Stormwater Calculations

Developer Improvements
Streets of Caledonia Lot 11
O'Fallon, Missouri

Project No. 22-9120

July, 2022

Timothy Schowe, P.E. #2018000268
State of Missouri
Registered Professional Engineer for Cochran

COCHRAN

Architecture • Civil Engineering • Land Surveying • Site Development • Geotechnical Engineering • Inspection & Materials Testing

8 East Main Street	737 Rudder Road	**530A East Independence Drive**	1163 Maple Street	2804 N. Biagio Street	905 Executive Drive
Wentzville, MO 63385	Fenton, MO 63026	**Union, MO 63084**	Farmington, MO 63640	Ozark, MO 65721	Osage Beach, MO 65065
Phone: 636-332-4574	Phone: 314-842-4033	**Phone: 636-584-0540**	Phone: 573-315-4810	Phone: 417-595-4108	Phone: 573-525-0299
Fax: 636-327-0760	Fax: 314-842-5957	**Fax: 636-584-0512**	Fax: 573-315-4811	Fax: 417-595-4109	Fax: 573-525-0298

www.cochraneng.com

STORMWATER CALCULATIONS

Lot 11 Improvements
O'Fallon, MO 63368
Project No. 22-9120
July, 2022

Stormwater calculations have been performed for the developer improvements for Lot 11A and Lot 11B of the Streets of Caledonia. A wet basin will provide stormwater detention and water quality for the 7.5 acres medical office building on Lot 11A and the northwest 15.5 acres of Lot 11B. Note that a portion of Lot 11B that detention will be provided for may bypass the basin once developed. Stormwater calculations were prepared following the design requirements of the City of O'Fallon and MSD. Rainfall intensities are from MSD Rules and Regulations Figure 4-1, and Illinois State Water Survey Bulletin 71.

STORM SEWER NETWORK SIZING:
Calculations have been performed modeling the proposed storm sewer network during a 15 year and 100 year storm using Hydraflow Storm Sewers and the Rational Method. A storm duration of 20 minutes was used per MSD requirements. The rainfall intensity and PI Values are from the MSD Rules and Regulations. All storm structures and piping have sufficient freeboard (2') during the 15-Year storm event. The hydraulic grade line is contained within the structures during the 100 year event. Storm Sewer Drainage Area Map can be found in Appendix A.

DETENTION BASIN CALCULATIONS SUMMARY:
All detention design was performed with the aid of Hydraflow Hydrographs Software using the SCS Method. Pre-Developed, Post-Developed, and Routed hydrographs for the 2, 15, 25, and 100 year 24 hours storms are attached. All detention calculations, including release rates are included in this report. Drainage area maps for the site are also included at the end of this report in Appendix B.

PRE-DEVELOPED STORMWATER RUNOFF				
Year of Storm Frequency	Pre-Developed DA #1 North (cfs) [Hyd. 1]	Pre-Developed DA #2 (cfs) [Hyd. 2]	Pre-Developed DA #3 (cfs) [Hyd. 3]	Pre-Developed Total to South (cfs) *[2+3=4]
2	**5.89**	35.14	7.85	**42.91**
15	**12.18**	72.79	16.24	**88.69**
25	**14.35**	85.78	19.13	**104.46**
100	**19.05**	113.93	25.39	**138.65**

POST DEVELOPED STORMWATER RUNOFF						
Year of Storm Frequency	Post Developed DA #1 North (cfs) [Hyd. 6]	Post Developed To Detention (cfs) [Hyd. 7]	Post Developed Bypass DA #2 (cfs) [Hyd. 8]	Post Developed Bypass DA #3 (cfs) [Hyd. 9]	Basin Release (cfs) [Hyd. 11]	Post Developed Total to South (cfs) [8+9+11=12]
2	**2.15**	71.82	3.27	13.75	26.78	**40.35**
15	**4.20**	121.30	7.04	23.14	61.58	**81.77**
25	**4.90**	137.91	8.36	26.30	75.35	**99.64**
100	**6.40**	173.73	11.22	33.10	85.84	**123.73**

*Runoff rates do not directly add up due to the difference in time of concentration.

Below is the table showing the 100 year high water elevation and berm elevation. The basin provides more than 1.0 feet of freeboard per MSD requirements. The outlet structure details can be found in Appendix B.

BASIN ELEVATIONS				
Bottom Elev.	Normal Pool Elev.	100 yr High Water Elev.	100 yr Blocked High Water Elev.	Berm Elev.
571.00	582.00	585.44	586.08	587.25

Below is the table showing the required and provided water quality volumes. Water quality is provided using the water volume below the normal pool elevation. Basin volumes can be found in the pond report section.
WQv = 1.14 inches * (0.05+0.009I) * Area per MSD requirements.

WATER QUALITY				
Drainage Area (Ac.)	% Impervious	Impervious Area (Ac.)	Required WQv (cf)	Provided WQv (cf)
17.87	91.0	16.26	64,249	136,988

Below is the table showing the required and provided forebay volumes. The provided volume is the volume from the bottom of the forebay up to the lowest elevation of the rip rap weir. The rip rap weir is at an elevation of 583.50. Forebay volumes can be found in the pond report section. The required forebay volume is based on 0.1 inches per impervious acre of contributing drainage per the Georgia Manual Section 3.2.1.5.D.

FOREBAY VOLUME		
Impervious Area (Ac.)	Required Volume (cf)	Provided Volume (cf)
7.15	2,597	5,926

TABLE OF CONTENTS

15 YEAR STORM SEWER ANALYSIS

100 YEAR STORM SEWER ANALYSIS

DRAINAGE AREAS SUMMARY

TIME OF CONCENTRATION

HYDROGRAPH RETURN PERIOD RECAP

2 YEAR HYDROGRAPHS

15 YEAR HYDROGRAPHS

25 YEAR HYDROGRAPHS

100 YEAR HYDROGRAPHS

100 YEAR HYDROGRAPHS LOW FLOW ORIFICE BLOCKED

POND REPORT – BASIN

POND REPORT – FOREBAYS

APPENDIX A - DRAINAGE AREA MAPS

APPENDIX B - OUTLET STRUCTURES

STORM SEWER PIPING

15 YEAR STORM

Cochran

Line No.	Inlet ID	DnStm Ln No	Invert Dn (ft)	Invert Up (ft)	Line Length (ft)	Line Slope (%)	Line Size (in)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)
1	NEW JUNCTION BOX #2	Outfall	582.00	582.21	41.291	0.51	36	4.28	26.03	51.53	5.16	584.83	583.86	583.86	584.95	590.00
2	NEW CURB INLET #3	1	582.31	583.33	204.500	0.50	30	21.75	21.75	31.38	6.73	583.86	584.91	584.91	590.00	588.50

Project File: storm sewer 15 year.stm | Number of lines: 2 | Date: 7/26/2022

NOTES: ** Critical depth

STORM SEWER PIPING

100 YEAR STORM

Cochran

Line No.	Inlet ID	DnStm Ln No	Invert Dn (ft)	Invert Up (ft)	Line Length (ft)	Line Slope (%)	Line Size (in)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)
1	NEW JUNCTION BOX #2	Outfall	582.00	582.21	41.291	0.51	36	5.77	35.09	51.53	4.96	585.64	585.74	585.92	584.95	590.00
2	NEW CURB INLET #3	1	582.31	583.33	204.500	0.50	30	29.32	29.32	31.38	5.97	585.92	586.81	587.36	590.00	588.50

Project File: New.stm | Number of lines: 2 | Date: 7/26/2022

NOTES: ** Critical depth

DRAINAGE AREAS SUMMARY

Pre-Developed DA #1									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	-	-	0.00	98.00		0.00
CN		98		98		98				
Residential 1/8 acre (65% Impervious)	1	0.00	-	-	-	-	0.00	85.00		0.00
CN		85		90		92				
Residential 1/4 acre (35% Impervious)	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	-	-	0.00	61.00		-
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		-
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	110,934	2.55	2.55	84.00		-
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		-
CN		60		73		79				
						Total	2.55	84.01	Imp. Ac.	0.00
						SF	110,934	2.55	% IMP	0.0%

Pre-Developed DA #2									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	-	-	0.00	98.00		0.00
CN		98		98		98				
Residential 1/8 acre (65% Impervious)	1	0.00	-	-	-	-	0.00	85.00		0.00
CN		85		90		92				
Residential 1/4 acre (35% Impervious)	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	-	-	0.00	61.00		-
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		-
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	758,373	17.41	17.41	84.00		-
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		-
CN		60		73		79				
						Total	17.41	84.00	Imp. Ac.	0.00
						SF	758,373	17.41	% IMP	0.0%

Pre-Developed DA #3									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	-	-	0.00	98.00		0.00
CN		98		98		98				
Residential 1/8 acre (65% Impervious)	1	0.00	-	-	-	-	0.00	85.00		0.00
CN		85		90		92				
Residential 1/4 acre (35% Impervious)	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	-	-	0.00	61.00		-
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		-
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	148,308	3.40	3.40	84.00		-
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		-
CN		60		73		79				
						Total	3.40	84.00	Imp. Ac.	0.00

Post-Developed Drainage Area To Basin									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	276,770	6.35	6.35	98.00		6.35
CN		98		98		98				
Commercial (95% Impervious)	1	0.00	-	-	451,491	10.36	10.36	96.00		9.85
CN		93		95		96				
Residential 1/4 acre (35% Impervious)	1	0.00		-		-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW (60% Impervious)	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	50,260	1.15	1.15	80.00		0.06
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	-	-	0.00	69.00		0.00
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		0.00
CN		60		73		79				
						Total	17.87	95.68	Imp. Ac.	16.26
						SF	778521	17.87	% IMP	91.0%

Post-Developed Drainage Area To Forebay									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	249,466	5.73	5.73	98.00		5.73
CN		98		98		98				
Commercial (95% Impervious)	1	0.00	-	-	64,053	1.47	1.47	96.00		1.40
CN		93		95		96				
Residential 1/4 acre (35% Impervious)	1	0.00		-		-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW (60% Impervious)	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	26,244	0.60	0.60	80.00		0.03
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	-	-	0.00	69.00		0.00
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		0.00
CN		60		73		79				
						Total	7.80	96.23	Imp. Ac.	7.15
						SF	339763	7.80	% IMP	91.7%

Post-Developed Bypass Drainage Area #1									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	11,291	0.26	0.26	98.00		0.26
CN		98		98		98				
Residential 1/8 acre (65% Impervious)	1	0.00	-	-	-	-	0.00	85.00		0.00
CN		85		90		92				
Residential 1/4 acre (35% Impervious)	1	0.00		-		-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW (60% Impervious)	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	19,861	0.46	0.46	80.00		0.02
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	-	-	0.00	69.00		0.00
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		0.00
CN		60		73		79				
					31,160	Total	0.72	86.54	Imp. Ac.	0.28
						SF	31152	0.72	% IMP	39.4%

Post-Developed Bypass Drainage Area #2									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	4,162	0.10	0.10	98.00		0.10
CN		98		98		98				
Residential 1/8 acre (65% Impervious)	1	0.00	-	-	-	-	0.00	85.00		0.00
CN		85		90		92				
Residential 1/4 acre (35% Impervious)	1	0.00		-		-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW (60% Impervious)	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	55,437	1.27	1.27	80.00		0.06
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	-	-	0.00	69.00		0.00
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		0.00
CN		60		73		79				
					59,607	Total	1.37	81.27	Imp. Ac.	0.16
						SF	59599	1.37	% IMP	11.6%

Post Developed DA #3 Bypass									Impervious Acres	
	Class B	Ac.	Class C	Ac.	Class D	Ac.	Total Ac.	Total CN		
Pavement (100% Impervious)	1	0.00	-	-	-	-	0.00	98.00		0.00
CN		98		98		98				
Commercial (95% Impervious)	1	0.00	-	-	148,308	3.40	3.40	96.00		3.23
CN		93		95		96				
Residential 1/4 acre (35% Impervious)	1	0.00	-	-	-	-	0.00	75.00		0.00
CN		75		83		87				
Streets/Roads w/ ROW	1	0.00	-	-	-	-	0.00	89.00		0.00
CN		89		92		93				
Open Space Good Condition	1	0.00	-	-	-	-	0.00	61.00		-
CN		61		74		80				
Row Crops Contoured Good Condition	1	0.00	-	-	-	-	0.00	75.00		-
CN		75		82		86				
Pasture Grassland Fair Condition	1	0.00	-	-	-	-	0.00	69.00		-
CN		69		79		84				
Woods Fair Condition	1	0.00	-	-	-	-	0.00	60.00		-
CN		60		73		79				
						Total	3.40	96.00	Imp. Ac.	3.23
						SF	148,308	3.40	% IMP	95.0%

TIME OF CONCENTRATION

TR55 Tc Worksheet

Hyd. No. 1

PRE-DEV DA 1 NORTH

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.10		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 9.95**	**+**	**0.00**	**+**	**0.00**	**=**	**9.95**
Shallow Concentrated Flow							
Flow length (ft)	= 195.00		0.00		0.00		
Watercourse slope (%)	= 4.60		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.46		0.00		0.00		
Travel Time (min)	**= 0.94**	**+**	**0.00**	**+**	**0.00**	**=**	**0.94**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.026		0.026		0.013		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.90 min

TR55 Tc Worksheet

Hyd. No. 2

PRE-DEV DA 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.10		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 9.95**	**+**	**0.00**	**+**	**0.00**	**=**	**9.95**
Shallow Concentrated Flow							
Flow length (ft)	= 345.00		0.00		0.00		
Watercourse slope (%)	= 4.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.57		0.00		0.00		
Travel Time (min)	**= 1.61**	**+**	**0.00**	**+**	**0.00**	**=**	**1.61**
Channel Flow							
X sectional flow area (sqft)	= 30.00		0.00		0.00		
Wetted perimeter (ft)	= 30.00		0.00		0.00		
Channel slope (%)	= 2.90		0.00		0.00		
Manning's n-value	= 0.150		0.026		0.013		
Velocity (ft/s)	=1.69						
			0.00				
					0.00		
Flow length (ft)	({0})370.0		0.0		0.0		
Travel Time (min)	**= 3.65**	**+**	**0.00**	**+**	**0.00**	**=**	**3.65**

Total Travel Time, Tc ..... 15.20 min

TR55 Tc Worksheet

Hyd. No. 3

PRE-DEV DA 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.10		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 9.95**	**+**	**0.00**	**+**	**0.00**	**=**	**9.95**
Shallow Concentrated Flow							
Flow length (ft)	= 365.00		0.00		0.00		
Watercourse slope (%)	= 4.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.57		0.00		0.00		
Travel Time (min)	**= 1.70**	**+**	**0.00**	**+**	**0.00**	**=**	**1.70**
Channel Flow							
X sectional flow area (sqft)	= 20.00		0.00		0.00		
Wetted perimeter (ft)	= 20.00		0.00		0.00		
Channel slope (%)	= 4.40		0.00		0.00		
Manning's n-value	= 0.150		0.026		0.013		
Velocity (ft/s)	=2.08						
			0.00				
					0.00		
Flow length (ft)	({0})180.0		0.0		0.0		
Travel Time (min)	**= 1.44**	**+**	**0.00**	**+**	**0.00**	**=**	**1.44**

Total Travel Time, Tc ..... 13.10 min

TR55 Tc Worksheet

Hyd. No. 7

POST-DEV TO DETENTION

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 20.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.10		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 2.75**	**+**	**0.00**	**+**	**0.00**	**=**	**2.75**
Shallow Concentrated Flow							
Flow length (ft)	= 280.00		0.00		0.00		
Watercourse slope (%)	= 5.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=4.55		0.00		0.00		
Travel Time (min)	**= 1.03**	**+**	**0.00**	**+**	**0.00**	**=**	**1.03**
Channel Flow							
X sectional flow area (sqft)	= 3.14		3.14		4.91		
Wetted perimeter (ft)	= 6.28		6.28		7.85		
Channel slope (%)	= 1.00		5.00		1.00		
Manning's n-value	= 0.013		0.013		0.013		
Velocity (ft/s)	=7.20		16.11		8.37		
Flow length (ft)	({0})410.0		230.0		230.0		
Travel Time (min)	**= 0.95**	**+**	**0.24**	**+**	**0.46**	**=**	**1.64**

Total Travel Time, Tc ..... 5.40 min

HYDROGRAPH RETURN PERIOD RECAP

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	SCS Runoff	------	-------	5.886	-------	-------	12.18	14.35	-------	19.05	PRE-DEV DA 1 NORTH
2	SCS Runoff	------	-------	35.14	-------	-------	72.79	85.78	-------	113.93	PRE-DEV DA 2
3	SCS Runoff	------	-------	7.849	-------	-------	16.24	19.13	-------	25.39	PRE-DEV DA 3
4	Combine	2, 3	-------	42.91	-------	-------	88.69	104.46	-------	138.65	PRE-DEV TOTAL TO SOUTH
6	SCS Runoff	------	-------	2.154	-------	-------	4.204	4.900	-------	6.401	POST-DEV BYPASS 1 NORTH
7	SCS Runoff	------	-------	71.82	-------	-------	121.30	137.91	-------	173.73	POST-DEV TO DETENTION
8	SCS Runoff	------	-------	3.267	-------	-------	7.037	8.355	-------	11.22	POST-DEV BYPASS #2
9	SCS Runoff	------	-------	13.75	-------	-------	23.14	26.30	-------	33.10	POST-DEV BYPASS #3
11	Reservoir	7	-------	26.78	-------	-------	61.58	75.35	-------	85.84	BASIN RELEASE
12	Combine	8, 9, 11	-------	40.35	-------	-------	81.77	99.64	-------	123.73	POST DEV TOTAL TO SOUTH
14	Reservoir	7	-------	71.41	-------	-------	120.61	137.61	-------	173.03	FOREBAY

STORMWATER HYDROGRAPHS

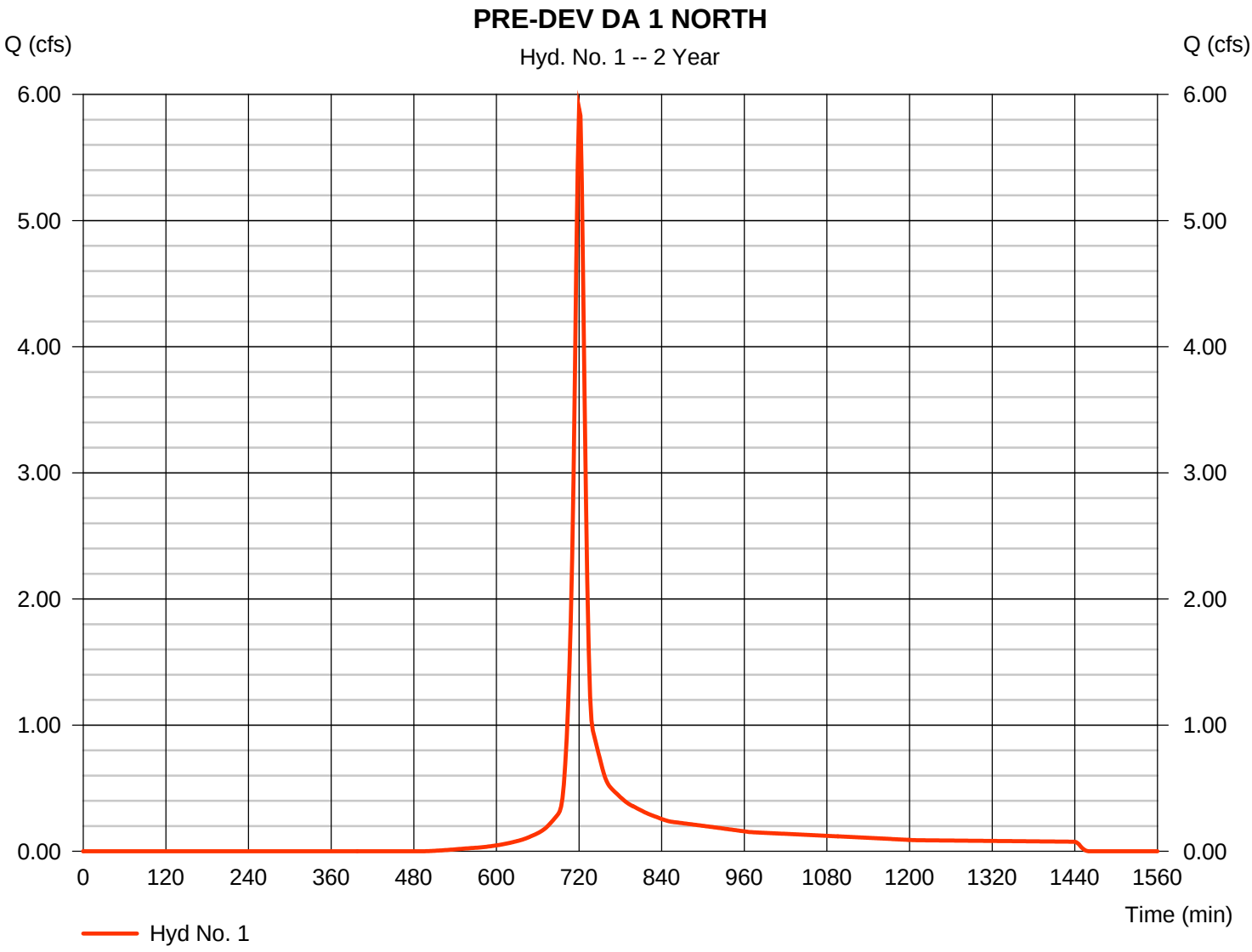
2 YEAR STORM

Hydrograph Report

Hyd. No. 1

PRE-DEV DA 1 NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.886 cfs
Storm frequency	=	2 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	15,263 cuft
Drainage area	=	2.550 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.90 min
Total precip.	=	3.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

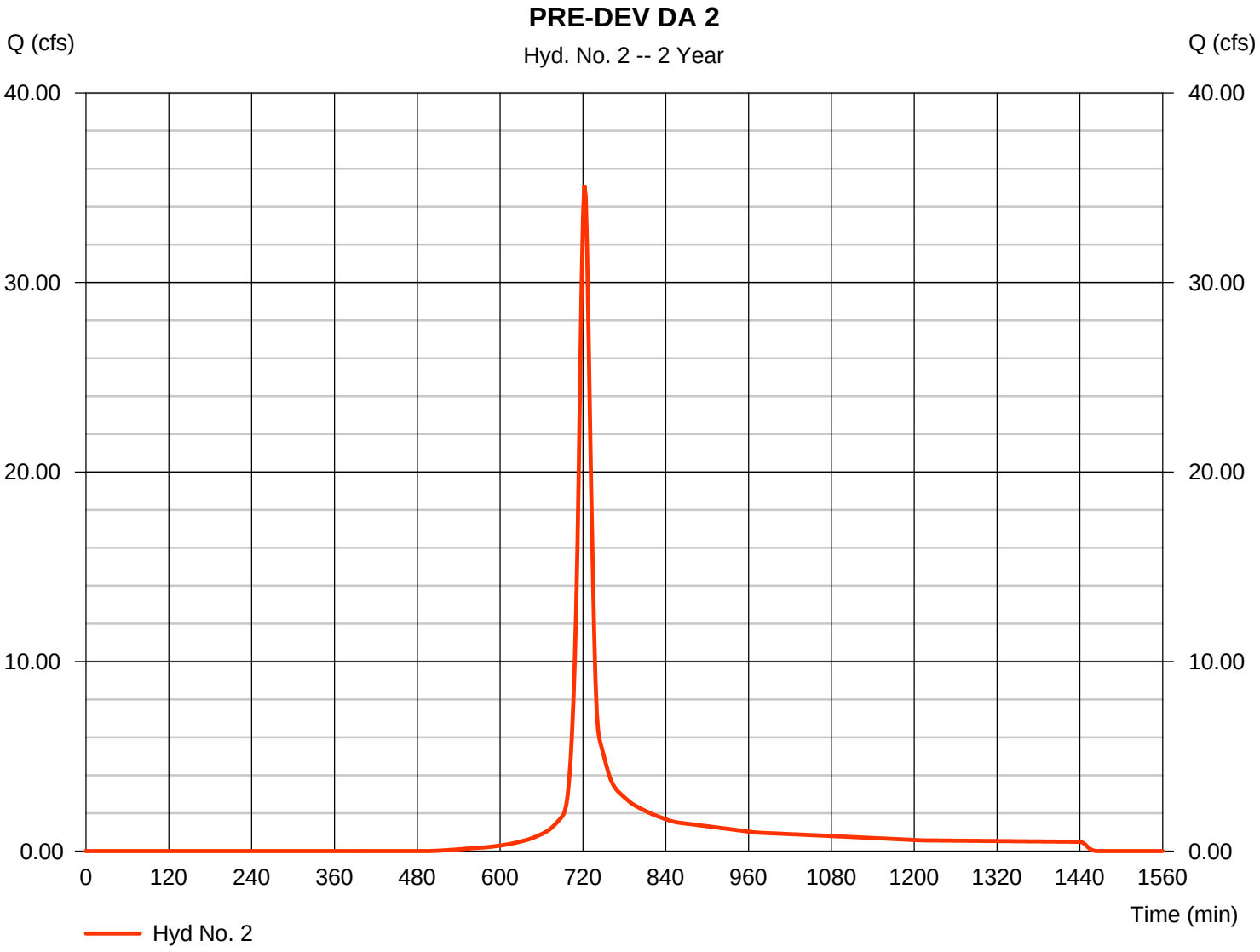


Hydrograph Report

Hyd. No. 2

PRE-DEV DA 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	35.14 cfs
Storm frequency	=	2 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	98,524 cuft
Drainage area	=	17.410 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.20 min
Total precip.	=	3.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

