Addition to – First Baptist Church Bryant

Stormwater Management Report

City of Bryant, Saline County, Arkansas

Submitted:
May 21, 2026

Revised:
June 23, 2026
July 8, 2026

MINTON ENGINEERING, INC.
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I. Pre-Development Conditions

The site is located at 6715 Hwy 5 N, in Bryant Arkansas. There is an existing church with associated parking and drives. The site generally drains from north to south through an existing detention pond at the southwest corner of the property. Stormwater exits the property through the detention pond into the north side road ditch of Hwy 5.

II. Post-Development Conditions

This project will include an 8,730 SF addition on the north side of the existing structure as well as re-working the drive on the east side of the addition. The drainage patterns will remain the same with stormwater ultimately ending up in the existing detention pond.

III. Design Considerations

The increase in hard surface for this project is minimal. There is existing asphalt on the north side of the church that will be removed for this addition that will offset the new development. This project will increase the overall hard surface area of the site by 0.08 acres or 3,484 square feet.

We were provided the original stormwater calculations for this property by the city. In reviewing these calculations, it appears there was an error made when calculating the time of concentration, specifically the manning's coefficient that was used in the overland flow calc. This caused the time of Tc to be much larger than it really is, the pre and post development flows appear correct. This caused the pond to be larger than required. Attached is the re-calculated storm #'s, pre-development is taking the property and completely undeveloped. All calculations and charts were created using Autodesk Hydraflow.

IV. Existing Detention Pond

The capacity of the existing detention pond will be utilized for the increase in hard surface area of this project. Below is a summary of the pre & post development flowrates.

Description	Pre-Dev.	Post-Dev. (No Detention)	Post-Dev. (Detention)	Decrease Discharge	Required Volume	Water Surf. Elevation
2-Year Storm	8.00 cfs	12.15 cfs	3.29 cfs	4.71 cfs	3,758 cf	385.58
10-Year Storm	10.90 cfs	15.25 cfs	3.81 cfs	7.09 cfs	5,153 cf	385.86
25-Year Storm	12.67 cfs	17.50 cfs	4.09 cfs	8.58 cfs	6,045 cf	386.03
50-Year Storm	14.06 cfs	19.28 cfs	4.25 cfs	9.81 cfs	6,771 cf	386.14
100-Year Storm	15.44 cfs	21.05 cfs	4.41 cfs	11.03 cfs	7,503 cf	386.24



POND CROSS SECTION @ CENTER

V. Waiver Considerations

We are requesting that the existing detention pond be accepted as-is with the improvement of adding a trickle channel. The pond was constructed in 2017, since then there have been changes to the city's stormwater requirements. The pond's volume and discharge flow rate still meet all the required limits, but the outlet structure and spillway do not.

The outlet structure for the existing pond is a 12 culvert; code requires a controlled structure and a minimum of 18" pipe for outlet. Considering that there haven't been any issues with the existing pond, and that this project is only adding 0.08 acres (3,484 sf) of hard surface to the property, we request that this requirement be waived.

Also, the existing spillway cannot adequately convey the 100-year storm alone. The current spillway is a 2' wide by 1.5' deep concrete channel, to comply with code this would need to increase to 4' wide. This increase in spillway size would only be needed if the outlet pipe were 100% obstructed, and a 100-year storm event occurred at the same time. We are requesting that the existing spillway remain. In the event that it is needed, the pond will overtop the levee and enter the roadside ditch of Hwy 5, there is no risk of damaging any structures.

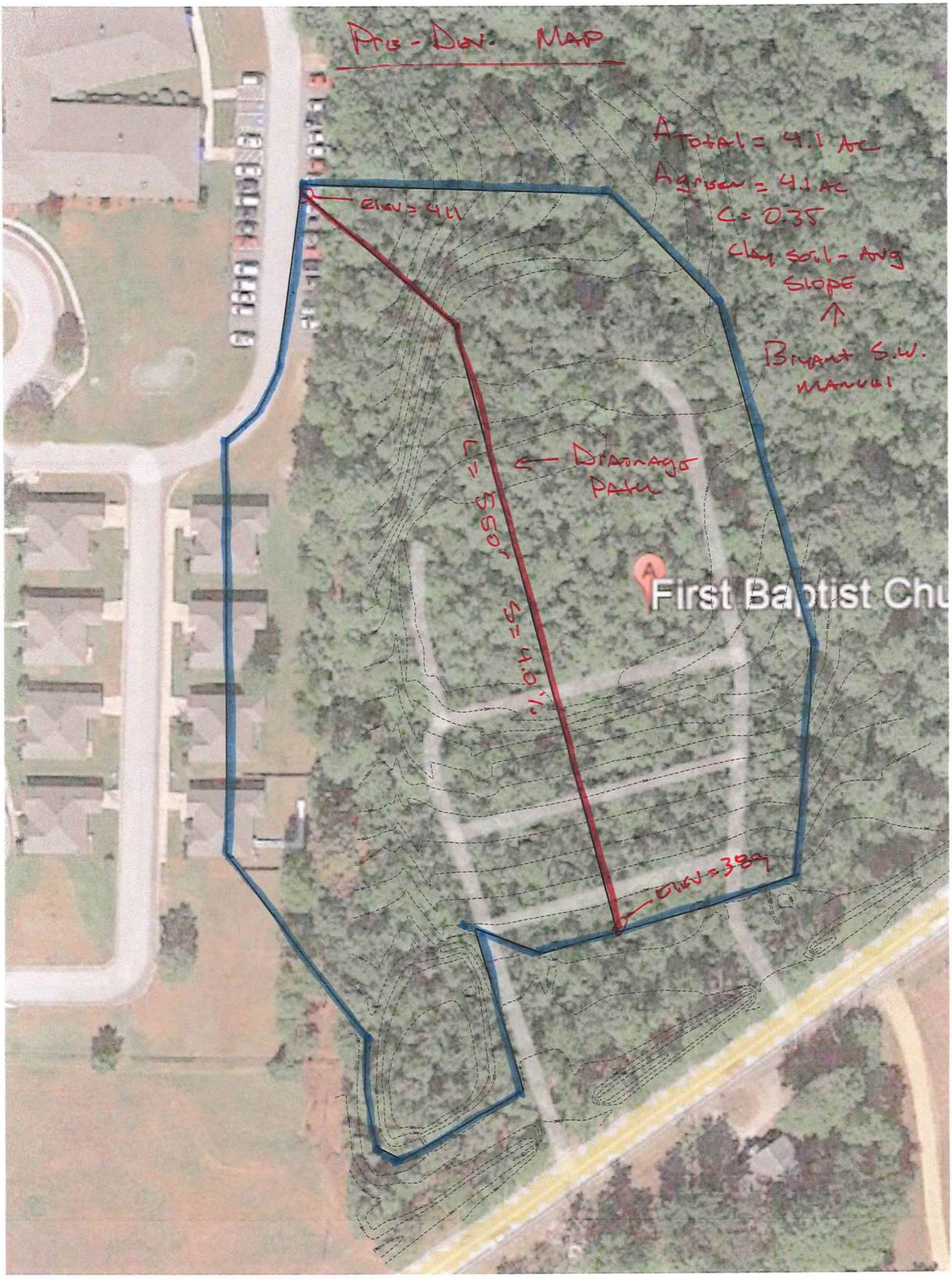
VI. Conclusion

By utilizing the existing detention pond, we are able to maintain post development flows well below pre development. Please take this report in consideration and let me know if you need any further information.

