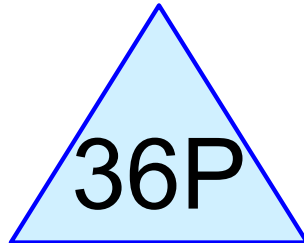
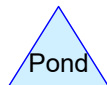
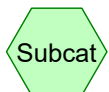


Fire Station WQv



Bioretention 5-29-20



Project Notes

Rainfall events imported from "Atlas-14-Rain.txt" for 1670 VT Washington

Berlin Designs Updated DAs - 5-29-20

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.809	96	Modified CN (3S)
0.809	96	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.809	Other	3S
0.809		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.809	0.809	Modified CN	3S
0.000	0.000	0.000	0.000	0.809	0.809	TOTAL	
						AREA	

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Pipe Listing (selected 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	36P	955.50	954.00	49.0	0.0306	0.010	15.0	0.0	0.0

Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 1-Year Rainfall=2.02"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=1.59"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=1.79 cfs 0.107 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.18' Storage=1,736 cf Inflow=1.79 cfs 0.107 af

Primary=1.54 cfs 0.107 af Secondary=0.00 cfs 0.000 af Outflow=1.54 cfs 0.107 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.107 af Average Runoff Depth = 1.59"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

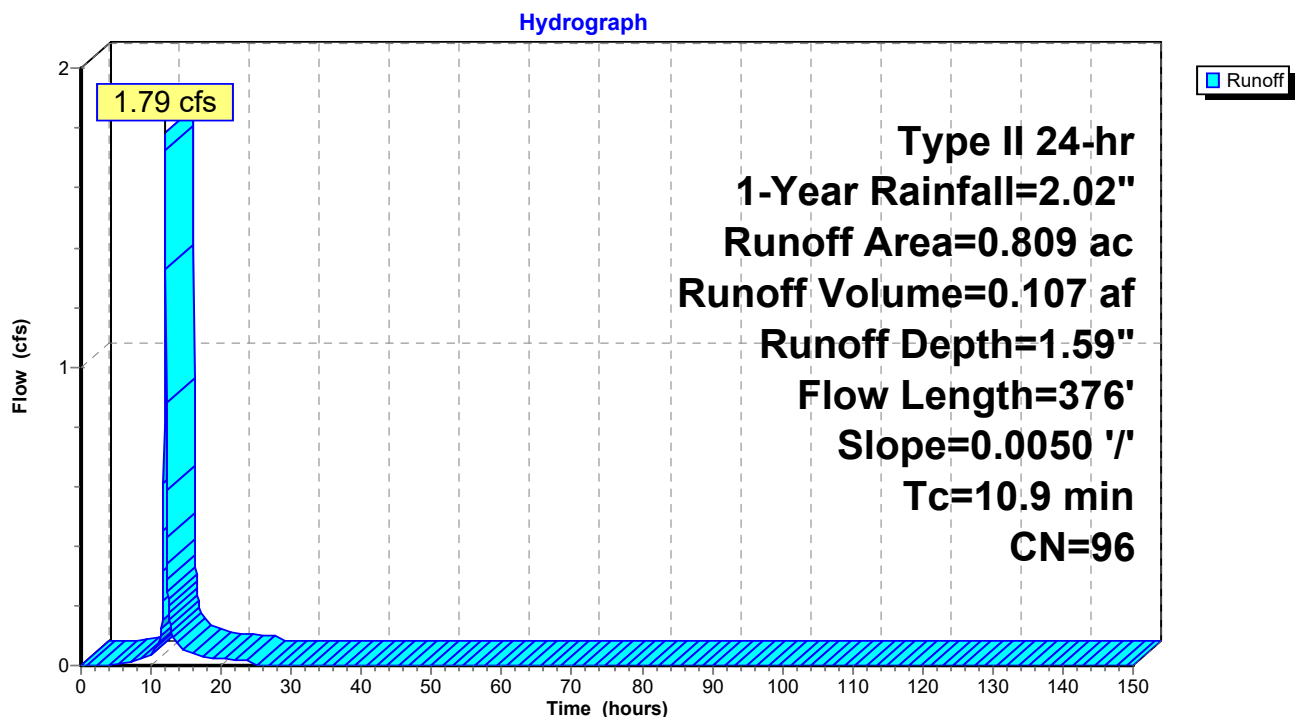
Runoff = 1.79 cfs @ 12.02 hrs, Volume= 0.107 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.02"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 1.59" for 1-Year event
 Inflow = 1.79 cfs @ 12.02 hrs, Volume= 0.107 af
 Outflow = 1.54 cfs @ 12.08 hrs, Volume= 0.107 af, Atten= 14%, Lag= 3.9 min
 Primary = 1.54 cfs @ 12.08 hrs, Volume= 0.107 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.18' @ 12.08 hrs Surf.Area= 1,379 sf Storage= 1,736 cf

Plug-Flow detention time= 581.8 min calculated for 0.107 af (100% of inflow)
 Center-of-Mass det. time= 582.4 min (1,371.9 - 789.5)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

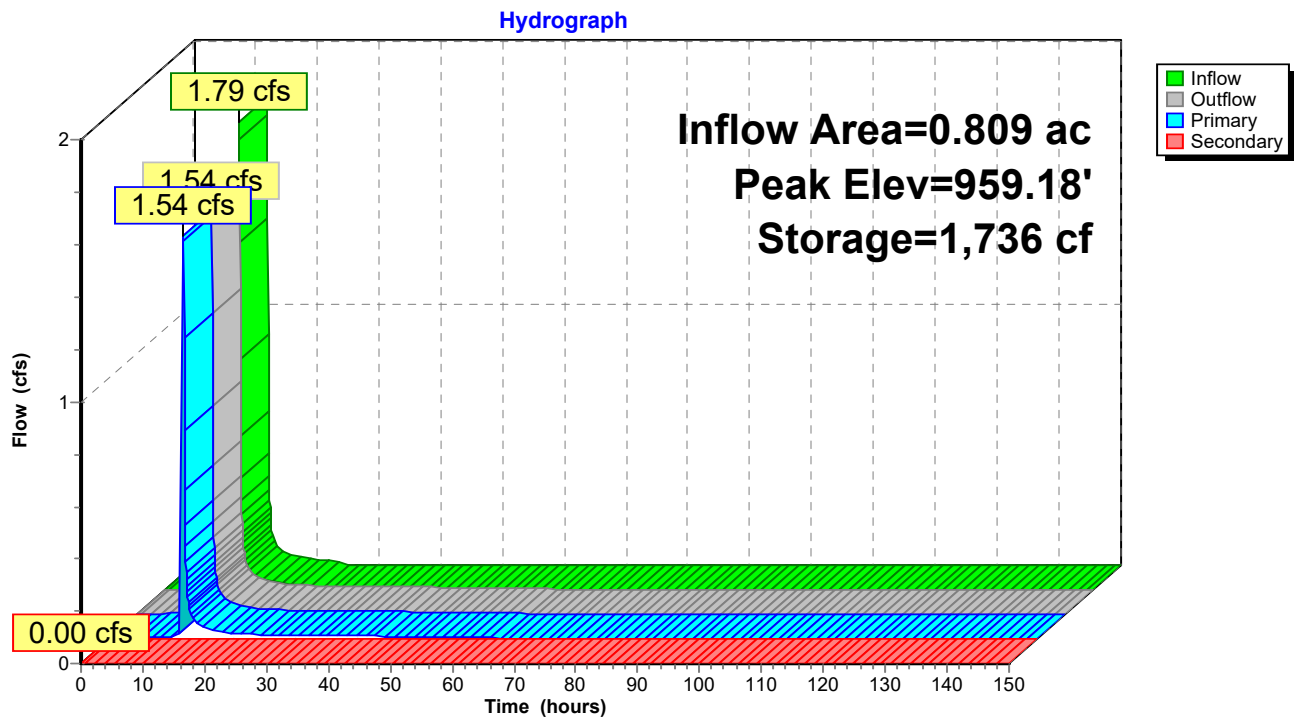
Primary OutFlow Max=1.49 cfs @ 12.08 hrs HW=959.17' (Free Discharge)