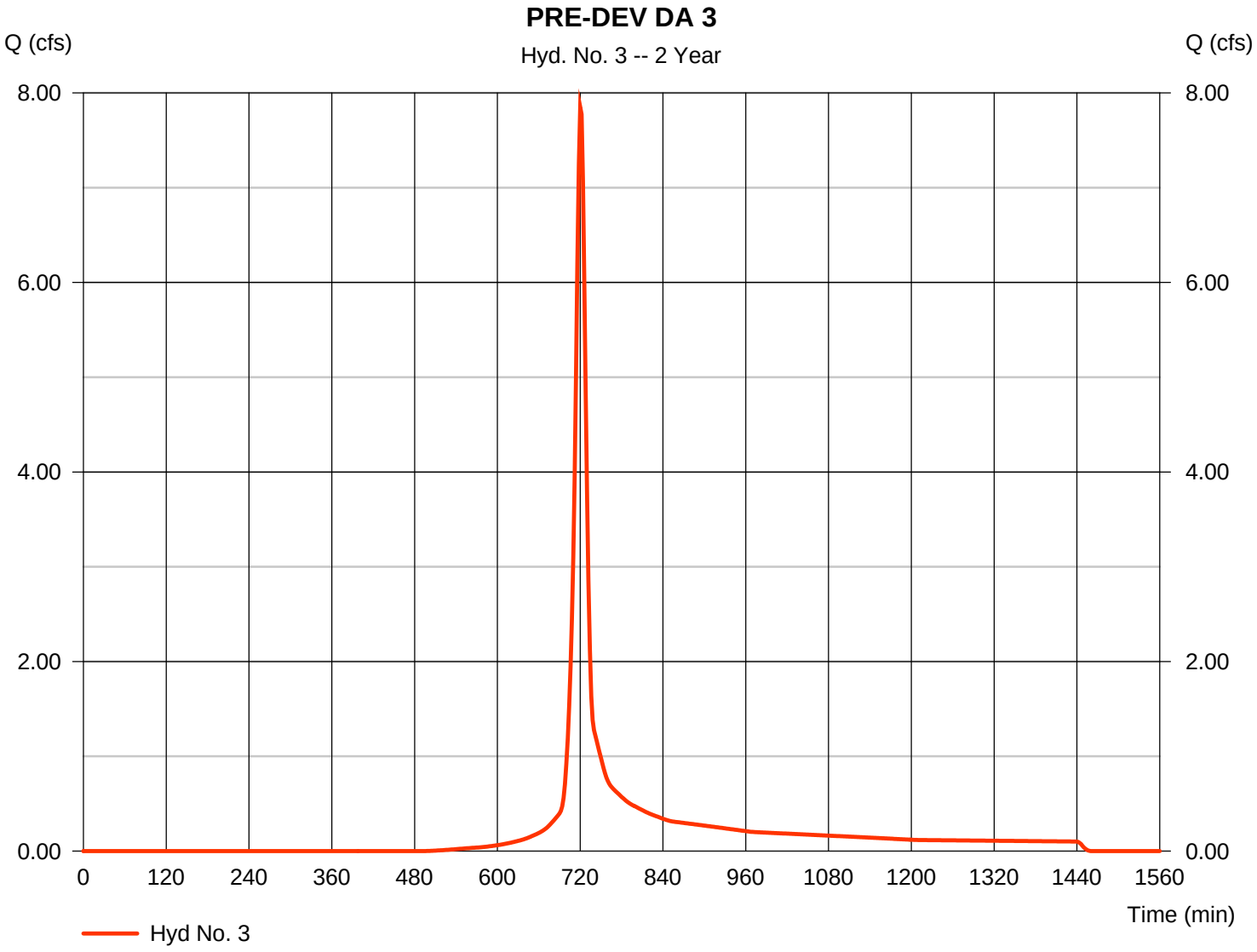


Hydrograph Report

Hyd. No. 3

PRE-DEV DA 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.849 cfs
Storm frequency	=	2 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	20,351 cuft
Drainage area	=	3.400 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.10 min
Total precip.	=	3.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

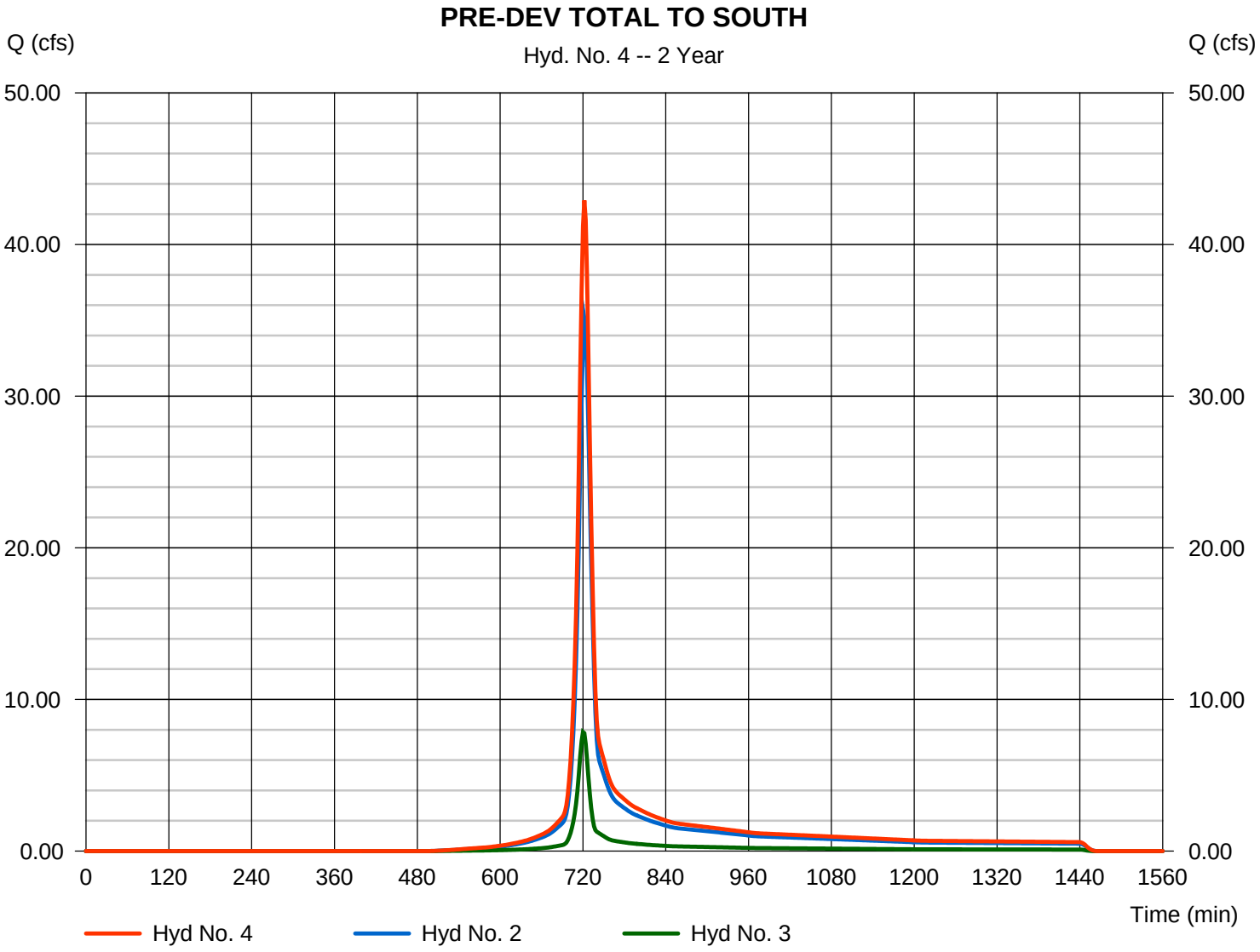


Hydrograph Report

Hyd. No. 4

PRE-DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 42.91 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 118,875 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 20.810 ac

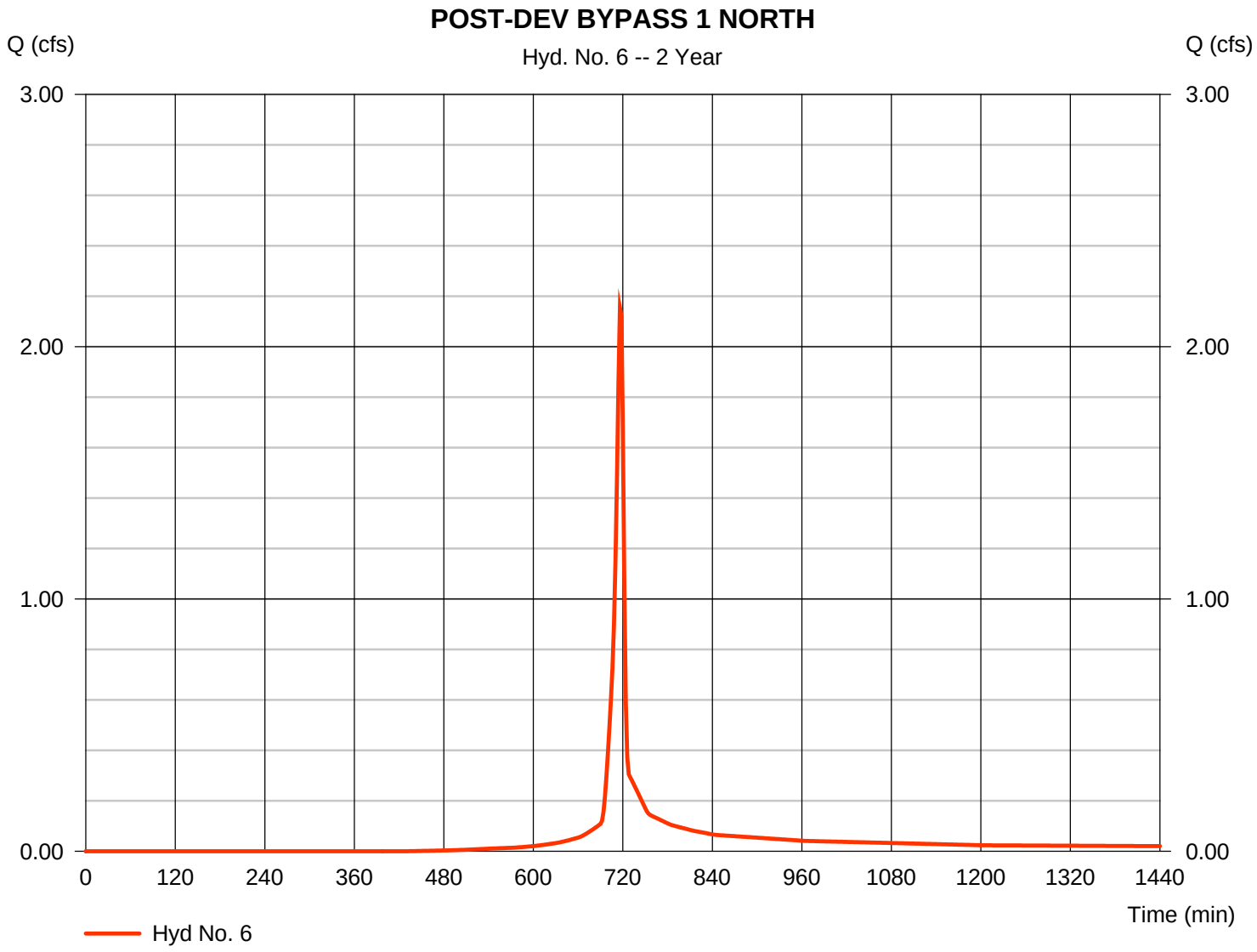


Hydrograph Report

Hyd. No. 6

POST-DEV BYPASS 1 NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 2.154 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 4,379 cuft
Drainage area	= 0.720 ac	Curve number	= 86.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

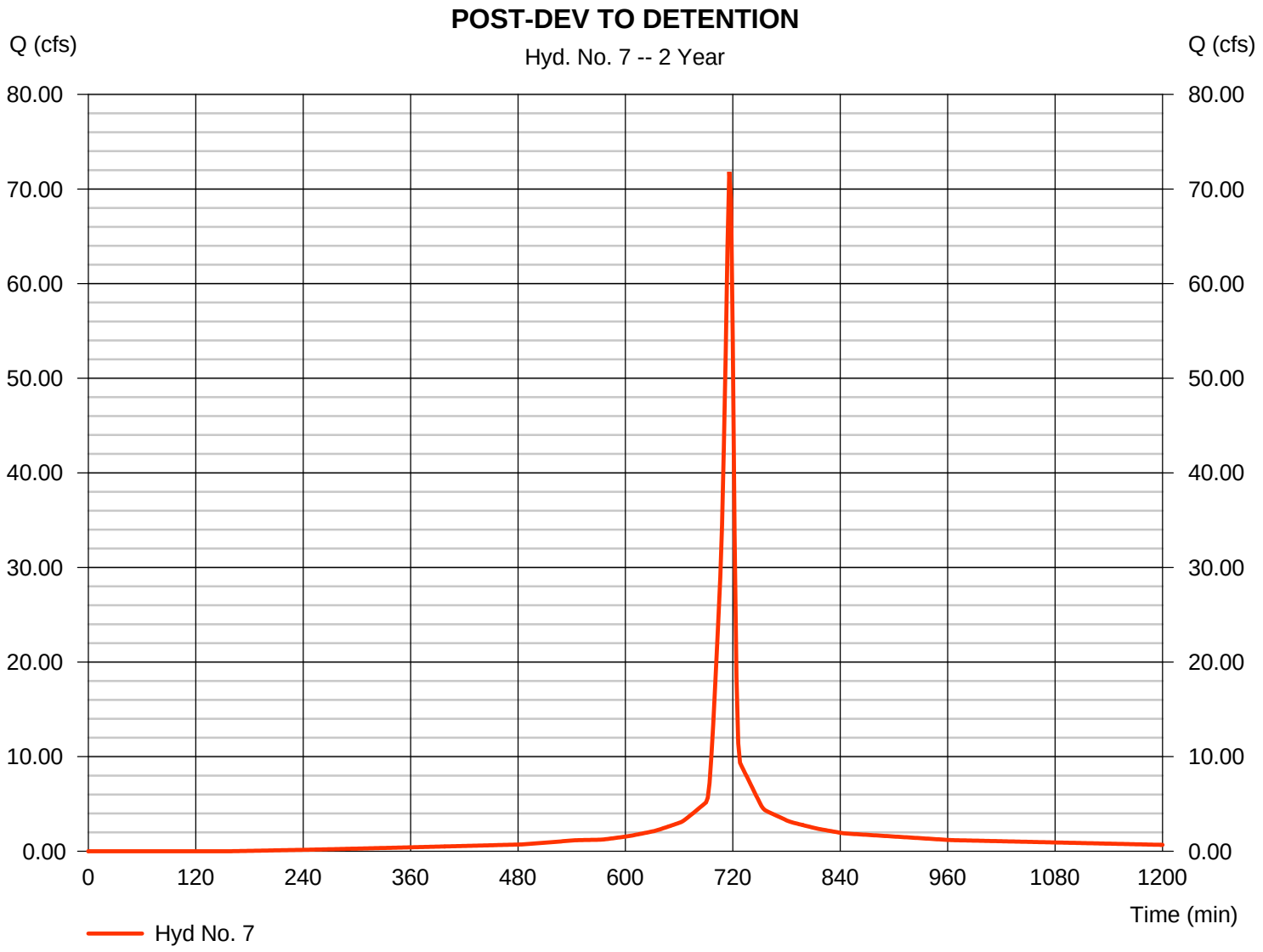


Hydrograph Report

Hyd. No. 7

POST-DEV TO DETENTION

Hydrograph type	=	SCS Runoff	Peak discharge	=	71.82 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	159,282 cuft
Drainage area	=	17.870 ac	Curve number	=	95.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.40 min
Total precip.	=	3.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

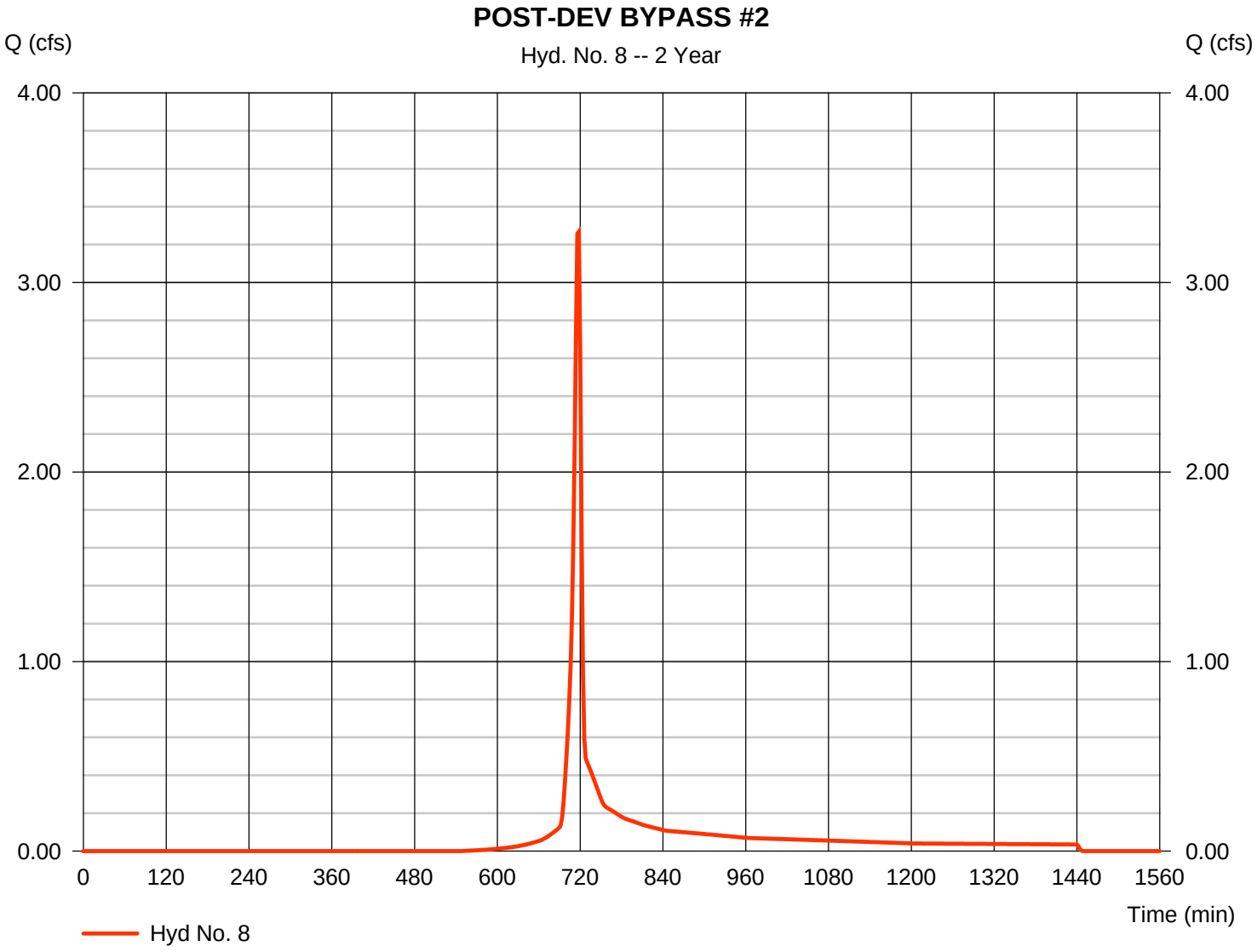


Hydrograph Report

Hyd. No. 8

POST-DEV BYPASS #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.267 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,578 cuft
Drainage area	=	1.370 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

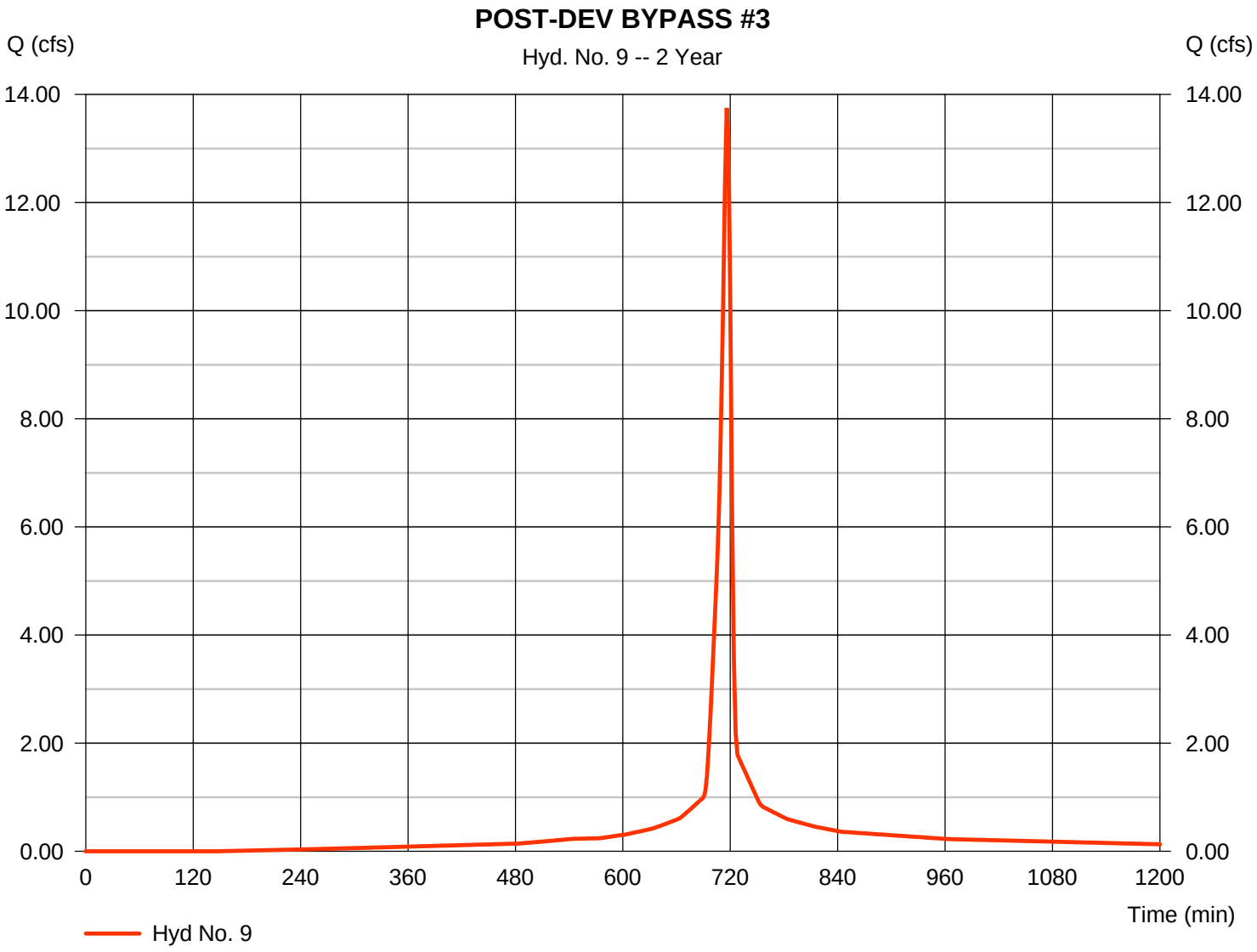


Hydrograph Report

Hyd. No. 9

POST-DEV BYPASS #3

Hydrograph type	= SCS Runoff	Peak discharge	= 13.75 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 30,669 cuft
Drainage area	= 3.400 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



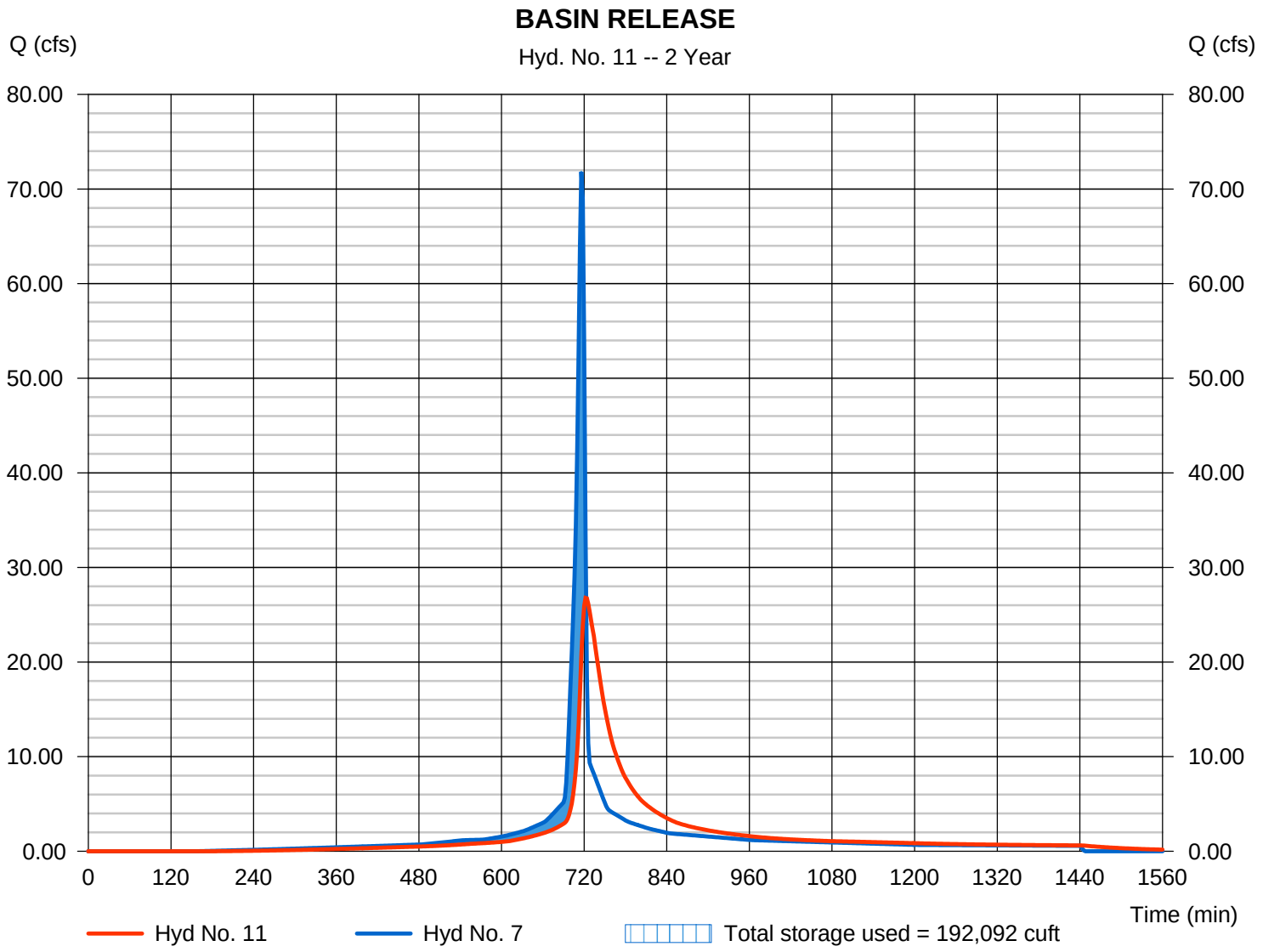
Hydrograph Report

Hyd. No. 11

BASIN RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	26.78 cfs
Storm frequency	=	2 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	159,277 cuft
Inflow hyd. No.	=	7 - POST-DEV TO DETENTION	Max. Elevation	=	583.90 ft
Reservoir name	=	WET BASIN #1	Max. Storage	=	192,092 cuft

Storage Indication method used. Wet pond routing start elevation = 582.00 ft.