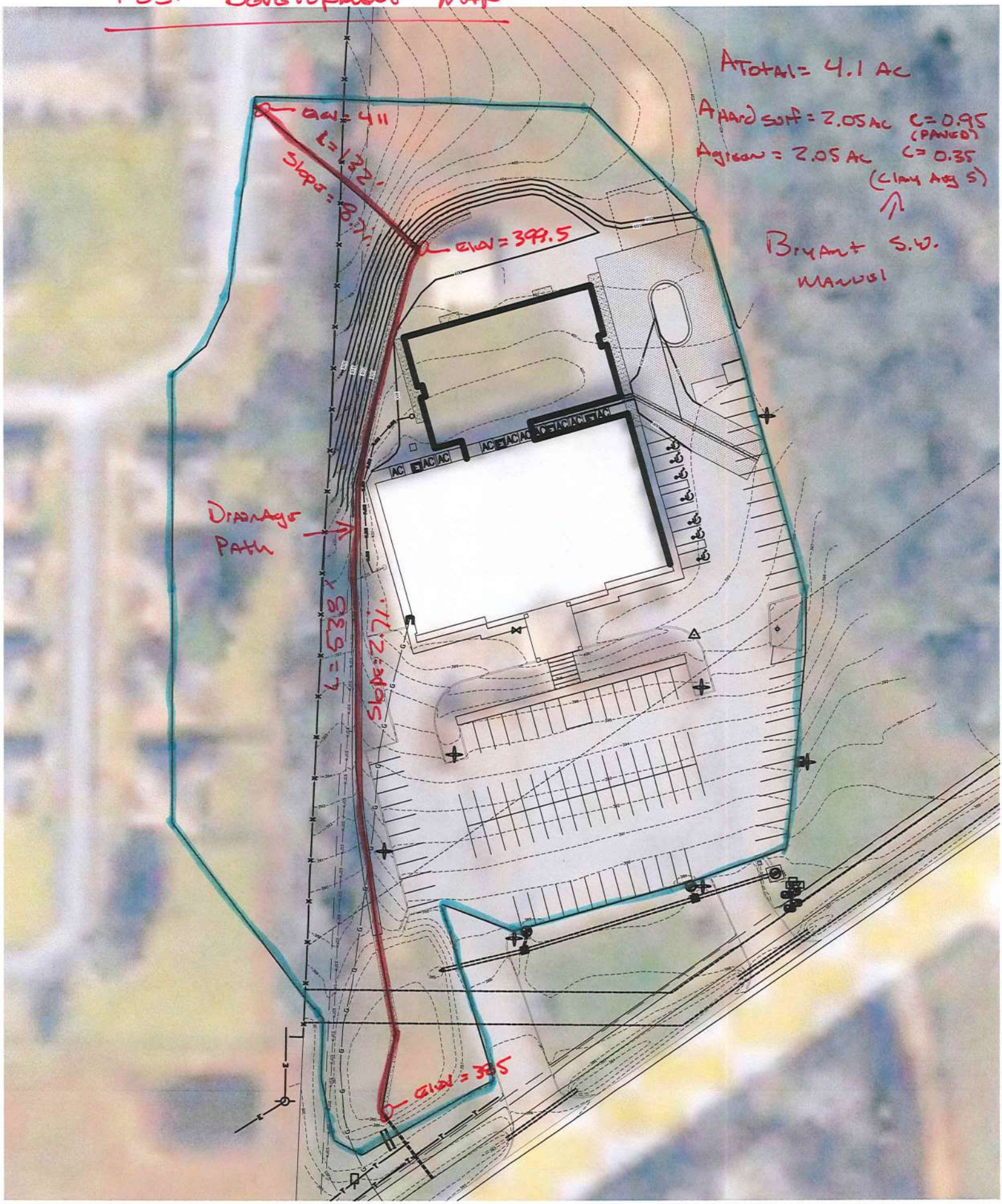
Sincerely,

Josh Minton, PE

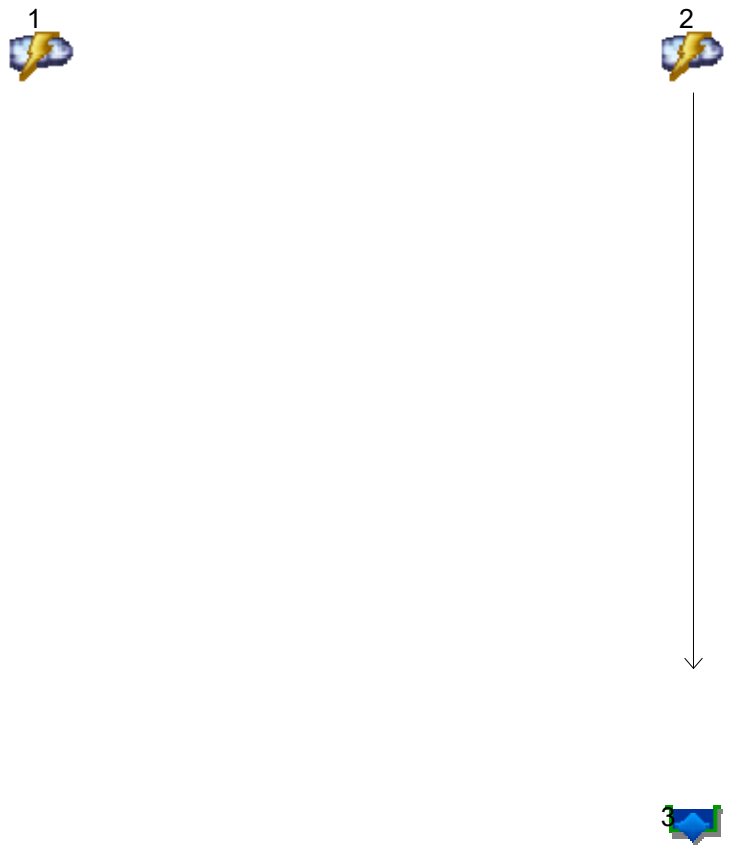



Pre-Dev. MAP
A_{TOTAL} = 4.1 Ac
A_{grass} = 4.1 Ac
C = 0.35
Clay soil - Avg Slope
Bryant S.W. Manual
Elev = 411
L = 550'
S = 4.0%
Drainage Path
Elev = 389
First Baptist Chu

Post Development Map



Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Rational	Post-Development
2	Rational	Post-Development
3	Reservoir	Through Pond

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	------	-------	8.002	-------	-------	10.90	12.67	14.06	15.44	Post-Development
2	Rational	------	-------	11.67	-------	-------	15.25	17.50	19.28	21.05	Post-Development
3	Reservoir	2	-------	3.287	-------	-------	3.809	4.086	4.250	4.409	Through Pond

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

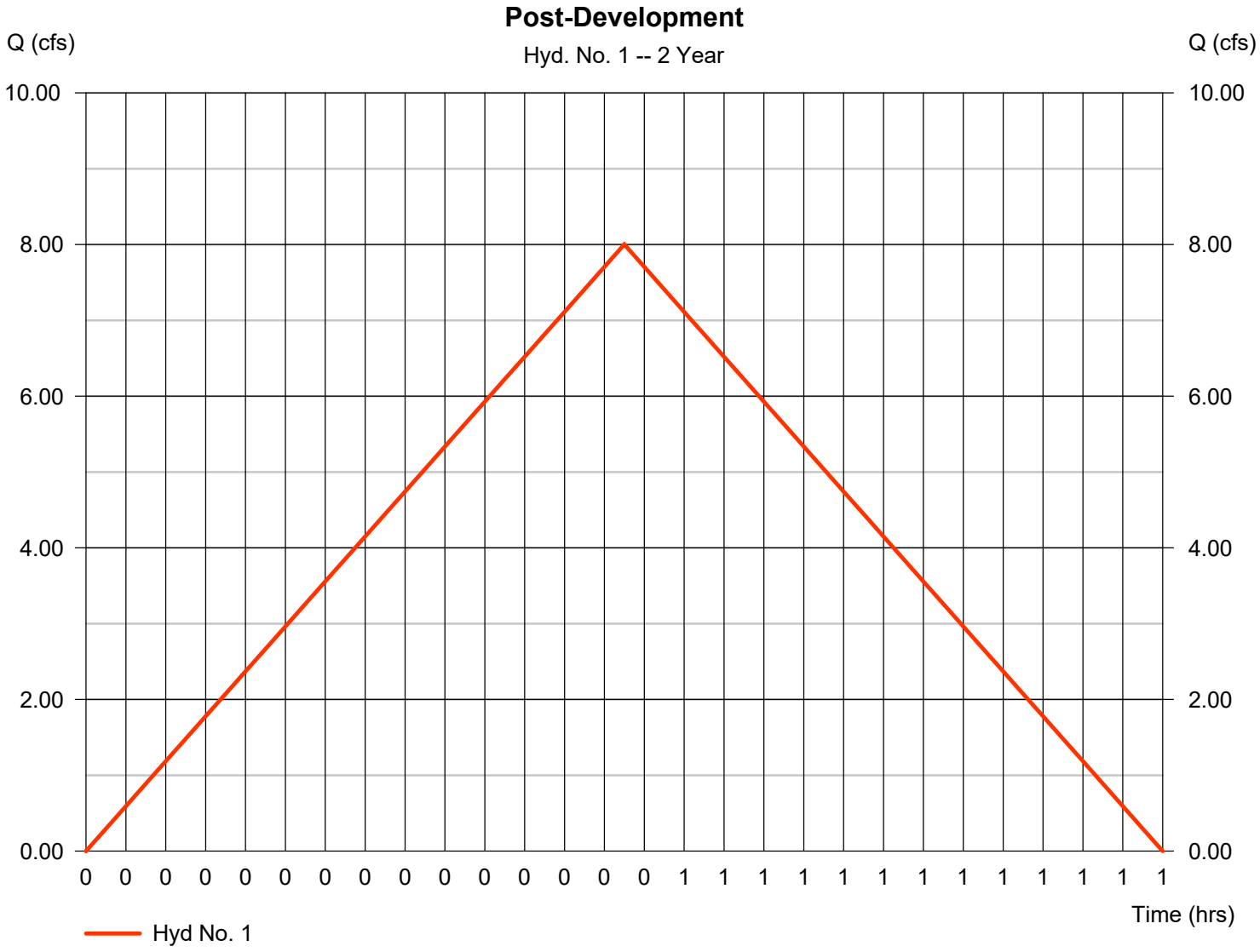
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	8.002	1	27	12,963	------	------	------	Post-Development
2	Rational	11.67	1	8	5,617	------	------	------	Post-Development
3	Reservoir	3.287	1	14	5,600	2	385.58	3,758	Through Pond

Hydrograph Report

Hyd. No. 1

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	8.002 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.45 hrs
Time interval	=	1 min	Hyd. volume	=	12,963 cuft
Drainage area	=	4.100 ac	Runoff coeff.	=	0.65
Intensity	=	3.003 in/hr	Tc by TR55	=	27.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No. 1

Post-Development

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.600		0.011		0.011		
Flow length (ft)	= 132.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 4.13		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 24.74**	**+**	**0.00**	**+**	**0.00**	**=**	**24.74**
Shallow Concentrated Flow							
Flow length (ft)	= 450.00		0.00		0.00		
Watercourse slope (%)	= 4.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.23		0.00		0.00		
Travel Time (min)	**= 2.32**	**+**	**0.00**	**+**	**0.00**	**=**	**2.32**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 27.00 min

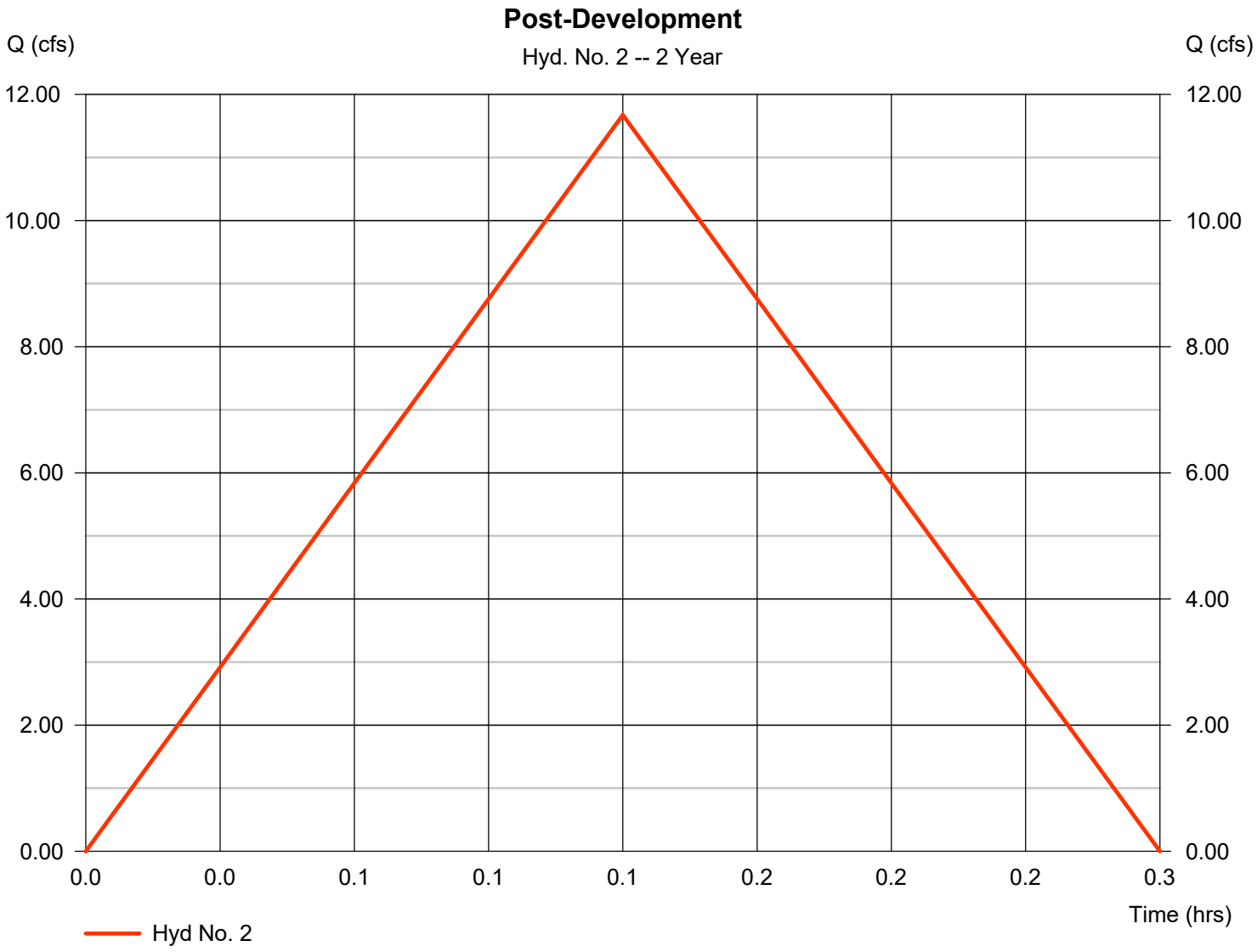
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	11.67 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	5,617 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	5.032 in/hr	Tc by TR55	=	8.02 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.95) + (2.050 x 0.35)] / 4.000



