WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS & PLANNERS

May 15, 2024

John Shirley
Anderson-Shirley Architects
695 Commercial St. SE, Suite 5
Salem, OR 97301

RE: Elimination of Existing Landscape Detention for Hear No Evil
JO 3508.0000.0

Dear John:

Per the City of Salem's request, I have analyzed the existing detention in the northwest corner of the Hear No Evil site at the corner of Commercial and Pine in Salem, Oregon. Per the original site plans this detention area serves 1,360 sf of landscape area. The current project proposes to eliminate the existing area drain which contains a 0.49-inch diameter flow control orifice and a total detention volume of 71 cubic feet. A copy of the relevant portion of the original site plan is attached.

The elimination of the area drain and landscape detention area occurs in conjunction with a ±323 square foot expansion of the existing building into the landscape area. This leaves a net of 1,037 sf of landscape area unchanged. A annotated copy of the proposed site plan showing the landscape area and proposed building expansion is attached.

Based on the above information, Hydrocad stormwater calculations were performed and a copy of those calculations is attached. The key findings are as follows:

> The existing detention pond virtually no detention. This can be seen by looking at the hydrographs on Pages 9, 13, and 17 of the Hydrocad Report. In the 10-year event a total of 5 cubic feet is detained. In the 25-year event 8 cubic feet are detained, and in the 100-year event only 15 cubic feet are detained.
>
> With regard to runoff rates, in a 10-year event on Page 9 the detained release is 0.004 cfs while on Page 10 the developed and undetained release is 0.01 cfs. The 0.006 cfs increase amounts to less than 3 gallons per minute. Similar changes are seen with the 25-year event (0.007 cfs/3.1 gpm increase) and the 100-year event (0.010 cfs/4.5 gpm). Keeping in mind the uncertainties inherently involved in stormwater calculations, these differences are inconsequential.

In summary, the stormwater calculations show that eliminating the existing landscape detention area and expanding the building by 323 square feet will not have any substantial impact on the site stormwater runoff.

3841 Fairview Industrial Dr. S.E., Suite 100, Salem, Oregon 97302
Phone: (503) 585-2474 Fax: (503) 585-3986

If you have any questions or need additional information regarding this matter, please contact us at (503) 585-2474.

Sincerely,

WESTECH ENGINEERING, INC.

Raymond C. Engel, P.E.
Project Manager

STORMWATER RETENTION CALCULATIONS

A. AREAS

Total Area = 18,385 sq.ft. = 0.42 acres (does not include portion of City sidewalk on property or 6-foot wide disputed strip along south property edge)

Building Roof Area = 4,650 sq.ft.

Site Concrete Area (not under roof overhangs) = 875 sq.ft.

Asphalt Paving Area = 9,700 sq.ft.

Planting(landscaped)Area = 1,360 sq.ft. to CB-4
- 1,800 sq.ft. to CB-3

B. RETENTION AT CB-4

$\frac{(1,360)(0.55)}{12}$ = 62 cu.ft. required

CB-4 volume = 21 cu.ft.

Retention pond volume = (0.33)(3.14)(8')(8')(0.75') = 49.74 cu.ft.

21 + 49.74 = 70.74 cu.ft. retention provided

Overflow is over sidewalk into street.

C. CB-4 ORIFICE SIZE

Area = 1,360 sq.ft. = 0.031 acre

Q = 0.3 x 0.031 = 0.0093 CFS

H = 1.33' + 0.75' = 2.08'

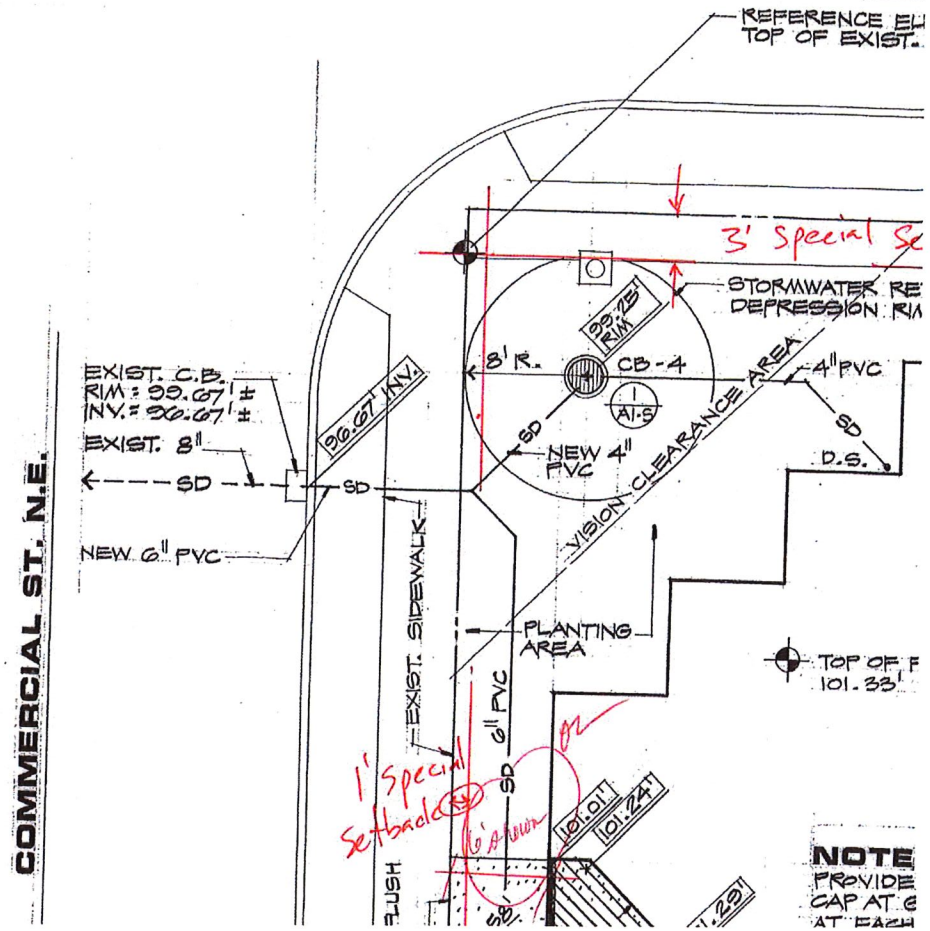
Orifice = $6.071\left(\frac{0.0093}{\sqrt{2.08}}\right)^{1/2}$ = 0.49"

D. RETENTION AT CB-3

Impervious Area: $\frac{(4,650+875+9,700)(0.75)}{12}$ = 951.56 cu.ft.

Pervious Area: $\frac{(1,800)(0.55)}{12}$ = 82.5 cu.ft.