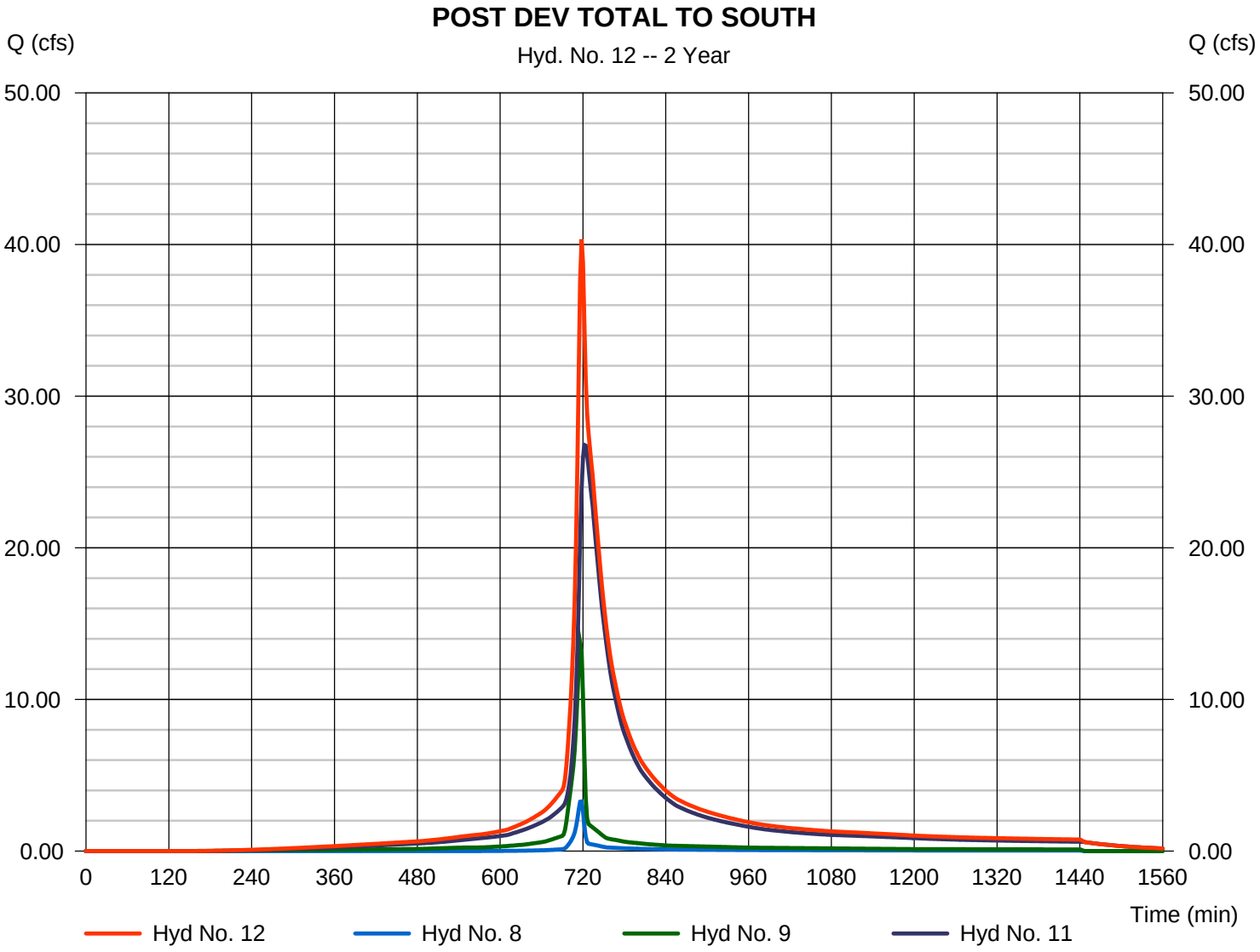


Hydrograph Report

Hyd. No. 12

POST DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 40.35 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 196,523 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 4.770 ac



STORMWATER HYDROGRAPHS

15 YEAR STORM

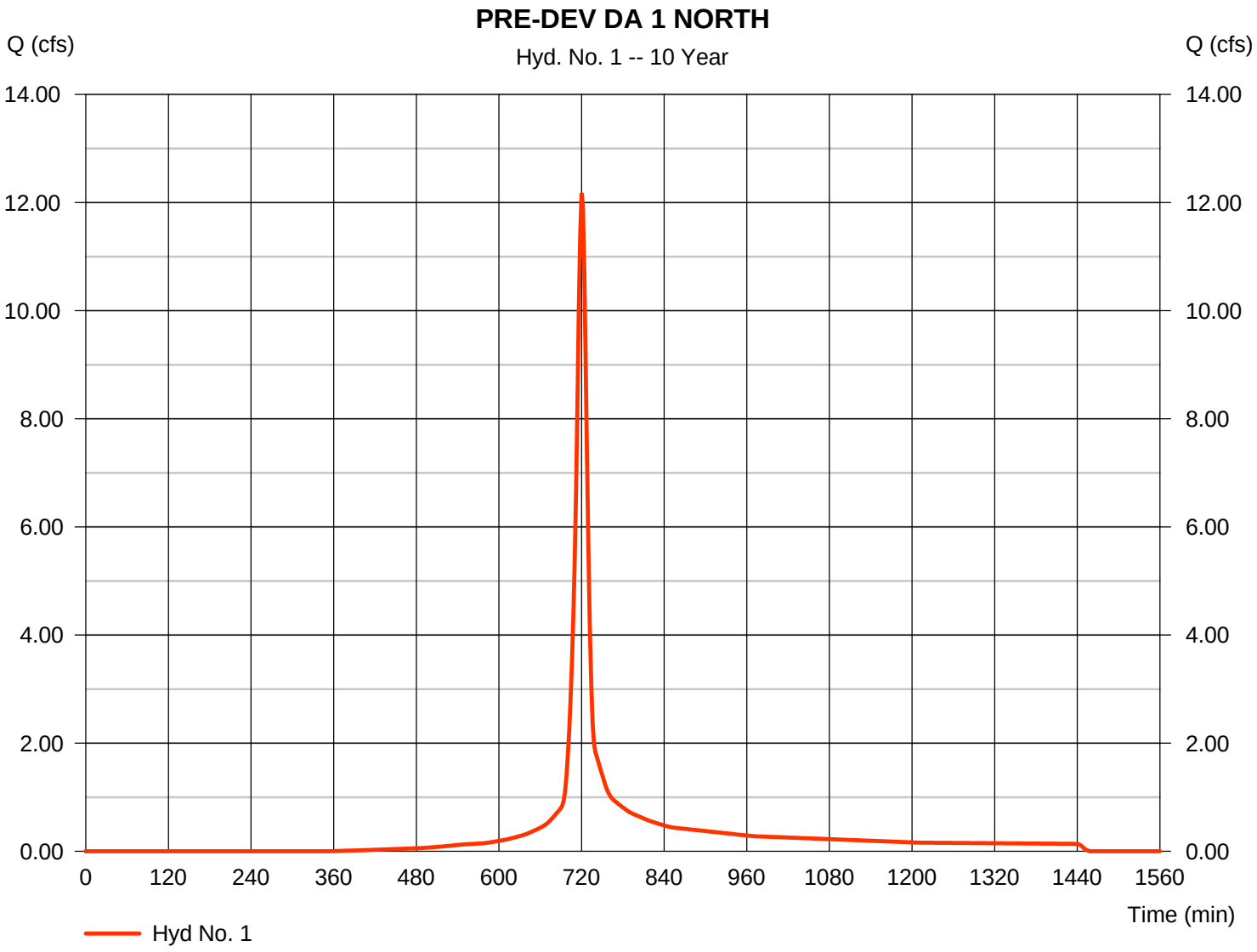
(Following Hydrographs show 10 year as the frequency due to default settings in program. The 15 year storm was modeled per city code.)

Hydrograph Report

Hyd. No. 1

PRE-DEV DA 1 NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.18 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	31,918 cuft
Drainage area	=	2.550 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.90 min
Total precip.	=	5.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

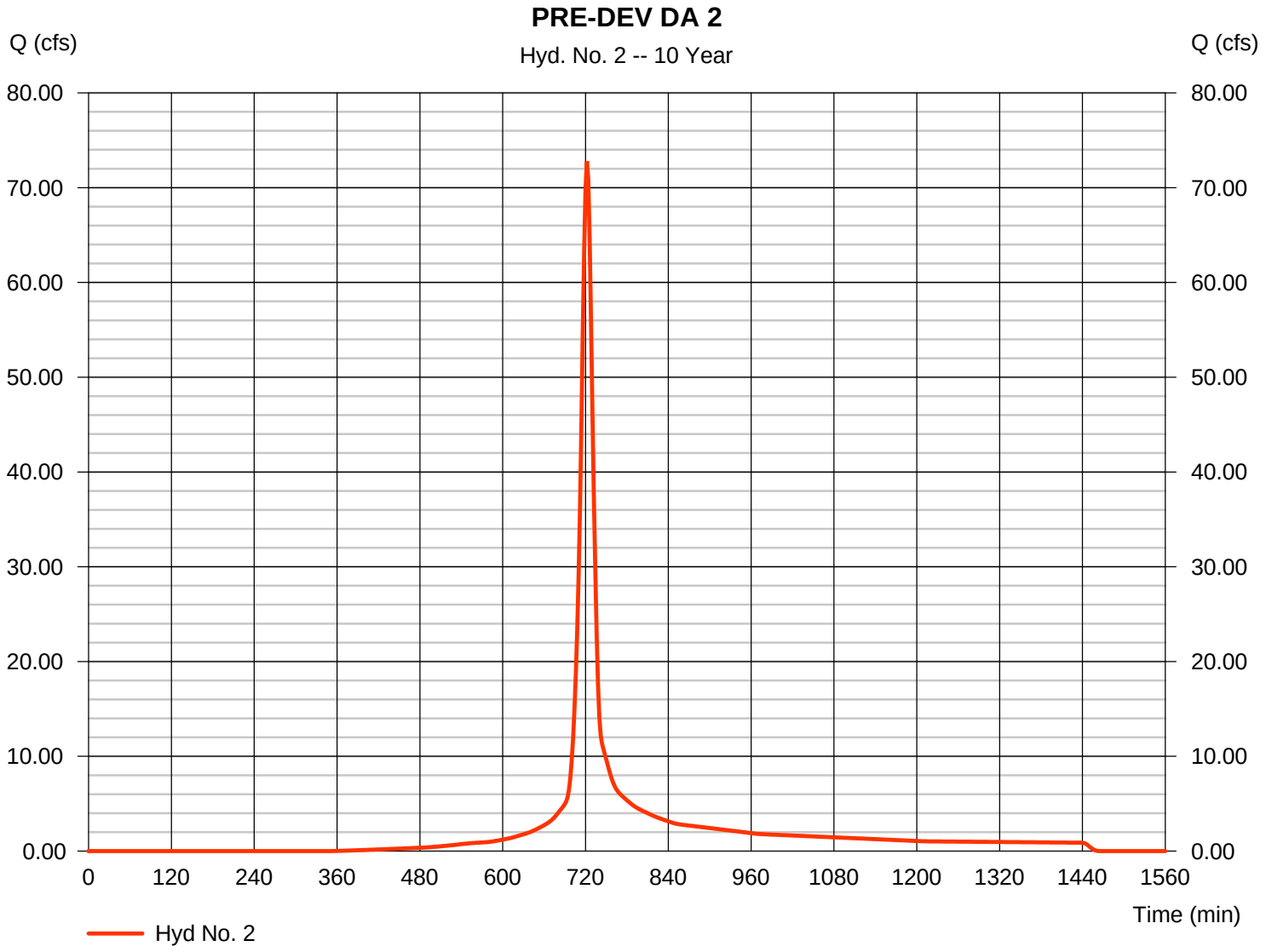


Hydrograph Report

Hyd. No. 2

PRE-DEV DA 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	72.79 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	206,032 cuft
Drainage area	=	17.410 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.20 min
Total precip.	=	5.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

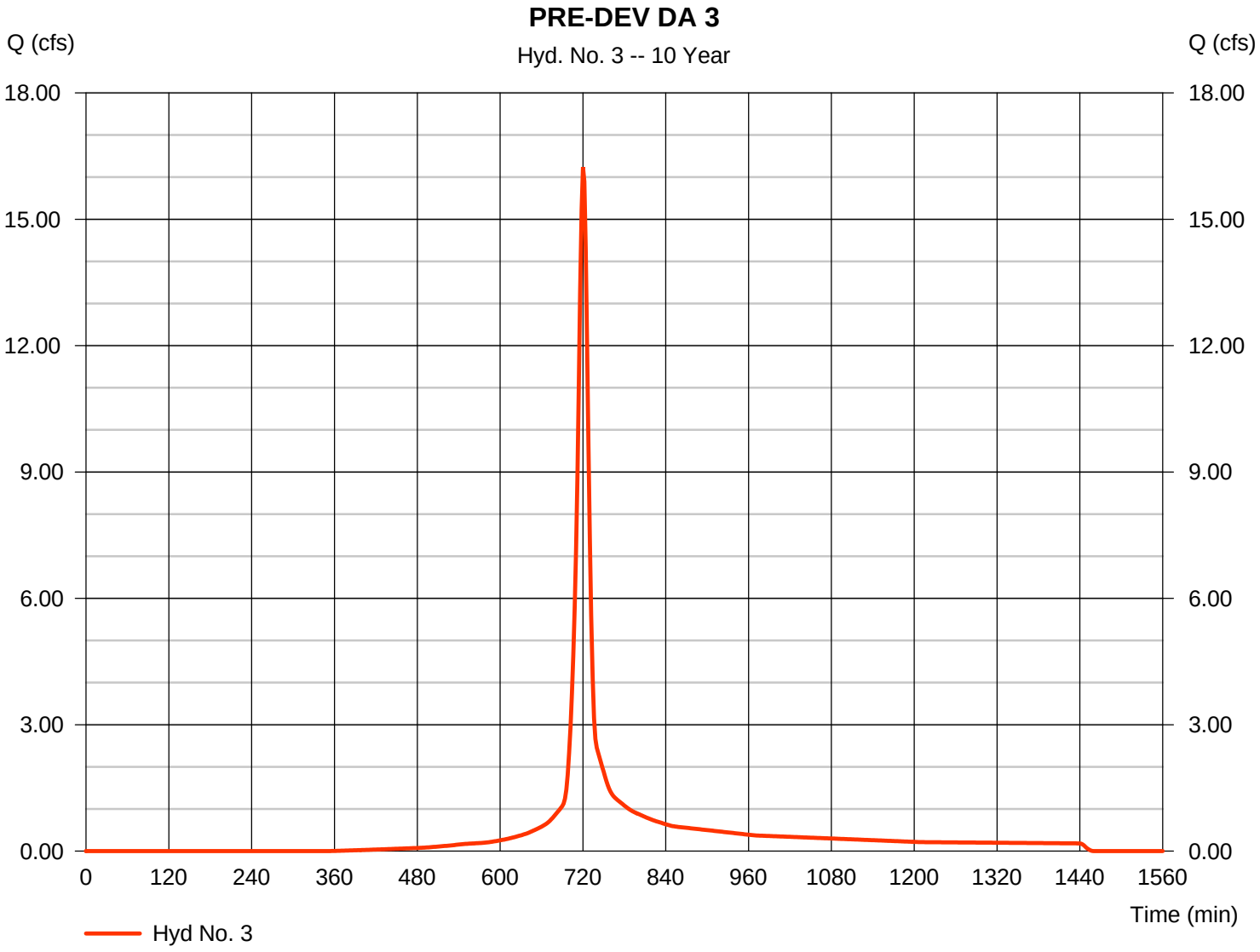


Hydrograph Report

Hyd. No. 3

PRE-DEV DA 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.24 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	42,557 cuft
Drainage area	=	3.400 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.10 min
Total precip.	=	5.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

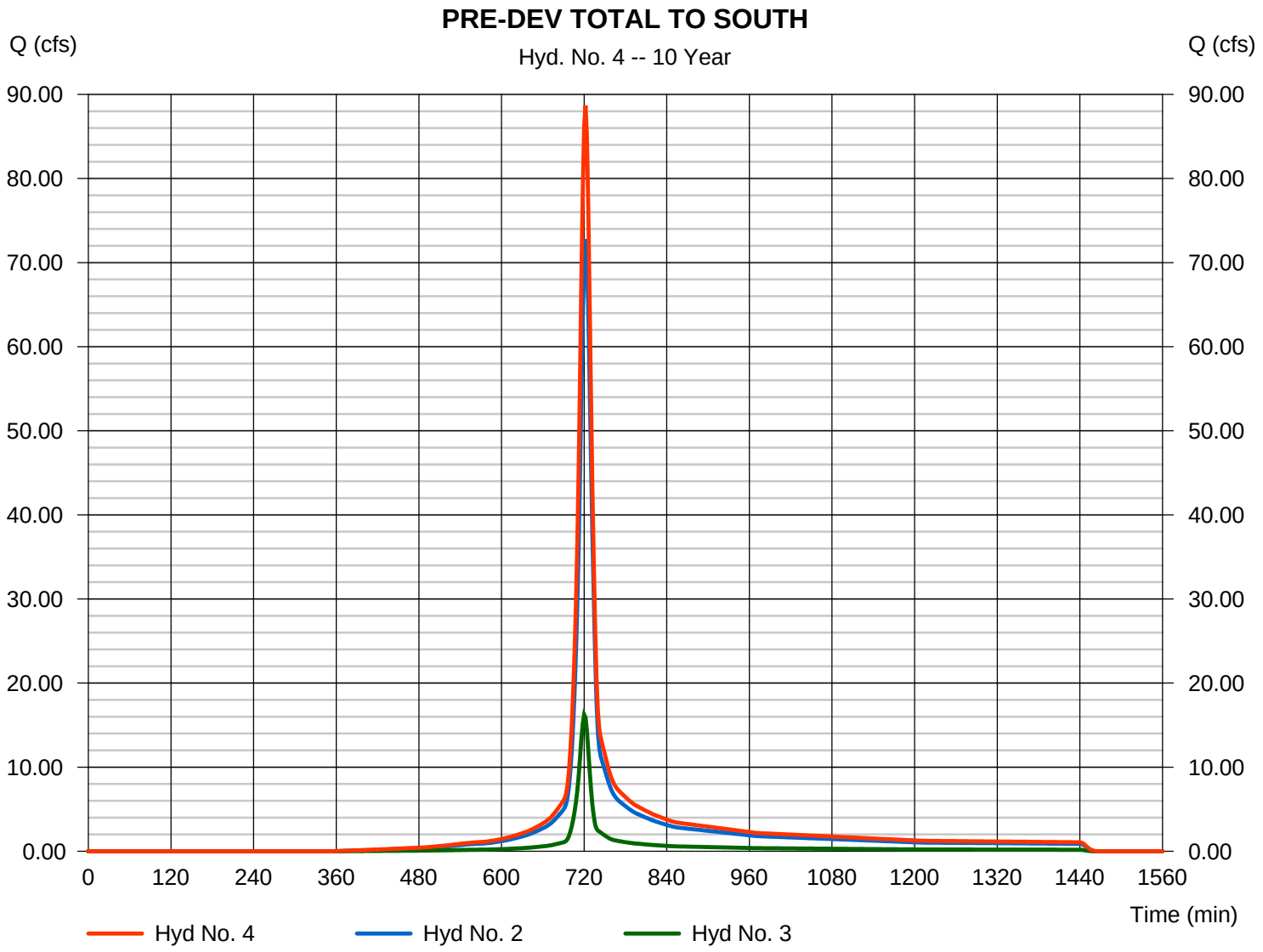


Hydrograph Report

Hyd. No. 4

PRE-DEV TOTAL TO SOUTH

Hydrograph type	=	Combine	Peak discharge	=	88.69 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	248,590 cuft
Inflow hyds.	=	2, 3	Contrib. drain. area	=	20.810 ac

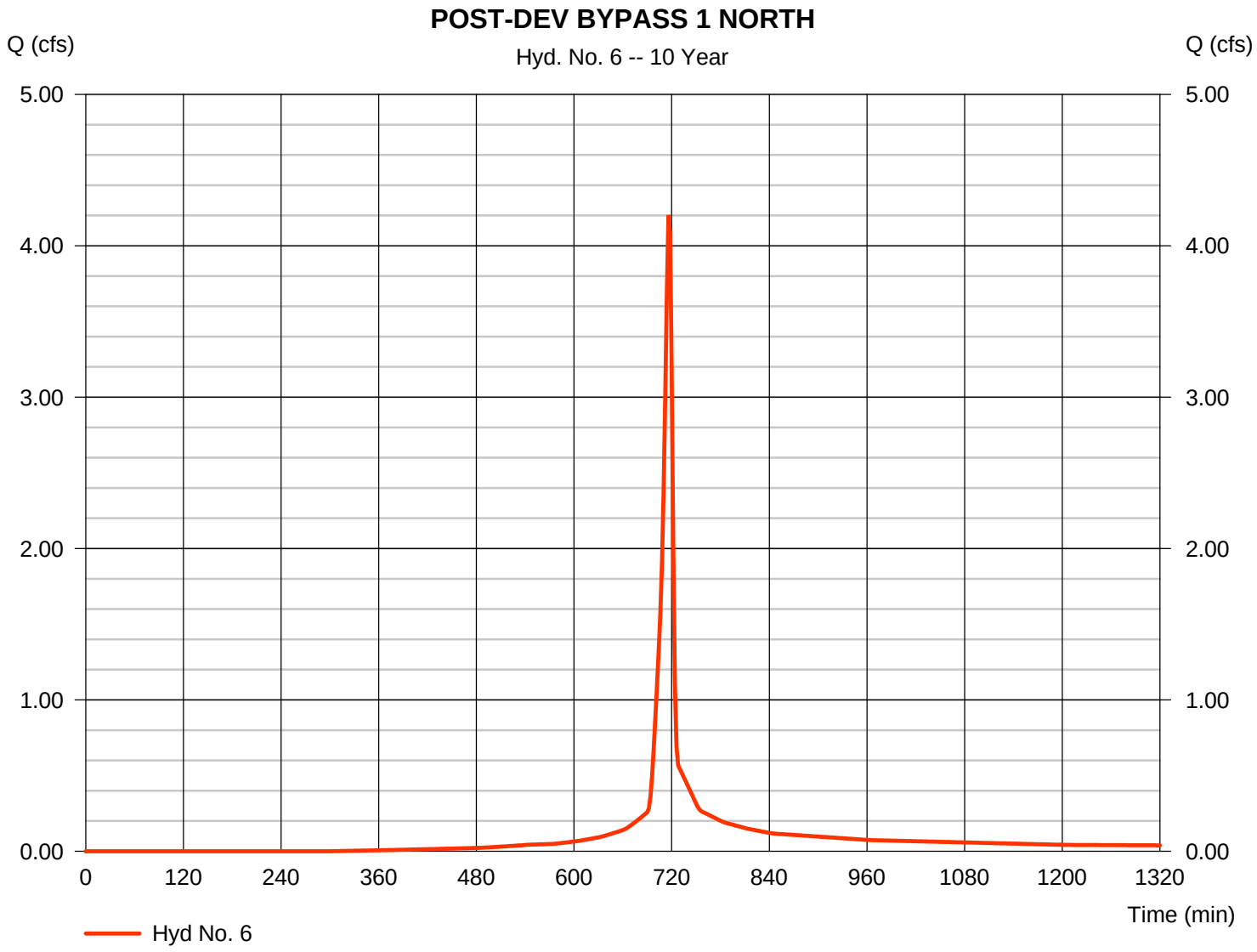


Hydrograph Report

Hyd. No. 6

POST-DEV BYPASS 1 NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 4.204 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 8,801 cuft
Drainage area	= 0.720 ac	Curve number	= 86.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.08 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

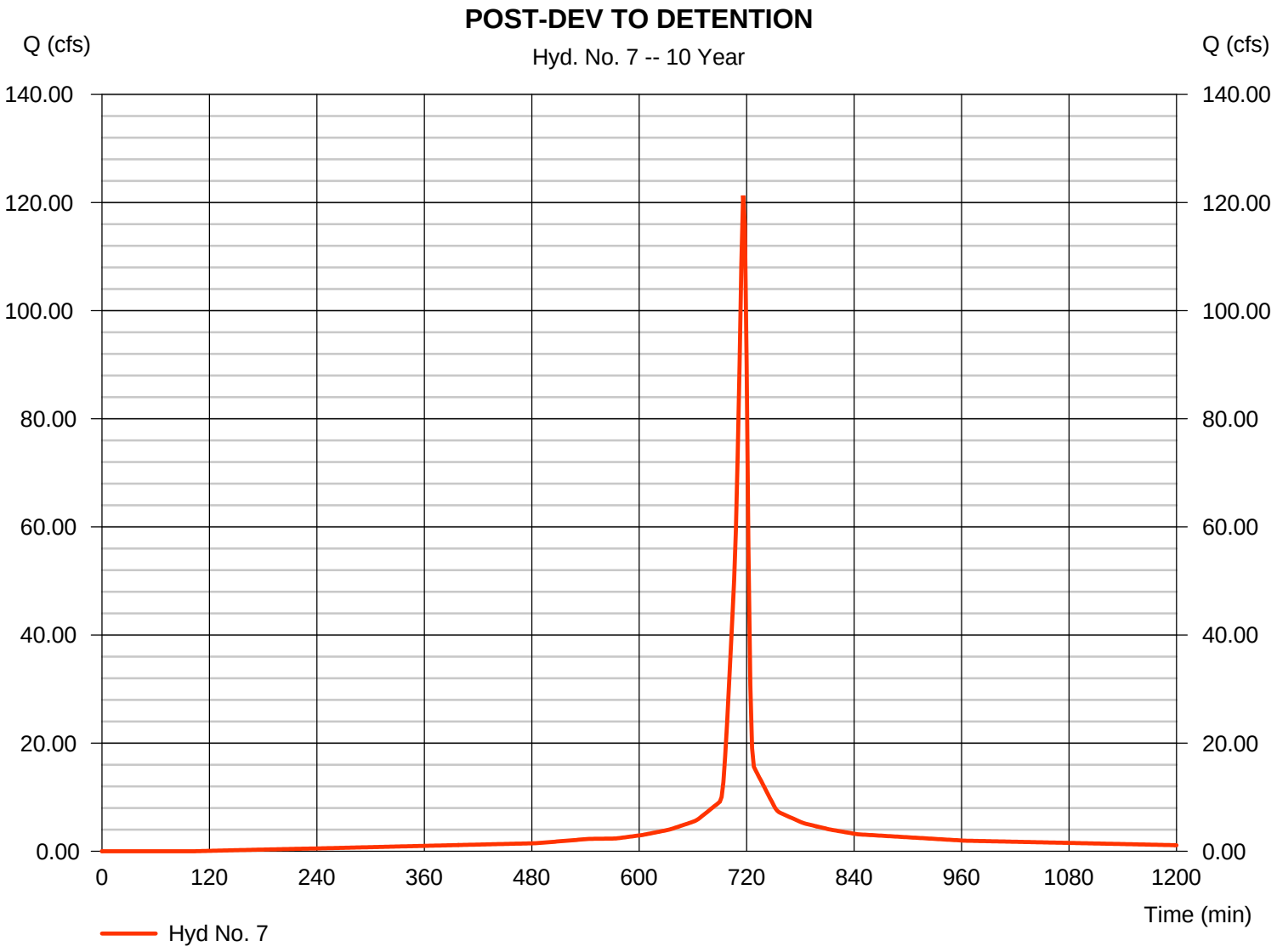


Hydrograph Report

Hyd. No. 7

POST-DEV TO DETENTION

Hydrograph type	=	SCS Runoff	Peak discharge	=	121.30 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	278,402 cuft
Drainage area	=	17.870 ac	Curve number	=	95.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.40 min
Total precip.	=	5.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

