PRELIMINARY STORMWATER MANAGEMENT REPORT

for

STOKES ESTATE

Residential Development
Westtown Township
Chester County, Pennsylvania

April 29, 2021
Revised August 31, 2021

D.L. Howell Job# 3868

Prepared for:

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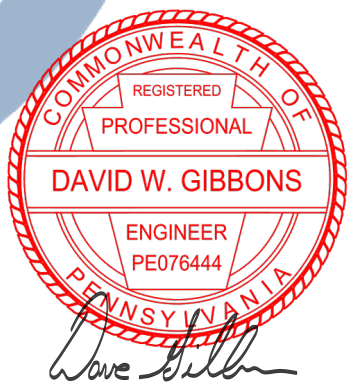

Prepared by:
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1.0 INTRODUCTION

This Stormwater Management Report presents the preliminary permanent control measures/facilities required to support construction activities for the Stokes Estate Residential Development . The 65 +/-acre tract is located in Westtown Township (Figure 1-1).

The proposed land development consists of constructing 68 residential dwelling units, access roads, stormwater management facilities, and public utilities. One access point to the parcel will be off Shiloh Road, with a second access through an existing right of way to Shiloh Hill Drive. The buildings and roads will be constructed to comply with design standards and safety requirements of the Townships and local Fire Marshals.

1.1 LAND USE

The existing land is currently utilized for agriculture, with a few hedgerows and mature trees scattered throughout, mostly along the existing driveway and near the existing residence and outbuildings. The site generally drains to two separate water bodies, where the southern portion of the property drains to an Unnamed Tributary to the East Branch of Chester Creek that flows through the property, and the eastern end of the site drains directly to the East Branch of Chester Creek, also on the property. Therefore, the entire site is located in the Chester Creek watershed. Per Pennsylvania Department of Environmental Protection, 25 Pa. Code, 93.9g "Water Quality Standards" Chester Creek is classified as Trout Stocking Fishery (TSF).

1.2 SITE SOILS

Site soils mapping provided by the United States Department of Agriculture Natural Resources Conservation Service – Web Soil Survey. According to the Web Soil Survey mapping, the following soil types are located within the project study area;

Baile Silt Loam (Ba)
Codorus Silt Loam (Co)
Gladstone Gravelly Loam (GdB) (GdC) (GfD)
Hatboro Silt Loam (Ha)
Manor Loam (MaD)
Urban land – Gladstone complex, 0 to 8 percent

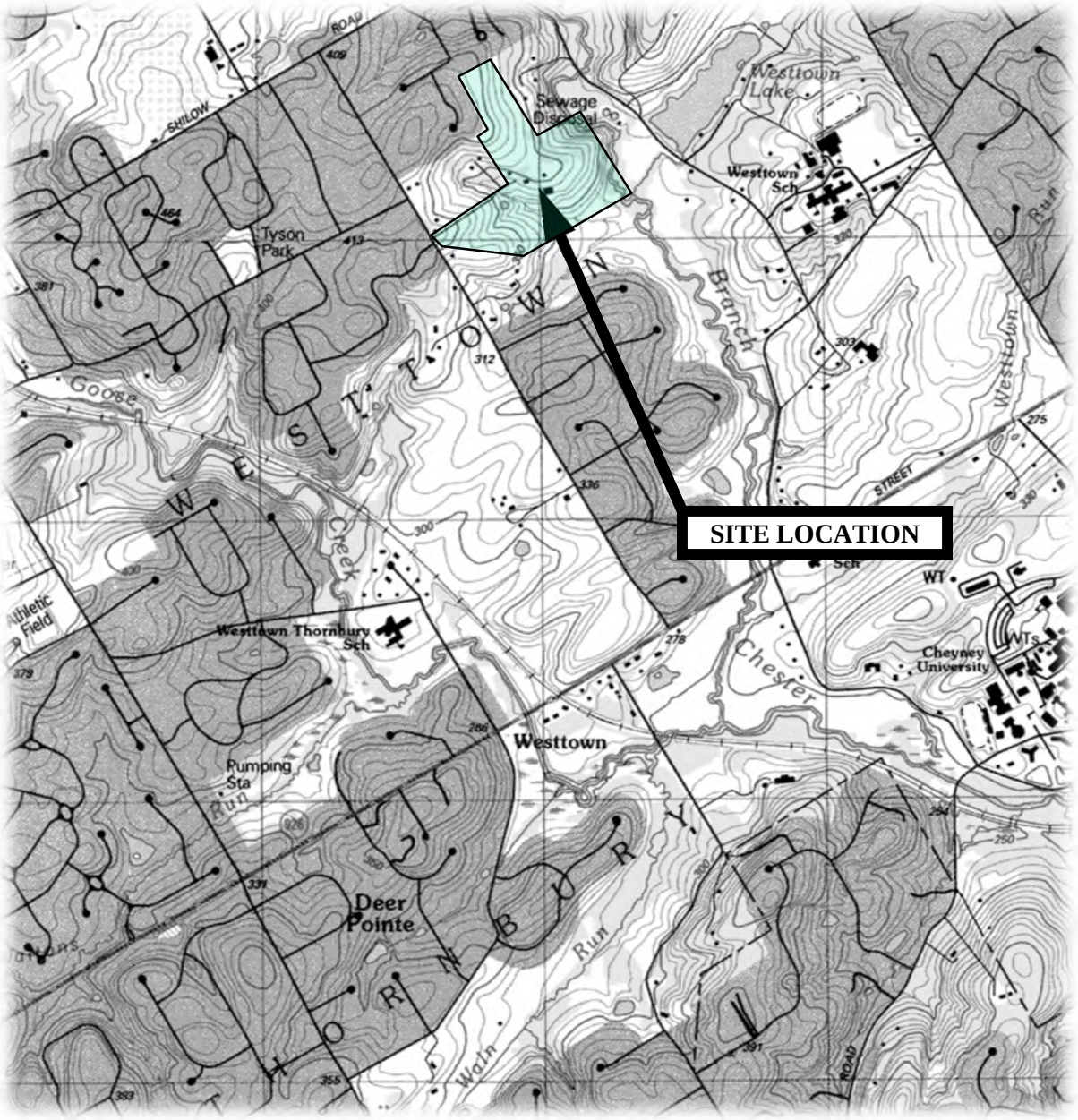
Refer to Appendix E for Soils Map and report.

1.3 SOIL/GEOLOGIC LIMITATIONS:

Some groundwater and rock were encountered in a few locations during infiltration testing. D.L. Howell has taken into consideration these known soil limitations when designing the infiltration BMPs for the project. The stormwater infiltration facilities have either been relocated to areas where limiting areas weren't encountered or has been set a minimum of 2 feet higher than any prohibitive soil limitation elevations witnessed during infiltration testing and adequate infiltration results have been achieved at the adjusted elevations.

If during construction, any other unknown soil limitation (i.e. bedrock or high water) is discovered the contractor is responsible for immediately contacting the site geo-technical engineer, design engineer, conservation district and the township engineer for an appropriate solution. The site design drawings contain a pumped water filter bag detail which should be utilized if any excavations need to be dewatered due to high groundwater or excessive rainfall.

Geologic formations/soil conditions that may have the potential to cause pollution:
Furthermore, there are no known geologic formations or soil conditions that have the potential to cause pollution during earth disturbance activities. If during construction, an unknown geologic formations or soil conditions is discovered the contractor is responsible for immediately contacting the Chester County Conservation District and the design engineer.



Source:
United States Department of the Interior Geological Survey
7.5 Minute Series (Topographic) Map
West Chester, Pennsylvania Quadrangle
Scale 1:24000

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Stokes Estate

Westtown Township
Chester County, Pennsylvania

Figure Number:
FIGURE 1-1

Title:
SITE LOCATION MAP

2.0 RUNOFF MANAGEMENT

The purpose of the stormwater management design is to quantify and control stormwater runoff generated by the modifications of the ground surface conditions to the site (i.e. roads, buildings, driveways, etc.). Post-development stormwater management is achieved at the site through three combination surface infiltration basins strategically located throughout the site to control runoff.

The infiltration basins have been designed utilizing Soil Conservation Service (SCS) method for infiltration and peak flow requirements and Westttown Township regulations for peak flow calculations (See Appendices for worksheets). The stormwater management control for this project was designed to include all impervious surfaces associated with this subdivision application, with an assumption of 3,800 SF of impervious coverage per single family lot. These systems are designed to provide an overall reduction in the post-developed runoff for the 2-year, 10-year, 25-year, 50-year, and 100-year, 24-hour storm event to less than 50% of the pre-development runoff rates for the equivalent storm events based on the Chester Creek Watershed Release Rate Map. A stormwater conveyance system will be utilized to convey runoff from the proposed improvements to the proposed stormwater facilities. The stormwater conveyance system will be designed to convey flows up to the 100-year storm event. Flows to the pipes will be generated using the Universal Rational Method and the pipes sized using Manning's Method and Hydraulic Grade Line calculations will also be provided. The infiltration basins have been designed and sized to fully infiltrate the increase in volume, pre to post-development for the 2-year storm as required by the NPDES Phase II regulations.

3.0 NPDES STORMWATER COMPLIANCE

As stated above, the infiltration facilities have been designed and sized to fully infiltrate the 2-year increase in volume; therefore the NPDES Phase II infiltration requirement has been met. Furthermore, as described above, the infiltration basins have been designed to incorporate Pennsylvania Department of Environmental Protection's infiltration guidelines, as stated in Appendix C of the Pennsylvania Stormwater Best Management Practices Manual dated December 2006. The stormwater management systems have been designed to maximize infiltration best management practice (BMP) technologies and minimize point source discharges. This plan will further act to perform/provide the following:

- Preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving stream by utilizing several BMPs to handle the increase in runoff and volume prior to reaching the stream.
- Prevent an increase in the rate of stormwater runoff by utilizing BMPs to reduce the peak flow rate of all storm events up to the 100 year to below the equivalent storm in the pre developed condition.
- Minimize any increase in stormwater runoff volume by utilizing infiltration BMPs which are designed and sized to fully infiltrate the 2-year increase in volume.
- Minimize impervious areas
- Maximize the protection of existing drainage features and existing vegetation by capturing stormwater runoff from the proposed impervious areas then conveying the flow to stormwater BMPs facilities prior to any release to the existing stream, thereby protecting it from any sediment.
- Minimize land clearing and grading by protecting and preserving the majority of the existing woodlands, and natural areas.
- Minimize soil compaction by specifying the installation of orange construction fencing to protect the areas of the proposed infiltration BMPs.
- Utilize other structural or nonstructural BMPs that prevent or minimize changes in stormwater runoff. The structural BMPs are infiltration beds, and water quality filters, while the non-

structural BMPs are protecting existing riparian buffers, minimizing total disturbed area, and protecting sensitive features.

D.L. Howell & Associates, Inc. has designed Best management Practices (BMP's) consistent with Chapter 6 of the PA Stormwater Best Management Practices Manual within the stormwater collection and conveyance system in addition to infiltrating the net increase in volume from pre to post-development for the 2-year storm event.

The applicant has been able to demonstrate compliance with 102.8(b), through the use of infiltration.

Permanent BMP's proposed for the developed site are as follows:

- Vegetated Swales
- Infiltration Basins
- Forebays
- Level Spreaders

4.0 CONCLUSIONS

D.L. Howell & Associates, Inc. has completed a preliminary stormwater engineering design for the proposed project in Westtown Township, Chester County, Pennsylvania. Using site-specific topography, soils, land cover, hydrologic data, and Township Ordinances, D.L. Howell & Associates, Inc. designed the stormwater management system for the proposed facilities. The objective of the stormwater design was to develop site-specific stormwater management structures that reduced post-development runoff to pre-development runoff rates and provided volumetric storage per PADEP NPDES Phase II requirements. Post-development stormwater management is achieved through a stormwater collection system consisting of curbed inlets, swales, catch basins, and stormwater infiltration basins/beds.

APPENDIX A

STORMWATER VOLUME CALCULATIONS

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CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

Worksheet 4, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Drainage Area: DP001 Chester Creek
2-Year Rainfall: 3.2 **in**

Total Site Area: _____ **acres**
Protected Site Area: _____ **acres**
Managed Area: 13.67 **acres**

Existing Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland	**A**		0.00	25	30.0000	6.0000	0.29	
Meadow	**A**		0.00	30	23.3333	4.6667	0.10	
Impervious	**A**		0.00	98	0.20	0.04	2.97	
Woodland	**B**		0.00	55	8.1818	1.6364	0.25	
Meadow	**B**	672,131	15.43	58	7.2414	1.4483	0.34	19,111
Meadow (20% Imperv)	**B**		0.00	58	7.2414	1.4483	0.34	
Impervious (80%)	**B**		0.00	98	0.2041	0.0408	2.97	
Woodland	**C**		0.00	70	4.2857	0.8571	0.83	
Meadow	**C**		0.00	71	4.0845	0.8169	0.88	
Impervious	**C**		0.00	98	0.2041	0.0408	2.97	
Woodland	**D**		0.00	77	2.9870	0.5974	1.21	
Meadow	**D**		0.00	78	2.8205	0.5641	1.27	
Impervious	**D**		0.00	98	0.2041	0.0408	2.97	
TOTAL:		**672,131**	**15.43**					**19,111**

Developed Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Lawn	**B**	323,952	7.44	61	6.3934	1.2787	0.44	11,985
Impervious	**N/A**	153,121	3.52	98	0.2041	0.0408	2.97	37,865
Meadow	**B**	118,483	2.72	58	7.2414	1.4483	0.34	3,369
			0.00					
			0.00					
			0.00					
			0.00					
			0.00					
TOTAL:		**595,556**	**13.67**					**53,220**

2-Year Volume Increase (ft^3):	**34,108**

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)2 / (P + 08.S)
   P = 2-Year Rainfall (in)
   S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land Use Area (Sq. Ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

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CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

Worksheet 4, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Rustin Residential
Drainage Area: DP002 UNT Chester Creek
2-Year Rainfall: 3.2 **in**

Total Site Area: _____ **acres**
Protected Site Area: _____ **acres**
Managed Area: 20.97 **acres**

Existing Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland	**A**		0.00	25	30.0000	6.0000	0.29	
Meadow	**A**		0.00	30	23.3333	4.6667	0.10	
Impervious	**A**		0.00	98	0.20	0.04	2.97	
Woodland	**B**		0.00	55	8.1818	1.6364	0.25	
Meadow	**B**	745,375	17.11	58	7.2414	1.4483	0.34	21,194
Meadow (20% Imperv)	**B**		0.00	58	7.2414	1.4483	0.34	
Impervious (80%)	**B**		0.00	98	0.2041	0.0408	2.97	
Woodland	**C**		0.00	70	4.2857	0.8571	0.83	
Meadow	**C**	91,390	2.10	71	4.0845	0.8169	0.88	6,687
Impervious	**C**		0.00	98	0.2041	0.0408	2.97	
Woodland	**D**		0.00	77	2.9870	0.5974	1.21	
Meadow	**D**		0.00	78	2.8205	0.5641	1.27	
Impervious	**D**		0.00	98	0.2041	0.0408	2.97	
TOTAL:		**836,765**	**19.21**					**27,882**

Developed Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Lawn	**C**	75,360	1.73	74	3.5135	0.7027	1.04	6,516
Lawn	**B**	563,811	12.94	61	6.3934	1.2787	0.44	20,859
Impervious	**N/A**	274,153	6.29	98	0.2041	0.0408	2.97	67,795
			0.00					
			0.00					
			0.00					
			0.00					
			0.00					
			0.00					
TOTAL:		**913,324**	**20.97**					**95,170**

2-Year Volume Increase (ft^3):	**67,289**

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)2 / (P + 08.S)
   P = 2-Year Rainfall (in)
   S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land Use Area (Sq. Ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

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STRUCTURAL BMP VOLUME CREDITS

Worksheet 5, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Sub-Basin Chester Creek DP001

Required Control Volume	34,108	**Cubic Feet**
Non-Structural Volume Credit	0	**Cubic Feet**
Structure Volume Requirement	34,108	**Cubic Feet**

Section	Proposed BMP	Area (sf)	Storage Volume (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		34,460
6.4.3	Infltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well/Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Infiltration Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-Use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond/Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
	Other		
		0	**34,460**

Total Structural Volume (cf)	**34,460**
Structural Volume Requirement (cf)	**34,108**
DIFFERENCE	**352**

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STRUCTURAL BMP VOLUME CREDITS

Worksheet 5, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Sub-Basin UNT Chester Creek DP002

Required Control Volume	67,289	**Cubic Feet**
Non-Structural Volume Credit	0	**Cubic Feet**
Structure Volume Requirement	67,289	**Cubic Feet**

Section	Proposed BMP	Area (sf)	Storage Volume (ft^3)
6.4.2	Infiltration Basin 1 Upper		30,500
6.4.2	Infiltration Basin 1 Lower		3,754
6.4.2	Infiltration Basin 2		33,072
6.4.3	Infltration Bed(s)		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well/Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Infiltration Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-Use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond/Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
	Other		
		0	**67,326**

Total Structural Volume (cf)	**67,326**
Structural Volume Requirement (cf)	**67,289**
DIFFERENCE	**37**

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INFILTRATION VOLUME CALCULATION
Basin 1 Upper

PROJECT NAME: ***Stokes Estate***
LOCATION: ***Westtown Township***
PREPARED BY: ***DWG*** DATE: ***3/30/2021***
CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
314.00	**7,537**				**0**
		9,223	**2.00**	**18445**	
316.00	**10,908**				**18,445**
		13,394	**2.00**	**26788**	
318.00	**15,880**				**45,233**
		19,412	**2.00**	**38823**	
320.00	**22,943**				**84,056**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
316.00	18,445
316.90	***30,500***
318.00	45,233

Volume = 30,500 CF

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INFILTRATION VOLUME CALCULATION
Basin 1 Lower

PROJECT NAME: ***Stokes Estate***
LOCATION: ***Westtown Township***
PREPARED BY: ***DWG*** DATE: ***3/30/2021***
CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
298.00	**3,320**				**0**
		4,336	**2.00**	**8672**	
300.00	**5,352**				**8,672**
		7,856	**2.00**	**15711**	
302.00	**10,359**				**24,383**
		14,651	**2.00**	**29301**	
304.00	**18,942**				**53,684**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
298.00	0
299.50	***6,504***
300.00	8,672

Volume = 6,504 CF

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INFILTRATION VOLUME CALCULATION
Basin 2

PROJECT NAME: ***Stokes Estate***
LOCATION: ***Westtown Township***
PREPARED BY: ***DWG*** DATE: ***3/30/2021***
CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
304.00	**8,255**				**0**
		10,349	**2.00**	**20698**	
306.00	**12,443**				**20,698**
		14,558	**2.00**	**29116**	
308.00	**16,673**				**49,814**
		18,892	**2.00**	**37783**	
310.00	**21,110**				**87,597**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
306.00	20,698
306.85	***33,072***
308.00	49,814

Volume = 33,072 CF

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INFILTRATION VOLUME CALCULATION
Basin 3

PROJECT NAME: ***Stokes Estate***
LOCATION: ***Westtown Township***
PREPARED BY: ***DWG*** DATE: ***3/30/2021***
CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
312.00	**6,536**				**0**
		8,811	**2.00**	**17622**	
314.00	**11,086**				**17,622**
		13,471	**2.00**	**26941**	
316.00	**15,855**				**44,563**
		18,020	**2.00**	**36039**	
318.00	**20,184**				**80,602**
		21,592	**1.00**	**21592**	
319.00	**23,000**				**102,194**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
314.00	17,622
315.25	***34,460***
316.00	44,563

Volume = 34,460 CF

APPENDIX B

TOWNSHIP POST DEVELOPMENT

FLOW REDUCTION SUMMARIES

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Stormwater Summary
Peak Flow Reduction Requirements

DATE: 4/30/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: Stormwater Summary DP001 Chester Creek

				% Reduction
1-year	Pre-Developed	1.30 cfs	*Hydrograph 1*	54%
1-year	Post-Developed	0.60 cfs	*Hydrograph 7*	
2-year	Pre-Developed	4.32 cfs	*Hydrograph 1*	72%
2-year	Post-Developed	1.19 cfs	*Hydrograph 7*	
5-year	Pre-Developed	12.58 cfs	*Hydrograph 1*	81%
5-year	Post-Developed	2.39 cfs	*Hydrograph 7*	
10-year	Pre-Developed	20.75 cfs	*Hydrograph 1*	83%
10-year	Post-Developed	3.47 cfs	*Hydrograph 7*	
25-year	Pre-Developed	33.98 cfs	*Hydrograph 1*	83%
25-year	Post-Developed	5.72 cfs	*Hydrograph 7*	
50-year	Pre-Developed	46.28 cfs	*Hydrograph 1*	57%
50-year	Post-Developed	19.70 cfs	*Hydrograph 7*	
100-year	Pre-Developed	60.31 cfs	*Hydrograph 1*	52%
100-year	Post-Developed	28.93 cfs	*Hydrograph 7*	

CHESTER CREEK 0.50 RELEASE RATE AREA

Post Developed 2 Year Flow =	**1.19**	**cfs**	SATISFIED
Pre Developed 1 Year Flow =	**1.30**	**cfs**	
Post Developed 5 Year Flow =	**2.39**	**cfs**	SATISFIED
50% Pre Developed 5 Year Flow =	**6.29**	**cfs**	
Post Developed 10 Year Flow =	**3.47**	**cfs**	SATISFIED
50% Pre Developed 10 Year Flow =	**10.38**	**cfs**	
Post Developed 25 Year Flow =	**5.72**	**cfs**	SATISFIED
50% Pre Developed 25 Year Flow =	**16.99**	**cfs**	
Post Developed 50 Year Flow =	**19.70**	**cfs**	SATISFIED
50% Pre Developed 50Year Flow =	**23.14**	**cfs**	
Post Developed 100 Year Flow =	**28.93**	**cfs**	SATISFIED
50% Pre Developed 100 Year Flow =	**30.16**	**cfs**	

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Stormwater Summary
Peak Flow Reduction Requirements

DATE: 4/30/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: Stormwater Summary DP002 UNT Chester Creek

				% Reduction
1-year	Pre-Developed	2.47 cfs	*Hydrograph 2*	83%
1-year	Post-Developed	0.42 cfs	*Hydrograph 15*	
2-year	Pre-Developed	6.85 cfs	*Hydrograph 2*	86%
2-year	Post-Developed	0.96 cfs	*Hydrograph 15*	
5-year	Pre-Developed	18.02 cfs	*Hydrograph 2*	88%
5-year	Post-Developed	2.12 cfs	*Hydrograph 15*	
10-year	Pre-Developed	28.64 cfs	*Hydrograph 2*	89%
10-year	Post-Developed	3.17 cfs	*Hydrograph 15*	
25-year	Pre-Developed	45.70 cfs	*Hydrograph 2*	84%
25-year	Post-Developed	7.47 cfs	*Hydrograph 15*	
50-year	Pre-Developed	46.28 cfs	*Hydrograph 2*	52%
50-year	Post-Developed	22.07 cfs	*Hydrograph 15*	
100-year	Pre-Developed	79.34 cfs	*Hydrograph 2*	50%
100-year	Post-Developed	39.37 cfs	*Hydrograph 15*	

CHESTER CREEK 0.50 RELEASE RATE AREA

Post Developed 2 Year Flow =	**0.96**	**cfs**	SATISFIED
Pre Developed 1 Year Flow =	**2.47**	**cfs**	
Post Developed 5 Year Flow =	**2.12**	**cfs**	SATISFIED
50% Pre Developed 5 Year Flow =	**9.01**	**cfs**	
Post Developed 10 Year Flow =	**3.17**	**cfs**	SATISFIED
50% Pre Developed 10 Year Flow =	**14.32**	**cfs**	
Post Developed 25 Year Flow =	**7.47**	**cfs**	SATISFIED
50% Pre Developed 25 Year Flow =	**22.85**	**cfs**	
Post Developed 50 Year Flow =	**22.07**	**cfs**	SATISFIED
50% Pre Developed 50Year Flow =	**23.14**	**cfs**	
Post Developed 100 Year Flow =	**39.37**	**cfs**	SATISFIED
50% Pre Developed 100 Year Flow =	**39.67**	**cfs**	

APPENDIX C

SCS METHOD CURVE NUMBER (CN) CALCULATIONS

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: PREDEVELOPED AREA CHESTER CREEK DP001

Total Area: 15.43 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	15.43	894.94	
	Loam	B	Woods	Good	55	0.00	0.00	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Woods	Good	70	0.00	0.00	
					Total Area	15.43	894.94	

Weighted Soil Complex Number = 894.9 / 15.4 = 58.0

**SEE HYDRAFLOW REPORT FOR TIME OF CONCENTRATION*

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: PREDEVELOPED AREA UNT CHESTER CREEK DP002

Total Area: 19.21 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	17.11	992.38	
	Loam	B	Woods	Good	55	0.00	0.00	
Ba	Baile Silt	C	Meadow	Good	71	2.10	149.10	
	Loam	C	Woods	Good	70	0.00	0.00	
					Total Area	19.21	1141.48	

Weighted Soil Complex Number = 1141.5 / 19.2 = 59.4

**SEE HYDRAFLOW REPORT FOR TIME OF CONCENTRATION*

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 3

Total Area: 12.15 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	2.47	143.26	
	Loam	B	Lawn	Good	61	6.25	381.38	
		N/A	Impervious	N/A	98	3.43	335.94	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.00	0.00	
					Total Area	12.15	860.57	

Weighted Soil Complex Number = 860.6 / 12.2 = 70.8

ASSUMES 5 MINUTE TIME OF CONCENTRATION

DLHowell
Civil Engineering & Land Planning
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SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BYPASS DP002

Total Area: 1.49 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	1.40	85.40	
		N/A	Impervious	N/A	98	0.09	8.55	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.00	0.00	
					Total Area	1.49	93.95	

Weighted Soil Complex Number: 93.9 / 1.5 = 63.2

ASSUMES 5 MINUTE TIME OF CONCENTRATION

DLHowell
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SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 1

Total Area: 10.95 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	7.57	461.77	
		N/A	Impervious	N/A	98	3.08	301.86	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.30	22.20	
					Total Area	10.95	785.83	

Weighted Soil Complex Number: 785.8 / 11.0 = 71.8

ASSUMES 5 MINUTE TIME OF CONCENTRATION

DLHowell
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SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 2

Total Area: 8.54 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	4.41	269.01	
		N/A	Impervious	N/A	98	3.23	316.23	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.90	66.60	
					Total Area	8.54	651.84	

Weighted Soil Complex Number = 651.8 / 8.5 = 76.4

ASSUMES 5 MINUTE TIME OF CONCENTRATION

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BYPASS DP002

Total Area: 1.54 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	1.54	93.94	
		N/A	Impervious	N/A	98	0.00	0.00	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.00	0.00	
					Total Area	1.54	93.94	

Weighted Soil Complex Number: 93.9 / 1.5 = 61.0

ASSUMES 5 MINUTE TIME OF CONCENTRATION

APPENDIX D

HYDRAFLOW HYDROGRAPH REPORTS

Hydraflow Table of Contents

SWM.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 09 / 1 / 2021

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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	SCS Runoff	------	1.295	4.322	-------	12.58	20.75	33.98	46.28	60.31	Pre Developed DP001
2	SCS Runoff	------	2.474	6.847	-------	18.02	28.64	45.70	61.46	79.34	Pre Developed DP002
4	SCS Runoff	------	11.58	17.70	-------	29.68	39.83	55.13	68.94	84.16	Post Basin 3
5	Reservoir	4	0.000	0.060	-------	0.729	1.627	5.027	17.74	26.51	Basin 3 Routed
6	SCS Runoff	------	0.603	1.185	-------	2.394	3.466	5.139	6.648	8.332	Post Bypass DP001
7	Combine	5, 6	0.603	1.185	-------	2.394	3.466	5.719	19.70	28.93	Post Total DP001
9	SCS Runoff	------	11.30	16.97	-------	28.01	37.29	51.31	63.94	77.75	Post Basin 1
10	Reservoir	9	0.000	0.198	-------	0.923	2.423	11.78	29.32	41.09	Basin 1 Upper Routed
11	Reservoir	10	0.000	0.000	-------	0.688	1.433	2.629	6.885	15.55	Basin 1 Lower Routed
12	SCS Runoff	------	12.13	17.09	-------	26.44	34.26	46.02	56.20	67.22	Post Basin 2
13	Reservoir	12	0.000	0.120	-------	0.682	1.706	5.509	18.98	33.12	Basin 2 Routed
14	SCS Runoff	------	0.417	0.956	-------	2.121	3.170	4.826	6.335	8.028	Post Bypass DP002
15	Combine	11, 13, 14	0.417	0.956	-------	2.121	3.170	7.474	22.07	39.37	Post Total DP002

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

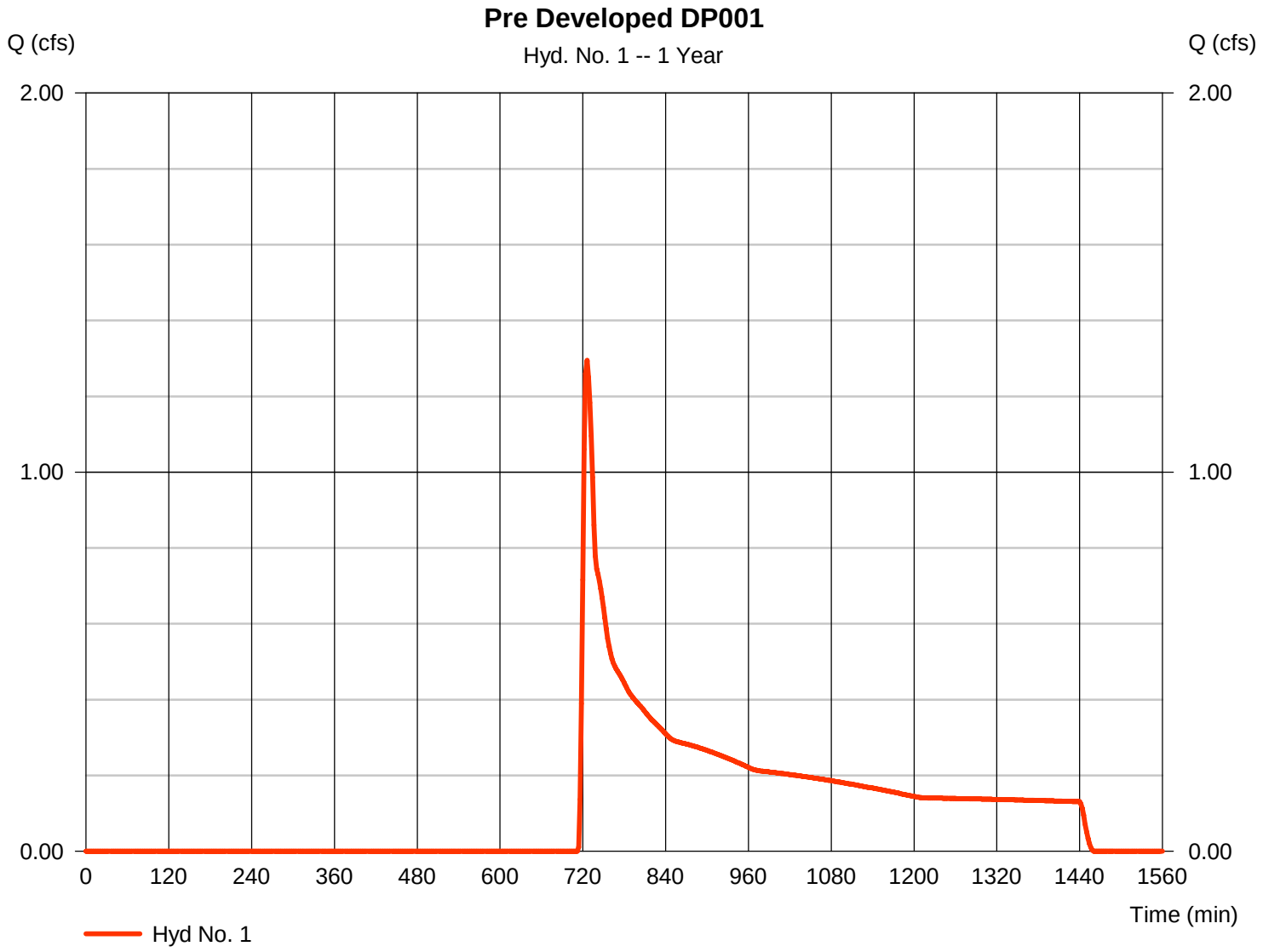
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.295	2	726	10,628	------	------	------	Pre Developed DP001
2	SCS Runoff	2.474	2	724	15,638	------	------	------	Pre Developed DP002
4	SCS Runoff	11.58	2	718	24,233	------	------	------	Post Basin 3
5	Reservoir	0.000	2	n/a	0	4	314.49	24,233	Basin 3 Routed
6	SCS Runoff	0.603	2	718	1,625	------	------	------	Post Bypass DP001
7	Combine	0.603	2	718	1,625	5, 6	------	------	Post Total DP001
9	SCS Runoff	11.30	2	718	23,379	------	------	------	Post Basin 1
10	Reservoir	0.000	2	n/a	0	9	316.37	23,379	Basin 1 Upper Routed
11	Reservoir	0.000	2	n/a	0	10	298.20	0.000	Basin 1 Lower Routed
12	SCS Runoff	12.13	2	718	24,366	------	------	------	Post Basin 2
13	Reservoir	0.000	2	n/a	0	12	306.25	24,366	Basin 2 Routed
14	SCS Runoff	0.417	2	720	1,355	------	------	------	Post Bypass DP002
15	Combine	0.417	2	720	1,355	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	= SCS Runoff	Peak discharge	= 1.295 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 10,628 cuft
Drainage area	= 15.430 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 1

Pre Developed DP001

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.20		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 10.81**	**+**	**0.00**	**+**	**0.00**	**=**	**10.81**
Shallow Concentrated Flow							
Flow length (ft)	= 330.00		0.00		0.00		
Watercourse slope (%)	= 9.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.84		0.00		0.00		
Travel Time (min)	**= 1.14**	**+**	**0.00**	**+**	**0.00**	**=**	**1.14**
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**

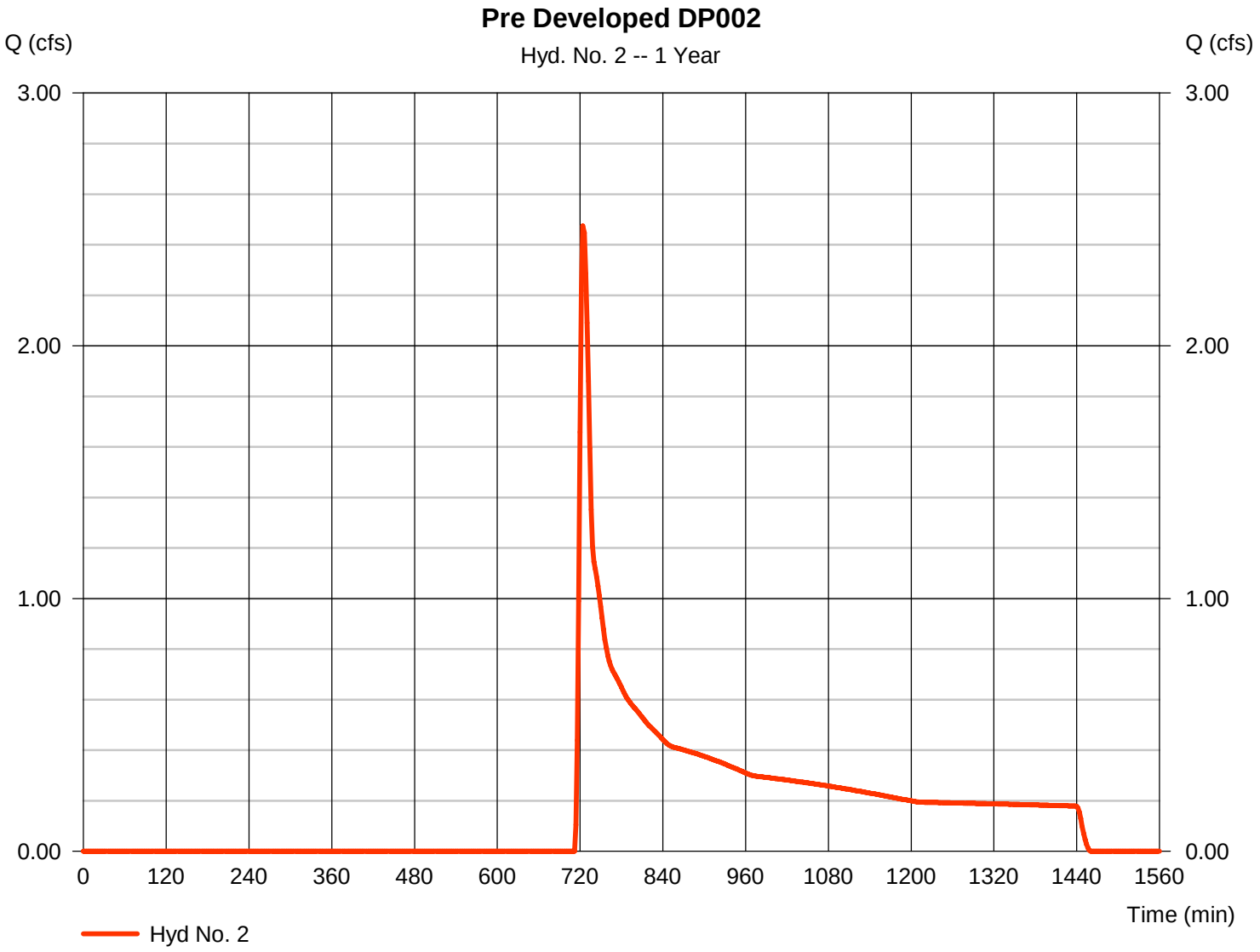
Total Travel Time, Tc ..... 12.00 min

Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.474 cfs
Storm frequency	=	1 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	15,638 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 2

Pre Developed DP002

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.20		0.00		0.00		
Land slope (%)	= 7.00		0.00		0.00		
Travel Time (min)	**= 8.65**	**+**	**0.00**	**+**	**0.00**	**=**	**8.65**
Shallow Concentrated Flow							
Flow length (ft)	= 957.00		0.00		0.00		
Watercourse slope (%)	= 8.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.81		0.00		0.00		
Travel Time (min)	**= 3.31**	**+**	**0.00**	**+**	**0.00**	**=**	**3.31**
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**

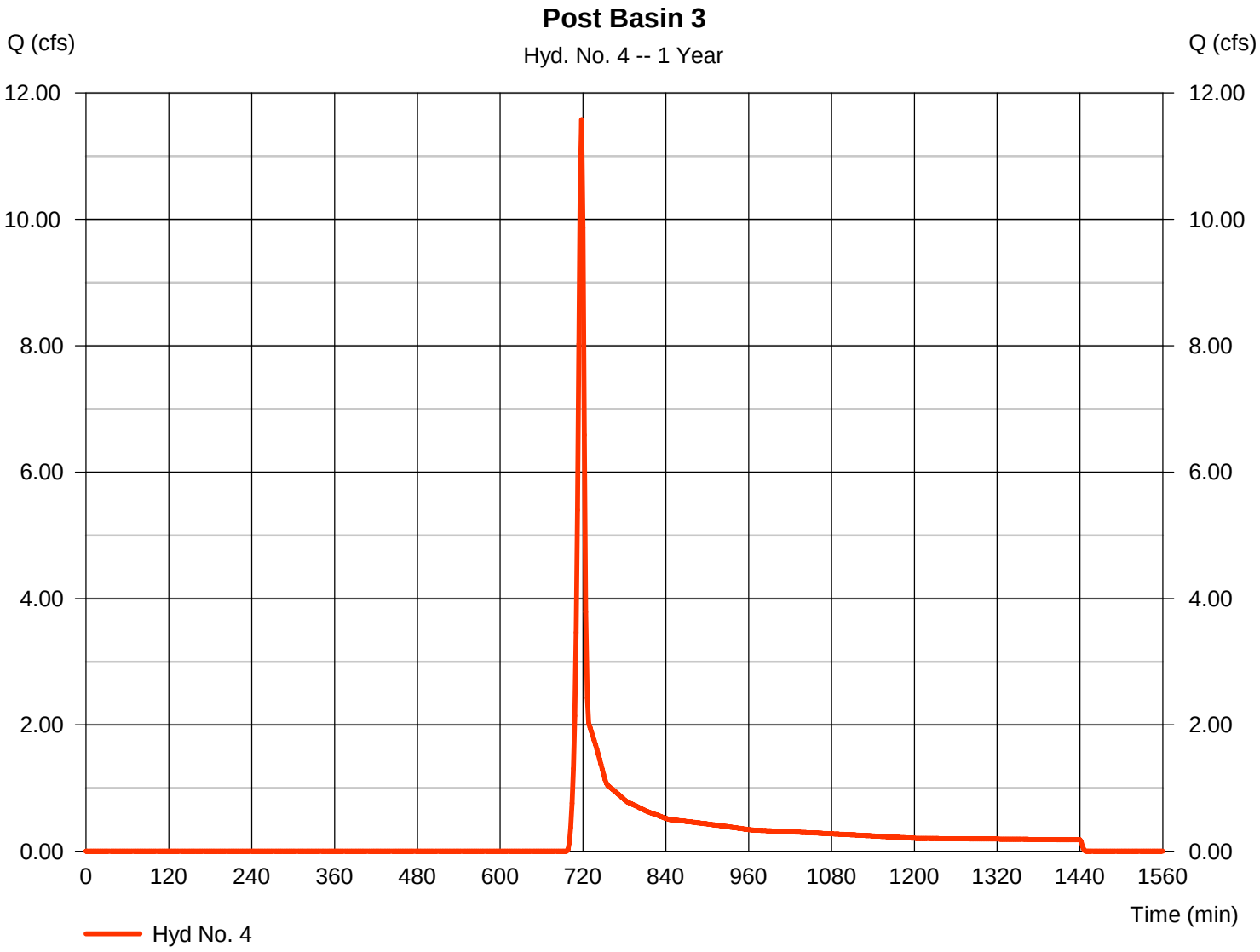
Total Travel Time, Tc ..... 12.00 min

Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	= SCS Runoff	Peak discharge	= 11.58 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 24,233 cuft
Drainage area	= 12.150 ac	Curve number	= 70.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



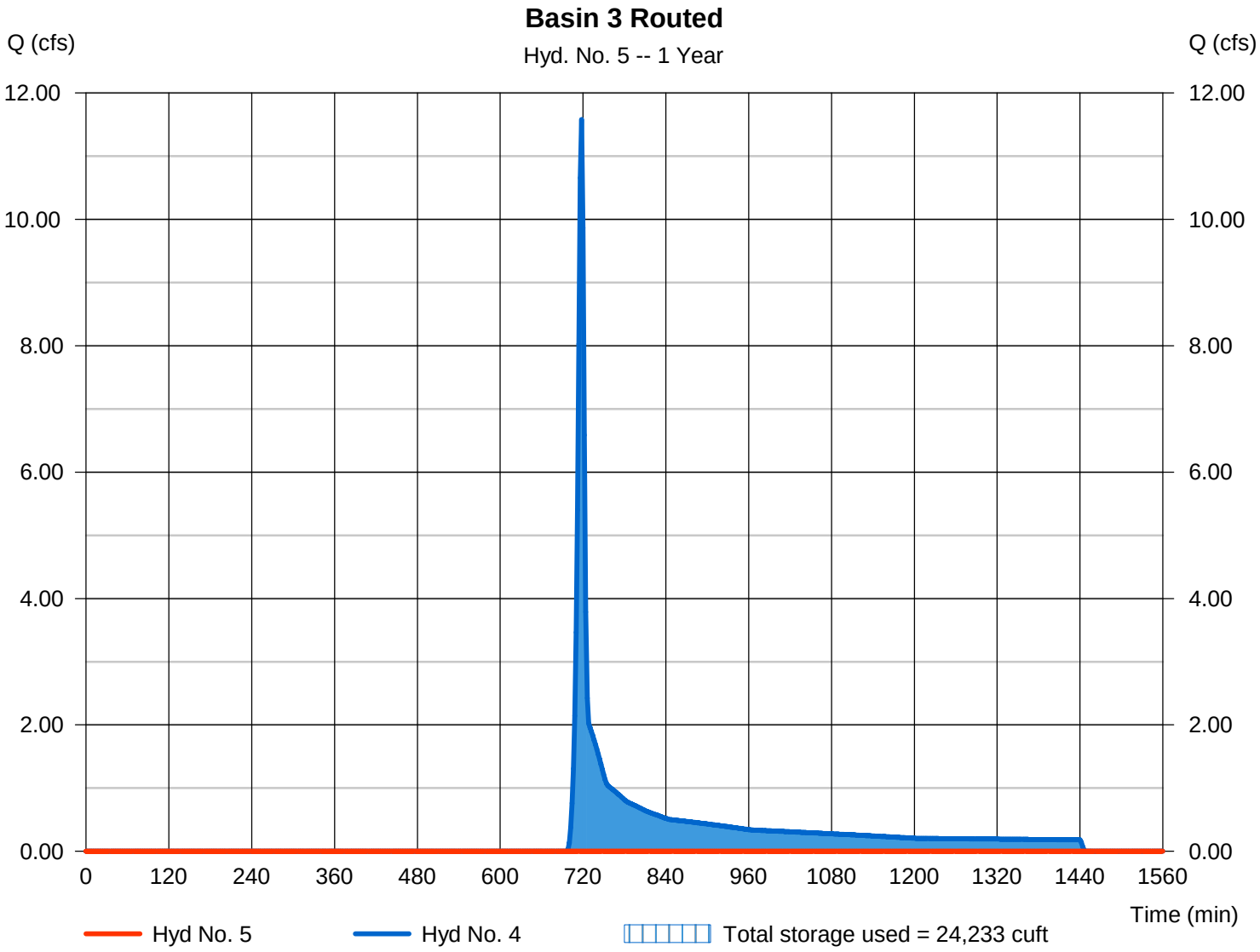
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	314.49 ft
Reservoir name	=	Basin 3	Max. Storage	=	24,233 cuft

Storage Indication method used.



Pond Report

Pond No. 4 - Basin 3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 312.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	312.00	6,536	0	0
2.00	314.00	11,086	17,622	17,622
4.00	316.00	15,855	26,941	44,563
6.00	318.00	20,184	36,039	80,602
7.00	319.00	23,000	21,592	102,194

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	10.00	0.00	0.00
Span (in)	= 18.00	10.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 310.00	315.25	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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	Yes	No	No

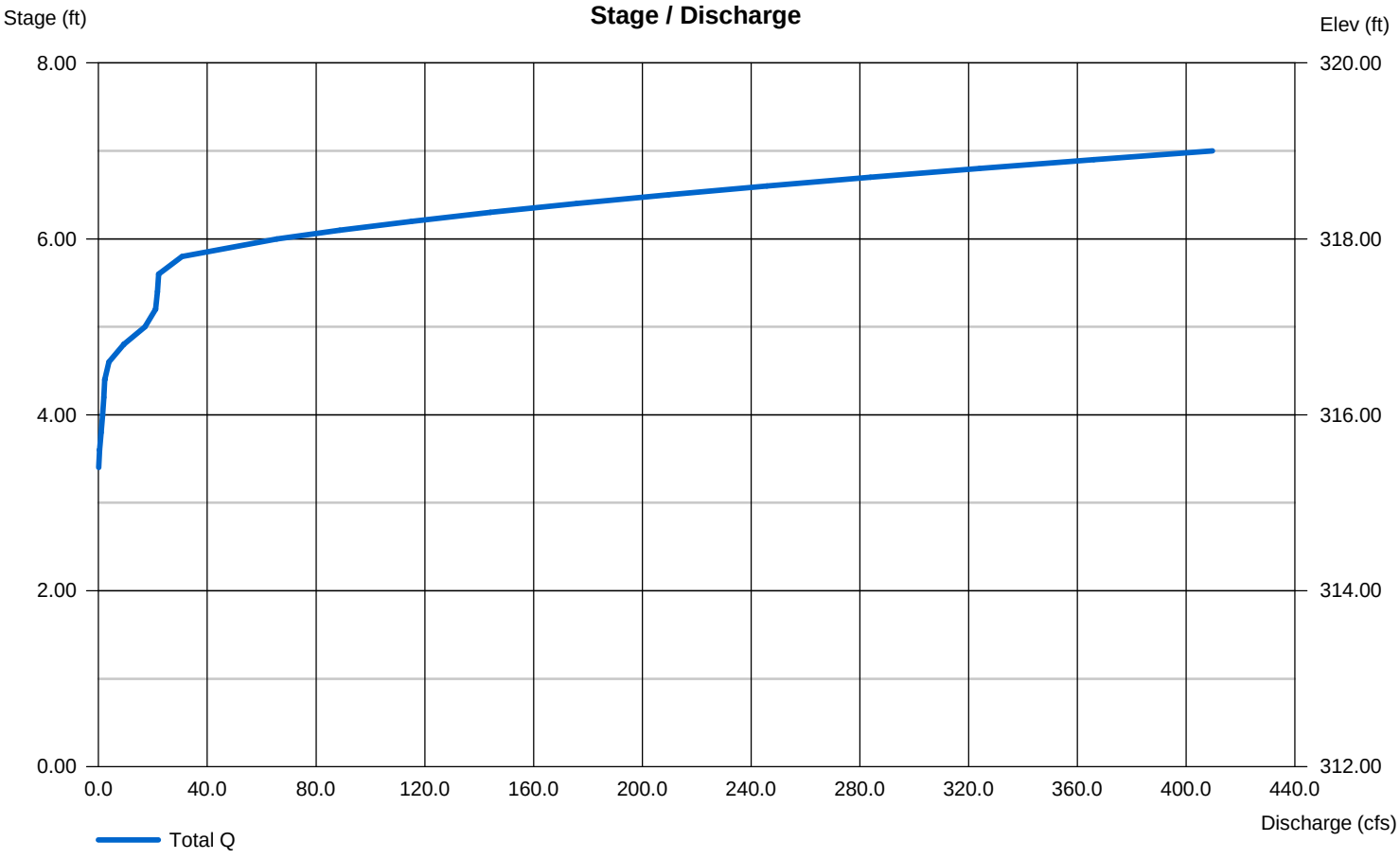
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	100.00	0.00
Crest El. (ft)	= 316.50	0.00	317.70	0.00
Weir Coeff.	= 3.33	0.00	2.60	3.33
Weir Type	= 1	---	Broad	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

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).

