Montello

TETRA TECH, INC.

By: RH Date: 11/10/2016 Subject: Montello
Checked By: JB Date: 11/15/2016 PCSM Design and Evaluation

PURPOSE:

The purpose of these calculations is to design a Post-Construction Stormwater Management (PCSM) Plan for the Montello block valve as part of the Sunoco Pipeline L.P. Pennsylvania Pipeline Project. The site is located within Spring Township, Berks County, Pennsylvania. Permanent stormwater controls will be developed to satisfy PADEP and Spring Township's approved Act 167 Plan.

PCSM DESIGN REQUIREMENTS:

The PCSM design for this project follows the PA Department of Environmental Protection's (PADEP) Pennsylvania Stormwater Best Management Practices Manual (BMP Manual), December 2006; and the standard design criteria from PA Title 25, Chapter 102.8.(g)(2) and (3). The design criteria evaluated for the site are summarized below.

Act 167 Consistency

The Montello block valve site is located in Berks County, which does not have a county-wide Act 167 Plan adopted. However, Spring Township has enacted the Schuylkill River Act 167 Plan. According to the management plan, the Montello block valve site is not located in one of the stormwater management districts that has rate release requirements. By designing in accordance with PADEP's Stormwater BMP Manual, the requirements outlined in Spring Township's Act 167 Plan will be fulfilled.

Recommended Volume Control Guideline

Use of Control Guideline 1 is recommended where site conditions offer the opportunity to reduce the increase in runoff volume as follows:

- Do not increase the post-development total runoff volume for all storms equal to or less than the two-year/24-hour event;
- Existing (pre-development) non-forested pervious areas must be considered meadow (good condition) or its equivalent; and
- 20 percent of existing impervious area, when present, shall be considered meadow (good condition) or its equivalent.

This site will utilize two infiltration berms and one infiltration trench to manage the two-year/24-hour volume increase.

Recommended Peak Rate Control Guideline

The recommended control guideline for peak rate control is:

- Do not increase the peak rate of discharge for the 2-year through 100-year events (at minimum).

This site will utilize two infiltration berms and an infiltration trench to manage the 2-year through 100-year peak rate increases. These volume-reducing BMPs will also help to increase the post-development time of concentration within the drainage area.

Recommended Water Quality Control Guideline

Control Guideline 1 will provide water quality control and stream channel protection as well as flood control protection.

Infiltration

Infiltration rates for the PCSM BMPs have been determined from site infiltration testing conducted in accordance of the PA BMP Manual. Documentation for infiltration testing and design infiltration rates can be found in Attachment 5 of the Site Restoration/Post Construction Stormwater Management Plan. Infiltration test locations and recommended design rates are also labeled on the PCSM Plan Drawings in Attachment 6.

During the onsite infiltration tests, the depth to seasonal high groundwater and shallow bedrock or another confining layer were evaluated. The post-construction stormwater management facility for the site has been designed to maintain 2 feet of separation between the ponding elevation of the facility and the seasonal high water table and bedrock.

The post-construction stormwater management design will utilize onsite infiltration to meet Volume Control Guideline 1.

Loading Ratio

Loading ratios have been considered for the design of infiltration BMPs. In general, the following Loading Ratio guidelines are recommended:

- Maximum Impervious Loading Ratio of 5:1 relating impervious drainage area to infiltration area.
- Maximum Drainage Area Loading Ratio of 8:1 relating total drainage area to infiltration area.

The maximum impervious loading ratio of 5:1 has been met. The impervious loading ratio for the site is 3.7:1.

The maximum drainage area loading ratio of 8:1 has not been met. The drainage area loading ratio for the site is 19.4:1. However, runoff from the site and upslope drainage area will be dispersed to two relatively long infiltration berms and an infiltration trench. These BMPs have been placed to maximize the loading ratio to the maximum extent practicable, and other infiltration design parameters from the PA Stormwater BMP Manual have been met.

Disturbed Area

To meet Standard Worksheet 10 guidelines, 90% of the disturbed area is detained by the proposed PCSM BMPs.

Karst Topography

Montello block valve is located in an area of karst terrain. Several design principles were incorporated to minimize the risk of sinkholes to the maximum extent practicable. The proposed impervious surface was reduced to the maximum extent practicable. Stormwater runoff from the site is being spread out over a large area. The site will achieve a 3.4:1 impervious loading ratio by directing stormwater runoff into three separate infiltration BMPs. The infiltration berms and trench will avoid concentrating stormwater runoff and will encourage relatively shallow and broad ponding areas.

Additional post-construction inspection and maintenance will be required onsite as documented in the Sinkhole Repair Plan in Attachment 2. In areas of known karst terrain, stormwater BMPs shall be inspected at regular intervals of at least once every quarter for the first two years following installation and then at regular periods thereafter. Inspections shall also be made after every storm event greater than 1 inch during the establishment period. Inspections shall consist of an examination of any noticeable subsidence, surface depressions, or sinkholes. Inspections shall include an evaluation of all inlet and outlet structures and document any areas to be cleaned, maintained, or repaired.

Special Protection Watershed

Montello block valve is not located within a special protection watershed, so antidegradation requirements do not apply.

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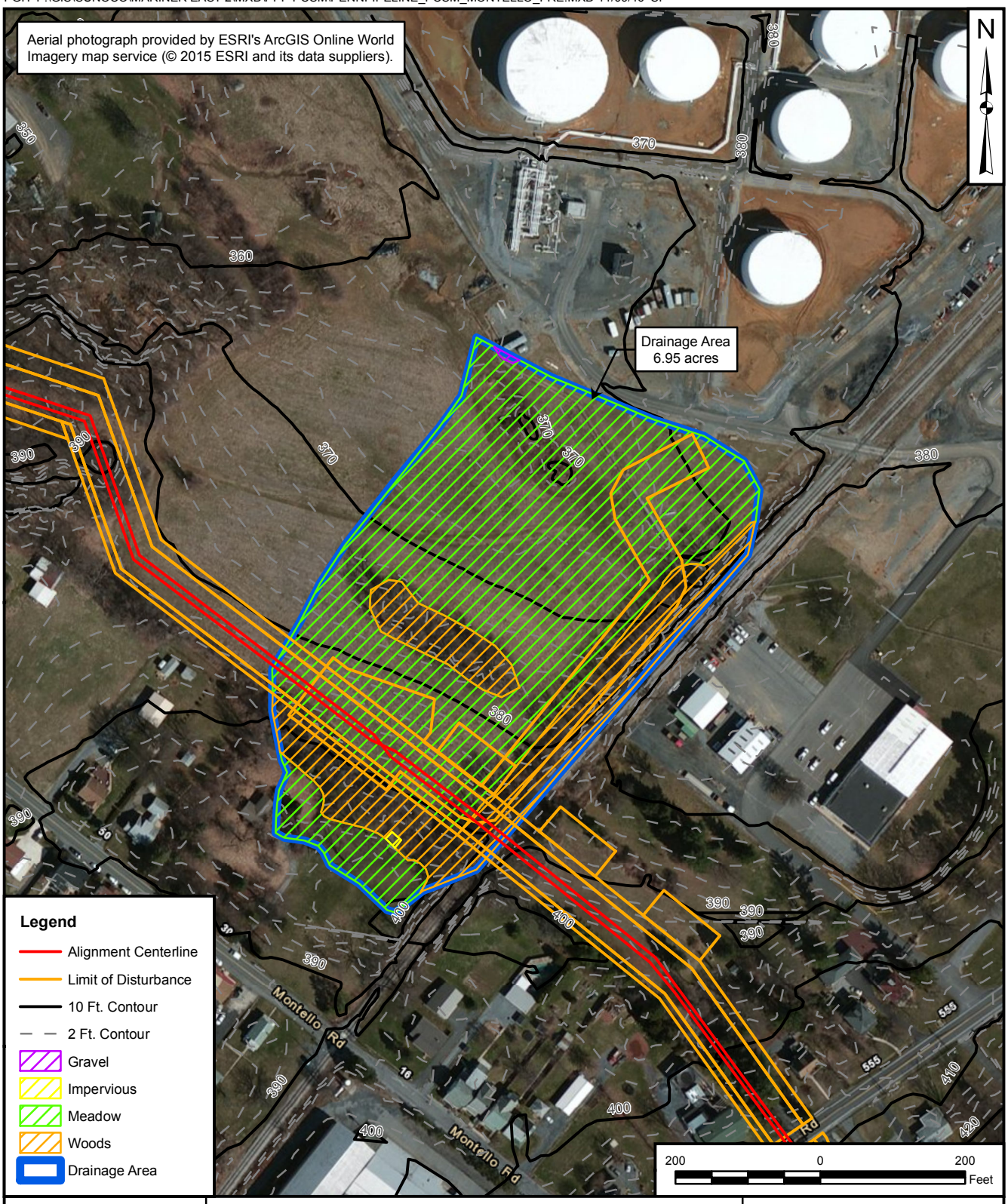

TETRA TECH

PRE-DEVELOPMENT DRAINAGE AREA MAP
MONTELLO
PENNSYLVANIA PIPELINE PROJECT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PENNSYLVANIA

DRAWN BY: J. HERNING 05/03/15
CHECKED BY: J. BRODY 11/09/16

APPROVED BY:

CONTRACT NUMBER: 112IC05958

FIGURE NUMBER	REV
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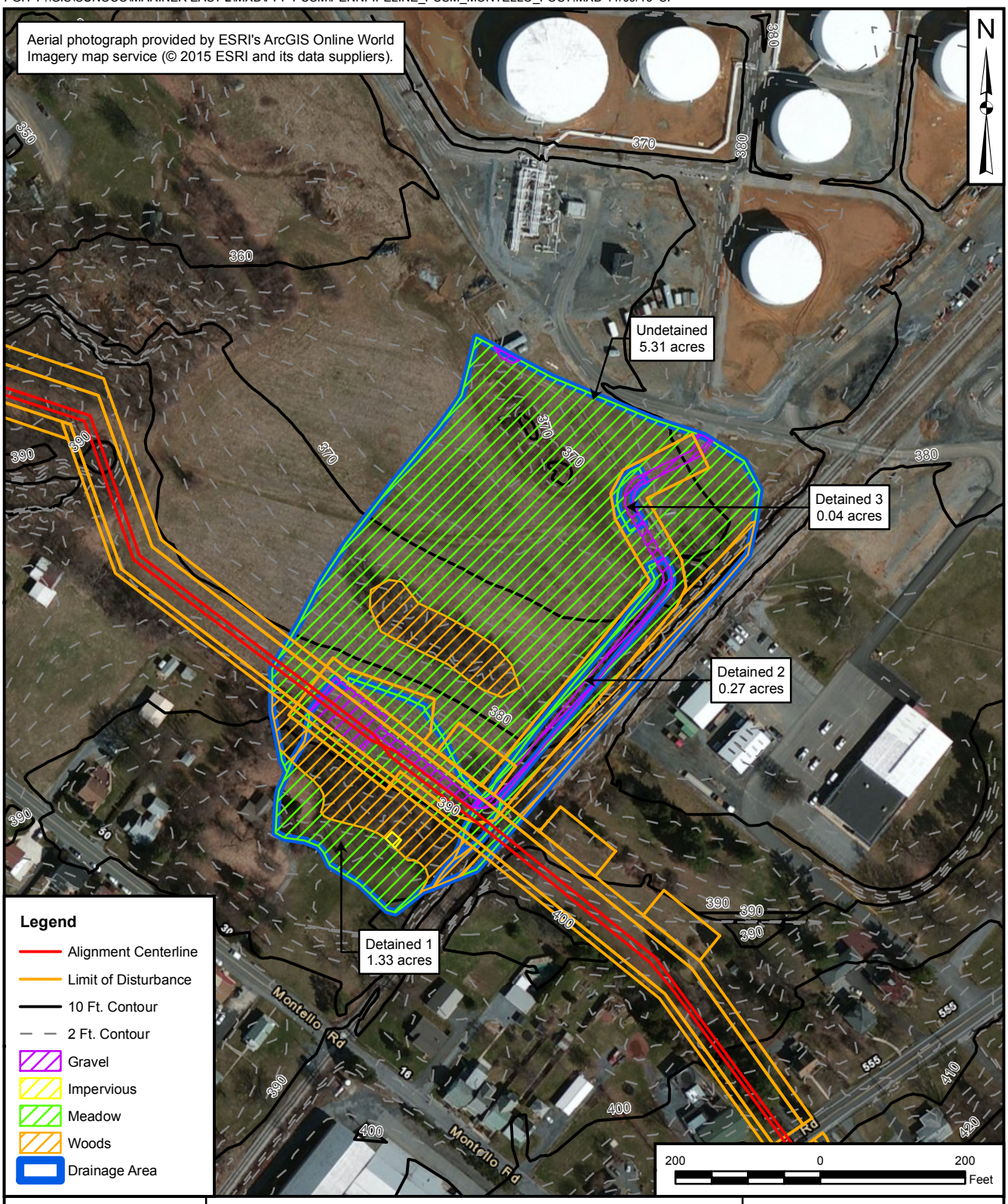

TETRA TECH

POST-DEVELOPMENT DRAINAGE AREA MAP
MONTELLO
PENNSYLVANIA PIPELINE PROJECT
SUNOCO LOGISTICS, L.P.
BERKS COUNTY, PENNSYLVANIA

DRAWN BY: J. HERNING 05/03/15
CHECKED BY: J. BRODY 11/09/16

APPROVED BY:

CONTRACT NUMBER: 112IC05958

FIGURE NUMBER	REV
2	0

NOAA Atlas 14, Volume 2, Version 3
Location name: Spring Twp, Pennsylvania, USA*
Latitude: 40.3142°, Longitude: -76.0387°
Elevation: 383.39 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.336** (0.305-0.370)	**0.399** (0.363-0.441)	**0.467** (0.423-0.515)	**0.516** (0.467-0.568)	**0.570** (0.514-0.627)	**0.611** (0.548-0.671)	**0.649** (0.581-0.713)	**0.682** (0.608-0.750)	**0.724** (0.640-0.796)	**0.753** (0.662-0.830)
10-min	**0.533** (0.484-0.587)	**0.636** (0.578-0.702)	**0.744** (0.675-0.821)	**0.821** (0.744-0.904)	**0.904** (0.816-0.994)	**0.964** (0.865-1.06)	**1.02** (0.914-1.12)	**1.07** (0.954-1.18)	**1.13** (0.998-1.24)	**1.17** (1.03-1.29)
15-min	**0.665** (0.604-0.733)	**0.796** (0.723-0.878)	**0.937** (0.849-1.03)	**1.03** (0.936-1.14)	**1.14** (1.03-1.26)	**1.22** (1.09-1.34)	**1.29** (1.15-1.41)	**1.35** (1.20-1.48)	**1.42** (1.25-1.56)	**1.47** (1.29-1.61)
30-min	**0.906** (0.822-0.999)	**1.09** (0.994-1.21)	**1.32** (1.20-1.46)	**1.49** (1.35-1.64)	**1.68** (1.51-1.85)	**1.82** (1.63-2.00)	**1.96** (1.75-2.15)	**2.08** (1.85-2.29)	**2.24** (1.98-2.46)	**2.35** (2.06-2.59)
60-min	**1.13** (1.02-1.24)	**1.37** (1.24-1.51)	**1.69** (1.53-1.86)	**1.93** (1.75-2.13)	**2.23** (2.01-2.45)	**2.45** (2.20-2.69)	**2.68** (2.40-2.95)	**2.90** (2.59-3.19)	**3.19** (2.82-3.51)	**3.41** (3.00-3.75)
2-hr	**1.36** (1.21-1.54)	**1.64** (1.47-1.86)	**2.05** (1.83-2.32)	**2.37** (2.11-2.68)	**2.80** (2.48-3.16)	**3.15** (2.77-3.54)	**3.50** (3.07-3.95)	**3.88** (3.38-4.38)	**4.40** (3.79-4.97)	**4.82** (4.12-5.45)
3-hr	**1.49** (1.32-1.70)	**1.80** (1.60-2.06)	**2.25** (2.00-2.57)	**2.60** (2.30-2.96)	**3.08** (2.71-3.50)	**3.47** (3.03-3.93)	**3.87** (3.36-4.38)	**4.29** (3.70-4.86)	**4.88** (4.16-5.52)	**5.35** (4.52-6.06)
6-hr	**1.86** (1.65-2.14)	**2.25** (1.99-2.58)	**2.80** (2.47-3.21)	**3.25** (2.85-3.71)	**3.89** (3.39-4.43)	**4.41** (3.83-5.01)	**4.98** (4.29-5.65)	**5.59** (4.77-6.34)	**6.47** (5.45-7.32)	**7.18** (5.98-8.14)
12-hr	**2.29** (2.02-2.63)	**2.76** (2.44-3.17)	**3.46** (3.05-3.96)	**4.04** (3.54-4.62)	**4.89** (4.25-5.56)	**5.62** (4.84-6.35)	**6.42** (5.48-7.24)	**7.29** (6.15-8.21)	**8.58** (7.11-9.66)	**9.68** (7.91-10.9)
24-hr	**2.64** (2.42-2.90)	**3.19** (2.92-3.50)	**4.00** (3.65-4.39)	**4.68** (4.26-5.12)	**5.67** (5.13-6.20)	**6.51** (5.86-7.11)	**7.43** (6.64-8.09)	**8.43** (7.48-9.17)	**9.90** (8.68-10.7)	**11.1** (9.66-12.1)
2-day	**3.08** (2.81-3.39)	**3.72** (3.40-4.09)	**4.67** (4.26-5.13)	**5.45** (4.96-5.98)	**6.58** (5.95-7.19)	**7.51** (6.76-8.20)	**8.51** (7.63-9.28)	**9.59** (8.53-10.4)	**11.1** (9.81-12.1)	**12.4** (10.8-13.5)
3-day	**3.25** (2.98-3.56)	**3.92** (3.60-4.29)	**4.91** (4.50-5.37)	**5.71** (5.22-6.25)	**6.88** (6.26-7.50)	**7.84** (7.10-8.54)	**8.88** (8.00-9.66)	**9.99** (8.93-10.9)	**11.6** (10.3-12.6)	**12.9** (11.3-14.1)
4-day	**3.42** (3.15-3.74)	**4.12** (3.80-4.50)	**5.14** (4.73-5.61)	**5.98** (5.49-6.52)	**7.18** (6.56-7.81)	**8.18** (7.44-8.89)	**9.24** (8.37-10.0)	**10.4** (9.34-11.3)	**12.0** (10.7-13.1)	**13.4** (11.8-14.6)
7-day	**4.02** (3.71-4.39)	**4.82** (4.45-5.27)	**5.96** (5.49-6.50)	**6.90** (6.35-7.52)	**8.25** (7.56-8.98)	**9.38** (8.55-10.2)	**10.6** (9.60-11.5)	**11.9** (10.7-12.9)	**13.7** (12.3-14.9)	**15.3** (13.5-16.6)
10-day	**4.61** (4.27-5.01)	**5.50** (5.09-5.99)	**6.71** (6.21-7.30)	**7.68** (7.09-8.35)	**9.06** (8.33-9.84)	**10.2** (9.31-11.0)	**11.3** (10.3-12.3)	**12.6** (11.4-13.6)	**14.3** (12.8-15.5)	**15.7** (14.0-17.1)
20-day	**6.24** (5.84-6.68)	**7.40** (6.93-7.93)	**8.81** (8.24-9.44)	**9.94** (9.28-10.6)	**11.5** (10.7-12.3)	**12.7** (11.8-13.6)	**13.9** (12.9-14.9)	**15.1** (14.0-16.2)	**16.8** (15.5-18.1)	**18.2** (16.6-19.5)
30-day	**7.76** (7.31-8.25)	**9.15** (8.62-9.72)	**10.7** (10.0-11.3)	**11.8** (11.1-12.6)	**13.4** (12.6-14.3)	**14.6** (13.7-15.5)	**15.8** (14.8-16.8)	**17.0** (15.8-18.1)	**18.6** (17.2-19.8)	**19.7** (18.2-21.1)
45-day	**9.79** (9.28-10.3)	**11.5** (10.9-12.1)	**13.2** (12.5-13.9)	**14.5** (13.7-15.3)	**16.2** (15.3-17.1)	**17.4** (16.4-18.4)	**18.6** (17.5-19.6)	**19.7** (18.6-20.8)	**21.2** (19.9-22.4)	**22.2** (20.8-23.5)
60-day	**11.7** (11.2-12.4)	**13.8** (13.1-14.5)	**15.7** (14.9-16.5)	**17.1** (16.3-18.1)	**19.0** (18.0-20.0)	**20.3** (19.2-21.4)	**21.6** (20.4-22.7)	**22.8** (21.5-24.0)	**24.3** (22.9-25.6)	**25.3** (23.8-26.8)

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

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

Please refer to NOAA Atlas 14 document for more information.

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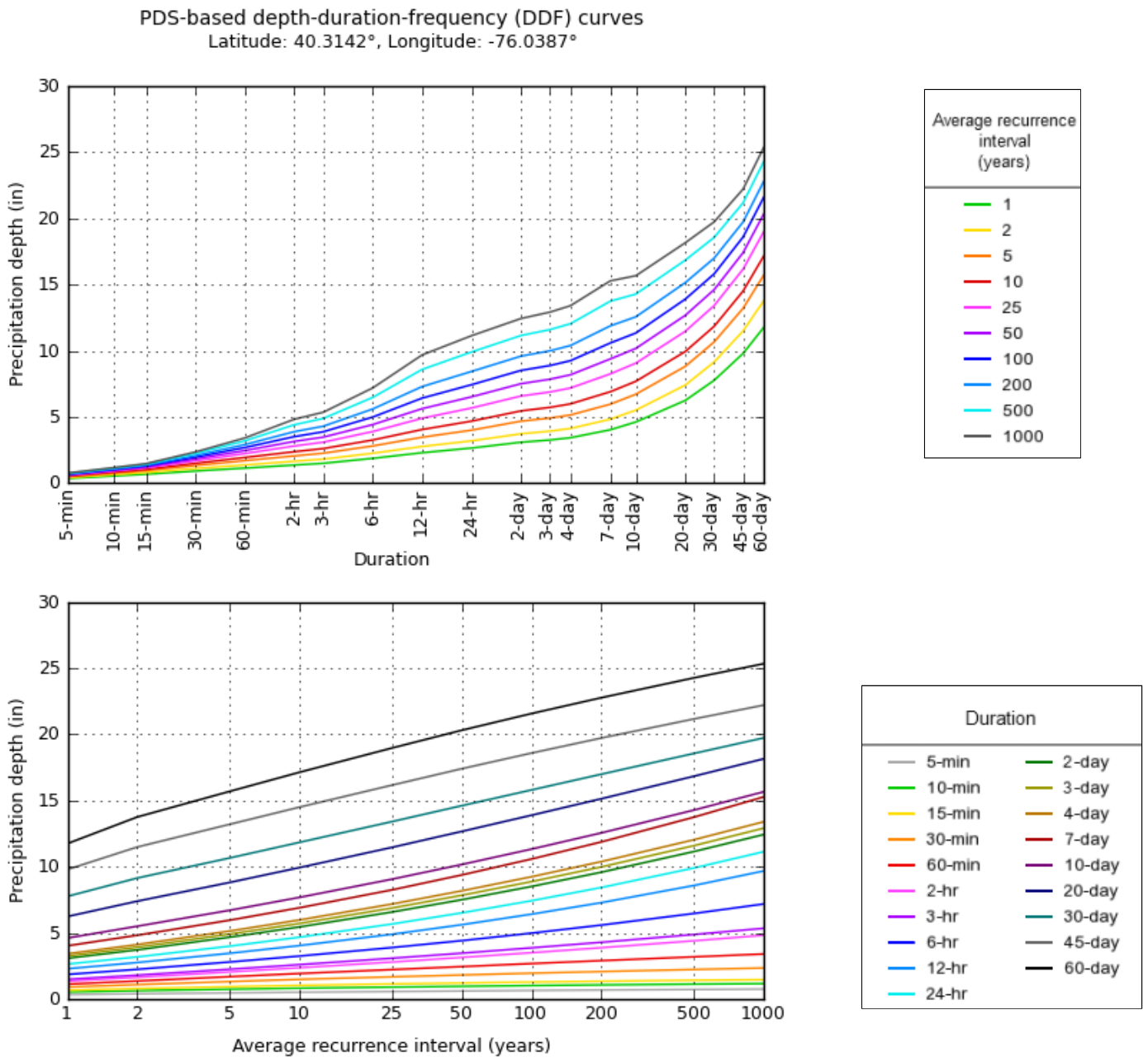
PF graphical



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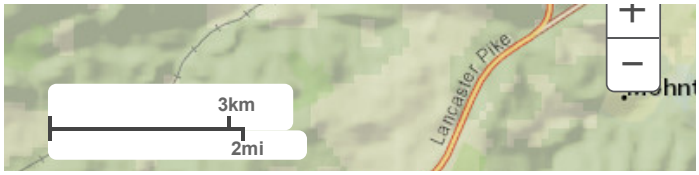
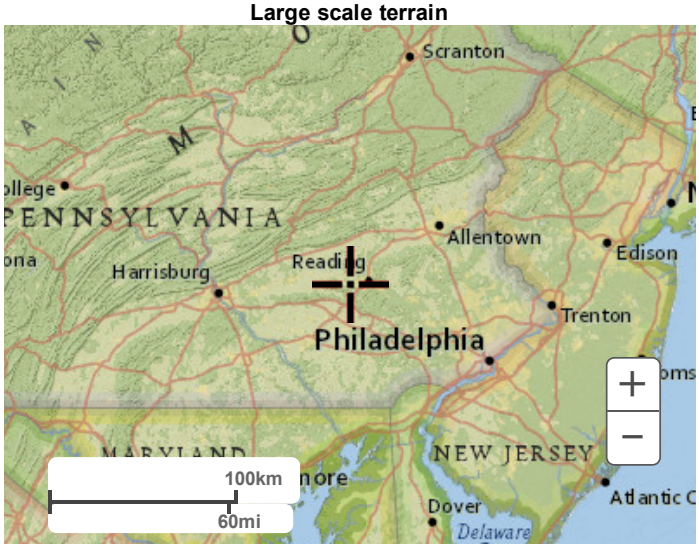
Maps & aerials

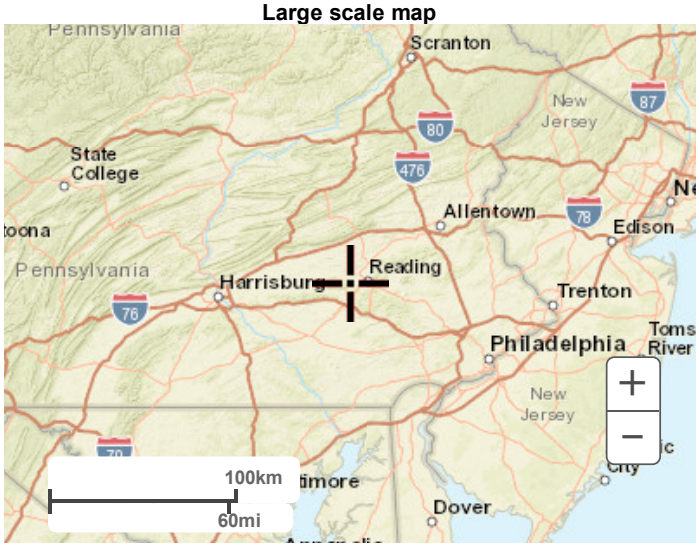
Small scale terrain



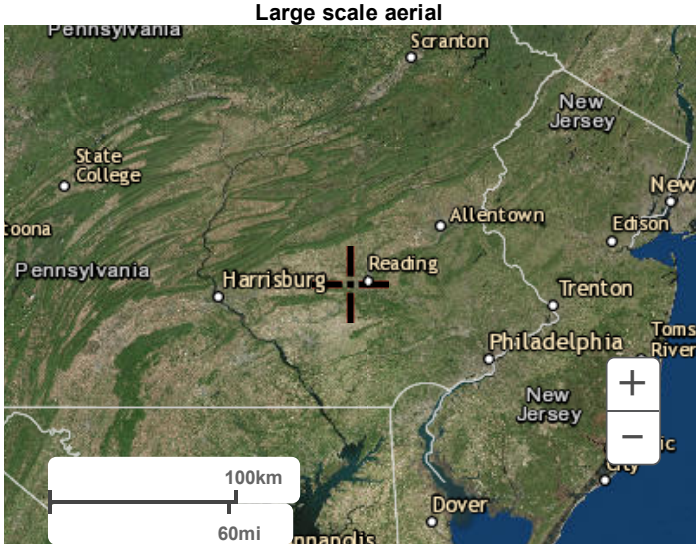
Large scale terrain



Large scale map



Large scale aerial



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WORKSHEET 1. GENERAL SITE INFORMATION

Date: November 11, 2016

Project Name: Montello

Municipality: Spring Township

County: Berks

Total Area (acres): 6.74

Major River Basin: Schuylkill River

Watershed: Tulpehocken Creek

Sub Basin: Cacossing Creek

Nearest Surface Water to Receive Runoff: UNT Cacoosing Creek

Chapter 93 - Designated Water Use: CWF

Impaired according to Chapter 303(d) list?	YES	
List Causes of Impairment:	NO	X

Is Project Subject to, or Part of:

Municipal Separate Storm Sewer System (MS4) Requirements	YES	X
	NO	
Existing or Planned drinking water supply?	YES	
	NO	X
If yes, distance from proposed discharge (miles):		
Approved Act 167 Plan?	YES	X
	NO	
Existing River Conservation Plan?	YES	
	NO	X

Worksheet 2. Sensitive Natural Resources

INSTRUCTIONS

1. Provide Sensitive Resources Map according to non-structural BMP 5.4.1 in Chapter 5. This map should identify wetlands, woodlands, natural drainage ways, steep slopes, and other sensitive natural areas.

   See pre-development drainage area map

2. Summarize the existing extent of each sensitive resource in the Existing Sensitive Resources Table (below, using Acres). If none present, insert 0.

   Woodlands - 0.40 acres

3. Summarize Total Protected Area as defined under BMPs in Chapter 5.

   0.00 acres

4. Do not count any area twice. For example, an area that is both a floodplain and a wetland may only be considered once.

EXISTING NATURAL SENSITIVE RESOURCE	MAPPED? Yes/no/n/a	TOTAL AREA (Ac.)	PROTECTED AREA (Ac.)
Waterbodies	N/A		
Floodplains	N/A		
Riparian Areas	N/A		
Wetlands	N/A		
Woodlands	Yes	0.40	
Natural Drainage Ways	N/A		
Steep Slopes, 15% - 25%	N/A		
Steep Slopes, over 25%	N/A		
Other:			
Other:			
TOTAL EXISTING:		**0.40**	**0.00**

Worksheet 3. Nonstructural BMP Credits

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2) 0.00 **Ac.**

1.2 Area of Riparian Forest Buffer Protection 0.00 **Ac.**

3.1 Area of Minimum Disturbance/Reduced Grading 0.00 **Ac**

TOTAL 0.00 **Ac**

Site Area	Minus	Protected Area	=	Stormwater Management Area
1.65	-	0	=	1.65

This is the area that requires stormwater management

VOLUME CREDITS

3.1 Minimum Soil Compaction (See Chapter 8, page 22 – SW BMP Manual)

Lawn _____ ft² x 1/4" x 1/12 = _____ ft³

Meadow _____ ft² x 1/3" x 1/12 = _____ ft³

3.3 Protect Existing Trees (See Chapter 8, page 23 – SW BMP Manual)

For Trees within 100 feet of impervious area:

Tree Canopy _____ ft² x 1/2" x 1/12 = _____ ft³

5.1 Disconnect Roof Leaders to Vegetated Areas (See Chapter 8 page 25 – SW BMP Manual)

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area _____ ft² x 1/3" x 1/12 = _____ ft³

For all other disconnected roof areas

Roof Area _____ ft² x 1/4" x 1/12 = _____ ft³

5.2 Disconnect Non-Roof impervious to Vegetated Areas (See Chapter 8, page 26 – SW BMP Manual)

For Runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area _____ ft² x 1/3" x 1/12 = _____ ft³

For all other disconnected roof areas

Impervious Area _____ ft² x 1/4" x 1/12 = _____ ft³

TOTAL NON-STRUCTURAL VOLUME CREDIT* _____ ft³

**For use on Worksheet 5*

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: Montello
Drainage Area: 6.95 acres
2-Year Rainfall: 3.19 in

Total Site Area: 1.65 acres
Protected Site Area: N/A acres
Managed Site Area: 1.65 acres

Existing Conditions

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[3] (ft^3)
Gravel	B	0	0.00	85	1.76	0.35	1.75	0
Woods	B	17,424	0.40	55	8.18	1.64	0.25	360
Meadow	B	54,450	1.25	58	7.24	1.45	0.34	1,532
TOTAL:		**71,874**	**1.65**					**1,892**

Developed Conditions

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[3] (ft^3)
Gravel	B	15,246	0.35	85	1.76	0.35	1.75	2,222
Woods	B	0	0.00	55	8.18	1.64	0.25	0
Meadow	B	56,628	1.30	58	7.24	1.45	0.34	1,594
TOTAL:		**71,874**	**1.65**					**3,816**

2-Year Volume Increase (ft^3):	**1,924**

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

1. Runoff (in) = Q = (P - 0.2S)2 / (P+ 0.8S) where
   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.

Worksheet 5. Structural BMP Volume Credits

PROJECT: Montello
SUB-BASIN:

Required Control Volume (ft^3) - *from Worksheet 4:* 1,924

Non-structural Volume Credit (ft^3) - *from Worksheet 3:* N/A
(maximum is 25% of required volume)

Structural Volume Reqmt (ft^3) 1,924
(Required Control Volume minus Non-structural Credit)

Proposed BMPs from PA Stormwater Best Management Practices Manual Chapter 6		Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench	309	134
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	Berm	3,331	2,618
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-Use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond/Retention Basin		
6.7.1	Riparian Buffer/Riparian Forest 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:			

Total Structural Volume (ft^3): **2,752**

Structural Volume Requirement (ft^3): **1,924**

DIFFERENCE: **-828**

VOLUME CREDIT DETERMINATION - BERM A

1 Detained area runoff volume from Hydraflow = 2,124 cf

2 Storage volume of the BMP = 2,800 cf

3 Infiltrated volume within 72 hours after the 2-yr/24-hr event
(Infiltration Rate/12) x Infiltration Area x 72 hrs = 2,124 cf

Potential infiltrated volume = 36,101 cf. Since this is greater than the storage volume, only the storage volume can be used and assumed to infiltrate within 72 hours.

VOLUME CREDIT DETERMINATION - BERM B

1 Detained area runoff volume from Hydraflow = 806 cf

2 Storage volume of the BMP = 640 cf

3 Infiltrated volume within 72 hours after the 2-yr/24-hr event
(Infiltration Rate/12) x Infiltration Area x 72 hrs = 494 cf

VOLUME CREDIT DETERMINATION - INFILTRATION TRENCH

1 Detained area runoff volume from Hydraflow = 134 cf

2 Storage volume of the BMP = 565 cf

3 Infiltrated volume within 72 hours after the 2-yr/24-hr event
(Infiltration Rate/12) x Infiltration Area x 72 hrs = 185 cf

WORKSHEET 10. WATER QUALITY COMPLIANCE FOR NITRATE

Does the site design incorporate the following BMPs to address nitrate pollution? A summary "yes" rating is achieved if at least 2 Primary BMPs for nitrate are provided across the site or 4 secondary BMPs for nitrate are provided across the site (or the

PRIMARY BMPs FOR NITRATE:

	YES	NO
NS BMP 5.4.2 - Protect / Conserve / Enhance Riparian Buffers		
NS BMP 5.5.4 - Cluster Uses at Each Site		
NS BMP 5.6.1 - Minimize Total Disturbed Area	X	
NS BMP 5.6.3 - Re-Vegetate / Re-Forest Disturbed Areas (Native Species)	X	
NS BMP 5.9.1 - Street Sweeping / Vacuuming		
Structural BMP 6.7.1 - Riparian Buffer Restoration		
Structural BMP 6.7.2 - Landscape Restoration		

SECONDARY BMPs FOR NITRATE:

NS BMP 5.4.1 - Protect Sensitive / Special Value Features		
NS BMP 5.4.3 - Protect / Utilize Natural Drainage Features		
NS BMP 5.6.2 - Minimize Soil Compaction	X	
Structural BMP 6.4.5 - Rain Garden / Bioretention		
Structural BMP 6.4.8 - Vegetated Swale		
Structural BMP 6.4.9 - Vegetated Filter Strip		
Structural BMP 6.6.1 - Constructed Wetland		
Structural BMP 6.7.1 - Riparian Buffer Restoration		
Structural BMP 6.7.2 - Landscape Restoration		
Structural BMP 6.7.3 - Soils Amendment/Restoration	X	

TIME OF CONCENTRATION ADJUSTMENT

POST CONSTRUCTION TC TO BMP (DETAINED TC) BEFORE ADJUSTMENT 9.9 MIN

STRUCTURAL VOLUME PROVIDED BY BMP 2,124 CF FOR 2-YR/24-HR EVENT
2,800 CF FOR ALL REMAINING EVENTS

RATES OF RUNOFF TO THE BMP (FROM HYDRAFLOW REPORT)

Storm Event	Q (CFS)
2 YR/24 HR	0.590
10 YR/24 HR	2.104
50 YR/24 HR	4.436
100 YR/24 HR	5.728

ADDITIONAL RESIDENCE TIME (MIN) = (STRUCTURAL VOLUME PROVIDED BY BMP / RATE OF RUNOFF TO BMP) / 60

Storm Event	Q (CFS)	Additional Residence Time (min.)
2 YR/24 HR	0.590	60.000
10 YR/24 HR	2.104	22.180
50 YR/24 HR	4.436	10.520
100 YR/24 HR	5.728	8.147

ADJUSTED TC = POST CONSTRUCTION TC TO BMP BEFORE ADJUSTMENT + ADDITIONAL RESIDENCE TIME

Storm Event	Q (CFS)	Additional Residence Time (min.)	Adjusted Time of Concentration (min.)
2 YR/24 HR	0.590	60.000	69.900
10 YR/24 HR	2.104	22.180	32.080
50 YR/24 HR	4.436	10.520	20.420
100 YR/24 HR	5.728	8.147	18.047

TIME OF CONCENTRATION ADJUSTMENT

POST CONSTRUCTION TC TO BMP (DETAINED TC) BEFORE ADJUSTMENT 7.5 MIN

STRUCTURAL VOLUME PROVIDED BY BMP 640 CF

RATES OF RUNOFF TO THE BMP (FROM HYDRAFLOW REPORT)

Storm Event	Q (CFS)
2 YR/24 HR	0.338
10 YR/24 HR	0.771
50 YR/24 HR	1.377
100 YR/24 HR	1.704

ADDITIONAL RESIDENCE TIME (MIN) = (STRUCTURAL VOLUME PROVIDED BY BMP / RATE OF RUNOFF TO BMP) / 60

Storm Event	Q (CFS)	Additional Residence Time (min.)
2 YR/24 HR	0.338	31.558
10 YR/24 HR	0.771	13.835
50 YR/24 HR	1.377	7.746
100 YR/24 HR	1.704	6.260

ADJUSTED TC = POST CONSTRUCTION TC TO BMP BEFORE ADJUSTMENT + ADDITIONAL RESIDENCE TIME

Storm Event	Q (CFS)	Additional Residence Time (min.)	Adjusted Time of Concentration (min.)
2 YR/24 HR	0.338	31.558	39.058
10 YR/24 HR	0.771	13.835	21.335
50 YR/24 HR	1.377	7.746	15.246
100 YR/24 HR	1.704	6.260	13.760

TIME OF CONCENTRATION ADJUSTMENT

POST CONSTRUCTION TC TO BMP (DETAINED TC) BEFORE ADJUSTMENT 6.5 MIN

STRUCTURAL VOLUME PROVIDED BY BMP 376 CF

RATES OF RUNOFF TO THE BMP (FROM HYDRAFLOW REPORT)

Storm Event	Q (CFS)
2 YR/24 HR	0.057
10 YR/24 HR	0.124
50 YR/24 HR	0.217
100 YR/24 HR	0.266

ADDITIONAL RESIDENCE TIME (MIN) = (STRUCTURAL VOLUME PROVIDED BY BMP / RATE OF RUNOFF TO BMP) / 60

Storm Event	Q (CFS)	Additional Residence Time (min.)
2 YR/24 HR	0.057	109.942
10 YR/24 HR	0.124	50.538
50 YR/24 HR	0.217	28.879
100 YR/24 HR	0.266	23.559

ADJUSTED TC = POST CONSTRUCTION TC TO BMP BEFORE ADJUSTMENT + ADDITIONAL RESIDENCE TIME

Storm Event	Q (CFS)	Additional Residence Time (min.)	Adjusted Time of Concentration (min.)
2 YR/24 HR	0.057	109.942	116.442
10 YR/24 HR	0.124	50.538	57.038
50 YR/24 HR	0.217	28.879	35.379
100 YR/24 HR	0.266	23.559	30.059

INFILTRATION BERM DEWATERING CALCULATION SITE NAME: Montello

BERM A

STORAGE VOLUME	2,800	CF	
DESIGN INFILTRATION RATE	2.4	IN/HR	BASED ON IT-01 AND IT-02
INFILTRATION AREA	2,507	SF	

DEWATERING TIME = STORAGE VOLUME / ((DESIGN INFILTRATION RATE /12) * INFILTRATION AREA)

DEWATERING TIME = 5.6 HOURS

INFILTRATION BERM DEWATERING CALCULATION SITE NAME: Montello

BERM B

STORAGE VOLUME	640	CF	
DESIGN INFILTRATION RATE	0.1	IN/HR	BASED ON IT-04
INFILTRATION AREA	824	SF	

DEWATERING TIME = STORAGE VOLUME / ((DESIGN INFILTRATION RATE /12) * INFILTRATION AREA)

DEWATERING TIME = 93.2 HOURS

INFILTRATION BERM DEWATERING CALCULATION SITE NAME: Montello

TRENCH

STORAGE VOLUME	565	CF	
DESIGN INFILTRATION RATE	0.1	IN/HR	BASED ON IT-0B
INFILTRATION AREA	309	SF	

DEWATERING TIME = STORAGE VOLUME / ((DESIGN INFILTRATION RATE /12) * INFILTRATION AREA)

DEWATERING TIME = 219.4 HOURS

INFILTRATION TRENCH - VOLUME CALCULATION

LENGTH	103	FT
WIDTH	3	FT
DEPTH	3	FT
PIPE DIAMETER	1	FT
NUMBER OF PIPES	1	
VOID RATIO OF GRAVEL	0.4	
X-SECTIONAL AREA OF VOIDS IN TRENCH	3.29	SF
AREA OF PIPE(S)	0.79	SF
COMBINED X-SECTIONAL AREA	4.07	SF

STORAGE IN TRENCH	**419.31**	**CF**

Worksheet for Circular Pipe - 1

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01900	ft/ft
Normal Depth	0.33	ft
Diameter	0.33	ft
Discharge	0.28	ft³/s

Results

Discharge	0.28	ft³/s
Normal Depth	0.33	ft
Flow Area	0.09	ft²
Wetted Perimeter	1.05	ft
Hydraulic Radius	0.08	ft
Top Width	0.00	ft
Critical Depth	0.29	ft
Percent Full	100.0	%
Critical Slope	0.01708	ft/ft
Velocity	3.25	ft/s
Velocity Head	0.16	ft
Specific Energy	0.50	ft
Froude Number	0.00	
Maximum Discharge	0.30	ft³/s
Discharge Full	0.28	ft³/s
Slope Full	0.01900	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for Circular Pipe - 1

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.29	ft
Channel Slope	0.01900	ft/ft
Critical Slope	0.01708	ft/ft

Worksheet for Triangular Channel - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.034	
Channel Slope	0.04800	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	0.72	ft^3/s

Results

Normal Depth	0.36	ft
Flow Area	0.26	ft^2
Wetted Perimeter	1.60	ft
Hydraulic Radius	0.16	ft
Top Width	1.43	ft
Critical Depth	0.38	ft
Critical Slope	0.03396	ft/ft
Velocity	2.82	ft/s
Velocity Head	0.12	ft
Specific Energy	0.48	ft
Froude Number	1.18	
Flow Type	Supercritical	

GVF Input Data

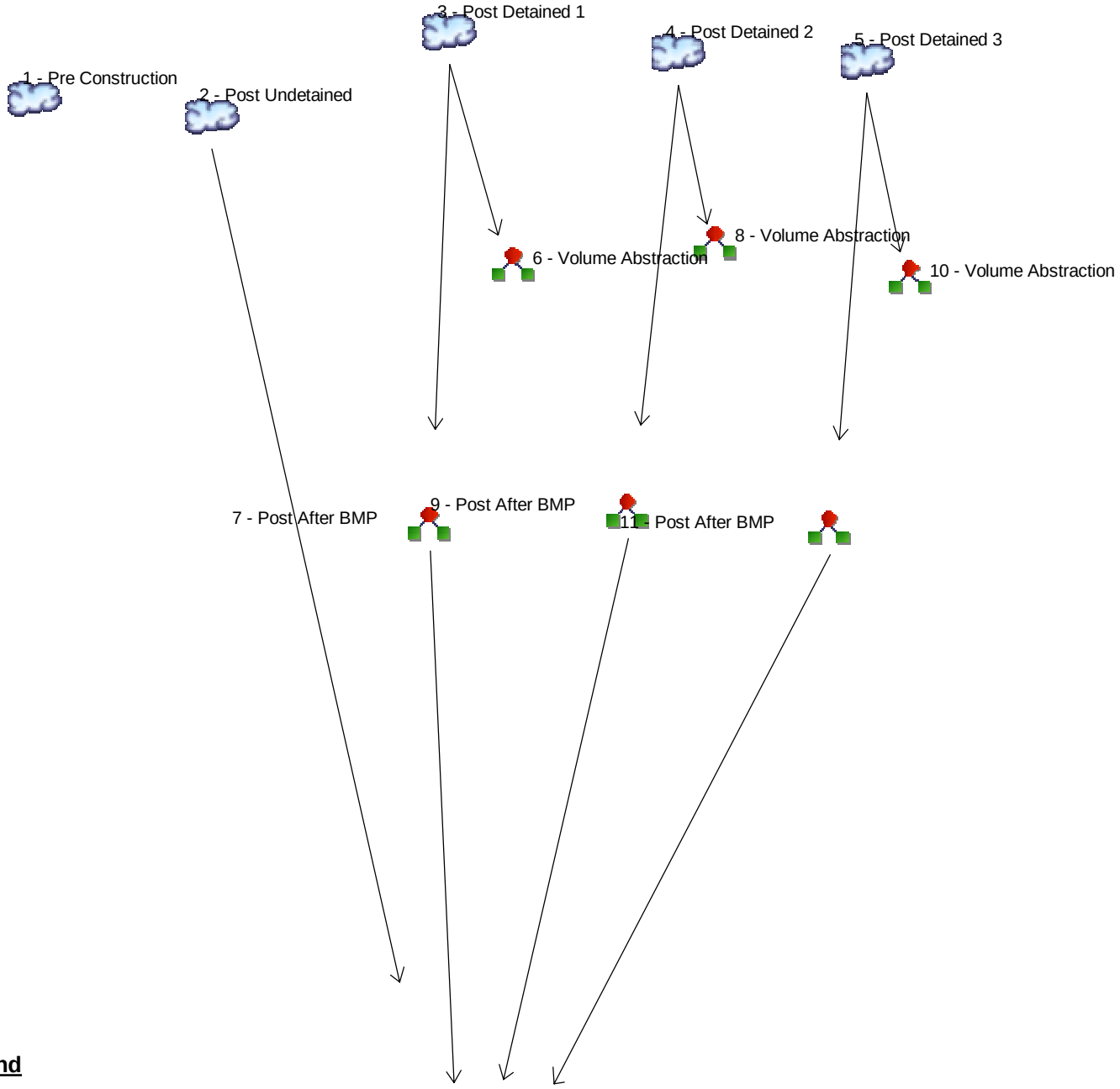
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.38	ft
Channel Slope	0.04800	ft/ft
Critical Slope	0.03396	ft/ft

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Construction
2	SCS Runoff	Post Undetained
3	SCS Runoff	Post Detained 1
4	SCS Runoff	Post Detained 2
5	SCS Runoff	Post Detained 3
6	Diversion1	Volume Abstraction
7	Diversion2	Post After BMP
8	Diversion1	Volume Abstraction
9	Diversion2	Post After BMP
10	Diversion1	Volume Abstraction
11	Diversion2	Post After BMP
12	Combine	Post at POI

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	1.575	-------	-------	8.136	-------	19.26	25.57	Pre Construction
2	SCS Runoff	------	-------	1.463	-------	-------	6.754	-------	15.46	20.37	Post Undetained
3	SCS Runoff	------	-------	0.590	-------	-------	2.104	-------	4.436	5.728	Post Detained 1
4	SCS Runoff	------	-------	0.338	-------	-------	0.771	-------	1.377	1.704	Post Detained 2
5	SCS Runoff	------	-------	0.057	-------	-------	0.124	-------	0.217	0.266	Post Detained 3
6	Diversion1	3	-------	0.590	-------	-------	2.104	-------	4.436	5.187	Volume Abstraction
7	Diversion2	3	-------	0.000	-------	-------	0.235	-------	4.096	5.728	Post After BMP
8	Diversion1	4	-------	0.338	-------	-------	0.771	-------	0.993	0.768	Volume Abstraction
9	Diversion2	4	-------	0.009	-------	-------	0.381	-------	1.377	1.704	Post After BMP
10	Diversion1	5	-------	0.057	-------	-------	0.124	-------	0.217	0.266	Volume Abstraction
11	Diversion2	5	-------	0.000	-------	-------	0.000	-------	0.007	0.020	Post After BMP
12	Combine	2, 7, 9, 11	-------	1.463	-------	-------	6.754	-------	19.38	27.57	Post at POI

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	1.575	2	724	7,971	------	------	------	Pre Construction
2	SCS Runoff	1.463	2	724	6,706	------	------	------	Post Undetained
3	SCS Runoff	0.590	2	724	2,190	------	------	------	Post Detained 1
4	SCS Runoff	0.338	2	720	806	------	------	------	Post Detained 2
5	SCS Runoff	0.057	2	720	134	------	------	------	Post Detained 3
6	Diversion1	0.590	2	724	2,190	3	------	------	Volume Abstraction
7	Diversion2	0.000	2	n/a	0	3	------	------	Post After BMP
8	Diversion1	0.338	2	720	641	4	------	------	Volume Abstraction
9	Diversion2	0.009	2	1040	165	4	------	------	Post After BMP
10	Diversion1	0.057	2	720	134	5	------	------	Volume Abstraction
11	Diversion2	0.000	2	n/a	0	5	------	------	Post After BMP
12	Combine	1.463	2	724	6,871	2, 7, 9, 11	------	------	Post at POI

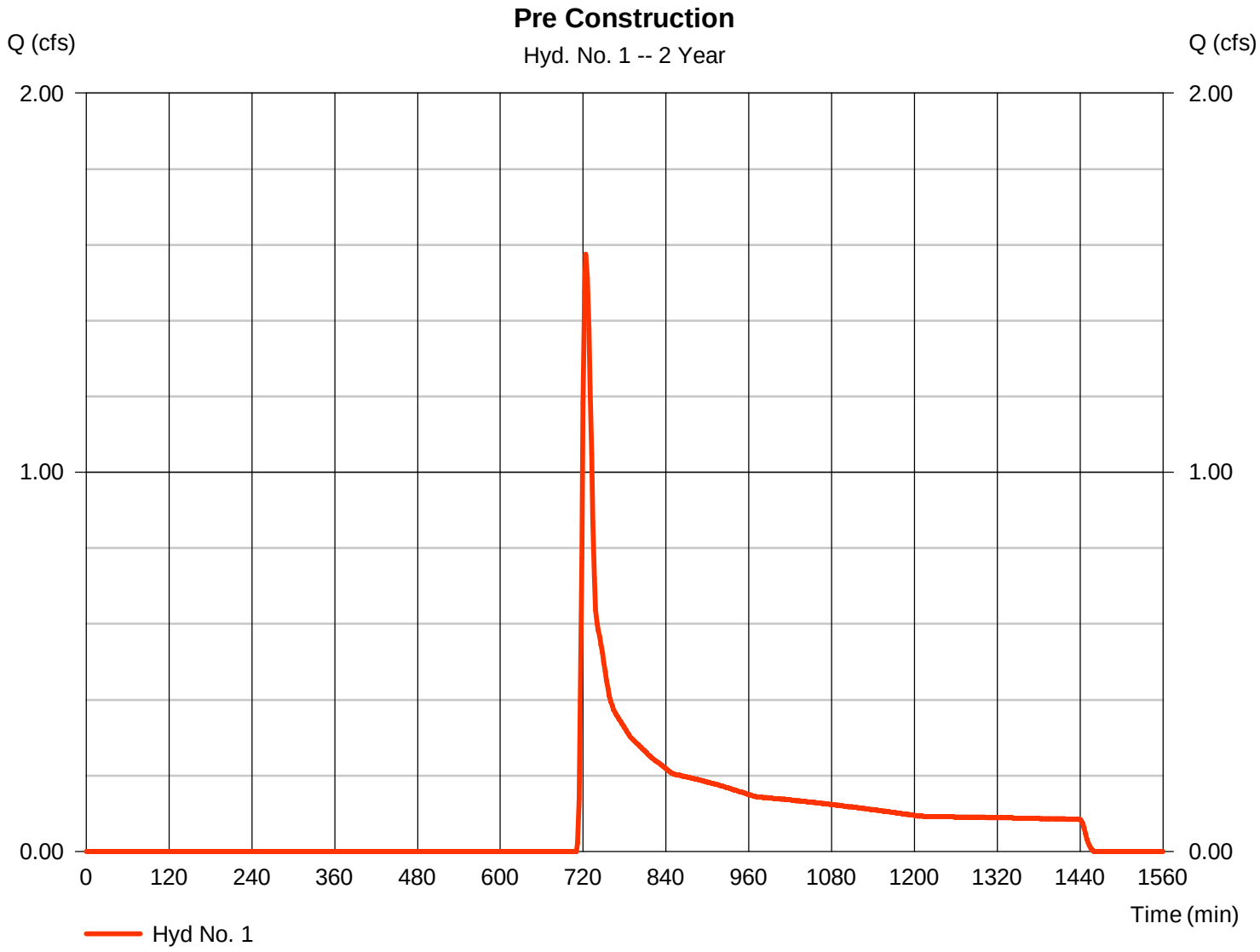
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.575 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	7,971 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	3.19 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



TR55 Tc Worksheet

Hyd. No. 1

Pre Construction

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 7.51**	**+**	**0.00**	**+**	**0.00**	**=**	**7.51**
Shallow Concentrated Flow							
Flow length (ft)	= 837.00		0.00		0.00		
Watercourse slope (%)	= 3.30		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.93		0.00		0.00		
Travel Time (min)	**= 4.76**	**+**	**0.00**	**+**	**0.00**	**=**	**4.76**
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 ..... 12.30 min

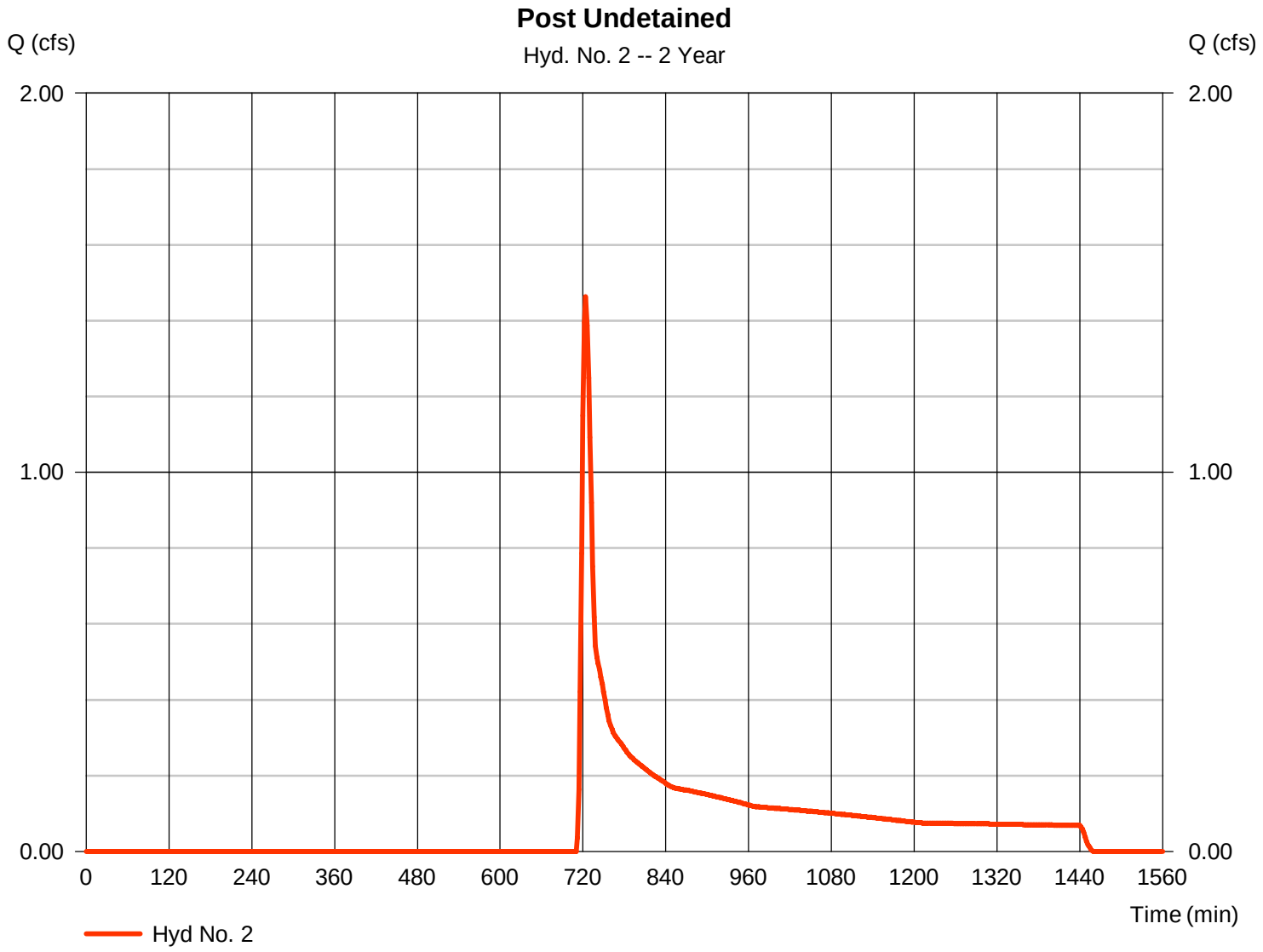
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.463 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	6,706 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	3.19 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



