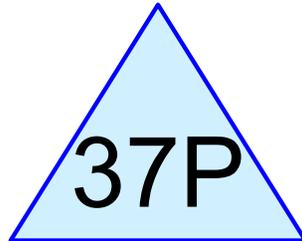
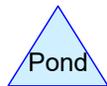
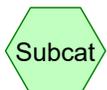


Subcat DA\_School WQv



School Bioretention  
5-29-20



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**Project Notes**

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

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### Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.726	94	(4S)
<b>2.726</b>	<b>94</b>	<b>TOTAL AREA</b>

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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	
2.726	Other	4S
<b>2.726</b>		<b>TOTAL AREA</b>

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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	2.726	2.726		4S
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2.726</b>	<b>2.726</b>	<b>TOTAL AREA</b>	

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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	37P	959.50	955.70	72.0	0.0528	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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=1.42"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=3.06 cfs 0.321 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.23' Storage=5,319 cf Inflow=3.06 cfs 0.321 af  
Primary=2.34 cfs 0.296 af Secondary=0.00 cfs 0.000 af Outflow=2.34 cfs 0.296 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.321 af Average Runoff Depth = 1.42"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 3.06 cfs @ 12.28 hrs, Volume= 0.321 af, Depth= 1.42"

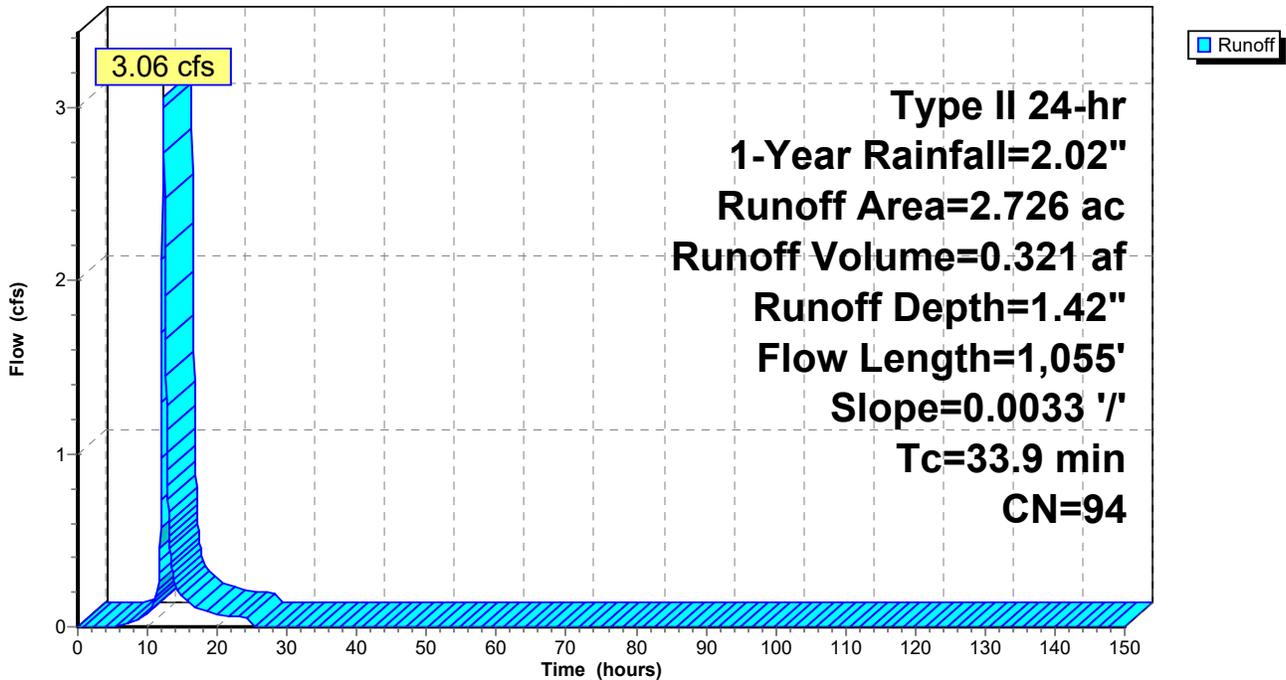
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 1-Year Rainfall=2.02"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 1.42" for 1-Year event  
 Inflow = 3.06 cfs @ 12.28 hrs, Volume= 0.321 af  
 Outflow = 2.34 cfs @ 12.48 hrs, Volume= 0.296 af, Atten= 24%, Lag= 11.8 min  
 Primary = 2.34 cfs @ 12.48 hrs, Volume= 0.296 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= 961.23' @ 12.48 hrs Surf.Area= 3,564 sf Storage= 5,319 cf

Plug-Flow detention time= 468.0 min calculated for 0.296 af (92% of inflow)  
 Center-of-Mass det. time= 424.3 min ( 1,250.4 - 826.1 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=2.32 cfs @ 12.48 hrs HW=961.23' (Free Discharge)

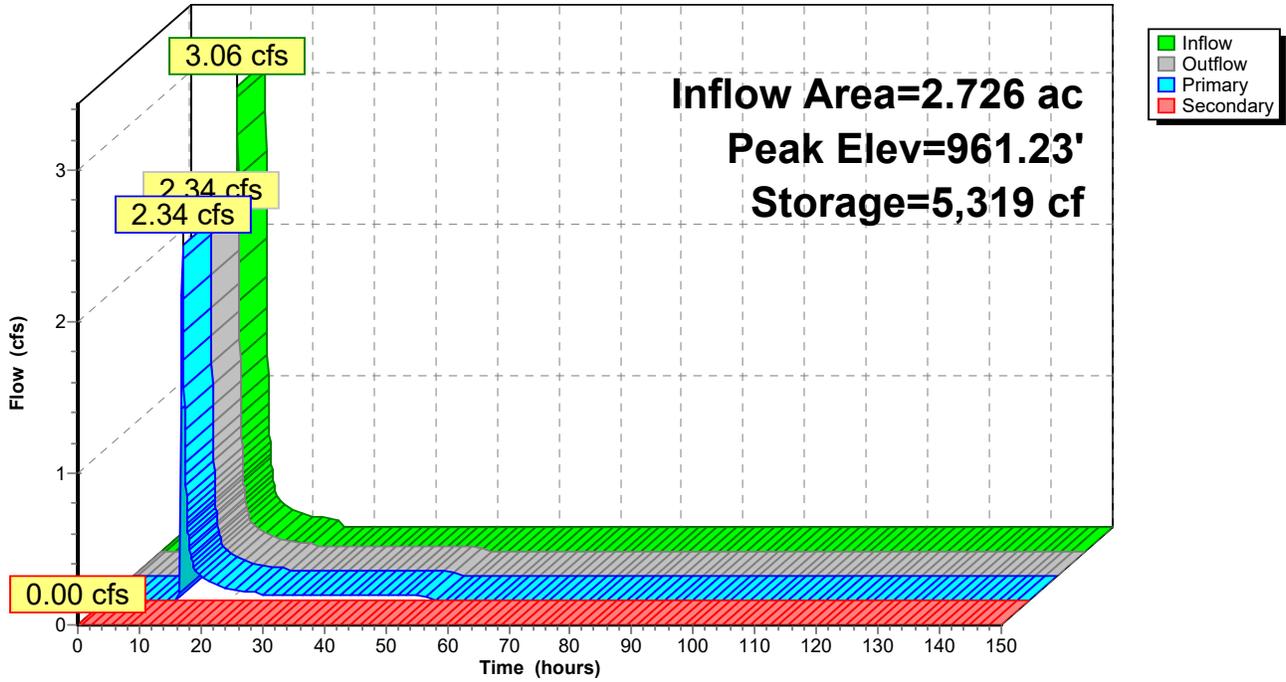
- ↑ 1=Culvert (Passes 2.32 cfs of 4.90 cfs potential flow)
- ↑ 2=Exfiltration (Exfiltration Controls 0.04 cfs)
- ↑ 3=Orifice/Grate (Weir Controls 2.27 cfs @ 1.57 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=958.00' (Free Discharge)

