Stormwater Management Facilities Report

C3 Industries Expansion
S. Cool Springs Road
O'Fallon, Missouri

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NUMBER
PE-2017018980

2/17/23

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DETENTION CALCULATIONS

DETENTION CALCULATIONS
FOR BMP #1
FOR
S. COOL SPRINGS ROAD
O’FALLON, MISSOURI
FEBRUARY 2, 2023
PROJECT NO. M20-8003C

The following detention calculations have been performed for final design for S. Cool Springs Road Expansion in O’Fallon, Missouri. Said calculations were performed in accordance with the City of O’Fallon Standards. All calculations and design was performed with the aid of AutoCAD Civil 3D Software. Existing, proposed, and routed hydrographs for the 2-year, 15-year, 25-year, 100-year storms are attached.

BMP #1 CALCULATIONS SUMMARY:

A summary of the detention calculations is shown below. All detention calculations, including release rates and volumes, are included in this report. Drainage area maps are also included at the end of this report.

The existing basin located in the southeastern portion of the property has been modified to take in the new tributary drainage area for the site. This new drainage area takes in some of the pavement, but the majority of the new expansion will be handled by the existing retention basin located in the northeastern portion of the site. This existing retention basin has been designed to take in the majority of the new building expansion. See report from Bax Engineering for detention and water quality calculations.

Year of Storm Frequency	Existing Peak Runoff (cfs) [A]	Proposed Peak Runoff (cfs) [B]	**Required Detention (cfs) [B] – [A]**	Tributary/Runoff to Basin (cfs) [C]	Basin Peak Release Rate (cfs) [D]	**Actual Detention (cfs) [C] – [D]**
2	16.47	23.43	**6.96**	14.17	**0.024**	**14.15**
15	25.28	36.92	**11.64**	21.86	**0.031**	**21.83**
25	26.72	38.98	**12.26**	23.10	**0.032**	**23.07**
100	31.63	44.72	**13.09**	27.17	**0.035**	**27.14**

The 100-year storm, with low flow blocked reaches a peak elevation of 472.00 in the basin; the basin berm elevation is 473.00 providing 1.00’ freeboard.

Storm Water Handling for S. Cool Springs Road Expansion will be provided in BMP #1 at the southeastern portion of the property. The detention basin was designed and modified so that the existing flow of the site would not be exceeded by the proposed flow of the site. Due to programming of the AutoCAD Civil 3D Software, the heading and title for the 15-year event is listed as the 3-year event on all hydrograph sheets. All necessary calculations are attached.

2-YEAR STORM

Existing Onsite Runoff (2-year storm**)**

Total Development = 7.53 acres
Existing Runoff (cfs) = 16.47 cfs

Proposed On-Site Runoff (2-year storm)

Total Development = 7.53 acres
Proposed Runoff (cfs) = 23.43 cfs

Tributary Runoff to Basin (2-year storm)

Total On-Site Development = 7.53 acres
Proposed “C” Factor= Tributary area is made of subareas which each have separate runoff coefficients, see subarea hydrograph for specific runoff coefficient.
Proposed ToC = Tributary area is made of subareas which each have separate time of concentrations, see subarea hydrograph for specific time of concentrations.
Proposed Runoff (cfs) = 14.17 cfs

Required Detention (2-year storm)

Required Detained Runoff = Developed Runoff – Undeveloped Runoff
Required Detained Runoff = **6.96 cfs**

Actual Detained Run-off = Tributary run-off to basin – Peak detention basin release rate
Actual Detained Run-off = 14.17 cfs – 0.024 cfs = 14.15 cfs
Actual High Water Elevation = 470.41 ft

Total Stored Volume = 2,545 ft^3

Detention Basin Volume = 37,154 ft^3 (To elevation 473.00, not including 1 ft of freeboard)

15-YEAR STORM

Existing Onsite Runoff (15-year storm**)**

Total Development = 7.53 acres
Existing Runoff (cfs) = 25.28 cfs

Proposed On-Site Runoff (15-year storm)

Total Development = 7.53 acres
Proposed Runoff (cfs) = 36.92 cfs

Tributary Runoff to Basin (15-year storm)

Total On-Site Development = 7.53 acres
Proposed "C" Factor= Tributary area is made of subareas which each have separate runoff coefficients, see subarea hydrograph for specific runoff coefficient.
Proposed ToC = Tributary area is made of subareas which each have separate time of concentrations, see subarea hydrograph for specific time of concentrations.
Proposed Runoff (cfs) = 21.86 cfs

Required Detention (15-year storm)

Required Detained Runoff = Developed Runoff – Undeveloped Runoff
Required Detained Runoff = **11.64 cfs**

Actual Detained Run-off = Tributary run-off to basin – Peak detention basin release rate
Actual Detained Run-off = 21.86 cfs – 0.031 cfs = 21.83 cfs
Actual High Water Elevation = 470.64 ft

Total Stored Volume = 3,929 ft^3

Detention Basin Volume = 37,154 ft^3 (To elevation 473.00, not including 1 ft of freeboard)

25-YEAR STORM

Existing Onsite Runoff (25-year storm**)**

Total Development = 7.53 acres
Existing Runoff (cfs) = 26.72 cfs

Proposed Runoff (25-year storm)

Total Development = 7.53 acres
Proposed Runoff (cfs) = 38.98 cfs

Tributary Runoff to Basin (25-year storm)

Total On-Site Development = 7.53 acres
Proposed “C” Factor= Tributary area is made of subareas which each have separate runoff coefficients, see subarea hydrograph for specific runoff coefficient.
Proposed ToC = Tributary area is made of subareas which each have separate time of concentrations, see subarea hydrograph for specific time of concentrations.
Proposed Runoff (cfs) = 23.10 cfs

Required Detention (25-year storm)

Required Detained Runoff = Developed Runoff – Undeveloped Runoff
Required Detained Runoff = **12.26 cfs**

Actual Detained Run-off = Tributary run-off to basin – Peak detention basin release rate
Actual Detained Run-off = 23.10 cfs – 0.032 cfs = 23.07 cfs
Actual High Water Elevation = 470.67 ft

Total Stored Volume = 4,151 ft^3

Detention Basin Volume = 37,154 ft^3 (To elevation 473.00, not including 1 ft of freeboard)

100-YEAR STORM

Existing Onsite Runoff (100-year storm**)**

Total Development = 7.53 acres
Existing Runoff (cfs) = 31.63 cfs

Proposed Runoff (100-year storm)

Total Development = 7.53 acres
Proposed Runoff (cfs) = 44.72 cfs

Tributary Runoff to Basin (100-year storm)

Total On-Site Development = 7.53 acres
Proposed “C” Factor= Tributary area is made of subareas which each have separate runoff coefficients, see subarea hydrograph for specific runoff coefficient.
Proposed ToC = Tributary area is made of subareas which each have separate time of concentrations, see subarea hydrograph for specific time of concentrations.
Proposed Runoff (cfs) = 27.17 cfs

Required Detention (100-year storm)

Required Detained Runoff = Developed Runoff – Undeveloped Runoff
Required Detained Runoff = **13.09 cfs**

Actual Detained Run-off = Tributary run-off to basin – Peak detention basin release rate
Actual Detained Run-off = 27.17 cfs – 0.035 cfs = 27.14 cfs
Actual High Water Elevation = 470.79 ft

Total Stored Volume = 4,883 ft^3

Detention Basin Volume = 37,154 ft^3 (To elevation 473.00, not including 1 ft of freeboard)

CALCULATIONS – BMP #1

Low Flow Orifice Open

Low Flow Orifice Blocked

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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	Rational	------	-------	0.861	1.448	-------	1.086	1.525	-------	1.622	EX_TRIB1
2	Rational	------	-------	4.823	7.263	-------	6.476	7.681	-------	9.314	EX_TRIB2
3	Rational	------	-------	38.30	54.41	-------	55.07	57.71	-------	76.16	EX_TRIB3
4	Rational	------	-------	12.85	19.83	-------	16.96	20.96	-------	24.65	EX_TRIB4
6	Combine	1, 2, 4,	-------	16.47	25.28	-------	21.82	26.72	-------	31.63	TOTAL EX
8	Rational	------	-------	13.99	22.35	-------	18.08	23.59	-------	26.61	P_TRIB1
9	Rational	------	-------	0.966	1.626	-------	1.219	1.713	-------	1.821	P_TRIB2
10	Rational	------	-------	14.17	21.86	-------	18.70	23.10	-------	27.17	P_TRIB3
11	Rational	------	-------	0.211	0.356	-------	0.267	0.375	-------	0.398	P_TRIB4
13	Combine	8, 9, 10, 11,	-------	23.43	36.92	-------	30.55	38.98	-------	44.72	TOTAL P
15	Rational	------	-------	38.30	54.41	-------	55.07	57.71	-------	76.16	OFF_TRIB1
17	Reservoir	10	-------	0.024	0.031	-------	0.028	0.032	-------	0.035	ROUTED BASIN
19	Combine	8, 9, 11, 17,	-------	13.99	22.36	-------	18.09	23.60	-------	26.62	TOTAL P W/DETENTION

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

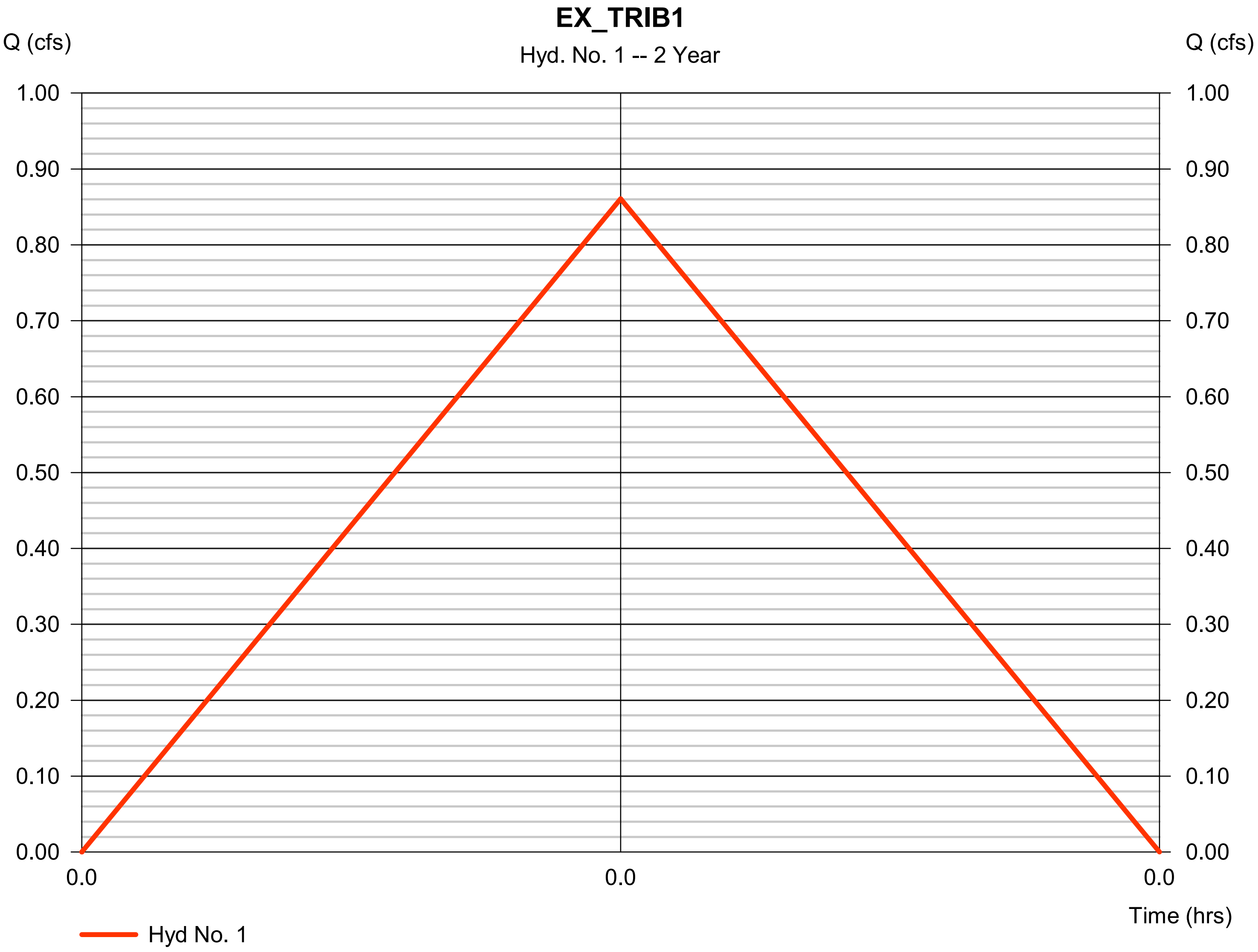
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	0.861	1	1	52	------	------	------	EX_TRIB1
2	Rational	4.823	1	4	1,158	------	------	------	EX_TRIB2
3	Rational	38.30	1	11	25,280	------	------	------	EX_TRIB3
4	Rational	12.85	1	3	2,313	------	------	------	EX_TRIB4
6	Combine	16.47	1	3	3,523	1, 2, 4,	------	------	TOTAL EX
8	Rational	13.99	1	2	1,678	------	------	------	P_TRIB1
9	Rational	0.966	1	1	58	------	------	------	P_TRIB2
10	Rational	14.17	1	3	2,550	------	------	------	P_TRIB3
11	Rational	0.211	1	1	13	------	------	------	P_TRIB4
13	Combine	23.43	1	2	4,299	8, 9, 10, 11,	------	------	TOTAL P
15	Rational	38.30	1	11	25,280	------	------	------	OFF_TRIB1
17	Reservoir	0.024	1	6	2,232	10	470.41	2,545	ROUTED BASIN
19	Combine	13.99	1	2	3,981	8, 9, 11, 17,	------	------	TOTAL P W/DETENTION

Hydrograph Report

Hyd. No. 1

EX_TRIB1

Hydrograph type	= Rational	Peak discharge	= 0.861 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.570 ac	Runoff coeff.	= 0.2
Intensity	= 7.550 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

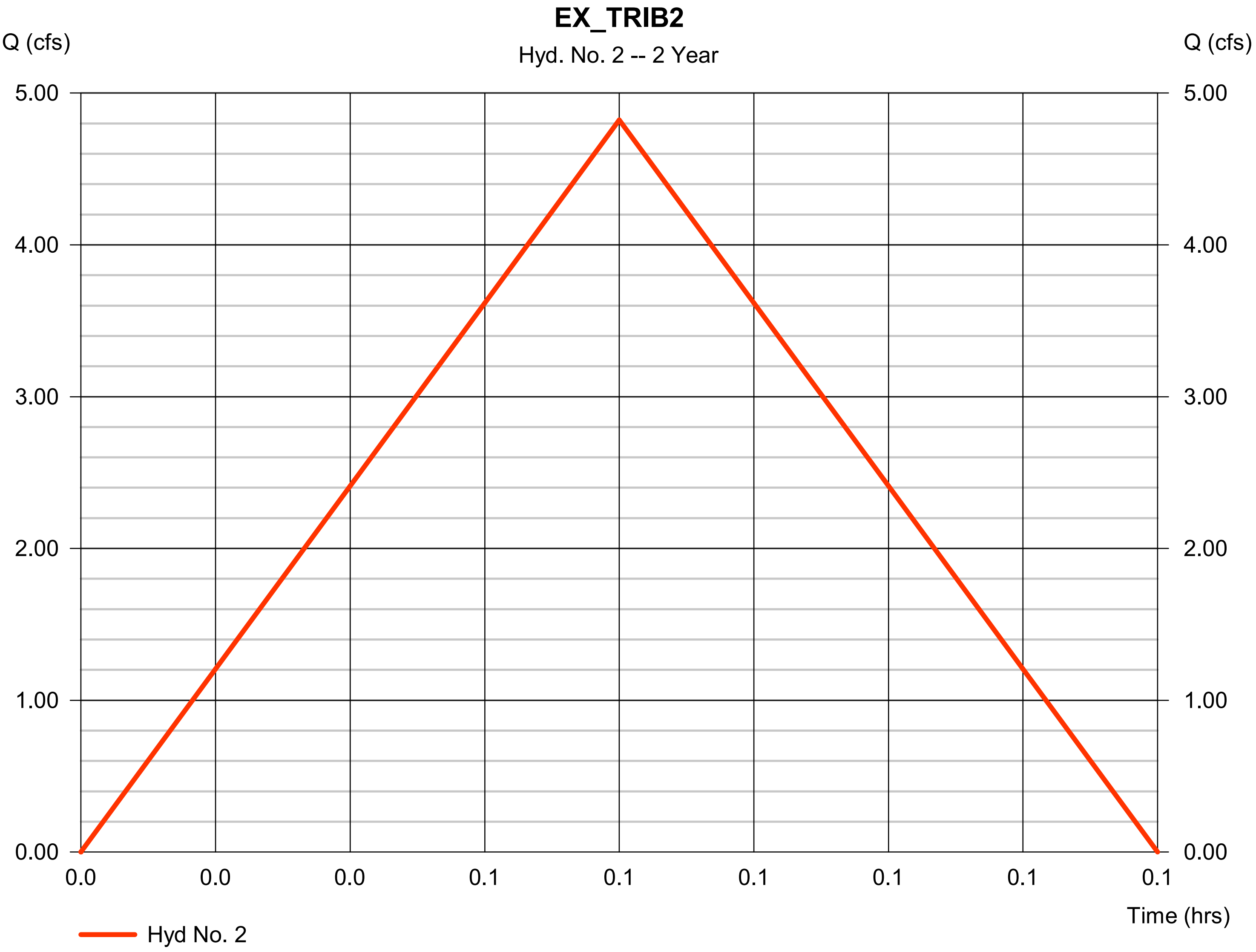


Hydrograph Report

Hyd. No. 2

EX_TRIB2

Hydrograph type	= Rational	Peak discharge	= 4.823 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 1,158 cuft
Drainage area	= 4.020 ac	Runoff coeff.	= 0.2
Intensity	= 5.999 in/hr	Tc by User	= 4.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



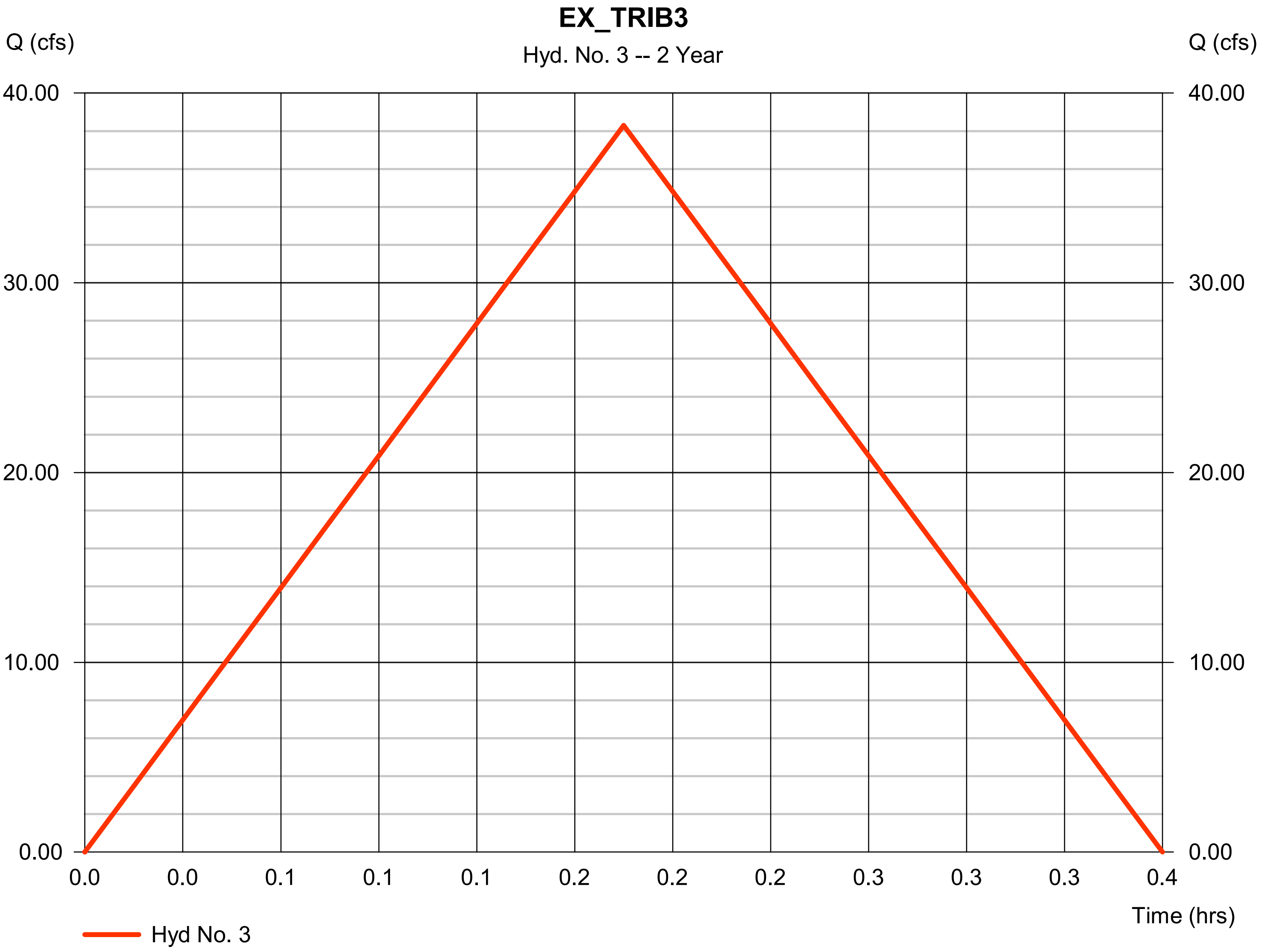
Hydrograph Report

Hyd. No. 3

EX_TRIB3

Hydrograph type = Rational
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 16.670 ac
Intensity = 4.178 in/hr
IDF Curve = MSD.IDF

Peak discharge = 38.30 cfs
Time to peak = 0.18 hrs
Hyd. volume = 25,280 cuft
Runoff coeff. = 0.55
Tc by User = 11.00 min
Asc/Rec limb fact = 1/1

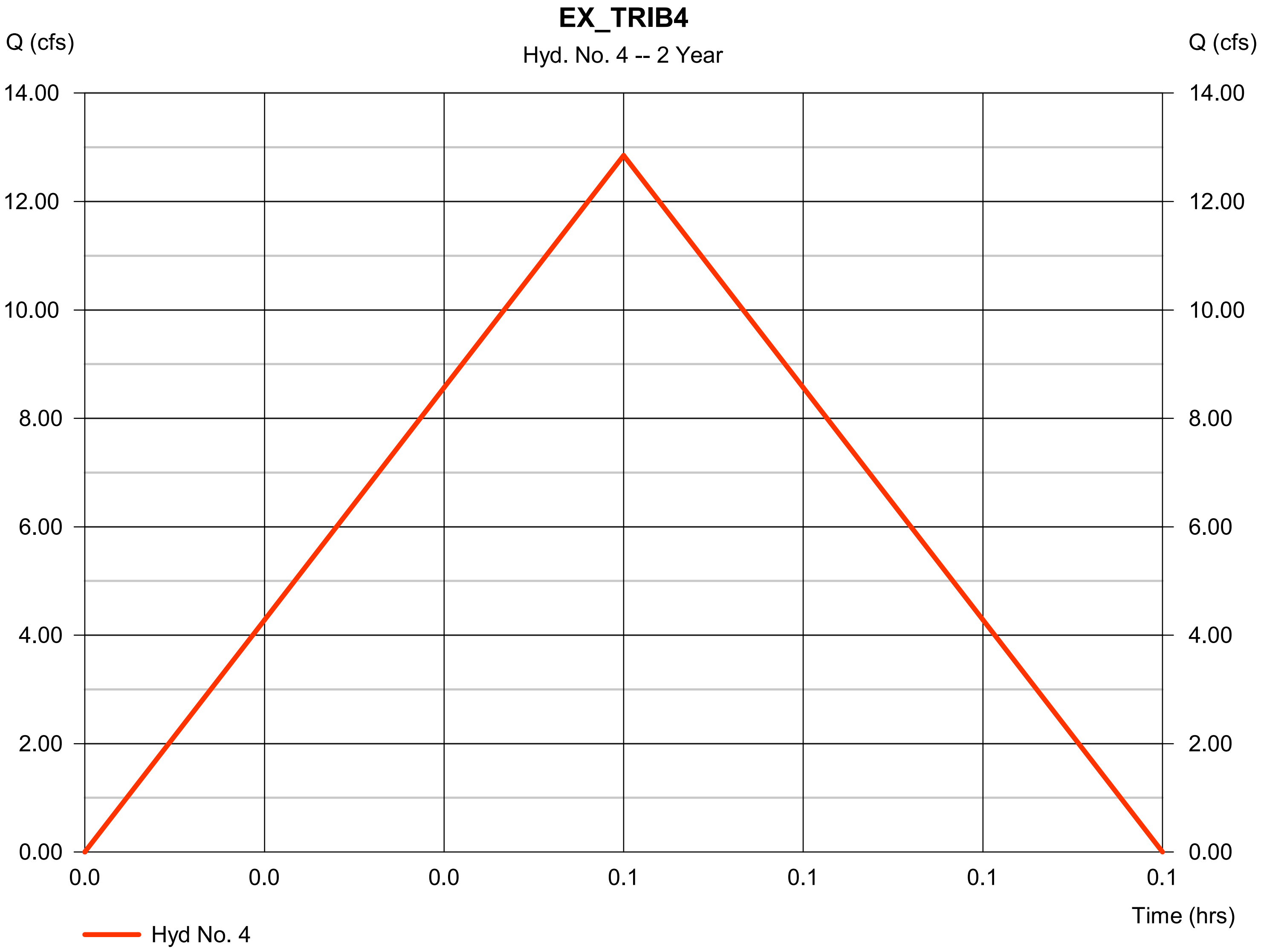


Hydrograph Report

Hyd. No. 4

EX_TRIB4

Hydrograph type	= Rational	Peak discharge	= 12.85 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 2,313 cuft
Drainage area	= 2.940 ac	Runoff coeff.	= 0.68
Intensity	= 6.429 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

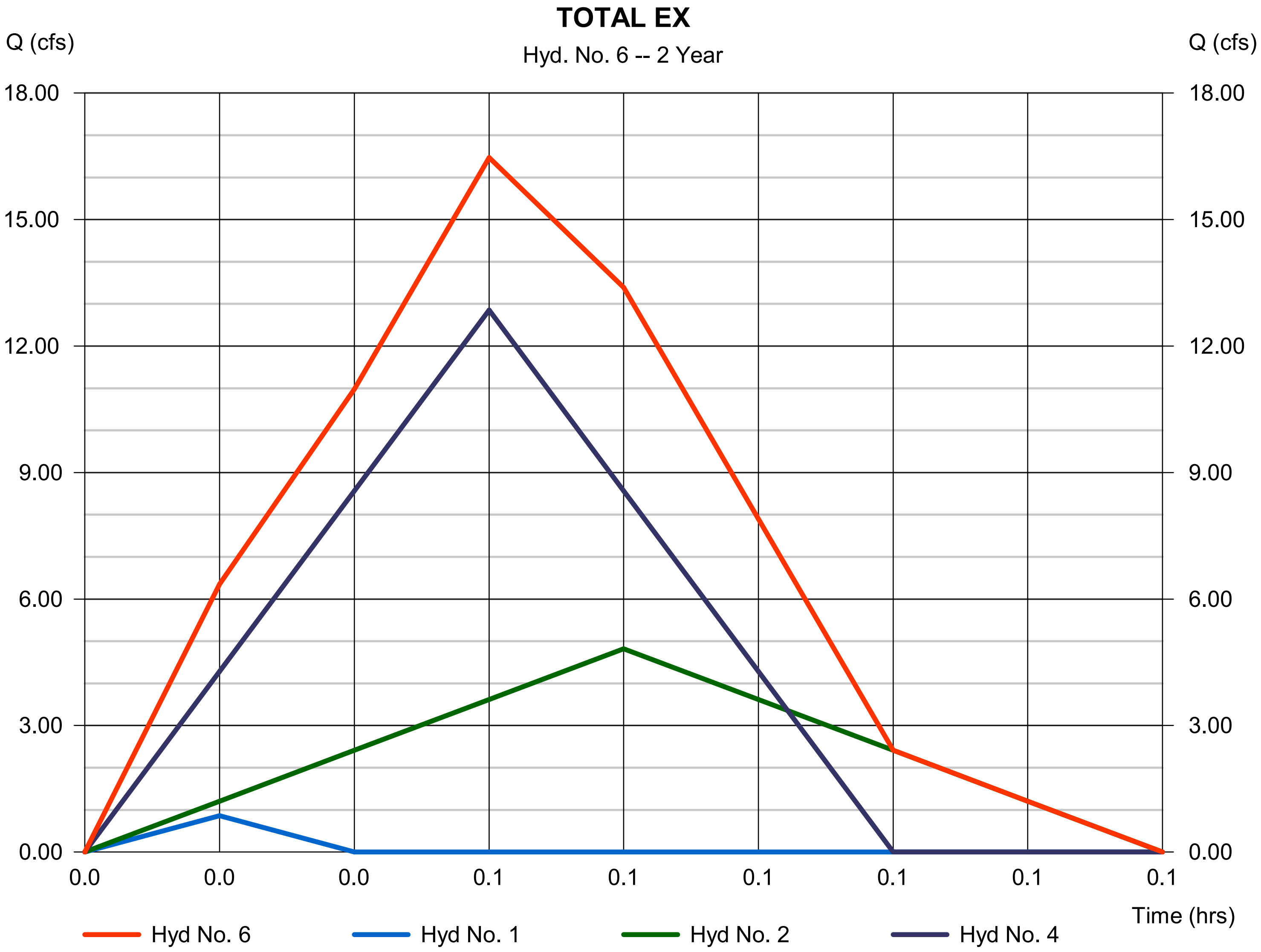


Hydrograph Report

Hyd. No. 6

TOTAL EX

Hydrograph type	= Combine	Peak discharge	= 16.47 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 3,523 cuft
Inflow hyds.	= 1, 2, 4	Contrib. drain. area	= 7.530 ac

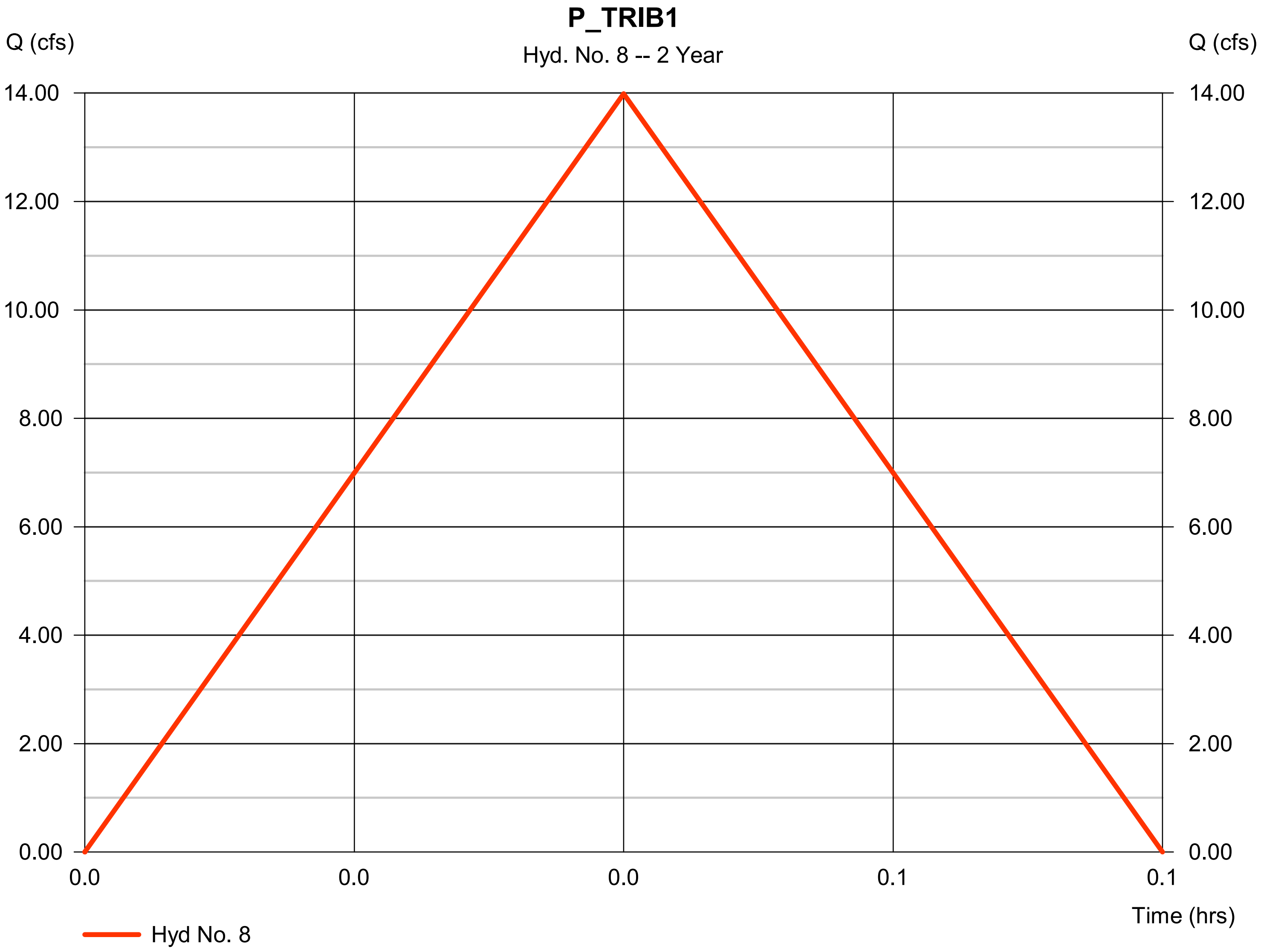


Hydrograph Report

Hyd. No. 8

P_TRIB1

Hydrograph type	= Rational	Peak discharge	= 13.99 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 1,678 cuft
Drainage area	= 3.360 ac	Runoff coeff.	= 0.6
Intensity	= 6.937 in/hr	Tc by User	= 2.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

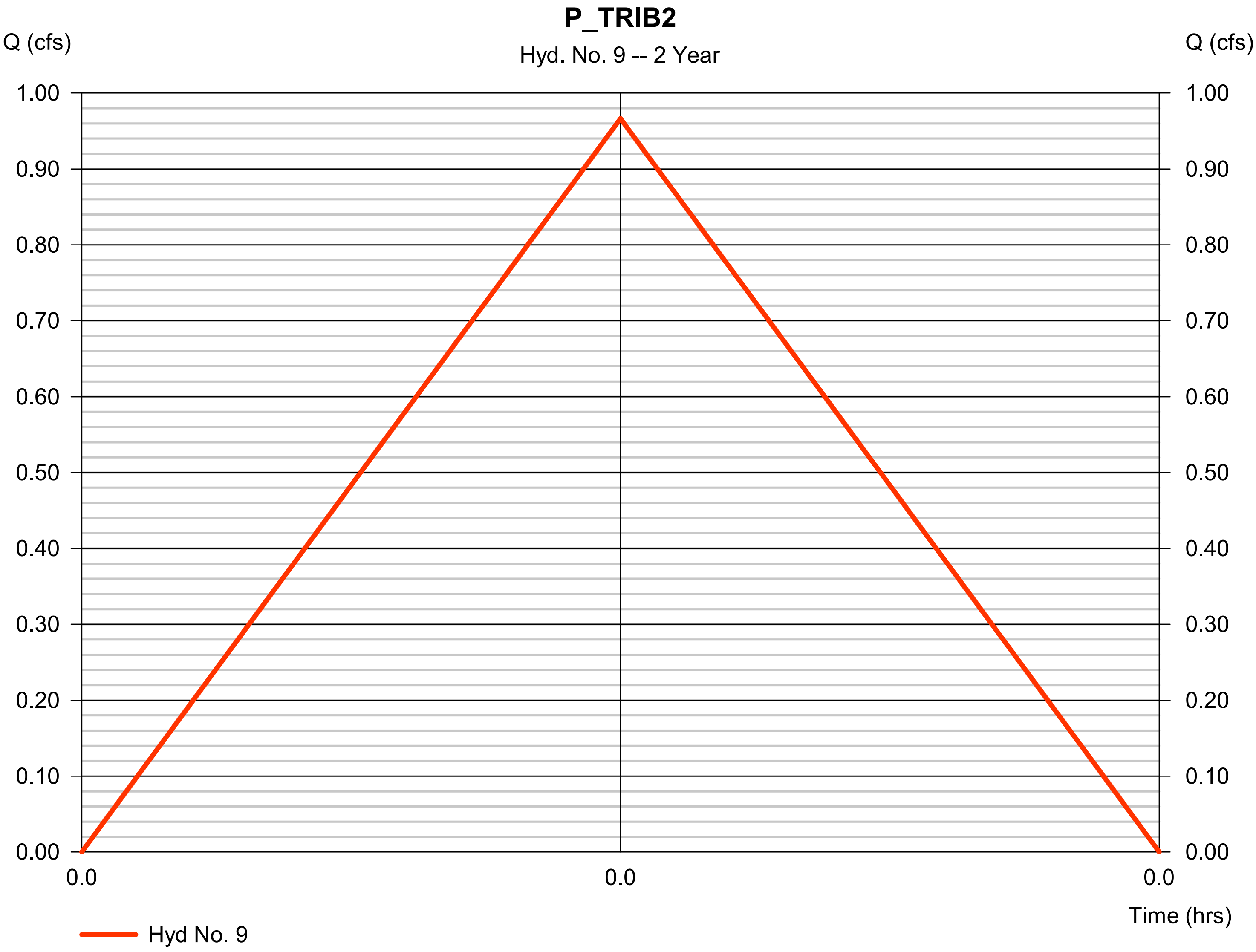


Hydrograph Report

Hyd. No. 9

P_TRIB2

Hydrograph type	= Rational	Peak discharge	= 0.966 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 58 cuft
Drainage area	= 0.640 ac	Runoff coeff.	= 0.2
Intensity	= 7.550 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

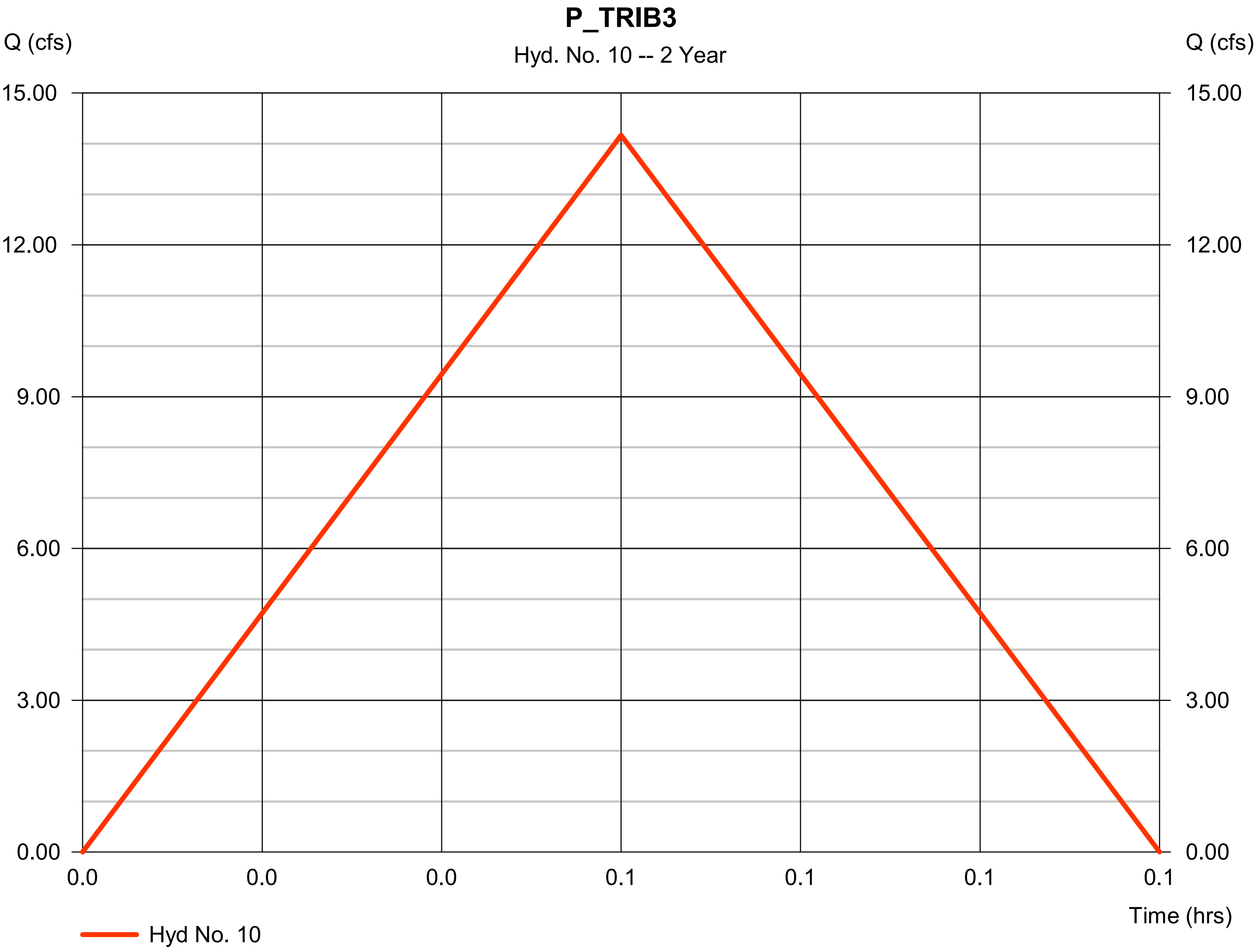


Hydrograph Report

Hyd. No. 10

P_TRIB3

Hydrograph type	= Rational	Peak discharge	= 14.17 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 2,550 cuft
Drainage area	= 3.390 ac	Runoff coeff.	= 0.65
Intensity	= 6.429 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

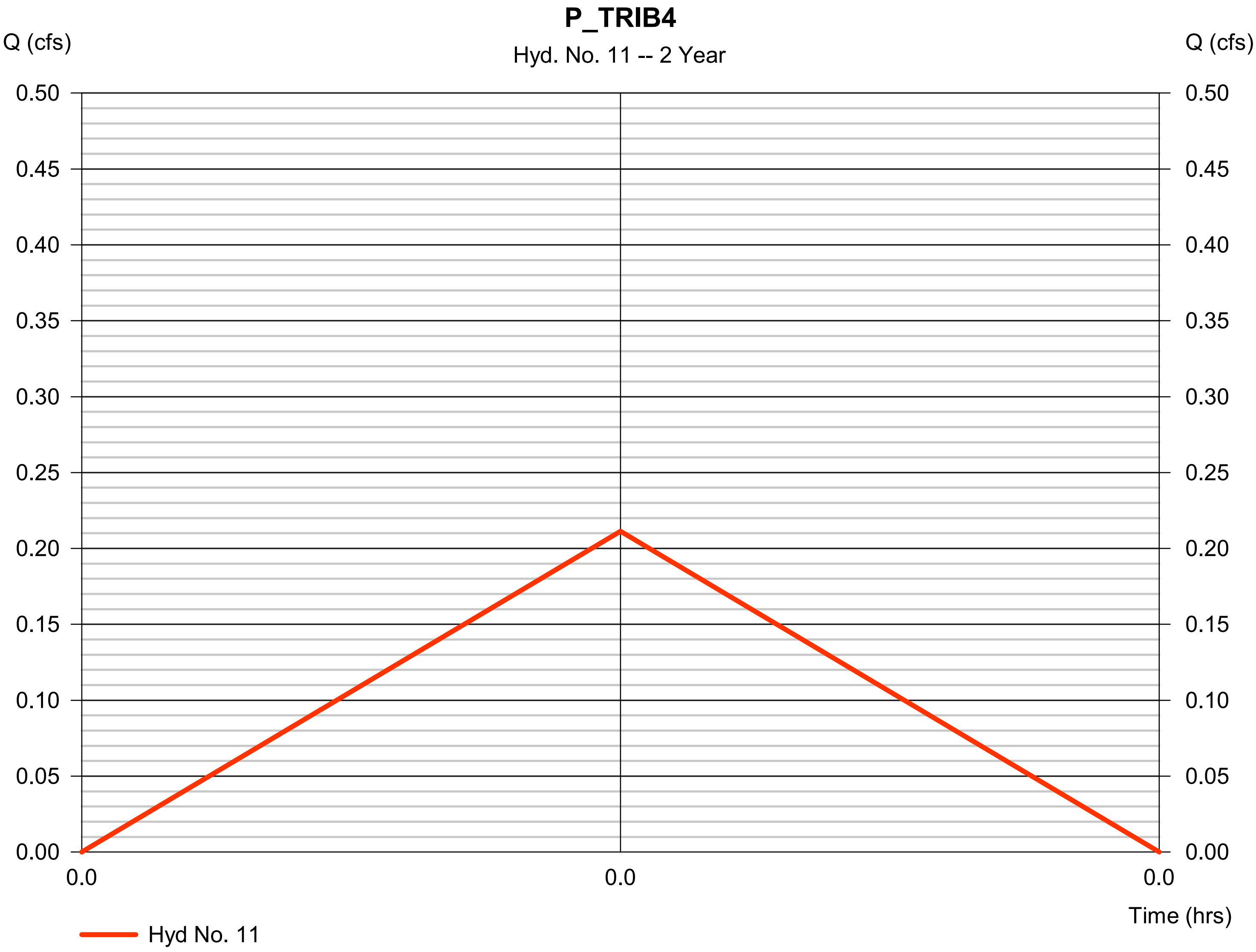


Hydrograph Report

Hyd. No. 11

P_TRIB4

Hydrograph type	= Rational	Peak discharge	= 0.211 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 13 cuft
Drainage area	= 0.140 ac	Runoff coeff.	= 0.2
Intensity	= 7.550 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

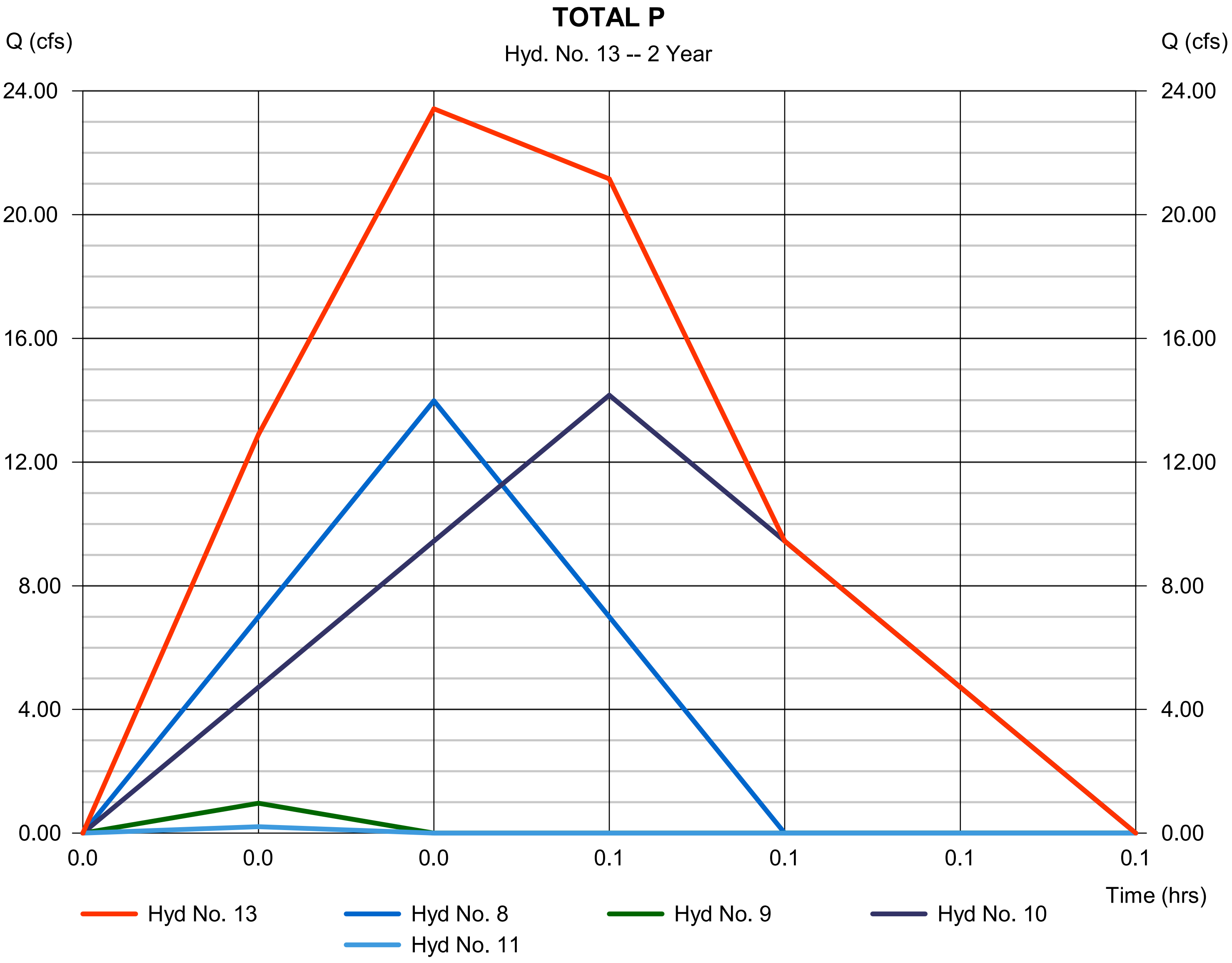


Hydrograph Report

Hyd. No. 13

TOTAL P

Hydrograph type	= Combine	Peak discharge	= 23.43 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 4,299 cuft
Inflow hyds.	= 8, 9, 10, 11	Contrib. drain. area	= 7.530 ac

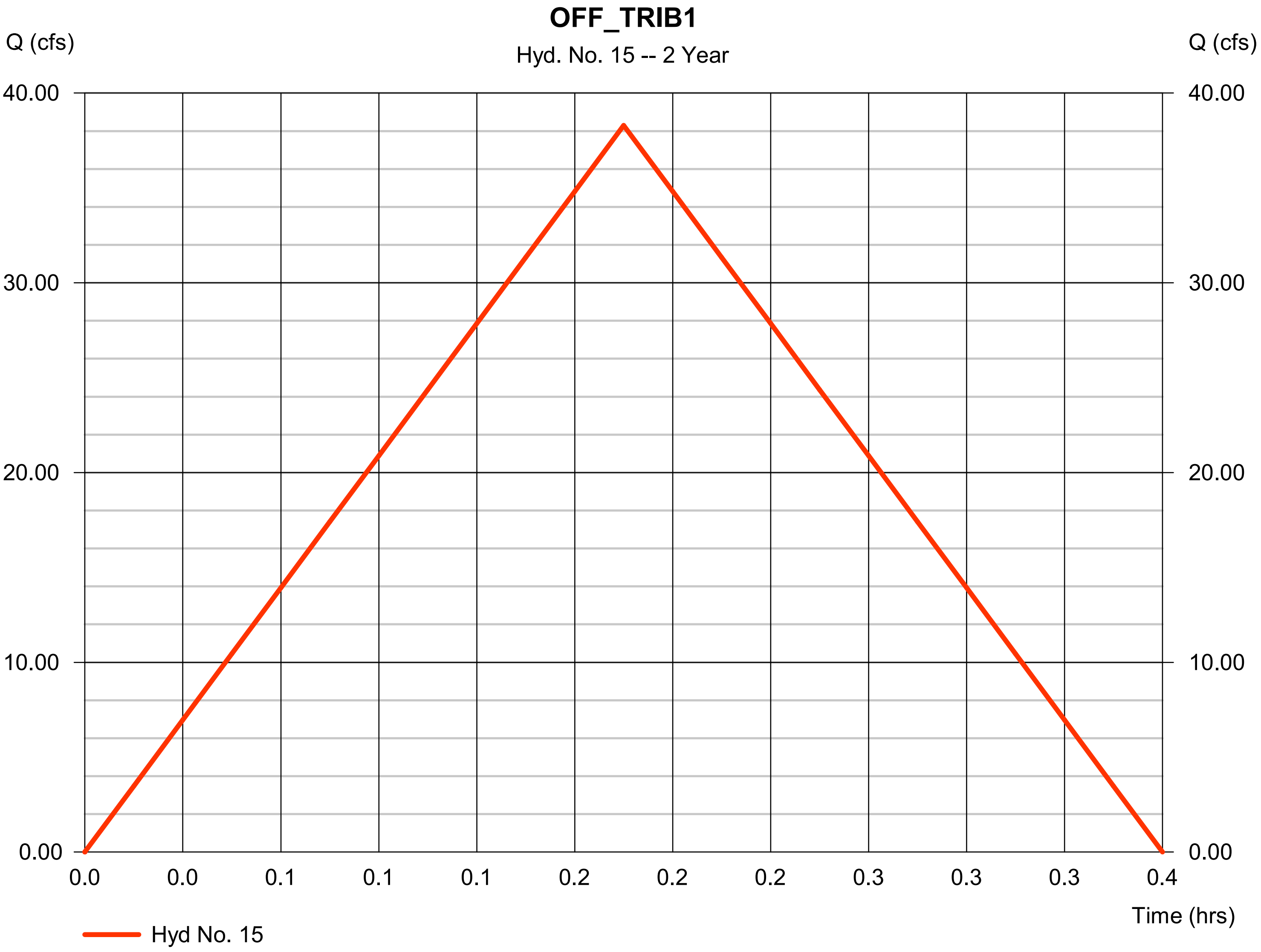


Hydrograph Report

Hyd. No. 15

OFF_TRIB1

Hydrograph type	= Rational	Peak discharge	= 38.30 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 25,280 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 4.178 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



