STORRS
RETHINK MAIN STREET
CENTER

STORRS CENTER ALLIANCE, LLC

APPLICATION TO AMEND THE MANSFIELD ZONING MAP

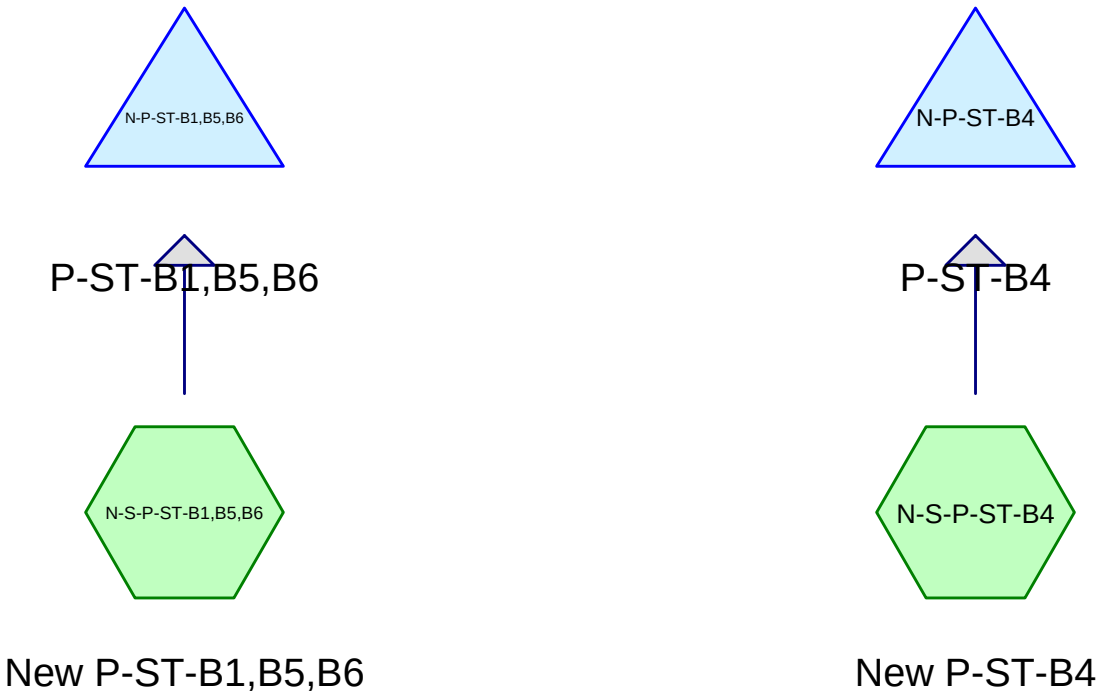
APPENDICES

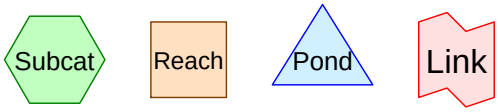
STORRS CENTER
SPECIAL DESIGN DISTRICT
MARKET SQUARE AREA

August 29, 2012

Appendix A

HydroCAD Calculations





Drainage Diagram for 03C667-Phase 4-PriceChopperRev08-29-2012
Prepared by BL Companies
HydroCAD® 7.10 s/n 002266 © 2005 HydroCAD Software Solutions LLC

Time span=0.00-108.00 hrs, dt=0.01 hrs, 10801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6 Runoff Area=1.806 ac Runoff Depth=2.16"
Tc=5.0 min CN=96 Runoff=4.47 cfs 0.325 af

Subcatchment N-S-P-ST-B4: New P-ST-B4 Runoff Area=2.167 ac Runoff Depth=2.37"
Tc=5.0 min CN=98 Runoff=5.63 cfs 0.428 af

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6 Peak Elev=607.05' Storage=0.147 af Inflow=4.47 cfs 0.325 af
Outflow=0.47 cfs 0.325 af

Pond N-P-ST-B4: P-ST-B4 Peak Elev=609.62' Storage=9,003 cf Inflow=5.63 cfs 0.428 af
Primary=0.49 cfs 0.428 af Secondary=0.00 cfs 0.000 af Outflow=0.49 cfs 0.428 af

Total Runoff Area = 3.973 ac Runoff Volume = 0.753 af Average Runoff Depth = 2.27"

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6

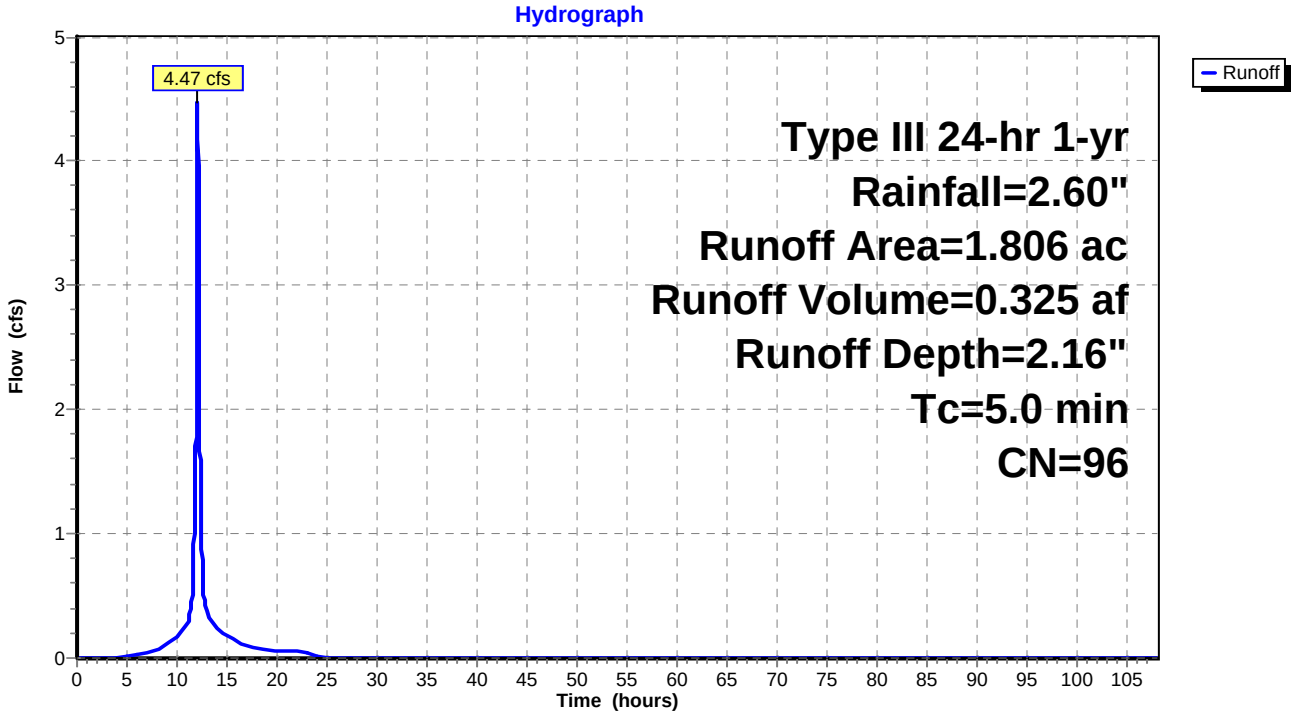
Runoff = 4.47 cfs @ 12.07 hrs, Volume= 0.325 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-yr Rainfall=2.60"

Area (ac)	CN	Description
1.665	98	
0.141	69	Pasture/grassland/range, Fair, HSG B
1.806	96	Weighted Average

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

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6



Subcatchment N-S-P-ST-B4: New P-ST-B4

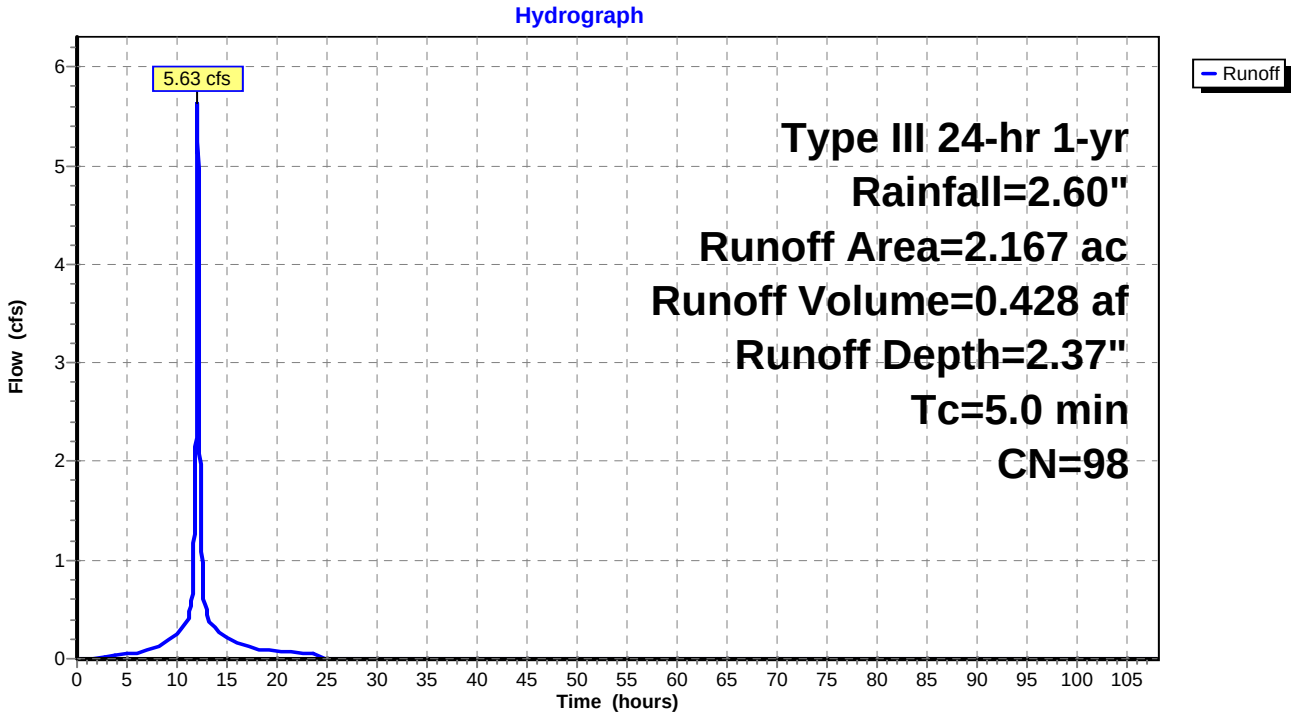
Runoff = 5.63 cfs @ 12.07 hrs, Volume= 0.428 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-yr Rainfall=2.60"

Area (ac)	CN	Description
2.167	98	

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

Subcatchment N-S-P-ST-B4: New P-ST-B4



Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6

Inflow Area = 1.806 ac, Inflow Depth = 2.16" for 1-yr event
Inflow = 4.47 cfs @ 12.07 hrs, Volume= 0.325 af
Outflow = 0.47 cfs @ 12.75 hrs, Volume= 0.325 af, Atten= 89%, Lag= 40.9 min
Primary = 0.47 cfs @ 12.75 hrs, Volume= 0.325 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 607.05' @ 12.75 hrs Surf.Area= 0.054 ac Storage= 0.147 af
Plug-Flow detention time= 163.5 min calculated for 0.325 af (100% of inflow)
Center-of-Mass det. time= 163.3 min (942.5 - 779.2)

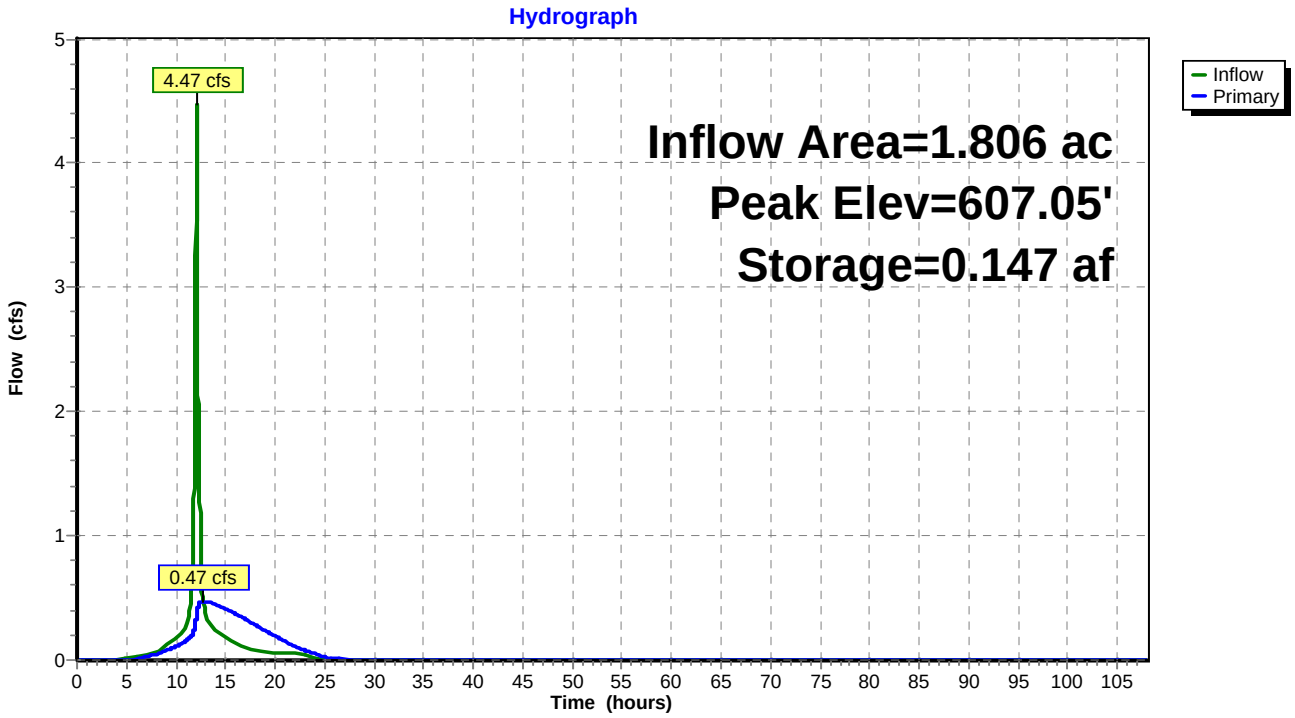
Volume	Invert	Avail.Storage	Storage Description
#1	604.33'	0.540 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.33	0.054	0.000	0.000
614.33	0.054	0.540	0.540