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

Pond 37P: School Bioretention 5-29-20

Hydrograph



**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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=1.73"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=3.72 cfs 0.392 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.29' Storage=5,552 cf Inflow=3.72 cfs 0.392 af  
Primary=3.31 cfs 0.366 af Secondary=0.00 cfs 0.000 af Outflow=3.31 cfs 0.366 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.392 af Average Runoff Depth = 1.73"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 3.72 cfs @ 12.28 hrs, Volume= 0.392 af, Depth= 1.73"

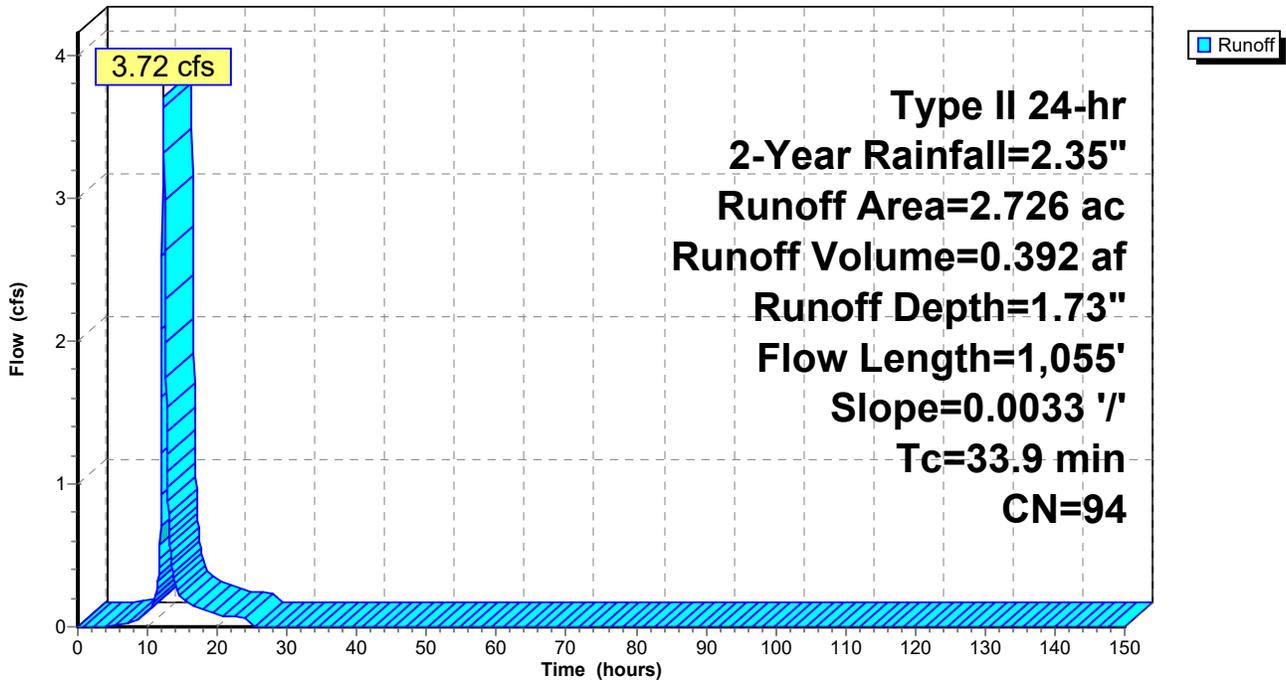
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-Year Rainfall=2.35"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 1.73" for 2-Year event  
 Inflow = 3.72 cfs @ 12.28 hrs, Volume= 0.392 af  
 Outflow = 3.31 cfs @ 12.41 hrs, Volume= 0.366 af, Atten= 11%, Lag= 7.7 min  
 Primary = 3.31 cfs @ 12.41 hrs, Volume= 0.366 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= 961.29' @ 12.41 hrs Surf.Area= 3,620 sf Storage= 5,552 cf

Plug-Flow detention time= 386.6 min calculated for 0.366 af (93% of inflow)  
 Center-of-Mass det. time= 349.3 min ( 1,169.7 - 820.5 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=3.28 cfs @ 12.41 hrs HW=961.29' (Free Discharge)

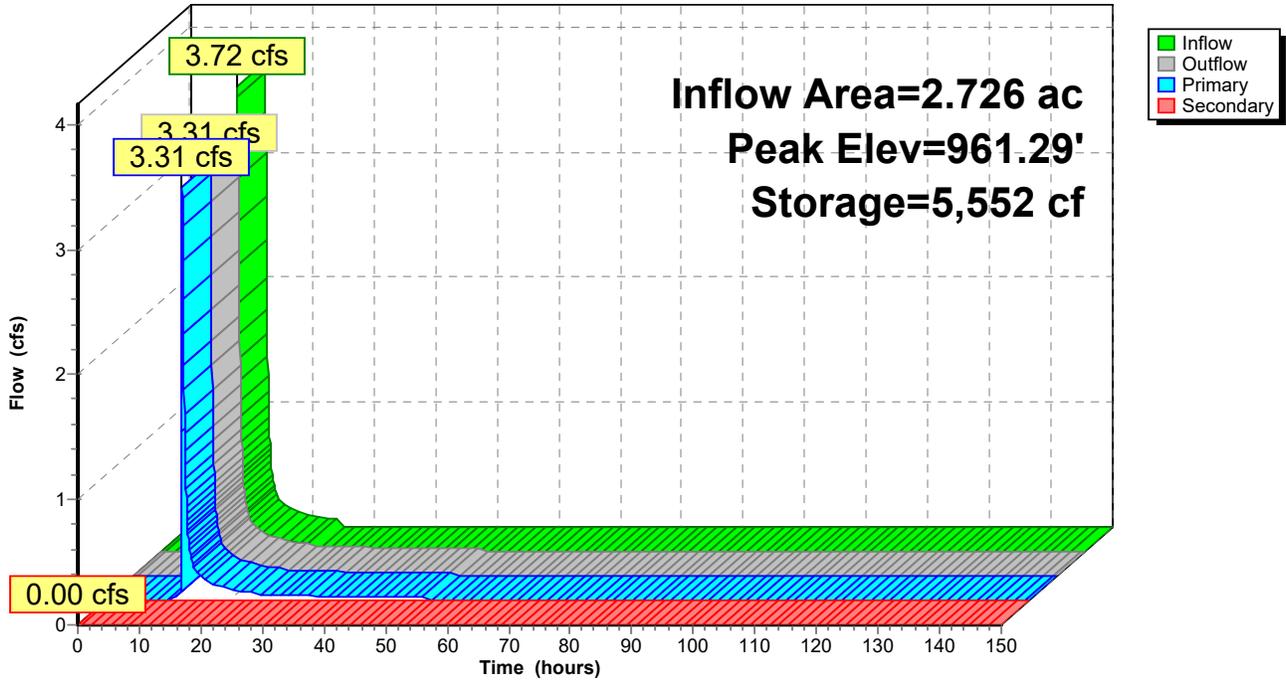
- ↑ 1=Culvert (Passes 3.28 cfs of 5.04 cfs potential flow)
- ↑ 2=Exfiltration (Exfiltration Controls 0.04 cfs)
- ↑ 3=Orifice/Grate (Weir Controls 3.24 cfs @ 1.77 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=958.00' (Free Discharge)