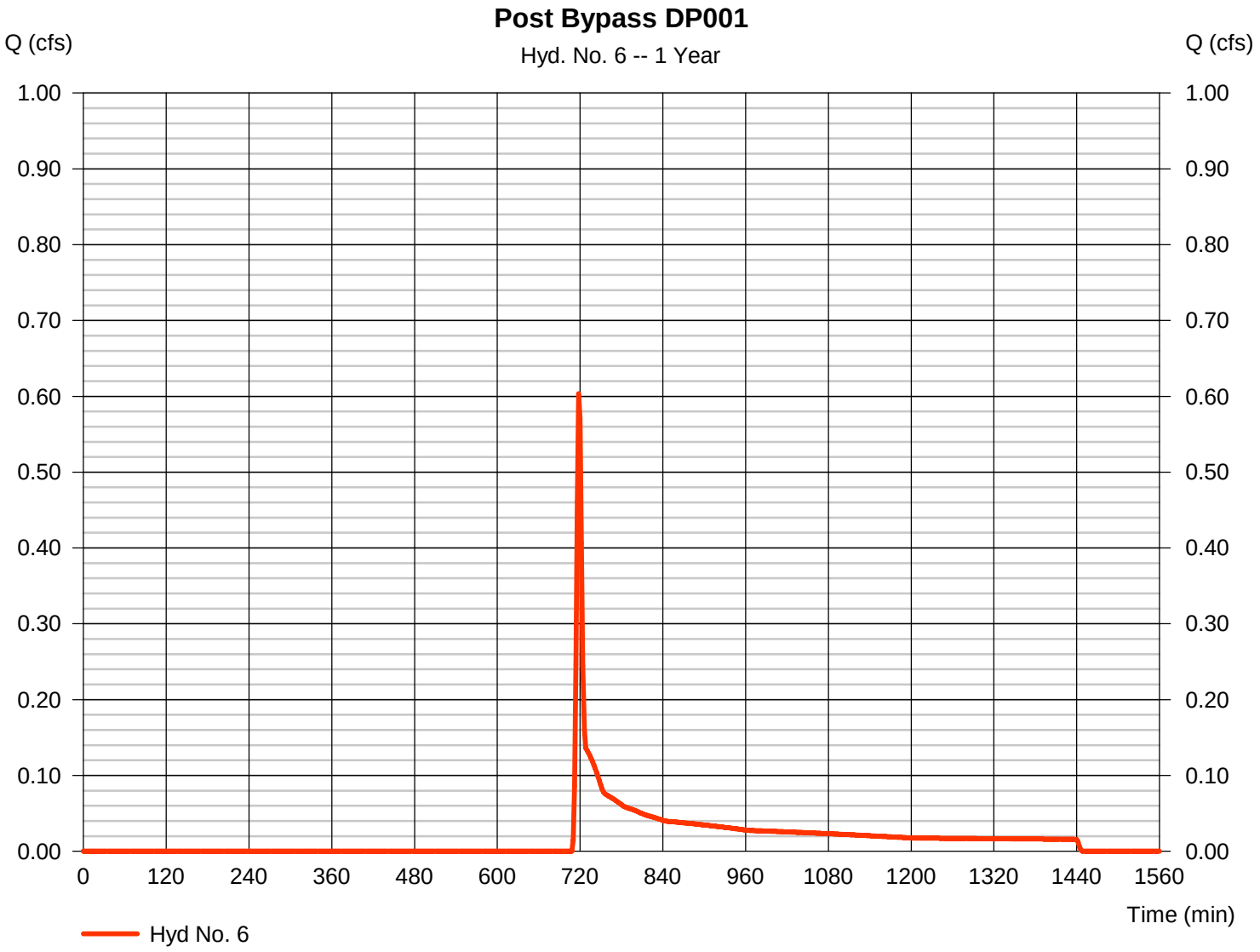


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.603 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,625 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

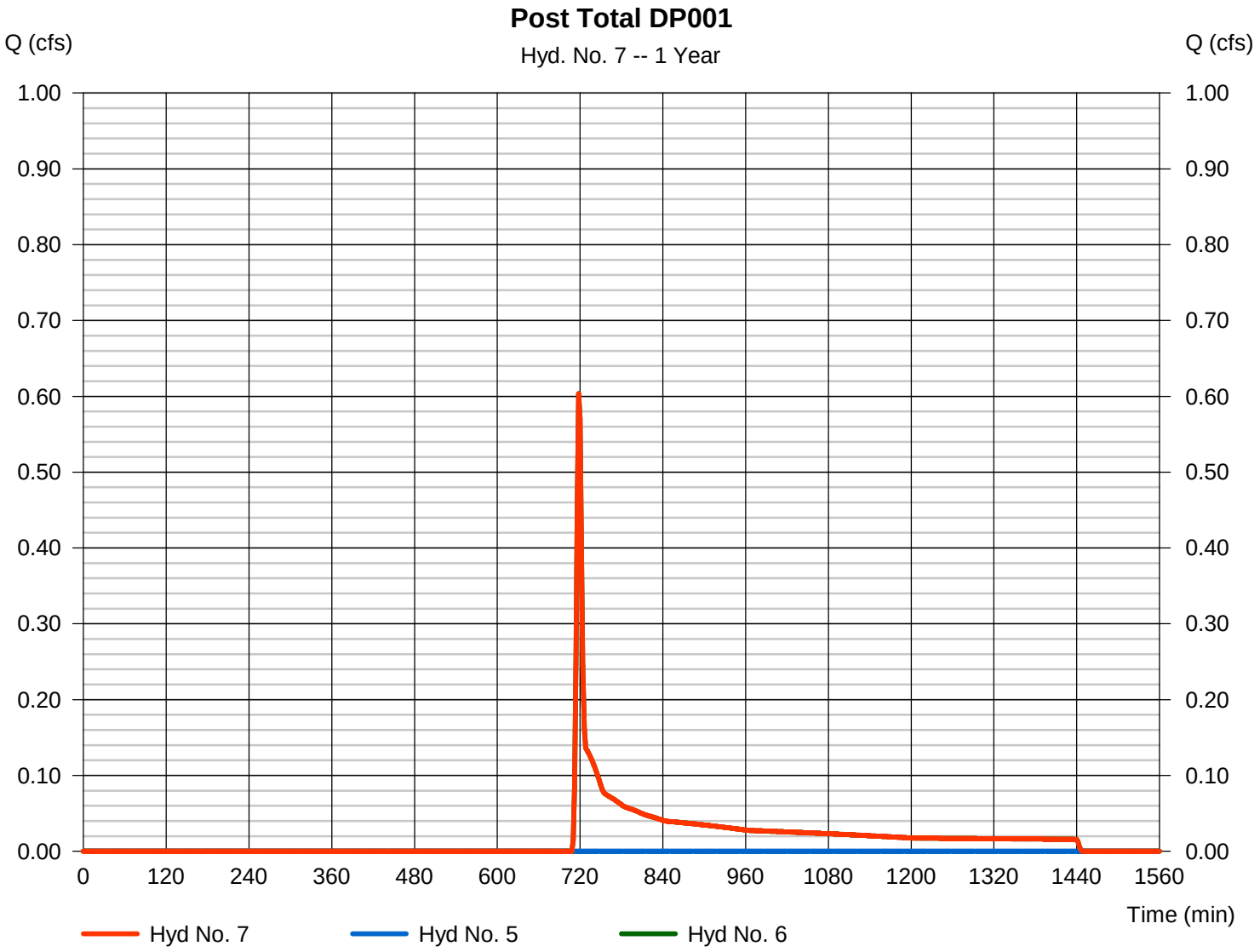


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 0.603 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,625 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.490 ac

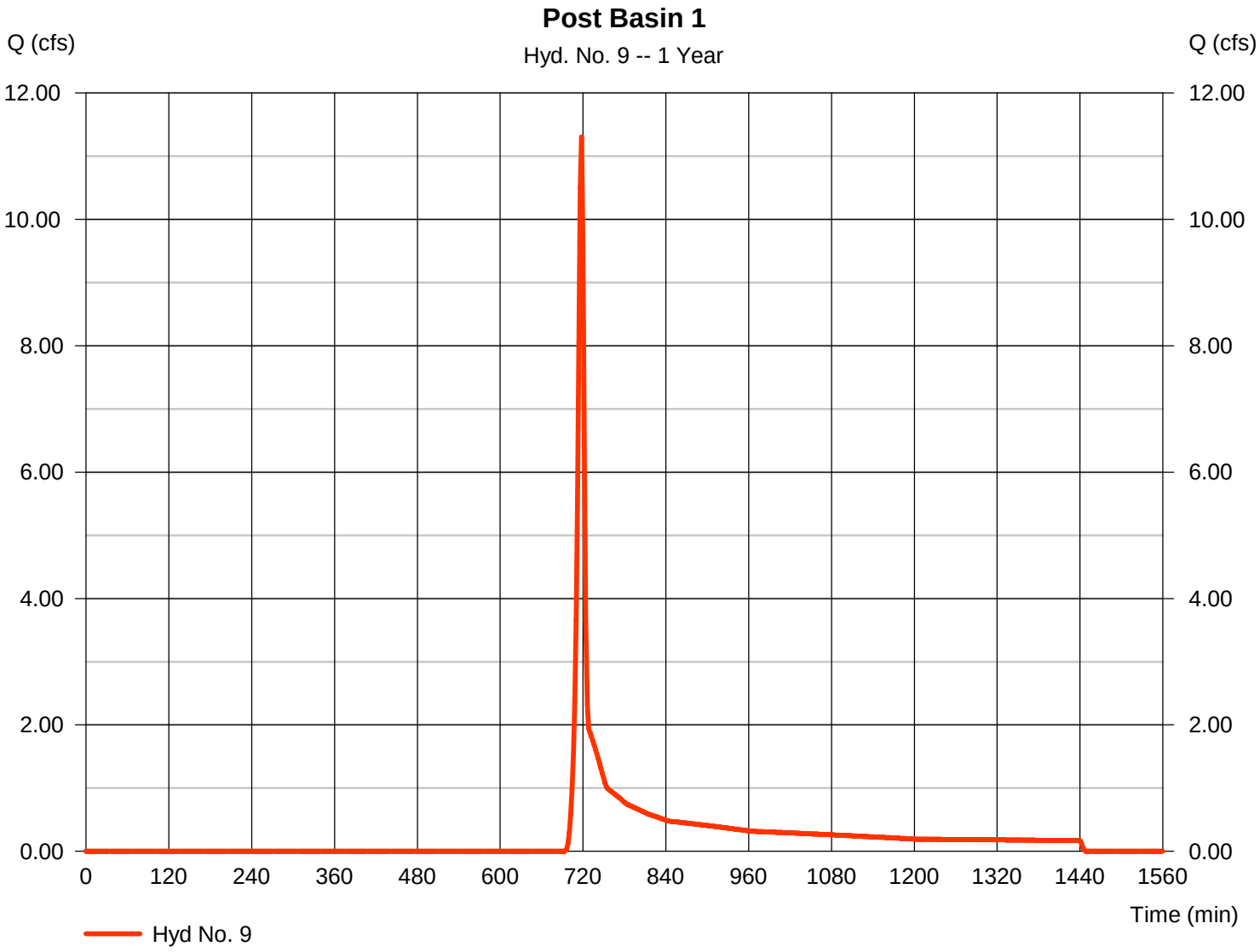


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.30 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	23,379 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



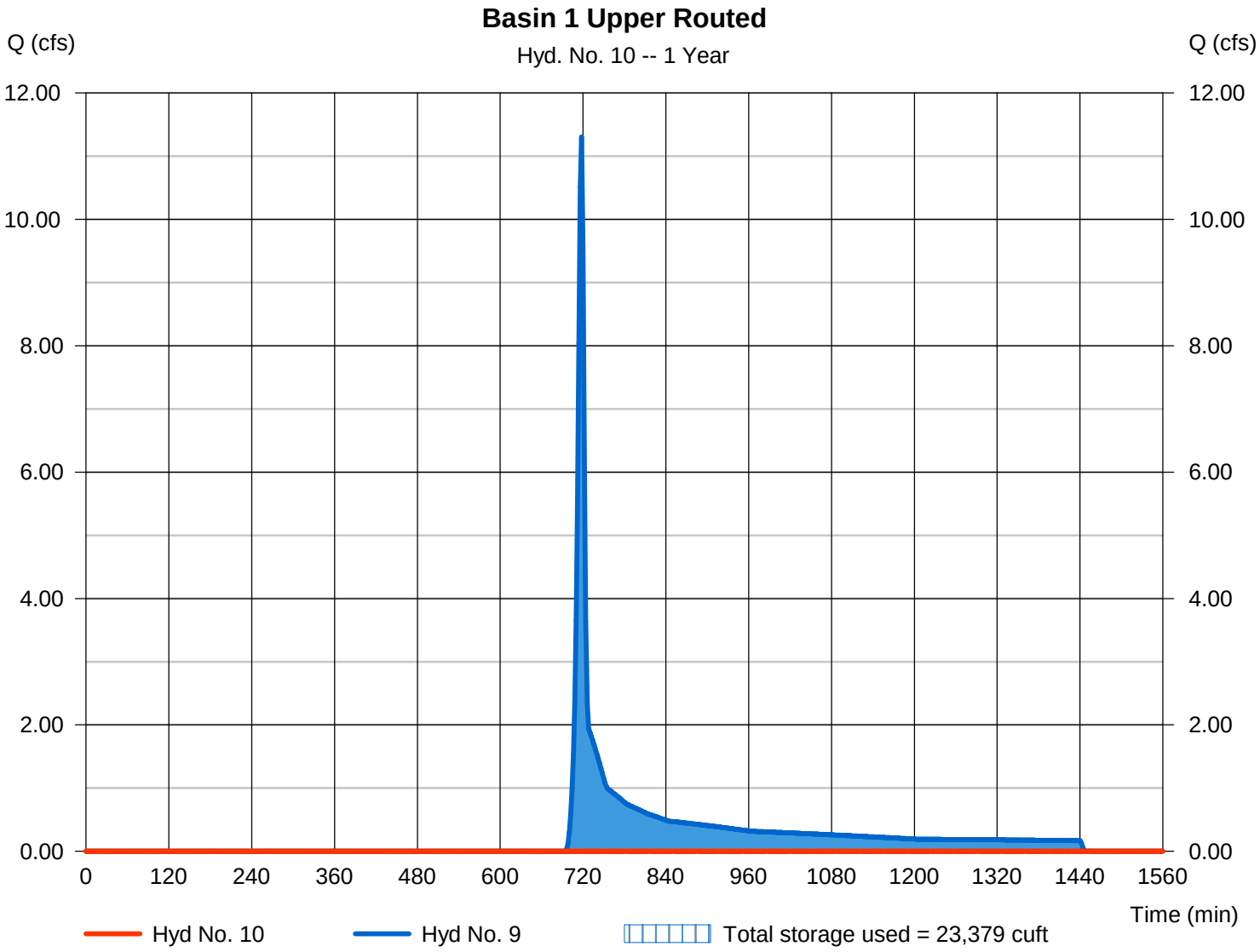
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	316.37 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	23,379 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Basin 1 Upper

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 314.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	314.00	7,531	0	0
2.00	316.00	10,908	18,439	18,439
4.00	318.00	15,880	26,788	45,227
6.00	320.00	22,943	38,823	84,050

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 310.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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

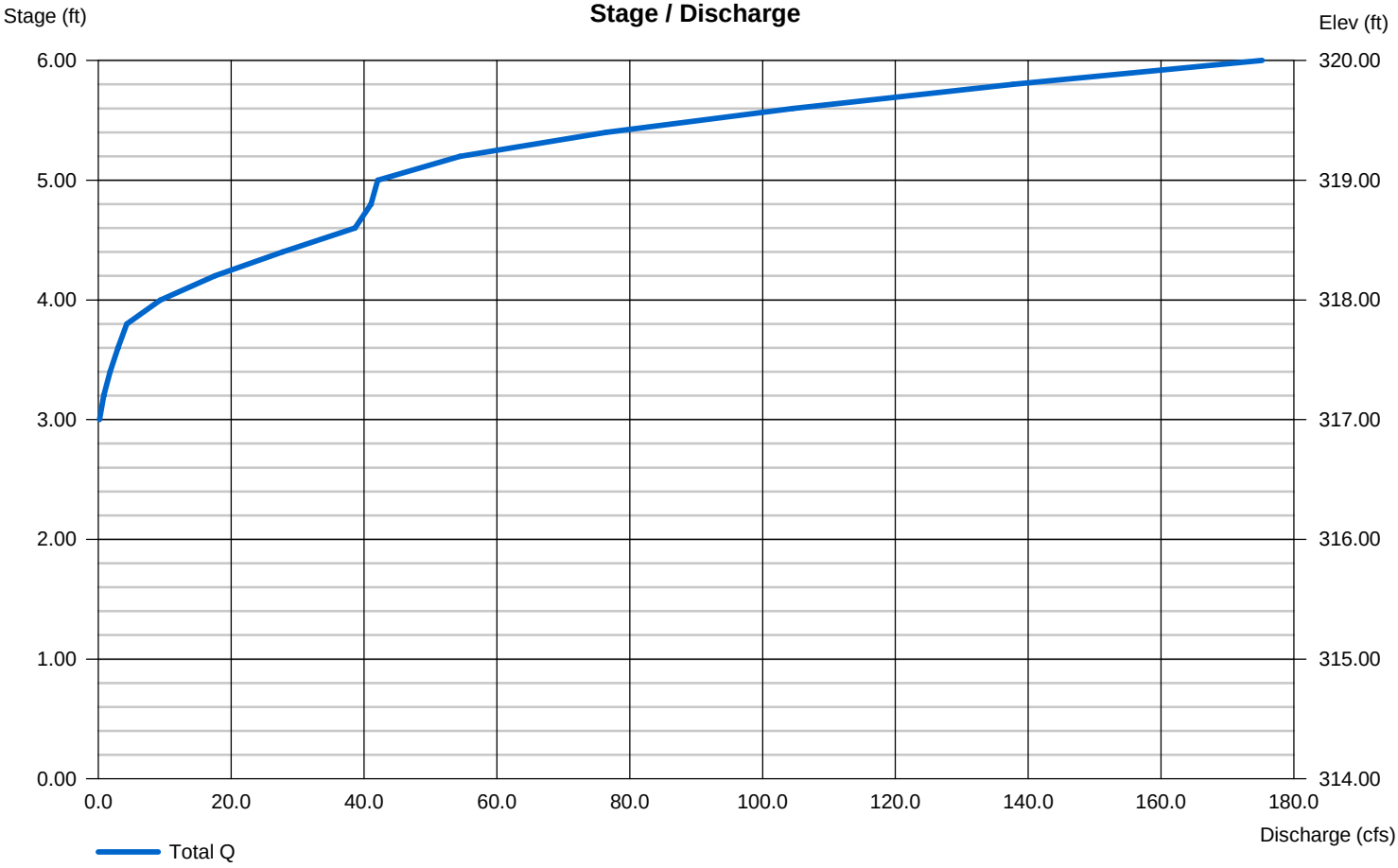
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	1.50	50.00	0.00
Crest El. (ft)	= 317.80	316.90	319.00	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	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).



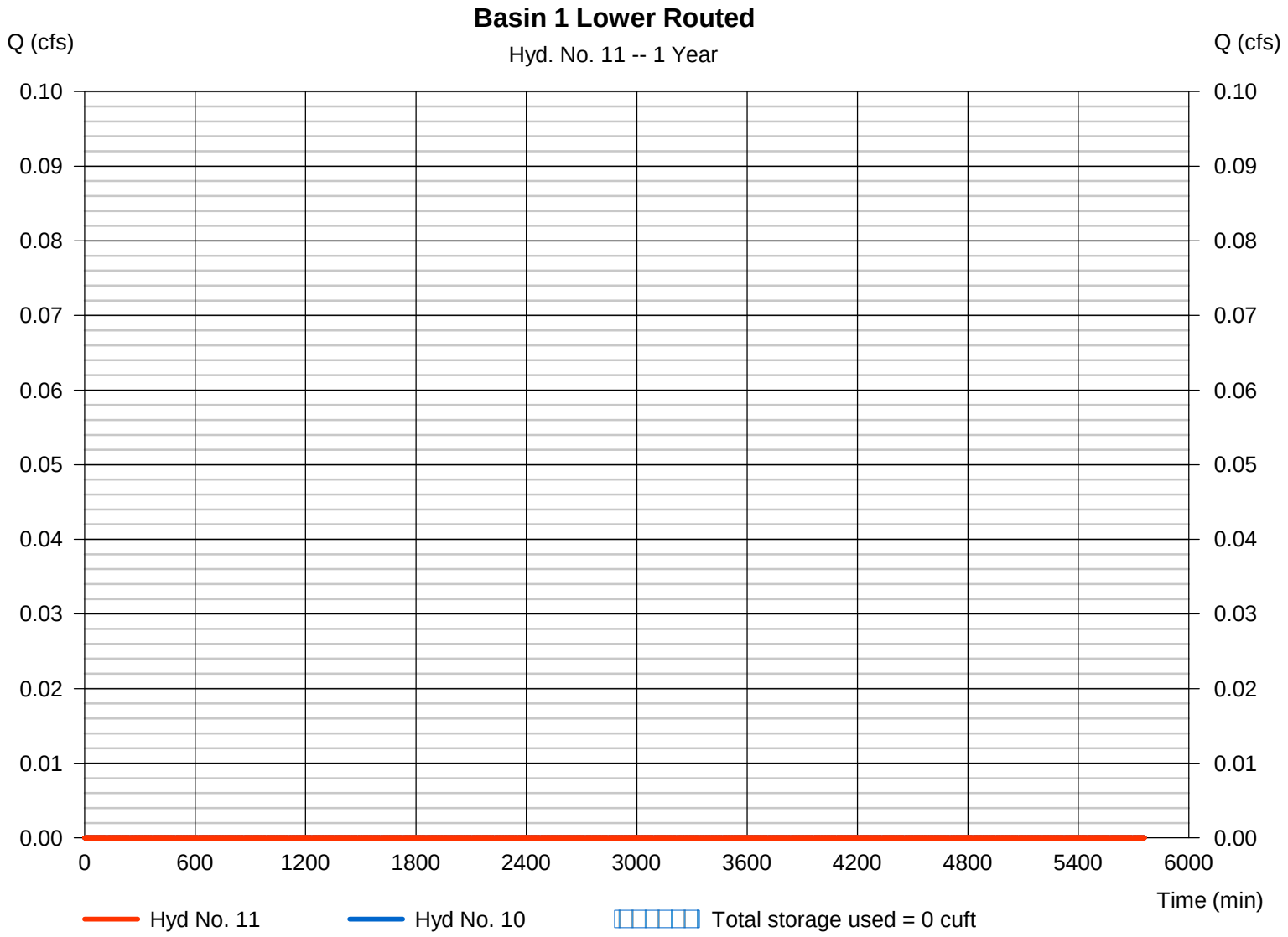
Hydrograph Report

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	298.20 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	0 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin 1 Lower

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 298.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	298.00	3,320	0	0
2.00	300.00	5,352	8,672	8,672
4.00	302.00	10,359	15,711	24,383
6.00	304.00	18,942	29,301	53,684

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	9.00	0.00	0.00
Span (in)	= 18.00	9.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 298.00	299.50	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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	Yes	No	No

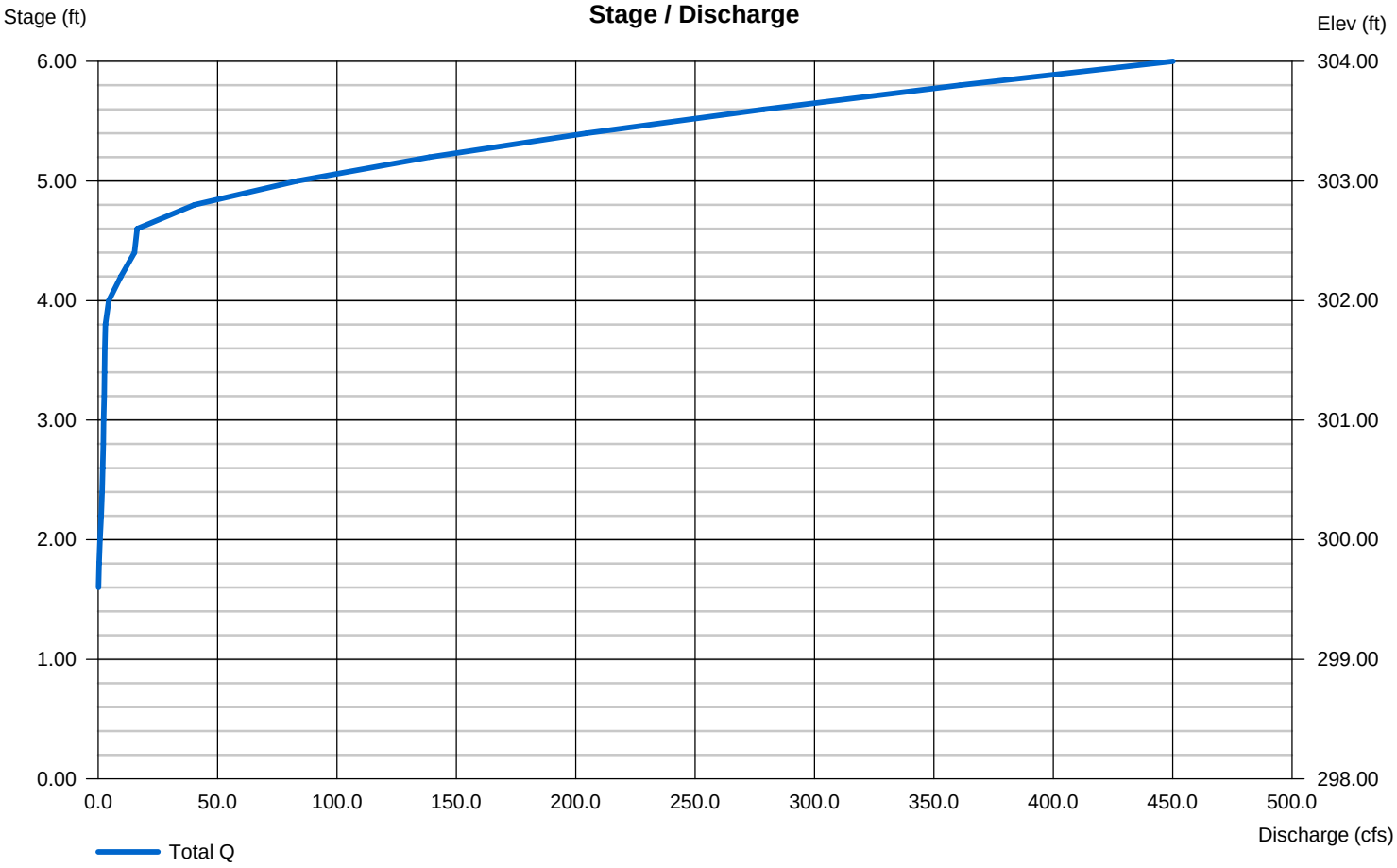
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	100.00	0.00	0.00
Crest El. (ft)	= 301.90	302.60	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	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).

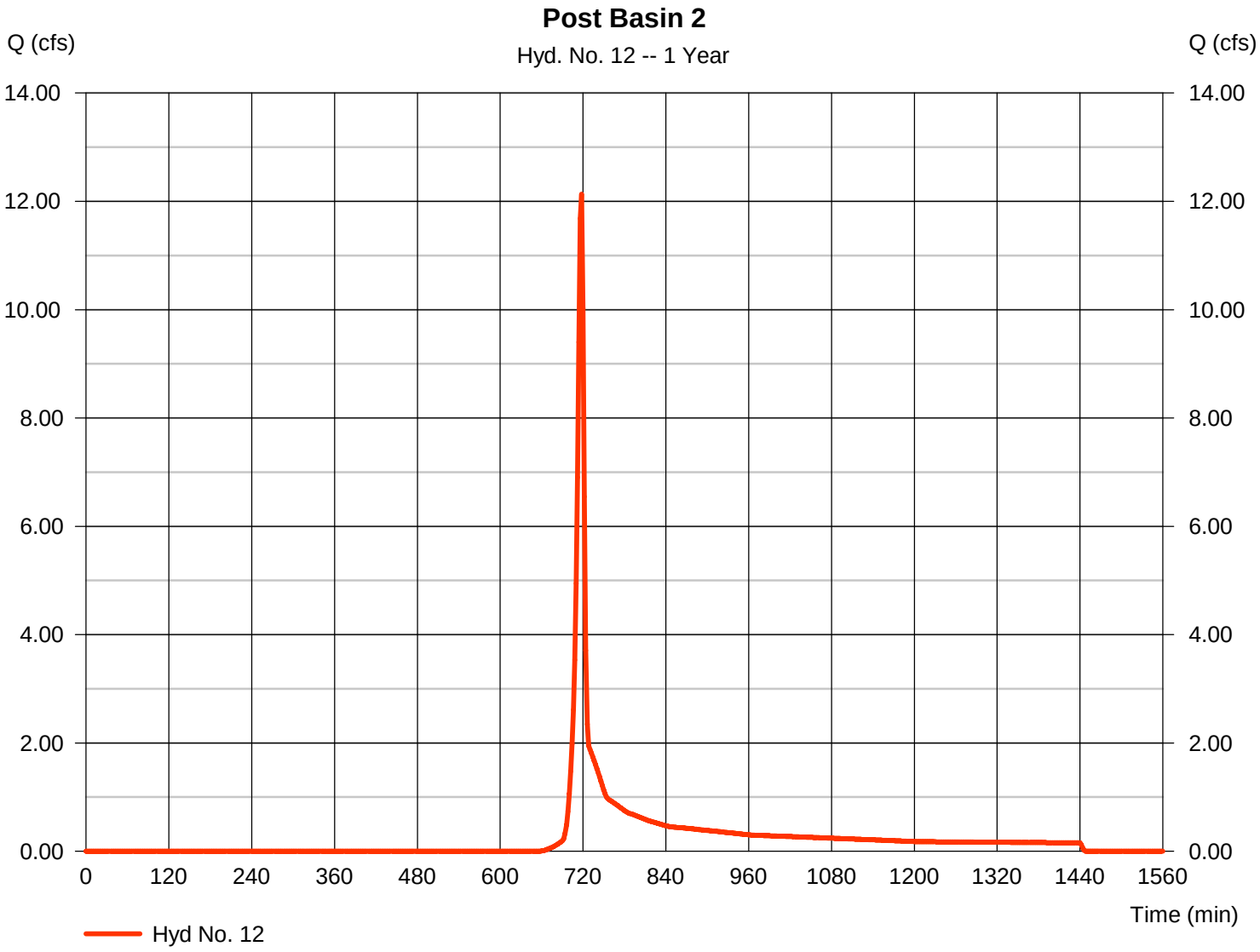


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 12.13 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 24,366 cuft
Drainage area	= 8.540 ac	Curve number	= 76.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



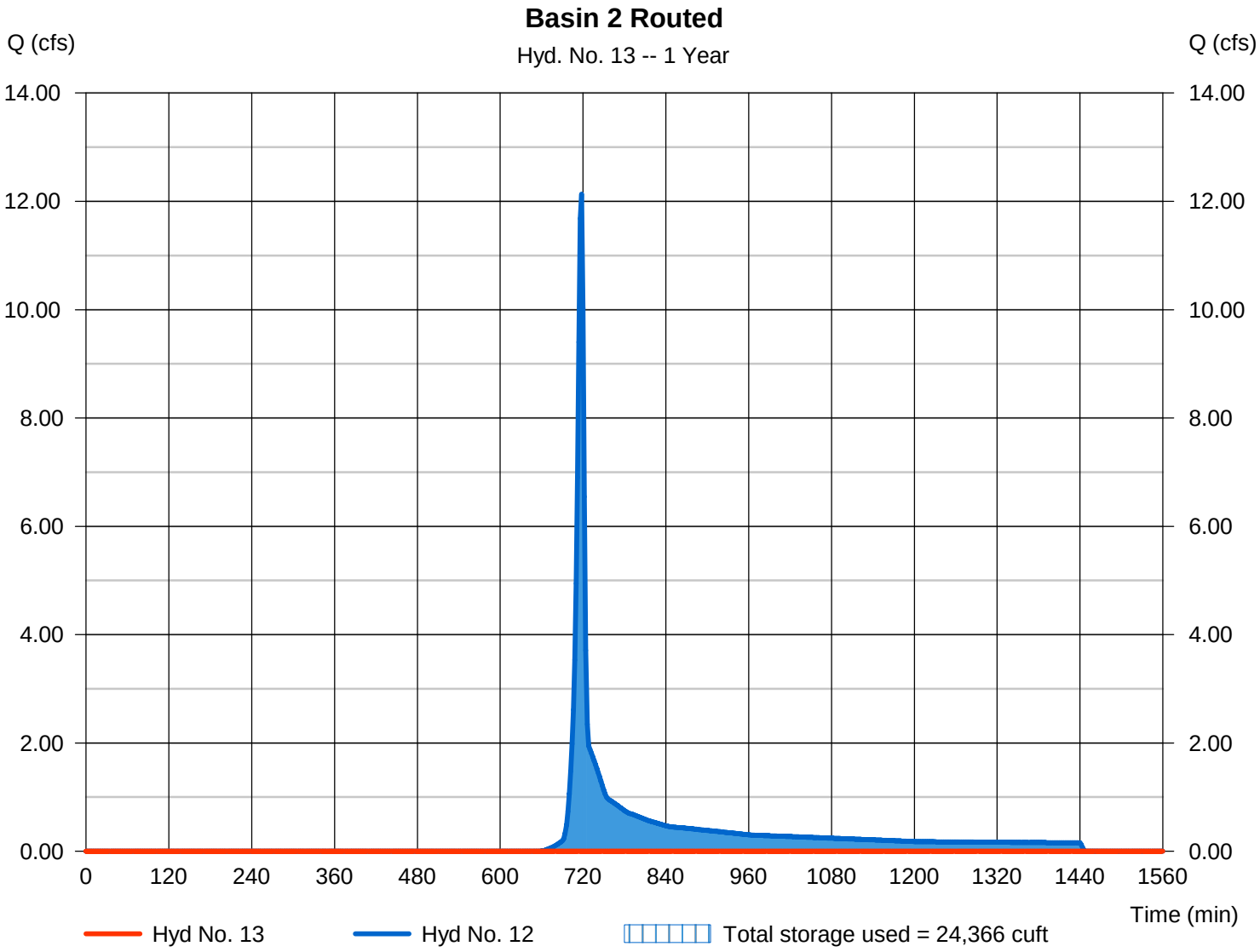
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	306.25 ft
Reservoir name	=	Basin 2	Max. Storage	=	24,366 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Basin 2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 304.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	304.00	8,255	0	0
2.00	306.00	12,443	20,698	20,698
4.00	308.00	16,673	29,116	49,814
6.00	310.00	21,110	37,783	87,597

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 302.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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

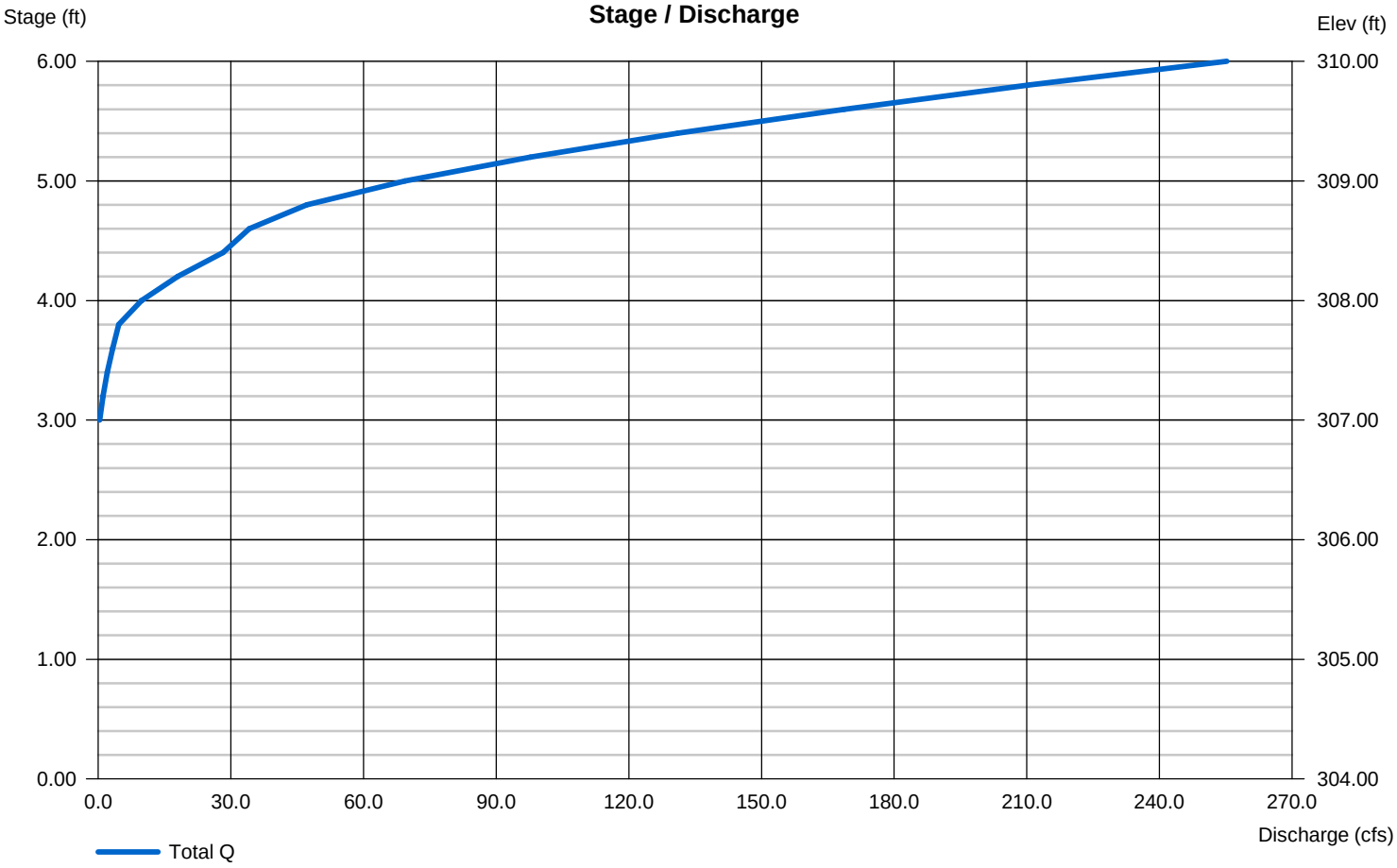
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	1.50	50.00	0.00
Crest El. (ft)	= 307.80	306.85	308.60	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	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).

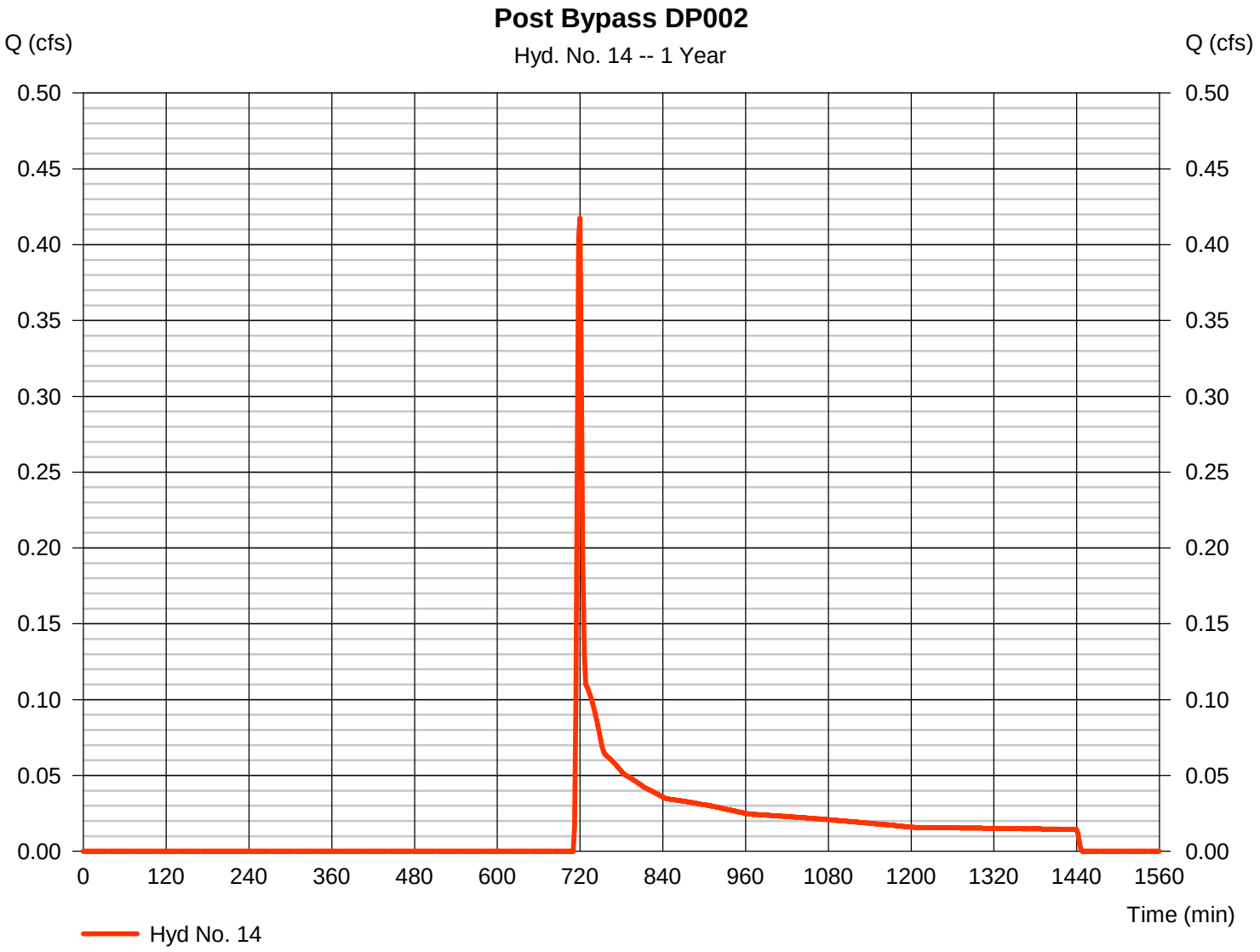


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.417 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	1,355 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

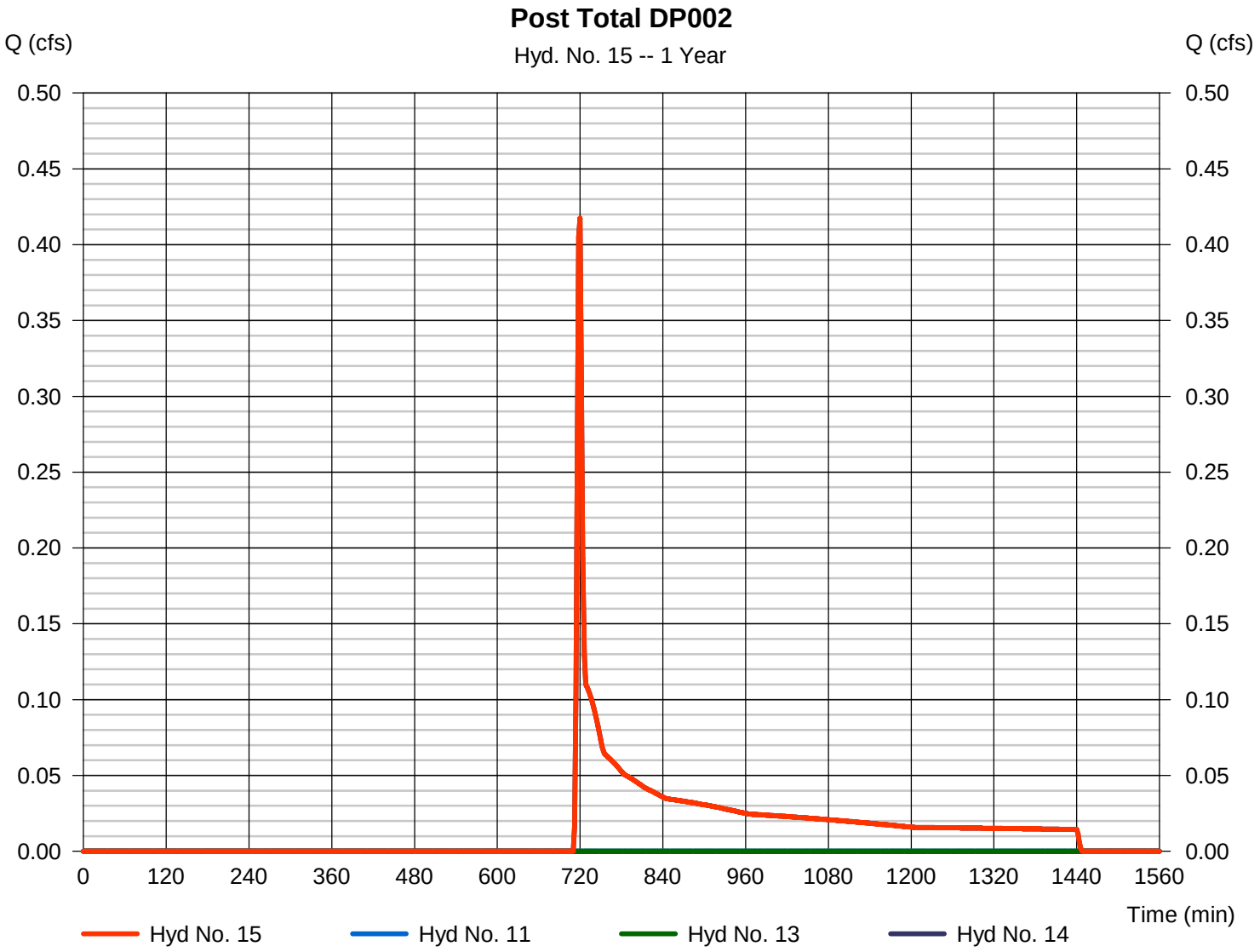


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	= Combine	Peak discharge	= 0.417 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,355 cuft
Inflow hyds.	= 11, 13, 14	Contrib. drain. area	= 1.540 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

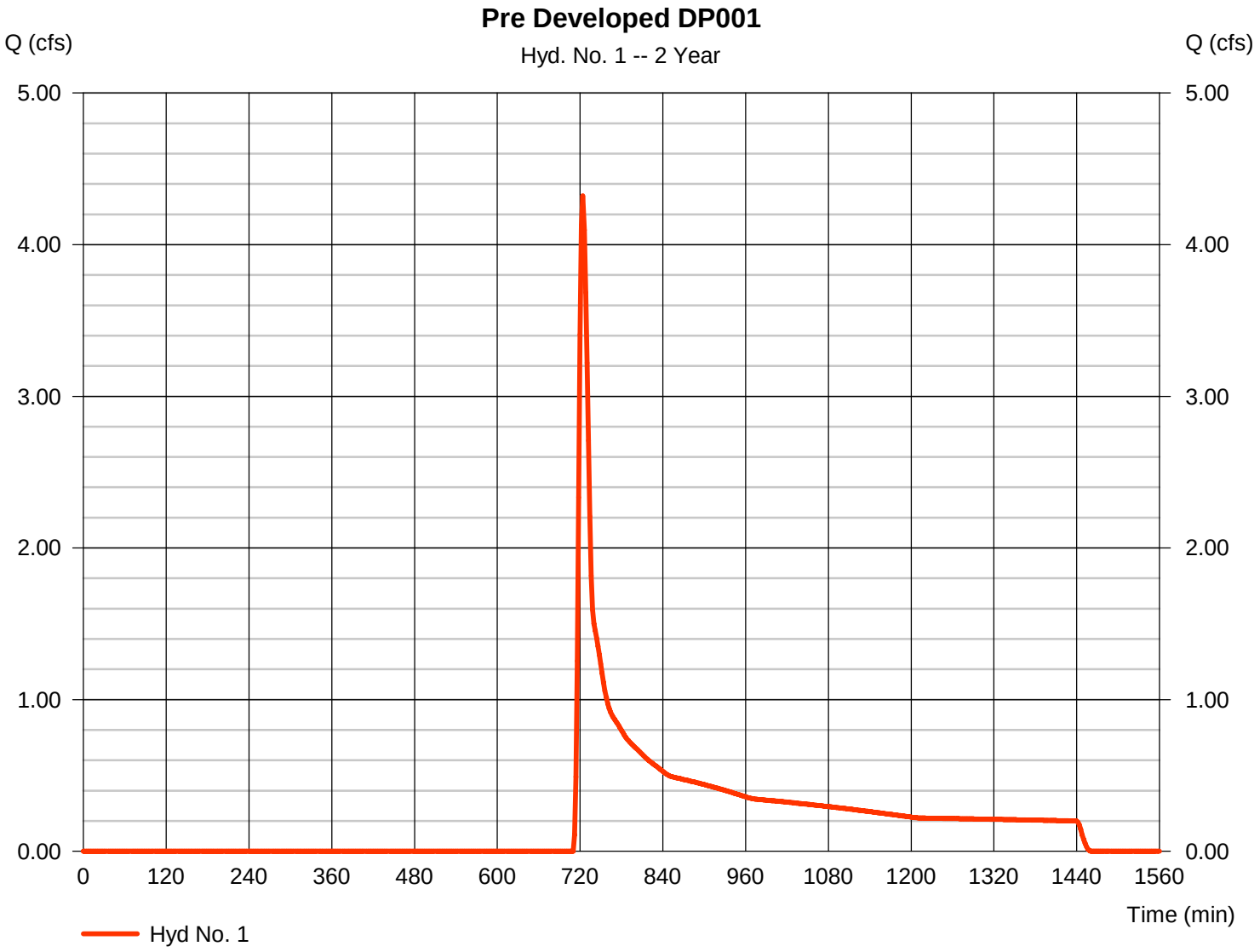
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.322	2	724	19,687	------	------	------	Pre Developed DP001
2	SCS Runoff	6.847	2	724	27,873	------	------	------	Pre Developed DP002
4	SCS Runoff	17.70	2	718	35,889	------	------	------	Post Basin 3
5	Reservoir	0.060	2	1446	2,072	4	315.34	35,610	Basin 3 Routed
6	SCS Runoff	1.185	2	718	2,673	------	------	------	Post Bypass DP001
7	Combine	1.185	2	718	4,744	5, 6	------	------	Post Total DP001
9	SCS Runoff	16.97	2	718	34,254	------	------	------	Post Basin 1
10	Reservoir	0.198	2	1442	5,083	9	317.01	31,994	Basin 1 Upper Routed
11	Reservoir	0.000	2	n/a	0	10	299.17	5,083	Basin 1 Lower Routed
12	SCS Runoff	17.09	2	718	34,170	------	------	------	Post Basin 2
13	Reservoir	0.120	2	1444	1,815	12	306.88	33,545	Basin 2 Routed
14	SCS Runoff	0.956	2	718	2,327	------	------	------	Post Bypass DP002
15	Combine	0.956	2	718	4,142	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	= SCS Runoff	Peak discharge	= 4.322 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 19,687 cuft
Drainage area	= 15.430 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

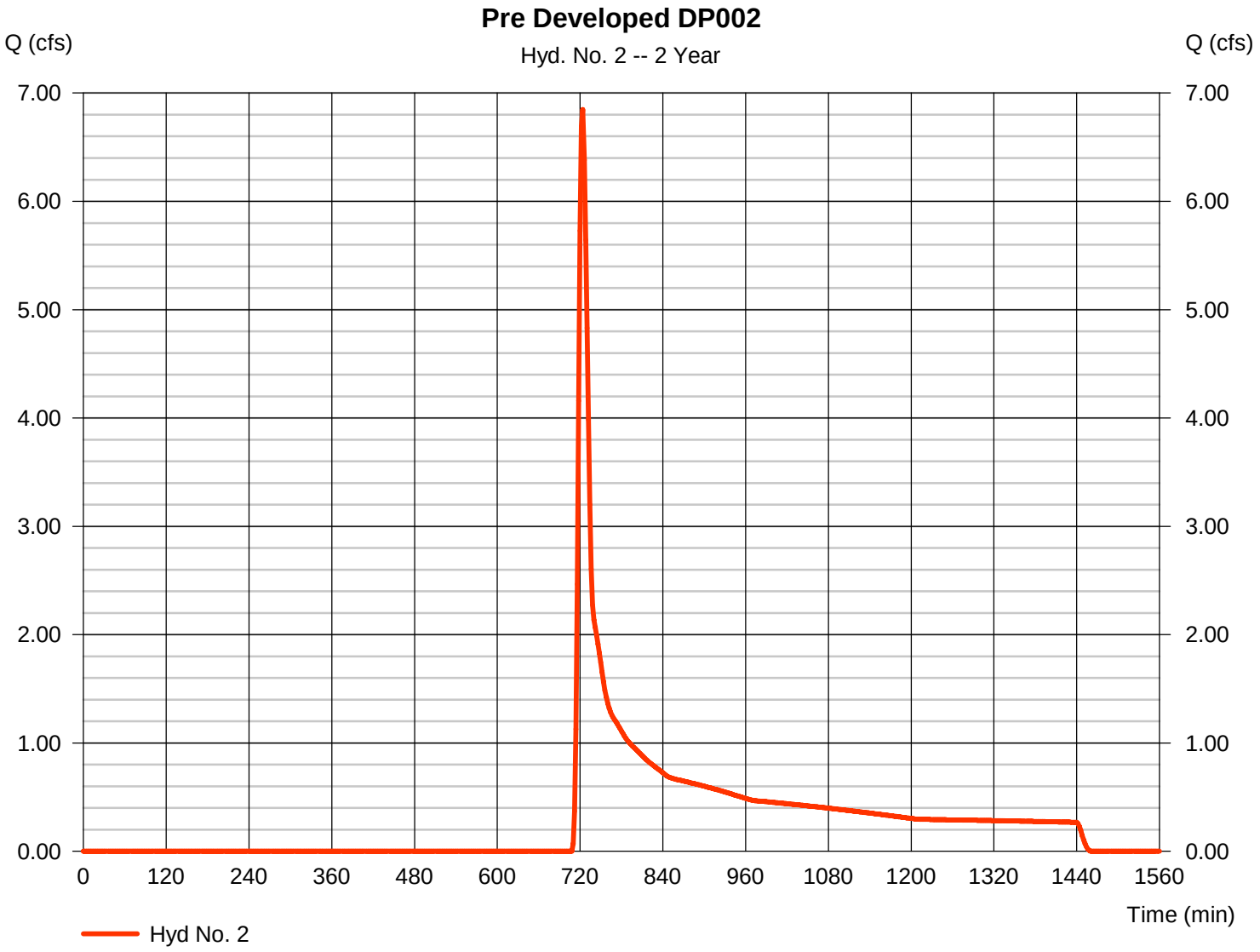


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.847 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	27,873 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

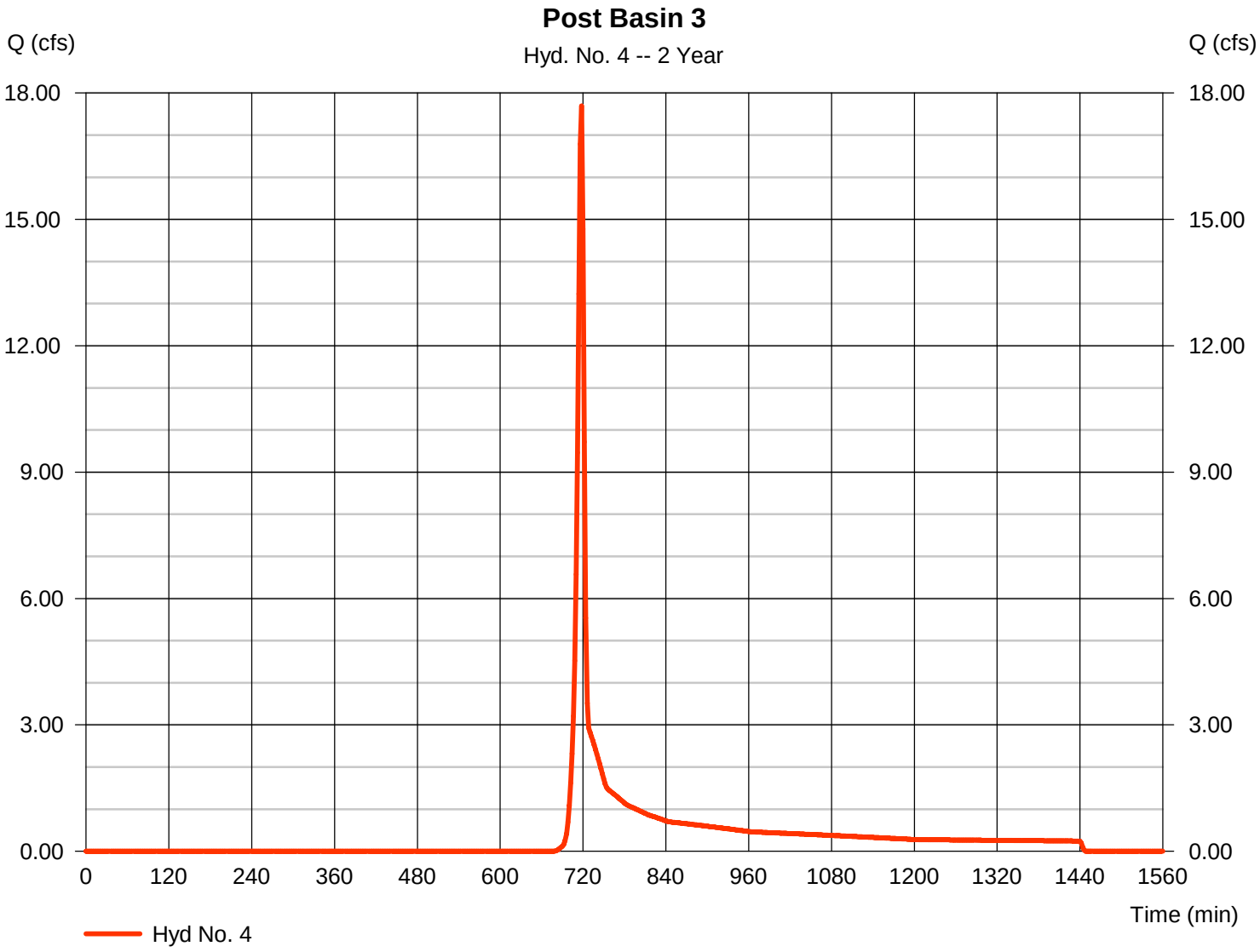


Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.70 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	35,889 cuft
Drainage area	=	12.150 ac	Curve number	=	70.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



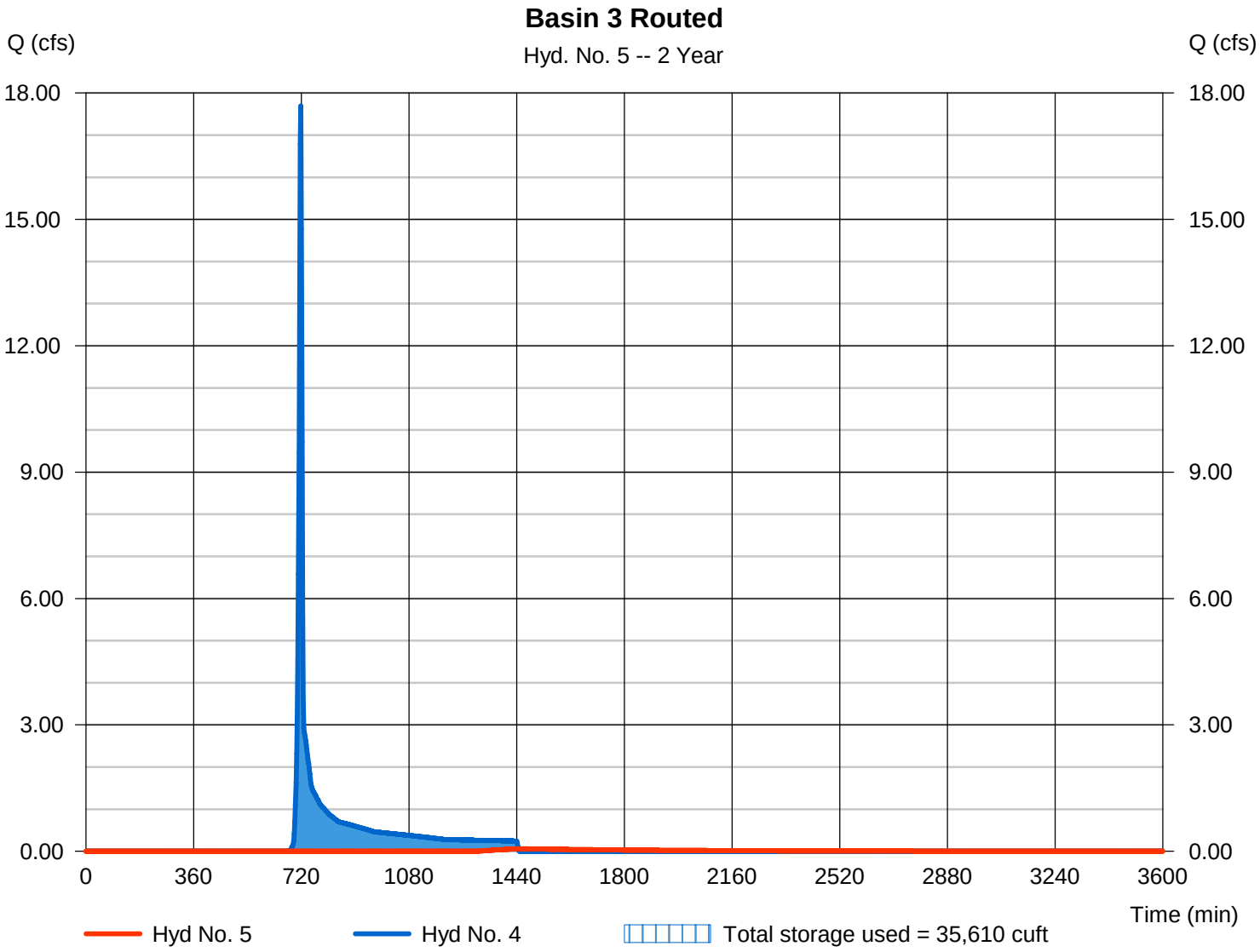
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.060 cfs
Storm frequency	=	2 yrs	Time to peak	=	1446 min
Time interval	=	2 min	Hyd. volume	=	2,072 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	315.34 ft
Reservoir name	=	Basin 3	Max. Storage	=	35,610 cuft

Storage Indication method used.