Device	Routing	Invert	Outlet Devices
#1	Primary	604.33'	**12.0" x 430.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 597.20' S= 0.0166 '/' Cc= 0.900 n= 0.013
#2	Device 1	604.33'	**3.0" Vert. Orifice/Grate X 0.00** C= 0.600
#3	Device 1	604.33'	**0.40' W x 0.15' H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.47 cfs @ 12.75 hrs HW=607.05' (Free Discharge)
└─**1=Culvert** (Passes 0.47 cfs of 4.84 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.47 cfs @ 7.8 fps)

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6



Pond N-P-ST-B4: P-ST-B4

Inflow Area =	2.167 ac,	Inflow Depth =	2.37"	for	1-yr event
Inflow =	5.63 cfs @	12.07 hrs,	Volume=	0.428 af	
Outflow =	0.49 cfs @	12.93 hrs,	Volume=	0.428 af,	Atten= 91%, Lag= 51.6 min
Primary =	0.49 cfs @	12.93 hrs,	Volume=	0.428 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 609.62' @ 12.93 hrs Surf.Area= 2,058 sf Storage= 9,003 cf
Plug-Flow detention time= 222.9 min calculated for 0.428 af (100% of inflow)
Center-of-Mass det. time= 223.1 min (983.1 - 760.1)

Volume	Invert	Avail.Storage	Storage Description
#1	605.25'	20,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

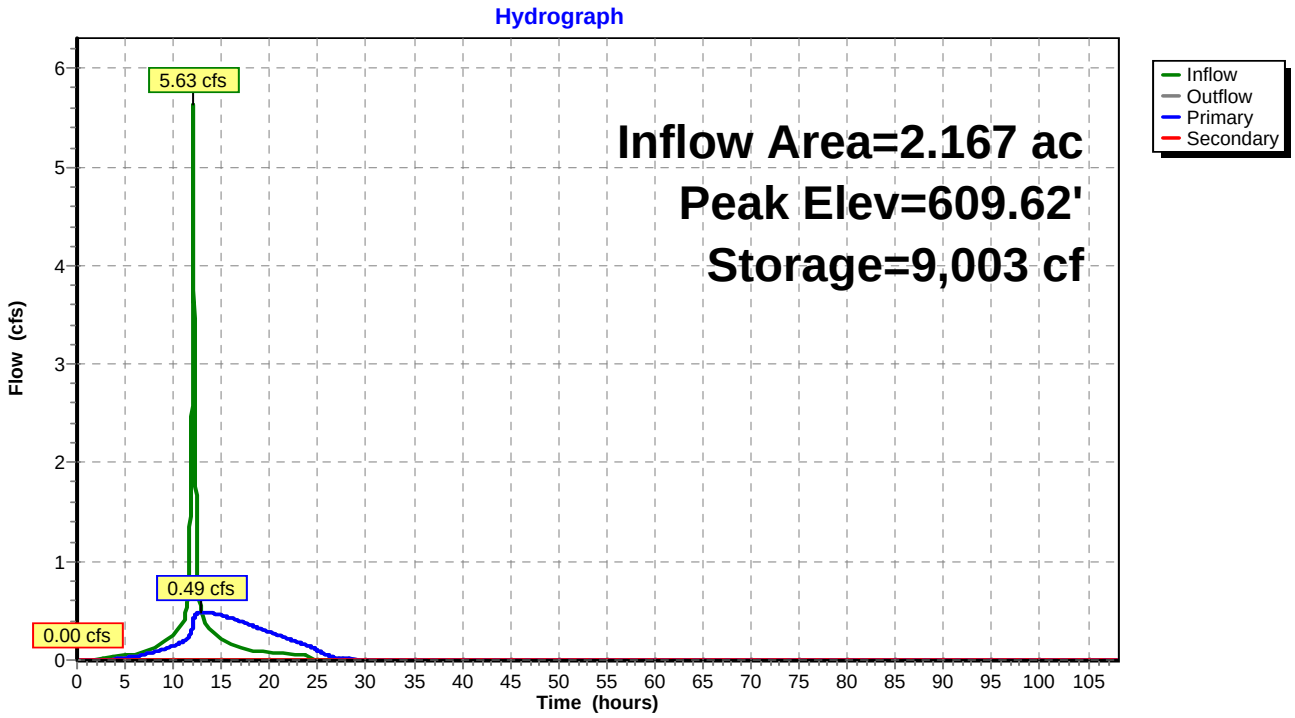
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
605.25	2,058	0	0
615.25	2,058	20,580	20,580

Device	Routing	Invert	Outlet Devices
#1	Primary	605.25'	**12.0" x 19.0' long Culvert** RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 605.00' S= 0.0132 '/' Cc= 0.900 n= 0.013
#2	Device 1	605.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	610.00'	**12.0" x 18.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 609.50' S= 0.0278 '/' Cc= 0.900 n= 0.013
#4	Device 3	610.00'	**11.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.49 cfs @ 12.93 hrs HW=609.62' (Free Discharge)
└─**1=Culvert** (Passes 0.49 cfs of 7.44 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.49 cfs @ 9.9 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=605.25' (Free Discharge)
└─**3=Culvert** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond N-P-ST-B4: P-ST-B4



Time span=0.00-108.00 hrs, dt=0.01 hrs, 10801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6 Runoff Area=1.806 ac Runoff Depth=2.75"
Tc=5.0 min CN=96 Runoff=5.61 cfs 0.414 af

Subcatchment N-S-P-ST-B4: New P-ST-B4 Runoff Area=2.167 ac Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=6.97 cfs 0.536 af

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6 Peak Elev=607.89' Storage=0.192 af Inflow=5.61 cfs 0.414 af
Outflow=0.54 cfs 0.414 af

Pond N-P-ST-B4: P-ST-B4 Peak Elev=610.47' Storage=10,746 cf Inflow=6.97 cfs 0.536 af
Primary=0.53 cfs 0.500 af Secondary=0.80 cfs 0.036 af Outflow=1.33 cfs 0.536 af

Total Runoff Area = 3.973 ac Runoff Volume = 0.950 af Average Runoff Depth = 2.87"

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6

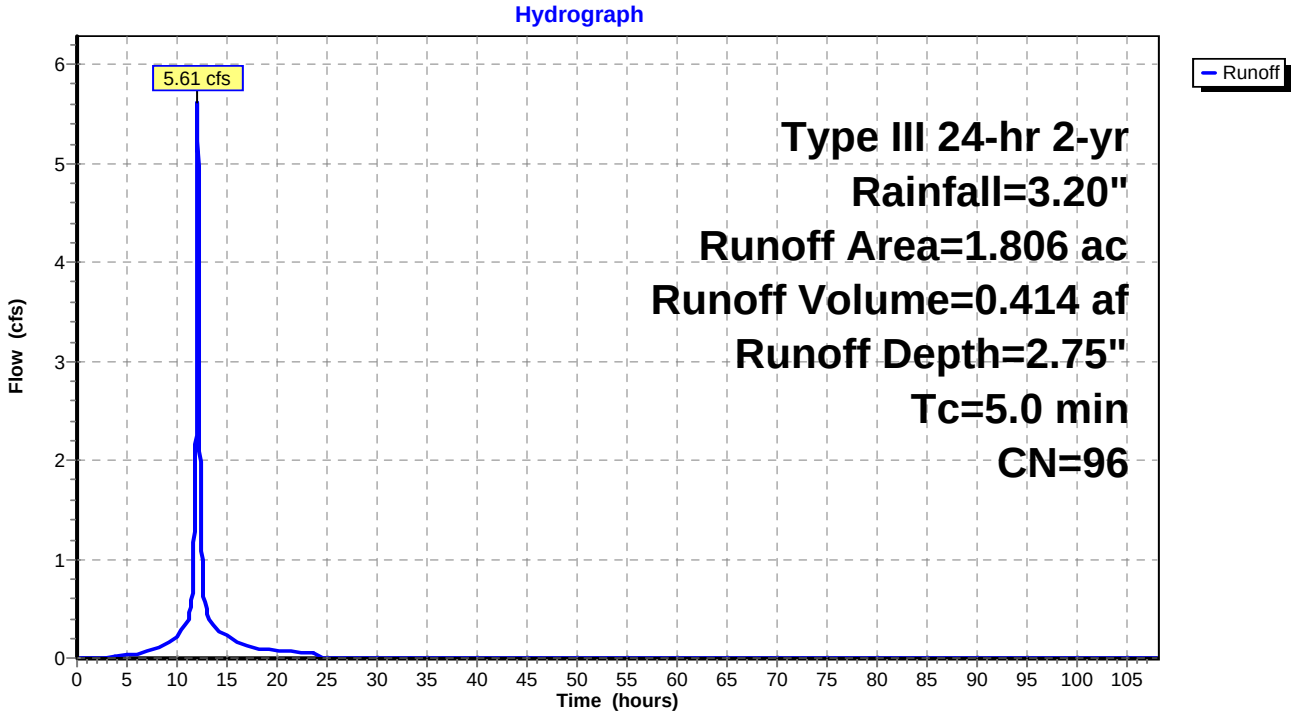
Runoff = 5.61 cfs @ 12.07 hrs, Volume= 0.414 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (ac)	CN	Description
1.665	98	
0.141	69	Pasture/grassland/range, Fair, HSG B
1.806	96	Weighted Average

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

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6



Subcatchment N-S-P-ST-B4: New P-ST-B4

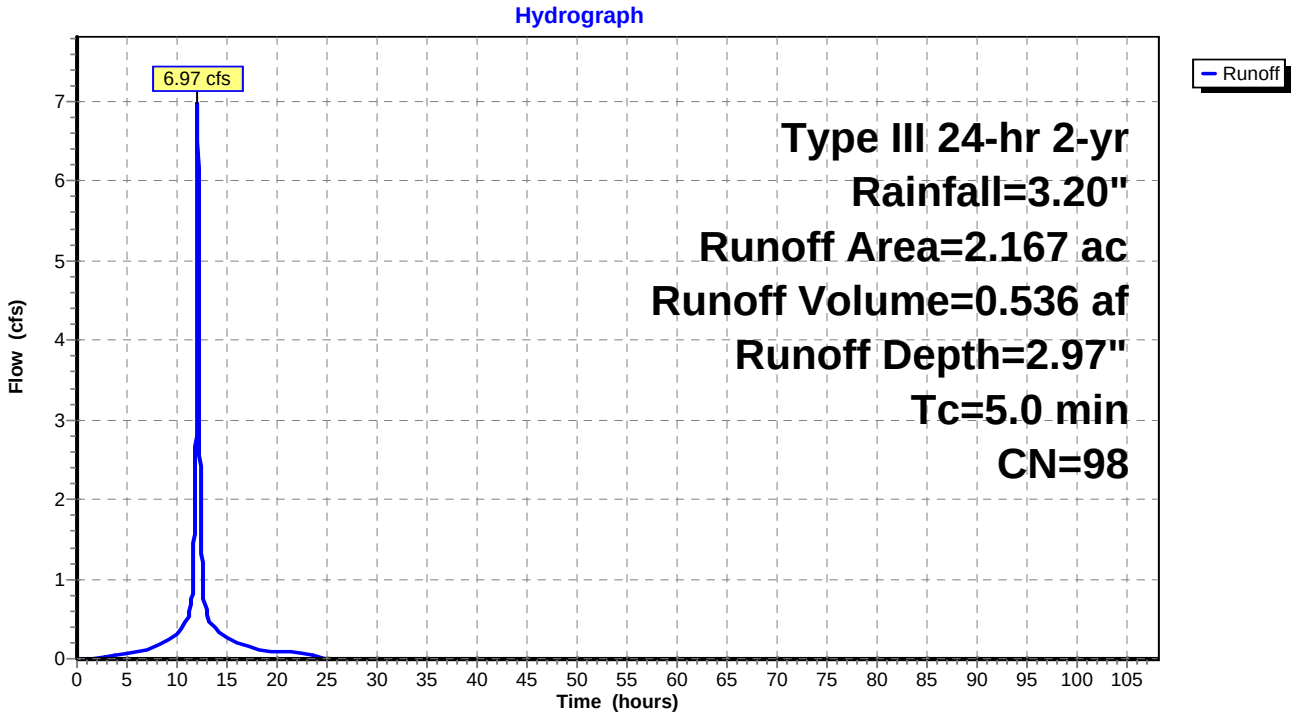
Runoff = 6.97 cfs @ 12.07 hrs, Volume= 0.536 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (ac)	CN	Description
2.167	98	