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

Pond 37P: School Bioretention 5-29-20

Hydrograph



**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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=2.20"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=4.69 cfs 0.499 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.36' Storage=5,806 cf Inflow=4.69 cfs 0.499 af  
Primary=4.48 cfs 0.473 af Secondary=0.00 cfs 0.000 af Outflow=4.48 cfs 0.473 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.499 af Average Runoff Depth = 2.20"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 4.69 cfs @ 12.28 hrs, Volume= 0.499 af, Depth= 2.20"

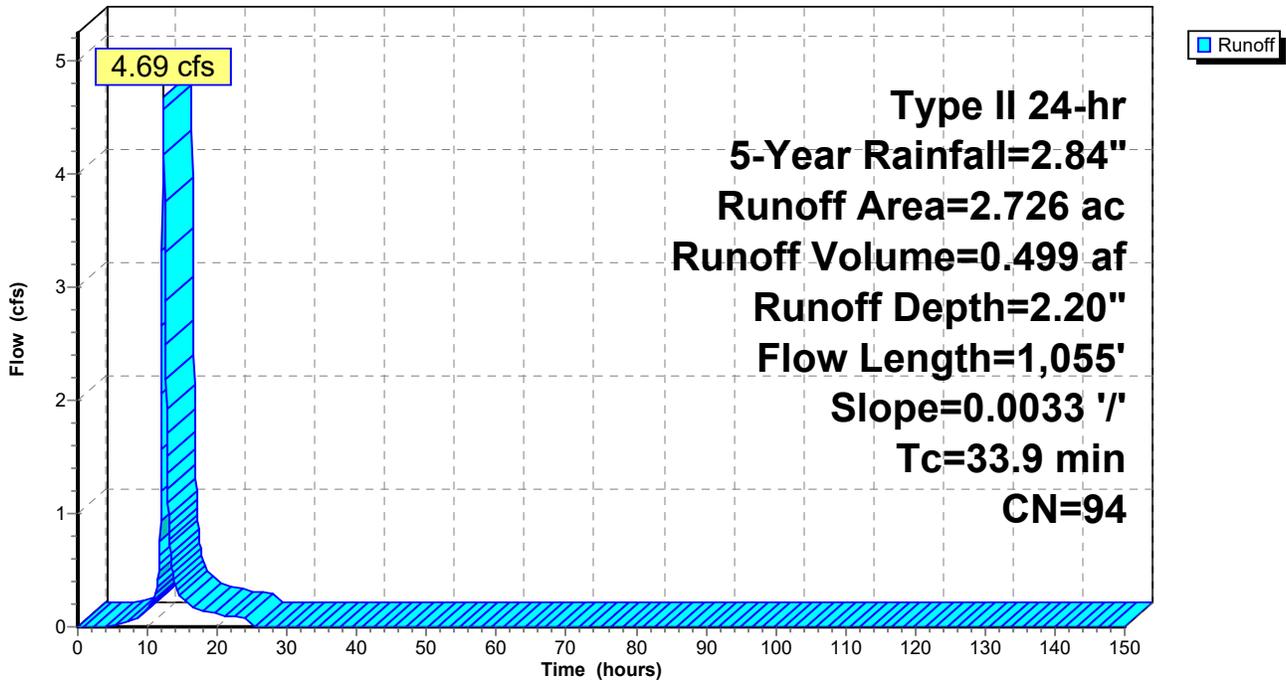
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 5-Year Rainfall=2.84"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 2.20" for 5-Year event  
 Inflow = 4.69 cfs @ 12.28 hrs, Volume= 0.499 af  
 Outflow = 4.48 cfs @ 12.36 hrs, Volume= 0.473 af, Atten= 4%, Lag= 4.6 min  
 Primary = 4.48 cfs @ 12.36 hrs, Volume= 0.473 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= 961.36' @ 12.36 hrs Surf.Area= 3,680 sf Storage= 5,806 cf

Plug-Flow detention time= 308.1 min calculated for 0.473 af (95% of inflow)  
 Center-of-Mass det. time= 278.7 min ( 1,092.4 - 813.8 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=4.47 cfs @ 12.36 hrs HW=961.36' (Free Discharge)

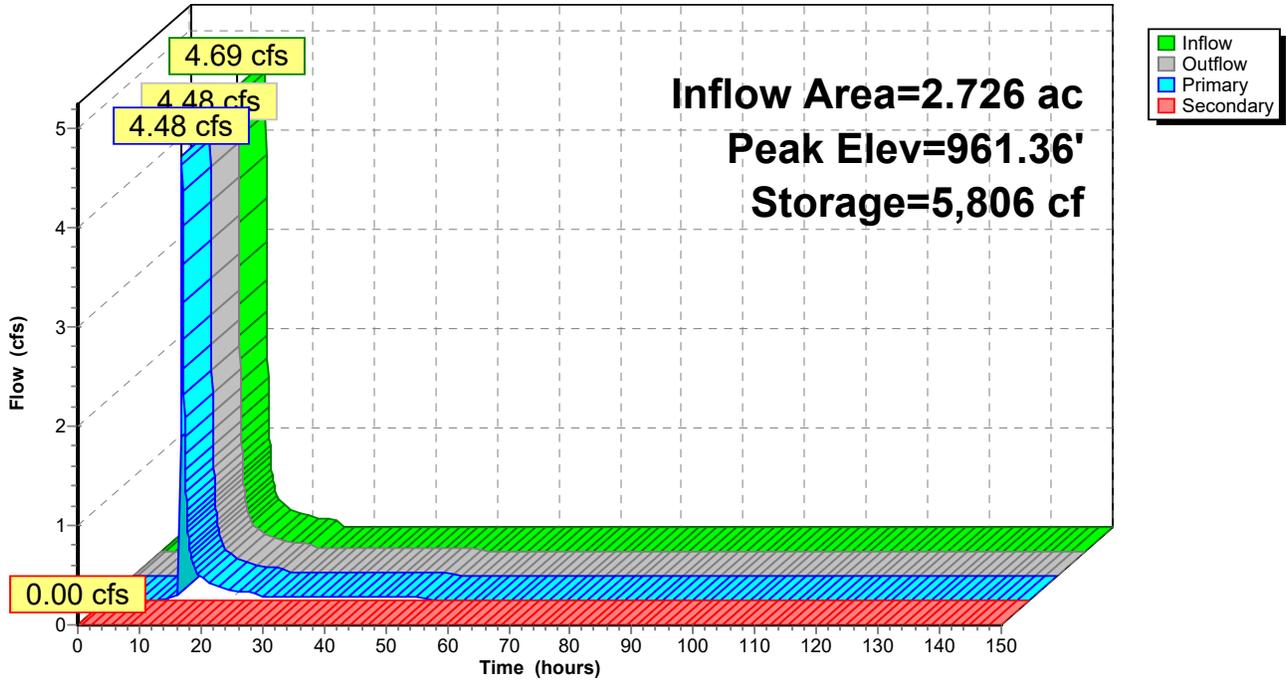
- ↑ 1=Culvert (Passes 4.47 cfs of 5.18 cfs potential flow)
- ↑ 2=Exfiltration (Exfiltration Controls 0.04 cfs)
- ↑ 3=Orifice/Grate (Weir Controls 4.42 cfs @ 1.96 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=958.00' (Free Discharge)

