FREEMAN COMPANIES

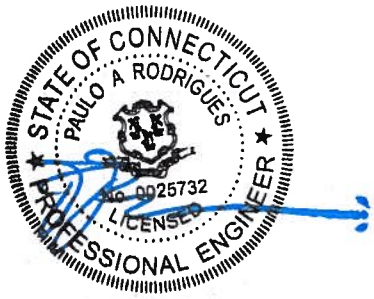
LAND DEVELOPMENT
ENGINEERING DESIGN
CONSTRUCTION SERVICES

Date: **September 25, 2018**

To: **East Hartford Planning and Zoning Commission**

From: **Paul Rodrigues, PE**
Freeman Companies, LLC

Subject: **Drainage Memorandum with Stormwater Calculations**
Nixon Medical Laundry Site Plan Modification
East Hartford, Connecticut



The Nixon Medical Laundry facility is an existing use expanding its parking lot. The total development is approximately 2.2 acres. The proposed parking lot expansion is currently a residential lot that is proposed to be demolished and converted. The total increase in impervious area draining to the Town storm drain system is approximately 3,300 square feet (sf).

According to NRCS Web Soil Survey, the site consists mainly of Urban Land and has a Hydrologic Soil Group of D, which relates to poorly draining material. There is a slight increase in post development flow rates offsite, which connect into the Town storm drainage system. To mitigate this increase, the proposed drainage system includes 3 underground plastic storage chambers surrounded by stone, model SC-740 by StormTech. The calculations do not account for any infiltration to be conservative in the required volume. The storage volume provided is 10.8 cubic yards (cy).

The subject property contains a conventional stormwater system consisting of trench drains, catch basins, and drainage manholes. These existing drainage structures collect stormwater and direct it to the storm drainage system (not a combined system) on James Street and Cherry Street. The total flow offsite was used as the design point for comparison of both Pre and Post flows.

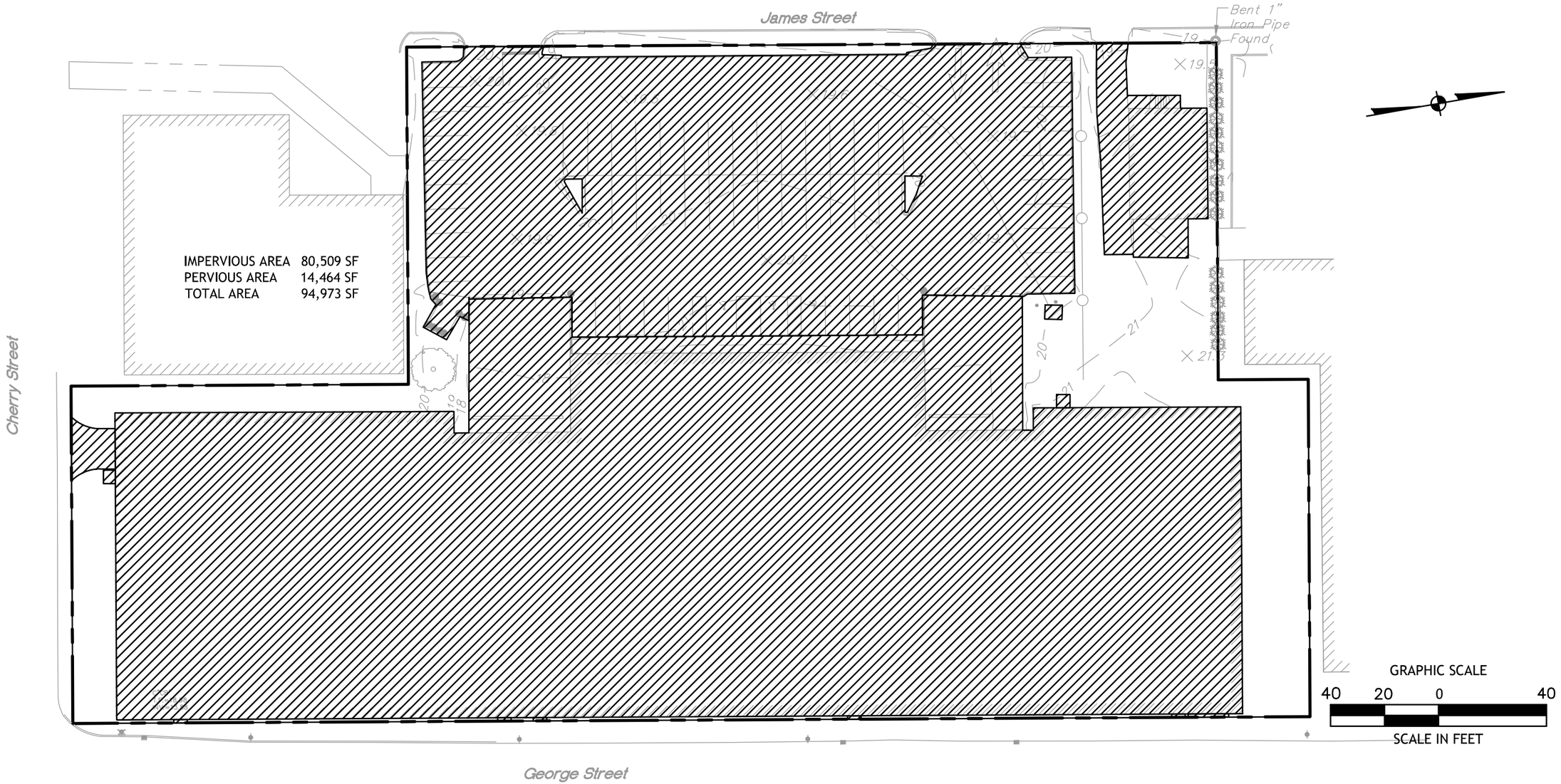
The intent of the proposed site drainage is to mimic the existing drainage patterns as much as possible while taking into account the existing site features and the inverts of the existing drainage systems within the site and the adjacent road, James Street. The proposed drainage system is designed in accordance with the 2004 Connecticut Stormwater Quality Manual and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control Manual. The underground chambers capture and treat the Water Quality Volume of 1-inch over the 3,300 sf, which equates to 10.2 cy. Therefore, there is no increase in Directly Connected Impervious area to the MS4 system of East Hartford.

Conclusions

The HydroCAD calculations show a decrease in the peak flow rates offsite for each of the following storm events, 2-yr, 10-yr, 25-yr, 50-yr and 100-yr. The

Attachments

Figure 1 Existing Drainage Area Map
Figure 2 Proposed Drainage Area Map
HydroCAD Stormwater Management Calculations
Web Soil Survey information



EXISTING DRAINAGE AREA MAP
NIXON MEDICAL
80 GEORGE STREET
EAST HARTFORD, CONNECTICUT

FREEMAN COMPANIES
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ELEVATE YOUR EXPECTATIONS

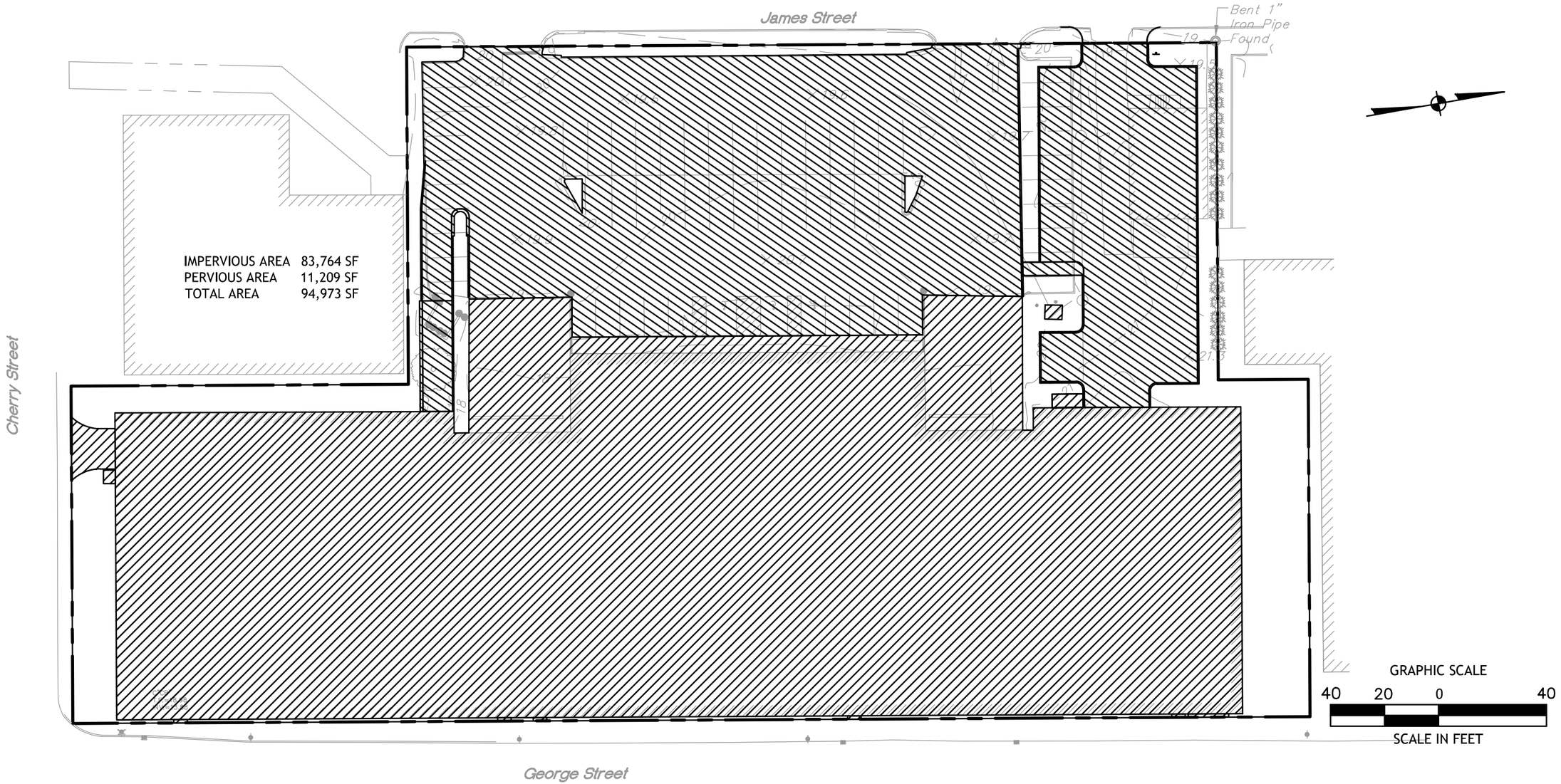
No.	Date	Description
–	–	–

REVISIONS

DRAWN:	M.K.
CHECKED:	J.N.L.
APPROVED:	J.N.L.
SCALE:	1" = 40'
PROJECT NO.:	2013–1004B
DATE:	09/24/2018

SHEET NO.

FIGURE 1



POST DRAINAGE AREA MAP
NIXON MEDICAL
80 GEORGE STREET
EAST HARTFORD, CONNECTICUT

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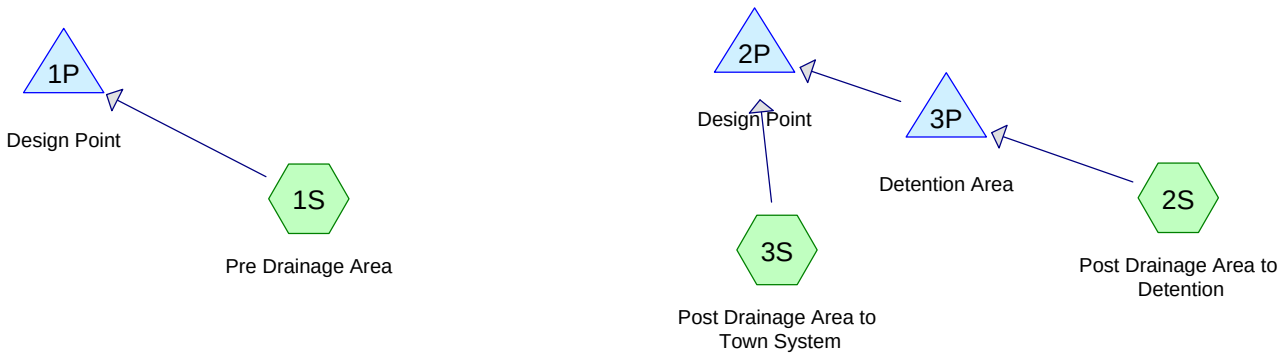
FIGURE 2



Subcat Reach Pond Link

Routing Diagram for Pre and Post-Development Calcs
Prepared by Freeman Companies, LLC, Printed 9/25/2018

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Drainage Area Runoff Area=94,973 sf 0.00% Impervious Runoff Depth=0.33"
Tc=5.0 min C=0.82 Runoff=8.44 cfs 0.060 af

Subcatchment 2S: Post Drainage Area to Runoff Area=8,742 sf 0.00% Impervious Runoff Depth=0.36"
Tc=5.0 min C=0.90 Runoff=0.85 cfs 0.006 af

Subcatchment 3S: Post Drainage Area to Runoff Area=86,231 sf 0.00% Impervious Runoff Depth=0.33"
Tc=5.0 min C=0.83 Runoff=7.75 cfs 0.055 af

Pond 1P: Design Point Inflow=8.44 cfs 0.060 af
Primary=8.44 cfs 0.060 af

Pond 2P: Design Point Inflow=7.75 cfs 0.055 af
Primary=7.75 cfs 0.055 af

Pond 3P: Detention Area Peak Elev=15.60' Storage=265 cf Inflow=0.85 cfs 0.006 af
12.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=0.00 cfs 0.000 af

Total Runoff Area = 4.361 ac Runoff Volume = 0.121 af Average Runoff Depth = 0.33"
100.00% Pervious = 4.361 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre Drainage Area

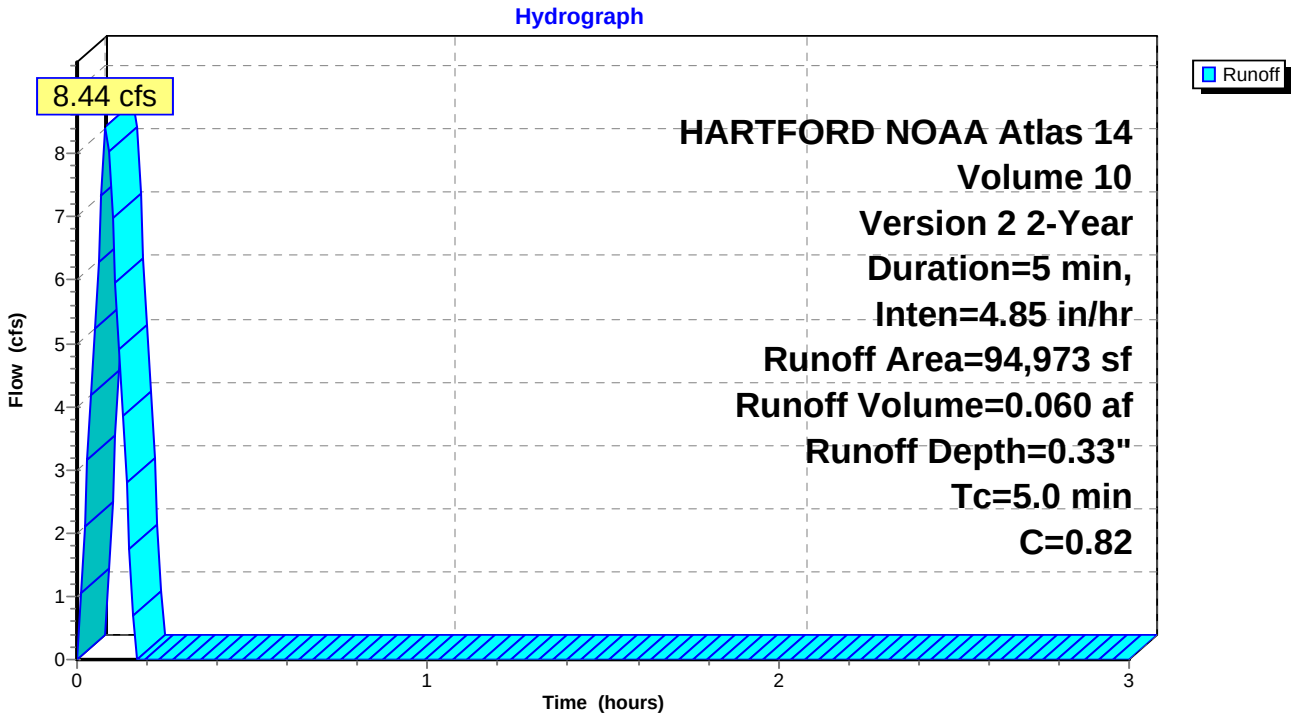
Runoff = 8.44 cfs @ 0.08 hrs, Volume= 0.060 af, Depth= 0.33"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 2-Year Duration=5 min, Inten=4.85 in/hr

