PROPOSED COMMERCIAL

25300 I30 N

DRAINAGE REPORT

FOR
City of Bryant, Saline County, AR

November 2025

Vicinity Map

Owner & Developer: FINLEY & COMPANY

By:

HOPE CONSULTING
ENGINEERS - SURVEYORS

129 N. Main Street
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

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ITEM DESCRIPTION

Narrative & Summary

PROJECT TITLE

25300 I30 N COMMERCIAL

PROJECT PROPERTY OWNER

Stuart Finley

PROJECT LOCATION

Bryant, Saline County, AR

PROJECT DESCRIPTION

The proposed commercial development is at the city of Bryant, AR. Total development site area is 0.90 acres.

DRAINAGE ANALYSIS

On Site Drainage- Rational method was used to determine the existing and proposed flow from proposed site. There will be one detention pond to detain water from this development. Detailed drainage calculation considering the future expected development has been conducted to determine the required pond and culvert dimension. Summary of the calculation is below:

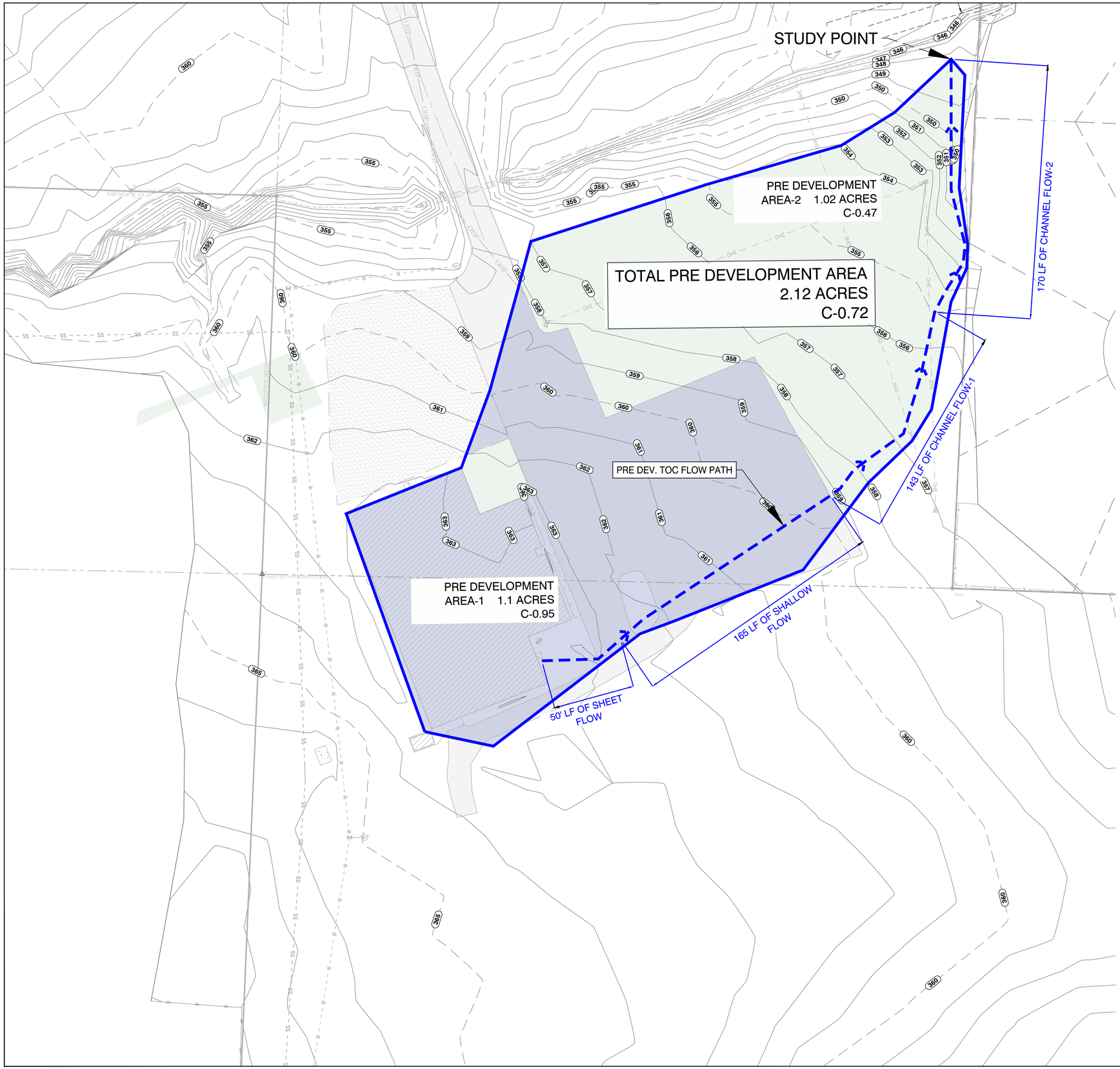
Detention Pond –North East Pond:

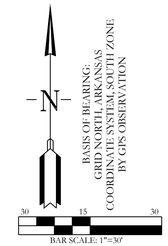
- Pond is situated on the north east side of the property.
- Pre-development area 2.12 acres.
- Post-development area 2.04 acres.
- Pre-development runoff coefficient 0.72.
- Post-development runoff coefficient 0.80.
- Pond has a bottom elevation of 351.00'.
- One 18" RCP with 0.72% slope is proposed for outflow culverts.

Peak flows for Pre and post development phase of onsite area have been tabulated below-

Period of time	Pre-development	Post-dev. Without detention	Post-dev. With detention
	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)
2-Year	9.308	9.952	2.162
5-Year	11.05	11.81	2.705
10-Year	12.44	13.31	3.523
25-Year	14.28	15.27	4.816
50--Year	15.72	16.81	5.980
100-Year	16.91	18.08	6.950

CONCLUSION: From the onsite drainage calculation, it is seen that there is decrease in flow for all storm events due to the proposed pond.





VICINITY MAP:

PRE DEVELOPMENT TOC:

Time of Concentration, tc (min)

Area (ft2)	92233.0						
Area (Acre)	*2.12*						
Total Length, L (ft)	***528.0***						
Change in Elevation (ft)	16						
Slope, S (ft/ft)	*0.030*						
N (Coeff. Of roughness, Table 400-3)	0.020						
L_i (overland/sheet flow, ft)	50.0						
L_{scs}(shallow concentrated, ft)	165.0	Velocity, V (ft/sec)	Length, L (ft)	Height, h (ft)	Slope, S (ft/ft)	Mannings, n	Hydraulic Radius, R
L_{cs} (channel , ft)	313.0						
$t_i = 0.83\frac{(N L_i)^{0.467}}{S^{0.5}}$, (min)	*2.07*		50.0	1.0	*0.020*		
$t_{scs} = \frac{L_{scs}}{60\,V}$, (min) , paved							
V=20.3282(S^0.5)	*1.00*	*2.74*	165.0	3.0	*0.018*		
$t_{cs} = \frac{L_{cs}}{60\,V}$, (min)							
$V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$ Channel flow-1	*1.00*	*2.37*	143.0	5.0	*0.035*	0.050	*0.278*
Channel flow-2	*0.68*	*4.17*	170.0	7.0	*0.041*	0.050	*0.573*
Total time of concentration, tc (min)	**4.76**						
USE	**5**						

PRE DEVELOPMENT RUNOFF COEFFICIENT

	Area (acer)	C 100 year	Corrected C 100 year
PRE DEV. AREA-1	1.10	0.95	1.045
PRE DEV. AREA-2	1.02	0.47	0.4794
Tot =	2.12		0.72

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129 N. Main Street,
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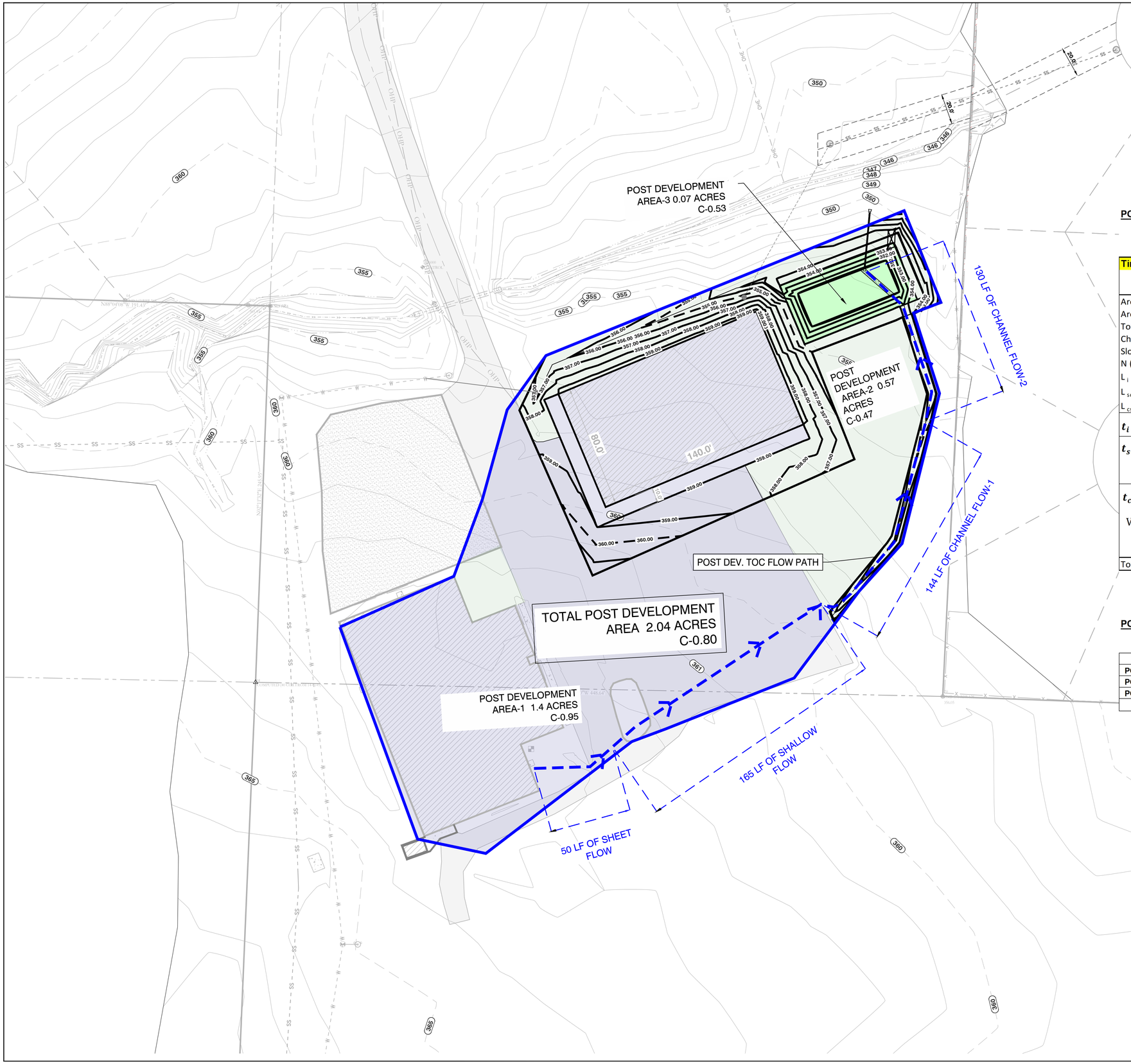
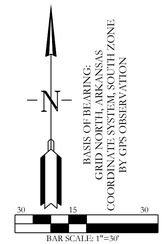
FOR USE AND BENEFIT OF:
STUART FINLEY

25-1210 Comm./ 25300 I30 N
PRE DEVELOPMENT DRAINAGE EXHIBITION
A COMMERCIAL IN BRYANT CITY, SALINE COUNTY, ARKANSAS

DATE:	11/19/2025	C.A.D. BY:	DRAWING NUMBER:
REVISED:	##	CHECKED BY:	25-1210
SHEET:		SCALE: 1"=30'	

500	01S	14W	0	13	400	62	1664





VICINITY MAP:

POST DEVELOPMENT TOC:

Time of Concentration, tc (min)

Area (ft2)	88645.3						
Area (Acre)-Total	*2.04*						
Total Length, L (ft)	***489.0***						
Change in Elevation (ft)	13						
Slope, S (ft/ft)	*0.027*						
N (Coeff. Of roughness, Table 400-3)	0.020						
L_i (overland/sheet flow, ft)	*50.0*						
L_{scs}(shallow concentrated, ft)	*165.0*	Velocity, V (ft/sec)	Length, L (ft)	Height, h (ft)	Slope, S (ft/ft)	Mannings, n	Hydraulic Radius, R
L_{cs} (channel , ft)	274.0						
$t_i = 0.83\frac{(N\,L_i)^{0.467}}{S^{0.5}}$, (min)	*2.07*		50.0	1.0	*0.020*		
$t_{scs} = \frac{L_{scs}}{60\,V}$, (min) , paved							
V=20.3282(S^0.5)	*1.00*	*2.74*	165.0	3.0	*0.018*		
$t_{cs} = \frac{L_{cs}}{60\,V}$, (min)							
$V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$ Channel flow-1	*0.96*	*2.49*	144.0	5.0	*0.035*	0.050	*0.300*
Channel flow-2	*0.60*	*3.61*	130.0	4.0	*0.031*	0.050	*0.573*
Total time of concentration, tc (min)	**4.64**						
USE	**5**						

POST DEVELOPMENT RUNOFF COEFFICIENT

	Area (acer)	C 25 year	Corrected C 100 year
POST DEV. AREA-1	1.40	0.95	1.33
POST DEV. AREA-2	0.57	0.47	0.2679
POST DEV. AREA-3	0.07	0.53	0.0371
Tot =	2.04		0.80

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A COMMERCIAL IN BRYANT CITY, SALINE COUNTY, ARKANSAS

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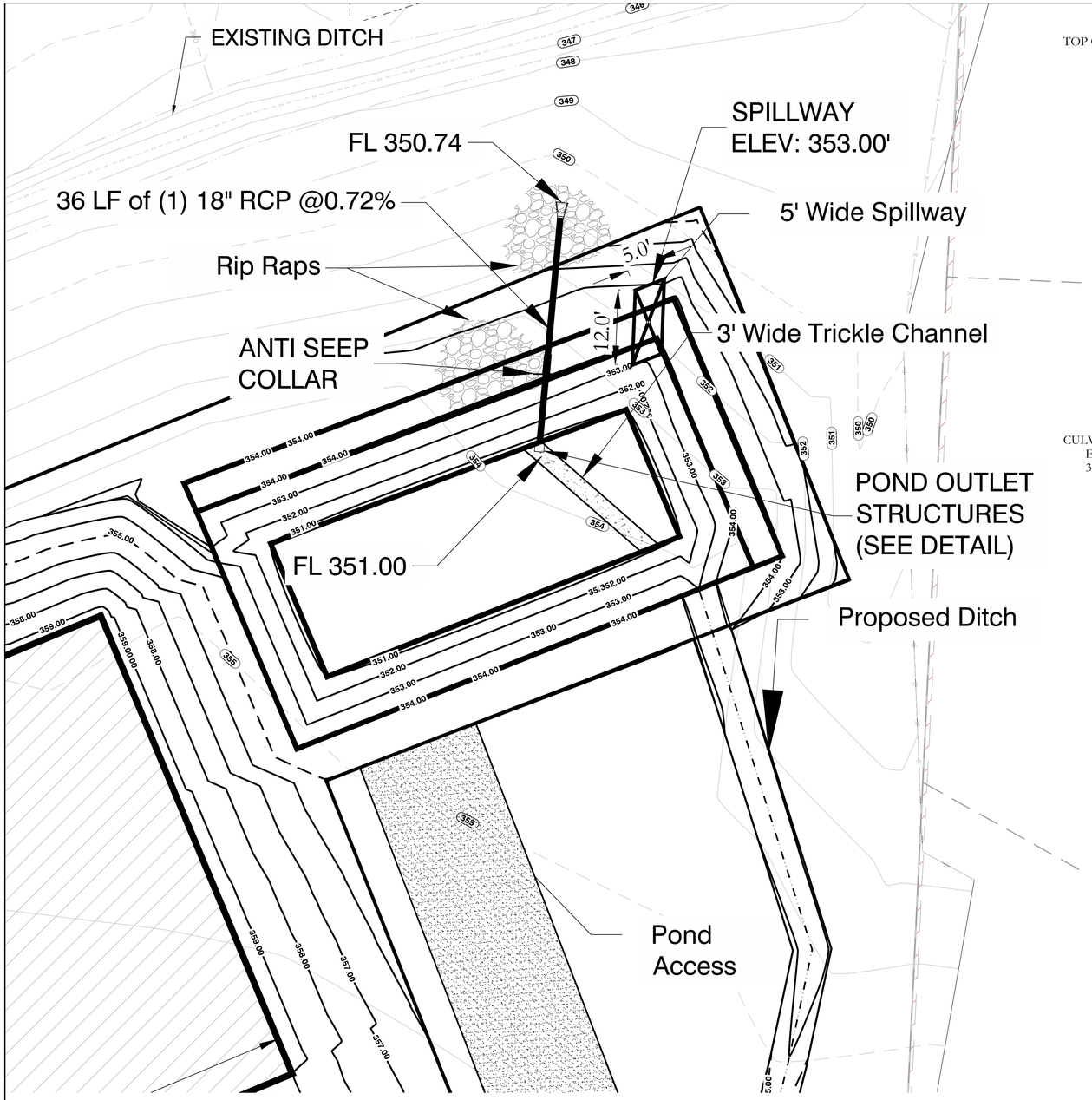
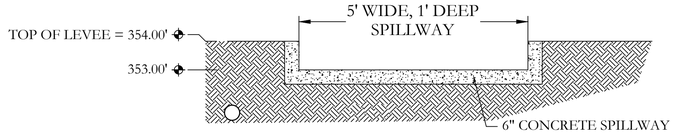
SHEET:		SCALE: 1"=30'	

