Post Construction
Stormwater Management Analysis

Hamilton Estate
Strafford Avenue

Radnor Township, Delaware County

Date: August 27, 2020

Plan Prepared For:

Haverford Properties
551 W. Lancaster Avenue, Suite 307
Haverford, PA 19041

Plan Prepared By:

Site Engineering Concepts, LLC
P.O. Box 1992
Southeastern, PA 19399

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Executive Summary

The applicant proposes to remove all existing improvements on 208 and 228 Strafford Avenue and 18 Forrest Lane. Proposed is the construction of 41 Townhouses with 2 new roads, related parking and walkways. 2 main entrance will be located on Strafford Avenue.

Six pipe storage stormwater management systems are proposed. the stormwater runoff rates are controlled per the township ordinance using different size orifices within the outlet structure at the outlet of each bed. the beds are used for storm water volume, quality and runoff rate control.

During construction erosion and sediment control will be accomplished through limited disturbance, immediate stabilization, a stabilized construction entrance, sediment basin and compost filter sock. Total limit of disturbance is approximately 6.0 acres.

STRAFFORD AVENUE

Stormwater Management Summary-Post Construction

Radnor Township Stormwater District A

Stormwater Management Summary - POI A

Yr	Pre-Development				Post Development	Compliance	Percentage Reduction
	On-Site		Allowable Release Rate*		Total Post Developed Flow		
1	1.376		1.376		0.104	-1.27	-92%
2	2.909		1.376		0.196	-1.18	-86%
5	5.703		5.703		0.356	-5.35	-94%
10	8.360		8.360		0.505	-7.86	-94%
25	12.480		12.480		1.928	-10.55	-85%
50	16.210		16.210		6.585	-9.63	-59%
100	20.430		20.430		10.180	-10.25	-50%

Design Storm Proposed Conditions	Reduce to	Design Storm Existing Conditions
1yr		1 yr
2 yr		1 yr
5 yr		5 yr
10 yr		10 yr
25 yr		25 yr
50 yr		50 yr
100 yr		100 yr

2-YR - 24HR DIRECT RUNOFF VOLUME

POI A - NO STONE

VARIABLES		
	P =	Precipitation (inches)
	Q =	Depth of Stormwater Runoff (inches)
	S =	Runoff Retention Variable
	V =	Volume of Stormwater Runoff from Drainage Area (ft^3)
	CN =	TR-55 Curve Number for Subject Drainage Area

EQUATIONS

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

CONSTANTS

Storm Event =	**2-Year 24-Hour**
P (in) =	**3.2**

PRE-DEVELOPMENT

Cover:	*Soil Type*	*Area (ft)*	*CN*	*S*	*Q (in)*	*V (ft^3)*
Impervious (80%-30124)	B	24,099	98	0.2041	2.9675	**5,959**
Meadow	B	131,846	58	7.2414	0.3412	**3,749**
	Total Area =	**155,945**			**Runoff Volume =**	**9,708**

POST-DEVELOPMENT

Cover:	*Soil Type*	*Area (ft)*	*CN*	*S*	*Q (in)*	*V (ft^3)*
Impervious	B	105,915	98	0.2041	2.9675	**26192**
Lawn	B	115,819	61	6.3934	0.4440	**4285**
	Total Area =	**221,734**			**Runoff Volume =**	**30477**

Runoff Volume Increase =	**20768**

Bed 1 =	**13798**
Bed 2 =	**9990**
Bed 3 =	**7006**
Bed 4 =	**8313**
Bed 5 =	**660**

Infiltration Volume Provided =	**39767**

INFILTRATION BED 1		
Pipe Diameter =	48	inches
Pipe Length =	1464	ft
Stone Bed Length	144	ft
Stone Bed Width =	80.0	ft
Stone Depth =	5.0	ft
Pipe Volume =	*18397*	ft^2
+ Stone Voids Volume =	*0*	*ft*
Provided V_t =	**18397**	**ft^3**

Dead Storage Depth = 3.0

Infiltration Bed Dead Storage Provided = 13,798

INFILTRATION BED 2		
Pipe Diameter =	48	inches
Pipe Length =	1060	ft
Stone Bed Length	140	ft
Stone Bed Width =	40.0	ft
Stone Depth =	5.0	ft
Pipe Volume =	*13320*	ft^2
+ Stone Voids Volume =	*0*	*ft*
Provided V_t =	**13320**	**ft^3**

Dead Storage Depth = 3.0

Infiltration Bed Dead Storage Provided = 9,990

INFILTRATION BED 3		
Pipe Diameter =	48	inches
Pipe Length =	892	ft
Stone Bed Length	100	ft
Stone Bed Width =	46.0	ft
Stone Depth =	5.0	ft
Pipe Volume =	*11209*	ft^2
+ Stone Voids Volume =	*0*	*ft*
Provided V_t =	**11209**	**ft^3**

Dead Storage Depth = 2.5

Infiltration Bed Dead Storage Provided = 7,006

INFILTRATION BED 4		
Pipe Diameter =	48	inches
Pipe Length =	1323	ft
Stone Bed Length	144	ft
Stone Bed Width =	80.0	ft
Stone Depth =	5.0	ft
Pipe Volume =	*16625*	*ft²*
+ Stone Voids Volume =	*0*	*ft*
Provided V_t =	**16625**	**ft³**

Dead Storage Depth = 2.0

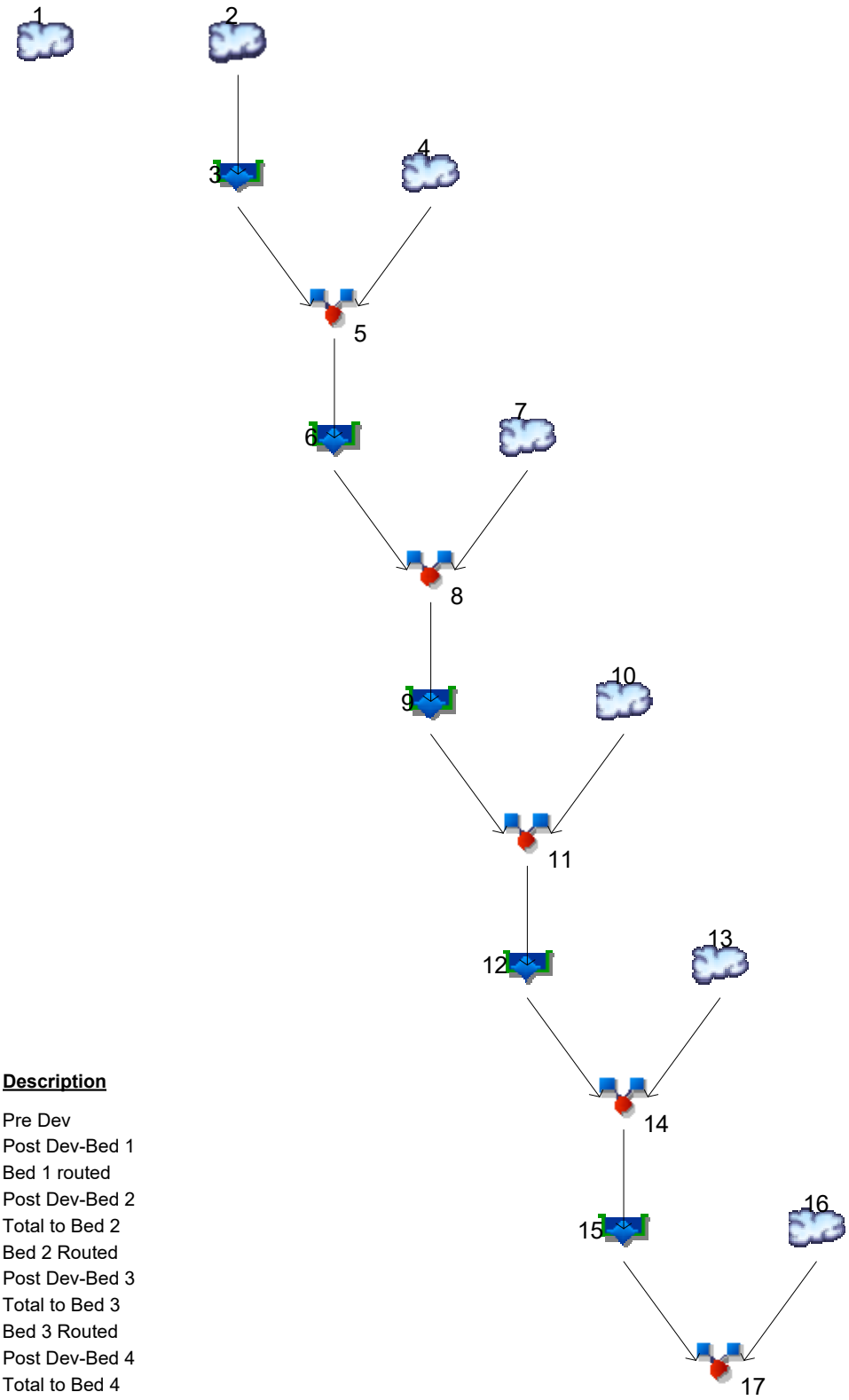
Infiltration Bed Dead Storage Provided = 8,313

INFILTRATION BED 5		
Pipe Diameter =	48	inches
Pipe Length =	210	ft
Stone Bed Length	140	ft
Stone Bed Width =	40.0	ft
Stone Depth =	5.0	ft
Pipe Volume =	*2639*	*ft²*
+ Stone Voids Volume =	*0*	*ft*
Provided V_t =	**2639**	**ft³**

Dead Storage Depth = 1.0

Infiltration Bed Dead Storage Provided = 660

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Dev
2	SCS Runoff	Post Dev-Bed 1
3	Reservoir	Bed 1 routed
4	SCS Runoff	Post Dev-Bed 2
5	Combine	Total to Bed 2
6	Reservoir	Bed 2 Routed
7	SCS Runoff	Post Dev-Bed 3
8	Combine	Total to Bed 3
9	Reservoir	Bed 3 Routed
10	SCS Runoff	Post Dev-Bed 4
11	Combine	Total to Bed 4
12	Reservoir	Bed 4 Routed
13	SCS Runoff	Post Dev-Bed 5
14	Combine	Total to Bed 5
15	Reservoir	Bed 5 Routed
16	SCS Runoff	Bypass
17	Combine	Total Post Dev

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	1.376	2.909	-------	5.703	8.360	12.48	16.21	20.43	Pre Dev
2	SCS Runoff	------	2.309	3.373	-------	5.079	6.600	8.881	10.85	12.99	Post Dev-Bed 1
3	Reservoir	2	0.000	0.000	-------	0.000	0.000	0.070	0.156	0.444	Bed 1 routed
4	SCS Runoff	------	0.798	1.182	-------	1.801	2.350	3.183	3.907	4.693	Post Dev-Bed 2
5	Combine	3, 4	0.798	1.182	-------	1.801	2.350	3.183	3.907	4.693	Total to Bed 2
6	Reservoir	5	0.000	0.000	-------	0.000	0.000	0.009	0.071	0.256	Bed 2 Routed
7	SCS Runoff	------	2.862	3.917	-------	5.598	7.048	9.131	10.90	12.81	Post Dev-Bed 3
8	Combine	6, 7	2.862	3.917	-------	5.598	7.048	9.131	10.90	12.81	Total to Bed 3
9	Reservoir	8	0.000	0.032	-------	0.095	0.391	2.764	6.591	9.753	Bed 3 Routed
10	SCS Runoff	------	3.088	4.099	-------	5.636	6.940	8.794	10.36	12.03	Post Dev-Bed 4
11	Combine	9, 10	3.088	4.099	-------	5.636	6.940	8.794	14.21	20.81	Total to Bed 4
12	Reservoir	11	0.000	0.016	-------	0.092	0.375	1.791	5.887	10.27	Bed 4 Routed
13	SCS Runoff	------	0.021	0.052	-------	0.109	0.163	0.248	0.325	0.412	Post Dev-Bed 5
14	Combine	12, 13	0.021	0.052	-------	0.109	0.381	1.819	5.948	10.39	Total to Bed 5
15	Reservoir	14	0.000	0.012	-------	0.090	0.381	1.848	6.413	9.978	Bed 5 Routed
16	SCS Runoff	------	0.104	0.196	-------	0.356	0.505	0.734	0.939	1.167	Bypass
17	Combine	15, 16	0.104	0.196	-------	0.356	0.505	1.928	6.585	10.18	Total Post Dev

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.376	2	724	5,416	------	------	------	Pre Dev
2	SCS Runoff	2.309	2	718	4,644	------	------	------	Post Dev-Bed 1
3	Reservoir	0.000	2	n/a	0	2	438.01	4,644	Bed 1 routed
4	SCS Runoff	0.798	2	718	1,613	------	------	------	Post Dev-Bed 2
5	Combine	0.798	2	718	1,613	3, 4	------	------	Total to Bed 2
6	Reservoir	0.000	2	n/a	0	5	435.48	1,613	Bed 2 Routed
7	SCS Runoff	2.862	2	718	5,740	------	------	------	Post Dev-Bed 3
8	Combine	2.862	2	718	5,740	6, 7	------	------	Total to Bed 3
9	Reservoir	0.000	2	n/a	0	8	432.55	5,740	Bed 3 Routed
10	SCS Runoff	3.088	2	716	6,243	------	------	------	Post Dev-Bed 4
11	Combine	3.088	2	716	6,243	9, 10	------	------	Total to Bed 4
12	Reservoir	0.000	2	n/a	0	11	421.50	6,243	Bed 4 Routed
13	SCS Runoff	0.021	2	720	69	------	------	------	Post Dev-Bed 5
14	Combine	0.021	2	720	69	12, 13	------	------	Total to Bed 5
15	Reservoir	0.000	2	n/a	0	14	419.14	69.5	Bed 5 Routed
16	SCS Runoff	0.104	2	718	253	------	------	------	Bypass
17	Combine	0.104	2	718	253	15, 16	------	------	Total Post Dev

Hydrograph Report

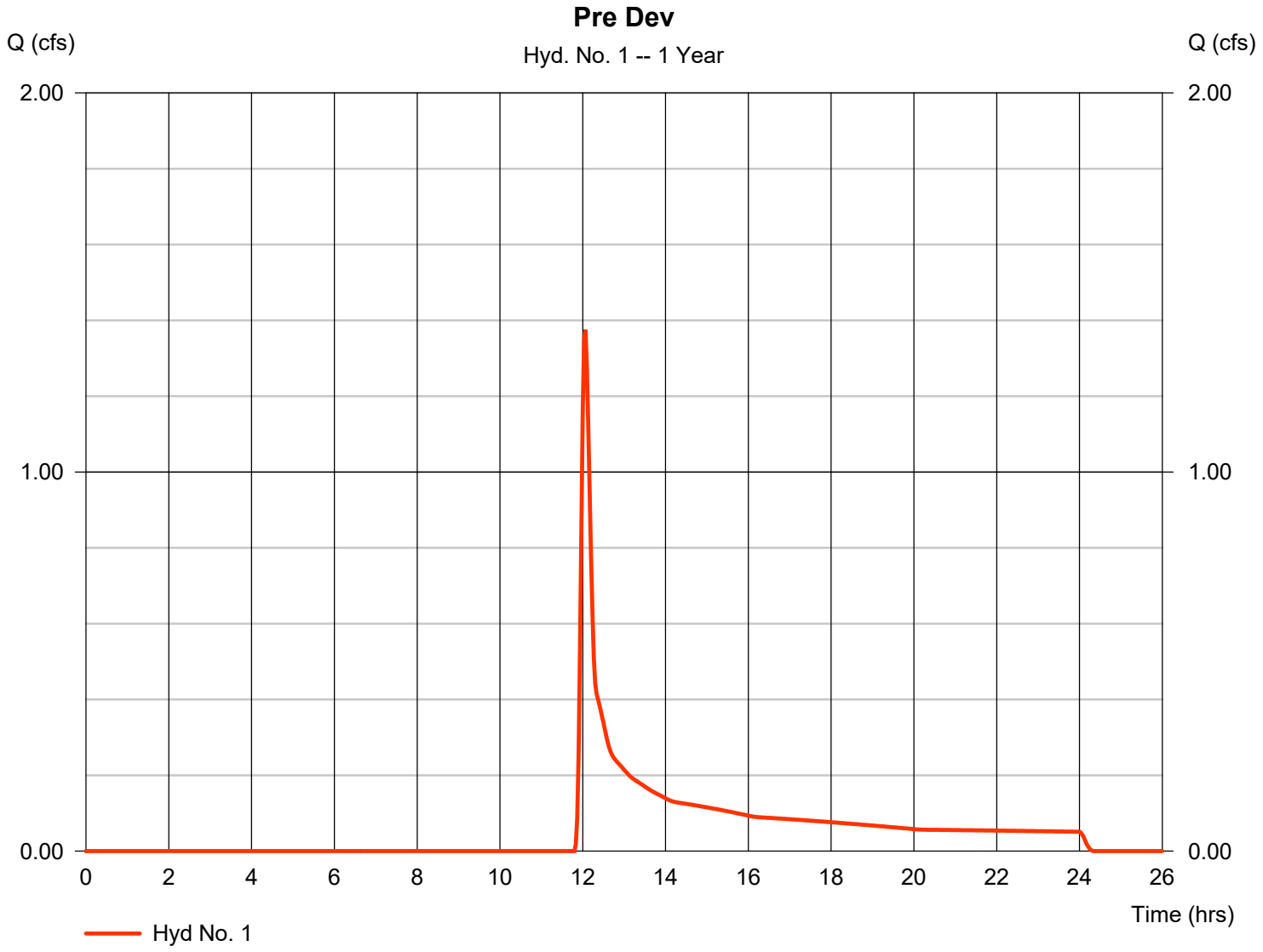
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 1.376 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,416 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



TR55 Tc Worksheet

Hyd. No. 1

Pre Dev

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.24		0.00		0.00		
Land slope (%)	= 6.00		0.00		0.00		
Travel Time (min)	**= 8.68**	**+**	**0.00**	**+**	**0.00**	**=**	**8.68**
Shallow Concentrated Flow							
Flow length (ft)	= 735.00		0.00		0.00		
Watercourse slope (%)	= 5.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61		0.00		0.00		
Travel Time (min)	**= 3.40**	**+**	**0.00**	**+**	**0.00**	**=**	**3.40**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 12.10 min

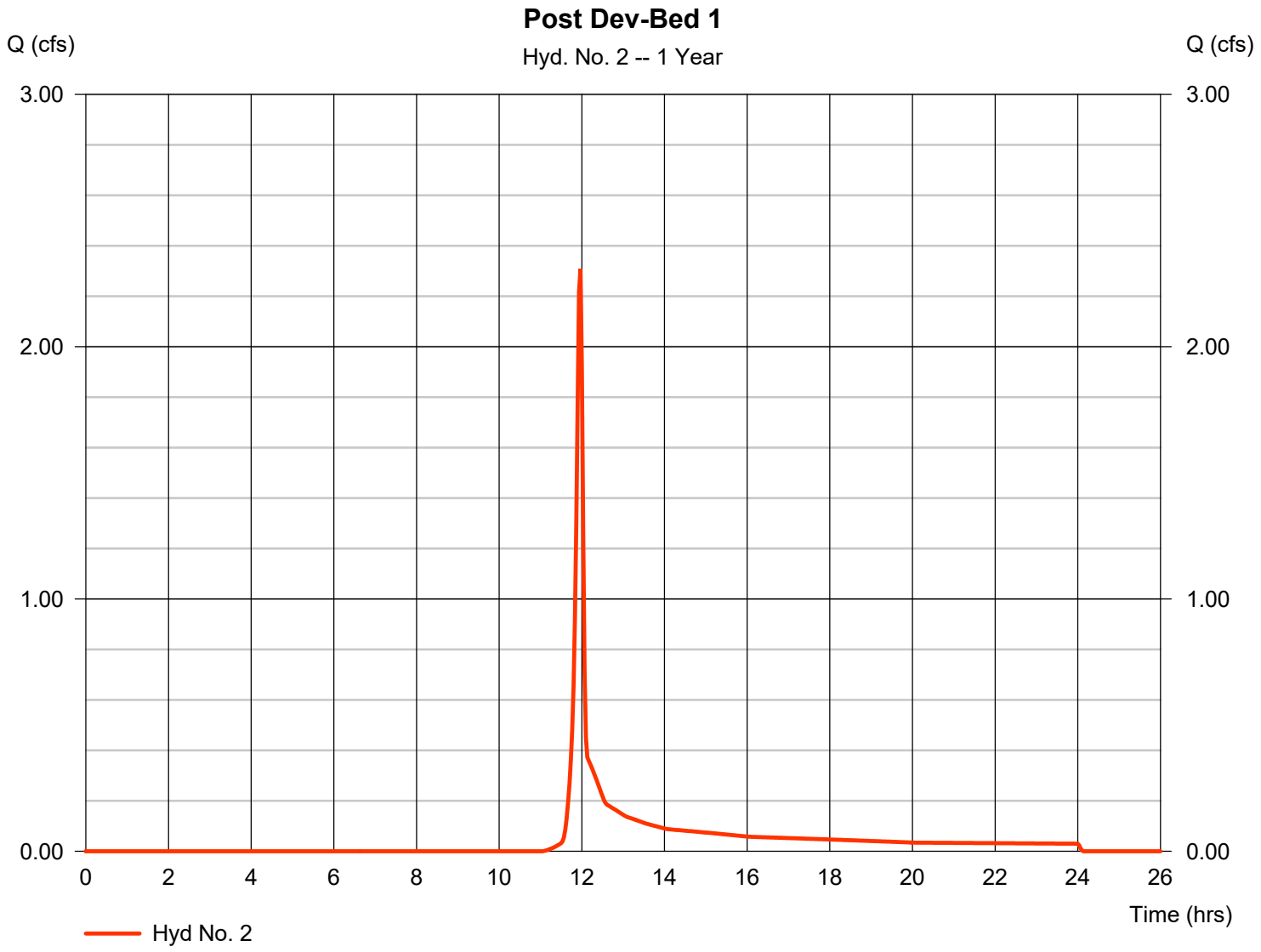
Hydrograph Report

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.309 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 4,644 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



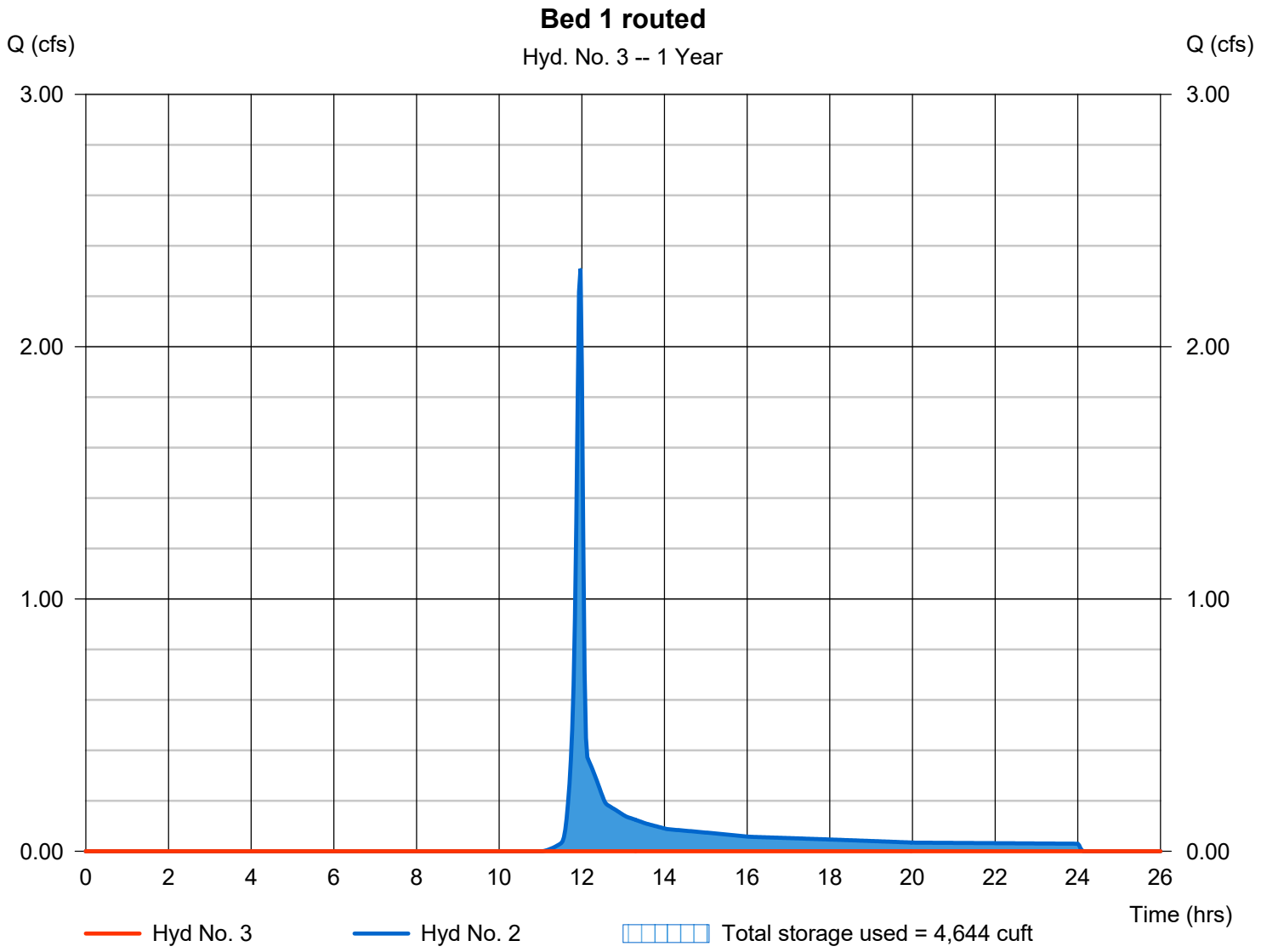
Hydrograph Report

Hyd. No. 3

Bed 1 routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 2 - Post Dev-Bed 1	Max. Elevation	= 438.01 ft
Reservoir name	= Bed 1	Max. Storage	= 4,644 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Bed 1

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	437.00	n/a	0	0
1.00	438.00	n/a	4,599	4,599
2.00	439.00	n/a	4,599	9,198
3.00	440.00	n/a	4,599	13,797
4.00	441.00	n/a	4,599	18,396

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	0.00	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 437.00	440.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 440.90	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	437.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	460	437.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.20	920	437.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	1,380	437.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	1,840	437.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	2,300	437.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	2,759	437.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.70	3,219	437.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.80	3,679	437.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	4,139	437.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	4,599	438.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.10	5,059	438.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.20	5,519	438.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.30	5,979	438.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.40	6,439	438.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.50	6,898	438.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.60	7,358	438.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.70	7,818	438.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.80	8,278	438.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.90	8,738	438.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	9,198	439.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.10	9,658	439.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.20	10,118	439.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.30	10,578	439.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.40	11,038	439.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.50	11,498	439.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.60	11,957	439.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.70	12,417	439.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.80	12,877	439.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.90	13,337	439.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
3.00	13,797	440.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
3.10	14,257	440.10	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
3.20	14,717	440.20	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
3.30	15,177	440.30	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.049
3.40	15,637	440.40	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.059
3.50	16,097	440.50	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.068
3.60	16,556	440.60	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.076
3.70	17,016	440.70	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.082
3.80	17,476	440.80	0.09 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.089

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Bed 1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.90	17,936	440.90	0.10 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.095
4.00	18,396	441.00	0.53 ic	0.10 ic	---	---	0.42	---	---	---	---	---	0.522

...End

Hydrograph Report

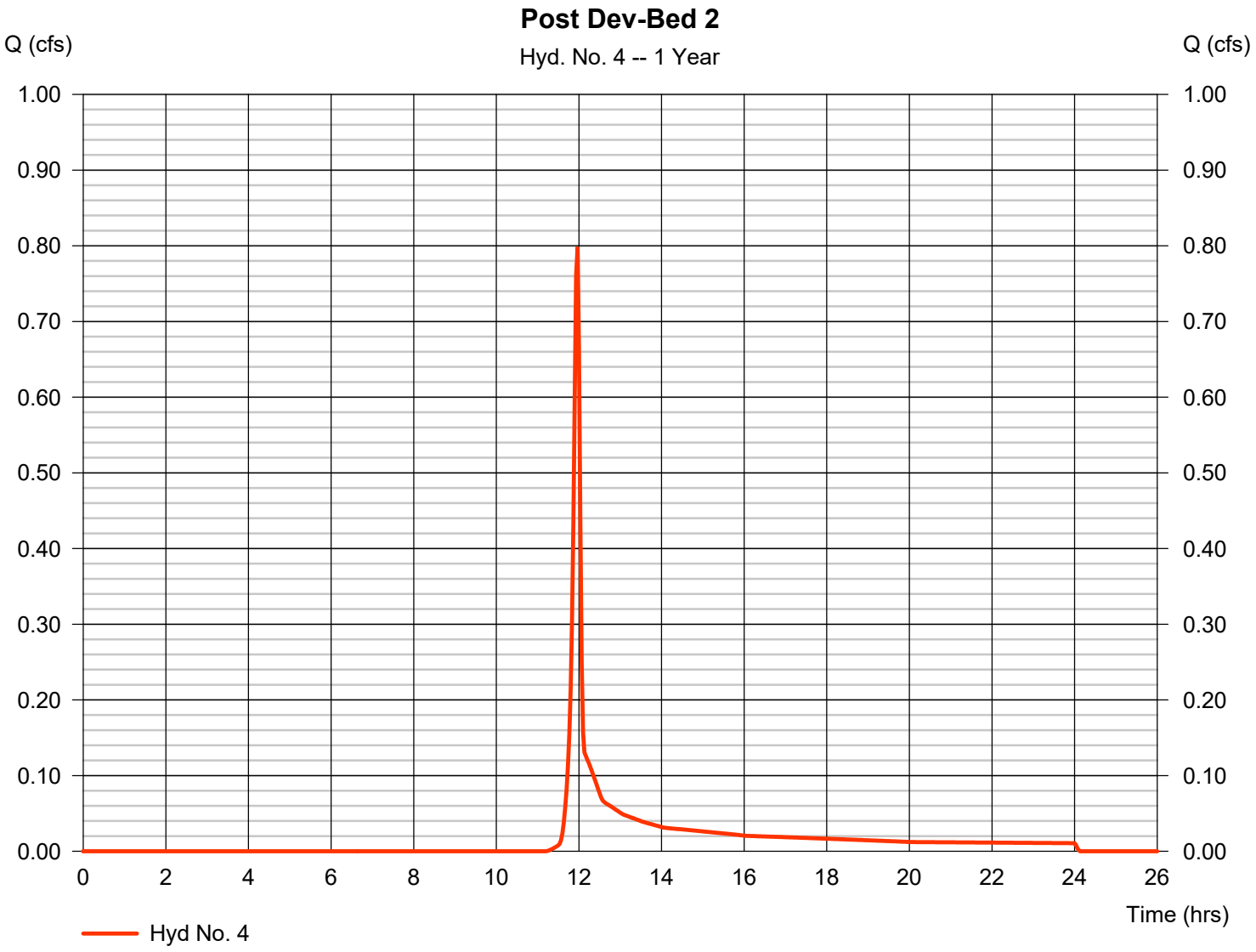
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.798 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 1,613 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620