Assume that an additional paved area of 224 sq.ft. and an additional landscaped area of 778 sq.ft. may become part of this property depending

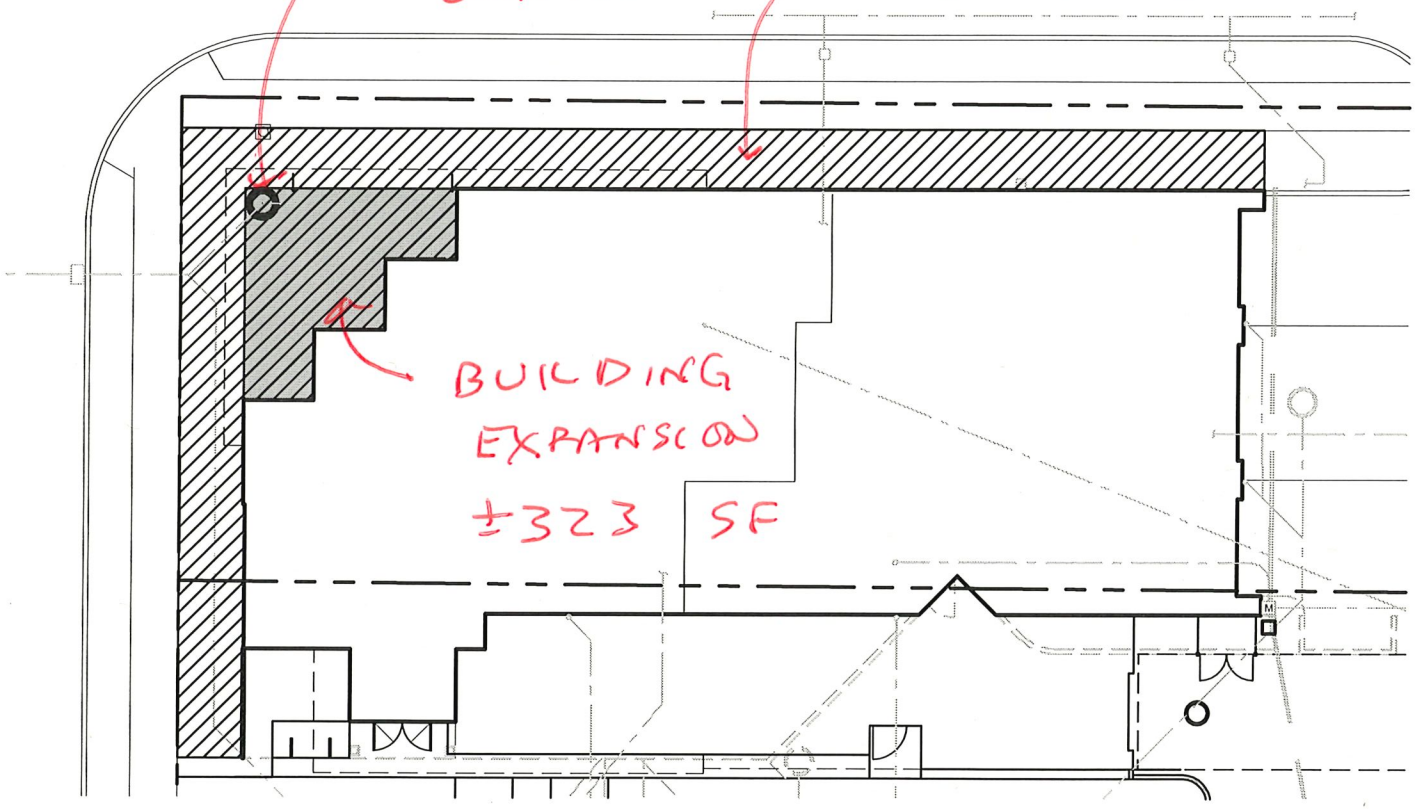


PINE ST

1" = 20'

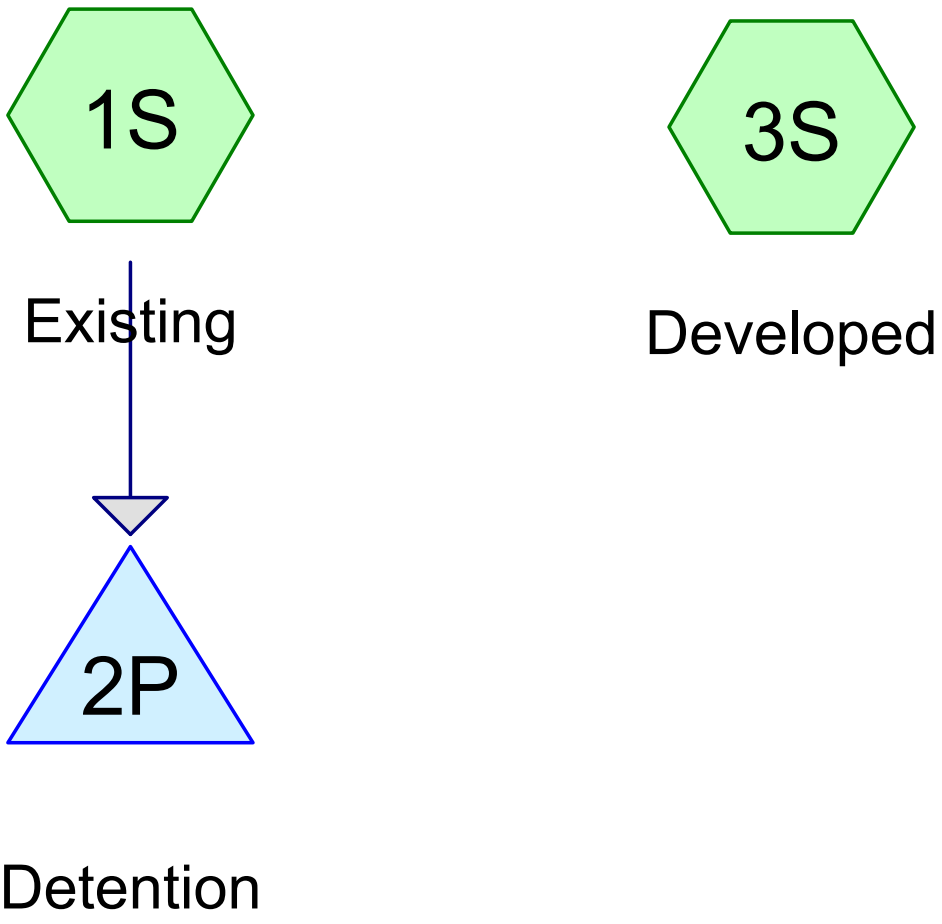
EXISTING AREA DRAIN w/ 0.49" ORIFICE

LANDSCAPE AREA TO REMAIN



COMMERCIAL ST.