Area (sf)	C	Description
14,464	0.35	50-75% Grass cover, Fair, HSG D
80,509	0.90	Paved parking, HSG D
94,973	0.82	Weighted Average
94,973		100.00% Pervious Area

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

Subcatchment 1S: Pre Drainage Area



Summary for Subcatchment 2S: Post Drainage Area to Detention

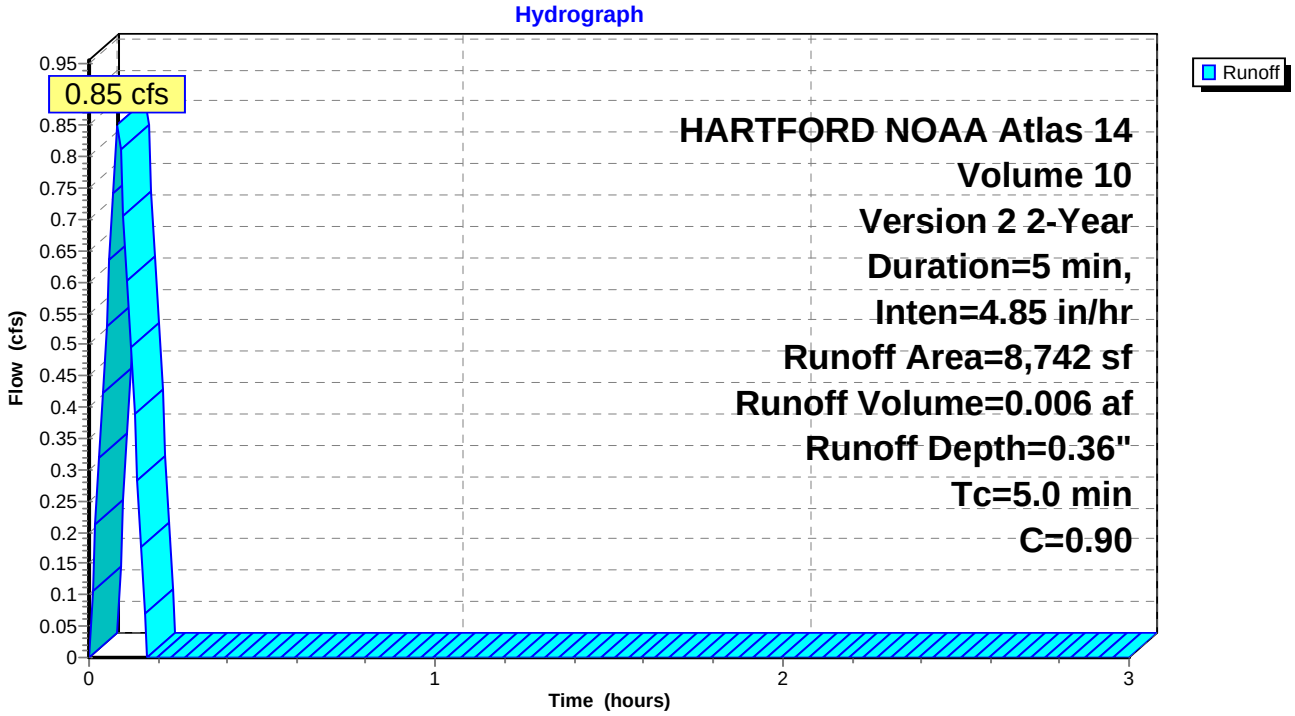
Runoff = 0.85 cfs @ 0.08 hrs, Volume= 0.006 af, Depth= 0.36"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 2-Year Duration=5 min, Inten=4.85 in/hr

Area (sf)	C	Description
8,742	0.90	Paved parking, HSG D
8,742		100.00% Pervious Area

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

Subcatchment 2S: Post Drainage Area to Detention



Summary for Subcatchment 3S: Post Drainage Area to Town System

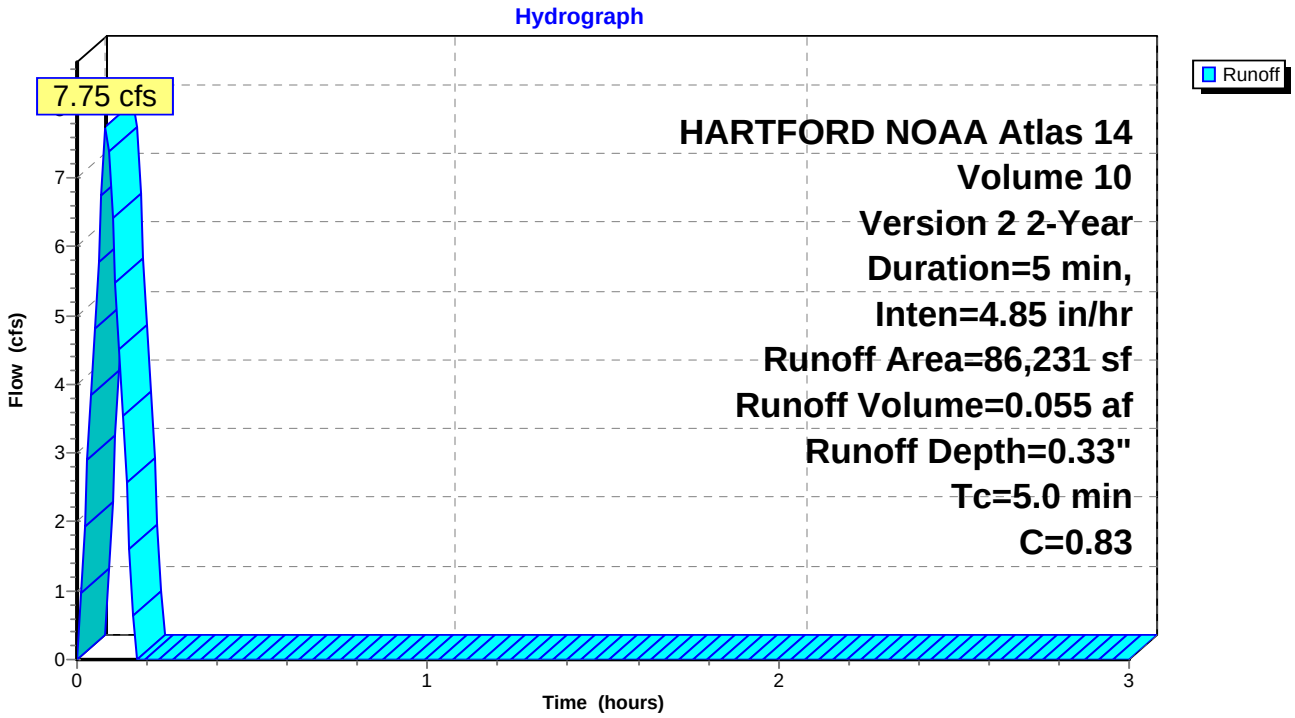
Runoff = 7.75 cfs @ 0.08 hrs, Volume= 0.055 af, Depth= 0.33"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 2-Year Duration=5 min, Inten=4.85 in/hr

Area (sf)	C	Description
11,209	0.35	50-75% Grass cover, Fair, HSG D
75,022	0.90	Paved parking, HSG D
86,231	0.83	Weighted Average
86,231		100.00% Pervious Area

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

Subcatchment 3S: Post Drainage Area to Town System

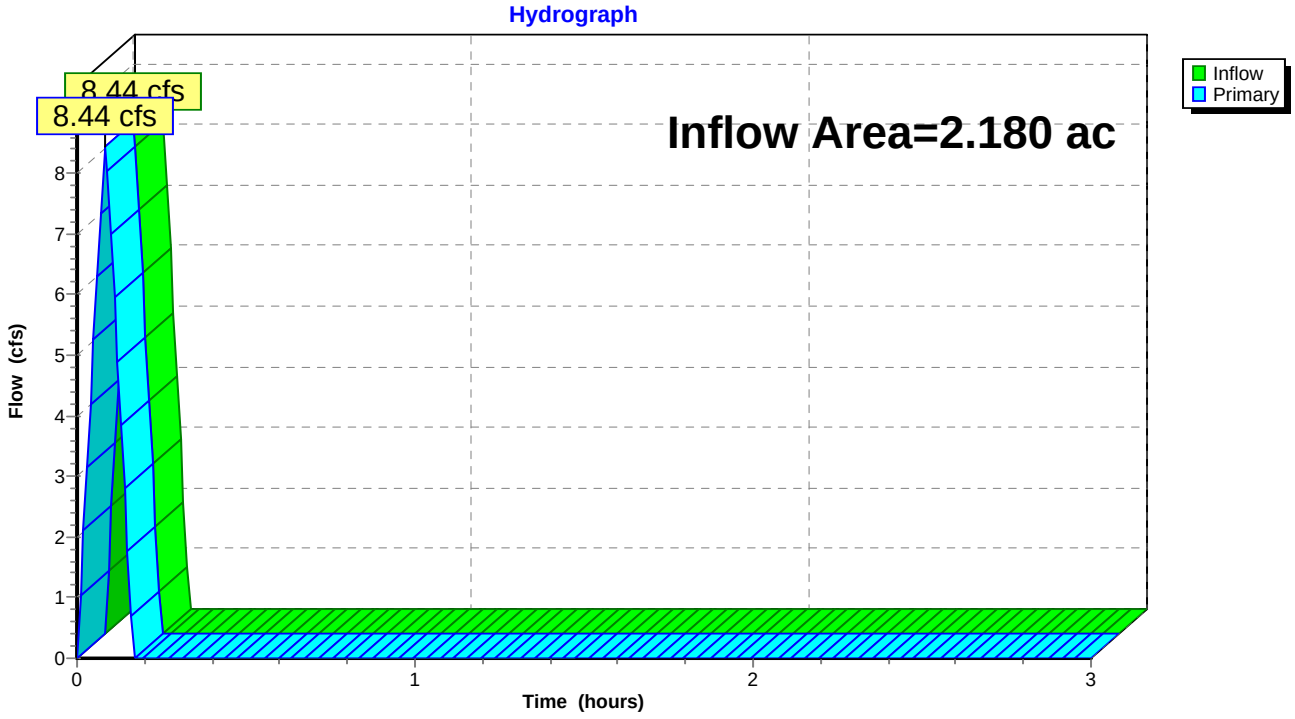


Summary for Pond 1P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.33" for 2-Year event
Inflow = 8.44 cfs @ 0.08 hrs, Volume= 0.060 af
Primary = 8.44 cfs @ 0.08 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point

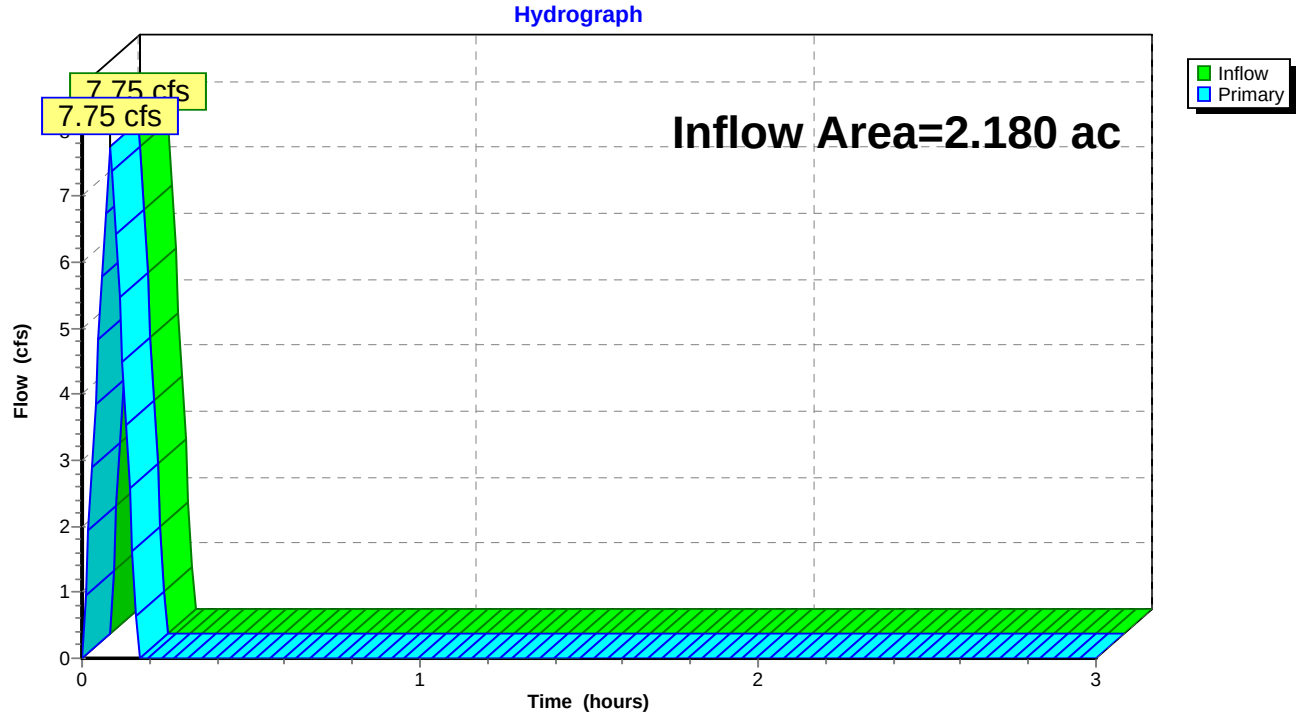


Summary for Pond 2P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2-Year event
Inflow = 7.75 cfs @ 0.08 hrs, Volume= 0.055 af
Primary = 7.75 cfs @ 0.08 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point



Summary for Pond 3P: Detention Area

Inflow Area = 0.201 ac, 0.00% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 0.85 cfs @ 0.08 hrs, Volume= 0.006 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 15.60' @ 0.17 hrs Surf.Area= 161 sf Storage= 265 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.75'	152 cf	**6.25'W x 23.80'L x 3.50'H Field A** 521 cf Overall - 141 cf Embedded = 380 cf x 40.0% Voids
#2A	13.25'	141 cf	**ADS_StormTech SC-740** x 3 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 1 rows
#3	14.75'	50 cf	**4.00'D x 4.00'H CB**
#4	15.89'	14 cf	**12.0" Round Pipe Storage** L= 18.0' S= 0.0050 '/'
#5	18.75'	28 cf	**surface storage (Prismatic)**Listed below (Recalc)
		385 cf	Total Available Storage

