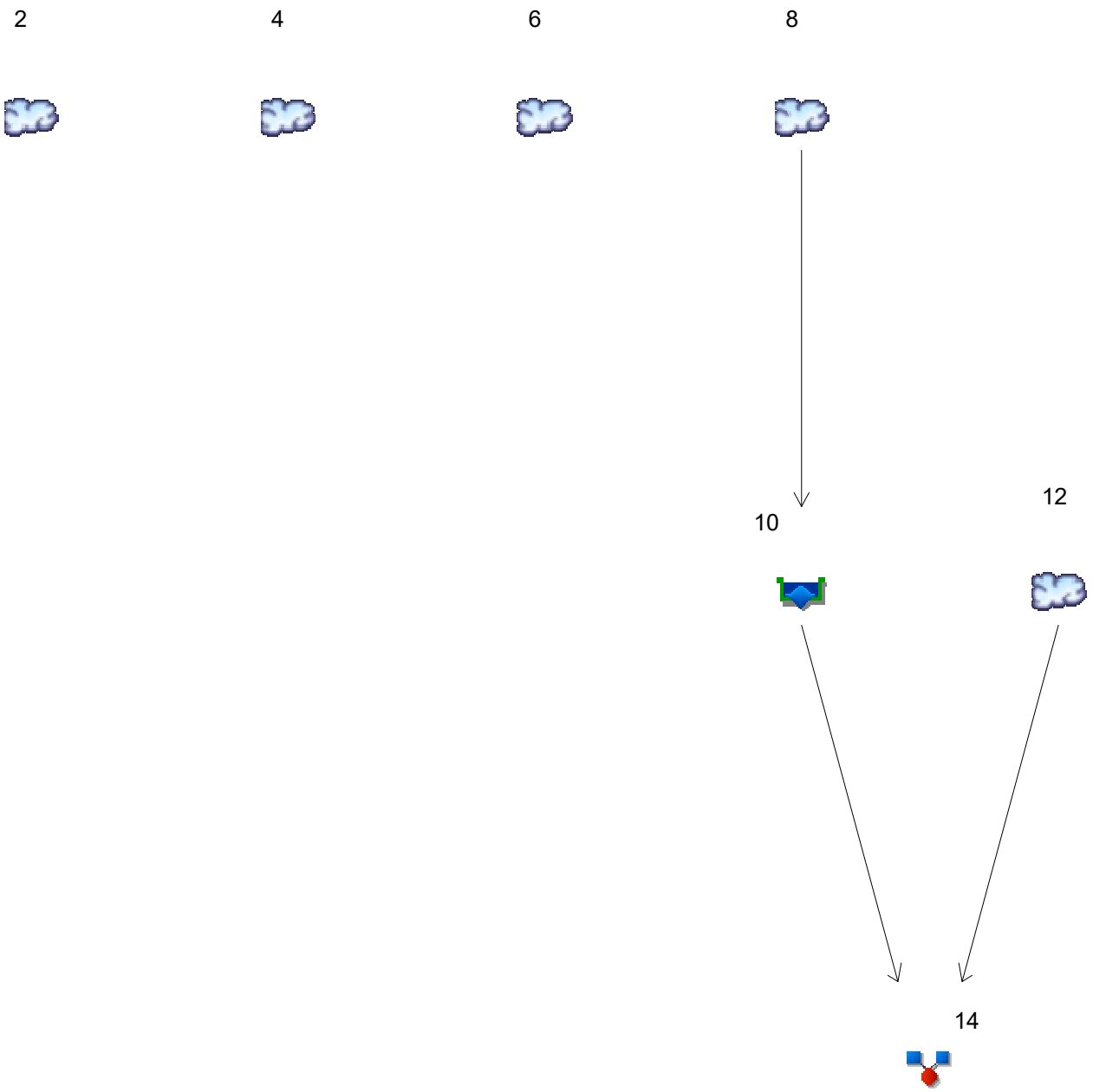
Watershed Model Schematic



Legend

Hyd.	Origin	Description
2	SCS Runoff	Existing to POI 1
4	SCS Runoff	Proposed to POI 1
6	SCS Runoff	Existing to POI 2
8	SCS Runoff	Prop to Detention Pond
10	Reservoir	Detention Pond
12	SCS Runoff	Remainder Prop to POI 2
14	Combine	Total to POI 2

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	
2	SCS Runoff	------	-------	2.343	-------	-------	4.214	-------	-------	7.681	Existing to POI 1
4	SCS Runoff	------	-------	2.248	-------	-------	3.714	-------	-------	6.376	Proposed to POI 1
6	SCS Runoff	------	-------	5.230	-------	-------	10.99	-------	-------	22.65	Existing to POI 2
8	SCS Runoff	------	-------	4.086	-------	-------	6.926	-------	-------	12.10	Prop to Detention Pond
10	Reservoir	8	-------	0.026	-------	-------	0.129	-------	-------	5.849	Detention Pond
12	SCS Runoff	------	-------	3.543	-------	-------	7.442	-------	-------	15.34	Remainder Prop to POI 2
14	Combine	10, 12,	-------	3.565	-------	-------	7.469	-------	-------	19.35	Total to POI 2

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

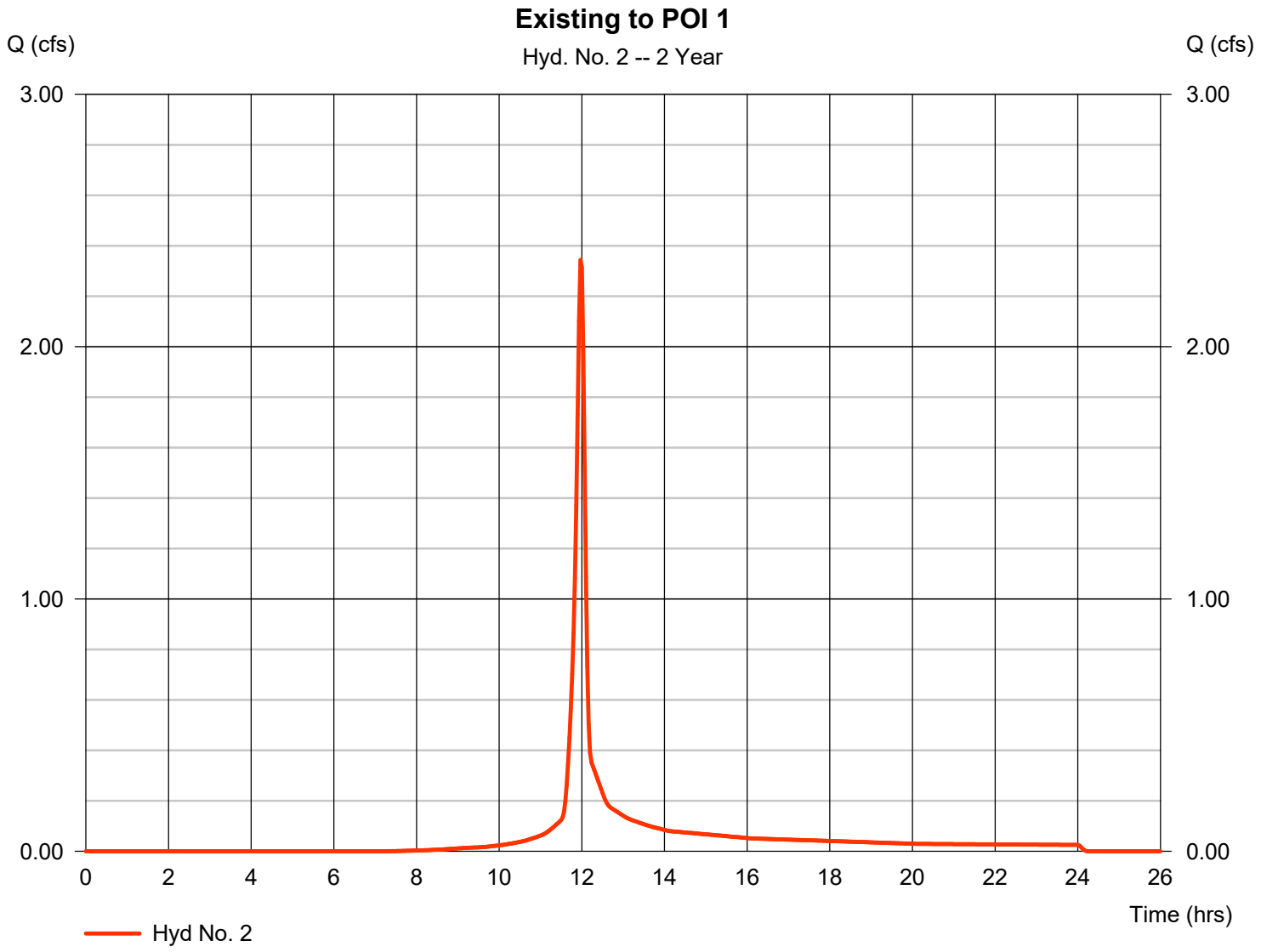
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
2	SCS Runoff	2.343	2	718	5,375	------	------	------	Existing to POI 1
4	SCS Runoff	2.248	2	716	4,711	------	------	------	Proposed to POI 1
6	SCS Runoff	5.230	2	720	12,002	------	------	------	Existing to POI 2
8	SCS Runoff	4.086	2	716	8,447	------	------	------	Prop to Detention Pond
10	Reservoir	0.026	2	1090	3,968	8	1012.61	6,039	Detention Pond
12	SCS Runoff	3.543	2	720	8,130	------	------	------	Remainder Prop to POI 2
14	Combine	3.565	2	720	12,099	10, 12,	------	------	Total to POI 2

Hydrograph Report

Hyd. No. 2

Existing to POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.343 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 5,375 cuft
Drainage area	= 0.708 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.60 min
Total precip.	= 3.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 2

Existing to POI 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.68		0.00		0.00		
Land slope (%)	= 2.24		0.00		0.00		
Travel Time (min)	**= 8.73**	**+**	**0.00**	**+**	**0.00**	**=**	**8.73**
Shallow Concentrated Flow							
Flow length (ft)	= 100.00		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)	**= 0.84**	**+**	**0.00**	**+**	**0.00**	**=**	**0.84**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

