

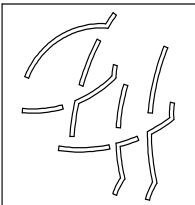


Zebulon Public Safety Station

201 W Judd St
Zebulon, NC 27597

Stormwater Management Design Narrative & Calculations

2nd CD Submittal
April 2025



Prepared by:
CLH Design, pa

CONTENTS

Design Narrative

Maps

Quad Map

Soils Map

FEMA Map

Supporting Calculations

Pre/Post Development Analysis

Storm Drainage System

Outlet Protection Design

Hydraflow Calculations

Stormwater Management Design Narrative
Wendell Public Works Facility
CLH Project No.: 22-154
April 2025

PROJECT DESCRIPTION

The Zebulon Public Safety Station project site is located on a 11.13-acre property in Zebulon, NC. This project proposes dividing the existing property and extending the street right-of-way, creating a new 4.93-acre property for the construction of a new emergency responder facility. The proposed construction includes a new building and associated parking, curb and gutter, sidewalks, storm drainage, utilities, landscaping, etc. The construction area is currently undeveloped. The proposed elements will result in a Built-Upon Area (BUA) of 1.97-acres, approximately 40% of the new property.

Soils on the site consist mostly of Wedowee-Urban land complex (WgB – Hydrologic Soil Group B).

The site is located within the Neuse river basin and stormwater runoff from the property discharges southwest towards Little River (Stream Index: 27-57-(8.5), Classification WS-V;NSW). The project site is not within the Little River water supply watershed or any others.

FEMA FIRM #3720270500K, dated 07/19/2022, indicates that the site does not reside within any flood hazard areas. The FEMA map is provided for reference.

VOLUME MANAGEMENT

The site is designed to meet the Wake County stormwater requirements for peak runoff flow. Our analysis splits the site into two drainage areas. Drainage area A is located on the western side of the property and drains towards the existing wetlands. Drainage area B is located on the eastern side of the property and drains into the road's stormwater drainage pipe system. A constructed wetland SCM will be installed in both drainage areas, labeled SCM-1 and SCM-2. These SCM's have sufficient detention to allow their respective drainage areas to meet the overall pre-development flow rates for the 1-yr, 10-yr, and 100-yr 24-hr storm events.

The time of concentrations were conservatively assumed to be 5 minutes. The stormwater flow calculations were performed with Hydraflow Hydrographs Extension for AutoCAD Civil 3D software which utilizes the SCS method.

The summary of the Hydraflow routing is as follows. Refer to Pre/Post Development Analysis and Hydraflow Calculations for more details.

Area A Stormwater Peak Flow Summary	Pre-Development	Post-Development (without detention)	Post-Development (with detention)	Pre/Post Volume Reduction?
1-yr, 24-hr Storm	0.629 cfs	3.151 cfs	0.232 cfs	Yes
10-yr, 24-hr Storm	6.790 cfs	11.19 cfs	4.935 cfs	Yes
100-yr, 24-hr Storm	17.51 cfs	23.10 cfs	17.00 cfs	Yes

Area B Stormwater Peak Flow Summary	Pre-Development	Post-Development (without detention)	Post-Development (with detention)	Pre/Post Volume Reduction?
1-yr, 24-hr Storm	1.384 cfs	4.460 cfs	1.057 cfs	Yes
10-yr, 24-hr Storm	6.732 cfs	11.95 cfs	4.460 cfs	Yes
100-yr, 24-hr Storm	15.06 cfs	22.14 cfs	14.44 cfs	Yes

NUTRIENT CONTROL

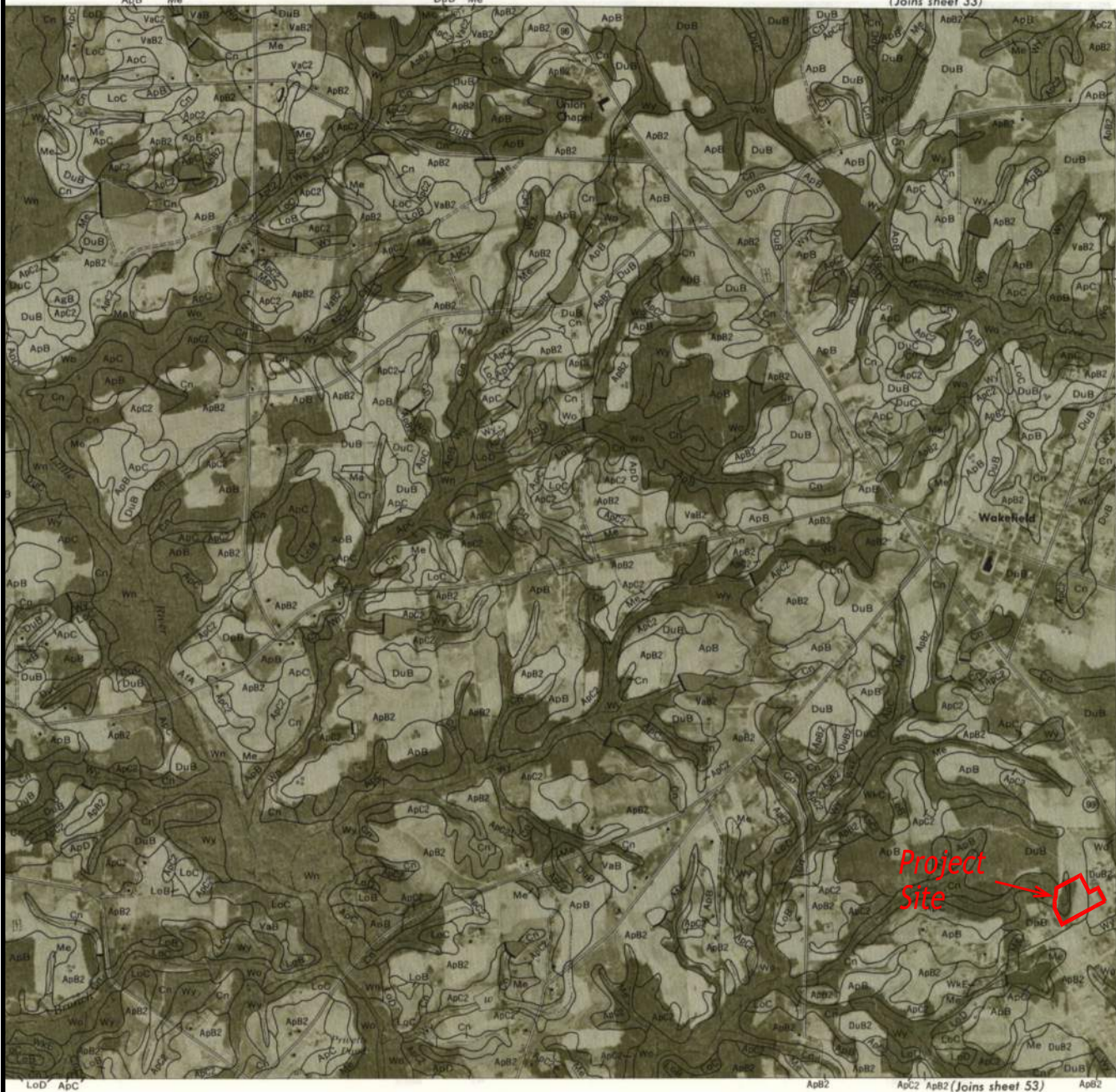
This project proposes reducing nitrogen export by utilizing a wet pond SCM. Refer to SNAP tool. The runoff from approximately 1.7-ac (86%) of the site's proposed impervious areas will be directed to the wet pond for treatment. This will reduce the on-site nitrogen loading rate to 5.71 lbs/ac/yr, see Wake County Municipal Stormwater Tool. The target nitrogen loading rate is 3.60-lb/ac/yr, thus an offset fee will be required.

Maps

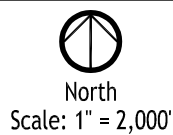
WAKE COUNTY, NORTH CAROLINA - SHEET NUMBER 43

(Joins sheet 33)

43

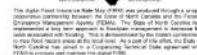


Town of Zebulon
Zebulon Public Safety Station

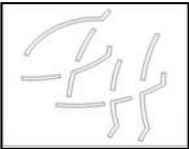


Portion of NRCS Soil Map

Wake County, NC - #43



Supporting Calculations

STORMWATER PRE/POST DEVELOPMENT ANALYSIS		DATE 4/28/2025	
PROJECT NAME Zebulon Public Safety Station		PROJECT NO 22-154	
LOCATION Zebulon, NC		BY KAS	

STORMWATER ANALYSIS POINT: 'A'

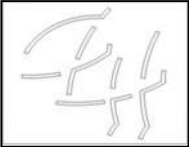
Runoff Calculations

Pre-Development On-Site:

Site Area	=	3.33 ac		
Site Soils:		(Hydrologic Soil Group B)		
Wooded Area:		1.75 ac	CN=	55
Impervious Area:		0.00 ac	CN=	98
Lawn Area:		1.58 ac	CN=	61
Weighted CN:				57.8

Post-Development On-Site:

Site Area	=	3.10 ac		
Site Soils:		(Hydrologic Soil Group B)		
Wooded Area:		1.32 ac	CN=	55
Impervious Area:		0.95 ac	CN=	98
Lawn Area:		0.83 ac	CN=	61
Future Impervious:		0.00 ac	CN=	98
Weighted CN:				69.8

STORMWATER PRE/POST DEVELOPMENT ANALYSIS		DATE 4/28/2025	
PROJECT NAME Zebulon Public Safety Station		PROJECT NO 22-154	
LOCATION Zebulon, NC		BY KAS	

STORMWATER ANALYSIS POINT: 'B'

Runoff Calculations

Pre-Development On-Site:

Site Area	=	1.56 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.00 ac	CN=		98
Lawn Area:		1.56 ac	CN=		61
Weighted CN:					61.0

Pre-Development Off-Site:

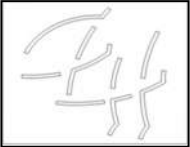
Site Area	=	0.81 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.19 ac	CN=		98
Lawn Area:		0.62 ac	CN=		61
Weighted CN:					69.7

Post-Development On-Site:

Site Area	=	1.79 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		1.02 ac	CN=		98
Lawn Area:		0.77 ac	CN=		61
Future Impervious:		0.00 ac	CN=		98
Weighted CN:					82.1

Post-Development Off-Site:

Site Area	=	0.74 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.13 ac	CN=		98
Lawn Area:		0.61 ac	CN=		61
Future Impervious:		0.00 ac	CN=		98
Weighted CN:					67.5

STORMWATER PRE/POST DEVELOPMENT ANALYSIS		DATE 4/28/2025	
PROJECT NAME Zebulon Public Safety Station		PROJECT NO 22-154	
LOCATION Zebulon, NC		BY KAS	

STORMWATER ANALYSIS POINT:		'SCM-1 & Bypass'	
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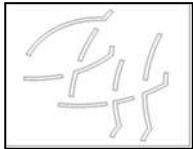
Runoff Calculations

SCM-1:

Site Area	=	1.38 ac		
Site Soils:		(Hydrologic Soil Group B)		
Wooded Area:		0.00 ac	CN=	55
Impervious Area:		0.95 ac	CN=	98
Lawn Area:		0.43 ac	CN=	61
Weighted CN:				86.5

Area A Bypass:

Site Area	=	1.72 ac		
Site Soils:		(Hydrologic Soil Group B)		
Wooded Area:		1.32 ac	CN=	55
Impervious Area:		0.00 ac	CN=	98
Lawn Area:		0.40 ac	CN=	61
Weighted CN:				56.4

STORMWATER PRE/POST DEVELOPMENT ANALYSIS		DATE 4/28/2025	
PROJECT NAME Zebulon Public Safety Station		PROJECT NO 22-154	
LOCATION Zebulon, NC		BY KAS	

STORMWATER ANALYSIS POINT: 'SCM-2 & Bypass'

Runoff Calculations

SCM-2 On-Site:

Site Area	=	1.12 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.75 ac	CN=		98
Lawn Area:		0.37 ac	CN=		61
Weighted CN:					85.8

SCM-2 Off-Site:

Site Area	=	0.74 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.13 ac	CN=		98
Lawn Area:		0.61 ac	CN=		61
Future Impervious:		0.00 ac	CN=		98
Weighted CN:					67.5

Area B On-Site Bypass:

Site Area	=	0.67 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.27 ac	CN=		98
Lawn Area:		0.40 ac	CN=		61
Weighted CN:					75.9

Area B Off-Site Bypass:

Site Area	=	0.00 ac			
Site Soils:		(Hydrologic Soil Group B)			
Wooded Area:		0.00 ac	CN=		55
Impervious Area:		0.00 ac	CN=		98
Lawn Area:		0.00 ac	CN=		61
Future Impervious:		0.00 ac	CN=		98
Weighted CN:					#DIV/0!

	STORM DRAINAGE / HYDRAULIC GRADE LINE							DATE		DESIGN PHASE			
	ANALYSIS							4/28/2025		PRELIM	/ /		
	PROJECT NAME							PROJECT NO		CONSTR	/X/		
	Zebulon Public Safety Station							22-154		REVISION	/ /		
	LOCATION							BY		RECORD	/ /		
	Zebulon, NC							KAS		OTHER	/ /		
							CHECKED BY		(SPECIFY)				
							-						
Storm Event=	10												
n=	0.013	STORM DRAINAGE SCHEDULE									CONTINUED →		
m=	-1.99												
b=	10.34												
l=	7.14												
					INLET					Tc	I	Cc	
					Cc	INLET	TOTAL	INLET	PIPE	TIME			
FROM	TO	INLET	INLET	IMPERVIOUS	RUNOFF	DISCHARGE	AREAS	TIME	TIME	OF CONC.	INTENSITY	RUNOFF	
		AREA	AREA	(%)	COEFF.	(CFS)	(AC)	(MIN)	(MIN)	(MIN)	(IN/HR)	COEFF.	
		(SF)	(AC)										
A1	A2	4,350	0.10	63	0.71	0.00	0.10	5.00	0.00	5.00	7.14	0.71	
A2	A3	7,210	0.17	56	0.66	0.78	0.27	5.00	0.35	5.35	7.01	0.68	
A3	A4	23,350	0.54	95	0.92	3.51	0.80	5.00	1.06	6.06	6.76	0.84	
A4	A5	12,010	0.28	99	0.94	1.86	1.08	5.00	1.90	6.90	6.50	0.87	
B1	B2	29,340	0.67	53	0.64	0.00	0.67	5.00	0.00	5.00	7.14	0.64	
B2	B3	18,270	0.42	35	0.53	1.58	1.09	5.00	0.29	5.29	7.03	0.60	
B3	B4	18,170	0.42	66	0.73	2.17	1.51	5.00	0.68	5.68	6.89	0.64	
C1	C2	4,710	0.11	92	0.90	0.00	0.11	5.00	0.00	5.00	7.14	0.90	
D1	EX1	30,340	0.70	62	0.70	0.00	0.70	5.00	0.00	5.00	7.14	0.70	
EX2	E1	22,700	0.52	67	0.74	0.00	0.52	5.00	0.00	5.00	7.14	0.74	
E1	EX4	2,260	0.05	76	0.79	0.29	0.57	5.00	0.08	5.08	7.11	0.74	
EX4	E2	0	0.00	100	0.95	0.00	0.57	5.00	0.27	5.27	7.04	0.74	
E2	E3	0	0.00	100	0.95	0.00	0.57	5.00	0.48	5.48	6.96	0.74	
E3	E4	0	0.00	100	0.95	0.00	0.57	5.00	0.76	5.76	6.86	0.74	
E4	EX5	84,700	1.94	57	0.67	9.31	2.52	5.00	1.29	6.29	6.69	0.69	
EX3	EX4	4,900	0.11	100	0.95	0.00	0.11	5.00	0.00	5.00	7.14	0.95	
SCM-1 Outlet Barrel		*Refer to Hydraflow report for discharge calculations											

	STORM DRAINAGE / HYDRAULIC GRADE LINE							DATE		DESIGN PHASE			
	ANALYSIS							4/28/2025		PRELIM		/ /	
	PROJECT NAME							PROJECT NO		CONSTR		/ X /	
	Zebulon Public Safety Station							22-154		REVISION		/ /	
	LOCATION							BY		RECORD		/ /	
	Zebulon, NC							KAS		OTHER		/ /	
							CHECKED BY		(SPECIFY)				
							-						
Storm Event=	10												
n=	0.013	STORM DRAINAGE SCHEDULE - CONTINUED											
m=	-1.99												
b=	10.34												
l=	7.14	Q	Q									UPSTREAM	
FROM	TO	DISCHARGE	SIDE- STREAM	SLOPE	DIA.	CAPACITY	V FULL	LENGTH	SEGMENT	UPPER	LOWER	TOP	PIPE
		(CFS)	(CFS)	(FT/FT)	(IN)	(FULL) (CFS)	(FPS)	(FT)	TIME (MIN)	INV. (FT)	INV. (FT)	ELEV. (FT)	COVER (FT)
A1	A2	0.51	0.00	0.0060	15	5.0	4.1	84	0.35	328.10	327.60	332.00	2.54
A2	A3	1.27	0.00	0.0062	15	5.1	4.1	177	0.71	327.50	326.40	331.90	3.04
A3	A4	4.55	0.00	0.0068	15	5.3	4.4	219	0.84	326.30	324.80	331.15	3.49
A4	A5	6.07	0.00	0.0071	18	8.9	5.0	28	0.09	324.70	324.50	331.82	5.48
B1	B2	3.10	0.00	0.0067	15	5.3	4.3	75	0.29	327.80	327.30	331.25	2.09
B2	B3	4.61	0.00	0.0062	15	5.1	4.1	97	0.39	327.20	326.60	330.75	2.19
B3	B4	6.61	0.00	0.0076	18	9.1	5.2	33	0.11	326.50	326.25	331.05	2.91
C1	C2	0.69	0.00	0.0603	15	15.9	12.9	29	0.04	328.00	326.25	332.00	2.64
D1	EX1	3.50	0.00	0.0091	15	6.2	5.0	11	0.04	325.60	325.50	328.40	1.44
EX2	E1	2.74	0.00	0.0096	15	6.3	5.2	26	0.08	328.24	327.99	331.25	1.65
E1	EX4	3.02	0.00	0.0102	15	6.5	5.3	60	0.19	327.99	327.38	331.25	1.90
EX4	E2	3.75	0.76	0.0109	15	6.7	5.5	67	0.20	327.28	326.55	330.90	2.26
E2	E3	3.72	0.00	0.0053	15	4.7	3.8	66	0.29	326.45	326.10	330.25	2.44
E3	E4	3.67	0.00	0.0051	15	4.6	3.7	118	0.52	326.00	325.40	329.50	2.14
E4	EX5	15.09	2.78	0.0045	24	15.3	4.8	22	0.08	325.30	325.20	328.06	0.58
EX3	EX4	0.76	0.00	0.0208	6	0.8	4.1	106	0.43	330.68	328.48	333.58	2.35
SCM-1 Outlet Barrel		2.57	0.00	0.0103	15	6.5	5.3	39	0.12	324.40	324.00	326.75	0.99

	STORM DRAINAGE / HYDRAULIC GRADE LINE					DATE				DESIGN PHASE		
	ANALYSIS					4/28/2025				PRELIM	/ /	
	PROJECT NAME					PROJECT NO				CONSTR	/X/	
	Zebulon Public Safety Station					22-154				REVISION	/ /	
	LOCATION					BY				RECORD	/ /	
	Zebulon, NC					KAS				OTHER	/ /	
					CHECKED BY				(SPECIFY)			
					-							
Storm Event=	10											
n=	0.013	HYDRAULIC GRADE LINE										CONTINUED →
m=	-1.99						BEND LOSS		K's			
b=	10.34						90° = 0.70	70° = 0.61	50° = 0.47	30° = 0.28	20° = 0.16	
l=	7.14						80° = 0.66	60° = 0.55	40° = 0.38	25° = 0.22	15° = 0.10	
		PIPE	HYDRAULIC	SIDESTREAM	HEAD LOSS					BEND	FRICTION	FRICTION
FROM	TO	AREA	RADIUS	SUMMATION	Hf	Hc	He	Hb	Ht	LOSS	SLOPE	VELOCITY
		(FT)	(FT)	(CFS)						K	(FT/FT)	(FPS)
A1	A2	1.2272	0.3125	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.0001	0.41
A2	A3	1.2272	0.3125	0.00	0.07	0.00	0.00	0.00	0.07	0.38	0.0004	1.03
A3	A4	1.2272	0.3125	0.00	1.08	0.05	0.01	0.01	1.15	0.45	0.0049	3.69
A4	A5	1.7671	0.3750	0.00	0.09	0.05	0.07	0.15	0.36	0.70	0.0033	3.42
B1	B2	1.2272	0.3125	0.00	0.17	0.02	0.00	0.00	0.20	0.00	0.0023	2.52
B2	B3	1.2272	0.3125	0.00	0.49	0.05	0.03	0.01	0.59	0.10	0.0051	3.74
B3	B4	1.7671	0.3750	0.00	0.13	0.05	0.08	0.15	0.41	0.70	0.0039	3.72
C1	C2	1.2272	0.3125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0001	0.56
D1	EX1	1.2272	0.3125	0.00	0.03	0.03	0.00	0.00	0.06	0.00	0.0029	2.84
EX2	E1	1.2272	0.3125	0.00	0.05	0.02	0.00	0.00	0.07	0.00	0.0018	2.22
E1	EX4	1.2272	0.3125	0.00	0.13	0.02	0.03	0.00	0.18	0.00	0.0022	2.45
EX4	E2	1.2272	0.3125	0.76	0.22	0.04	0.03	0.01	0.30	0.10	0.0034	3.04
E2	E3	1.2272	0.3125	0.76	0.22	0.04	0.05	0.03	0.34	0.22	0.0033	3.02
E3	E4	1.2272	0.3125	0.76	0.38	0.03	0.05	0.09	0.56	0.66	0.0032	2.98
E4	EX5	3.1416	0.5000	3.54	0.10	0.09	0.05	0.10	0.33	0.70	0.0044	4.78
EX3	EX4	0.1963	0.1250	0.00	1.96	0.06	0.00	0.00	2.02	0.00	0.0185	3.88
SCM-1 Outlet Barrel		1.2272	0.3125	0.00	0.06	0.02	0.00	0.00	0.08	0.00	0.0016	2.09

	STORM DRAINAGE / HYDRAULIC GRADE LINE										DATE		DESIGN PHASE	
	ANALYSIS										4/28/2025		PRELIM	/ /
	PROJECT NAME										PROJECT NO		CONSTR	/ X /
	Zebulon Public Safety Station										22-154		REVISION	/ /
	LOCATION										BY		RECORD	/ /
	Zebulon, NC										KAS		OTHER	/ /
										CHECKED BY		(SPECIFY)		
										-				
Storm Event=	10											DESIGN CRITERIA:		
n=	0.013	HYDRAULIC GRADE LINE - CONTINUED										1. DESIGN FOR THE 10 YR STORM		
m=	-1.99											2. ASSUME TIME OF CONCENTRATION TO		
b=	10.34											AN INDIVIDUAL INLET = 5 MIN.		
l=	7.14											3. INTENSITY = g/(h+T), FOR 10 YR STORM		
FROM	TO	OUTLET W.S. ELEV (FT)	OUTLET CONTOL (FT)	INLET CONTROL (FT)	USE (FT)	FLOW CONDITION CONTROL	HGL INSIDE PIPE DOWN (HW/D<1)	HGL INSIDE PIPE UP (HW/D<1)	UPSTREAM INLET TYPE	INSIDE PIPE?	INSIDE STRUCTURE?	4. MANNINGS "n" FACTOR= .013		
												5. RATIONAL METHOD: C= .30 GRASS, C= .95 PAVEMENT		
A1	A2	328.60	328.61	328.73	328.73	INLET	0.80	0.51	CB	OK	OK			
A2	A3	328.09	328.16	328.17	328.17	INLET	1.35	0.54	CB	USE O-RING	OK			
A3	A4	326.94	328.09	327.52	328.09	OUTLET	1.71	1.43	CB	USE O-RING	OK			
A4	A5	326.58	326.94	325.96	326.94	OUTLET	1.39	1.49	CB	USE O-RING	OK			
		Tailwater Elev=				326.58								
B1	B2	329.38	329.58	328.70	329.58	OUTLET	1.67	1.42	CB	USE O-RING	OK			
B2	B3	328.79	329.38	328.43	329.38	OUTLET	1.75	1.75	DI	USE O-RING	OK			
B3	B4	328.38	328.79	327.85	328.79	OUTLET	1.42	1.53	CB	USE O-RING	OK			
		Tailwater Elev=				328.38								
C1	C2	328.38	328.38	328.64	328.64	INLET	1.70	0.51	CB	USE O-RING	OK			
		Tailwater Elev=				328.38								
D1	EX1	326.50	326.56	326.58	326.58	INLET	0.80	0.78	CI	OK	OK			
		Tailwater Elev=				326.50								
EX2	E1	328.99	329.06	329.08	329.08	INLET	0.80	0.67	DI	OK	OK			
E1	EX4	328.49	328.67	328.88	328.88	INLET	0.89	0.71	DI	OK	OK			
EX4	E2	328.19	328.49	328.31	328.49	OUTLET	1.31	0.97	MH	USE O-RING	OK			
E2	E3	327.85	328.19	327.47	328.19	OUTLET	1.40	1.39	MH	USE O-RING	OK			
E3	E4	327.30	327.85	327.01	327.85	OUTLET	1.52	1.48	MH	USE O-RING	OK			
E4	EX5	326.80	327.13	327.30	327.30	INLET	0.80	1.00	DBL CB	OK	OK			
		Tailwater Elev=				326.80								
EX3	EX4	328.88	330.90	331.58	331.58	INLET	0.80	1.80	JB	USE O-RING	OK			
		Tailwater Elev=				328.38								
SCM-1 Outlet Barrel		325.00	325.08	325.21	325.21	INLET	0.80	0.65	RISER	OK	OK			
		Tailwater Elev=				325.00								

OUTLET PROTECTION DESIGN		DATE	DESIGN PHASE	
		4/28/2025	PRELIM	/ /
PROJECT NAME		PROJECT NO	CONSTR	/ X /
Zebulon Public Safety Station		22-154	REVISION	/ /
LOCATION		BY	RECORD	/ /
Zebulon, NC		KAS	OTHER	/ /
		CHECKED BY	(SPECIFY)	
		-		

Riprap Apron Outlet Protection

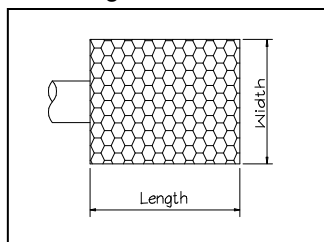
FES No.= A5
 Pipe Dia= 18 in
 Q₁₀ = 6.07 cfs
 Q_{full} = 8.88 cfs
 V_{full} = 5.02 fps

Q₁₀/Q_{full} = 0.68
 V/V_{full} = 1.07
 V = 5.4 fps

From Fig. 8.06.b.1:

Zone = 2

From Fig. 8.06.b.2:



D₅₀ = 8 in
 D_{MAX} = 12 in
 Riprap Class = B
 Apron Thickness = 18 in
 Apron Length = 9 ft
 Apron Width = 3xDia = 5 ft

Riprap Apron Outlet Protection

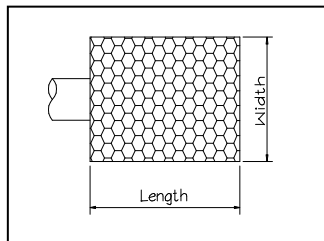
FES No.= B4
 Pipe Dia= 18 in
 Q₁₀ = 6.61 cfs
 Q_{full} = 9.14 cfs
 V_{full} = 5.17 fps

Q₁₀/Q_{full} = 0.72
 V/V_{full} = 1.08
 V = 5.6 fps

From Fig. 8.06.b.1:

Zone = 2

From Fig. 8.06.b.2:



D₅₀ = 8 in
 D_{MAX} = 12 in
 Riprap Class = B
 Apron Thickness = 18 in
 Apron Length = 9 ft
 Apron Width = 3xDia = 5 ft

OUTLET PROTECTION DESIGN		DATE	DESIGN PHASE
		4/28/2025	PRELIM / /
PROJECT NAME	PROJECT NO	CONSTR	/ X /
Zebulon Public Safety Station	22-154	REVISION	/ /
LOCATION	BY	RECORD	/ /
Zebulon, NC	KAS	OTHER	/ /
	CHECKED BY	(SPECIFY)	
	-		

Riprap Apron Outlet Protection

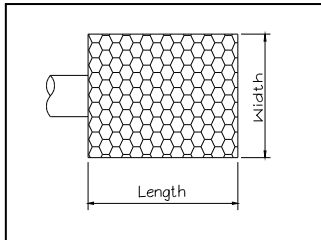
FES No.= C2
 Pipe Dia= 15 in
 Q₁₀ = 0.69 cfs
 Q_{full} = 15.87 cfs
 V_{full} = 12.91 fps

Q₁₀/Q_{full} = 0.04
 V/V_{full} = 0.42
 V = 5.5 fps

From Fig. 8.06.b.1:

Zone = 2

From Fig. 8.06.b.2:



D₅₀ = 8 in
 D_{MAX} = 12 in
 Riprap Class = B
 Apron Thickness = 18 in
 Apron Length = 7.5 ft
 Apron Width = 3xDia = 4 ft

Riprap Apron Outlet Protection

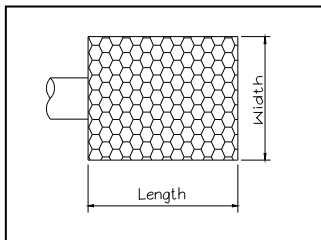
FES No.= SCM-1 Outlet Barrel
 Pipe Dia= 15 in
 Q₁₀ = 2.57 cfs
 Q_{full} = 6.54 cfs
 V_{full} = 5.32 fps

Q₁₀/Q_{full} = 0.39
 V/V_{full} = 0.93
 V = 4.9 fps

From Fig. 8.06.b.1:

Zone = 2

From Fig. 8.06.b.2:



D₅₀ = 8 in
 D_{MAX} = 12 in
 Riprap Class = B
 Apron Thickness = 18 in
 Apron Length = 7.5 ft
 Apron Width = 3xDia = 4 ft