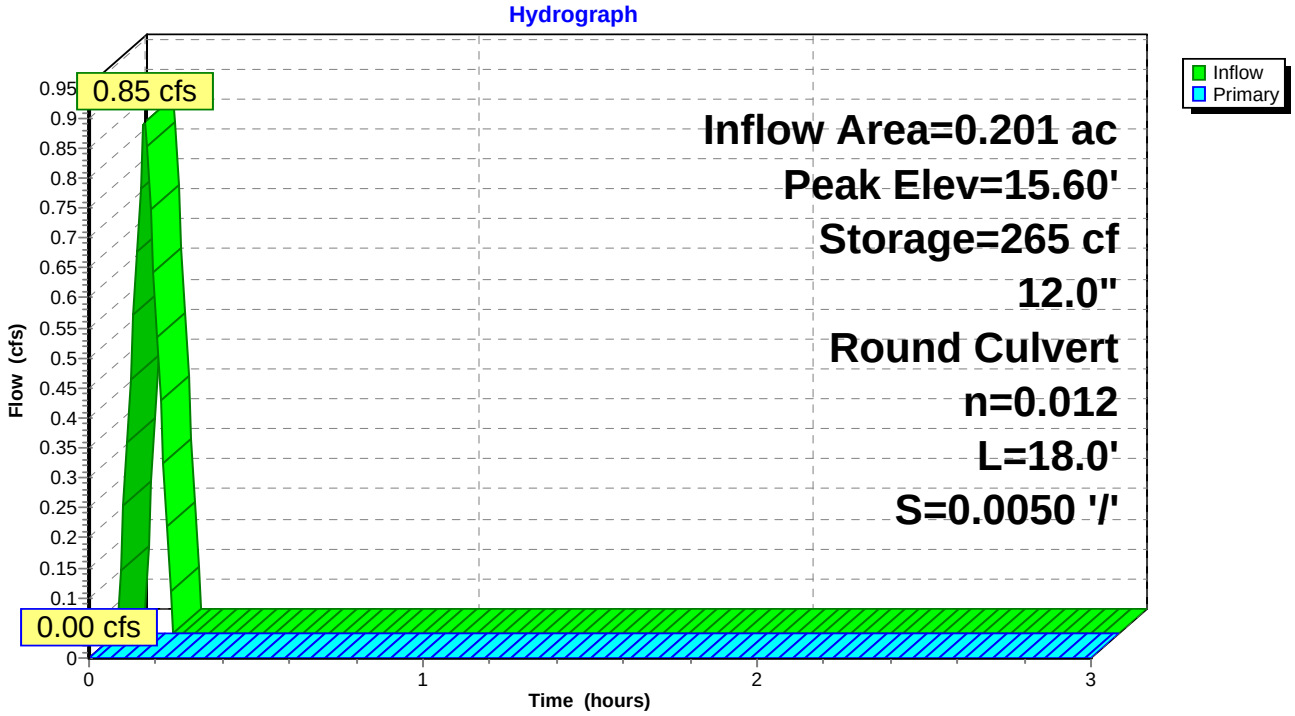
Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.75	0	0	0
19.00	225	28	28

Device	Routing	Invert	Outlet Devices
#1	Primary	15.89'	**12.0" Round Culvert** L= 18.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 15.89' / 15.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=12.75' (Free Discharge)
1=Culvert (Controls 0.00 cfs)

Pond 3P: Detention Area



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Drainage Area Runoff Area=94,973 sf 0.00% Impervious Runoff Depth=0.51"
Tc=5.0 min C=0.82 Runoff=12.94 cfs 0.092 af

Subcatchment 2S: Post Drainage Area to Runoff Area=8,742 sf 0.00% Impervious Runoff Depth=0.56"
Tc=5.0 min C=0.90 Runoff=1.31 cfs 0.009 af

Subcatchment 3S: Post Drainage Area to Runoff Area=86,231 sf 0.00% Impervious Runoff Depth=0.51"
Tc=5.0 min C=0.83 Runoff=11.89 cfs 0.085 af

Pond 1P: Design Point Inflow=12.94 cfs 0.092 af
Primary=12.94 cfs 0.092 af

Pond 2P: Design Point Inflow=11.89 cfs 0.088 af
Primary=11.89 cfs 0.088 af

Pond 3P: Detention Area Peak Elev=16.43' Storage=321 cf Inflow=1.31 cfs 0.009 af
12.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=0.77 cfs 0.003 af

Total Runoff Area = 4.361 ac Runoff Volume = 0.186 af Average Runoff Depth = 0.51"
100.00% Pervious = 4.361 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre Drainage Area

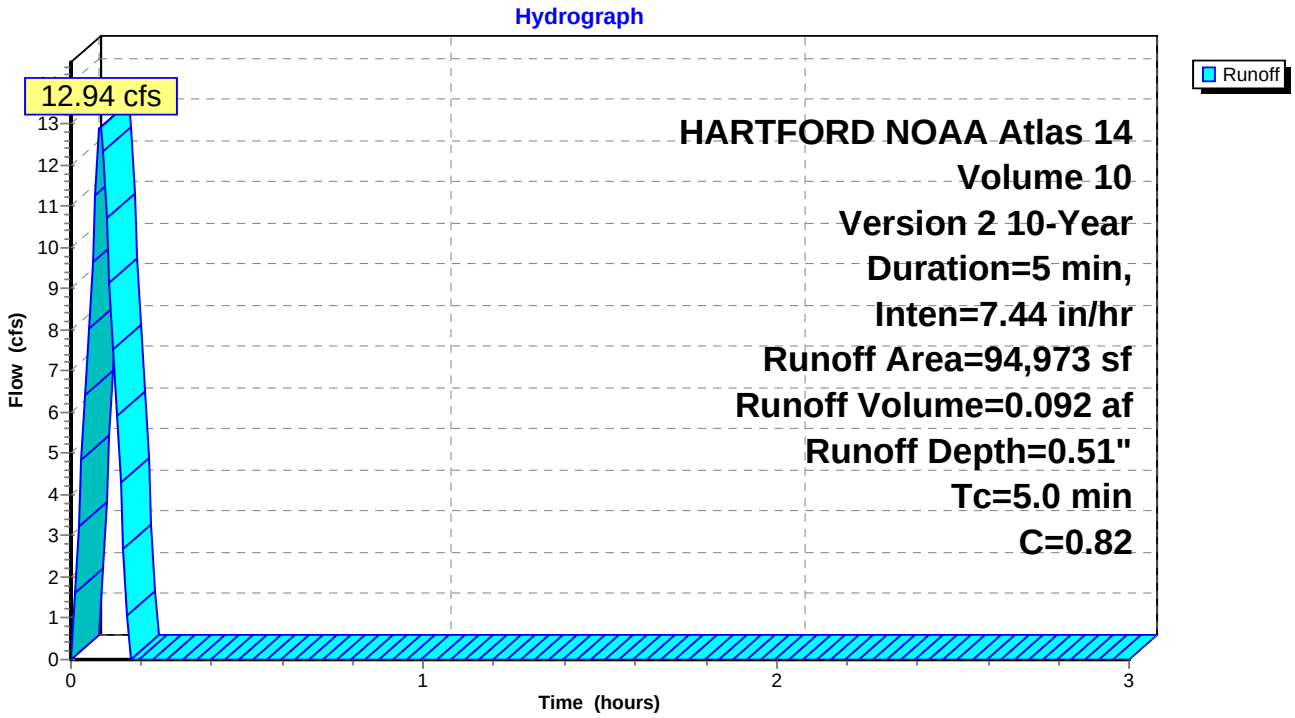
Runoff = 12.94 cfs @ 0.08 hrs, Volume= 0.092 af, Depth= 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 10-Year Duration=5 min, Inten=7.44 in/hr

Area (sf)	C	Description
14,464	0.35	50-75% Grass cover, Fair, HSG D
80,509	0.90	Paved parking, HSG D
94,973	0.82	Weighted Average
94,973		100.00% Pervious Area

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

Subcatchment 1S: Pre Drainage Area



Summary for Subcatchment 2S: Post Drainage Area to Detention

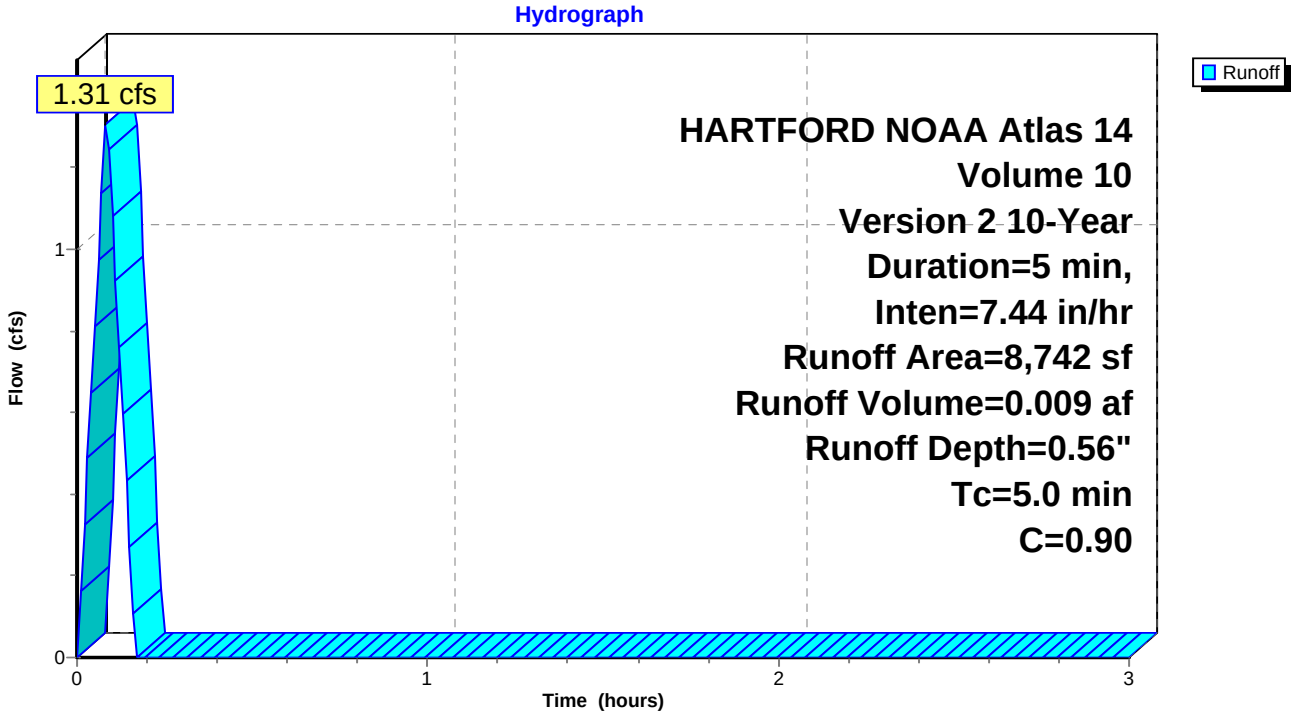
Runoff = 1.31 cfs @ 0.08 hrs, Volume= 0.009 af, Depth= 0.56"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 10-Year Duration=5 min, Inten=7.44 in/hr

Area (sf)	C	Description
8,742	0.90	Paved parking, HSG D
8,742		100.00% Pervious Area

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

Subcatchment 2S: Post Drainage Area to Detention



Summary for Subcatchment 3S: Post Drainage Area to Town System

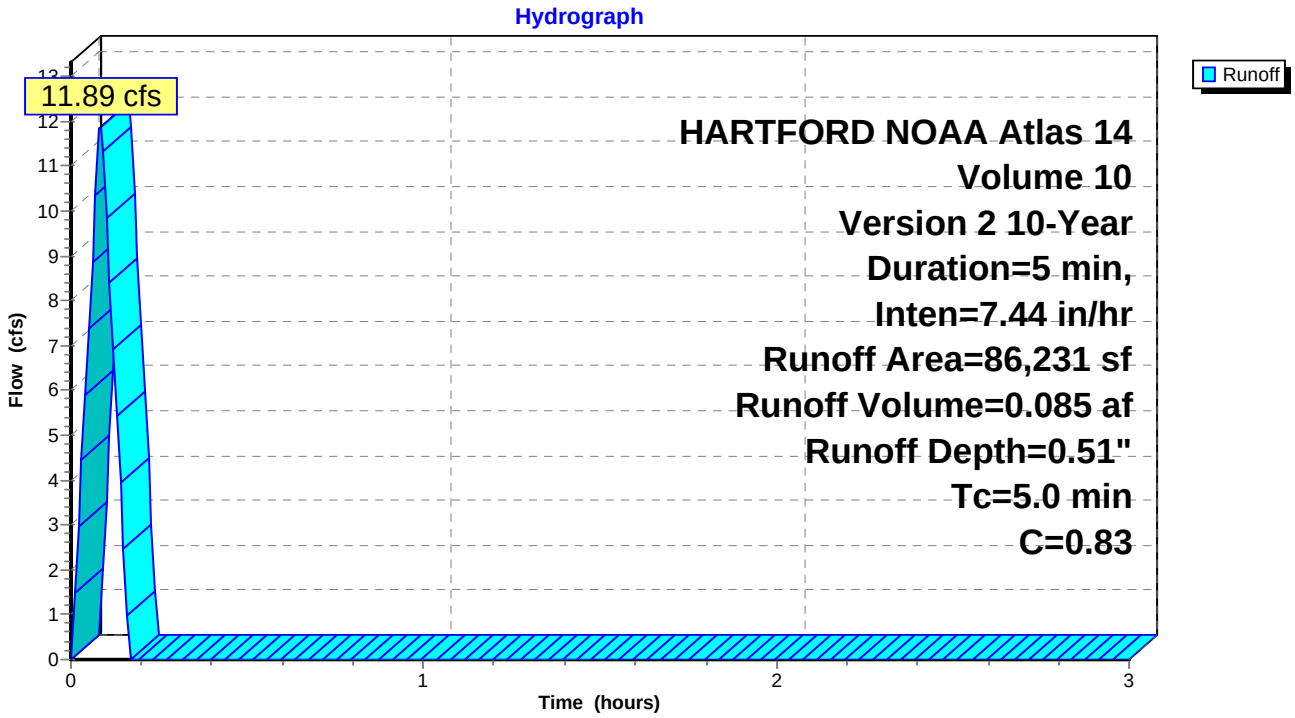
Runoff = 11.89 cfs @ 0.08 hrs, Volume= 0.085 af, Depth= 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 10-Year Duration=5 min, Inten=7.44 in/hr

Area (sf)	C	Description
11,209	0.35	50-75% Grass cover, Fair, HSG D
75,022	0.90	Paved parking, HSG D
86,231	0.83	Weighted Average
86,231		100.00% Pervious Area