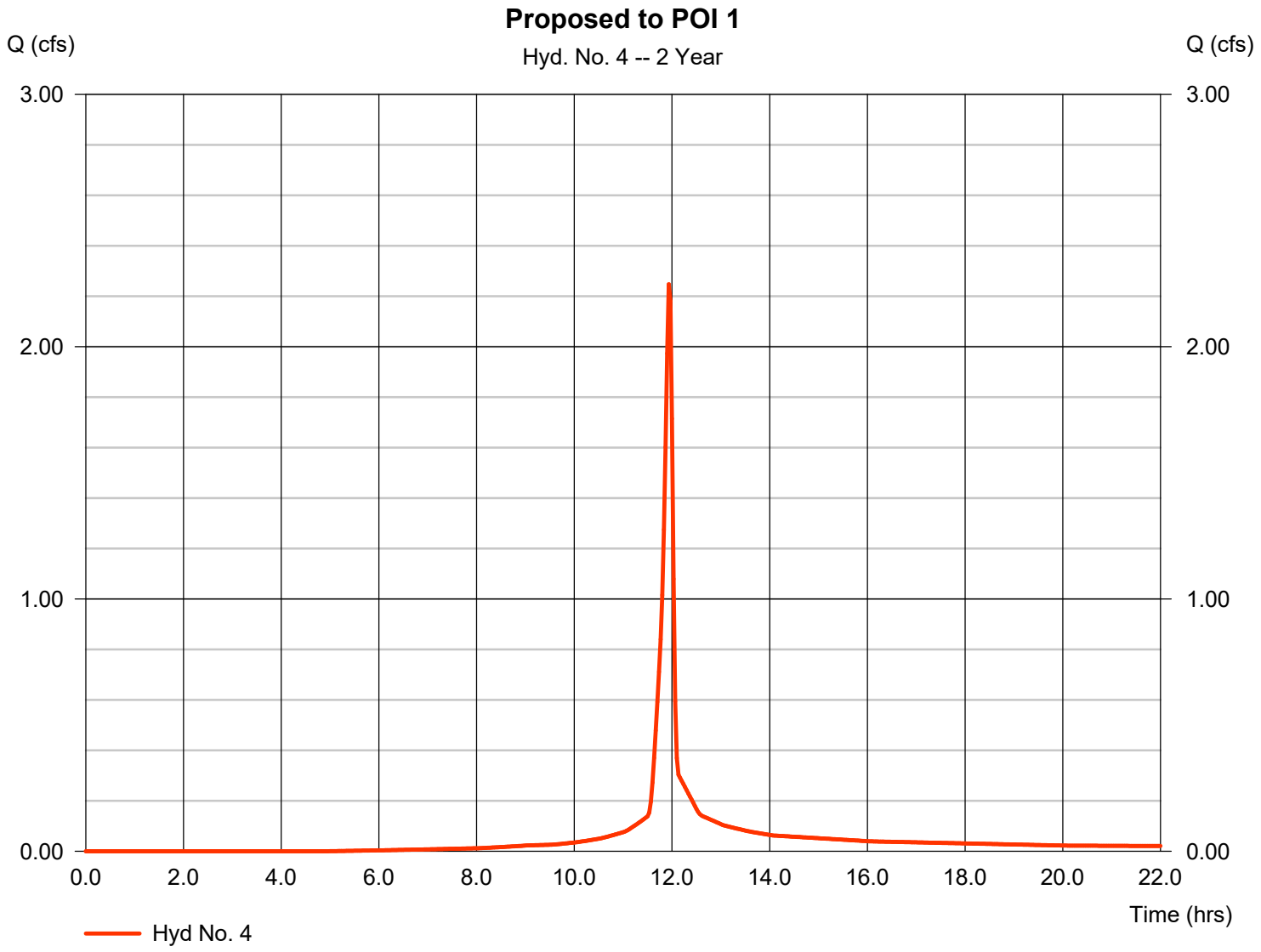
Total Travel Time, Tc ..... 9.60 min

Hydrograph Report

Hyd. No. 4

Proposed to POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.248 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 4,711 cuft
Drainage area	= 0.529 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

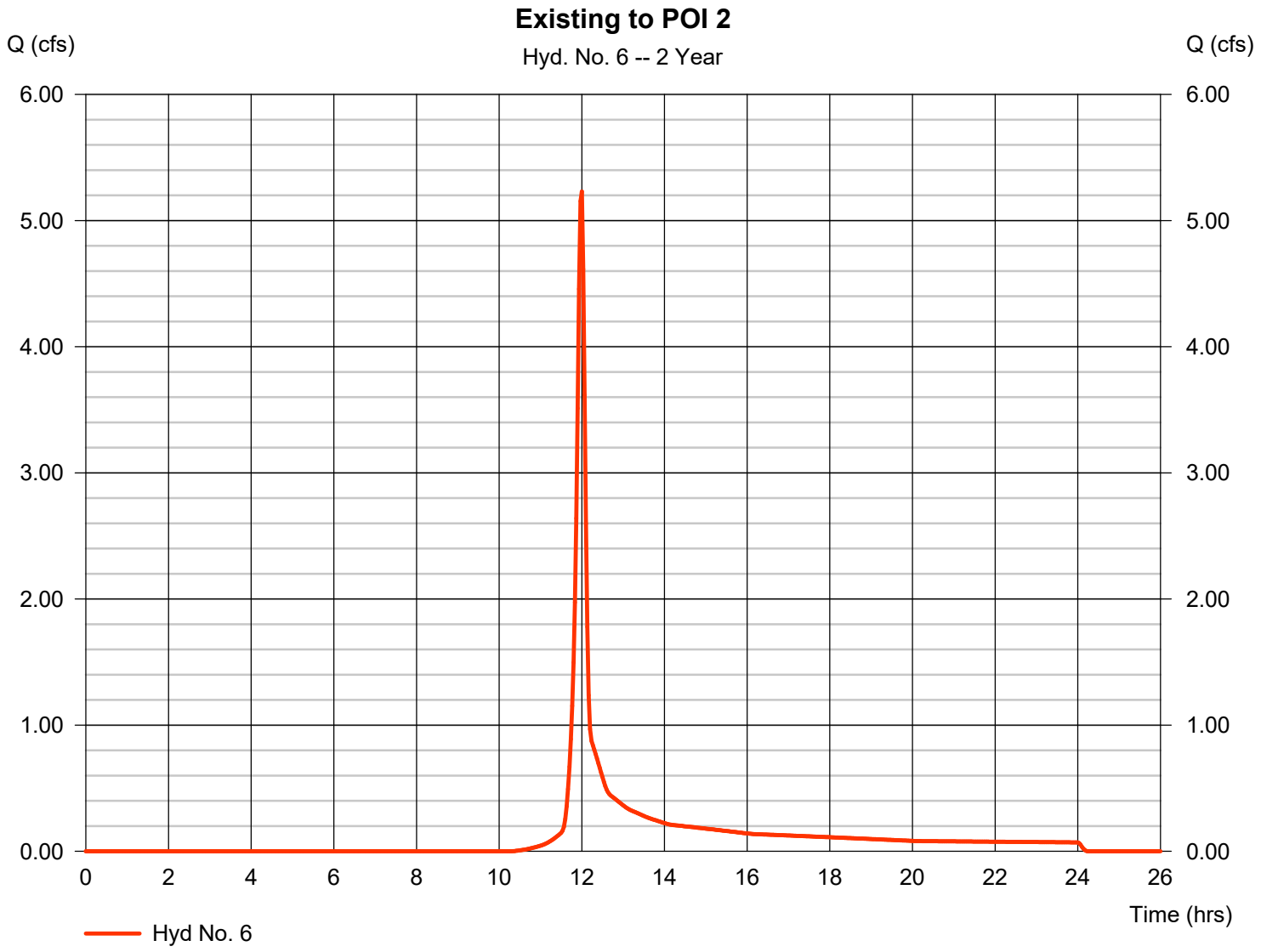


Hydrograph Report

Hyd. No. 6

Existing to POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 5.230 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 12,002 cuft
Drainage area	= 2.421 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.80 min
Total precip.	= 3.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

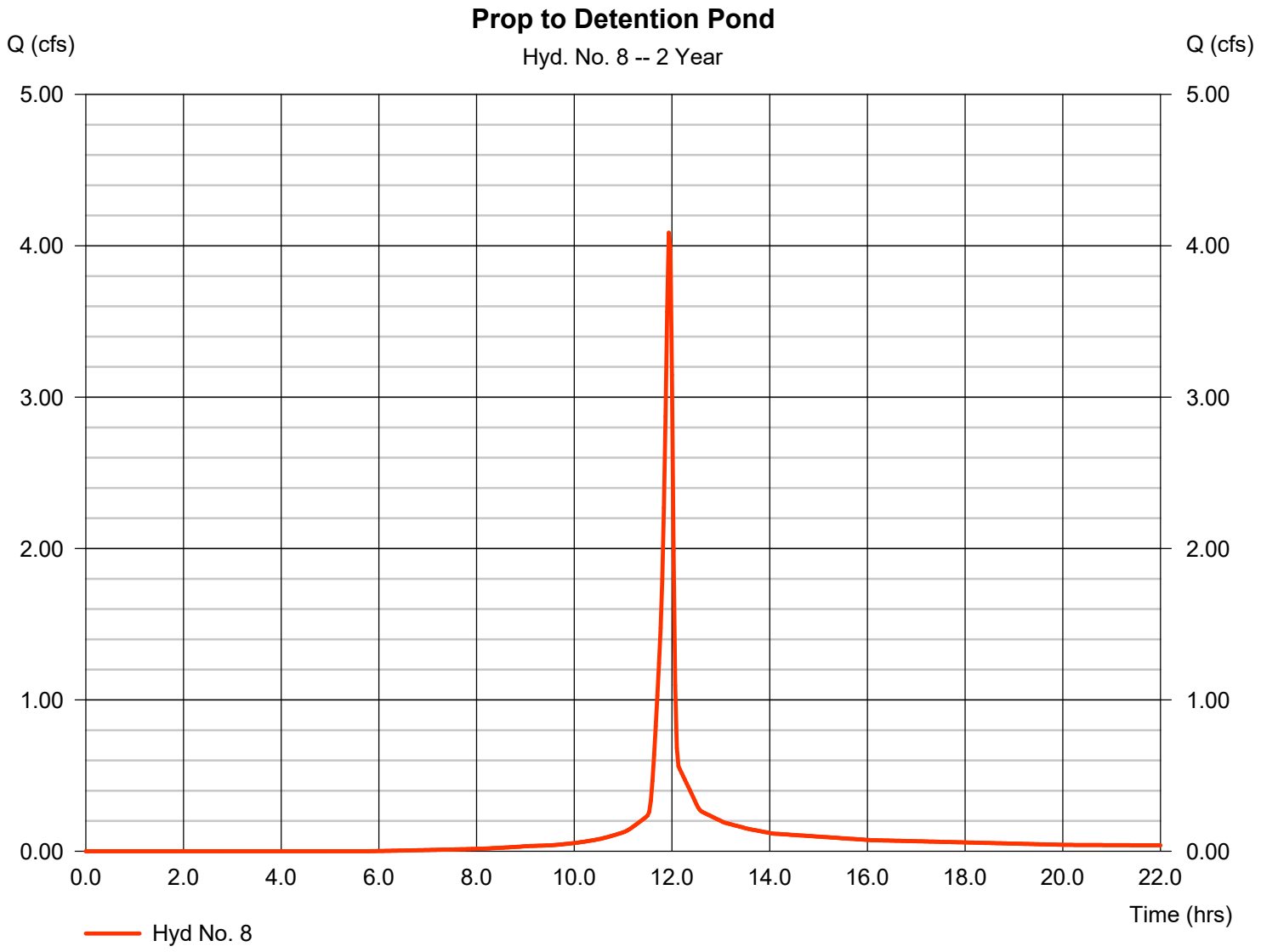


Hydrograph Report

Hyd. No. 8

Prop to Detention Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.086 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	8,447 cuft
Drainage area	=	1.020 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