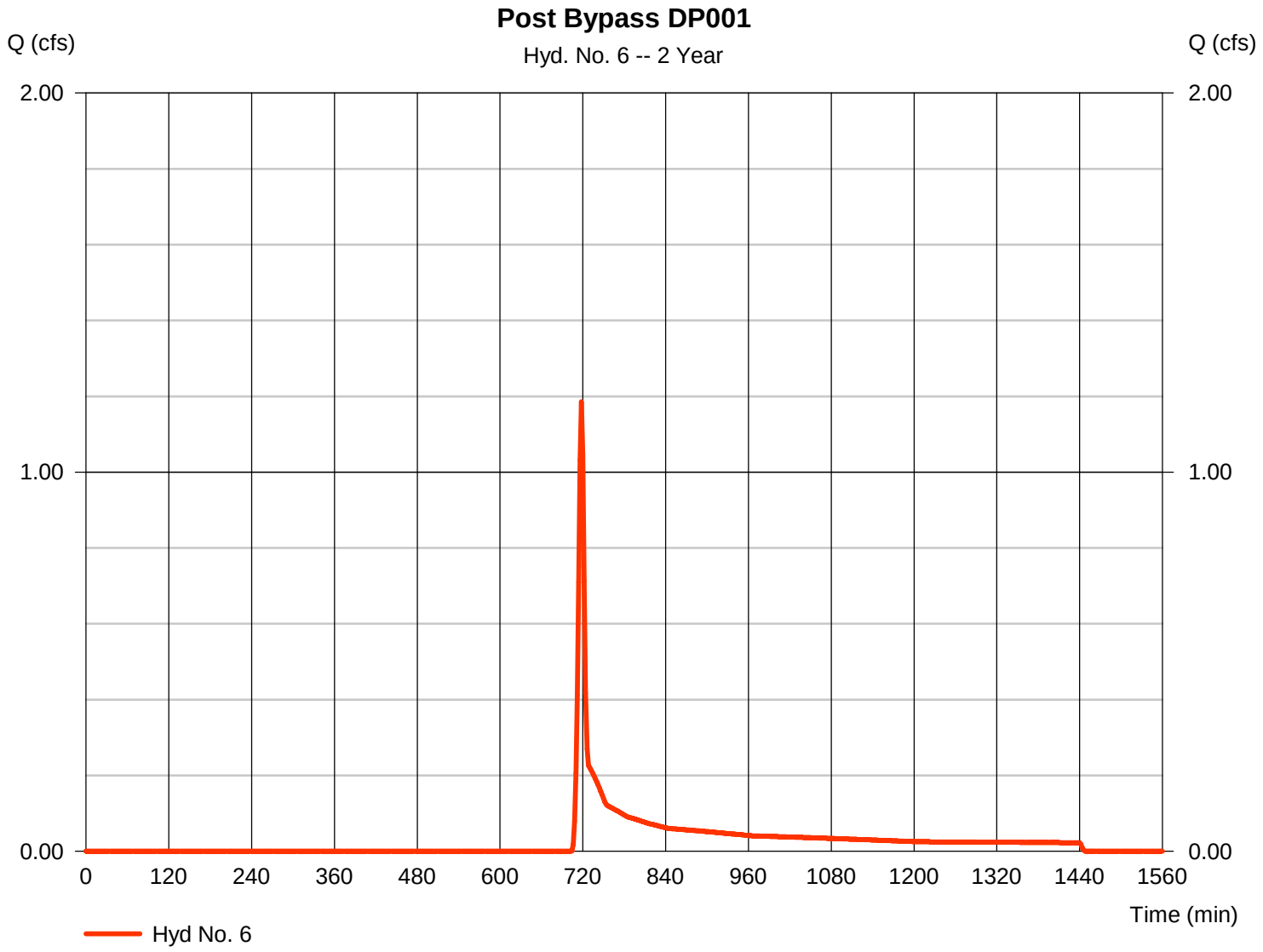


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.185 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,673 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

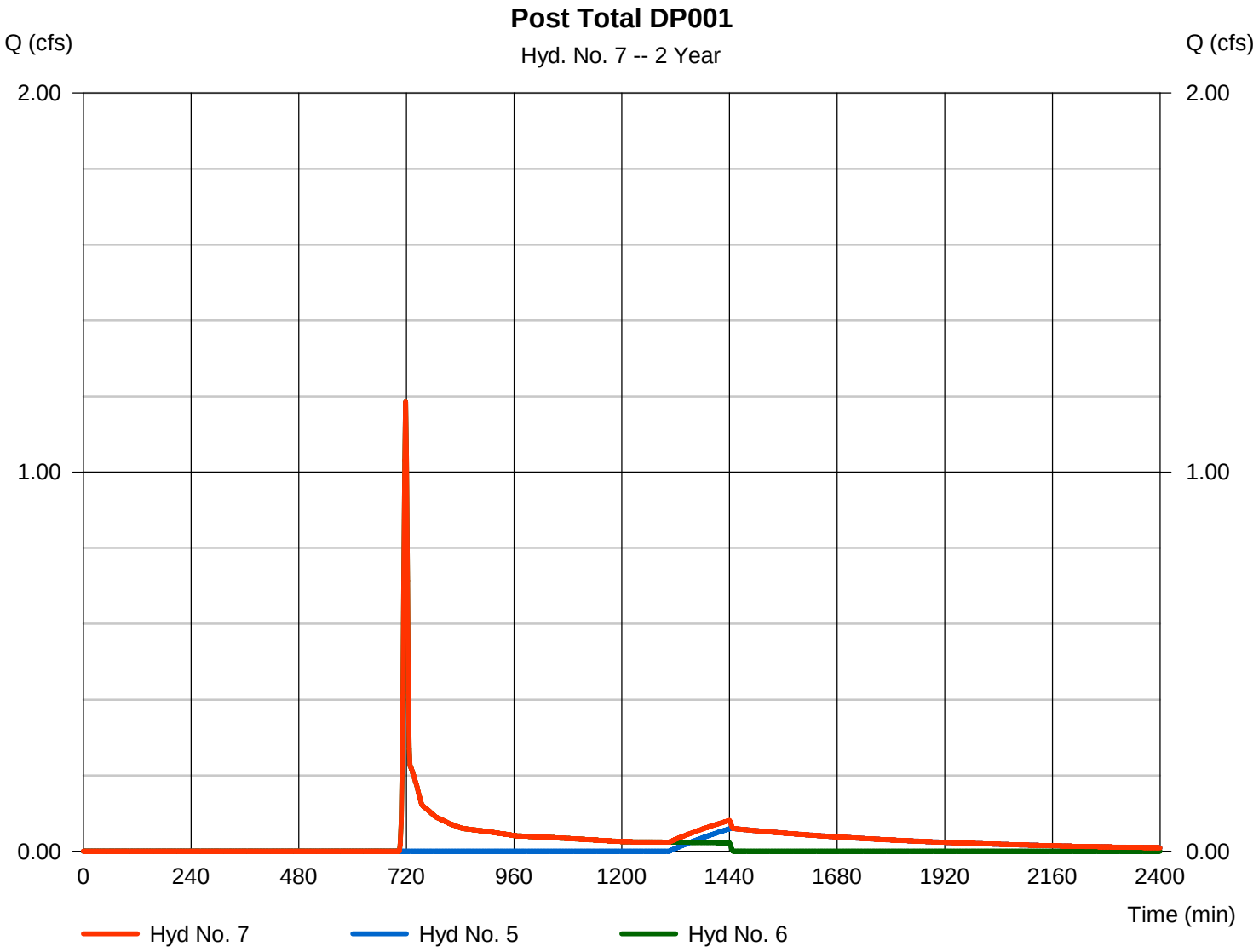


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 1.185 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 4,744 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.490 ac

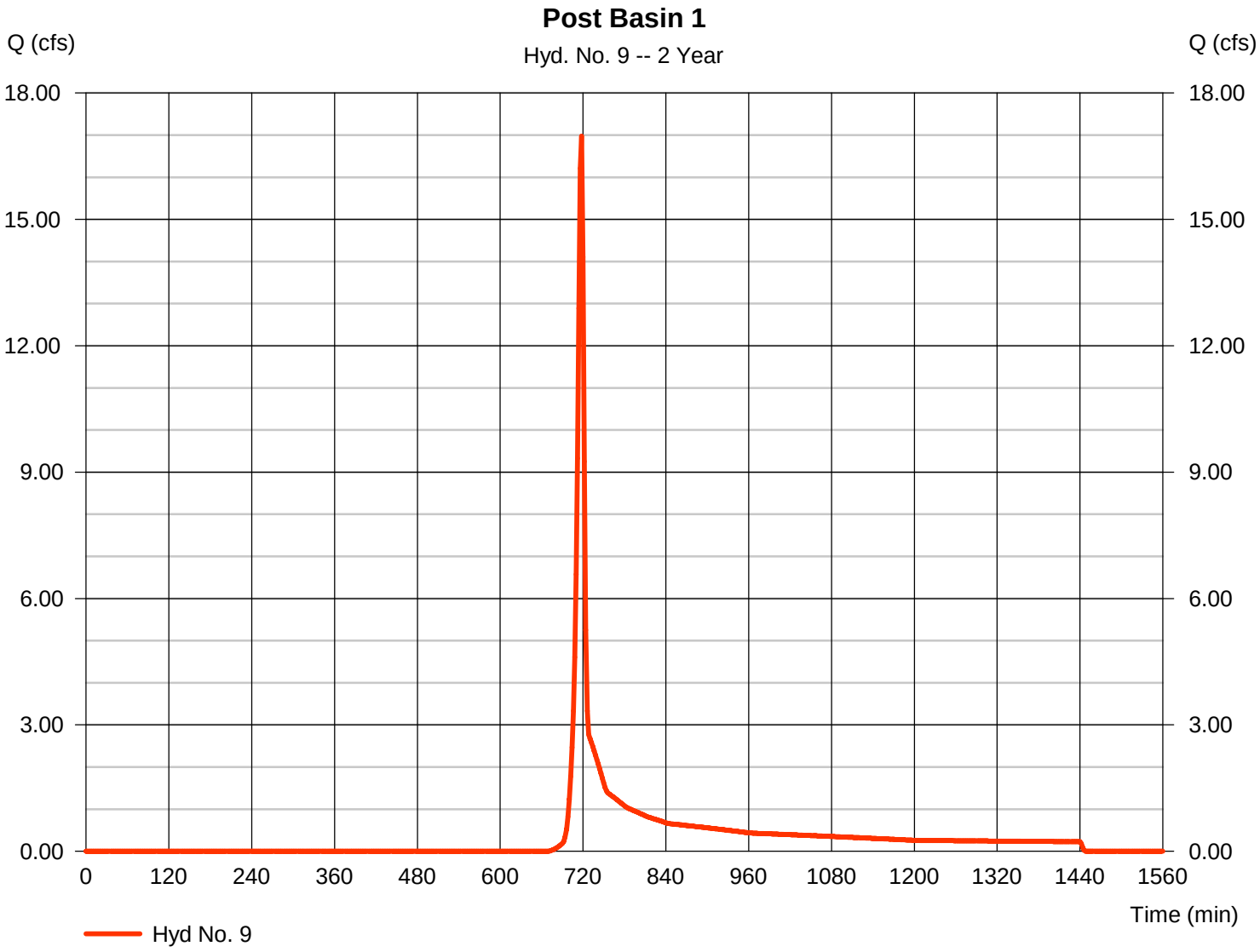


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.97 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	34,254 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



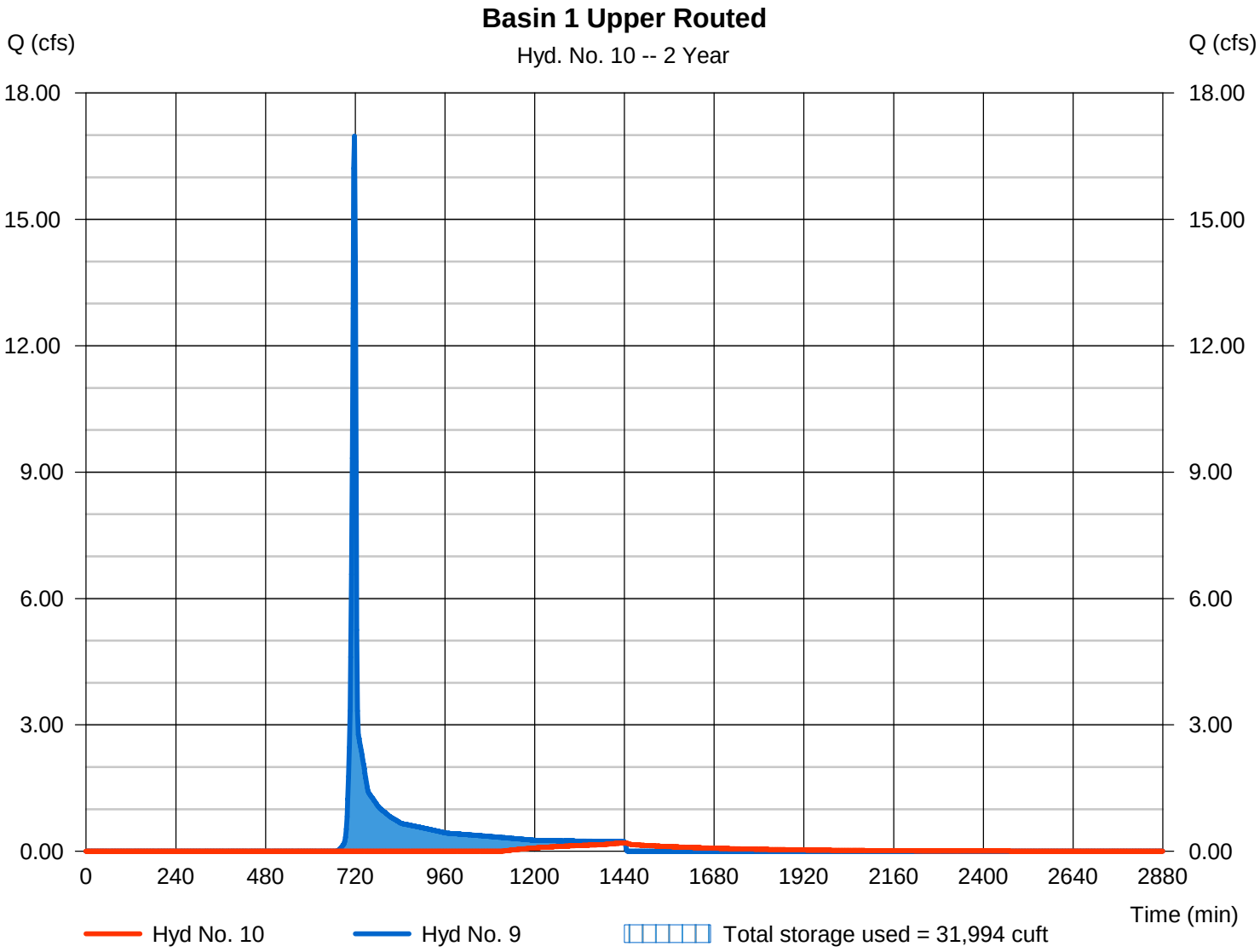
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.198 cfs
Storm frequency	=	2 yrs	Time to peak	=	1442 min
Time interval	=	2 min	Hyd. volume	=	5,083 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	317.01 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	31,994 cuft

Storage Indication method used.



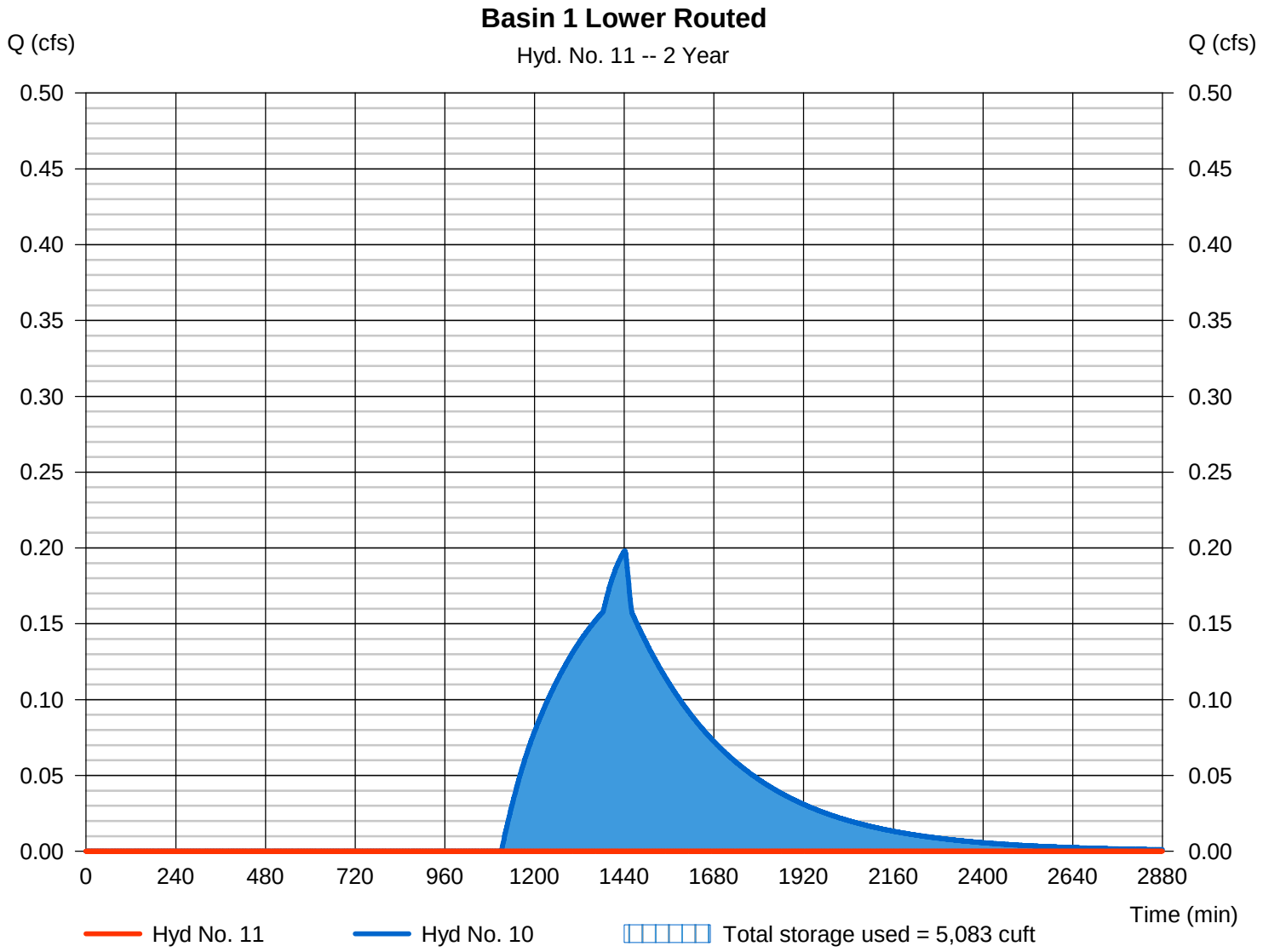
Hydrograph Report

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	299.17 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	5,083 cuft

Storage Indication method used.

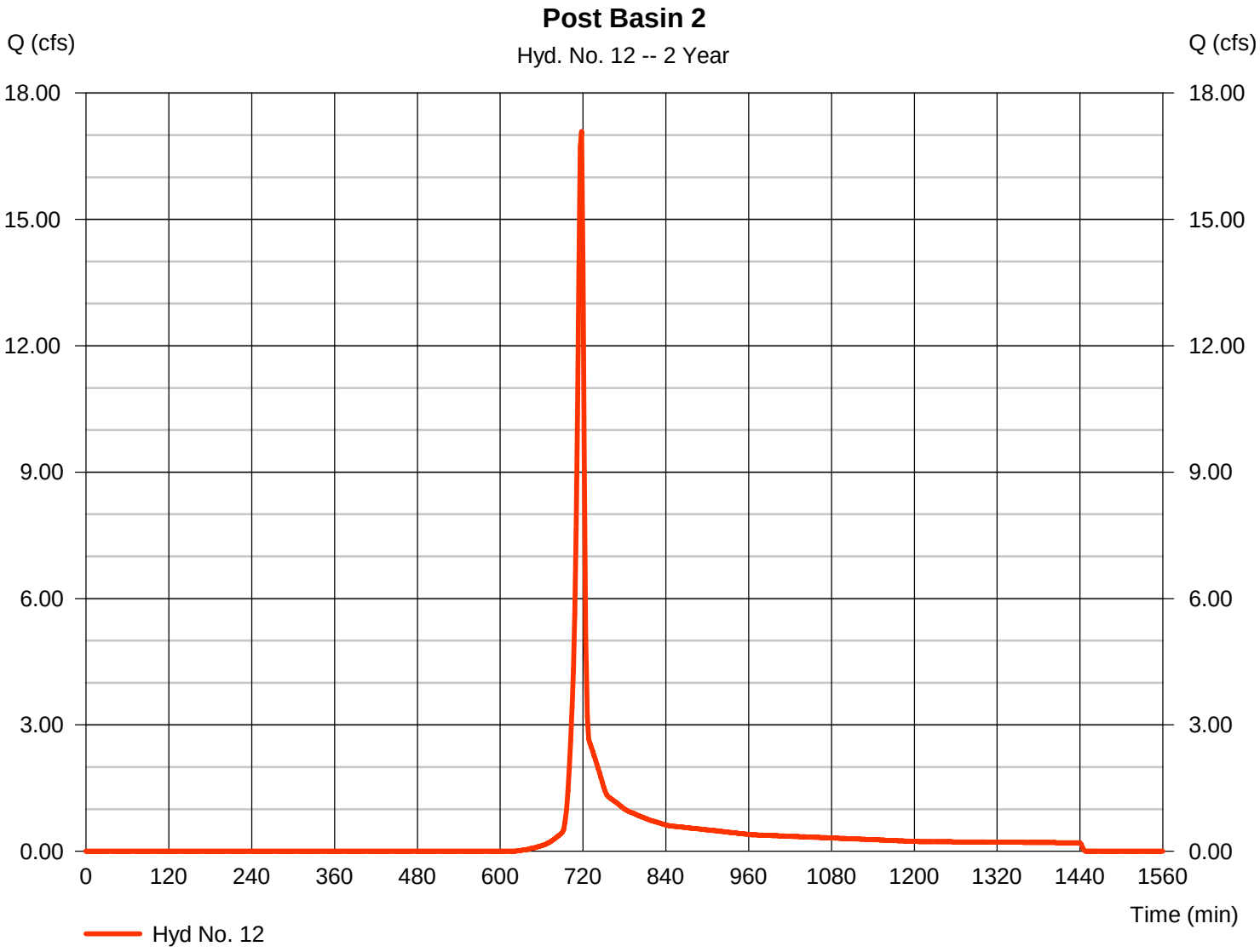


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 17.09 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 34,170 cuft
Drainage area	= 8.540 ac	Curve number	= 76.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



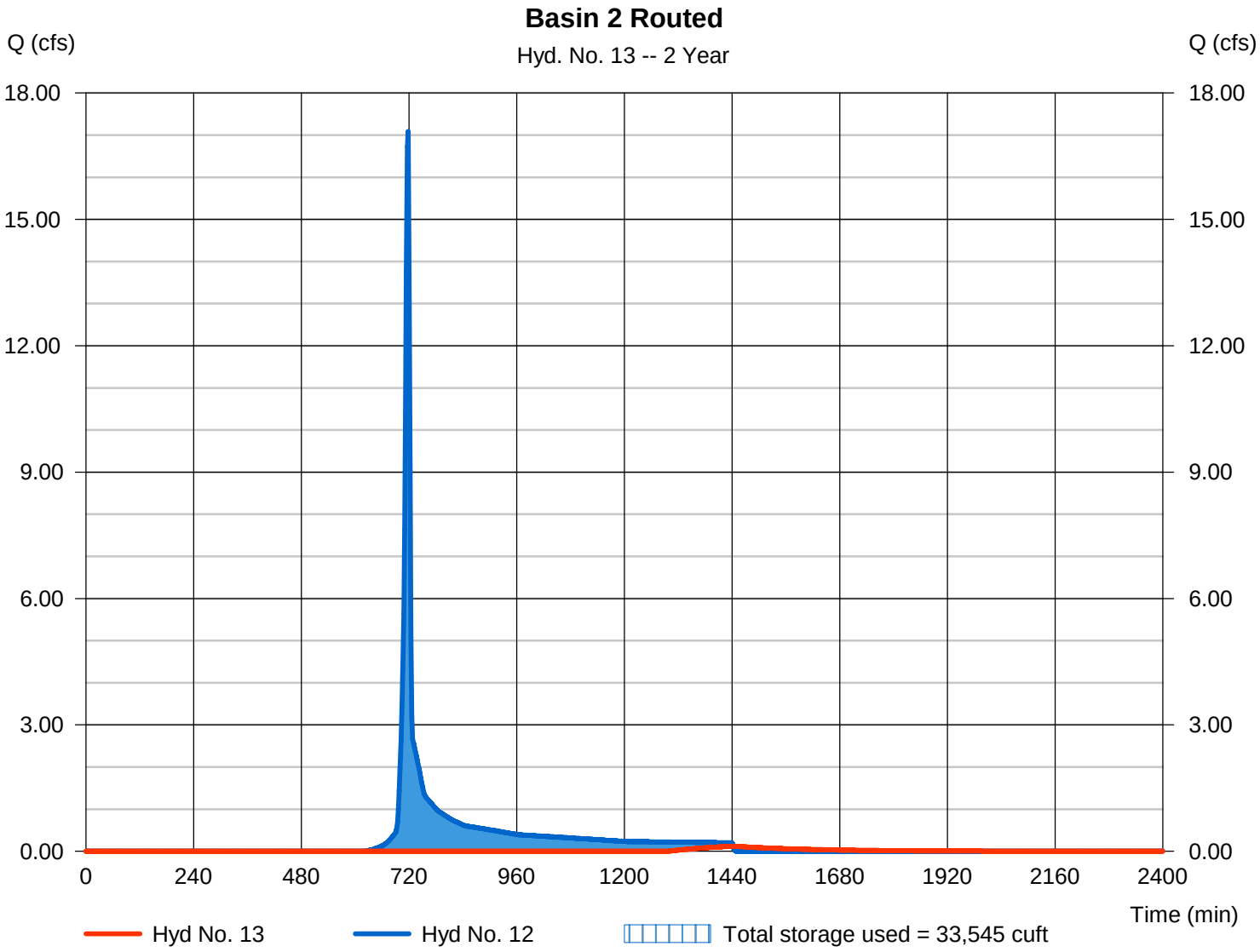
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.120 cfs
Storm frequency	=	2 yrs	Time to peak	=	1444 min
Time interval	=	2 min	Hyd. volume	=	1,815 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	306.88 ft
Reservoir name	=	Basin 2	Max. Storage	=	33,545 cuft

Storage Indication method used.

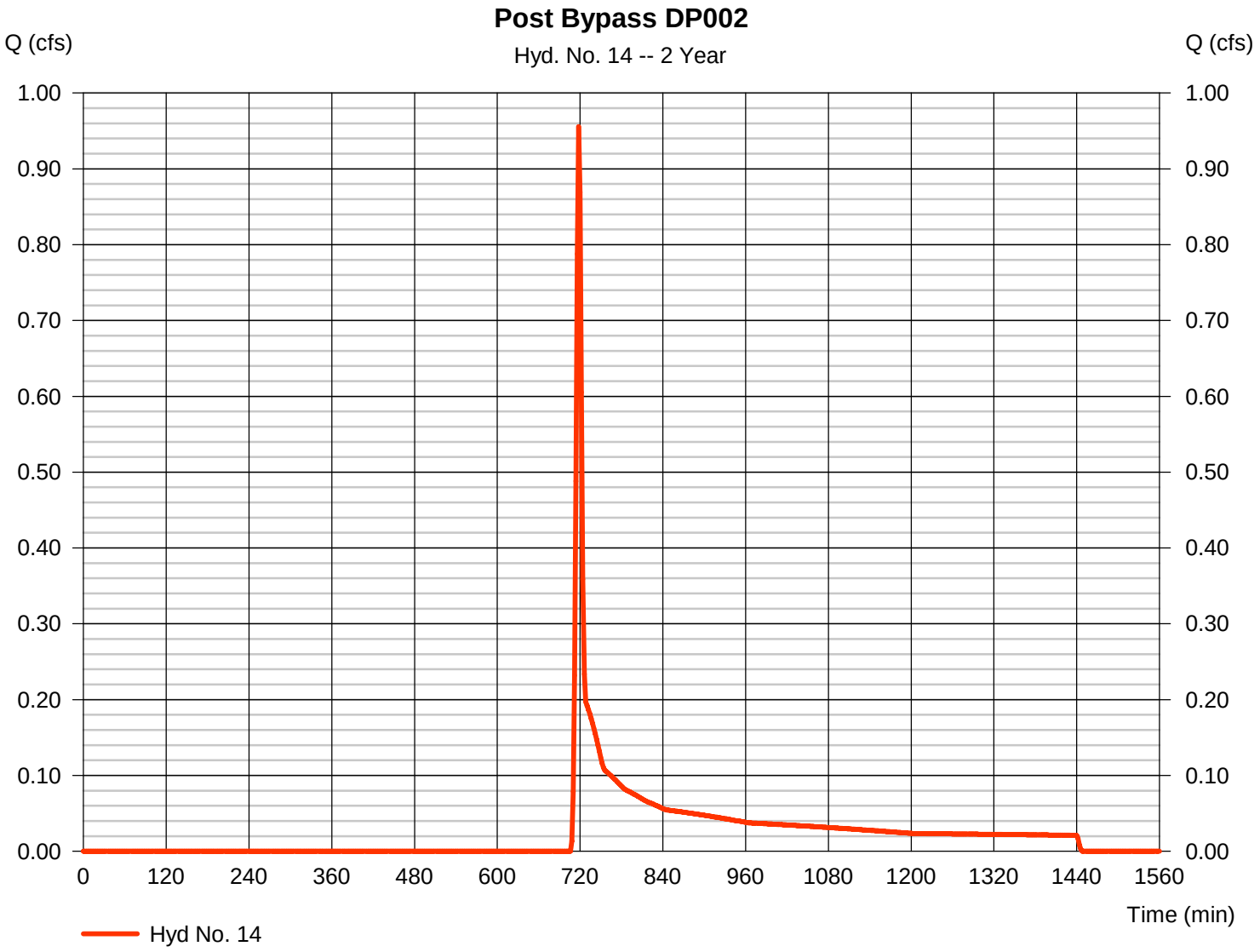


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.956 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,327 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

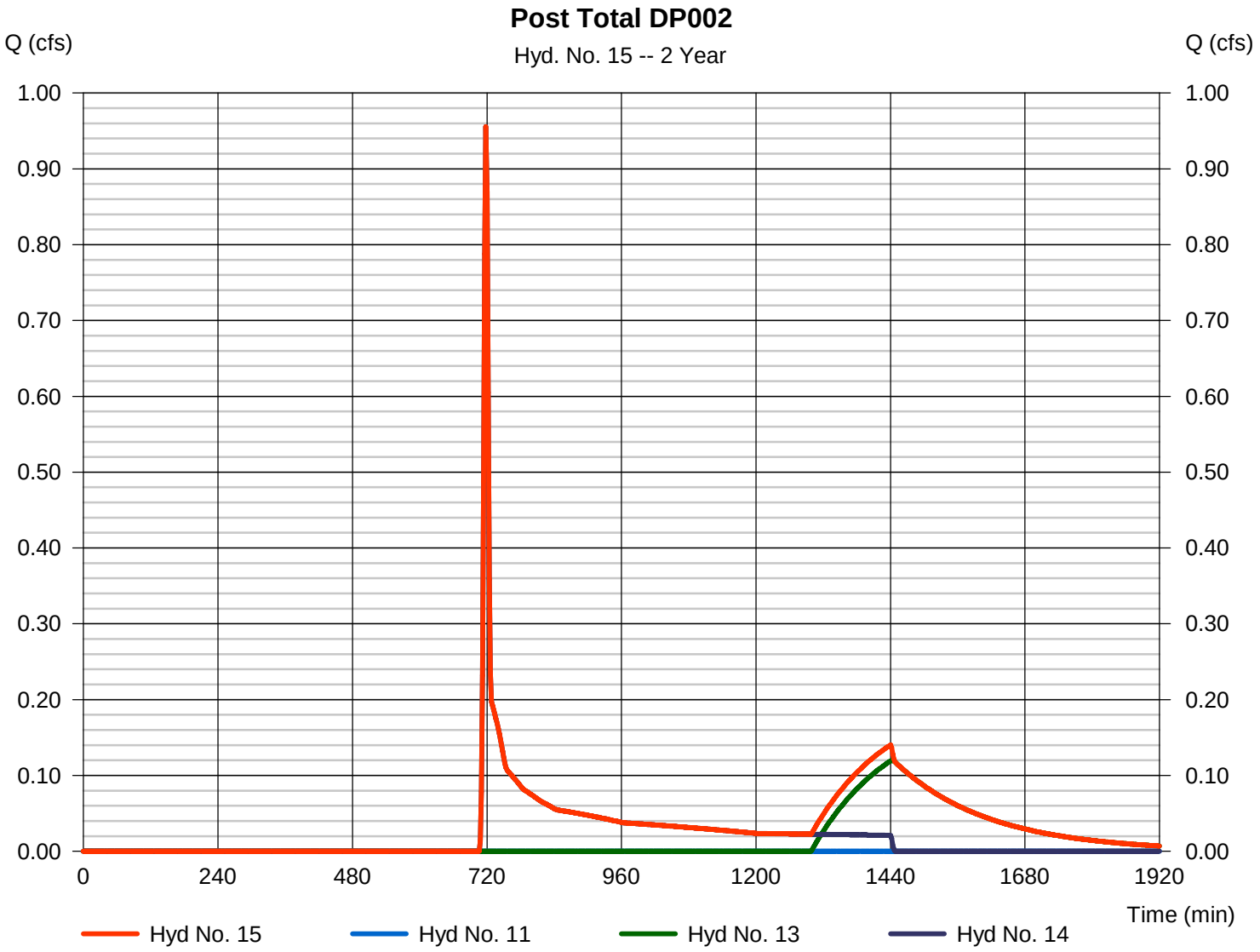


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	= Combine	Peak discharge	= 0.956 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 4,142 cuft
Inflow hyds.	= 11, 13, 14	Contrib. drain. area	= 1.540 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

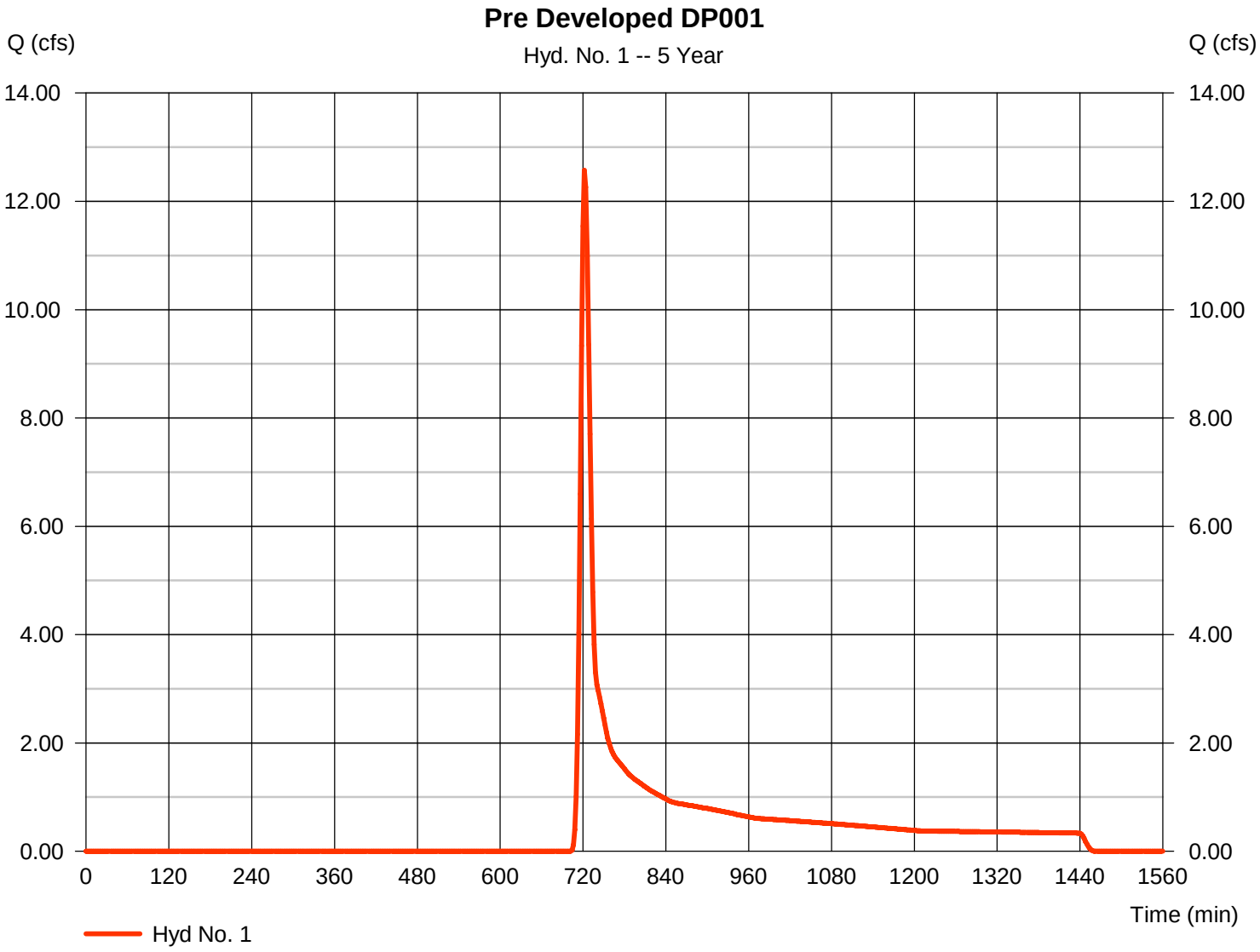
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	12.58	2	722	40,519	------	------	------	Pre Developed DP001
2	SCS Runoff	18.02	2	722	55,435	------	------	------	Pre Developed DP002
4	SCS Runoff	29.68	2	718	59,371	------	------	------	Post Basin 3
5	Reservoir	0.729	2	952	25,554	4	315.71	40,649	Basin 3 Routed
6	SCS Runoff	2.394	2	718	4,932	------	------	------	Post Bypass DP001
7	Combine	2.394	2	718	30,486	5, 6	------	------	Post Total DP001
9	SCS Runoff	28.01	2	718	56,002	------	------	------	Post Basin 1
10	Reservoir	0.923	2	868	26,831	9	317.22	34,801	Basin 1 Upper Routed
11	Reservoir	0.688	2	1016	20,738	10	299.97	8,537	Basin 1 Lower Routed
12	SCS Runoff	26.44	2	718	53,176	------	------	------	Post Basin 2
13	Reservoir	0.682	2	918	20,822	12	307.11	36,789	Basin 2 Routed
14	SCS Runoff	2.121	2	718	4,472	------	------	------	Post Bypass DP002
15	Combine	2.121	2	718	46,032	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.58 cfs
Storm frequency	=	5 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	40,519 cuft
Drainage area	=	15.430 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

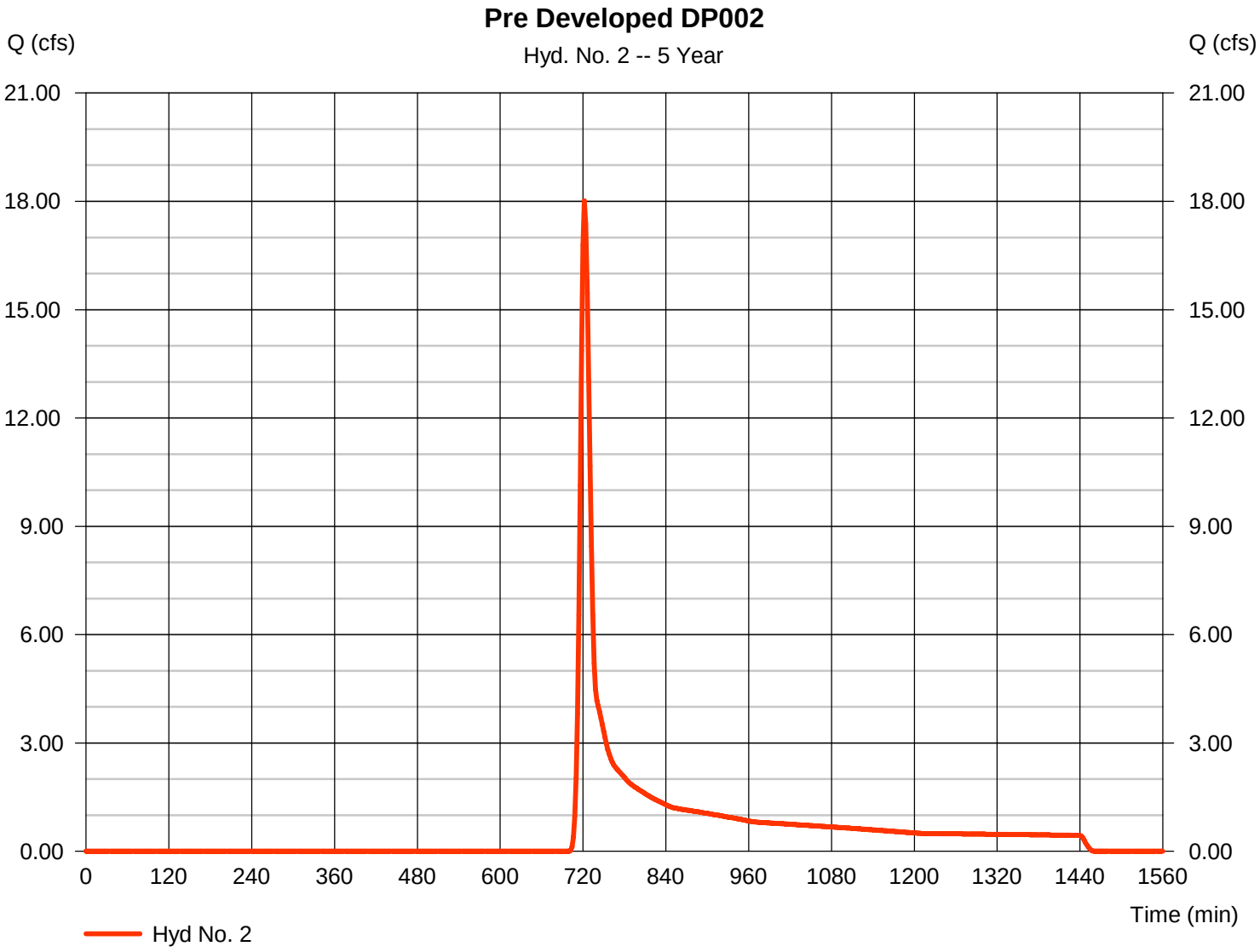


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.02 cfs
Storm frequency	=	5 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	55,435 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

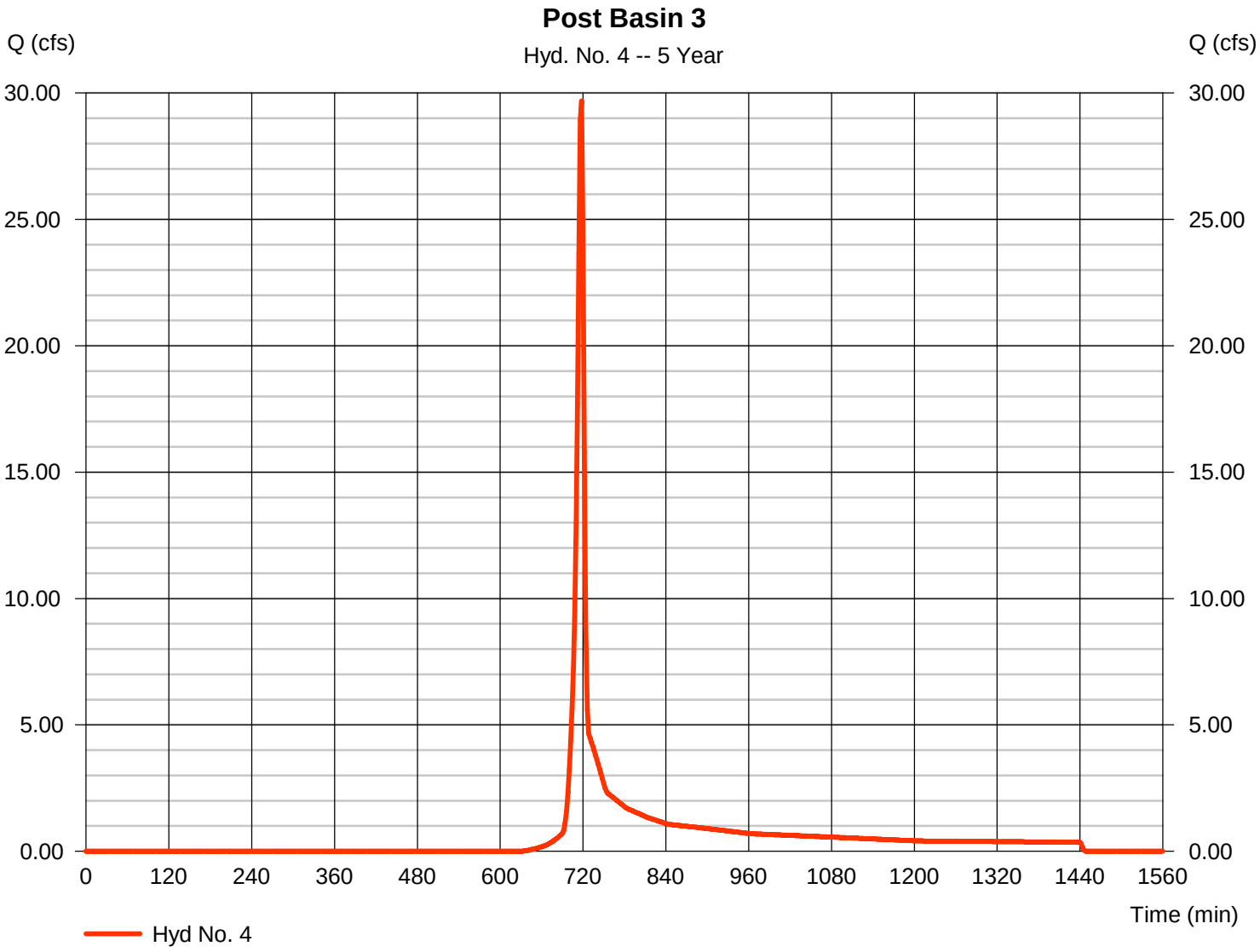


Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	29.68 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	59,371 cuft
Drainage area	=	12.150 ac	Curve number	=	70.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



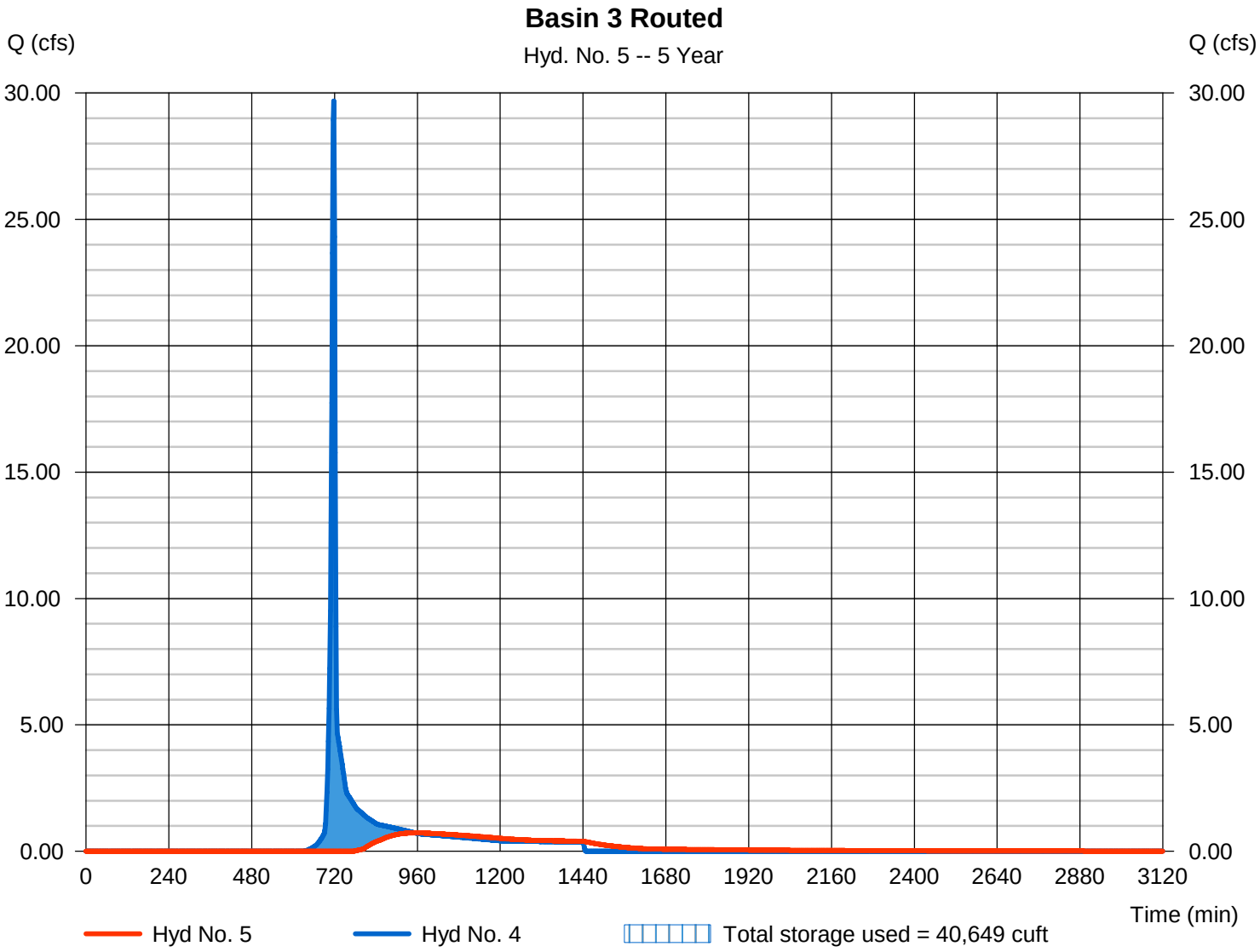
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.729 cfs
Storm frequency	=	5 yrs	Time to peak	=	952 min
Time interval	=	2 min	Hyd. volume	=	25,554 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	315.71 ft
Reservoir name	=	Basin 3	Max. Storage	=	40,649 cuft

Storage Indication method used.