TOTAL LANDSCAPE AREA TO AREA DRAIN	1,360 SF
BUILDING EXPANSION	323 SF
NET LANDSCAPE AREA	1,037 SF



Subcat Reach Pond Link

Routing Diagram for Hear No Evil 05-15-24
Prepared by Westech Engineering Inc, Printed 5/15/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	00 Half 2-year	Type IA 24-hr		Default	24.00	1	1.10	2
2	10 10-year	Type IA 24-hr		Default	24.00	1	3.20	2
3	25 25-year	Type IA 24-hr		Default	24.00	1	3.60	2
4	100 100-year	Type IA 24-hr		Default	24.00	1	4.40	2

Summary for Subcatchment 1S: Existing

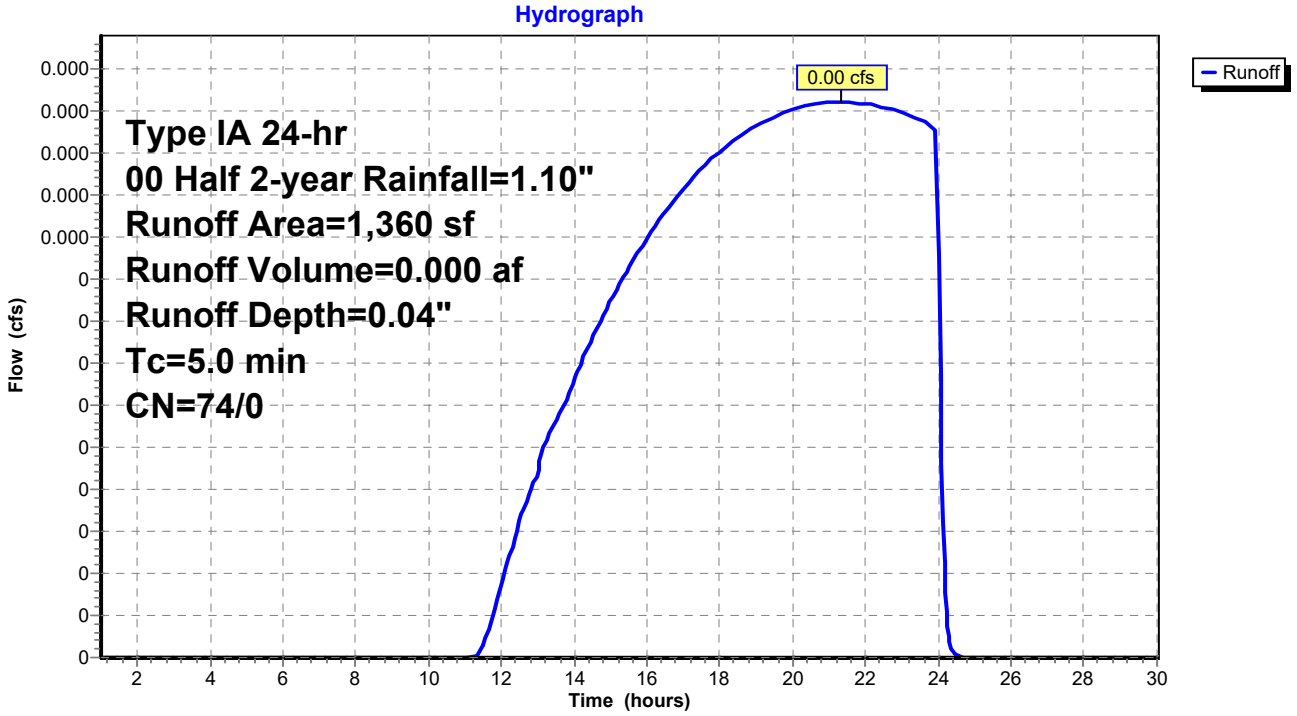
Runoff = 0.00 cfs @ 21.34 hrs, Volume= 0.000 af, Depth= 0.04"
Routed to Pond 2P : Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 00 Half 2-year Rainfall=1.10"

	Area (sf)	CN	Description
*	1,360	74	
	1,360	74	100.00% Pervious Area

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

Subcatchment 1S: Existing



Summary for Pond 2P: Detention

Inflow Area = 0.031 ac, 0.00% Impervious, Inflow Depth = 0.04" for 00 Half 2-year event
Inflow = 0.00 cfs @ 21.34 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 21.42 hrs, Volume= 0.000 af, Atten= 0%, Lag= 5.1 min
Primary = 0.00 cfs @ 21.42 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Peak Elev= 98.33' @ 21.42 hrs Surf.Area= 13 sf Storage= 0 cf

Plug-Flow detention time= 5.1 min calculated for 0.000 af (100% of inflow)
Center-of-Mass det. time= 5.1 min (1,144.1 - 1,139.0)

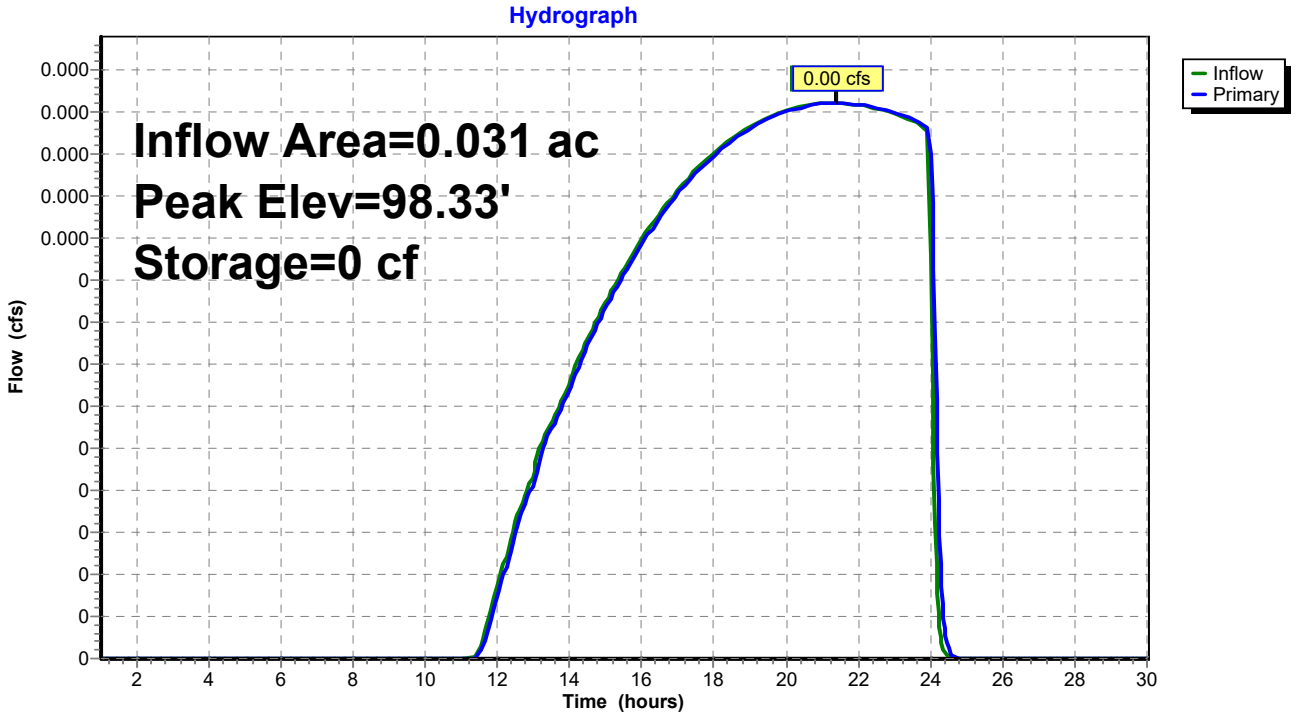
Volume	Invert	Avail.Storage	Storage Description
#1	98.33'	15,004 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.33	13	0.0	0	0
98.34	13	100.0	0	0
100.00	13	100.0	22	22
100.83	64	100.0	32	54
100.84	10,000	100.0	50	104
102.33	10,000	100.0	14,900	15,004