TR55 Tc Worksheet

Hyd. No. 2

Post Undetained

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 5.69**	**+**	**0.00**	**+**	**0.00**	**=**	**5.69**
Shallow Concentrated Flow							
Flow length (ft)	= 687.00		0.00		0.00		
Watercourse slope (%)	= 2.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.75		0.00		0.00		
Travel Time (min)	**= 4.17**	**+**	**0.00**	**+**	**0.00**	**=**	**4.17**
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 ..... 9.90 min

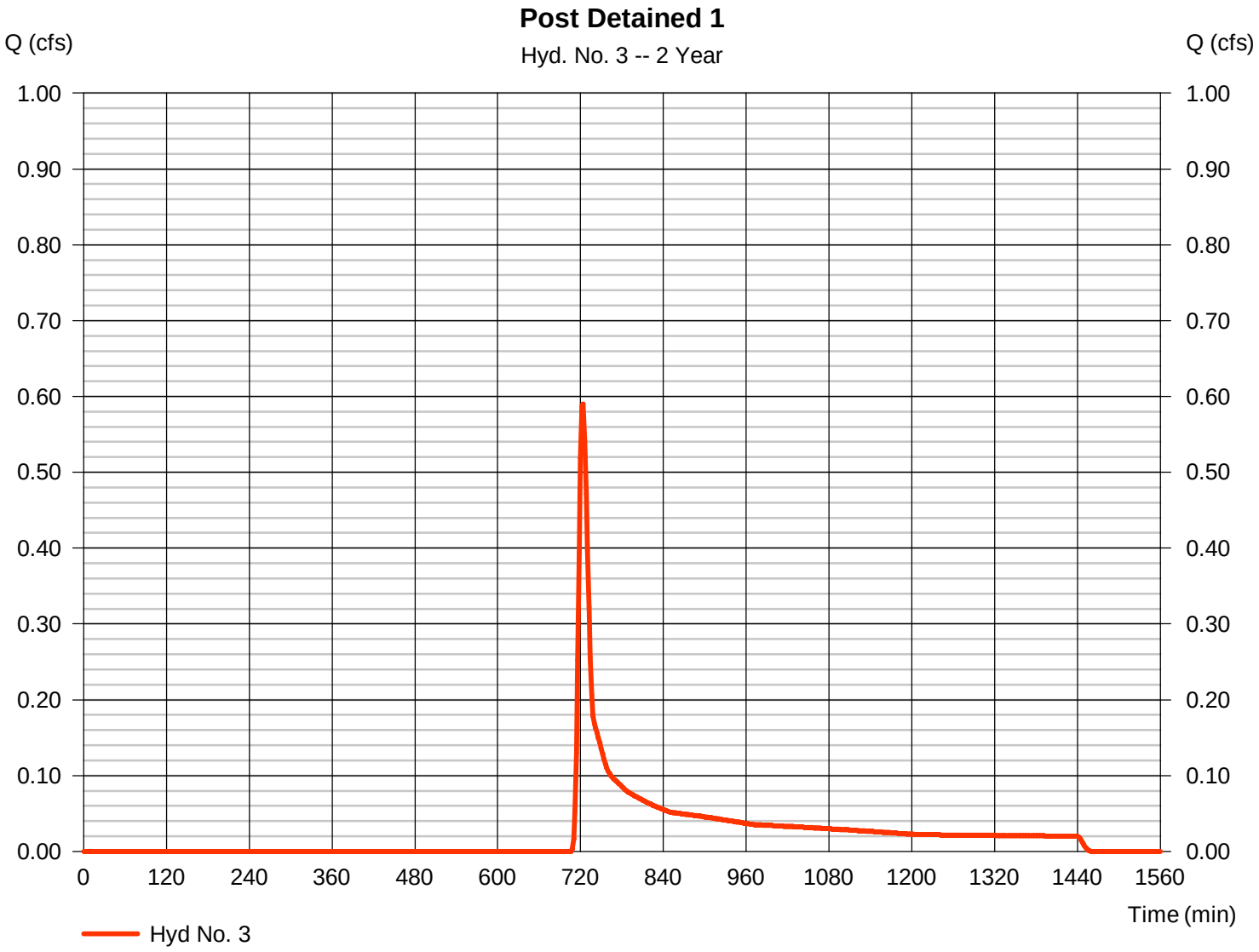
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.590 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,190 cuft
Drainage area	= 1.330 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 3.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



TR55 Tc Worksheet

Hyd. No. 3

Post Detained 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 8.21**	**+**	**0.00**	**+**	**0.00**	**=**	**8.21**
Shallow Concentrated Flow							
Flow length (ft)	= 299.00		0.00		0.00		
Watercourse slope (%)	= 5.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.75		0.00		0.00		
Travel Time (min)	**= 1.33**	**+**	**0.00**	**+**	**0.00**	**=**	**1.33**
Channel Flow							
X sectional flow area (sqft)	= 0.09		0.00		0.00		
Wetted perimeter (ft)	= 1.05		0.00		0.00		
Channel slope (%)	= 1.90		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=2.58						
			0.00				
					0.00		
Flow length (ft)	({0})53.0		0.0		0.0		
Travel Time (min)	**= 0.34**	**+**	**0.00**	**+**	**0.00**	**=**	**0.34**

Total Travel Time, Tc ..... 9.90 min

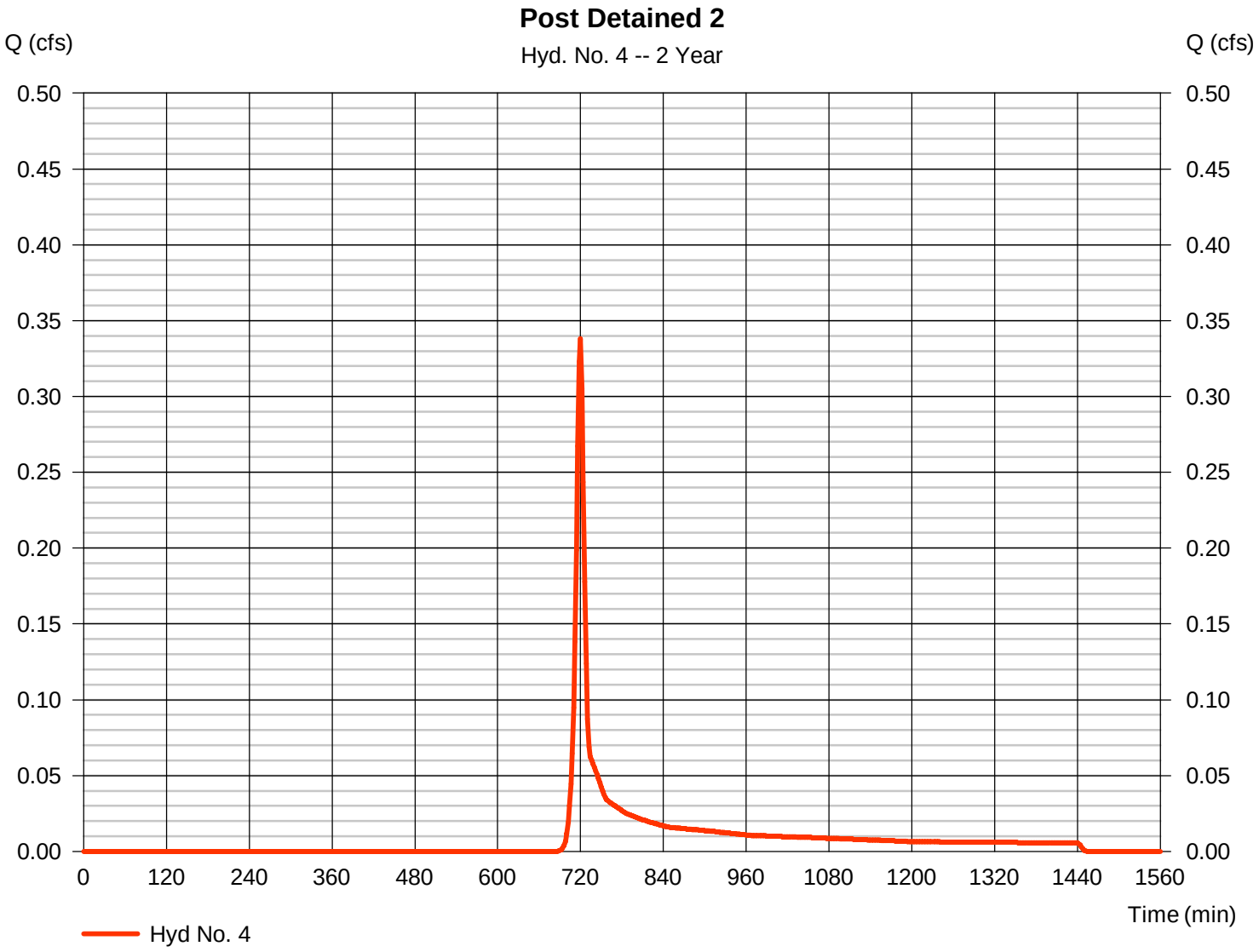
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.338 cfs
Storm frequency	=	2 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	806 cuft
Drainage area	=	0.270 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.50 min
Total precip.	=	3.19 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



TR55 Tc Worksheet

Hyd. No. 4

Post Detained 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 5.69**	**+**	**0.00**	**+**	**0.00**	**=**	**5.69**
Shallow Concentrated Flow							
Flow length (ft)	= 60.00		0.00		0.00		
Watercourse slope (%)	= 5.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61		0.00		0.00		
Travel Time (min)	**= 0.28**	**+**	**0.00**	**+**	**0.00**	**=**	**0.28**
Channel Flow							
X sectional flow area (sqft)	= 0.26		0.00		0.00		
Wetted perimeter (ft)	= 1.60		0.00		0.00		
Channel slope (%)	= 4.80		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=3.22						
			0.00				
					0.00		
Flow length (ft)	({0})300.0		0.0		0.0		
Travel Time (min)	**= 1.55**	**+**	**0.00**	**+**	**0.00**	**=**	**1.55**

Total Travel Time, Tc ..... 7.50 min

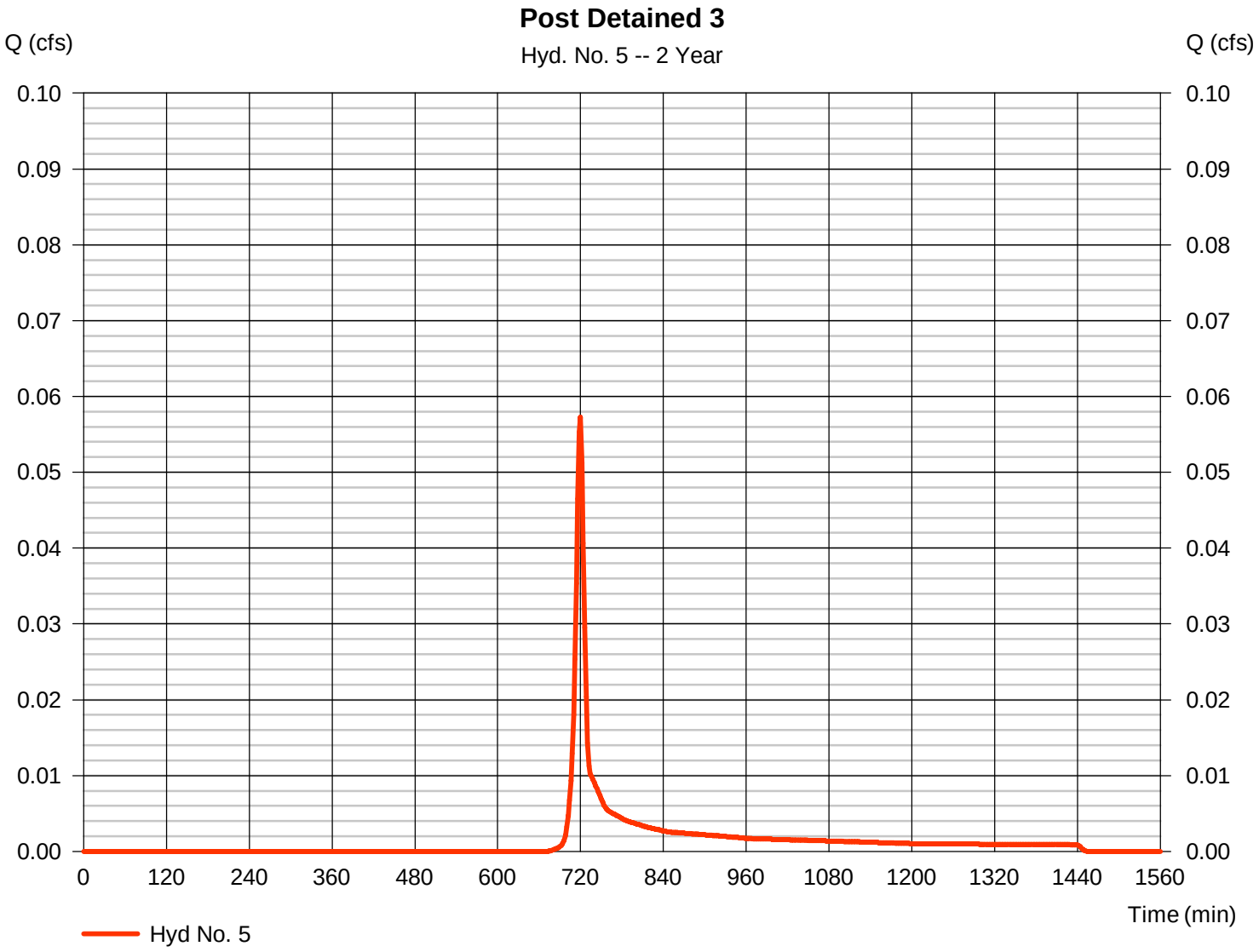
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.057 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 134 cuft
Drainage area	= 0.040 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.80 min
Total precip.	= 3.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040



TR55 Tc Worksheet

Hyd. No. 5

Post Detained 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 37.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 1.80		0.00		0.00		
Travel Time (min)	**= 6.73**	**+**	**0.00**	**+**	**0.00**	**=**	**6.73**
Shallow Concentrated Flow							
Flow length (ft)	= 16.00		0.00		0.00		
Watercourse slope (%)	= 25.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=10.16		0.00		0.00		
Travel Time (min)	**= 0.03**	**+**	**0.00**	**+**	**0.00**	**=**	**0.03**
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	= 0.030		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**

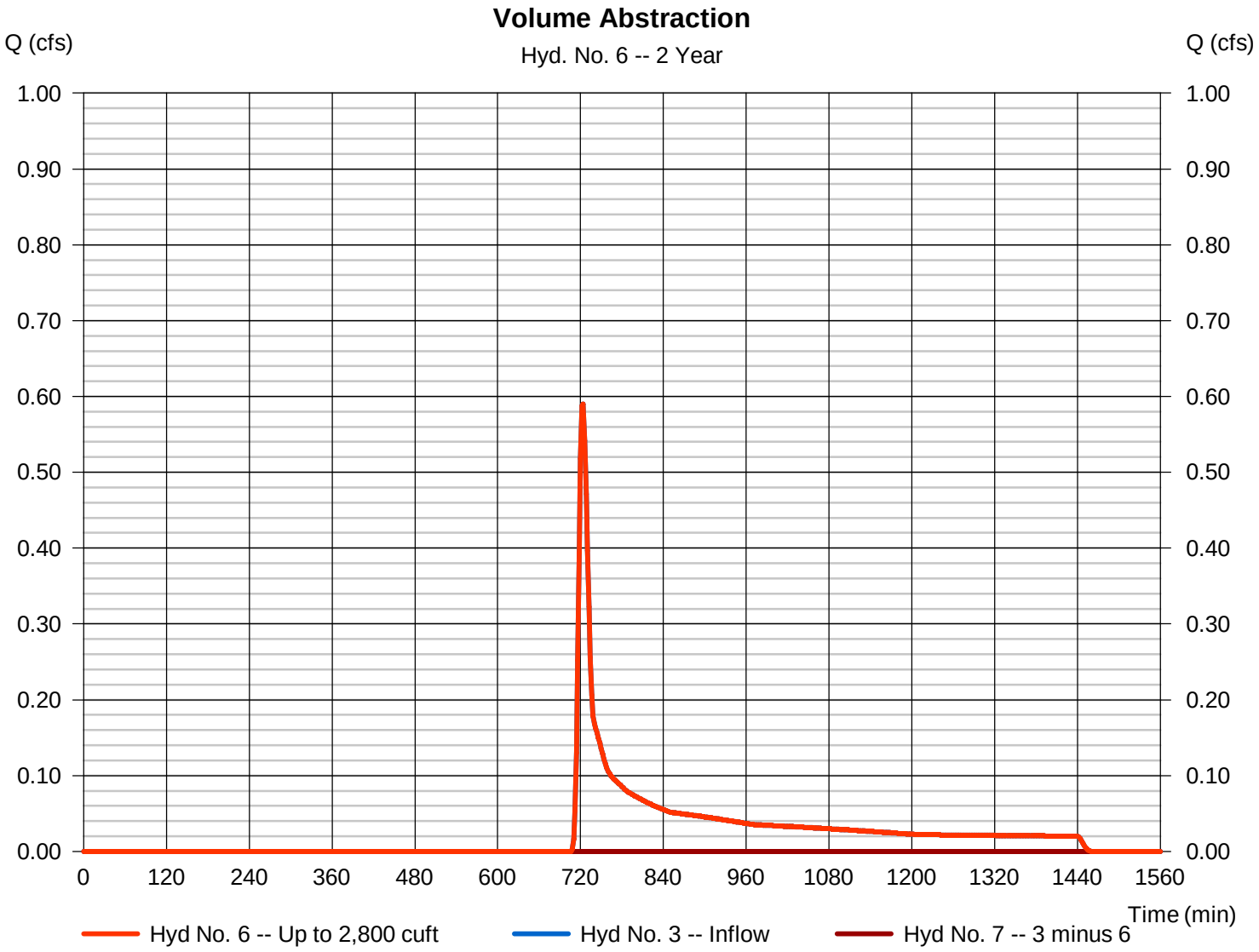
Total Travel Time, Tc ..... 6.80 min

Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.590 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,190 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

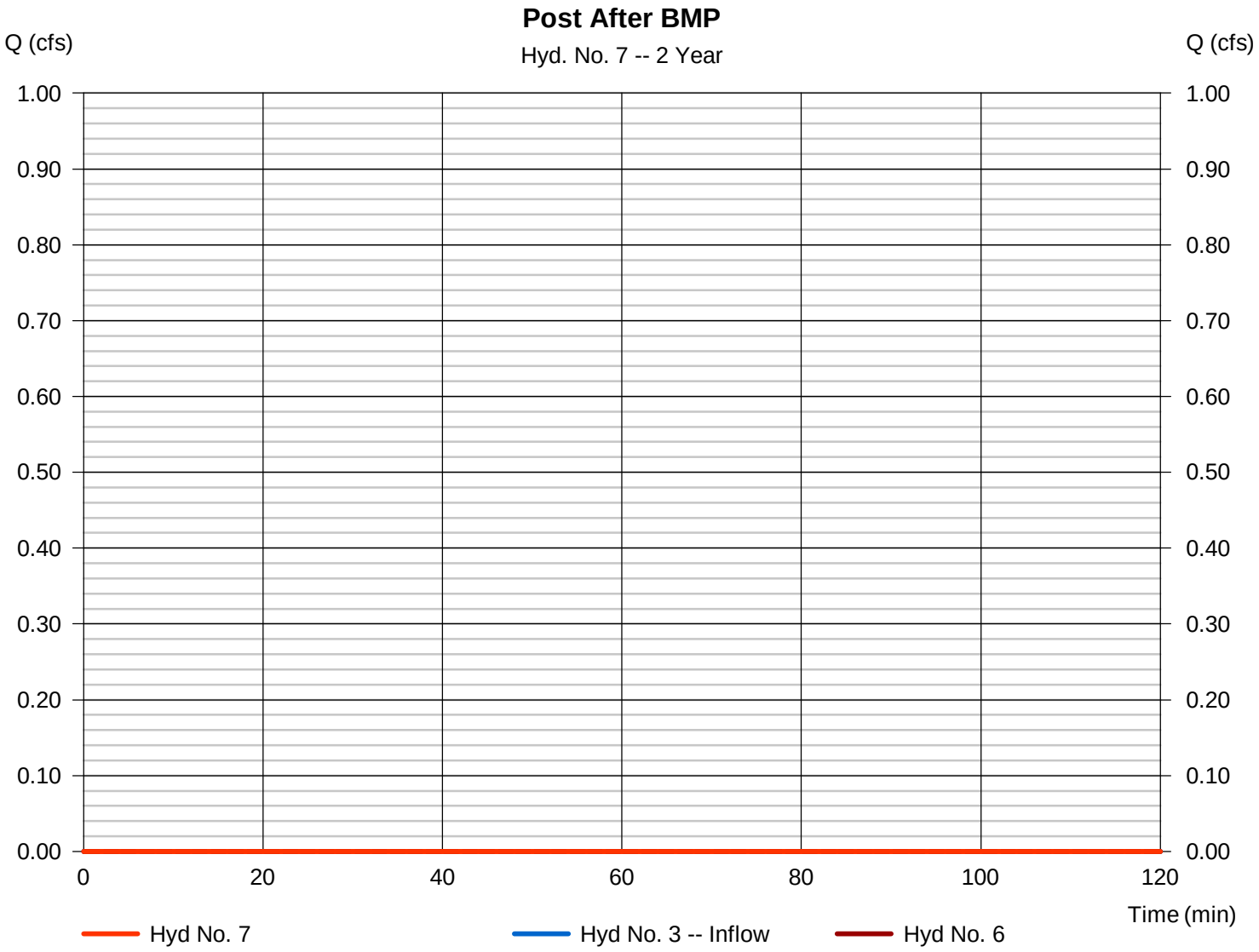


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

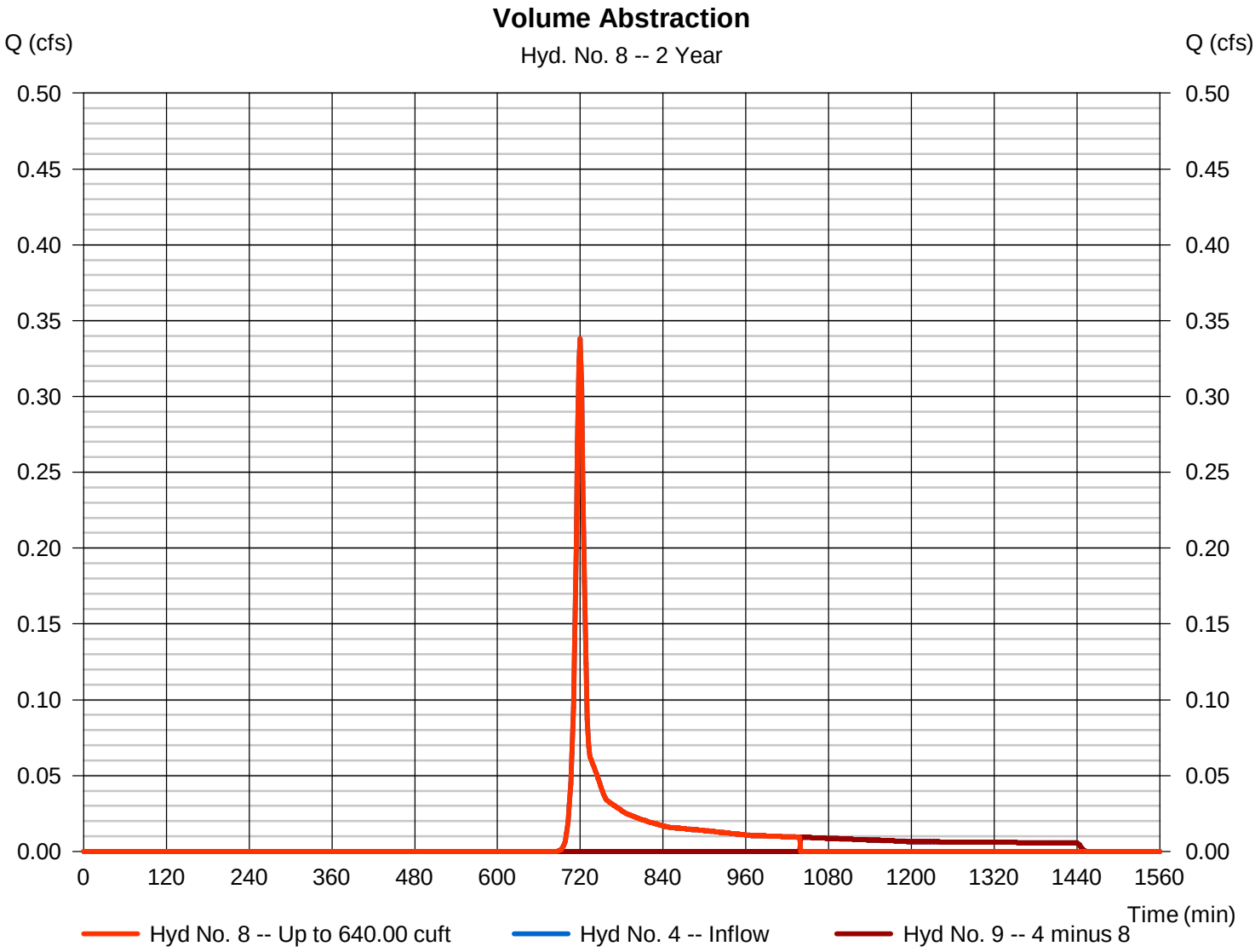


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.338 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 641 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

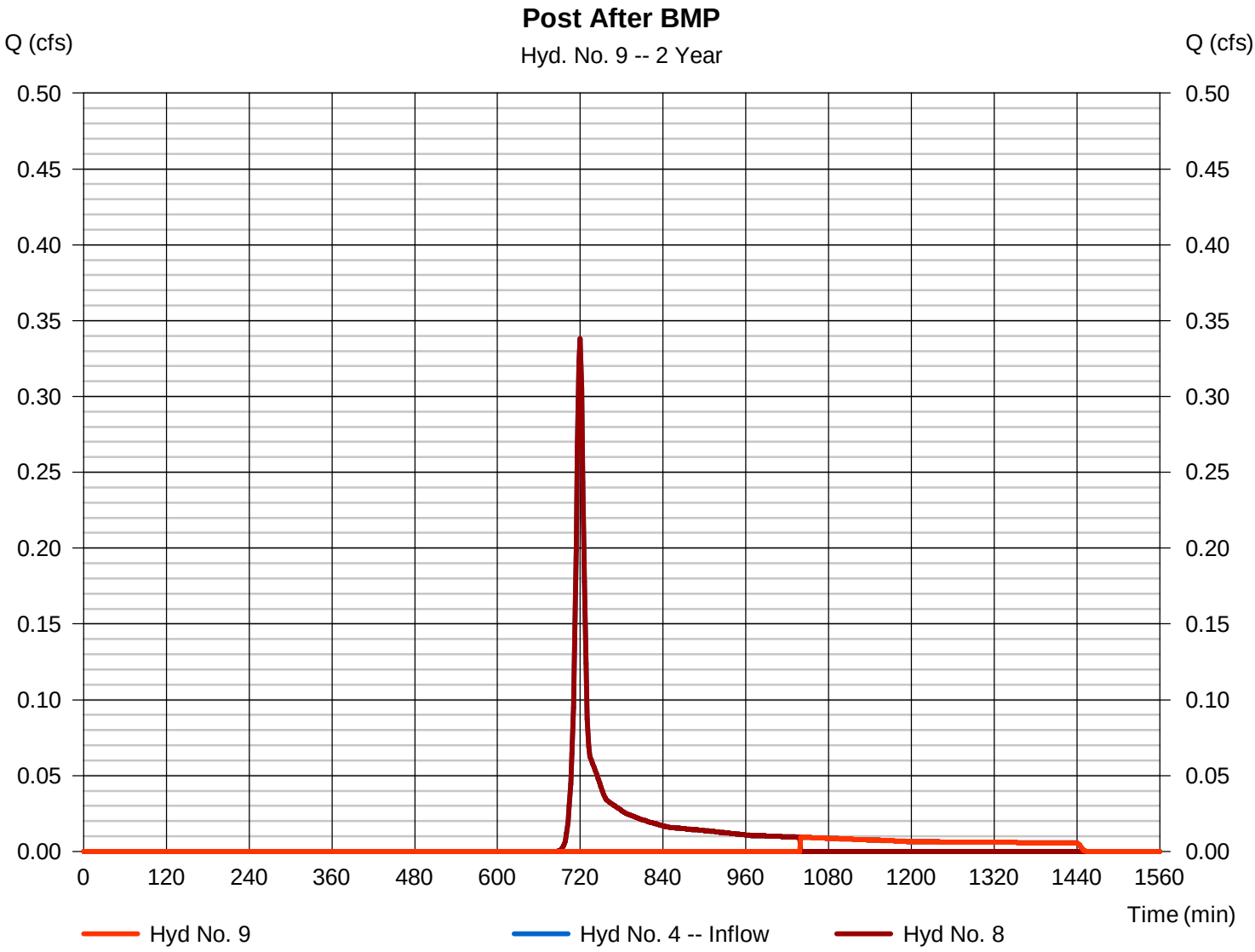


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.009 cfs
Storm frequency	= 2 yrs	Time to peak	= 1040 min
Time interval	= 2 min	Hyd. volume	= 165 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

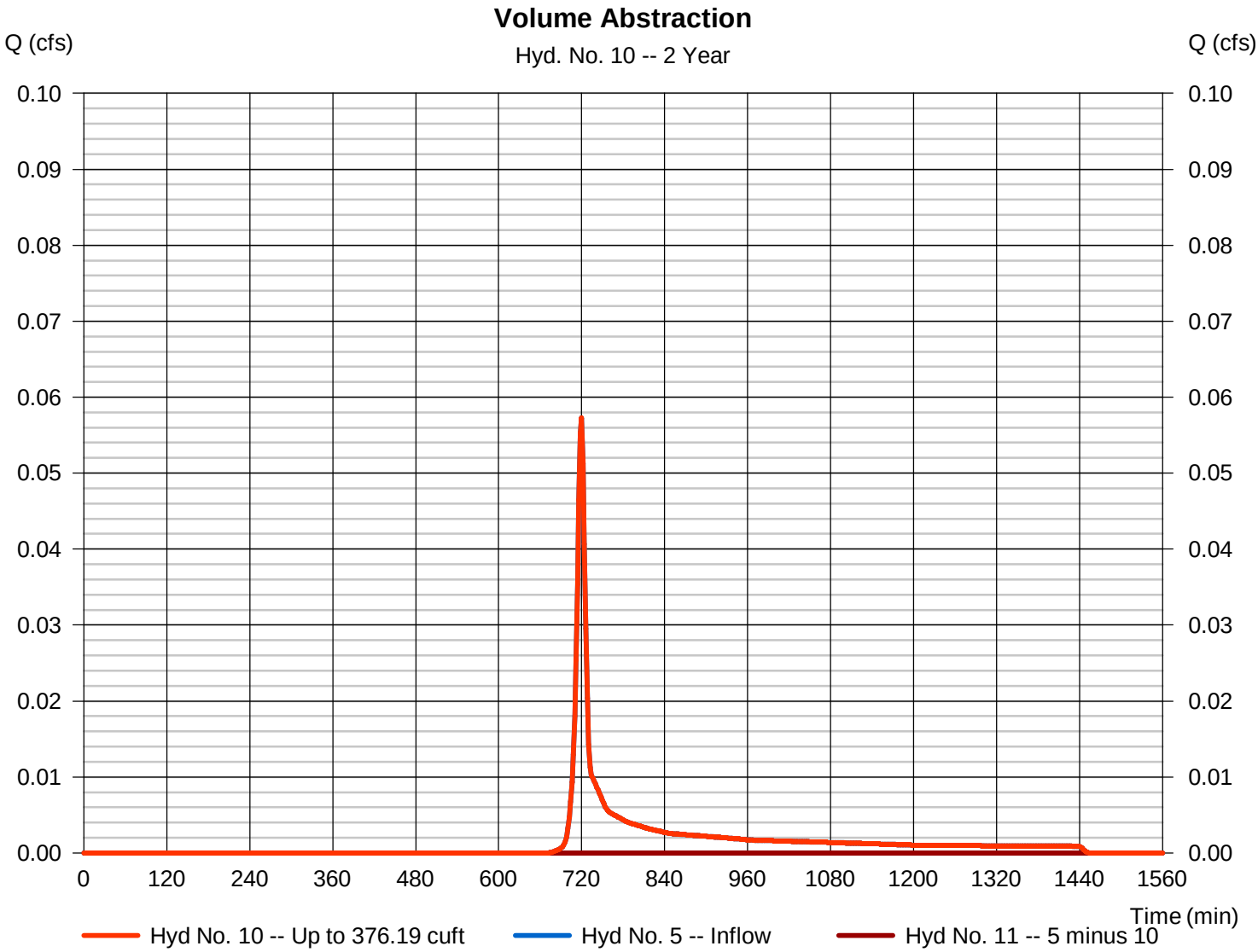


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.057 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 134 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

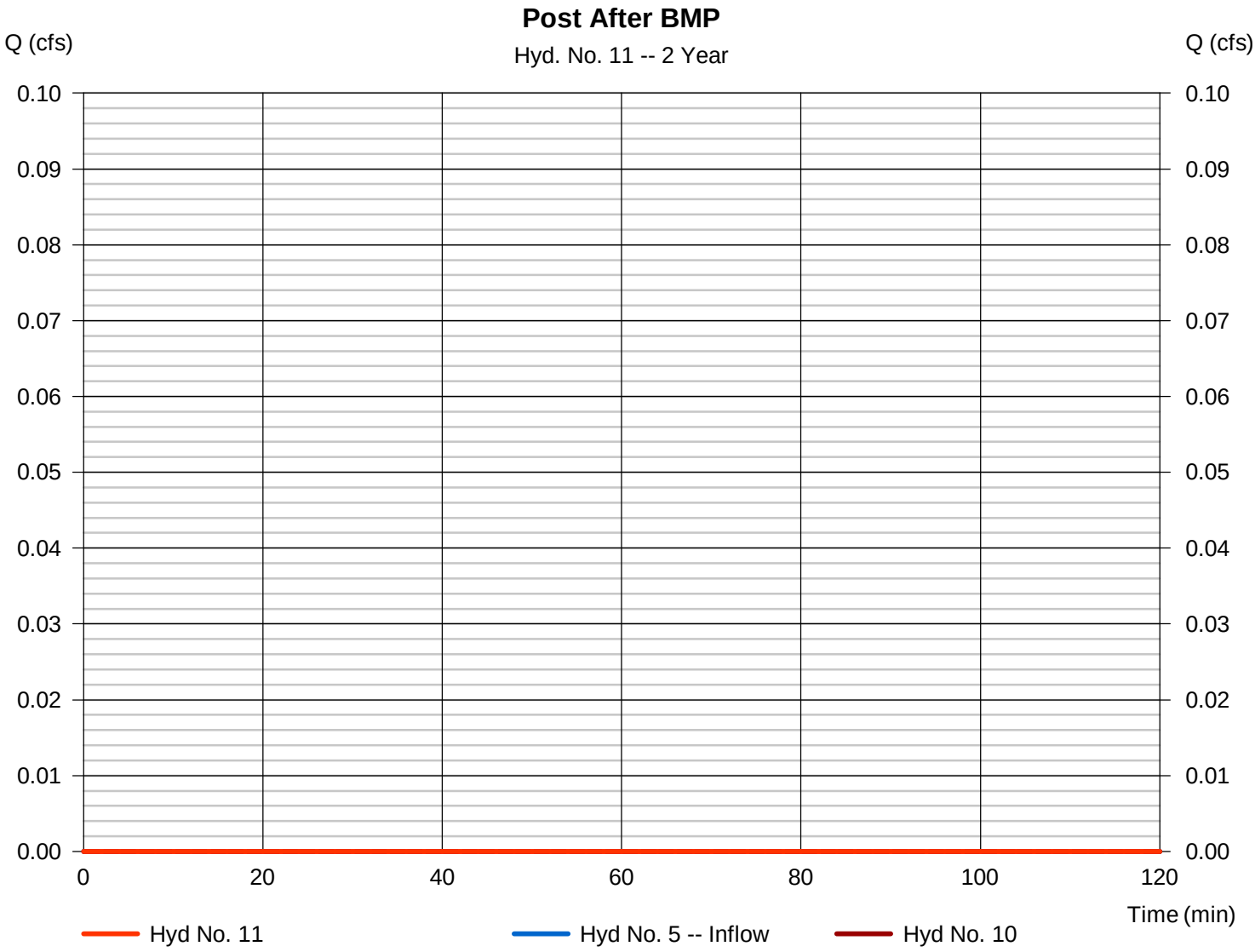


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

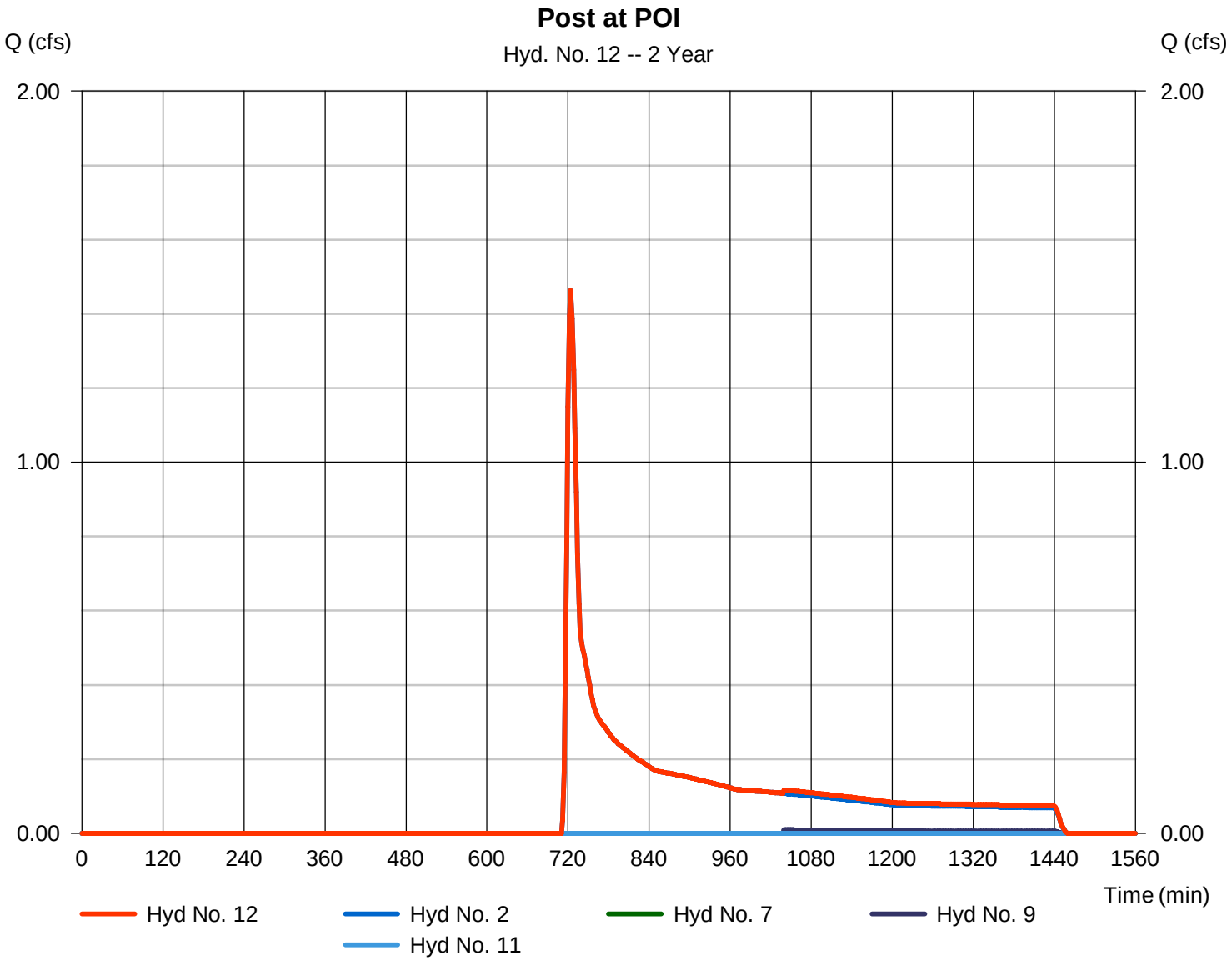


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	=	Combine	Peak discharge	=	1.463 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	6,871 cuft
Inflow hyds.	=	2, 7, 9, 11	Contrib. drain. area	=	5.310 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	8.136	2	722	24,418	------	------	------	Pre Construction
2	SCS Runoff	6.754	2	722	19,822	------	------	------	Post Undetained
3	SCS Runoff	2.104	2	722	5,881	------	------	------	Post Detained 1
4	SCS Runoff	0.771	2	720	1,766	------	------	------	Post Detained 2
5	SCS Runoff	0.124	2	720	284	------	------	------	Post Detained 3
6	Diversion1	2.104	2	722	2,804	3	------	------	Volume Abstraction
7	Diversion2	0.235	2	766	3,076	3	------	------	Post After BMP
8	Diversion1	0.771	2	720	696	4	------	------	Volume Abstraction
9	Diversion2	0.381	2	726	1,071	4	------	------	Post After BMP
10	Diversion1	0.124	2	720	284	5	------	------	Volume Abstraction
11	Diversion2	0.000	2	n/a	0	5	------	------	Post After BMP
12	Combine	6.754	2	722	23,969	2, 7, 9, 11	------	------	Post at POI

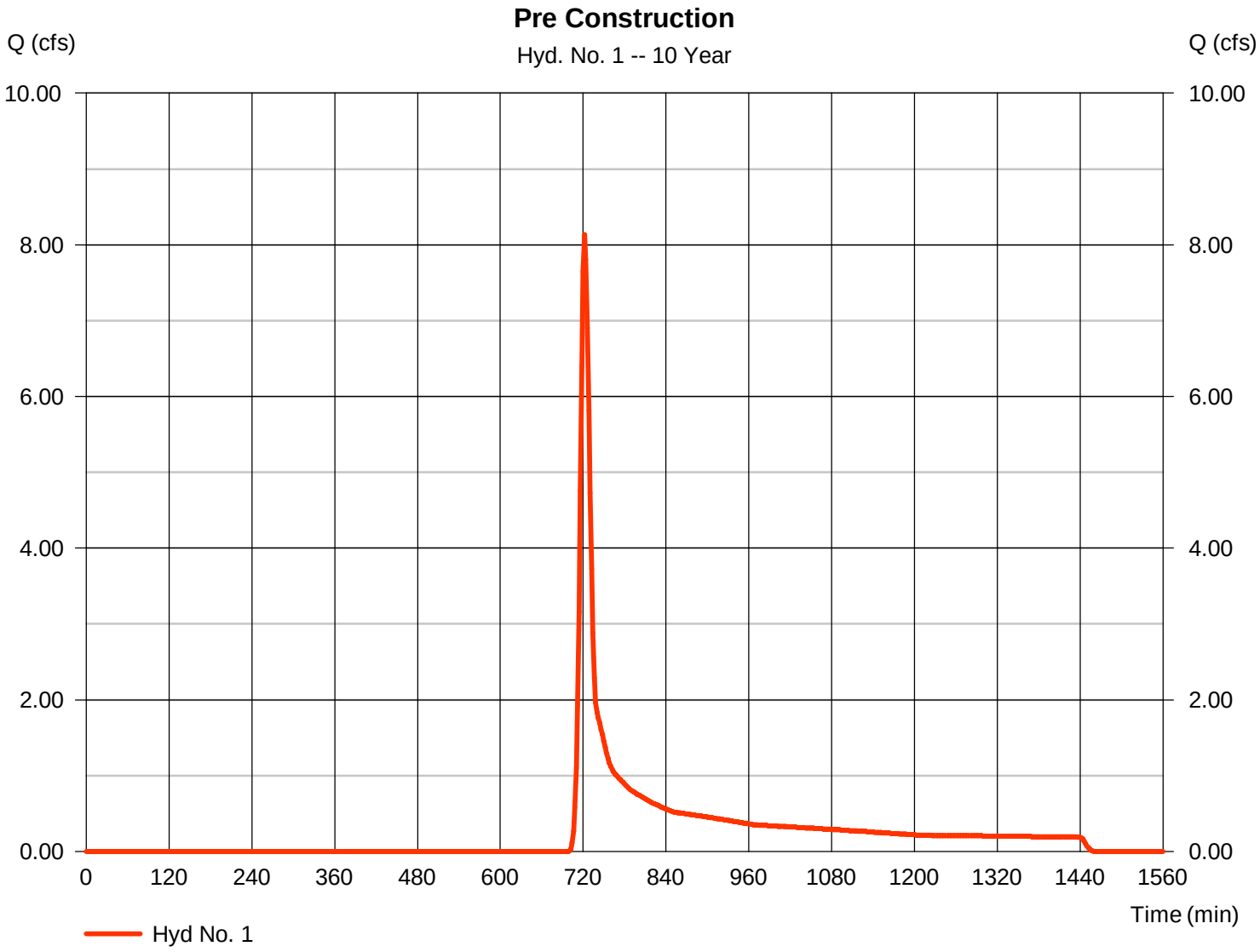
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.136 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	24,418 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



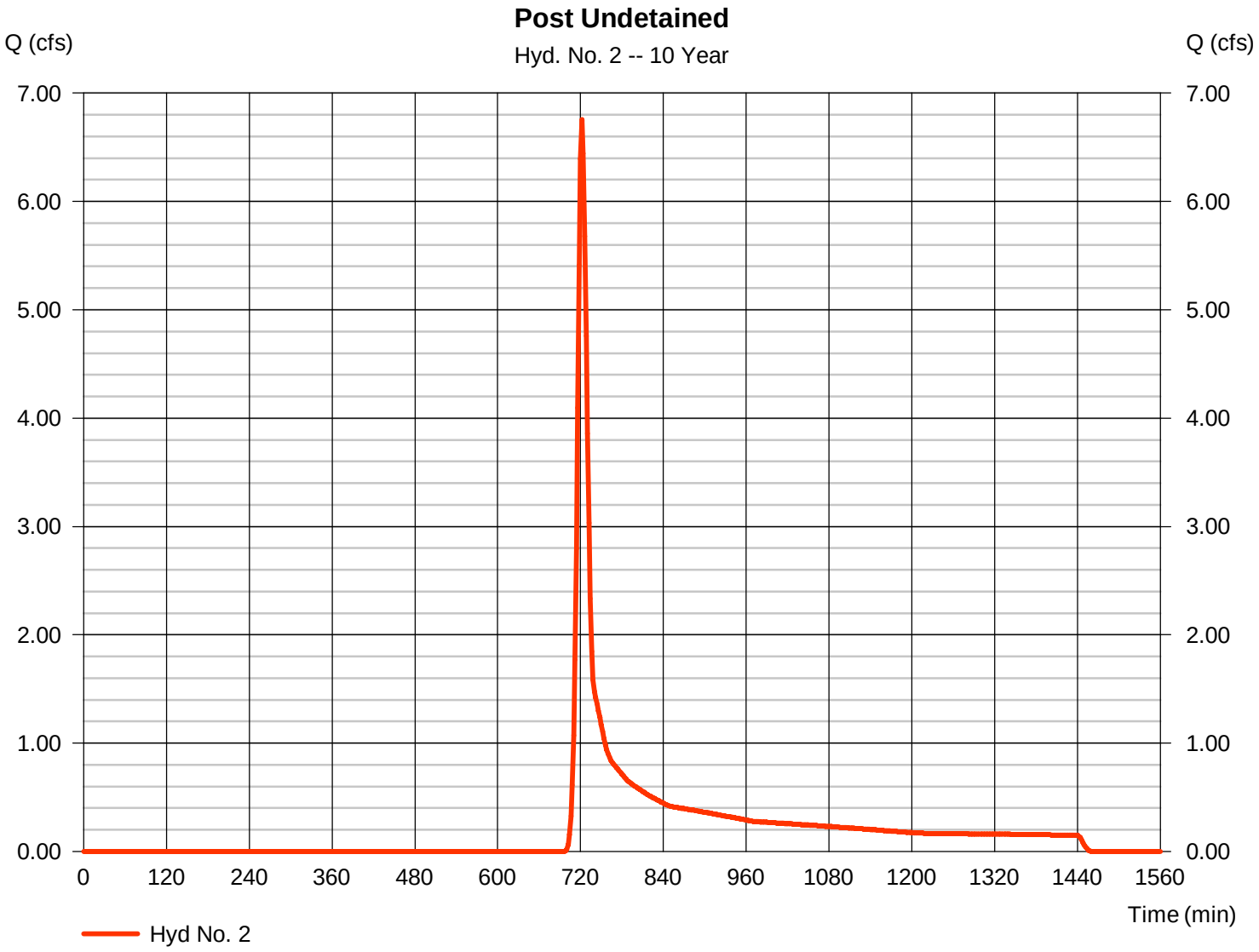
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.754 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	19,822 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



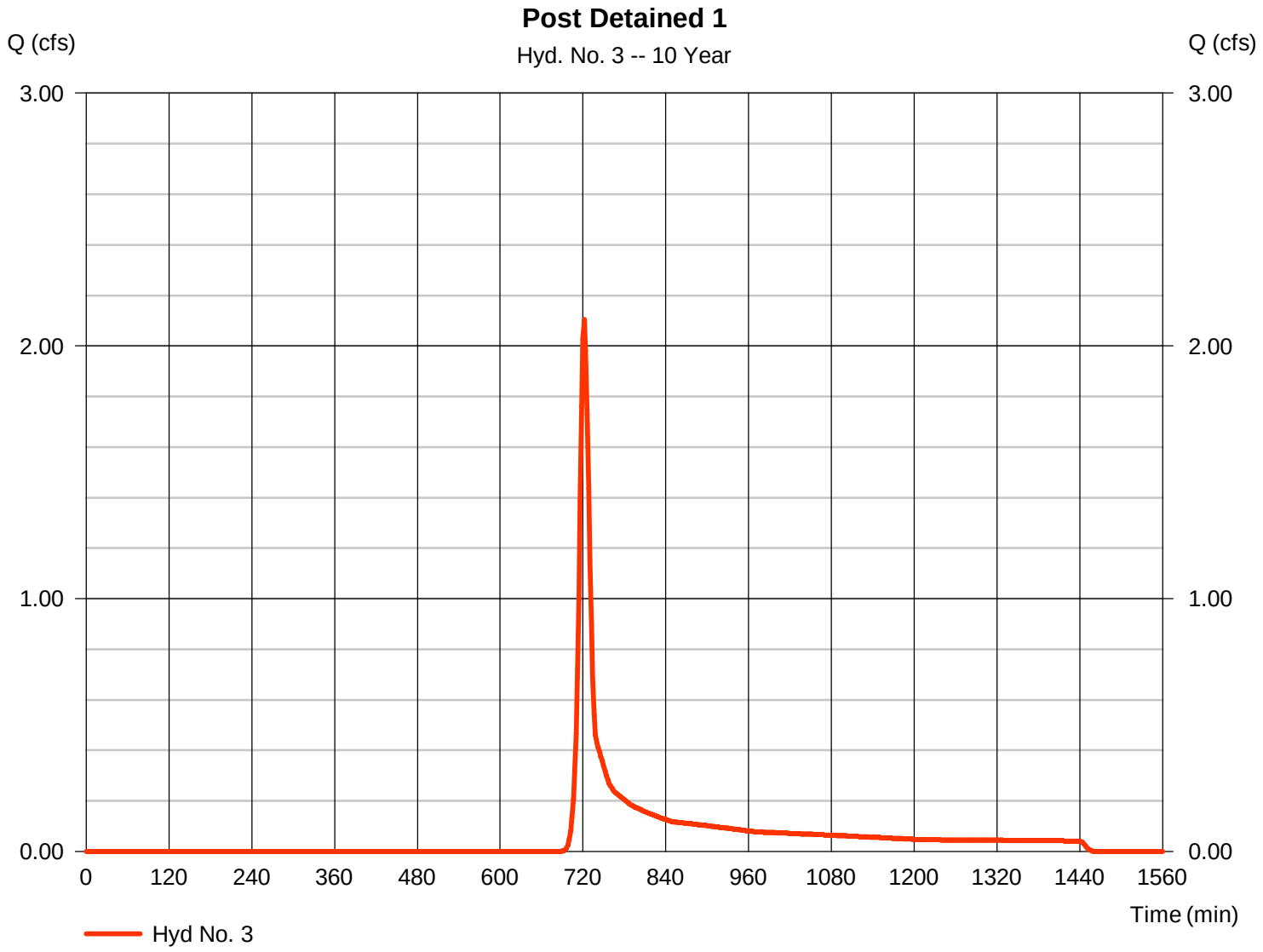
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.104 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	5,881 cuft
Drainage area	=	1.330 ac	Curve number	=	61*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



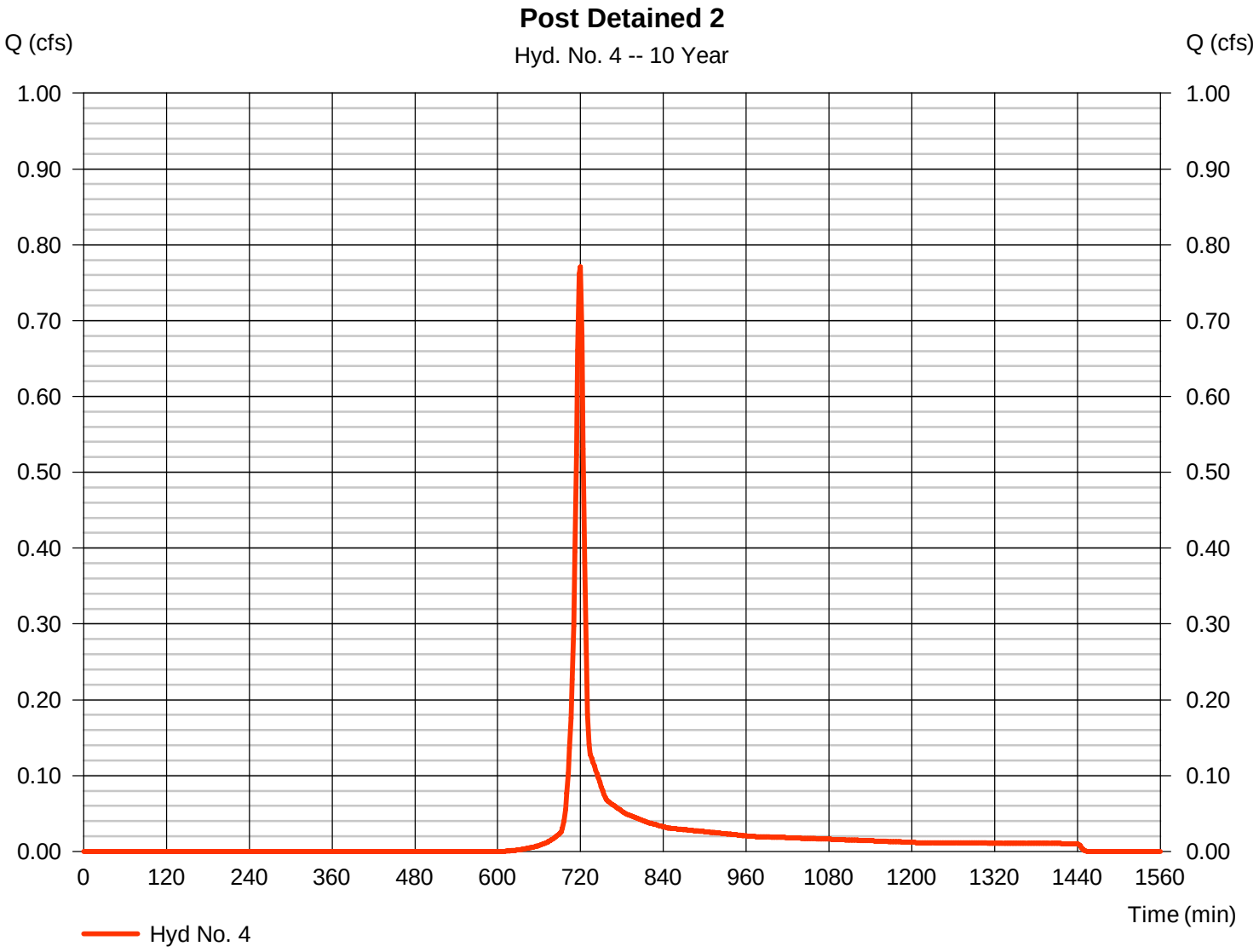
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.771 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,766 cuft
Drainage area	= 0.270 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.50 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