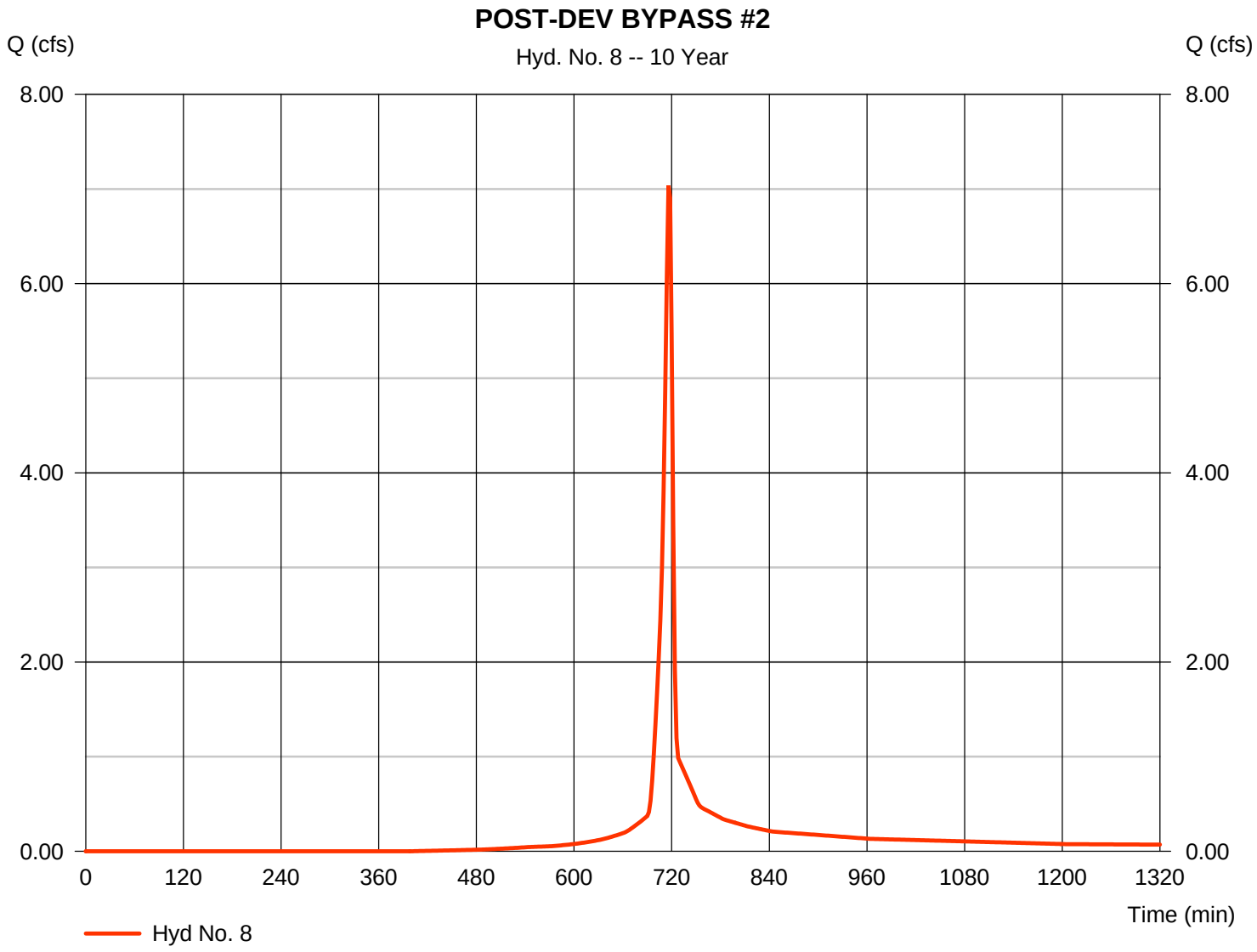


Hydrograph Report

Hyd. No. 8

POST-DEV BYPASS #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.037 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	14,380 cuft
Drainage area	=	1.370 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

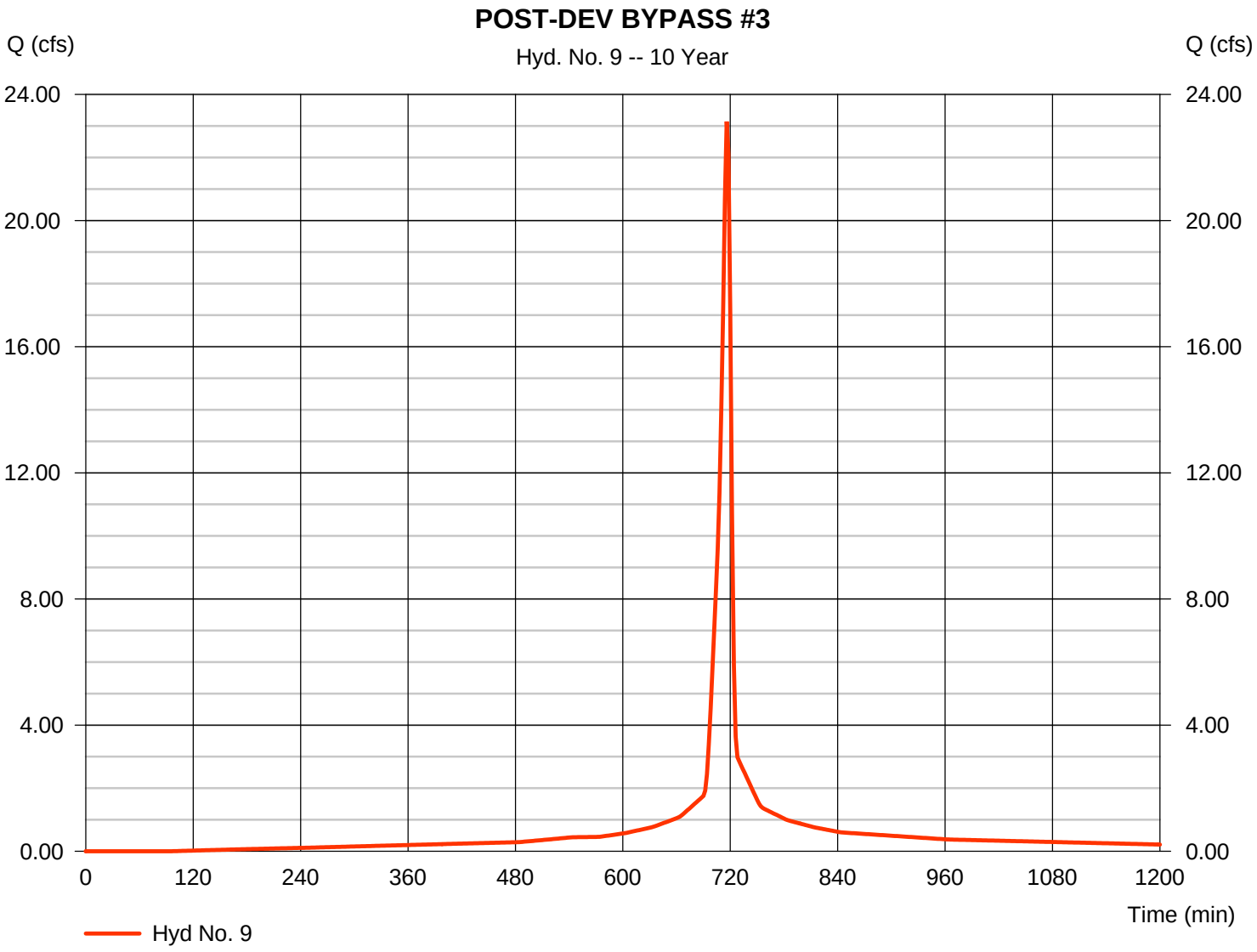


Hydrograph Report

Hyd. No. 9

POST-DEV BYPASS #3

Hydrograph type	= SCS Runoff	Peak discharge	= 23.14 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 53,365 cuft
Drainage area	= 3.400 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.08 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



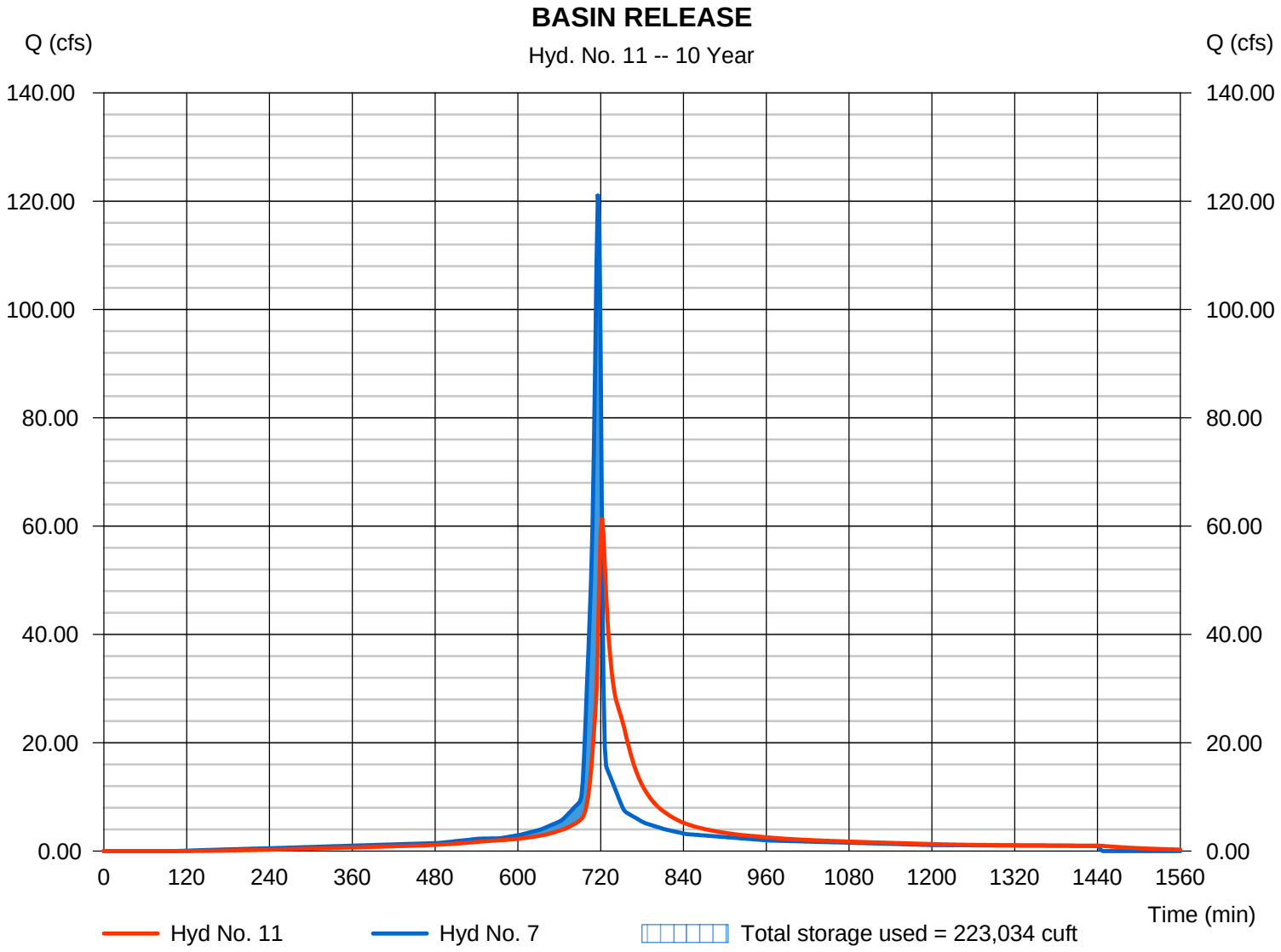
Hydrograph Report

Hyd. No. 11

BASIN RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	61.58 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	278,396 cuft
Inflow hyd. No.	=	7 - POST-DEV TO DETENTION	Max. Elevation	=	584.83 ft
Reservoir name	=	WET BASIN #1	Max. Storage	=	223,034 cuft

Storage Indication method used. Wet pond routing start elevation = 582.00 ft.

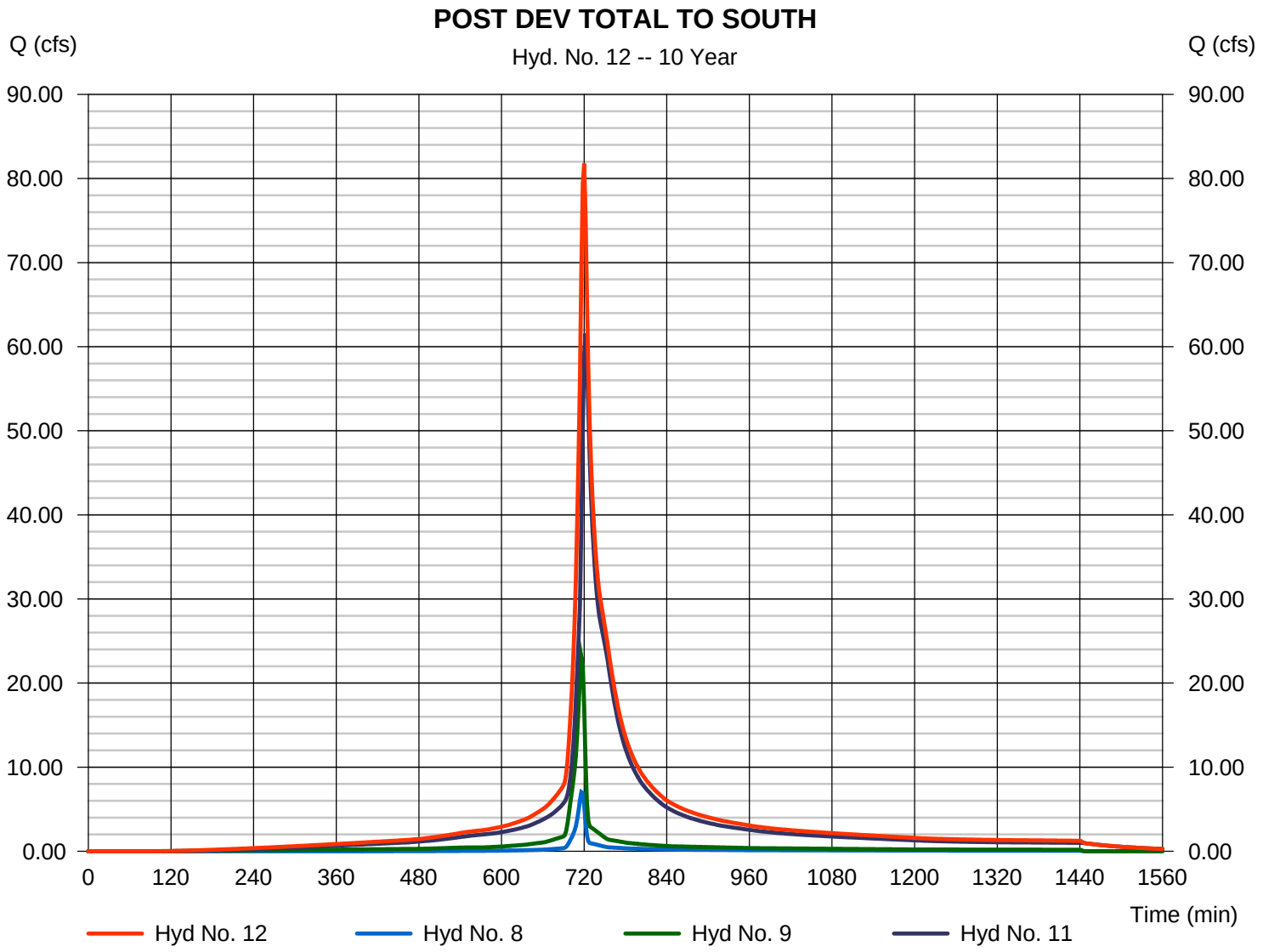


Hydrograph Report

Hyd. No. 12

POST DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 81.77 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 346,141 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 4.770 ac



STORMWATER HYDROGRAPHS

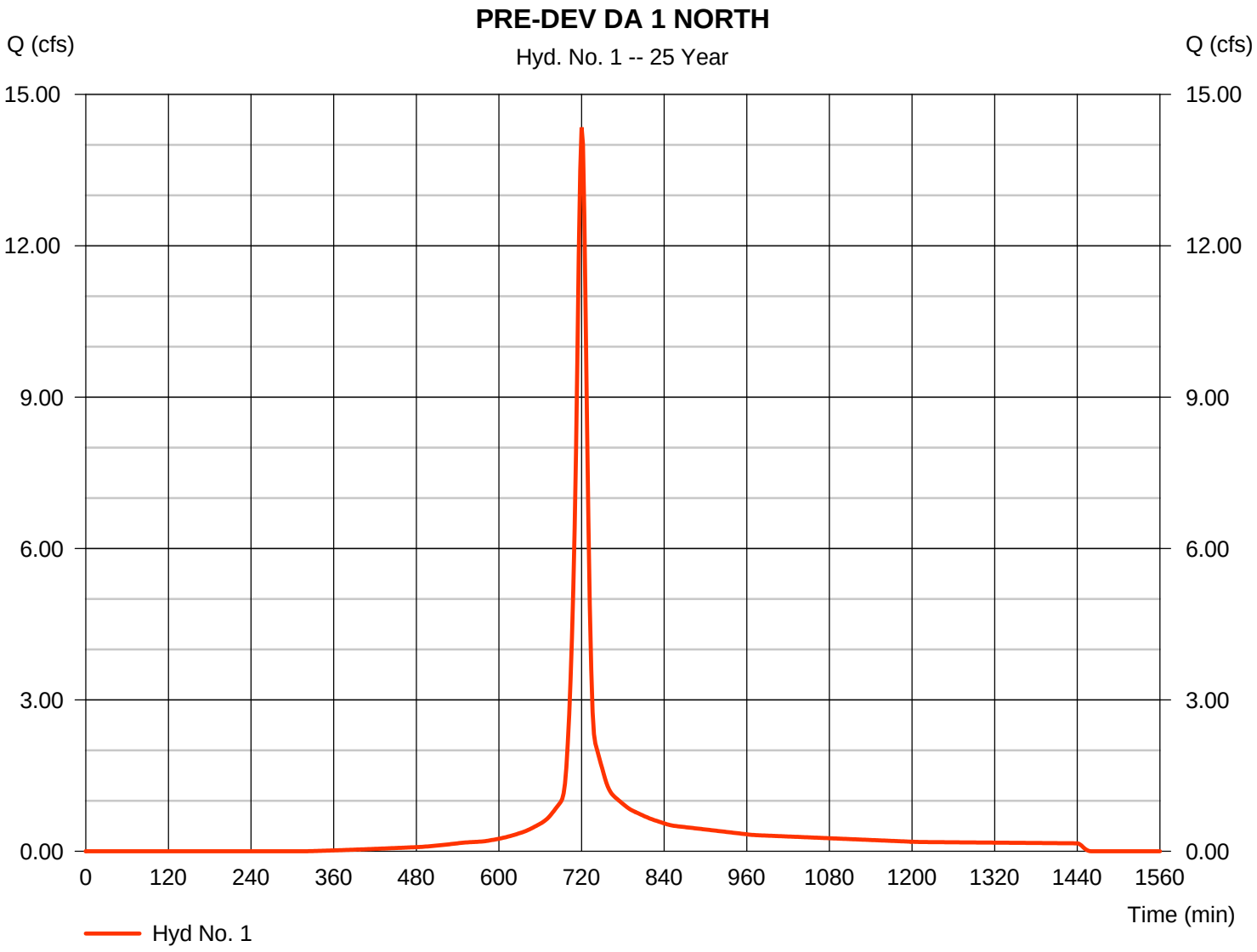
25 YEAR STORM

Hydrograph Report

Hyd. No. 1

PRE-DEV DA 1 NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.35 cfs
Storm frequency	=	25 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	37,831 cuft
Drainage area	=	2.550 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.90 min
Total precip.	=	5.75 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

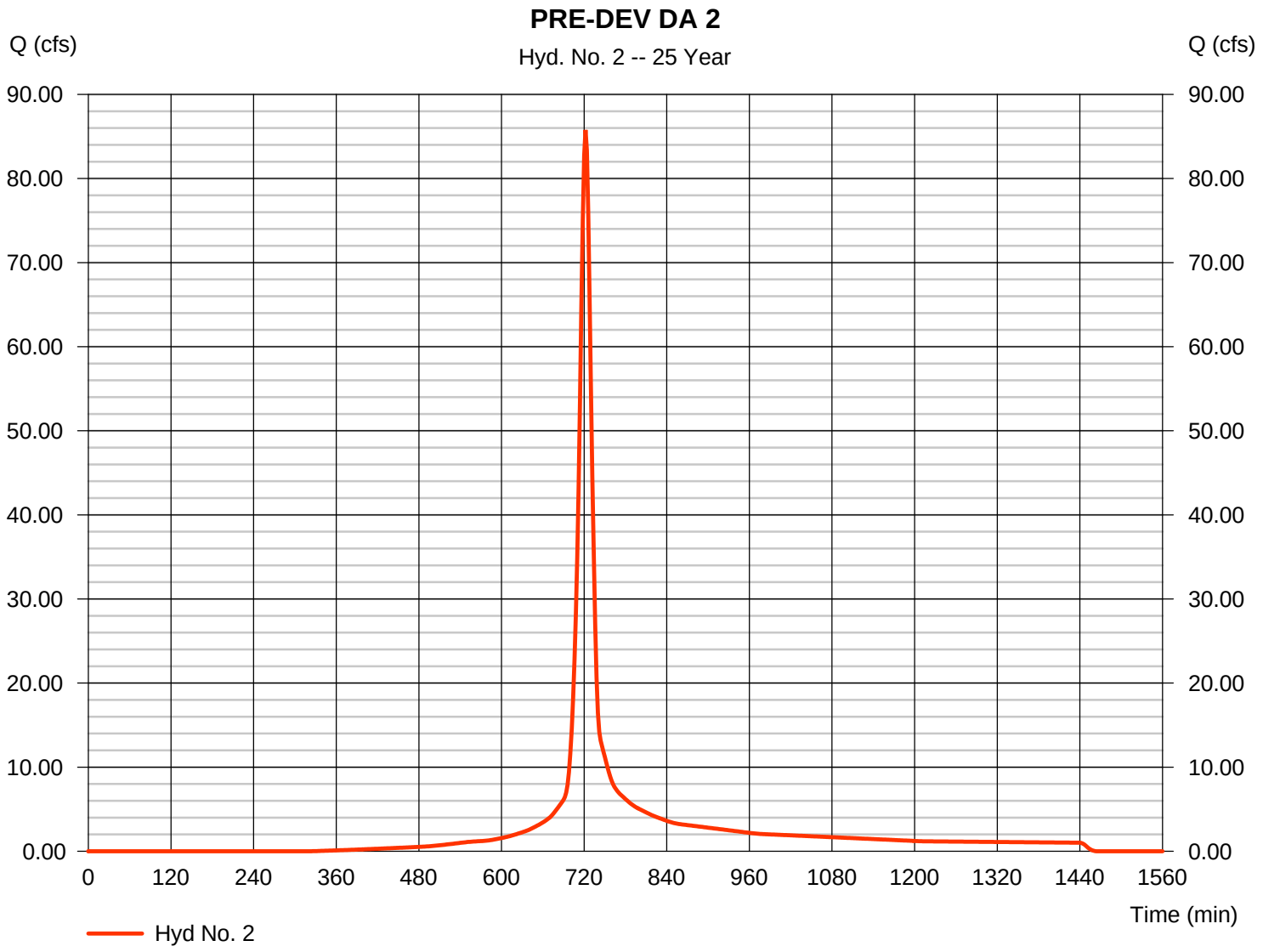


Hydrograph Report

Hyd. No. 2

PRE-DEV DA 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	85.78 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	244,198 cuft
Drainage area	=	17.410 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.20 min
Total precip.	=	5.75 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

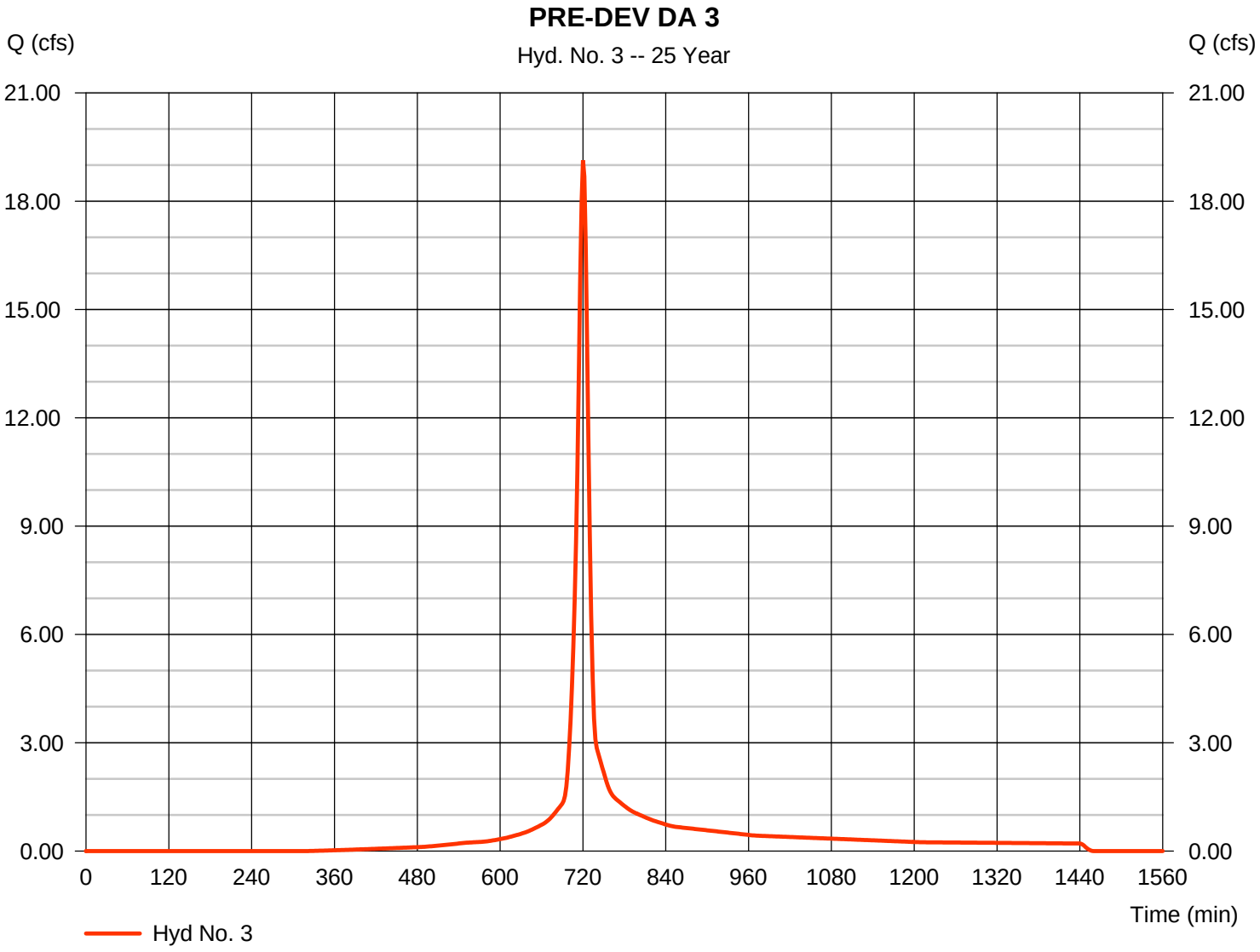


Hydrograph Report

Hyd. No. 3

PRE-DEV DA 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.13 cfs
Storm frequency	=	25 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	50,441 cuft
Drainage area	=	3.400 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.10 min
Total precip.	=	5.75 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