TR55 Tc Worksheet

Hyd. No. 2

Post-Development

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.130		0.011		0.011		
Flow length (ft)	= 132.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 4.13		0.00		0.00		
Land slope (%)	= 8.70		0.00		0.00		
Travel Time (min)	**= 5.33**	**+**	**0.00**	**+**	**0.00**	**=**	**5.33**
Shallow Concentrated Flow							
Flow length (ft)	= 538.00		0.00		0.00		
Watercourse slope (%)	= 2.70		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=3.34		0.00		0.00		
Travel Time (min)	**= 2.68**	**+**	**0.00**	**+**	**0.00**	**=**	**2.68**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 8.02 min

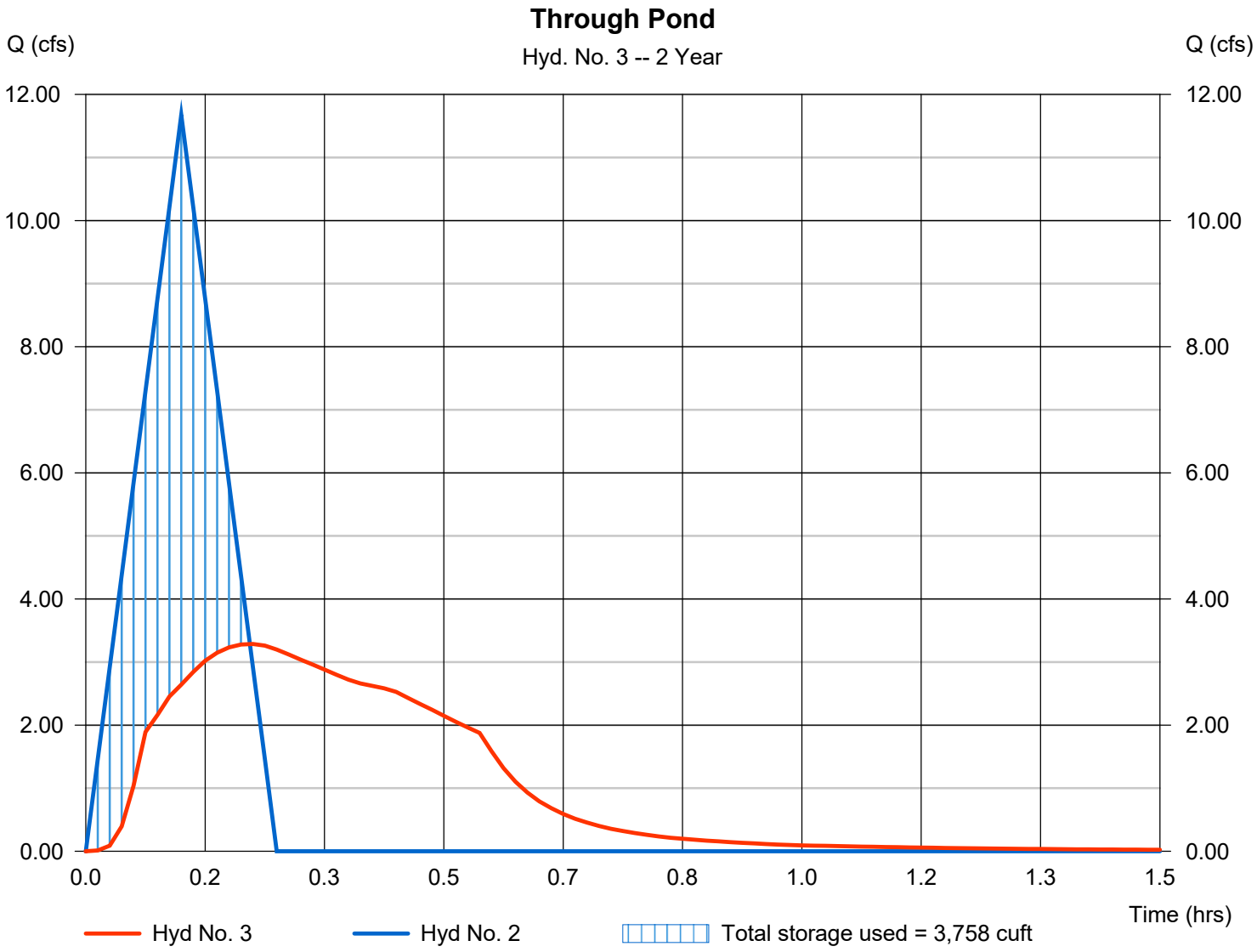
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.287 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.23 hrs
Time interval	=	1 min	Hyd. volume	=	5,600 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	385.58 ft
Reservoir name	=	<New Pond>	Max. Storage	=	3,758 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 384.25 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	384.25	00	0	0
0.75	385.00	3,644	911	911
1.75	386.00	6,295	4,909	5,820
2.75	387.00	7,578	6,926	12,746
3.55	387.80	9,336	6,753	19,499

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 384.25	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

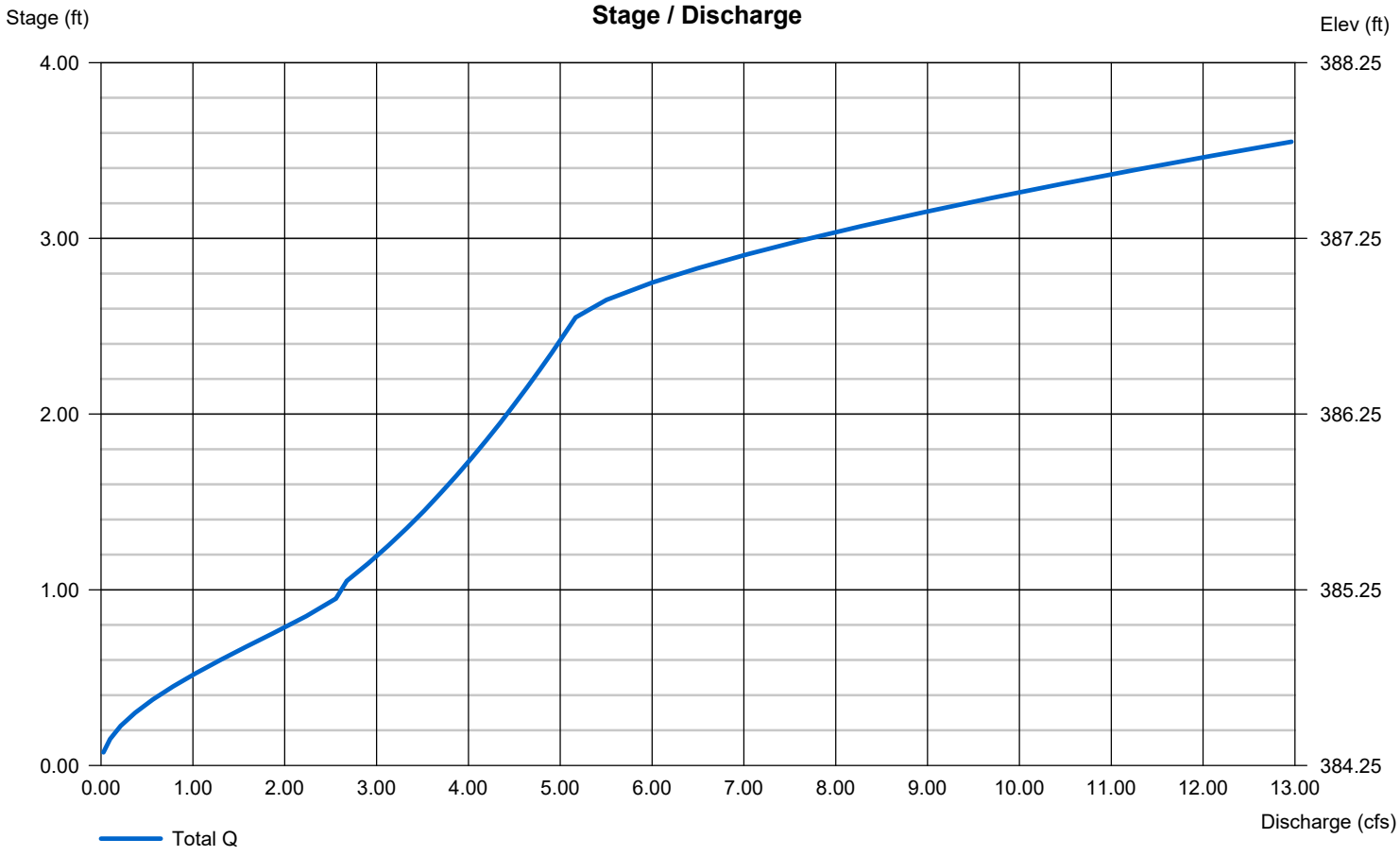
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 386.80	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