500	01S	14W	0	13	400	62	1664



NORTH EAST DETENTION POND

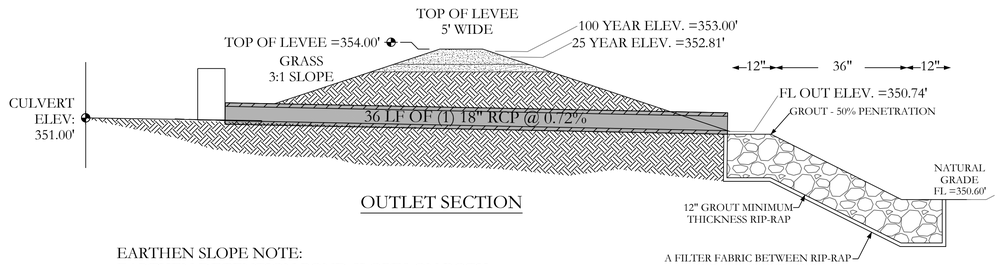


SPILLWAY END VIEW
NTS

SPILLWAY DESIGN

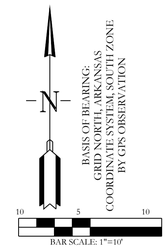
Spillway Capacity, Q=CLH^(3/2)

C Discharge Coefficient	L Spillway Width (ft)	H Head over Crest (ft)	
2.5	5	1	
	Spillway Capacity (cfs)	12.5	Adequate
	100 year Flow(cfs)	6.9	



OUTLET SECTION

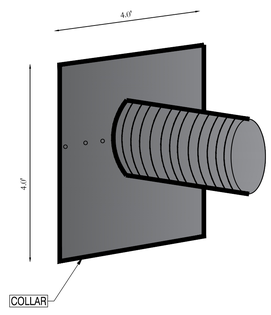
VICINITY MAP:



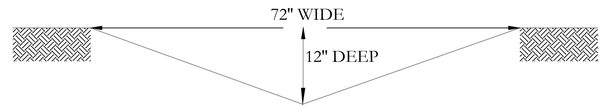
EARTHEN SLOPE NOTE:
EARTHEN DETENTION POND SLOPES ON BOTH THE INTERIOR AND EXTERIOR OF THE POND SHALL HAVE A MAXIMUM SLOPE OF 3:1.

NOTE:

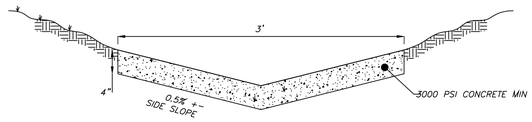
1. DETENTION POND WILL BE REQUIRED TO BE STABILIZED WITH SOLID SOD/SEED STABILIZATION PER THE STORM WATER MANAGEMENT MANUAL.
2. DETENTION POND WILL HAVE A 5' WIDE LEVEE.
3. DETENTION POND REQUIRED STORAGE 5,420 CUFT. THE DESIGNED DETENTION POND'S AVAILABLE STORAGE 6,758 CUFT.
4. THE EXISTING DITCH HAS FLOW FOR 100 YEAR 116 CFS. THE FLOW FROM POND IS 6.9 CFS FOR 100 YEAR



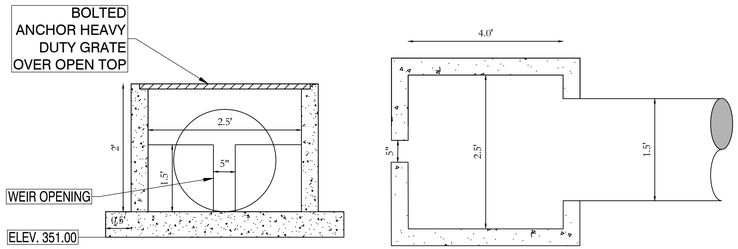
ANTI SEEP COLLAR



PROPOSED DITCH SECTION



DETAIL (NTS)
TRICKLE CHANNEL SECTION



POND OUTLET STRUCTURE

DETENTION POND MAINTENANCE PLAN

Background
The Detention pond is located at the North East of the subjected property. It is designed to temporarily detain stormwater to meet water quantity criteria before discharging off the property.

Routine Maintenance
Routine maintenance will include but not be limited to:
-Moving of the bank slopes and area around the pond on a monthly basis during the growing season and as needed during the cooler months.

-The outlet pipe from the pond and other areas will be inspected monthly for debris which could inhibit the proper flow of discharge. Any debris will be removed immediately and disposed of or placed in a location to prevent future maintenance and to not cause impact up or downstream of the structure.

-Trash will be removed from around the pond to prevent entering the pond. Generally, the site should be kept free of loose trash which could be carried off site by wind or rain.

-Inspect the pond and outlet pipe for non-routine maintenance need.

Periodic or Non-Routine Maintenance
The routine inspection of the pond area and discharge pipe will identify needed repairs and non-routine maintenance. These items may include but not be limited to:

-Re-growth of trees on or around the pond bank. These should be cut and removed from the pond area.

-Sediment from the site may accumulate in the pond bottom and reduce the pond to below design volume requirements. The pond should be excavated if the pond bottom elevation reached a level that allows excessive aquatic growth or reduces the pond efficiency such, that the sediments are passing the discharge structure and release off site.

-Stabilization or re-grading of side slopes may be required periodically or after excessive rain events. Any disturbance of slopes should be reseeded or may require installation of erosion control materials until seeding can reestablish adequate grasses to prevent future erosion.

-Existing ditch will be maintained by regular inspection, sediment removal, clearing debris, controlling vegetation.

-Any other maintenance or repairs which would minimize other maintenance to the pond or outfall structures.
-For questions or concerns about Tract "A", contact at **(501)315-2626.**

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811 Know what's below. Call before you dig.

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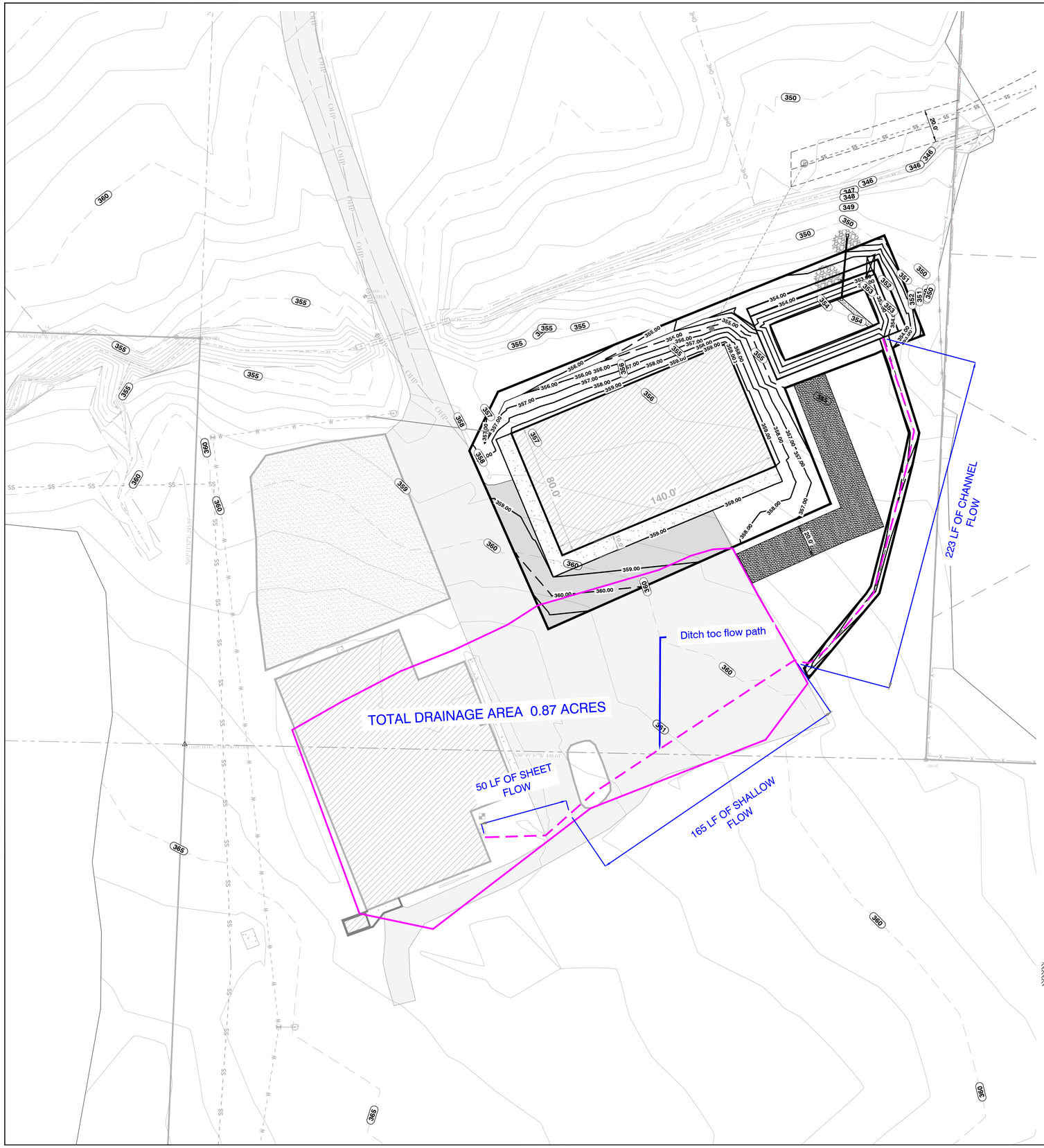
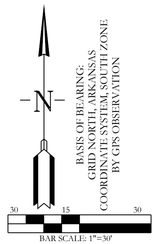
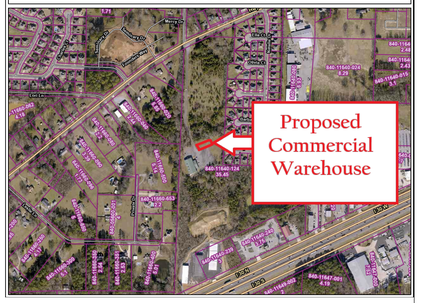
25-1210 Comm./ 25300 I30 N
NORTH EAST DETENTION POND
A COMMERCIAL IN BRYANT CITY, SALINE COUNTY, ARKANSAS

DATE:	11/19/2025	C.A.D. BY:		DRAWING NUMBER:			
REVISED:	##	CHECKED BY:		25-1210			
SHEET:	C-3.0	SCALE:	1"=10'				
500	01S	14W	0	13	400	62	1664





VICINITY MAP:



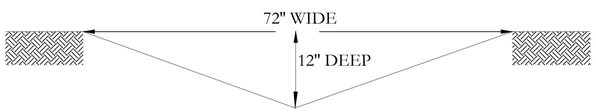
Ditch Size Calculation

Time of Concentration, tc (min)								
Area (ft2)	37737.2							
Area (Acre)	*0.87*							
Total Length, L (ft)	***438.0***							
Change in Elevation (ft)	10							
Gross Slope, S (ft/ft)	*0.023*							
N (Coeff. Of roughness, Table 400	*0.020*							
L_i (overland/sheet flow, ft)	50.0							
L_{scs}(shallow concentrated, ft)	165.0	Velocity, V (ft/sec)	Length, L (ft)	Height, h (ft)	Slope, S (ft/ft)	Mannings, n	Hydraulic Radius, R	
L_{cs} (channel , ft)	223.0							
$t_i = 0.83 \frac{(N L_i)^{0.467}}{S^{0.5}}$, (min)	*2.07*	-	50.0	1.0	*0.020*	0.020	-	
$t_{scs} = \frac{L_{scs}}{60\,V}$, (min) , paved								
V=20.3282(S^0.5)	*1.00*	*2.74*	165.0	3.0	*0.018*	-	-	
$t_{cs} = \frac{L_{cs}}{60\,V}$, (min)								
$V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$ Ch1	*1.80*	*2.07*	223.0	6.0	*0.027*	0.050	*0.275*	
Total time of concentration, tc (m	**4.87**							
USE MIN	**5**							

Design Peak Runoff Rates, Qp (cfs)				
tc =	5.00	Runoff	Toal A	Q
	Intensity, I (in/hr)	Coefficient,		
100year	11.10	**0.950**	**0.87 acer**	**9.14**

Channel/ Ditch Dimension Calculation											
Total Length, L (ft)	***223.0***										
Total Change in Elevation (ft)	6										
Slope, S (ft/ft)	*0.027*										
Target Discharge, Q (ft^3/s)	***9.1***										
		Channel Dimenstion									
$Q = V A$		Velocity, V (ft/sec)	Bottom Width, (ft)	Depth, (ft)	Top Width, (ft)	Ch Side Slope 1:Z	Area, (ft^2)	Length, L (ft)	Elevation, h (ft)	Slope, S (ft/ft)	Mannings, n	Hydraulic Radius, R
$V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$											
C Flow	*14.87*	*4.96*	0.00	1.00	*6.00*	3	*3.00*	223.0	6.0	*0.0269*	0.030	*0.474*
Discharge Capacity, Q =	**14.87**	ft^3/s										

Adequate size



DITCH SECTION

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FOR USE AND BENEFIT OF:
STUART FINLEY