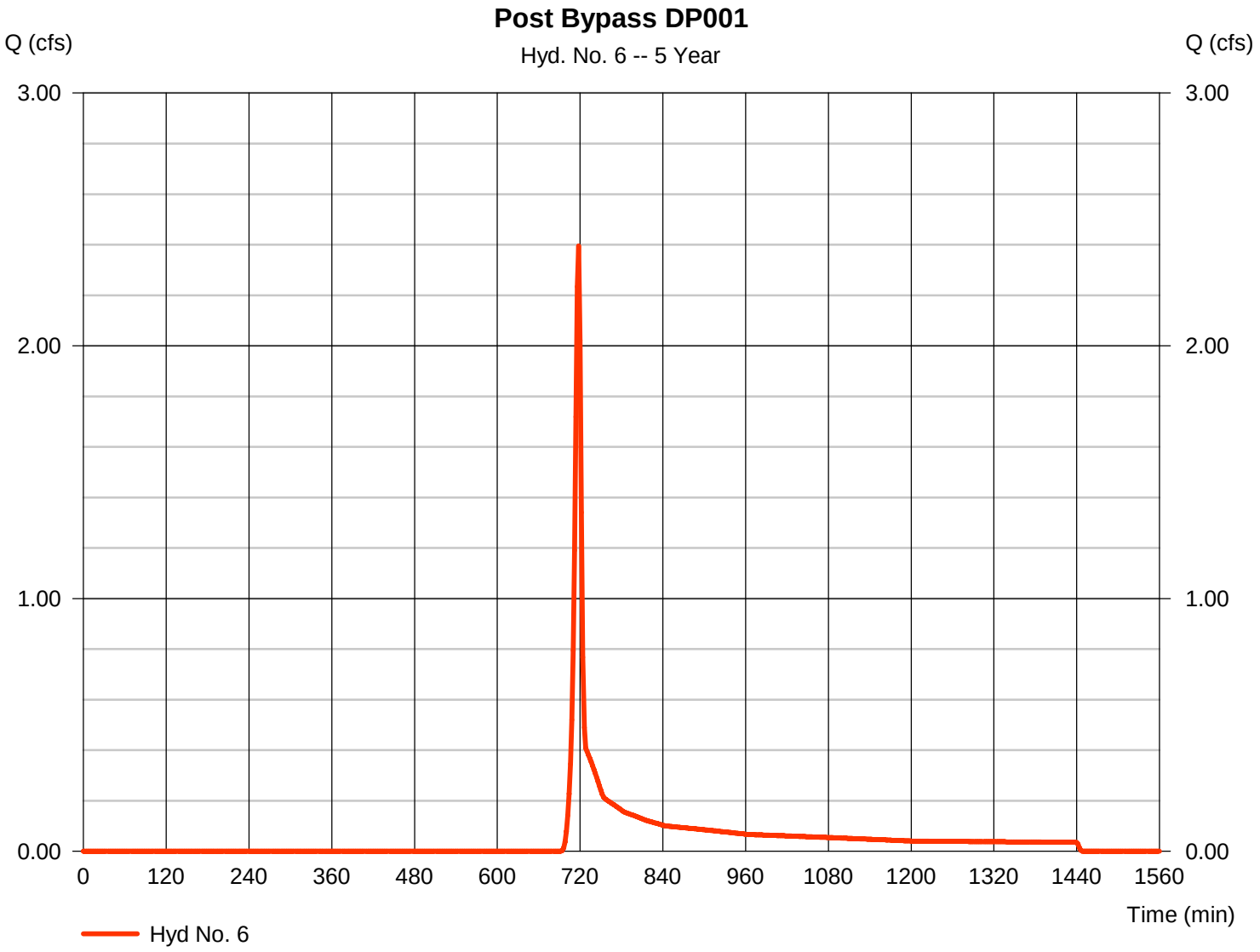


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.394 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,932 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

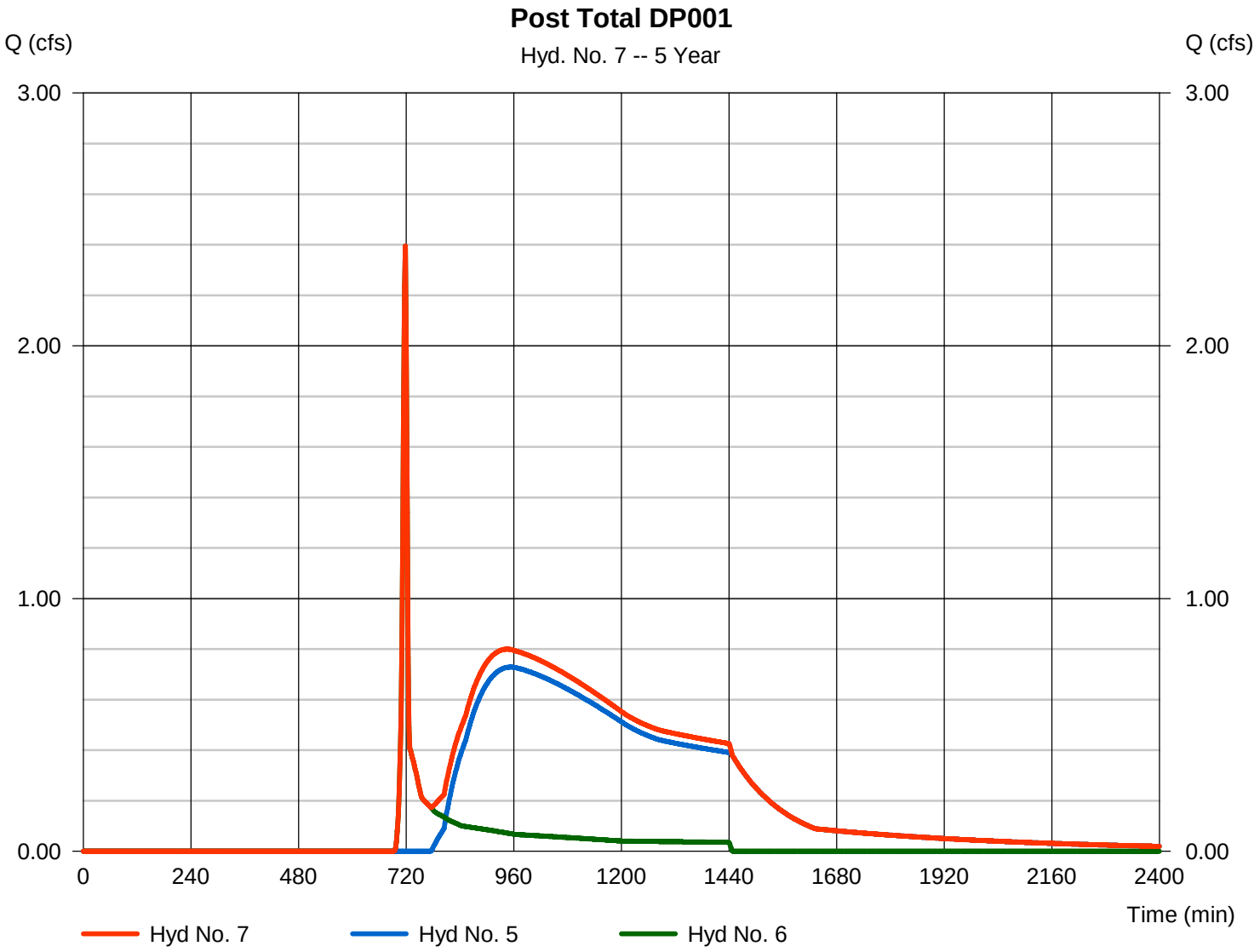


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 2.394 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 30,486 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.490 ac

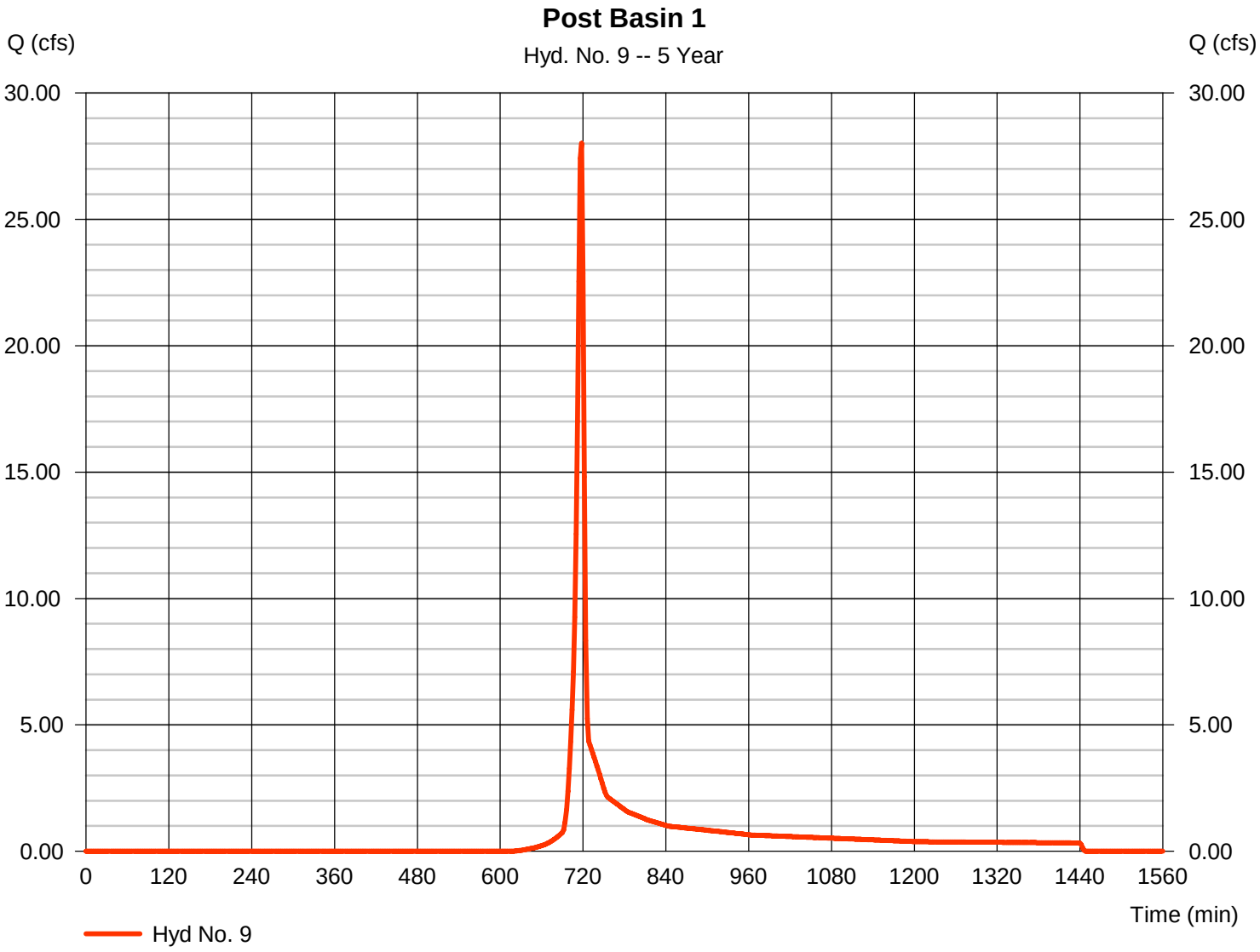


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.01 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	56,002 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



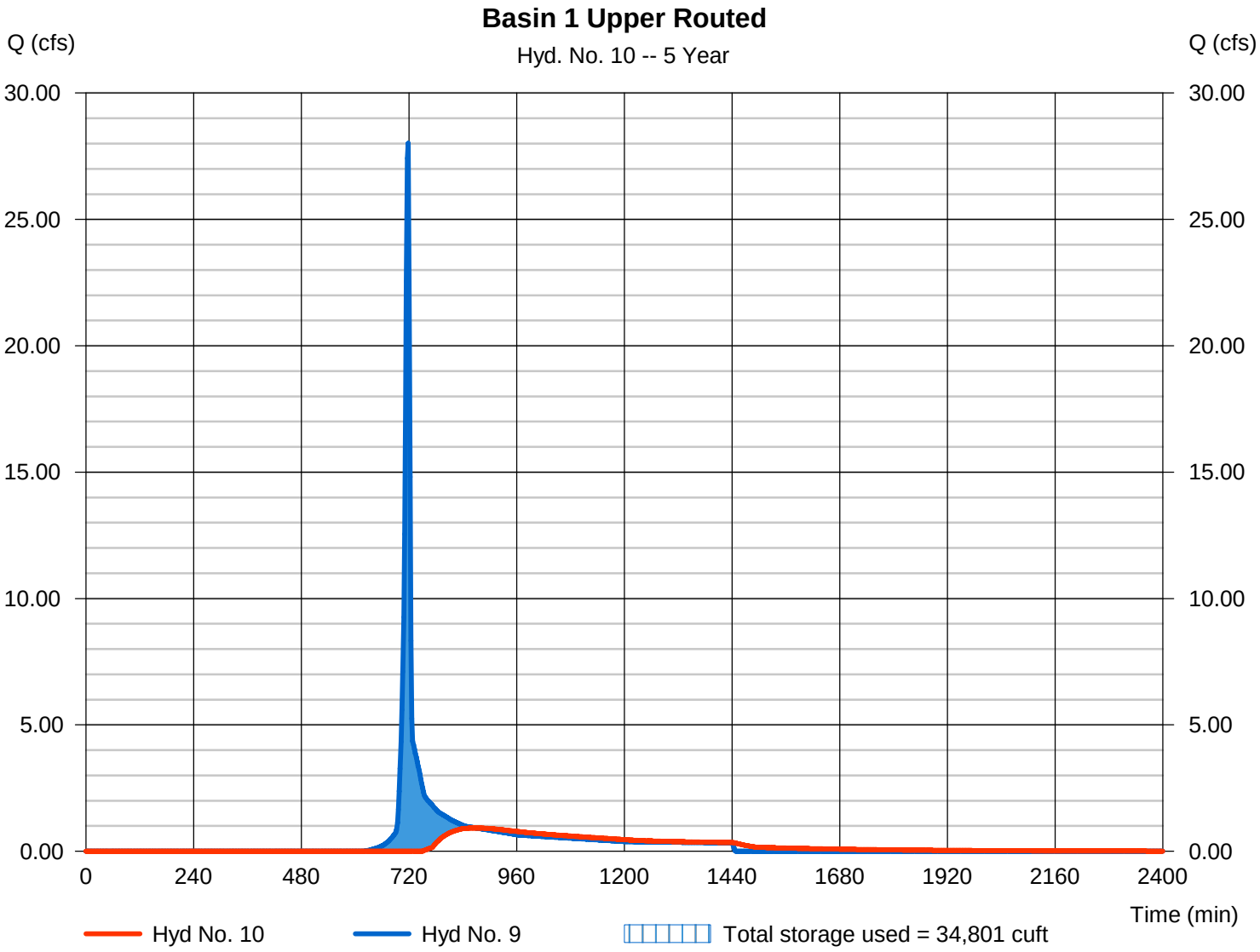
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.923 cfs
Storm frequency	=	5 yrs	Time to peak	=	868 min
Time interval	=	2 min	Hyd. volume	=	26,831 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	317.22 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	34,801 cuft

Storage Indication method used.



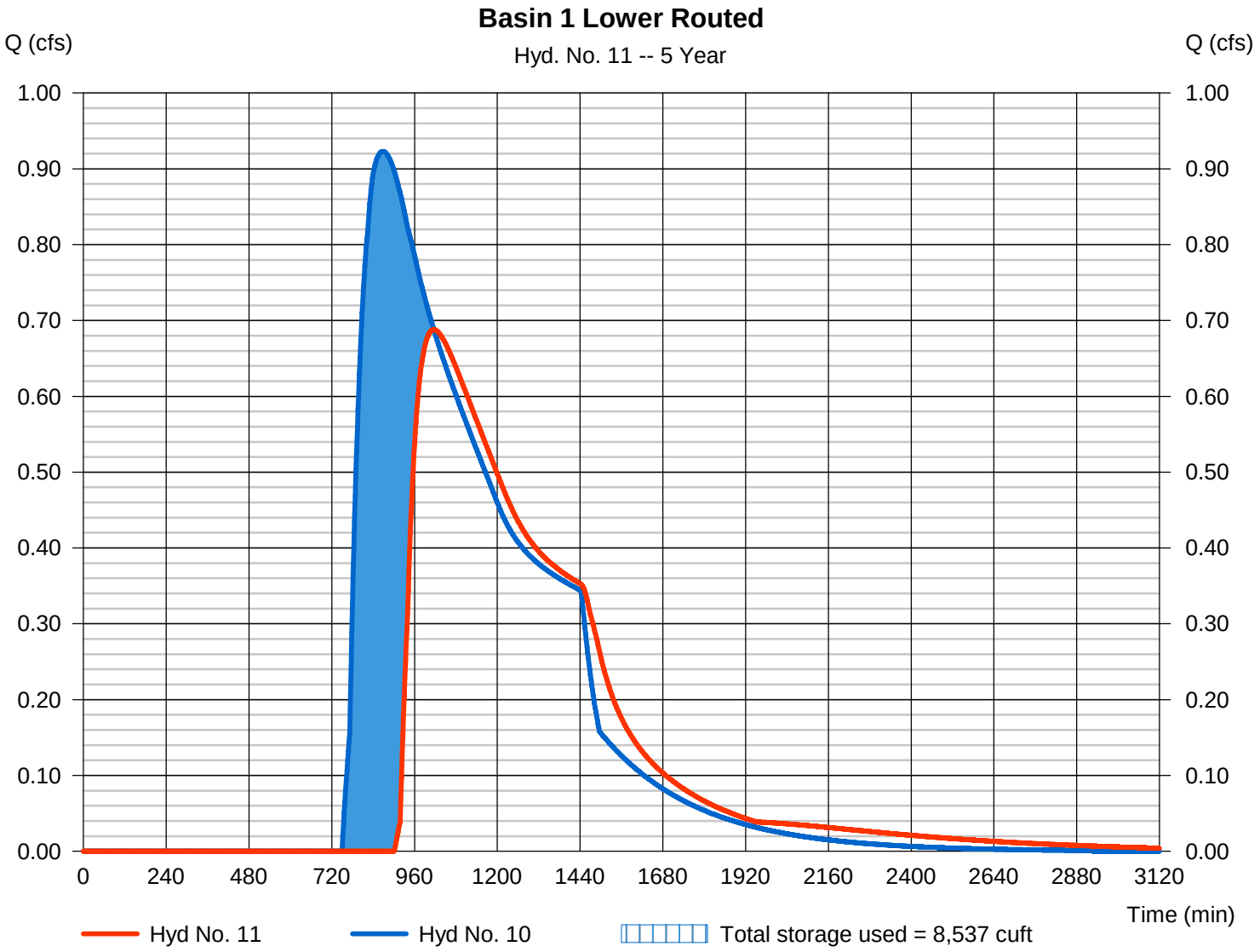
Hydrograph Report

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.688 cfs
Storm frequency	=	5 yrs	Time to peak	=	1016 min
Time interval	=	2 min	Hyd. volume	=	20,738 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	299.97 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	8,537 cuft

Storage Indication method used.

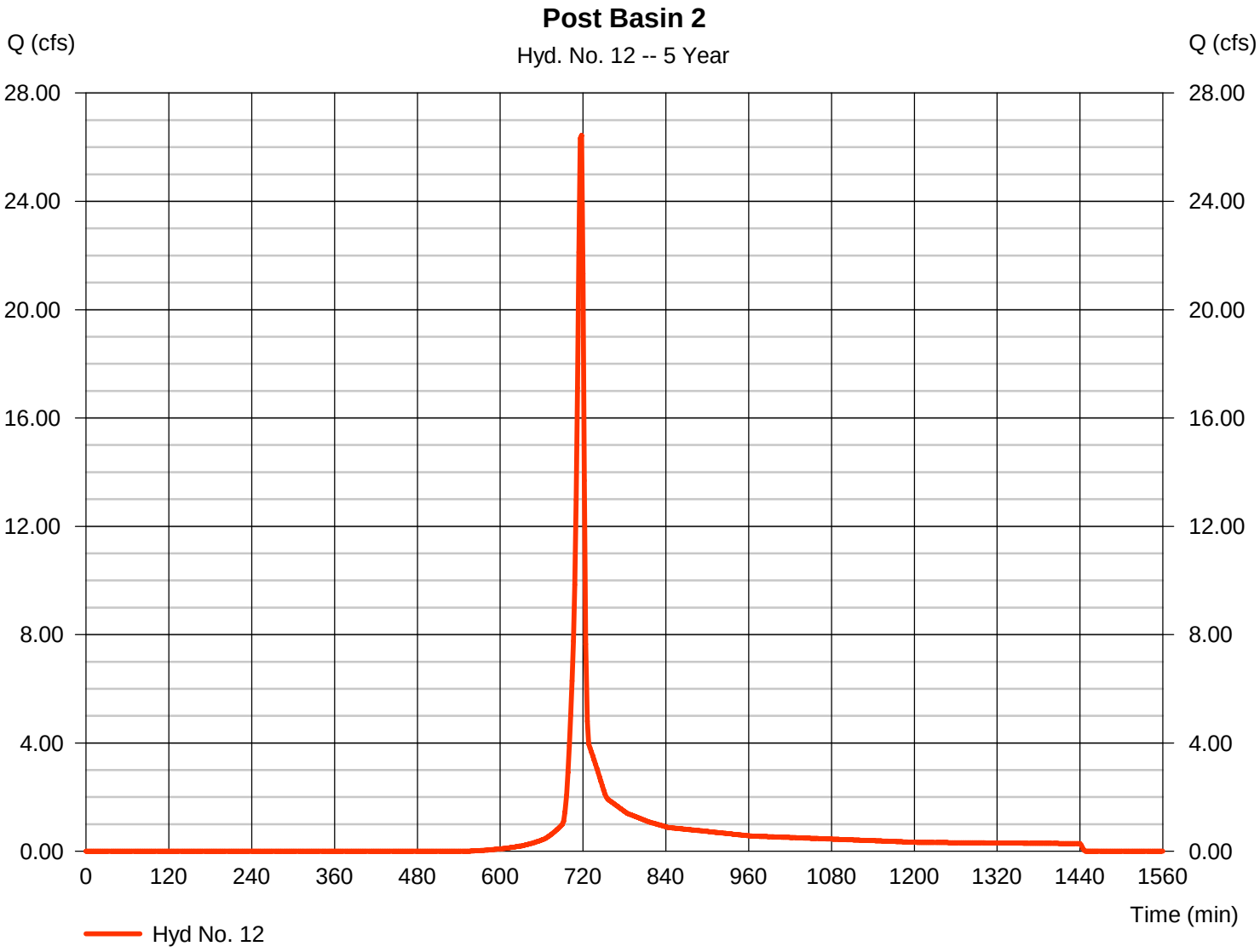


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.44 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	53,176 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



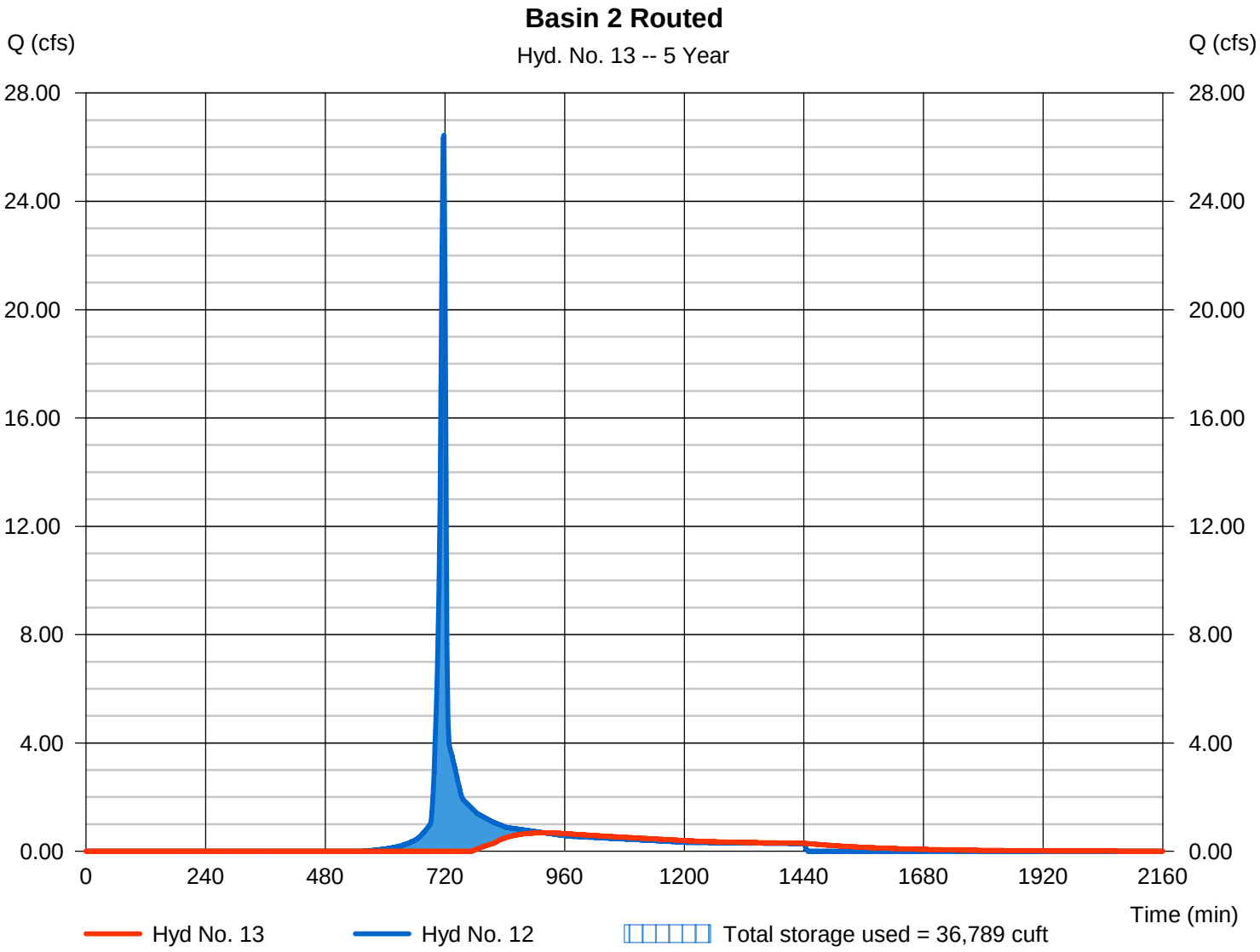
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.682 cfs
Storm frequency	=	5 yrs	Time to peak	=	918 min
Time interval	=	2 min	Hyd. volume	=	20,822 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	307.11 ft
Reservoir name	=	Basin 2	Max. Storage	=	36,789 cuft

Storage Indication method used.

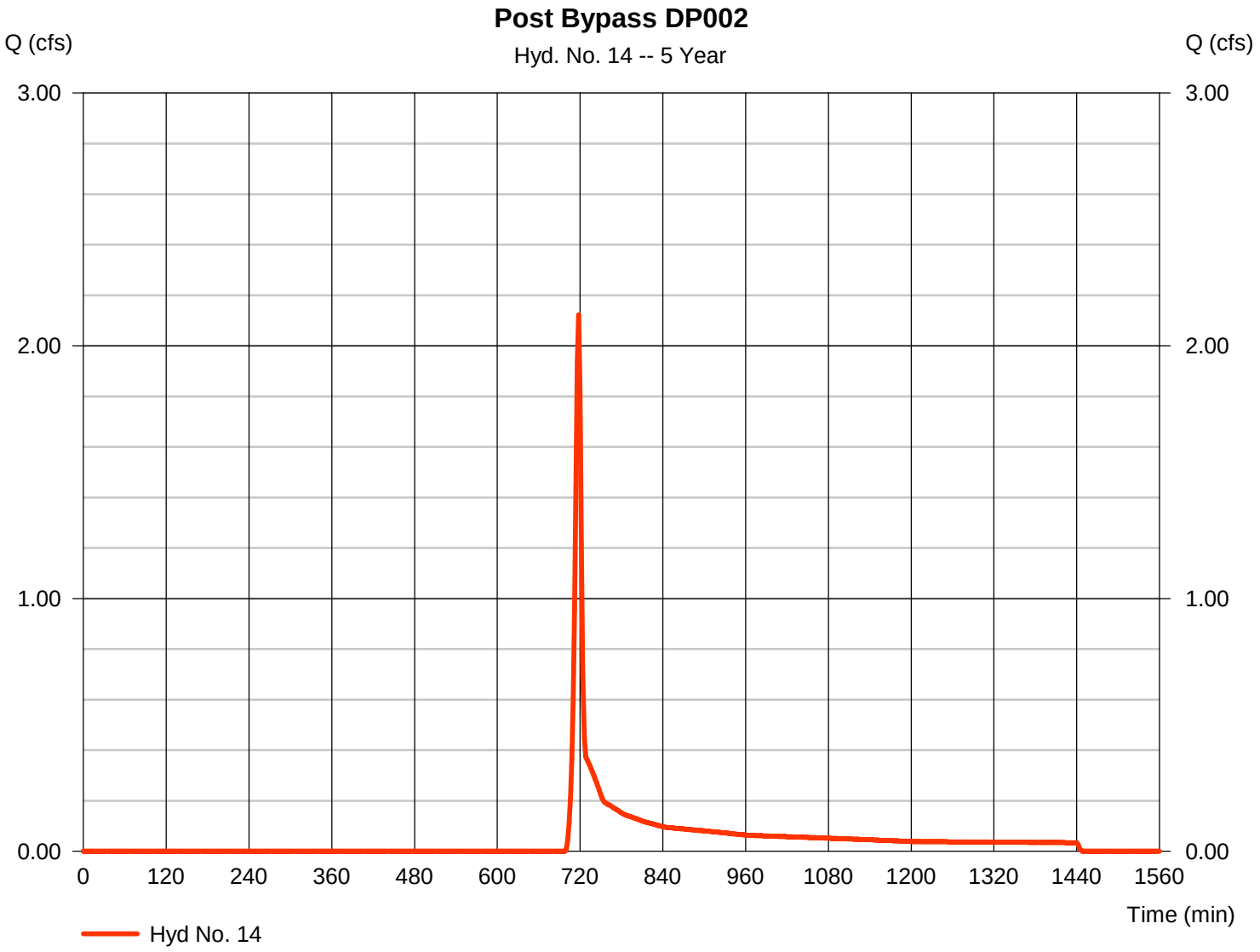


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.121 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,472 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

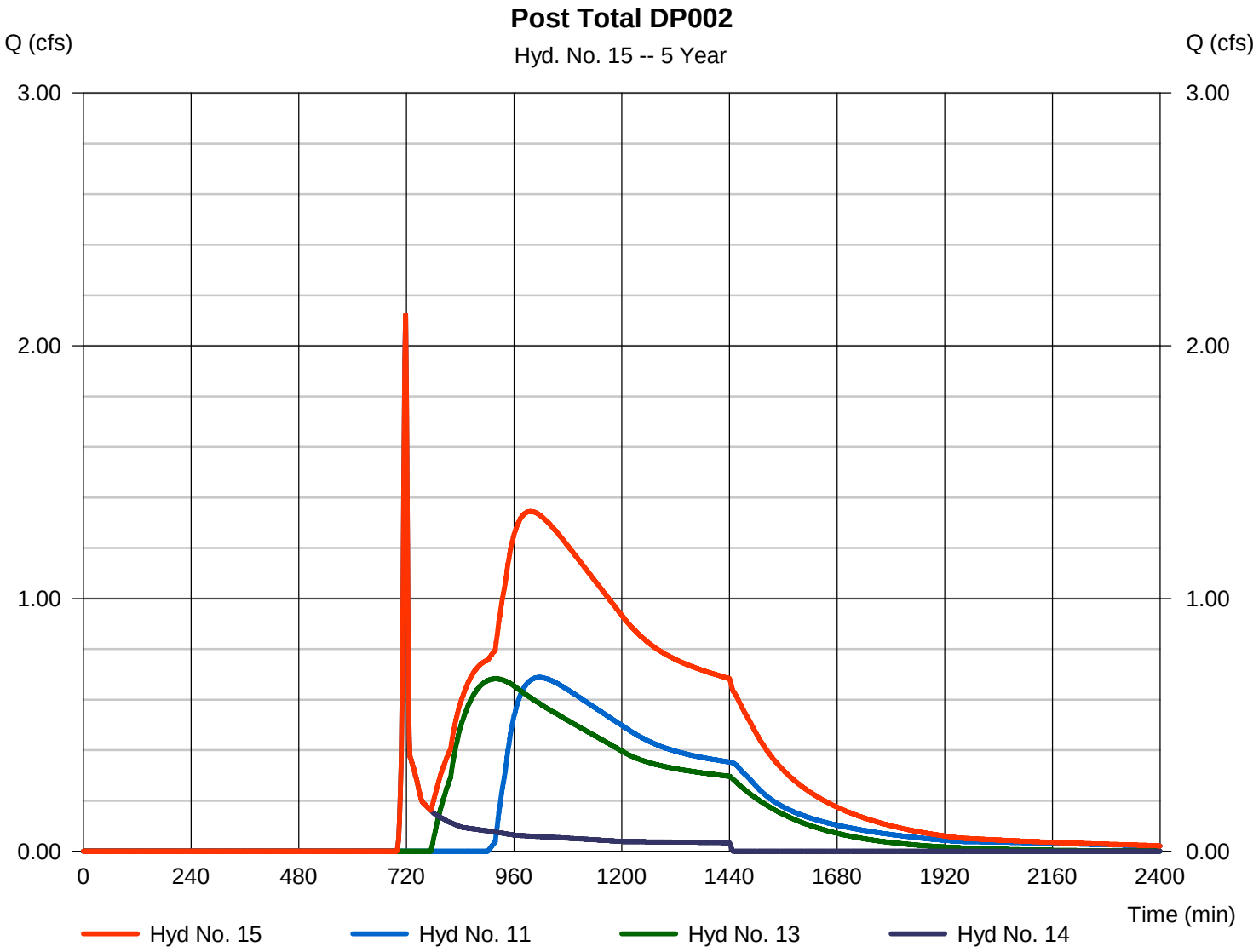


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	= Combine	Peak discharge	= 2.121 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 46,032 cuft
Inflow hyds.	= 11, 13, 14	Contrib. drain. area	= 1.540 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

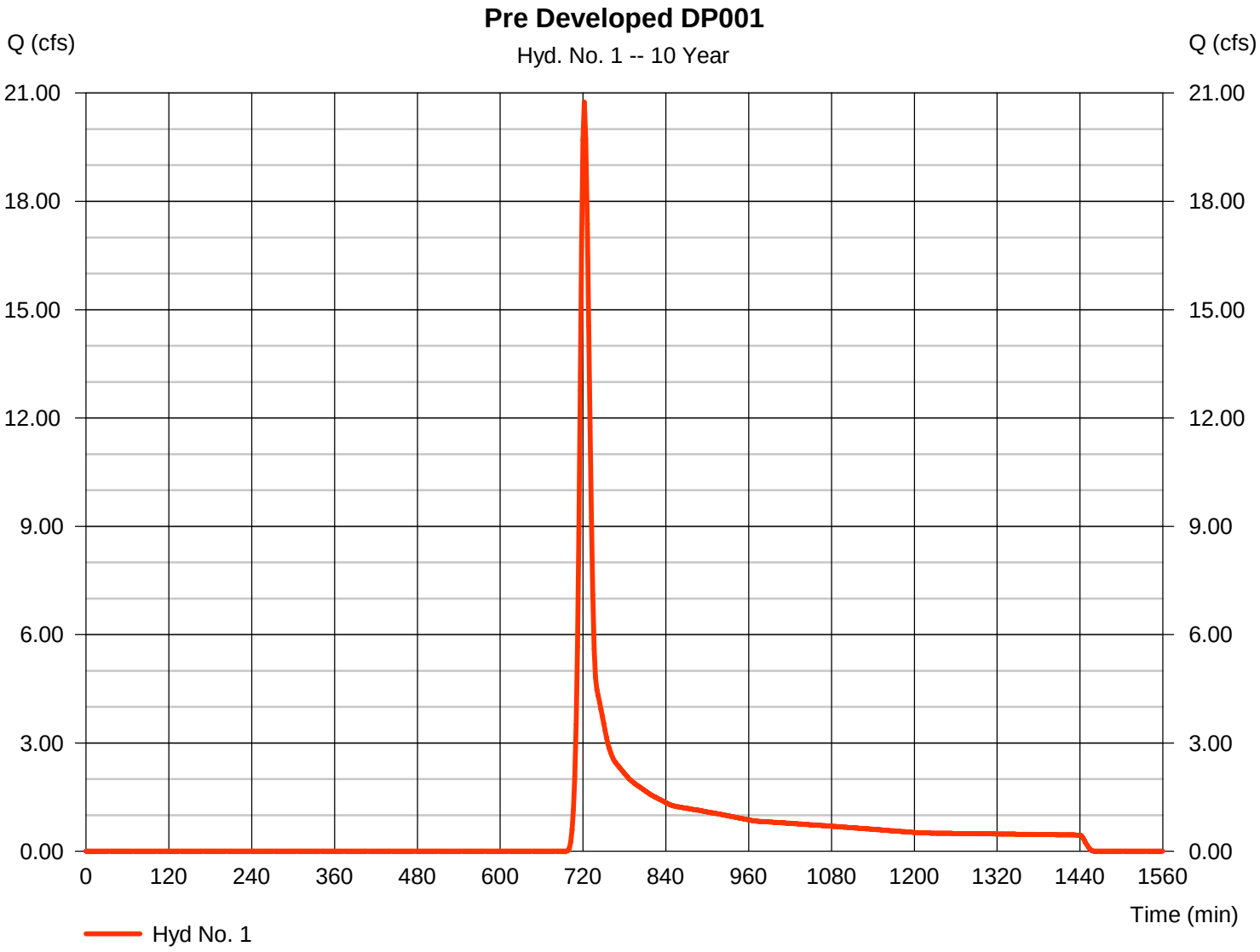
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	20.75	2	722	60,334	------	------	------	Pre Developed DP001
2	SCS Runoff	28.64	2	722	81,339	------	------	------	Pre Developed DP002
4	SCS Runoff	39.83	2	718	79,751	------	------	------	Post Basin 3
5	Reservoir	1.627	2	820	45,934	4	316.05	45,462	Basin 3 Routed
6	SCS Runoff	3.466	2	718	6,991	------	------	------	Post Bypass DP001
7	Combine	3.466	2	718	52,925	5, 6	------	------	Post Total DP001
9	SCS Runoff	37.29	2	718	74,773	------	------	------	Post Basin 1
10	Reservoir	2.423	2	768	45,602	9	317.51	38,706	Basin 1 Upper Routed
11	Reservoir	1.433	2	880	39,509	10	300.33	11,278	Basin 1 Lower Routed
12	SCS Runoff	34.26	2	716	69,196	------	------	------	Post Basin 2
13	Reservoir	1.706	2	788	36,842	12	307.33	40,114	Basin 2 Routed
14	SCS Runoff	3.170	2	718	6,463	------	------	------	Post Bypass DP002
15	Combine	3.170	2	718	82,814	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	= SCS Runoff	Peak discharge	= 20.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 60,334 cuft
Drainage area	= 15.430 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.00 min
Total precip.	= 4.77 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

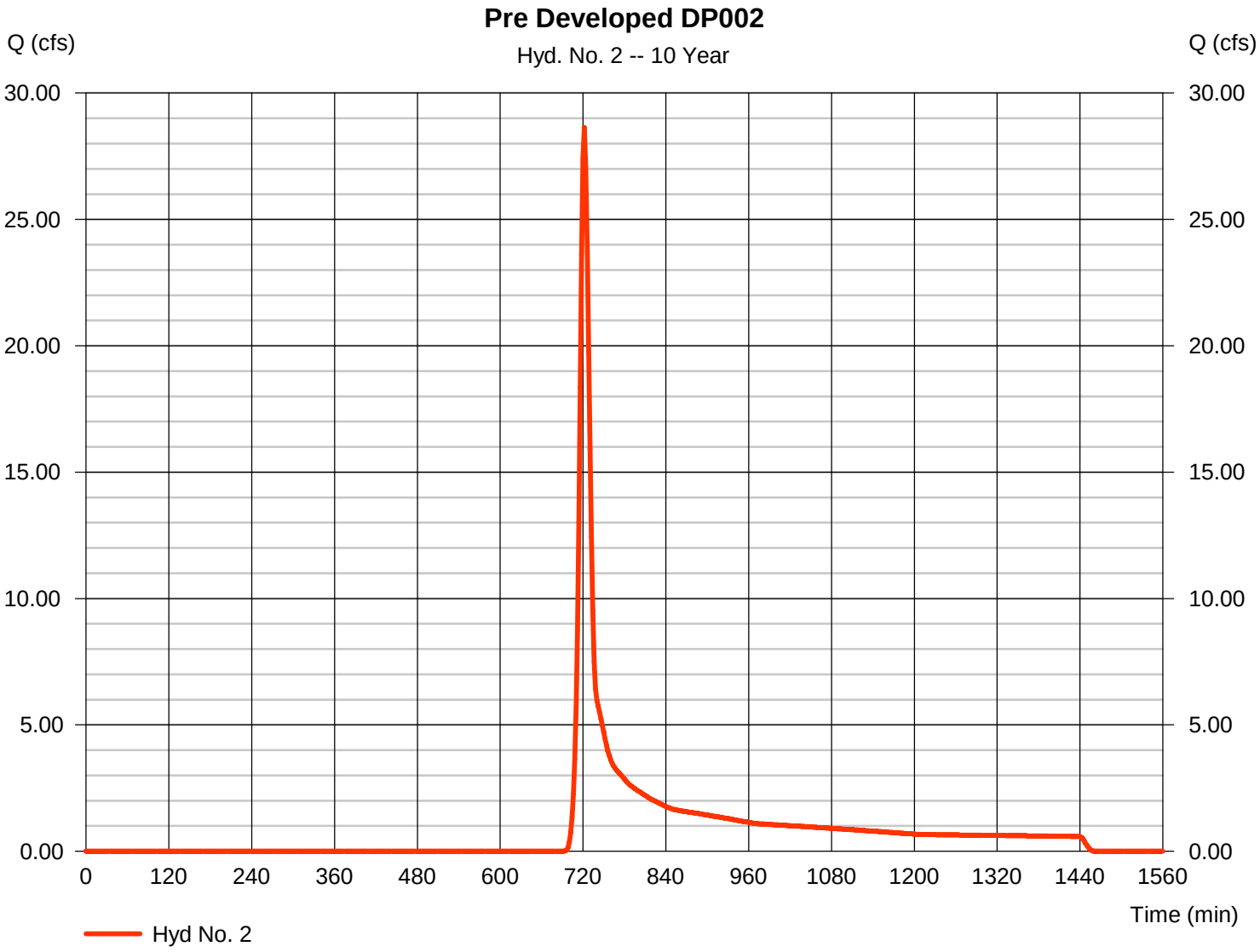


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.64 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	81,339 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

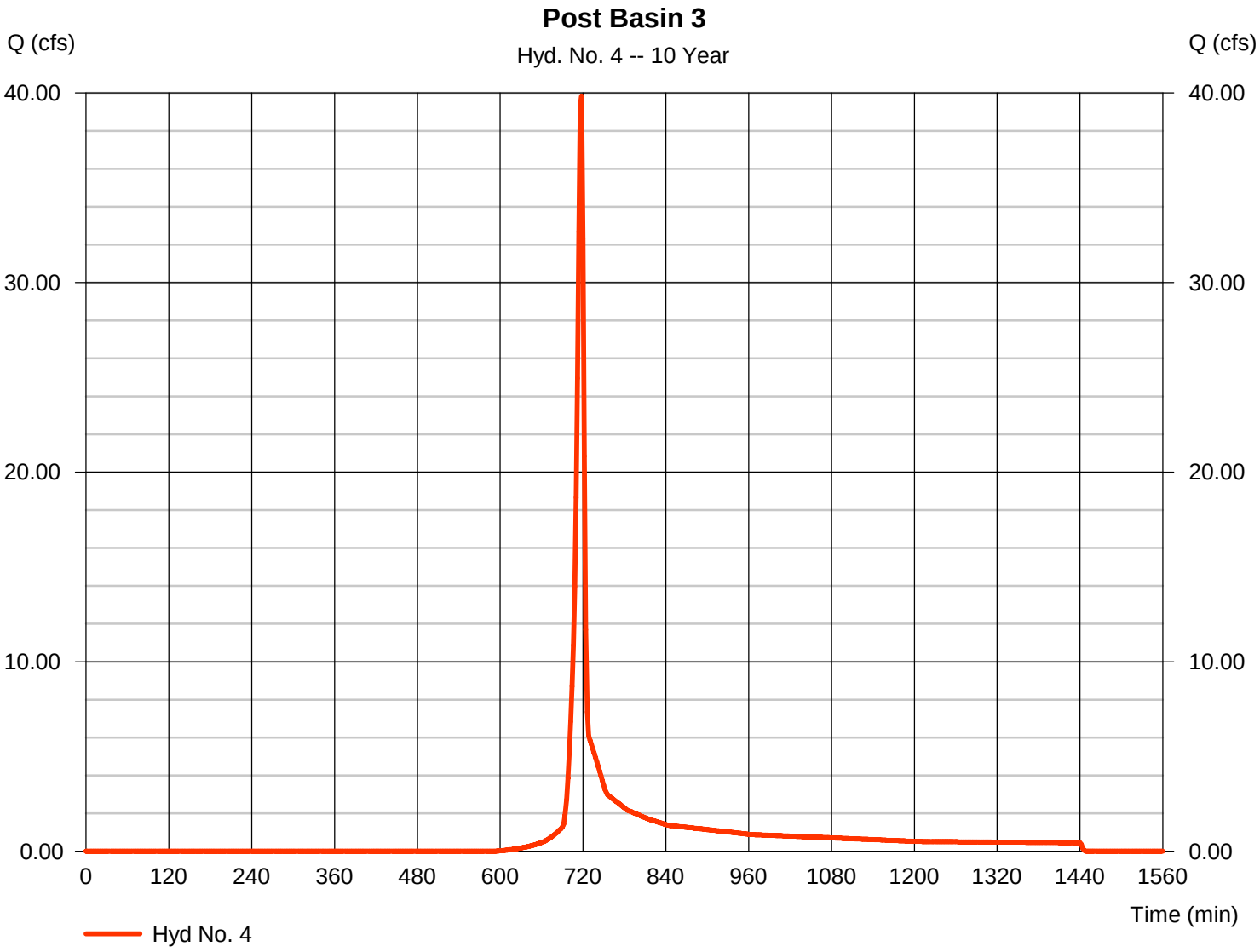


Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	39.83 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	79,751 cuft
Drainage area	=	12.150 ac	Curve number	=	70.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



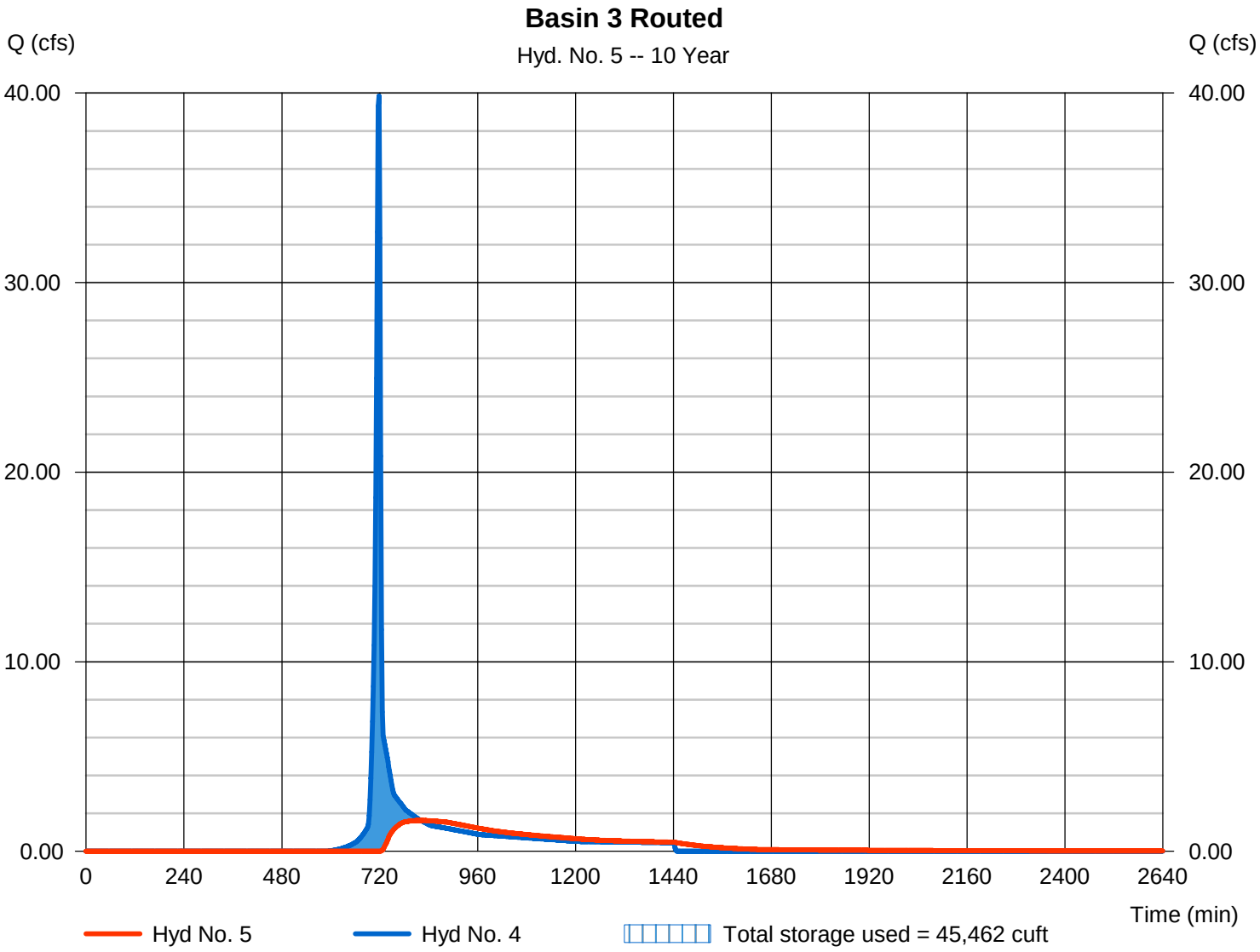
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.627 cfs
Storm frequency	=	10 yrs	Time to peak	=	820 min
Time interval	=	2 min	Hyd. volume	=	45,934 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	316.05 ft
Reservoir name	=	Basin 3	Max. Storage	=	45,462 cuft

Storage Indication method used.