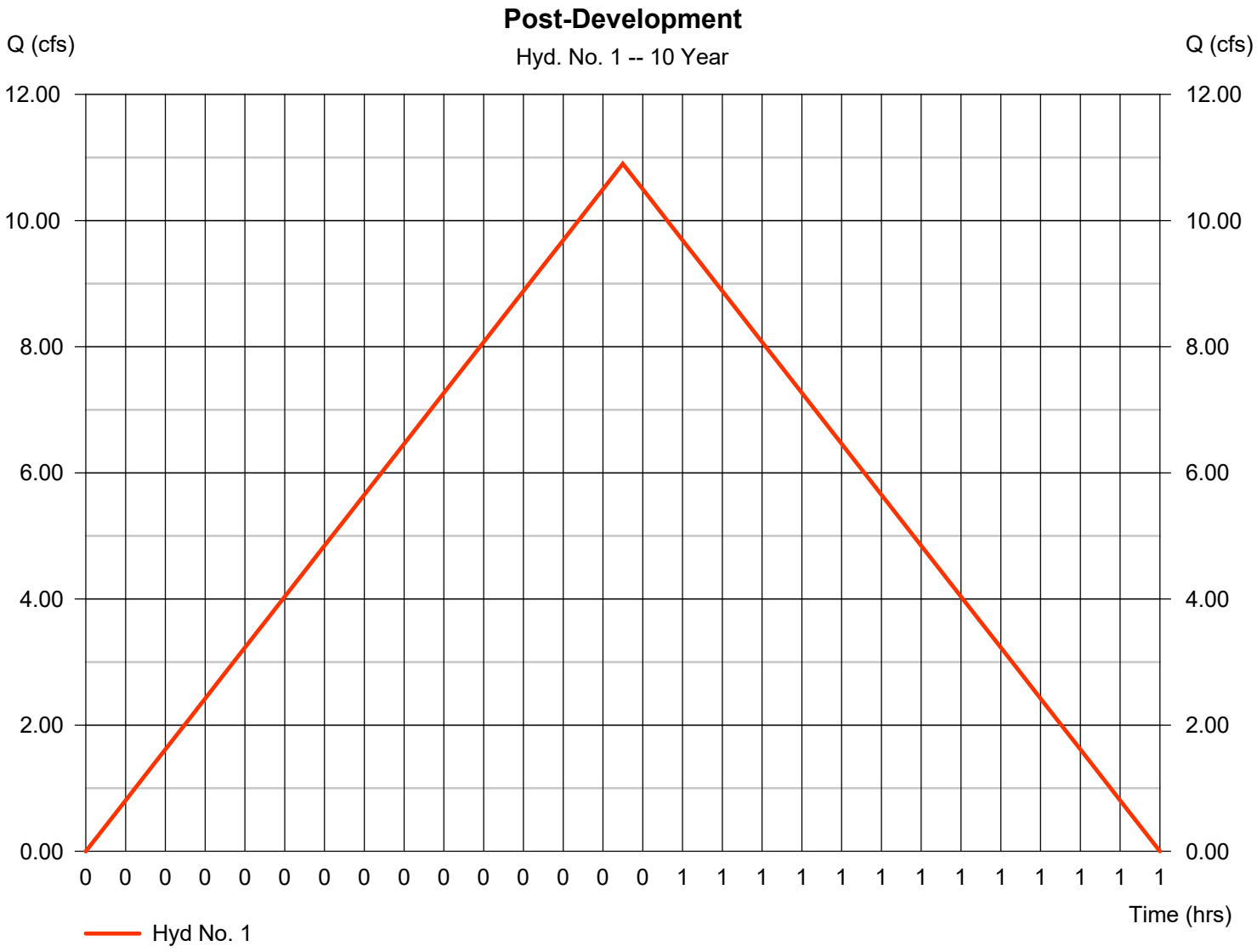
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	10.90	1	27	17,659	------	------	------	Post-Development
2	Rational	15.25	1	8	7,336	------	------	------	Post-Development
3	Reservoir	3.809	1	14	7,315	2	385.86	5,153	Through Pond

Hydrograph Report

Hyd. No. 1

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	10.90 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.45 hrs
Time interval	=	1 min	Hyd. volume	=	17,659 cuft
Drainage area	=	4.100 ac	Runoff coeff.	=	0.65
Intensity	=	4.090 in/hr	Tc by TR55	=	27.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



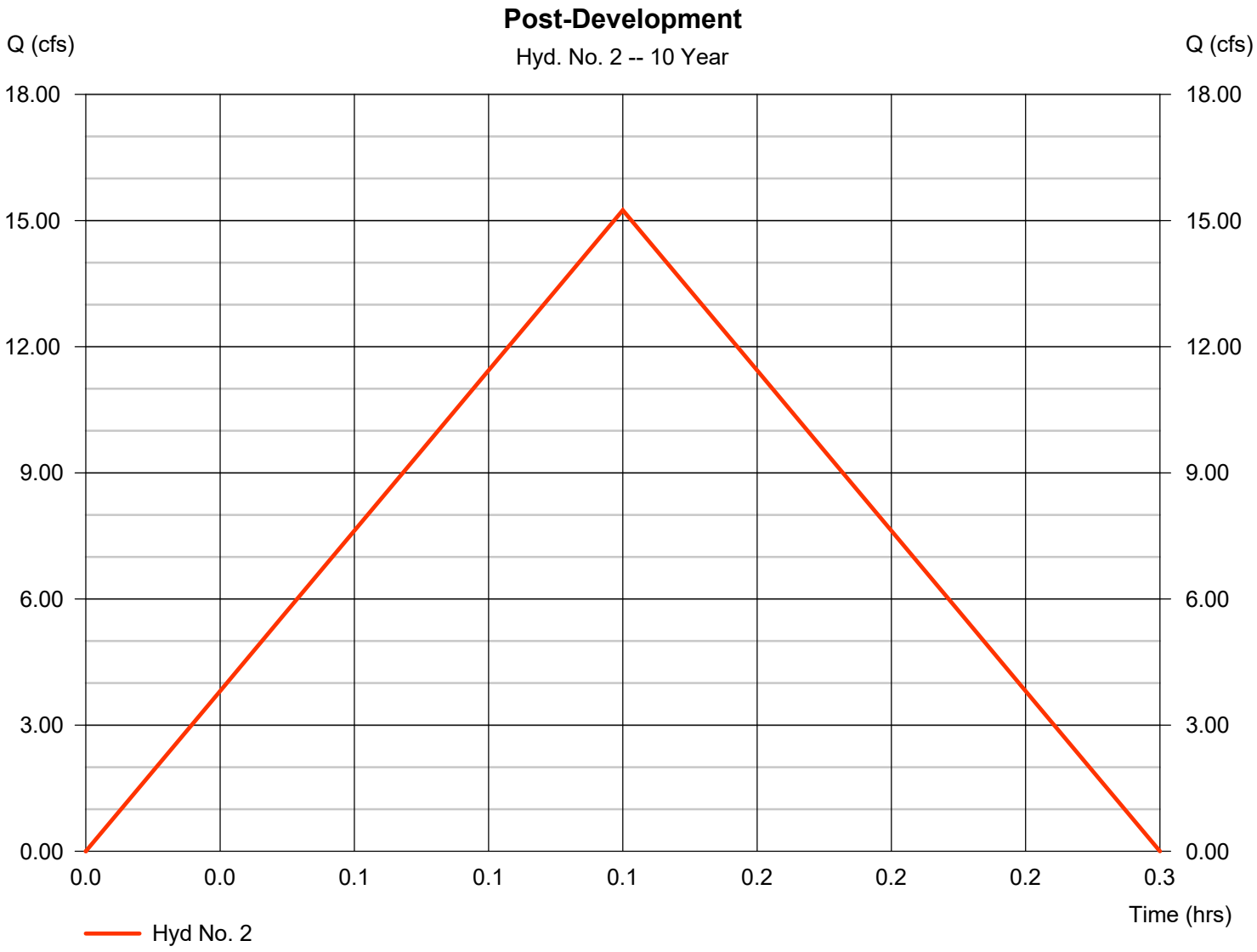
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	15.25 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	7,336 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	6.572 in/hr	Tc by TR55	=	8.02 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.95) + (2.050 x 0.35)] / 4.000



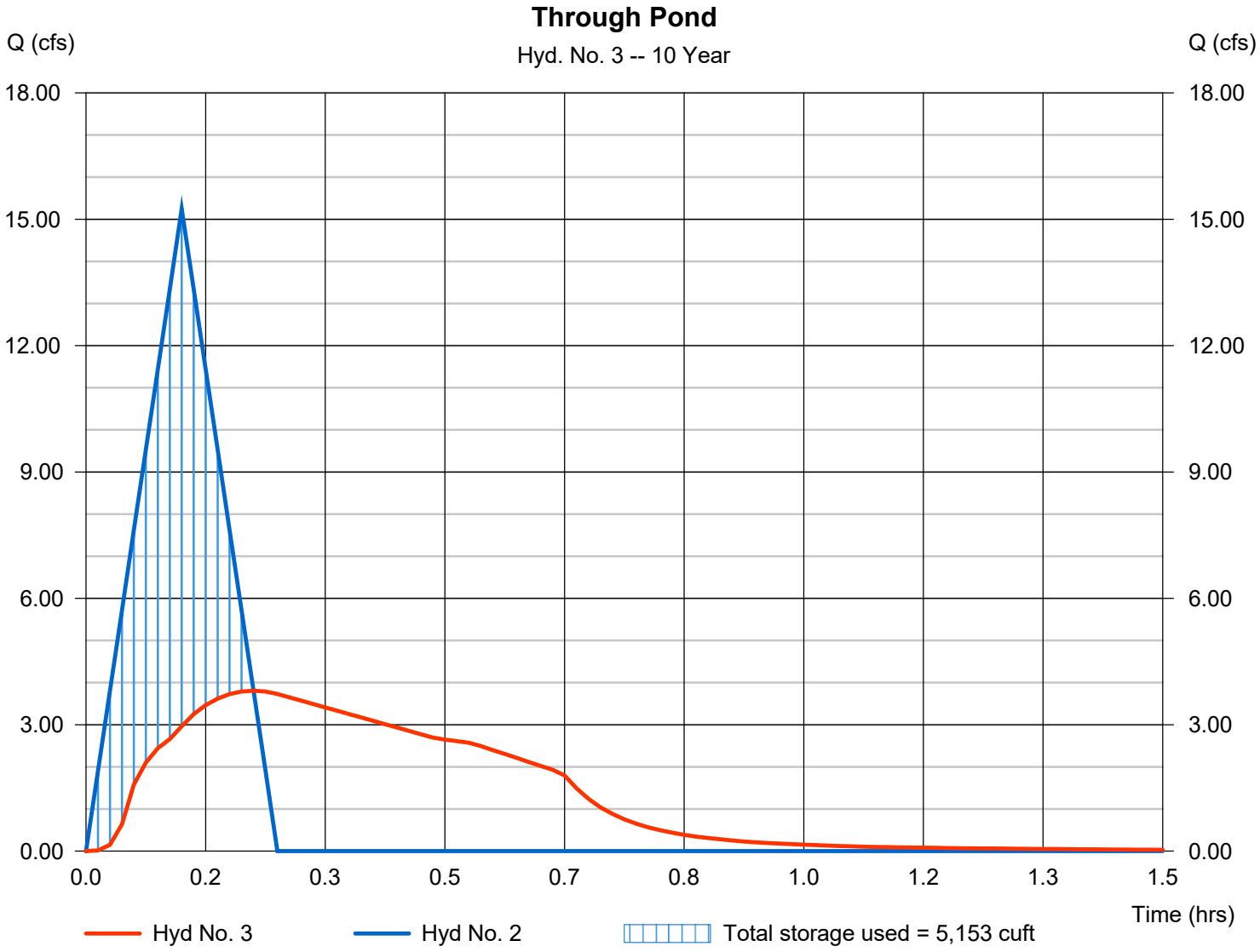
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.809 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.23 hrs
Time interval	=	1 min	Hyd. volume	=	7,315 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	385.86 ft
Reservoir name	=	<New Pond>	Max. Storage	=	5,153 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

