Addition to – First Baptist Church Bryant

Stormwater Management Report

City of Bryant, Saline County, Arkansas

Submitted:
May 21, 2026

MINTON ENGINEERING, INC.
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Cabot, AR 72023
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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.

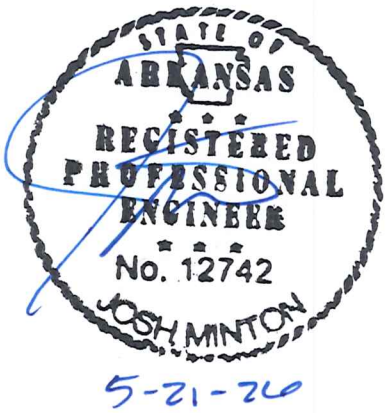
Description	Pre-Development	Post-Development	Decrease Discharge
2-Year Storm	5.04 cfs	3.20 cfs	1.84 cfs
10-Year Storm	6.58 cfs	3.68 cfs	2.90 cfs
25-Year Storm	7.55 cfs	3.96 cfs	3.59 cfs
50-Year Storm	8.31 cfs	4.14 cfs	4.17 cfs
100-Year Storm	9.08 cfs	4.29 cfs	4.79 cfs

V. Conclusion

By utilizing the existing detention pond we are able to maintain post development flows below pre development. The existing pond will require some upgrades to bring it to within code. A trickle channel is being added in the pond as required. Also, a control structure at the outlet is required by code. Considering that the discharge rates are well below pre-development levels (a 50% reduction in the 100-yr storm), and that we are improving the pond by adding a concrete channel, we are requesting that this requirement be waived. Also, the overflow weir is available if the pipe becomes obstructed. The weir is not currently being utilized by any of the storm events.

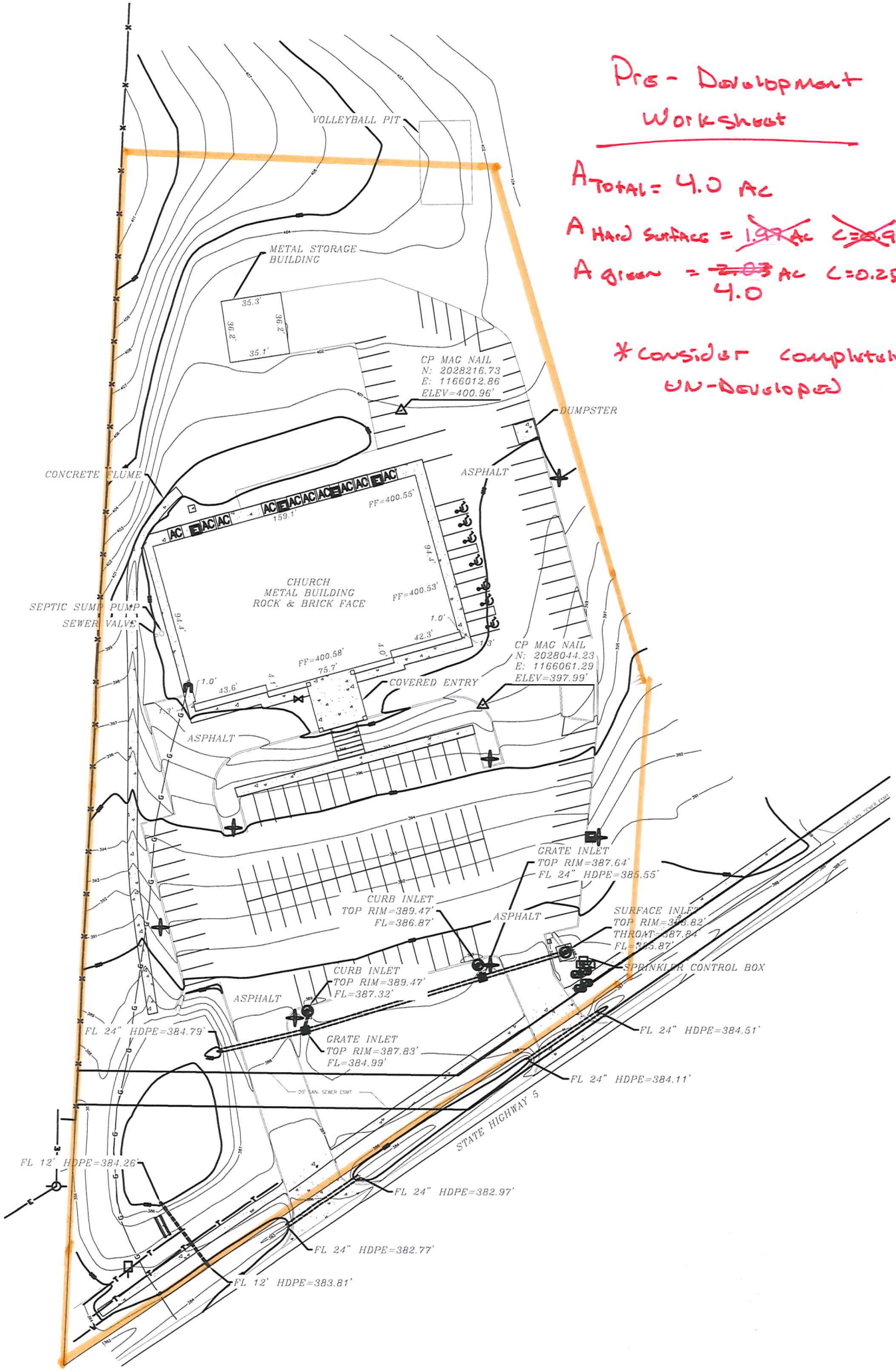
Please take this report in consideration and let me know if you need any further information.