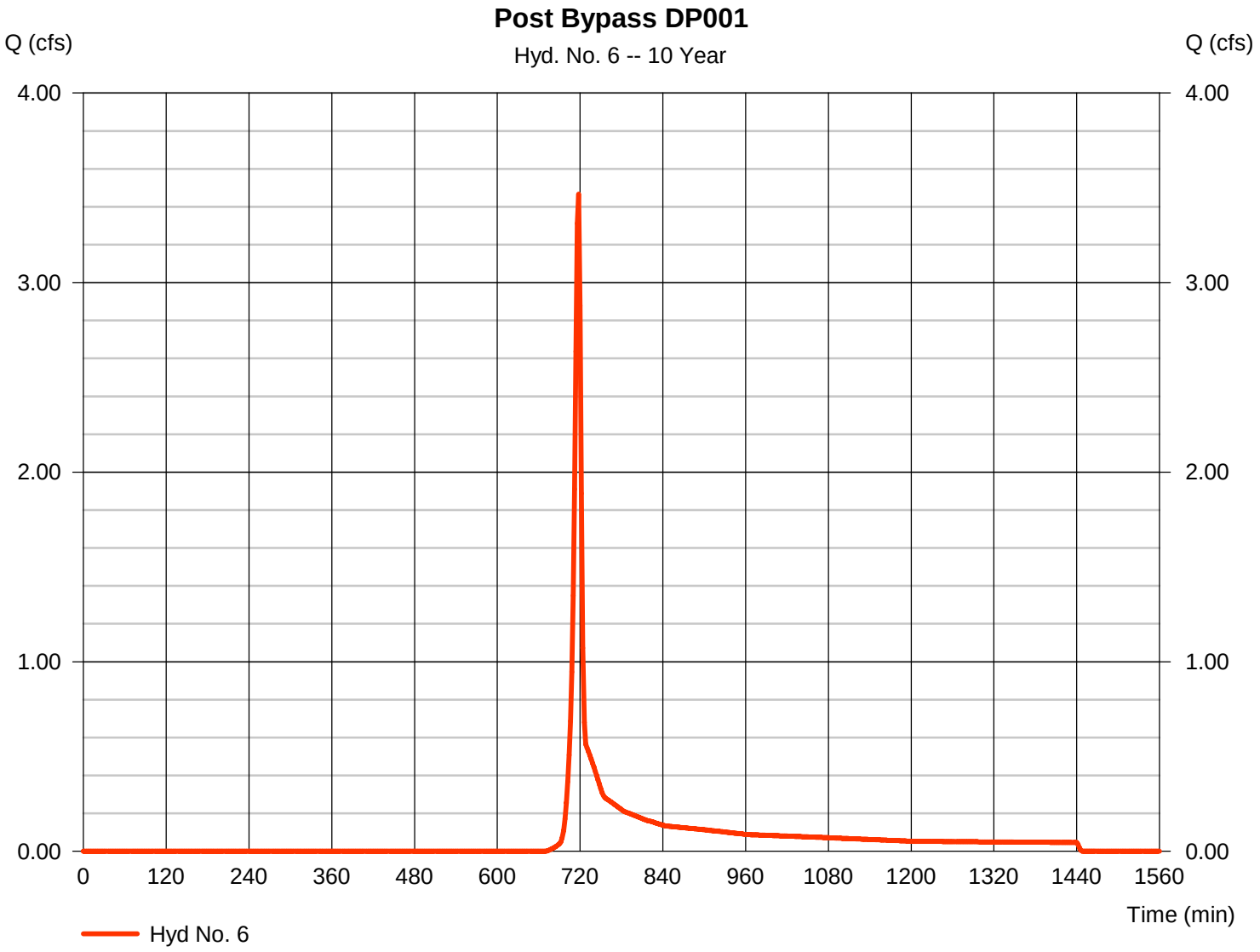


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.466 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,991 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

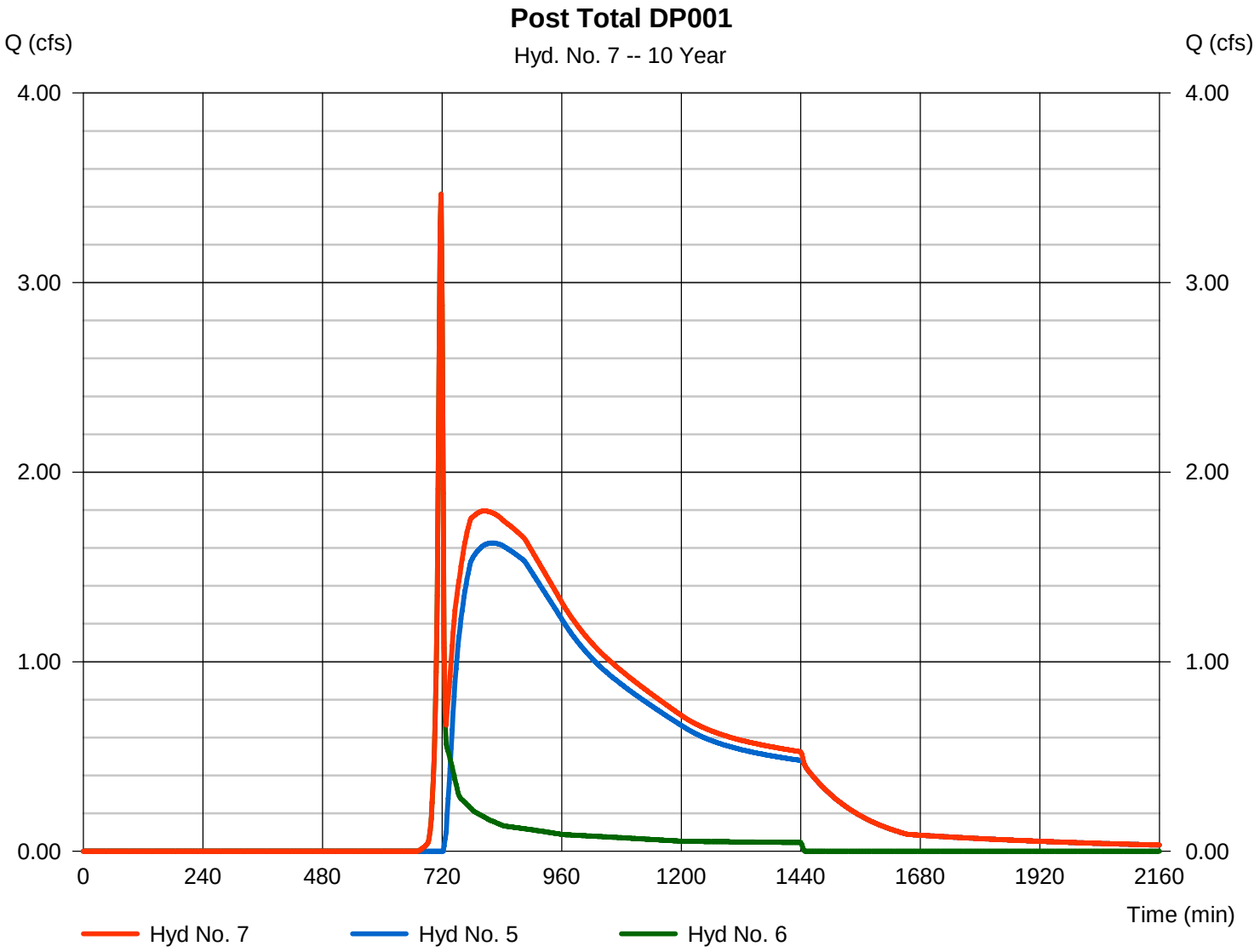


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 3.466 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 52,925 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.490 ac

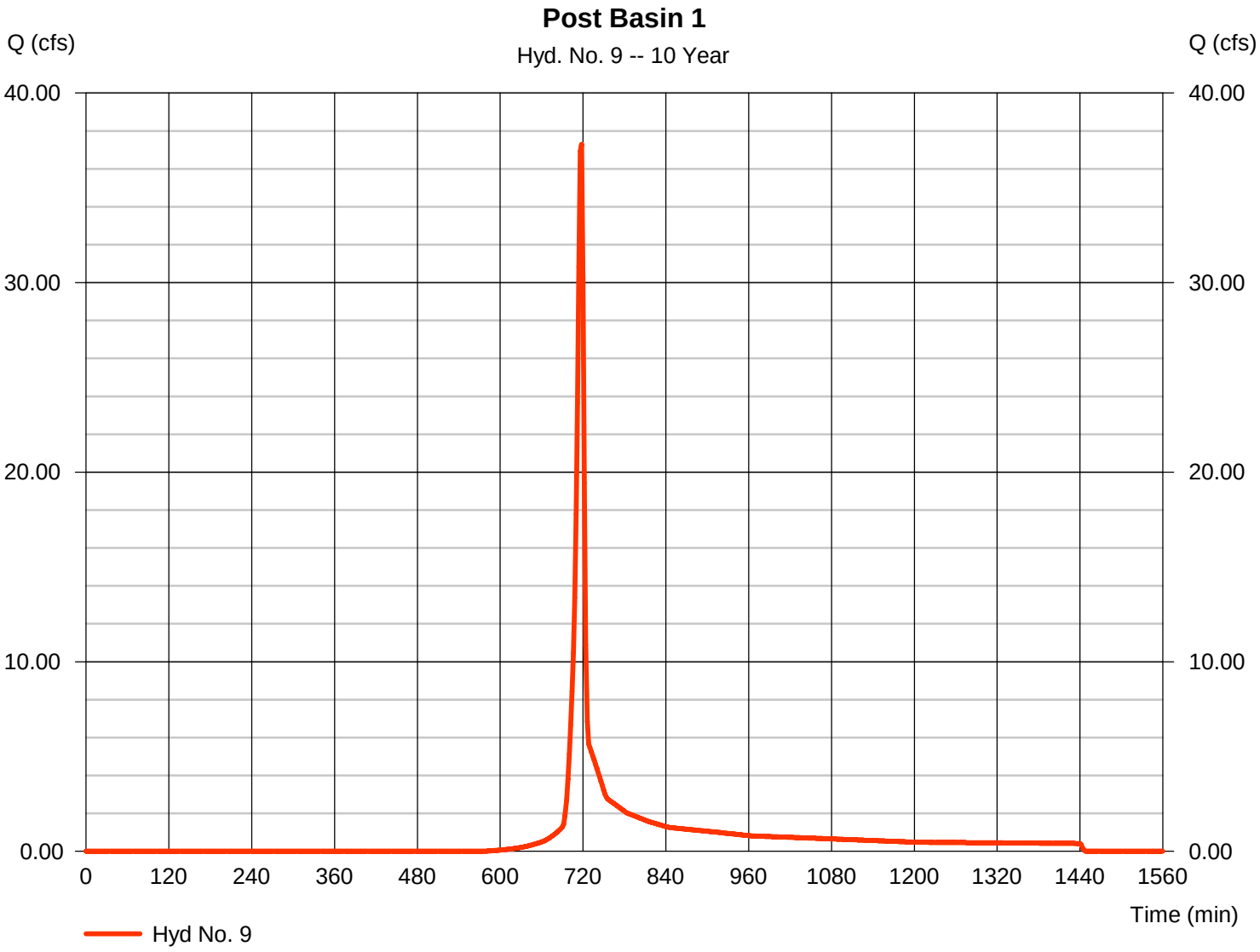


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	37.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	74,773 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



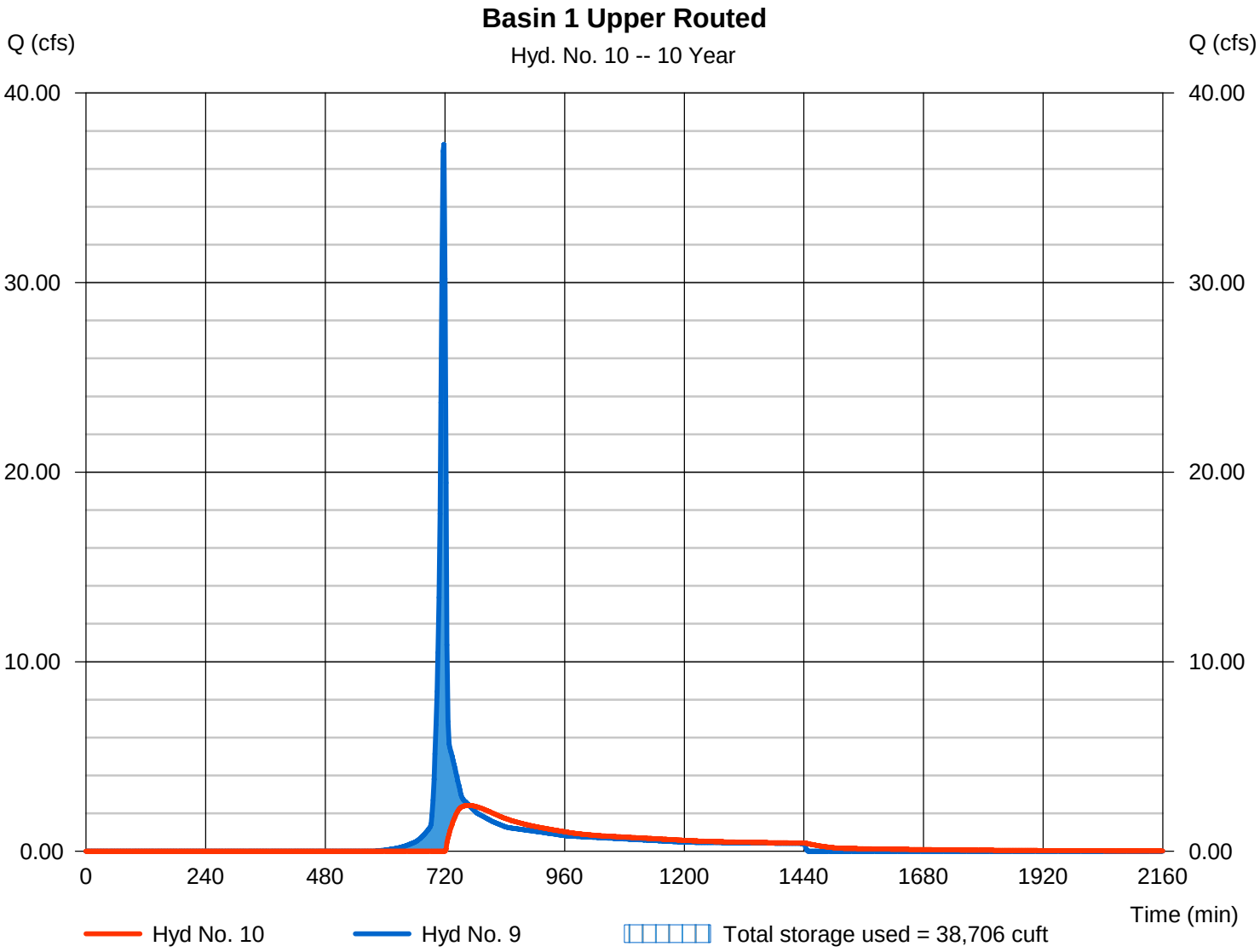
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	2.423 cfs
Storm frequency	=	10 yrs	Time to peak	=	768 min
Time interval	=	2 min	Hyd. volume	=	45,602 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	317.51 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	38,706 cuft

Storage Indication method used.



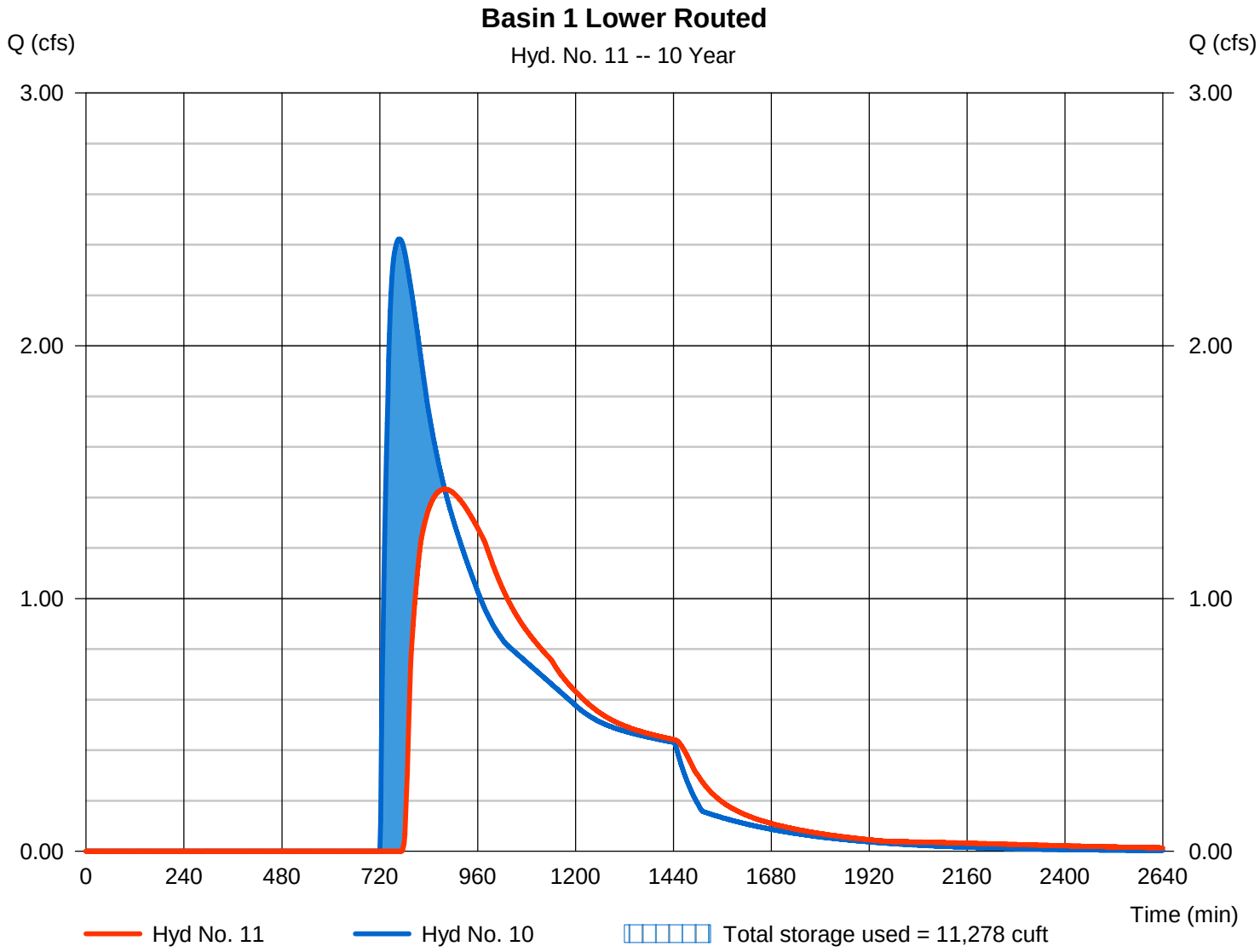
Hydrograph Report

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.433 cfs
Storm frequency	=	10 yrs	Time to peak	=	880 min
Time interval	=	2 min	Hyd. volume	=	39,509 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	300.33 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	11,278 cuft

Storage Indication method used.

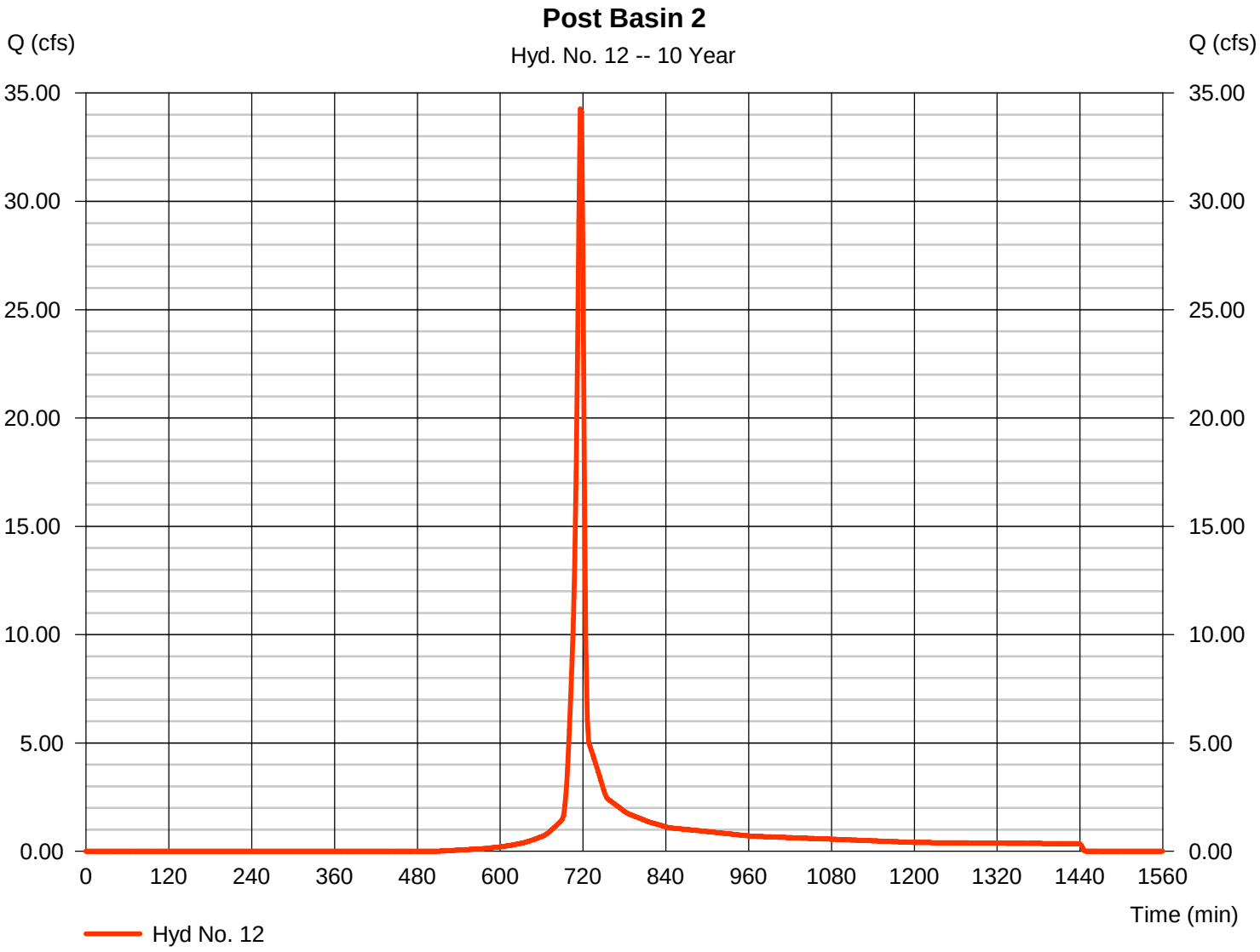


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.26 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	69,196 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



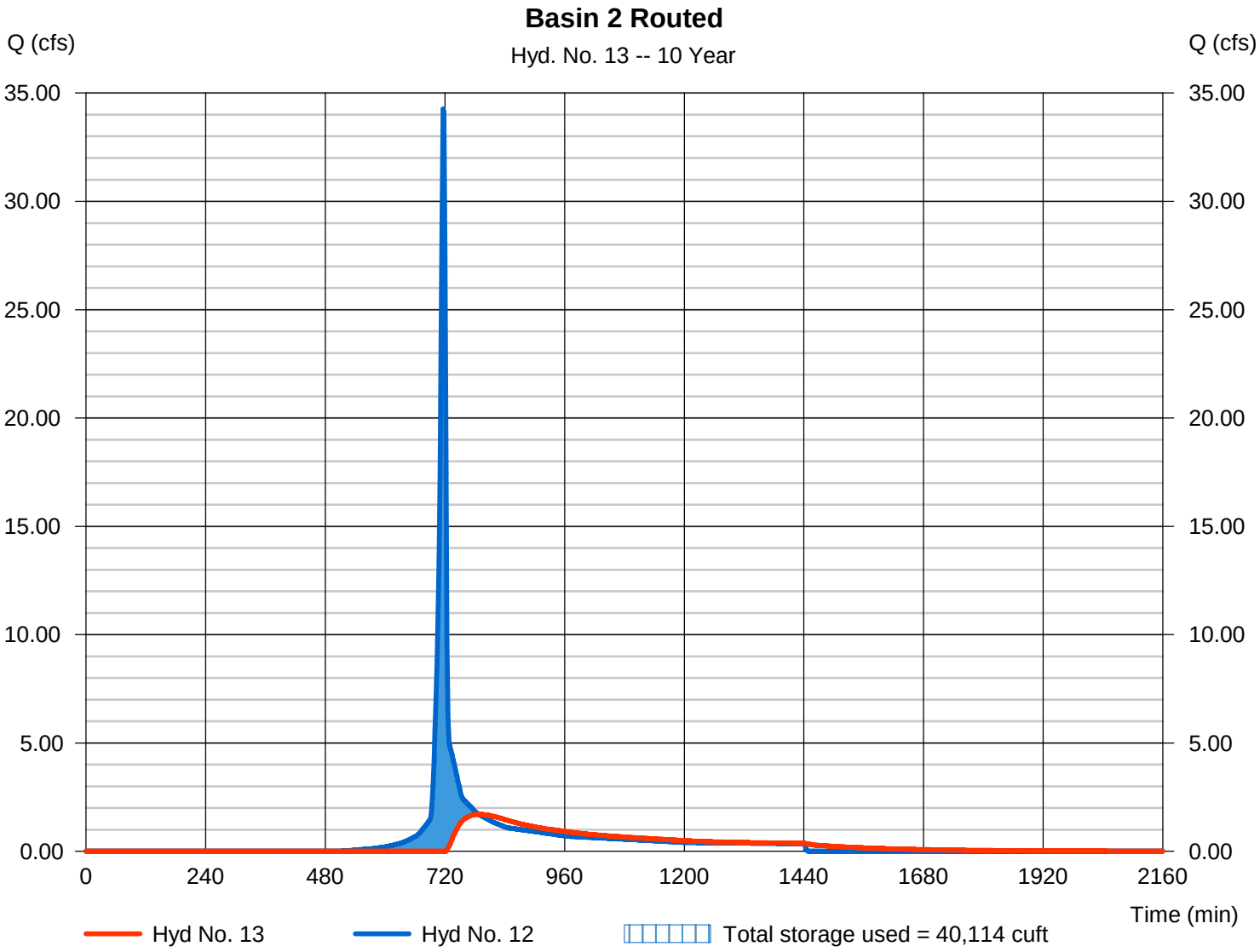
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.706 cfs
Storm frequency	=	10 yrs	Time to peak	=	788 min
Time interval	=	2 min	Hyd. volume	=	36,842 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	307.33 ft
Reservoir name	=	Basin 2	Max. Storage	=	40,114 cuft

Storage Indication method used.

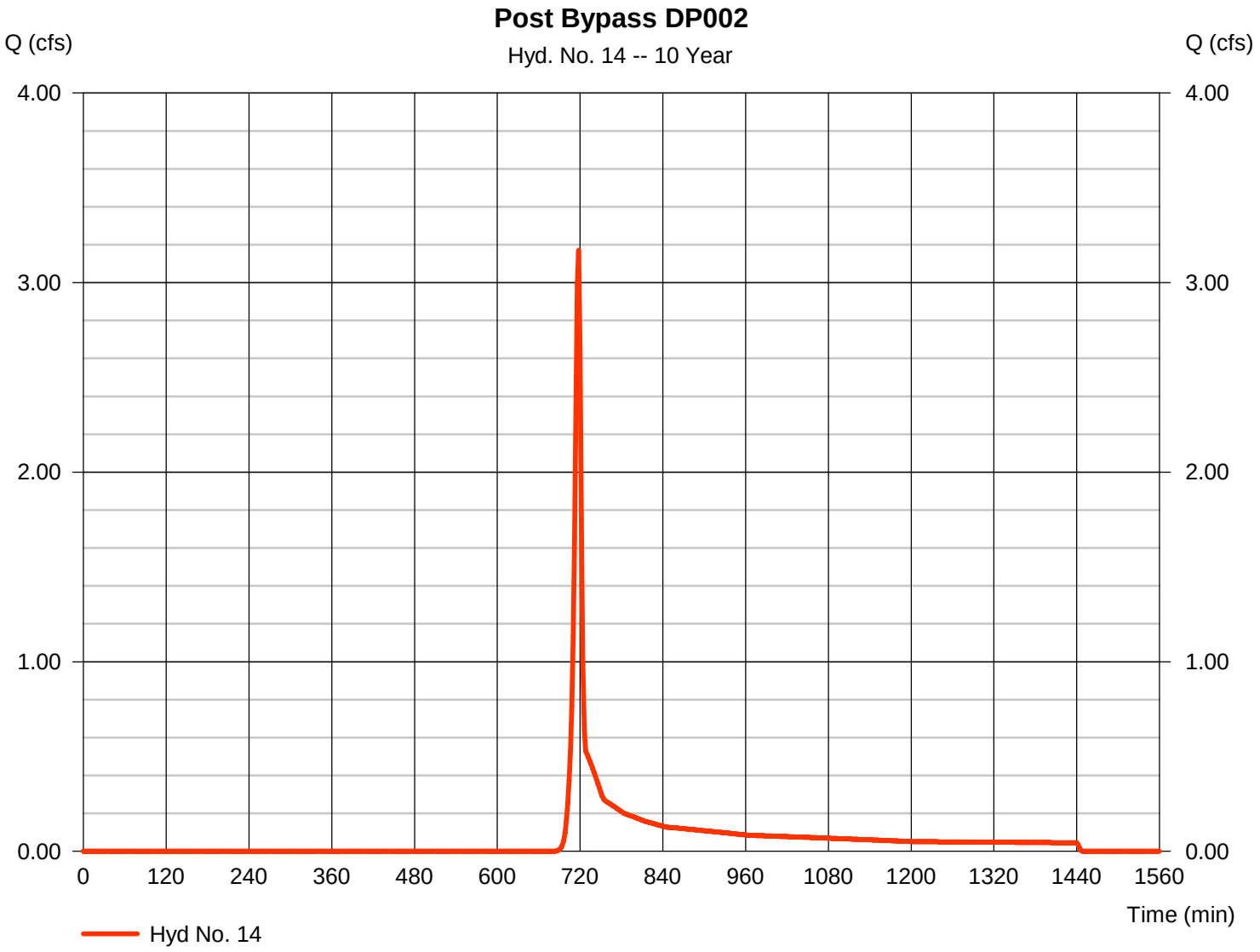


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.170 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,463 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

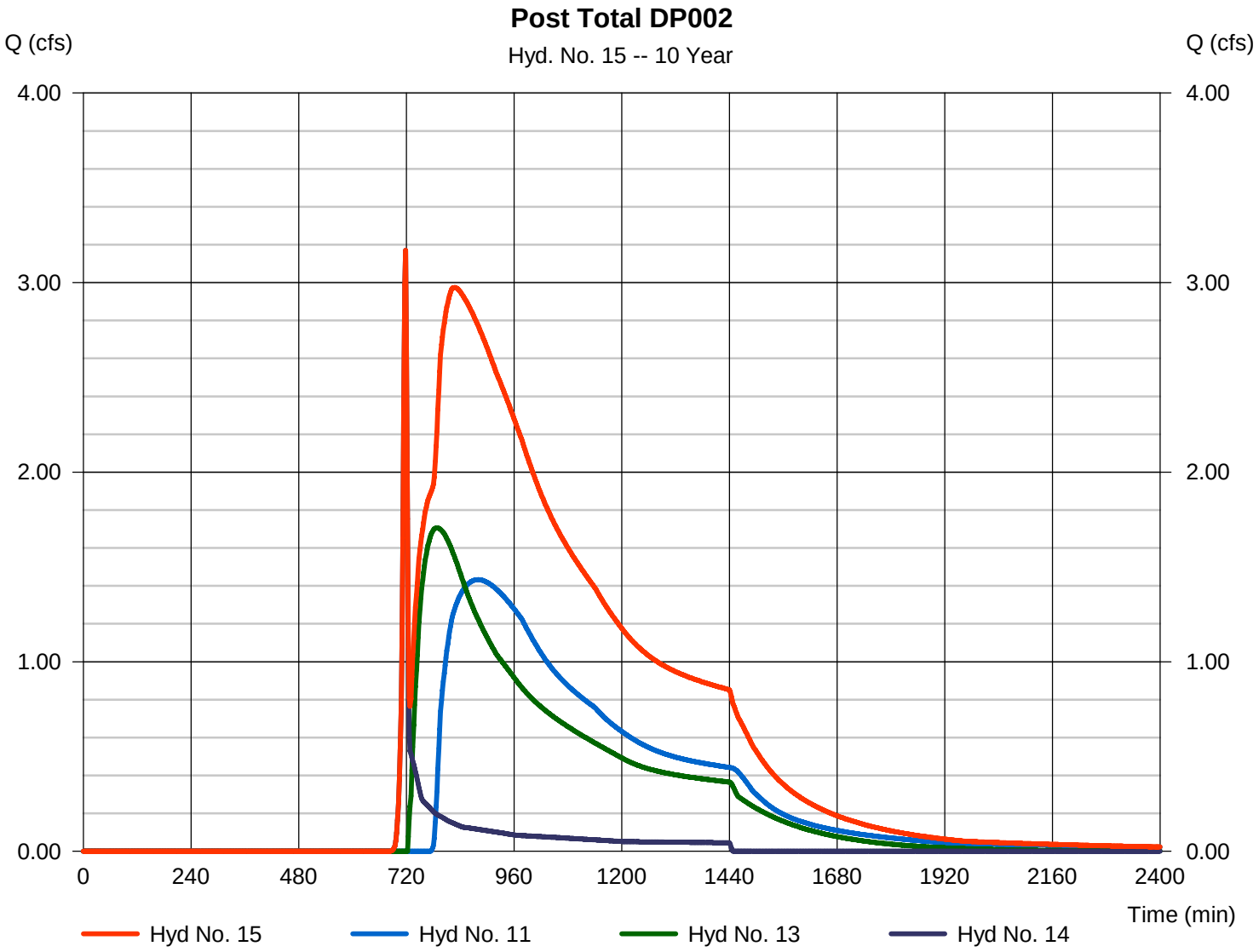


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	3.170 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	82,814 cuft
Inflow hyds.	=	11, 13, 14	Contrib. drain. area	=	1.540 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

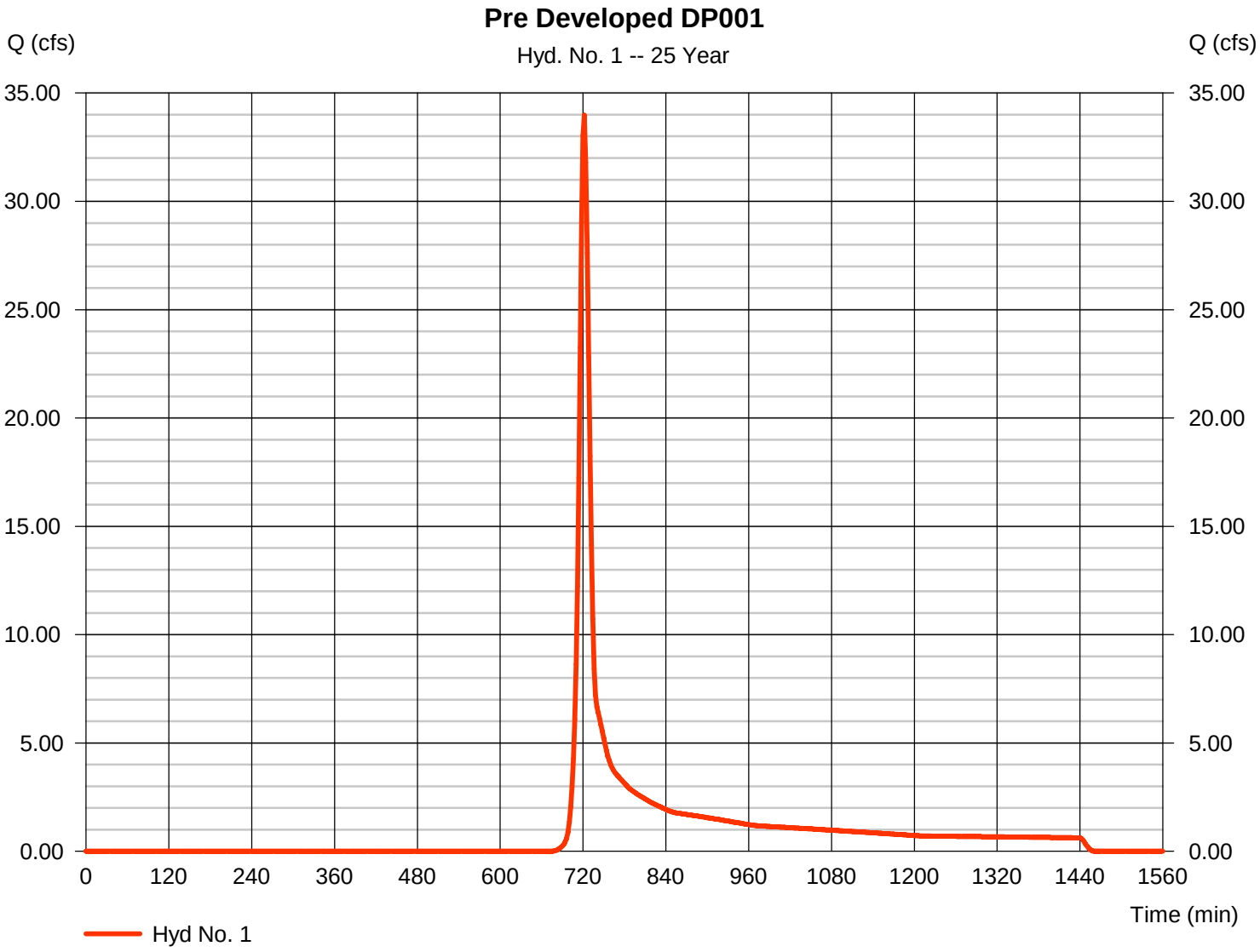
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	33.98	2	722	92,948	------	------	------	Pre Developed DP001
2	SCS Runoff	45.70	2	722	123,600	------	------	------	Pre Developed DP002
4	SCS Runoff	55.13	2	718	111,161	------	------	------	Post Basin 3
5	Reservoir	5.027	2	748	77,344	4	316.64	56,169	Basin 3 Routed
6	SCS Runoff	5.139	2	718	10,278	------	------	------	Post Bypass DP001
7	Combine	5.719	2	720	87,622	5, 6	------	------	Post Total DP001
9	SCS Runoff	51.31	2	716	103,585	------	------	------	Post Basin 1
10	Reservoir	11.78	2	726	74,414	9	318.06	46,385	Basin 1 Upper Routed
11	Reservoir	2.629	2	826	68,321	10	301.40	19,695	Basin 1 Lower Routed
12	SCS Runoff	46.02	2	716	93,362	------	------	------	Post Basin 2
13	Reservoir	5.509	2	736	61,008	12	307.83	47,406	Basin 2 Routed
14	SCS Runoff	4.826	2	718	9,678	------	------	------	Post Bypass DP002
15	Combine	7.474	2	742	139,007	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.98 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	92,948 cuft
Drainage area	=	15.430 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

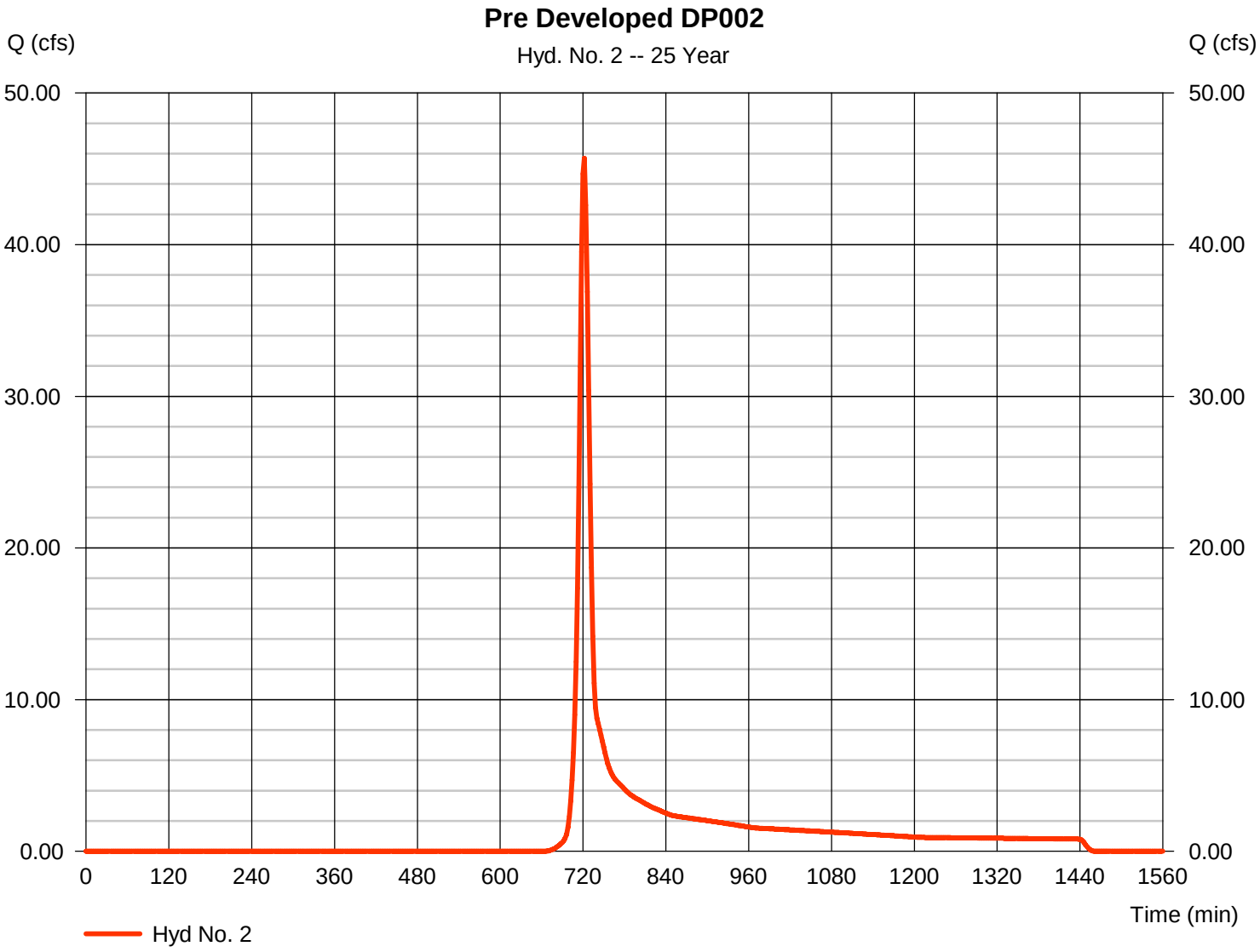


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.70 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	123,600 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

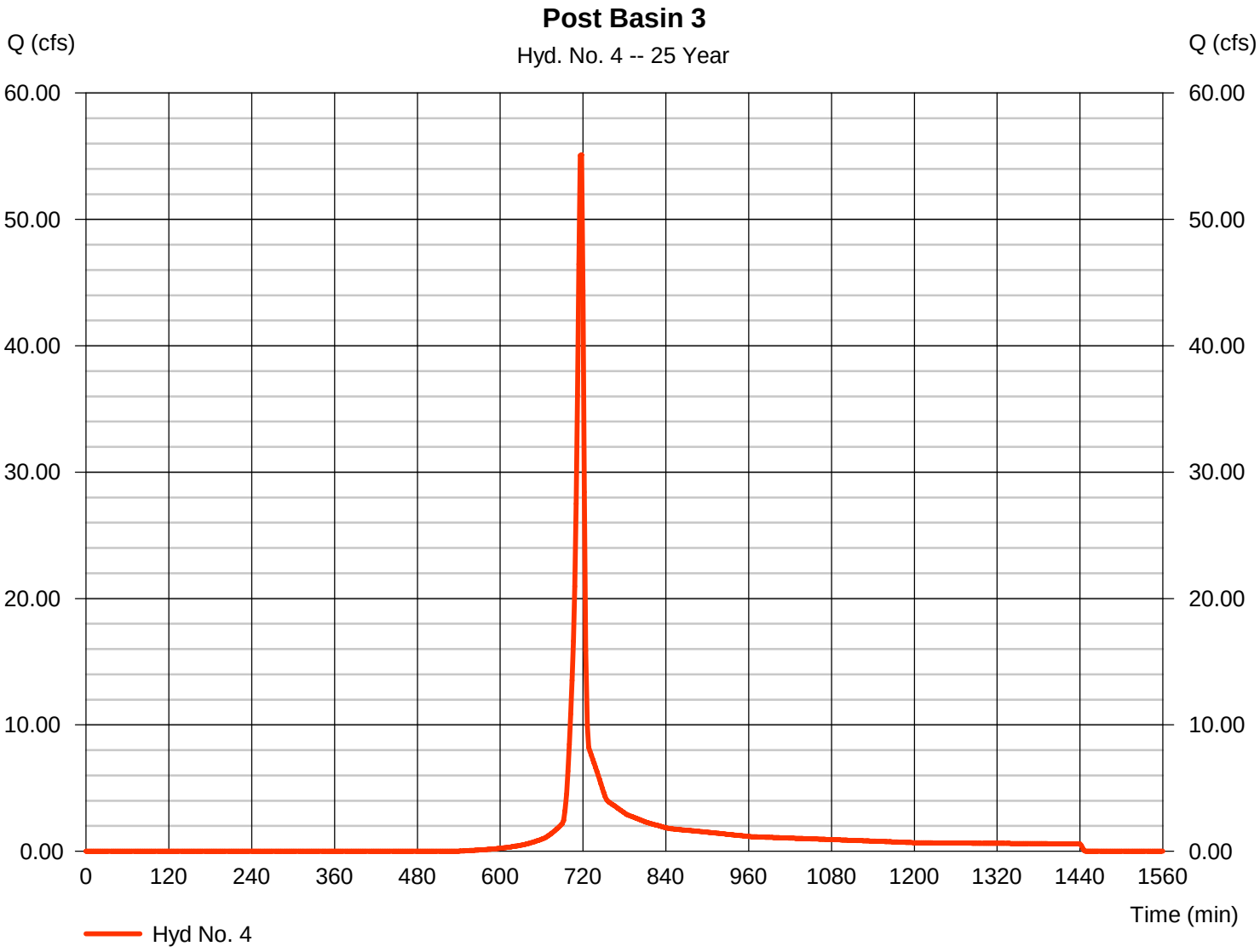


Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	55.13 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	111,161 cuft
Drainage area	=	12.150 ac	Curve number	=	70.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



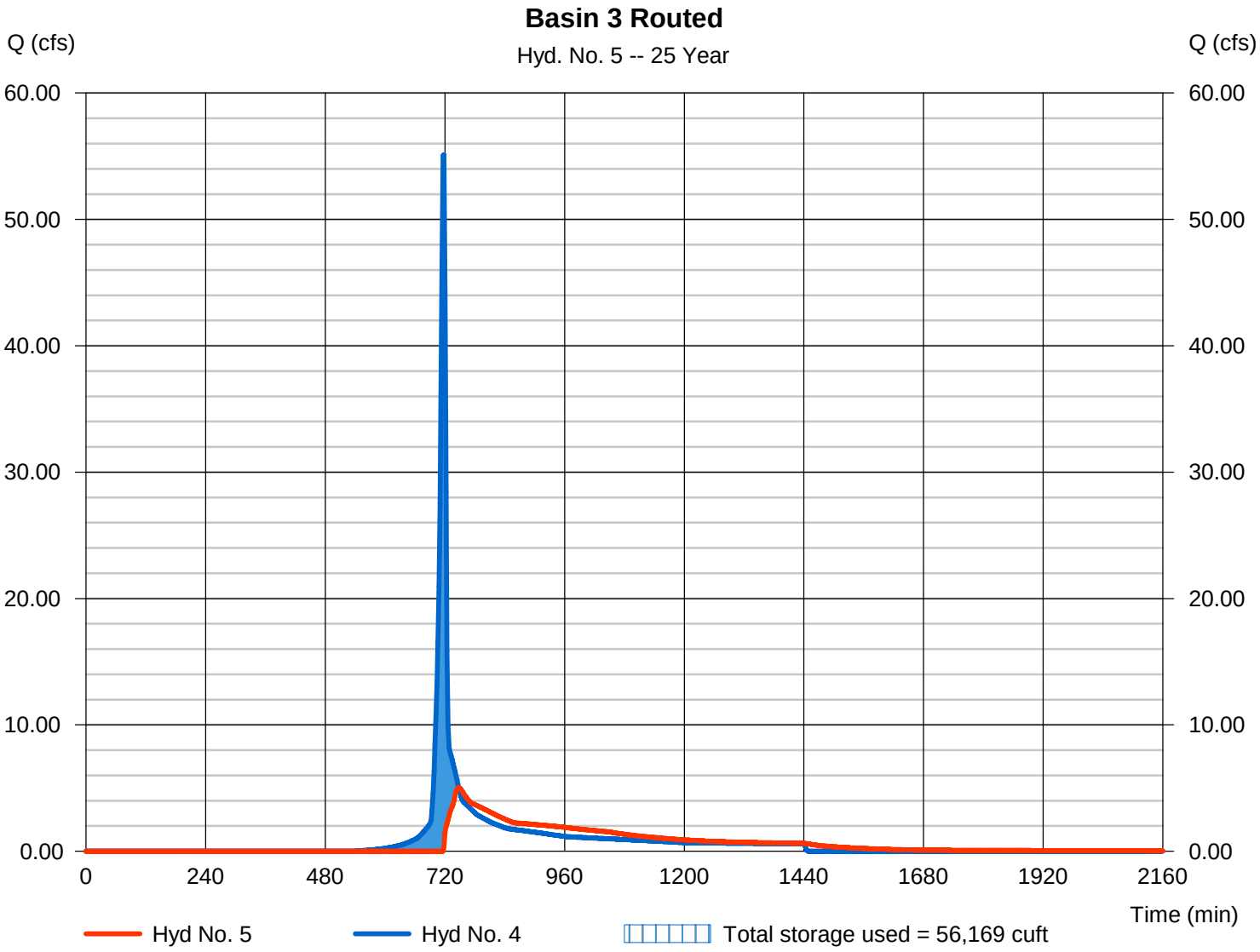
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	5.027 cfs
Storm frequency	=	25 yrs	Time to peak	=	748 min
Time interval	=	2 min	Hyd. volume	=	77,344 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	316.64 ft
Reservoir name	=	Basin 3	Max. Storage	=	56,169 cuft

Storage Indication method used.