↑ **1=Culvert** (Passes 1.49 cfs of 8.14 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 1.47 cfs @ 1.36 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 2-Year Rainfall=2.35"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=1.91"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=2.12 cfs 0.129 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.21' Storage=1,787 cf Inflow=2.12 cfs 0.129 af

Primary=2.05 cfs 0.129 af Secondary=0.00 cfs 0.000 af Outflow=2.05 cfs 0.129 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.129 af Average Runoff Depth = 1.91"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 2.12 cfs @ 12.02 hrs, Volume= 0.129 af, Depth= 1.91"

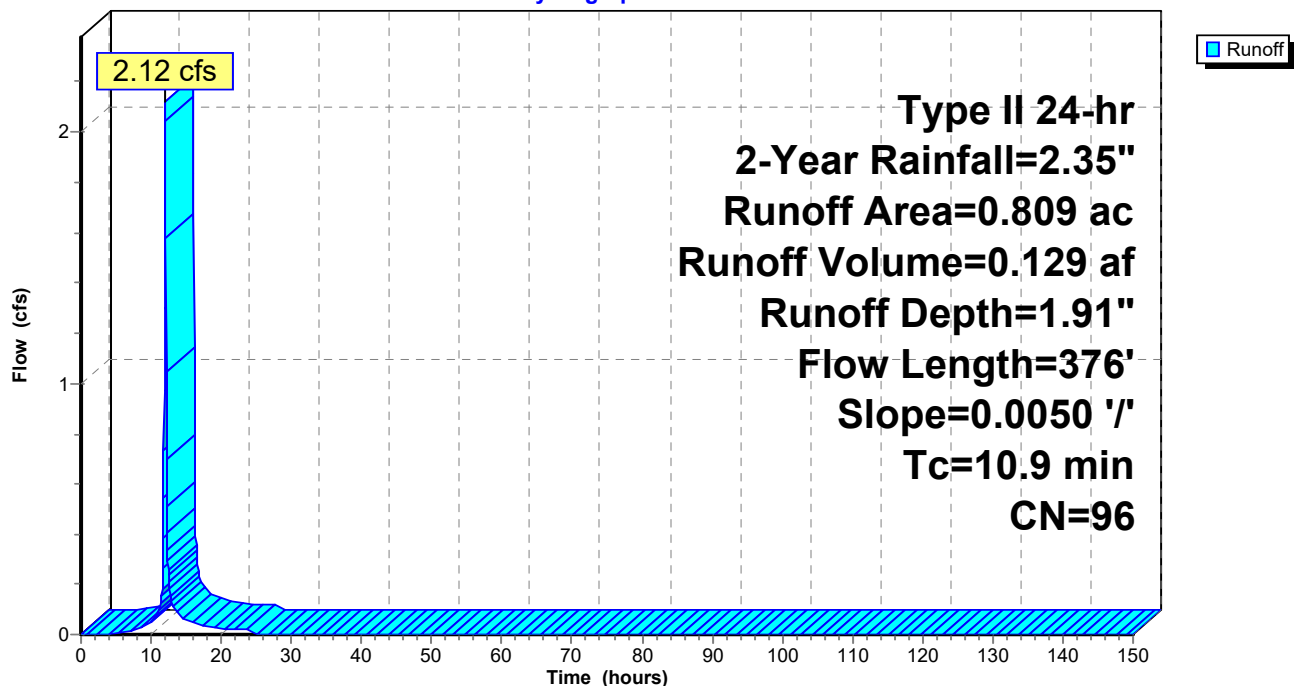
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.35"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 1.91" for 2-Year event
 Inflow = 2.12 cfs @ 12.02 hrs, Volume= 0.129 af
 Outflow = 2.05 cfs @ 12.06 hrs, Volume= 0.129 af, Atten= 3%, Lag= 2.2 min
 Primary = 2.05 cfs @ 12.06 hrs, Volume= 0.129 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.21' @ 12.06 hrs Surf.Area= 1,398 sf Storage= 1,787 cf

Plug-Flow detention time= 489.9 min calculated for 0.129 af (100% of inflow)
 Center-of-Mass det. time= 490.5 min (1,275.0 - 784.5)

Volume	Invert	Avail.Storage	Storage Description	
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

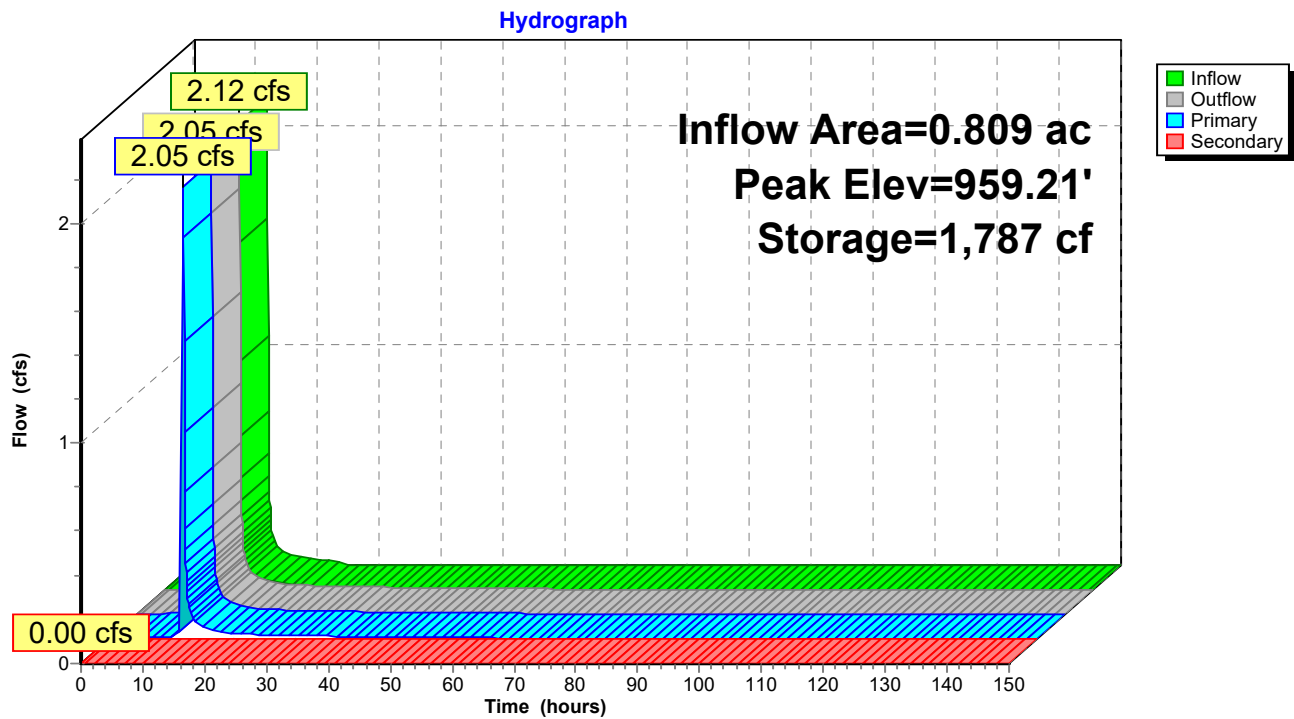
Primary OutFlow Max=2.02 cfs @ 12.06 hrs HW=959.21' (Free Discharge)