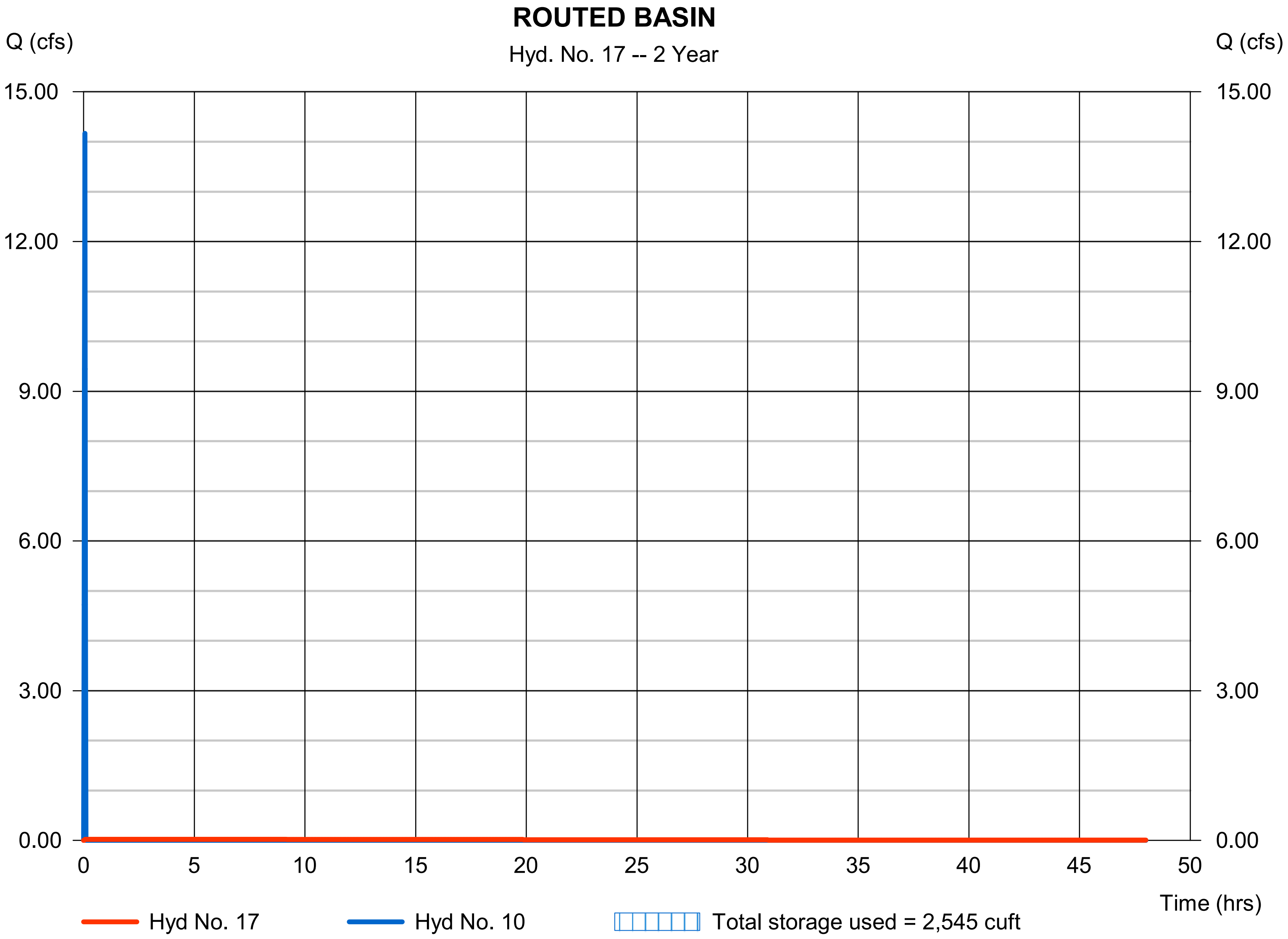
Hydrograph Report

Hyd. No. 17

ROUTED BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.024 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.10 hrs
Time interval	= 1 min	Hyd. volume	= 2,232 cuft
Inflow hyd. No.	= 10 - P_TRIB3	Max. Elevation	= 470.41 ft
Reservoir name	= BMP 1	Max. Storage	= 2,545 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - BMP 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 470.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	470.00	1,768	0	0
1.00	471.00	12,089	6,159	6,159
2.00	472.00	14,867	13,453	19,612
3.00	473.00	20,363	17,541	37,154

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.25	6.00	0.00
Span (in)	= 18.00	1.25	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 468.40	470.01	471.25	0.00
Length (ft)	= 40.00	0.00	0.00	0.00
Slope (%)	= 1.00	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	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 471.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

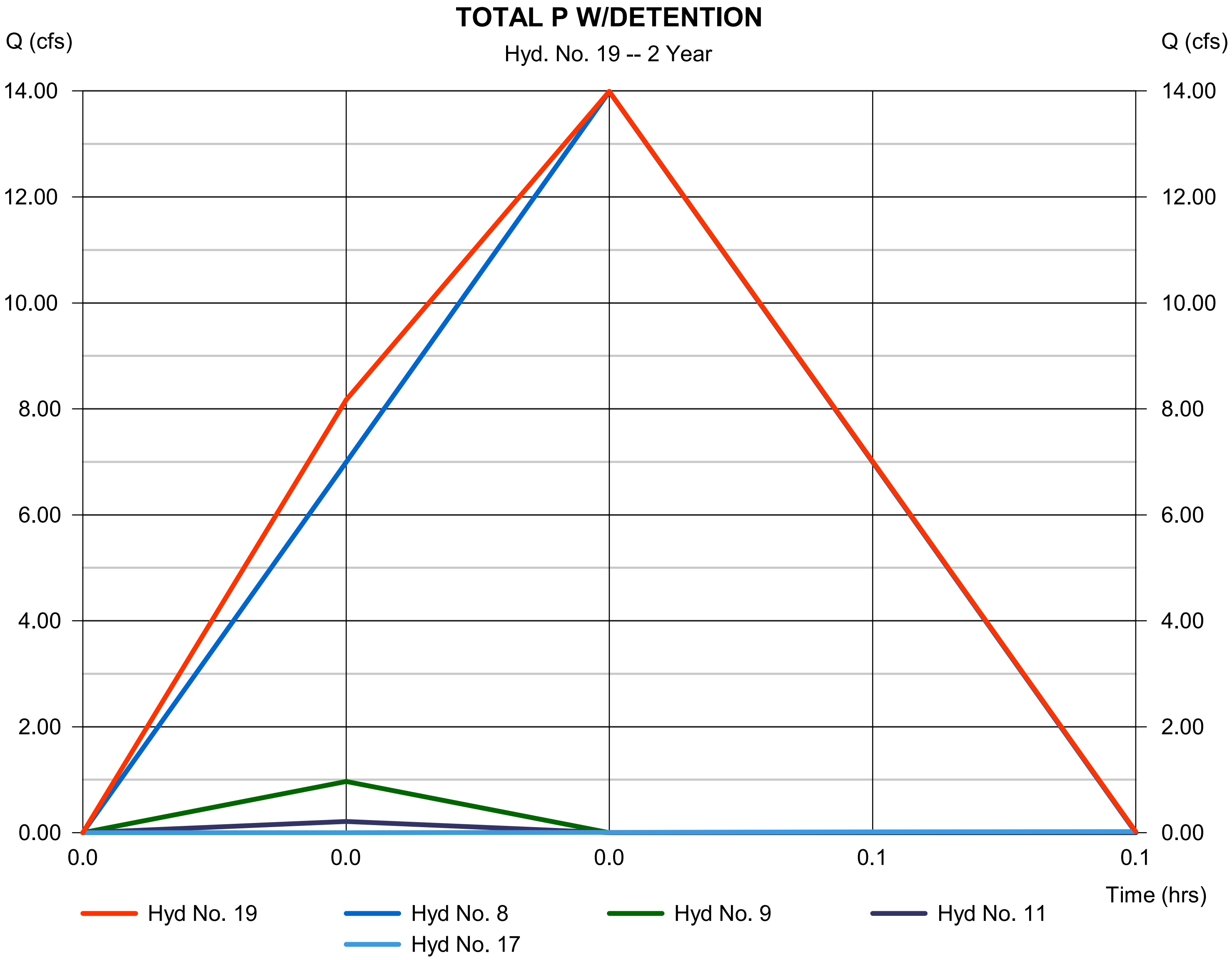
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	470.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.10	616	470.10	6.73 oc	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.008
0.20	1,232	470.20	6.73 oc	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.015
0.30	1,848	470.30	6.73 oc	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.020
0.40	2,464	470.40	6.73 oc	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.024
0.50	3,080	470.50	6.73 oc	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.027
0.60	3,696	470.60	6.73 oc	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.030
0.70	4,312	470.70	6.73 oc	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.033
0.80	4,928	470.80	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.035
0.90	5,543	470.90	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.038
1.00	6,159	471.00	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.040
1.10	7,505	471.10	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.042
1.20	8,850	471.20	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.044
1.30	10,195	471.30	6.73 oc	0.05 ic	0.03 ic	---	0.00	---	---	---	---	---	0.071
1.40	11,541	471.40	6.73 oc	0.05 ic	0.13 ic	---	0.00	---	---	---	---	---	0.179
1.50	12,886	471.50	6.73 oc	0.05 ic	0.28 ic	---	0.00	---	---	---	---	---	0.333
1.60	14,231	471.60	6.73 oc	0.05 ic	0.47 ic	---	0.00	---	---	---	---	---	0.521
1.70	15,576	471.70	6.73 oc	0.05 ic	0.69 ic	---	0.00	---	---	---	---	---	0.738
1.80	16,922	471.80	6.73 oc	0.05 ic	0.88 ic	---	0.45	---	---	---	---	---	1.380
1.90	18,267	471.90	6.73 oc	0.06 ic	1.02 ic	---	2.32	---	---	---	---	---	3.394
2.00	19,612	472.00	6.73 oc	0.06 ic	1.13 ic	---	4.99	---	---	---	---	---	6.187
2.10	21,366	472.10	9.57 oc	0.05 ic	1.24 ic	---	8.27	---	---	---	---	---	9.569
2.20	23,120	472.20	13.33 ic	0.03 ic	1.24 ic	---	12.06	---	---	---	---	---	13.33
2.30	24,875	472.30	14.45 ic	0.02 ic	0.83 ic	---	13.61 s	---	---	---	---	---	14.45
2.40	26,629	472.40	14.93 ic	0.02 ic	0.66 ic	---	14.24 s	---	---	---	---	---	14.93
2.50	28,383	472.50	15.29 ic	0.01 ic	0.55 ic	---	14.72 s	---	---	---	---	---	15.29
2.60	30,137	472.60	15.60 ic	0.01 ic	0.48 ic	---	15.11 s	---	---	---	---	---	15.60
2.70	31,891	472.70	15.88 ic	0.01 ic	0.41 ic	---	15.45 s	---	---	---	---	---	15.87
2.80	33,645	472.80	16.14 ic	0.01 ic	0.37 ic	---	15.76 s	---	---	---	---	---	16.13
2.90	35,399	472.90	16.38 ic	0.01 ic	0.33 ic	---	16.04 s	---	---	---	---	---	16.37
3.00	37,154	473.00	16.62 ic	0.01 ic	0.30 ic	---	16.31 s	---	---	---	---	---	16.61

Hydrograph Report

Hyd. No. 19

TOTAL P W/DETENTION

Hydrograph type	= Combine	Peak discharge	= 13.99 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 3,981 cuft
Inflow hyds.	= 8, 9, 11, 17	Contrib. drain. area	= 4.140 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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	Rational	1.448	1	1	87	------	------	------	EX_TRIB1
2	Rational	7.263	1	4	1,743	------	------	------	EX_TRIB2
3	Rational	54.41	1	11	35,914	------	------	------	EX_TRIB3
4	Rational	19.83	1	3	3,570	------	------	------	EX_TRIB4
6	Combine	25.28	1	3	5,400	1, 2, 4,	------	------	TOTAL EX
8	Rational	22.35	1	2	2,682	------	------	------	P_TRIB1
9	Rational	1.626	1	1	98	------	------	------	P_TRIB2
10	Rational	21.86	1	3	3,935	------	------	------	P_TRIB3
11	Rational	0.356	1	1	21	------	------	------	P_TRIB4
13	Combine	36.92	1	2	6,736	8, 9, 10, 11,	------	------	TOTAL P
15	Rational	54.41	1	11	35,914	------	------	------	OFF_TRIB1
17	Reservoir	0.031	1	6	3,327	10	470.64	3,929	ROUTED BASIN
19	Combine	22.36	1	2	6,127	8, 9, 11, 17,	------	------	TOTAL P W/DETENTION

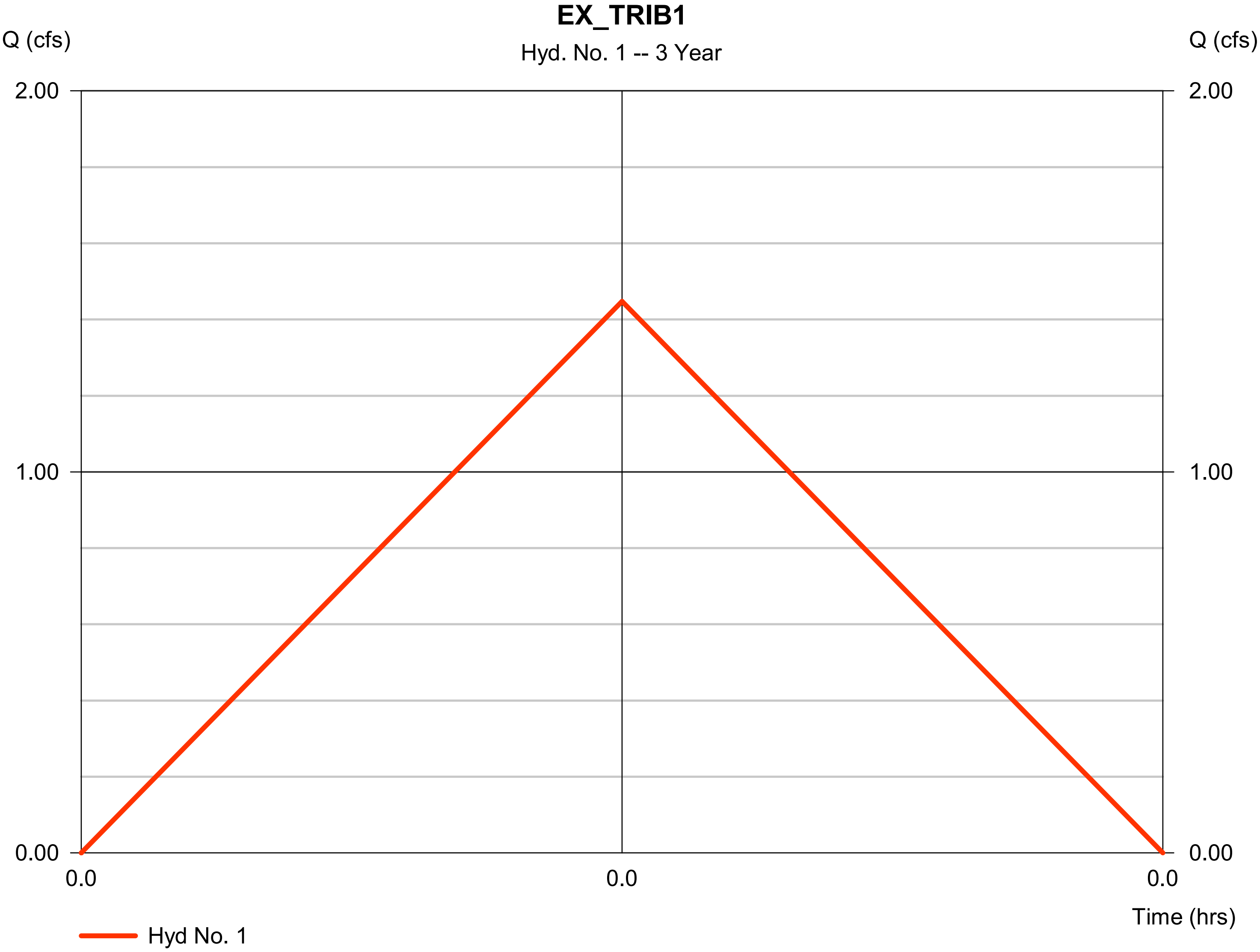
Hydrograph Report

Hyd. No. 1

EX_TRIB1

Hydrograph type = Rational
Storm frequency = 3 yrs
Time interval = 1 min
Drainage area = 0.570 ac
Intensity = 12.701 in/hr
IDF Curve = MSD.IDF

Peak discharge = 1.448 cfs
Time to peak = 0.02 hrs
Hyd. volume = 87 cuft
Runoff coeff. = 0.2
Tc by User = 1.00 min
Asc/Rec limb fact = 1/1

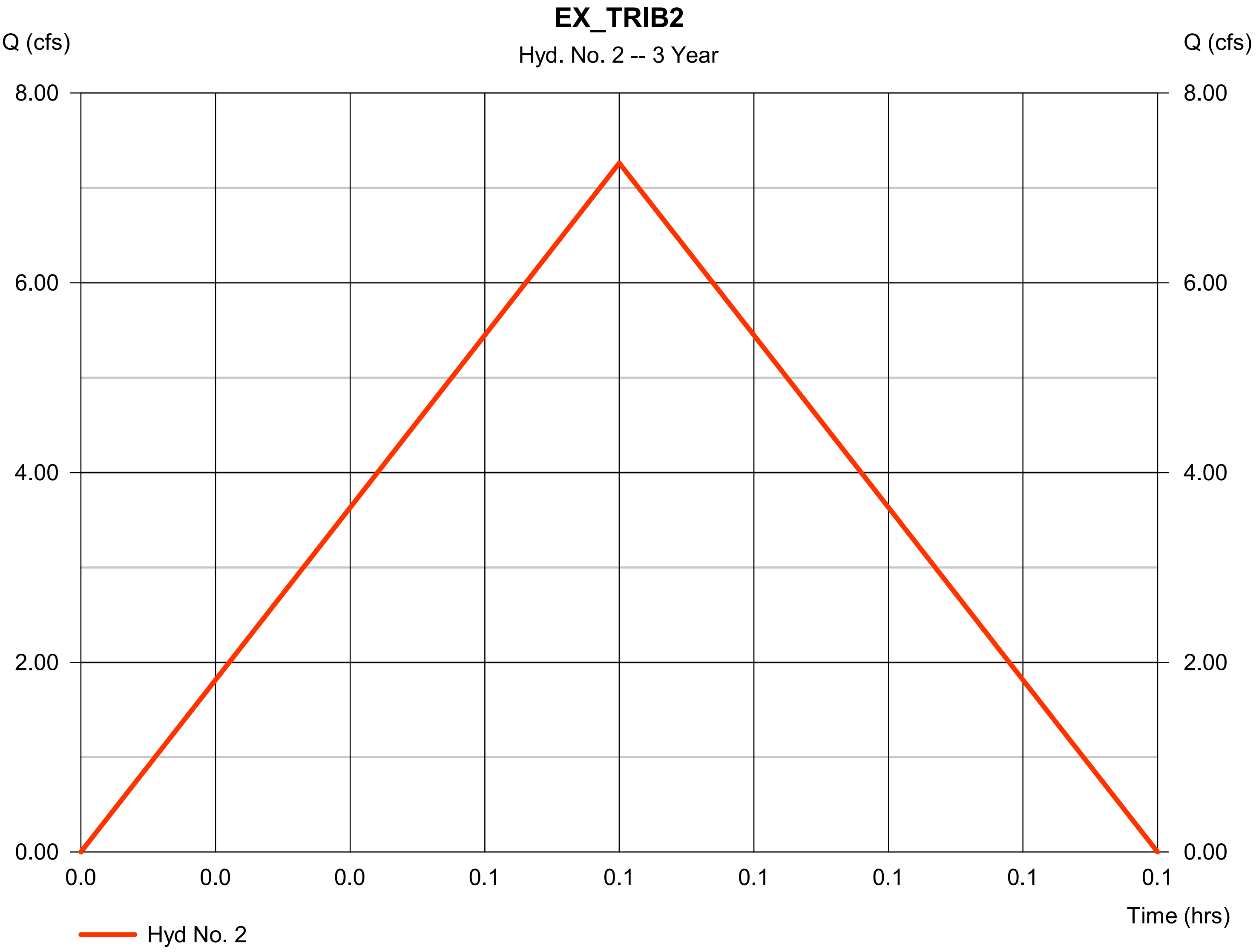


Hydrograph Report

Hyd. No. 2

EX_TRIB2

Hydrograph type	= Rational	Peak discharge	= 7.263 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 1,743 cuft
Drainage area	= 4.020 ac	Runoff coeff.	= 0.2
Intensity	= 9.034 in/hr	Tc by User	= 4.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

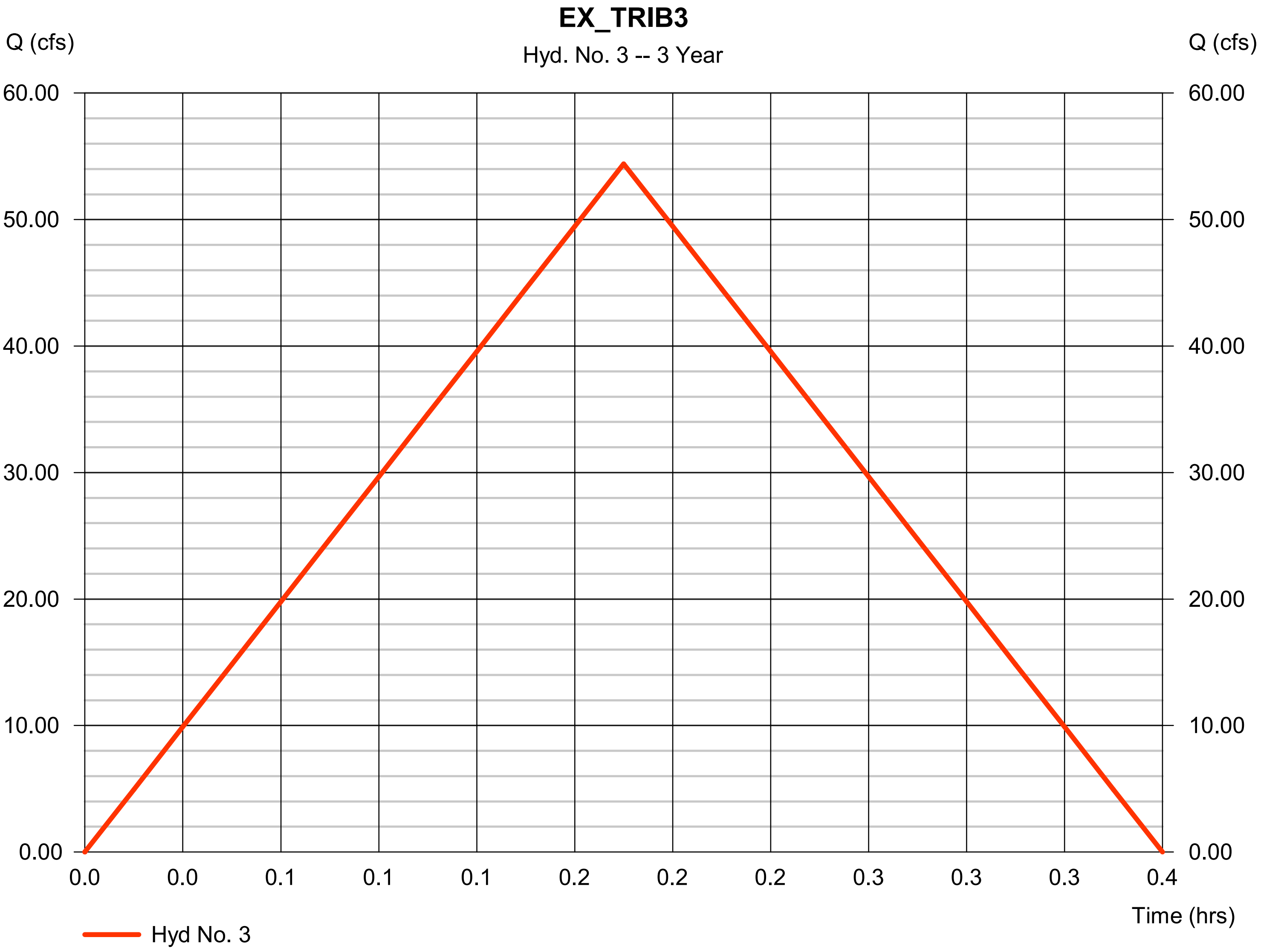


Hydrograph Report

Hyd. No. 3

EX_TRIB3

Hydrograph type	= Rational	Peak discharge	= 54.41 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 35,914 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 5.935 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

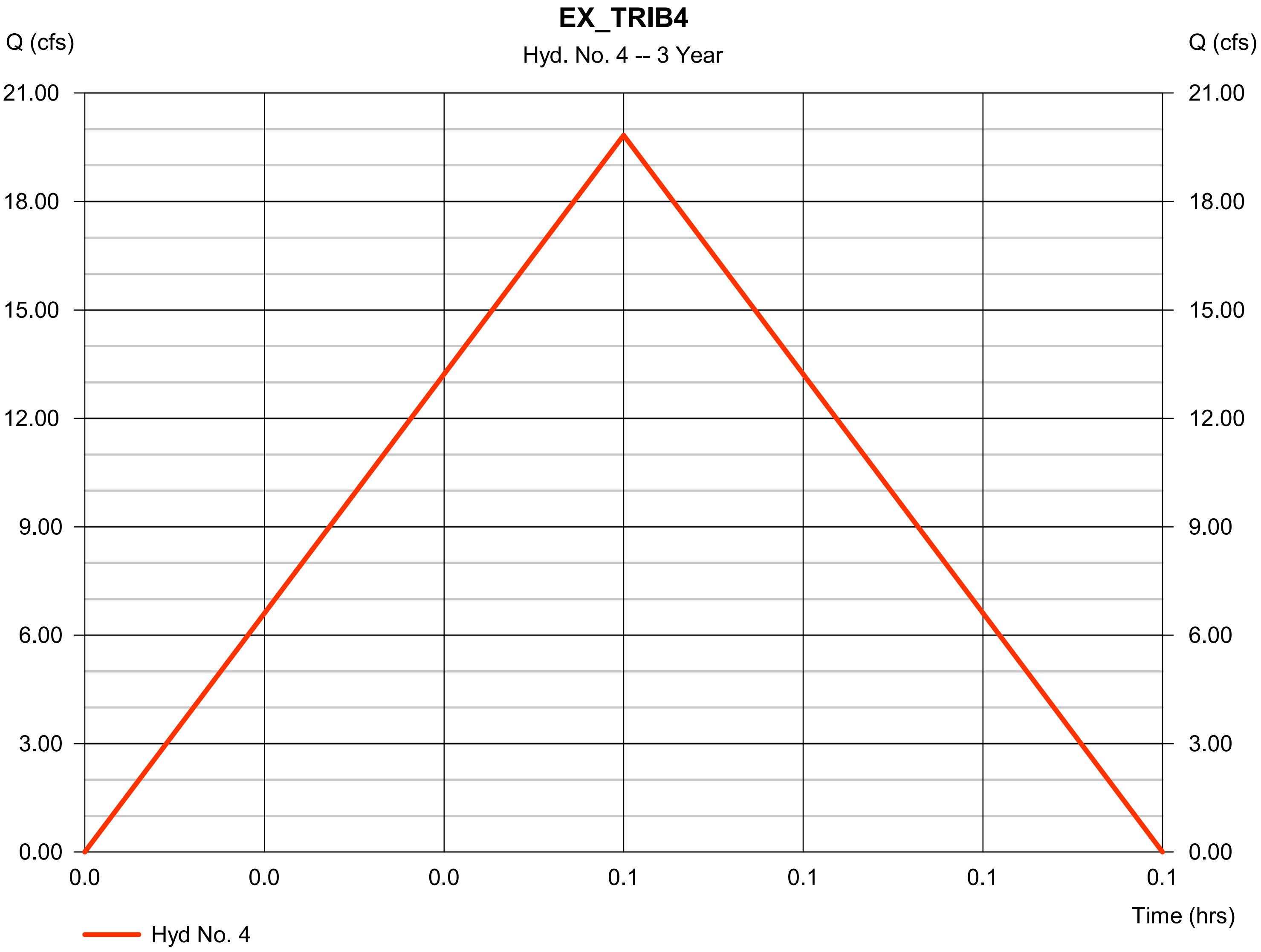


Hydrograph Report

Hyd. No. 4

EX_TRIB4

Hydrograph type	= Rational	Peak discharge	= 19.83 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 3,570 cuft
Drainage area	= 2.940 ac	Runoff coeff.	= 0.68
Intensity	= 9.921 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

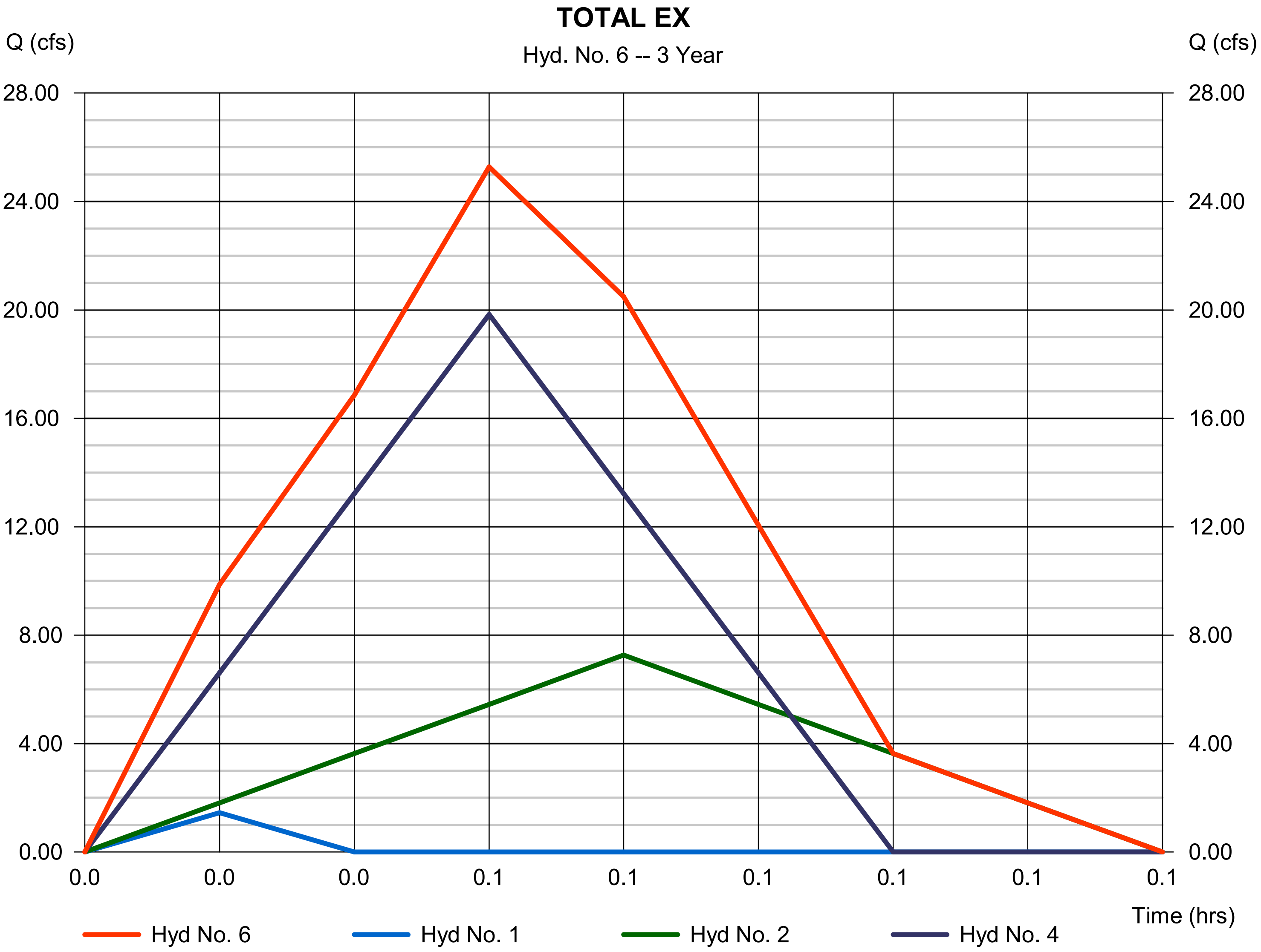


Hydrograph Report

Hyd. No. 6

TOTAL EX

Hydrograph type	= Combine	Peak discharge	= 25.28 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 5,400 cuft
Inflow hyds.	= 1, 2, 4	Contrib. drain. area	= 7.530 ac

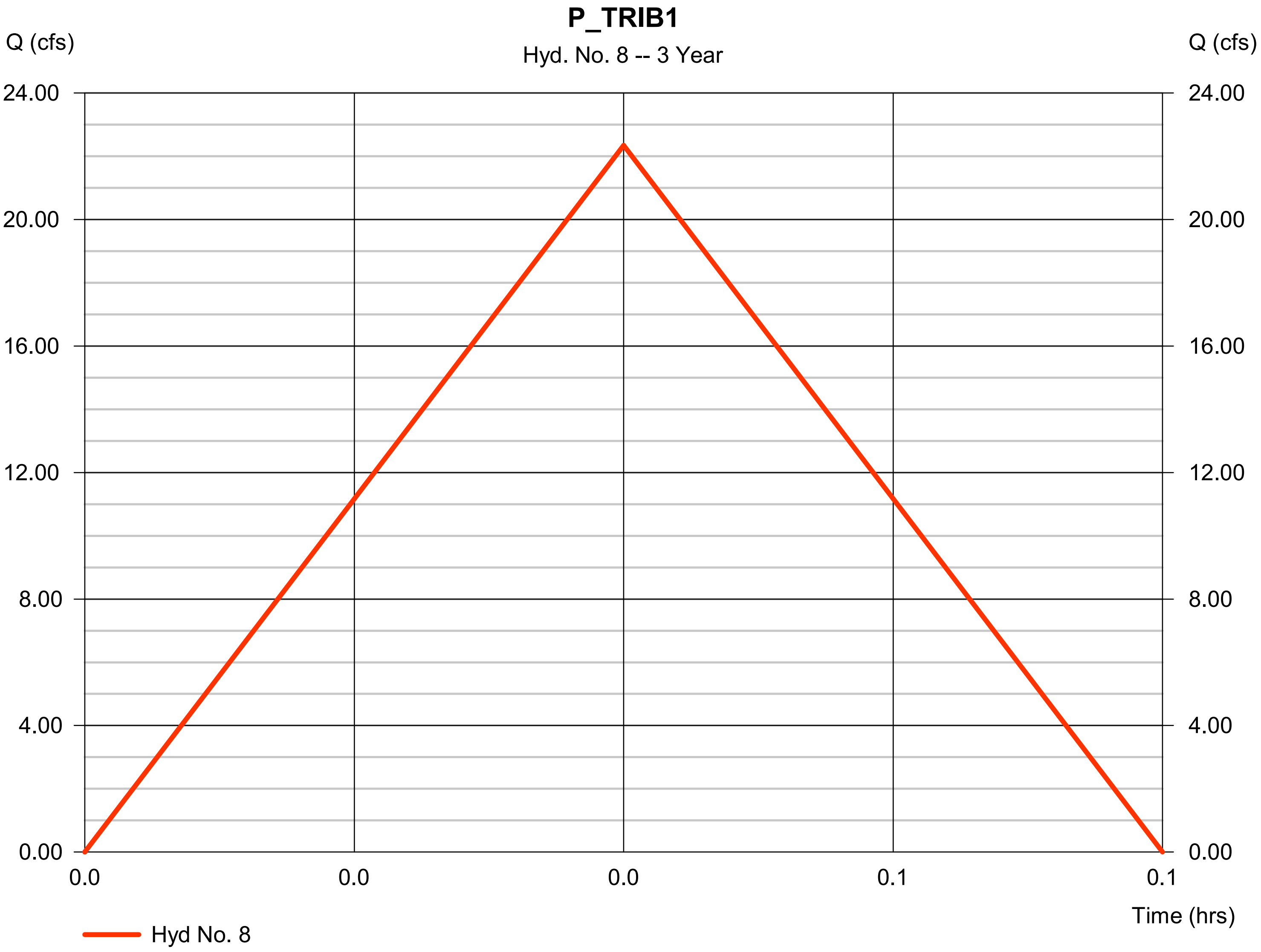


Hydrograph Report

Hyd. No. 8

P_TRIB1

Hydrograph type	= Rational	Peak discharge	= 22.35 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 2,682 cuft
Drainage area	= 3.360 ac	Runoff coeff.	= 0.6
Intensity	= 11.085 in/hr	Tc by User	= 2.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

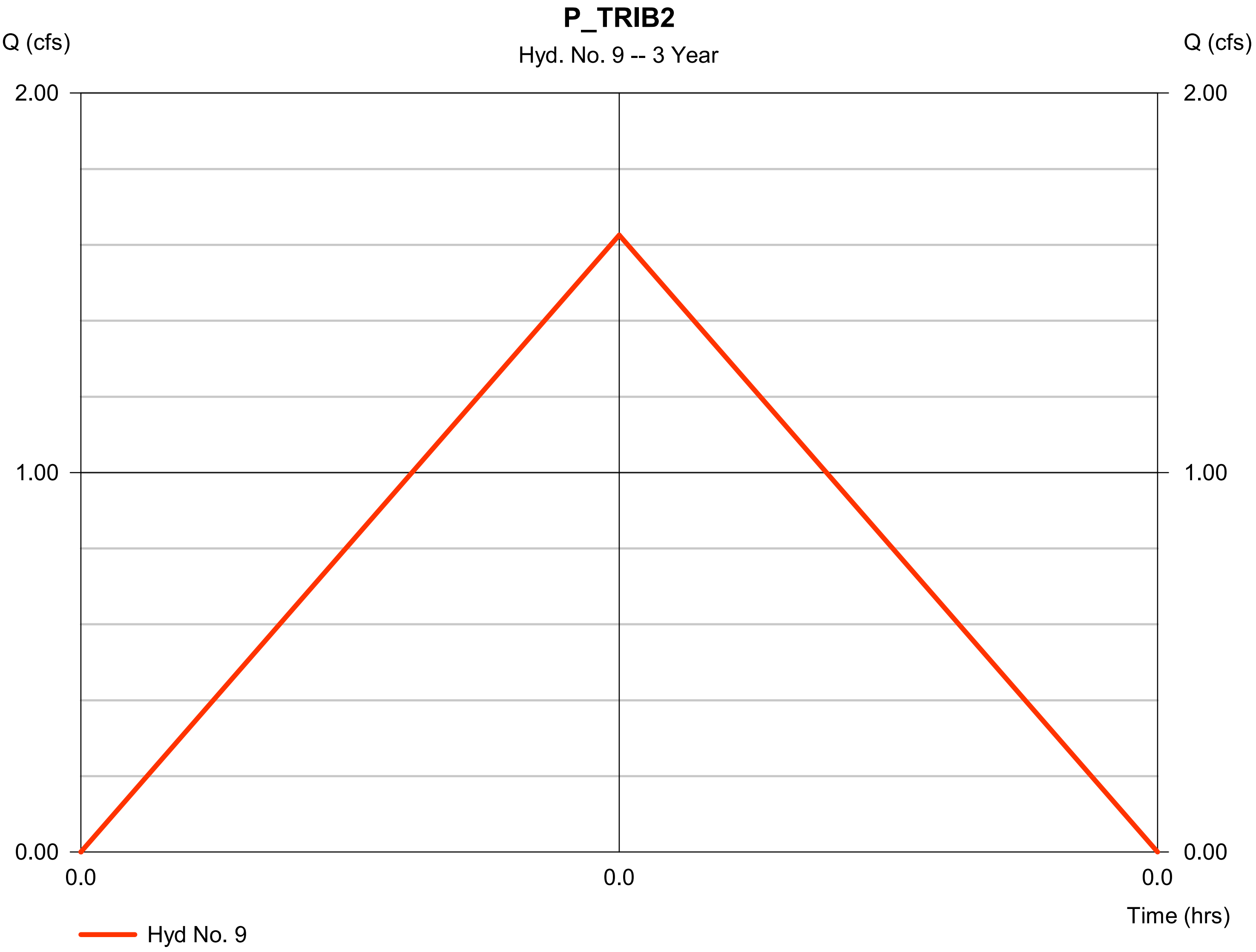


Hydrograph Report

Hyd. No. 9

P_TRIB2

Hydrograph type	= Rational	Peak discharge	= 1.626 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 98 cuft
Drainage area	= 0.640 ac	Runoff coeff.	= 0.2
Intensity	= 12.701 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



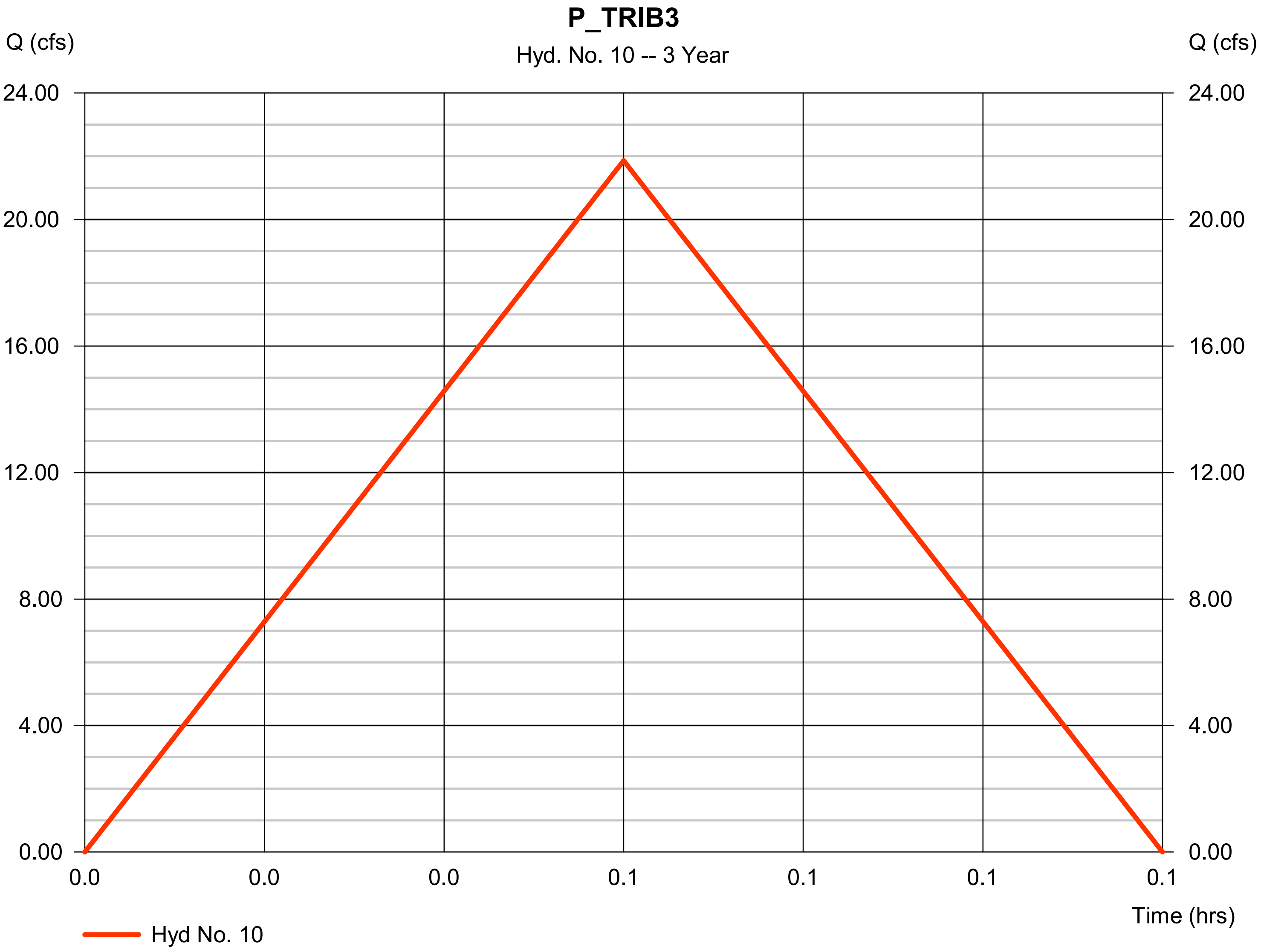
Hydrograph Report

Hyd. No. 10

P_TRIB3

Hydrograph type = Rational
Storm frequency = 3 yrs
Time interval = 1 min
Drainage area = 3.390 ac
Intensity = 9.921 in/hr
IDF Curve = MSD.IDF

Peak discharge = 21.86 cfs
Time to peak = 0.05 hrs
Hyd. volume = 3,935 cuft
Runoff coeff. = 0.65
Tc by User = 3.00 min
Asc/Rec limb fact = 1/1

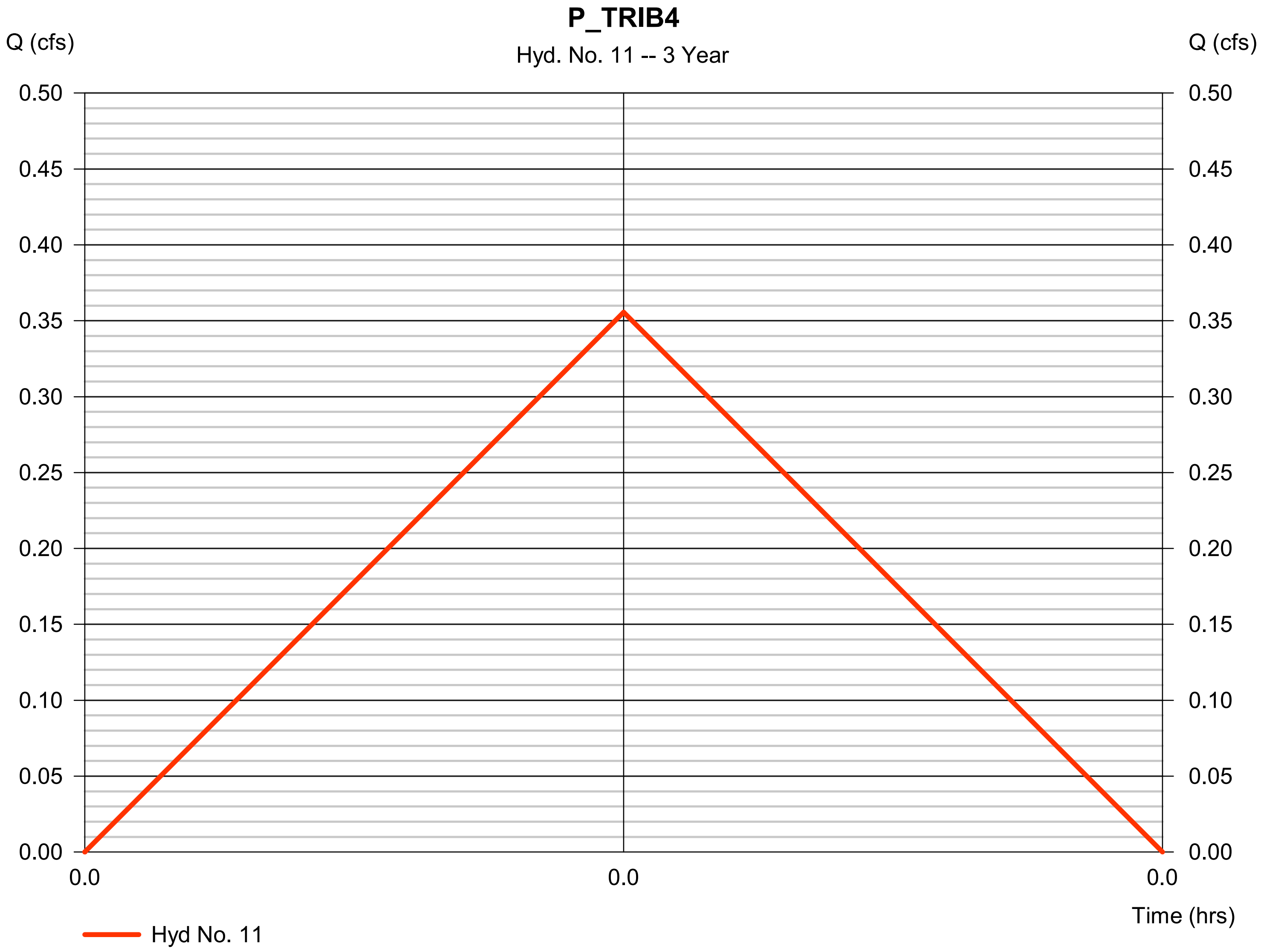


Hydrograph Report

Hyd. No. 11

P_TRIB4

Hydrograph type	= Rational	Peak discharge	= 0.356 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 21 cuft
Drainage area	= 0.140 ac	Runoff coeff.	= 0.2
Intensity	= 12.701 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

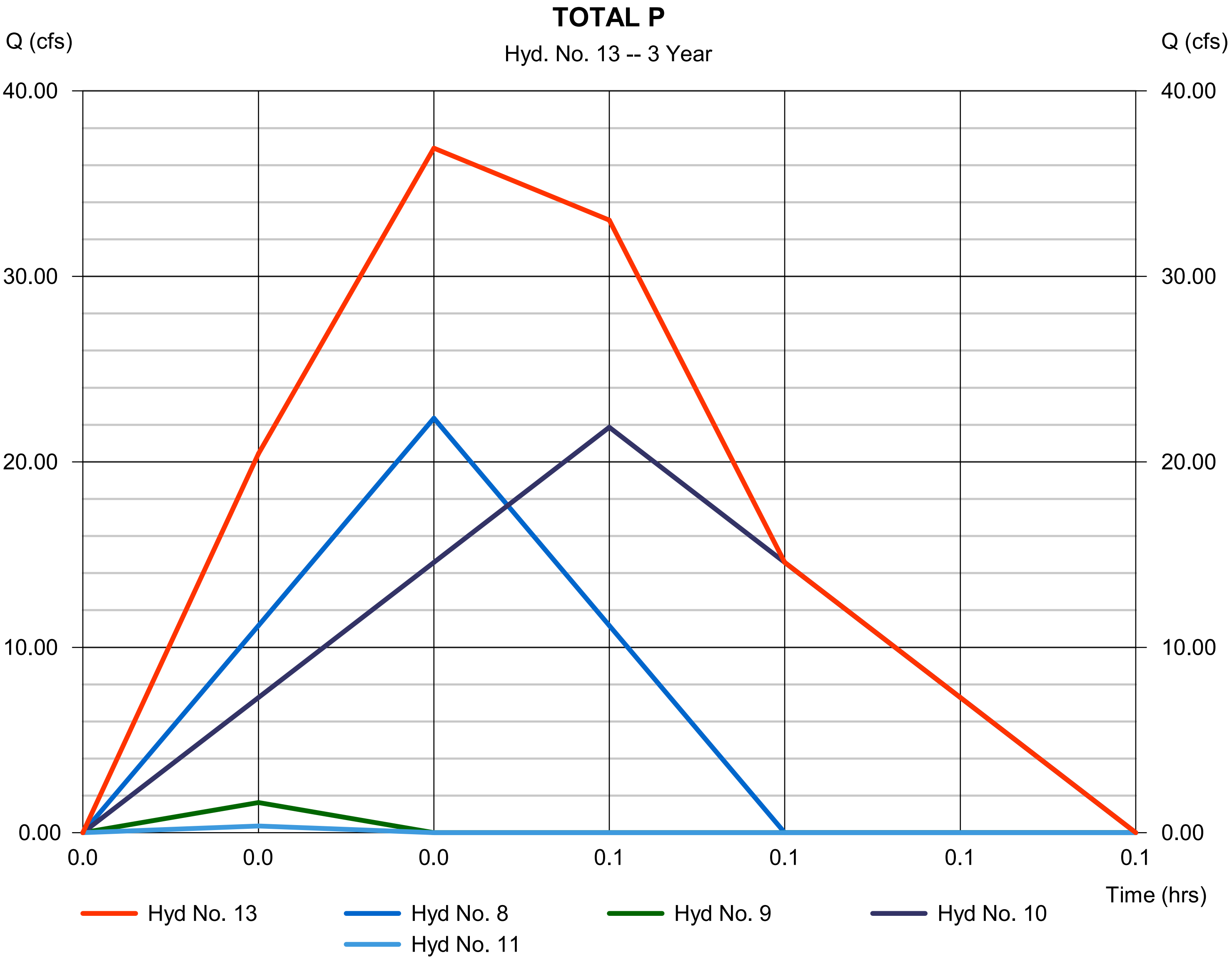


Hydrograph Report

Hyd. No. 13

TOTAL P

Hydrograph type	= Combine	Peak discharge	= 36.92 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 6,736 cuft
Inflow hyds.	= 8, 9, 10, 11	Contrib. drain. area	= 7.530 ac