25-1210 Comm./ 25300 I30 N
DITCH CALCULATION
A COMMERCIAL IN BRYANT CITY, SALINE COUNTY, ARKANSAS

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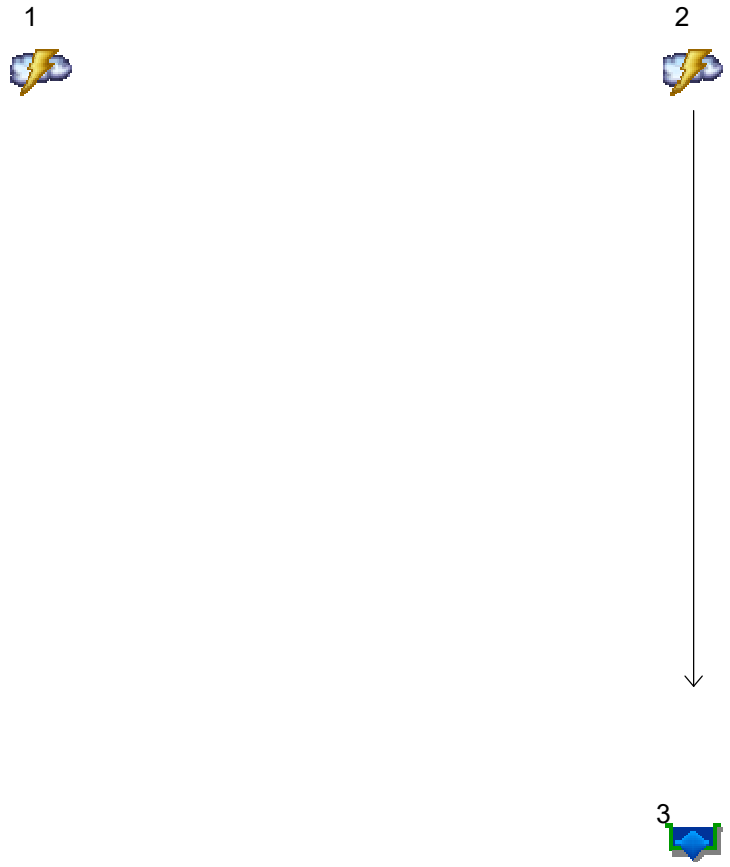
500	01S	14W	0	13	400	62	1664

Hydrograph Summary Report
North East Detention Pond

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Rational	Pre-Development
2	Rational	Dev. Generated Flow
3	Reservoir	Post Dev. Flow

Multi-Hydrograph Plot

Hyd. No. 1

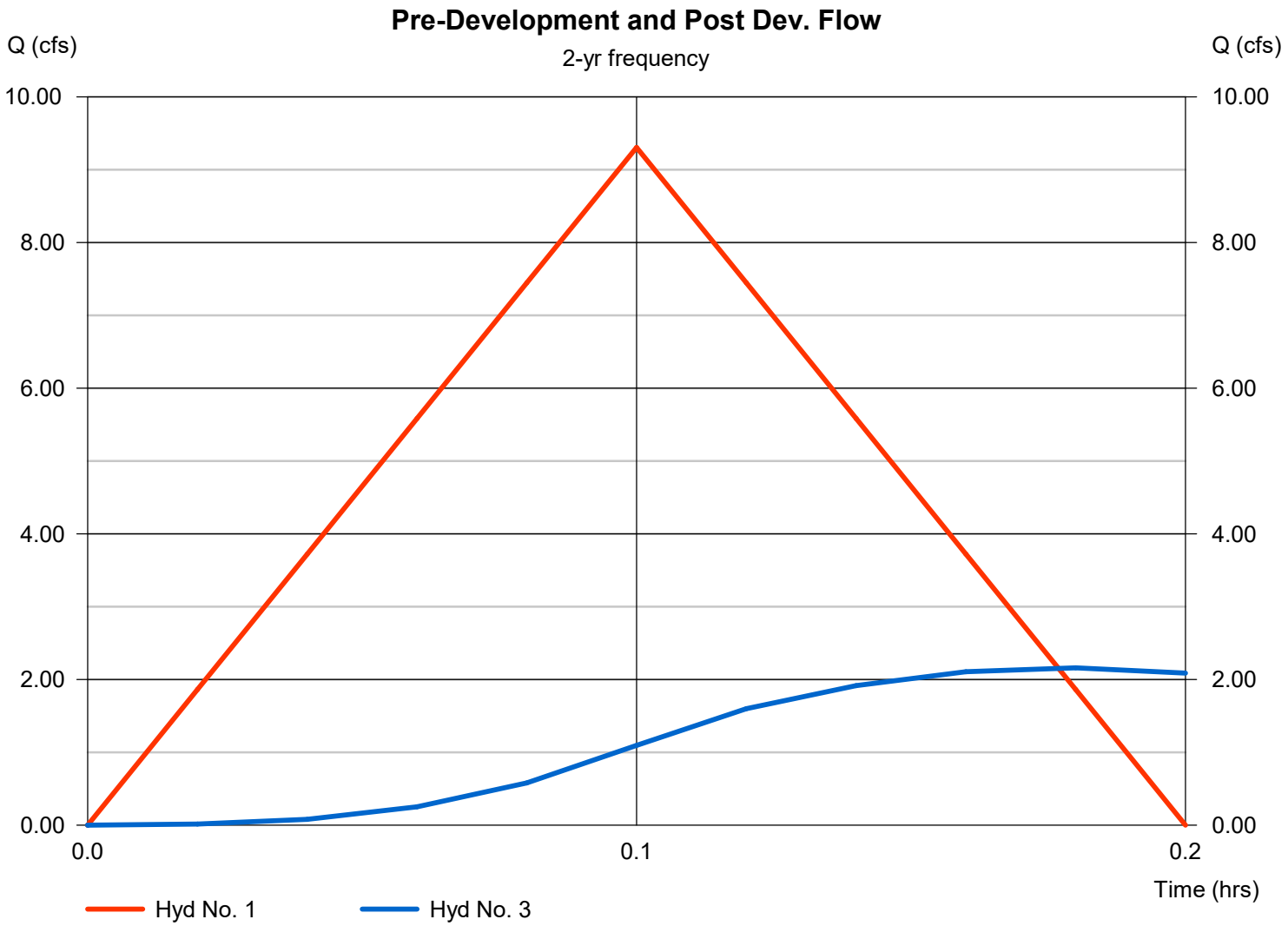
Pre-Development

Hydrograph type	=	Rational
Peak discharge	=	9.308 cfs
Time to peak	=	0.08 hrs
Hyd. Volume	=	2,792 cuft

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir
Peak discharge	=	2.16 cfs
Time to peak	=	0.15 hrs
Hyd. Volume	=	2,982 cuft



Multi-Hydrograph Plot

Hyd. No. 1

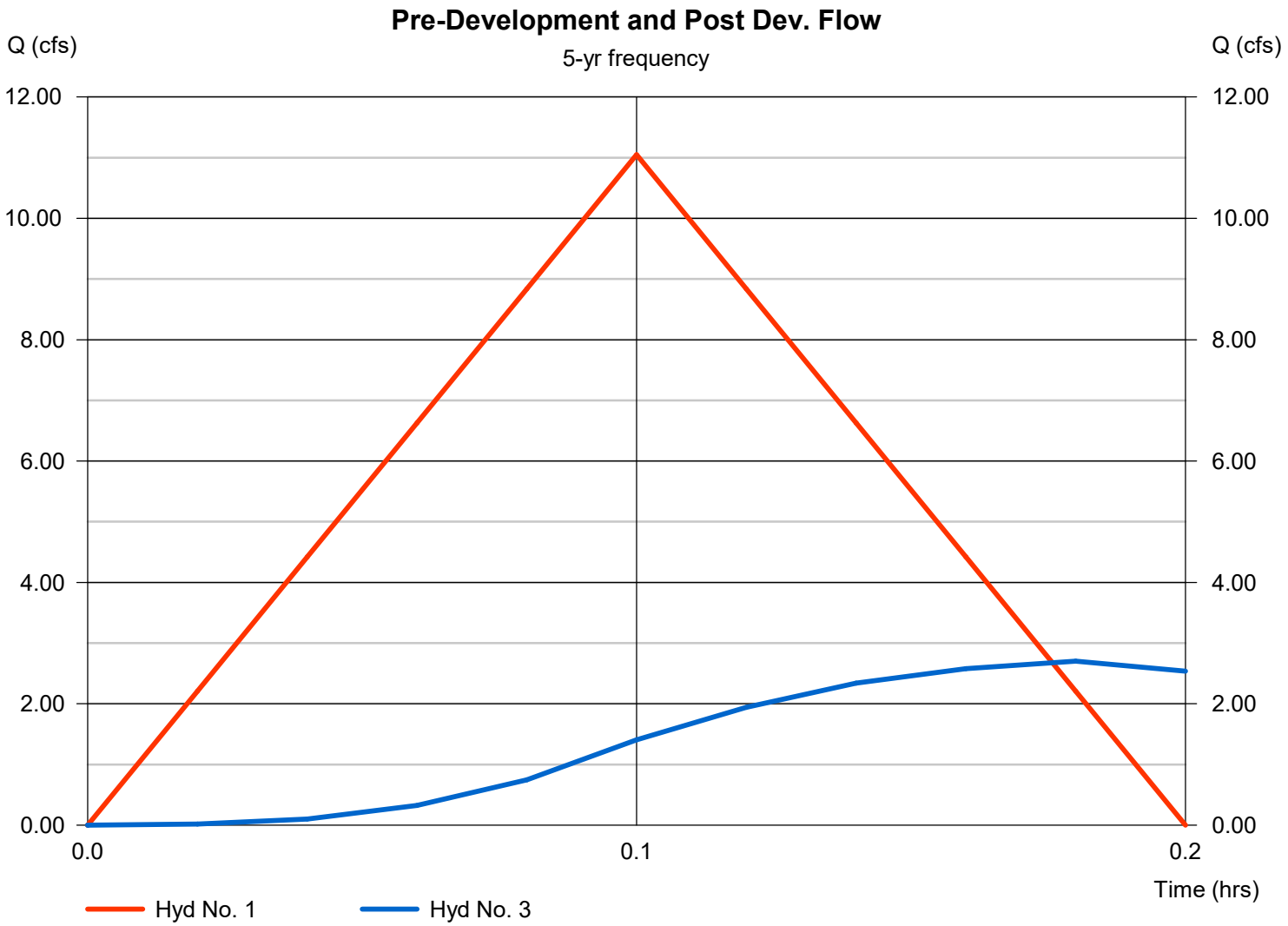
Pre-Development

Hydrograph type	=	Rational
Peak discharge	=	11.05 cfs
Time to peak	=	0.08 hrs
Hyd. Volume	=	3,314 cuft

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir
Peak discharge	=	2.70 cfs
Time to peak	=	0.15 hrs
Hyd. Volume	=	3,540 cuft



Multi-Hydrograph Plot

Hyd. No. 1

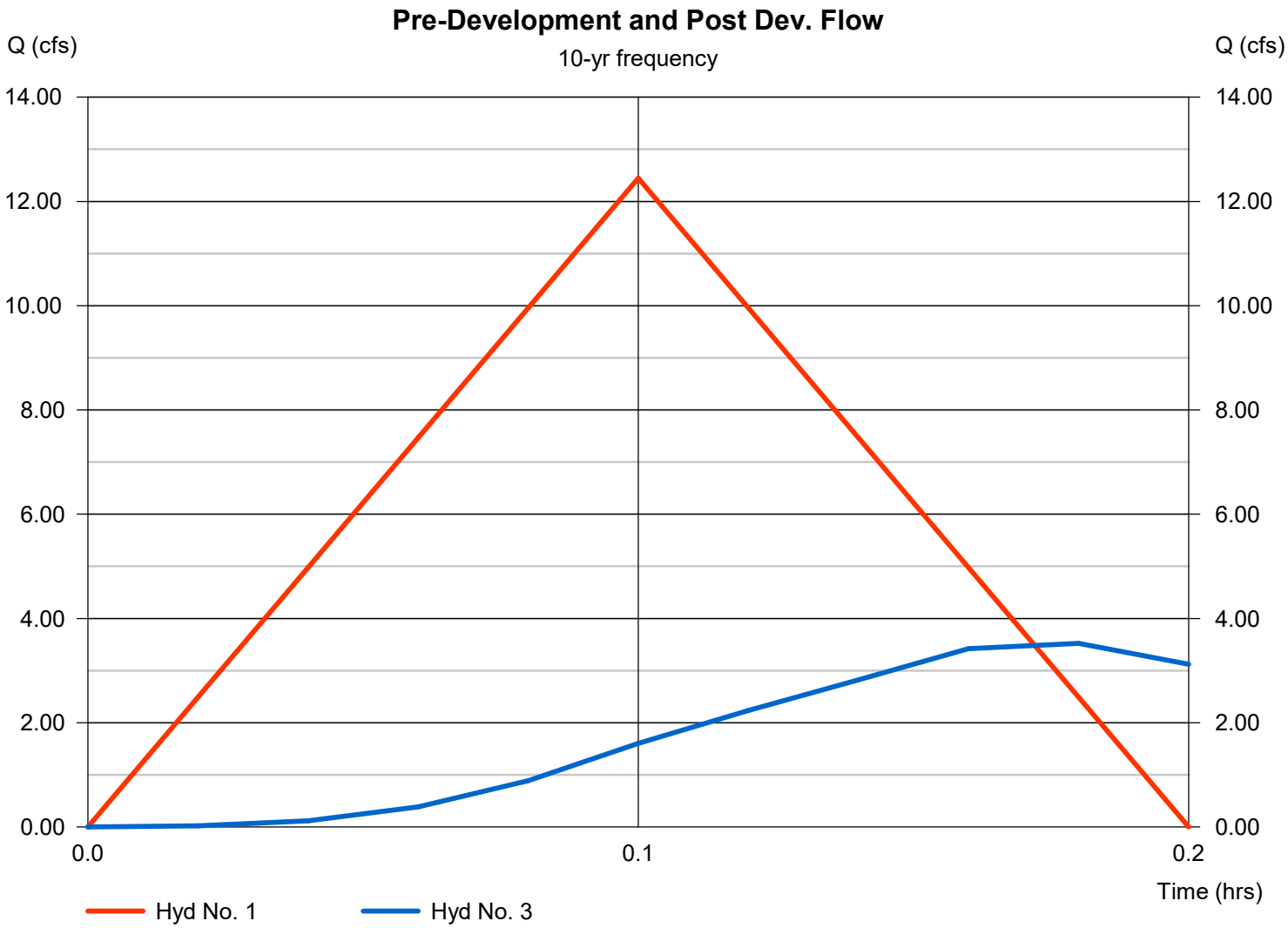
Pre-Development

Hydrograph type	=	Rational
Peak discharge	=	12.44 cfs
Time to peak	=	0.08 hrs
Hyd. Volume	=	3,733 cuft

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir
Peak discharge	=	3.52 cfs
Time to peak	=	0.15 hrs
Hyd. Volume	=	3,988 cuft