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

Pond 37P: School Bioretention 5-29-20

Hydrograph



**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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=2.61"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=5.54 cfs 0.593 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.41' Storage=5,999 cf Inflow=5.54 cfs 0.593 af  
Primary=5.27 cfs 0.567 af Secondary=0.00 cfs 0.000 af Outflow=5.27 cfs 0.567 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.593 af Average Runoff Depth = 2.61"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 5.54 cfs @ 12.28 hrs, Volume= 0.593 af, Depth= 2.61"

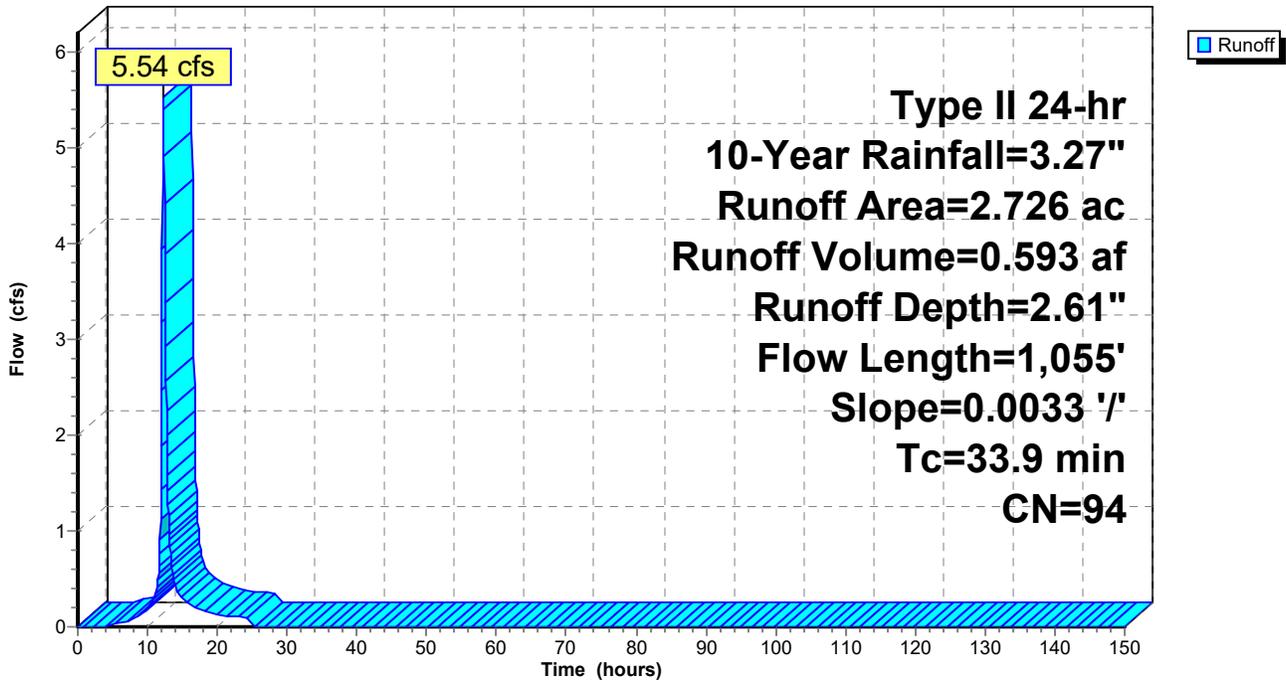
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 10-Year Rainfall=3.27"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 2.61" for 10-Year event  
 Inflow = 5.54 cfs @ 12.28 hrs, Volume= 0.593 af  
 Outflow = 5.27 cfs @ 12.35 hrs, Volume= 0.567 af, Atten= 5%, Lag= 4.3 min  
 Primary = 5.27 cfs @ 12.35 hrs, Volume= 0.567 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= 961.41' @ 12.35 hrs Surf.Area= 3,726 sf Storage= 5,999 cf

Plug-Flow detention time= 263.7 min calculated for 0.567 af (96% of inflow)  
 Center-of-Mass det. time= 238.4 min ( 1,047.3 - 809.0 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=5.29 cfs @ 12.35 hrs HW=961.41' (Free Discharge)

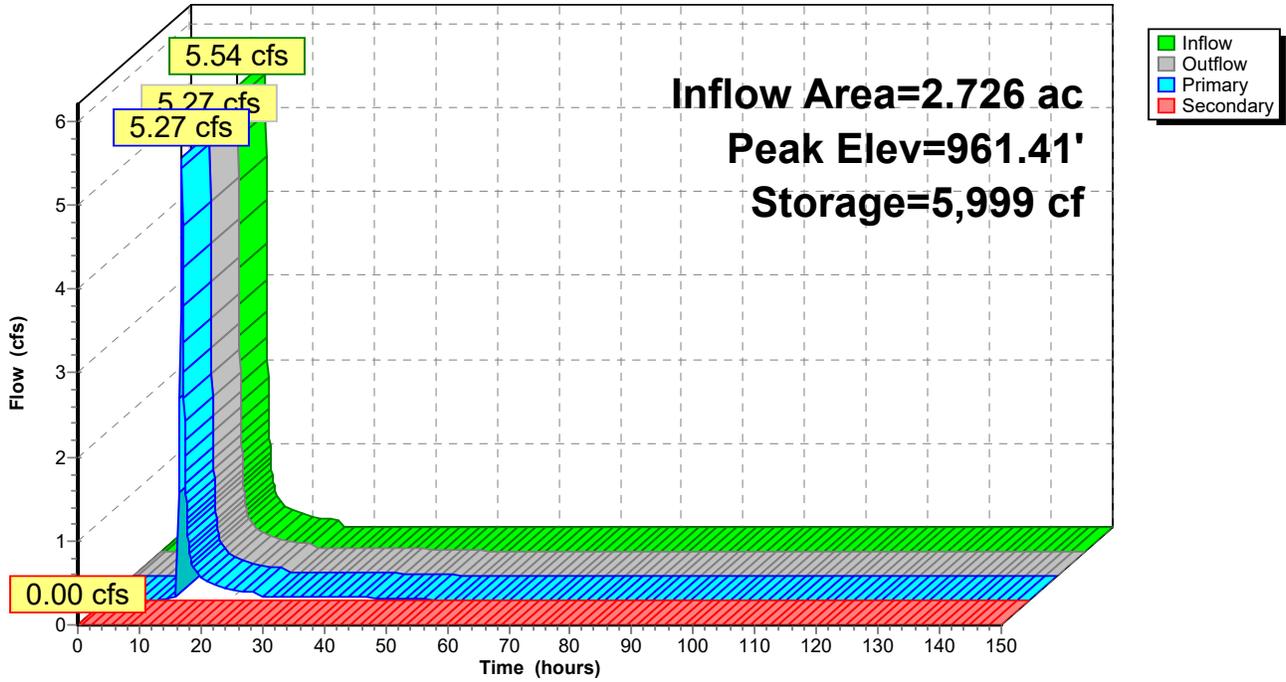
- ↑ 1=Culvert (Inlet Controls 5.29 cfs @ 4.31 fps)
- ↑ 2=Exfiltration (Passes < 0.04 cfs potential flow)
- ↑ 3=Orifice/Grate (Passes < 5.40 cfs potential flow)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=958.00' (Free Discharge)