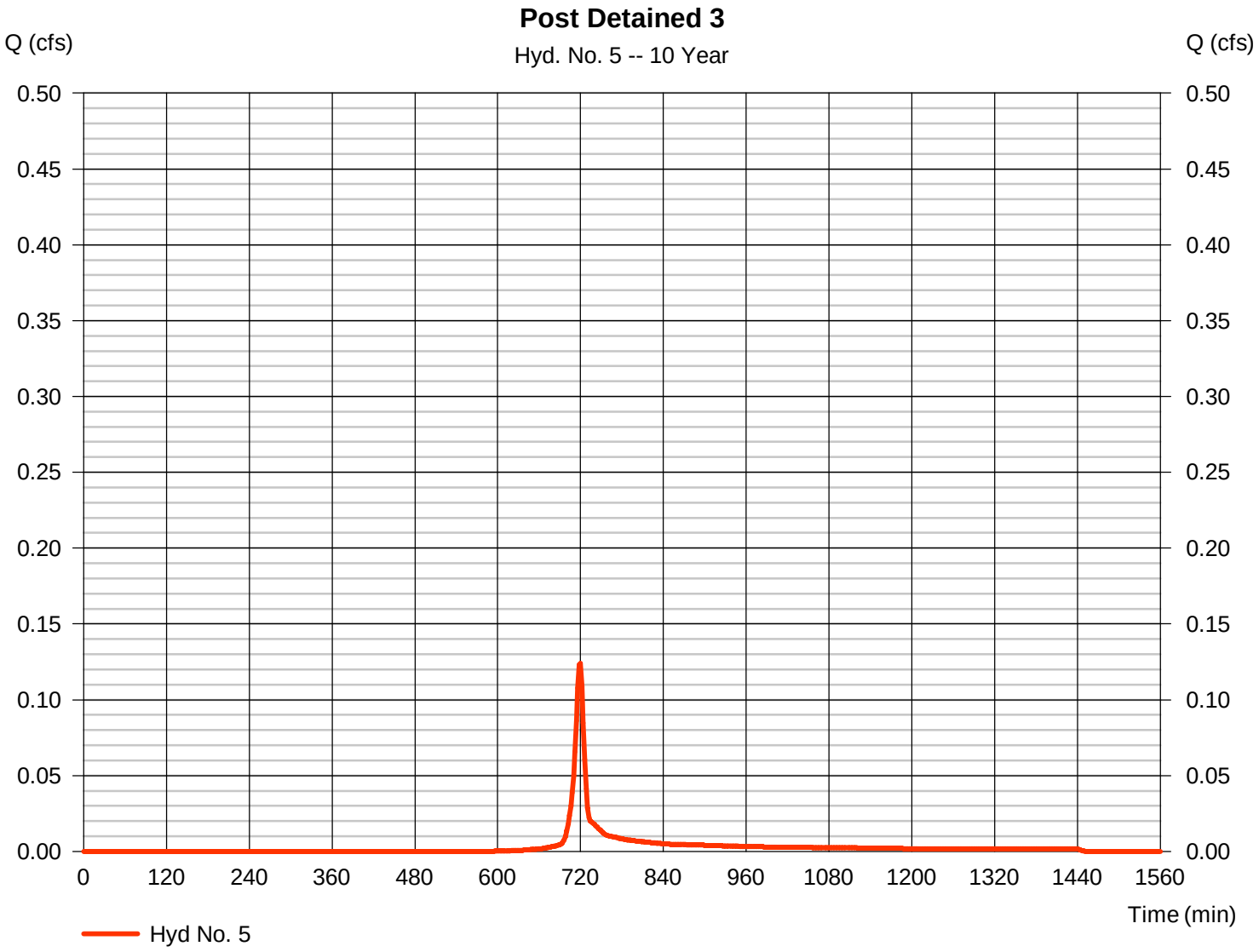
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.124 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 284 cuft
Drainage area	= 0.040 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.80 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

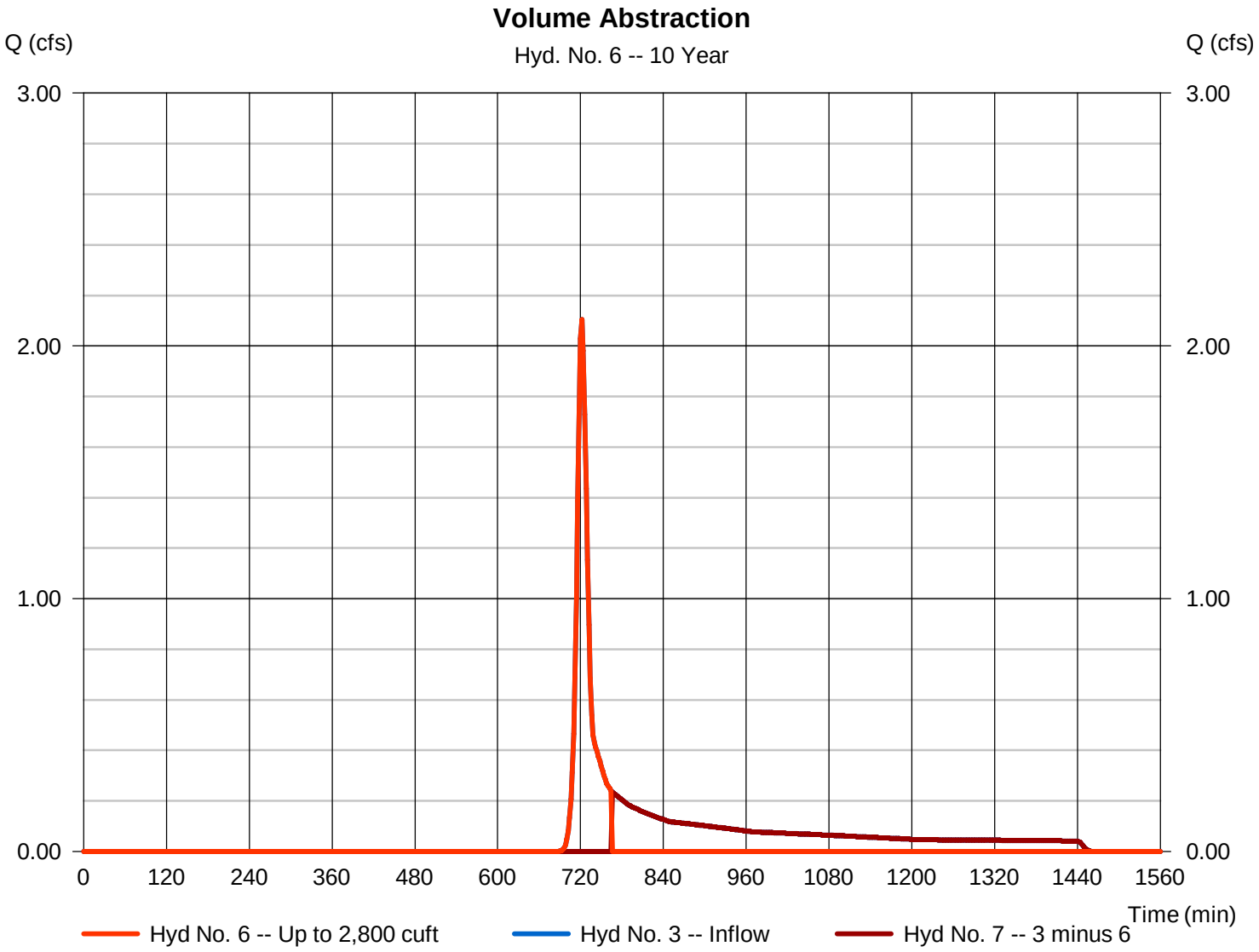


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 2.104 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,804 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

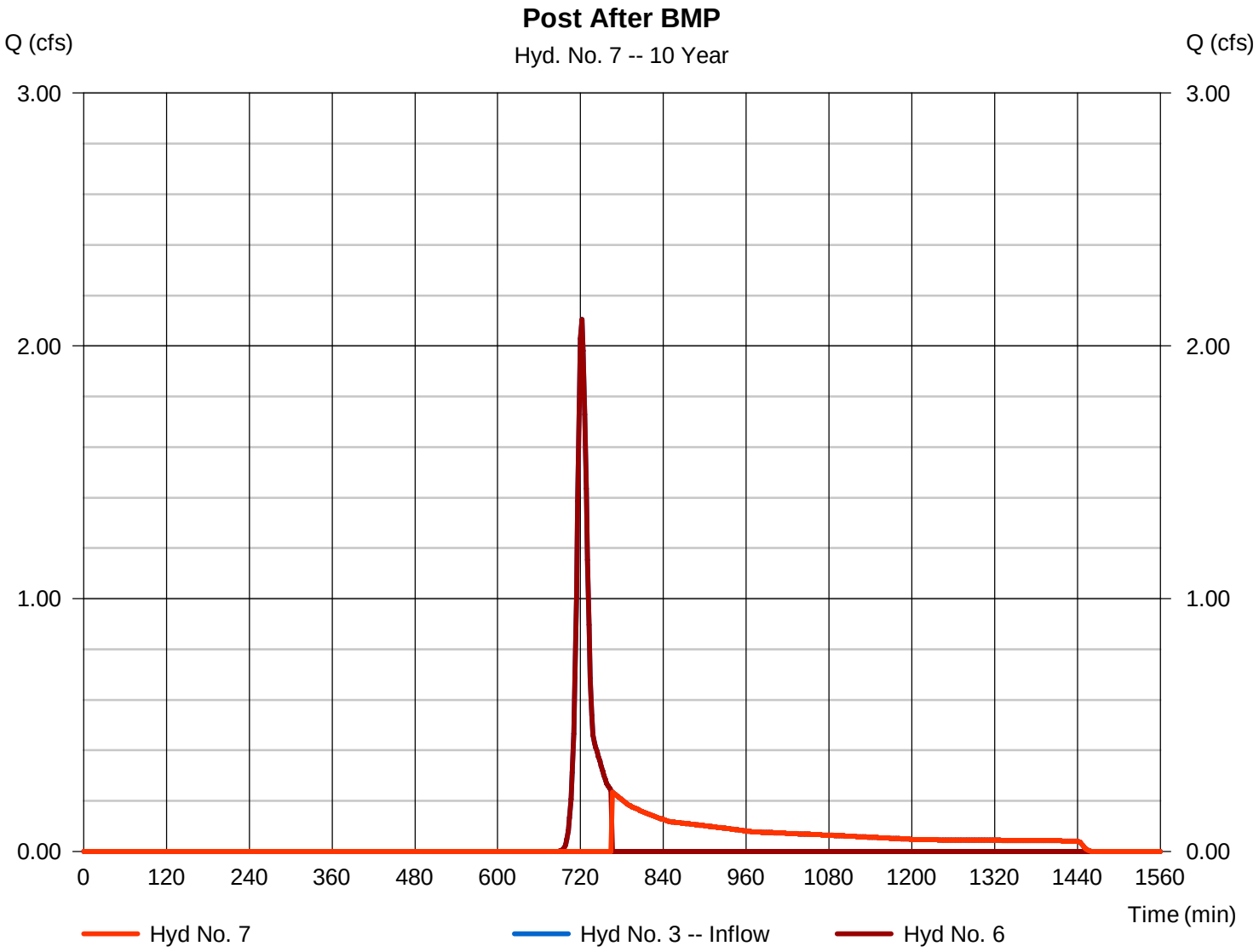


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.235 cfs
Storm frequency	= 10 yrs	Time to peak	= 766 min
Time interval	= 2 min	Hyd. volume	= 3,076 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

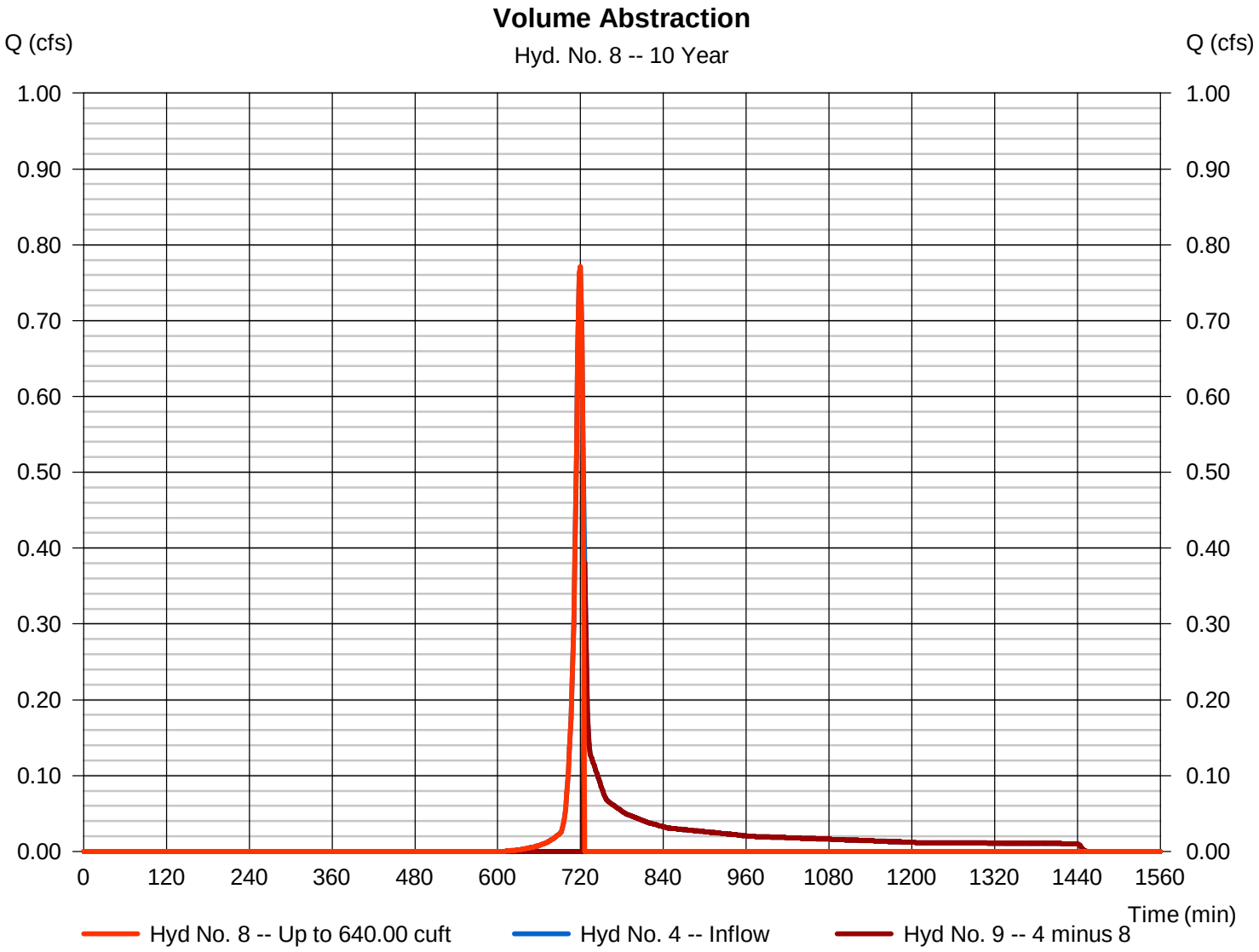


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.771 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 696 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

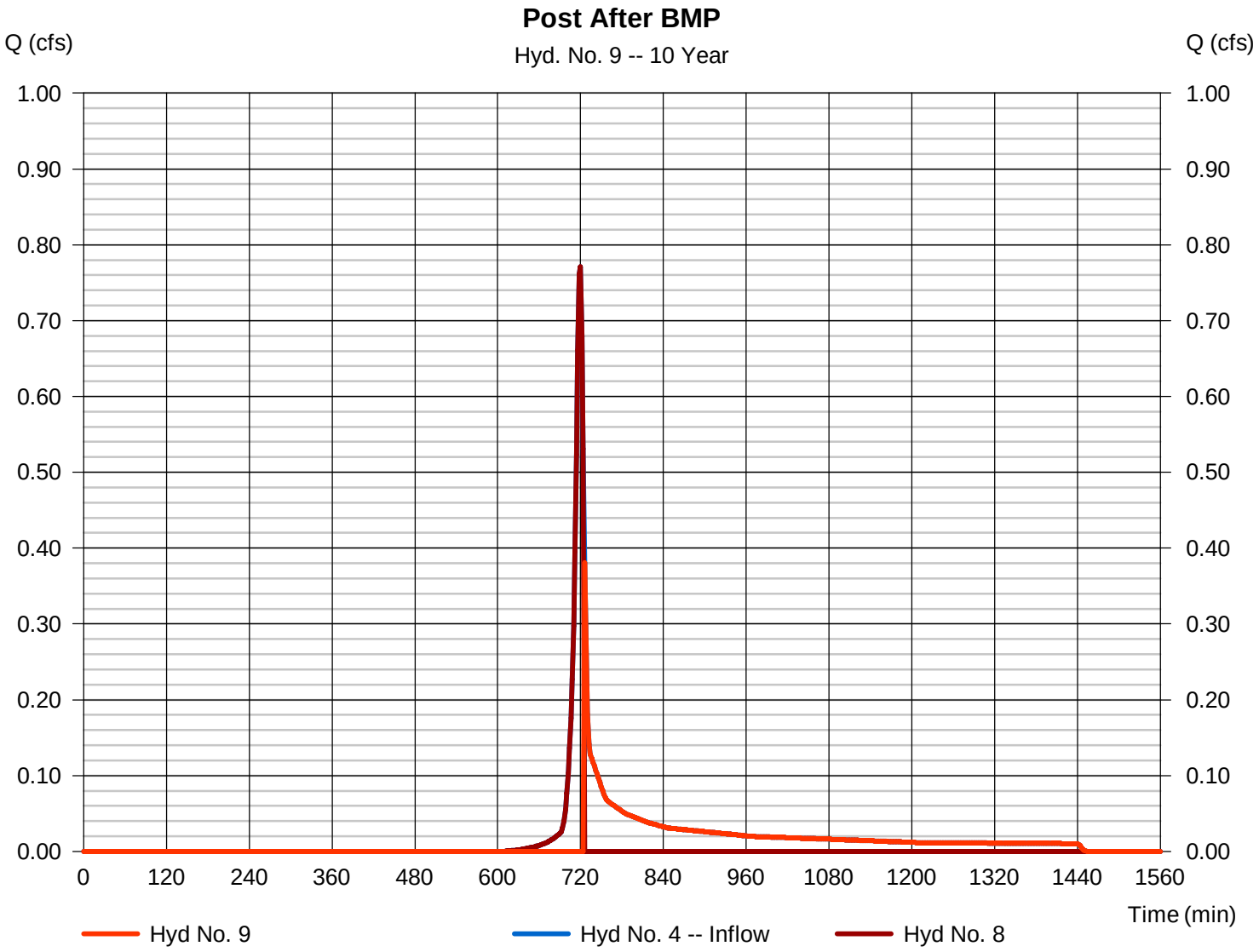


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.381 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,071 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

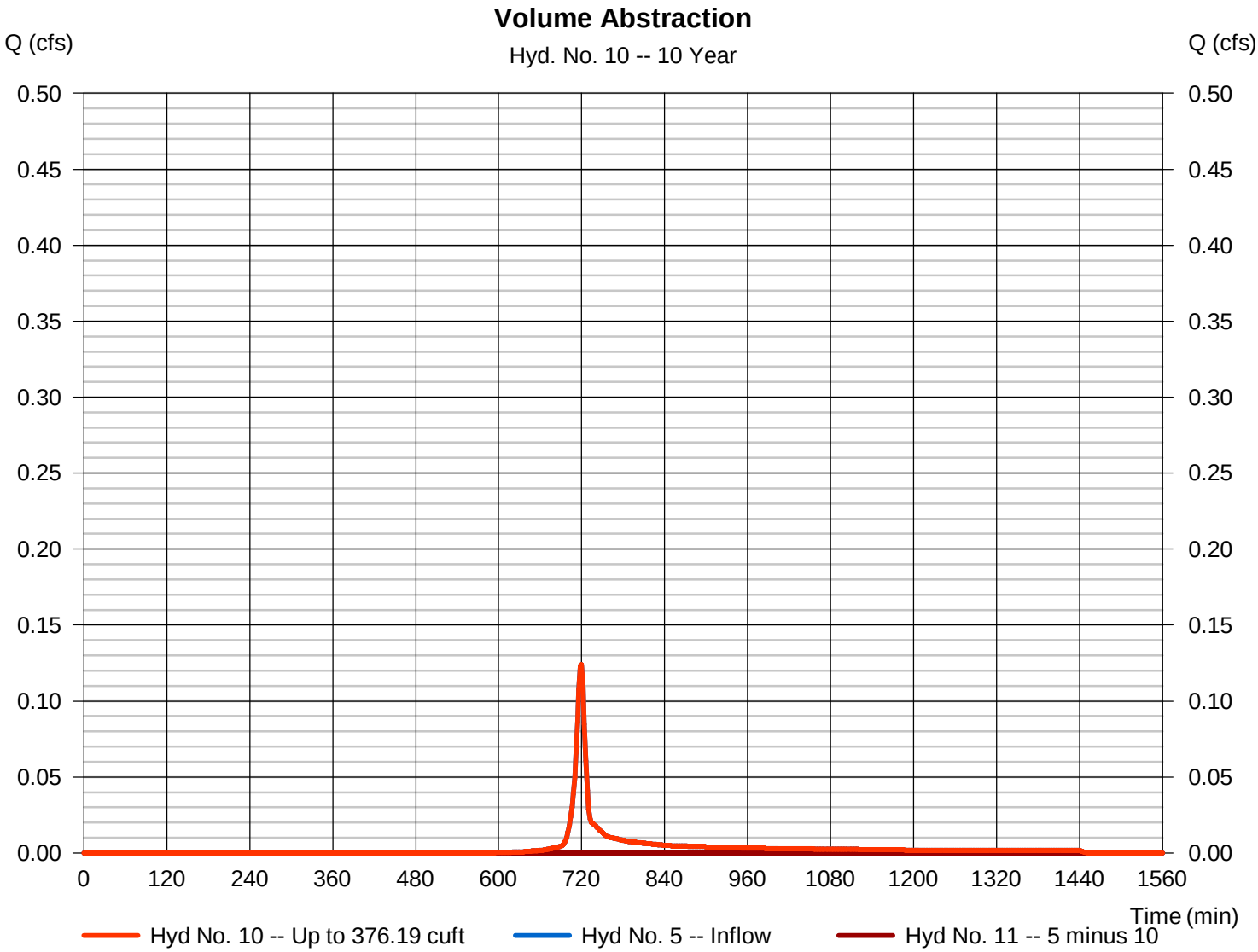


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.124 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 284 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

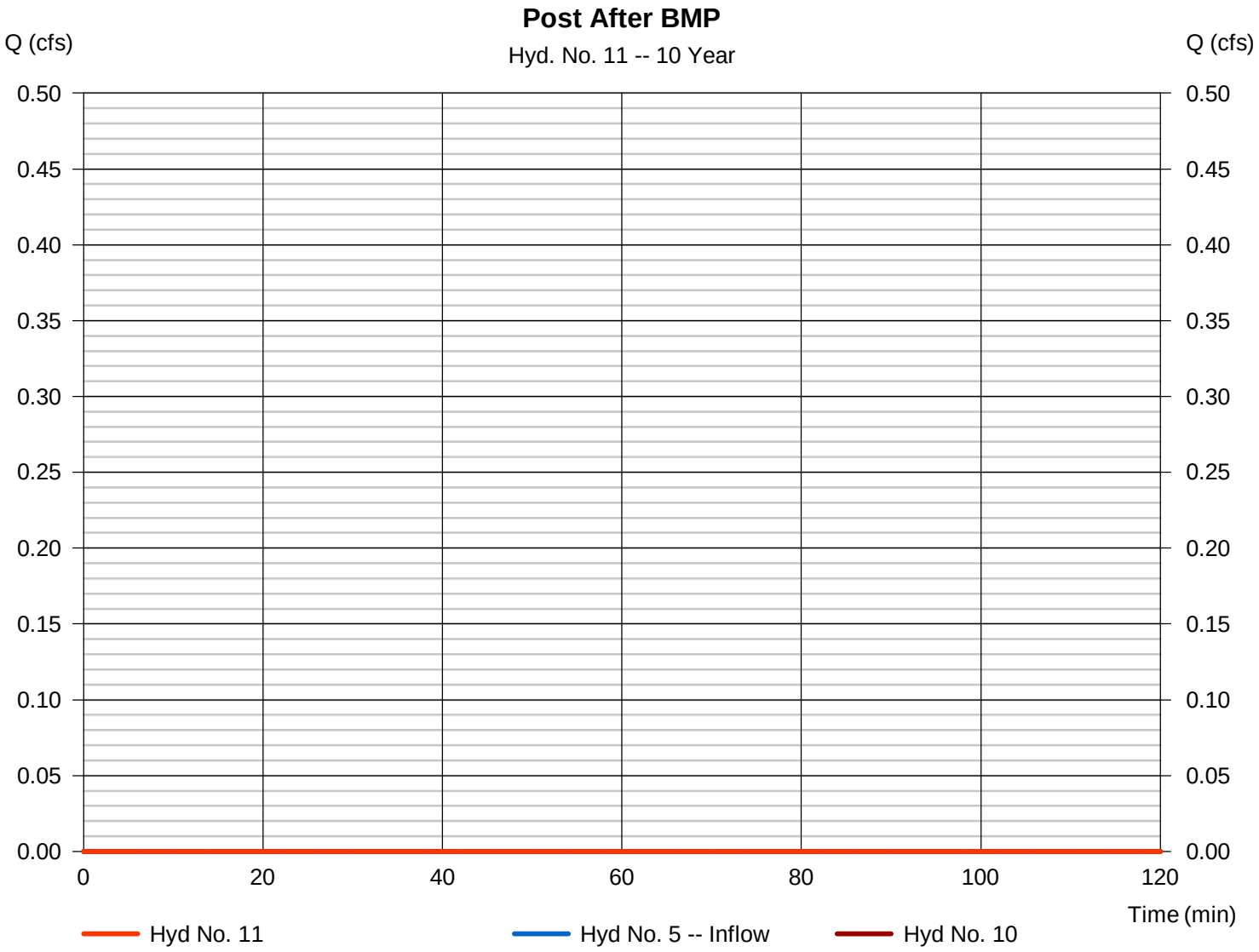


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

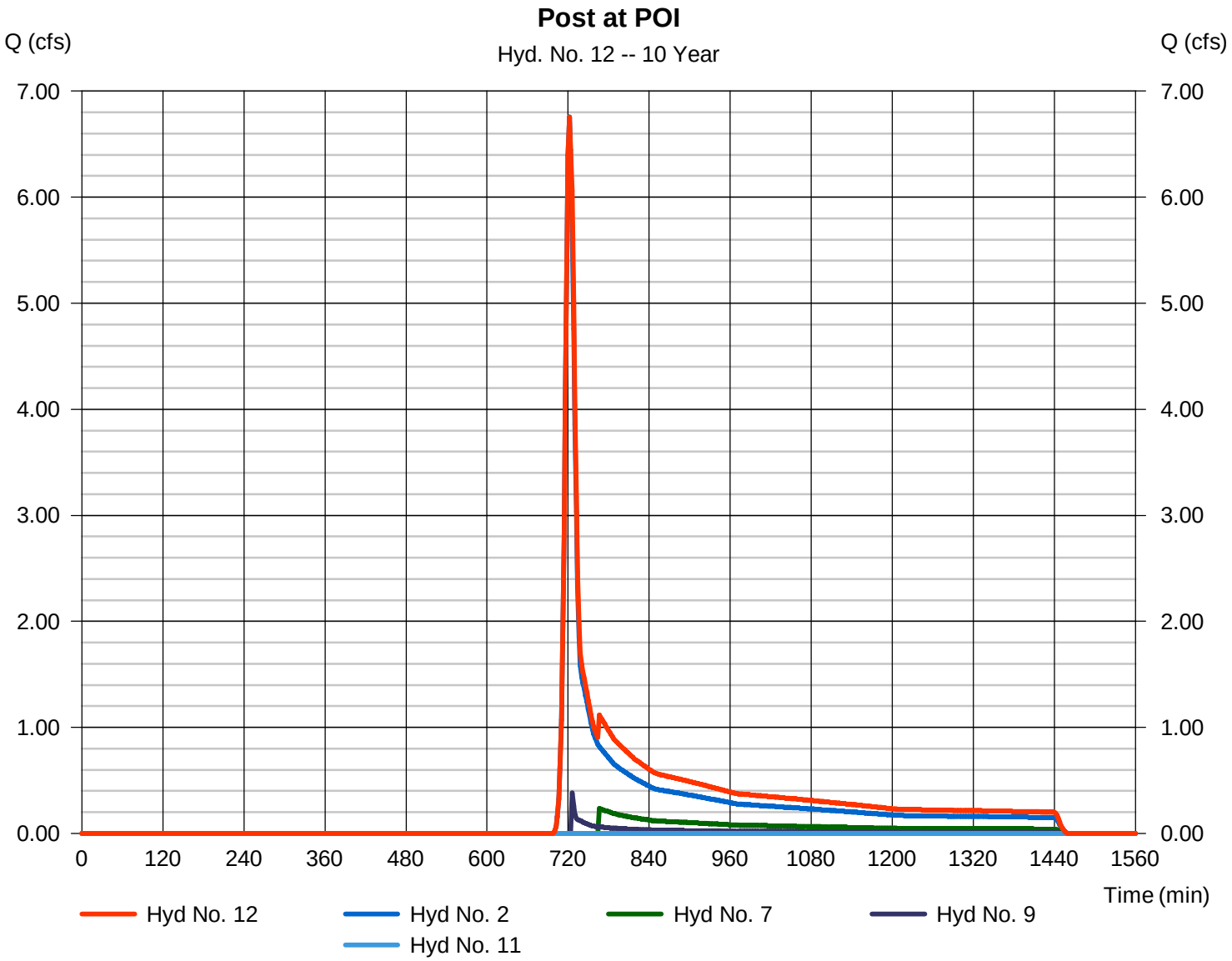


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	=	Combine	Peak discharge	=	6.754 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	23,969 cuft
Inflow hyds.	=	2, 7, 9, 11	Contrib. drain. area	=	5.310 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	19.26	2	722	51,872	------	------	------	Pre Construction
2	SCS Runoff	15.46	2	722	41,395	------	------	------	Post Undetained
3	SCS Runoff	4.436	2	722	11,721	------	------	------	Post Detained 1
4	SCS Runoff	1.377	2	718	3,151	------	------	------	Post Detained 2
5	SCS Runoff	0.217	2	718	496	------	------	------	Post Detained 3
6	Diversion1	4.436	2	722	3,277	3	------	------	Volume Abstraction
7	Diversion2	4.096	2	724	8,444	3	------	------	Post After BMP
8	Diversion1	0.993	2	714	678	4	------	------	Volume Abstraction
9	Diversion2	1.377	2	718	2,473	4	------	------	Post After BMP
10	Diversion1	0.217	2	718	377	5	------	------	Volume Abstraction
11	Diversion2	0.007	2	892	119	5	------	------	Post After BMP
12	Combine	19.38	2	724	52,431	2, 7, 9, 11	------	------	Post at POI

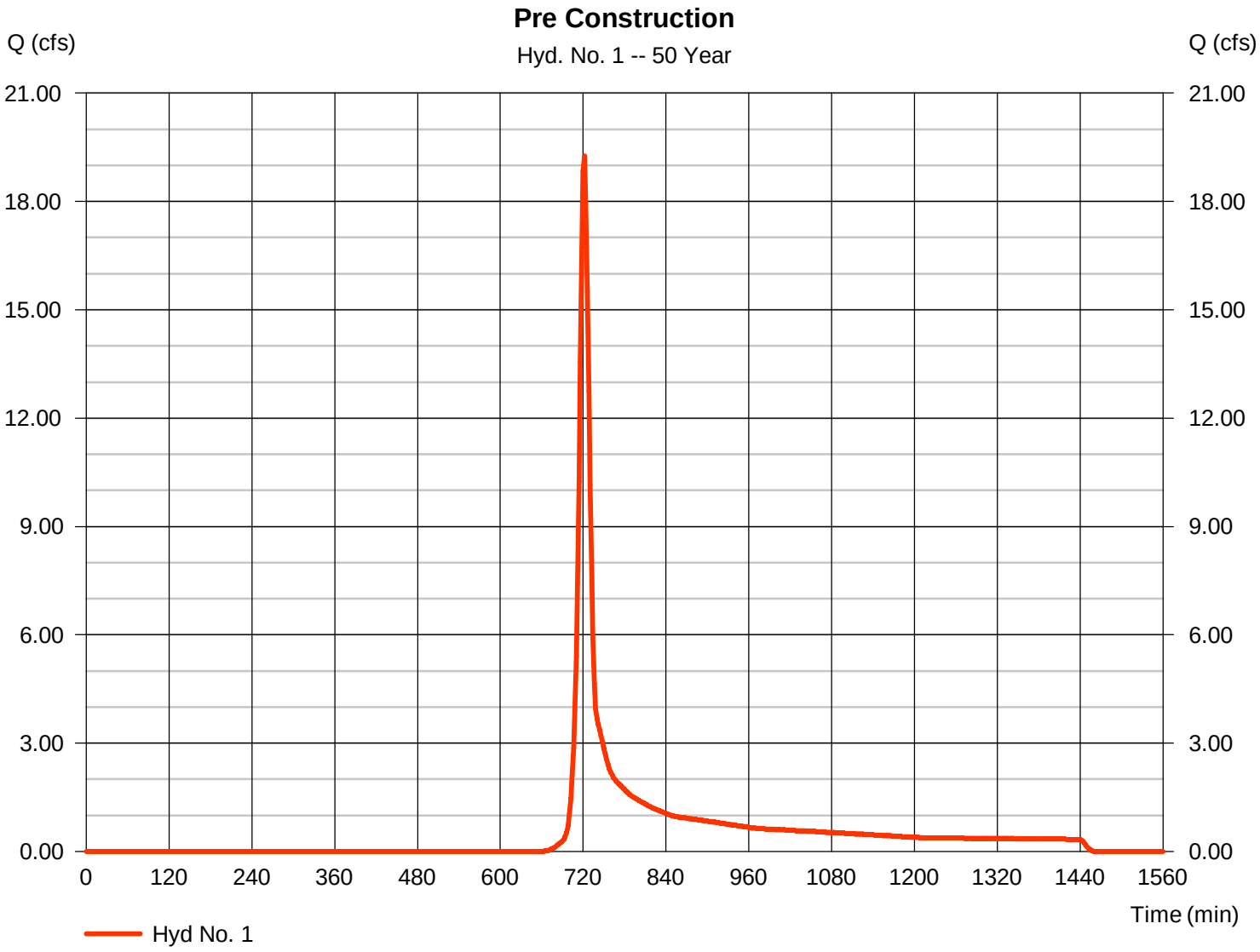
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.26 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	51,872 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



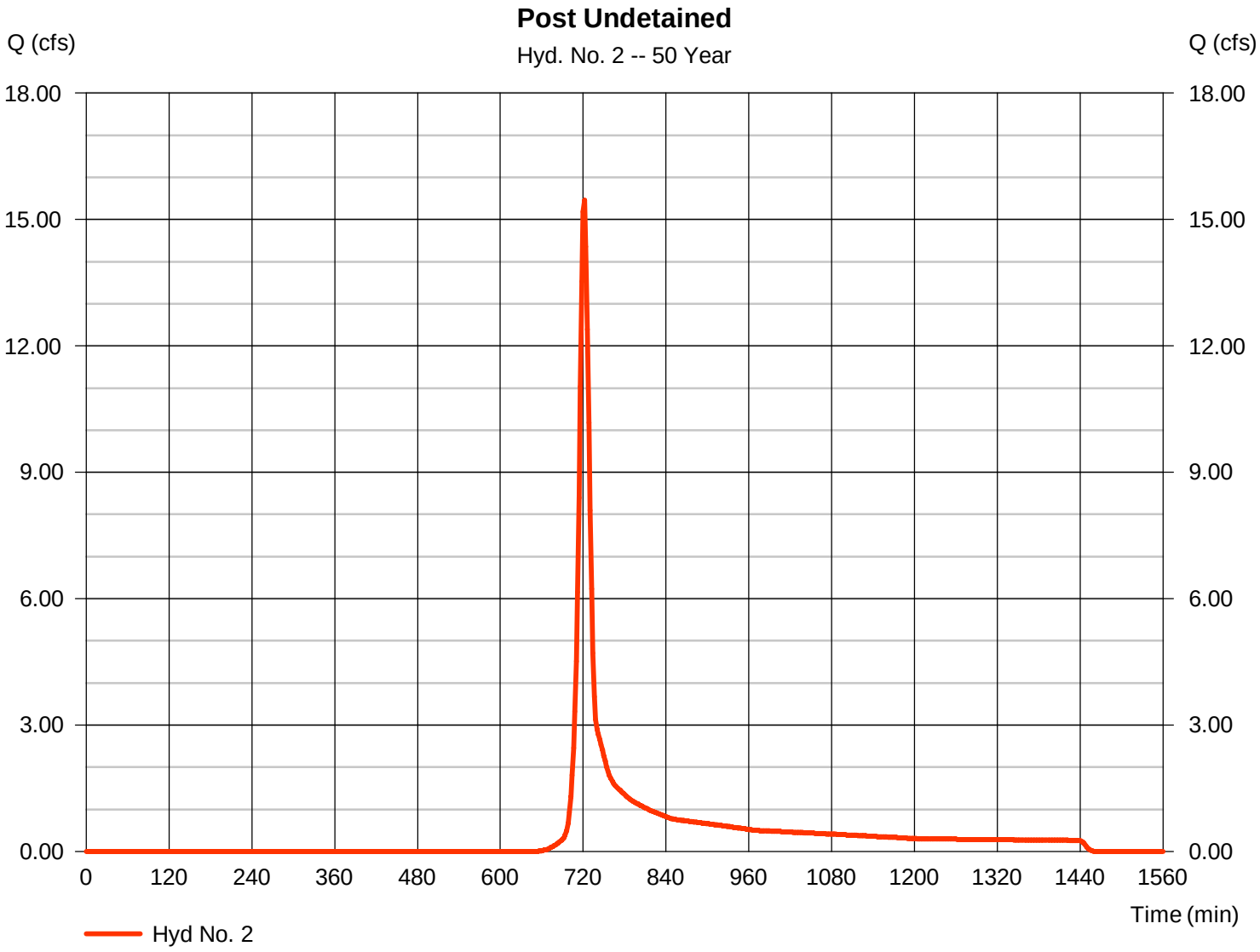
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.46 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	41,395 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



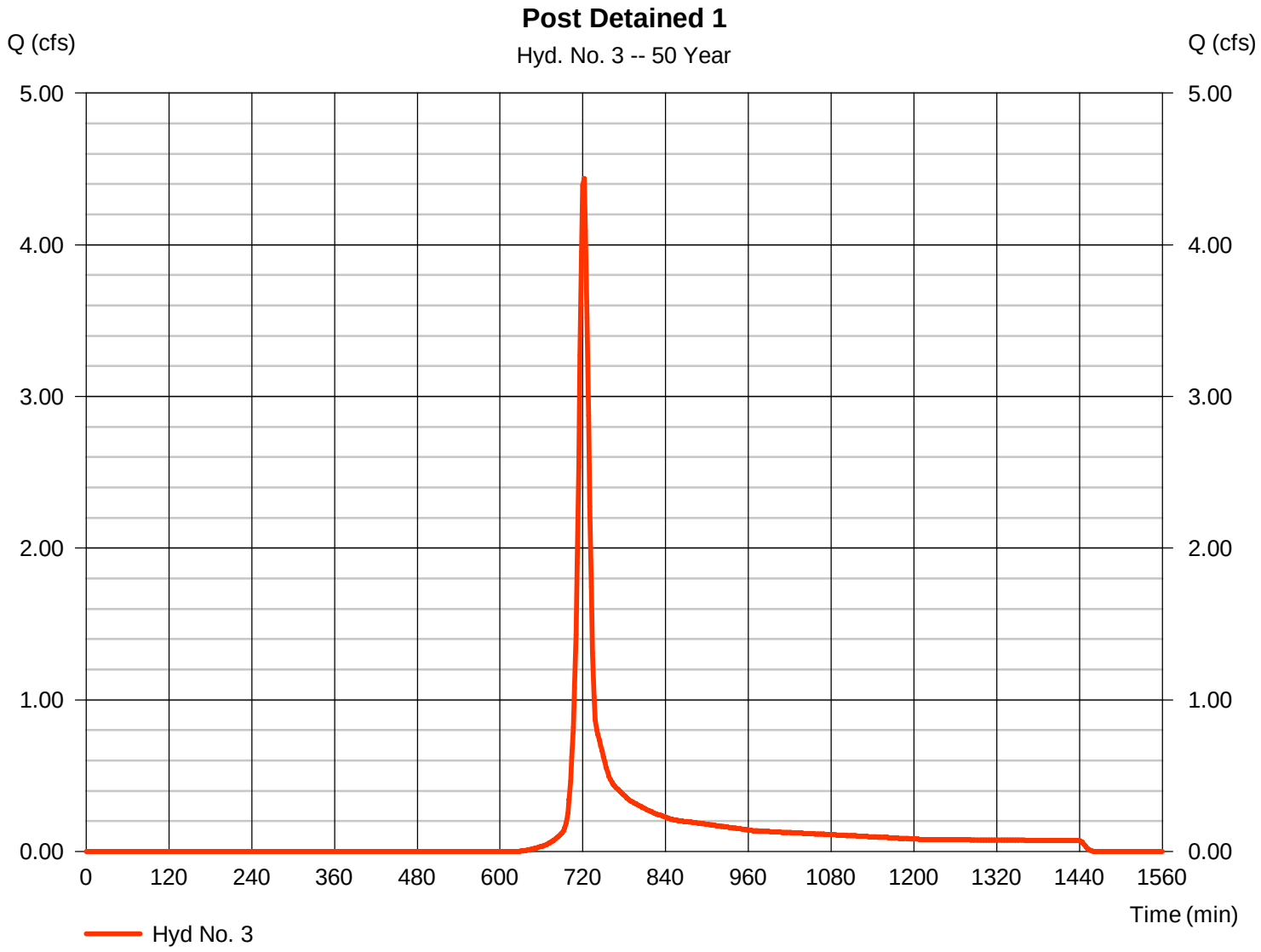
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.436 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	11,721 cuft
Drainage area	=	1.330 ac	Curve number	=	61*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



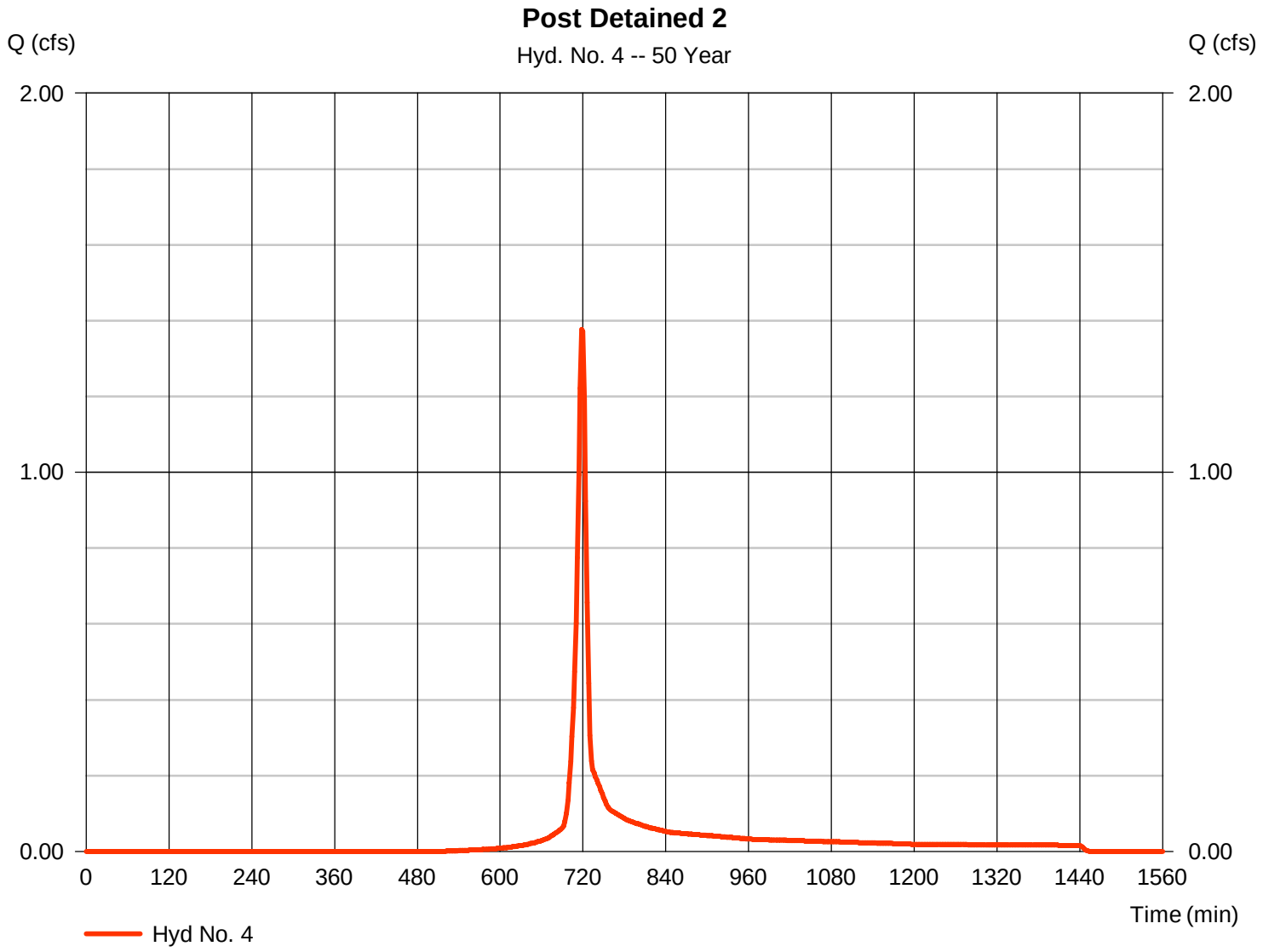
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.377 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	3,151 cuft
Drainage area	=	0.270 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.50 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



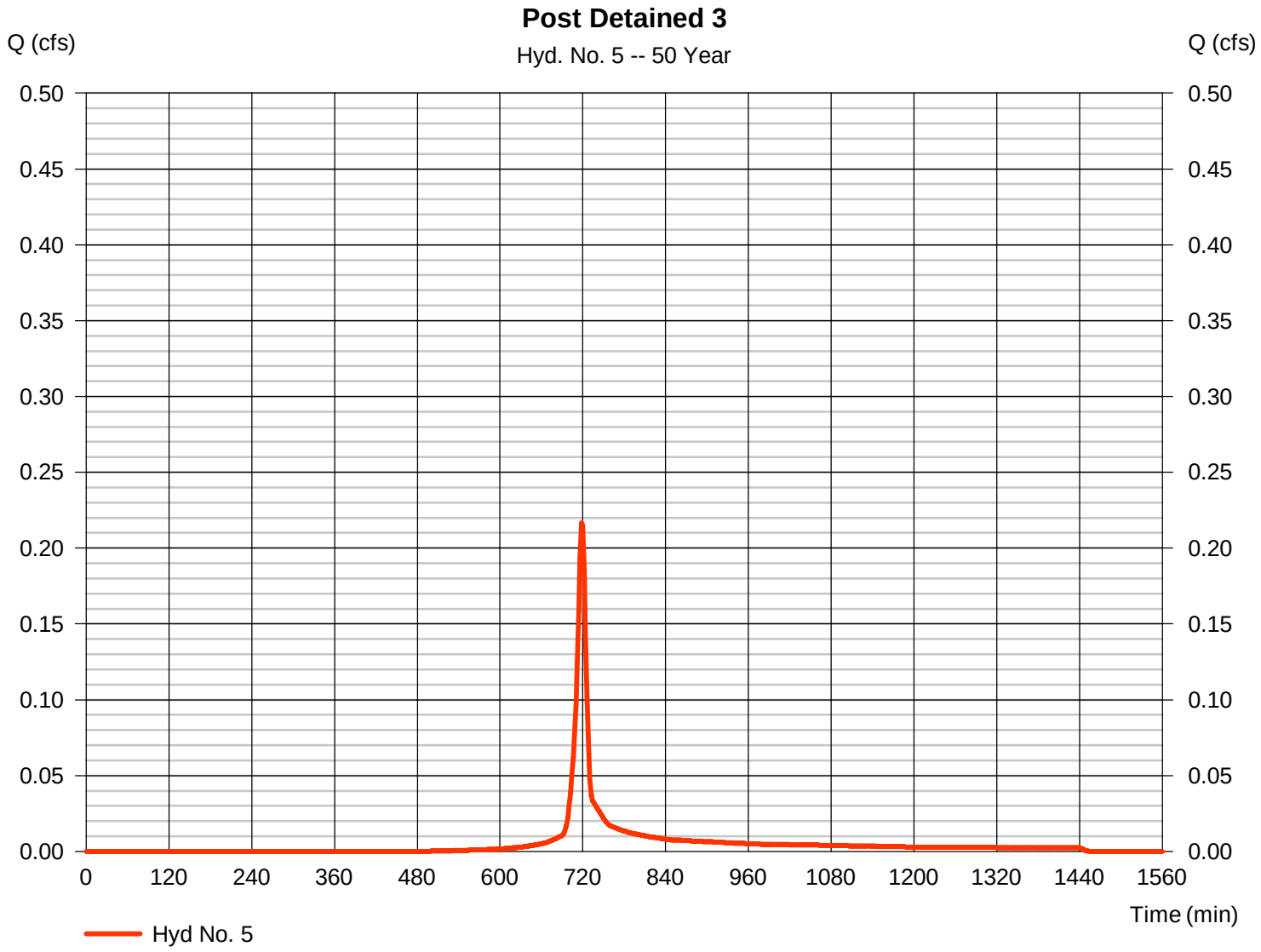
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.217 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	496 cuft
Drainage area	=	0.040 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	6.80 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

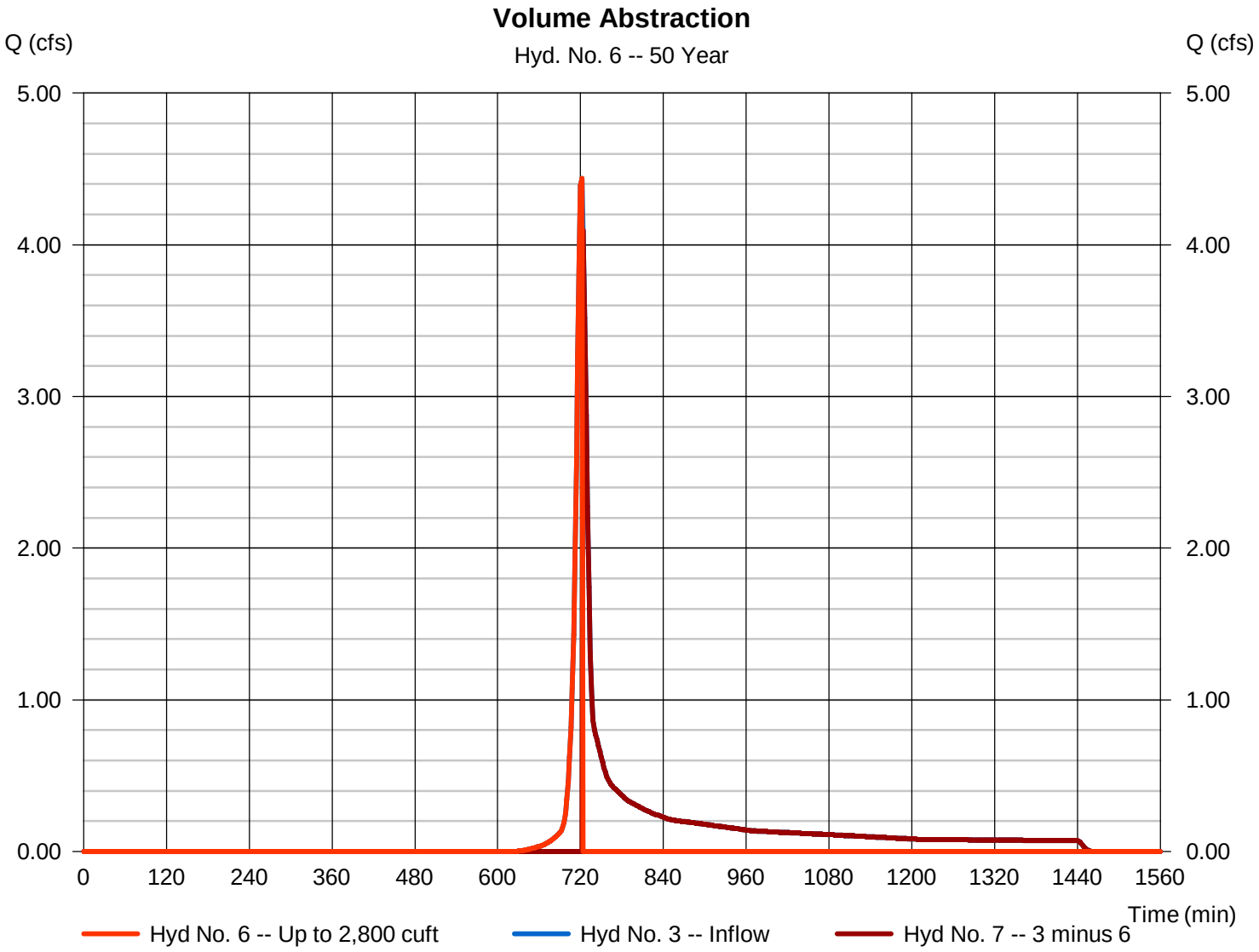


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 4.436 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 3,277 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

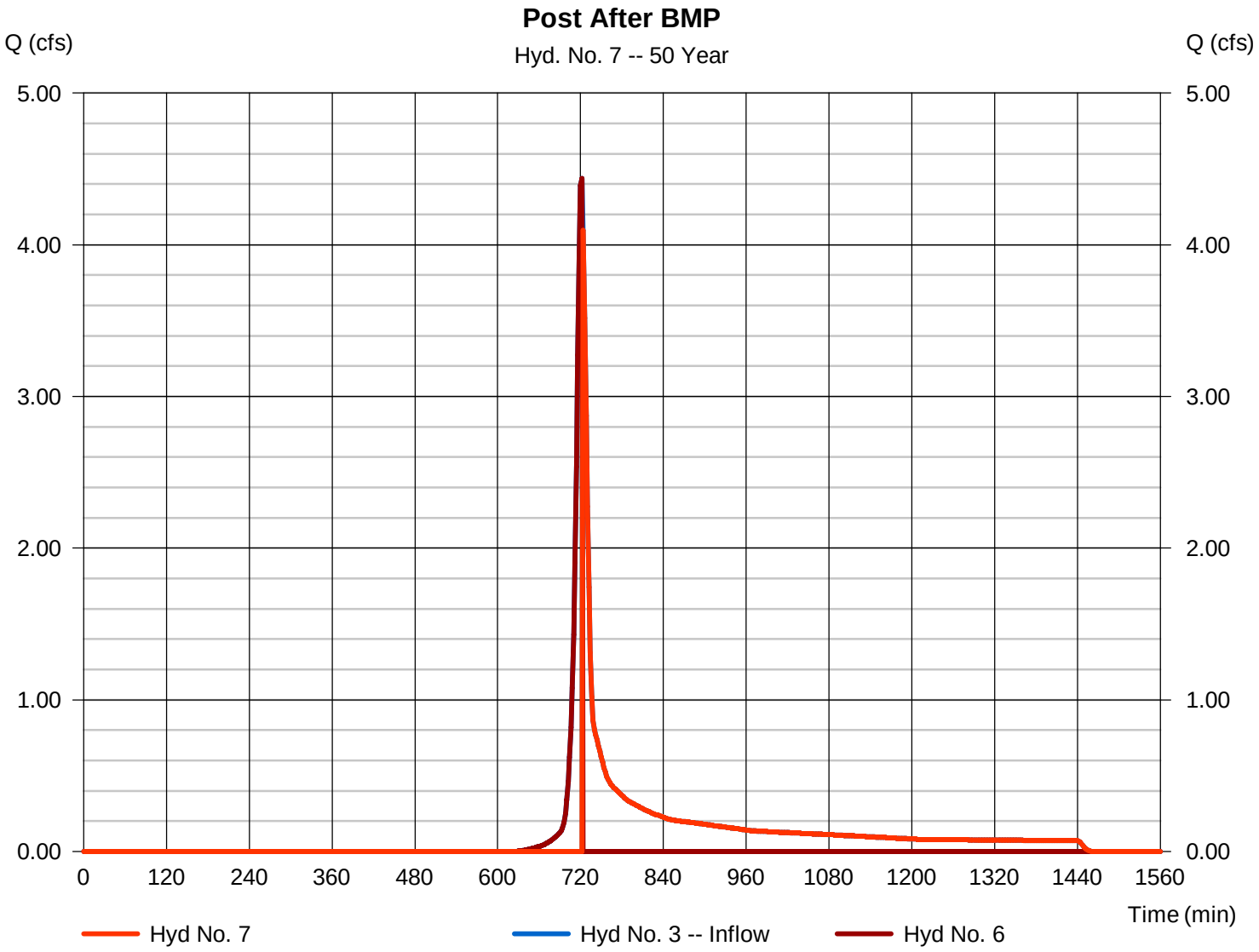


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 4.096 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 8,444 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