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

Subcatchment N-S-P-ST-B4: New P-ST-B4



Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6

Inflow Area = 1.806 ac, Inflow Depth = 2.75" for 2-yr event
Inflow = 5.61 cfs @ 12.07 hrs, Volume= 0.414 af
Outflow = 0.54 cfs @ 12.84 hrs, Volume= 0.414 af, Atten= 90%, Lag= 46.2 min
Primary = 0.54 cfs @ 12.84 hrs, Volume= 0.414 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 607.89' @ 12.84 hrs Surf.Area= 0.054 ac Storage= 0.192 af
Plug-Flow detention time= 184.0 min calculated for 0.414 af (100% of inflow)
Center-of-Mass det. time= 183.8 min (956.9 - 773.1)

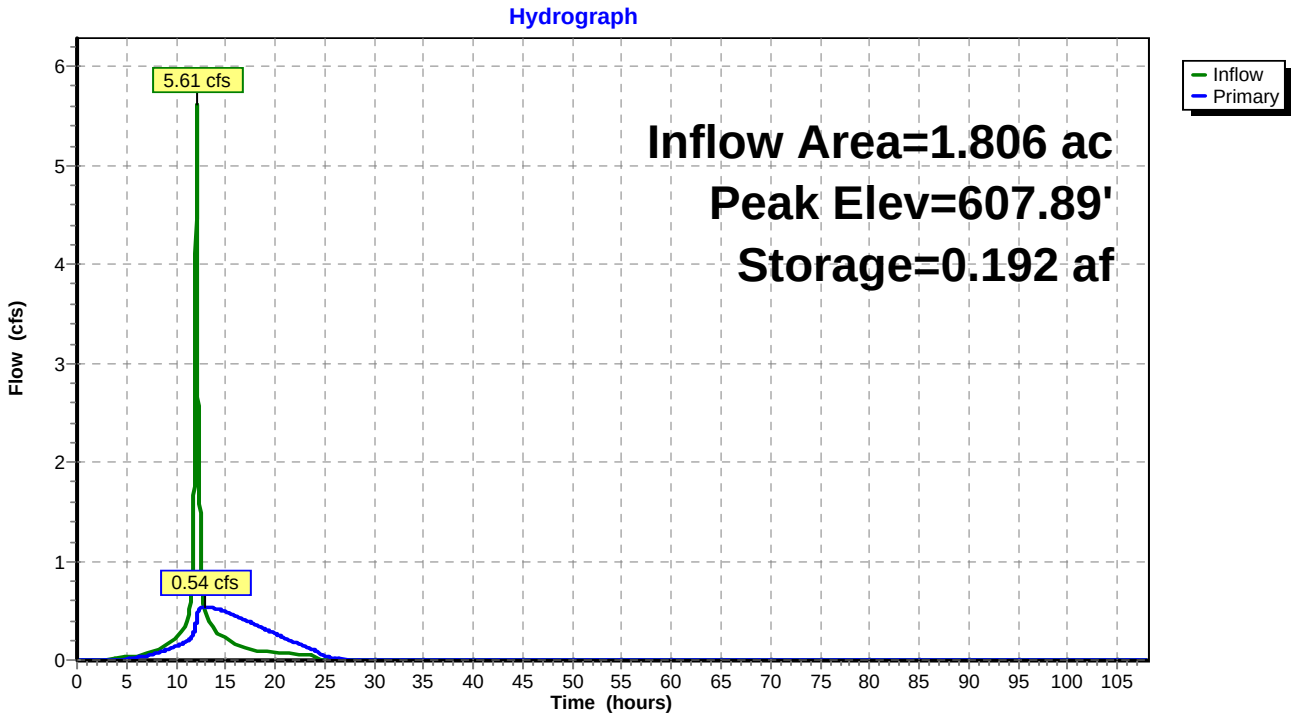
Volume	Invert	Avail.Storage	Storage Description
#1	604.33'	0.540 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.33	0.054	0.000	0.000
614.33	0.054	0.540	0.540

Device	Routing	Invert	Outlet Devices
#1	Primary	604.33'	**12.0" x 430.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 597.20' S= 0.0166 '/' Cc= 0.900 n= 0.013
#2	Device 1	604.33'	**3.0" Vert. Orifice/Grate X 0.00** C= 0.600
#3	Device 1	604.33'	**0.40' W x 0.15' H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.54 cfs @ 12.84 hrs HW=607.89' (Free Discharge)
└─**1=Culvert** (Passes 0.54 cfs of 5.07 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.54 cfs @ 9.0 fps)

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6



Pond N-P-ST-B4: P-ST-B4

Inflow Area =	2.167 ac,	Inflow Depth =	2.97"	for 2-yr event	
Inflow =	6.97 cfs @	12.07 hrs,	Volume=	0.536 af	
Outflow =	1.33 cfs @	12.49 hrs,	Volume=	0.536 af,	Atten= 81%, Lag= 25.4 min
Primary =	0.53 cfs @	12.49 hrs,	Volume=	0.500 af	
Secondary =	0.80 cfs @	12.49 hrs,	Volume=	0.036 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 610.47' @ 12.49 hrs Surf.Area= 2,058 sf Storage= 10,746 cf
Plug-Flow detention time= 221.5 min calculated for 0.536 af (100% of inflow)
Center-of-Mass det. time= 221.3 min (976.8 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	605.25'	20,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

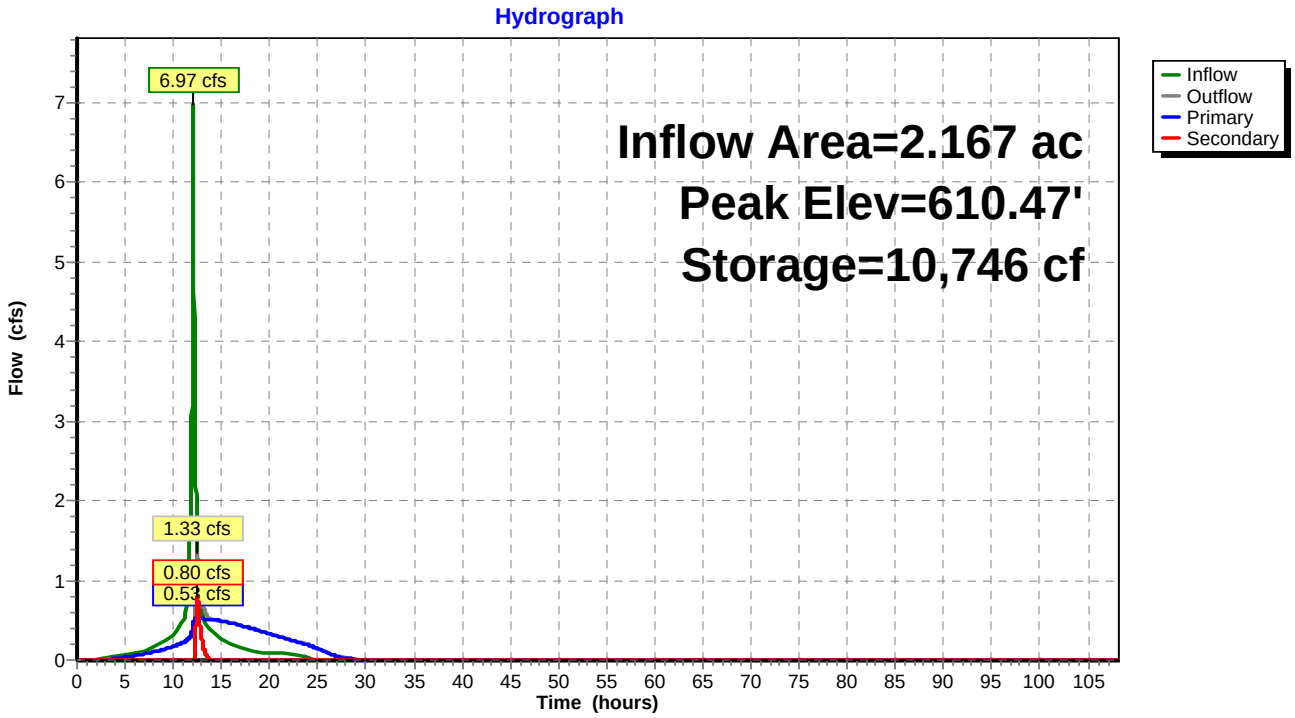
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
605.25	2,058	0	0
615.25	2,058	20,580	20,580

Device	Routing	Invert	Outlet Devices
#1	Primary	605.25'	**12.0" x 19.0' long Culvert** RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 605.00' S= 0.0132 '/' Cc= 0.900 n= 0.013
#2	Device 1	605.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	610.00'	**12.0" x 18.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 609.50' S= 0.0278 '/' Cc= 0.900 n= 0.013
#4	Device 3	610.00'	**11.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.53 cfs @ 12.49 hrs HW=610.47' (Free Discharge)
└─**1=Culvert** (Passes 0.53 cfs of 8.22 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 10.9 fps)

Secondary OutFlow Max=0.80 cfs @ 12.49 hrs HW=610.47' (Free Discharge)
└─**3=Culvert** (Passes 0.80 cfs of 0.85 cfs potential flow)
  └─**4=Orifice/Grate** (Orifice Controls 0.80 cfs @ 2.3 fps)

Pond N-P-ST-B4: P-ST-B4



Time span=0.00-108.00 hrs, dt=0.01 hrs, 10801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6 Runoff Area=1.806 ac Runoff Depth=4.33"
Tc=5.0 min CN=96 Runoff=8.63 cfs 0.652 af

Subcatchment N-S-P-ST-B4: New P-ST-B4 Runoff Area=2.167 ac Runoff Depth=4.56"
Tc=5.0 min CN=98 Runoff=10.54 cfs 0.824 af

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6 Peak Elev=610.24' Storage=0.319 af Inflow=8.63 cfs 0.652 af
Outflow=0.70 cfs 0.652 af

Pond N-P-ST-B4: P-ST-B4 Peak Elev=611.77' Storage=13,418 cf Inflow=10.54 cfs 0.824 af
Primary=0.60 cfs 0.607 af Secondary=3.64 cfs 0.217 af Outflow=4.24 cfs 0.824 af

Total Runoff Area = 3.973 ac Runoff Volume = 1.476 af Average Runoff Depth = 4.46"

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6

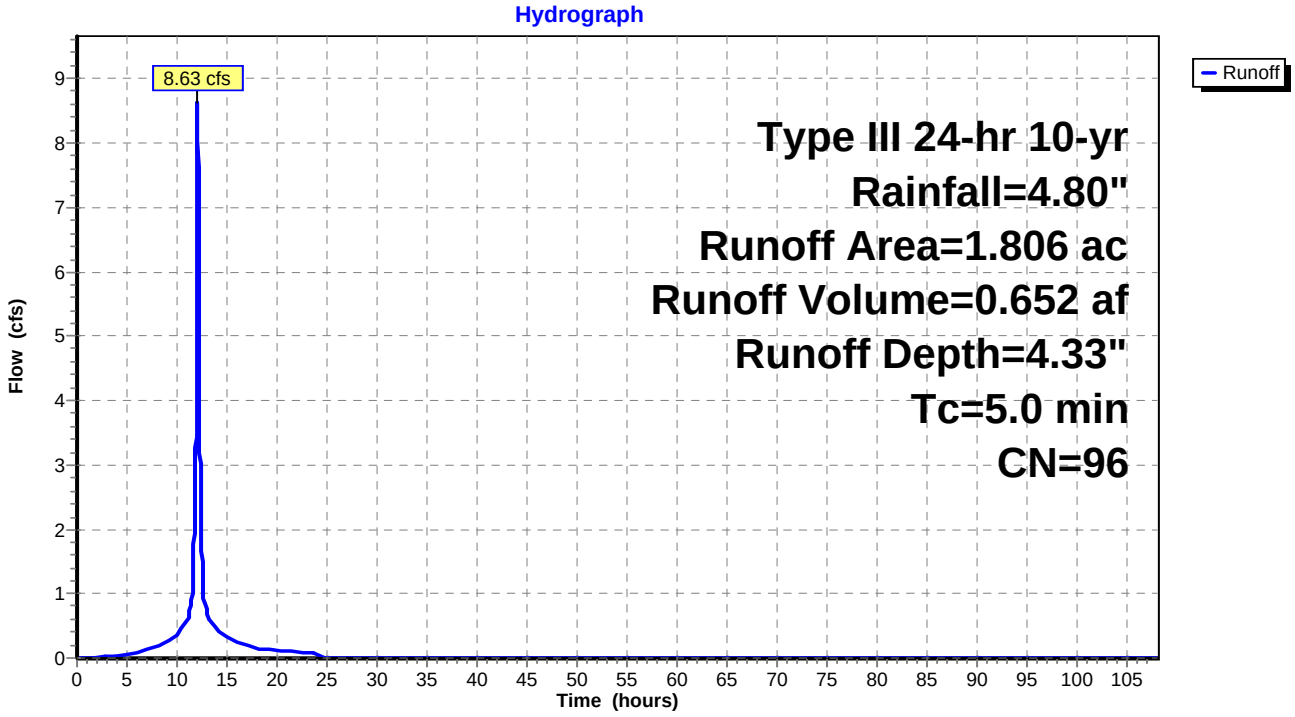
Runoff = 8.63 cfs @ 12.07 hrs, Volume= 0.652 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (ac)	CN	Description
1.665	98	
0.141	69	Pasture/grassland/range, Fair, HSG B
1.806	96	Weighted Average