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

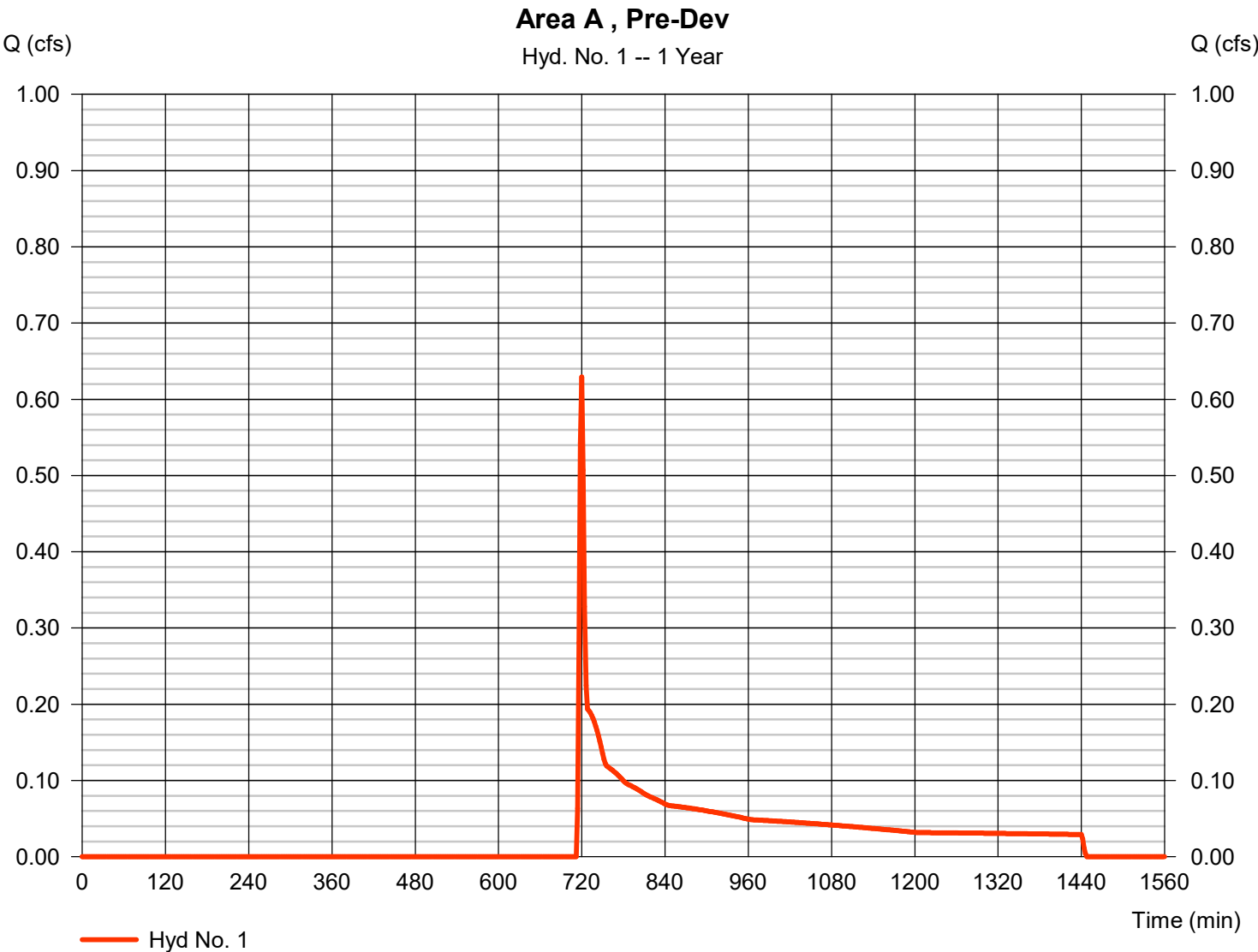
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.629	2	720	2,519	-----	-----	-----	Area A , Pre-Dev
2	SCS Runoff	0.568	2	718	1,644	-----	-----	-----	Area B, Pre-Dev, On-Site
3	SCS Runoff	0.817	2	718	1,709	-----	-----	-----	Area B, Pre-Dev, Off-Site
4	Combine	1.384	2	718	3,352	2, 3	-----	-----	Area B, Pre-Dev
6	SCS Runoff	3.151	2	718	6,584	-----	-----	-----	Area A, Post-Dev
7	SCS Runoff	3.843	2	718	7,726	-----	-----	-----	Area B, Post-Dev, On-Site
8	SCS Runoff	0.617	2	718	1,338	-----	-----	-----	Area B, Post-Dev, Off-Site
9	Combine	4.460	2	718	9,064	7, 8	-----	-----	Area B, Post-Dev
11	SCS Runoff	3.640	2	716	7,380	-----	-----	-----	SCM-1 Drainage Area
12	Reservoir	0.121	2	834	7,231	11	325.84	4,765	SCM-1
13	SCS Runoff	0.207	2	720	1,098	-----	-----	-----	Area A Bypass
14	Combine	0.232	2	720	8,328	12, 13	-----	-----	Area A, Post-Dev w/ Detention
16	SCS Runoff	2.863	2	716	5,794	-----	-----	-----	SCM-2 On-Site
17	SCS Runoff	0.617	2	718	1,338	-----	-----	-----	SCM-2 Off-Site
18	Combine	3.454	2	718	7,132	16, 17	-----	-----	SCM-2 Drainage Area
19	Reservoir	0.111	2	866	7,023	18	327.58	4,492	SCM-2
20	SCS Runoff	1.035	2	718	2,075	-----	-----	-----	Area B On-Site Bypass
21	SCS Runoff	0.000	2	720	0	-----	-----	-----	Area B Off-Site Bypass
22	Combine	1.057	2	718	9,098	19, 20, 21	-----	-----	Area B, Post-Dev w/ Detention
22-154 Hydraflow.gpw					Return Period: 1 Year			Monday, 04 / 28 / 2025	

Hydrograph Report

Hyd. No. 1

Area A , Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.629 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 2,519 cuft
Drainage area	= 3.330 ac	Curve number	= 57.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

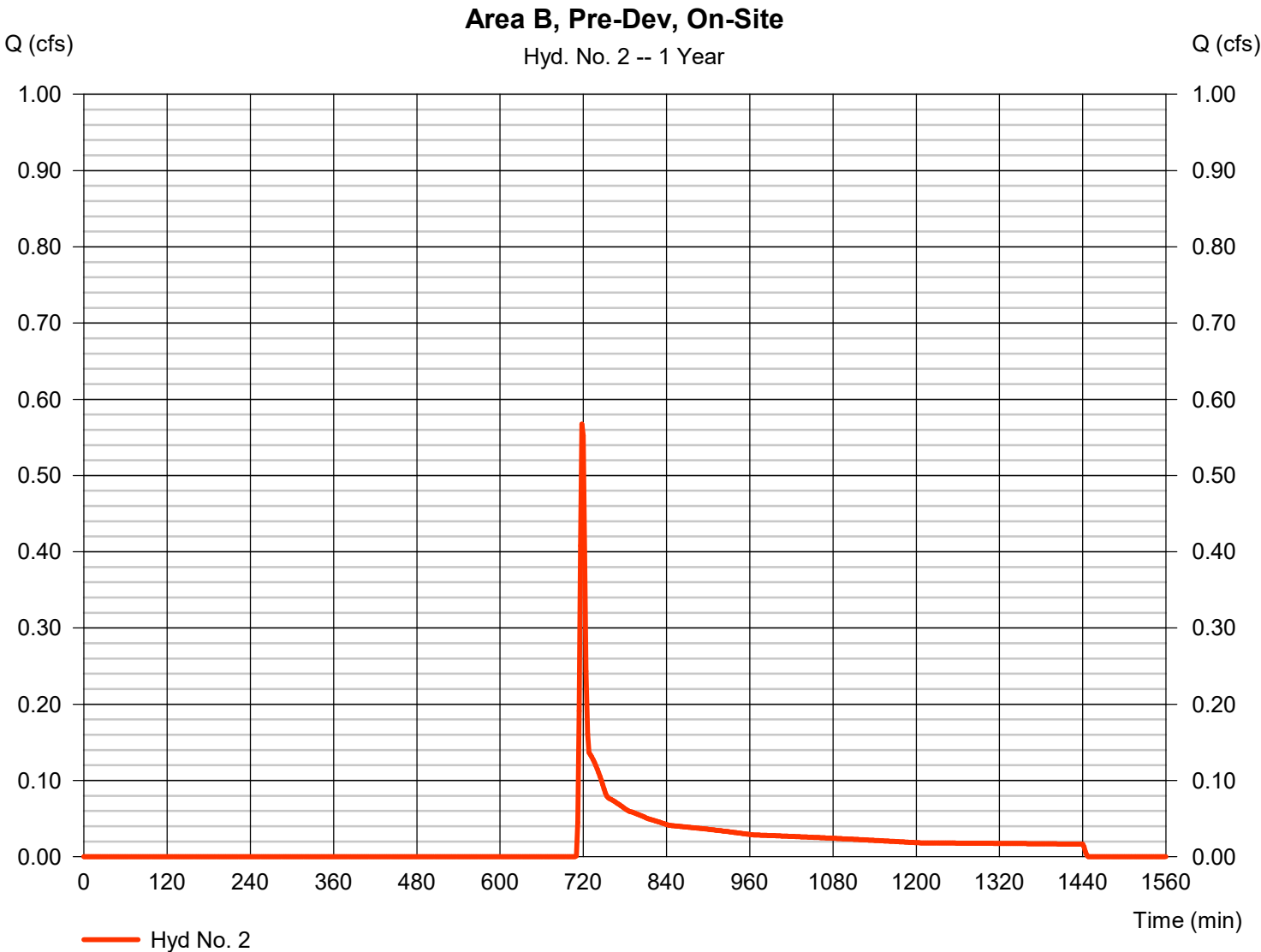


Hydrograph Report

Hyd. No. 2

Area B, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.568 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,644 cuft
Drainage area	=	1.560 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

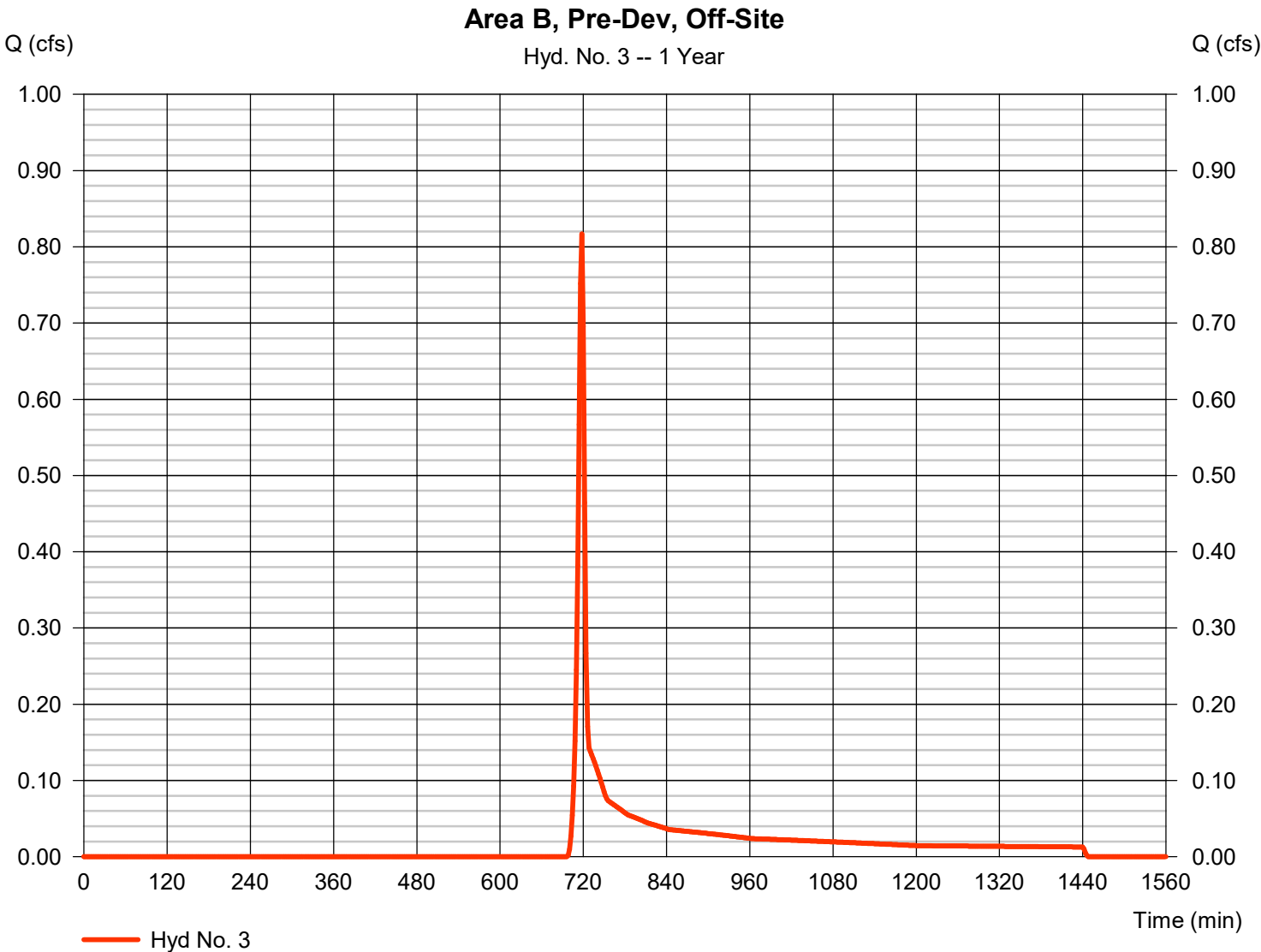


Hydrograph Report

Hyd. No. 3

Area B, Pre-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.817 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,709 cuft
Drainage area	=	0.810 ac	Curve number	=	69.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

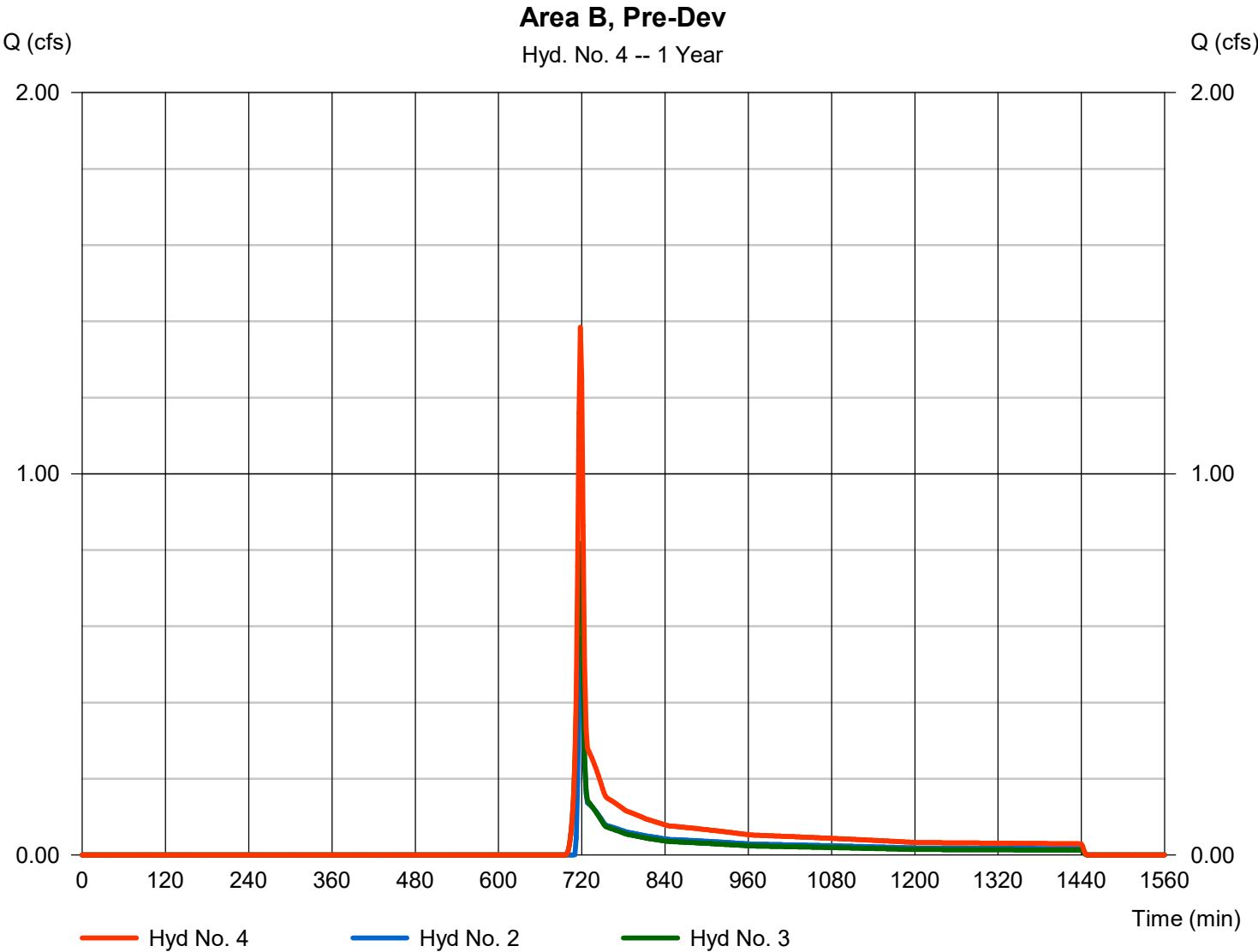


Hydrograph Report

Hyd. No. 4

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 1.384 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 3,352 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 2.370 ac



Hydrograph Report

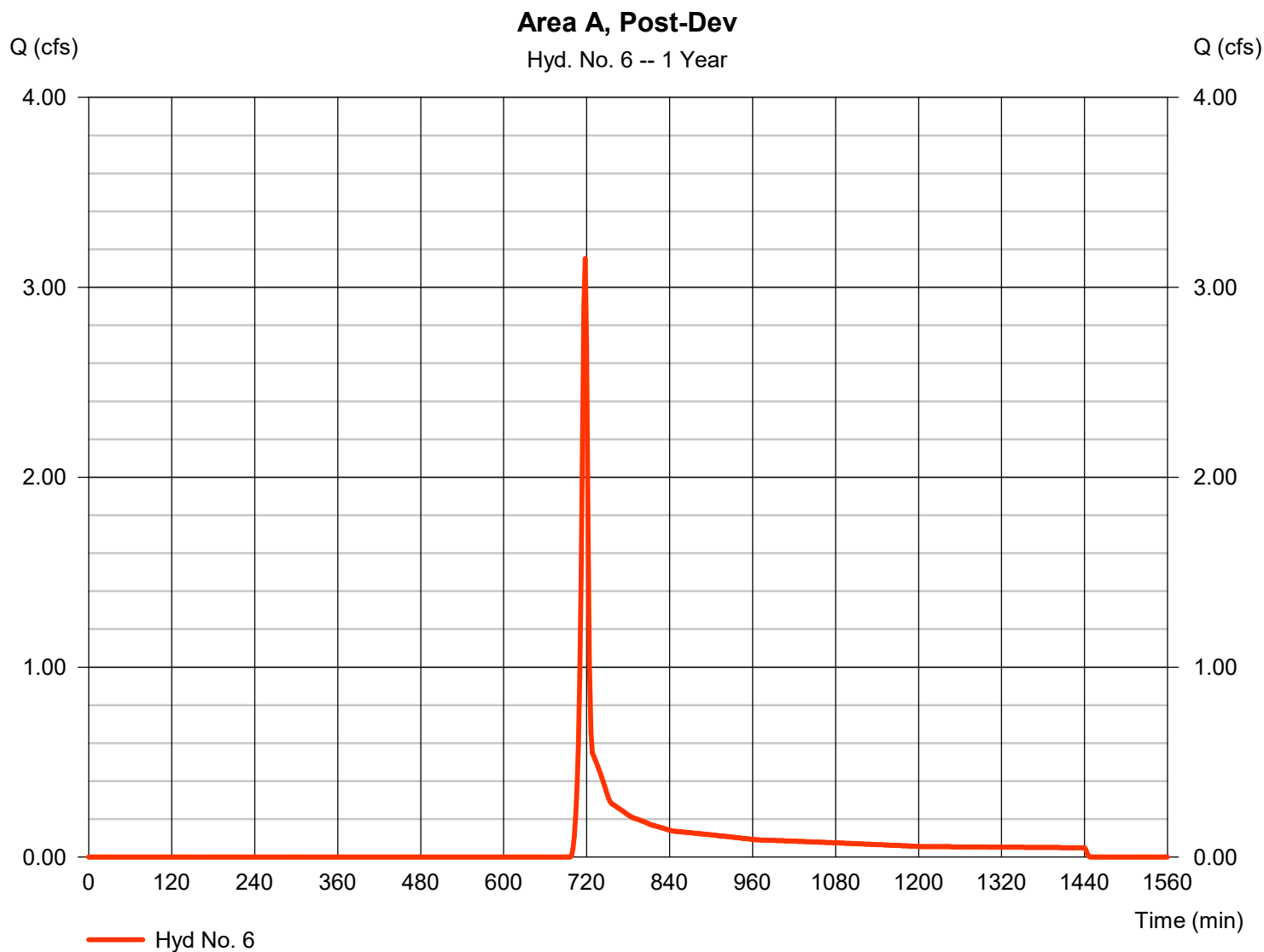
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 6

Area A, Post-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 3.151 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 6,584 cuft
Drainage area	= 3.100 ac	Curve number	= 69.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

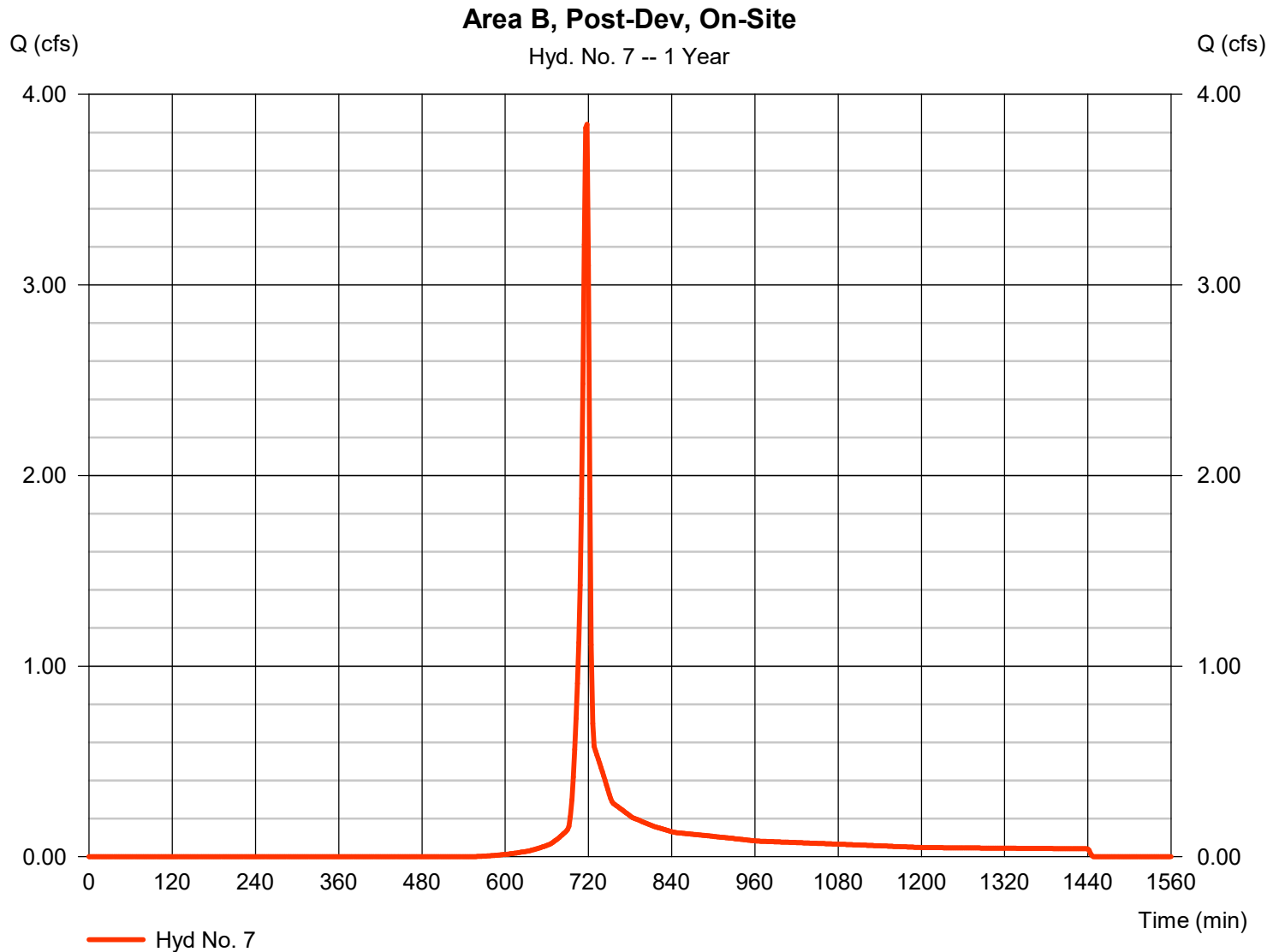
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 7

Area B, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.843 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,726 cuft
Drainage area	= 1.790 ac	Curve number	= 82.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

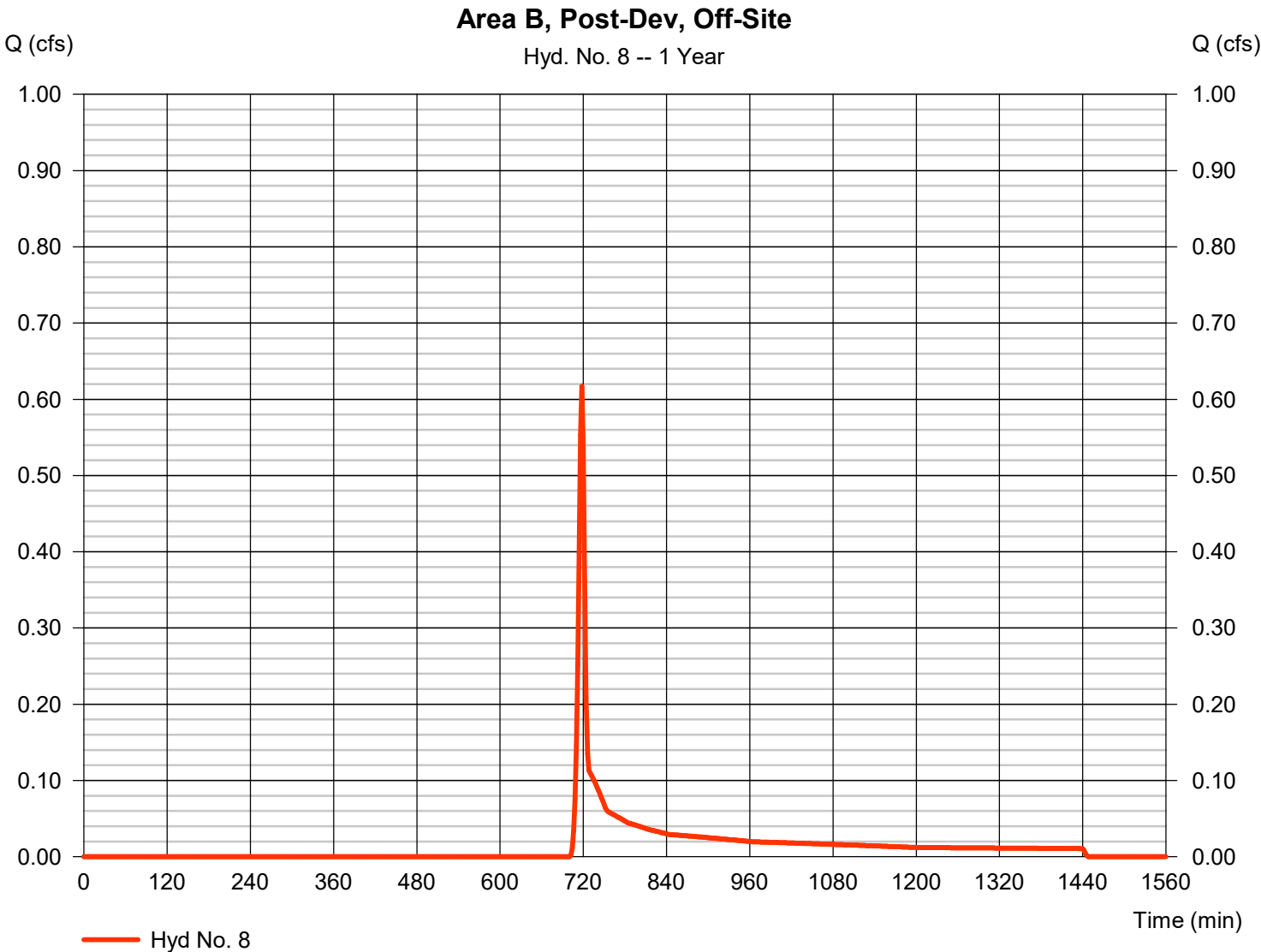


Hydrograph Report

Hyd. No. 8

Area B, Post-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.617 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,338 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

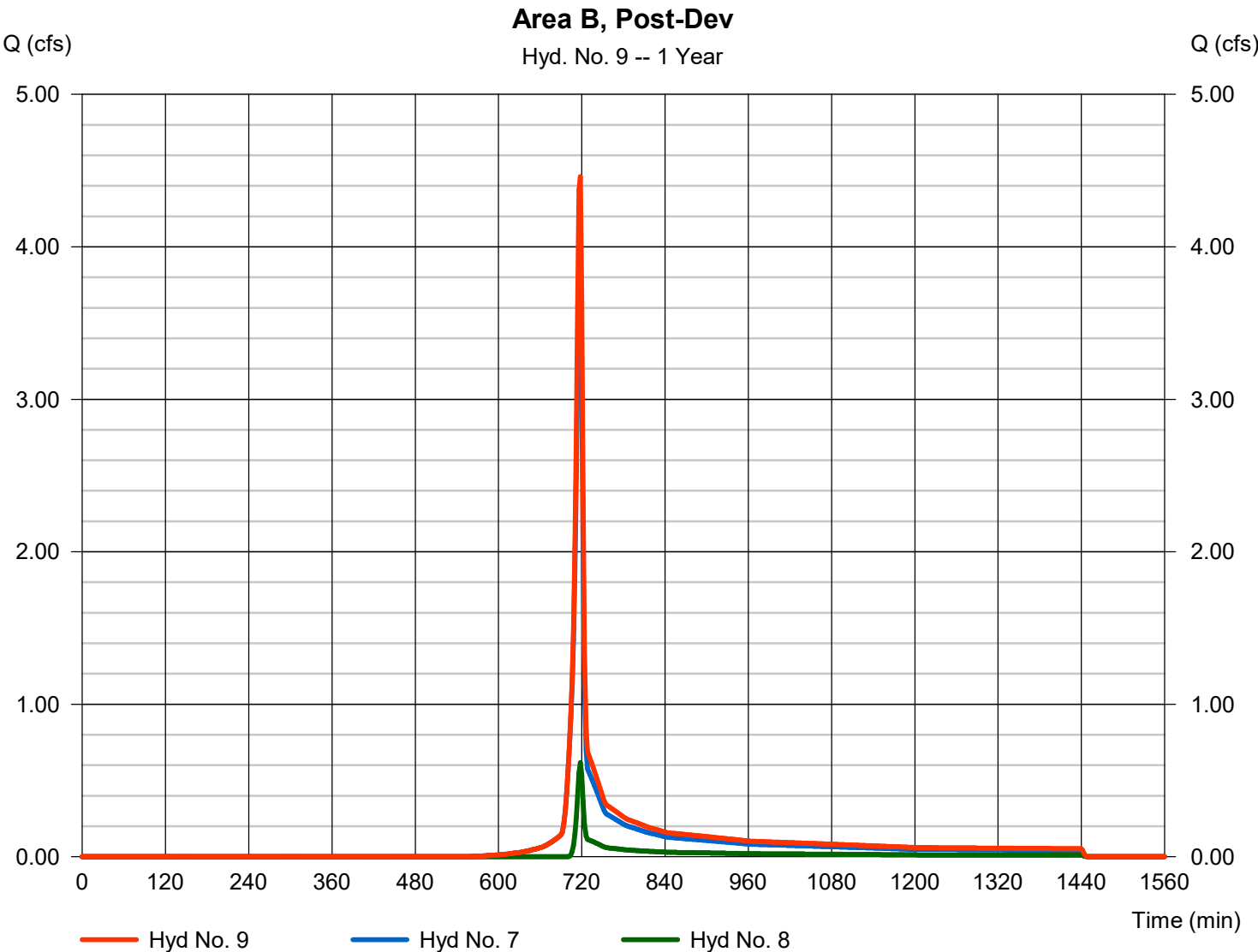


Hydrograph Report

Hyd. No. 9

Area B, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 4.460 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 9,064 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 2.530 ac



Hydrograph Report

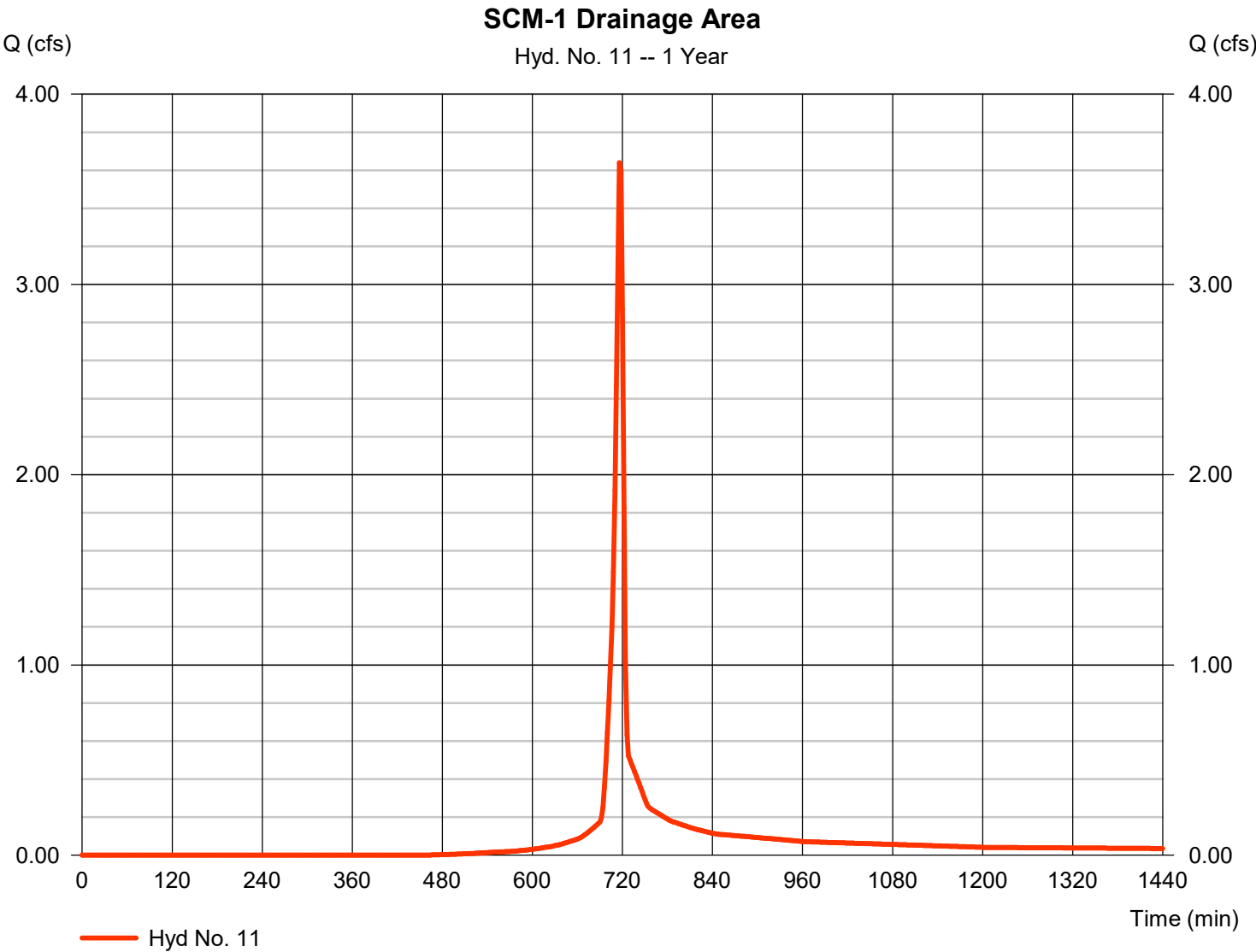
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 11