↑ **1=Culvert** (Passes 2.02 cfs of 8.20 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 2.00 cfs @ 1.50 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 5-Year Rainfall=2.84"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=2.39"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=2.62 cfs 0.161 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.25' Storage=1,835 cf Inflow=2.62 cfs 0.161 af

Primary=2.55 cfs 0.161 af Secondary=0.00 cfs 0.000 af Outflow=2.55 cfs 0.161 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.161 af Average Runoff Depth = 2.39"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 2.62 cfs @ 12.02 hrs, Volume= 0.161 af, Depth= 2.39"

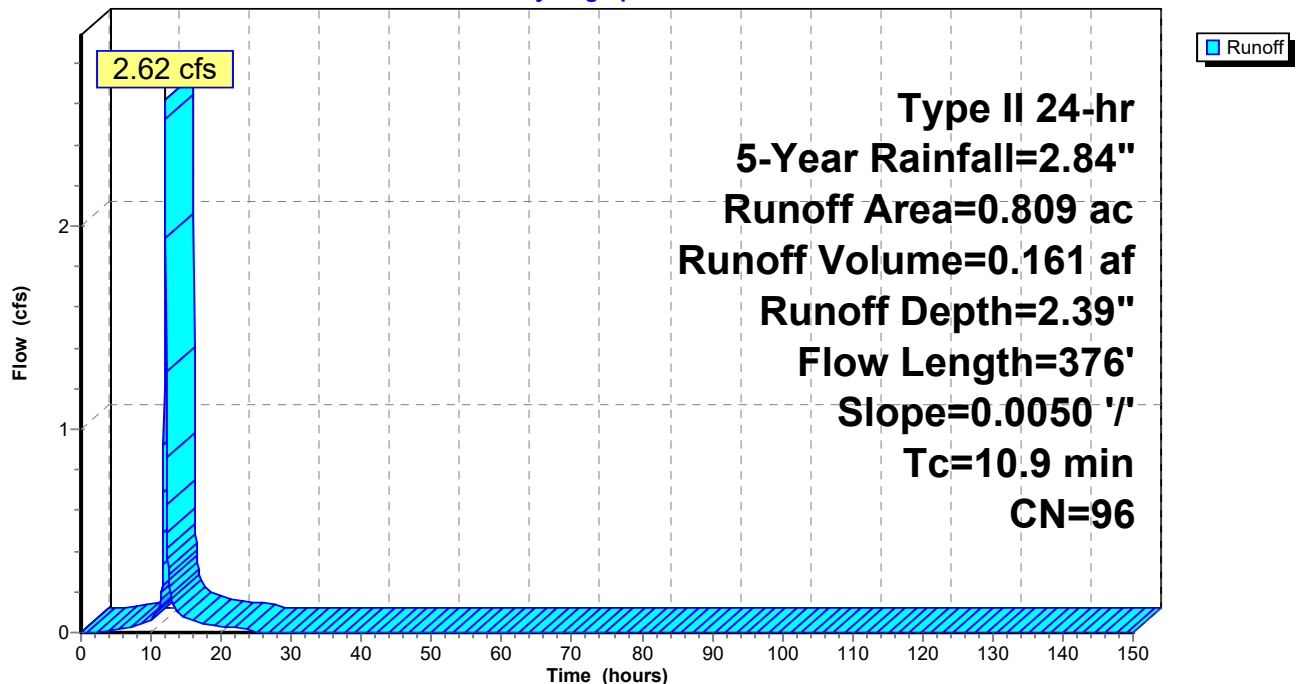
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=2.84"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 2.39" for 5-Year event
 Inflow = 2.62 cfs @ 12.02 hrs, Volume= 0.161 af
 Outflow = 2.55 cfs @ 12.04 hrs, Volume= 0.161 af, Atten= 3%, Lag= 1.6 min
 Primary = 2.55 cfs @ 12.04 hrs, Volume= 0.161 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.25' @ 12.04 hrs Surf.Area= 1,416 sf Storage= 1,835 cf

Plug-Flow detention time= 399.0 min calculated for 0.161 af (100% of inflow)
 Center-of-Mass det. time= 399.7 min (1,178.3 - 778.6)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

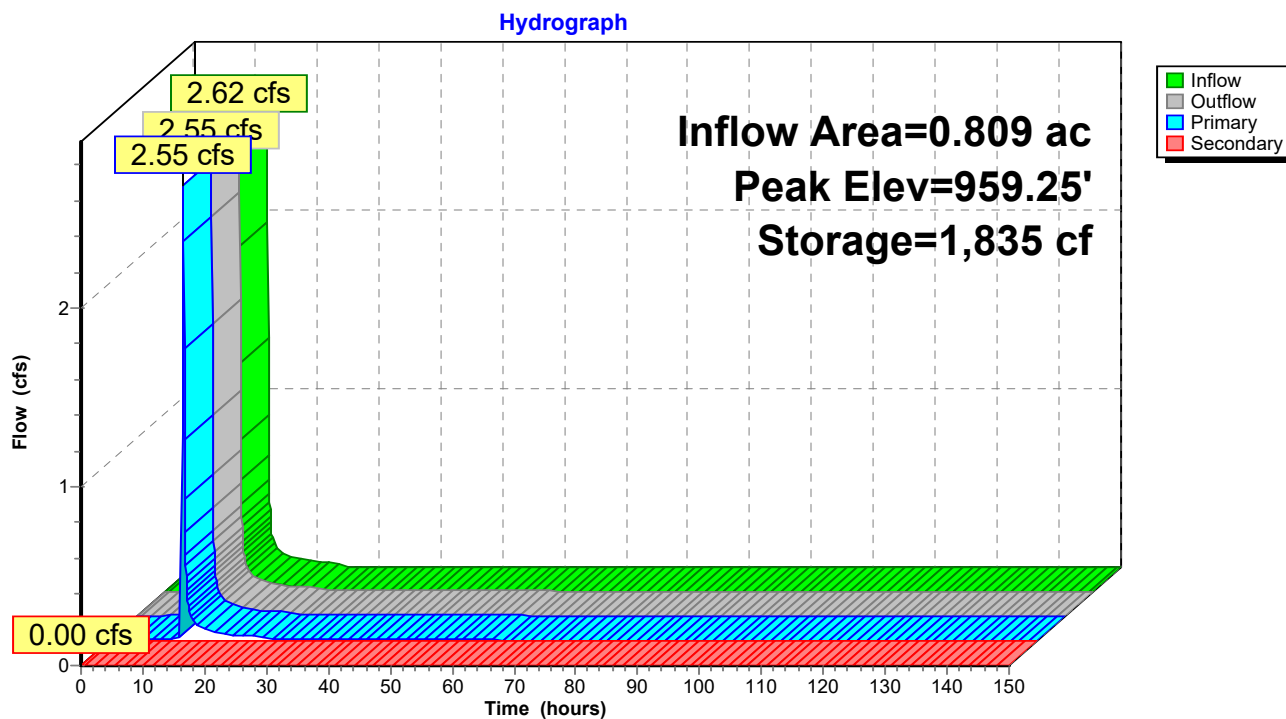
Primary OutFlow Max=2.52 cfs @ 12.04 hrs HW=959.25' (Free Discharge)