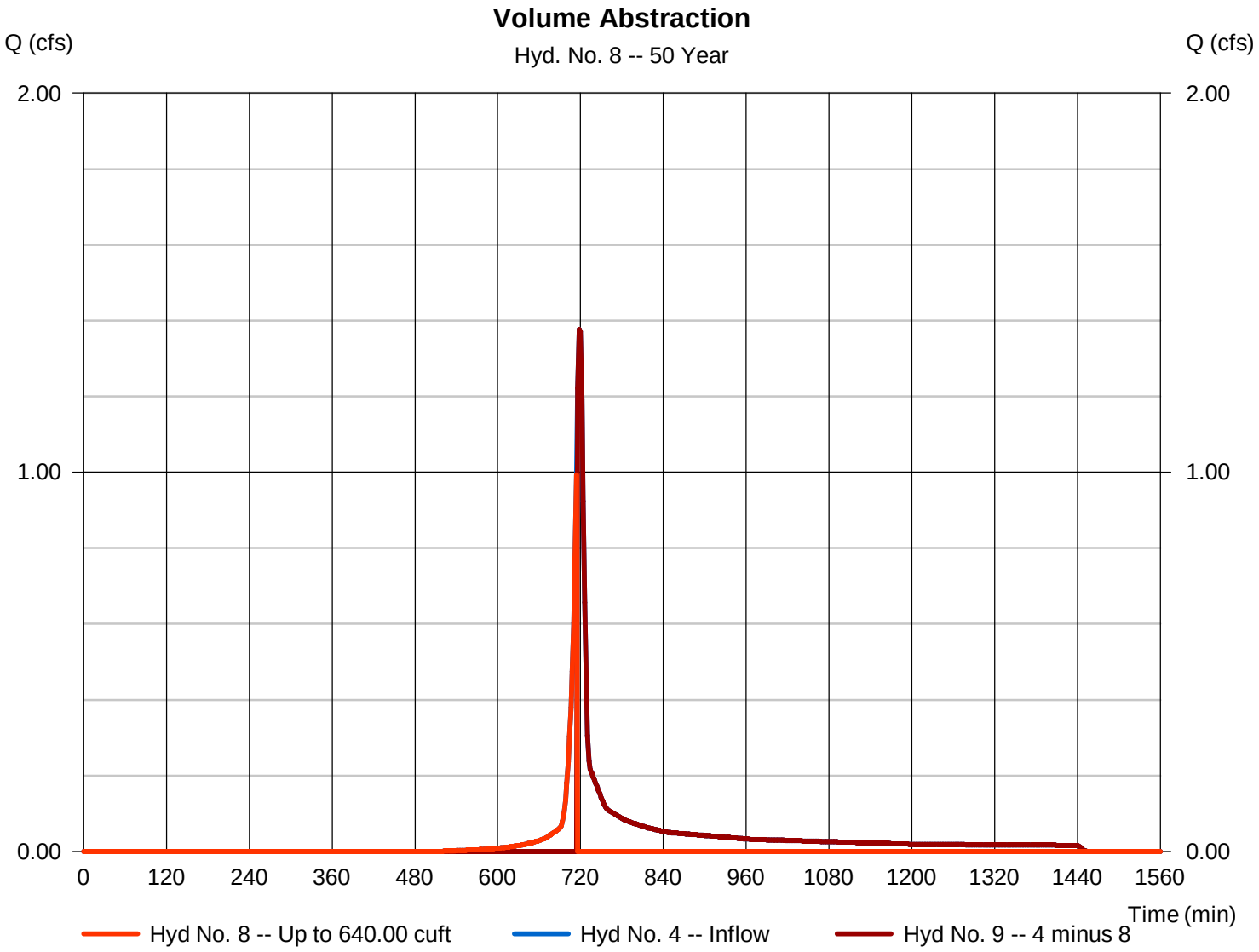


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.993 cfs
Storm frequency	= 50 yrs	Time to peak	= 714 min
Time interval	= 2 min	Hyd. volume	= 678 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

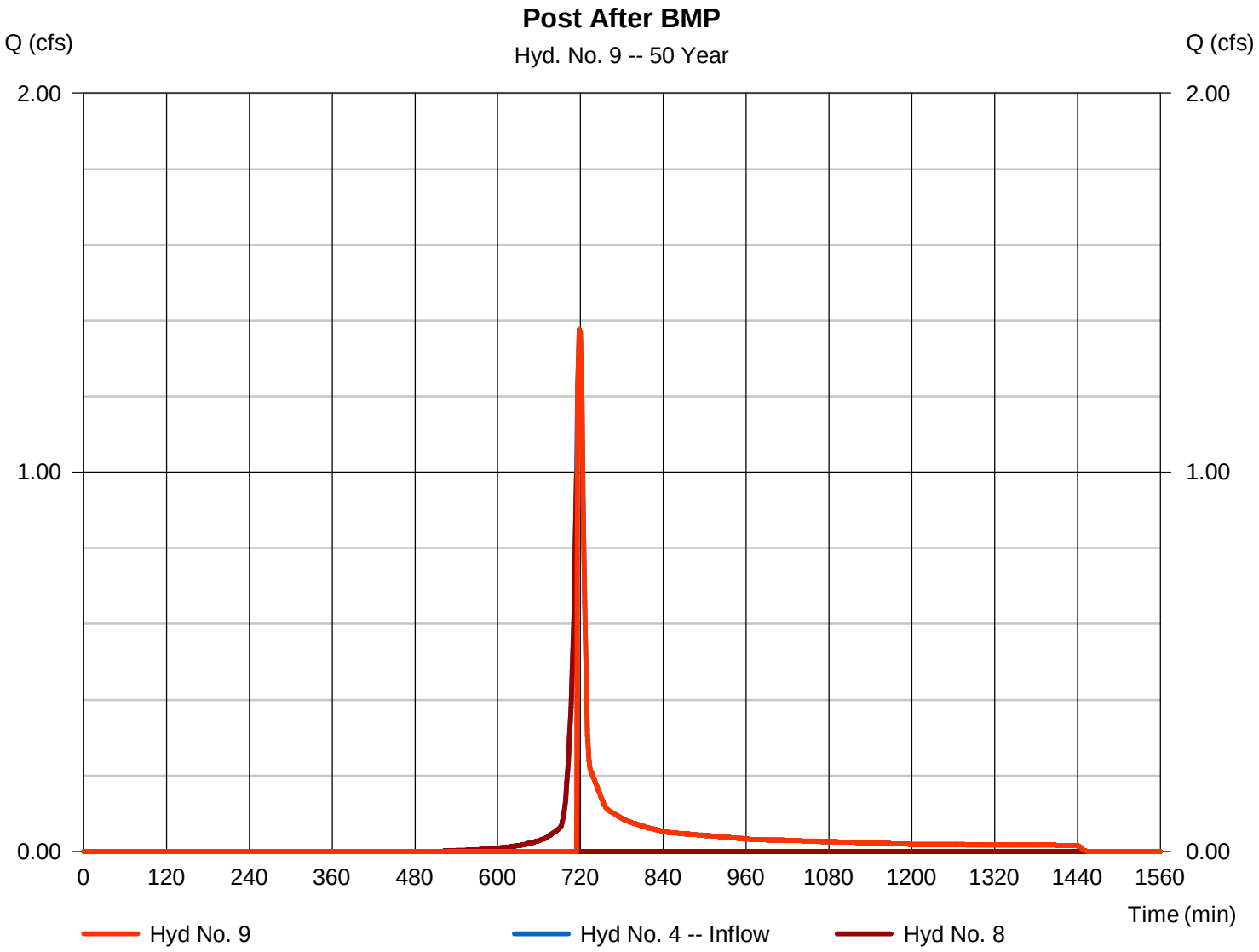


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.377 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,473 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

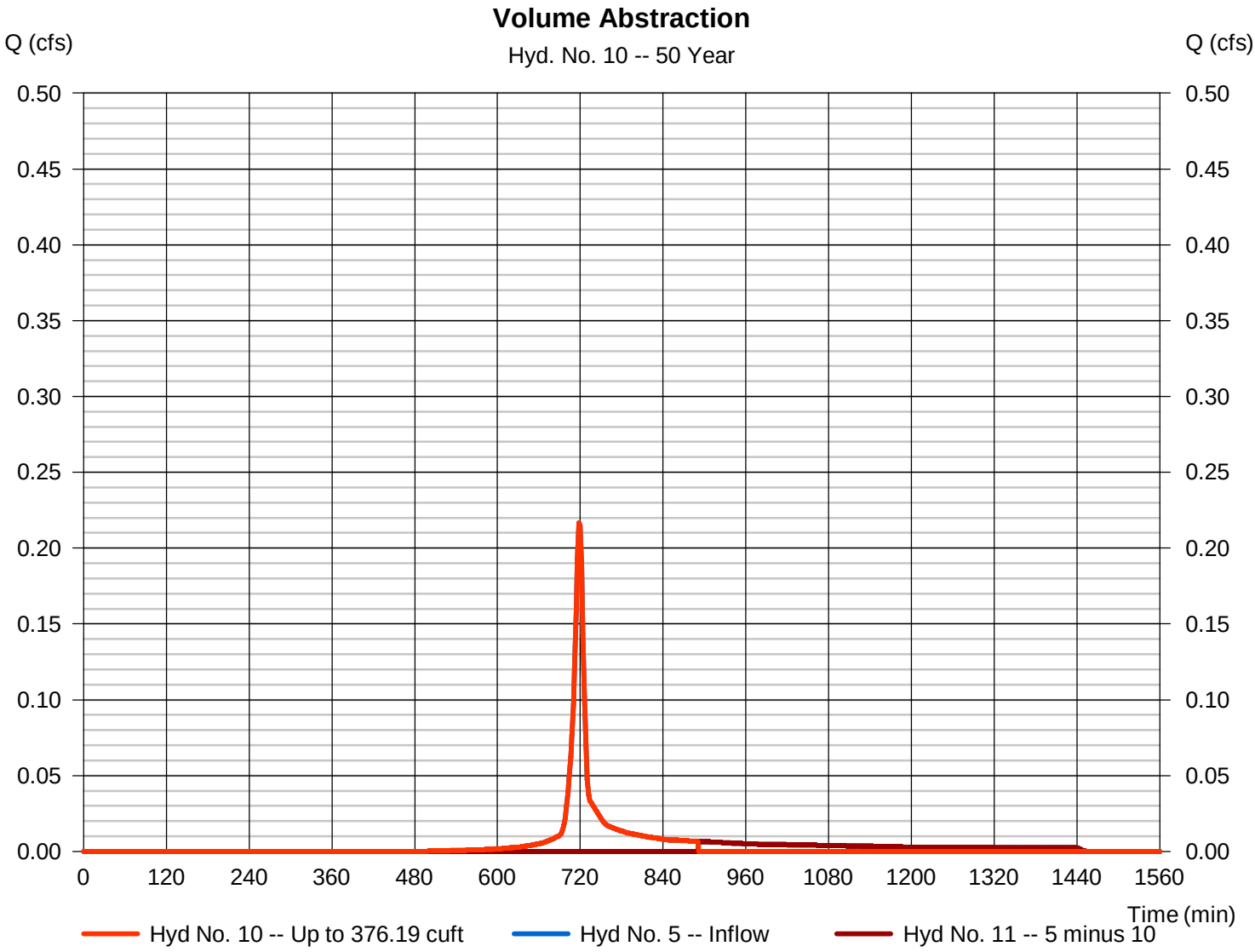


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.217 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 377 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

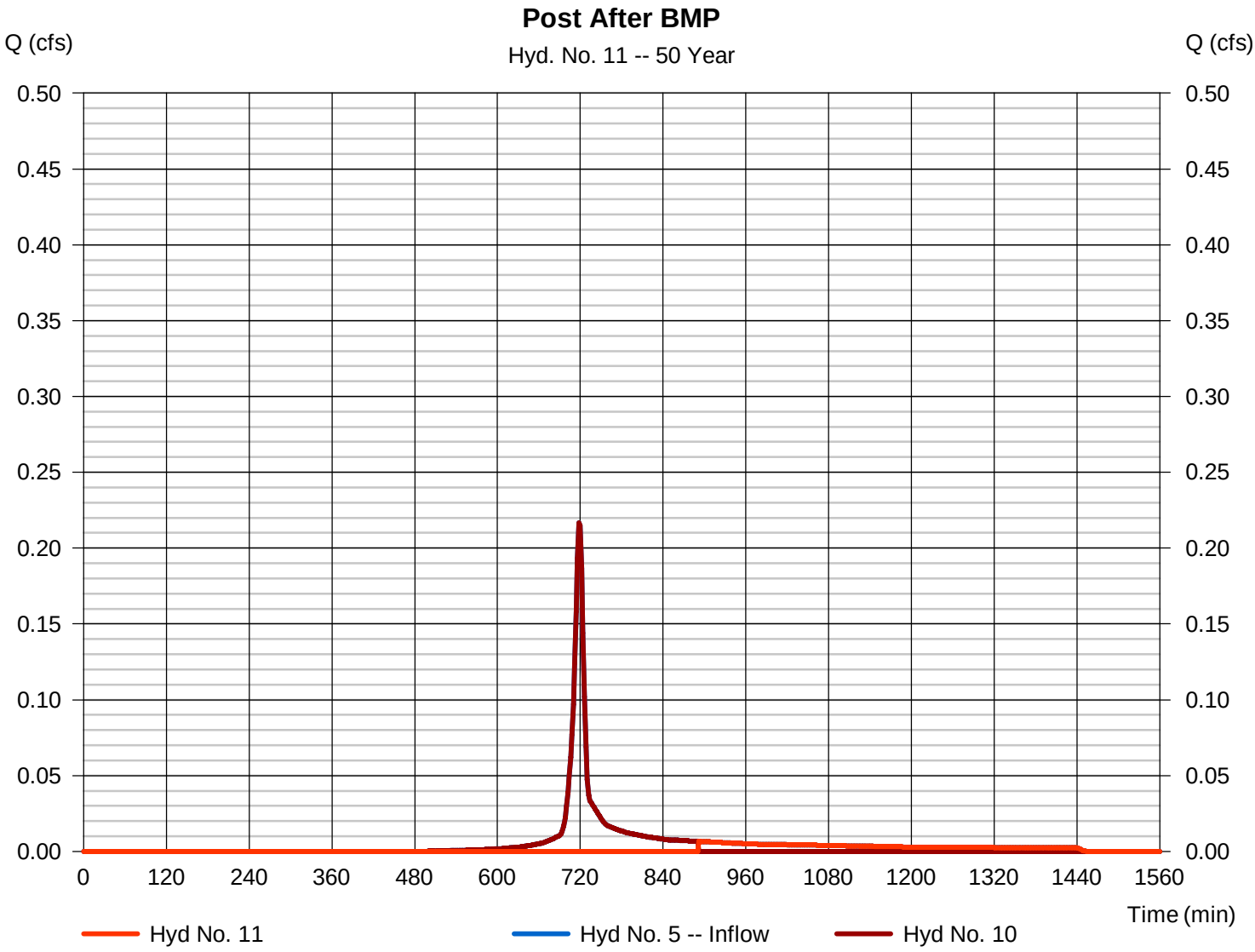


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.007 cfs
Storm frequency	= 50 yrs	Time to peak	= 892 min
Time interval	= 2 min	Hyd. volume	= 119 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

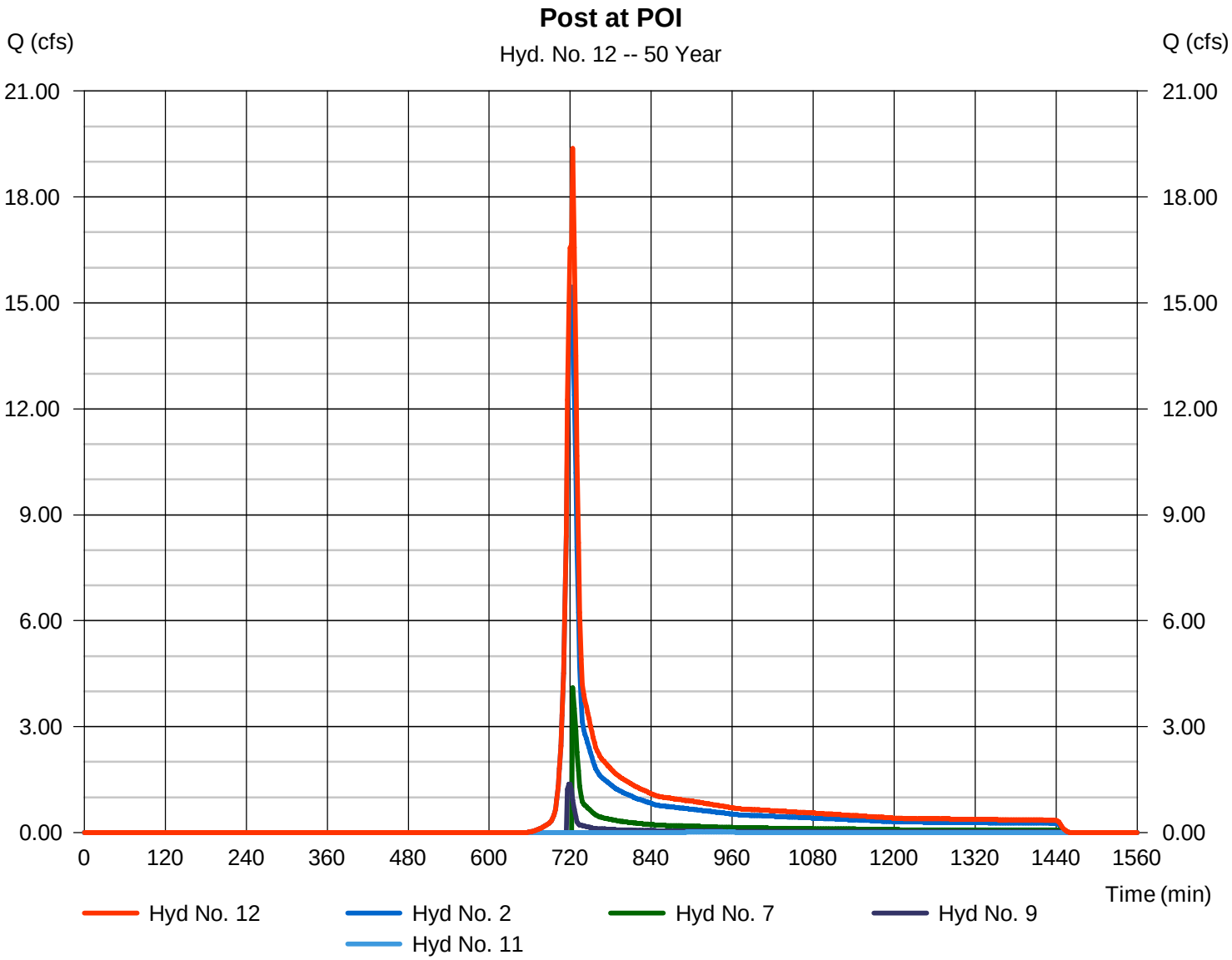


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	= Combine	Peak discharge	= 19.38 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 52,431 cuft
Inflow hyds.	= 2, 7, 9, 11	Contrib. drain. area	= 5.310 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	25.57	2	722	67,744	------	------	------	Pre Construction
2	SCS Runoff	20.37	2	722	53,788	------	------	------	Post Undetained
3	SCS Runoff	5.728	2	722	15,017	------	------	------	Post Detained 1
4	SCS Runoff	1.704	2	718	3,899	------	------	------	Post Detained 2
5	SCS Runoff	0.266	2	718	610	------	------	------	Post Detained 3
6	Diversion1	5.187	2	718	3,187	3	------	------	Volume Abstraction
7	Diversion2	5.728	2	722	11,831	3	------	------	Post After BMP
8	Diversion1	0.768	2	710	646	4	------	------	Volume Abstraction
9	Diversion2	1.704	2	718	3,253	4	------	------	Post After BMP
10	Diversion1	0.266	2	718	377	5	------	------	Volume Abstraction
11	Diversion2	0.020	2	762	232	5	------	------	Post After BMP
12	Combine	27.57	2	720	69,105	2, 7, 9, 11	------	------	Post at POI

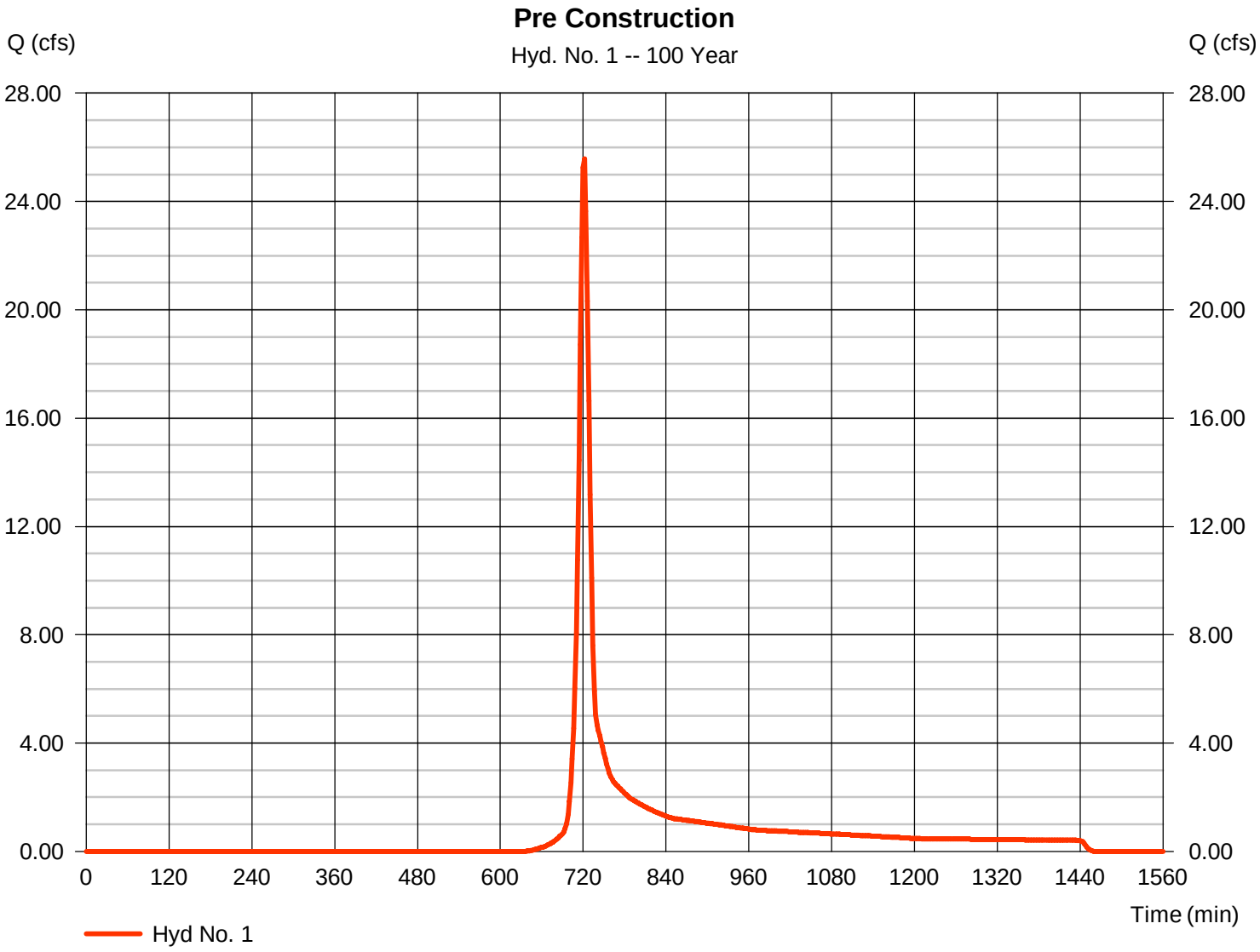
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.57 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	67,744 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



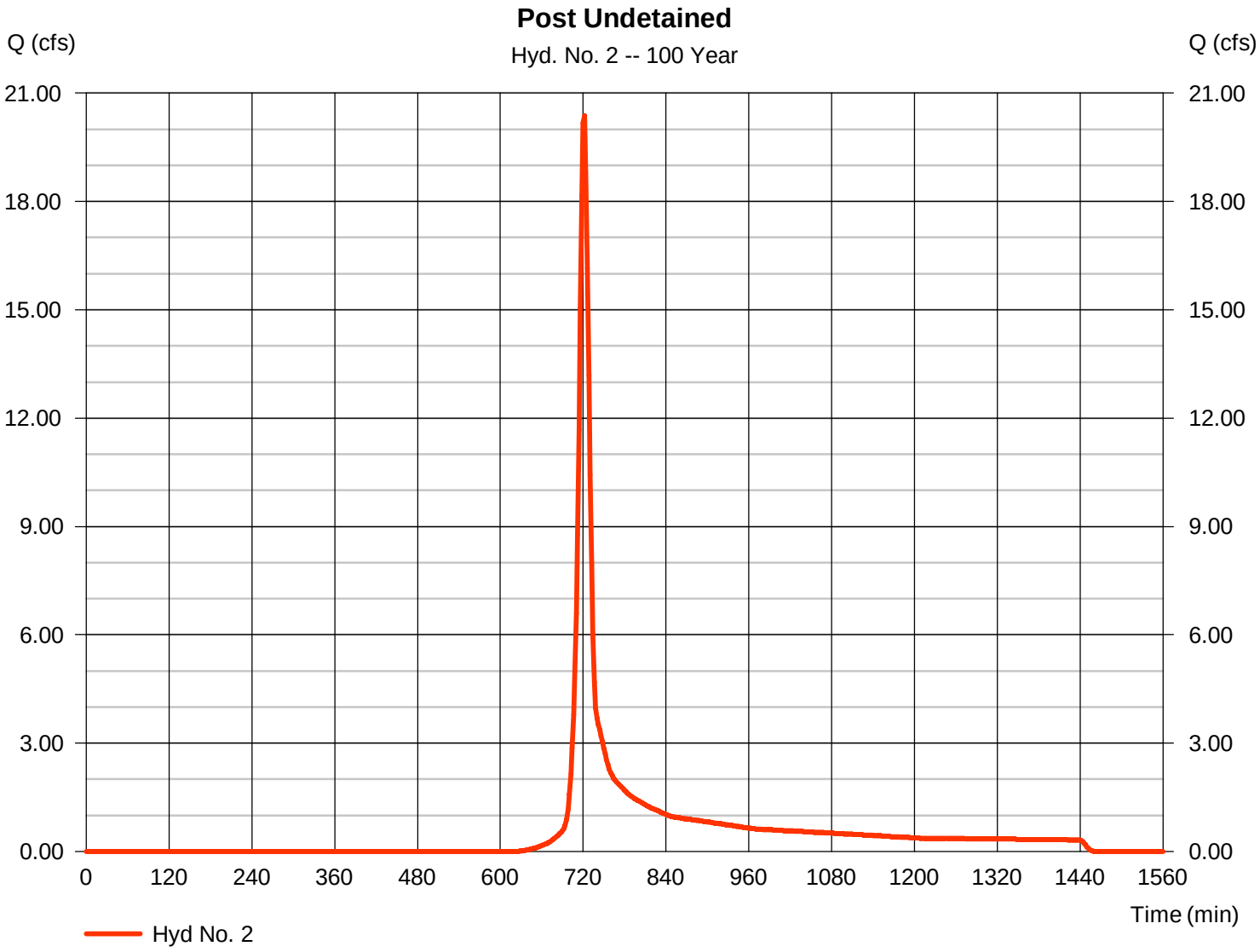
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.37 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	53,788 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



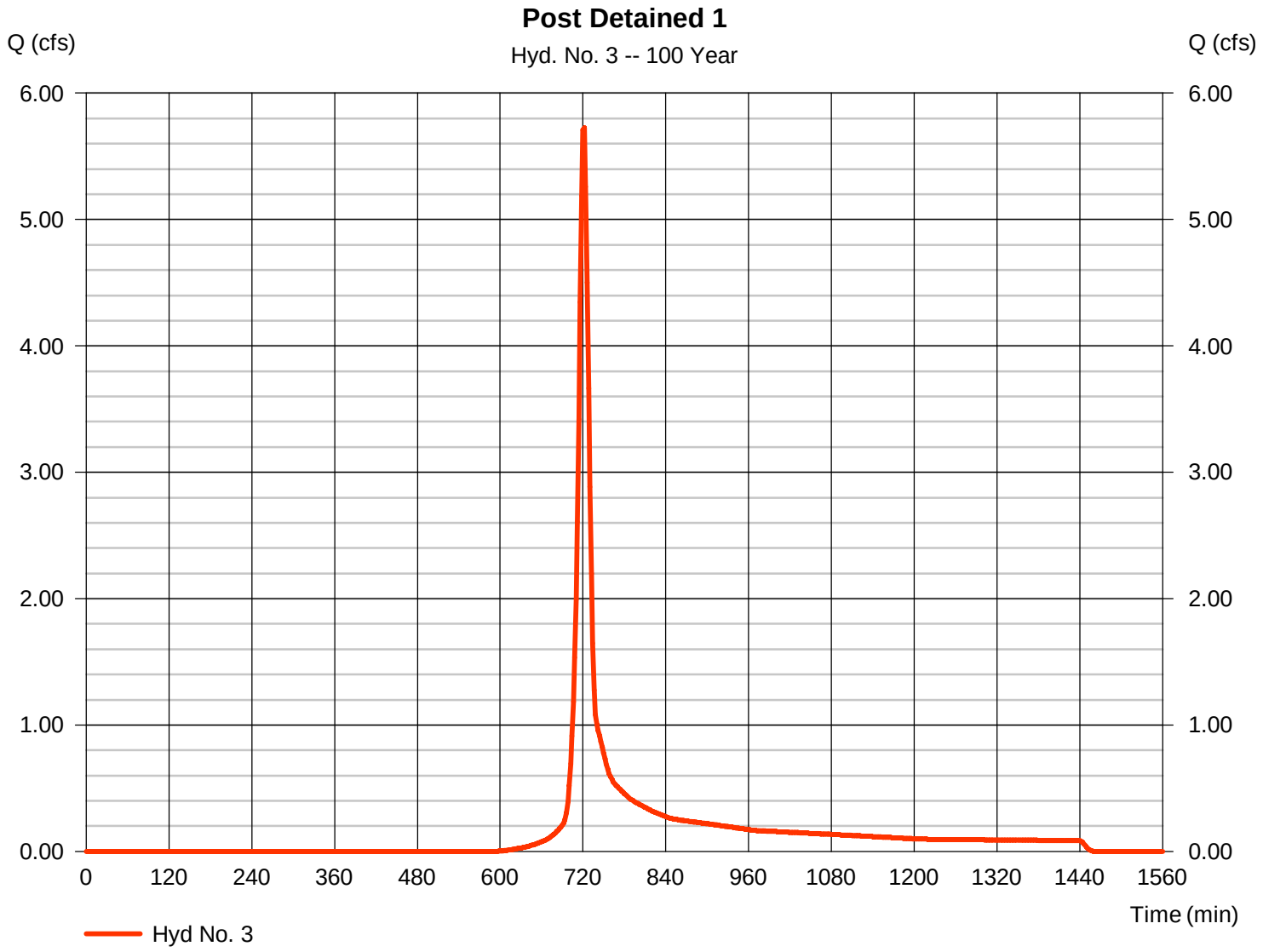
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.728 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	15,017 cuft
Drainage area	=	1.330 ac	Curve number	=	61*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



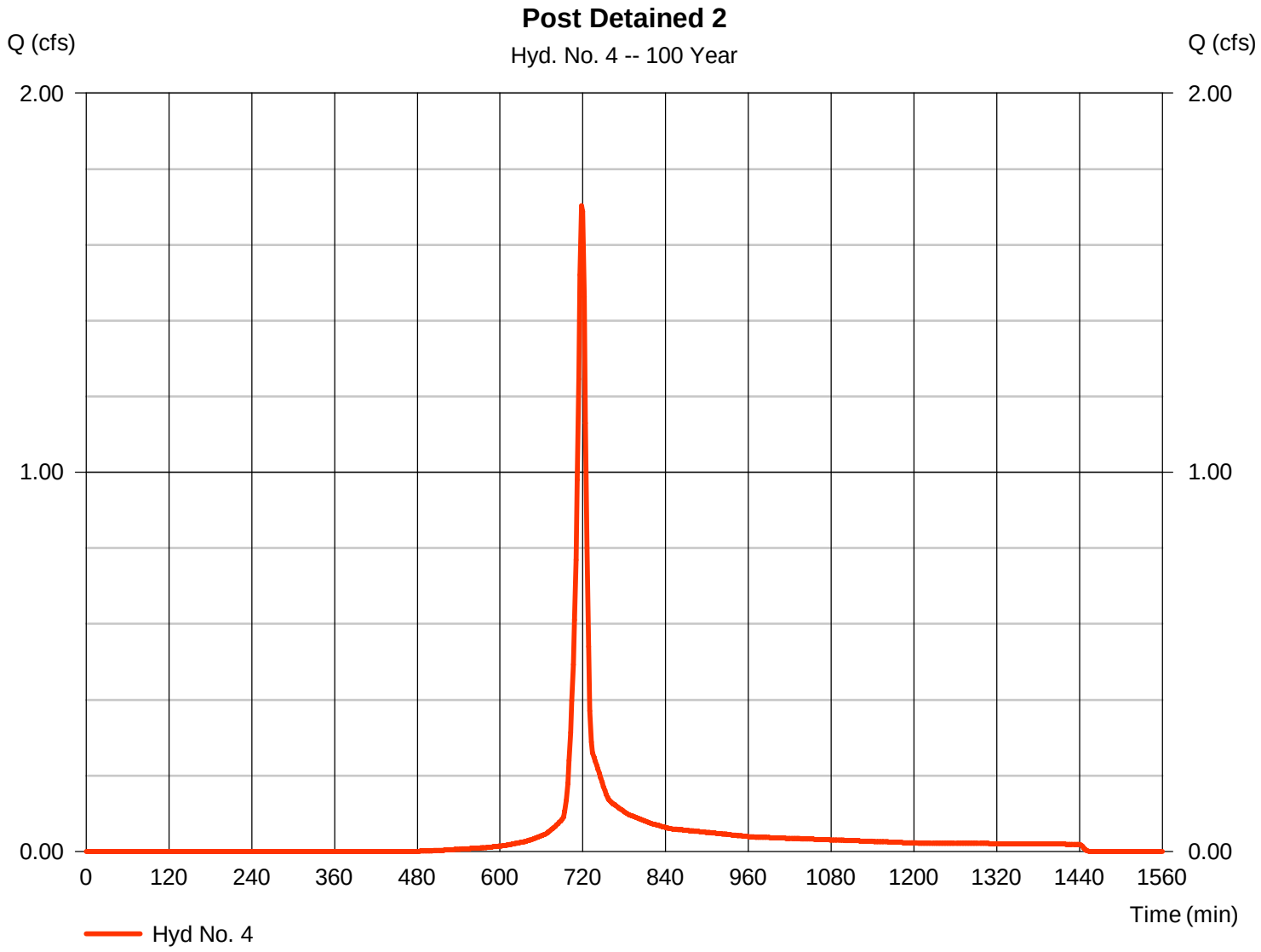
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.704 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	3,899 cuft
Drainage area	=	0.270 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.50 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



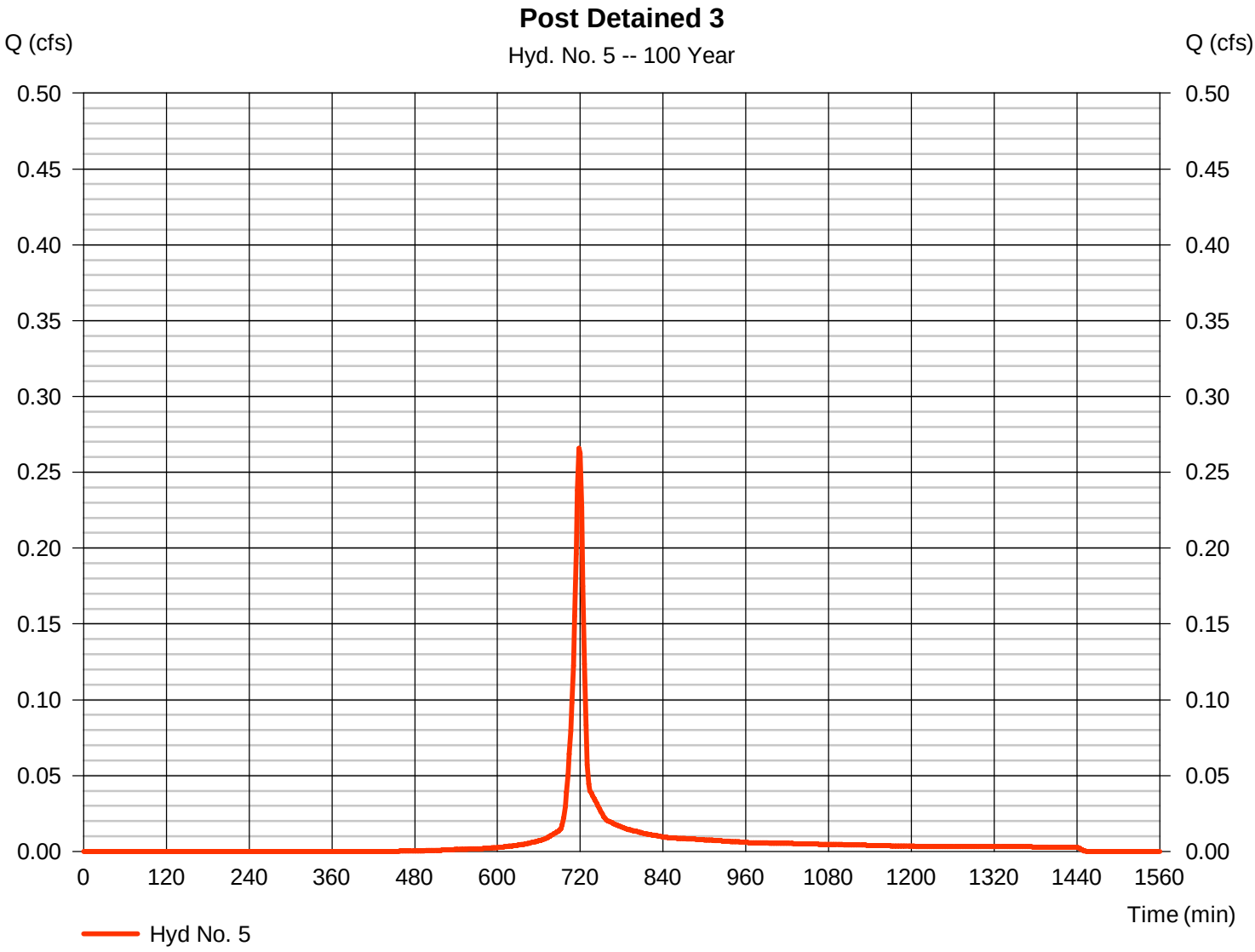
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.266 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	610 cuft
Drainage area	=	0.040 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	6.80 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

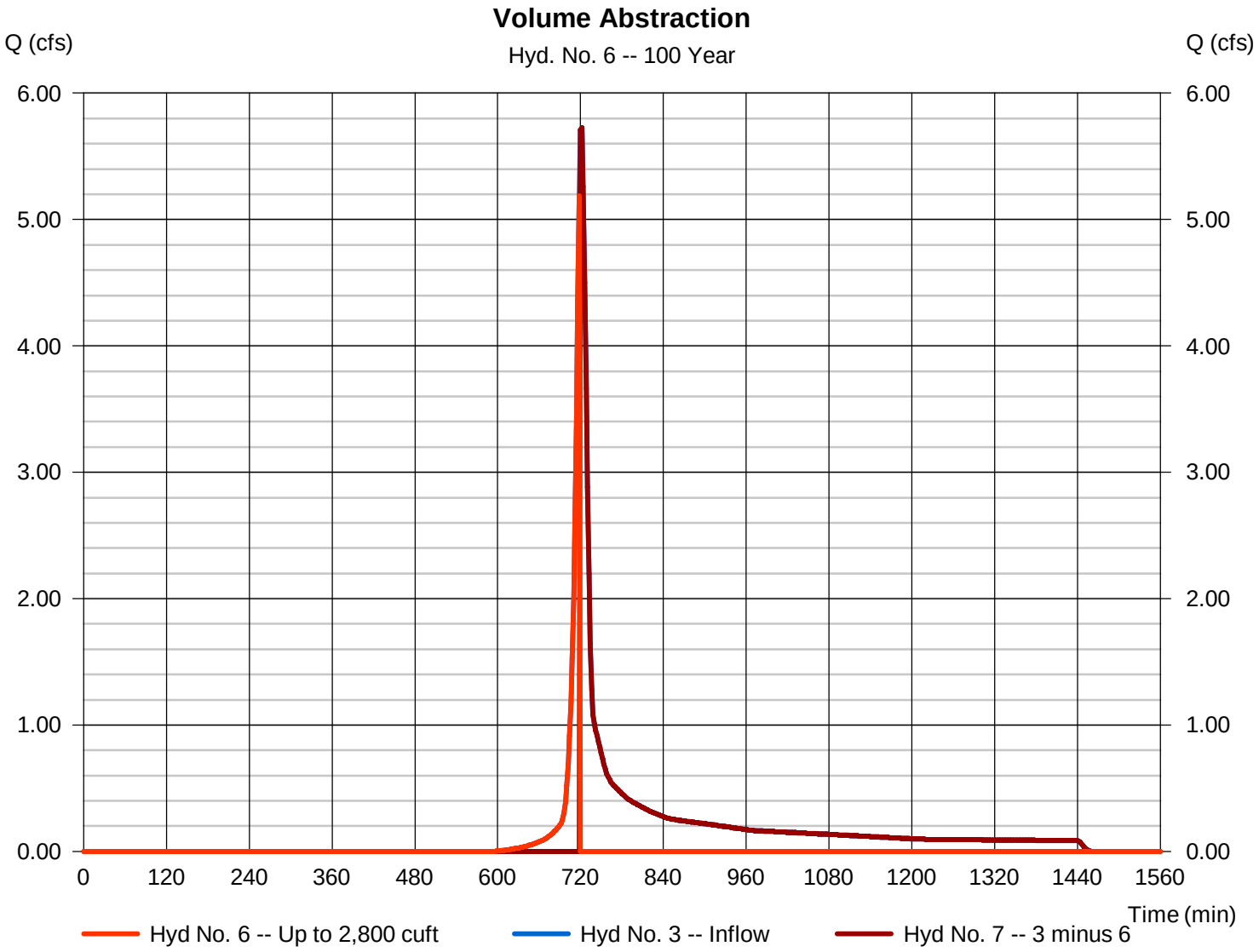


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 5.187 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 3,187 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

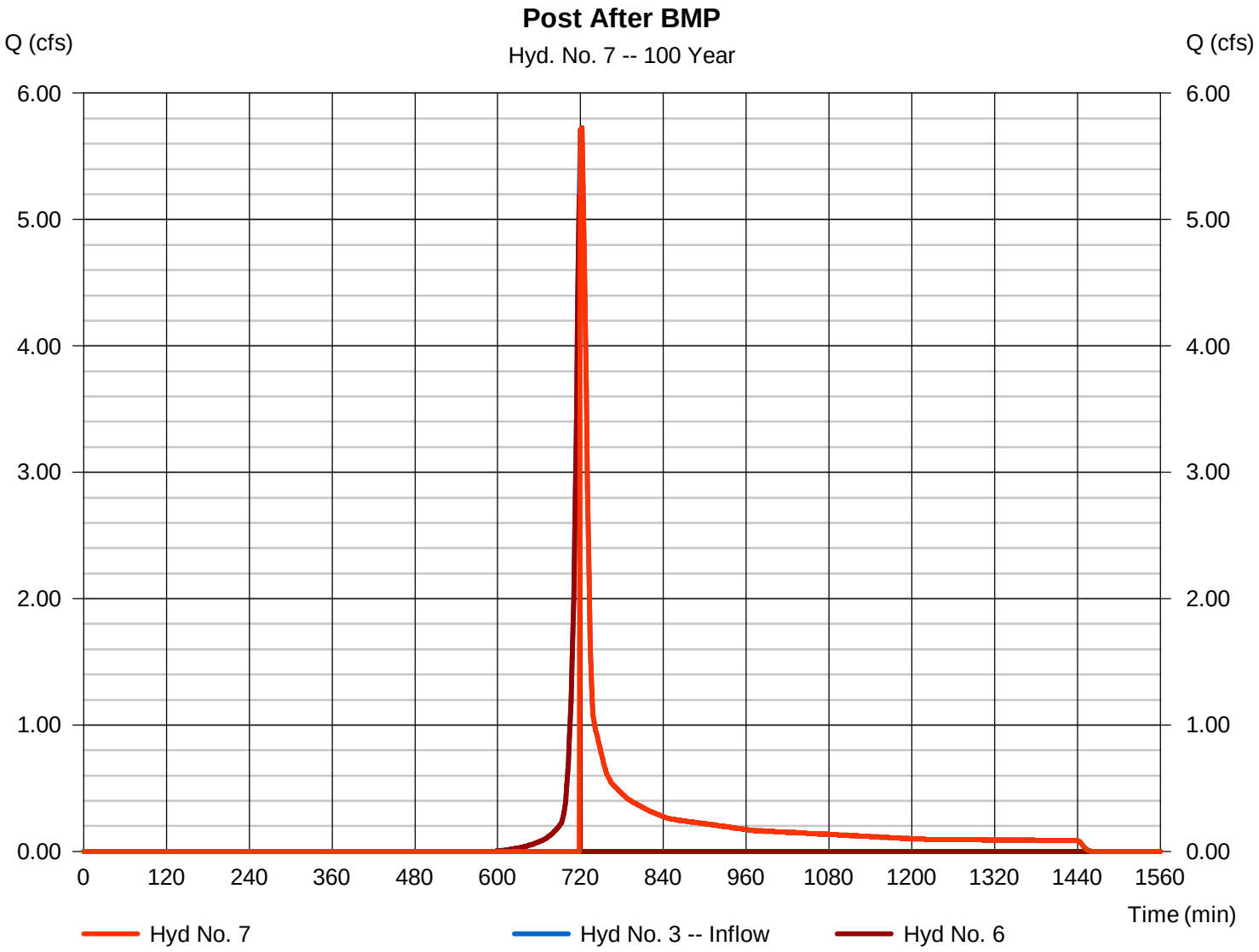


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 5.728 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 11,831 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

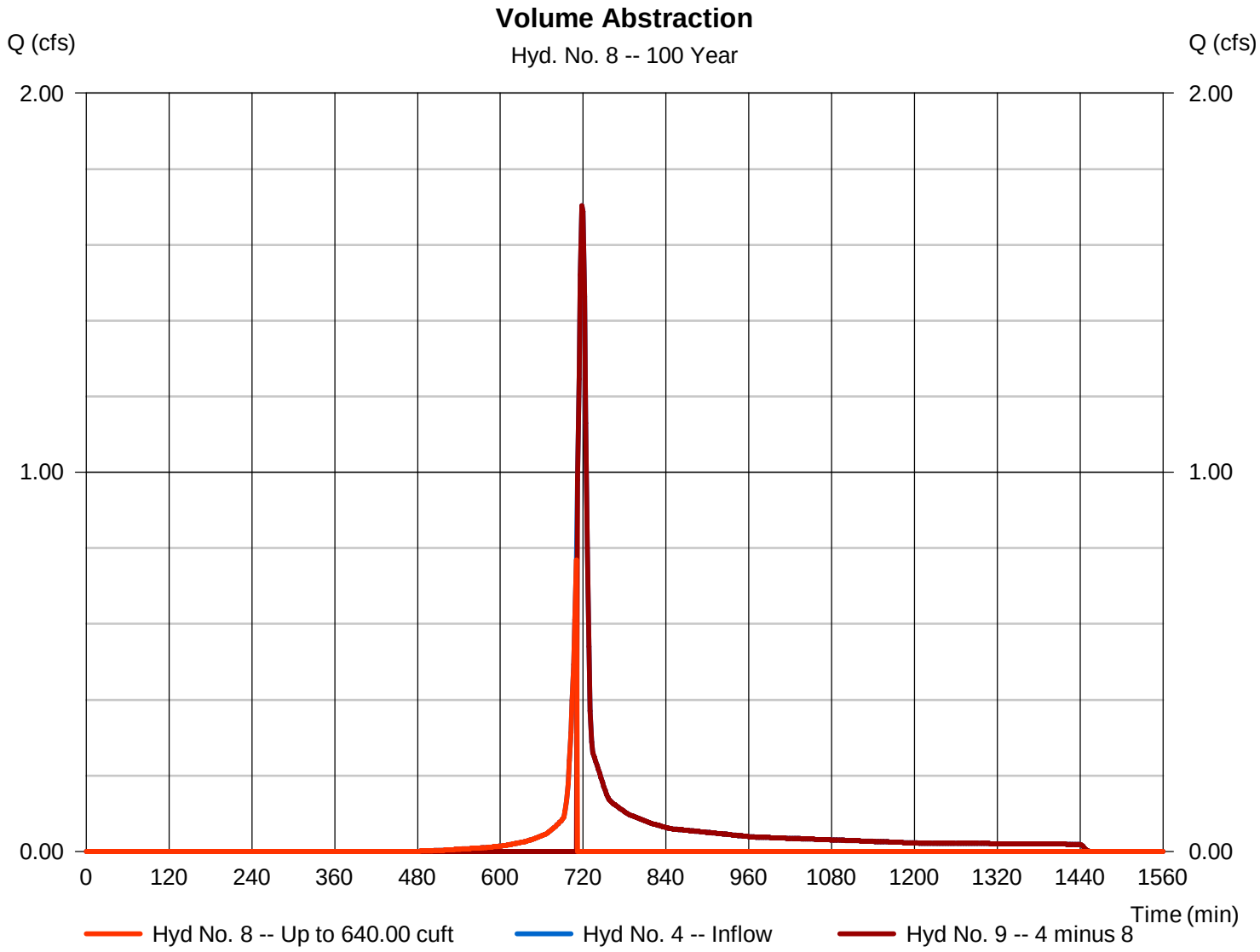


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.768 cfs
Storm frequency	= 100 yrs	Time to peak	= 710 min
Time interval	= 2 min	Hyd. volume	= 646 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

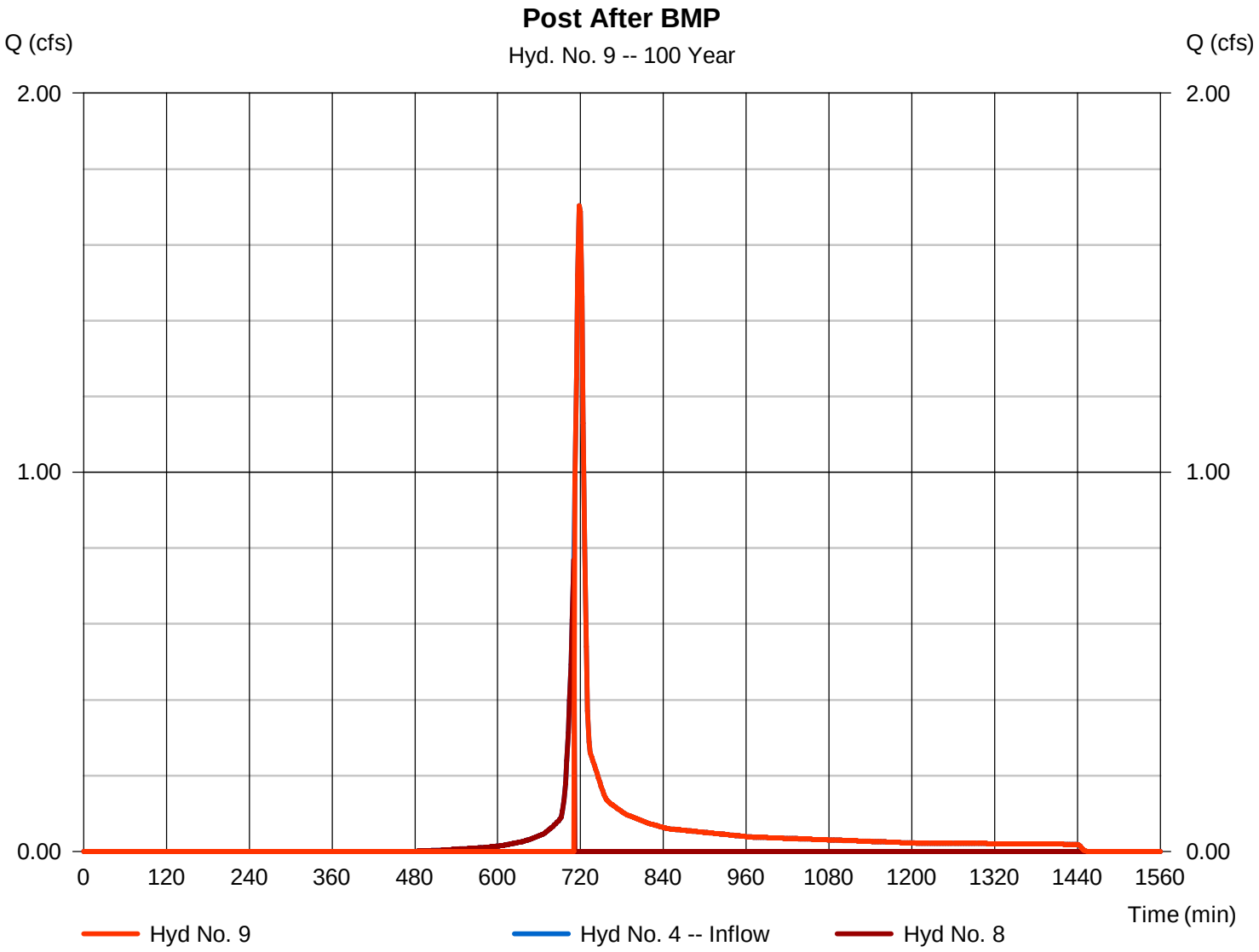


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.704 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 3,253 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

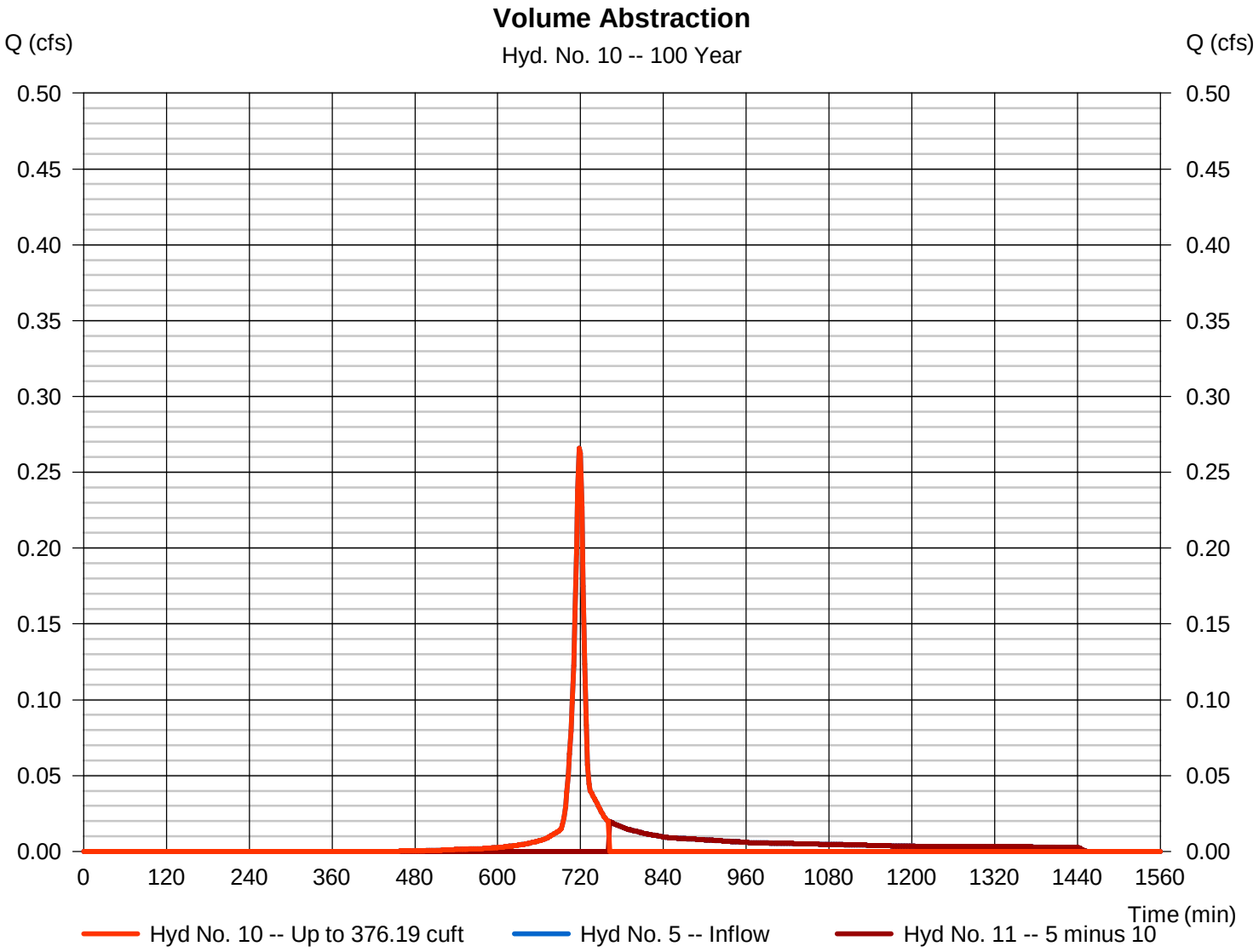


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.266 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 377 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