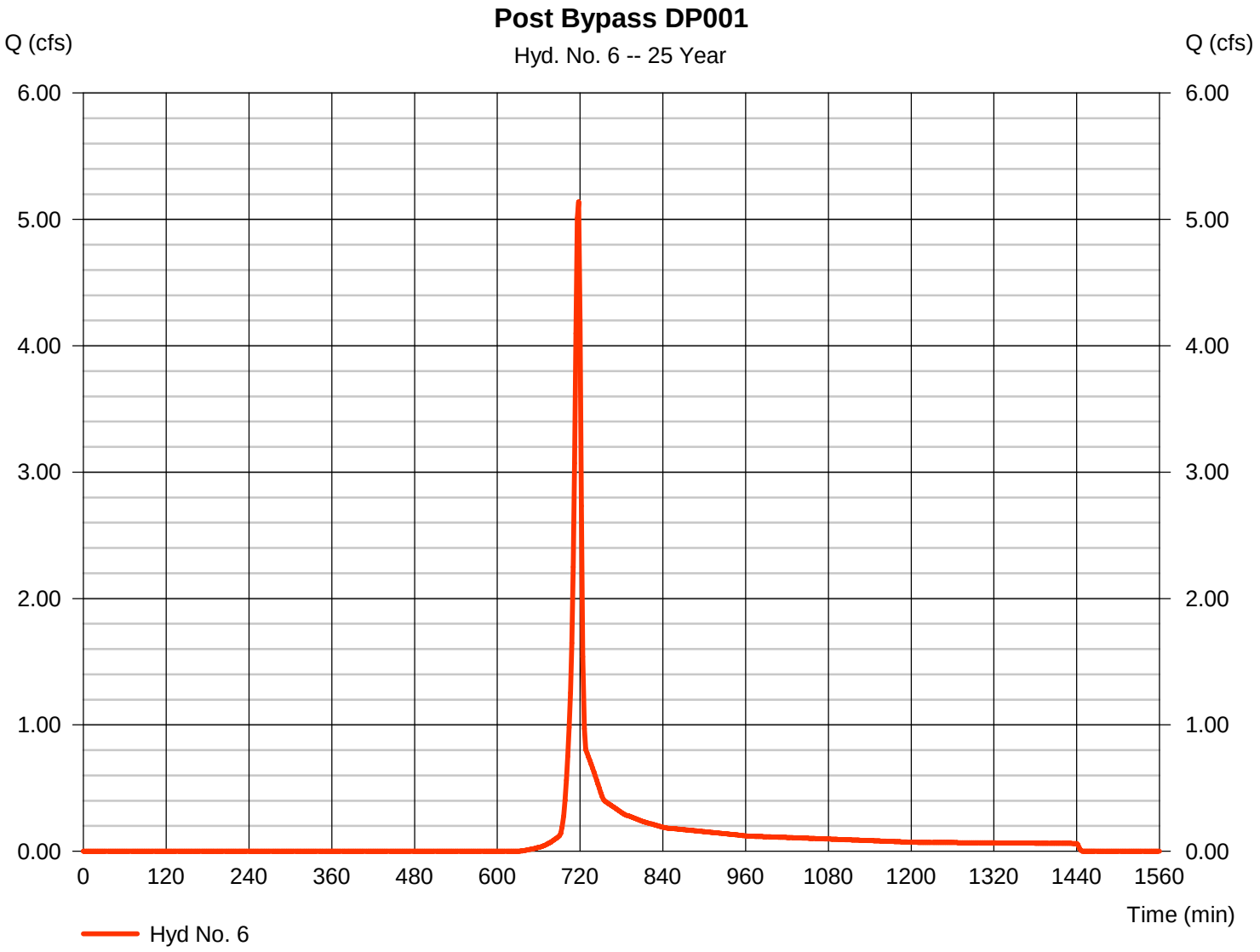


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.139 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	10,278 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

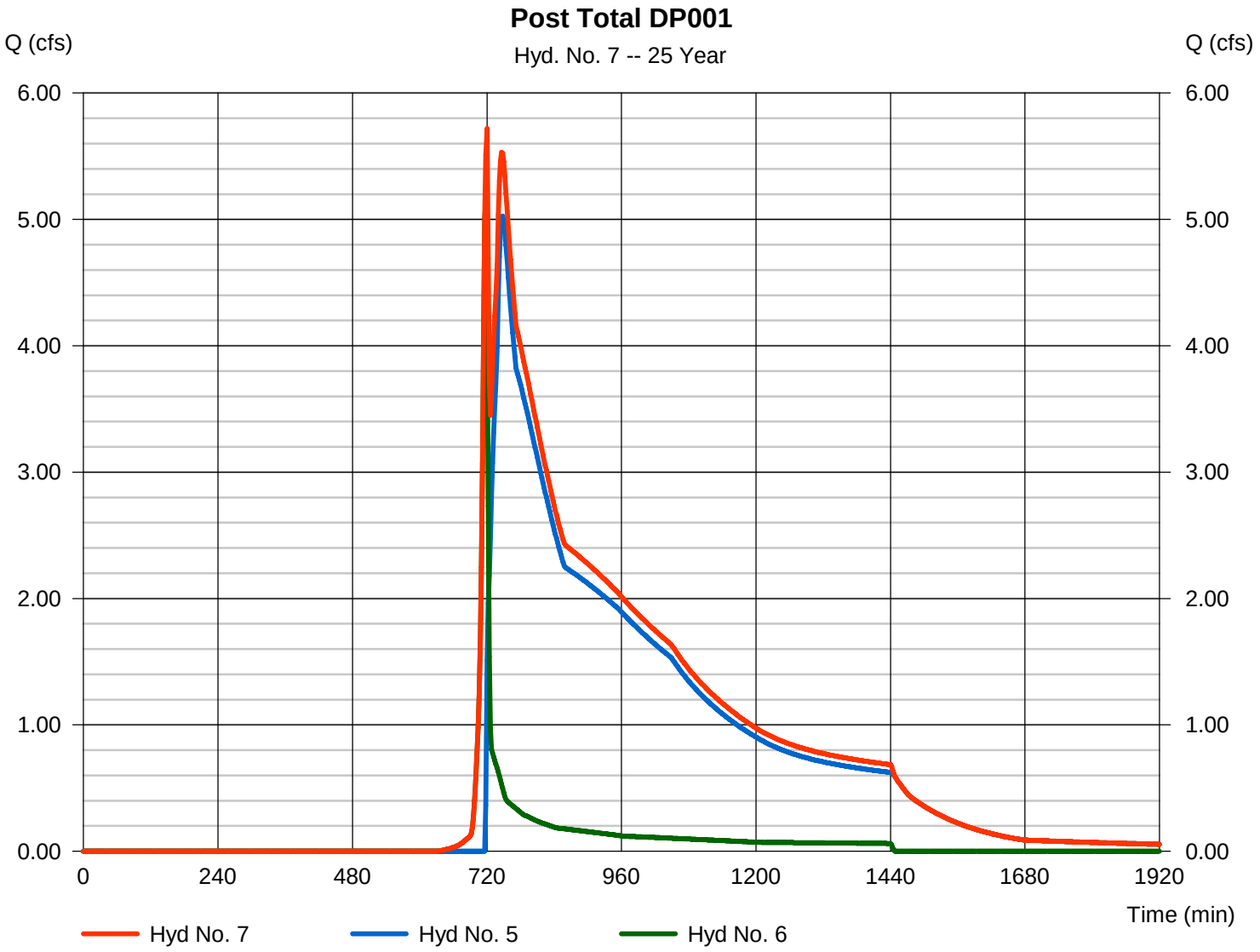


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 5.719 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 87,622 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.490 ac

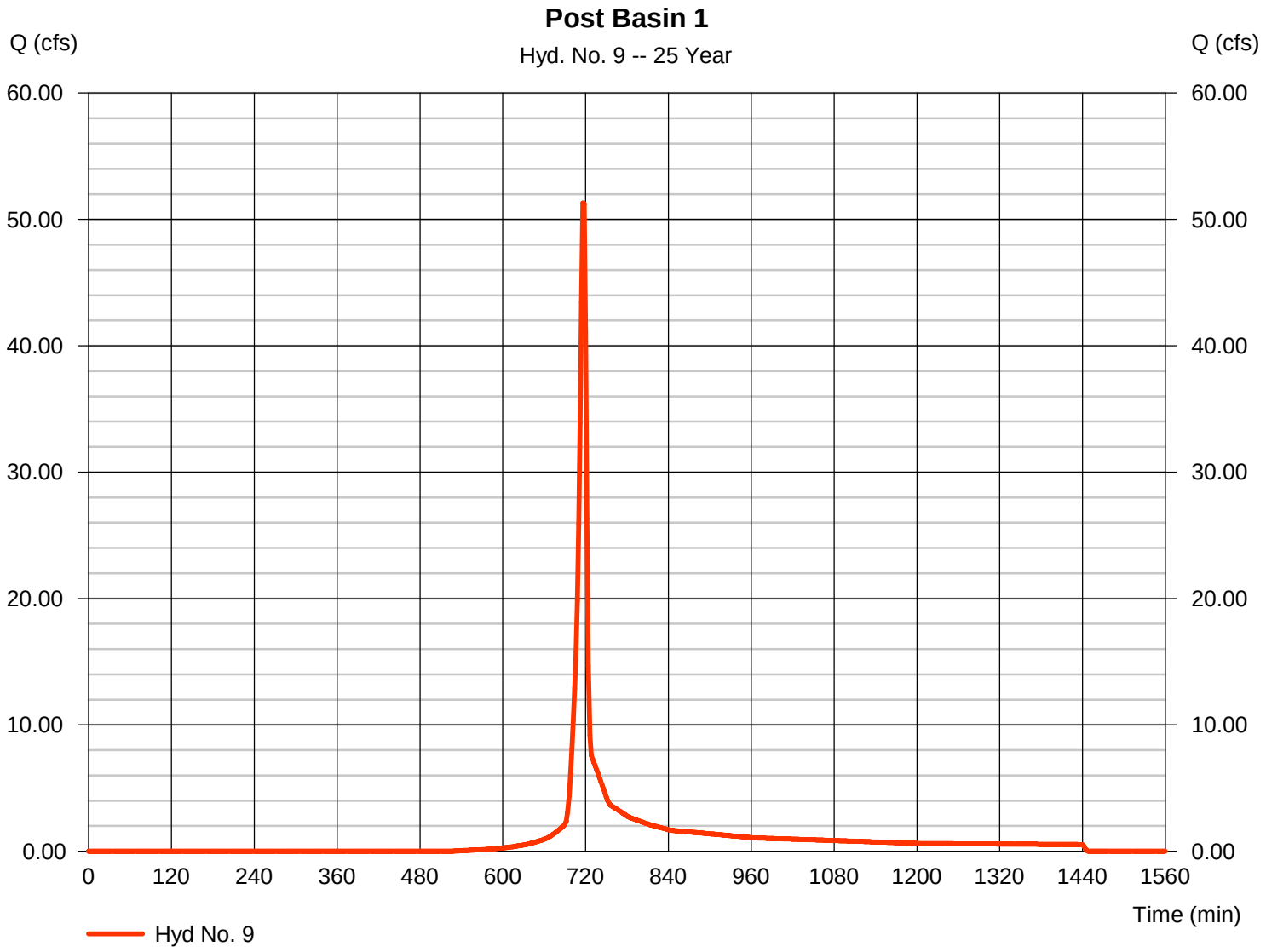


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	51.31 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	103,585 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



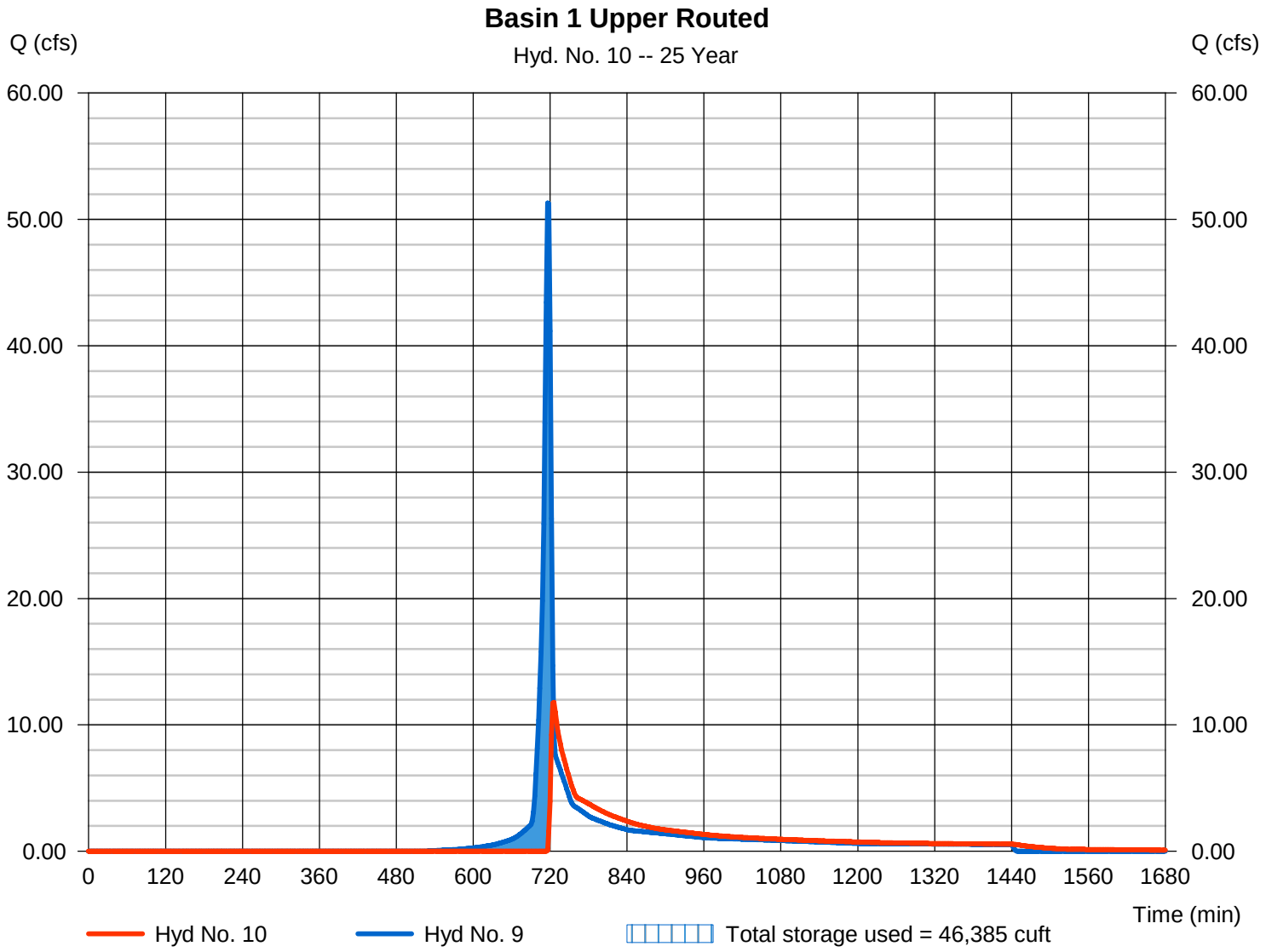
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	11.78 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	74,414 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	318.06 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	46,385 cuft

Storage Indication method used.



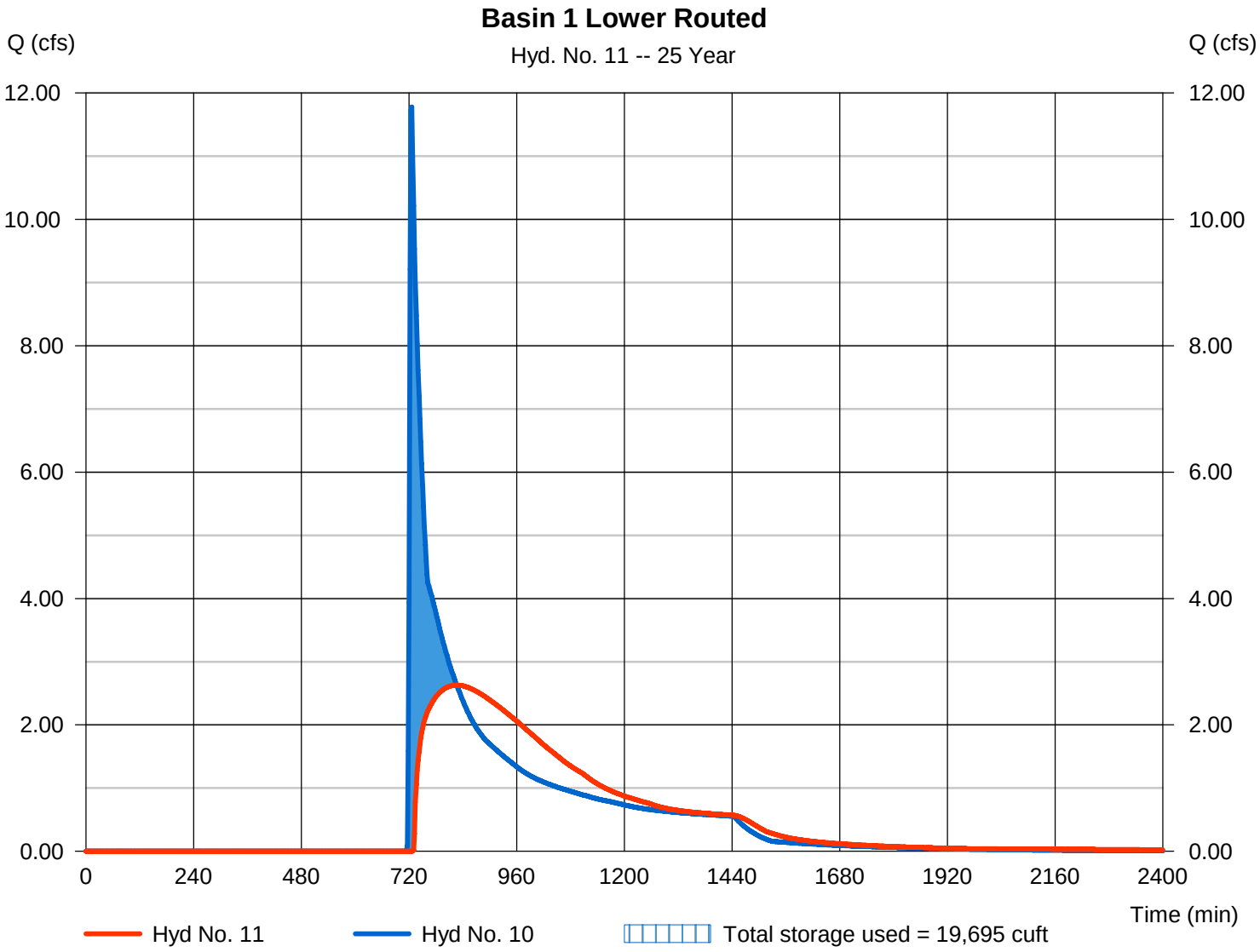
Hydrograph Report

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	2.629 cfs
Storm frequency	=	25 yrs	Time to peak	=	826 min
Time interval	=	2 min	Hyd. volume	=	68,321 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	301.40 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	19,695 cuft

Storage Indication method used.

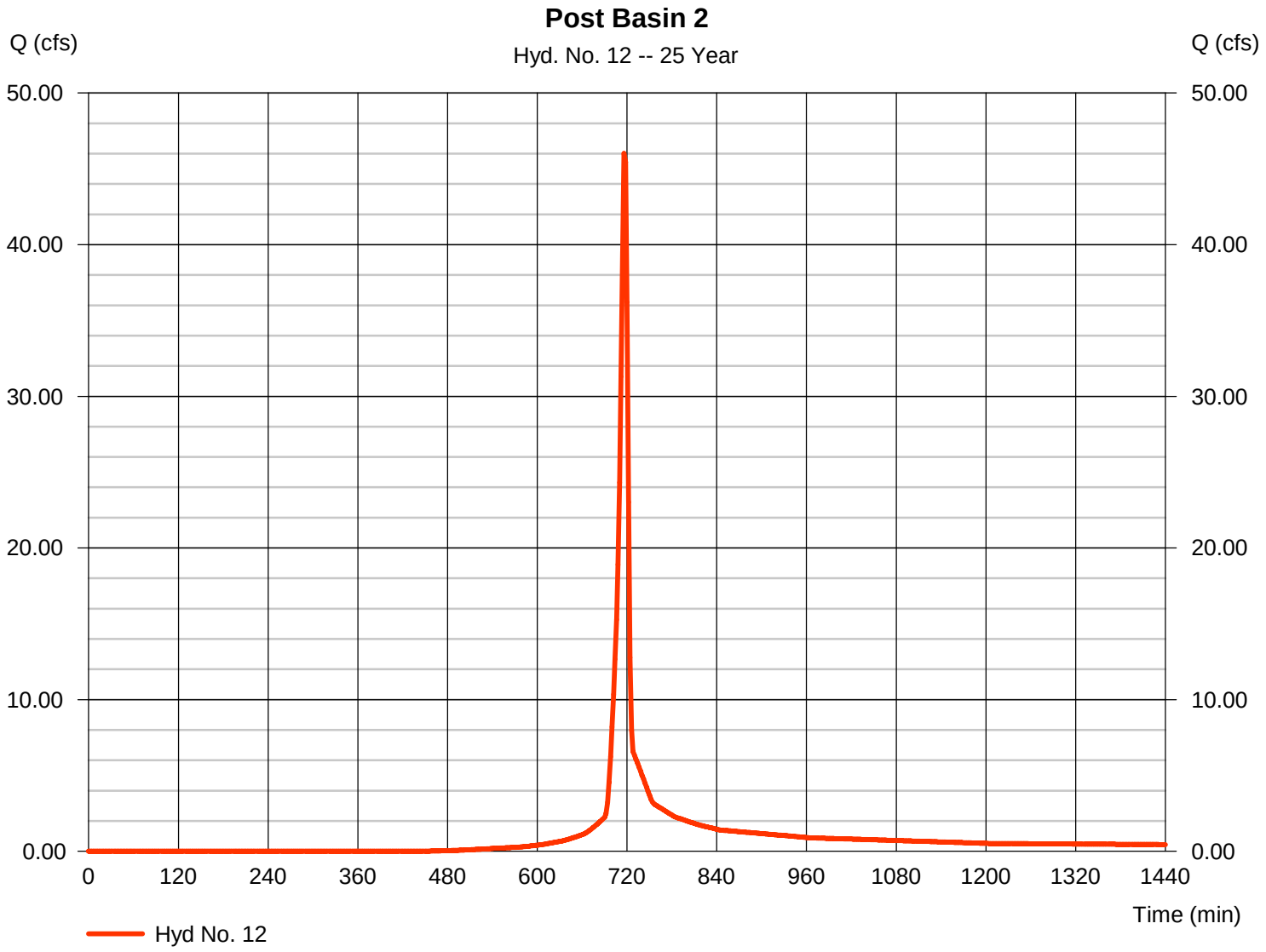


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 46.02 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 93,362 cuft
Drainage area	= 8.540 ac	Curve number	= 76.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.76 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



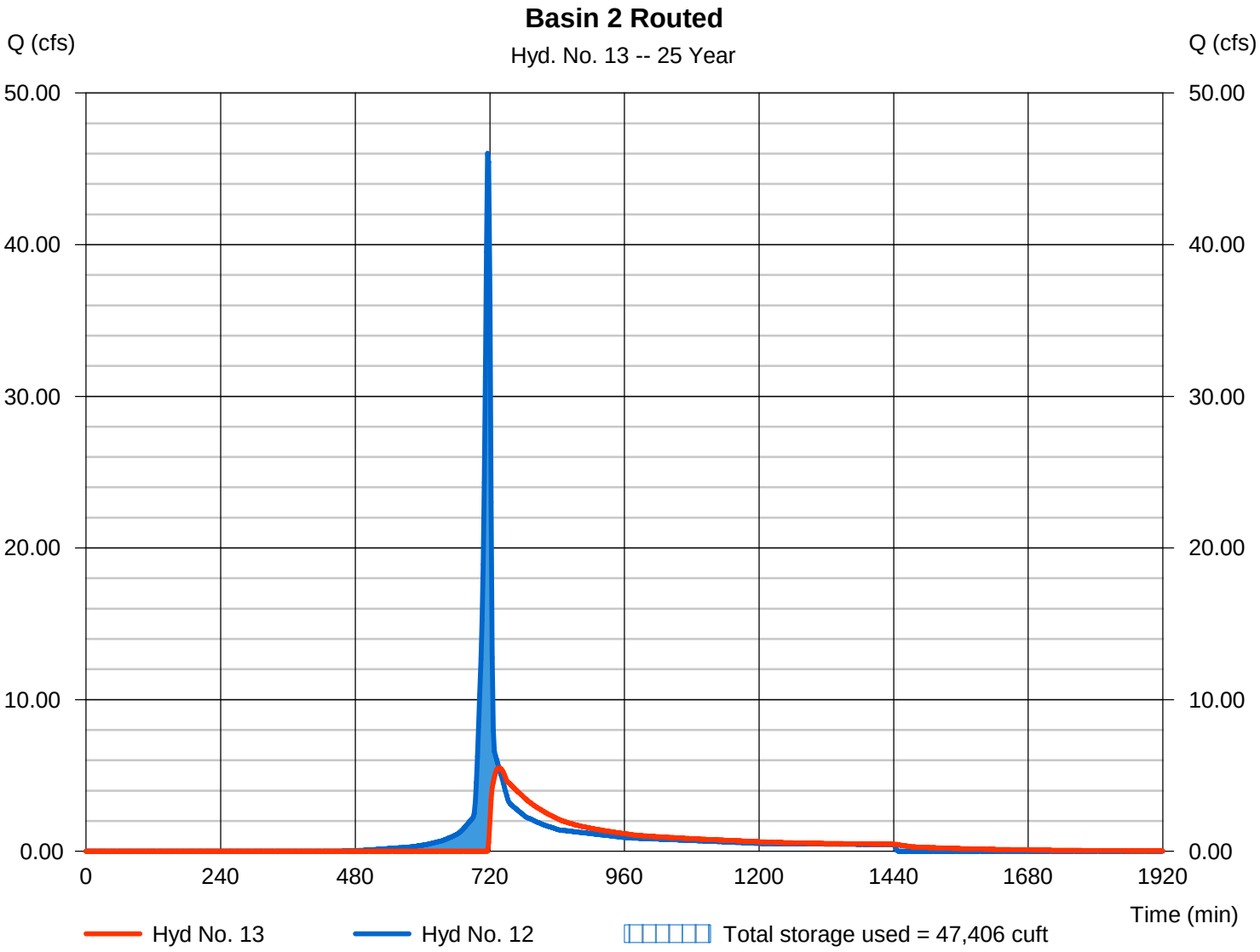
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	5.509 cfs
Storm frequency	=	25 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	61,008 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	307.83 ft
Reservoir name	=	Basin 2	Max. Storage	=	47,406 cuft

Storage Indication method used.

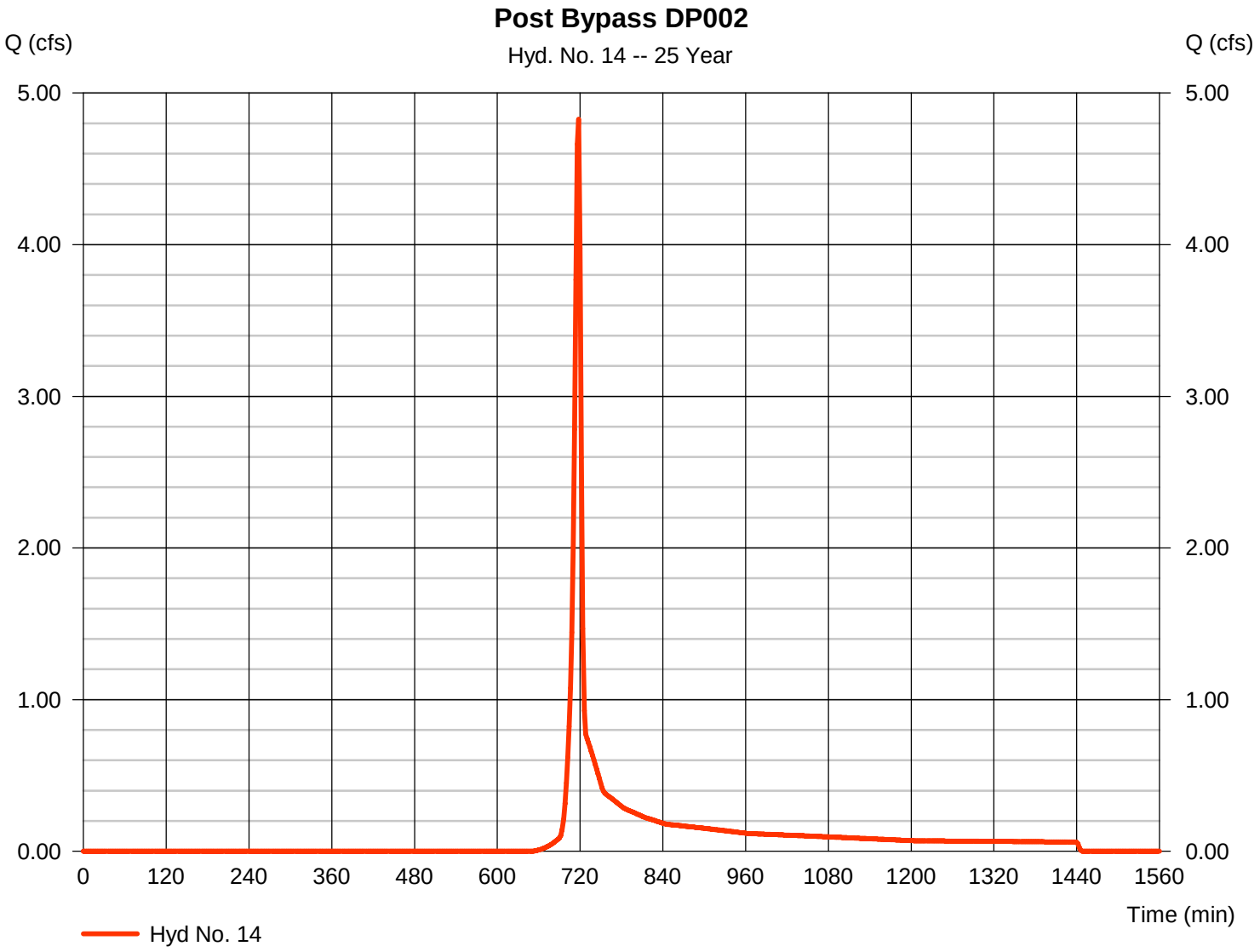


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.826 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	9,678 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

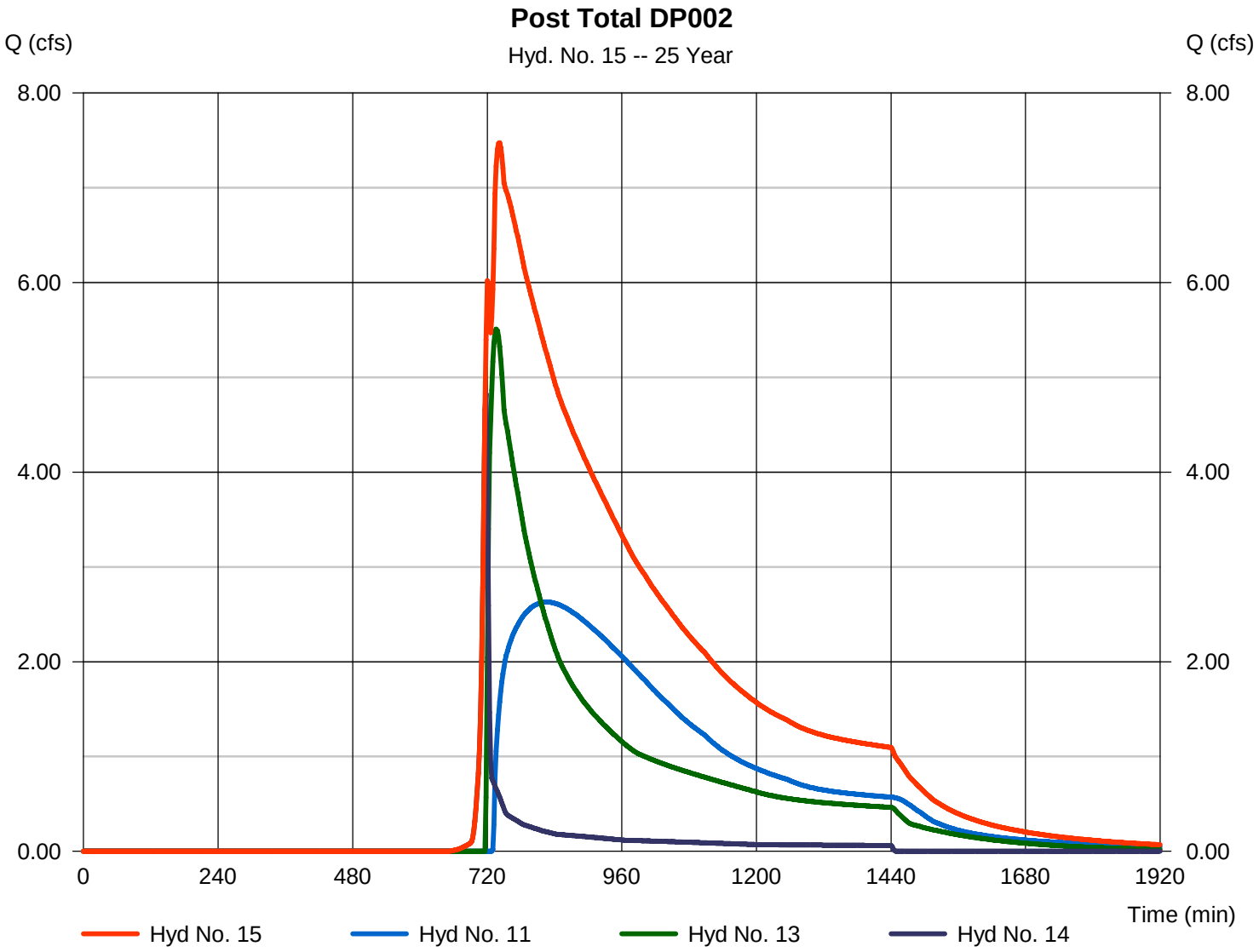


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	7.474 cfs
Storm frequency	=	25 yrs	Time to peak	=	742 min
Time interval	=	2 min	Hyd. volume	=	139,007 cuft
Inflow hyds.	=	11, 13, 14	Contrib. drain. area	=	1.540 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

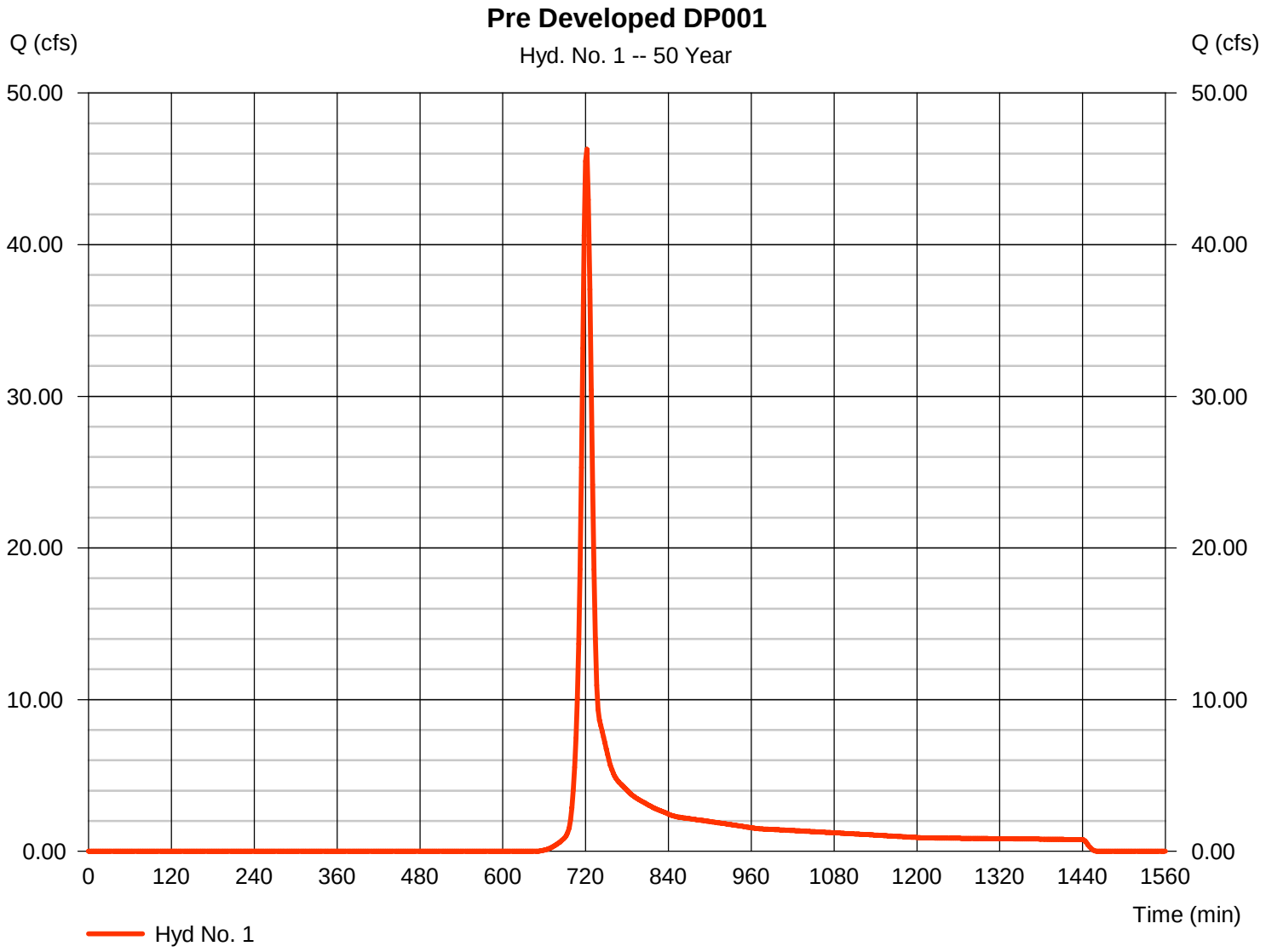
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	46.28	2	722	123,698	------	------	------	Pre Developed DP001
2	SCS Runoff	61.46	2	722	163,179	------	------	------	Pre Developed DP002
4	SCS Runoff	68.94	2	716	139,306	------	------	------	Post Basin 3
5	Reservoir	17.74	2	724	105,489	4	317.03	63,121	Basin 3 Routed
6	SCS Runoff	6.648	2	718	13,307	------	------	------	Post Bypass DP001
7	Combine	19.70	2	724	118,795	5, 6	------	------	Post Total DP001
9	SCS Runoff	63.94	2	716	129,320	------	------	------	Post Basin 1
10	Reservoir	29.32	2	722	100,148	9	318.43	53,551	Basin 1 Upper Routed
11	Reservoir	6.885	2	752	94,055	10	302.10	25,827	Basin 1 Lower Routed
12	SCS Runoff	56.20	2	716	114,655	------	------	------	Post Basin 2
13	Reservoir	18.98	2	724	82,300	12	308.22	53,973	Basin 2 Routed
14	SCS Runoff	6.335	2	718	12,668	------	------	------	Post Bypass DP002
15	Combine	22.07	2	724	189,024	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	= SCS Runoff	Peak discharge	= 46.28 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 123,698 cuft
Drainage area	= 15.430 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.00 min
Total precip.	= 6.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

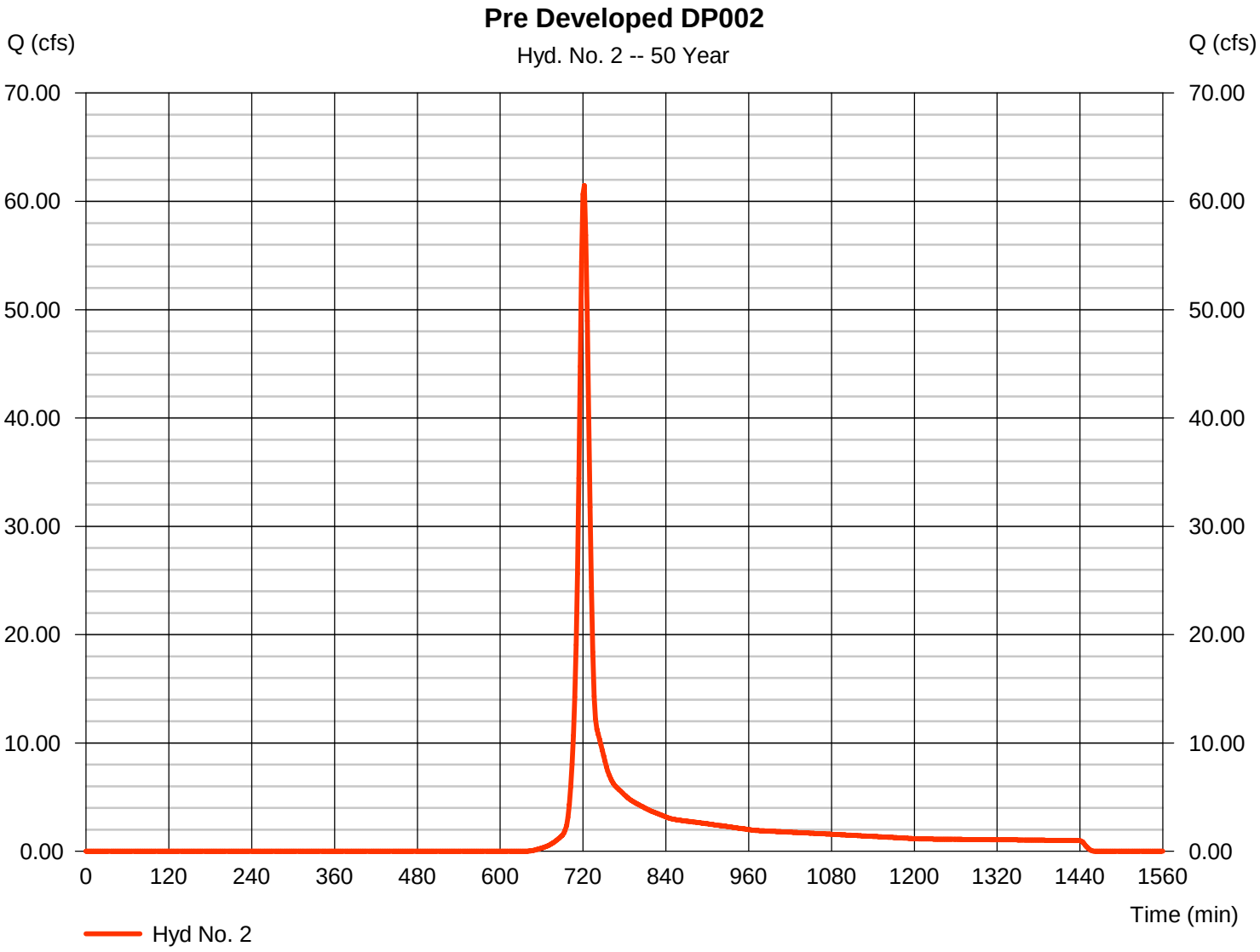


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	61.46 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	163,179 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

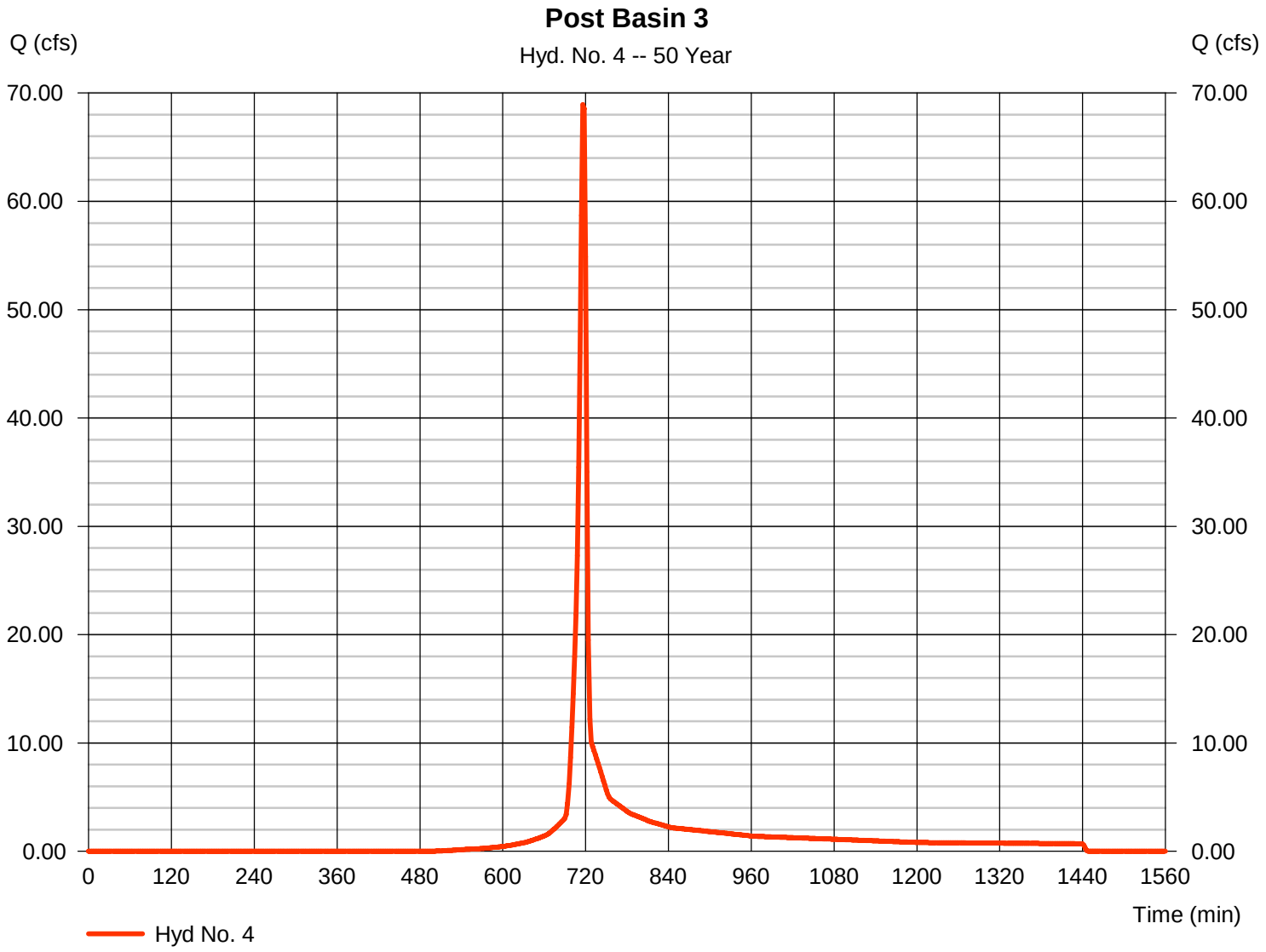


Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	68.94 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	139,306 cuft
Drainage area	=	12.150 ac	Curve number	=	70.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



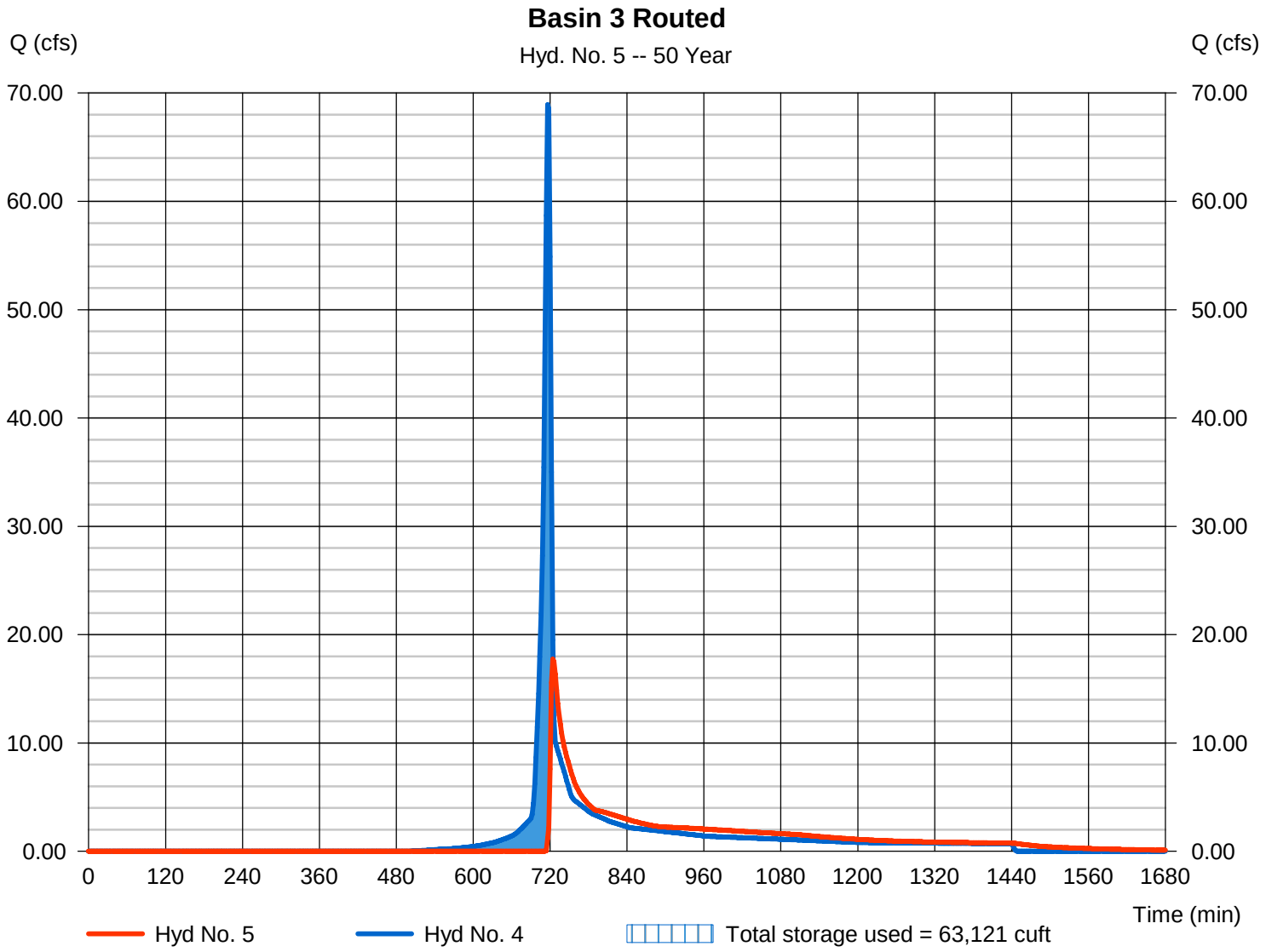
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	17.74 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	105,489 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	317.03 ft
Reservoir name	=	Basin 3	Max. Storage	=	63,121 cuft

Storage Indication method used.