Multi-Hydrograph Plot

Hyd. No. 1

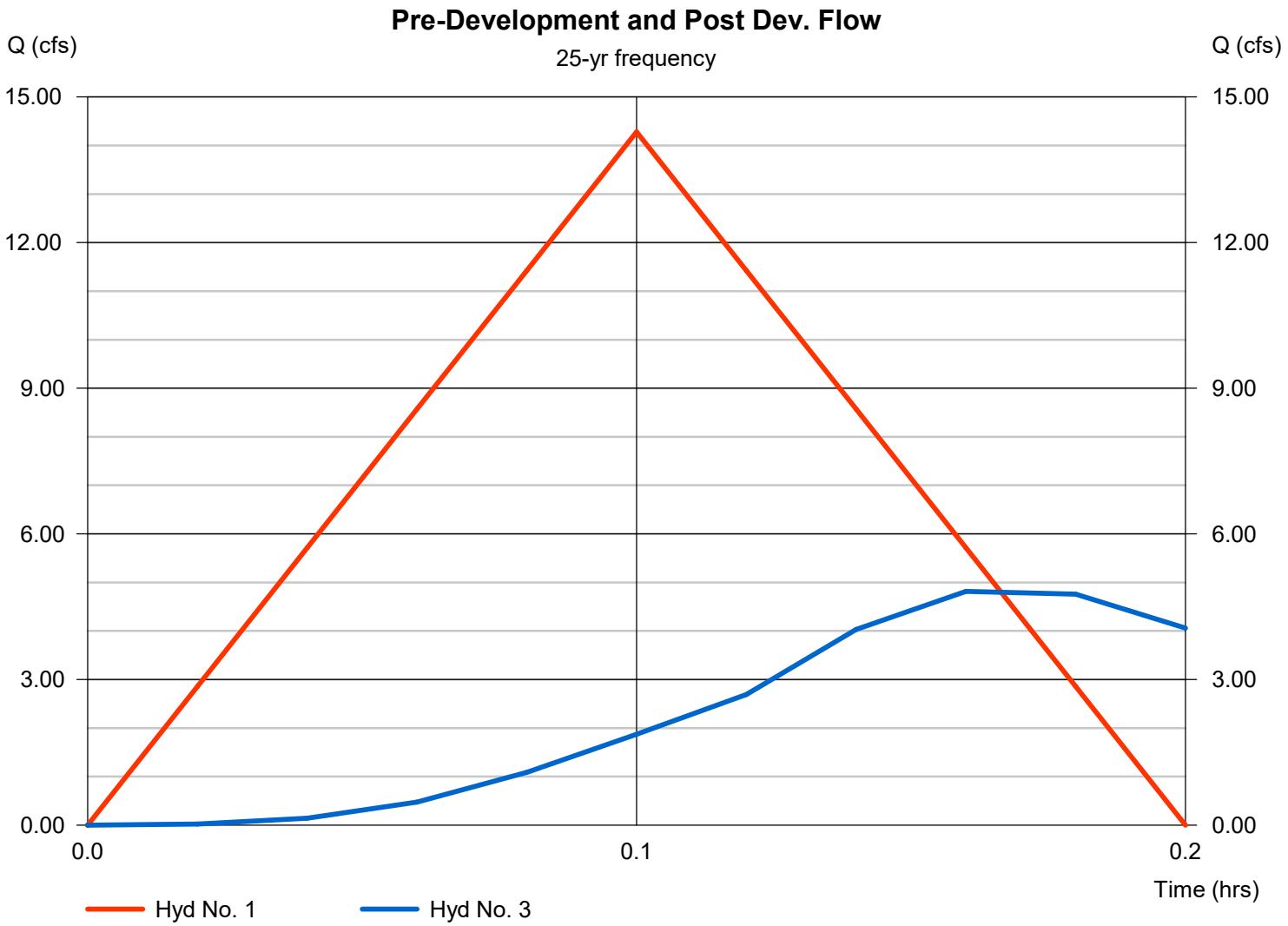
Pre-Development

Hydrograph type	=	Rational
Peak discharge	=	14.28 cfs
Time to peak	=	0.08 hrs
Hyd. Volume	=	4,284 cuft

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir
Peak discharge	=	4.82 cfs
Time to peak	=	0.13 hrs
Hyd. Volume	=	4,577 cuft



Multi-Hydrograph Plot

Hyd. No. 1

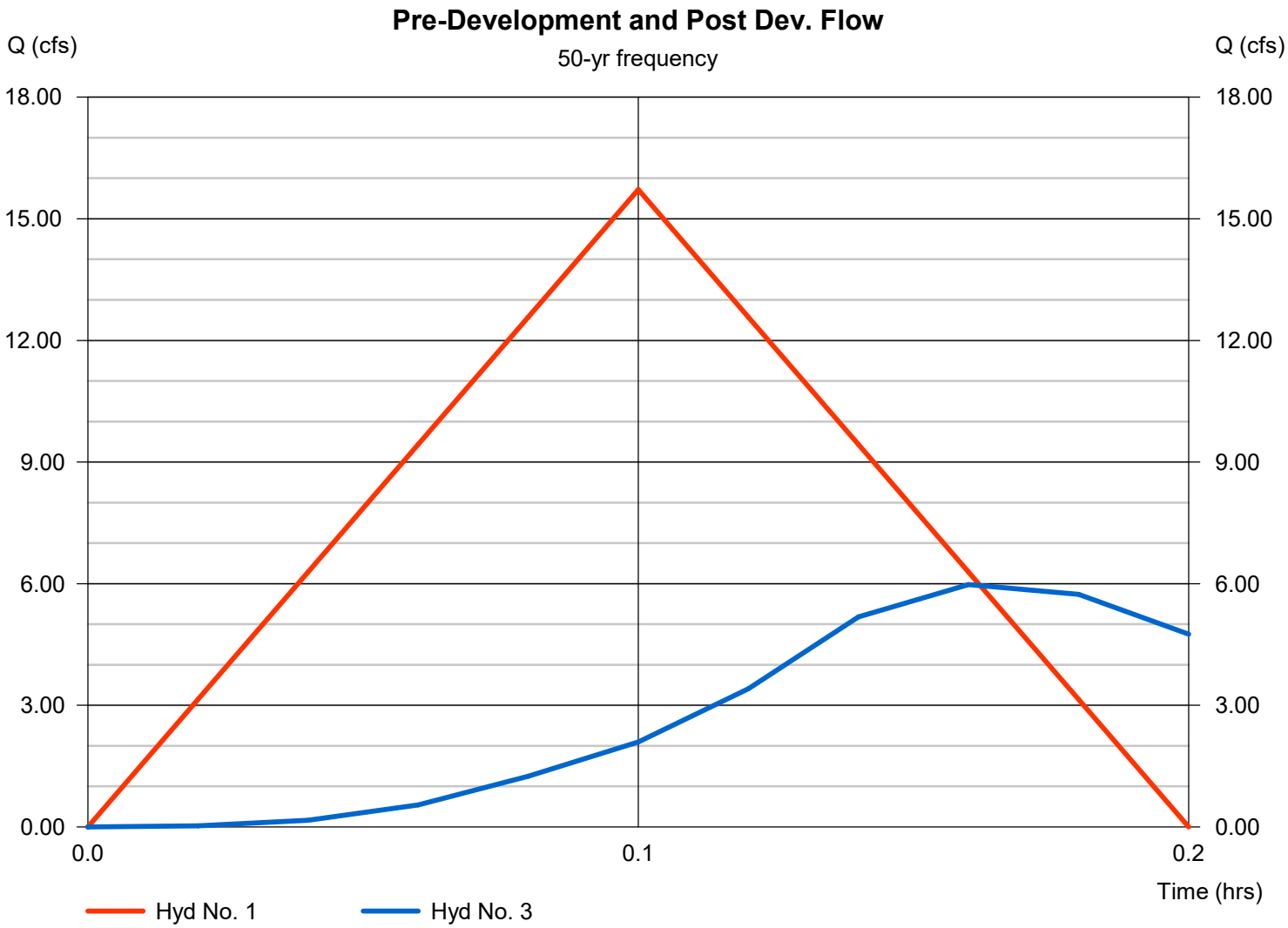
Pre-Development

Hydrograph type	=	Rational
Peak discharge	=	15.72 cfs
Time to peak	=	0.08 hrs
Hyd. Volume	=	4,716 cuft

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir
Peak discharge	=	5.98 cfs
Time to peak	=	0.13 hrs
Hyd. Volume	=	5,039 cuft



Multi-Hydrograph Plot

Hyd. No. 1

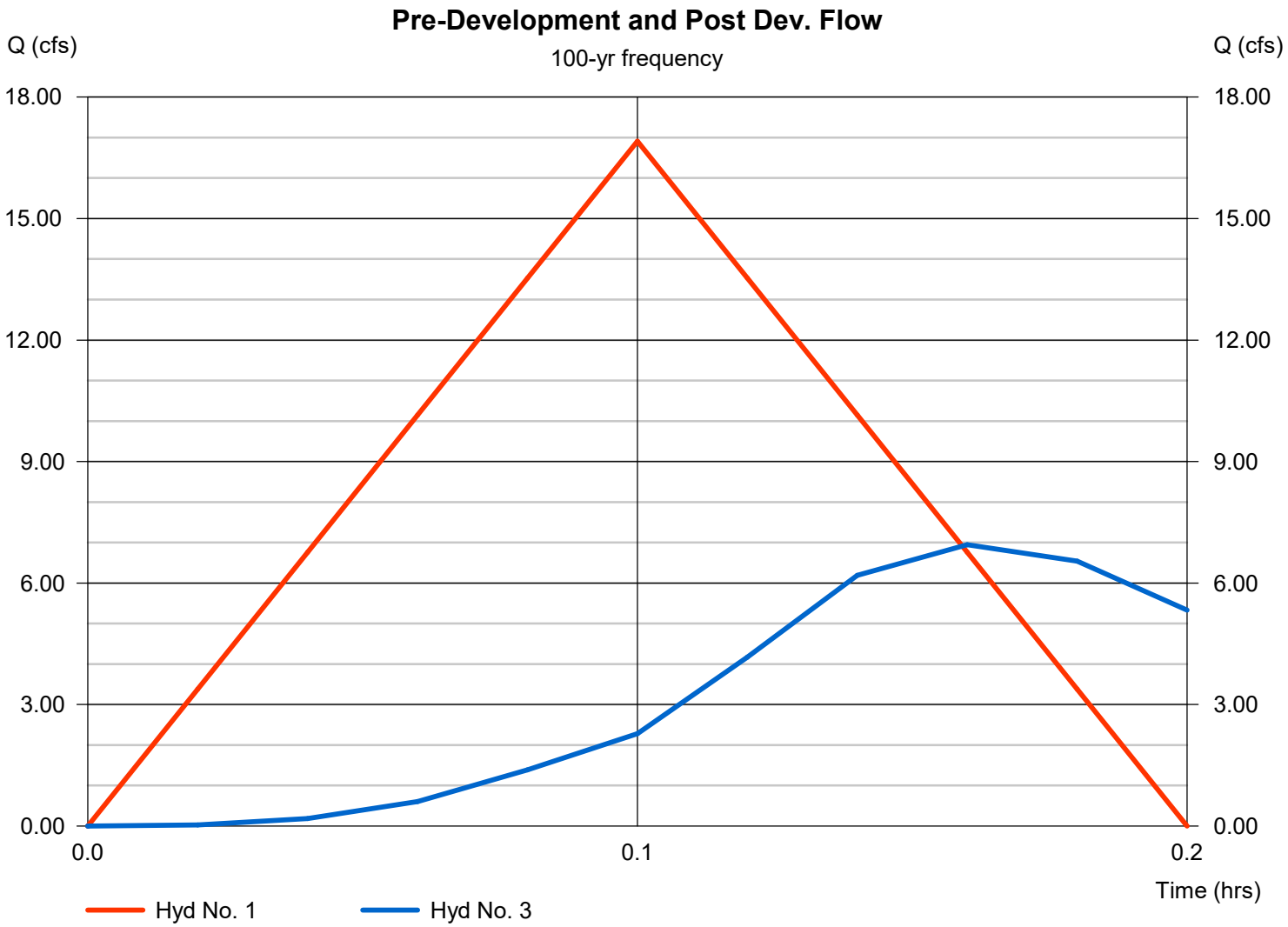
Pre-Development

Hydrograph type	=	Rational
Peak discharge	=	16.91 cfs
Time to peak	=	0.08 hrs
Hyd. Volume	=	5,073 cuft

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir
Peak discharge	=	6.95 cfs
Time to peak	=	0.13 hrs
Hyd. Volume	=	5,420 cuft



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	------	-------	9.308	-------	11.05	12.44	14.28	15.72	16.91	Pre-Development
2	Rational	------	-------	9.952	-------	11.81	13.31	15.27	16.81	18.08	Dev. Generated Flow
3	Reservoir	2	-------	2.162	-------	2.705	3.523	4.816	5.980	6.950	Post Dev. Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

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	9.308	1	5	2,792	------	------	------	Pre-Development
2	Rational	9.952	1	5	2,985	------	------	------	Dev. Generated Flow
3	Reservoir	2.162	1	9	2,982	2	352.34	2,402	Post Dev. Flow

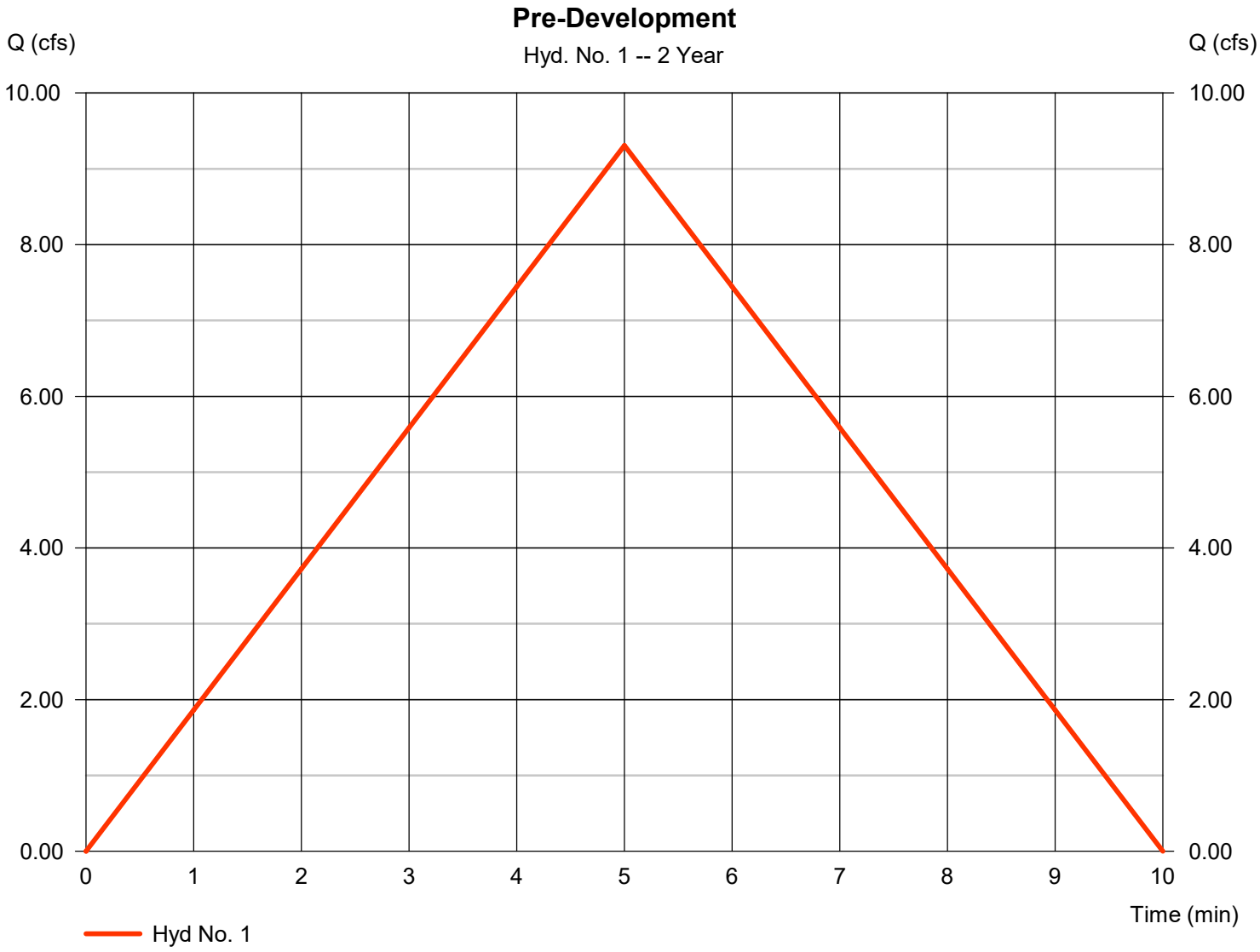
Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	9.308 cfs
Storm frequency	=	2 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	2,792 cuft
Drainage area	=	2.120 ac	Runoff coeff.	=	0.72*
Intensity	=	6.098 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(11.990 x 0.44) + (4.630 x 0.90)] / 2.120



Hydrograph Report

Hyd. No. 2

Dev. Generated Flow

Hydrograph type	=	Rational	Peak discharge	=	9.952 cfs
Storm frequency	=	2 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	2,985 cuft
Drainage area	=	2.040 ac	Runoff coeff.	=	0.8
Intensity	=	6.098 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