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

Pond 37P: School Bioretention 5-29-20

Hydrograph



**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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=3.27"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=6.85 cfs 0.742 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.60' Storage=6,702 cf Inflow=6.85 cfs 0.742 af  
Primary=5.66 cfs 0.710 af Secondary=0.43 cfs 0.006 af Outflow=6.09 cfs 0.716 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.742 af Average Runoff Depth = 3.27"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 6.85 cfs @ 12.28 hrs, Volume= 0.742 af, Depth= 3.27"

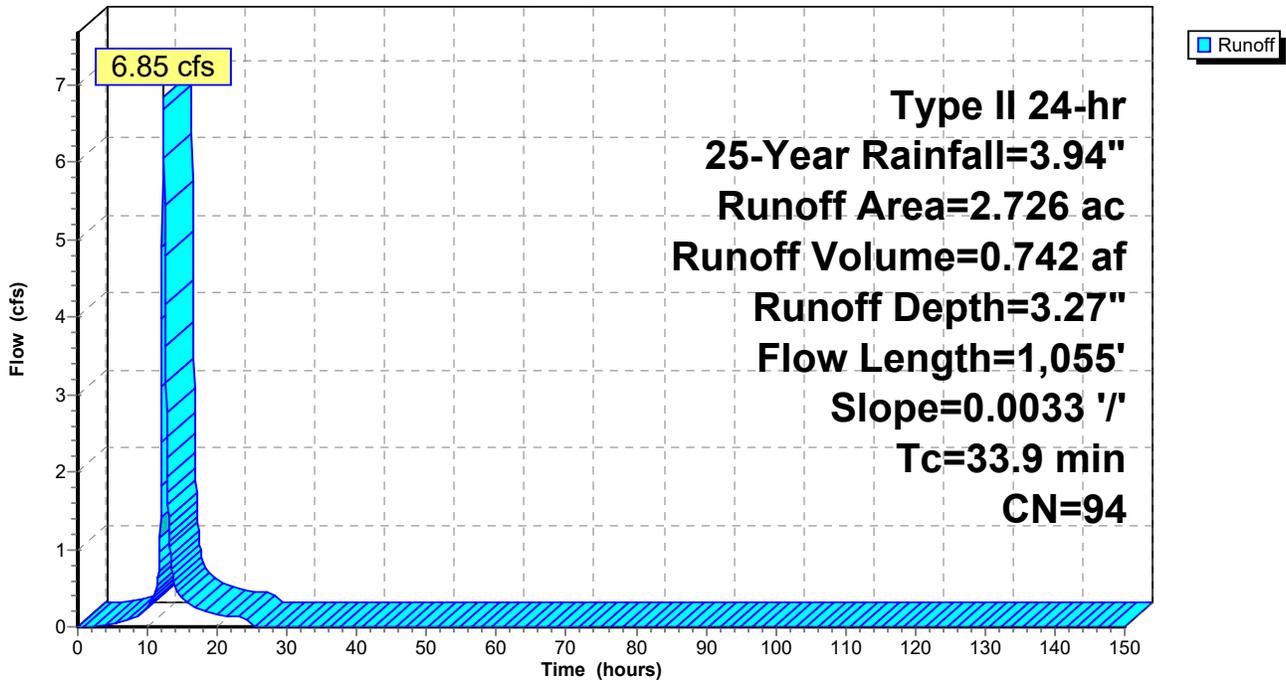
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25-Year Rainfall=3.94"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 3.27" for 25-Year event  
 Inflow = 6.85 cfs @ 12.28 hrs, Volume= 0.742 af  
 Outflow = 6.09 cfs @ 12.40 hrs, Volume= 0.716 af, Atten= 11%, Lag= 7.4 min  
 Primary = 5.66 cfs @ 12.40 hrs, Volume= 0.710 af  
 Secondary = 0.43 cfs @ 12.40 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Peak Elev= 961.60' @ 12.40 hrs Surf.Area= 3,893 sf Storage= 6,702 cf

Plug-Flow detention time= 217.6 min calculated for 0.716 af (96% of inflow)  
 Center-of-Mass det. time= 196.9 min ( 999.9 - 803.0 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
	Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)
	958.00	2,508	0.0	0
	960.00	2,508	30.0	1,505
	961.00	3,355	100.0	2,932
	962.00	4,258	100.0	3,807

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=5.66 cfs @ 12.40 hrs HW=961.60' (Free Discharge)

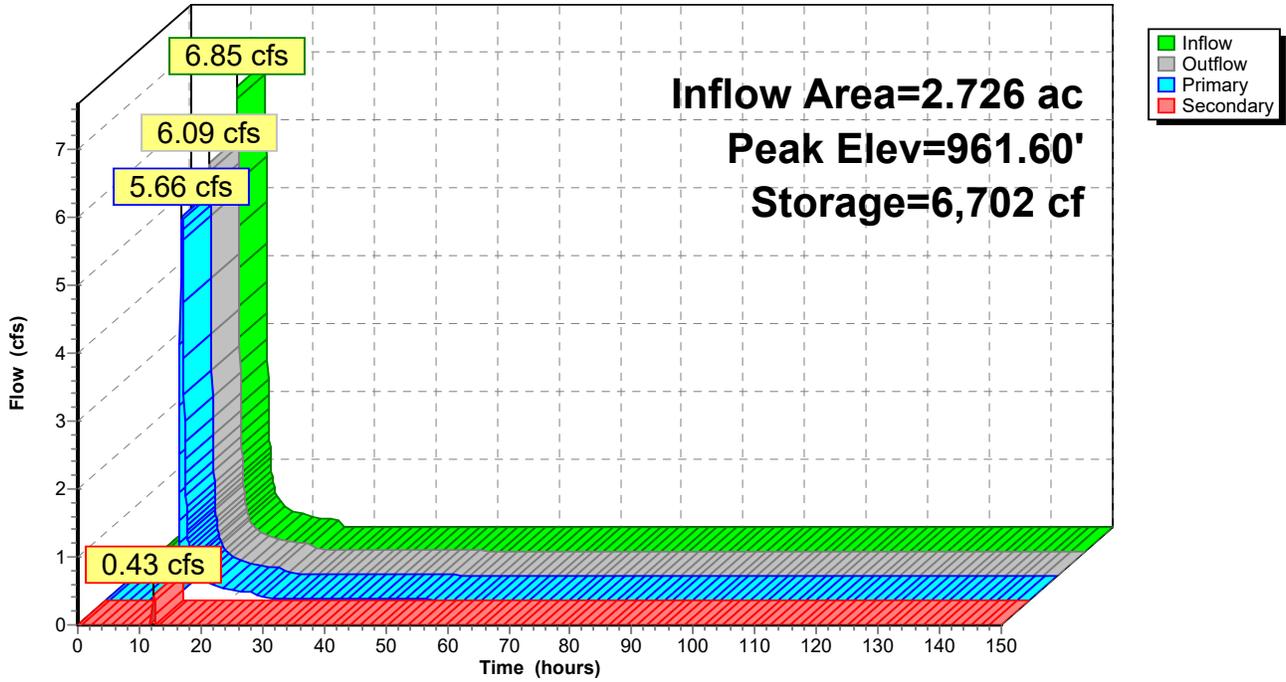
- ↑ 1=Culvert (Inlet Controls 5.66 cfs @ 4.61 fps)
- ↑ 2=Exfiltration (Passes < 0.05 cfs potential flow)
- ↑ 3=Orifice/Grate (Passes < 9.43 cfs potential flow)