Device	Routing	Invert	Outlet Devices
#1	Primary	98.33'	**0.5" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.83'	**30.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 21.42 hrs HW=98.33' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.00 cfs @ 0.18 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Detention



Summary for Subcatchment 3S: Developed

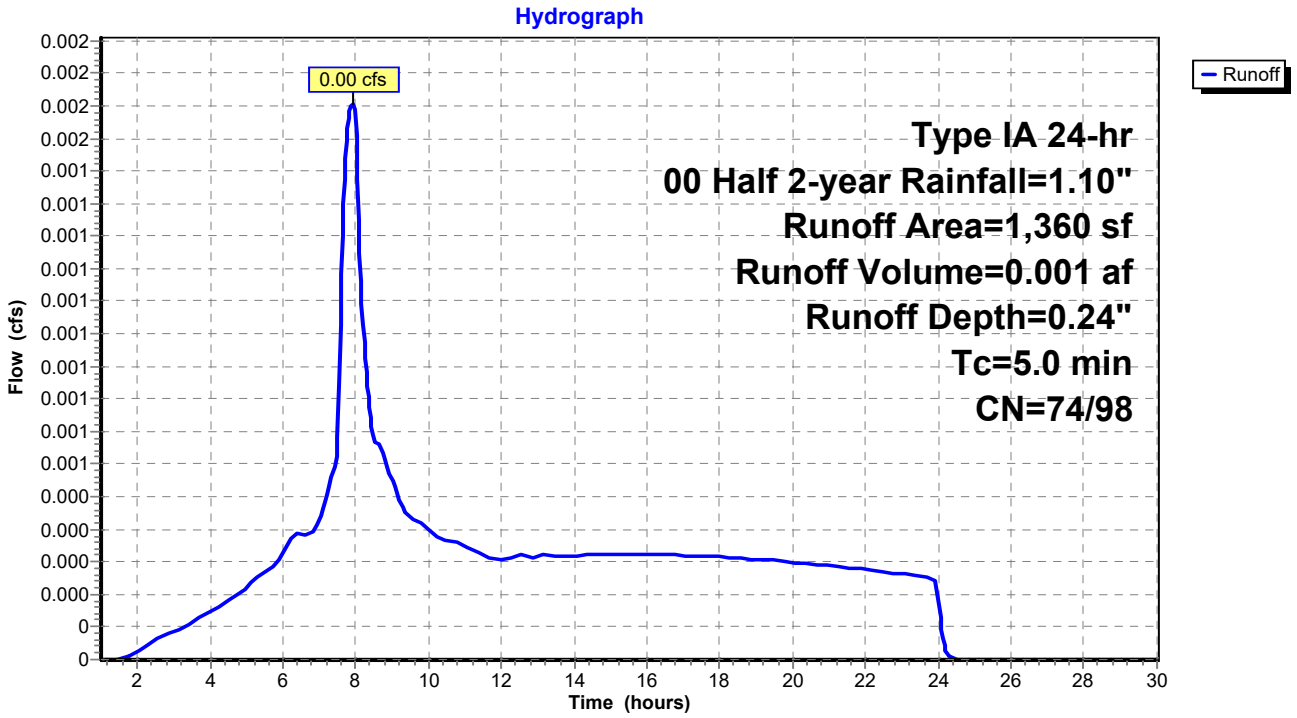
Runoff = 0.00 cfs @ 7.91 hrs, Volume= 0.001 af, Depth= 0.24"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 00 Half 2-year Rainfall=1.10"

	Area (sf)	CN	Description
*	323	98	
*	1,037	74	
	1,360	80	Weighted Average
	1,037	74	76.25% Pervious Area
	323	98	23.75% Impervious Area

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

Subcatchment 3S: Developed



Summary for Subcatchment 1S: Existing

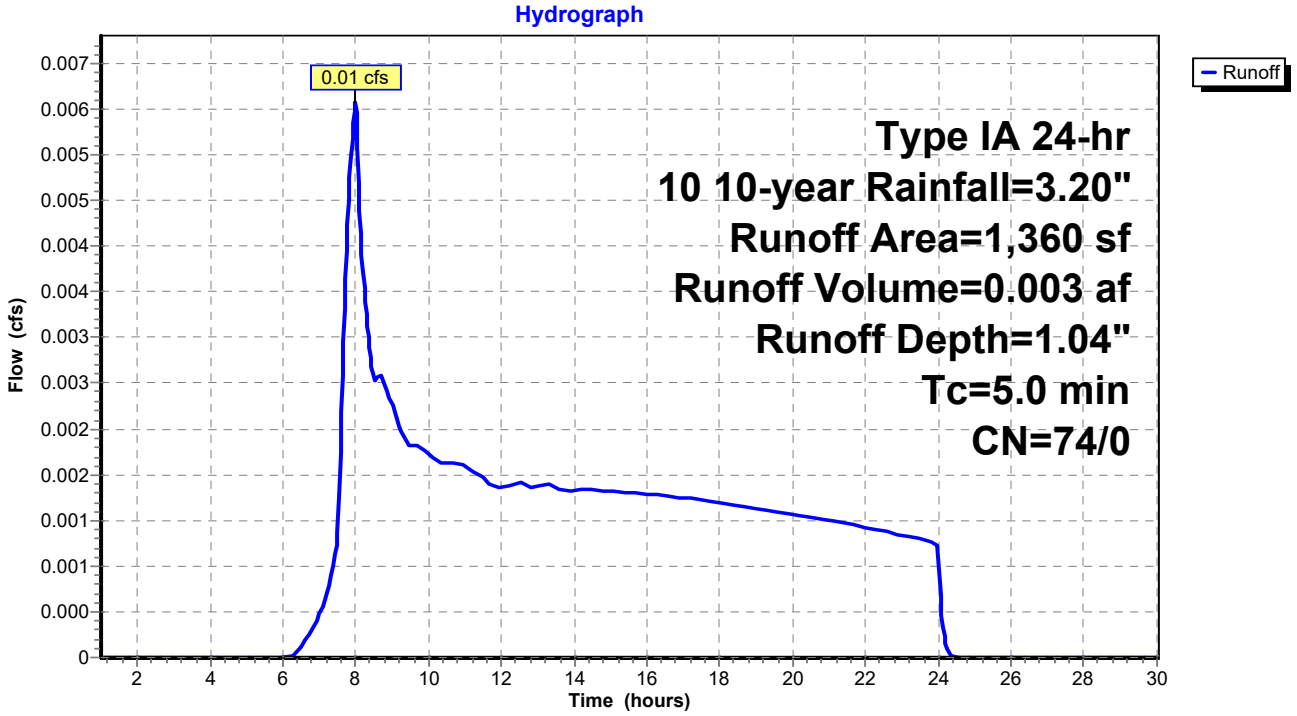
Runoff = 0.01 cfs @ 7.99 hrs, Volume= 0.003 af, Depth= 1.04"
Routed to Pond 2P : Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 10 10-year Rainfall=3.20"