↑ **1=Culvert** (Passes 2.52 cfs of 8.24 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 2.51 cfs @ 1.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 10-Year Rainfall=3.27"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=2.82"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=3.05 cfs 0.190 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.27' Storage=1,874 cf Inflow=3.05 cfs 0.190 af

Primary=2.98 cfs 0.190 af Secondary=0.00 cfs 0.000 af Outflow=2.98 cfs 0.190 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.190 af Average Runoff Depth = 2.82"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 3.05 cfs @ 12.02 hrs, Volume= 0.190 af, Depth= 2.82"

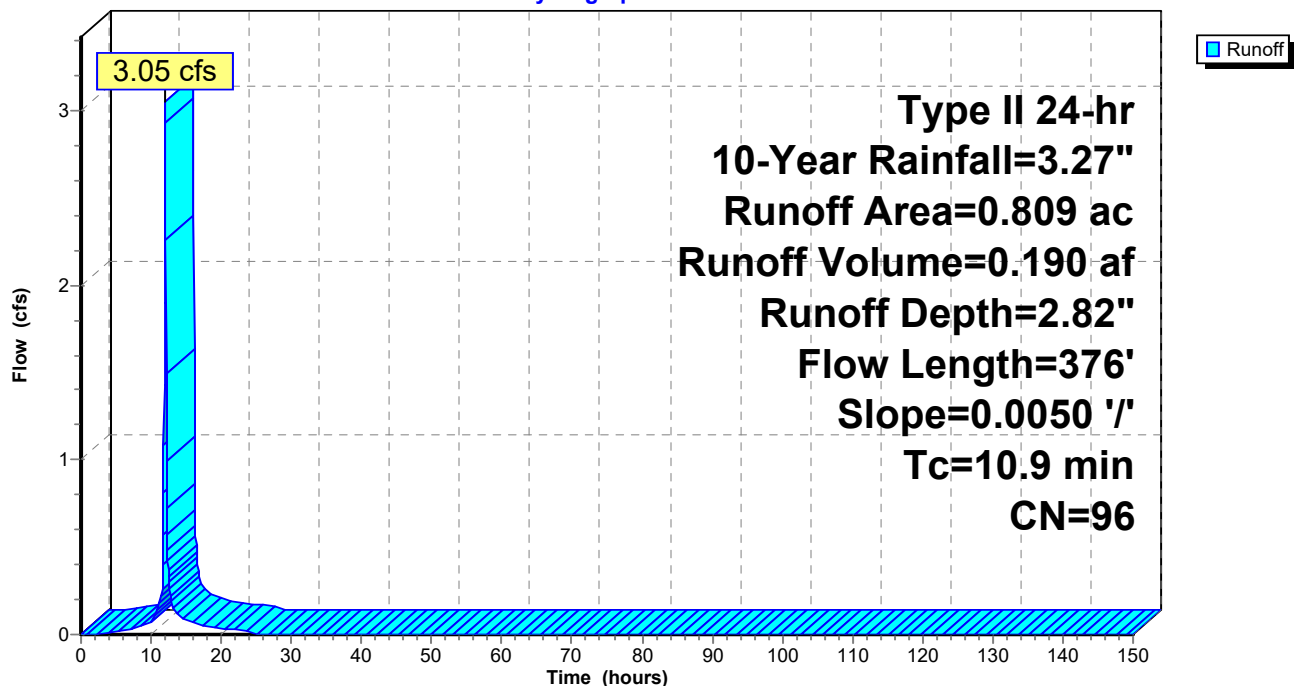
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.27"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 2.82" for 10-Year event
 Inflow = 3.05 cfs @ 12.02 hrs, Volume= 0.190 af
 Outflow = 2.98 cfs @ 12.04 hrs, Volume= 0.190 af, Atten= 2%, Lag= 1.5 min
 Primary = 2.98 cfs @ 12.04 hrs, Volume= 0.190 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.27' @ 12.04 hrs Surf.Area= 1,429 sf Storage= 1,874 cf

Plug-Flow detention time= 344.9 min calculated for 0.190 af (100% of inflow)
 Center-of-Mass det. time= 345.6 min (1,120.0 - 774.5)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

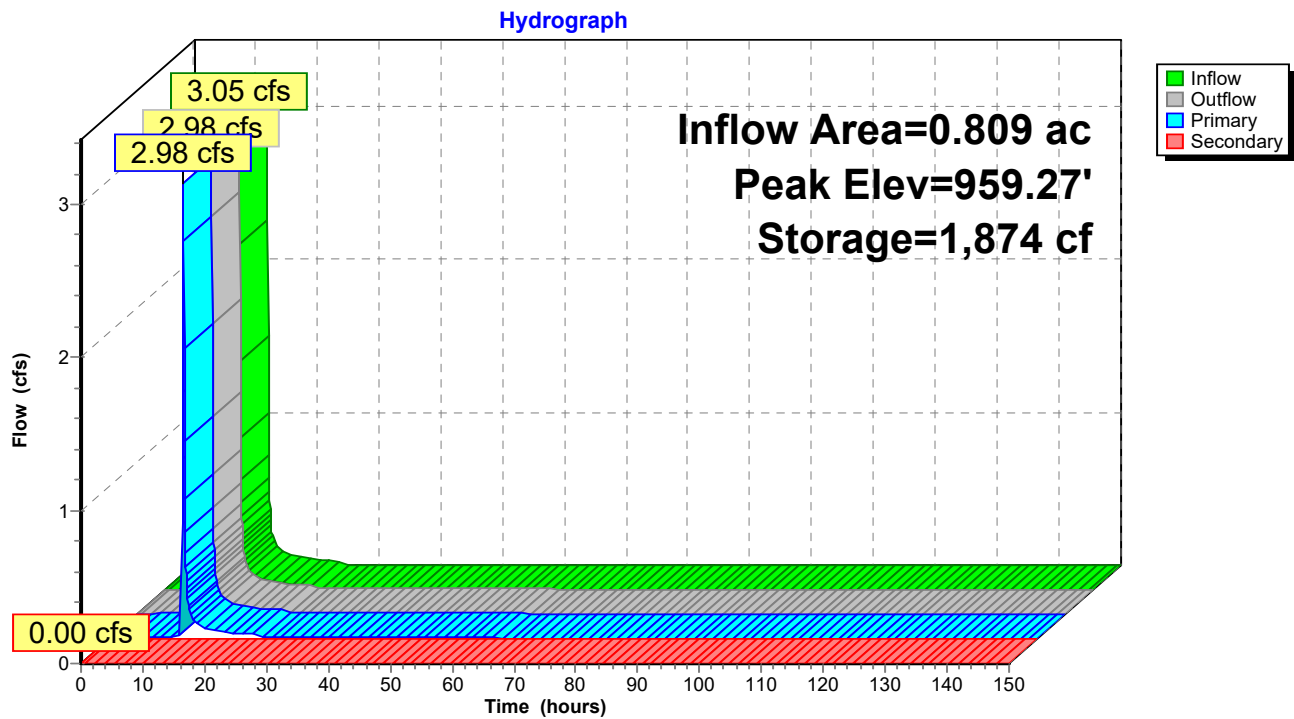
Primary OutFlow Max=2.94 cfs @ 12.04 hrs HW=959.27' (Free Discharge)