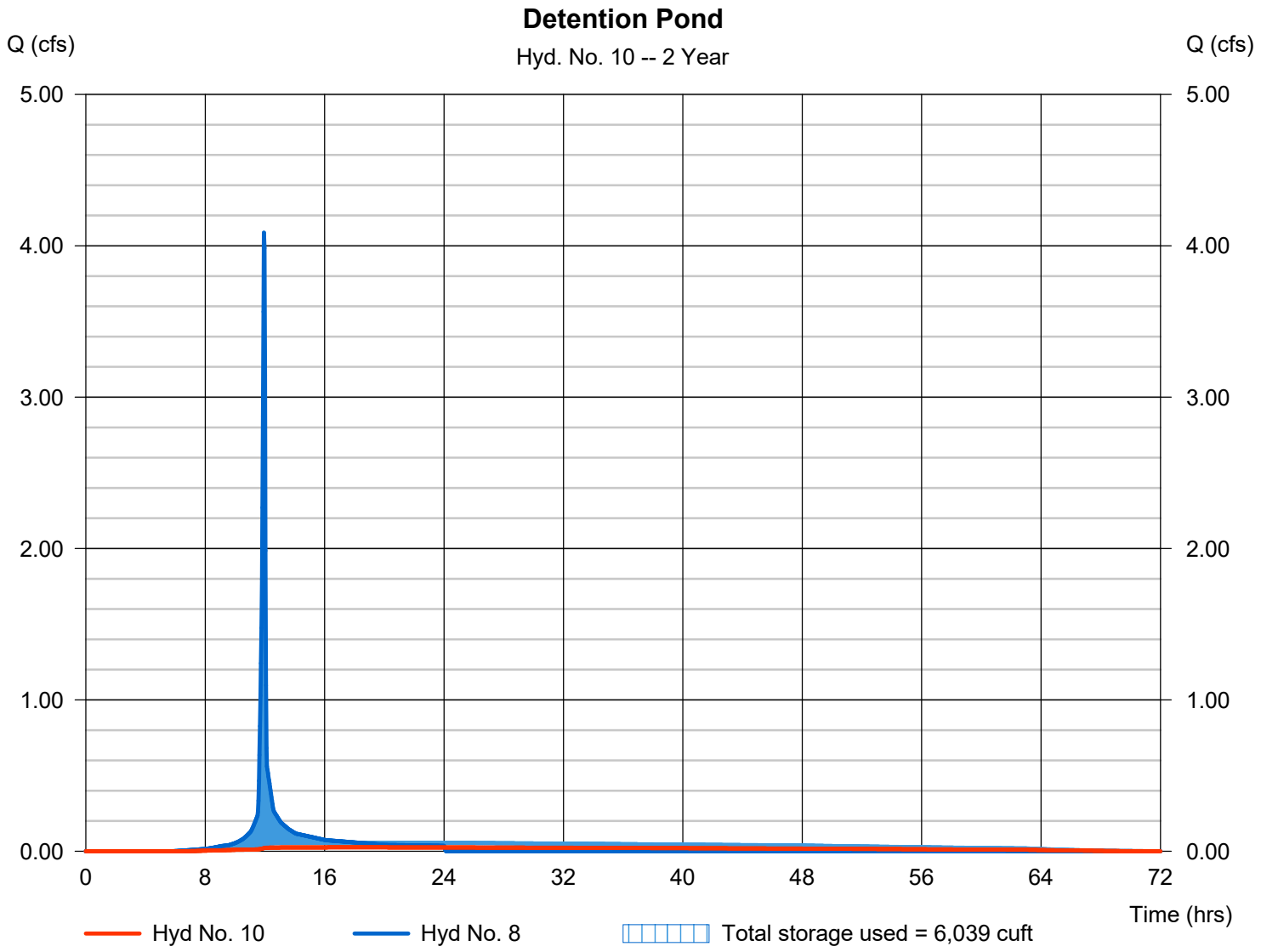
Hydrograph Report

Hyd. No. 10

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.026 cfs
Storm frequency	=	2 yrs	Time to peak	=	18.17 hrs
Time interval	=	2 min	Hyd. volume	=	3,968 cuft
Inflow hyd. No.	=	8 - Prop to Detention Pond	Max. Elevation	=	1012.61 ft
Reservoir name	=	Detention Pond	Max. Storage	=	6,039 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 1 - Detention Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1009.54 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1009.54	00	0	0
0.46	1010.00	909	209	209
1.46	1011.00	2,085	1,497	1,706
2.46	1012.00	2,776	2,431	4,137
3.46	1013.00	3,504	3,140	7,277
4.46	1014.00	4,409	3,957	11,233
5.46	1015.00	5,525	4,967	16,200
6.46	1016.00	6,079	5,802	22,002

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.75	12.00	0.00
Span (in)	= 12.00	0.75	5.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1009.50	1009.54	1013.57	0.00
Length (ft)	= 31.00	0.50	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

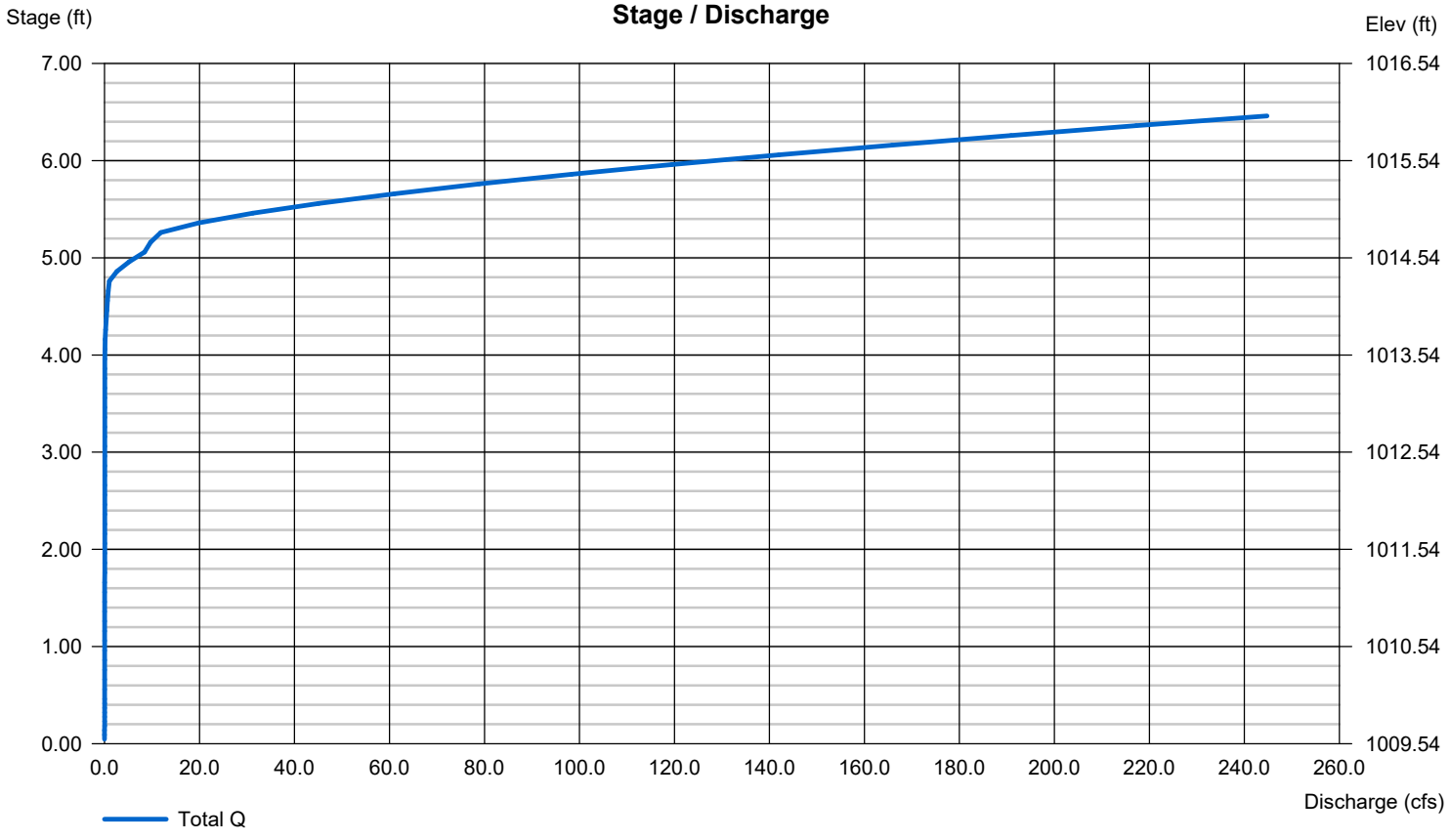
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	50.00	0.00	Inactive
Crest El. (ft)	= 1014.29	1014.75	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.420 (by Contour)

TW Elev. (ft) = 0.00

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

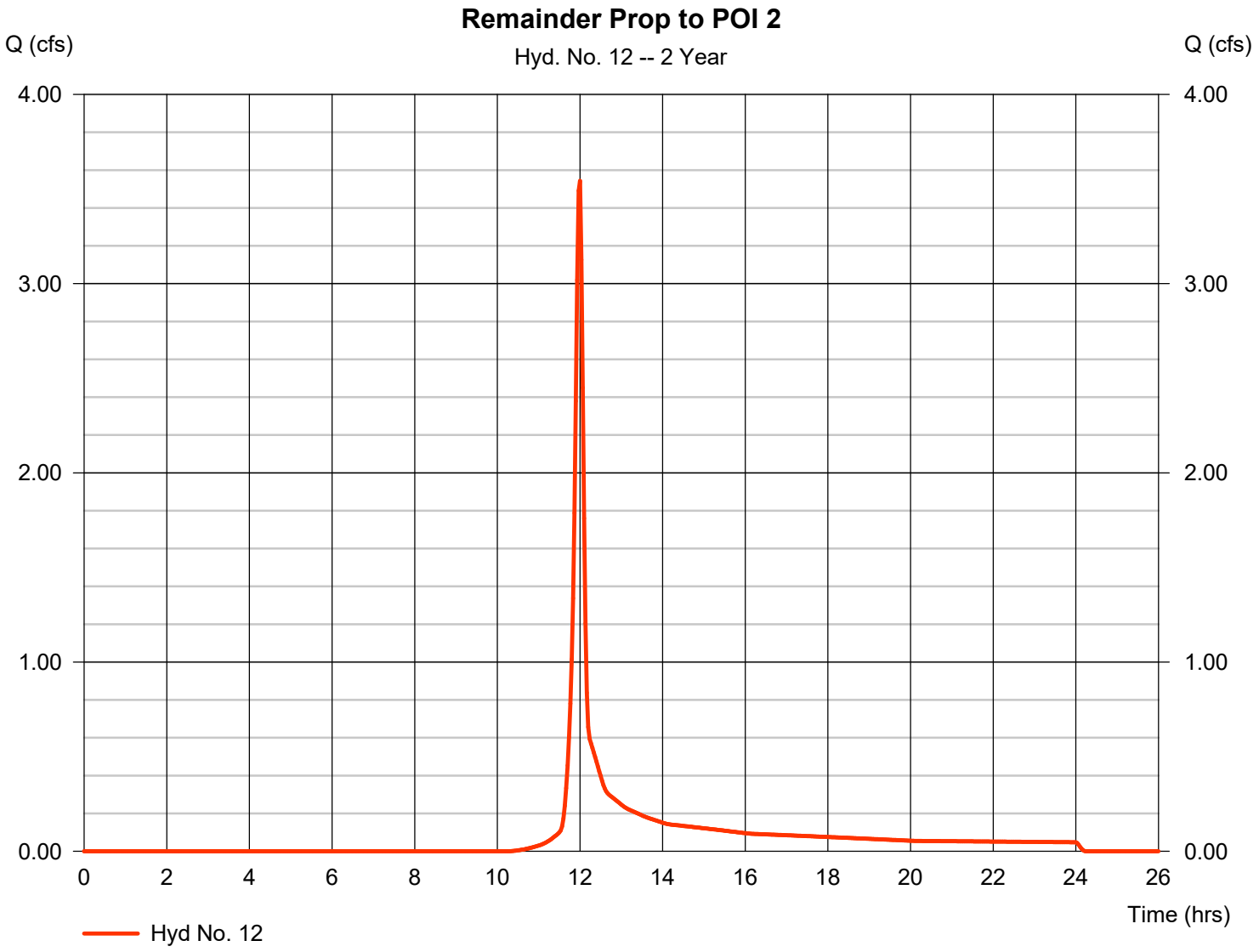


Hydrograph Report

Hyd. No. 12

Remainder Prop to POI 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.543 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	8,130 cuft
Drainage area	=	1.640 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.80 min
Total precip.	=	3.68 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