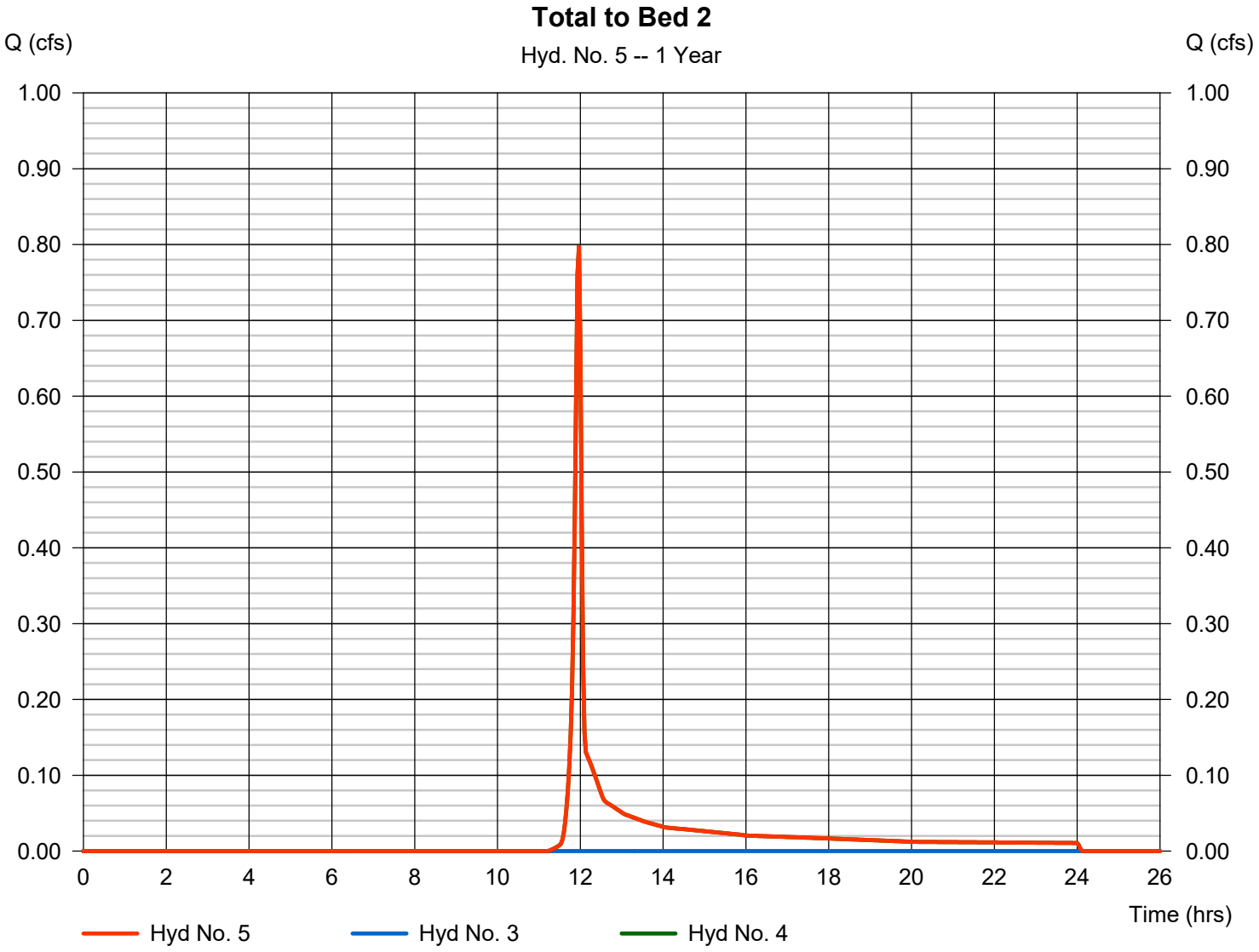


Hydrograph Report

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 0.798 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 1,613 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



Hydrograph Report

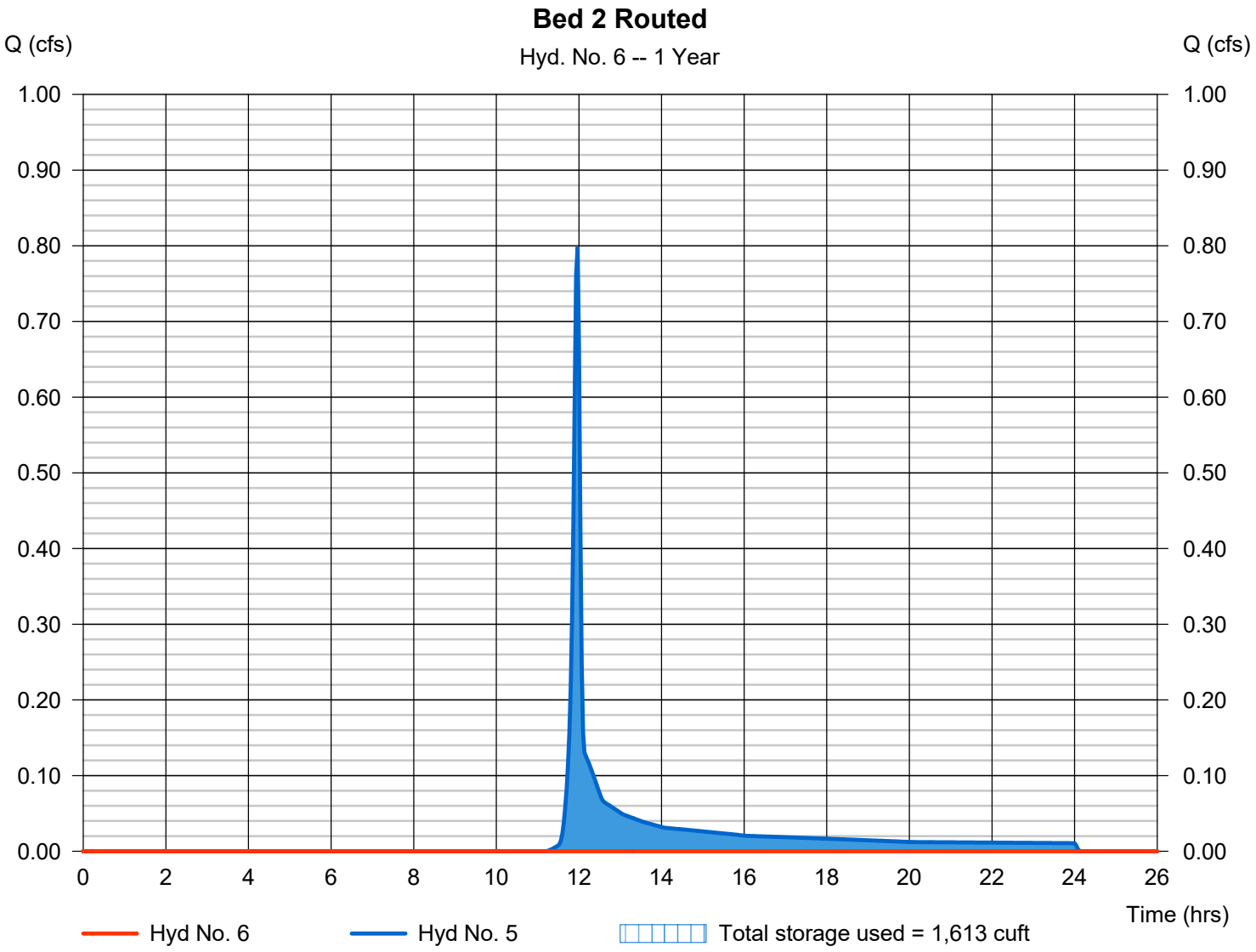
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 6

Bed 2 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - Total to Bed 2	Max. Elevation	= 435.48 ft
Reservoir name	= Bed 2	Max. Storage	= 1,613 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Bed 2

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	435.00	n/a	0	0
1.00	436.00	n/a	3,330	3,330
2.00	437.00	n/a	3,330	6,660
3.00	438.00	n/a	3,330	9,990
4.00	439.00	n/a	3,330	13,320

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	0.00	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 435.00	438.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 438.90	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	435.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	333	435.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.20	666	435.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	999	435.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	1,332	435.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	1,665	435.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	1,998	435.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.70	2,331	435.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.80	2,664	435.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	2,997	435.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	3,330	436.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.10	3,663	436.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.20	3,996	436.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.30	4,329	436.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.40	4,662	436.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.50	4,995	436.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.60	5,328	436.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.70	5,661	436.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.80	5,994	436.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.90	6,327	436.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	6,660	437.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.10	6,993	437.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.20	7,326	437.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.30	7,659	437.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.40	7,992	437.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.50	8,325	437.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.60	8,658	437.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.70	8,991	437.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.80	9,324	437.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.90	9,657	437.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
3.00	9,990	438.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
3.10	10,323	438.10	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
3.20	10,656	438.20	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
3.30	10,989	438.30	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.049
3.40	11,322	438.40	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.059
3.50	11,655	438.50	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.068
3.60	11,988	438.60	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.076
3.70	12,321	438.70	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.082
3.80	12,654	438.80	0.09 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.089

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Bed 2

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.90	12,987	438.90	0.10 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.095
4.00	13,320	439.00	0.53 ic	0.10 ic	---	---	0.42	---	---	---	---	---	0.522

...End

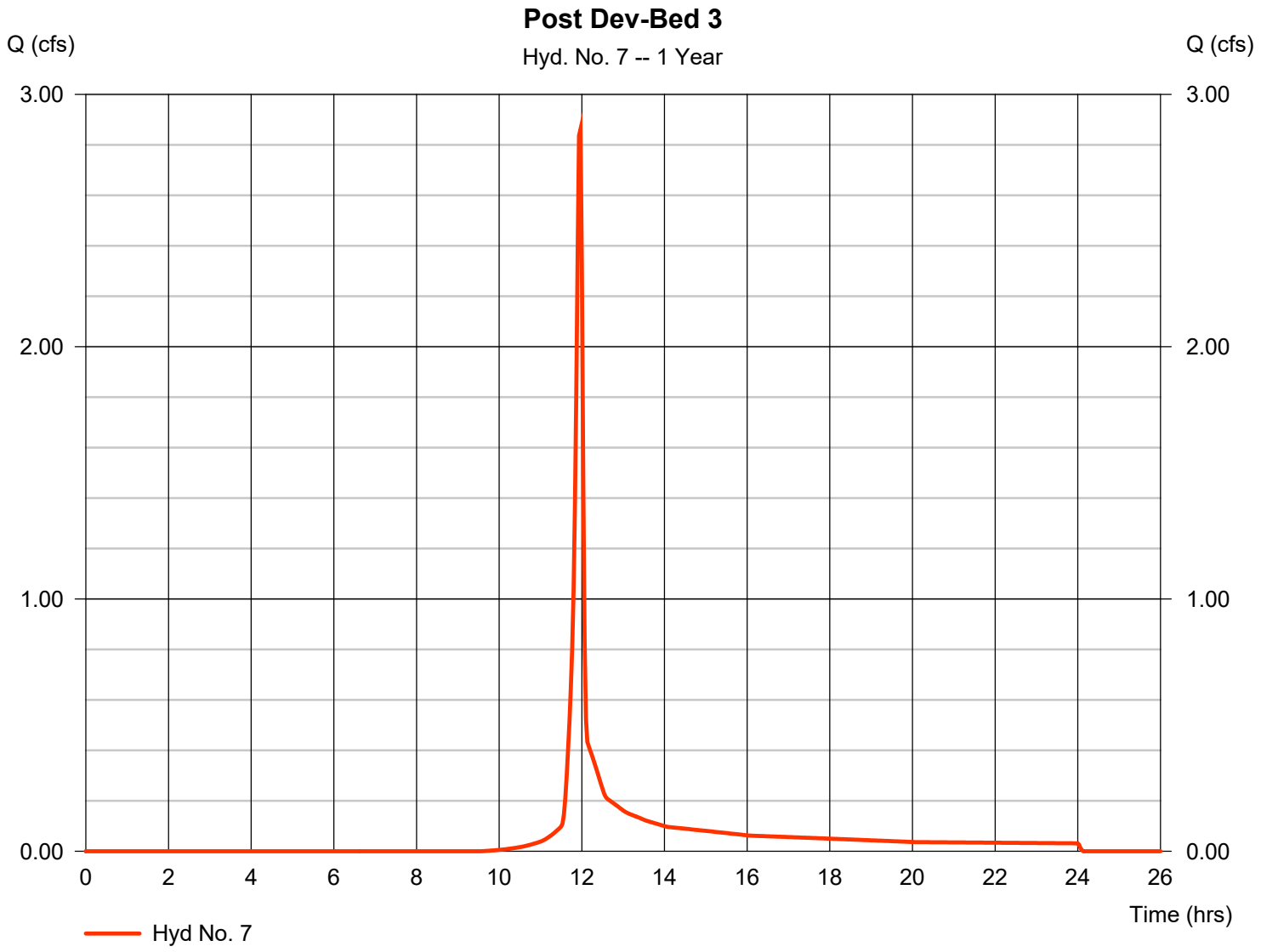
Hydrograph Report

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.862 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 5,740 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480

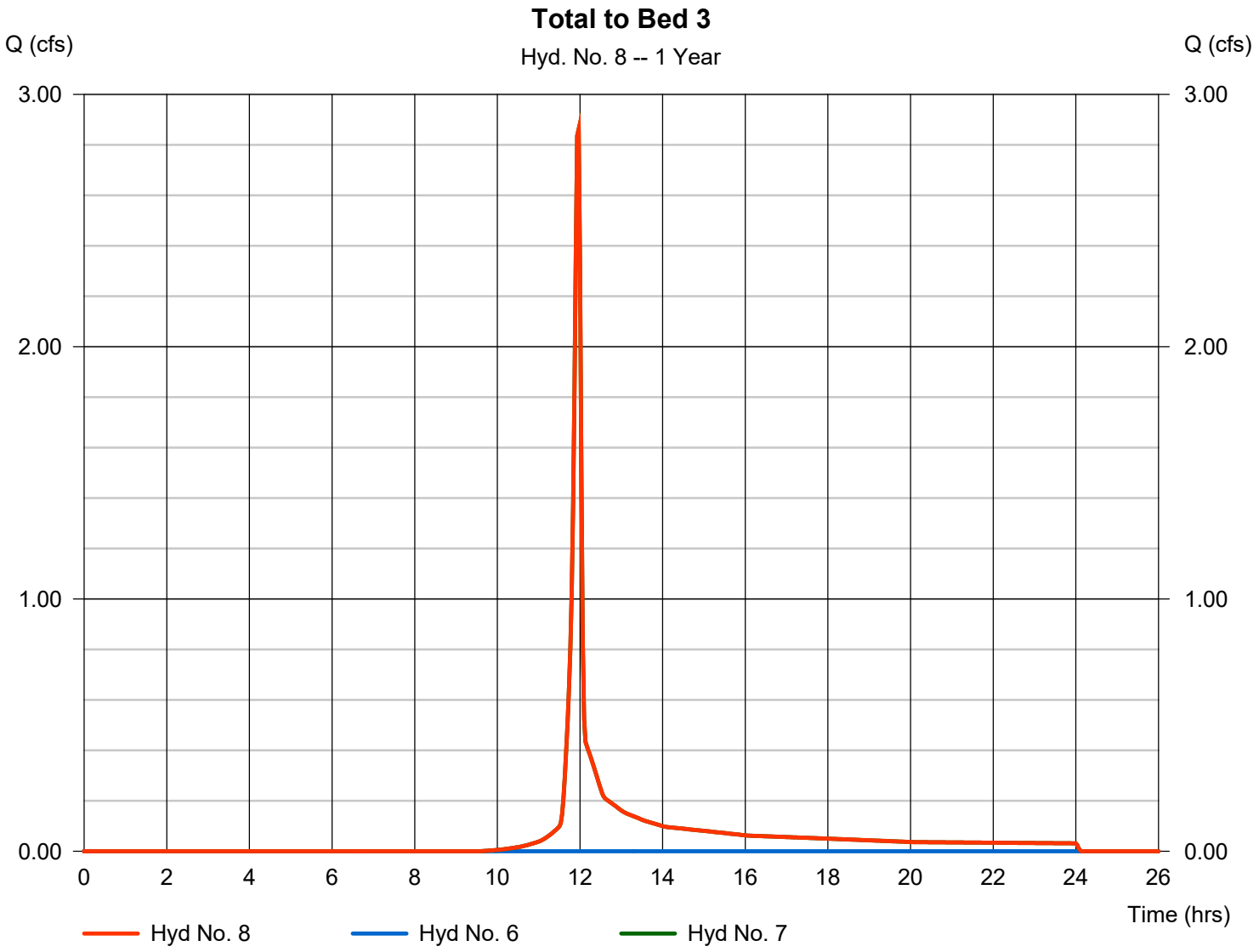


Hydrograph Report

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 2.862 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 5,740 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



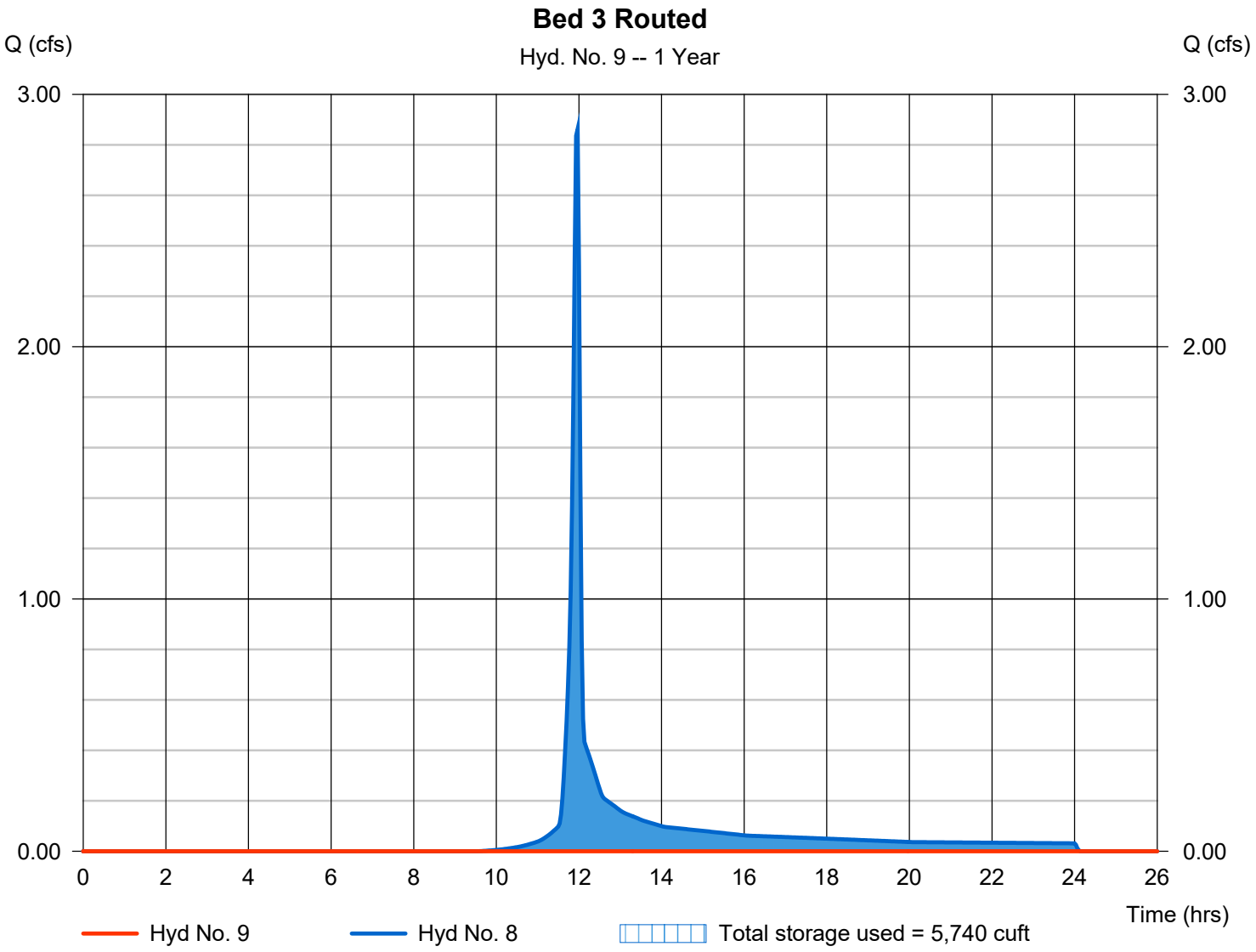
Hydrograph Report

Hyd. No. 9

Bed 3 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - Total to Bed 3	Max. Elevation	= 432.55 ft
Reservoir name	= Bed 3	Max. Storage	= 5,740 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Bed 3

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	430.50	n/a	0	0
1.00	431.50	n/a	2,802	2,802
2.00	432.50	n/a	2,802	5,604
3.00	433.50	n/a	2,802	8,406
4.00	434.50	n/a	2,802	11,208

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	0.00	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 430.50	433.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 433.60	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	430.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	280	430.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.20	560	430.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	841	430.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	1,121	430.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	1,401	431.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	1,681	431.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.70	1,961	431.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.80	2,242	431.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	2,522	431.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	2,802	431.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.10	3,082	431.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.20	3,362	431.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.30	3,643	431.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.40	3,923	431.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.50	4,203	432.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.60	4,483	432.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.70	4,763	432.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.80	5,044	432.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.90	5,324	432.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	5,604	432.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.10	5,884	432.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.20	6,164	432.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.30	6,445	432.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.40	6,725	432.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.50	7,005	433.00	0.00 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.000
2.60	7,285	433.10	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
2.70	7,565	433.20	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
2.80	7,846	433.30	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.049
2.90	8,126	433.40	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.059
3.00	8,406	433.50	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.068
3.10	8,686	433.60	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.075
3.20	8,966	433.70	0.51 ic	0.08 ic	---	---	0.42	---	---	---	---	---	0.504
3.30	9,247	433.80	1.29 ic	0.09 ic	---	---	1.19	---	---	---	---	---	1.280
3.40	9,527	433.90	2.29 oc	0.09 ic	---	---	2.19	---	---	---	---	---	2.284
3.50	9,807	434.00	3.47 oc	0.10 ic	---	---	3.37	---	---	---	---	---	3.471
3.60	10,087	434.10	4.82 oc	0.11 ic	---	---	4.71	---	---	---	---	---	4.816
3.70	10,367	434.20	6.30 oc	0.11 ic	---	---	6.19	---	---	---	---	---	6.302
3.80	10,648	434.30	7.92 ic	0.12 ic	---	---	7.80	---	---	---	---	---	7.918

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Bed 3

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.90	10,928	434.40	9.47 ic	0.09 ic	---	---	9.38 s	---	---	---	---	---	9.470
4.00	11,208	434.50	10.02 ic	0.07 ic	---	---	9.94 s	---	---	---	---	---	10.01

...End

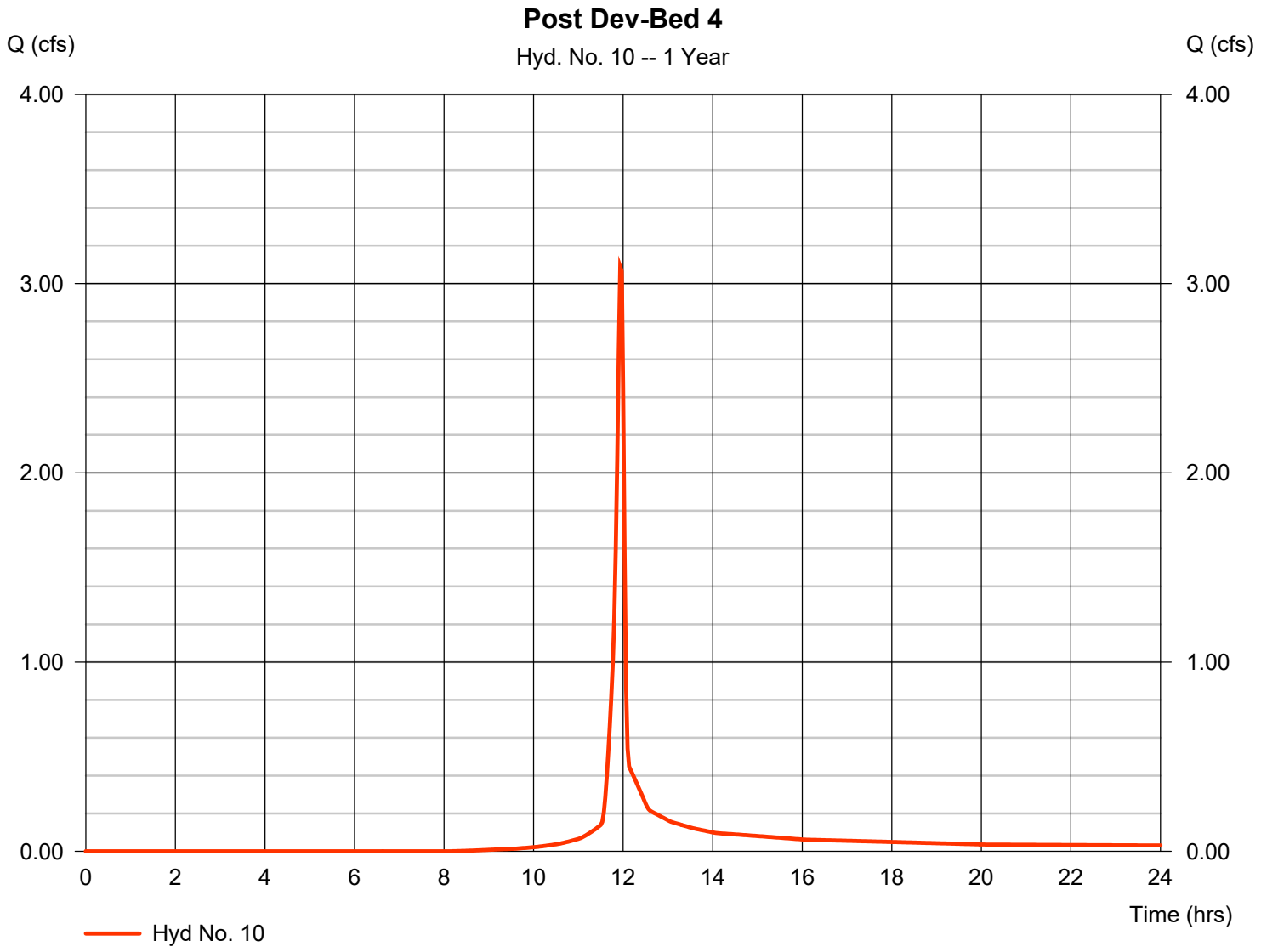
Hydrograph Report

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 3.088 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 6,243 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310

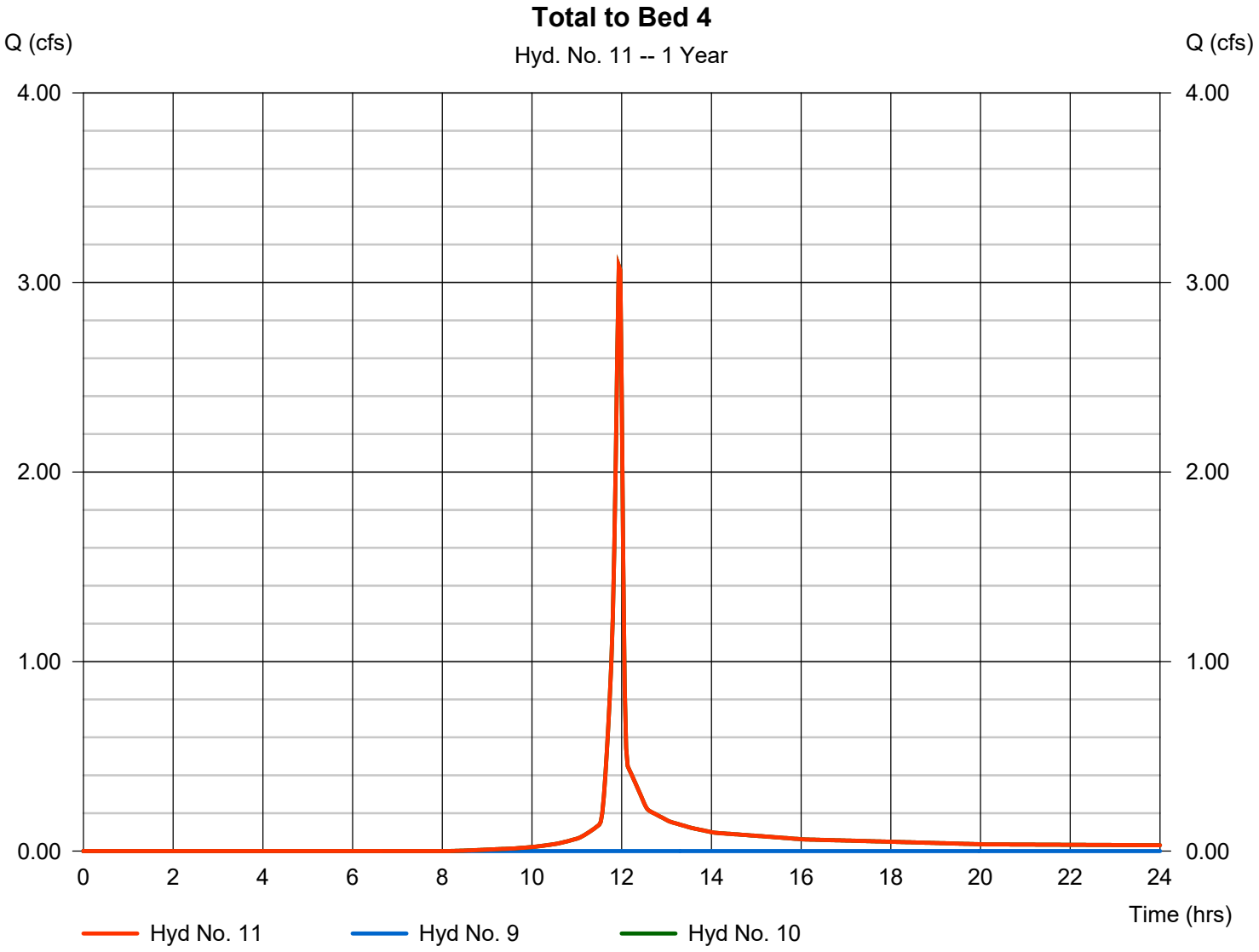


Hydrograph Report

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 3.088 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 6,243 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

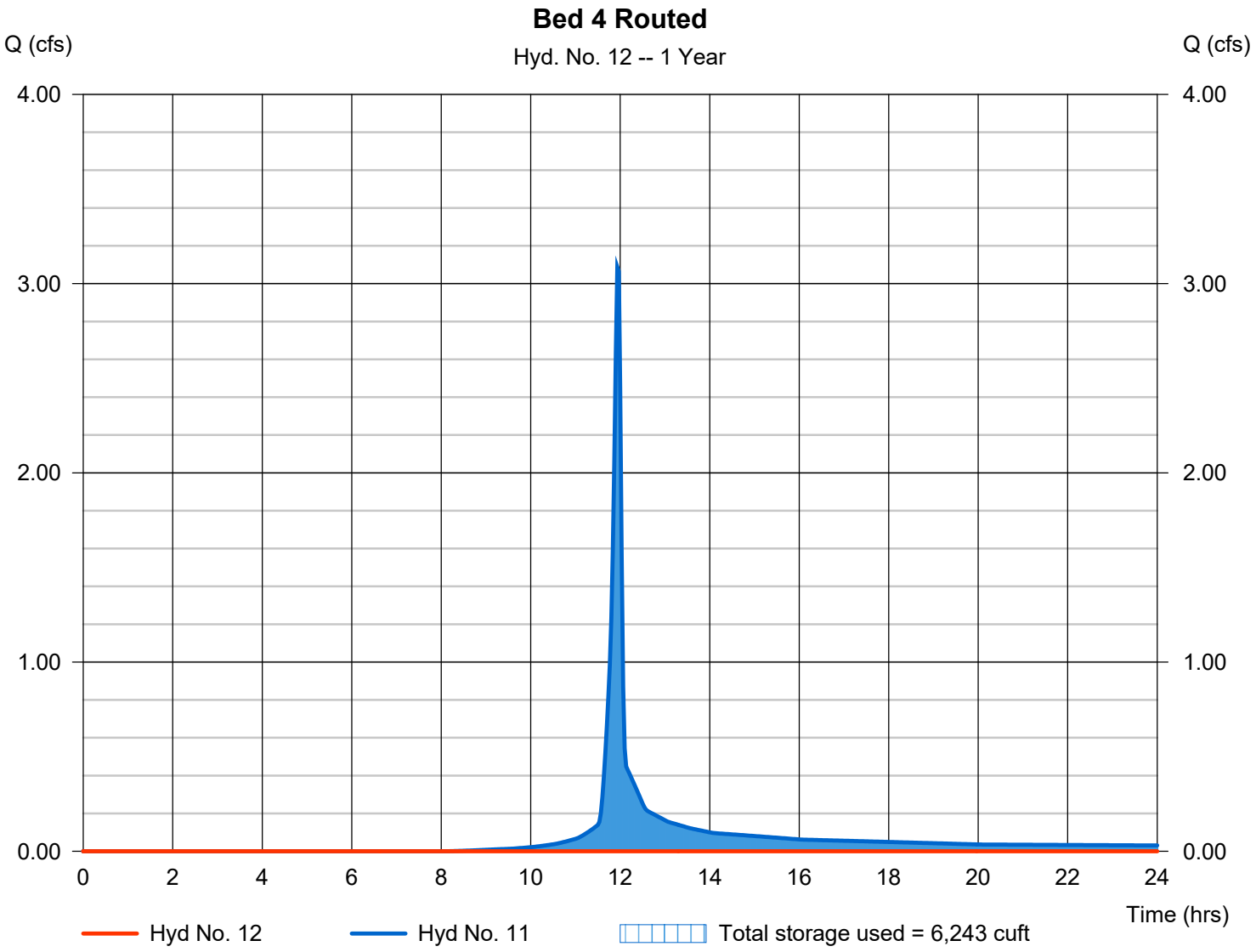
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 11 - Total to Bed 4	Max. Elevation	= 421.50 ft
Reservoir name	= Bed 4	Max. Storage	= 6,243 cuft

Storage Indication method used.