↑ **1=Culvert** (Passes 2.94 cfs of 8.28 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 2.92 cfs @ 1.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 25-Year Rainfall=3.94"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=3.48"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=3.72 cfs 0.235 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.31' Storage=1,931 cf Inflow=3.72 cfs 0.235 af

Primary=3.64 cfs 0.235 af Secondary=0.00 cfs 0.000 af Outflow=3.64 cfs 0.235 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.235 af Average Runoff Depth = 3.48"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 3.72 cfs @ 12.02 hrs, Volume= 0.235 af, Depth= 3.48"

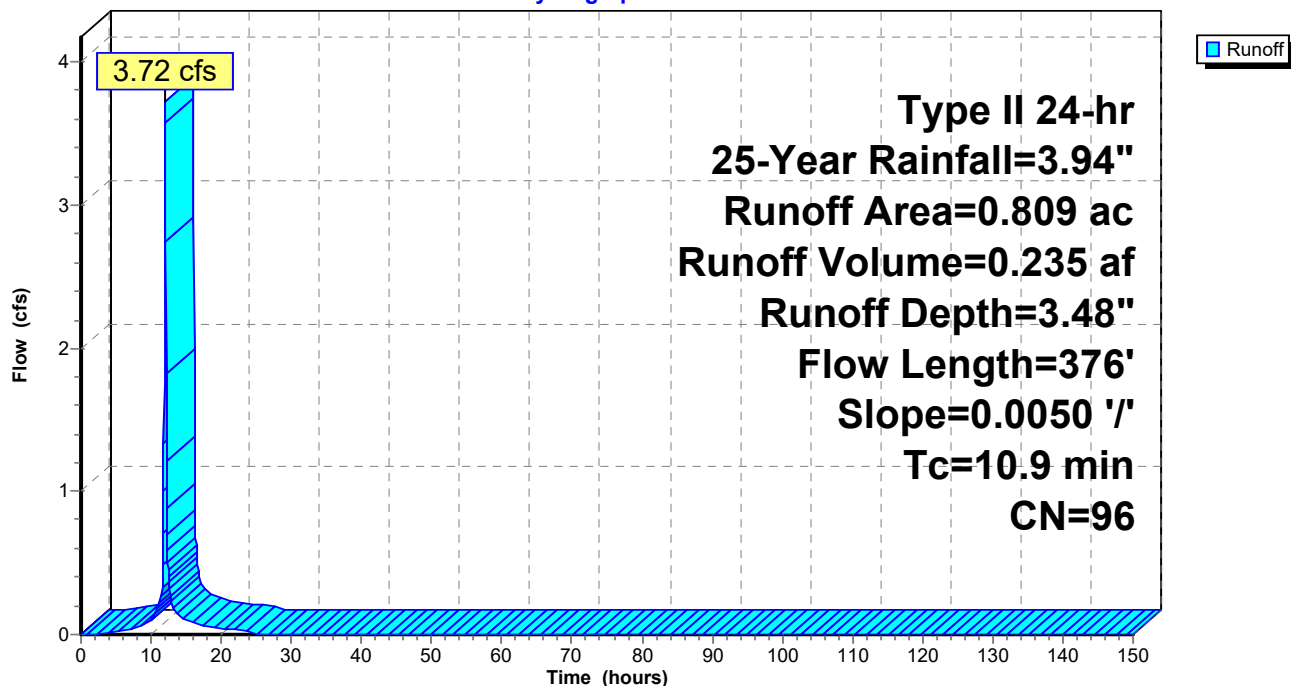
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=3.94"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 3.48" for 25-Year event
 Inflow = 3.72 cfs @ 12.02 hrs, Volume= 0.235 af
 Outflow = 3.64 cfs @ 12.04 hrs, Volume= 0.235 af, Atten= 2%, Lag= 1.5 min
 Primary = 3.64 cfs @ 12.04 hrs, Volume= 0.235 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.31' @ 12.04 hrs Surf.Area= 1,450 sf Storage= 1,931 cf

Plug-Flow detention time= 286.8 min calculated for 0.235 af (100% of inflow)
 Center-of-Mass det. time= 287.5 min (1,056.8 - 769.3)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

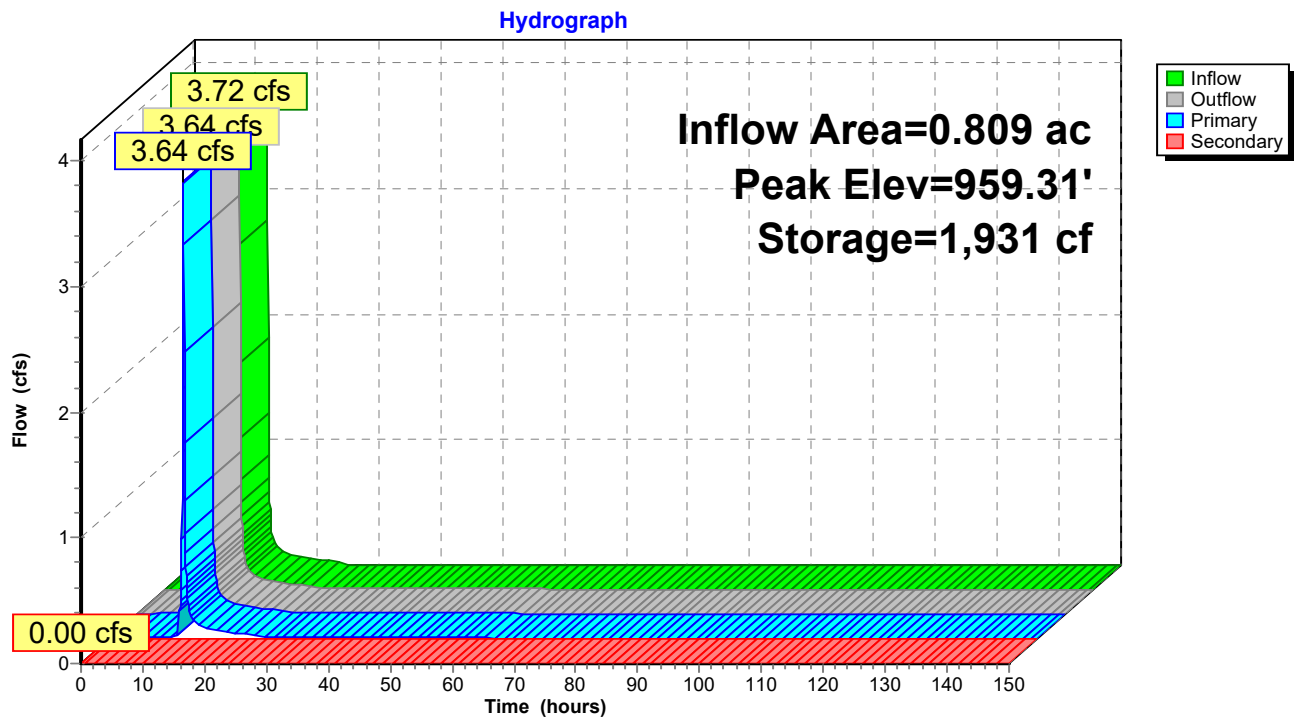
Primary OutFlow Max=3.59 cfs @ 12.04 hrs HW=959.31' (Free Discharge)