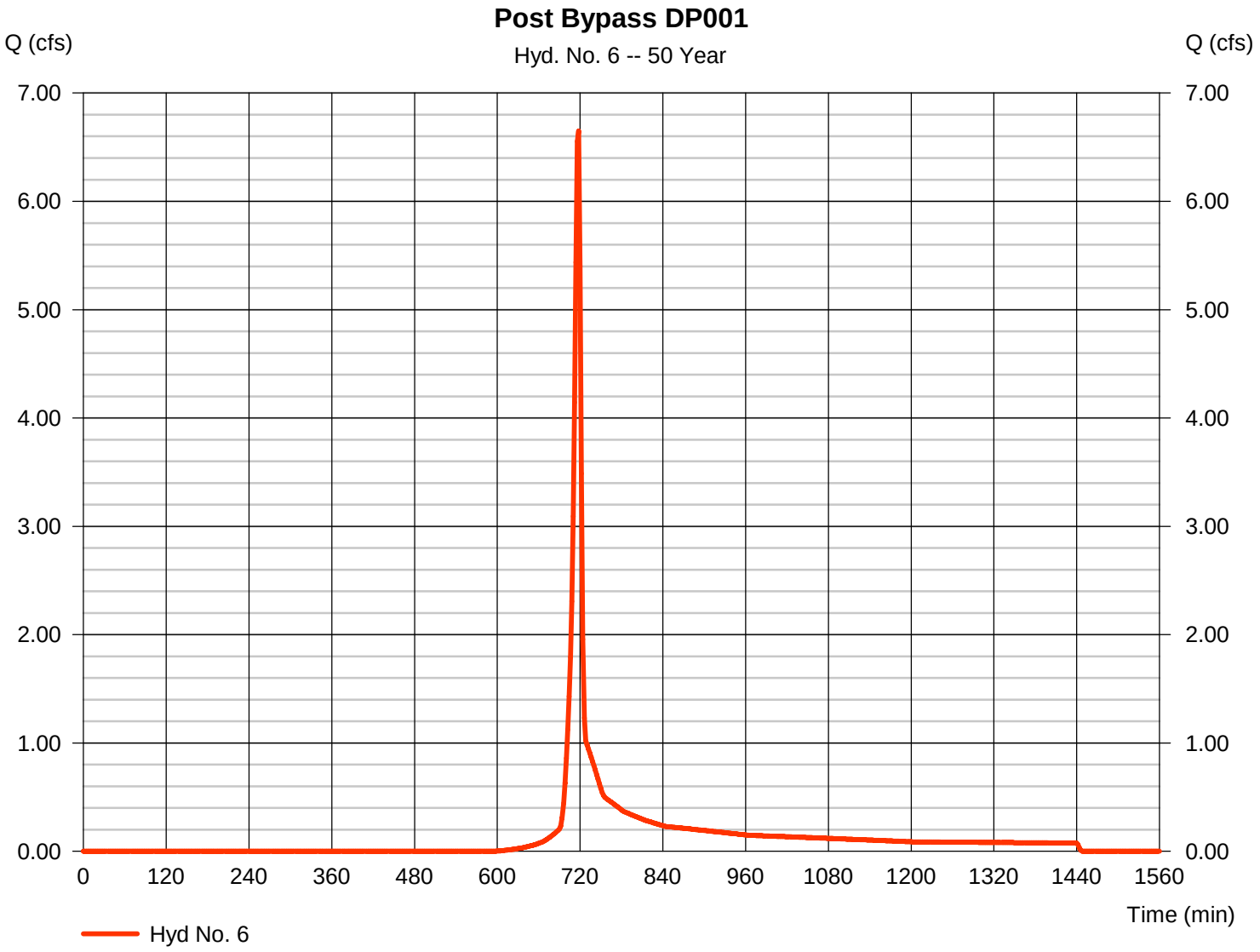


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.648 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	13,307 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

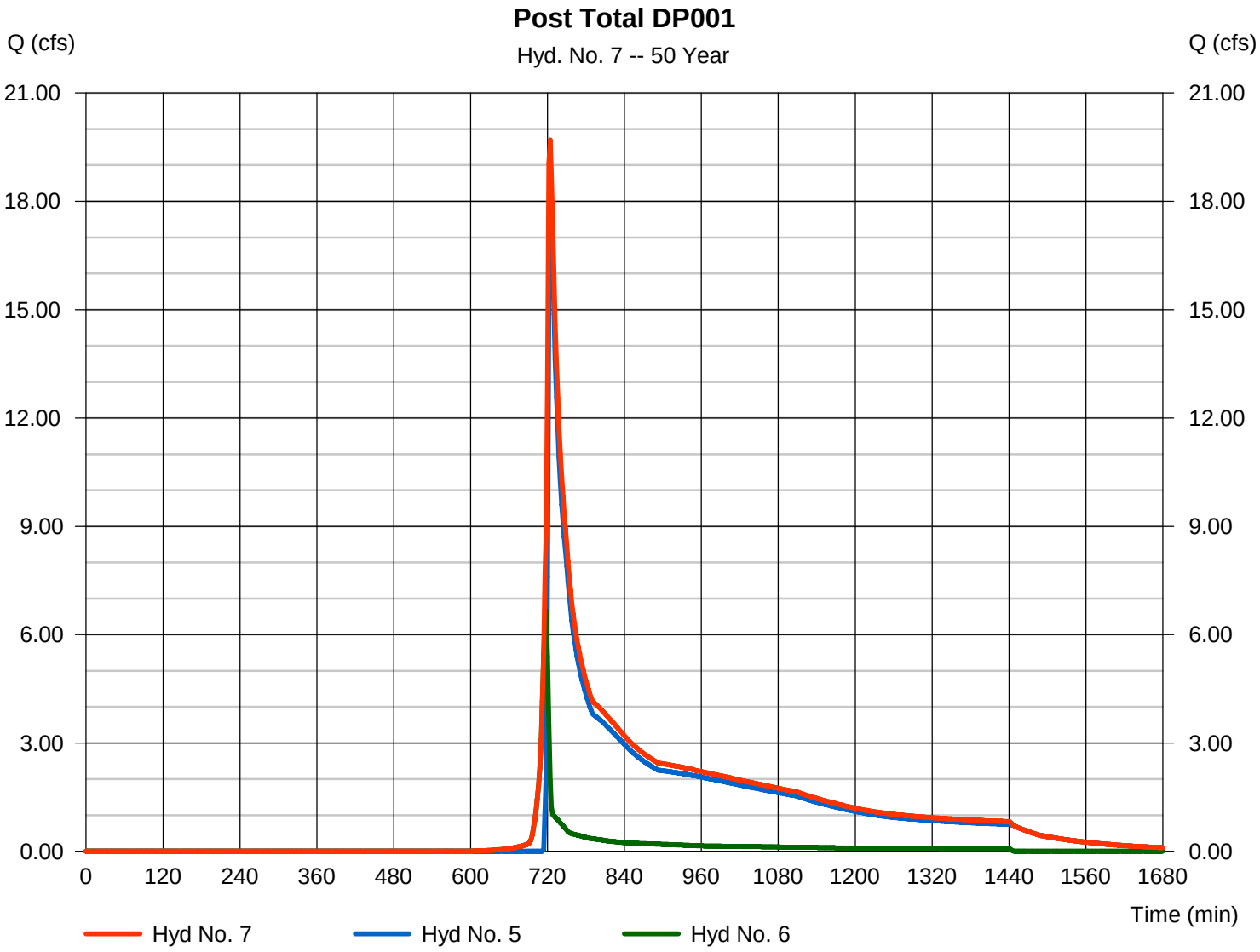


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	=	Combine	Peak discharge	=	19.70 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	118,795 cuft
Inflow hyds.	=	5, 6	Contrib. drain. area	=	1.490 ac

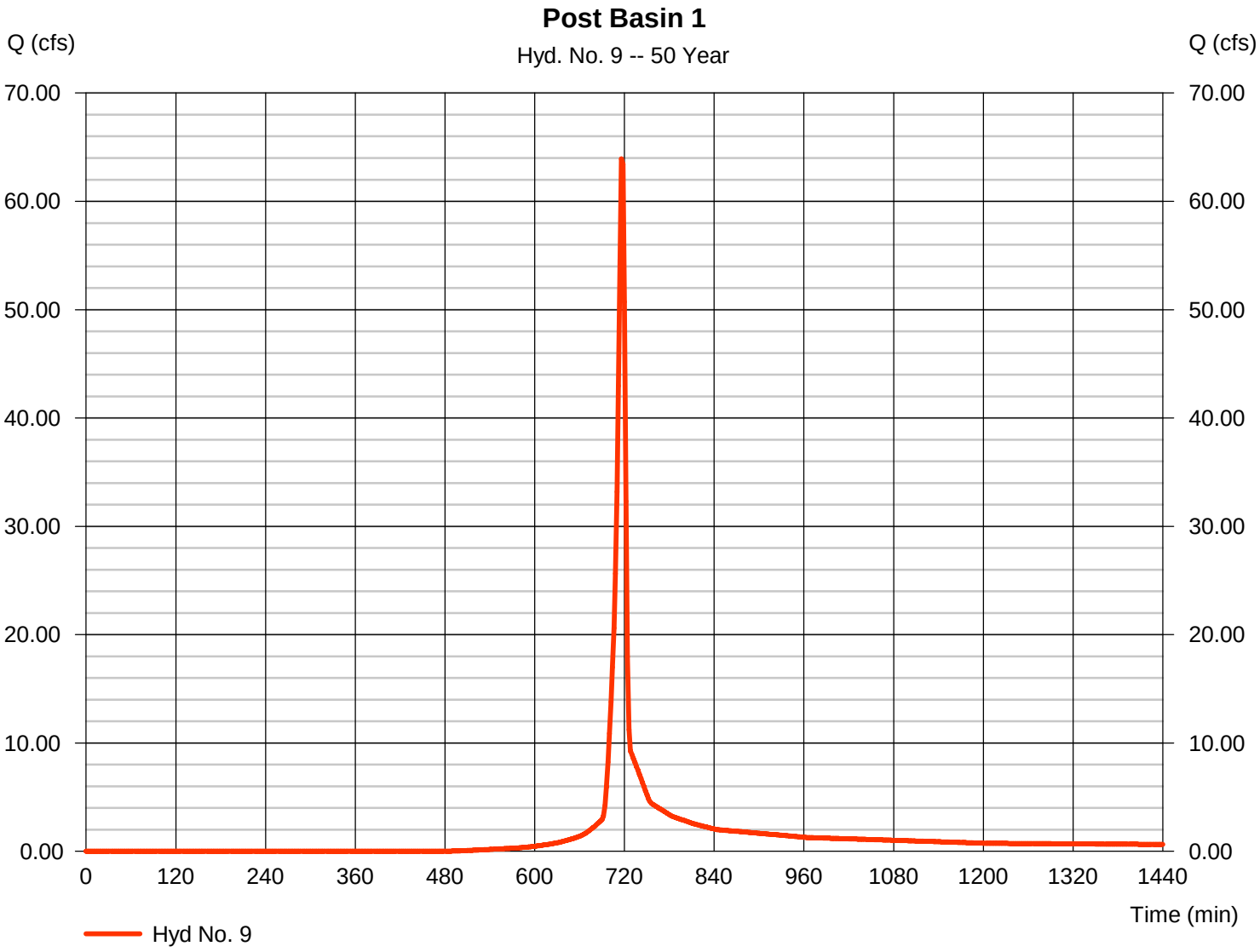


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	63.94 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	129,320 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



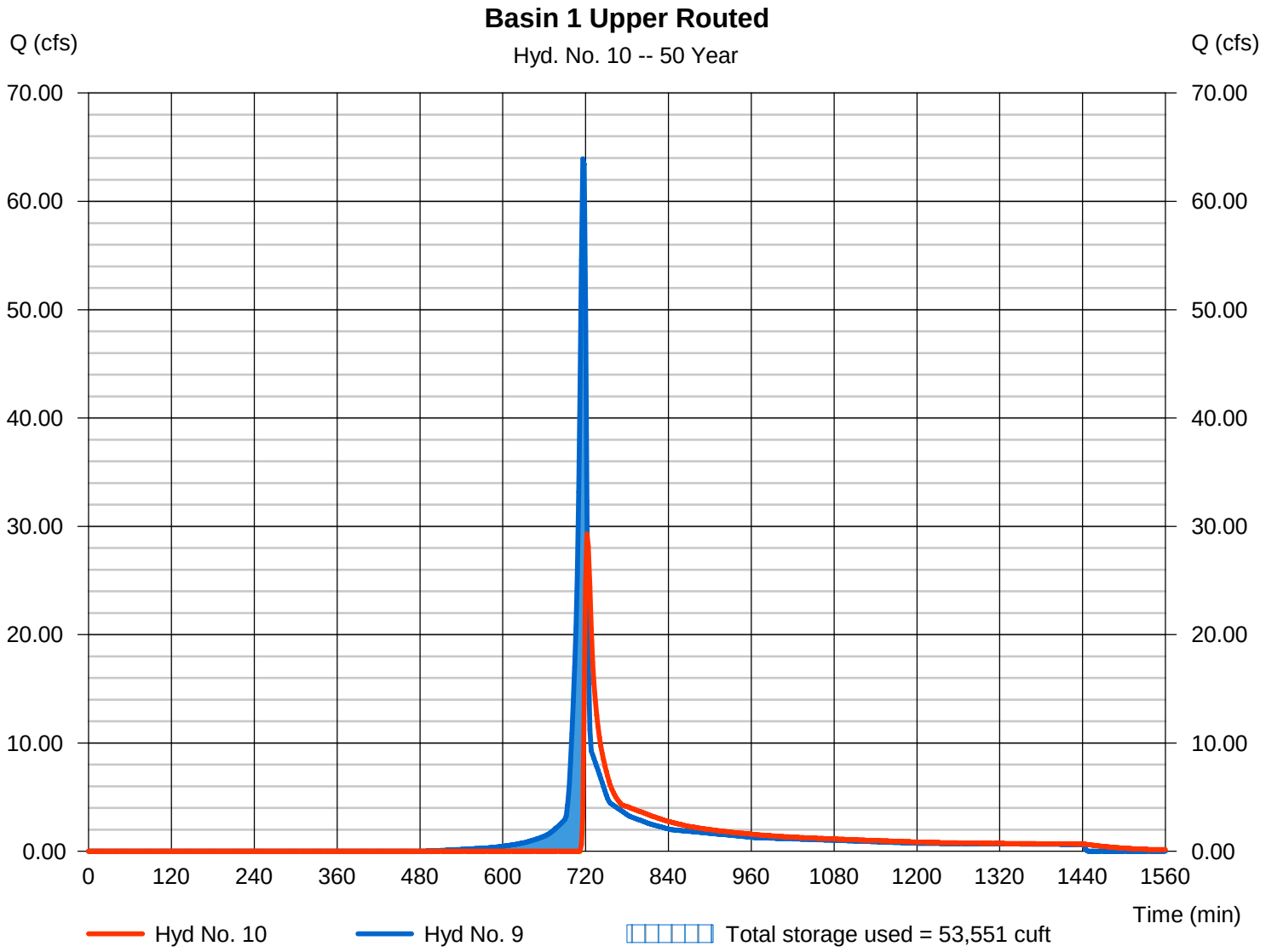
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	29.32 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	100,148 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	318.43 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	53,551 cuft

Storage Indication method used.



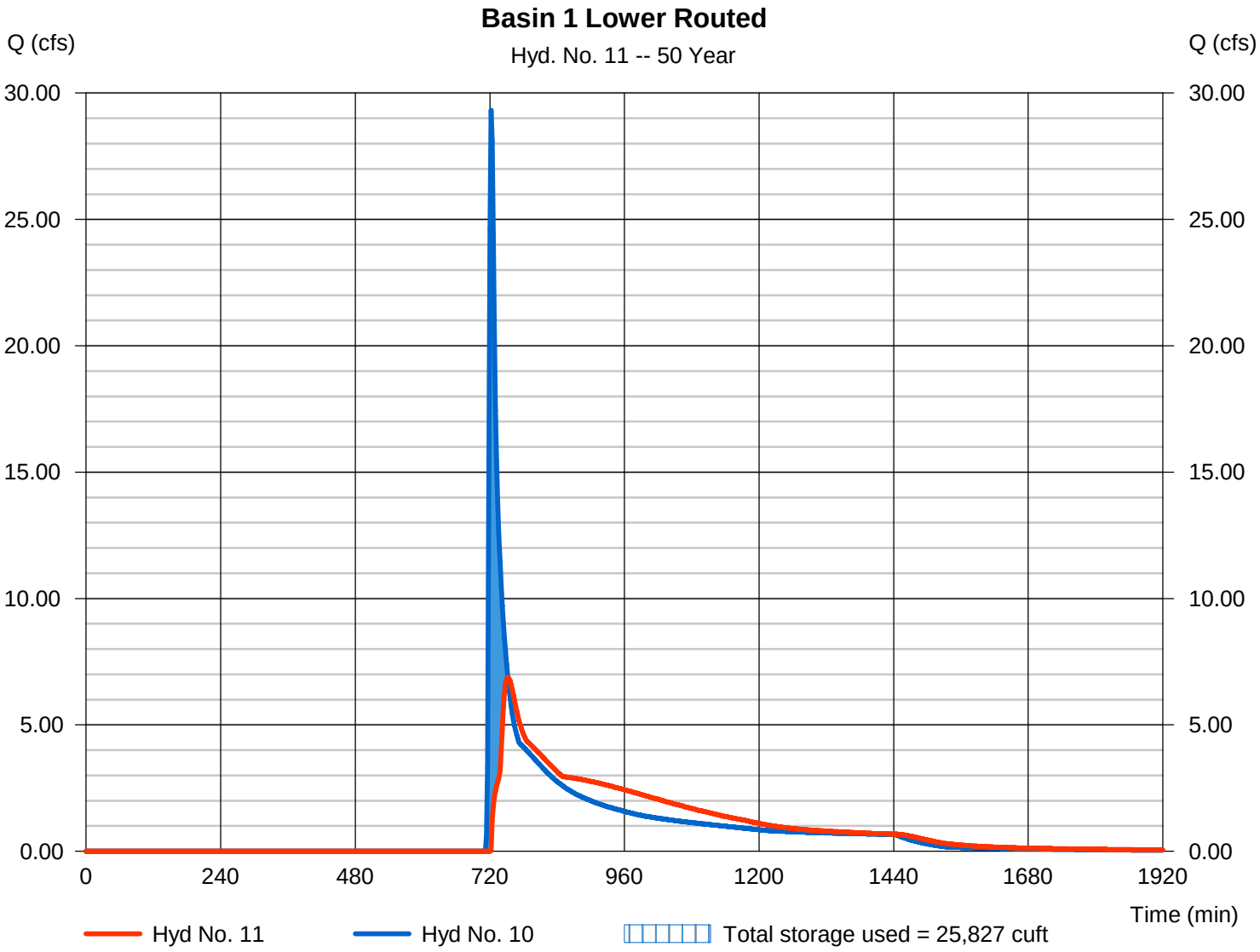
Hydrograph Report

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	6.885 cfs
Storm frequency	=	50 yrs	Time to peak	=	752 min
Time interval	=	2 min	Hyd. volume	=	94,055 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	302.10 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	25,827 cuft

Storage Indication method used.

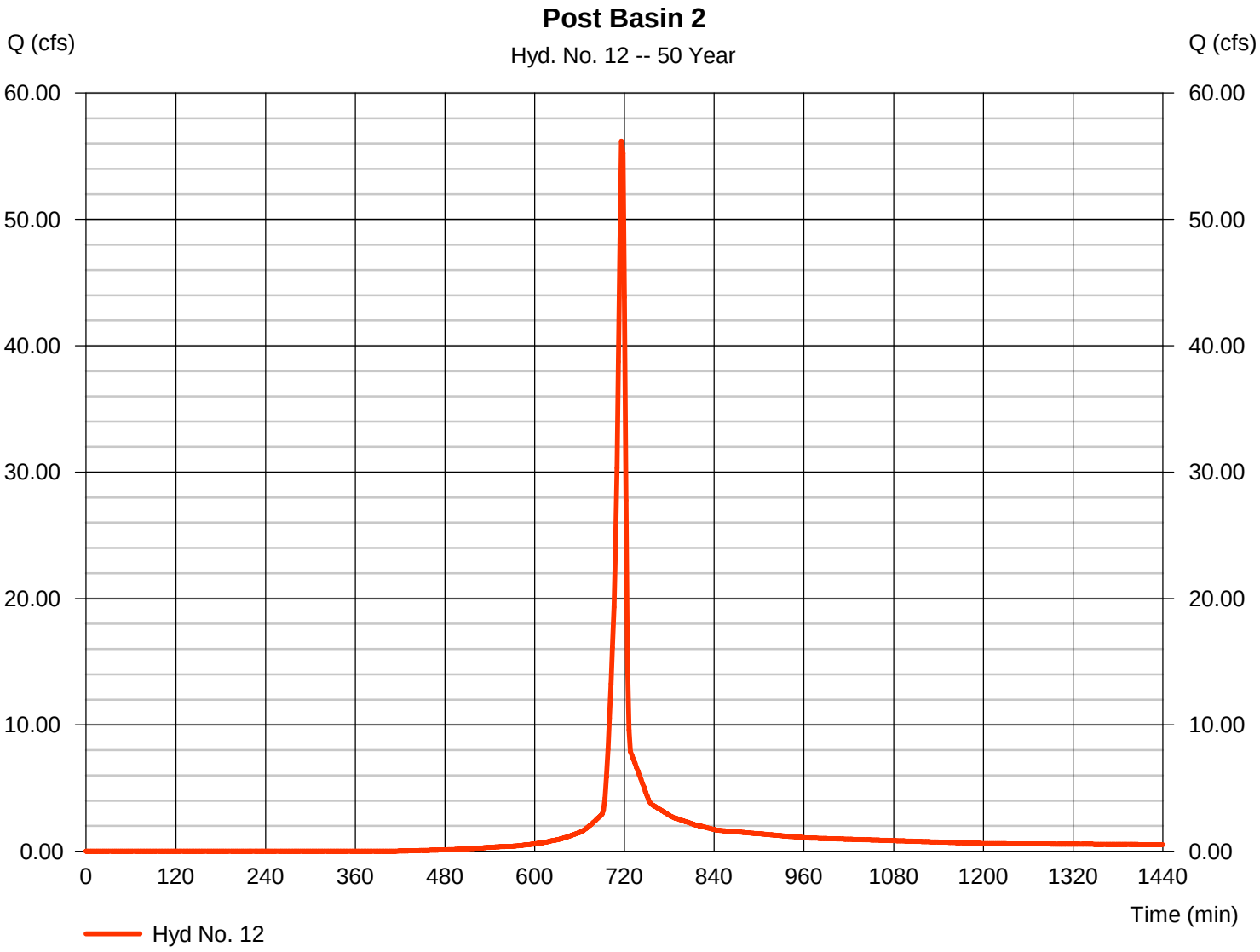


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	56.20 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	114,655 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



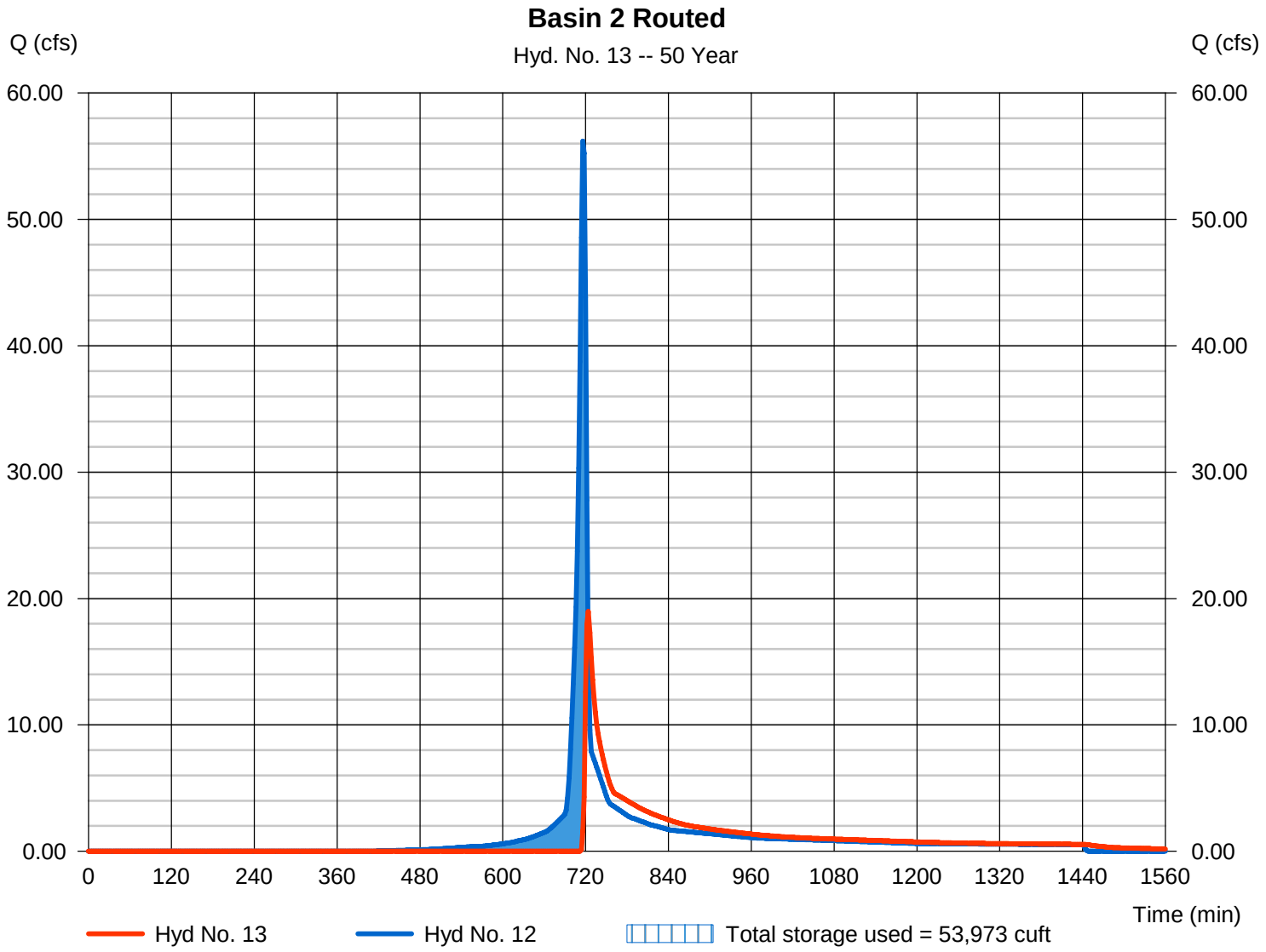
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	18.98 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	82,300 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	308.22 ft
Reservoir name	=	Basin 2	Max. Storage	=	53,973 cuft

Storage Indication method used.

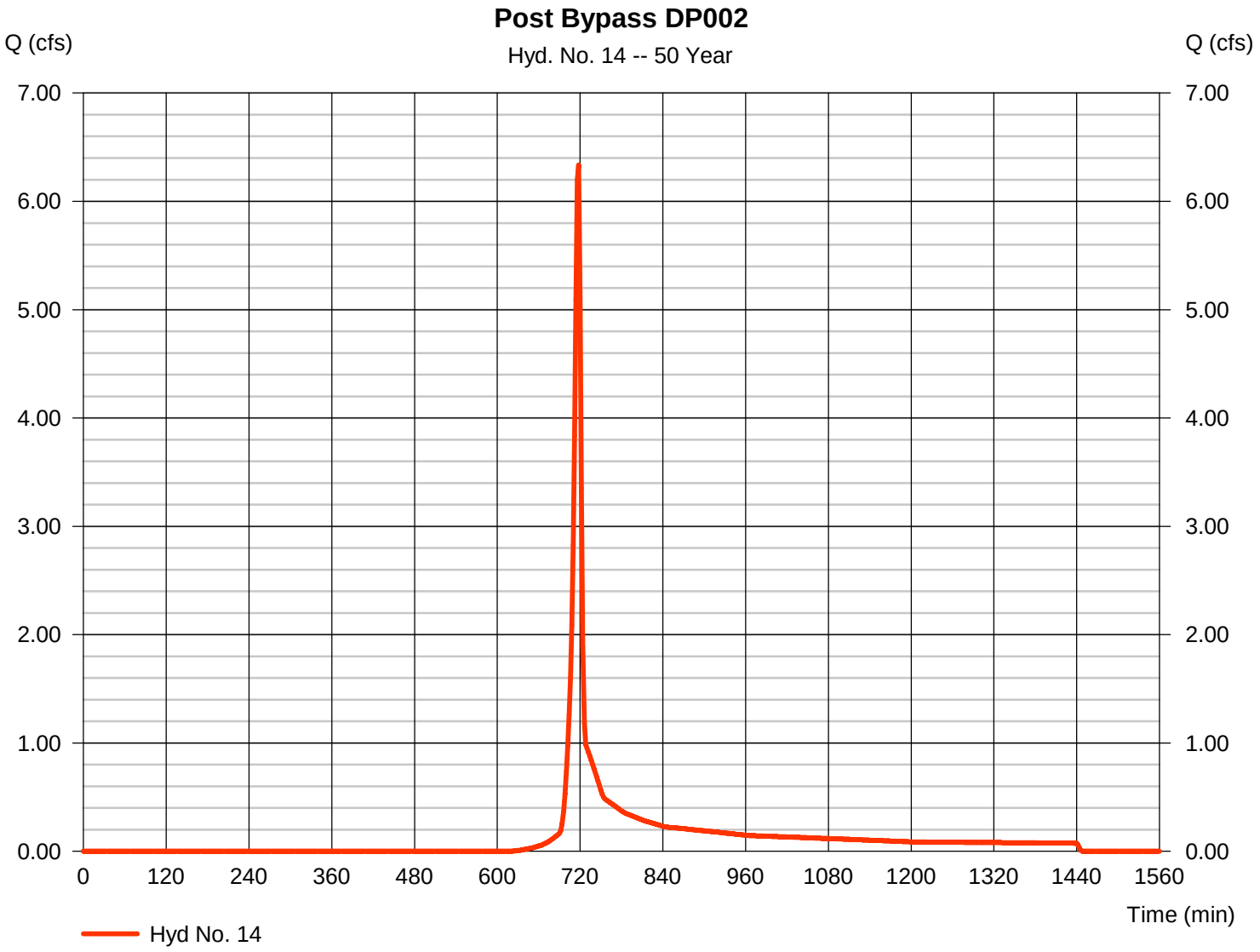


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.335 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	12,668 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

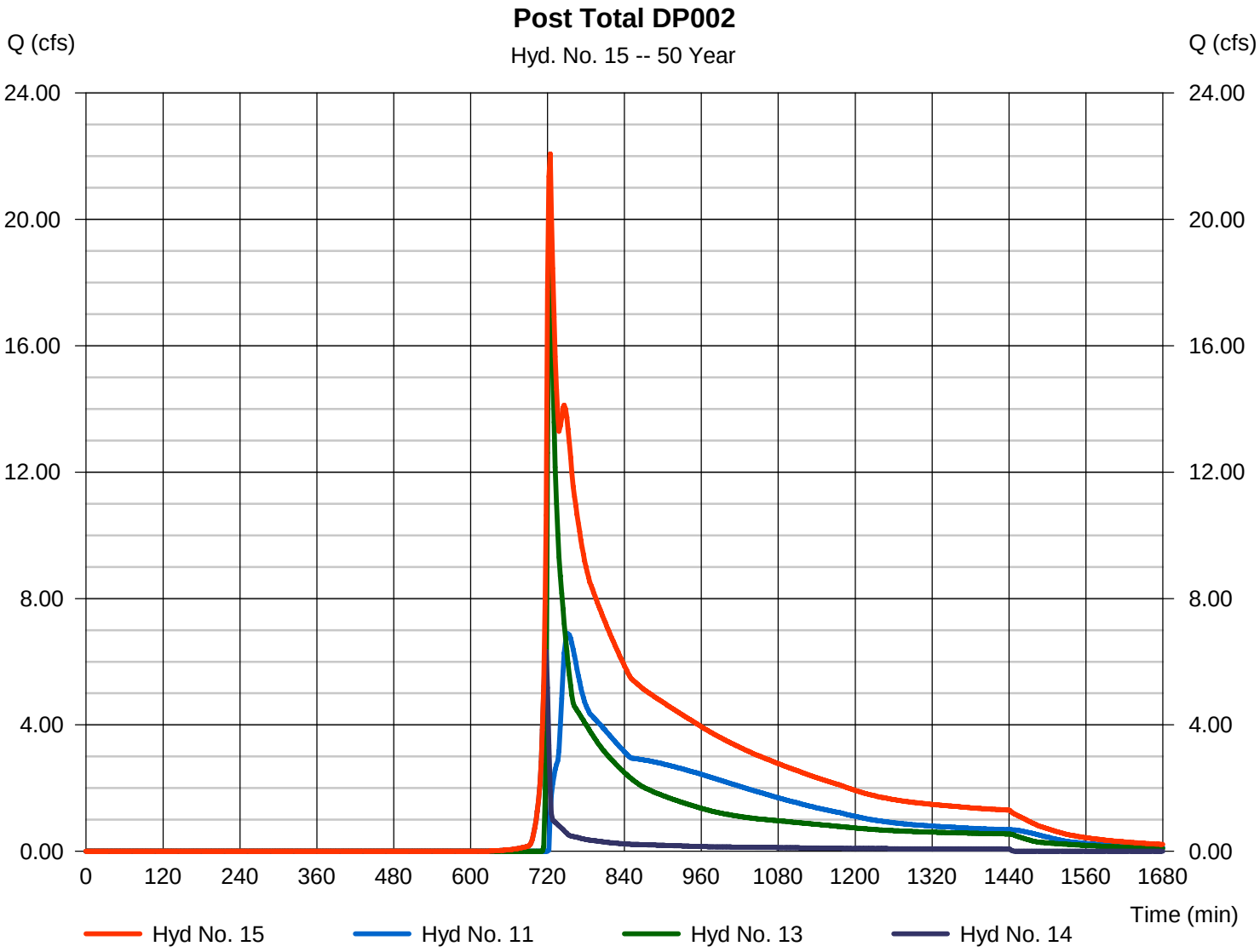


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	22.07 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	189,024 cuft
Inflow hyds.	=	11, 13, 14	Contrib. drain. area	=	1.540 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

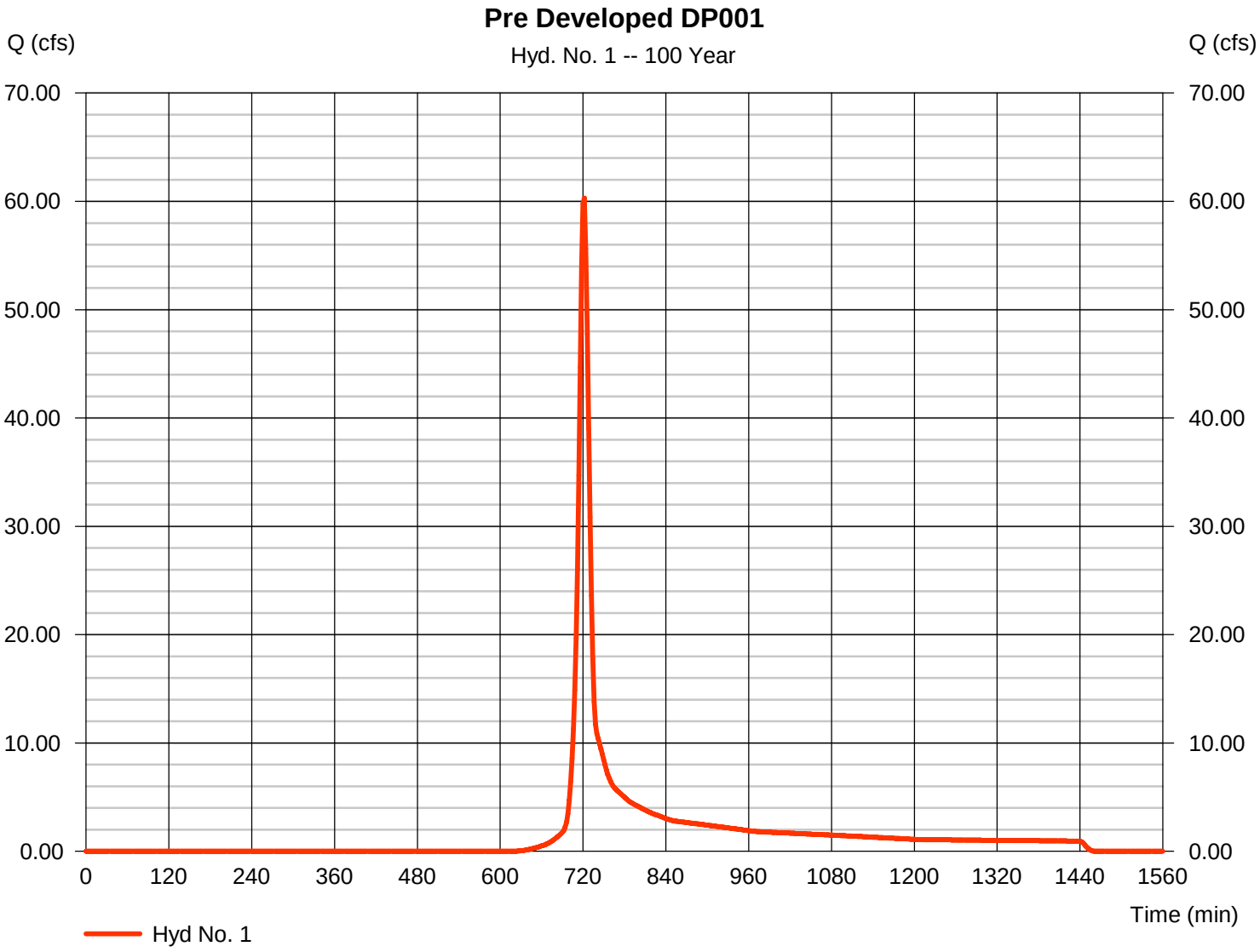
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	60.31	2	722	159,136	------	------	------	Pre Developed DP001
2	SCS Runoff	79.34	2	722	208,579	------	------	------	Pre Developed DP002
4	SCS Runoff	84.16	2	716	170,598	------	------	------	Post Basin 3
5	Reservoir	26.51	2	724	136,781	4	317.70	75,240	Basin 3 Routed
6	SCS Runoff	8.332	2	718	16,740	------	------	------	Post Bypass DP001
7	Combine	28.93	2	724	153,521	5, 6	------	------	Post Total DP001
9	SCS Runoff	77.75	2	716	157,867	------	------	------	Post Basin 1
10	Reservoir	41.09	2	722	128,696	9	318.81	61,017	Basin 1 Upper Routed
11	Reservoir	15.55	2	736	122,603	10	302.47	31,288	Basin 1 Lower Routed
12	SCS Runoff	67.22	2	716	138,052	------	------	------	Post Basin 2
13	Reservoir	33.12	2	722	105,698	12	308.57	60,504	Basin 2 Routed
14	SCS Runoff	8.028	2	718	16,080	------	------	------	Post Bypass DP002
15	Combine	39.37	2	722	244,381	11, 13, 14	------	------	Post Total DP002

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	60.31 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	159,136 cuft
Drainage area	=	15.430 ac	Curve number	=	58
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

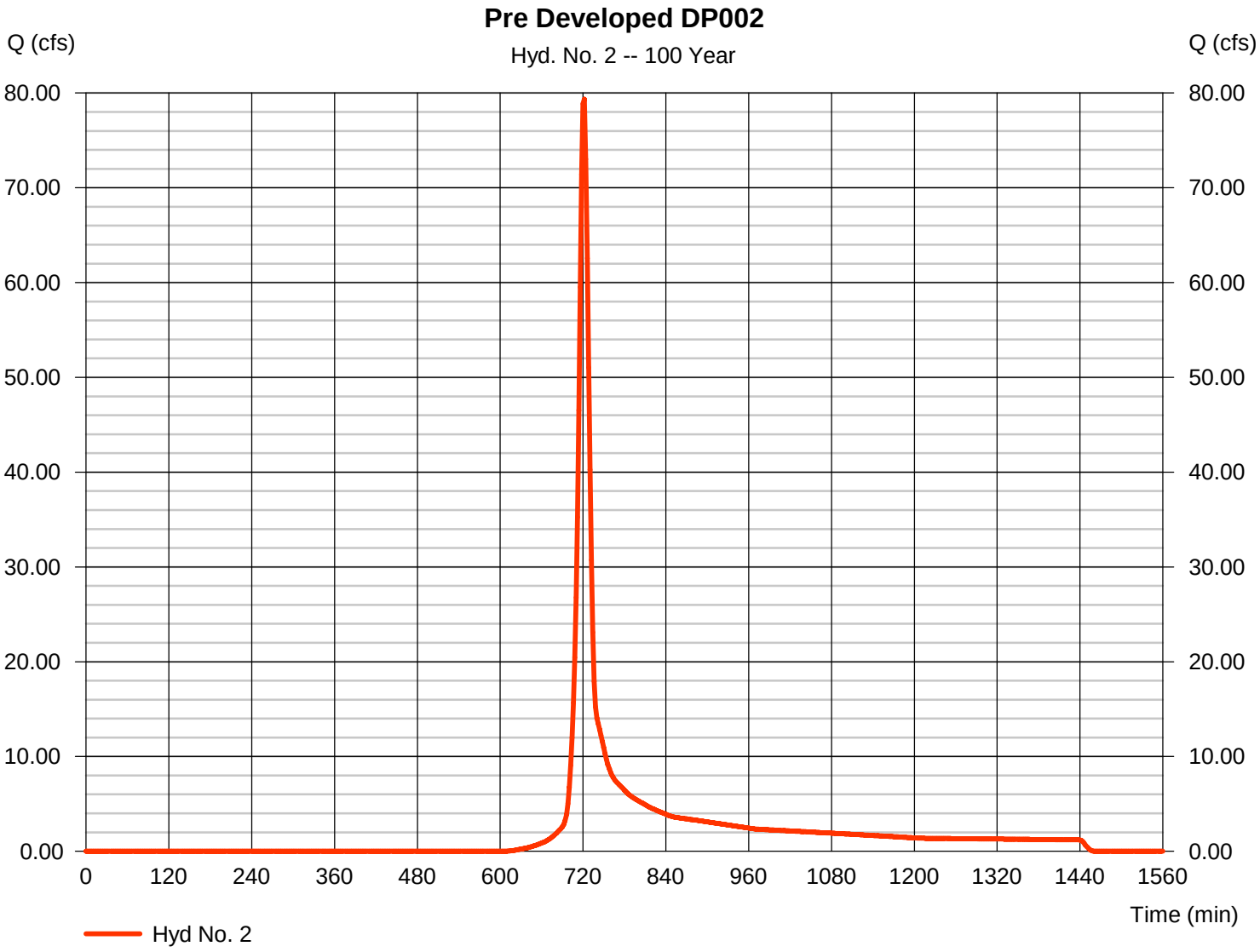


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	79.34 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	208,579 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

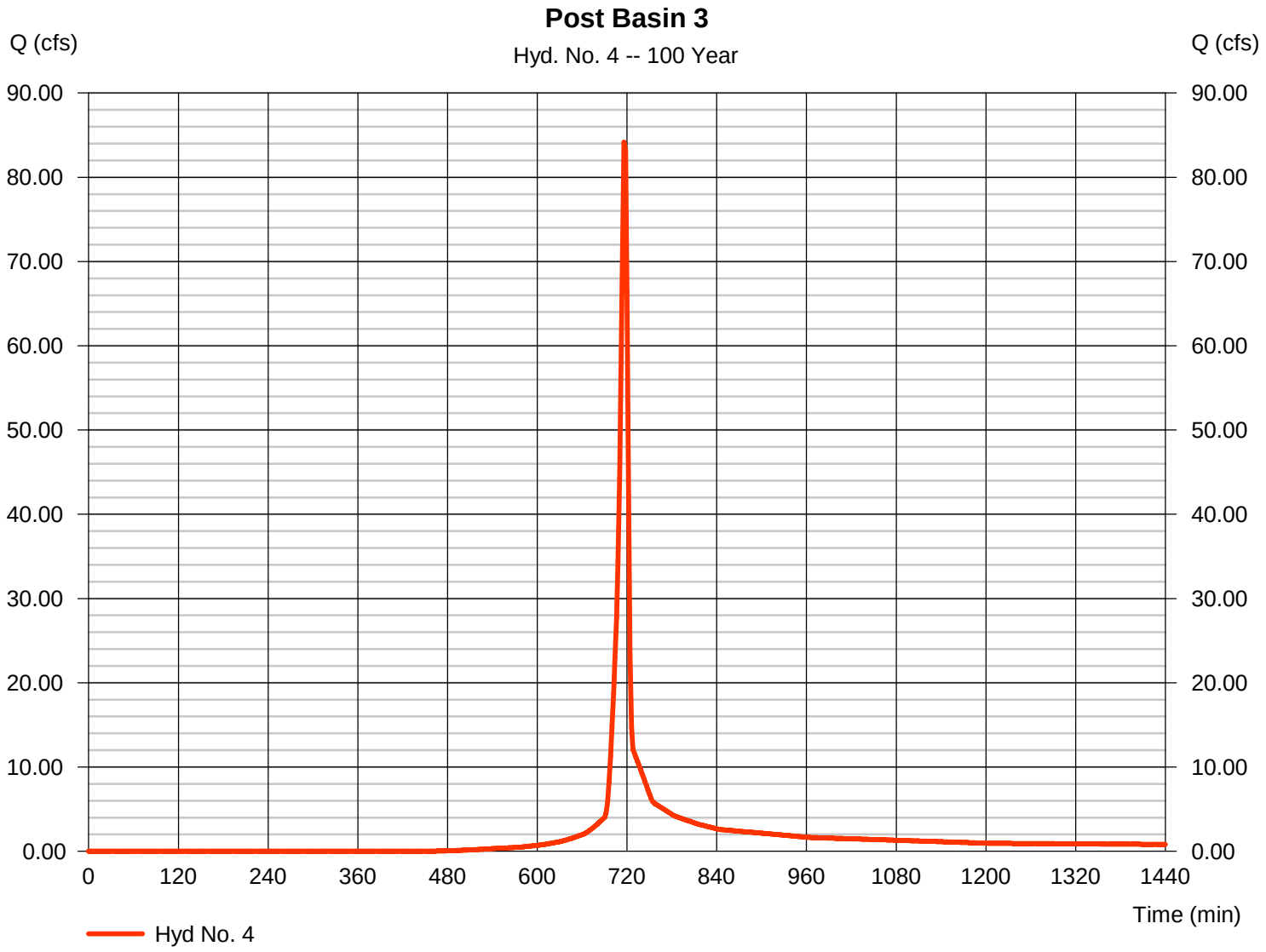


Hydrograph Report

Hyd. No. 4

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	84.16 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	170,598 cuft
Drainage area	=	12.150 ac	Curve number	=	70.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



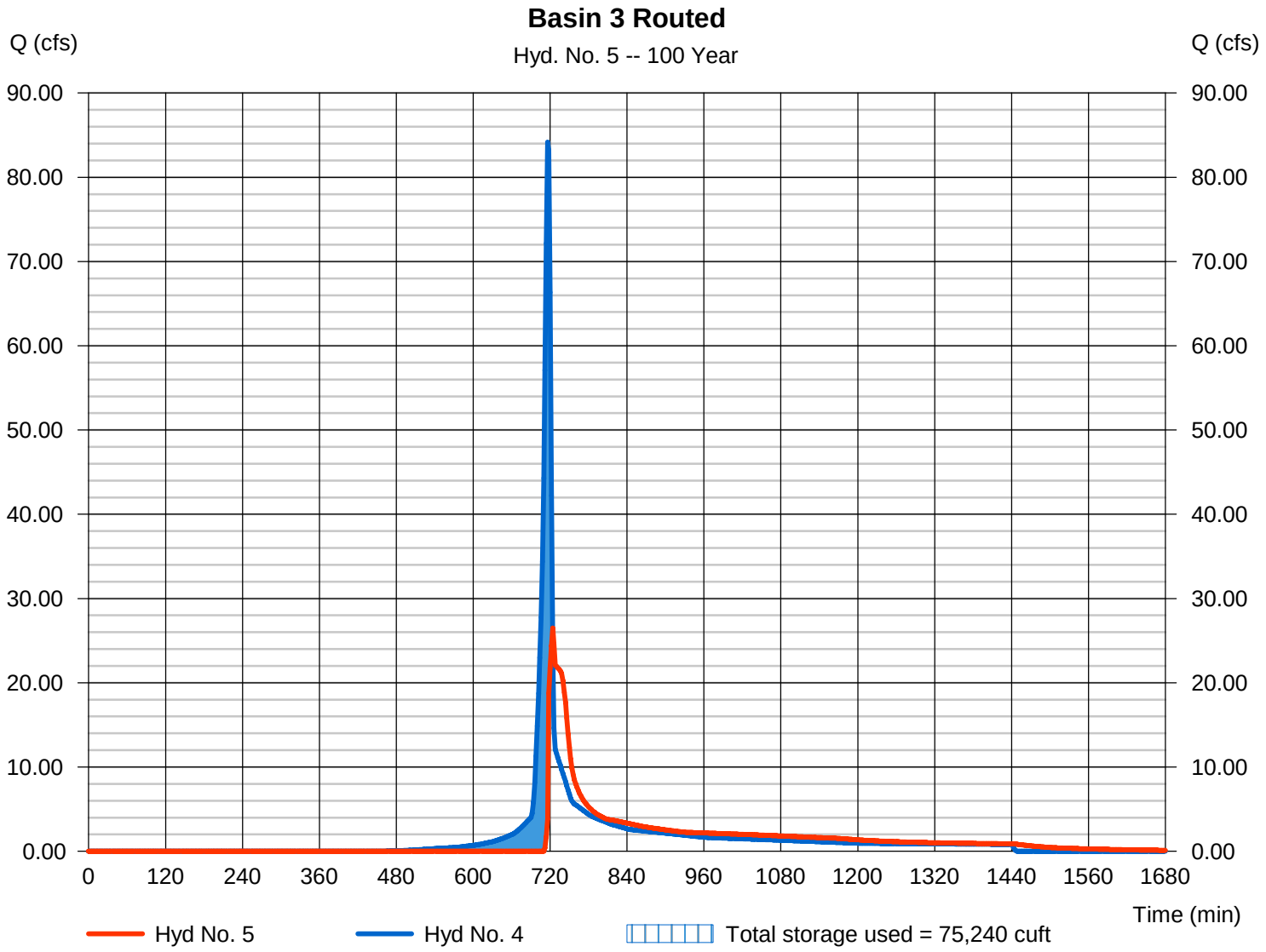
Hydrograph Report

Hyd. No. 5

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	26.51 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	136,781 cuft
Inflow hyd. No.	=	4 - Post Basin 3	Max. Elevation	=	317.70 ft
Reservoir name	=	Basin 3	Max. Storage	=	75,240 cuft

Storage Indication method used.