Pond Report

Pond No. 4 - Bed 4

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	420.00	n/a	0	0
1.00	421.00	n/a	4,156	4,156
2.00	422.00	n/a	4,156	8,312
3.00	423.00	n/a	4,156	12,468
4.00	424.00	n/a	4,156	16,624

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	0.00	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 420.00	422.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 422.90	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	420.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	416	420.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.20	831	420.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	1,247	420.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	1,662	420.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	2,078	420.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	2,494	420.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.70	2,909	420.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.80	3,325	420.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	3,740	420.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	4,156	421.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.10	4,572	421.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.20	4,987	421.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.30	5,403	421.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.40	5,818	421.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.50	6,234	421.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.60	6,650	421.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.70	7,065	421.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.80	7,481	421.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.90	7,896	421.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	8,312	422.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.10	8,728	422.10	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
2.20	9,143	422.20	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
2.30	9,559	422.30	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.049
2.40	9,974	422.40	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.059
2.50	10,390	422.50	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.068
2.60	10,806	422.60	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.076
2.70	11,221	422.70	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.082
2.80	11,637	422.80	0.09 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.089
2.90	12,052	422.90	0.10 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.095
3.00	12,468	423.00	0.53 ic	0.10 ic	---	---	0.42	---	---	---	---	---	0.522
3.10	12,884	423.10	1.30 ic	0.11 ic	---	---	1.19	---	---	---	---	---	1.297
3.20	13,299	423.20	2.33 oc	0.11 ic	---	---	2.19	---	---	---	---	---	2.300
3.30	13,715	423.30	3.49 oc	0.12 ic	---	---	3.37	---	---	---	---	---	3.486
3.40	14,130	423.40	4.83 oc	0.12 ic	---	---	4.71	---	---	---	---	---	4.830
3.50	14,546	423.50	6.32 oc	0.13 ic	---	---	6.19	---	---	---	---	---	6.316
3.60	14,962	423.60	7.92 ic	0.11 ic	---	---	7.80	---	---	---	---	---	7.916
3.70	15,377	423.70	9.24 ic	0.08 ic	---	---	9.16 s	---	---	---	---	---	9.240
3.80	15,793	423.80	9.74 ic	0.07 ic	---	---	9.67 s	---	---	---	---	---	9.738

Continues on next page...

Bed 4

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.90	16,208	423.90	10.10 ic	0.06 ic	---	---	10.04 s	---	---	---	---	---	10.10
4.00	16,624	424.00	10.39 ic	0.06 ic	---	---	10.34 s	---	---	---	---	---	10.39

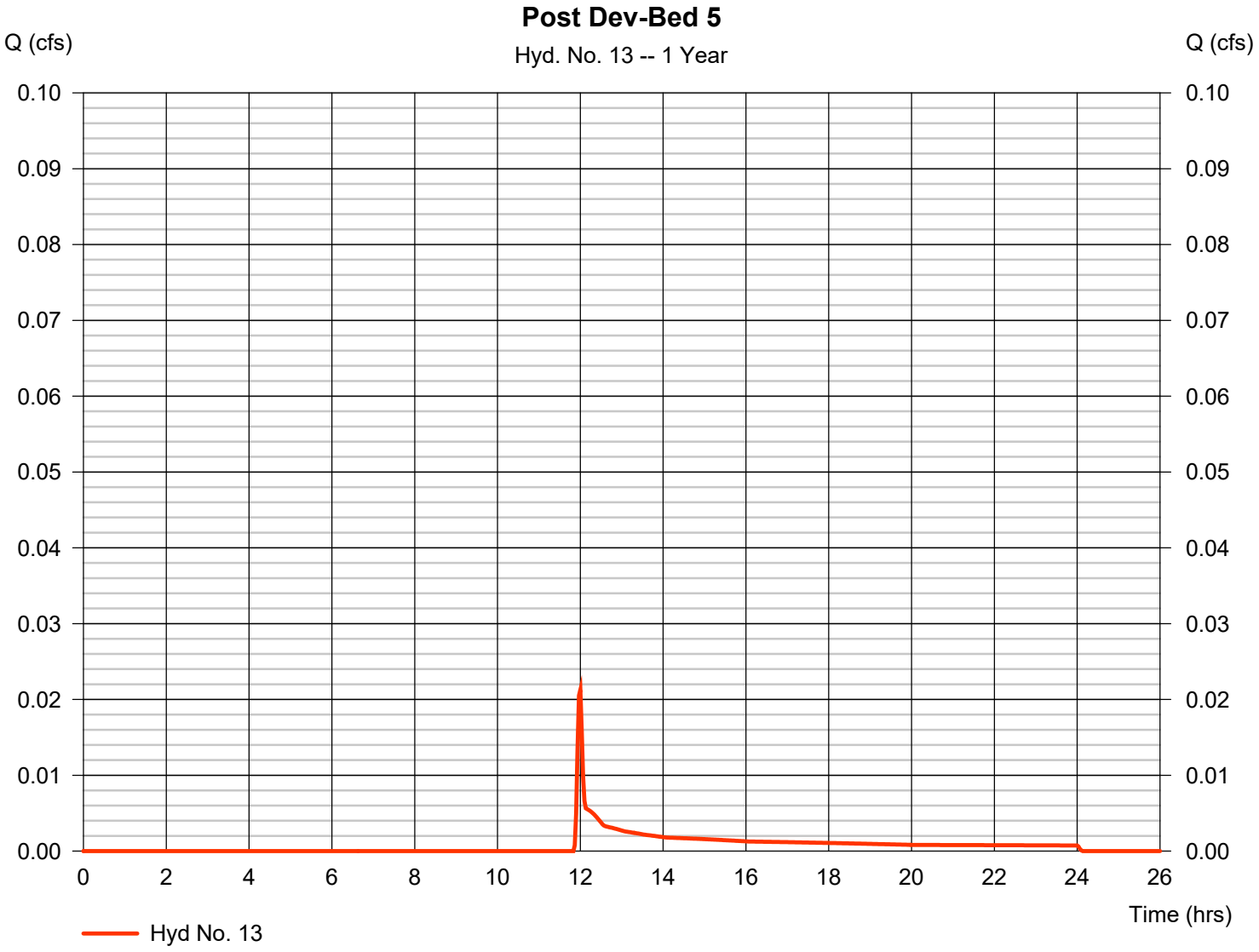
...End

Hydrograph Report

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 69 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

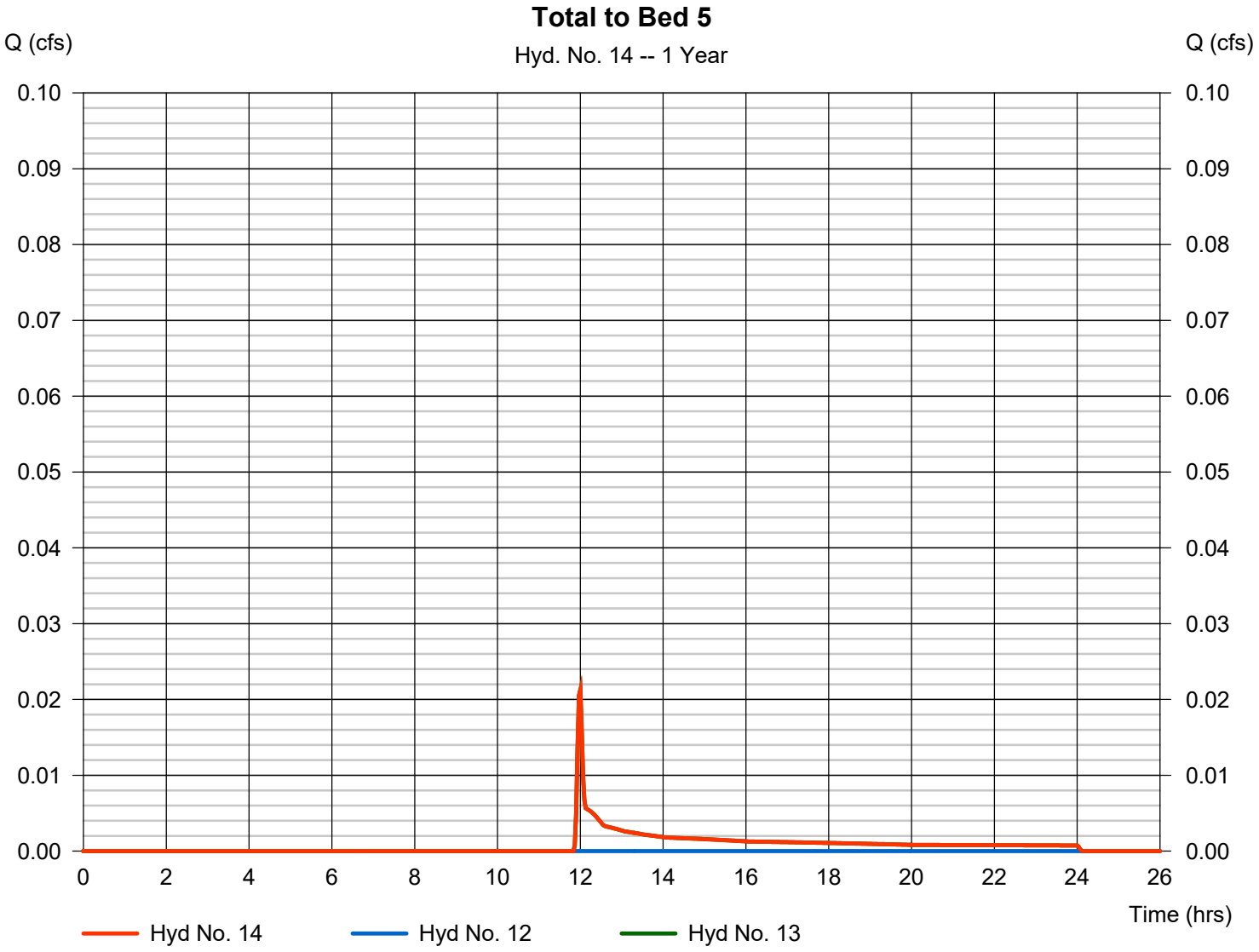


Hydrograph Report

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 69 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



Hydrograph Report

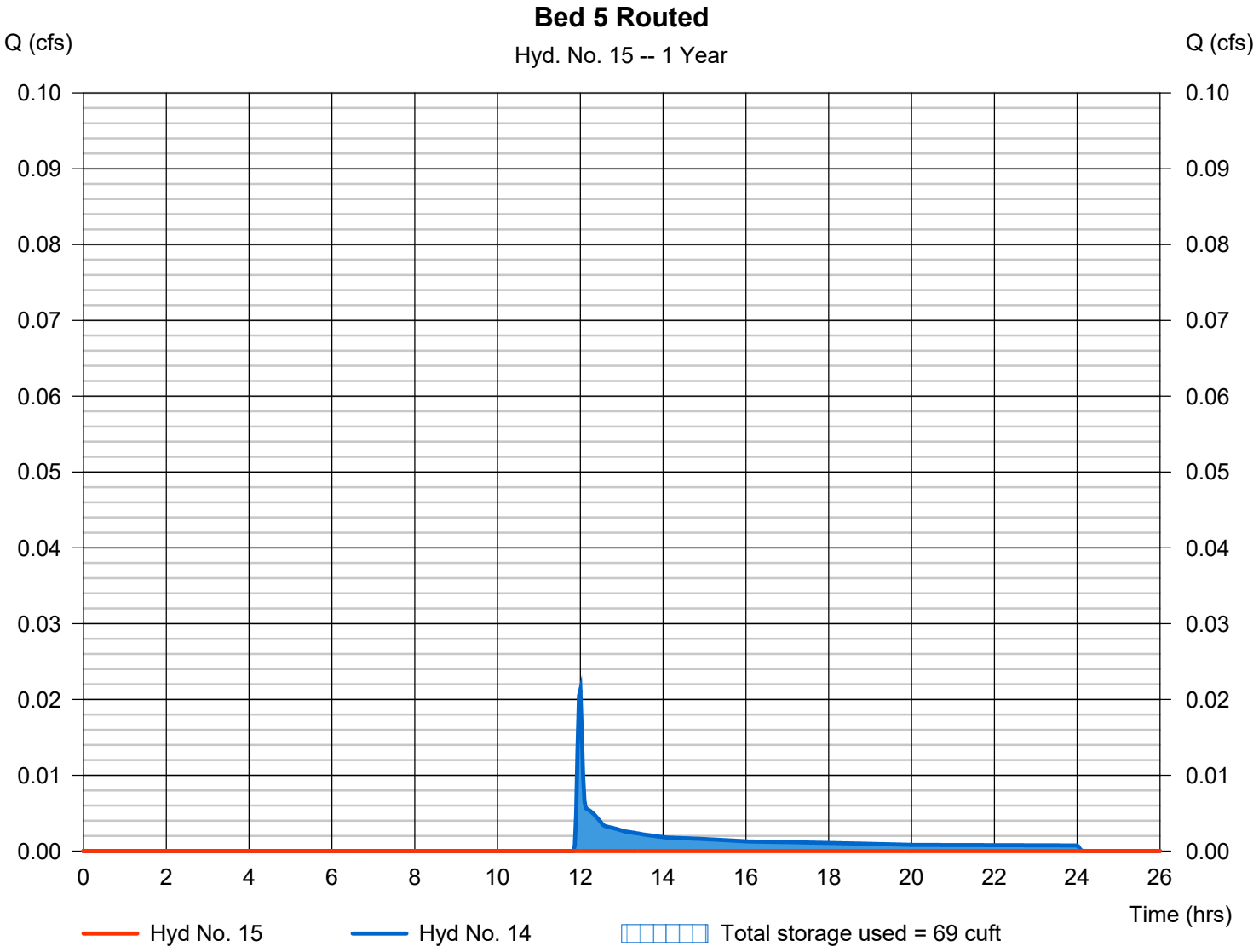
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 419.14 ft
Reservoir name	= Bed 5	Max. Storage	= 69 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - Bed 5

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	419.00	n/a	0	0
1.00	420.00	n/a	495	495
2.00	421.00	n/a	495	990
3.00	422.00	n/a	495	1,485
4.00	423.00	n/a	495	1,980

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	0.00	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 419.00	420.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 421.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	419.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	50	419.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.20	99	419.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	149	419.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	198	419.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	248	419.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	297	419.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.70	347	419.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.80	396	419.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	446	419.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	495	420.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.10	545	420.10	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
1.20	594	420.20	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
1.30	644	420.30	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.049
1.40	693	420.40	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.059
1.50	743	420.50	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.068
1.60	792	420.60	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.076
1.70	842	420.70	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.082
1.80	891	420.80	0.09 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.089
1.90	941	420.90	0.10 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.095
2.00	990	421.00	0.10 ic	0.10 ic	---	---	0.00	---	---	---	---	---	0.101
2.10	1,040	421.10	0.53 ic	0.11 ic	---	---	0.42	---	---	---	---	---	0.527
2.20	1,089	421.20	1.33 ic	0.11 ic	---	---	1.19	---	---	---	---	---	1.302
2.30	1,139	421.30	2.33 oc	0.12 ic	---	---	2.19	---	---	---	---	---	2.305
2.40	1,188	421.40	3.48 oc	0.11 ic	---	---	3.37	---	---	---	---	---	3.482
2.50	1,238	421.50	4.82 oc	0.11 ic	---	---	4.71	---	---	---	---	---	4.815
2.60	1,287	421.60	6.28 oc	0.09 ic	---	---	6.19	---	---	---	---	---	6.282
2.70	1,337	421.70	7.41 ic	0.07 ic	---	---	7.33 s	---	---	---	---	---	7.407
2.80	1,386	421.80	7.93 ic	0.06 ic	---	---	7.87 s	---	---	---	---	---	7.934
2.90	1,436	421.90	8.33 ic	0.06 ic	---	---	8.27 s	---	---	---	---	---	8.331
3.00	1,485	422.00	8.66 ic	0.05 ic	---	---	8.61 s	---	---	---	---	---	8.656
3.10	1,535	422.10	8.94 ic	0.05 ic	---	---	8.89 s	---	---	---	---	---	8.939
3.20	1,584	422.20	9.19 ic	0.04 ic	---	---	9.15 s	---	---	---	---	---	9.194
3.30	1,634	422.30	9.43 ic	0.04 ic	---	---	9.39 s	---	---	---	---	---	9.427
3.40	1,683	422.40	9.65 ic	0.03 ic	---	---	9.61 s	---	---	---	---	---	9.644
3.50	1,733	422.50	9.85 ic	0.03 ic	---	---	9.82 s	---	---	---	---	---	9.851
3.60	1,782	422.60	10.05 ic	0.03 ic	---	---	10.01 s	---	---	---	---	---	10.04
3.70	1,832	422.70	10.24 ic	0.03 ic	---	---	10.20 s	---	---	---	---	---	10.23
3.80	1,881	422.80	10.42 ic	0.03 ic	---	---	10.39 s	---	---	---	---	---	10.42

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Bed 5

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.90	1,931	422.90	10.60 ic	0.03 ic	---	---	10.57 s	---	---	---	---	---	10.59
4.00	1,980	423.00	10.77 ic	0.02 ic	---	---	10.74 s	---	---	---	---	---	10.77

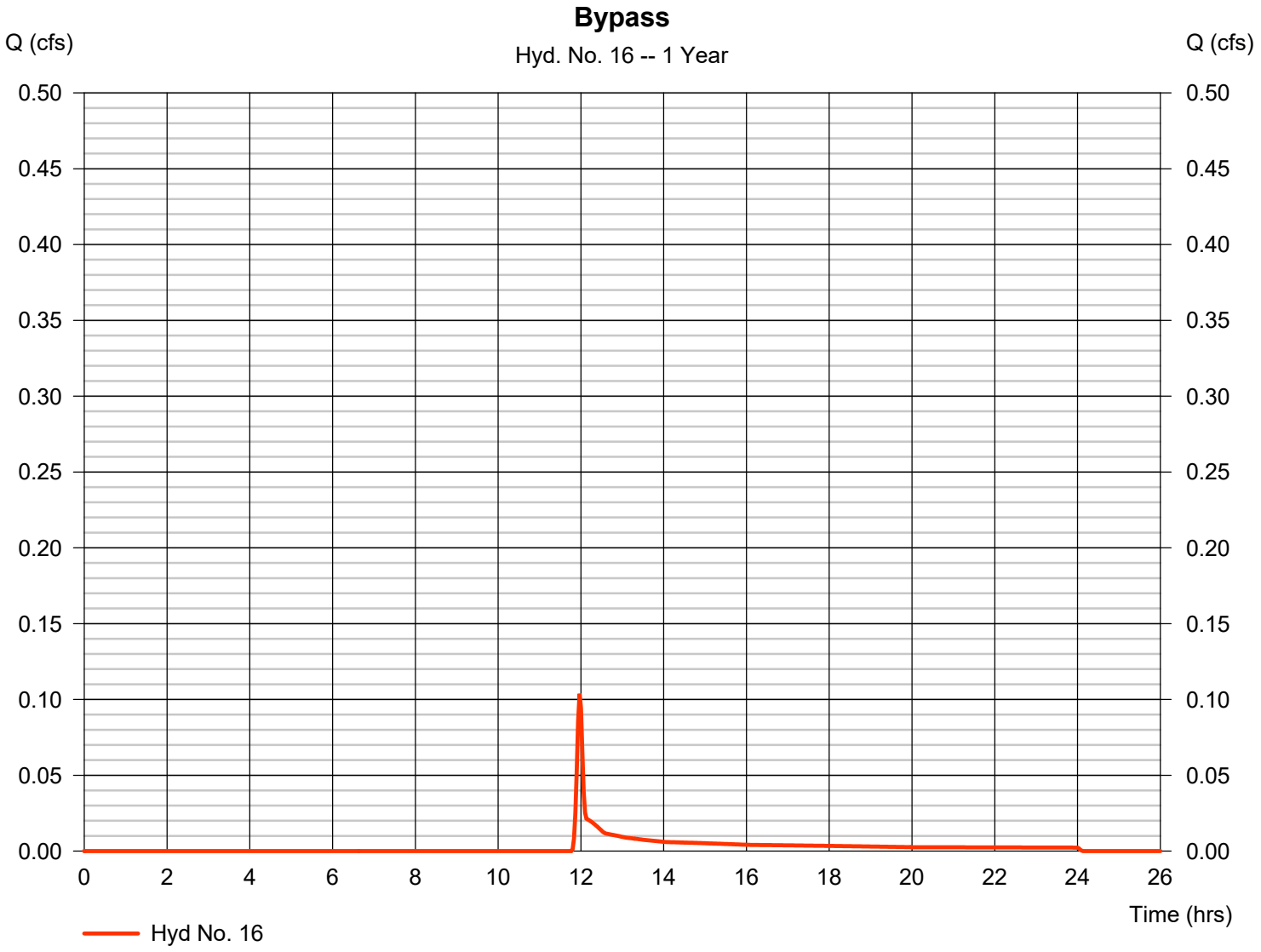
...End

Hydrograph Report

Hyd. No. 16

Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.104 cfs
Storm frequency	=	1 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	253 cuft
Drainage area	=	0.200 ac	Curve number	=	65
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.69 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

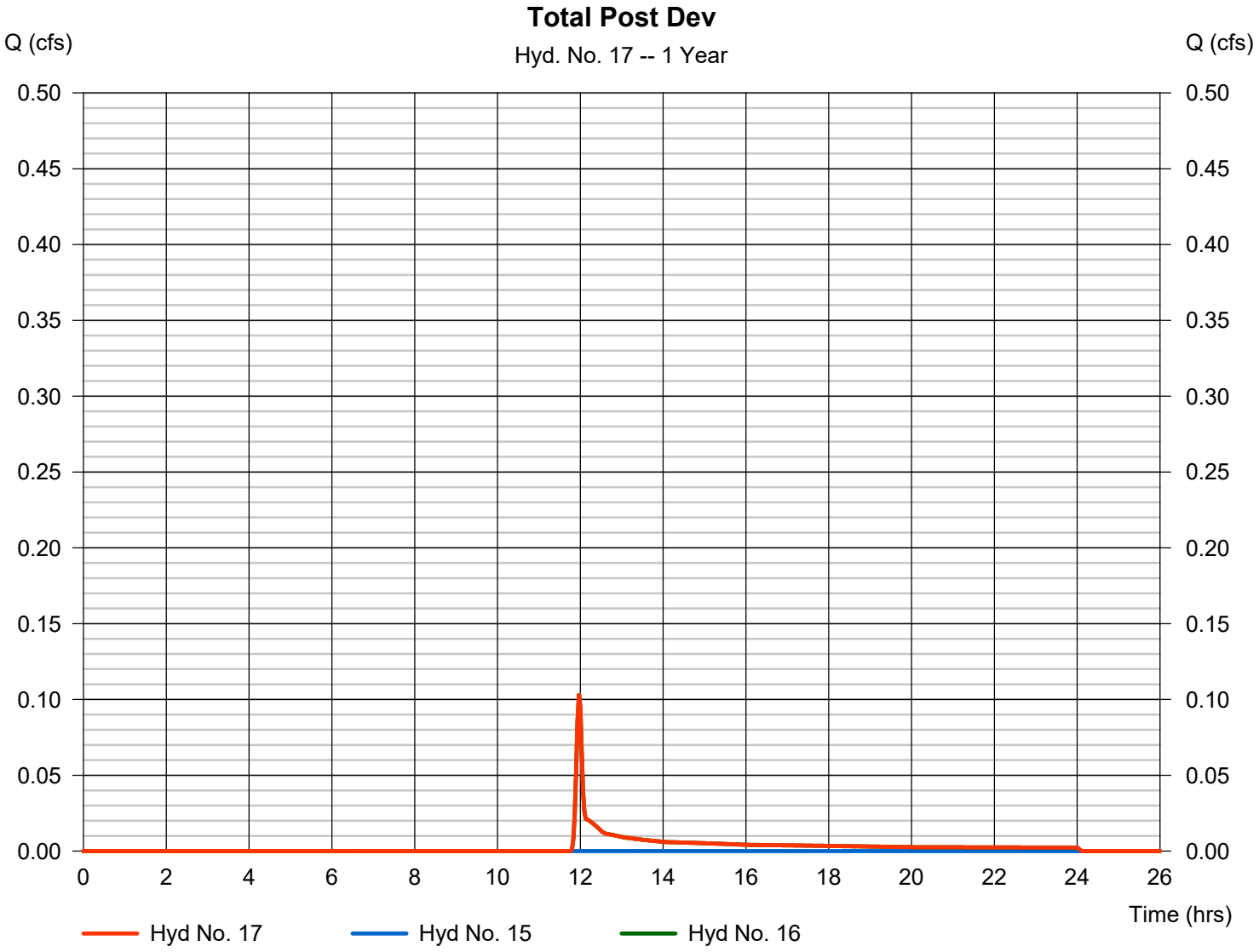


Hydrograph Report

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 0.104 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 253 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.909	2	722	9,193	------	------	------	Pre Dev
2	SCS Runoff	3.373	2	718	6,746	------	------	------	Post Dev-Bed 1
3	Reservoir	0.000	2	n/a	0	2	438.47	6,746	Bed 1 routed
4	SCS Runoff	1.182	2	718	2,365	------	------	------	Post Dev-Bed 2
5	Combine	1.182	2	718	2,365	3, 4	------	------	Total to Bed 2
6	Reservoir	0.000	2	n/a	0	5	435.71	2,365	Bed 2 Routed
7	SCS Runoff	3.917	2	716	7,909	------	------	------	Post Dev-Bed 3
8	Combine	3.917	2	716	7,909	6, 7	------	------	Total to Bed 3
9	Reservoir	0.032	2	1442	885	8	433.18	7,518	Bed 3 Routed
10	SCS Runoff	4.099	2	716	8,336	------	------	------	Post Dev-Bed 4
11	Combine	4.099	2	716	9,221	9, 10	------	------	Total to Bed 4
12	Reservoir	0.016	2	1594	881	11	422.11	8,760	Bed 4 Routed
13	SCS Runoff	0.052	2	718	125	------	------	------	Post Dev-Bed 5
14	Combine	0.052	2	718	1,007	12, 13	------	------	Total to Bed 5
15	Reservoir	0.012	2	1962	508	14	420.08	535	Bed 5 Routed
16	SCS Runoff	0.196	2	718	422	------	------	------	Bypass
17	Combine	0.196	2	718	930	15, 16	------	------	Total Post Dev

Hydrograph Report

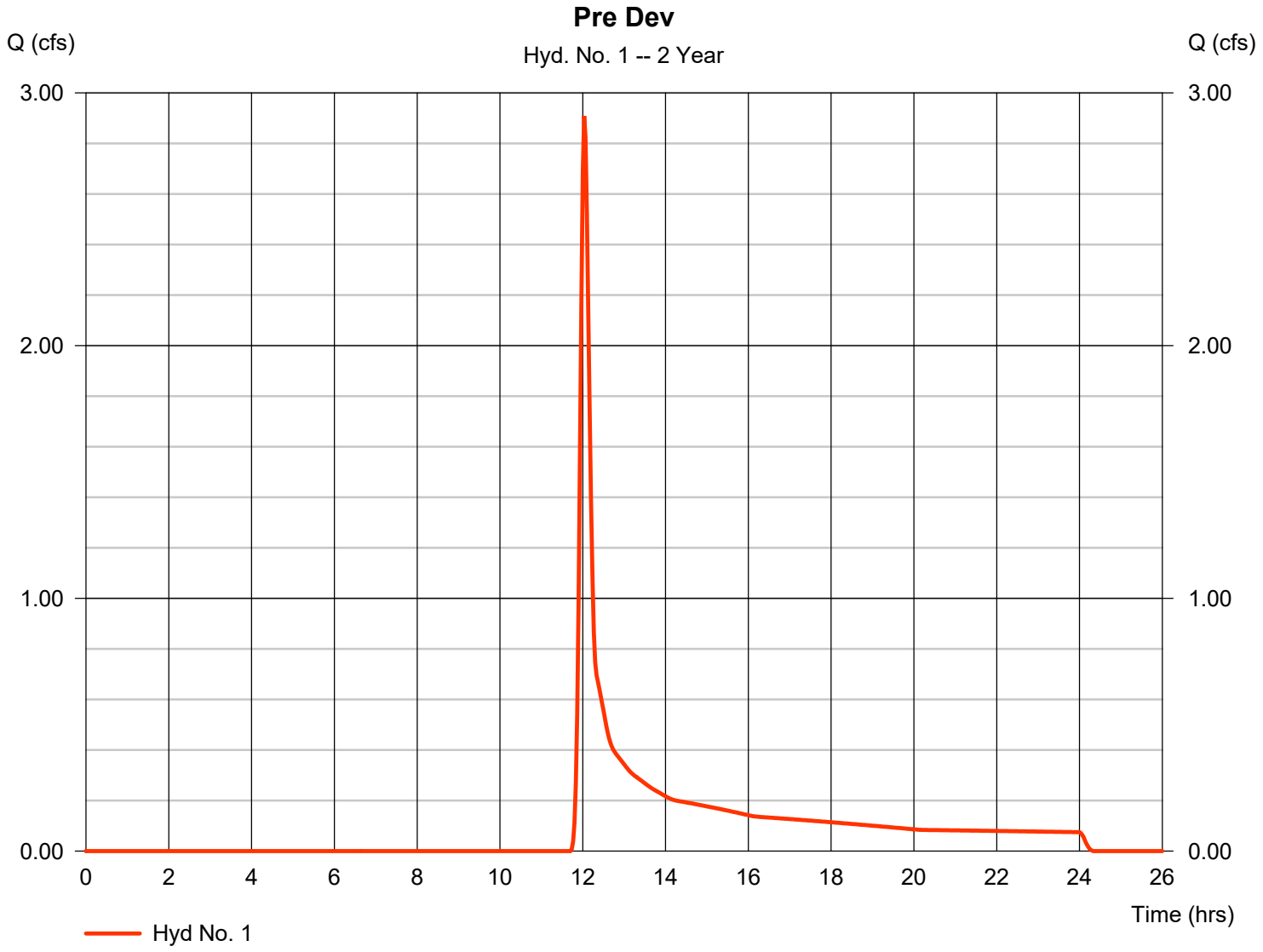
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 2.909 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 9,193 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