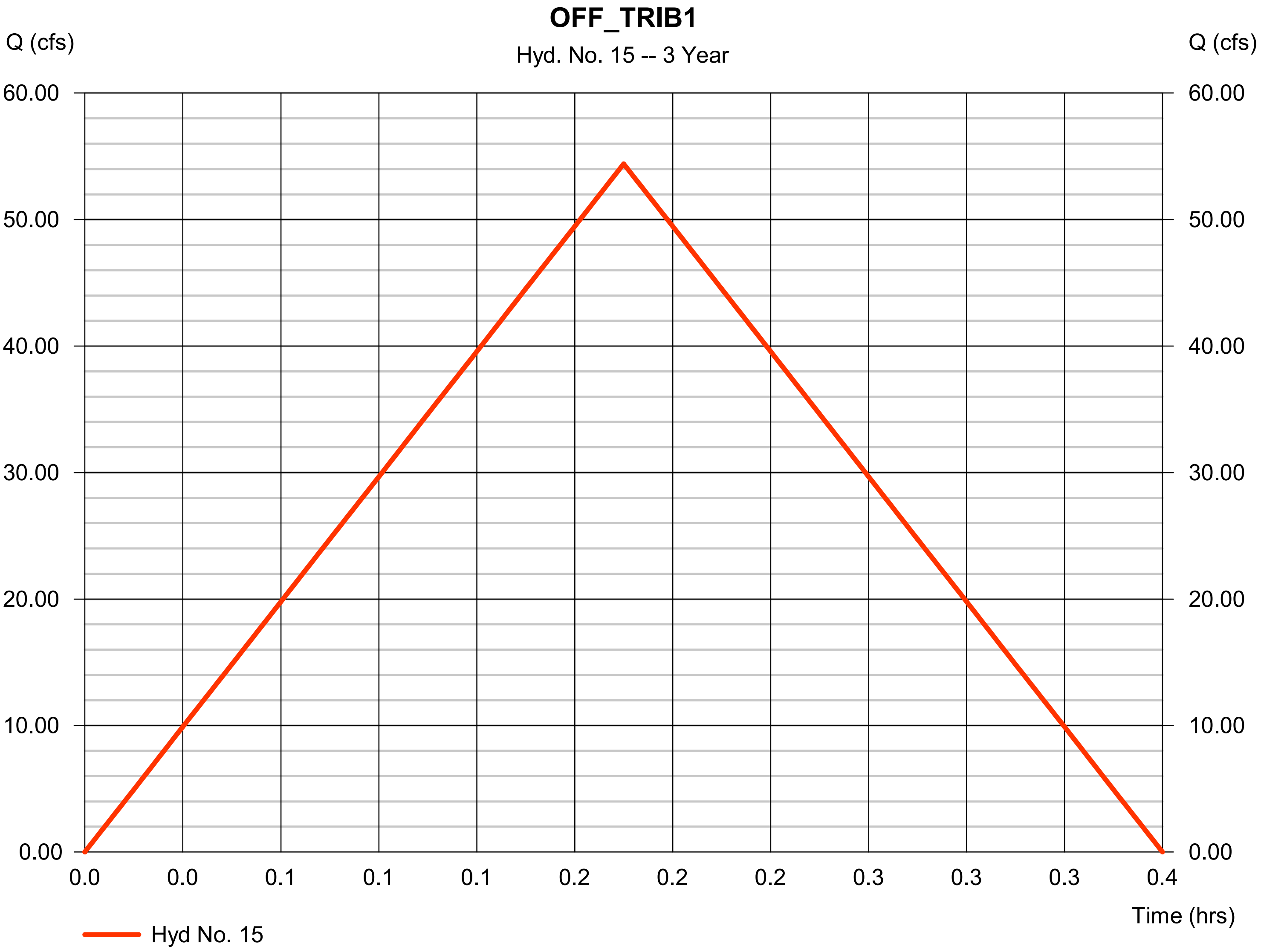


Hydrograph Report

Hyd. No. 15

OFF_TRIB1

Hydrograph type	= Rational	Peak discharge	= 54.41 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 35,914 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 5.935 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



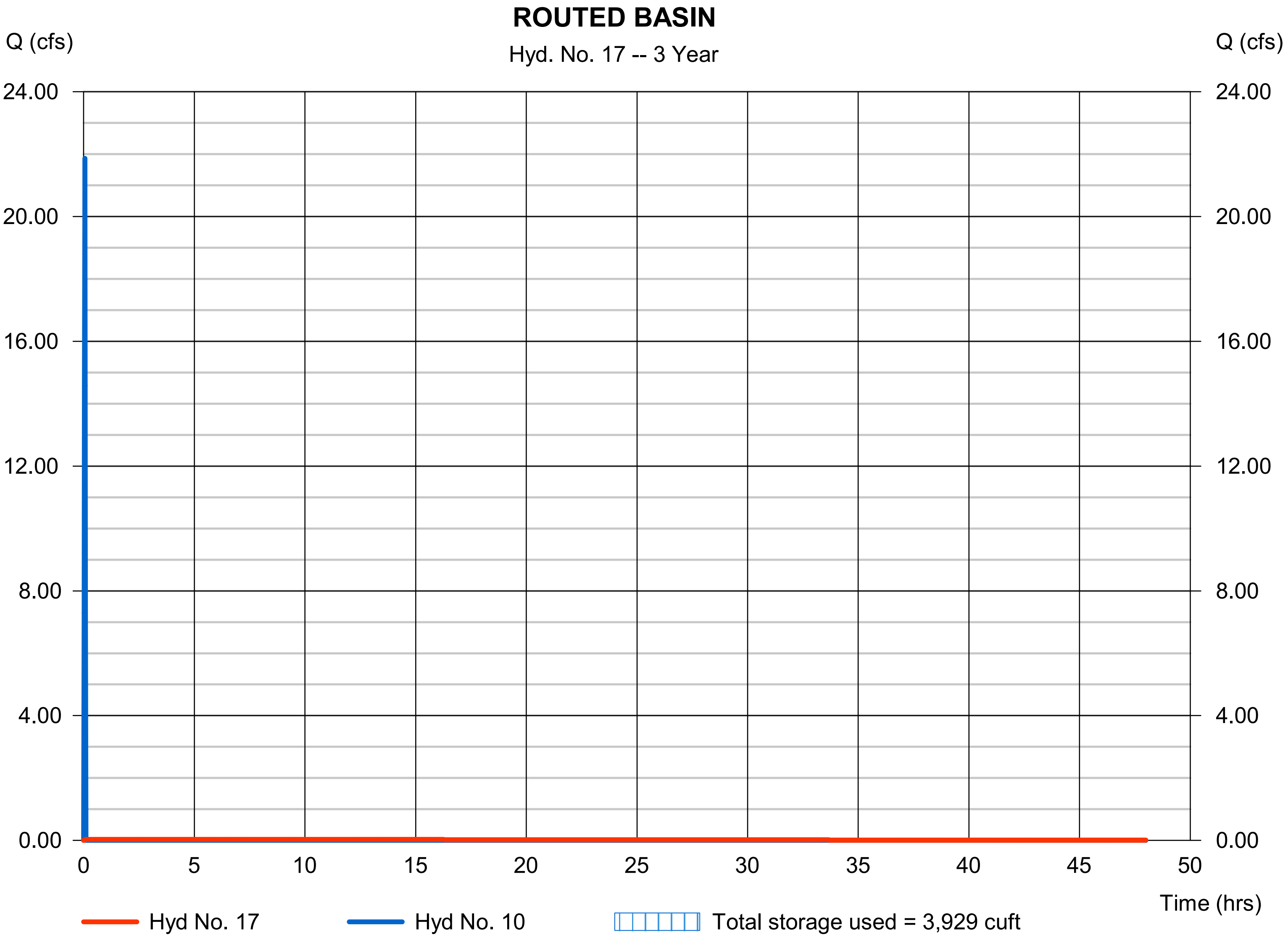
Hydrograph Report

Hyd. No. 17

ROUTED BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.031 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.10 hrs
Time interval	= 1 min	Hyd. volume	= 3,327 cuft
Inflow hyd. No.	= 10 - P_TRIB3	Max. Elevation	= 470.64 ft
Reservoir name	= BMP 1	Max. Storage	= 3,929 cuft

Storage Indication method used.



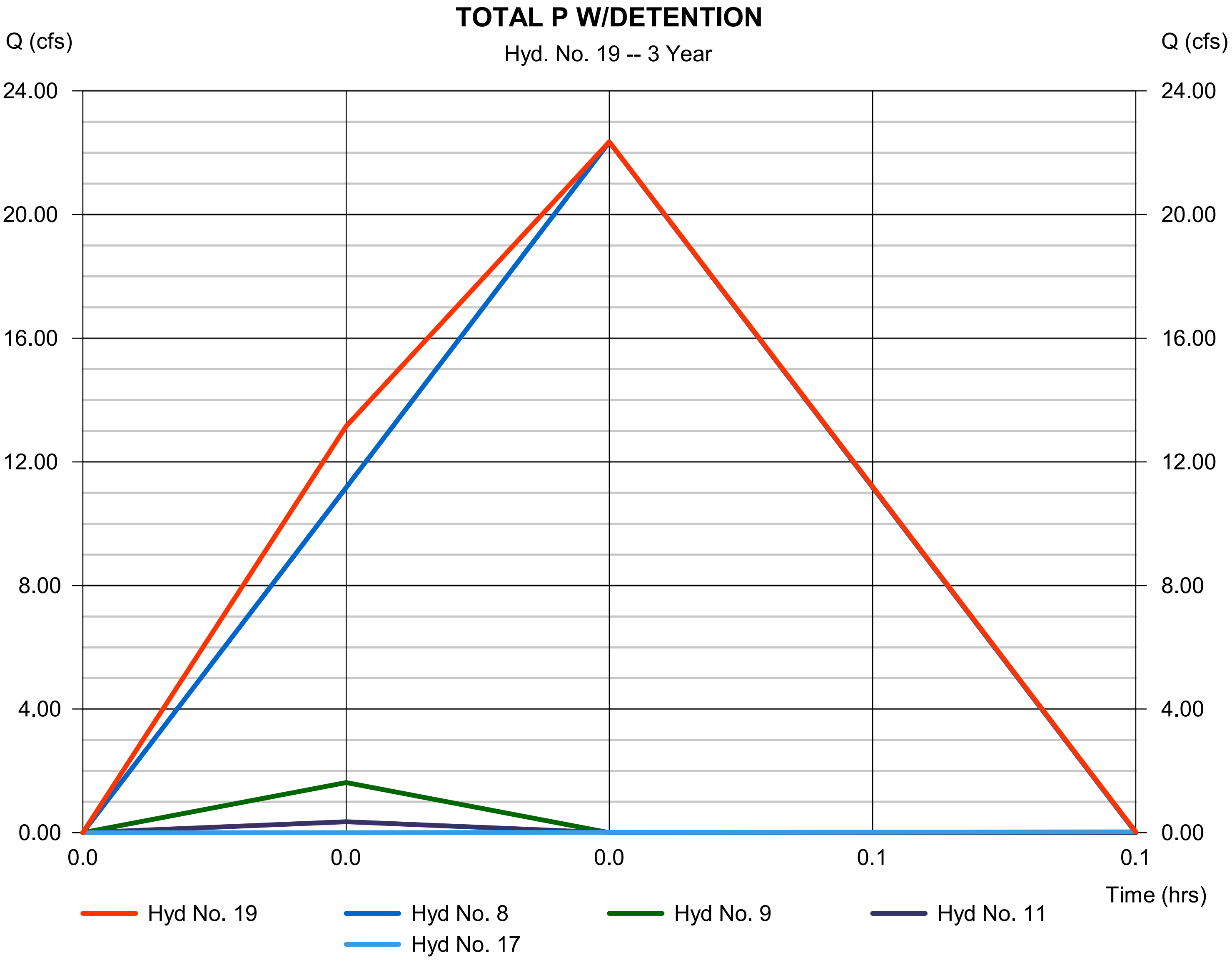
Hydrograph Report

Hyd. No. 19

TOTAL P W/DETENTION

Hydrograph type = Combine
Storm frequency = 3 yrs
Time interval = 1 min
Inflow hyds. = 8, 9, 11, 17

Peak discharge = 22.36 cfs
Time to peak = 0.03 hrs
Hyd. volume = 6,127 cuft
Contrib. drain. area = 4.140 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

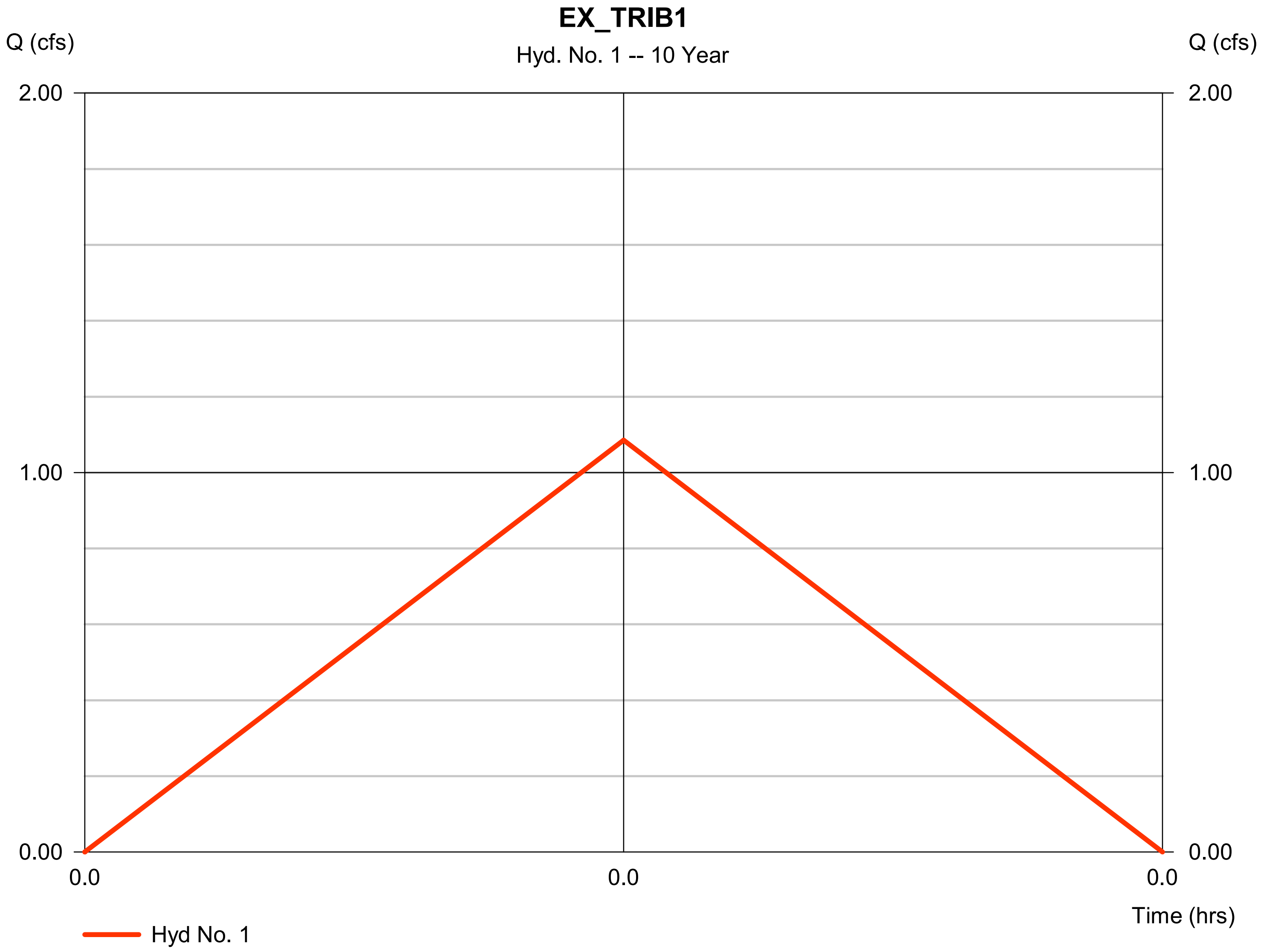
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.086	1	1	65	------	------	------	EX_TRIB1
2	Rational	6.476	1	4	1,554	------	------	------	EX_TRIB2
3	Rational	55.07	1	11	36,348	------	------	------	EX_TRIB3
4	Rational	16.96	1	3	3,054	------	------	------	EX_TRIB4
6	Combine	21.82	1	3	4,673	1, 2, 4,	------	------	TOTAL EX
8	Rational	18.08	1	2	2,170	------	------	------	P_TRIB1
9	Rational	1.219	1	1	73	------	------	------	P_TRIB2
10	Rational	18.70	1	3	3,366	------	------	------	P_TRIB3
11	Rational	0.267	1	1	16	------	------	------	P_TRIB4
13	Combine	30.55	1	2	5,625	8, 9, 10, 11,	------	------	TOTAL P
15	Rational	55.07	1	11	36,348	------	------	------	OFF_TRIB1
17	Reservoir	0.028	1	6	2,891	10	470.55	3,360	ROUTED BASIN
19	Combine	18.09	1	2	5,150	8, 9, 11, 17,	------	------	TOTAL P W/DETENTION

Hydrograph Report

Hyd. No. 1

EX_TRIB1

Hydrograph type	= Rational	Peak discharge	= 1.086 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 65 cuft
Drainage area	= 0.570 ac	Runoff coeff.	= 0.2
Intensity	= 9.522 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

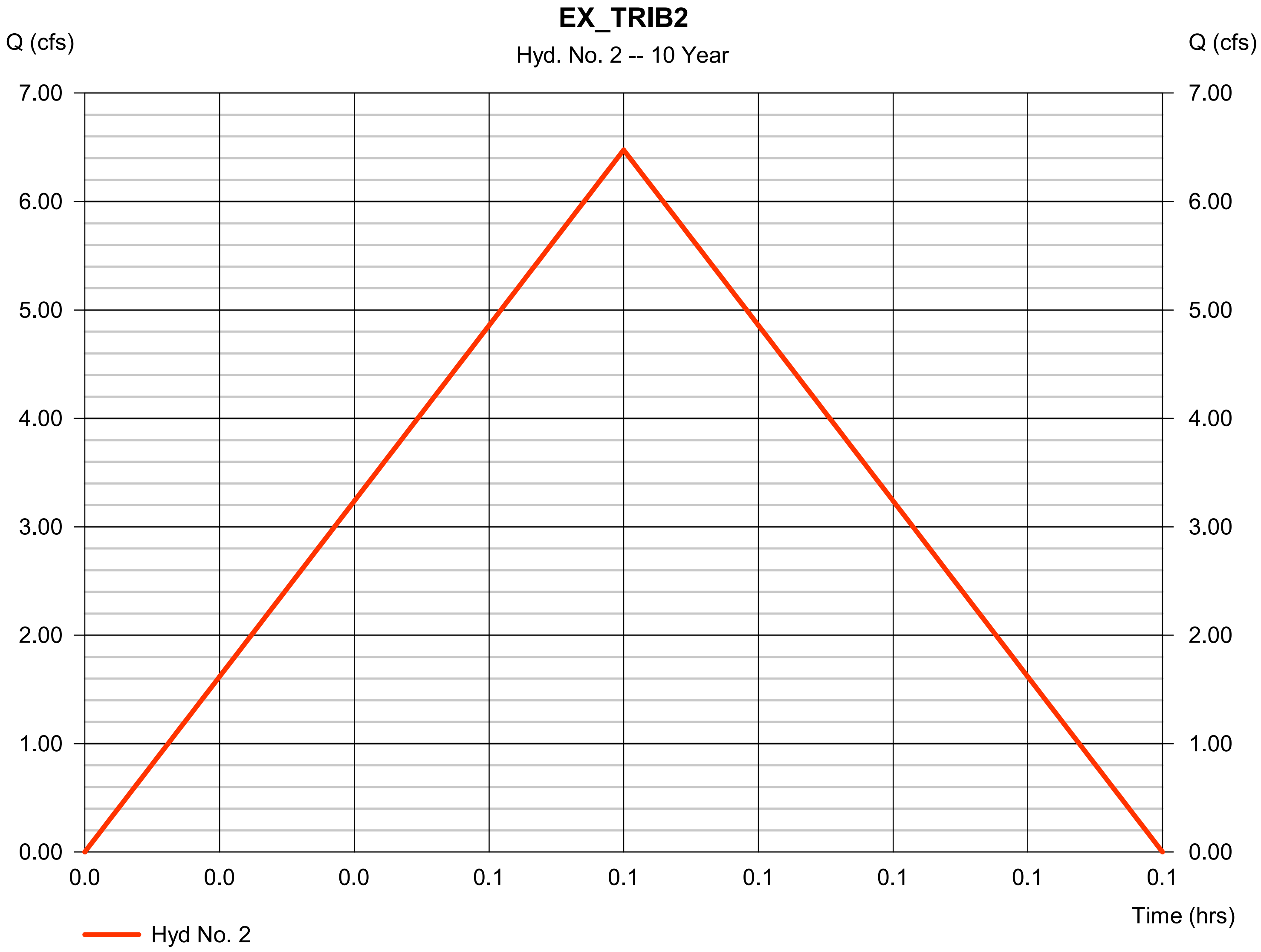


Hydrograph Report

Hyd. No. 2

EX_TRIB2

Hydrograph type	= Rational	Peak discharge	= 6.476 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 1,554 cuft
Drainage area	= 4.020 ac	Runoff coeff.	= 0.2
Intensity	= 8.055 in/hr	Tc by User	= 4.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

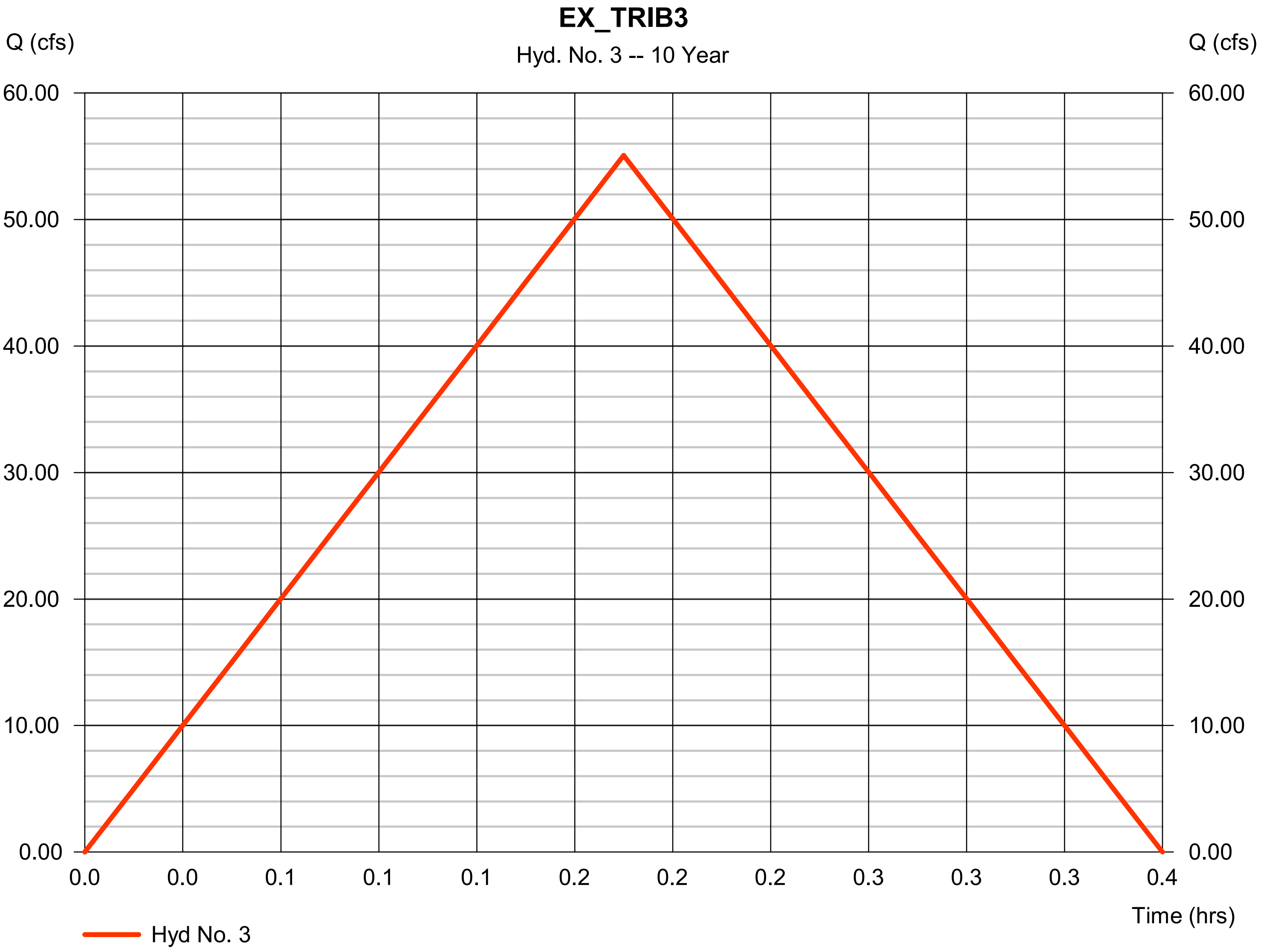


Hydrograph Report

Hyd. No. 3

EX_TRIB3

Hydrograph type	= Rational	Peak discharge	= 55.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 36,348 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 6.007 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

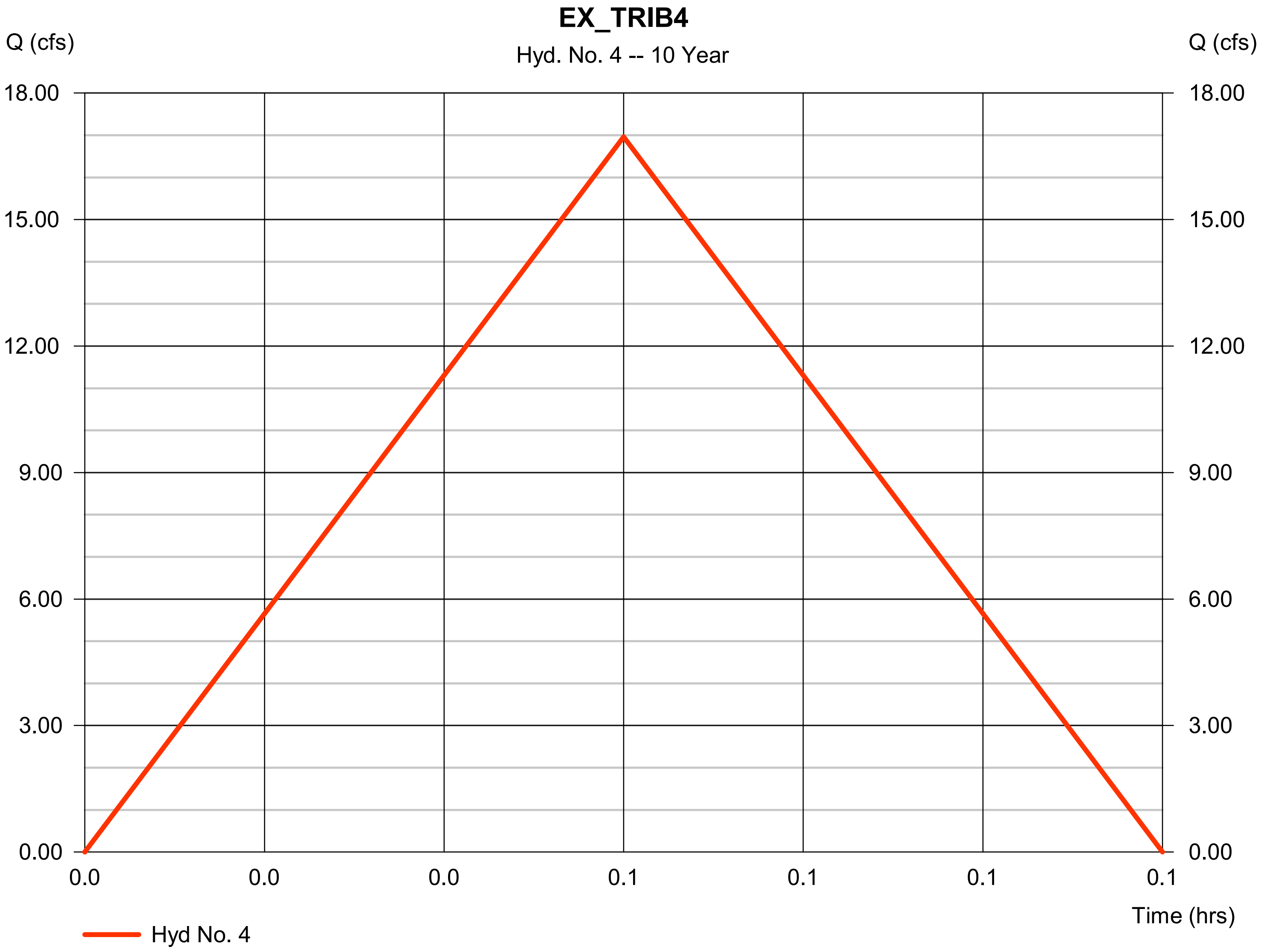


Hydrograph Report

Hyd. No. 4

EX_TRIB4

Hydrograph type	= Rational	Peak discharge	= 16.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 3,054 cuft
Drainage area	= 2.940 ac	Runoff coeff.	= 0.68
Intensity	= 8.486 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

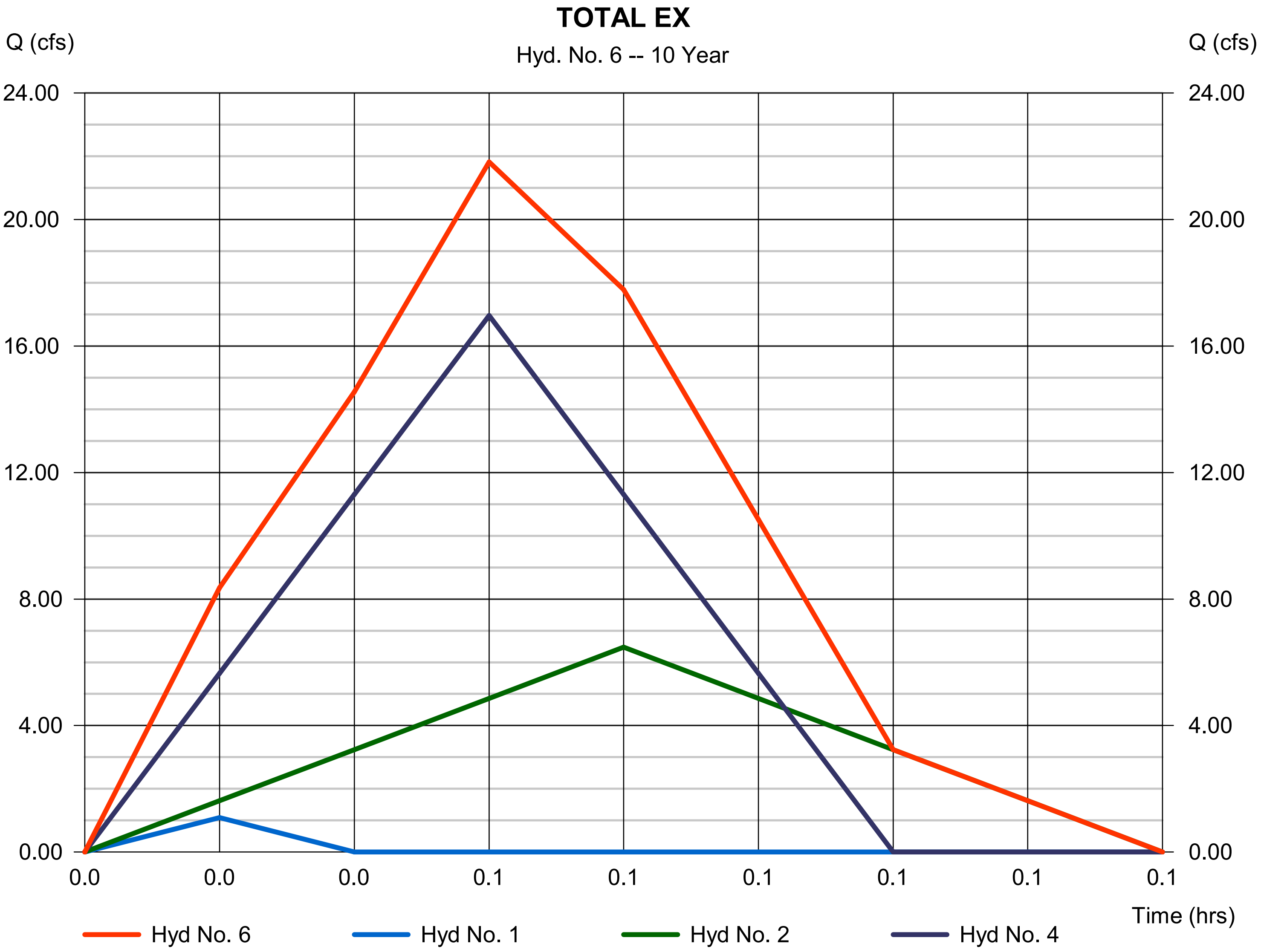


Hydrograph Report

Hyd. No. 6

TOTAL EX

Hydrograph type	= Combine	Peak discharge	= 21.82 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 4,673 cuft
Inflow hyds.	= 1, 2, 4	Contrib. drain. area	= 7.530 ac

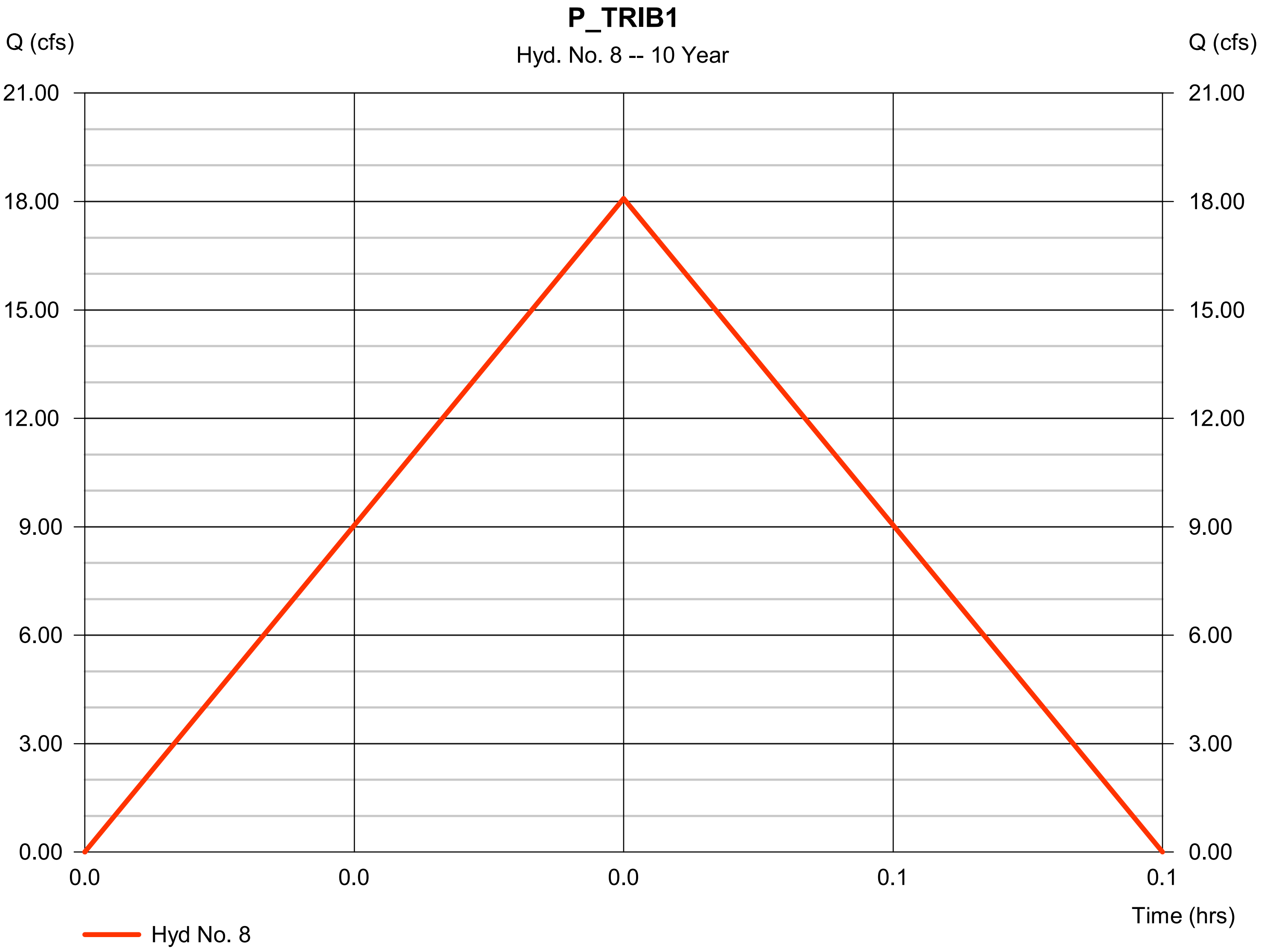


Hydrograph Report

Hyd. No. 8

P_TRIB1

Hydrograph type	= Rational	Peak discharge	= 18.08 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 2,170 cuft
Drainage area	= 3.360 ac	Runoff coeff.	= 0.6
Intensity	= 8.971 in/hr	Tc by User	= 2.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

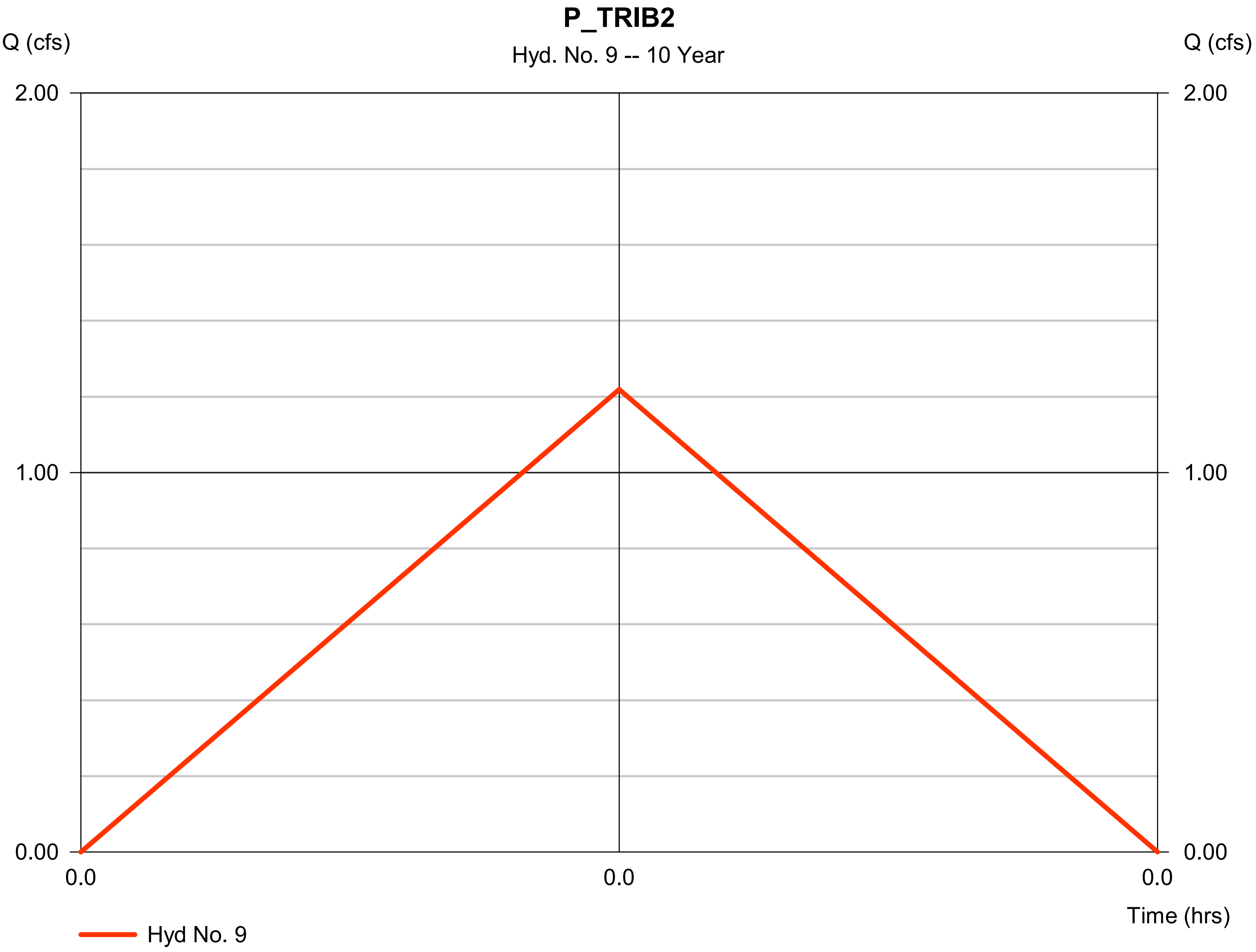


Hydrograph Report

Hyd. No. 9

P_TRIB2

Hydrograph type	= Rational	Peak discharge	= 1.219 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 73 cuft
Drainage area	= 0.640 ac	Runoff coeff.	= 0.2
Intensity	= 9.522 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

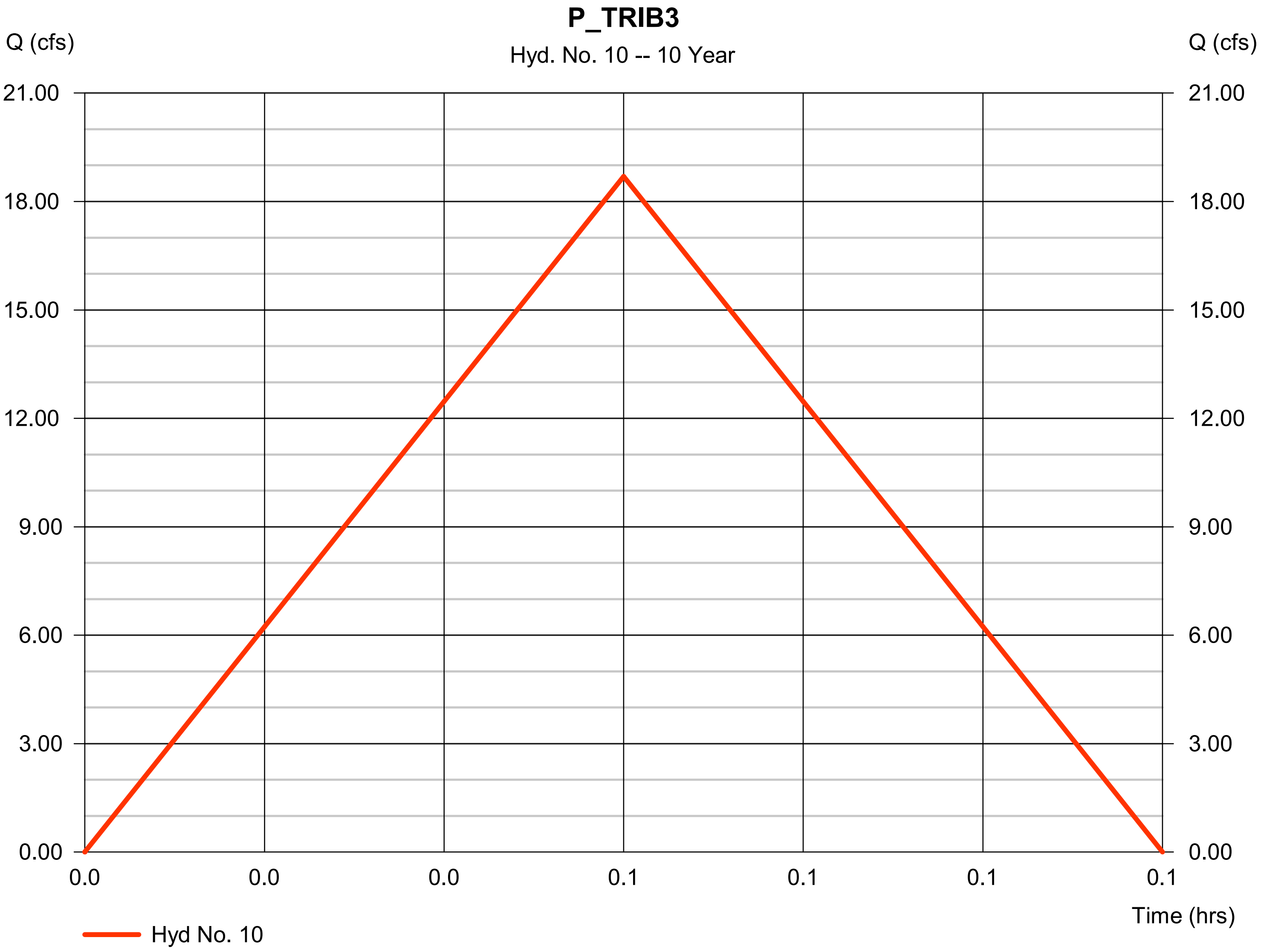


Hydrograph Report

Hyd. No. 10

P_TRIB3

Hydrograph type	= Rational	Peak discharge	= 18.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 3,366 cuft
Drainage area	= 3.390 ac	Runoff coeff.	= 0.65
Intensity	= 8.486 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

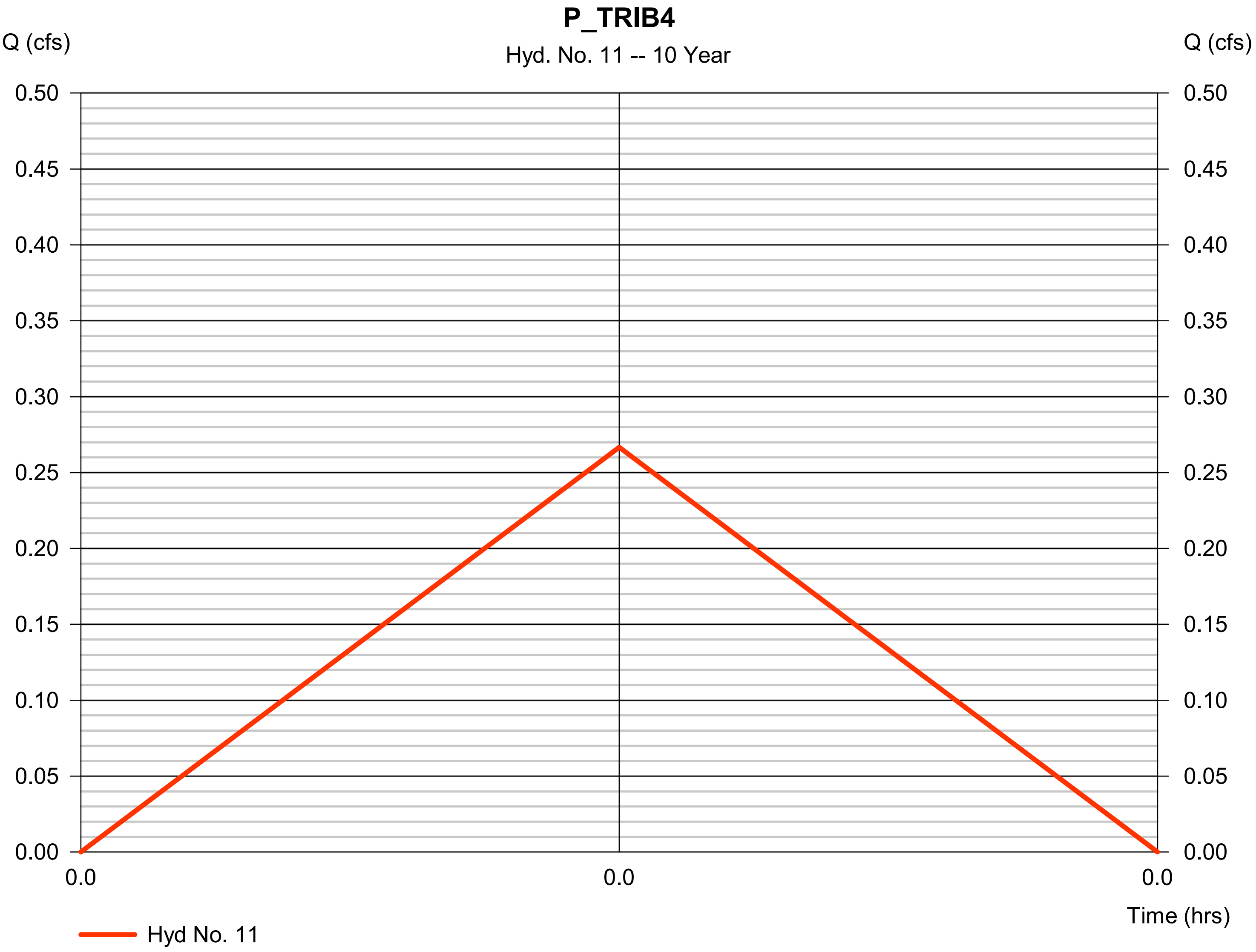


Hydrograph Report

Hyd. No. 11

P_TRIB4

Hydrograph type	= Rational	Peak discharge	= 0.267 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 16 cuft
Drainage area	= 0.140 ac	Runoff coeff.	= 0.2
Intensity	= 9.522 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

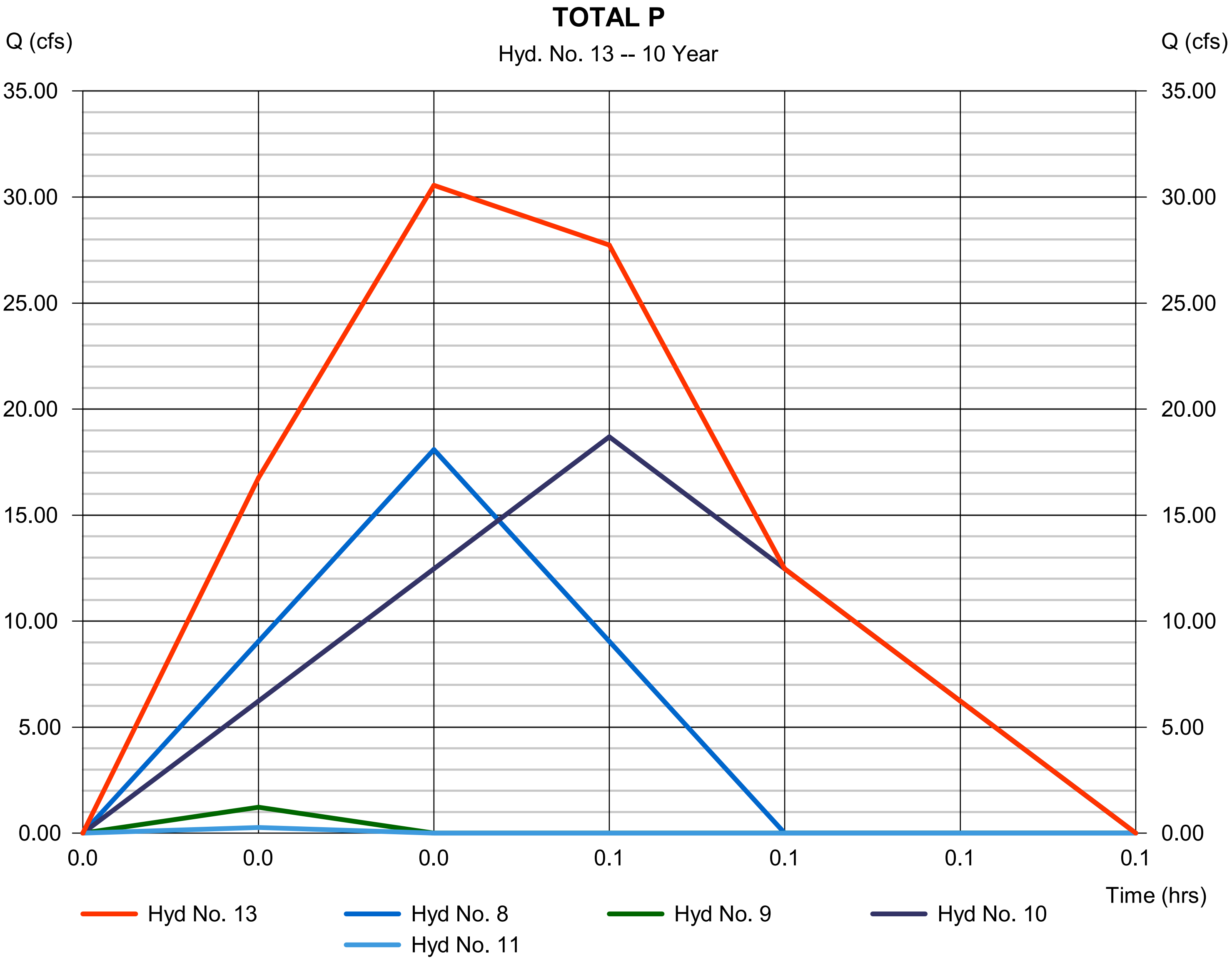


Hydrograph Report

Hyd. No. 13

TOTAL P

Hydrograph type	= Combine	Peak discharge	= 30.55 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 5,625 cuft
Inflow hyds.	= 8, 9, 10, 11	Contrib. drain. area	= 7.530 ac