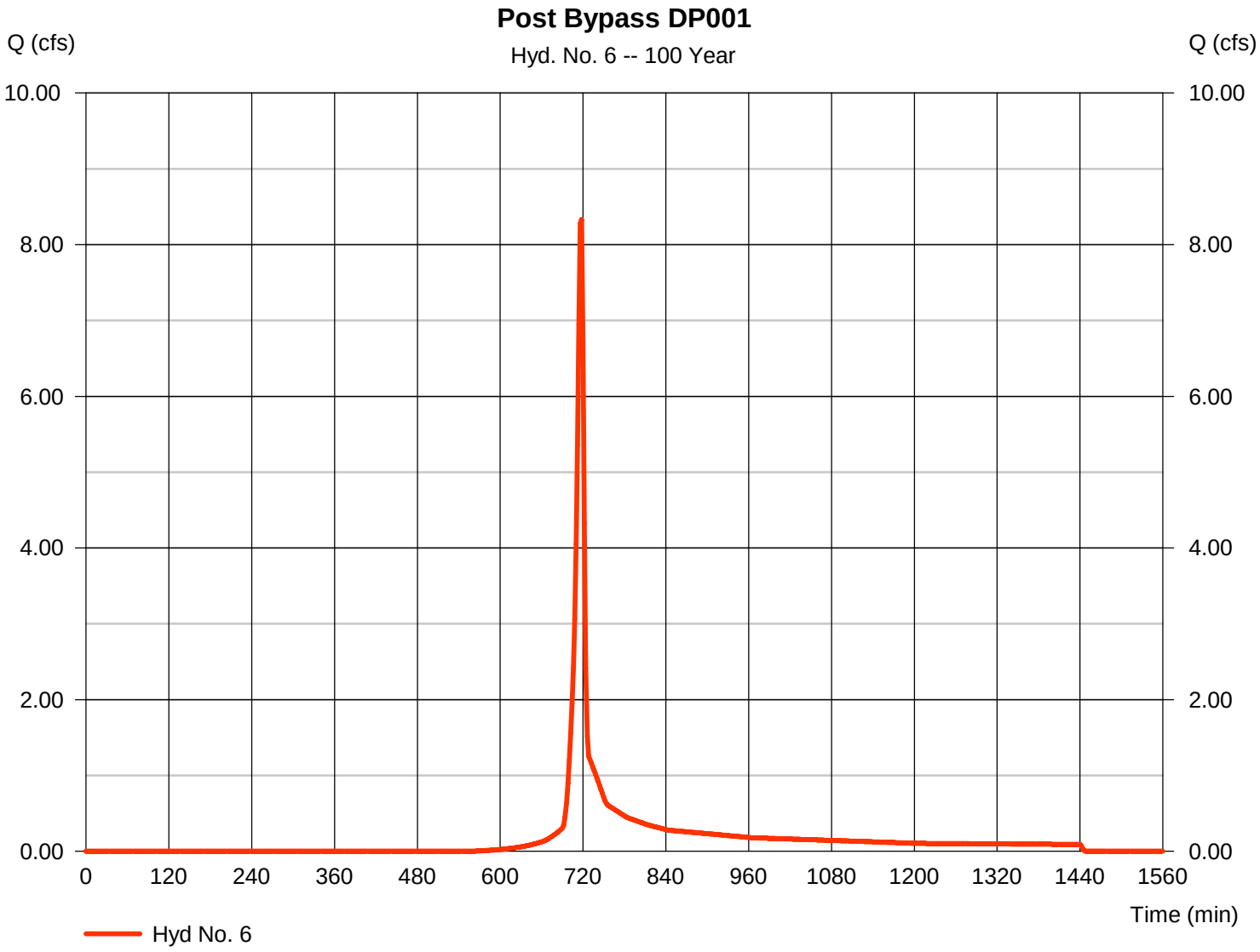


Hydrograph Report

Hyd. No. 6

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.332 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	16,740 cuft
Drainage area	=	1.490 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

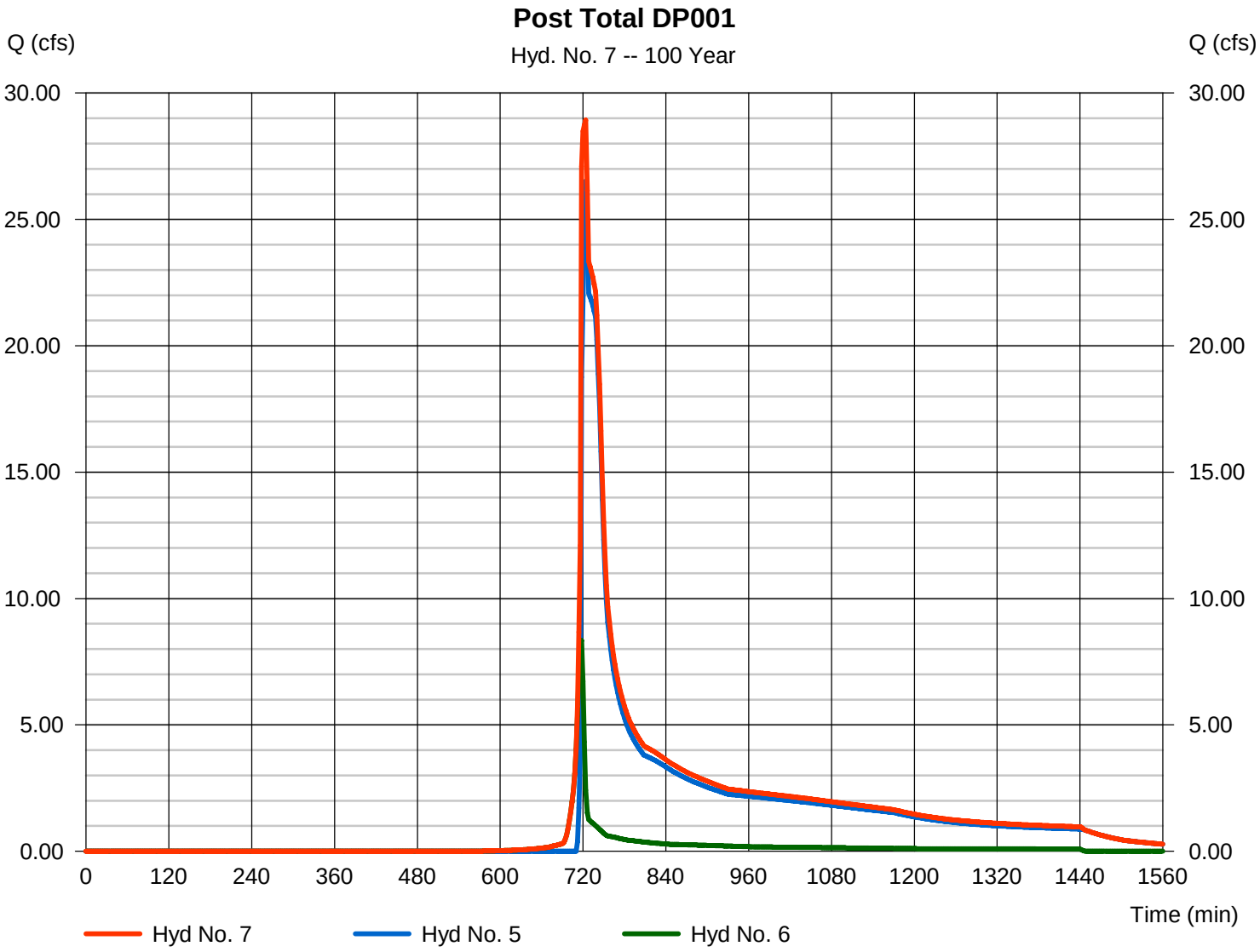


Hydrograph Report

Hyd. No. 7

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 28.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 153,521 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.490 ac

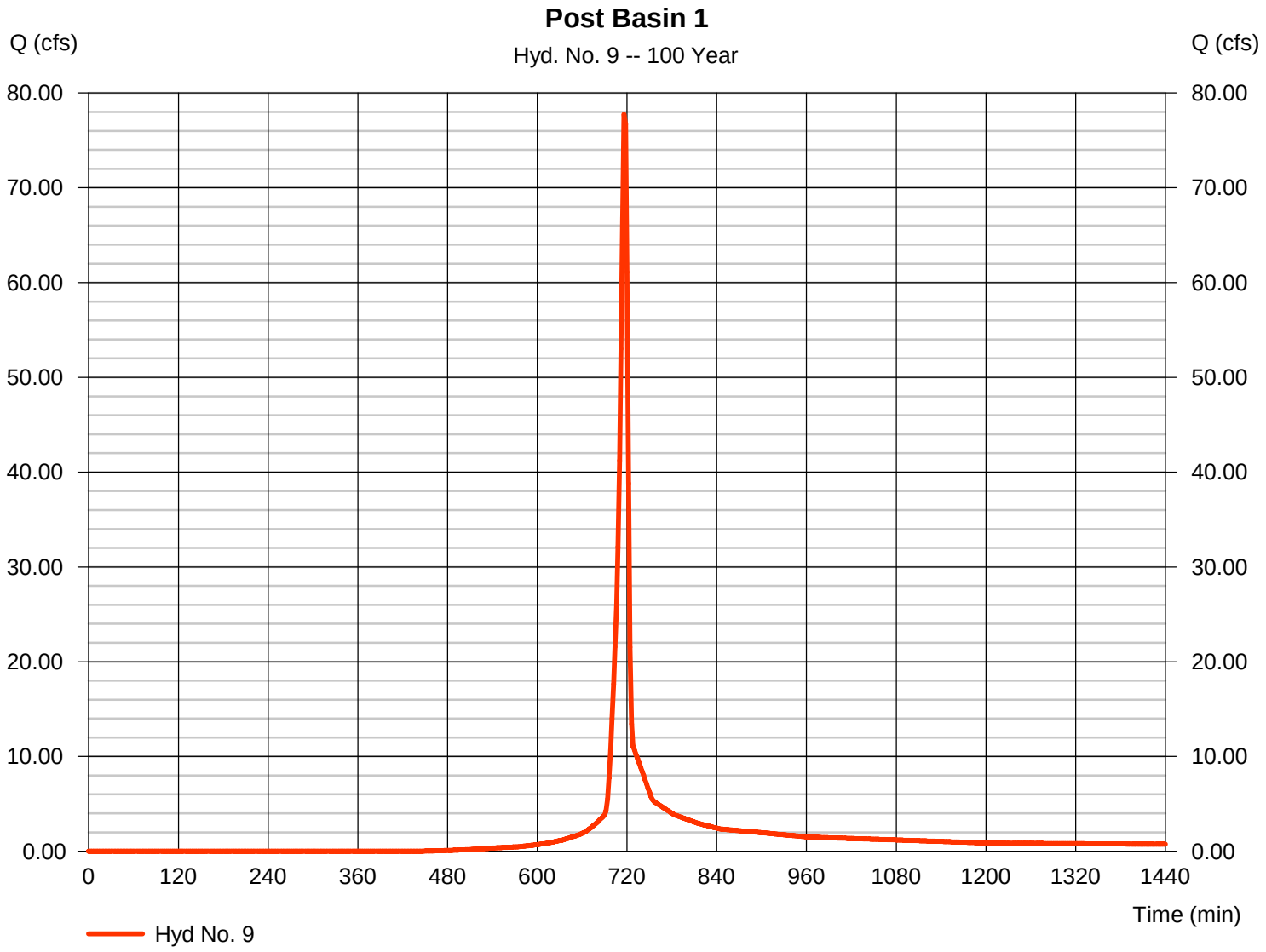


Hydrograph Report

Hyd. No. 9

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	77.75 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	157,867 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



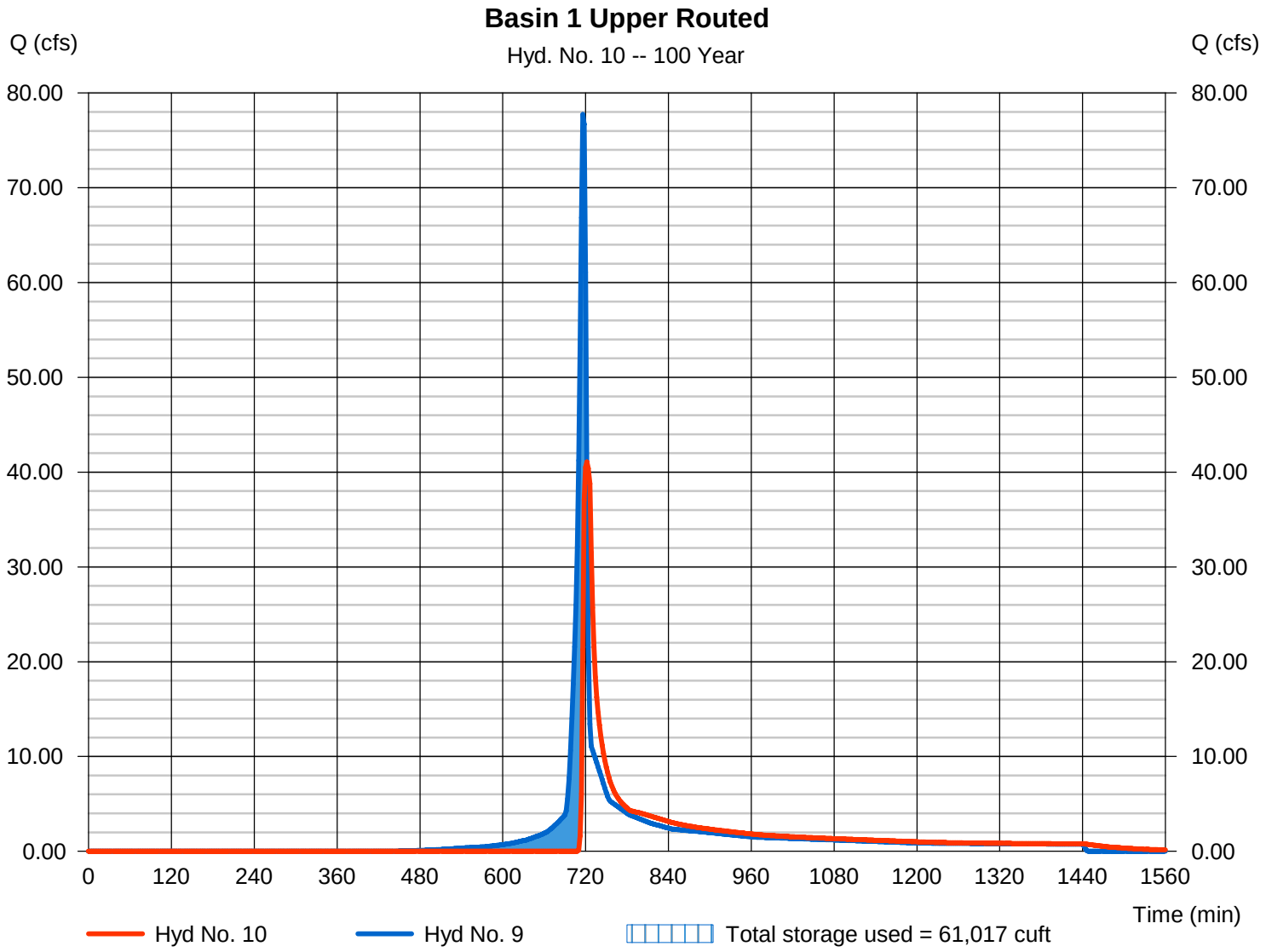
Hydrograph Report

Hyd. No. 10

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	41.09 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	128,696 cuft
Inflow hyd. No.	=	9 - Post Basin 1	Max. Elevation	=	318.81 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	61,017 cuft

Storage Indication method used.



Hydrograph Report

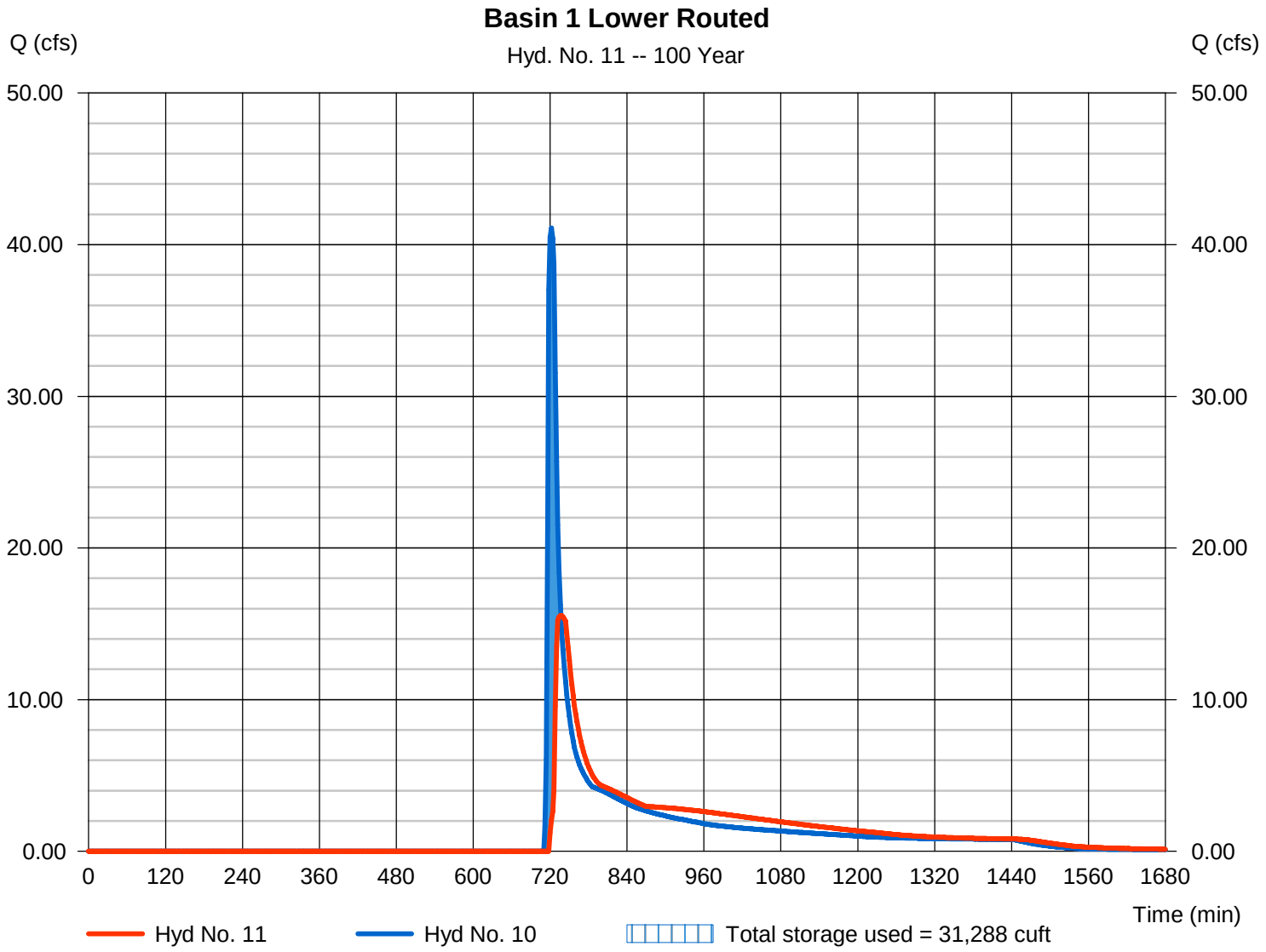
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 09 / 1 / 2021

Hyd. No. 11

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	15.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	122,603 cuft
Inflow hyd. No.	=	10 - Basin 1 Upper Routed	Max. Elevation	=	302.47 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	31,288 cuft

Storage Indication method used.

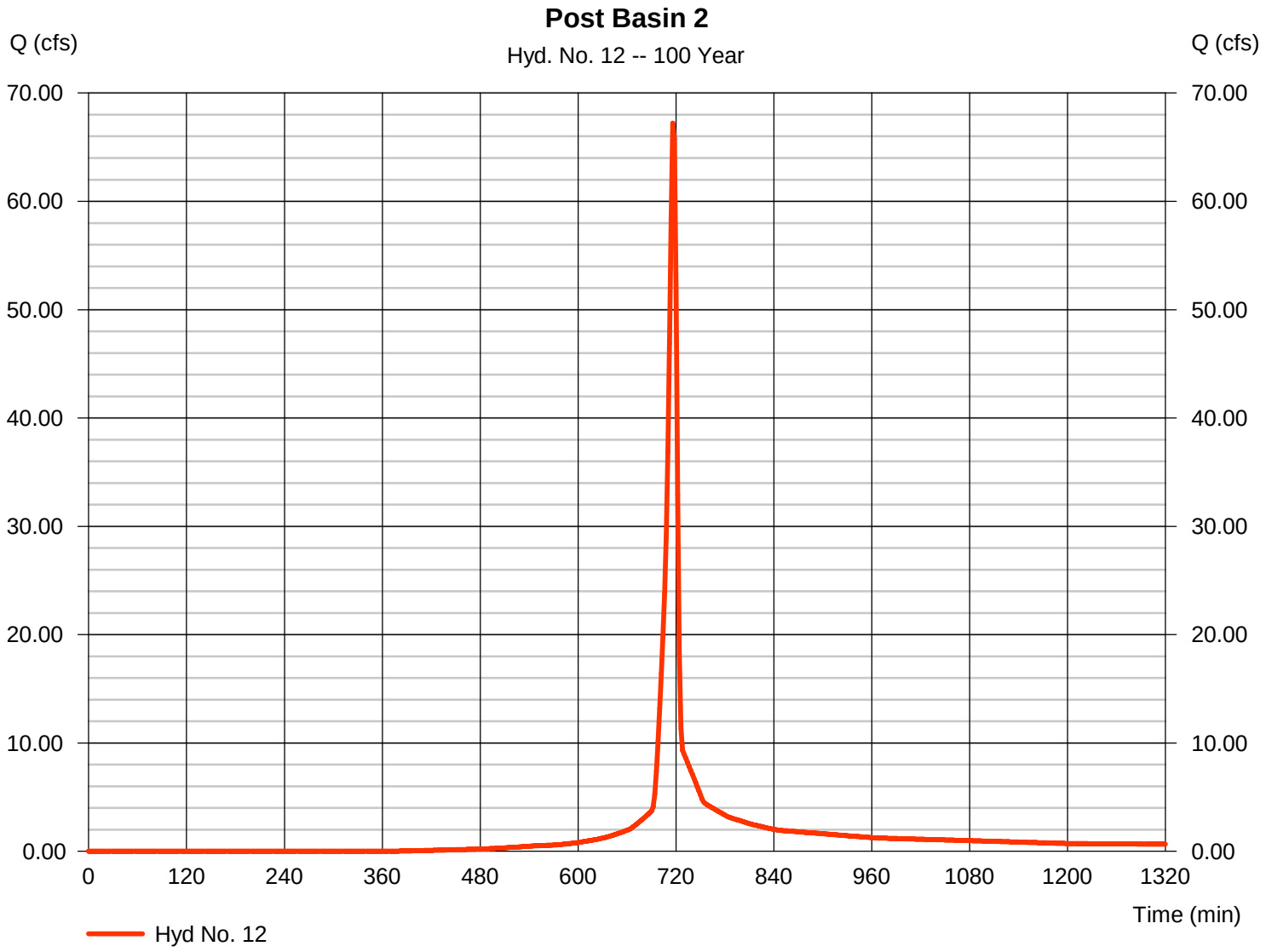


Hydrograph Report

Hyd. No. 12

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	67.22 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	138,052 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



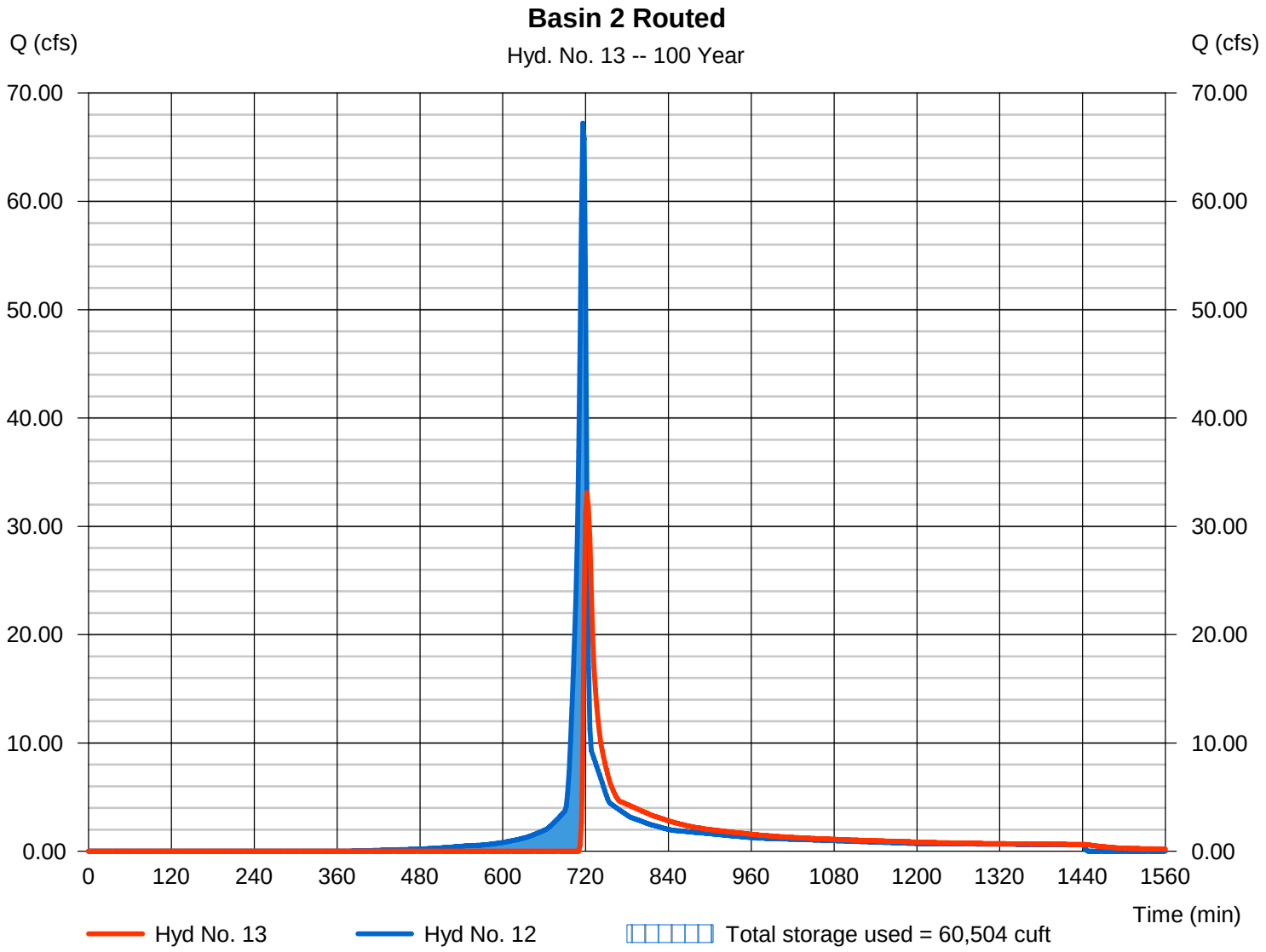
Hydrograph Report

Hyd. No. 13

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	33.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	105,698 cuft
Inflow hyd. No.	=	12 - Post Basin 2	Max. Elevation	=	308.57 ft
Reservoir name	=	Basin 2	Max. Storage	=	60,504 cuft

Storage Indication method used.

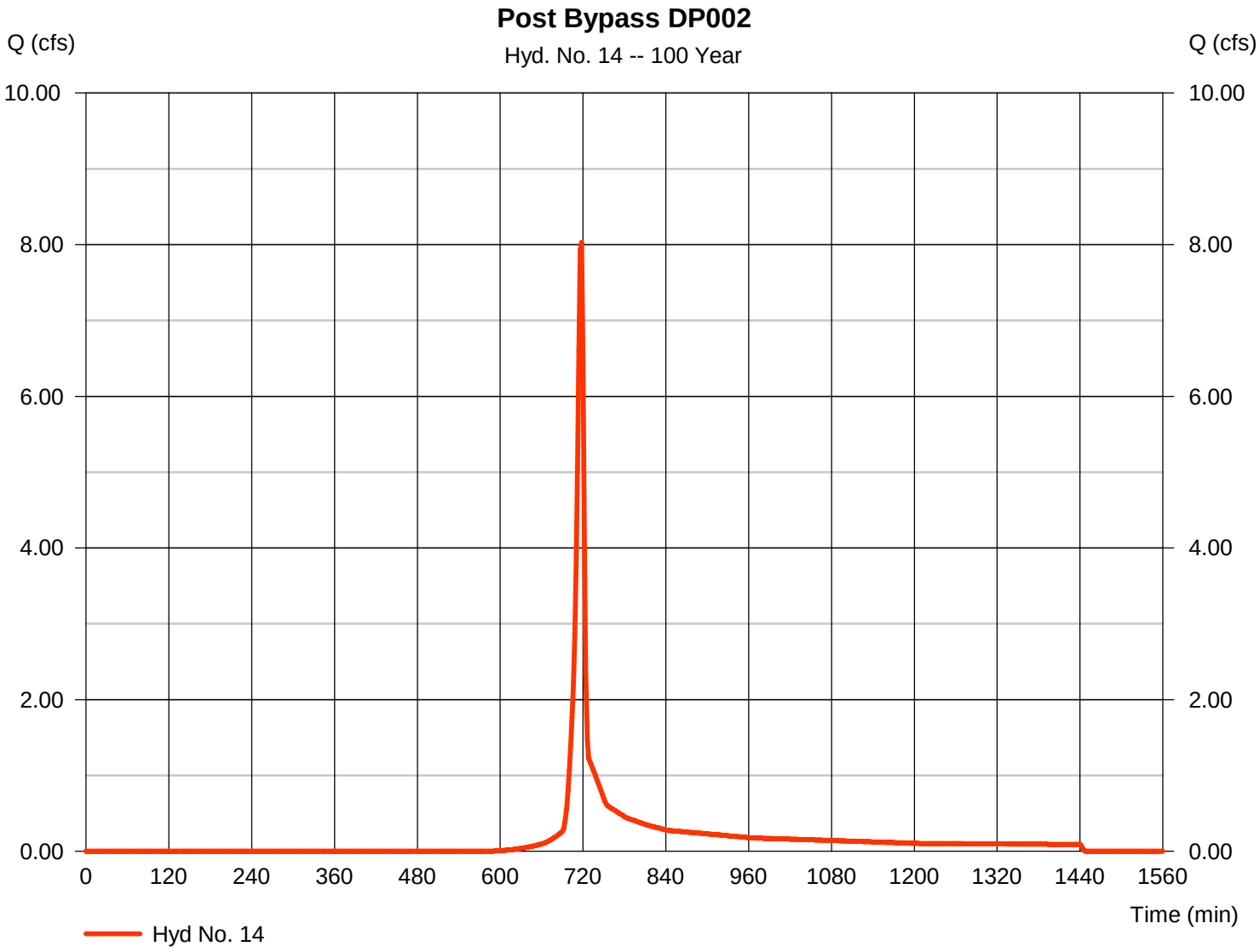


Hydrograph Report

Hyd. No. 14

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.028 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	16,080 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

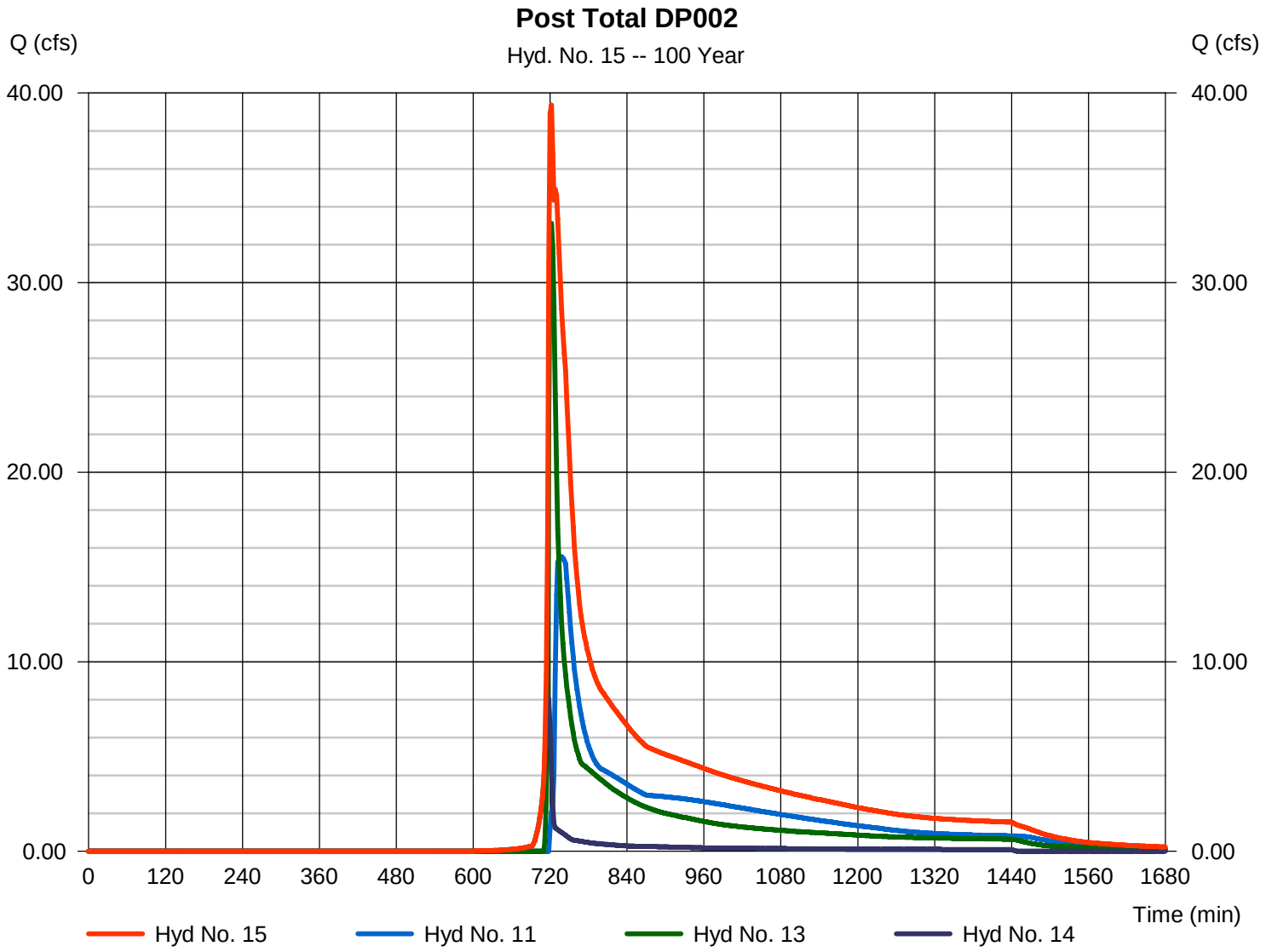


Hydrograph Report

Hyd. No. 15

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	39.37 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	244,381 cuft
Inflow hyds.	=	11, 13, 14	Contrib. drain. area	=	1.540 ac



APPENDIX E

USDA NRCS SOIL REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Chester County, Pennsylvania

Stokes

March 28, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:6,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 13, Jun 5, 2020

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

Date(s) aerial images were photographed: May 26, 2019—Jul 10, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Baile silt loam	11.2	16.9%
Co	Codorus silt loam	1.1	1.6%
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	6.0	9.1%
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	32.3	49.0%
GfD	Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery	5.5	8.4%
Ha	Hatboro silt loam	6.0	9.1%
MaD	Manor loam, 15 to 25 percent slopes	3.8	5.8%
UrlB	Urban land-Gladstone complex, 0 to 8 percent slopes	0.1	0.1%
Totals for Area of Interest		**66.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit

descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Chester County, Pennsylvania

Ba—Baile silt loam

Map Unit Setting

National map unit symbol: pjb7
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Baile and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baile

Setting

Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Parent material: Local alluvium over residuum weathered from mica schist

Typical profile

Ap - 0 to 10 inches: silt loam
Btg - 10 to 40 inches: silt loam
Cg - 40 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 9 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope

Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Manor

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Chester

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Glenelg

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Co—Codorus silt loam

Map Unit Setting

National map unit symbol: pjfx
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 120 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Codorus and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Codorus

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from gneiss and/or alluvium derived from mica schist

Typical profile

Ap - 0 to 12 inches: silt loam
Bw - 12 to 48 inches: silt loam
C - 48 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 72 to 99 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hatboro

Percent of map unit: 8 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Glenville

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Baile

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear

Hydric soil rating: Yes

GdB—Gladstone gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v7gk
Elevation: 250 to 1,200 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Gladstone and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gladstone

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy colluvium derived from granite and gneiss and/or loamy residuum weathered from granite and gneiss

Typical profile

Ap - 0 to 10 inches: gravelly loam
Bt1 - 10 to 22 inches: sandy clay loam
Bt2 - 22 to 37 inches: loam
C - 37 to 66 inches: sandy loam
R - 66 to 76 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Califon

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Annandale

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Parker

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

GdC—Gladstone gravelly loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v7gl
Elevation: 250 to 1,200 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 170 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Gladstone and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gladstone

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy colluvium derived from granite and gneiss and/or loamy residuum weathered from granite and gneiss

Typical profile

Ap - 0 to 10 inches: gravelly loam
Bt1 - 10 to 22 inches: gravelly sandy clay loam
Bt2 - 22 to 37 inches: gravelly loam
C - 37 to 66 inches: gravelly sandy loam
R - 66 to 76 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 65 to 67 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Parker

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Califon

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Annandale

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

GfD—Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery

Map Unit Setting

National map unit symbol: wphh
Elevation: 200 to 1,200 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Gladstone, very bouldery, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gladstone, Very Bouldery

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Local colluvium and residuum weathered from granite and gneiss

Typical profile

A - 0 to 10 inches: gravelly loam
Bt - 10 to 42 inches: gravelly clay loam
C - 42 to 68 inches: very gravelly loam
R - 68 to 78 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 60 to 100 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Cokesbury

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Califon

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Ha—Hatboro silt loam

Map Unit Setting

National map unit symbol: 1lwqq
Elevation: 200 to 800 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Hatboro and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatboro

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Alluvium derived from metamorphic and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 44 inches: silt loam
Cg - 44 to 56 inches: sandy clay loam
C - 56 to 70 inches: stratified gravelly sand to clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

MaD—Manor loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2tmcg
Elevation: 250 to 1,000 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 192 days
Farmland classification: Not prime farmland

Map Unit Composition

Manor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery coarse sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 59 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope, head slope, interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Mt. airy

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Blocktown

Percent of map unit: 5 percent

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

UrlB—Urban land-Gladstone complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1r3cq
Elevation: 200 to 1,200 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 44 to 57 degrees F
Frost-free period: 130 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 65 percent
Gladstone and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 100 inches to lithic bedrock
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Gladstone

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear, convex

Across-slope shape: Linear, convex
Parent material: Local colluvium and residuum weathered from granite and gneiss

Typical profile

A - 0 to 10 inches: gravelly loam
C - 10 to 42 inches: gravelly clay loam
2Ap - 42 to 68 inches: gravelly loam
R - 68 to 78 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 60 to 100 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Cokesbury

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Califon

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

APPENDIX E

STORMWATER INFILTRATION TESTING REPORT

STORMWATER INFILTRATION REPORT

FOR

1013 SHILOH ROAD
WESTTOWN TOWNSHIP
CHESTER COUNTY

PREPARED FOR:

Keystone Custom Homes

PREPARED BY:

D.L. Howell & Associates, Inc.
1250 Wrights Lane
West Chester, PA 19380

March 2021

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

Stormwater Infiltration Test Report
1013 Shiloh Road
Westtown Township
Chester County

On Monday and Tuesday, March 22-23, 2021, D.L. Howell and Associates, Inc. preformed hydraulic conductivity tests for the proposed stormwater management areas for the property located at 1013 Shiloh Road in Westtown Township, Chester County. The purpose of the hydraulic conductivity testing was to determine site suitability for the proposed stormwater infiltration areas associated with proposed improvements at the site (see development plan).

Testing was conducted in general accordance with the Pennsylvania Department of Environmental Protection (PADEP)'s Pennsylvania Stormwater Best Management Practices Manual specifications, in a cased, sealed, borehole utilizing the falling head method designed to measure the vertical hydraulic conductivity of the soil. An approximate five-inch diameter borehole was hand dug to the depth of the proposed bottom elevation of the infiltration structure and a 3-inch diameter PVC casing was installed. A mixture of bentonite and soil was placed around the annulus of the casing and packed to seal the casing in place. The casing was presoaked immediately prior to the start of the test to simulate field saturated conditions. A measured amount of water was poured into the sealed casing to begin the 30-minute presoak. After the final 30-minute presoaking period, the water in the casing was adjusted to a known depth and consecutively re-adjusted after each reading and the drop of the water column is measured. The test continued until the readings became stabilized or for a maximum of eight readings. A stabilized rate of drop means a difference of ¼ inch or less of drop between the highest and lowest readings of four consecutive readings.

Within the site, four hydraulic conductivity tests were conducted at the elevations associated with the proposed bottom of the infiltration structures. One deep test pit was excavated at each infiltration test location to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structures.

- Infiltration Test 3-23-1 was conducted at approximately ± 5.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 317.0. One deep test pit was excavated at this location to a depth of 7.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 7.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-1: an infiltration rate of 1.50 inches per hour shall be used.

- Infiltration Test 3-23-2 was conducted at approximately ± 4.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 314.0. One deep test pit was excavated at this location to a depth of 6.0 feet below existing grade. No limiting conditions were identified at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-2: an infiltration rate of 1.14 inches per hour shall be used.

- Infiltration Test 3-23-3 was conducted at approximately ± 3.5 feet below existing grade, which corresponds to an approximate infiltration elevation of 303.5. One deep test pit was excavated at this location to a depth of 5.5 feet below existing grade. During excavation, rock was encountered at a depth of approximately 5.5 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-3: an infiltration rate of 1.68 inches per hour shall be used.

- Infiltration Test 3-23-4 was conducted at approximately ± 5.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 298.0. One deep test pit was excavated at this location to a depth of 7.0 feet below existing grade. During excavation, groundwater was encountered at a depth of approximately 7.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-4: an infiltration rate of 1.96 inches per hour shall be used.

- Infiltration Test 3-22-5 was conducted at approximately ± 6.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 334.0. One deep test pit was excavated at this location to a depth of 8.0 feet below existing grade. No limiting conditions were encountered at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-5: an infiltration rate of 2.81 inches per hour shall be used.

- Infiltration Test 3-22-6 was conducted at approximately ± 2.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 306.0. One

deep test pit was excavated at this location to a depth of 6.0 feet below existing grade. No limiting conditions were encountered at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-6: an infiltration rate of 2.93 inches per hour shall be used.

- Infiltration Test 3-22-7 was conducted at approximately ± 2.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 336.0. One deep test pit was excavated at this location to a depth of 4.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 4.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-7: an infiltration rate of 0.88 inches per hour shall be used.

- Infiltration Test 3-22-8 was conducted at approximately ± 2.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 314.0. One deep test pit was excavated at this location to a depth of 4.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 4.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-8: an infiltration rate of 0.43 inches per hour shall be used.

Please reference plan drawings for exact locations and visual representation of infiltration tests and test pits. Results of the hydraulic conductivity testing and soil horizon descriptions can be found in the enclosed attachments.

Hydraulic Conductivity Calculation

Coefficient of Permeability: $K = [A/(F*D*t)] \times \ln (h1 / h2)$

Where:
K = permeability (inches per hour)
A = cross sectional area of cased hole
F = shape factor (2.75 constant of flat bottom)
D = cased hole diameter
t = time for head change from h1 to h2
h1 = initial height of water column in casing
h2 = final height of water column in casing

*Reference *Soil Hydraulic Conductivity Analysis Form* for infiltration testing data and *Soil Morphology Form* for soil profile data.

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/22/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 62 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-5	72									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		15.00	14.75	14.75	14.50	14.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-6	24									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		15.25	15.00	14.75	14.75	14.75	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-22-5 Results		Test 3-22-6 Results	
Kv =	***Vertical Permeability***	**2.8062**	**(in/hour)**	**2.93319**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	3.50	(Inches)	3.25	(Inches)

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/22/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 62 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-7	24									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		7.25	7.25	7.25	7.25	7.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-8	24									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		4.25	4.00	4.00	4.00	4.00	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-22-7 Results		Test 3-22-8 Results	
Kv =	***Vertical Permeability***	**0.8833**	**(in/hour)**	**0.43065**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	10.75	(Inches)	14.00	(Inches)

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/23/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 64 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-1	60									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		11.75	10.50	10.50	10.50	10.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-2	48									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		10.50	8.75	8.75	8.75	8.75	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-23-1 Results		Test 3-23-2 Results	
Kv =	***Vertical Permeability***	**1.5002**	**(in/hour)**	**1.14082**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	7.50	(Inches)	9.25	(Inches)

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/23/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 64 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-3	42									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		11.75	11.25	11.25	11.25	11.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-4	60									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		12.25	12.25	12.25	12.25	12.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-23-3 Results		Test 3-23-4 Results	
Kv =	***Vertical Permeability***	**1.68075**	**(in/hour)**	**1.95551**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	6.75	(Inches)	5.75	(Inches)

Soil Morphology Form

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PIT NUMBER: TP 3-23-1 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	11	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	11	46	A	W	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	46	84			VAR	SANDY SILT	0				GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-1. During excavation, rock was encountered at a depth of approximately 84 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	**Well Drained**	Poorly Drained	
Depth: ~84"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 84"
COVER: Meadow LANDSCAPE POSITION: SW

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-23-2 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	9	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	9	35	A	IR	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	35	72			VAR	SANDY SILT	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-2. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained Somewhat Poorly Drained	
Type: Water Rock Mottling	**Well Drained** Poorly Drained	
Depth: +72"	Moderately Well Drained Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 72"
COVER: Meadow LANDSCAPE POSITION: S

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-23-3 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	11	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	11	47	A	W	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	47	66			10 YR 3/4	STONY SILT	<20				GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-1. During excavation, rock was encountered at a depth of approximately 66 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	**Well Drained**	Poorly Drained	
Depth: ~66"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 66"
COVER: Meadow LANDSCAPE POSITION: S

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-23-4 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	8	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	8	31	A	W	10 YR 4/4	SILTY CLAY	0				MA	FIRM		
	31	47	G	W	10 YR 6/4	SILT LOAM	0				MA	FRI		
	47	84			VAR	SANDY SILT					GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-4. During excavation, groundwater was encountered at a depth of approximately 84 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Groundwater	Excessively Drained	Somewhat Poorly Drained	
Type: **Water** **Rock** Mottling	**Well Drained**	Poorly Drained	
Depth: ~84"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 84"
COVER: Meadow LANDSCAPE POSITION: S

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-1 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	5	A	W	10 YR 4/2	SILT LOAM	0				SBK	FRI		
	5	50	A	W	7.5 YR 4/3	SILTY CLAY	0				MA	FIRM		
	50	96			VAR	SILT LOAM	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-5. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained Somewhat Poorly Drained	
Type: Water Rock Mottling	Well Drained **Poorly Drained**	
Depth: +96"	Moderately Well Drained Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 96"
COVER: Meadow LANDSCAPE POSITION: SW

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-6 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	7	A	W	10 YR 4/2	SILT LOAM	0				MA	FRI		
	7	35	A	W	10 YR 4/3	SILTY CLAY	0				MA	FIRM		
	35	72			VAR	SANDY SILT	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-6. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained Somewhat Poorly Drained	
Type: Water **Rock** Mottling	Well Drained **Poorly Drained**	
Depth: ~84"	Moderately Well Drained Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 84"
COVER: Meadow LANDSCAPE POSITION: SW

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-7 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	4	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	4	48			10 YR 5/4	STONY SILT	<20				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-7. During excavation, rock was encountered at a depth of approximately 48 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	Well Drained	Poorly Drained	
Depth: ~48"	**Moderately Well Drained**	Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 48"
COVER: Meadow LANDSCAPE POSITION: NE

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-8 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	3	A	W	10 YR 3/1	SILT LOAM	0				GRAN	FRI		
	3	11	A	W	2.5 Y 5/3	SILTY CLAY	0				MA	FRI		
	11	31	G	W	10 YR 5/6	SILTY CLAY	0				MA	FRI		
	31	48			10 YR 4/4	STONY SILT	<20				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-8. During excavation, rock was encountered at a depth of approximately 48 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	Well Drained	Poorly Drained	
Depth: ~48"	**Moderately Well Drained**	Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 48"
COVER: Woodlands LANDSCAPE POSITION: NE

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

1250 Wrights Lane
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P: (610) 918-9002
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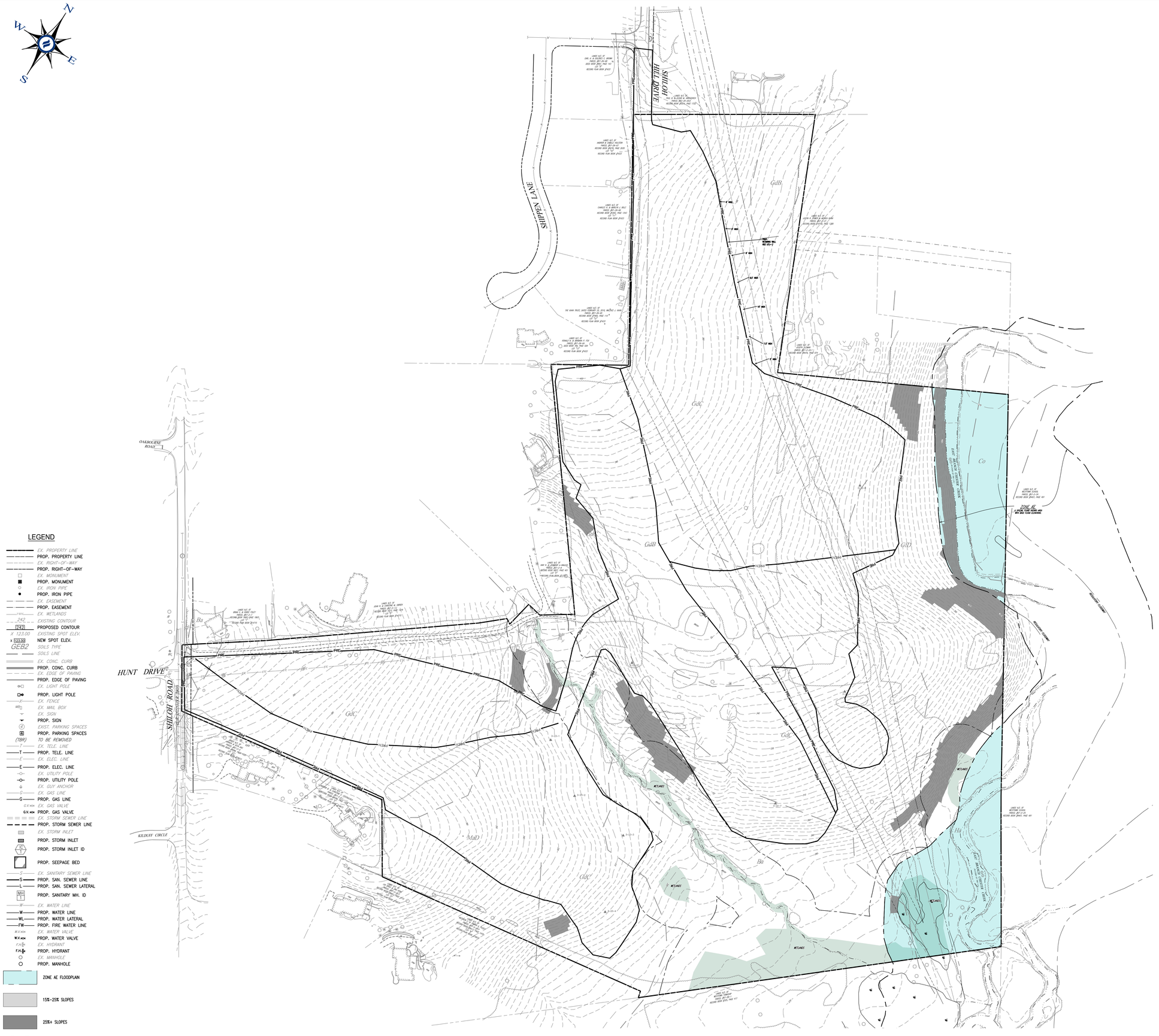

PRE-DEVELOPED DRAINAGE AREA PLAN

SCALE: 1"=100'

GRAPHIC SCALE
100 0 50 100 200
1 inch = 100 feet

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NO.	DATE	REVISION
1		
2		
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6		
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PRE-DEVELOPED DRAINAGE AREA PLAN

OWNER: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	09/01/21
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	Drainage Area Plan.dwg
PLOTTED:	09/01/21
DRAWING NO.:	SWM-1
SHEET	1 OF 2

POST-DEVELOPED DRAINAGE AREA PLAN

SCALE: 1"=100'

GRAPHIC SCALE
100 0 50 100 200
1 inch = 100 feet

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West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

NO.	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		

POST-DEVELOPED DRAINAGE AREA PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	09/01/21
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	Drainage Area Plan.dwg
PLOTTED:	09/01/21
DRAWING NO.:	SWM-2
SHEET	2 OF 2