Hydrograph Report

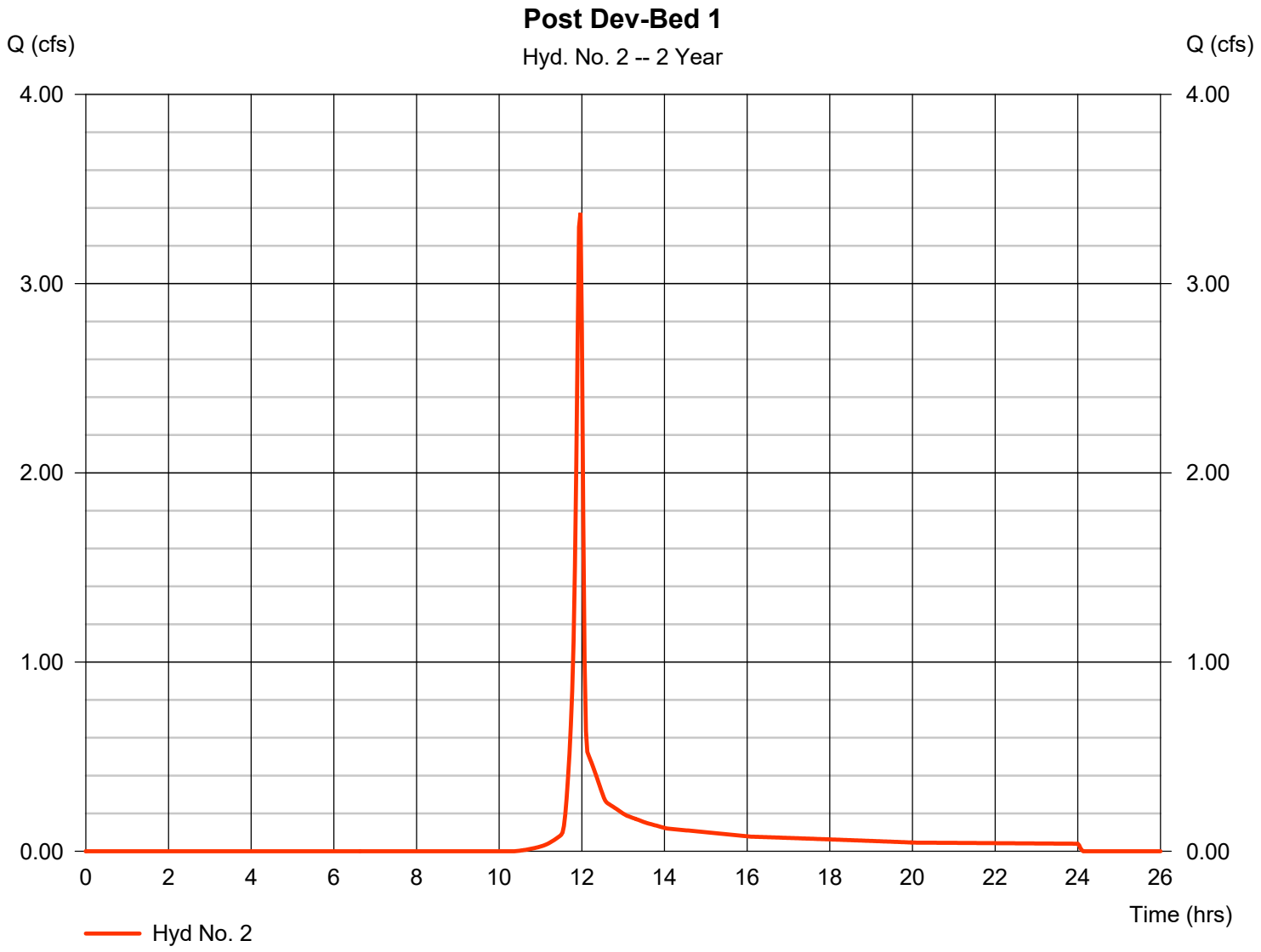
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.373 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 6,746 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



Hydrograph Report

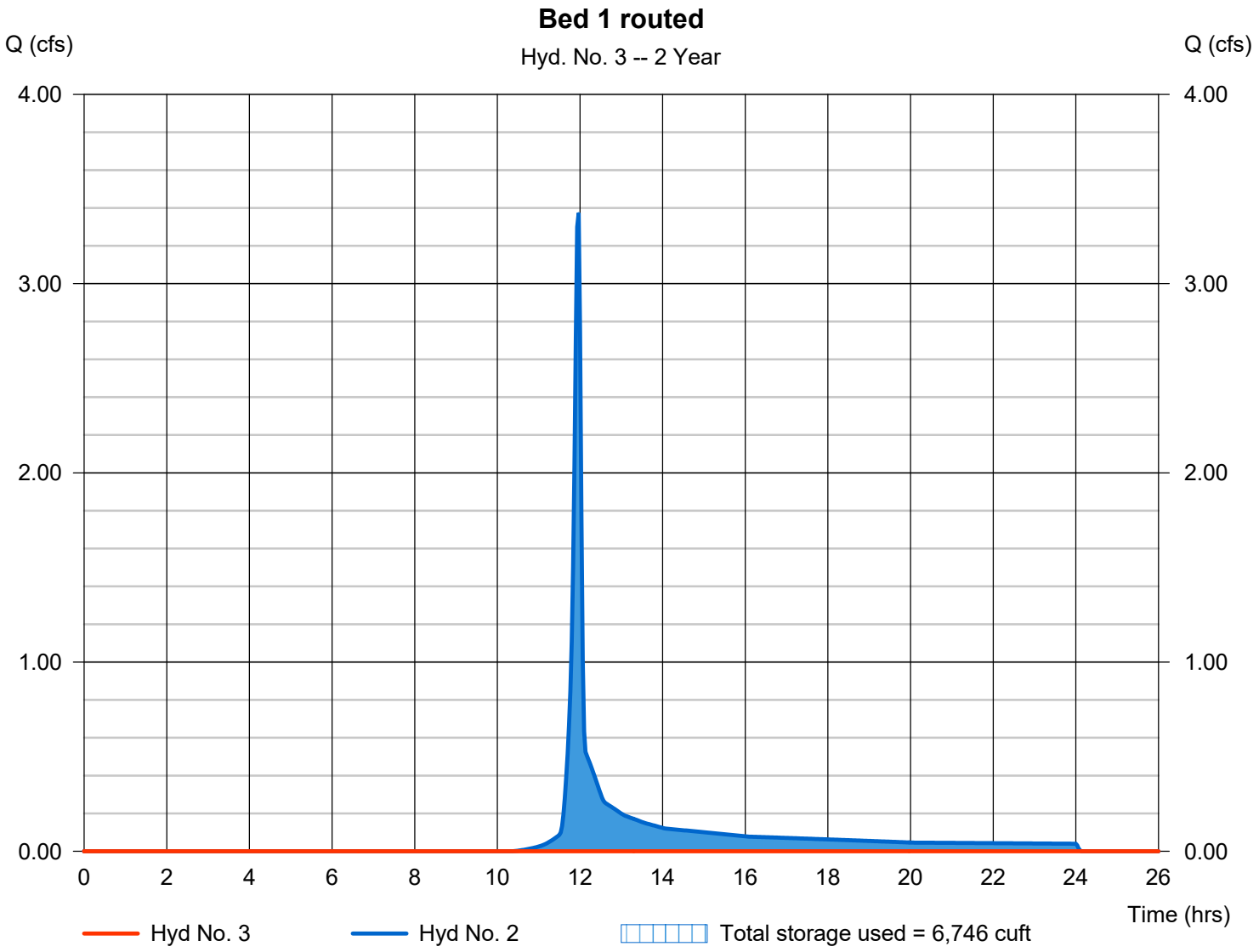
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 1 routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	2 - Post Dev-Bed 1	Max. Elevation	=	438.47 ft
Reservoir name	=	Bed 1	Max. Storage	=	6,746 cuft

Storage Indication method used.



Hydrograph Report

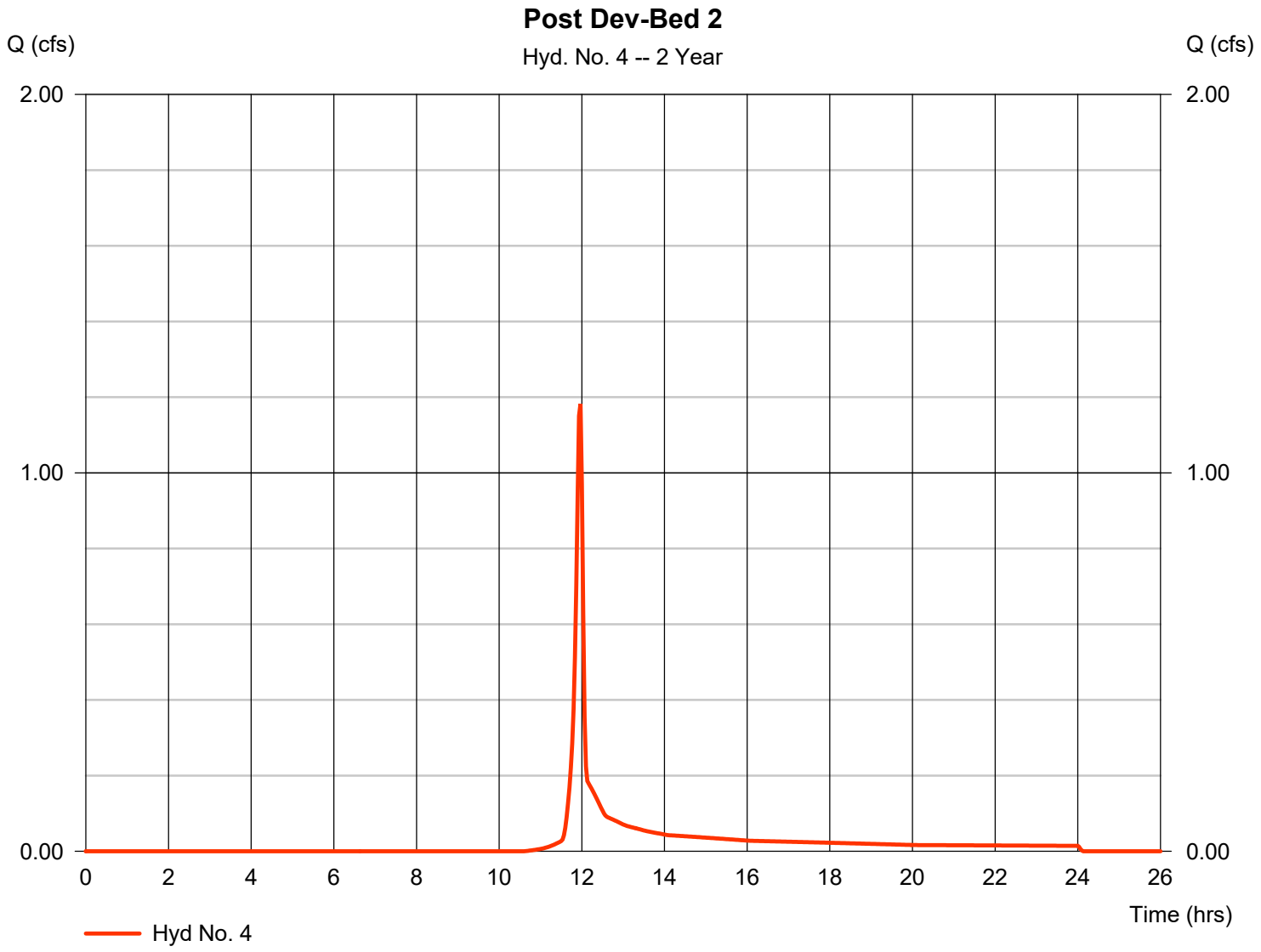
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 2,365 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620

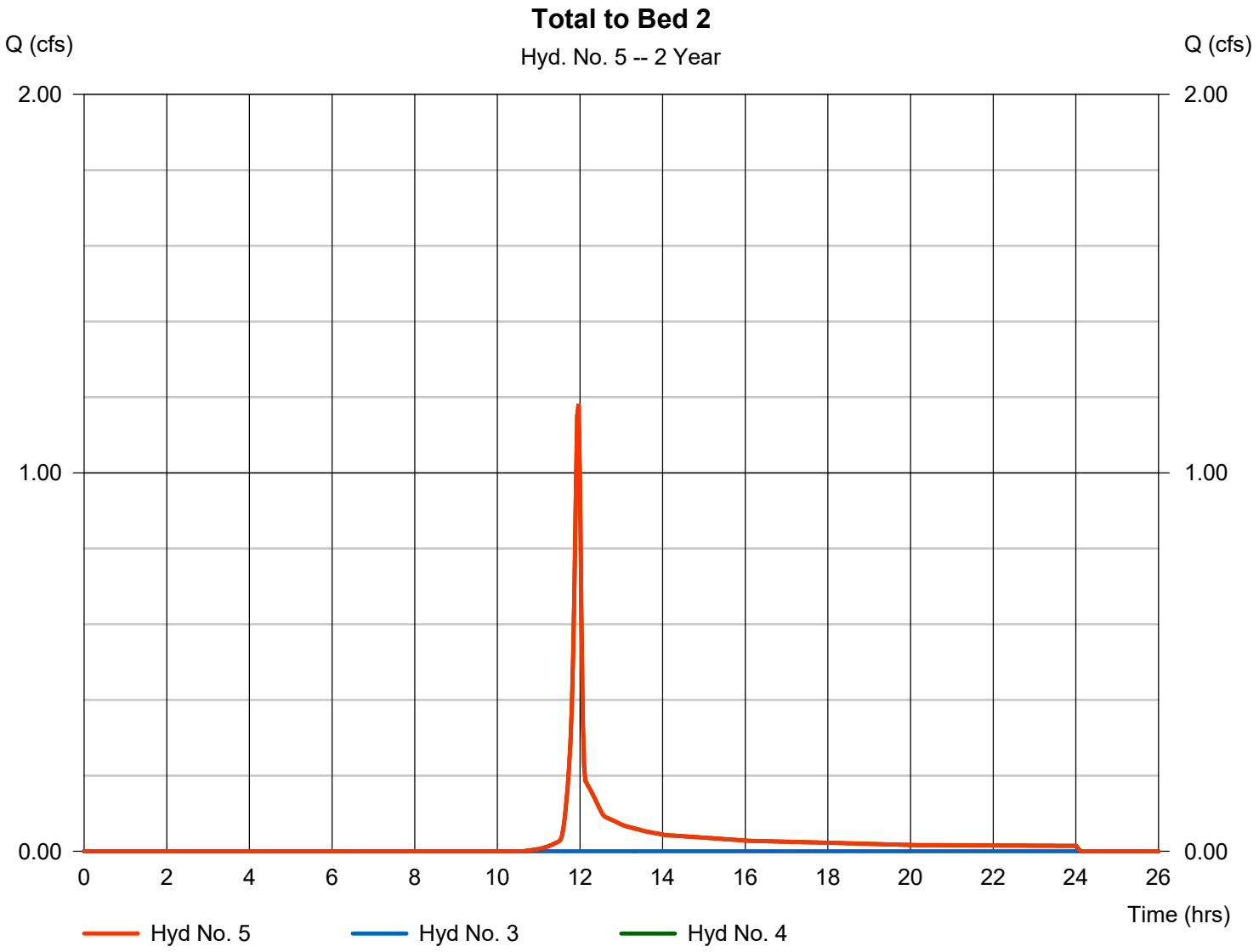


Hydrograph Report

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 1.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 2,365 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



Hydrograph Report

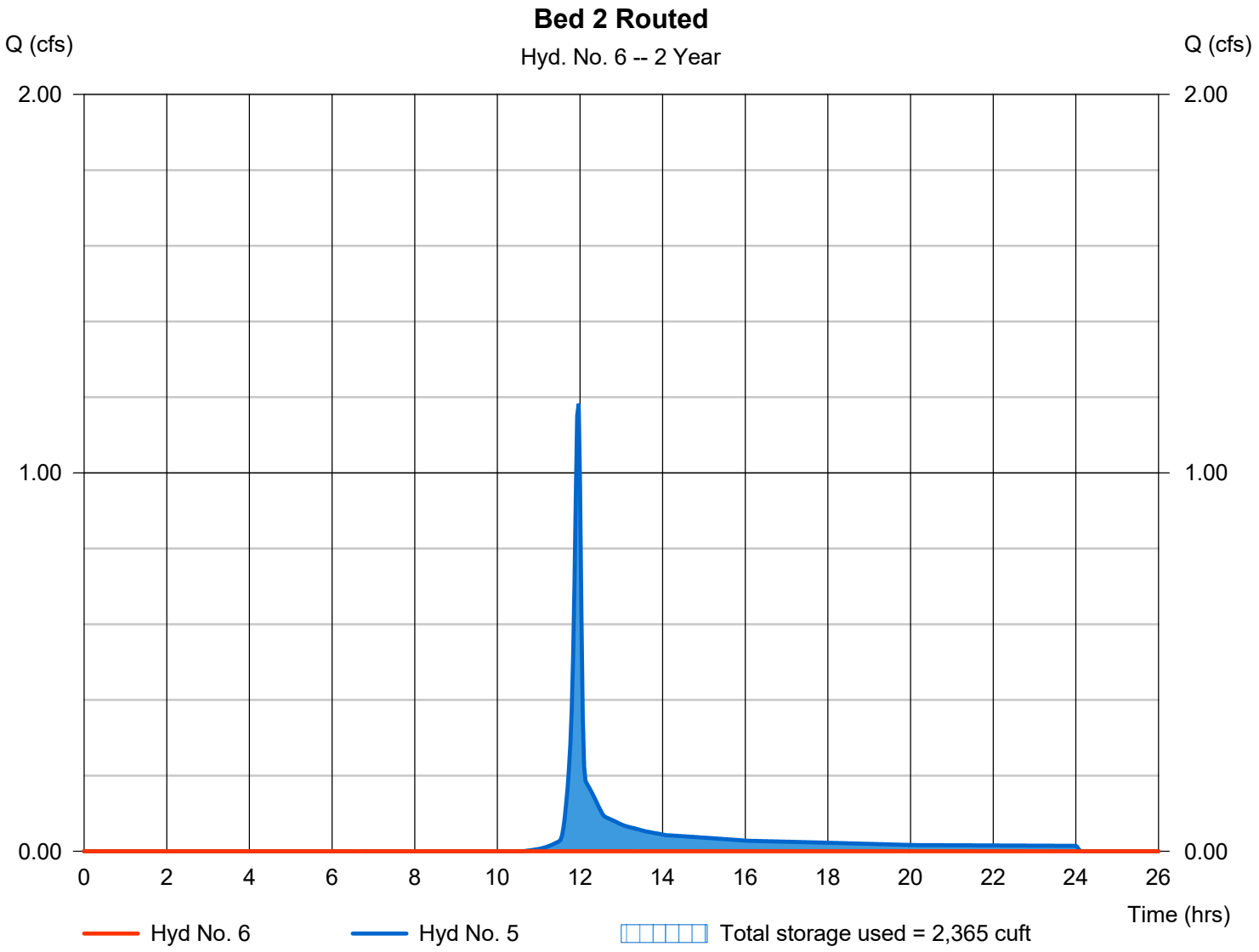
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 6

Bed 2 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - Total to Bed 2	Max. Elevation	= 435.71 ft
Reservoir name	= Bed 2	Max. Storage	= 2,365 cuft

Storage Indication method used.



Hydrograph Report

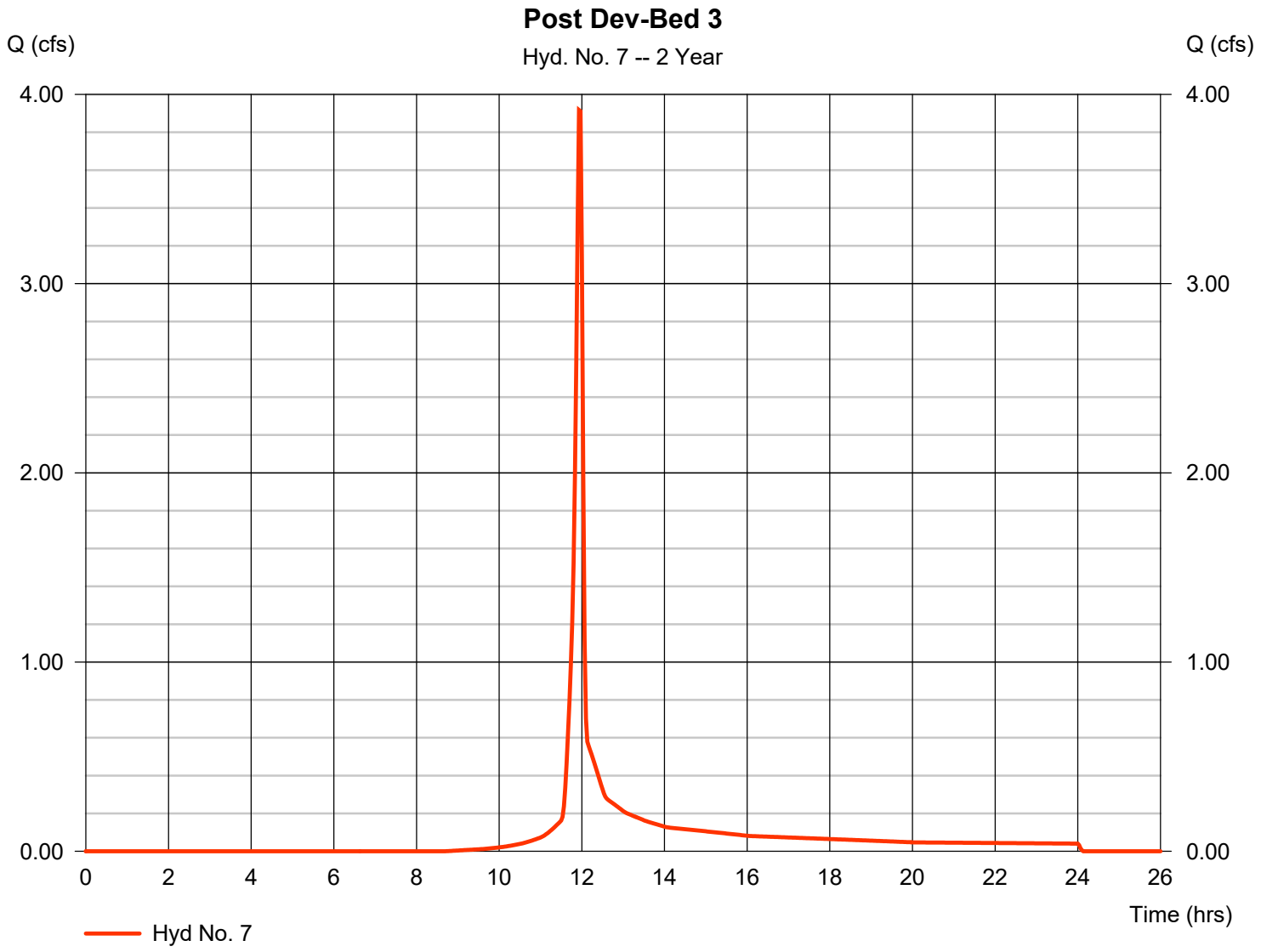
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.917 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 7,909 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480



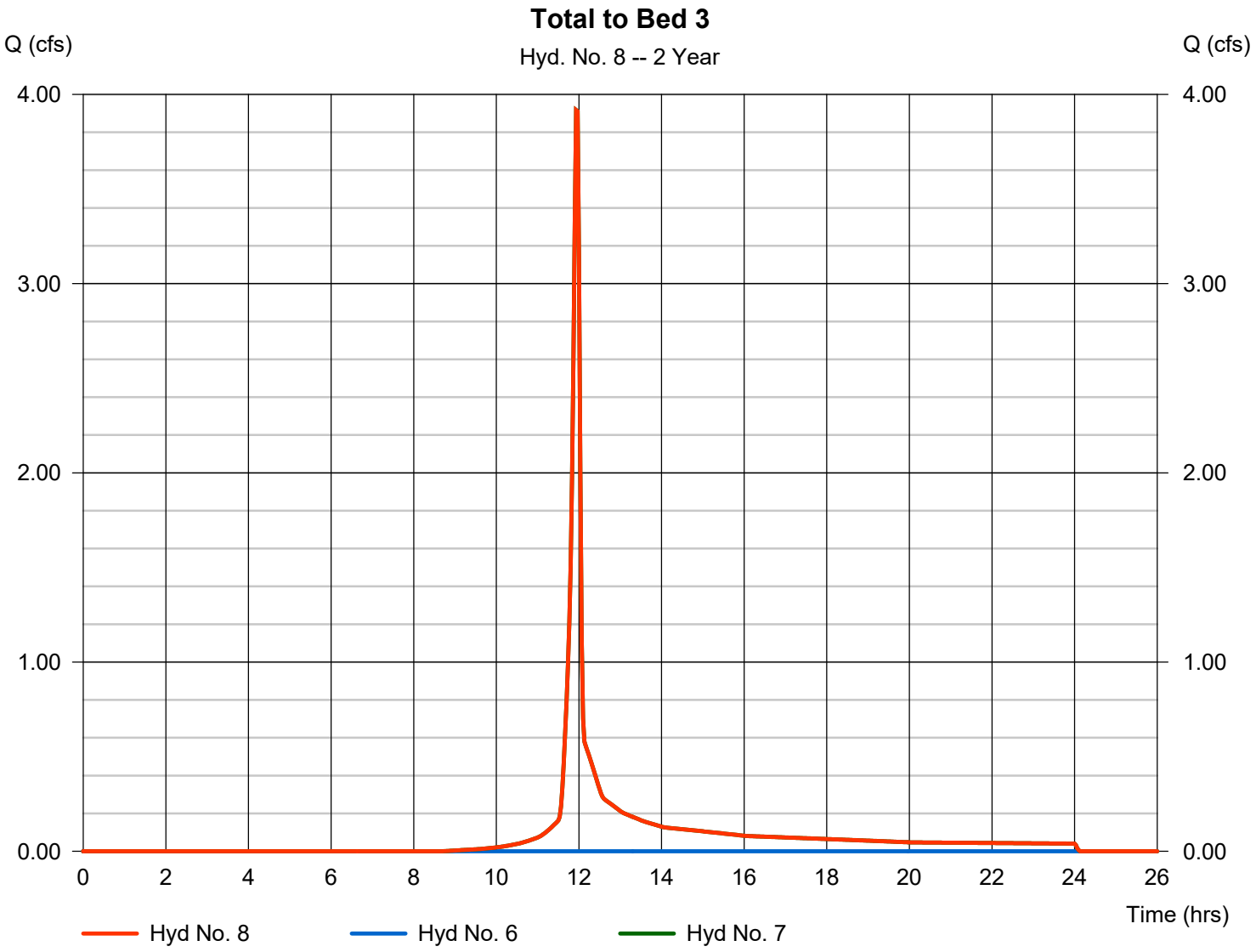
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 3.917 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 7,909 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



Hydrograph Report

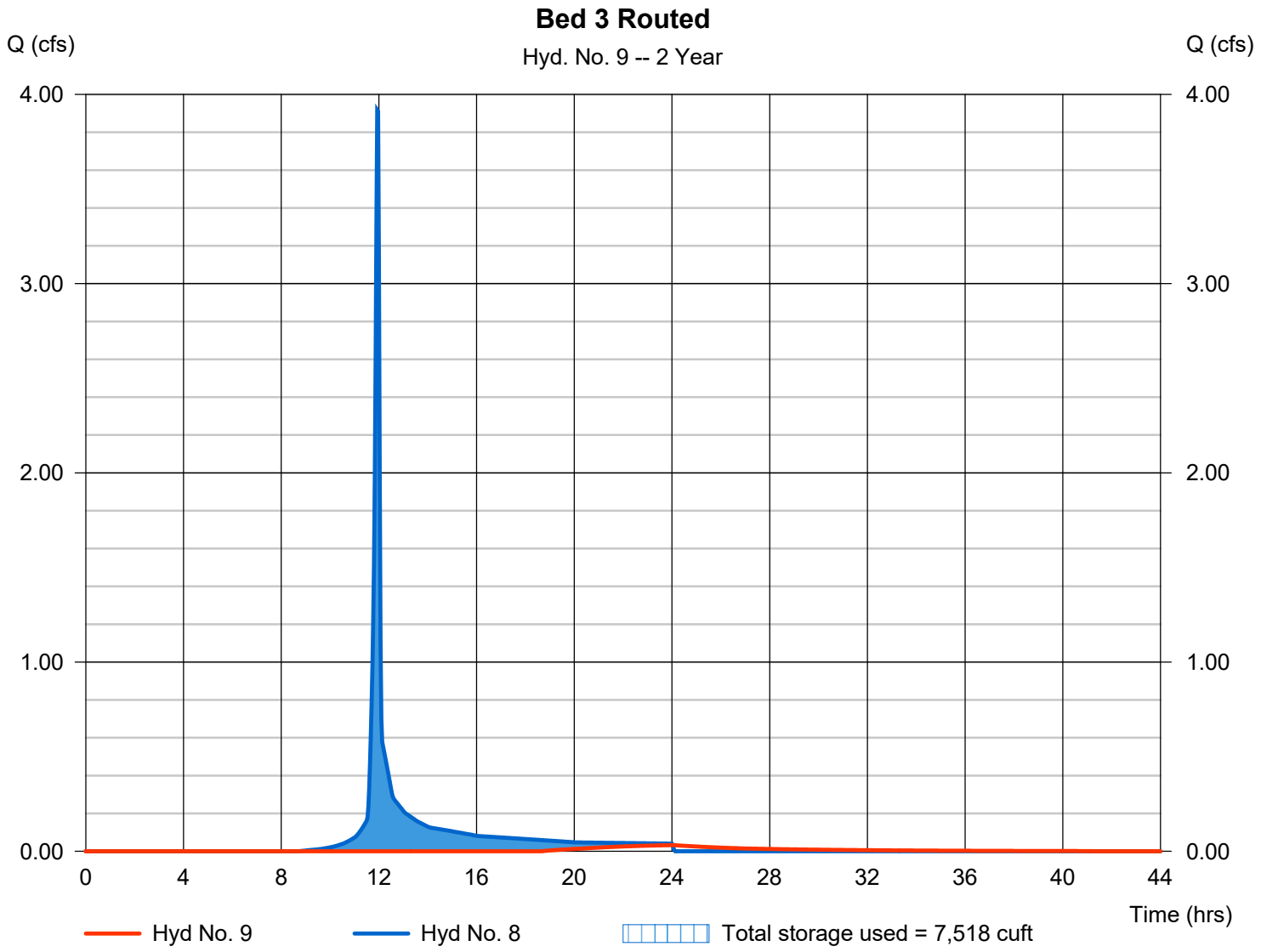
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 9

Bed 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.032 cfs
Storm frequency	=	2 yrs	Time to peak	=	24.03 hrs
Time interval	=	2 min	Hyd. volume	=	885 cuft
Inflow hyd. No.	=	8 - Total to Bed 3	Max. Elevation	=	433.18 ft
Reservoir name	=	Bed 3	Max. Storage	=	7,518 cuft

Storage Indication method used.