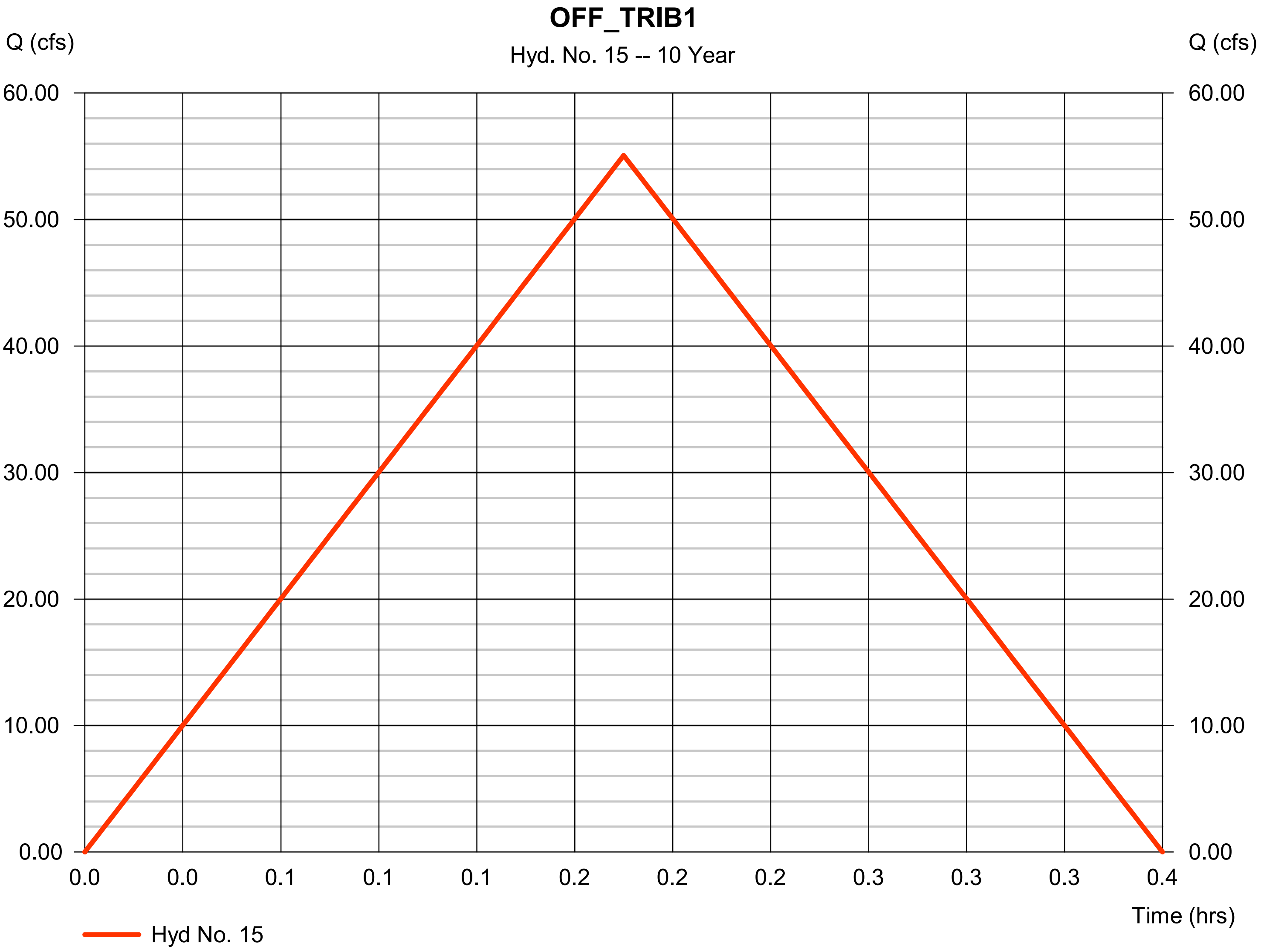


Hydrograph Report

Hyd. No. 15

OFF_TRIB1

Hydrograph type	= Rational	Peak discharge	= 55.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 36,348 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 6.007 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



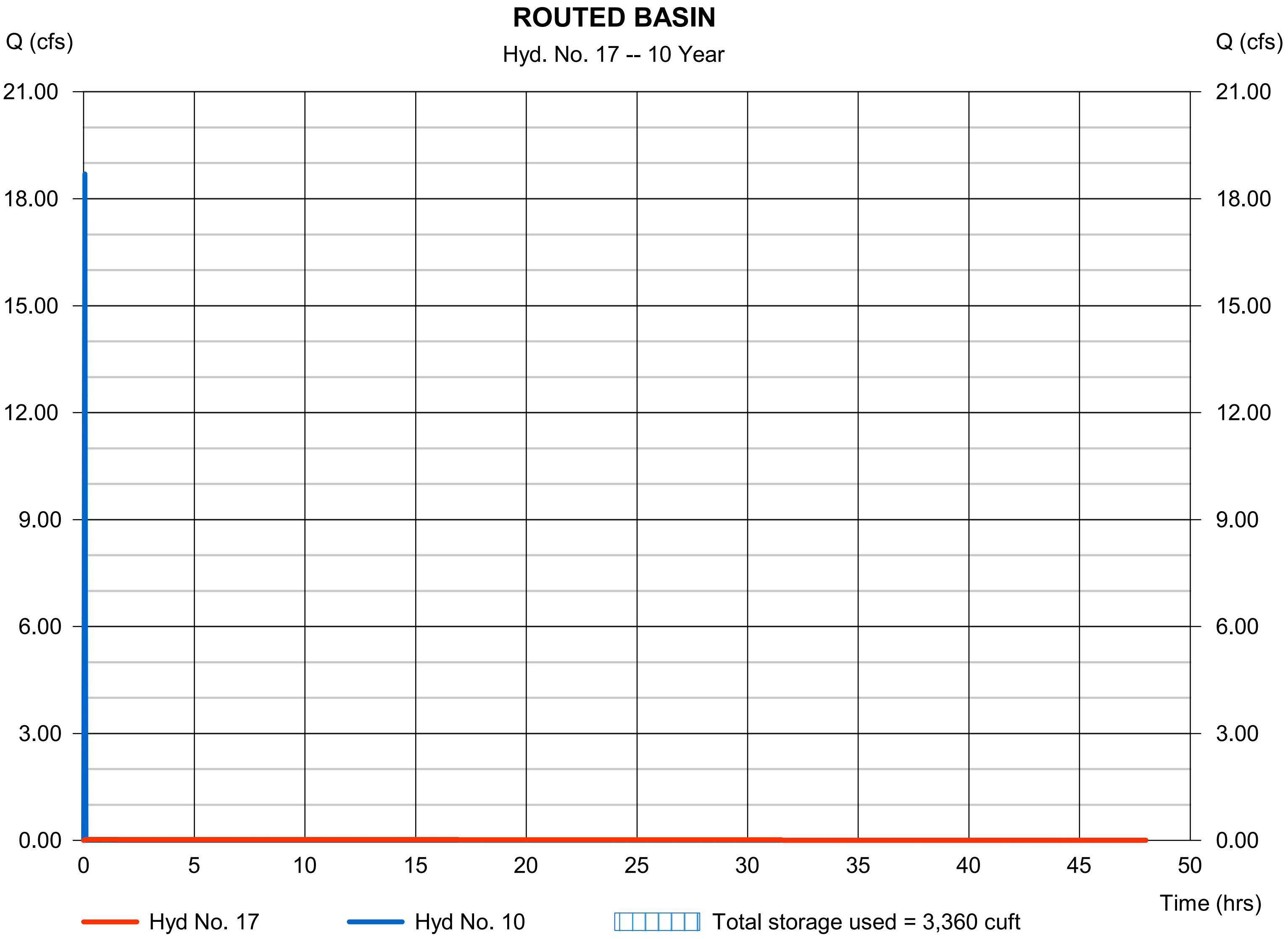
Hydrograph Report

Hyd. No. 17

ROUTED BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.028 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.10 hrs
Time interval	= 1 min	Hyd. volume	= 2,891 cuft
Inflow hyd. No.	= 10 - P_TRIB3	Max. Elevation	= 470.55 ft
Reservoir name	= BMP 1	Max. Storage	= 3,360 cuft

Storage Indication method used.

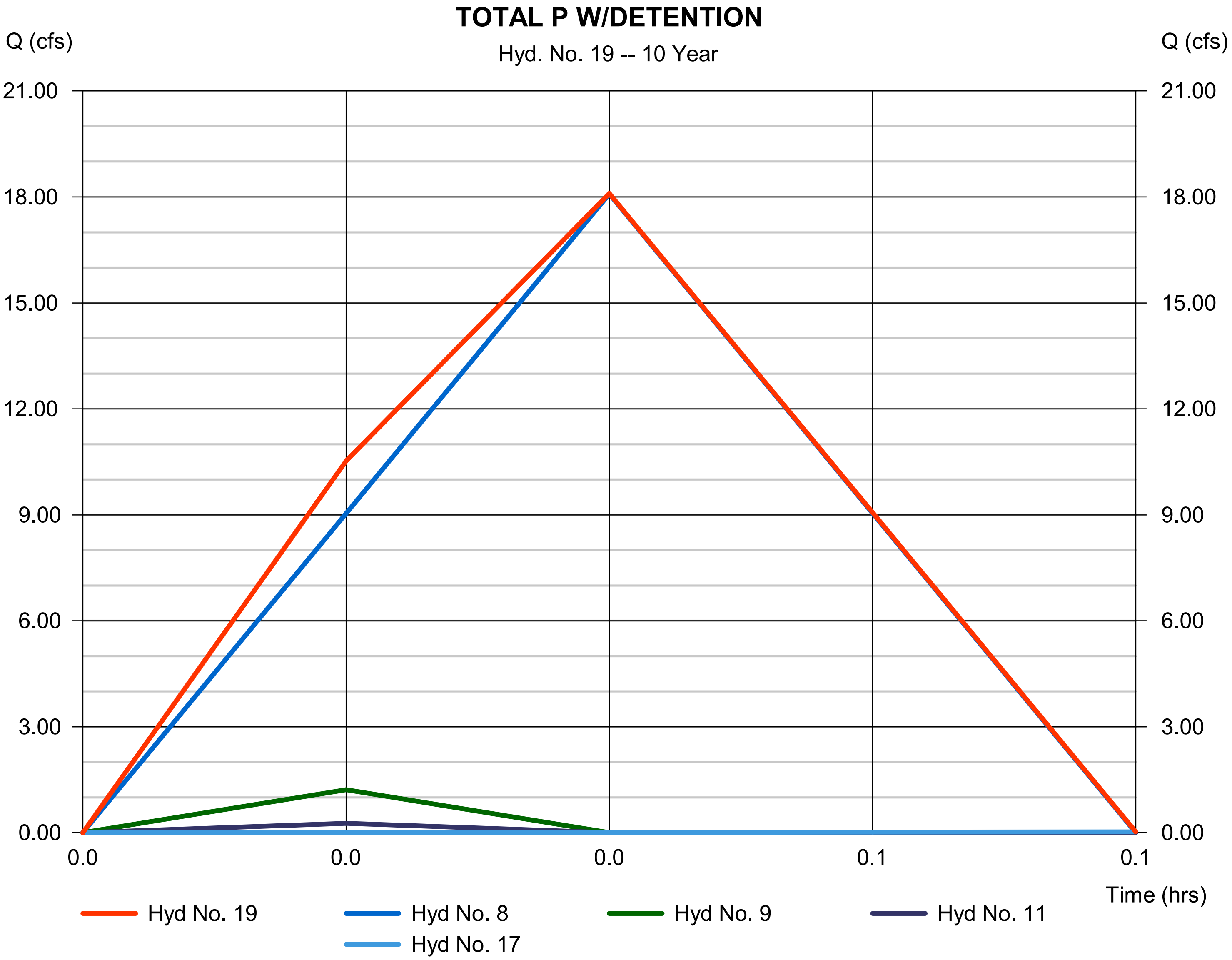


Hydrograph Report

Hyd. No. 19

TOTAL P W/DETENTION

Hydrograph type	= Combine	Peak discharge	= 18.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 5,150 cuft
Inflow hyds.	= 8, 9, 11, 17	Contrib. drain. area	= 4.140 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

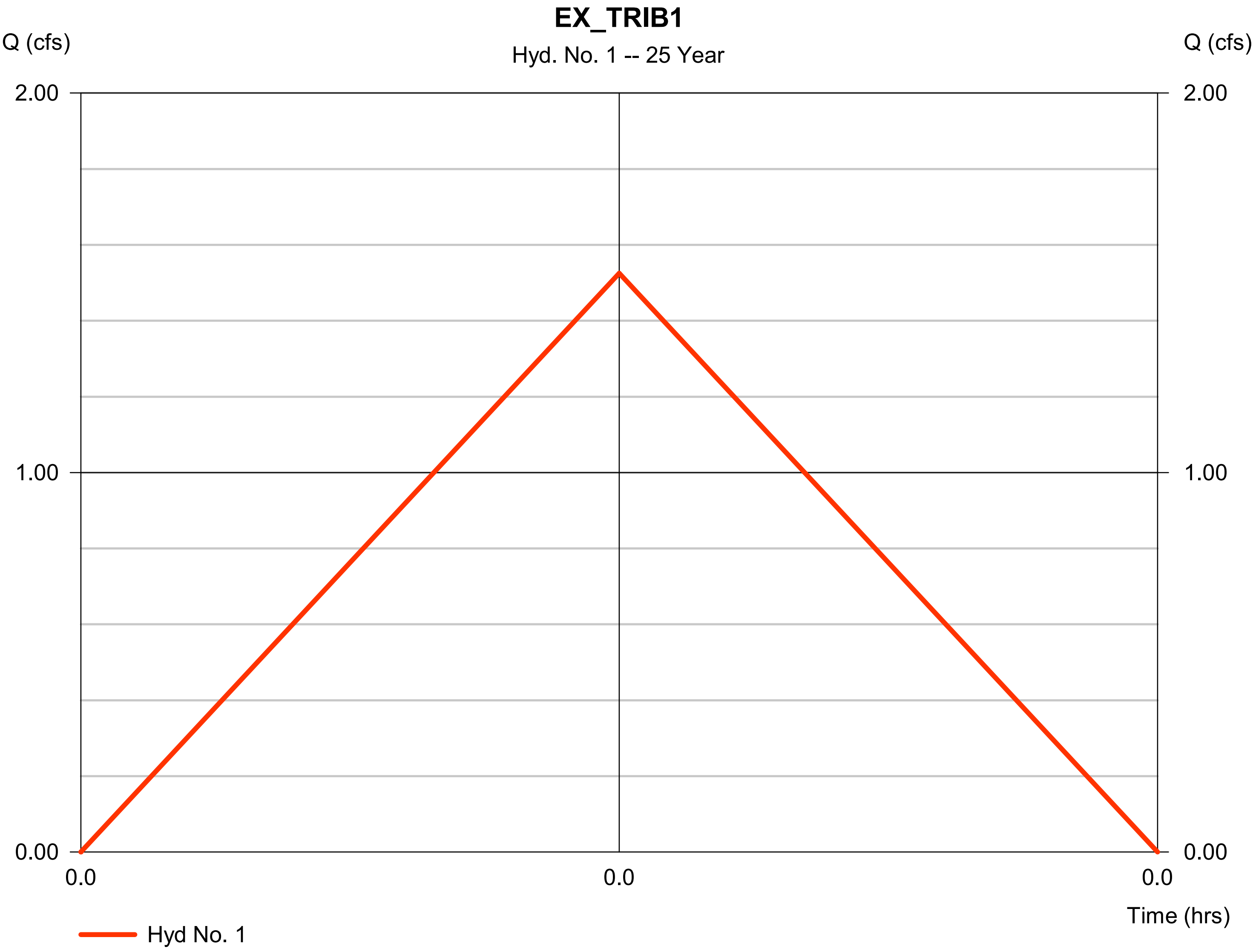
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.525	1	1	92	------	------	------	EX_TRIB1
2	Rational	7.681	1	4	1,844	------	------	------	EX_TRIB2
3	Rational	57.71	1	11	38,089	------	------	------	EX_TRIB3
4	Rational	20.96	1	3	3,772	------	------	------	EX_TRIB4
6	Combine	26.72	1	3	5,707	1, 2, 4,	------	------	TOTAL EX
8	Rational	23.59	1	2	2,830	------	------	------	P_TRIB1
9	Rational	1.713	1	1	103	------	------	------	P_TRIB2
10	Rational	23.10	1	3	4,158	------	------	------	P_TRIB3
11	Rational	0.375	1	1	22	------	------	------	P_TRIB4
13	Combine	38.98	1	2	7,113	8, 9, 10, 11,	------	------	TOTAL P
15	Rational	57.71	1	11	38,089	------	------	------	OFF_TRIB1
17	Reservoir	0.032	1	6	3,491	10	470.67	4,151	ROUTED BASIN
19	Combine	23.60	1	2	6,447	8, 9, 11, 17,	------	------	TOTAL P W/DETENTION

Hydrograph Report

Hyd. No. 1

EX_TRIB1

Hydrograph type	= Rational	Peak discharge	= 1.525 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 92 cuft
Drainage area	= 0.570 ac	Runoff coeff.	= 0.2
Intensity	= 13.381 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

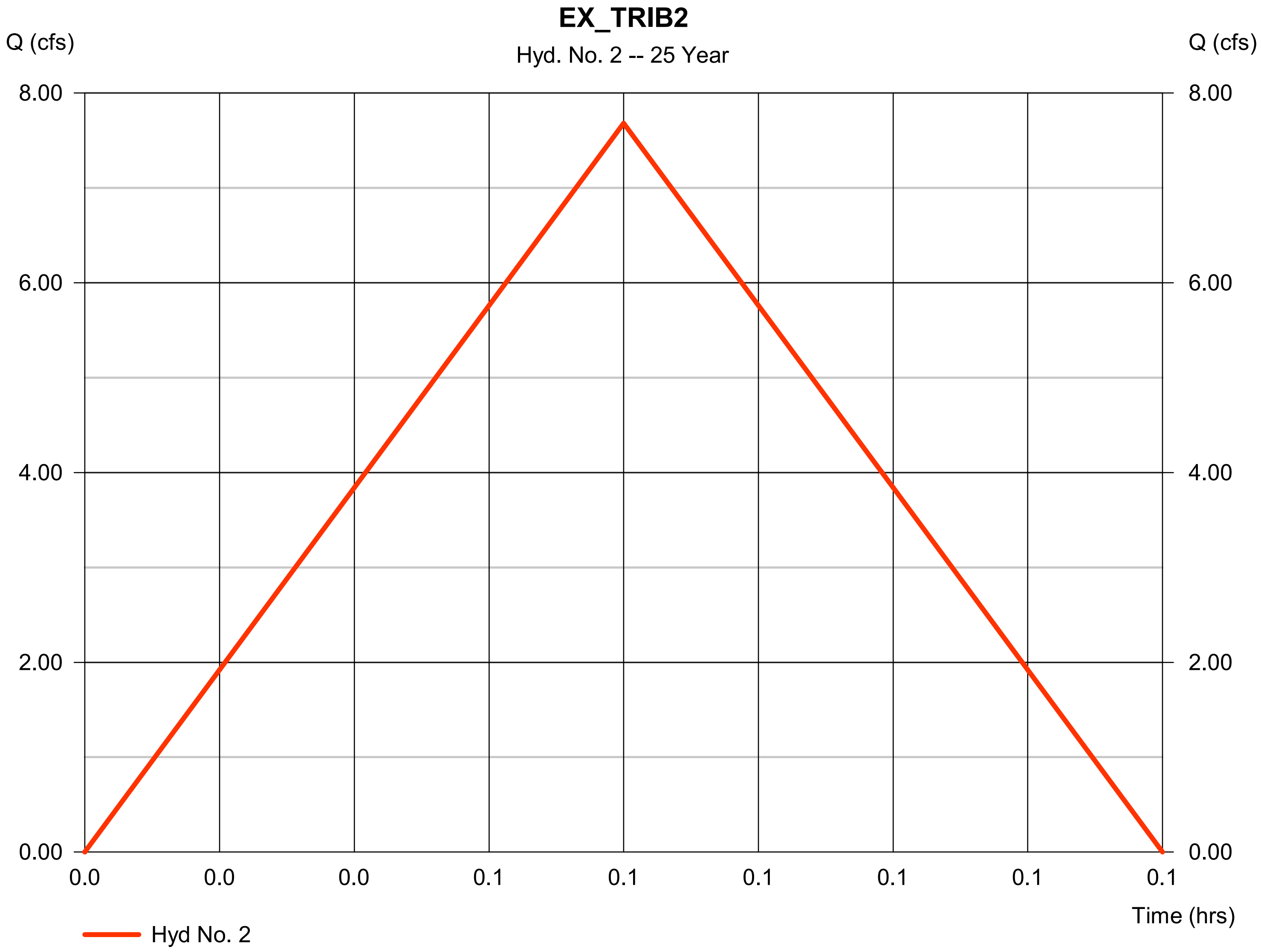
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 02 / 2 / 2023

Hyd. No. 2

EX_TRIB2

Hydrograph type = Rational
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 4.020 ac
Intensity = 9.554 in/hr
IDF Curve = MSD.IDF

Peak discharge = 7.681 cfs
Time to peak = 0.07 hrs
Hyd. volume = 1,844 cuft
Runoff coeff. = 0.2
Tc by User = 4.00 min
Asc/Rec limb fact = 1/1



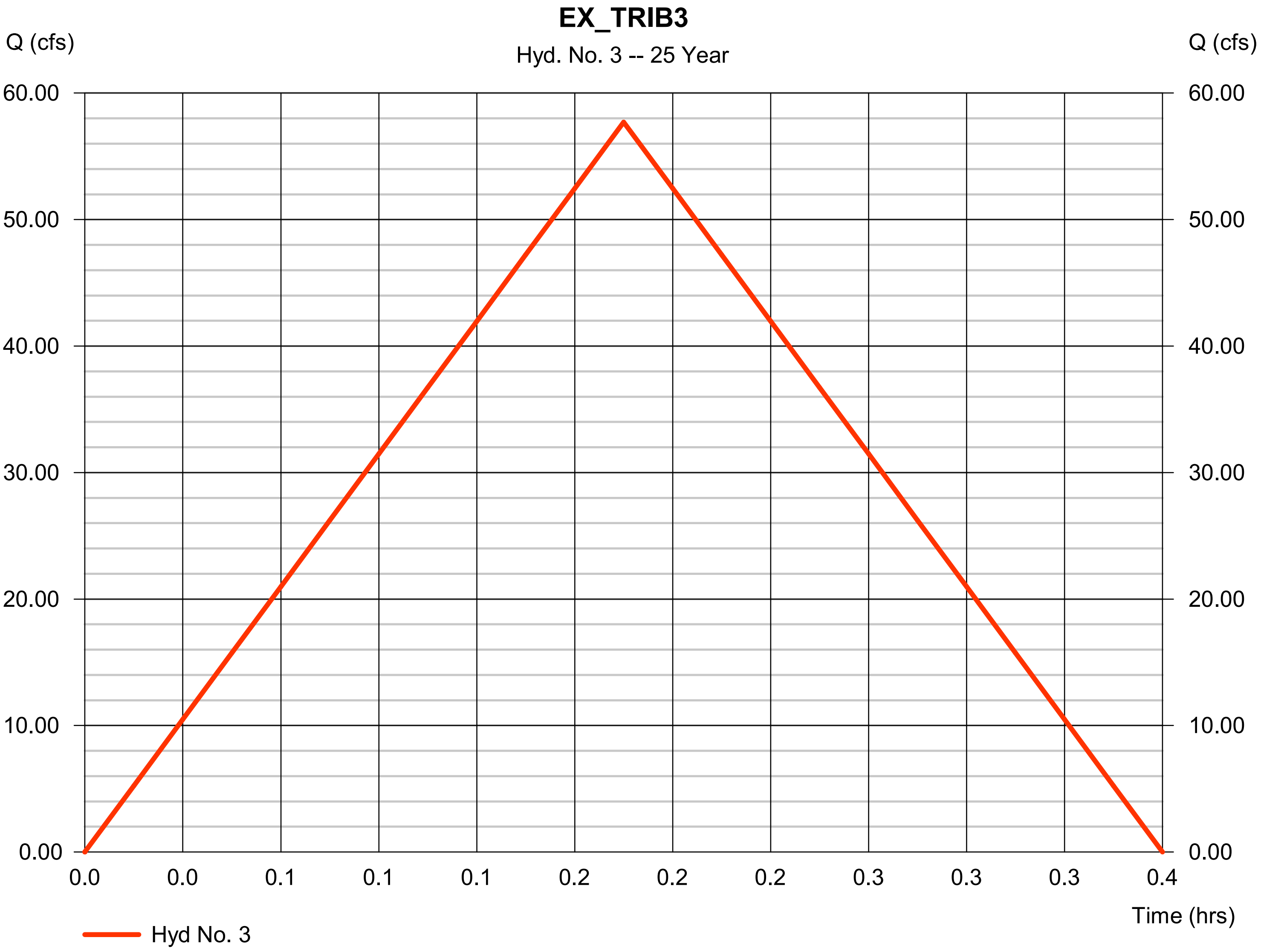
Hydrograph Report

Hyd. No. 3

EX_TRIB3

Hydrograph type = Rational
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 16.670 ac
Intensity = 6.295 in/hr
IDF Curve = MSD.IDF

Peak discharge = 57.71 cfs
Time to peak = 0.18 hrs
Hyd. volume = 38,089 cuft
Runoff coeff. = 0.55
Tc by User = 11.00 min
Asc/Rec limb fact = 1/1

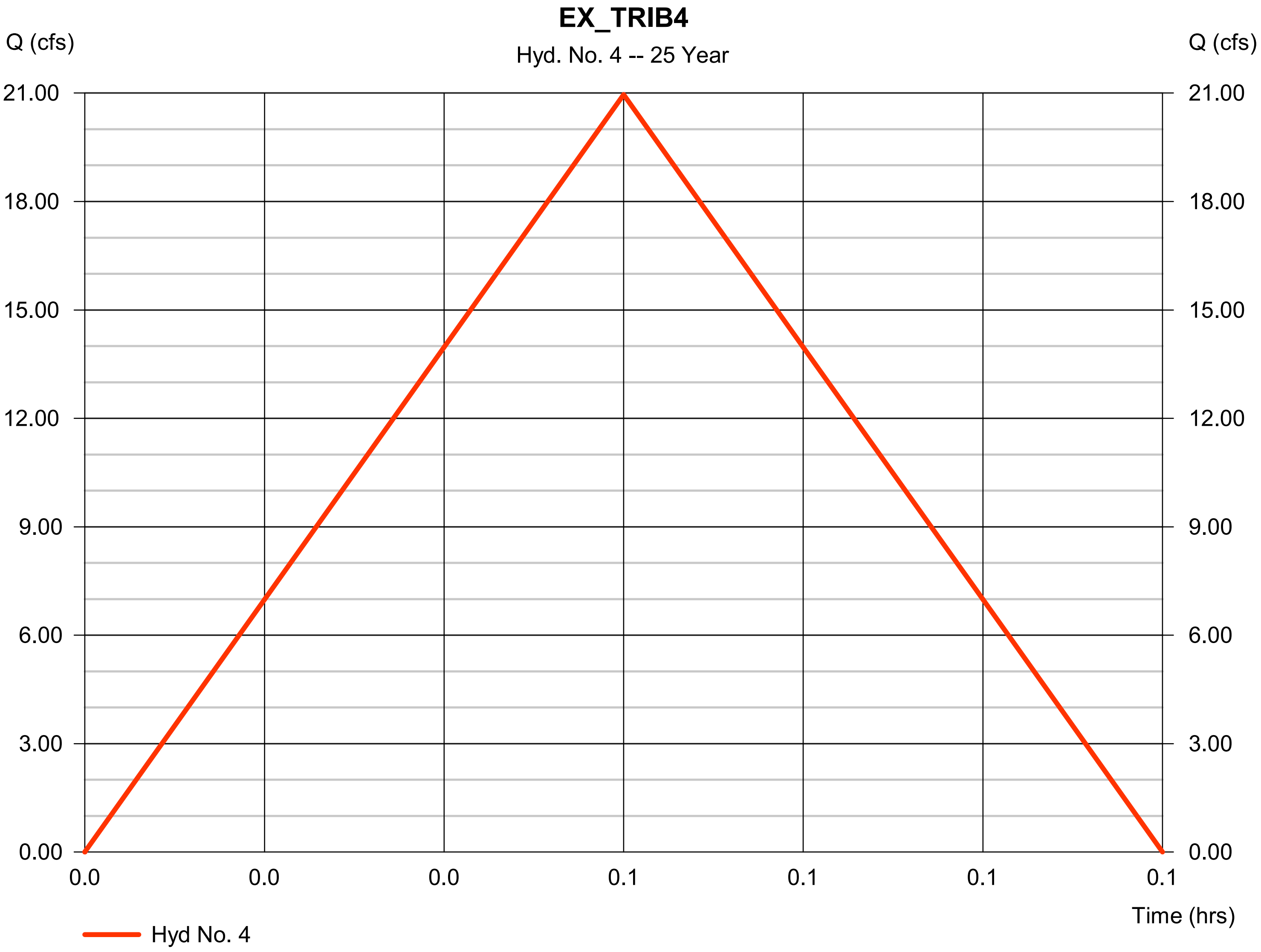


Hydrograph Report

Hyd. No. 4

EX_TRIB4

Hydrograph type	= Rational	Peak discharge	= 20.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 3,772 cuft
Drainage area	= 2.940 ac	Runoff coeff.	= 0.68
Intensity	= 10.483 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



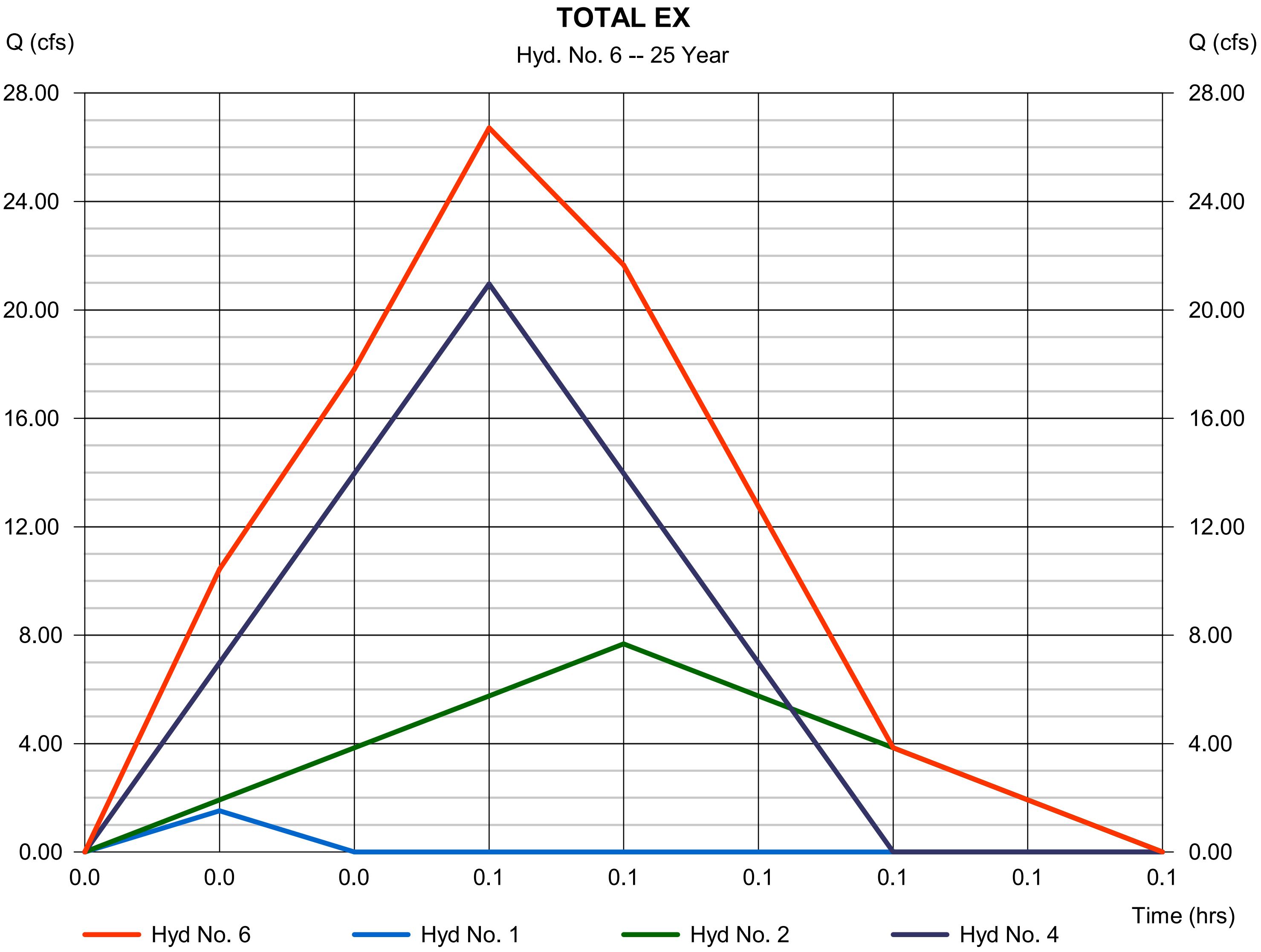
Hydrograph Report

Hyd. No. 6

TOTAL EX

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 1 min
Inflow hyds. = 1, 2, 4

Peak discharge = 26.72 cfs
Time to peak = 0.05 hrs
Hyd. volume = 5,707 cuft
Contrib. drain. area = 7.530 ac



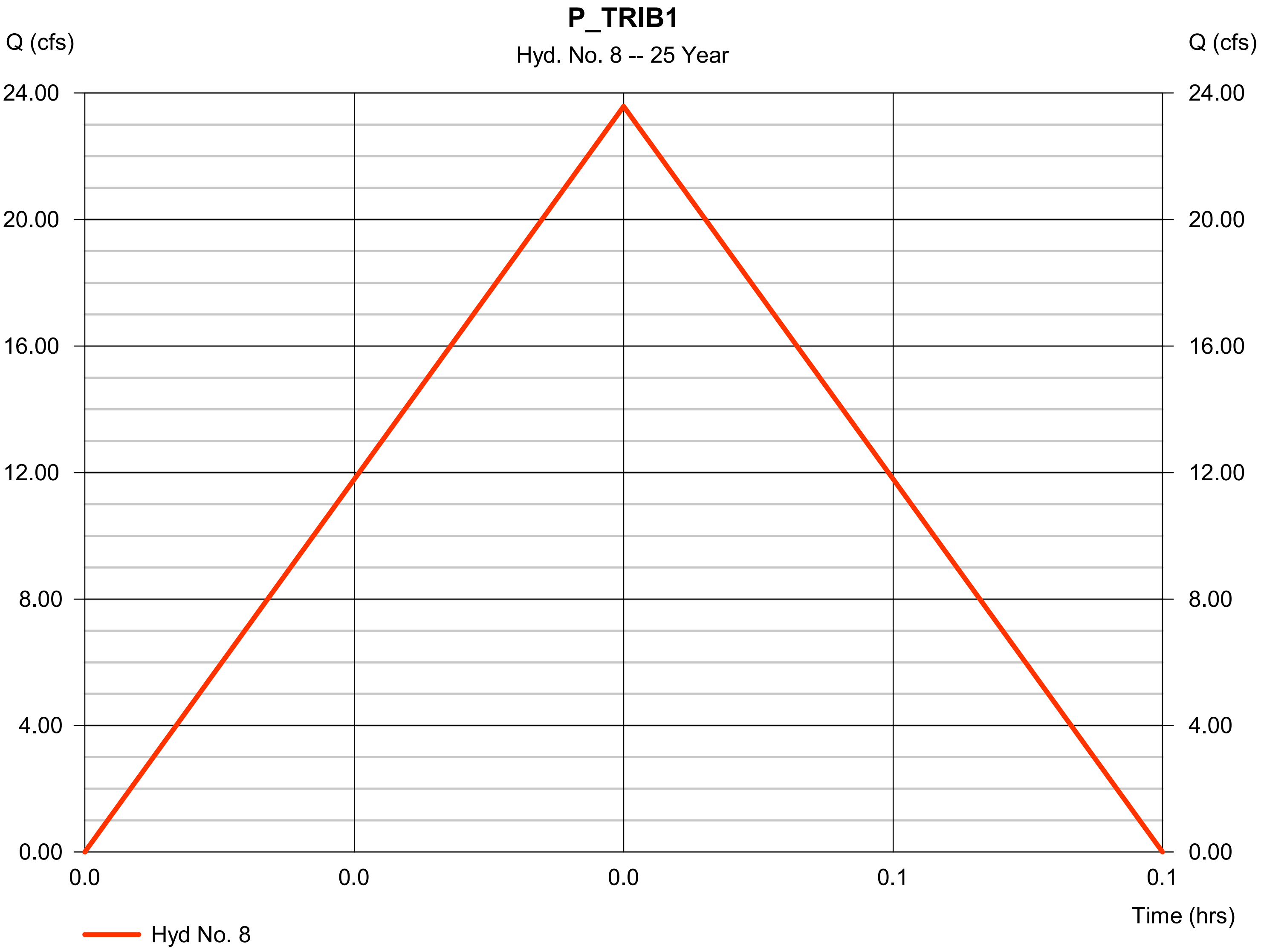
Hydrograph Report

Hyd. No. 8

P_TRIB1

Hydrograph type = Rational
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 3.360 ac
Intensity = 11.699 in/hr
IDF Curve = MSD.IDF

Peak discharge = 23.59 cfs
Time to peak = 0.03 hrs
Hyd. volume = 2,830 cuft
Runoff coeff. = 0.6
Tc by User = 2.00 min
Asc/Rec limb fact = 1/1



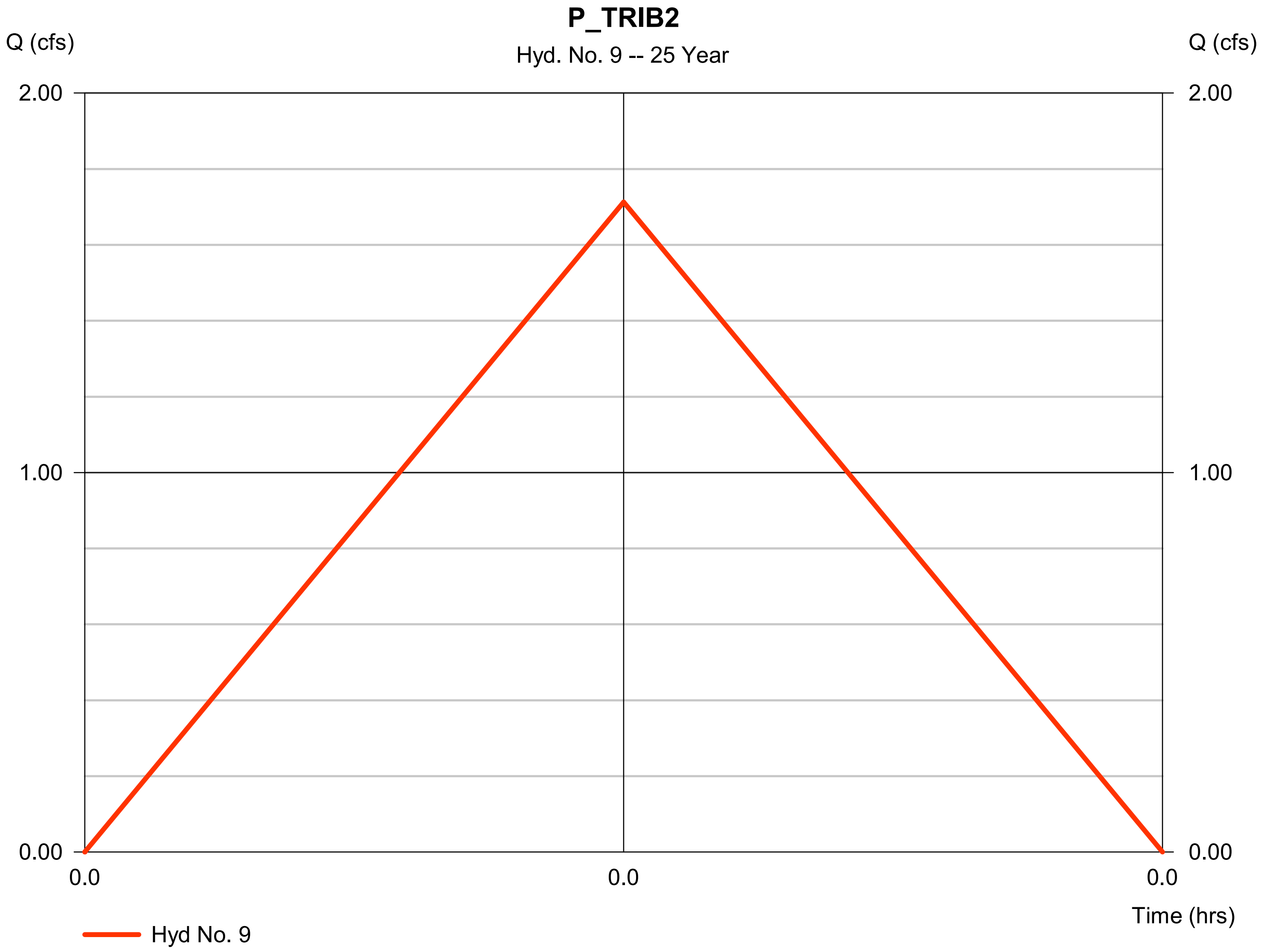
Hydrograph Report

Hyd. No. 9

P_TRIB2

Hydrograph type = Rational
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 0.640 ac
Intensity = 13.381 in/hr
IDF Curve = MSD.IDF

Peak discharge = 1.713 cfs
Time to peak = 0.02 hrs
Hyd. volume = 103 cuft
Runoff coeff. = 0.2
Tc by User = 1.00 min
Asc/Rec limb fact = 1/1

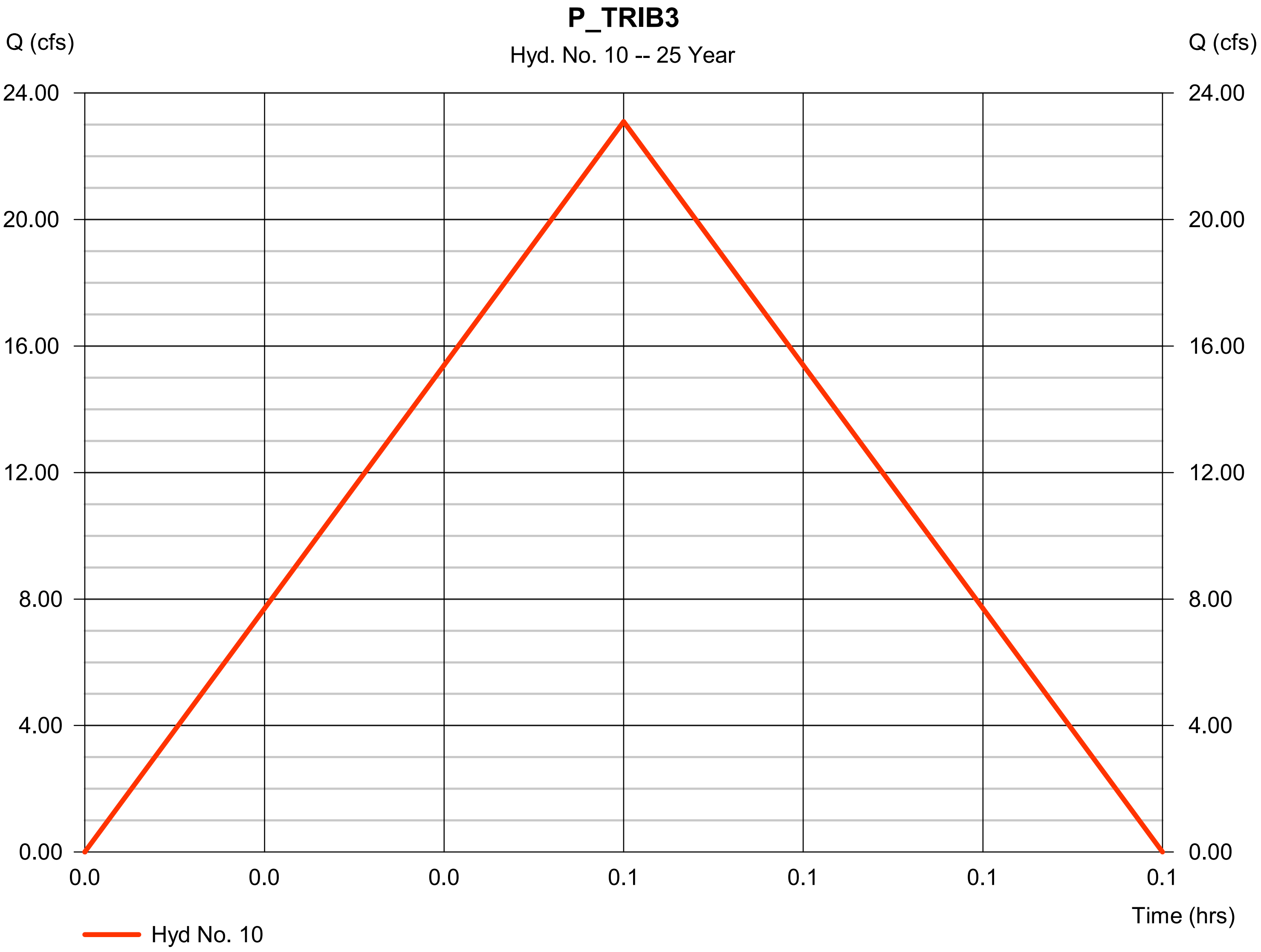


Hydrograph Report

Hyd. No. 10

P_TRIB3

Hydrograph type	= Rational	Peak discharge	= 23.10 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 4,158 cuft
Drainage area	= 3.390 ac	Runoff coeff.	= 0.65
Intensity	= 10.483 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

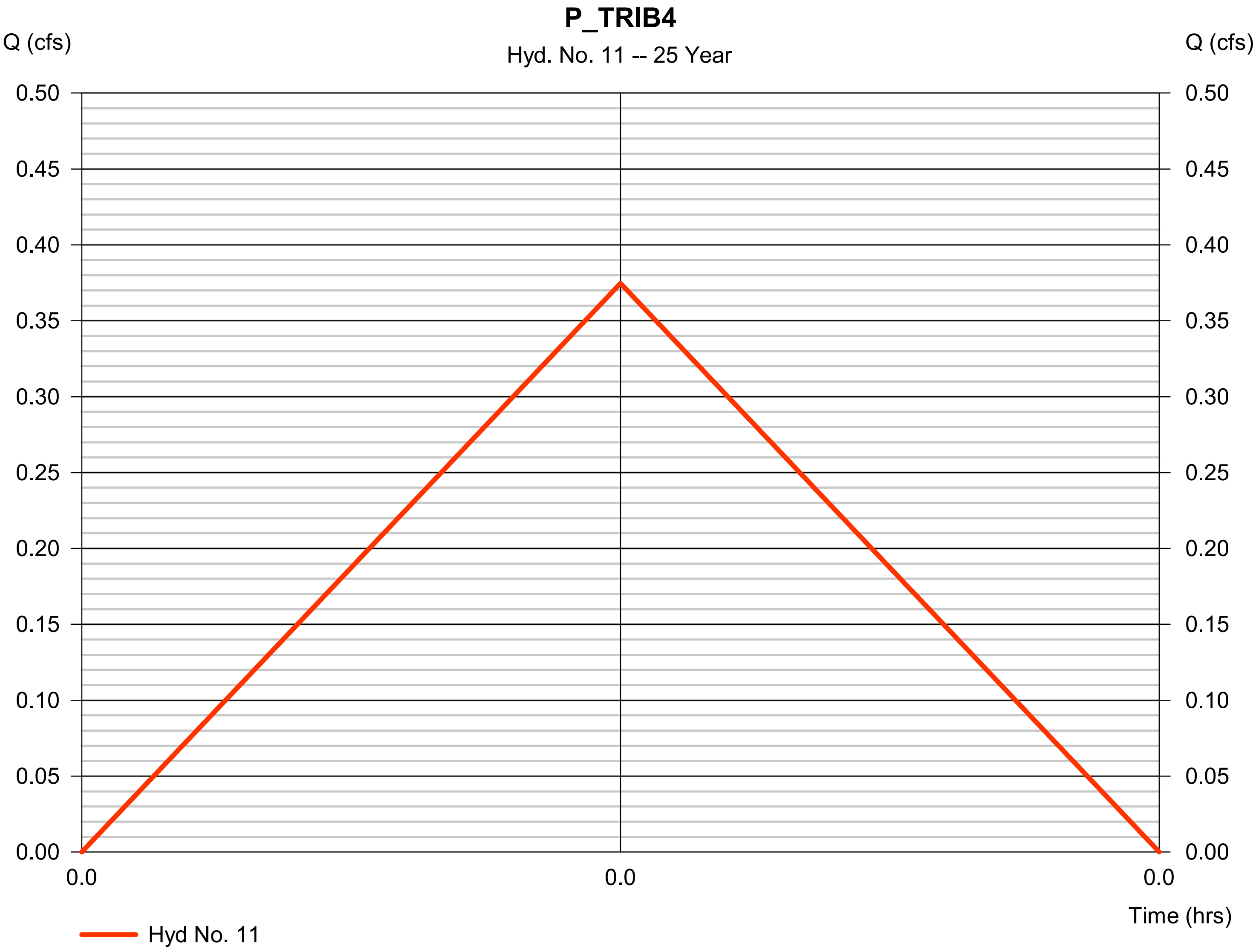


Hydrograph Report

Hyd. No. 11

P_TRIB4

Hydrograph type	= Rational	Peak discharge	= 0.375 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 22 cuft
Drainage area	= 0.140 ac	Runoff coeff.	= 0.2
Intensity	= 13.381 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