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

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6



Subcatchment N-S-P-ST-B4: New P-ST-B4

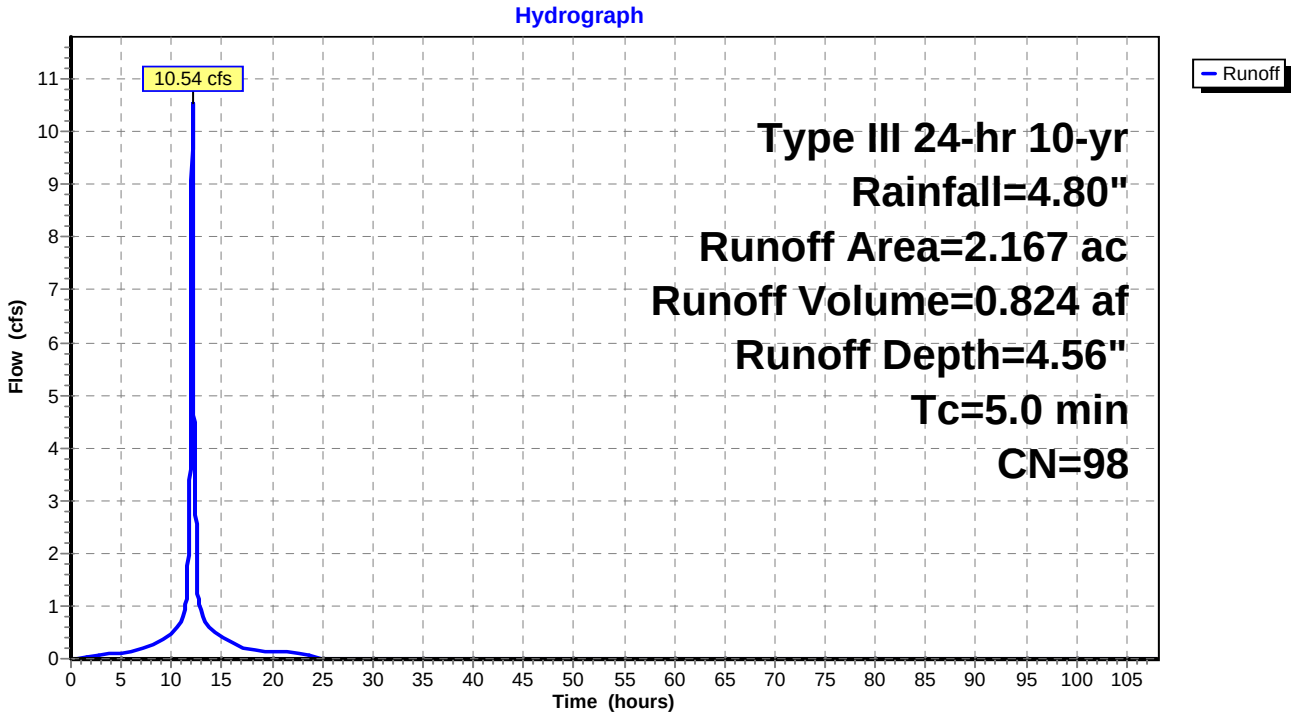
Runoff = 10.54 cfs @ 12.07 hrs, Volume= 0.824 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (ac)	CN	Description
2.167	98	

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

Subcatchment N-S-P-ST-B4: New P-ST-B4



Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6

Inflow Area = 1.806 ac, Inflow Depth = 4.33" for 10-yr event
Inflow = 8.63 cfs @ 12.07 hrs, Volume= 0.652 af
Outflow = 0.70 cfs @ 12.99 hrs, Volume= 0.652 af, Atten= 92%, Lag= 55.4 min
Primary = 0.70 cfs @ 12.99 hrs, Volume= 0.652 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 610.24' @ 12.99 hrs Surf.Area= 0.054 ac Storage= 0.319 af
Plug-Flow detention time= 234.0 min calculated for 0.652 af (100% of inflow)
Center-of-Mass det. time= 233.8 min (996.3 - 762.4)

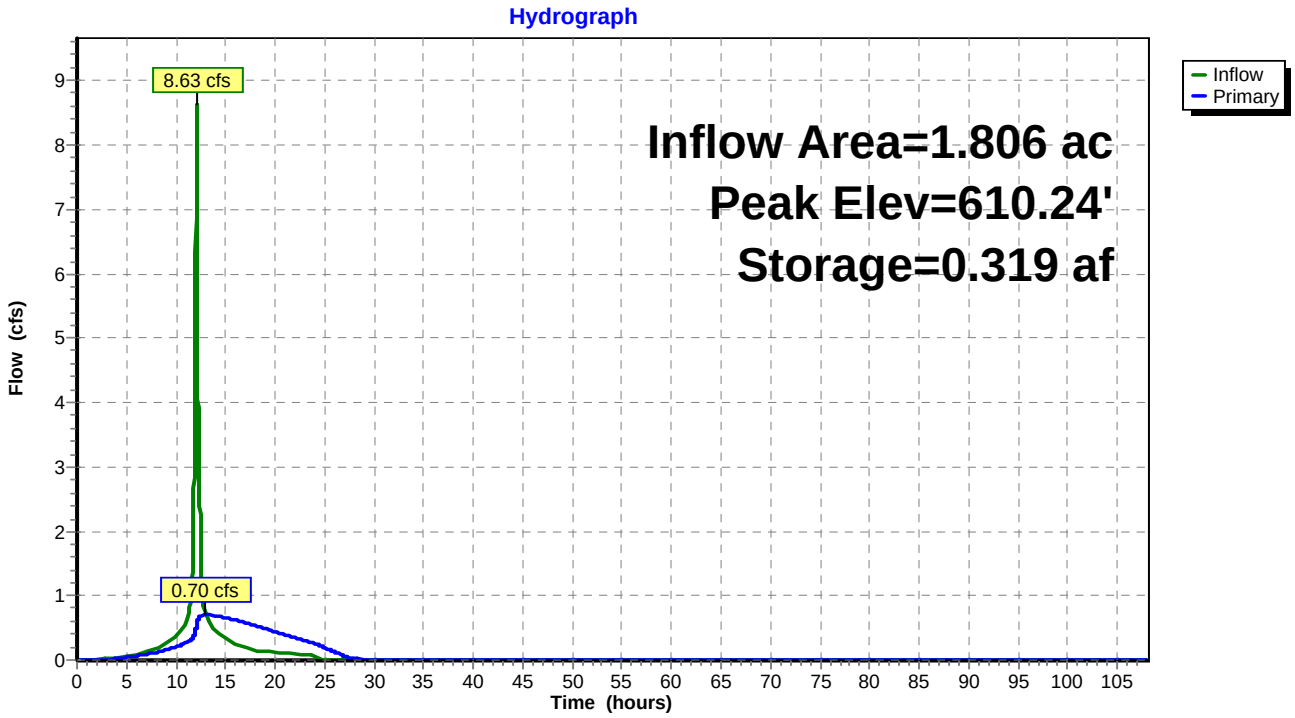
Volume	Invert	Avail.Storage	Storage Description
#1	604.33'	0.540 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.33	0.054	0.000	0.000
614.33	0.054	0.540	0.540

Device	Routing	Invert	Outlet Devices
#1	Primary	604.33'	**12.0" x 430.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 597.20' S= 0.0166 '/' Cc= 0.900 n= 0.013
#2	Device 1	604.33'	**3.0" Vert. Orifice/Grate X 0.00** C= 0.600
#3	Device 1	604.33'	**0.40' W x 0.15' H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.70 cfs @ 12.99 hrs HW=610.24' (Free Discharge)
└─**1=Culvert** (Passes 0.70 cfs of 5.65 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.70 cfs @ 11.6 fps)

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6



Pond N-P-ST-B4: P-ST-B4

Inflow Area =	2.167 ac,	Inflow Depth =	4.56"	for	10-yr event
Inflow =	10.54 cfs @	12.07 hrs,	Volume=	0.824 af	
Outflow =	4.24 cfs @	12.26 hrs,	Volume=	0.824 af,	Atten= 60%, Lag= 11.4 min
Primary =	0.60 cfs @	12.26 hrs,	Volume=	0.607 af	
Secondary =	3.64 cfs @	12.26 hrs,	Volume=	0.217 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 611.77' @ 12.26 hrs Surf.Area= 2,058 sf Storage= 13,418 cf
Plug-Flow detention time= 182.2 min calculated for 0.824 af (100% of inflow)
Center-of-Mass det. time= 182.1 min (929.9 - 747.8)

Volume	Invert	Avail.Storage	Storage Description
#1	605.25'	20,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

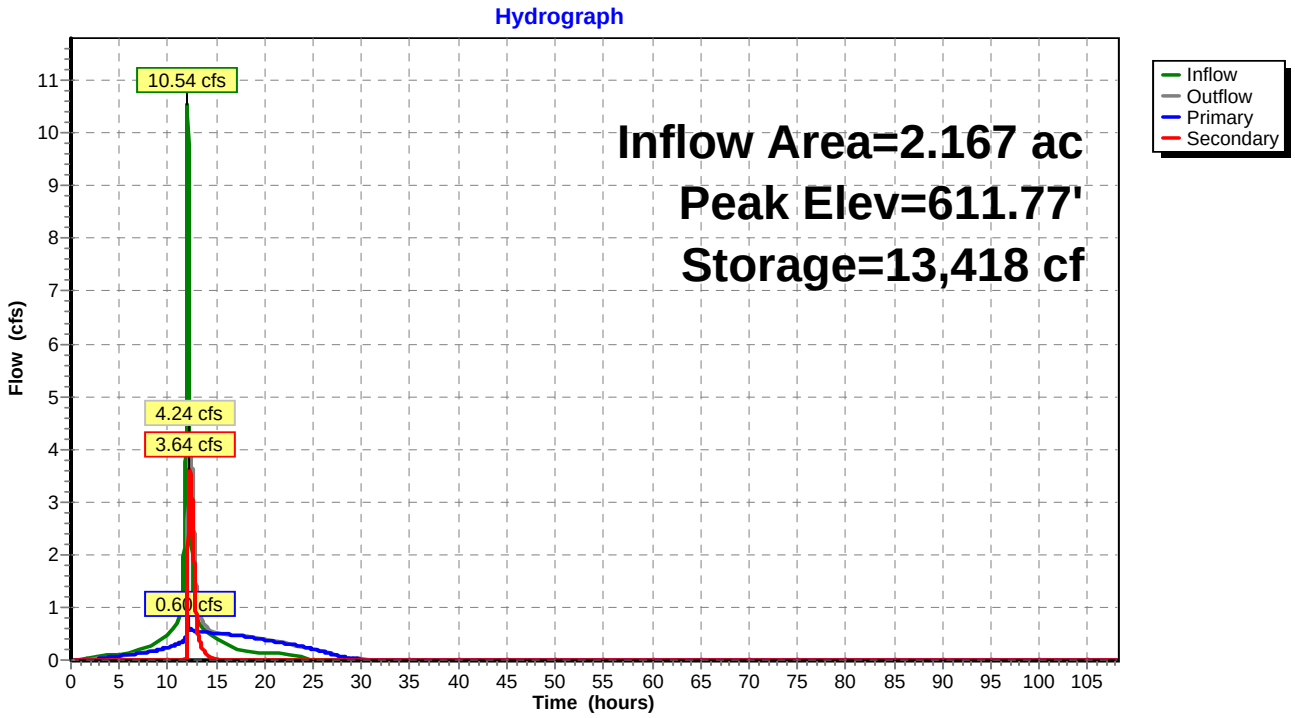
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
605.25	2,058	0	0
615.25	2,058	20,580	20,580

Device	Routing	Invert	Outlet Devices
#1	Primary	605.25'	**12.0" x 19.0' long Culvert** RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 605.00' S= 0.0132 '/' Cc= 0.900 n= 0.013
#2	Device 1	605.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	610.00'	**12.0" x 18.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 609.50' S= 0.0278 '/' Cc= 0.900 n= 0.013
#4	Device 3	610.00'	**11.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.60 cfs @ 12.26 hrs HW=611.77' (Free Discharge)
└─**1=Culvert** (Passes 0.60 cfs of 9.28 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.60 cfs @ 12.2 fps)

Secondary OutFlow Max=3.64 cfs @ 12.26 hrs HW=611.77' (Free Discharge)
└─**3=Culvert** (Passes 3.64 cfs of 4.26 cfs potential flow)
  └─**4=Orifice/Grate** (Orifice Controls 3.64 cfs @ 5.5 fps)

Pond N-P-ST-B4: P-ST-B4



Time span=0.00-108.00 hrs, dt=0.01 hrs, 10801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6 Runoff Area=1.806 ac Runoff Depth=5.03"
Tc=5.0 min CN=96 Runoff=9.94 cfs 0.757 af

Subcatchment N-S-P-ST-B4: New P-ST-B4 Runoff Area=2.167 ac Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=12.09 cfs 0.950 af

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6 Peak Elev=611.30' Storage=0.377 af Inflow=9.94 cfs 0.757 af
Outflow=0.76 cfs 0.757 af

Pond N-P-ST-B4: P-ST-B4 Peak Elev=612.48' Storage=14,887 cf Inflow=12.09 cfs 0.950 af
Primary=0.63 cfs 0.648 af Secondary=4.52 cfs 0.302 af Outflow=5.15 cfs 0.950 af

Total Runoff Area = 3.973 ac Runoff Volume = 1.707 af Average Runoff Depth = 5.16"