Hydrograph Report

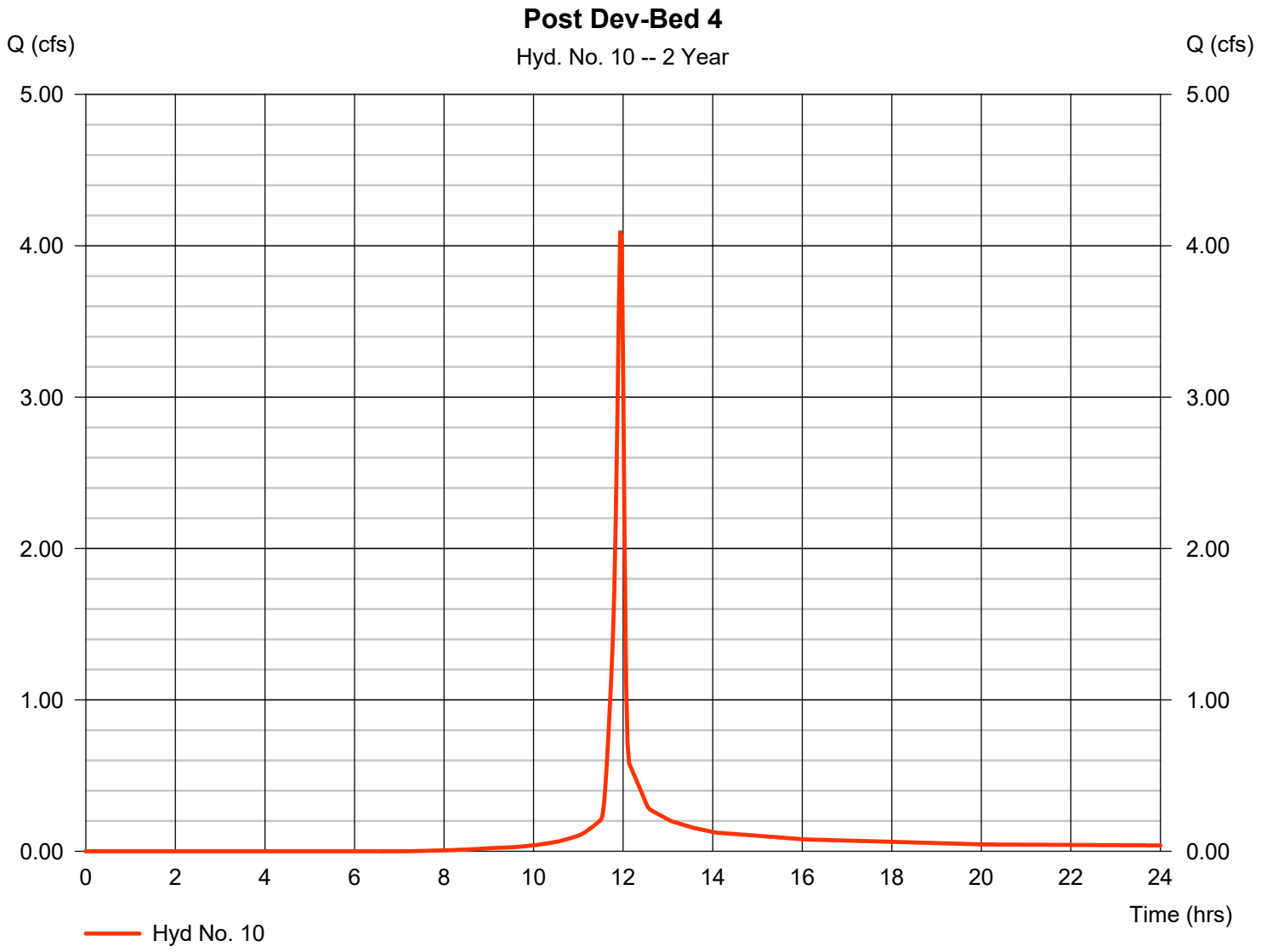
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 4.099 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 8,336 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310



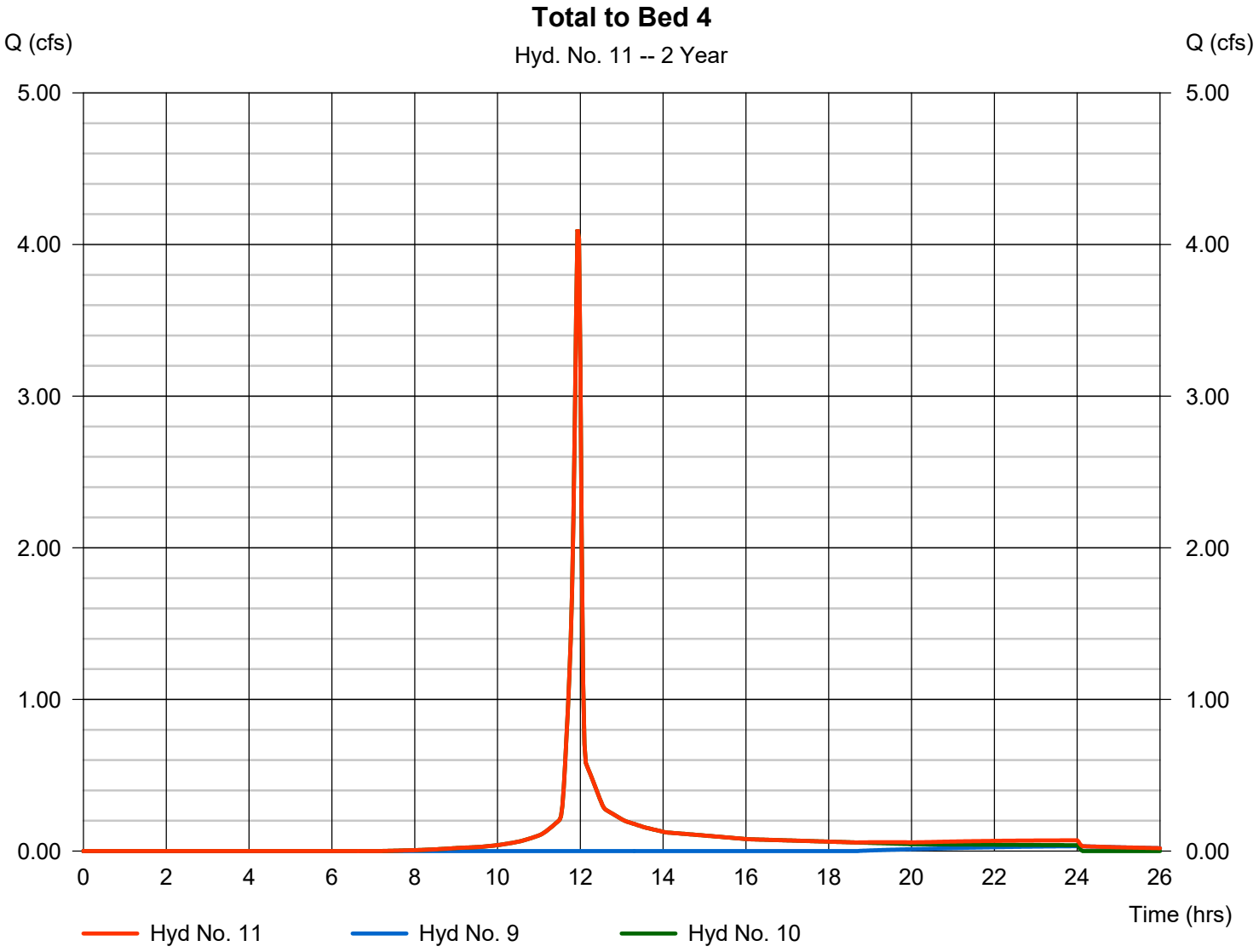
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 4.099 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 9,221 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

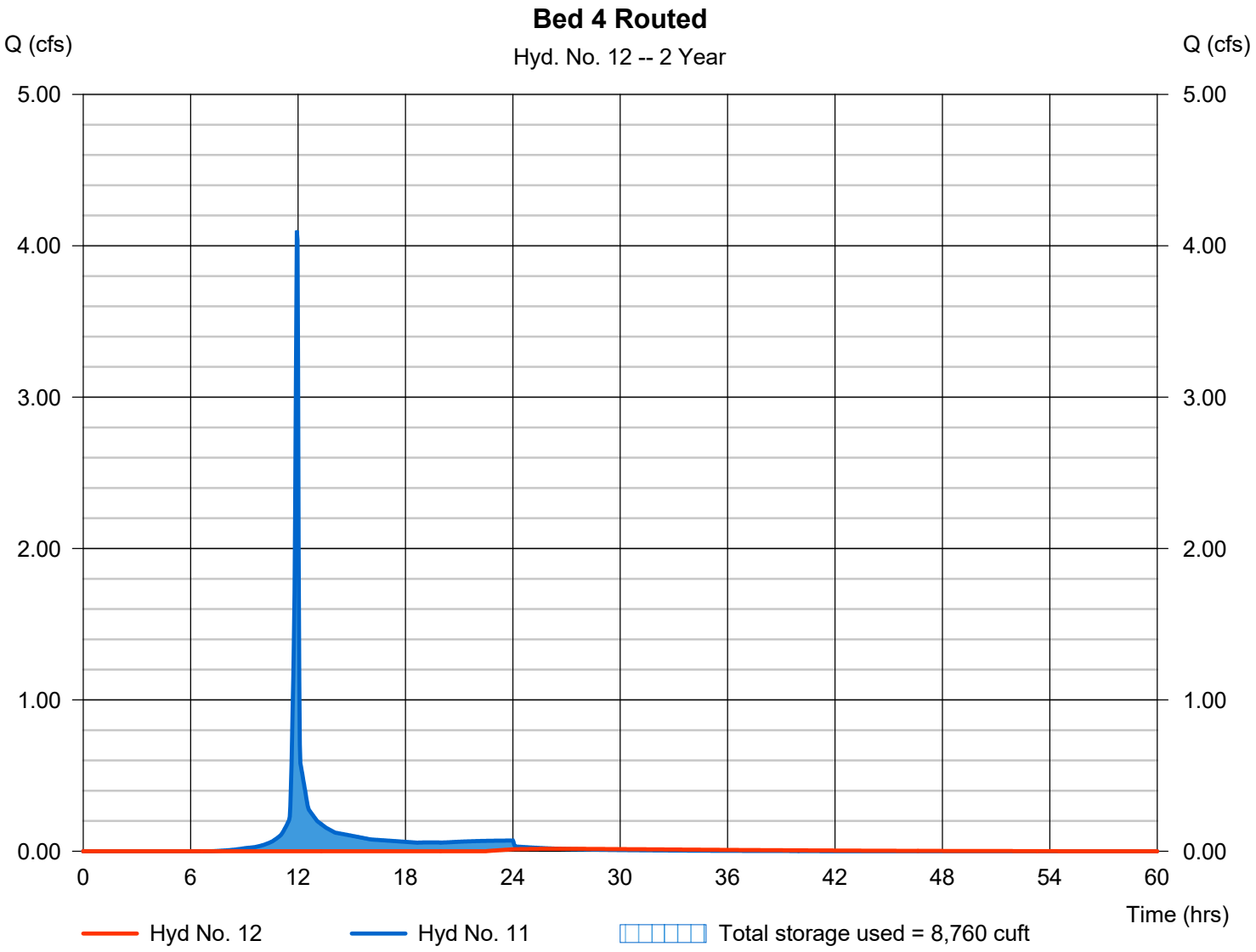
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.016 cfs
Storm frequency	= 2 yrs	Time to peak	= 26.57 hrs
Time interval	= 2 min	Hyd. volume	= 881 cuft
Inflow hyd. No.	= 11 - Total to Bed 4	Max. Elevation	= 422.11 ft
Reservoir name	= Bed 4	Max. Storage	= 8,760 cuft

Storage Indication method used.



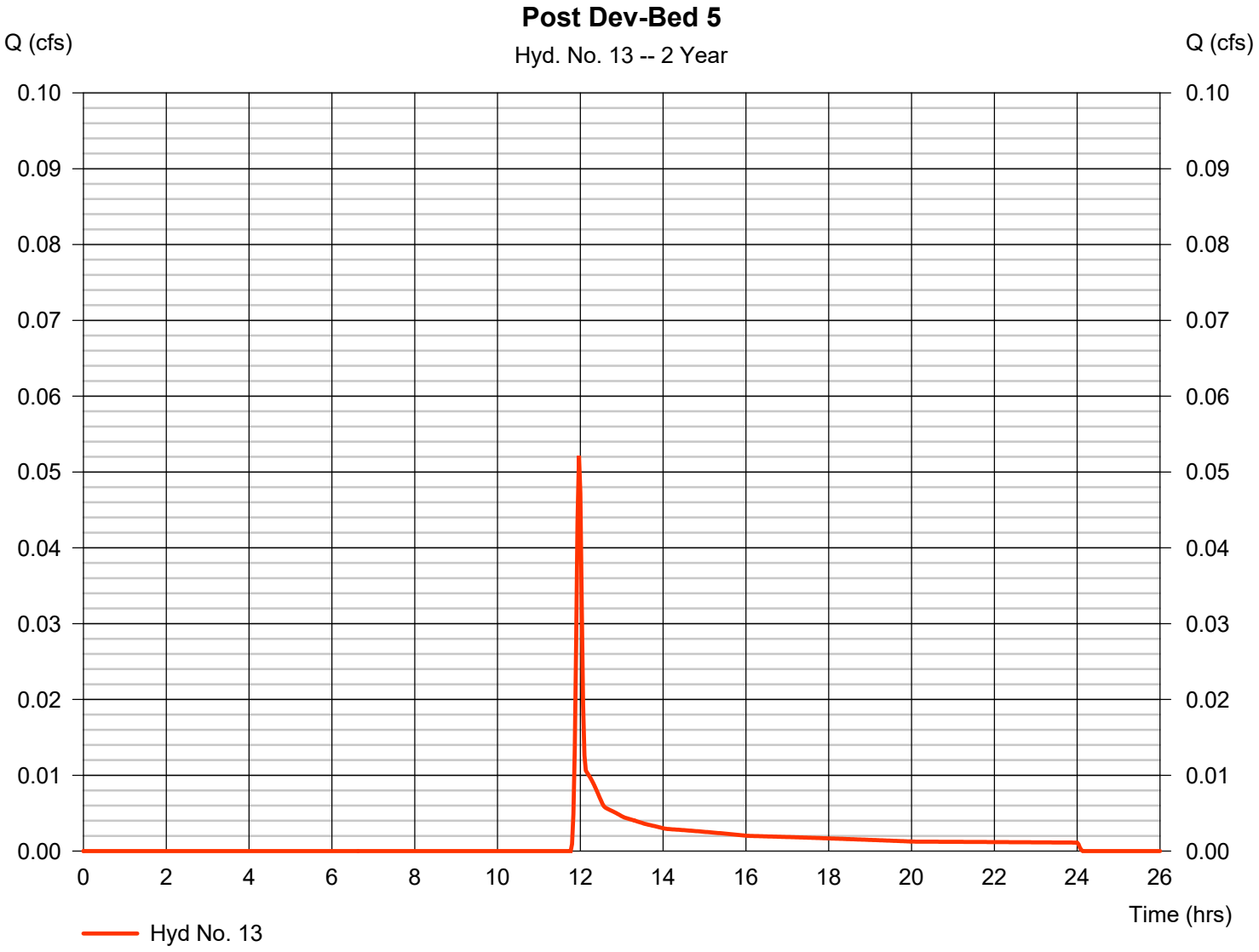
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.052 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 125 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

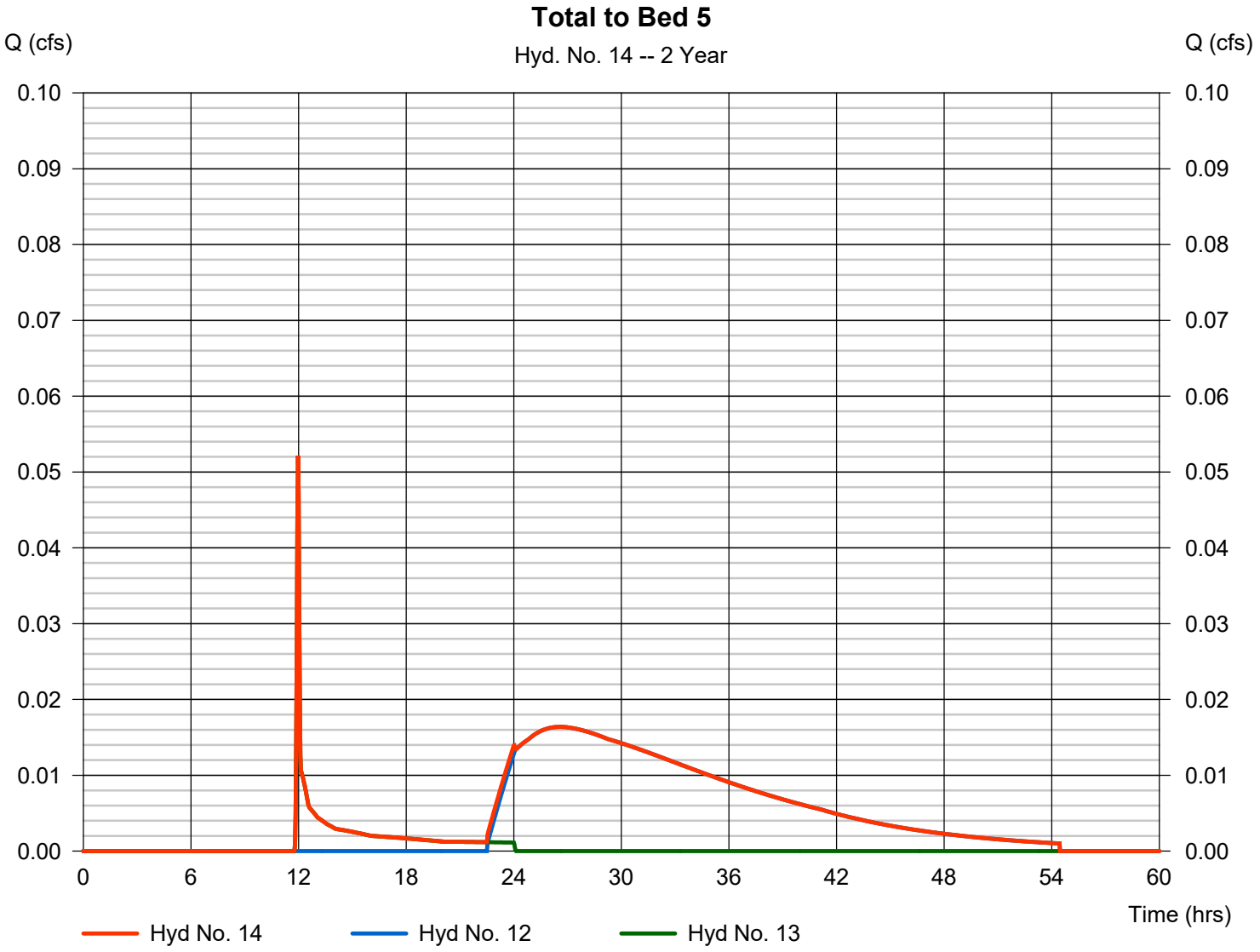


Hydrograph Report

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 0.052 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 1,007 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



Hydrograph Report

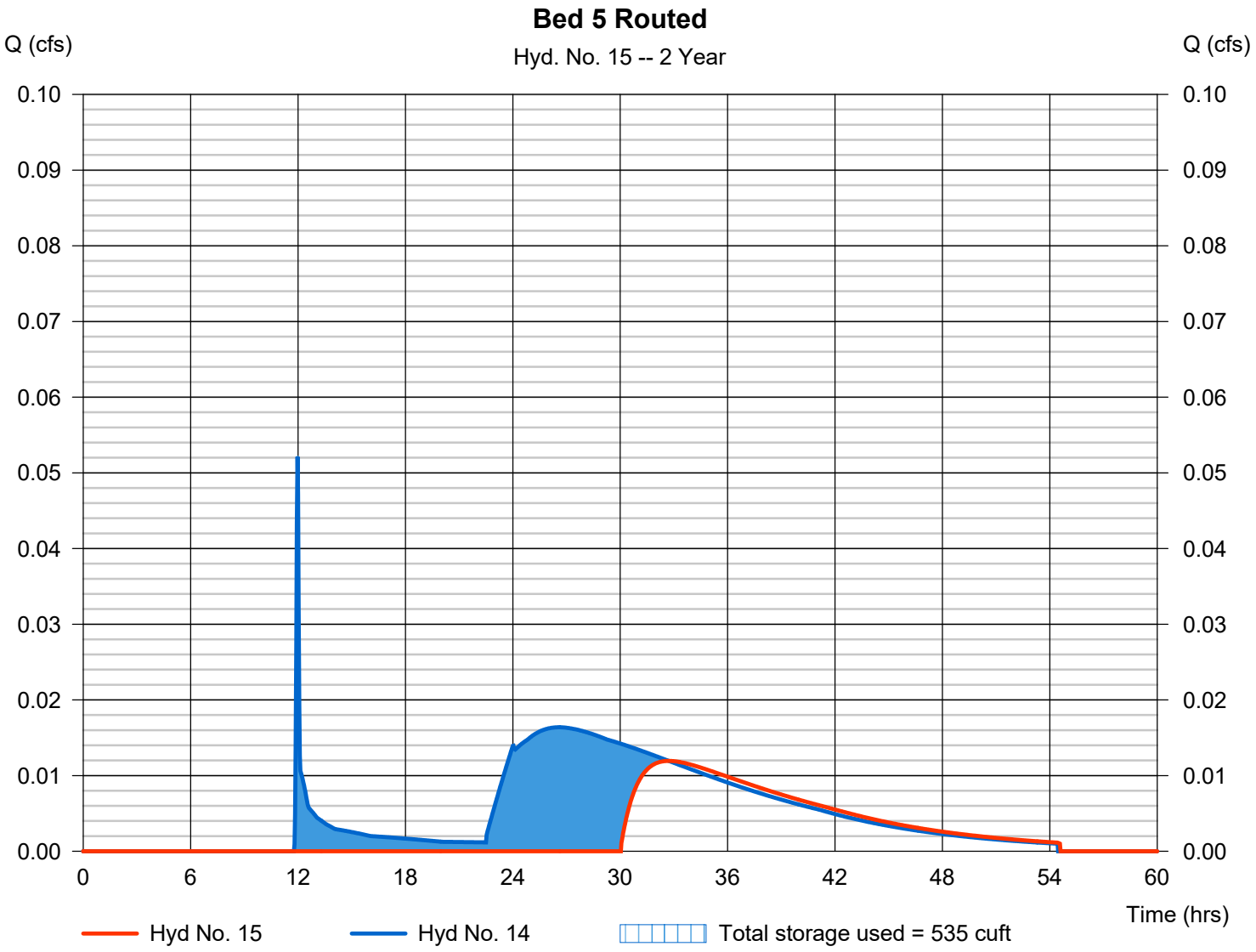
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.012 cfs
Storm frequency	= 2 yrs	Time to peak	= 32.70 hrs
Time interval	= 2 min	Hyd. volume	= 508 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 420.08 ft
Reservoir name	= Bed 5	Max. Storage	= 535 cuft

Storage Indication method used.

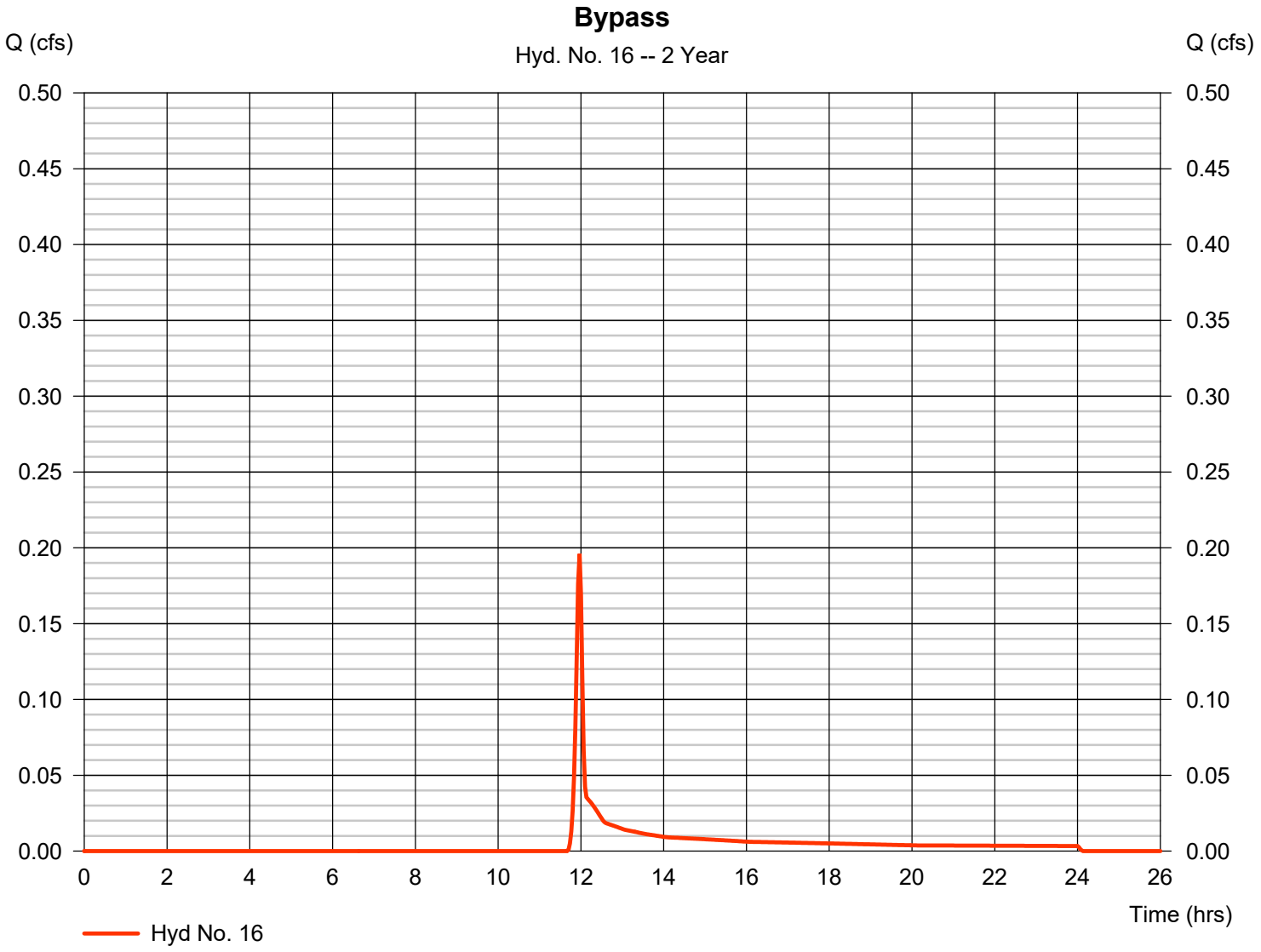


Hydrograph Report

Hyd. No. 16

Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.196 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	422 cuft
Drainage area	=	0.200 ac	Curve number	=	65
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



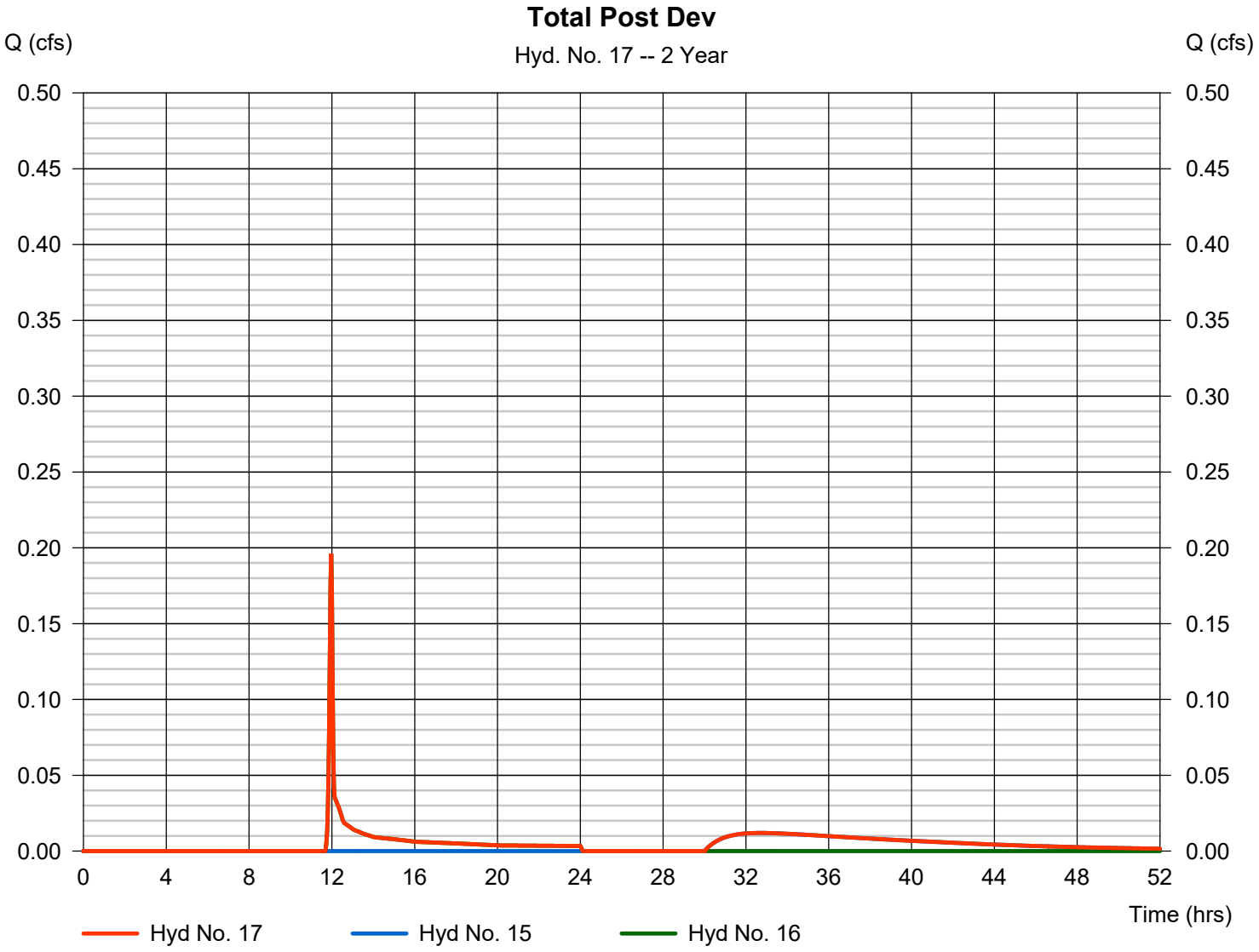
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 0.196 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 930 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	5.703	2	722	16,010	------	------	------	Pre Dev
2	SCS Runoff	5.079	2	718	10,203	------	------	------	Post Dev-Bed 1
3	Reservoir	0.000	2	n/a	0	2	439.22	10,203	Bed 1 routed
4	SCS Runoff	1.801	2	718	3,612	------	------	------	Post Dev-Bed 2
5	Combine	1.801	2	718	3,612	3, 4	------	------	Total to Bed 2
6	Reservoir	0.000	2	n/a	0	5	436.08	3,612	Bed 2 Routed
7	SCS Runoff	5.598	2	716	11,354	------	------	------	Post Dev-Bed 3
8	Combine	5.598	2	716	11,354	6, 7	------	------	Total to Bed 3
9	Reservoir	0.095	2	1034	4,330	8	433.60	8,699	Bed 3 Routed
10	SCS Runoff	5.636	2	716	11,594	------	------	------	Post Dev-Bed 4
11	Combine	5.636	2	716	15,925	9, 10	------	------	Total to Bed 4
12	Reservoir	0.092	2	1444	7,584	11	422.84	11,821	Bed 4 Routed
13	SCS Runoff	0.109	2	718	230	------	------	------	Post Dev-Bed 5
14	Combine	0.109	2	718	7,814	12, 13	------	------	Total to Bed 5
15	Reservoir	0.090	2	1532	7,316	14	420.81	896	Bed 5 Routed
16	SCS Runoff	0.356	2	718	724	------	------	------	Bypass
17	Combine	0.356	2	718	8,039	15, 16	------	------	Total Post Dev