Sincerely,



Josh Minton, PE

HYDRAULIC CALCULATIONS



Pre-Development Worksheet

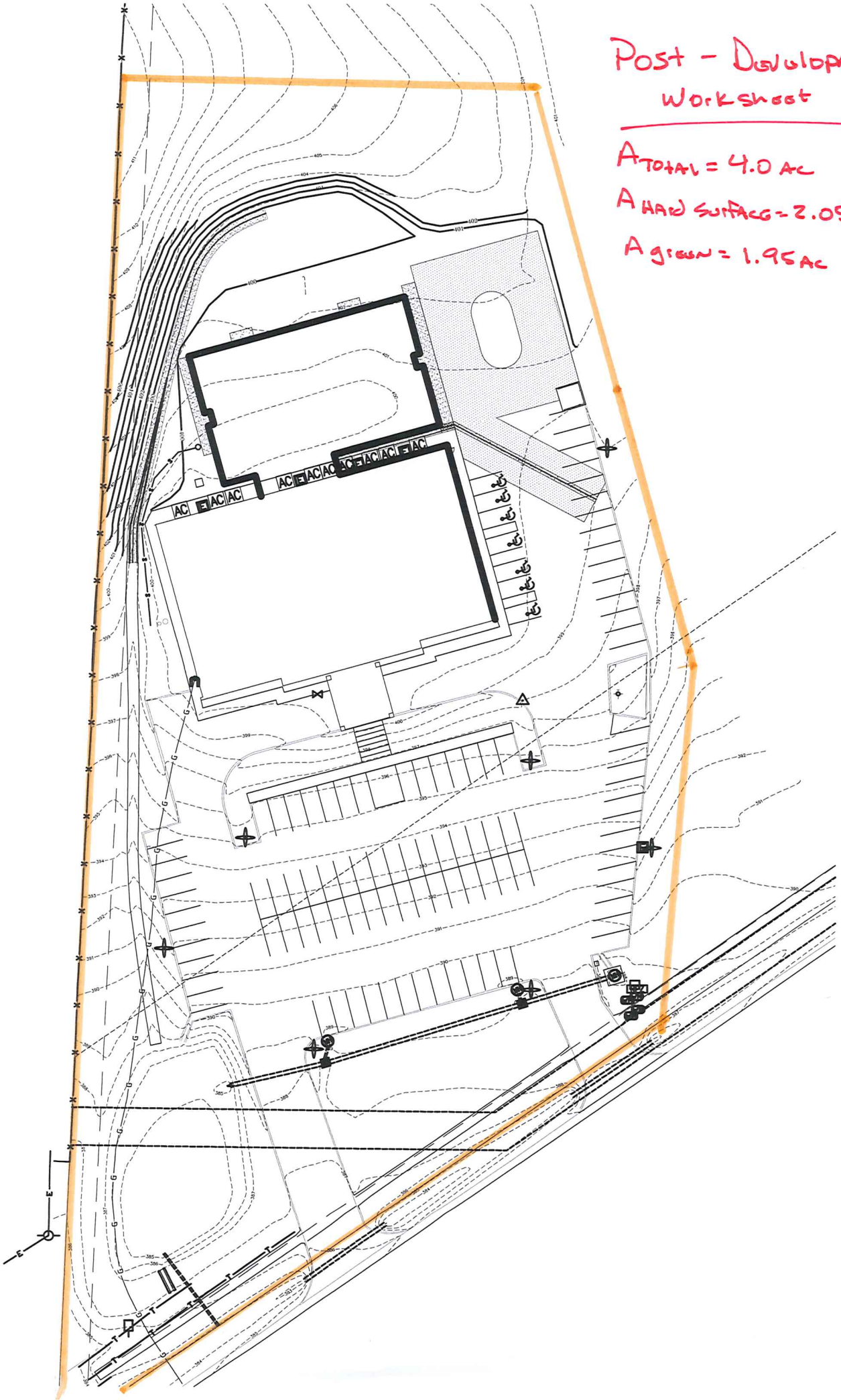
$A_{TOTAL} = 4.0$ AC

$A_{HARD\ SURFACE} = \cancel{1.97\ AC}$ $\cancel{C=0.9}$

$A_{GRASS} = \cancel{2.03}$ AC $C=0.25$

4.0

*Consider completely UN-Developed



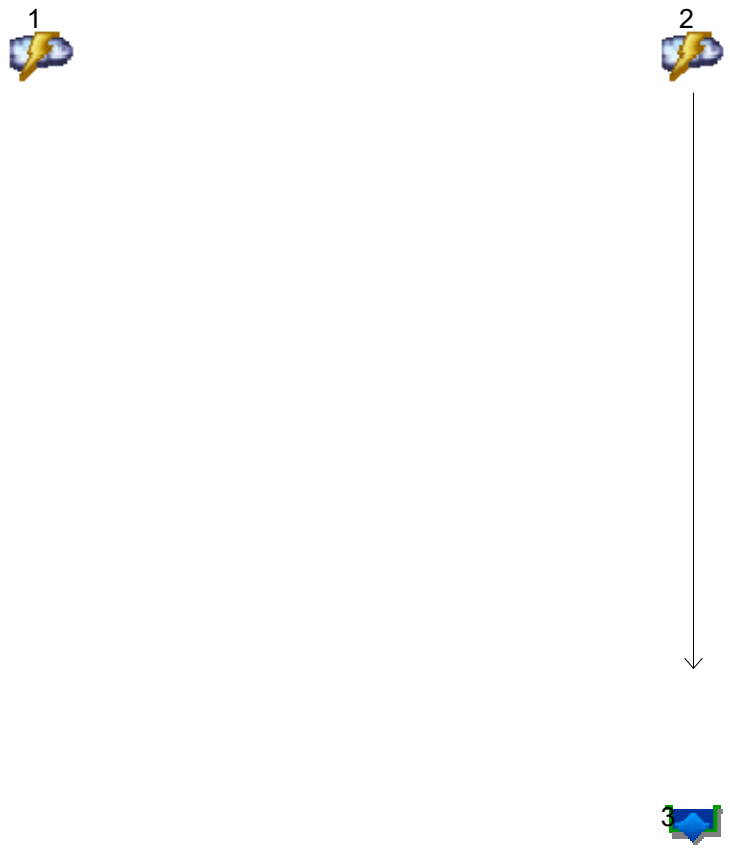
Post - Development Worksheet

$A_{TOTAL} = 4.0\ Ac$

$A_{HARD\ SURFACE} = 2.05\ Ac$ $C = 0.9$

$A_{GREEN} = 1.95\ Ac$ $C = 0.25$

Watershed Model Schematic



Legend

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

Hydrograph Summary Report

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

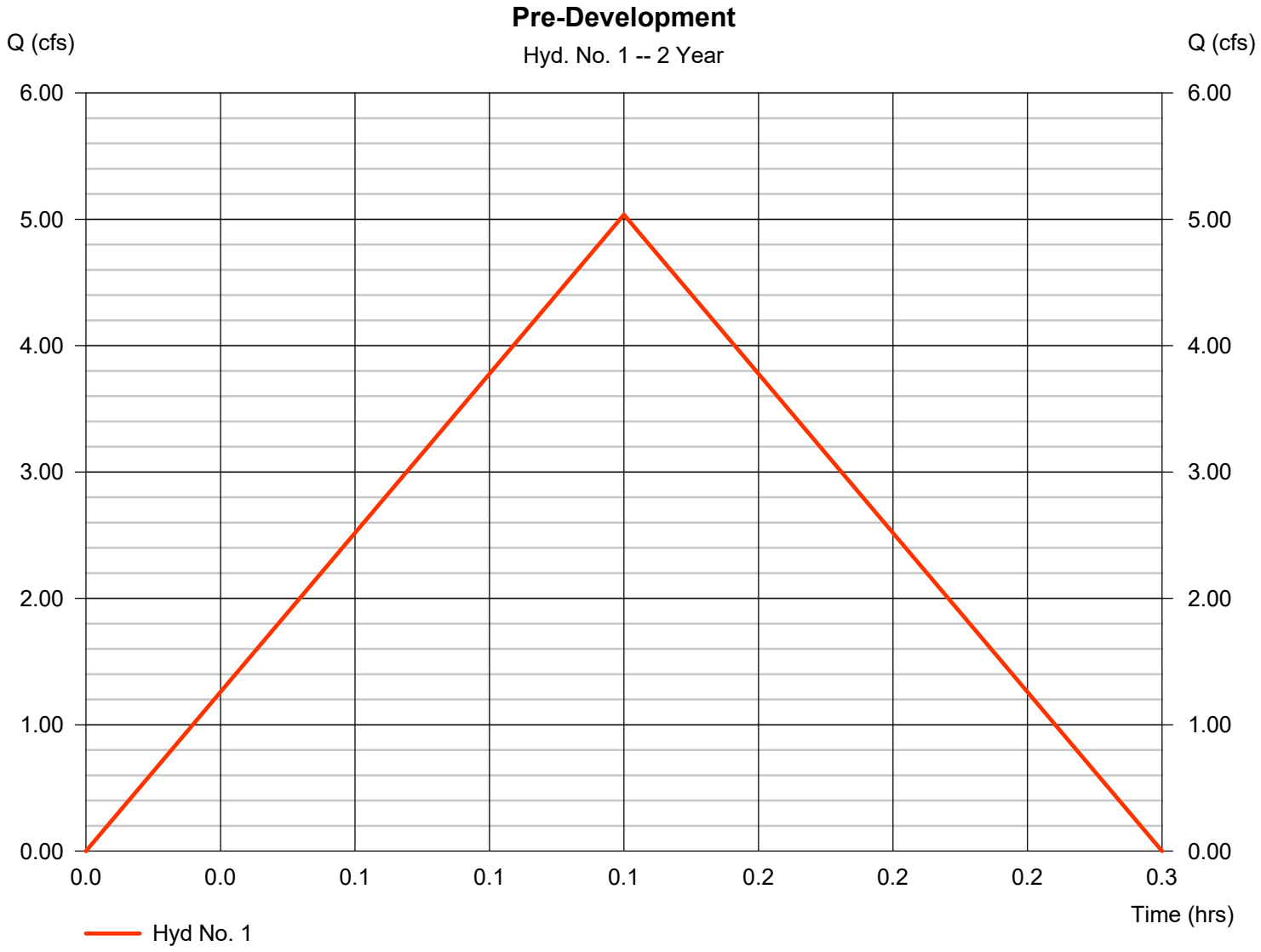
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	5.036	1	8	2,417	------	------	------	Pre-Development
2	Rational	12.15	1	7	5,102	------	------	------	Post-Development
3	Reservoir	3.196	1	12	5,099	2	385.53	3,537	Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	5.036 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	2,417 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.25
Intensity	=	5.036 in/hr	Tc by TR55	=	8.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



TR55 Tc Worksheet

Hyd. No. 1

Pre-Development

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.130		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 4.13		0.00		0.00		
Land slope (%)	= 4.20		0.00		0.00		
Travel Time (min)	**= 5.72**	**+**	**0.00**	**+**	**0.00**	**=**	**5.72**
Shallow Concentrated Flow							
Flow length (ft)	= 475.00		0.00		0.00		
Watercourse slope (%)	= 4.13		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.28		0.00		0.00		
Travel Time (min)	**= 2.41**	**+**	**0.00**	**+**	**0.00**	**=**	**2.41**
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 ..... 8.00 min