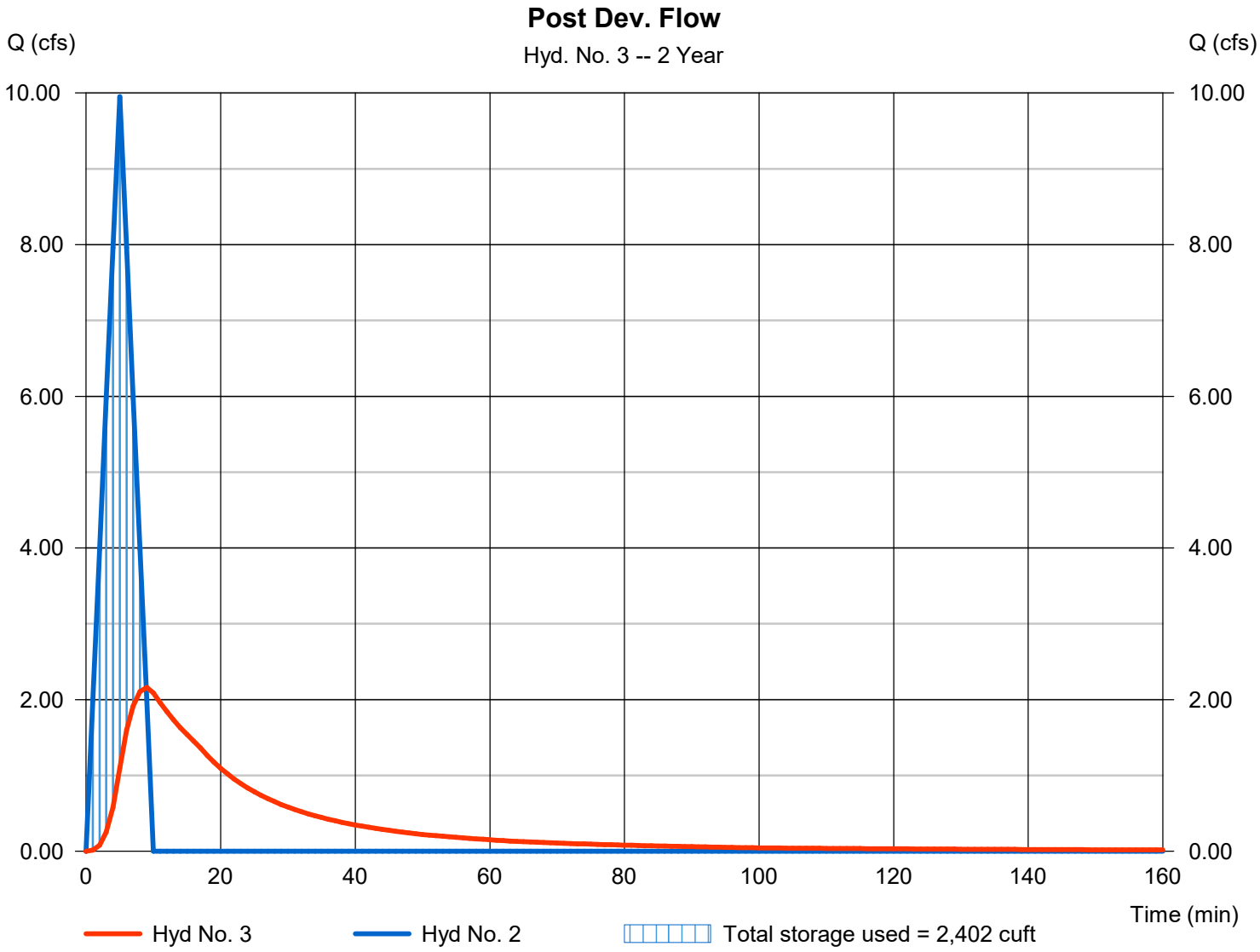
Hydrograph Report

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir	Peak discharge	=	2.162 cfs
Storm frequency	=	2 yrs	Time to peak	=	9 min
Time interval	=	1 min	Hyd. volume	=	2,982 cuft
Inflow hyd. No.	=	2 - Dev. Generated Flow	Max. Elevation	=	352.34 ft
Reservoir name	=	detention	Max. Storage	=	2,402 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - detention

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 351.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.00	1,390	0	0
1.00	352.00	1,930	1,652	1,652
2.00	353.00	2,542	2,229	3,881
3.00	354.00	3,225	2,876	6,758

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 351.00	0.00	0.00	0.00
Length (ft)	= 36.00	0.00	0.00	0.00
Slope (%)	= 0.72	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

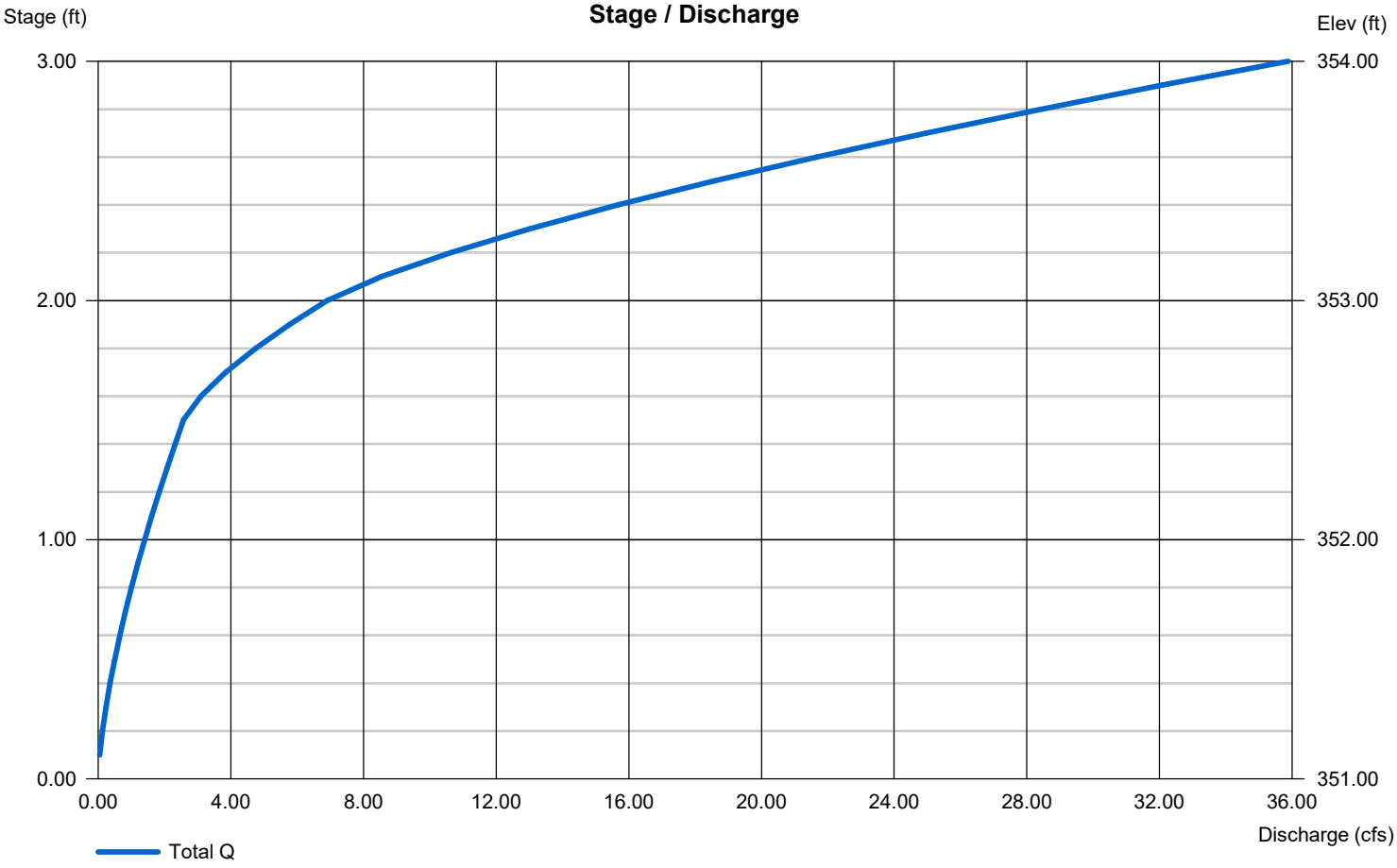
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.42	2.50	4.00	0.00
Crest El. (ft)	= 351.00	352.50	353.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	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. v2025

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	11.05	1	5	3,314	------	------	------	Pre-Development
2	Rational	11.81	1	5	3,543	------	------	------	Dev. Generated Flow
3	Reservoir	2.705	1	9	3,540	2	352.53	2,824	Post Dev. Flow

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	11.05 cfs
Storm frequency	=	5 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	3,314 cuft
Drainage area	=	2.120 ac	Runoff coeff.	=	0.72*
Intensity	=	7.237 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

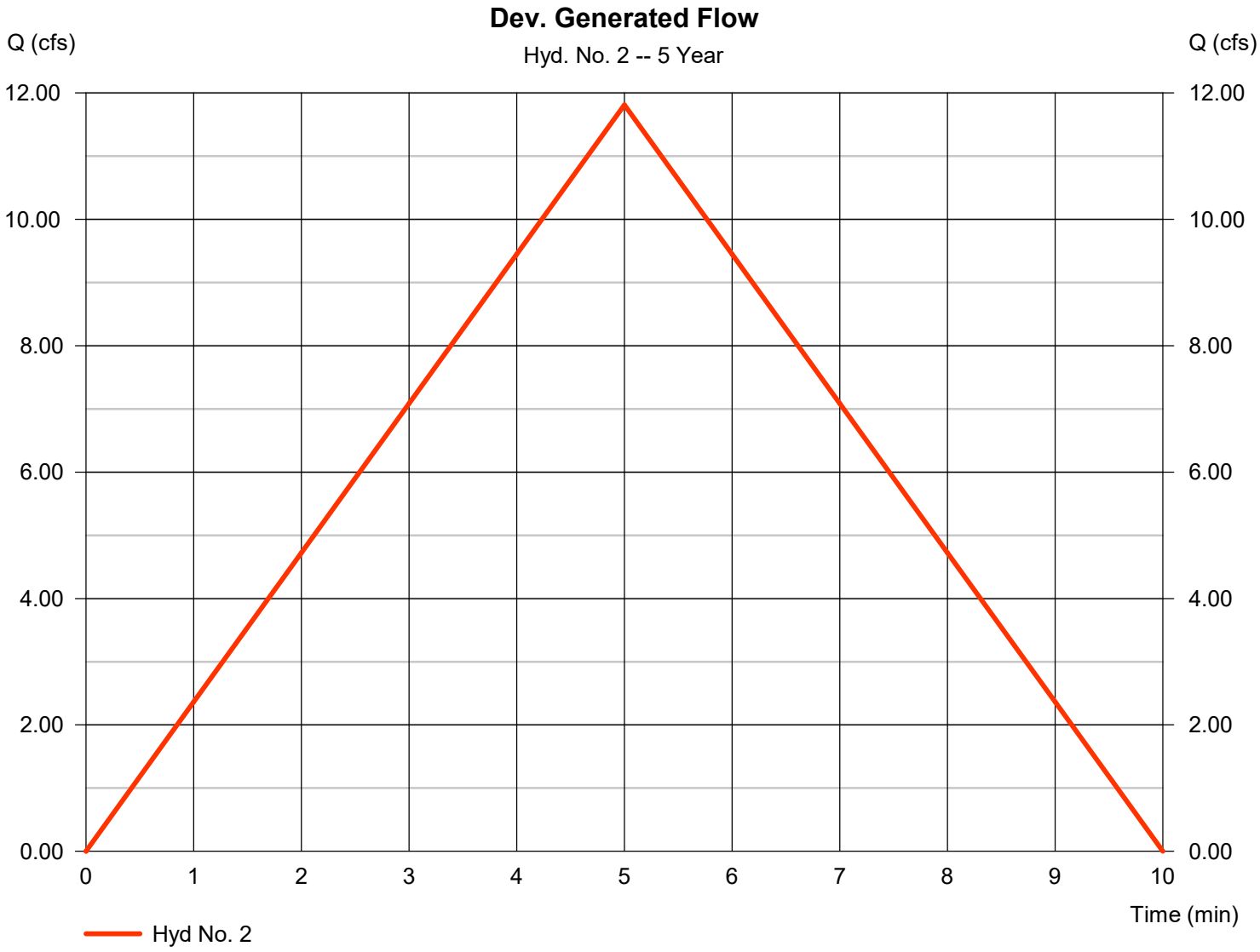
* Composite (Area/C) = [(11.990 x 0.44) + (4.630 x 0.90)] / 2.120

Hydrograph Report

Hyd. No. 2

Dev. Generated Flow

Hydrograph type	=	Rational	Peak discharge	=	11.81 cfs
Storm frequency	=	5 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	3,543 cuft
Drainage area	=	2.040 ac	Runoff coeff.	=	0.8
Intensity	=	7.237 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1



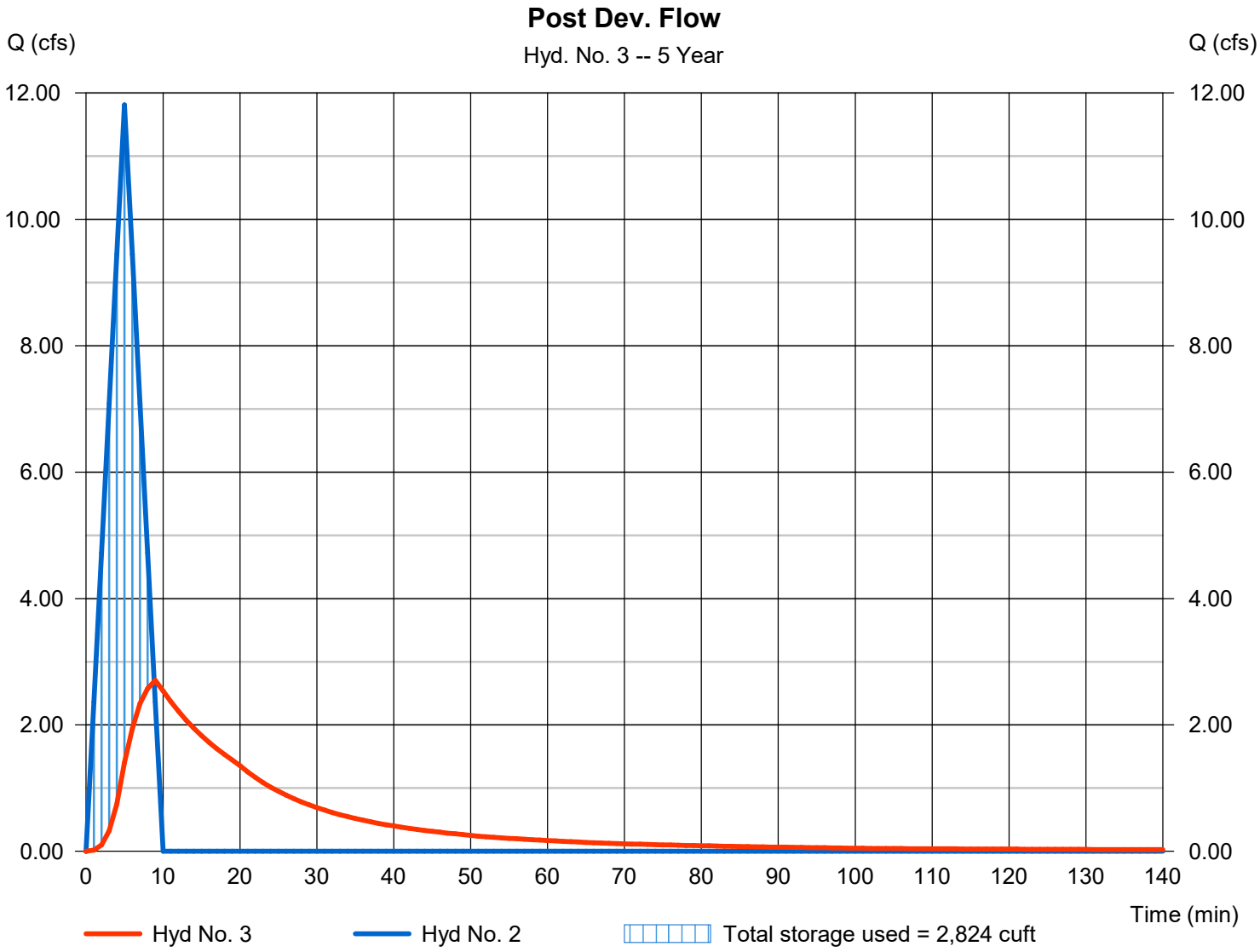
Hydrograph Report

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir	Peak discharge	=	2.705 cfs
Storm frequency	=	5 yrs	Time to peak	=	9 min
Time interval	=	1 min	Hyd. volume	=	3,540 cuft
Inflow hyd. No.	=	2 - Dev. Generated Flow	Max. Elevation	=	352.53 ft
Reservoir name	=	detention	Max. Storage	=	2,824 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