Hydrograph Report

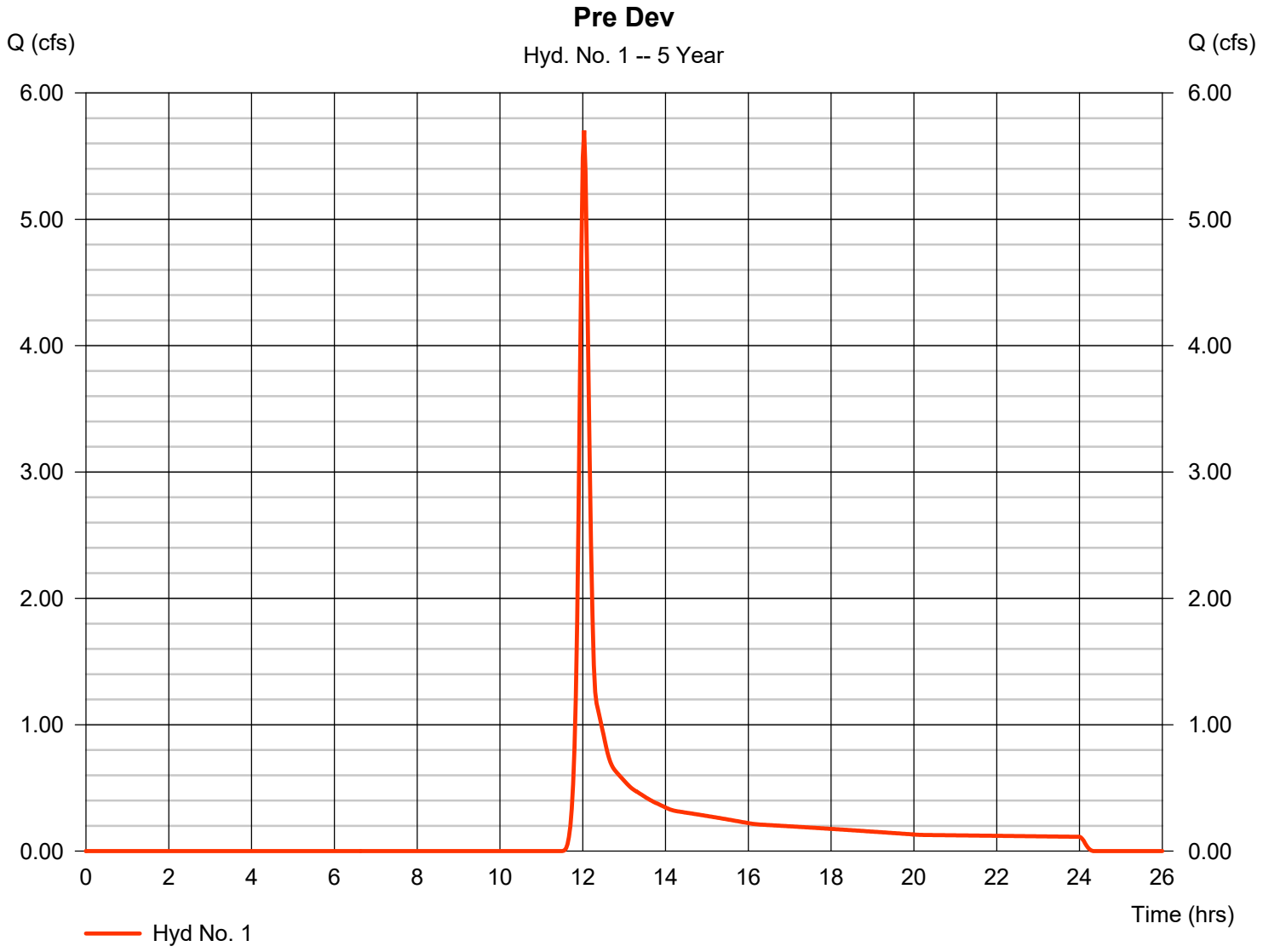
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 5.703 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 16,010 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



Hydrograph Report

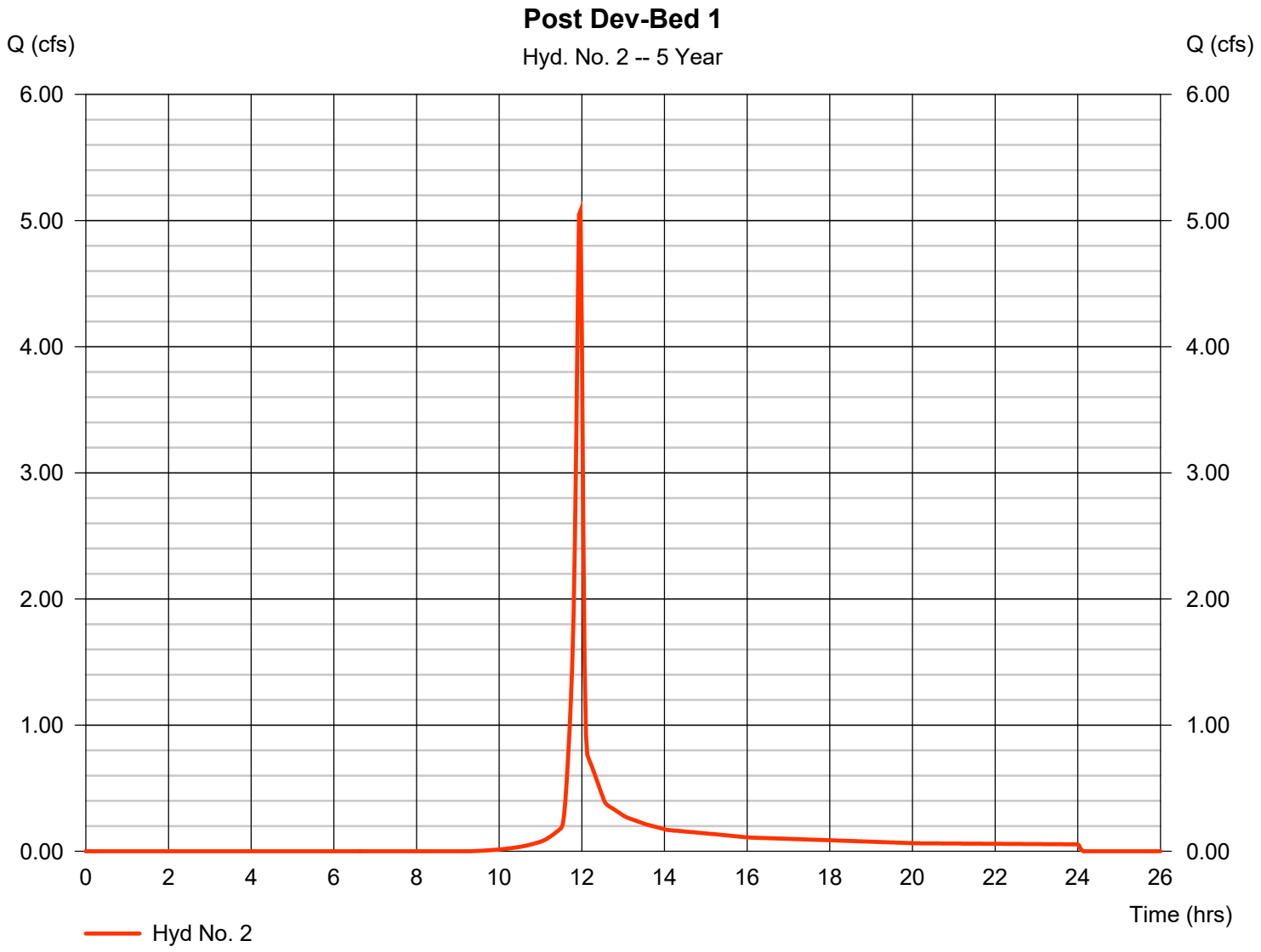
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 5.079 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 10,203 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



Hydrograph Report

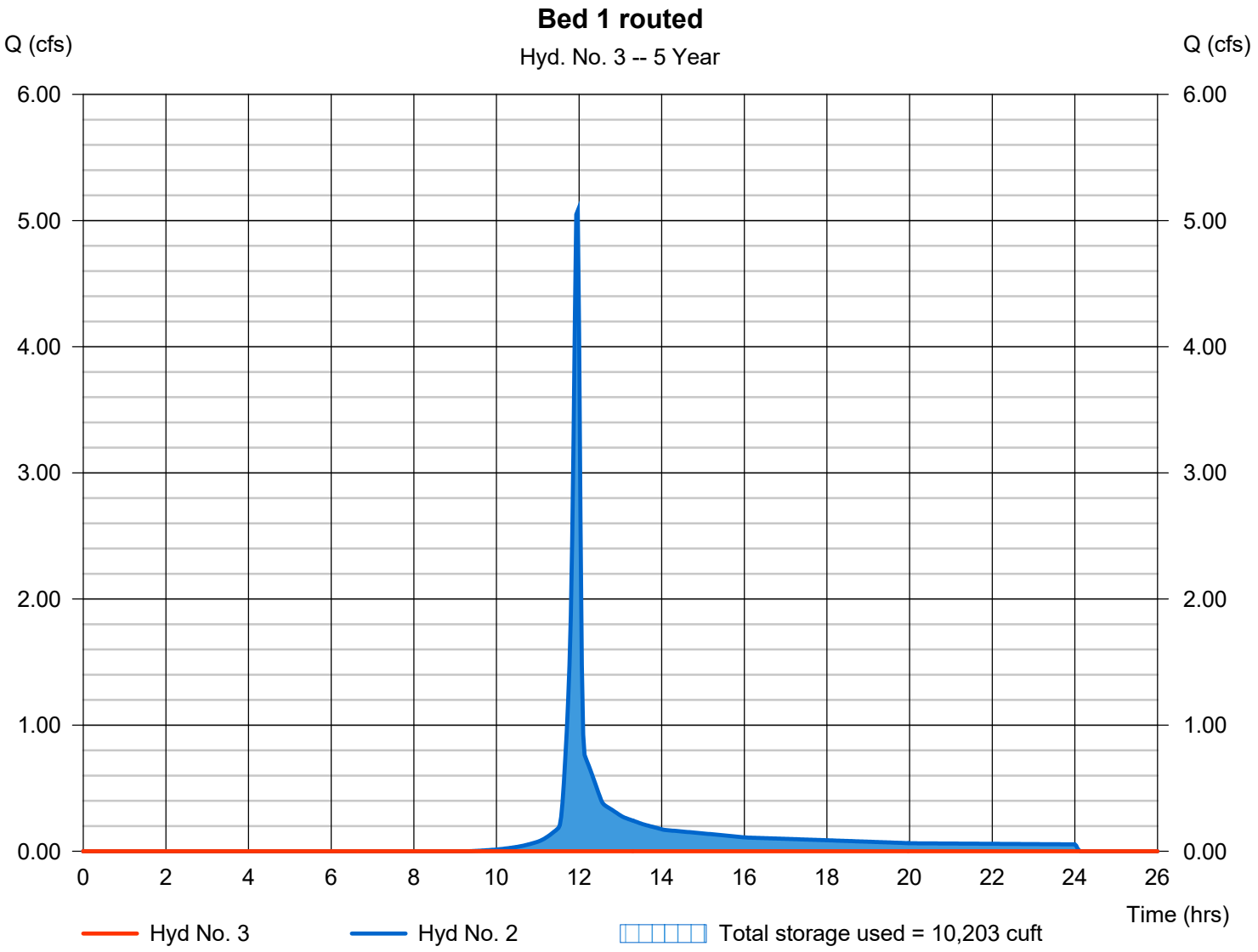
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 1 routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 5 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 2 - Post Dev-Bed 1	Max. Elevation	= 439.22 ft
Reservoir name	= Bed 1	Max. Storage	= 10,203 cuft

Storage Indication method used.



Hydrograph Report

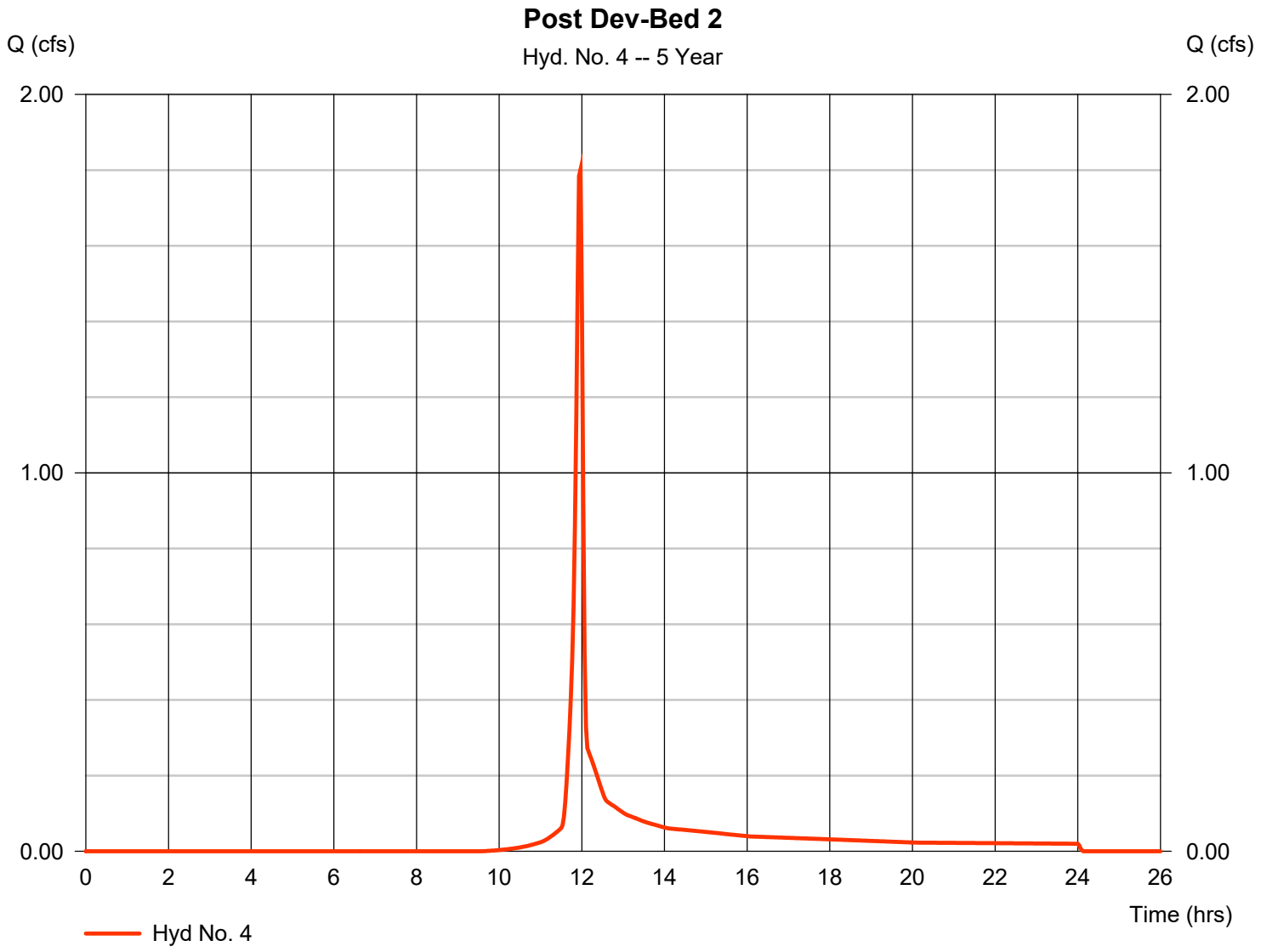
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.801 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 3,612 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620



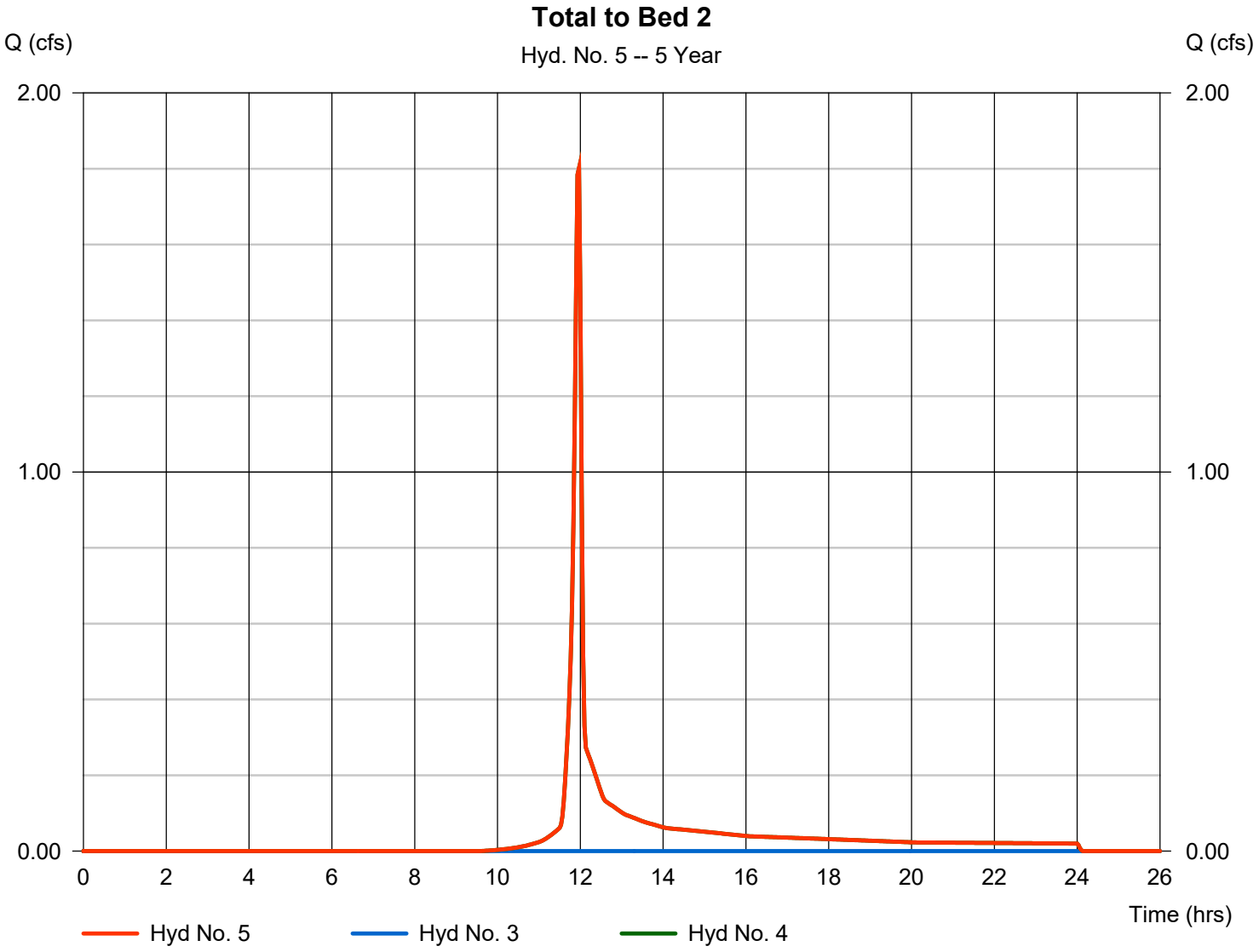
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 1.801 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 3,612 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



Hydrograph Report

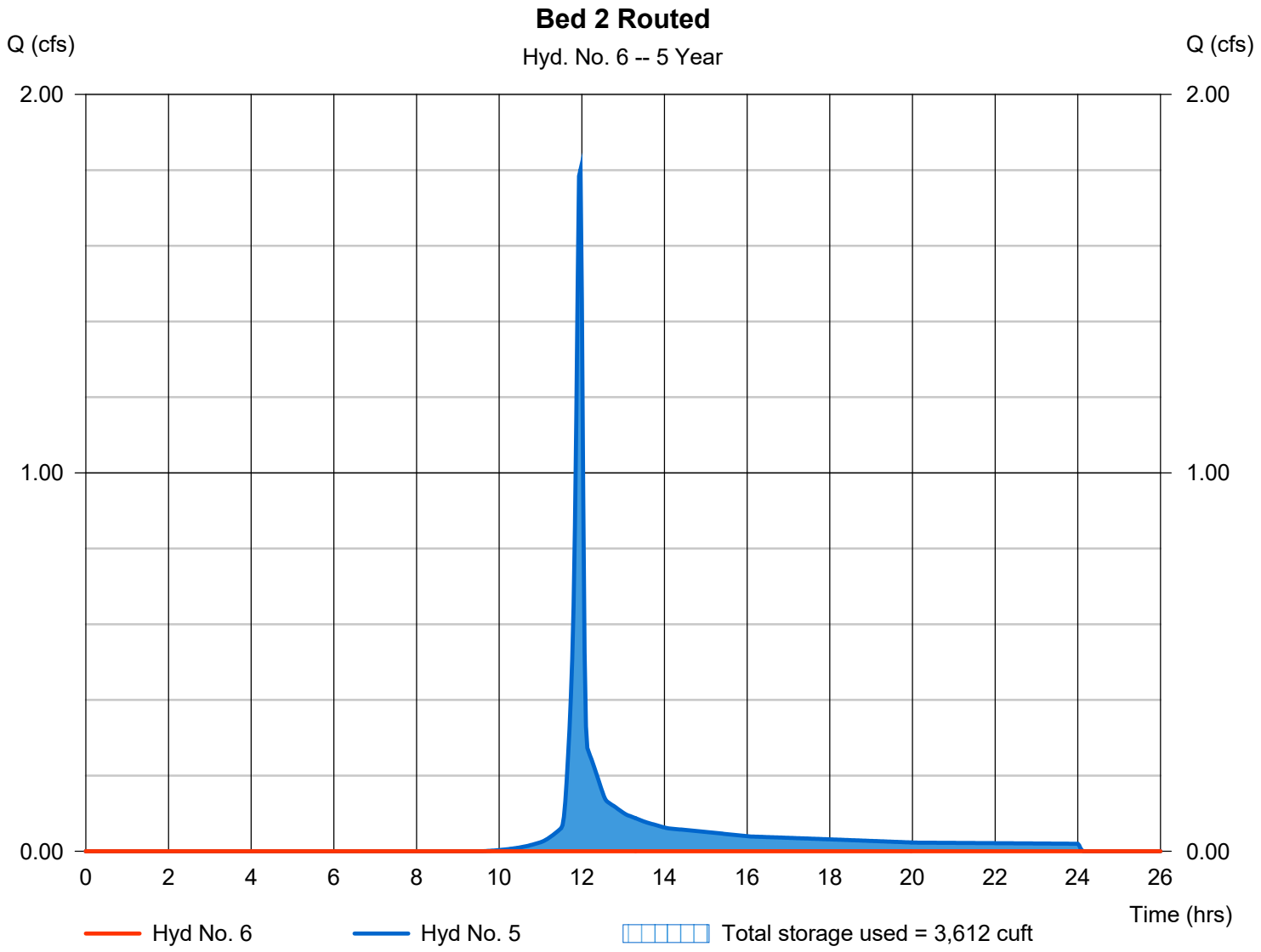
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 6

Bed 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	5 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	5 - Total to Bed 2	Max. Elevation	=	436.08 ft
Reservoir name	=	Bed 2	Max. Storage	=	3,612 cuft

Storage Indication method used.



Hydrograph Report

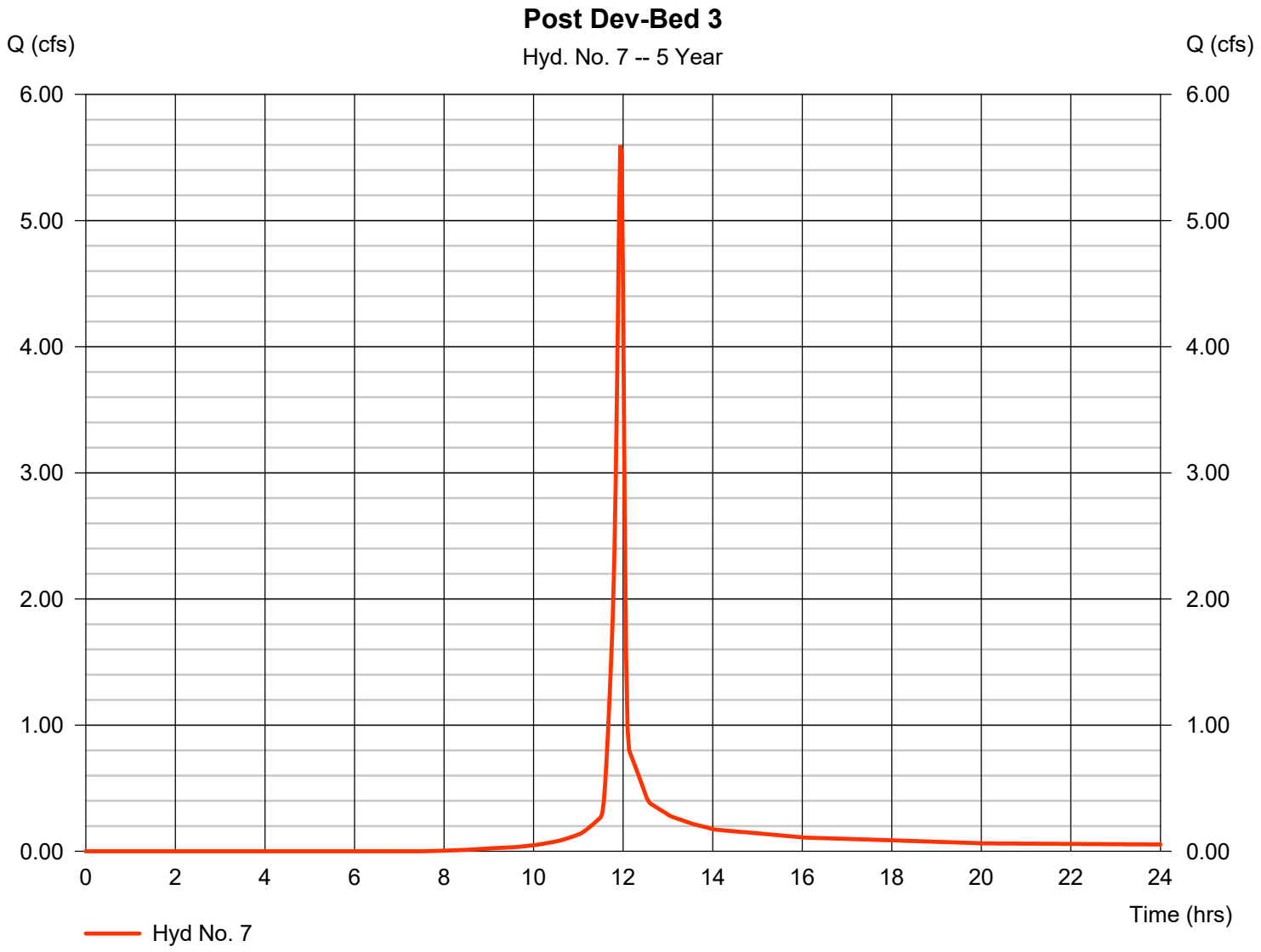
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.598 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 11,354 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480

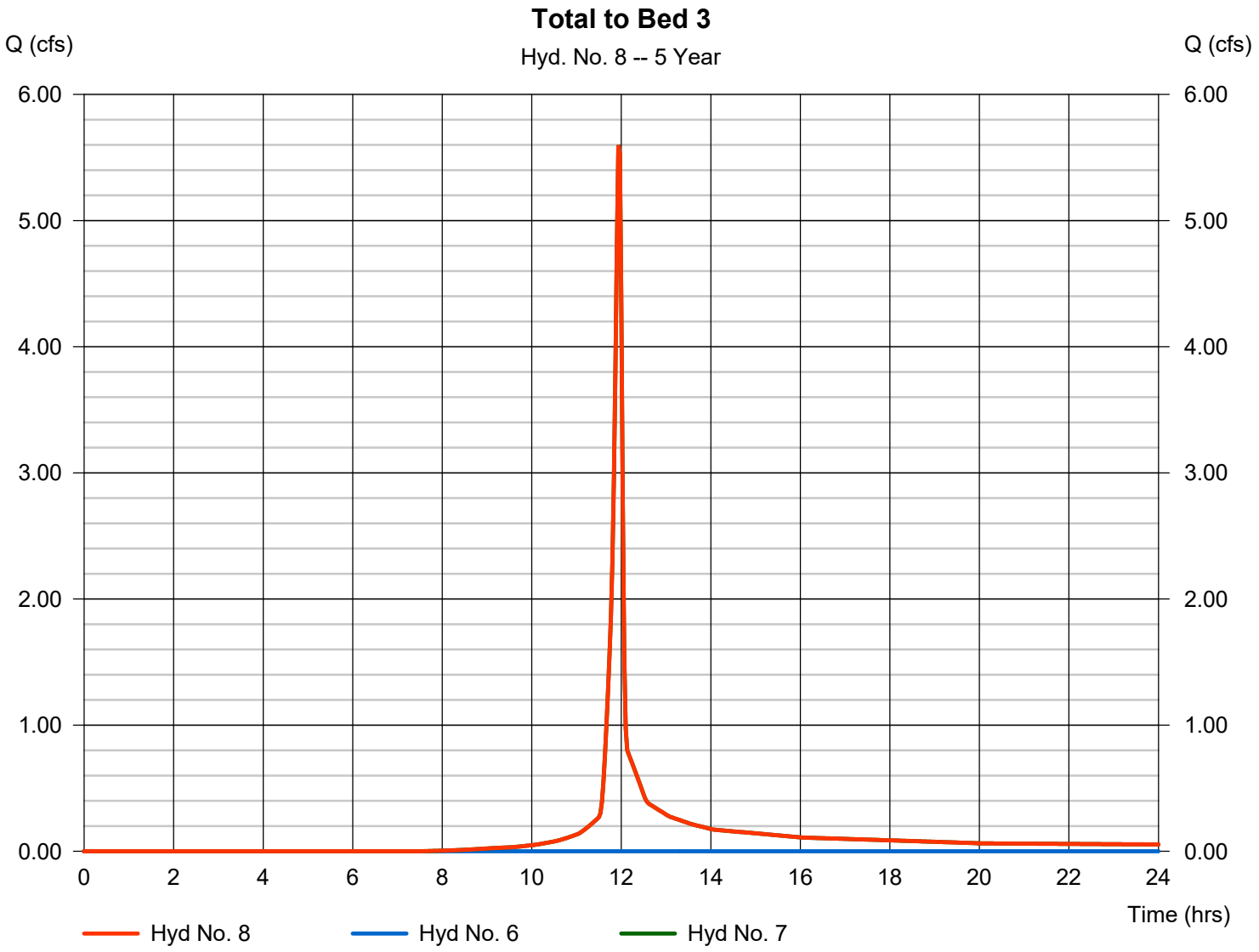


Hydrograph Report

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 5.598 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 11,354 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



Hydrograph Report

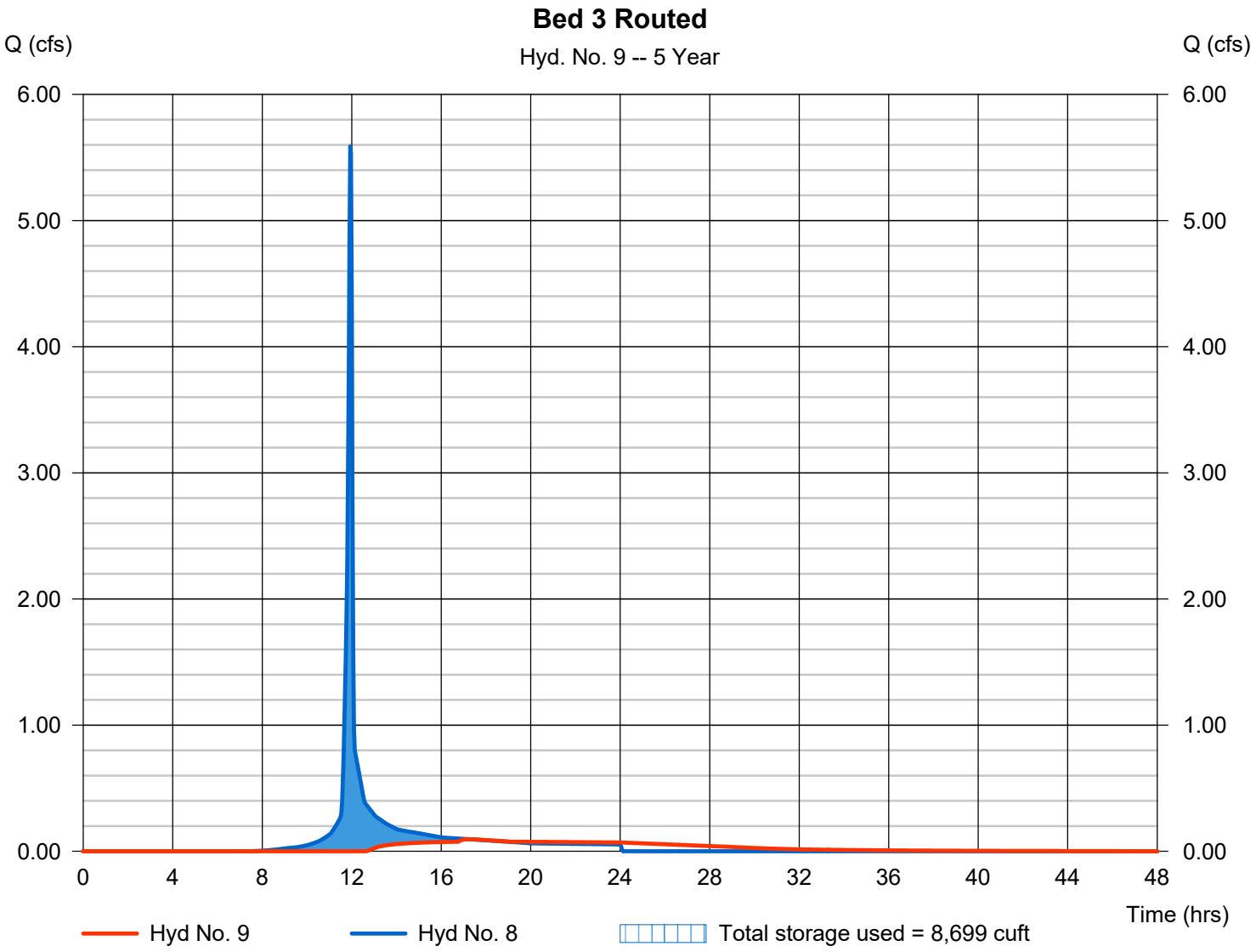
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 9

Bed 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.095 cfs
Storm frequency	=	5 yrs	Time to peak	=	17.23 hrs
Time interval	=	2 min	Hyd. volume	=	4,330 cuft
Inflow hyd. No.	=	8 - Total to Bed 3	Max. Elevation	=	433.60 ft
Reservoir name	=	Bed 3	Max. Storage	=	8,699 cuft

Storage Indication method used.