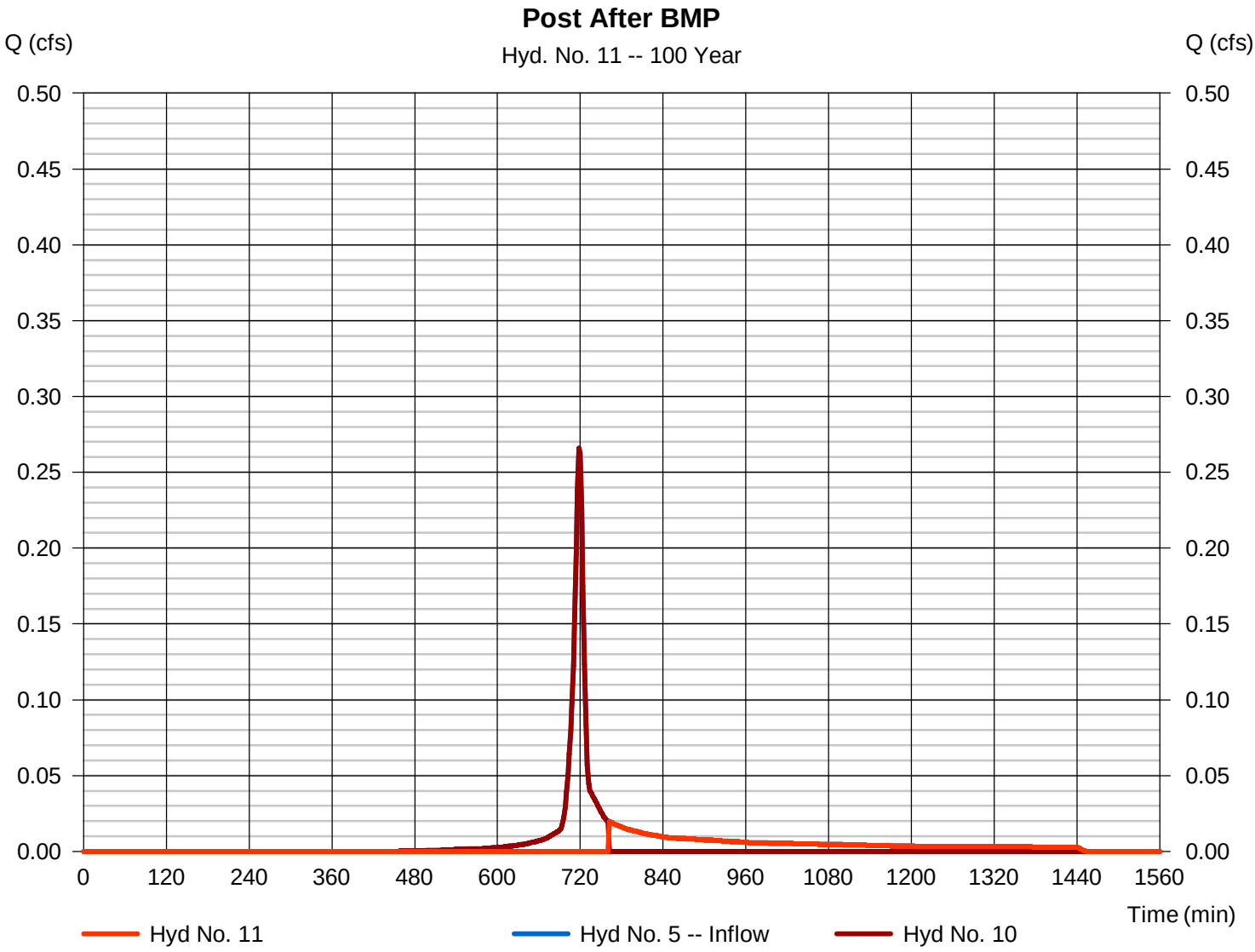


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.020 cfs
Storm frequency	= 100 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 232 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

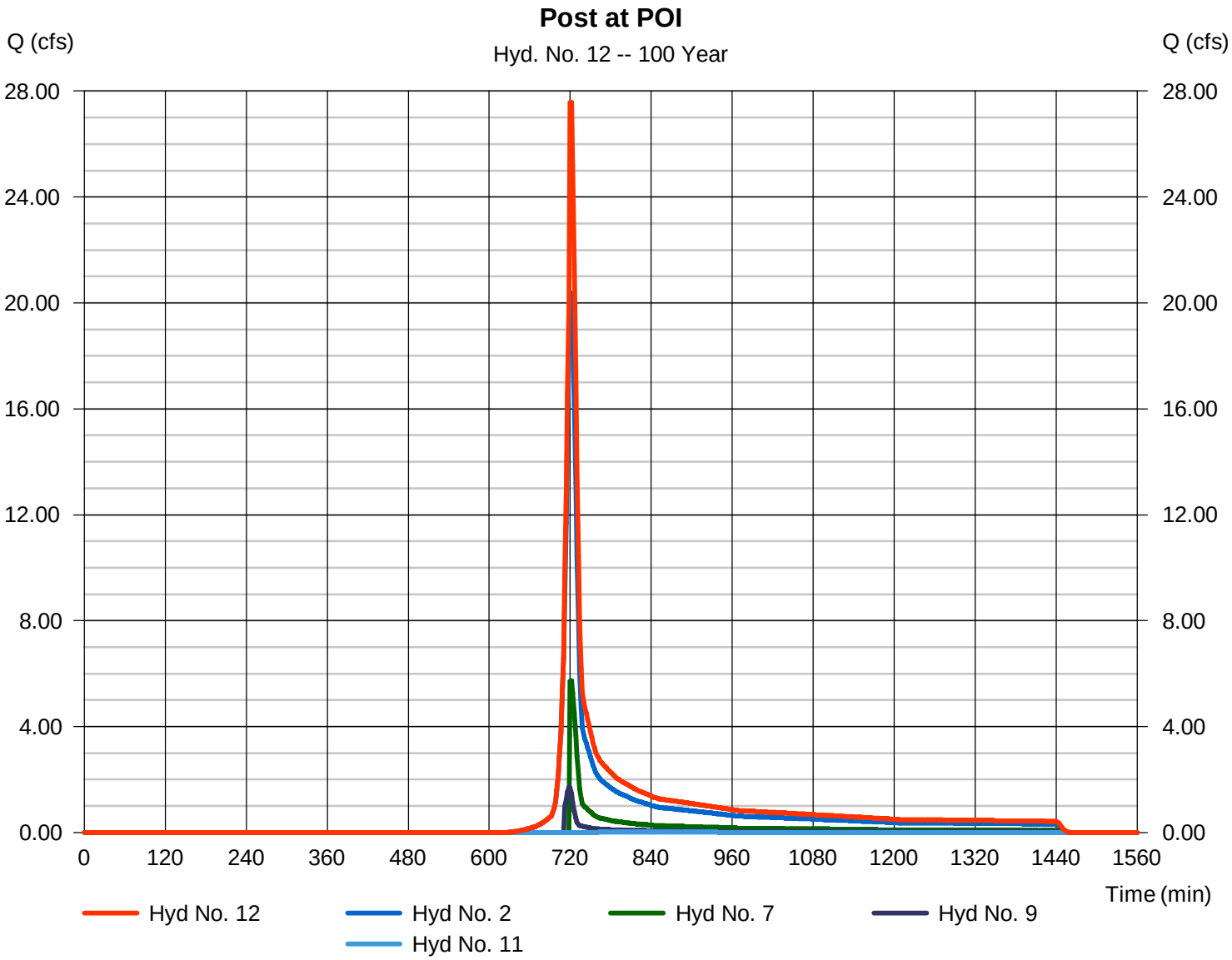


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	= Combine	Peak discharge	= 27.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 69,105 cuft
Inflow hyds.	= 2, 7, 9, 11	Contrib. drain. area	= 5.310 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	46.3657	11.6000	0.8696	--------
2	52.9099	11.6000	0.8555	--------
3	0.0000	0.0000	0.0000	--------
5	57.3166	11.8000	0.8245	--------
10	60.1494	11.9000	0.8045	--------
25	51.8954	10.5000	0.7395	--------
50	48.4904	9.7000	0.7034	--------
100	44.4757	8.8000	0.6639	--------

File name: Montello IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.03	3.20	2.67	2.30	2.03	1.81	1.64	1.50	1.39	1.29	1.20	1.13
2	4.78	3.82	3.20	2.76	2.43	2.18	1.98	1.81	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.60	4.52	3.81	3.31	2.93	2.64	2.41	2.21	2.05	1.91	1.79	1.69
10	6.19	5.02	4.26	3.71	3.30	2.98	2.72	2.51	2.33	2.18	2.05	1.93
25	6.84	5.56	4.73	4.14	3.70	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.32	5.96	5.08	4.46	4.00	3.64	3.35	3.11	2.91	2.73	2.58	2.45
100	7.79	6.34	5.42	4.78	4.30	3.92	3.62	3.37	3.16	2.97	2.82	2.68

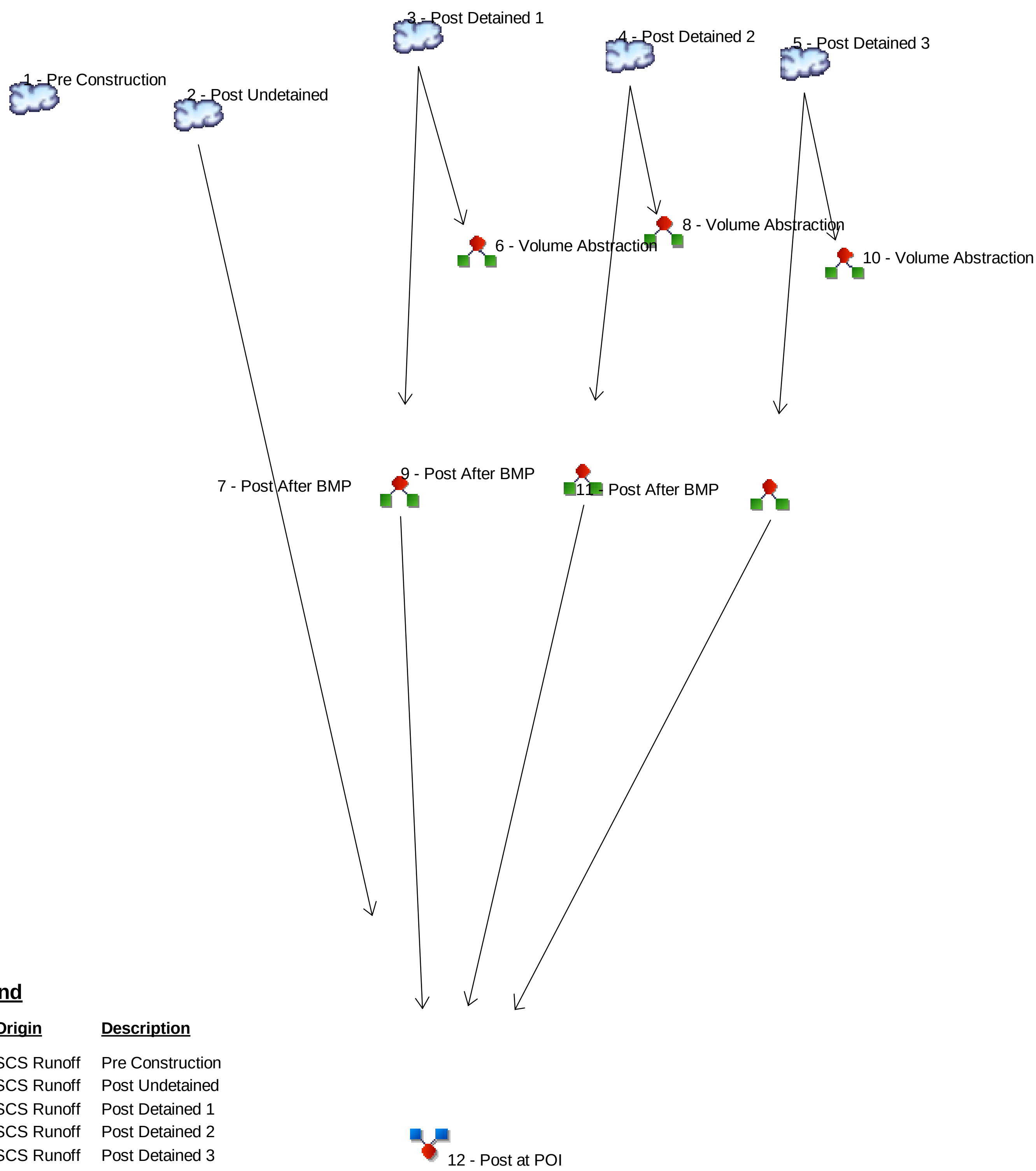
Tc = time in minutes. Values may exceed 60.

hase 2)\ESCGP-2\PPP\02 SCRO\07 PCSM\Attach 4 Stormwater Calcs\Montello\Hydraflow Rev 1\Montello Precip.pc

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.64	3.19	0.00	4.00	4.68	5.67	6.51	7.43
SCS 6-Hr	1.86	2.25	0.00	2.80	3.25	3.89	4.41	4.98
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Construction
2	SCS Runoff	Post Undetained
3	SCS Runoff	Post Detained 1
4	SCS Runoff	Post Detained 2
5	SCS Runoff	Post Detained 3
6	Diversion1	Volume Abstraction
7	Diversion2	Post After BMP
8	Diversion1	Volume Abstraction
9	Diversion2	Post After BMP
10	Diversion1	Volume Abstraction
11	Diversion2	Post After BMP
12	Combine	Post at POI

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	------	-------	1.575	-------	-------	-------	-------	-------	-------	Pre Construction
2	SCS Runoff	------	-------	1.463	-------	-------	-------	-------	-------	-------	Post Undetained
3	SCS Runoff	------	-------	0.186	-------	-------	-------	-------	-------	-------	Post Detained 1
4	SCS Runoff	------	-------	0.144	-------	-------	-------	-------	-------	-------	Post Detained 2
5	SCS Runoff	------	-------	0.011	-------	-------	-------	-------	-------	-------	Post Detained 3
6	Diversion1	3	-------	0.186	-------	-------	-------	-------	-------	-------	Volume Abstraction
7	Diversion2	3	-------	0.000	-------	-------	-------	-------	-------	-------	Post After BMP
8	Diversion1	4	-------	0.144	-------	-------	-------	-------	-------	-------	Volume Abstraction
9	Diversion2	4	-------	0.009	-------	-------	-------	-------	-------	-------	Post After BMP
10	Diversion1	5	-------	0.011	-------	-------	-------	-------	-------	-------	Volume Abstraction
11	Diversion2	5	-------	0.000	-------	-------	-------	-------	-------	-------	Post After BMP
12	Combine	2, 7, 9, 11	-------	1.463	-------	-------	-------	-------	-------	-------	Post at POI

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	1.575	2	724	7,971	------	------	------	Pre Construction
2	SCS Runoff	1.463	2	724	6,706	------	------	------	Post Undetained
3	SCS Runoff	0.186	2	766	2,124	------	------	------	Post Detained 1
4	SCS Runoff	0.144	2	738	806	------	------	------	Post Detained 2
5	SCS Runoff	0.011	2	788	134	------	------	------	Post Detained 3
6	Diversion1	0.186	2	766	2,124	3	------	------	Volume Abstraction
7	Diversion2	0.000	2	n/a	0	3	------	------	Post After BMP
8	Diversion1	0.144	2	738	641	4	------	------	Volume Abstraction
9	Diversion2	0.009	2	1062	165	4	------	------	Post After BMP
10	Diversion1	0.011	2	788	134	5	------	------	Volume Abstraction
11	Diversion2	0.000	2	n/a	0	5	------	------	Post After BMP
12	Combine	1.463	2	724	6,871	2, 7, 9, 11	------	------	Post at POI

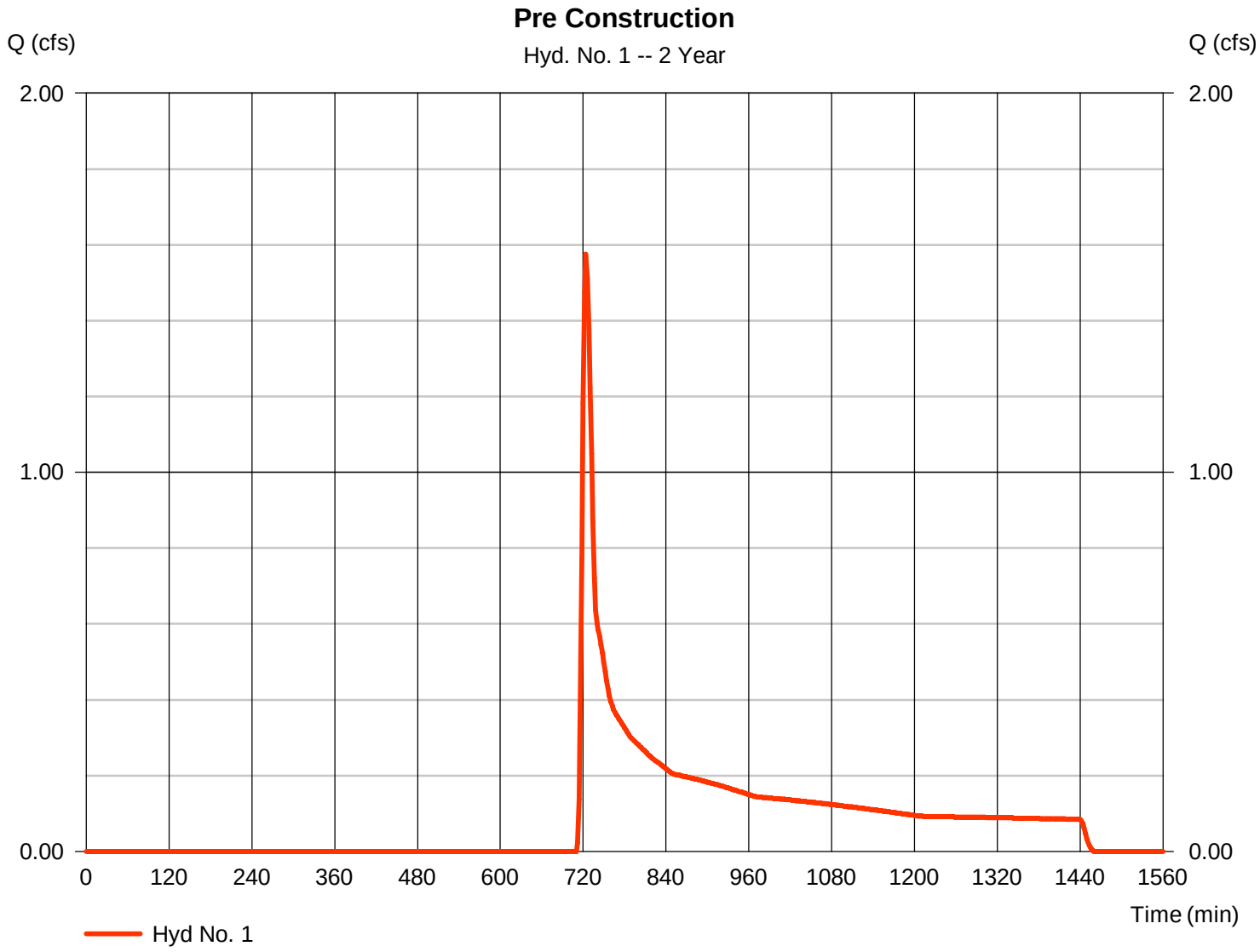
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.575 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	7,971 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	3.19 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



TR55 Tc Worksheet

Hyd. No. 1

Pre Construction

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 7.51**	**+**	**0.00**	**+**	**0.00**	**=**	**7.51**
Shallow Concentrated Flow							
Flow length (ft)	= 837.00		0.00		0.00		
Watercourse slope (%)	= 3.30		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.93		0.00		0.00		
Travel Time (min)	**= 4.76**	**+**	**0.00**	**+**	**0.00**	**=**	**4.76**
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 ..... 12.30 min

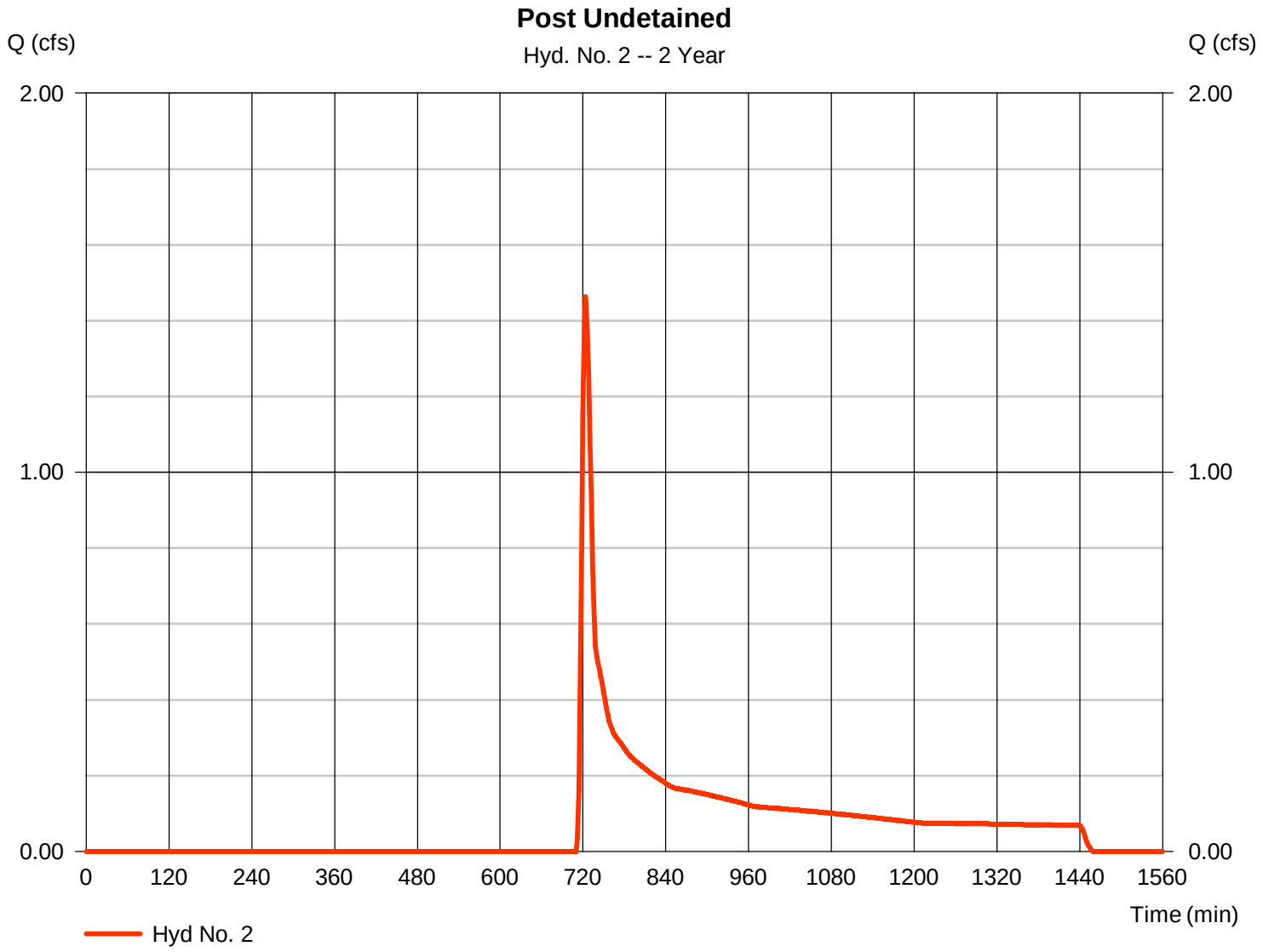
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.463 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	6,706 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	3.19 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



TR55 Tc Worksheet

Hyd. No. 2

Post Undetained

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 5.69**	**+**	**0.00**	**+**	**0.00**	**=**	**5.69**
Shallow Concentrated Flow							
Flow length (ft)	= 687.00		0.00		0.00		
Watercourse slope (%)	= 2.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.75		0.00		0.00		
Travel Time (min)	**= 4.17**	**+**	**0.00**	**+**	**0.00**	**=**	**4.17**
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 ..... 9.90 min

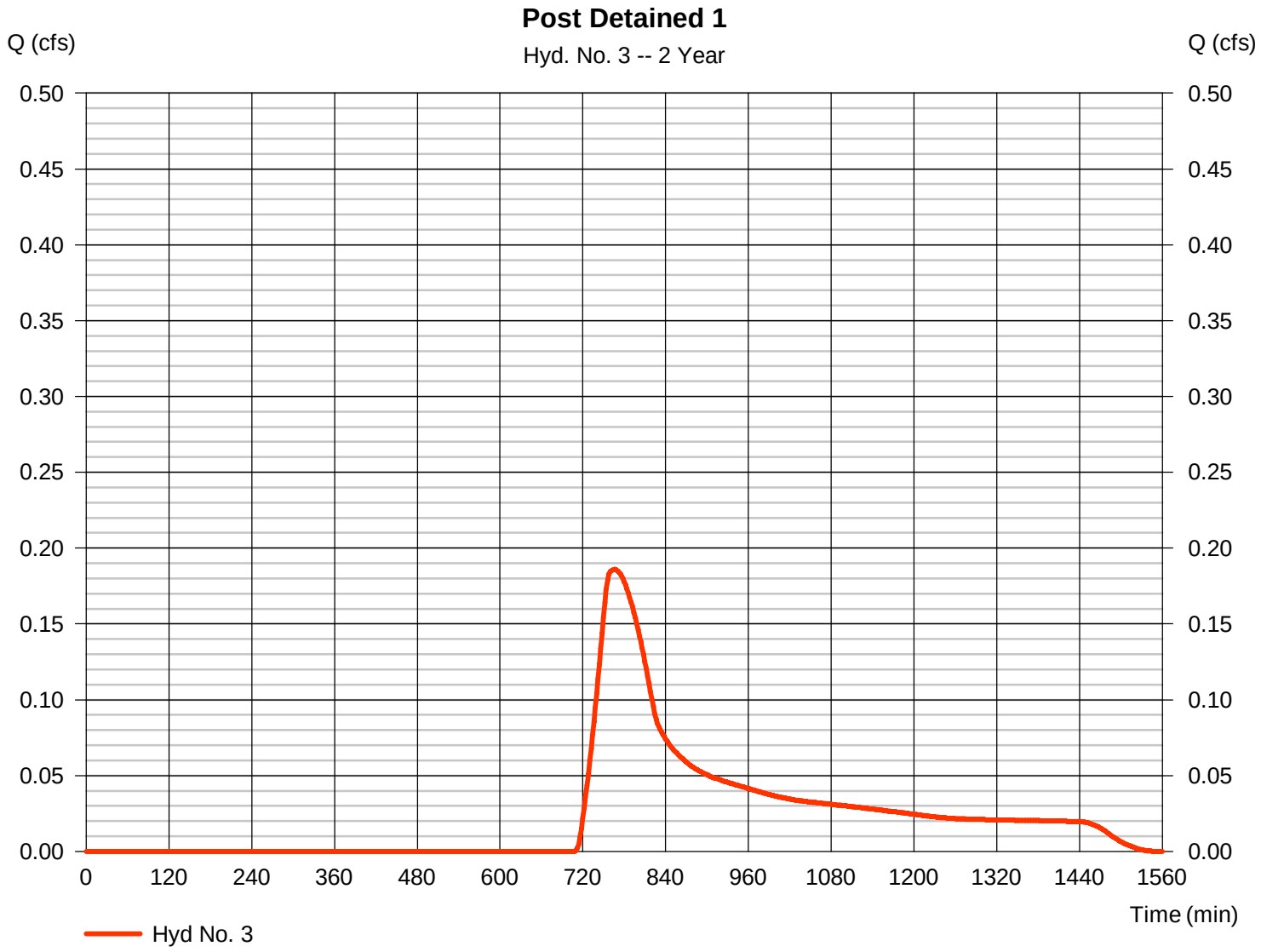
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.186 cfs
Storm frequency	= 2 yrs	Time to peak	= 766 min
Time interval	= 2 min	Hyd. volume	= 2,124 cuft
Drainage area	= 1.330 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 69.90 min
Total precip.	= 3.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



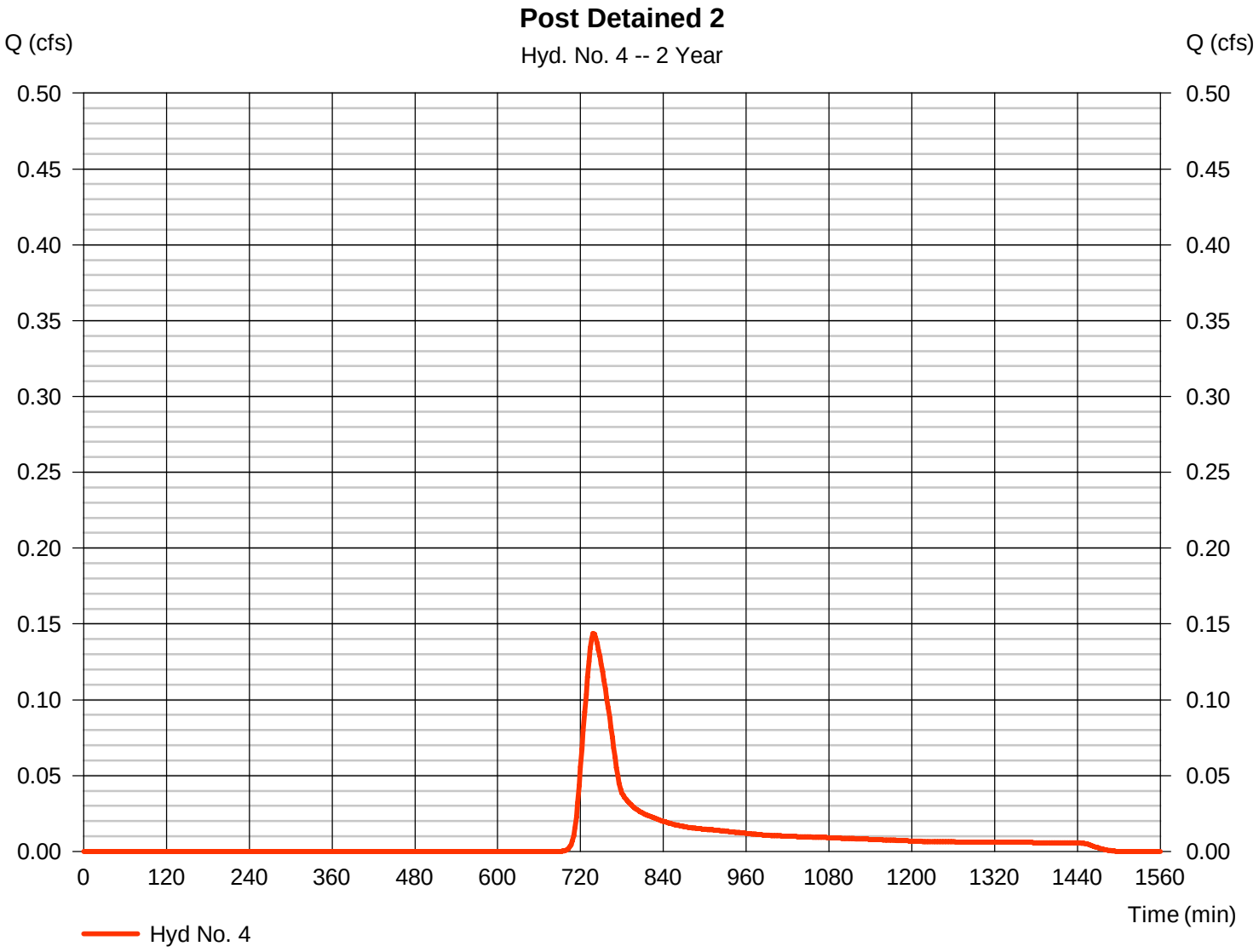
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.144 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 806 cuft
Drainage area	= 0.270 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 39.10 min
Total precip.	= 3.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



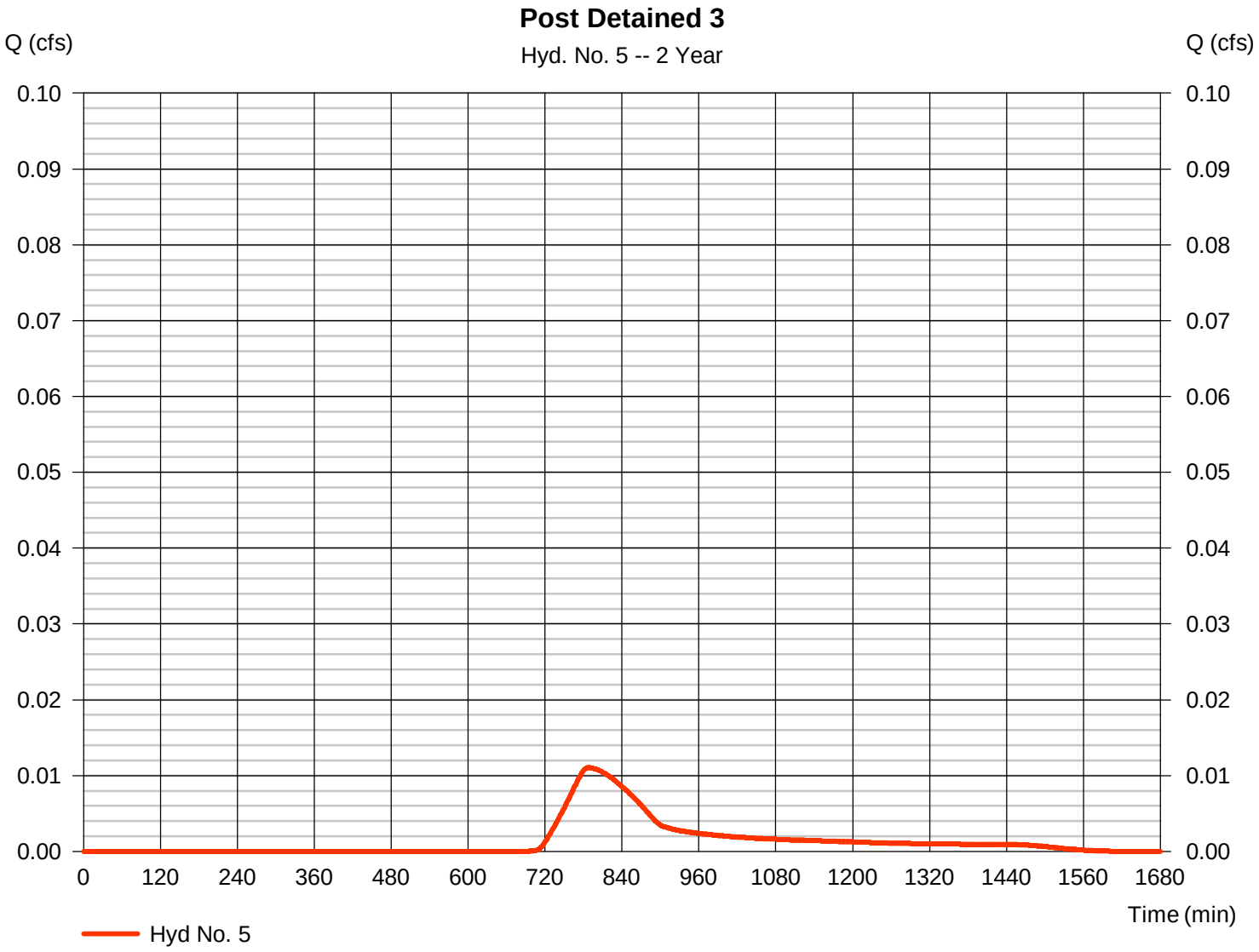
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.011 cfs
Storm frequency	= 2 yrs	Time to peak	= 788 min
Time interval	= 2 min	Hyd. volume	= 134 cuft
Drainage area	= 0.040 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 116.00 min
Total precip.	= 3.19 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

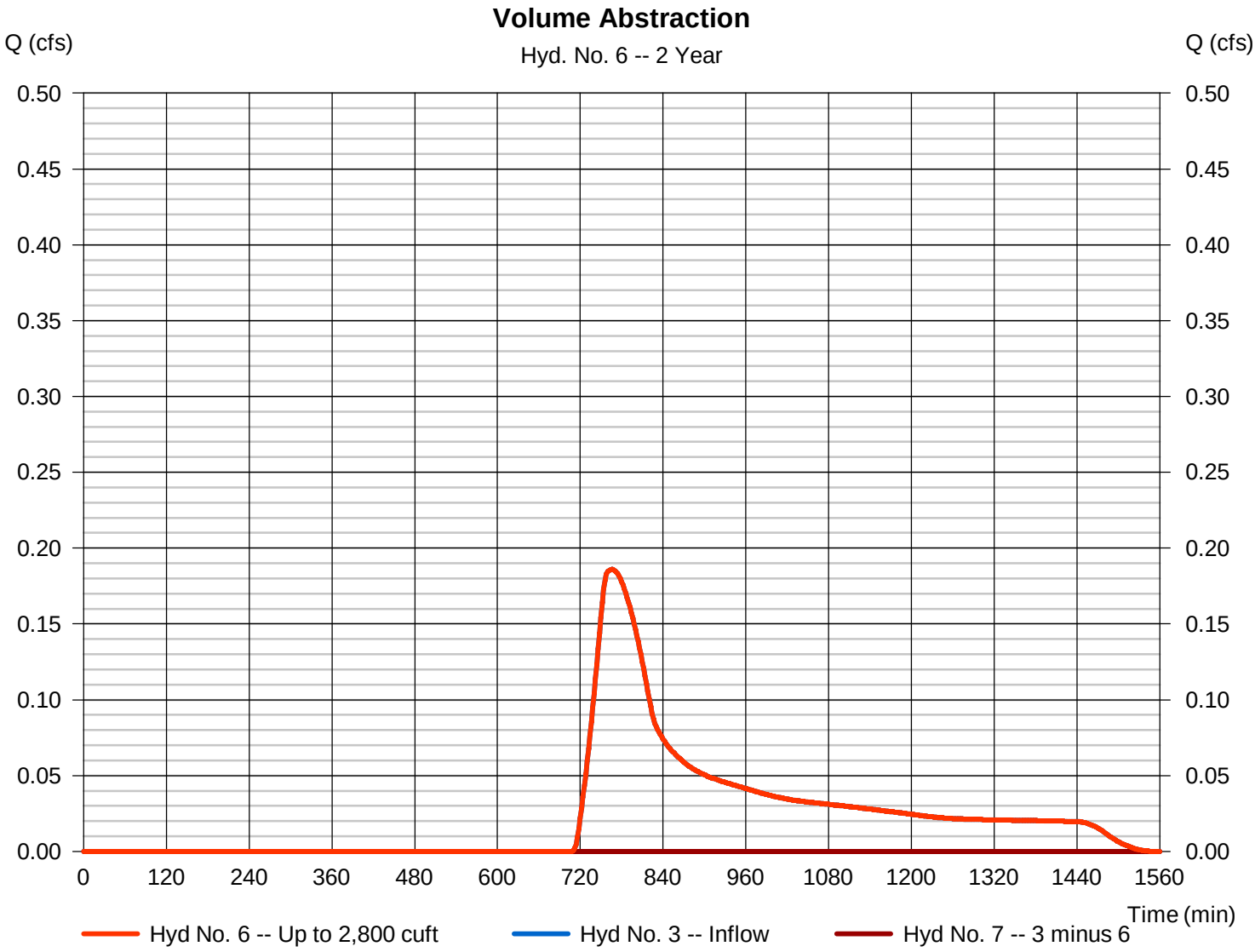


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.186 cfs
Storm frequency	= 2 yrs	Time to peak	= 766 min
Time interval	= 2 min	Hyd. volume	= 2,124 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

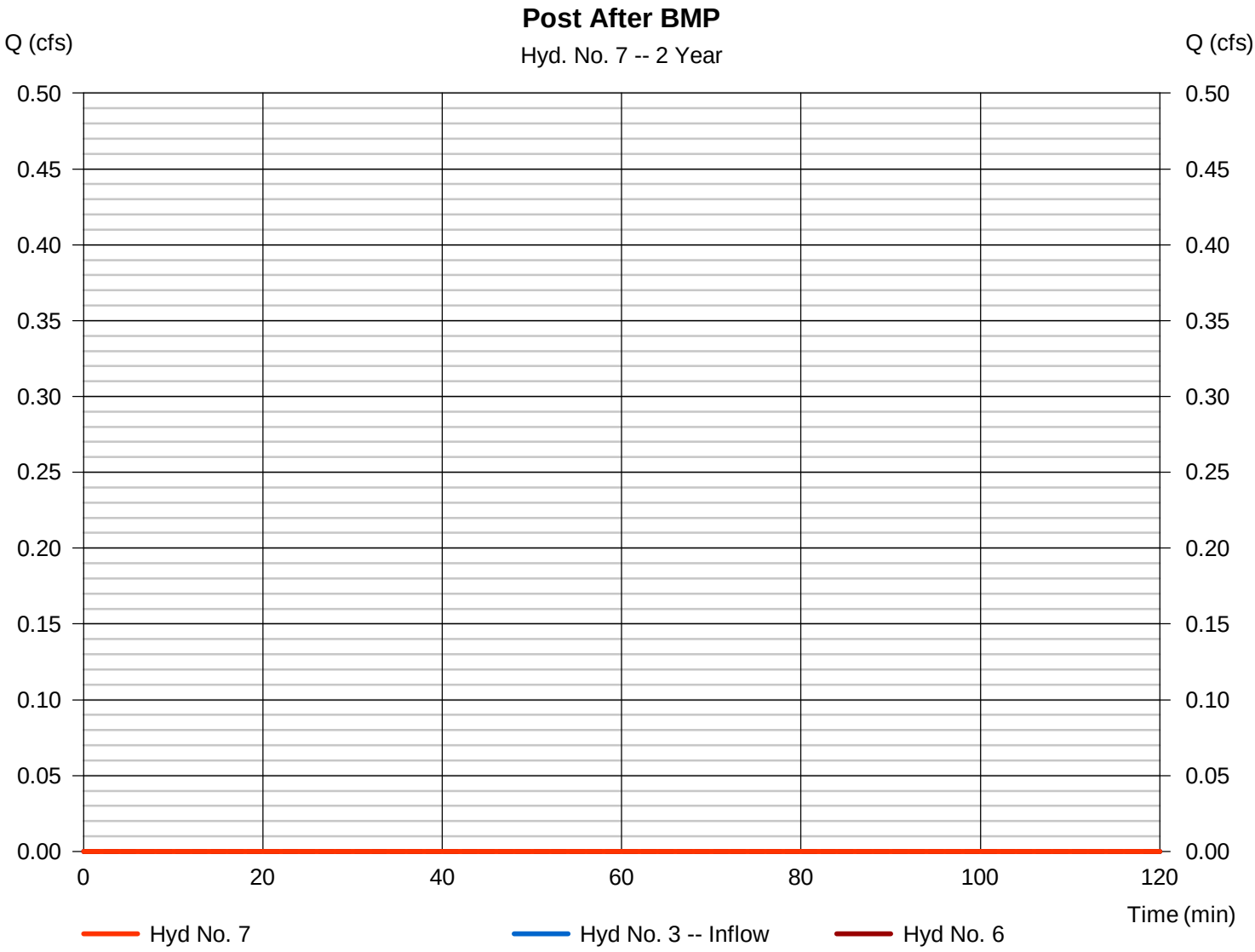


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

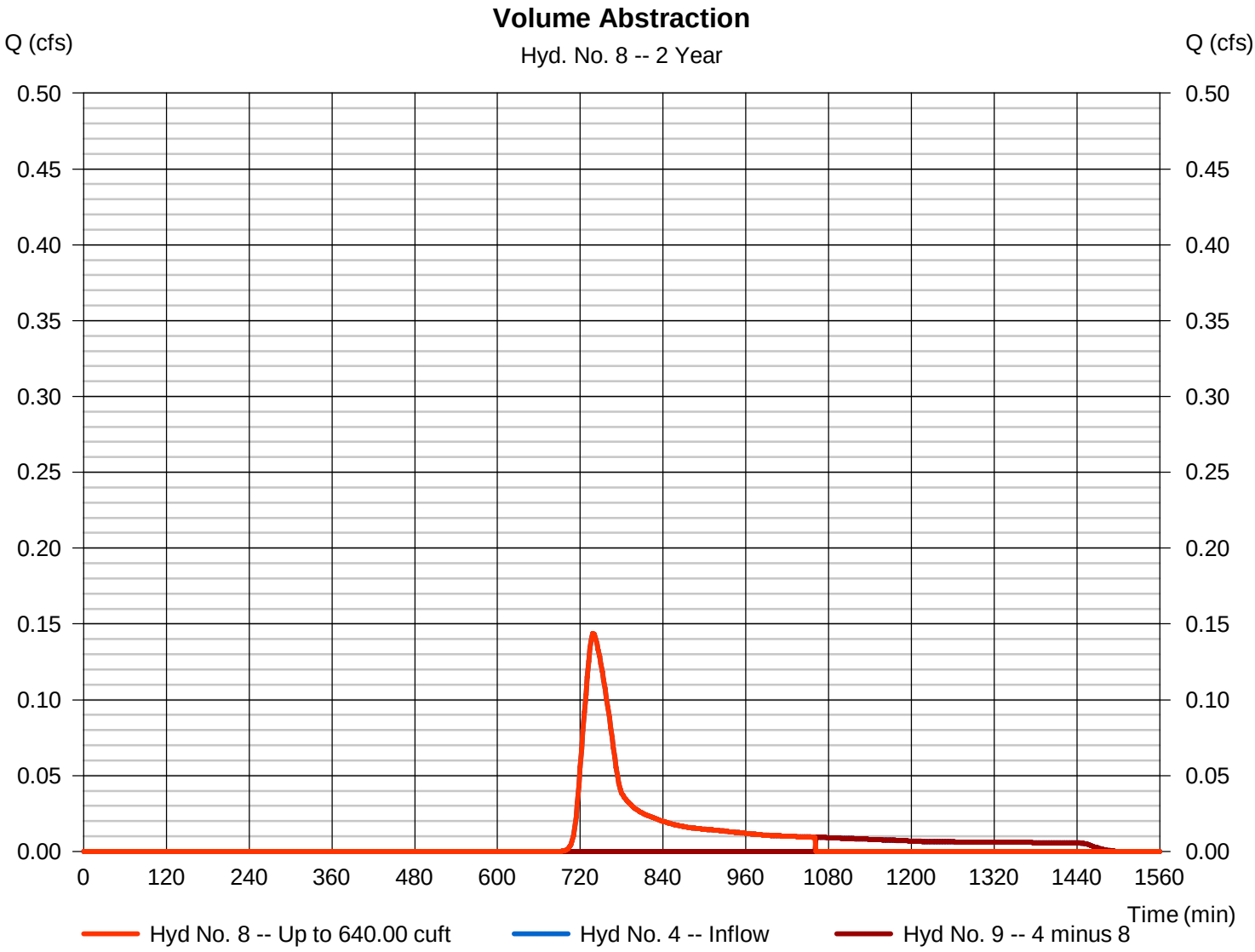


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.144 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 641 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

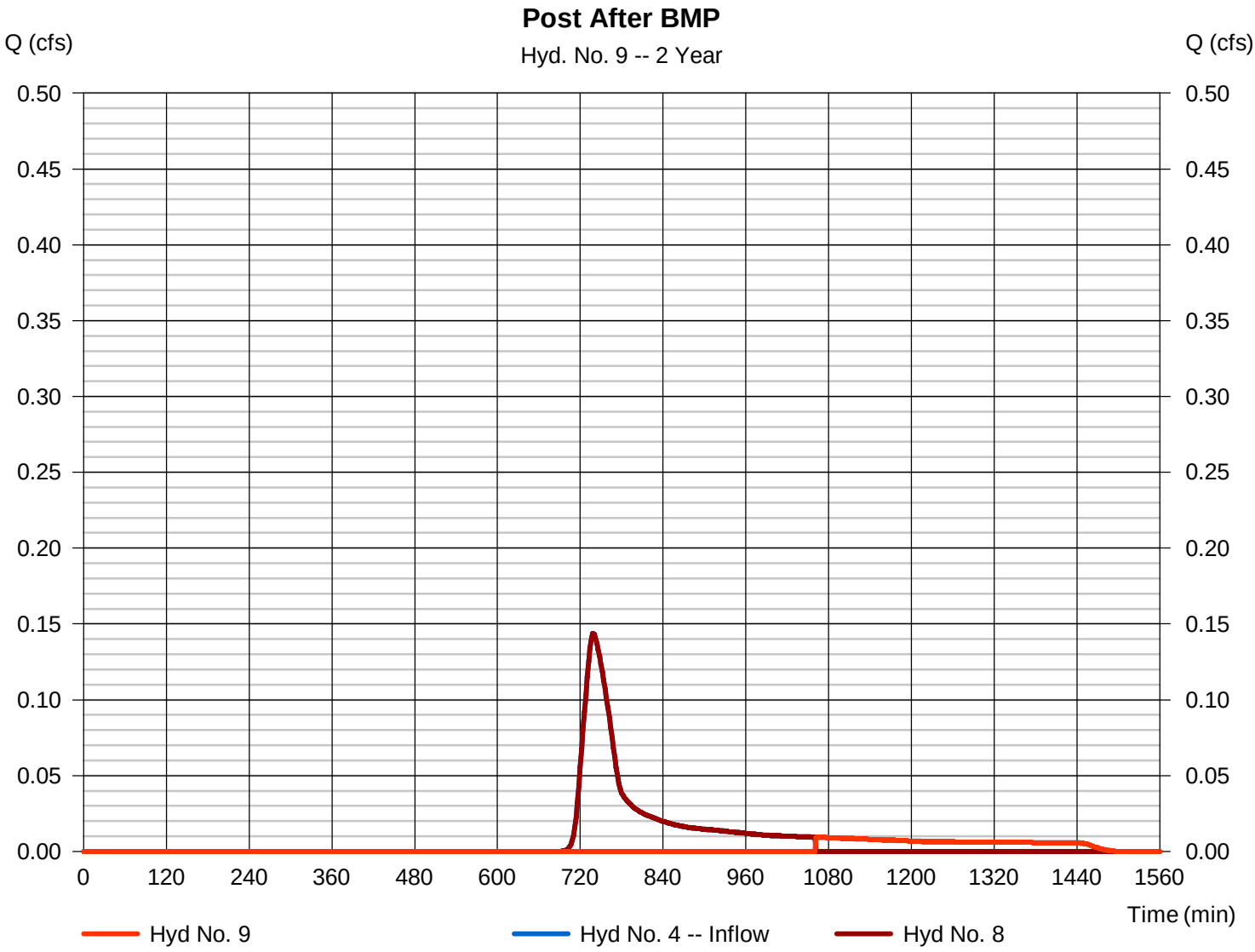


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.009 cfs
Storm frequency	= 2 yrs	Time to peak	= 1062 min
Time interval	= 2 min	Hyd. volume	= 165 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

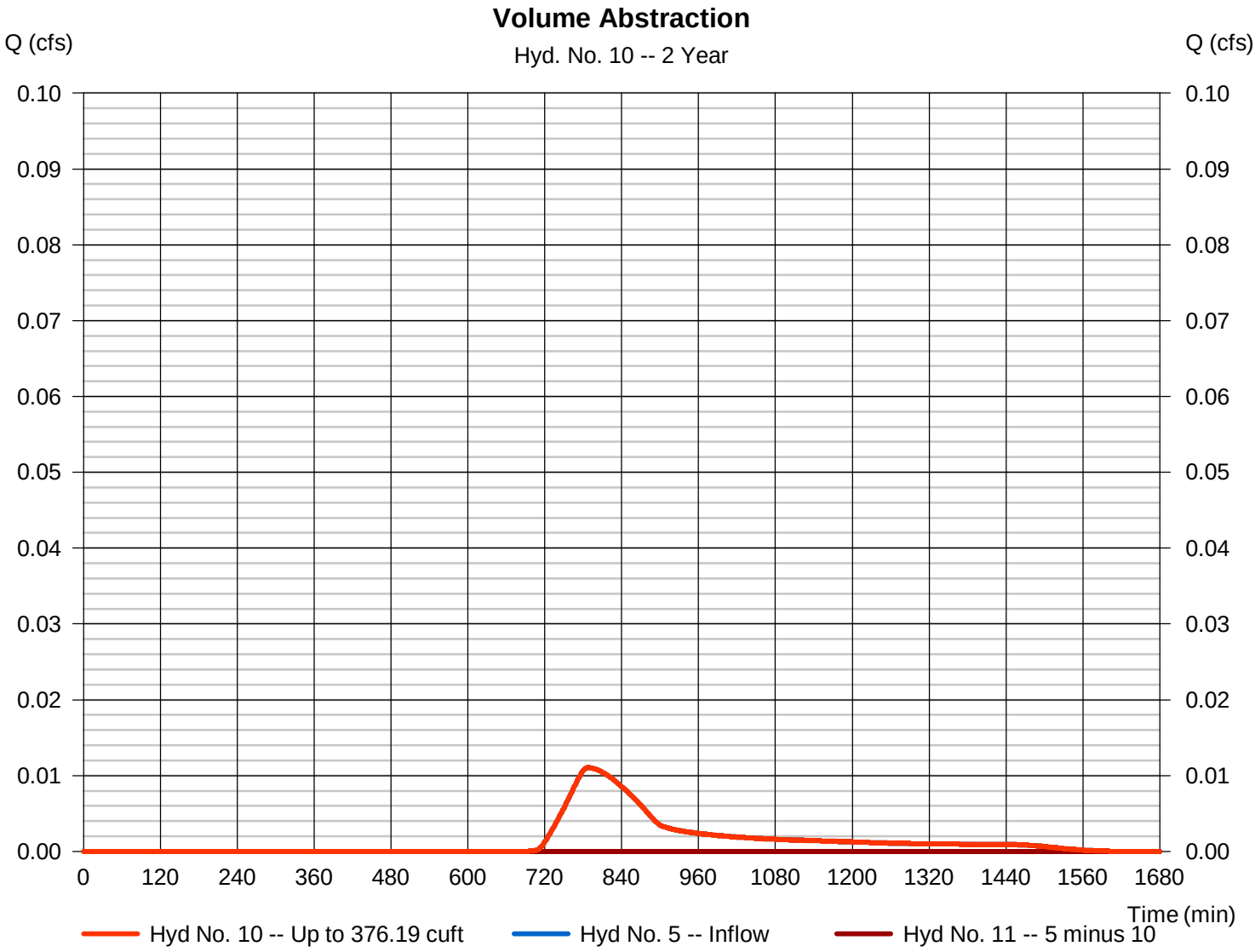


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.011 cfs
Storm frequency	= 2 yrs	Time to peak	= 788 min
Time interval	= 2 min	Hyd. volume	= 134 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