↑ **1=Culvert** (Passes 3.59 cfs of 8.33 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 3.57 cfs @ 1.83 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 50-Year Rainfall=4.54"*

Prepared by Hewlett-Packard Company

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=4.08"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=4.32 cfs 0.275 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.35' Storage=1,980 cf Inflow=4.32 cfs 0.275 af

Primary=4.24 cfs 0.275 af Secondary=0.00 cfs 0.000 af Outflow=4.24 cfs 0.275 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.275 af Average Runoff Depth = 4.08"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 4.32 cfs @ 12.02 hrs, Volume= 0.275 af, Depth= 4.08"

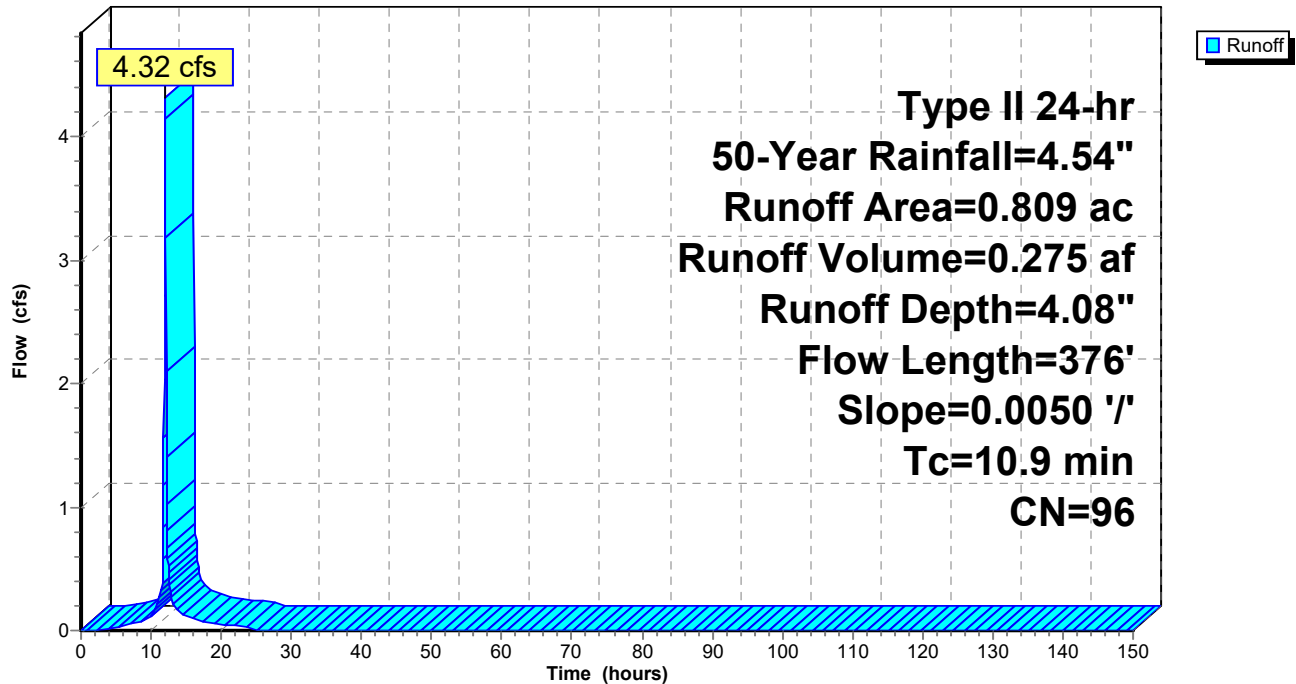
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.54"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 4.08" for 50-Year event
 Inflow = 4.32 cfs @ 12.02 hrs, Volume= 0.275 af
 Outflow = 4.24 cfs @ 12.04 hrs, Volume= 0.275 af, Atten= 2%, Lag= 1.4 min
 Primary = 4.24 cfs @ 12.04 hrs, Volume= 0.275 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.35' @ 12.04 hrs Surf.Area= 1,467 sf Storage= 1,980 cf

Plug-Flow detention time= 250.4 min calculated for 0.275 af (100% of inflow)
 Center-of-Mass det. time= 251.1 min (1,016.7 - 765.6)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

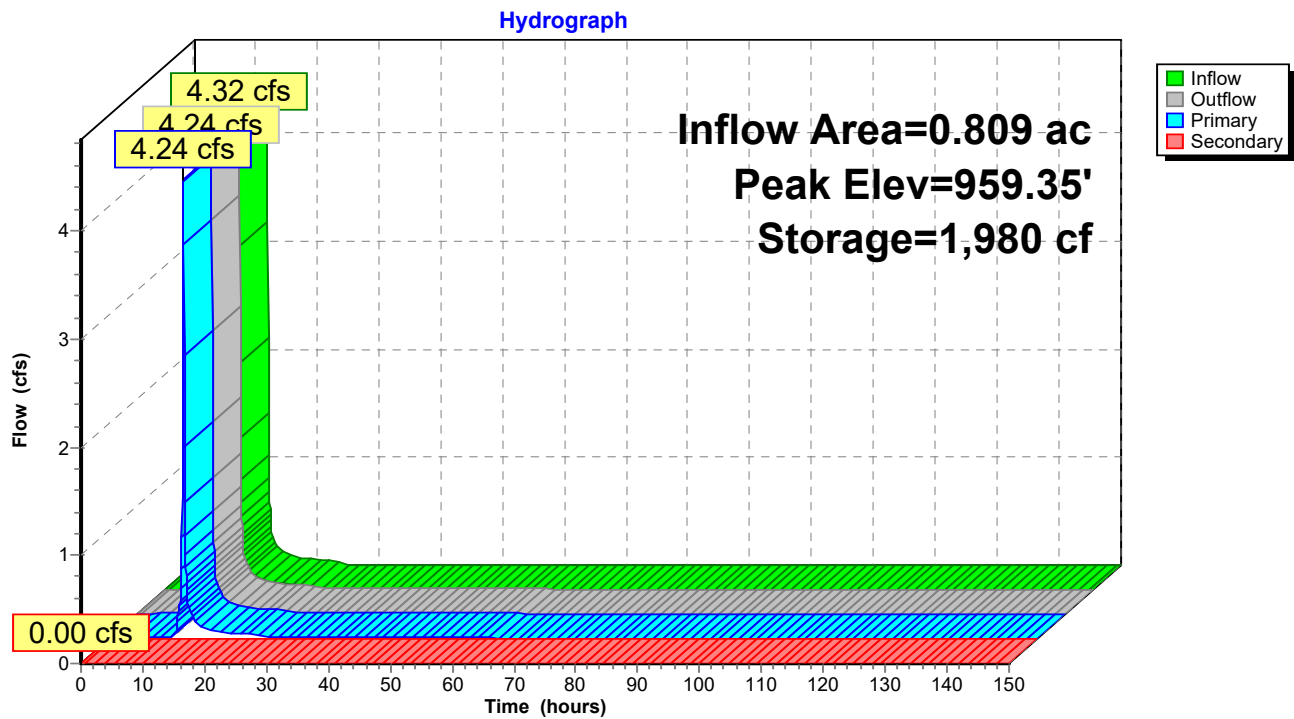
Primary OutFlow Max=4.17 cfs @ 12.04 hrs HW=959.34' (Free Discharge)