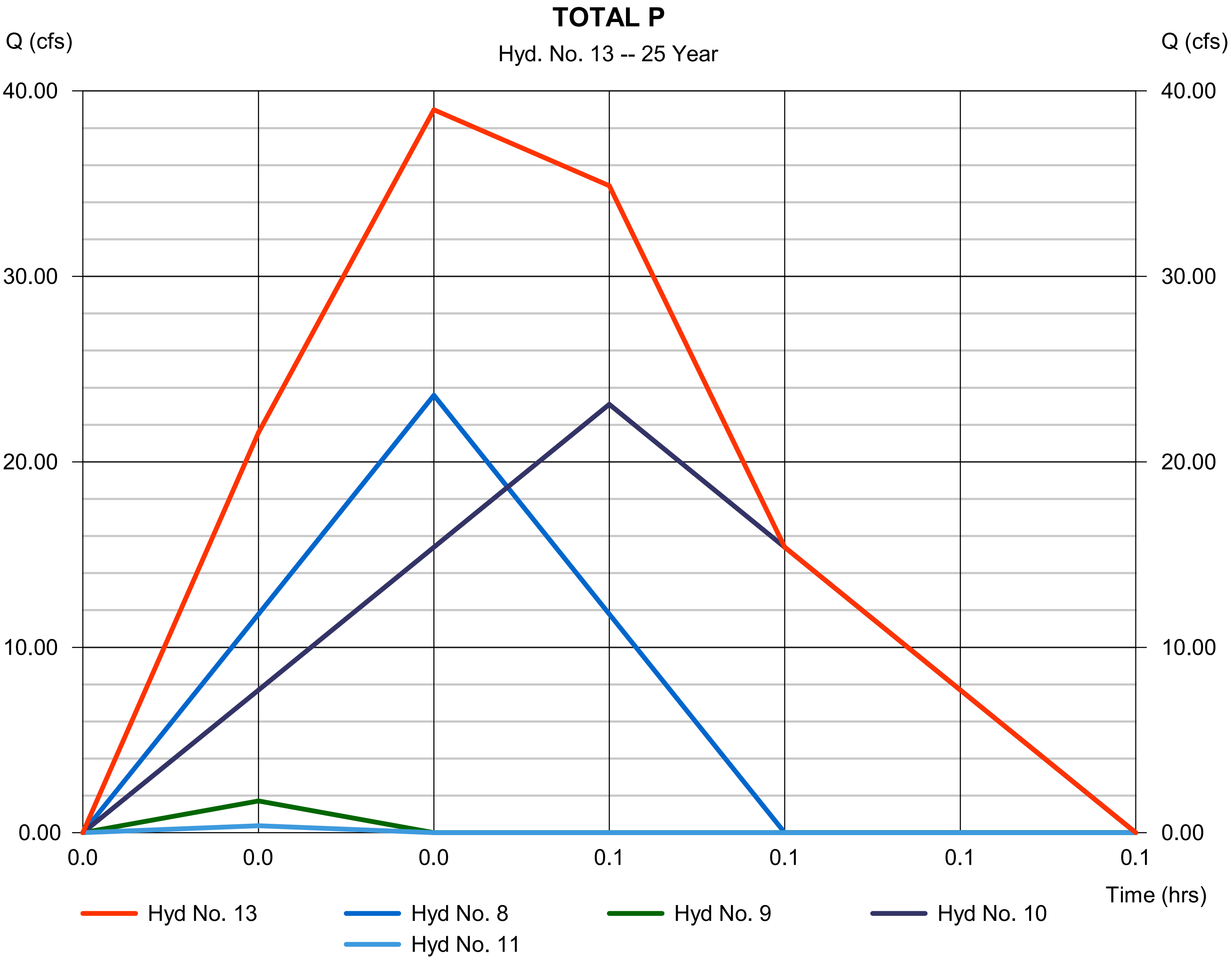


Hydrograph Report

Hyd. No. 13

TOTAL P

Hydrograph type	= Combine	Peak discharge	= 38.98 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 7,113 cuft
Inflow hyds.	= 8, 9, 10, 11	Contrib. drain. area	= 7.530 ac

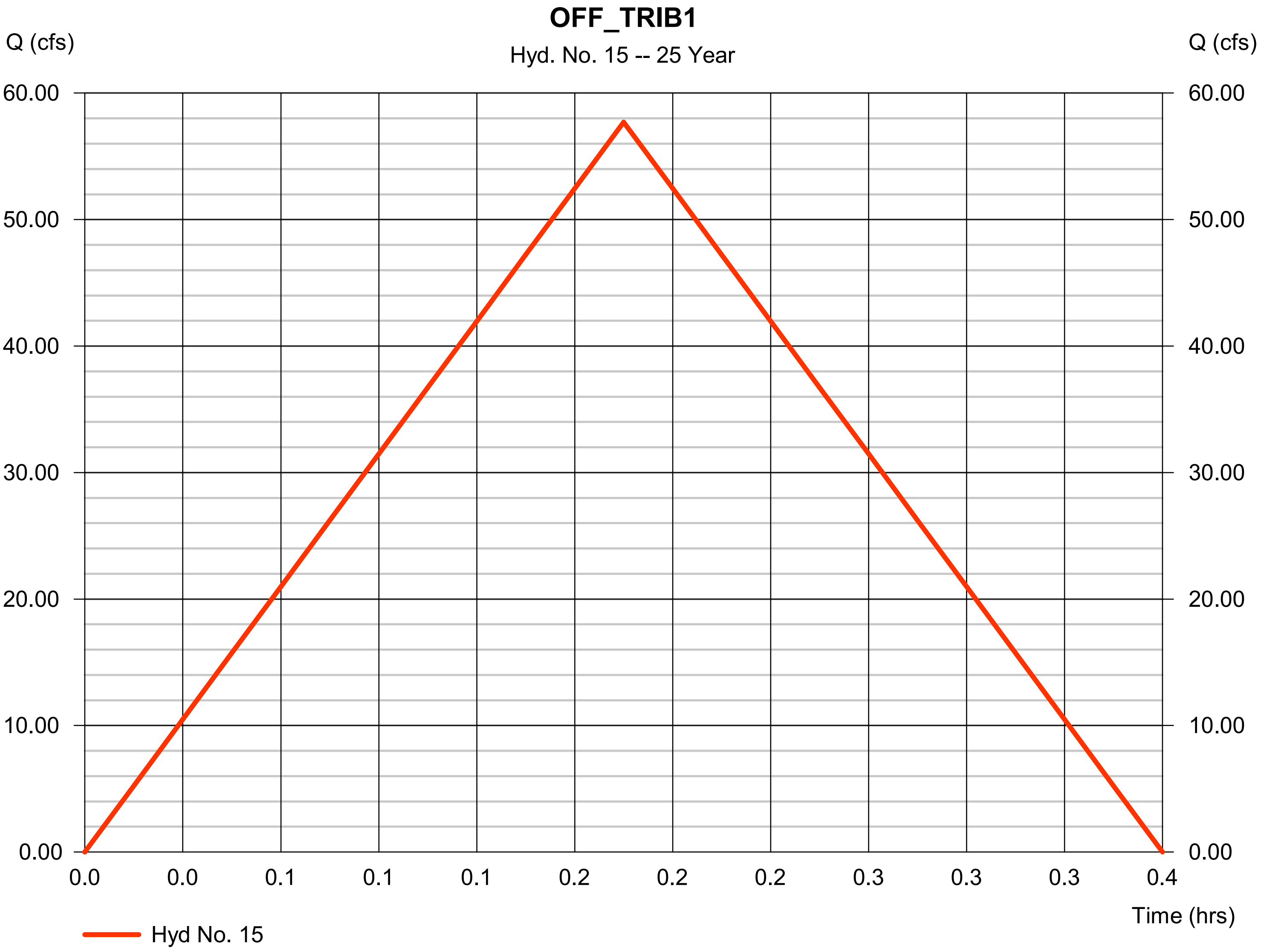


Hydrograph Report

Hyd. No. 15

OFF_TRIB1

Hydrograph type	= Rational	Peak discharge	= 57.71 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 38,089 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 6.295 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

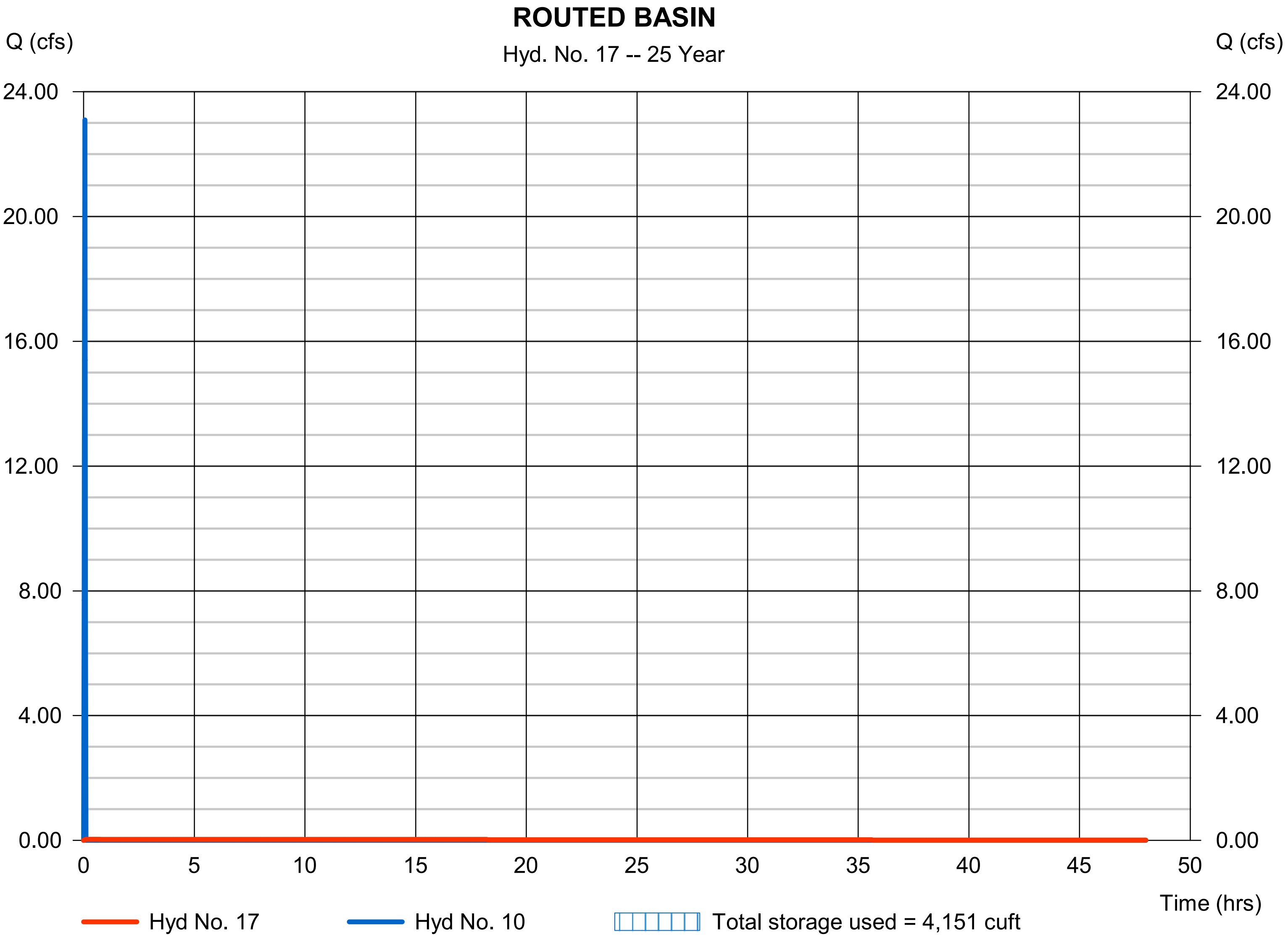
Hyd. No. 17

ROUTED BASIN

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Time interval = 1 min
Inflow hyd. No. = 10 - P_TRIB3
Reservoir name = BMP 1

Peak discharge = 0.032 cfs
Time to peak = 0.10 hrs
Hyd. volume = 3,491 cuft
Max. Elevation = 470.67 ft
Max. Storage = 4,151 cuft

Storage Indication method used.

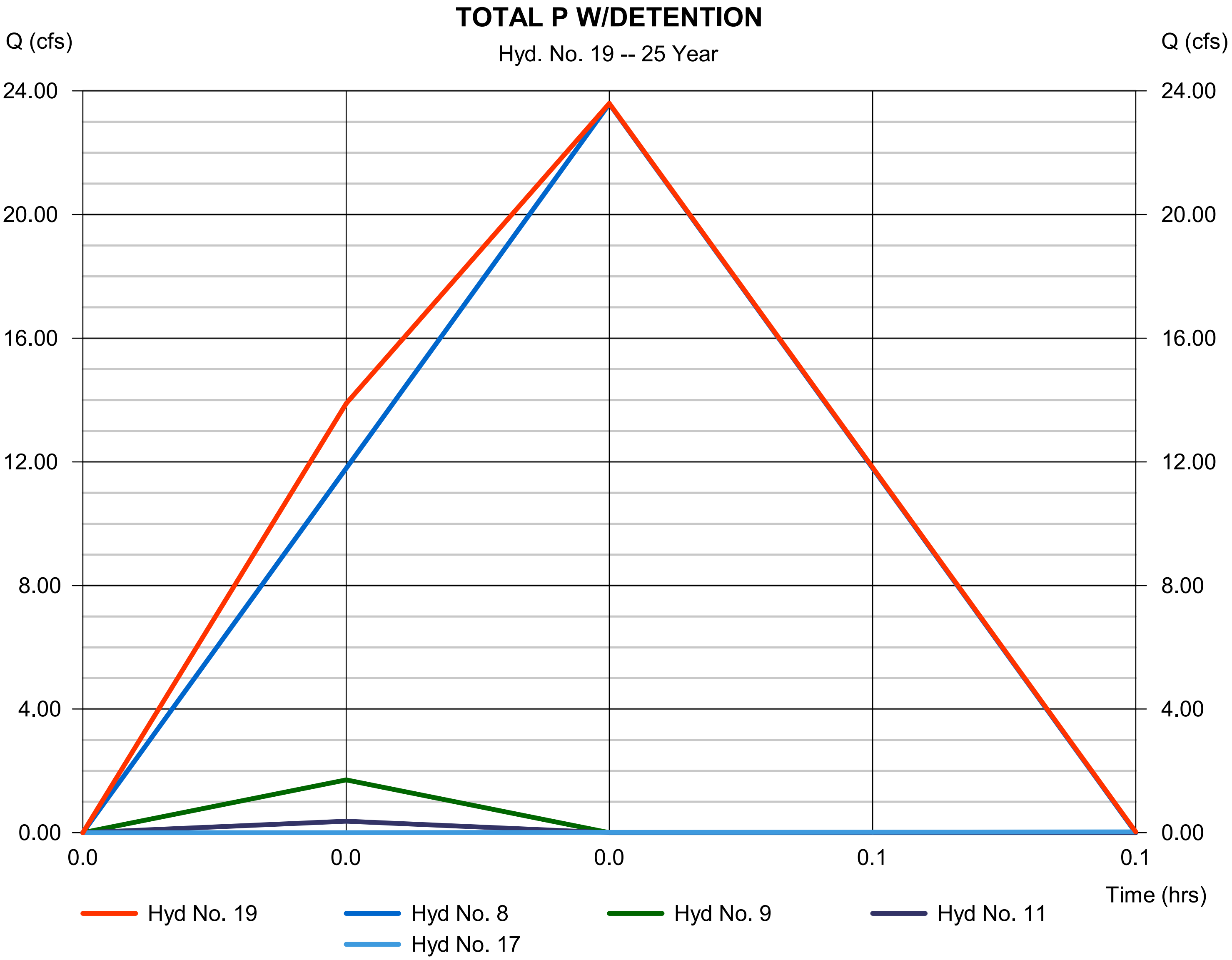


Hydrograph Report

Hyd. No. 19

TOTAL P W/DETENTION

Hydrograph type	= Combine	Peak discharge	= 23.60 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 6,447 cuft
Inflow hyds.	= 8, 9, 11, 17	Contrib. drain. area	= 4.140 ac



Hydrograph Summary Report

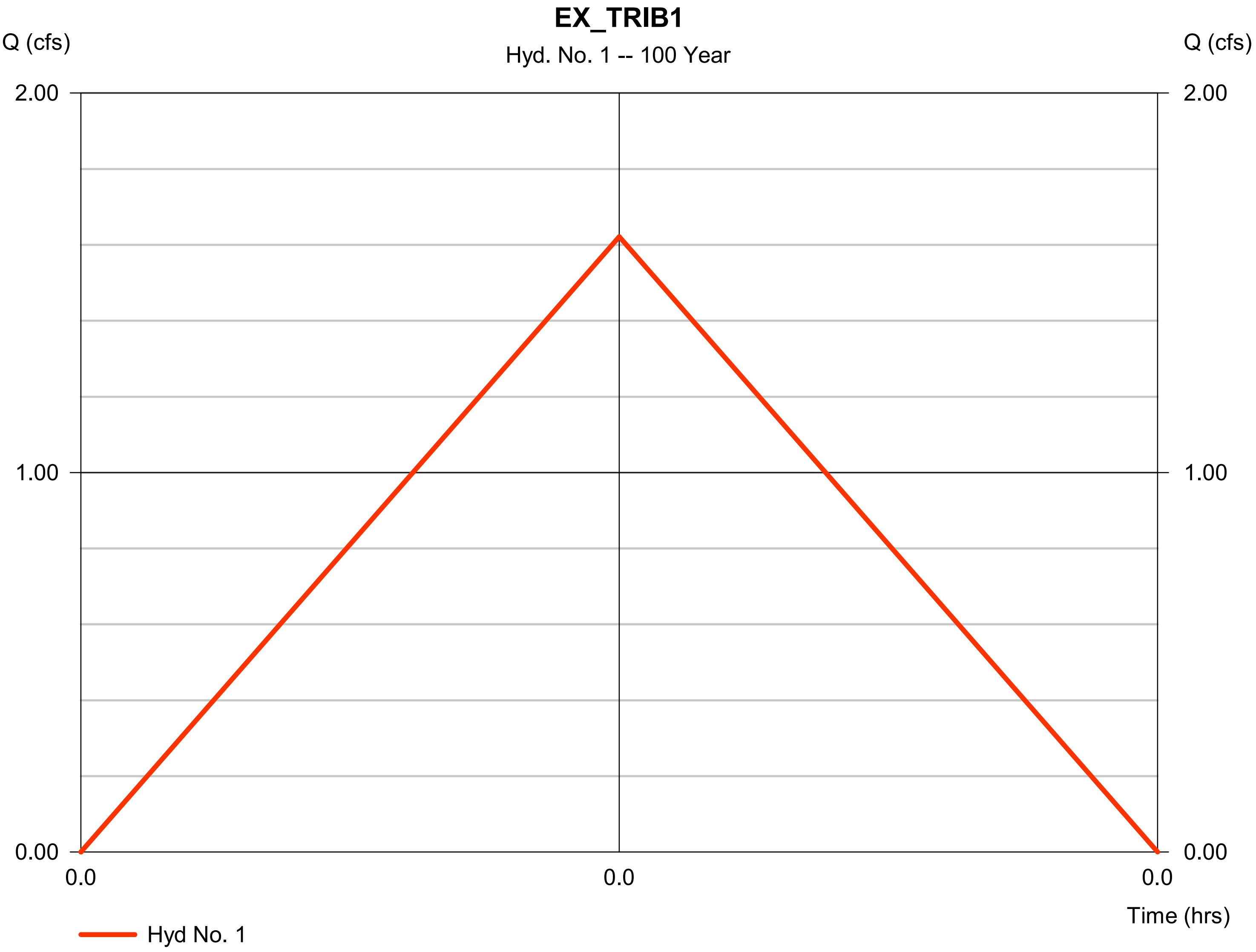
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.622	1	1	97	------	------	------	EX_TRIB1
2	Rational	9.314	1	4	2,235	------	------	------	EX_TRIB2
3	Rational	76.16	1	11	50,263	------	------	------	EX_TRIB3
4	Rational	24.65	1	3	4,437	------	------	------	EX_TRIB4
6	Combine	31.63	1	3	6,769	1, 2, 4,	------	------	TOTAL EX
8	Rational	26.61	1	2	3,193	------	------	------	P_TRIB1
9	Rational	1.821	1	1	109	------	------	------	P_TRIB2
10	Rational	27.17	1	3	4,890	------	------	------	P_TRIB3
11	Rational	0.398	1	1	24	------	------	------	P_TRIB4
13	Combine	44.72	1	2	8,216	8, 9, 10, 11,	------	------	TOTAL P
15	Rational	76.16	1	11	50,263	------	------	------	OFF_TRIB1
17	Reservoir	0.035	1	6	4,010	10	470.79	4,883	ROUTED BASIN
19	Combine	26.62	1	2	7,336	8, 9, 11, 17,	------	------	TOTAL P W/DETENTION

Hydrograph Report

Hyd. No. 1

EX_TRIB1

Hydrograph type	= Rational	Peak discharge	= 1.622 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 97 cuft
Drainage area	= 0.570 ac	Runoff coeff.	= 0.2
Intensity	= 14.224 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

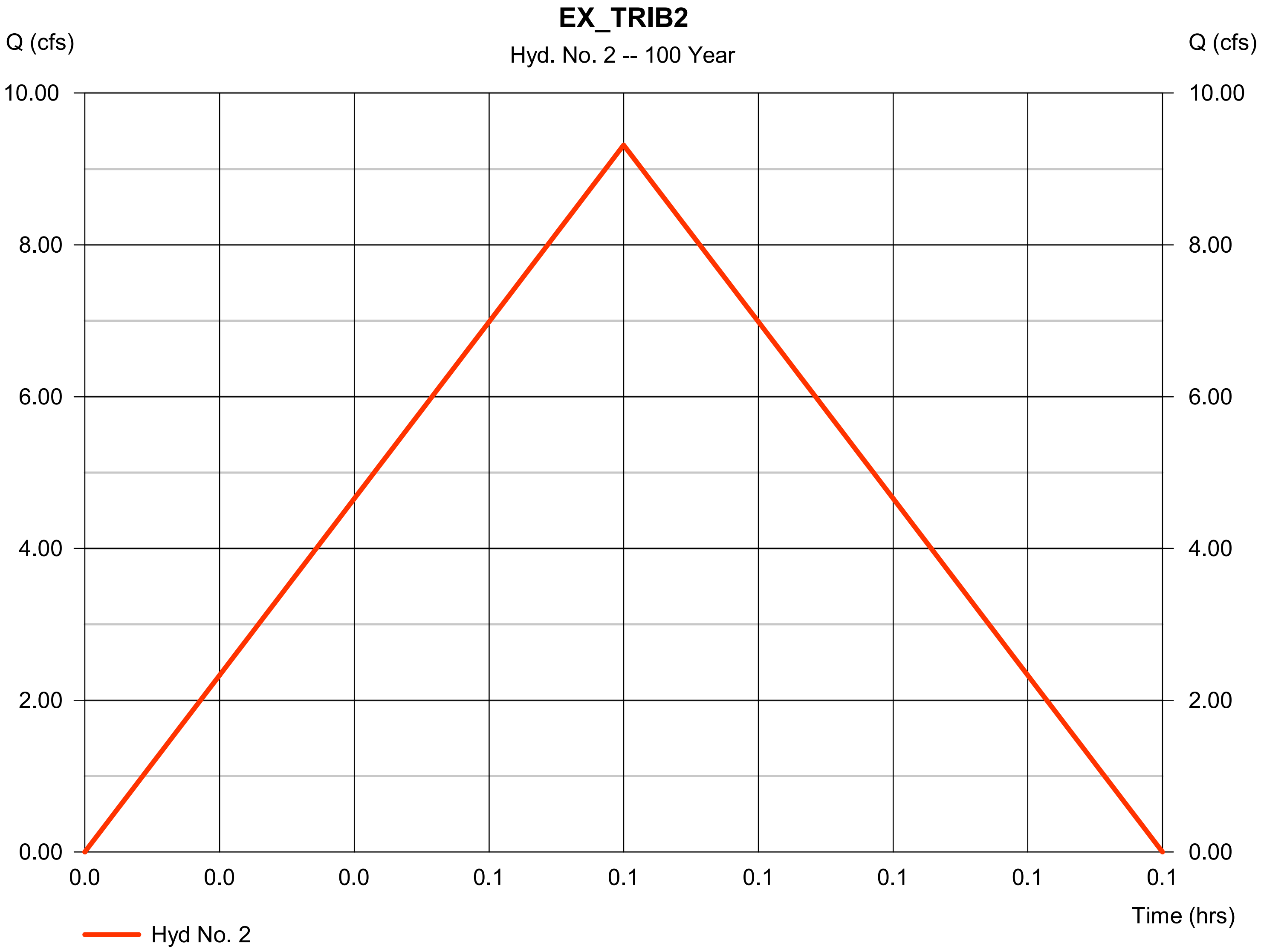


Hydrograph Report

Hyd. No. 2

EX_TRIB2

Hydrograph type	= Rational	Peak discharge	= 9.314 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 2,235 cuft
Drainage area	= 4.020 ac	Runoff coeff.	= 0.2
Intensity	= 11.584 in/hr	Tc by User	= 4.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

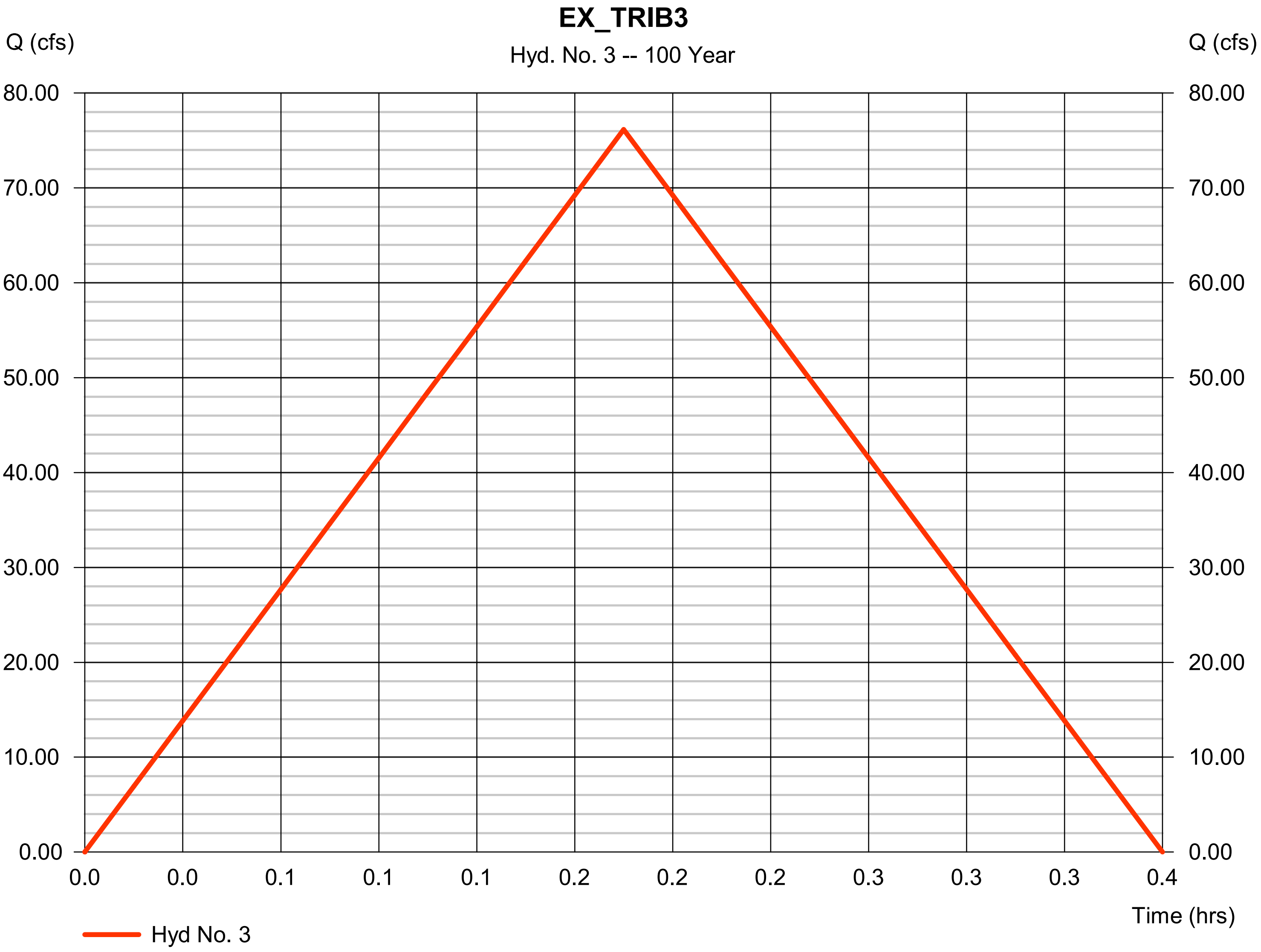


Hydrograph Report

Hyd. No. 3

EX_TRIB3

Hydrograph type	= Rational	Peak discharge	= 76.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 50,263 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 8.306 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

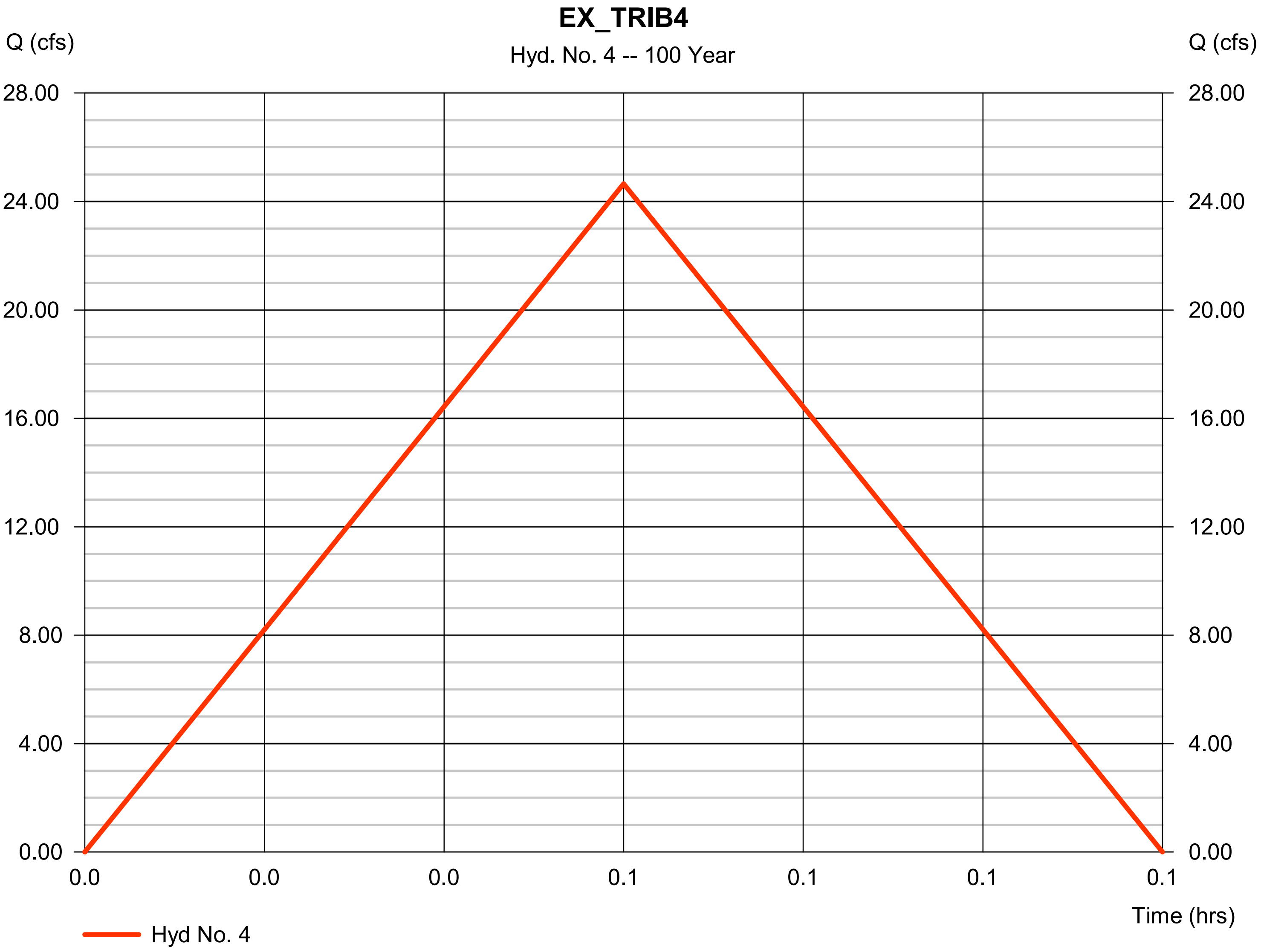


Hydrograph Report

Hyd. No. 4

EX_TRIB4

Hydrograph type	= Rational	Peak discharge	= 24.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 4,437 cuft
Drainage area	= 2.940 ac	Runoff coeff.	= 0.68
Intensity	= 12.330 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

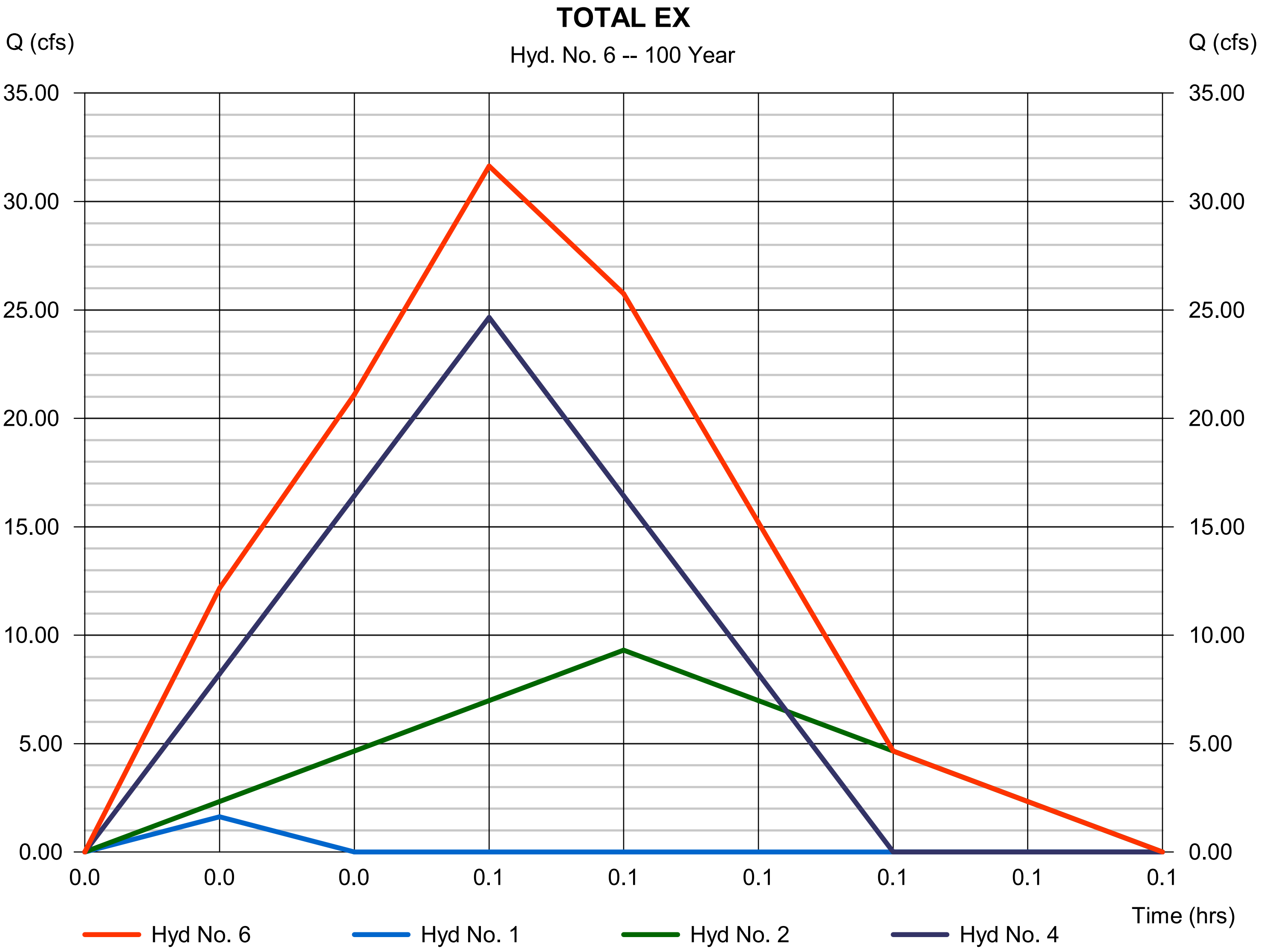


Hydrograph Report

Hyd. No. 6

TOTAL EX

Hydrograph type	= Combine	Peak discharge	= 31.63 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 6,769 cuft
Inflow hyds.	= 1, 2, 4	Contrib. drain. area	= 7.530 ac

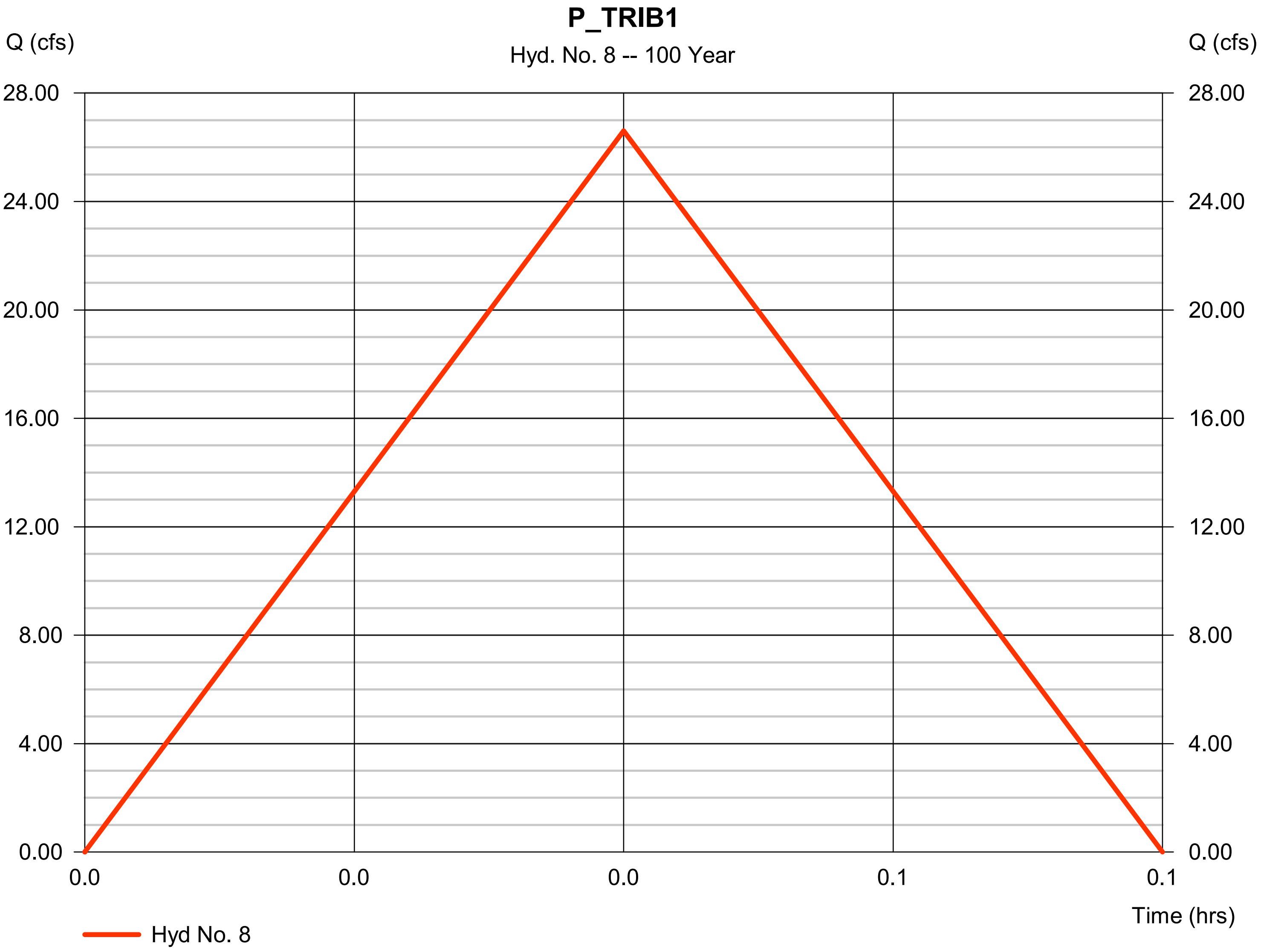


Hydrograph Report

Hyd. No. 8

P_TRIB1

Hydrograph type	= Rational	Peak discharge	= 26.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 3,193 cuft
Drainage area	= 3.360 ac	Runoff coeff.	= 0.6
Intensity	= 13.198 in/hr	Tc by User	= 2.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



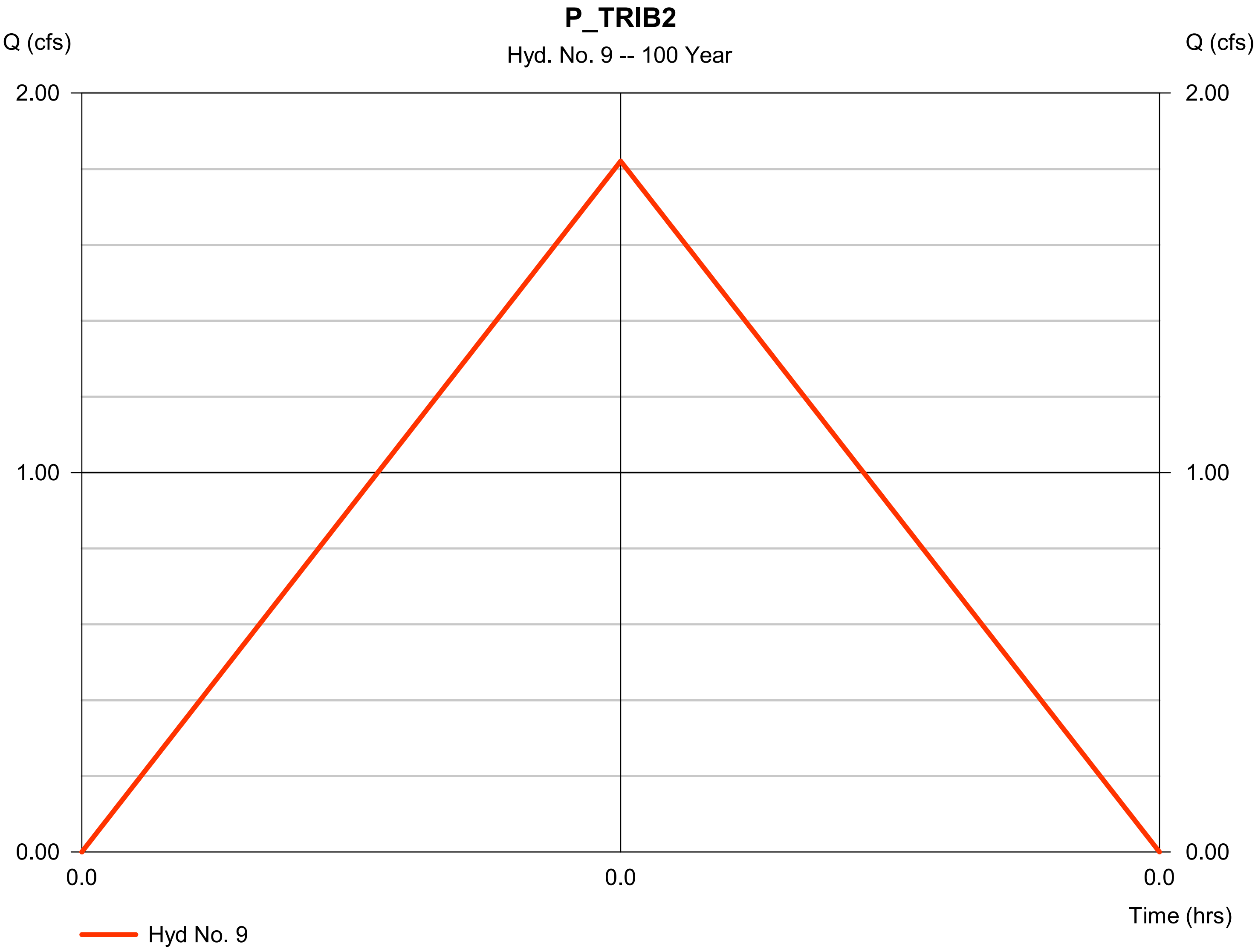
Hydrograph Report

Hyd. No. 9

P_TRIB2

Hydrograph type = Rational
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.640 ac
Intensity = 14.224 in/hr
IDF Curve = MSD.IDF

Peak discharge = 1.821 cfs
Time to peak = 0.02 hrs
Hyd. volume = 109 cuft
Runoff coeff. = 0.2
Tc by User = 1.00 min
Asc/Rec limb fact = 1/1

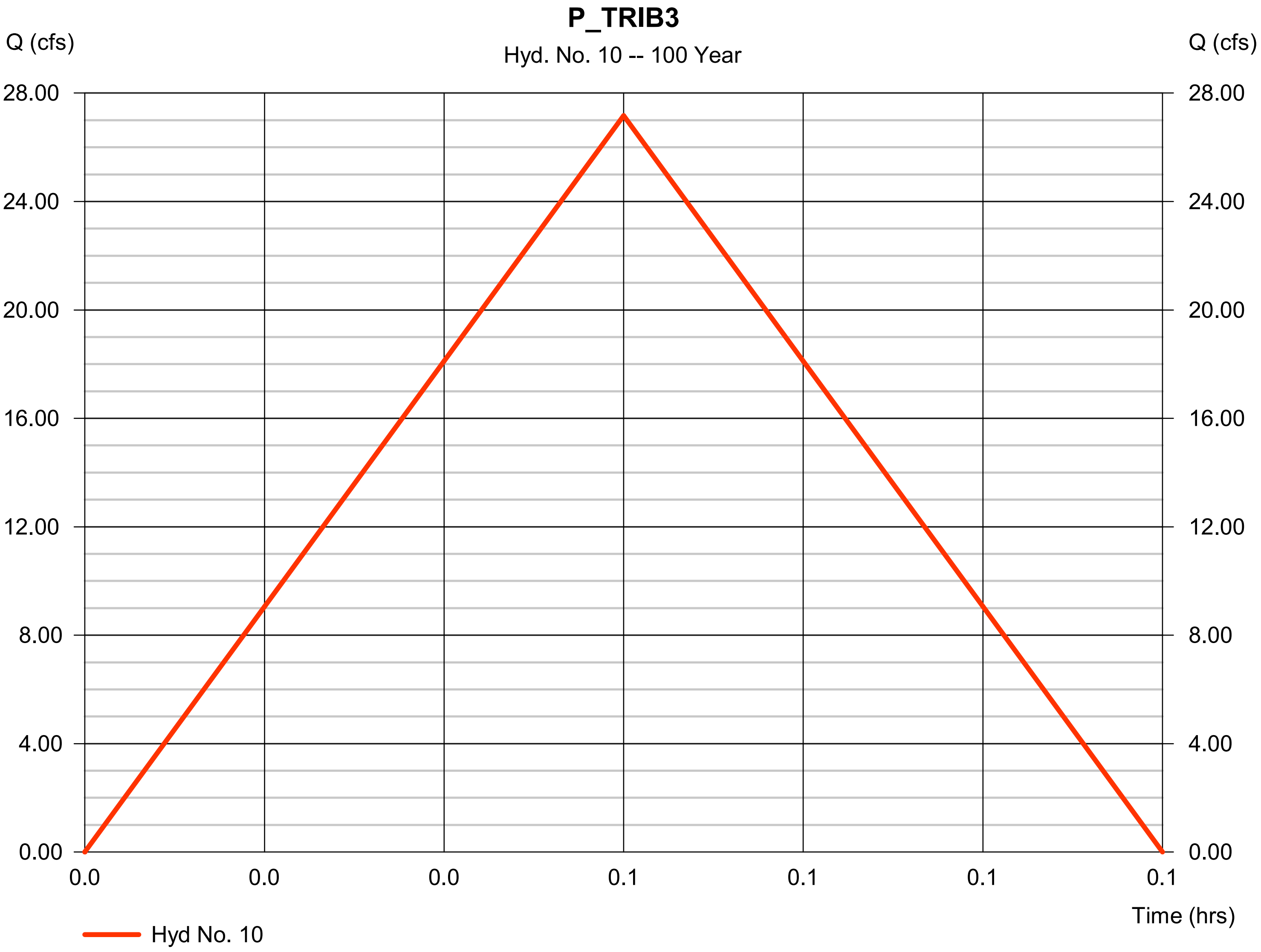


Hydrograph Report

Hyd. No. 10

P_TRIB3

Hydrograph type	= Rational	Peak discharge	= 27.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 4,890 cuft
Drainage area	= 3.390 ac	Runoff coeff.	= 0.65
Intensity	= 12.330 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

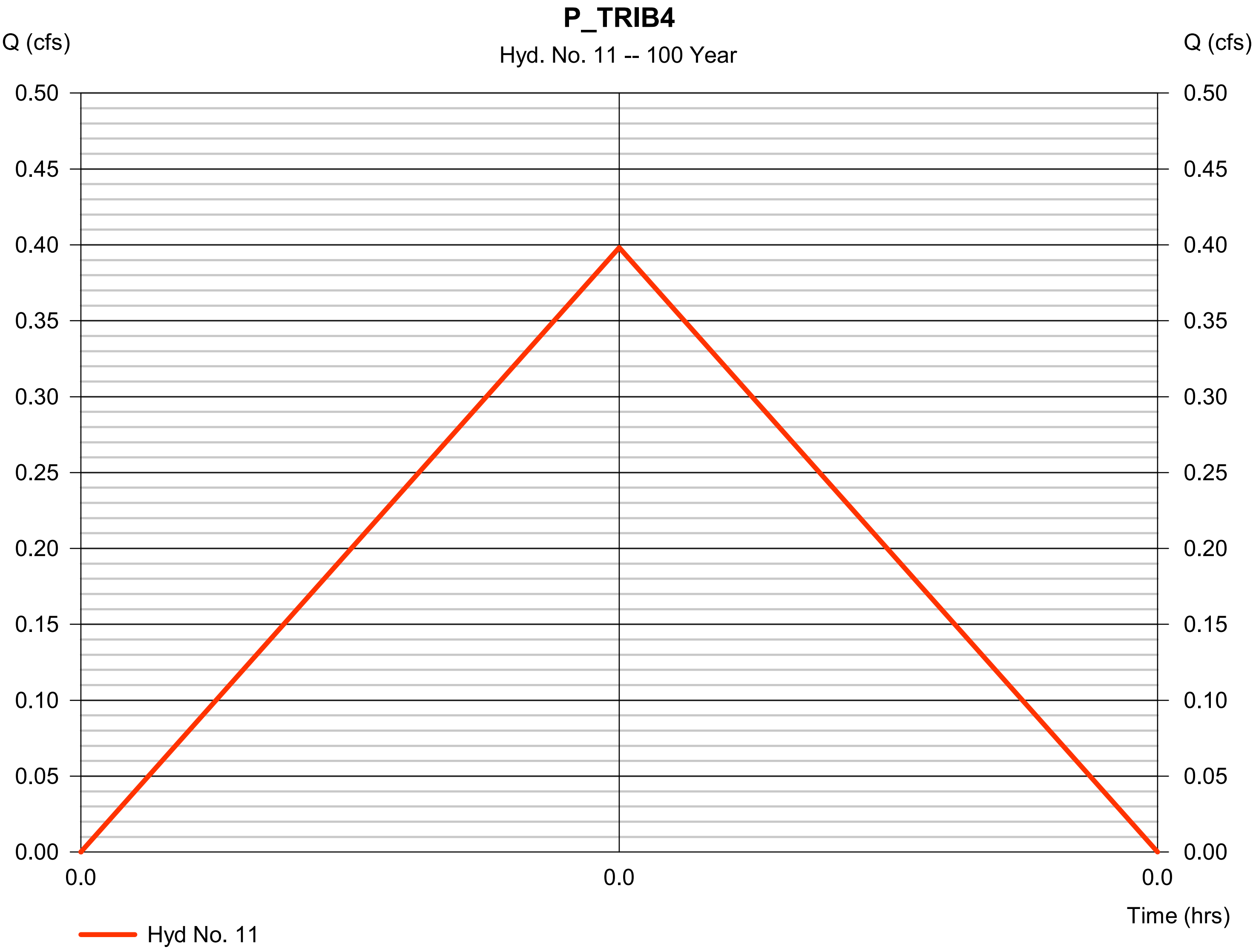


Hydrograph Report

Hyd. No. 11

P_TRIB4

Hydrograph type	= Rational	Peak discharge	= 0.398 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 24 cuft
Drainage area	= 0.140 ac	Runoff coeff.	= 0.2
Intensity	= 14.224 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