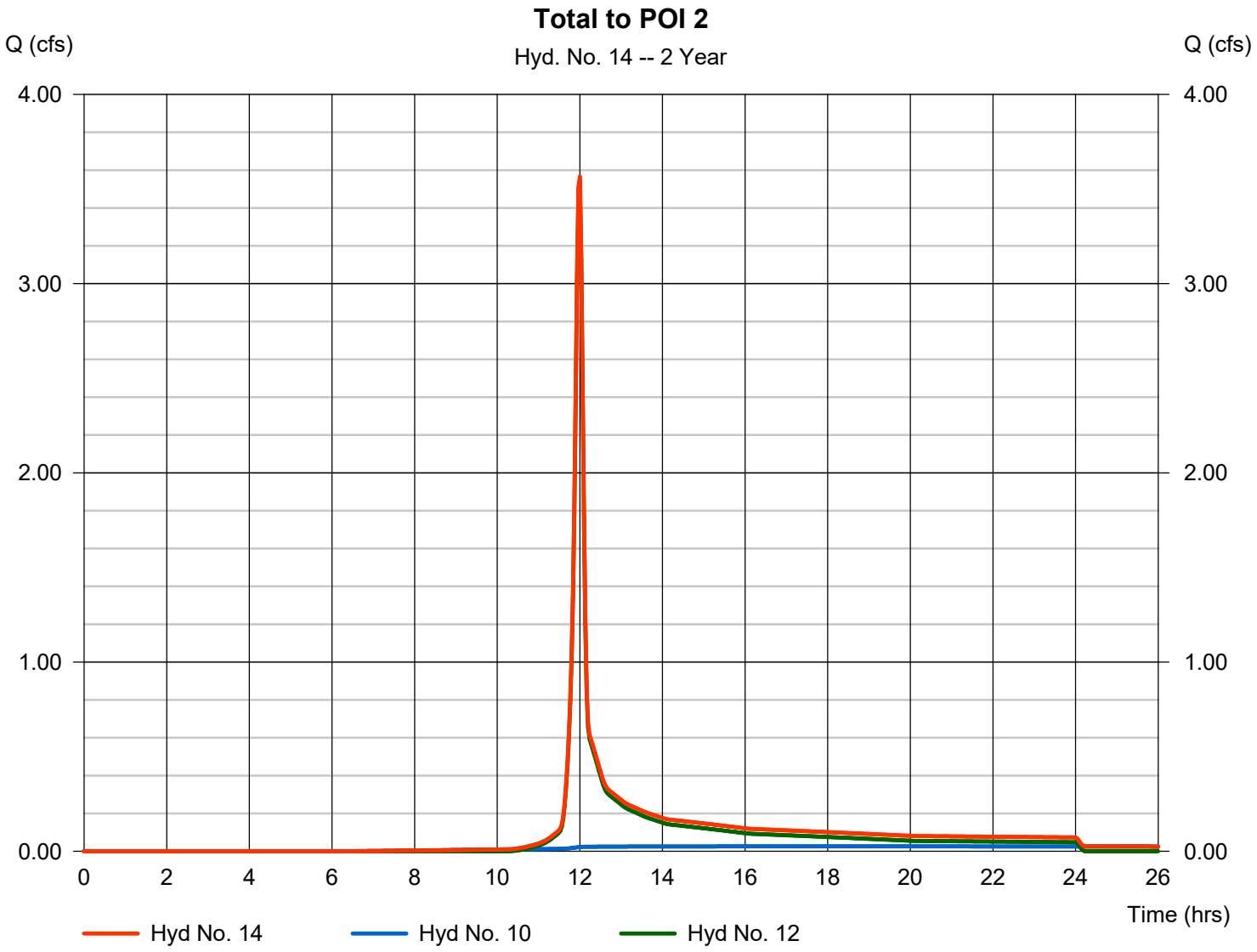


Hydrograph Report

Hyd. No. 14

Total to POI 2

Hydrograph type	= Combine	Peak discharge	= 3.565 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 12,099 cuft
Inflow hyds.	= 10, 12	Contrib. drain. area	= 1.640 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

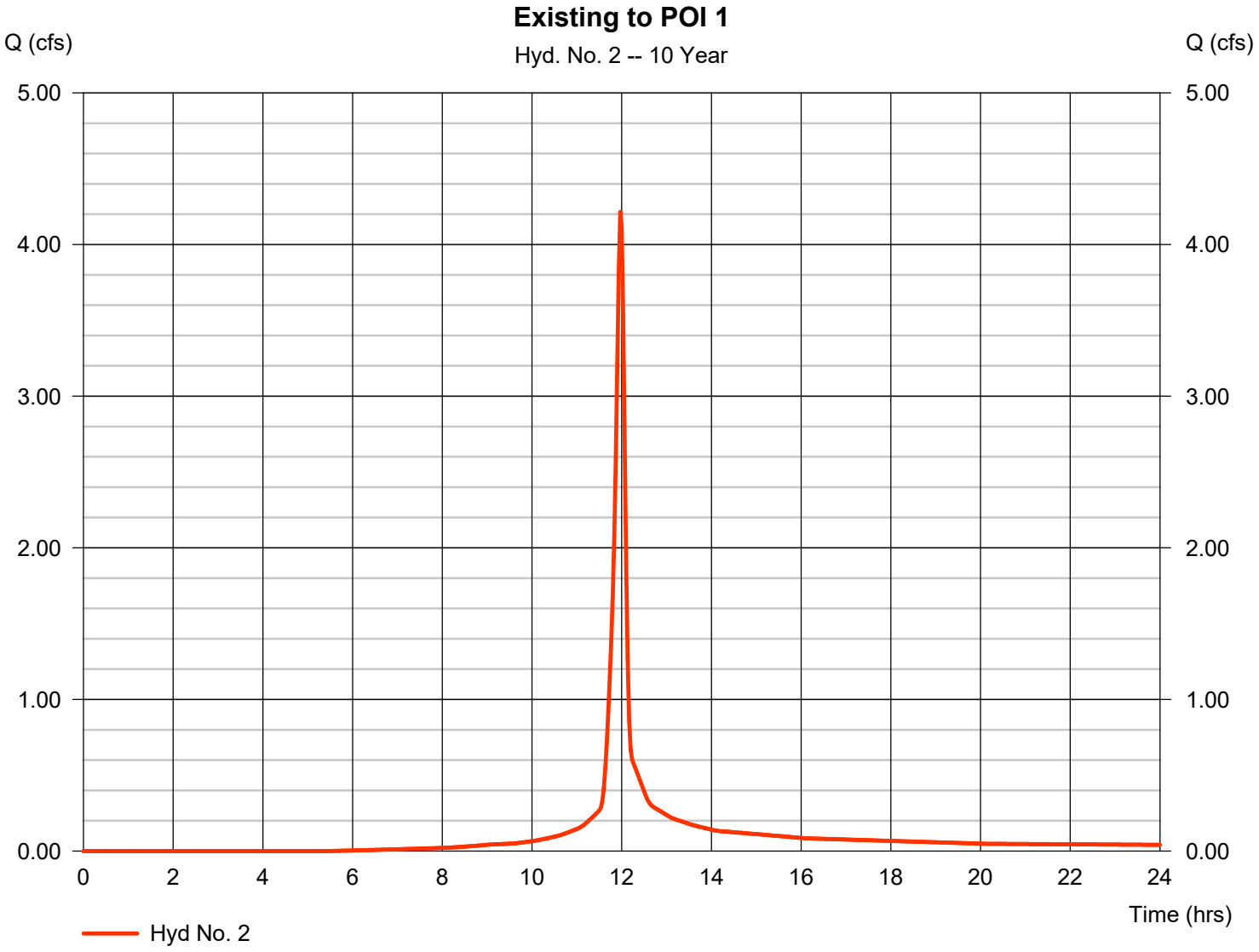
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
2	SCS Runoff	4.214	2	718	9,851	------	------	------	Existing to POI 1
4	SCS Runoff	3.714	2	716	8,041	------	------	------	Proposed to POI 1
6	SCS Runoff	10.99	2	718	25,132	------	------	------	Existing to POI 2
8	SCS Runoff	6.926	2	716	14,757	------	------	------	Prop to Detention Pond
10	Reservoir	0.129	2	878	7,672	8	1013.74	10,187	Detention Pond
12	SCS Runoff	7.442	2	718	17,025	------	------	------	Remainder Prop to POI 2
14	Combine	7.469	2	718	24,697	10, 12,	------	------	Total to POI 2

Hydrograph Report

Hyd. No. 2

Existing to POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.214 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 9,851 cuft
Drainage area	= 0.708 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.60 min
Total precip.	= 5.61 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

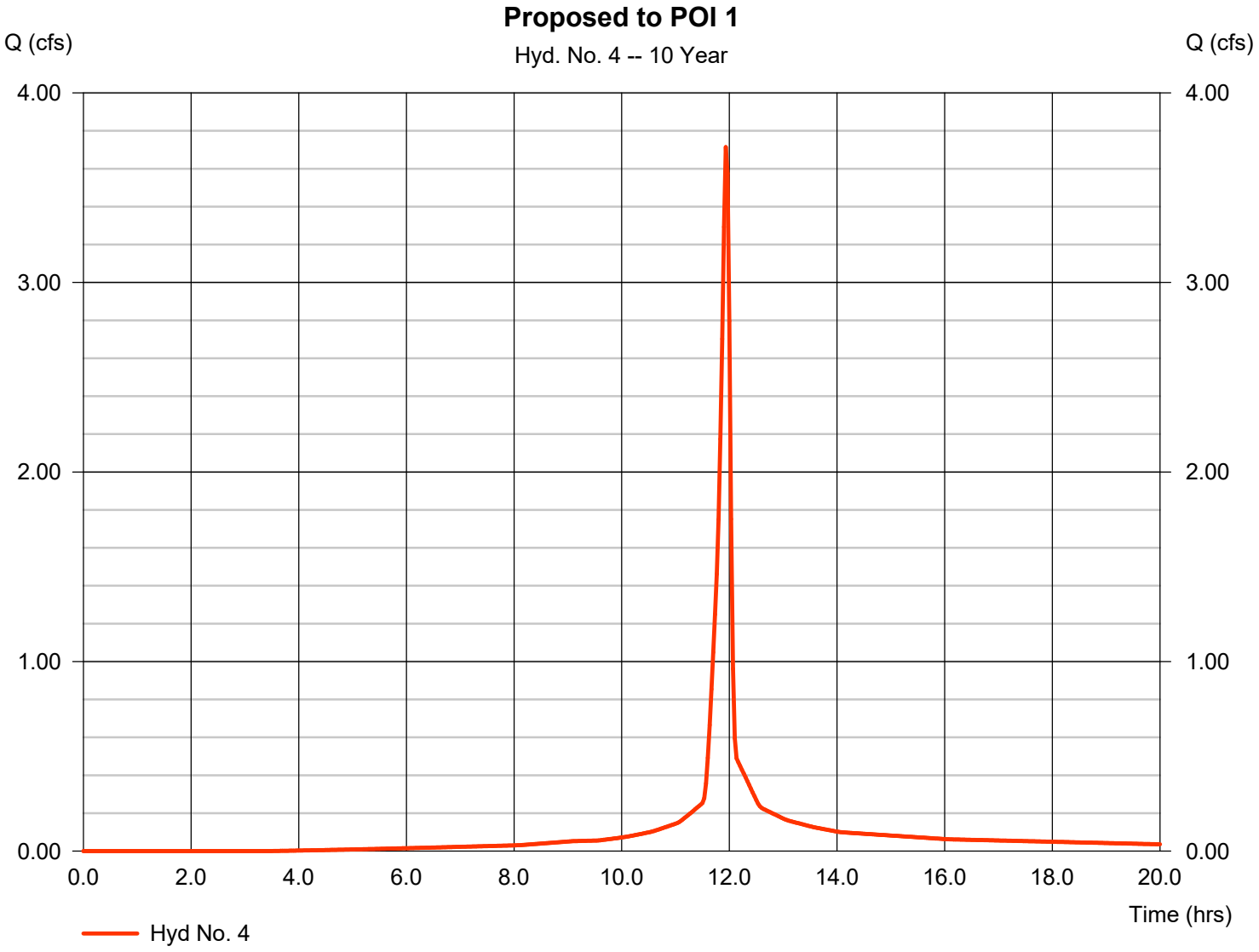


Hydrograph Report

Hyd. No. 4

Proposed to POI 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.714 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	8,041 cuft
Drainage area	=	0.529 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.61 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