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

Subcatchment 3S: Post Drainage Area to Town System

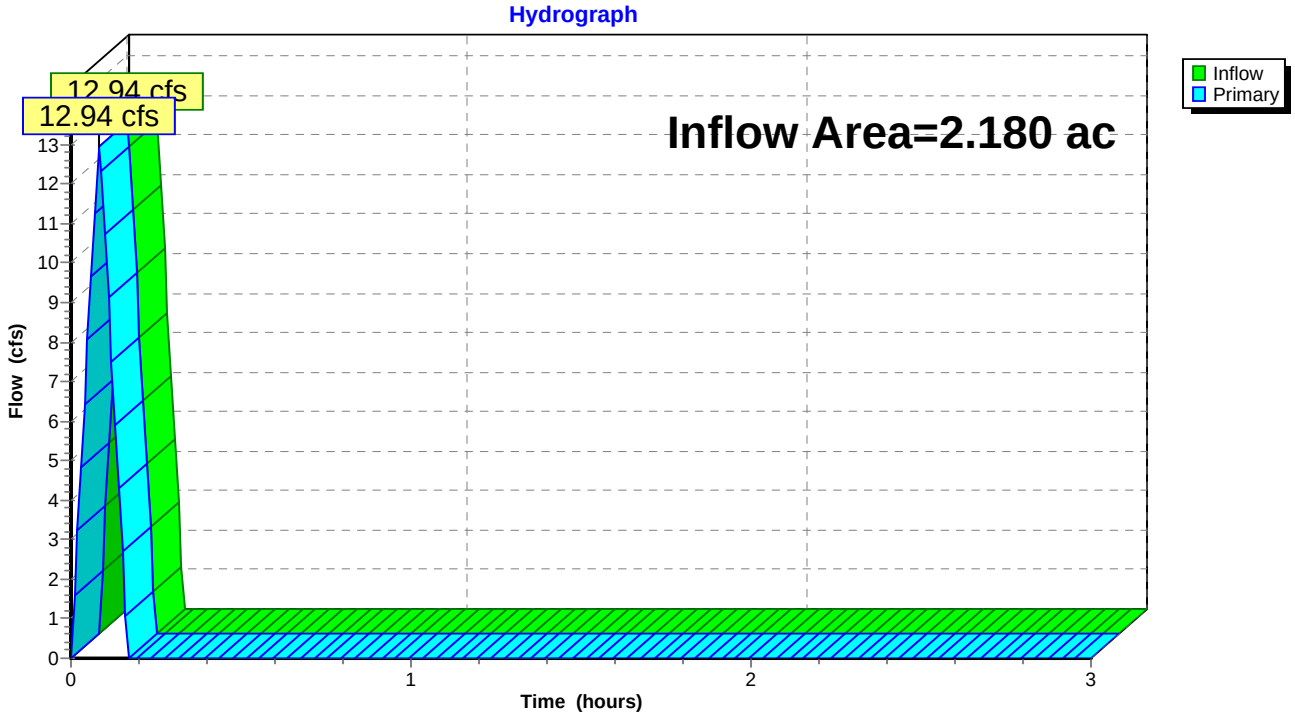


Summary for Pond 1P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.51" for 10-Year event
Inflow = 12.94 cfs @ 0.08 hrs, Volume= 0.092 af
Primary = 12.94 cfs @ 0.08 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point

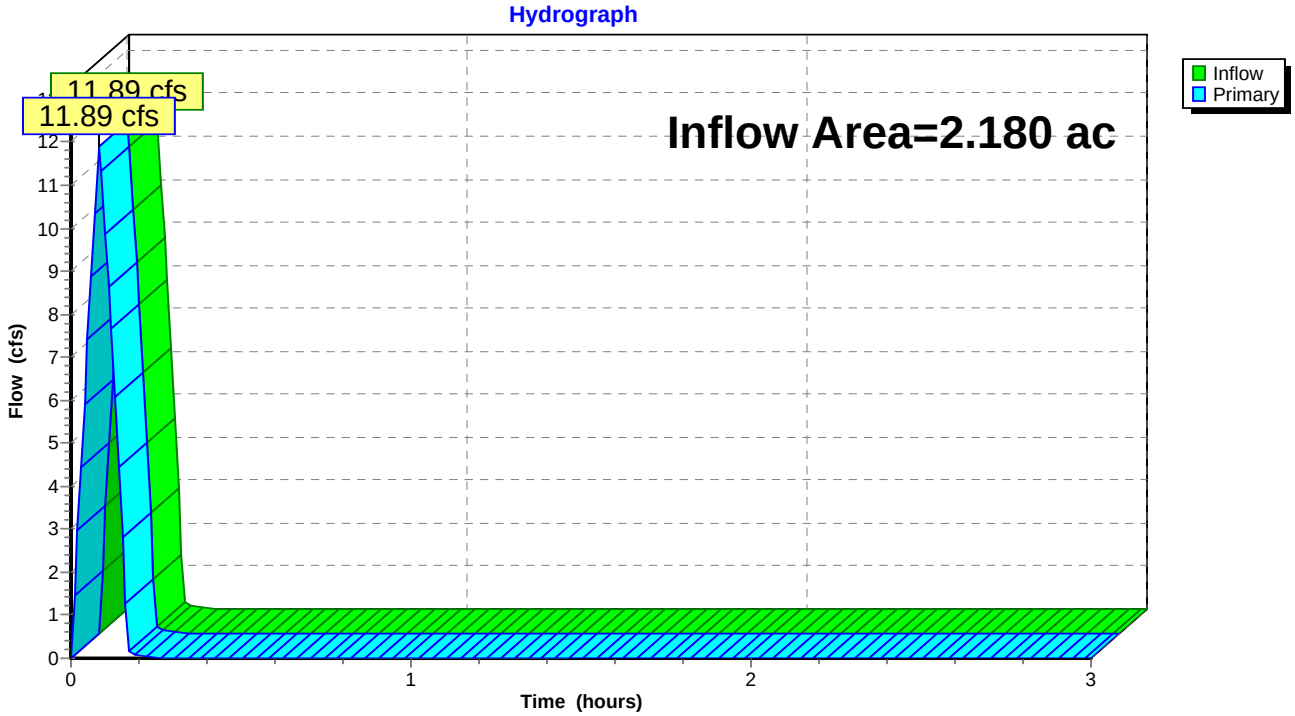


Summary for Pond 2P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.48" for 10-Year event
Inflow = 11.89 cfs @ 0.08 hrs, Volume= 0.088 af
Primary = 11.89 cfs @ 0.08 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point



Summary for Pond 3P: Detention Area

Inflow Area = 0.201 ac, 0.00% Impervious, Inflow Depth = 0.56" for 10-Year event
Inflow = 1.31 cfs @ 0.08 hrs, Volume= 0.009 af
Outflow = 0.77 cfs @ 0.12 hrs, Volume= 0.003 af, Atten= 41%, Lag= 2.5 min
Primary = 0.77 cfs @ 0.12 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 16.43' @ 0.12 hrs Surf.Area= 179 sf Storage= 321 cf

Plug-Flow detention time= 6.4 min calculated for 0.003 af (30% of inflow)
Center-of-Mass det. time= 4.0 min (9.1 - 5.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.75'	152 cf	**6.25'W x 23.80'L x 3.50'H Field A** 521 cf Overall - 141 cf Embedded = 380 cf x 40.0% Voids
#2A	13.25'	141 cf	**ADS_StormTech SC-740** x 3 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 1 rows
#3	14.75'	50 cf	**4.00'D x 4.00'H CB**
#4	15.89'	14 cf	**12.0" Round Pipe Storage** L= 18.0' S= 0.0050 '/'
#5	18.75'	28 cf	**surface storage (Prismatic)**Listed below (Recalc)
		385 cf	Total Available Storage

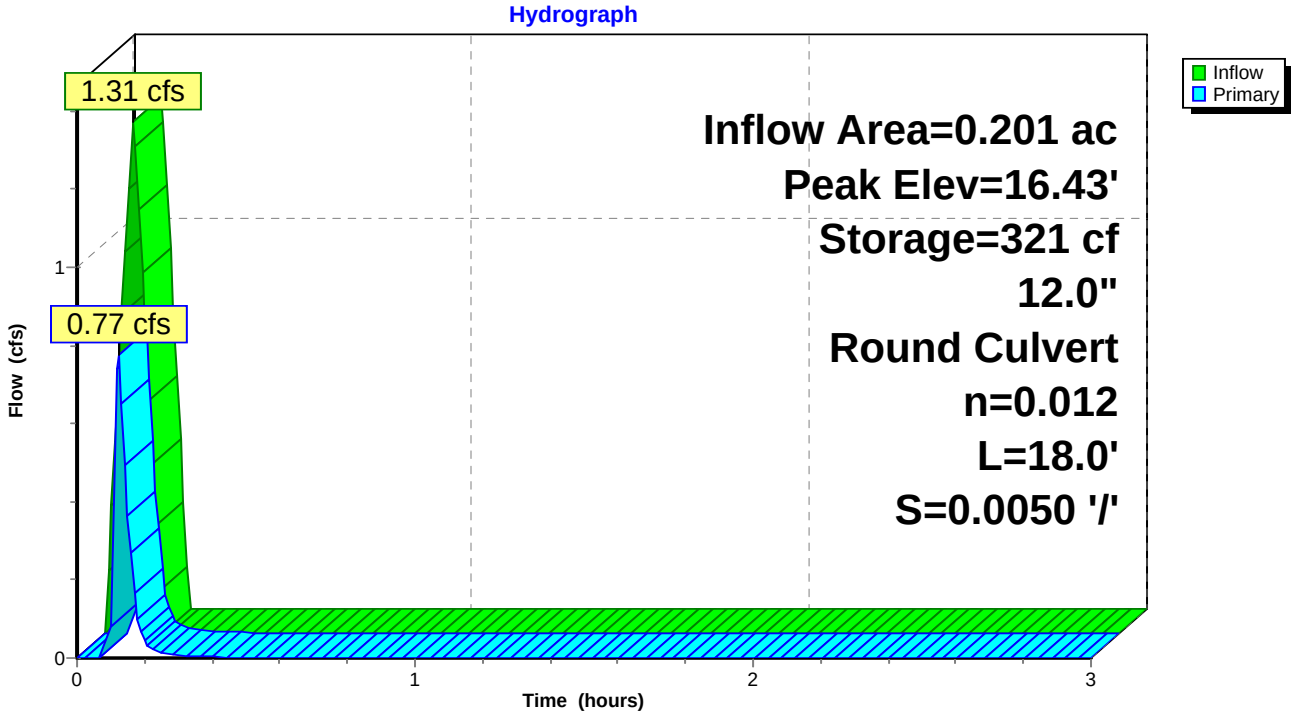
Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.75	0	0	0
19.00	225	28	28

Device	Routing	Invert	Outlet Devices
#1	Primary	15.89'	**12.0" Round Culvert** L= 18.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 15.89' / 15.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 0.12 hrs HW=16.40' (Free Discharge)
1=Culvert (Barrel Controls 0.71 cfs @ 2.57 fps)

Pond 3P: Detention Area



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Drainage Area Runoff Area=94,973 sf 0.00% Impervious Runoff Depth=0.62"
Tc=5.0 min C=0.82 Runoff=15.76 cfs 0.112 af

Subcatchment 2S: Post Drainage Area to Runoff Area=8,742 sf 0.00% Impervious Runoff Depth=0.68"
Tc=5.0 min C=0.90 Runoff=1.59 cfs 0.011 af

Subcatchment 3S: Post Drainage Area to Runoff Area=86,231 sf 0.00% Impervious Runoff Depth=0.63"
Tc=5.0 min C=0.83 Runoff=14.48 cfs 0.103 af

Pond 1P: Design Point Inflow=15.76 cfs 0.112 af
Primary=15.76 cfs 0.112 af

Pond 2P: Design Point Inflow=14.48 cfs 0.108 af
Primary=14.48 cfs 0.108 af

Pond 3P: Detention Area Peak Elev=16.57' Storage=325 cf Inflow=1.59 cfs 0.011 af
12.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=1.17 cfs 0.005 af

Total Runoff Area = 4.361 ac Runoff Volume = 0.227 af Average Runoff Depth = 0.62"
100.00% Pervious = 4.361 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre Drainage Area

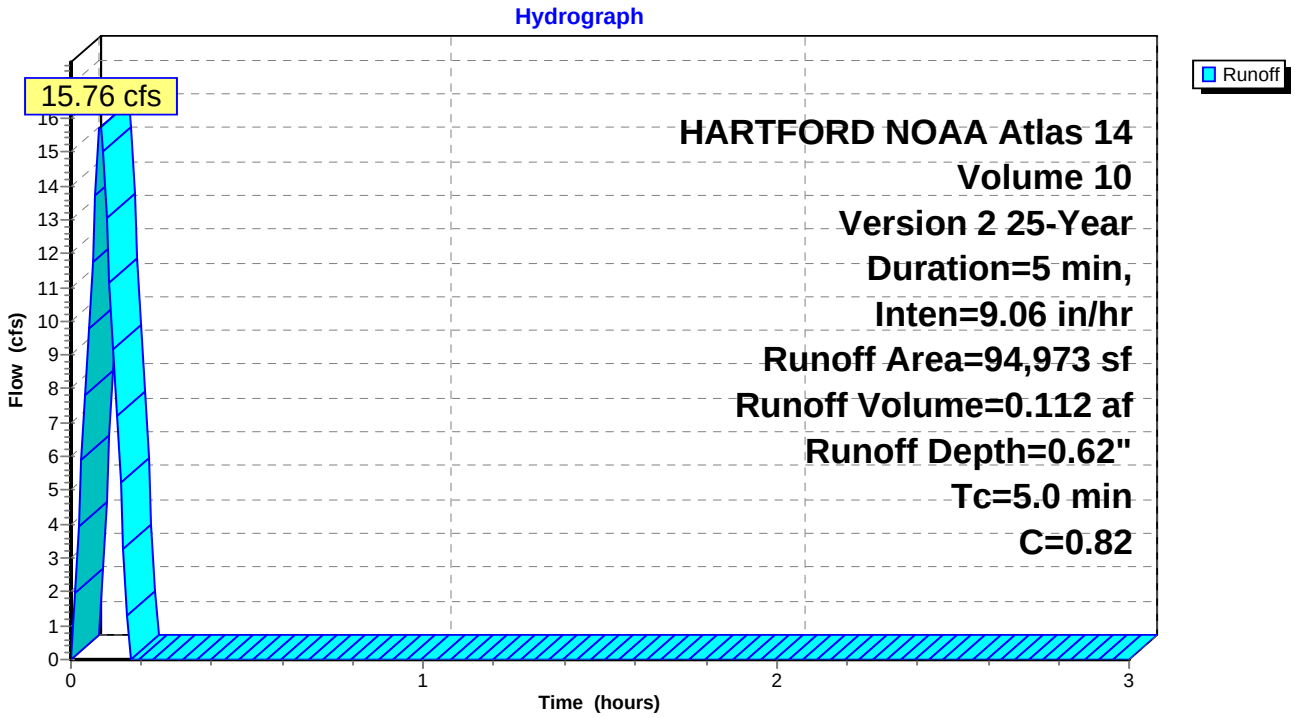
Runoff = 15.76 cfs @ 0.08 hrs, Volume= 0.112 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 25-Year Duration=5 min, Inten=9.06 in/hr

Area (sf)	C	Description
14,464	0.35	50-75% Grass cover, Fair, HSG D
80,509	0.90	Paved parking, HSG D
94,973	0.82	Weighted Average
94,973		100.00% Pervious Area