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6

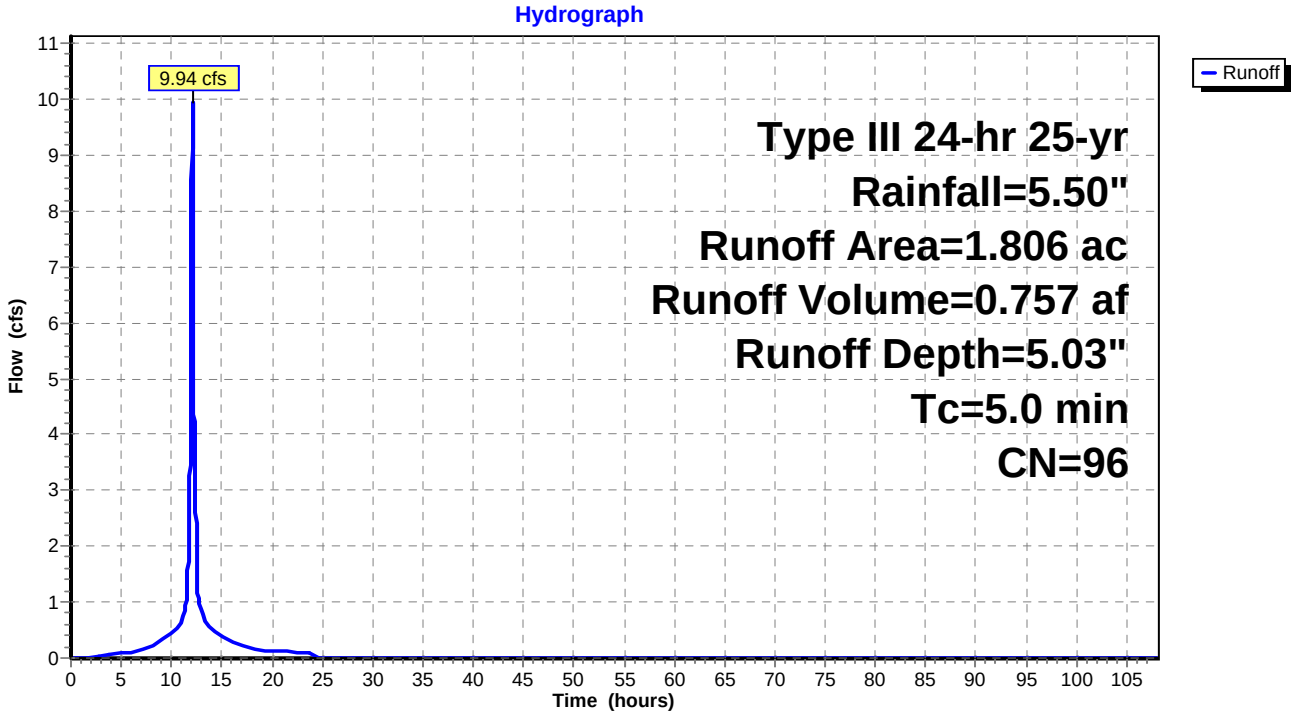
Runoff = 9.94 cfs @ 12.07 hrs, Volume= 0.757 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (ac)	CN	Description
1.665	98	
0.141	69	Pasture/grassland/range, Fair, HSG B
1.806	96	Weighted Average

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

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6



Subcatchment N-S-P-ST-B4: New P-ST-B4

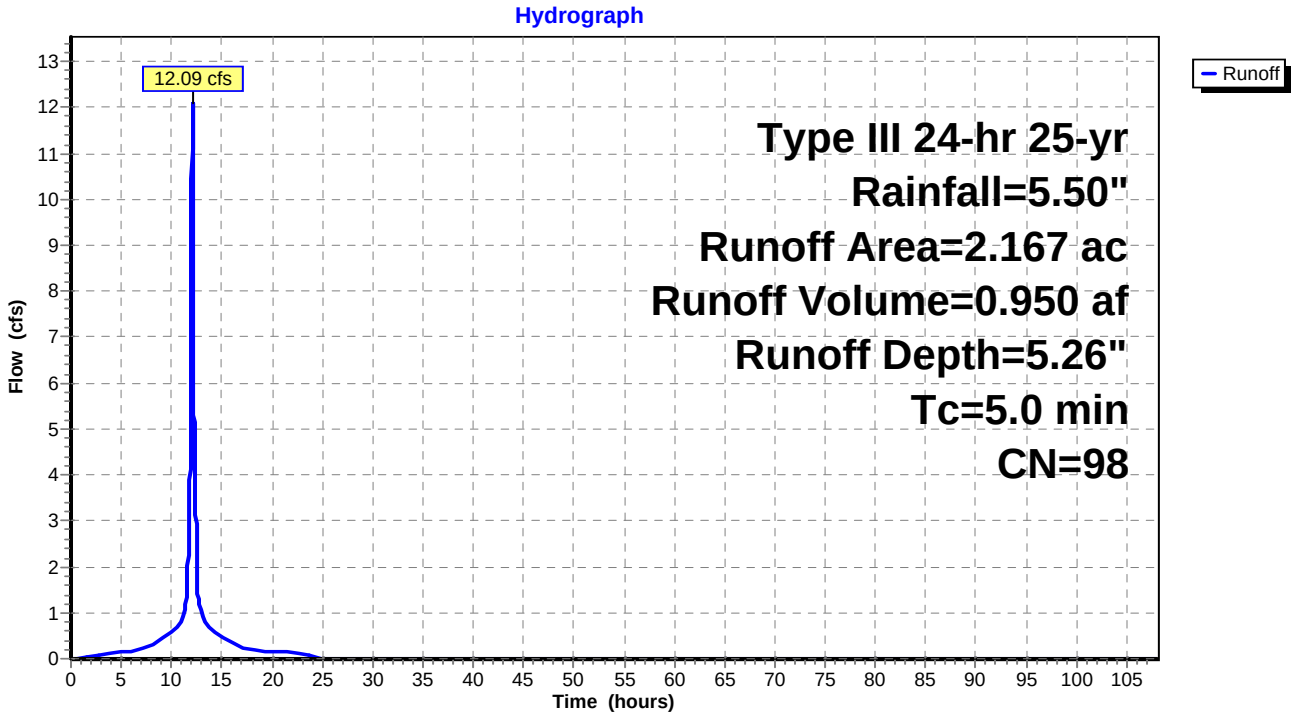
Runoff = 12.09 cfs @ 12.07 hrs, Volume= 0.950 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (ac)	CN	Description
2.167	98	

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

Subcatchment N-S-P-ST-B4: New P-ST-B4



Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6

Inflow Area = 1.806 ac, Inflow Depth = 5.03" for 25-yr event
Inflow = 9.94 cfs @ 12.07 hrs, Volume= 0.757 af
Outflow = 0.76 cfs @ 13.04 hrs, Volume= 0.757 af, Atten= 92%, Lag= 58.3 min
Primary = 0.76 cfs @ 13.04 hrs, Volume= 0.757 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 611.30' @ 13.04 hrs Surf.Area= 0.054 ac Storage= 0.377 af
Plug-Flow detention time= 253.5 min calculated for 0.757 af (100% of inflow)
Center-of-Mass det. time= 253.7 min (1,013.0 - 759.2)

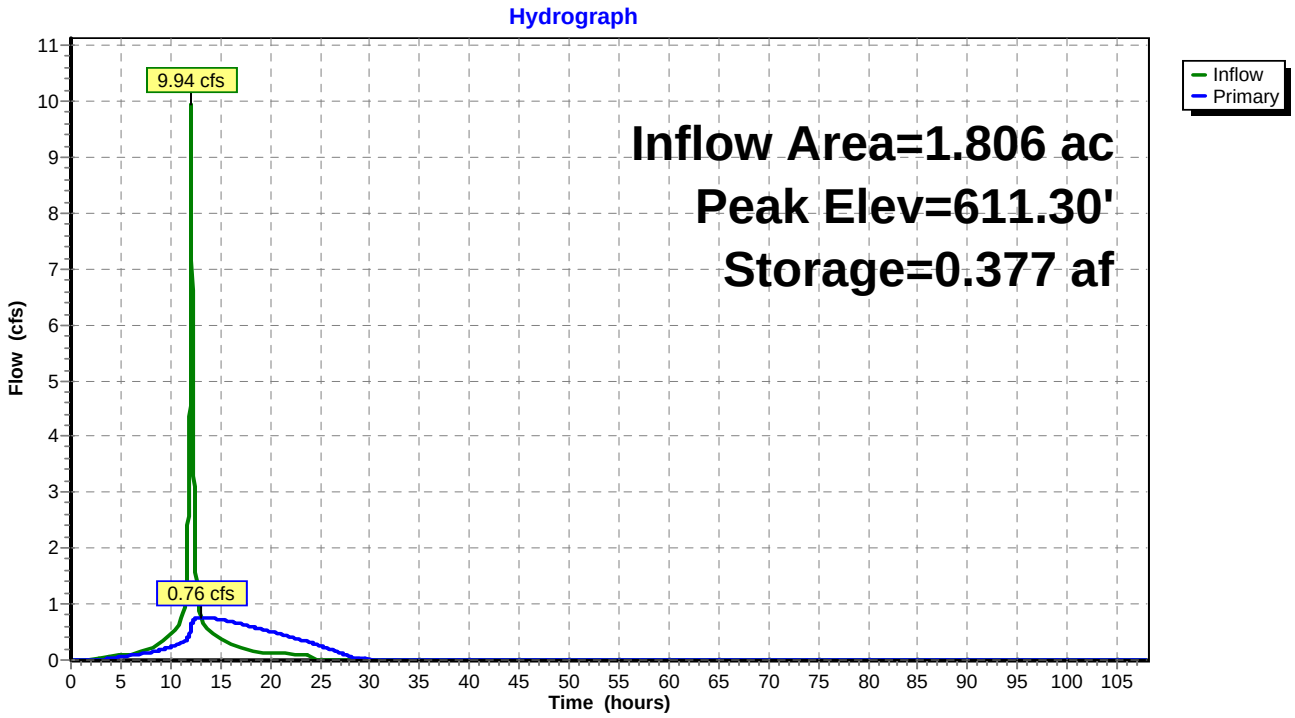
Volume	Invert	Avail.Storage	Storage Description
#1	604.33'	0.540 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.33	0.054	0.000	0.000
614.33	0.054	0.540	0.540

Device	Routing	Invert	Outlet Devices
#1	Primary	604.33'	**12.0" x 430.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 597.20' S= 0.0166 '/' Cc= 0.900 n= 0.013
#2	Device 1	604.33'	**3.0" Vert. Orifice/Grate X 0.00** C= 0.600
#3	Device 1	604.33'	**0.40' W x 0.15' H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.76 cfs @ 13.04 hrs HW=611.30' (Free Discharge)
└─**1=Culvert** (Passes 0.76 cfs of 5.89 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.76 cfs @ 12.6 fps)

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6



Pond N-P-ST-B4: P-ST-B4

Inflow Area =	2.167 ac,	Inflow Depth =	5.26"	for	25-yr event
Inflow =	12.09 cfs @	12.07 hrs,	Volume=	0.950 af	
Outflow =	5.15 cfs @	12.24 hrs,	Volume=	0.950 af,	Atten= 57%, Lag= 10.1 min
Primary =	0.63 cfs @	12.24 hrs,	Volume=	0.648 af	
Secondary =	4.52 cfs @	12.24 hrs,	Volume=	0.302 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 612.48' @ 12.24 hrs Surf.Area= 2,058 sf Storage= 14,887 cf
Plug-Flow detention time= 171.7 min calculated for 0.950 af (100% of inflow)
Center-of-Mass det. time= 171.6 min (917.1 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	605.25'	20,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

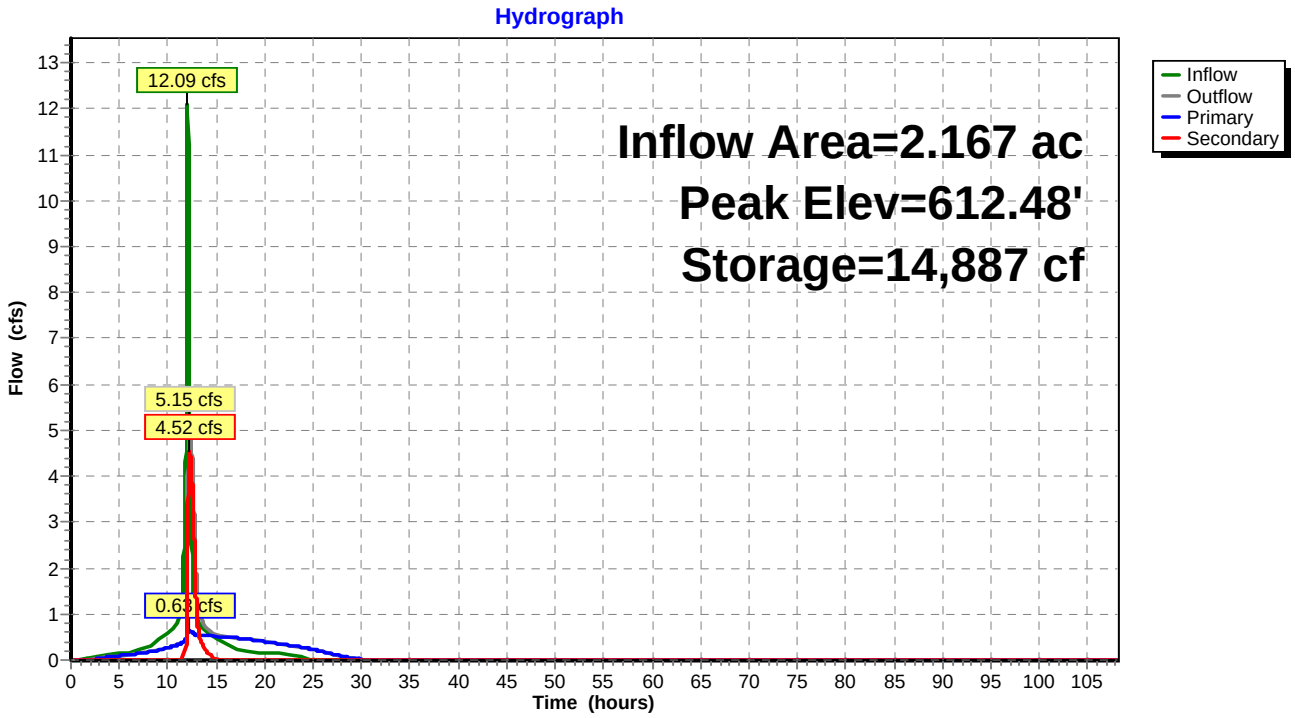
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
605.25	2,058	0	0
615.25	2,058	20,580	20,580