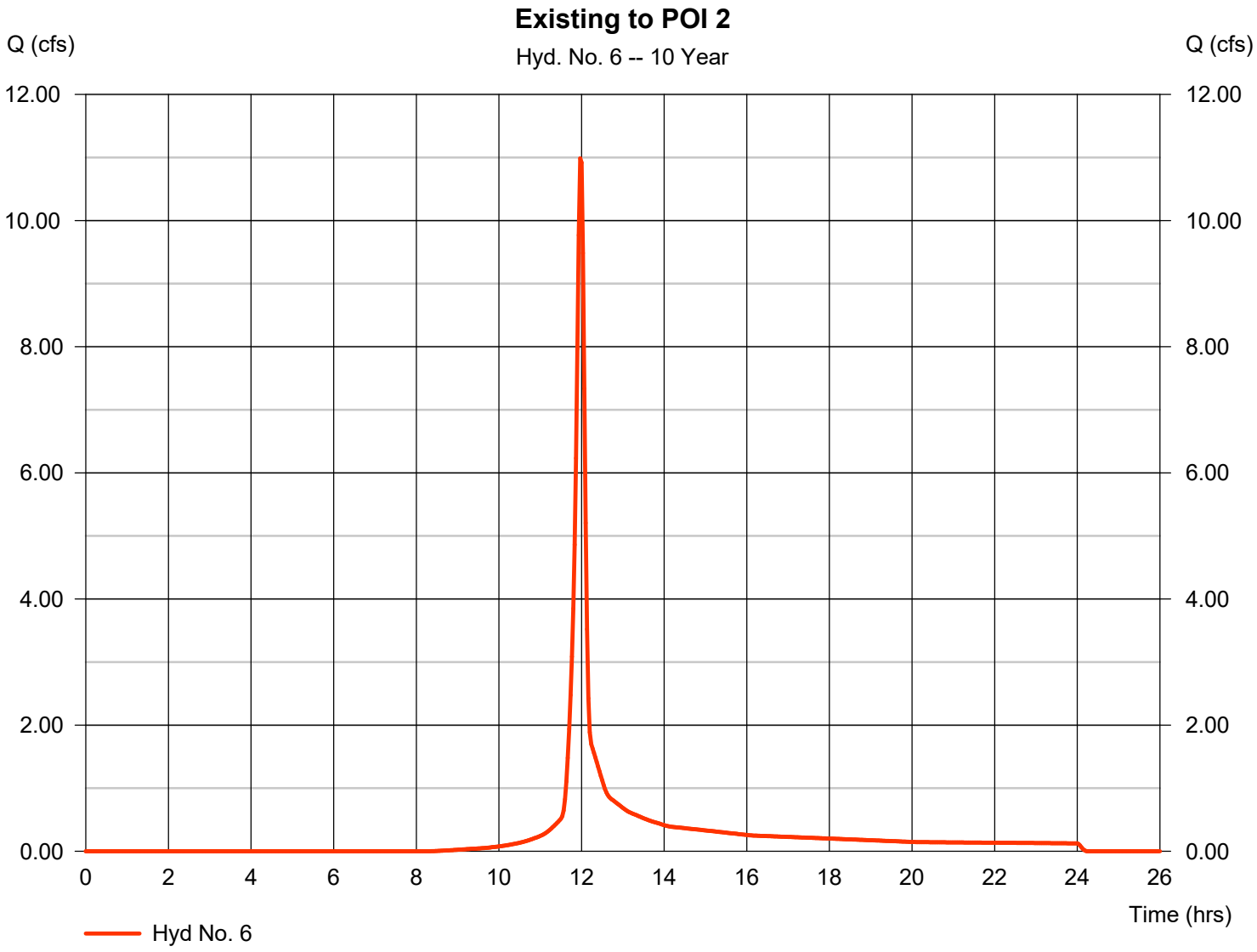


Hydrograph Report

Hyd. No. 6

Existing to POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 10.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 25,132 cuft
Drainage area	= 2.421 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.80 min
Total precip.	= 5.61 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

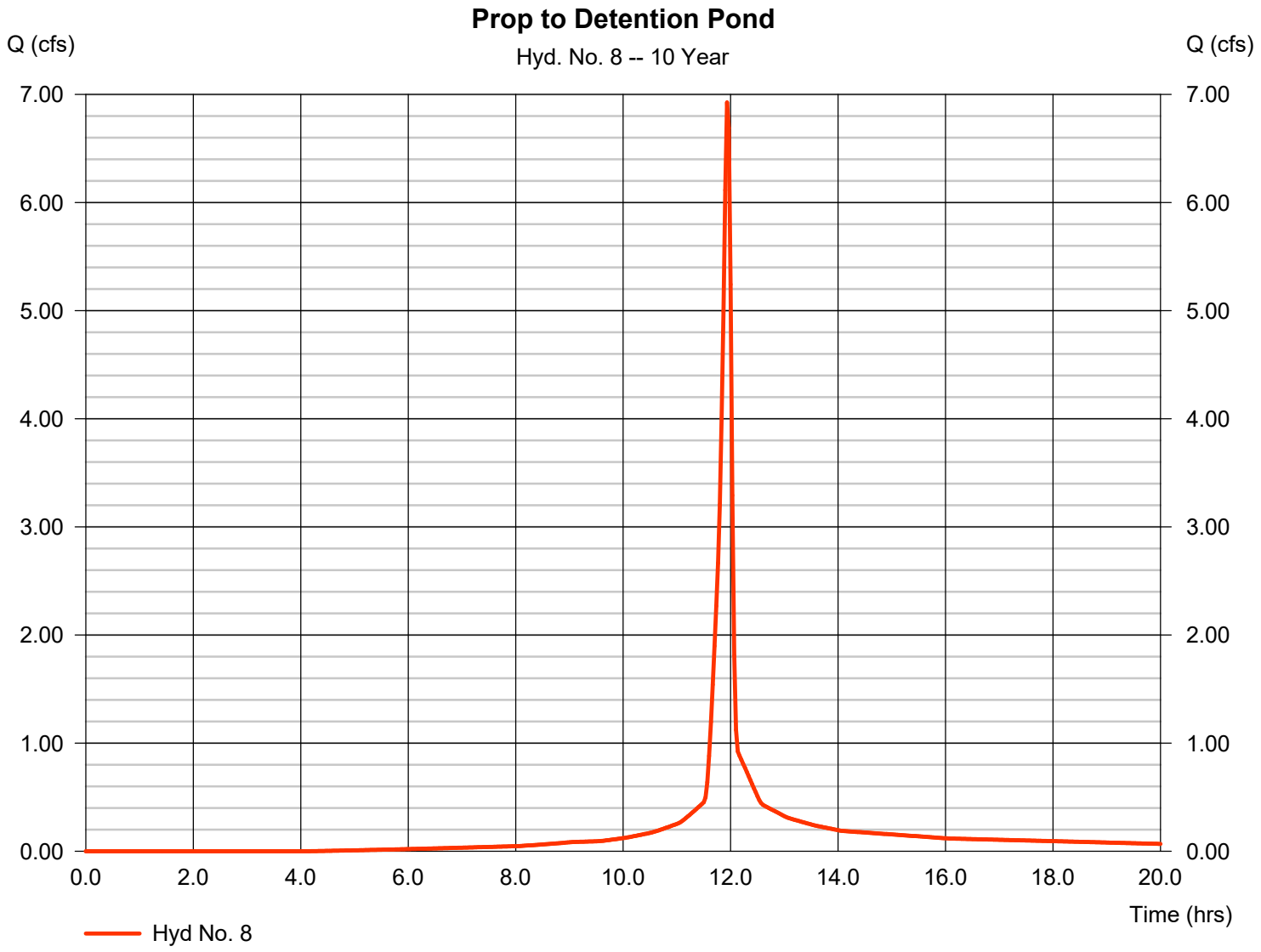


Hydrograph Report

Hyd. No. 8

Prop to Detention Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.926 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	14,757 cuft
Drainage area	=	1.020 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.61 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



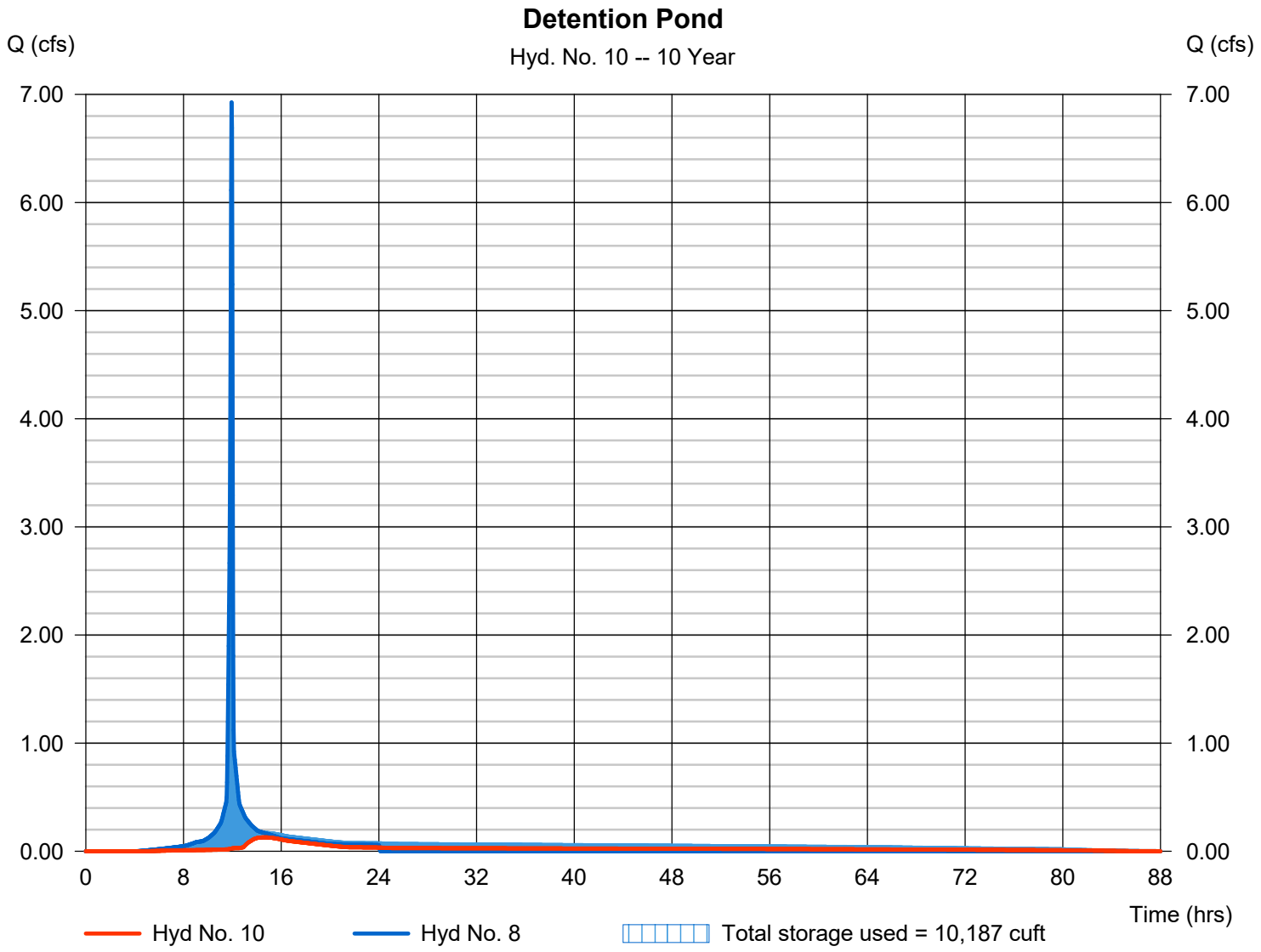
Hydrograph Report

Hyd. No. 10

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	0.129 cfs
Storm frequency	=	10 yrs	Time to peak	=	14.63 hrs
Time interval	=	2 min	Hyd. volume	=	7,672 cuft
Inflow hyd. No.	=	8 - Prop to Detention Pond	Max. Elevation	=	1013.74 ft
Reservoir name	=	Detention Pond	Max. Storage	=	10,187 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