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

Subcatchment 1S: Pre Drainage Area



Summary for Subcatchment 2S: Post Drainage Area to Detention

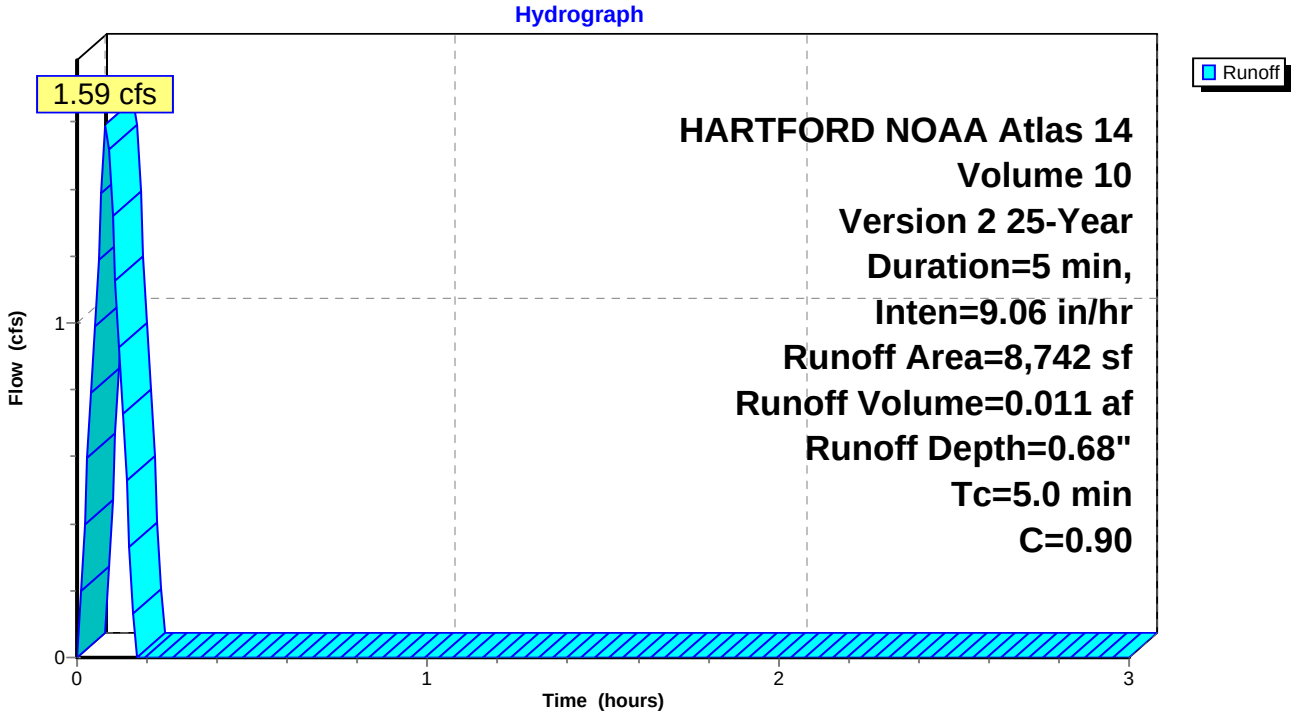
Runoff = 1.59 cfs @ 0.08 hrs, Volume= 0.011 af, Depth= 0.68"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 25-Year Duration=5 min, Inten=9.06 in/hr

Area (sf)	C	Description
8,742	0.90	Paved parking, HSG D
8,742		100.00% Pervious Area

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

Subcatchment 2S: Post Drainage Area to Detention



Summary for Subcatchment 3S: Post Drainage Area to Town System

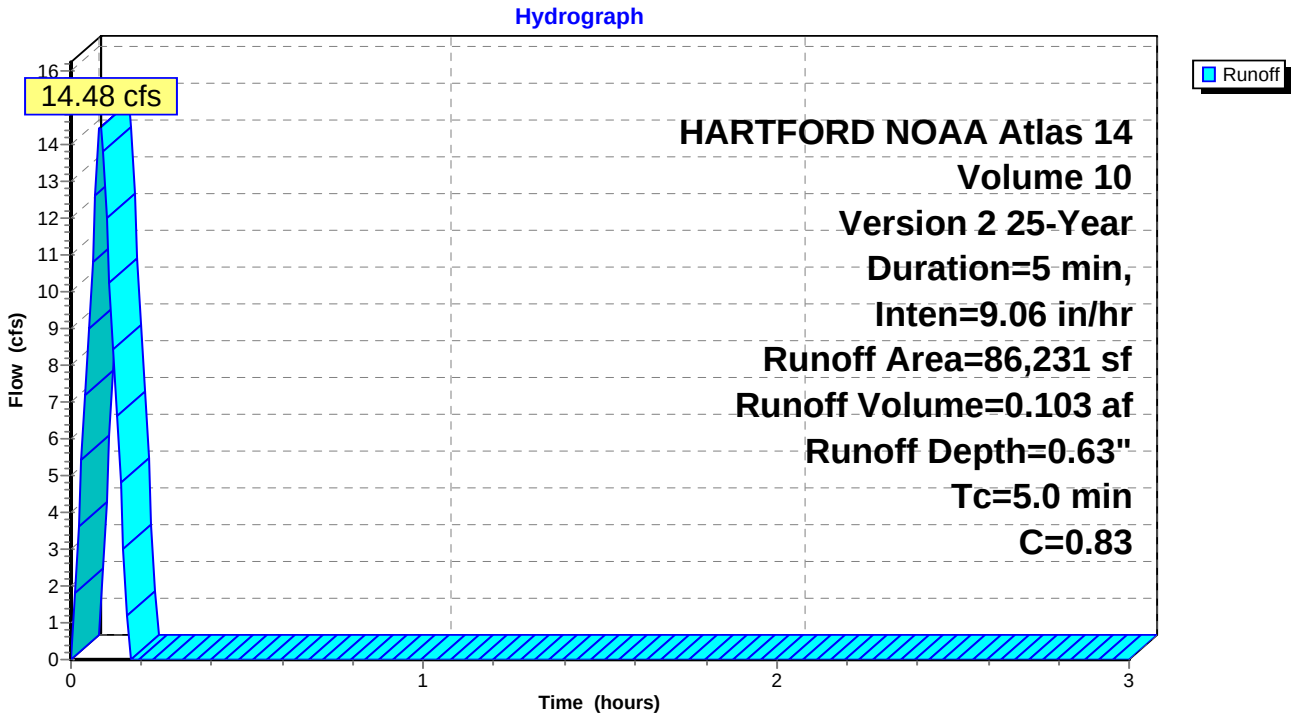
Runoff = 14.48 cfs @ 0.08 hrs, Volume= 0.103 af, Depth= 0.63"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 25-Year Duration=5 min, Inten=9.06 in/hr

Area (sf)	C	Description
11,209	0.35	50-75% Grass cover, Fair, HSG D
75,022	0.90	Paved parking, HSG D
86,231	0.83	Weighted Average
86,231		100.00% Pervious Area

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

Subcatchment 3S: Post Drainage Area to Town System

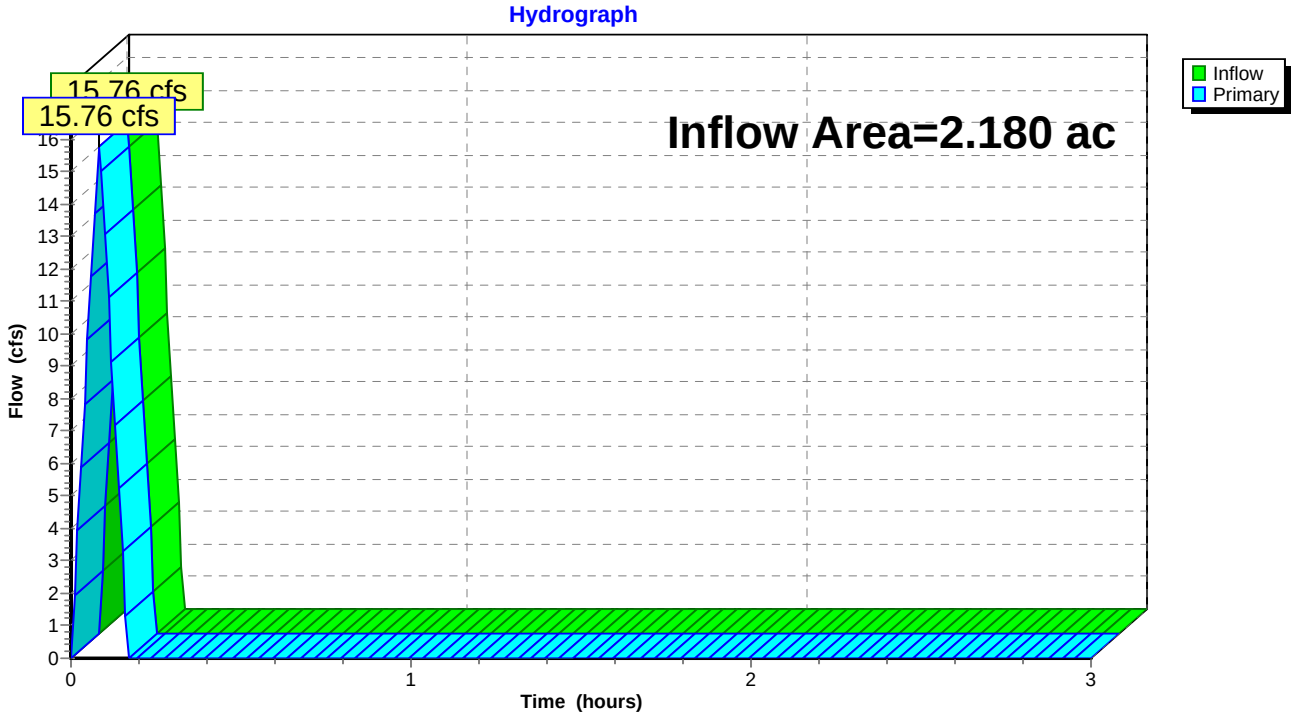


Summary for Pond 1P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.62" for 25-Year event
Inflow = 15.76 cfs @ 0.08 hrs, Volume= 0.112 af
Primary = 15.76 cfs @ 0.08 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point

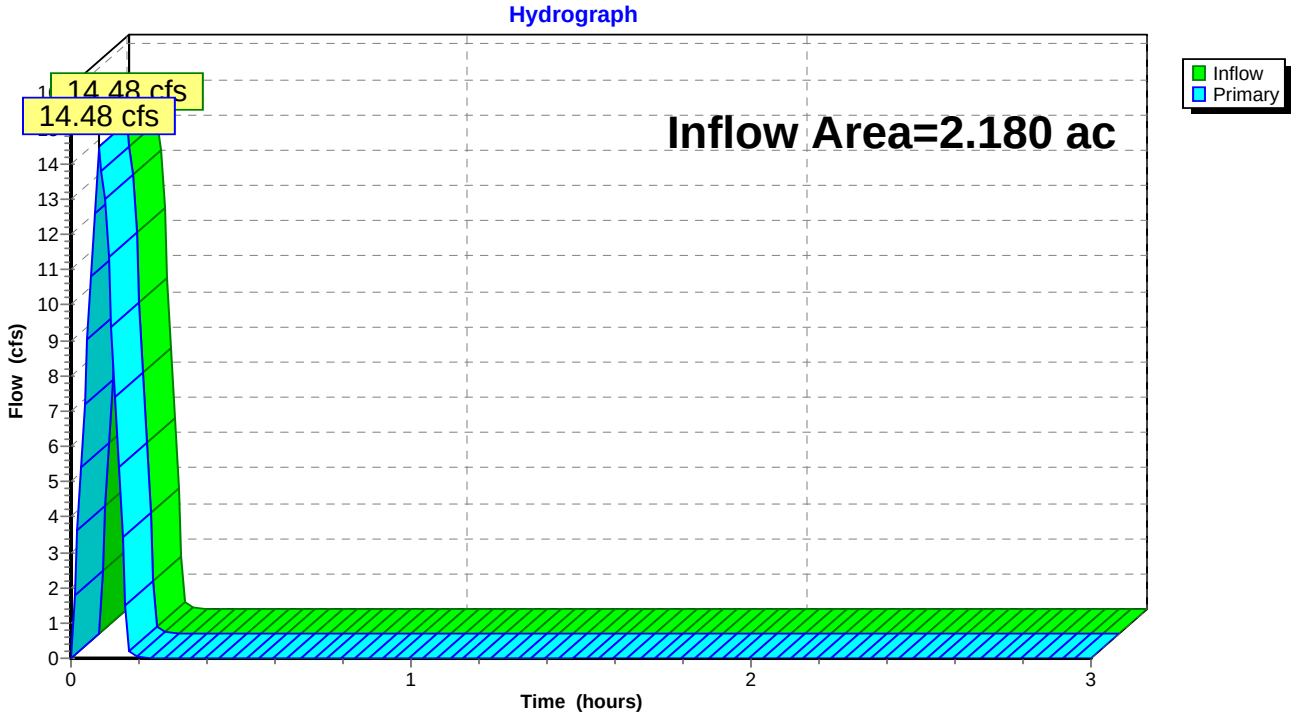


Summary for Pond 2P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.59" for 25-Year event
Inflow = 14.48 cfs @ 0.08 hrs, Volume= 0.108 af
Primary = 14.48 cfs @ 0.08 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point



Summary for Pond 3P: Detention Area

Inflow Area = 0.201 ac, 0.00% Impervious, Inflow Depth = 0.68" for 25-Year event
Inflow = 1.59 cfs @ 0.08 hrs, Volume= 0.011 af
Outflow = 1.17 cfs @ 0.11 hrs, Volume= 0.005 af, Atten= 27%, Lag= 1.7 min
Primary = 1.17 cfs @ 0.11 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 16.57' @ 0.11 hrs Surf.Area= 179 sf Storage= 325 cf

Plug-Flow detention time= 4.9 min calculated for 0.005 af (43% of inflow)
Center-of-Mass det. time= 3.1 min (8.1 - 5.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.75'	152 cf	**6.25'W x 23.80'L x 3.50'H Field A** 521 cf Overall - 141 cf Embedded = 380 cf x 40.0% Voids
#2A	13.25'	141 cf	**ADS_StormTech SC-740** x 3 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 1 rows
#3	14.75'	50 cf	**4.00'D x 4.00'H CB**
#4	15.89'	14 cf	**12.0" Round Pipe Storage** L= 18.0' S= 0.0050 '/'
#5	18.75'	28 cf	**surface storage (Prismatic)**Listed below (Recalc)
		385 cf	Total Available Storage

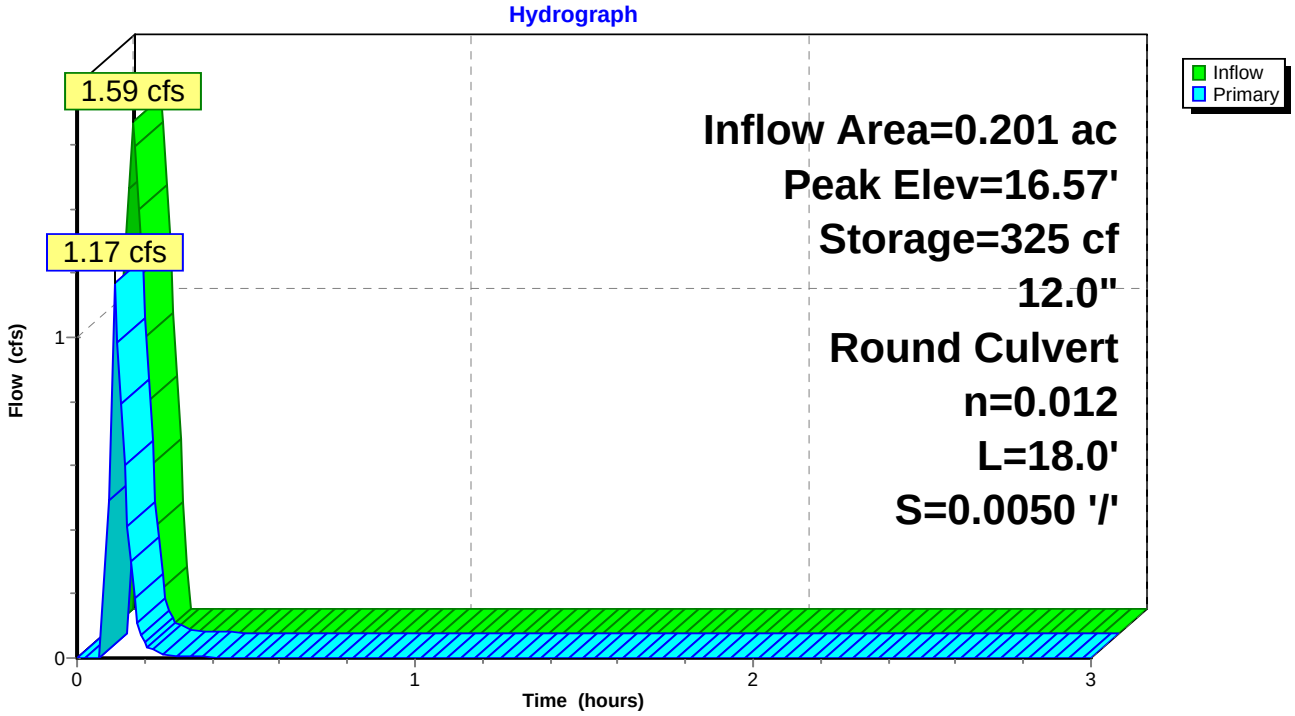
Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.75	0	0	0
19.00	225	28	28