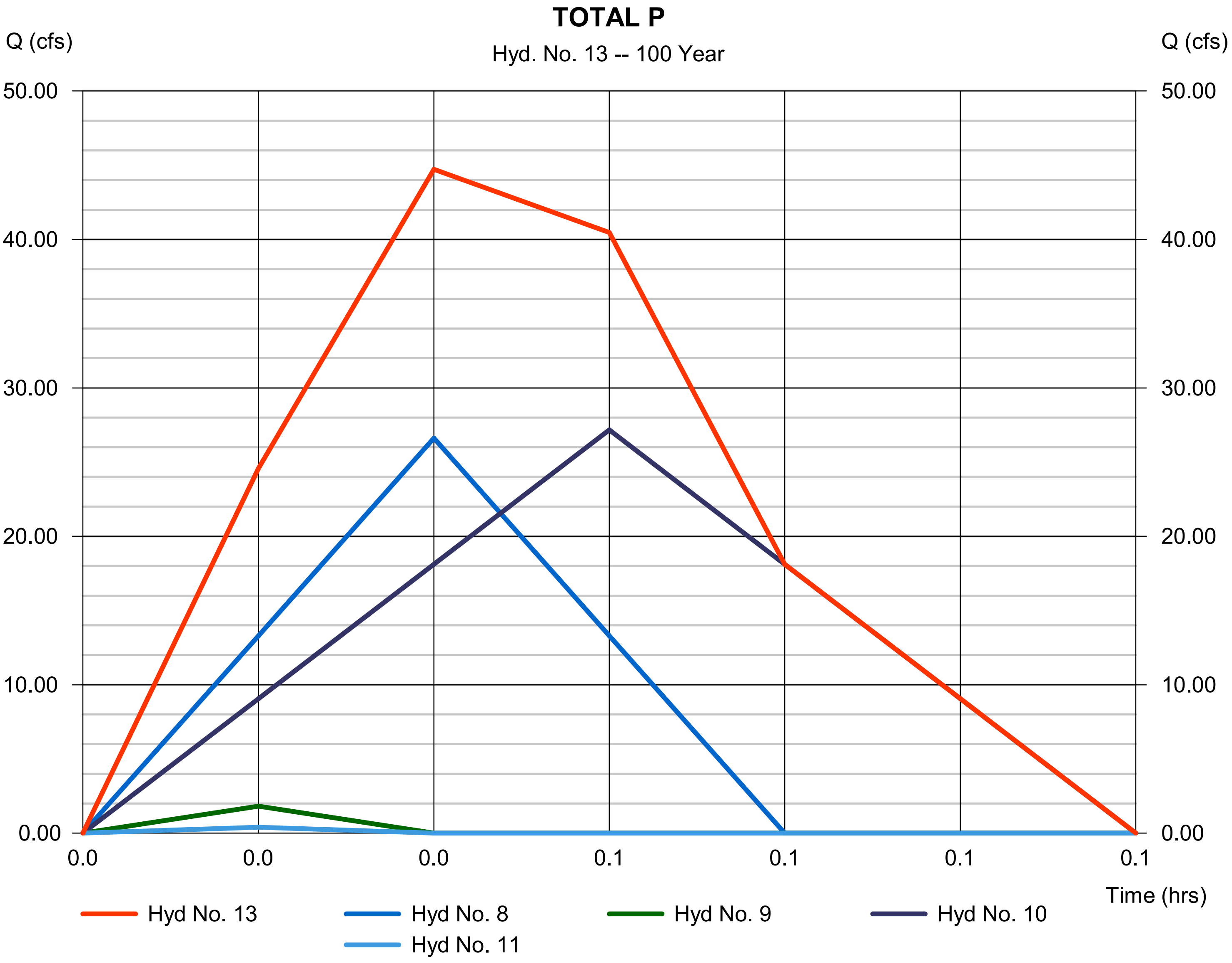


Hydrograph Report

Hyd. No. 13

TOTAL P

Hydrograph type	= Combine	Peak discharge	= 44.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 8,216 cuft
Inflow hyds.	= 8, 9, 10, 11	Contrib. drain. area	= 7.530 ac

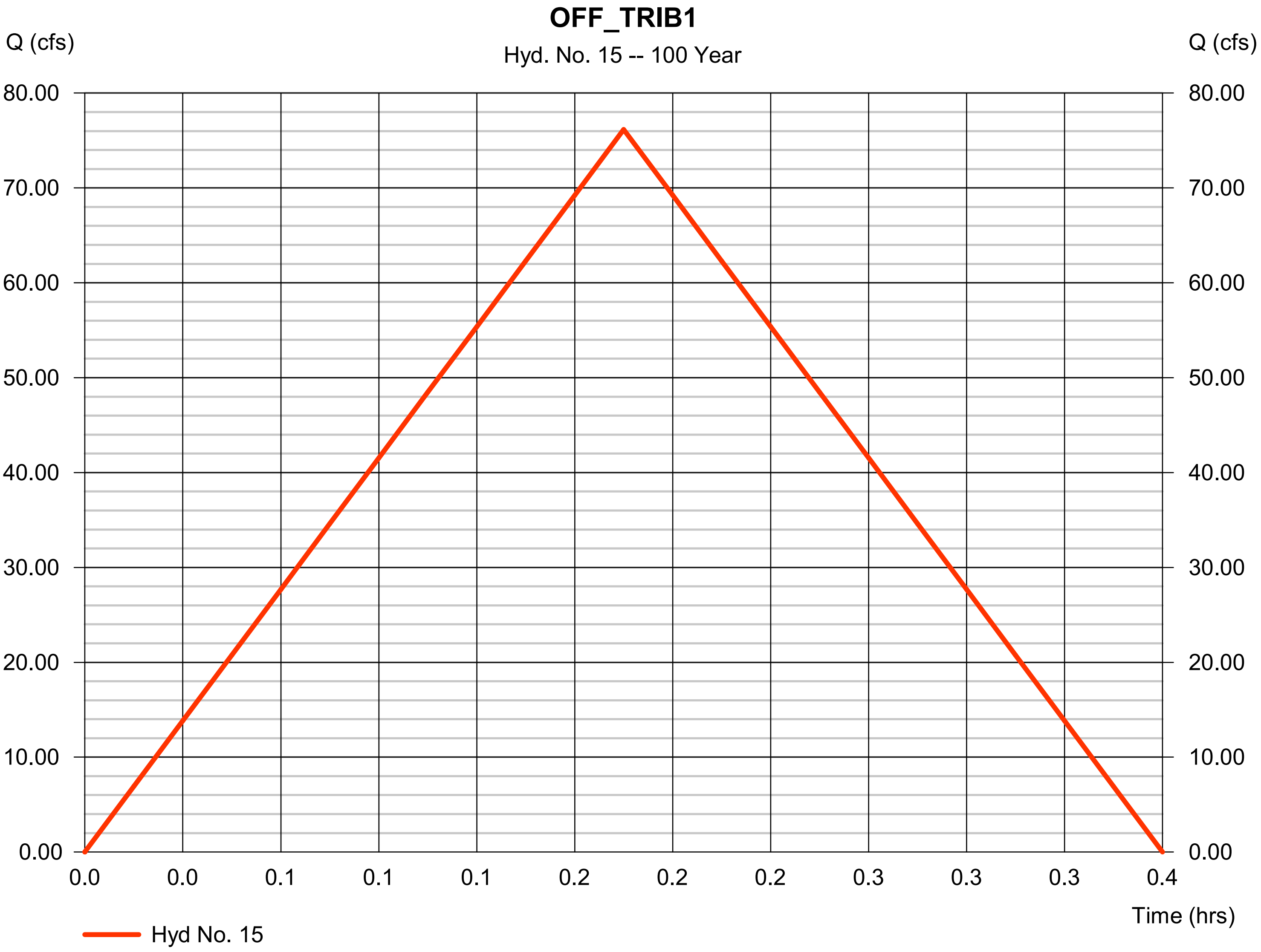


Hydrograph Report

Hyd. No. 15

OFF_TRIB1

Hydrograph type	= Rational	Peak discharge	= 76.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.18 hrs
Time interval	= 1 min	Hyd. volume	= 50,263 cuft
Drainage area	= 16.670 ac	Runoff coeff.	= 0.55
Intensity	= 8.306 in/hr	Tc by User	= 11.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



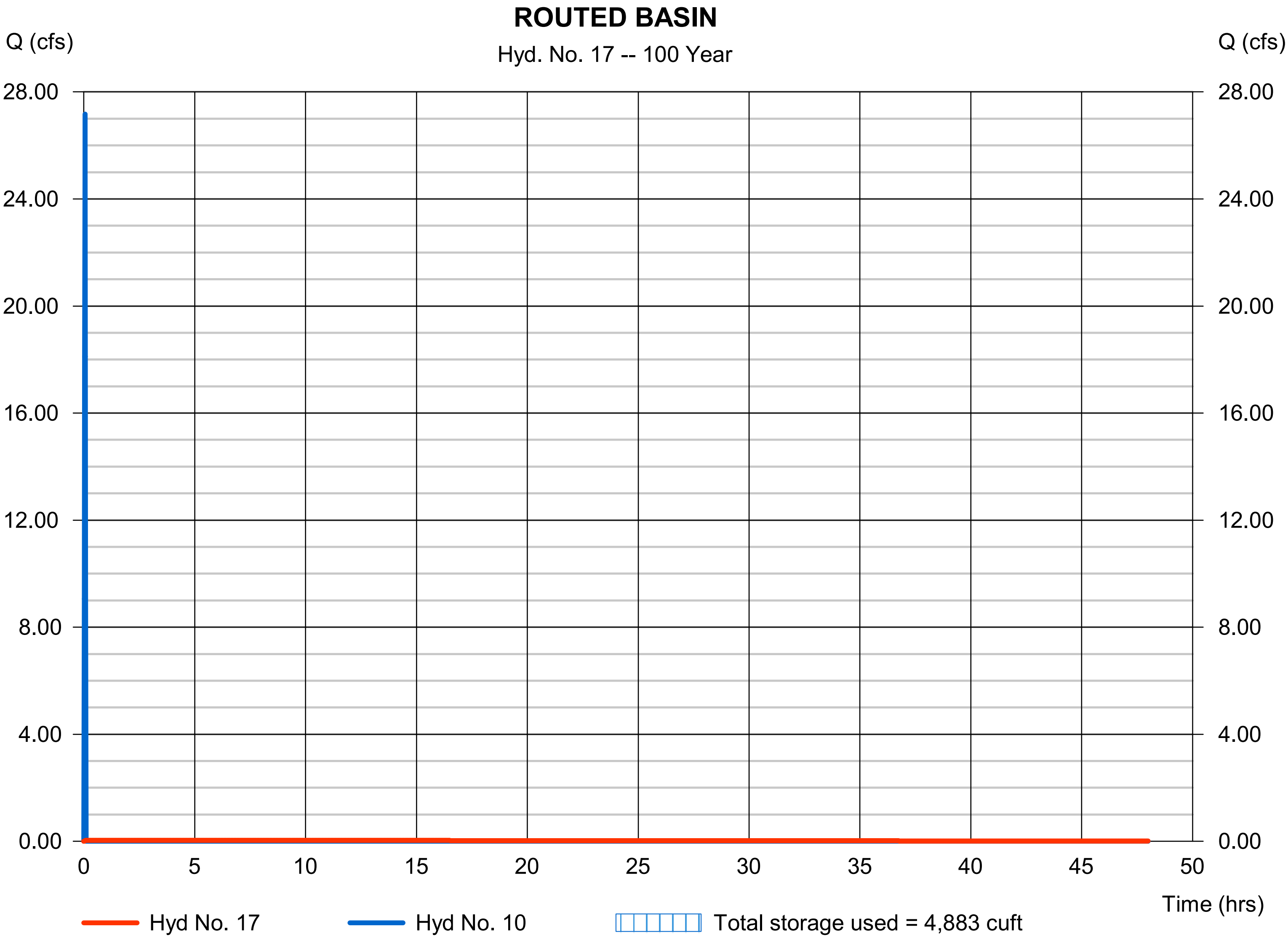
Hydrograph Report

Hyd. No. 17

ROUTED BASIN

Hydrograph type	= Reservoir	Peak discharge	= 0.035 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.10 hrs
Time interval	= 1 min	Hyd. volume	= 4,010 cuft
Inflow hyd. No.	= 10 - P_TRIB3	Max. Elevation	= 470.79 ft
Reservoir name	= BMP 1	Max. Storage	= 4,883 cuft

Storage Indication method used.

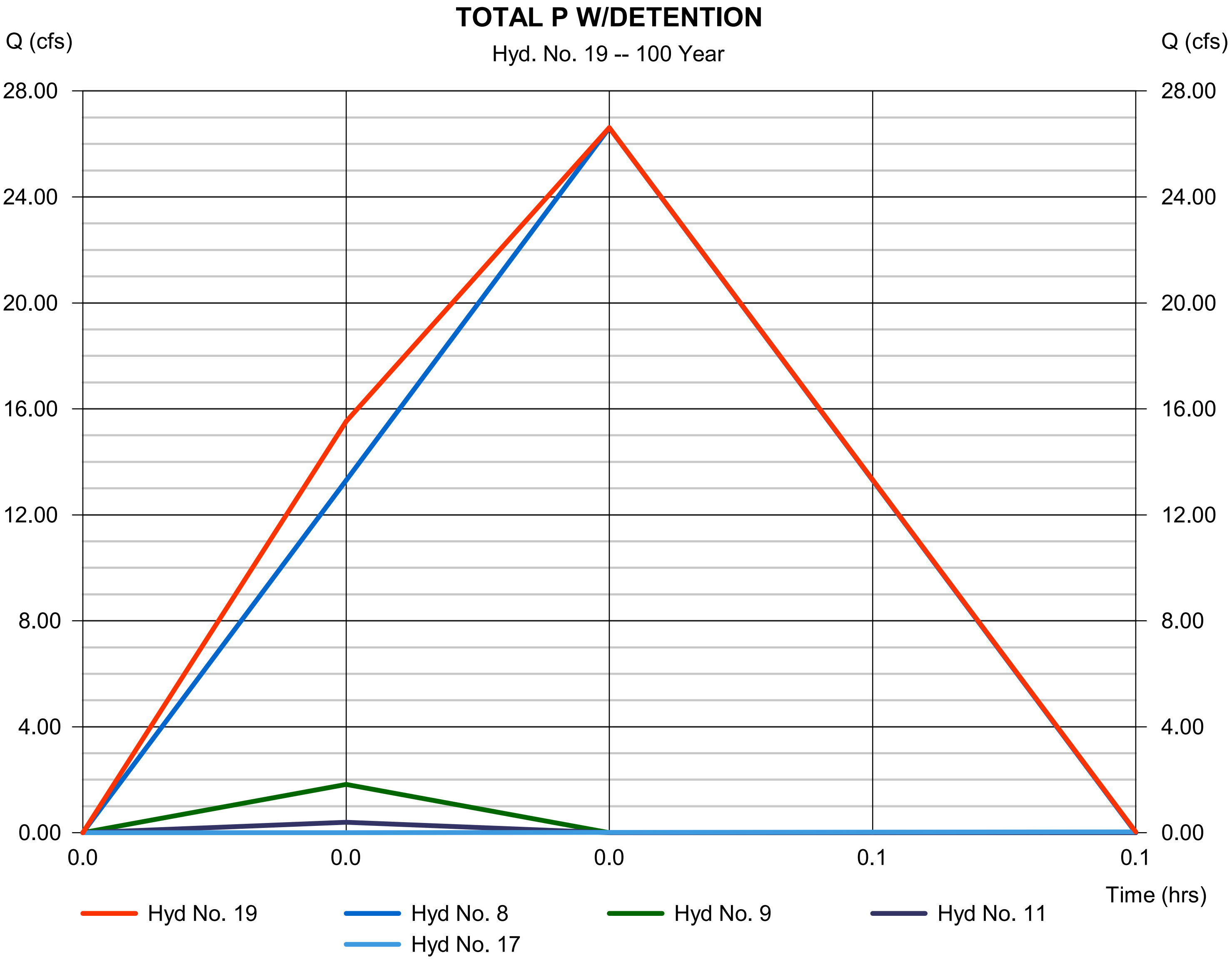


Hydrograph Report

Hyd. No. 19

TOTAL P W/DETENTION

Hydrograph type	= Combine	Peak discharge	= 26.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 7,336 cuft
Inflow hyds.	= 8, 9, 11, 17	Contrib. drain. area	= 4.140 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	38.4810	7.5000	0.7610	--------
3	29.0800	2.9500	0.6030	--------
5	0.0000	0.0000	0.0000	--------
10	78.3870	12.2000	0.8170	--------
25	30.8270	3.0000	0.6020	--------
50	0.0000	0.0000	0.0000	--------
100	76.6220	8.5000	0.7480	--------

File name: MSD.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	5.63	4.36	3.60	3.09	2.72	2.44	2.22	2.04	1.89	1.76	1.65	1.56
3	8.33	6.21	5.10	4.40	3.90	3.53	3.25	3.01	2.82	2.66	2.51	2.39
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.67	6.23	5.27	4.60	4.08	3.68	3.36	3.10	2.87	2.68	2.52	2.38
25	8.82	6.58	5.41	4.67	4.15	3.76	3.45	3.20	3.00	2.82	2.68	2.55
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	10.94	8.64	7.22	6.25	5.54	4.99	4.56	4.20	3.90	3.65	3.43	3.25

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.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	2.50	3.10	0.00	3.30	4.64	5.60	6.80	7.21
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	2.75	0.00	0.00	6.50	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	2.80	0.00	0.00	6.00	0.00

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	Rational	------	-------	-------	-------	-------	-------	-------	-------	1.622	EX_TRIB1
2	Rational	------	-------	-------	-------	-------	-------	-------	-------	9.314	EX_TRIB2
3	Rational	------	-------	-------	-------	-------	-------	-------	-------	76.16	EX_TRIB3
4	Rational	------	-------	-------	-------	-------	-------	-------	-------	21.86	EX_TRIB4
6	Combine	1, 2, 4,	-------	-------	-------	-------	-------	-------	-------	28.85	TOTAL EX
8	Rational	------	-------	-------	-------	-------	-------	-------	-------	26.61	P_TRIB1
9	Rational	------	-------	-------	-------	-------	-------	-------	-------	1.821	P_TRIB2
10	Rational	------	-------	-------	-------	-------	-------	-------	-------	27.17	P_TRIB3
11	Rational	------	-------	-------	-------	-------	-------	-------	-------	0.398	P_TRIB4
13	Combine	8, 9, 10, 11,	-------	-------	-------	-------	-------	-------	-------	44.72	TOTAL P
15	Rational	------	-------	-------	-------	-------	-------	-------	-------	76.16	OFF_TRIB1
17	Reservoir	10	-------	-------	-------	-------	-------	-------	-------	5.089	ROUTED BASIN
19	Combine	8, 9, 11, 17,	-------	-------	-------	-------	-------	-------	-------	26.96	TOTAL P W/DETENTION

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

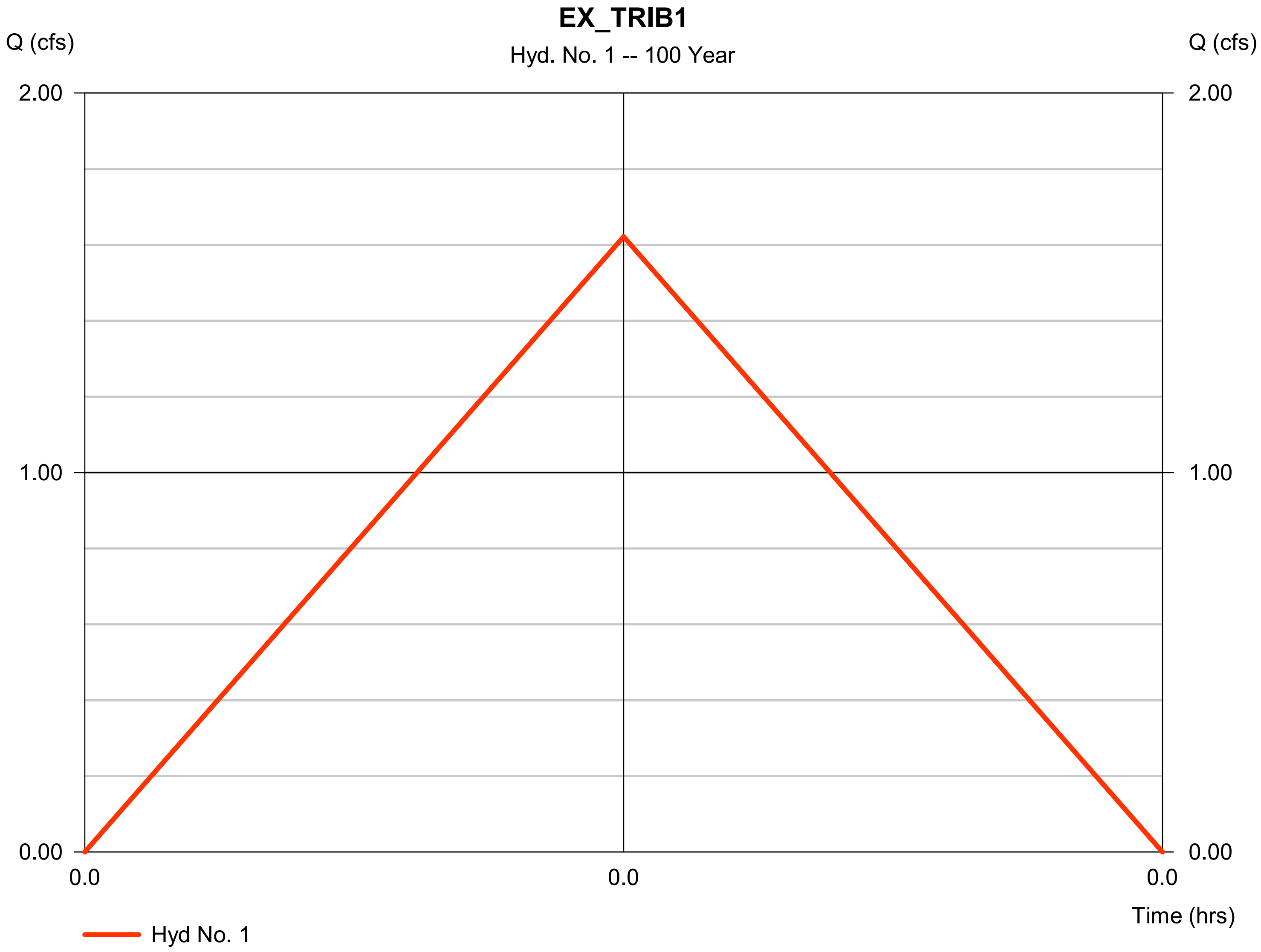
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.622	1	1	97	------	------	------	EX_TRIB1
2	Rational	9.314	1	4	2,235	------	------	------	EX_TRIB2
3	Rational	76.16	1	11	50,263	------	------	------	EX_TRIB3
4	Rational	21.86	1	5	6,559	------	------	------	EX_TRIB4
6	Combine	28.85	1	5	8,892	1, 2, 4,	------	------	TOTAL EX
8	Rational	26.61	1	2	3,193	------	------	------	P_TRIB1
9	Rational	1.821	1	1	109	------	------	------	P_TRIB2
10	Rational	27.17	1	3	4,890	------	------	------	P_TRIB3
11	Rational	0.398	1	1	24	------	------	------	P_TRIB4
13	Combine	44.72	1	2	8,216	8, 9, 10, 11,	------	------	TOTAL P
15	Rational	76.16	1	11	50,263	------	------	------	OFF_TRIB1
17	Reservoir	5.089	1	5	4,887	10	472.00	19,663	ROUTED BASIN
19	Combine	26.96	1	2	8,213	8, 9, 11, 17,	------	------	TOTAL P W/DETENTION

Hydrograph Report

Hyd. No. 1

EX_TRIB1

Hydrograph type	= Rational	Peak discharge	= 1.622 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 97 cuft
Drainage area	= 0.570 ac	Runoff coeff.	= 0.2
Intensity	= 14.224 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

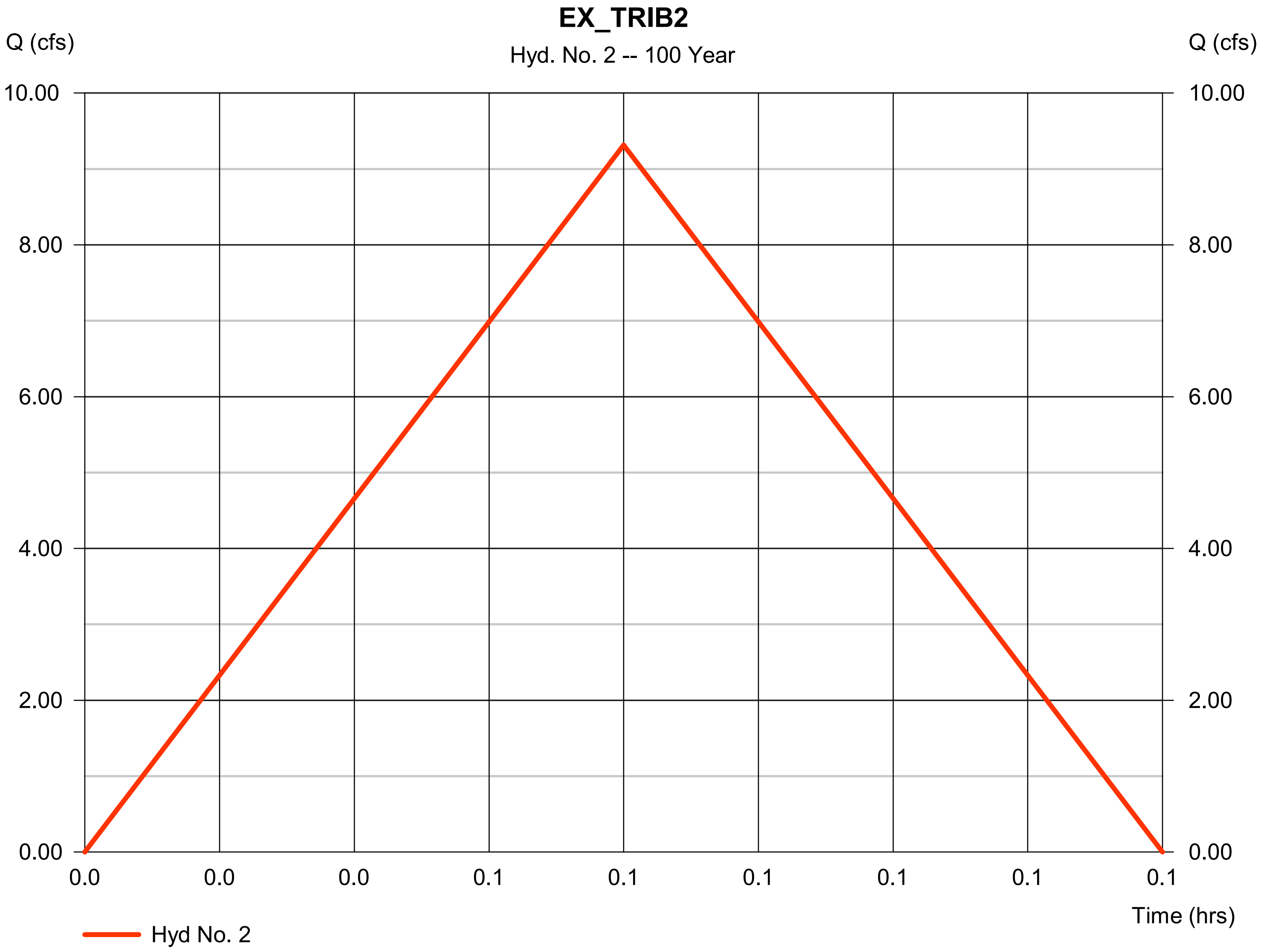


Hydrograph Report

Hyd. No. 2

EX_TRIB2

Hydrograph type	= Rational	Peak discharge	= 9.314 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.07 hrs
Time interval	= 1 min	Hyd. volume	= 2,235 cuft
Drainage area	= 4.020 ac	Runoff coeff.	= 0.2
Intensity	= 11.584 in/hr	Tc by User	= 4.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

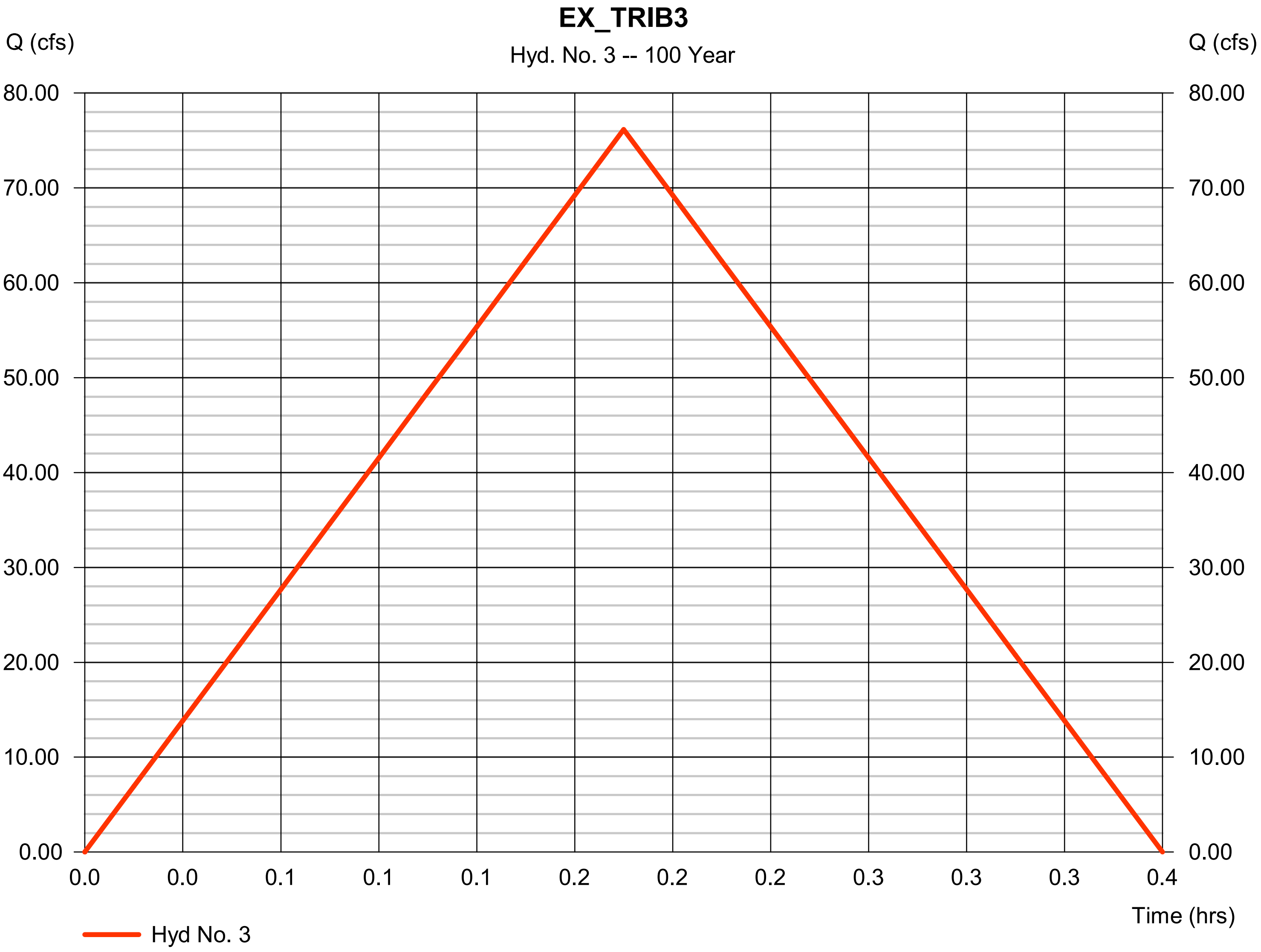


Hyd. No. 3

EX_TRIB3

Hydrograph type = Rational
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 16.670 ac
Intensity = 8.306 in/hr
IDF Curve = MSD.IDF

Peak discharge = 76.16 cfs
Time to peak = 0.18 hrs
Hyd. volume = 50,263 cuft
Runoff coeff. = 0.55
Tc by User = 11.00 min
Asc/Rec limb fact = 1/1

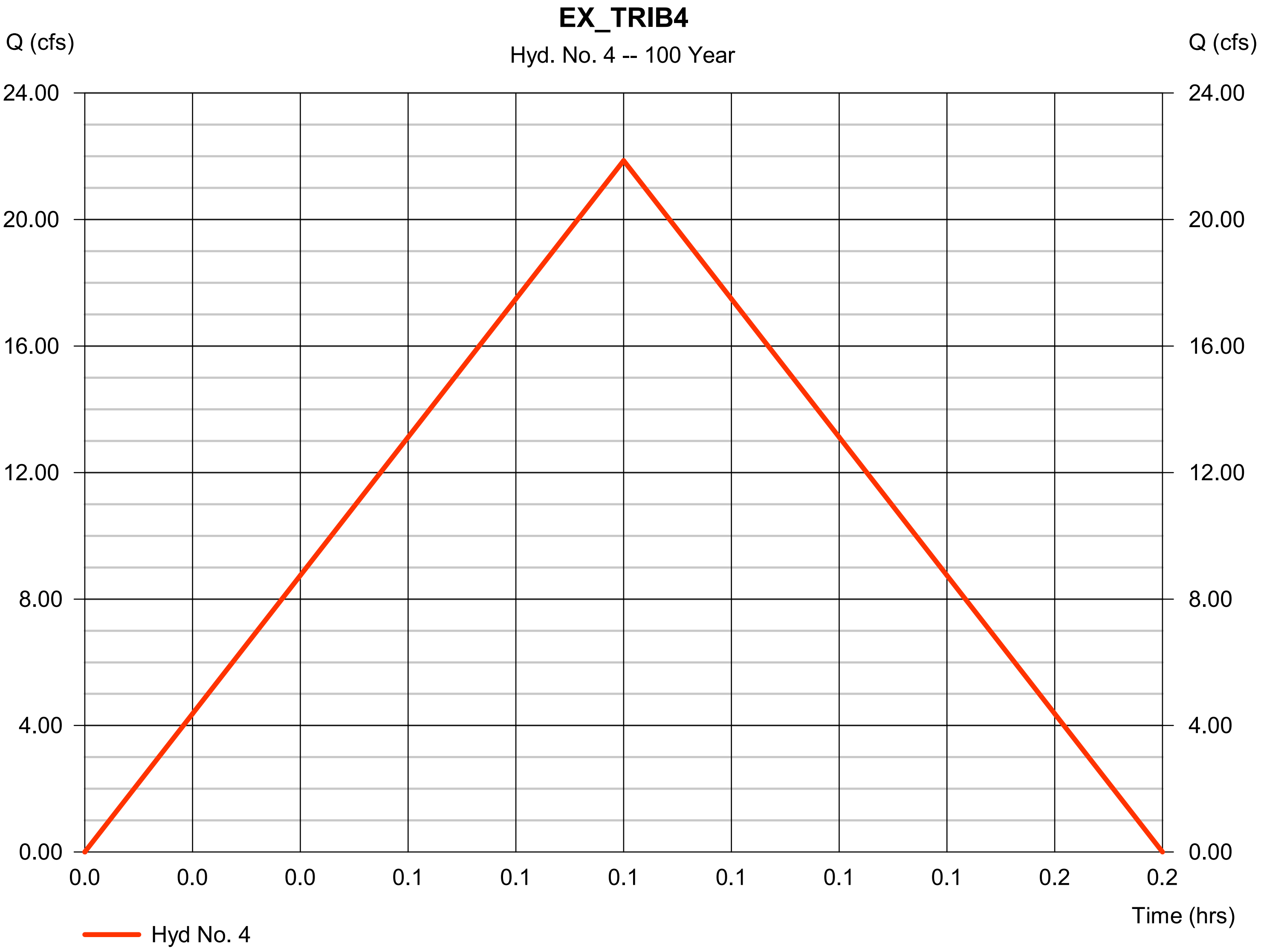


Hydrograph Report

Hyd. No. 4

EX_TRIB4

Hydrograph type	= Rational	Peak discharge	= 21.86 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.08 hrs
Time interval	= 1 min	Hyd. volume	= 6,559 cuft
Drainage area	= 2.940 ac	Runoff coeff.	= 0.68
Intensity	= 10.936 in/hr	Tc by User	= 5.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1



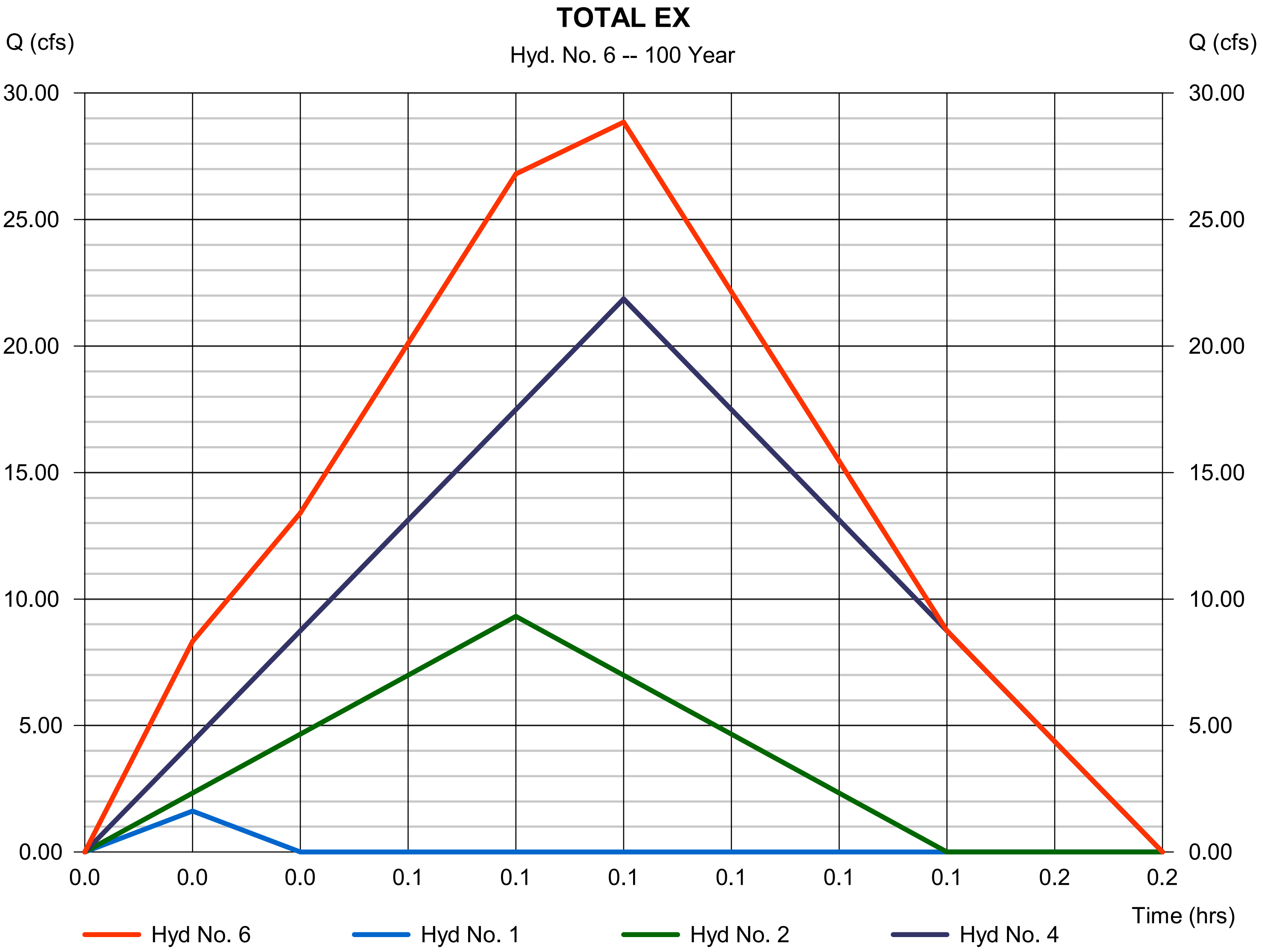
Hydrograph Report

Hyd. No. 6

TOTAL EX

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 1, 2, 4

Peak discharge = 28.85 cfs
Time to peak = 0.08 hrs
Hyd. volume = 8,892 cuft
Contrib. drain. area = 7.530 ac

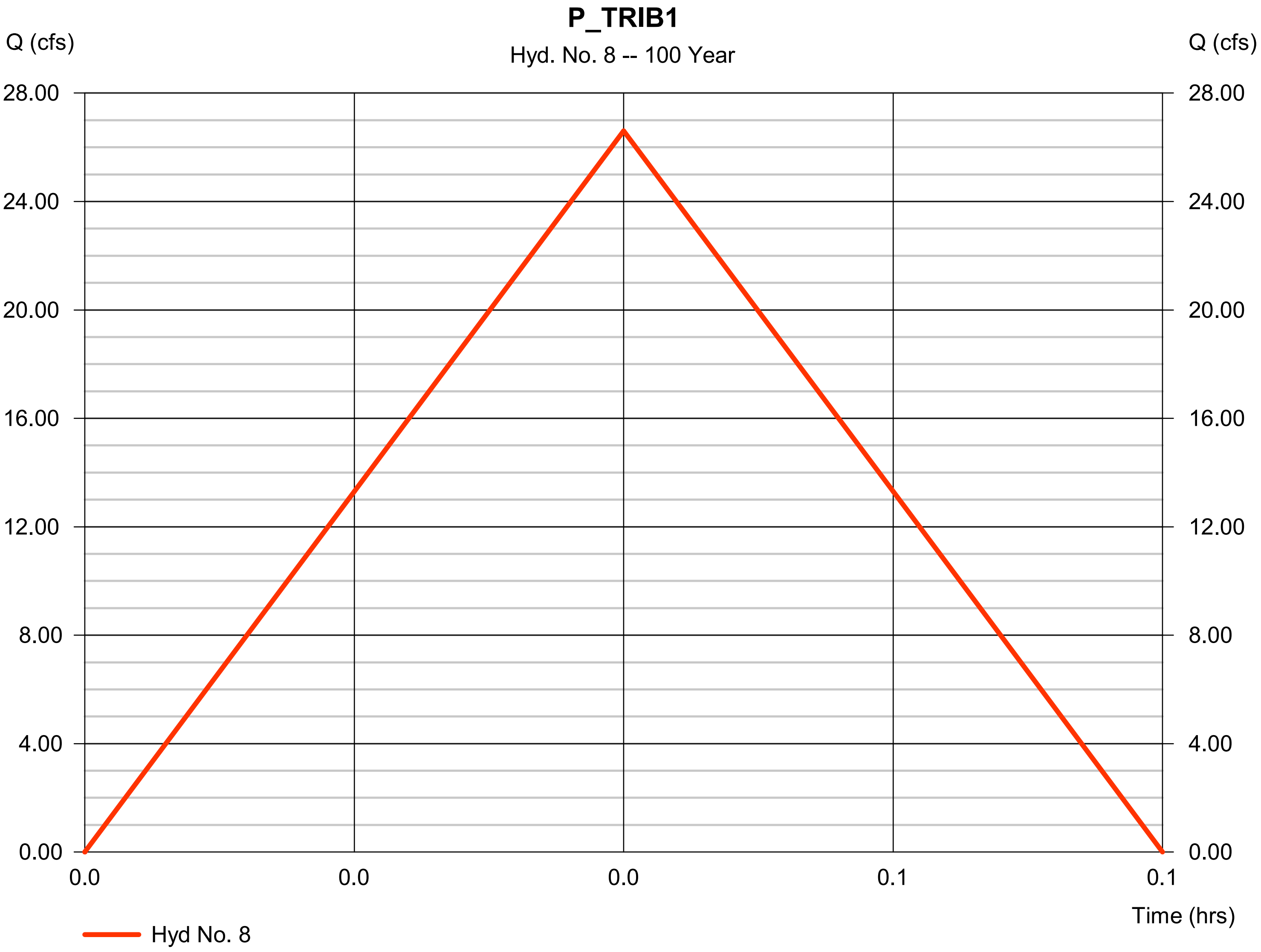


Hydrograph Report

Hyd. No. 8

P_TRIB1

Hydrograph type	= Rational	Peak discharge	= 26.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 3,193 cuft
Drainage area	= 3.360 ac	Runoff coeff.	= 0.6
Intensity	= 13.198 in/hr	Tc by User	= 2.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

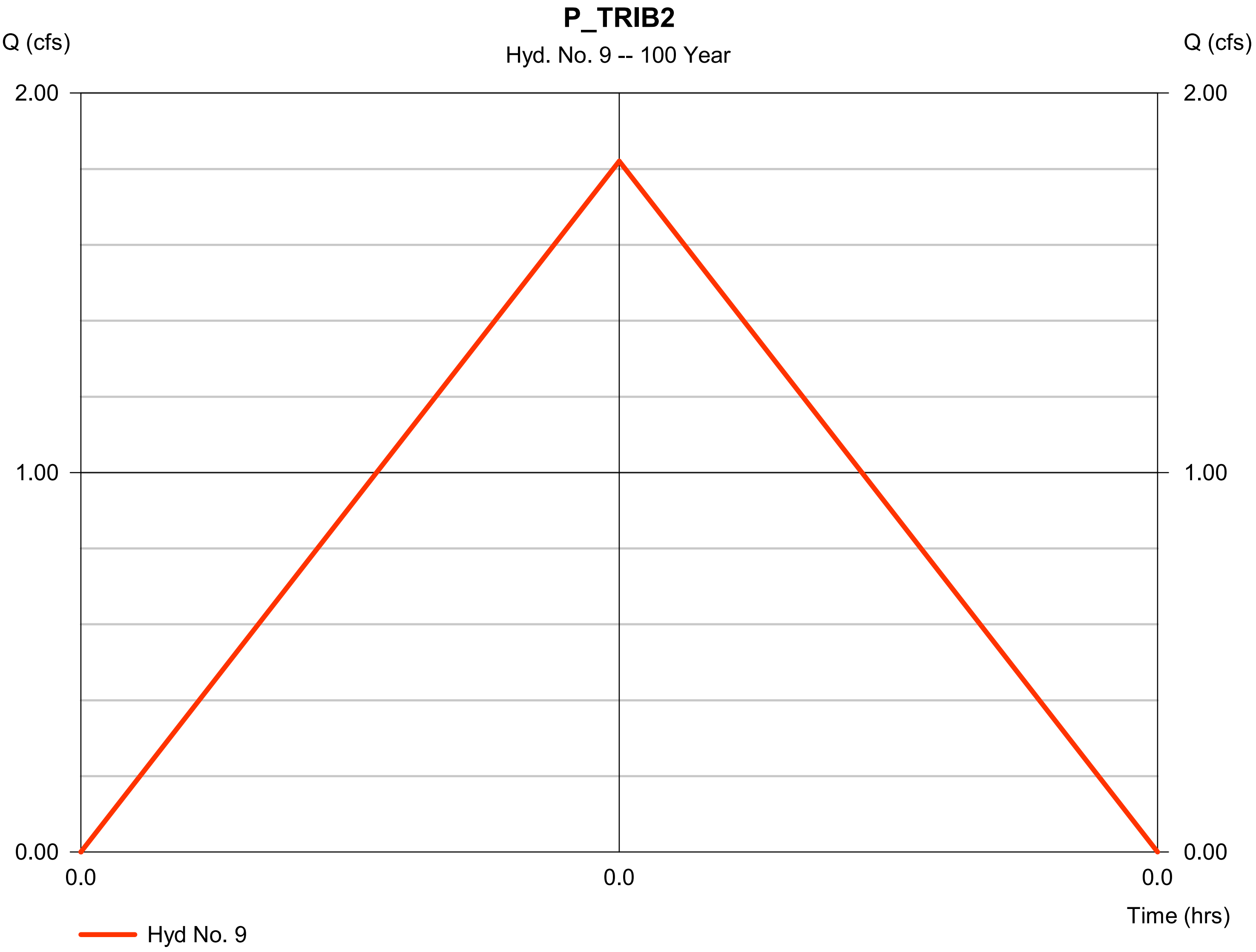


Hydrograph Report

Hyd. No. 9

P_TRIB2

Hydrograph type	= Rational	Peak discharge	= 1.821 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 109 cuft
Drainage area	= 0.640 ac	Runoff coeff.	= 0.2
Intensity	= 14.224 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

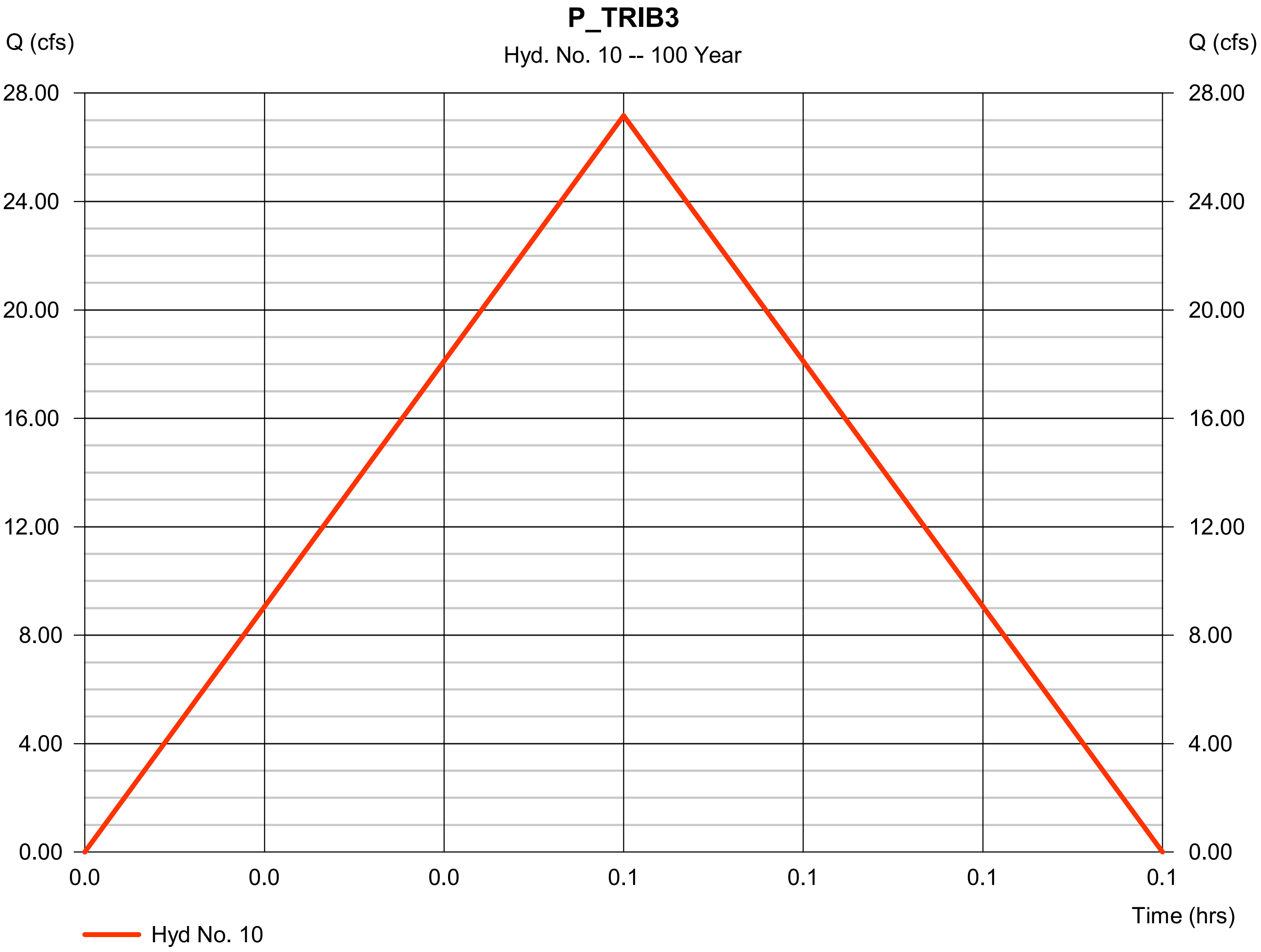


Hydrograph Report

Hyd. No. 10

P_TRIB3

Hydrograph type	= Rational	Peak discharge	= 27.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.05 hrs
Time interval	= 1 min	Hyd. volume	= 4,890 cuft
Drainage area	= 3.390 ac	Runoff coeff.	= 0.65
Intensity	= 12.330 in/hr	Tc by User	= 3.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