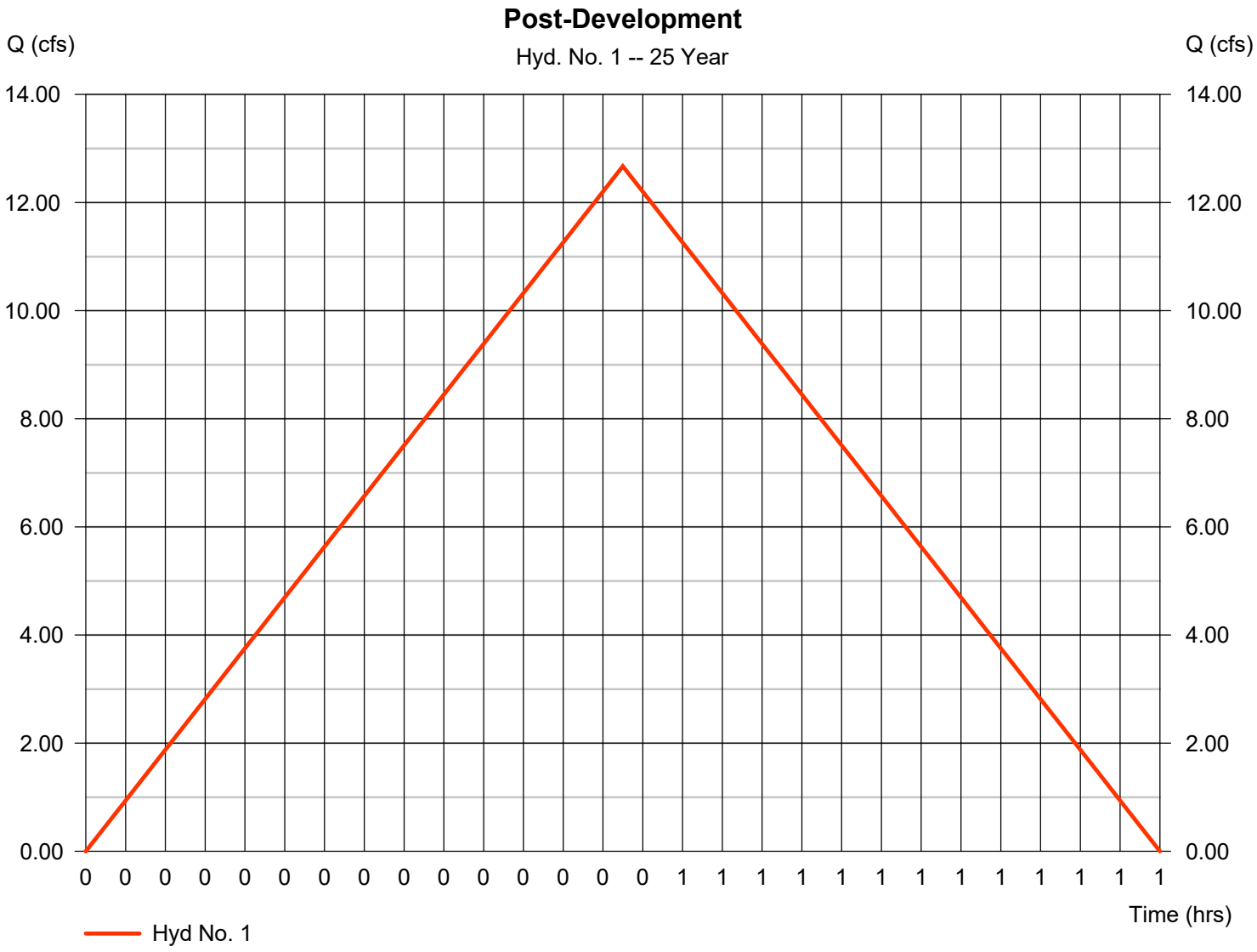
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	12.67	1	27	20,528	------	------	------	Post-Development
2	Rational	17.50	1	8	8,421	------	------	------	Post-Development
3	Reservoir	4.086	1	14	8,398	2	386.03	6,045	Through Pond

Hydrograph Report

Hyd. No. 1

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	12.67 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.45 hrs
Time interval	=	1 min	Hyd. volume	=	20,528 cuft
Drainage area	=	4.100 ac	Runoff coeff.	=	0.65
Intensity	=	4.755 in/hr	Tc by TR55	=	27.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



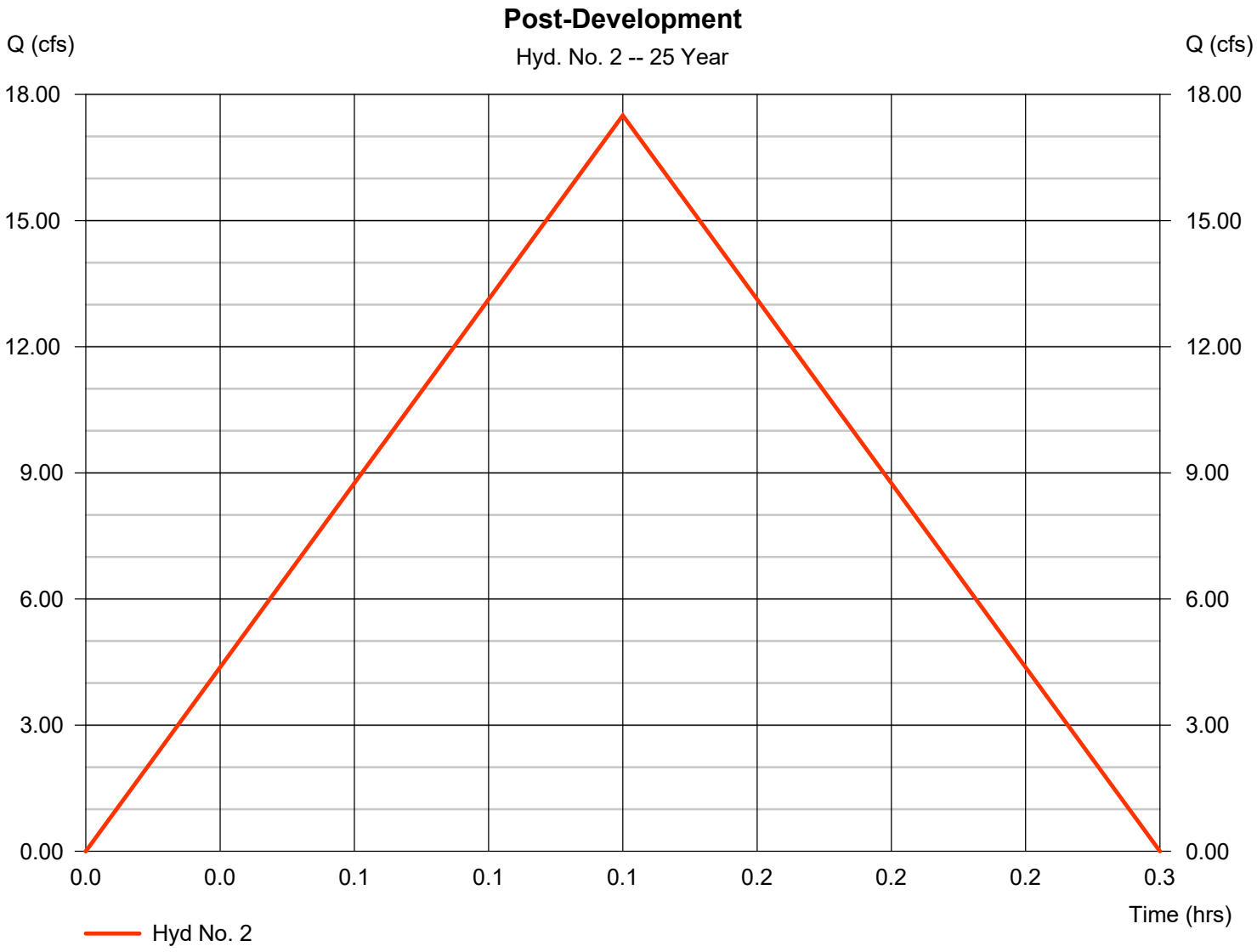
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	17.50 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	8,421 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	7.544 in/hr	Tc by TR55	=	8.02 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.95) + (2.050 x 0.35)] / 4.000