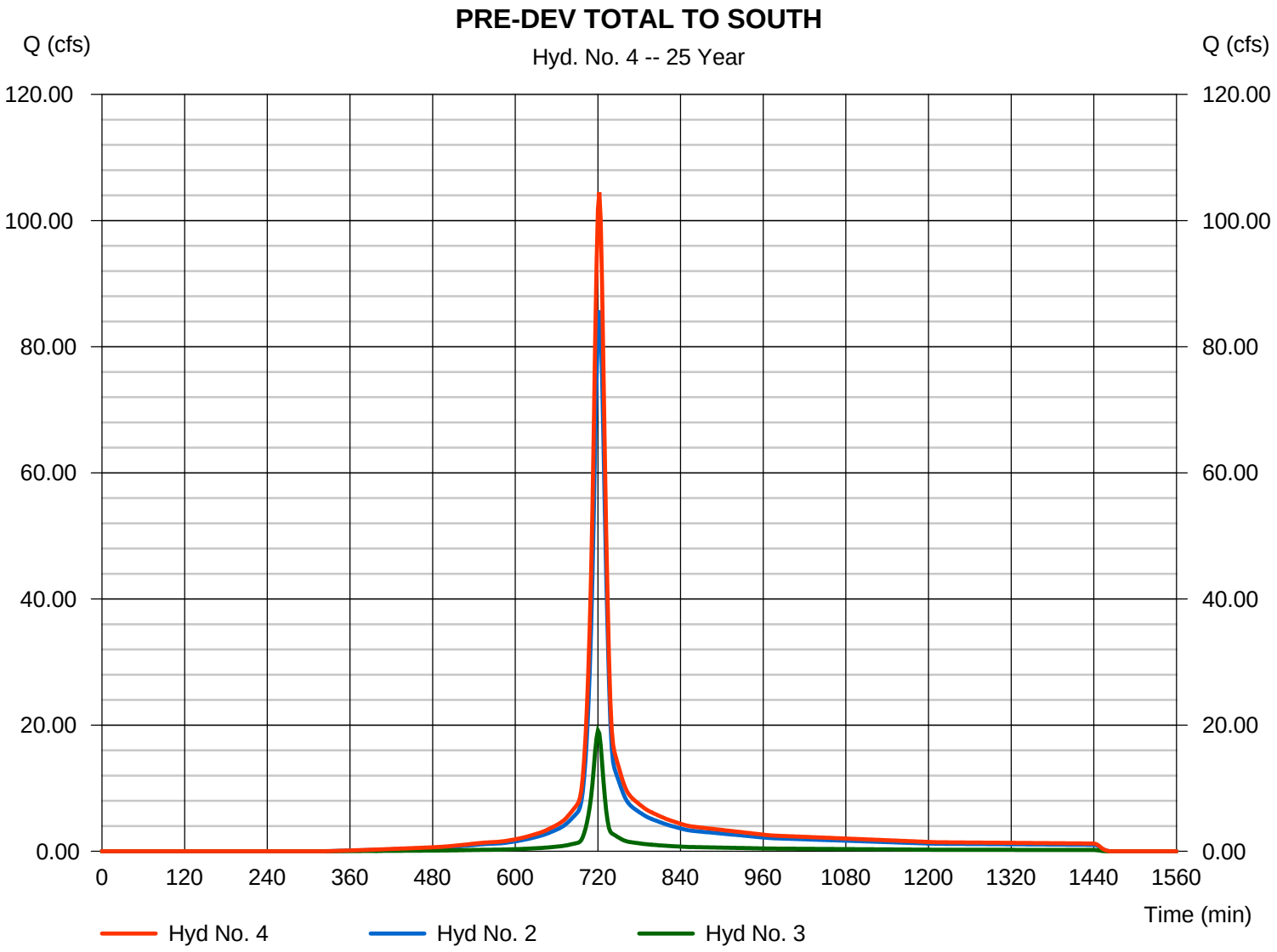


Hydrograph Report

Hyd. No. 4

PRE-DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 104.46 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 294,639 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 20.810 ac

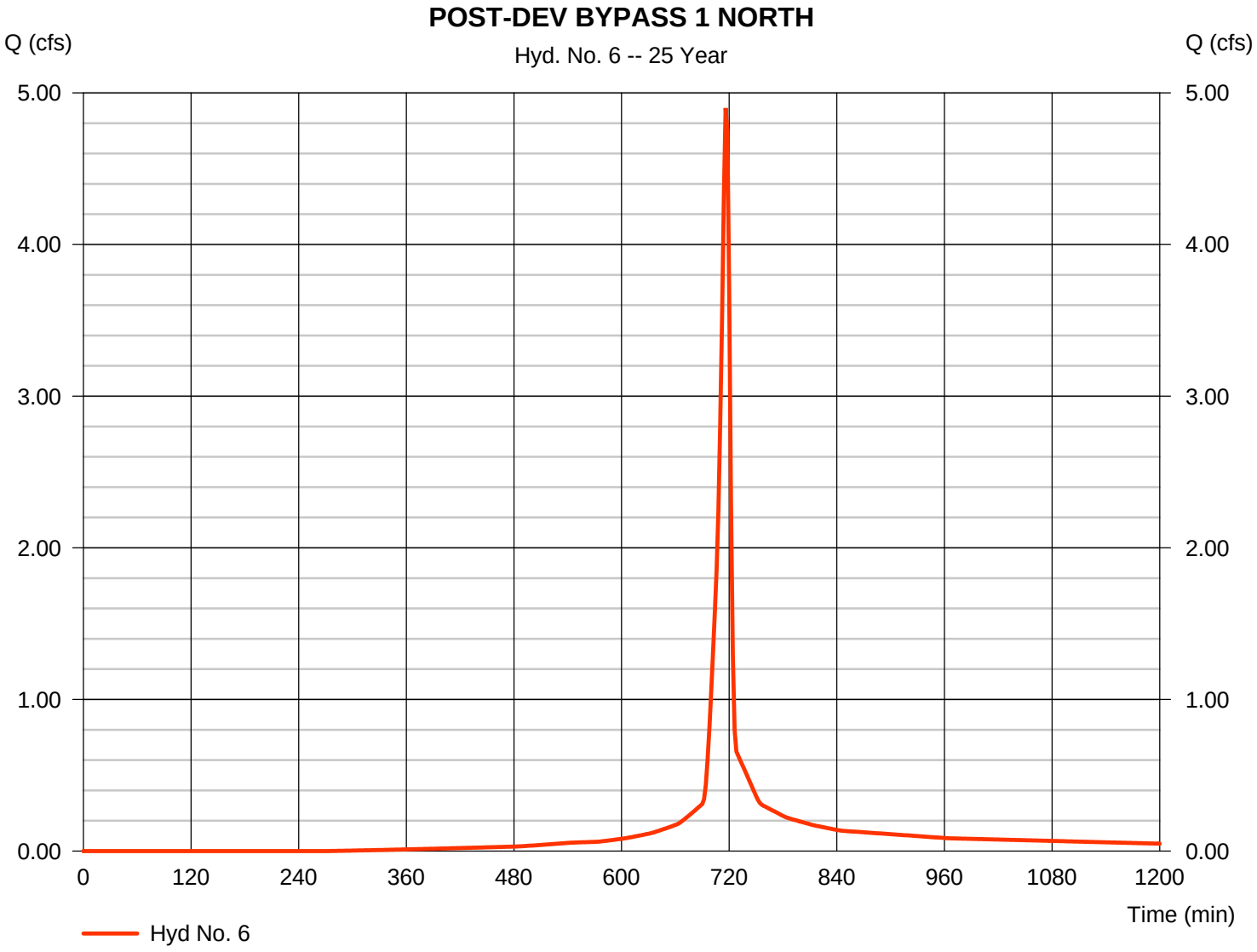


Hydrograph Report

Hyd. No. 6

POST-DEV BYPASS 1 NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 4.900 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 10,353 cuft
Drainage area	= 0.720 ac	Curve number	= 86.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

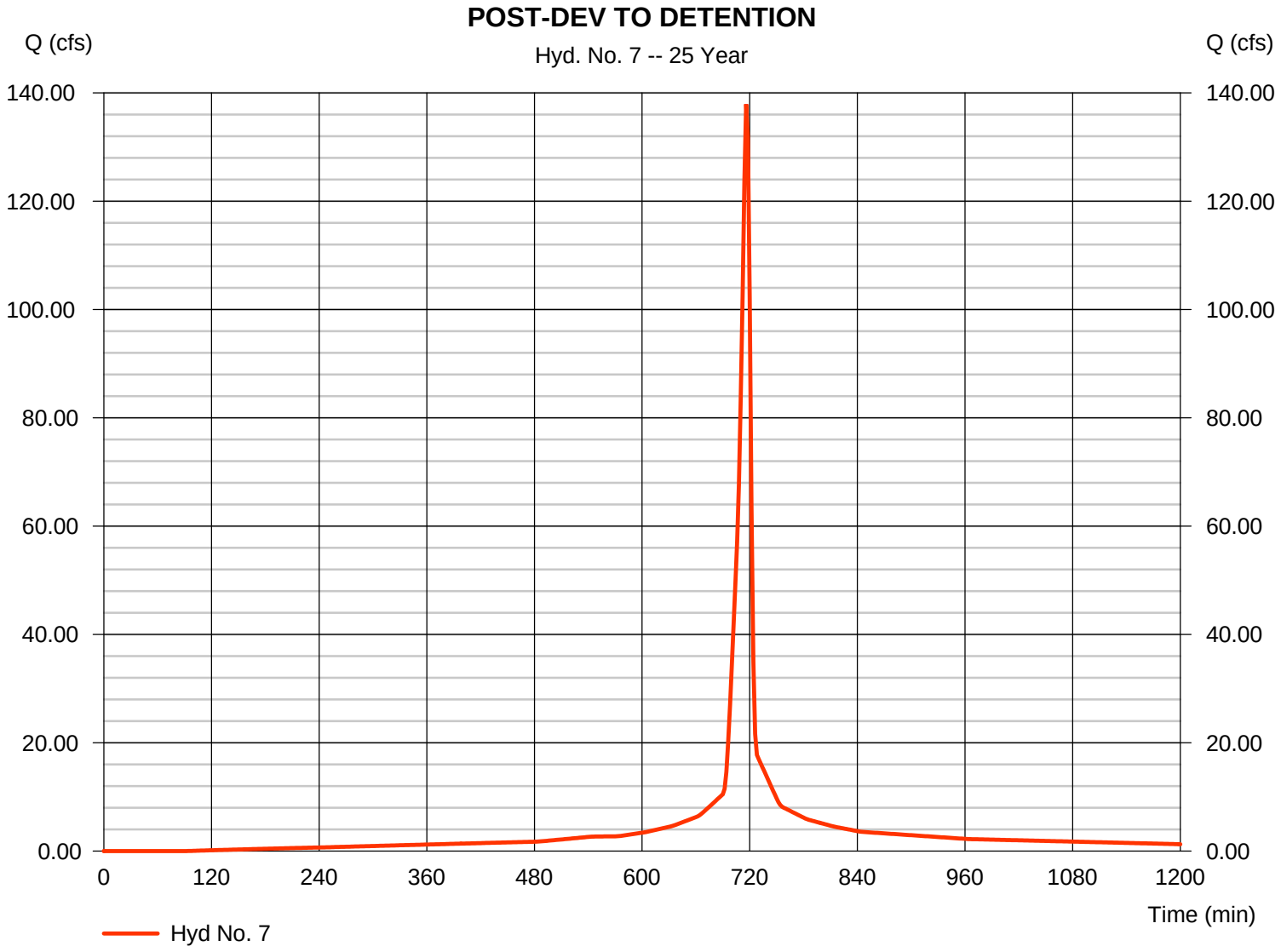


Hydrograph Report

Hyd. No. 7

POST-DEV TO DETENTION

Hydrograph type	= SCS Runoff	Peak discharge	= 137.91 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 318,899 cuft
Drainage area	= 17.870 ac	Curve number	= 95.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.40 min
Total precip.	= 5.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

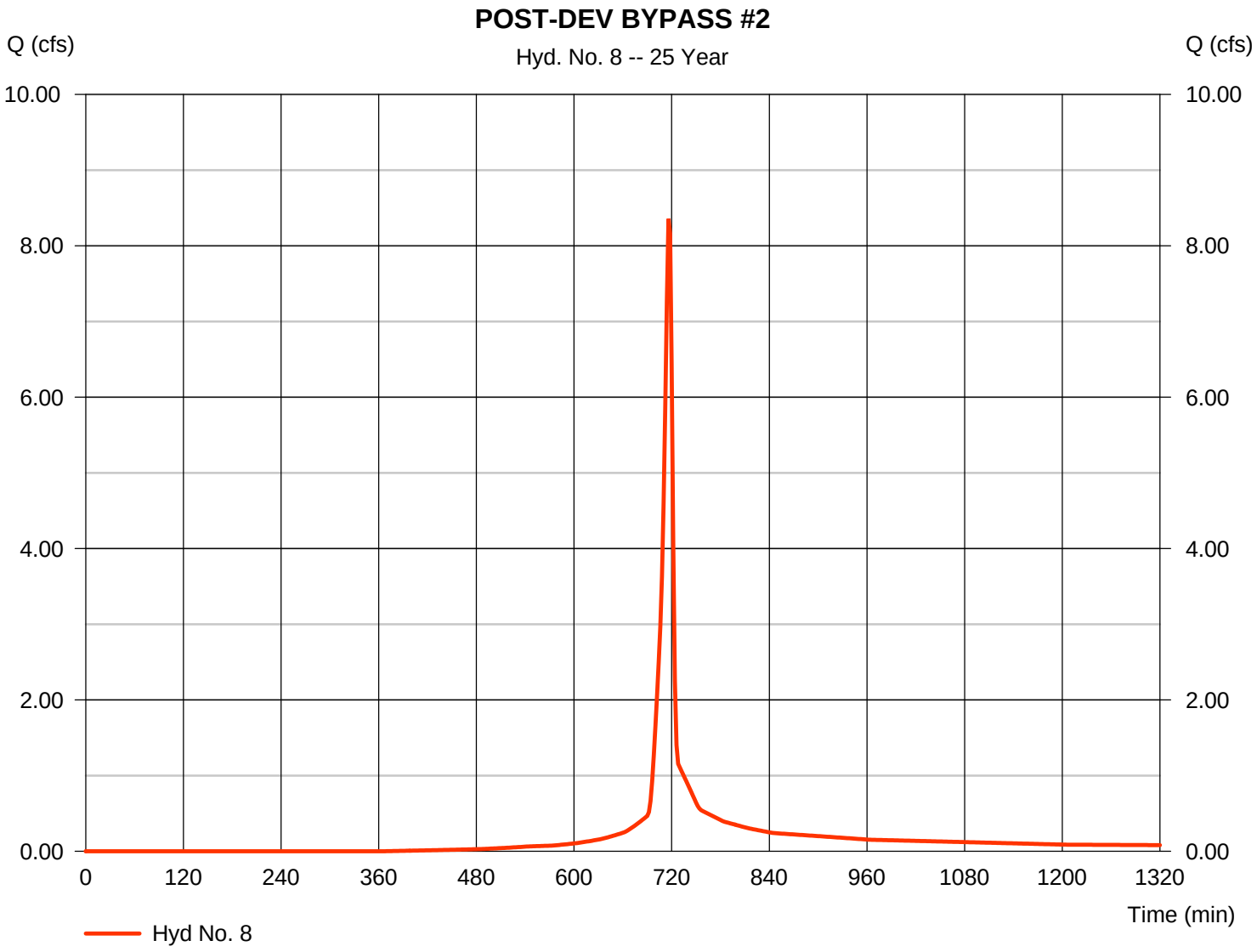


Hydrograph Report

Hyd. No. 8

POST-DEV BYPASS #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.355 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	17,189 cuft
Drainage area	=	1.370 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.75 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

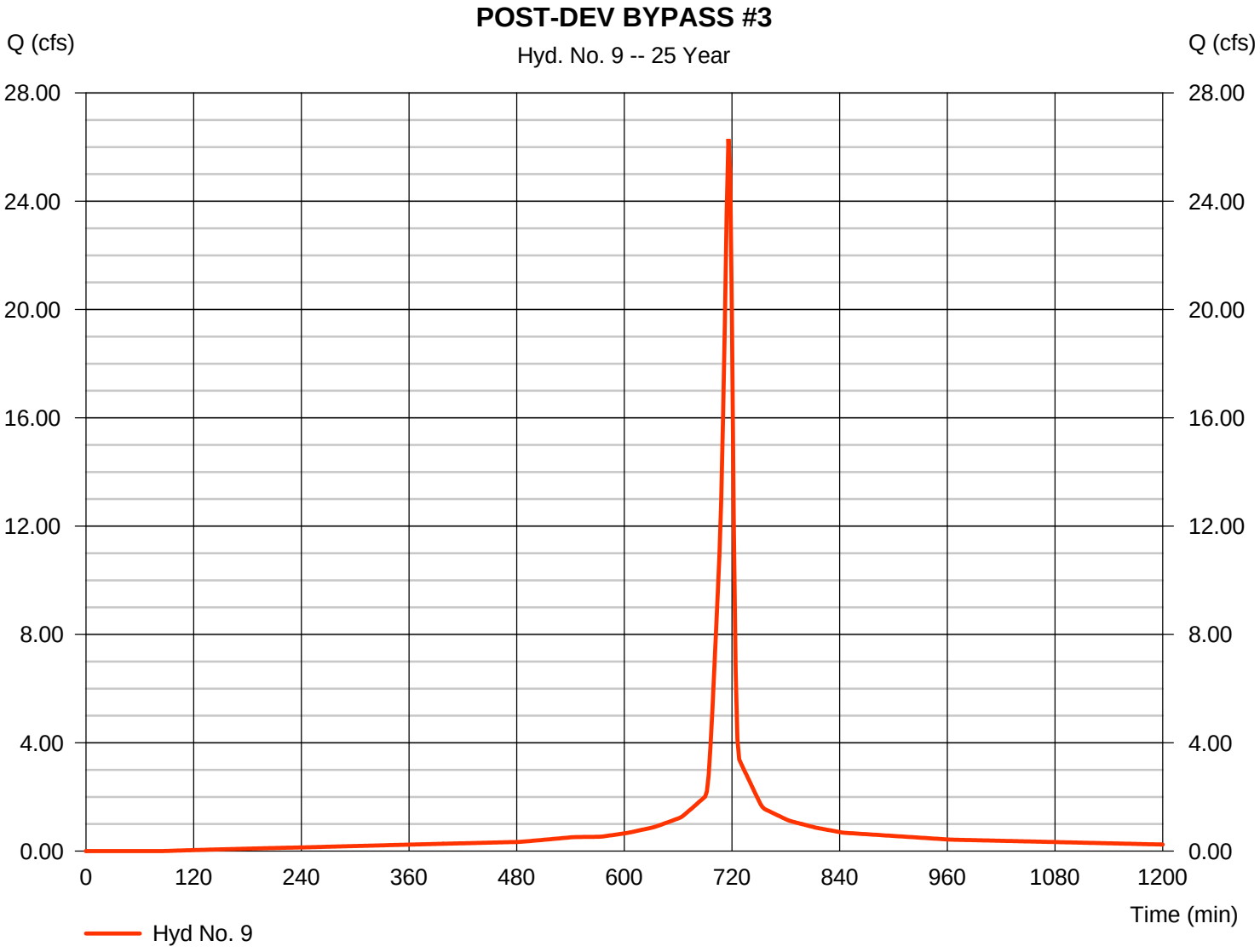


Hydrograph Report

Hyd. No. 9

POST-DEV BYPASS #3

Hydrograph type	= SCS Runoff	Peak discharge	= 26.30 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 61,076 cuft
Drainage area	= 3.400 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



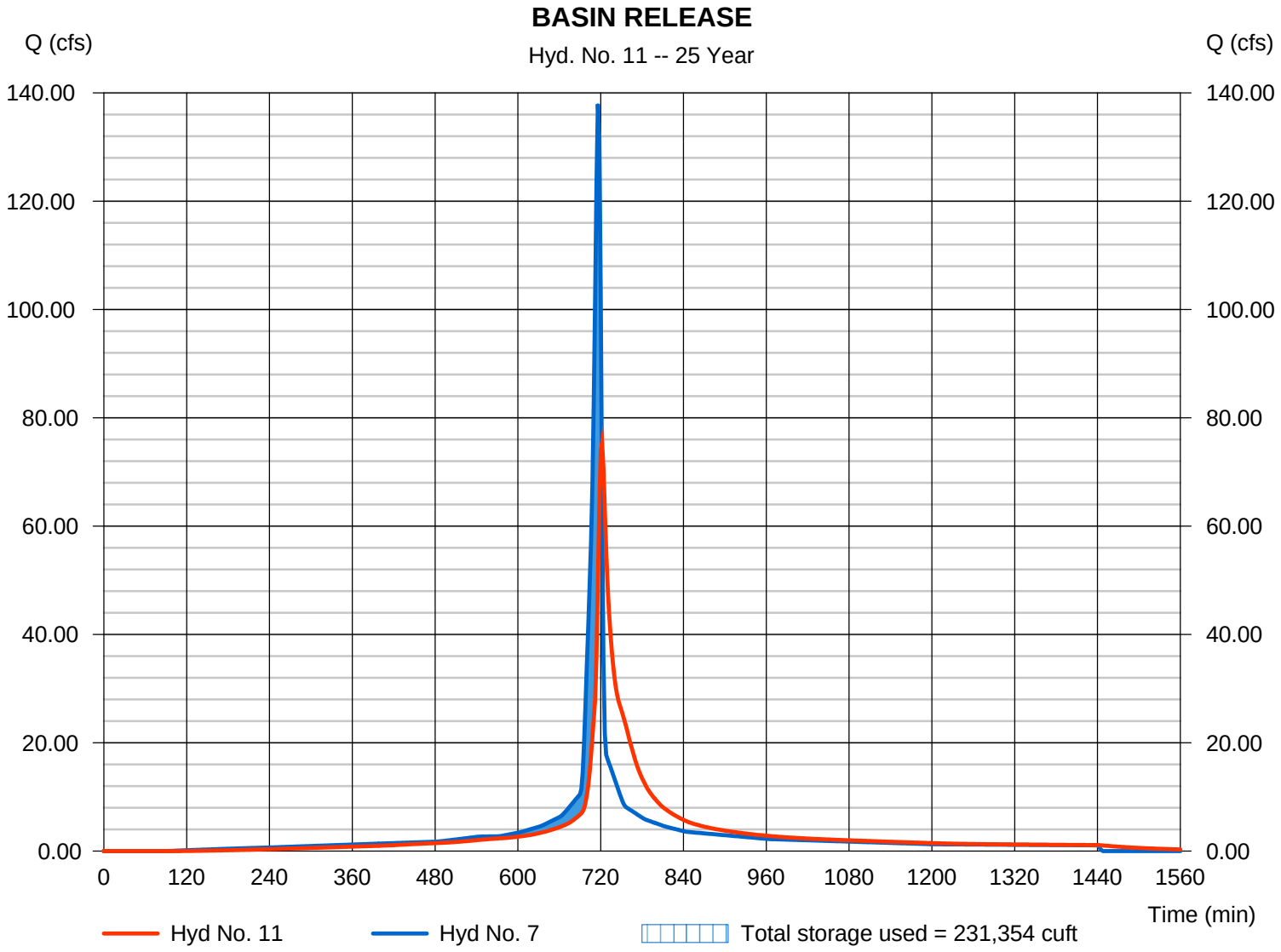
Hydrograph Report

Hyd. No. 11

BASIN RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	75.35 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	318,894 cuft
Inflow hyd. No.	=	7 - POST-DEV TO DETENTION	Max. Elevation	=	585.07 ft
Reservoir name	=	WET BASIN #1	Max. Storage	=	231,354 cuft

Storage Indication method used. Wet pond routing start elevation = 582.00 ft.