**Secondary OutFlow** Max=0.43 cfs @ 12.40 hrs HW=961.60' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Weir Controls 0.43 cfs @ 0.90 fps)

Pond 37P: School Bioretention 5-29-20

Hydrograph



**Berlin Designs Updated DAs - 5-29-20**

*Type II 24-hr 50-Year Rainfall=4.54"*

Prepared by Hewlett-Packard Company

Printed 5/29/2020

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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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=3.85"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=8.03 cfs 0.876 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.71' Storage=7,153 cf Inflow=8.03 cfs 0.876 af  
Primary=5.88 cfs 0.821 af Secondary=1.45 cfs 0.029 af Outflow=7.33 cfs 0.850 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.876 af Average Runoff Depth = 3.85"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 8.03 cfs @ 12.27 hrs, Volume= 0.876 af, Depth= 3.85"

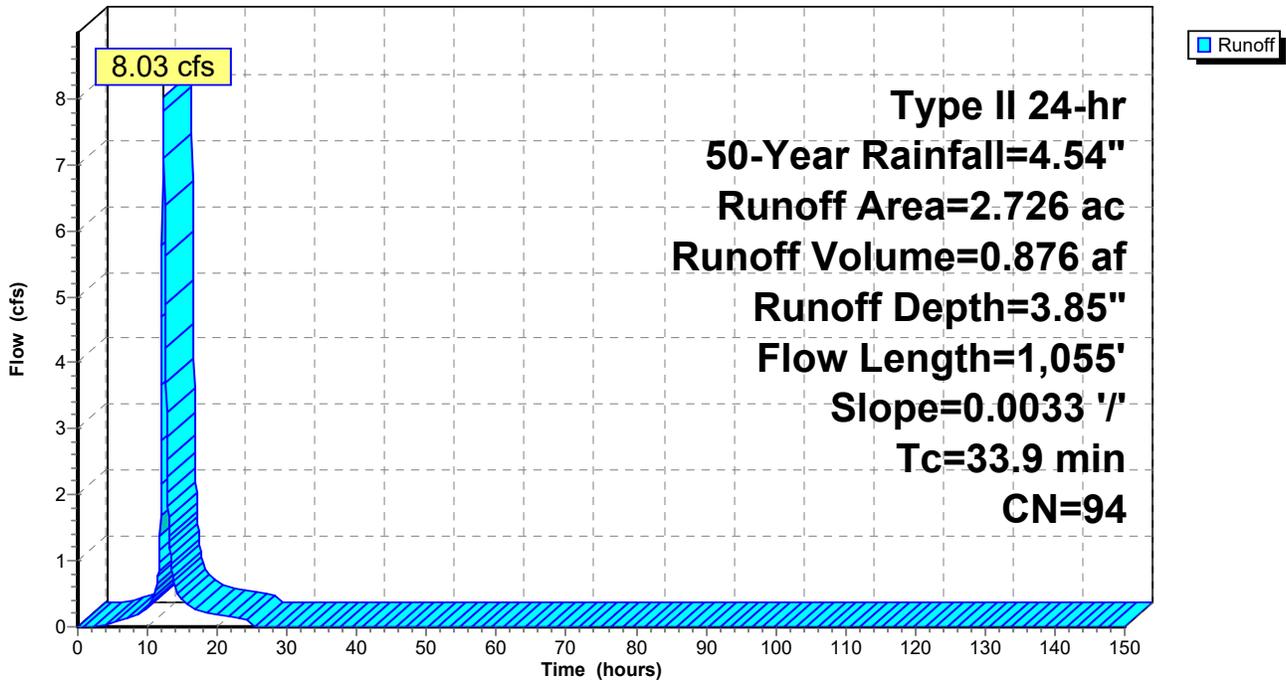
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 50-Year Rainfall=4.54"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 3.85" for 50-Year event  
 Inflow = 8.03 cfs @ 12.27 hrs, Volume= 0.876 af  
 Outflow = 7.33 cfs @ 12.38 hrs, Volume= 0.850 af, Atten= 9%, Lag= 6.5 min  
 Primary = 5.88 cfs @ 12.38 hrs, Volume= 0.821 af  
 Secondary = 1.45 cfs @ 12.38 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Peak Elev= 961.71' @ 12.38 hrs Surf.Area= 4,000 sf Storage= 7,153 cf

Plug-Flow detention time= 190.6 min calculated for 0.850 af (97% of inflow)  
 Center-of-Mass det. time= 171.6 min ( 970.3 - 798.7 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=5.87 cfs @ 12.38 hrs HW=961.71' (Free Discharge)

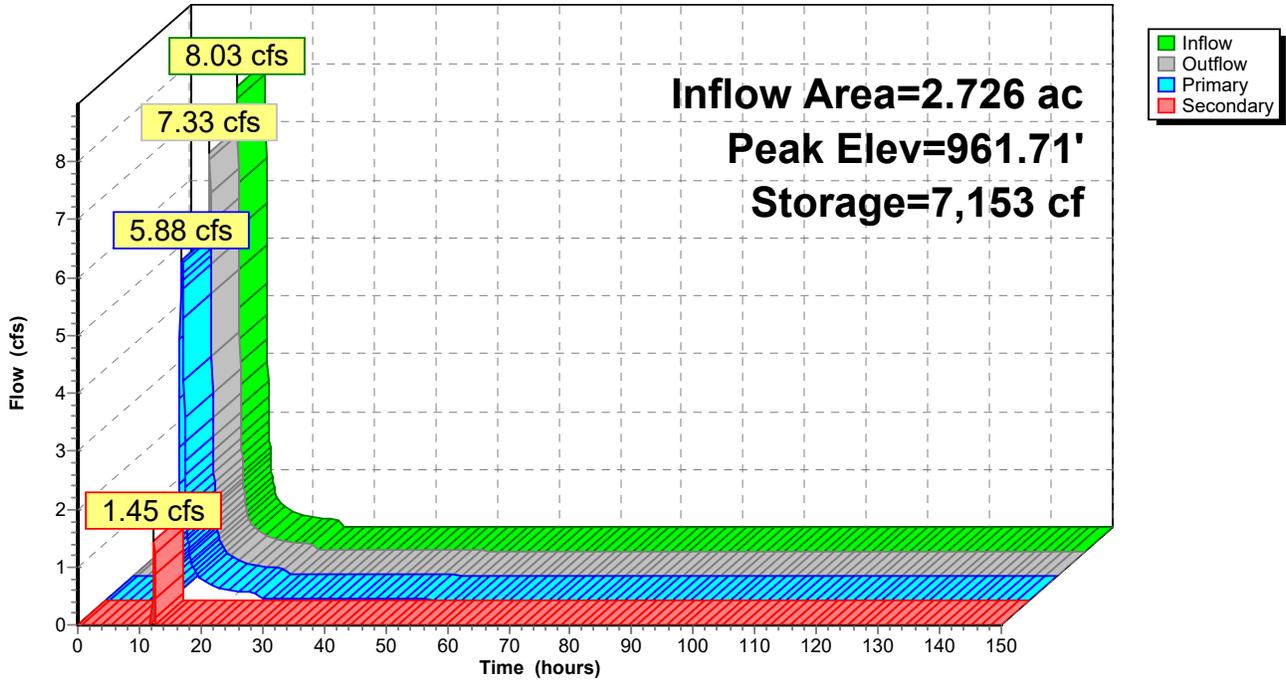
- ↑ 1=Culvert (Inlet Controls 5.87 cfs @ 4.79 fps)
- ↑ 2=Exfiltration (Passes < 0.05 cfs potential flow)
- ↑ 3=Orifice/Grate (Passes < 12.31 cfs potential flow)