	Area (sf)	CN	Description
*	1,360	74	
	1,360	74	100.00% Pervious Area

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

Subcatchment 1S: Existing



Summary for Pond 2P: Detention

Inflow Area = 0.031 ac, 0.00% Impervious, Inflow Depth = 1.04" for 10 10-year event
Inflow = 0.01 cfs @ 7.99 hrs, Volume= 0.003 af
Outflow = 0.00 cfs @ 8.25 hrs, Volume= 0.003 af, Atten= 35%, Lag= 15.5 min
Primary = 0.00 cfs @ 8.25 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Peak Elev= 98.69' @ 8.25 hrs Surf.Area= 13 sf Storage= 5 cf

Plug-Flow detention time= 10.6 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 10.6 min (874.4 - 863.8)

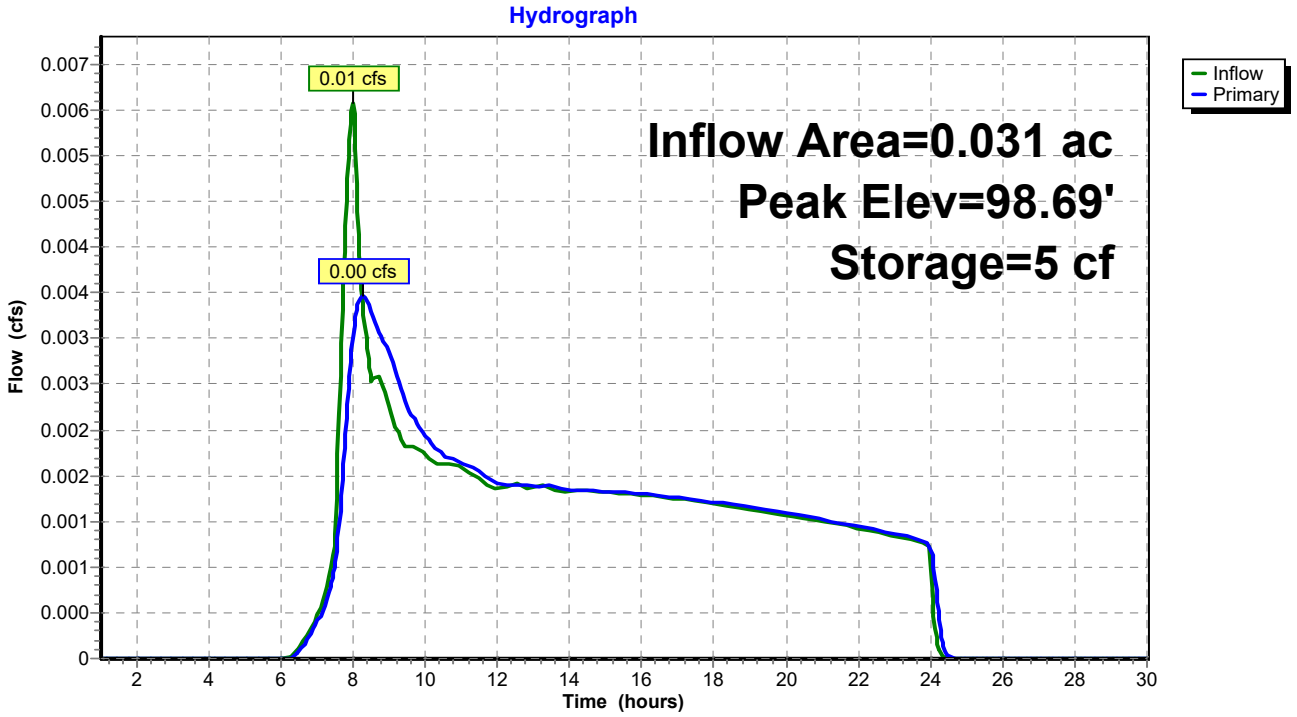
Volume	Invert	Avail.Storage	Storage Description
#1	98.33'	15,004 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.33	13	0.0	0	0
98.34	13	100.0	0	0
100.00	13	100.0	22	22
100.83	64	100.0	32	54
100.84	10,000	100.0	50	104
102.33	10,000	100.0	14,900	15,004

Device	Routing	Invert	Outlet Devices
#1	Primary	98.33'	**0.5" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.83'	**30.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 8.25 hrs HW=98.69' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.00 cfs @ 2.91 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Detention



Summary for Subcatchment 3S: Developed

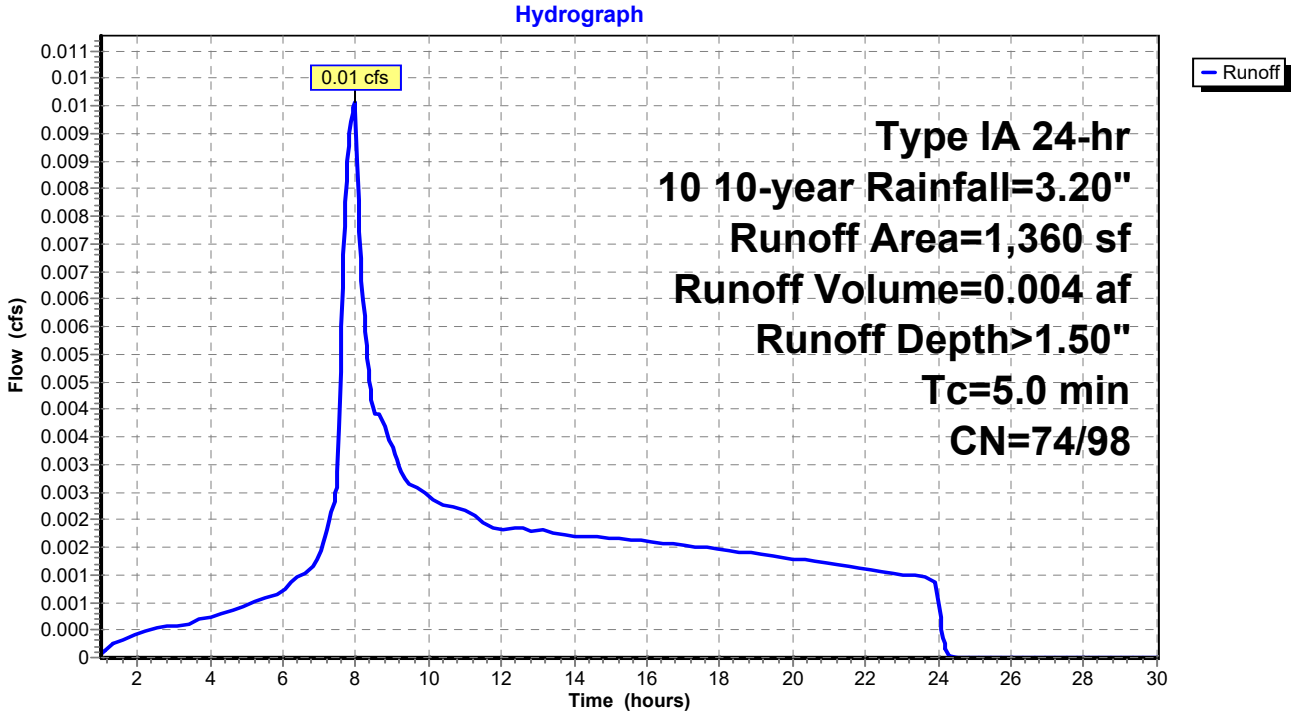
Runoff = 0.01 cfs @ 7.98 hrs, Volume= 0.004 af, Depth> 1.50"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 10 10-year Rainfall=3.20"