Device	Routing	Invert	Outlet Devices
#1	Primary	605.25'	**12.0" x 19.0' long Culvert** RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 605.00' S= 0.0132 '/' Cc= 0.900 n= 0.013
#2	Device 1	605.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	610.00'	**12.0" x 18.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 609.50' S= 0.0278 '/' Cc= 0.900 n= 0.013
#4	Device 3	610.00'	**11.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.63 cfs @ 12.24 hrs HW=612.48' (Free Discharge)
└─**1=Culvert** (Passes 0.63 cfs of 9.81 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.63 cfs @ 12.8 fps)

Secondary OutFlow Max=4.52 cfs @ 12.24 hrs HW=612.48' (Free Discharge)
└─**3=Culvert** (Passes 4.52 cfs of 5.33 cfs potential flow)
  └─**4=Orifice/Grate** (Orifice Controls 4.52 cfs @ 6.9 fps)

Pond N-P-ST-B4: P-ST-B4



Time span=0.00-108.00 hrs, dt=0.01 hrs, 10801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6 Runoff Area=1.806 ac Runoff Depth=5.73"
Tc=5.0 min CN=96 Runoff=11.24 cfs 0.862 af

Subcatchment N-S-P-ST-B4: New P-ST-B4 Runoff Area=2.167 ac Runoff Depth=5.96"
Tc=5.0 min CN=98 Runoff=13.64 cfs 1.077 af

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6 Peak Elev=612.39' Storage=0.435 af Inflow=11.24 cfs 0.862 af
Outflow=0.82 cfs 0.862 af

Pond N-P-ST-B4: P-ST-B4 Peak Elev=613.18' Storage=16,314 cf Inflow=13.64 cfs 1.077 af
Primary=0.66 cfs 0.686 af Secondary=5.24 cfs 0.391 af Outflow=5.90 cfs 1.076 af

Total Runoff Area = 3.973 ac Runoff Volume = 1.938 af Average Runoff Depth = 5.85"

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6

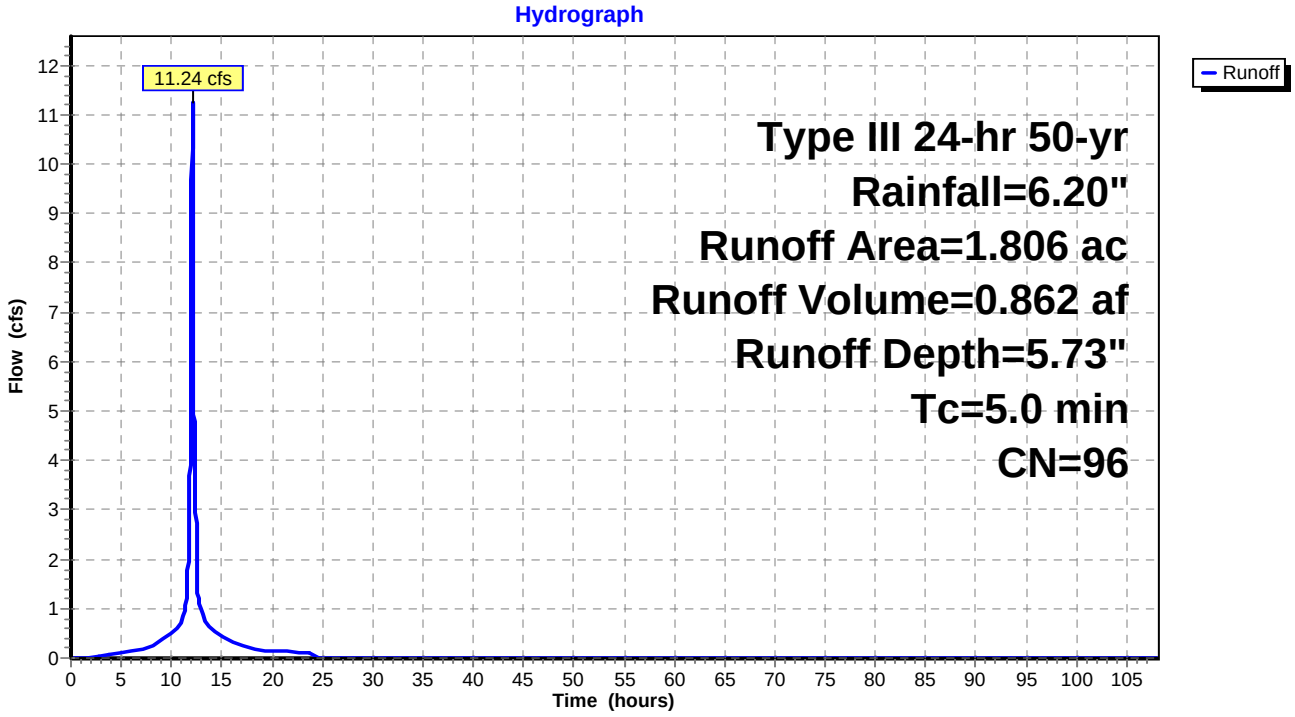
Runoff = 11.24 cfs @ 12.07 hrs, Volume= 0.862 af, Depth= 5.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.20"

Area (ac)	CN	Description
1.665	98	
0.141	69	Pasture/grassland/range, Fair, HSG B
1.806	96	Weighted Average

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

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6



Subcatchment N-S-P-ST-B4: New P-ST-B4

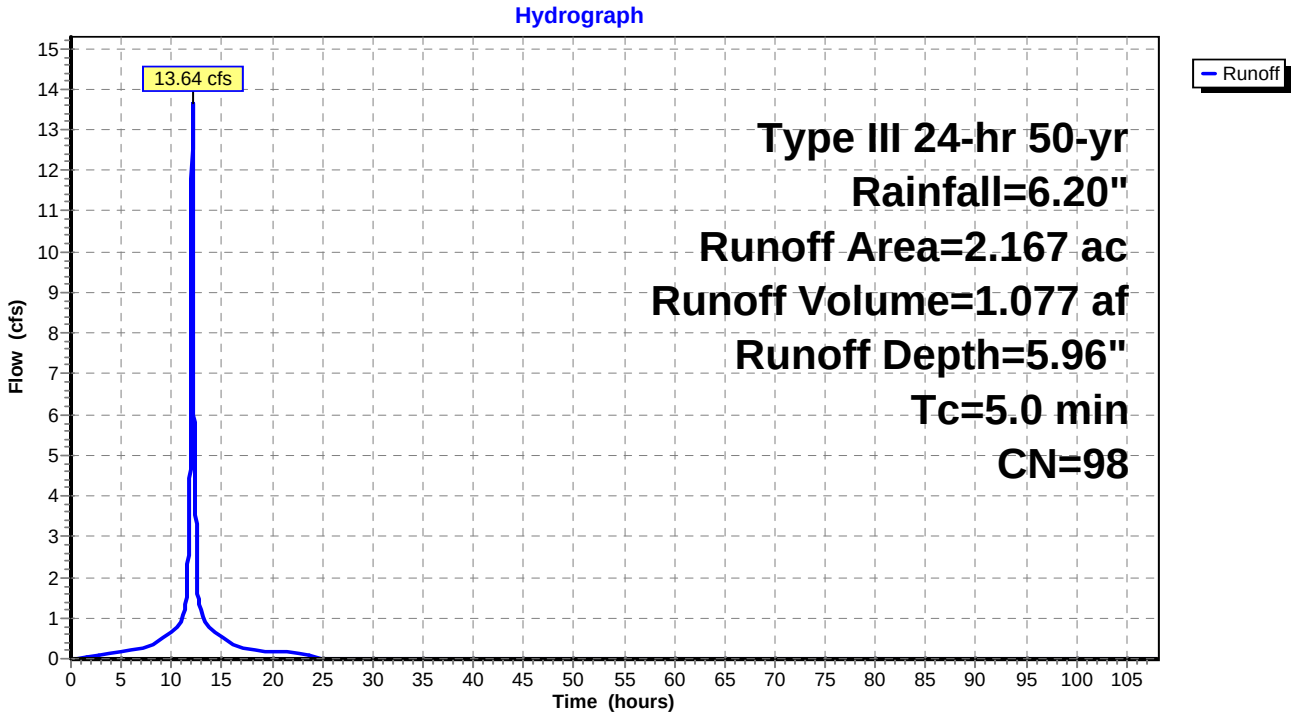
Runoff = 13.64 cfs @ 12.07 hrs, Volume= 1.077 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.20"

Area (ac)	CN	Description
2.167	98	

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

Subcatchment N-S-P-ST-B4: New P-ST-B4



Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6

Inflow Area =	1.806 ac,	Inflow Depth =	5.73"	for	50-yr event
Inflow =	11.24 cfs @	12.07 hrs,	Volume=	0.862 af	
Outflow =	0.82 cfs @	13.10 hrs,	Volume=	0.862 af,	Atten= 93%, Lag= 62.0 min
Primary =	0.82 cfs @	13.10 hrs,	Volume=	0.862 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 612.39' @ 13.10 hrs Surf.Area= 0.054 ac Storage= 0.435 af
Plug-Flow detention time= 272.4 min calculated for 0.862 af (100% of inflow)
Center-of-Mass det. time= 272.7 min (1,029.2 - 756.6)

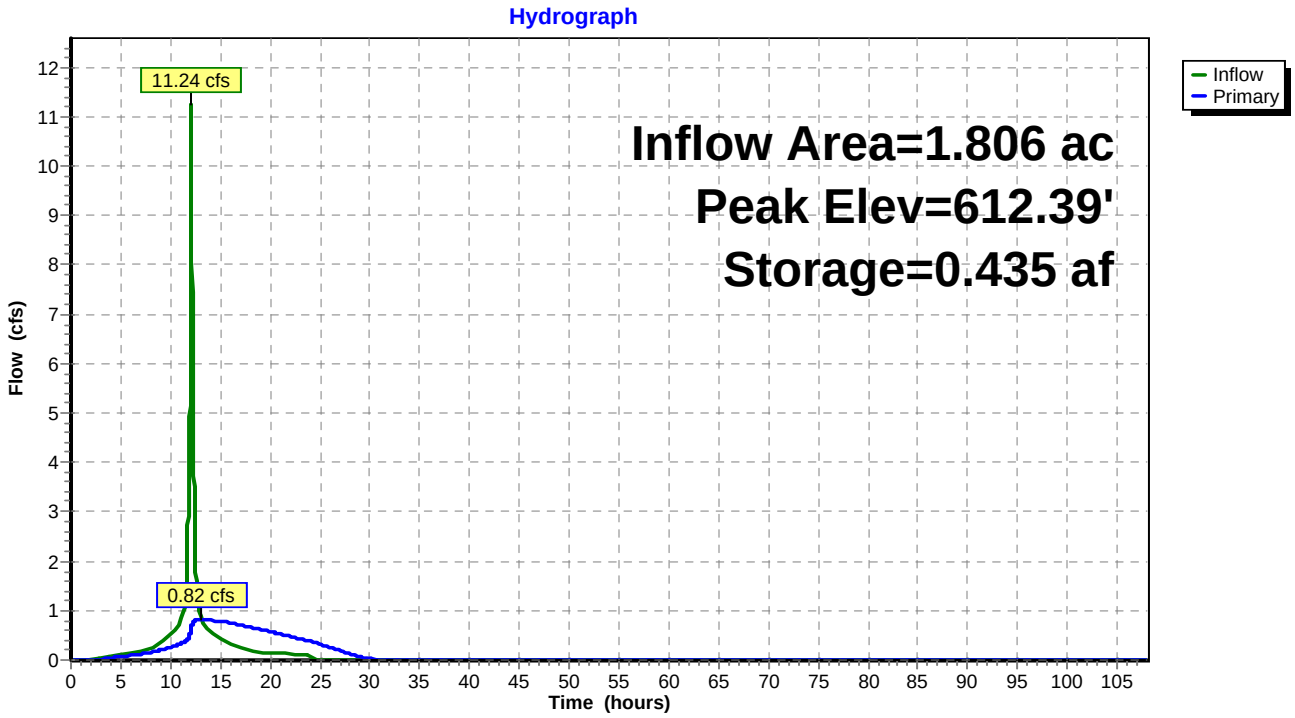
Volume	Invert	Avail.Storage	Storage Description
#1	604.33'	0.540 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.33	0.054	0.000	0.000
614.33	0.054	0.540	0.540