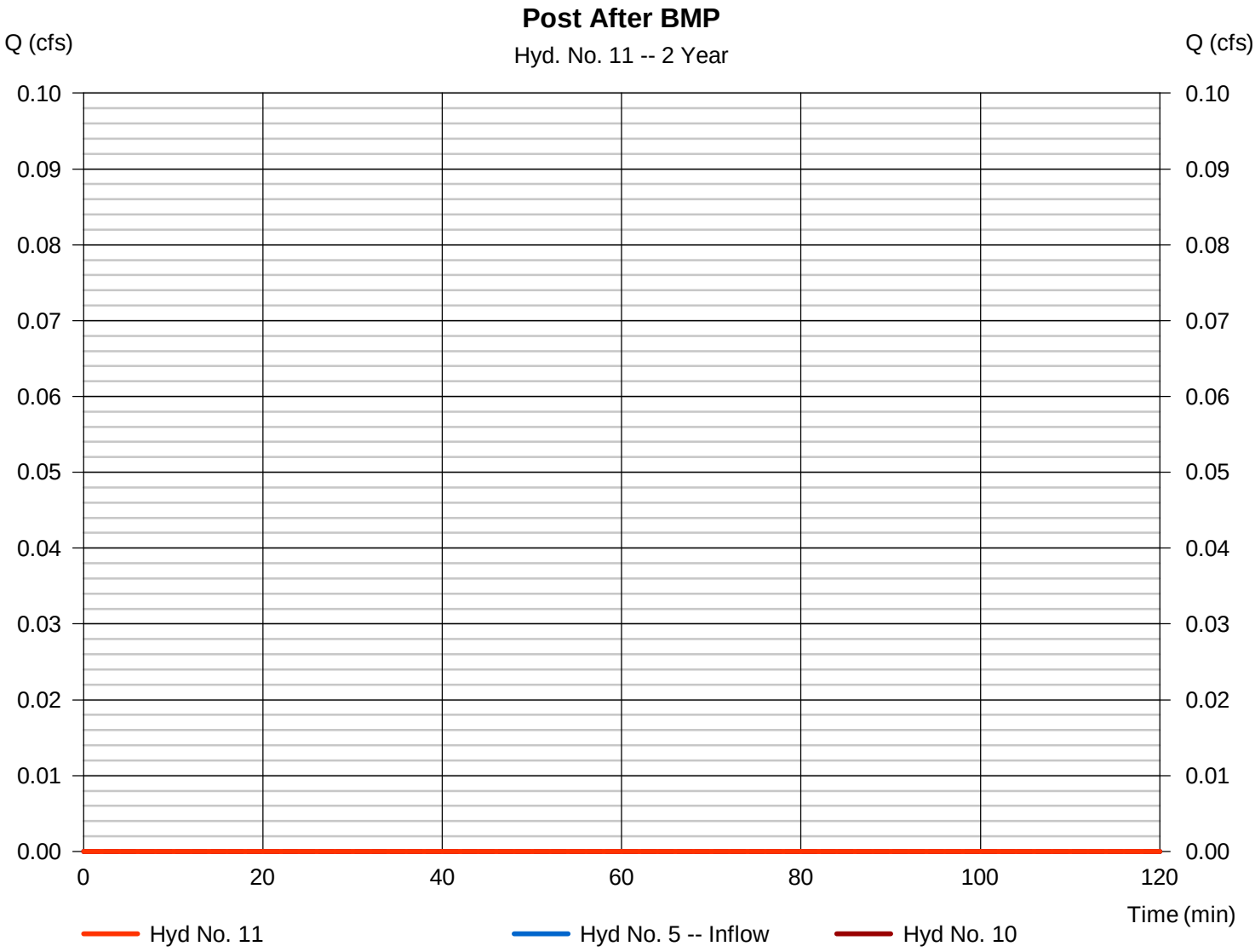


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

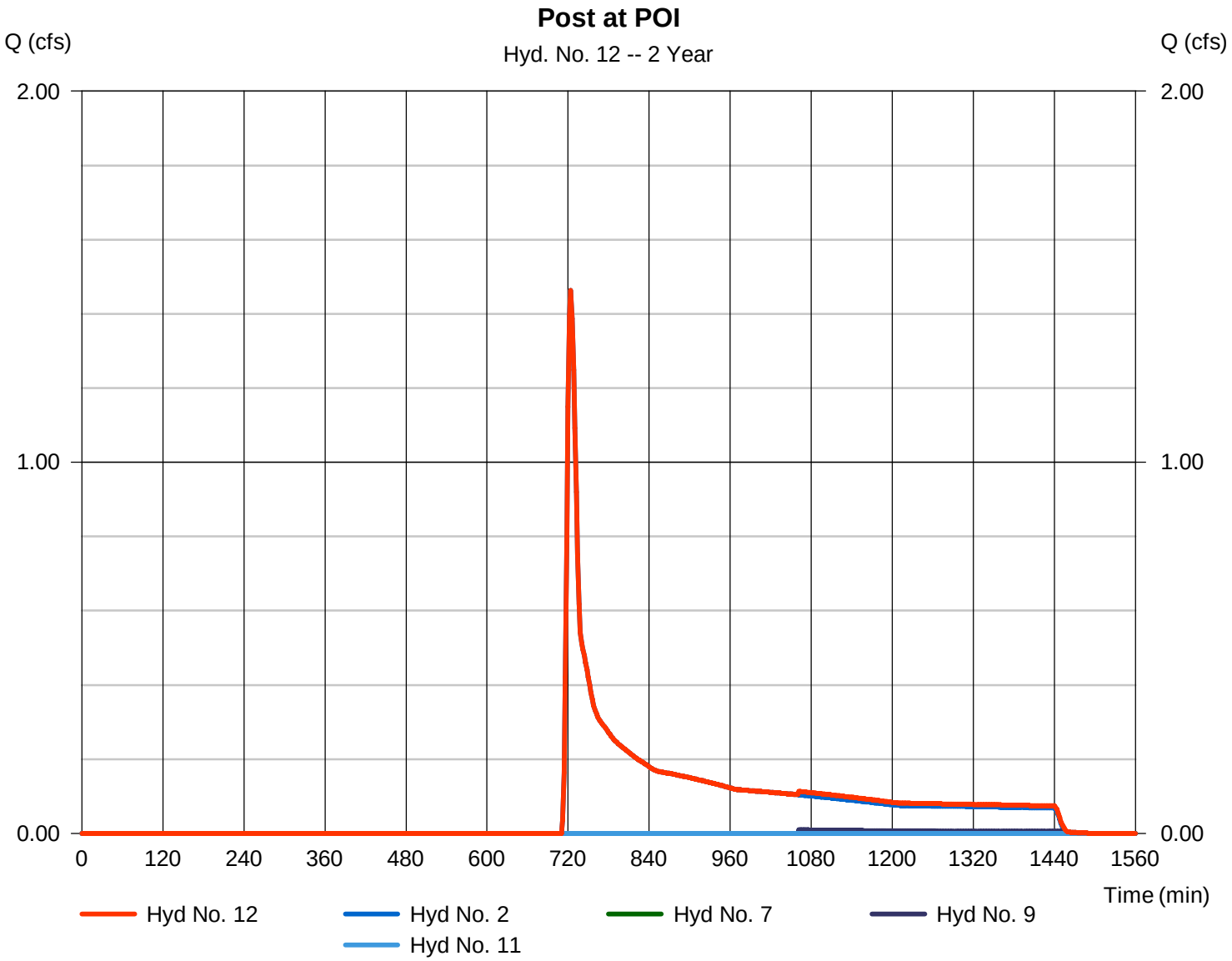


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	=	Combine	Peak discharge	=	1.463 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	6,871 cuft
Inflow hyds.	=	2, 7, 9, 11	Contrib. drain. area	=	5.310 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	46.3657	11.6000	0.8696	--------
2	52.9099	11.6000	0.8555	--------
3	0.0000	0.0000	0.0000	--------
5	57.3166	11.8000	0.8245	--------
10	60.1494	11.9000	0.8045	--------
25	51.8954	10.5000	0.7395	--------
50	48.4904	9.7000	0.7034	--------
100	44.4757	8.8000	0.6639	--------

File name: Montello IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.03	3.20	2.67	2.30	2.03	1.81	1.64	1.50	1.39	1.29	1.20	1.13
2	4.78	3.82	3.20	2.76	2.43	2.18	1.98	1.81	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.60	4.52	3.81	3.31	2.93	2.64	2.41	2.21	2.05	1.91	1.79	1.69
10	6.19	5.02	4.26	3.71	3.30	2.98	2.72	2.51	2.33	2.18	2.05	1.93
25	6.84	5.56	4.73	4.14	3.70	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.32	5.96	5.08	4.46	4.00	3.64	3.35	3.11	2.91	2.73	2.58	2.45
100	7.79	6.34	5.42	4.78	4.30	3.92	3.62	3.37	3.16	2.97	2.82	2.68

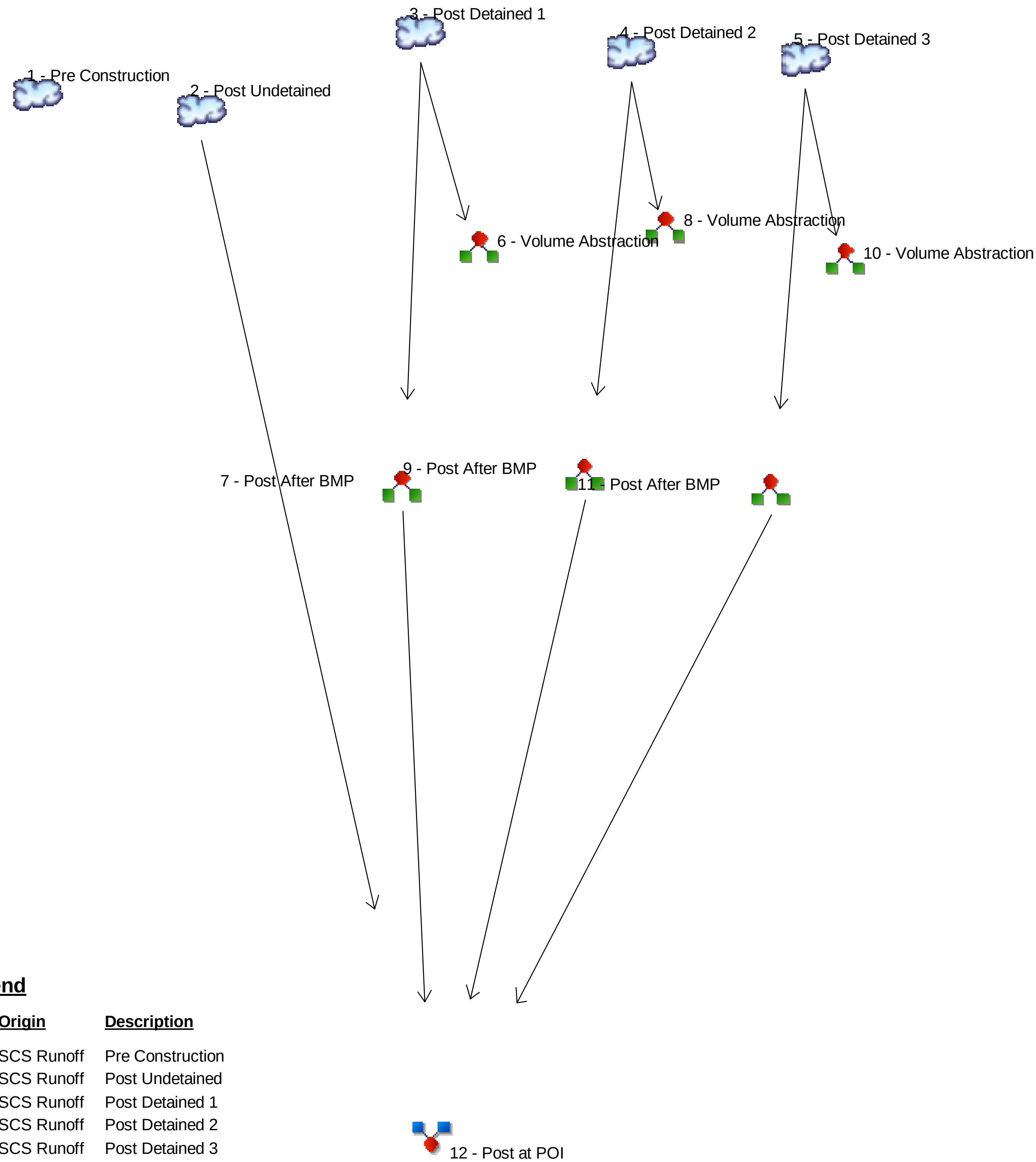
Tc = time in minutes. Values may exceed 60.

hase 2)\ESCGP-2\PPP\02 SCRO\07 PCSM\Attach 4 Stormwater Calcs\Montello\Hydraflow Rev 1\Montello Precip.pc

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.64	3.19	0.00	4.00	4.68	5.67	6.51	7.43
SCS 6-Hr	1.86	2.25	0.00	2.80	3.25	3.89	4.41	4.98
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Construction
2	SCS Runoff	Post Undetained
3	SCS Runoff	Post Detained 1
4	SCS Runoff	Post Detained 2
5	SCS Runoff	Post Detained 3
6	Diversion1	Volume Abstraction
7	Diversion2	Post After BMP
8	Diversion1	Volume Abstraction
9	Diversion2	Post After BMP
10	Diversion1	Volume Abstraction
11	Diversion2	Post After BMP
12	Combine	Post at POI

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	-------	-------	-------	8.136	-------	-------	-------	Pre Construction
2	SCS Runoff	------	-------	-------	-------	-------	6.754	-------	-------	-------	Post Undetained
3	SCS Runoff	------	-------	-------	-------	-------	1.155	-------	-------	-------	Post Detained 1
4	SCS Runoff	------	-------	-------	-------	-------	0.505	-------	-------	-------	Post Detained 2
5	SCS Runoff	------	-------	-------	-------	-------	0.044	-------	-------	-------	Post Detained 3
6	Diversion1	3	-------	-------	-------	-------	1.155	-------	-------	-------	Volume Abstraction
7	Diversion2	3	-------	-------	-------	-------	0.225	-------	-------	-------	Post After BMP
8	Diversion1	4	-------	-------	-------	-------	0.505	-------	-------	-------	Volume Abstraction
9	Diversion2	4	-------	-------	-------	-------	0.341	-------	-------	-------	Post After BMP
10	Diversion1	5	-------	-------	-------	-------	0.044	-------	-------	-------	Volume Abstraction
11	Diversion2	5	-------	-------	-------	-------	0.000	-------	-------	-------	Post After BMP
12	Combine	2, 7, 9, 11	-------	-------	-------	-------	6.754	-------	-------	-------	Post at POI

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	8.136	2	722	24,418	------	------	------	Pre Construction
2	SCS Runoff	6.754	2	722	19,822	------	------	------	Post Undetained
3	SCS Runoff	1.155	2	734	5,774	------	------	------	Post Detained 1
4	SCS Runoff	0.505	2	728	1,798	------	------	------	Post Detained 2
5	SCS Runoff	0.044	2	748	282	------	------	------	Post Detained 3
6	Diversion1	1.155	2	734	2,817	3	------	------	Volume Abstraction
7	Diversion2	0.225	2	786	2,957	3	------	------	Post After BMP
8	Diversion1	0.505	2	728	685	4	------	------	Volume Abstraction
9	Diversion2	0.341	2	738	1,113	4	------	------	Post After BMP
10	Diversion1	0.044	2	748	282	5	------	------	Volume Abstraction
11	Diversion2	0.000	2	n/a	0	5	------	------	Post After BMP
12	Combine	6.754	2	722	23,892	2, 7, 9, 11	------	------	Post at POI

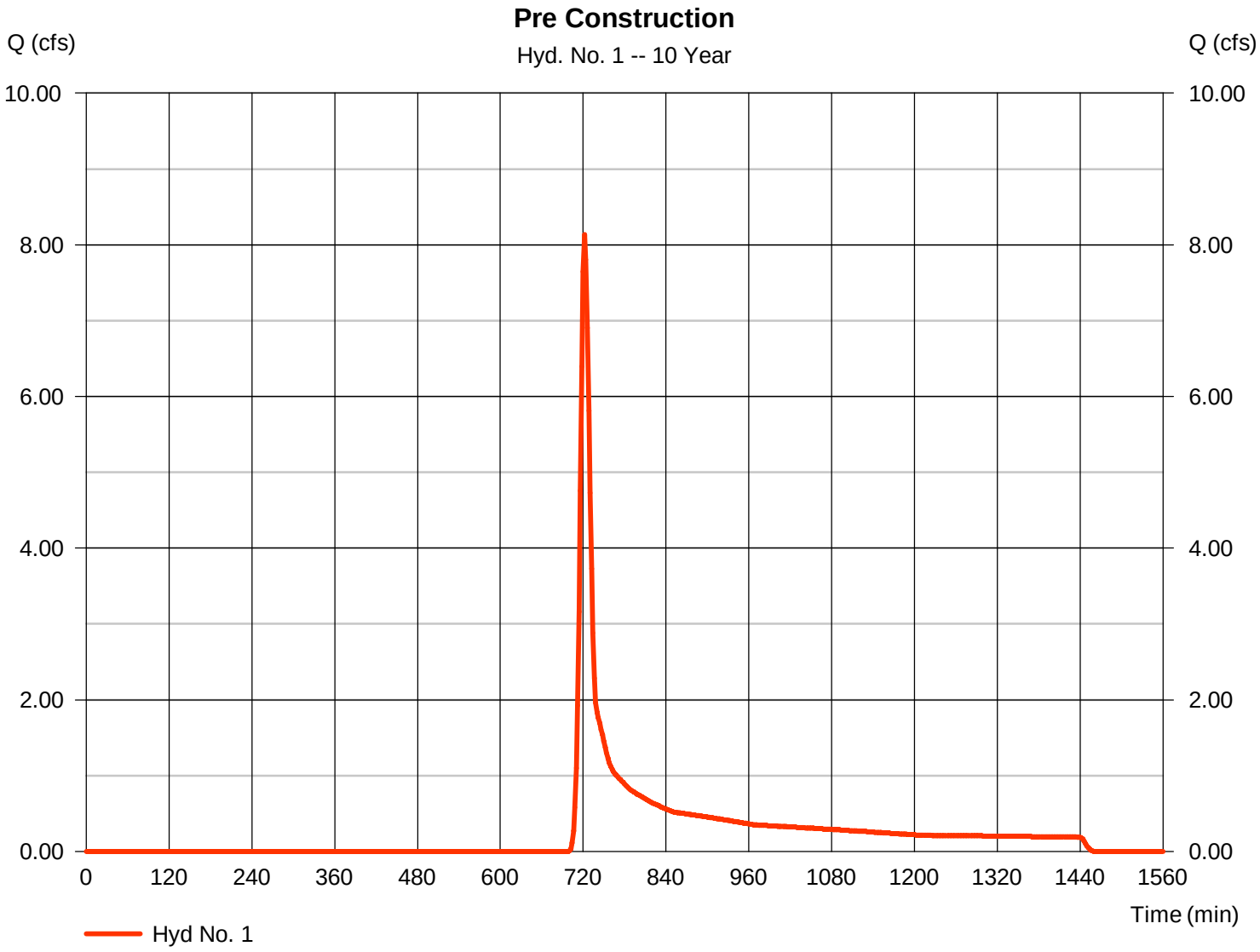
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.136 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	24,418 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



TR55 Tc Worksheet

Hyd. No. 1

Pre Construction

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 7.51**	**+**	**0.00**	**+**	**0.00**	**=**	**7.51**
Shallow Concentrated Flow							
Flow length (ft)	= 837.00		0.00		0.00		
Watercourse slope (%)	= 3.30		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.93		0.00		0.00		
Travel Time (min)	**= 4.76**	**+**	**0.00**	**+**	**0.00**	**=**	**4.76**
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 ..... 12.30 min

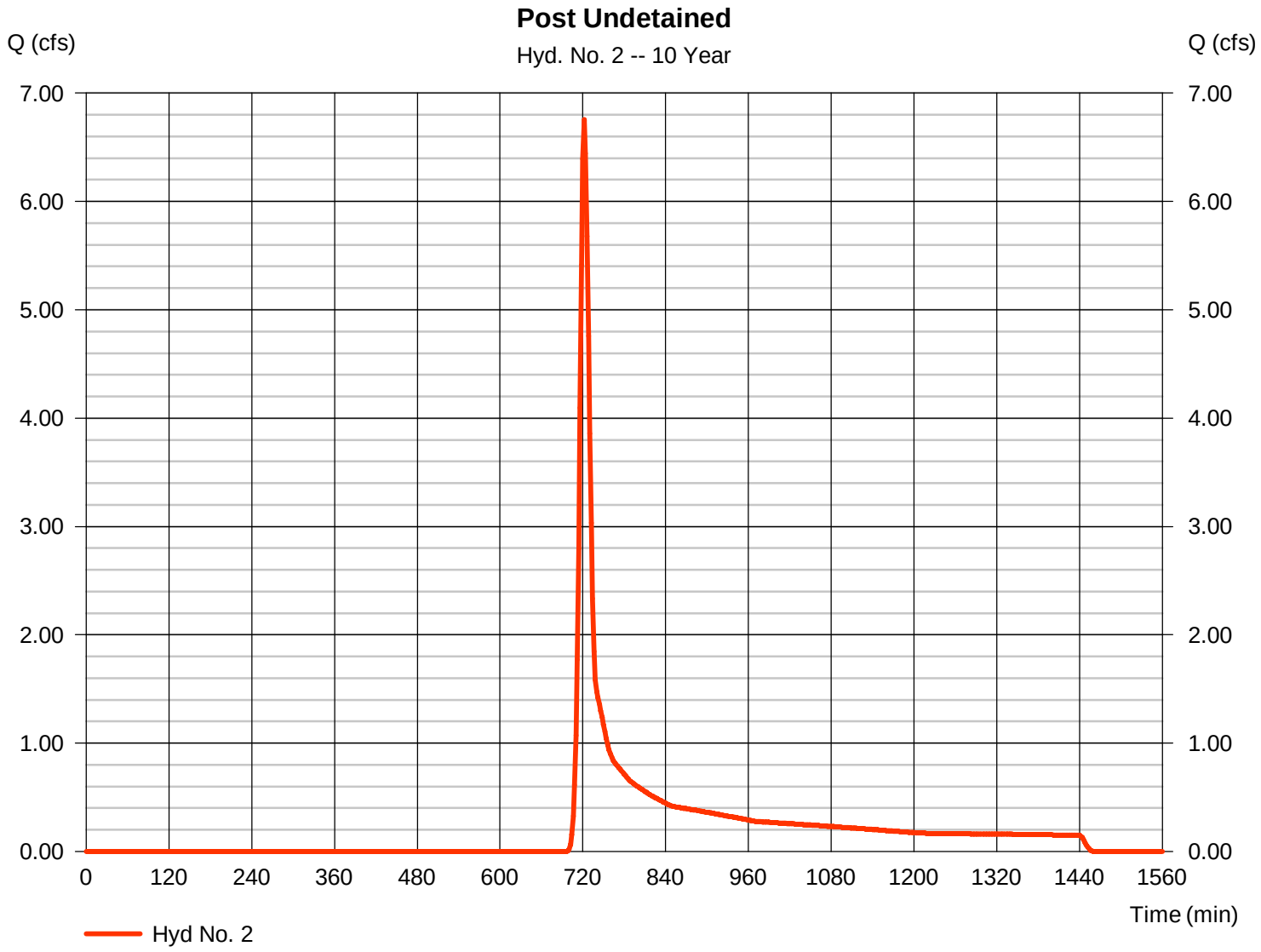
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.754 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	19,822 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



TR55 Tc Worksheet

Hyd. No. 2

Post Undetained

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 5.69**	**+**	**0.00**	**+**	**0.00**	**=**	**5.69**
Shallow Concentrated Flow							
Flow length (ft)	= 687.00		0.00		0.00		
Watercourse slope (%)	= 2.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.75		0.00		0.00		
Travel Time (min)	**= 4.17**	**+**	**0.00**	**+**	**0.00**	**=**	**4.17**
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 ..... 9.90 min

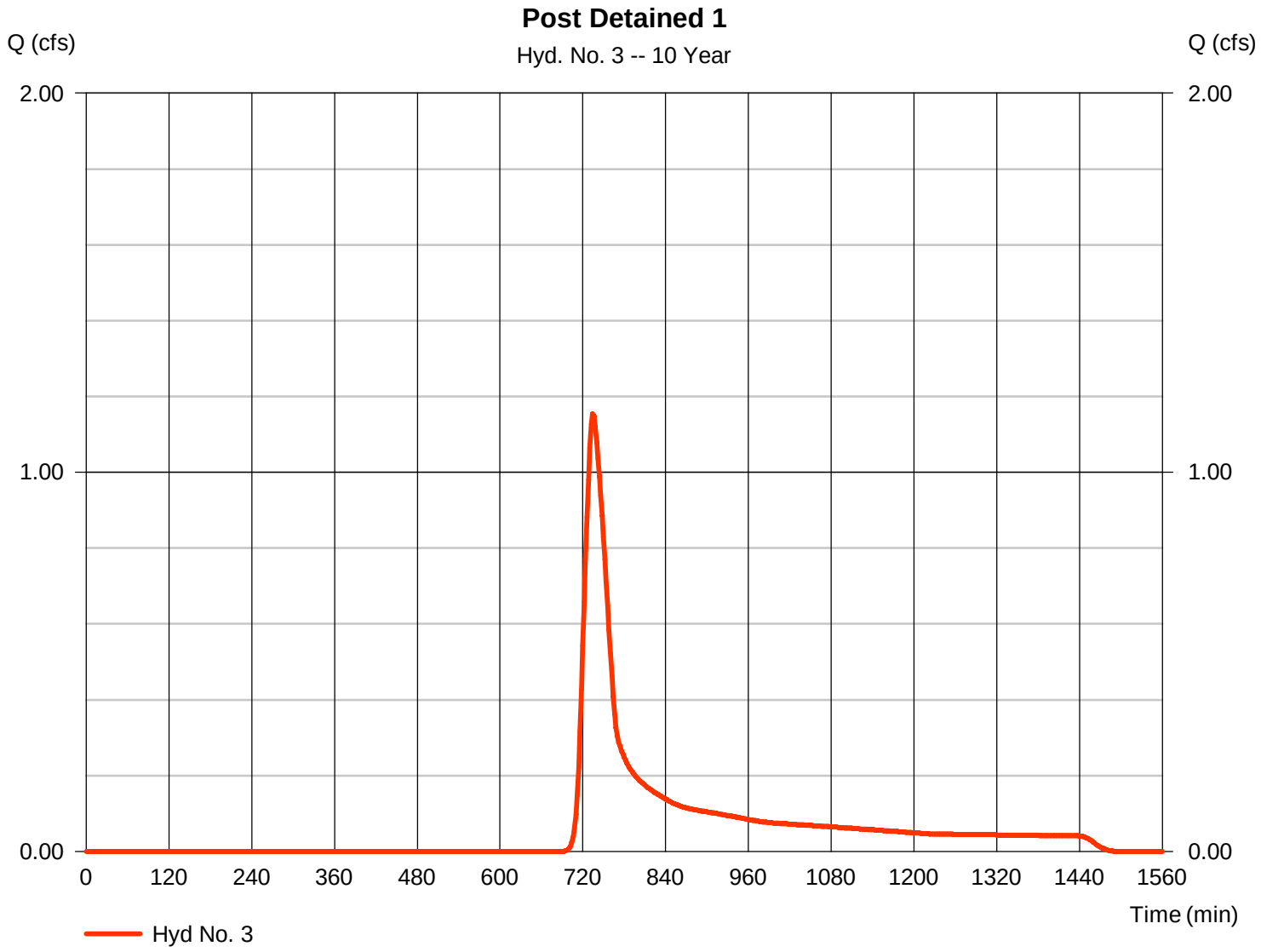
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.155 cfs
Storm frequency	=	10 yrs	Time to peak	=	734 min
Time interval	=	2 min	Hyd. volume	=	5,774 cuft
Drainage area	=	1.330 ac	Curve number	=	61*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	32.10 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



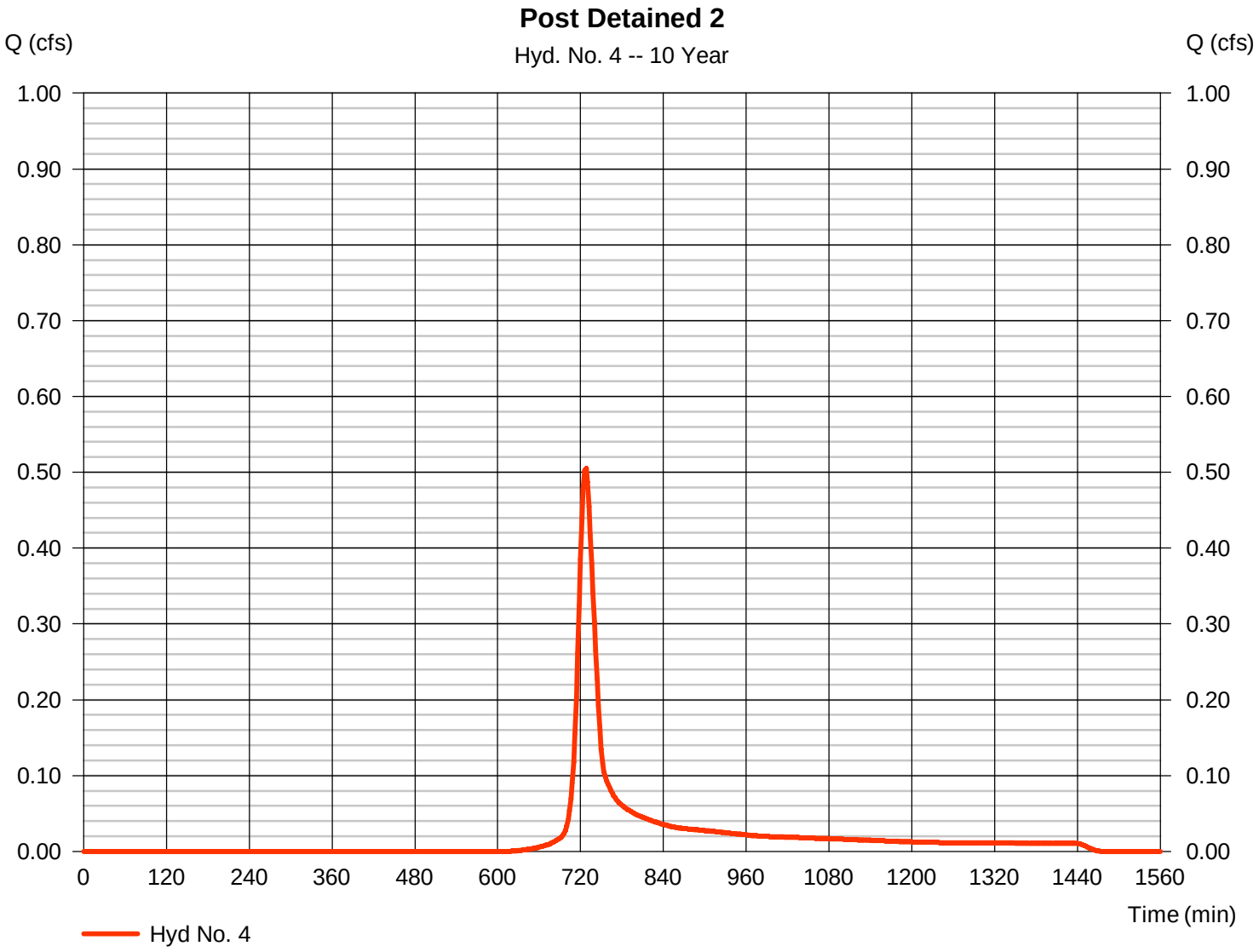
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.505 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,798 cuft
Drainage area	= 0.270 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 4.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



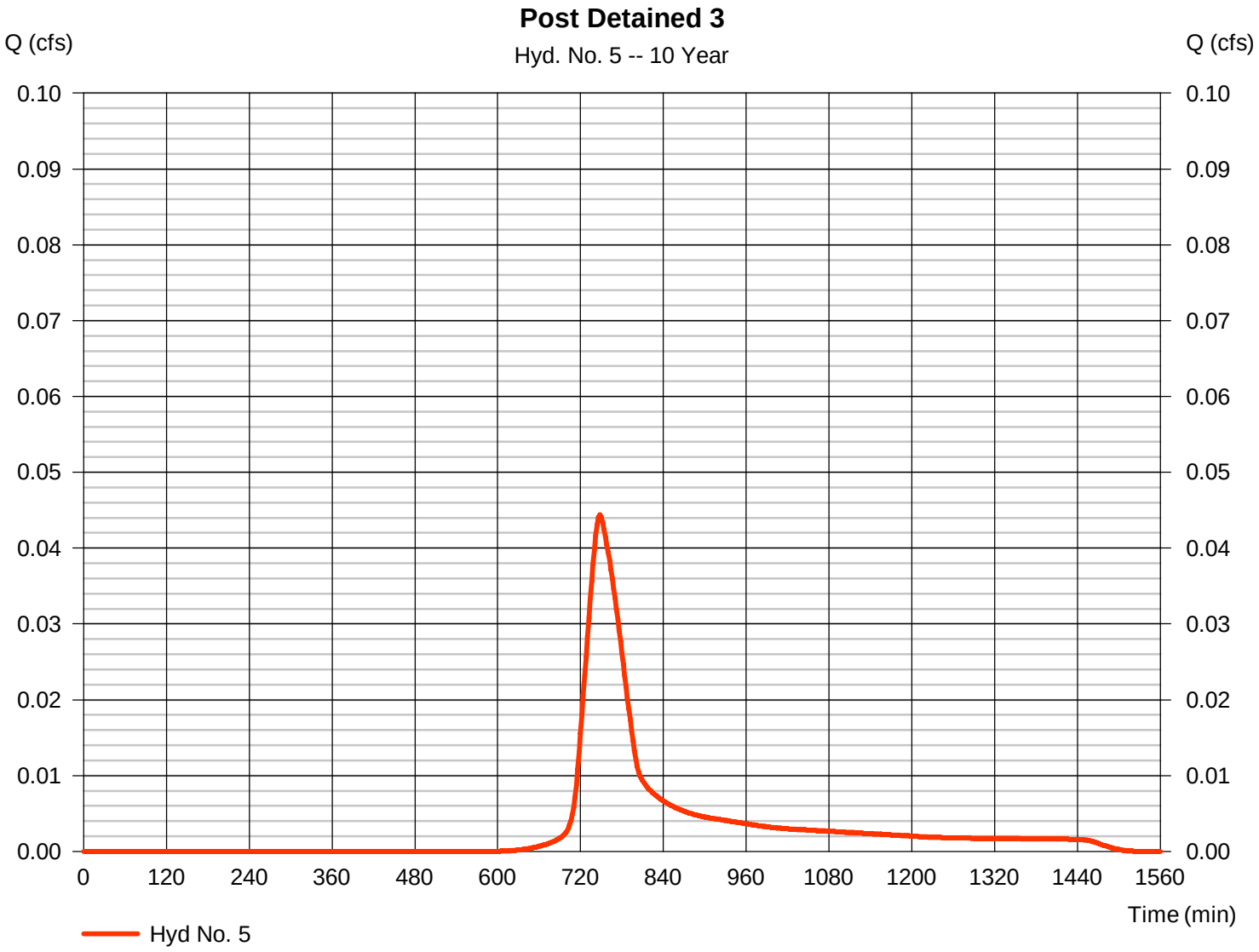
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.044 cfs
Storm frequency	=	10 yrs	Time to peak	=	748 min
Time interval	=	2 min	Hyd. volume	=	282 cuft
Drainage area	=	0.040 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	57.00 min
Total precip.	=	4.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

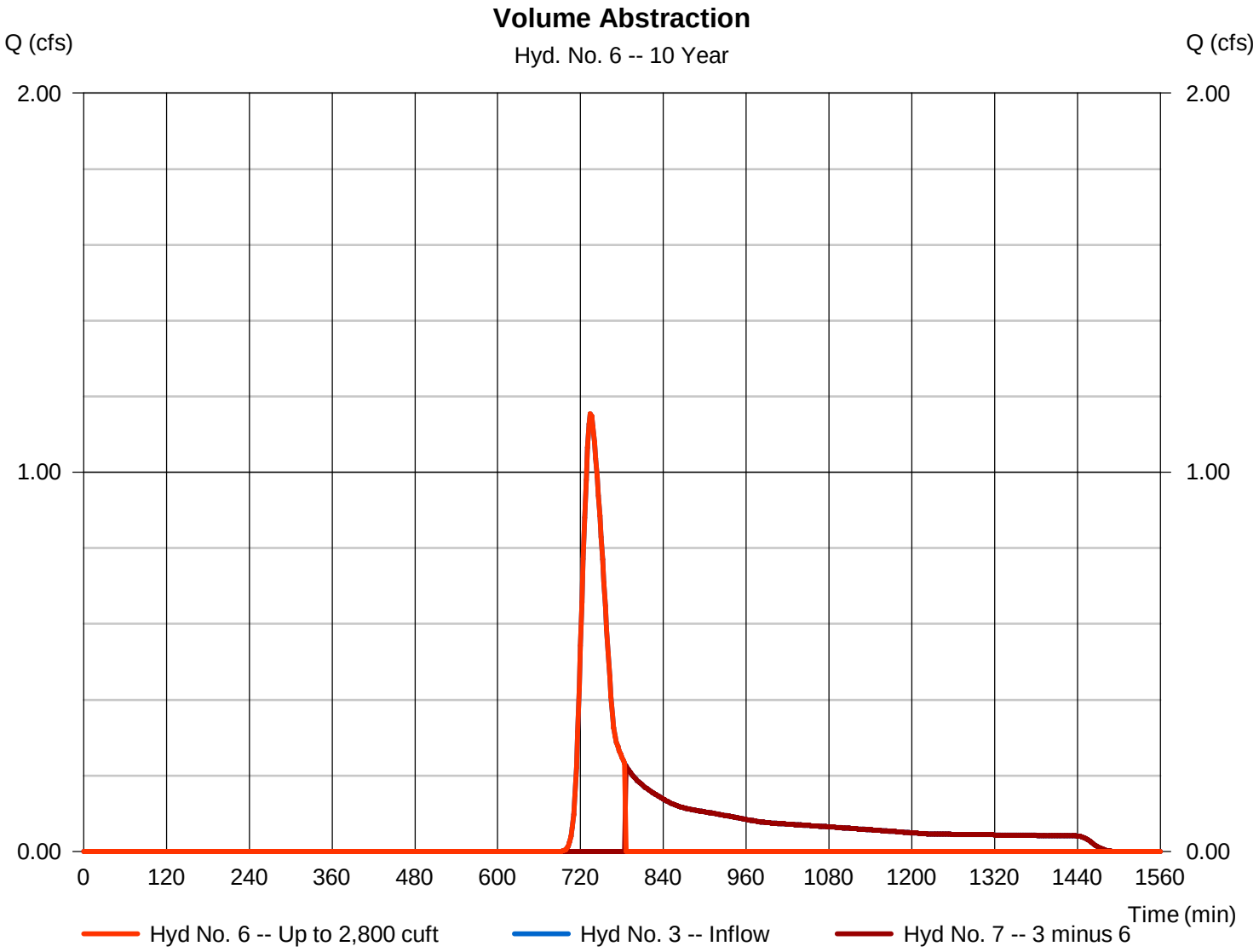


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 1.155 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 2,817 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

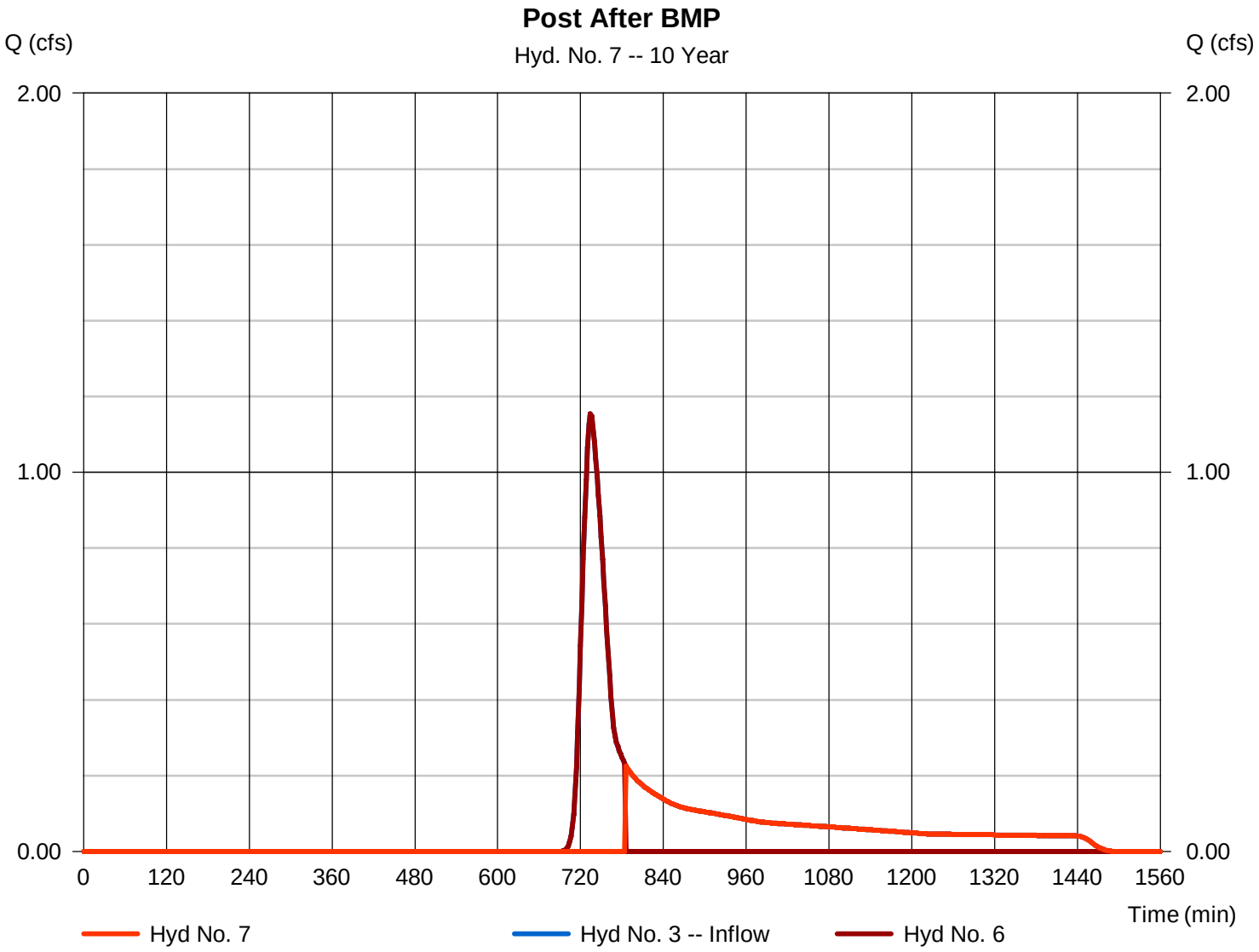


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 786 min
Time interval	= 2 min	Hyd. volume	= 2,957 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

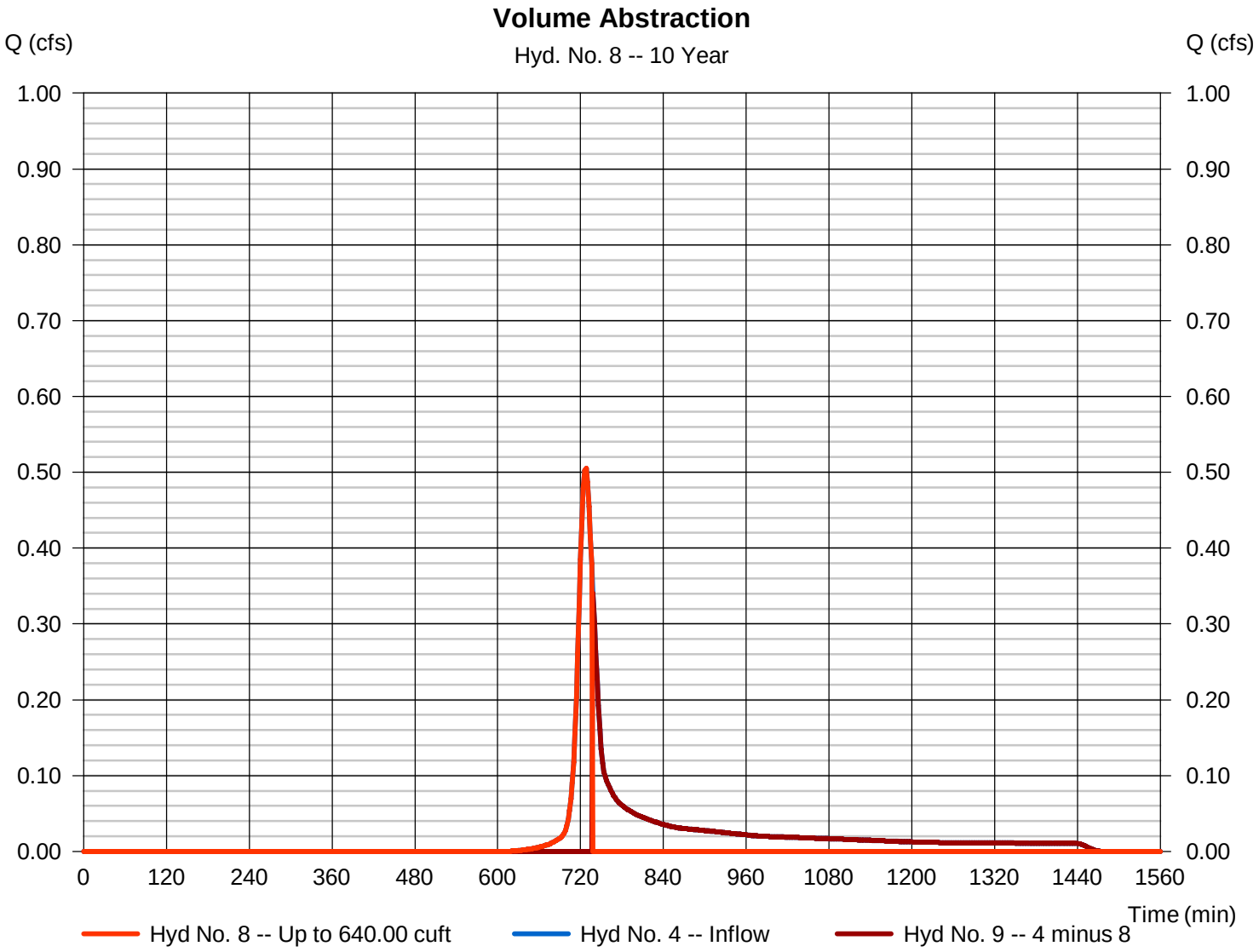


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.505 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 685 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

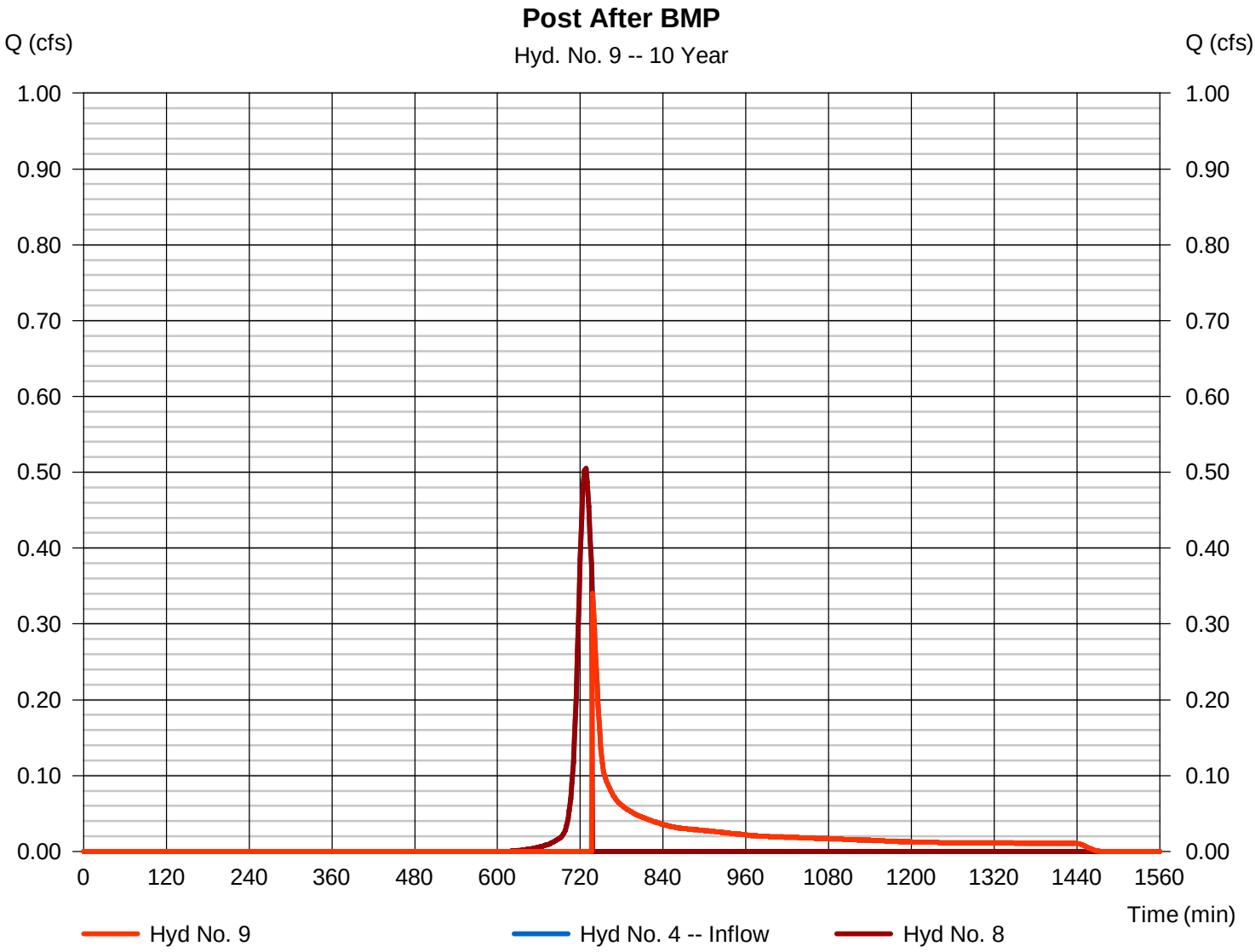


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.341 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 1,113 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

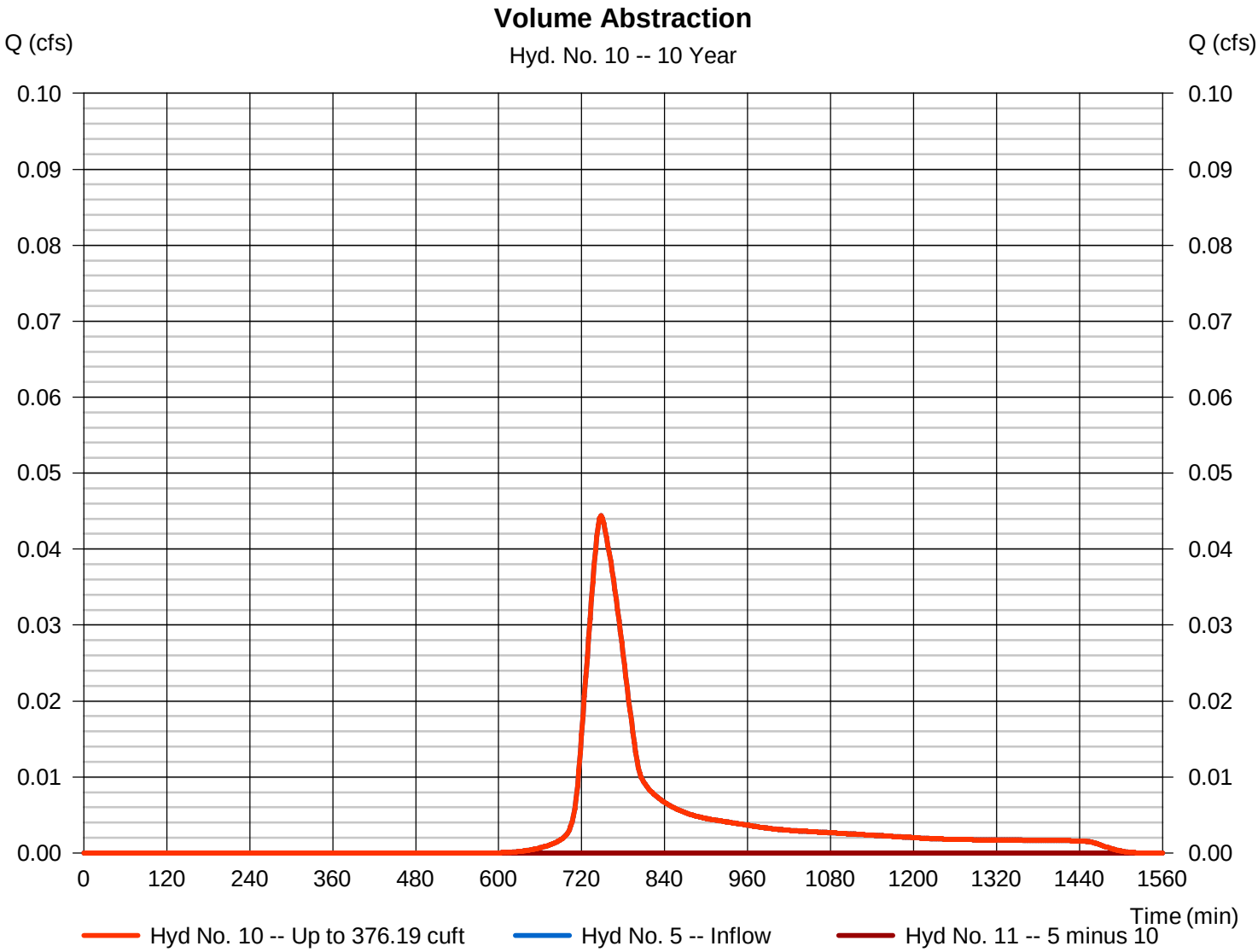


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.044 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 282 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

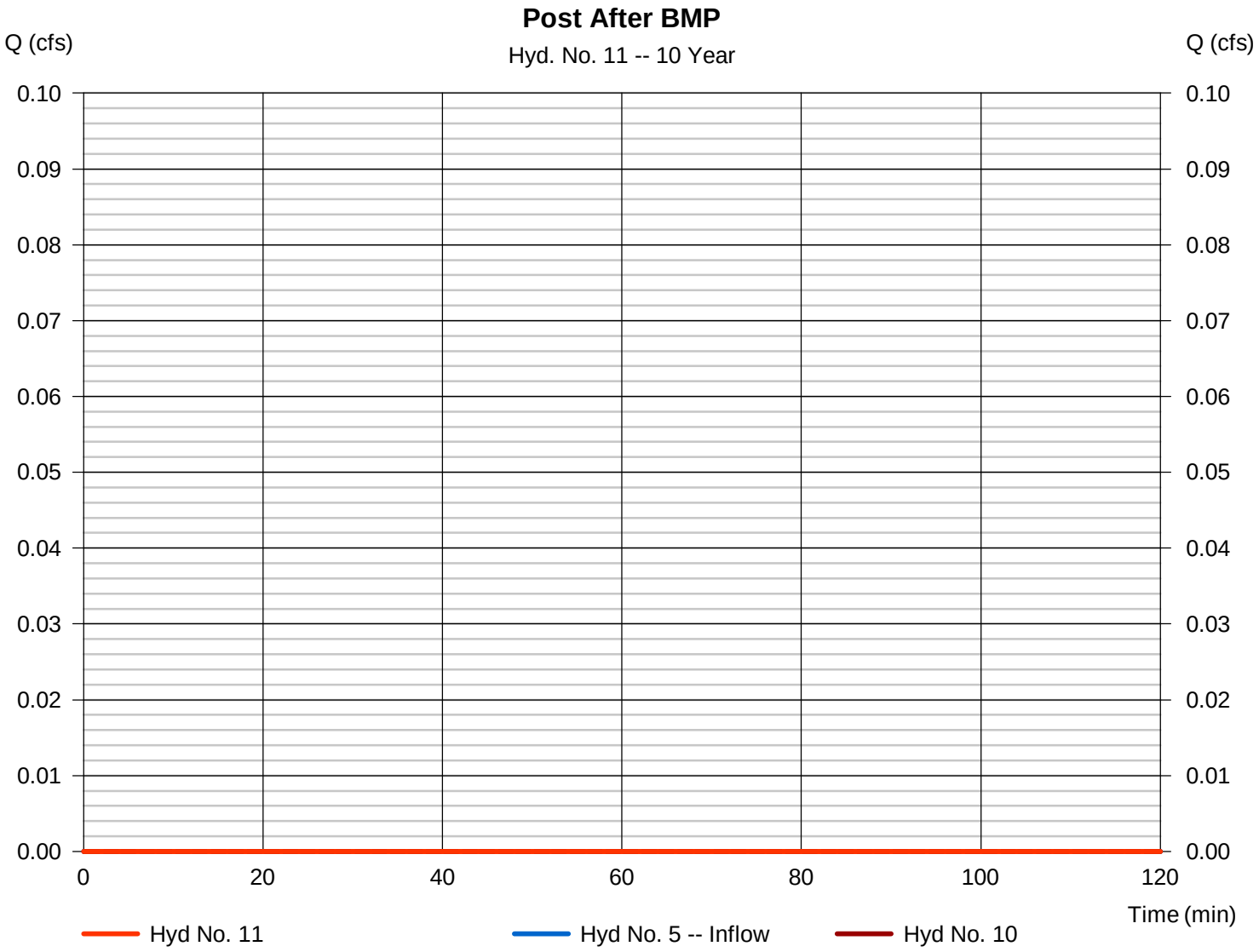


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

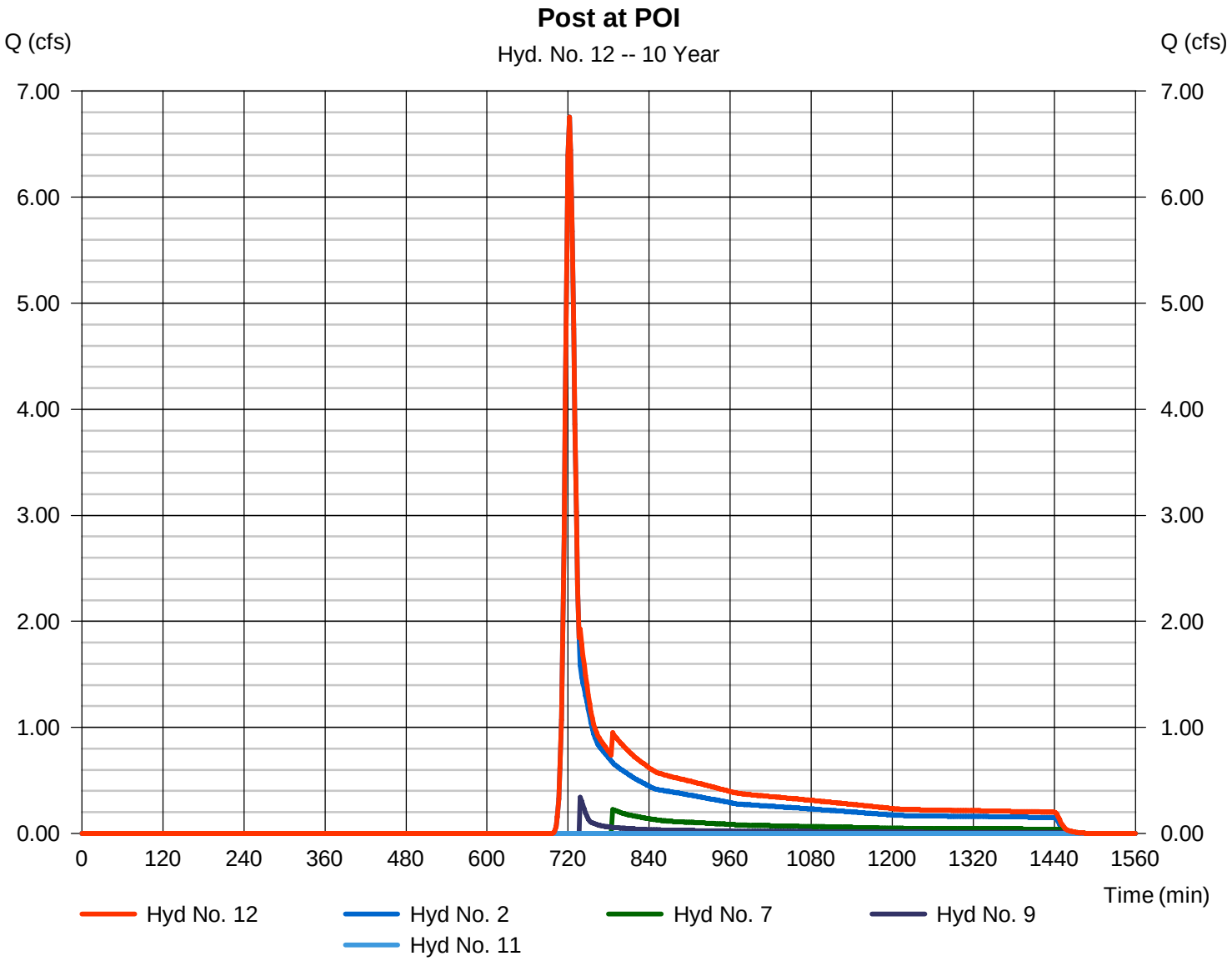


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	= Combine	Peak discharge	= 6.754 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 23,892 cuft
Inflow hyds.	= 2, 7, 9, 11	Contrib. drain. area	= 5.310 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	46.3657	11.6000	0.8696	--------
2	52.9099	11.6000	0.8555	--------
3	0.0000	0.0000	0.0000	--------
5	57.3166	11.8000	0.8245	--------
10	60.1494	11.9000	0.8045	--------
25	51.8954	10.5000	0.7395	--------
50	48.4904	9.7000	0.7034	--------
100	44.4757	8.8000	0.6639	--------