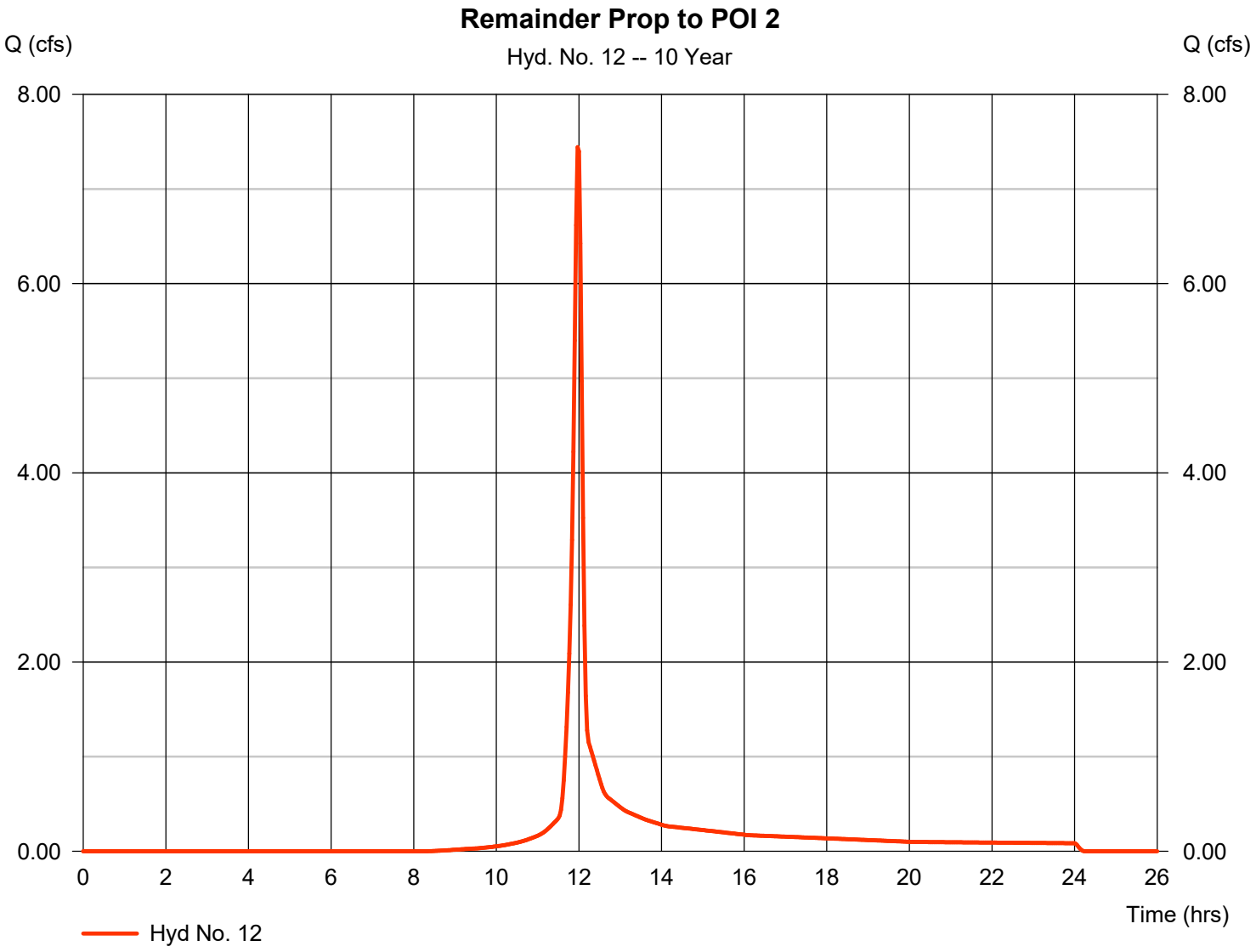


Hydrograph Report

Hyd. No. 12

Remainder Prop to POI 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.442 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	17,025 cuft
Drainage area	=	1.640 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.80 min
Total precip.	=	5.61 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

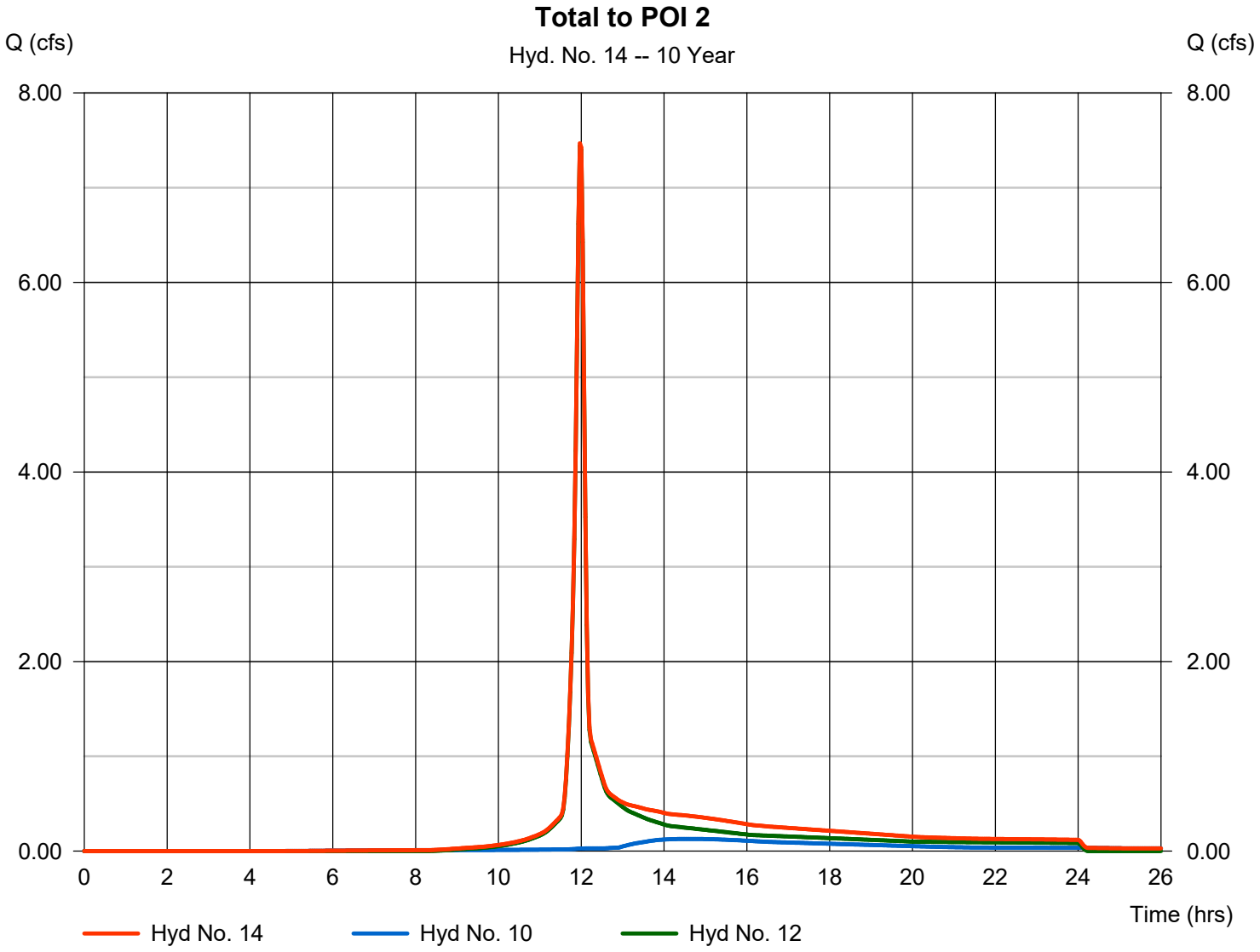


Hydrograph Report

Hyd. No. 14

Total to POI 2

Hydrograph type	= Combine	Peak discharge	= 7.469 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 24,697 cuft
Inflow hyds.	= 10, 12	Contrib. drain. area	= 1.640 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

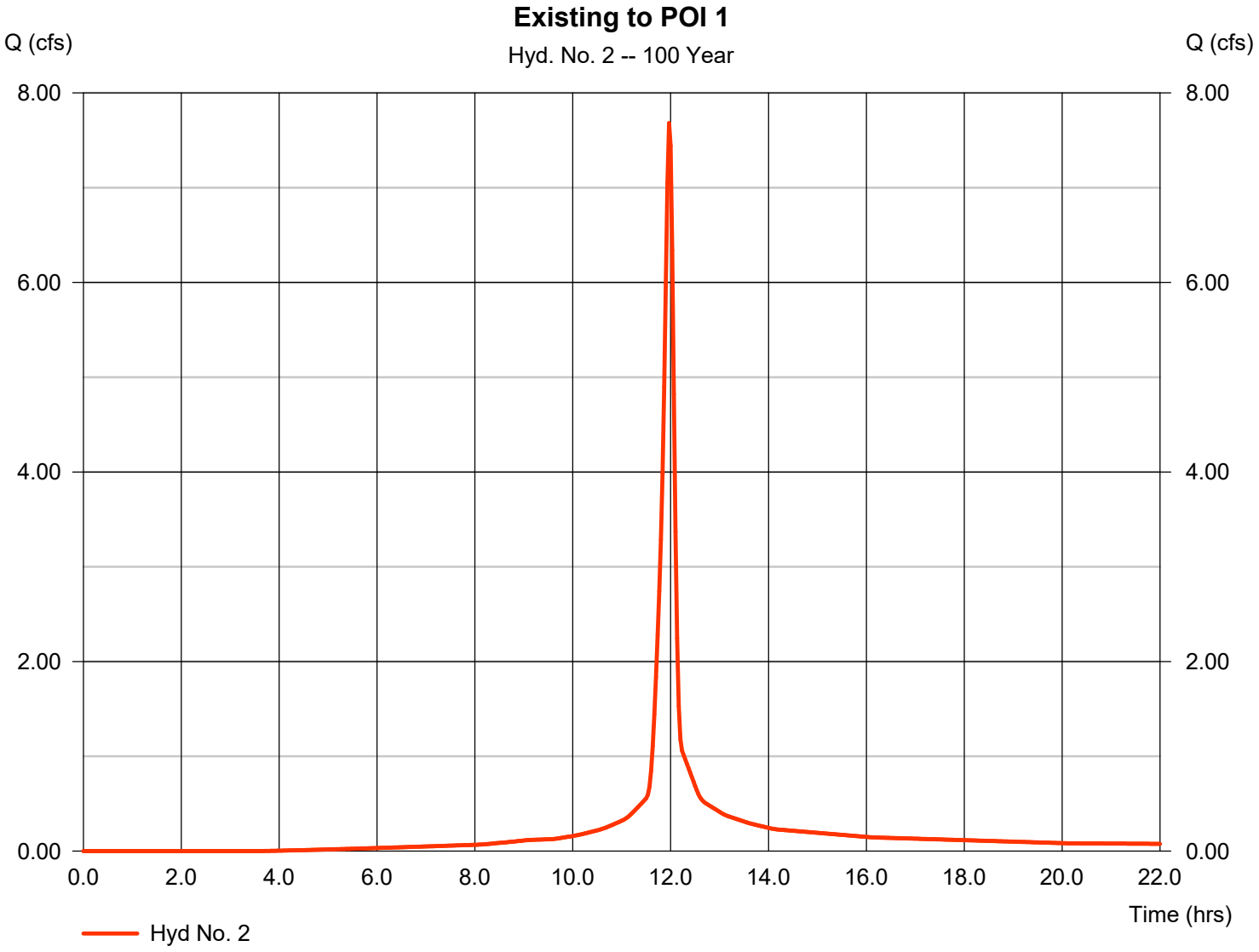
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
2	SCS Runoff	7.681	2	718	18,565	------	------	------	Existing to POI 1
4	SCS Runoff	6.376	2	716	14,329	------	------	------	Proposed to POI 1
6	SCS Runoff	22.65	2	718	52,590	------	------	------	Existing to POI 2
8	SCS Runoff	12.10	2	716	26,780	------	------	------	Prop to Detention Pond
10	Reservoir	5.849	2	722	19,271	8	1014.52	13,825	Detention Pond
12	SCS Runoff	15.34	2	718	35,625	------	------	------	Remainder Prop to POI 2
14	Combine	19.35	2	720	54,895	10, 12,	------	------	Total to POI 2

Hydrograph Report

Hyd. No. 2

Existing to POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 7.681 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 18,565 cuft
Drainage area	= 0.708 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.60 min
Total precip.	= 9.17 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

