West Trindle

TETRA TECH, INC.

By: RH Date: 11/11/2016 Subject: West Trindle Road
Checked By: JB Date: 11/13/2016 PCSM Design and Evaluation

PURPOSE:

The purpose of these calculations is to design a Post-Construction Stormwater Management (PCSM) Plan for the West Trindle Road block valve site as part of the Sunoco Pipeline L.P. Pennsylvania Pipeline Project. The site is located within Silver Spring Township, Cumberland County, Pennsylvania. Permanent stormwater controls will be developed to satisfy PADEP and Cumberland County County'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 West Trindle Road block valve is located within the Conodoguinet Creek watershed which has a 100% release rate. All other design standards within Cumberland County's approved Act 167 Plan are consistent with the requirements in PADEP's Stormwater BMP Manual. The PCSM design at the West Trindle Road block valve has been designed for consistency with Cumberland County's approved Act 167 Plan.

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 an infiltration trench and an infiltration trench with a berm 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); as necessary, provide additional peak rate control as required by applicable and approved Act 167 plan.

- Cumberland County's approved Act 167 plan establishes release rate requirements for various watersheds throughout the county. The West Trindle Road block valve site is located in the Conodoguinet Creek watershed, which has 100% release rates.

This site will utilize an infiltration trench and an infiltration trench with a berm to manage the two-year through 100-year peak rate increases. These BMPs, in conjunction with a diversion berm, will also help to increase the time of concentration for the drainage area encompassing the block valve.

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 2.3:1.

The maximum drainage area loading ratio of 8:1 has been met. The drainage area loading ratio for the site is 7.5:1.

Disturbed Area

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

Karst Topography

The West Trindle Road block valve is located within the vicinity of known depressions or sinkholes. Several design principles were incorporated to minimize the risk of sinkholes to the maximum extent practicable, including reducing the proposed impervious area to the maximum extent practicable.

Stormwater runoff from the site is being spread out over a relatively large area. The site will achieve a 2.3:1 impervious loading ratio by directing stormwater runoff into two long infiltration trenches. The infiltration trenches 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

West Trindle Road block valve is located within a siltation impaired watershed. The project site was designed to minimize the total amount of impervious area. The impervious area for the West Trindle Road valve site was limited to the amount that is required to safely construct and operate the block valve. In addition, the previously proposed gravel turn-around was eliminated, and replaced with a grass area.

Non-discharge alternatives were analyzed for this block valve site. The location of the West Trindle Road block valve site was evaluated by ASME B31.4 Valve Spacing 434.15.2(e) which states that mainline valves should not be more than 7.5 miles apart. The valve sites were located in such a way that they avoided environmentally sensitive areas (such as wetlands and floodplains), were close to an existing road, and close to power. Land owner preference was also accounted for while locating the block valve sites. Once all of these factors were taken into account, several block valve sites, including West Trindle Road, were located in special protection or siltation impaired watersheds.

Non-discharge alternatives were also considered when determining the type of BMP proposed. West Trindle Road block valve site utilizes two infiltration trenches to manage stormwater. Stormwater runoff is infiltrated to the maximum extent possible. Stormwater runoff is spread out to flow through areas that have been restored to meadow conditions, to an infiltration trench, or to undisturbed area. There will not be an increase in stormwater runoff rate or volume to prevent the physical degradation of the receiving water, such as scour, and stream bank destabilization. Stormwater runoff volume is not increasing throughout post-construction, and any post-construction stormwater discharge is managed so that it will not degrade the physical, chemical or biological characteristics of the receiving stream.

Runoff from the site will be managed by two downslope infiltration trenches. Ponded runoff will be temporarily stored upslope of the trench using a berm until it infiltrates and filters through the soil media. Due to the design of the trench the stormwater runoff will be released in sheet flow down a stabilized slope, without causing erosion, rather than concentrating the flow. Filtration through the existing vegetation and soil is an efficient way to remove suspended stormwater pollutants such as sediment, as the suspended particles are physically filtered from the stormwater as it flows through the vegetation and percolates into the soil.

The extent of the disturbed area will be minimized, and the duration of disturbance will be minimized by stabilizing disturbed areas as soon as practicable. Cut and fill for the project site has been minimized. Where possible based on the criteria listed above, sites were located in areas with shallow slopes to minimize the amount of cut and fill required. There is minimal cut and fill required at the West Trindle Road block valve site. All of the block valve sites were graded towards the natural slope. No direct discharge to surface water occurs at the site. The site will be restored promptly with proper vegetative cover techniques.

Antidegradation requirements for the special protection watershed are met because the post-construction stormwater infiltration volume equals or exceeds the pre-construction stormwater infiltration volume, and post-construction stormwater discharge is pretreated via infiltration berms. The runoff is managed so that it will not degrade the physical, chemical, or biological characteristics of the receiving stream.

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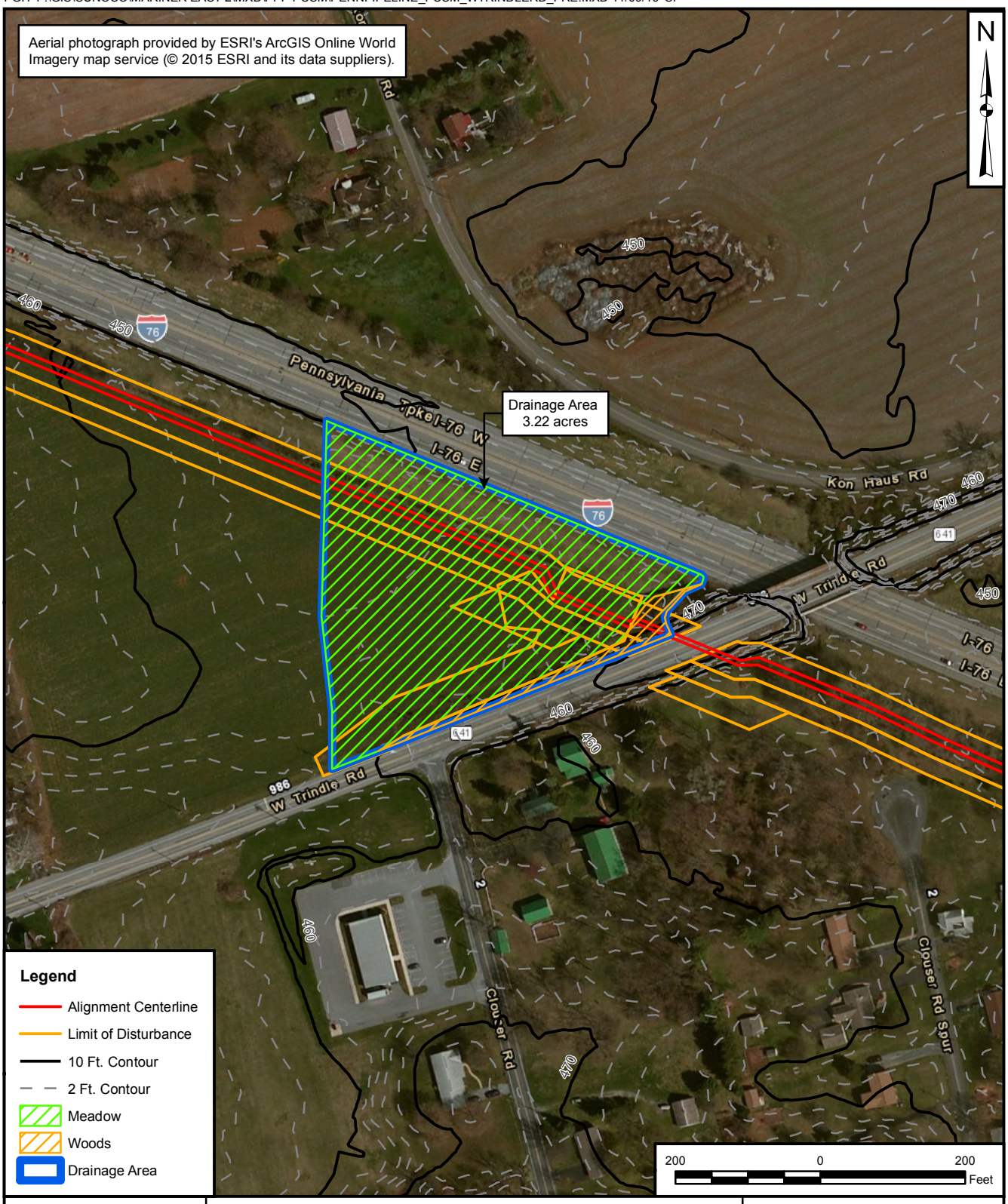

TETRA TECH

PRE-DEVELOPMENT DRAINAGE AREA MAP
W. TRINDLE ROAD
PENNSYLVANIA PIPELINE PROJECT
SUNOCO LOGISTICS, L.P.
WESTMORELAND COUNTY, PENNSYLVANIA

DRAWN BY: S. PAXTON 05/21/16
CHECKED BY: J. BRODY 11/09/16

APPROVED BY:

CONTRACT NUMBER: 112IC05958

FIGURE NUMBER	REV
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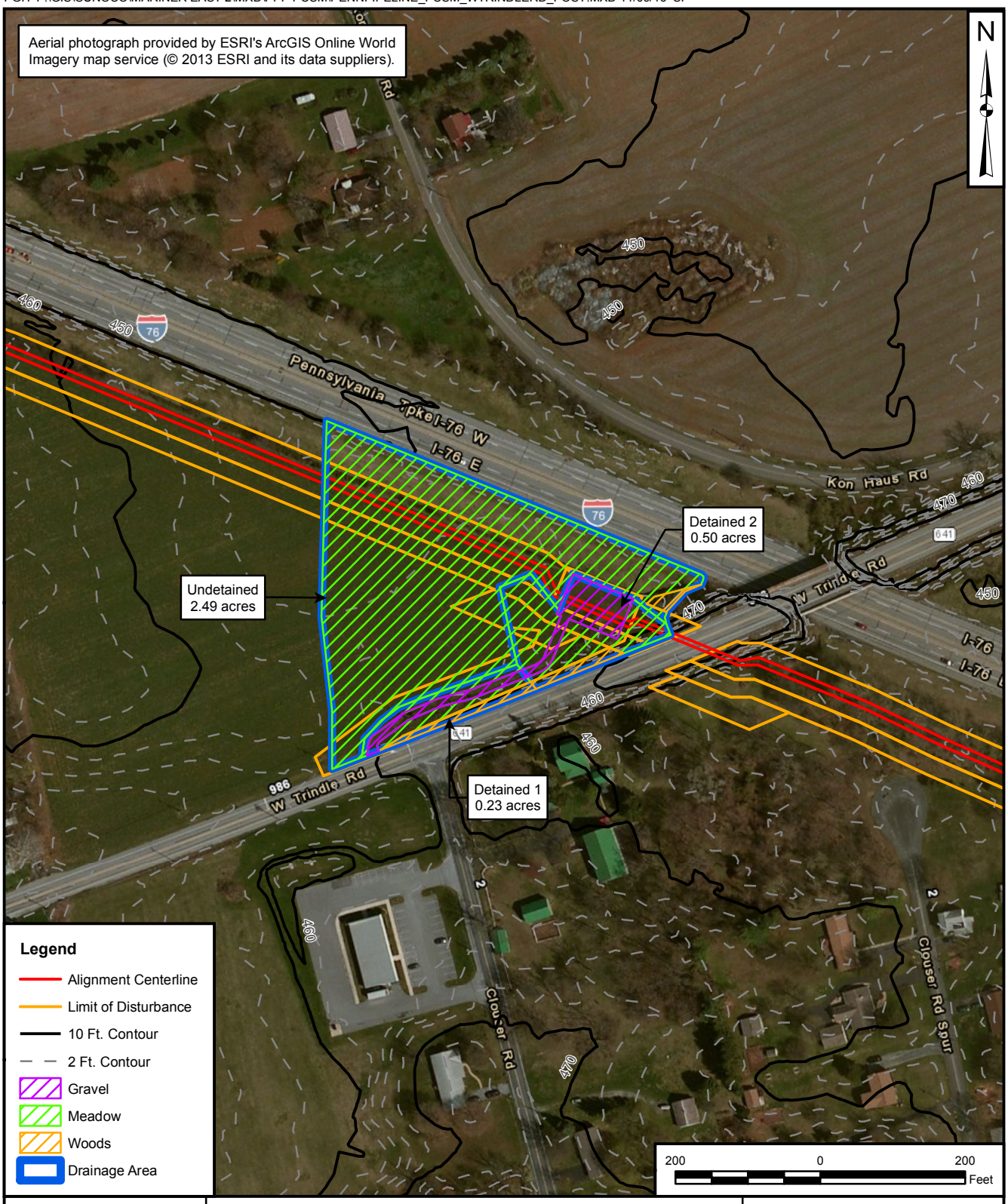

TETRA TECH

POST-DEVELOPMENT DRAINAGE AREA MAP
W. TRINDLE ROAD
PENNSYLVANIA PIPELINE PROJECT
SUNOCO LOGISTICS, L.P.
WESTMORELAND COUNTY, PENNSYLVANIA

DRAWN BY: S. PAXTON 05/21/16
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: Monroe Twp, Pennsylvania, USA*
Latitude: 40.2029°, Longitude: -77.0442°
Elevation: 456.69 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	0.320 (0.286-0.358)	0.381 (0.340-0.427)	0.453 (0.404-0.508)	0.506 (0.451-0.566)	0.577 (0.512-0.644)	0.628 (0.555-0.701)	0.682 (0.600-0.759)	0.734 (0.642-0.816)	0.807 (0.700-0.898)	0.864 (0.744-0.962)
10-min	0.508 (0.455-0.569)	0.607 (0.542-0.681)	0.720 (0.643-0.808)	0.803 (0.716-0.899)	0.908 (0.806-1.01)	0.989 (0.873-1.10)	1.07 (0.941-1.19)	1.15 (1.00-1.28)	1.25 (1.09-1.40)	1.34 (1.15-1.49)
15-min	0.633 (0.567-0.709)	0.757 (0.677-0.851)	0.904 (0.808-1.01)	1.01 (0.900-1.13)	1.15 (1.02-1.28)	1.25 (1.10-1.39)	1.35 (1.19-1.50)	1.45 (1.26-1.61)	1.58 (1.37-1.76)	1.68 (1.44-1.87)
30-min	0.861 (0.771-0.964)	1.04 (0.930-1.17)	1.28 (1.14-1.43)	1.45 (1.29-1.63)	1.68 (1.49-1.88)	1.86 (1.64-2.07)	2.04 (1.79-2.27)	2.22 (1.94-2.47)	2.48 (2.15-2.75)	2.67 (2.30-2.98)
60-min	1.07 (0.958-1.20)	1.30 (1.16-1.46)	1.63 (1.46-1.83)	1.88 (1.68-2.10)	2.23 (1.98-2.48)	2.50 (2.21-2.79)	2.79 (2.46-3.11)	3.10 (2.71-3.44)	3.53 (3.06-3.92)	3.88 (3.34-4.31)
2-hr	1.24 (1.11-1.39)	1.51 (1.35-1.69)	1.91 (1.71-2.13)	2.23 (1.98-2.49)	2.71 (2.40-3.01)	3.12 (2.74-3.46)	3.58 (3.12-3.96)	4.08 (3.54-4.52)	4.85 (4.16-5.37)	5.51 (4.68-6.11)
3-hr	1.35 (1.21-1.53)	1.64 (1.47-1.85)	2.07 (1.85-2.34)	2.42 (2.16-2.73)	2.94 (2.60-3.29)	3.38 (2.97-3.79)	3.88 (3.39-4.34)	4.43 (3.84-4.94)	5.28 (4.52-5.89)	6.01 (5.09-6.71)
6-hr	1.67 (1.50-1.90)	2.02 (1.80-2.29)	2.53 (2.25-2.86)	2.96 (2.63-3.34)	3.61 (3.18-4.06)	4.17 (3.65-4.68)	4.81 (4.18-5.38)	5.53 (4.76-6.17)	6.63 (5.63-7.40)	7.60 (6.38-8.47)
12-hr	2.05 (1.81-2.34)	2.46 (2.18-2.81)	3.09 (2.73-3.53)	3.63 (3.20-4.14)	4.47 (3.90-5.06)	5.21 (4.51-5.88)	6.06 (5.20-6.83)	7.03 (5.97-7.89)	8.54 (7.15-9.58)	9.90 (8.17-11.1)
24-hr	2.40 (2.21-2.65)	2.89 (2.66-3.19)	3.63 (3.33-4.00)	4.28 (3.91-4.70)	5.30 (4.80-5.79)	6.23 (5.60-6.77)	7.32 (6.52-7.92)	8.60 (7.57-9.27)	10.6 (9.22-11.4)	12.5 (10.7-13.4)
2-day	2.78 (2.54-3.09)	3.34 (3.05-3.72)	4.19 (3.81-4.66)	4.93 (4.47-5.47)	6.08 (5.48-6.72)	7.14 (6.37-7.86)	8.36 (7.40-9.18)	9.79 (8.58-10.7)	12.1 (10.4-13.2)	14.1 (12.0-15.4)
3-day	2.96 (2.71-3.27)	3.55 (3.26-3.93)	4.44 (4.06-4.91)	5.21 (4.74-5.75)	6.41 (5.80-7.05)	7.51 (6.74-8.24)	8.77 (7.81-9.60)	10.2 (9.03-11.2)	12.6 (10.9-13.7)	14.7 (12.6-16.0)
4-day	3.14 (2.88-3.45)	3.76 (3.46-4.15)	4.68 (4.30-5.16)	5.49 (5.02-6.03)	6.75 (6.13-7.39)	7.88 (7.11-8.61)	9.19 (8.22-10.0)	10.7 (9.48-11.7)	13.1 (11.4-14.2)	15.3 (13.1-16.6)
7-day	3.66 (3.38-4.02)	4.38 (4.05-4.81)	5.41 (4.99-5.93)	6.31 (5.79-6.90)	7.68 (7.01-8.39)	8.92 (8.08-9.72)	10.3 (9.29-11.2)	12.0 (10.7-13.0)	14.5 (12.7-15.7)	16.8 (14.6-18.2)
10-day	4.22 (3.92-4.58)	5.03 (4.68-5.47)	6.14 (5.70-6.66)	7.08 (6.56-7.68)	8.51 (7.83-9.21)	9.77 (8.94-10.5)	11.2 (10.2-12.1)	12.8 (11.5-13.8)	15.2 (13.6-16.4)	17.4 (15.3-18.7)
20-day	5.74 (5.40-6.14)	6.79 (6.39-7.26)	8.04 (7.55-8.59)	9.08 (8.51-9.70)	10.6 (9.91-11.3)	11.9 (11.1-12.7)	13.4 (12.4-14.2)	14.9 (13.7-15.9)	17.3 (15.7-18.4)	19.3 (17.4-20.5)
30-day	7.11 (6.71-7.55)	8.36 (7.89-8.89)	9.74 (9.18-10.4)	10.9 (10.2-11.6)	12.5 (11.8-13.3)	13.9 (13.0-14.8)	15.4 (14.3-16.4)	17.0 (15.8-18.1)	19.4 (17.8-20.6)	21.4 (19.5-22.7)
45-day	8.95 (8.51-9.45)	10.5 (9.97-11.1)	12.0 (11.4-12.7)	13.3 (12.6-14.0)	15.0 (14.2-15.8)	16.4 (15.5-17.3)	17.9 (16.9-18.9)	19.5 (18.3-20.6)	21.7 (20.3-22.9)	23.6 (21.9-24.9)
60-day	10.7 (10.2-11.2)	12.5 (11.9-13.1)	14.2 (13.5-14.9)	15.5 (14.8-16.3)	17.4 (16.6-18.3)	19.0 (18.0-19.9)	20.6 (19.4-21.6)	22.3 (20.9-23.4)	24.6 (23.0-25.8)	26.5 (24.7-27.9)

[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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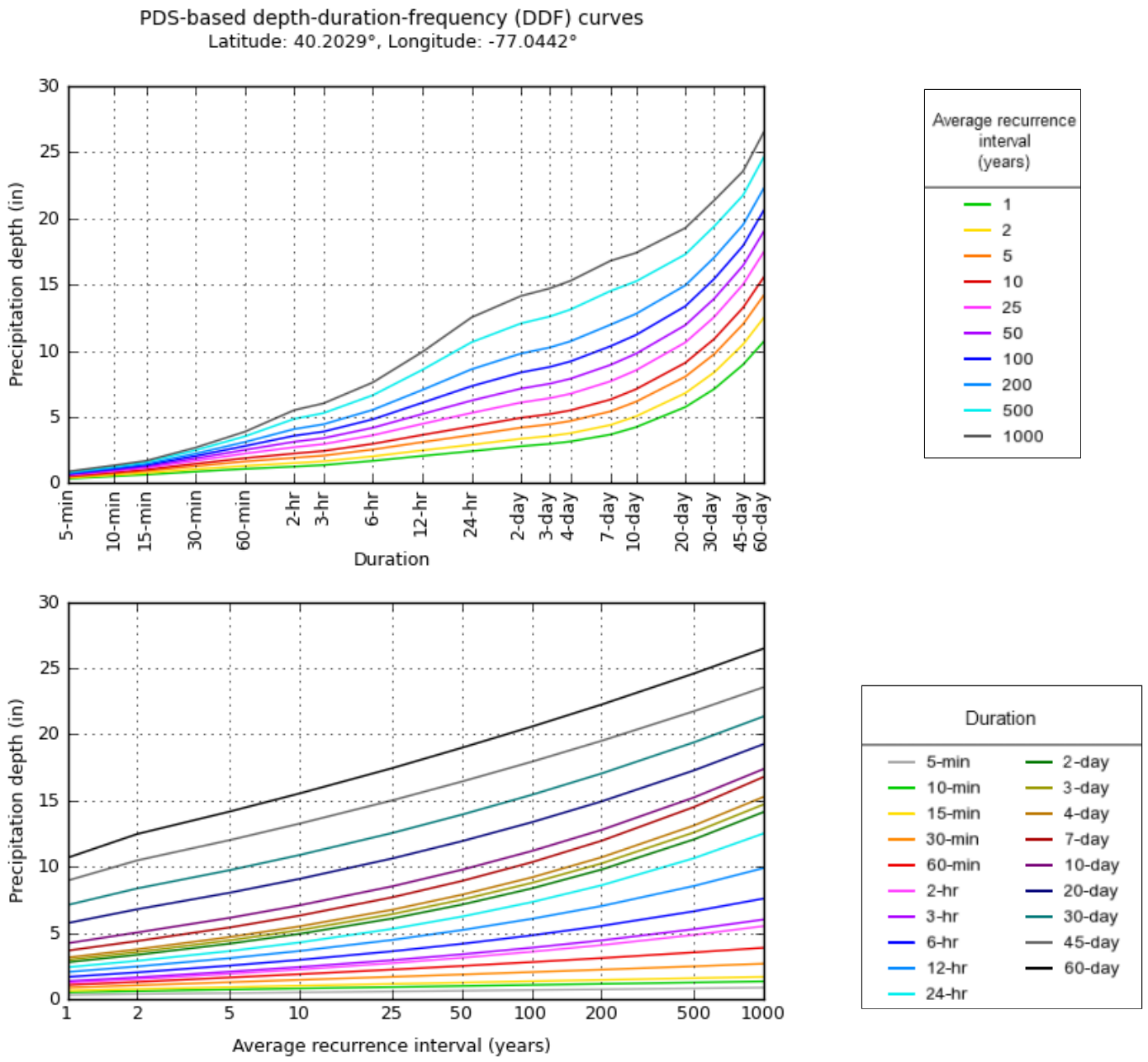
PF graphical



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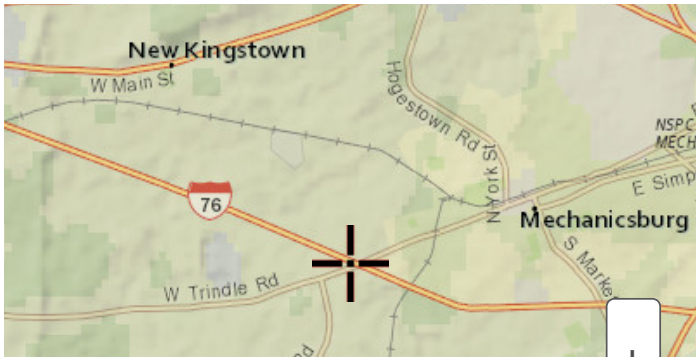
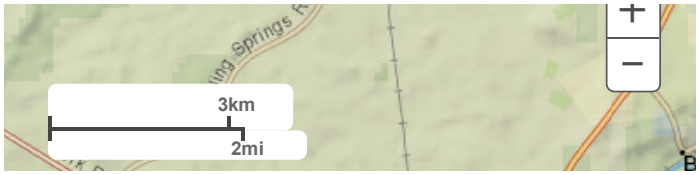
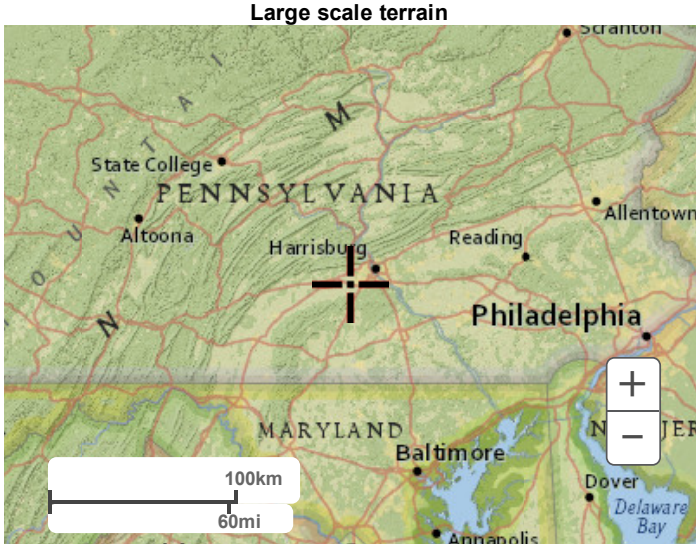
Maps & aerials

Small scale terrain

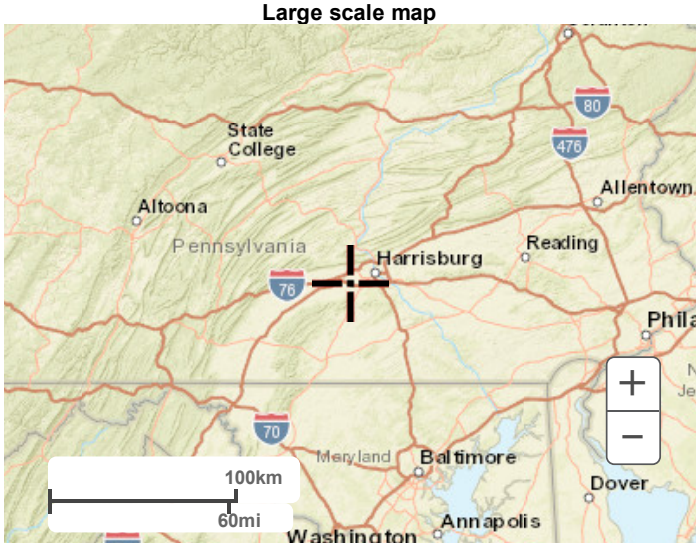




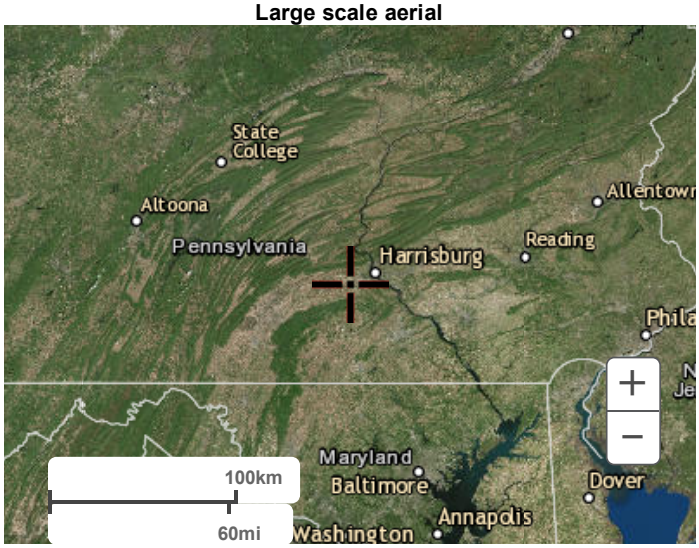
Large scale terrain



Large scale map



Large scale aerial



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WORKSHEET 1. GENERAL SITE INFORMATION

Date: November 11, 2016

Project Name: W. Trindle Road

Municipality: Silver Spring

County: Cumberland

Total Area (acres): 3.22

Major River Basin: Mid Atlantic Region

Watershed: Susquehanna River

Sub Basin: Conodoguinet Creek

Nearest Surface Water to Receive Runoff: Trindle Spring Run

Chapter 93 - Designated Water Use: Cold Water Fishes (CWF)

Impaired according to Chapter 303(d) list?	YES	X
	NO	

List Causes of Impairment:

Agriculture - Siltation ; Construction - Siltation ; Urban Runoff/Storm Sewers - Cause Unknown

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	X
	NO	

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 - 0.07 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	0.07	
Natural Drainage Ways	N/A		
Steep Slopes, 15% - 25%	N/A		
Steep Slopes, over 25%	N/A		
Other:			
Other:			
TOTAL EXISTING:		**0.07**	**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
1.41	-	0	=	1.41

This is the area that requires stormwater management

VOLUME CREDITS

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

Lawn _____ ft^2 x 1/4" x 1/12 = _____ ft^3

Meadow _____ ft^2 x 1/3" x 1/12 = _____ ft^3

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

For Trees within 100 feet of impervious area:

Tree Canopy _____ ft^2 x 1/2" x 1/12 = _____ ft^3

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 _____ ft^2 x 1/3" x 1/12 = _____ ft^3

For all other disconnected roof areas

Roof Area _____ ft^2 x 1/4" x 1/12 = _____ ft^3

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 _____ ft^2 x 1/3" x 1/12 = _____ ft^3

For all other disconnected roof areas

Impervious Area _____ ft^2 x 1/4" x 1/12 = _____ ft^3

TOTAL NON-STRUCTURAL VOLUME CREDIT* _____ ft^3

**For use on Worksheet 5*

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

PROJECT: W. Trindle Road
Drainage Area: 3.22 acres
2-Year Rainfall: 2.89 in

Total Site Area: 1.41 acres
Protected Site Area: N/A acres
Managed Site Area: 1.41 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)
Meadow	B	58,370	1.34	58	7.24	1.45	0.24	1,164
Woods	B	3,049	0.07	55	8.18	1.64	0.17	42
TOTAL:		**61,420**	**1.41**					**1,207**

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)
Meadow	B	51,836	1.19	58	7.24	1.45	0.24	1,034
Impervious - Gravel	B	9,583	0.22	85	1.76	0.35	1.50	1,195
TOTAL:		**61,420**	**1.41**					**2,229**

2-Year Volume Increase (ft^3):	**1,022**

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: W. Trindle Road
SUB-BASIN:

Required Control Volume (ft^3) - *from Worksheet 4:* 1,022

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

Structural Volume Reqmt (ft^3) 1,022
(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	336	1,225
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		
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 Provided (ft^3):	**1,225**
		Structural Volume Requirement (ft^3):	**1,022**
		DIFFERENCE:	**-203**

VOLUME CREDIT DETERMINATION - DETAINED 1 - TRENCH WITH BERM

1	Detained area runoff volume from Hydraflow	=	386	cf
2	Storage volume of the BMP	=	1,705	cf
3	Infiltrated volume within 72 hours after the 2-yr/24-hr event (Infiltration Rate/12) x Infiltration Area x 72 hrs	=	4,861	cf

VOLUME CREDIT DETERMINATION - DETAINED 2 - TRENCH WITH BERM

1	Detained area runoff volume from Hydraflow	=	839	cf
2	Storage volume of the BMP	=	1,518	cf
3	Infiltrated volume within 72 hours after the 2-yr/24-hr event (Infiltration Rate/12) x Infiltration Area x 72 hrs	=	2,164	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 - INFILTRATION TRENCH - DETAINED 1

POST CONSTRUCTION TC TO BMP (DETAINED TC) BEFORE ADJUSTMENT 5.1 MIN

STRUCTURAL VOLUME PROVIDED BY BMP 187 CF

RATES OF RUNOFF TO THE BMP (FROM HYDRAFLOW REPORT)

Storm Event	Q (CFS)
2 YR/24 HR	0.173
10 YR/24 HR	0.488
50 YR/24 HR	1.02
100 YR/24 HR	1.34

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	0.173	18.015
10 YR/24 HR	0.488	6.387
50 YR/24 HR	1.020	3.056
100 YR/24 HR	1.340	2.326

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	0.173	18.015	23.115
10 YR/24 HR	0.488	6.387	11.487
50 YR/24 HR	1.020	3.056	8.156
100 YR/24 HR	1.340	2.326	7.426

TIME OF CONCENTRATION ADJUSTMENT - INFILTRATION TRENCH - DETAINED 1

POST CONSTRUCTION TC TO BMP (DETAINED TC) BEFORE ADJUSTMENT 4.2 MIN

STRUCTURAL VOLUME PROVIDED BY BMP 923 CF FOR 2-YR/24-HR EVENT
1787 CF FOR REMAINING EVENTS

RATES OF RUNOFF TO THE BMP (FROM HYDRAFLOW REPORT)

Storm Event	Q (CFS)
2 YR/24 HR	0.377
10 YR/24 HR	1.062
50 YR/24 HR	2.217
100 YR/24 HR	2.915

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	0.377	40.805
10 YR/24 HR	1.062	28.045
50 YR/24 HR	2.217	13.434
100 YR/24 HR	2.915	10.217

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	0.377	40.805	45.005
10 YR/24 HR	1.062	28.045	32.245
50 YR/24 HR	2.217	13.434	17.634
100 YR/24 HR	2.915	10.217	14.417

INFILTRATION BERM DEWATERING CALCULATION SITE NAME: W. Trindle Road

TRENCH WITH BERM

STORAGE VOLUME	1,705	CF	
DESIGN INFILTRATION RATE	0.20	IN/HR	BASED ON IT-0A, IT-B, IT-04 and IT-05
INFILTRATION AREA	4,051	SF	

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

DEWATERING TIME = 25.3 HOURS

INFILTRATION BERM DEWATERING CALCULATION SITE NAME: W. Trindle Road

TRENCH

STORAGE VOLUME	1,518	CF	
DESIGN INFILTRATION RATE	0.10	IN/HR	BASED ON IT-01, IT-02 AND IT-03
INFILTRATION AREA	198	SF	

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

DEWATERING TIME = 920.0 HOURS

INFILTRATION TRENCH A - VOLUME CALCULATION

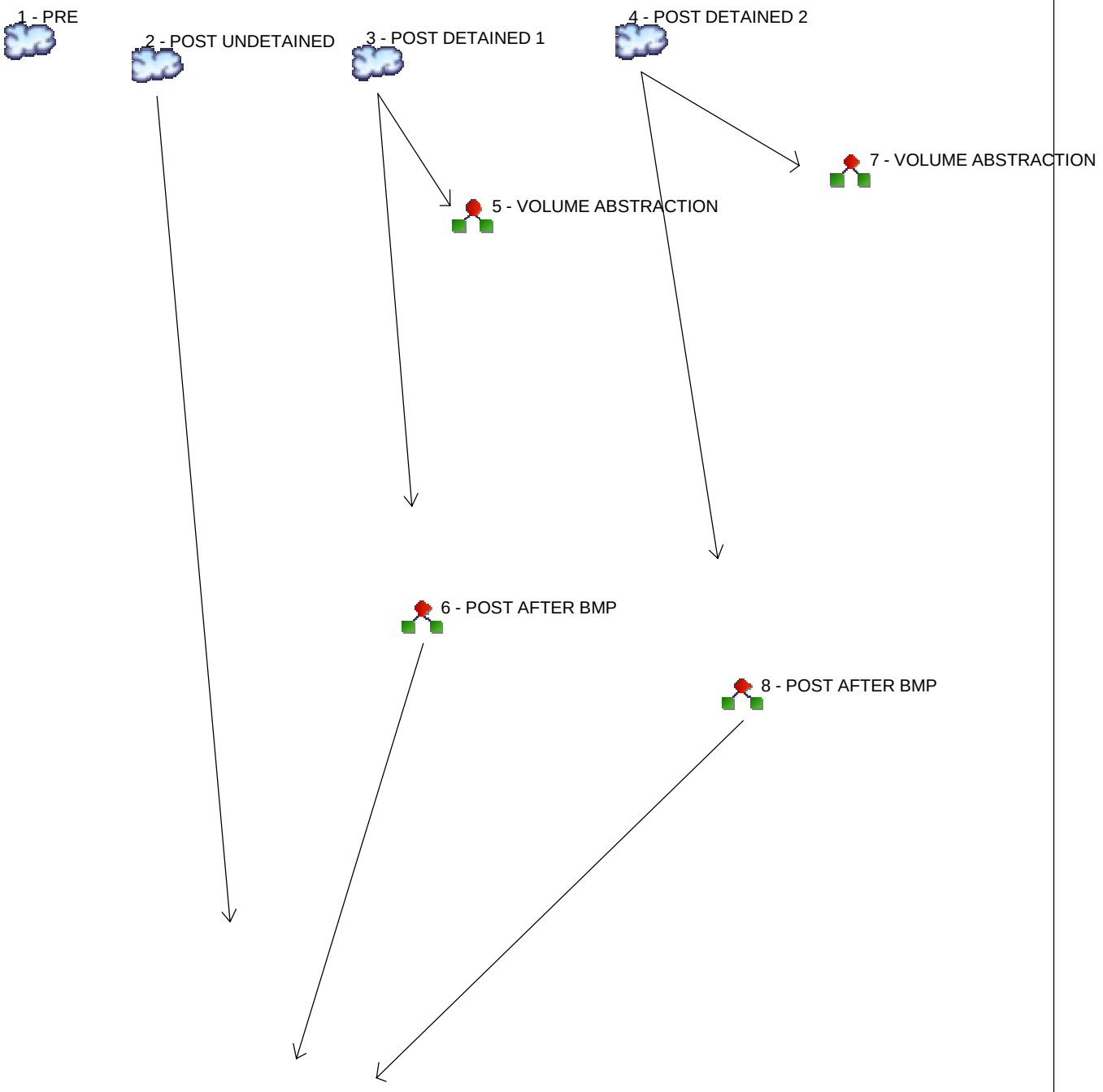
LENGTH	46	FT
WIDTH	3	FT
DEPTH	3	FT
PIPE DIAMETER	1	FT
NUMBER OF PIPES	1	
VOID RATIO	0.4	
X-SECTIONAL AREA OF VOIDS IN TRENCH	3.286	SF
AREA OF PIPE (S)	0.785	SF
COMBINED X-SECTIONAL AREA	4.071	SF
STORAGE IN TRENCH	187.266	CF

INFILTRATION TRENCH B - VOLUME CALCULATION

LENGTH	66	FT
WIDTH	3	FT
DEPTH	3	FT
PIPE DIAMETER	1	FT
NUMBER OF PIPES	1	
VOID RATIO	0.4	
X-SECTIONAL AREA OF VOIDS IN TRENCH	3.286	SF
AREA OF PIPE (S)	0.785	SF
COMBINED X-SECTIONAL AREA	4.071	SF
STORAGE IN TRENCH	268.686	CF

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	PRE
2	SCS Runoff	POST UNDETAINED
3	SCS Runoff	POST DETAINED 1
4	SCS Runoff	POST DETAINED 2
5	Diversion1	VOLUME ABSTRACTION
6	Diversion2	POST AFTER BMP
7	Diversion1	VOLUME ABSTRACTION
8	Diversion2	POST AFTER BMP
9	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	------	-------	0.473	-------	-------	3.097	-------	8.505	11.99	PRE
2	SCS Runoff	------	-------	0.278	-------	-------	2.167	-------	6.240	8.882	POST UNDETAINED
3	SCS Runoff	------	-------	0.173	-------	-------	0.488	-------	1.020	1.341	POST DETAINED 1
4	SCS Runoff	------	-------	0.377	-------	-------	1.062	-------	2.217	2.915	POST DETAINED 2
5	Diversion1	3	-------	0.173	-------	-------	0.467	-------	0.286	0.208	VOLUME ABSTRACTION
6	Diversion2	3	-------	0.012	-------	-------	0.488	-------	1.020	1.341	POST AFTER BMP
7	Diversion1	4	-------	0.377	-------	-------	1.062	-------	2.217	2.914	VOLUME ABSTRACTION
8	Diversion2	4	-------	0.000	-------	-------	0.022	-------	0.648	2.915	POST AFTER BMP
9	Combine	2, 6, 8	-------	0.277	-------	-------	2.424	-------	6.890	12.16	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	0.473	2	724	2,883	------	------	------	PRE
2	SCS Runoff	0.278	2	726	1,992	------	------	------	POST UNDETAINED
3	SCS Runoff	0.173	2	718	386	------	------	------	POST DETAINED 1
4	SCS Runoff	0.377	2	718	839	------	------	------	POST DETAINED 2
5	Diversion1	0.173	2	718	188	3	------	------	VOLUME ABSTRACTION
6	Diversion2	0.012	2	798	198	3	------	------	POST AFTER BMP
7	Diversion1	0.377	2	718	839	4	------	------	VOLUME ABSTRACTION
8	Diversion2	0.000	2	n/a	0	4	------	------	POST AFTER BMP
9	Combine	0.277	2	726	2,182	2, 6, 8	------	------	POST AT POI

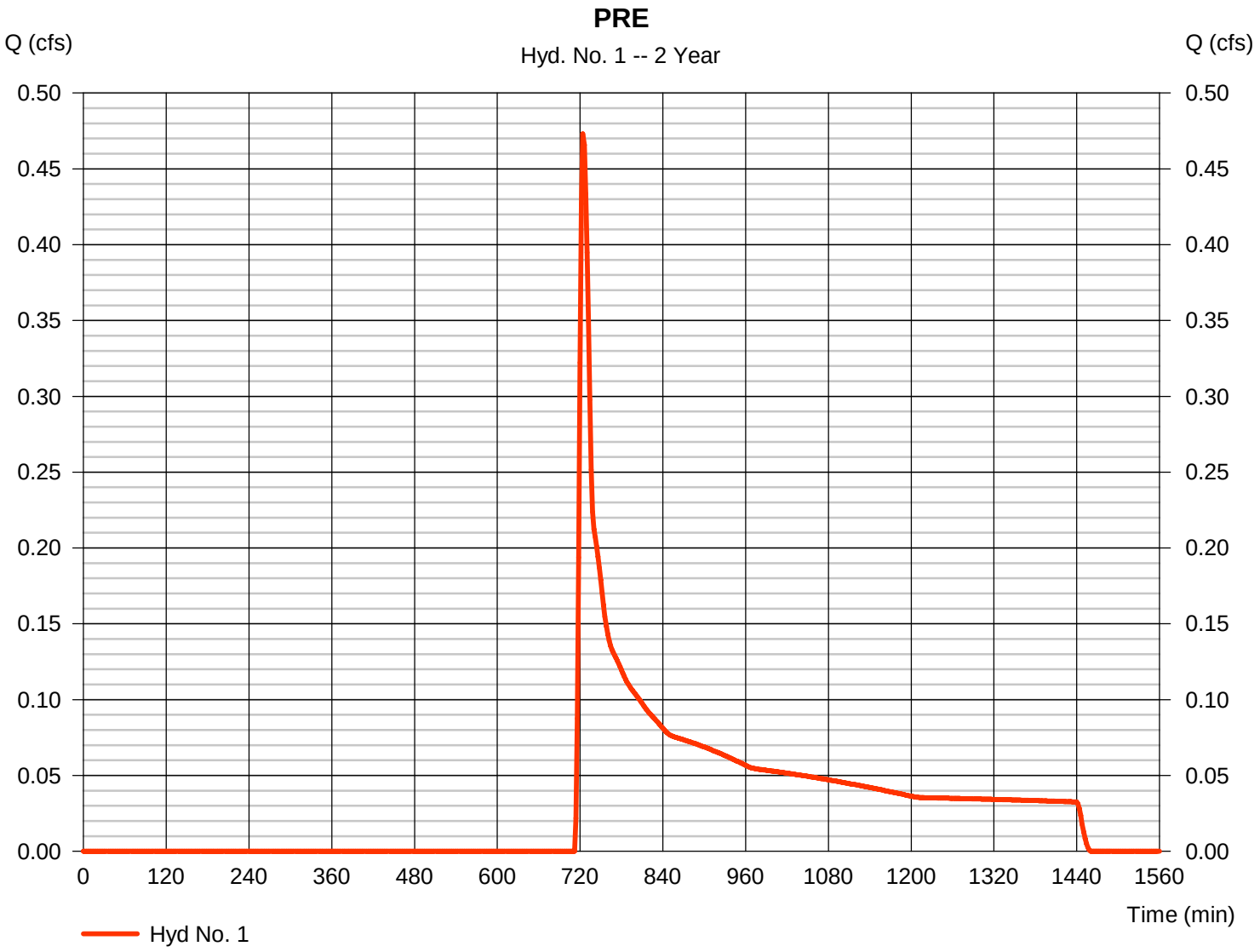
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.473 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	2,883 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	2.89 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



TR55 Tc Worksheet

Hyd. No. 1

PRE

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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

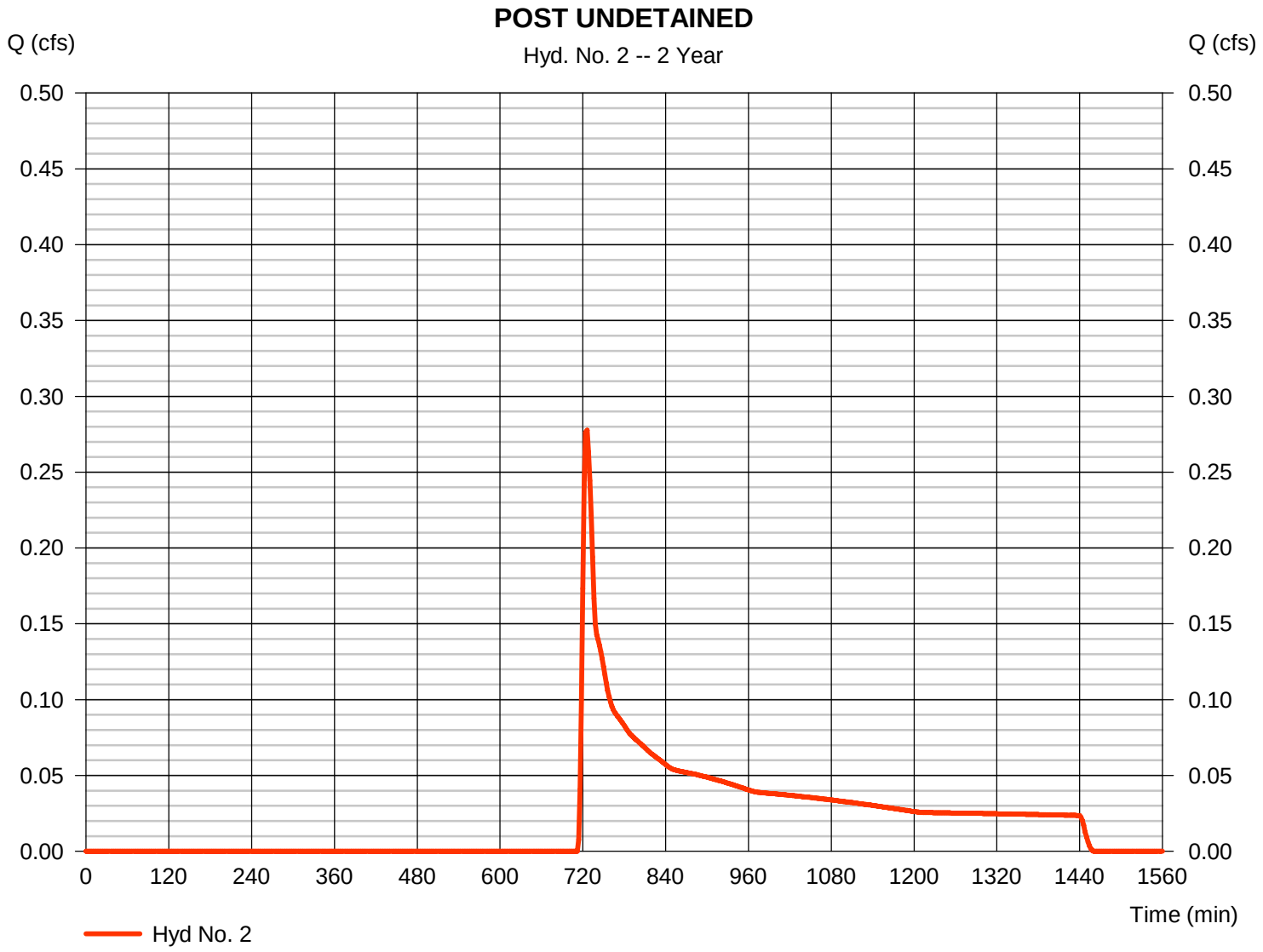
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	= SCS Runoff	Peak discharge	= 0.278 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,992 cuft
Drainage area	= 2.490 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 2.89 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.640 x 55) + (1.850 x 58)] / 2.490



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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

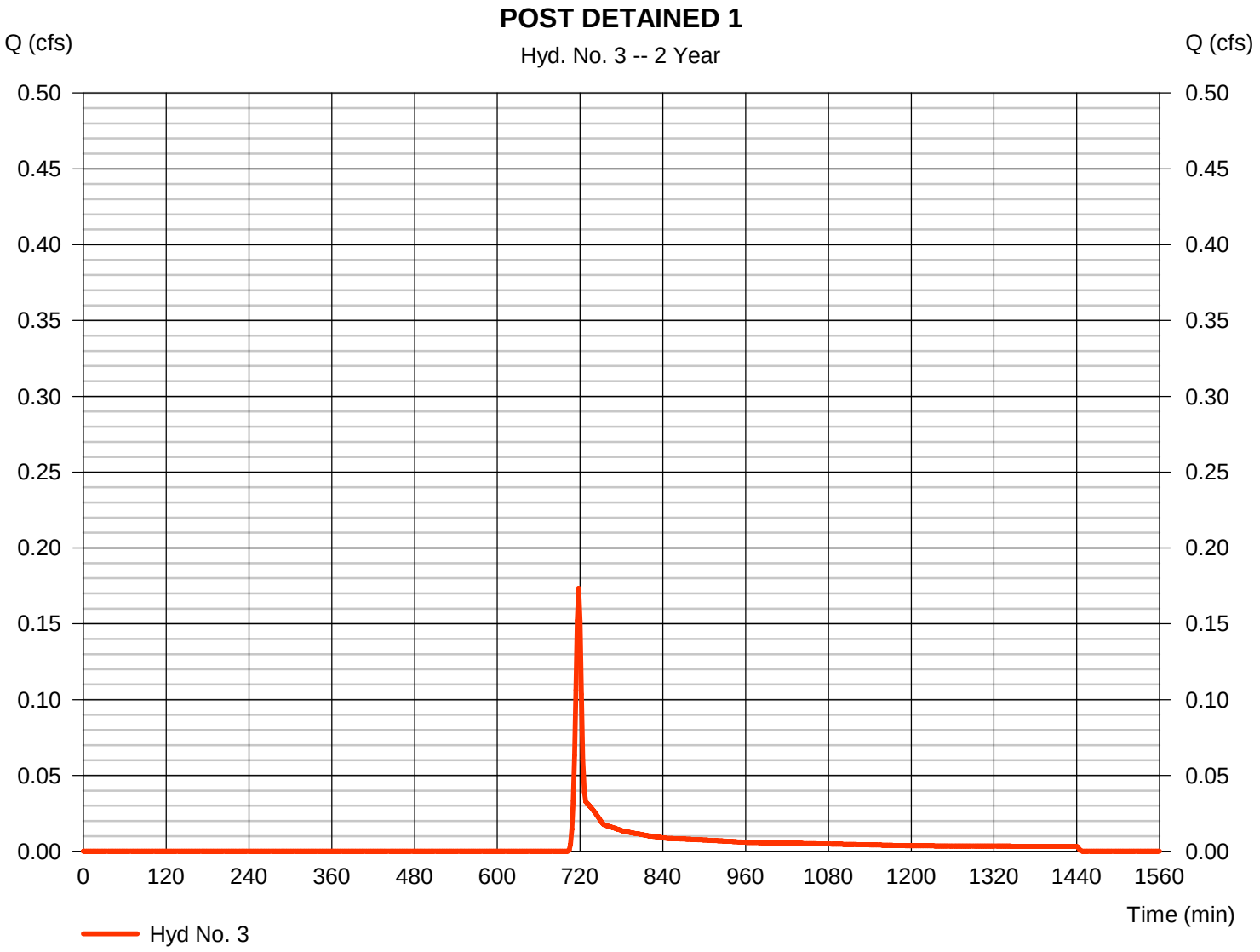
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 386 cuft
Drainage area	= 0.230 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.10 min
Total precip.	= 2.89 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



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)	= 2.89		0.00		0.00		
Land slope (%)	= 24.00		0.00		0.00		
Travel Time (min)	**= 3.19**	**+**	**0.00**	**+**	**0.00**	**=**	**3.19**
Shallow Concentrated Flow							
Flow length (ft)	= 88.00		133.00		0.00		
Watercourse slope (%)	= 1.10		1.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.69		2.03		0.00		
Travel Time (min)	**= 0.87**	**+**	**1.09**	**+**	**0.00**	**=**	**1.96**
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 ..... 5.10 min

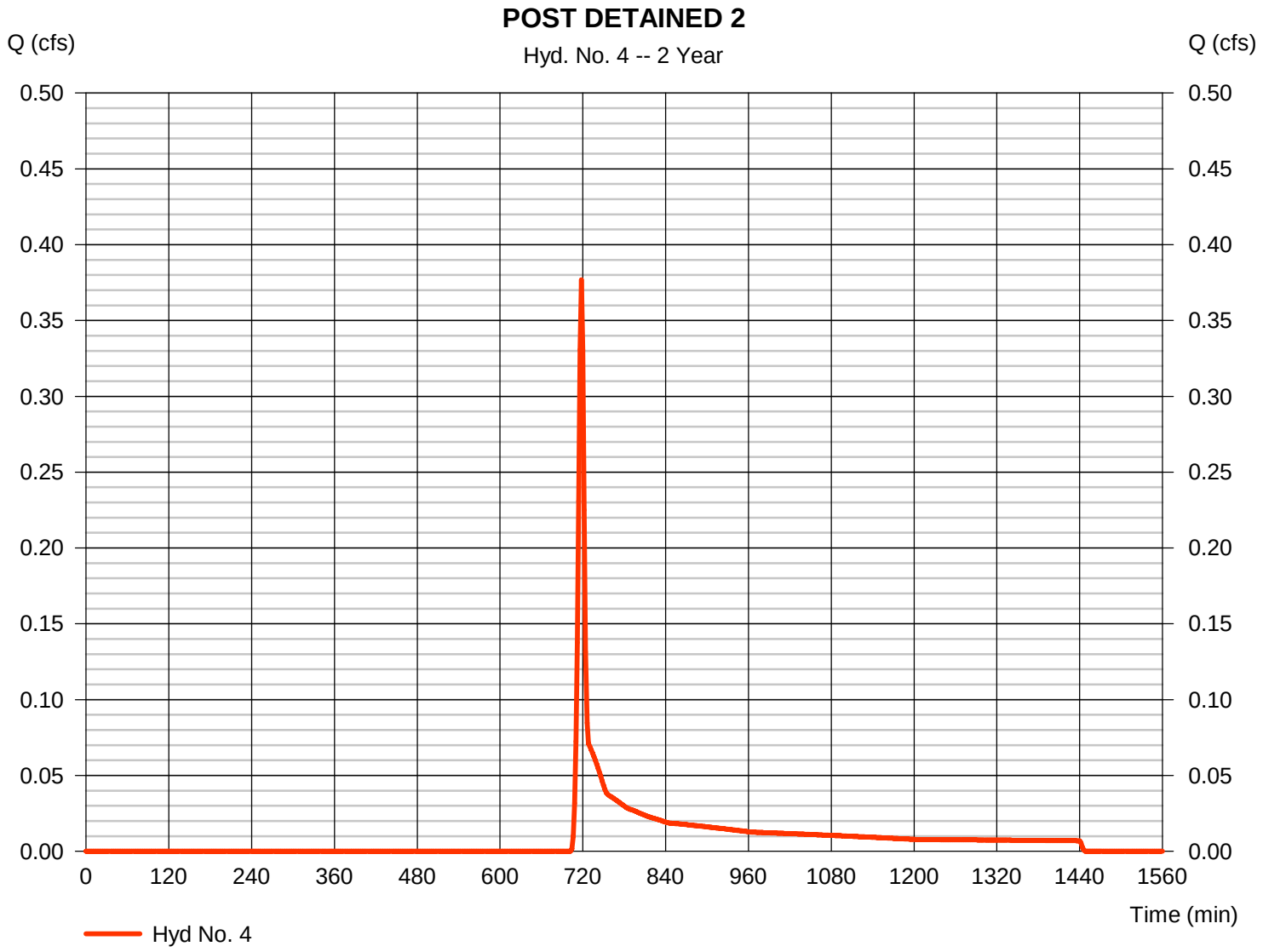
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.377 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 839 cuft
Drainage area	= 0.500 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 2.89 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500



TR55 Tc Worksheet

Hyd. No. 4

POST DETAINED 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.89		0.00		0.00		
Land slope (%)	= 12.00		0.00		0.00		
Travel Time (min)	**= 3.20**	**+**	**0.00**	**+**	**0.00**	**=**	**3.20**
Shallow Concentrated Flow							
Flow length (ft)	= 115.00		0.00		0.00		
Watercourse slope (%)	= 1.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.98		0.00		0.00		
Travel Time (min)	**= 0.97**	**+**	**0.00**	**+**	**0.00**	**=**	**0.97**
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**

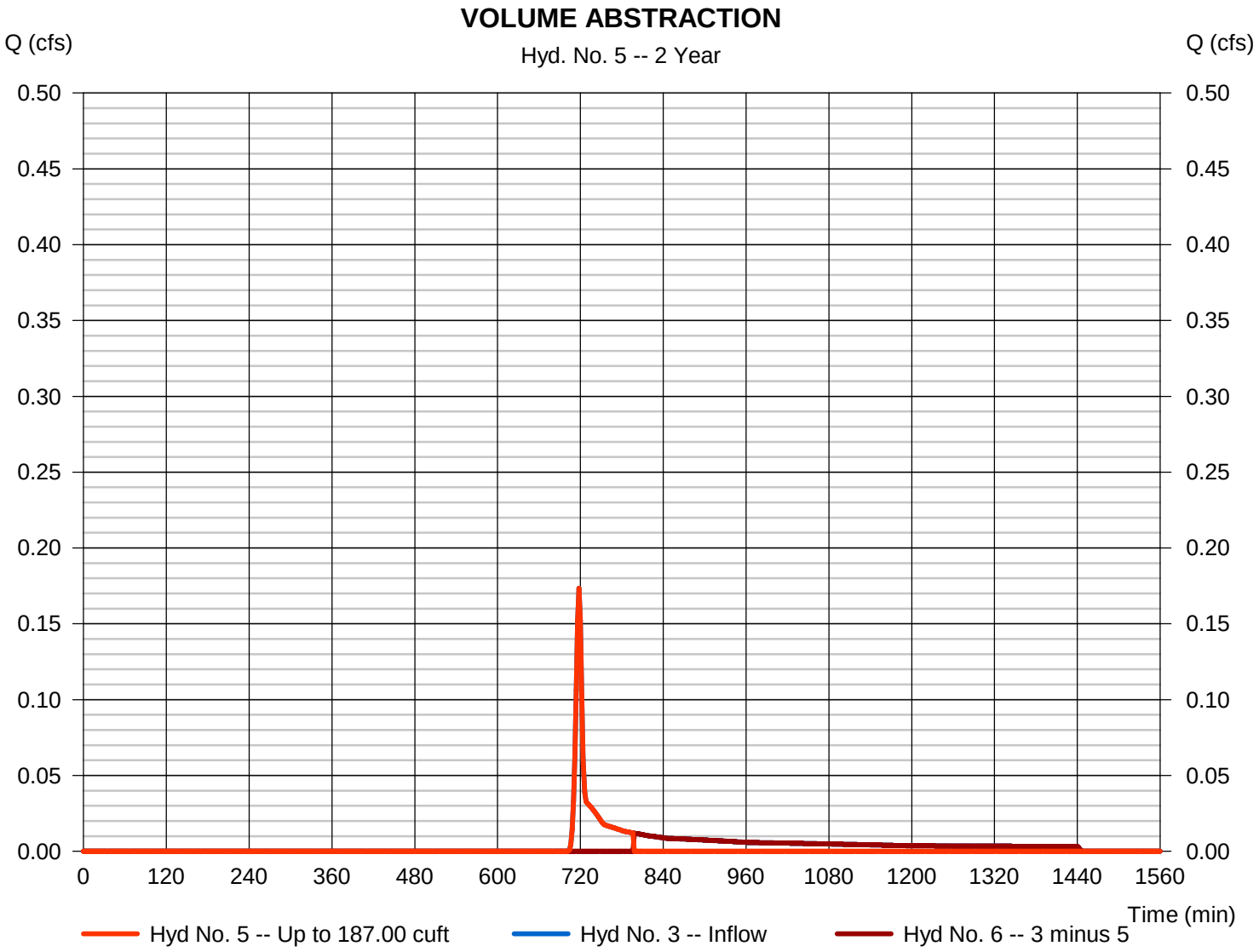
Total Travel Time, Tc ..... 4.20 min

Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.173 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 188 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

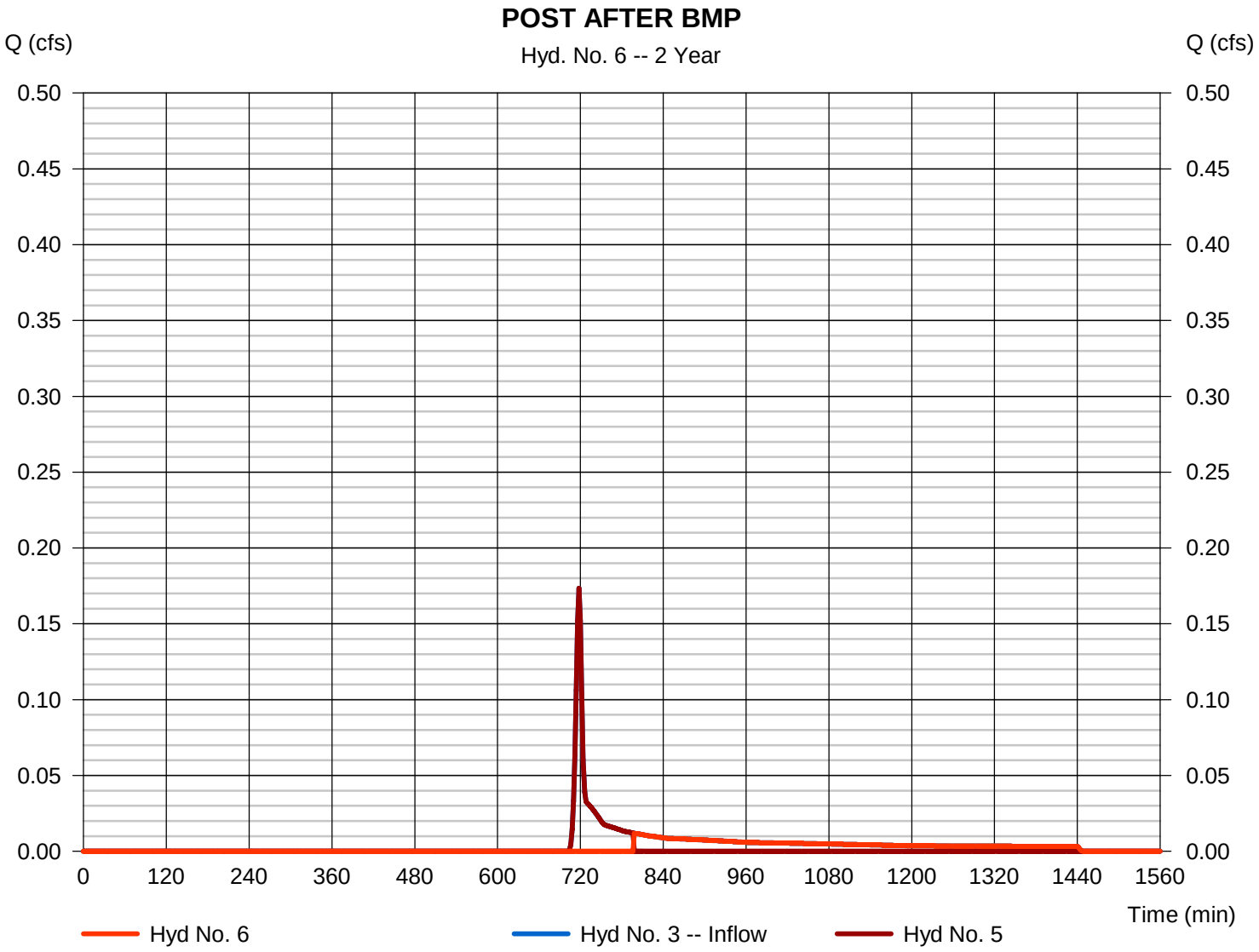


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.012 cfs
Storm frequency	= 2 yrs	Time to peak	= 798 min
Time interval	= 2 min	Hyd. volume	= 198 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

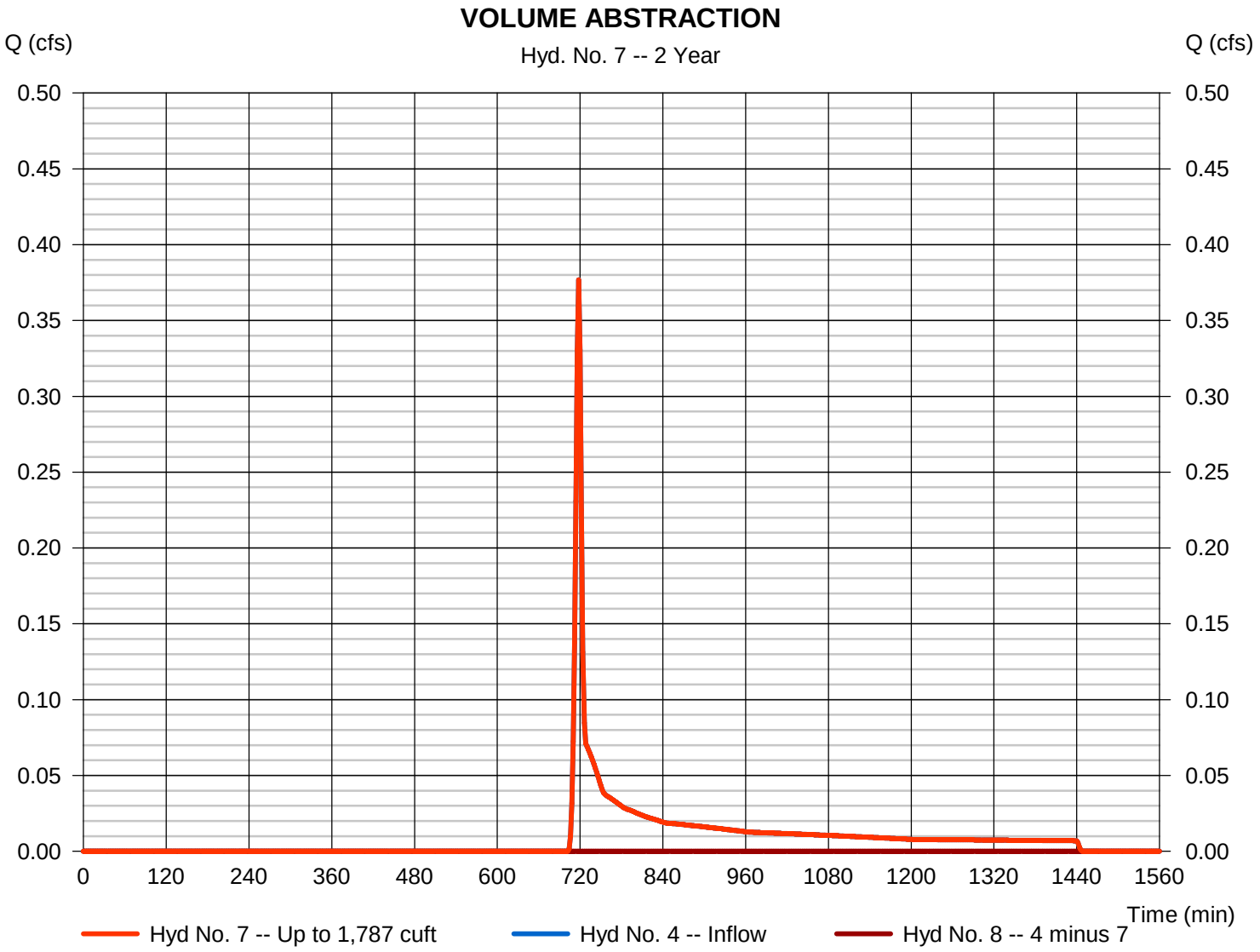


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.377 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 839 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

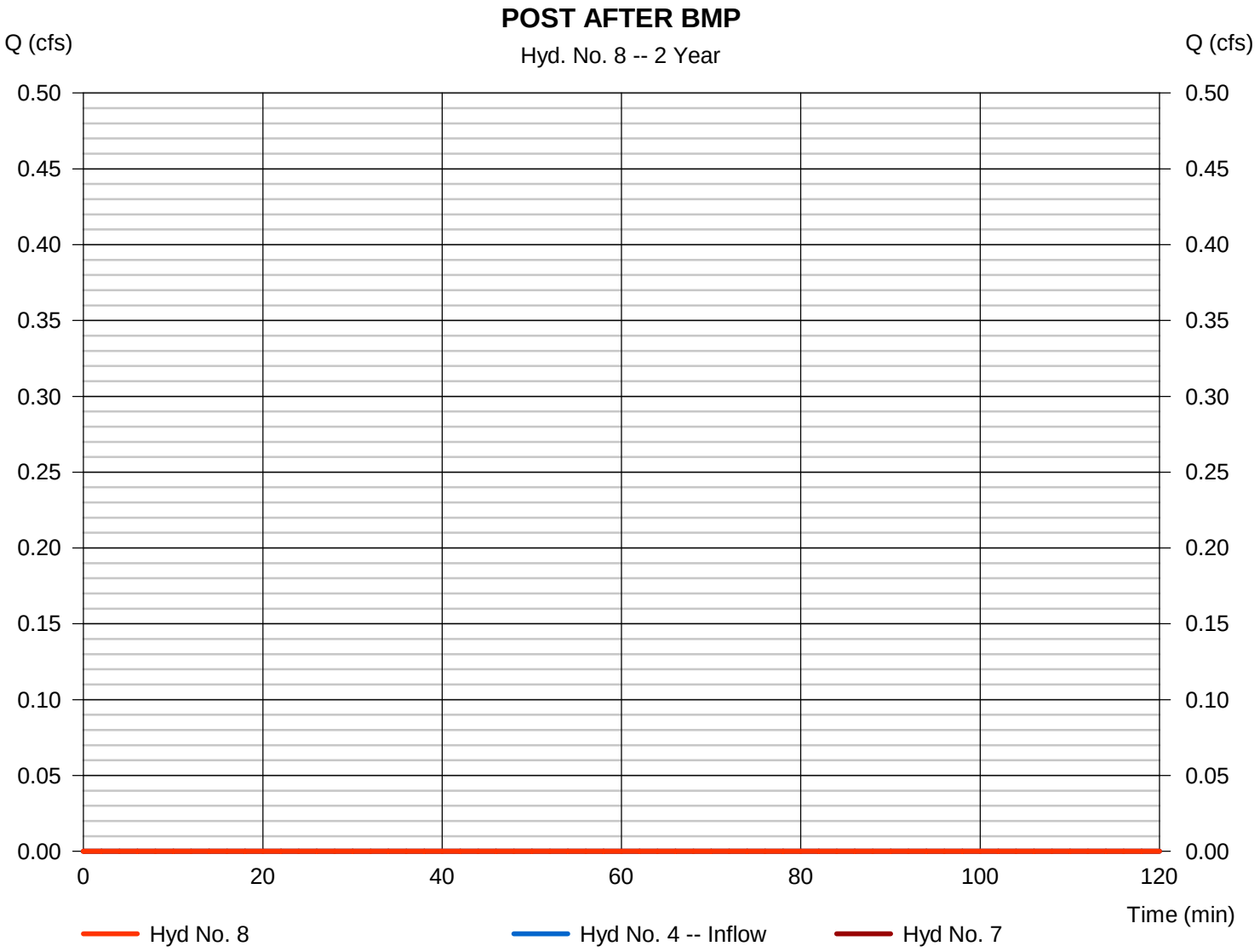


Hydrograph Report

Hyd. No. 8

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	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

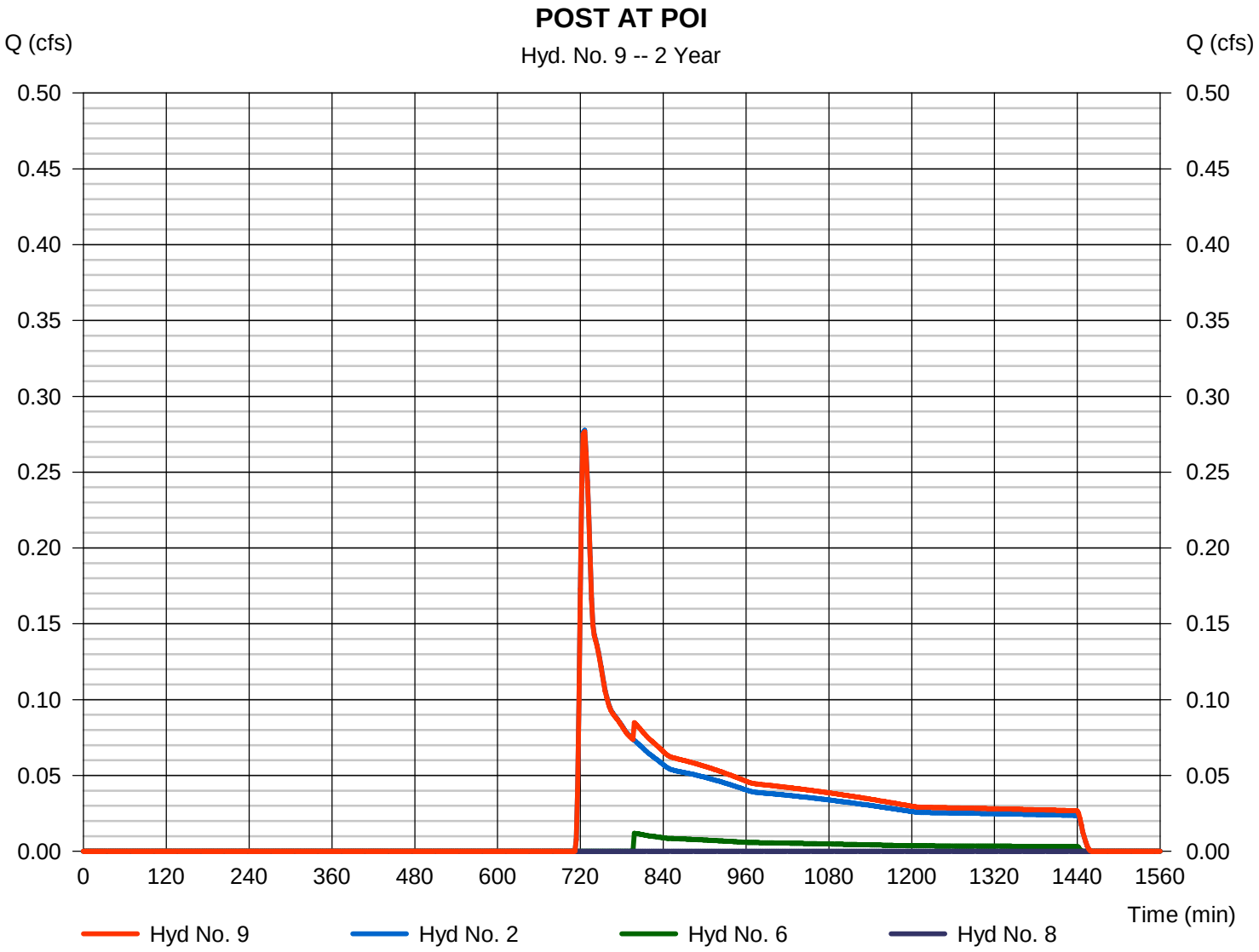


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	= Combine	Peak discharge	= 0.277 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 2,182 cuft
Inflow hyds.	= 2, 6, 8	Contrib. drain. area	= 2.490 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	3.097	2	722	9,595	------	------	------	PRE
2	SCS Runoff	2.167	2	722	6,940	------	------	------	POST UNDETAINED
3	SCS Runoff	0.488	2	718	984	------	------	------	POST DETAINED 1
4	SCS Runoff	1.062	2	718	2,139	------	------	------	POST DETAINED 2
5	Diversion1	0.467	2	716	215	3	------	------	VOLUME ABSTRACTION
6	Diversion2	0.488	2	718	769	3	------	------	POST AFTER BMP
7	Diversion1	1.062	2	718	1,788	4	------	------	VOLUME ABSTRACTION
8	Diversion2	0.022	2	1084	351	4	------	------	POST AFTER BMP
9	Combine	2.424	2	722	8,031	2, 6, 8	------	------	POST AT POI

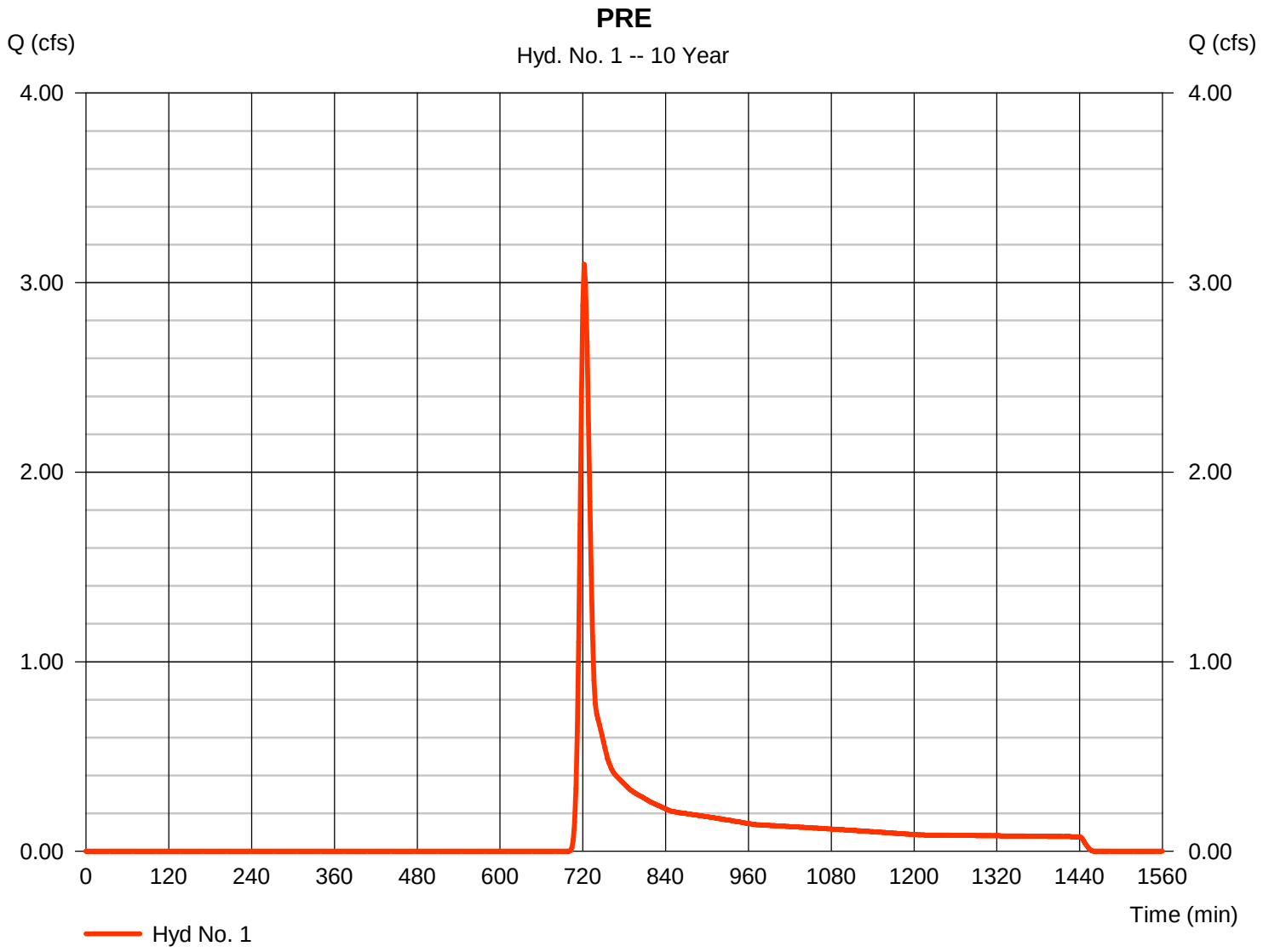
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.097 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	9,595 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	4.28 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



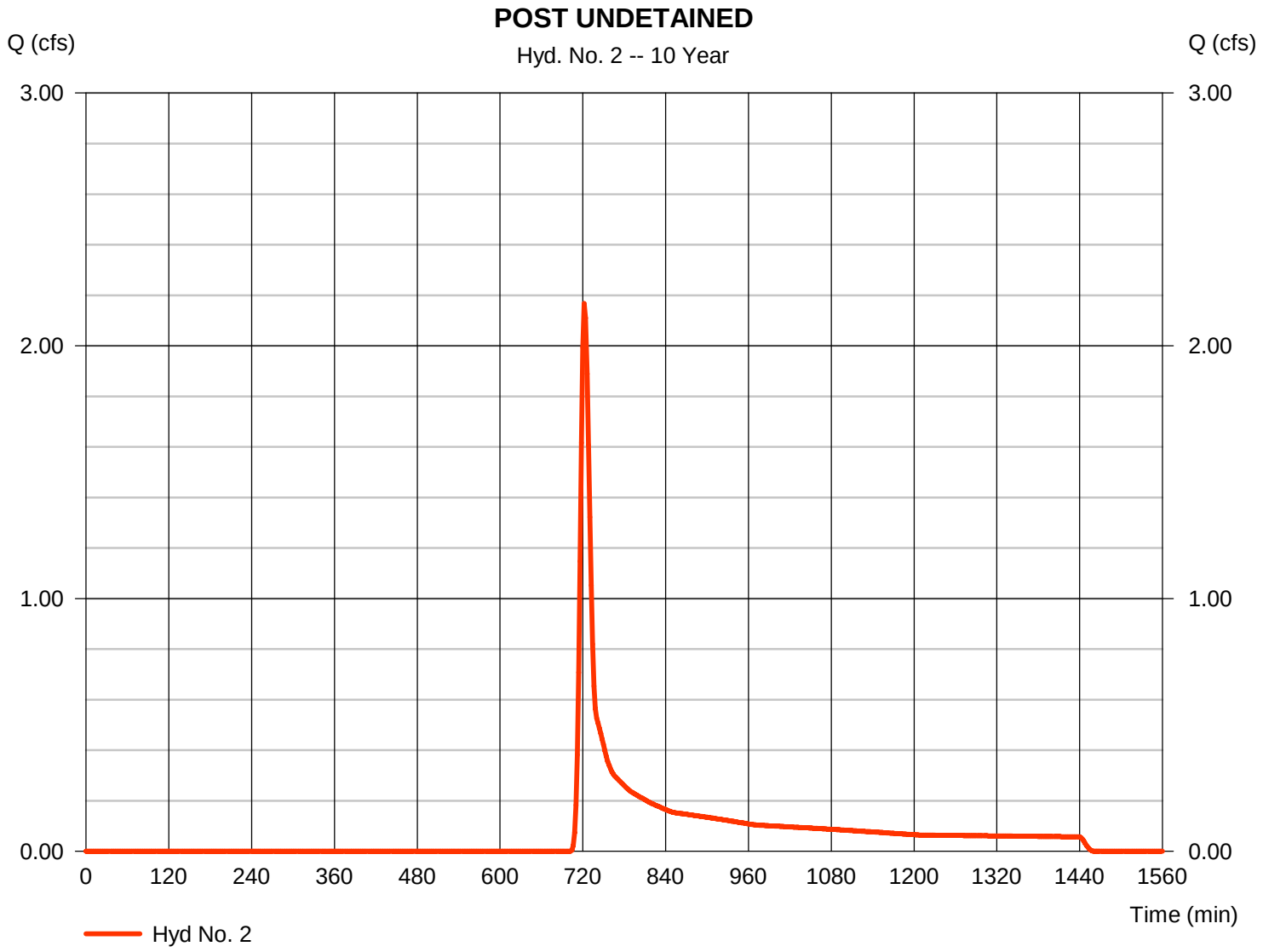
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.167 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	6,940 cuft
Drainage area	=	2.490 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	4.28 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.640 x 55) + (1.850 x 58)] / 2.490



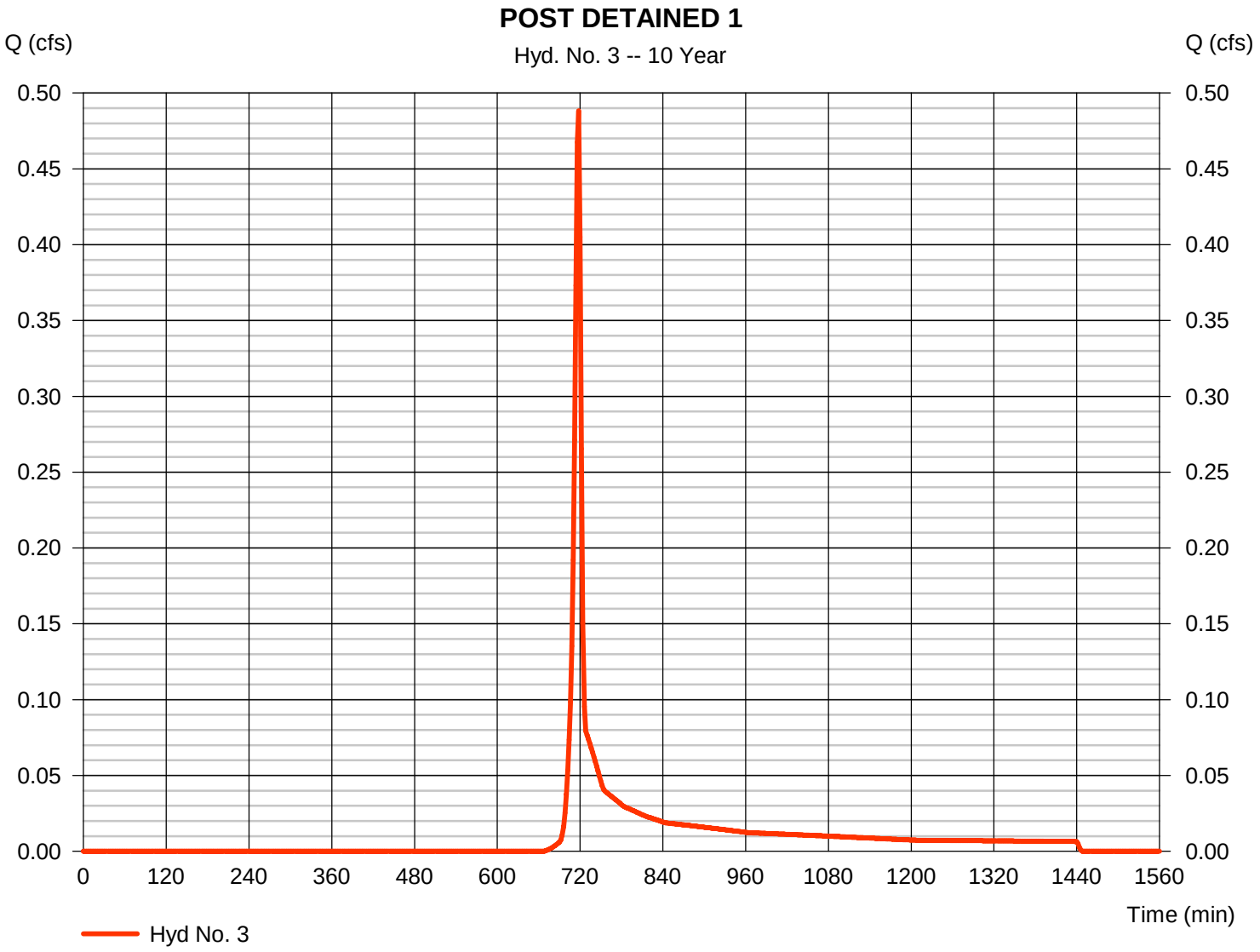
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.488 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 984 cuft
Drainage area	= 0.230 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.10 min
Total precip.	= 4.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



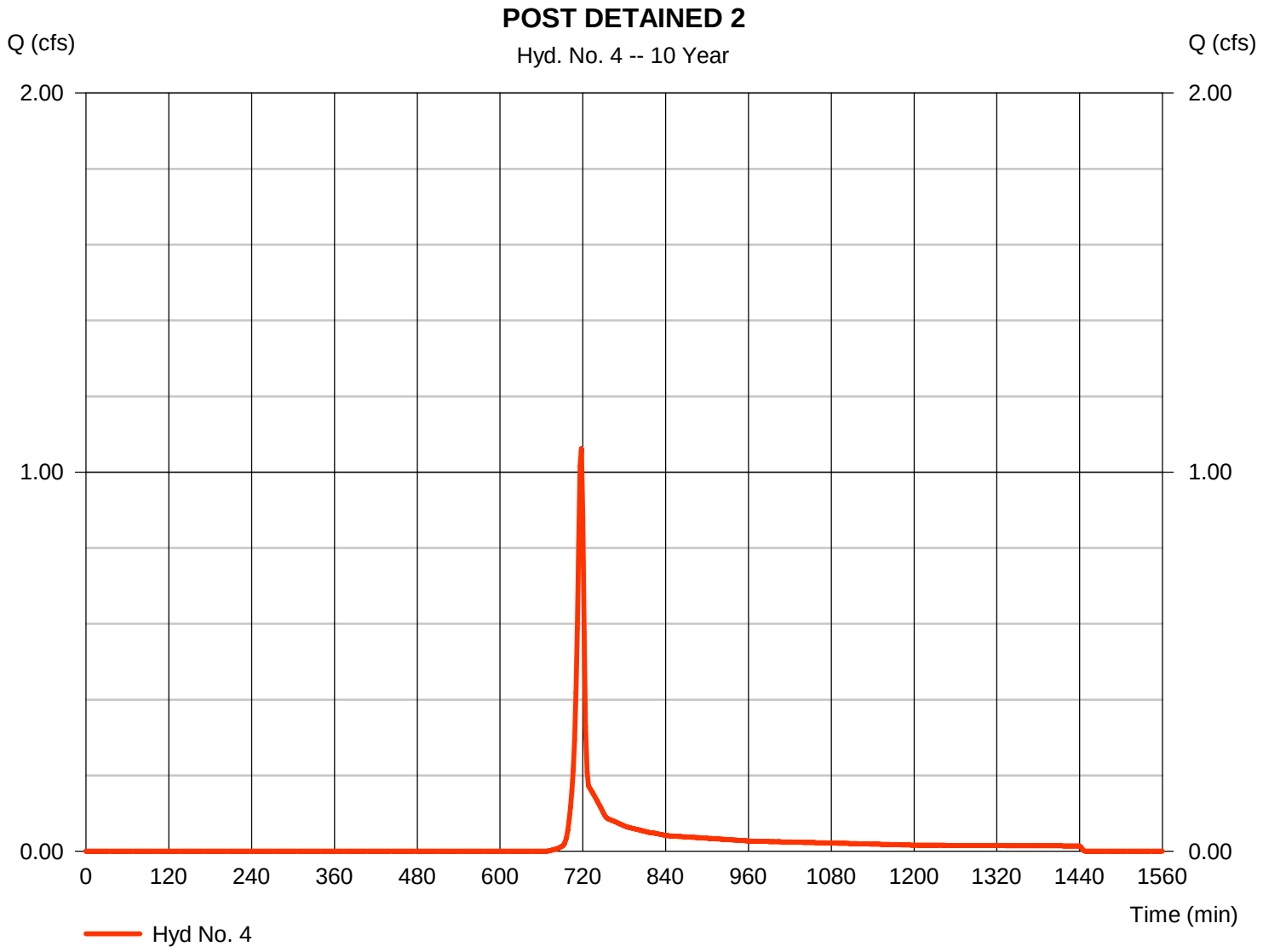
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.062 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,139 cuft
Drainage area	=	0.500 ac	Curve number	=	66*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.20 min
Total precip.	=	4.28 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

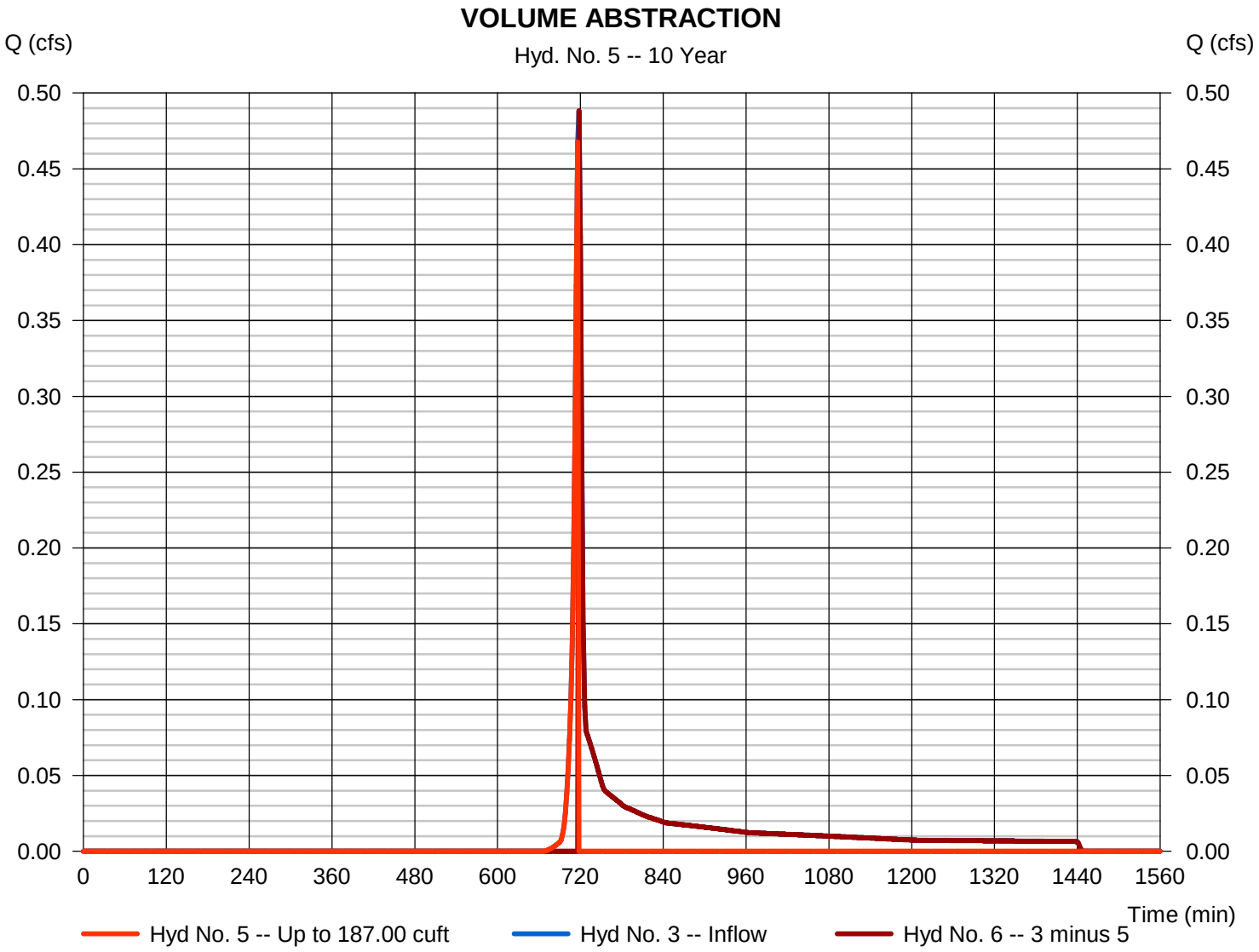


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.467 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 215 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

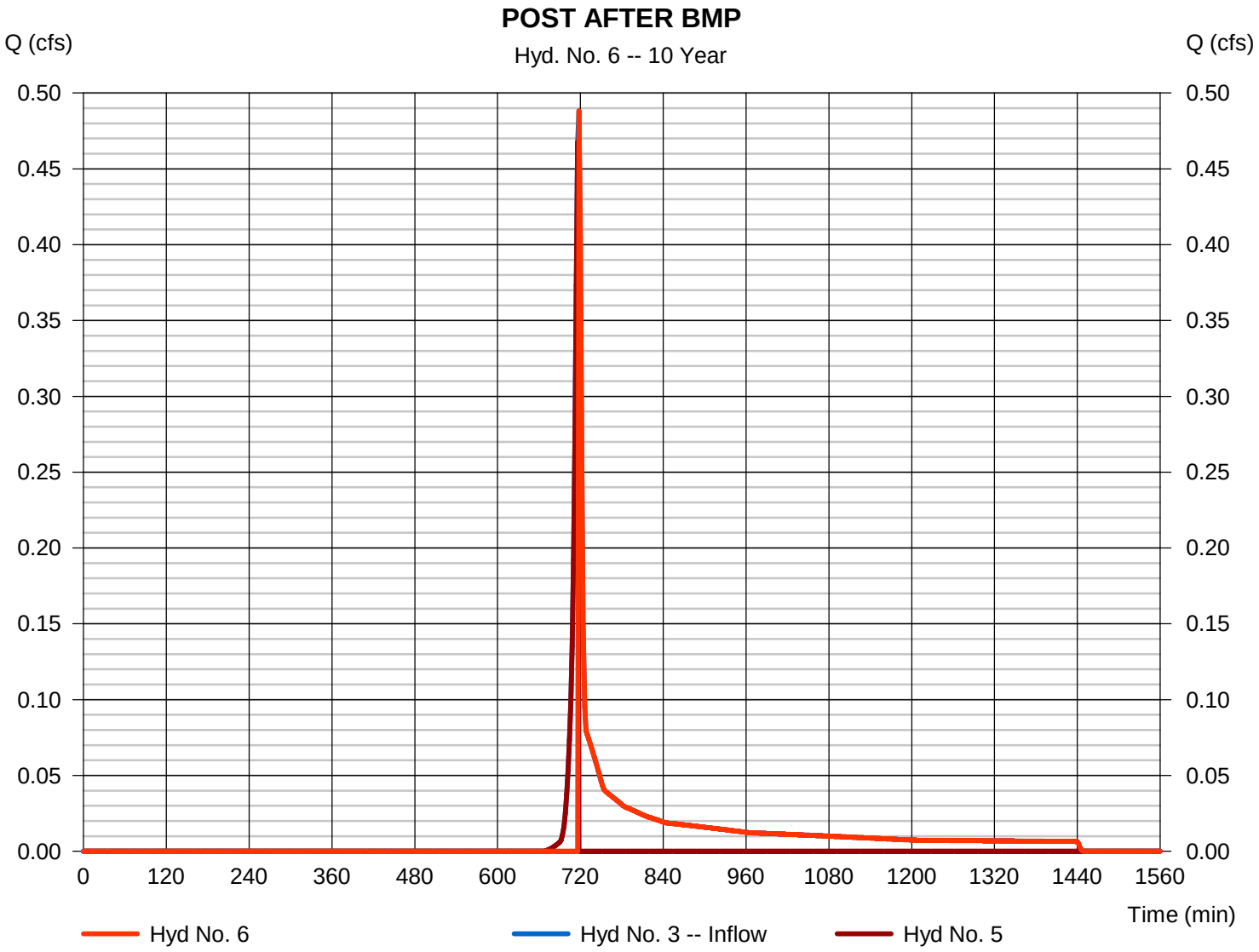


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.488 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 769 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

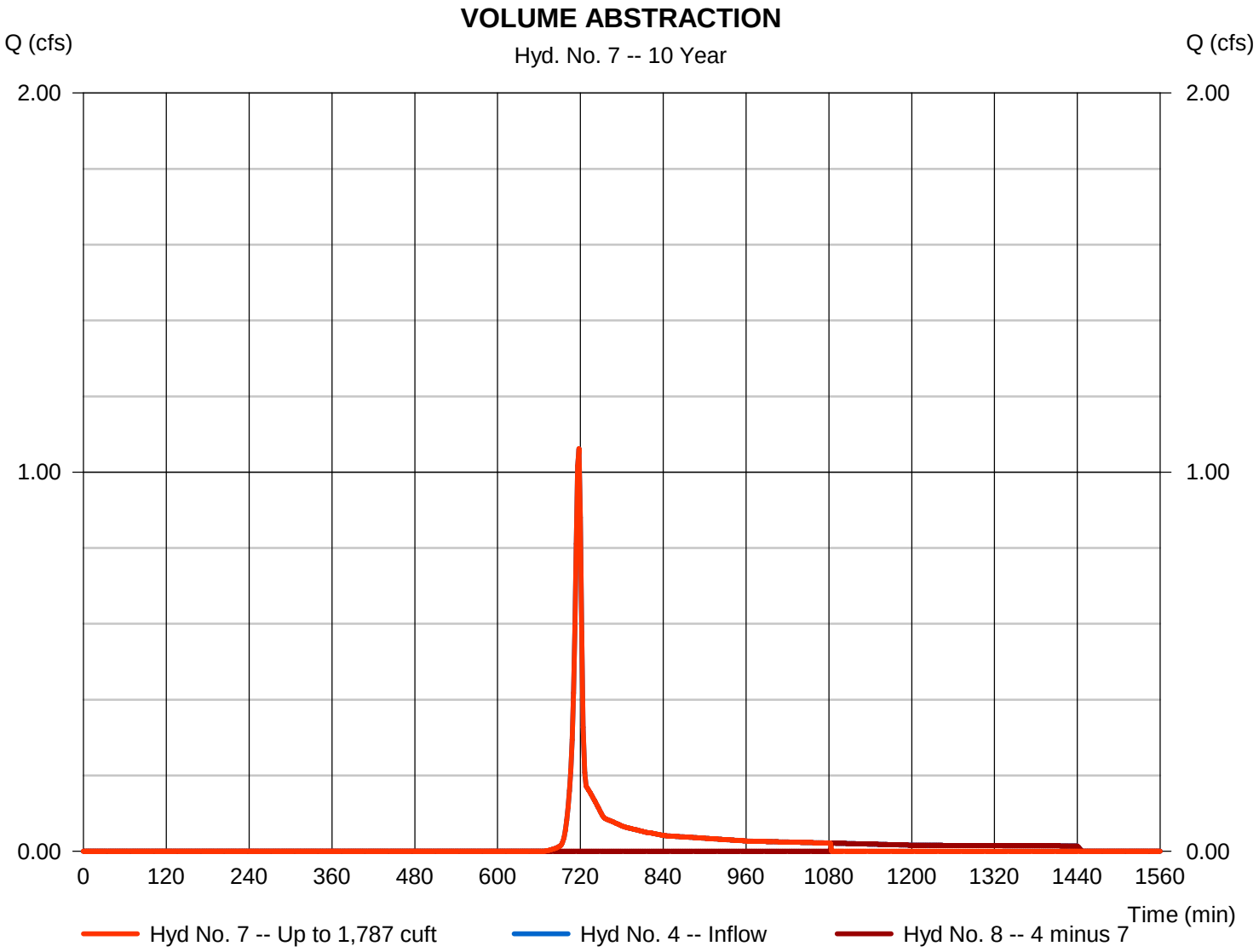


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 1.062 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,788 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

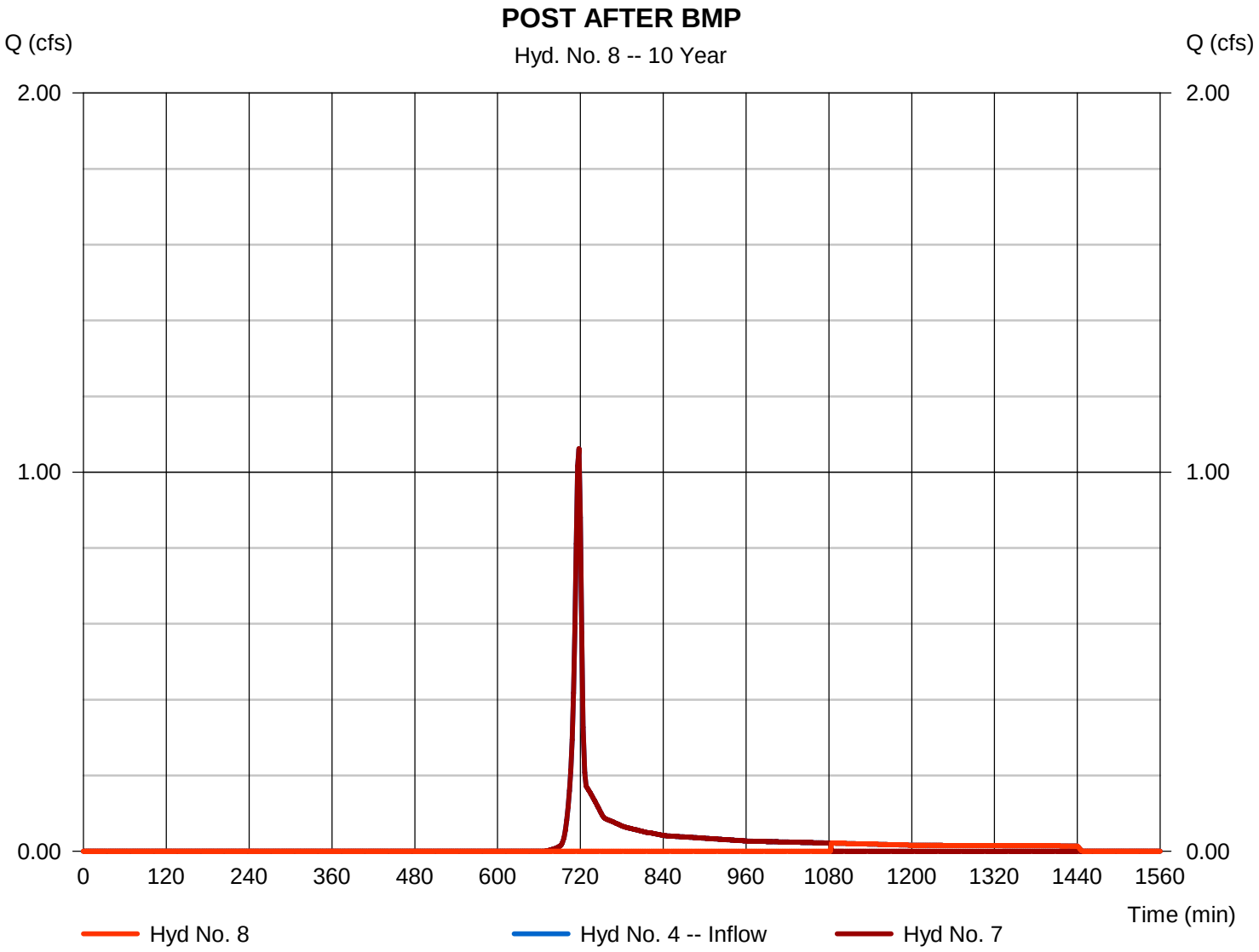


Hydrograph Report

Hyd. No. 8

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.022 cfs
Storm frequency	= 10 yrs	Time to peak	= 1084 min
Time interval	= 2 min	Hyd. volume	= 351 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

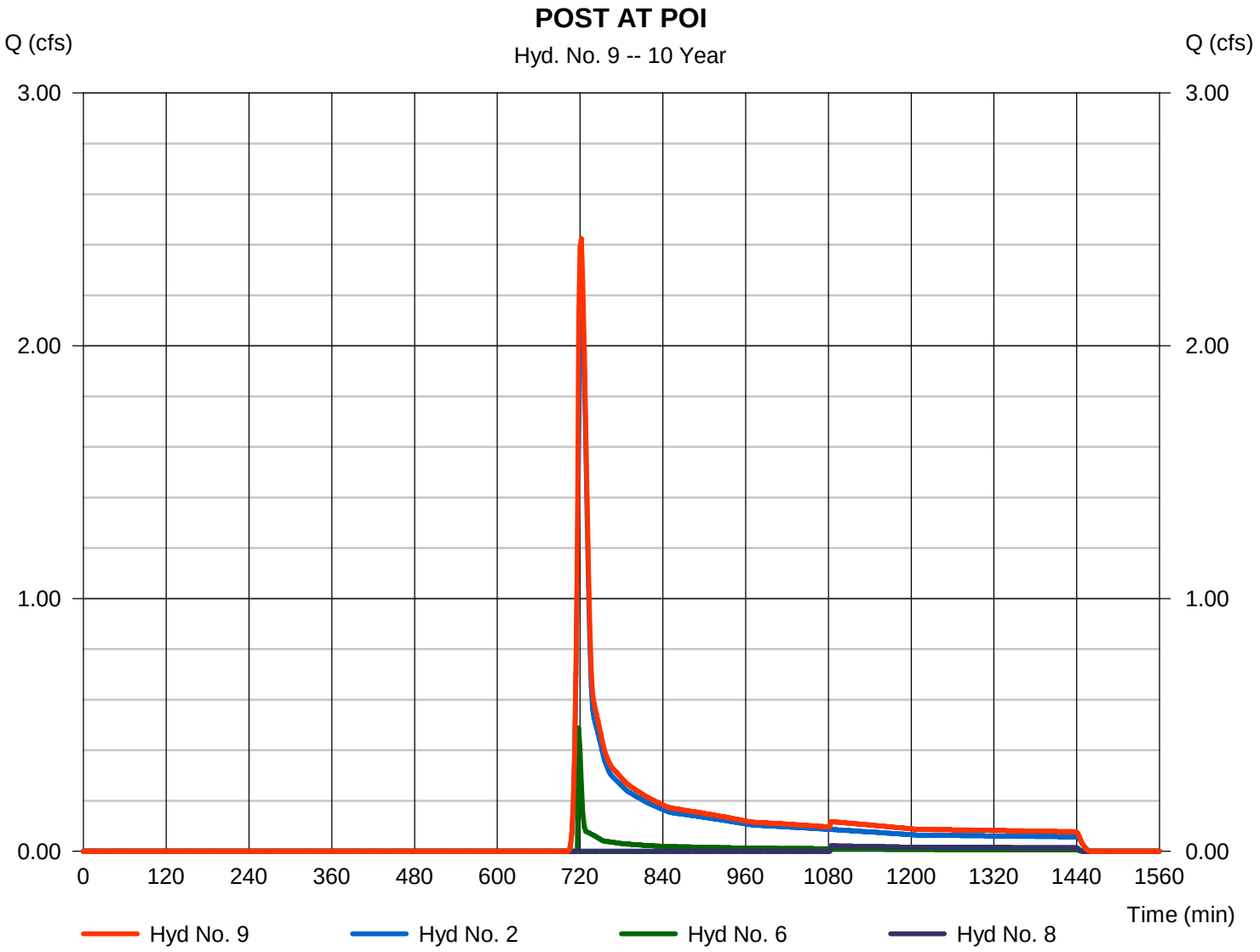


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	= Combine	Peak discharge	= 2.424 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 8,031 cuft
Inflow hyds.	= 2, 6, 8	Contrib. drain. area	= 2.490 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	8.505	2	722	22,923	------	------	------	PRE
2	SCS Runoff	6.240	2	722	16,940	------	------	------	POST UNDETAINED
3	SCS Runoff	1.020	2	718	2,044	------	------	------	POST DETAINED 1
4	SCS Runoff	2.217	2	718	4,444	------	------	------	POST DETAINED 2
5	Diversion1	0.286	2	706	198	3	------	------	VOLUME ABSTRACTION
6	Diversion2	1.020	2	718	1,846	3	------	------	POST AFTER BMP
7	Diversion1	2.217	2	718	1,925	4	------	------	VOLUME ABSTRACTION
8	Diversion2	0.648	2	724	2,519	4	------	------	POST AFTER BMP
9	Combine	6.890	2	720	21,238	2, 6, 8	------	------	POST AT POI

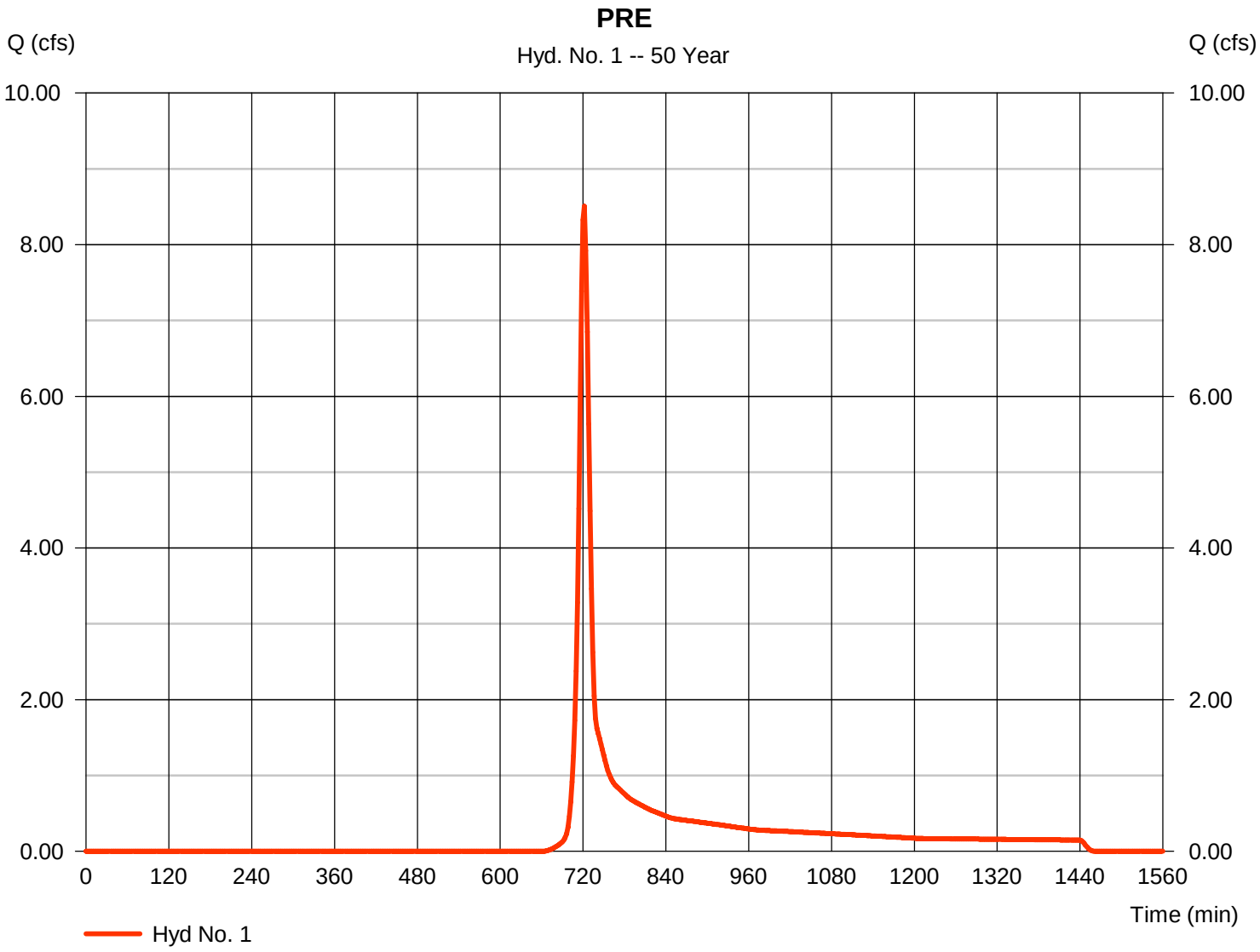
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.505 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	22,923 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	6.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



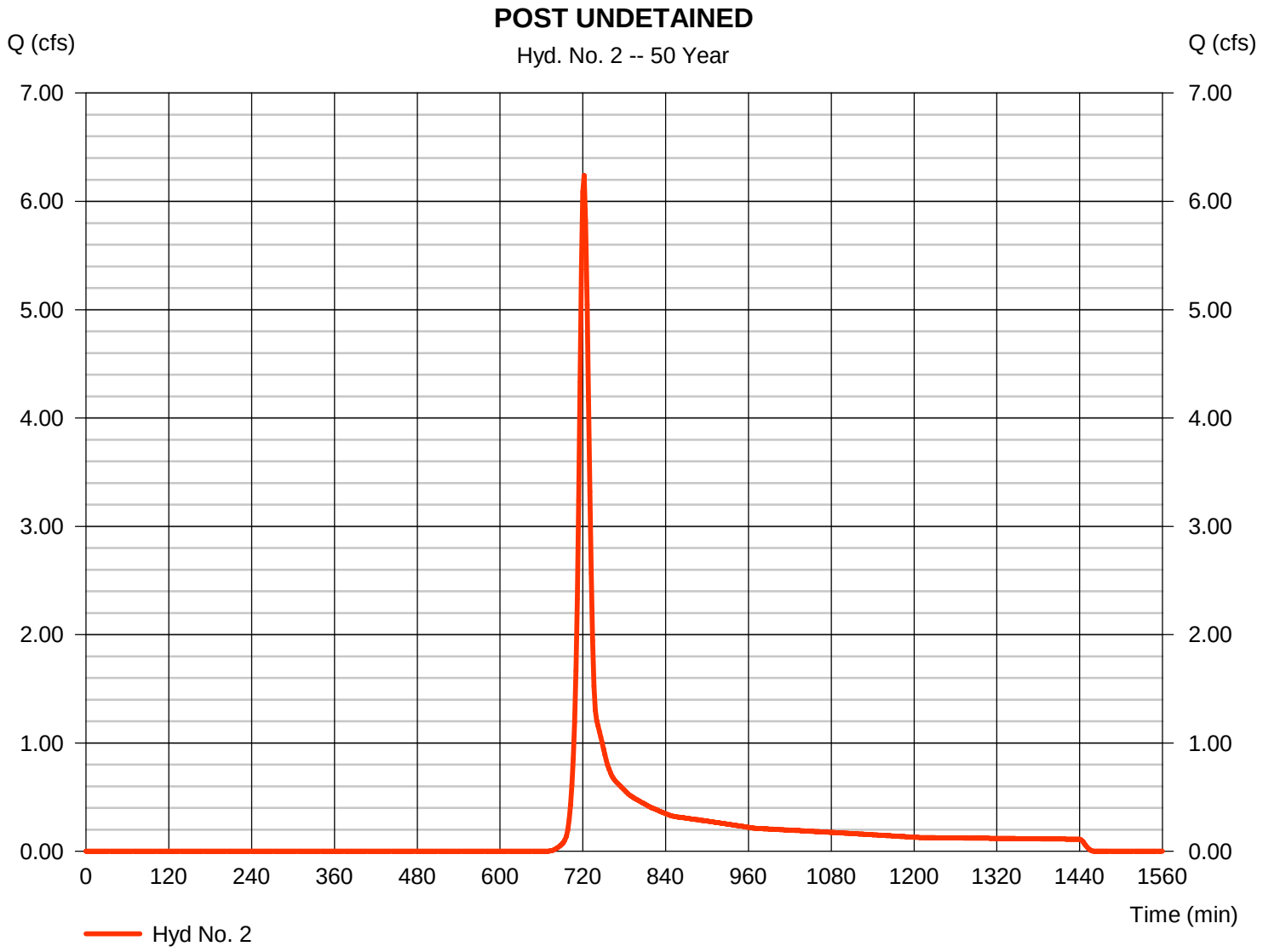
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.240 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	16,940 cuft
Drainage area	=	2.490 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	6.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.640 x 55) + (1.850 x 58)] / 2.490



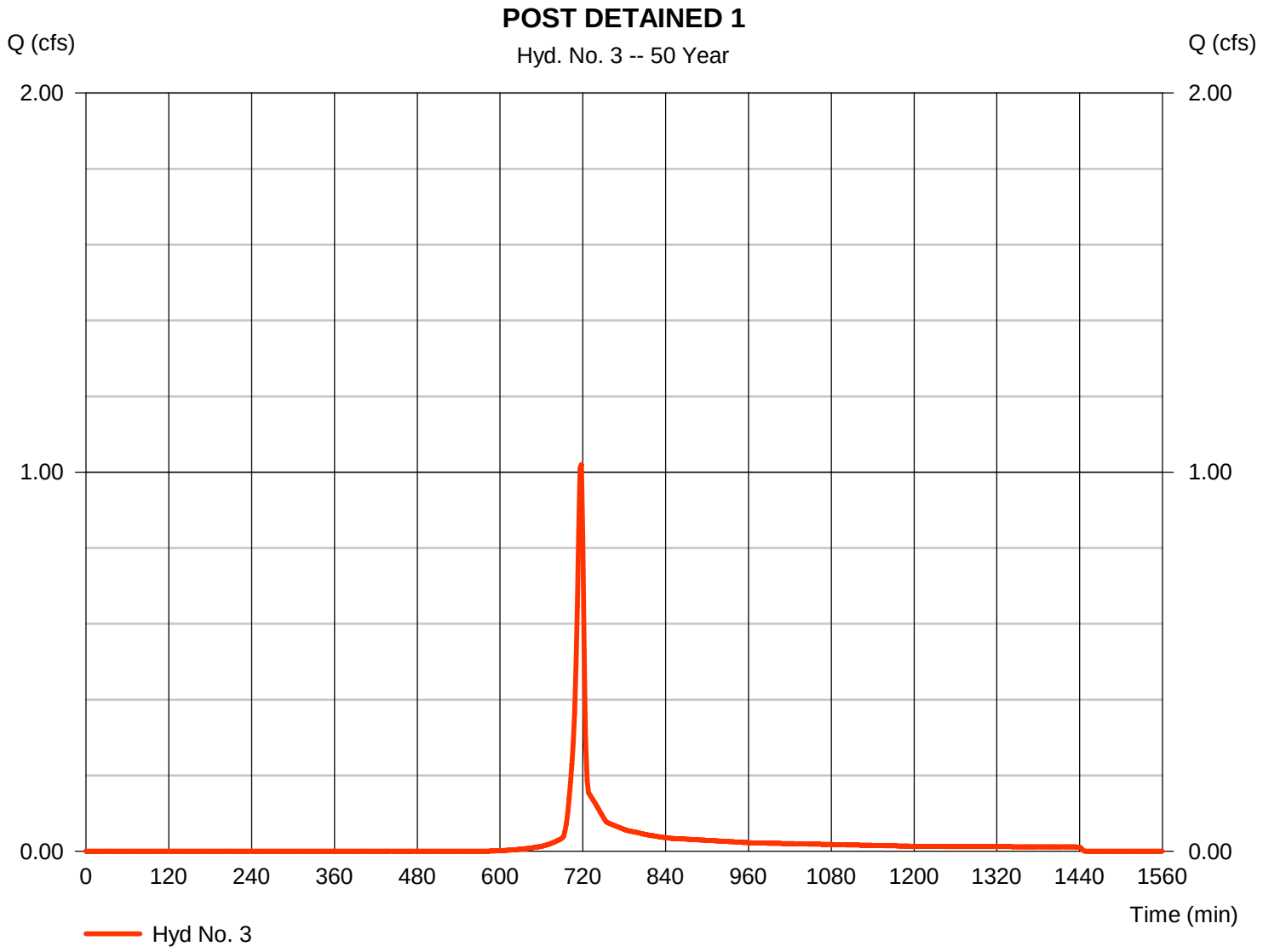
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.020 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,044 cuft
Drainage area	= 0.230 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.10 min
Total precip.	= 6.23 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



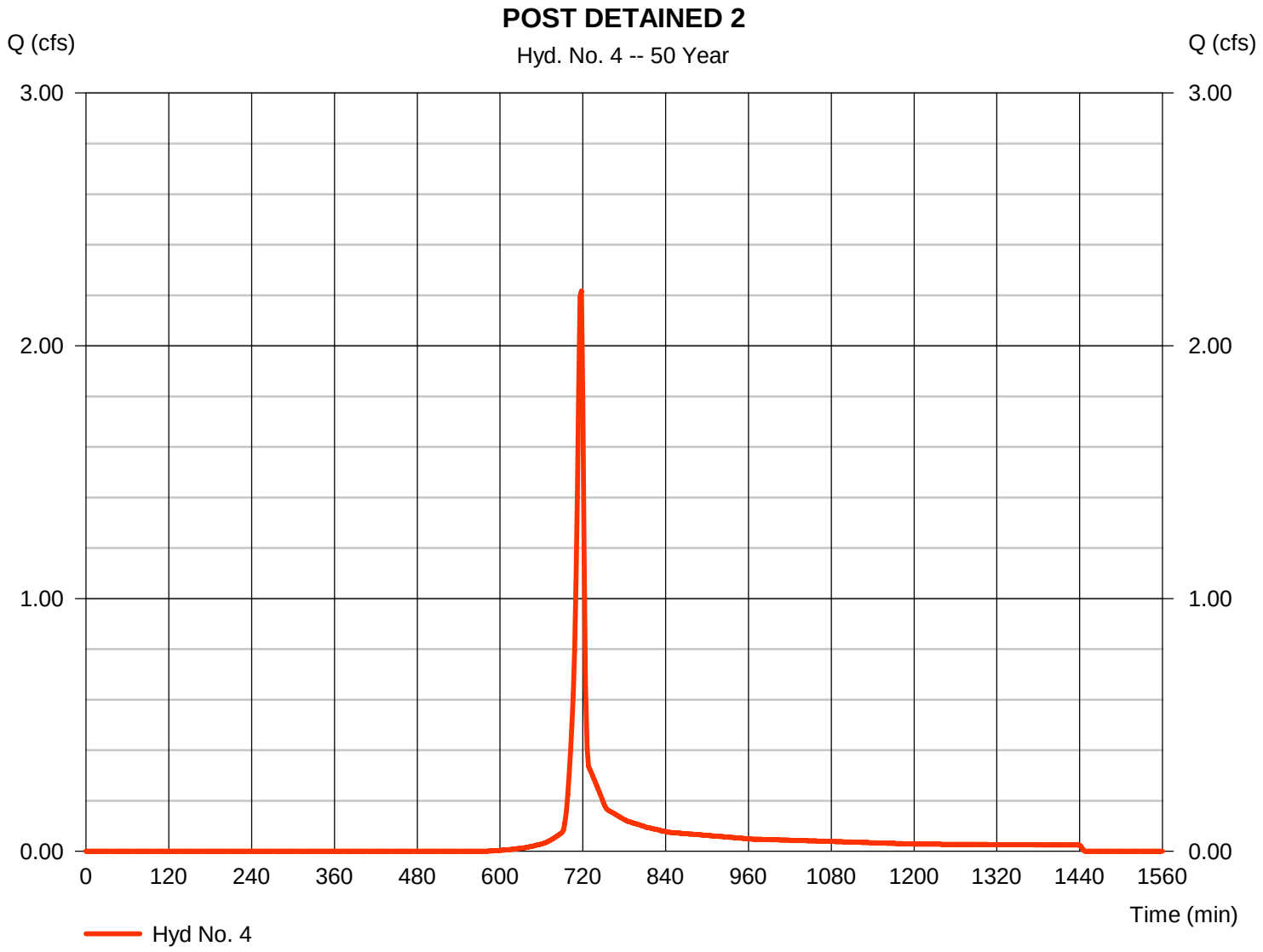
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.217 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,444 cuft
Drainage area	=	0.500 ac	Curve number	=	66*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.20 min
Total precip.	=	6.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

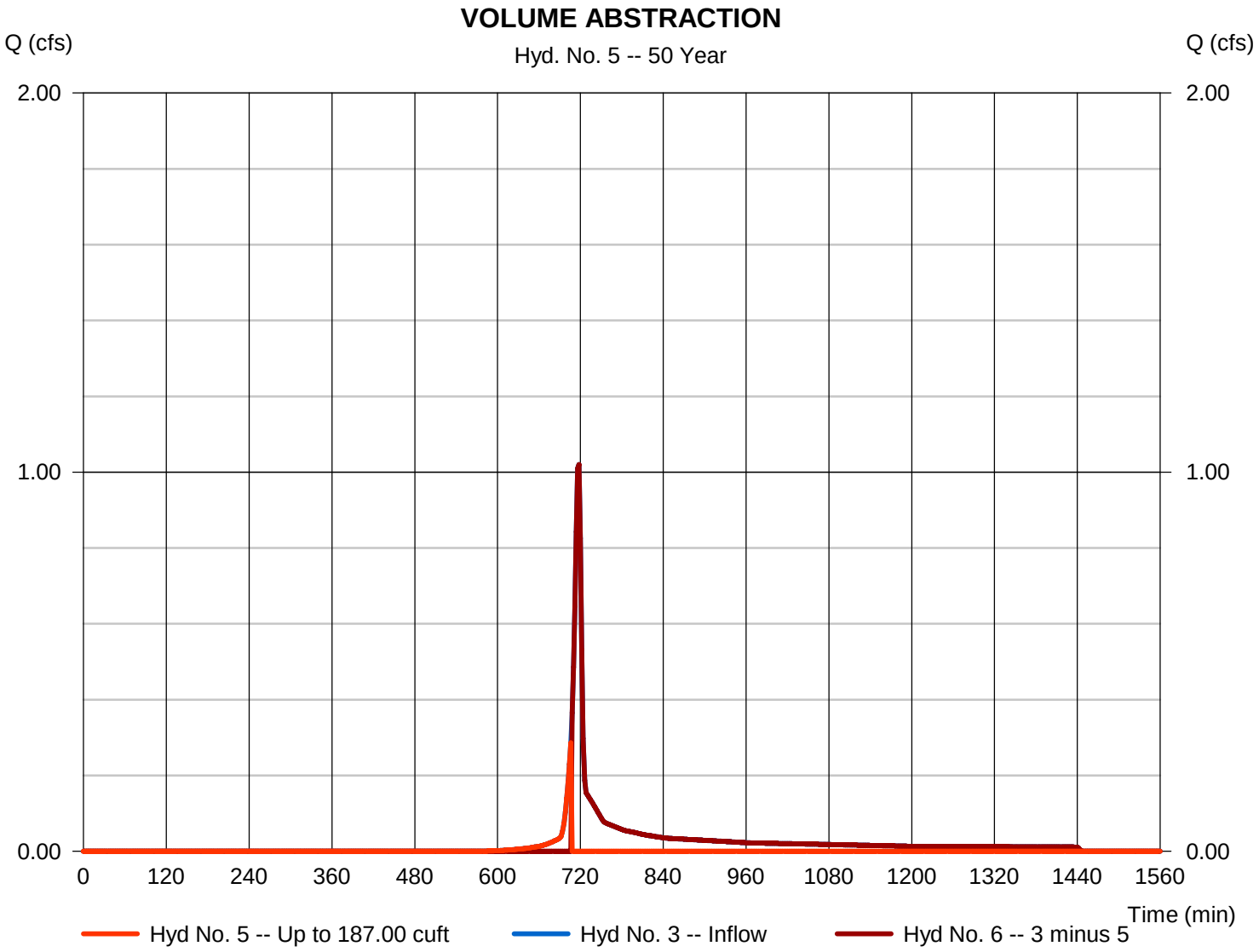


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.286 cfs
Storm frequency	= 50 yrs	Time to peak	= 706 min
Time interval	= 2 min	Hyd. volume	= 198 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

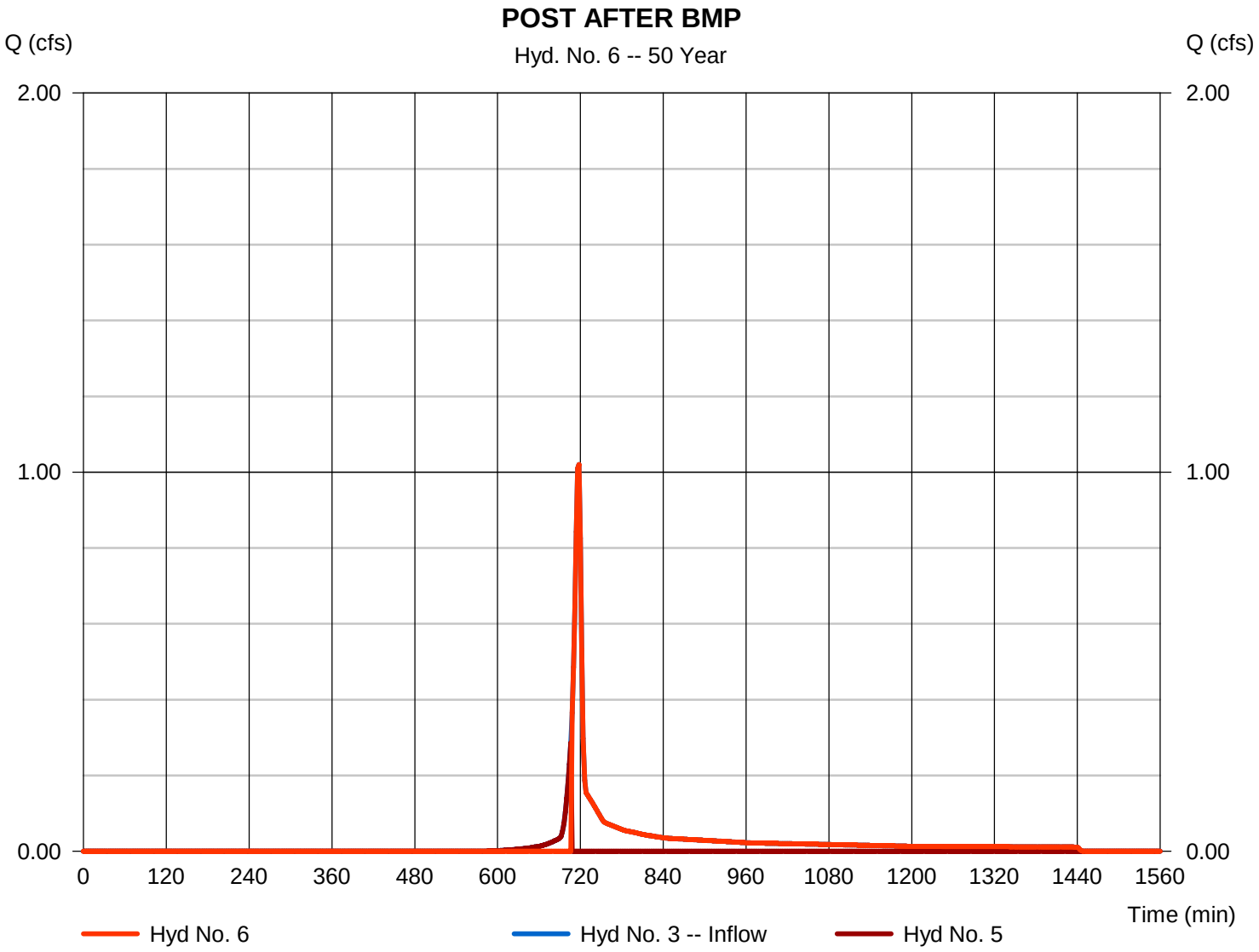


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.020 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,846 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

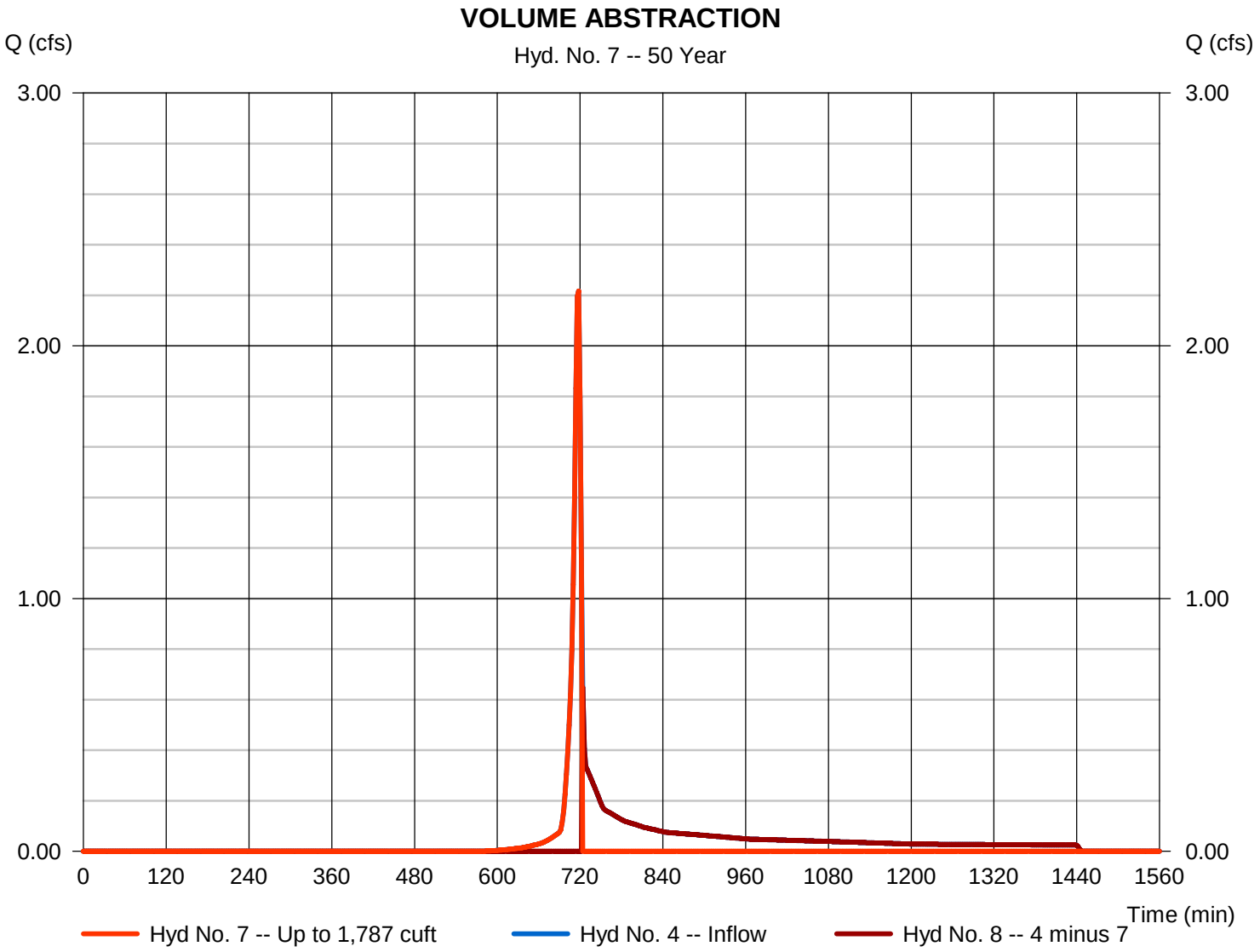


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 2.217 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,925 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

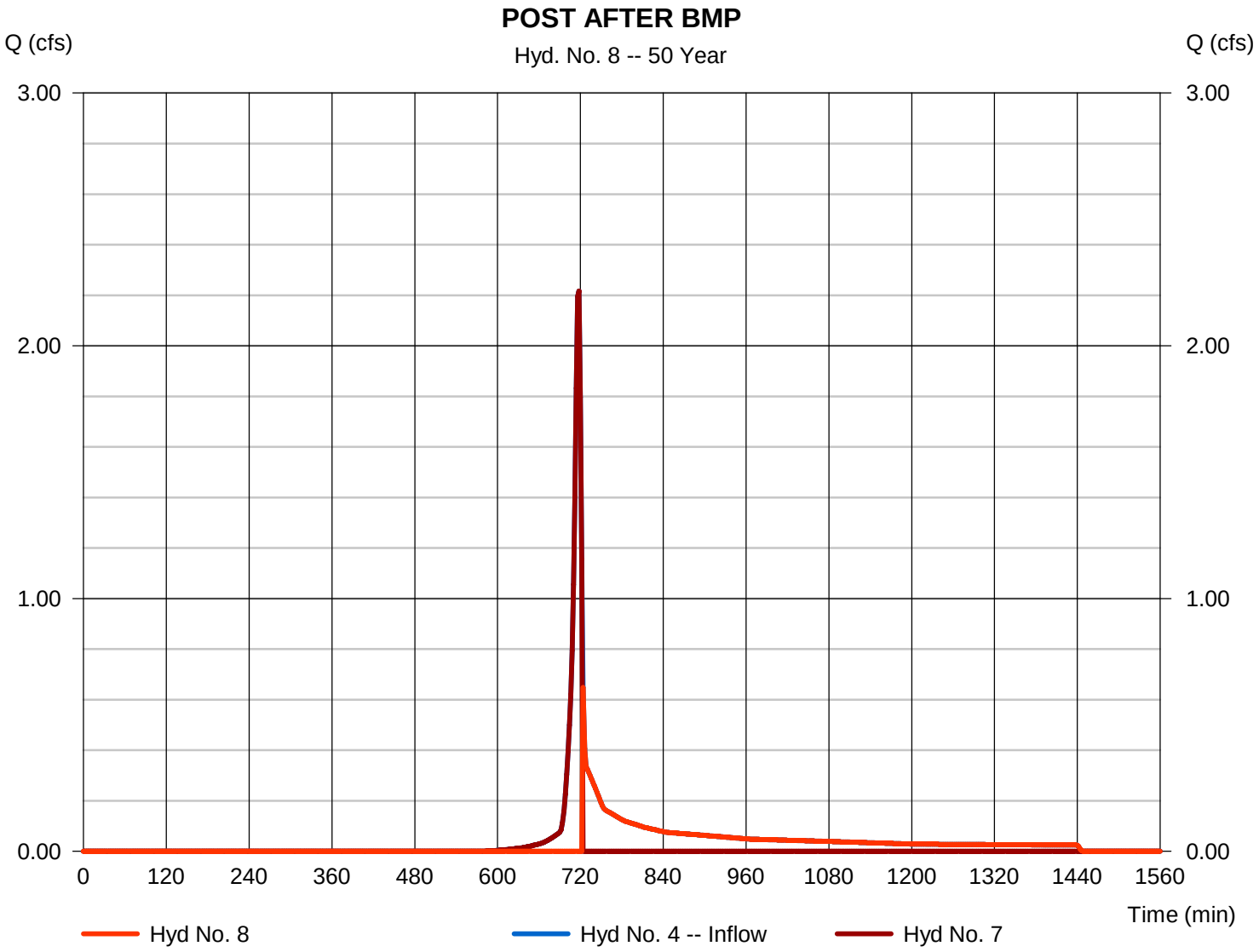


Hydrograph Report

Hyd. No. 8

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.648 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,519 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

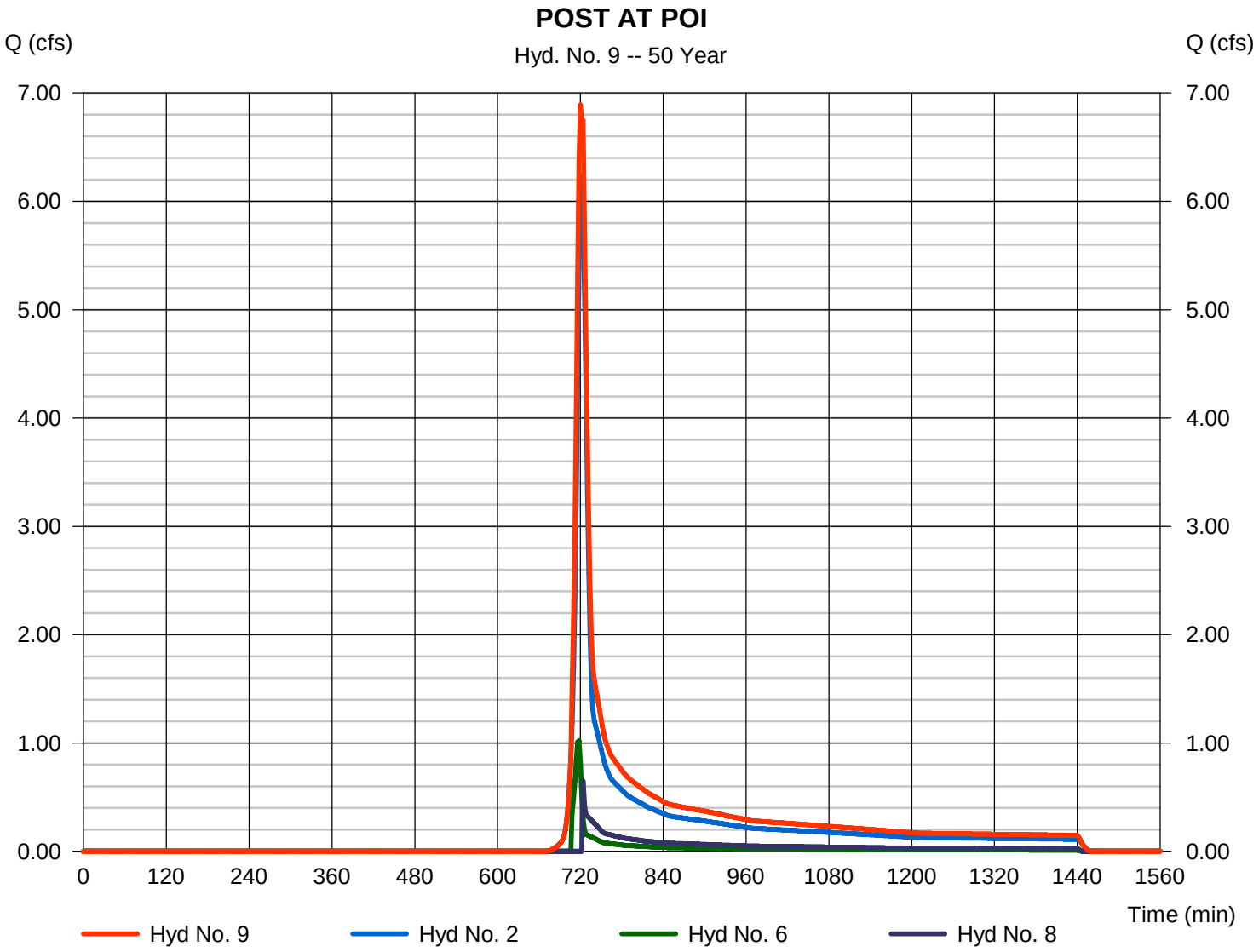


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	= Combine	Peak discharge	= 6.890 cfs
Storm frequency	= 50 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 21,238 cuft
Inflow hyds.	= 2, 6, 8	Contrib. drain. area	= 2.490 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	11.99	2	722	31,692	------	------	------	PRE
2	SCS Runoff	8.882	2	722	23,570	------	------	------	POST UNDETAINED
3	SCS Runoff	1.341	2	718	2,706	------	------	------	POST DETAINED 1
4	SCS Runoff	2.915	2	718	5,883	------	------	------	POST DETAINED 2
5	Diversion1	0.208	2	700	202	3	------	------	VOLUME ABSTRACTION
6	Diversion2	1.341	2	718	2,504	3	------	------	POST AFTER BMP
7	Diversion1	2.914	2	716	1,886	4	------	------	VOLUME ABSTRACTION
8	Diversion2	2.915	2	718	3,998	4	------	------	POST AFTER BMP
9	Combine	12.16	2	720	29,978	2, 6, 8	------	------	POST AT POI

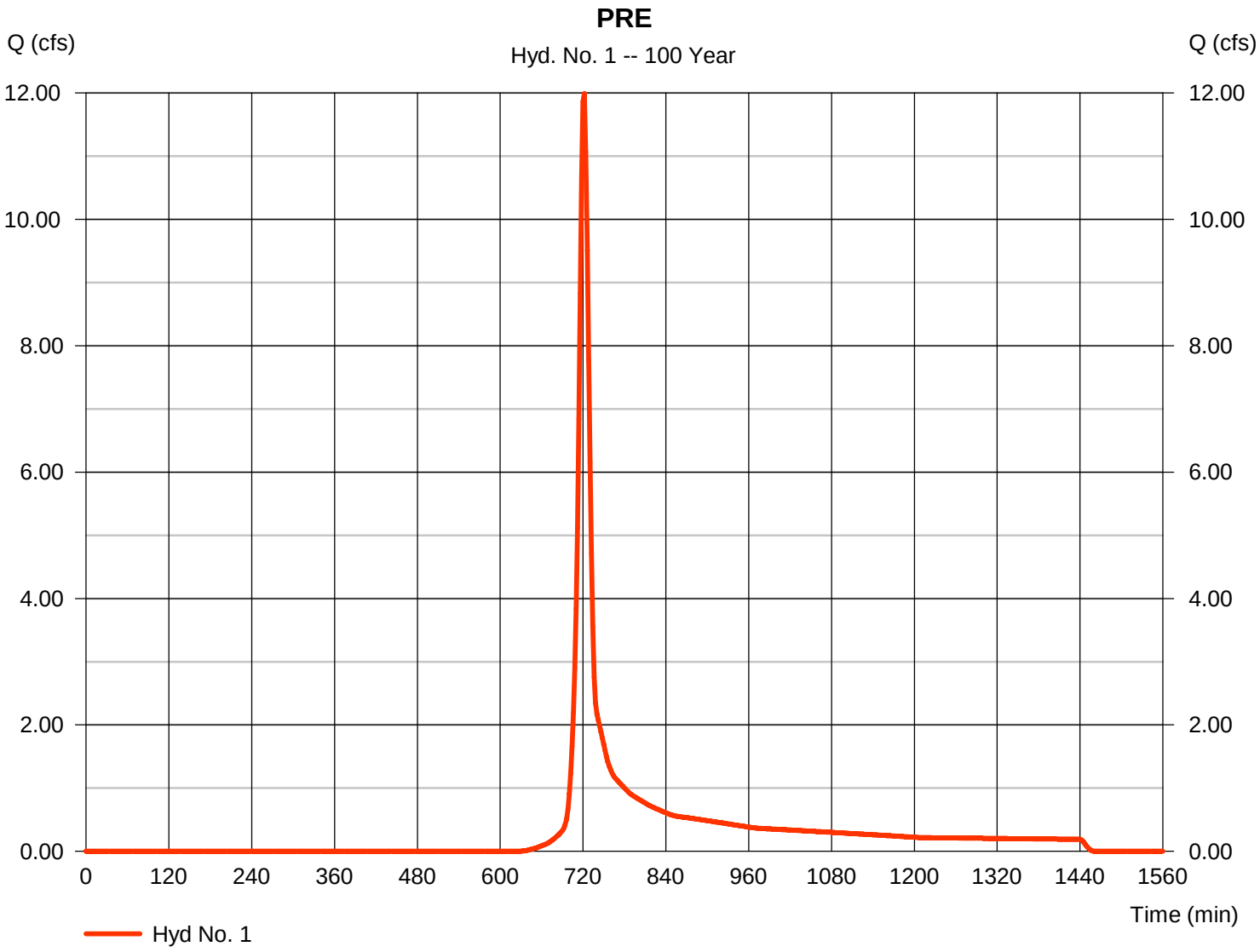
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.99 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	31,692 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



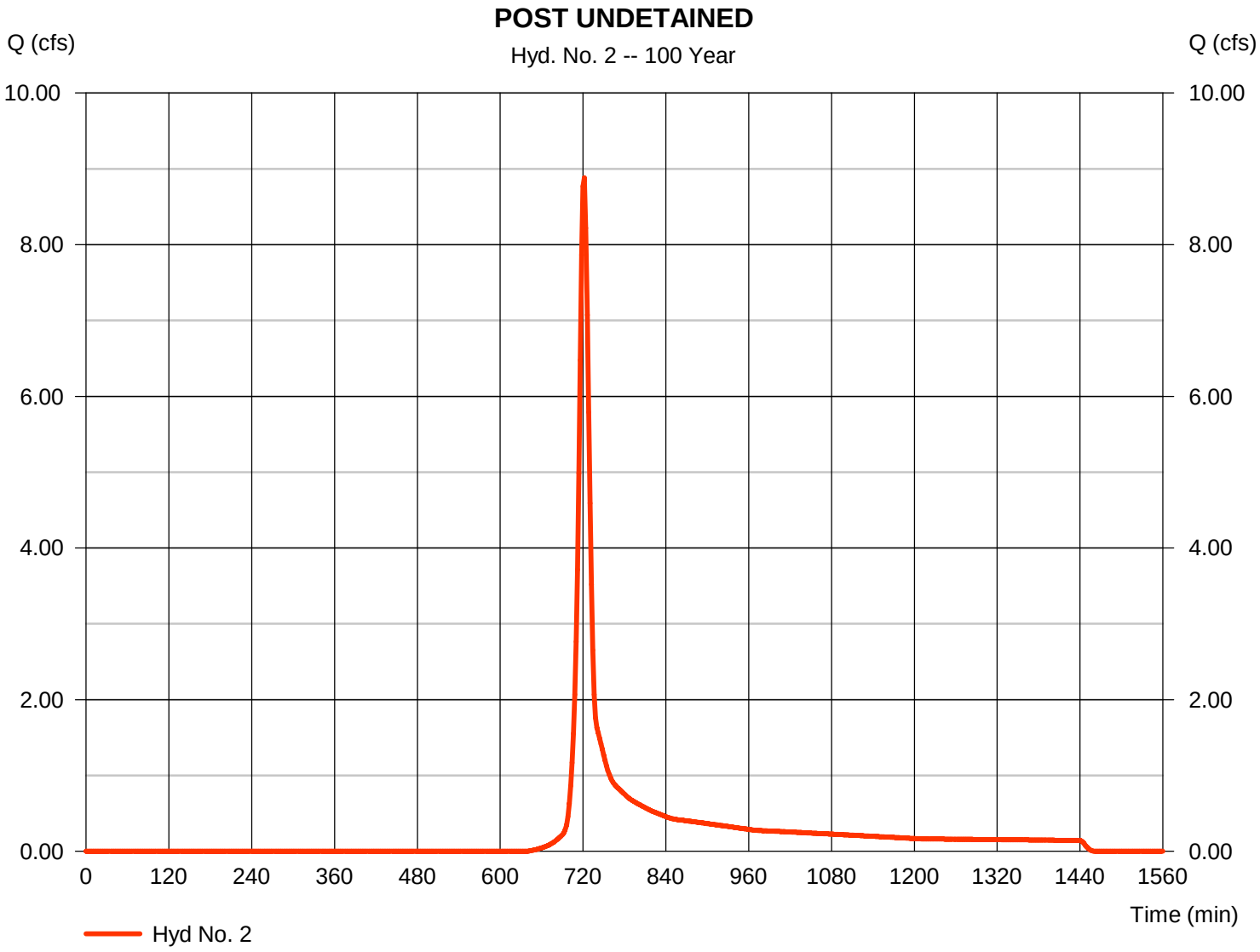
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.882 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	23,570 cuft
Drainage area	=	2.490 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.640 x 55) + (1.850 x 58)] / 2.490



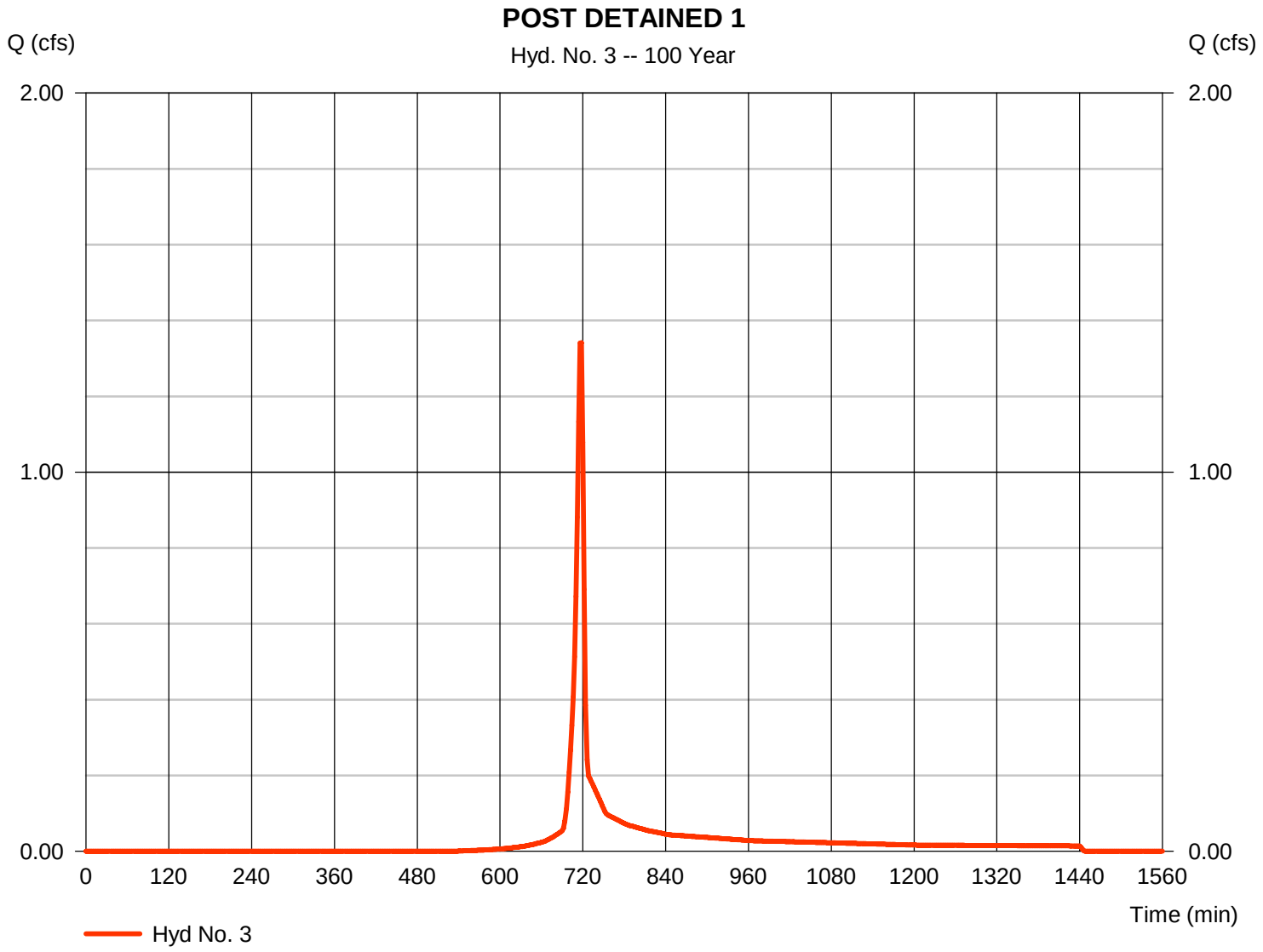
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.341 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,706 cuft
Drainage area	=	0.230 ac	Curve number	=	66*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.10 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



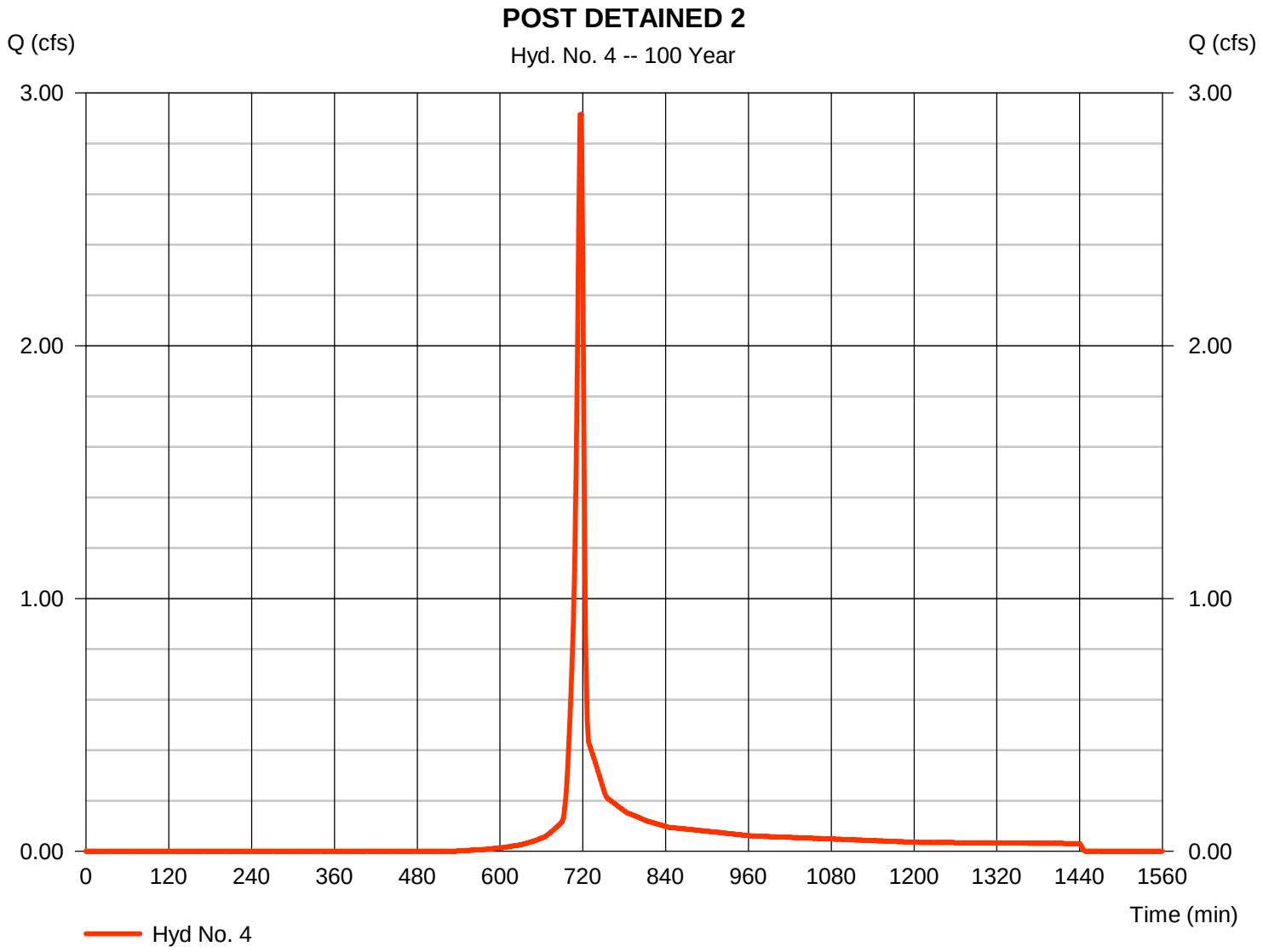
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.915 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	5,883 cuft
Drainage area	=	0.500 ac	Curve number	=	66*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.20 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

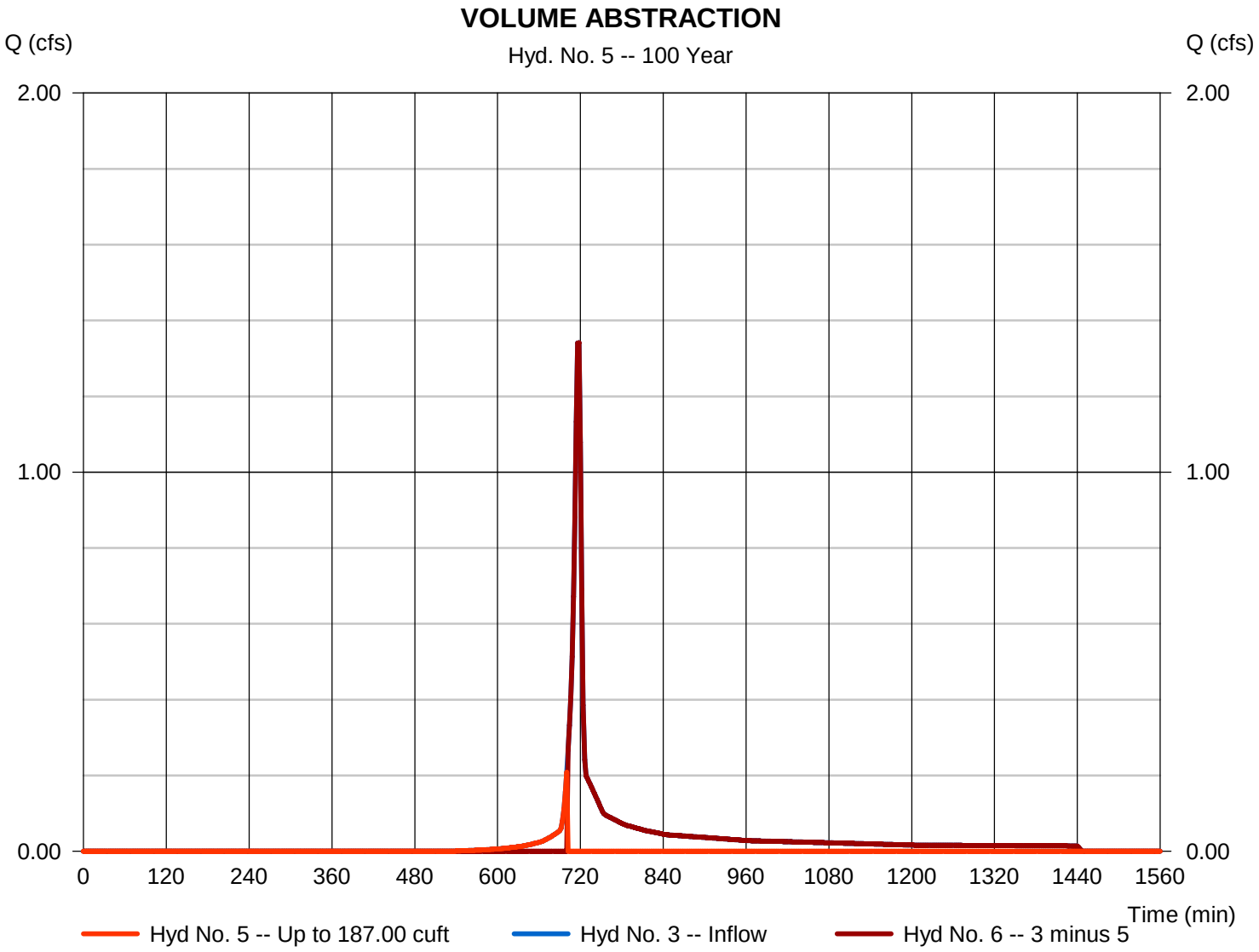


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.208 cfs
Storm frequency	= 100 yrs	Time to peak	= 700 min
Time interval	= 2 min	Hyd. volume	= 202 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

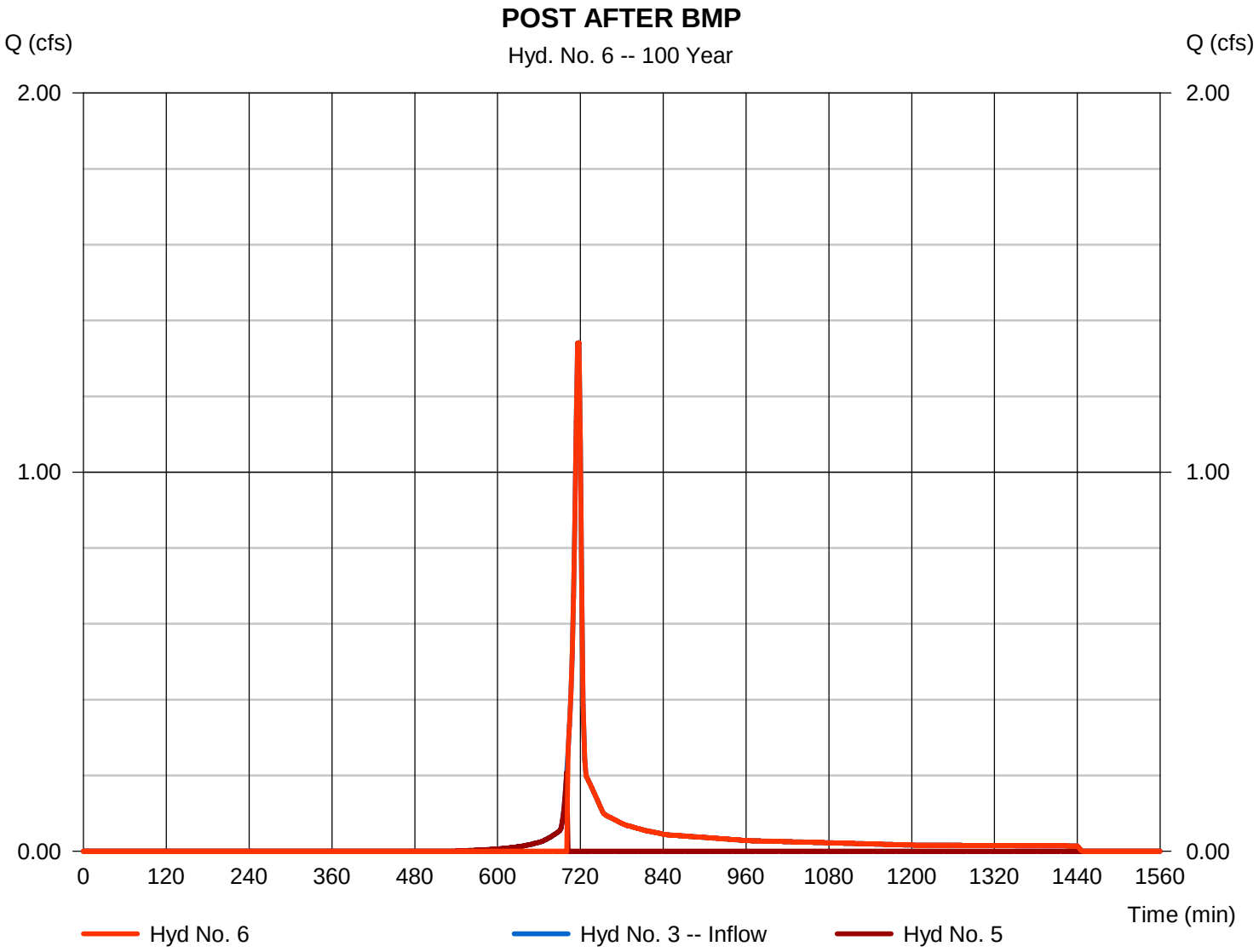


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.341 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,504 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

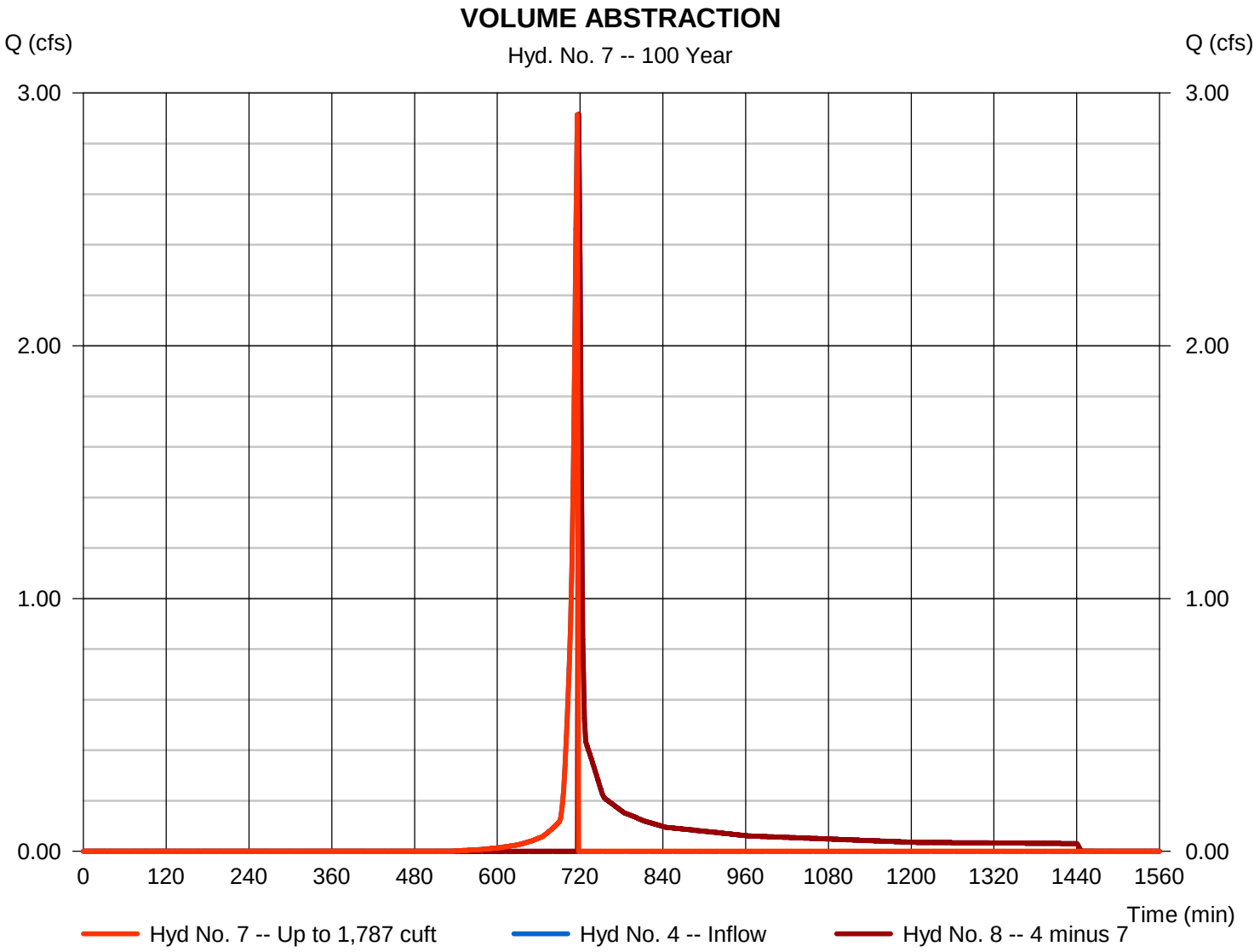


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 2.914 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,886 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

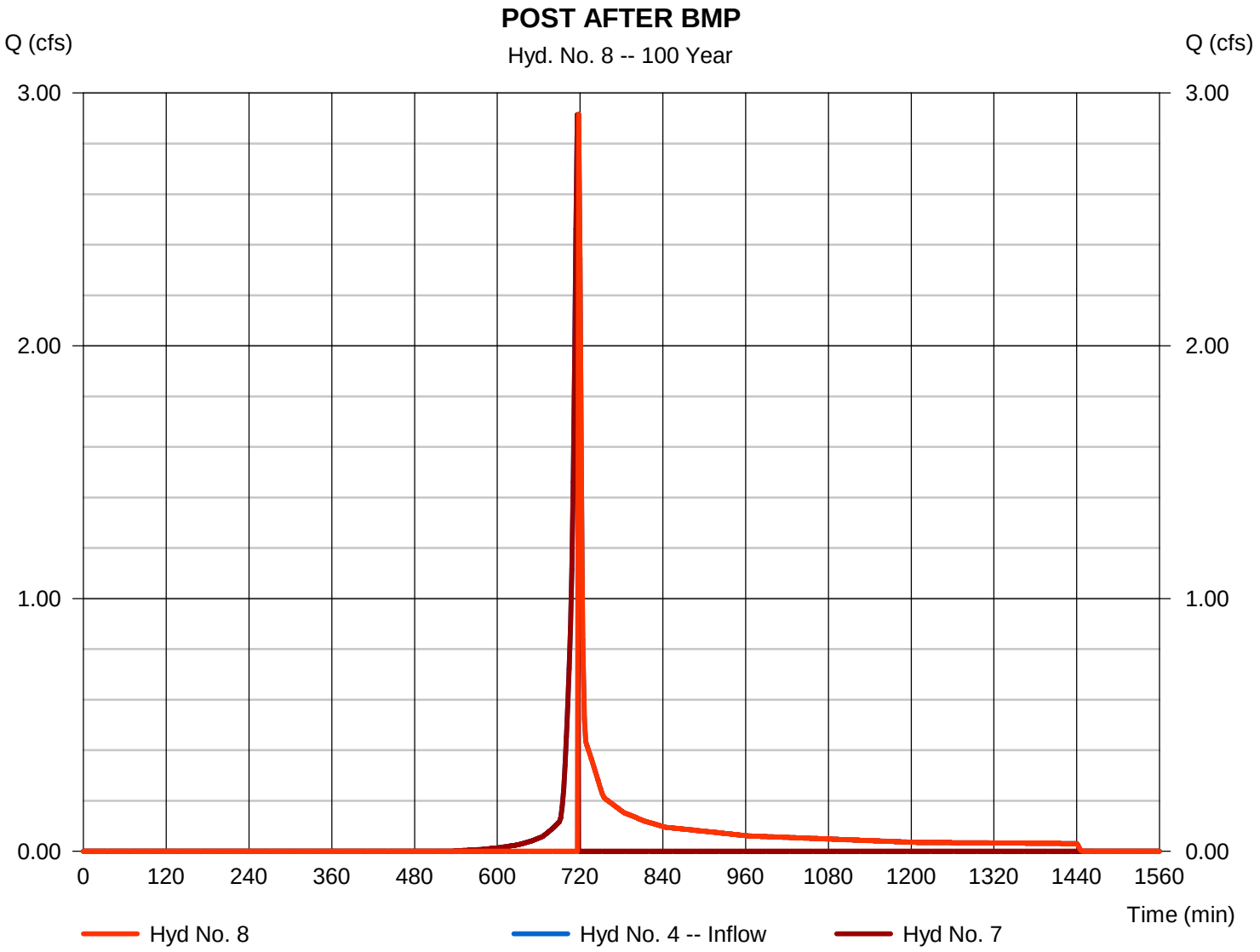


Hydrograph Report

Hyd. No. 8

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 2.915 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 3,998 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

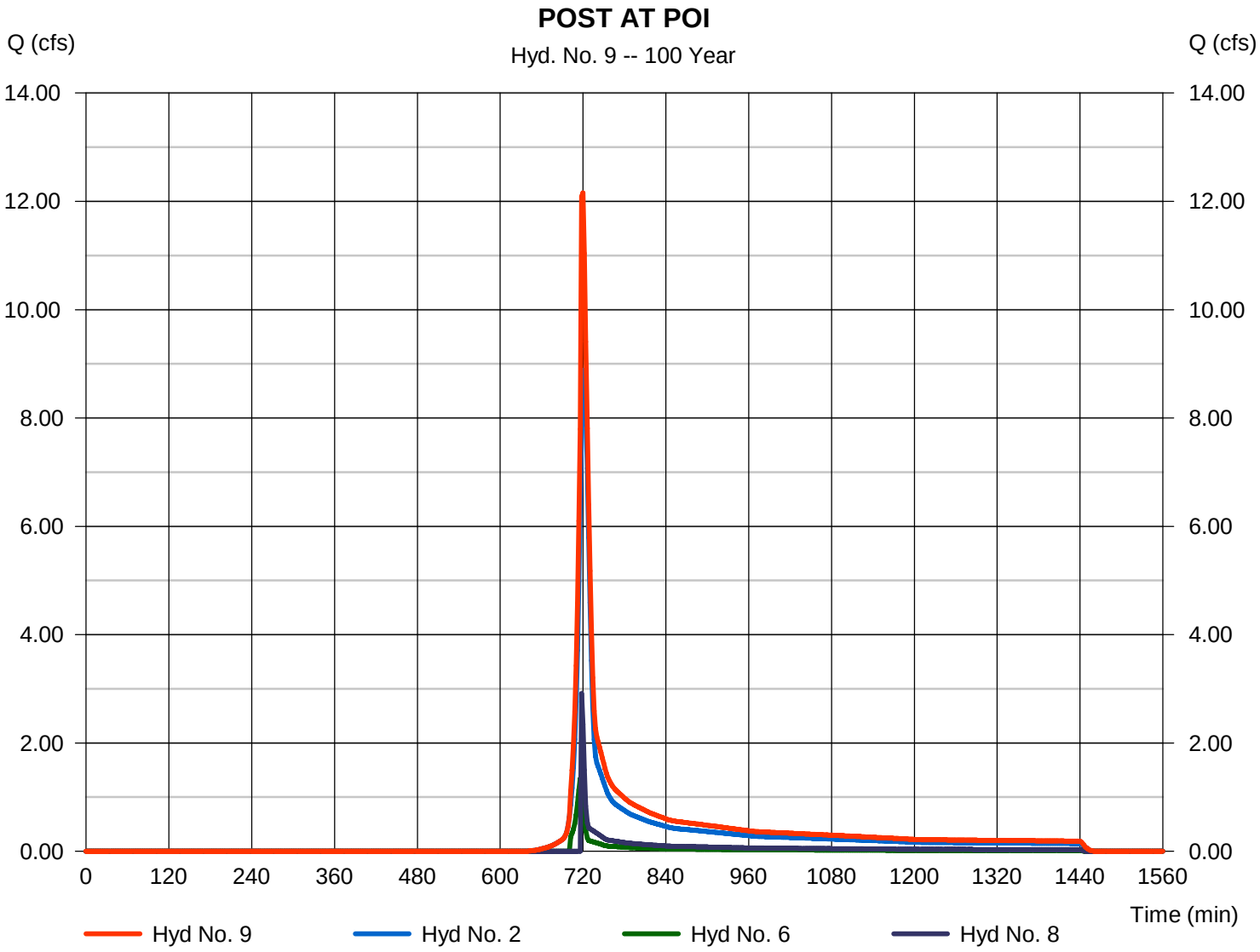


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	= Combine	Peak discharge	= 12.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 29,978 cuft
Inflow hyds.	= 2, 6, 8	Contrib. drain. area	= 2.490 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	45.9138	11.8000	0.8796	--------
2	54.5808	12.1000	0.8736	--------
3	0.0000	0.0000	0.0000	--------
5	59.9618	12.3000	0.8422	--------
10	55.6073	11.3000	0.7938	--------
25	49.4111	9.8000	0.7297	--------
50	49.3823	9.5000	0.7034	--------
100	44.7550	8.3000	0.6570	--------

File name: West Trindle Road 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	3.84	3.05	2.55	2.19	1.93	1.72	1.56	1.43	1.31	1.22	1.14	1.07
2	4.57	3.65	3.06	2.64	2.32	2.08	1.89	1.73	1.59	1.48	1.38	1.30
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	5.44	4.39	3.70	3.21	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
10	6.07	4.91	4.15	3.61	3.21	2.90	2.65	2.44	2.27	2.12	1.99	1.88
25	6.92	5.59	4.75	4.15	3.71	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.53	6.11	5.21	4.57	4.09	3.72	3.42	3.17	2.97	2.79	2.63	2.50
100	8.17	6.63	5.66	4.98	4.47	4.08	3.76	3.50	3.28	3.10	2.93	2.79

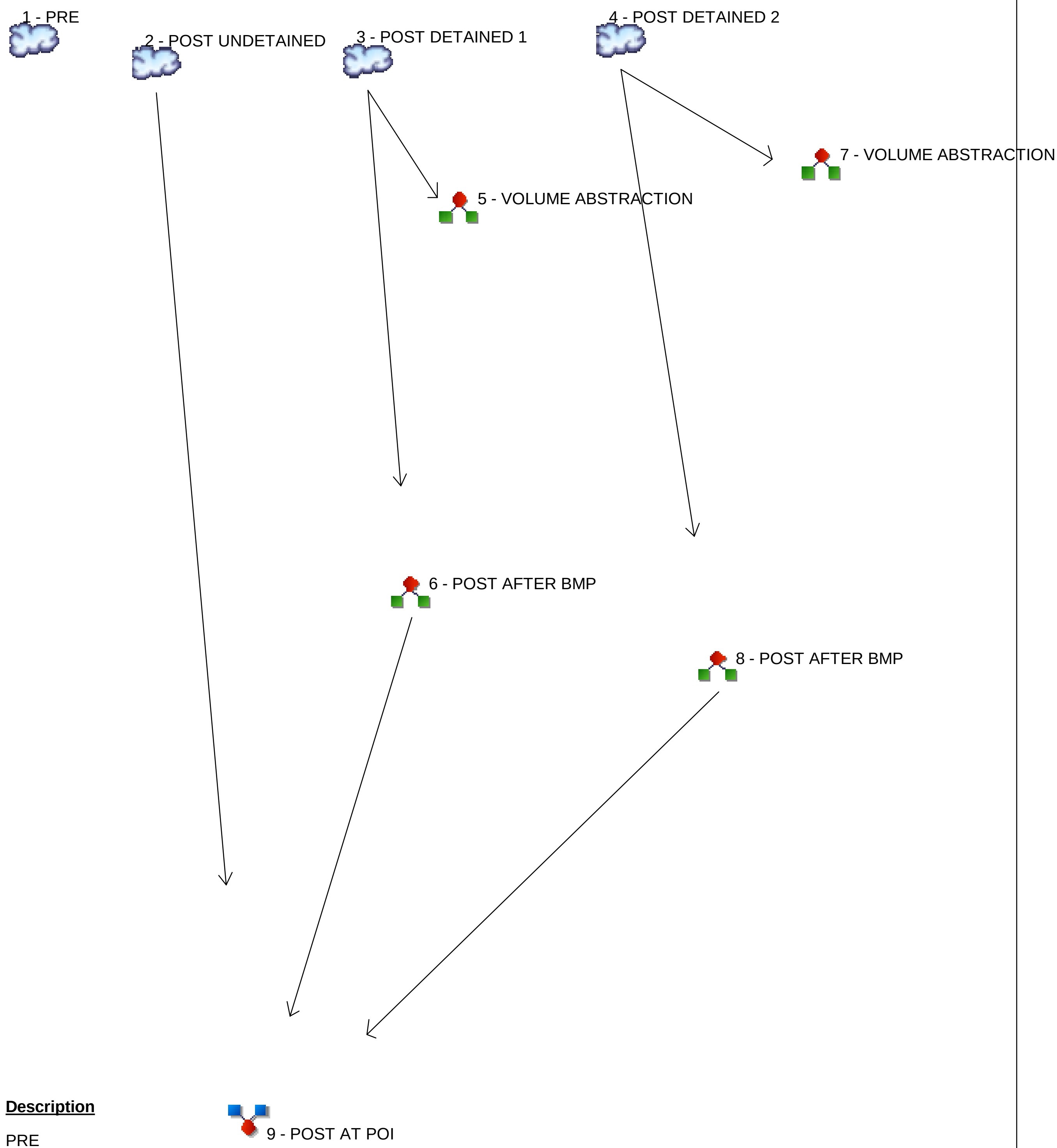
Tc = time in minutes. Values may exceed 60.

RO\07 PCSM\Attach 4 Stormwater Calcs\W Trindle Road (Middlesex)\Hydraflow Rev 1\West Trindle Road Precip.p

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	2.40	2.89	0.00	3.63	4.28	5.30	6.23	7.32
SCS 6-Hr	1.67	2.02	0.00	2.53	2.96	3.61	4.17	4.81
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
2	SCS Runoff	POST UNDETAINED
3	SCS Runoff	POST DETAINED 1
4	SCS Runoff	POST DETAINED 2
5	Diversion1	VOLUME ABSTRACTION
6	Diversion2	POST AFTER BMP
7	Diversion1	VOLUME ABSTRACTION
8	Diversion2	POST AFTER BMP
9	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	------	-------	0.473	-------	-------	-------	-------	-------	-------	PRE
2	SCS Runoff	------	-------	0.277	-------	-------	-------	-------	-------	-------	POST UNDETAINED
3	SCS Runoff	------	-------	0.089	-------	-------	-------	-------	-------	-------	POST DETAINED 1
4	SCS Runoff	------	-------	0.118	-------	-------	-------	-------	-------	-------	POST DETAINED 2
5	Diversion1	3	-------	0.089	-------	-------	-------	-------	-------	-------	VOLUME ABSTRACTION
6	Diversion2	3	-------	0.015	-------	-------	-------	-------	-------	-------	POST AFTER BMP
7	Diversion1	4	-------	0.118	-------	-------	-------	-------	-------	-------	VOLUME ABSTRACTION
8	Diversion2	4	-------	0.000	-------	-------	-------	-------	-------	-------	POST AFTER BMP
9	Combine	2, 6, 8	-------	0.277	-------	-------	-------	-------	-------	-------	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	0.473	2	724	2,883	------	------	------	PRE
2	SCS Runoff	0.277	2	726	1,984	------	------	------	POST UNDETAINED
3	SCS Runoff	0.089	2	730	419	------	------	------	POST DETAINED 1
4	SCS Runoff	0.118	2	744	887	------	------	------	POST DETAINED 2
5	Diversion1	0.089	2	730	188	3	------	------	VOLUME ABSTRACTION
6	Diversion2	0.015	2	792	231	3	------	------	POST AFTER BMP
7	Diversion1	0.118	2	744	887	4	------	------	VOLUME ABSTRACTION
8	Diversion2	0.000	2	n/a	0	4	------	------	POST AFTER BMP
9	Combine	0.277	2	726	2,215	2, 6, 8	------	------	POST AT POI

\\nuss010fp2\shared\Marcellus_M-Z - Mark Slater\Sunoco Logistics (SXL)\112IC05958 (Mariner East Phase 2)\ESCGP-2\PPP\02 S	Return Period: 2 Year	Tuesday, 11 / 1 / 2016

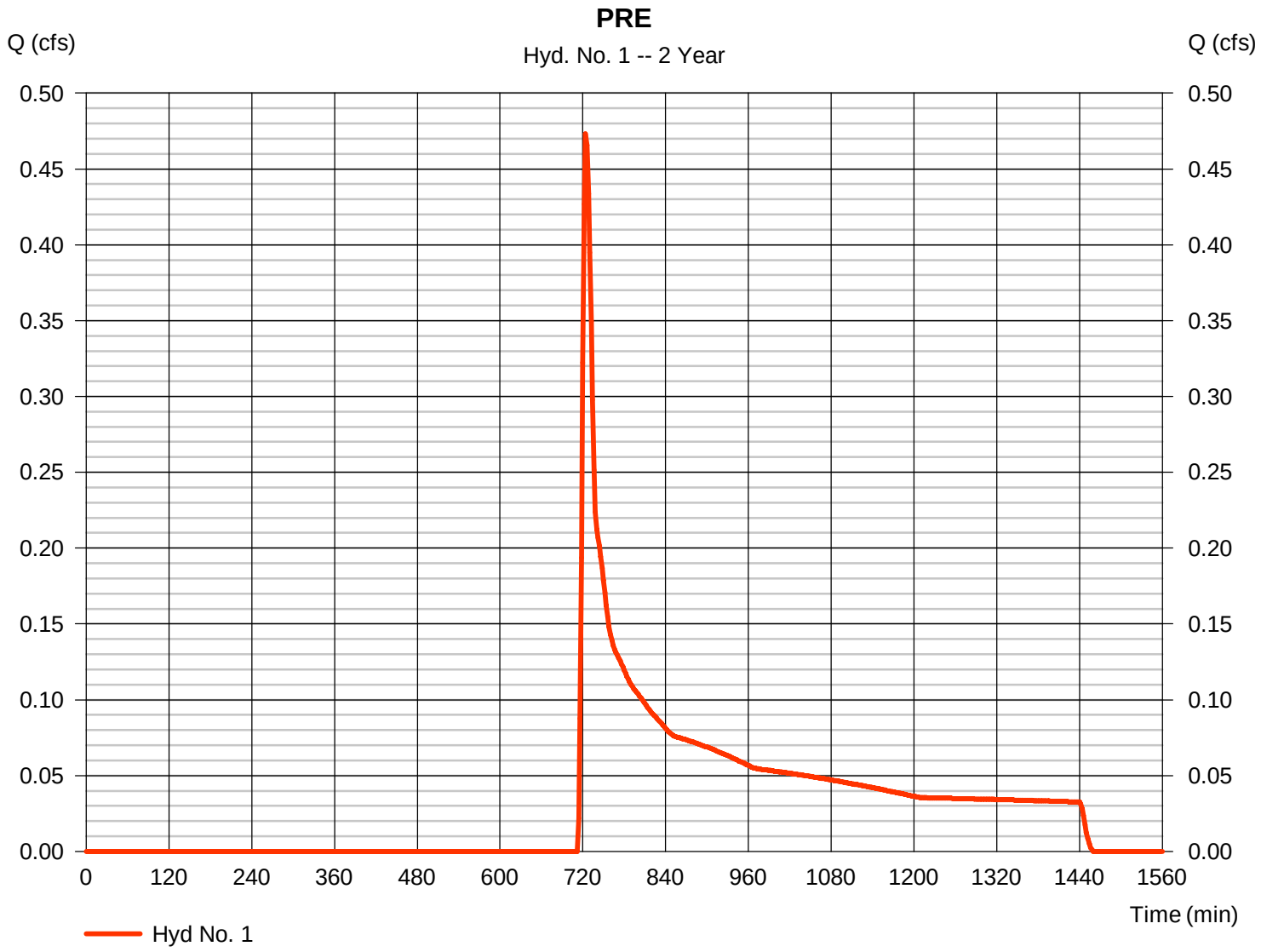
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.473 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	2,883 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	2.89 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



TR55 Tc Worksheet

Hyd. No. 1

PRE

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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

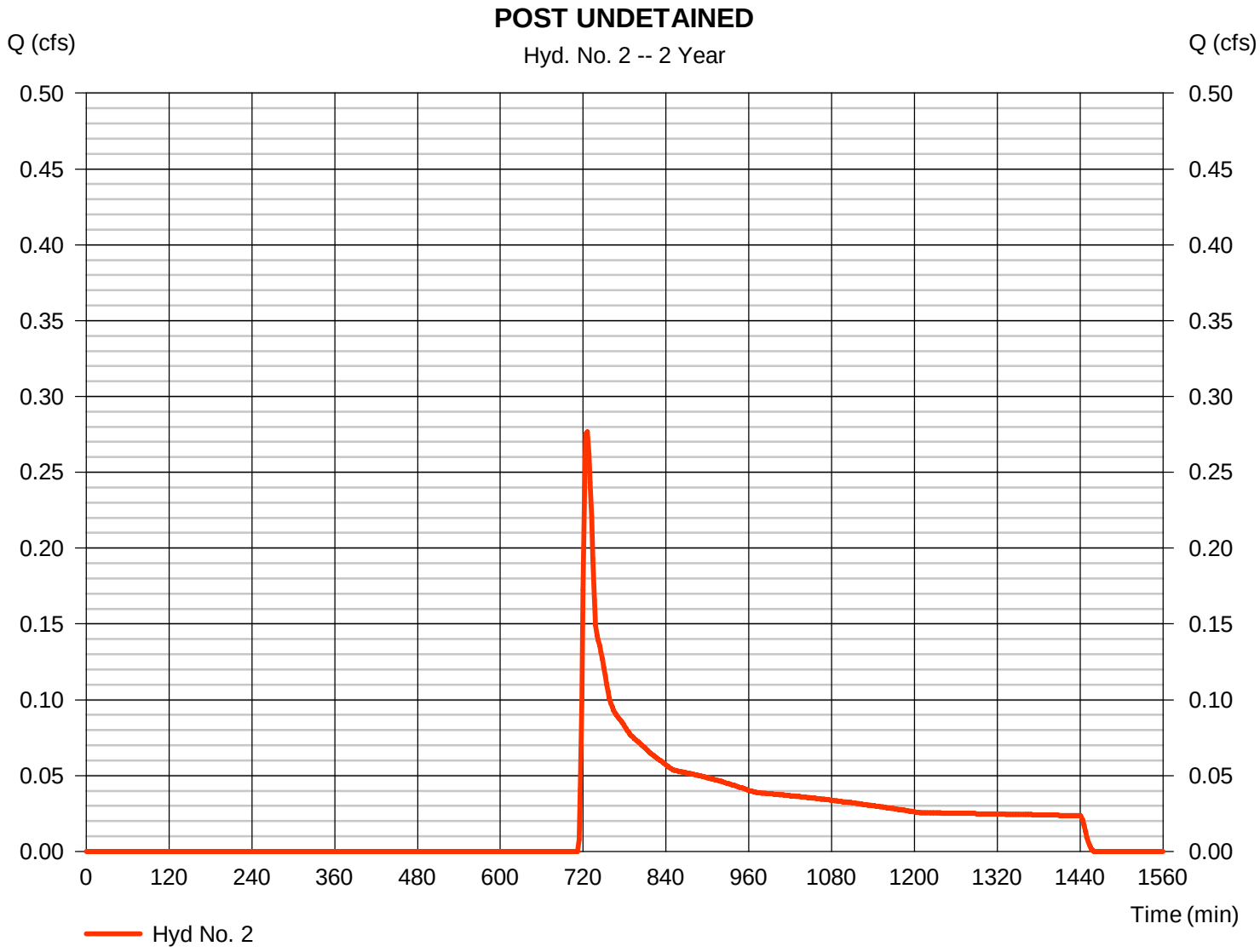
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	= SCS Runoff	Peak discharge	= 0.277 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,984 cuft
Drainage area	= 2.480 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 2.89 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.630 x 55) + (1.850 x 58)] / 2.480



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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

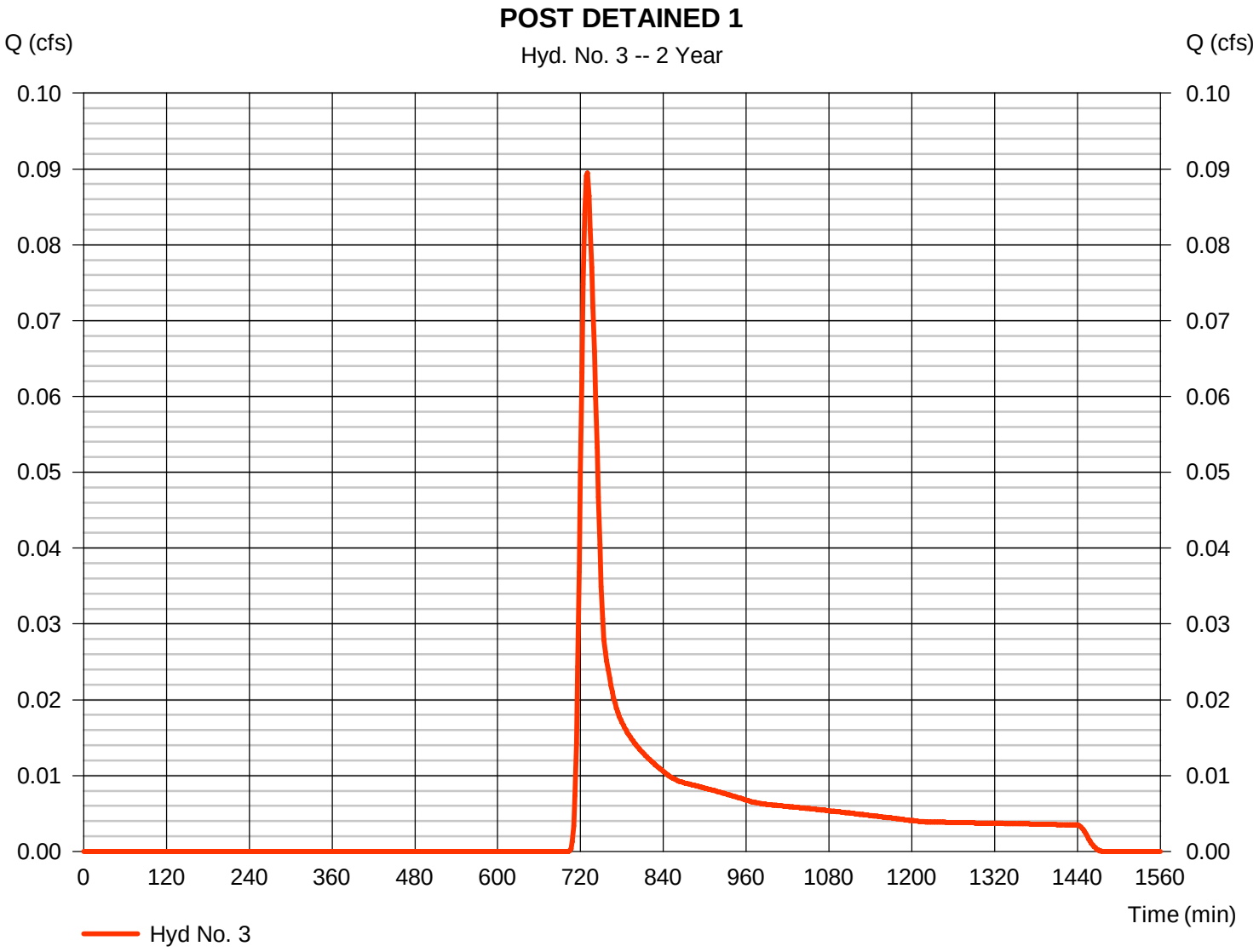
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.089 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 419 cuft
Drainage area	= 0.230 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 23.10 min
Total precip.	= 2.89 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



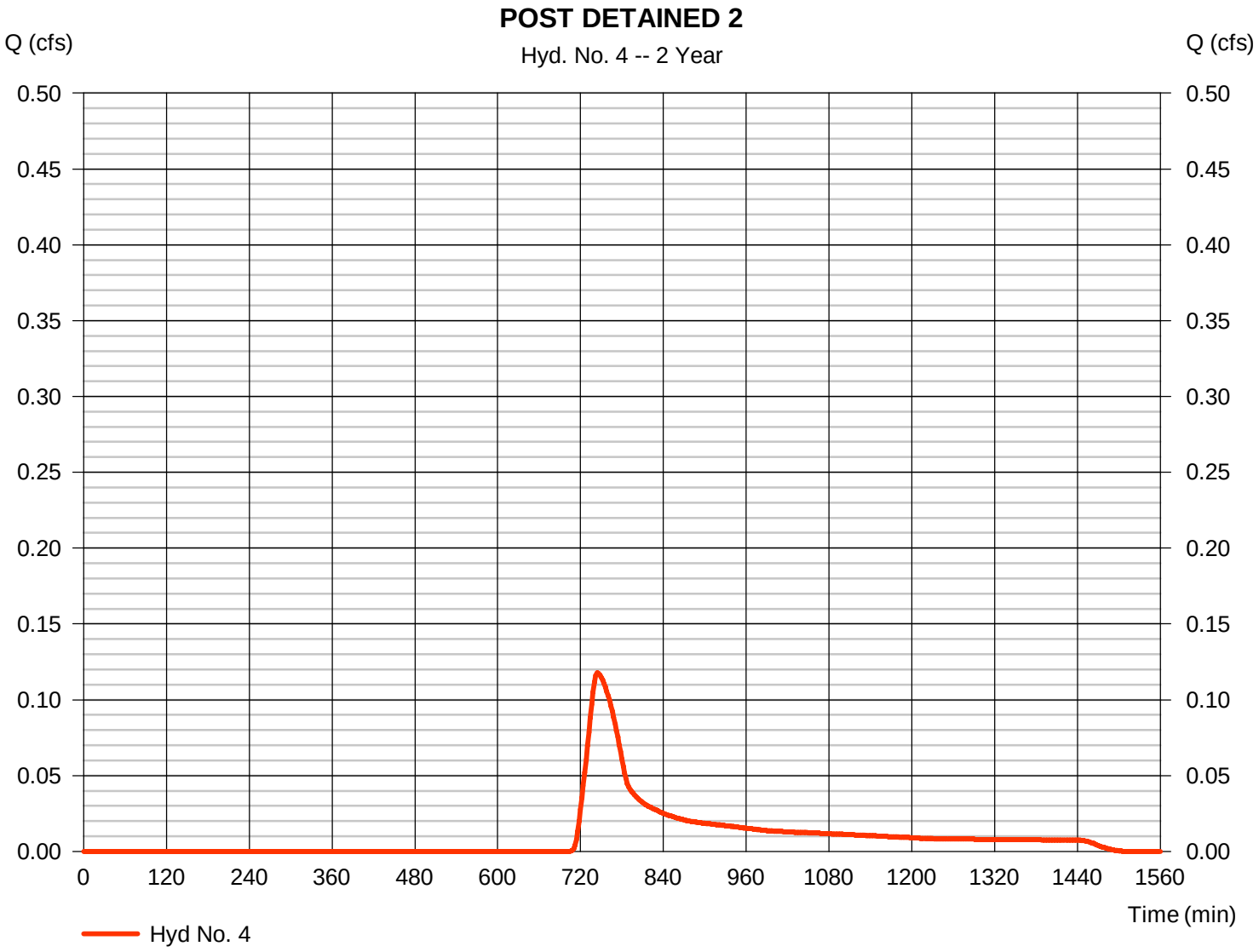
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.118 cfs
Storm frequency	= 2 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 887 cuft
Drainage area	= 0.500 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 2.89 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

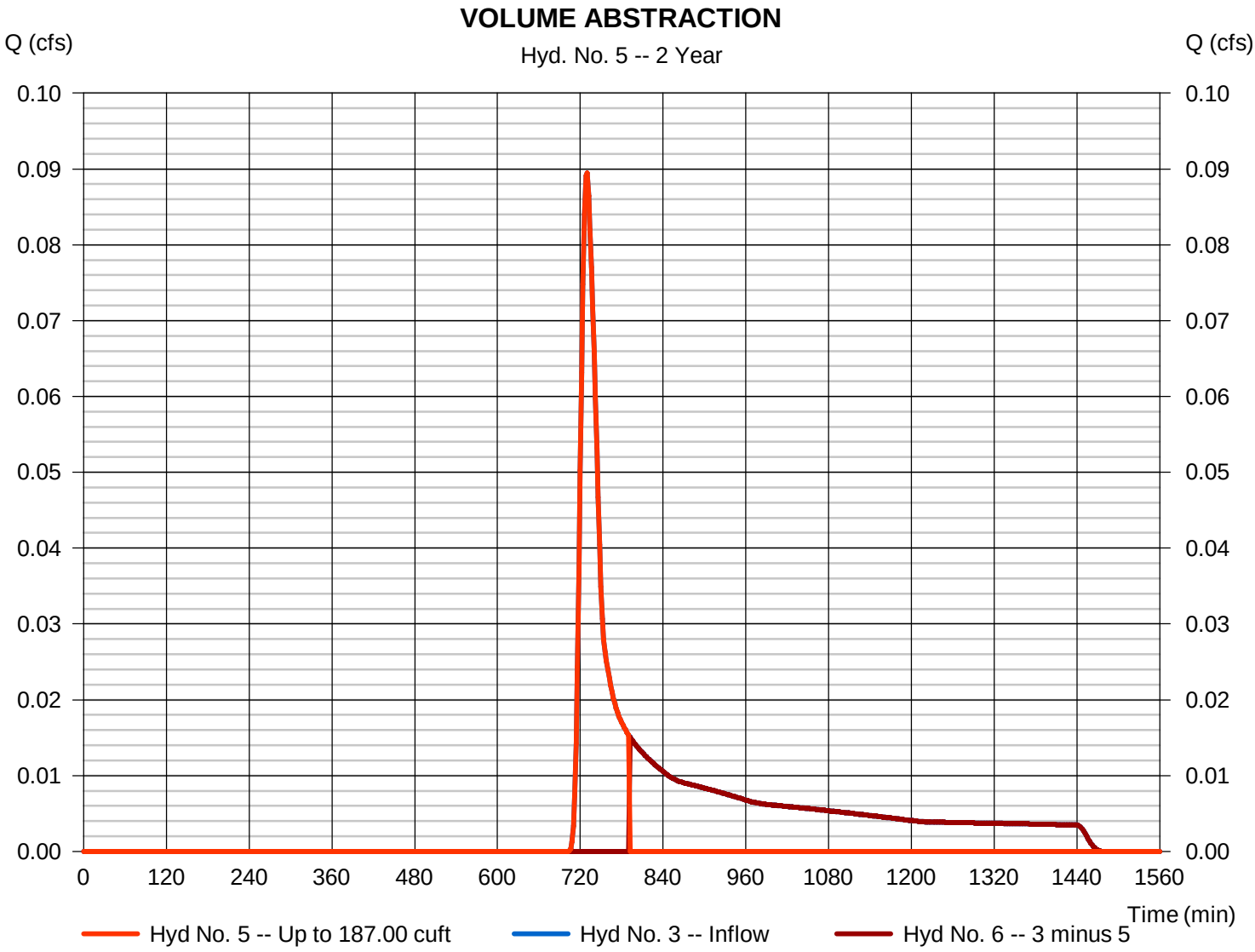


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.089 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 188 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

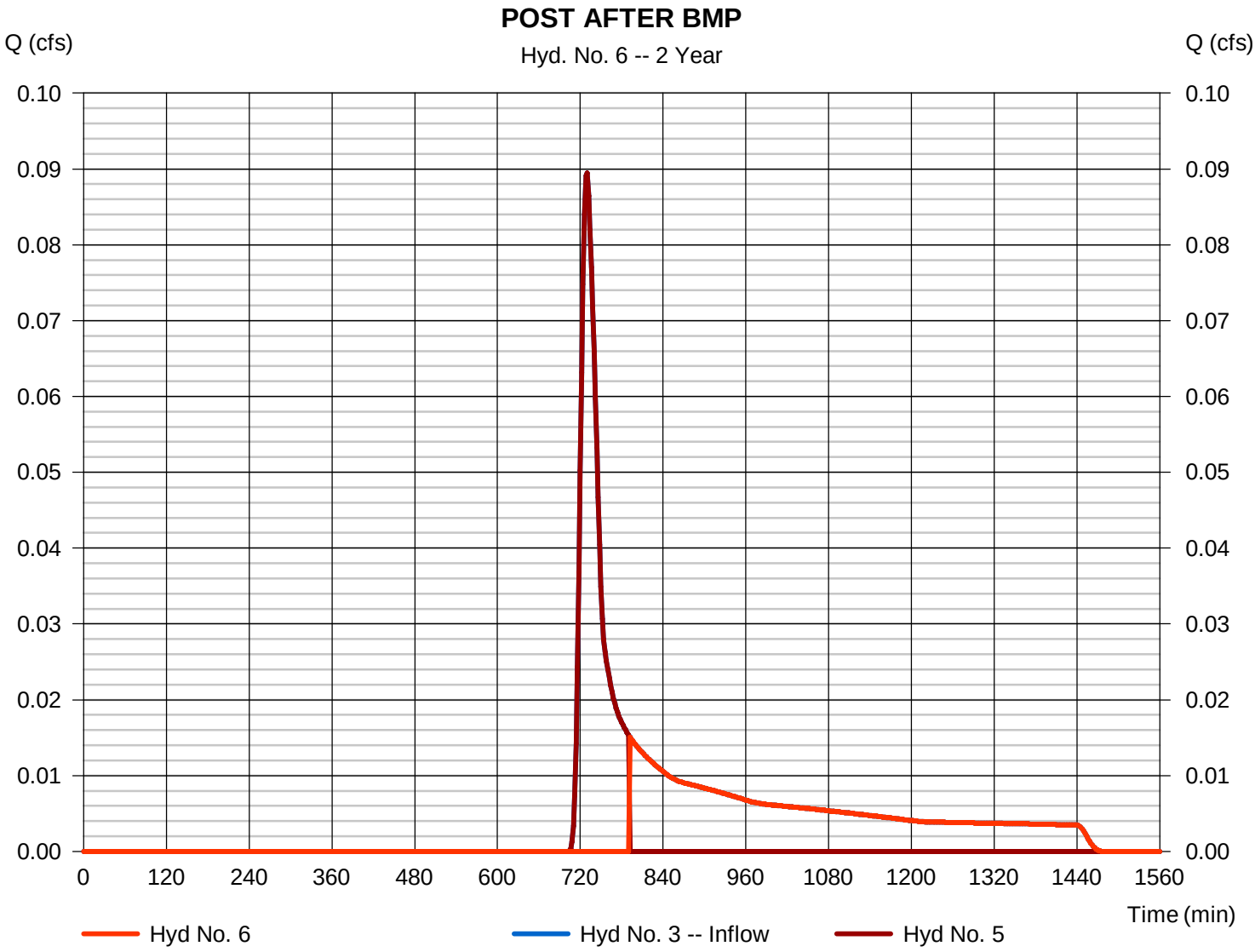


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.015 cfs
Storm frequency	= 2 yrs	Time to peak	= 792 min
Time interval	= 2 min	Hyd. volume	= 231 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

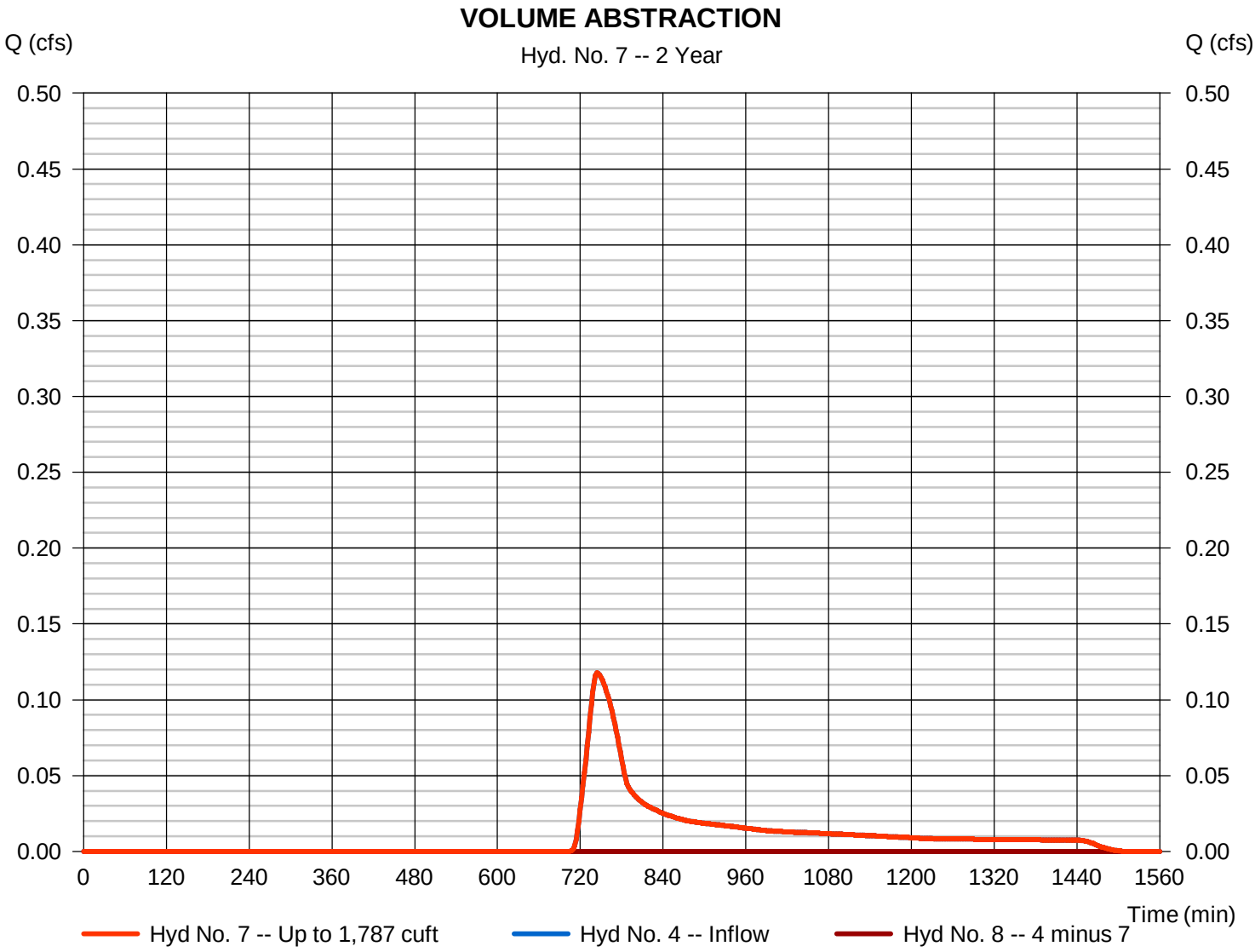


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.118 cfs
Storm frequency	= 2 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 887 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

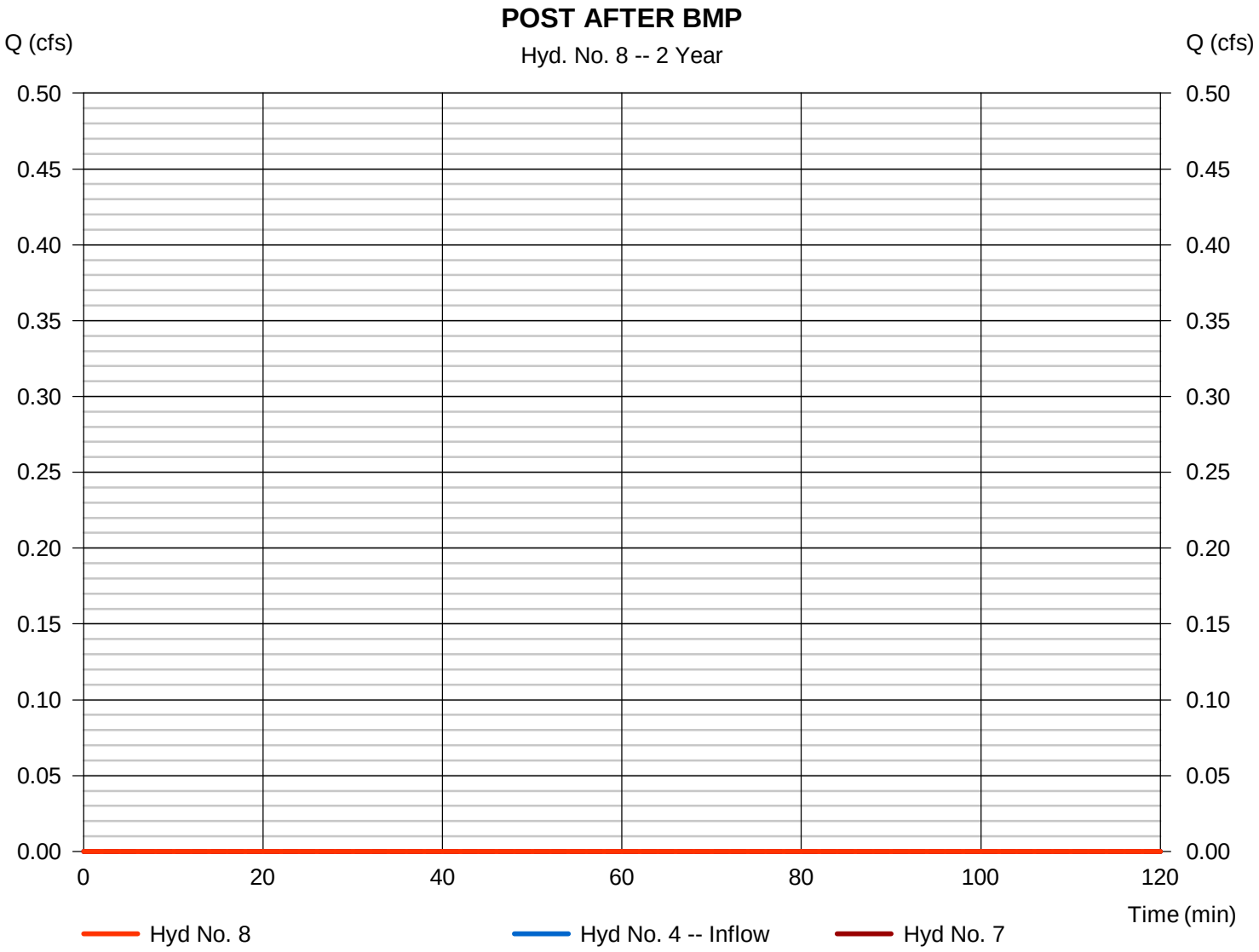


Hydrograph Report

Hyd. No. 8

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	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

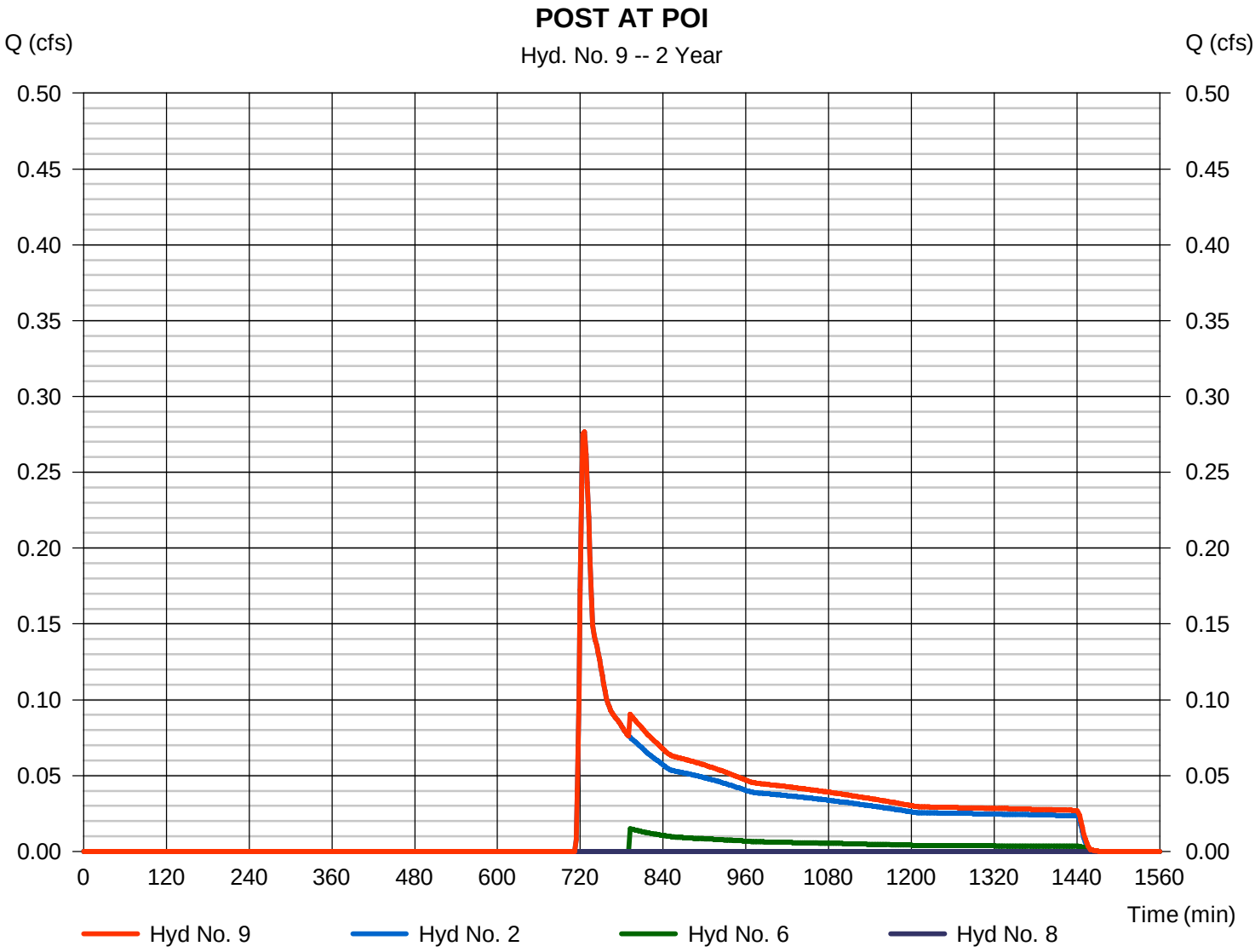


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	= Combine	Peak discharge	= 0.277 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 2,215 cuft
Inflow hyds.	= 2, 6, 8	Contrib. drain. area	= 2.480 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	45.9138	11.8000	0.8796	--------
2	54.5808	12.1000	0.8736	--------
3	0.0000	0.0000	0.0000	--------
5	59.9618	12.3000	0.8422	--------
10	55.6073	11.3000	0.7938	--------
25	49.4111	9.8000	0.7297	--------
50	49.3823	9.5000	0.7034	--------
100	44.7550	8.3000	0.6570	--------

File name: West Trindle Road 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	3.84	3.05	2.55	2.19	1.93	1.72	1.56	1.43	1.31	1.22	1.14	1.07
2	4.57	3.65	3.06	2.64	2.32	2.08	1.89	1.73	1.59	1.48	1.38	1.30
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	5.44	4.39	3.70	3.21	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
10	6.07	4.91	4.15	3.61	3.21	2.90	2.65	2.44	2.27	2.12	1.99	1.88
25	6.92	5.59	4.75	4.15	3.71	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.53	6.11	5.21	4.57	4.09	3.72	3.42	3.17	2.97	2.79	2.63	2.50
100	8.17	6.63	5.66	4.98	4.47	4.08	3.76	3.50	3.28	3.10	2.93	2.79

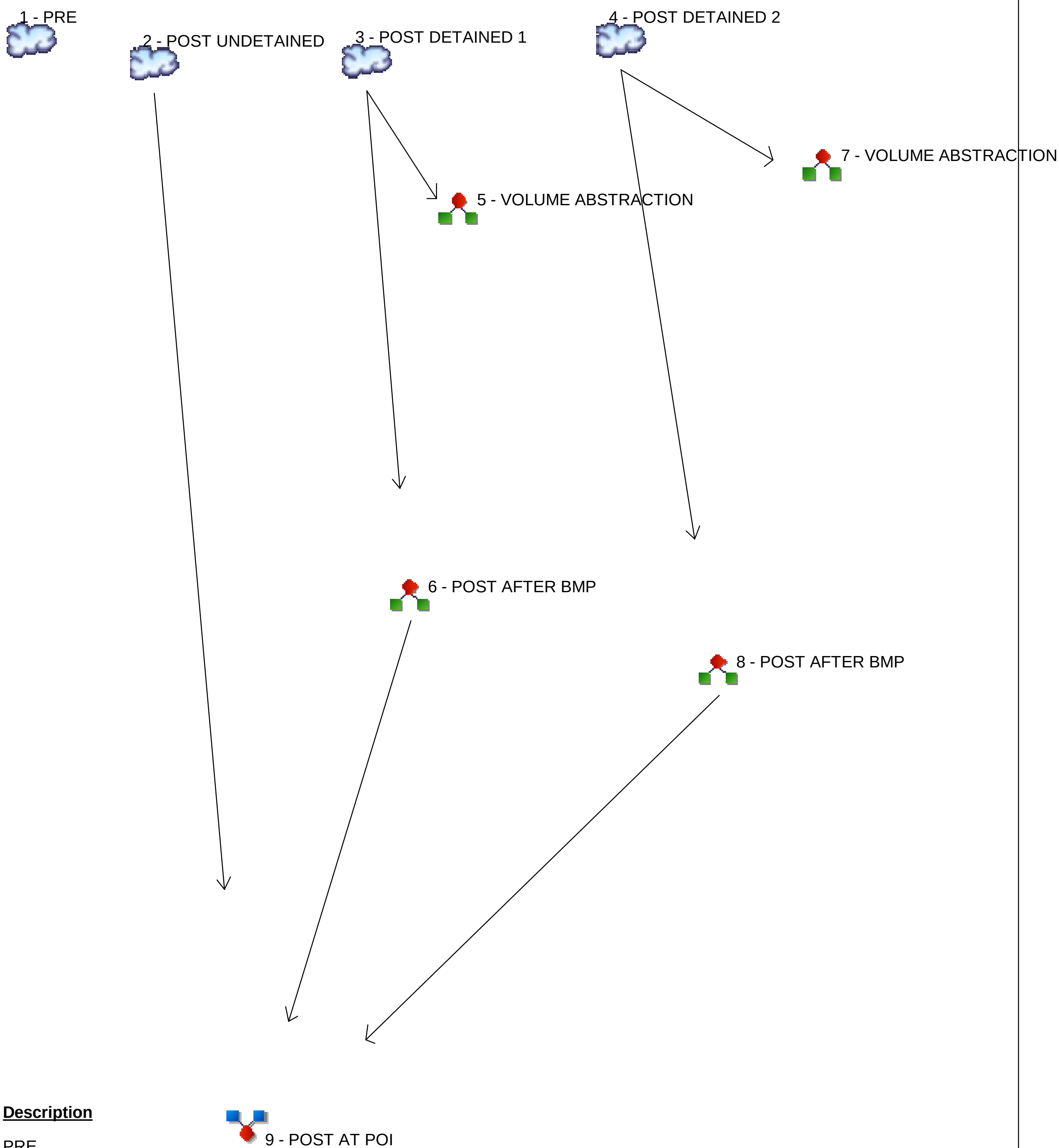
Tc = time in minutes. Values may exceed 60.

RO\07 PCSM\Attach 4 Stormwater Calcs\W Trindle Road (Middlesex)\Hydraflow Rev 1\West Trindle Road 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	2.40	2.89	0.00	3.63	4.28	5.30	6.23	7.32
SCS 6-Hr	1.67	2.02	0.00	2.53	2.96	3.61	4.17	4.81
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
2	SCS Runoff	POST UNDETAINED
3	SCS Runoff	POST DETAINED 1
4	SCS Runoff	POST DETAINED 2
5	Diversion1	VOLUME ABSTRACTION
6	Diversion2	POST AFTER BMP
7	Diversion1	VOLUME ABSTRACTION
8	Diversion2	POST AFTER BMP
9	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	------	-------	-------	-------	-------	3.097	-------	-------	-------	PRE
2	SCS Runoff	------	-------	-------	-------	-------	2.158	-------	-------	-------	POST UNDETAINED
3	SCS Runoff	------	-------	-------	-------	-------	0.399	-------	-------	-------	POST DETAINED 1
4	SCS Runoff	------	-------	-------	-------	-------	0.486	-------	-------	-------	POST DETAINED 2
5	Diversion1	3	-------	-------	-------	-------	0.390	-------	-------	-------	VOLUME ABSTRACTION
6	Diversion2	3	-------	-------	-------	-------	0.399	-------	-------	-------	POST AFTER BMP
7	Diversion1	4	-------	-------	-------	-------	0.486	-------	-------	-------	VOLUME ABSTRACTION
8	Diversion2	4	-------	-------	-------	-------	0.028	-------	-------	-------	POST AFTER BMP
9	Combine	2, 6, 8	-------	-------	-------	-------	2.558	-------	-------	-------	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	3.097	2	722	9,595	------	------	------	PRE
2	SCS Runoff	2.158	2	722	6,912	------	------	------	POST UNDETAINED
3	SCS Runoff	0.399	2	722	1,082	------	------	------	POST DETAINED 1
4	SCS Runoff	0.486	2	734	2,310	------	------	------	POST DETAINED 2
5	Diversion1	0.390	2	720	210	3	------	------	VOLUME ABSTRACTION
6	Diversion2	0.399	2	722	872	3	------	------	POST AFTER BMP
7	Diversion1	0.486	2	734	1,790	4	------	------	VOLUME ABSTRACTION
8	Diversion2	0.028	2	1012	520	4	------	------	POST AFTER BMP
9	Combine	2.558	2	722	8,304	2, 6, 8	------	------	POST AT POI

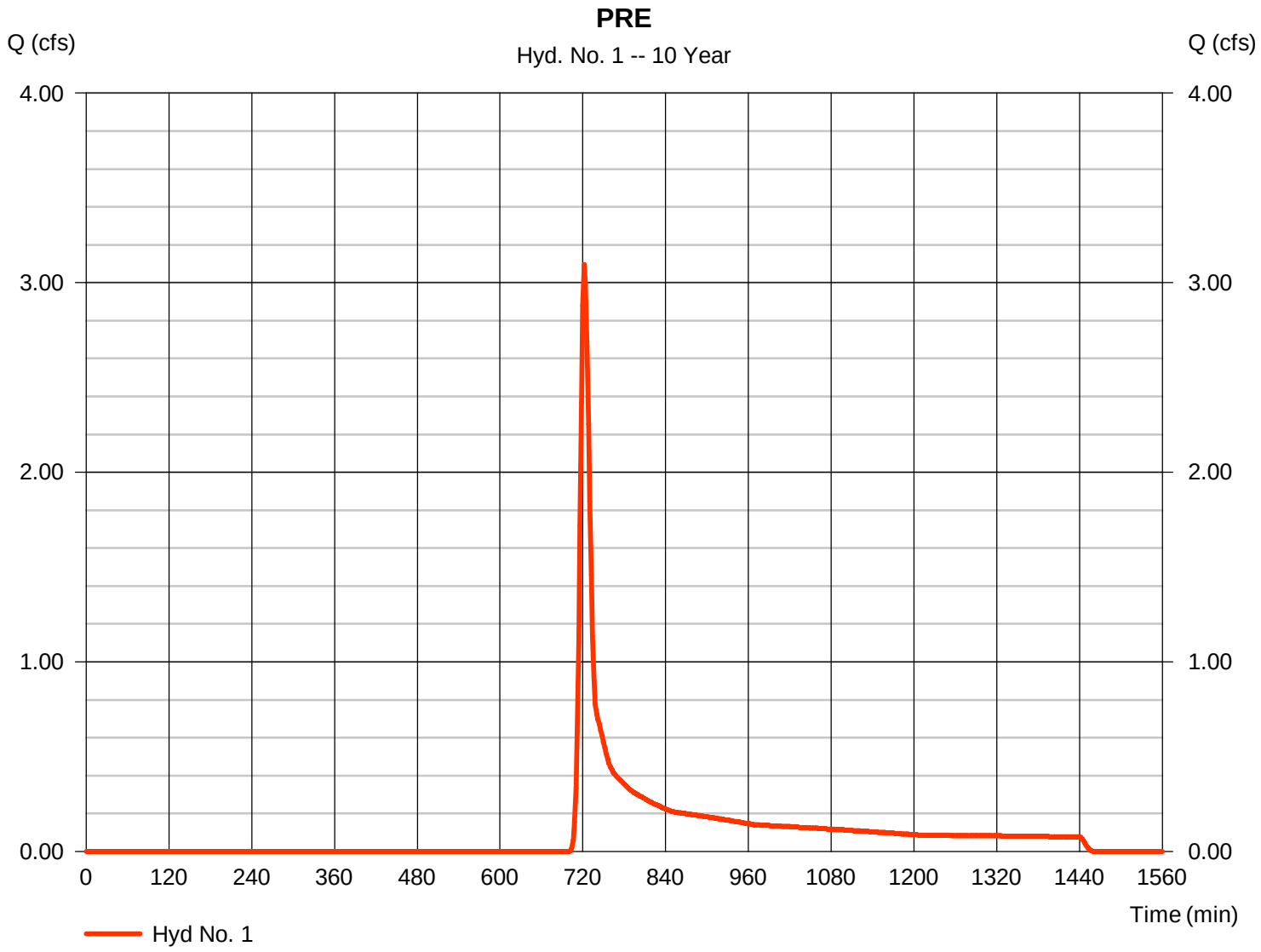
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.097 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	9,595 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	4.28 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



TR55 Tc Worksheet

Hyd. No. 1

PRE

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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

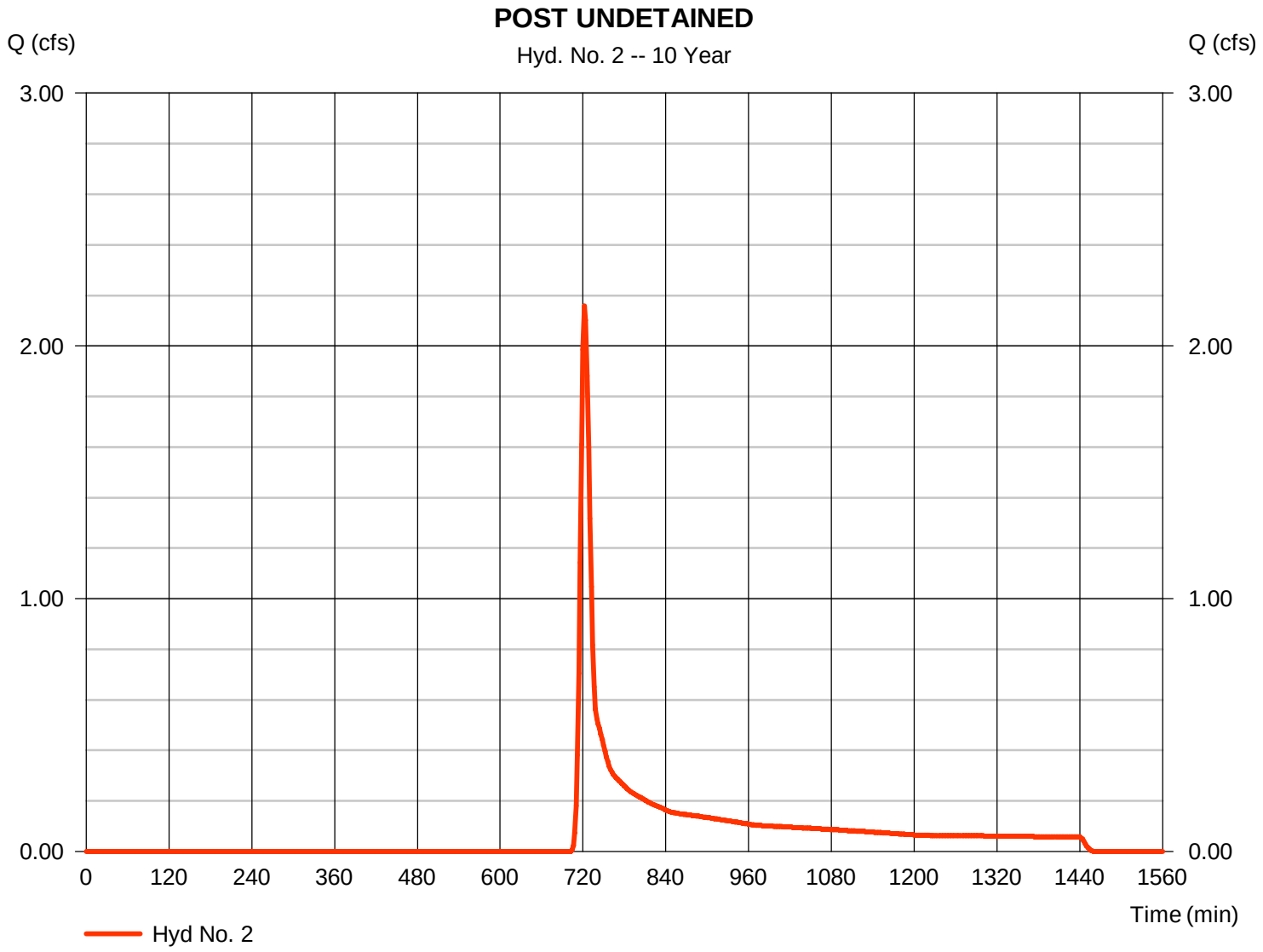
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	= SCS Runoff	Peak discharge	= 2.158 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 6,912 cuft
Drainage area	= 2.480 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 4.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.630 x 55) + (1.850 x 58)] / 2.480



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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

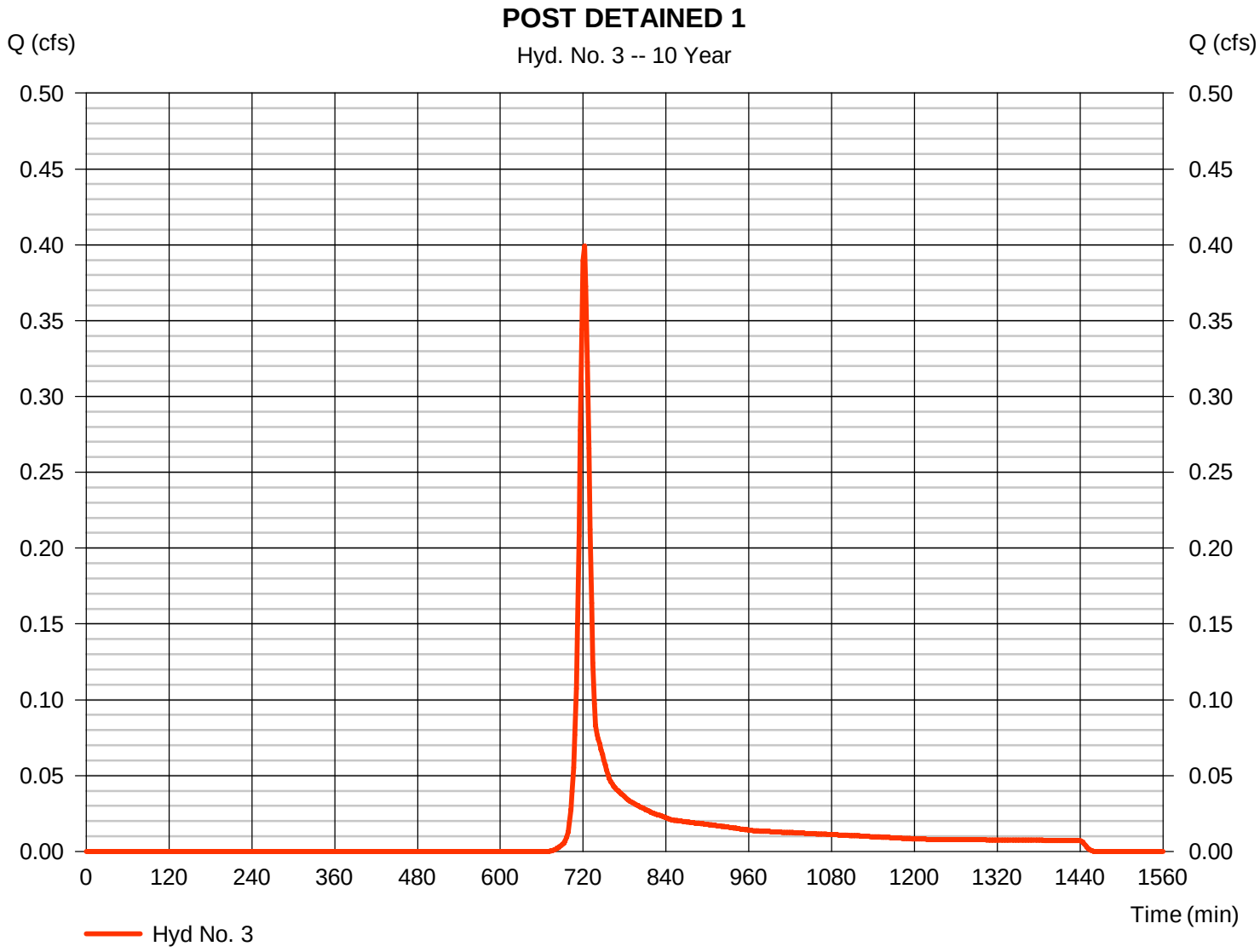
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.399 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,082 cuft
Drainage area	= 0.230 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.50 min
Total precip.	= 4.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



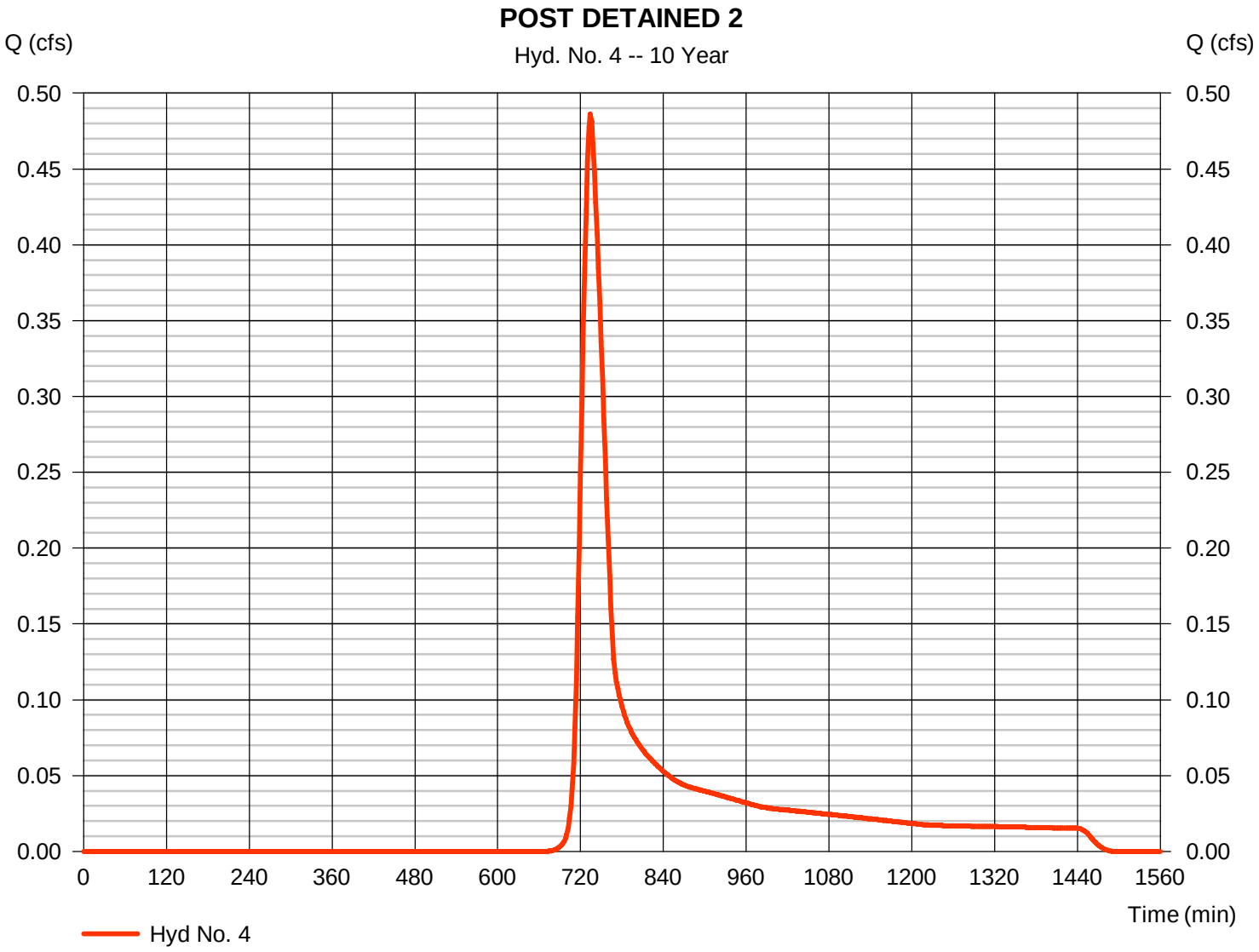
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.486 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 2,310 cuft
Drainage area	= 0.500 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.30 min
Total precip.	= 4.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

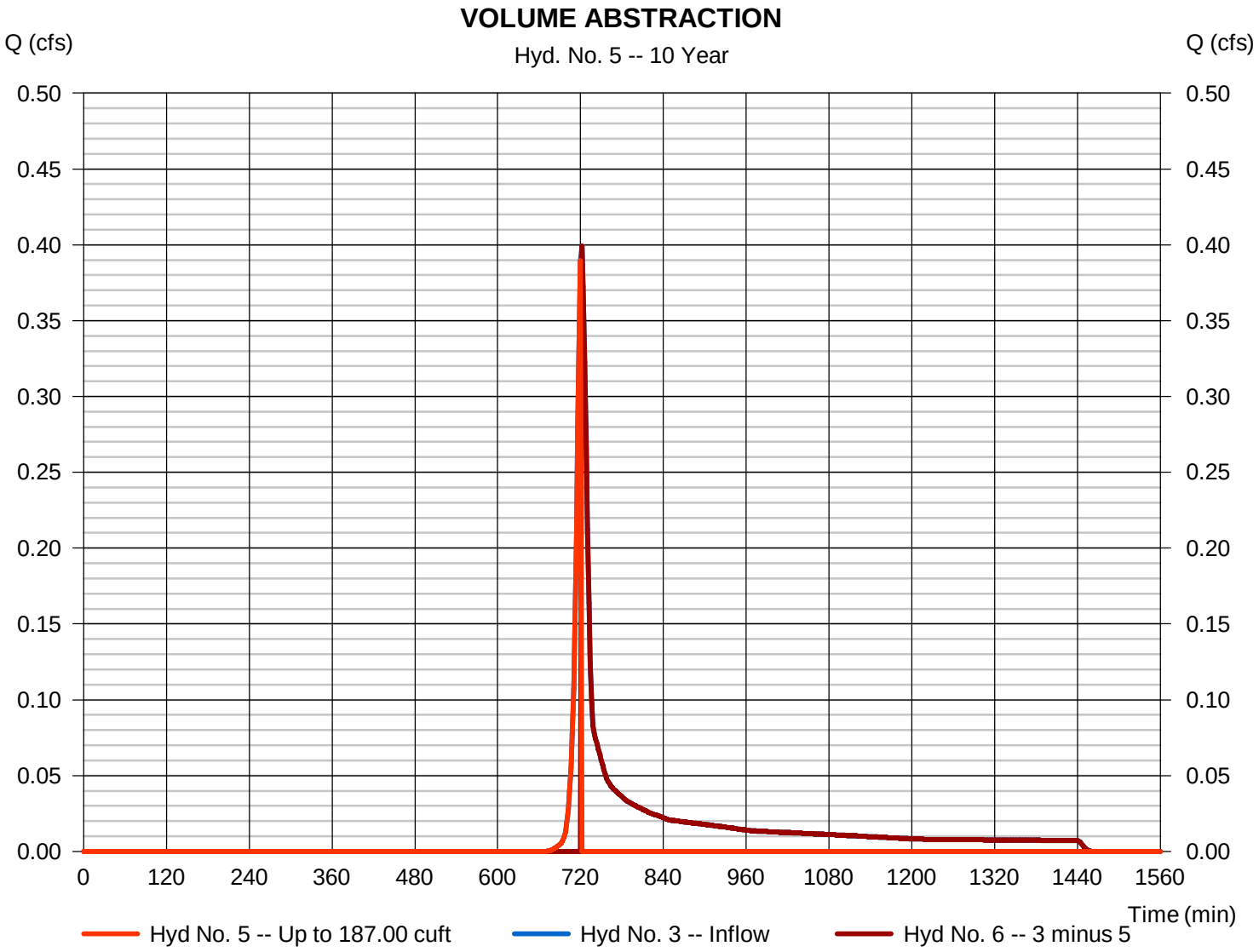


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.390 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 210 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

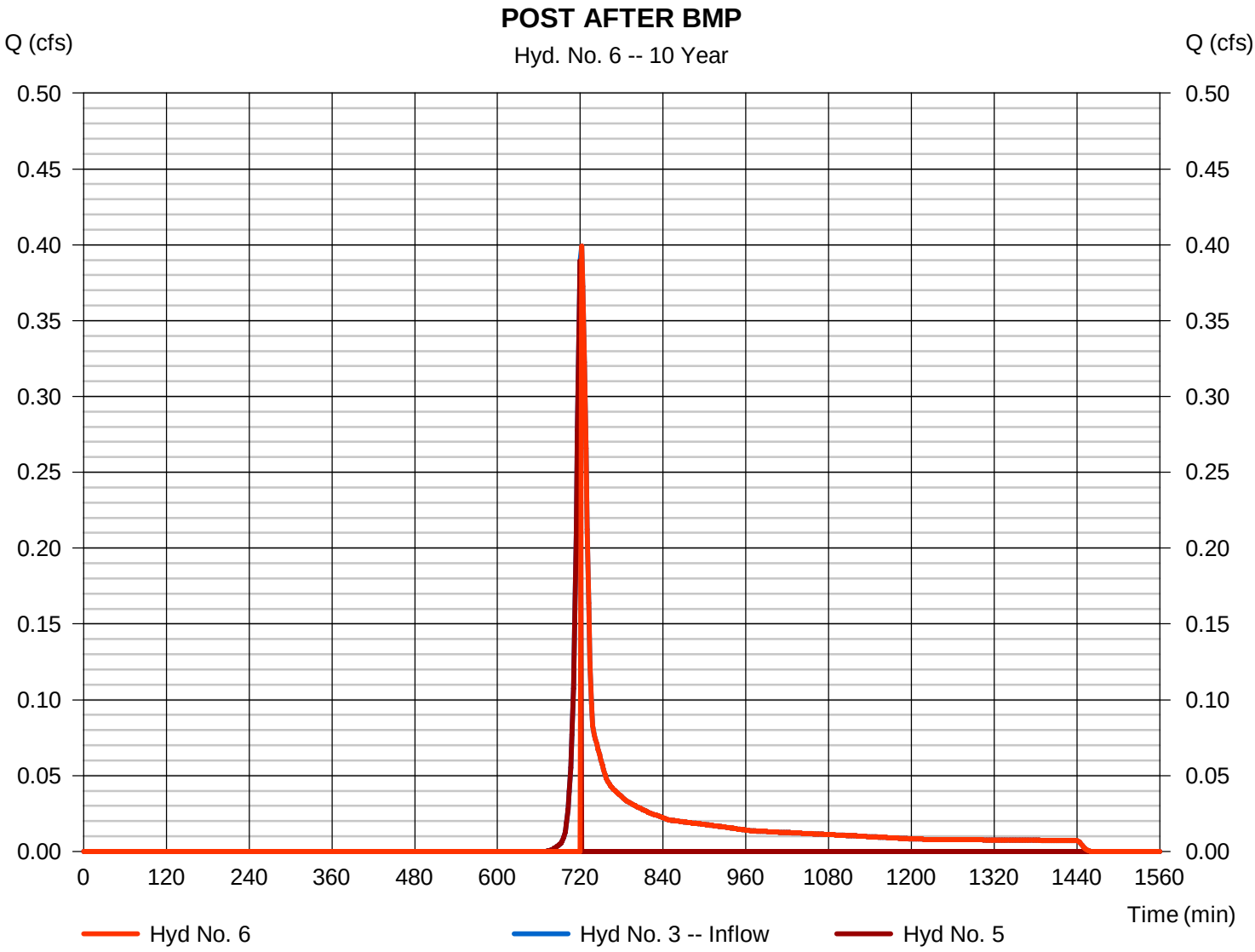


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.399 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 872 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

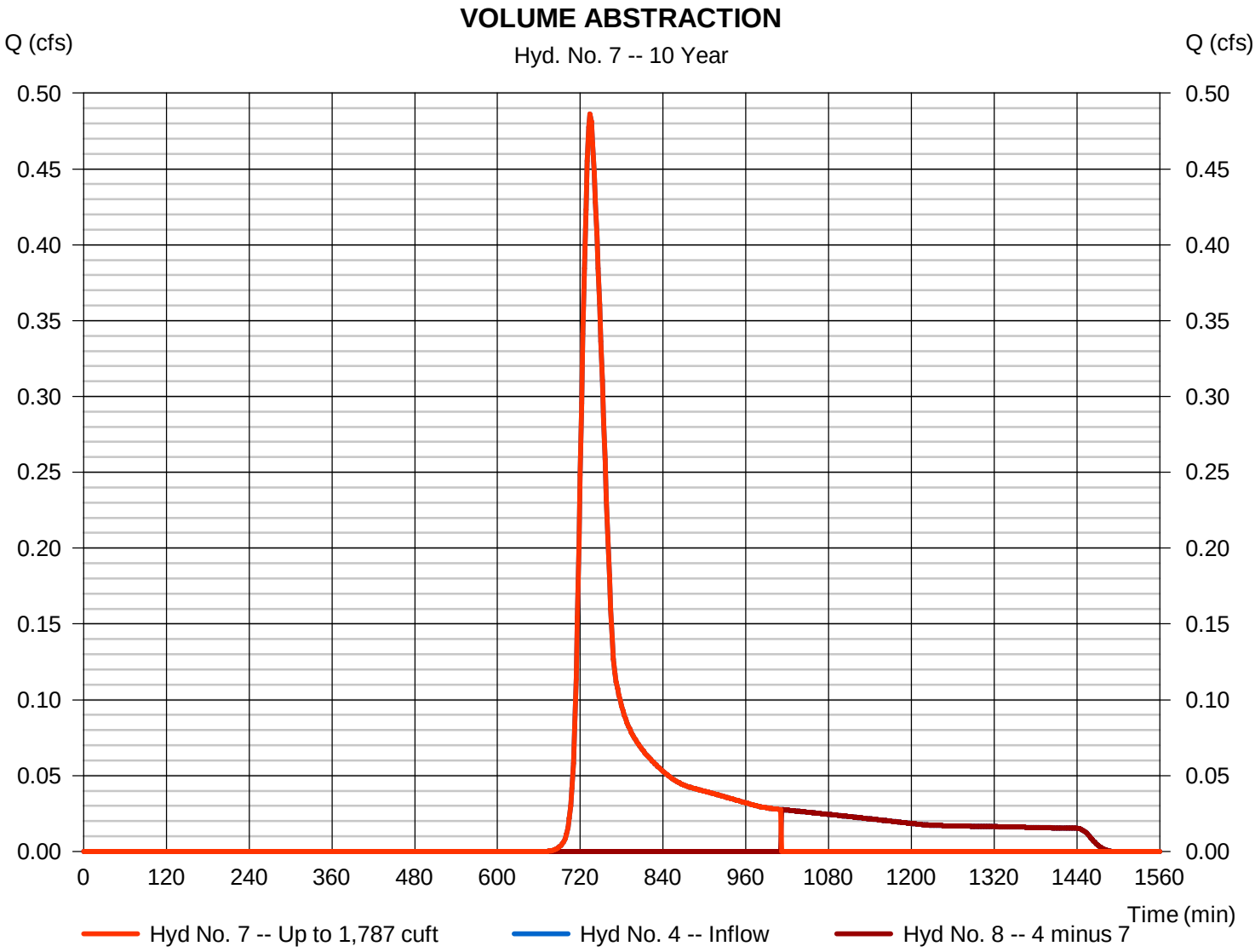


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.486 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 1,790 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

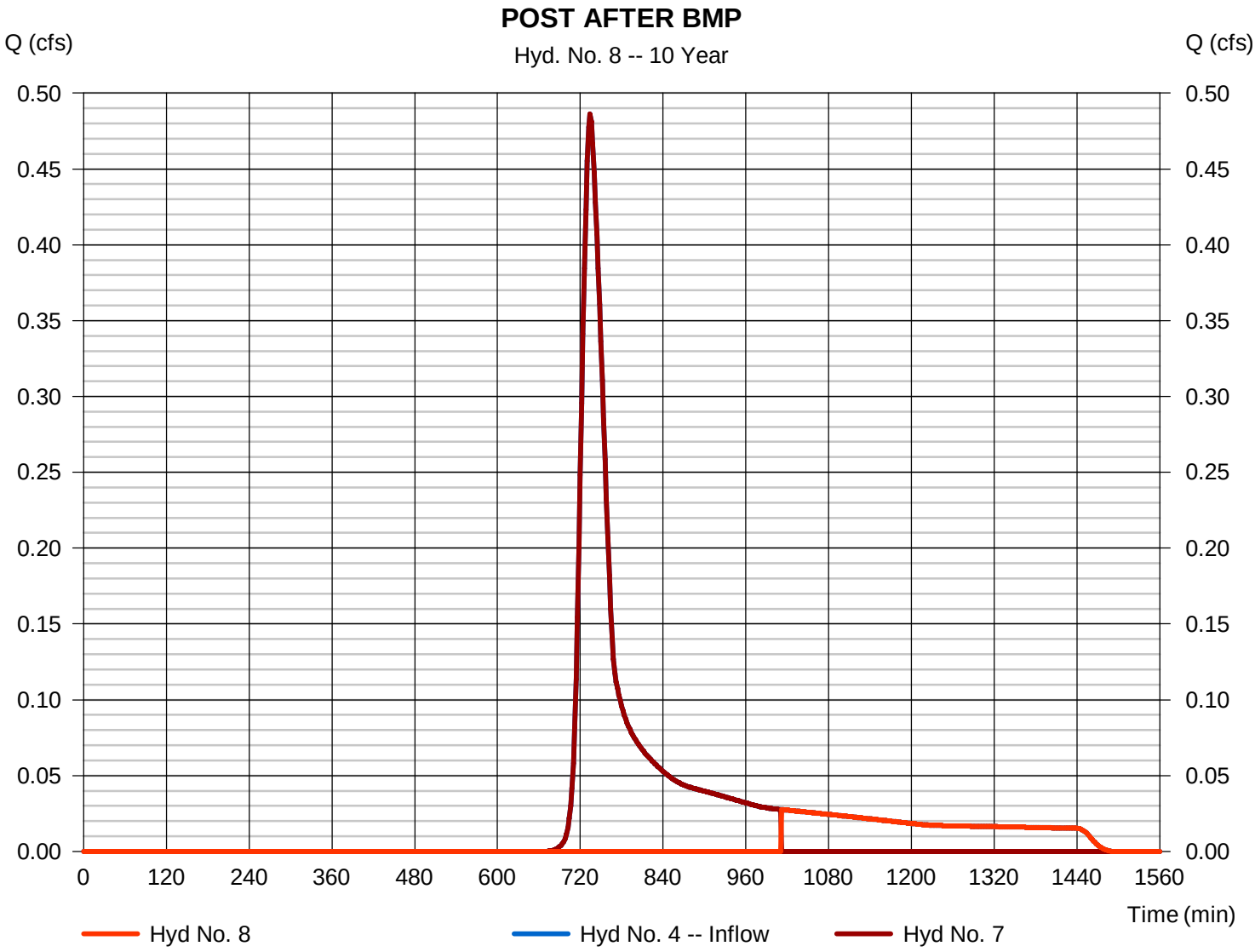


Hydrograph Report

Hyd. No. 8

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.028 cfs
Storm frequency	= 10 yrs	Time to peak	= 1012 min
Time interval	= 2 min	Hyd. volume	= 520 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

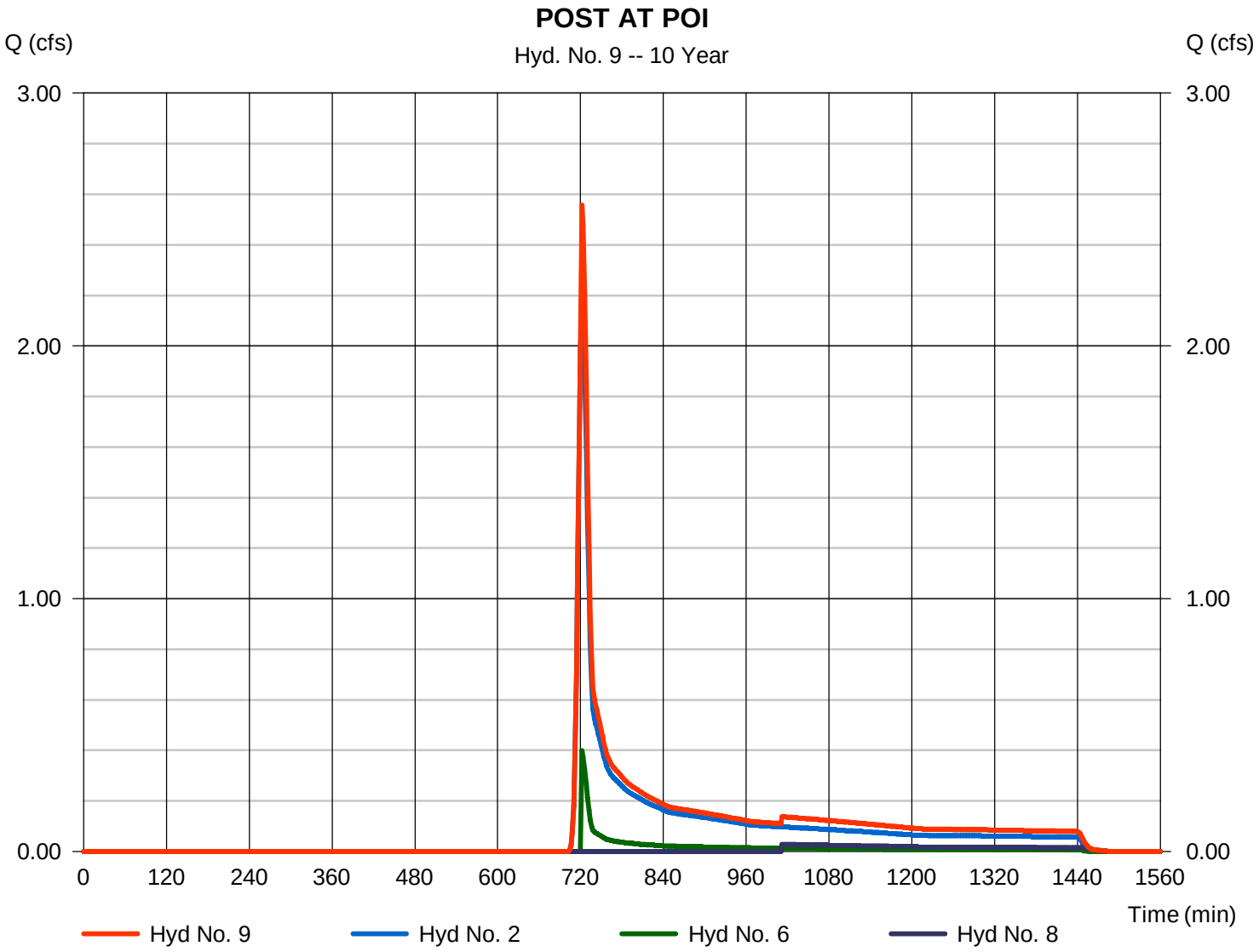


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	= Combine	Peak discharge	= 2.558 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 8,304 cuft
Inflow hyds.	= 2, 6, 8	Contrib. drain. area	= 2.480 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	45.9138	11.8000	0.8796	--------
2	54.5808	12.1000	0.8736	--------
3	0.0000	0.0000	0.0000	--------
5	59.9618	12.3000	0.8422	--------
10	55.6073	11.3000	0.7938	--------
25	49.4111	9.8000	0.7297	--------
50	49.3823	9.5000	0.7034	--------
100	44.7550	8.3000	0.6570	--------

File name: West Trindle Road 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	3.84	3.05	2.55	2.19	1.93	1.72	1.56	1.43	1.31	1.22	1.14	1.07
2	4.57	3.65	3.06	2.64	2.32	2.08	1.89	1.73	1.59	1.48	1.38	1.30
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	5.44	4.39	3.70	3.21	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
10	6.07	4.91	4.15	3.61	3.21	2.90	2.65	2.44	2.27	2.12	1.99	1.88
25	6.92	5.59	4.75	4.15	3.71	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.53	6.11	5.21	4.57	4.09	3.72	3.42	3.17	2.97	2.79	2.63	2.50
100	8.17	6.63	5.66	4.98	4.47	4.08	3.76	3.50	3.28	3.10	2.93	2.79

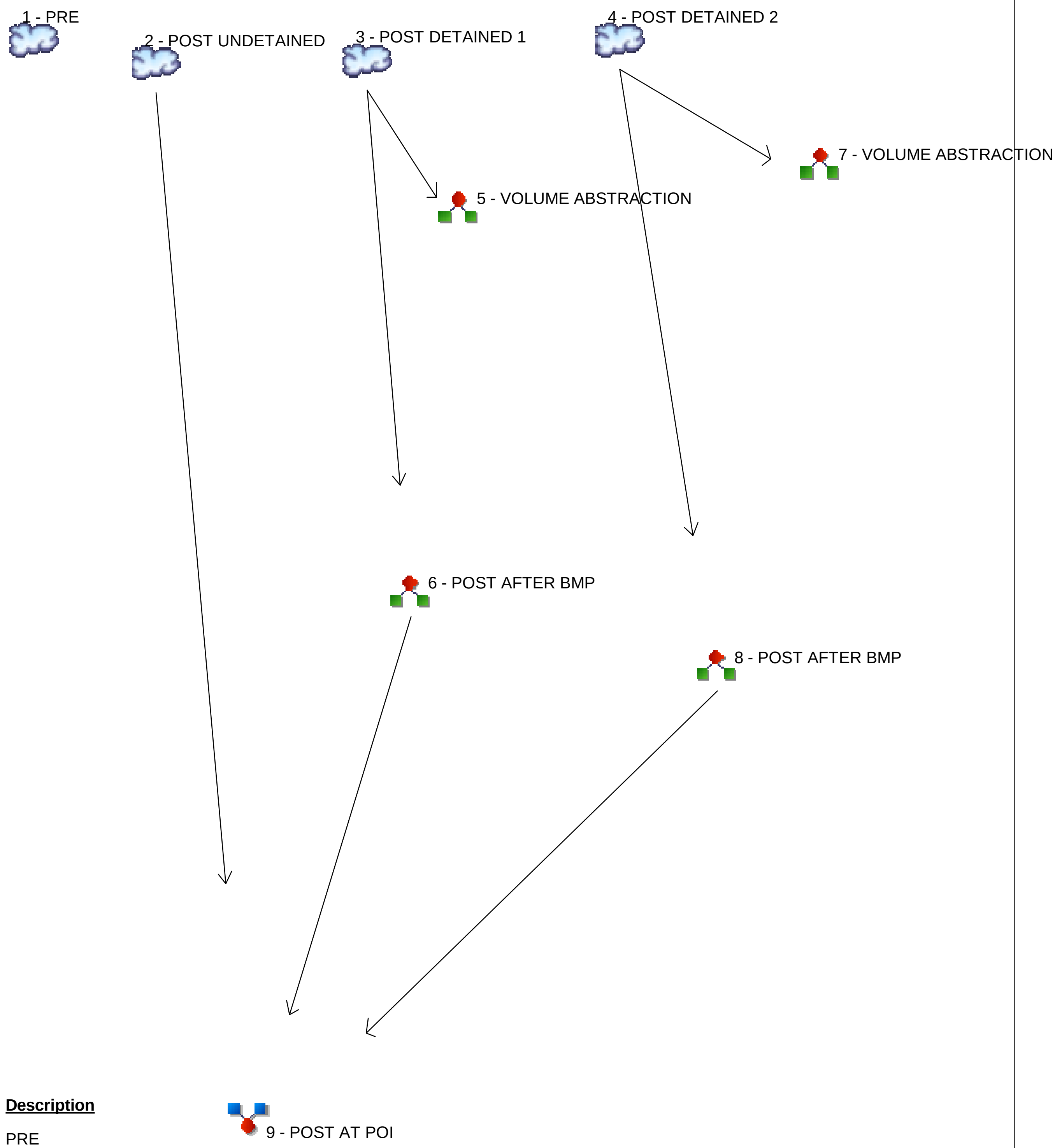
Tc = time in minutes. Values may exceed 60.

RO\07 PCSM\Attach 4 Stormwater Calcs\W Trindle Road (Middlesex)\Hydraflow Rev 1\West Trindle Road 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	2.40	2.89	0.00	3.63	4.28	5.30	6.23	7.32
SCS 6-Hr	1.67	2.02	0.00	2.53	2.96	3.61	4.17	4.81
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
2	SCS Runoff	POST UNDETAINED
3	SCS Runoff	POST DETAINED 1
4	SCS Runoff	POST DETAINED 2
5	Diversion1	VOLUME ABSTRACTION
6	Diversion2	POST AFTER BMP
7	Diversion1	VOLUME ABSTRACTION
8	Diversion2	POST AFTER BMP
9	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	------	-------	-------	-------	-------	-------	-------	8.505	-------	PRE
2	SCS Runoff	------	-------	-------	-------	-------	-------	-------	6.215	-------	POST UNDETAINED
3	SCS Runoff	------	-------	-------	-------	-------	-------	-------	0.953	-------	POST DETAINED 1
4	SCS Runoff	------	-------	-------	-------	-------	-------	-------	1.489	-------	POST DETAINED 2
5	Diversion1	3	-------	-------	-------	-------	-------	-------	0.298	-------	VOLUME ABSTRACTION
6	Diversion2	3	-------	-------	-------	-------	-------	-------	0.953	-------	POST AFTER BMP
7	Diversion1	4	-------	-------	-------	-------	-------	-------	1.489	-------	VOLUME ABSTRACTION
8	Diversion2	4	-------	-------	-------	-------	-------	-------	0.998	-------	POST AFTER BMP
9	Combine	2, 6, 8	-------	-------	-------	-------	-------	-------	7.051	-------	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	8.505	2	722	22,923	------	------	------	PRE
2	SCS Runoff	6.215	2	722	16,872	------	------	------	POST UNDETAINED
3	SCS Runoff	0.953	2	720	2,181	------	------	------	POST DETAINED 1
4	SCS Runoff	1.489	2	724	4,741	------	------	------	POST DETAINED 2
5	Diversion1	0.298	2	708	206	3	------	------	VOLUME ABSTRACTION
6	Diversion2	0.953	2	720	1,975	3	------	------	POST AFTER BMP
7	Diversion1	1.489	2	724	1,851	4	------	------	VOLUME ABSTRACTION
8	Diversion2	0.998	2	734	2,890	4	------	------	POST AFTER BMP
9	Combine	7.051	2	722	21,737	2, 6, 8	------	------	POST AT POI

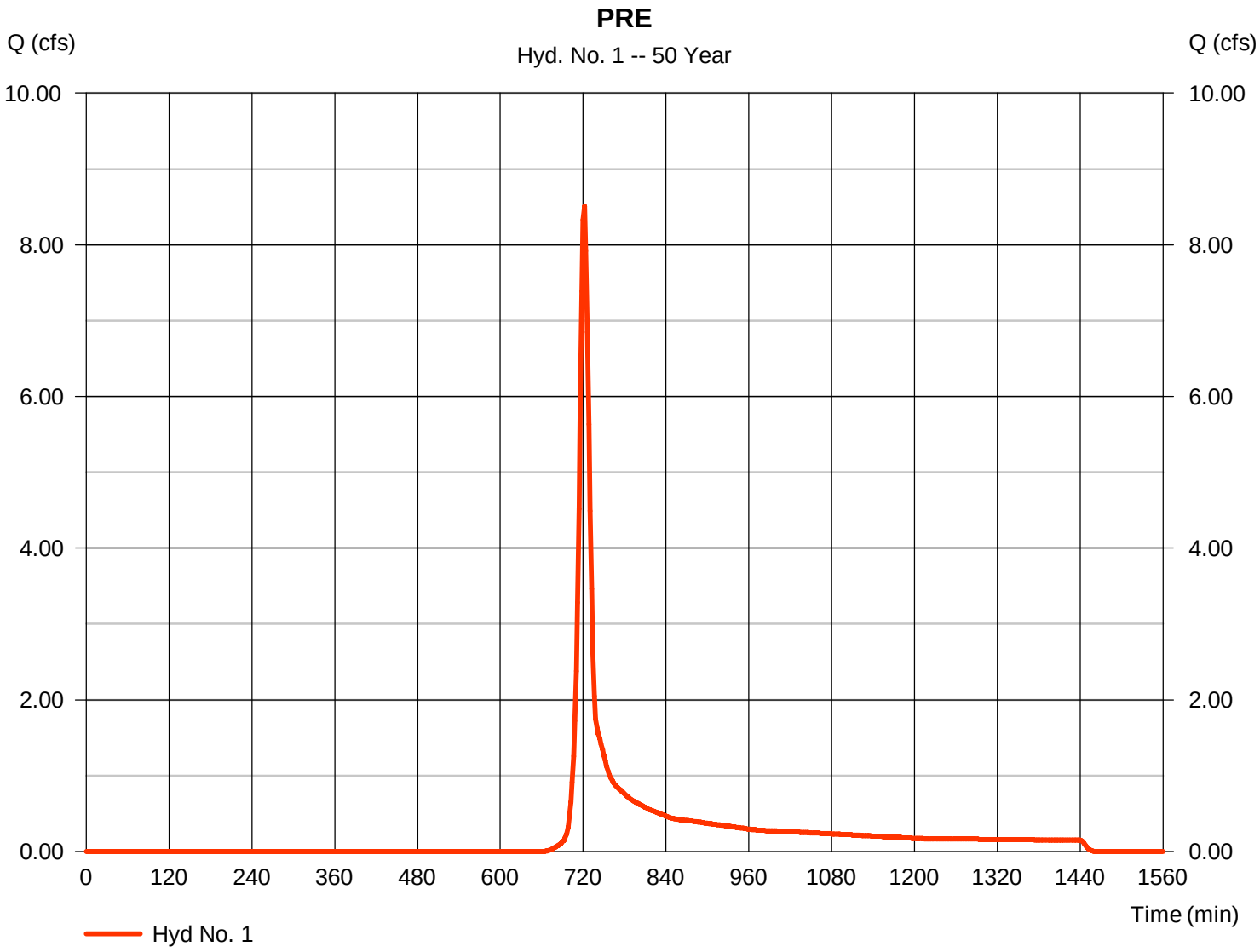
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.505 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	22,923 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	6.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



TR55 Tc Worksheet

Hyd. No. 1

PRE

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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

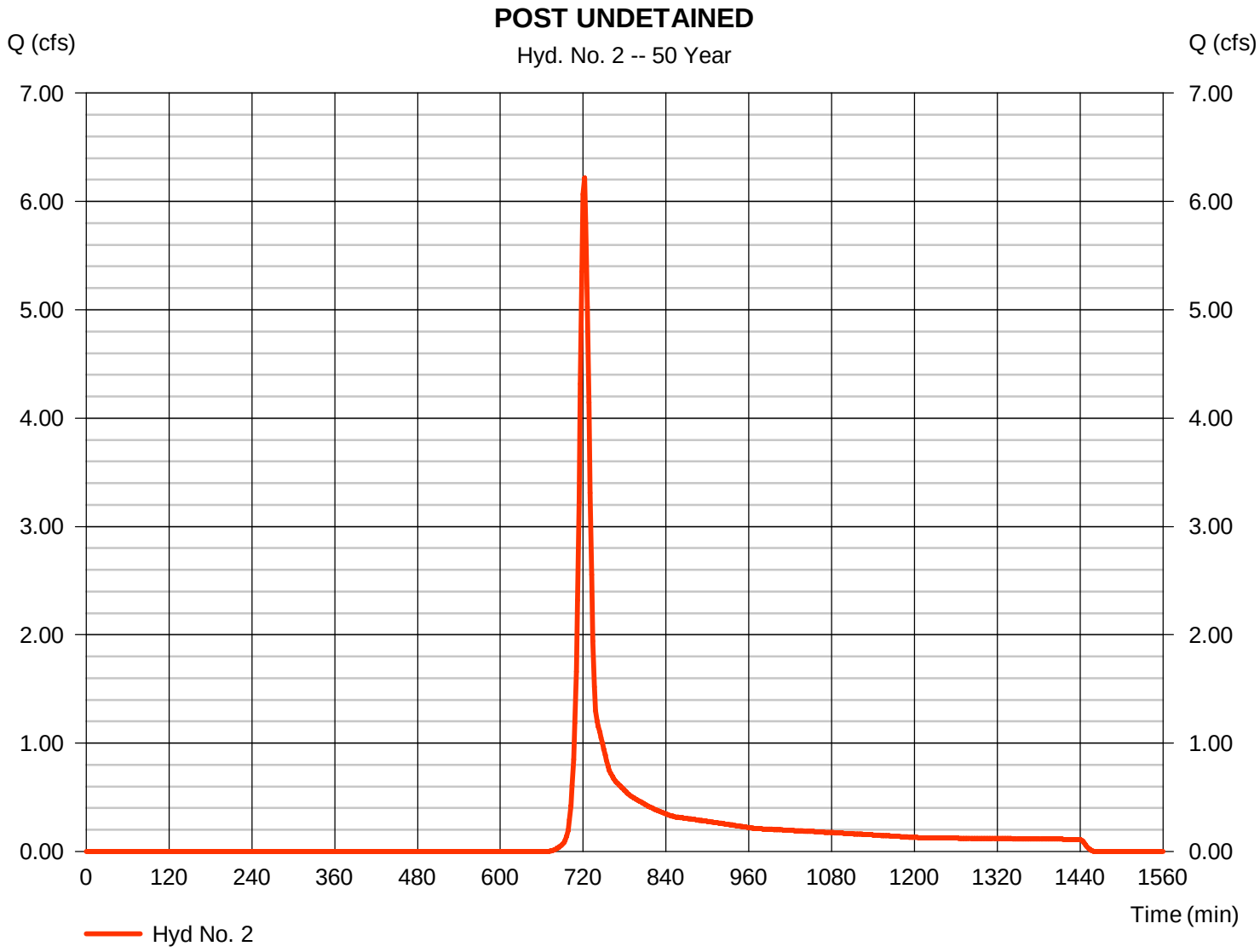
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.215 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	16,872 cuft
Drainage area	=	2.480 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	6.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.630 x 55) + (1.850 x 58)] / 2.480



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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

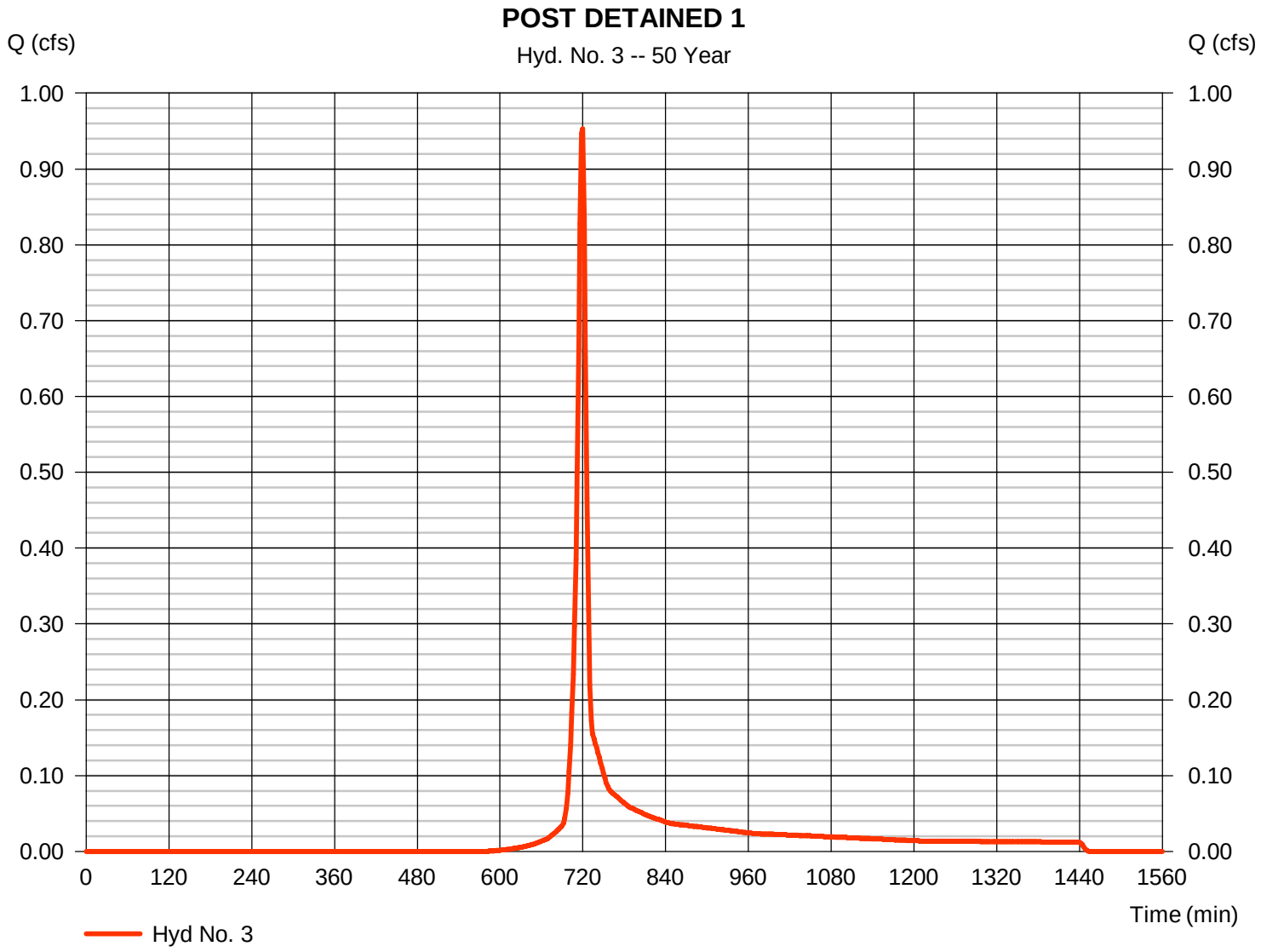
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.953 cfs
Storm frequency	= 50 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 2,181 cuft
Drainage area	= 0.230 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.20 min
Total precip.	= 6.23 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



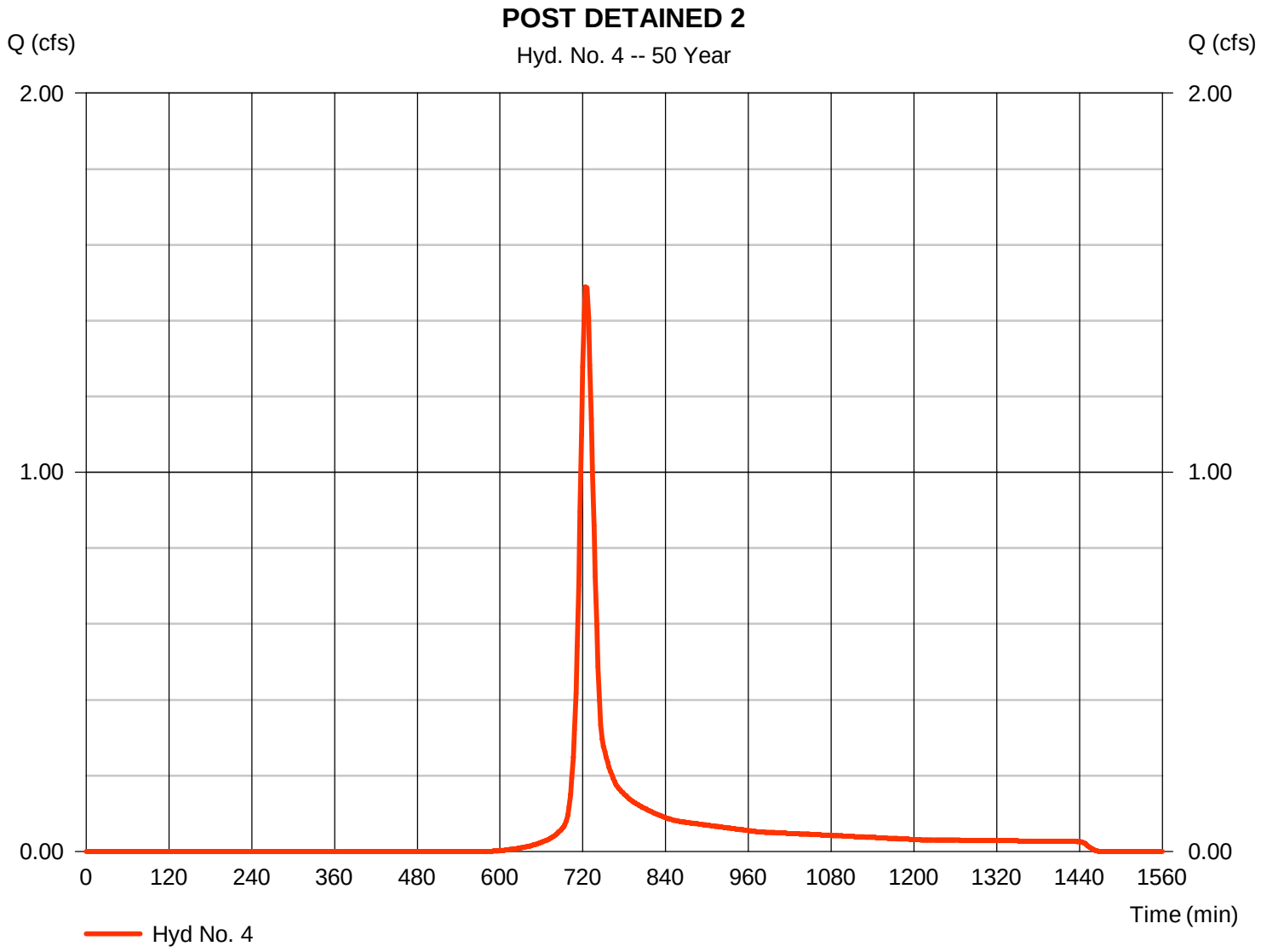
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.489 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,741 cuft
Drainage area	= 0.500 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.60 min
Total precip.	= 6.23 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

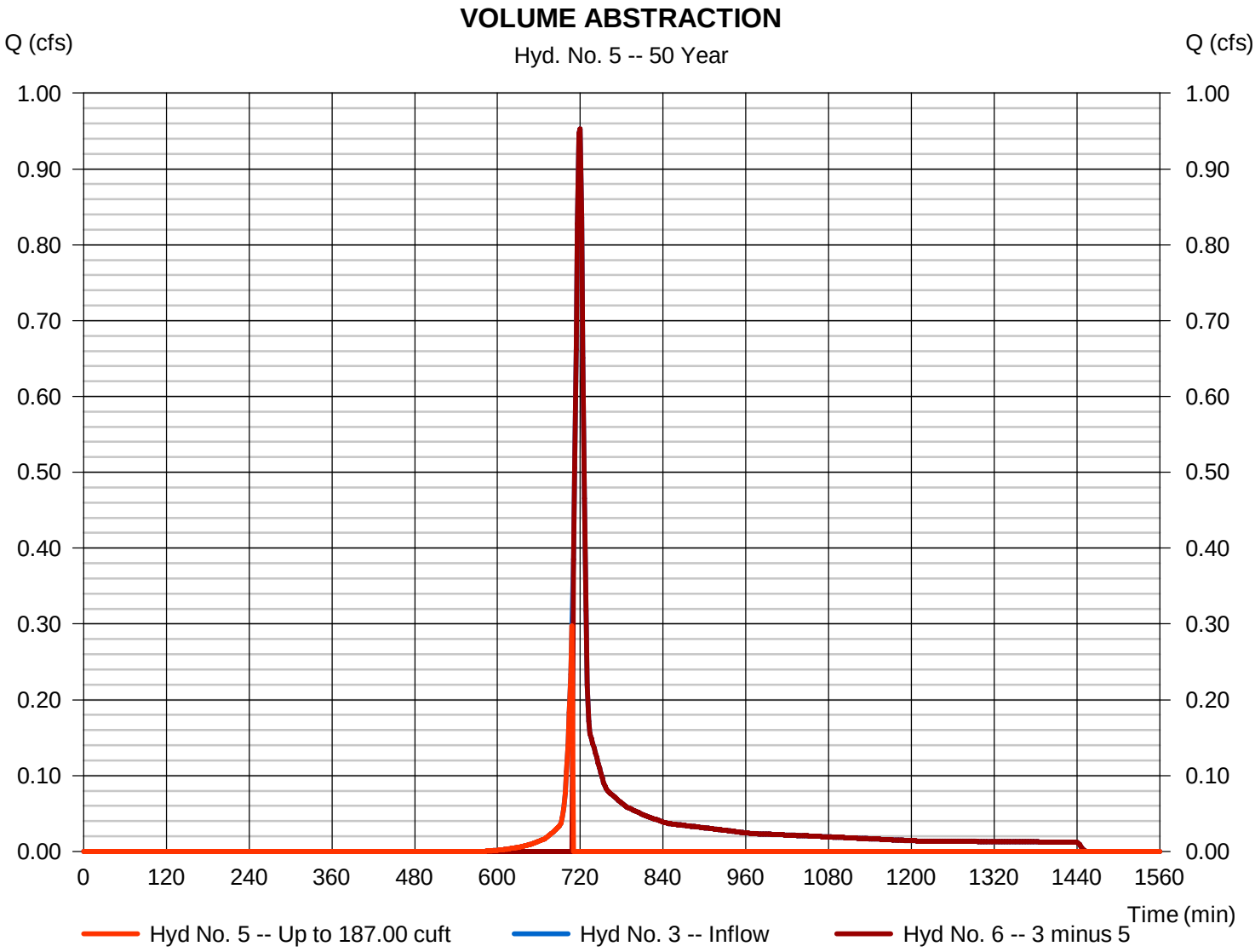


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.298 cfs
Storm frequency	= 50 yrs	Time to peak	= 708 min
Time interval	= 2 min	Hyd. volume	= 206 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

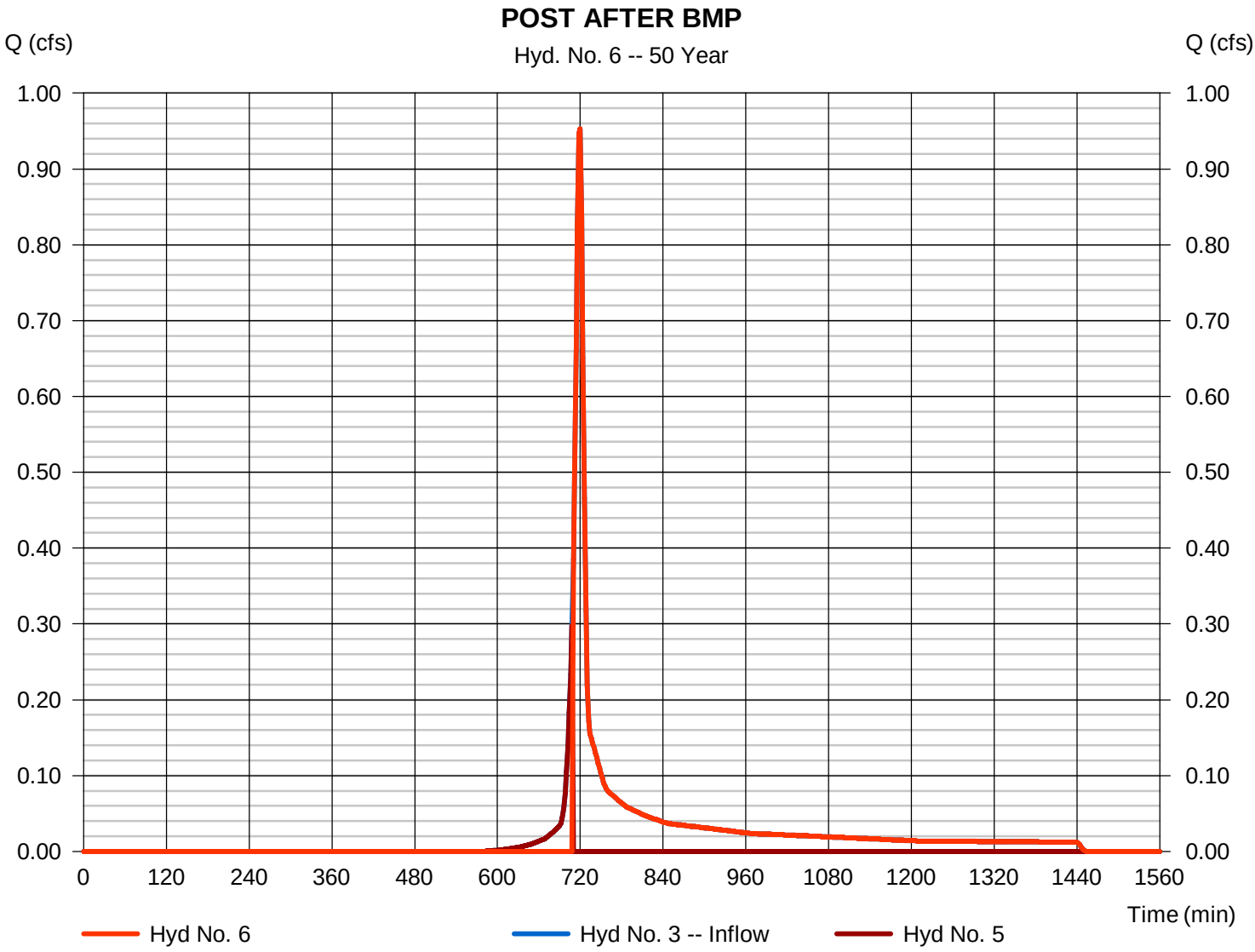


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.953 cfs
Storm frequency	= 50 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,975 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

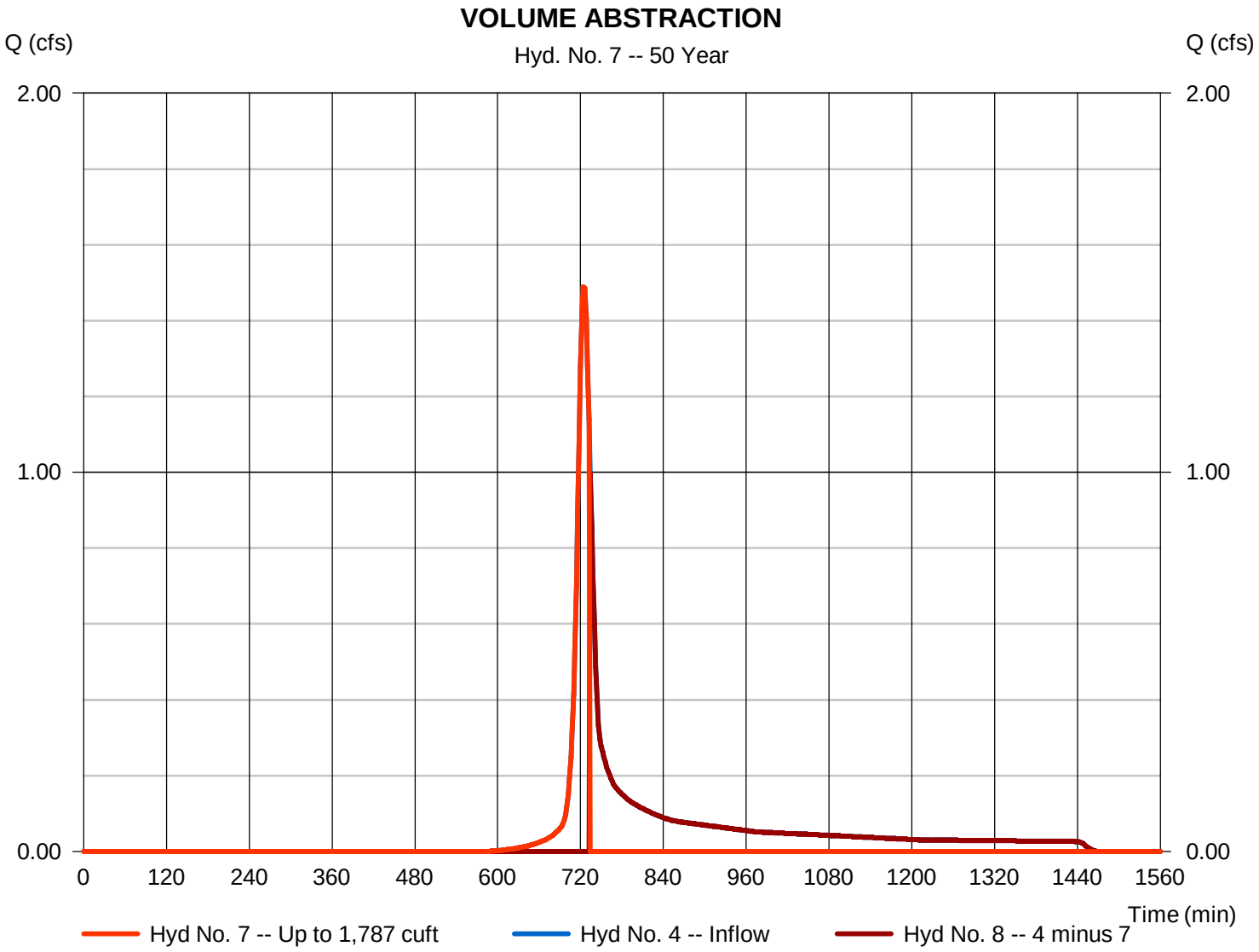


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 1.489 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,851 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

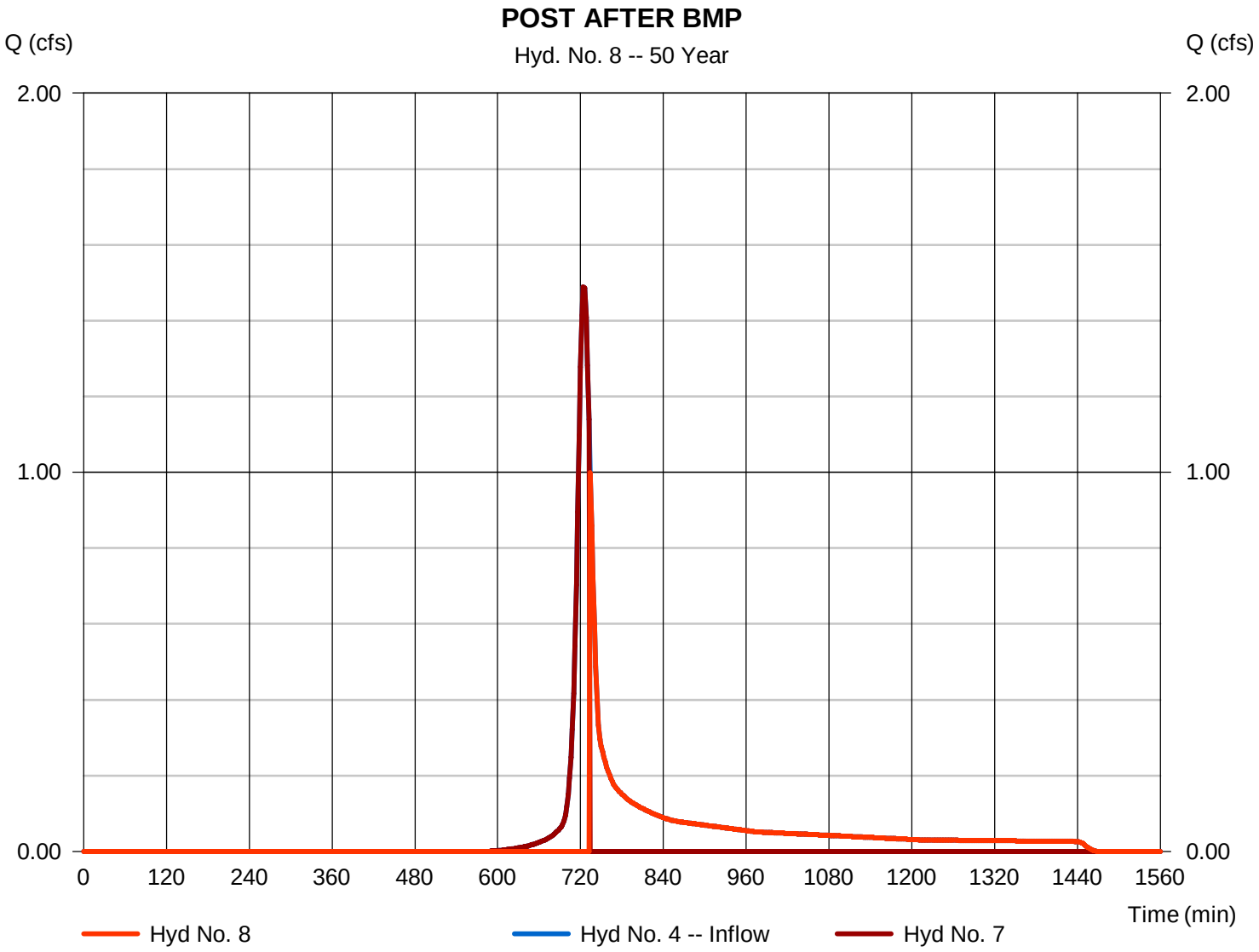


Hydrograph Report

Hyd. No. 8

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 0.998 cfs
Storm frequency	= 50 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 2,890 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

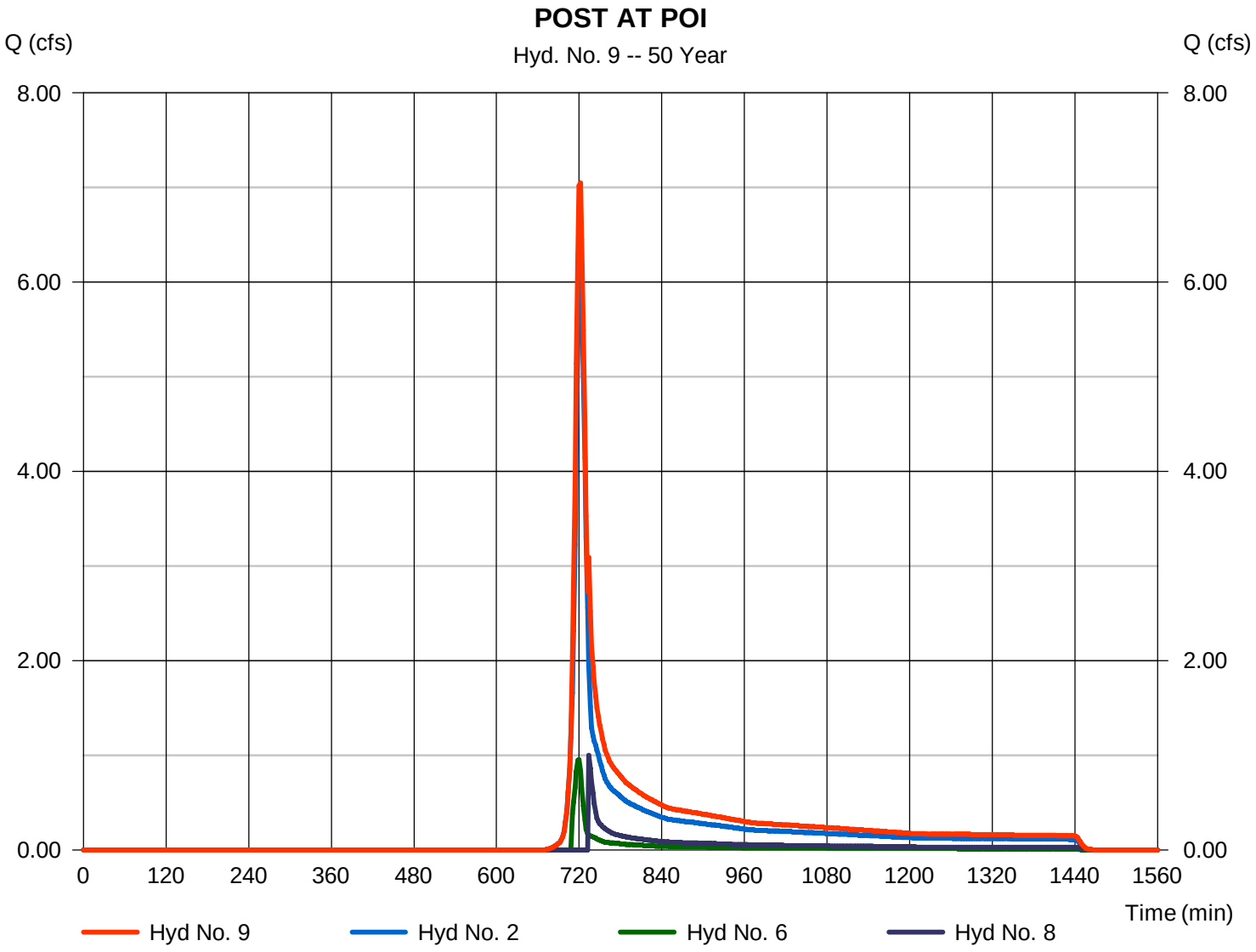


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	=	Combine	Peak discharge	=	7.051 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	21,737 cuft
Inflow hyds.	=	2, 6, 8	Contrib. drain. area	=	2.480 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	45.9138	11.8000	0.8796	--------
2	54.5808	12.1000	0.8736	--------
3	0.0000	0.0000	0.0000	--------
5	59.9618	12.3000	0.8422	--------
10	55.6073	11.3000	0.7938	--------
25	49.4111	9.8000	0.7297	--------
50	49.3823	9.5000	0.7034	--------
100	44.7550	8.3000	0.6570	--------

File name: West Trindle Road 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	3.84	3.05	2.55	2.19	1.93	1.72	1.56	1.43	1.31	1.22	1.14	1.07
2	4.57	3.65	3.06	2.64	2.32	2.08	1.89	1.73	1.59	1.48	1.38	1.30
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	5.44	4.39	3.70	3.21	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
10	6.07	4.91	4.15	3.61	3.21	2.90	2.65	2.44	2.27	2.12	1.99	1.88
25	6.92	5.59	4.75	4.15	3.71	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.53	6.11	5.21	4.57	4.09	3.72	3.42	3.17	2.97	2.79	2.63	2.50
100	8.17	6.63	5.66	4.98	4.47	4.08	3.76	3.50	3.28	3.10	2.93	2.79

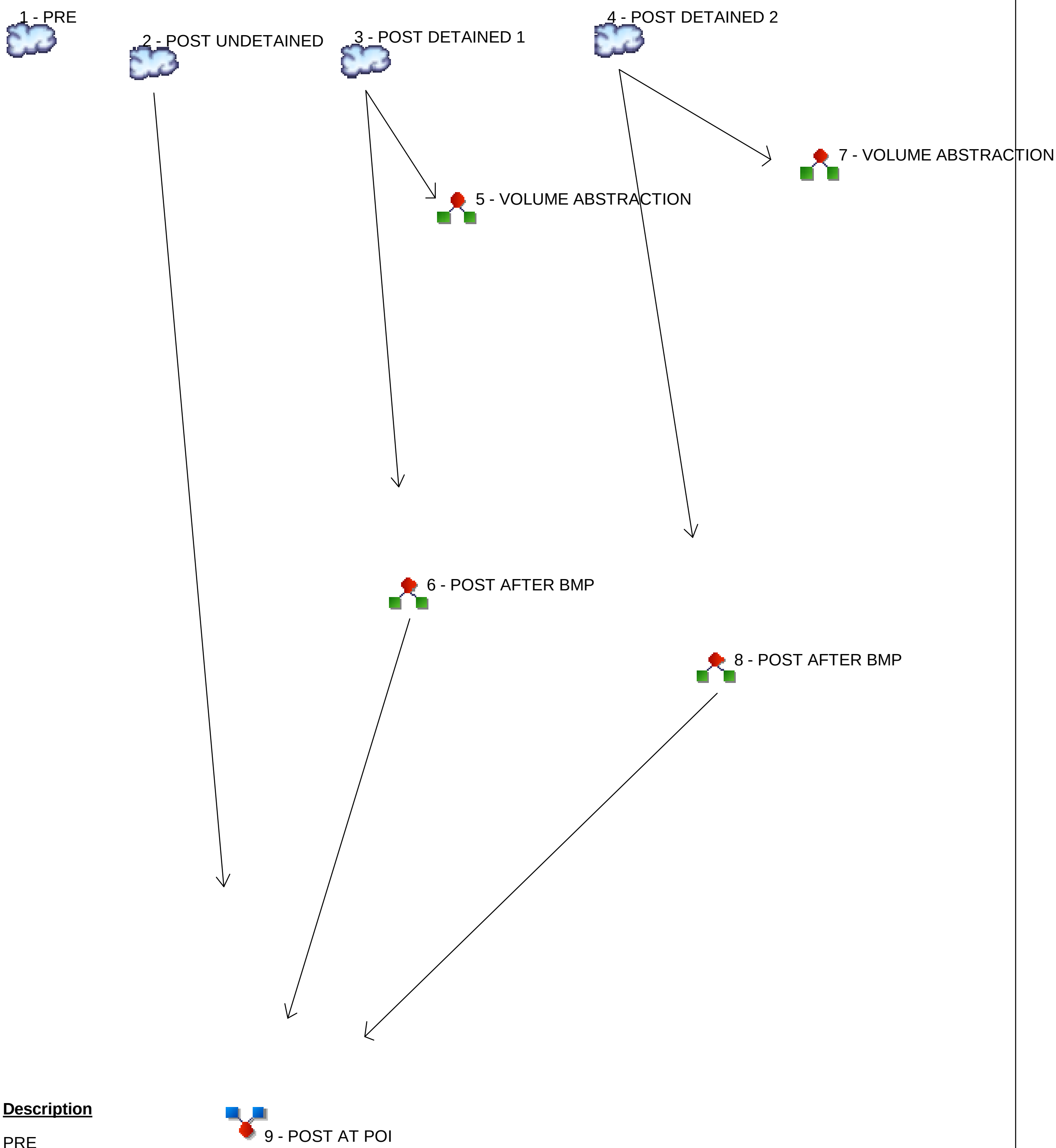
Tc = time in minutes. Values may exceed 60.

RO\07 PCSM\Attach 4 Stormwater Calcs\W Trindle Road (Middlesex)\Hydraflow Rev 1\West Trindle Road 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	2.40	2.89	0.00	3.63	4.28	5.30	6.23	7.32
SCS 6-Hr	1.67	2.02	0.00	2.53	2.96	3.61	4.17	4.81
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
2	SCS Runoff	POST UNDETAINED
3	SCS Runoff	POST DETAINED 1
4	SCS Runoff	POST DETAINED 2
5	Diversion1	VOLUME ABSTRACTION
6	Diversion2	POST AFTER BMP
7	Diversion1	VOLUME ABSTRACTION
8	Diversion2	POST AFTER BMP
9	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	------	-------	-------	-------	-------	-------	-------	-------	11.99	PRE
2	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	8.847	POST UNDETAINED
3	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	1.261	POST DETAINED 1
4	SCS Runoff	------	-------	-------	-------	-------	-------	-------	-------	2.175	POST DETAINED 2
5	Diversion1	3	-------	-------	-------	-------	-------	-------	-------	0.209	VOLUME ABSTRACTION
6	Diversion2	3	-------	-------	-------	-------	-------	-------	-------	1.261	POST AFTER BMP
7	Diversion1	4	-------	-------	-------	-------	-------	-------	-------	2.175	VOLUME ABSTRACTION
8	Diversion2	4	-------	-------	-------	-------	-------	-------	-------	1.983	POST AFTER BMP
9	Combine	2, 6, 8	-------	-------	-------	-------	-------	-------	-------	9.992	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	11.99	2	722	31,692	------	------	------	PRE
2	SCS Runoff	8.847	2	722	23,475	------	------	------	POST UNDETAINED
3	SCS Runoff	1.261	2	718	2,887	------	------	------	POST DETAINED 1
4	SCS Runoff	2.175	2	722	6,119	------	------	------	POST DETAINED 2
5	Diversion1	0.209	2	702	212	3	------	------	VOLUME ABSTRACTION
6	Diversion2	1.261	2	718	2,675	3	------	------	POST AFTER BMP
7	Diversion1	2.175	2	722	2,043	4	------	------	VOLUME ABSTRACTION
8	Diversion2	1.983	2	726	4,076	4	------	------	POST AFTER BMP
9	Combine	9.992	2	720	30,226	2, 6, 8	------	------	POST AT POI

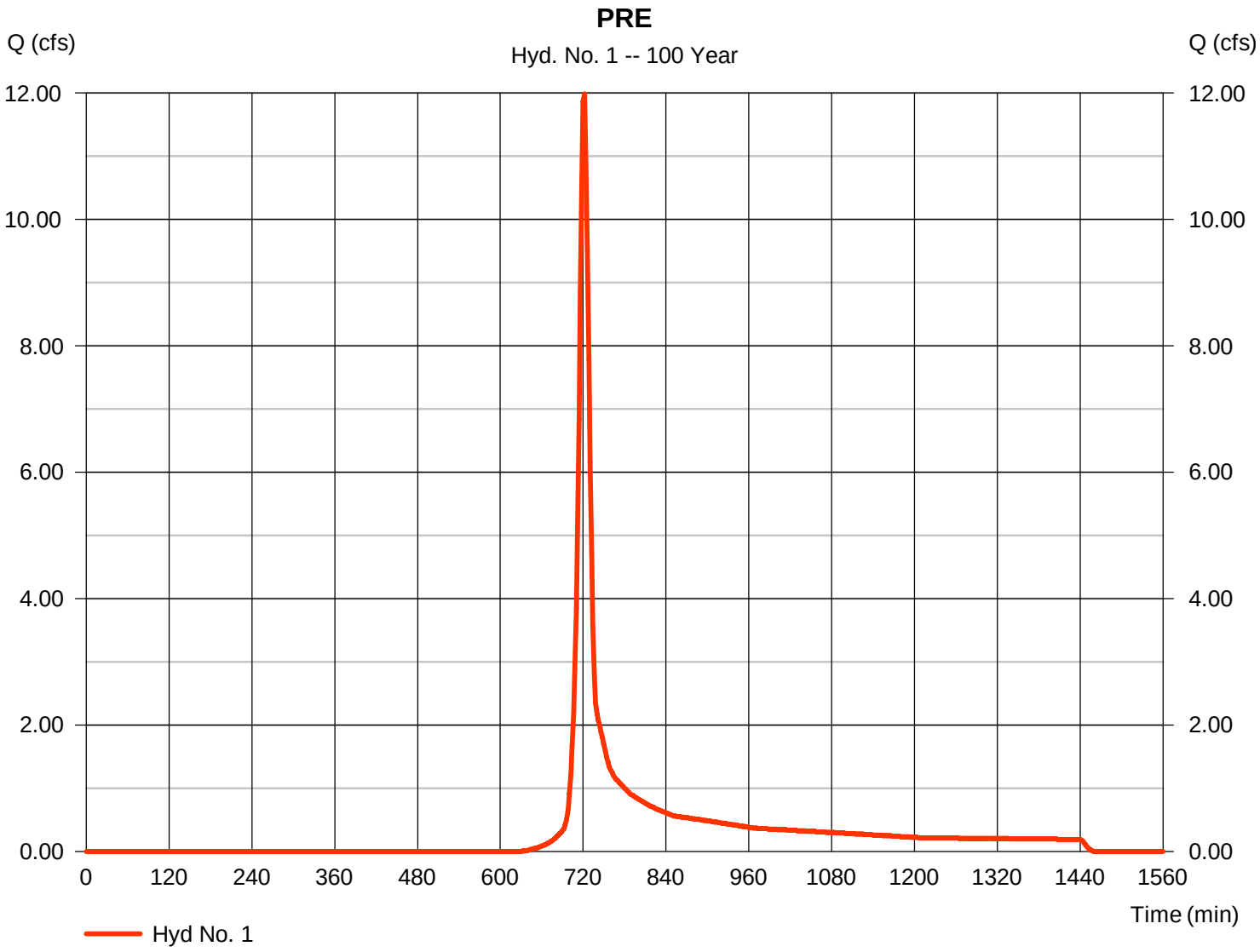
Hydrograph Report

Hyd. No. 1

PRE

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.99 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	31,692 cuft
Drainage area	=	3.220 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.060 x 58) + (0.160 x 55)] / 3.220



TR55 Tc Worksheet

Hyd. No. 1

PRE

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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

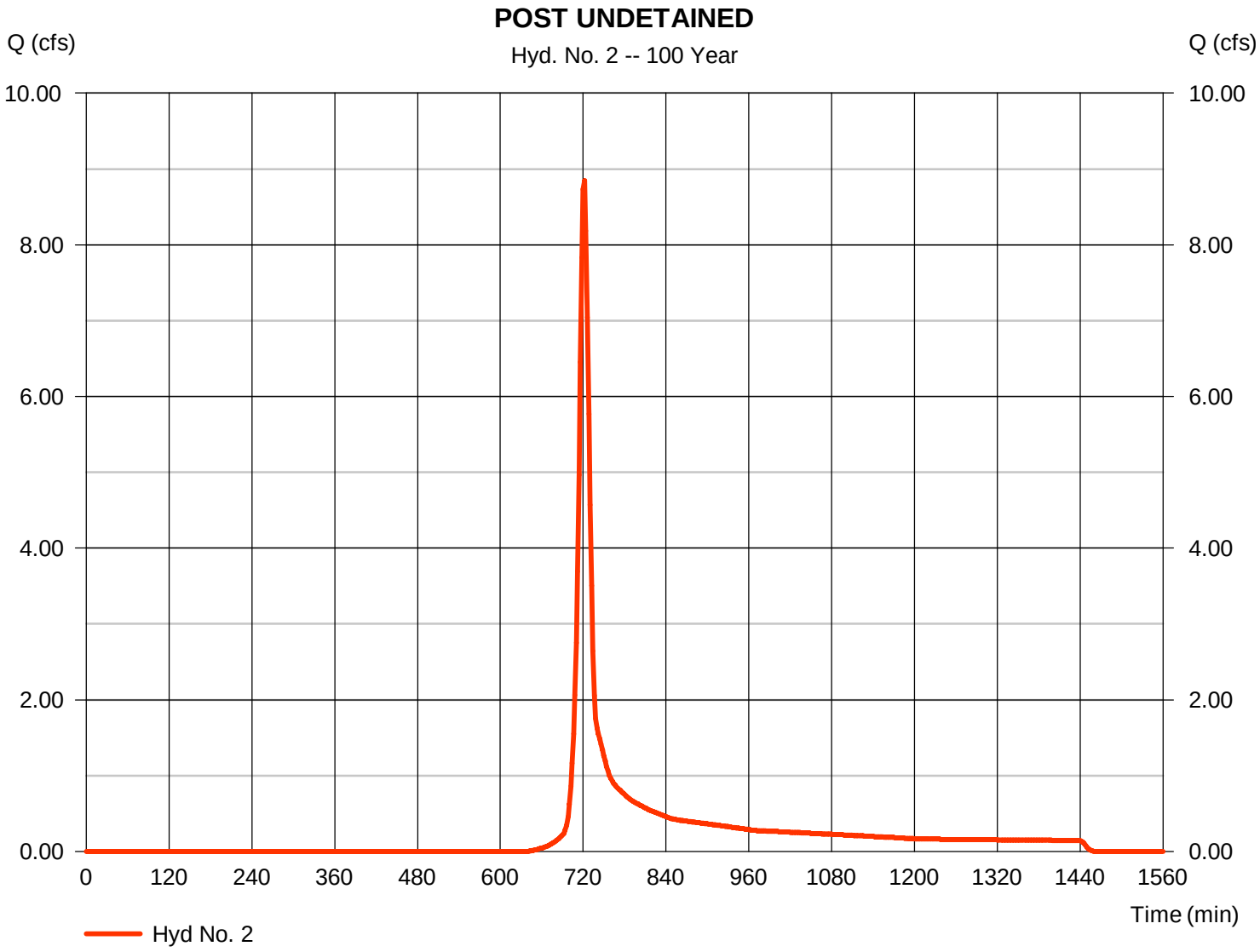
Hydrograph Report

Hyd. No. 2

POST UNDETAINED

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.847 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	23,475 cuft
Drainage area	=	2.480 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.60 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.630 x 55) + (1.850 x 58)] / 2.480



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)	= 2.89		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.33**	**+**	**0.00**	**+**	**0.00**	**=**	**7.33**
Shallow Concentrated Flow							
Flow length (ft)	= 96.00		146.00		245.00		
Watercourse slope (%)	= 1.00		2.70		1.20		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=1.61		2.65		1.77		
Travel Time (min)	**= 0.99**	**+**	**0.92**	**+**	**2.31**	**=**	**4.22**
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 ..... 11.60 min

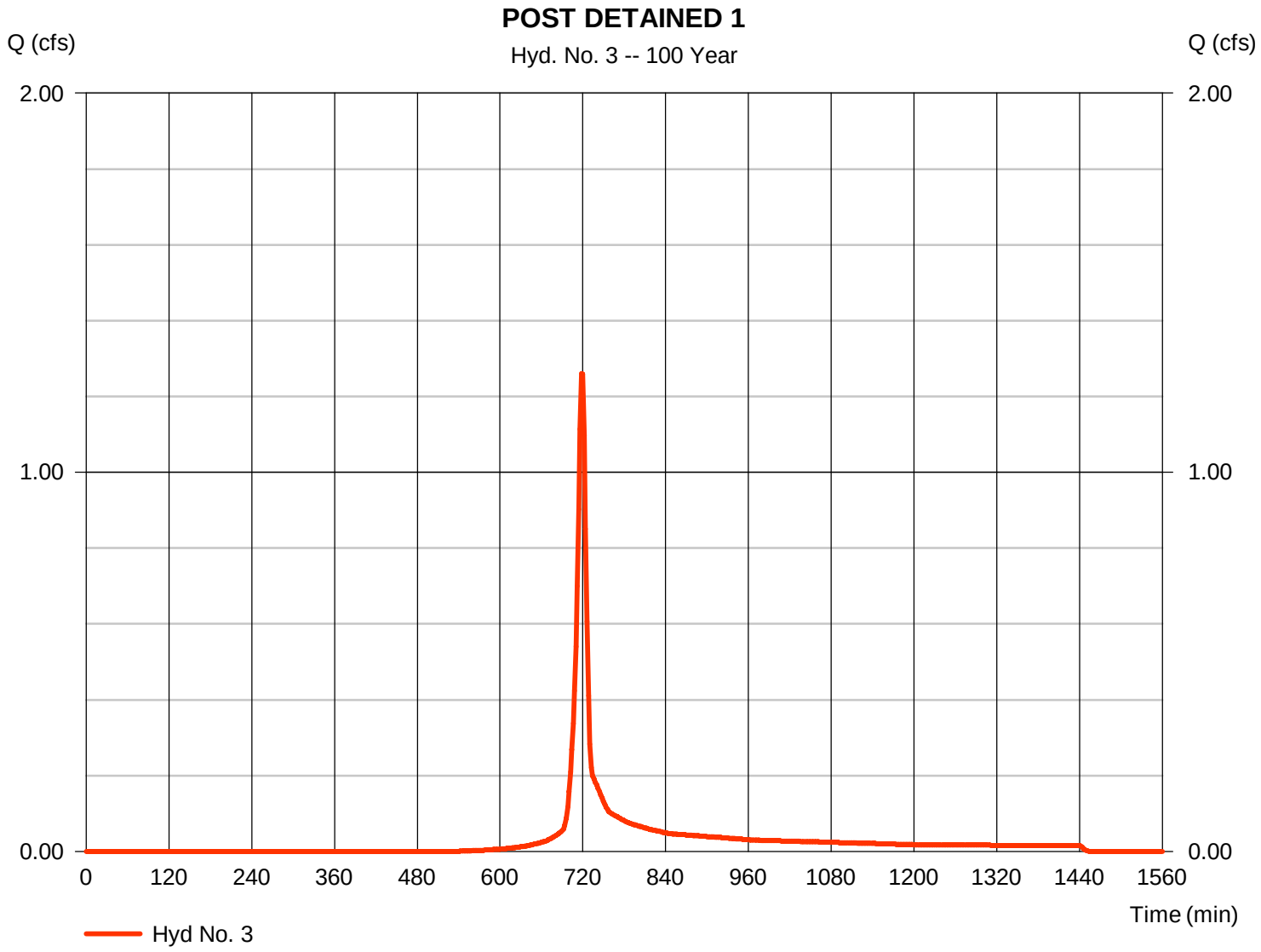
Hydrograph Report

Hyd. No. 3

POST DETAINED 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.261 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,887 cuft
Drainage area	=	0.230 ac	Curve number	=	66*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.40 min
Total precip.	=	7.32 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.070 x 85) + (0.040 x 55) + (0.120 x 58)] / 0.230



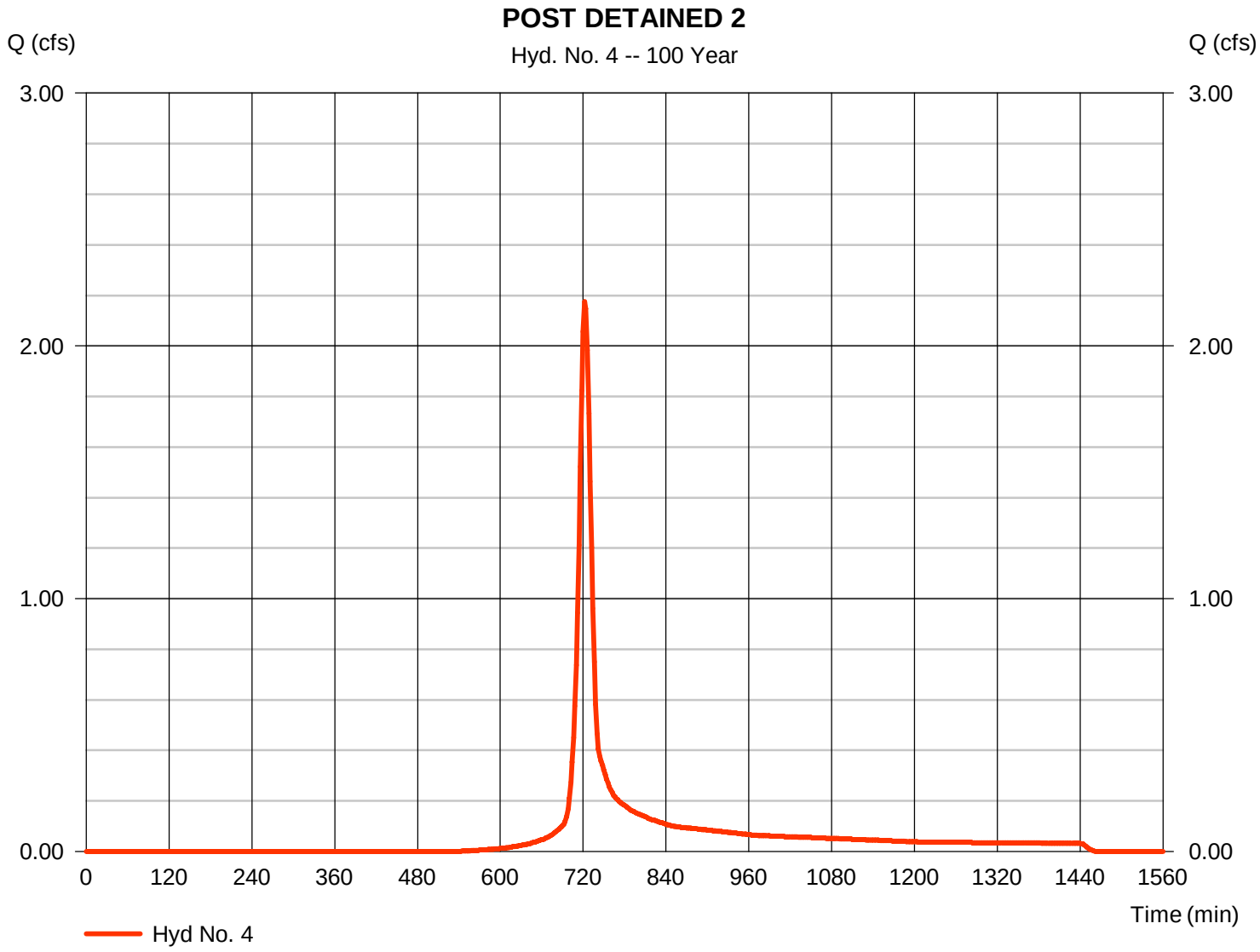
Hydrograph Report

Hyd. No. 4

POST DETAINED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.175 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 6,119 cuft
Drainage area	= 0.500 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 7.32 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 85) + (0.310 x 58) + (0.040 x 55)] / 0.500

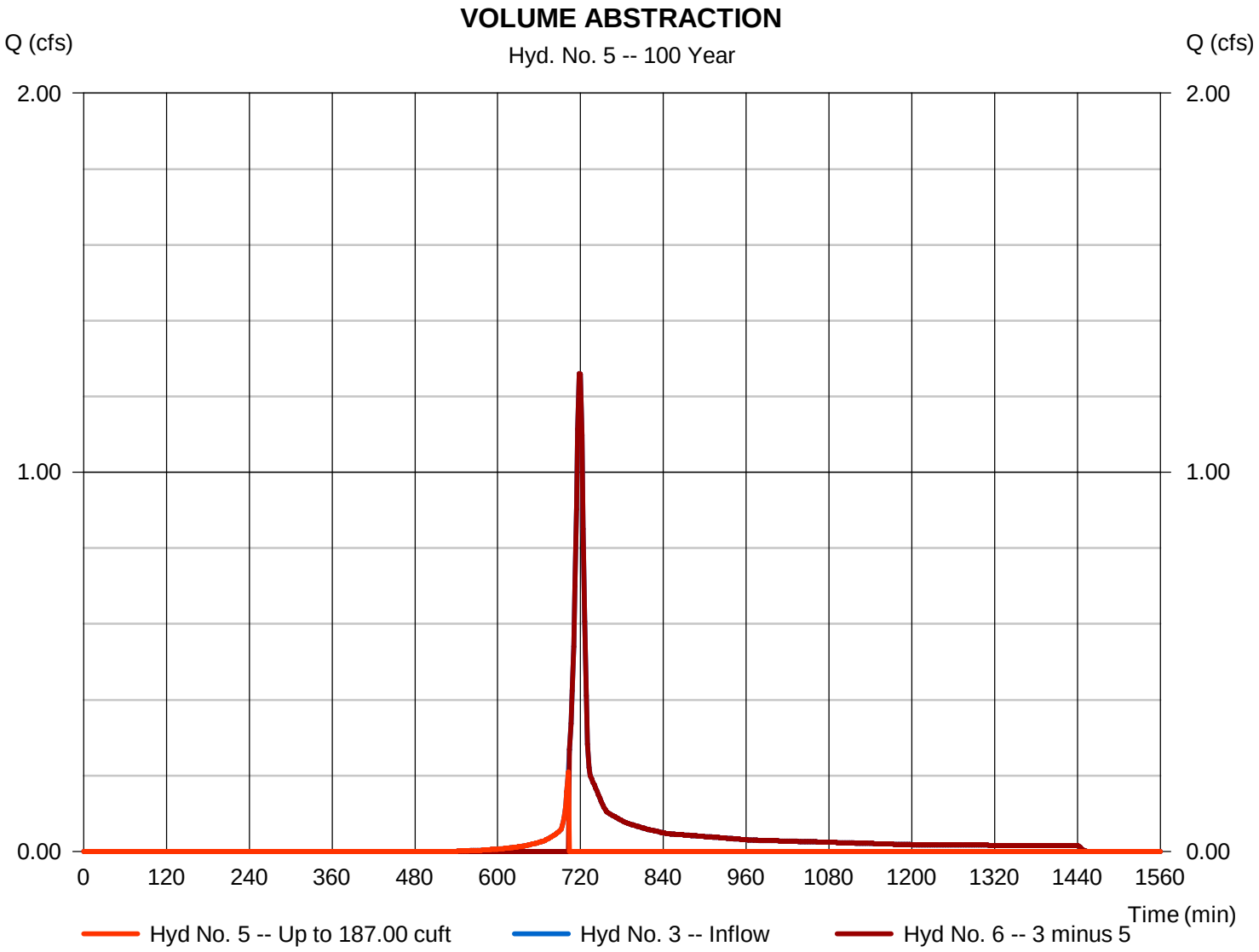


Hydrograph Report

Hyd. No. 5

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 0.209 cfs
Storm frequency	= 100 yrs	Time to peak	= 702 min
Time interval	= 2 min	Hyd. volume	= 212 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 6
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

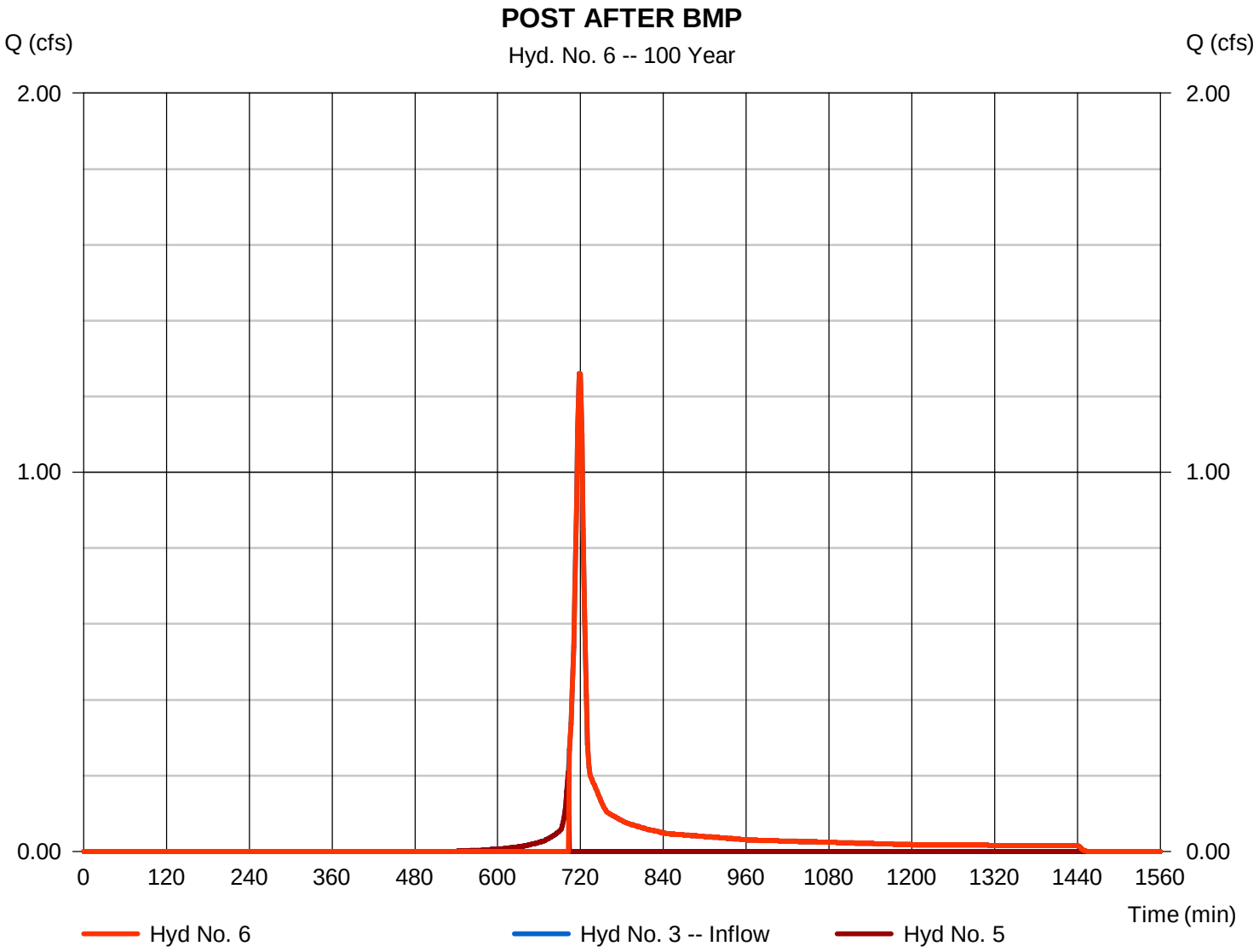


Hydrograph Report

Hyd. No. 6

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.261 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,675 cuft
Inflow hydrograph	= 3 - POST DETAINED 1	2nd diverted hyd.	= 5
Diversion method	= First Flush Volume	Volume Up To	= 187.00 cuft

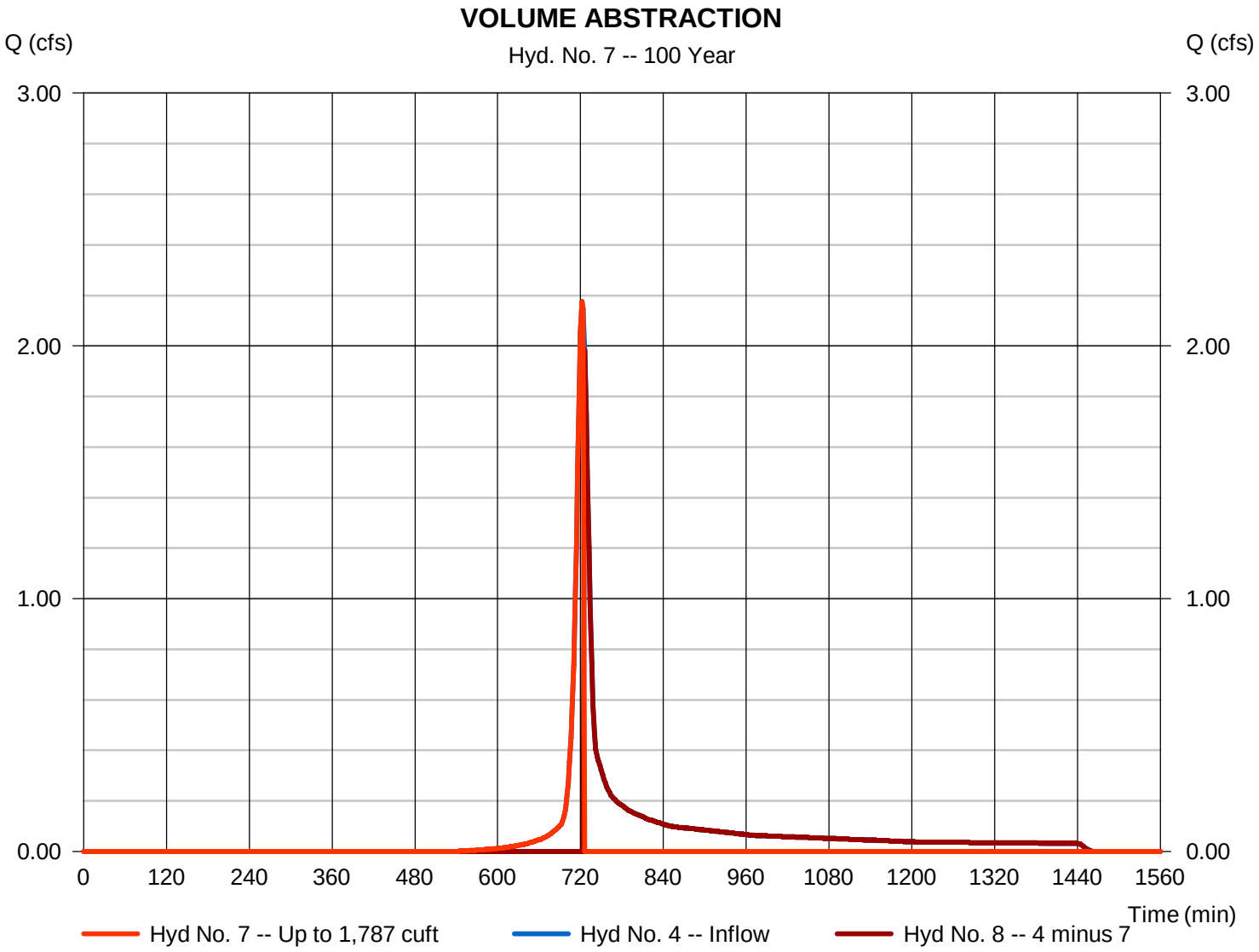


Hydrograph Report

Hyd. No. 7

VOLUME ABSTRACTION

Hydrograph type	= Diversion1	Peak discharge	= 2.175 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,043 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 8
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

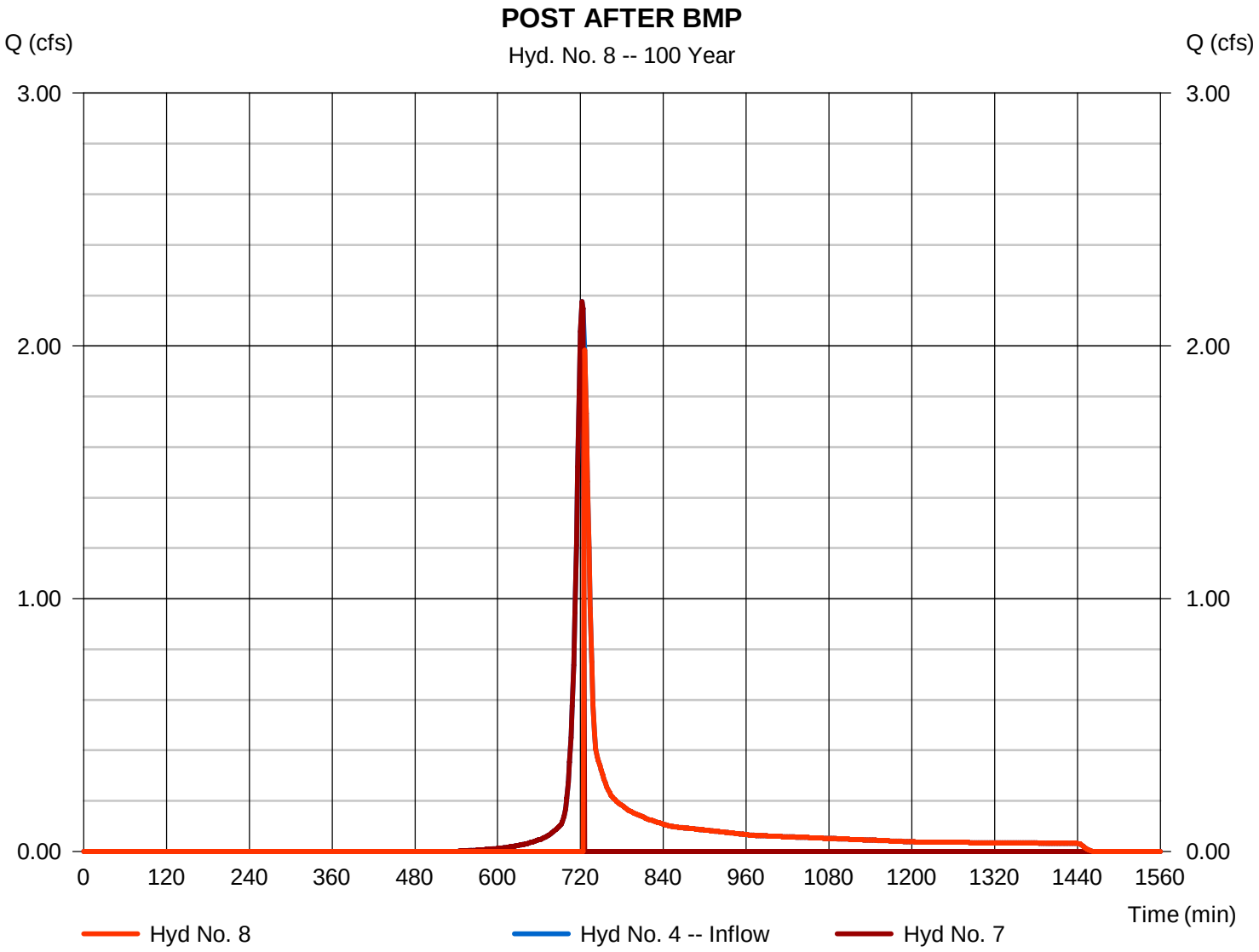


Hydrograph Report

Hyd. No. 8

POST AFTER BMP

Hydrograph type	= Diversion2	Peak discharge	= 1.983 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 4,076 cuft
Inflow hydrograph	= 4 - POST DETAINED 2	2nd diverted hyd.	= 7
Diversion method	= First Flush Volume	Volume Up To	= 1,787 cuft

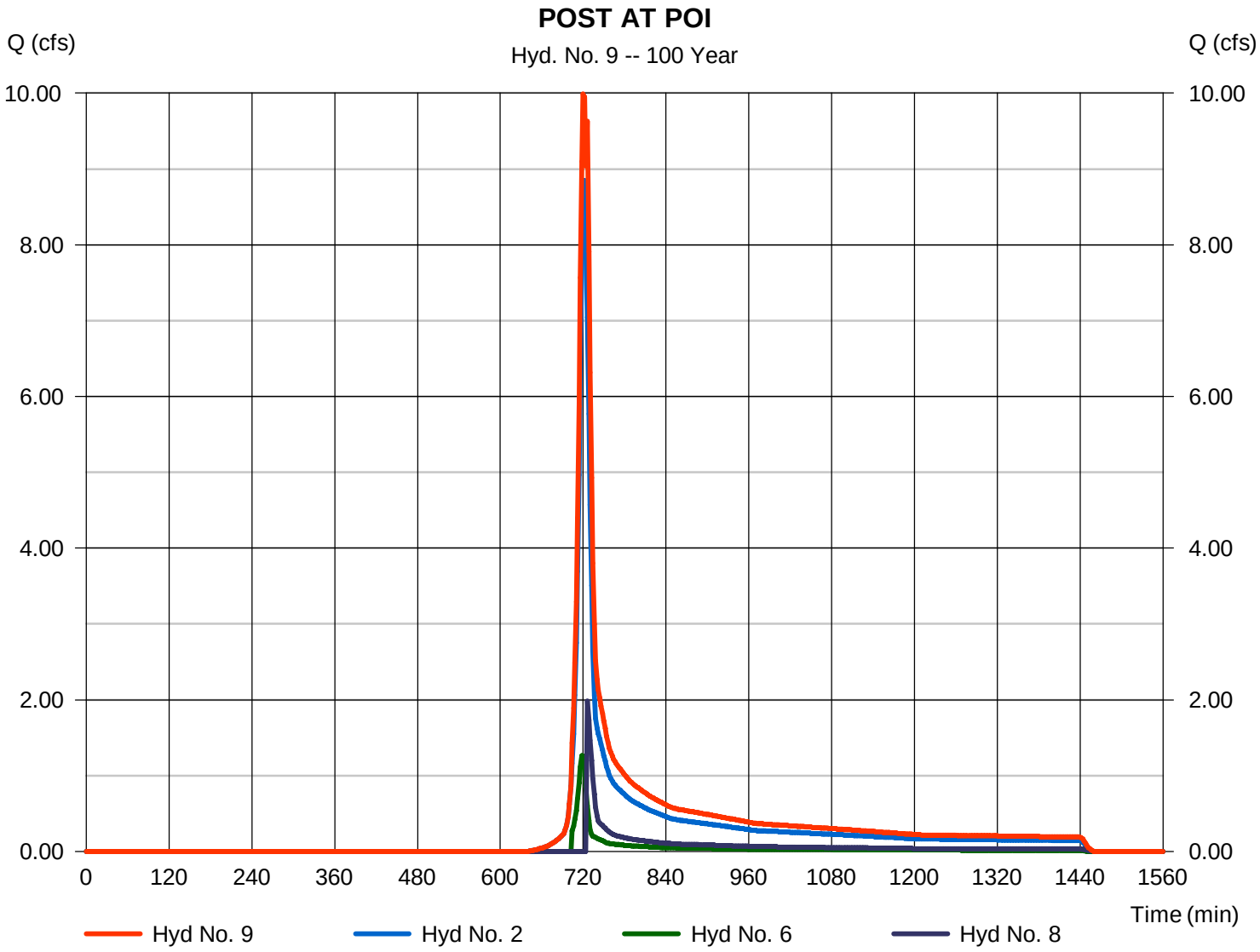


Hydrograph Report

Hyd. No. 9

POST AT POI

Hydrograph type	=	Combine	Peak discharge	=	9.992 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	30,226 cuft
Inflow hyds.	=	2, 6, 8	Contrib. drain. area	=	2.480 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	45.9138	11.8000	0.8796	--------
2	54.5808	12.1000	0.8736	--------
3	0.0000	0.0000	0.0000	--------
5	59.9618	12.3000	0.8422	--------
10	55.6073	11.3000	0.7938	--------
25	49.4111	9.8000	0.7297	--------
50	49.3823	9.5000	0.7034	--------
100	44.7550	8.3000	0.6570	--------

File name: West Trindle Road 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	3.84	3.05	2.55	2.19	1.93	1.72	1.56	1.43	1.31	1.22	1.14	1.07
2	4.57	3.65	3.06	2.64	2.32	2.08	1.89	1.73	1.59	1.48	1.38	1.30
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	5.44	4.39	3.70	3.21	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
10	6.07	4.91	4.15	3.61	3.21	2.90	2.65	2.44	2.27	2.12	1.99	1.88
25	6.92	5.59	4.75	4.15	3.71	3.36	3.08	2.85	2.66	2.50	2.35	2.23
50	7.53	6.11	5.21	4.57	4.09	3.72	3.42	3.17	2.97	2.79	2.63	2.50
100	8.17	6.63	5.66	4.98	4.47	4.08	3.76	3.50	3.28	3.10	2.93	2.79

Tc = time in minutes. Values may exceed 60.

RO\07 PCSM\Attach 4 Stormwater Calcs\W Trindle Road (Middlesex)\Hydraflow Rev 1\West Trindle Road 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	2.40	2.89	0.00	3.63	4.28	5.30	6.23	7.32
SCS 6-Hr	1.67	2.02	0.00	2.53	2.96	3.61	4.17	4.81
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