File name: Montello IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.03	3.20	2.67	2.30	2.03	1.81	1.64	1.50	1.39	1.29	1.20	1.13
2	4.78	3.82	3.20	2.76	2.43	2.18	1.98	1.81	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.60	4.52	3.81	3.31	2.93	2.64	2.41	2.21	2.05	1.91	1.79	1.69
10	6.19	5.02	4.26	3.71	3.30	2.98	2.72	2.51	2.33	2.18	2.05	1.93
25	6.84	5.56	4.73	4.14	3.70	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.32	5.96	5.08	4.46	4.00	3.64	3.35	3.11	2.91	2.73	2.58	2.45
100	7.79	6.34	5.42	4.78	4.30	3.92	3.62	3.37	3.16	2.97	2.82	2.68

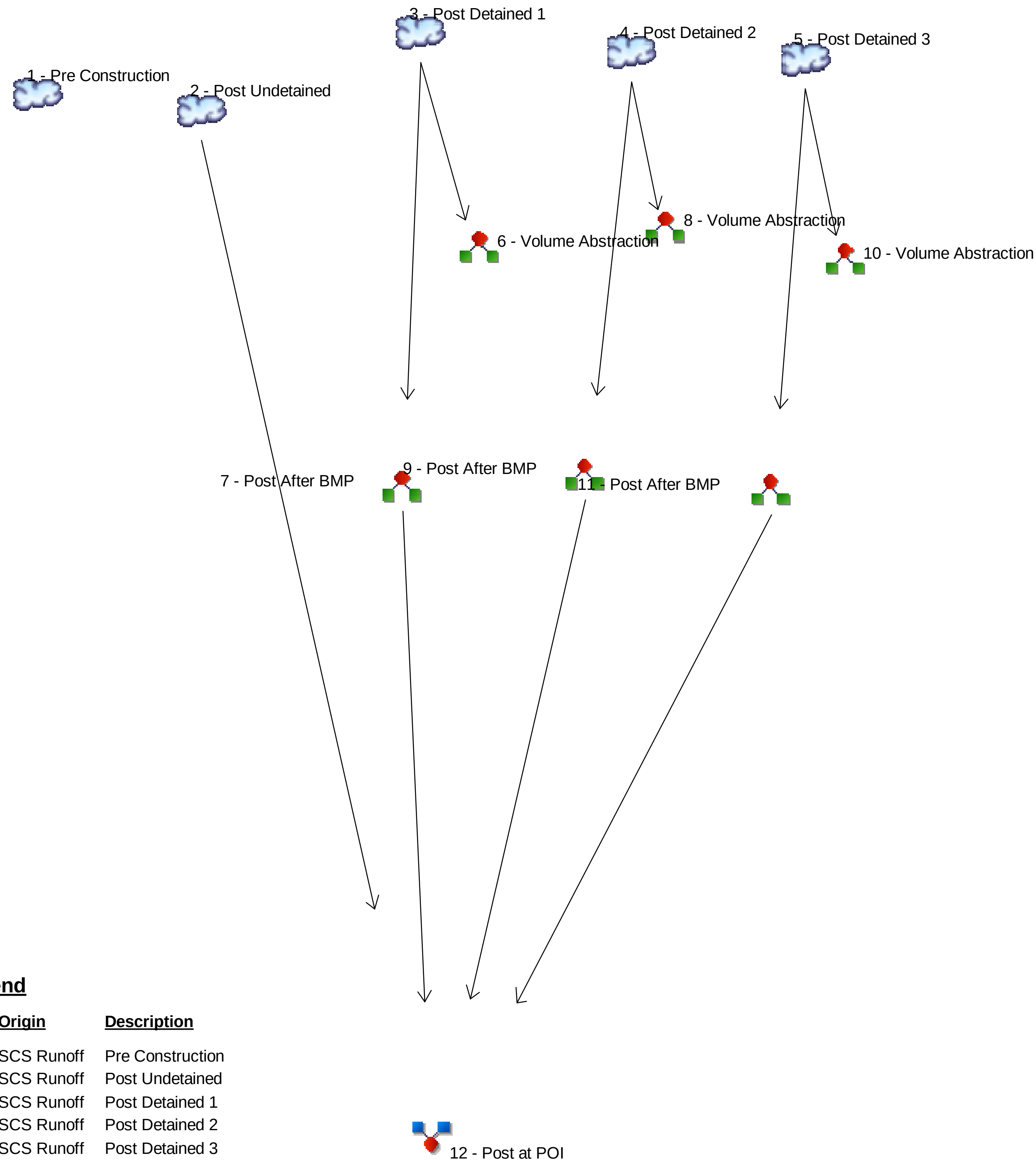
Tc = time in minutes. Values may exceed 60.

hase 2)\ESCGP-2\PPP\02 SCRO\07 PCSM\Attach 4 Stormwater Calcs\Montello\Hydraflow Rev 1\Montello Precip.pc

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.64	3.19	0.00	4.00	4.68	5.67	6.51	7.43
SCS 6-Hr	1.86	2.25	0.00	2.80	3.25	3.89	4.41	4.98
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Construction
2	SCS Runoff	Post Undetained
3	SCS Runoff	Post Detained 1
4	SCS Runoff	Post Detained 2
5	SCS Runoff	Post Detained 3
6	Diversion1	Volume Abstraction
7	Diversion2	Post After BMP
8	Diversion1	Volume Abstraction
9	Diversion2	Post After BMP
10	Diversion1	Volume Abstraction
11	Diversion2	Post After BMP
12	Combine	Post at POI

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	------	-------	-------	-------	-------	-------	-------	19.26	-------	Pre Construction
2	SCS Runoff	------	-------	-------	-------	-------	-------	-------	15.46	-------	Post Undetained
3	SCS Runoff	------	-------	-------	-------	-------	-------	-------	3.223	-------	Post Detained 1
4	SCS Runoff	------	-------	-------	-------	-------	-------	-------	1.094	-------	Post Detained 2
5	SCS Runoff	------	-------	-------	-------	-------	-------	-------	0.108	-------	Post Detained 3
6	Diversion1	3	-------	-------	-------	-------	-------	-------	3.223	-------	Volume Abstraction
7	Diversion2	3	-------	-------	-------	-------	-------	-------	3.113	-------	Post After BMP
8	Diversion1	4	-------	-------	-------	-------	-------	-------	0.922	-------	Volume Abstraction
9	Diversion2	4	-------	-------	-------	-------	-------	-------	1.094	-------	Post After BMP
10	Diversion1	5	-------	-------	-------	-------	-------	-------	0.108	-------	Volume Abstraction
11	Diversion2	5	-------	-------	-------	-------	-------	-------	0.006	-------	Post After BMP
12	Combine	2, 7, 9, 11	-------	-------	-------	-------	-------	-------	16.55	-------	Post at POI

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	19.26	2	722	51,872	------	------	------	Pre Construction
2	SCS Runoff	15.46	2	722	41,395	------	------	------	Post Undetained
3	SCS Runoff	3.223	2	728	11,569	------	------	------	Post Detained 1
4	SCS Runoff	1.094	2	722	3,072	------	------	------	Post Detained 2
5	SCS Runoff	0.108	2	734	490	------	------	------	Post Detained 3
6	Diversion1	3.223	2	728	2,921	3	------	------	Volume Abstraction
7	Diversion2	3.113	2	730	8,647	3	------	------	Post After BMP
8	Diversion1	0.922	2	718	671	4	------	------	Volume Abstraction
9	Diversion2	1.094	2	722	2,401	4	------	------	Post After BMP
10	Diversion1	0.108	2	734	376	5	------	------	Volume Abstraction
11	Diversion2	0.006	2	922	114	5	------	------	Post After BMP
12	Combine	16.55	2	722	52,557	2, 7, 9, 11	------	------	Post at POI

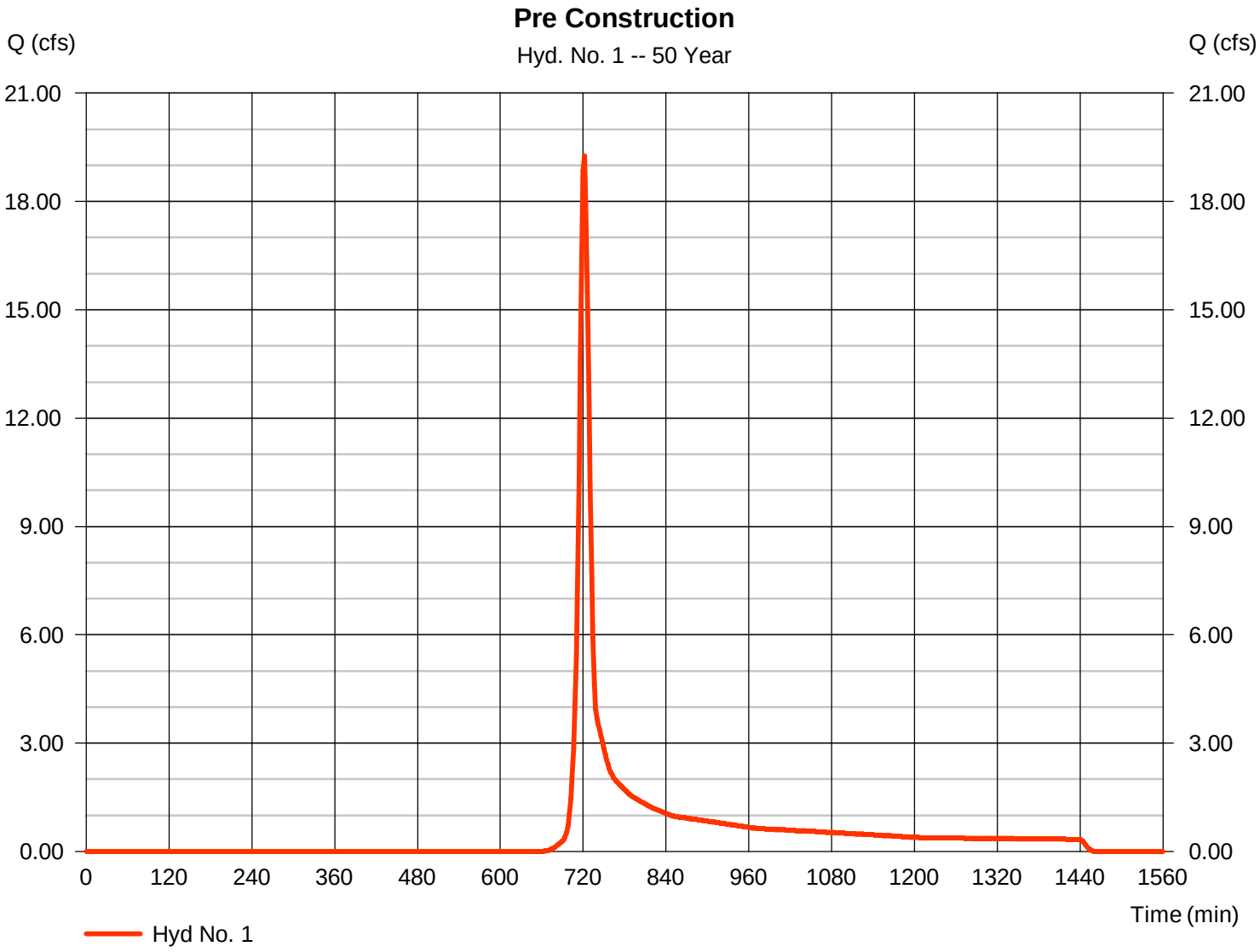
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.26 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	51,872 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



TR55 Tc Worksheet

Hyd. No. 1

Pre Construction

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 7.51**	**+**	**0.00**	**+**	**0.00**	**=**	**7.51**
Shallow Concentrated Flow							
Flow length (ft)	= 837.00		0.00		0.00		
Watercourse slope (%)	= 3.30		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.93		0.00		0.00		
Travel Time (min)	**= 4.76**	**+**	**0.00**	**+**	**0.00**	**=**	**4.76**
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 ..... 12.30 min

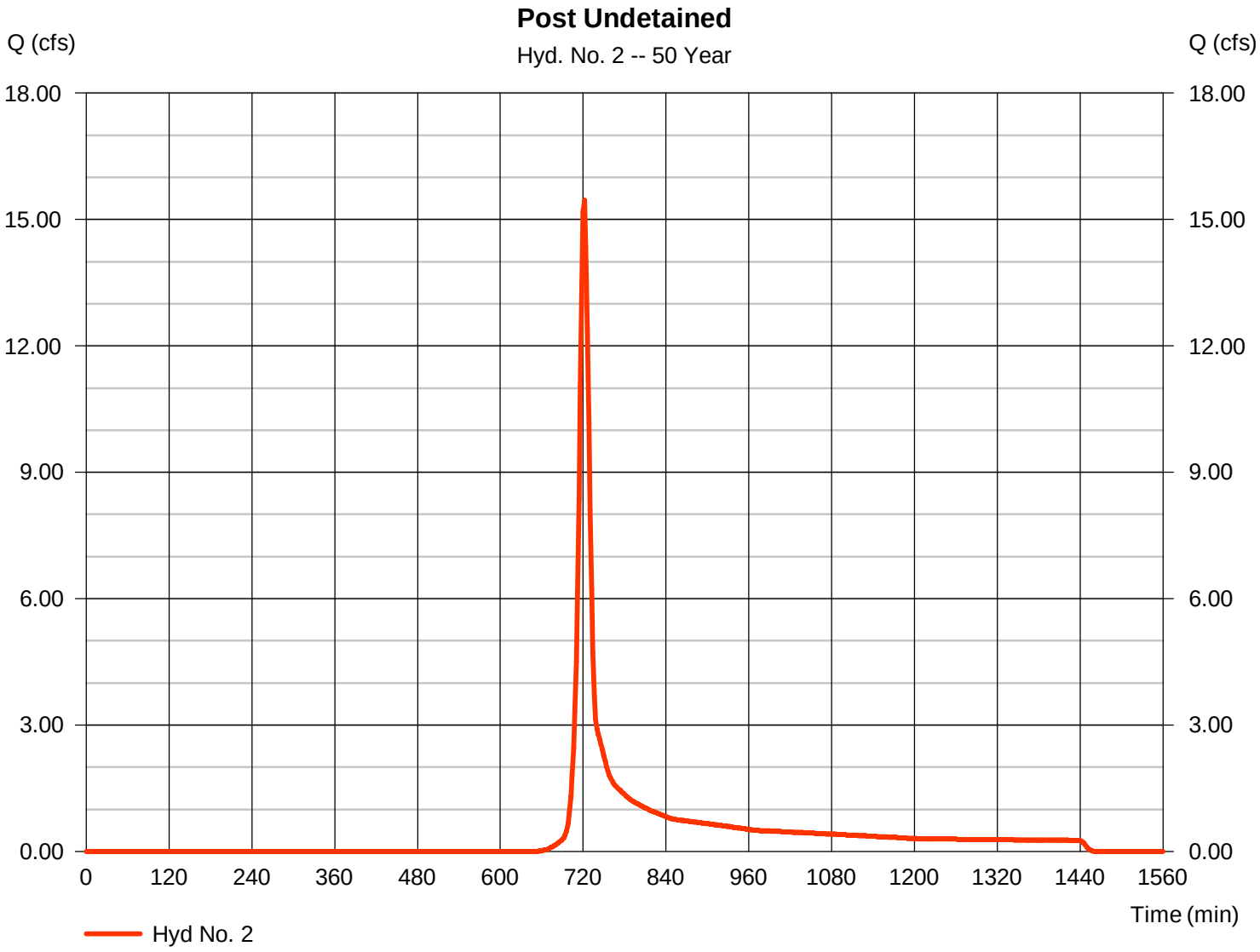
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	= SCS Runoff	Peak discharge	= 15.46 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 41,395 cuft
Drainage area	= 5.310 ac	Curve number	= 58*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 6.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



TR55 Tc Worksheet

Hyd. No. 2

Post Undetained

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 5.69**	**+**	**0.00**	**+**	**0.00**	**=**	**5.69**
Shallow Concentrated Flow							
Flow length (ft)	= 687.00		0.00		0.00		
Watercourse slope (%)	= 2.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.75		0.00		0.00		
Travel Time (min)	**= 4.17**	**+**	**0.00**	**+**	**0.00**	**=**	**4.17**
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 ..... 9.90 min

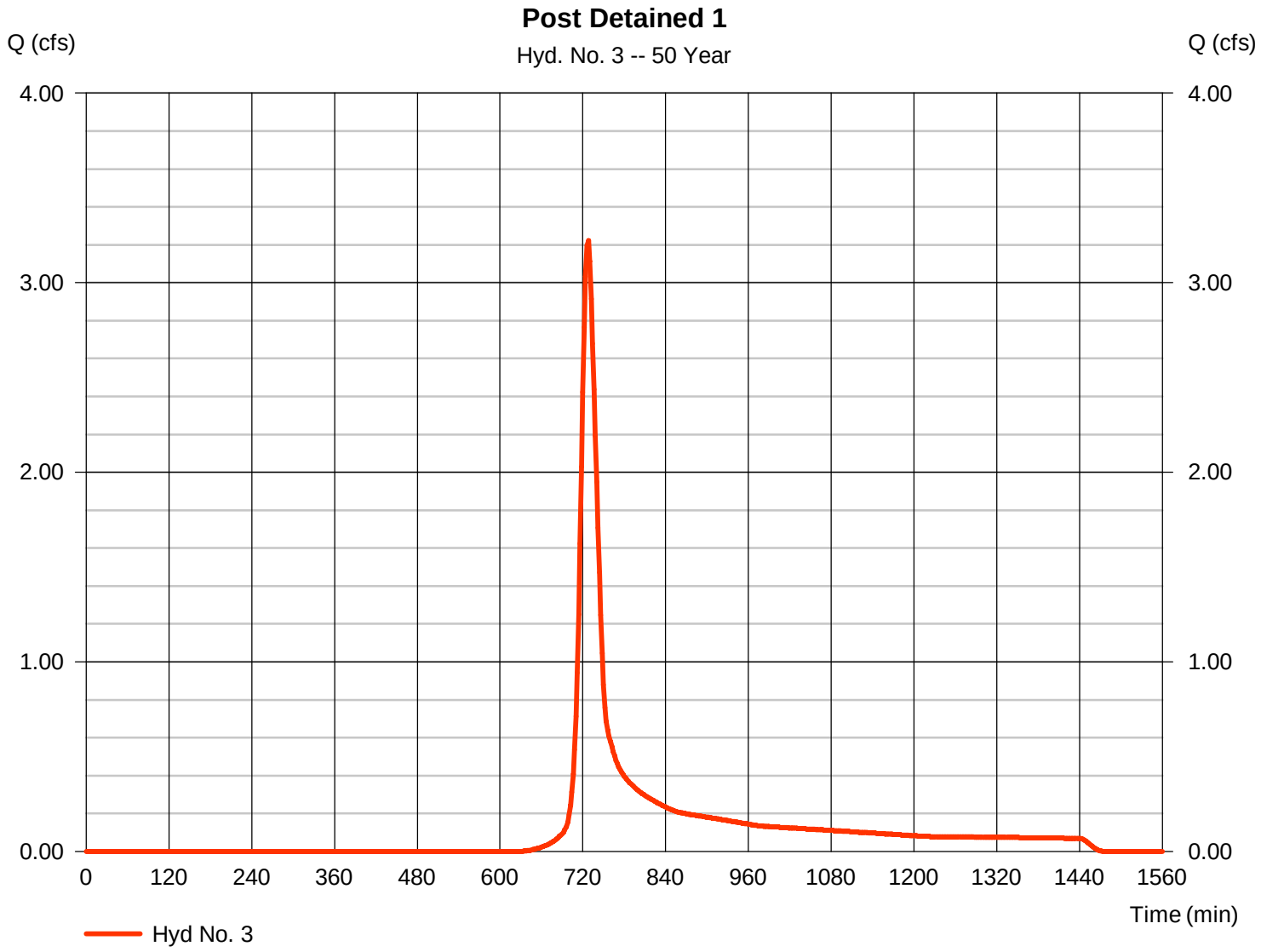
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.223 cfs
Storm frequency	=	50 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	11,569 cuft
Drainage area	=	1.330 ac	Curve number	=	61*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.40 min
Total precip.	=	6.51 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



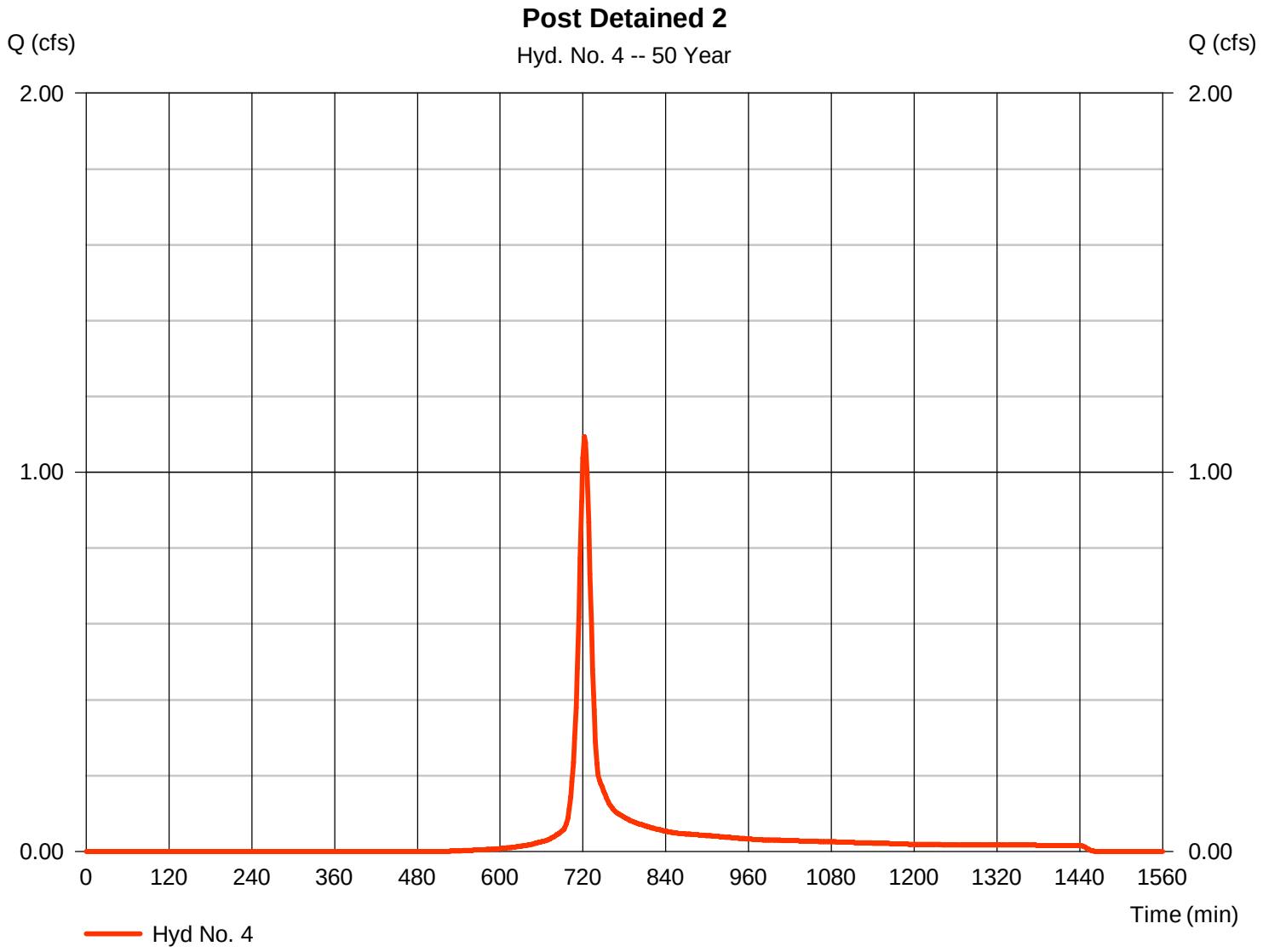
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.094 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 3,072 cuft
Drainage area	= 0.270 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.30 min
Total precip.	= 6.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



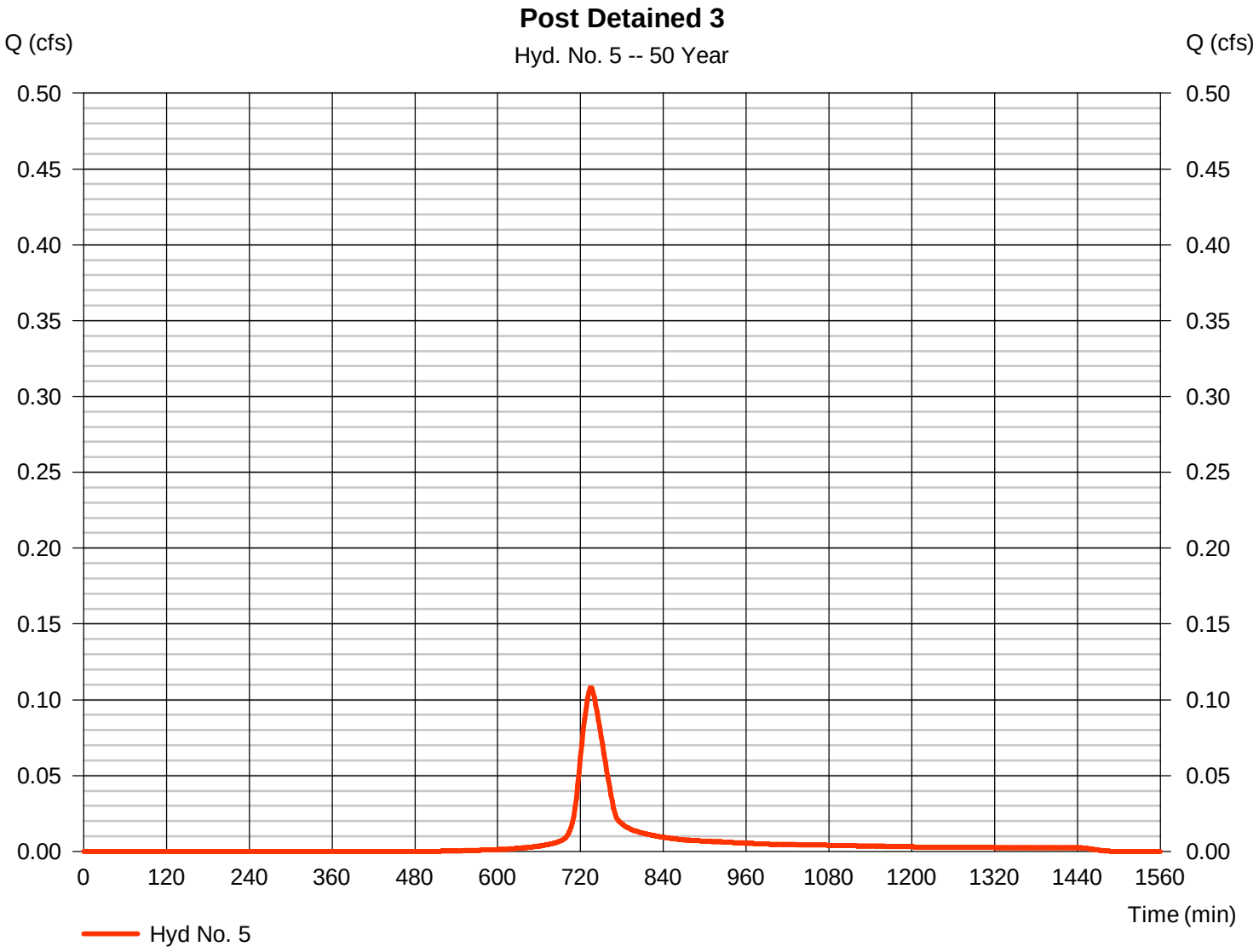
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.108 cfs
Storm frequency	= 50 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 490 cuft
Drainage area	= 0.040 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 35.40 min
Total precip.	= 6.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

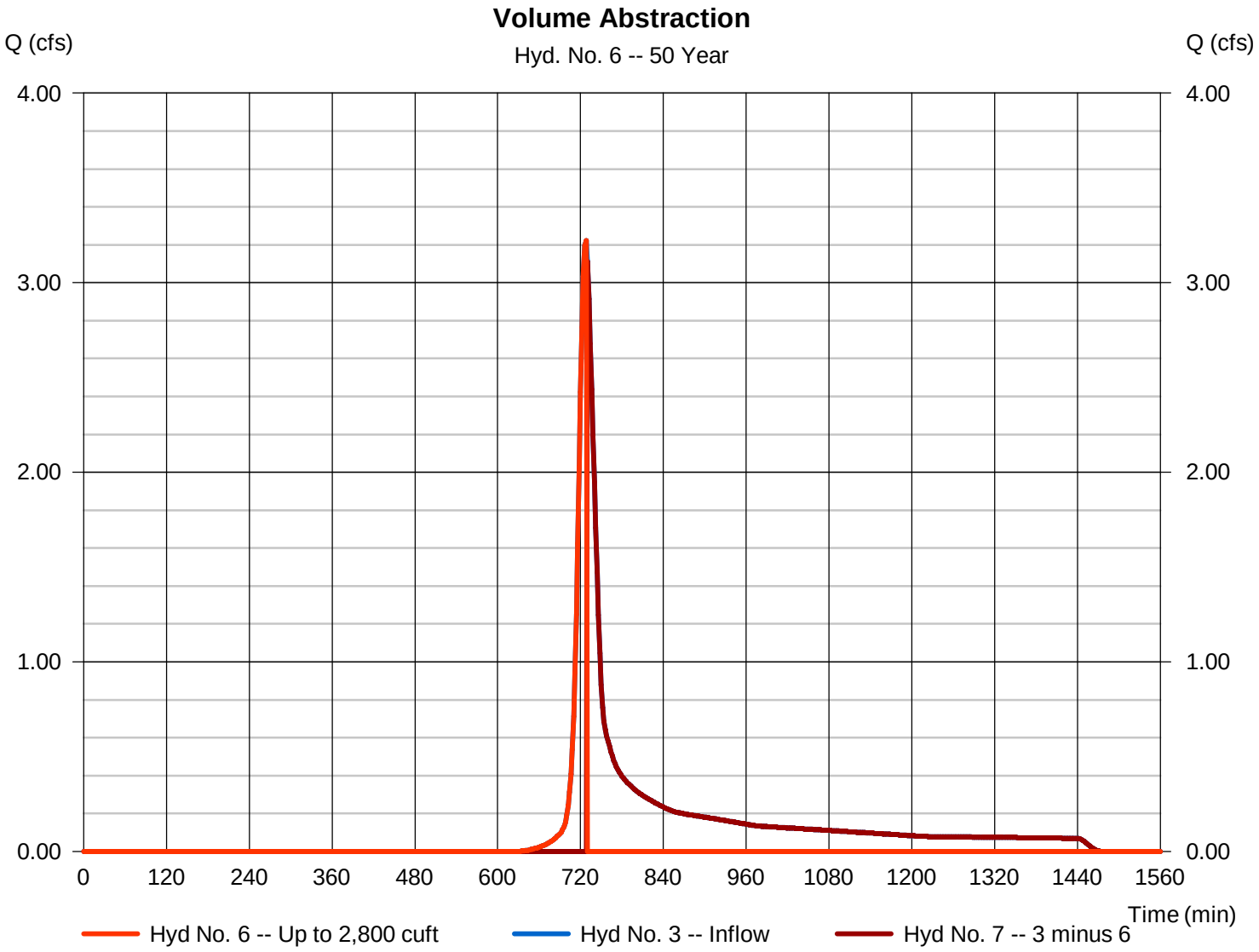


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 3.223 cfs
Storm frequency	= 50 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,921 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

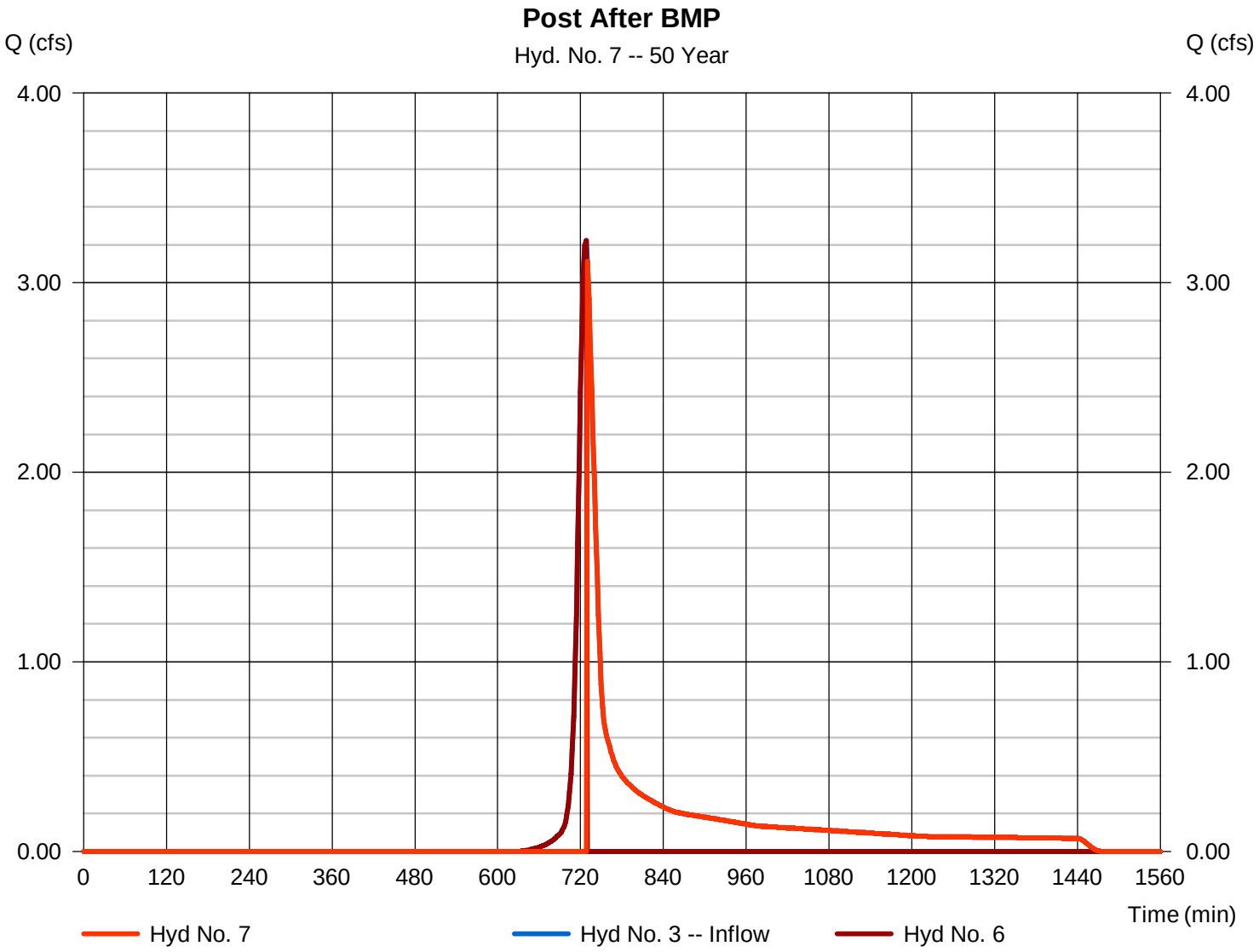


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 3.113 cfs
Storm frequency	= 50 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 8,647 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

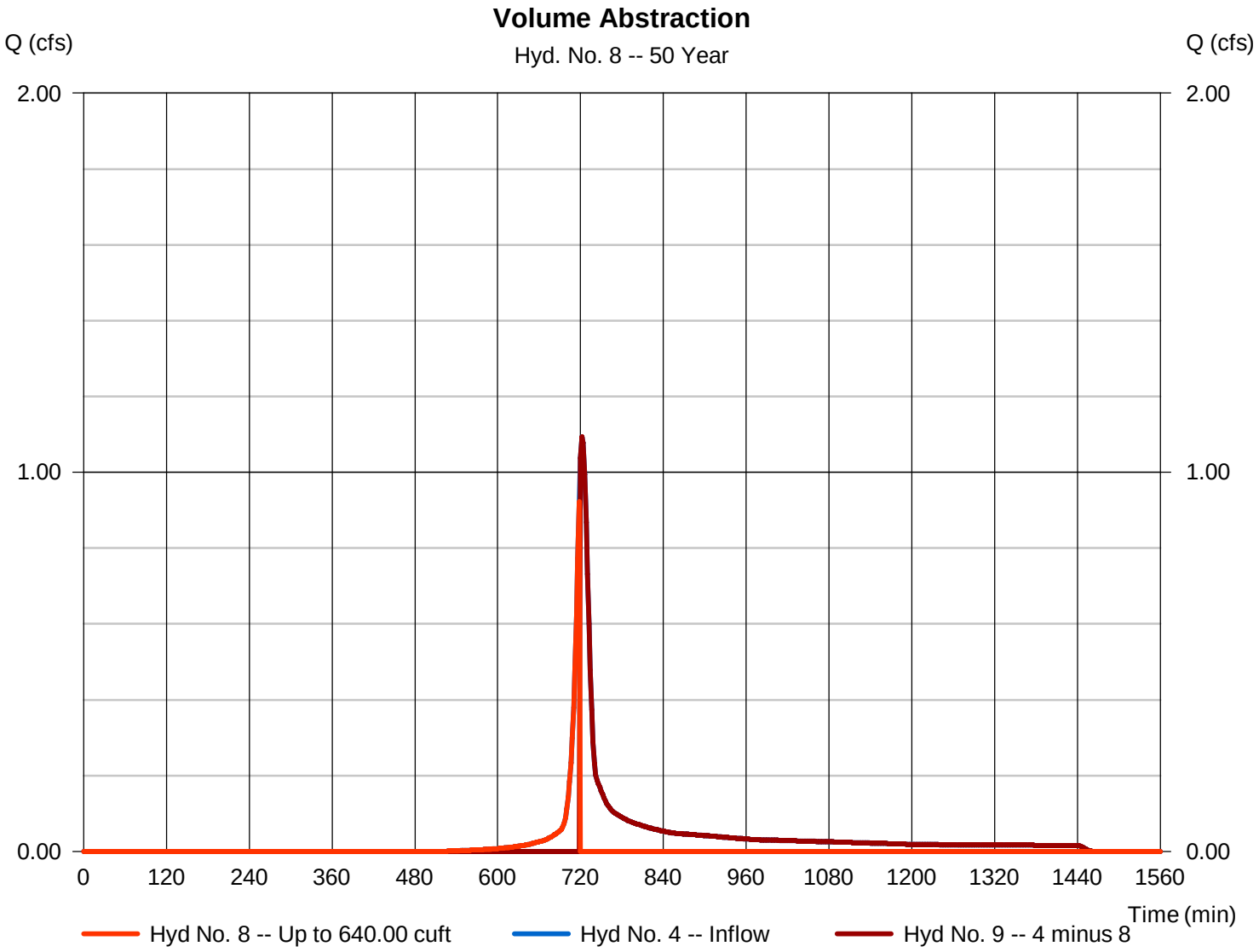


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.922 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 671 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

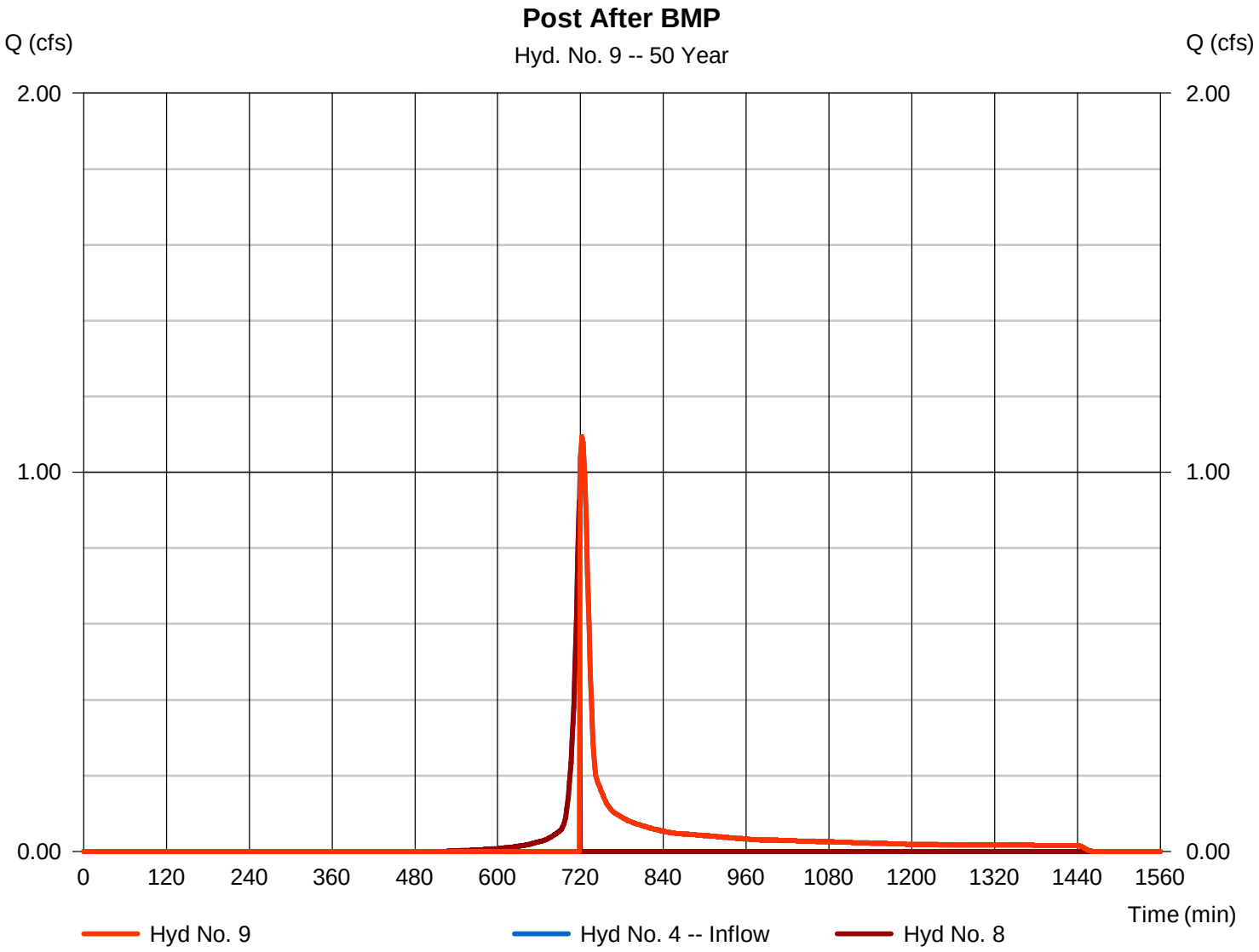


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.094 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,401 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

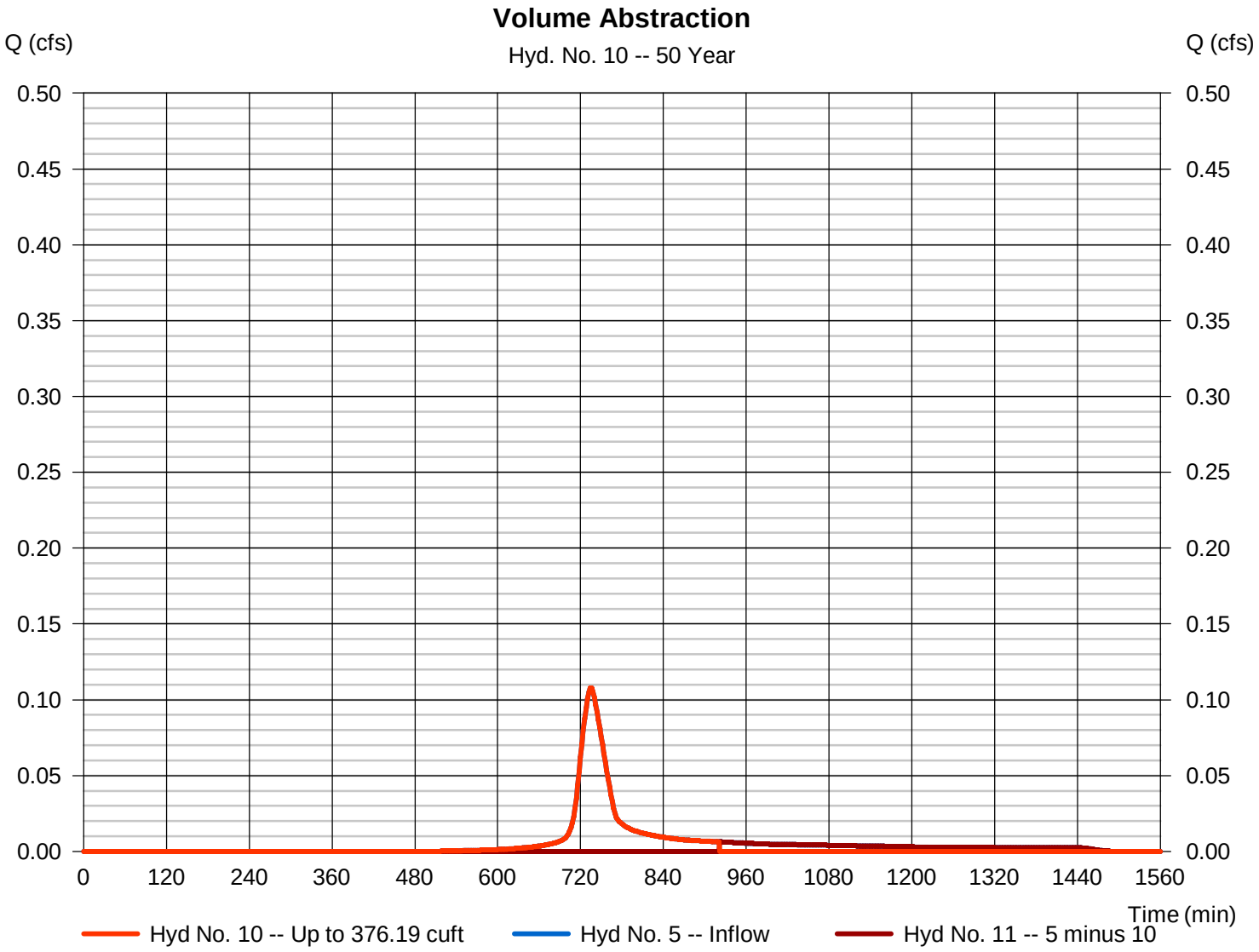


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.108 cfs
Storm frequency	= 50 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 376 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

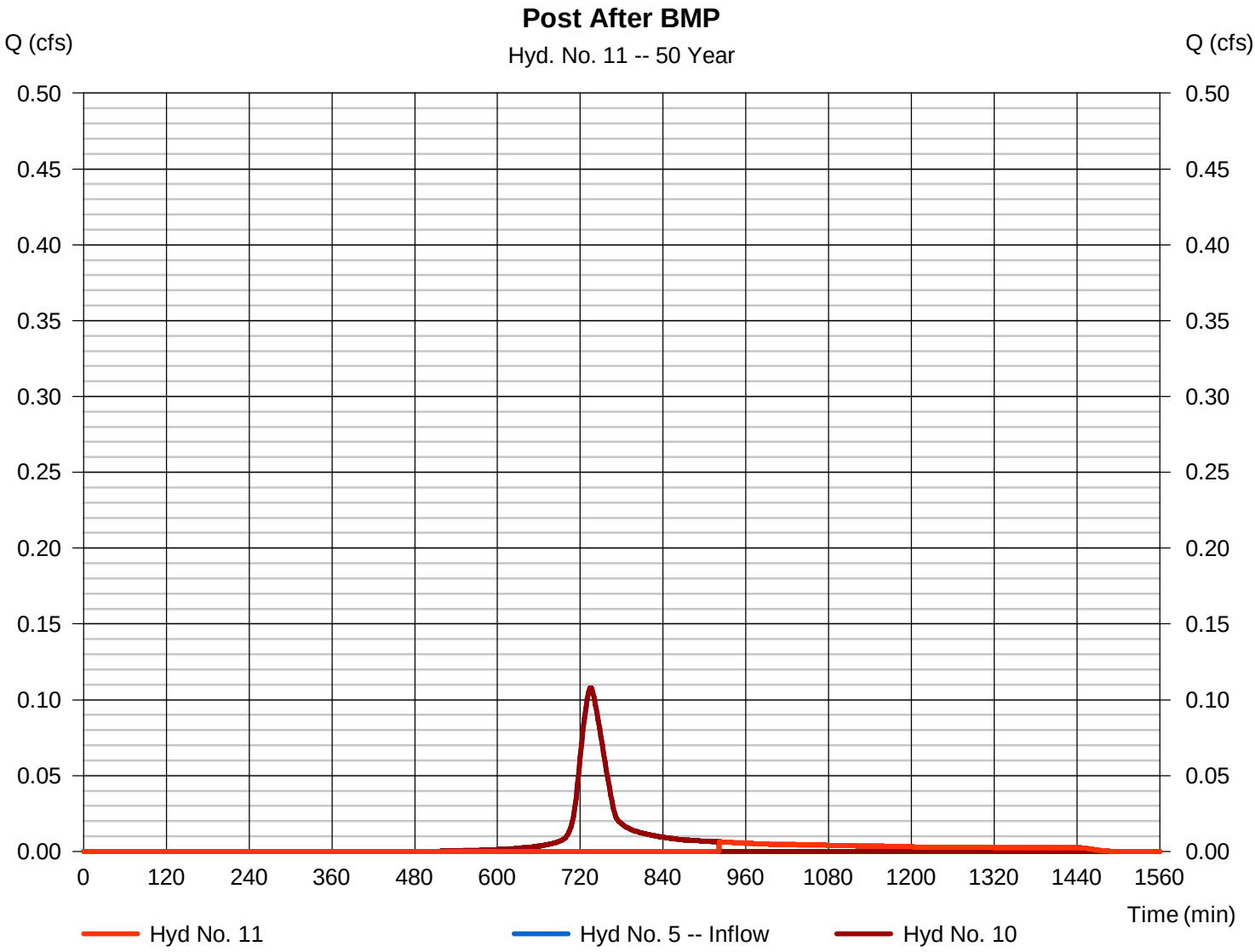


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.006 cfs
Storm frequency	= 50 yrs	Time to peak	= 922 min
Time interval	= 2 min	Hyd. volume	= 114 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

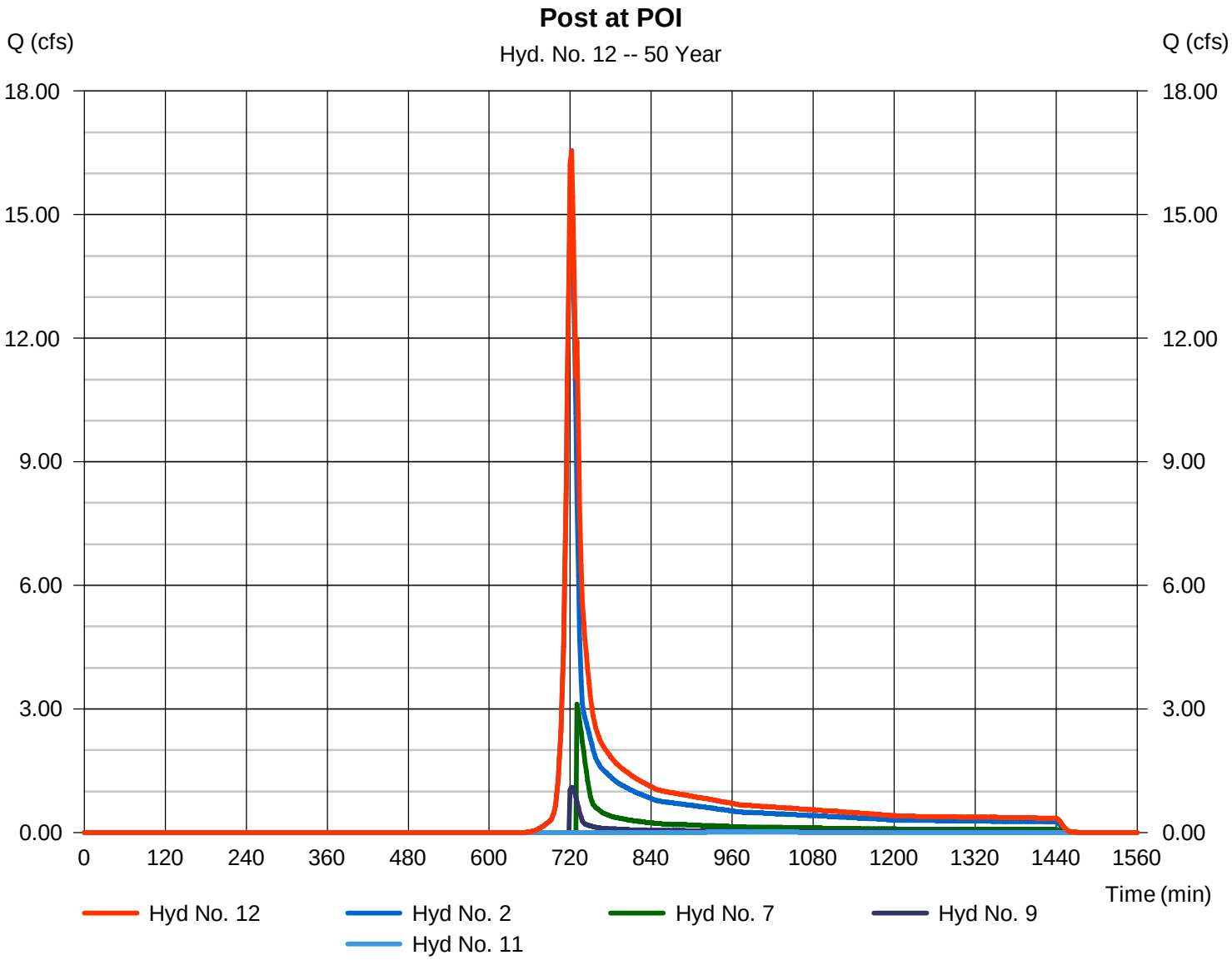


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	= Combine	Peak discharge	= 16.55 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 52,557 cuft
Inflow hyds.	= 2, 7, 9, 11	Contrib. drain. area	= 5.310 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	46.3657	11.6000	0.8696	--------
2	52.9099	11.6000	0.8555	--------
3	0.0000	0.0000	0.0000	--------
5	57.3166	11.8000	0.8245	--------
10	60.1494	11.9000	0.8045	--------
25	51.8954	10.5000	0.7395	--------
50	48.4904	9.7000	0.7034	--------
100	44.4757	8.8000	0.6639	--------