SCM-1 Drainage Area

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.640 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	7,380 cuft
Drainage area	=	1.380 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.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

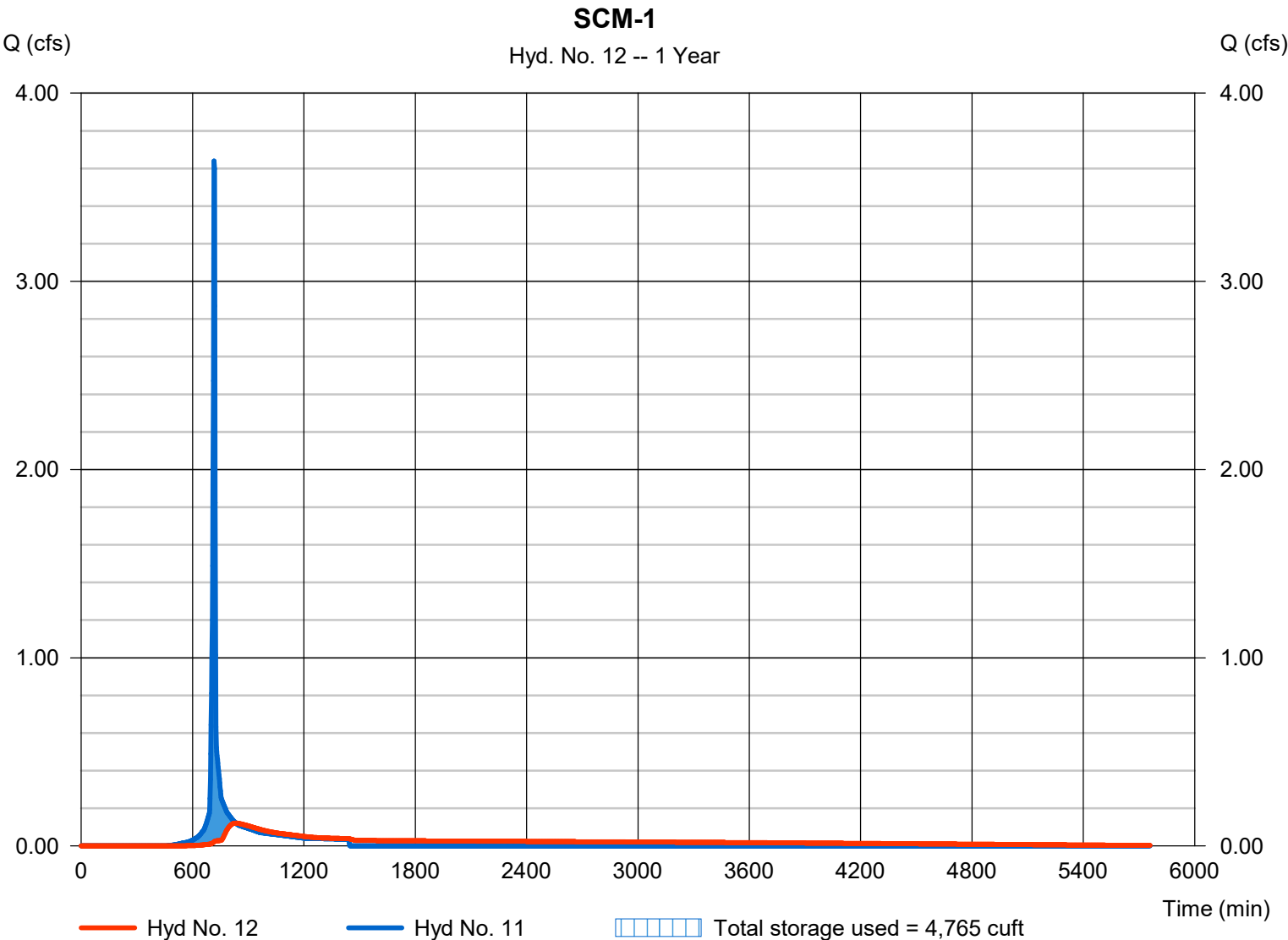
Monday, 04 / 28 / 2025

Hyd. No. 12

SCM-1

Hydrograph type	= Reservoir	Peak discharge	= 0.121 cfs
Storm frequency	= 1 yrs	Time to peak	= 834 min
Time interval	= 2 min	Hyd. volume	= 7,231 cuft
Inflow hyd. No.	= 11 - SCM-1 Drainage Area	Max. Elevation	= 325.84 ft
Reservoir name	= SCM-1	Max. Storage	= 4,765 cuft

Storage Indication method used.



Pond No. 2 - SCM-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 324.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	324.50	2,373	0	0
0.50	325.00	3,562	1,474	1,474
1.25	325.75	4,187	2,902	4,376
1.50	326.00	4,402	1,073	5,449
2.50	327.00	5,298	4,843	10,292
3.50	328.00	6,251	5,767	16,059
4.50	329.00	7,261	6,749	22,808
5.00	329.50	7,787	3,761	26,569

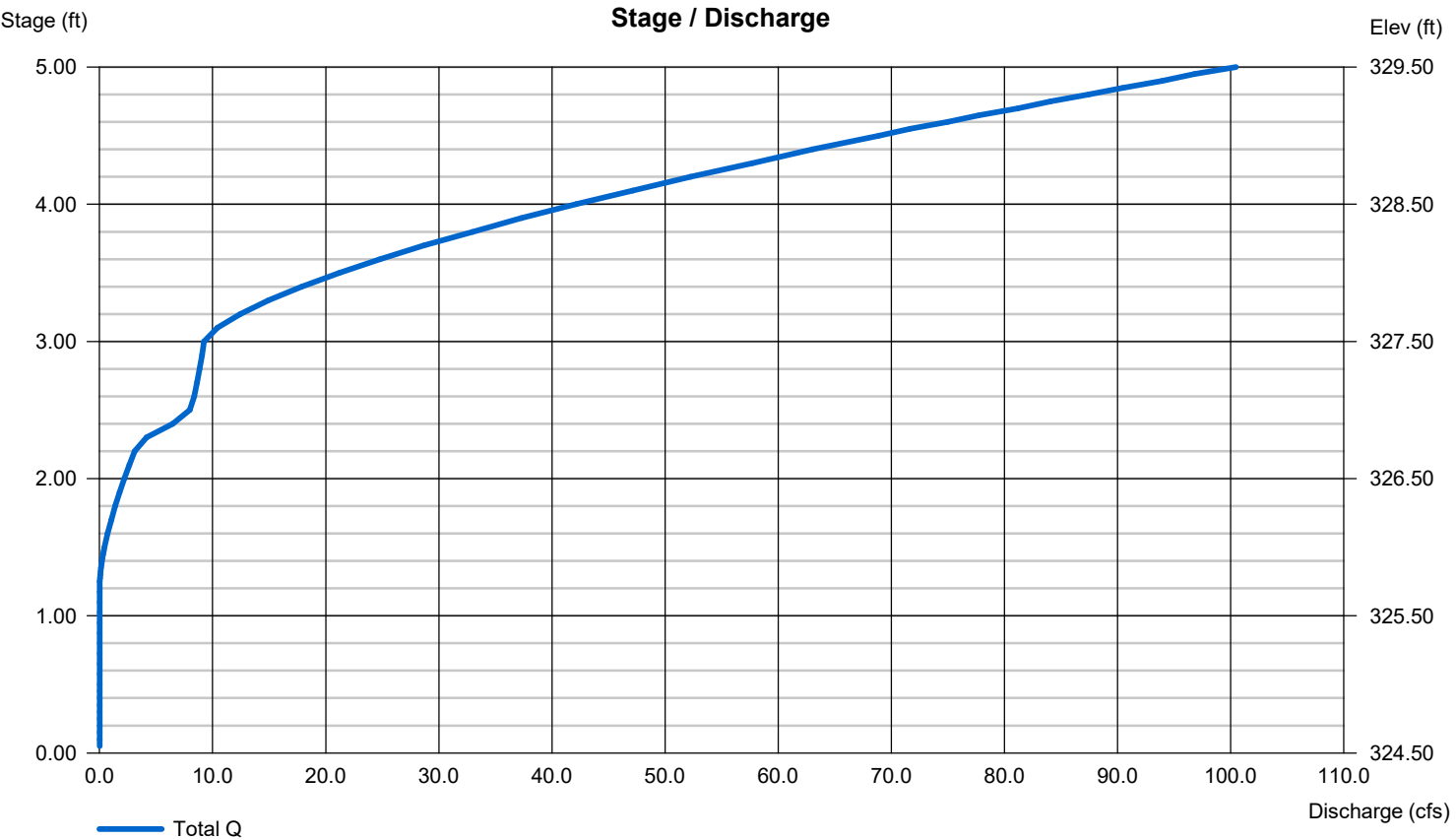
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	1.00	0.00	0.00
Span (in)	= 15.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 324.40	324.50	0.00	0.00
Length (ft)	= 39.00	5.00	0.00	0.00
Slope (%)	= 1.03	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	1.00	0.00	12.00
Crest El. (ft)	= 326.75	325.75	0.00	327.50
Weir Coeff.	= 3.33	3.33	3.33	2.60
Weir Type	= 1	Rect	---	Broad
Multi-Stage	= Yes	Yes	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).



Hydrograph Report

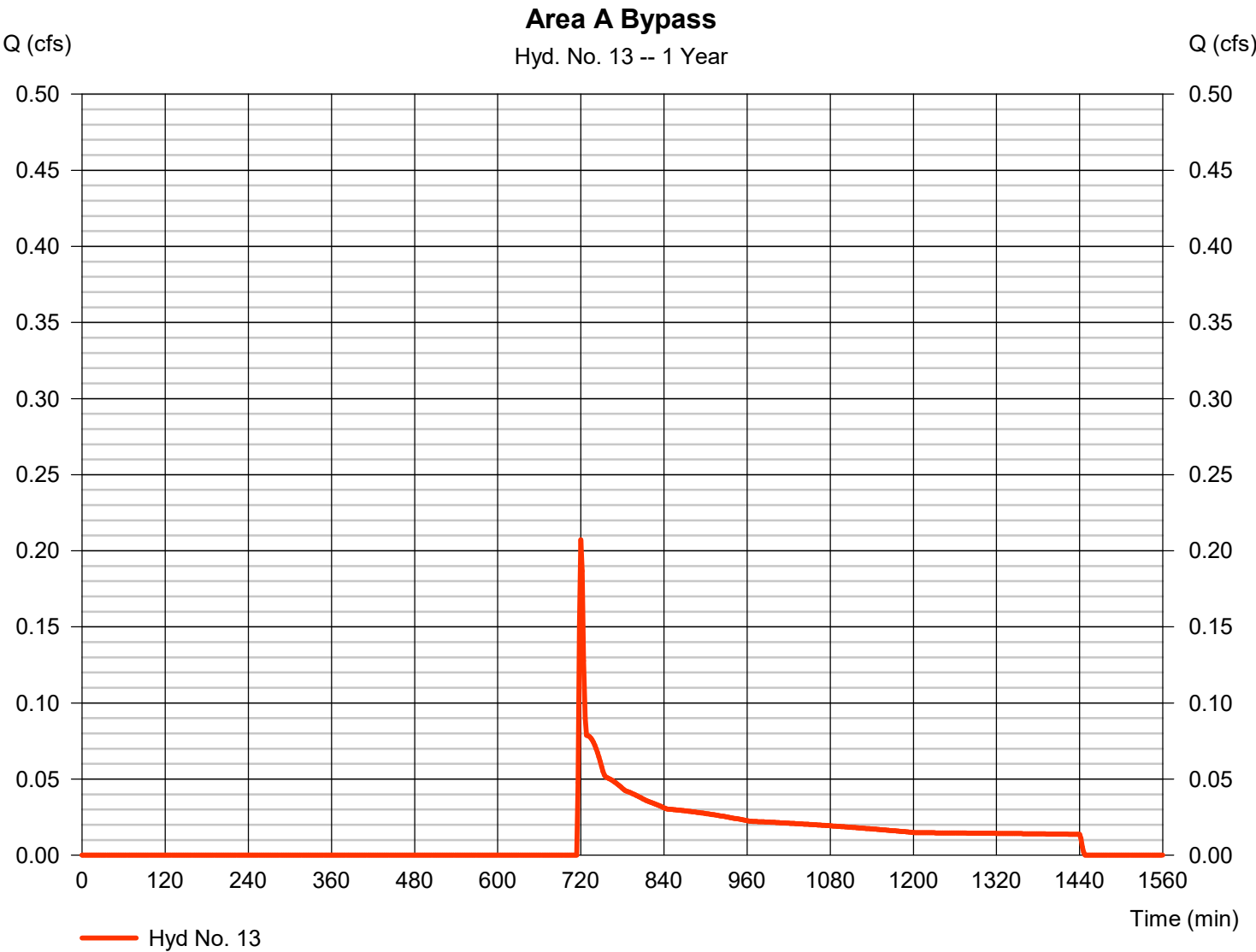
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 13

Area A Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.207 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,098 cuft
Drainage area	= 1.720 ac	Curve number	= 56.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

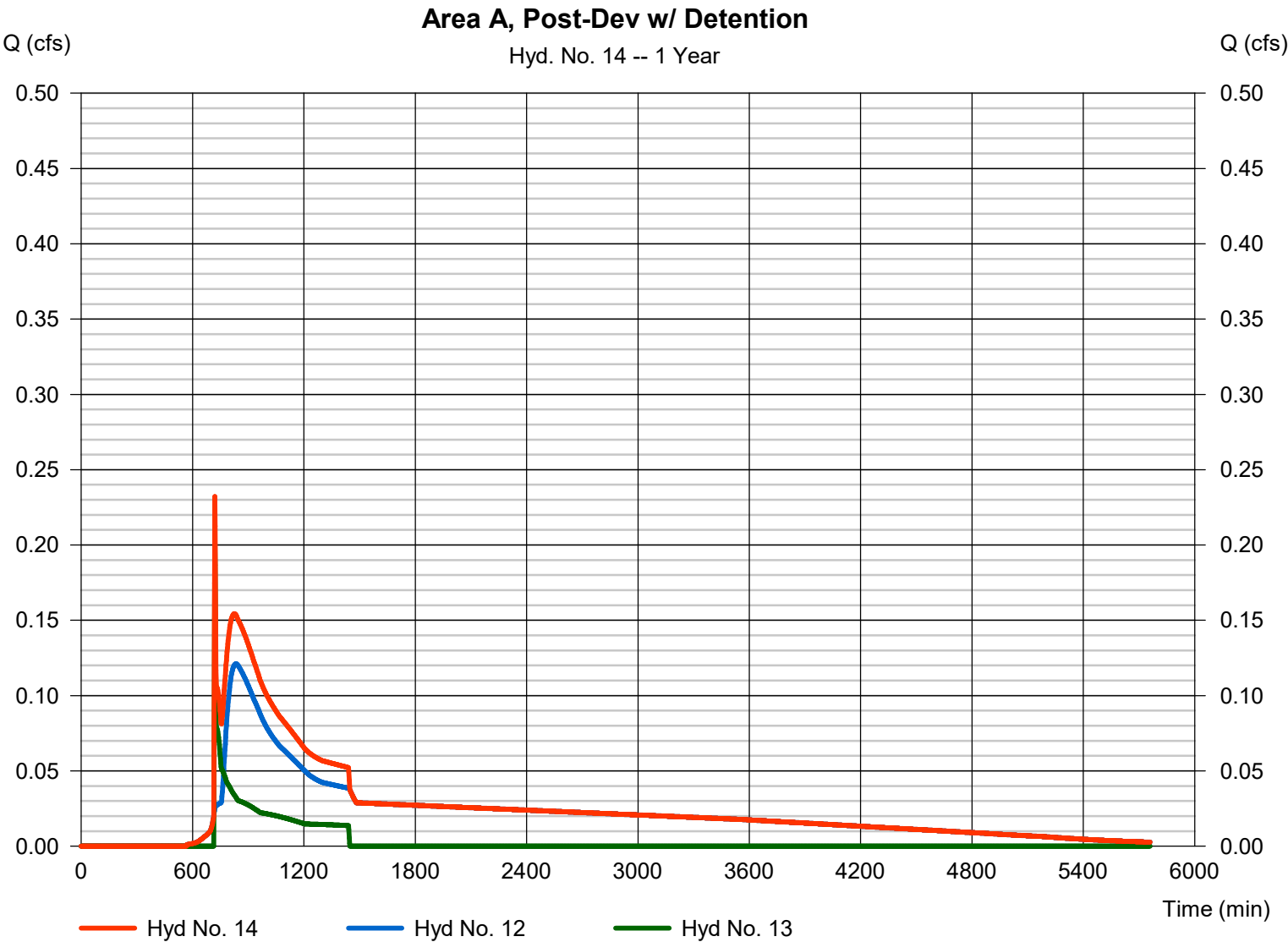


Hydrograph Report

Hyd. No. 14

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 0.232 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 8,328 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 1.720 ac

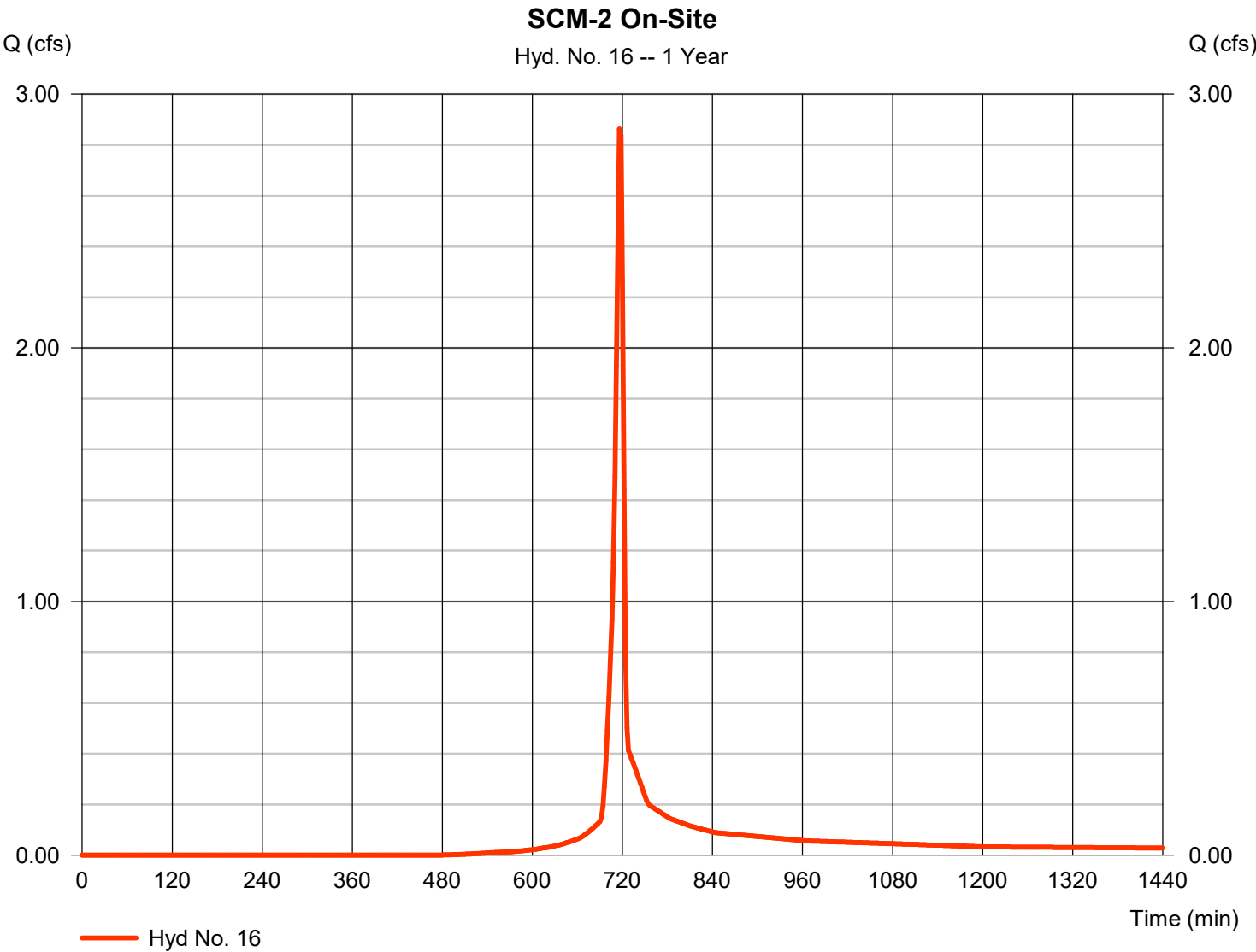


Hydrograph Report

Hyd. No. 16

SCM-2 On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 2.863 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 5,794 cuft
Drainage area	= 1.120 ac	Curve number	= 85.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

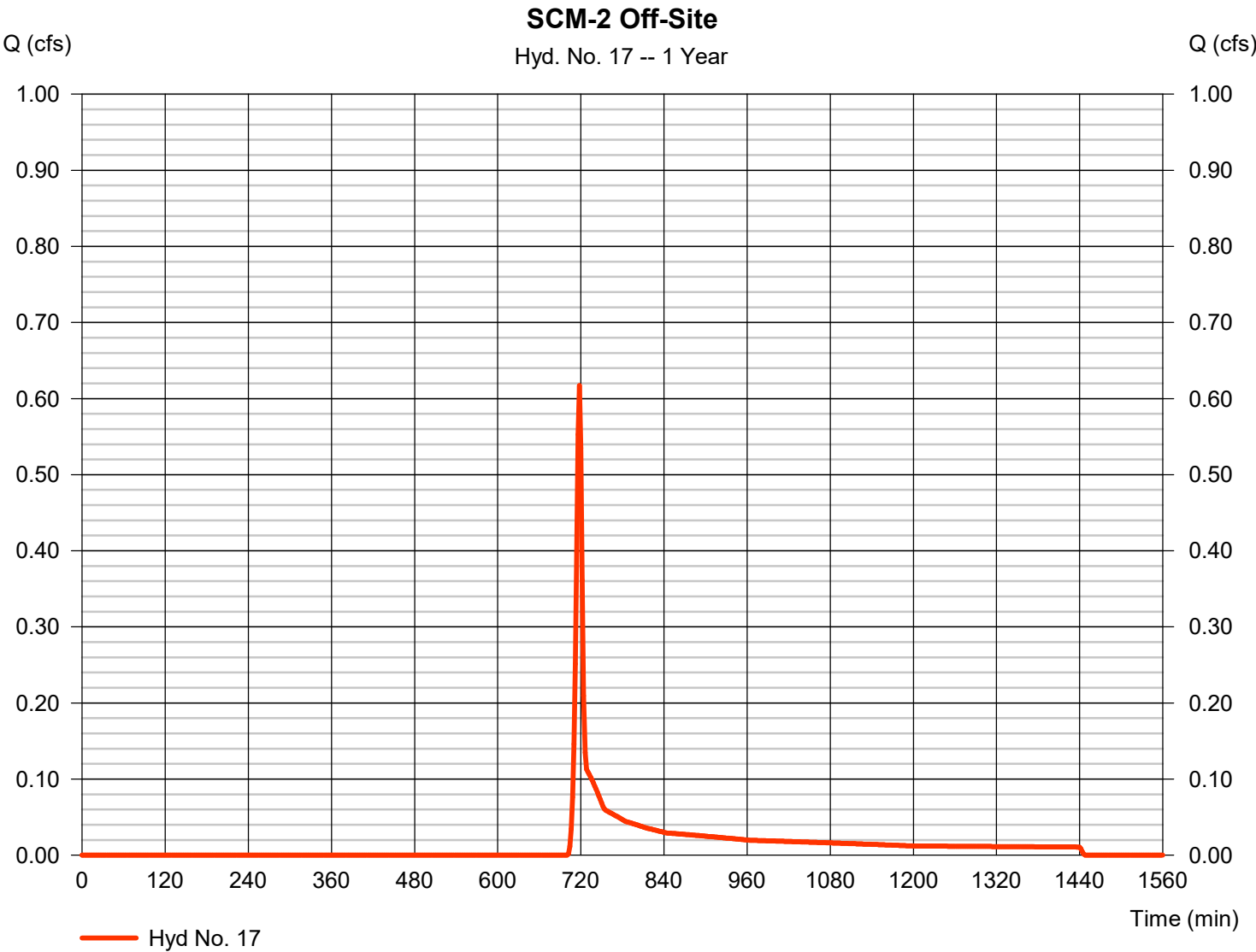


Hydrograph Report

Hyd. No. 17

SCM-2 Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.617 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,338 cuft
Drainage area	= 0.740 ac	Curve number	= 67.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

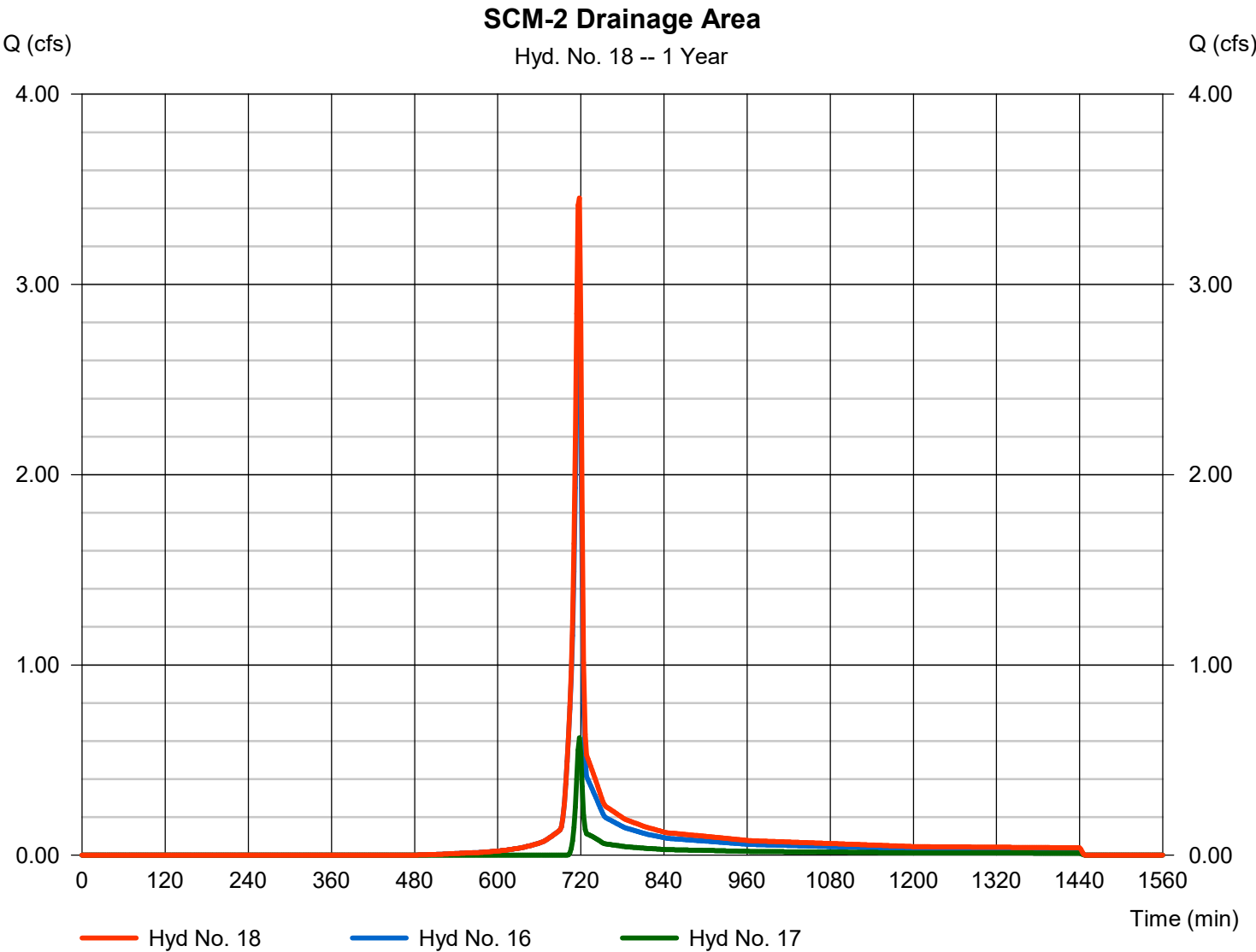


Hydrograph Report

Hyd. No. 18

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 3.454 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,132 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 1.860 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

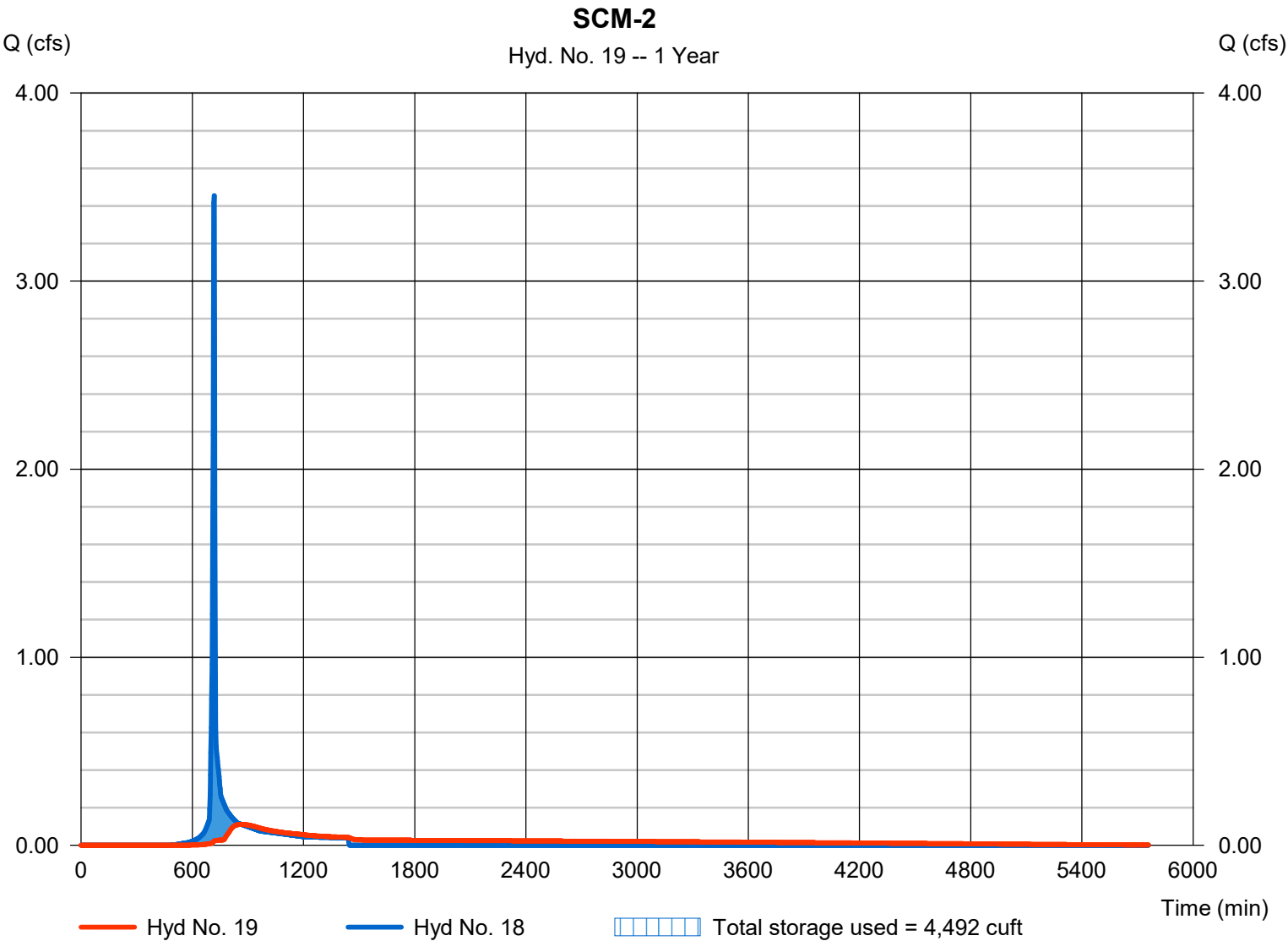
Monday, 04 / 28 / 2025

Hyd. No. 19

SCM-2

Hydrograph type	= Reservoir	Peak discharge	= 0.111 cfs
Storm frequency	= 1 yrs	Time to peak	= 866 min
Time interval	= 2 min	Hyd. volume	= 7,023 cuft
Inflow hyd. No.	= 18 - SCM-2 Drainage Area	Max. Elevation	= 327.58 ft
Reservoir name	= SCM-2	Max. Storage	= 4,492 cuft

Storage Indication method used.



Pond No. 1 - SCM-2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 326.25 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	326.25	2,259	0	0
0.50	326.75	3,280	1,377	1,377
0.75	327.00	3,542	852	2,229
1.25	327.50	4,074	1,902	4,131
1.75	328.00	4,620	2,172	6,303
2.75	329.00	5,784	5,191	11,494
3.75	330.00	6,663	6,218	17,712
4.25	330.50	7,124	3,446	21,157

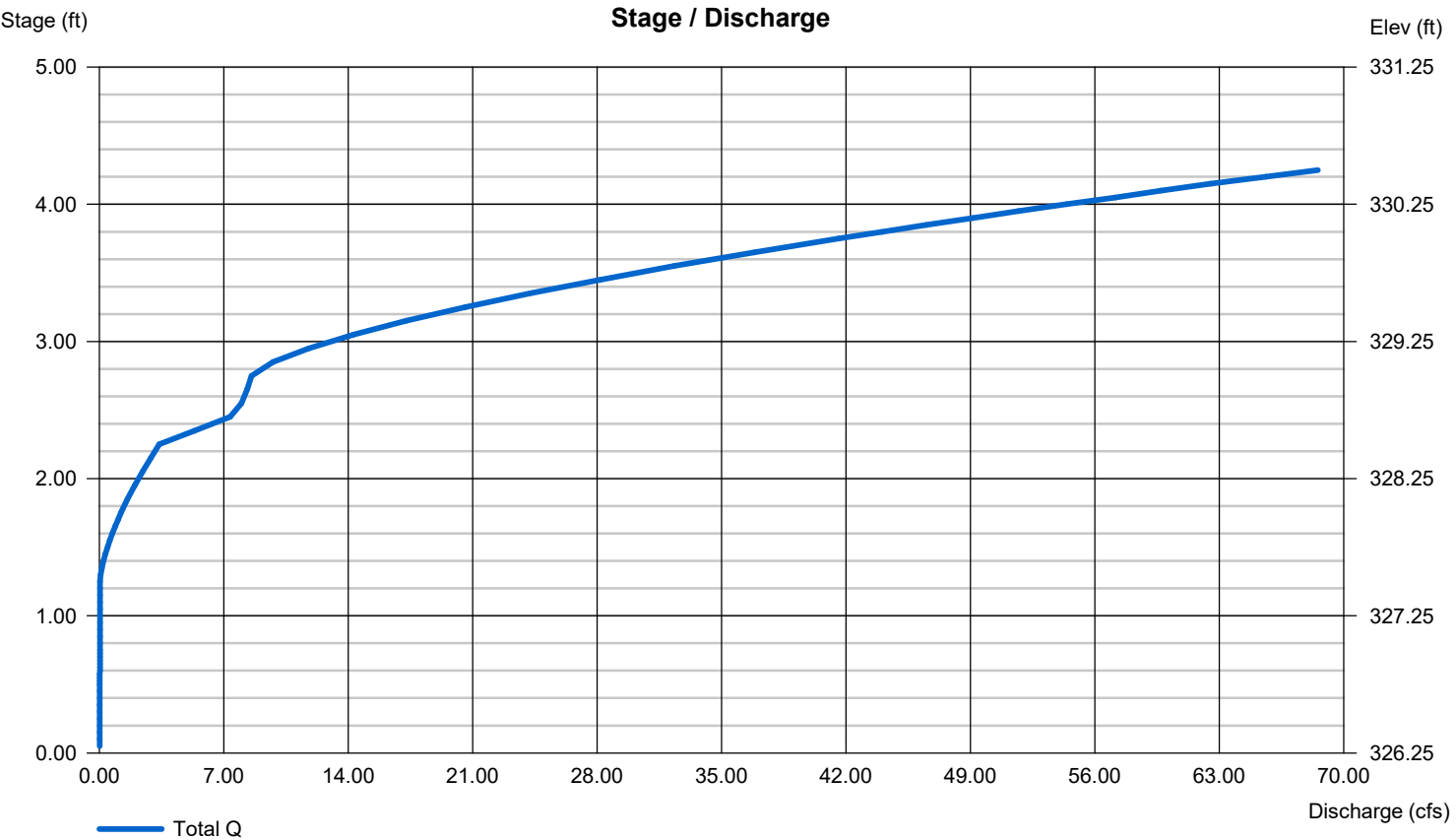
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	1.00	0.00	0.00
Span (in)	= 15.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 326.25	326.25	0.00	0.00
Length (ft)	= 46.00	5.00	0.00	0.00
Slope (%)	= 1.63	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	1.00	0.00	12.00
Crest El. (ft)	= 328.50	327.50	0.00	329.00
Weir Coeff.	= 3.33	3.33	3.33	2.60
Weir Type	= 1	Rect	---	Broad
Multi-Stage	= Yes	Yes	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).

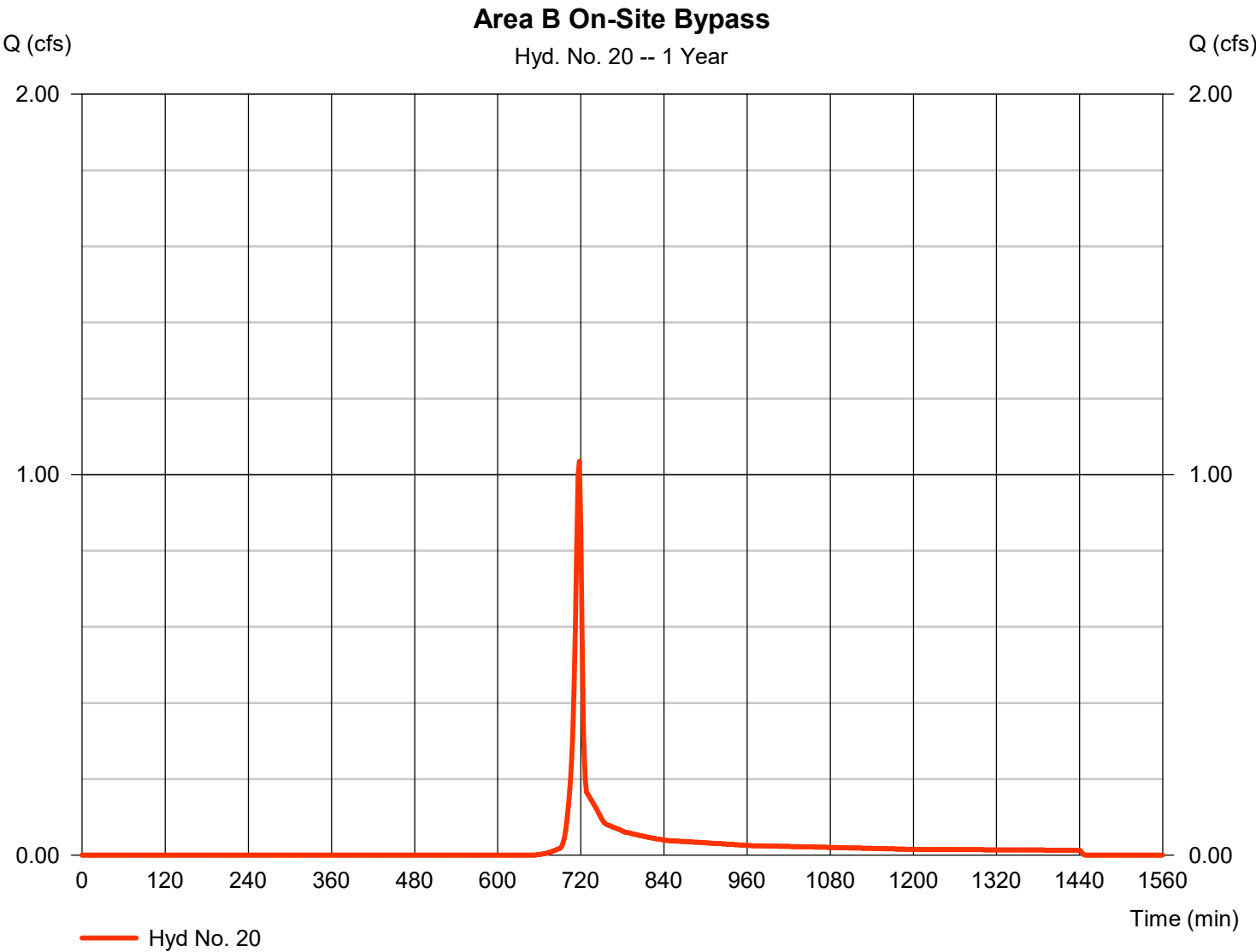


Hydrograph Report

Hyd. No. 20

Area B On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.035 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,075 cuft
Drainage area	=	0.670 ac	Curve number	=	75.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

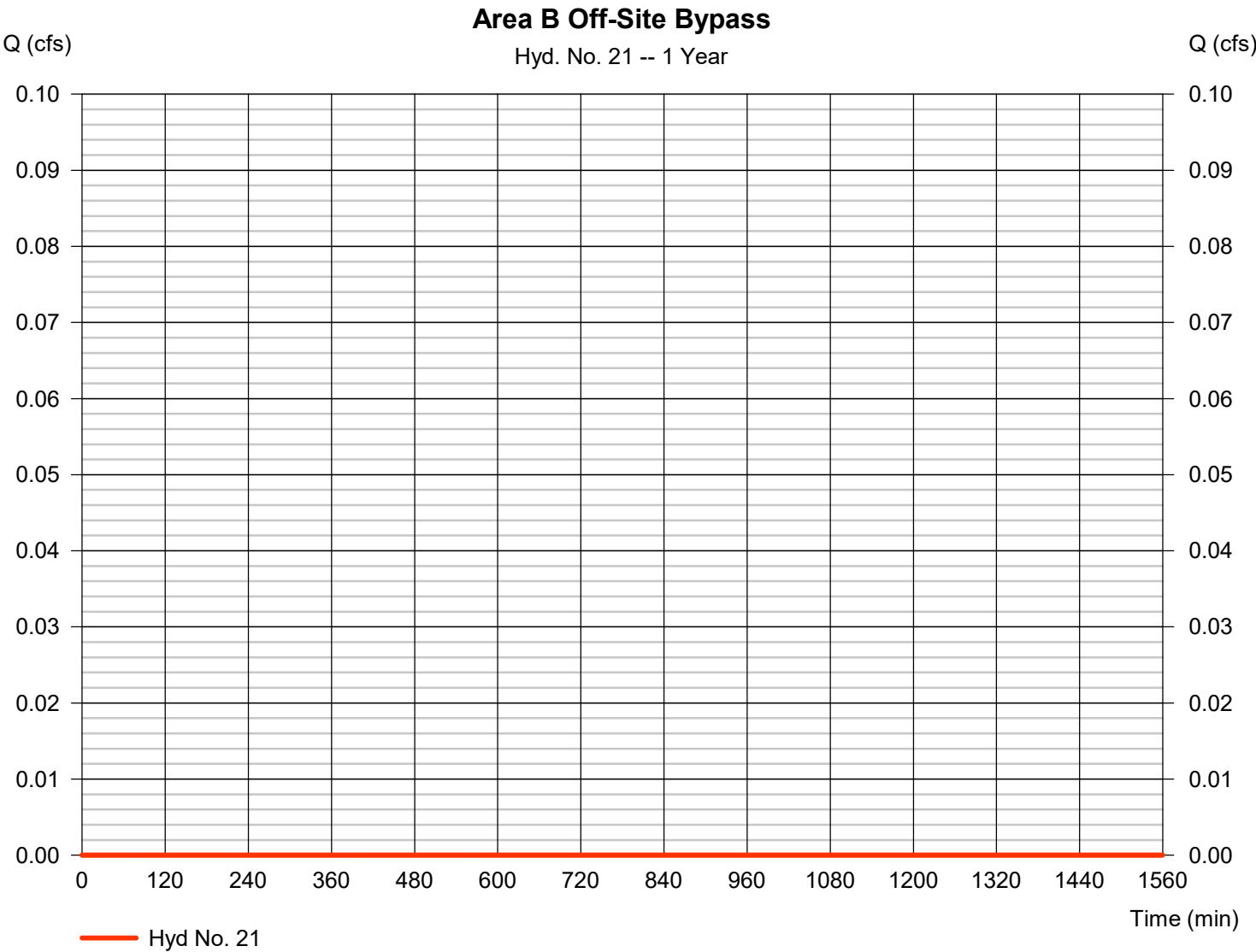


Hydrograph Report

Hyd. No. 21

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Drainage area	=	0.000 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

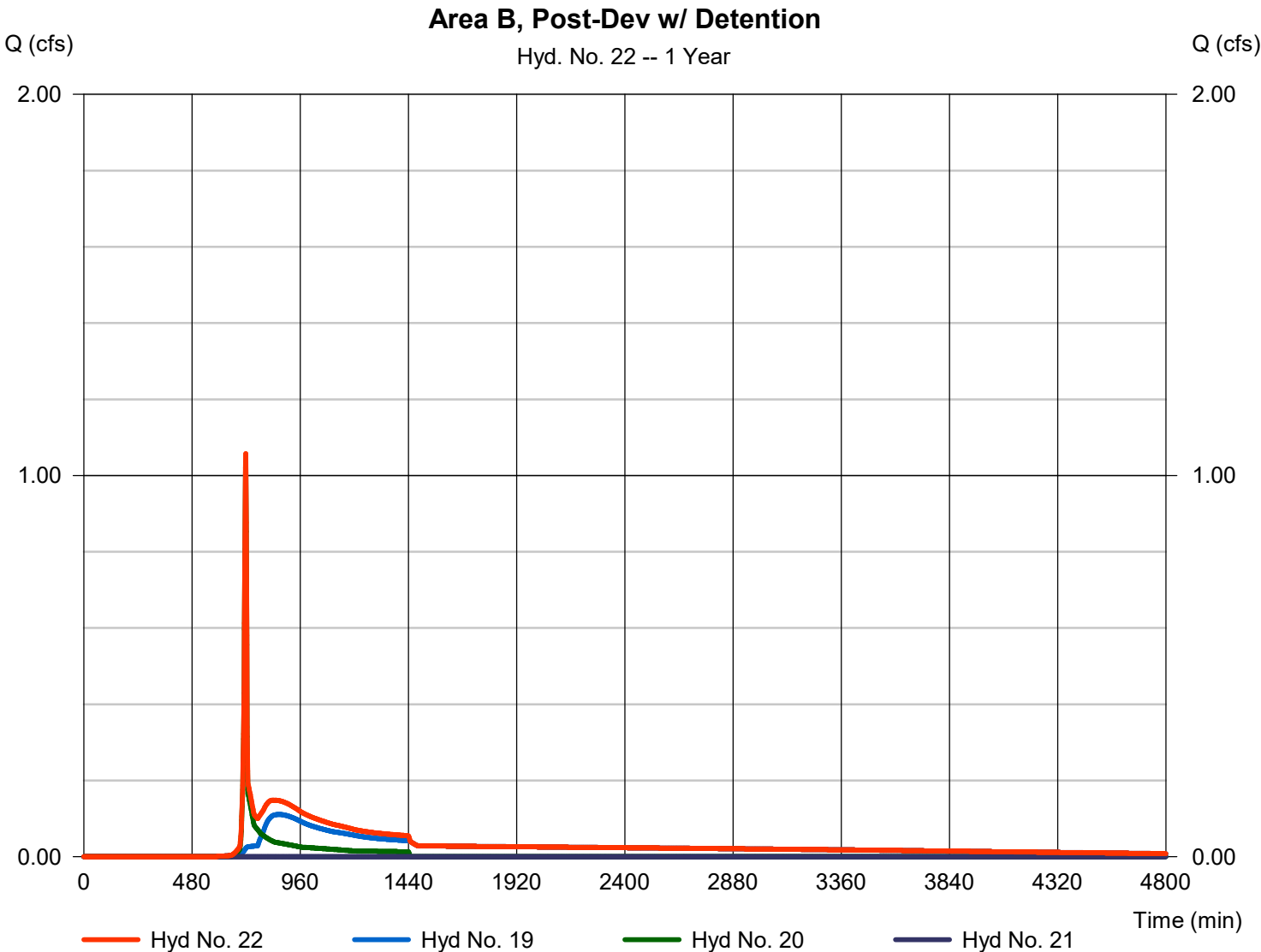
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 22

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 1.057 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 9,098 cuft
Inflow hyds.	= 19, 20, 21	Contrib. drain. area	= 0.670 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

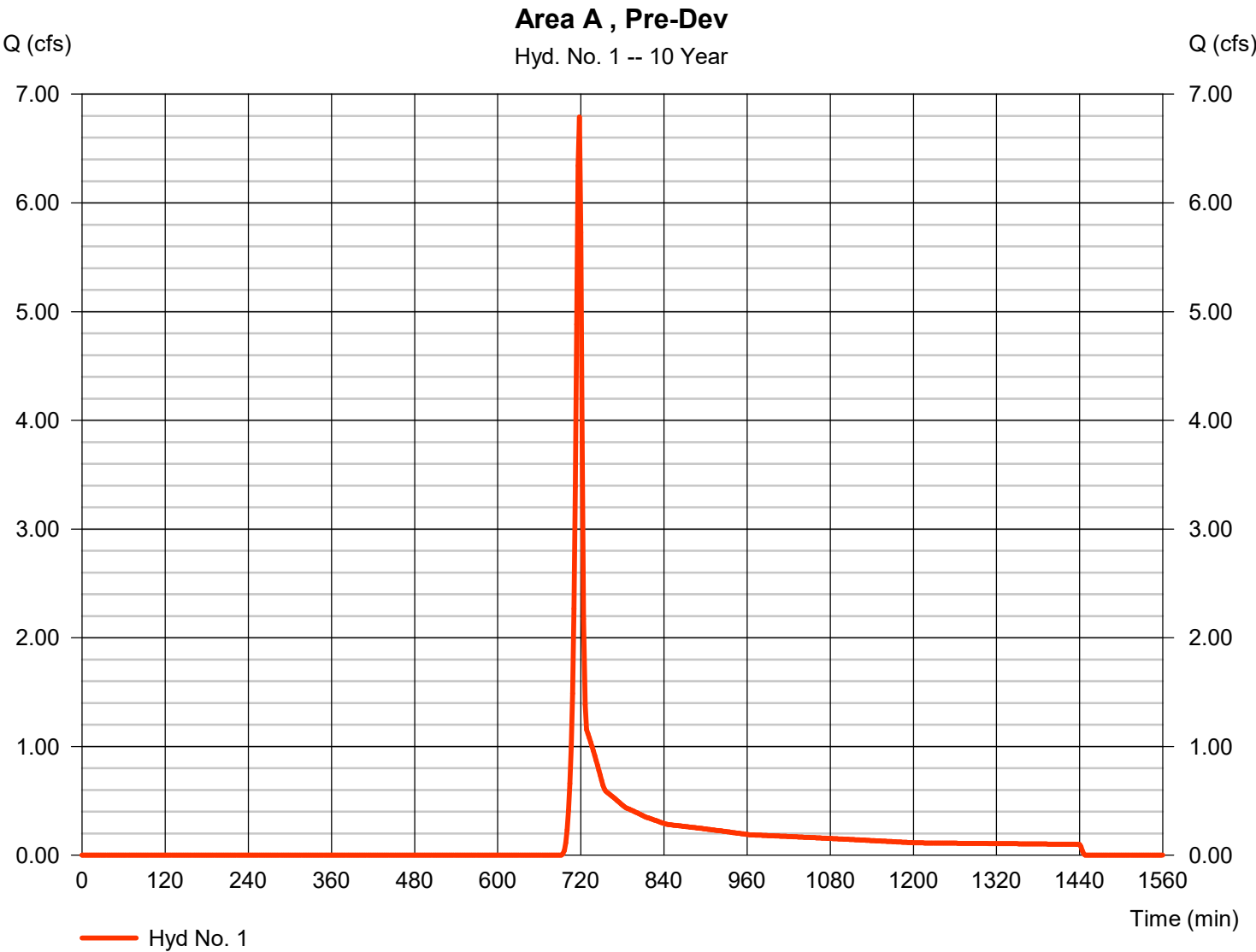
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.790	2	718	13,974	-----	-----	-----	Area A , Pre-Dev
2	SCS Runoff	3.820	2	718	7,719	-----	-----	-----	Area B, Pre-Dev, On-Site
3	SCS Runoff	2.912	2	718	5,834	-----	-----	-----	Area B, Pre-Dev, Off-Site
4	Combine	6.732	2	718	13,552	2, 3	-----	-----	Area B, Pre-Dev
6	SCS Runoff	11.19	2	718	22,412	-----	-----	-----	Area A, Post-Dev
7	SCS Runoff	9.549	2	716	19,579	-----	-----	-----	Area B, Post-Dev, On-Site
8	SCS Runoff	2.443	2	718	4,886	-----	-----	-----	Area B, Post-Dev, Off-Site
9	Combine	11.95	2	716	24,466	7, 8	-----	-----	Area B, Post-Dev
11	SCS Runoff	8.178	2	716	17,134	-----	-----	-----	SCM-1 Drainage Area
12	Reservoir	2.569	2	724	16,976	11	326.58	8,278	SCM-1
13	SCS Runoff	3.203	2	718	6,676	-----	-----	-----	Area A Bypass
14	Combine	4.935	2	720	23,652	12, 13	-----	-----	Area A, Post-Dev w/ Detention
16	SCS Runoff	6.536	2	716	13,637	-----	-----	-----	SCM-2 On-Site
17	SCS Runoff	2.443	2	718	4,886	-----	-----	-----	SCM-2 Off-Site
18	Combine	8.933	2	716	18,523	16, 17	-----	-----	SCM-2 Drainage Area
19	Reservoir	2.776	2	724	18,406	18	328.38	8,271	SCM-2
20	SCS Runoff	2.981	2	716	6,025	-----	-----	-----	Area B On-Site Bypass
21	SCS Runoff	0.000	2	718	0	-----	-----	-----	Area B Off-Site Bypass
22	Combine	4.760	2	718	24,431	19, 20, 21	-----	-----	Area B, Post-Dev w/ Detention
22-154 Hydraflow.gpw					Return Period: 10 Year			Monday, 04 / 28 / 2025	

Hydrograph Report

Hyd. No. 1

Area A , Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 6.790 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 13,974 cuft
Drainage area	= 3.330 ac	Curve number	= 57.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

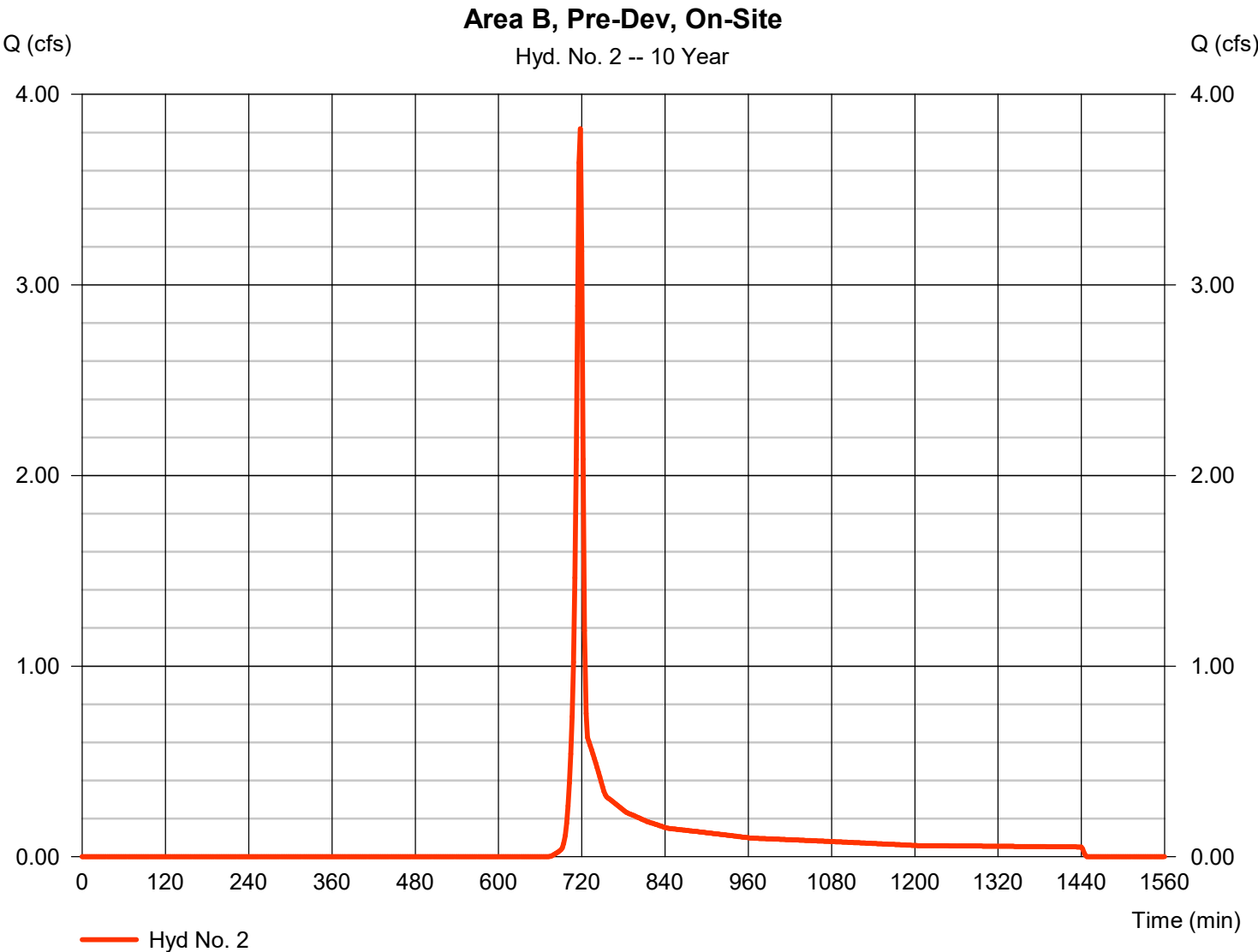


Hydrograph Report

Hyd. No. 2

Area B, Pre-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.820 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,719 cuft
Drainage area	= 1.560 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

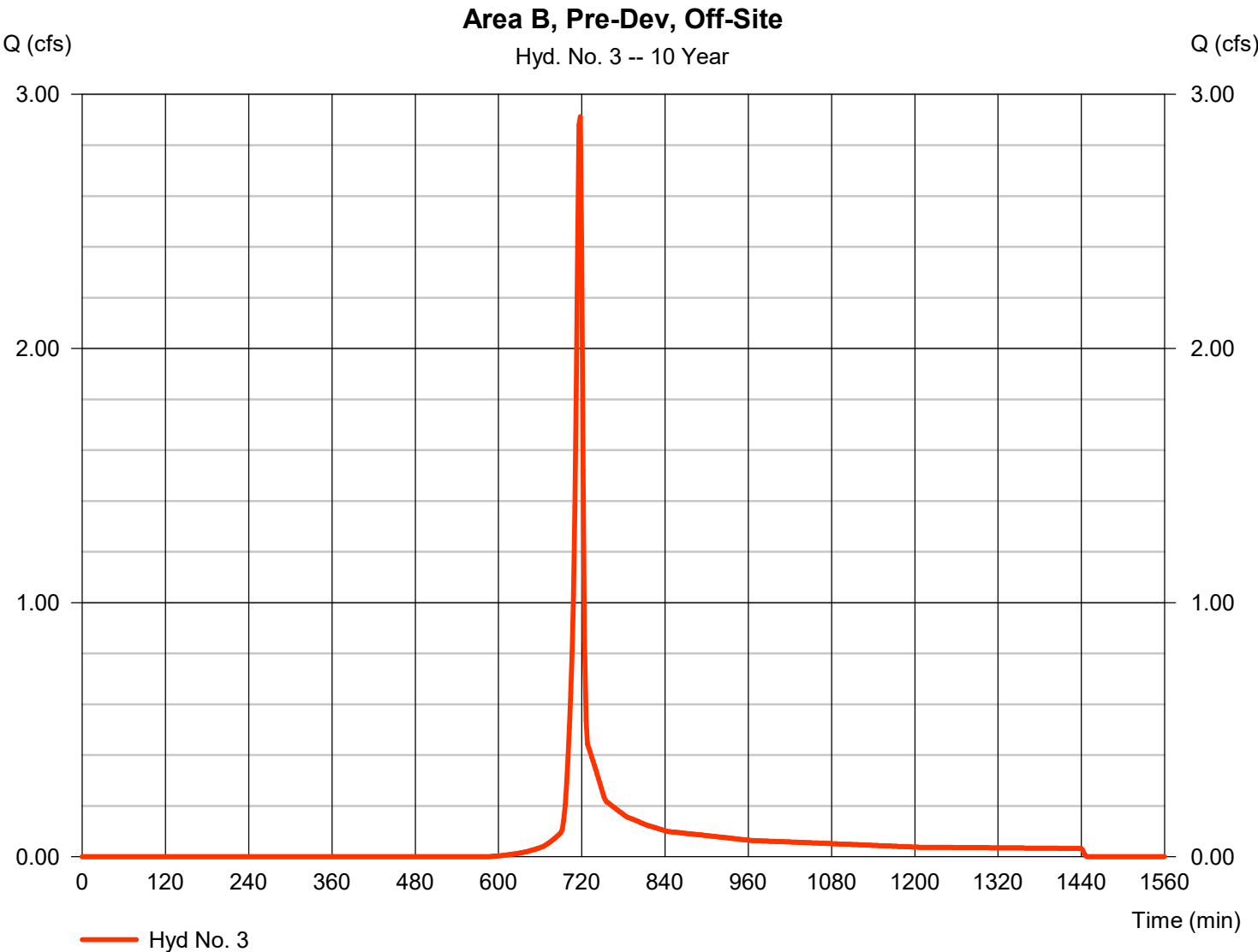


Hydrograph Report

Hyd. No. 3

Area B, Pre-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.912 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	5,834 cuft
Drainage area	=	0.810 ac	Curve number	=	69.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

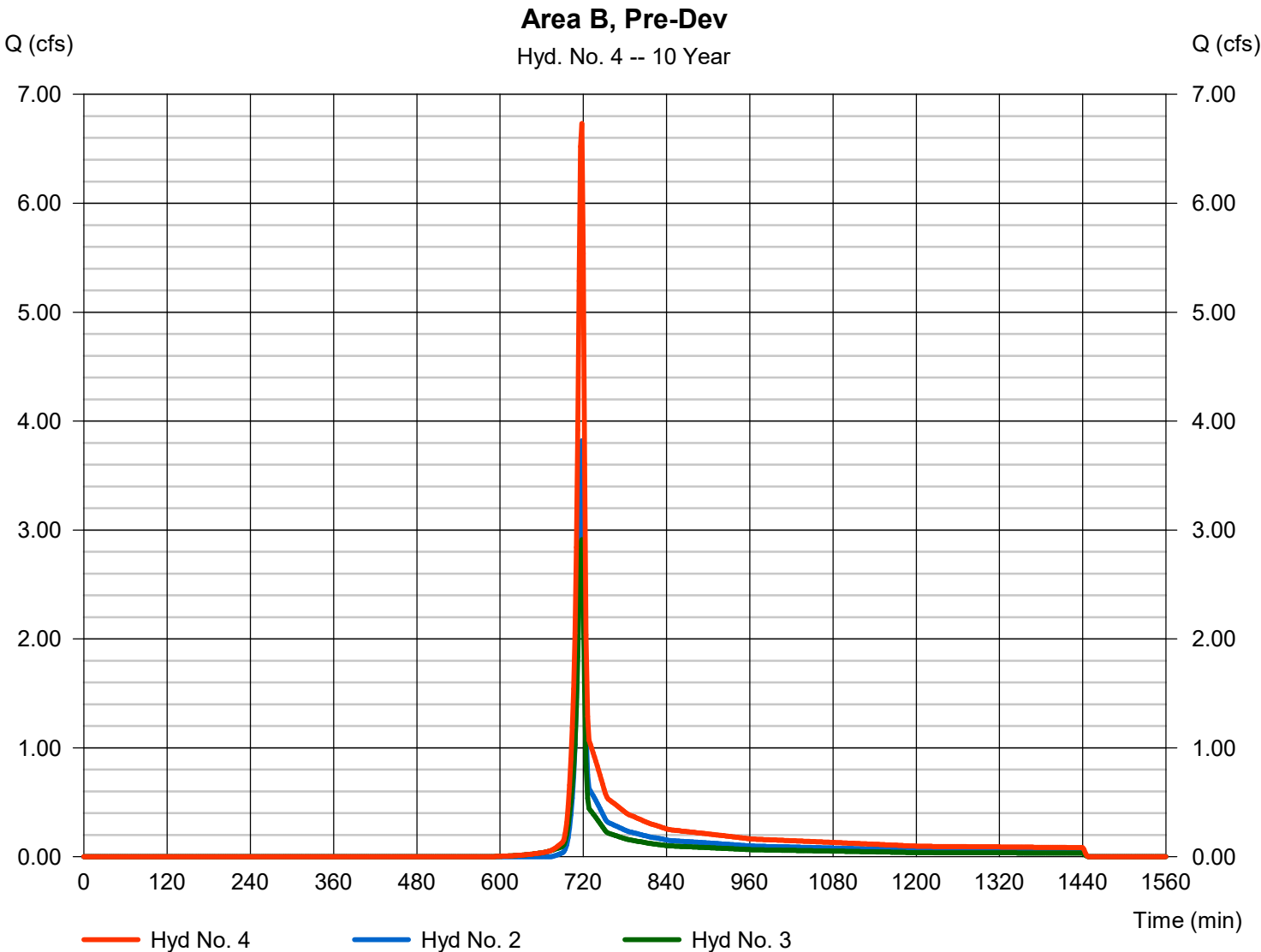
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 4

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 6.732 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 13,552 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 2.370 ac

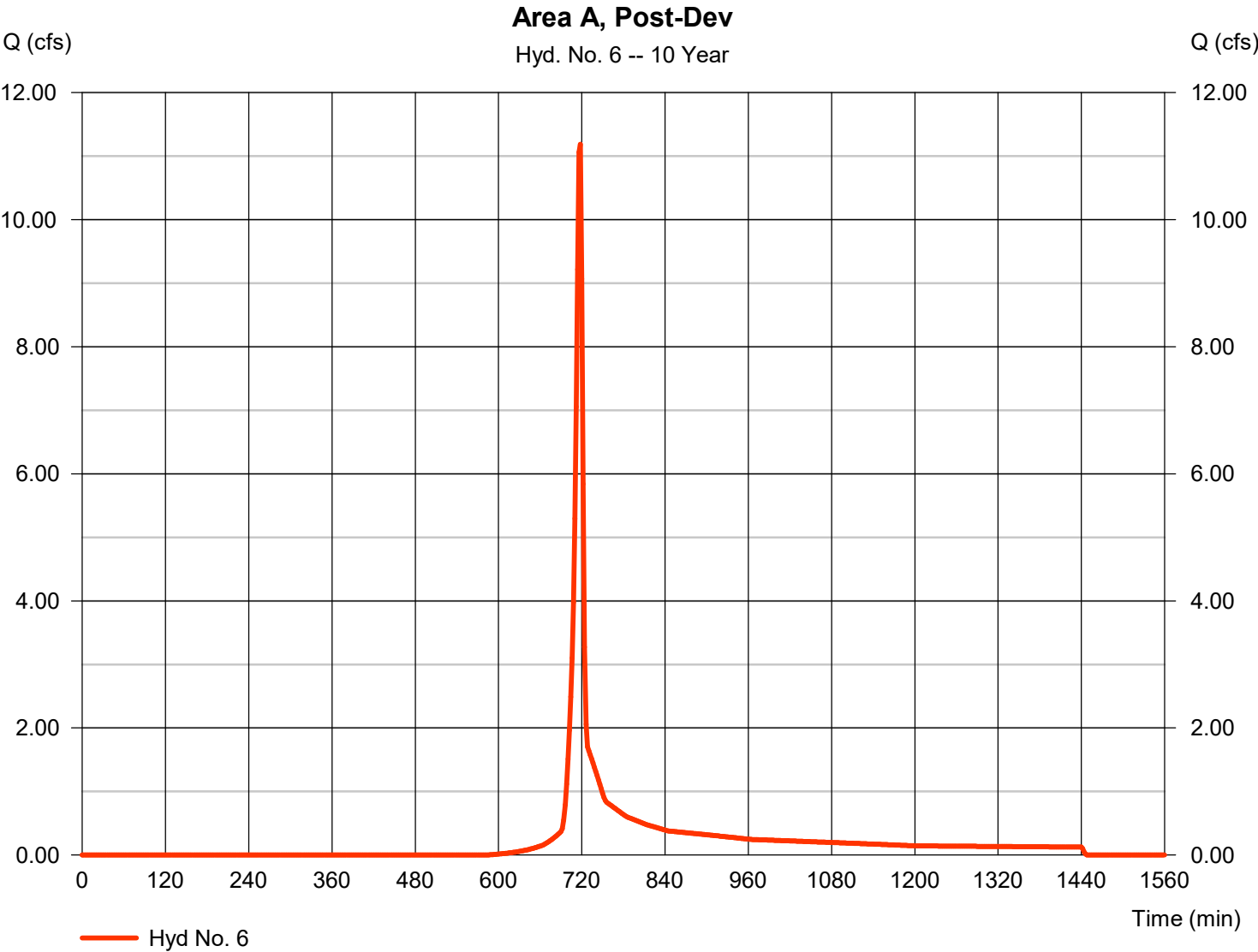


Hydrograph Report

Hyd. No. 6

Area A, Post-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 11.19 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 22,412 cuft
Drainage area	= 3.100 ac	Curve number	= 69.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

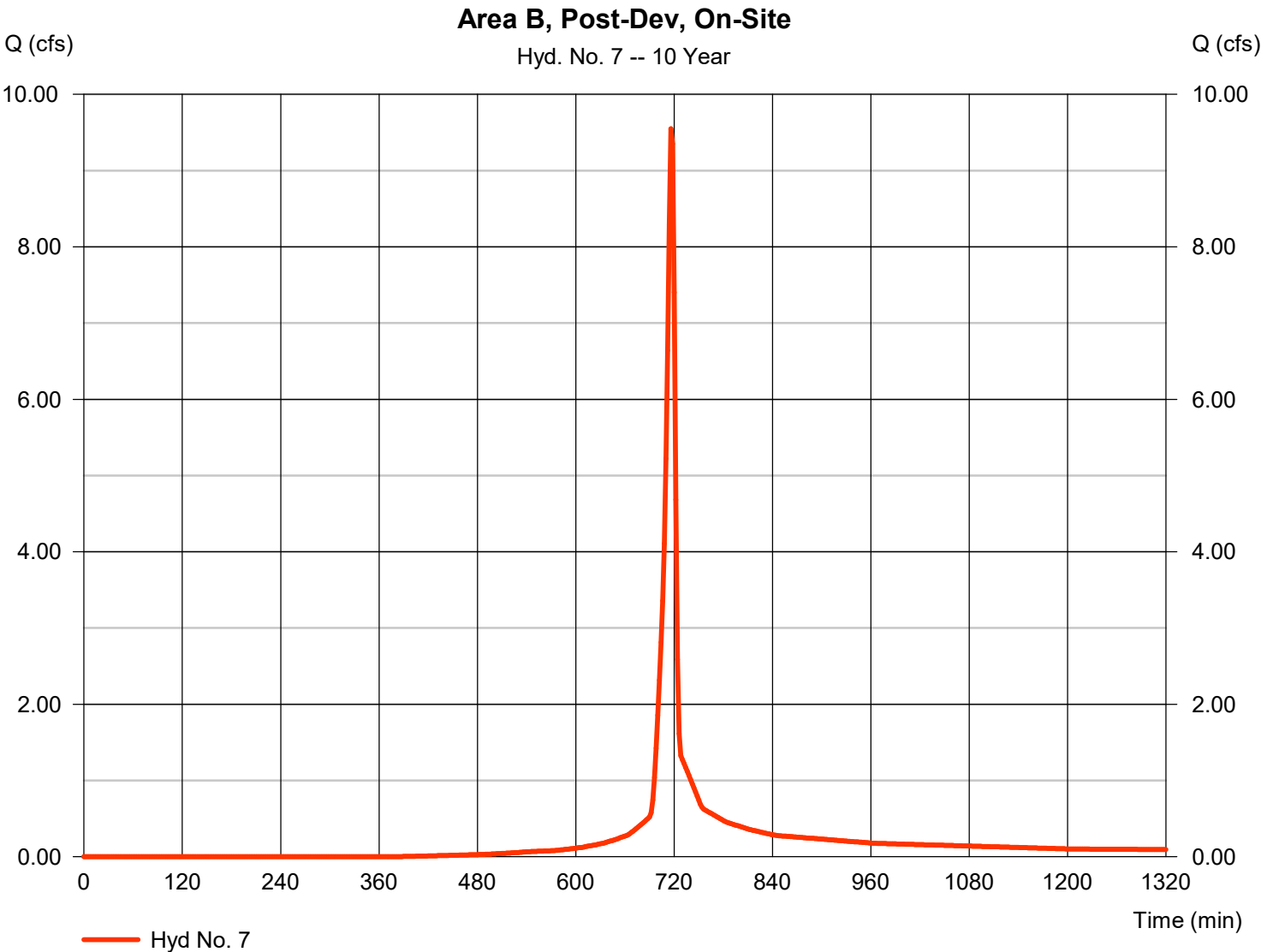
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 7

Area B, Post-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.549 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	19,579 cuft
Drainage area	=	1.790 ac	Curve number	=	82.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

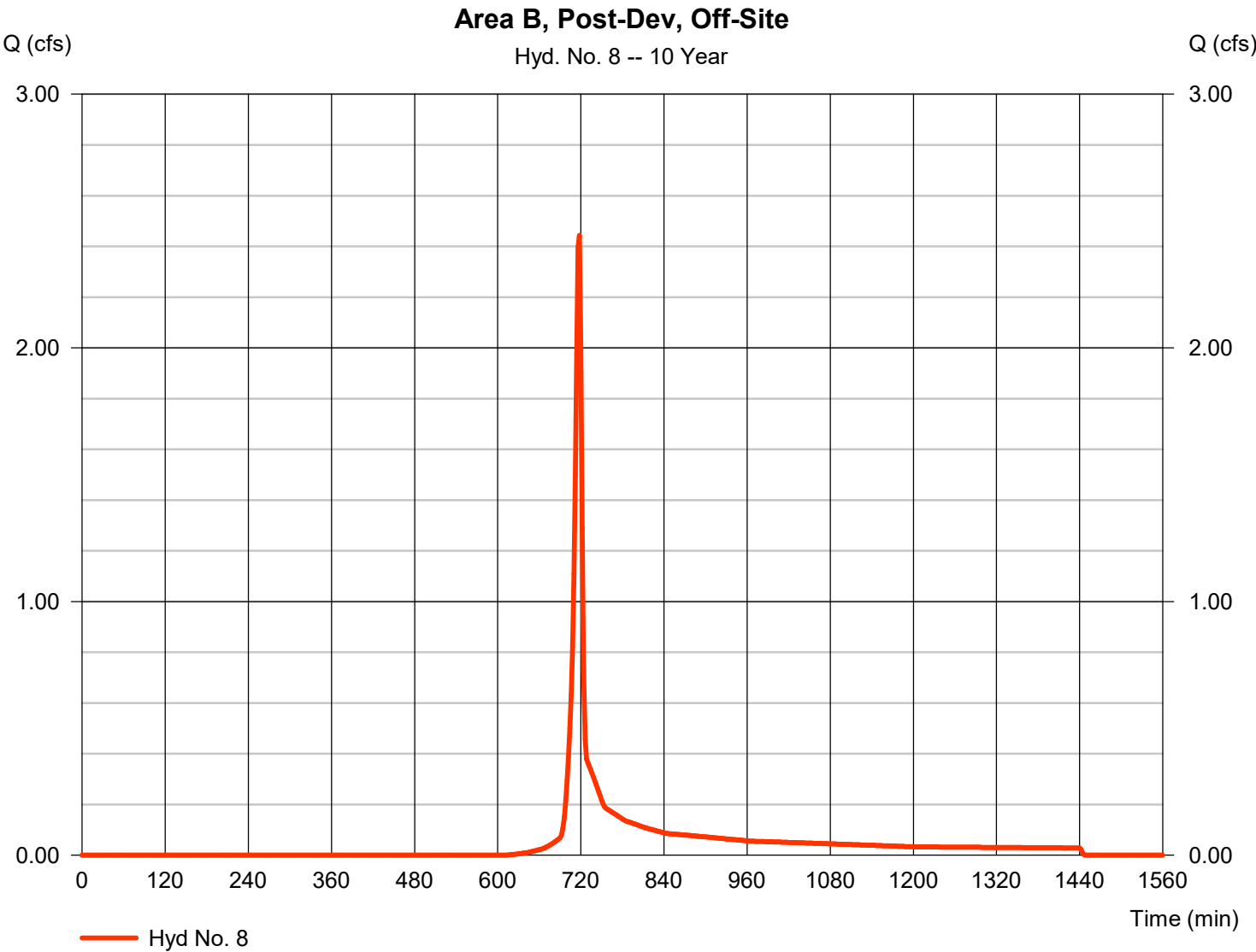
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 8

Area B, Post-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.443 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,886 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

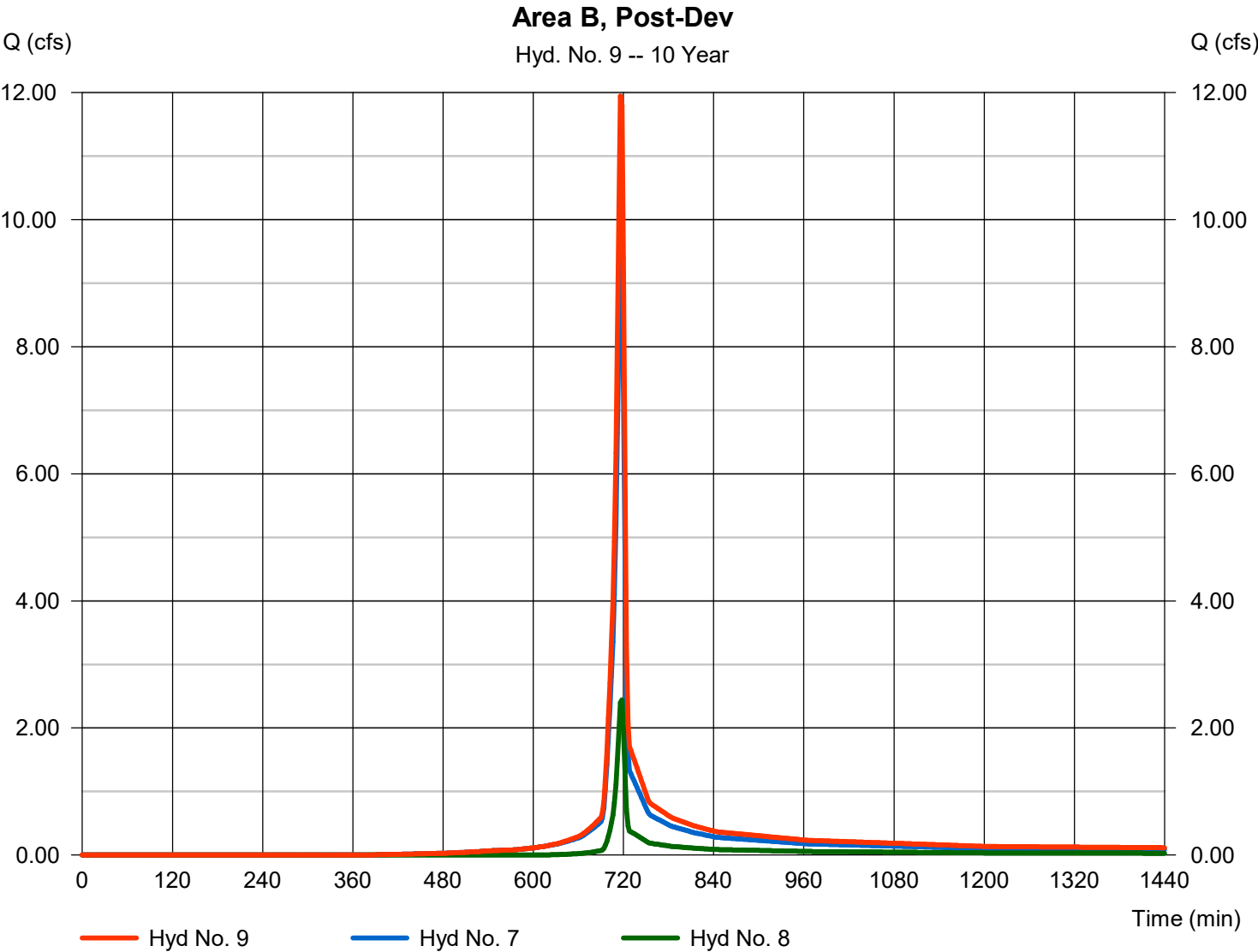
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 9

Area B, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 11.95 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 24,466 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 2.530 ac

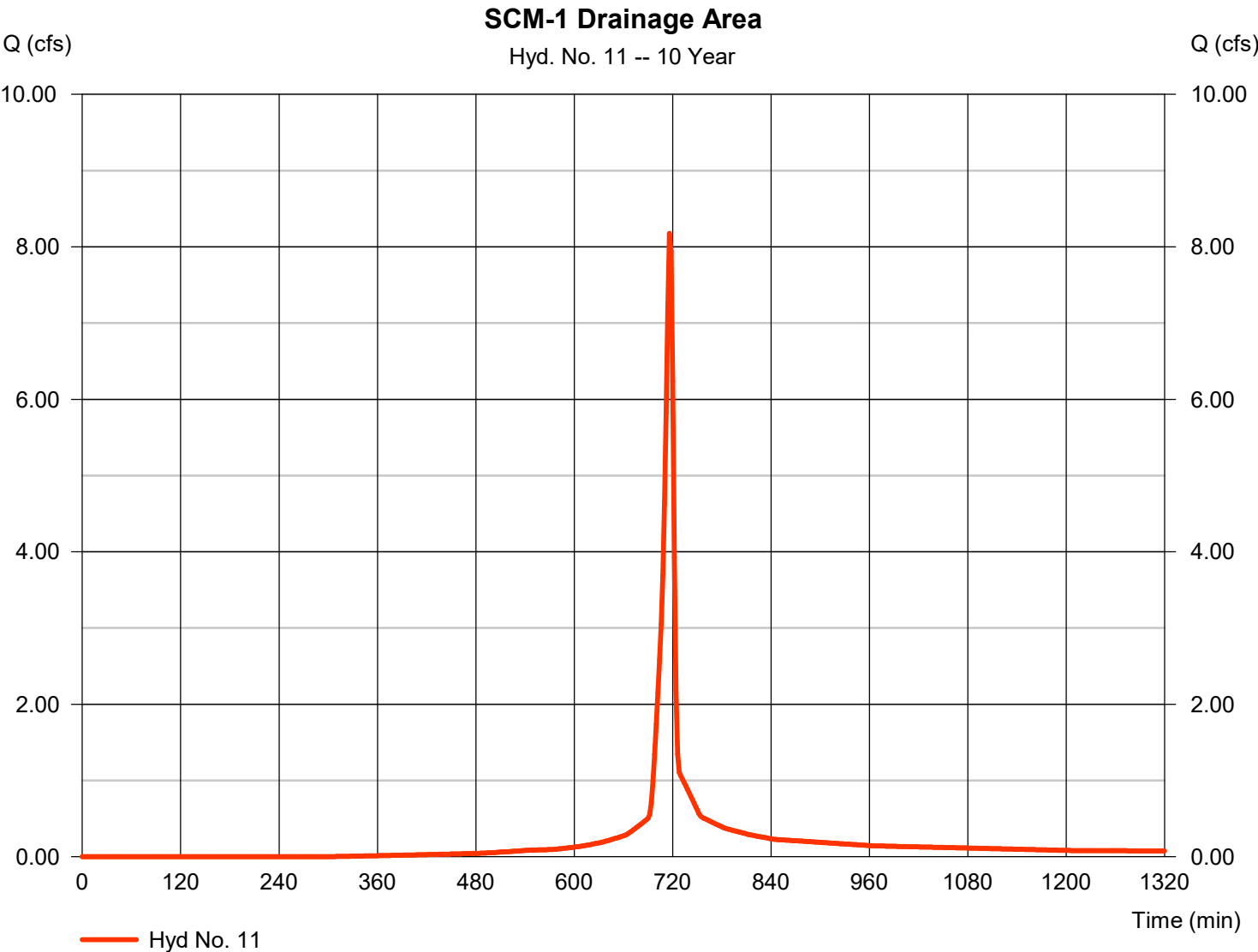


Hydrograph Report

Hyd. No. 11

SCM-1 Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 8.178 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 17,134 cuft
Drainage area	= 1.380 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.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

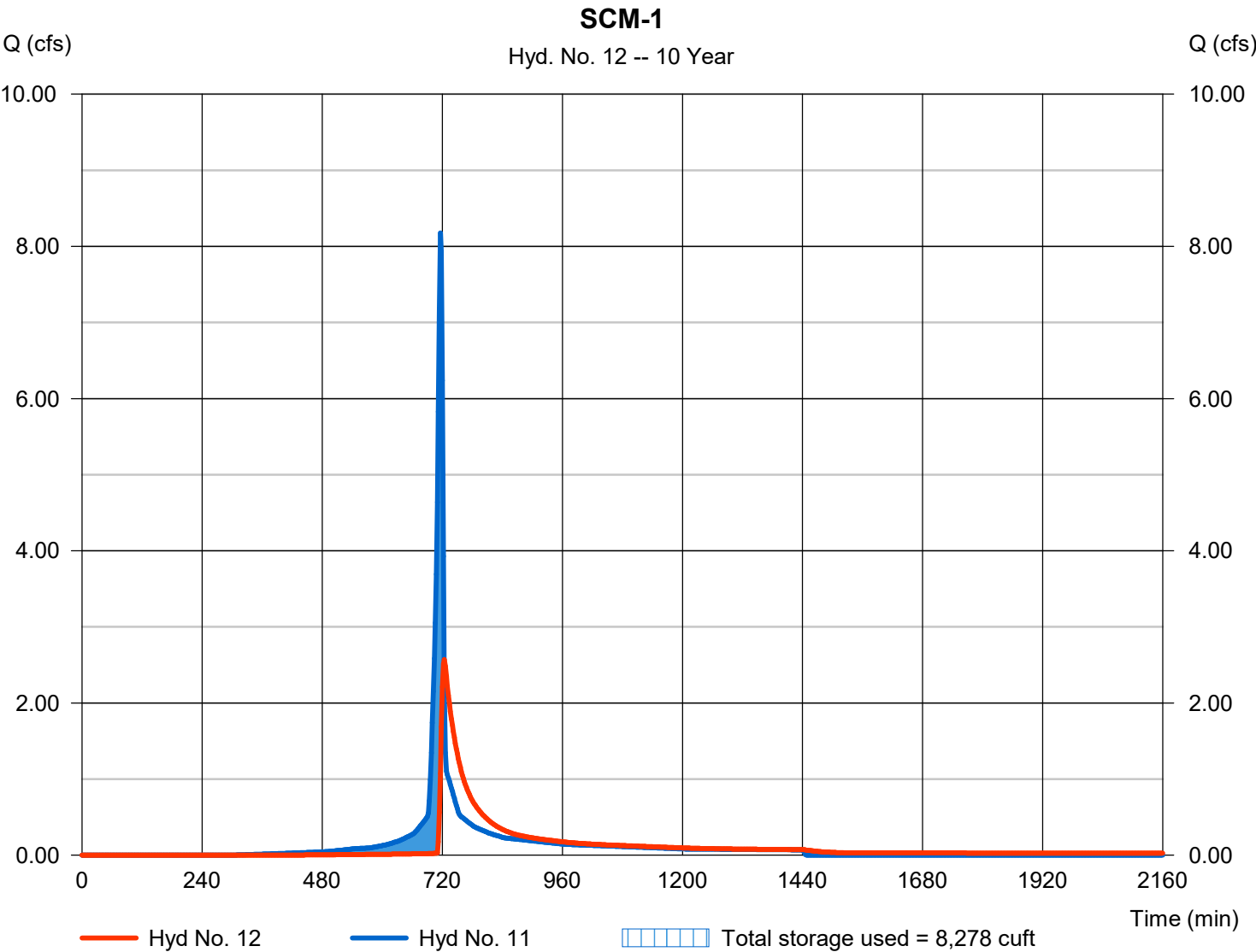
Monday, 04 / 28 / 2025

Hyd. No. 12

SCM-1

Hydrograph type	= Reservoir	Peak discharge	= 2.569 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 16,976 cuft
Inflow hyd. No.	= 11 - SCM-1 Drainage Area	Max. Elevation	= 326.58 ft
Reservoir name	= SCM-1	Max. Storage	= 8,278 cuft

Storage Indication method used.

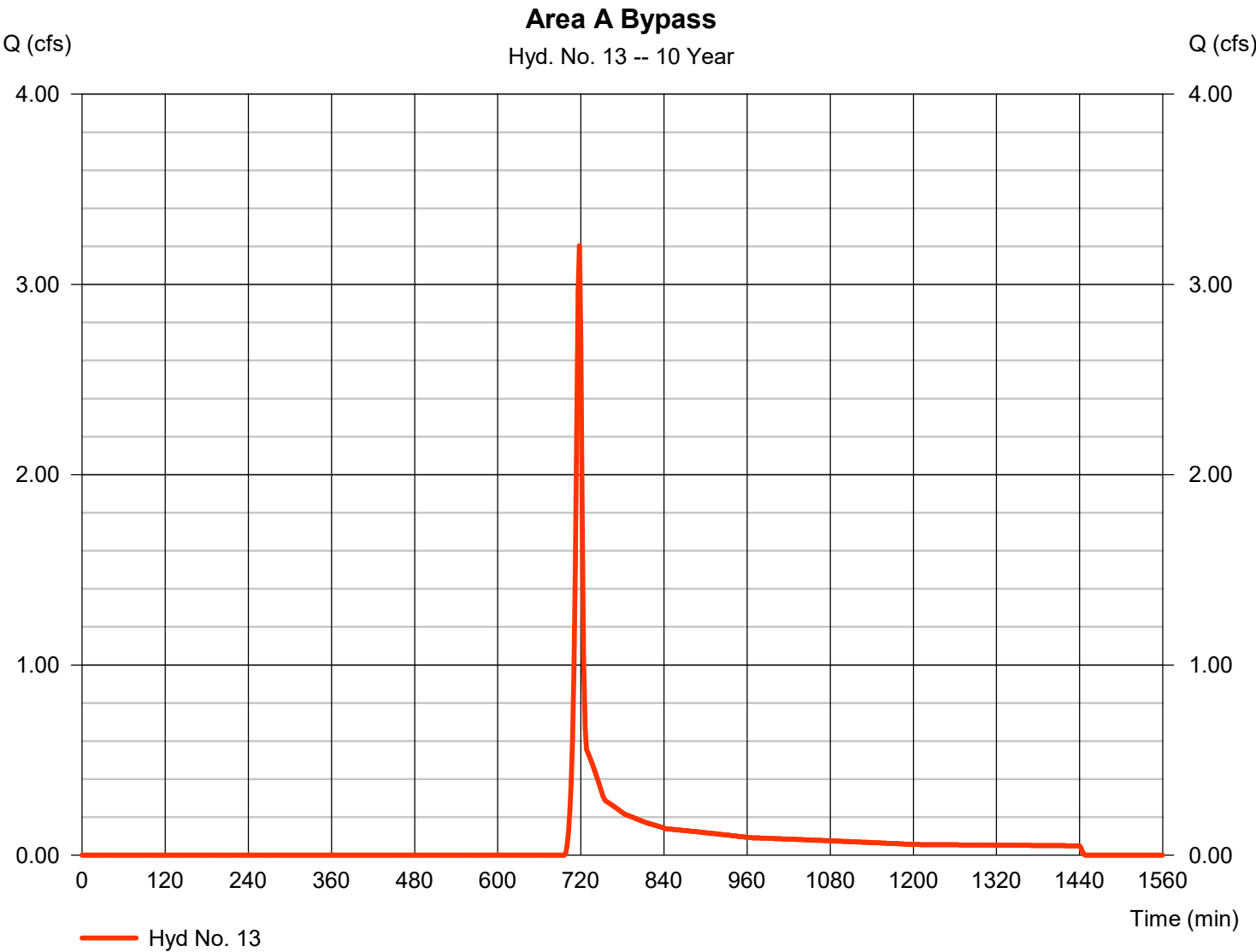


Hydrograph Report

Hyd. No. 13

Area A Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 3.203 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 6,676 cuft
Drainage area	= 1.720 ac	Curve number	= 56.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

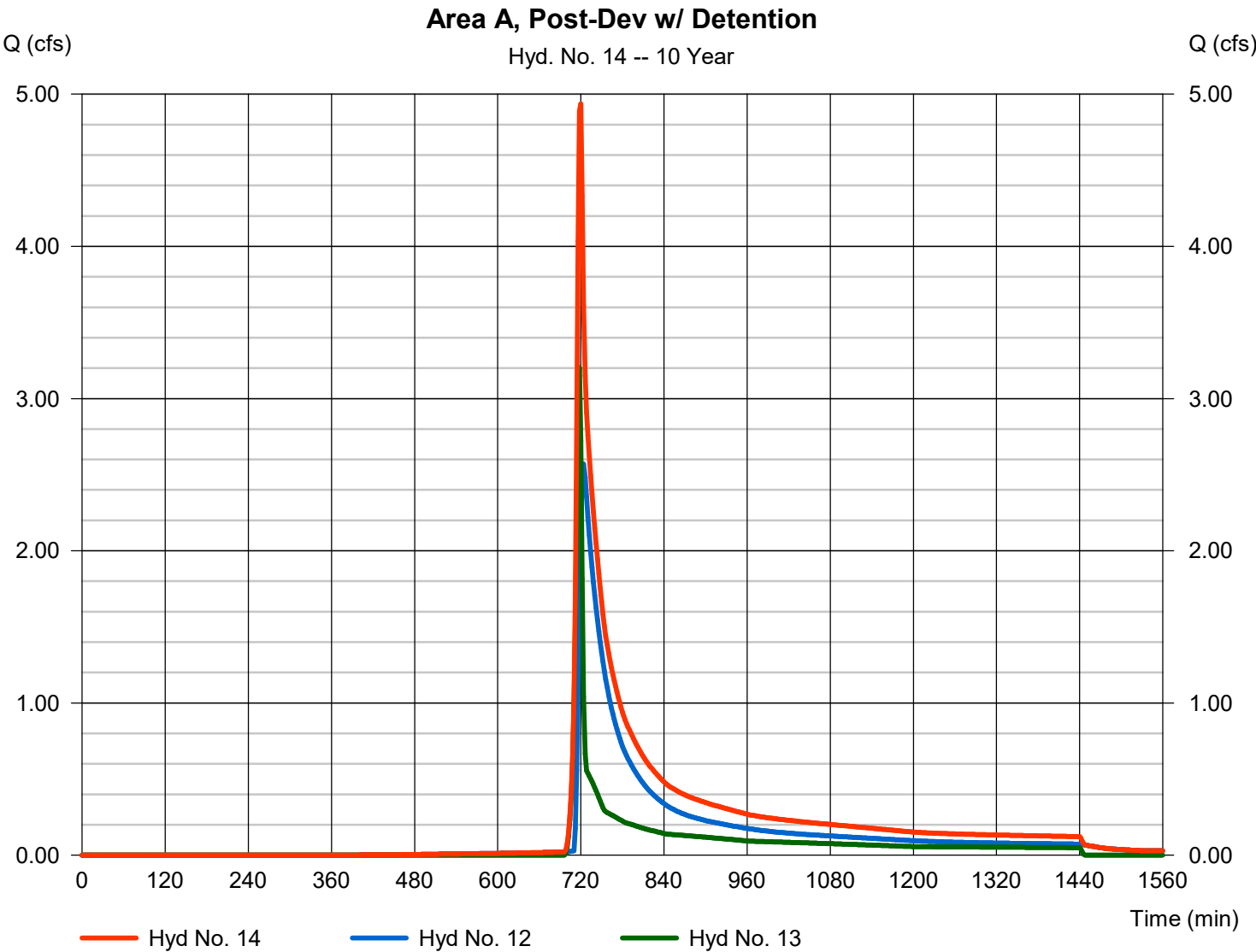


Hydrograph Report

Hyd. No. 14

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 4.935 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 23,652 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 1.720 ac

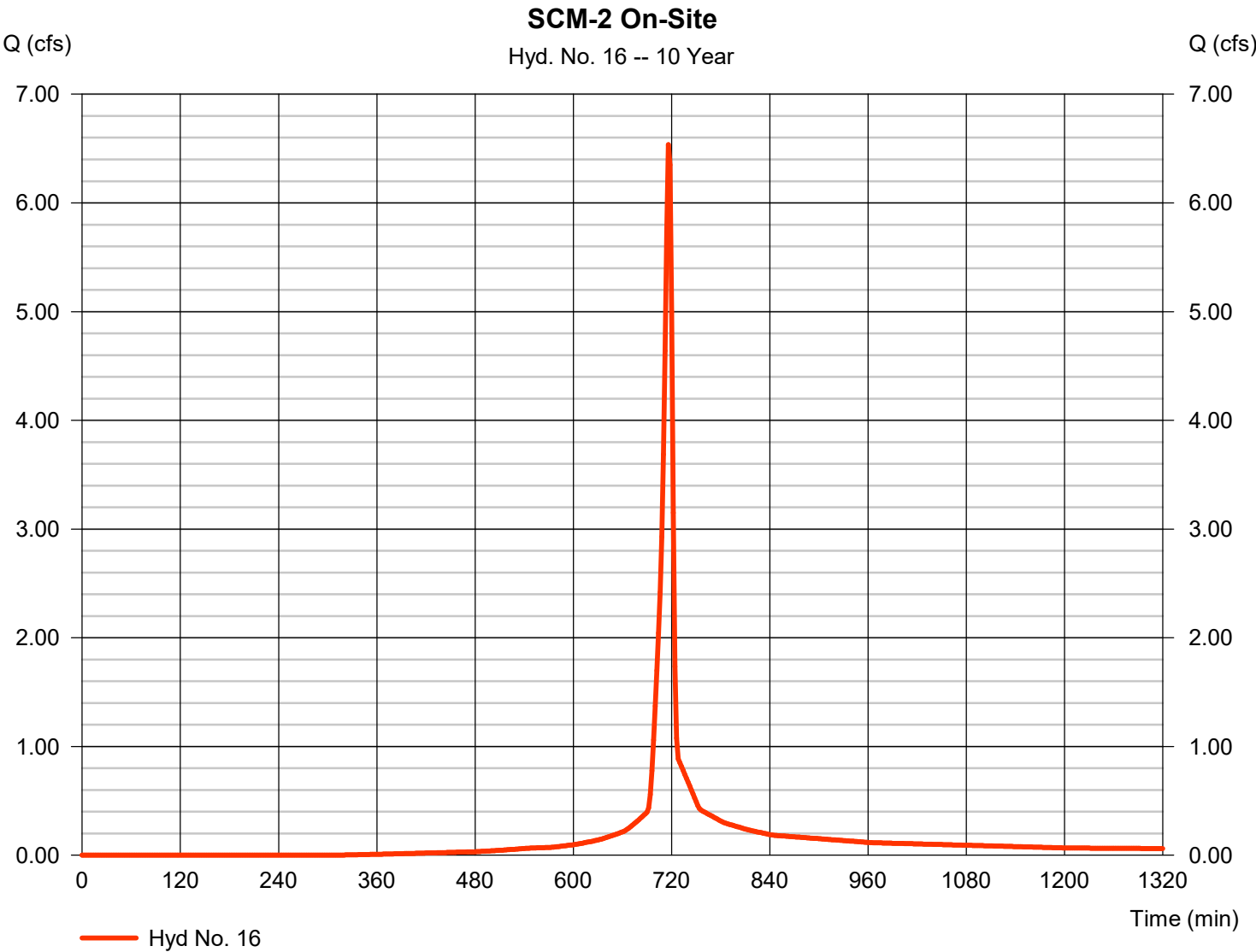


Hydrograph Report

Hyd. No. 16

SCM-2 On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 6.536 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 13,637 cuft
Drainage area	= 1.120 ac	Curve number	= 85.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

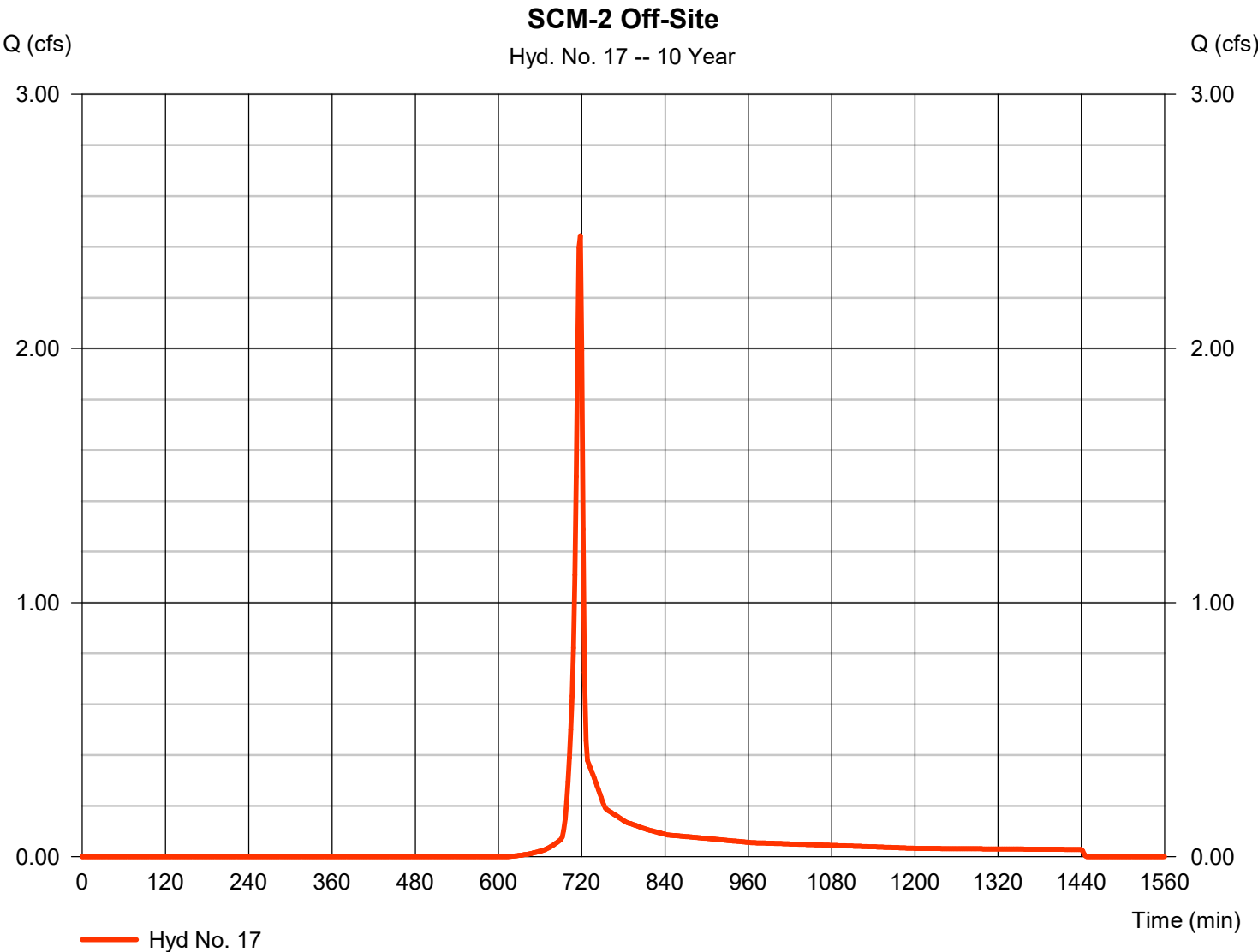


Hydrograph Report

Hyd. No. 17

SCM-2 Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 2.443 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 4,886 cuft
Drainage area	= 0.740 ac	Curve number	= 67.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

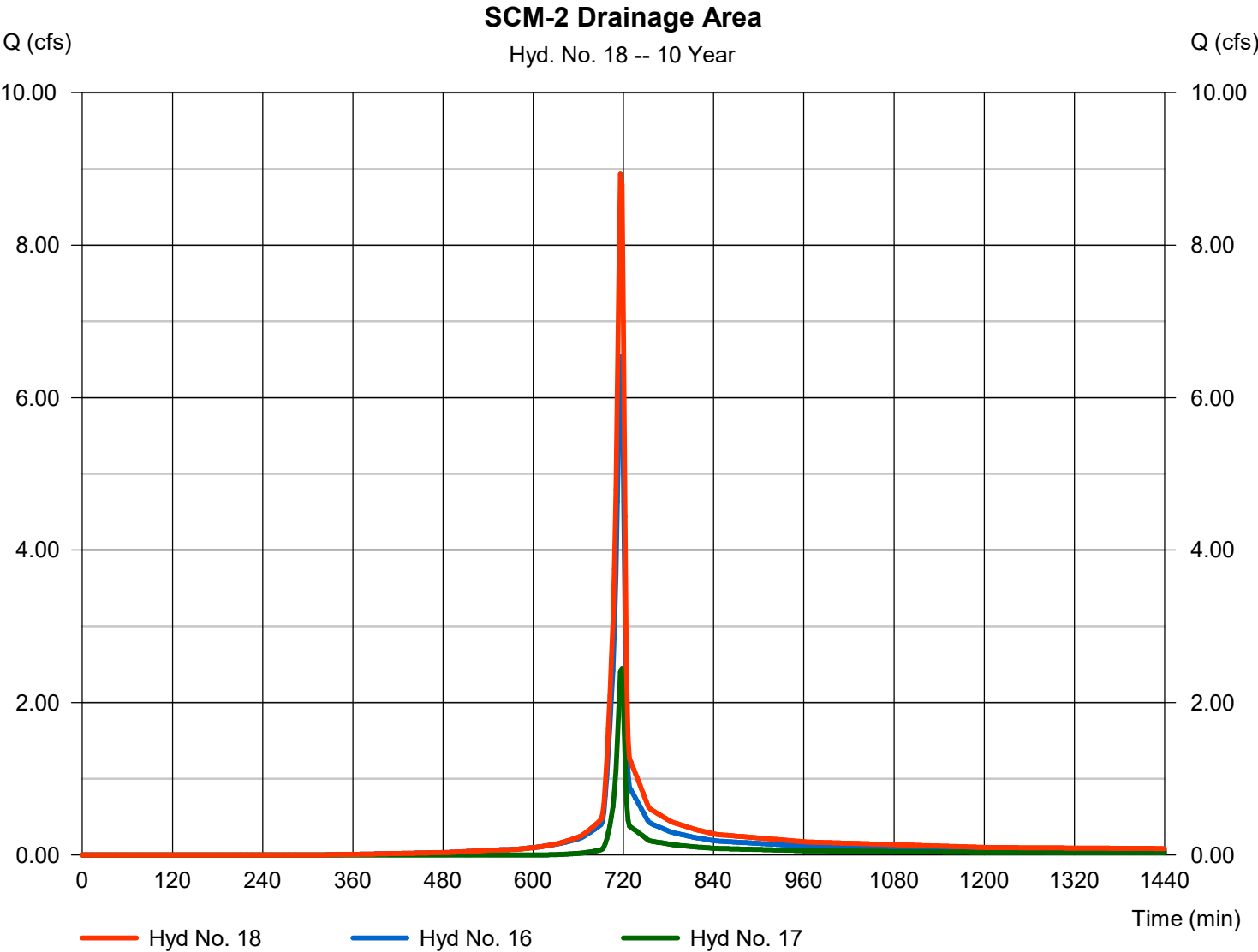


Hydrograph Report

Hyd. No. 18

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 8.933 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 18,523 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 1.860 ac



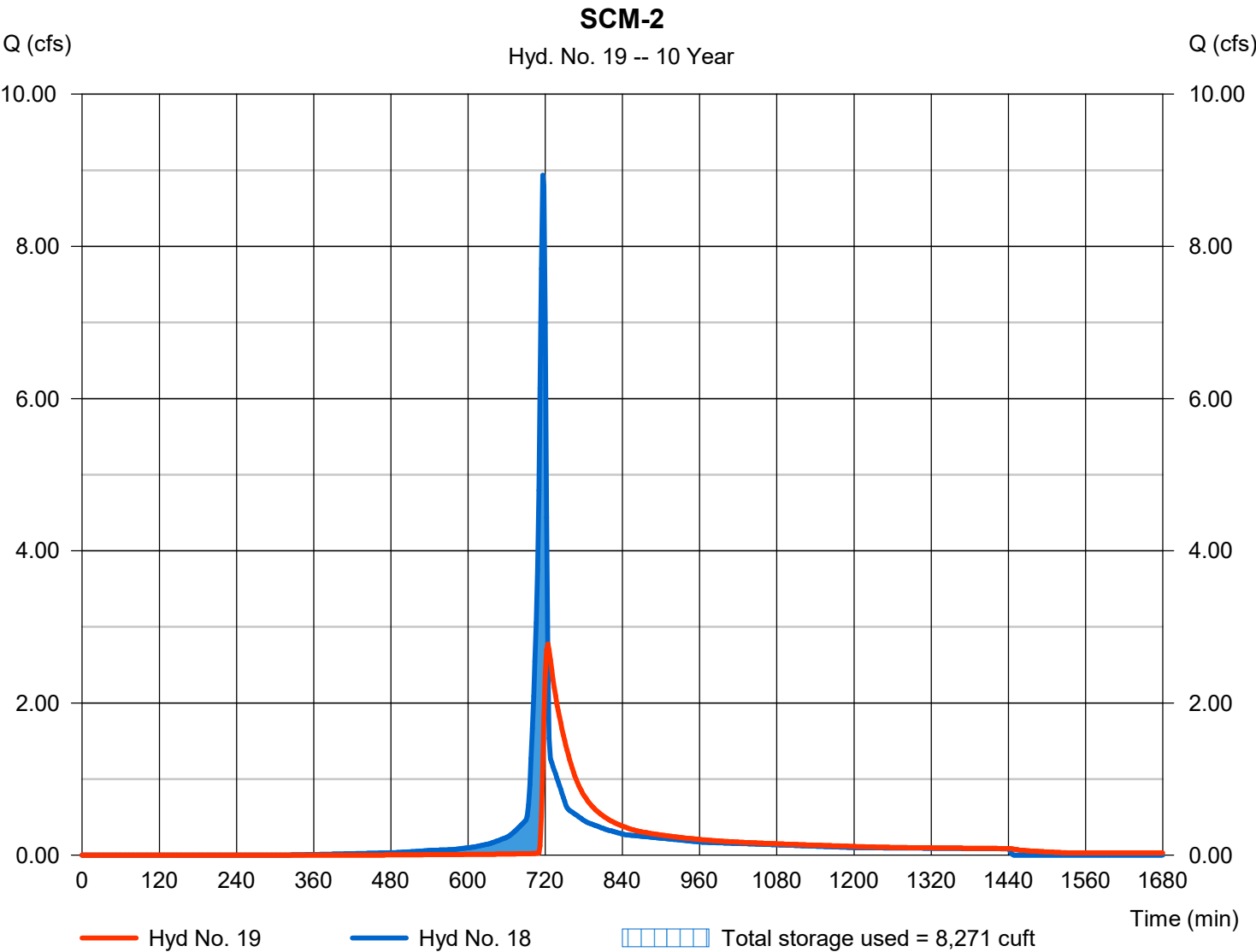
Hydrograph Report

Hyd. No. 19

SCM-2

Hydrograph type	= Reservoir	Peak discharge	= 2.776 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 18,406 cuft
Inflow hyd. No.	= 18 - SCM-2 Drainage Area	Max. Elevation	= 328.38 ft
Reservoir name	= SCM-2	Max. Storage	= 8,271 cuft

Storage Indication method used.

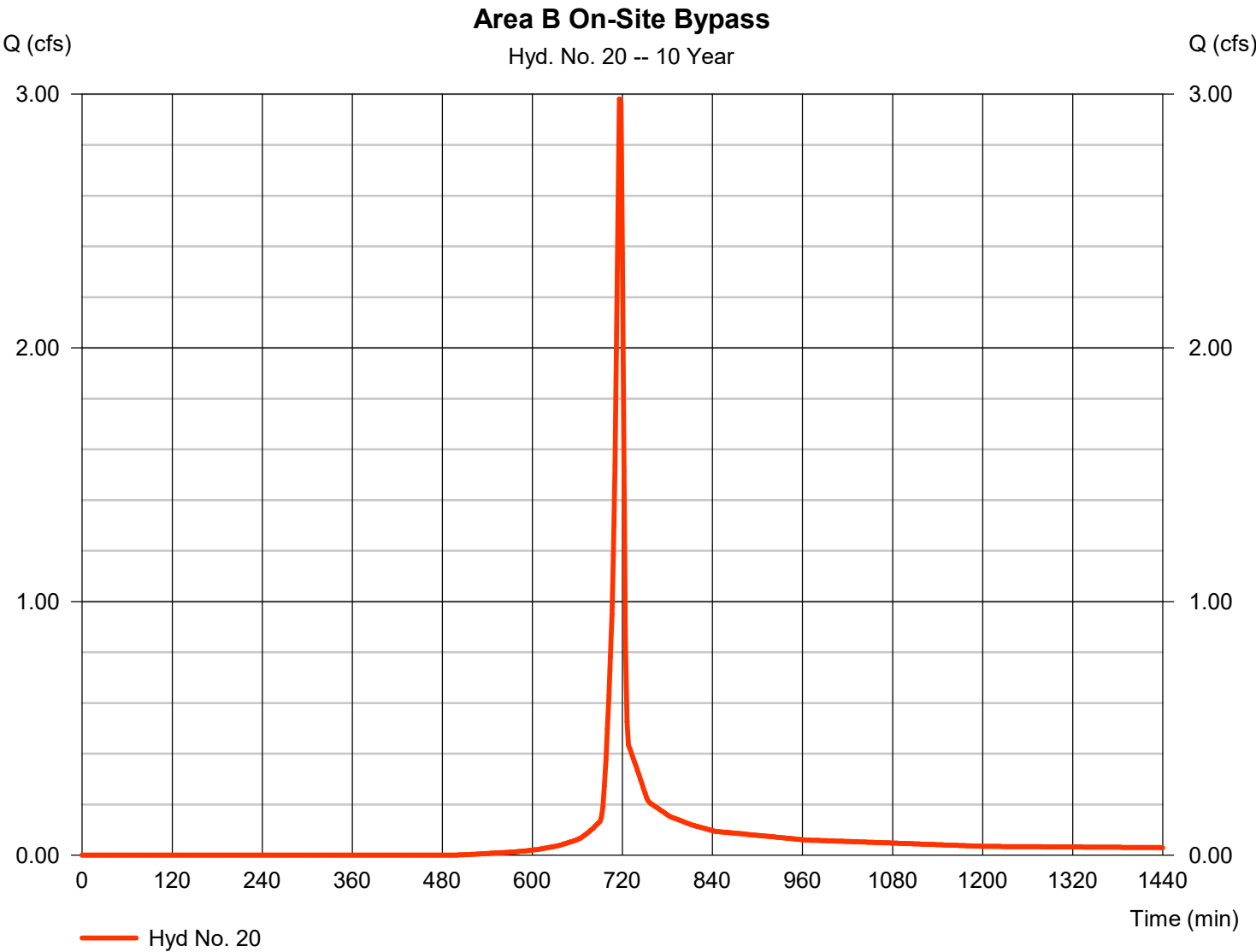


Hydrograph Report

Hyd. No. 20

Area B On-Site Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 2.981 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 6,025 cuft
Drainage area	= 0.670 ac	Curve number	= 75.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

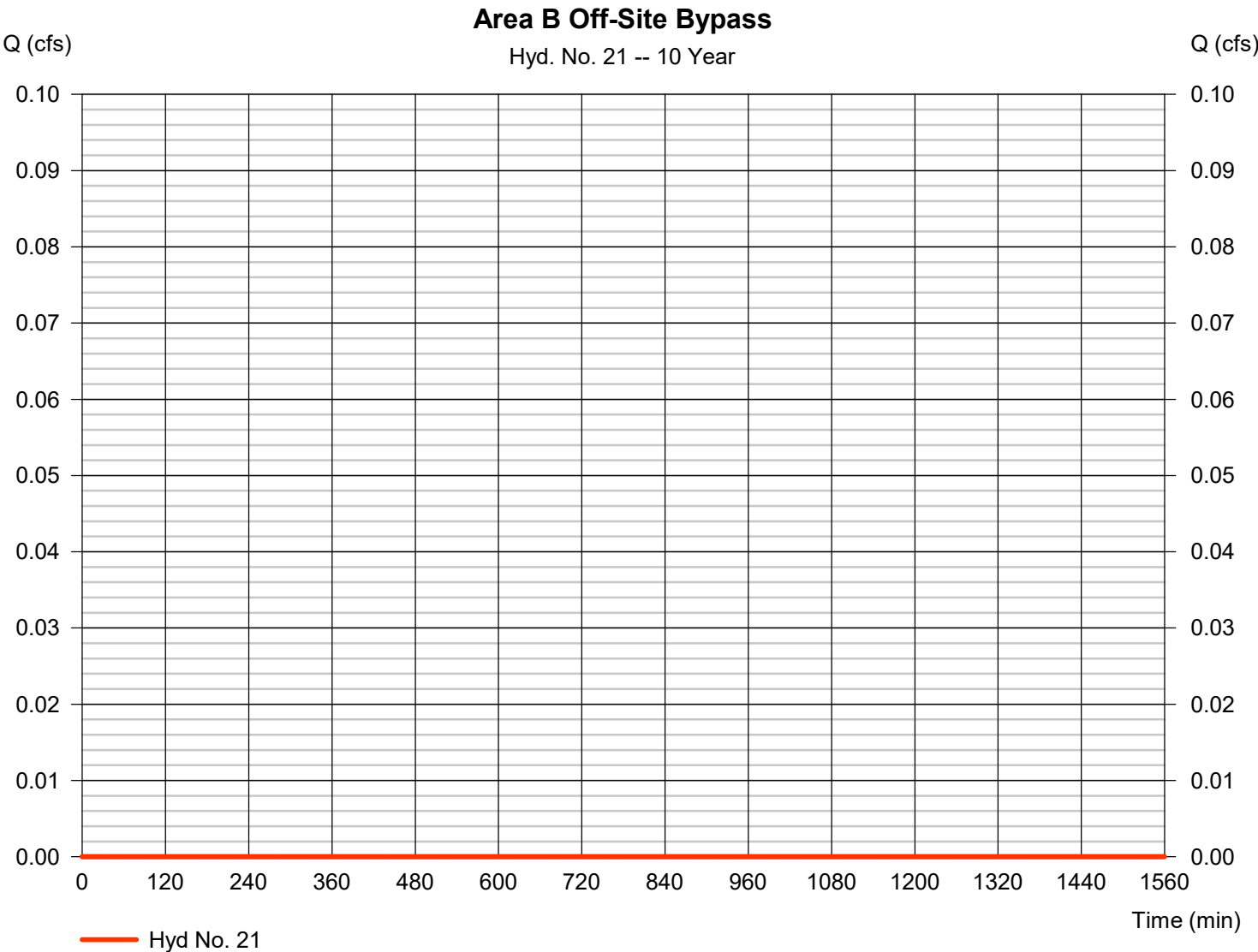


Hydrograph Report

Hyd. No. 21

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Drainage area	=	0.000 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

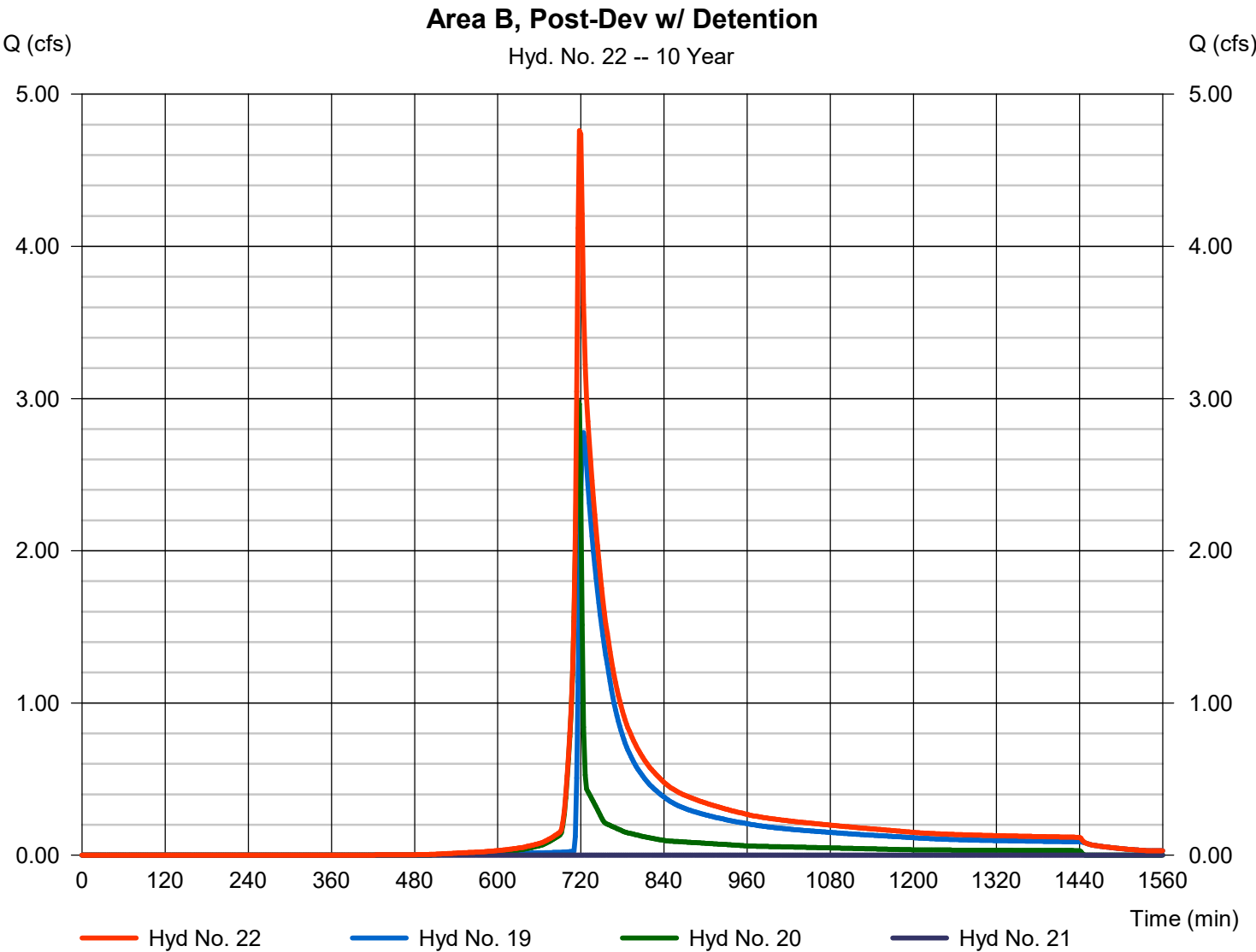


Hydrograph Report

Hyd. No. 22

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 4.760 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 24,431 cuft
Inflow hyds.	= 19, 20, 21	Contrib. drain. area	= 0.670 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

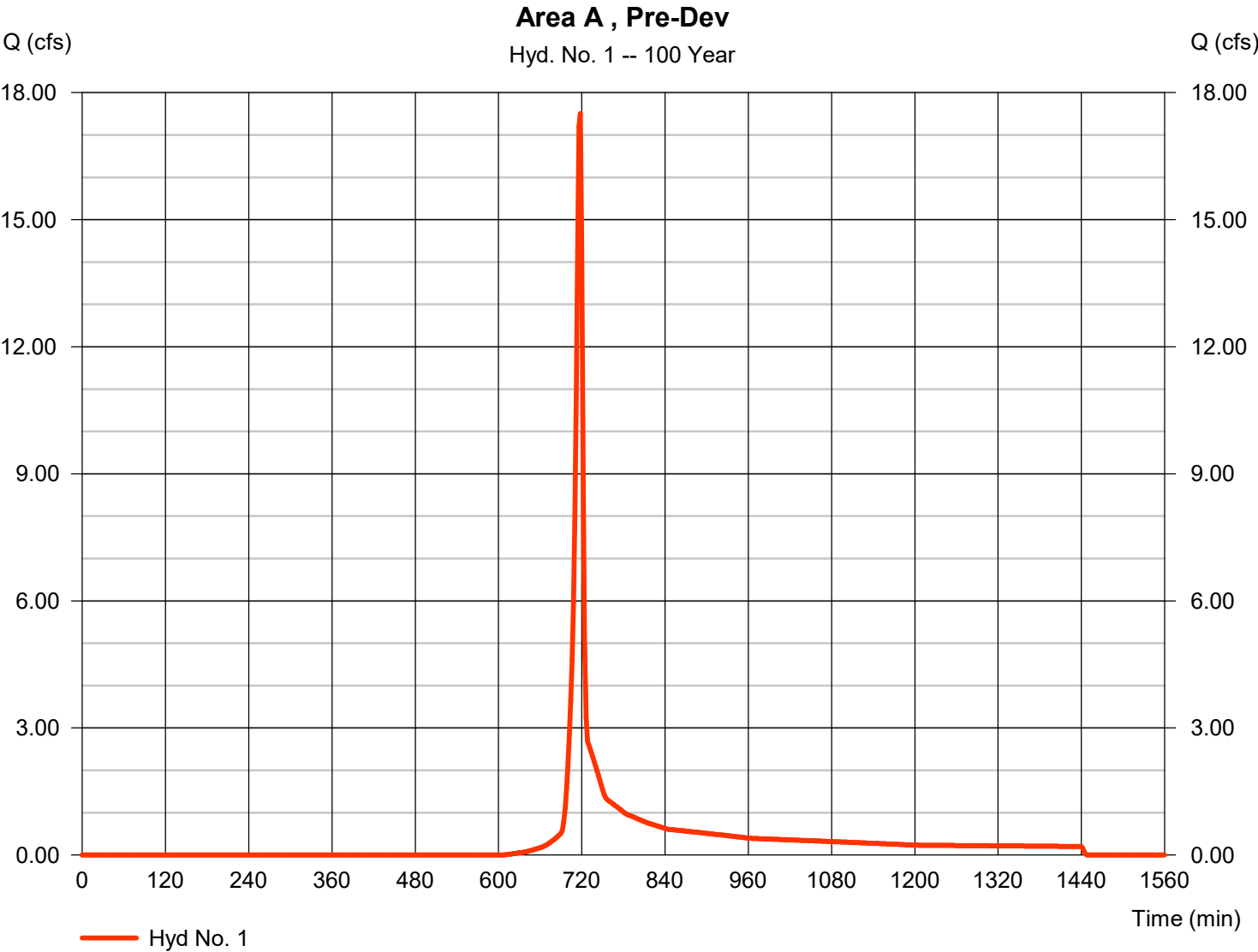
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	17.51	2	718	35,018	-----	-----	-----	Area A , Pre-Dev
2	SCS Runoff	9.112	2	718	18,287	-----	-----	-----	Area B, Pre-Dev, On-Site
3	SCS Runoff	6.022	2	716	12,211	-----	-----	-----	Area B, Pre-Dev, Off-Site
4	Combine	15.06	2	716	30,498	2, 3	-----	-----	Area B, Pre-Dev
6	SCS Runoff	23.10	2	716	46,855	-----	-----	-----	Area A, Post-Dev
7	SCS Runoff	16.94	2	716	35,767	-----	-----	-----	Area B, Post-Dev, On-Site
8	SCS Runoff	5.204	2	716	10,522	-----	-----	-----	Area B, Post-Dev, Off-Site
9	Combine	22.14	2	716	46,289	7, 8	-----	-----	Area B, Post-Dev
11	SCS Runoff	13.85	2	716	30,012	-----	-----	-----	SCM-1 Drainage Area
12	Reservoir	8.592	2	720	29,850	11	327.19	11,372	SCM-1
13	SCS Runoff	8.596	2	718	17,189	-----	-----	-----	Area A Bypass
14	Combine	17.00	2	718	47,038	12, 13	-----	-----	Area A, Post-Dev w/ Detention
16	SCS Runoff	11.14	2	716	24,042	-----	-----	-----	SCM-2 On-Site
17	SCS Runoff	5.204	2	716	10,522	-----	-----	-----	SCM-2 Off-Site
18	Combine	16.35	2	716	34,564	16, 17	-----	-----	SCM-2 Drainage Area
19	Reservoir	10.10	2	722	34,444	18	329.12	12,221	SCM-2
20	SCS Runoff	5.701	2	716	11,734	-----	-----	-----	Area B On-Site Bypass
21	SCS Runoff	0.000	2	718	0	-----	-----	-----	Area B Off-Site Bypass
22	Combine	14.44	2	720	46,178	19, 20, 21	-----	-----	Area B, Post-Dev w/ Detention
22-154 Hydraflow.gpw					Return Period: 100 Year			Monday, 04 / 28 / 2025	

Hydrograph Report

Hyd. No. 1

Area A , Pre-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 17.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 35,018 cuft
Drainage area	= 3.330 ac	Curve number	= 57.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

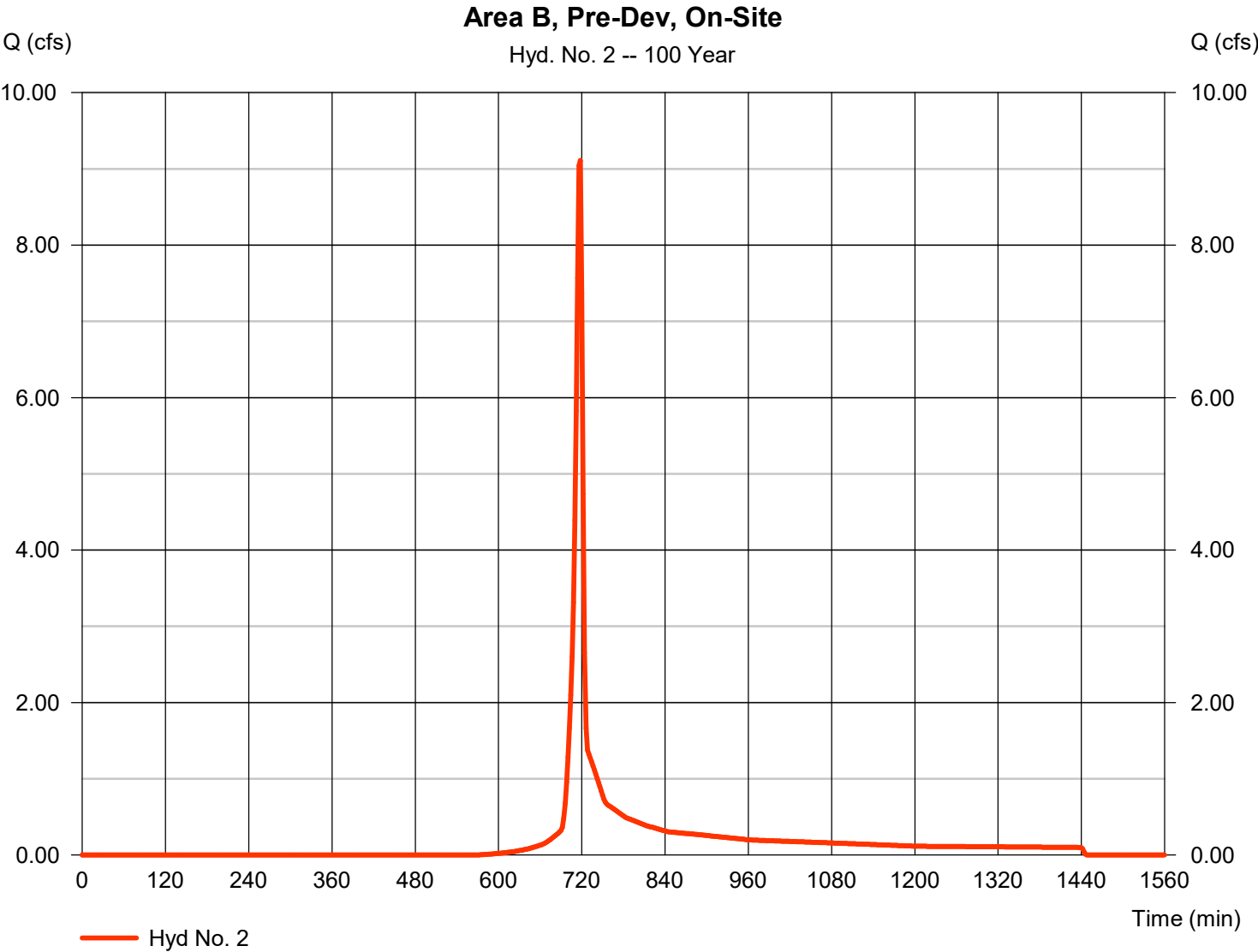


Hydrograph Report

Hyd. No. 2

Area B, Pre-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 9.112 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 18,287 cuft
Drainage area	= 1.560 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

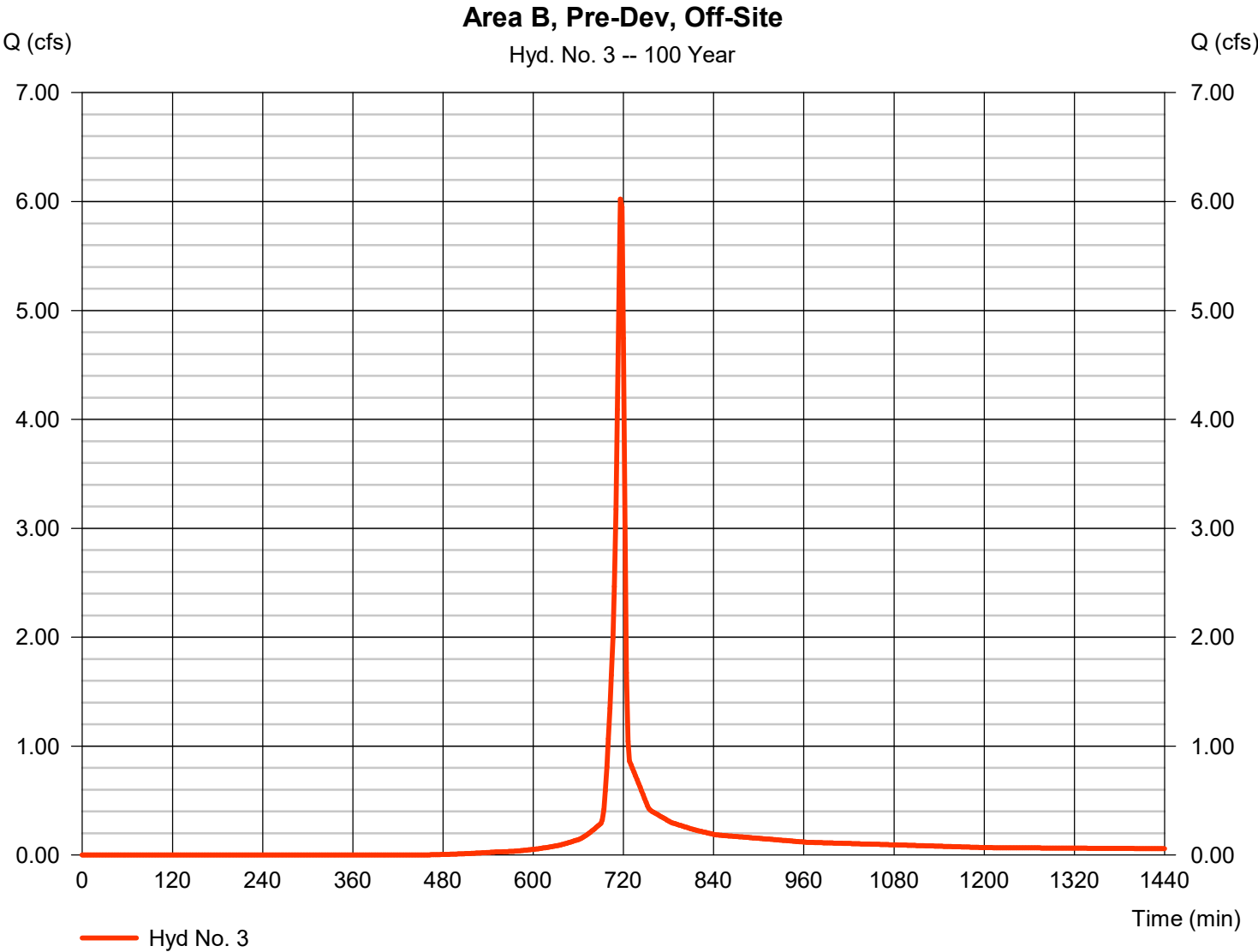


Hydrograph Report

Hyd. No. 3

Area B, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 6.022 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 12,211 cuft
Drainage area	= 0.810 ac	Curve number	= 69.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

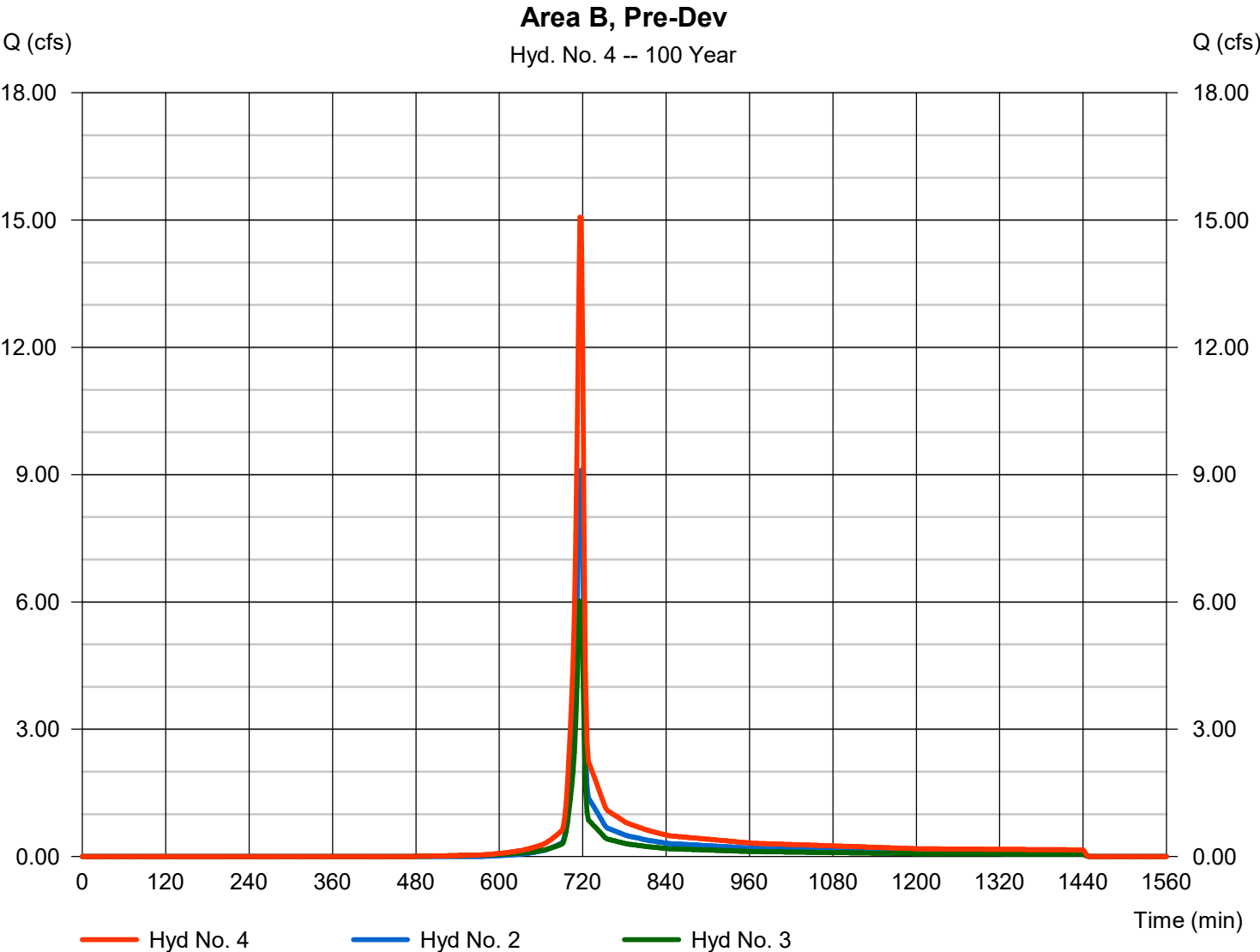
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 4

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 15.06 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 30,498 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 2.370 ac

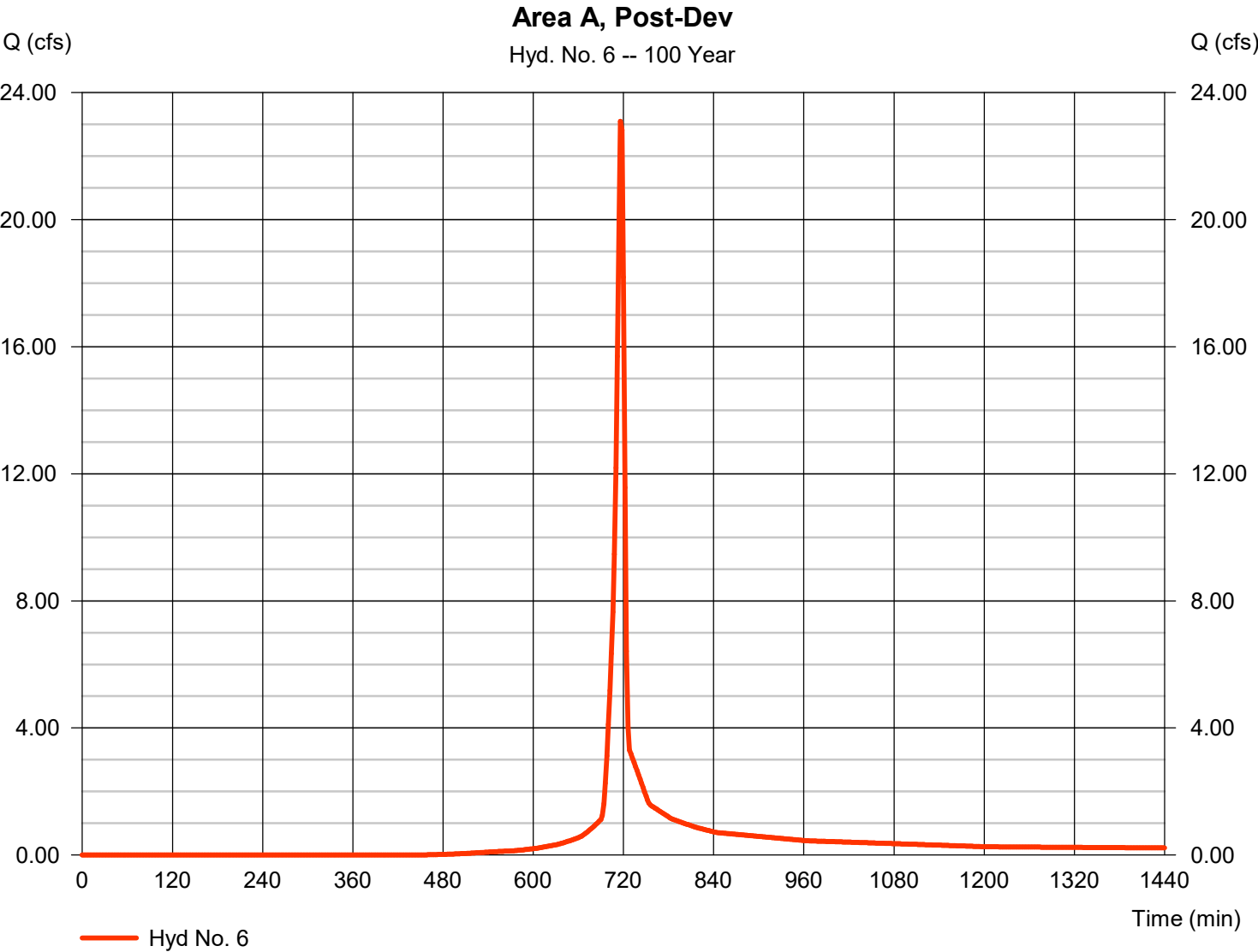


Hydrograph Report

Hyd. No. 6

Area A, Post-Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 23.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 46,855 cuft
Drainage area	= 3.100 ac	Curve number	= 69.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

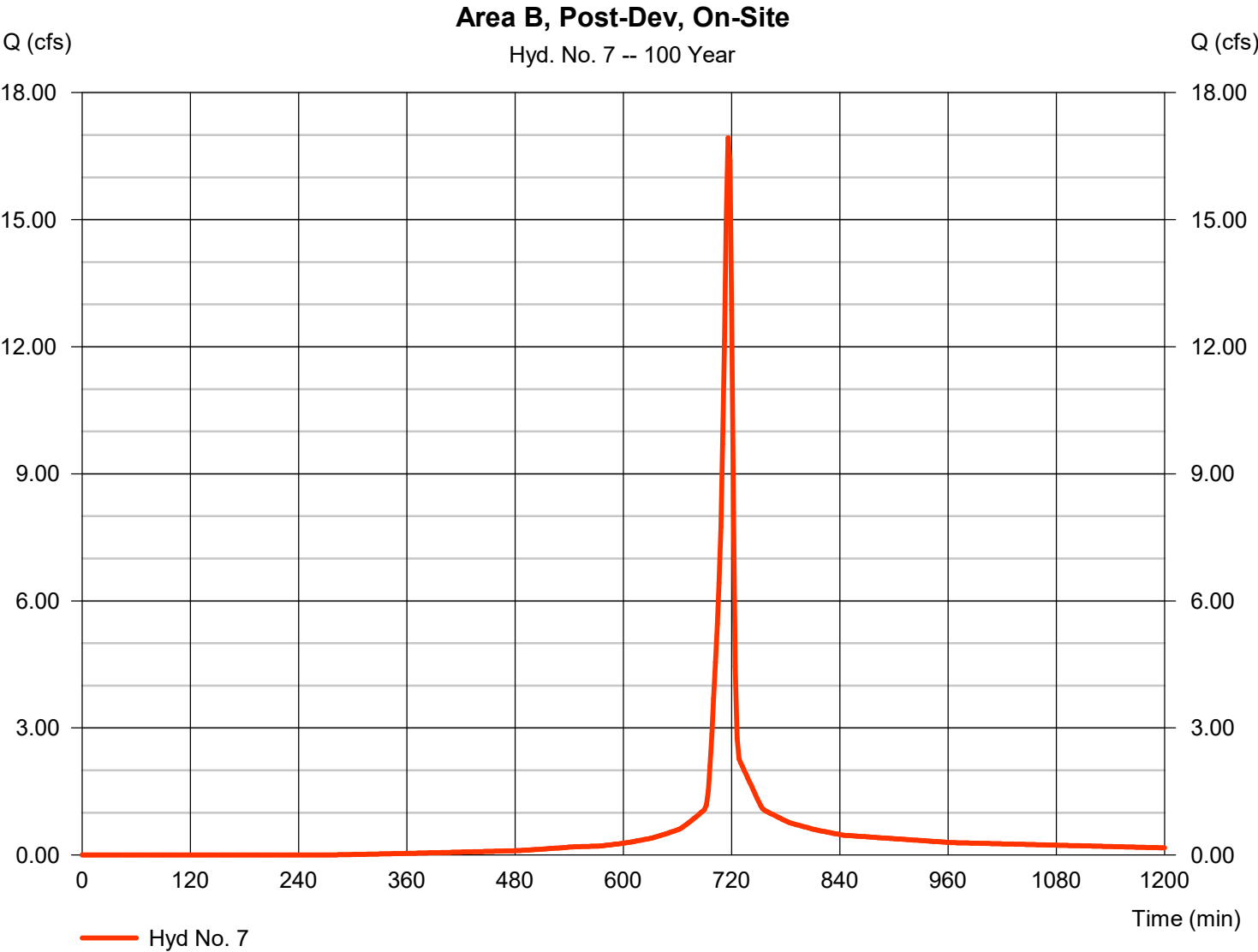


Hydrograph Report

Hyd. No. 7

Area B, Post-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.94 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	35,767 cuft
Drainage area	=	1.790 ac	Curve number	=	82.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

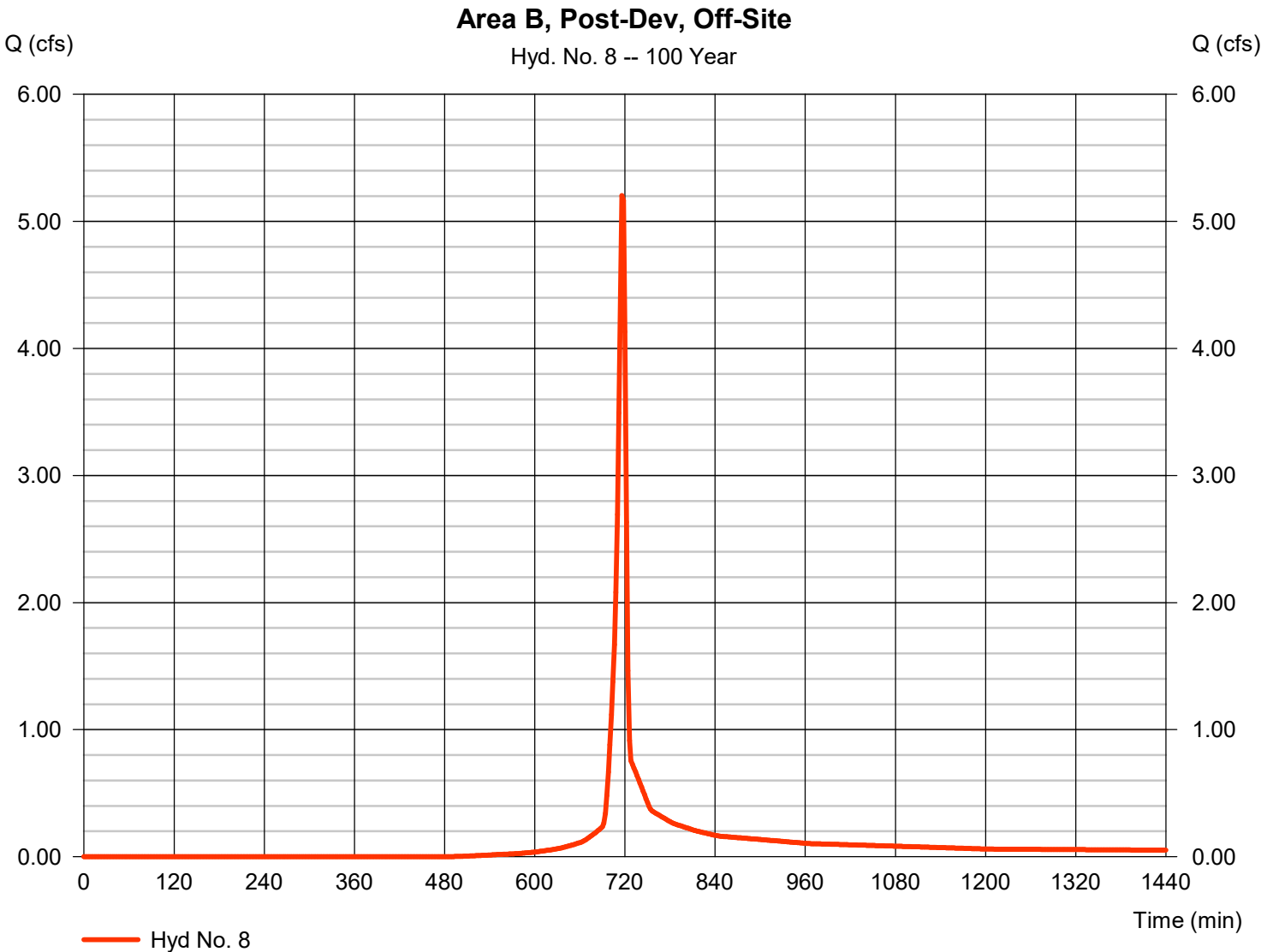
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Monday, 04 / 28 / 2025

Hyd. No. 8

Area B, Post-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 5.204 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 10,522 cuft
Drainage area	= 0.740 ac	Curve number	= 67.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

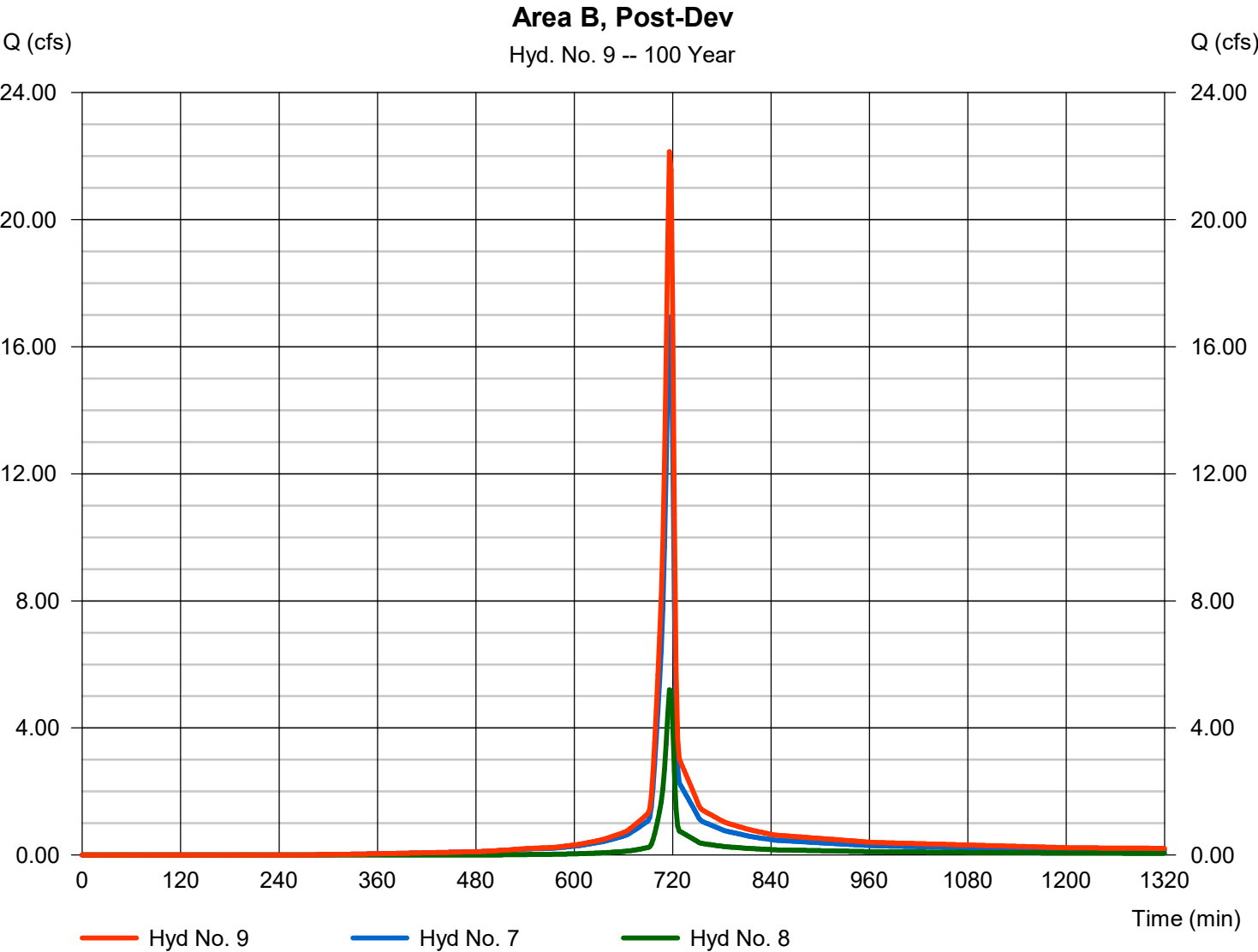


Hydrograph Report

Hyd. No. 9

Area B, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 22.14 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 46,289 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 2.530 ac



Hydrograph Report

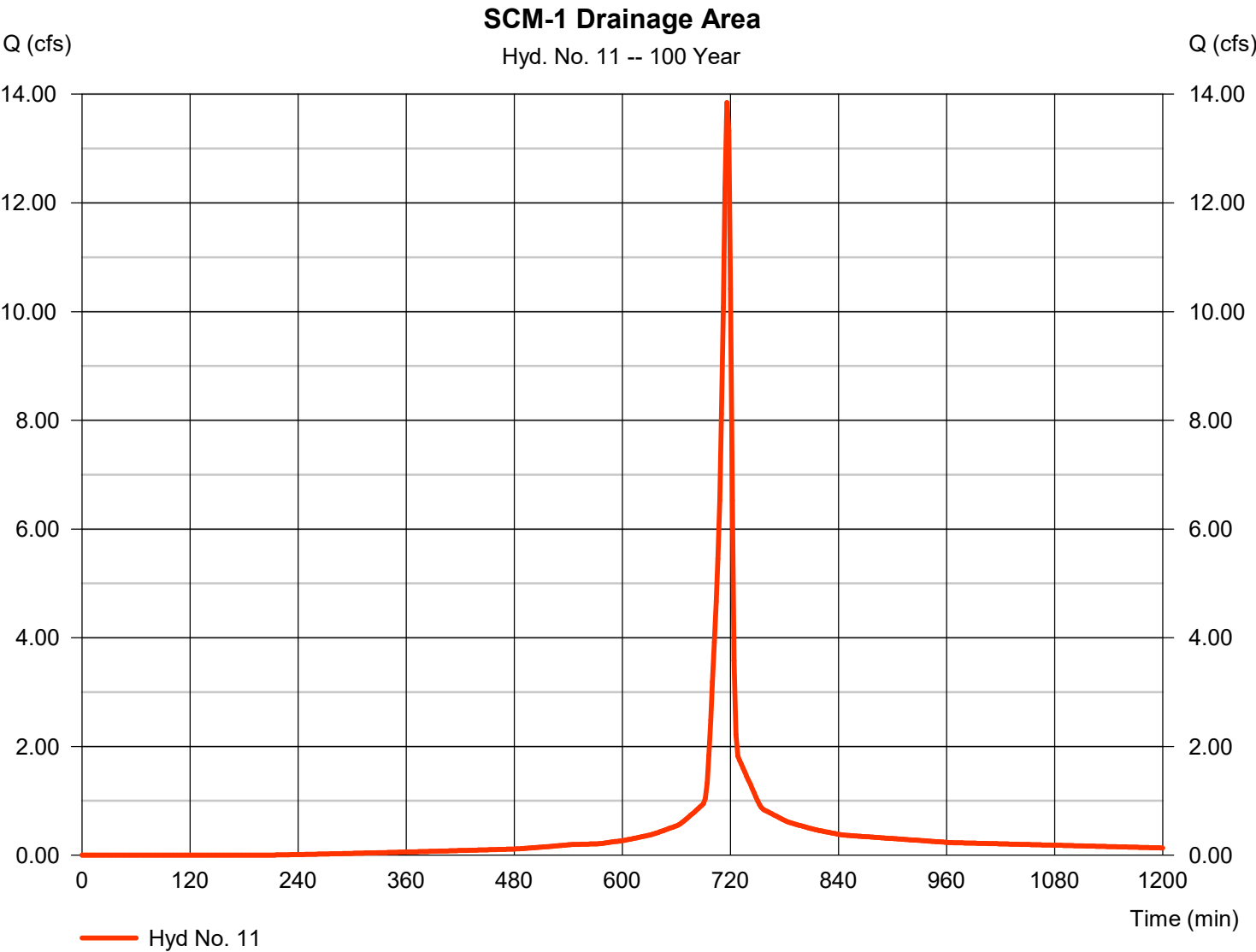
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Monday, 04 / 28 / 2025

Hyd. No. 11

SCM-1 Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 13.85 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 30,012 cuft
Drainage area	= 1.380 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.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



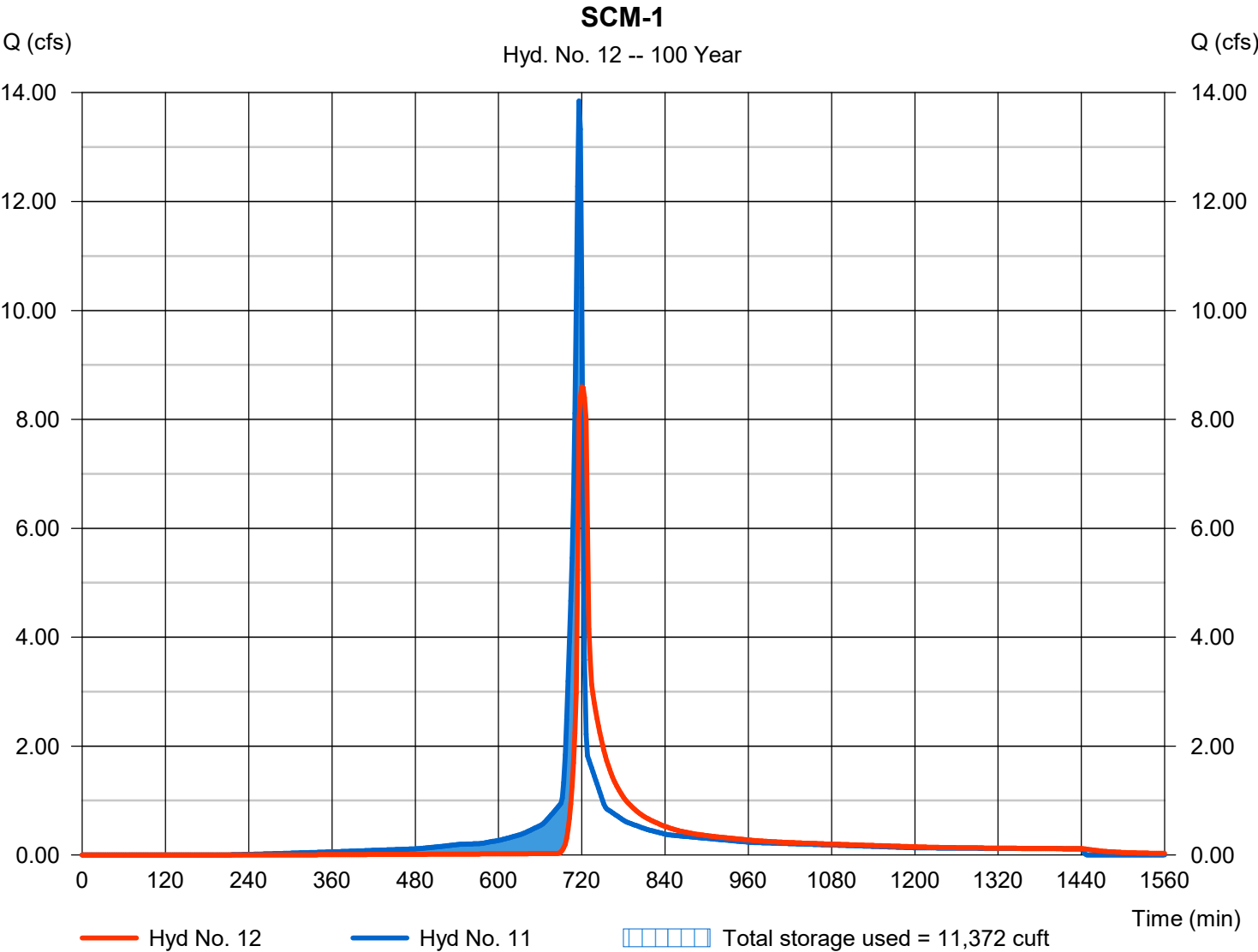
Hydrograph Report

Hyd. No. 12

SCM-1

Hydrograph type	= Reservoir	Peak discharge	= 8.592 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 29,850 cuft
Inflow hyd. No.	= 11 - SCM-1 Drainage Area	Max. Elevation	= 327.19 ft
Reservoir name	= SCM-1	Max. Storage	= 11,372 cuft

Storage Indication method used.



Hydrograph Report

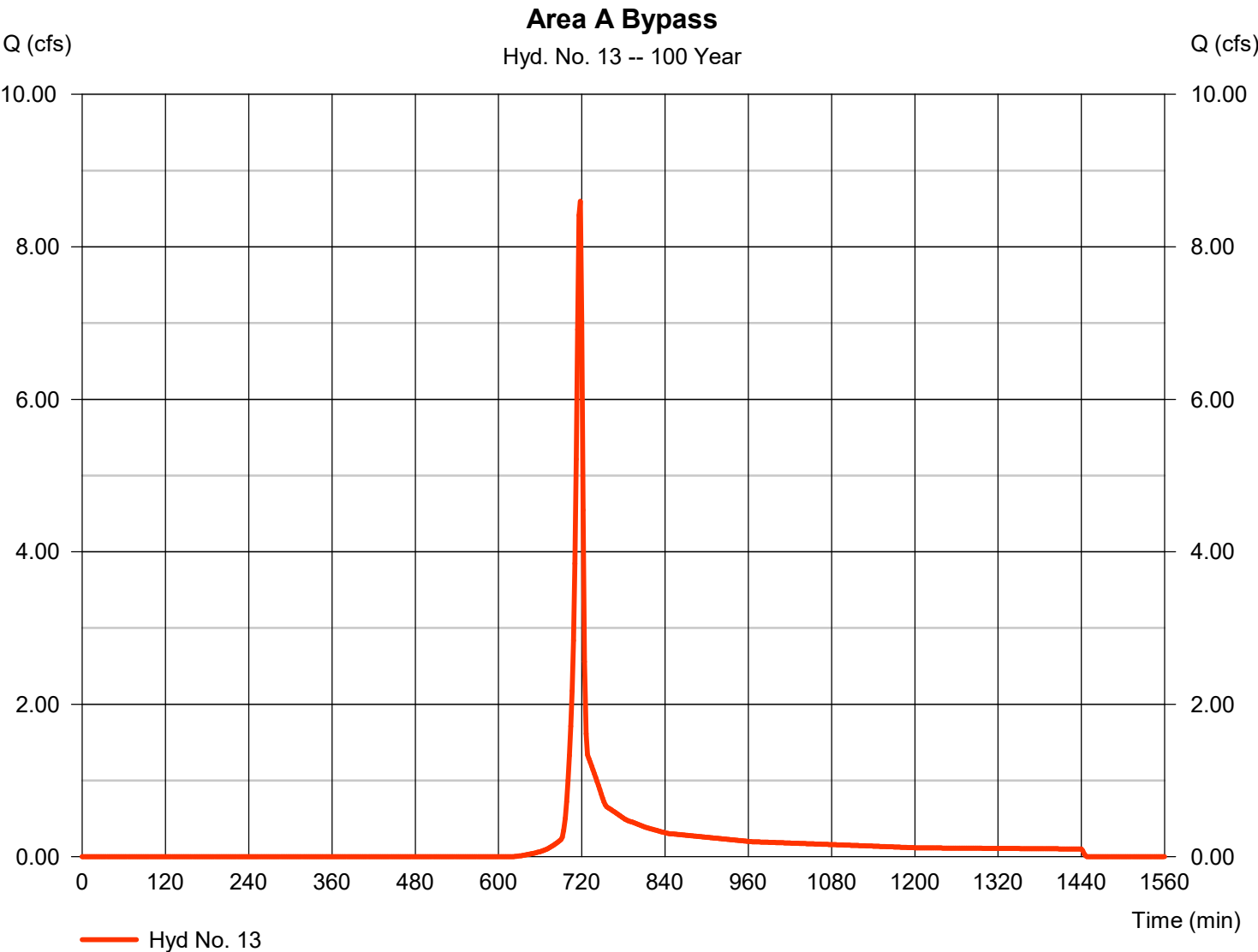
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 13

Area A Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 8.596 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 17,189 cuft
Drainage area	= 1.720 ac	Curve number	= 56.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

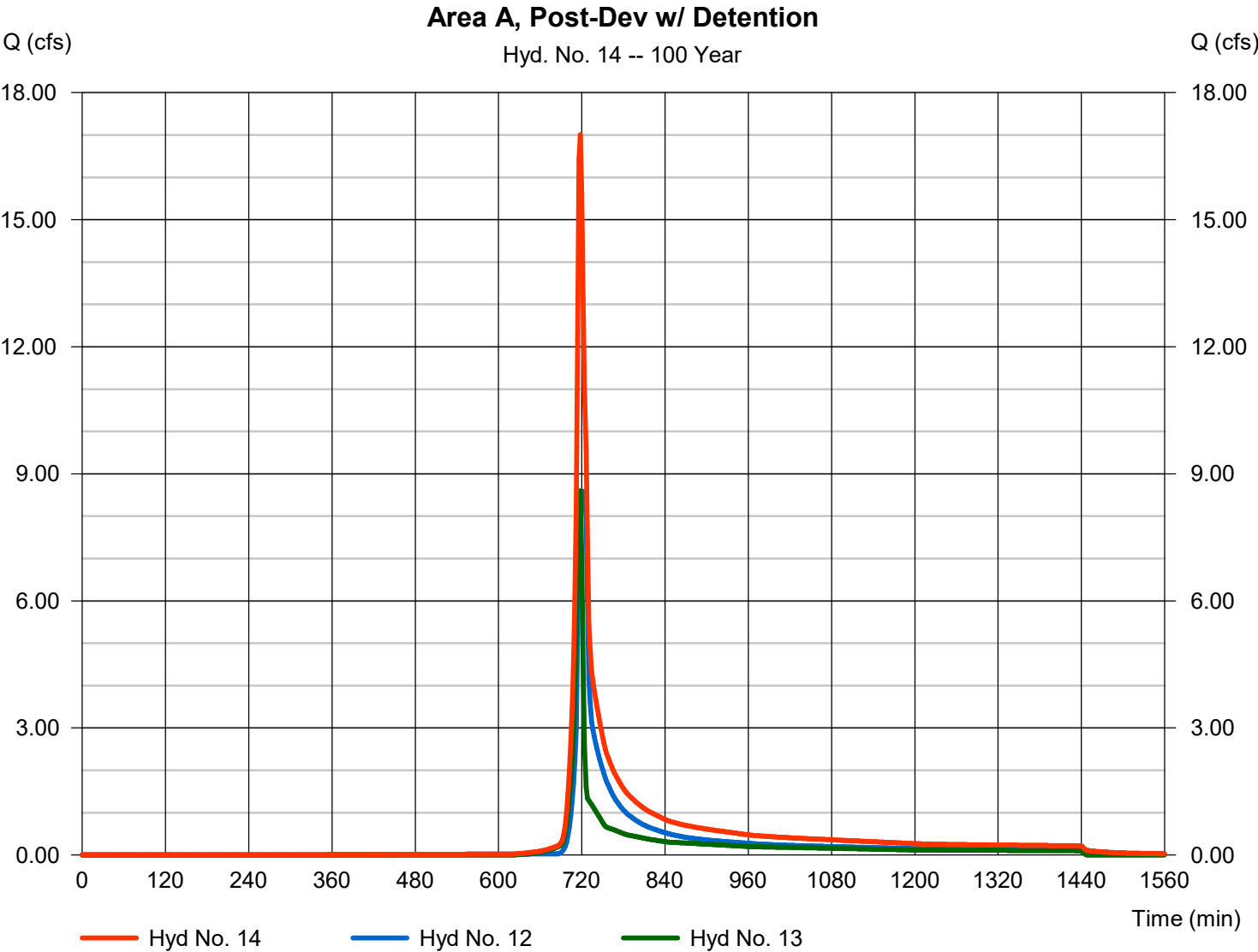


Hydrograph Report

Hyd. No. 14

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 17.00 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 47,038 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 1.720 ac

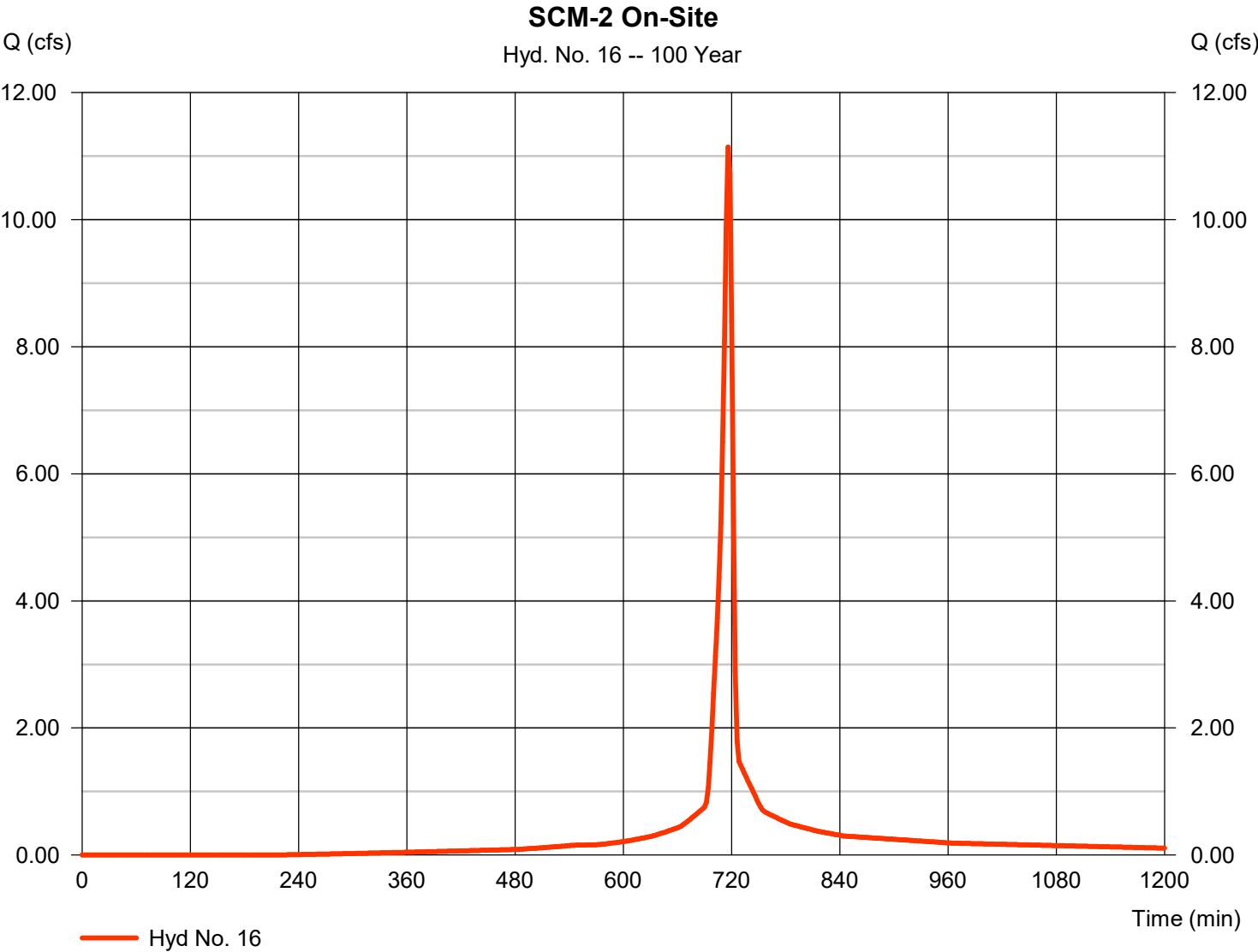


Hydrograph Report

Hyd. No. 16

SCM-2 On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 11.14 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 24,042 cuft
Drainage area	= 1.120 ac	Curve number	= 85.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



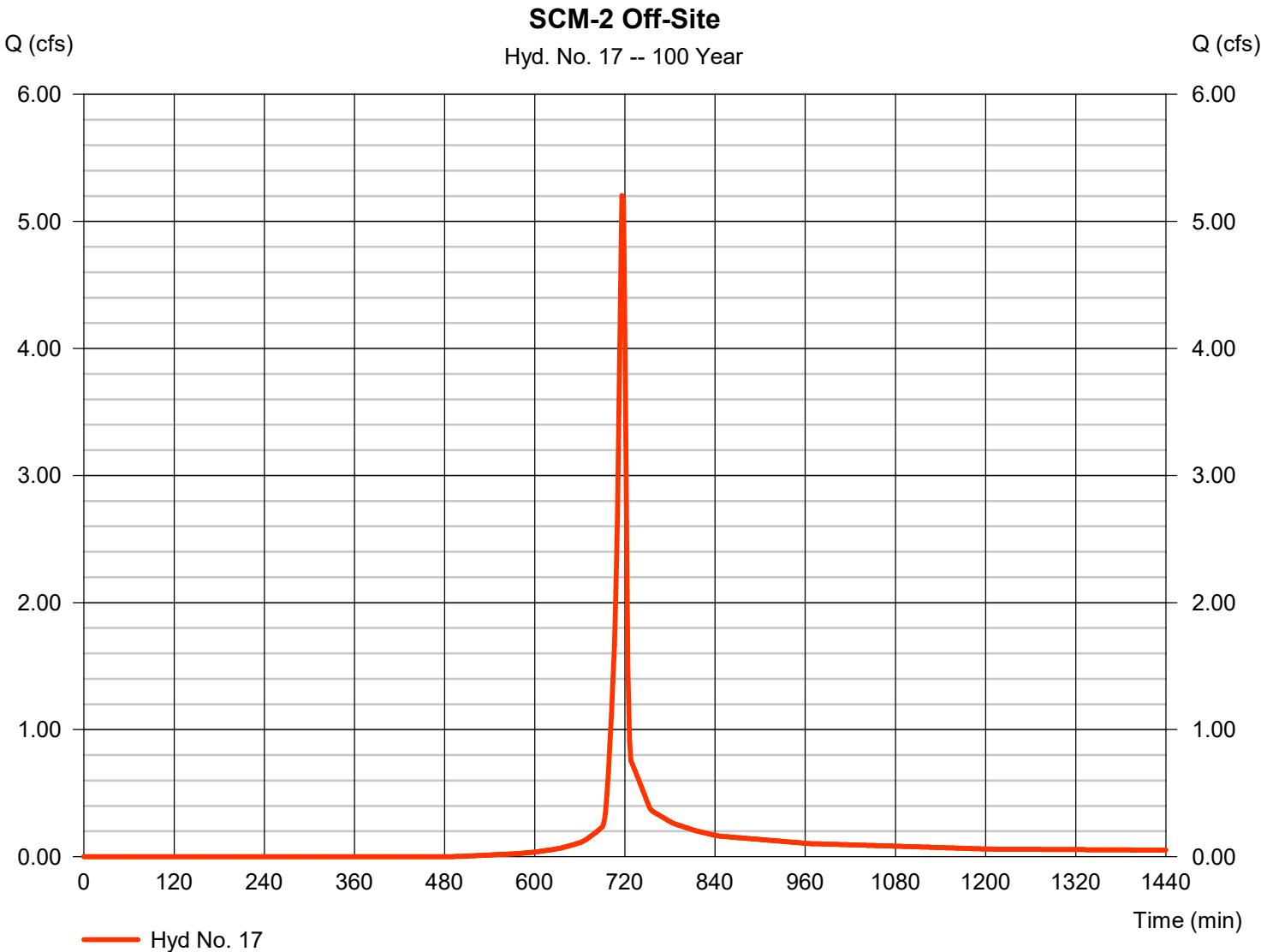
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024
Monday, 04 / 28 / 2025

Hyd. No. 17

SCM-2 Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.204 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	10,522 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

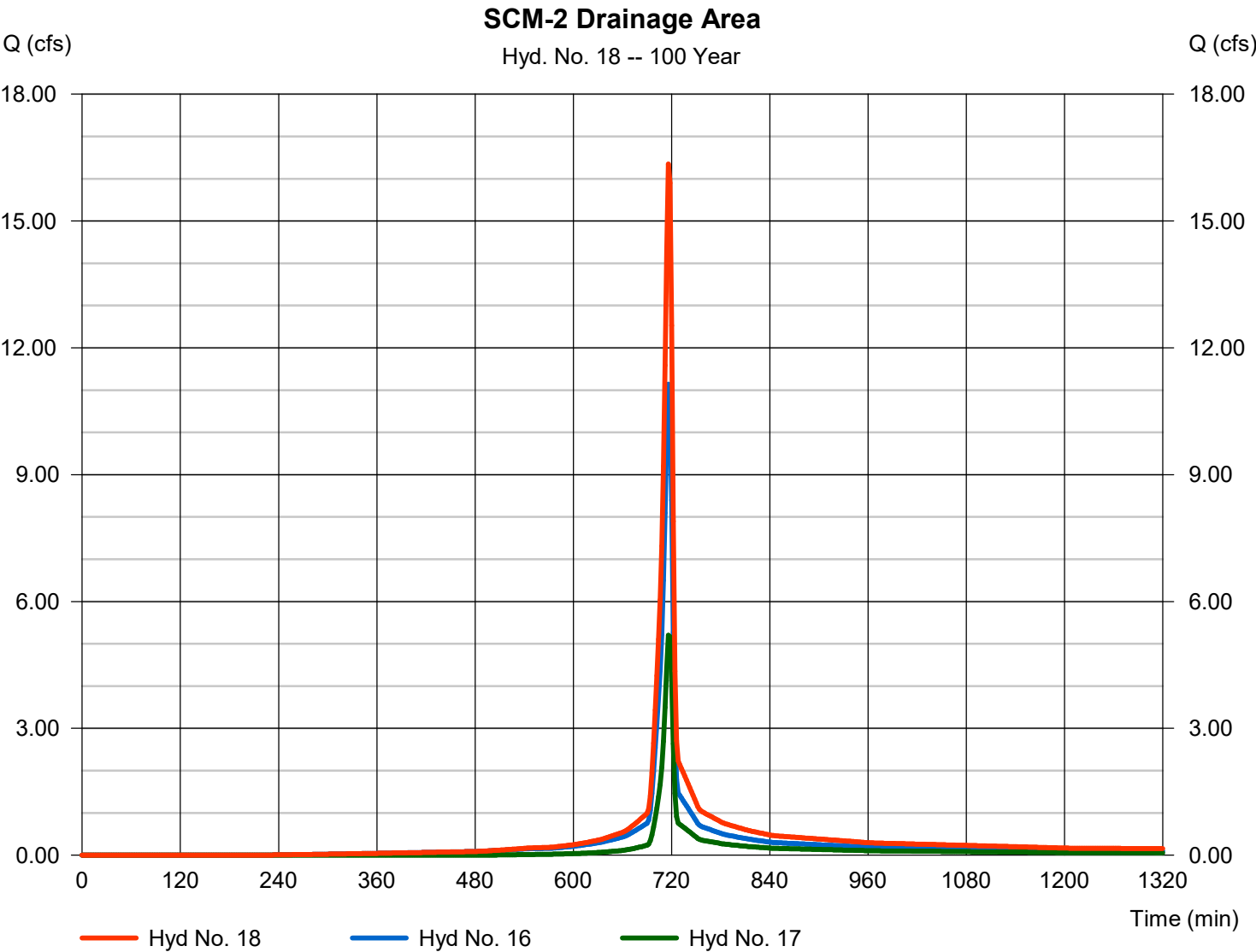
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Monday, 04 / 28 / 2025

Hyd. No. 18

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 16.35 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 34,564 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 1.860 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

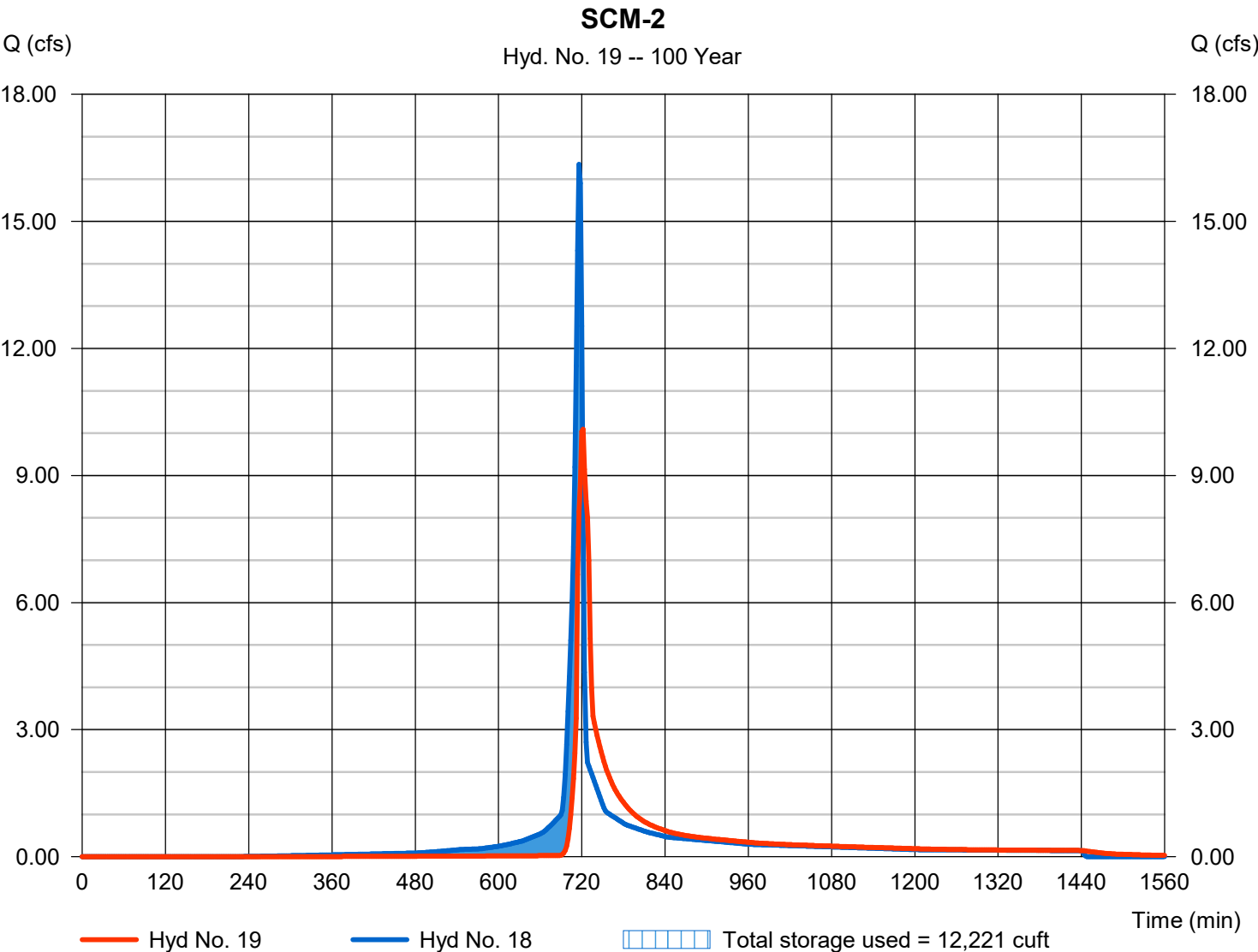
Monday, 04 / 28 / 2025

Hyd. No. 19

SCM-2

Hydrograph type	= Reservoir	Peak discharge	= 10.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 34,444 cuft
Inflow hyd. No.	= 18 - SCM-2 Drainage Area	Max. Elevation	= 329.12 ft
Reservoir name	= SCM-2	Max. Storage	= 12,221 cuft

Storage Indication method used.

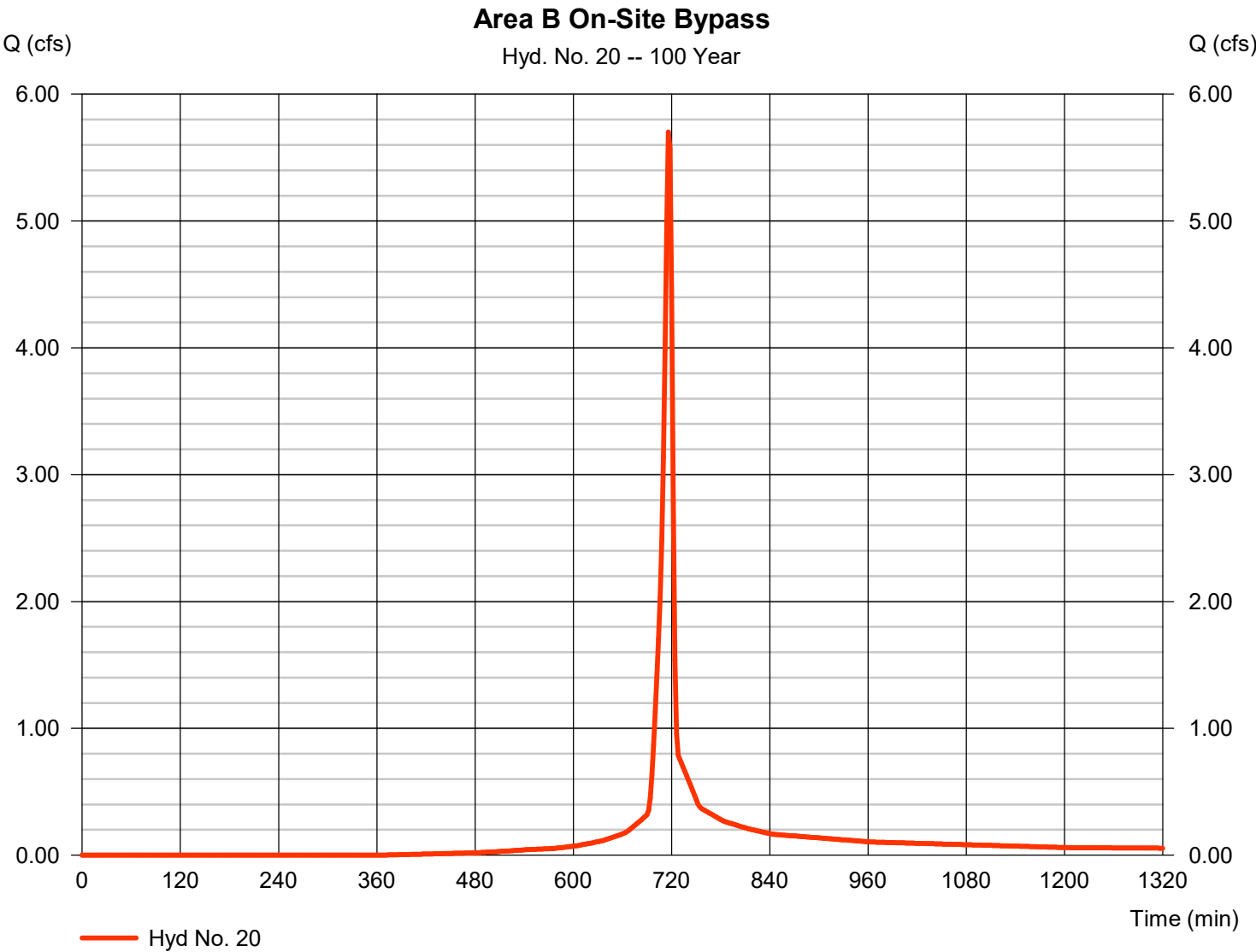


Hydrograph Report

Hyd. No. 20

Area B On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.701 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	11,734 cuft
Drainage area	=	0.670 ac	Curve number	=	75.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

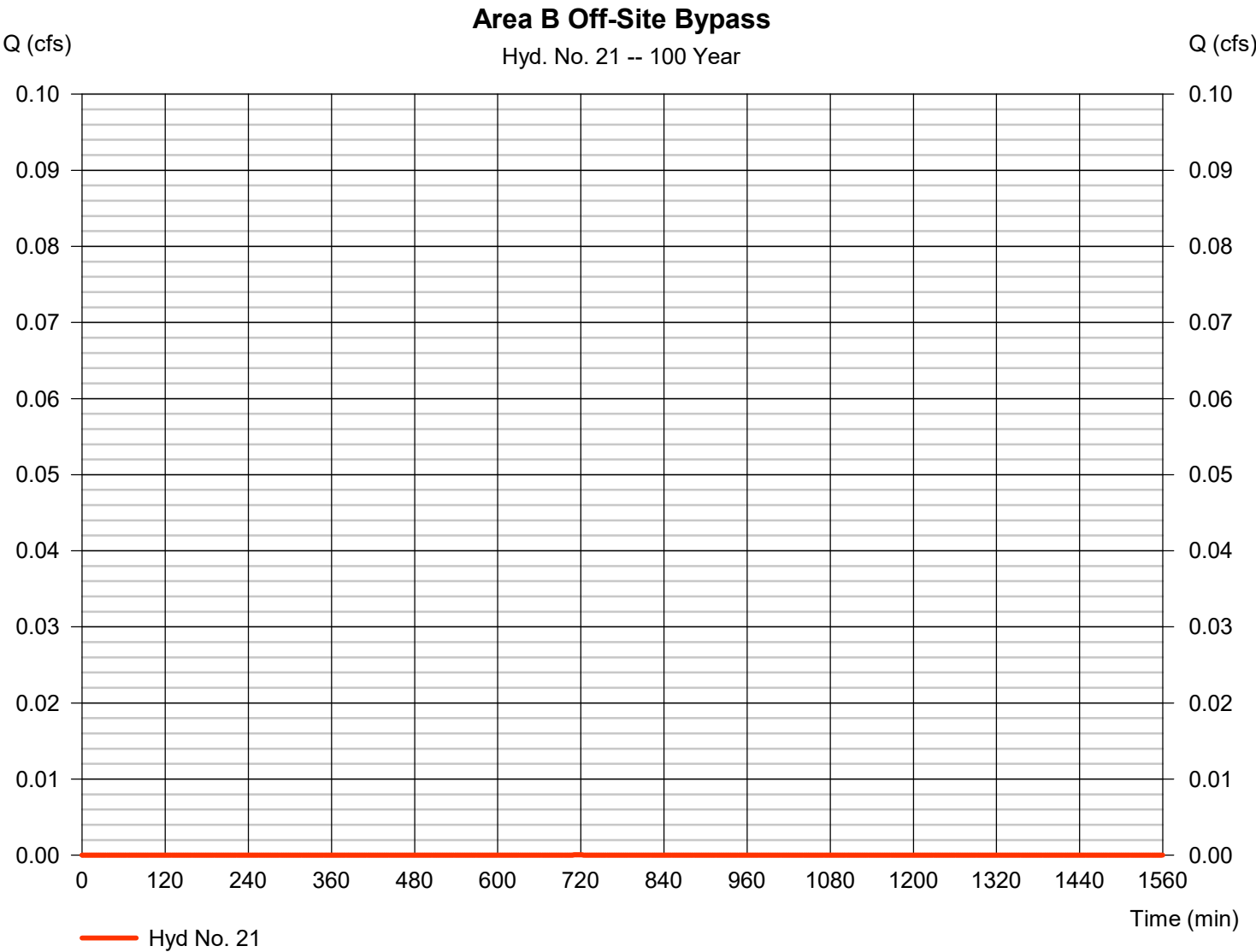


Hydrograph Report

Hyd. No. 21

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.000 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Drainage area	=	0.000 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 04 / 28 / 2025

Hyd. No. 22

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 14.44 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 46,178 cuft
Inflow hyds.	= 19, 20, 21	Contrib. drain. area	= 0.670 ac