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	12.44	1	5	3,733	------	------	------	Pre-Development
2	Rational	13.31	1	5	3,992	------	------	------	Dev. Generated Flow
3	Reservoir	3.523	1	9	3,988	2	352.66	3,117	Post Dev. Flow

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	12.44 cfs
Storm frequency	=	10 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	3,733 cuft
Drainage area	=	2.120 ac	Runoff coeff.	=	0.72*
Intensity	=	8.153 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

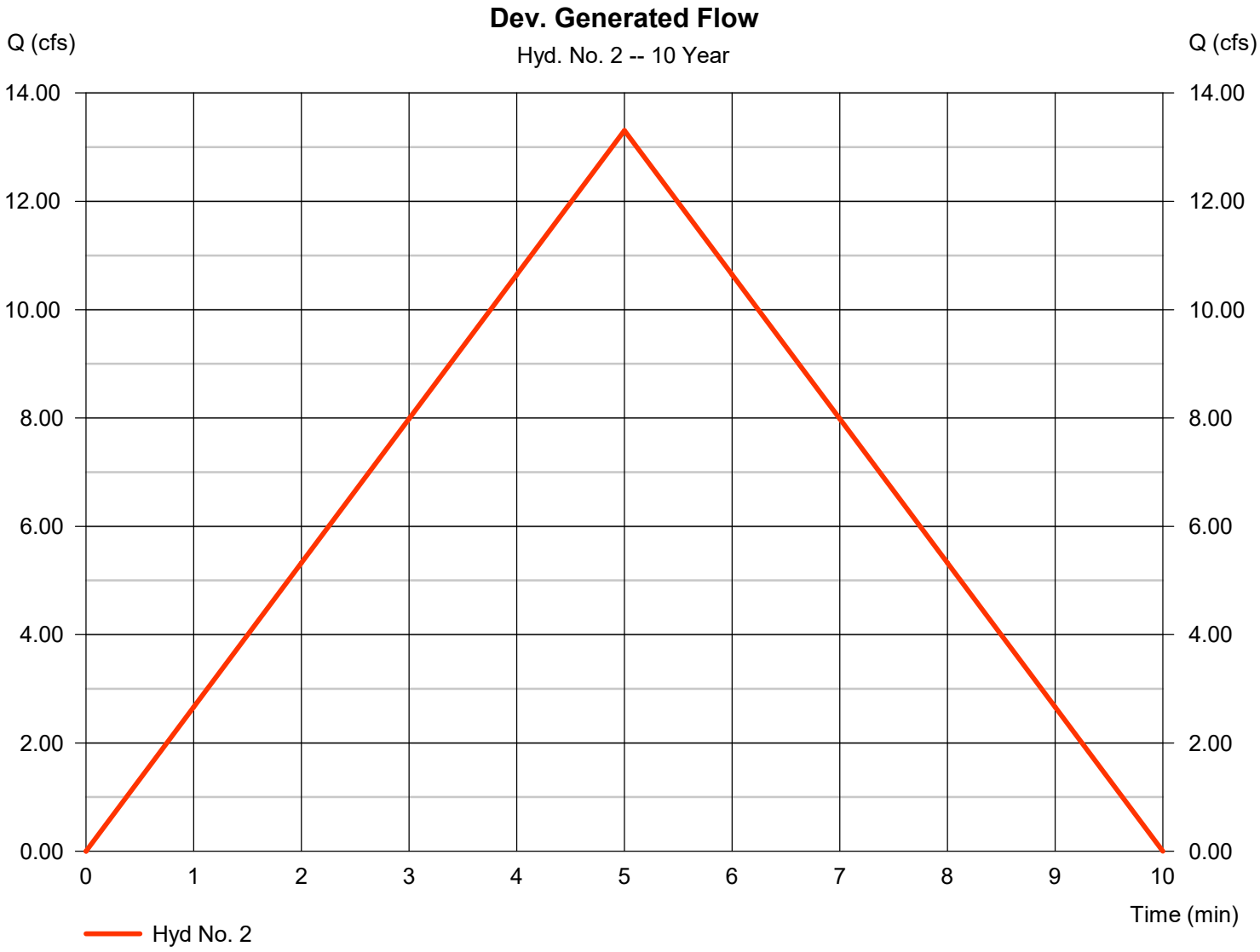
* Composite (Area/C) = [(11.990 x 0.44) + (4.630 x 0.90)] / 2.120

Hydrograph Report

Hyd. No. 2

Dev. Generated Flow

Hydrograph type	=	Rational	Peak discharge	=	13.31 cfs
Storm frequency	=	10 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	3,992 cuft
Drainage area	=	2.040 ac	Runoff coeff.	=	0.8
Intensity	=	8.153 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1



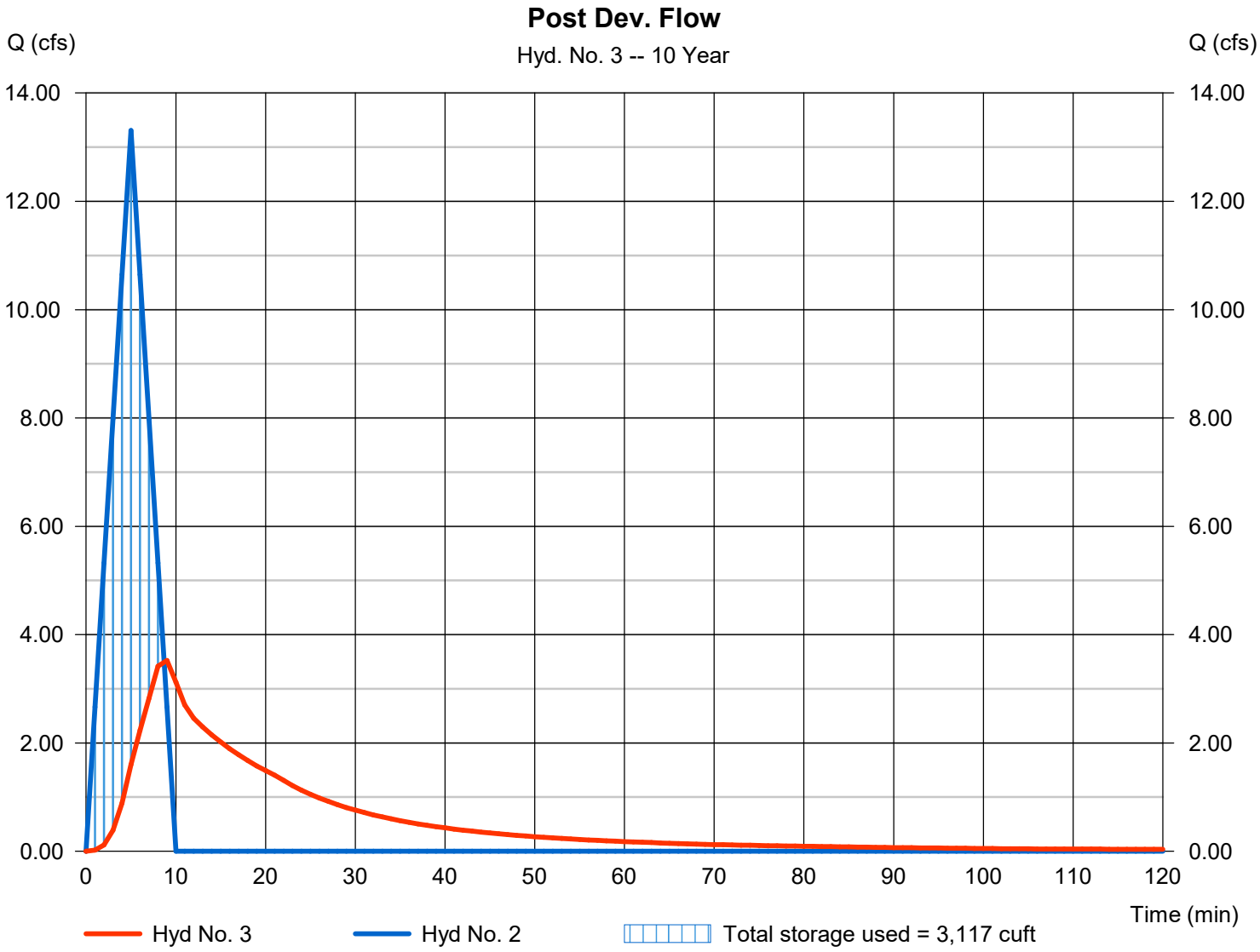
Hydrograph Report

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir	Peak discharge	=	3.523 cfs
Storm frequency	=	10 yrs	Time to peak	=	9 min
Time interval	=	1 min	Hyd. volume	=	3,988 cuft
Inflow hyd. No.	=	2 - Dev. Generated Flow	Max. Elevation	=	352.66 ft
Reservoir name	=	detention	Max. Storage	=	3,117 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

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	14.28	1	5	4,284	------	------	------	Pre-Development
2	Rational	15.27	1	5	4,581	------	------	------	Dev. Generated Flow
3	Reservoir	4.816	1	8	4,577	2	352.81	3,451	Post Dev. Flow

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	14.28 cfs
Storm frequency	=	25 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	4,284 cuft
Drainage area	=	2.120 ac	Runoff coeff.	=	0.72*
Intensity	=	9.356 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

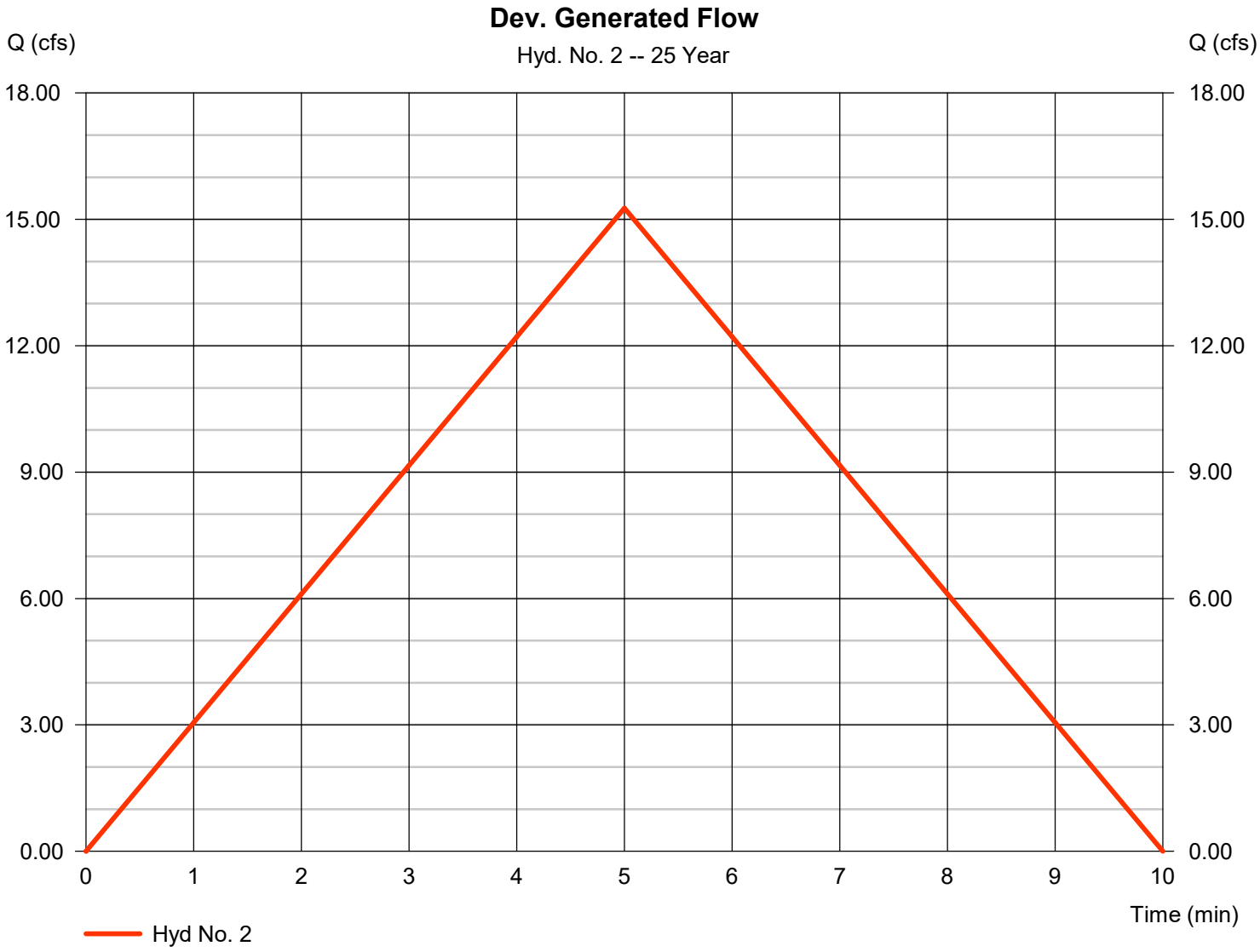
* Composite (Area/C) = [(11.990 x 0.44) + (4.630 x 0.90)] / 2.120

Hydrograph Report

Hyd. No. 2

Dev. Generated Flow

Hydrograph type	=	Rational	Peak discharge	=	15.27 cfs
Storm frequency	=	25 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	4,581 cuft
Drainage area	=	2.040 ac	Runoff coeff.	=	0.8
Intensity	=	9.356 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1



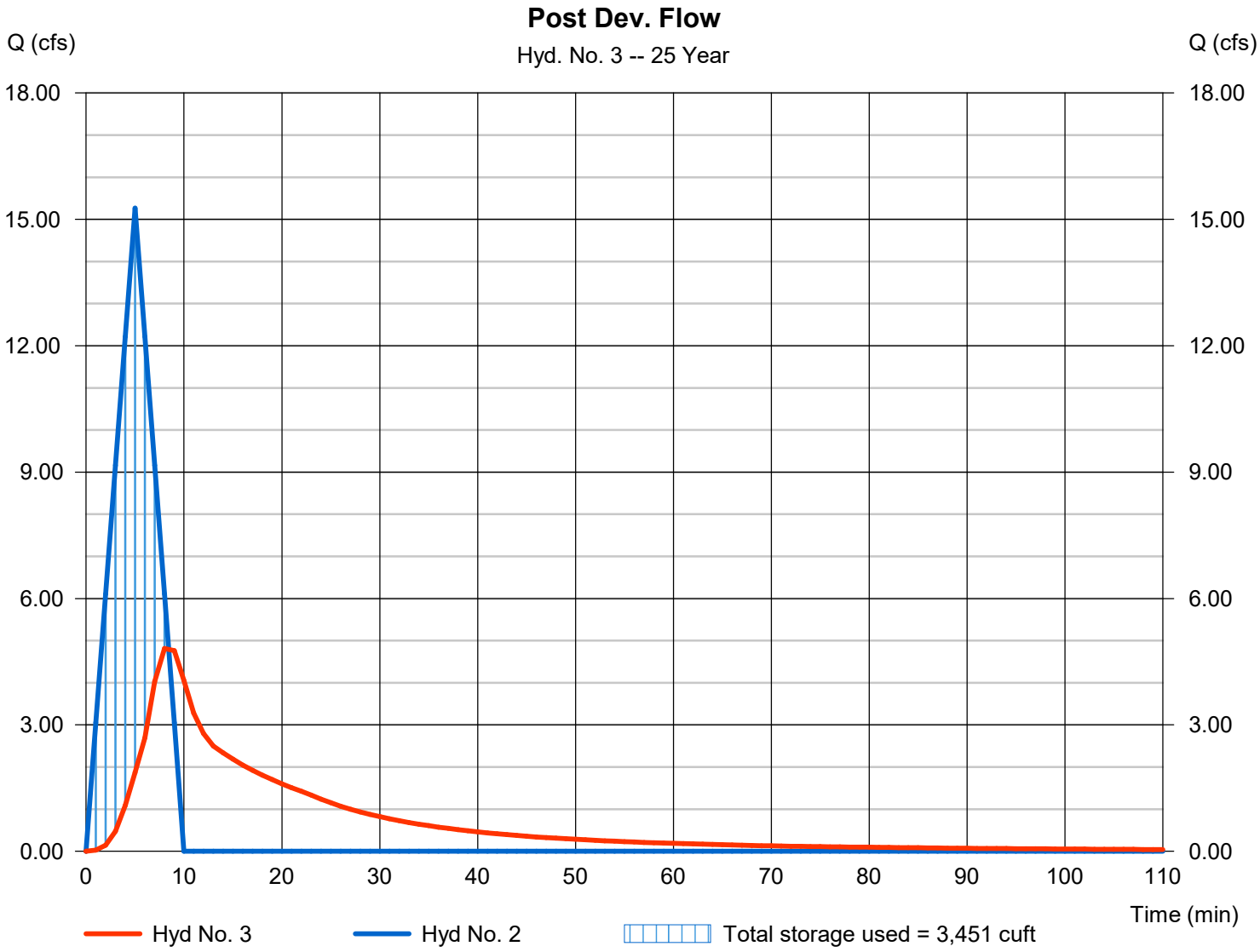
Hydrograph Report

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir	Peak discharge	=	4.816 cfs
Storm frequency	=	25 yrs	Time to peak	=	8 min
Time interval	=	1 min	Hyd. volume	=	4,577 cuft
Inflow hyd. No.	=	2 - Dev. Generated Flow	Max. Elevation	=	352.81 ft
Reservoir name	=	detention	Max. Storage	=	3,451 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