File name: Montello IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.03	3.20	2.67	2.30	2.03	1.81	1.64	1.50	1.39	1.29	1.20	1.13
2	4.78	3.82	3.20	2.76	2.43	2.18	1.98	1.81	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.60	4.52	3.81	3.31	2.93	2.64	2.41	2.21	2.05	1.91	1.79	1.69
10	6.19	5.02	4.26	3.71	3.30	2.98	2.72	2.51	2.33	2.18	2.05	1.93
25	6.84	5.56	4.73	4.14	3.70	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.32	5.96	5.08	4.46	4.00	3.64	3.35	3.11	2.91	2.73	2.58	2.45
100	7.79	6.34	5.42	4.78	4.30	3.92	3.62	3.37	3.16	2.97	2.82	2.68

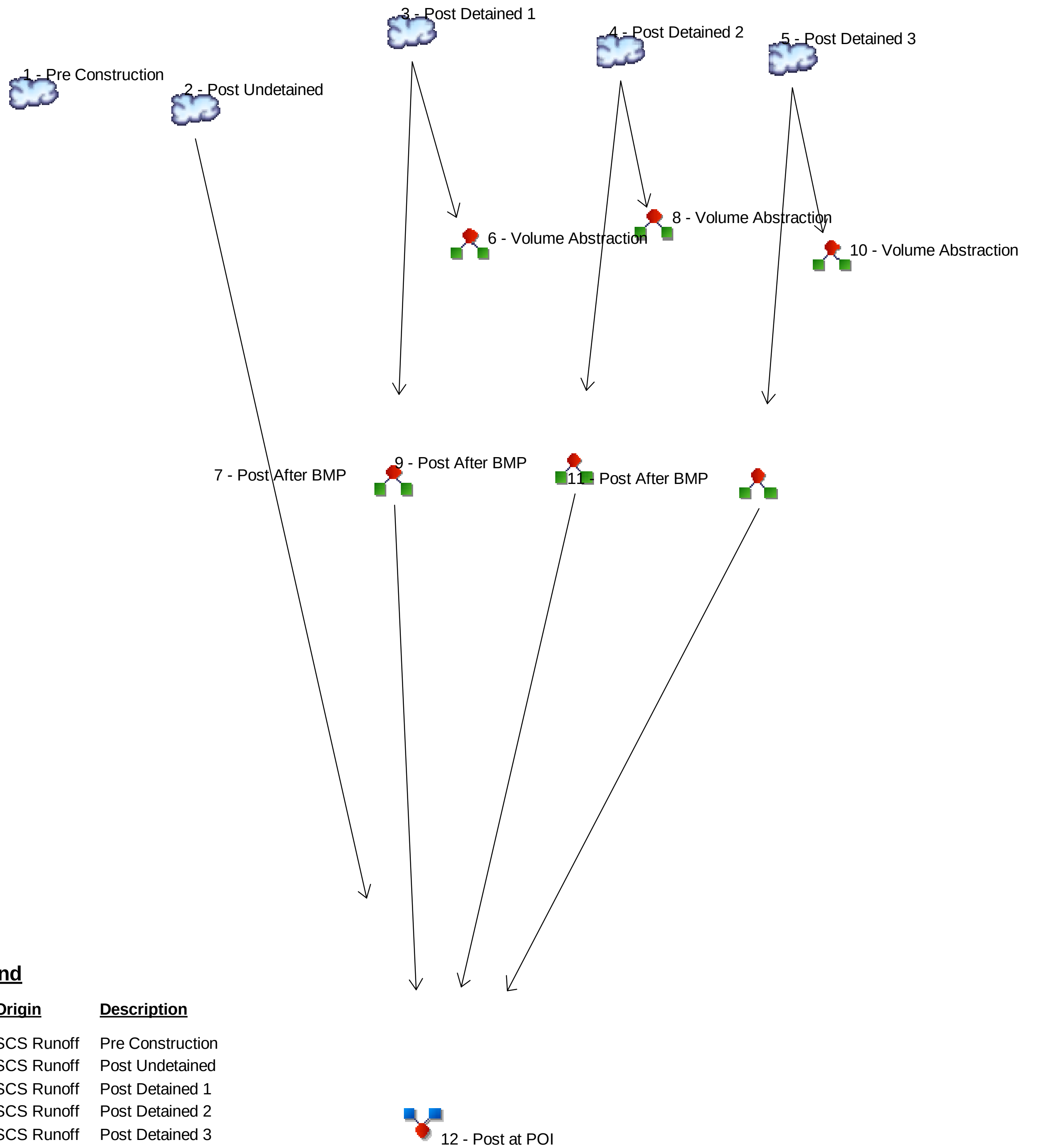
Tc = time in minutes. Values may exceed 60.

hase 2)\ESCGP-2\PPP\02 SCRO\07 PCSM\Attach 4 Stormwater Calcs\Montello\Hydraflow Rev 1\Montello Precip.pc

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.64	3.19	0.00	4.00	4.68	5.67	6.51	7.43
SCS 6-Hr	1.86	2.25	0.00	2.80	3.25	3.89	4.41	4.98
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Construction
2	SCS Runoff	Post Undetained
3	SCS Runoff	Post Detained 1
4	SCS Runoff	Post Detained 2
5	SCS Runoff	Post Detained 3
6	Diversion1	Volume Abstraction
7	Diversion2	Post After BMP
8	Diversion1	Volume Abstraction
9	Diversion2	Post After BMP
10	Diversion1	Volume Abstraction
11	Diversion2	Post After BMP
12	Combine	Post at POI

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	25.57	Pre Construction
2	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	20.37	Post Undetained
3	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	4.556	Post Detained 1
4	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	1.356	Post Detained 2
5	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	0.152	Post Detained 3
6	Diversion1	3	-------	-------	-------	-------	-------	-------	-------	4.318	Volume Abstraction
7	Diversion2	3	-------	-------	-------	-------	-------	-------	-------	4.556	Post After BMP
8	Diversion1	4	-------	-------	-------	-------	-------	-------	-------	0.784	Volume Abstraction
9	Diversion2	4	-------	-------	-------	-------	-------	-------	-------	1.356	Post After BMP
10	Diversion1	5	-------	-------	-------	-------	-------	-------	-------	0.152	Volume Abstraction
11	Diversion2	5	-------	-------	-------	-------	-------	-------	-------	0.020	Post After BMP
12	Combine	2, 7, 9, 11	-------	-------	-------	-------	-------	-------	-------	24.69	Post at POI

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	25.57	2	722	67,744	------	------	------	Pre Construction
2	SCS Runoff	20.37	2	722	53,788	------	------	------	Post Undetained
3	SCS Runoff	4.556	2	724	14,562	------	------	------	Post Detained 1
4	SCS Runoff	1.356	2	722	3,802	------	------	------	Post Detained 2
5	SCS Runoff	0.152	2	730	610	------	------	------	Post Detained 3
6	Diversion1	4.318	2	722	3,085	3	------	------	Volume Abstraction
7	Diversion2	4.556	2	724	11,477	3	------	------	Post After BMP
8	Diversion1	0.784	2	714	645	4	------	------	Volume Abstraction
9	Diversion2	1.356	2	722	3,157	4	------	------	Post After BMP
10	Diversion1	0.152	2	730	378	5	------	------	Volume Abstraction
11	Diversion2	0.020	2	778	232	5	------	------	Post After BMP
12	Combine	24.69	2	724	68,654	2, 7, 9, 11	------	------	Post at POI

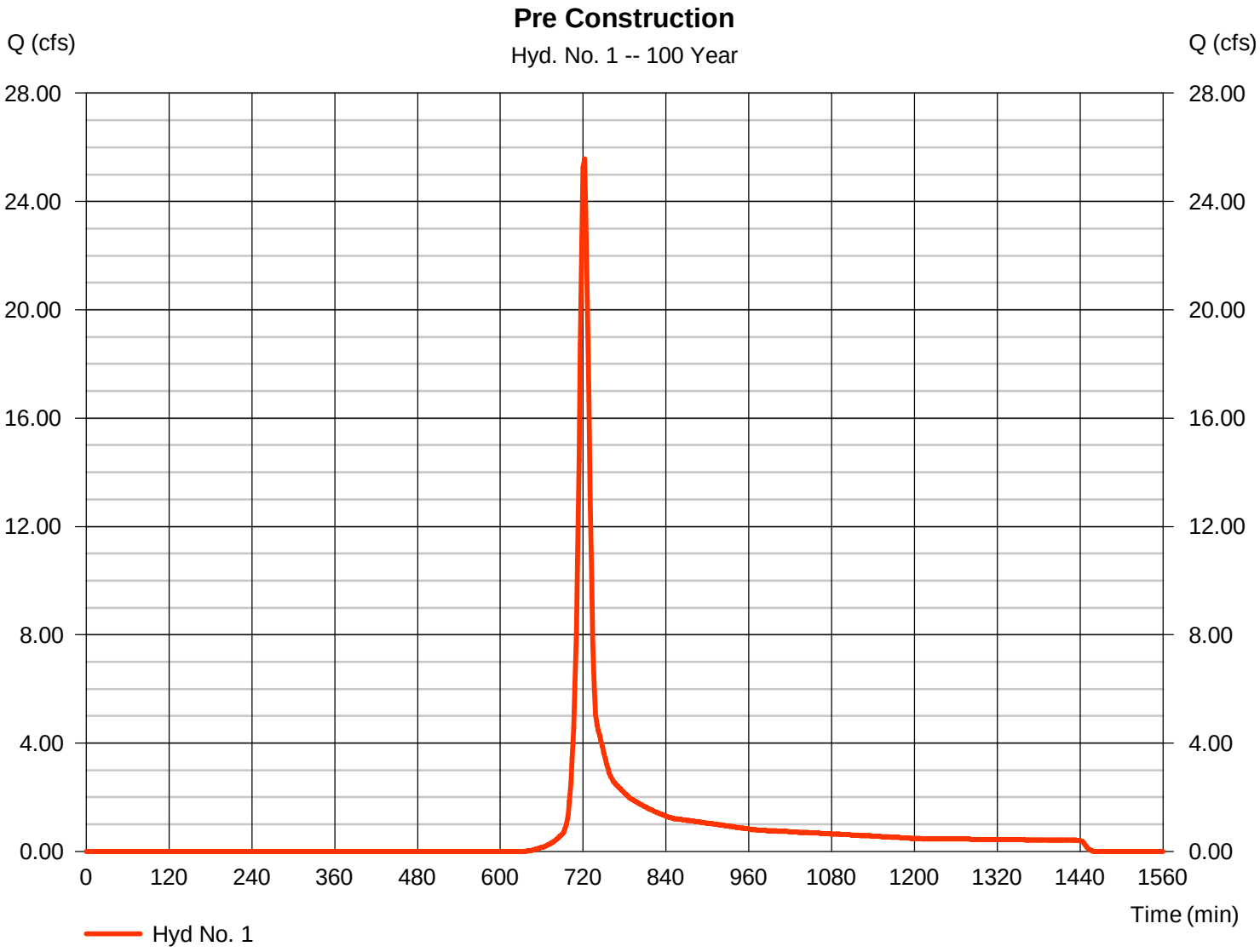
Hydrograph Report

Hyd. No. 1

Pre Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.57 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	67,744 cuft
Drainage area	=	6.950 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.30 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.520 x 55) + (0.010 x 85) + (0.010 x 98) + (5.410 x 58)] / 6.950



TR55 Tc Worksheet

Hyd. No. 1

Pre Construction

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 7.51**	**+**	**0.00**	**+**	**0.00**	**=**	**7.51**
Shallow Concentrated Flow							
Flow length (ft)	= 837.00		0.00		0.00		
Watercourse slope (%)	= 3.30		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.93		0.00		0.00		
Travel Time (min)	**= 4.76**	**+**	**0.00**	**+**	**0.00**	**=**	**4.76**
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 ..... 12.30 min

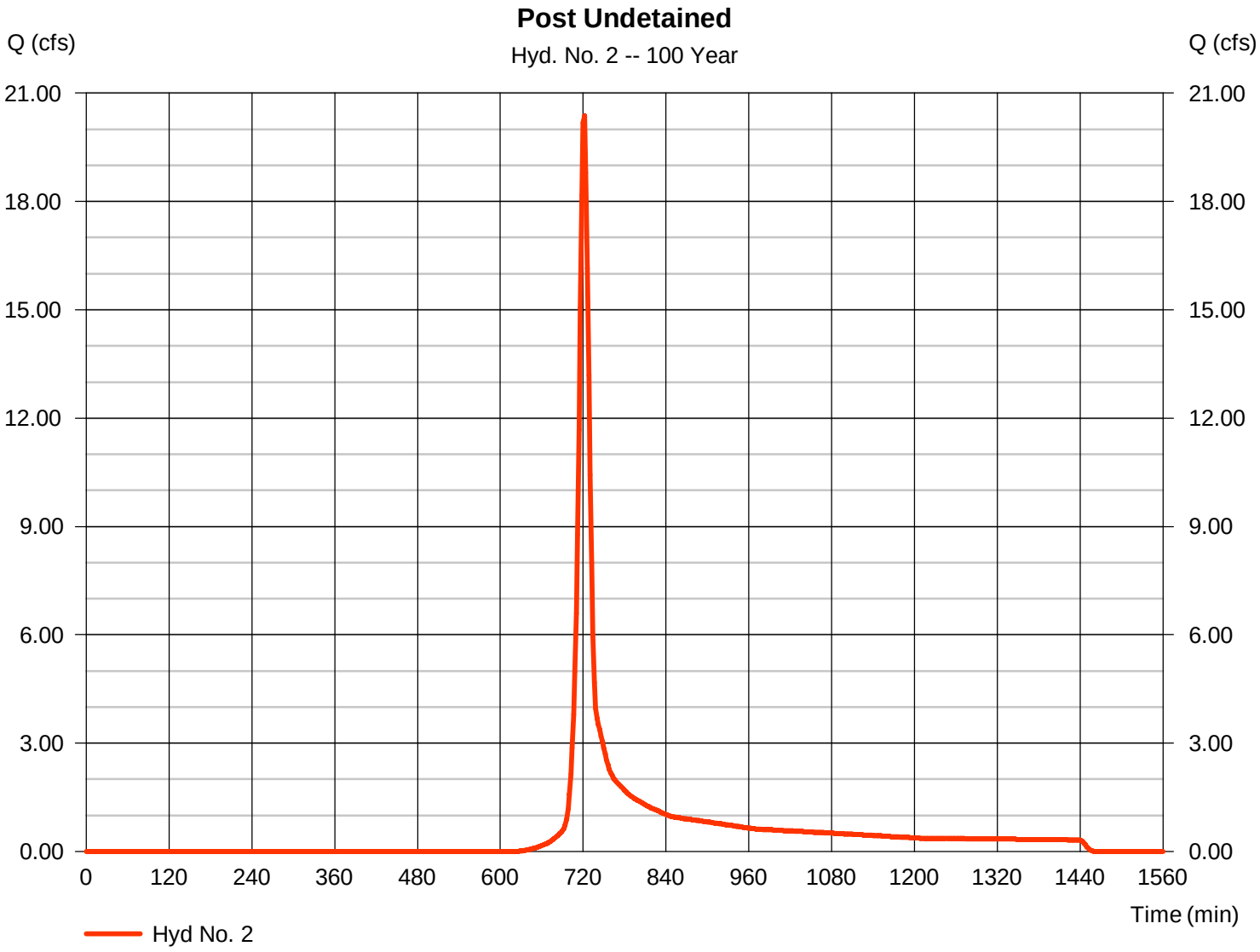
Hydrograph Report

Hyd. No. 2

Post Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.37 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	53,788 cuft
Drainage area	=	5.310 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.90 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.050 x 85) + (4.470 x 58) + (0.790 x 55)] / 5.310



TR55 Tc Worksheet

Hyd. No. 2

Post Undetained

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.19		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 5.69**	**+**	**0.00**	**+**	**0.00**	**=**	**5.69**
Shallow Concentrated Flow							
Flow length (ft)	= 687.00		0.00		0.00		
Watercourse slope (%)	= 2.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.75		0.00		0.00		
Travel Time (min)	**= 4.17**	**+**	**0.00**	**+**	**0.00**	**=**	**4.17**
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 ..... 9.90 min

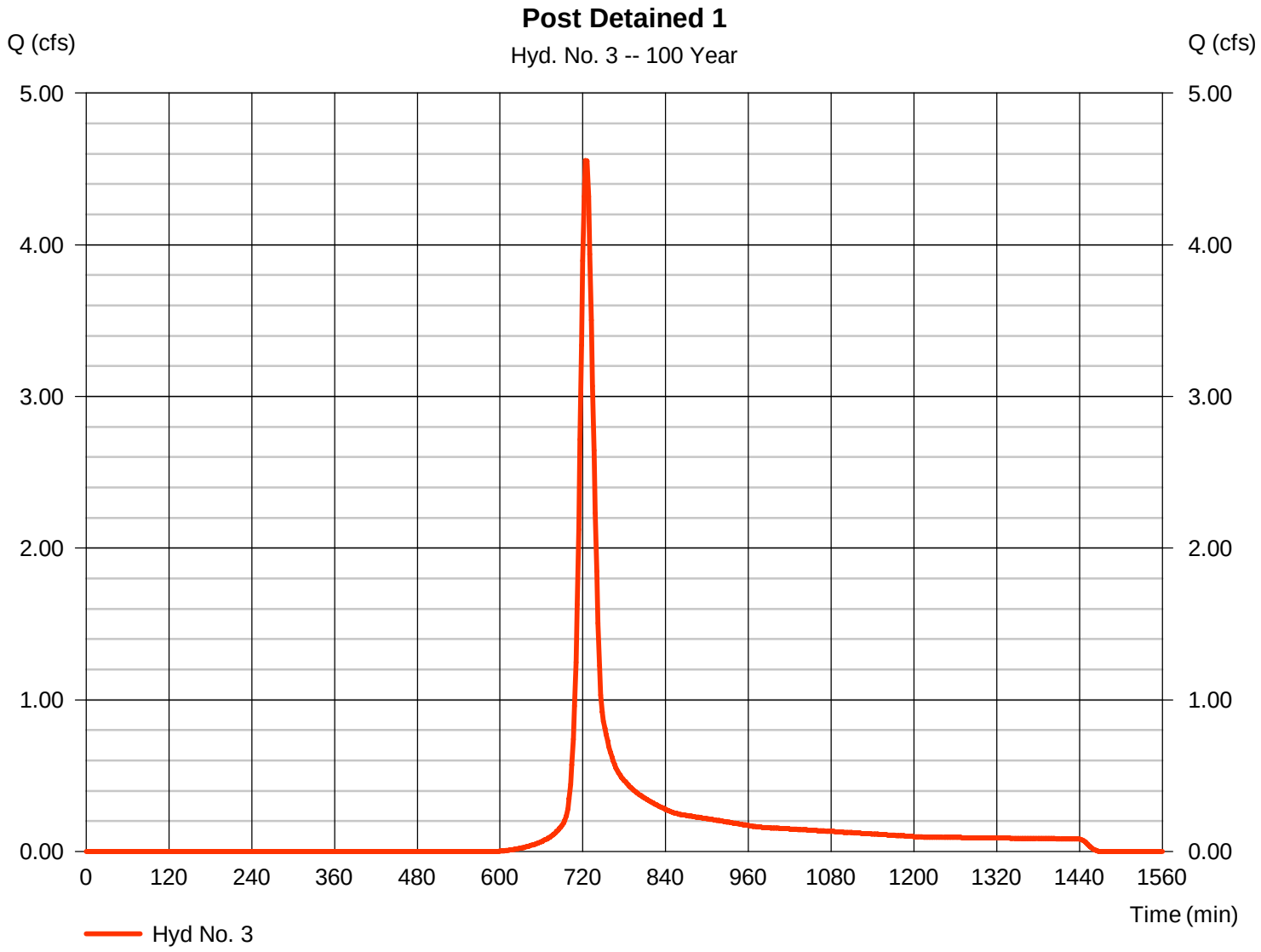
Hydrograph Report

Hyd. No. 3

Post Detained 1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.556 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 14,562 cuft
Drainage area	= 1.330 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 7.43 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.420 x 55) + (0.170 x 85) + (0.730 x 58) + (0.010 x 98)] / 1.330



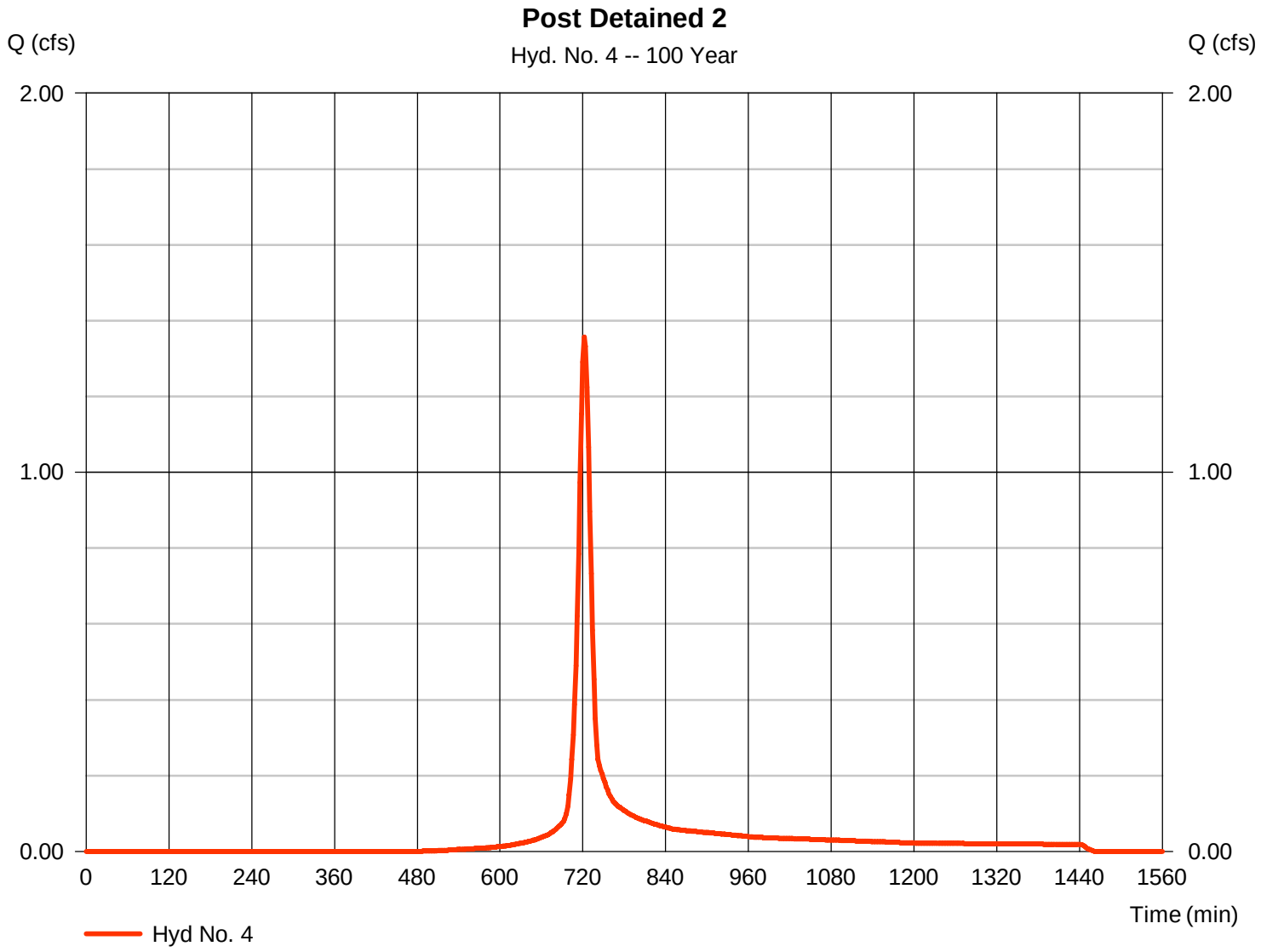
Hydrograph Report

Hyd. No. 4

Post Detained 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.356 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	3,802 cuft
Drainage area	=	0.270 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.80 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 85) + (0.140 x 58) + (0.010 x 55)] / 0.270



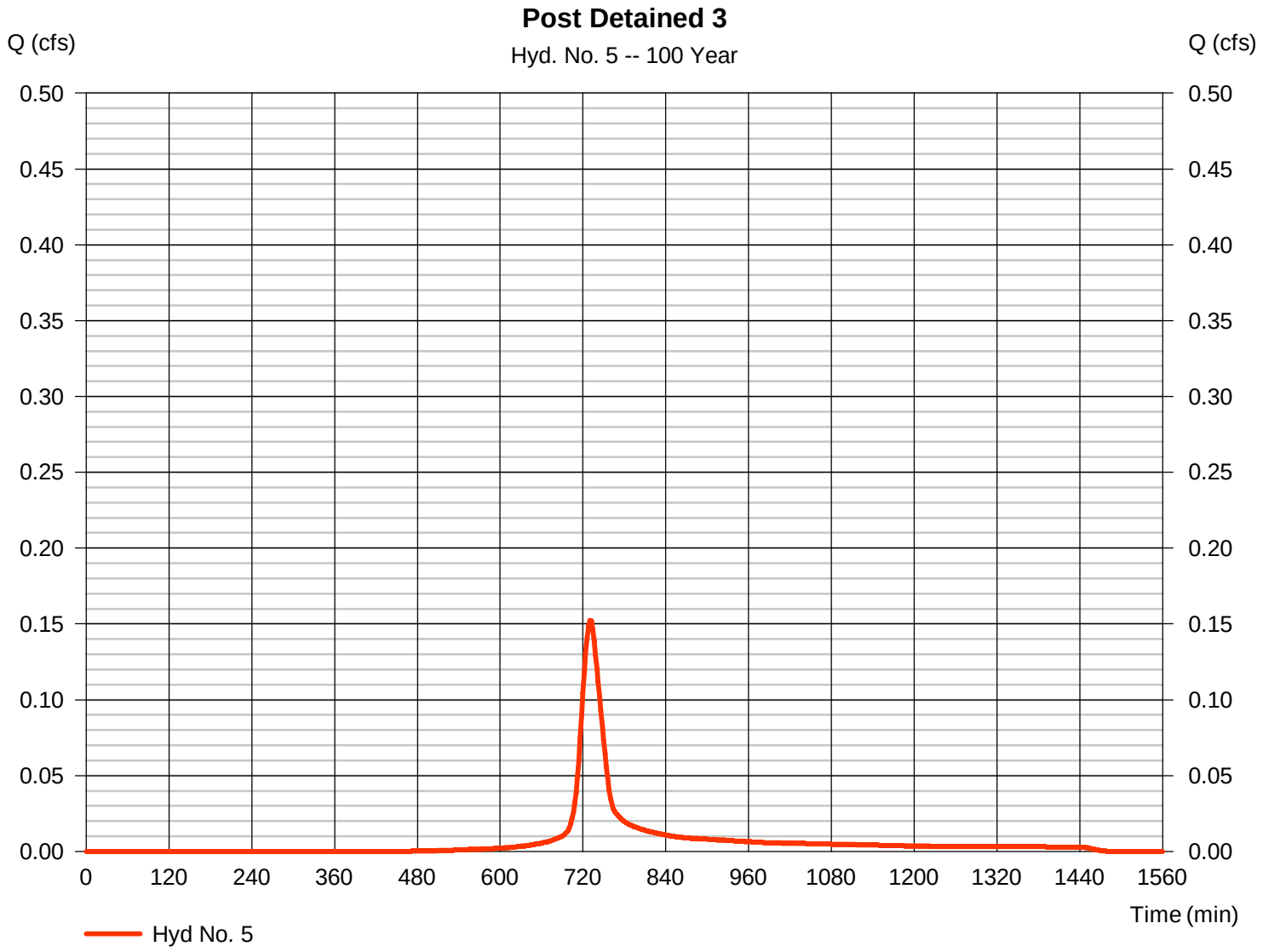
Hydrograph Report

Hyd. No. 5

Post Detained 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.152 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	610 cuft
Drainage area	=	0.040 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	30.06 min
Total precip.	=	7.43 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.020 x 58) + (0.020 x 85)] / 0.040

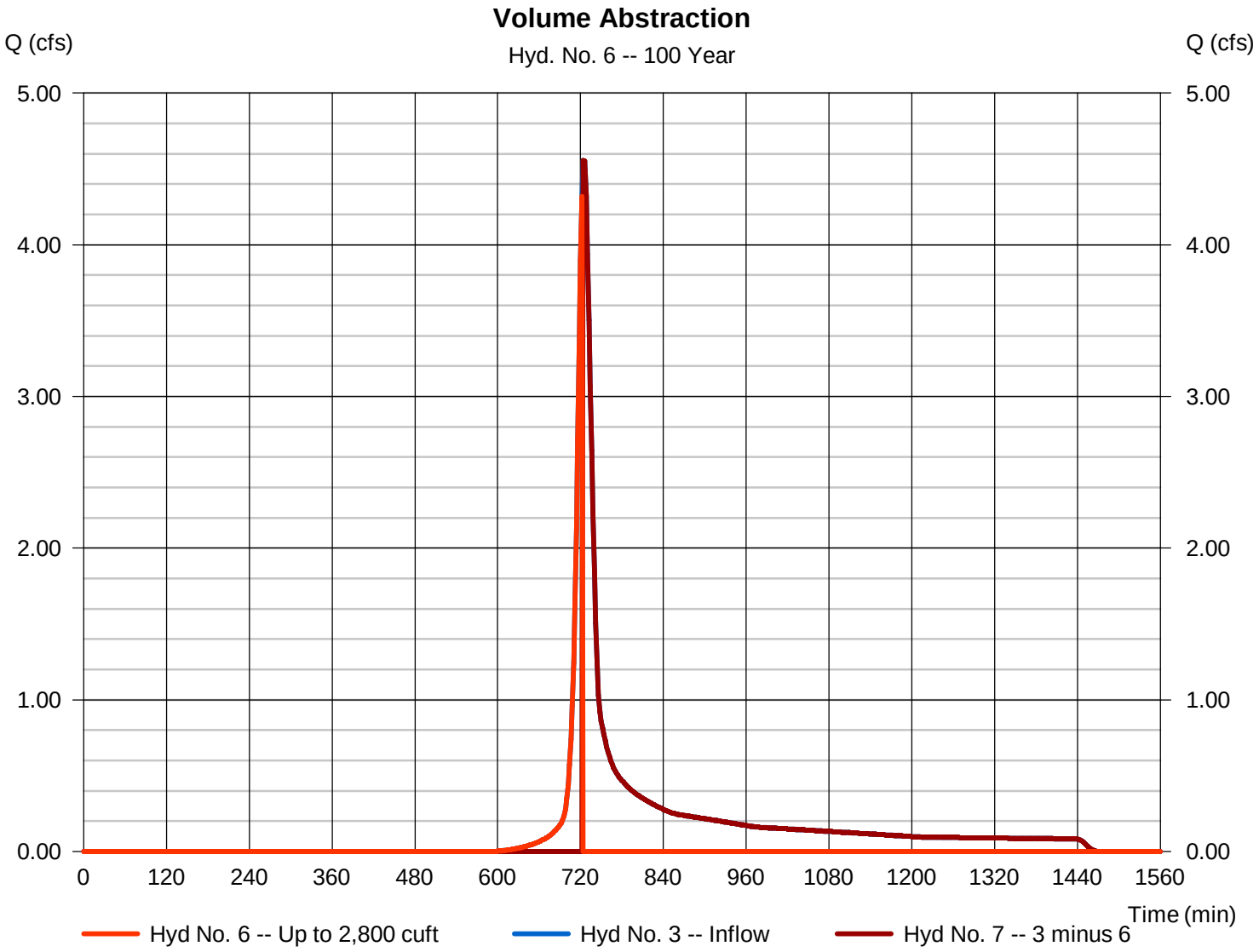


Hydrograph Report

Hyd. No. 6

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 4.318 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 3,085 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

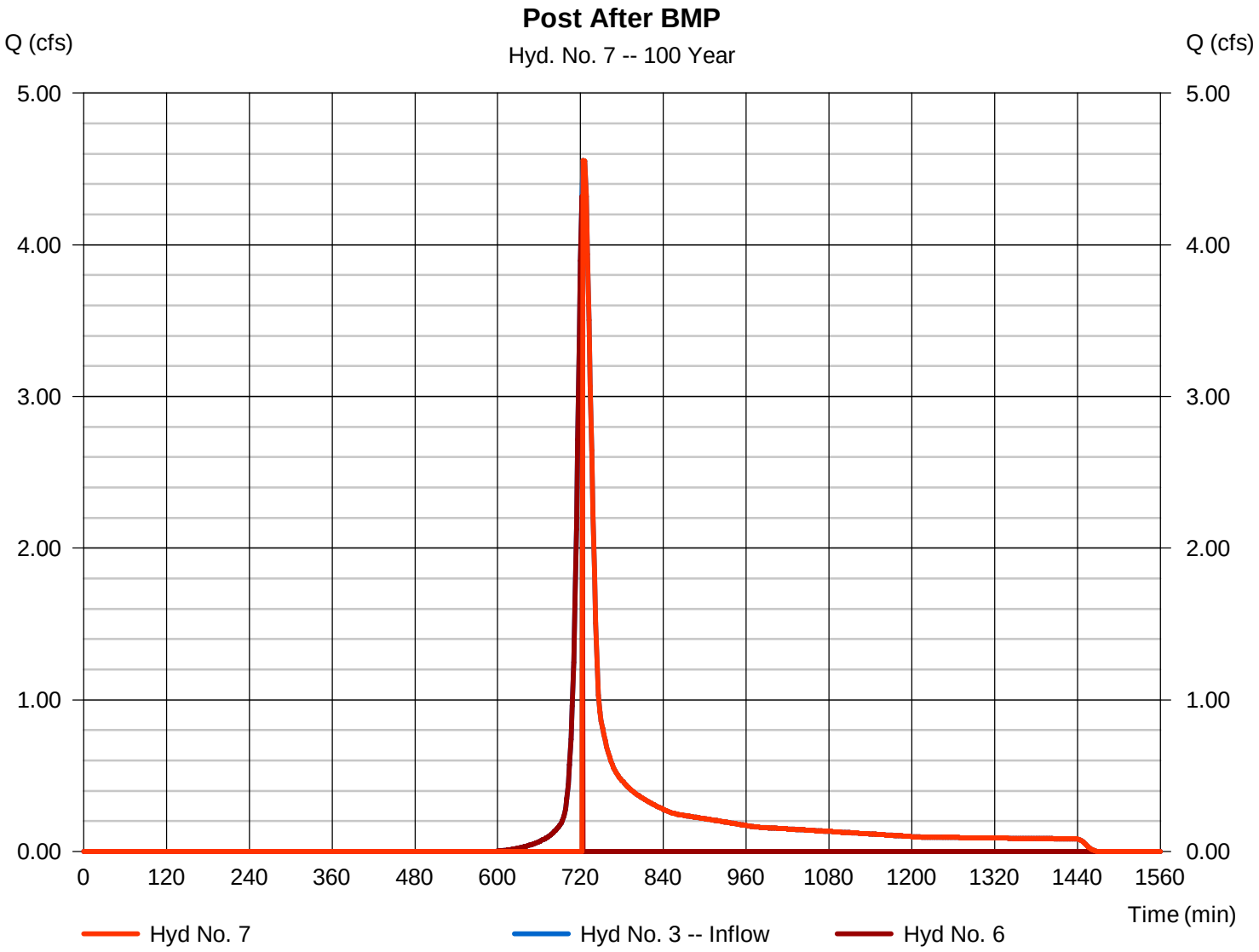


Hydrograph Report

Hyd. No. 7

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 4.556 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 11,477 cuft
Inflow hydrograph	= 3 - Post Detained 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 2,800 cuft

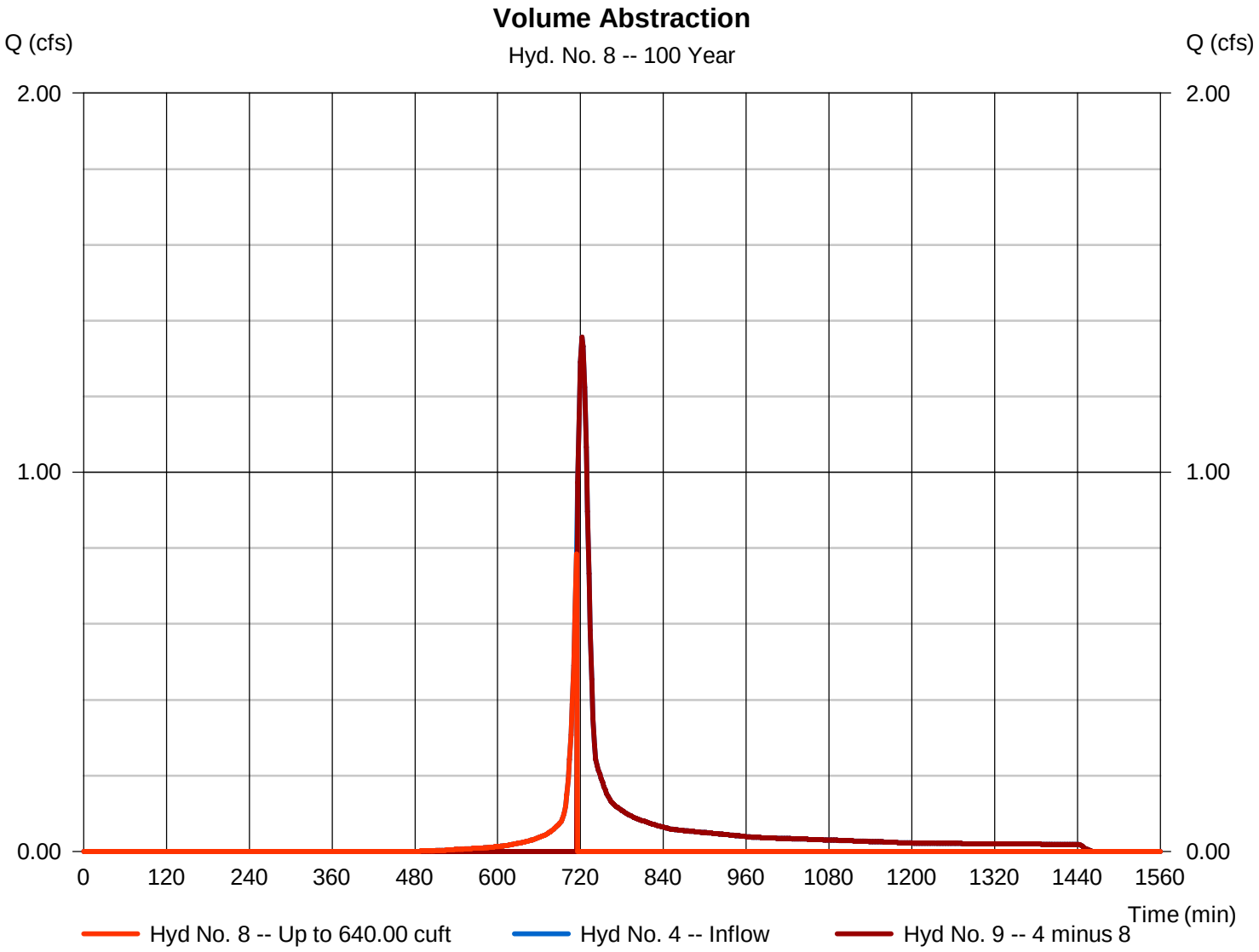


Hydrograph Report

Hyd. No. 8

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.784 cfs
Storm frequency	= 100 yrs	Time to peak	= 714 min
Time interval	= 2 min	Hyd. volume	= 645 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 9
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

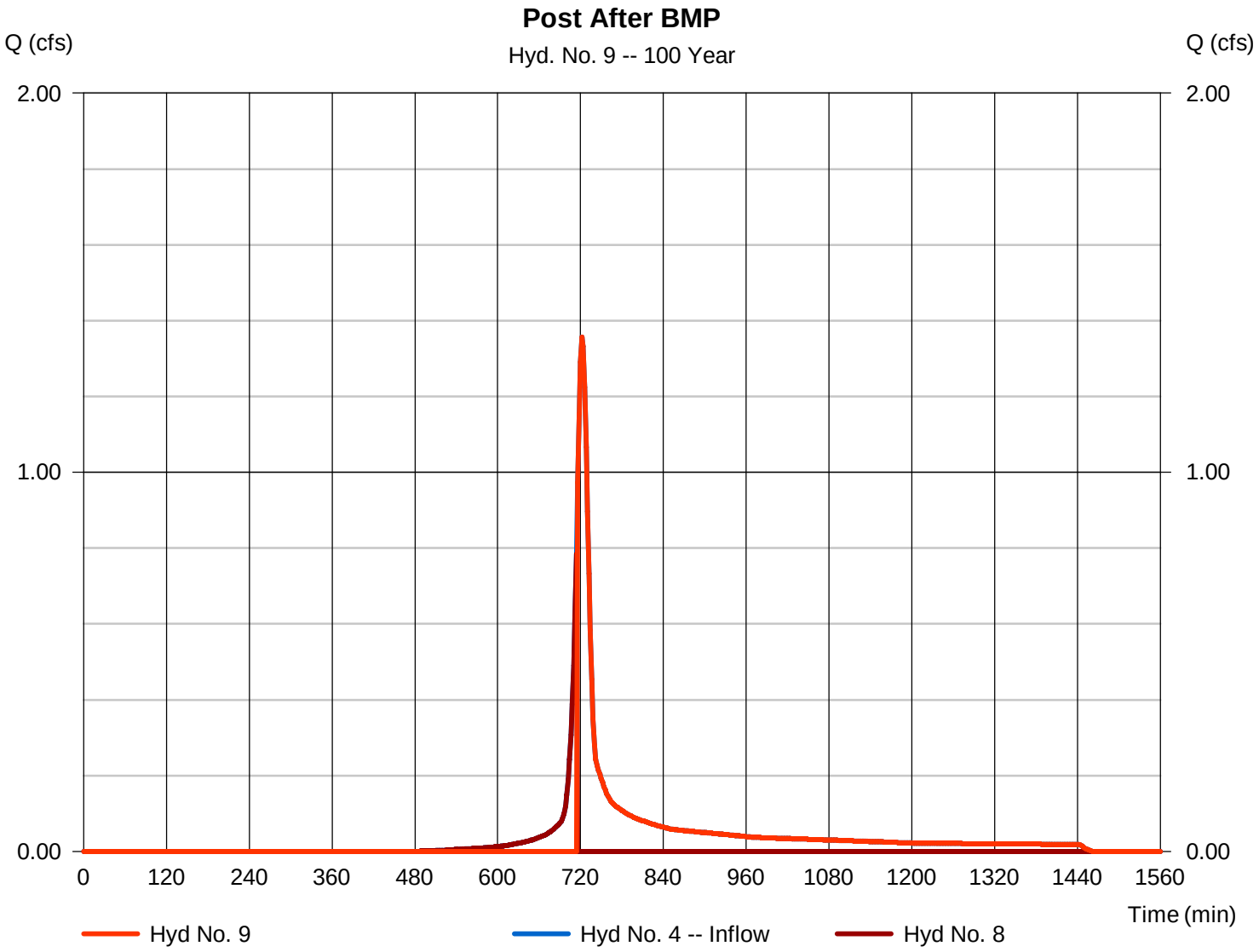


Hydrograph Report

Hyd. No. 9

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.356 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 3,157 cuft
Inflow hydrograph	= 4 - Post Detained 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 640.00 cuft

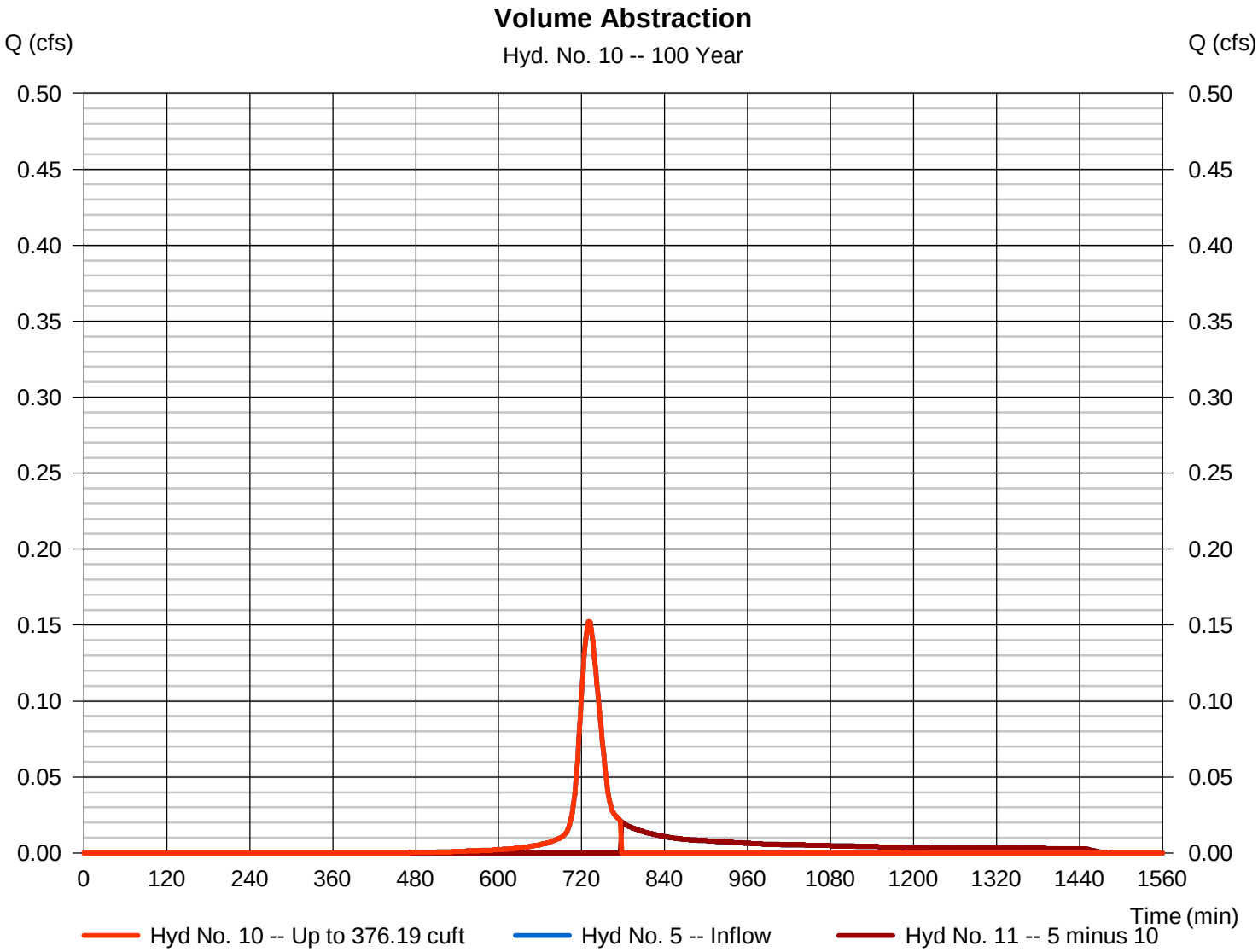


Hydrograph Report

Hyd. No. 10

Volume Abstraction

Hydrograph type	= Diversion1	Peak discharge	= 0.152 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 378 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 11
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

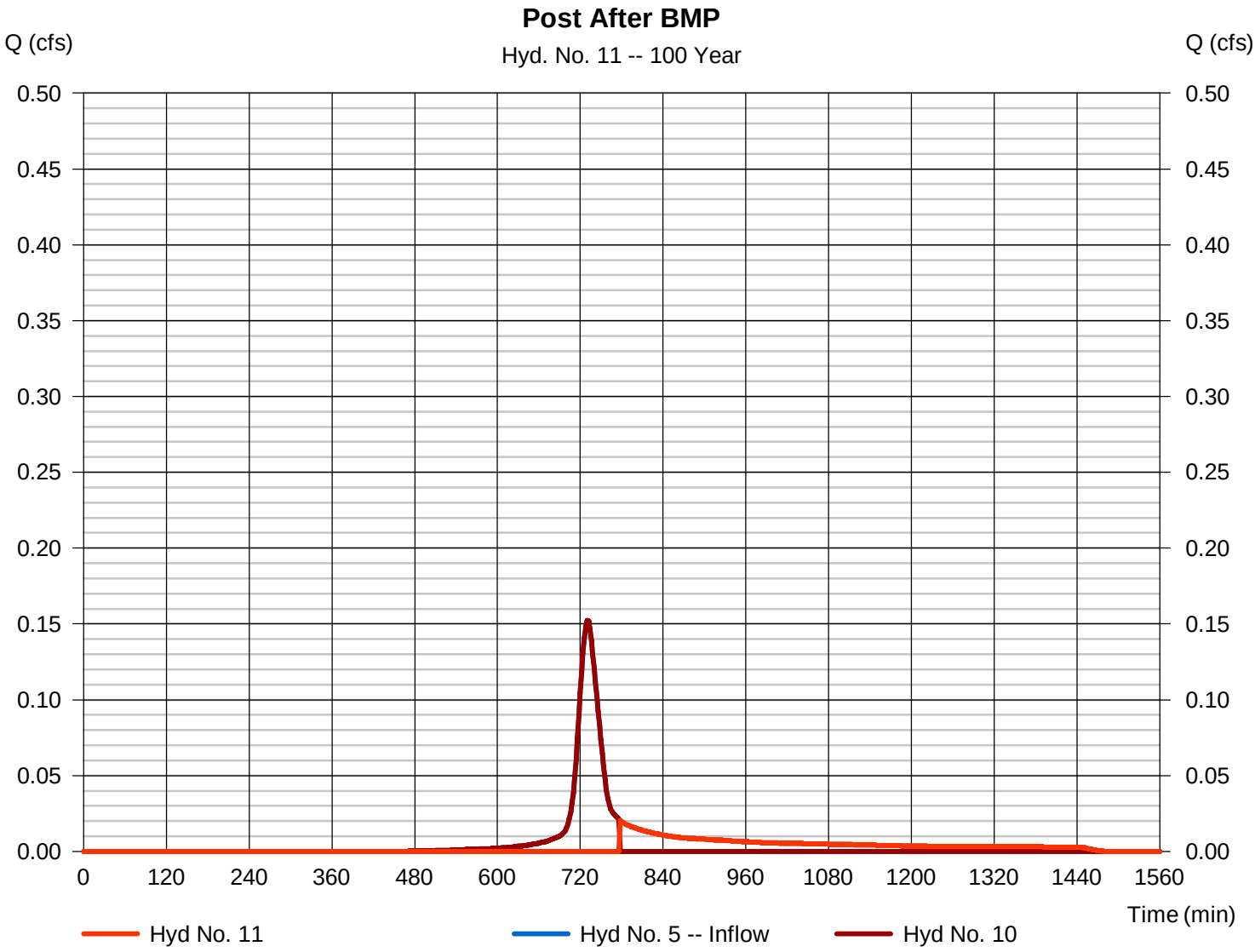


Hydrograph Report

Hyd. No. 11

Post After BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.020 cfs
Storm frequency	= 100 yrs	Time to peak	= 778 min
Time interval	= 2 min	Hyd. volume	= 232 cuft
Inflow hydrograph	= 5 - Post Detained 3	2nd diverted hyd.	= 10
Diversion method	= First Flush Volume	Volume Up To	= 376.19 cuft

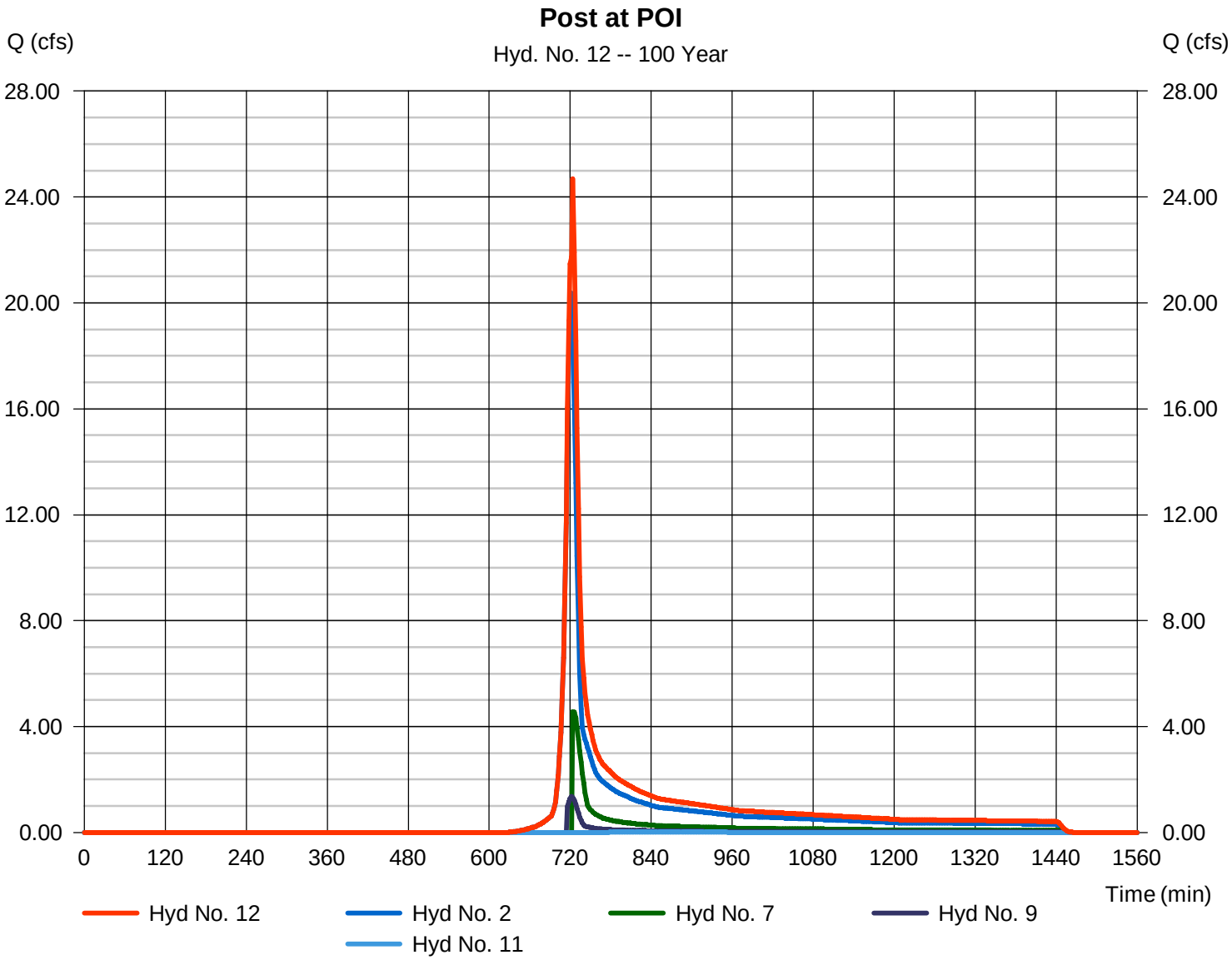


Hydrograph Report

Hyd. No. 12

Post at POI

Hydrograph type	= Combine	Peak discharge	= 24.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 68,654 cuft
Inflow hyds.	= 2, 7, 9, 11	Contrib. drain. area	= 5.310 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	46.3657	11.6000	0.8696	--------
2	52.9099	11.6000	0.8555	--------
3	0.0000	0.0000	0.0000	--------
5	57.3166	11.8000	0.8245	--------
10	60.1494	11.9000	0.8045	--------
25	51.8954	10.5000	0.7395	--------
50	48.4904	9.7000	0.7034	--------
100	44.4757	8.8000	0.6639	--------

File name: Montello IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.03	3.20	2.67	2.30	2.03	1.81	1.64	1.50	1.39	1.29	1.20	1.13
2	4.78	3.82	3.20	2.76	2.43	2.18	1.98	1.81	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.60	4.52	3.81	3.31	2.93	2.64	2.41	2.21	2.05	1.91	1.79	1.69
10	6.19	5.02	4.26	3.71	3.30	2.98	2.72	2.51	2.33	2.18	2.05	1.93
25	6.84	5.56	4.73	4.14	3.70	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.32	5.96	5.08	4.46	4.00	3.64	3.35	3.11	2.91	2.73	2.58	2.45
100	7.79	6.34	5.42	4.78	4.30	3.92	3.62	3.37	3.16	2.97	2.82	2.68

Tc = time in minutes. Values may exceed 60.

hase 2)\ESCGP-2\PPP\02 SCRO\07 PCSM\Attach 4 Stormwater Calcs\Montello\Hydraflow Rev 1\Montello Precip.pc

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.64	3.19	0.00	4.00	4.68	5.67	6.51	7.43
SCS 6-Hr	1.86	2.25	0.00	2.80	3.25	3.89	4.41	4.98
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00