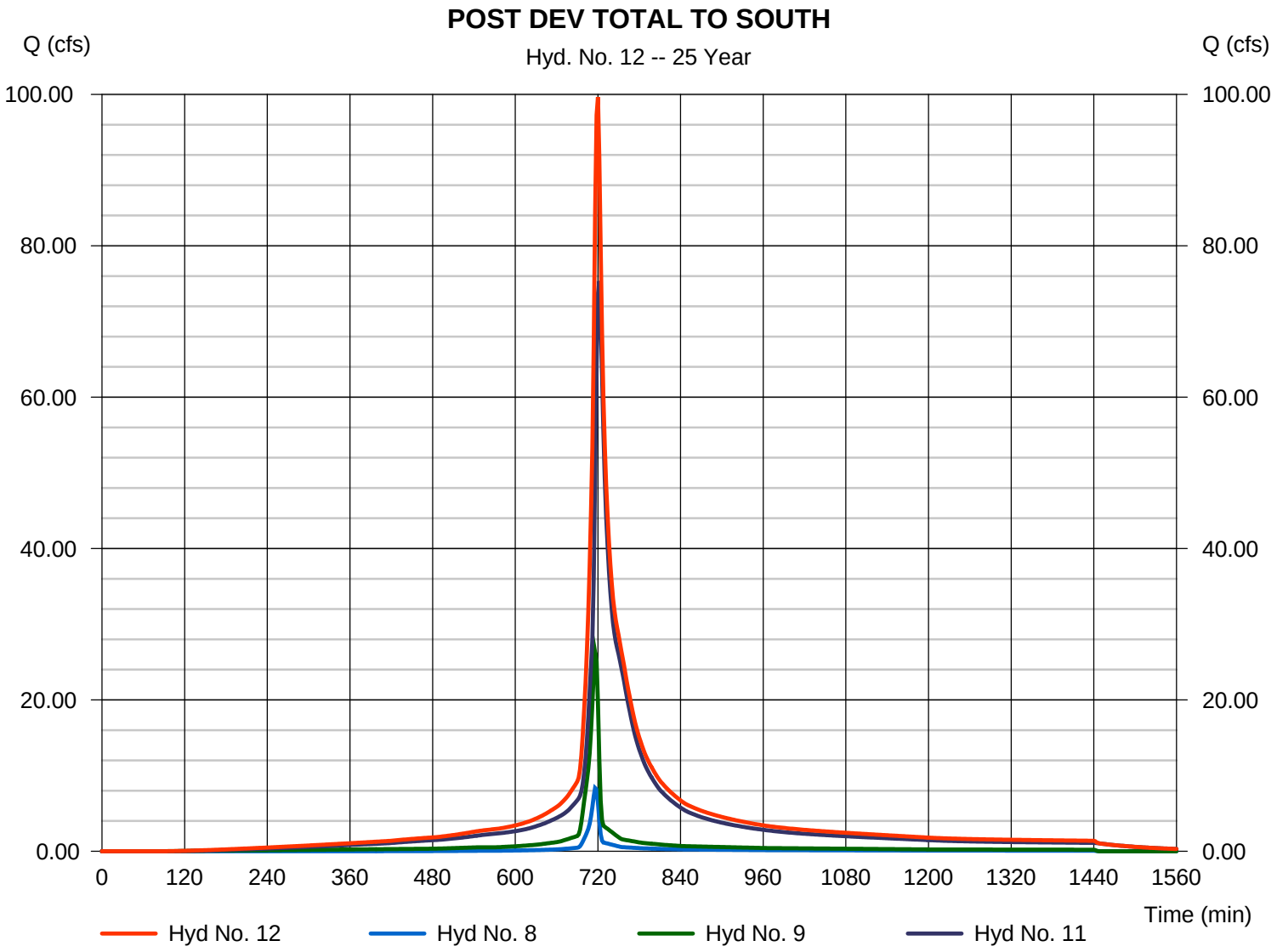


Hydrograph Report

Hyd. No. 12

POST DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 99.64 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 397,159 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 4.770 ac



STORMWATER HYDROGRAPHS

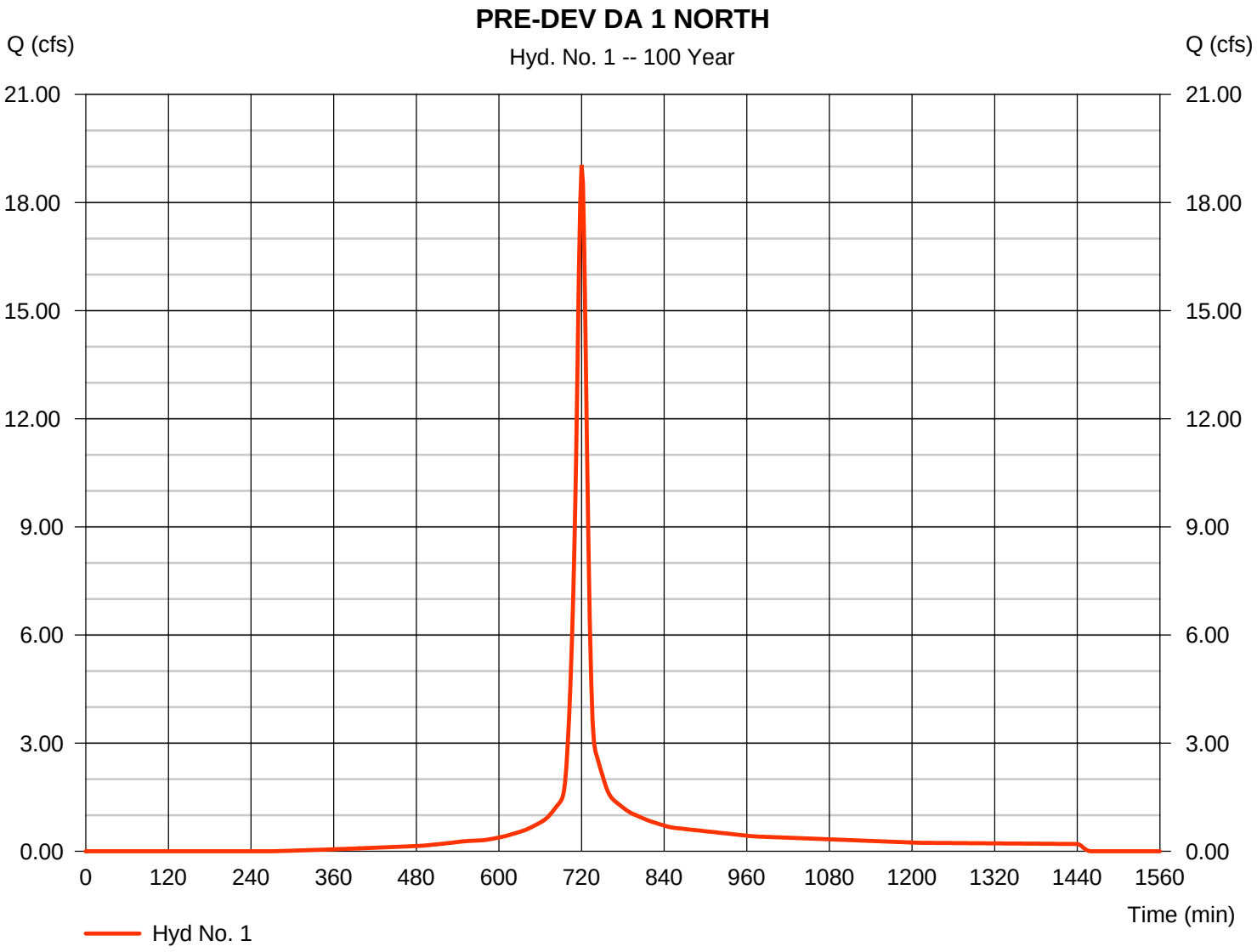
100 YEAR STORM

Hydrograph Report

Hyd. No. 1

PRE-DEV DA 1 NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	50,881 cuft
Drainage area	=	2.550 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.90 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

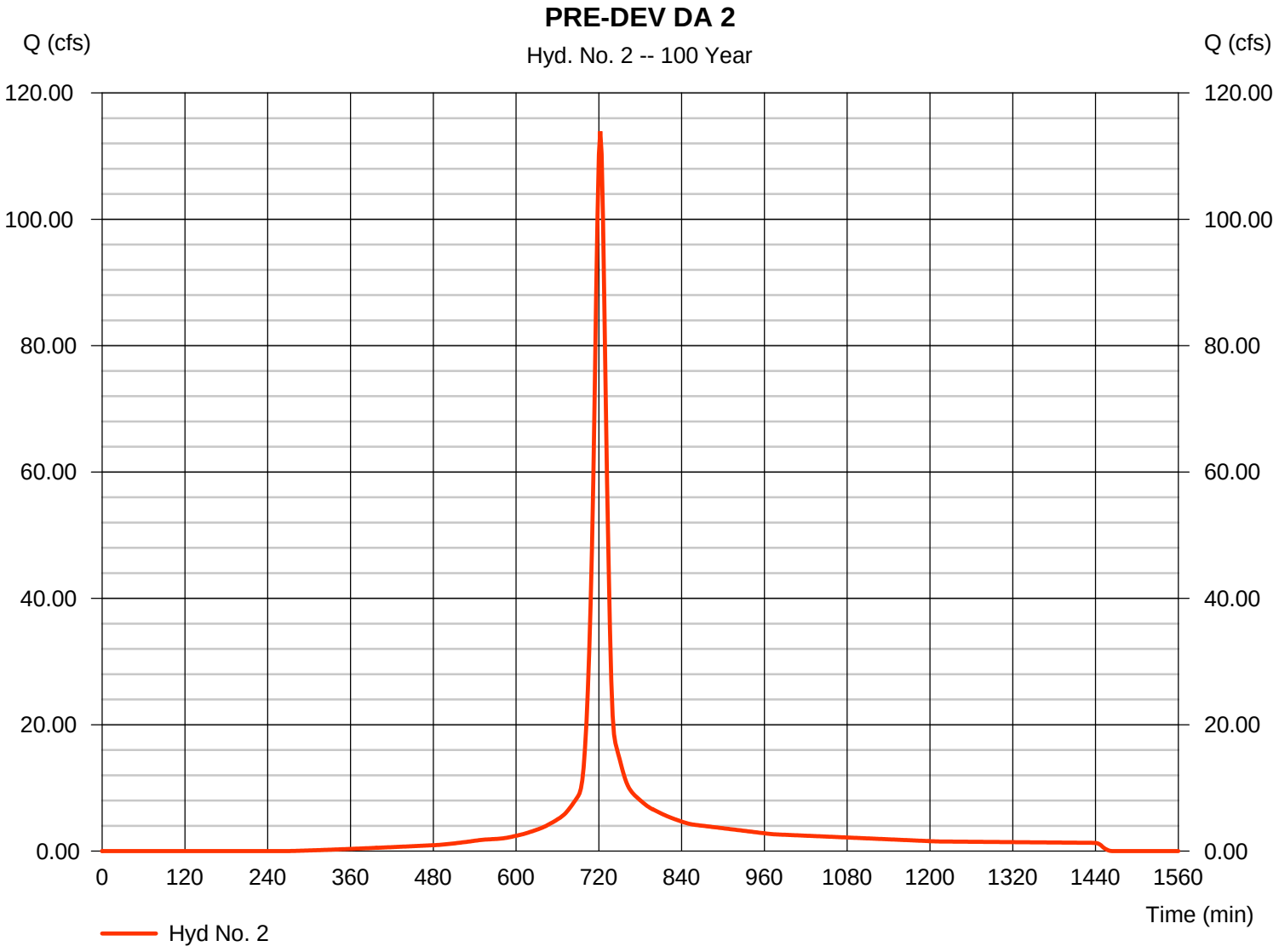


Hydrograph Report

Hyd. No. 2

PRE-DEV DA 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	113.93 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	328,436 cuft
Drainage area	=	17.410 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.20 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

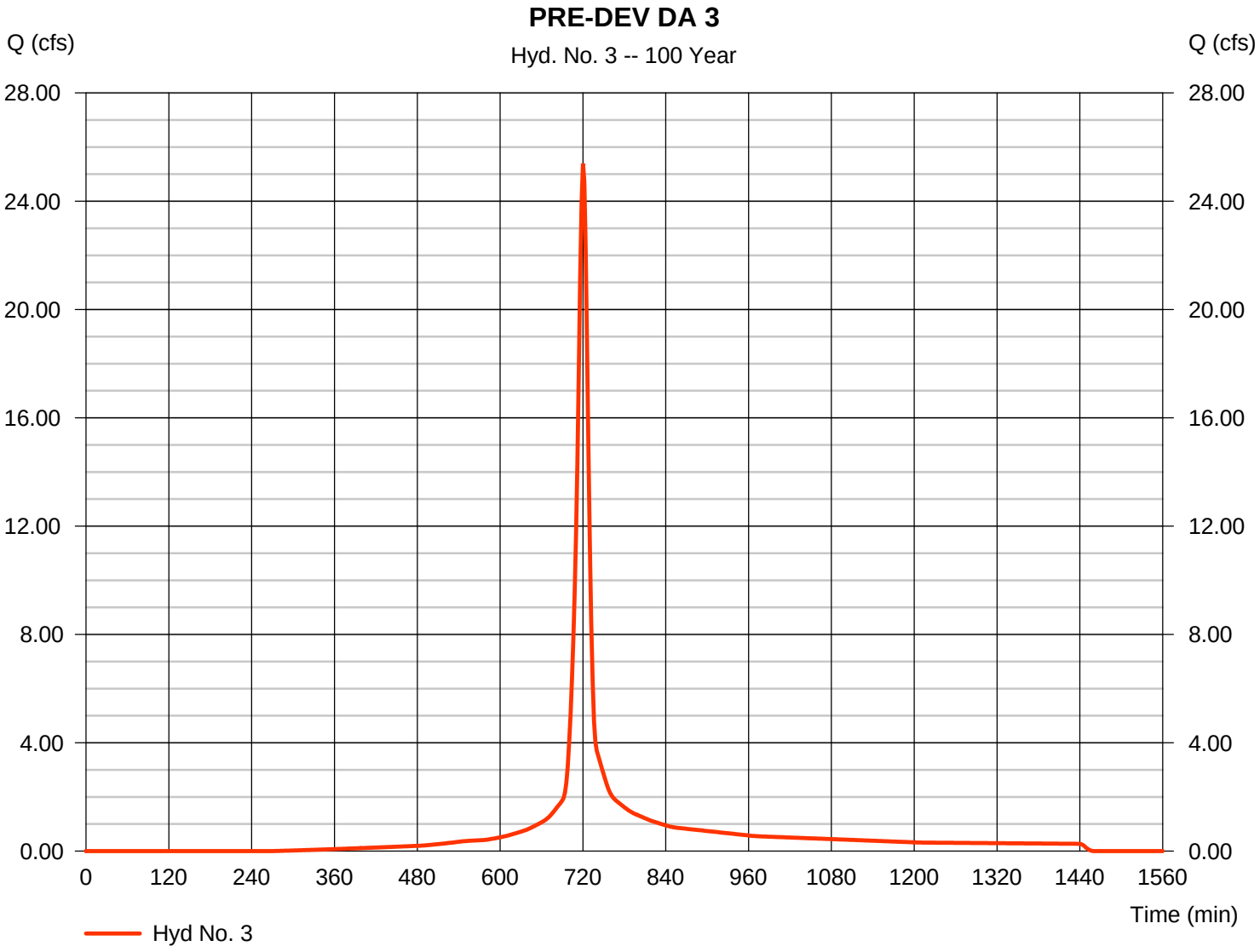


Hydrograph Report

Hyd. No. 3

PRE-DEV DA 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.39 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	67,841 cuft
Drainage area	=	3.400 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.10 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

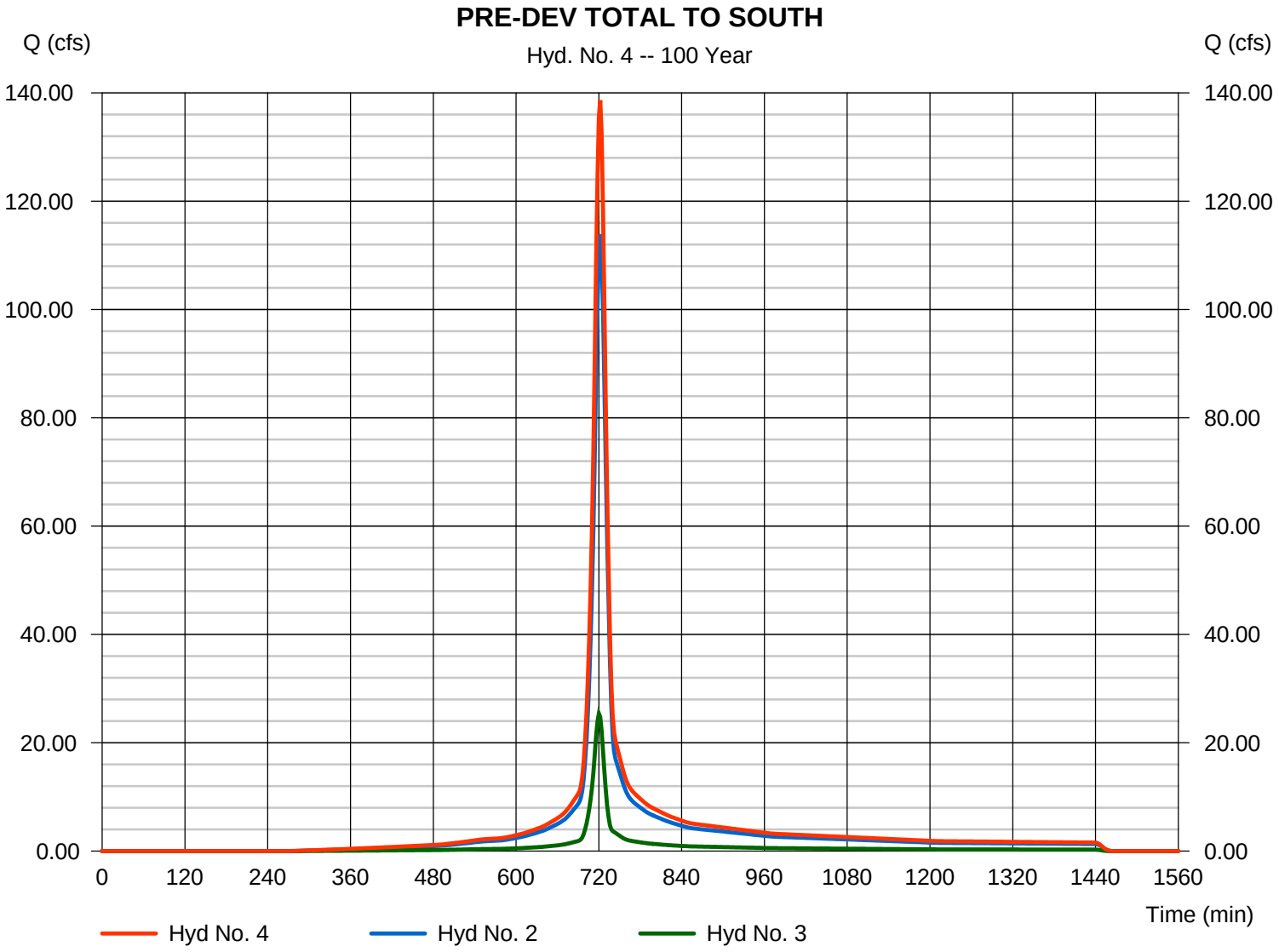


Hydrograph Report

Hyd. No. 4

PRE-DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 138.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 396,277 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 20.810 ac

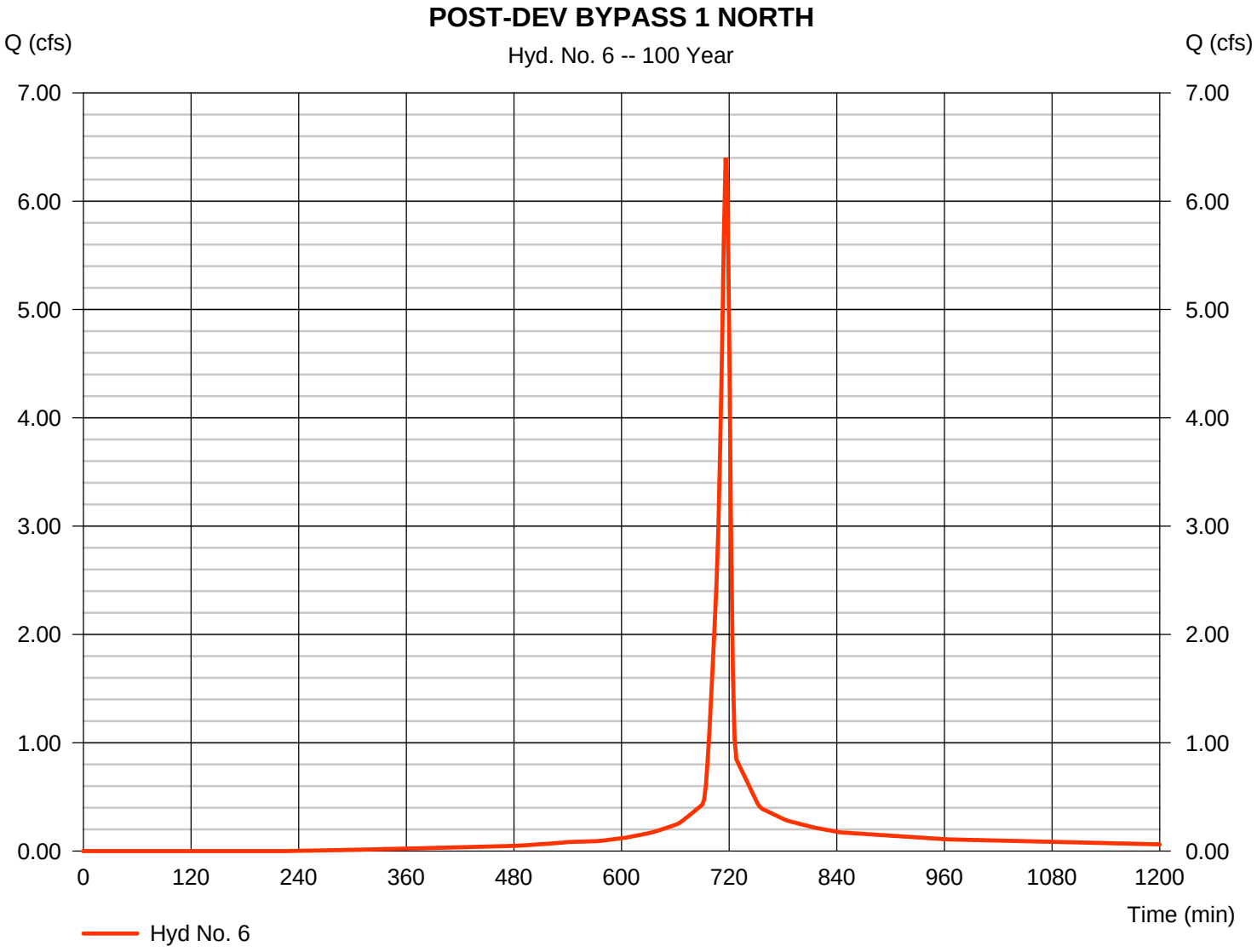


Hydrograph Report

Hyd. No. 6

POST-DEV BYPASS 1 NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.401 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	13,759 cuft
Drainage area	=	0.720 ac	Curve number	=	86.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

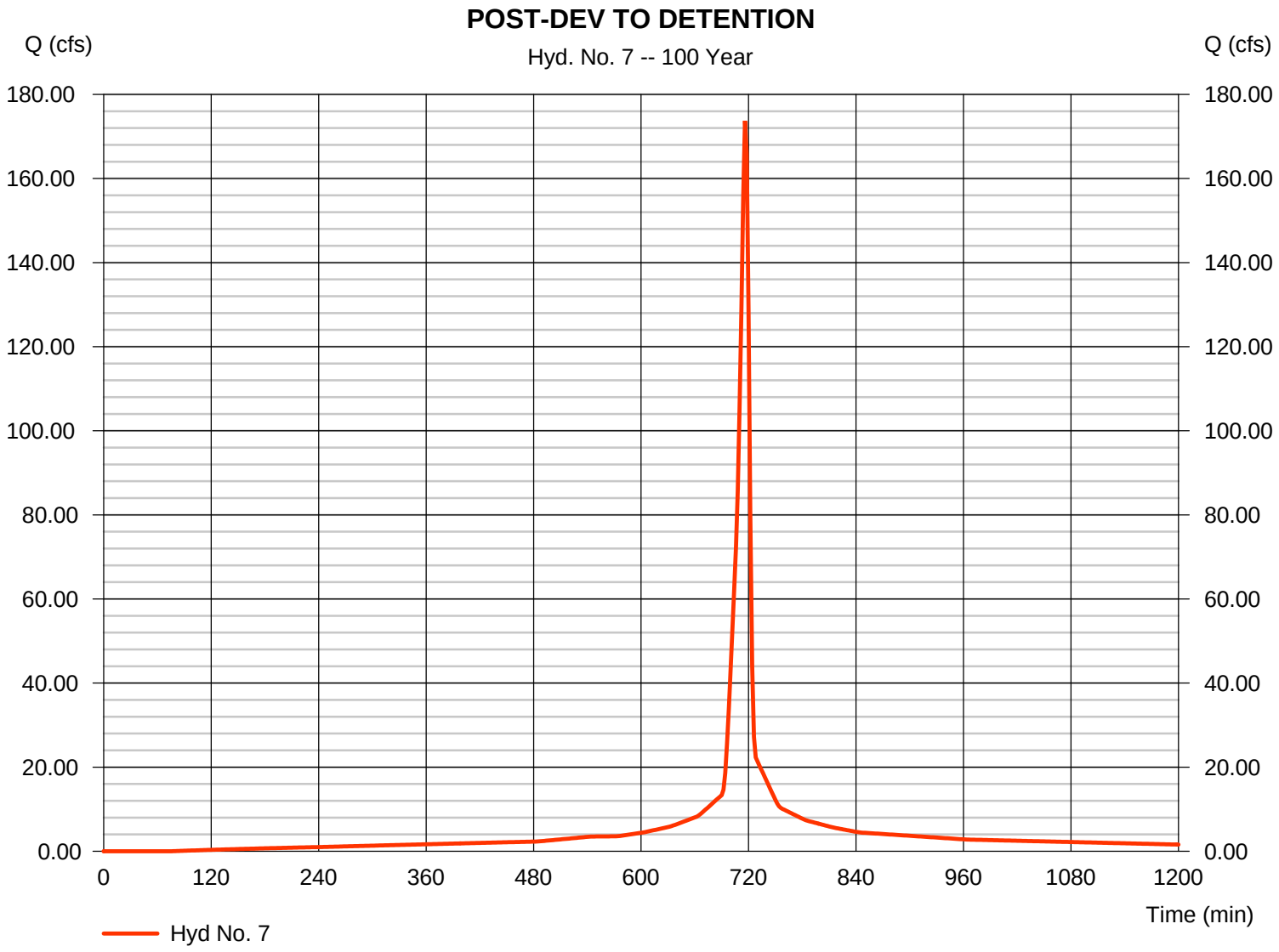


Hydrograph Report

Hyd. No. 7

POST-DEV TO DETENTION

Hydrograph type	=	SCS Runoff	Peak discharge	=	173.73 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	406,694 cuft
Drainage area	=	17.870 ac	Curve number	=	95.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.40 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

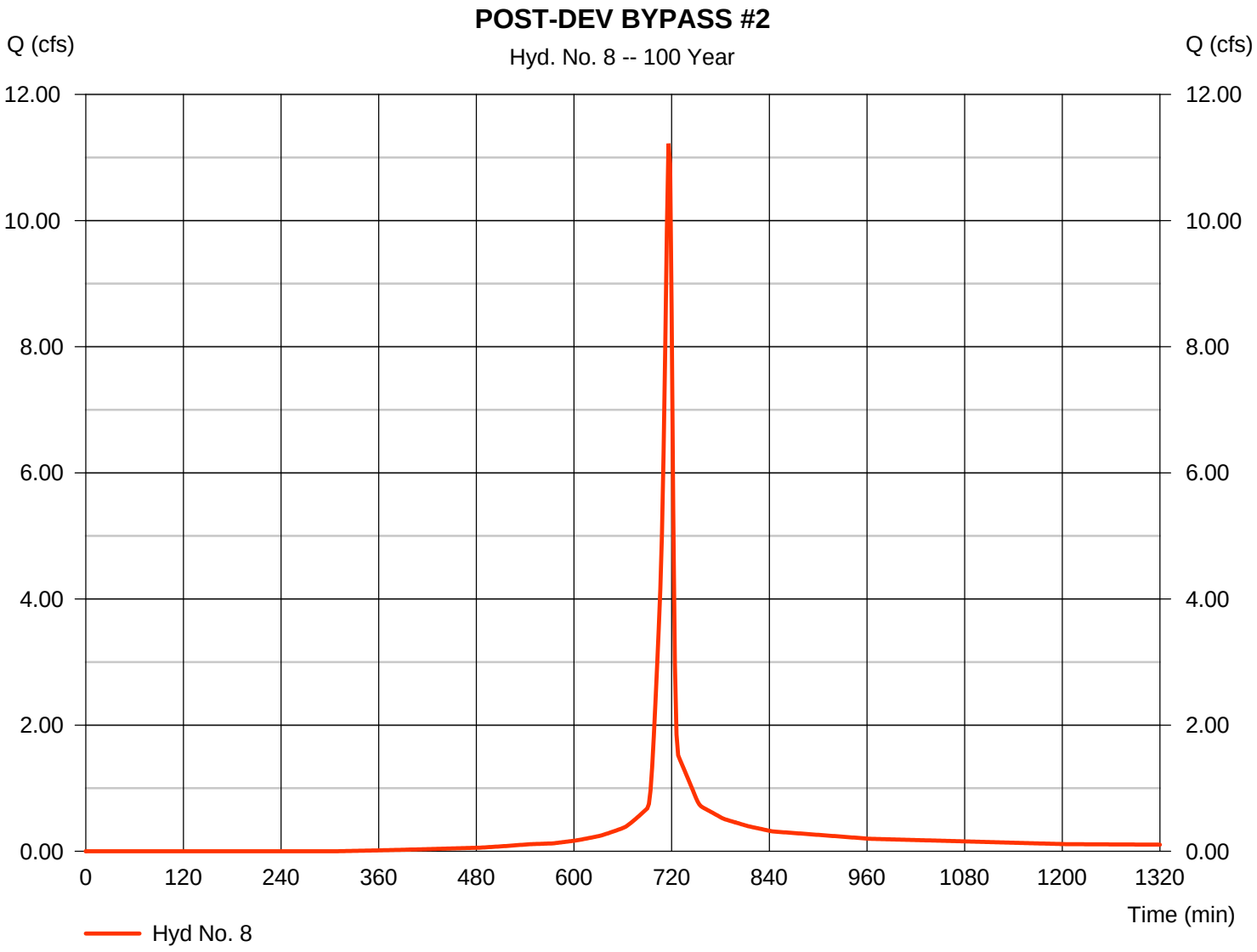


Hydrograph Report

Hyd. No. 8

POST-DEV BYPASS #2

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.22 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	23,428 cuft
Drainage area	=	1.370 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