↑ **1=Culvert** (Passes 4.17 cfs of 8.37 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 4.15 cfs @ 1.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr 100-Year Rainfall=5.24"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=4.77"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=5.02 cfs 0.322 af

Pond 36P: Bioretention 5-29-20

Peak Elev=959.38' Storage=2,034 cf Inflow=5.02 cfs 0.322 af

Primary=4.93 cfs 0.322 af Secondary=0.00 cfs 0.000 af Outflow=4.93 cfs 0.322 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.322 af Average Runoff Depth = 4.77"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 5.02 cfs @ 12.02 hrs, Volume= 0.322 af, Depth= 4.77"

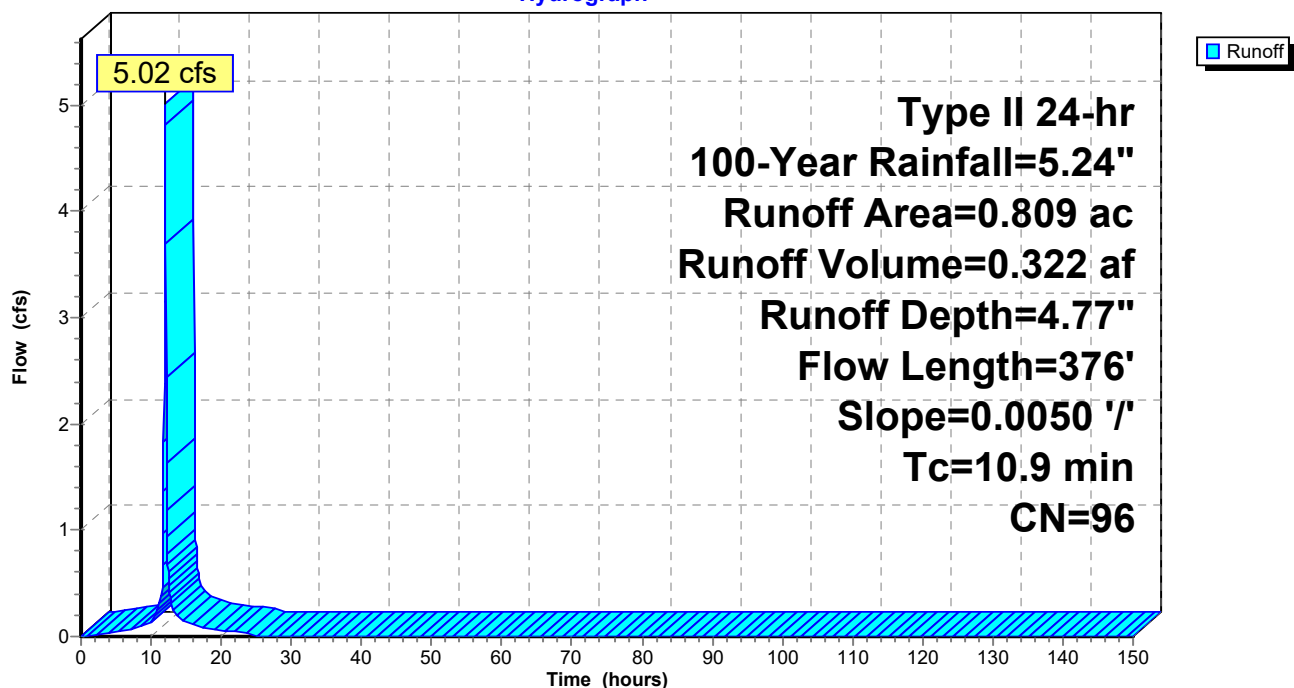
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.24"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 4.77" for 100-Year event
 Inflow = 5.02 cfs @ 12.02 hrs, Volume= 0.322 af
 Outflow = 4.93 cfs @ 12.04 hrs, Volume= 0.322 af, Atten= 2%, Lag= 1.4 min
 Primary = 4.93 cfs @ 12.04 hrs, Volume= 0.322 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 959.38' @ 12.04 hrs Surf.Area= 1,486 sf Storage= 2,034 cf

Plug-Flow detention time= 218.9 min calculated for 0.322 af (100% of inflow)
 Center-of-Mass det. time= 219.6 min (981.6 - 762.0)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

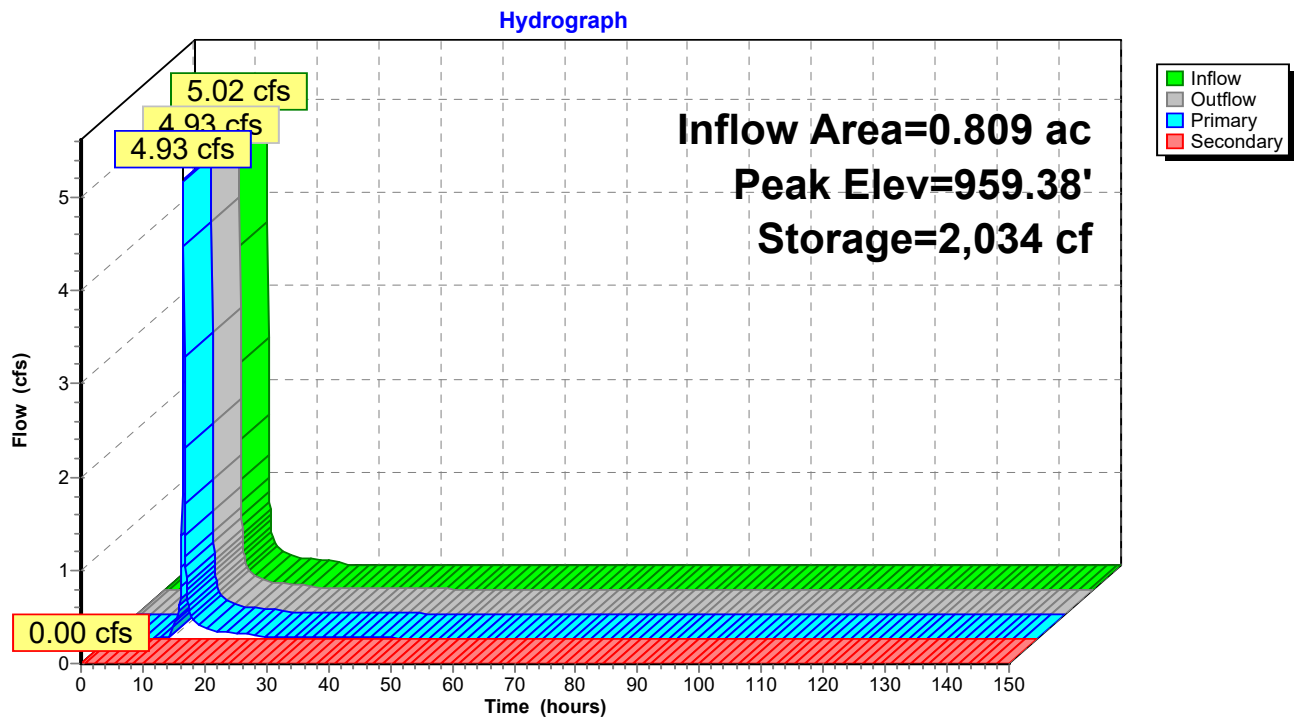
Primary OutFlow Max=4.84 cfs @ 12.04 hrs HW=959.38' (Free Discharge)