Hydrograph Report

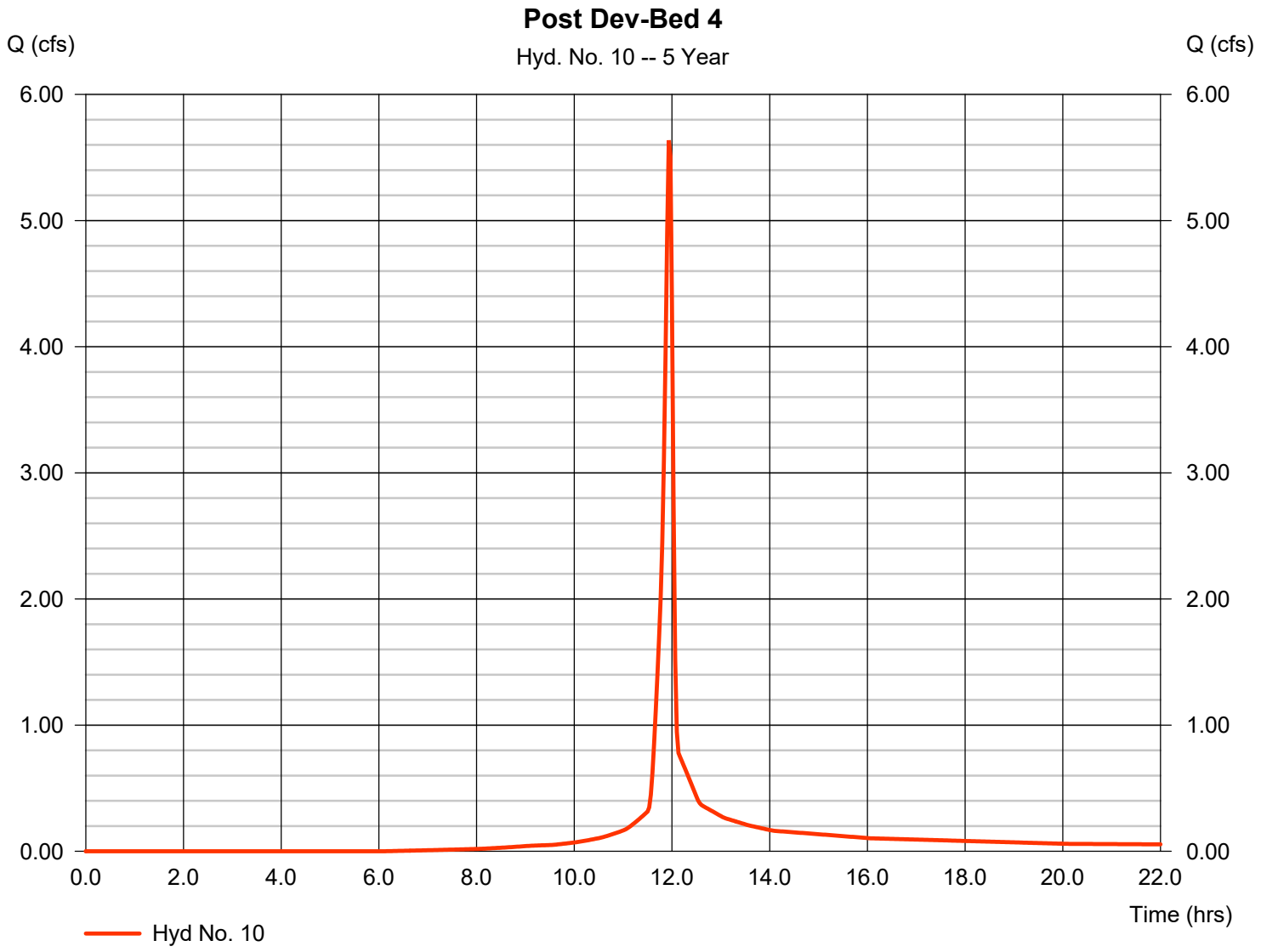
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 5.636 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 11,594 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310

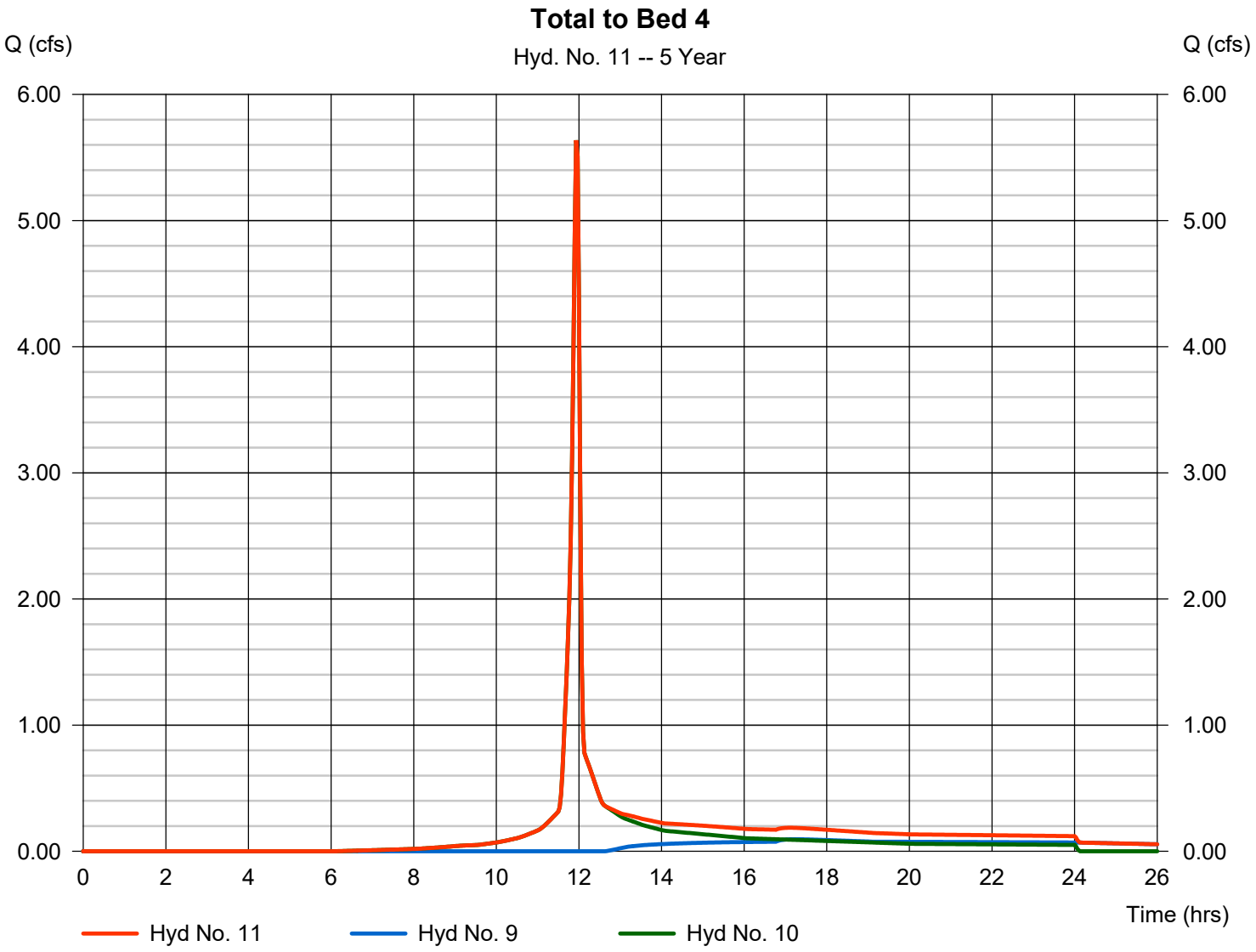


Hydrograph Report

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 5.636 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 15,925 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

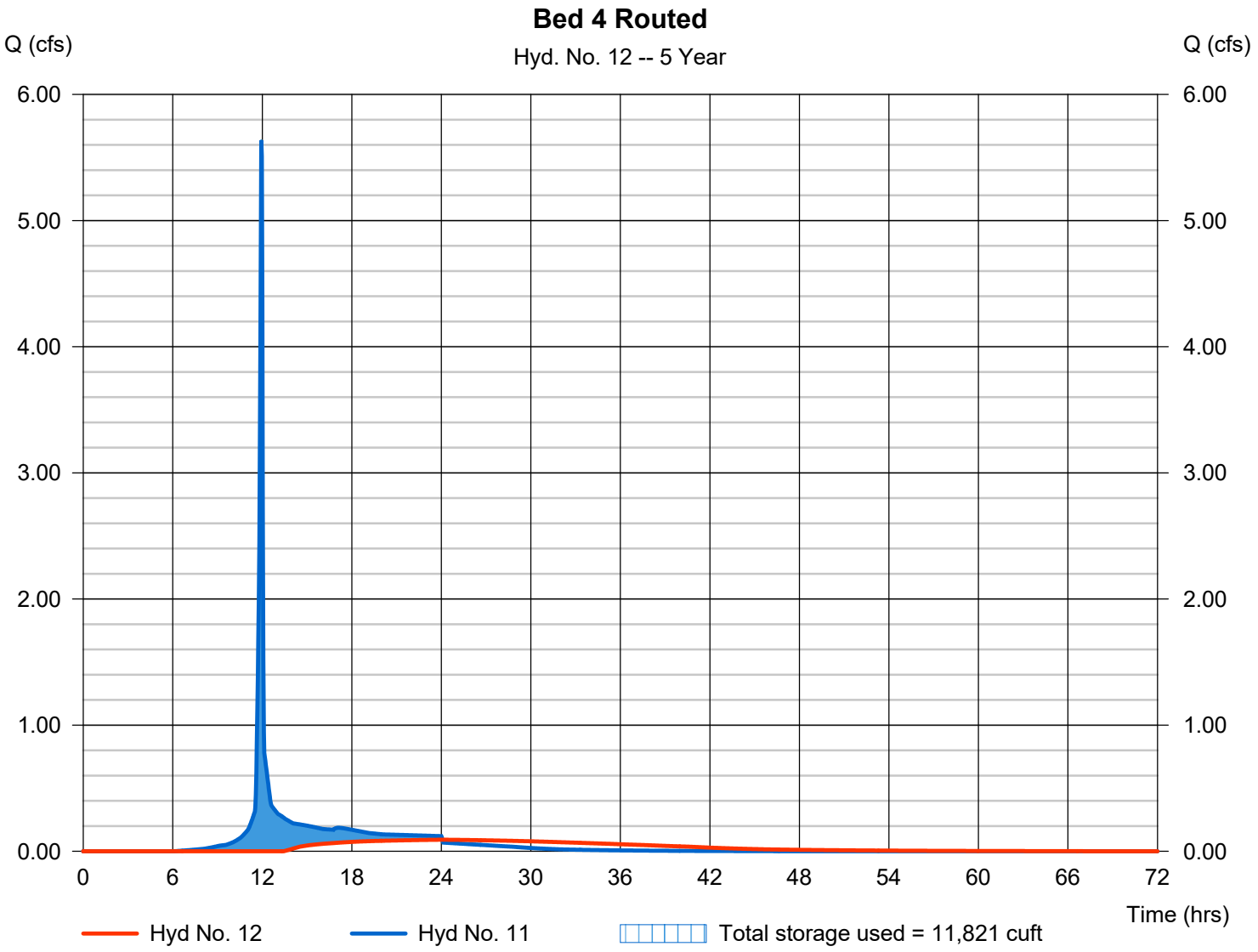
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.092 cfs
Storm frequency	= 5 yrs	Time to peak	= 24.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,584 cuft
Inflow hyd. No.	= 11 - Total to Bed 4	Max. Elevation	= 422.84 ft
Reservoir name	= Bed 4	Max. Storage	= 11,821 cuft

Storage Indication method used.



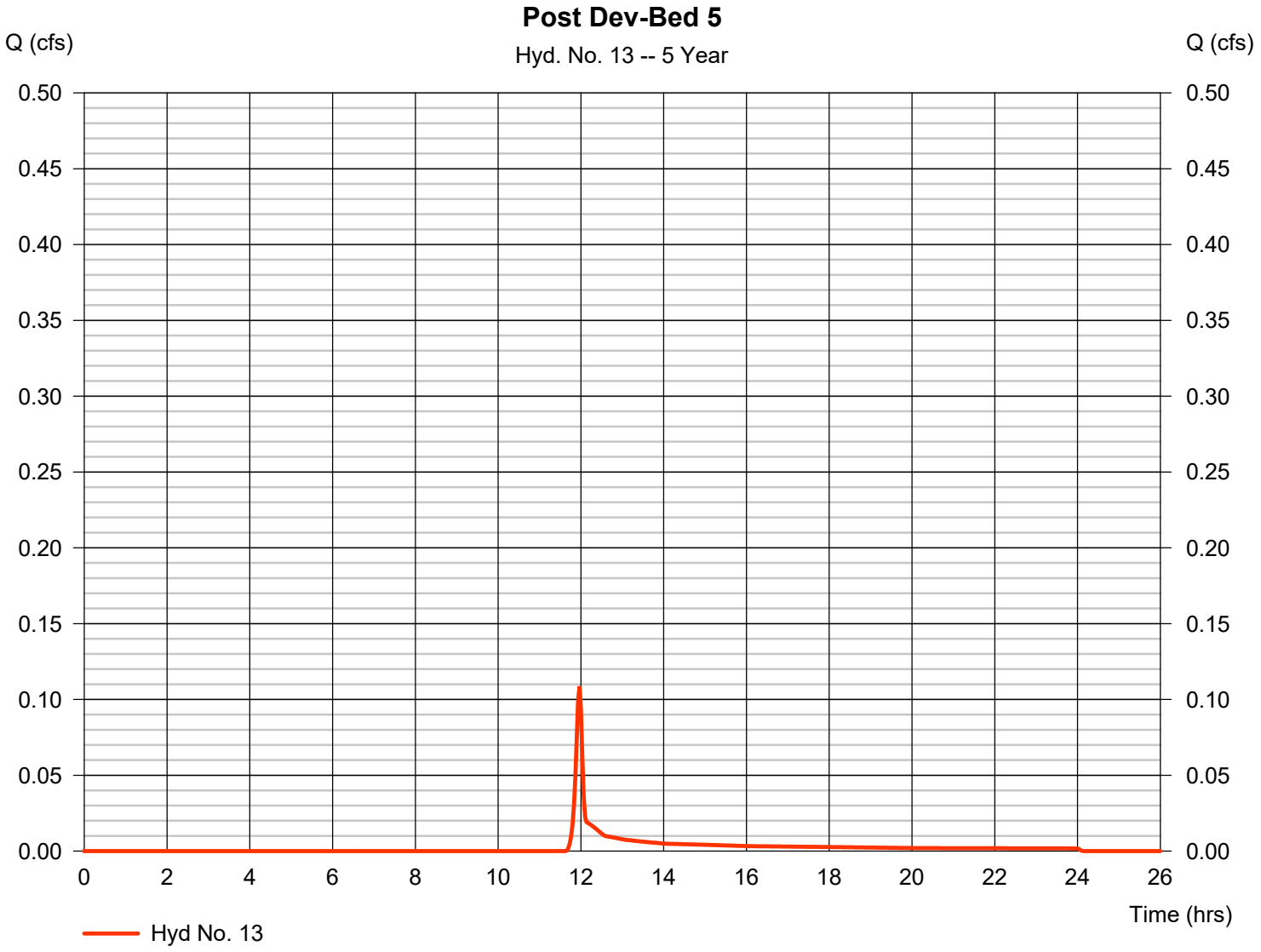
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.109 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 230 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



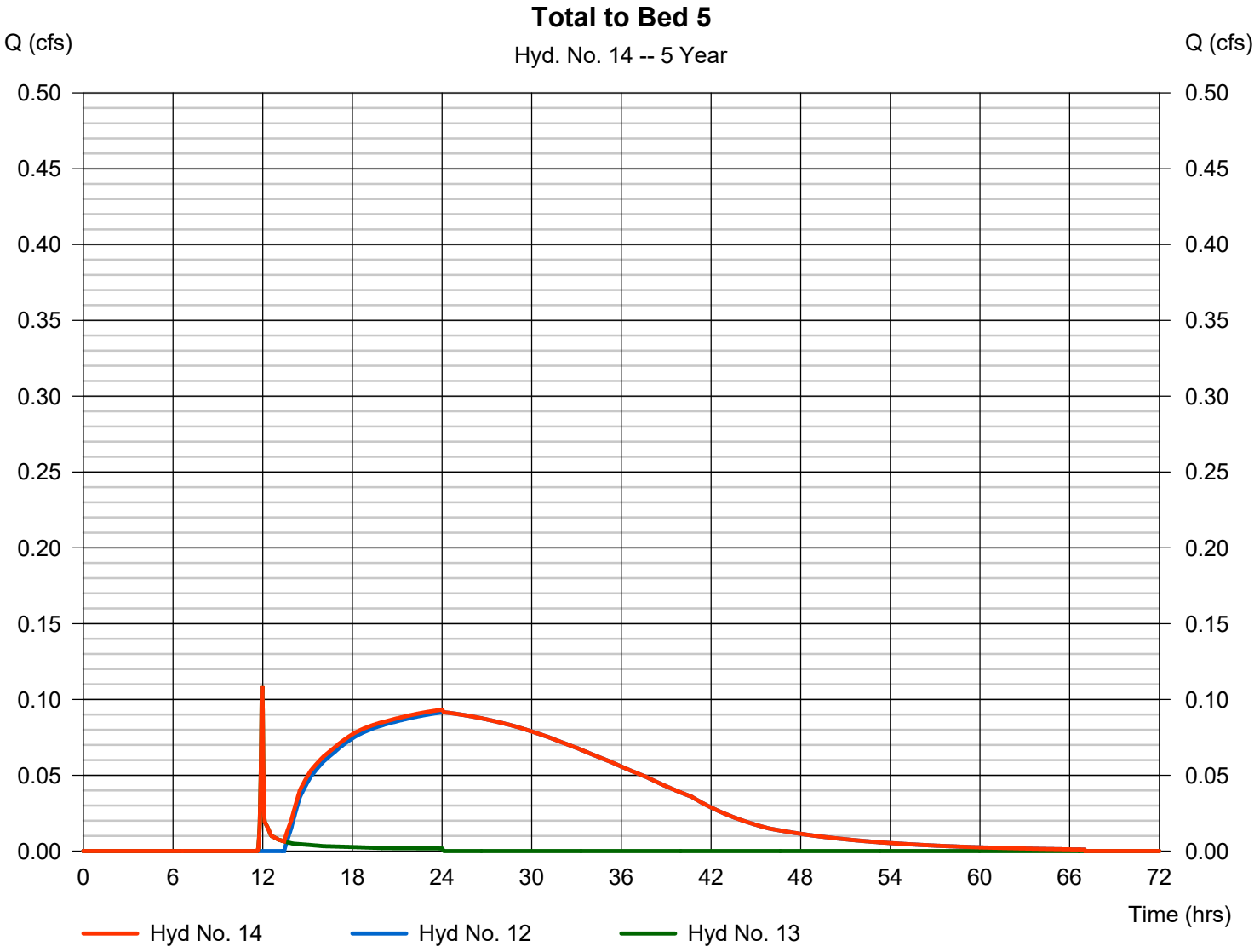
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 0.109 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 7,814 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



Hydrograph Report

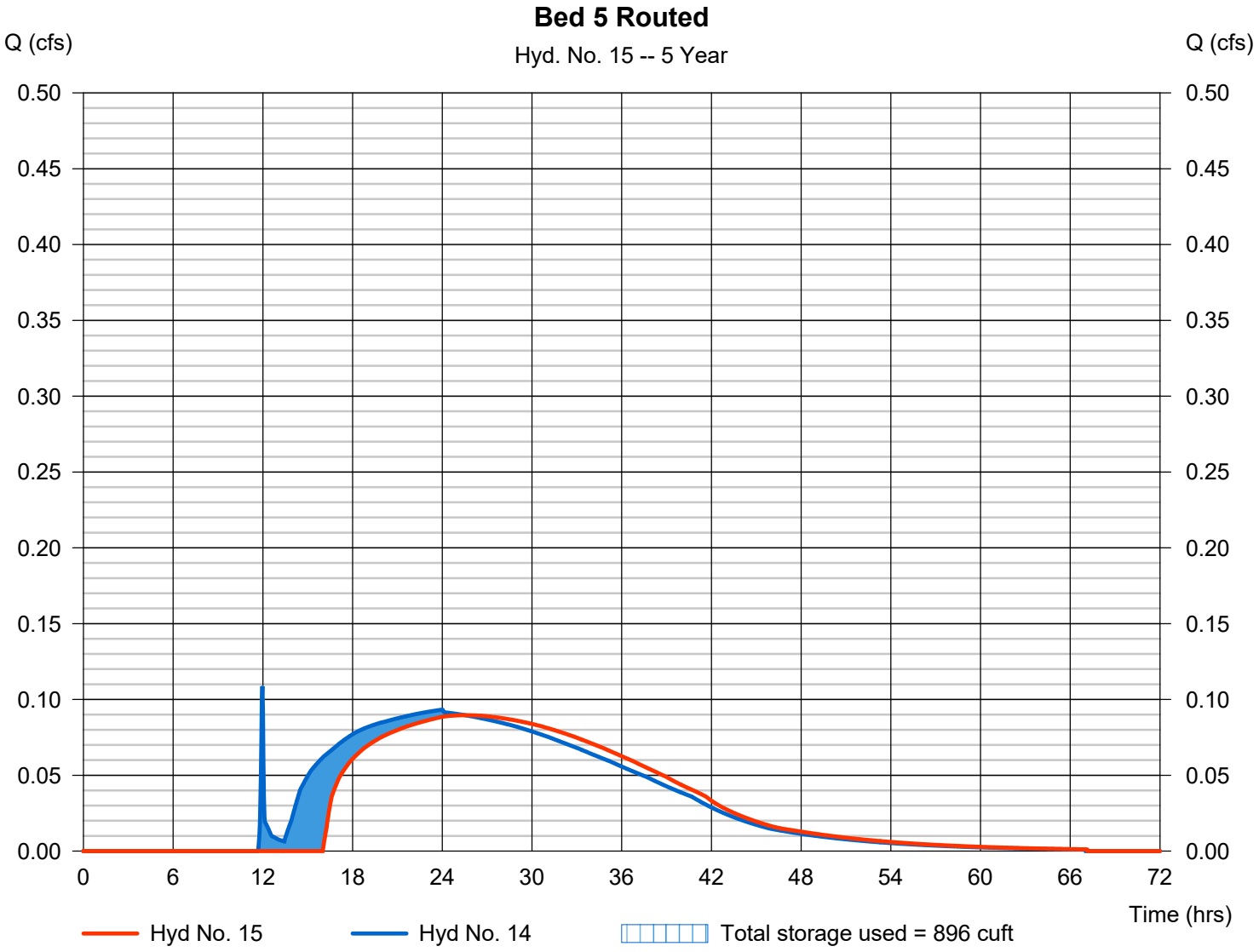
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.090 cfs
Storm frequency	= 5 yrs	Time to peak	= 25.53 hrs
Time interval	= 2 min	Hyd. volume	= 7,316 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 420.81 ft
Reservoir name	= Bed 5	Max. Storage	= 896 cuft

Storage Indication method used.



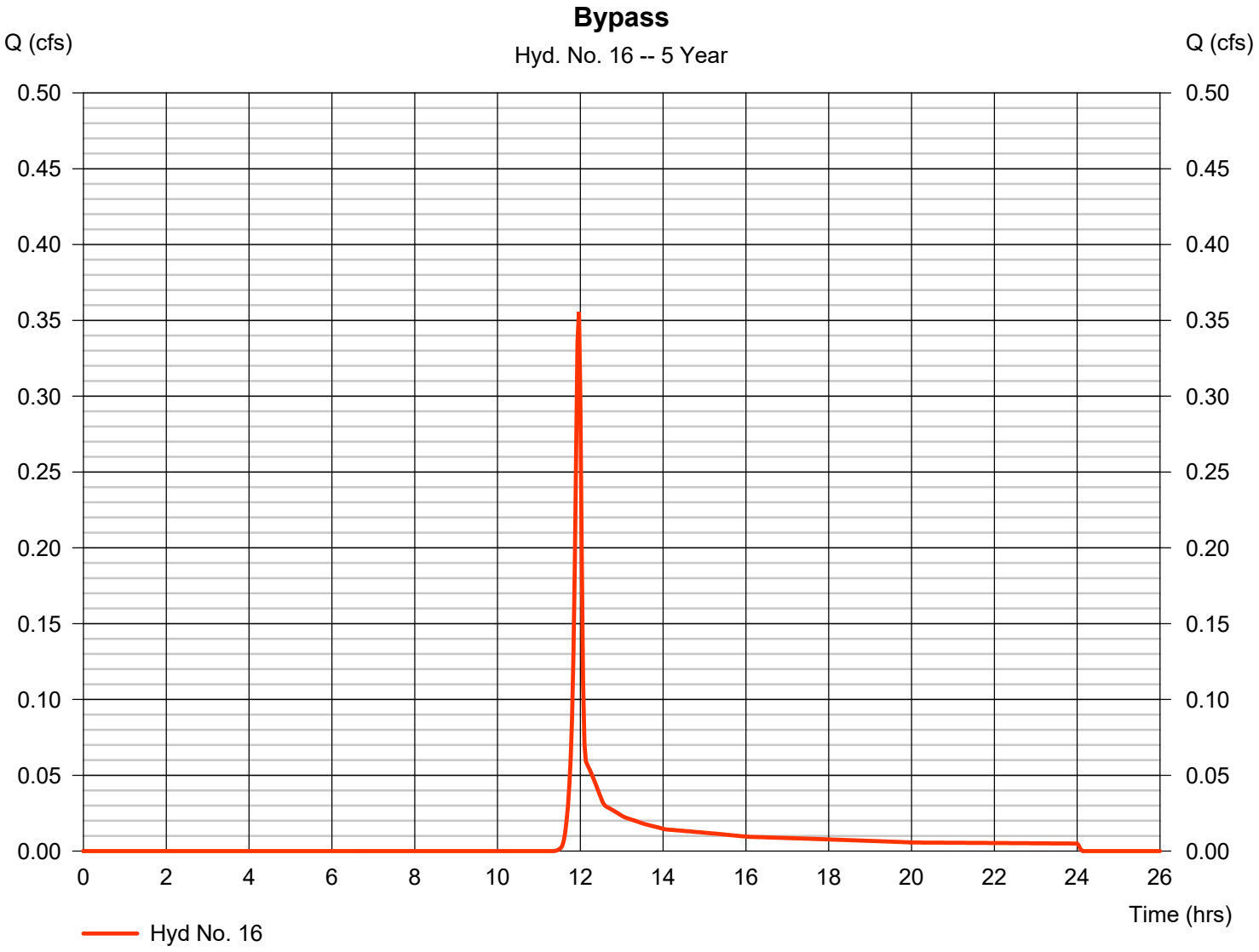
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 16

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.356 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 724 cuft
Drainage area	= 0.200 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



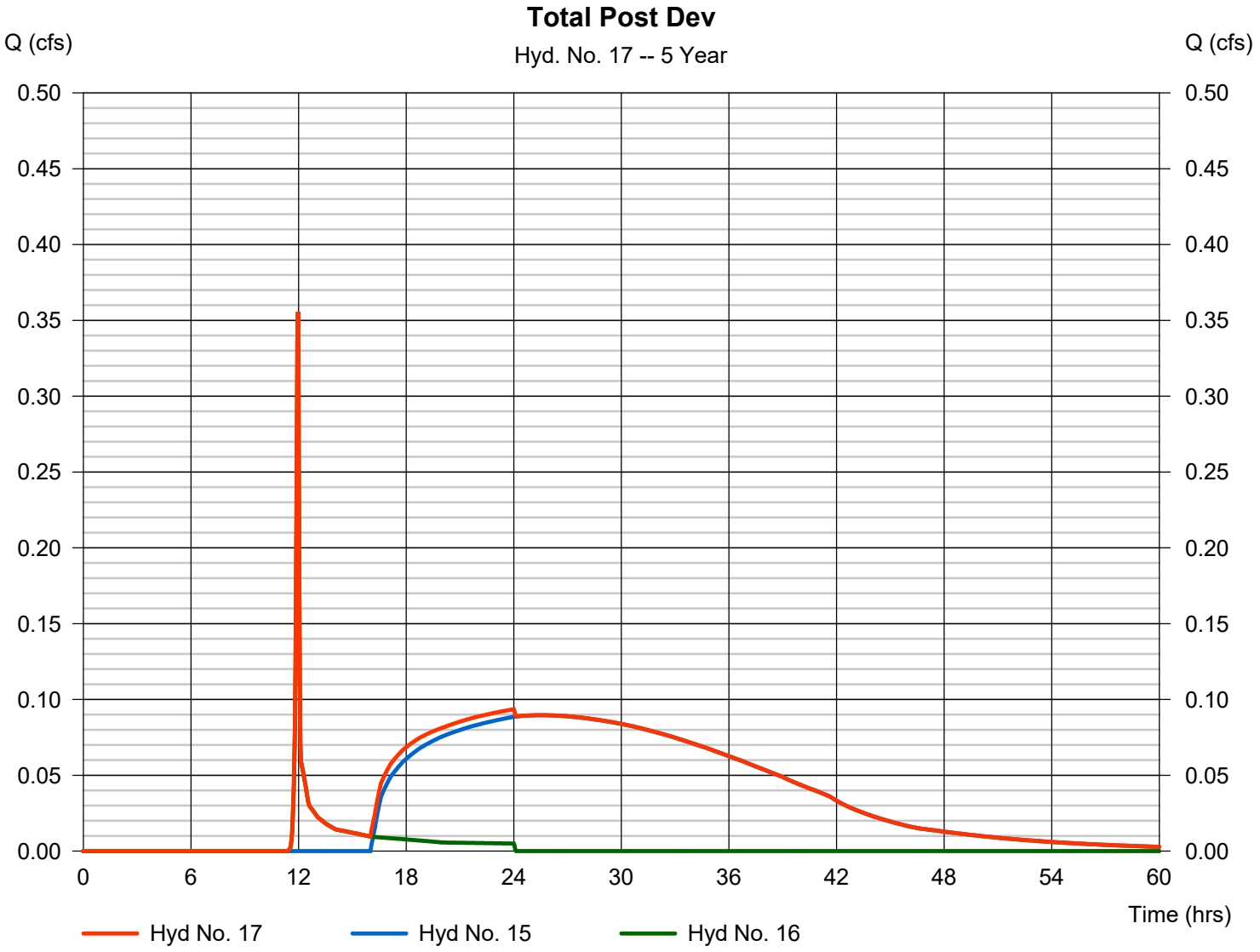
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 0.356 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 8,039 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	8.360	2	722	22,601	------	------	------	Pre Dev
2	SCS Runoff	6.600	2	716	13,327	------	------	------	Post Dev-Bed 1
3	Reservoir	0.000	2	n/a	0	2	439.90	13,327	Bed 1 routed
4	SCS Runoff	2.350	2	718	4,743	------	------	------	Post Dev-Bed 2
5	Combine	2.350	2	718	4,743	3, 4	------	------	Total to Bed 2
6	Reservoir	0.000	2	n/a	0	5	436.42	4,743	Bed 2 Routed
7	SCS Runoff	7.048	2	716	14,387	------	------	------	Post Dev-Bed 3
8	Combine	7.048	2	716	14,387	6, 7	------	------	Total to Bed 3
9	Reservoir	0.391	2	772	7,363	8	433.67	8,893	Bed 3 Routed
10	SCS Runoff	6.940	2	716	14,419	------	------	------	Post Dev-Bed 4
11	Combine	6.940	2	716	21,782	9, 10	------	------	Total to Bed 4
12	Reservoir	0.375	2	874	13,442	11	422.97	12,325	Bed 4 Routed
13	SCS Runoff	0.163	2	718	333	------	------	------	Post Dev-Bed 5
14	Combine	0.381	2	874	13,774	12, 13	------	------	Total to Bed 5
15	Reservoir	0.381	2	876	13,276	14	421.07	1,023	Bed 5 Routed
16	SCS Runoff	0.505	2	718	1,014	------	------	------	Bypass
17	Combine	0.505	2	718	14,290	15, 16	------	------	Total Post Dev