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	15.72	1	5	4,716	------	------	------	Pre-Development
2	Rational	16.81	1	5	5,043	------	------	------	Dev. Generated Flow
3	Reservoir	5.980	1	8	5,039	2	352.92	3,700	Post Dev. Flow

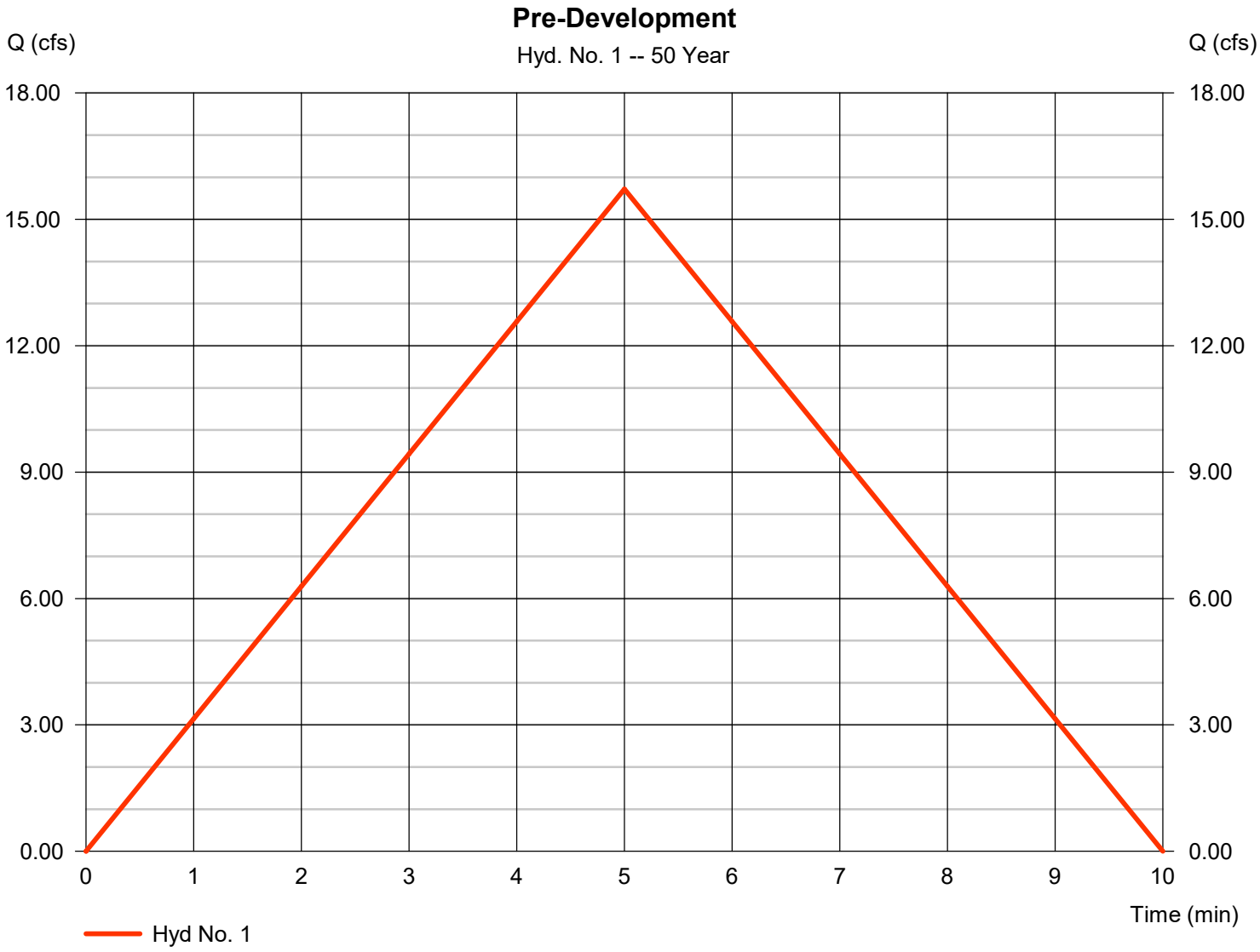
Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	15.72 cfs
Storm frequency	=	50 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	4,716 cuft
Drainage area	=	2.120 ac	Runoff coeff.	=	0.72*
Intensity	=	10.300 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(11.990 x 0.44) + (4.630 x 0.90)] / 2.120

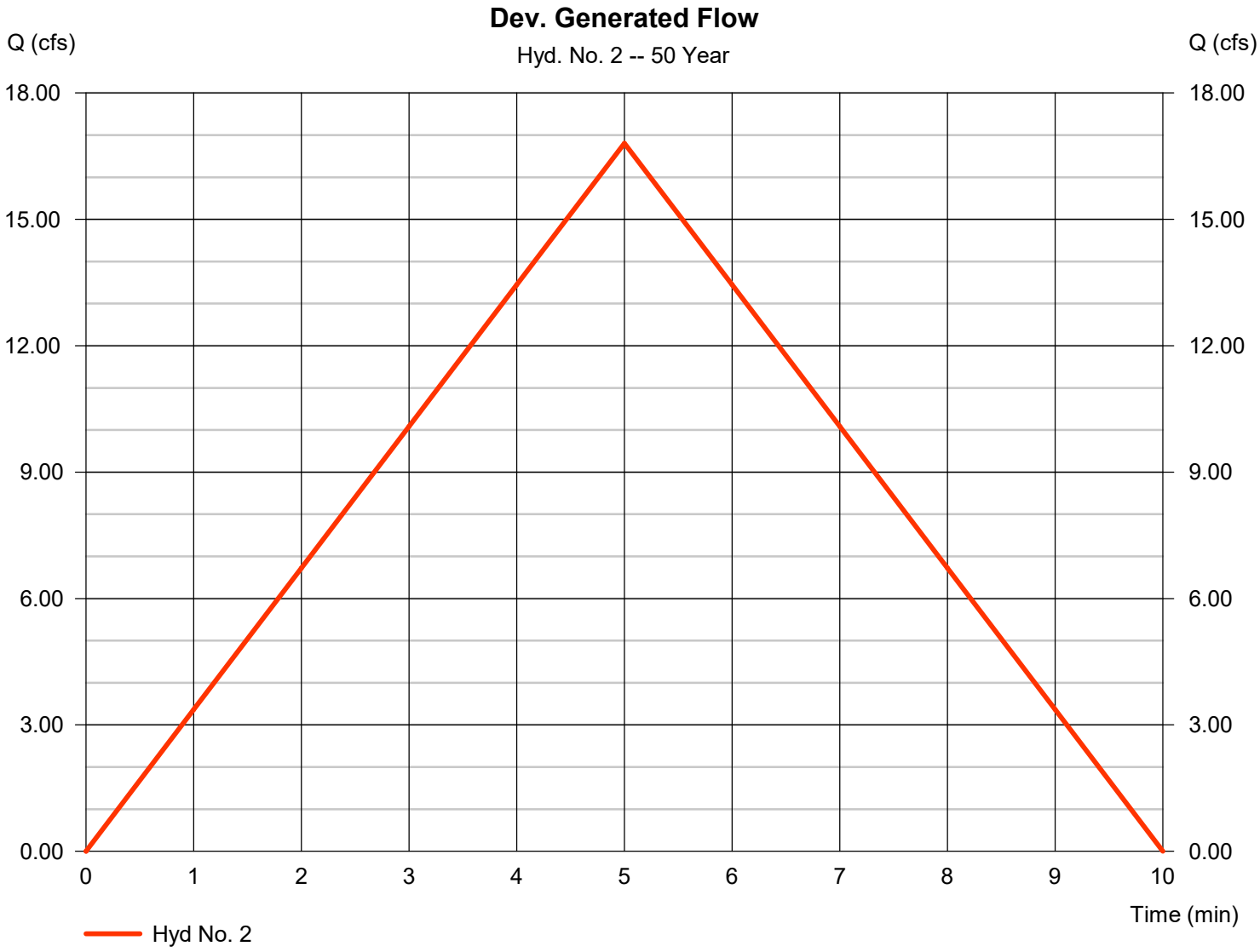


Hydrograph Report

Hyd. No. 2

Dev. Generated Flow

Hydrograph type	=	Rational	Peak discharge	=	16.81 cfs
Storm frequency	=	50 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	5,043 cuft
Drainage area	=	2.040 ac	Runoff coeff.	=	0.8
Intensity	=	10.300 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1



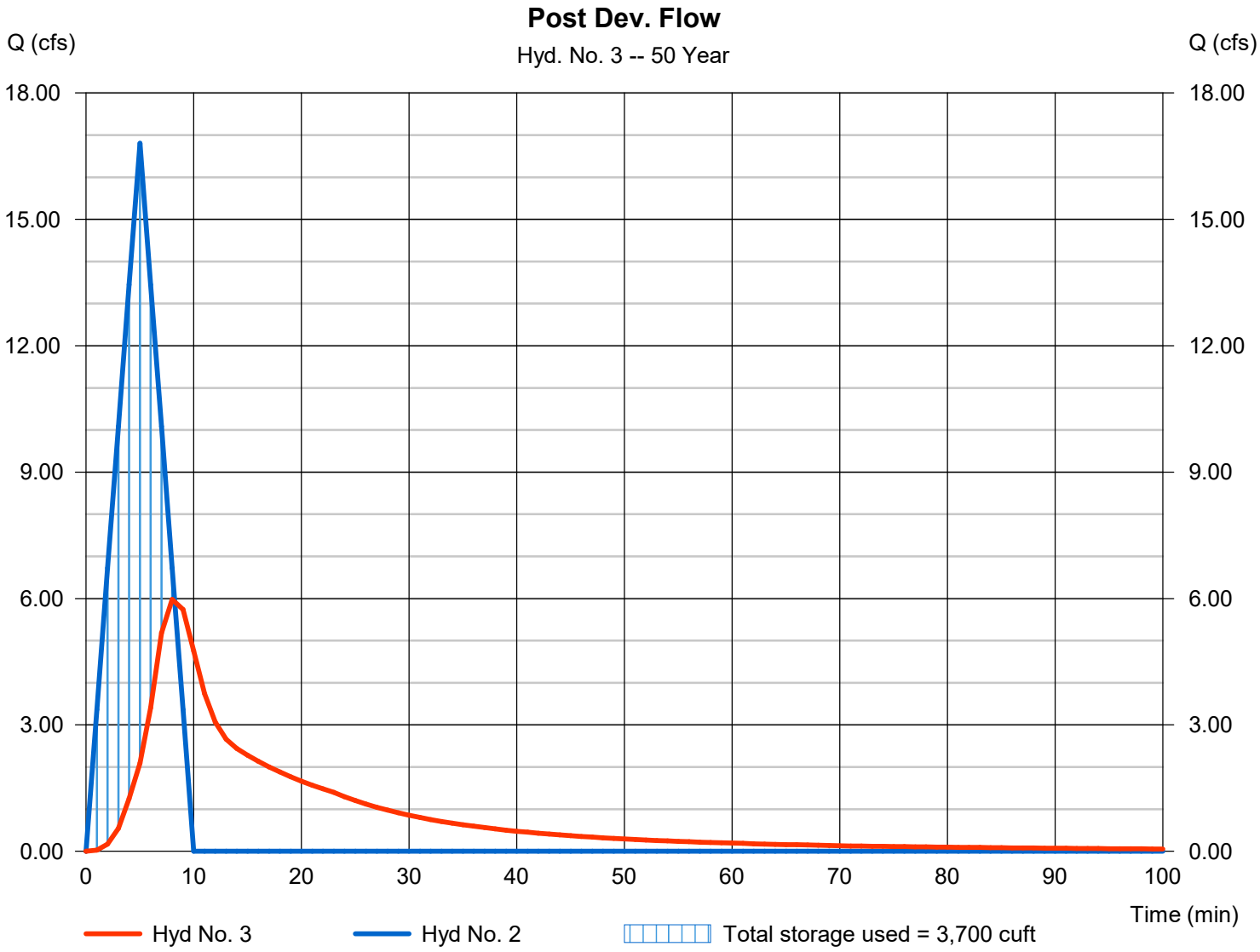
Hydrograph Report

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir	Peak discharge	=	5.980 cfs
Storm frequency	=	50 yrs	Time to peak	=	8 min
Time interval	=	1 min	Hyd. volume	=	5,039 cuft
Inflow hyd. No.	=	2 - Dev. Generated Flow	Max. Elevation	=	352.92 ft
Reservoir name	=	detention	Max. Storage	=	3,700 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

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	16.91	1	5	5,073	------	------	------	Pre-Development
2	Rational	18.08	1	5	5,424	------	------	------	Dev. Generated Flow
3	Reservoir	6.950	1	8	5,420	2	353.00	3,890	Post Dev. Flow

Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	Rational	Peak discharge	=	16.91 cfs
Storm frequency	=	100 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	5,073 cuft
Drainage area	=	2.120 ac	Runoff coeff.	=	0.72*
Intensity	=	11.078 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1