Device	Routing	Invert	Outlet Devices
#1	Primary	15.89'	**12.0" Round Culvert** L= 18.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 15.89' / 15.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.17 cfs @ 0.11 hrs HW=16.57' (Free Discharge)
1=Culvert (Barrel Controls 1.17 cfs @ 2.91 fps)

Pond 3P: Detention Area



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Drainage Area Runoff Area=94,973 sf 0.00% Impervious Runoff Depth=0.70"
Tc=5.0 min C=0.82 Runoff=17.92 cfs 0.128 af

Subcatchment 2S: Post Drainage Area to Runoff Area=8,742 sf 0.00% Impervious Runoff Depth=0.77"
Tc=5.0 min C=0.90 Runoff=1.81 cfs 0.013 af

Subcatchment 3S: Post Drainage Area to Runoff Area=86,231 sf 0.00% Impervious Runoff Depth=0.71"
Tc=5.0 min C=0.83 Runoff=16.47 cfs 0.117 af

Pond 1P: Design Point Inflow=17.92 cfs 0.128 af
Primary=17.92 cfs 0.128 af

Pond 2P: Design Point Inflow=16.60 cfs 0.124 af
Primary=16.60 cfs 0.124 af

Pond 3P: Detention Area Peak Elev=16.71' Storage=329 cf Inflow=1.81 cfs 0.013 af
12.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=1.60 cfs 0.006 af

Total Runoff Area = 4.361 ac Runoff Volume = 0.258 af Average Runoff Depth = 0.71"
100.00% Pervious = 4.361 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre Drainage Area

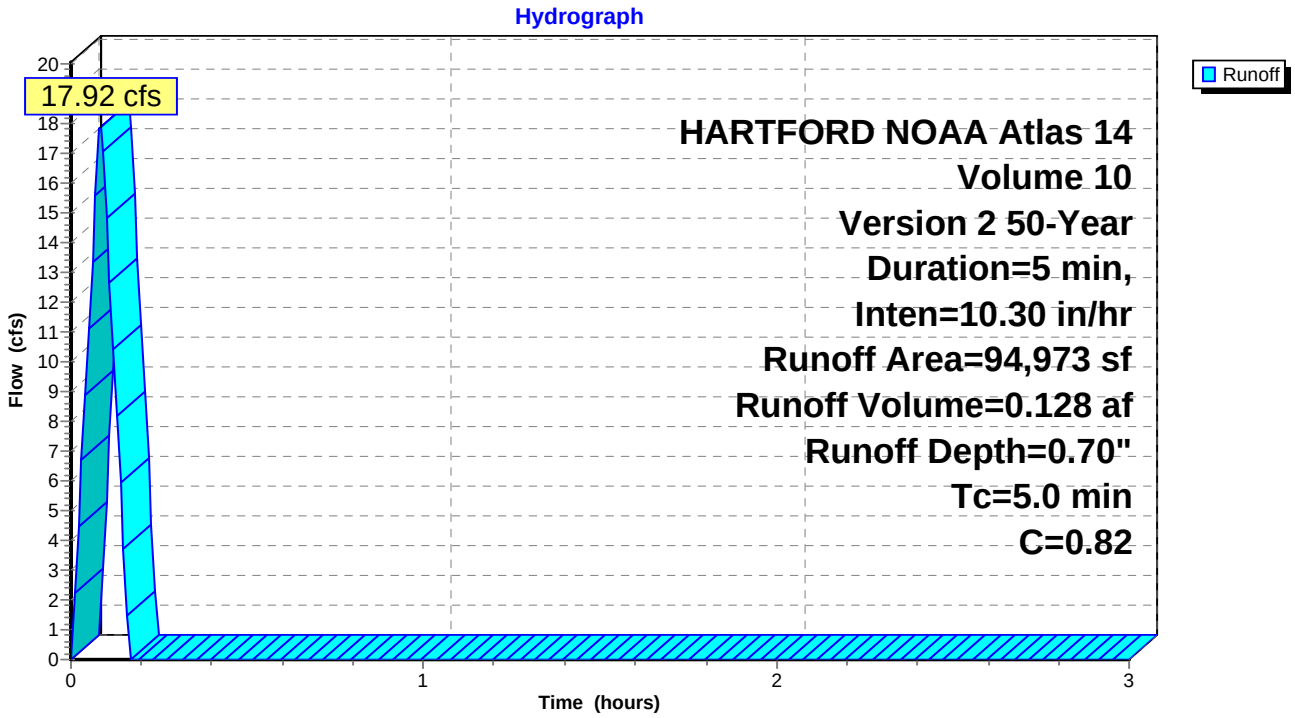
Runoff = 17.92 cfs @ 0.08 hrs, Volume= 0.128 af, Depth= 0.70"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 50-Year Duration=5 min, Inten=10.30 in/hr

Area (sf)	C	Description
14,464	0.35	50-75% Grass cover, Fair, HSG D
80,509	0.90	Paved parking, HSG D
94,973	0.82	Weighted Average
94,973		100.00% Pervious Area

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

Subcatchment 1S: Pre Drainage Area



Summary for Subcatchment 2S: Post Drainage Area to Detention

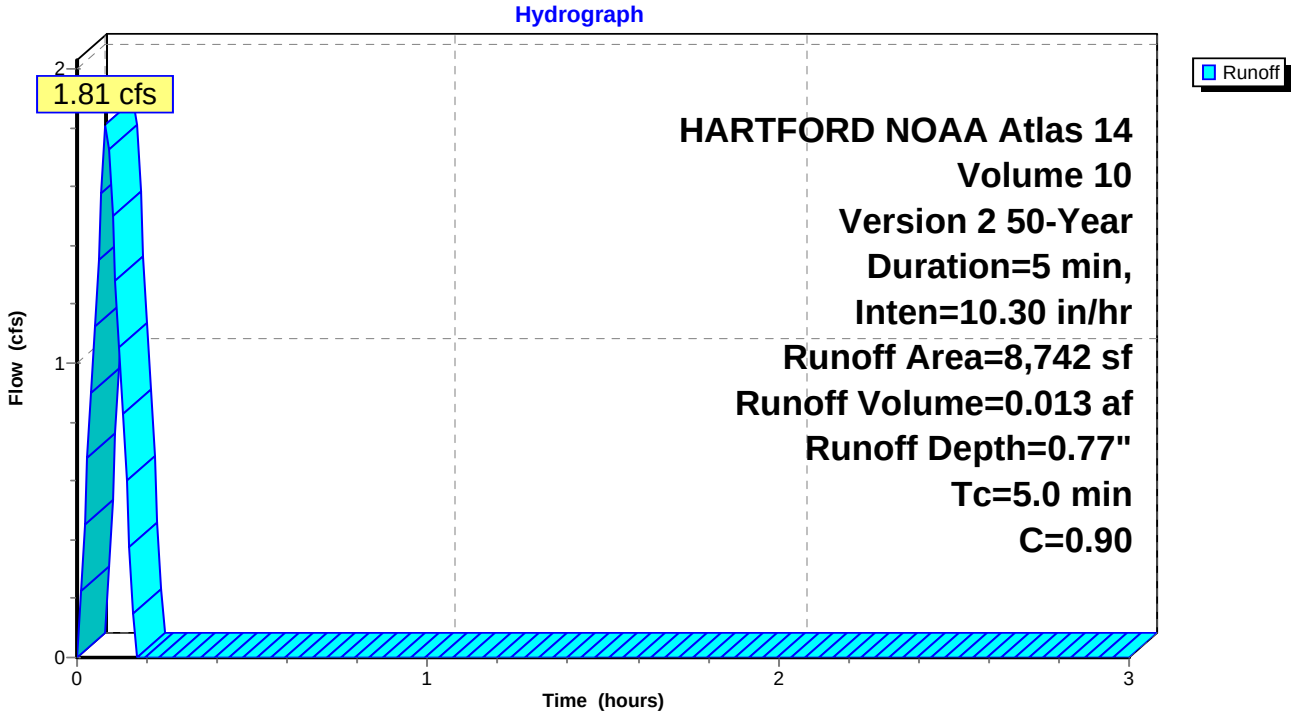
Runoff = 1.81 cfs @ 0.08 hrs, Volume= 0.013 af, Depth= 0.77"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 50-Year Duration=5 min, Inten=10.30 in/hr

Area (sf)	C	Description
8,742	0.90	Paved parking, HSG D
8,742		100.00% Pervious Area

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

Subcatchment 2S: Post Drainage Area to Detention



Summary for Subcatchment 3S: Post Drainage Area to Town System

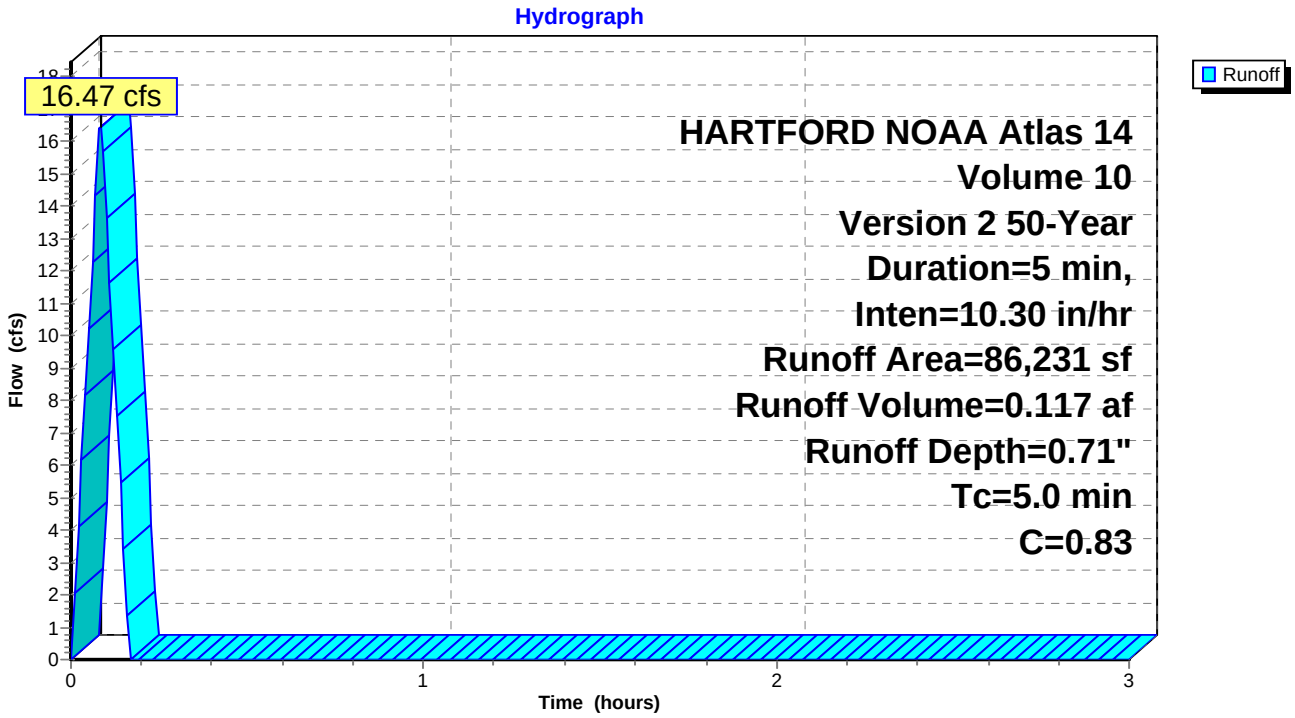
Runoff = 16.47 cfs @ 0.08 hrs, Volume= 0.117 af, Depth= 0.71"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 50-Year Duration=5 min, Inten=10.30 in/hr

Area (sf)	C	Description
11,209	0.35	50-75% Grass cover, Fair, HSG D
75,022	0.90	Paved parking, HSG D
86,231	0.83	Weighted Average
86,231		100.00% Pervious Area

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

Subcatchment 3S: Post Drainage Area to Town System

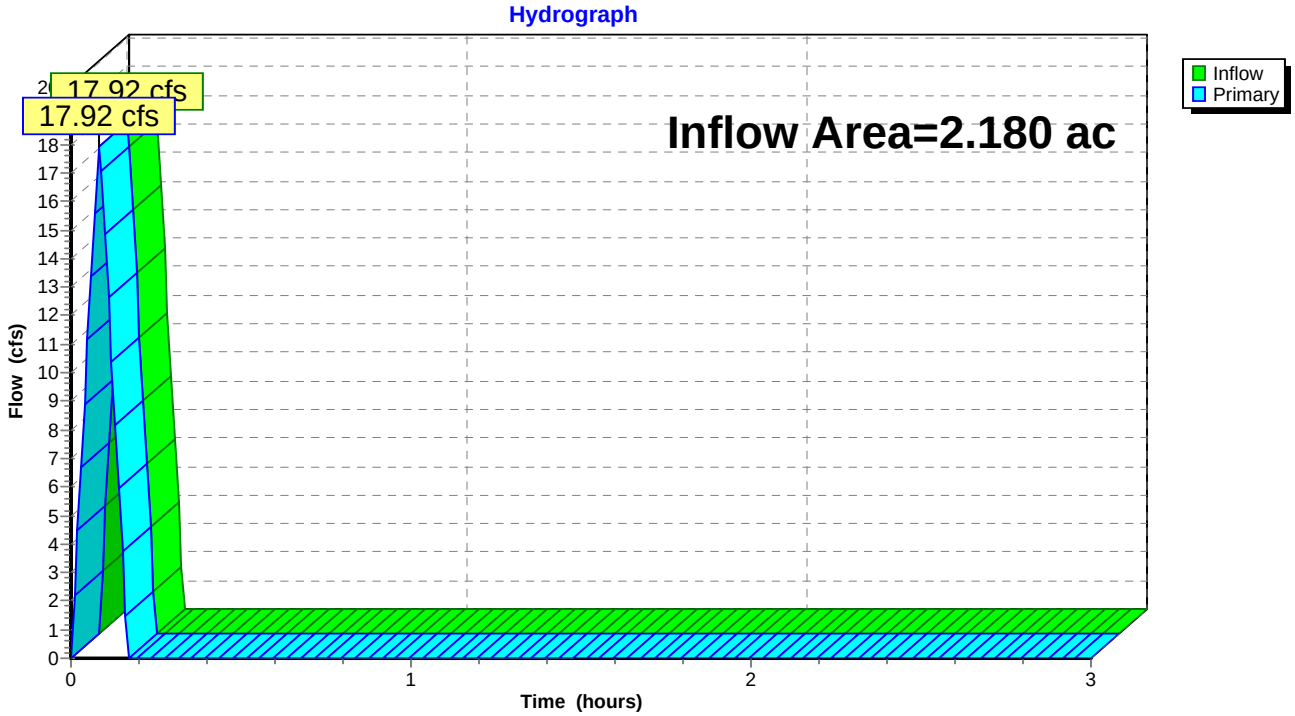


Summary for Pond 1P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.70" for 50-Year event
Inflow = 17.92 cfs @ 0.08 hrs, Volume= 0.128 af
Primary = 17.92 cfs @ 0.08 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point