↑ **1=Culvert** (Passes 4.84 cfs of 8.42 cfs potential flow)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
 ↑ **3=Orifice/Grate** (Weir Controls 4.83 cfs @ 2.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20



Berlin Designs Updated DAs - 5-29-20*Type II 24-hr WQ Rainfall=1.00"*

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Time span=0.00-150.00 hrs, dt=0.05 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Fire Station WQv

Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=0.63"

Flow Length=376' Slope=0.0050 '/' Tc=10.9 min CN=96 Runoff=0.74 cfs 0.042 af

Pond 36P: Bioretention 5-29-20

Peak Elev=958.79' Storage=1,244 cf Inflow=0.74 cfs 0.042 af

Primary=0.01 cfs 0.042 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.042 af

Total Runoff Area = 0.809 ac Runoff Volume = 0.042 af Average Runoff Depth = 0.63"
100.00% Pervious = 0.809 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 3S: Fire Station WQv

Runoff = 0.74 cfs @ 12.02 hrs, Volume= 0.042 af, Depth= 0.63"

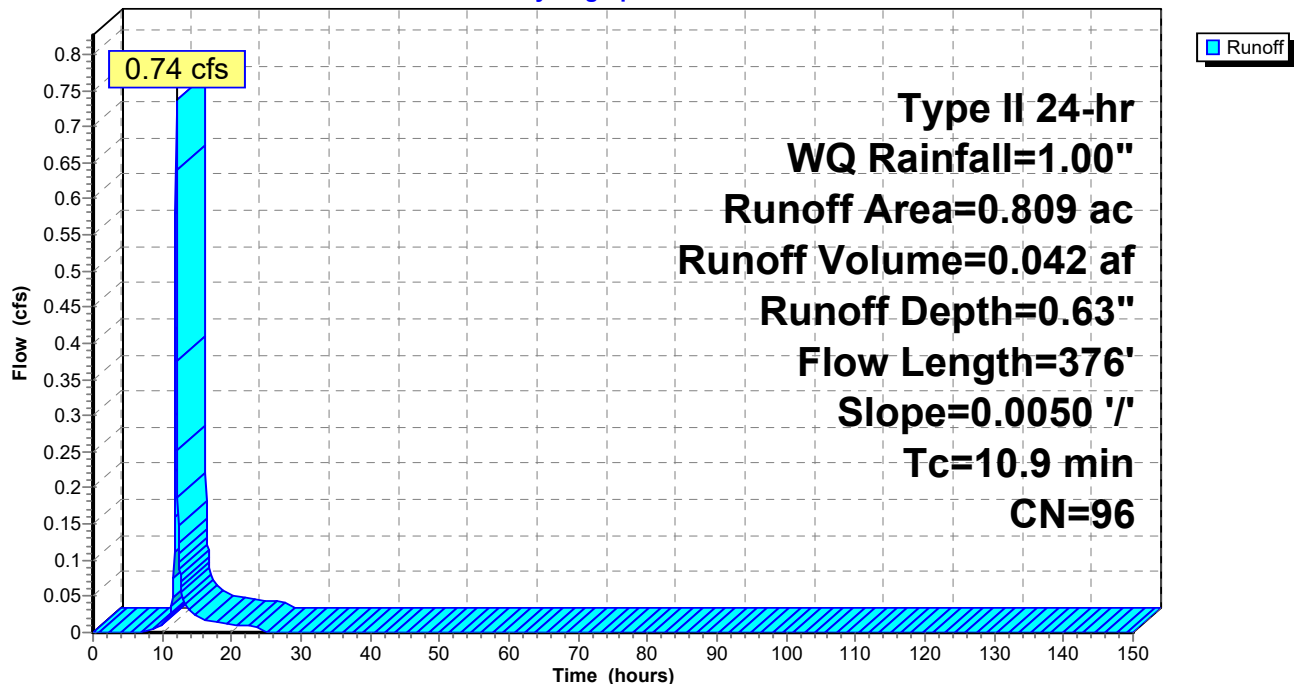
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
Type II 24-hr WQ Rainfall=1.00"

Area (ac)	CN	Description
* 0.809	96	Modified CN
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	376	0.0050	0.57		Lag/CN Method, Contour Length= 176' Interval= 1'

Subcatchment 3S: Fire Station WQv

Hydrograph



Summary for Pond 36P: Bioretention 5-29-20

[92] Warning: Device #4 is above defined storage

Inflow Area = 0.809 ac, 0.00% Impervious, Inflow Depth = 0.63" for WQ event
 Inflow = 0.74 cfs @ 12.02 hrs, Volume= 0.042 af
 Outflow = 0.01 cfs @ 17.81 hrs, Volume= 0.042 af, Atten= 98%, Lag= 347.2 min
 Primary = 0.01 cfs @ 17.81 hrs, Volume= 0.042 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs
 Peak Elev= 958.79' @ 17.81 hrs Surf.Area= 1,183 sf Storage= 1,244 cf

Plug-Flow detention time= 1,024.9 min calculated for 0.042 af (100% of inflow)
 Center-of-Mass det. time= 1,025.3 min (1,840.9 - 815.6)

Volume	Invert	Avail.Storage	Storage Description
#1	956.00'	3,045 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
956.00	778	0.0	0	0
958.00	778	30.0	467	467
960.00	1,800	100.0	2,578	3,045

Device	Routing	Invert	Outlet Devices
#1	Primary	955.50'	15.0" Round Culvert L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 955.50' / 954.00' S= 0.0306 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	956.00'	0.500 in/hr Exfiltration over Surface area
#3	Device 1	959.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	960.00'	5.0' long (Profile 1) Broad-Crested Rectangular Weir Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=0.01 cfs @ 17.81 hrs HW=958.79' (Free Discharge)

↑ **1=Culvert** (Passes 0.01 cfs of 7.62 cfs potential flow)

↑ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 36P: Bioretention 5-29-20