**Secondary OutFlow** Max=1.41 cfs @ 12.38 hrs HW=961.71' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Weir Controls 1.41 cfs @ 1.34 fps)

Pond 37P: School Bioretention 5-29-20

Hydrograph



**Berlin Designs Updated DAs - 5-29-20**

*Type II 24-hr 100-Year Rainfall=5.24"*

Prepared by Hewlett-Packard Company

Printed 5/29/2020

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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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=4.54"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=9.40 cfs 1.032 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=961.82' Storage=7,571 cf Inflow=9.40 cfs 1.032 af  
Primary=6.08 cfs 0.941 af Secondary=2.69 cfs 0.065 af Outflow=8.77 cfs 1.007 af

**Total Runoff Area = 2.726 ac Runoff Volume = 1.032 af Average Runoff Depth = 4.54"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 9.40 cfs @ 12.27 hrs, Volume= 1.032 af, Depth= 4.54"

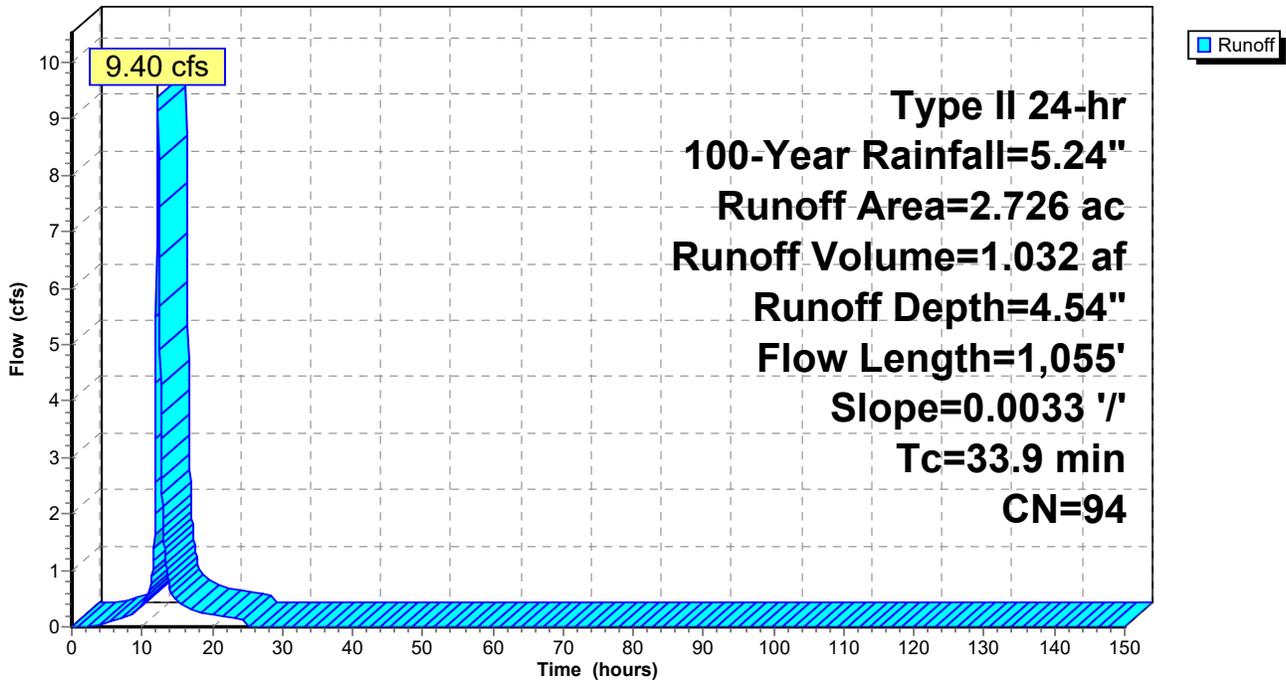
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-Year Rainfall=5.24"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 4.54" for 100-Year event  
 Inflow = 9.40 cfs @ 12.27 hrs, Volume= 1.032 af  
 Outflow = 8.77 cfs @ 12.37 hrs, Volume= 1.007 af, Atten= 7%, Lag= 5.6 min  
 Primary = 6.08 cfs @ 12.37 hrs, Volume= 0.941 af  
 Secondary = 2.69 cfs @ 12.37 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Peak Elev= 961.82' @ 12.37 hrs Surf.Area= 4,099 sf Storage= 7,571 cf

Plug-Flow detention time= 166.5 min calculated for 1.007 af (97% of inflow)  
 Center-of-Mass det. time= 150.1 min ( 944.6 - 794.5 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=6.07 cfs @ 12.37 hrs HW=961.82' (Free Discharge)

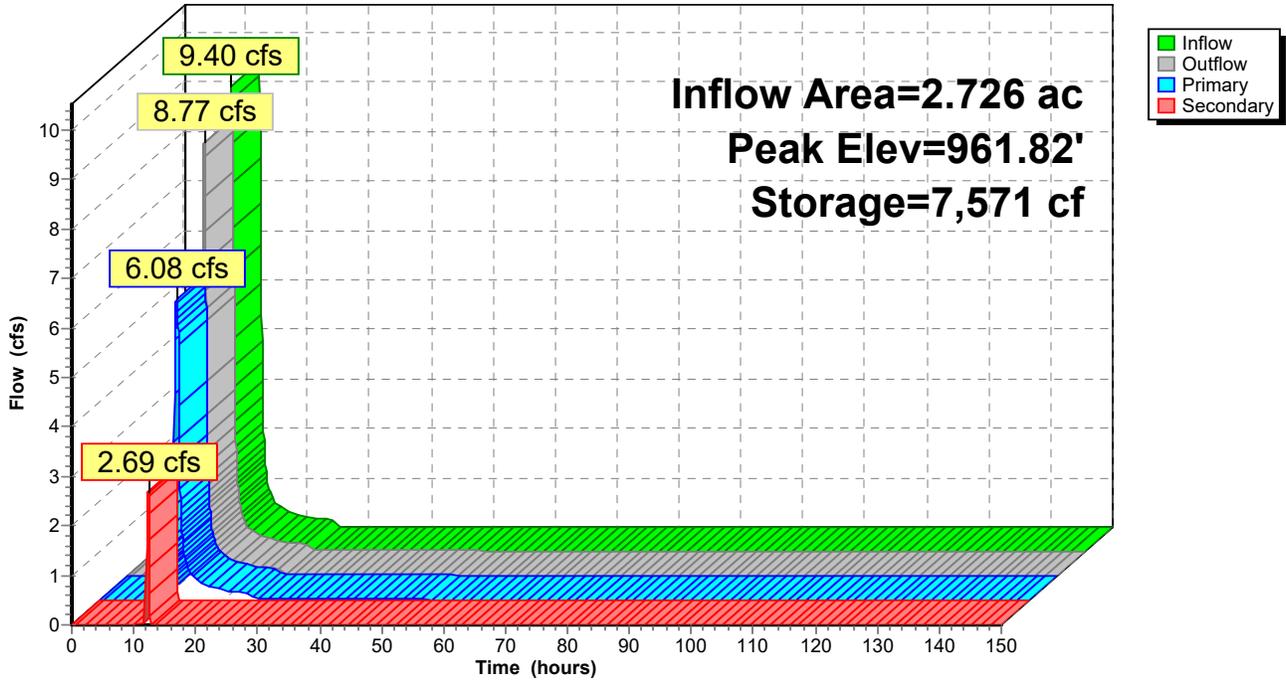
- ↑ 1=Culvert (Inlet Controls 6.07 cfs @ 4.95 fps)
- ↑ 2=Exfiltration (Passes < 0.05 cfs potential flow)
- ↑ 3=Orifice/Grate (Passes < 13.70 cfs potential flow)