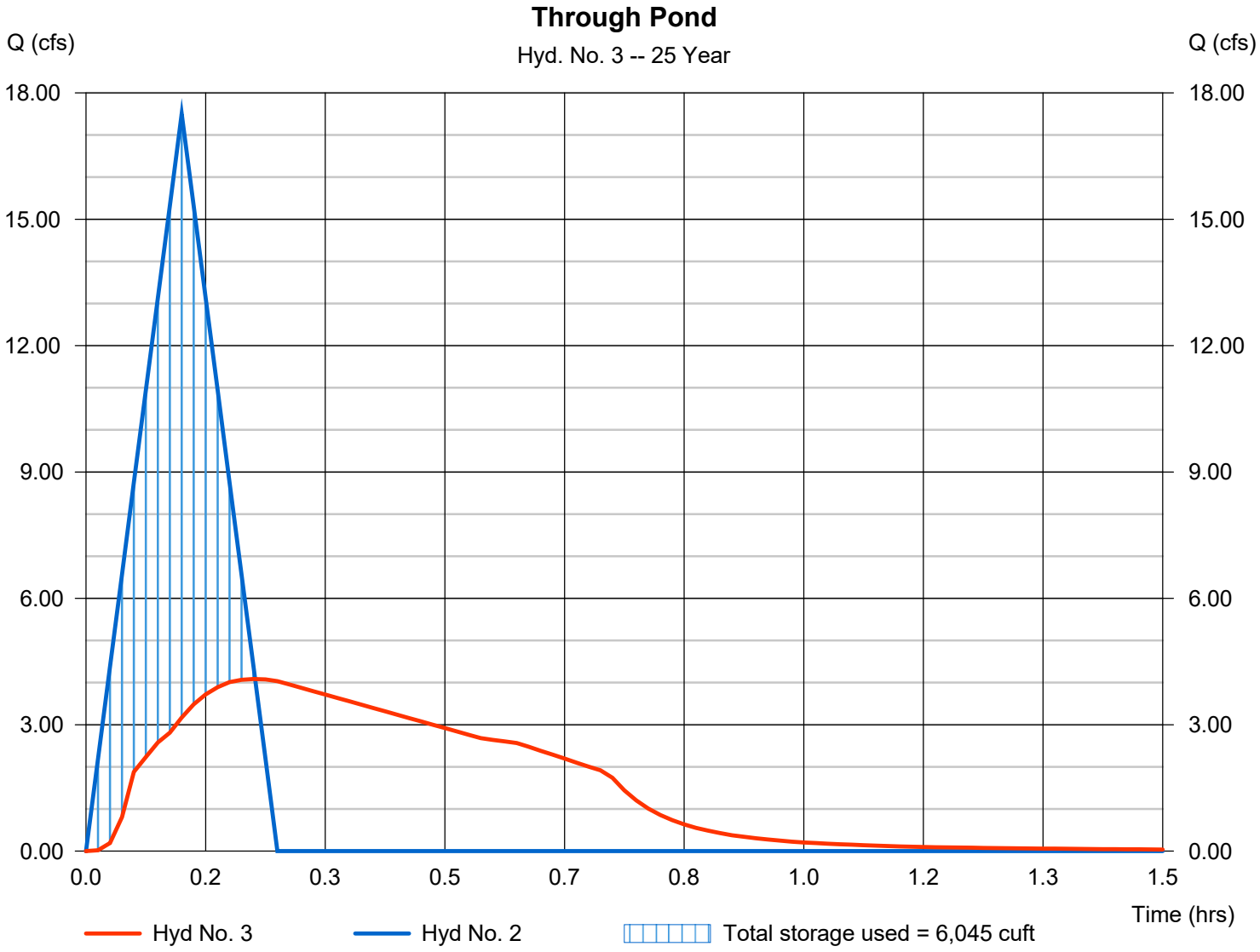
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	4.086 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.23 hrs
Time interval	=	1 min	Hyd. volume	=	8,398 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	386.03 ft
Reservoir name	=	<New Pond>	Max. Storage	=	6,045 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

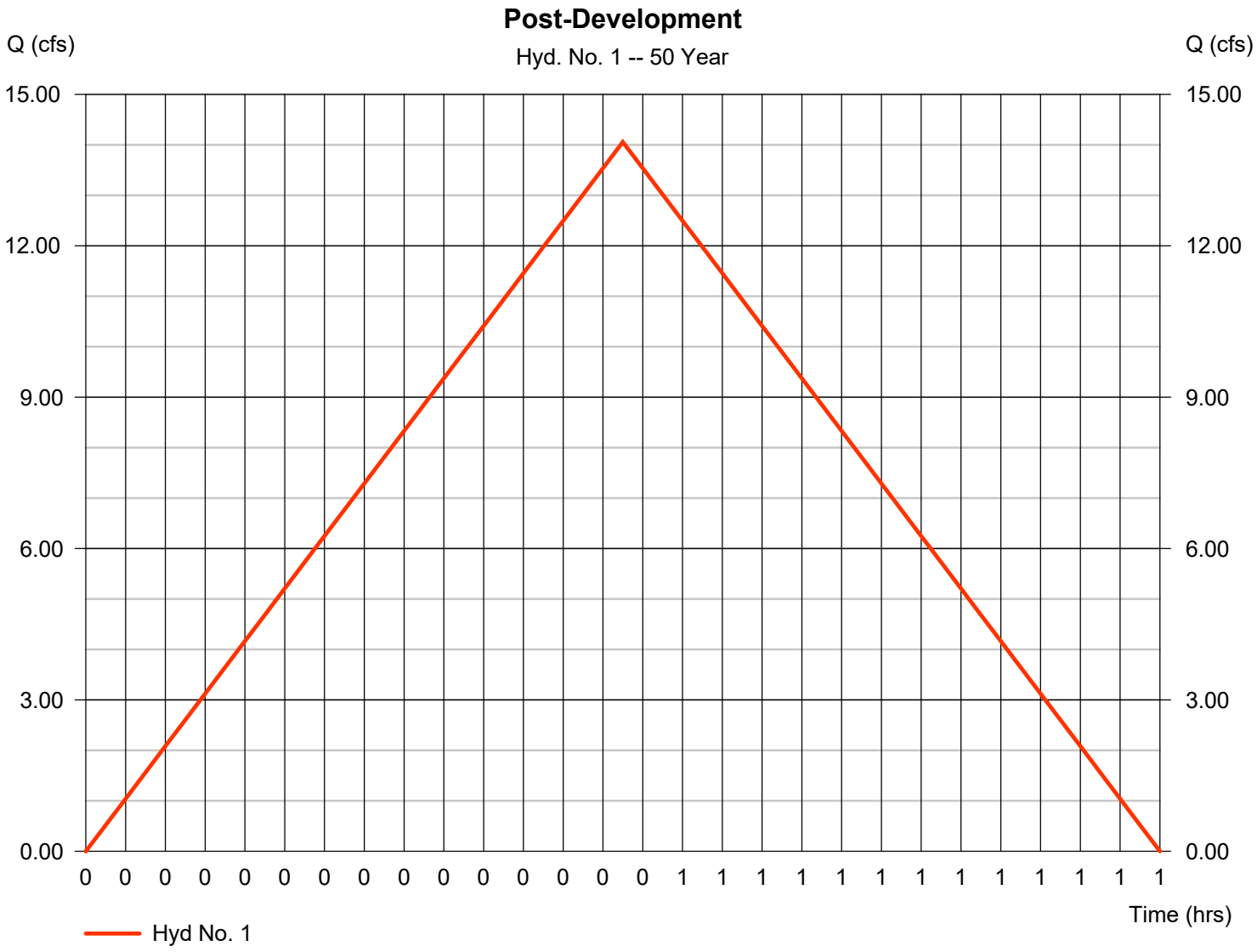
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	14.06	1	27	22,774	------	------	------	Post-Development
2	Rational	19.28	1	8	9,275	------	------	------	Post-Development
3	Reservoir	4.250	1	14	9,250	2	386.14	6,771	Through Pond

Hydrograph Report

Hyd. No. 1

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	14.06 cfs
Storm frequency	=	50 yrs	Time to peak	=	0.45 hrs
Time interval	=	1 min	Hyd. volume	=	22,774 cuft
Drainage area	=	4.100 ac	Runoff coeff.	=	0.65
Intensity	=	5.275 in/hr	Tc by TR55	=	27.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



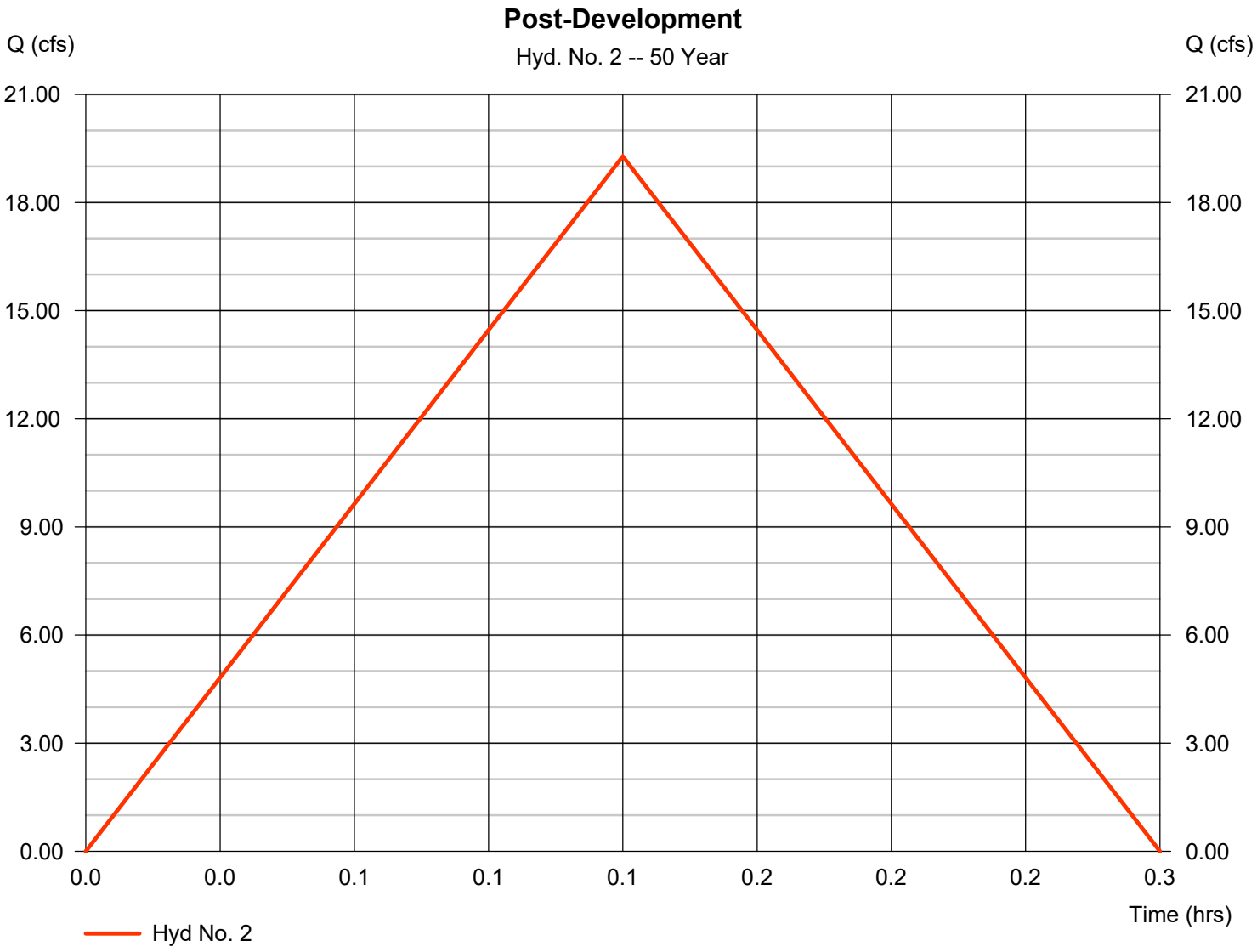
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	19.28 cfs
Storm frequency	=	50 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	9,275 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	8.310 in/hr	Tc by TR55	=	8.02 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.95) + (2.050 x 0.35)] / 4.000