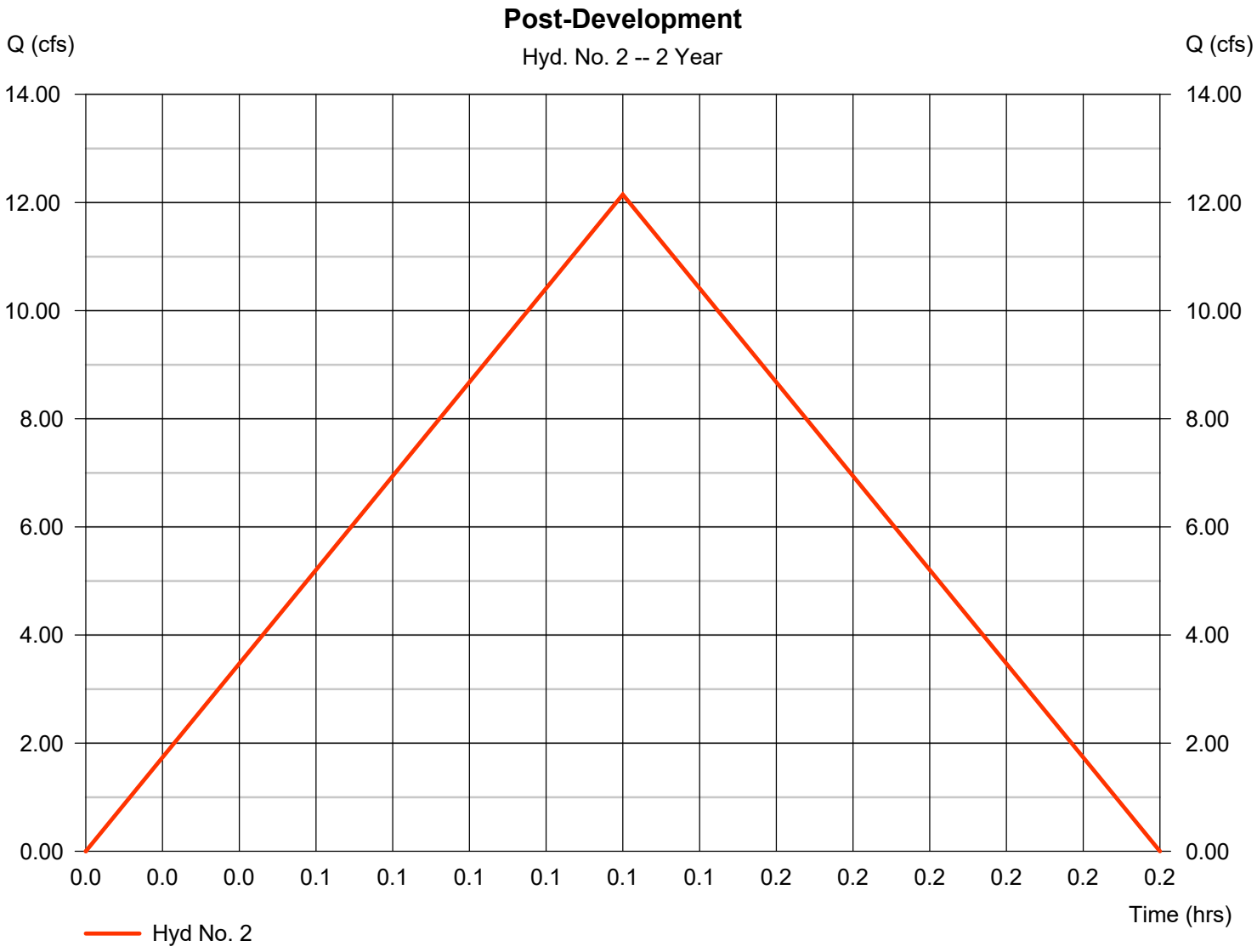
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	12.15 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.12 hrs
Time interval	=	1 min	Hyd. volume	=	5,102 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	5.236 in/hr	Tc by TR55	=	7.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.90) + (1.950 x 0.25)] / 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)	= 75.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 4.13		0.00		0.00		
Land slope (%)	= 4.10		0.00		0.00		
Travel Time (min)	**= 4.59**	**+**	**0.00**	**+**	**0.00**	**=**	**4.59**
Shallow Concentrated Flow							
Flow length (ft)	= 500.00		0.00		0.00		
Watercourse slope (%)	= 4.10		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=4.12		0.00		0.00		
Travel Time (min)	**= 2.02**	**+**	**0.00**	**+**	**0.00**	**=**	**2.02**
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 ..... 7.00 min

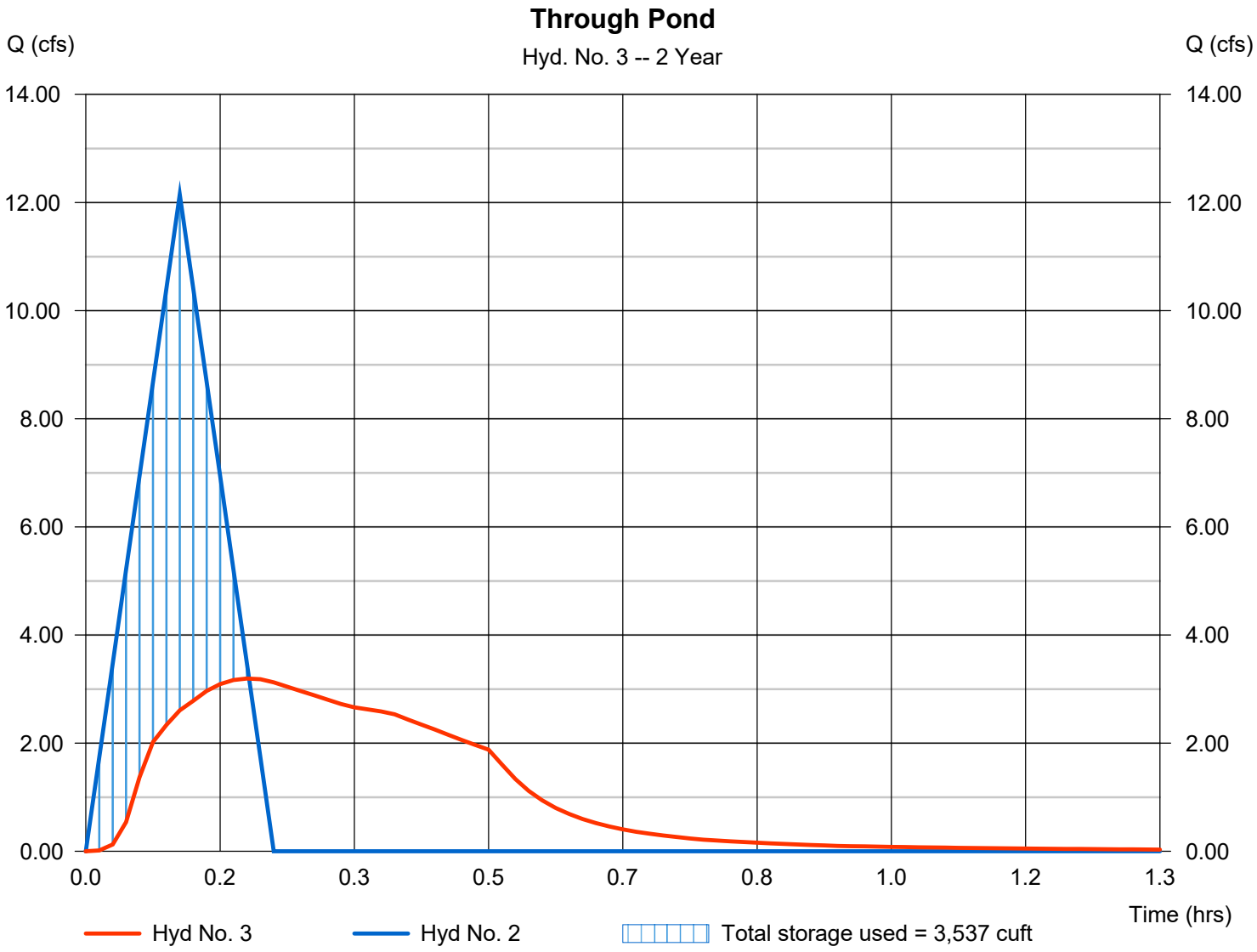
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.196 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.20 hrs
Time interval	=	1 min	Hyd. volume	=	5,099 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	385.53 ft
Reservoir name	=	<New Pond>	Max. Storage	=	3,537 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