**Secondary OutFlow** Max=2.64 cfs @ 12.37 hrs HW=961.82' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Weir Controls 2.64 cfs @ 1.65 fps)

Pond 37P: School Bioretention 5-29-20

Hydrograph



**Berlin Designs Updated DAs - 5-29-20**

Prepared by Hewlett-Packard Company

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*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

**Subcatchment4S: Subcat DA\_SchoolWQv** Runoff Area=2.726 ac 0.00% Impervious Runoff Depth=0.50"  
Flow Length=1,055' Slope=0.0033 '/' Tc=33.9 min CN=94 Runoff=1.09 cfs 0.114 af

**Pond 37P: School Bioretention 5-29-20** Peak Elev=960.70' Storage=3,571 cf Inflow=1.09 cfs 0.114 af  
Primary=0.04 cfs 0.089 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.089 af

**Total Runoff Area = 2.726 ac Runoff Volume = 0.114 af Average Runoff Depth = 0.50"**  
**100.00% Pervious = 2.726 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment 4S: Subcat DA\_School WQv**

Runoff = 1.09 cfs @ 12.30 hrs, Volume= 0.114 af, Depth= 0.50"

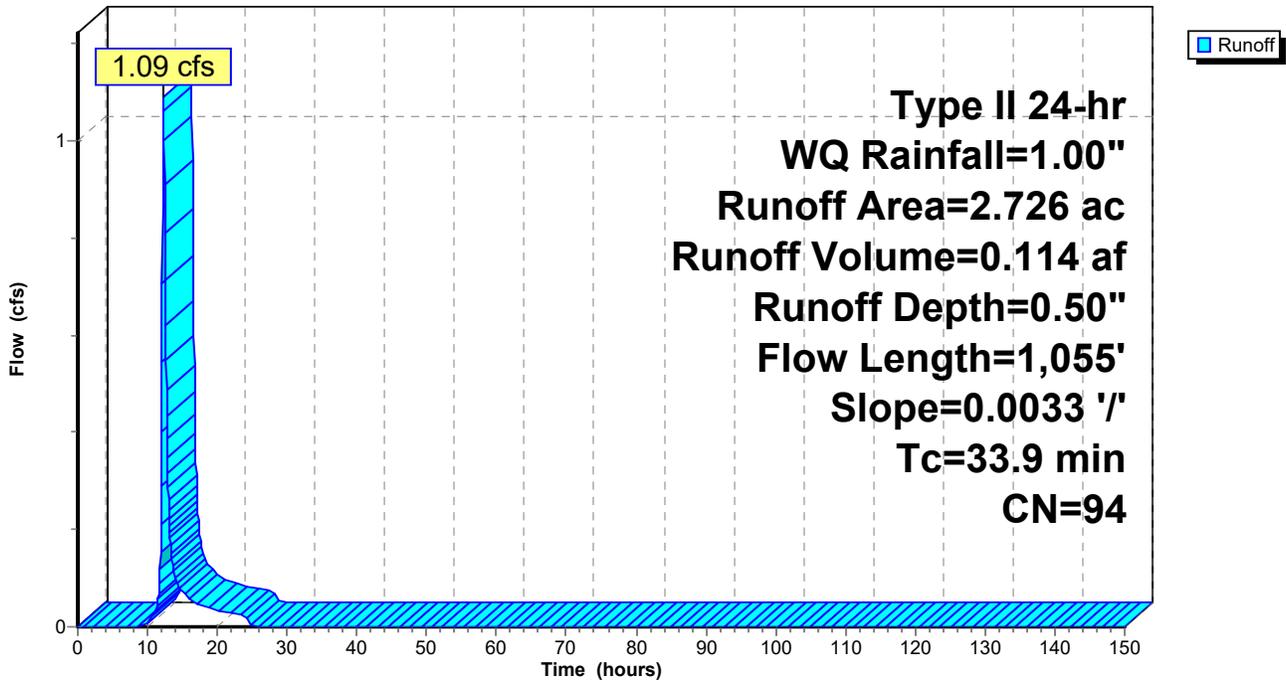
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-150.00 hrs, dt= 0.05 hrs  
 Type II 24-hr WQ Rainfall=1.00"

Area (ac)	CN	Description
* 2.726	94	
2.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.9	1,055	0.0033	0.52		Lag/CN Method, Contour Length= 394' Interval= 1'

**Subcatchment 4S: Subcat DA\_School WQv**

Hydrograph



**Summary for Pond 37P: School Bioretention 5-29-20**

Inflow Area = 2.726 ac, 0.00% Impervious, Inflow Depth = 0.50" for WQ event  
 Inflow = 1.09 cfs @ 12.30 hrs, Volume= 0.114 af  
 Outflow = 0.04 cfs @ 19.22 hrs, Volume= 0.089 af, Atten= 97%, Lag= 415.6 min  
 Primary = 0.04 cfs @ 19.22 hrs, Volume= 0.089 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= 960.70' @ 19.22 hrs Surf.Area= 3,105 sf Storage= 3,571 cf

Plug-Flow detention time= 910.4 min calculated for 0.089 af (77% of inflow)  
 Center-of-Mass det. time= 819.1 min ( 1,674.5 - 855.5 )

Volume	Invert	Avail.Storage	Storage Description	
#1	958.00'	8,243 cf	<b>Custom Stage Data (Prismatic)</b> Listed below	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
958.00	2,508	0.0	0	0
960.00	2,508	30.0	1,505	1,505
961.00	3,355	100.0	2,932	4,436
962.00	4,258	100.0	3,807	8,243

Device	Routing	Invert	Outlet Devices
#1	Primary	959.50'	<b>15.0" Round Culvert</b> L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 959.50' / 955.70' S= 0.0528 ' S= 0.0528 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#2	Device 1	958.00'	<b>0.500 in/hr Exfiltration over Surface area</b>
#3	Device 1	961.00'	<b>24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	961.50'	<b>5.0' long (Profile 1) Broad-Crested Rectangular Weir</b> Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

**Primary OutFlow** Max=0.04 cfs @ 19.22 hrs HW=960.70' (Free Discharge)

- ↑ 1=Culvert (Passes 0.04 cfs of 3.58 cfs potential flow)
- ↑ 2=Exfiltration (Exfiltration Controls 0.04 cfs)
- ↑ 3=Orifice/Grate ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=958.00' (Free Discharge)

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

Pond 37P: School Bioretention 5-29-20

Hydrograph