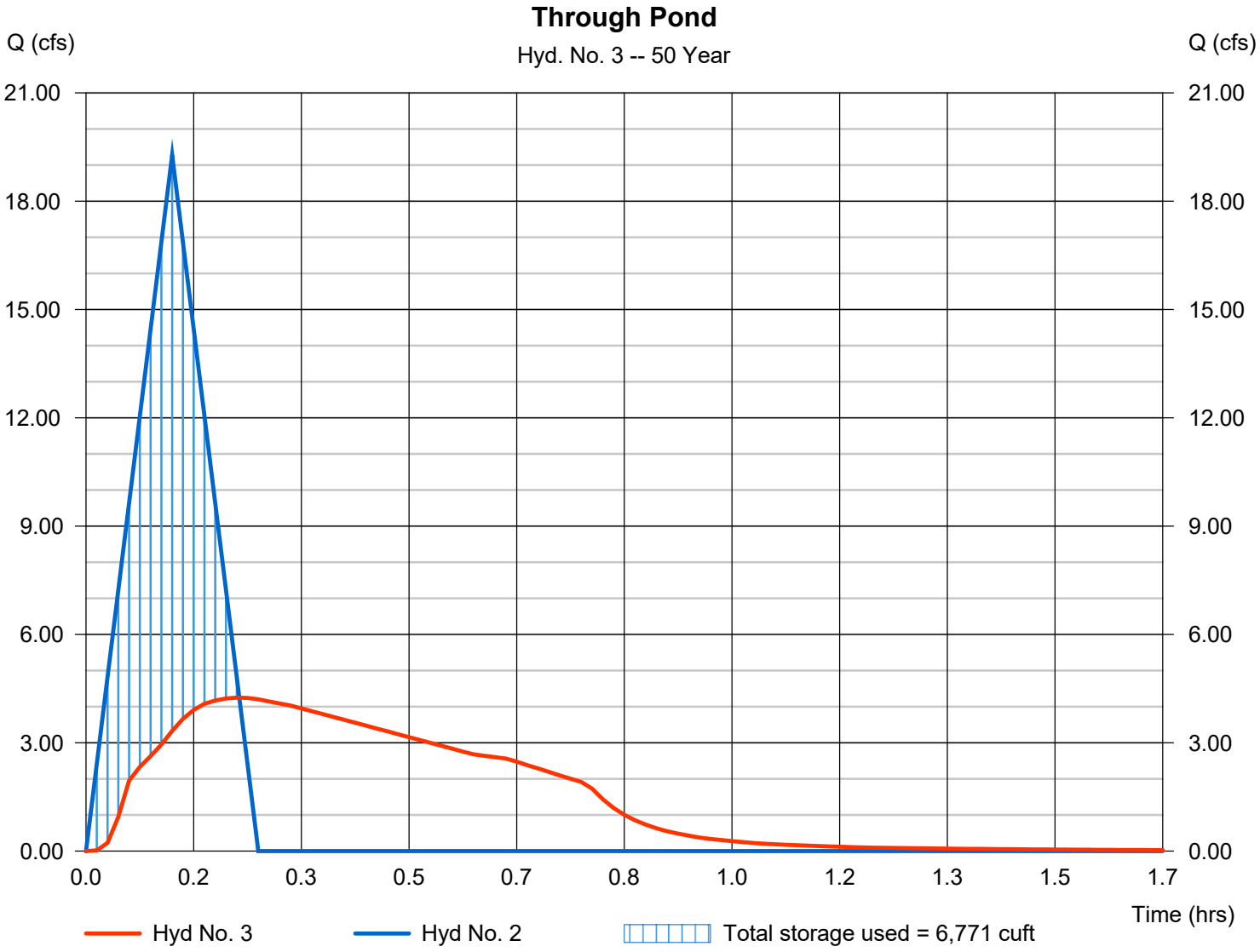
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	4.250 cfs
Storm frequency	=	50 yrs	Time to peak	=	0.23 hrs
Time interval	=	1 min	Hyd. volume	=	9,250 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	386.14 ft
Reservoir name	=	<New Pond>	Max. Storage	=	6,771 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

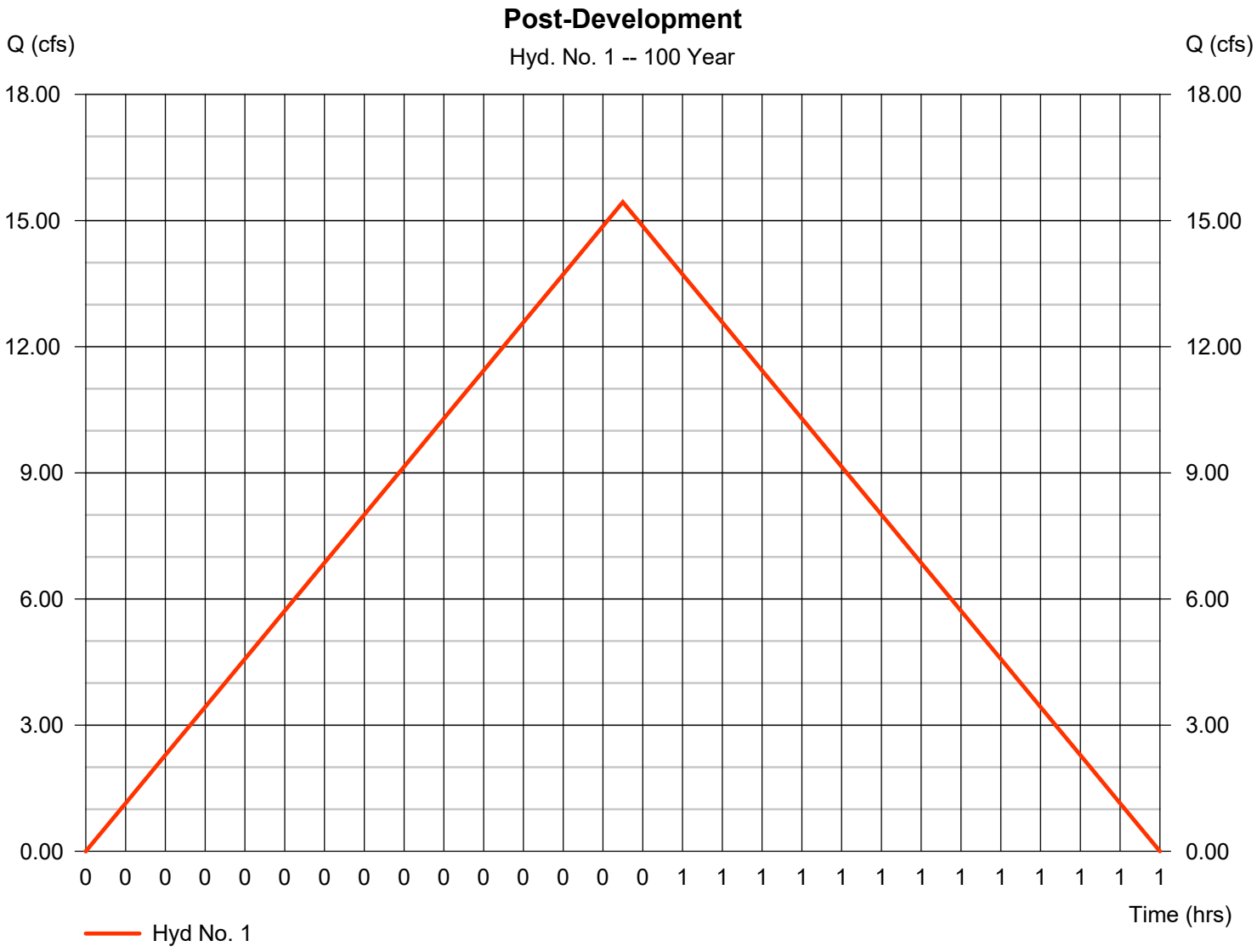
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	15.44	1	27	25,008	------	------	------	Post-Development
2	Rational	21.05	1	8	10,130	------	------	------	Post-Development
3	Reservoir	4.409	1	14	10,103	2	386.24	7,503	Through Pond

Hydrograph Report

Hyd. No. 1

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	15.44 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.45 hrs
Time interval	=	1 min	Hyd. volume	=	25,008 cuft
Drainage area	=	4.100 ac	Runoff coeff.	=	0.65
Intensity	=	5.792 in/hr	Tc by TR55	=	27.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



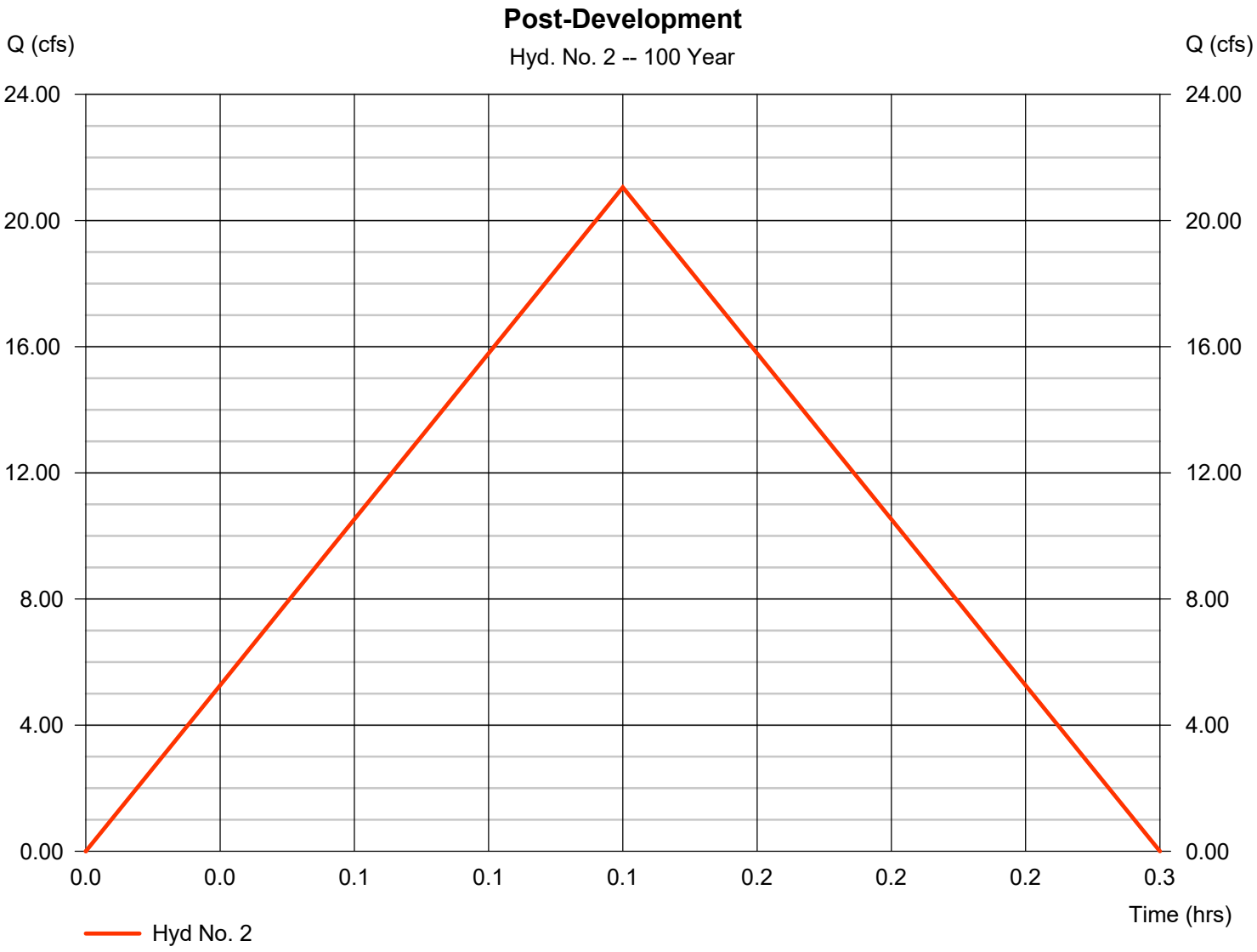
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	21.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	10,130 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	9.075 in/hr	Tc by TR55	=	8.02 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.95) + (2.050 x 0.35)] / 4.000