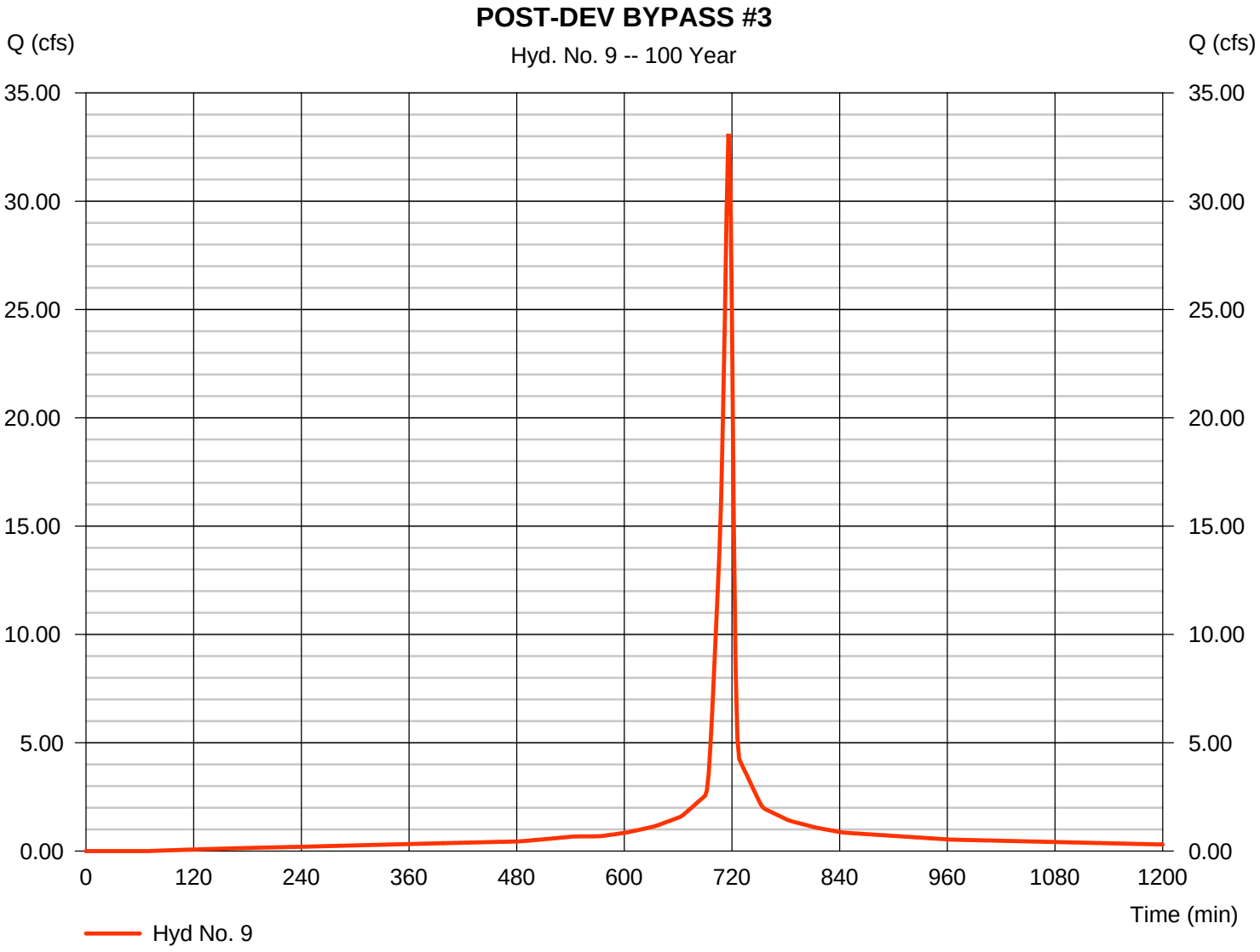


Hydrograph Report

Hyd. No. 9

POST-DEV BYPASS #3

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	77,790 cuft
Drainage area	=	3.400 ac	Curve number	=	96
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



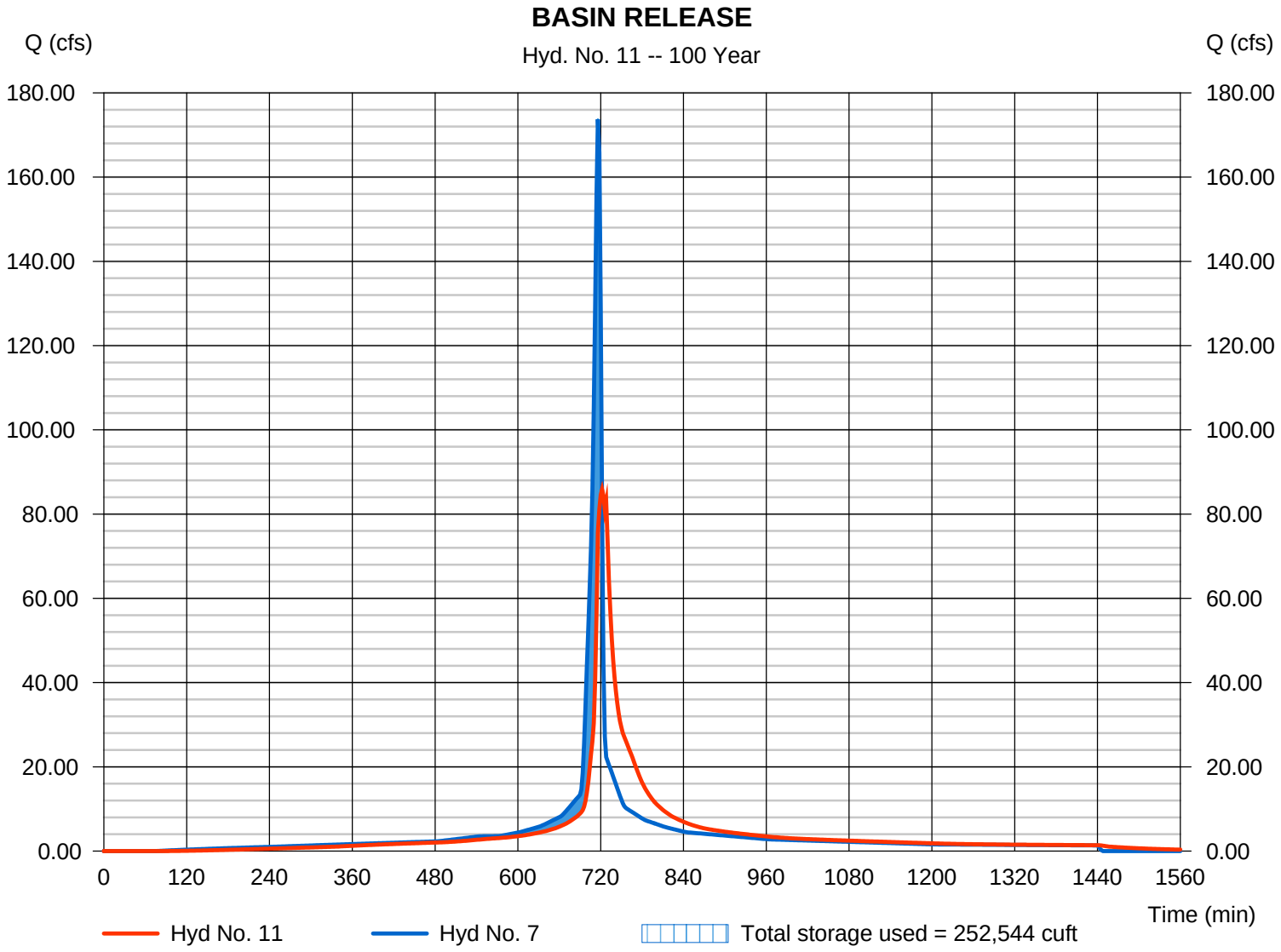
Hydrograph Report

Hyd. No. 11

BASIN RELEASE

Hydrograph type	=	Reservoir	Peak discharge	=	85.84 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	406,688 cuft
Inflow hyd. No.	=	7 - POST-DEV TO DETENTION	Max. Elevation	=	585.64 ft
Reservoir name	=	WET BASIN #1	Max. Storage	=	252,544 cuft

Storage Indication method used. Wet pond routing start elevation = 582.00 ft.

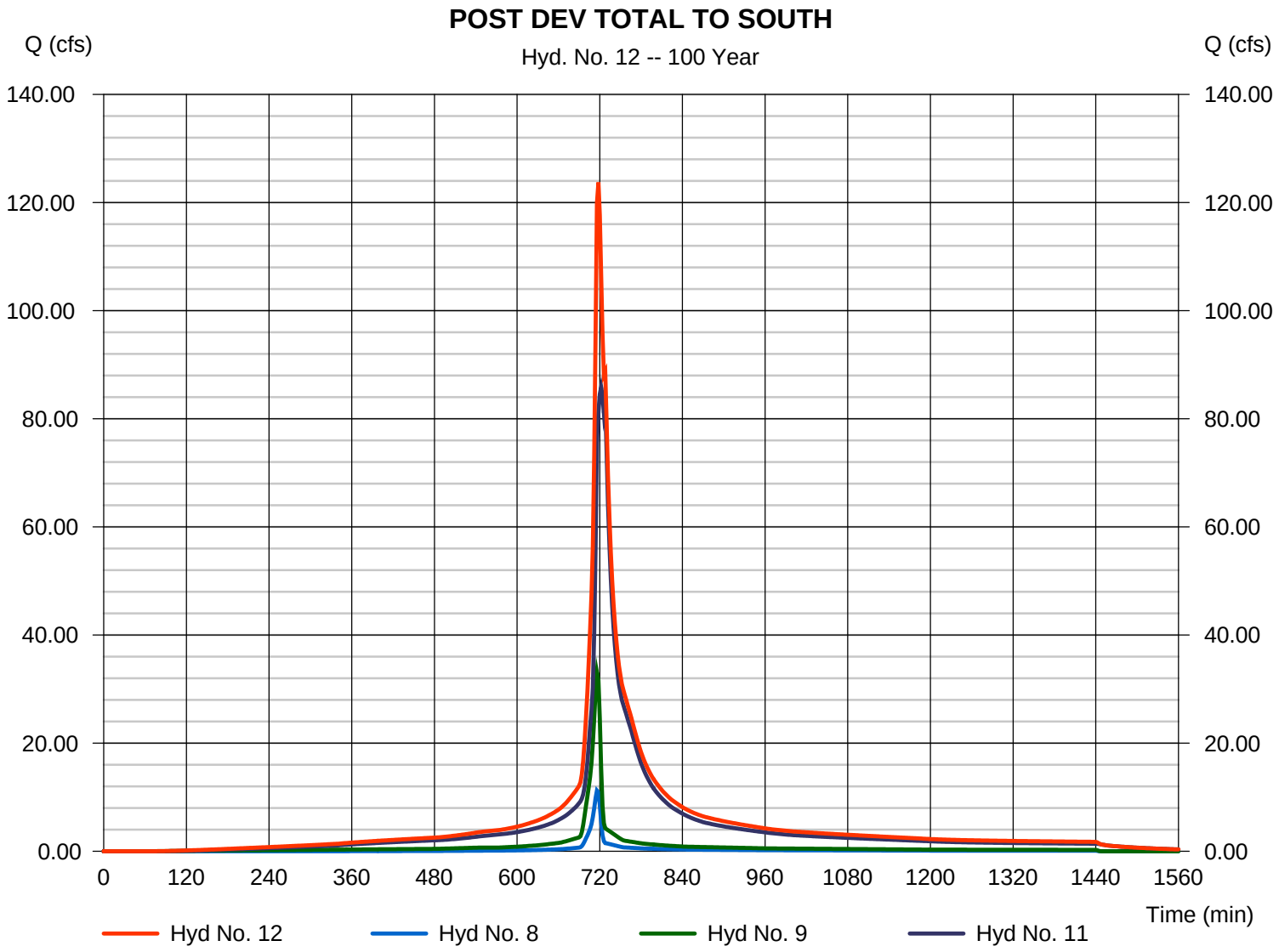


Hydrograph Report

Hyd. No. 12

POST DEV TOTAL TO SOUTH

Hydrograph type	= Combine	Peak discharge	= 123.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 507,907 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 4.770 ac



STORMWATER HYDROGRAPHS

100 YEAR STORM LOW FLOW BLOCKED

Hydrograph Report

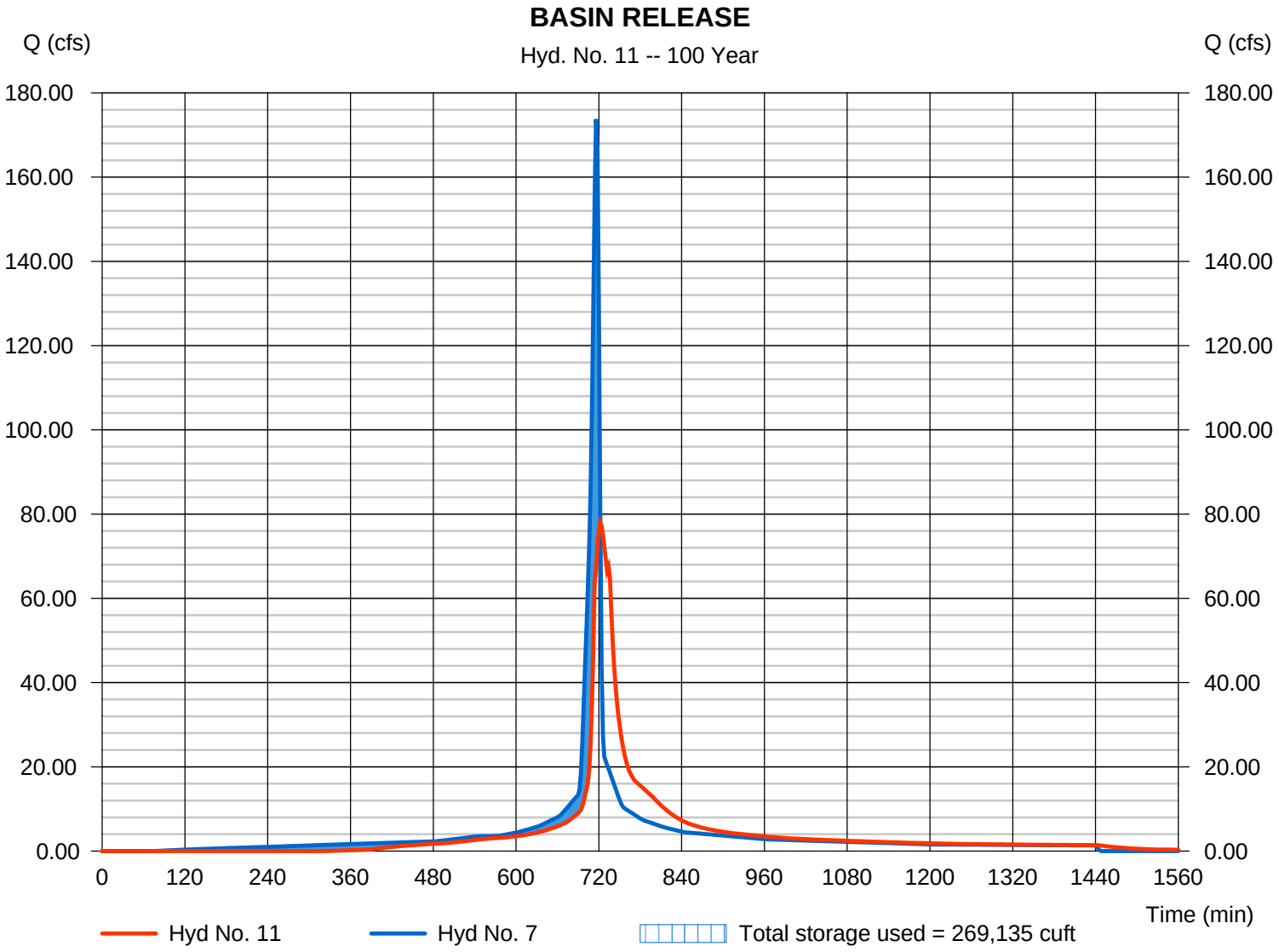
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Wednesday, 07 / 27 / 2022

Hyd. No. 11

BASIN RELEASE

Hydrograph type	= Reservoir	Peak discharge	= 78.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 395,077 cuft
Inflow hyd. No.	= 7 - POST-DEV TO DETENTION	Max. Elevation	= 586.08 ft
Reservoir name	= WET BASIN #1	Max. Storage	= 269,135 cuft

Storage Indication method used. Wet pond routing start elevation = 582.00 ft.



POND REPORT - BASINS

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Wednesday, 07 / 27 / 2022

Pond No. 2 - WET BASIN #1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 571.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	571.00	5,114	0	0
1.00	572.00	6,094	5,604	5,604
4.00	575.00	9,372	23,199	28,803
9.00	580.00	15,968	63,350	92,153
10.00	581.00	23,977	19,973	112,126
11.00	582.00	25,748	24,863	136,988
13.00	584.00	32,260	58,008	194,996
14.00	585.00	35,231	33,746	228,742
16.00	587.00	39,557	74,788	303,530
16.25	587.25	40,113	9,959	313,488

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	6.00	12.00	0.00
Span (in)	= 48.00	42.00	42.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 577.00	582.00	582.50	0.00
Length (ft)	= 64.00	1.00	1.00	0.00
Slope (%)	= 1.24	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.85	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

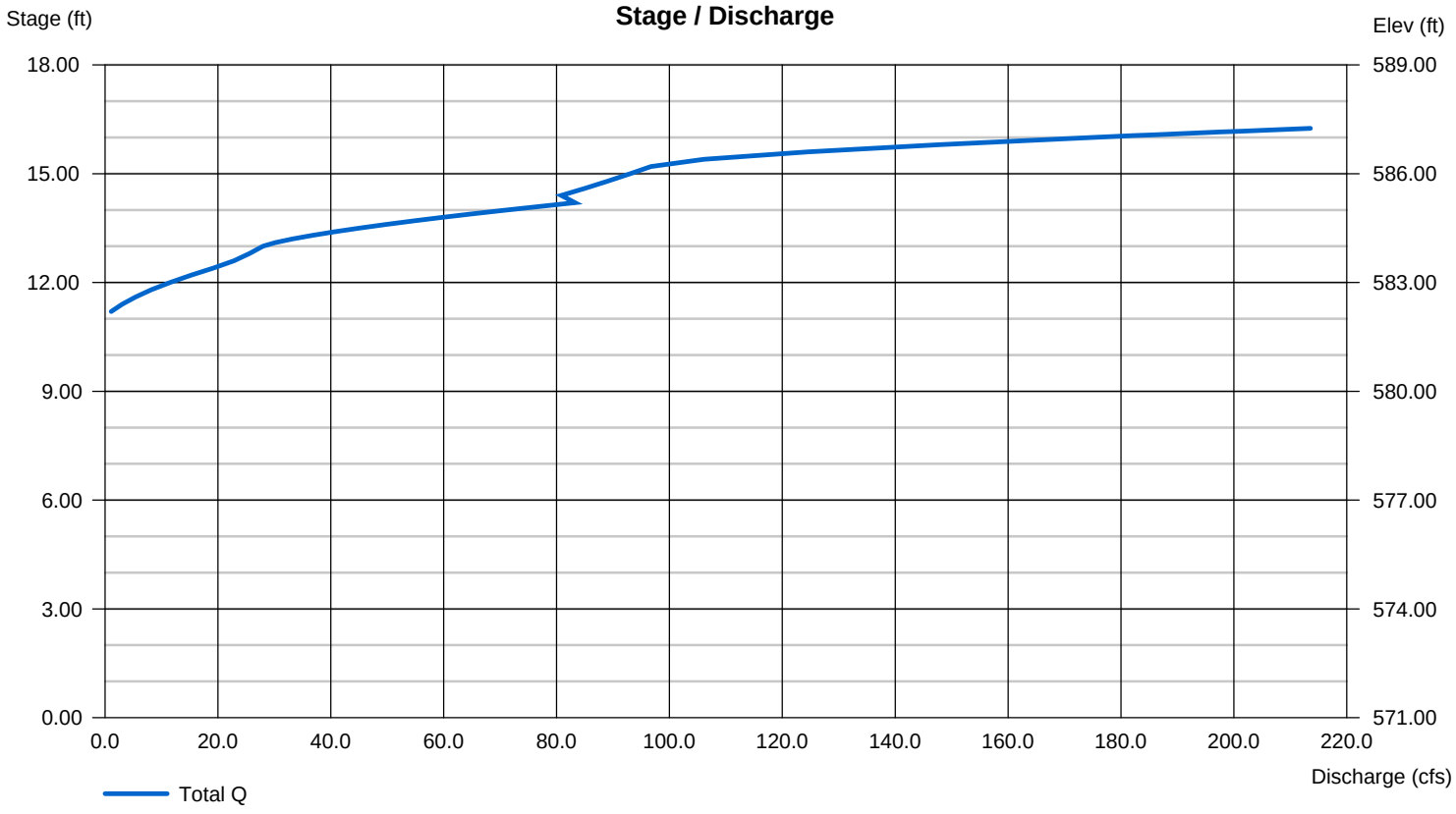
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	30.00	0.00	0.00
Crest El. (ft)	= 584.00	586.25	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	Ciplti	---
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).



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Wednesday, 07 / 27 / 2022

Pond No. 2 - WET BASIN #1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 571.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	571.00	5,114	0	0
1.00	572.00	6,094	5,604	5,604
4.00	575.00	9,372	23,199	28,803
9.00	580.00	15,968	63,350	92,153
10.00	581.00	23,977	19,973	112,126
11.00	582.00	25,748	24,863	136,988
13.00	584.00	32,260	58,008	194,996
14.00	585.00	35,231	33,746	228,742
16.00	587.00	39,557	74,788	303,530
16.25	587.25	40,113	9,959	313,488

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	6.00	12.00	0.00
Span (in)	= 48.00	42.00	42.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 577.00	582.00	582.50	0.00
Length (ft)	= 64.00	1.00	1.00	0.00
Slope (%)	= 1.24	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.85	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

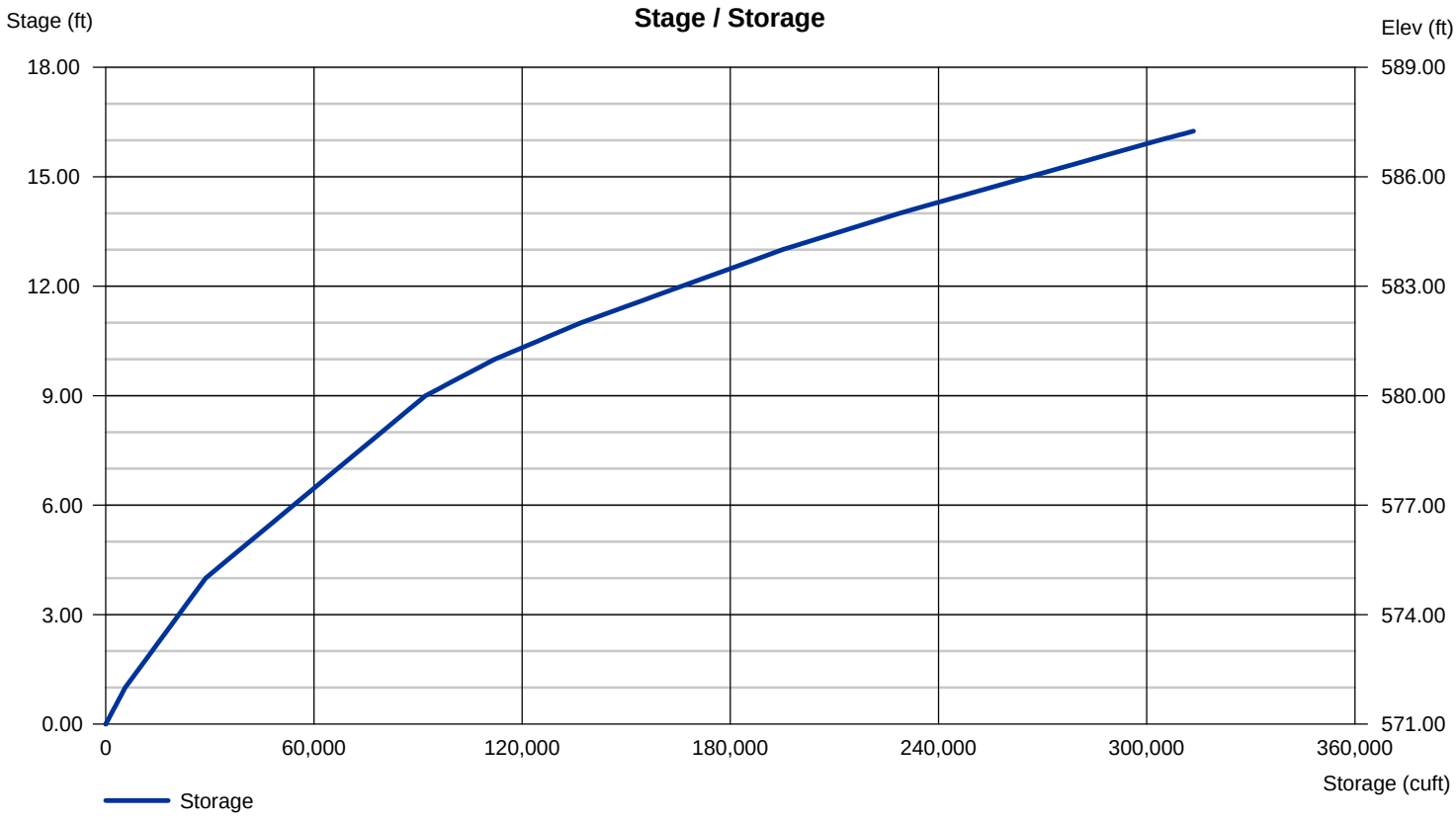
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	30.00	0.00	0.00
Crest El. (ft)	= 584.00	586.25	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	Ciplti	---
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).