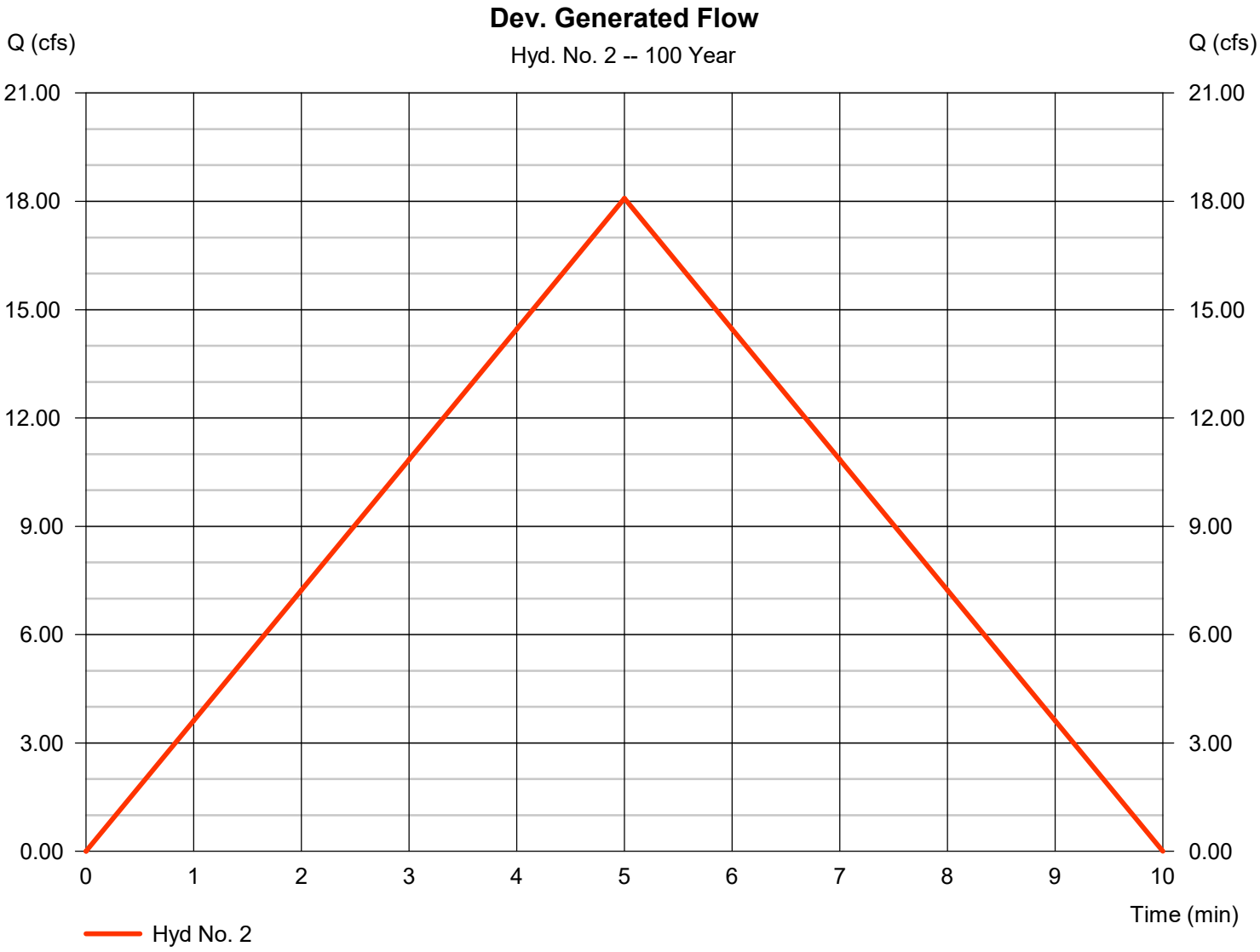
* Composite (Area/C) = [(11.990 x 0.44) + (4.630 x 0.90)] / 2.120

Hydrograph Report

Hyd. No. 2

Dev. Generated Flow

Hydrograph type	=	Rational	Peak discharge	=	18.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	5 min
Time interval	=	1 min	Hyd. volume	=	5,424 cuft
Drainage area	=	2.040 ac	Runoff coeff.	=	0.8
Intensity	=	11.078 in/hr	Tc by User	=	5.00 min
IDF Curve	=	BRYANT.IDF	Asc/Rec limb fact	=	1/1



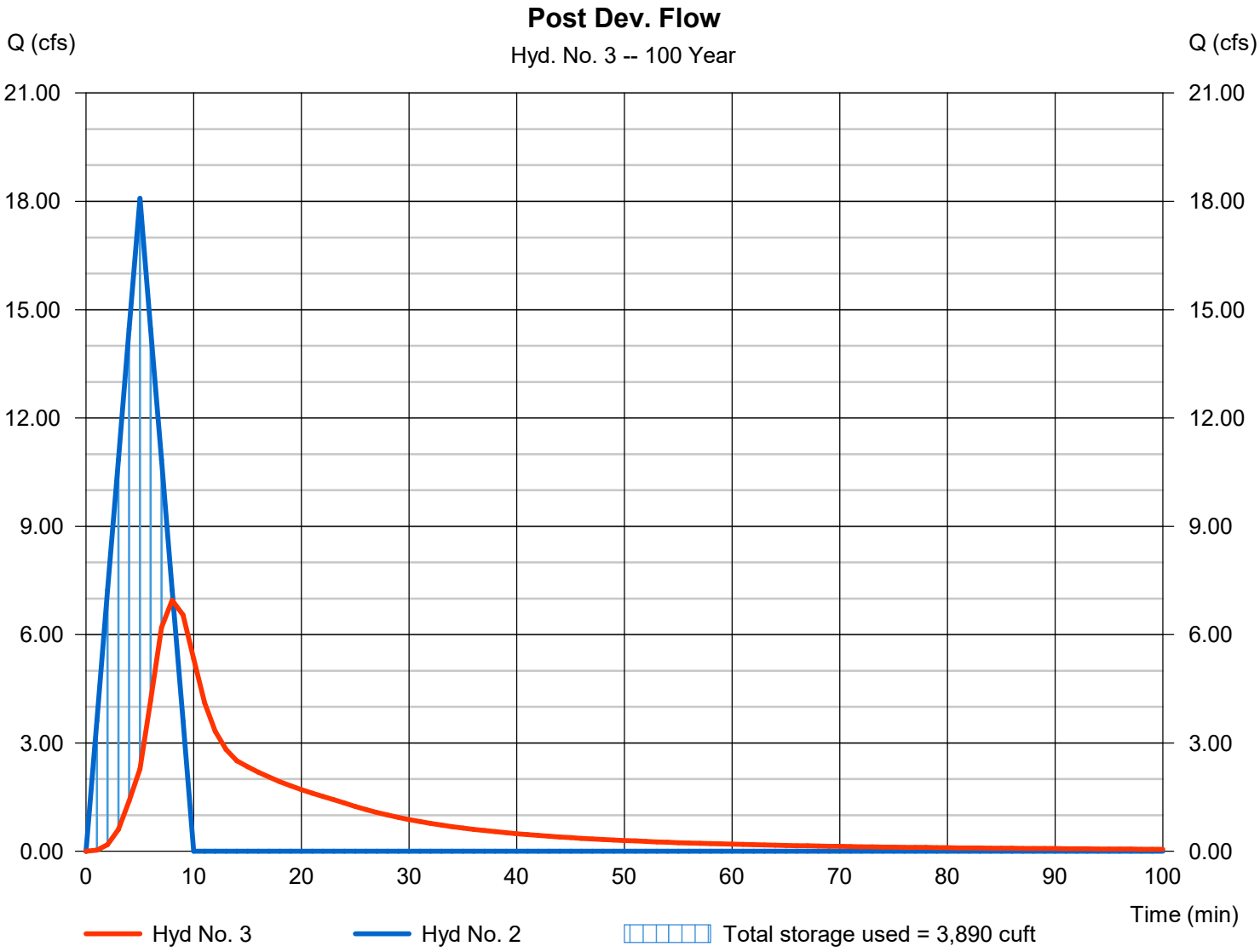
Hydrograph Report

Hyd. No. 3

Post Dev. Flow

Hydrograph type	=	Reservoir	Peak discharge	=	6.950 cfs
Storm frequency	=	100 yrs	Time to peak	=	8 min
Time interval	=	1 min	Hyd. volume	=	5,420 cuft
Inflow hyd. No.	=	2 - Dev. Generated Flow	Max. Elevation	=	353.00 ft
Reservoir name	=	detention	Max. Storage	=	3,890 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	23.7902	4.9000	0.6469	--------
2	29.4041	5.6000	0.6664	--------
3	0.0000	0.0000	0.0000	--------
5	34.6508	5.6000	0.6634	--------
10	39.6208	5.7000	0.6670	--------
25	45.2262	5.7000	0.6648	--------
50	46.6831	5.2000	0.6507	--------
100	48.6942	5.1000	0.6402	--------

File name: BRYANT.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	5.40	4.14	3.44	2.97	2.64	2.39	2.19	2.03	1.90	1.78	1.69	1.60
2	6.10	4.71	3.92	3.39	3.01	2.72	2.49	2.31	2.15	2.02	1.91	1.81
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	7.24	5.60	4.66	4.03	3.58	3.24	2.97	2.75	2.57	2.41	2.28	2.16
10	8.15	6.31	5.25	4.54	4.04	3.65	3.34	3.10	2.89	2.71	2.56	2.43
25	9.36	7.25	6.03	5.23	4.64	4.20	3.85	3.56	3.33	3.12	2.95	2.80
50	10.30	7.94	6.60	5.72	5.08	4.60	4.22	3.91	3.65	3.43	3.24	3.08
100	11.08	8.56	7.13	6.19	5.51	4.99	4.58	4.25	3.97	3.74	3.54	3.36

Tc = time in minutes. Values may exceed 60.

Precip. file name: C:\Documents and Settings\Will\Desktop\Fleming\fleming.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	3.50	0.00	0.00	4.80	5.40	0.00	6.70

NOAA Atlas 14, Volume 9, Version 2
Location name: Bryant, Arkansas, USA*
Latitude: 34.6406°, Longitude: -92.4706°
Elevation: 388 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.450** (0.363-0.553)	**0.510** (0.411-0.627)	**0.605** (0.486-0.745)	**0.681** (0.544-0.843)	**0.782** (0.603-0.990)	**0.858** (0.647-1.10)	**0.930** (0.679-1.22)	**1.00** (0.703-1.35)	**1.09** (0.738-1.51)	**1.16** (0.764-1.64)
10-min	**0.659** (0.532-0.809)	**0.746** (0.602-0.917)	**0.885** (0.711-1.09)	**0.997** (0.797-1.23)	**1.15** (0.883-1.45)	**1.26** (0.948-1.61)	**1.36** (0.995-1.79)	**1.47** (1.03-1.98)	**1.60** (1.08-2.22)	**1.69** (1.12-2.40)
15-min	**0.803** (0.648-0.987)	**0.910** (0.734-1.12)	**1.08** (0.867-1.33)	**1.22** (0.972-1.50)	**1.40** (1.08-1.77)	**1.53** (1.16-1.97)	**1.66** (1.21-2.18)	**1.79** (1.26-2.41)	**1.95** (1.32-2.70)	**2.06** (1.36-2.92)
30-min	**1.20** (0.966-1.47)	**1.36** (1.10-1.67)	**1.62** (1.30-2.00)	**1.83** (1.46-2.26)	**2.10** (1.62-2.66)	**2.30** (1.74-2.96)	**2.50** (1.82-3.28)	**2.68** (1.88-3.62)	**2.92** (1.97-4.05)	**3.09** (2.04-4.37)
60-min	**1.60** (1.29-1.97)	**1.81** (1.46-2.23)	**2.16** (1.73-2.66)	**2.43** (1.94-3.01)	**2.80** (2.16-3.55)	**3.08** (2.33-3.96)	**3.36** (2.45-4.42)	**3.63** (2.55-4.90)	**3.98** (2.69-5.52)	**4.23** (2.80-5.98)
2-hr	**2.01** (1.63-2.44)	**2.27** (1.84-2.77)	**2.69** (2.18-3.29)	**3.04** (2.45-3.73)	**3.51** (2.73-4.42)	**3.86** (2.94-4.94)	**4.22** (3.11-5.52)	**4.57** (3.23-6.14)	**5.03** (3.43-6.94)	**5.37** (3.57-7.55)
3-hr	**2.26** (1.85-2.74)	**2.55** (2.08-3.10)	**3.03** (2.47-3.69)	**3.43** (2.78-4.19)	**3.98** (3.12-5.01)	**4.41** (3.38-5.63)	**4.84** (3.59-6.32)	**5.28** (3.76-7.08)	**5.87** (4.02-8.08)	**6.31** (4.21-8.83)
6-hr	**2.71** (2.24-3.26)	**3.08** (2.54-3.71)	**3.70** (3.04-4.47)	**4.23** (3.46-5.13)	**4.99** (3.95-6.26)	**5.60** (4.33-7.10)	**6.22** (4.65-8.08)	**6.86** (4.92-9.16)	**7.75** (5.35-10.6)	**8.43** (5.67-11.7)
12-hr	**3.20** (2.66-3.81)	**3.68** (3.06-4.39)	**4.50** (3.73-5.39)	**5.23** (4.30-6.28)	**6.27** (5.02-7.83)	**7.12** (5.56-9.00)	**8.00** (6.03-10.4)	**8.93** (6.46-11.9)	**10.2** (7.11-14.0)	**11.2** (7.60-15.5)
24-hr	**3.74** (3.14-4.43)	**4.34** (3.64-5.14)	**5.36** (4.48-6.37)	**6.27** (5.21-7.48)	**7.60** (6.14-9.44)	**8.68** (6.84-10.9)	**9.83** (7.47-12.6)	**11.0** (8.05-14.6)	**12.7** (8.93-17.3)	**14.1** (9.59-19.3)
2-day	**4.38** (3.71-5.14)	**5.05** (4.27-5.94)	**6.22** (5.24-7.32)	**7.25** (6.07-8.57)	**8.76** (7.14-10.8)	**10.0** (7.94-12.5)	**11.3** (8.67-14.5)	**12.7** (9.34-16.7)	**14.7** (10.4-19.8)	**16.2** (11.1-22.1)
3-day	**4.80** (4.08-5.60)	**5.51** (4.69-6.45)	**6.75** (5.72-7.91)	**7.83** (6.60-9.22)	**9.42** (7.70-11.5)	**10.7** (8.54-13.3)	**12.1** (9.28-15.3)	**13.5** (9.95-17.6)	**15.5** (11.0-20.8)	**17.1** (11.7-23.2)
4-day	**5.12** (4.38-5.97)	**5.88** (5.02-6.85)	**7.17** (6.09-8.37)	**8.29** (7.01-9.73)	**9.91** (8.13-12.1)	**11.2** (8.98-13.9)	**12.6** (9.72-15.9)	**14.0** (10.4-18.3)	**16.0** (11.4-21.5)	**17.6** (12.2-23.9)
7-day	**5.94** (5.11-6.87)	**6.77** (5.82-7.83)	**8.16** (6.99-9.47)	**9.36** (7.97-10.9)	**11.1** (9.13-13.4)	**12.4** (10.0-15.2)	**13.9** (10.8-17.4)	**15.3** (11.4-19.8)	**17.3** (12.4-23.0)	**18.9** (13.1-25.5)
10-day	**6.72** (5.81-7.74)	**7.58** (6.55-8.74)	**9.03** (7.77-10.4)	**10.3** (8.77-11.9)	**12.0** (9.93-14.4)	**13.4** (10.8-16.3)	**14.8** (11.5-18.5)	**16.3** (12.1-20.9)	**18.3** (13.1-24.2)	**19.8** (13.8-26.6)
20-day	**9.11** (7.94-10.4)	**10.0** (8.75-11.5)	**11.6** (10.1-13.3)	**12.9** (11.1-14.8)	**14.7** (12.2-17.4)	**16.0** (13.1-19.3)	**17.4** (13.7-21.5)	**18.9** (14.2-24.0)	**20.7** (15.0-27.2)	**22.2** (15.6-29.6)
30-day	**11.1** (9.69-12.6)	**12.1** (10.6-13.8)	**13.9** (12.1-15.8)	**15.4** (13.3-17.6)	**17.3** (14.5-20.4)	**18.8** (15.4-22.5)	**20.3** (16.0-24.9)	**21.8** (16.4-27.5)	**23.7** (17.1-30.9)	**25.1** (17.7-33.4)
45-day	**13.4** (11.8-15.1)	**14.8** (13.0-16.7)	**17.0** (15.0-19.3)	**18.9** (16.4-21.5)	**21.3** (17.8-24.9)	**23.1** (18.9-27.4)	**24.8** (19.6-30.2)	**26.5** (20.0-33.3)	**28.7** (20.8-37.1)	**30.2** (21.4-40.0)
60-day	**15.3** (13.5-17.2)	**17.1** (15.1-19.2)	**19.9** (17.5-22.5)	**22.1** (19.4-25.1)	**25.1** (21.1-29.2)	**27.2** (22.4-32.2)	**29.3** (23.2-35.6)	**31.3** (23.7-39.2)	**33.8** (24.6-43.6)	**35.6** (25.2-47.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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