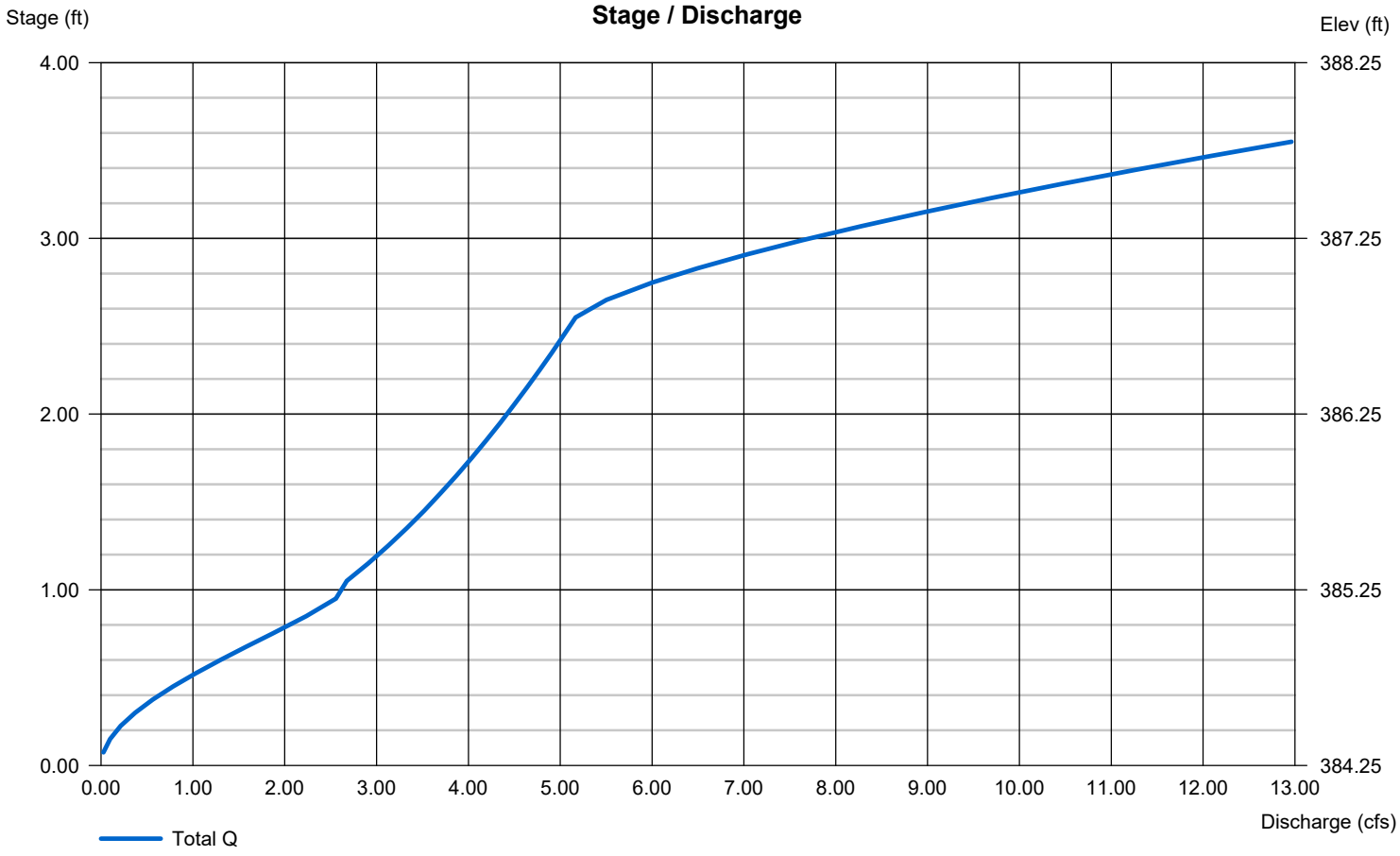
Weir Structures

	[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

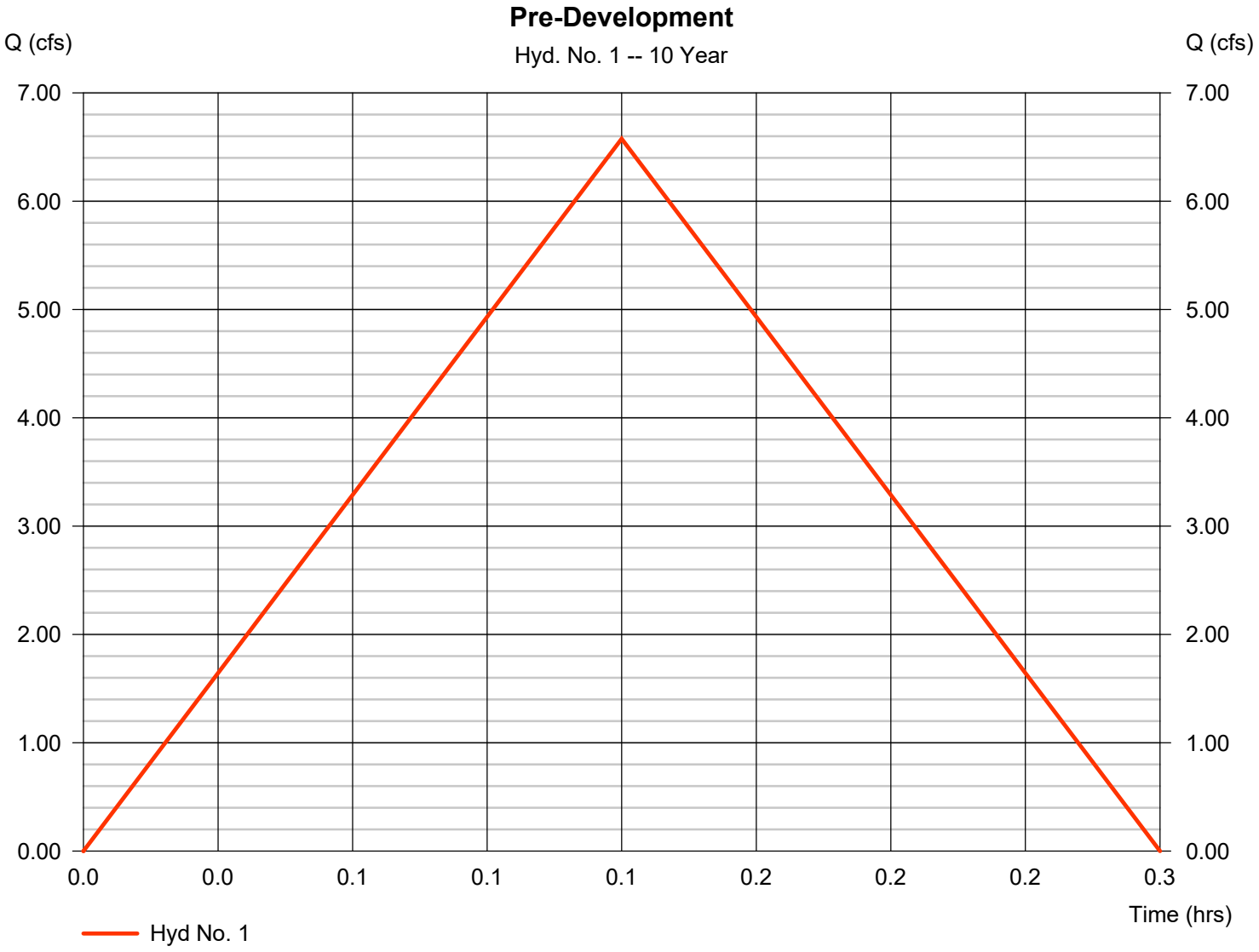
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	6.577	1	8	3,157	------	------	------	Pre-Development
2	Rational	15.81	1	7	6,639	------	------	------	Post-Development
3	Reservoir	3.681	1	12	6,635	2	385.79	4,792	Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	6.577 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	3,157 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.25
Intensity	=	6.577 in/hr	Tc by TR55	=	8.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	15.81 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.12 hrs
Time interval	=	1 min	Hyd. volume	=	6,639 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	6.813 in/hr	Tc by TR55	=	7.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.90) + (1.950 x 0.25)] / 4.000



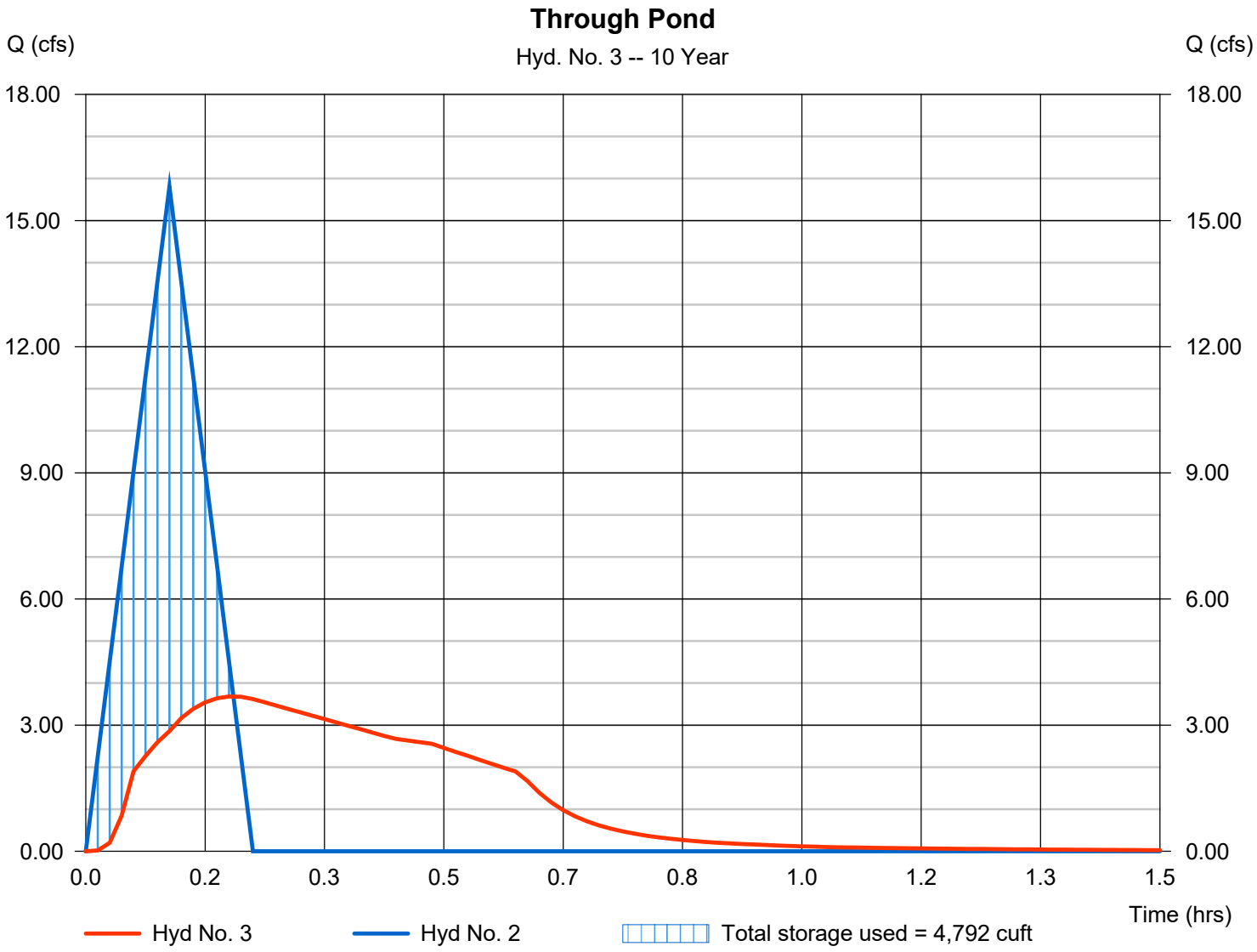
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	= Reservoir	Peak discharge	= 3.681 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.20 hrs
Time interval	= 1 min	Hyd. volume	= 6,635 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 385.79 ft
Reservoir name	= <New Pond>	Max. Storage	= 4,792 cuft

Storage Indication method used.



Hydrograph Summary Report

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

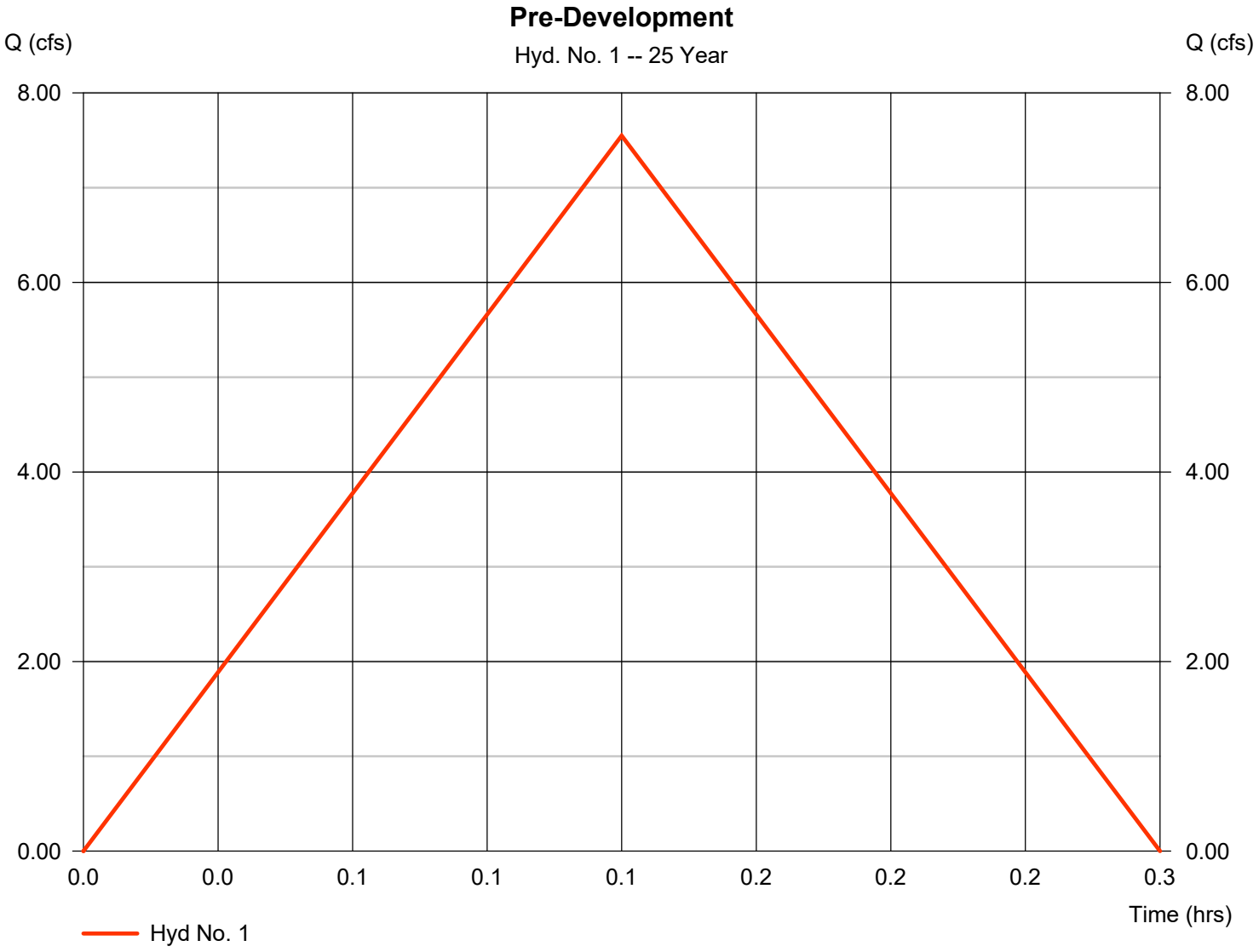
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	7.549	1	8	3,624	------	------	------	Pre-Development
2	Rational	18.12	1	7	7,612	------	------	------	Post-Development
3	Reservoir	3.964	1	12	7,608	2	385.96	5,607	Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	7.549 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	3,624 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.25
Intensity	=	7.549 in/hr	Tc by TR55	=	8.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



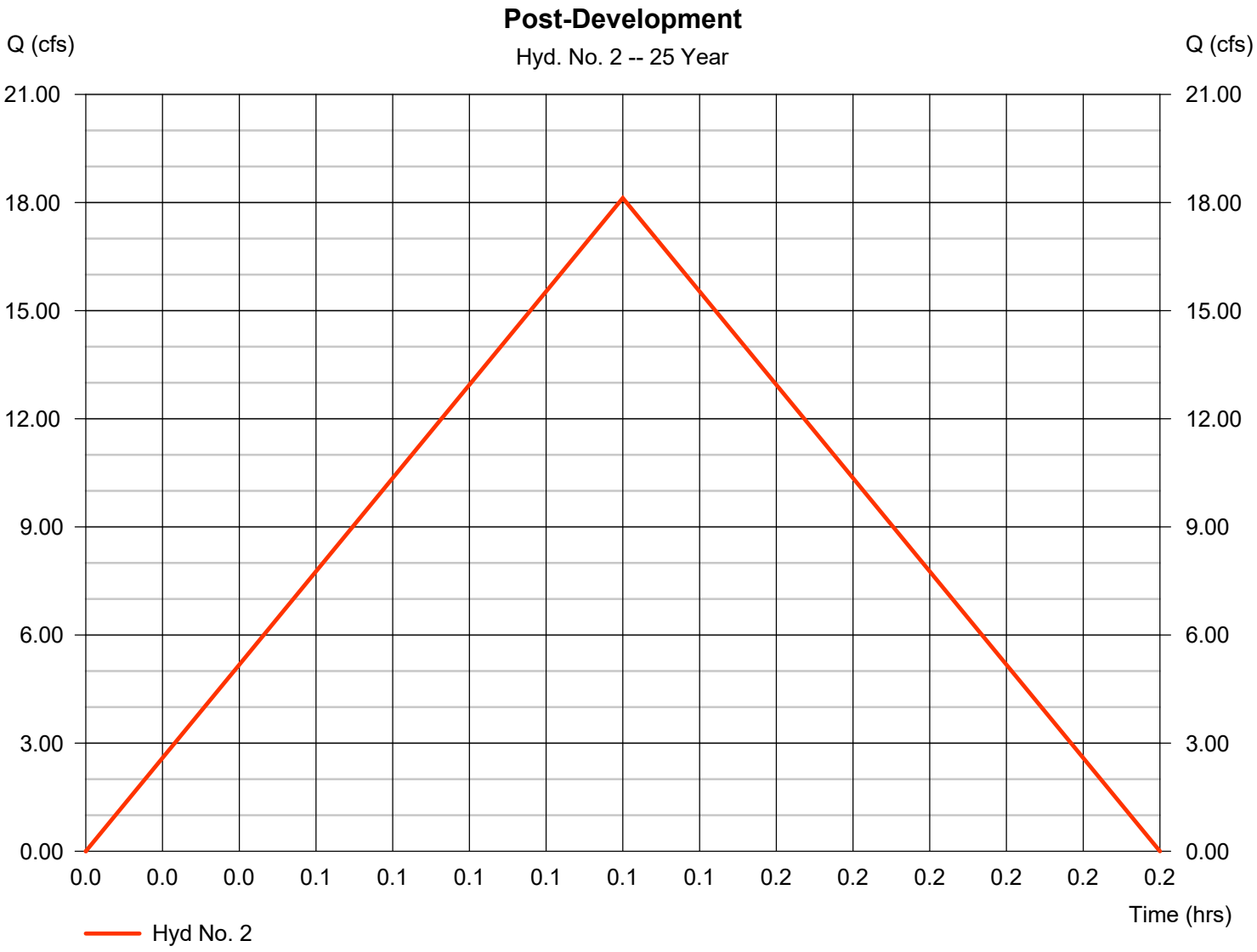
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	18.12 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.12 hrs
Time interval	=	1 min	Hyd. volume	=	7,612 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	7.812 in/hr	Tc by TR55	=	7.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.90) + (1.950 x 0.25)] / 4.000



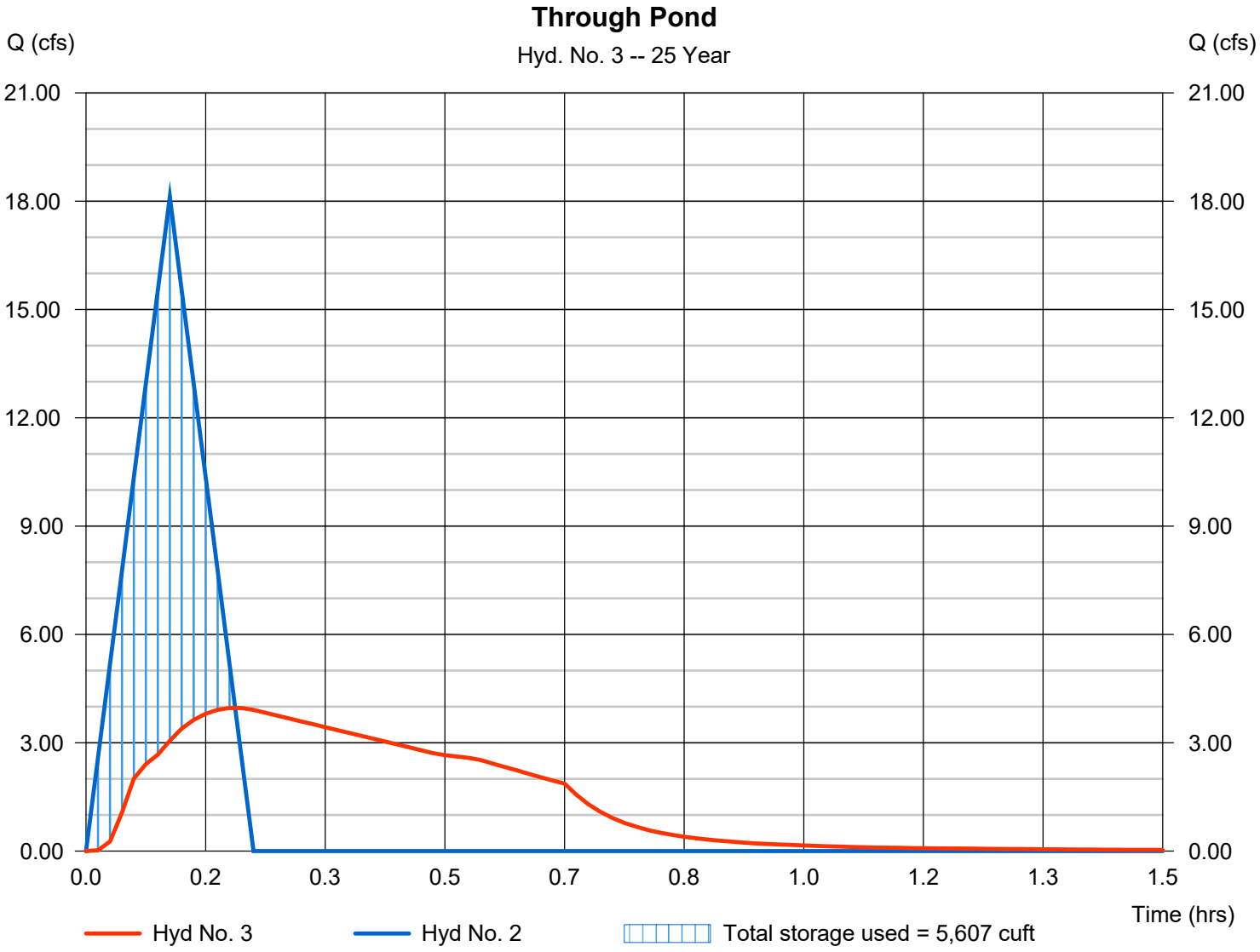
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.964 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.20 hrs
Time interval	=	1 min	Hyd. volume	=	7,608 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	385.96 ft
Reservoir name	=	<New Pond>	Max. Storage	=	5,607 cuft

Storage Indication method used.



Hydrograph Summary Report

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

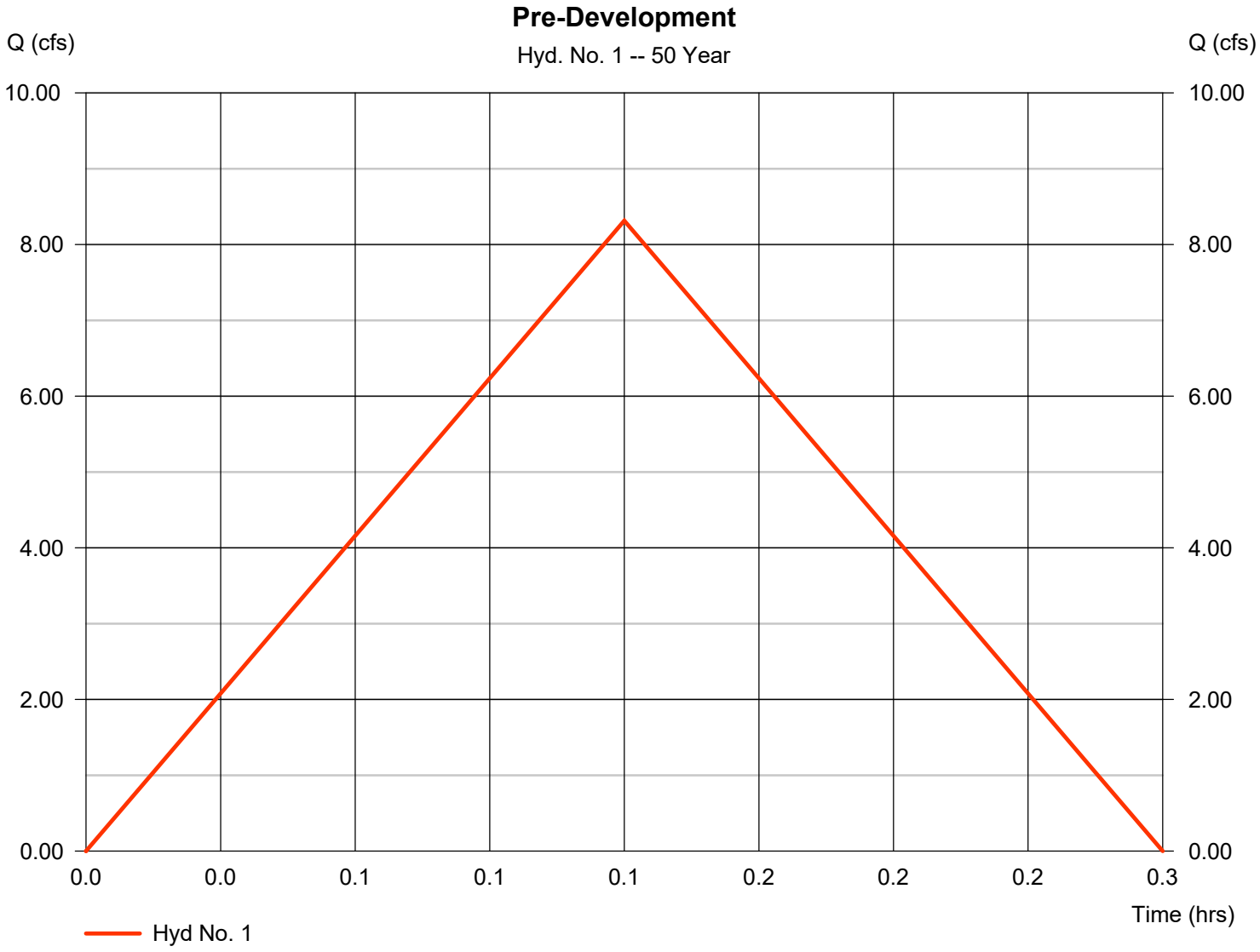
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	8.315	1	8	3,991	------	------	------	Pre-Development
2	Rational	19.95	1	7	8,379	------	------	------	Post-Development
3	Reservoir	4.136	1	13	8,375	2	386.06	6,261	Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	8.315 cfs
Storm frequency	=	50 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	3,991 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.25
Intensity	=	8.315 in/hr	Tc by TR55	=	8.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



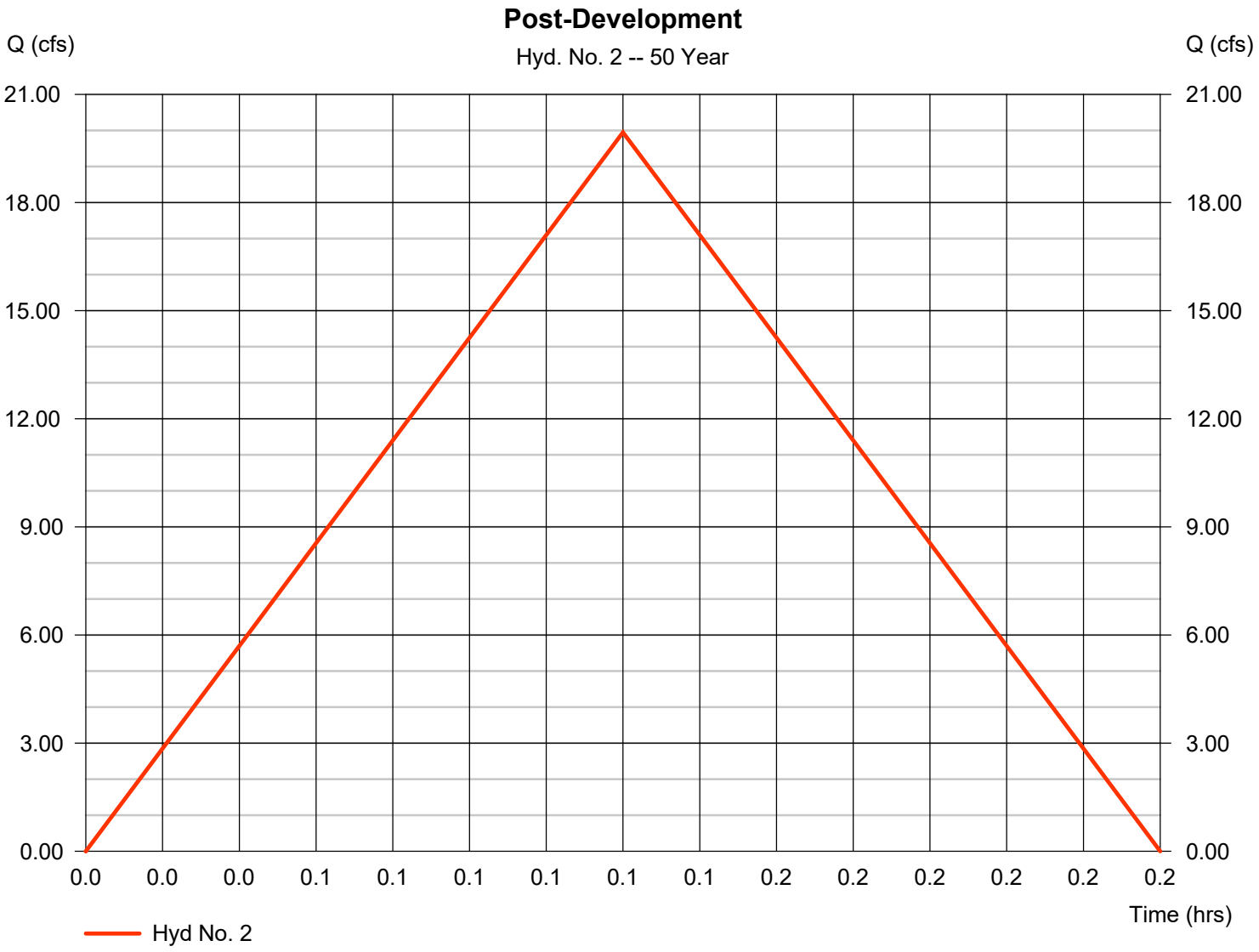
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	19.95 cfs
Storm frequency	=	50 yrs	Time to peak	=	0.12 hrs
Time interval	=	1 min	Hyd. volume	=	8,379 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	8.599 in/hr	Tc by TR55	=	7.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.90) + (1.950 x 0.25)] / 4.000



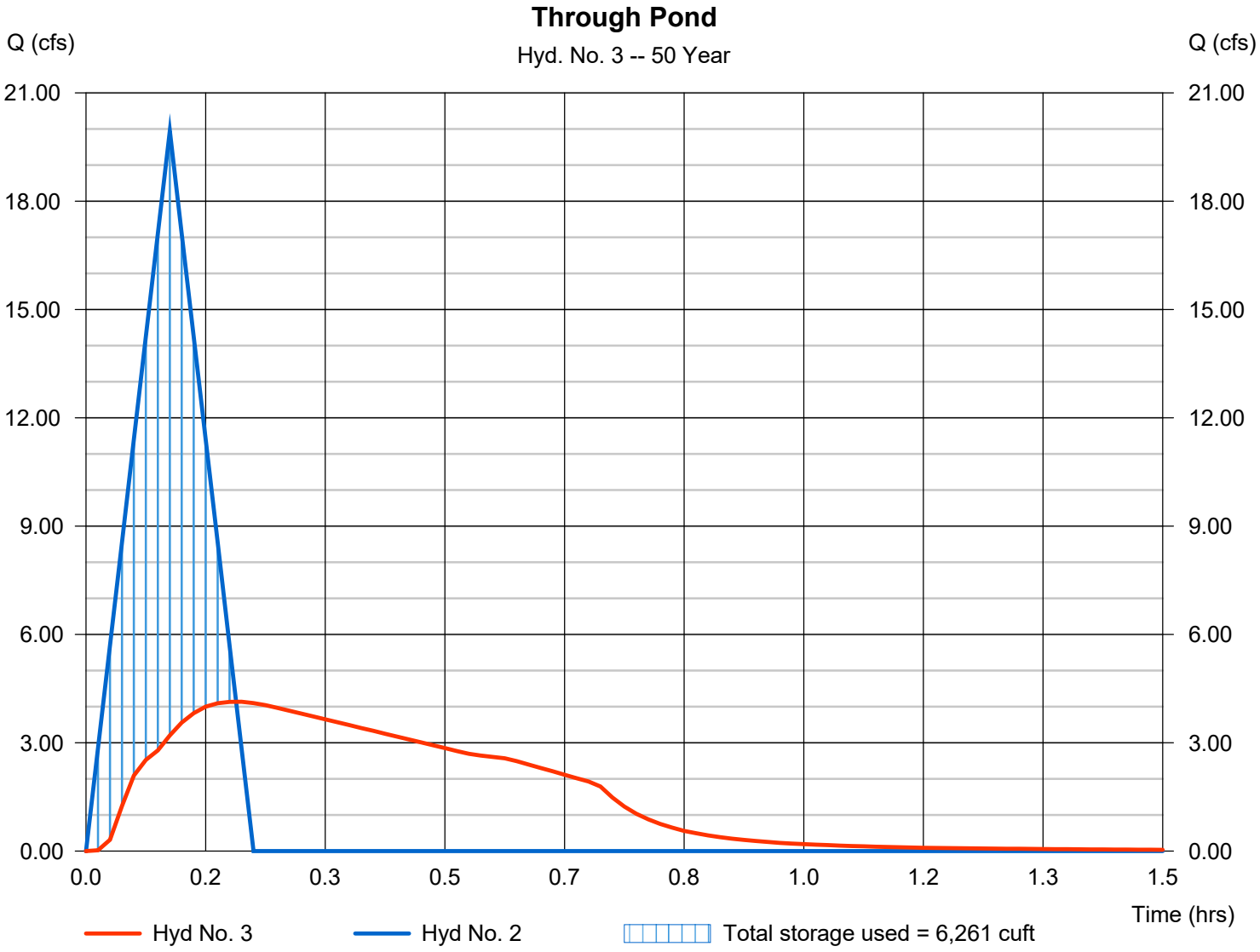
Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	4.136 cfs
Storm frequency	=	50 yrs	Time to peak	=	0.22 hrs
Time interval	=	1 min	Hyd. volume	=	8,375 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	386.06 ft
Reservoir name	=	<New Pond>	Max. Storage	=	6,261 cuft

Storage Indication method used.



Hydrograph Summary Report

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

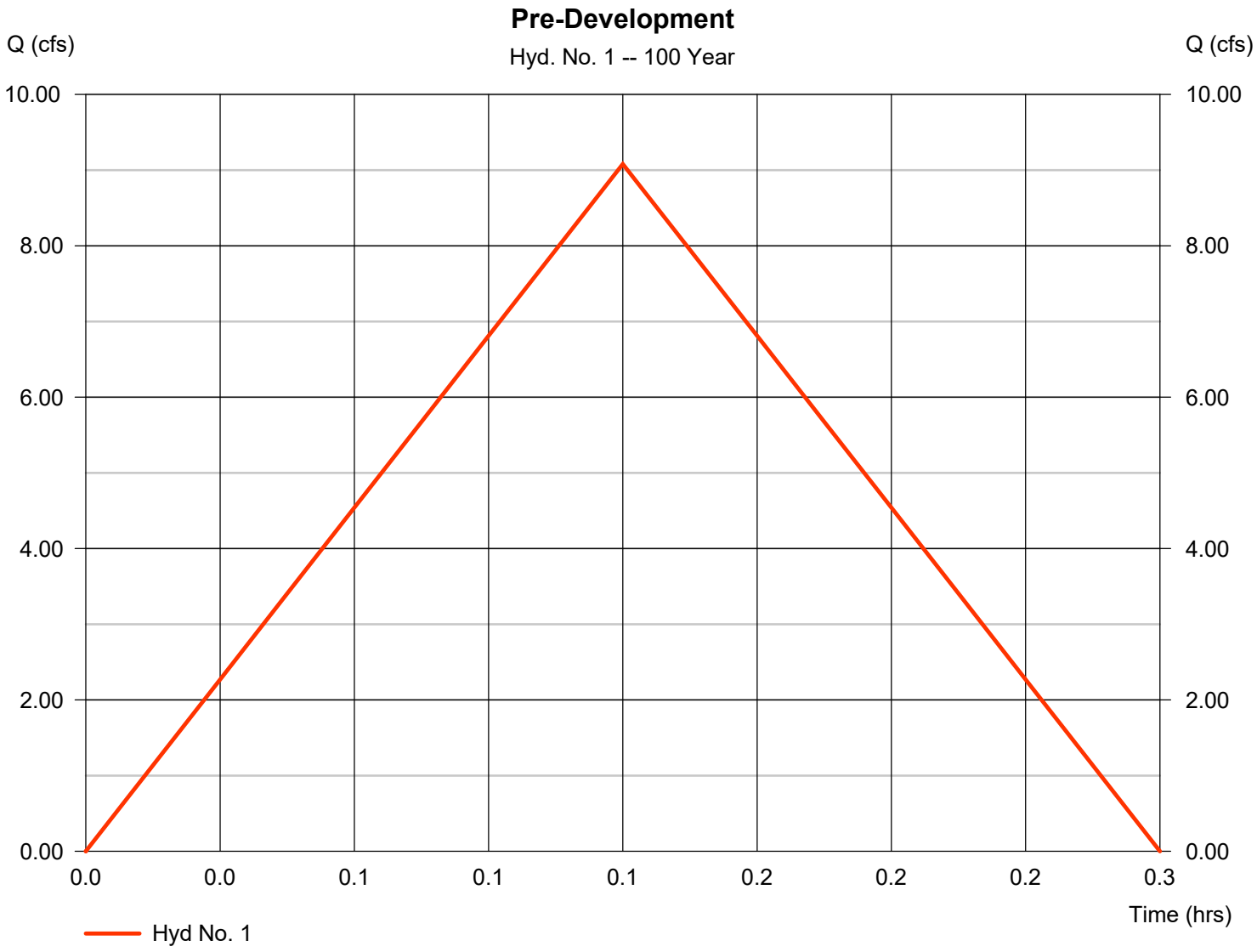
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	9.081	1	8	4,359	------	------	------	Pre-Development
2	Rational	21.78	1	7	9,146	------	------	------	Post-Development
3	Reservoir	4.286	1	13	9,142	2	386.16	6,931	Through Pond

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	9.081 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.13 hrs
Time interval	=	1 min	Hyd. volume	=	4,359 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.25
Intensity	=	9.081 in/hr	Tc by TR55	=	8.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1



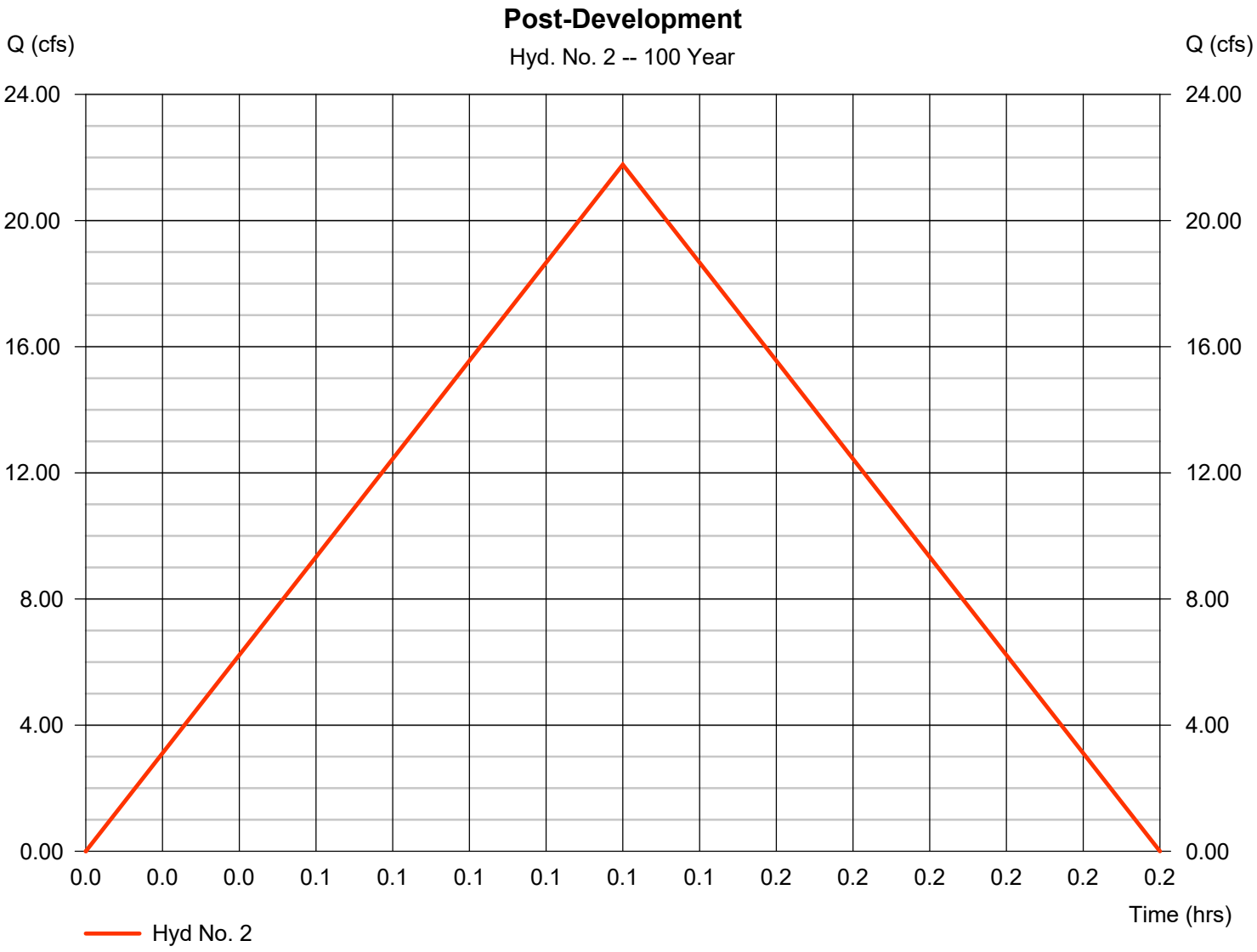
Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	Rational	Peak discharge	=	21.78 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.12 hrs
Time interval	=	1 min	Hyd. volume	=	9,146 cuft
Drainage area	=	4.000 ac	Runoff coeff.	=	0.58*
Intensity	=	9.386 in/hr	Tc by TR55	=	7.00 min
IDF Curve	=	Pulaski County.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.050 x 0.90) + (1.950 x 0.25)] / 4.000



Hydrograph Report

Hyd. No. 3

Through Pond

Hydrograph type	=	Reservoir	Peak discharge	=	4.286 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.22 hrs
Time interval	=	1 min	Hyd. volume	=	9,142 cuft
Inflow hyd. No.	=	2 - Post-Development	Max. Elevation	=	386.16 ft
Reservoir name	=	<New Pond>	Max. Storage	=	6,931 cuft

Storage Indication method used.