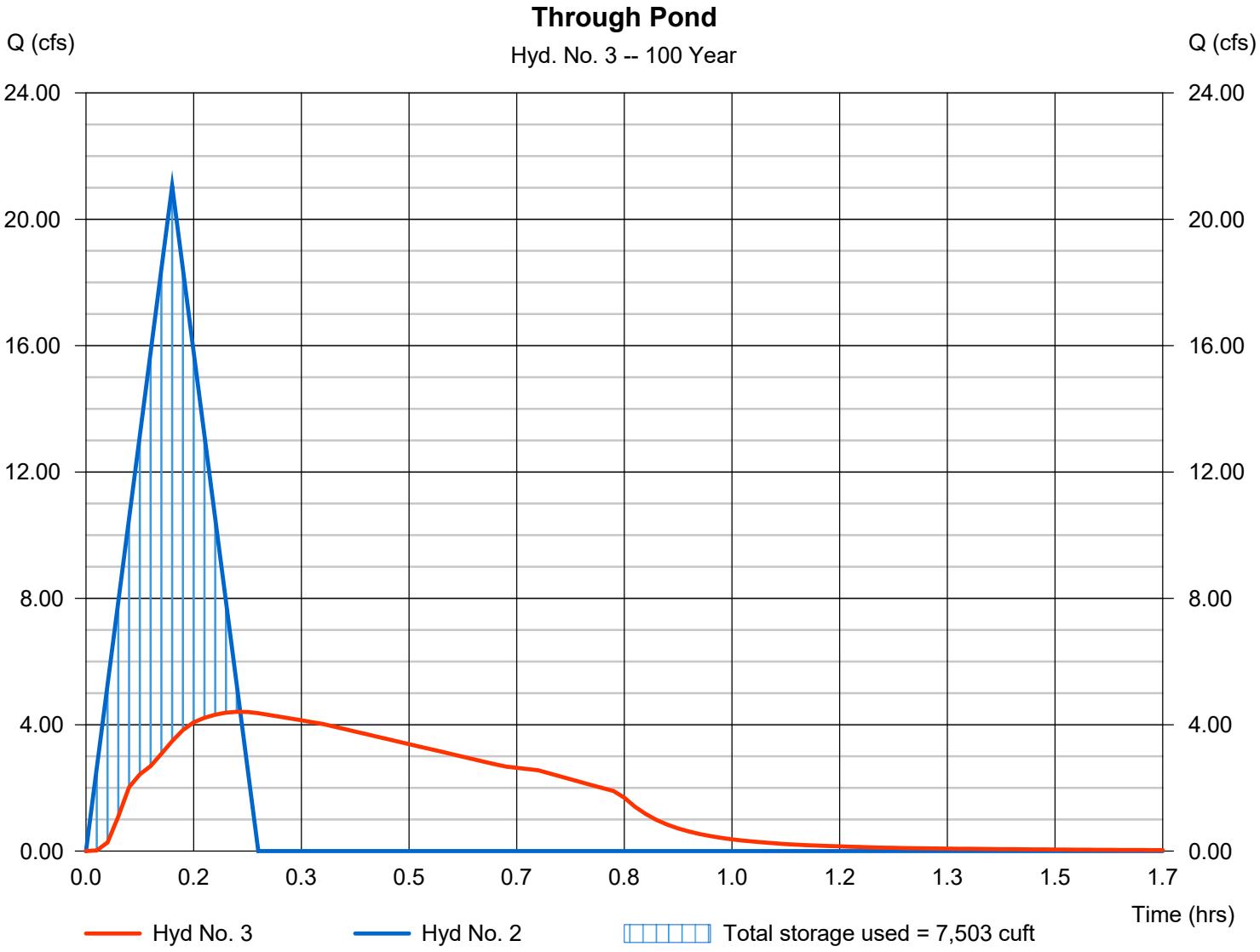
Hydrograph Report

Hyd. No. 3

Through Pond

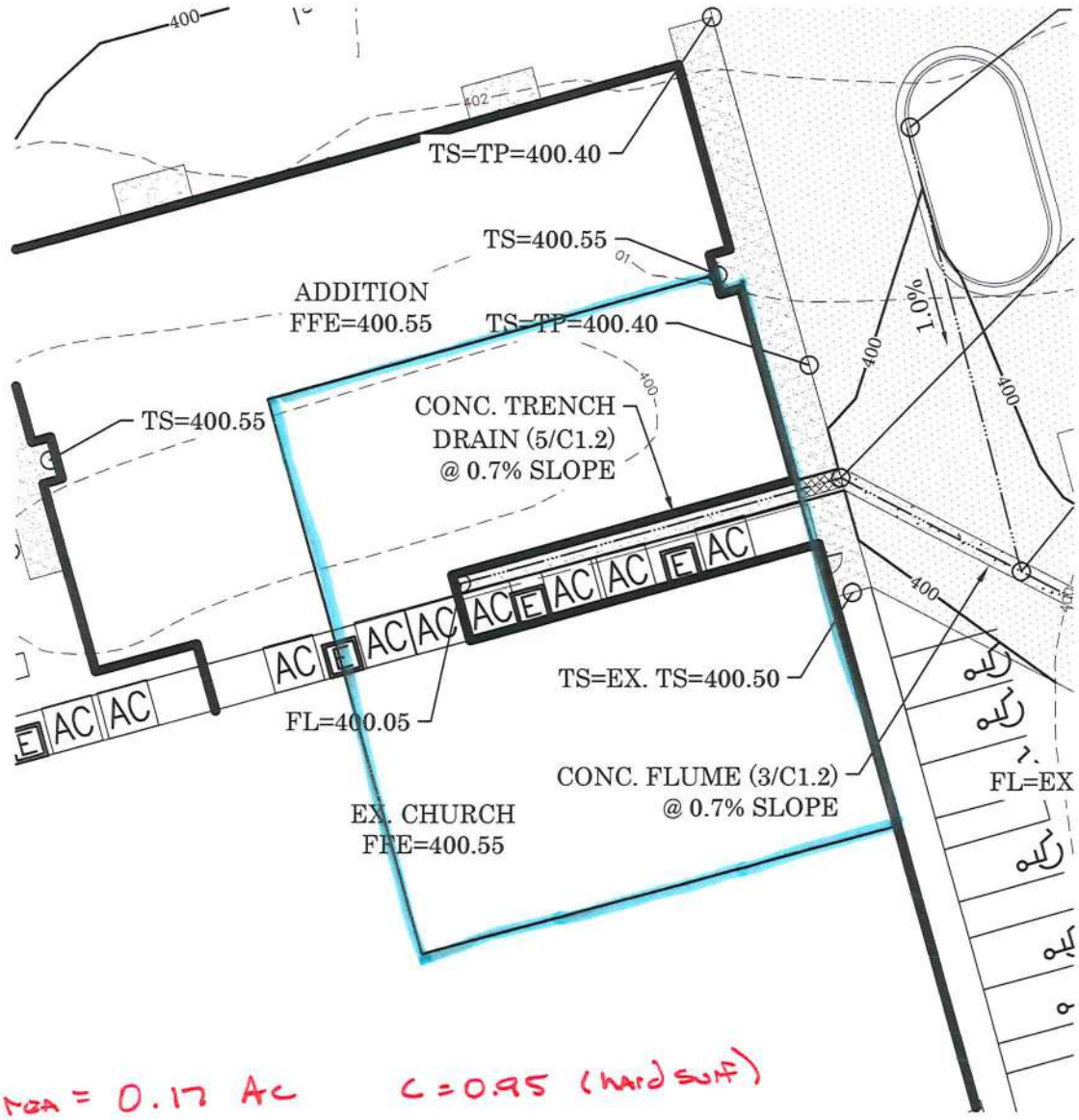
Hydrograph type	= Reservoir	Peak discharge	= 4.409 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.23 hrs
Time interval	= 1 min	Hyd. volume	= 10,103 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 386.24 ft
Reservoir name	= <New Pond>	Max. Storage	= 7,503 cuft

Storage Indication method used.



SUPPLEMENTAL CALCULATIONS

Trench Drain Sizing



$A_{TOT} = 0.17$ Ac $C = 0.95$ (hard surf)

$i = 10.08 - 100$ yr

$Q = C i A = 0.95 \times 10.08 \times 0.17 = 1.62$ cfs

Capacity @ trench drain = 5.56 cfs

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jul 8 2026

Trench Drain b/t Ex. & Pr. Bldgs

Rectangular

Bottom Width (ft)	= 2.16
Total Depth (ft)	= 0.85
Invert Elev (ft)	= 399.60
Slope (%)	= 0.70
N-Value	= 0.025

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 0.85

Highlighted

Depth (ft)	= 0.85
Q (cfs)	= 5.562
Area (sqft)	= 1.84
Velocity (ft/s)	= 3.03
Wetted Perim (ft)	= 3.86
Crit Depth, Yc (ft)	= 0.60
Top Width (ft)	= 2.16
EGL (ft)	= 0.99