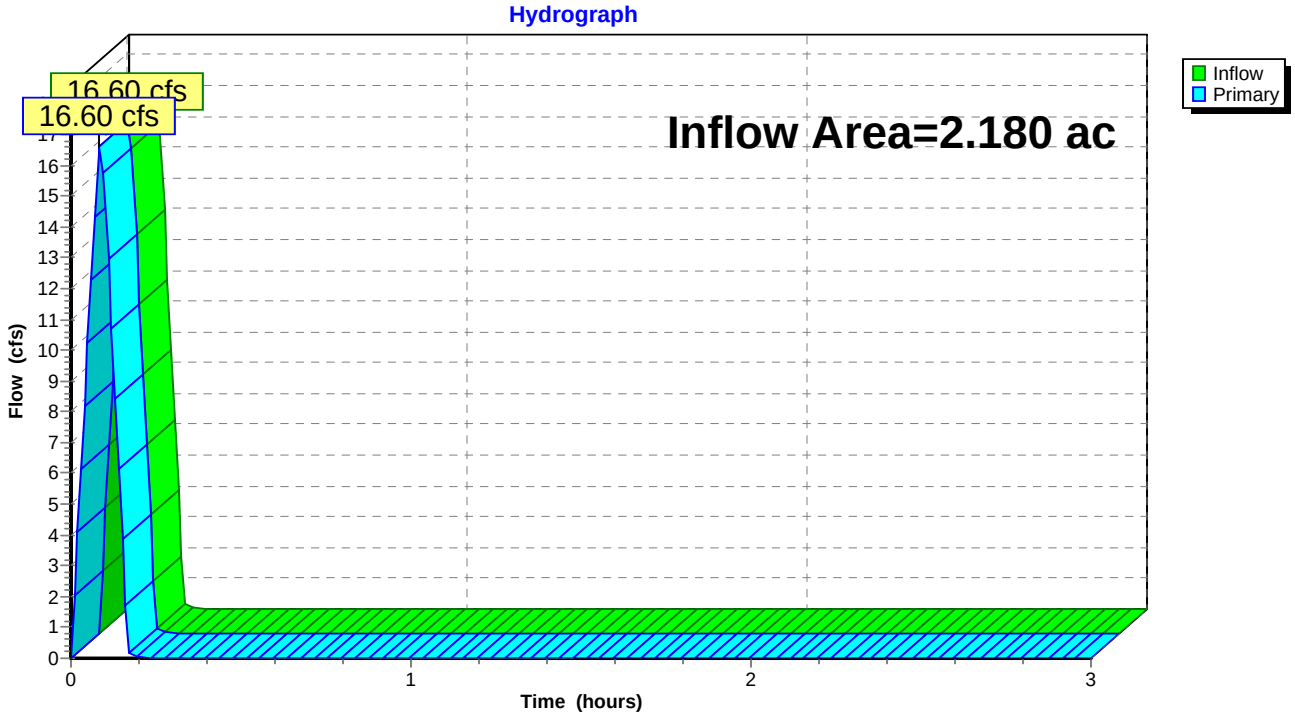


Summary for Pond 2P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.68" for 50-Year event
Inflow = 16.60 cfs @ 0.08 hrs, Volume= 0.124 af
Primary = 16.60 cfs @ 0.08 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point



Summary for Pond 3P: Detention Area

Inflow Area = 0.201 ac, 0.00% Impervious, Inflow Depth = 0.77" for 50-Year event
Inflow = 1.81 cfs @ 0.08 hrs, Volume= 0.013 af
Outflow = 1.60 cfs @ 0.10 hrs, Volume= 0.006 af, Atten= 12%, Lag= 1.2 min
Primary = 1.60 cfs @ 0.10 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 16.71' @ 0.10 hrs Surf.Area= 176 sf Storage= 329 cf

Plug-Flow detention time= 4.3 min calculated for 0.006 af (48% of inflow)
Center-of-Mass det. time= 2.7 min (7.7 - 5.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.75'	152 cf	**6.25'W x 23.80'L x 3.50'H Field A** 521 cf Overall - 141 cf Embedded = 380 cf x 40.0% Voids
#2A	13.25'	141 cf	**ADS_StormTech SC-740** x 3 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 1 rows
#3	14.75'	50 cf	**4.00'D x 4.00'H CB**
#4	15.89'	14 cf	**12.0" Round Pipe Storage** L= 18.0' S= 0.0050 '/'
#5	18.75'	28 cf	**surface storage (Prismatic)**Listed below (Recalc)
		385 cf	Total Available Storage

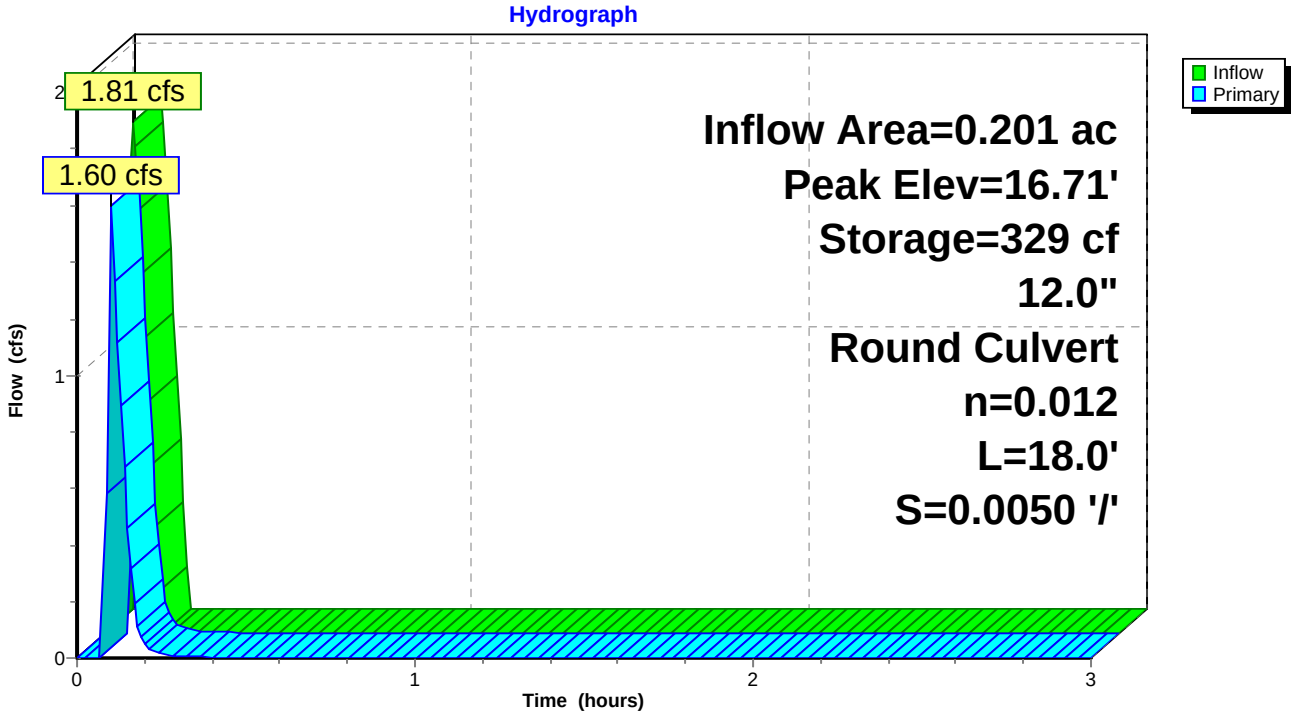
Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.75	0	0	0
19.00	225	28	28

Device	Routing	Invert	Outlet Devices
#1	Primary	15.89'	**12.0" Round Culvert** L= 18.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 15.89' / 15.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.47 cfs @ 0.10 hrs HW=16.67' (Free Discharge)
1=Culvert (Barrel Controls 1.47 cfs @ 3.09 fps)

Pond 3P: Detention Area



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Drainage Area Runoff Area=94,973 sf 0.00% Impervious Runoff Depth=0.79"
Tc=5.0 min C=0.82 Runoff=20.18 cfs 0.144 af

Subcatchment 2S: Post Drainage Area to Runoff Area=8,742 sf 0.00% Impervious Runoff Depth=0.87"
Tc=5.0 min C=0.90 Runoff=2.04 cfs 0.015 af

Subcatchment 3S: Post Drainage Area to Runoff Area=86,231 sf 0.00% Impervious Runoff Depth=0.80"
Tc=5.0 min C=0.83 Runoff=18.55 cfs 0.132 af

Pond 1P: Design Point Inflow=20.18 cfs 0.144 af
Primary=20.18 cfs 0.144 af

Pond 2P: Design Point Inflow=19.58 cfs 0.140 af
Primary=19.58 cfs 0.140 af

Pond 3P: Detention Area Peak Elev=16.88' Storage=333 cf Inflow=2.04 cfs 0.015 af
12.0" Round Culvert n=0.012 L=18.0' S=0.0050 '/' Outflow=2.03 cfs 0.008 af

Total Runoff Area = 4.361 ac Runoff Volume = 0.290 af Average Runoff Depth = 0.80"
100.00% Pervious = 4.361 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Pre Drainage Area

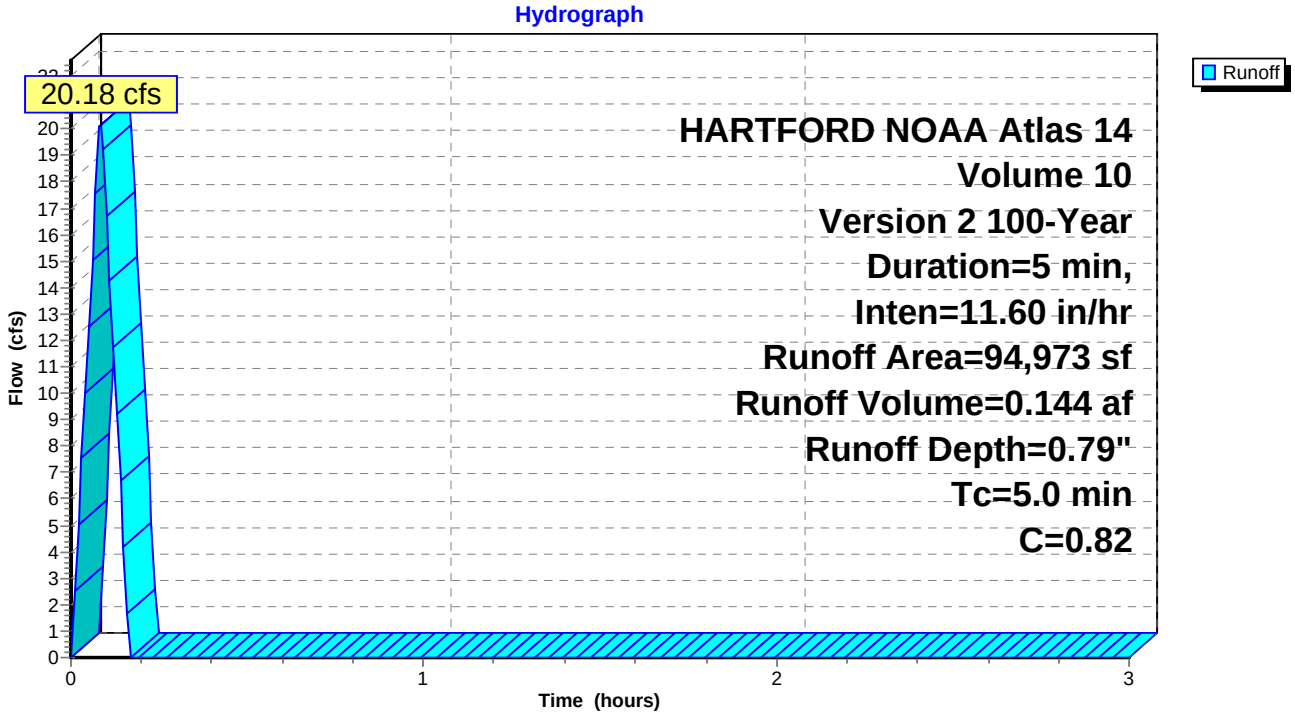
Runoff = 20.18 cfs @ 0.08 hrs, Volume= 0.144 af, Depth= 0.79"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 100-Year Duration=5 min, Inten=11.60 in/hr

Area (sf)	C	Description
14,464	0.35	50-75% Grass cover, Fair, HSG D
80,509	0.90	Paved parking, HSG D
94,973	0.82	Weighted Average
94,973		100.00% Pervious Area

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

Subcatchment 1S: Pre Drainage Area



Summary for Subcatchment 2S: Post Drainage Area to Detention

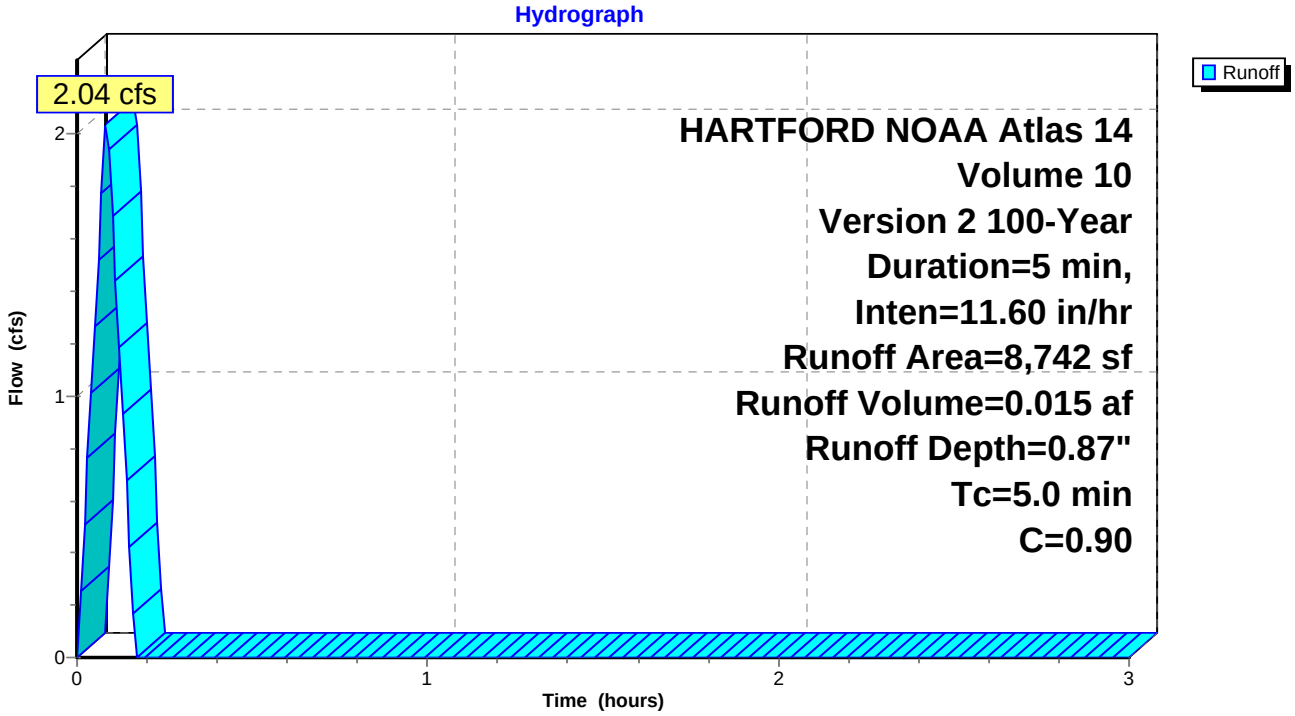
Runoff = 2.04 cfs @ 0.08 hrs, Volume= 0.015 af, Depth= 0.87"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 100-Year Duration=5 min, Inten=11.60 in/hr

Area (sf)	C	Description
8,742	0.90	Paved parking, HSG D
8,742		100.00% Pervious Area

