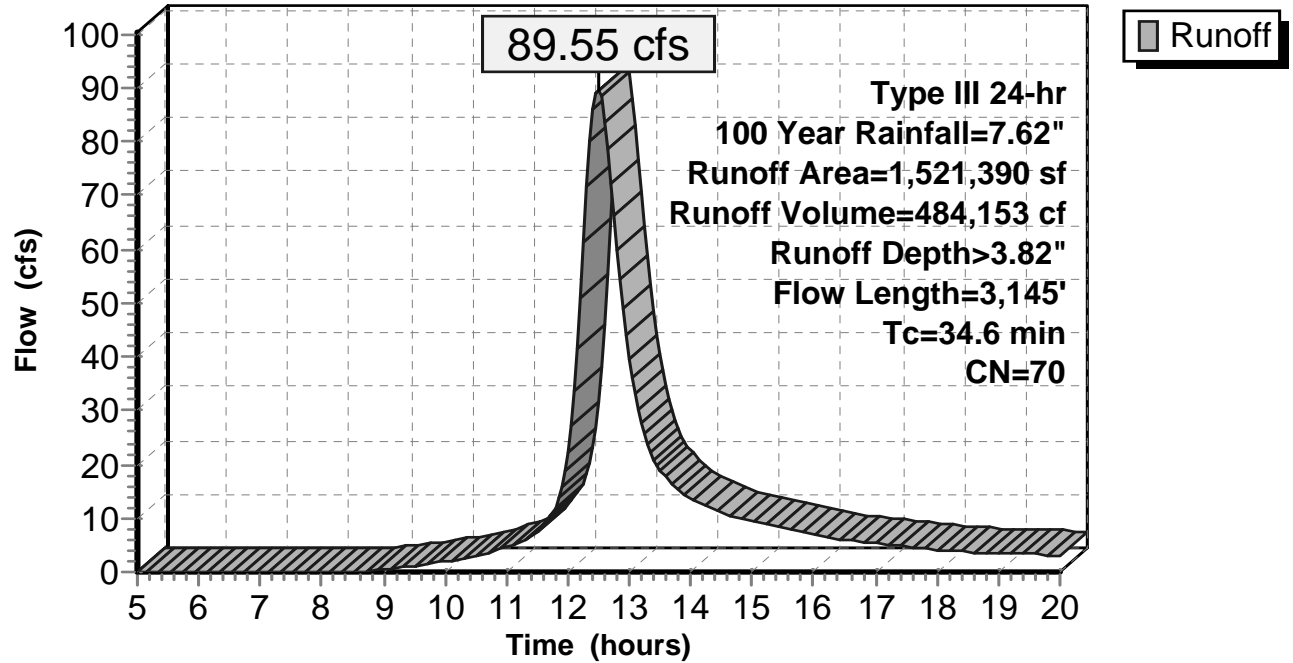
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=7.62"

Area (sf)	CN	Description
7,200	96	Gravel surface, HSG A
63,325	30	Woods, Good, HSG A
5,250	98	Water Surface, HSG A
2,770	96	Gravel surface, HSG C
1,158,495	70	Woods, Good, HSG C
20,660	71	Meadow, non-grazed, HSG C
3,400	98	Water Surface, HSG C
90	96	Gravel surface, HSG D
247,410	77	Woods, Good, HSG D
12,790	98	Water Surface, HSG D
1,521,390	70	Weighted Average
1,499,950		98.59% Pervious Area
21,440		1.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.07"
3.9	300	0.0670	1.29		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.8	420	0.0430	1.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.4	300	0.1670	2.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	175	0.0570	0.60		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
9.0	1,900		3.50		Direct Entry, Unquomonk Brook-Small Tributary
34.6	3,145	Total			

Subcatchment E: Pre-Development

Hydrograph

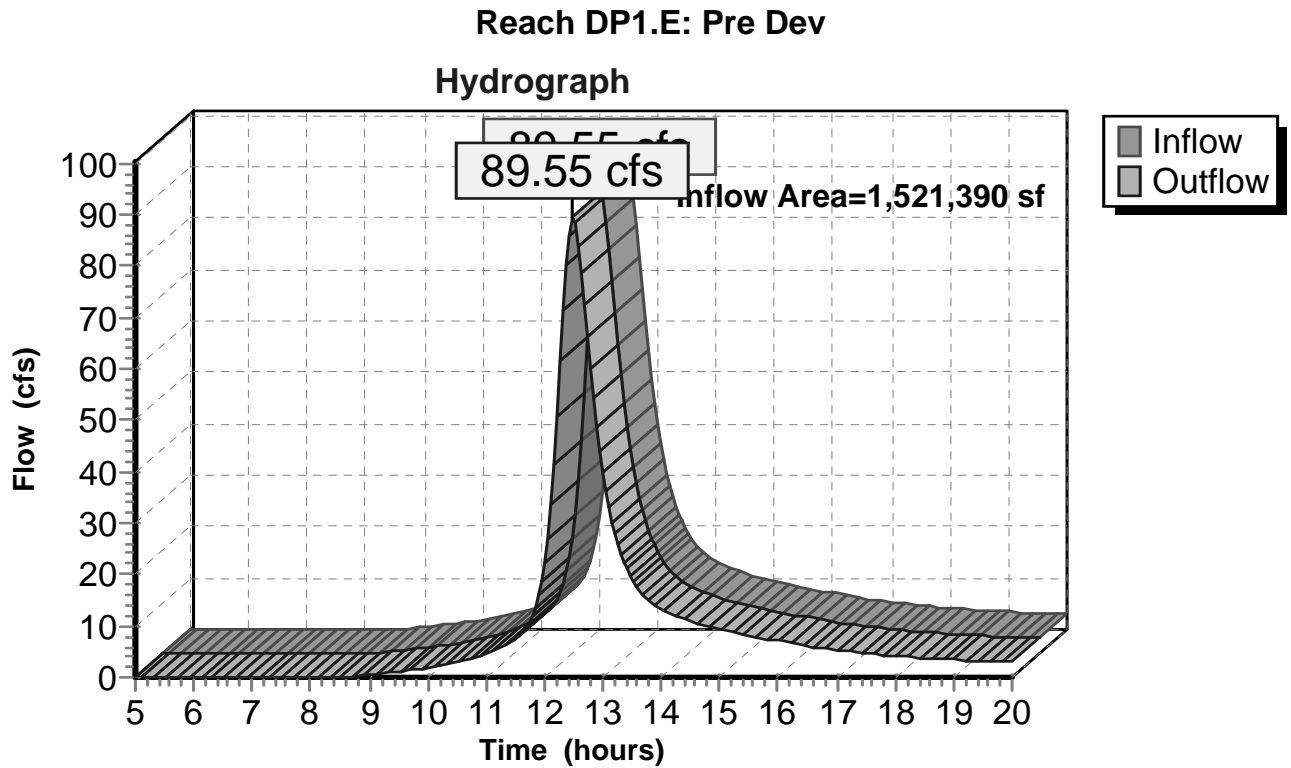


Summary for Reach DP1.E: Pre Dev

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,390 sf, 1.41% Impervious, Inflow Depth > 3.82" for 100 Year event
Inflow = 89.55 cfs @ 12.49 hrs, Volume= 484,153 cf
Outflow = 89.55 cfs @ 12.49 hrs, Volume= 484,153 cf, Atten= 0%, Lag= 0.0 min

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

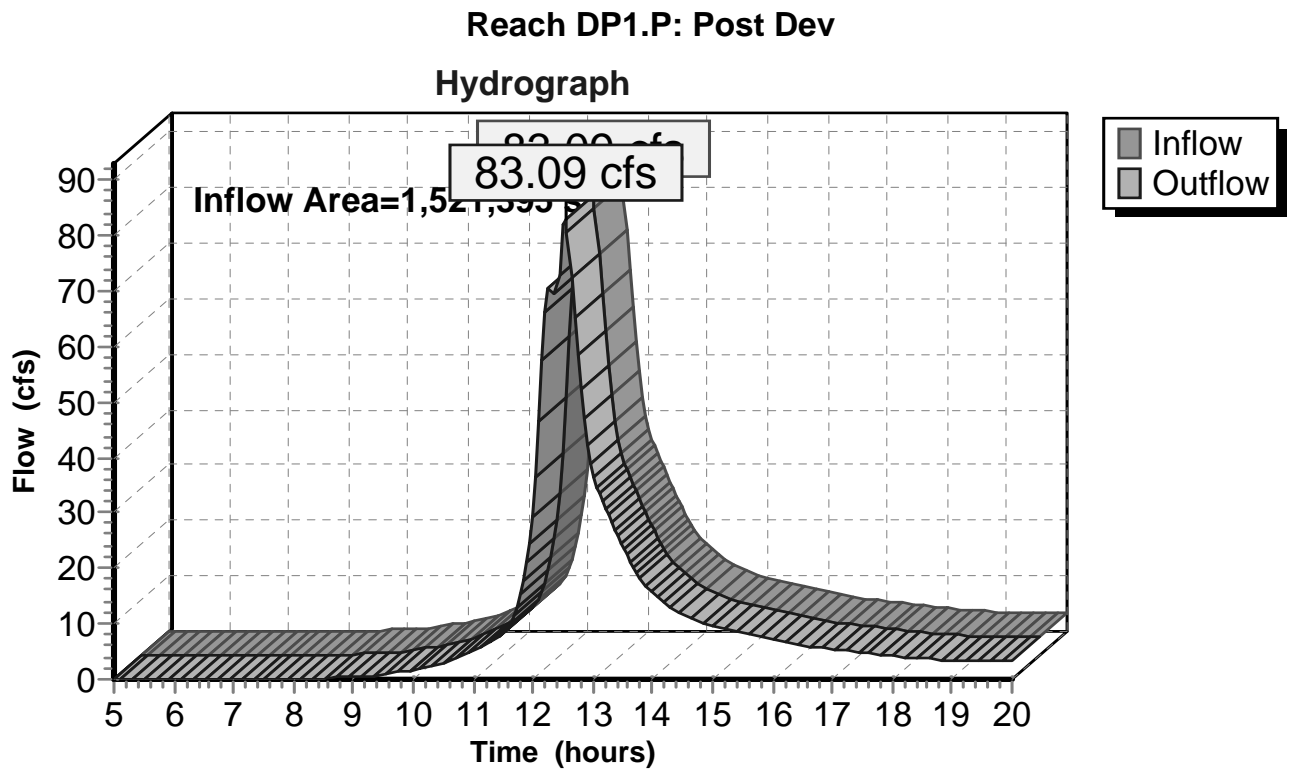


Summary for Reach DP1.P: Post Dev

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1,521,395 sf, 2.05% Impervious, Inflow Depth > 3.93" for 100 Year event
Inflow = 83.09 cfs @ 12.53 hrs, Volume= 498,714 cf
Outflow = 83.09 cfs @ 12.53 hrs, Volume= 498,714 cf, Atten= 0%, Lag= 0.0 min

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



Summary for Pond 2P: Pond West

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 3.95" for 100 Year event
 Inflow = 28.15 cfs @ 12.25 hrs, Volume= 114,711 cf
 Outflow = 16.71 cfs @ 12.51 hrs, Volume= 111,155 cf, Atten= 41%, Lag= 16.0 min
 Primary = 16.71 cfs @ 12.51 hrs, Volume= 111,155 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 537.42' @ 12.51 hrs Surf.Area= 11,223 sf Storage= 30,212 cf

Plug-Flow detention time= 40.1 min calculated for 111,155 cf (97% of inflow)
 Center-of-Mass det. time= 28.6 min (827.4 - 798.7)

Volume	Invert	Avail.Storage	Storage Description
#1	534.00'	37,008 cf	40.00'W x 165.00'L x 4.00'H Prismatic Z=3.0

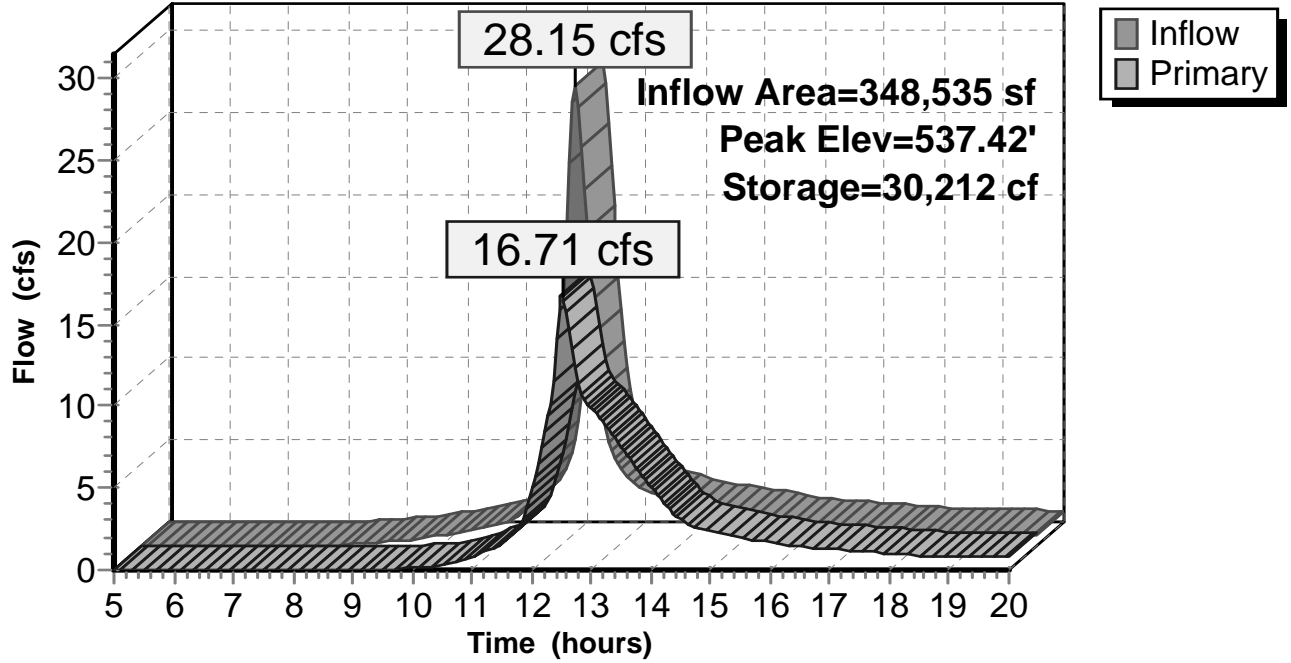
Device	Routing	Invert	Outlet Devices
#1	Primary	537.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	534.25'	12.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.25' / 526.00' S= 0.2750 1/ S= 0.2750 1/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Primary	534.00'	4.0" Round Culvert L= 302.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 534.00' / 526.00' S= 0.0265 1/ S= 0.0265 1/ Cc= 0.900 n= 0.012, Flow Area= 0.09 sf

Primary OutFlow Max=16.62 cfs @ 12.51 hrs HW=537.41' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Weir Controls 5.34 cfs @ 1.62 fps)
- 2=Culvert (Inlet Controls 10.89 cfs @ 6.93 fps)
- 3=Culvert (Barrel Controls 0.39 cfs @ 4.41 fps)

Pond 2P: Pond West

Hydrograph



Summary for Pond 3P:

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 4.06" for 100 Year event
 Inflow = 45.47 cfs @ 12.23 hrs, Volume= 182,373 cf
 Outflow = 39.76 cfs @ 12.34 hrs, Volume= 180,145 cf, Atten= 13%, Lag= 6.0 min
 Primary = 39.76 cfs @ 12.34 hrs, Volume= 180,145 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 549.95' @ 12.34 hrs Surf.Area= 8,591 sf Storage= 24,574 cf

Plug-Flow detention time= 16.6 min calculated for 179,546 cf (98% of inflow)
 Center-of-Mass det. time= 11.9 min (808.3 - 796.4)

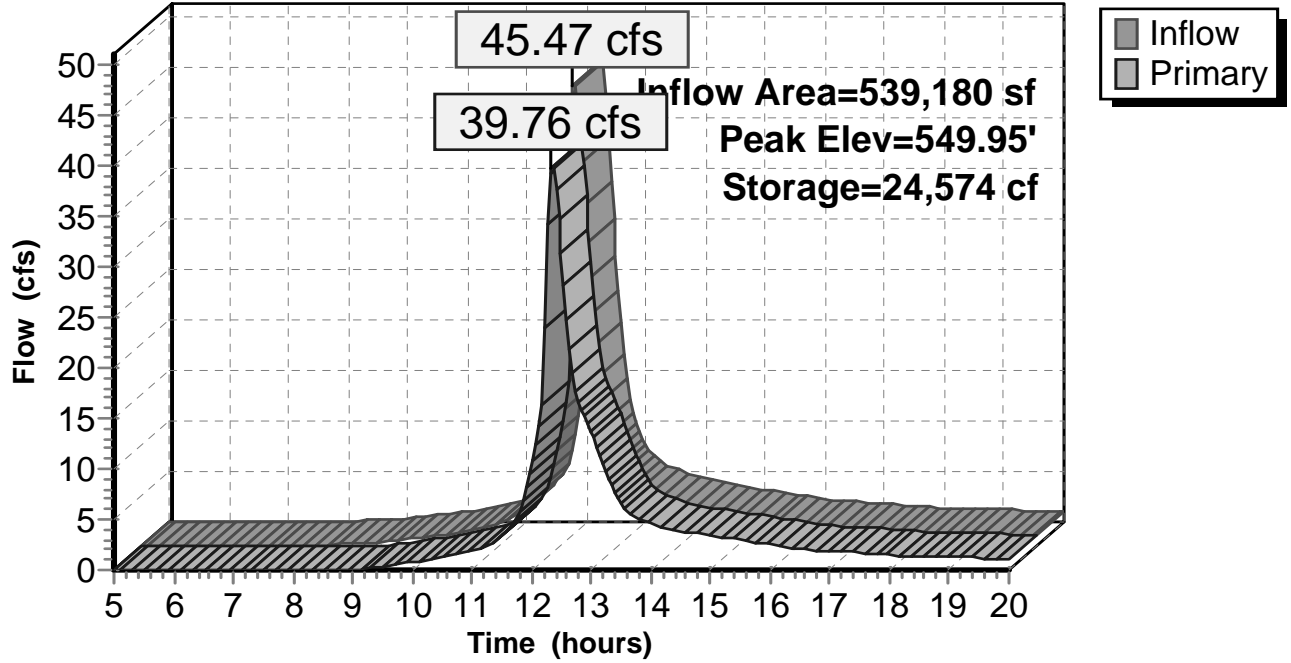
Volume	Invert	Avail.Storage	Storage Description
#1	546.00'	25,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
546.00	3,850	0	0
550.00	8,650	25,000	25,000

Device	Routing	Invert	Outlet Devices
#1	Primary	549.00'	8.0' long x 5.0' 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 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	546.25'	15.0" Round Culvert X 2.00 L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.25' / 545.00' S= 0.0417 '/ Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Primary	546.00'	6.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 546.00' / 545.00' S= 0.0333 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=39.49 cfs @ 12.34 hrs HW=549.94' (Free Discharge)
 1=Broad-Crested Rectangular Weir (Weir Controls 19.62 cfs @ 2.60 fps)
 2=Culvert (Inlet Controls 18.26 cfs @ 7.44 fps)
 3=Culvert (Inlet Controls 1.60 cfs @ 8.16 fps)

Pond 3P:

Hydrograph



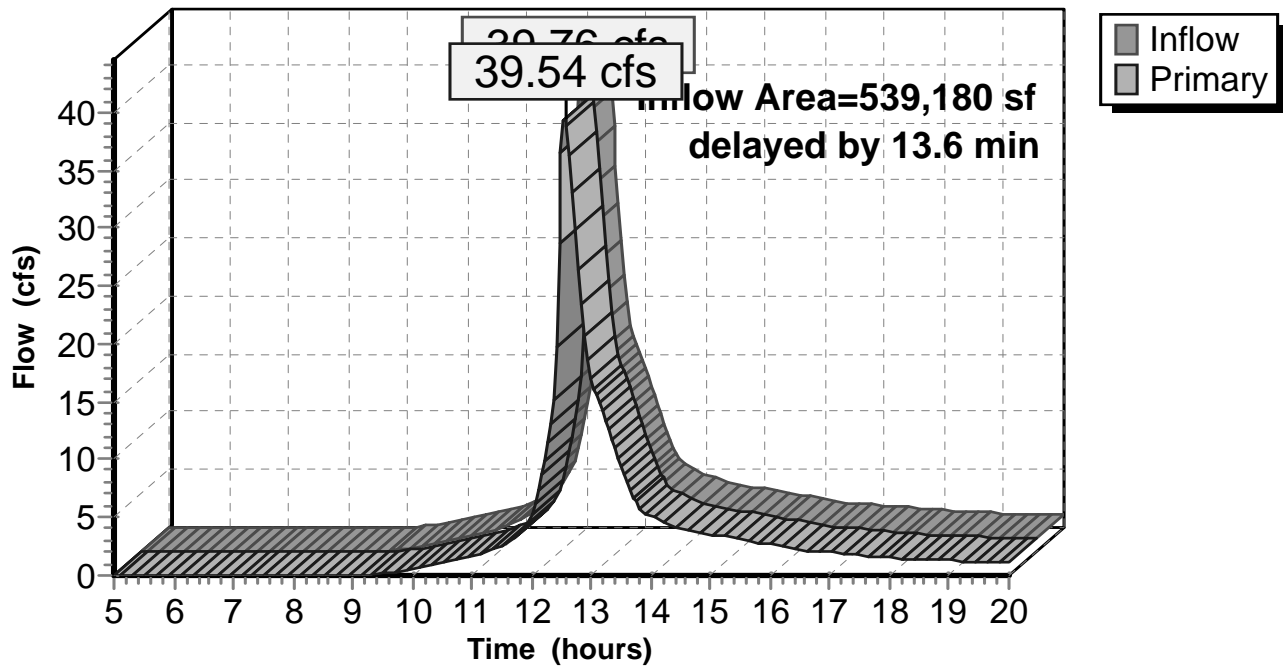
Summary for Link 4L: Post Dev

Inflow Area = 539,180 sf, 0.00% Impervious, Inflow Depth > 4.01" for 100 Year event
Inflow = 39.76 cfs @ 12.34 hrs, Volume= 180,145 cf
Primary = 39.54 cfs @ 12.57 hrs, Volume= 179,220 cf, Atten= 1%, Lag= 13.8 min

Primary outflow = Inflow delayed by 13.6 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 4L: Post Dev

Hydrograph



Summary for Link 5L: Post Dev

Inflow Area = 348,535 sf, 2.15% Impervious, Inflow Depth > 3.83" for 100 Year event
Inflow = 16.71 cfs @ 12.51 hrs, Volume= 111,155 cf
Primary = 16.62 cfs @ 12.60 hrs, Volume= 110,928 cf, Atten= 1%, Lag= 5.3 min

Primary outflow = Inflow delayed by 5.1 min, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Post Dev

Hydrograph