	Area (sf)	CN	Description
*	323	98	
*	1,037	74	
	1,360	80	Weighted Average
	1,037	74	76.25% Pervious Area
	323	98	23.75% Impervious Area

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

Subcatchment 3S: Developed



Summary for Subcatchment 1S: Existing

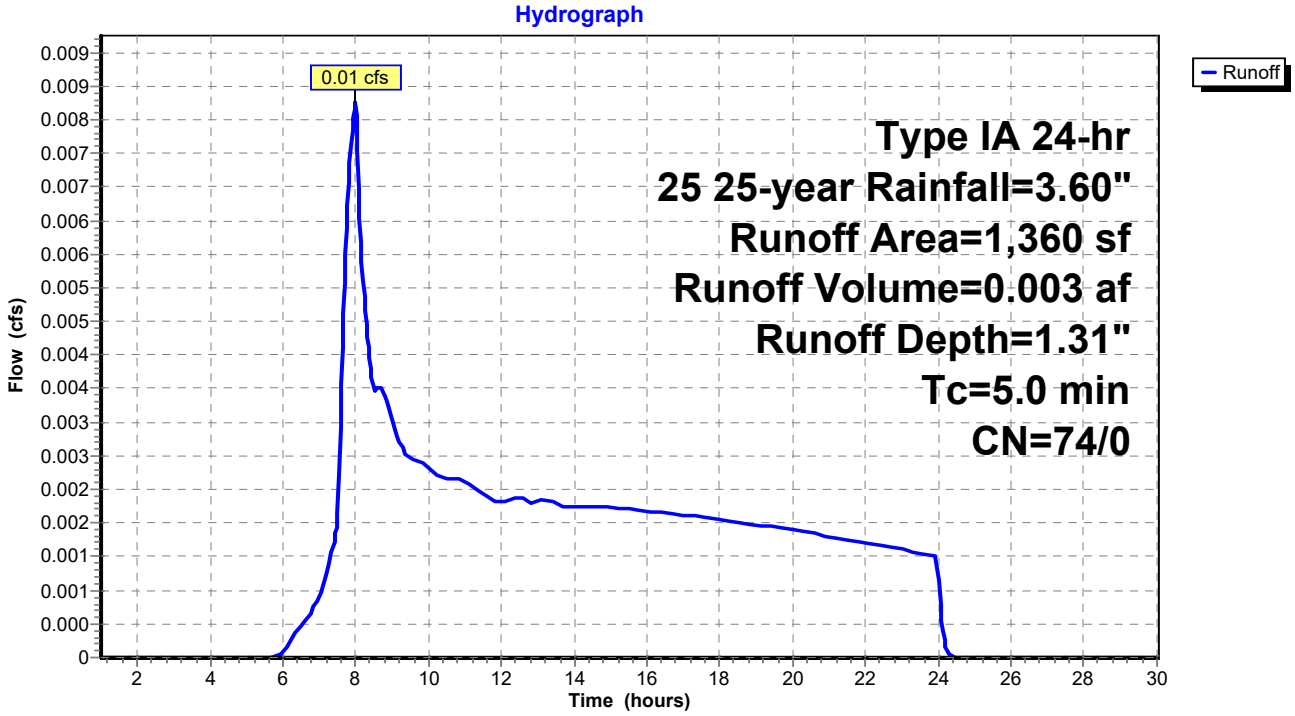
Runoff = 0.01 cfs @ 7.98 hrs, Volume= 0.003 af, Depth= 1.31"
Routed to Pond 2P : Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 25 25-year Rainfall=3.60"

	Area (sf)	CN	Description
*	1,360	74	
	1,360	74	100.00% Pervious Area

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

Subcatchment 1S: Existing



Summary for Pond 2P: Detention

Inflow Area = 0.031 ac, 0.00% Impervious, Inflow Depth = 1.31" for 25 25-year event
Inflow = 0.01 cfs @ 7.98 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 8.28 hrs, Volume= 0.003 af, Atten= 39%, Lag= 17.8 min
Primary = 0.01 cfs @ 8.28 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Peak Elev= 98.91' @ 8.28 hrs Surf.Area= 13 sf Storage= 8 cf

Plug-Flow detention time= 13.4 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 13.4 min (861.4 - 848.0)