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

Subcatchment 2S: Post Drainage Area to Detention



Summary for Subcatchment 3S: Post Drainage Area to Town System

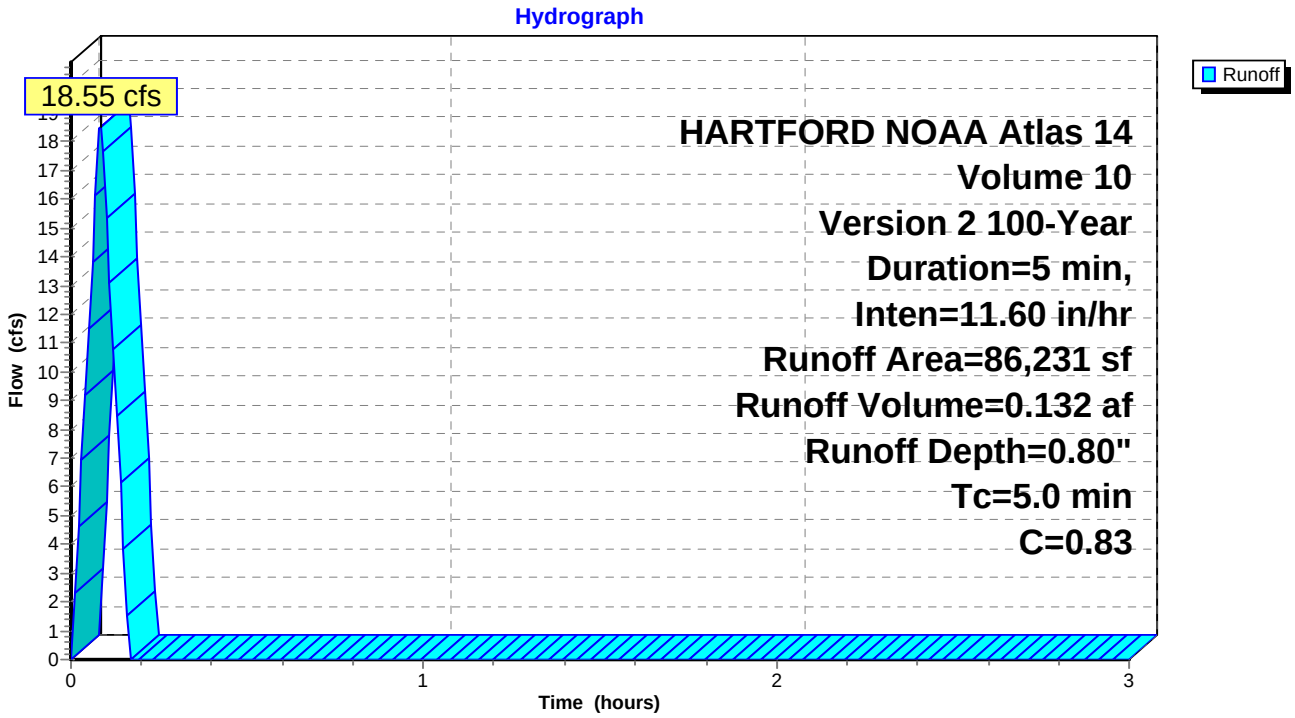
Runoff = 18.55 cfs @ 0.08 hrs, Volume= 0.132 af, Depth= 0.80"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
HARTFORD NOAA Atlas 14, Volume 10, Version 2 100-Year Duration=5 min, Inten=11.60 in/hr

Area (sf)	C	Description
11,209	0.35	50-75% Grass cover, Fair, HSG D
75,022	0.90	Paved parking, HSG D
86,231	0.83	Weighted Average
86,231		100.00% Pervious Area

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

Subcatchment 3S: Post Drainage Area to Town System

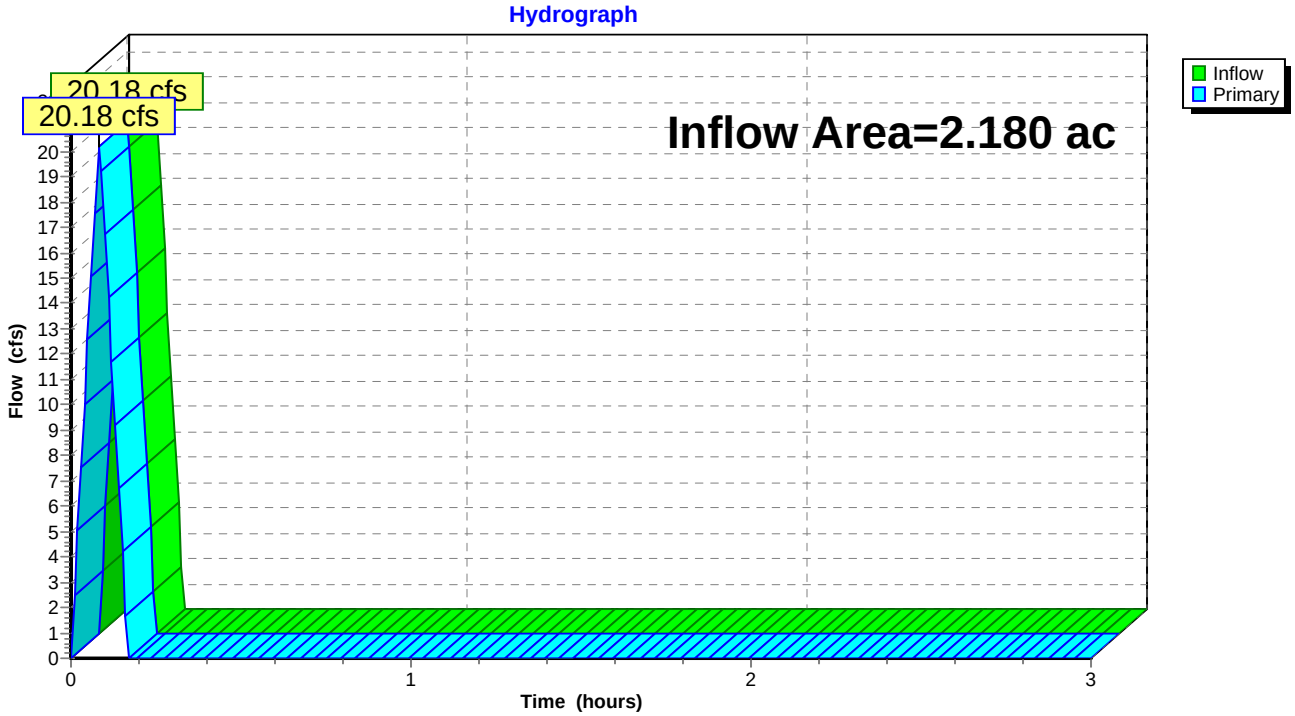


Summary for Pond 1P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.79" for 100-Year event
Inflow = 20.18 cfs @ 0.08 hrs, Volume= 0.144 af
Primary = 20.18 cfs @ 0.08 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 1P: Design Point

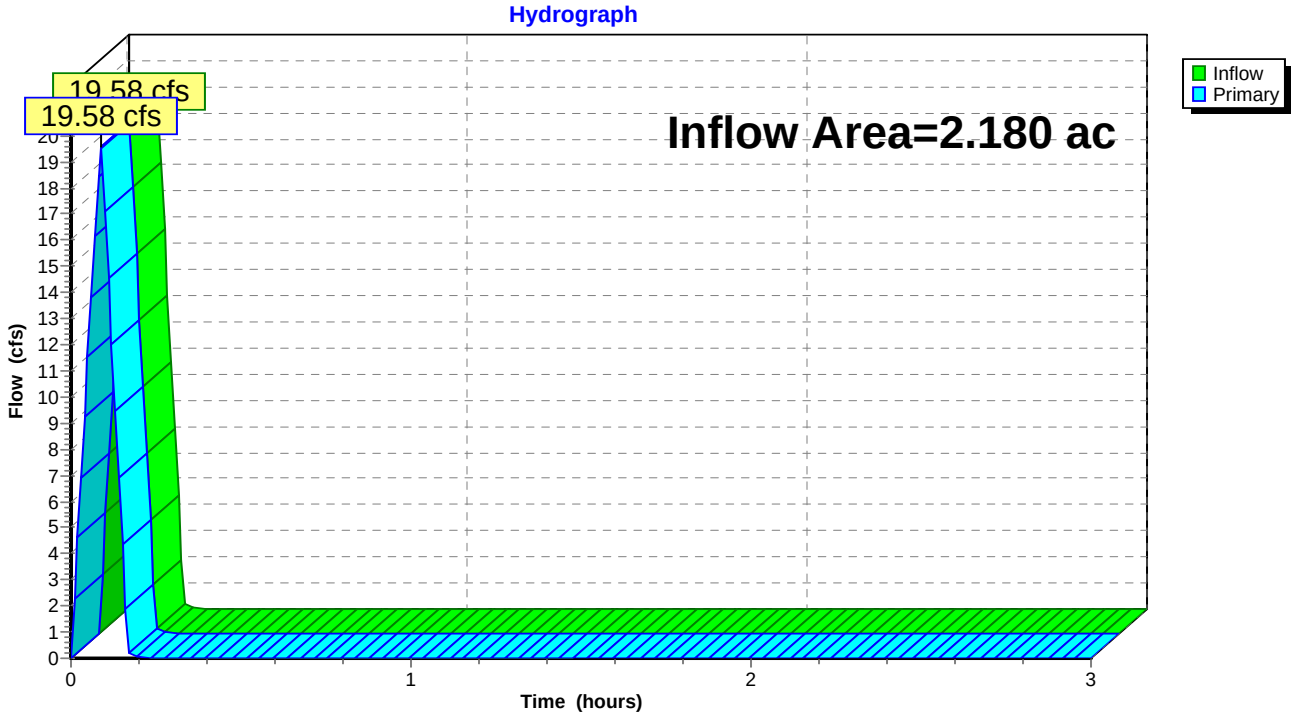


Summary for Pond 2P: Design Point

Inflow Area = 2.180 ac, 0.00% Impervious, Inflow Depth = 0.77" for 100-Year event
Inflow = 19.58 cfs @ 0.09 hrs, Volume= 0.140 af
Primary = 19.58 cfs @ 0.09 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Pond 2P: Design Point



Summary for Pond 3P: Detention Area

Inflow Area = 0.201 ac, 0.00% Impervious, Inflow Depth = 0.87" for 100-Year event
Inflow = 2.04 cfs @ 0.08 hrs, Volume= 0.015 af
Outflow = 2.03 cfs @ 0.09 hrs, Volume= 0.008 af, Atten= 1%, Lag= 0.7 min
Primary = 2.03 cfs @ 0.09 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 16.88' @ 0.09 hrs Surf.Area= 170 sf Storage= 333 cf

Plug-Flow detention time= 3.7 min calculated for 0.008 af (55% of inflow)
Center-of-Mass det. time= 2.3 min (7.3 - 5.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.75'	152 cf	**6.25'W x 23.80'L x 3.50'H Field A** 521 cf Overall - 141 cf Embedded = 380 cf x 40.0% Voids
#2A	13.25'	141 cf	**ADS_StormTech SC-740** x 3 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 1 rows
#3	14.75'	50 cf	**4.00'D x 4.00'H CB**
#4	15.89'	14 cf	**12.0" Round Pipe Storage** L= 18.0' S= 0.0050 '/'
#5	18.75'	28 cf	**surface storage (Prismatic)**Listed below (Recalc)
		385 cf	Total Available Storage

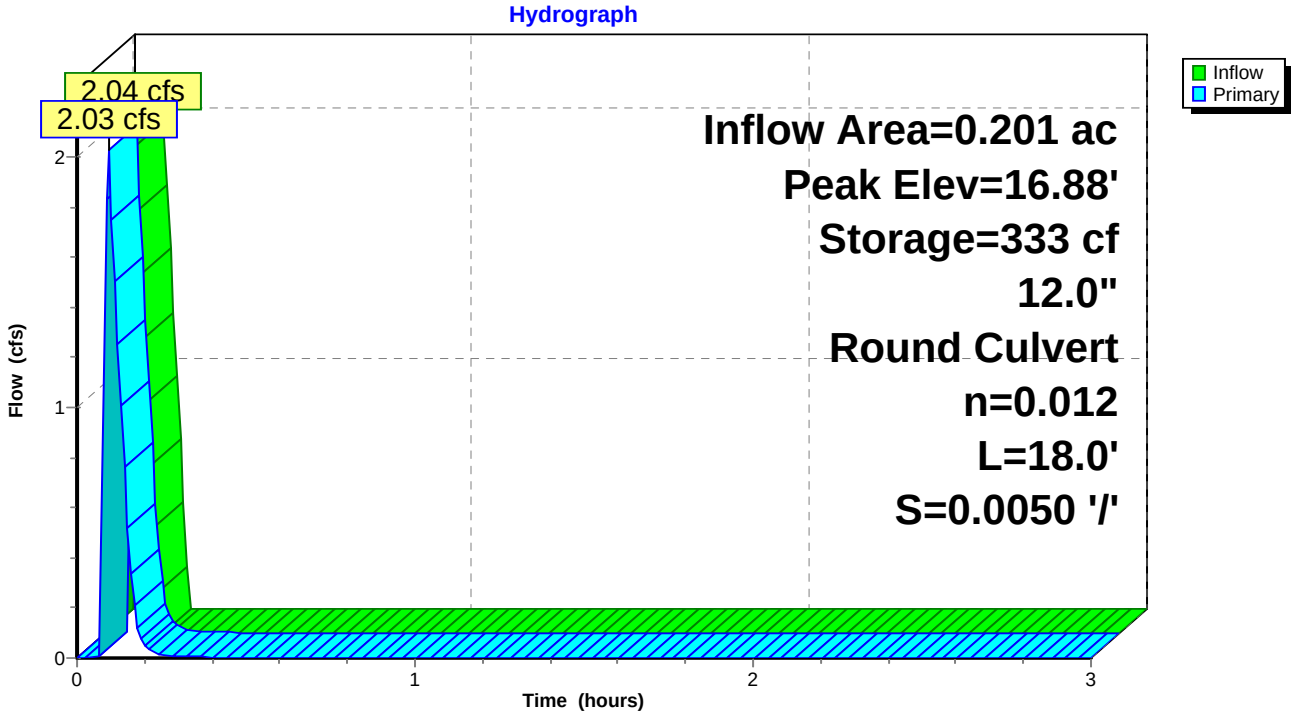
Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.75	0	0	0
19.00	225	28	28

Device	Routing	Invert	Outlet Devices
#1	Primary	15.89'	**12.0" Round Culvert** L= 18.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 15.89' / 15.80' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.79 cfs @ 0.09 hrs HW=16.77' (Free Discharge)
1=Culvert (Barrel Controls 1.79 cfs @ 3.25 fps)

Pond 3P: Detention Area



Pond 3P: Detention Area - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 (ADS StormTech® SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 1 rows

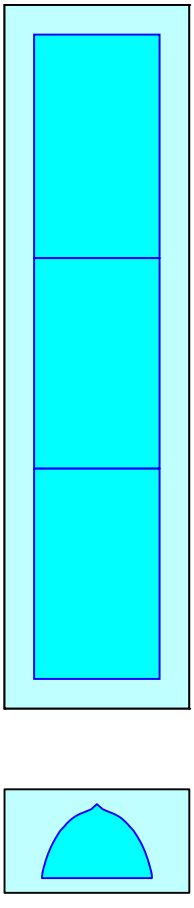
3 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 21.80' Row Length +12.0" End Stone x 2 = 23.80' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

3 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 1 Rows = 140.7 cf Chamber Storage

520.6 cf Field - 140.7 cf Chambers = 380.0 cf Stone x 40.0% Voids = 152.0 cf Stone Storage

Chamber Storage + Stone Storage = 292.6 cf = 0.007 af
Overall Storage Efficiency = 56.2%

3 Chambers
19.3 cy Field
14.1 cy Stone



Hydrologic Soil Group—State of Connecticut
(Nixon Medical Laundry)

Map Scale: 1:640 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 16, Sep 15, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 29, 2013—Oct 16, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
307	Urban land	D	2.2	100.0%
Totals for Area of Interest			**2.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher