HYDROLOGY REPORT
Valley Point Homes

0 Caldwell Rd
Ashaland City, TN 37015
Tax Map / Parcel: 64/11.01

Prepared By:

Williams Engineering
Plan - Design - Build

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Nashville, TN 37203
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Table of Contents

I. Project Narrative & Detention Summary

The proposed building site is located at 0 Caldwell Rd Ashland City, TN 37015 where (18) units are to be constructed.

Pre Development

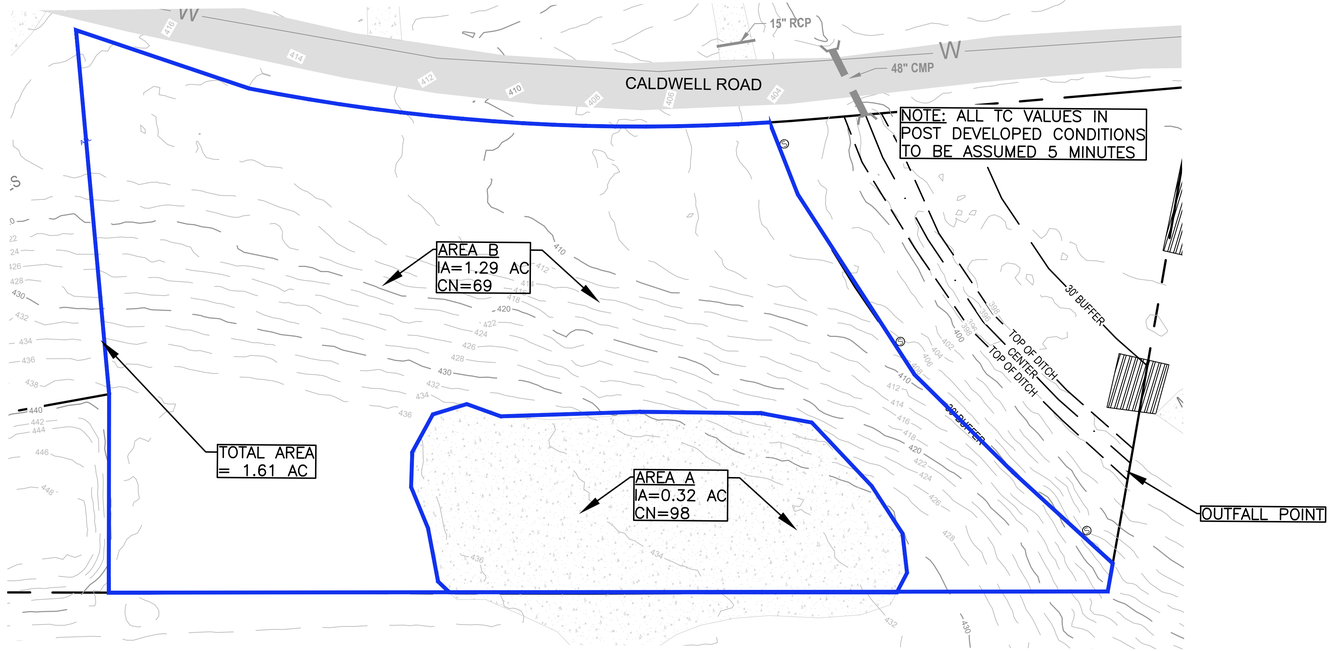
The total disturbed area of the site is 1.61 AC, in which 0.32 AC of existing gravel is present. The existing storm outfall point is located at the south east corner of the site. Per USDA web soil survey, the site is predominately comprised of Type B Soil. In existing conditions Time of Concentration was found to be a minimum of 5 minutes and this can be seen on the existing drainage map.

Post Development

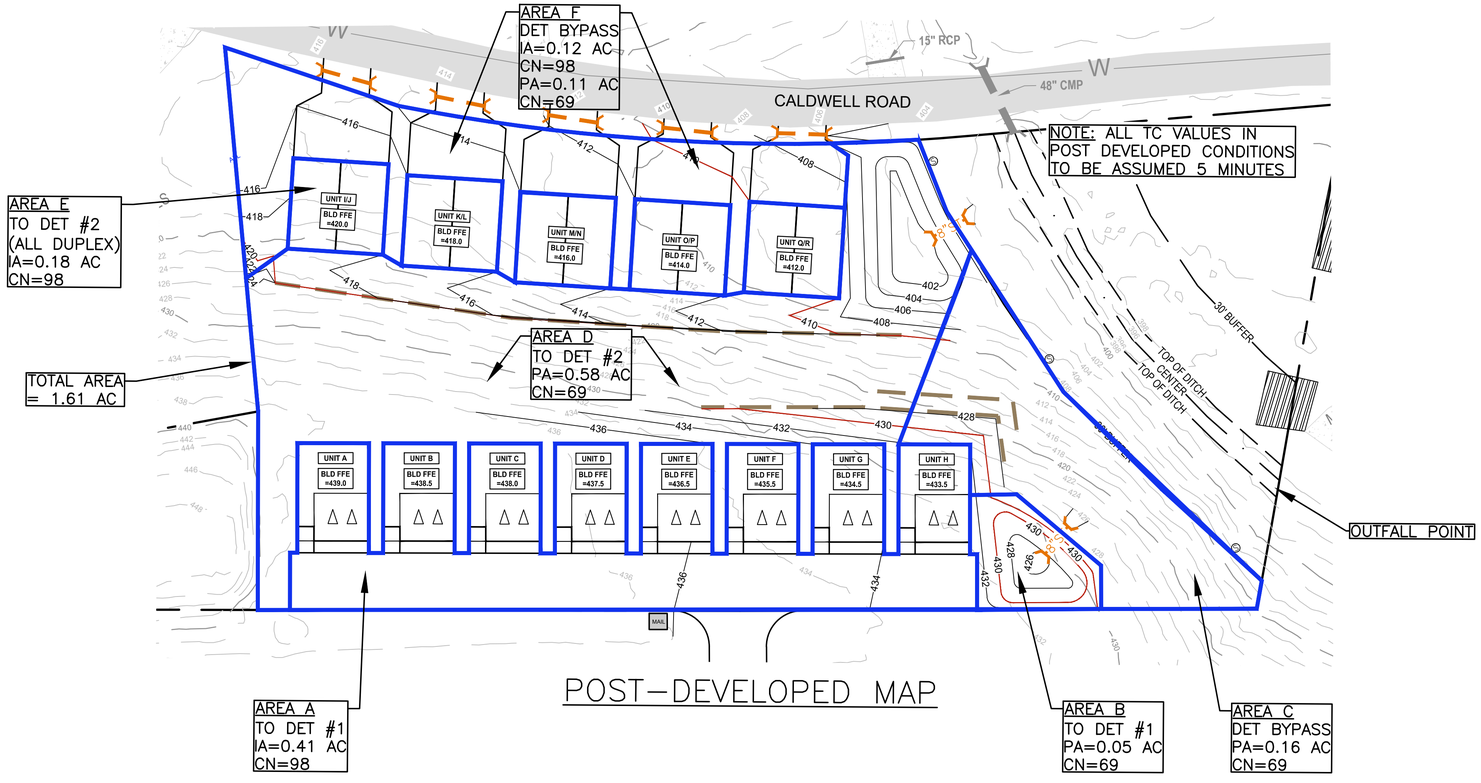
In post developed conditions, additional impervious area has been added to the site. In order to prevent an increase in storm runoff per storm intensity, Post-Developed peak flows must be less than that in Pre-Developed conditions. Two detention ponds have been provided to mitigate runoff. Detention Pond #1 is located at the southeast corner of the site, and Detention Pond #2 is located at the northeast corner of the site. A Pre vs Post storm map has been provided in this document, along with a hydrograph report to show Pre-Developed flow is less than Post-Developed flow. A 5 minute Time of concentration was used as a conservative value for Post Developed conditions. In consideration of the said values, Post Developed flow rates are less than existing conditions for the 2, 5, 10, 25, 50, & 100-yr storm frequencies as seen in the hydrograph report. In conclusion, stormwater has been mitigated for the subject proposed construction based on the Metro Stormwater manual.

Valley Point Homes						
SUMMARY – PRE-DEVELOPED VS POST-DEVELOPED DETENTION						
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
Pre-Developed Flow (cfs)	3.36	5.58	7.15	9.24	10.81	12.37
Pre-Developed Flow (cfs)	3.19	4.03	4.58	5.24	5.70	6.14

II. Pre-Developed & Post-Developed Map



PRE-DEVELOPED MAP



POST-DEVELOPED MAP

TENNESSEE STATE PLANE
COORDINATE SYSTEM - NAD 1983
VERTICAL DATUM - NAVD 1988

0 30 60 120 Feet

GRAPHIC SCALE

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ENGINEER
STATE OF TENNESSEE
Michael Williams
2.21.2023

VALLEY POINT HOMES
FOR
JIMMY BROOKS
0 CALDWELL ROAD ASHLAND CITY, TN 37015

REVISIONS	DATE
-	-
-	-
-	-
-	-
-	-
-	-

DEISGNED BY: MLW

DATE: 6/10/2021

SCALE: PER SCALE

JOB #: 20230210-1

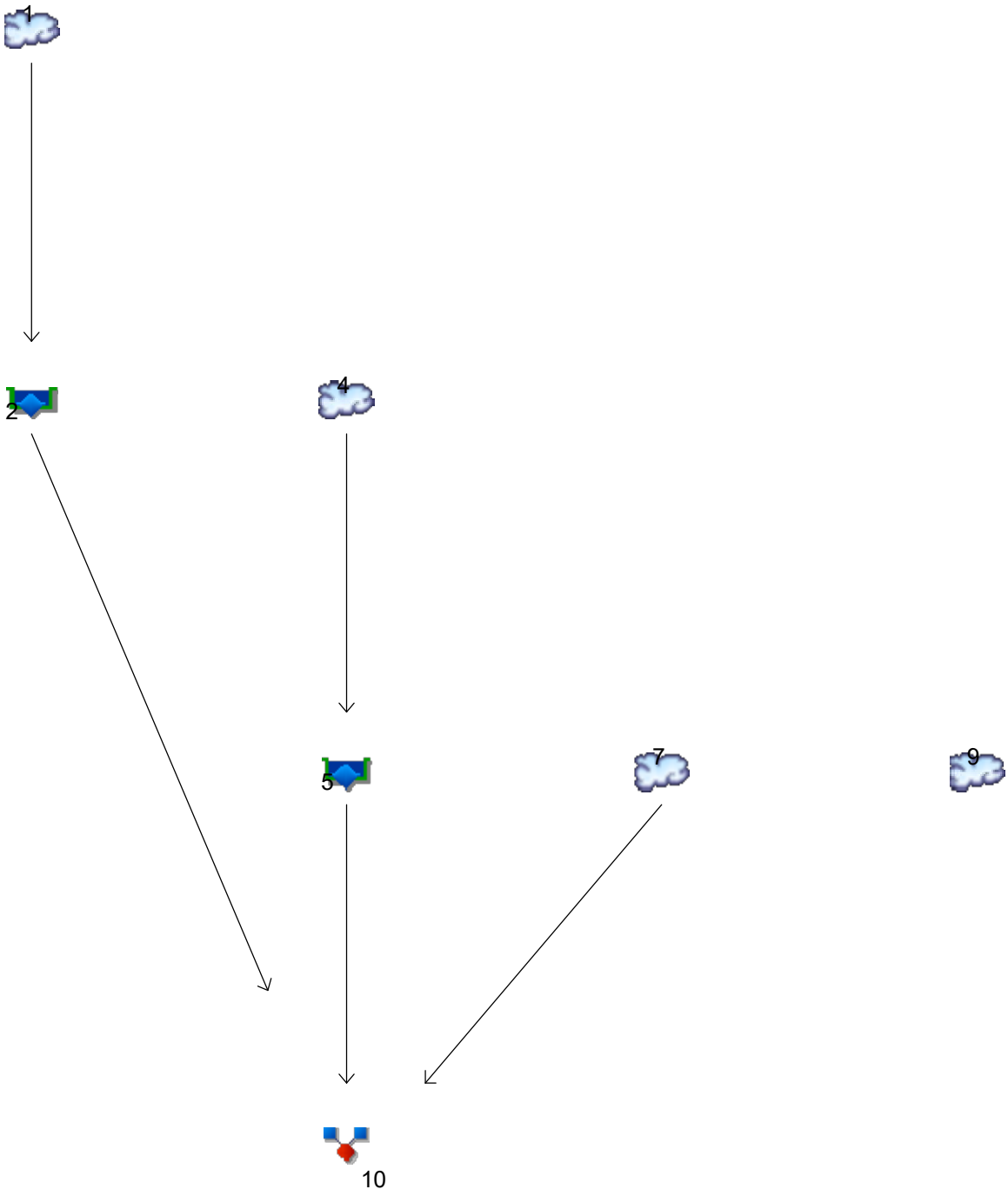
PRE-DEVELOPED
POST-DEVELOPED
MAPS

DET

III. Detention Hydrographs Report

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	To Det #1
2	Reservoir	After Det #1
4	SCS Runoff	To Det #2
5	Reservoir	After Det #2
7	SCS Runoff	Det Bypass
9	SCS Runoff	Pre-Developed
10	Combine	Post-Developed

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	------	-------	2.009	-------	2.727	3.196	3.791	4.231	4.664	To Det #1
2	Reservoir	1	-------	1.531	-------	1.772	1.933	2.073	2.175	2.275	After Det #1
4	SCS Runoff	------	-------	1.663	-------	2.729	3.487	4.478	5.224	5.965	To Det #2
5	Reservoir	4	-------	1.046	-------	1.364	1.569	1.819	1.973	2.079	After Det #2
7	SCS Runoff	------	-------	0.712	-------	1.075	1.317	1.626	1.855	2.080	Det Bypass
9	SCS Runoff	------	-------	3.355	-------	5.580	7.152	9.236	10.81	12.37	Pre-Developed
10	Combine	2, 5, 7,	-------	3.192	-------	4.032	4.584	5.240	5.700	6.136	Post-Developed

Hydrograph Summary Report

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	2.009	2	716	4,432	------	------	------	To Det #1
2	Reservoir	1.531	2	720	4,432	1	427.99	363	After Det #1
4	SCS Runoff	1.663	2	718	3,326	------	------	------	To Det #2
5	Reservoir	1.046	2	722	3,324	4	402.11	547	After Det #2
7	SCS Runoff	0.712	2	716	1,442	------	------	------	Det Bypass
9	SCS Runoff	3.355	2	718	6,709	------	------	------	Pre-Developed
10	Combine	3.192	2	718	9,198	2, 5, 7,	------	------	Post-Developed

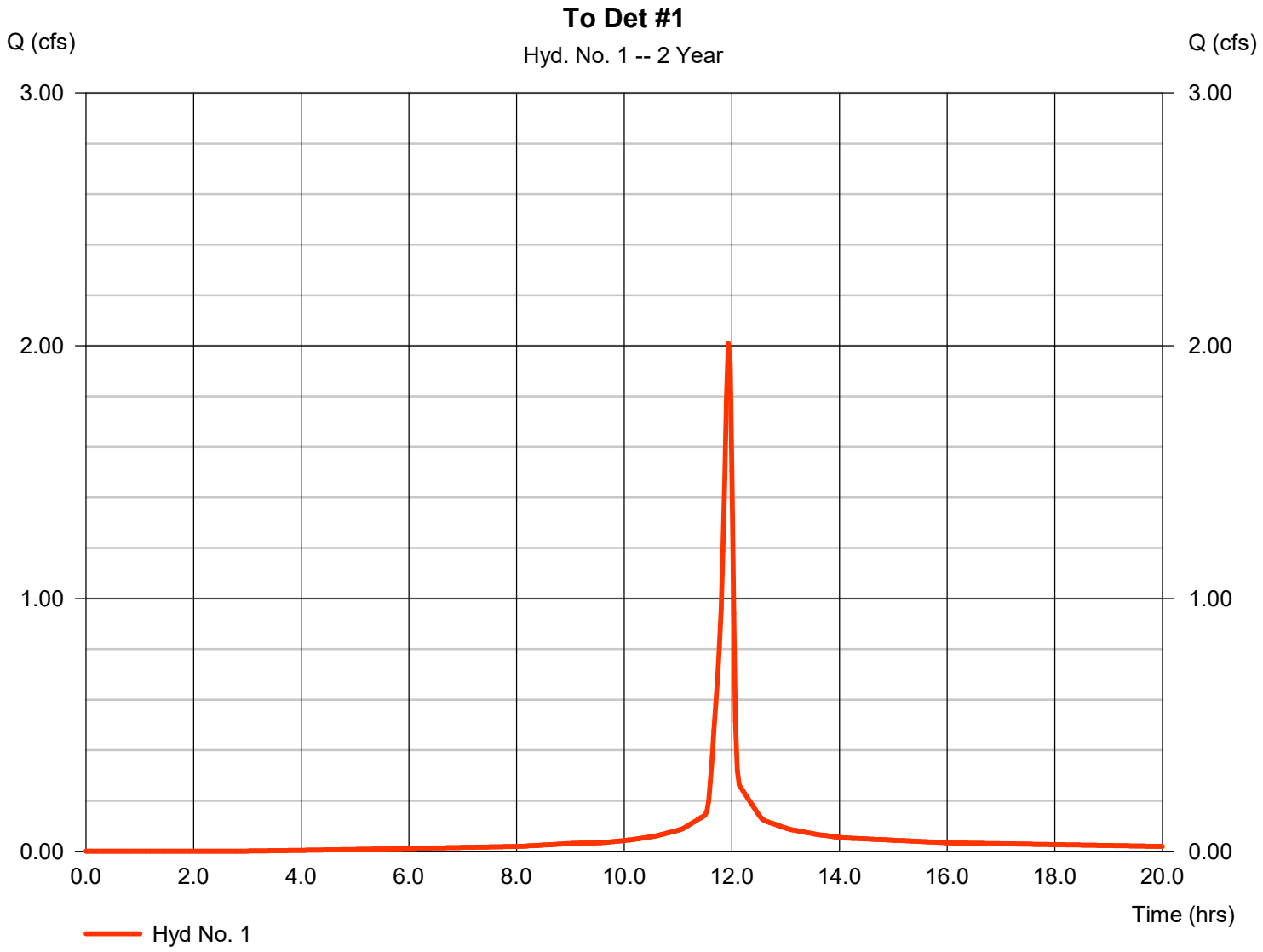
Hydrograph Report

Hyd. No. 1

To Det #1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.009 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 4,432 cuft
Drainage area	= 0.460 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.050 x 69)] / 0.460



Hydrograph Report

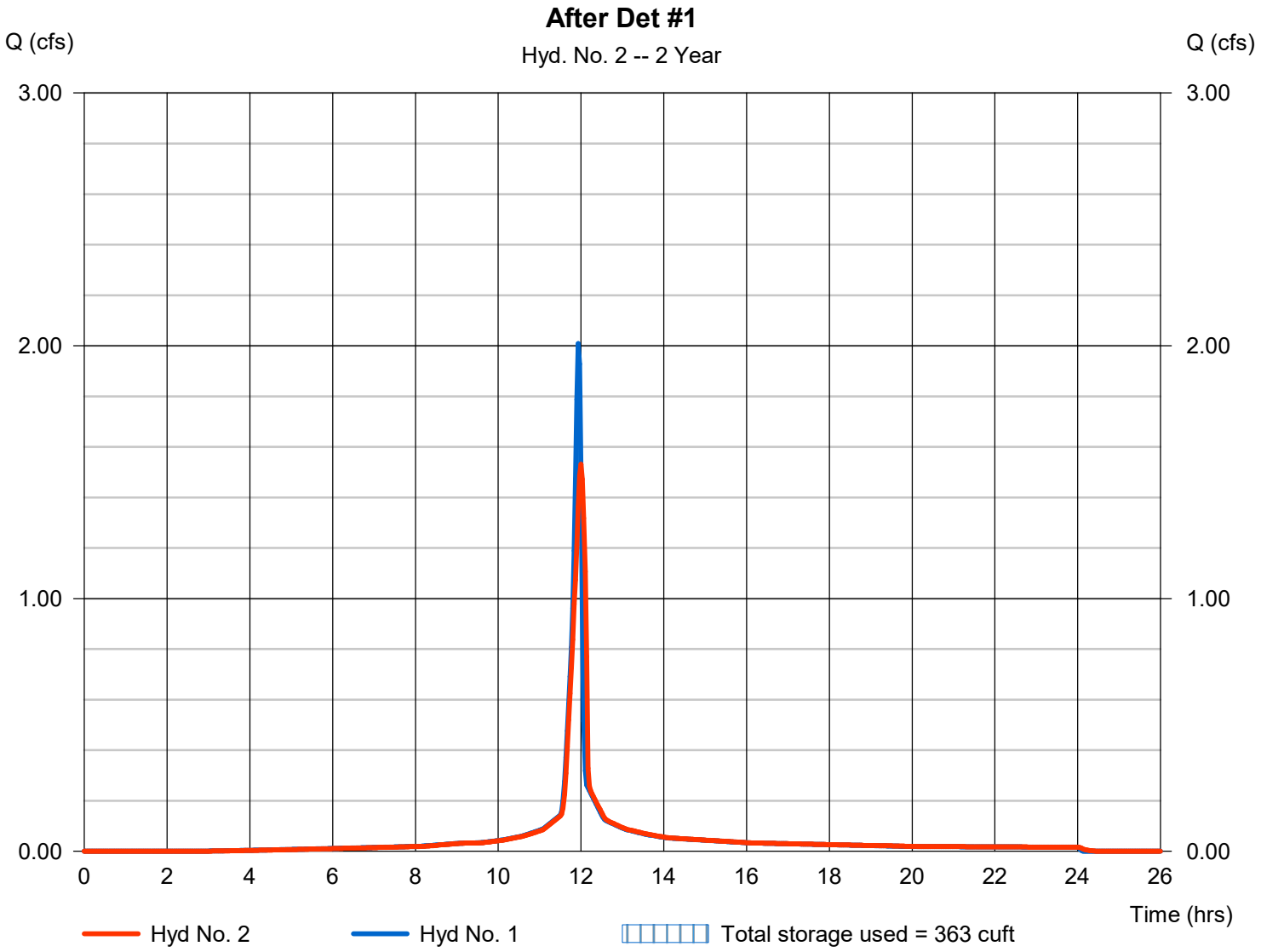
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 02 / 21 / 2023

Hyd. No. 2

After Det #1

Hydrograph type	= Reservoir	Peak discharge	= 1.531 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 4,432 cuft
Inflow hyd. No.	= 1 - To Det #1	Max. Elevation	= 427.99 ft
Reservoir name	= Det Pond #1	Max. Storage	= 363 cuft

Storage Indication method used.



Pond No. 1 - Det Pond #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 426.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	426.00	50	0	0
1.00	427.00	165	102	102
2.00	428.00	375	263	365
3.00	429.00	680	520	885
4.00	430.00	1,030	849	1,734

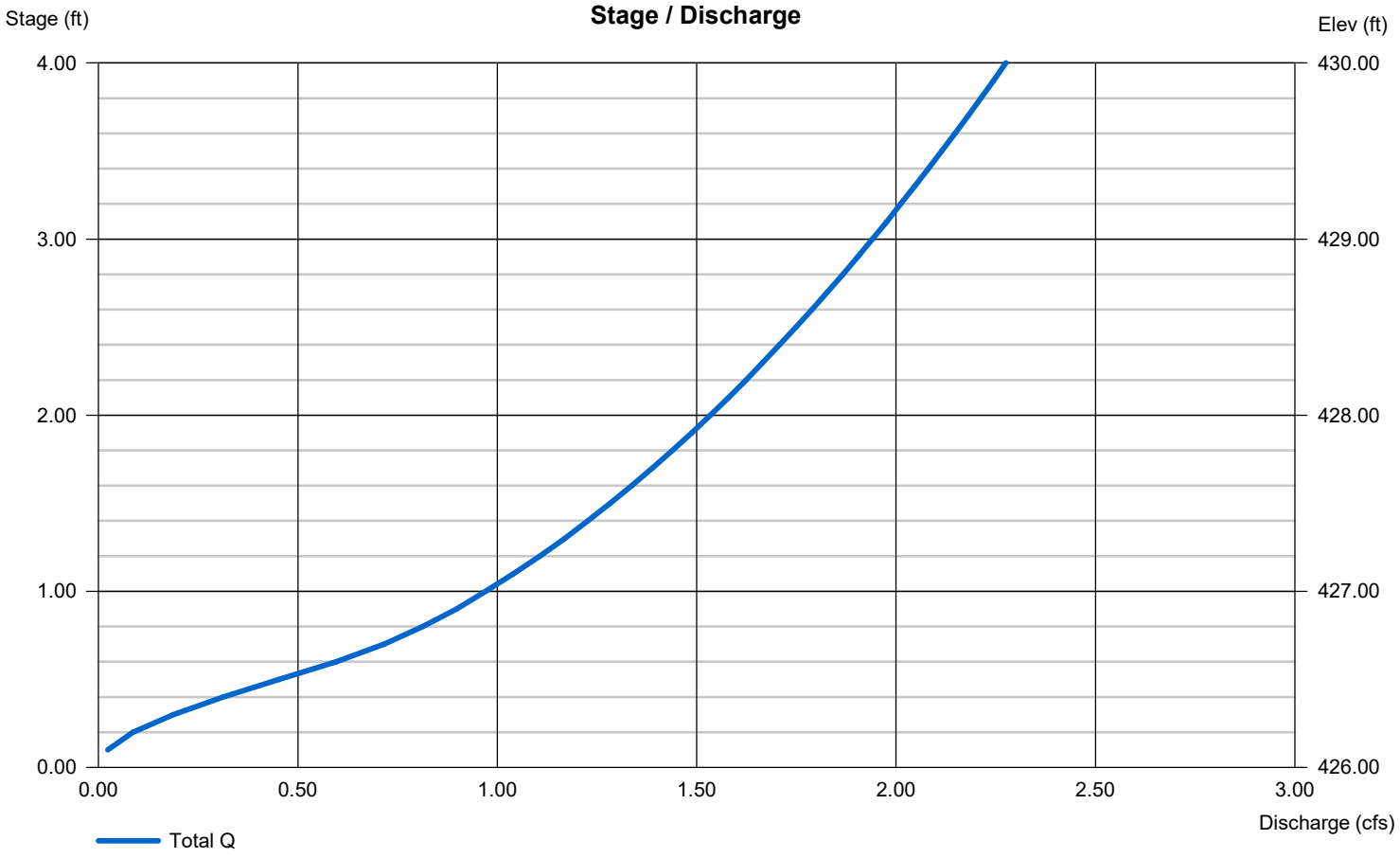
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	8.00	Inactive	Inactive
Span (in)	= 8.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 426.00	426.00	0.00	0.00
Length (ft)	= 15.00	1.00	0.00	0.00
Slope (%)	= 2.00	2.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	0.00
Crest El. (ft)	= 457.50	456.10	457.75	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Ciplti	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



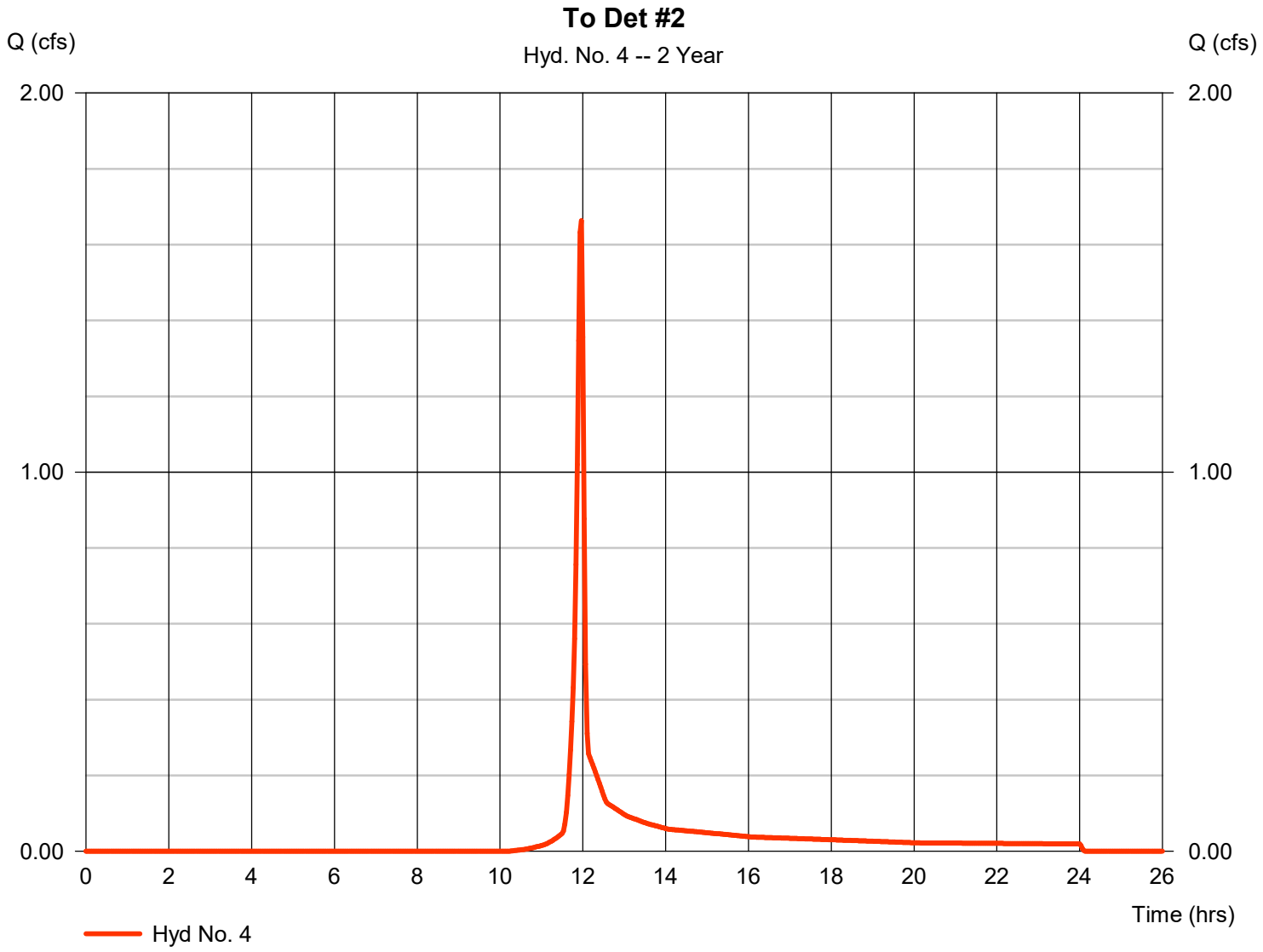
Hydrograph Report

Hyd. No. 4

To Det #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.663 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	3,326 cuft
Drainage area	=	0.760 ac	Curve number	=	76*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.39 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.580 x 69) + (0.180 x 98)] / 0.760



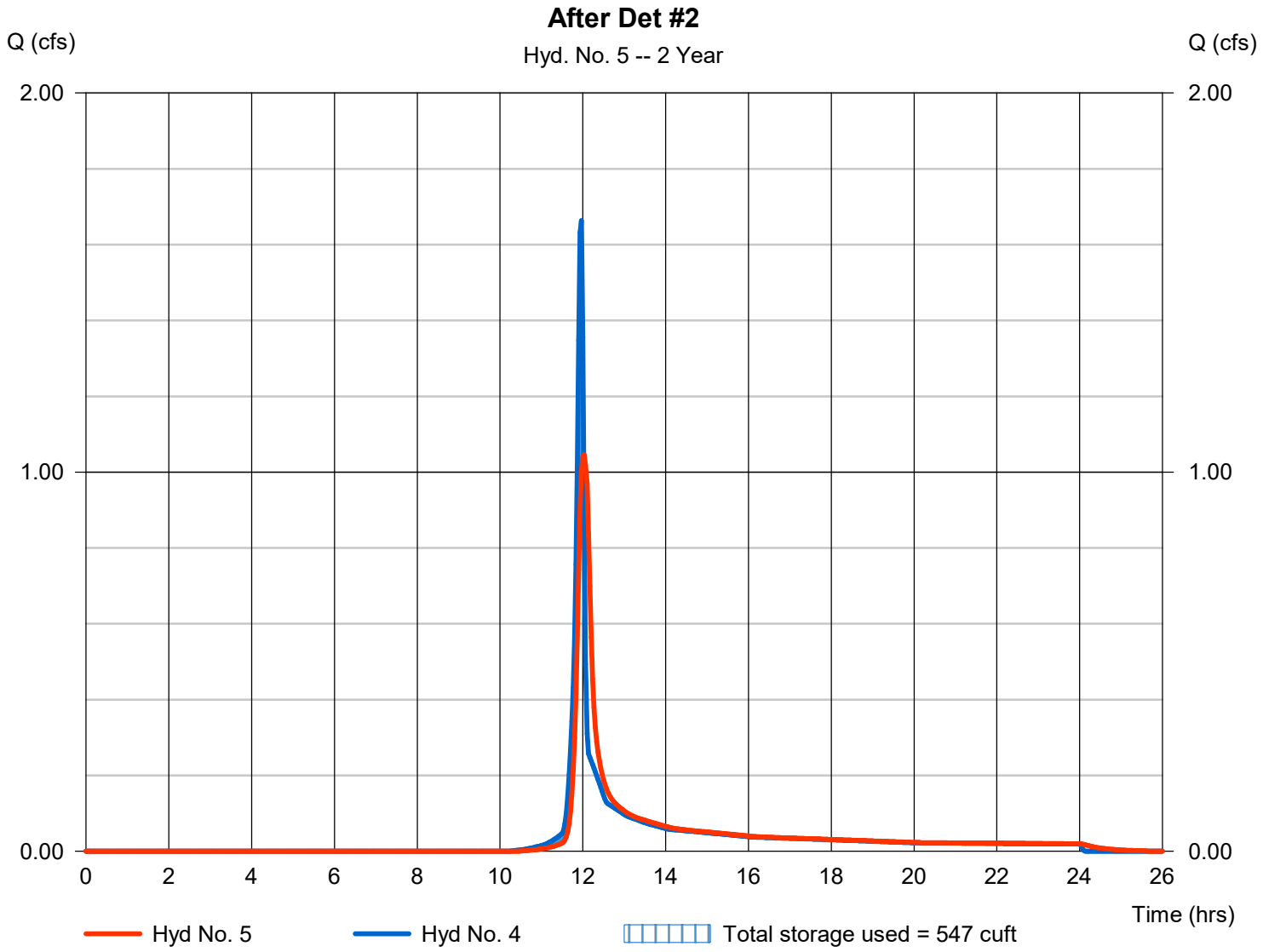
Hydrograph Report

Hyd. No. 5

After Det #2

Hydrograph type	=	Reservoir	Peak discharge	=	1.046 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	3,324 cuft
Inflow hyd. No.	=	4 - To Det #2	Max. Elevation	=	402.11 ft
Reservoir name	=	Det Pond #2	Max. Storage	=	547 cuft

Storage Indication method used.



Pond No. 2 - Det Pond #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 401.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	401.00	280	0	0
1.00	402.00	610	434	434
3.00	404.00	1,475	2,022	2,457
4.00	405.00	1,990	1,726	4,182

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	8.00	Inactive	Inactive
Span (in)	= 8.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 401.00	401.00	0.00	0.00
Length (ft)	= 25.00	1.00	0.00	0.00
Slope (%)	= 2.00	2.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

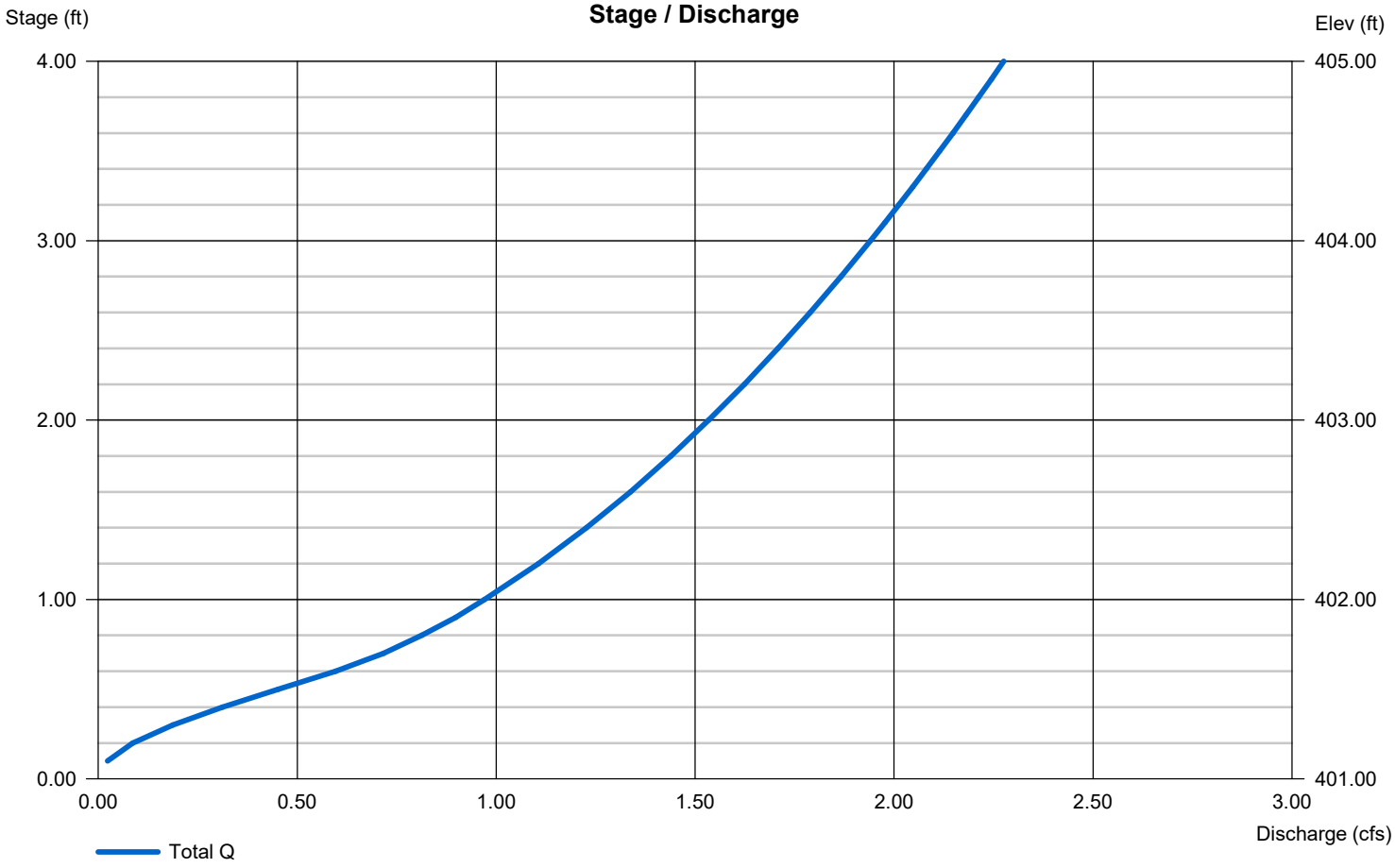
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	0.00
Crest El. (ft)	= 457.50	456.10	457.75	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Ciplti	---
Multi-Stage	= Yes	Yes	No	No

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

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



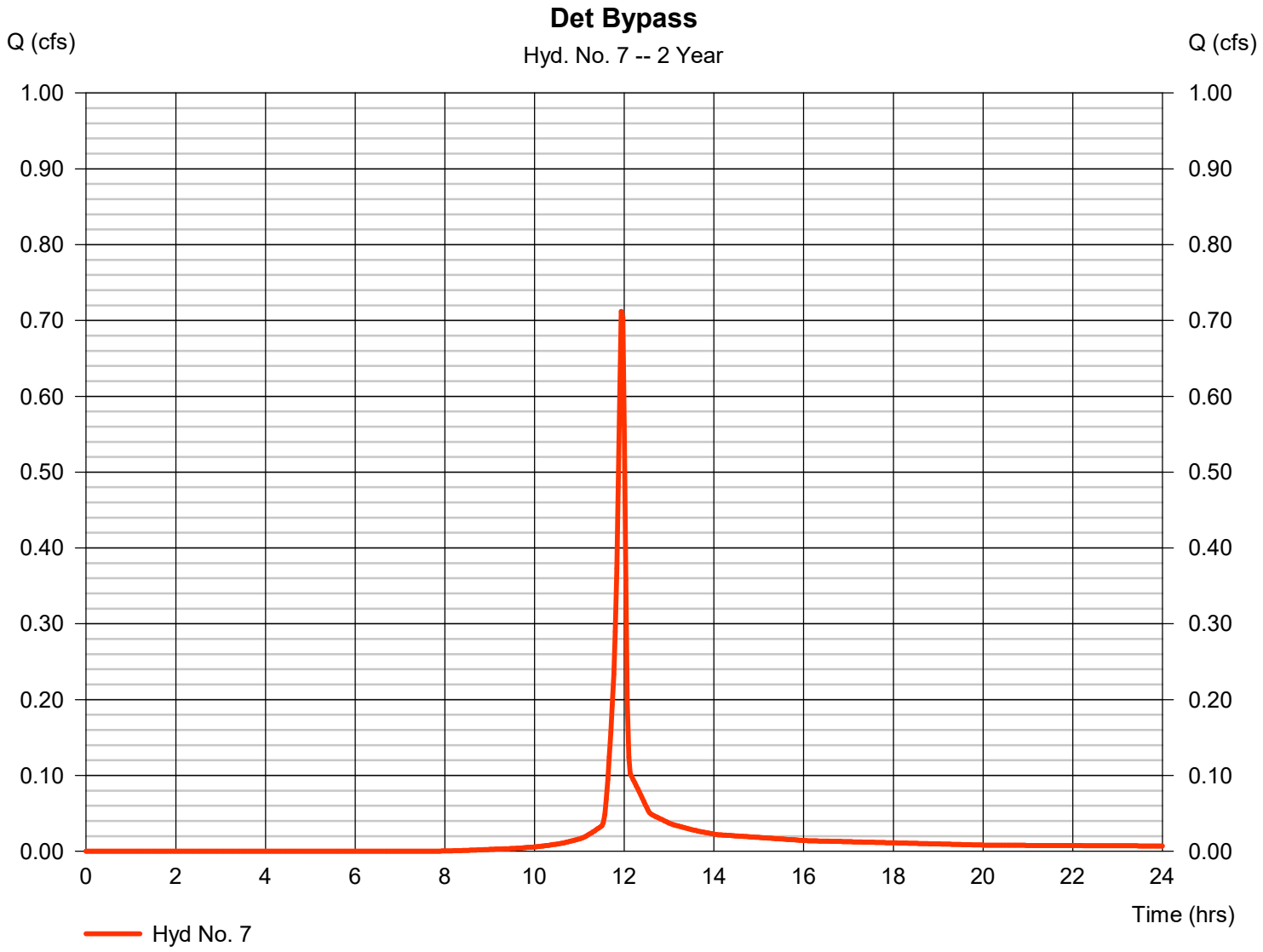
Hydrograph Report

Hyd. No. 7

Det Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.712 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	1,442 cuft
Drainage area	=	0.230 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.39 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 98) + (0.110 x 69)] / 0.230



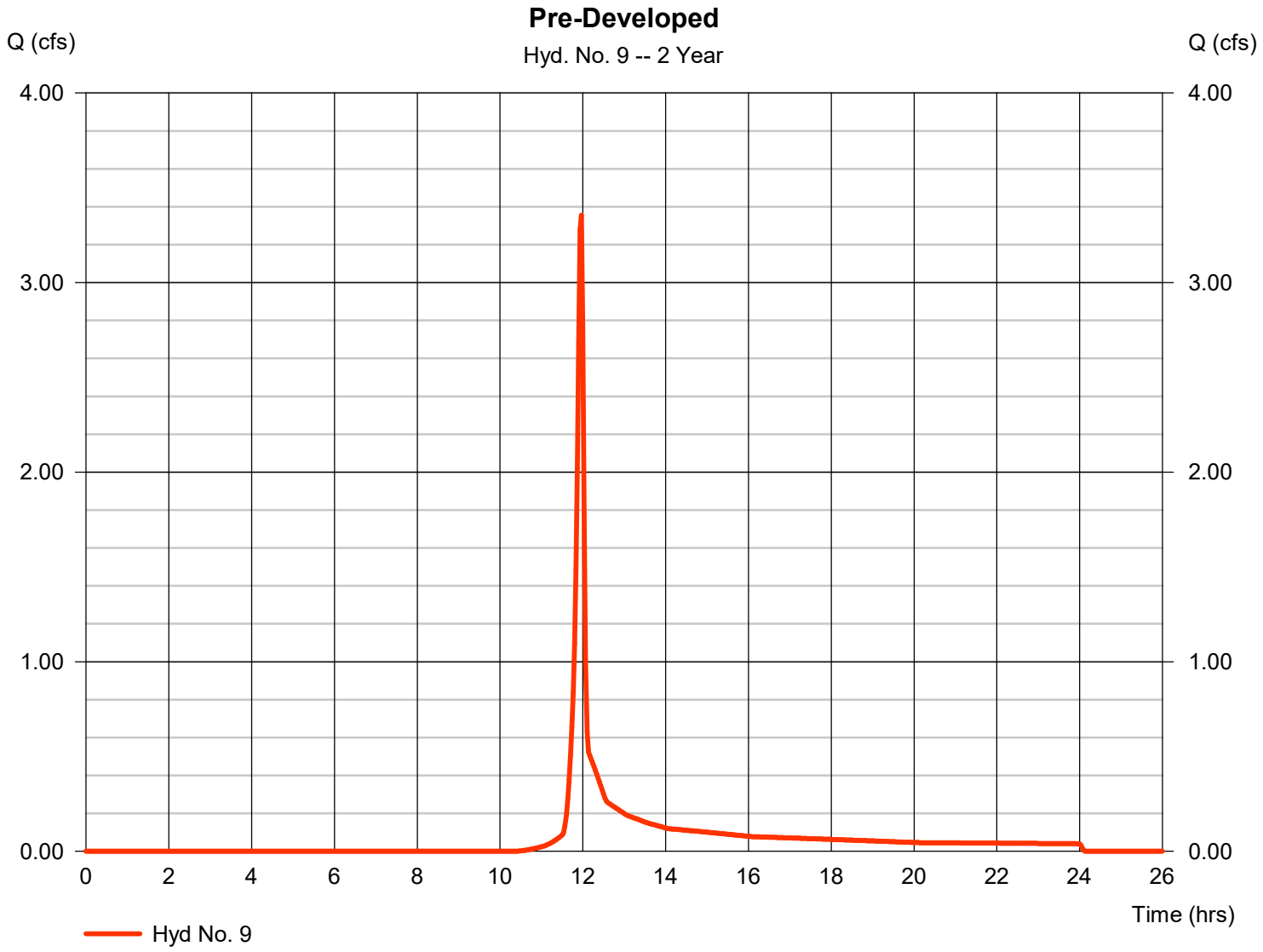
Hydrograph Report

Hyd. No. 9

Pre-Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 3.355 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 6,709 cuft
Drainage area	= 1.610 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.290 x 69) + (0.320 x 98)] / 1.610

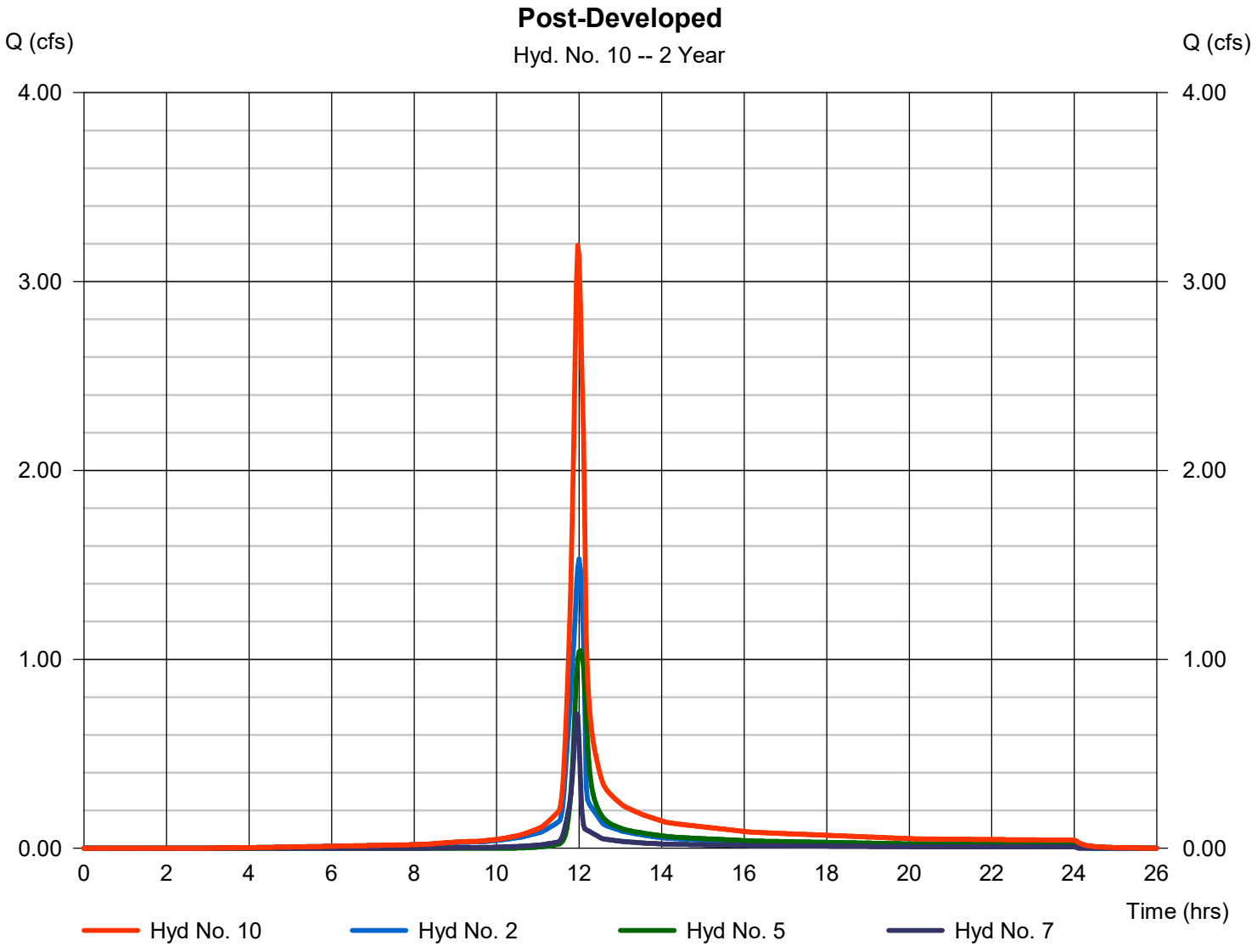


Hydrograph Report

Hyd. No. 10

Post-Developed

Hydrograph type	= Combine	Peak discharge	= 3.192 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 9,198 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 0.230 ac



Hydrograph Summary Report

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	2.727	2	716	6,144	------	------	------	To Det #1
2	Reservoir	1.772	2	720	6,143	1	428.56	655	After Det #1
4	SCS Runoff	2.729	2	718	5,508	------	------	------	To Det #2
5	Reservoir	1.364	2	722	5,507	4	402.65	1,095	After Det #2
7	SCS Runoff	1.075	2	716	2,205	------	------	------	Det Bypass
9	SCS Runoff	5.580	2	718	11,234	------	------	------	Pre-Developed
10	Combine	4.032	2	718	13,855	2, 5, 7,	------	------	Post-Developed

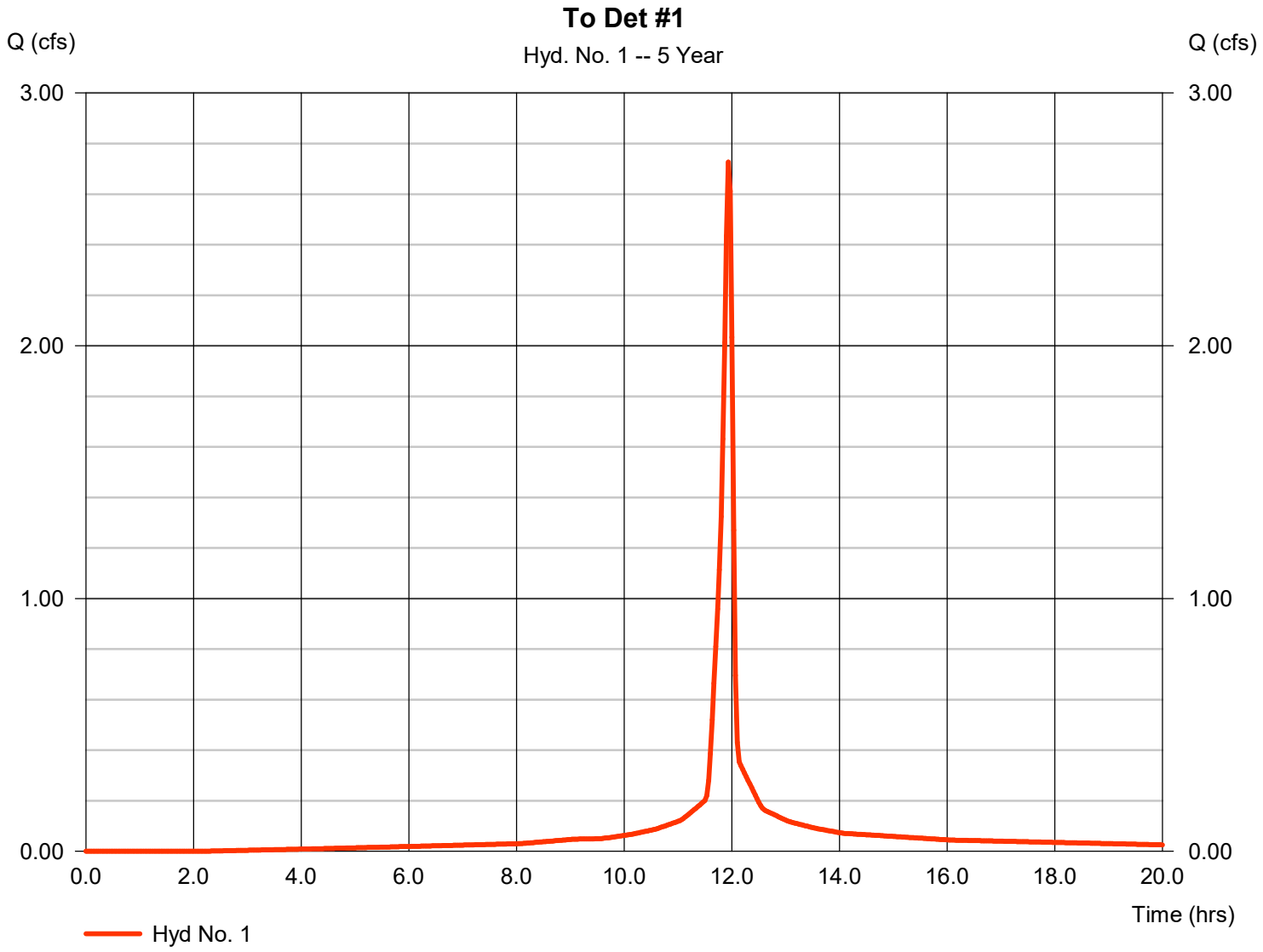
Hydrograph Report

Hyd. No. 1

To Det #1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.727 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 6,144 cuft
Drainage area	= 0.460 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.050 x 69)] / 0.460



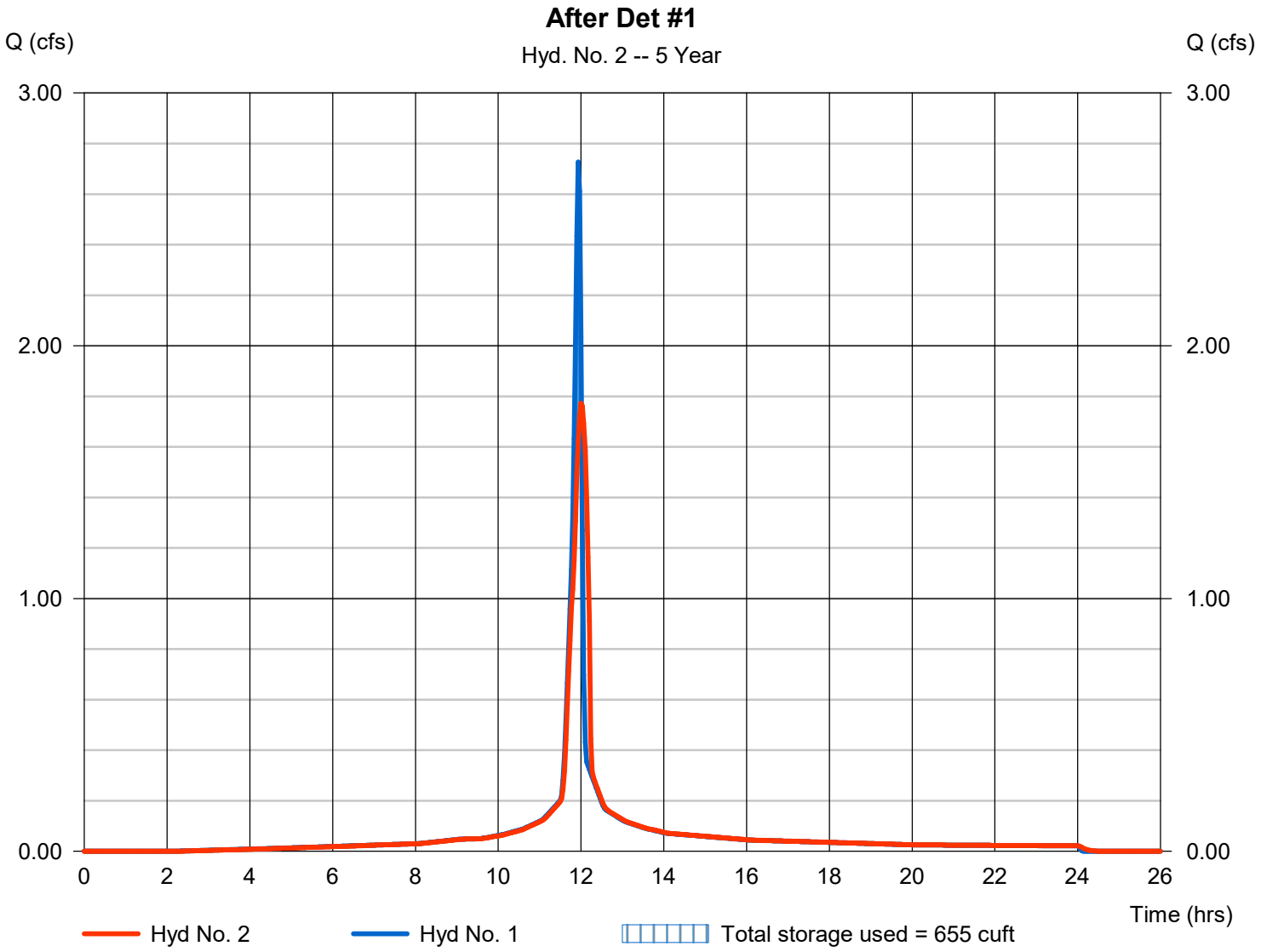
Hydrograph Report

Hyd. No. 2

After Det #1

Hydrograph type	=	Reservoir	Peak discharge	=	1.772 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	6,143 cuft
Inflow hyd. No.	=	1 - To Det #1	Max. Elevation	=	428.56 ft
Reservoir name	=	Det Pond #1	Max. Storage	=	655 cuft

Storage Indication method used.



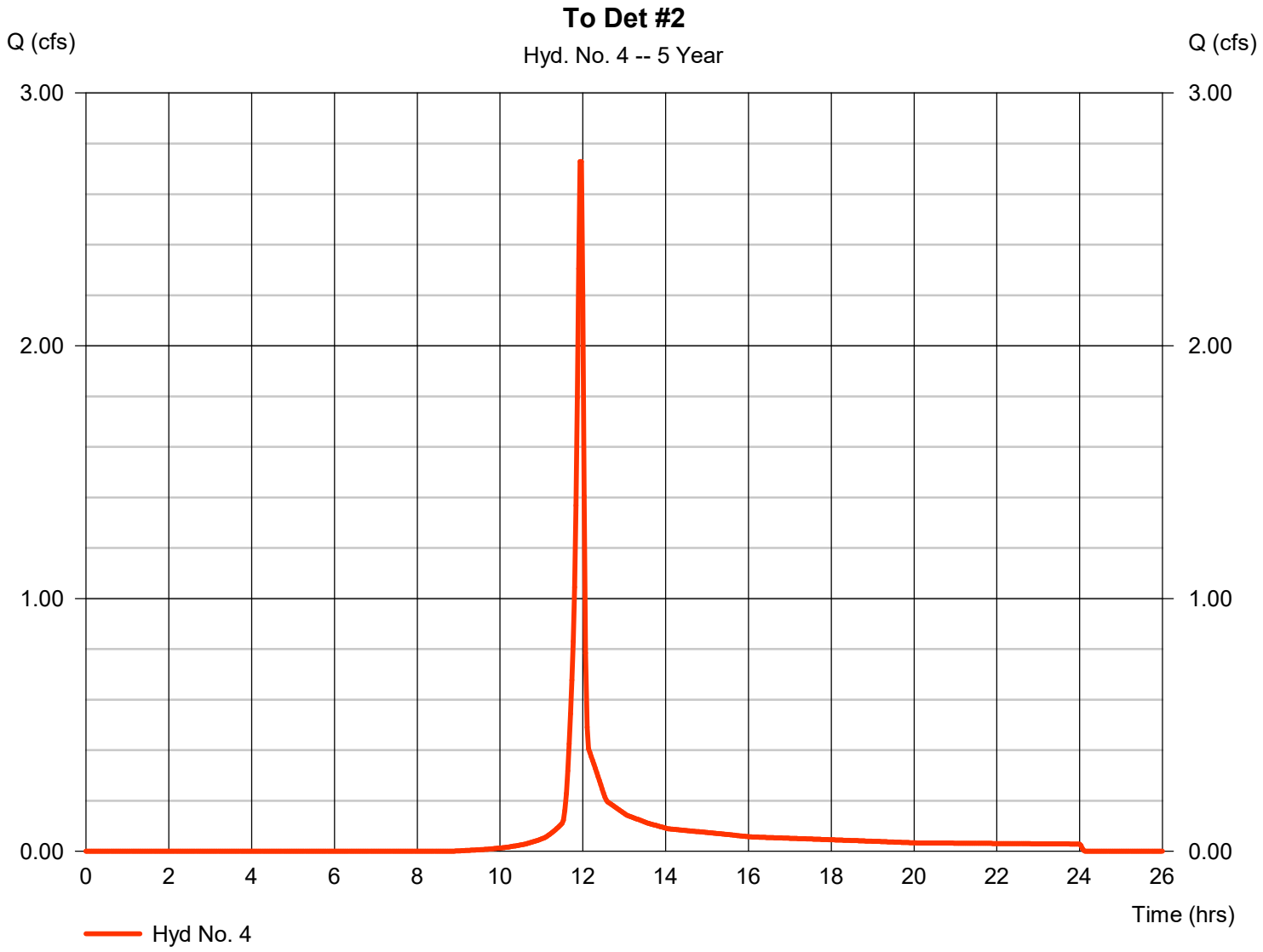
Hydrograph Report

Hyd. No. 4

To Det #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.729 cfs
Storm frequency	=	5 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	5,508 cuft
Drainage area	=	0.760 ac	Curve number	=	76*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.580 x 69) + (0.180 x 98)] / 0.760



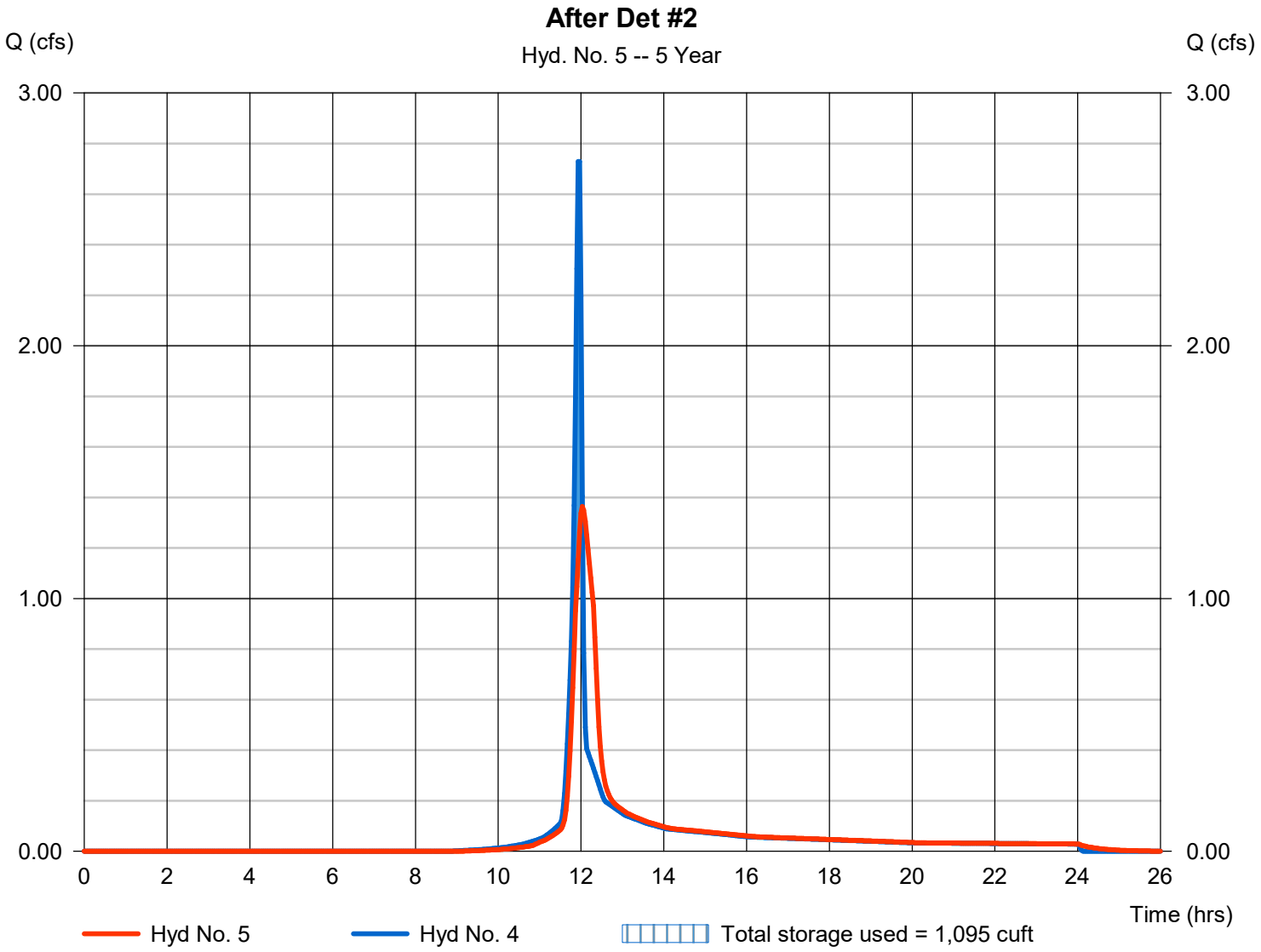
Hydrograph Report

Hyd. No. 5

After Det #2

Hydrograph type	=	Reservoir	Peak discharge	=	1.364 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	5,507 cuft
Inflow hyd. No.	=	4 - To Det #2	Max. Elevation	=	402.65 ft
Reservoir name	=	Det Pond #2	Max. Storage	=	1,095 cuft

Storage Indication method used.



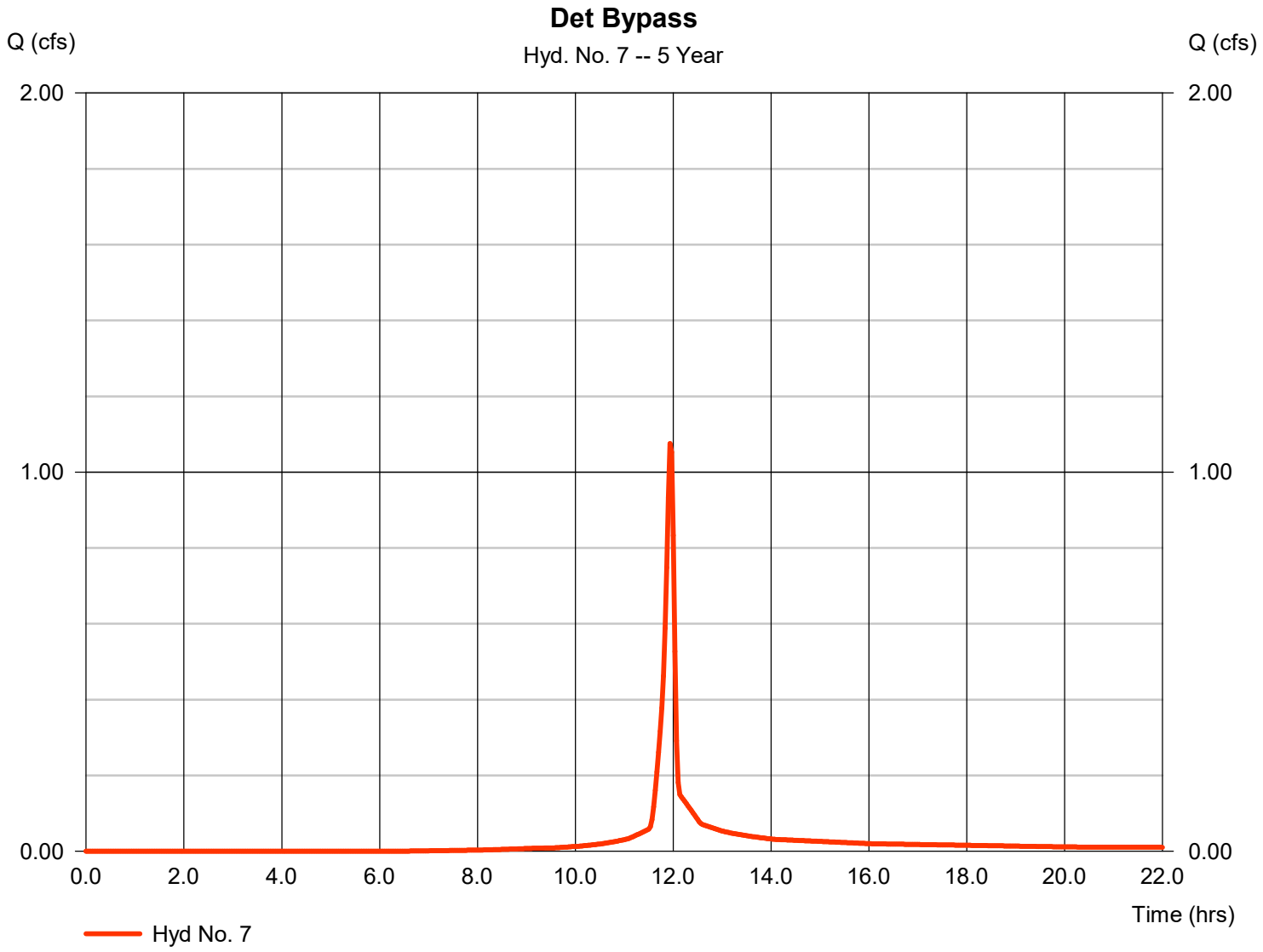
Hydrograph Report

Hyd. No. 7

Det Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.075 cfs
Storm frequency	=	5 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	2,205 cuft
Drainage area	=	0.230 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 98) + (0.110 x 69)] / 0.230



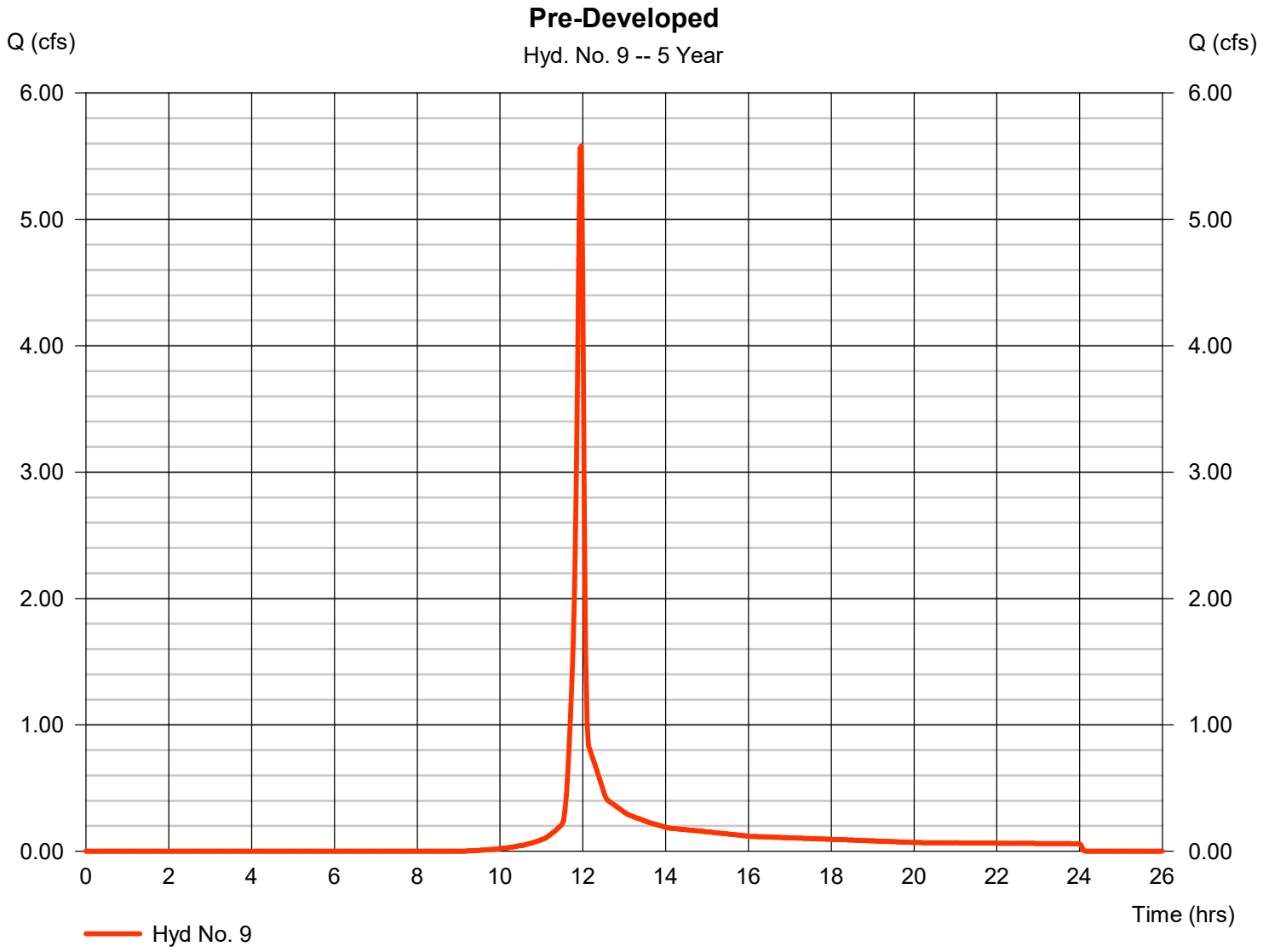
Hydrograph Report

Hyd. No. 9

Pre-Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 5.580 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 11,234 cuft
Drainage area	= 1.610 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.290 x 69) + (0.320 x 98)] / 1.610

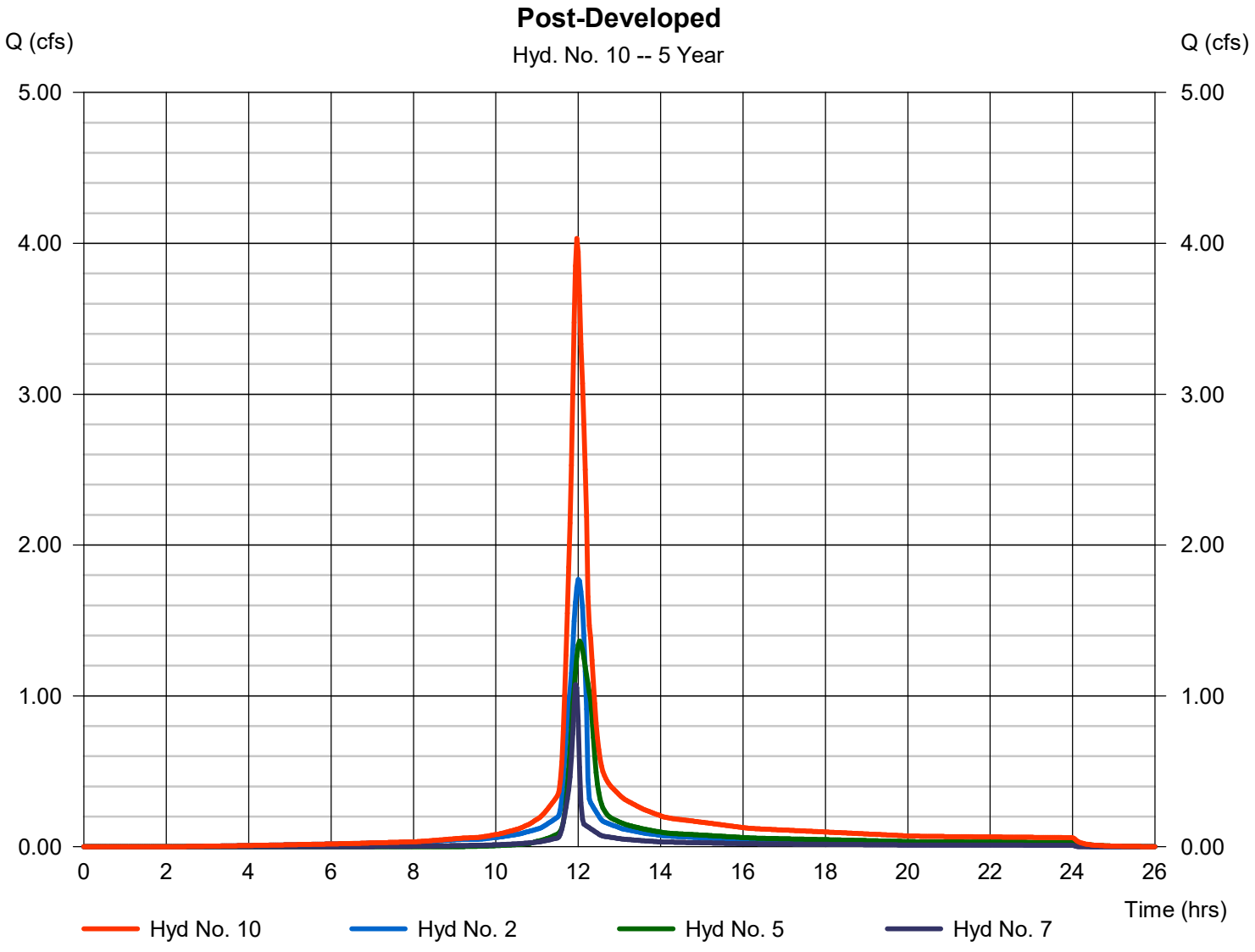


Hydrograph Report

Hyd. No. 10

Post-Developed

Hydrograph type	= Combine	Peak discharge	= 4.032 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 13,855 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 0.230 ac



Hydrograph Summary Report

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	3.196	2	716	7,275	------	------	------	To Det #1
2	Reservoir	1.933	2	722	7,275	1	428.98	873	After Det #1
4	SCS Runoff	3.487	2	716	7,051	------	------	------	To Det #2
5	Reservoir	1.569	2	722	7,049	4	403.08	1,524	After Det #2
7	SCS Runoff	1.317	2	716	2,725	------	------	------	Det Bypass
9	SCS Runoff	7.152	2	716	14,449	------	------	------	Pre-Developed
10	Combine	4.584	2	718	17,049	2, 5, 7,	------	------	Post-Developed

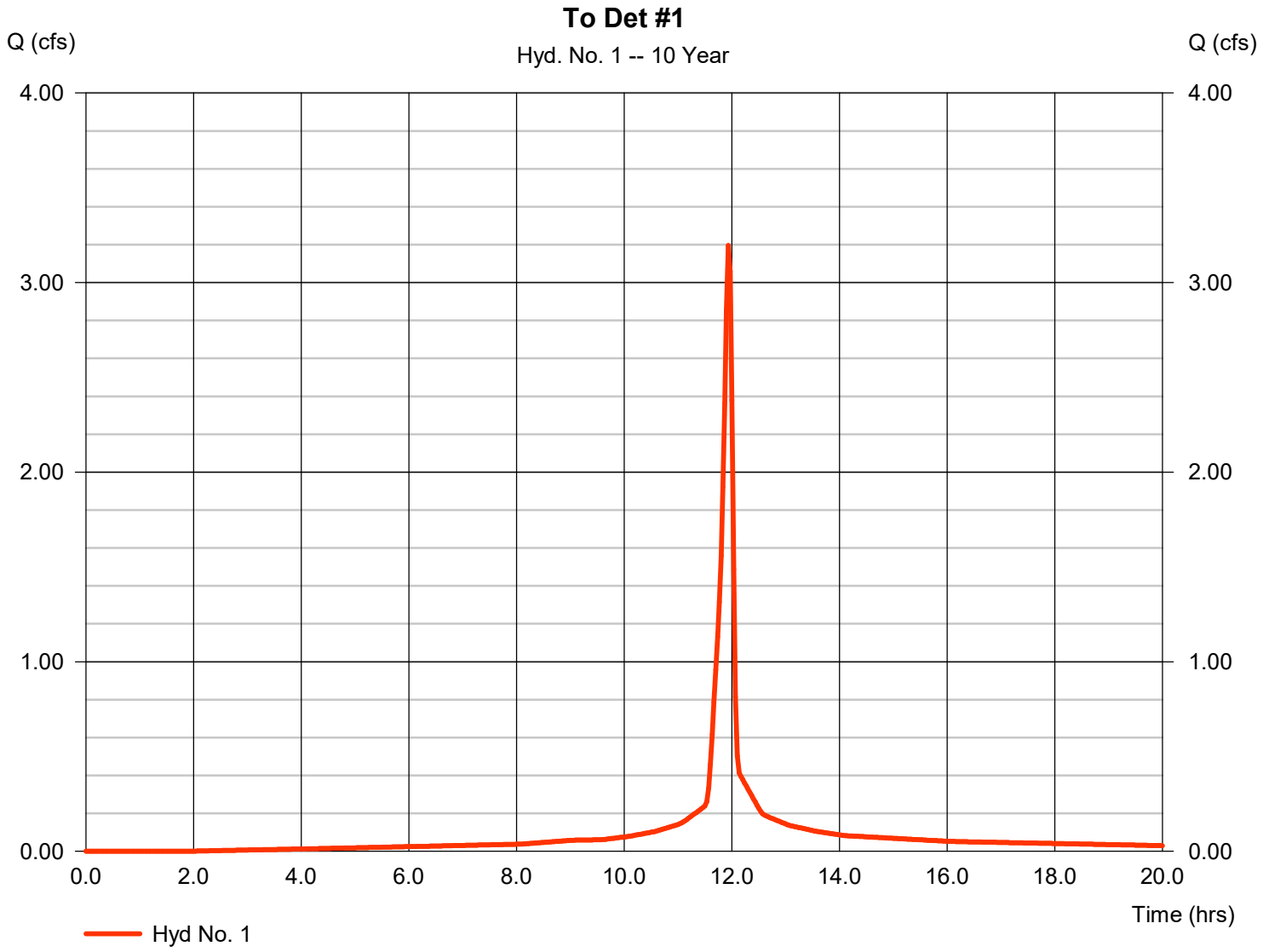
Hydrograph Report

Hyd. No. 1

To Det #1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.196 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 7,275 cuft
Drainage area	= 0.460 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.23 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.050 x 69)] / 0.460



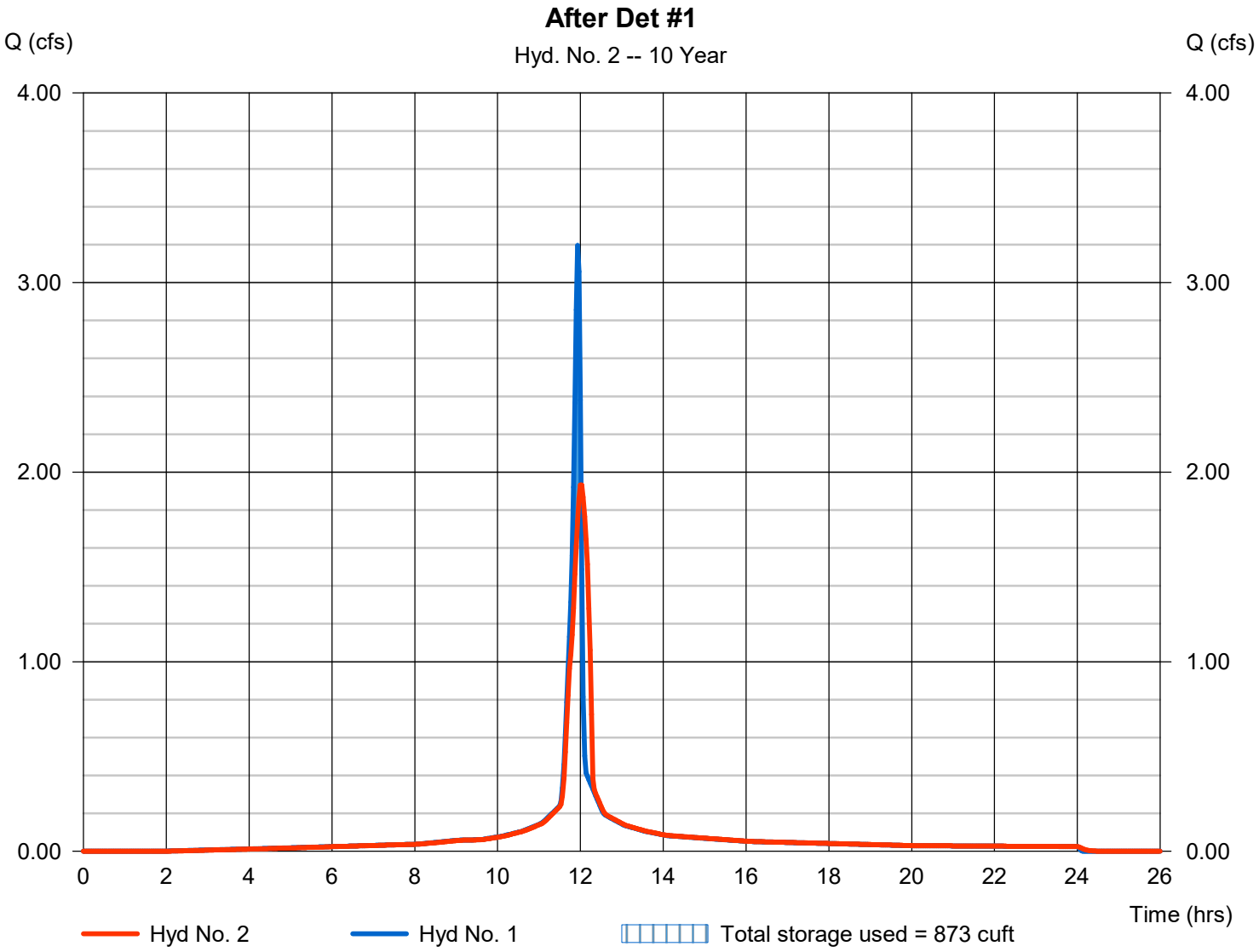
Hydrograph Report

Hyd. No. 2

After Det #1

Hydrograph type	=	Reservoir	Peak discharge	=	1.933 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	7,275 cuft
Inflow hyd. No.	=	1 - To Det #1	Max. Elevation	=	428.98 ft
Reservoir name	=	Det Pond #1	Max. Storage	=	873 cuft

Storage Indication method used.



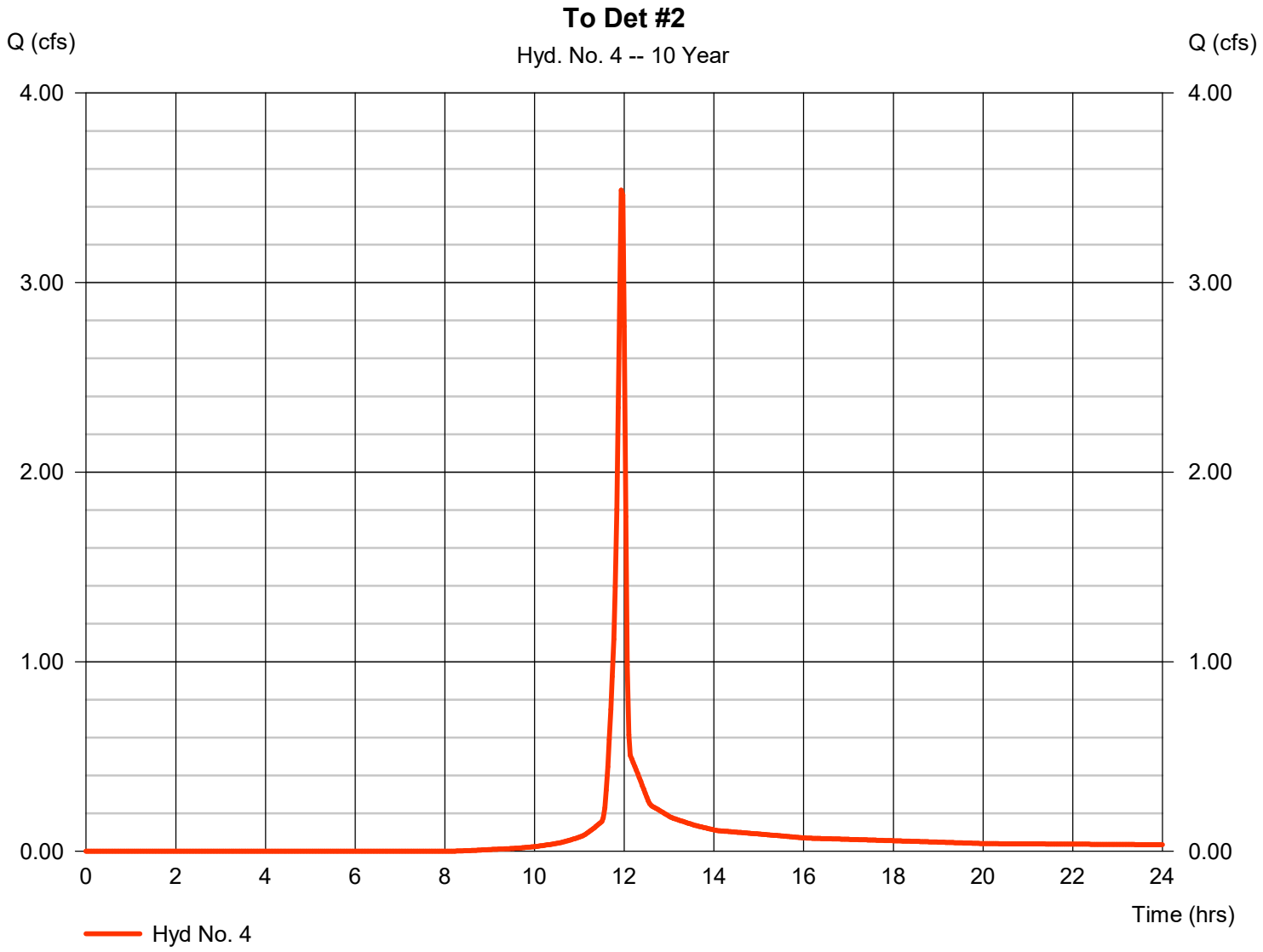
Hydrograph Report

Hyd. No. 4

To Det #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.487 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	7,051 cuft
Drainage area	=	0.760 ac	Curve number	=	76*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.580 x 69) + (0.180 x 98)] / 0.760



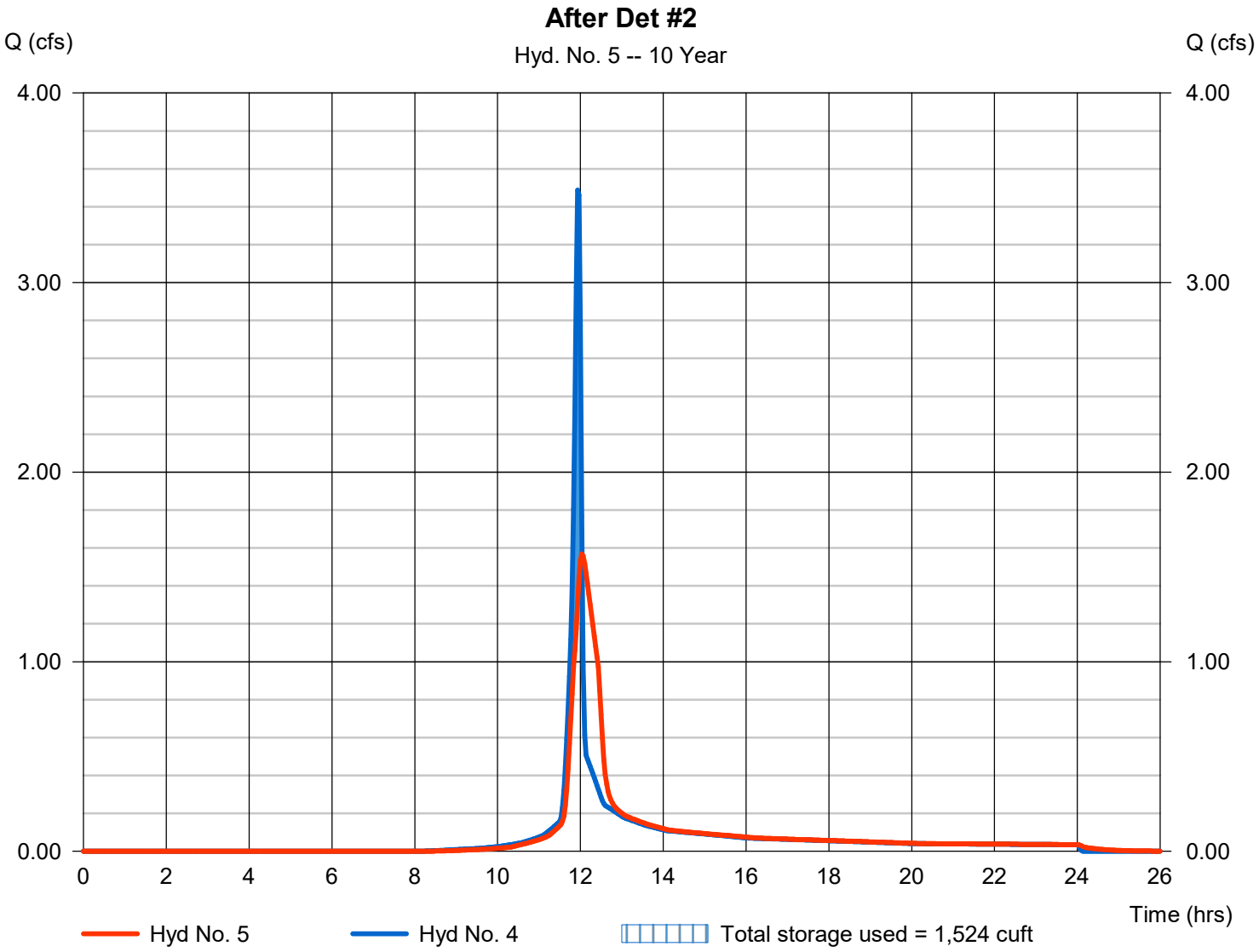
Hydrograph Report

Hyd. No. 5

After Det #2

Hydrograph type	= Reservoir	Peak discharge	= 1.569 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 7,049 cuft
Inflow hyd. No.	= 4 - To Det #2	Max. Elevation	= 403.08 ft
Reservoir name	= Det Pond #2	Max. Storage	= 1,524 cuft

Storage Indication method used.



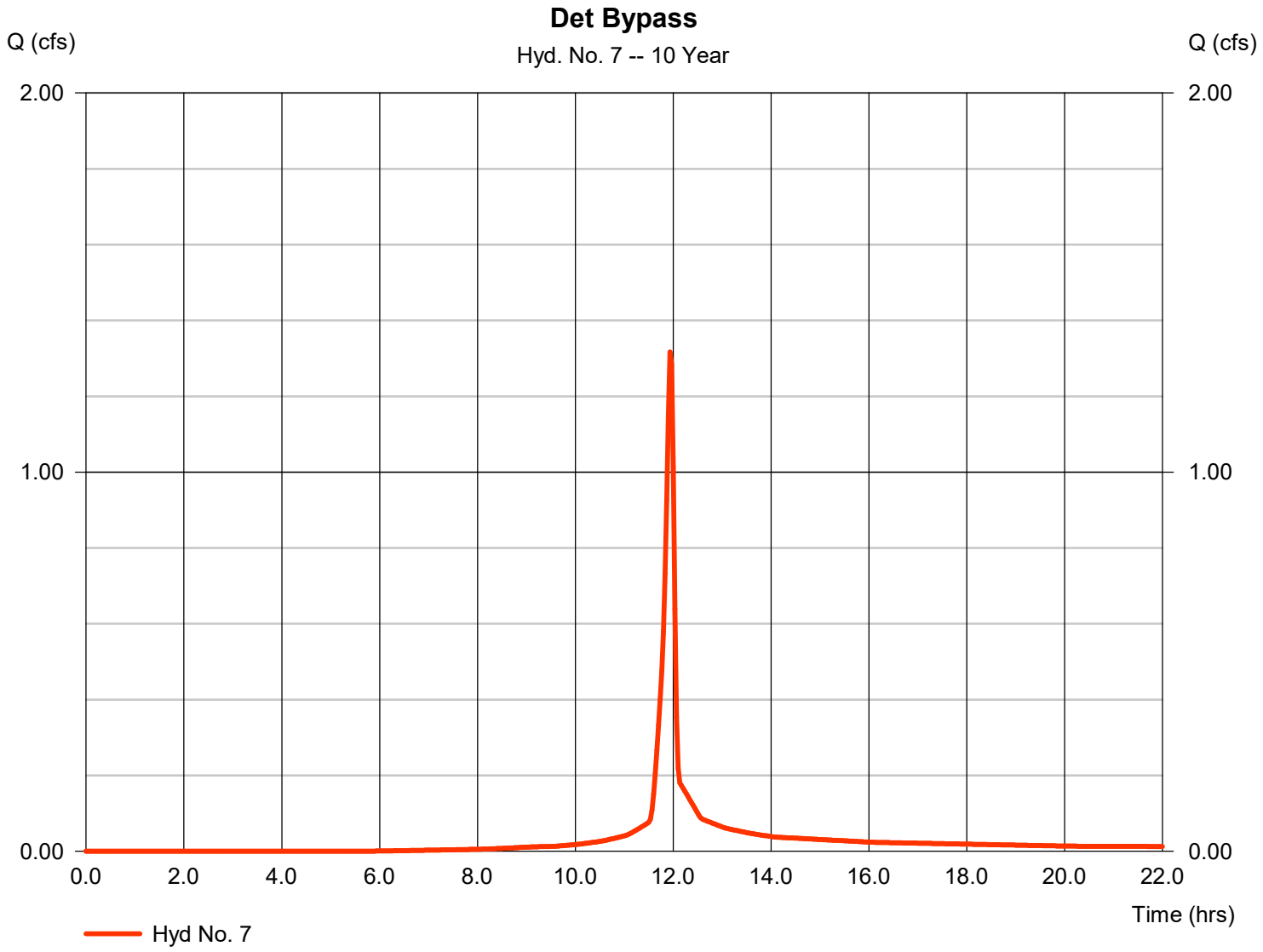
Hydrograph Report

Hyd. No. 7

Det Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.317 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	2,725 cuft
Drainage area	=	0.230 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.23 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 98) + (0.110 x 69)] / 0.230



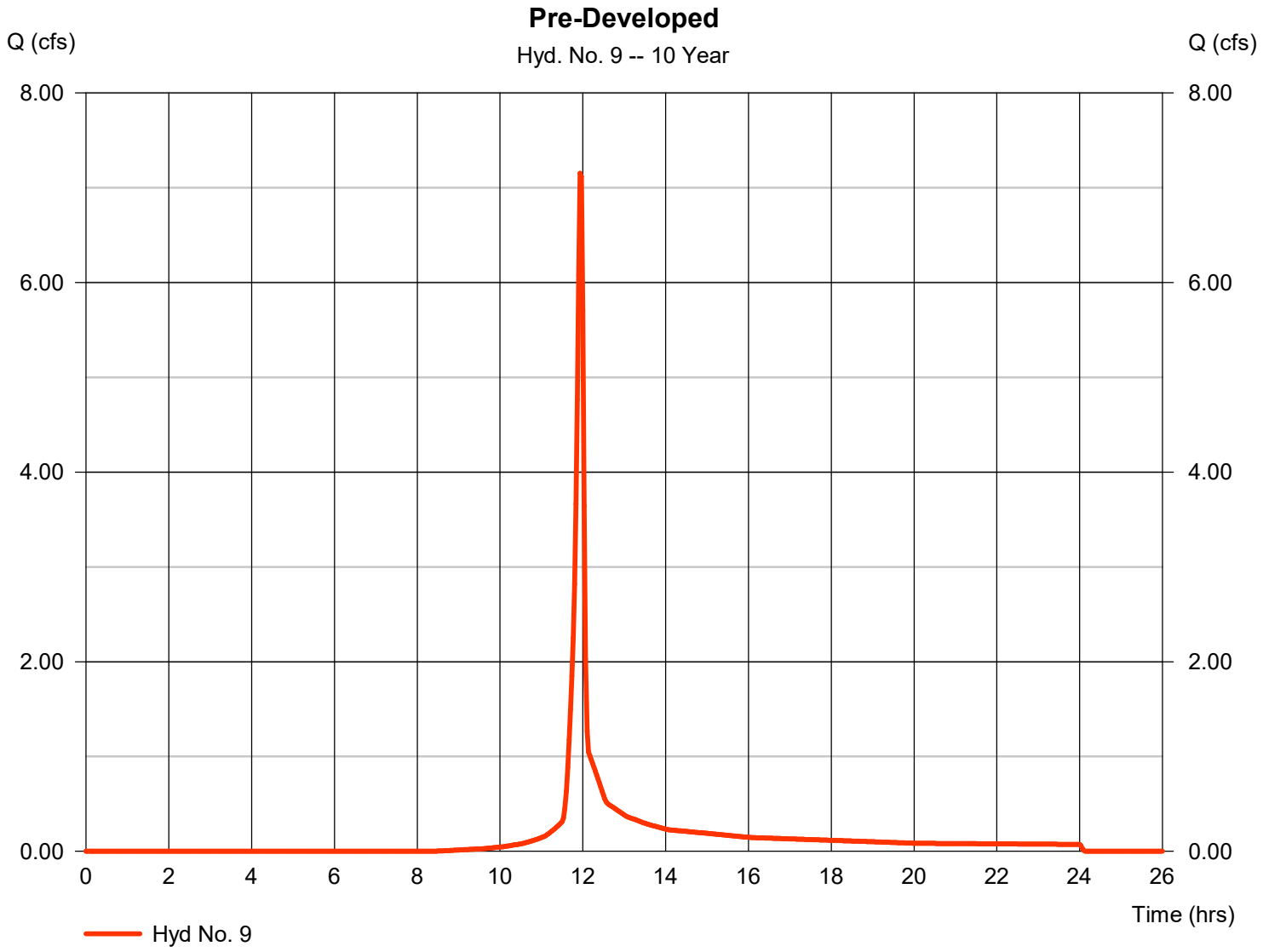
Hydrograph Report

Hyd. No. 9

Pre-Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 7.152 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 14,449 cuft
Drainage area	= 1.610 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.23 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.290 x 69) + (0.320 x 98)] / 1.610

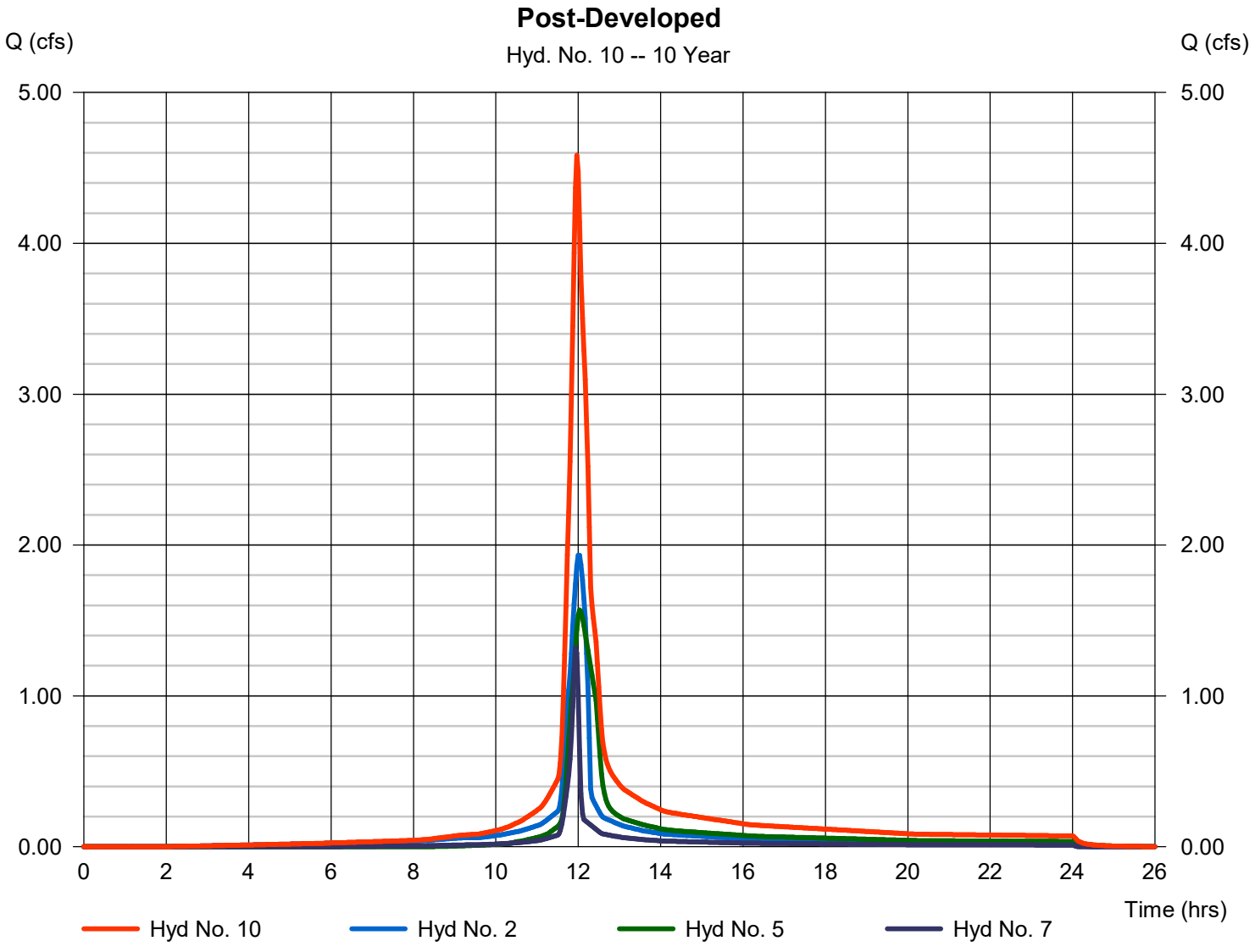


Hydrograph Report

Hyd. No. 10

Post-Developed

Hydrograph type	= Combine	Peak discharge	= 4.584 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 17,049 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 0.230 ac



Hydrograph Summary Report

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	3.791	2	716	8,720	------	------	------	To Det #1
2	Reservoir	2.073	2	722	8,720	1	429.38	1,205	After Det #1
4	SCS Runoff	4.478	2	716	9,100	------	------	------	To Det #2
5	Reservoir	1.819	2	722	9,098	4	403.68	2,130	After Det #2
7	SCS Runoff	1.626	2	716	3,402	------	------	------	Det Bypass
9	SCS Runoff	9.236	2	716	18,732	------	------	------	Pre-Developed
10	Combine	5.240	2	718	21,220	2, 5, 7,	------	------	Post-Developed

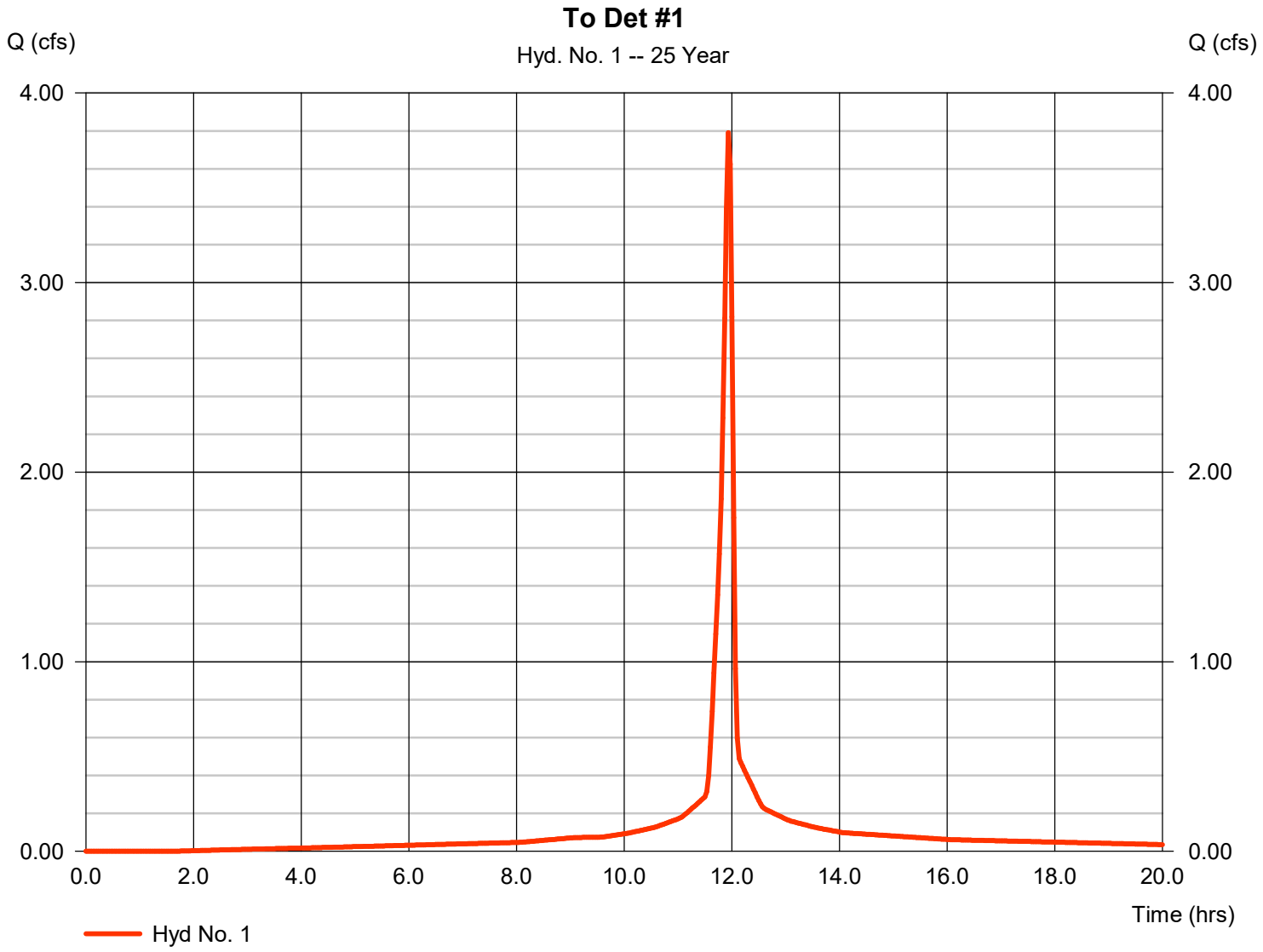
Hydrograph Report

Hyd. No. 1

To Det #1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.791 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 8,720 cuft
Drainage area	= 0.460 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.16 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.050 x 69)] / 0.460



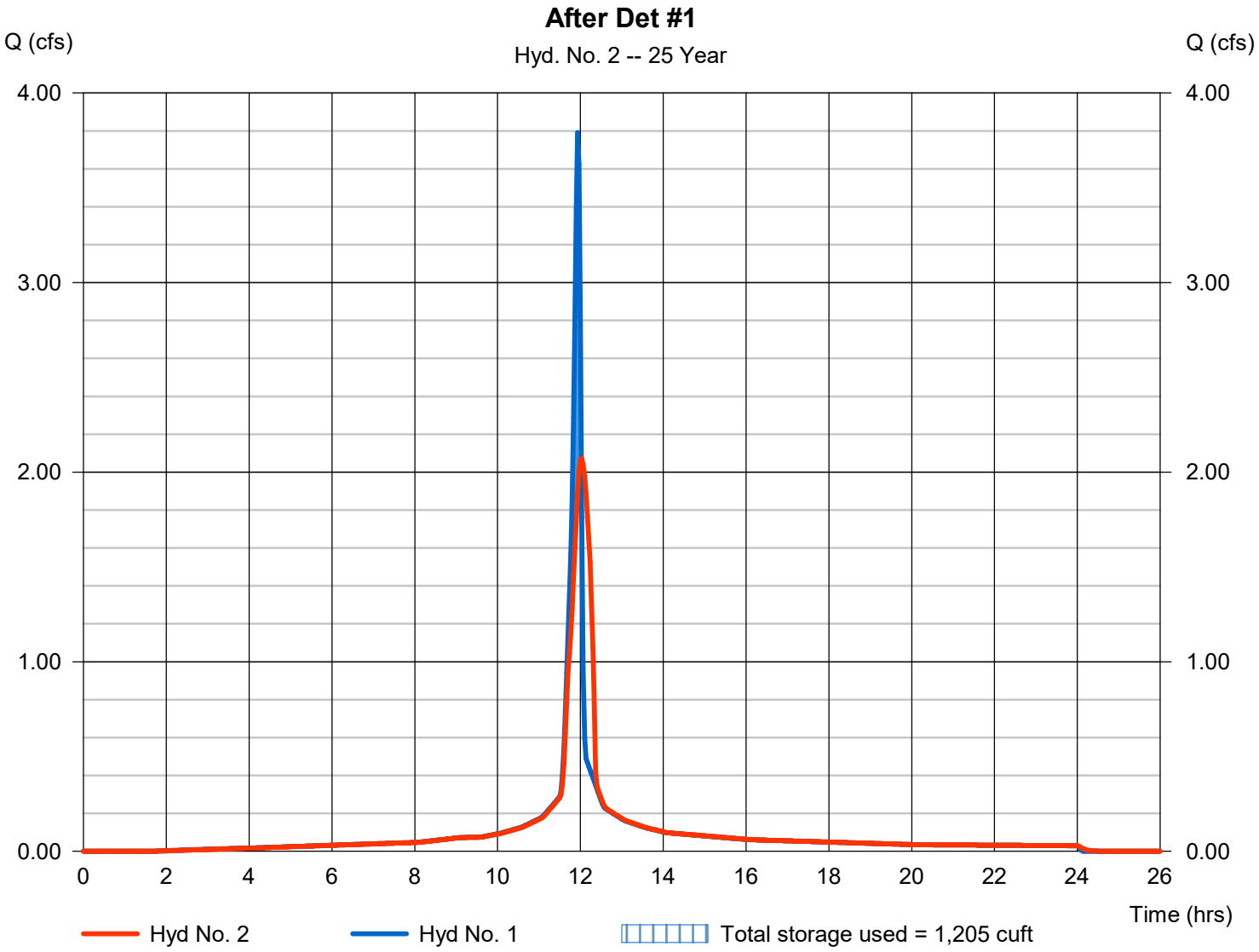
Hydrograph Report

Hyd. No. 2

After Det #1

Hydrograph type	=	Reservoir	Peak discharge	=	2.073 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	8,720 cuft
Inflow hyd. No.	=	1 - To Det #1	Max. Elevation	=	429.38 ft
Reservoir name	=	Det Pond #1	Max. Storage	=	1,205 cuft

Storage Indication method used.



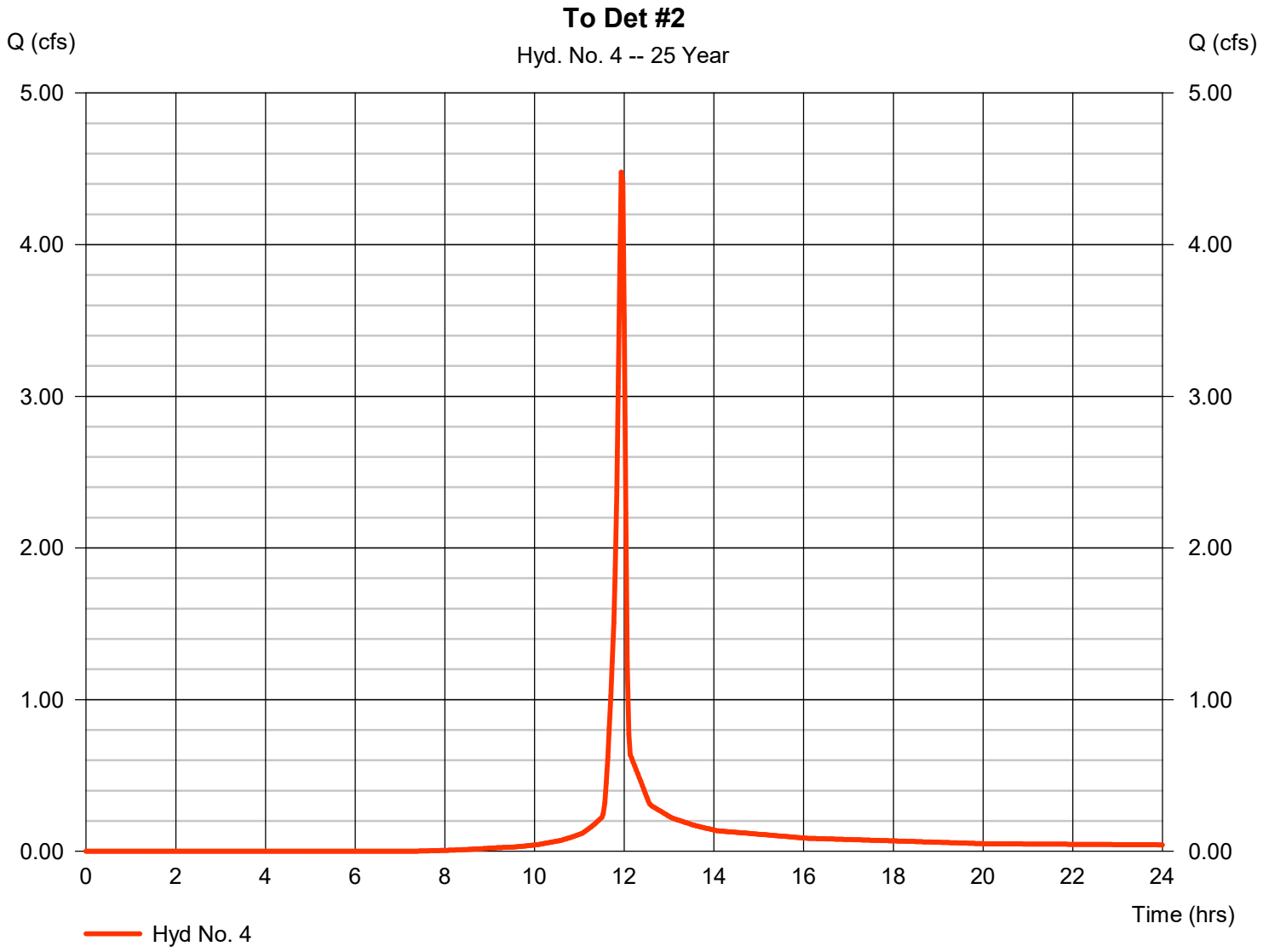
Hydrograph Report

Hyd. No. 4

To Det #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.478 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	9,100 cuft
Drainage area	=	0.760 ac	Curve number	=	76*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.16 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.580 x 69) + (0.180 x 98)] / 0.760



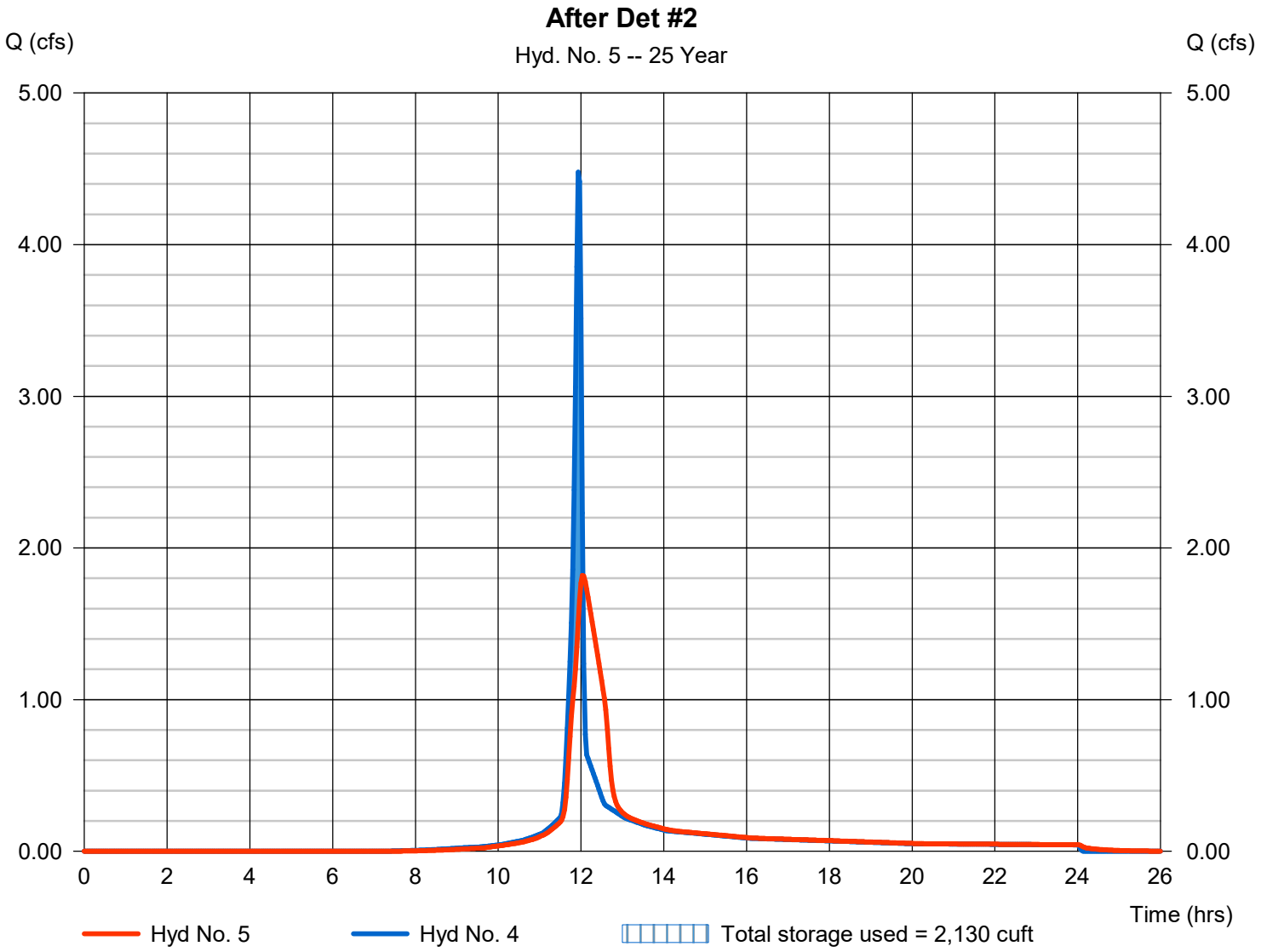
Hydrograph Report

Hyd. No. 5

After Det #2

Hydrograph type	=	Reservoir	Peak discharge	=	1.819 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	9,098 cuft
Inflow hyd. No.	=	4 - To Det #2	Max. Elevation	=	403.68 ft
Reservoir name	=	Det Pond #2	Max. Storage	=	2,130 cuft

Storage Indication method used.



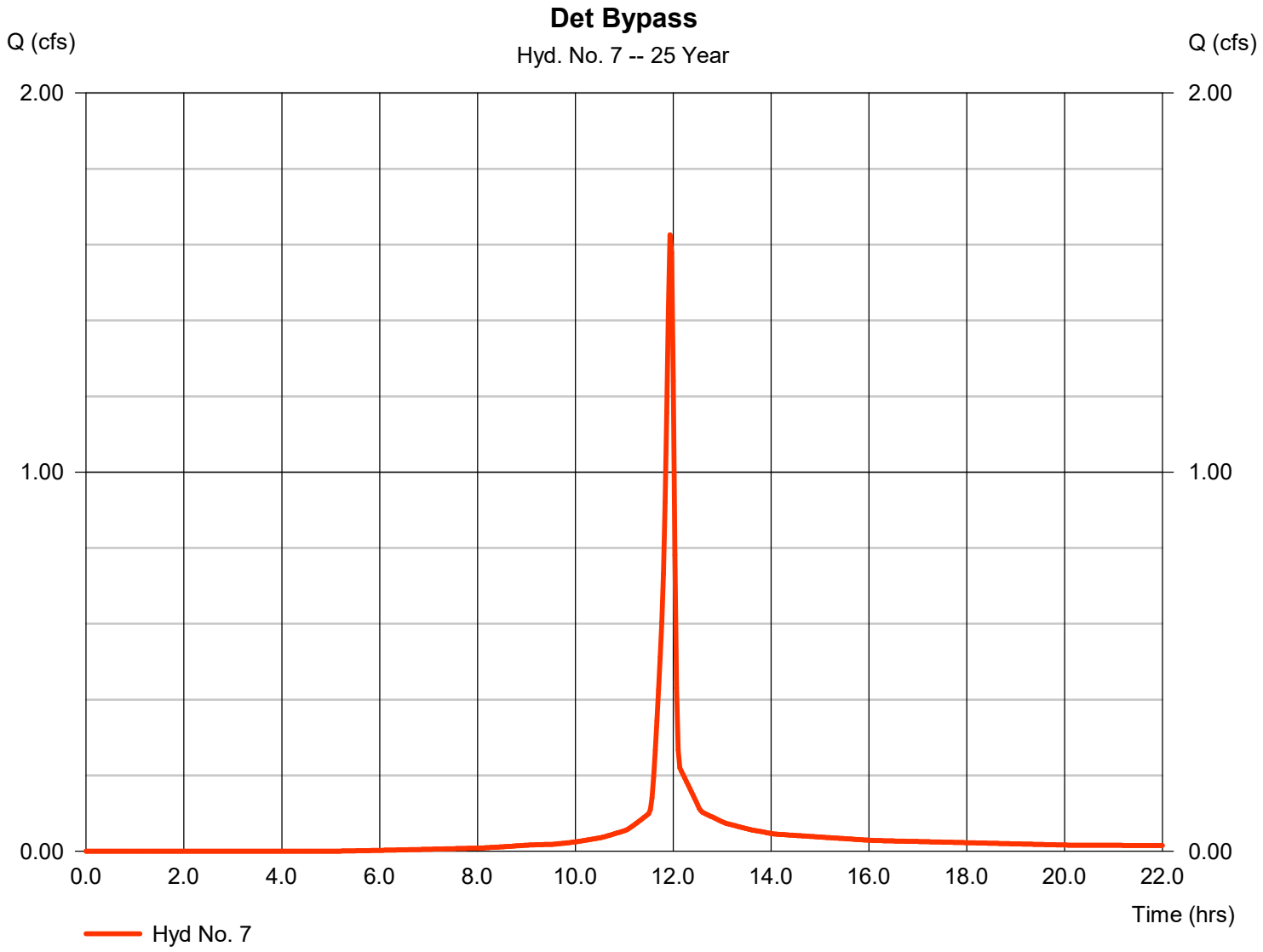
Hydrograph Report

Hyd. No. 7

Det Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.626 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	3,402 cuft
Drainage area	=	0.230 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.16 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 98) + (0.110 x 69)] / 0.230



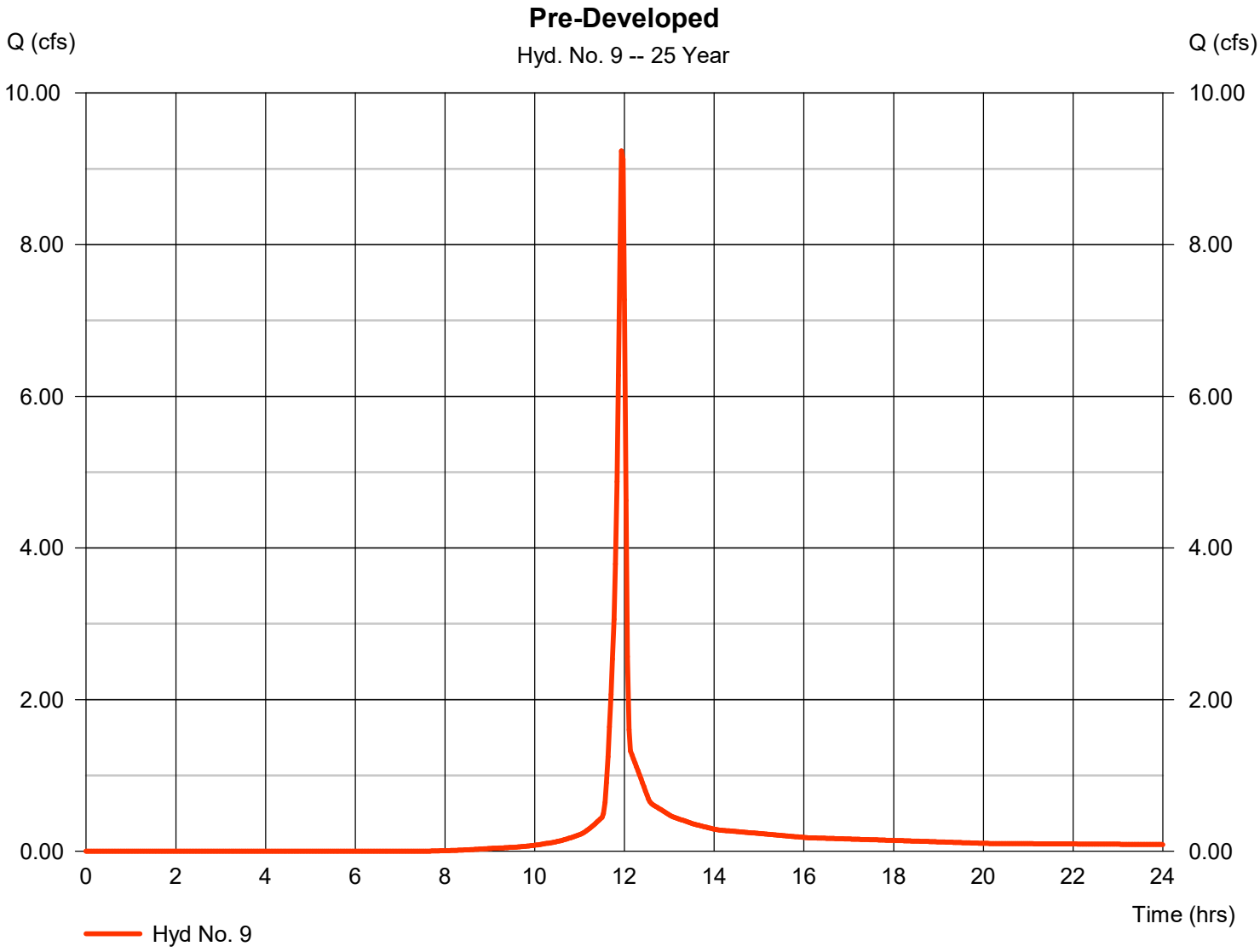
Hydrograph Report

Hyd. No. 9

Pre-Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 9.236 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 18,732 cuft
Drainage area	= 1.610 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.16 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.290 x 69) + (0.320 x 98)] / 1.610

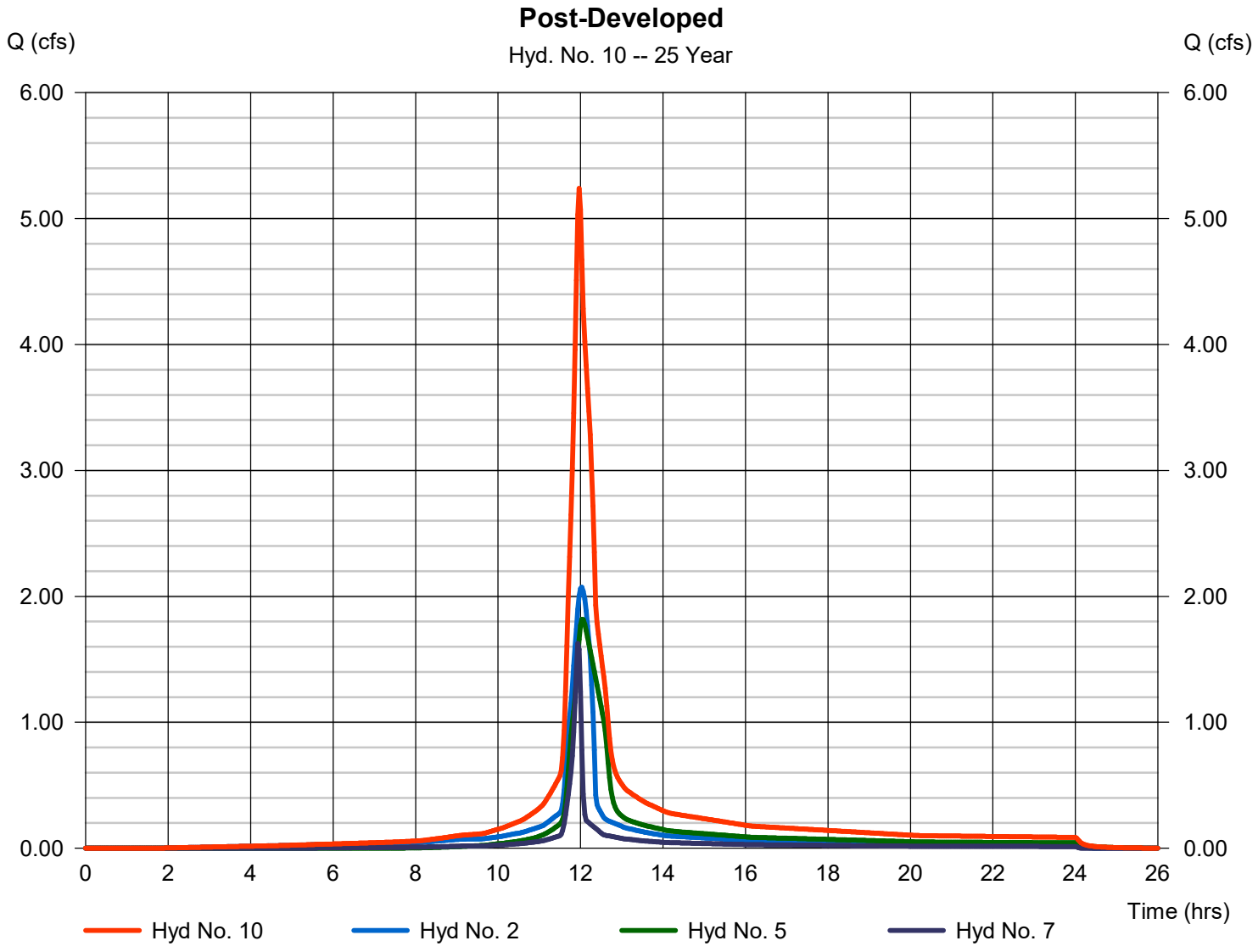


Hydrograph Report

Hyd. No. 10

Post-Developed

Hydrograph type	= Combine	Peak discharge	= 5.240 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 21,220 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 0.230 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.231	2	716	9,794	------	------	------	To Det #1
2	Reservoir	2.175	2	722	9,794	1	429.68	1,466	After Det #1
4	SCS Runoff	5.224	2	716	10,666	------	------	------	To Det #2
5	Reservoir	1.973	2	724	10,665	4	404.09	2,615	After Det #2
7	SCS Runoff	1.855	2	716	3,912	------	------	------	Det Bypass
9	SCS Runoff	10.81	2	716	22,012	------	------	------	Pre-Developed
10	Combine	5.700	2	718	24,370	2, 5, 7,	------	------	Post-Developed

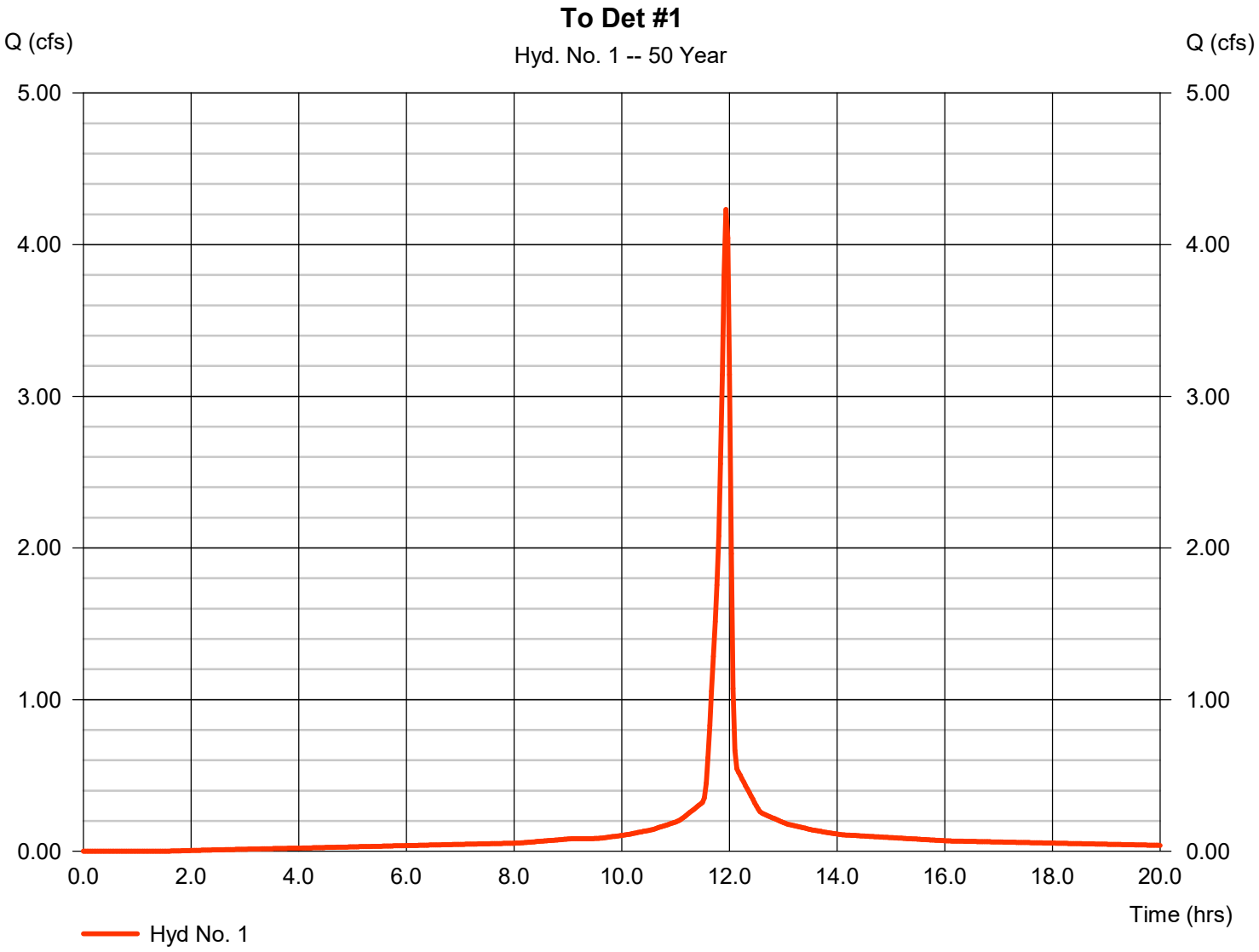
Hydrograph Report

Hyd. No. 1

To Det #1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.231 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 9,794 cuft
Drainage area	= 0.460 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.050 x 69)] / 0.460



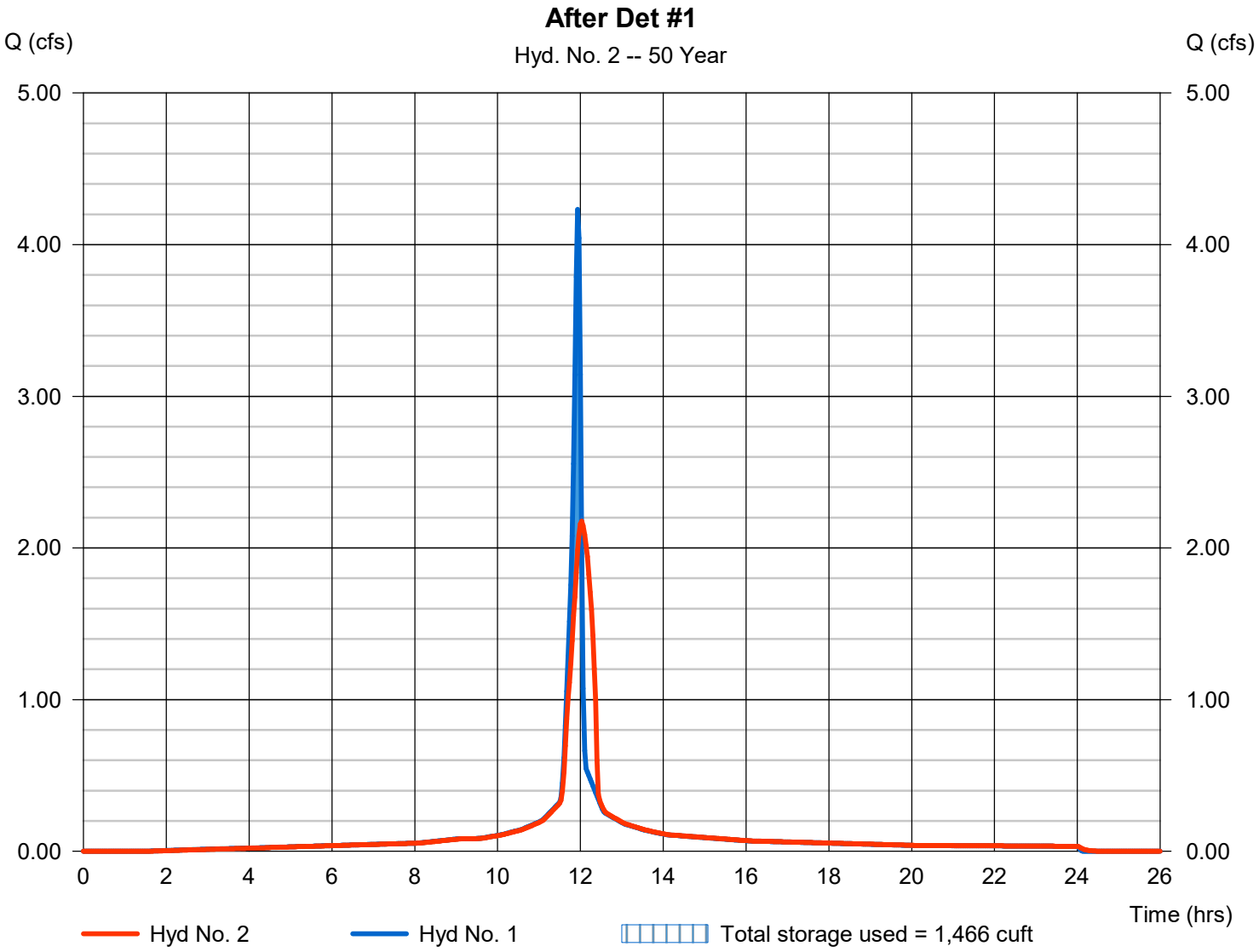
Hydrograph Report

Hyd. No. 2

After Det #1

Hydrograph type	= Reservoir	Peak discharge	= 2.175 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 9,794 cuft
Inflow hyd. No.	= 1 - To Det #1	Max. Elevation	= 429.68 ft
Reservoir name	= Det Pond #1	Max. Storage	= 1,466 cuft

Storage Indication method used.



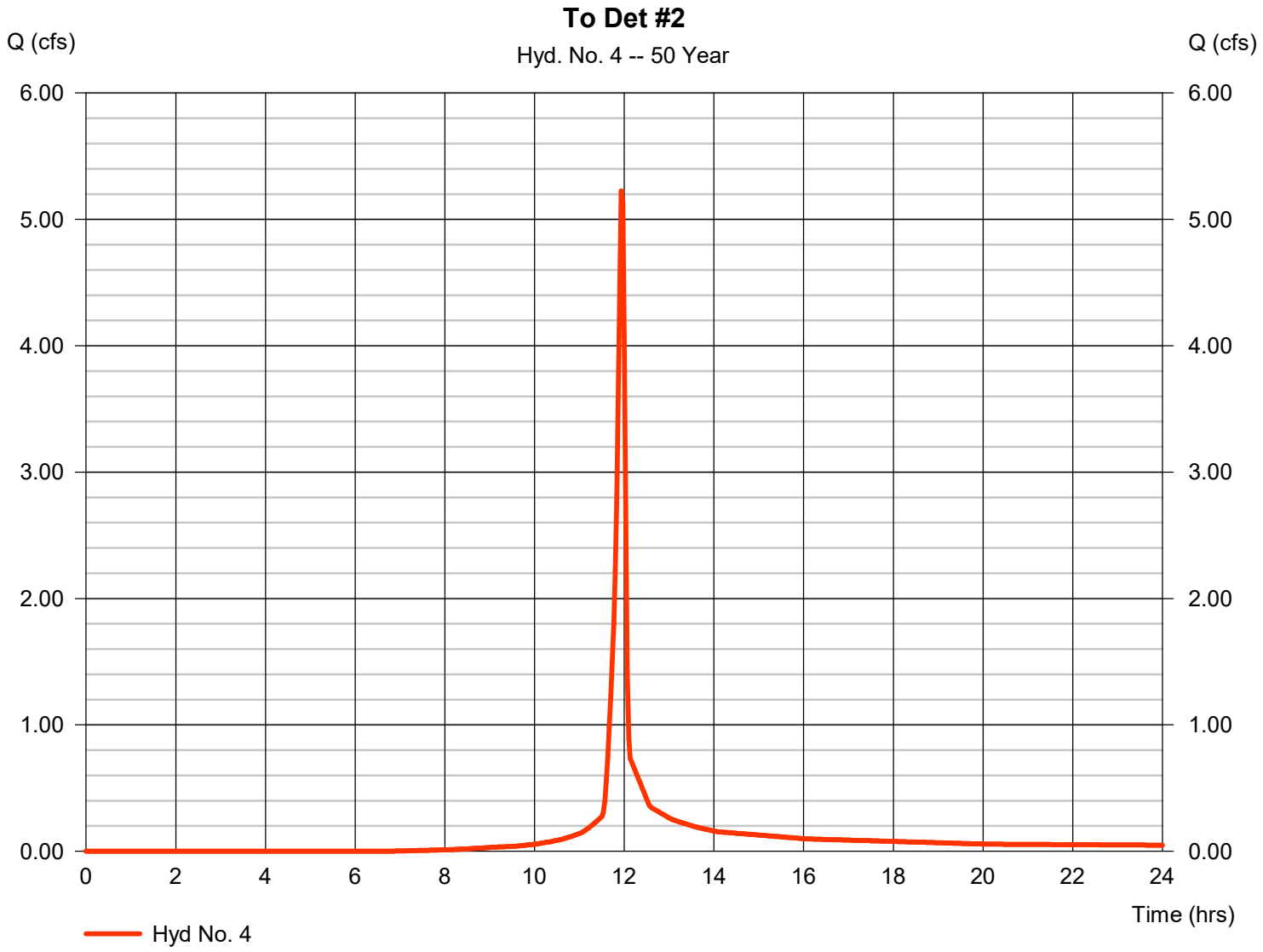
Hydrograph Report

Hyd. No. 4

To Det #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.224 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	10,666 cuft
Drainage area	=	0.760 ac	Curve number	=	76*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.580 x 69) + (0.180 x 98)] / 0.760



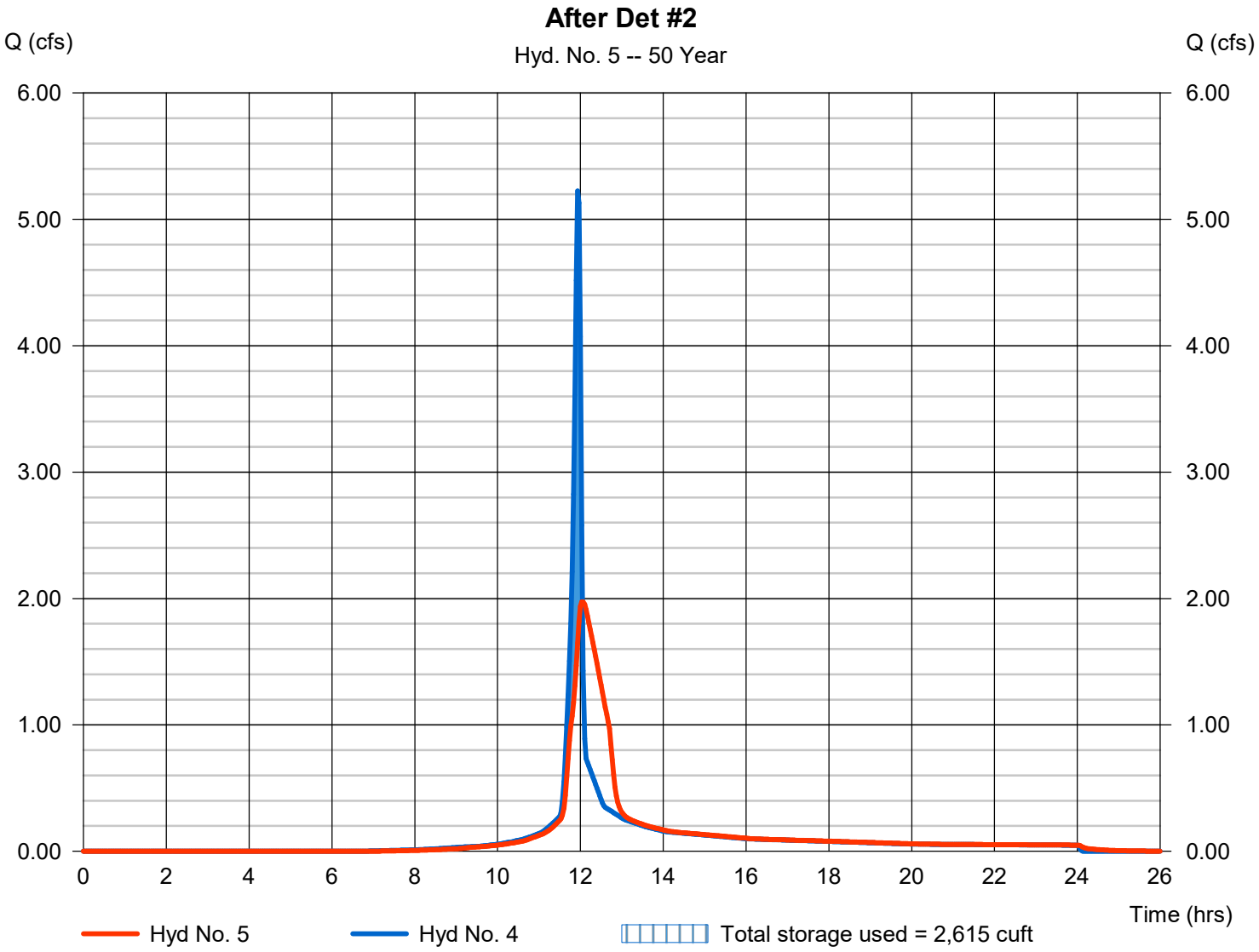
Hydrograph Report

Hyd. No. 5

After Det #2

Hydrograph type	=	Reservoir	Peak discharge	=	1.973 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	10,665 cuft
Inflow hyd. No.	=	4 - To Det #2	Max. Elevation	=	404.09 ft
Reservoir name	=	Det Pond #2	Max. Storage	=	2,615 cuft

Storage Indication method used.



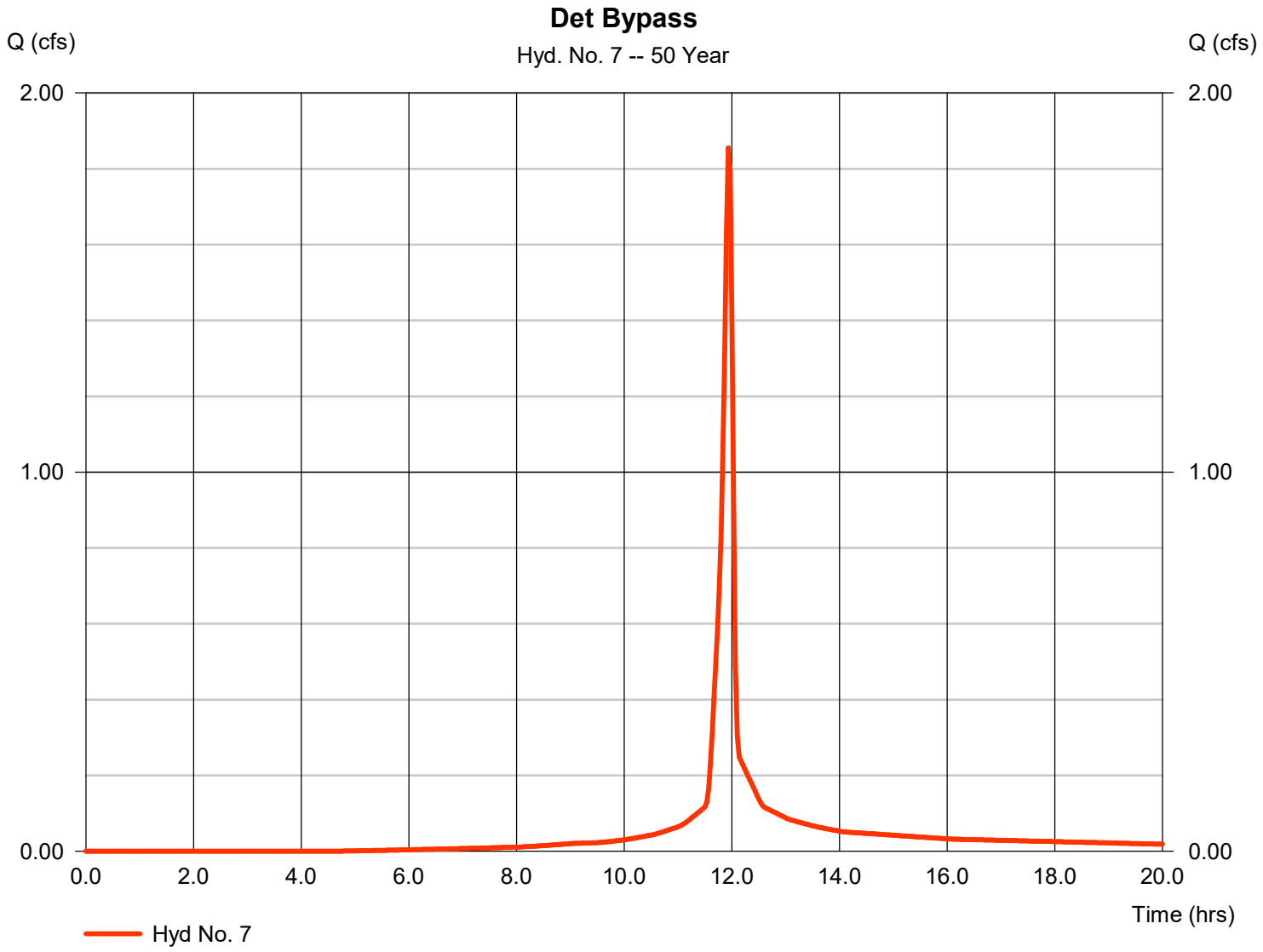
Hydrograph Report

Hyd. No. 7

Det Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.855 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	3,912 cuft
Drainage area	=	0.230 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 98) + (0.110 x 69)] / 0.230



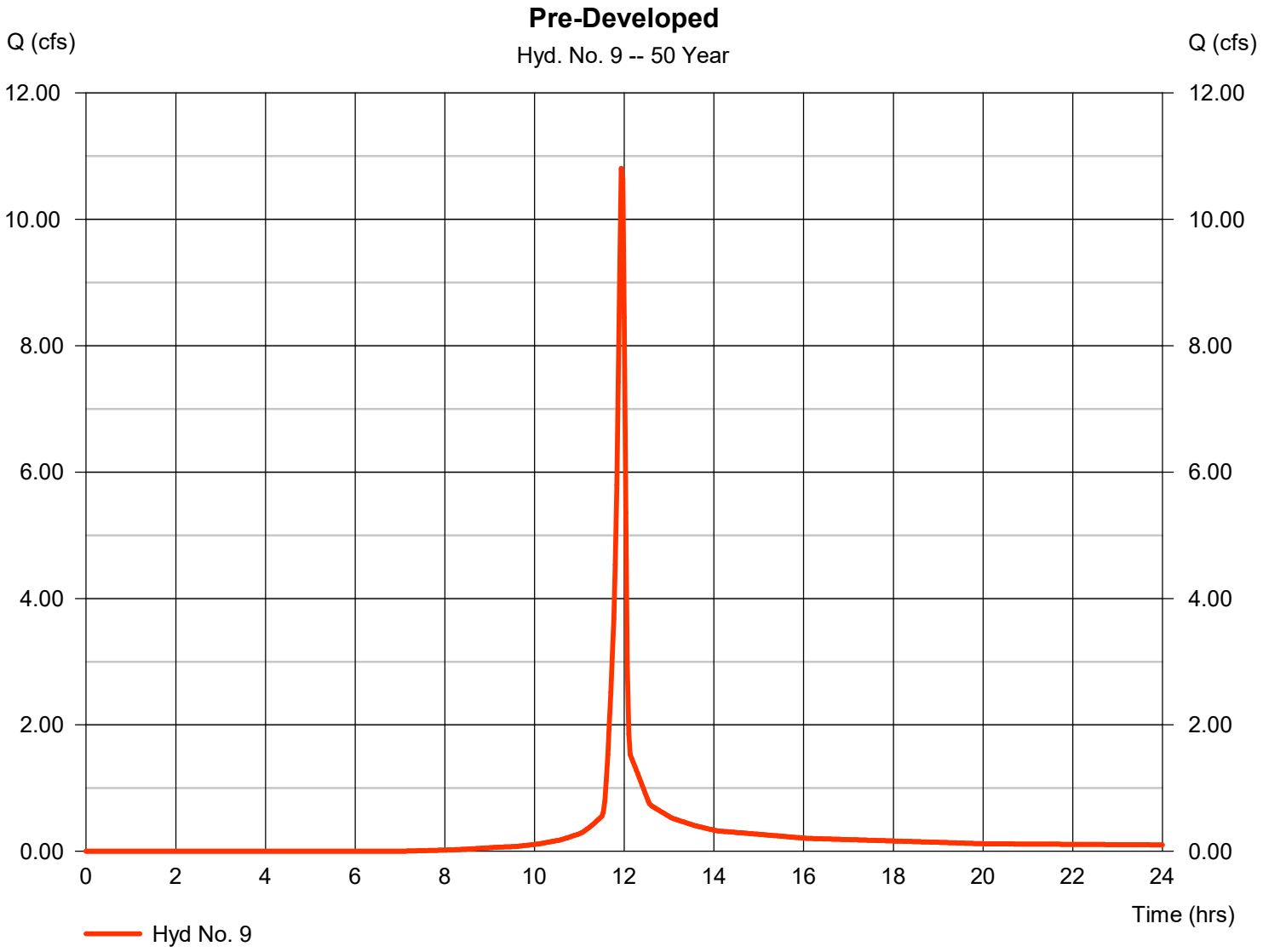
Hydrograph Report

Hyd. No. 9

Pre-Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 10.81 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 22,012 cuft
Drainage area	= 1.610 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.290 x 69) + (0.320 x 98)] / 1.610

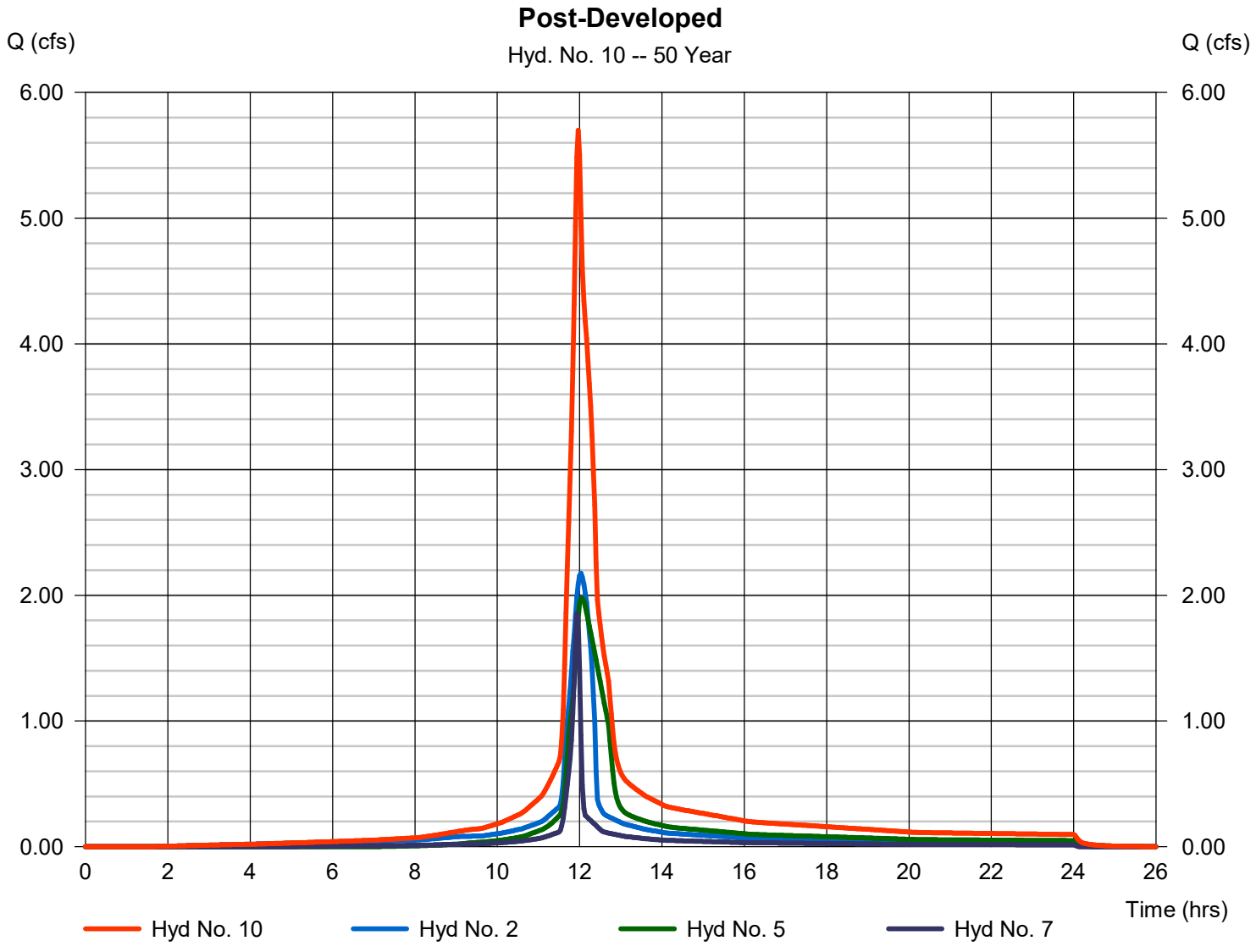


Hydrograph Report

Hyd. No. 10

Post-Developed

Hydrograph type	= Combine	Peak discharge	= 5.700 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 24,370 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 0.230 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.664	2	716	10,854	------	------	------	To Det #1
2	Reservoir	2.275	2	722	10,853	1	430.00	1,732	After Det #1
4	SCS Runoff	5.965	2	716	12,239	------	------	------	To Det #2
5	Reservoir	2.079	2	724	12,237	4	404.40	3,139	After Det #2
7	SCS Runoff	2.080	2	716	4,418	------	------	------	Det Bypass
9	SCS Runoff	12.37	2	716	25,311	------	------	------	Pre-Developed
10	Combine	6.136	2	718	27,509	2, 5, 7,	------	------	Post-Developed

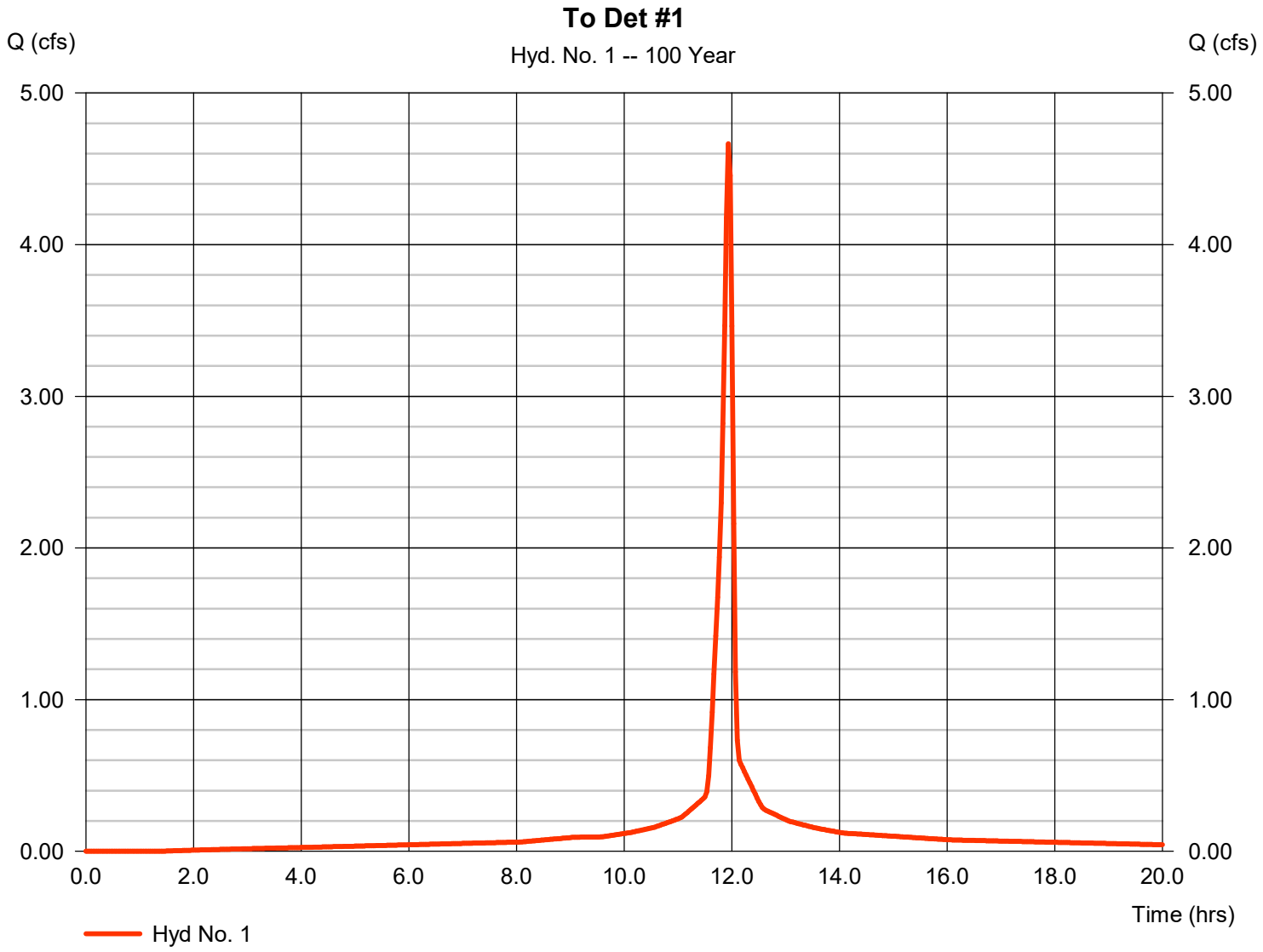
Hydrograph Report

Hyd. No. 1

To Det #1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.664 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 10,854 cuft
Drainage area	= 0.460 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.050 x 69)] / 0.460



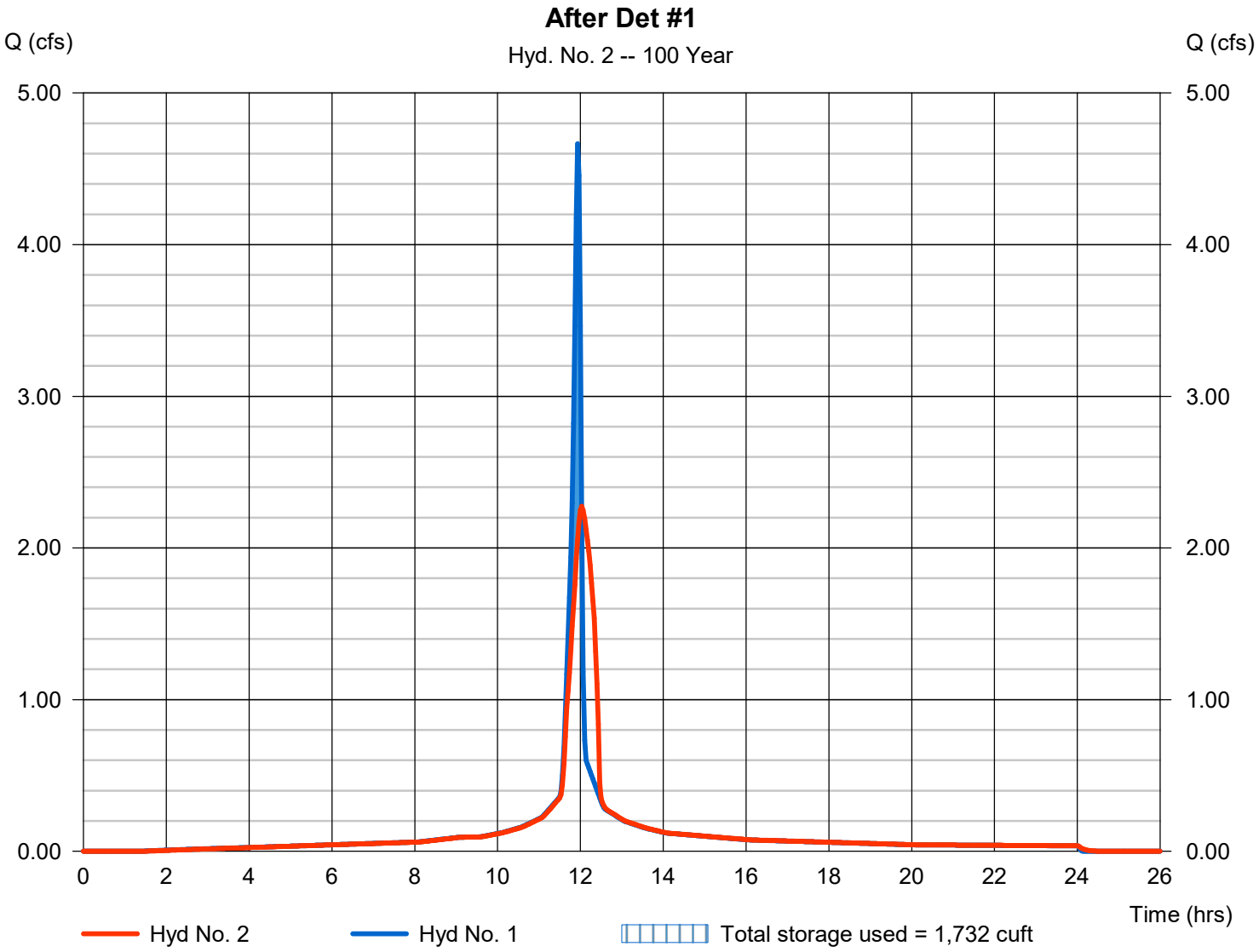
Hydrograph Report

Hyd. No. 2

After Det #1

Hydrograph type	= Reservoir	Peak discharge	= 2.275 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 10,853 cuft
Inflow hyd. No.	= 1 - To Det #1	Max. Elevation	= 430.00 ft
Reservoir name	= Det Pond #1	Max. Storage	= 1,732 cuft

Storage Indication method used.



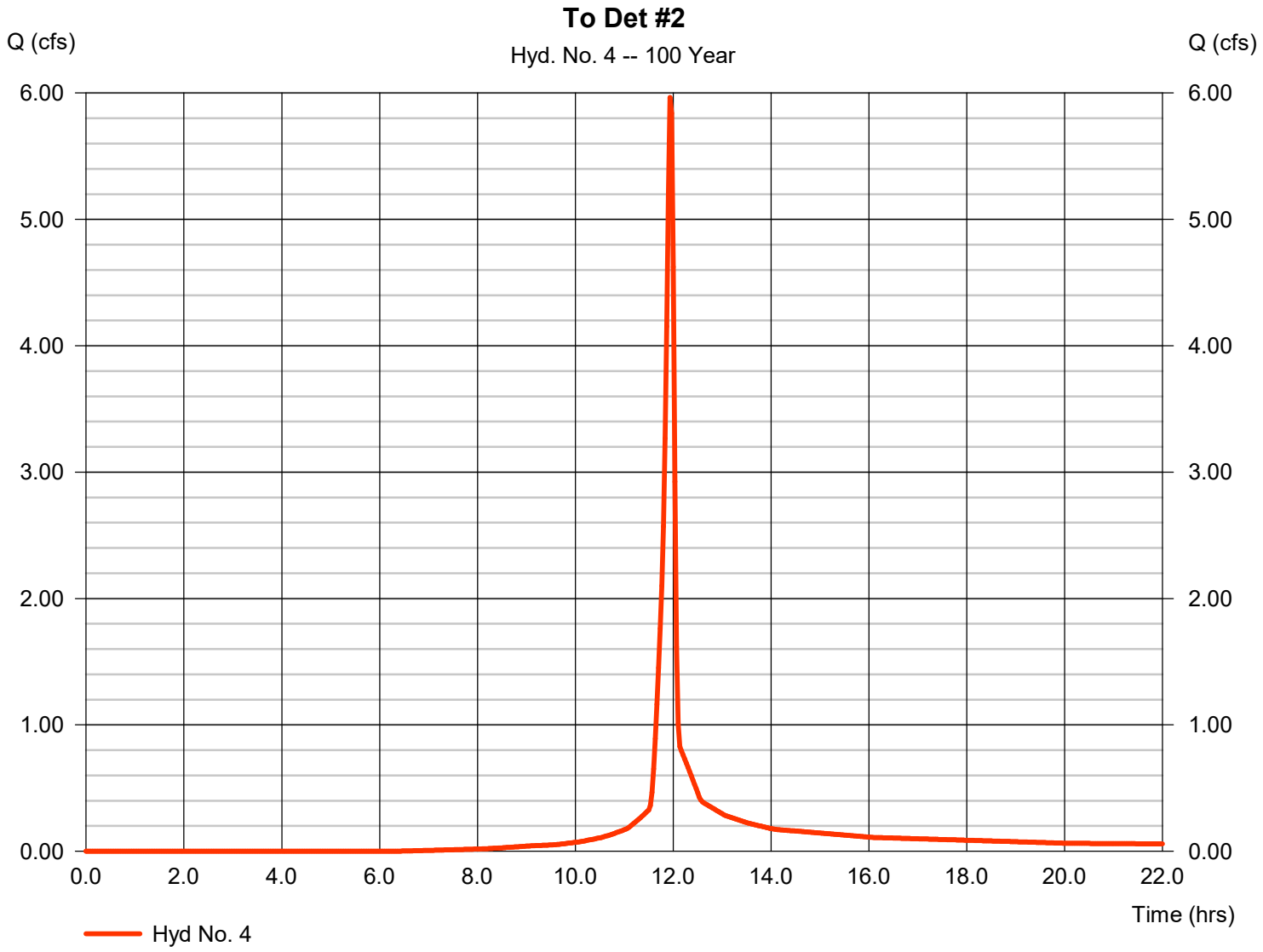
Hydrograph Report

Hyd. No. 4

To Det #2

Hydrograph type	= SCS Runoff	Peak discharge	= 5.965 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 12,239 cuft
Drainage area	= 0.760 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.580 x 69) + (0.180 x 98)] / 0.760



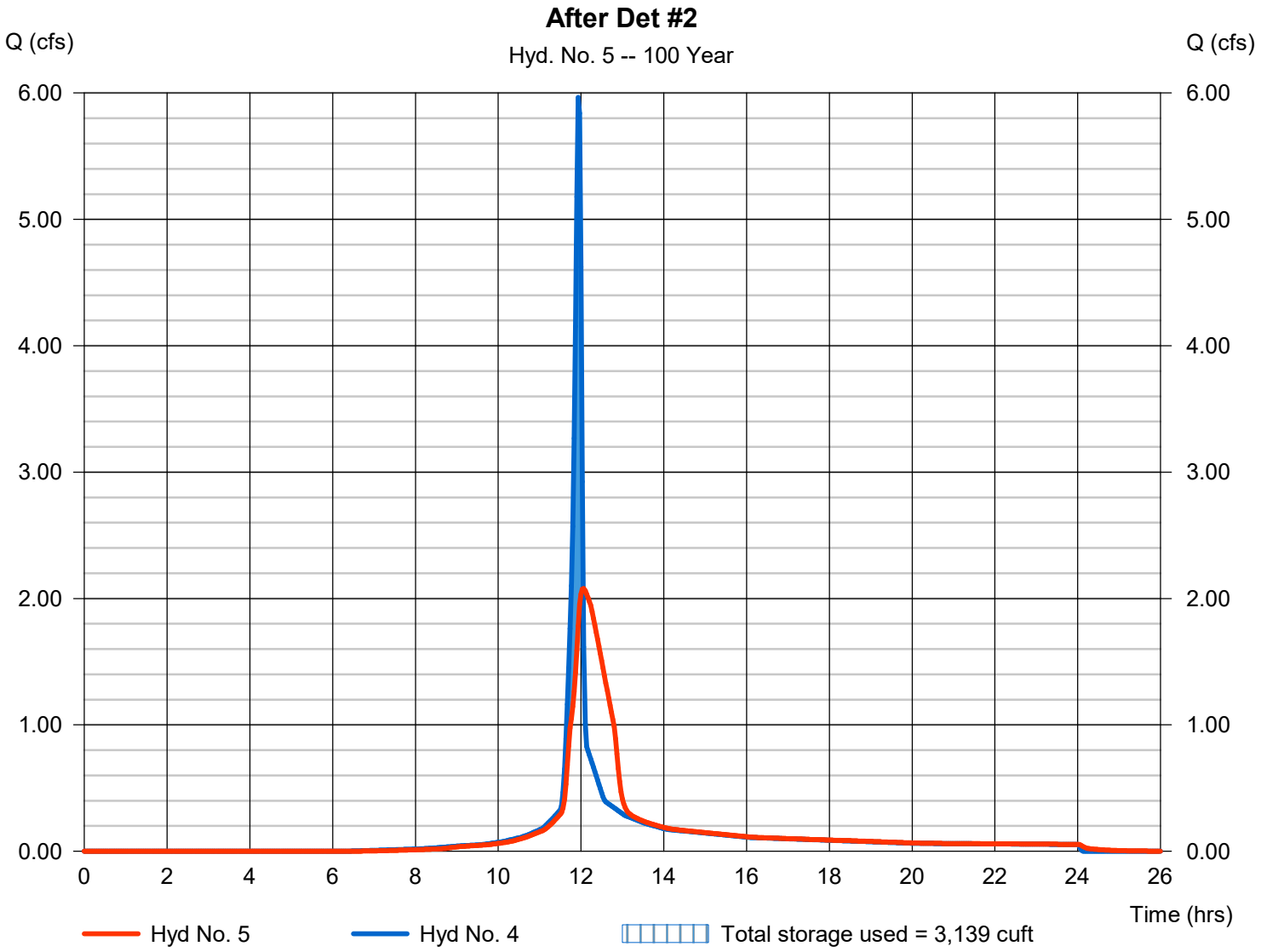
Hydrograph Report

Hyd. No. 5

After Det #2

Hydrograph type	=	Reservoir	Peak discharge	=	2.079 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	12,237 cuft
Inflow hyd. No.	=	4 - To Det #2	Max. Elevation	=	404.40 ft
Reservoir name	=	Det Pond #2	Max. Storage	=	3,139 cuft

Storage Indication method used.



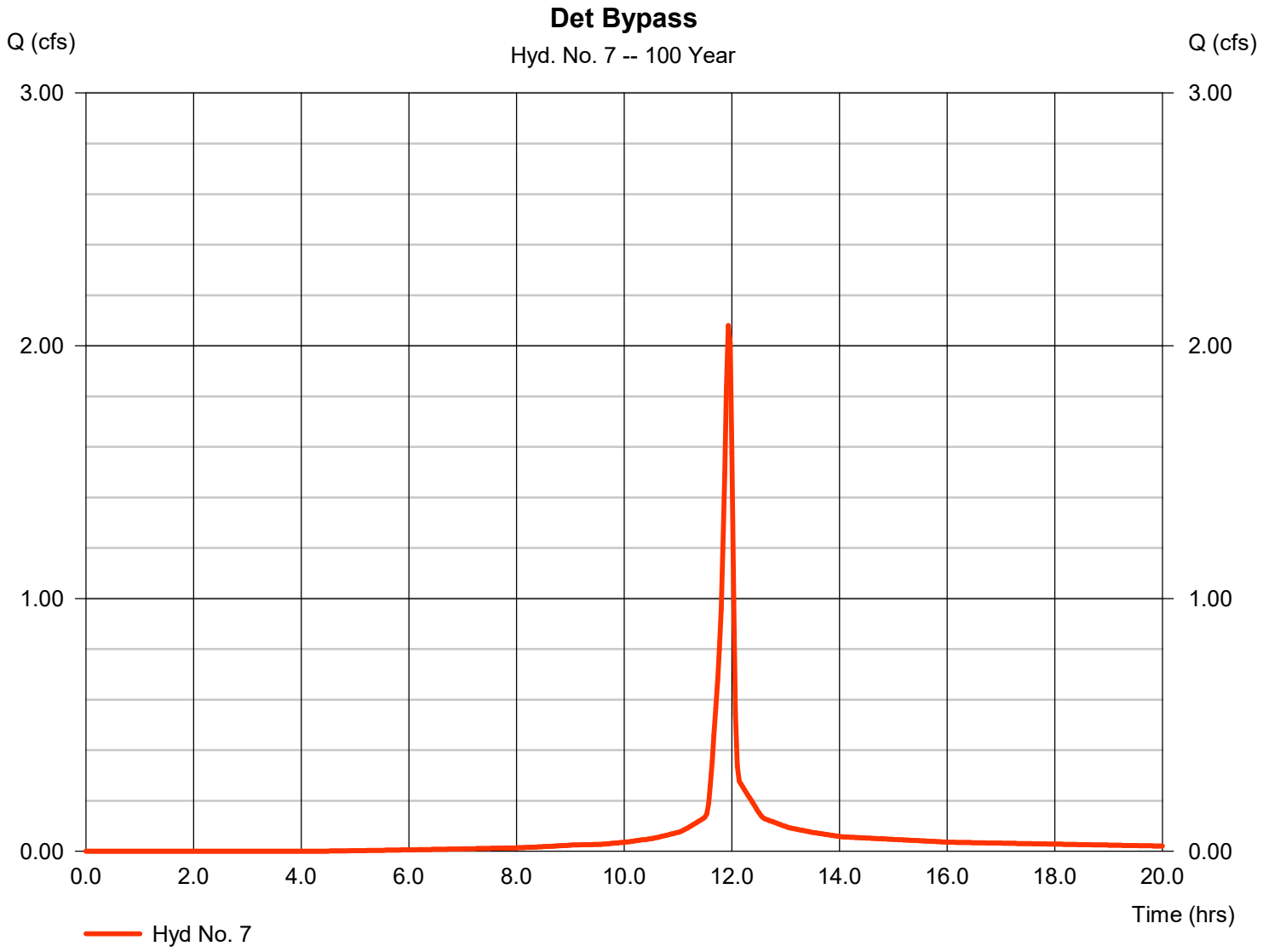
Hydrograph Report

Hyd. No. 7

Det Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.080 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	4,418 cuft
Drainage area	=	0.230 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.53 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.120 x 98) + (0.110 x 69)] / 0.230



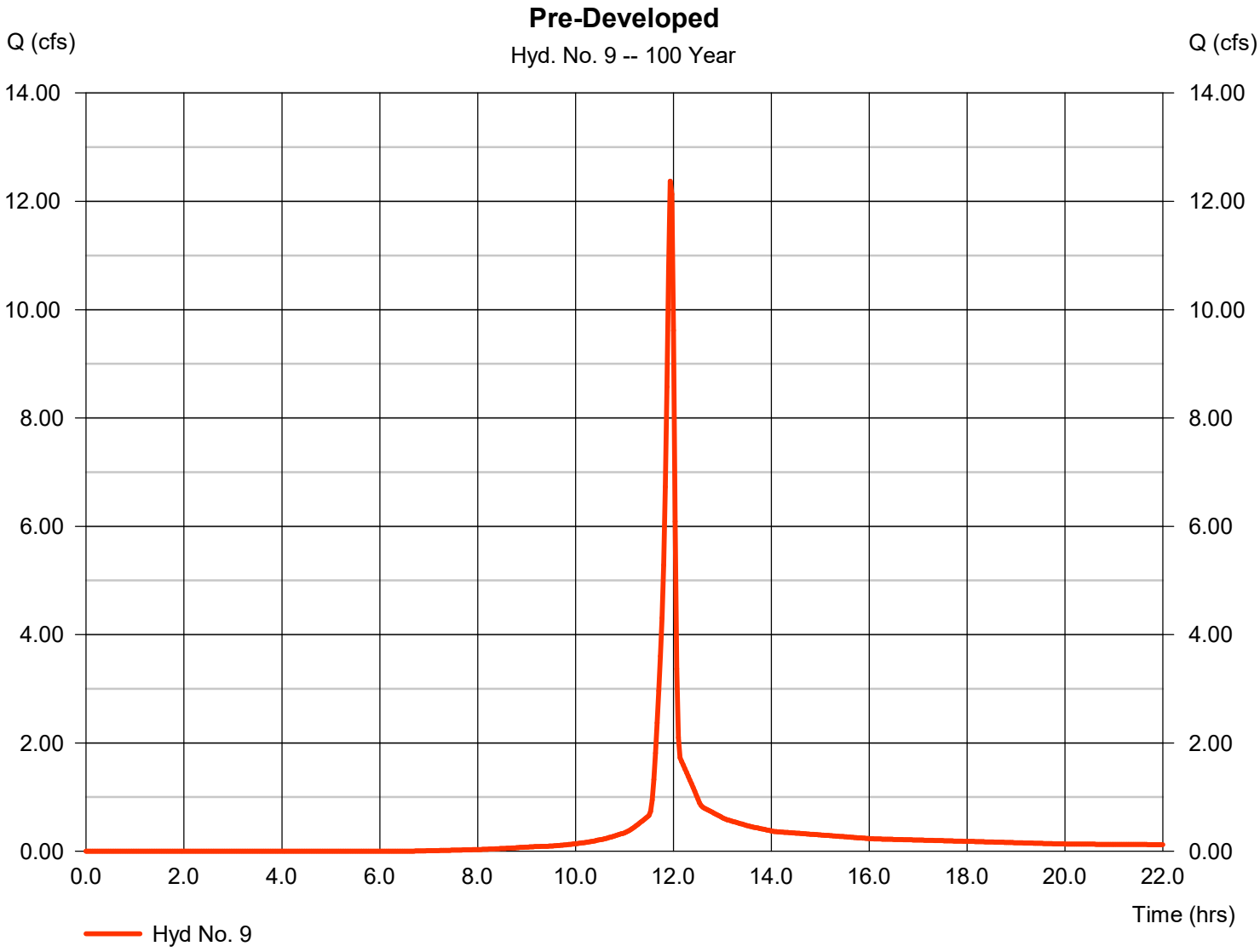
Hydrograph Report

Hyd. No. 9

Pre-Developed

Hydrograph type	= SCS Runoff	Peak discharge	= 12.37 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 25,311 cuft
Drainage area	= 1.610 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.290 x 69) + (0.320 x 98)] / 1.610

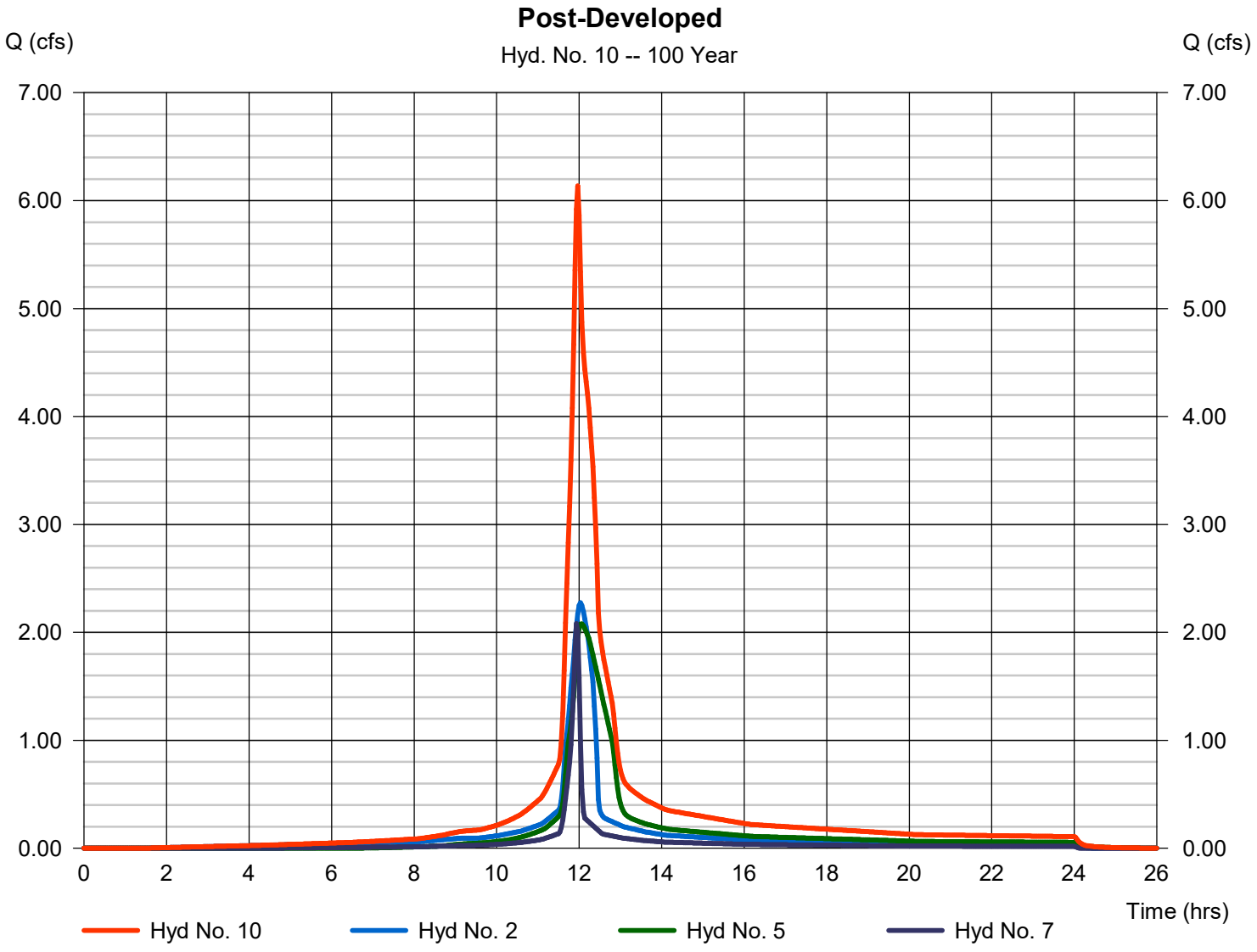


Hydrograph Report

Hyd. No. 10

Post-Developed

Hydrograph type	= Combine	Peak discharge	= 6.136 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 27,509 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 0.230 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	21.3913	5.8000	0.6332	--------
3	0.0000	0.0000	0.0000	--------
5	48.6847	10.2000	0.7544	--------
10	66.7072	12.5000	0.7892	--------
25	65.3872	11.5000	0.7499	--------
50	79.9547	12.2000	0.7718	--------
100	170.7963	18.2000	0.9117	--------

File name: Nashville_Rainfall Intensity.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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.74	3.73	3.13	2.73	2.44	2.22	2.04	1.90	1.78	1.68	1.59	1.51
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	6.25	5.04	4.27	3.72	3.32	3.00	2.75	2.54	2.36	2.21	2.08	1.97
10	6.97	5.72	4.88	4.28	3.82	3.46	3.17	2.93	2.73	2.55	2.40	2.27
25	7.99	6.55	5.60	4.92	4.40	4.00	3.67	3.40	3.17	2.98	2.81	2.66
50	8.90	7.31	6.25	5.48	4.90	4.45	4.08	3.78	3.52	3.30	3.11	2.94
100	9.72	8.13	7.01	6.17	5.51	4.99	4.56	4.20	3.90	3.64	3.41	3.21

Tc = time in minutes. Values may exceed 60.

e name: Z:\Projects\2607 Whites Creek Pike\1-Civil Engineering\Stormwater\Hydrographs\MWS Precipitation Data.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.39	0.00	4.50	5.23	6.16	6.85	7.53
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

IV. USDA Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Cheatham County, Tennessee

February 21, 2023

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Cheatham County, Tennessee
Survey Area Data: Version 16, Sep 15, 2022

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

Date(s) aerial images were photographed: Mar 21, 2021—Mar 30, 2021

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
En	Ennis gravelly silt loam, occasionally flooded	0.1	3.7%
HaC	Hawthorne gravelly silt loam, 5 to 12 percent slopes	1.8	54.3%
HsF	Hawthorne-Sulphura association, 20 to 60 percent slopes	1.4	42.0%
Totals for Area of Interest		**3.3**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Cheatham County, Tennessee

En—Ennis gravelly silt loam, occasionally flooded

Map Unit Setting

National map unit symbol: kpd9
Elevation: 900 to 1,300 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 180 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ennis and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ennis

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Parent material: Loamy alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 60 inches: gravelly silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F122XY034TN - Well Drained Gravelly Alluvium
Hydric soil rating: No

HaC—Hawthorne gravelly silt loam, 5 to 12 percent slopes

Map Unit Setting

National map unit symbol: kpdf
Elevation: 900 to 1,300 feet
Mean annual precipitation: 48 to 55 inches

Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 185 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Hawthorne and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hawthorne

Setting

Landform: Hillslopes
Landform position (three-dimensional): Crest
Parent material: Gravelly residuum weathered from limestone and siltstone

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 33 inches: very channery silt loam
Cr - 33 to 43 inches: bedrock

Properties and qualities

Slope: 5 to 12 percent
Depth to restrictive feature: 20 to 39 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

HsF—Hawthorne-Sulphura association, 20 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2v5c6
Elevation: 360 to 930 feet
Mean annual precipitation: 48 to 55 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 185 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Hawthorne and similar soils: 53 percent
Sulphura and similar soils: 32 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hawthorne

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly residuum weathered from limestone and siltstone

Typical profile

A - 0 to 6 inches: gravelly silt loam
Bw - 6 to 33 inches: very gravelly silt loam
Cr - 33 to 43 inches: bedrock

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: 20 to 39 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

Description of Sulphura

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Channery residuum weathered from limestone and shale

Typical profile

A - 0 to 10 inches: gravelly silt loam
Bw - 10 to 22 inches: very channery silt loam
R - 22 to 32 inches: bedrock

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: 20 to 39 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

Minor Components

Sengtown

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Minvale

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

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