Device	Routing	Invert	Outlet Devices
#1	Primary	604.33'	**12.0" x 430.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 597.20' S= 0.0166 '/' Cc= 0.900 n= 0.013
#2	Device 1	604.33'	**3.0" Vert. Orifice/Grate X 0.00** C= 0.600
#3	Device 1	604.33'	**0.40' W x 0.15' H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.82 cfs @ 13.10 hrs HW=612.39' (Free Discharge)
└─**1=Culvert** (Passes 0.82 cfs of 6.13 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.82 cfs @ 13.6 fps)

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6



Pond N-P-ST-B4: P-ST-B4

Inflow Area =	2.167 ac,	Inflow Depth =	5.96"	for	50-yr event
Inflow =	13.64 cfs @	12.07 hrs,	Volume=	1.077 af	
Outflow =	5.90 cfs @	12.23 hrs,	Volume=	1.076 af,	Atten= 57%, Lag= 9.8 min
Primary =	0.66 cfs @	12.23 hrs,	Volume=	0.686 af	
Secondary =	5.24 cfs @	12.23 hrs,	Volume=	0.391 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 613.18' @ 12.23 hrs Surf.Area= 2,058 sf Storage= 16,314 cf
Plug-Flow detention time= 163.2 min calculated for 1.076 af (100% of inflow)
Center-of-Mass det. time= 163.1 min (906.8 - 743.7)

Volume	Invert	Avail.Storage	Storage Description
#1	605.25'	20,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

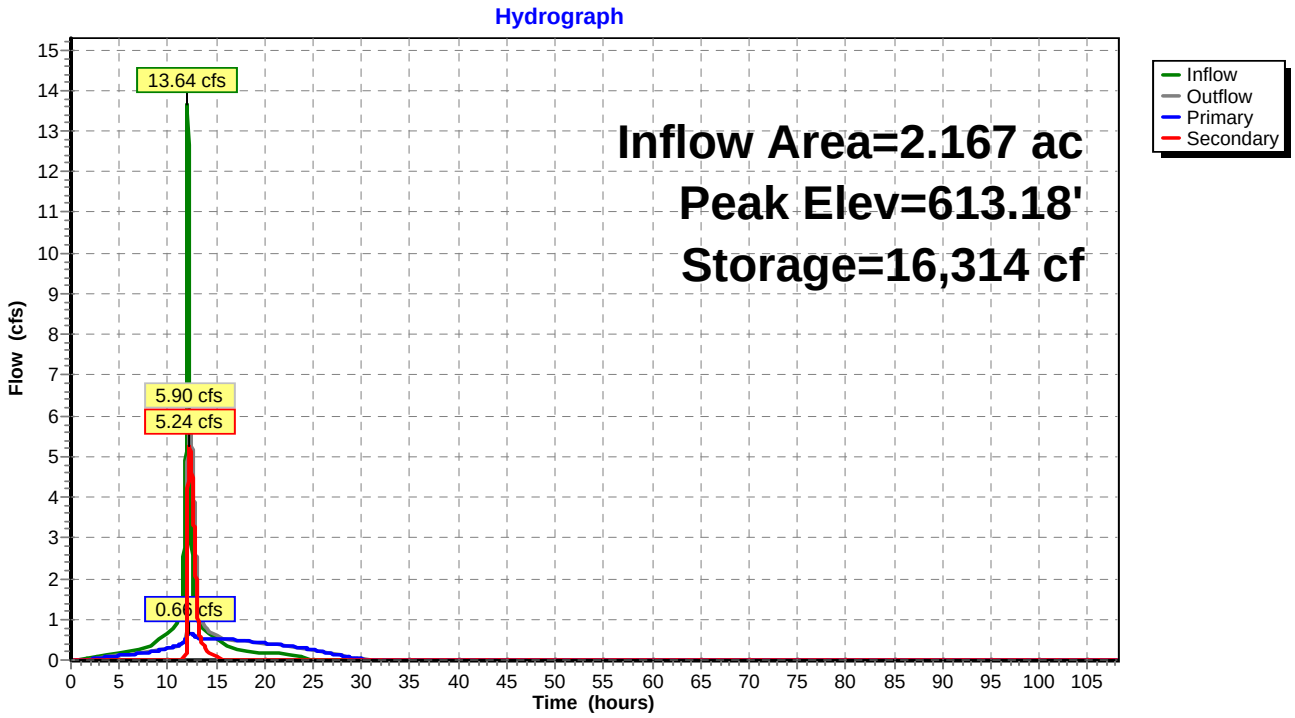
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
605.25	2,058	0	0
615.25	2,058	20,580	20,580

Device	Routing	Invert	Outlet Devices
#1	Primary	605.25'	**12.0" x 19.0' long Culvert** RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 605.00' S= 0.0132 '/' Cc= 0.900 n= 0.013
#2	Device 1	605.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	610.00'	**12.0" x 18.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 609.50' S= 0.0278 '/' Cc= 0.900 n= 0.013
#4	Device 3	610.00'	**11.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.66 cfs @ 12.23 hrs HW=613.18' (Free Discharge)
└─**1=Culvert** (Passes 0.66 cfs of 10.31 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.66 cfs @ 13.4 fps)

Secondary OutFlow Max=5.24 cfs @ 12.23 hrs HW=613.18' (Free Discharge)
└─**3=Culvert** (Passes 5.24 cfs of 6.19 cfs potential flow)
  └─**4=Orifice/Grate** (Orifice Controls 5.24 cfs @ 7.9 fps)

Pond N-P-ST-B4: P-ST-B4



Time span=0.00-108.00 hrs, dt=0.01 hrs, 10801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6 Runoff Area=1.806 ac Runoff Depth=6.42"
Tc=5.0 min CN=96 Runoff=12.55 cfs 0.967 af

Subcatchment N-S-P-ST-B4: New P-ST-B4 Runoff Area=2.167 ac Runoff Depth=6.66"
Tc=5.0 min CN=98 Runoff=15.20 cfs 1.203 af

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6 Peak Elev=613.50' Storage=0.495 af Inflow=12.55 cfs 0.967 af
Outflow=0.87 cfs 0.967 af

Pond N-P-ST-B4: P-ST-B4 Peak Elev=613.84' Storage=17,685 cf Inflow=15.20 cfs 1.203 af
Primary=0.69 cfs 0.722 af Secondary=5.85 cfs 0.481 af Outflow=6.53 cfs 1.203 af

Total Runoff Area = 3.973 ac Runoff Volume = 2.170 af Average Runoff Depth = 6.55"

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6

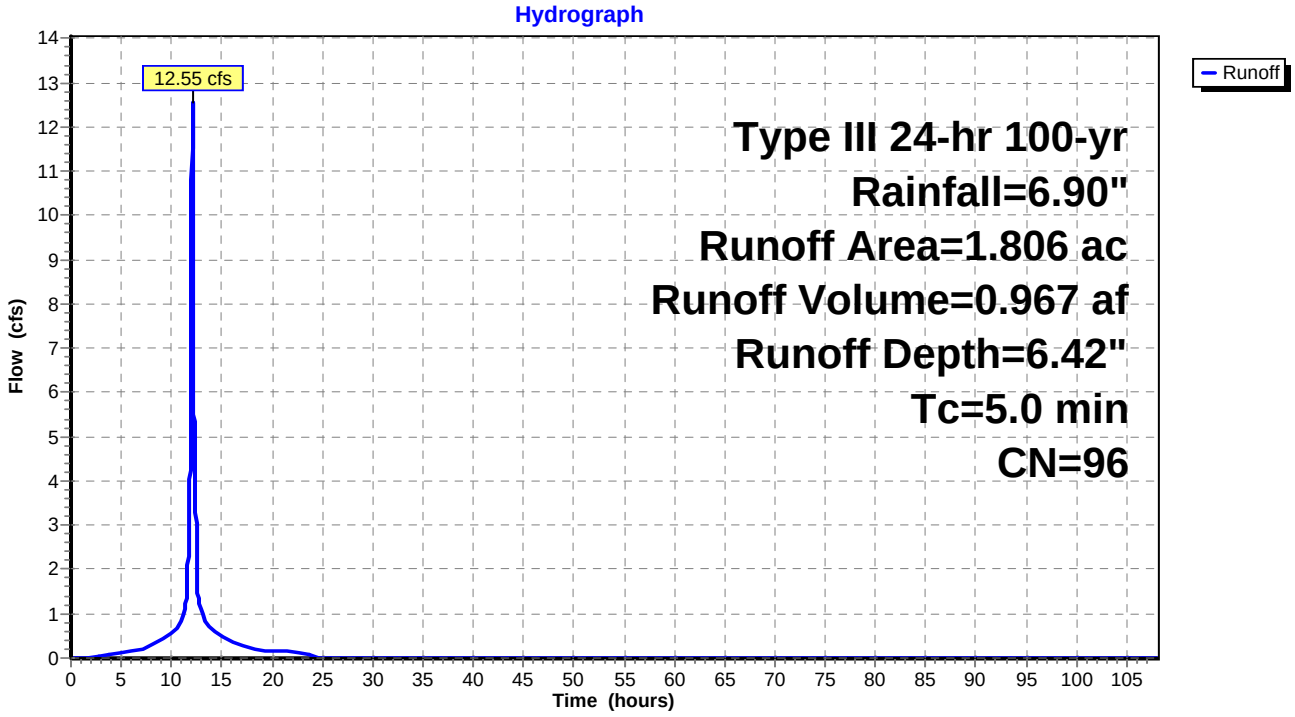
Runoff = 12.55 cfs @ 12.07 hrs, Volume= 0.967 af, Depth= 6.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.90"

Area (ac)	CN	Description
1.665	98	
0.141	69	Pasture/grassland/range, Fair, HSG B
1.806	96	Weighted Average

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

Subcatchment N-S-P-ST-B1,B5,B6: New P-ST-B1,B5,B6



Subcatchment N-S-P-ST-B4: New P-ST-B4

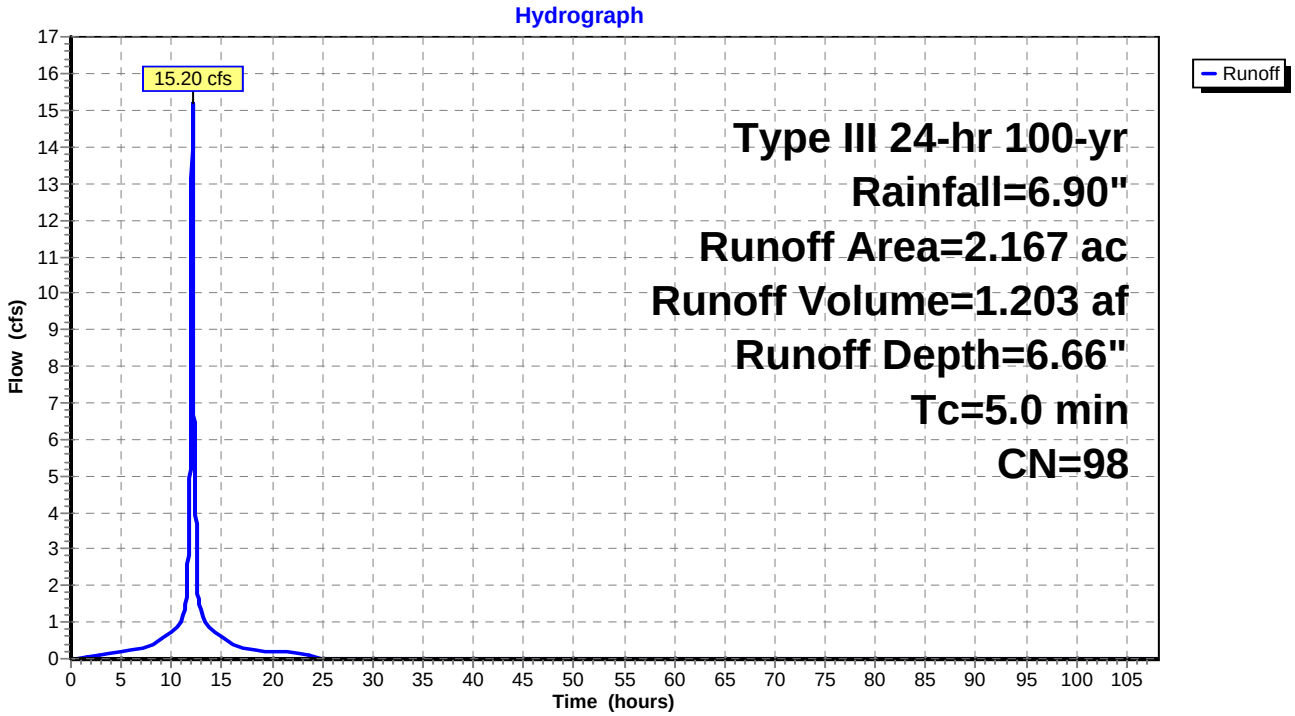
Runoff = 15.20 cfs @ 12.07 hrs, Volume= 1.203 af, Depth= 6.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.90"

Area (ac)	CN	Description
2.167	98	

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

Subcatchment N-S-P-ST-B4: New P-ST-B4



Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6

Inflow Area = 1.806 ac, Inflow Depth = 6.42" for 100-yr event
Inflow = 12.55 cfs @ 12.07 hrs, Volume= 0.967 af
Outflow = 0.87 cfs @ 13.21 hrs, Volume= 0.967 af, Atten= 93%, Lag= 68.6 min
Primary = 0.87 cfs @ 13.21 hrs, Volume= 0.967 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 613.50' @ 13.21 hrs Surf.Area= 0.054 ac Storage= 0.495 af
Plug-Flow detention time= 290.8 min calculated for 0.967 af (100% of inflow)
Center-of-Mass det. time= 290.7 min (1,045.1 - 754.3)