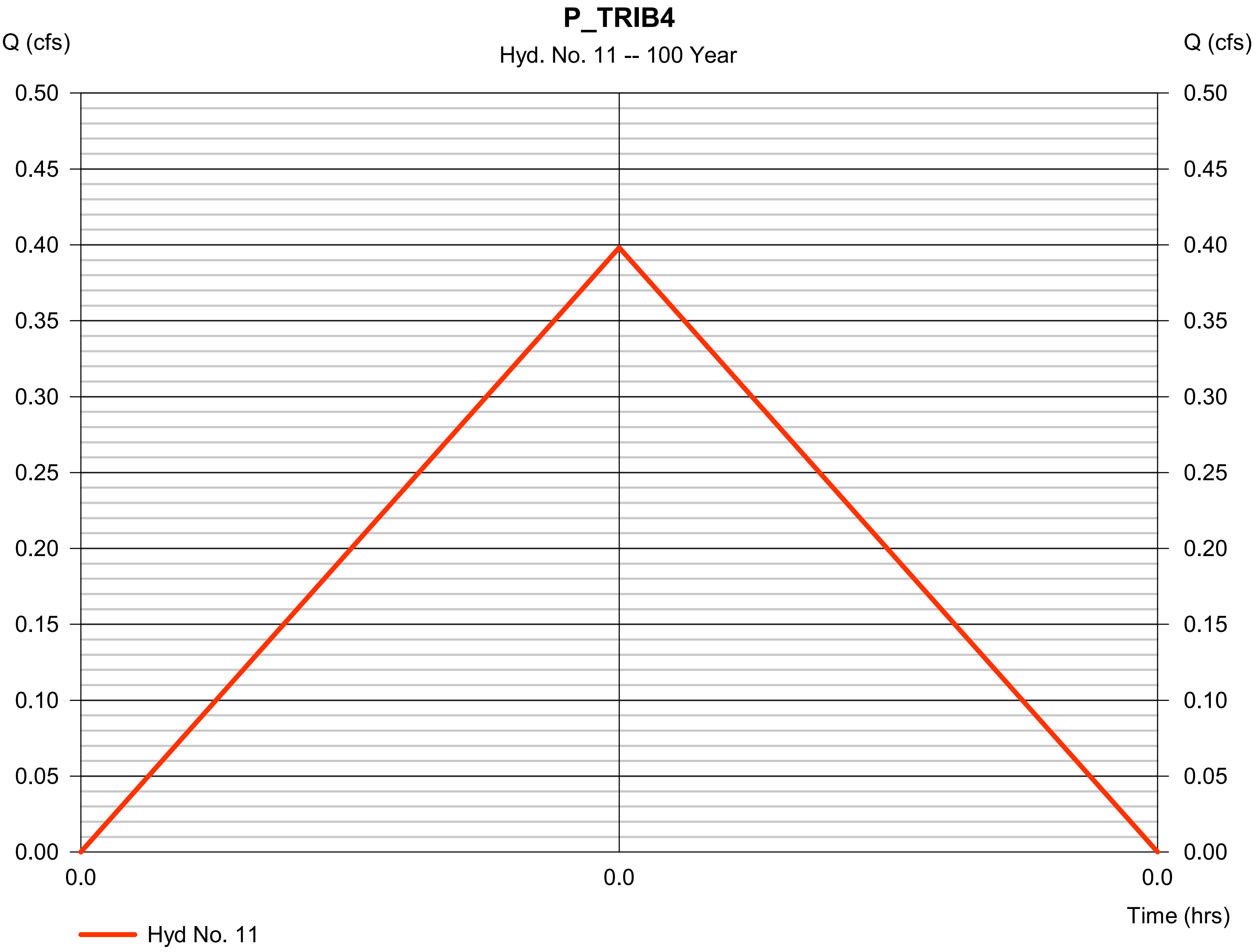


Hydrograph Report

Hyd. No. 11

P_TRIB4

Hydrograph type	= Rational	Peak discharge	= 0.398 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.02 hrs
Time interval	= 1 min	Hyd. volume	= 24 cuft
Drainage area	= 0.140 ac	Runoff coeff.	= 0.2
Intensity	= 14.224 in/hr	Tc by User	= 1.00 min
IDF Curve	= MSD.IDF	Asc/Rec limb fact	= 1/1

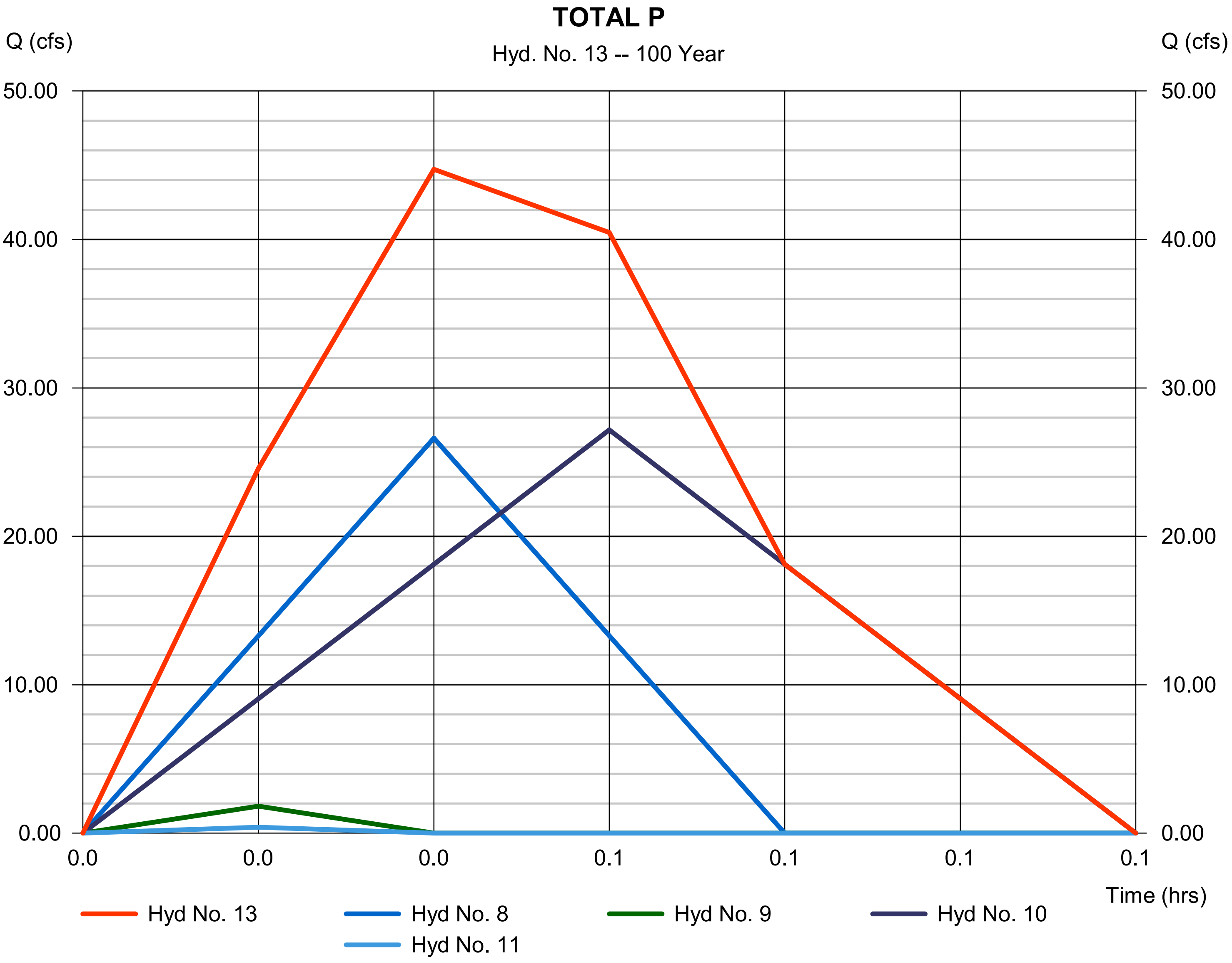


Hydrograph Report

Hyd. No. 13

TOTAL P

Hydrograph type	= Combine	Peak discharge	= 44.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 8,216 cuft
Inflow hyds.	= 8, 9, 10, 11	Contrib. drain. area	= 7.530 ac



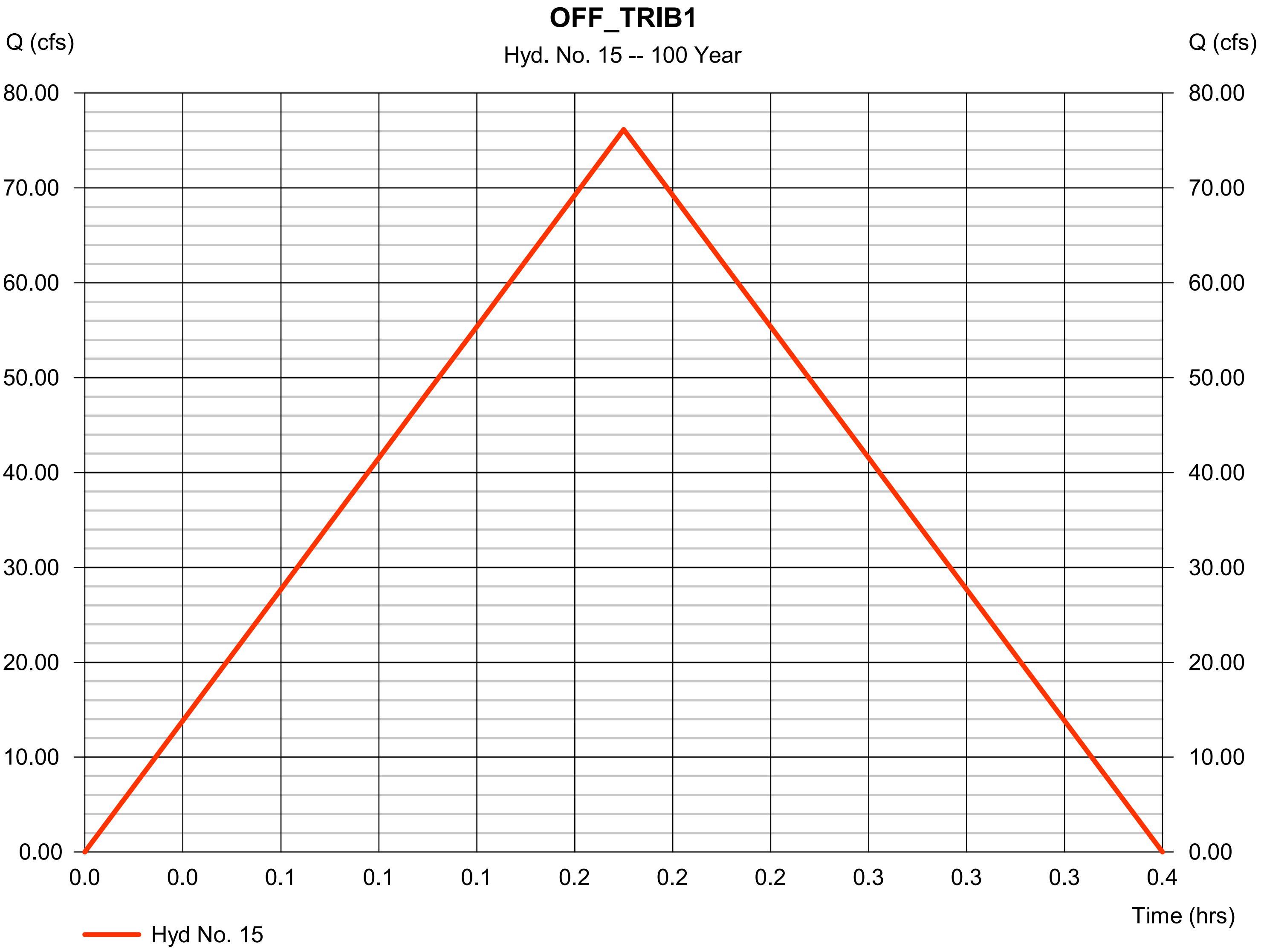
Hydrograph Report

Hyd. No. 15

OFF_TRIB1

Hydrograph type = Rational
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 16.670 ac
Intensity = 8.306 in/hr
IDF Curve = MSD.IDF

Peak discharge = 76.16 cfs
Time to peak = 0.18 hrs
Hyd. volume = 50,263 cuft
Runoff coeff. = 0.55
Tc by User = 11.00 min
Asc/Rec limb fact = 1/1



Hydrograph Report

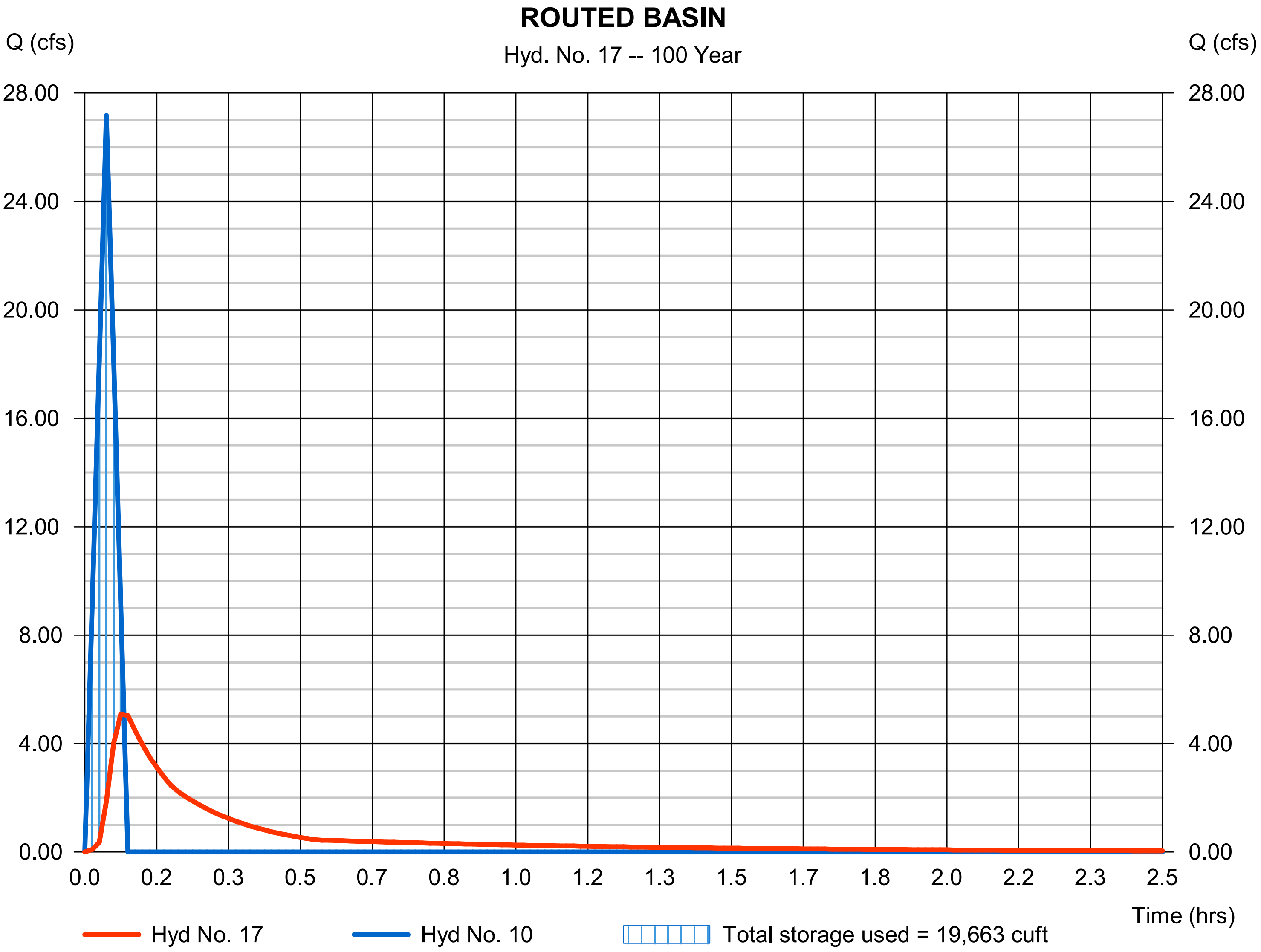
Hyd. No. 17

ROUTED BASIN

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyd. No. = 10 - P_TRIB3
Reservoir name = BMP 1

Peak discharge = 5.089 cfs
Time to peak = 0.08 hrs
Hyd. volume = 4,887 cuft
Max. Elevation = 472.00 ft
Max. Storage = 19,663 cuft

Storage Indication method used. Wet pond routing start elevation = 471.70 ft.



Pond Report

Pond No. 1 - BMP 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 470.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	470.00	1,768	0	0
1.00	471.00	12,089	6,159	6,159
2.00	472.00	14,867	13,453	19,612
3.00	473.00	20,363	17,541	37,154

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	Inactive	Inactive	0.00
Span (in)	=	18.00	1.25	8.00	0.00
No. Barrels	=	1	1	1	0
Invert El. (ft)	=	468.40	470.01	471.25	0.00
Length (ft)	=	40.00	0.00	0.00	0.00
Slope (%)	=	1.00	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	Yes	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	0.00	0.00	0.00
Crest El. (ft)	=	471.75	0.00	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	Rect	---	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

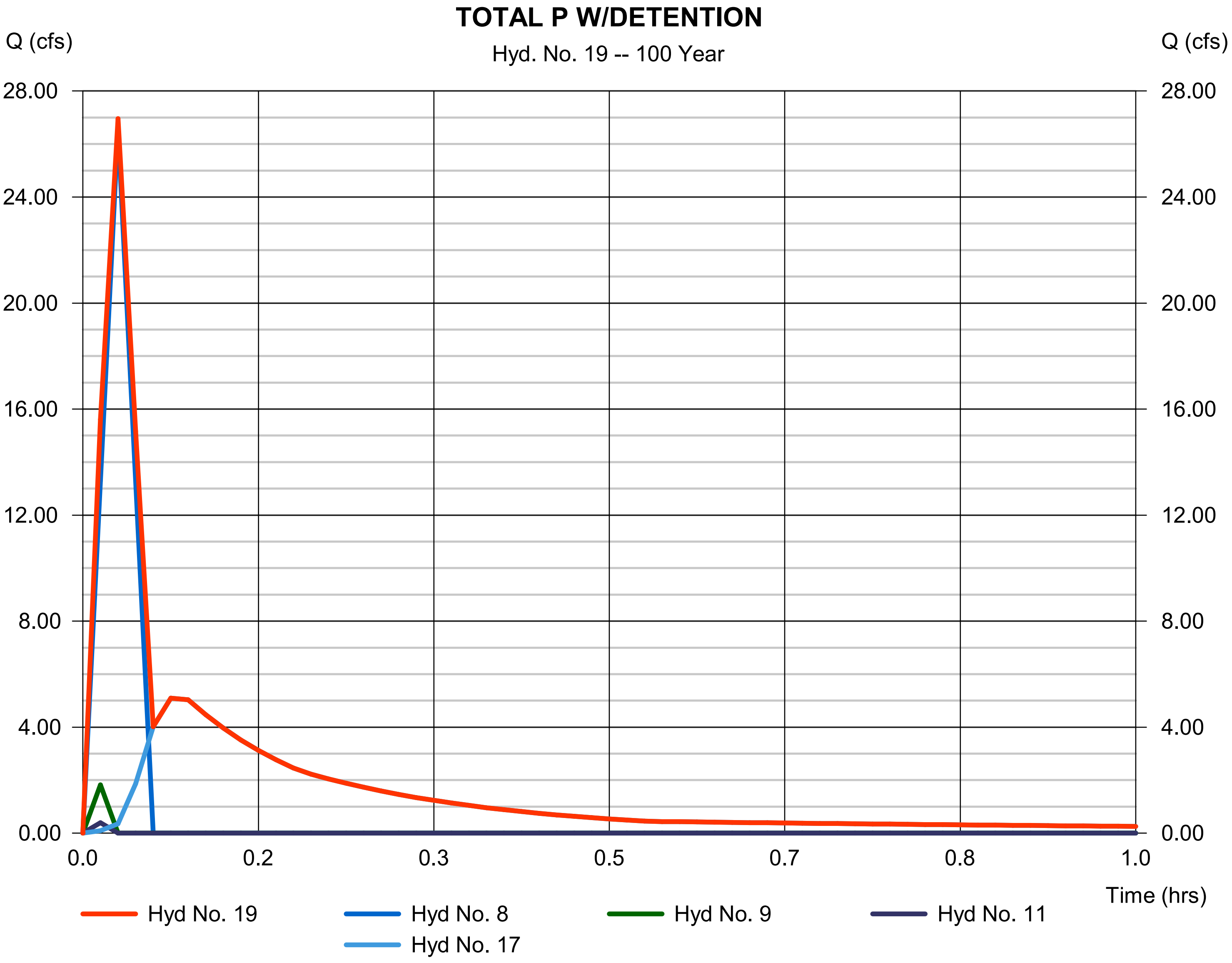
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	470.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.10	616	470.10	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.20	1,232	470.20	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.30	1,848	470.30	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.40	2,464	470.40	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.50	3,080	470.50	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.60	3,696	470.60	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.70	4,312	470.70	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.80	4,928	470.80	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.90	5,543	470.90	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	6,159	471.00	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.10	7,505	471.10	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.20	8,850	471.20	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.30	10,195	471.30	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.40	11,541	471.40	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.50	12,886	471.50	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.60	14,231	471.60	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.70	15,576	471.70	6.73 oc	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.80	16,922	471.80	6.73 oc	0.00	0.00	---	0.45	---	---	---	---	---	0.447
1.90	18,267	471.90	6.73 oc	0.00	0.00	---	2.32	---	---	---	---	---	2.323
2.00	19,612	472.00	6.73 oc	0.00	0.00	---	4.99	---	---	---	---	---	4.995
2.10	21,366	472.10	8.27 oc	0.00	0.00	---	8.27	---	---	---	---	---	8.274
2.20	23,120	472.20	12.06 ic	0.00	0.00	---	12.06	---	---	---	---	---	12.06
2.30	24,875	472.30	14.33 ic	0.00	0.00	---	14.33 s	---	---	---	---	---	14.33
2.40	26,629	472.40	14.87 ic	0.00	0.00	---	14.87 s	---	---	---	---	---	14.87
2.50	28,383	472.50	15.26 ic	0.00	0.00	---	15.26 s	---	---	---	---	---	15.26
2.60	30,137	472.60	15.58 ic	0.00	0.00	---	15.58 s	---	---	---	---	---	15.58
2.70	31,891	472.70	15.87 ic	0.00	0.00	---	15.87 s	---	---	---	---	---	15.87
2.80	33,645	472.80	16.13 ic	0.00	0.00	---	16.13 s	---	---	---	---	---	16.13
2.90	35,399	472.90	16.38 ic	0.00	0.00	---	16.36 s	---	---	---	---	---	16.36
3.00	37,154	473.00	16.62 ic	0.00	0.00	---	16.61 s	---	---	---	---	---	16.61

Hydrograph Report

Hyd. No. 19

TOTAL P W/DETENTION

Hydrograph type	= Combine	Peak discharge	= 26.96 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 8,213 cuft
Inflow hyds.	= 8, 9, 11, 17	Contrib. drain. area	= 4.140 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	38.4810	7.5000	0.7610	--------
3	29.0800	2.9500	0.6030	--------
5	0.0000	0.0000	0.0000	--------
10	78.3870	12.2000	0.8170	--------
25	30.8270	3.0000	0.6020	--------
50	0.0000	0.0000	0.0000	--------
100	76.6220	8.5000	0.7480	--------

File name: MSD.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	5.63	4.36	3.60	3.09	2.72	2.44	2.22	2.04	1.89	1.76	1.65	1.56
3	8.33	6.21	5.10	4.40	3.90	3.53	3.25	3.01	2.82	2.66	2.51	2.39
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.67	6.23	5.27	4.60	4.08	3.68	3.36	3.10	2.87	2.68	2.52	2.38
25	8.82	6.58	5.41	4.67	4.15	3.76	3.45	3.20	3.00	2.82	2.68	2.55
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	10.94	8.64	7.22	6.25	5.54	4.99	4.56	4.20	3.90	3.65	3.43	3.25

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.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	2.50	3.10	0.00	3.30	4.64	5.60	6.80	7.21
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	2.75	0.00	0.00	6.50	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	2.80	0.00	0.00	6.00	0.00

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	1.768	-------	-------	-------	-------	-------	-------	-------	P_TRIB3
3	Reservoir	1	0.033	-------	-------	-------	-------	-------	-------	-------	ROUTED THRU BASIN

Hydrograph Summary Report

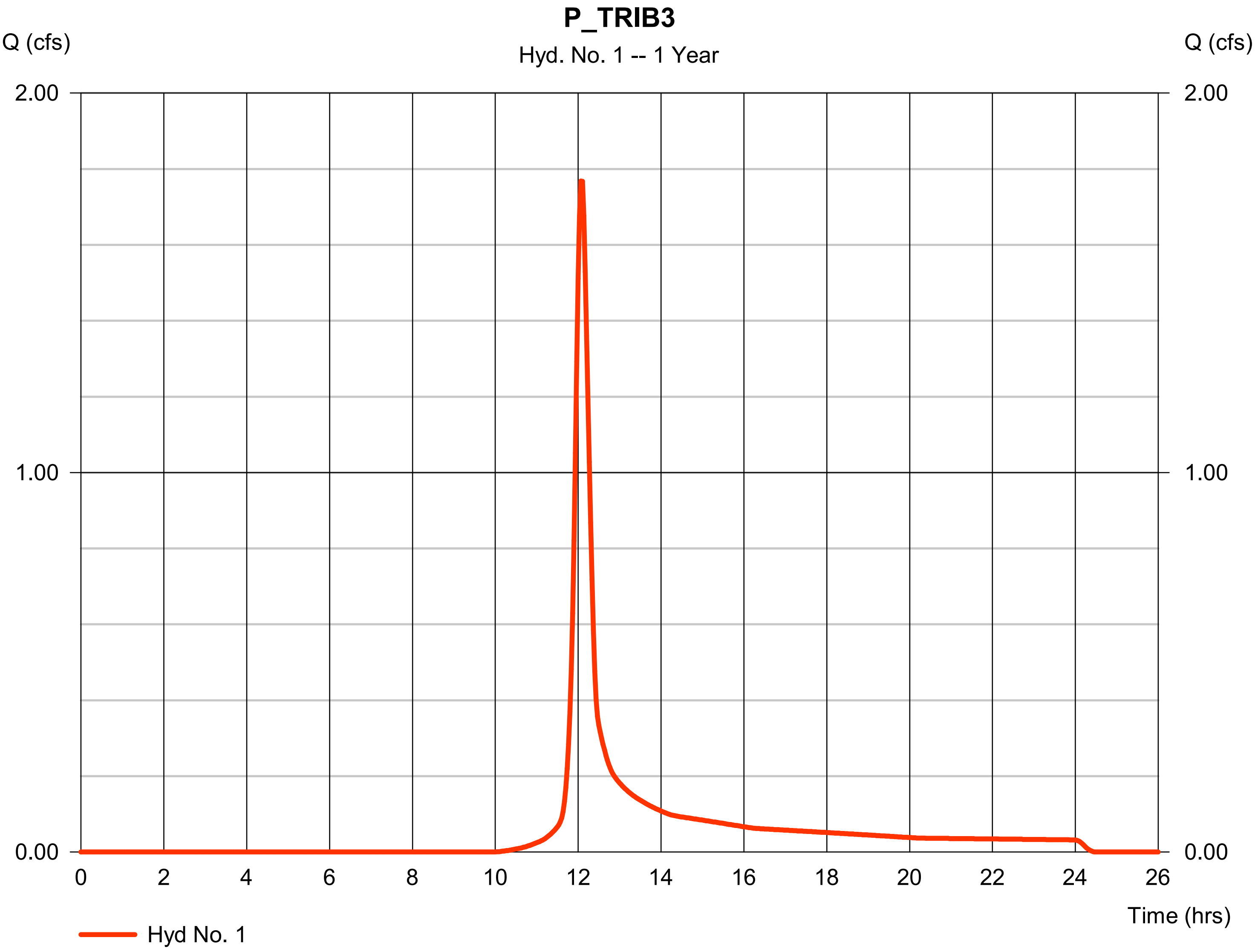
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.768	2	724	5,657	------	------	------	P_TRIB3
3	Reservoir	0.033	2	1406	5,427	1	470.70	4,282	ROUTED THRU BASIN

Hydrograph Report

Hyd. No. 1

P_TRIB3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.768 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,657 cuft
Drainage area	= 3.390 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.40 min
Total precip.	= 1.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

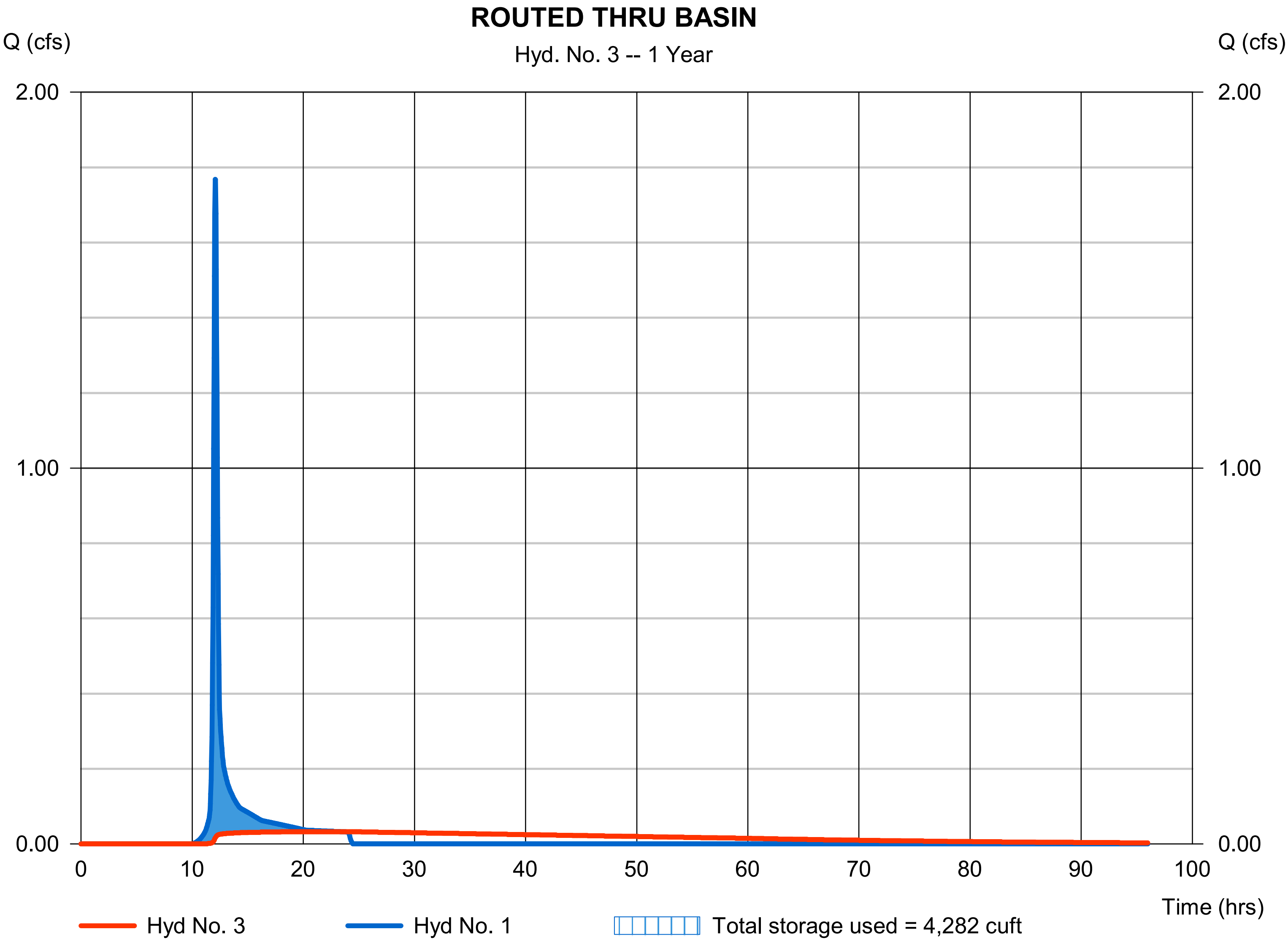
Hyd. No. 3

ROUTED THRU BASIN

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 1 - P_TRIB3
Reservoir name = BMP 1

Peak discharge = 0.033 cfs
Time to peak = 23.43 hrs
Hyd. volume = 5,427 cuft
Max. Elevation = 470.70 ft
Max. Storage = 4,282 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - BMP 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 470.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	470.00	1,768	0	0
1.00	471.00	12,089	6,159	6,159
2.00	472.00	14,867	13,453	19,612
3.00	473.00	20,363	17,541	37,154

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	18.00	1.25	6.00	0.00
Span (in)	=	18.00	1.25	8.00	0.00
No. Barrels	=	1	1	1	0
Invert El. (ft)	=	468.40	470.01	471.25	0.00
Length (ft)	=	40.00	0.00	0.00	0.00
Slope (%)	=	1.00	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	Yes	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	0.00	0.00	0.00
Crest El. (ft)	=	471.75	0.00	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	Rect	---	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	470.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.10	616	470.10	6.73 oc	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.008
0.20	1,232	470.20	6.73 oc	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.015
0.30	1,848	470.30	6.73 oc	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.020
0.40	2,464	470.40	6.73 oc	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.024
0.50	3,080	470.50	6.73 oc	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.027
0.60	3,696	470.60	6.73 oc	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.030
0.70	4,312	470.70	6.73 oc	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.033
0.80	4,928	470.80	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.035
0.90	5,543	470.90	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.038
1.00	6,159	471.00	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.040
1.10	7,505	471.10	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.042
1.20	8,850	471.20	6.73 oc	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.044
1.30	10,195	471.30	6.73 oc	0.05 ic	0.03 ic	---	0.00	---	---	---	---	---	0.071
1.40	11,541	471.40	6.73 oc	0.05 ic	0.13 ic	---	0.00	---	---	---	---	---	0.179
1.50	12,886	471.50	6.73 oc	0.05 ic	0.28 ic	---	0.00	---	---	---	---	---	0.333
1.60	14,231	471.60	6.73 oc	0.05 ic	0.47 ic	---	0.00	---	---	---	---	---	0.521
1.70	15,576	471.70	6.73 oc	0.05 ic	0.69 ic	---	0.00	---	---	---	---	---	0.738
1.80	16,922	471.80	6.73 oc	0.05 ic	0.88 ic	---	0.45	---	---	---	---	---	1.381
1.90	18,267	471.90	6.73 oc	0.06 ic	1.02 ic	---	2.32	---	---	---	---	---	3.394
2.00	19,612	472.00	6.73 oc	0.06 ic	1.13 ic	---	4.99	---	---	---	---	---	6.187
2.10	21,366	472.10	9.57 oc	0.05 ic	1.24 ic	---	8.27	---	---	---	---	---	9.569
2.20	23,120	472.20	13.33 ic	0.03 ic	1.24 ic	---	12.06	---	---	---	---	---	13.33
2.30	24,875	472.30	14.45 ic	0.02 ic	0.82 ic	---	13.61 s	---	---	---	---	---	14.45
2.40	26,629	472.40	14.93 ic	0.02 ic	0.66 ic	---	14.25 s	---	---	---	---	---	14.93
2.50	28,383	472.50	15.29 ic	0.01 ic	0.55 ic	---	14.72 s	---	---	---	---	---	15.29
2.60	30,137	472.60	15.60 ic	0.01 ic	0.48 ic	---	15.11 s	---	---	---	---	---	15.59
2.70	31,891	472.70	15.88 ic	0.01 ic	0.41 ic	---	15.45 s	---	---	---	---	---	15.88
2.80	33,645	472.80	16.14 ic	0.01 ic	0.37 ic	---	15.75 s	---	---	---	---	---	16.13
2.90	35,399	472.90	16.38 ic	0.01 ic	0.33 ic	---	16.05 s	---	---	---	---	---	16.38
3.00	37,154	473.00	16.62 ic	0.01 ic	0.30 ic	---	16.31 s	---	---	---	---	---	16.61

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	38.4810	7.5000	0.7610	--------
3	29.0800	2.9500	0.6030	--------
5	0.0000	0.0000	0.0000	--------
10	78.3870	12.2000	0.8170	--------
25	30.8270	3.0000	0.6020	--------
50	0.0000	0.0000	0.0000	--------
100	76.6220	8.5000	0.7480	--------

File name: MSD.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	5.63	4.36	3.60	3.09	2.72	2.44	2.22	2.04	1.89	1.76	1.65	1.56
3	8.33	6.21	5.10	4.40	3.90	3.53	3.25	3.01	2.82	2.66	2.51	2.39
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.67	6.23	5.27	4.60	4.08	3.68	3.36	3.10	2.87	2.68	2.52	2.38
25	8.82	6.58	5.41	4.67	4.15	3.76	3.45	3.20	3.00	2.82	2.68	2.55
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	10.94	8.64	7.22	6.25	5.54	4.99	4.56	4.20	3.90	3.65	3.43	3.25

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.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	1.14	3.10	0.00	3.30	4.64	5.60	6.80	7.21
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	2.75	0.00	0.00	6.50	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	2.80	0.00	0.00	6.00	0.00

Hydrograph Report

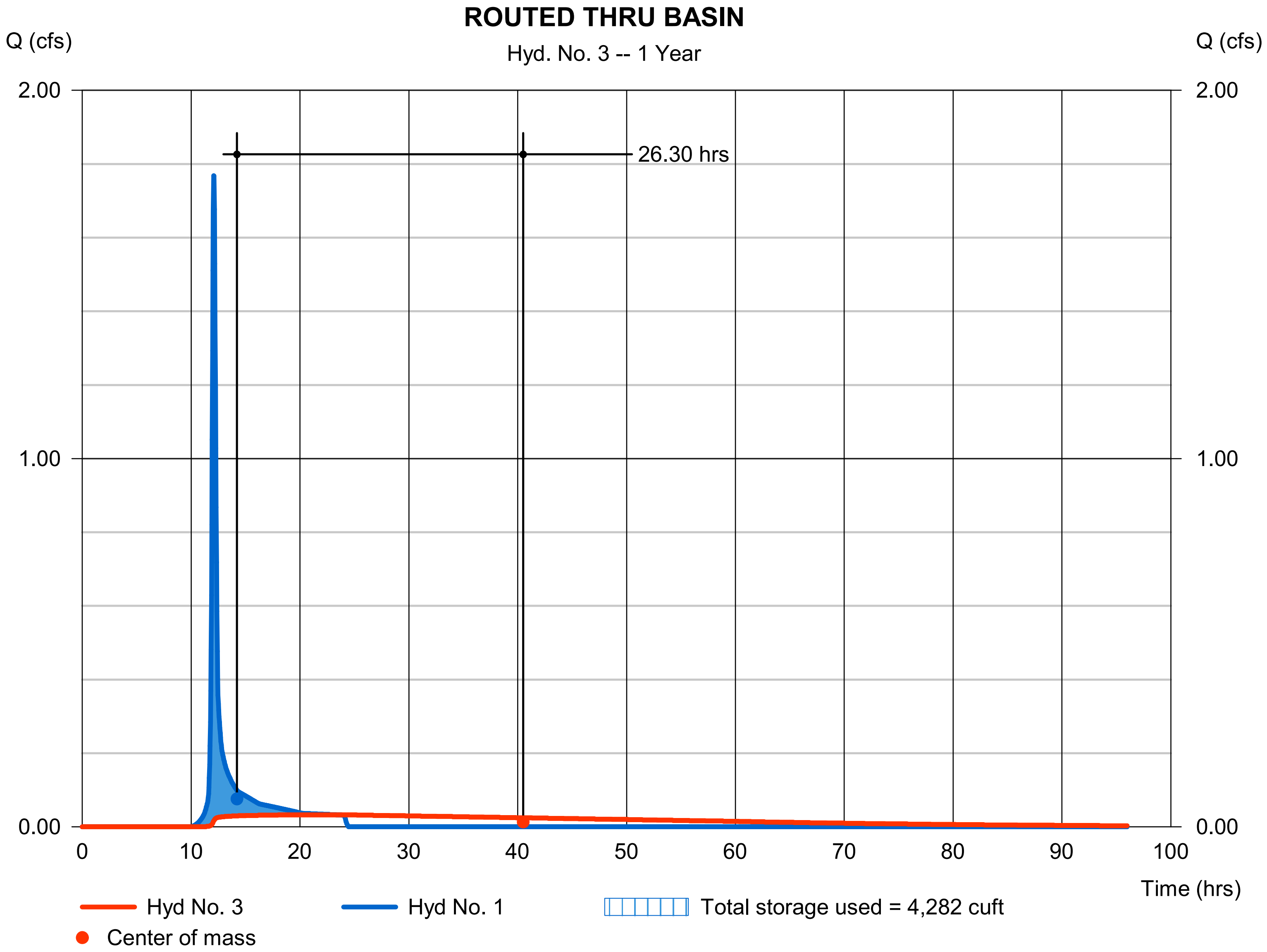
Hyd. No. 3

ROUTED THRU BASIN

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyd. No. = 1 - P_TRIB3
Reservoir name = BMP 1

Peak discharge = 0.033 cfs
Time to peak = 23.43 hrs
Hyd. volume = 5,427 cuft
Max. Elevation = 470.70 ft
Max. Storage = 4,282 cuft

Storage Indication method used.



DRAINAGE AREA MAPS

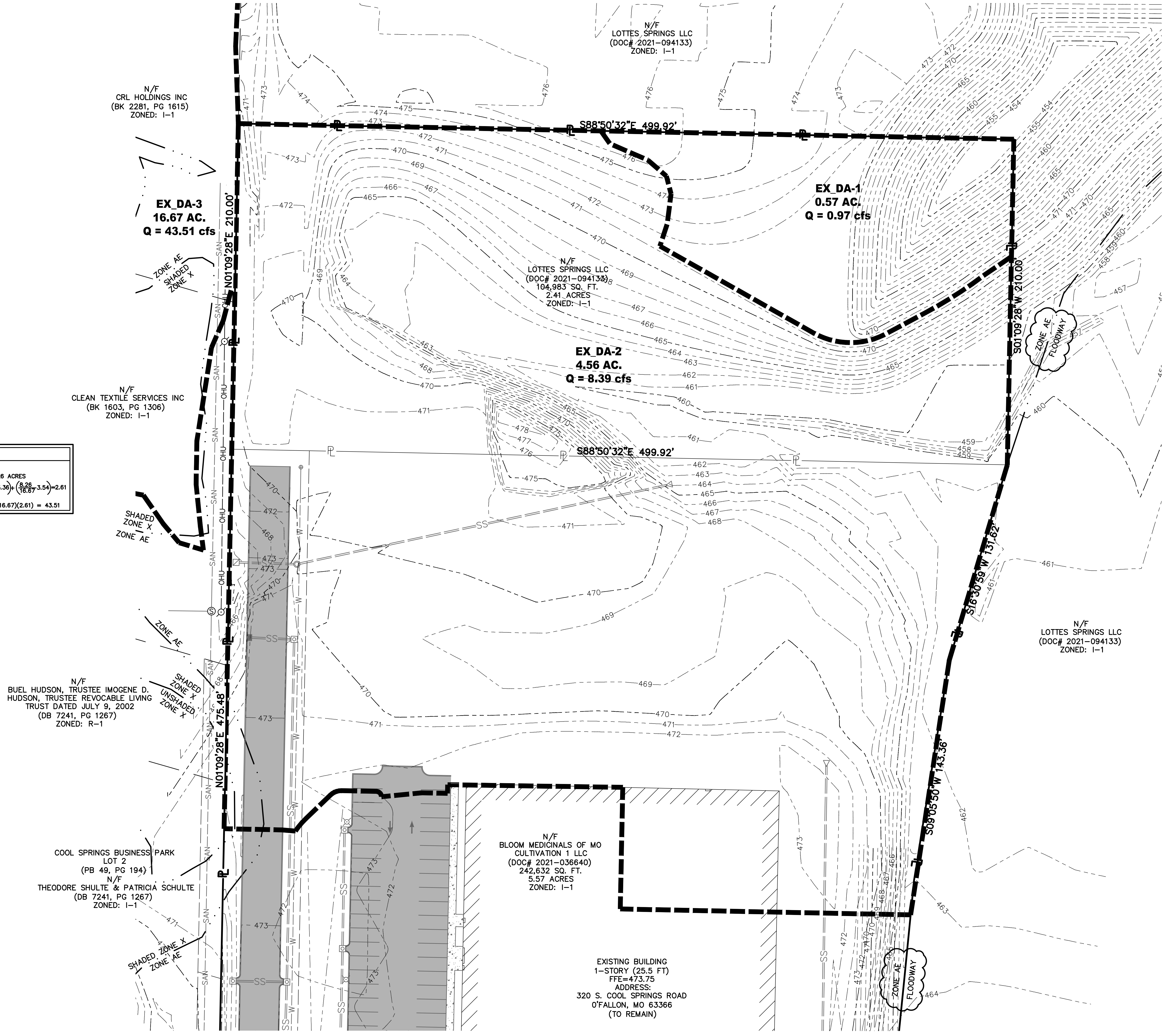
EXISTING DRAINAGE AREA MAP

SCALE: 1"=40'
SEPTEMBER 2022

ALL AREAS
PI VALUE OPEN = 1.70
PI VALUE GRAVEL = 3.36
PI VALUE PAVEMENT/BUILDING = 3.54

EX_DA-01	EX_DA-02	DA-03
OPEN = 0.57 ACRES GRAVEL = 0.00 ACRES PAVEMENT/BUILDING = 0.00 ACRES	OPEN = 4.20 ACRES GRAVEL = 0.00 ACRES PAVEMENT/BUILDING = 0.36 ACRES	OPEN = 8.41 ACRES GRAVEL = 0.00 ACRES PAVEMENT/BUILDING = 8.26 ACRES
$PI = \left(\frac{0.57}{0.57}1.70\right)+\left(\frac{0.00}{0.57}3.36\right)+\left(\frac{0.00}{0.57}3.54\right)=1.70$	$PI = \left(\frac{4.20}{4.56}1.70\right)+\left(\frac{0.00}{4.56}3.36\right)+\left(\frac{0.36}{4.56}3.54\right)=1.84$	$PI = \left(\frac{8.41}{16.67}1.70\right)+\left(\frac{0.00}{16.67}3.36\right)+\left(\frac{8.26}{16.67}3.54\right)=2.61$
Q(15YR, 20MIN) = API = (0.57)(1.70) = 0.97	Q(15YR, 20MIN) = API = (4.56)(1.84) = 8.39	Q(15YR, 20MIN) = API = (16.67)(2.61) = 43.51

TOTAL EXISTING FLOWS = 52.87 cfs



All OSHA rules & regulations established for the type of construction required by these plans shall be strictly followed (ie. Trenching, Blasting, etc.)

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COCHRAN

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- General Consulting
- Master Planning

Missouri State Certificate
of Authority Number: 2010000046

Cochran Project No. M20-8003C

MICHAEL L. HACKMEISTER
NUMBER
PE-2017018980
11/3/22

DATE

Michael L. Hackmeister No. E-2017018980
Registered Professional Engineer
State of Missouri
for Cochran Engineering & Surveying

Developer Information
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2082 SOUTH STATE STREET; ANN ARBOR, MI 48104
(734)-323-1822

Owner Information
BLOOM MEDICINALS OF MO CULTIVATION 1 LLC
2082 SOUTH STATE STREET; ANN ARBOR, MI 48104

Existing Drainage Area Map

P+Z No. 22-002935

City No.

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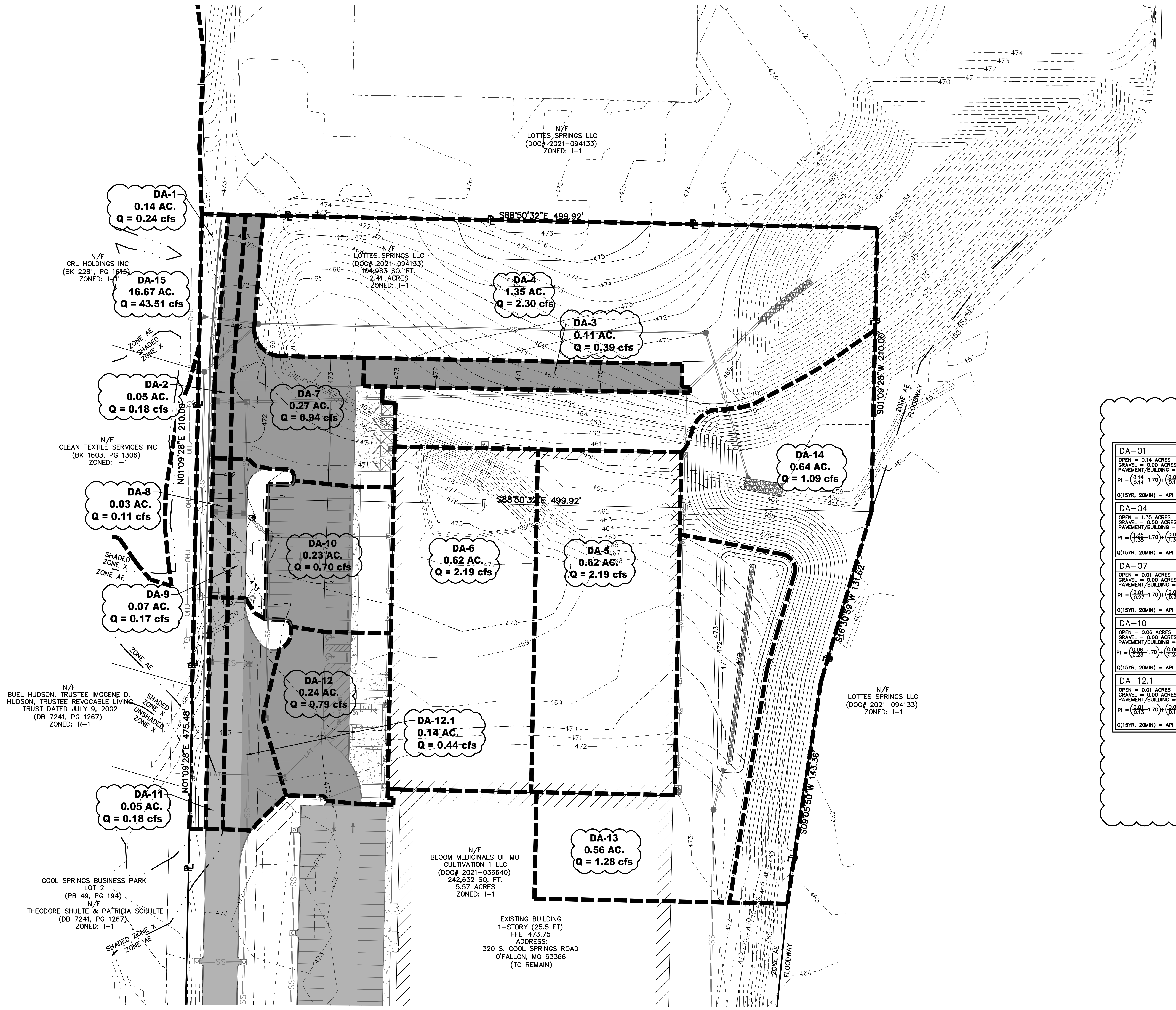
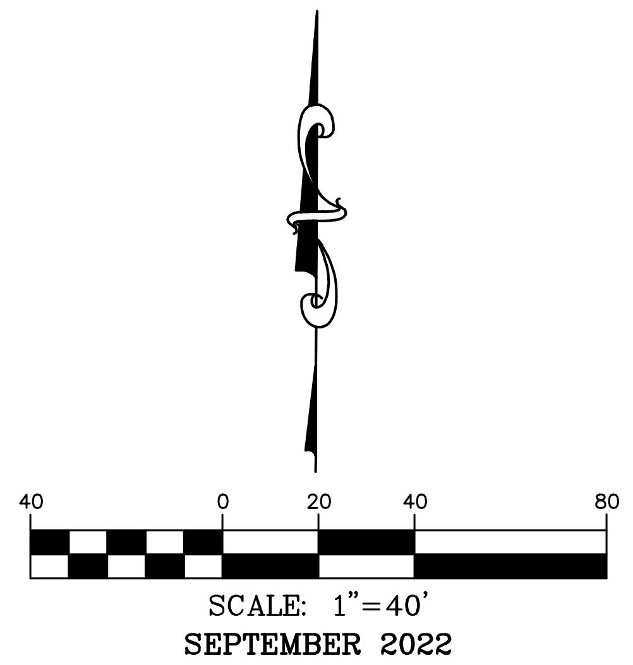
PROPOSED DRAINAGE AREA MAP





SCALE: 1"=40'
SEPTEMBER 2022

ALL AREAS
PI VALUE OPEN = 1.70
PI VALUE GRAVEL = 3.36
PI VALUE PAVEMENT/BUILDING = 3.54

DA-01	OPEN = 0.14 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.00 ACRES	$PI = \left(\frac{0.14}{0.14}1.70\right)+\left(\frac{0.00}{0.14}3.36\right)+\left(\frac{0.00}{0.14}3.54\right)=1.70$	Q(15YR, 20MIN) = API = (0.14)(1.70) = 0.24
DA-02	OPEN = 0.00 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.05 ACRES	$PI = \left(\frac{0.00}{0.05}1.70\right)+\left(\frac{0.00}{0.05}3.36\right)+\left(\frac{0.05}{0.05}3.54\right)=3.54$	Q(15YR, 20MIN) = API = (0.05)(3.54) = 0.18
DA-03	OPEN = 0.00 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.11 ACRES	$PI = \left(\frac{0.00}{0.11}1.70\right)+\left(\frac{0.00}{0.11}3.36\right)+\left(\frac{0.11}{0.11}3.54\right)=3.54$	Q(15YR, 20MIN) = API = (0.11)(3.54) = 0.39
DA-04	OPEN = 1.35 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.00 ACRES	$PI = \left(\frac{1.35}{1.35}1.70\right)+\left(\frac{0.00}{1.35}3.36\right)+\left(\frac{0.00}{1.35}3.54\right)=1.70$	Q(15YR, 20MIN) = API = (1.35)(1.70) = 0.42
DA-05	OPEN = 0.00 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.62 ACRES	$PI = \left(\frac{0.00}{0.62}1.70\right)+\left(\frac{0.00}{0.62}3.36\right)+\left(\frac{0.62}{0.62}3.54\right)=3.54$	Q(15YR, 20MIN) = API = (0.62)(3.54) = 2.19
DA-06	OPEN = 0.00 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.62 ACRES	$PI = \left(\frac{0.00}{0.62}1.70\right)+\left(\frac{0.00}{0.62}3.36\right)+\left(\frac{0.62}{0.62}3.54\right)=3.54$	Q(15YR, 20MIN) = API = (0.62)(3.54) = 2.19
DA-07	OPEN = 0.01 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.26 ACRES	$PI = \left(\frac{0.01}{0.27}1.70\right)+\left(\frac{0.00}{0.27}3.36\right)+\left(\frac{0.26}{0.27}3.54\right)=3.47$	Q(15YR, 20MIN) = API = (0.27)(3.47) = 0.94
DA-08	OPEN = 0.00 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.03 ACRES	$PI = \left(\frac{0.00}{0.03}1.70\right)+\left(\frac{0.00}{0.03}3.36\right)+\left(\frac{0.03}{0.03}3.54\right)=3.54$	Q(15YR, 20MIN) = API = (0.03)(3.54) = 0.11
DA-09	OPEN = 0.04 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.03 ACRES	$PI = \left(\frac{0.04}{0.07}1.70\right)+\left(\frac{0.00}{0.07}3.36\right)+\left(\frac{0.03}{0.07}3.54\right)=2.49$	Q(15YR, 20MIN) = API = (0.07)(2.49) = 0.17
DA-10	OPEN = 0.06 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.17 ACRES	$PI = \left(\frac{0.06}{0.23}1.70\right)+\left(\frac{0.00}{0.23}3.36\right)+\left(\frac{0.17}{0.23}3.54\right)=3.06$	Q(15YR, 20MIN) = API = (0.23)(3.06) = 0.70
DA-11	OPEN = 0.00 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.05 ACRES	$PI = \left(\frac{0.00}{0.05}1.70\right)+\left(\frac{0.00}{0.05}3.36\right)+\left(\frac{0.05}{0.05}3.54\right)=3.54$	Q(15YR, 20MIN) = API = (0.05)(3.54) = 0.18
DA-12	OPEN = 0.03 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.21 ACRES	$PI = \left(\frac{0.03}{0.24}1.70\right)+\left(\frac{0.00}{0.24}3.36\right)+\left(\frac{0.21}{0.24}3.54\right)=3.31$	Q(15YR, 20MIN) = API = (0.24)(3.31) = 0.79
DA-12.1	OPEN = 0.01 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.12 ACRES	$PI = \left(\frac{0.01}{0.13}1.70\right)+\left(\frac{0.00}{0.13}3.36\right)+\left(\frac{0.12}{0.13}3.54\right)=3.40$	Q(15YR, 20MIN) = API = (0.13)(3.40) = 0.44
DA-13	OPEN = 0.38 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.18 ACRES	$PI = \left(\frac{0.38}{0.56}1.70\right)+\left(\frac{0.00}{0.56}3.36\right)+\left(\frac{0.18}{0.56}3.54\right)=2.29$	Q(15YR, 20MIN) = API = (0.56)(2.29) = 1.28
DA-14	OPEN = 0.64 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 0.00 ACRES	$PI = \left(\frac{0.64}{0.64}1.70\right)+\left(\frac{0.00}{0.64}3.36\right)+\left(\frac{0.00}{0.64}3.54\right)=1.70$	Q(15YR, 20MIN) = API = (0.64)(1.70) = 1.09
DA-15	OPEN = 8.41 ACRES	GRAVEL = 0.00 ACRES	PAVEMENT/BUILDING = 8.26 ACRES	$PI = \left(\frac{8.41}{16.67}1.70\right)+\left(\frac{0.00}{16.67}3.36\right)+\left(\frac{8.26}{16.67}3.54\right)=2.61$	Q(15YR, 20MIN) = API = (16.67)(2.61) = 43.51

TOTAL PROPOSED FLOWS = 56.70 cfs

City of O'Fallon Standard Notes and Details – July 2019

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Missouri State Certificate
of Authority Number: 2010000046

Cochran Project No. M20-8003C

MICHAEL L. HACKMEISTER
NUMBER PE-2017018980

DATE

Michael L. Hackmeister No. E-2017018980
Registered Professional Engineer
State of Missouri
for Cochran Engineering & Surveying

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(734)-323-1822

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Proposed Drainage Area Map

P+Z No. 22-002935

City No.