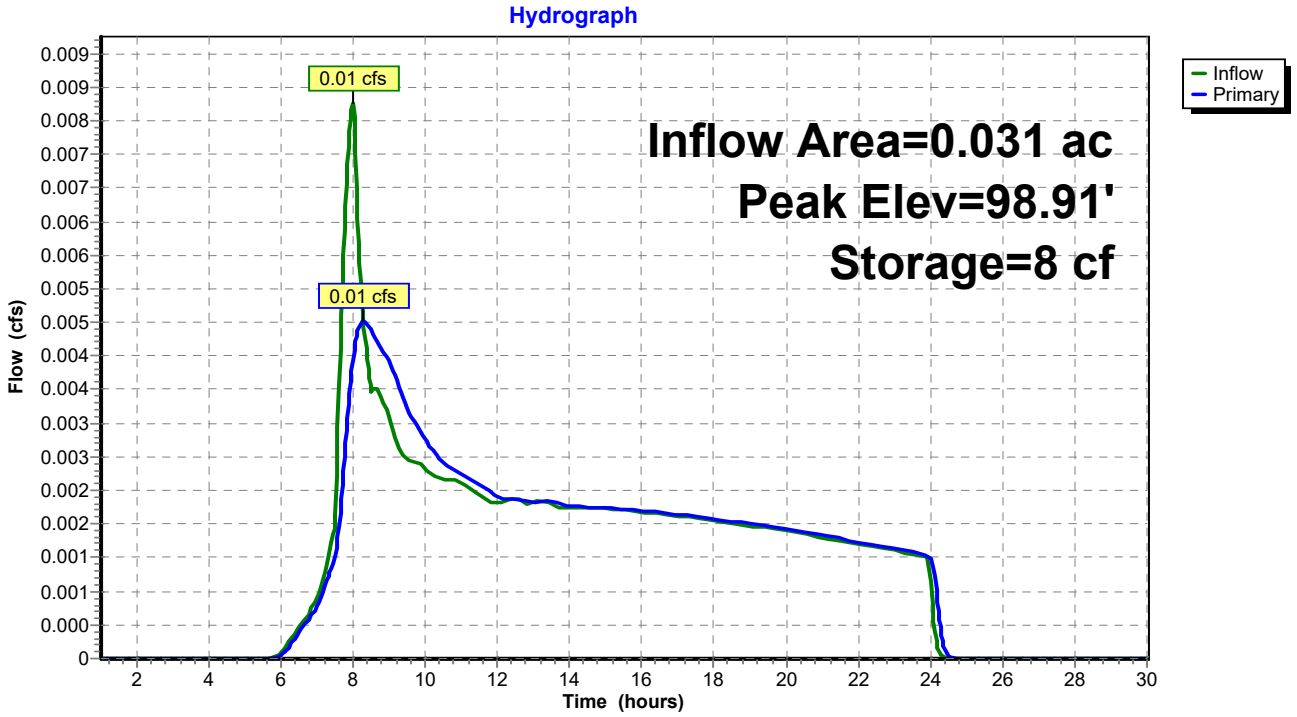
Volume	Invert	Avail.Storage	Storage Description
#1	98.33'	15,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.33	13	0.0	0	0
98.34	13	100.0	0	0
100.00	13	100.0	22	22
100.83	64	100.0	32	54
100.84	10,000	100.0	50	104
102.33	10,000	100.0	14,900	15,004

Device	Routing	Invert	Outlet Devices
#1	Primary	98.33'	**0.5" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.83'	**30.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.01 cfs @ 8.28 hrs HW=98.91' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.01 cfs @ 3.68 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Detention



Summary for Subcatchment 3S: Developed

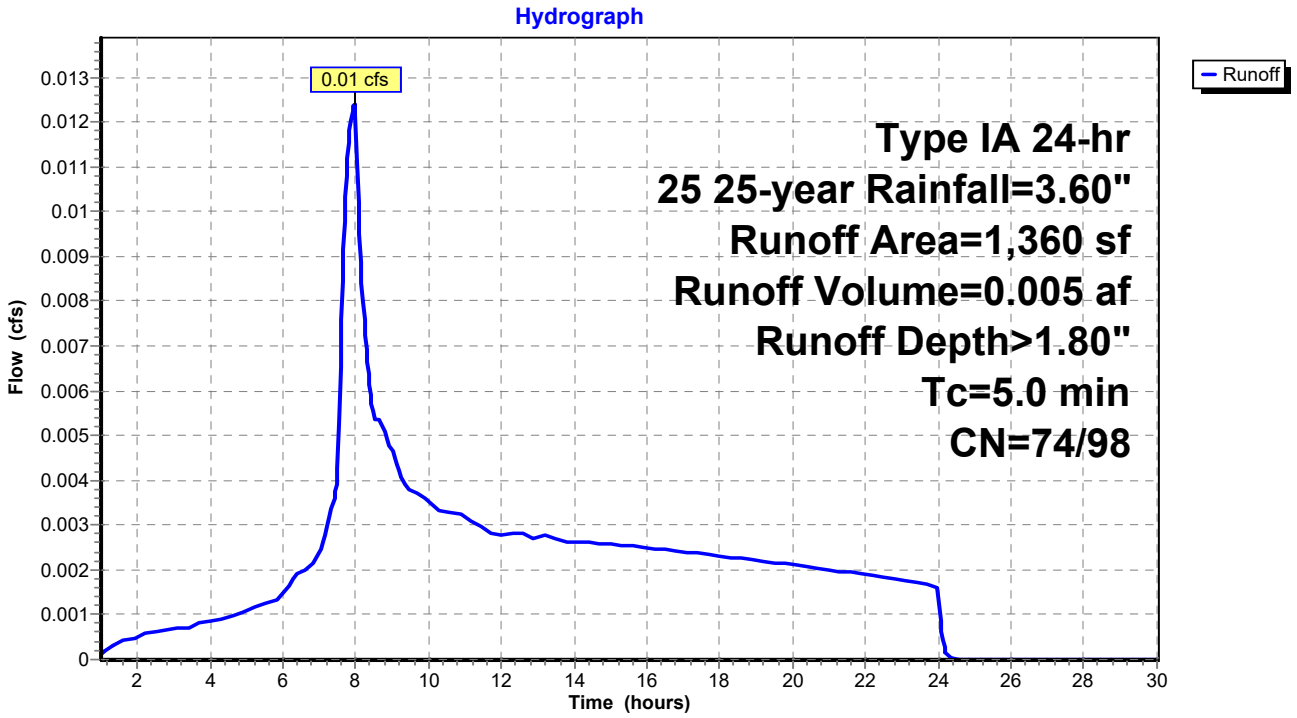
Runoff = 0.01 cfs @ 7.97 hrs, Volume= 0.005 af, Depth> 1.80"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 25 25-year Rainfall=3.60"

	Area (sf)	CN	Description
*	323	98	
*	1,037	74	
	1,360	80	Weighted Average
	1,037	74	76.25% Pervious Area
	323	98	23.75% Impervious Area