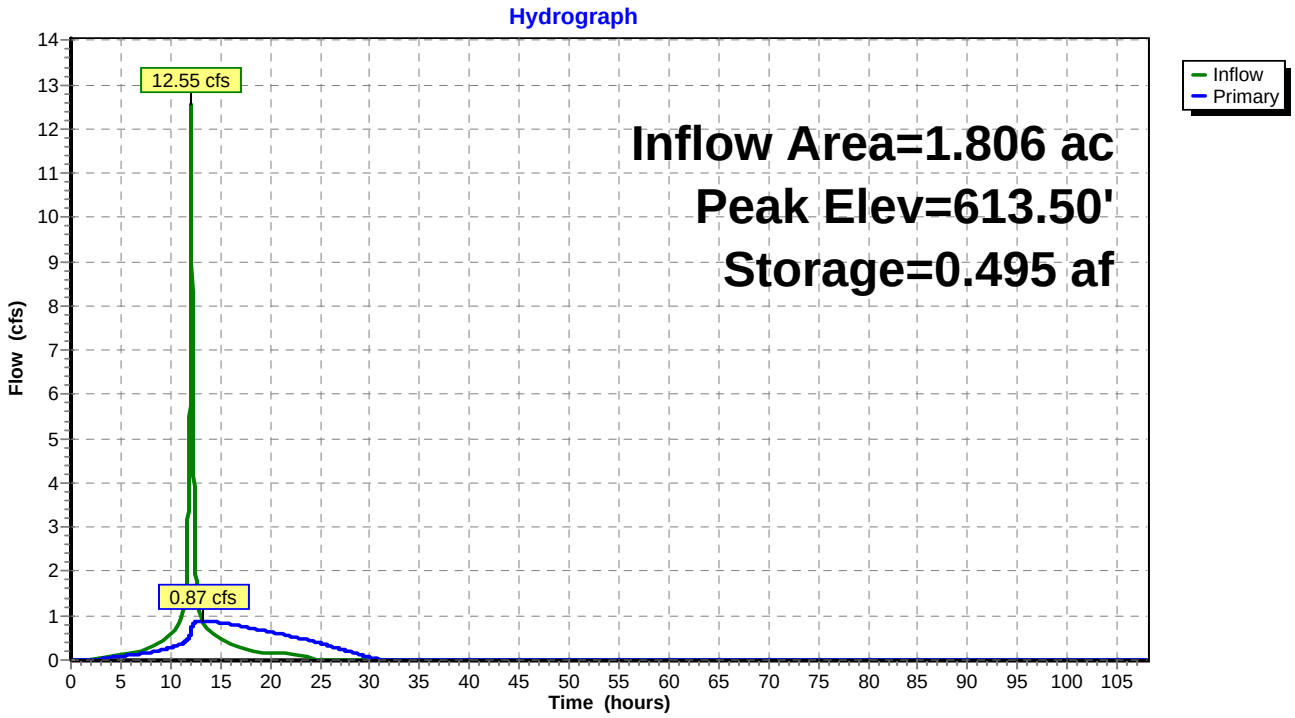
Volume	Invert	Avail.Storage	Storage Description
#1	604.33'	0.540 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.33	0.054	0.000	0.000
614.33	0.054	0.540	0.540

Device	Routing	Invert	Outlet Devices
#1	Primary	604.33'	**12.0" x 430.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 597.20' S= 0.0166 '/' Cc= 0.900 n= 0.013
#2	Device 1	604.33'	**3.0" Vert. Orifice/Grate X 0.00** C= 0.600
#3	Device 1	604.33'	**0.40' W x 0.15' H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.87 cfs @ 13.21 hrs HW=613.50' (Free Discharge)
└─**1=Culvert** (Passes 0.87 cfs of 6.36 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.87 cfs @ 14.5 fps)

Pond N-P-ST-B1,B5,B6: P-ST-B1,B5,B6



Pond N-P-ST-B4: P-ST-B4

Inflow Area =	2.167 ac,	Inflow Depth =	6.66"	for	100-yr event
Inflow =	15.20 cfs @	12.07 hrs,	Volume=	1.203 af	
Outflow =	6.53 cfs @	12.24 hrs,	Volume=	1.203 af,	Atten= 57%, Lag= 10.0 min
Primary =	0.69 cfs @	12.24 hrs,	Volume=	0.722 af	
Secondary =	5.85 cfs @	12.24 hrs,	Volume=	0.481 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-108.00 hrs, dt= 0.01 hrs
Peak Elev= 613.84' @ 12.24 hrs Surf.Area= 2,058 sf Storage= 17,685 cf
Plug-Flow detention time= 156.2 min calculated for 1.203 af (100% of inflow)
Center-of-Mass det. time= 156.1 min (898.4 - 742.2)

Volume	Invert	Avail.Storage	Storage Description
#1	605.25'	20,580 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

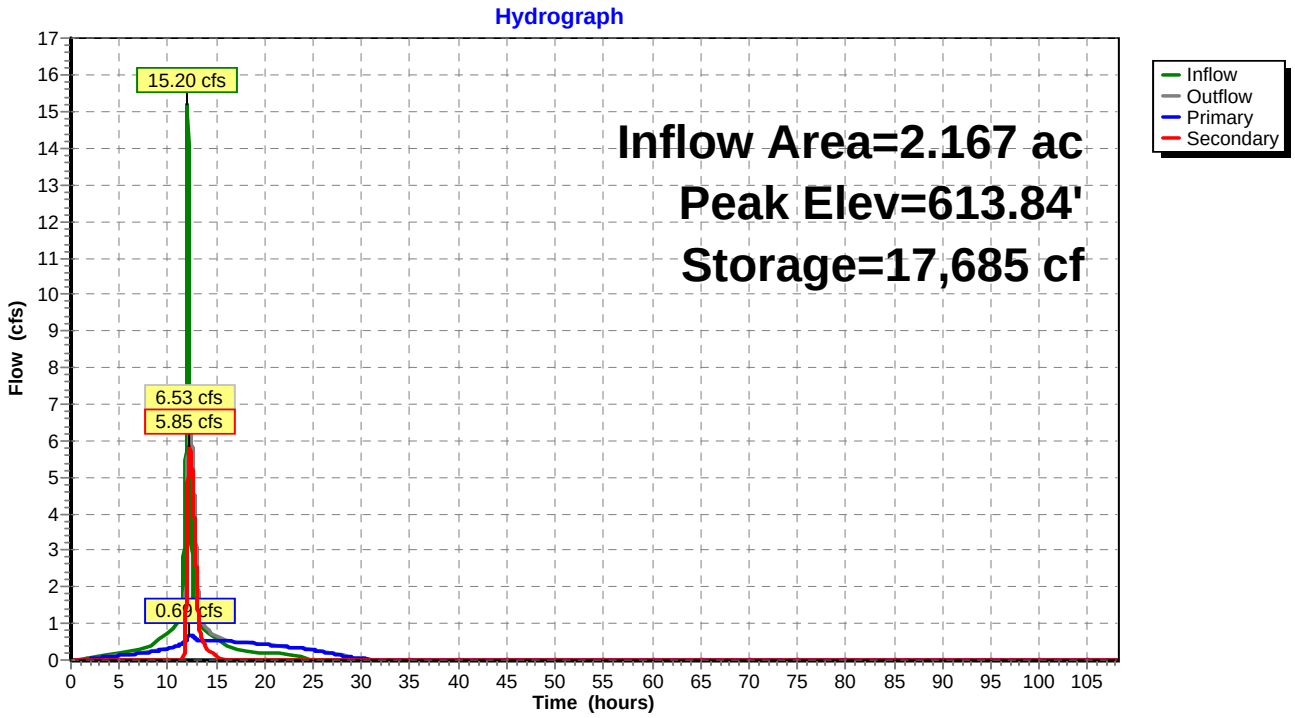
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
605.25	2,058	0	0
615.25	2,058	20,580	20,580

Device	Routing	Invert	Outlet Devices
#1	Primary	605.25'	**12.0" x 19.0' long Culvert** RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 605.00' S= 0.0132 '/' Cc= 0.900 n= 0.013
#2	Device 1	605.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	610.00'	**12.0" x 18.0' long Culvert** RCP, square edge headwall, Ke= 0.500 Outlet Invert= 609.50' S= 0.0278 '/' Cc= 0.900 n= 0.013
#4	Device 3	610.00'	**11.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.69 cfs @ 12.24 hrs HW=613.84' (Free Discharge)
└─**1=Culvert** (Passes 0.69 cfs of 10.76 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.69 cfs @ 14.0 fps)

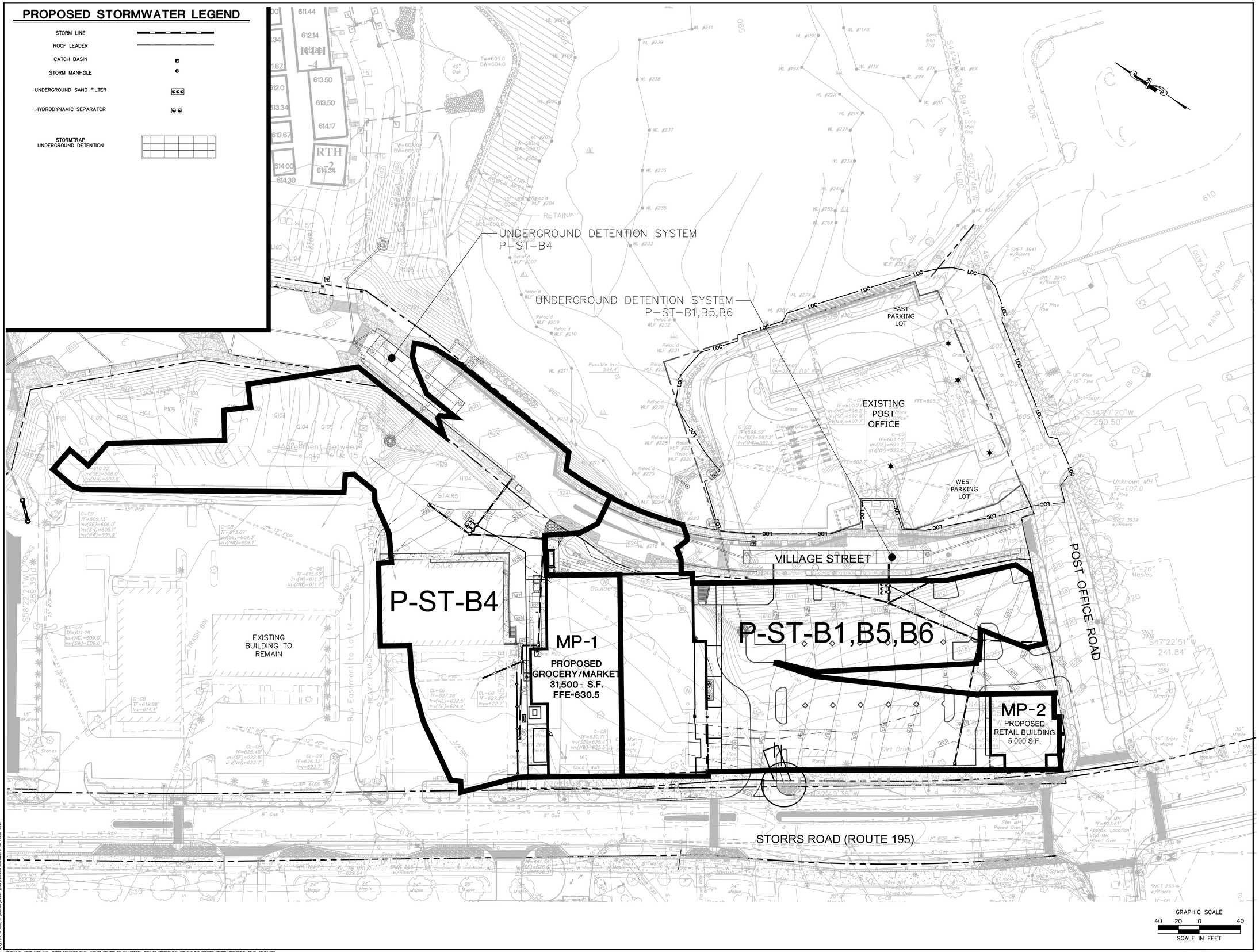
Secondary OutFlow Max=5.85 cfs @ 12.24 hrs HW=613.84' (Free Discharge)
└─**3=Culvert** (Passes 5.85 cfs of 6.91 cfs potential flow)
  └─**4=Orifice/Grate** (Orifice Controls 5.85 cfs @ 8.9 fps)

Pond N-P-ST-B4: P-ST-B4



Appendix B

Amended Post Development
Subwatersheds Map for Market Square (PD-3.a)



STORRS RETHINK MAIN STREET CENTER

Mansfield Downtown Partnership
Helping to Build Mansfield's Future

Town Builder & Master Developer
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ARCHITECTURE
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PLANNING
LANDSCAPE ARCHITECTURE
LAND SURVEYING
ENVIRONMENTAL SCIENCES

ROBINSON & COLE LLP

REVISION	DATE

AMENDED POSTDEVELOPMENT SUBWATERSHEDS MAP FOR MARKET SQUARE

DESIGNED	G.F.
DRAWN	N.G.Y.
CHECKED	
APPROVED	
SCALE	1"=40'
PROJECT #	03C667
DATE	08/29/2012

SHEET
PD-3.a

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