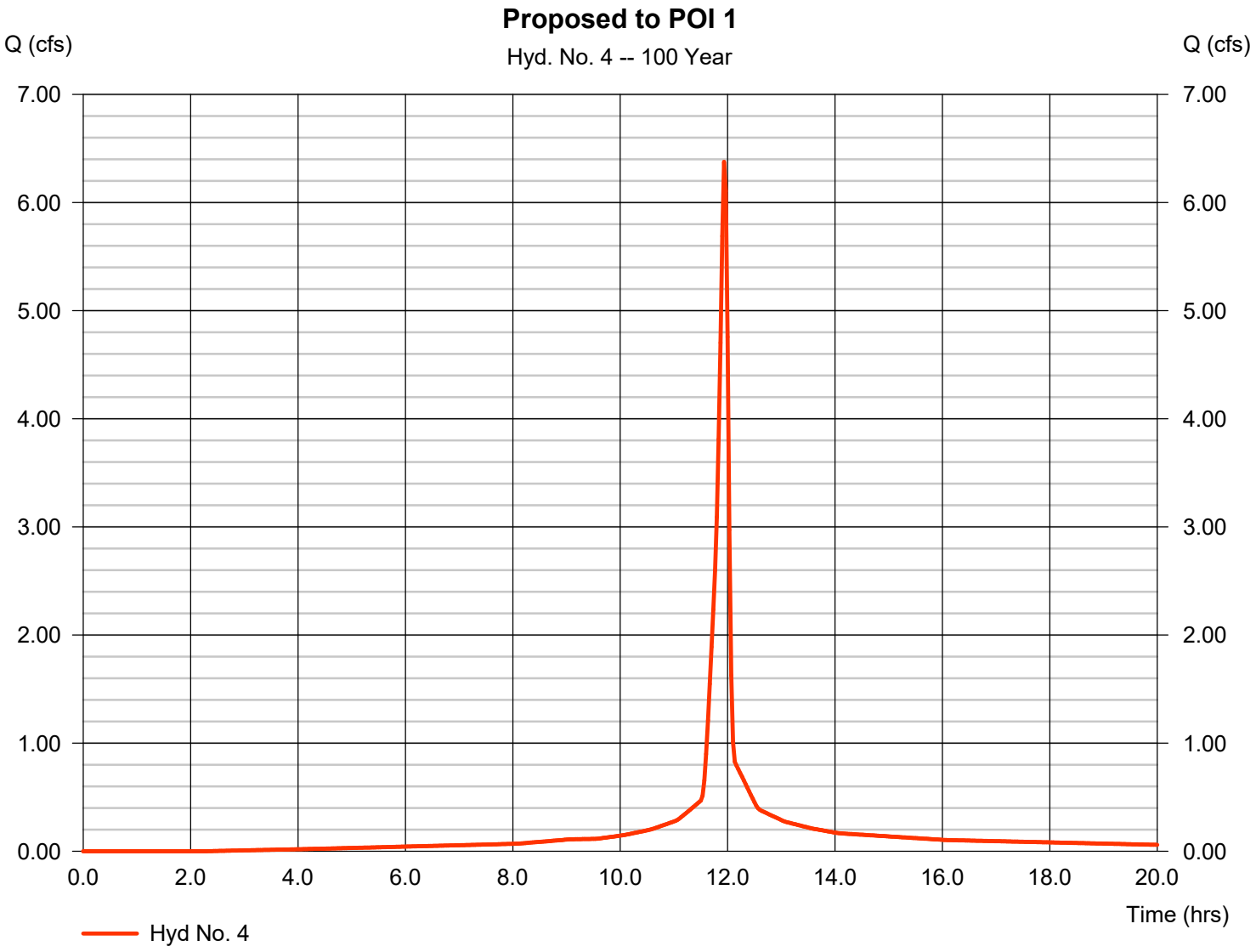


Hydrograph Report

Hyd. No. 4

Proposed to POI 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.376 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	14,329 cuft
Drainage area	=	0.529 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.17 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

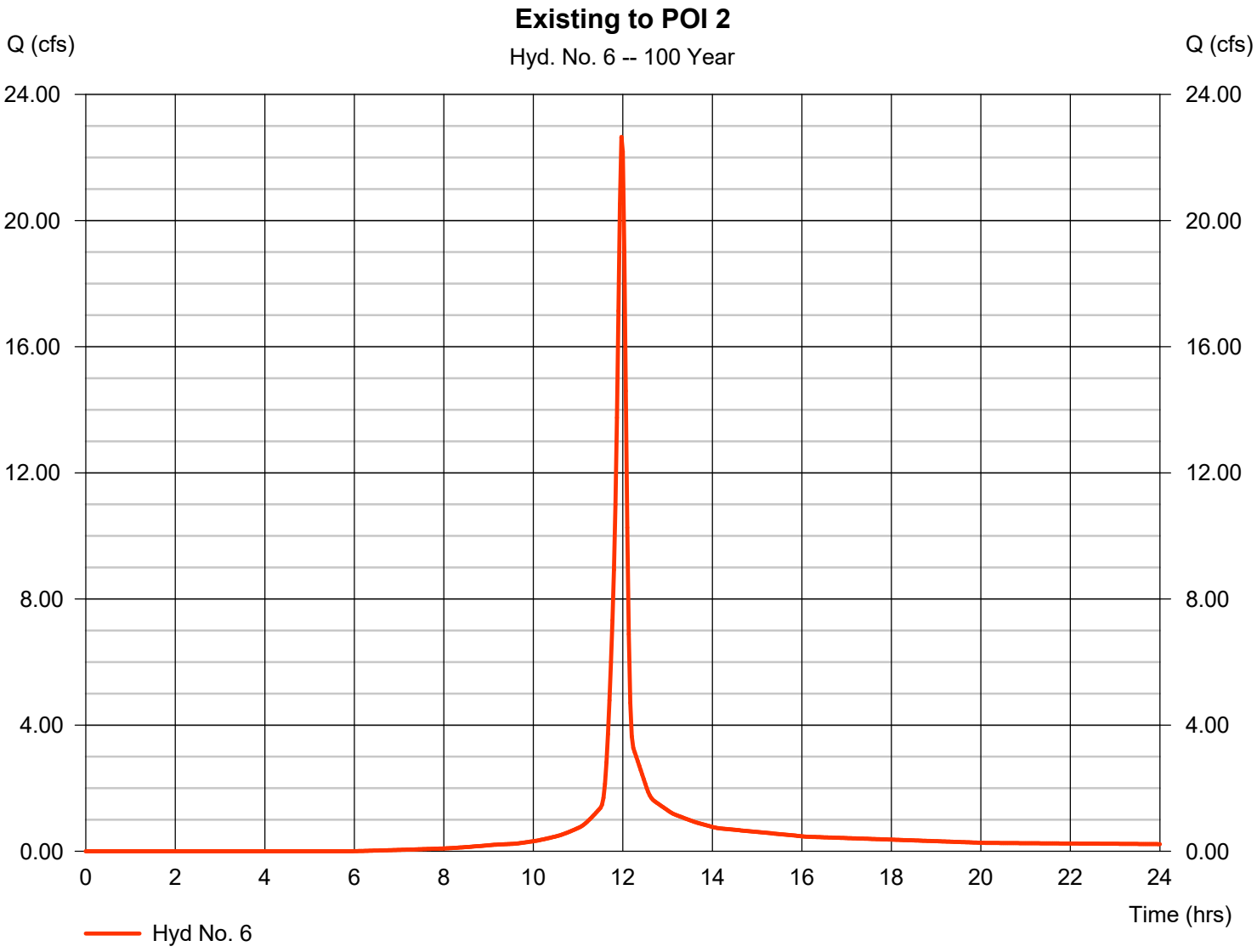


Hydrograph Report

Hyd. No. 6

Existing to POI 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	22.65 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	52,590 cuft
Drainage area	=	2.421 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.80 min
Total precip.	=	9.17 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

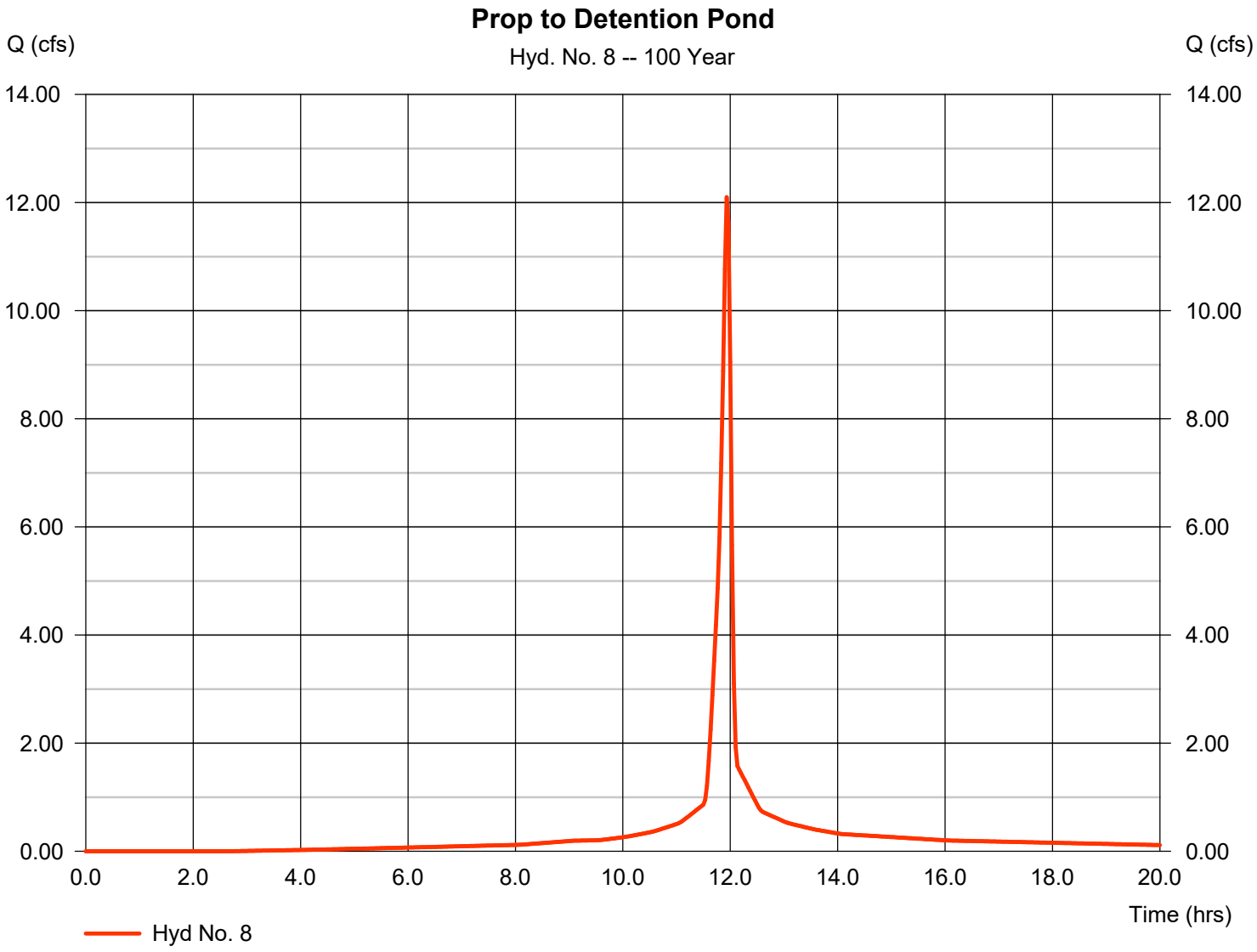


Hydrograph Report

Hyd. No. 8

Prop to Detention Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	26,780 cuft
Drainage area	=	1.020 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.17 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