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

Subcatchment 3S: Developed



Summary for Subcatchment 1S: Existing

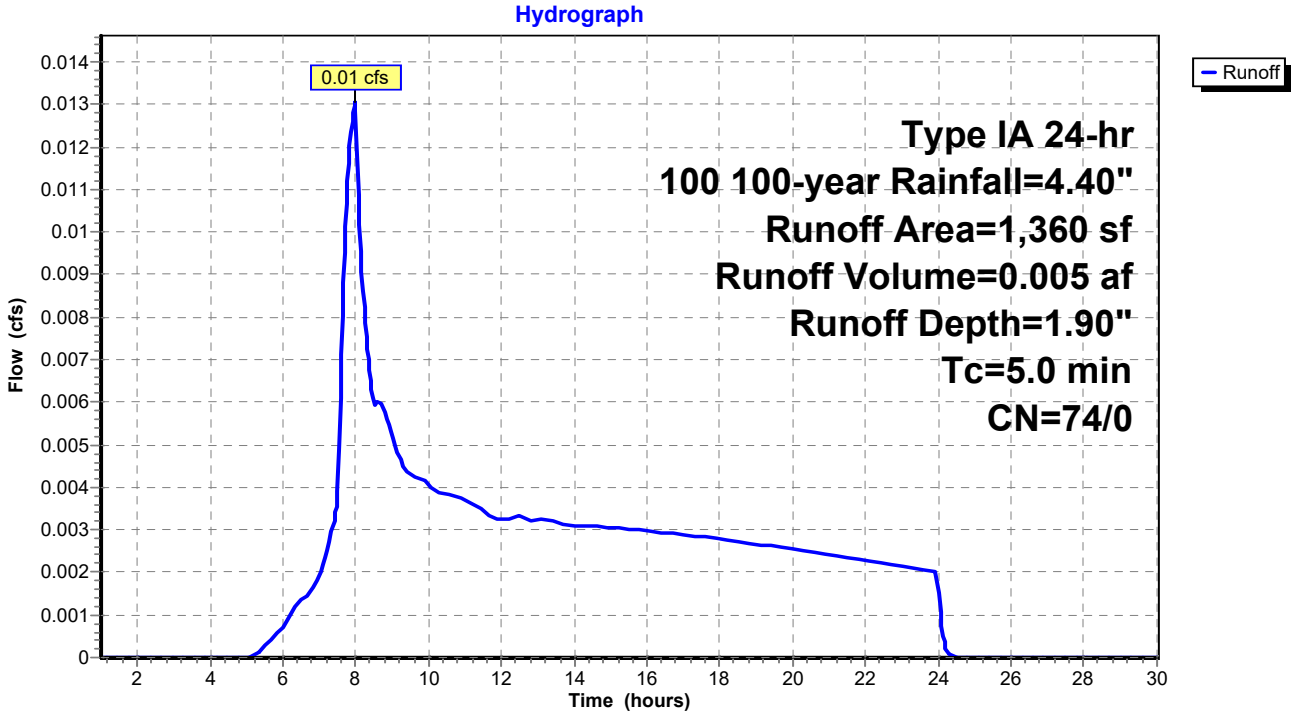
Runoff = 0.01 cfs @ 7.98 hrs, Volume= 0.005 af, Depth= 1.90"
Routed to Pond 2P : Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 100 100-year Rainfall=4.40"

	Area (sf)	CN	Description
*	1,360	74	
	1,360	74	100.00% Pervious Area

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

Subcatchment 1S: Existing



Summary for Pond 2P: Detention

Inflow Area = 0.031 ac, 0.00% Impervious, Inflow Depth = 1.90" for 100 100-year event
Inflow = 0.01 cfs @ 7.98 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 8.34 hrs, Volume= 0.005 af, Atten= 46%, Lag= 21.7 min
Primary = 0.01 cfs @ 8.34 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Peak Elev= 99.49' @ 8.34 hrs Surf.Area= 13 sf Storage= 15 cf

Plug-Flow detention time= 19.1 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 19.1 min (843.0 - 823.9)

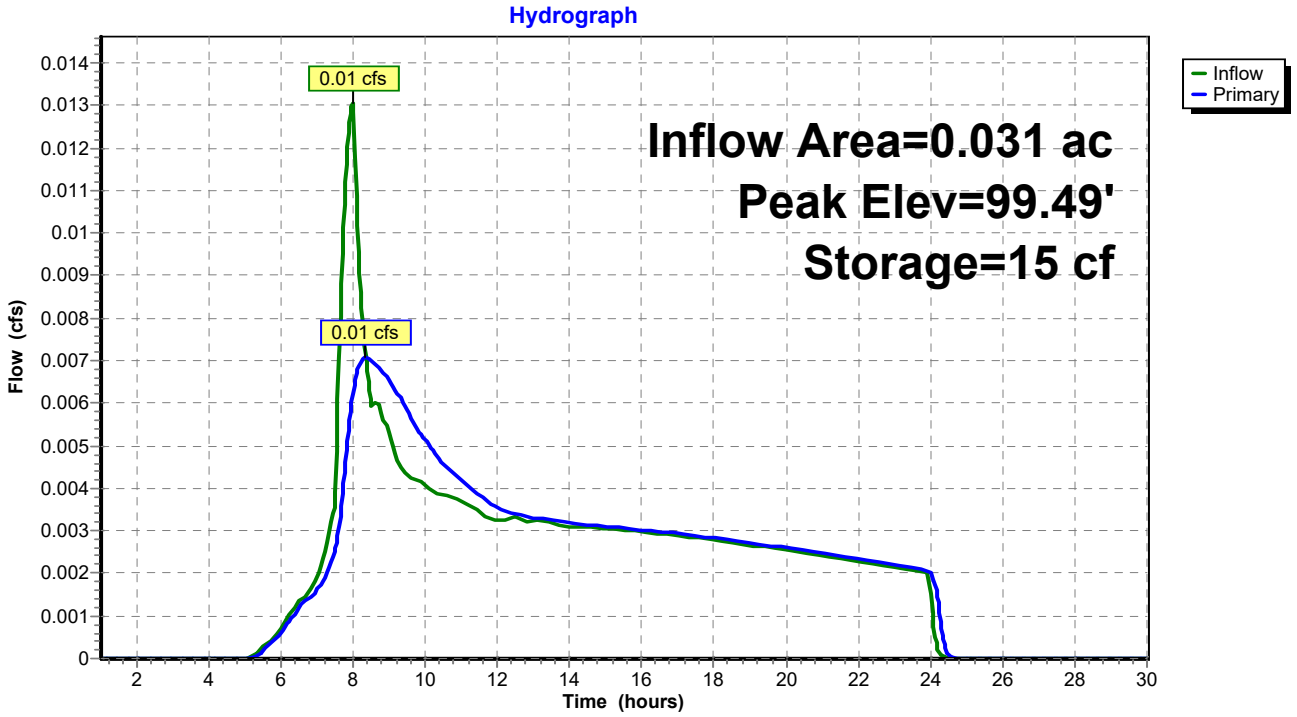
Volume	Invert	Avail.Storage	Storage Description
#1	98.33'	15,004 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.33	13	0.0	0	0
98.34	13	100.0	0	0
100.00	13	100.0	22	22
100.83	64	100.0	32	54
100.84	10,000	100.0	50	104
102.33	10,000	100.0	14,900	15,004

Device	Routing	Invert	Outlet Devices
#1	Primary	98.33'	**0.5" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.83'	**30.0' long + 100.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.01 cfs @ 8.34 hrs HW=99.49' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.01 cfs @ 5.19 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: Detention



Summary for Subcatchment 3S: Developed

Runoff = 0.02 cfs @ 7.96 hrs, Volume= 0.006 af, Depth> 2.43"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-30.01 hrs, dt= 0.03 hrs
Type IA 24-hr 100 100-year Rainfall=4.40"

	Area (sf)	CN	Description
*	323	98	
*	1,037	74	
	1,360	80	Weighted Average
	1,037	74	76.25% Pervious Area
	323	98	23.75% Impervious Area

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

Subcatchment 3S: Developed