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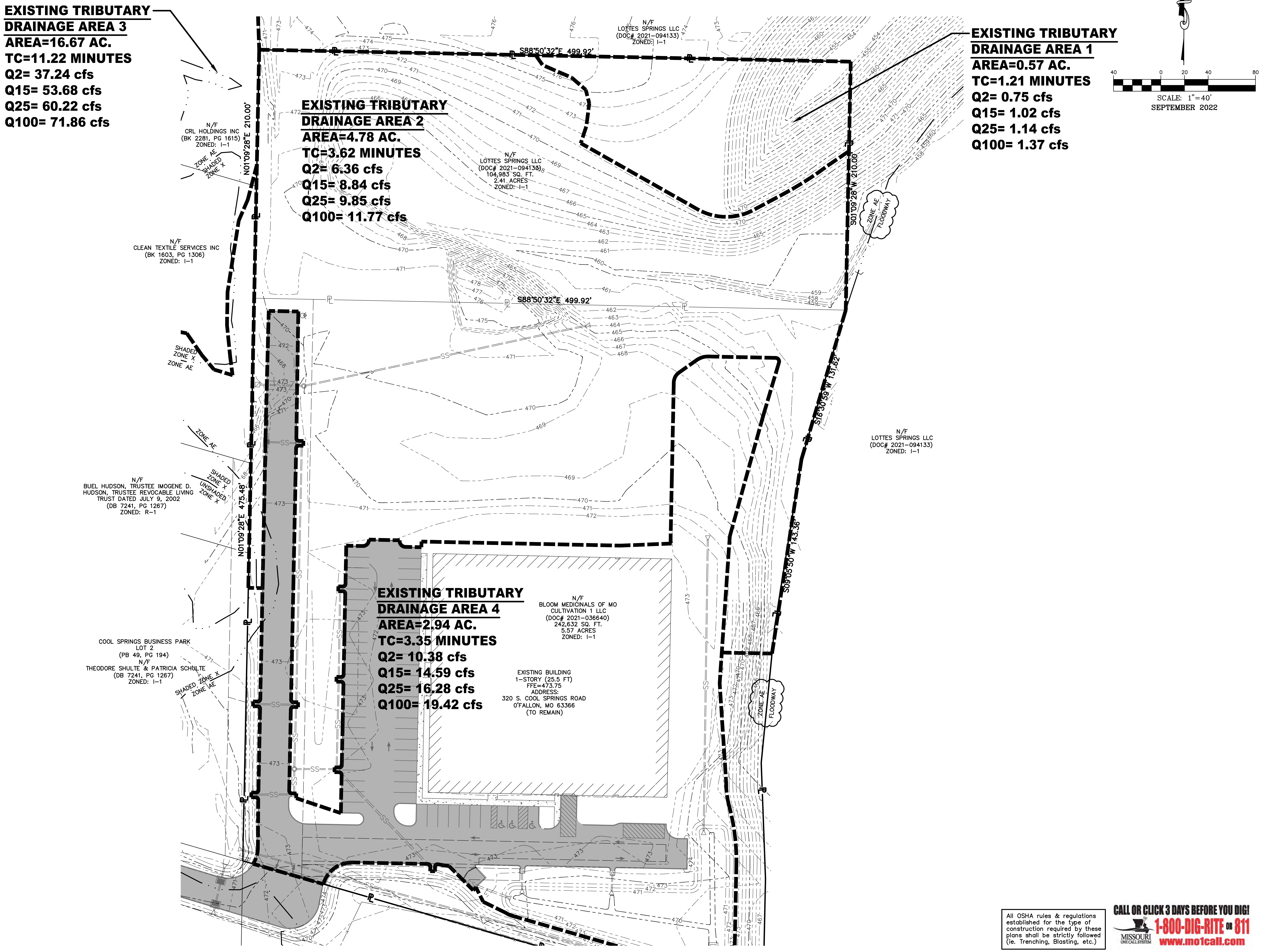
EXISTING TRIBUTARY DRAINAGE AREA MAP



EXISTING TRIBUTARY DRAINAGE AREA 3
AREA=16.67 AC.
TC=11.22 MINUTES
Q2= 37.24 cfs
Q15= 53.68 cfs
Q25= 60.22 cfs
Q100= 71.86 cfs

EXISTING TRIBUTARY DRAINAGE AREA 2
AREA=4.78 AC.
TC=3.62 MINUTES
Q2= 6.36 cfs
Q15= 8.84 cfs
Q25= 9.85 cfs
Q100= 11.77 cfs

EXISTING TRIBUTARY DRAINAGE AREA 1
AREA=0.57 AC.
TC=1.21 MINUTES
Q2= 0.75 cfs
Q15= 1.02 cfs
Q25= 1.14 cfs
Q100= 1.37 cfs

EXISTING TRIBUTARY DRAINAGE AREA 4
AREA=2.94 AC.
TC=3.35 MINUTES
Q2= 10.38 cfs
Q15= 14.59 cfs
Q25= 16.28 cfs
Q100= 19.42 cfs

All OSHA rules & regulations established for the type of construction required by these plans shall be strictly followed (ie. Trenching, Blasting, etc.)

City of O'Fallon Standard Notes and Details – July 2019

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NUMBER PE-2017018980

11/3/22

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Michael L. Hackmeister No. E-2017018980
Registered Professional Engineer
State of Missouri
for Cochran Engineering & Surveying

Developer Information
BLOOM MEDICINALS OF MO CULTIVATION 1 LLC
2082 SOUTH STATE STREET; ANN ARBOR, MI 48104
(734)-323-1822

Owner Information
BLOOM MEDICINALS OF MO CULTIVATION 1 LLC
2082 SOUTH STATE STREET; ANN ARBOR, MI 48104

Existing Tributary Drainage Area Map

P+Z No. 22-002935

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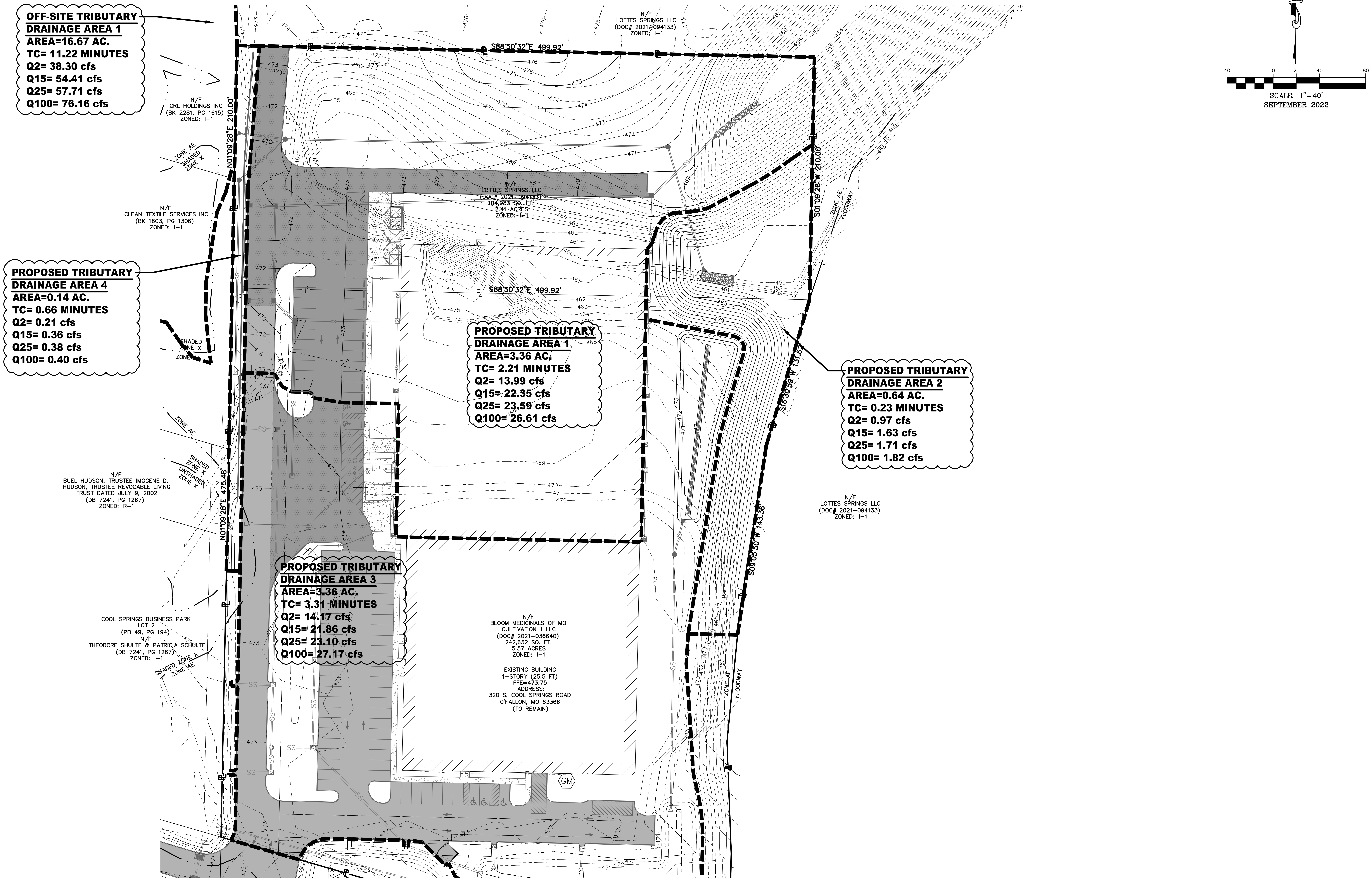
PROPOSED TRIBUTARY DRAINAGE AREA MAP



OFF-SITE TRIBUTARY DRAINAGE AREA 1
AREA=16.67 AC.
TC= 11.22 MINUTES
Q2= 38.30 cfs
Q15= 54.41 cfs
Q25= 57.71 cfs
Q100= 76.16 cfs

PROPOSED TRIBUTARY DRAINAGE AREA 4
AREA=0.14 AC.
TC= 0.66 MINUTES
Q2= 0.21 cfs
Q15= 0.36 cfs
Q25= 0.38 cfs
Q100= 0.40 cfs

PROPOSED TRIBUTARY DRAINAGE AREA 1
AREA=3.36 AC.
TC= 2.21 MINUTES
Q2= 13.99 cfs
Q15= 22.35 cfs
Q25= 23.59 cfs
Q100= 26.61 cfs

PROPOSED TRIBUTARY DRAINAGE AREA 2
AREA=0.64 AC.
TC= 0.23 MINUTES
Q2= 0.97 cfs
Q15= 1.63 cfs
Q25= 1.71 cfs
Q100= 1.82 cfs

PROPOSED TRIBUTARY DRAINAGE AREA 3
AREA=3.36 AC.
TC= 3.31 MINUTES
Q2= 14.17 cfs
Q15= 21.86 cfs
Q25= 23.10 cfs
Q100= 27.17 cfs

SCALE: 1"=40'
SEPTEMBER 2022

City of O'Fallon Standard Notes and Details – July 2019

C3 INDUSTRIES

North Office
8 East Main Street
Wentzville, Missouri 63385
636-332-4574 (tel.)
636-327-0760 (fax)
wentmail@cochraneng.com

COCHRAN

- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
- Master Planning

Missouri State Certificate of Authority Number: 2010000046

Cochran Project No. M20-8003C

MICHAEL L. HACKMEISTER
NUMBER PE-2017018980

DATE

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STORM SEWER HYDROLOGY

RESULTS

	Tc			
	2 YEAR	**15 YEAR**	**25 YEAR**	**100 YEAR**
EXISTING =	54.134	77.105	86.313	103.057
PROPOSED =	26.200	35.217	39.222	46.896
PROPOSED OFFSITE =	37.238	54.546	61.171	72.983
PROPOSED TOTAL =	63.438	89.763	100.394	119.879
DIFFERENCE =	9.304	12.658	14.081	16.822

	1-HOUR			
	2 YEAR	**15 YEAR**	**25 YEAR**	**100 YEAR**
EXISTING =	18.878	29.127	43.690	41.373
PROPOSED =	6.820	10.522	15.783	14.946
PROPOSED OFFSITE =	14.321	22.096	33.143	31.386
PROPOSED TOTAL =	21.141	32.618	48.926	46.332
DIFFERENCE =	2.263	3.491	5.236	4.959

	24-HOUR			
	2 YEAR	**15 YEAR**	**25 YEAR**	**100 YEAR**
EXISTING =	1.510	2.591	4.722	4.729
PROPOSED =	0.546	0.936	1.706	1.708
PROPOSED OFFSITE =	1.146	1.965	3.582	3.587
PROPOSED TOTAL =	1.691	2.901	5.288	5.296
DIFFERENCE =	0.181	0.311	0.566	0.567

WORST CASE FOR EACH STORM EVENT

	2 YEAR	**15 YEAR**	**25 YEAR**	**100 YEAR**
EXISTING =	54.134	77.105	86.313	103.057
PROPOSED =	26.200	35.217	39.222	46.896
PROPOSED OFFSITE =	37.238	54.546	61.171	72.983
PROPOSED TOTAL =	63.438	89.763	100.394	119.879
DIFFERENCE =	9.304	12.658	14.081	16.822

2 YEAR, TC

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	6.595
Q =		0.750	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	5.718
Q =		4.594	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	4.084
Q =		37.238	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	5.815
Q =		11.540	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.034
Tc =	2.209	I =	6.197
Q =		12.386	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.320
Tc =	0.227	I =	7.045
Q =		0.901	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606		53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	5.815
Q =		12.728	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.001
Tc =	0.656	I =	6.840
Q =		0.186	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	4.084
Q =		37.238	

EXISTING =	54.134
PROPOSED =	26.200
PROPOSED OFFSITE =	37.238
PROPOSED TOTAL =	63.438
DIFFERENCE =	9.304

RATIONAL DATA		
FREQUENC	2	YEARS
DURATION	TC	MIN.
I =	0.126	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

2 YEAR,1 HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	1.571
Q =		0.179	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	1.571
Q =		1.262	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	1.571
Q =		14.321	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	1.571
Q =		3.117	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.034
Tc =	2.209	I =	1.571
Q =		3.139	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.320
Tc =	0.227	I =	1.571
Q =		0.201	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	1.571
Q =		3.438	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.001
Tc =	0.656	I =	1.571
Q =		0.043	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	1.571
Q =		14.321	

EXISTING =	18.878
PROPOSED =	6.820
PROPOSED OFFSITE =	14.321
PROPOSED TOTAL =	21.141
DIFFERENCE =	2.263

RATIONAL DATA		
FREQUENC	2	YEARS
DURATION	60	MIN.
I =	1.571	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

2 YEAR,24 HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	0.126
Q =		0.014	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	0.126
Q =		0.101	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	0.126
Q =		1.146	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	0.126
Q =		0.249	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.034
Tc =	2.209	I =	0.126
Q =		0.251	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.320
Tc =	0.227	I =	0.126
Q =		0.016	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	0.126
Q =		0.275	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.001
Tc =	0.656	I =	0.126
Q =		0.003	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	0.126
Q =		1.146	

EXISTING =	1.510
PROPOSED =	0.546
PROPOSED OFFSITE =	1.146
PROPOSED TOTAL =	1.691
DIFFERENCE =	0.181

RATIONAL DATA		
FREQUENC	2	YEARS
DURATION	1440	MIN.
I =	0.126	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

15 YEAR, TC

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	9.008
Q =		1.024	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	7.952
Q =		6.389	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	5.886
Q =		53.675	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	8.071
Q =		16.017	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	8.059
Q =		16.107	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	9.289
Q =		1.188	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	8.071
Q =		17.665	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	9.497
Q =		0.258	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	5.982
Q =		54.546	

EXISTING =	77.105
PROPOSED =	35.217
PROPOSED OFFSITE =	54.546
PROPOSED TOTAL =	89.763
DIFFERENCE =	12.658

RATIONAL DATA		
FREQUENC	15	YEARS
DURATION	TC	MIN.
I =	N/A	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

15 YEAR, 1-HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	2.423
Q =		0.275	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	2.423
Q =		1.947	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	2.423
Q =		22.096	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	2.423
Q =		4.809	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	2.423
Q =		4.843	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	2.423
Q =		0.310	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	2.423
Q =		5.304	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	2.423
Q =		0.066	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	2.423
Q =		22.096	

EXISTING =	29.127
PROPOSED =	10.522
PROPOSED OFFSITE =	22.096
PROPOSED TOTAL =	32.618
DIFFERENCE =	3.491

RATIONAL DATA		
FREQUENC	15	YEARS
DURATION	60	MIN.
I =	2.423	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

15 YEAR, 24-HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	0.216
Q =		0.025	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	0.216
Q =		0.173	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	0.216
Q =		1.965	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	0.216
Q =		0.428	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	0.216
Q =		0.431	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	0.216
Q =		0.028	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	0.216
Q =		0.472	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	0.216
Q =		0.006	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	0.216
Q =		1.965	

EXISTING =	2.591
PROPOSED =	0.936
PROPOSED OFFSITE =	1.965
PROPOSED TOTAL =	2.901
DIFFERENCE =	0.311

RATIONAL DATA		
FREQUENC	15	YEARS
DURATION	1440	MIN.
I =	0.215542	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

25 YEAR, TC

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	10.005
Q =		1.137	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	8.861
Q =		7.120	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	6.604
Q =		60.215	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	8.990
Q =		17.841	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	8.977
Q =		17.942	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	10.309
Q =		1.318	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	8.990
Q =		19.677	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	10.534
Q =		0.286	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	6.708
Q =		61.171	

EXISTING =	86.313
PROPOSED =	39.222
PROPOSED OFFSITE =	61.171
PROPOSED TOTAL =	100.394
DIFFERENCE =	14.081

RATIONAL DATA		
FREQUENC	25	YEARS
DURATION	TC	MIN.
I =	N/A	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

25 YEAR, 1-HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	3.635
Q =		0.413	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	3.635
Q =		2.920	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	3.635
Q =		33.143	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	3.635
Q =		7.213	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	3.635
Q =		7.264	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	3.635
Q =		0.465	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	3.635
Q =		7.955	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	3.635
Q =		0.099	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	3.635
Q =		33.143	

EXISTING =	43.690
PROPOSED =	15.783
PROPOSED OFFSITE =	33.143
PROPOSED TOTAL =	48.926
DIFFERENCE =	5.236

RATIONAL DATA		
FREQUENC	25	YEARS
DURATION	60	MIN.
I =	3.634686	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

25 YEAR, 24-HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	0.393
Q =		0.045	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	0.393
Q =		0.316	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	0.393
Q =		3.582	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	0.393
Q =		0.780	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	0.393
Q =		0.785	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	0.393
Q =		0.050	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	0.393
Q =		0.860	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	0.393
Q =		0.011	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	0.393
Q =		3.582	

EXISTING =	4.722
PROPOSED =	1.706
PROPOSED OFFSITE =	3.582
PROPOSED TOTAL =	5.288
DIFFERENCE =	0.566

RATIONAL DATA		
FREQUENC	25	YEARS
DURATION	1440	MIN.
I =	0.392853	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

100 YEAR, TC

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	12.012
Q =		1.366	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	10.588
Q =		8.507	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	7.881
Q =		71.858	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	10.746
Q =		21.326	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	10.731
Q =		21.446	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	12.397
Q =		1.585	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	10.746
Q =		23.521	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	12.684
Q =		0.344	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	8.004
Q =		72.983	

EXISTING =	103.057
PROPOSED =	46.896
PROPOSED OFFSITE =	72.983
PROPOSED TOTAL =	119.879
DIFFERENCE =	16.822

RATIONAL DATA		
FREQUENC	100	YEARS
DURATION	TC	MIN.
I =	N/A	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

100 YEAR, 1 HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	3.442
Q =		0.391	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	3.442
Q =		2.765	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	3.442
Q =		31.386	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	3.442
Q =		6.831	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	3.442
Q =		6.879	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	3.442
Q =		0.440	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	3.442
Q =		7.534	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	3.442
Q =		0.093	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	3.442
Q =		31.386	

EXISTING =	41.373
PROPOSED =	14.946
PROPOSED OFFSITE =	31.386
PROPOSED TOTAL =	46.332
DIFFERENCE =	4.959

RATIONAL DATA		
FREQUENC	100	YEARS
DURATION	60	MIN.
I =	3.441978	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

100 YEAR, 24 HOUR

EX1			
OPEN	GRAVEL	PAVED	BUILDING
24760	0	0	0
24760	0	0	0
0.114	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	221	S =	0.100
Tc =	1.209	I =	0.393
Q =		0.045	

EX2			
OPEN	GRAVEL	PAVED	BUILDING
174990	0	0	0
174990	0	0	0
0.803	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	511	S =	0.031
Tc =	3.617	I =	0.393
Q =		0.316	

EX3			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.024
Tc =	11.218	I =	0.393
Q =		3.587	

EX4			
OPEN	GRAVEL	PAVED	BUILDING
40998	0	46705	40236
40998	0	46705	40236
0.188	0.000	0.965	0.831
COMPOSITE C =		0.676	
L =	241	S =	0.009
Tc =	3.312	I =	0.393
Q =		0.781	

POST 1			
OPEN	GRAVEL	PAVED	BUILDING
63688	0	28712	53866
63688	0	28712	53866
0.292	0.000	0.593	1.113
COMPOSITE C =		0.595	
L =	282	S =	0.012
Tc =	3.342	I =	0.393
Q =		0.786	

POST 2			
OPEN	GRAVEL	PAVED	BUILDING
27844	0	0	0
27844	0	0	0
0.128	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	45	S =	0.019
Tc =	0.669	I =	0.393
Q =		0.050	

POST 3			
OPEN	GRAVEL	PAVED	BUILDING
53606	0	53270	40754
53606	0	53270	40754
0.246	0.000	1.101	0.842
COMPOSITE C =		0.646	
L =	241	S =	0.009
Tc =	3.312	I =	0.393
Q =		0.861	

POST 4			
OPEN	GRAVEL	PAVED	BUILDING
5915	0	0	0
5915	0	0	0
0.027	0.000	0.000	0.000
COMPOSITE C =		0.200	
L =	10	S =	0.008
Tc =	0.292	I =	0.393
Q =		0.011	

OFF 1			
OPEN	GRAVEL	PAVED	BUILDING
366176	0	359963	0
366176	0	359963	0
1.681	0.000	7.437	0.000
COMPOSITE C =		0.547	
L =	1955	S =	0.027
Tc =	10.736	I =	0.393
Q =		3.587	

EXISTING =	4.729
PROPOSED =	1.708
PROPOSED OFFSITE =	3.587
PROPOSED TOTAL =	5.296
DIFFERENCE =	0.567

RATIONAL DATA		
FREQUENC	25	YEARS
DURATION	1440	MIN.
I =	0.393422	
C, IMP =	0.9	
C, PERV =	0.2	
C, GRA. =	0.85	

Existing Rational Method 15yr, 20min						
Drainage Area #	Open Area (ac.)	Gravel Area (ac.)	Impervious Area (ac.)	A	PI	Q
1	0.57	-	-	0.57	1.70	0.97
2	4.19	-	0.36	4.56	1.84	8.39
3	8.41	-	8.26	16.67	2.61	43.51

Q = API

A = total drainage area (acres)
P = runoff factor based on runoff from pervious and impervious surfaces
I = average intensity of rainfall for a given period and a given frequency (inches/hour)

Proposed Rational Method 15yr, 20min

Drainage Area #	Open Area (ac.)	Gravel Area (ac.)	Impervious Area (ac.)	A	PI	Q
1	0.14	-	-	0.14	1.70	0.24
2	-	-	0.05	0.05	3.54	0.18
3	-	-	0.11	0.11	3.54	0.39
4	1.35	-	-	1.35	1.70	2.30
5	-	-	0.62	0.62	3.54	2.19
6	-	-	0.62	0.62	3.54	2.19
7	0.01	-	0.26	0.27	3.47	0.94
8	-	-	0.03	0.03	3.54	0.11
9	0.04	-	0.03	0.07	2.49	0.17
10	0.06	-	0.17	0.23	3.06	0.70
11	-	-	0.05	0.05	3.54	0.18
12	0.03	-	0.21	0.24	3.31	0.79
12.1	0.01	-	0.12	0.14	3.16	0.44
13	0.38	-	0.18	0.56	2.29	1.28
14	0.64	-	-	0.64	1.70	1.09
15	8.41	-	8.26	16.67	2.61	43.51

Q = API

A = total drainage area (acres)
P = runoff factor based on runoff from pervious and impervious surfaces
I = average intensity of rainfall for a given period and a given frequency (inches/hour)

STORM SEWER HYDRAULICS

HGL CALCS

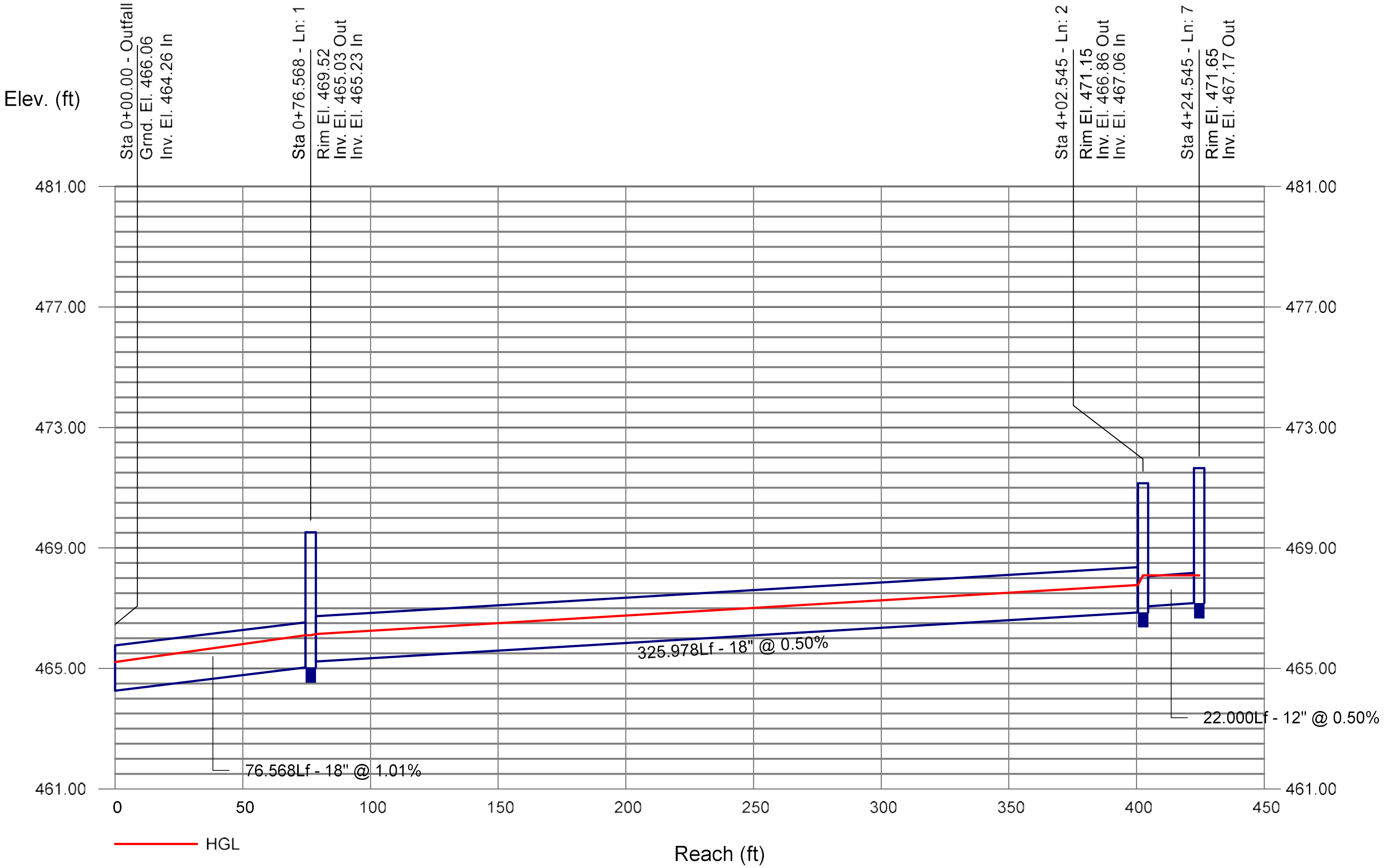
Line No.	Line ID	DnStm Ln No	Invert Dn (ft)	Invert Up (ft)	Line Length (ft)	Line Slope (%)	Line Size (in)	Capac Full (cfs)	Known Q (cfs)	Flow Rate (cfs)	Depth Dn (ft)	HGL Dn (ft)	HGL Up (ft)	Vel Ave (ft/s)	Vel Dn (ft/s)	Rim-Hw (ft)	
1	FES1-MH2	Outfall	464.26	465.03	76.568	1.01	18	10.53	2.58	7.66	0.95	465.21	466.10	6.09	6.50	3.42	
2	CI2-GI3	1	465.23	466.86	325.978	0.50	18	7.43	0.94	5.08	0.91	466.14	467.77	4.52	4.52	3.06	
3	GI3-GCI5	2	467.06	467.26	82.000	0.24	15	3.19	0.17	3.96	1.25	468.31	468.62	3.23	3.23	2.87	
4	GCI5-GCI7	3	467.46	467.51	26.233	0.19	12	1.56	2.89	3.68	1.00	468.78	469.06	4.69	4.69	3.08	
5	GCI7-GI8	4	467.71	468.38	133.344	0.50	12	2.52	0.79	0.79	1.00	469.32	469.38	1.01	1.01	2.75	
6	GCI5-GCI6	3	467.46	467.57	22.000	0.50	12	2.52	0.11	0.11	1.00	468.78	468.78	0.14	0.14	2.87	
7	FES9-MH10	Outfall	460.00	460.58	112.025	0.52	36	47.99	0.00	43.82	2.25	462.25	462.83	7.69	7.70	7.20	
8	MH10-MH11	7	460.78	462.44	331.297	0.50	36	47.16	0.00	43.82	2.94	463.72	464.90	6.64	6.23	7.14	
9	MH11-FES12	8	464.86	466.91	41.453	4.95	24	50.30	43.51	43.51	1.44	466.30	468.88	15.96	18.02	0.37	
10	GI3-GCI4	2	467.06	467.17	22.000	0.50	12	2.52	0.18	0.18	1.00	468.09	468.09	0.23	0.23	3.56	
11	MH11-MH13	8	462.64	462.92	53.400	0.53	18	7.64	0.00	0.31	1.50	465.46	465.46	0.18	0.18	1.13	
12	MH13-EXAI	11	463.12	463.54	166.395	0.25	12	1.79	0.31	0.31	1.00	465.46	465.47	0.39	0.39	1.00	

Project File: M20-8003C_STORM NETWORK_2023-02-07.stm	Number of lines: 12	Date: 2/7/2023

NOTES: ** Critical depth

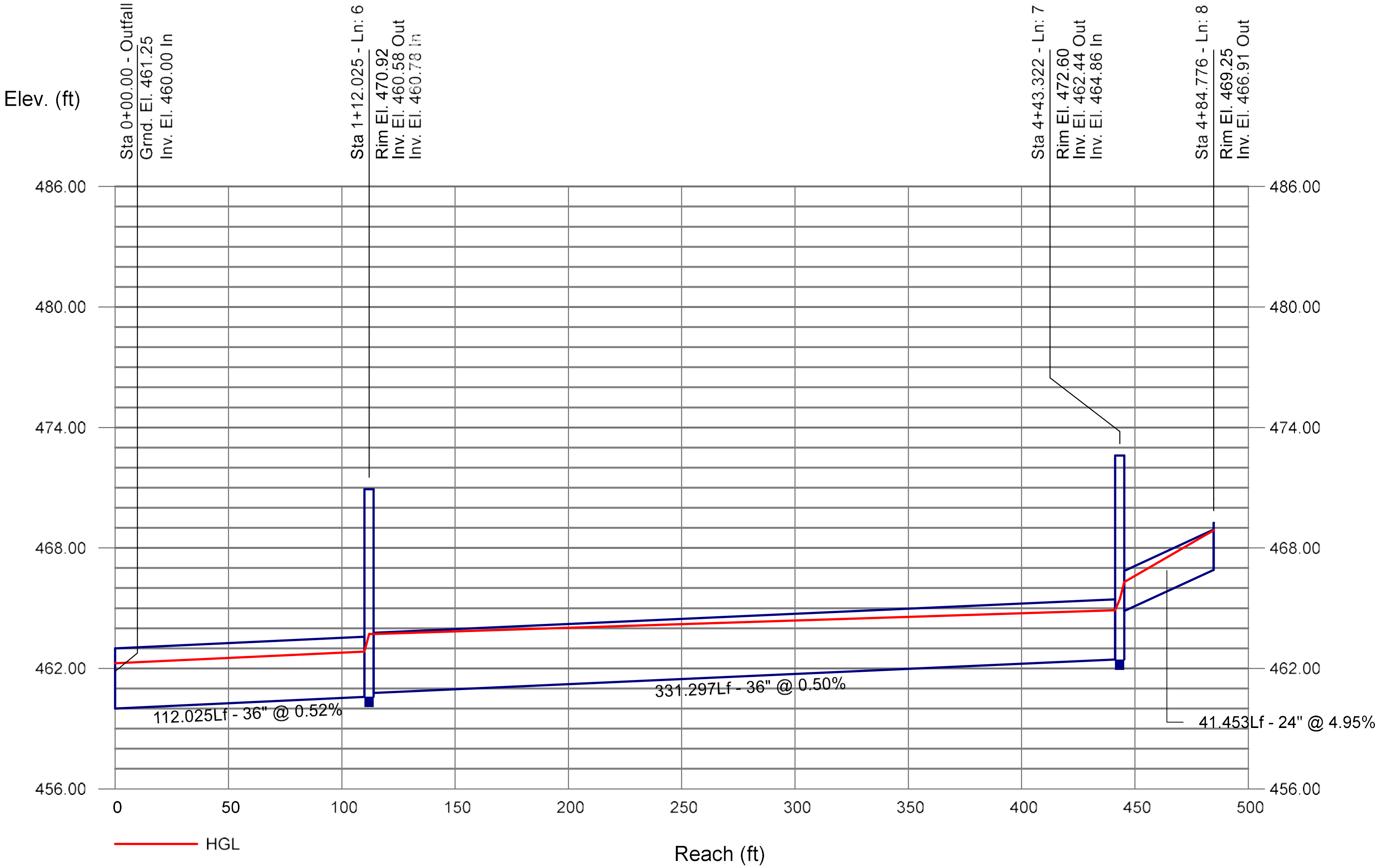
Storm Sewer Profile

Proj. file: M20-8003C_STORM NETWORK_2023-02-07.stm



Storm Sewer Profile

Proj. file: M20-8003C_STORM NETWORK_2023-02-02.stm



Storm Sewer Profile

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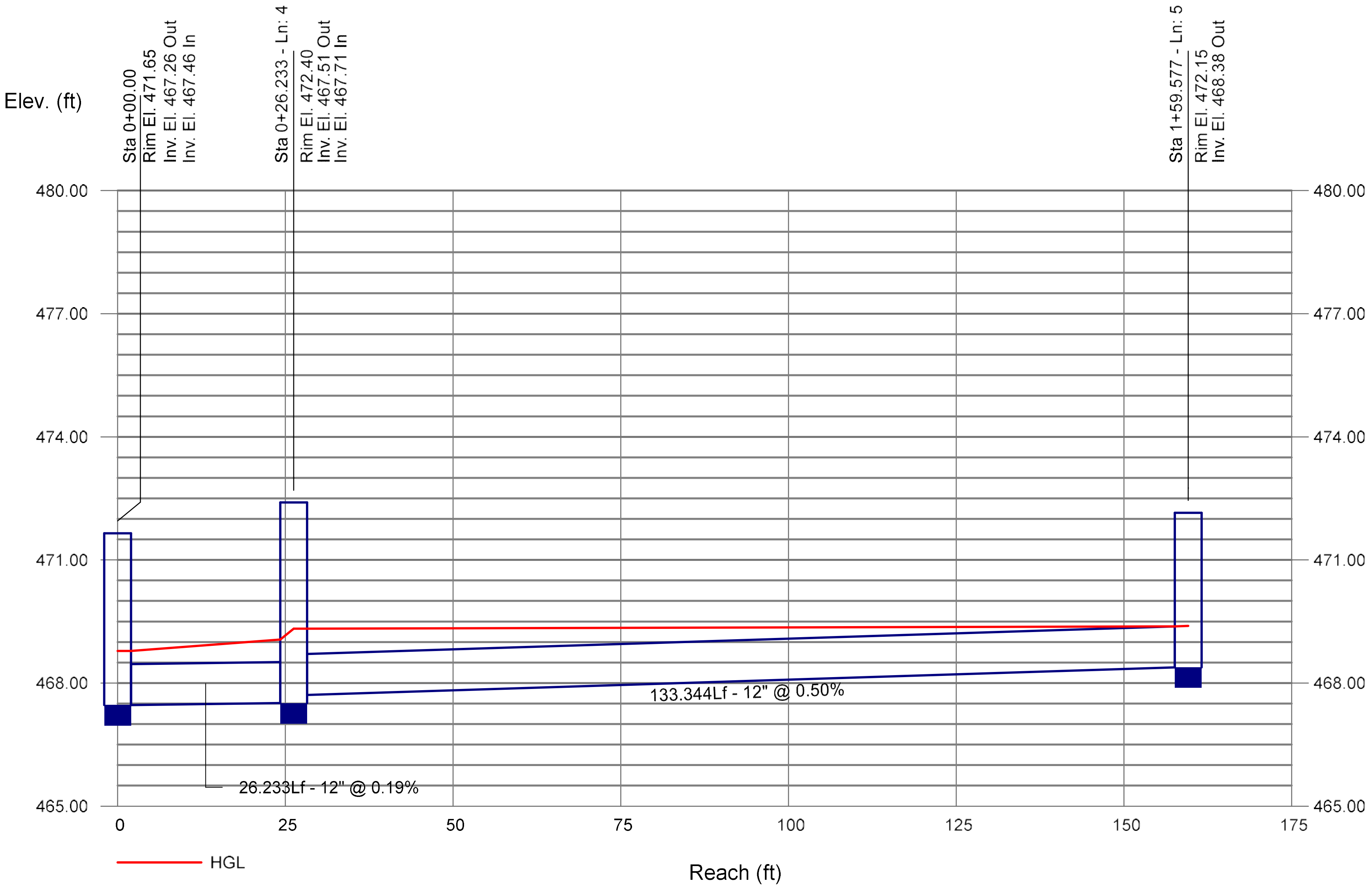

Storm Sewer Profile

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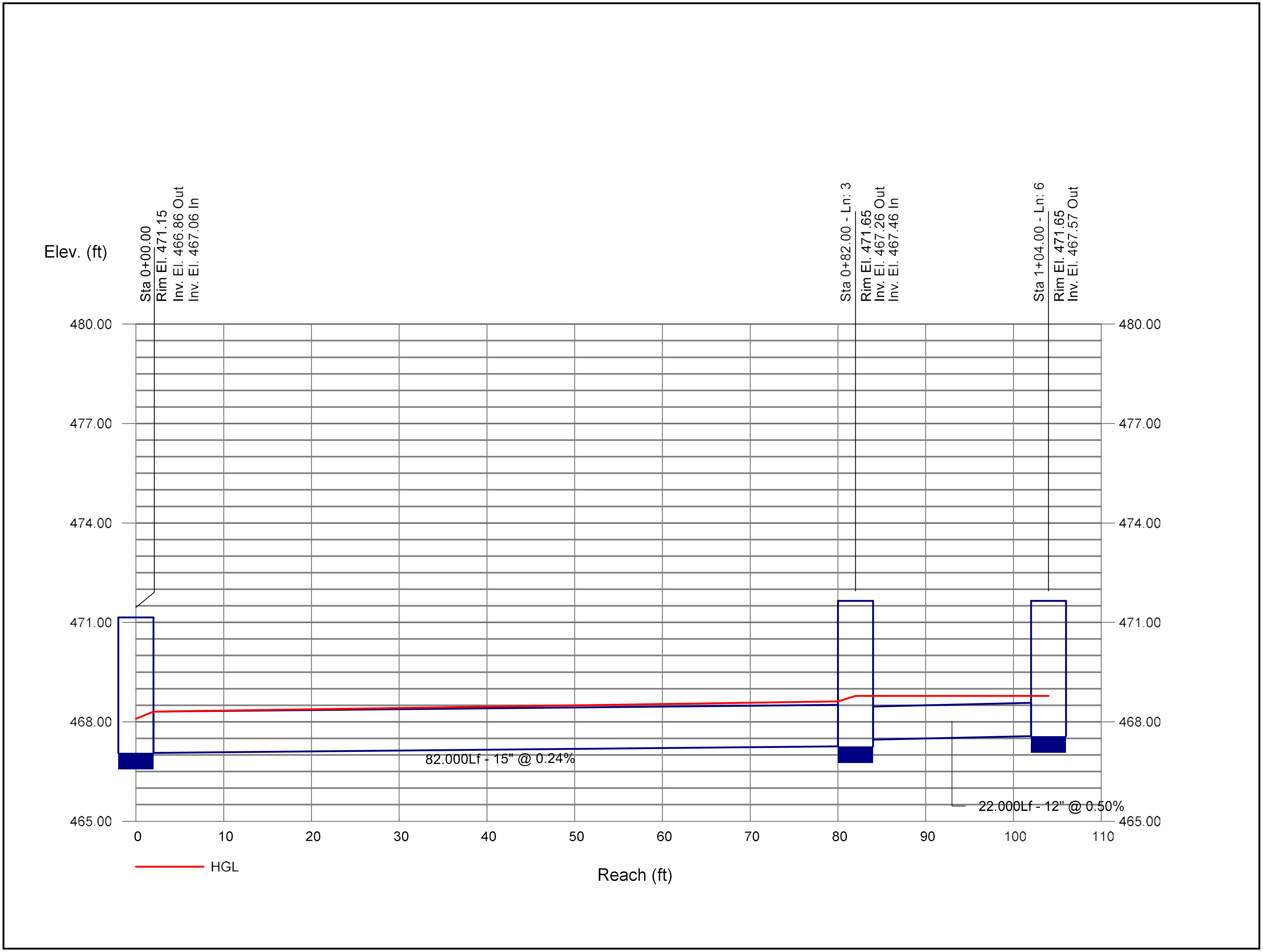
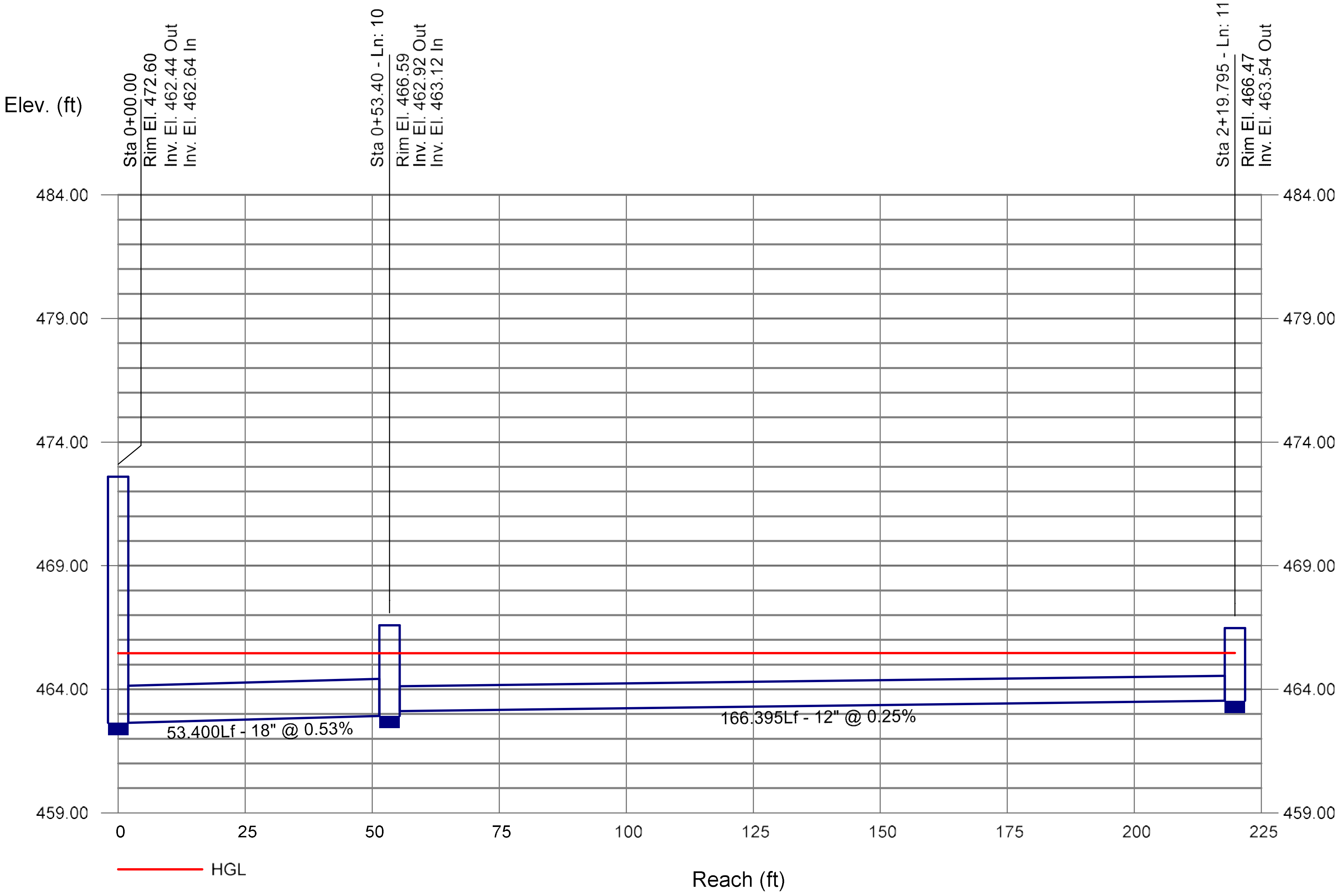


Storm Sewer Profile

Proj. file: M20-8003C_STORM NETWORK_2023-02-02.stm



HGL CALCS

Line No.	Line ID	DnStm Ln No	Invert Dn (ft)	Invert Up (ft)	Line Length (ft)	Line Slope (%)	Line Size (in)	Capac Full (cfs)	Known Q (cfs)	Flow Rate (cfs)	Depth Dn (ft)	HGL Dn (ft)	HGL Up (ft)	Vel Ave (ft/s)	Vel Dn (ft/s)	Rim-Hw (ft)	
1	EX1-EX2	Outfall	470.00	470.07	71.963	0.10	18	3.28	0.44	3.33	1.25	471.25	471.32	2.11	2.11	1.76	
2	EX2-EX3	1	470.07	470.19	116.320	0.10	18	3.37	1.48	2.89	1.29	471.36	471.44	1.81	1.79	1.52	
3	EX3-EX4	2	470.19	470.23	36.000	0.11	12	1.19	0.57	1.41	1.00	471.48	471.54	1.80	1.80	1.91	
4	EX4-EX5	3	470.27	470.32	54.374	0.09	12	1.08	0.22	0.84	1.00	471.59	471.62	1.07	1.07	1.38	
5	EX5-GI6	4	470.32	470.50	220.848	0.08	12	1.02	0.44	0.62	1.00	471.62	471.69	0.79	0.79	0.64	
6	GI6-EX7	5	470.50	470.53	28.000	0.11	12	1.17	0.18	0.18	1.00	471.70	471.70	0.23	0.23	1.30	

Project File: M20-8003C_OFFSITE STORM NETWORK_2023-02-06.stm

Number of lines: 6

Date: 2/7/2023

NOTES: ** Critical depth

Storm Sewer Profile

Proj. file: M20-8003C_OFFSITE STORM NETWORK_2023-02-06.stm