POND REPORT - FOREBAYS

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 07 / 25 / 2022

Pond No. 4 - BASIN #1 FOREBAY

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 578.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	578.00	146	0	0
1.00	579.00	369	258	258
2.00	580.00	693	531	789
3.00	581.00	1,096	895	1,683
4.00	582.00	1,555	1,326	3,009
5.00	583.00	2,070	1,813	4,821
5.50	583.50	2,350	1,105	5,926
6.00	584.00	2,643	1,248	7,174
7.00	585.00	3,272	2,958	10,132

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 1.00	1.00	0.00	0.00
Span (in)	= 1.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 582.00	582.00	0.00	0.00
Length (ft)	= 11.00	1.00	0.00	0.00
Slope (%)	= 1.00	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

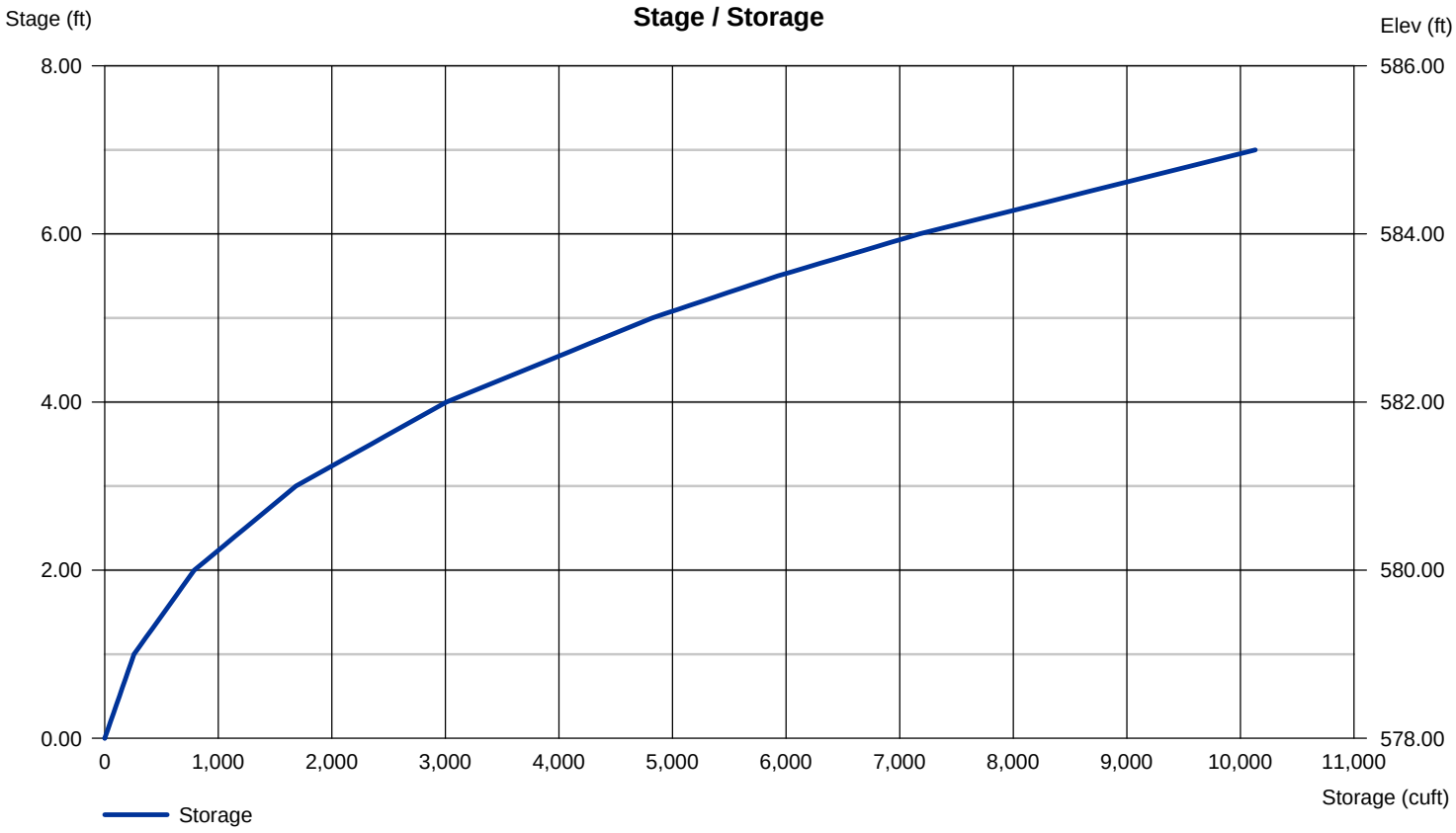
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 30.00	95.00	0.00	0.00
Crest El. (ft)	= 583.50	584.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	Ciplti	---	---
Multi-Stage	= No	No	No	No

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

TW Elev. (ft) = 582.00

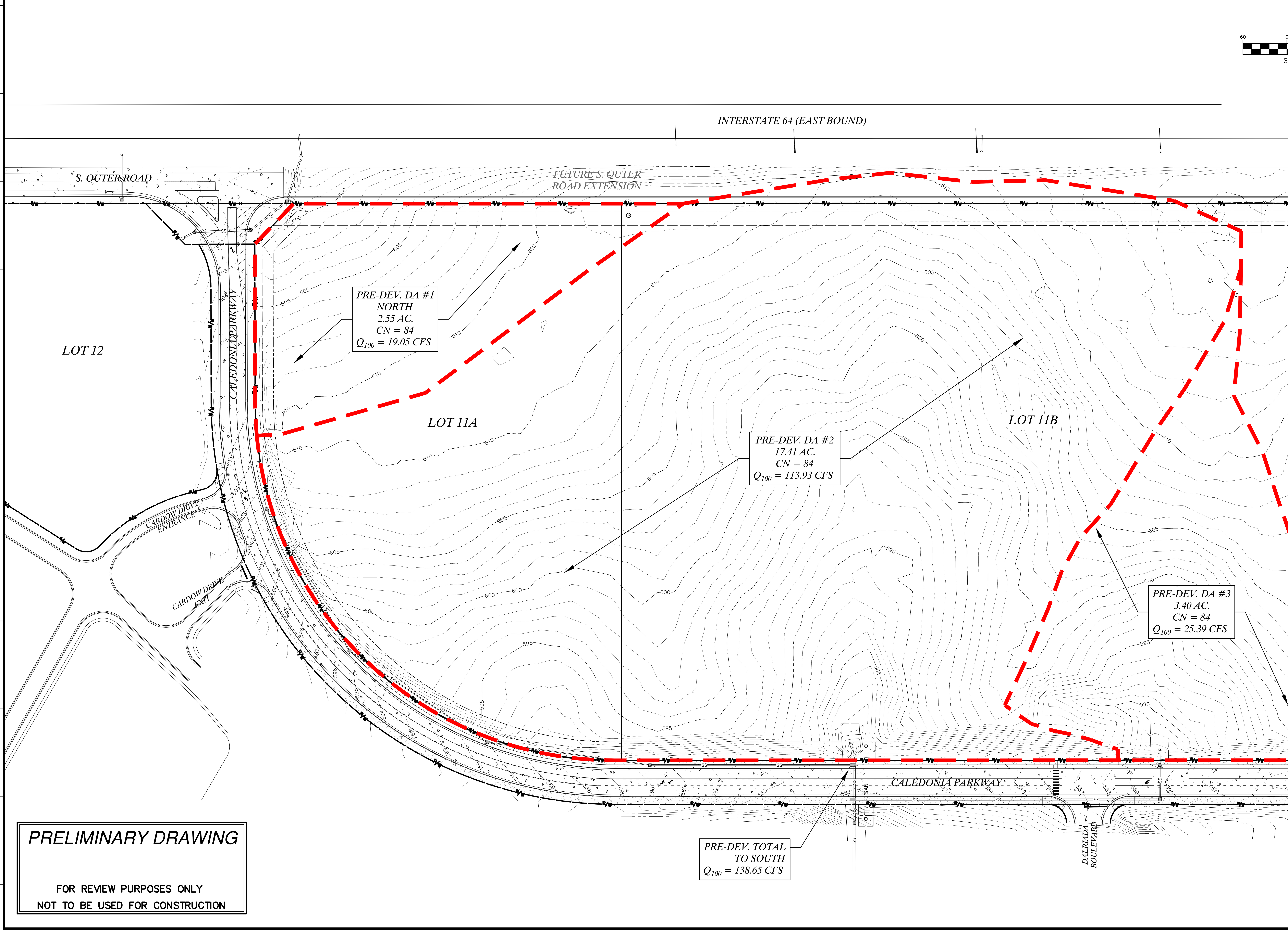
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



APPENDIX A

DRAINAGE AREA MAP

PRE-DEVELOPED DRAINAGE AREA MAP



Pre-Developed DA #1	Area (Ac.)	CN
Pavement	0.0	98.0
Residential 1/8 Acre	0.0	85.0
Residential 1/4 Acre	0.0	75.0
Streets w/ ROW	0.0	89.0
Open Space	0.0	61.0
Row Crops	0.0	75.0
Pasture	2.5	84.0
Woods	0.0	60.0
Total	2.5	84.0

Pre-Developed DA #2	Area (Ac.)	CN
Pavement	0.0	98.0
Residential 1/8 Acre	0.0	85.0
Residential 1/4 Acre	0.0	75.0
Streets w/ ROW	0.0	89.0
Open Space	0.0	61.0
Row Crops	0.0	75.0
Pasture	17.4	84.0
Woods	0.0	60.0
Total	17.4	84.0

Pre-Developed DA #3	Area (Ac.)	CN
Pavement	0.0	98.0
Residential 1/8 Acre	0.0	85.0
Residential 1/4 Acre	0.0	75.0
Streets w/ ROW	0.0	89.0
Open Space	0.0	61.0
Row Crops	0.0	75.0
Pasture	3.4	84.0
Woods	0.0	60.0
Total	3.4	84.0

PRELIMINARY DRAWING

FOR REVIEW PURPOSES ONLY
NOT TO BE USED FOR CONSTRUCTION

COCHRAN
530A E. Independence Dr.
Union, Missouri 63084
636-584-0540 (tel.)
636-584-0512 (fax)
mail@cochraneng.com
• Civil Engineering
• Land Surveying
• Architecture
• Site Development
• General Consulting
• Master Planning

Missouri State Certificate of Authority Numbers:
Survey : 000380
Engineering : 001655
Architecture : 2002014240

Three working days prior to the start of any excavation on this site, contractor shall call 1-800-DIG-RITE for utility location information.

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

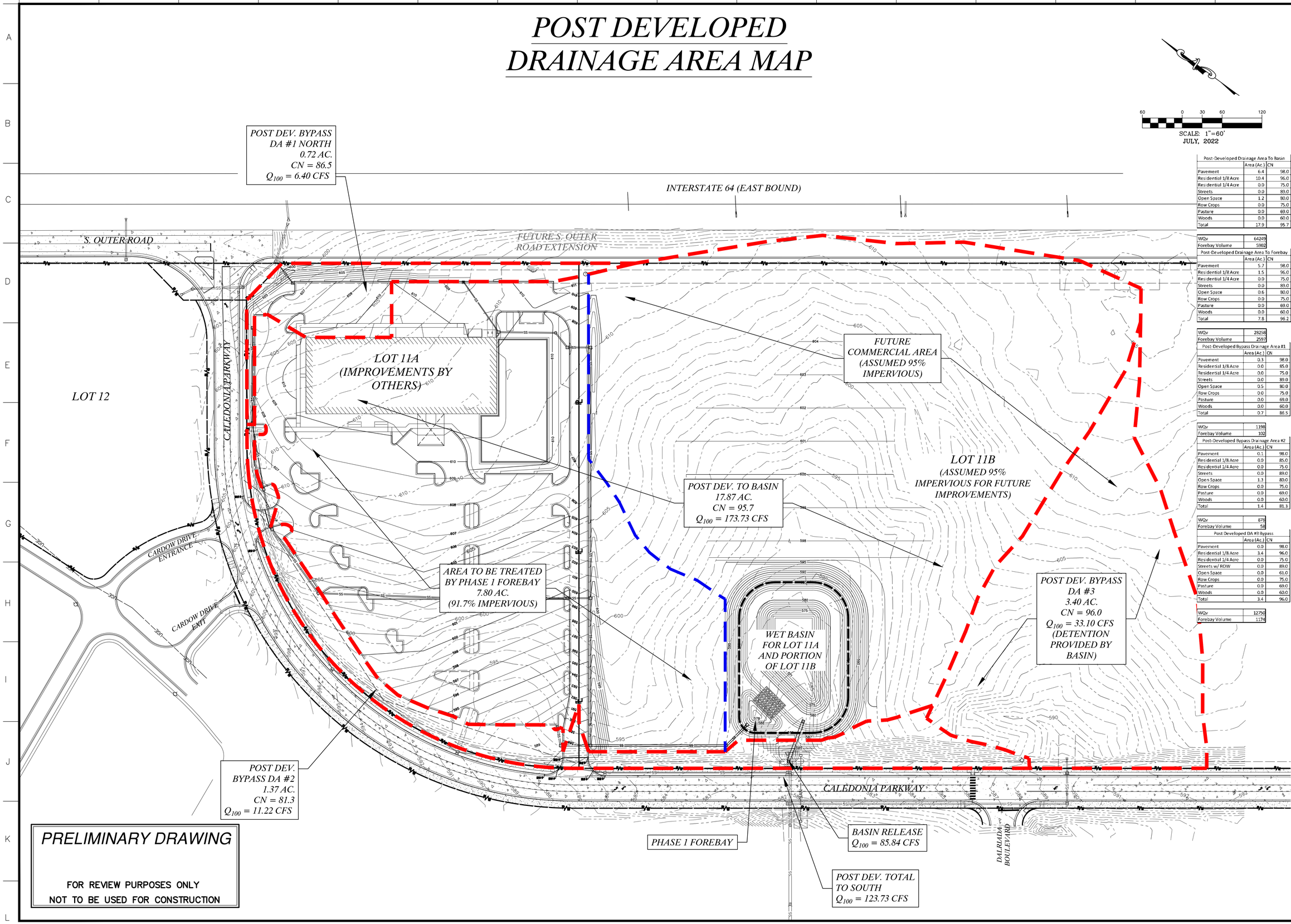
DEVELOPER PLANS
STREETS OF CALEDONIA LOT 11
O'FALLON, MISSOURI

PRE-DEVELOPED DRAINAGE AREA MAP

DWN. BY: JMM
APP'D BY: TES
DATE: JUL. 28, 2022
SCALE: 1"=60'
PROJ. NO. 22-9120
DWG. NO. C6.1

DWG NAME: F:\22-9120 - Professional Design Services for the SSM Medical Building in O'Fallon, MO\AutoCad Drawings\9120 - Plan Sheets\DEVELOPER PLANS\08 - PRE DEV DRAINAGE AREA MAP.dwg LAYOUT TAB: OVERALL PLOTTED ON: Jul 28, 2022 - 2:02pm PLOTTED BY: jmeyer

POST DEVELOPED DRAINAGE AREA MAP



Post-Developed Drainage Area To Basin		
	Area (Ac.)	CN
Pavement	6.4	98.0
Residential 1/8 Acre	10.4	96.0
Residential 1/4 Acre	0.0	75.0
Streets	0.0	89.0
Open Space	1.2	80.0
Row Crops	0.0	75.0
Pasture	0.0	69.0
Woods	0.0	60.0
Total	17.9	95.7

WQv	64249
Forebay Volume	5902

Post-Developed Drainage Area To Forebay		
	Area (Ac.)	CN
Pavement	5.7	98.0
Residential 1/8 Acre	1.5	96.0
Residential 1/4 Acre	0.0	75.0
Streets	0.0	89.0
Open Space	0.6	80.0
Row Crops	0.0	75.0
Pasture	0.0	69.0
Woods	0.0	60.0
Total	7.8	98.2

WQv	28258
Forebay Volume	2597

Post-Developed Bypass Drainage Area #1		
	Area (Ac.)	CN
Pavement	0.3	98.0
Residential 1/8 Acre	0.0	85.0
Residential 1/4 Acre	0.0	75.0
Streets	0.0	89.0
Open Space	0.5	80.0
Row Crops	0.0	75.0
Pasture	0.0	69.0
Woods	0.0	60.0
Total	0.7	86.5

WQv	1198
Forebay Volume	102

Post-Developed Bypass Drainage Area #2		
	Area (Ac.)	CN
Pavement	0.1	98.0
Residential 1/8 Acre	0.0	85.0
Residential 1/4 Acre	0.0	75.0
Streets	0.0	89.0
Open Space	1.3	80.0
Row Crops	0.0	75.0
Pasture	0.0	69.0
Woods	0.0	60.0
Total	1.4	81.3

WQv	878
Forebay Volume	58

Post Developed DA #3 Bypass		
	Area (Ac.)	CN
Pavement	0.0	98.0
Residential 1/8 Acre	3.4	96.0
Residential 1/4 Acre	0.0	75.0
Streets w/ ROW	0.0	89.0
Open Space	0.0	61.0
Row Crops	0.0	75.0
Pasture	0.0	69.0
Woods	0.0	60.0
Total	3.4	96.0

WQv	12750
Forebay Volume	1174

PRELIMINARY DRAWING

FOR REVIEW PURPOSES ONLY
NOT TO BE USED FOR CONSTRUCTION

530A E. Independence Dr.
Union, Missouri 63084
636-584-0540 (tel.)
636-584-0542 (fax)
mail@ochraneng.com
OCHRAN
• Civil Engineering • Site Development
• Land Surveying • General Consulting
• Architecture • Master Planning
Missouri State Certificate of Authority Numbers:
Survey : 000380
Engineering : 001655
Architecture: 2002014240

Three working days prior to the start of any excavation on this site, contractor shall contact all utilities for utility location information.

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

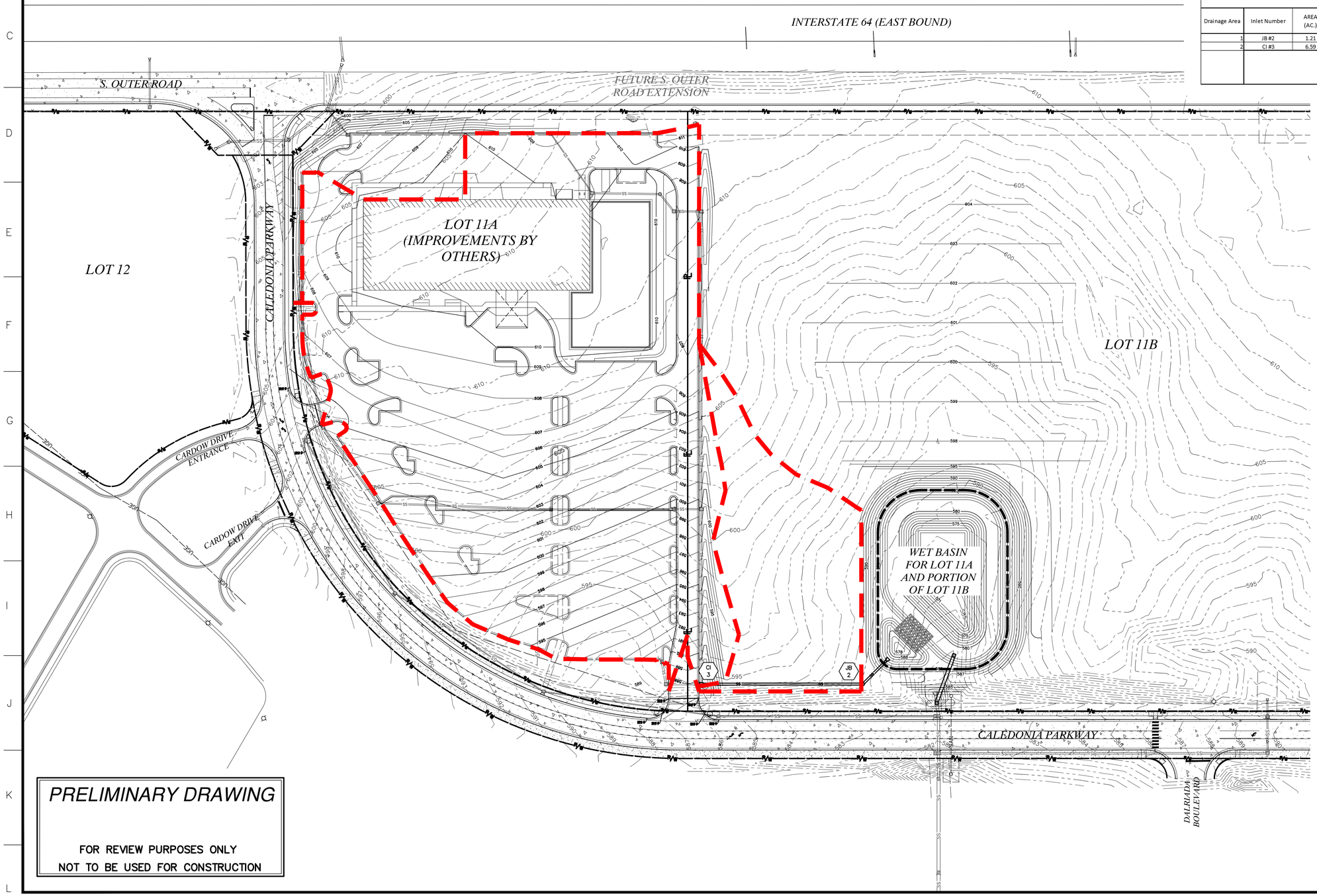
DEVELOPER PLANS
STREETS OF CALEDONIA LOT 11
O'FALLON, MISSOURI

POST DEVELOPED DRAINAGE AREA MAP

DATE	REVISION	DRN. BY	APPD. BY

DRN. BY: JMM
APPD. BY: TES
DATE: JUL. 28, 2022
SCALE: 1"=60'
PROJ. NO: 22-9120
DWG. NO: C6.2

STORM SEWER DRAINAGE AREA MAP



60 0 30 60 120

SCALE: 1"=60'
JULY, 2022

DRAINAGE TABLE

Drainage Area	Inlet Number	AREA (AC.)	% IMPERVIOUS	15 YEAR - 20 MIN P.I. VALUE (CFS/AC.)	15 YEAR - 20 MIN RUNOFF (CFS)	100 YEAR - 20 MIN P.I. VALUE (CFS/AC.)	100 YEAR - 20 MIN RUNOFF (CFS)
1	JB #2	1.21	100%	3.54	4.28	4.77	5.77
2	CI #3	6.59	87%	3.3	21.75	4.45	29.32

Q=API
Q= Runoff
A= Area (AC.)
P.I.= (CFS/AC.)

Percent Impervious	20 MIN DURATION 15 YEAR	100 YEAR
5%	1.70	2.29
10%	1.79	2.42
15%	1.89	2.54
20%	2.00	2.70
25%	2.09	2.82
30%	2.19	2.95
35%	2.28	3.07
40%	2.39	3.22
45%	2.48	3.35
50%	2.58	3.47
55%	2.67	3.60
60%	2.76	3.72
65%	2.88	3.88
70%	2.97	4.00
75%	3.06	4.12
80%	3.15	4.25
85%	3.24	4.37
90%	3.36	4.53
95%	3.45	4.65
100%	3.54	4.77

PRELIMINARY DRAWING

FOR REVIEW PURPOSES ONLY
NOT TO BE USED FOR CONSTRUCTION

636-584-0540 (tel.)
636-584-0542 (fax)
mail@ochraneng.com
530A E. Independence Dr.
Union, Missouri 63084
OCHRAN
• Civil Engineering • Land Surveying • Architecture • Site Development • General Consulting • Master Planning

Missouri State Certificate of Authority Numbers:
Survey : 000380
Engineering : 001655
Architecture: 2002014240

Three working days prior to the start of any excavation on this site, contractor shall call Missouri One Call for utility location information.

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

DEVELOPER PLANS
STREETS OF CALEDONIA LOT 11
O'FALLON, MISSOURI

STORM SEWER DRAINAGE AREA MAP

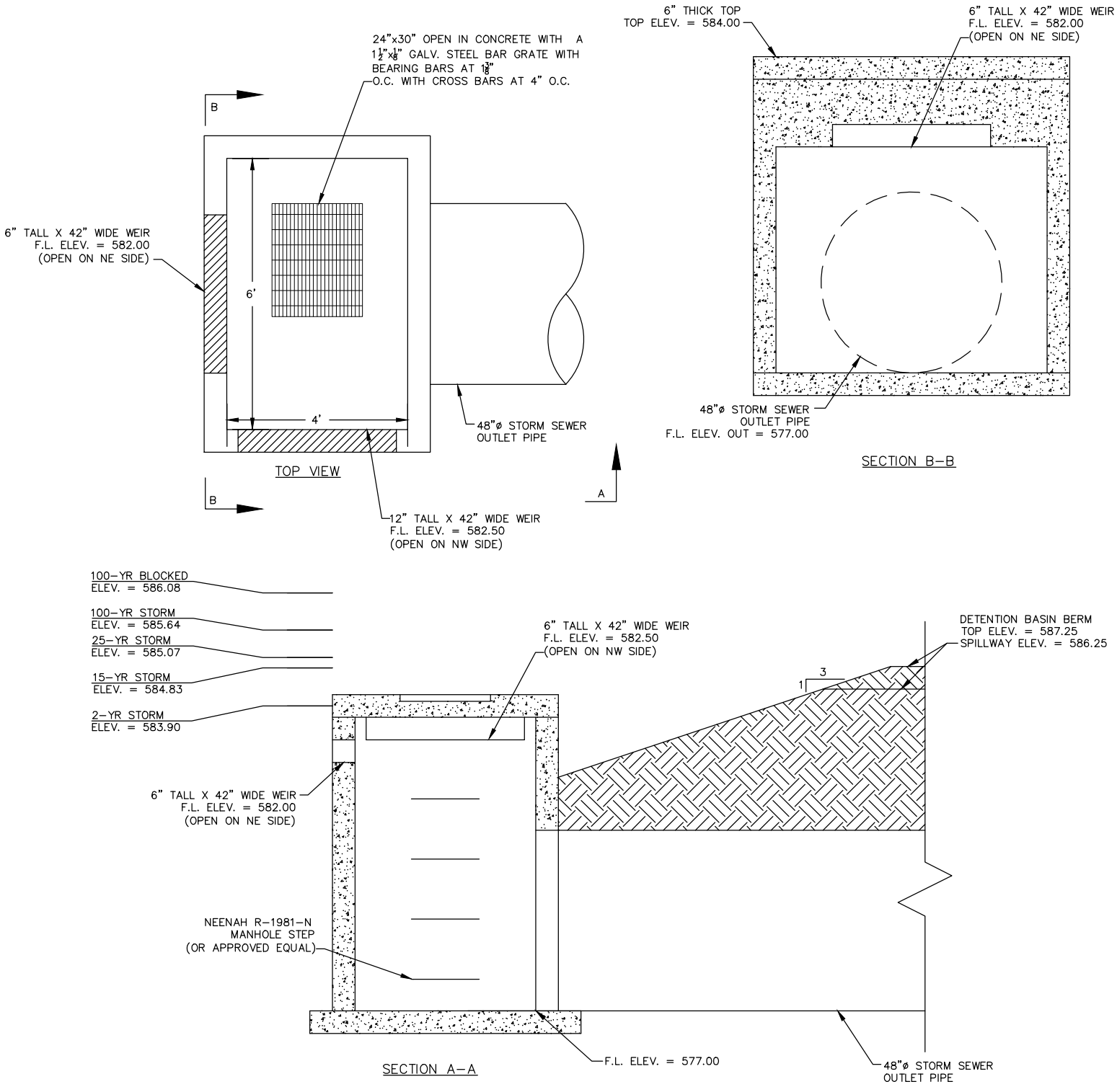
DRN. BY:	APP'D. BY:
JMM	TES

DATE: JUL. 28, 2022
SCALE: 1"=60'
PROJ. NO: 22-9120
DWG. NO: C6.3

DWG NAME: F:\22-9120 - Professional Design Services for the SSM Medical Building in O'Fallon, MO\AutoCad Drawings\9120 - Plan Sheets\DEVELOPER PLANS\10 - STORM SEWER DRAINAGE AREA MAP.dwg LAYOUT TAB: OVERALL PLOTTED ON: Jul 28, 2022 - 2:04pm PLOTTED BY: jmeyer

APPENDIX B

OUTLET STRUCTURE DETAIL



DEVELOPER DETENTION BASIN OUTLET STRUCTURE

NO SCALE