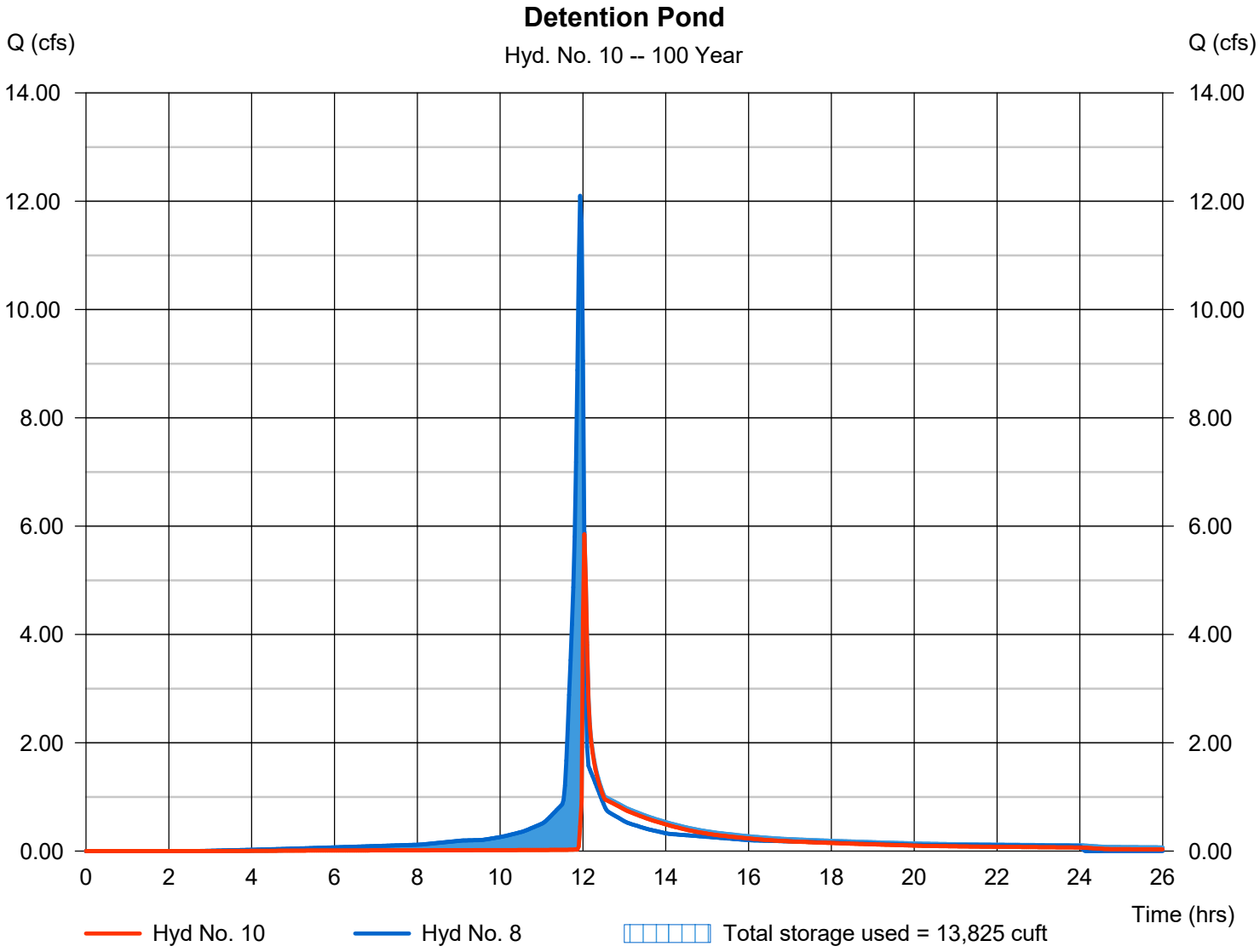
Hydrograph Report

Hyd. No. 10

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	5.849 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	19,271 cuft
Inflow hyd. No.	=	8 - Prop to Detention Pond	Max. Elevation	=	1014.52 ft
Reservoir name	=	Detention Pond	Max. Storage	=	13,825 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

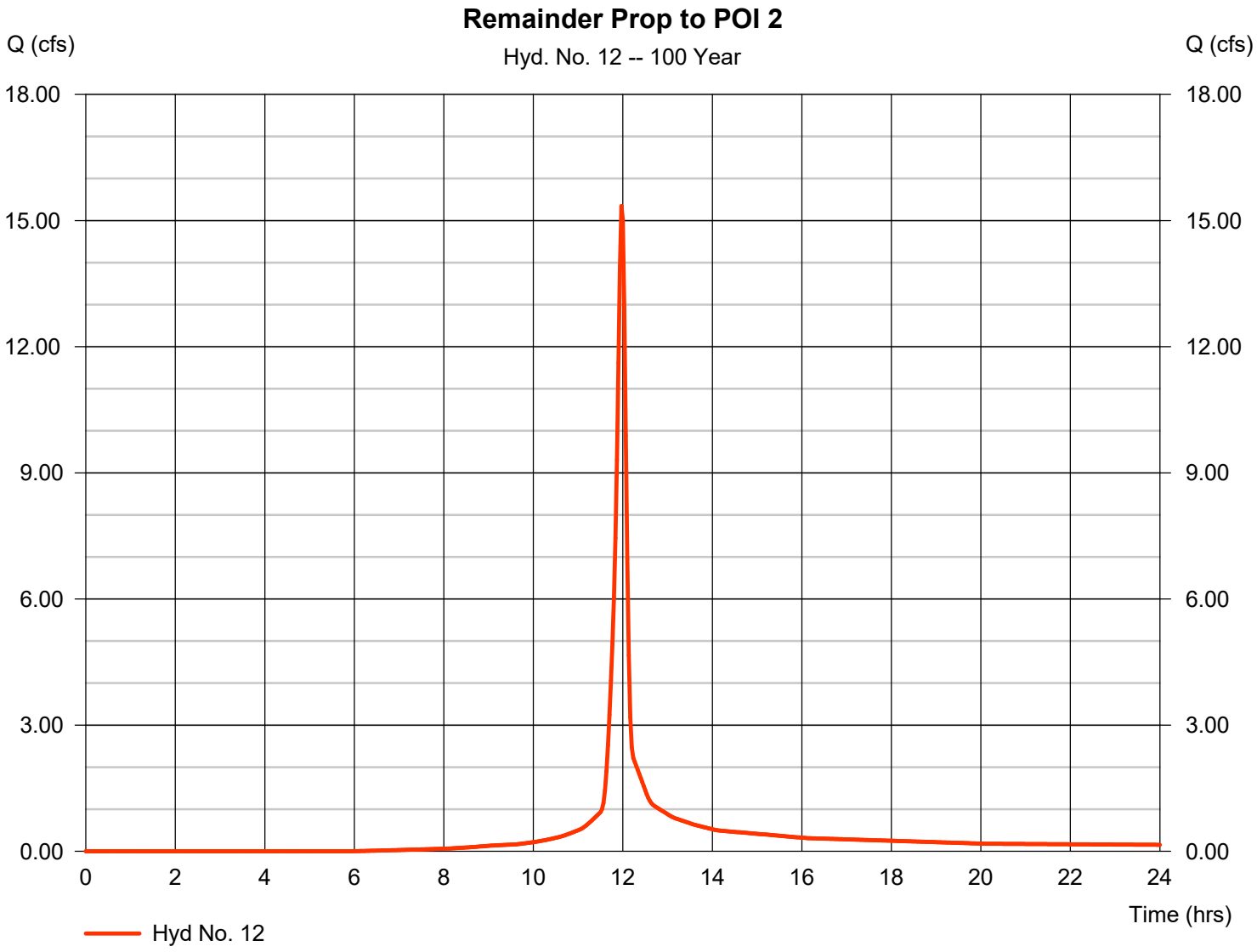


Hydrograph Report

Hyd. No. 12

Remainder Prop to POI 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.34 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	35,625 cuft
Drainage area	=	1.640 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.80 min
Total precip.	=	9.17 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

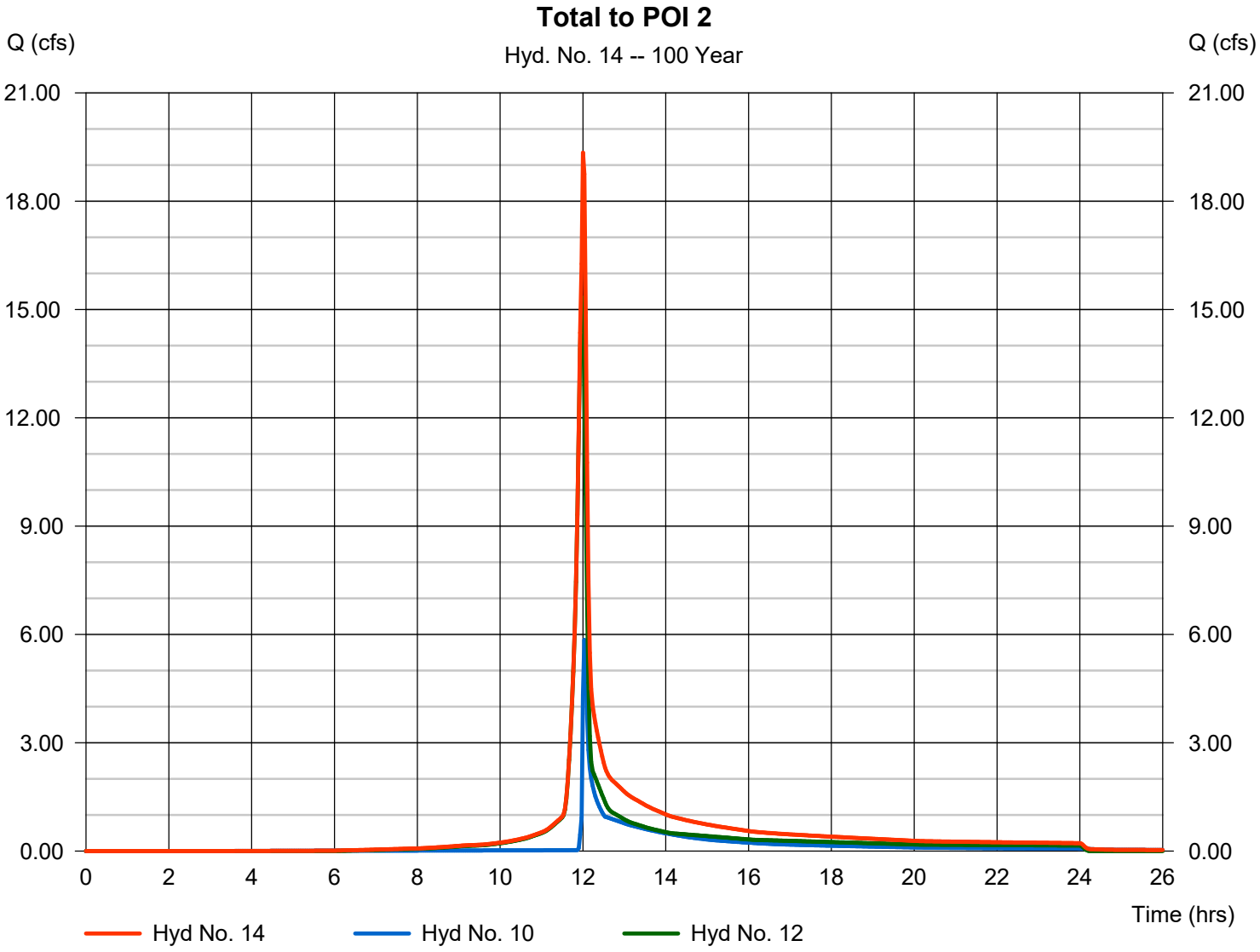


Hydrograph Report

Hyd. No. 14

Total to POI 2

Hydrograph type	=	Combine	Peak discharge	=	19.35 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	54,895 cuft
Inflow hyds.	=	10, 12	Contrib. drain. area	=	1.640 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	21.2433	4.0000	0.6645	--------
2	26.1250	4.3000	0.6753	--------
3	0.0000	0.0000	0.0000	--------
5	33.6055	4.6000	0.6818	--------
10	38.8836	4.6000	0.6794	--------
25	45.4115	4.5000	0.6730	--------
50	48.7964	4.2000	0.6607	--------
100	52.0785	3.9000	0.6501	--------

File name: Lees Summit.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.93	3.68	3.00	2.57	2.27	2.04	1.86	1.72	1.60	1.50	1.41	1.34
2	5.79	4.33	3.54	3.03	2.67	2.40	2.19	2.02	1.88	1.76	1.66	1.57
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	7.19	5.40	4.42	3.79	3.34	3.00	2.74	2.52	2.35	2.20	2.07	1.96
10	8.36	6.29	5.15	4.41	3.89	3.50	3.19	2.95	2.74	2.57	2.42	2.29
25	9.98	7.51	6.15	5.28	4.66	4.19	3.83	3.53	3.29	3.08	2.90	2.75
50	11.26	8.45	6.93	5.94	5.25	4.73	4.32	3.99	3.72	3.49	3.29	3.12
100	12.57	9.41	7.71	6.61	5.85	5.27	4.82	4.45	4.15	3.90	3.68	3.49

Tc = time in minutes. Values may exceed 60.

Precip. file name: \\global.gsp\data\nf\na_nf05\4083145\01Work\03Tech\LP\01Storm\02Detention\SCS.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	3.09	3.68	0.00	4.71	5.61	6.94	8.02	9.17
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

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