Hydrograph Report

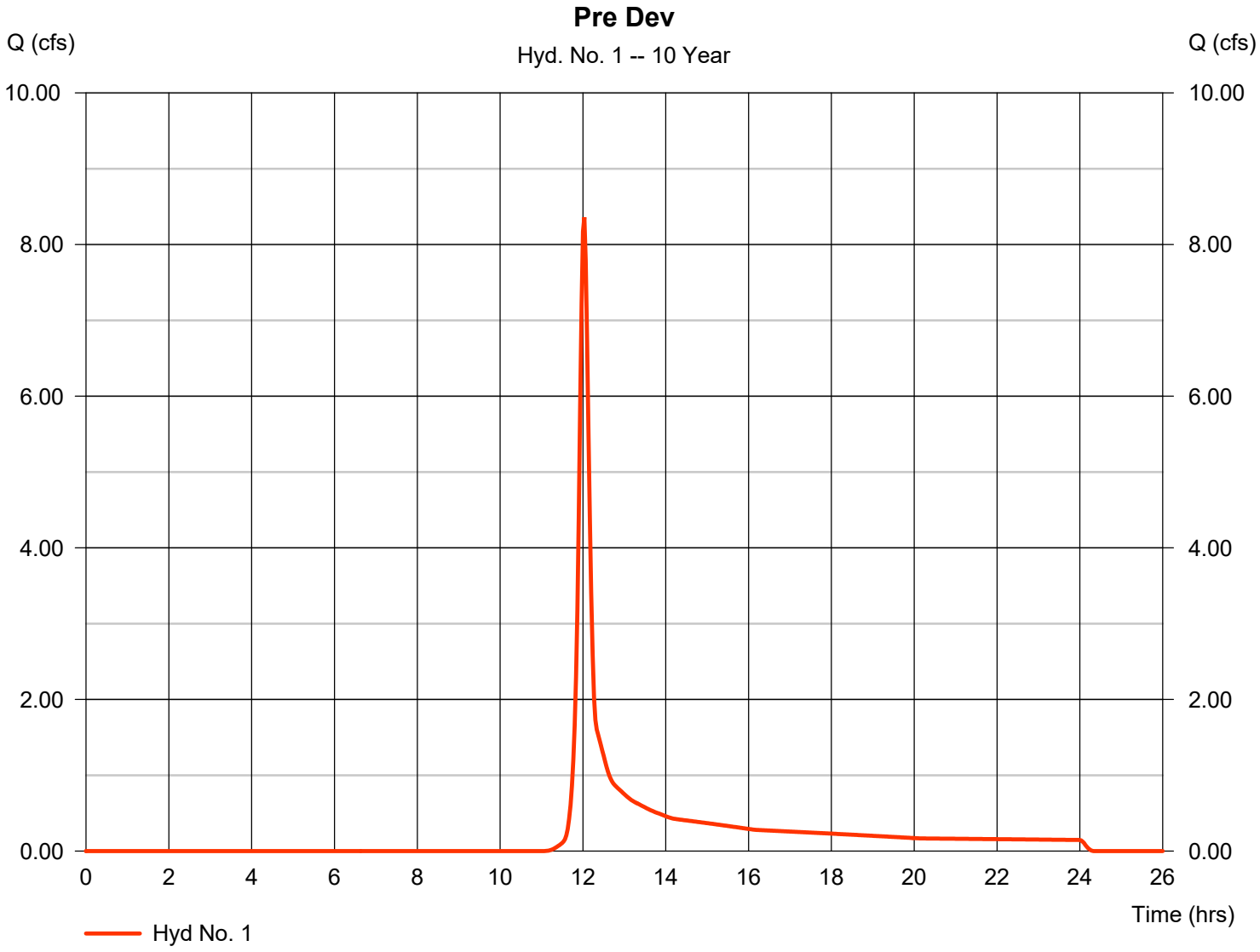
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 8.360 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 22,601 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



Hydrograph Report

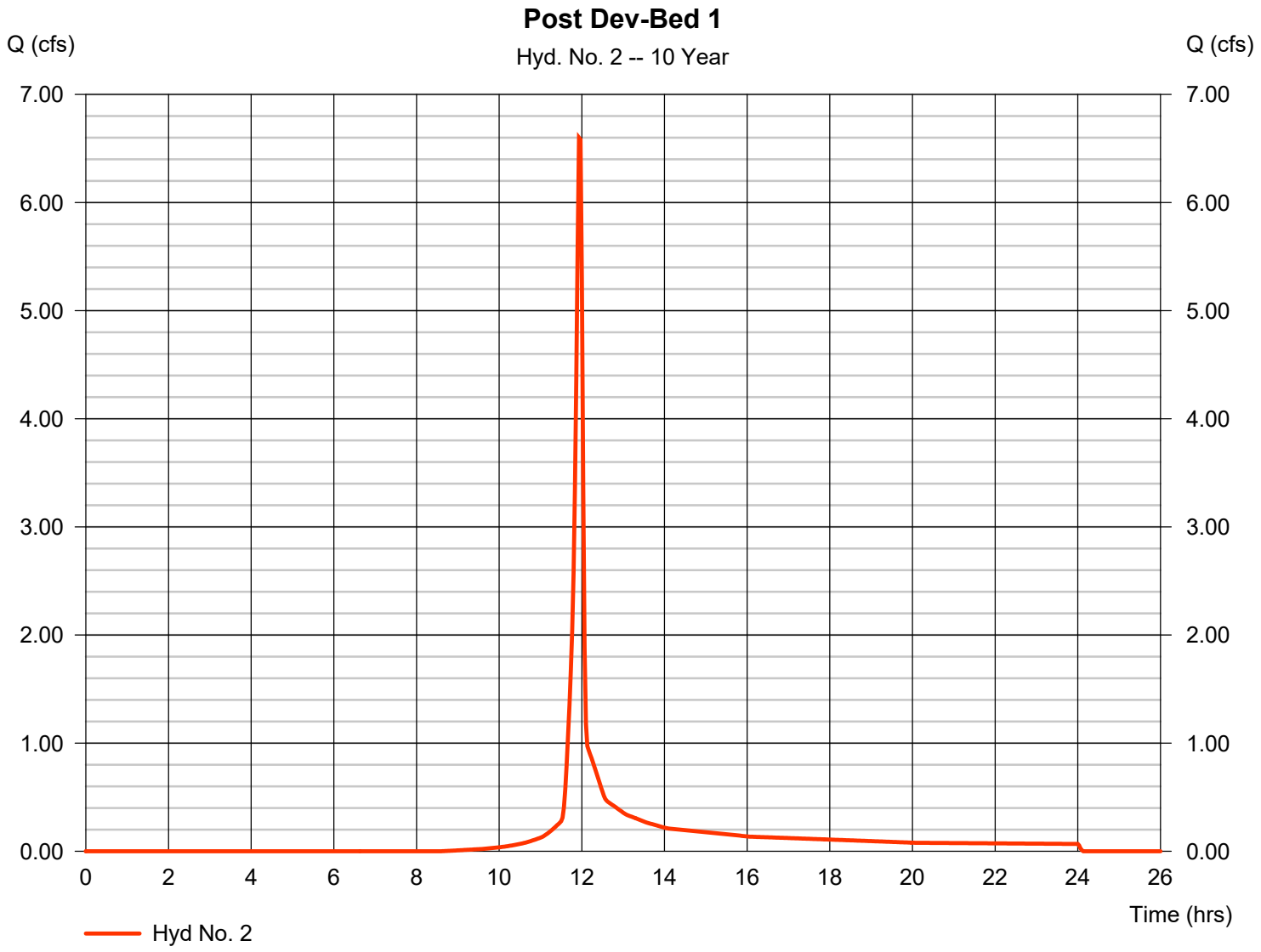
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 6.600 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 13,327 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



Hydrograph Report

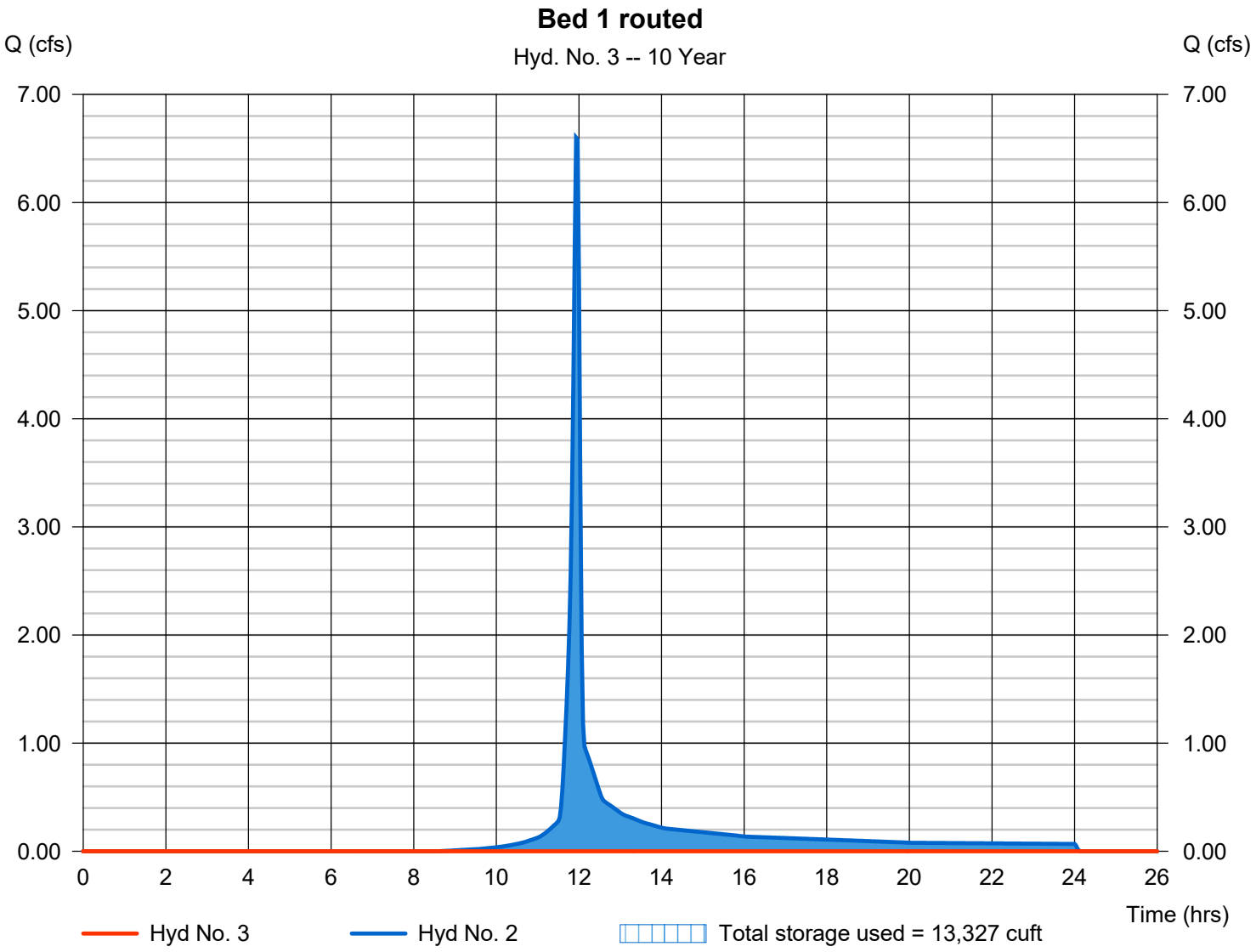
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 1 routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 2 - Post Dev-Bed 1	Max. Elevation	= 439.90 ft
Reservoir name	= Bed 1	Max. Storage	= 13,327 cuft

Storage Indication method used.



Hydrograph Report

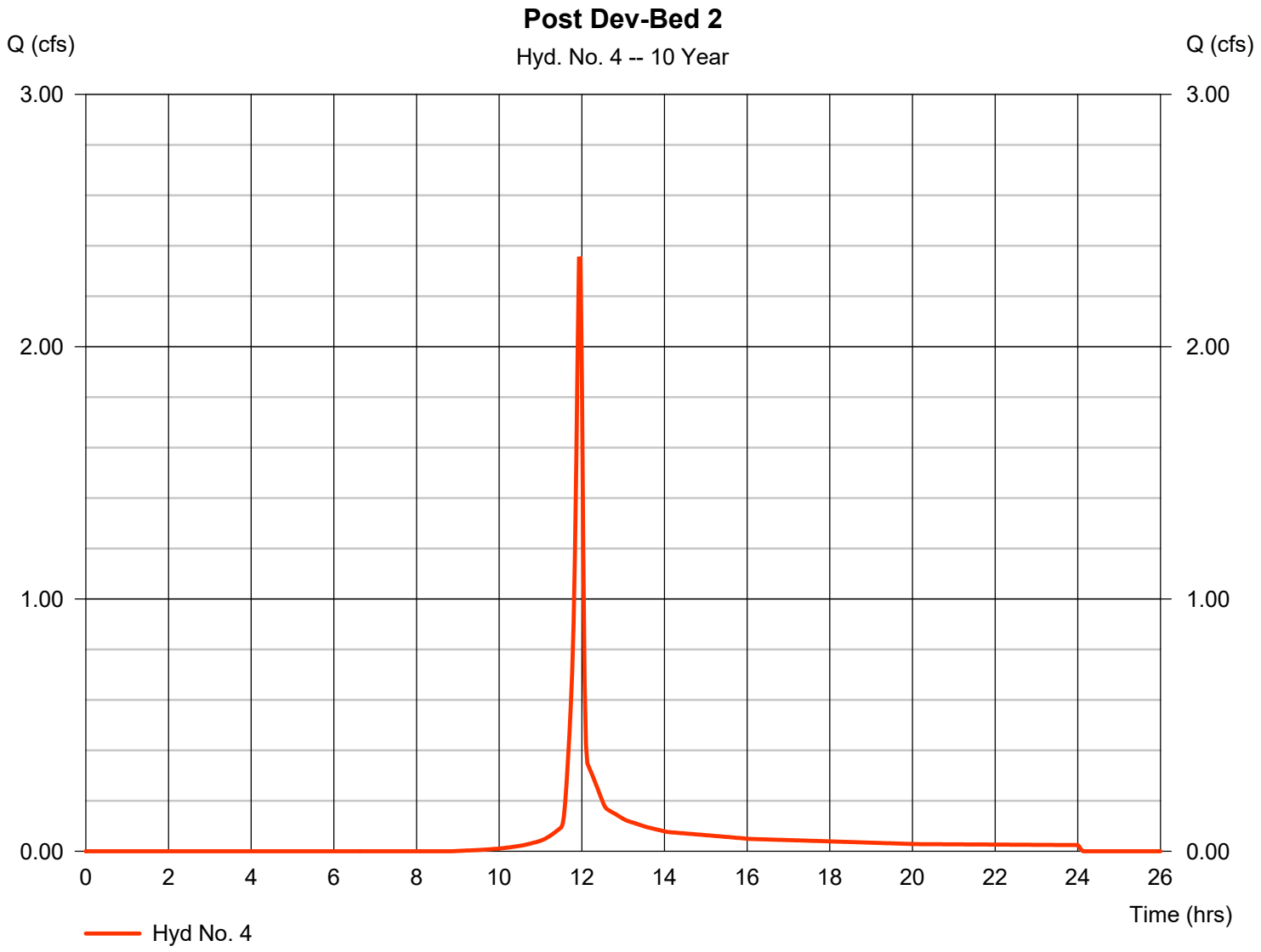
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.350 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 4,743 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620



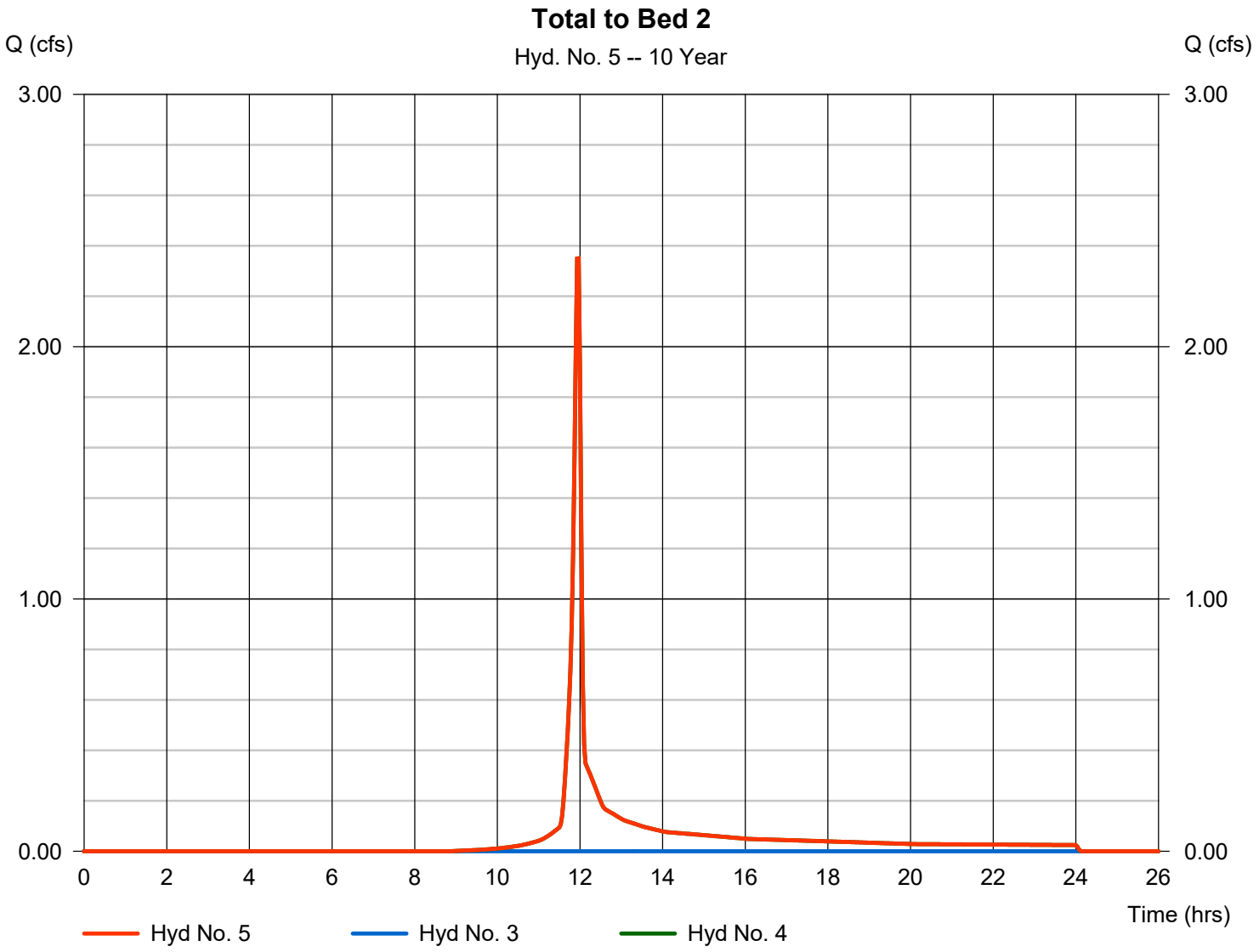
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 2.350 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 4,743 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



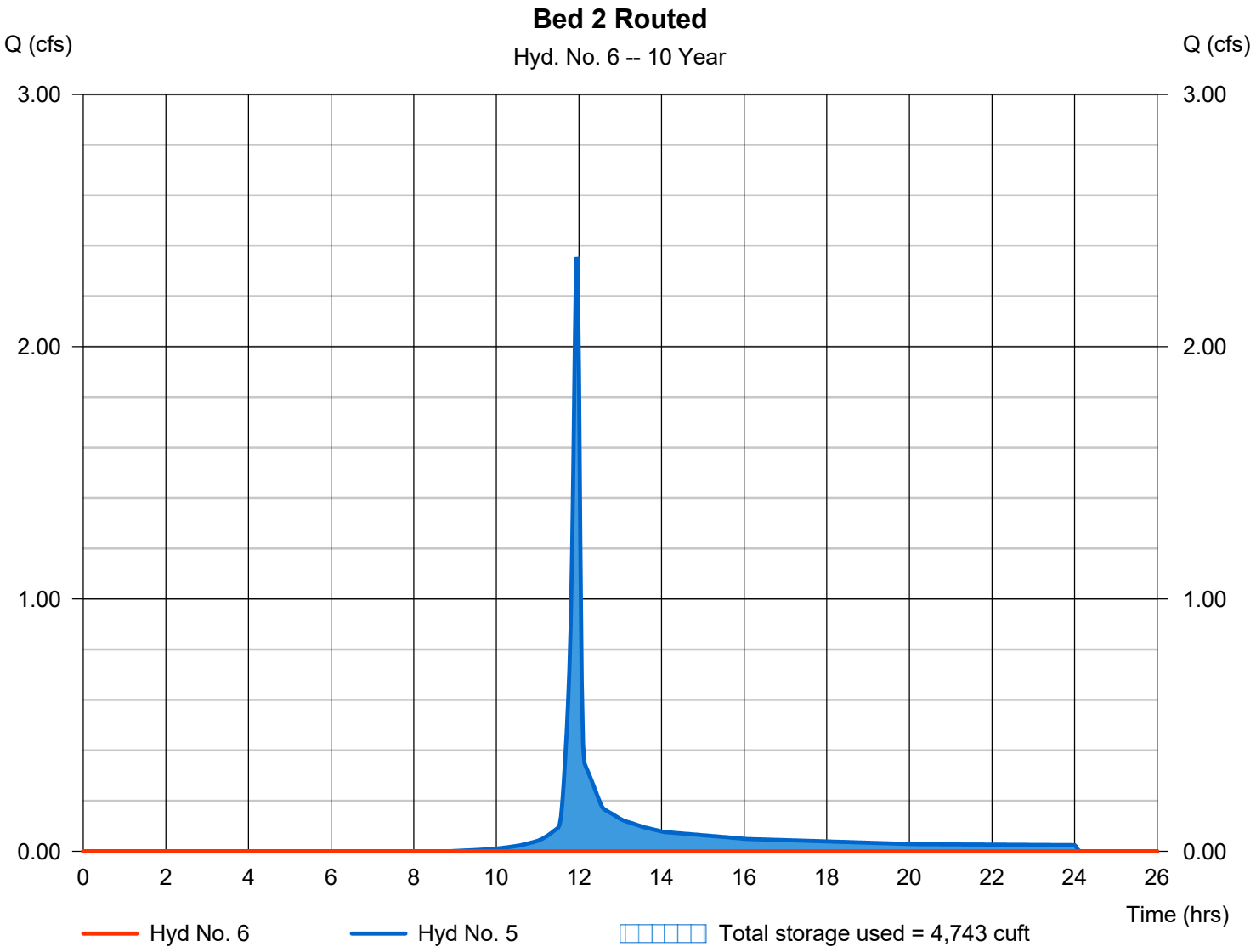
Hydrograph Report

Hyd. No. 6

Bed 2 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - Total to Bed 2	Max. Elevation	= 436.42 ft
Reservoir name	= Bed 2	Max. Storage	= 4,743 cuft

Storage Indication method used.



Hydrograph Report

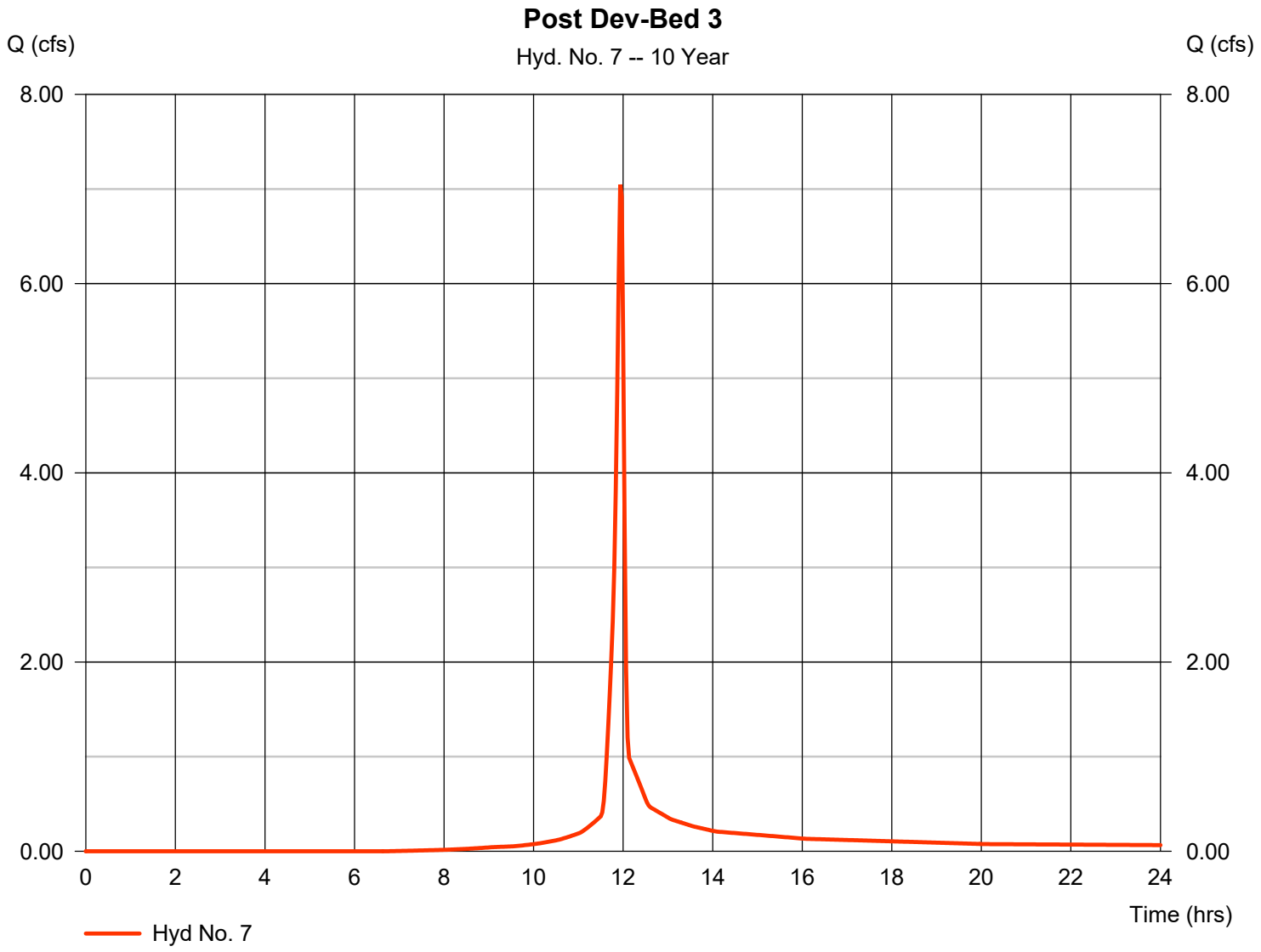
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 7.048 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 14,387 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480

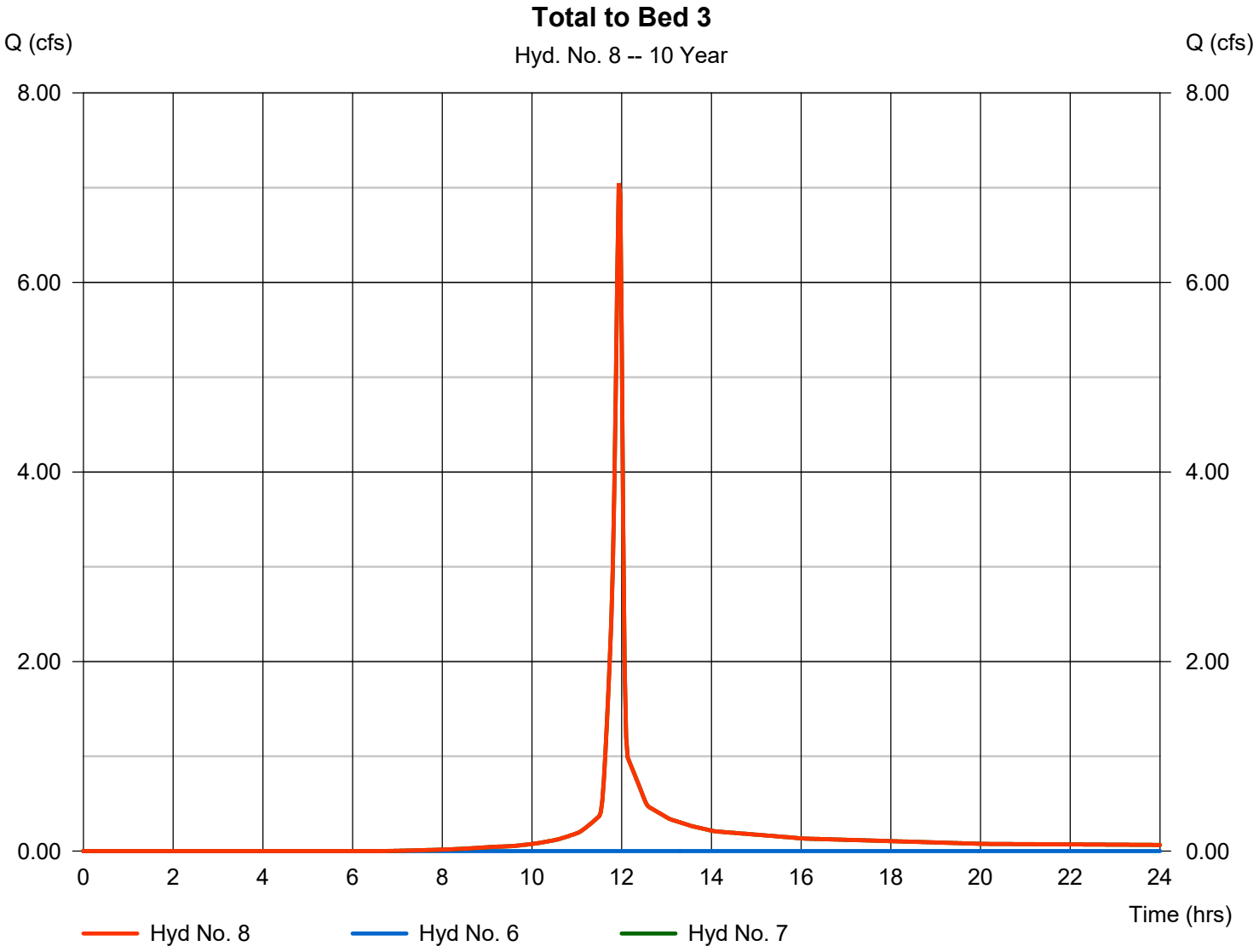


Hydrograph Report

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 7.048 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 14,387 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



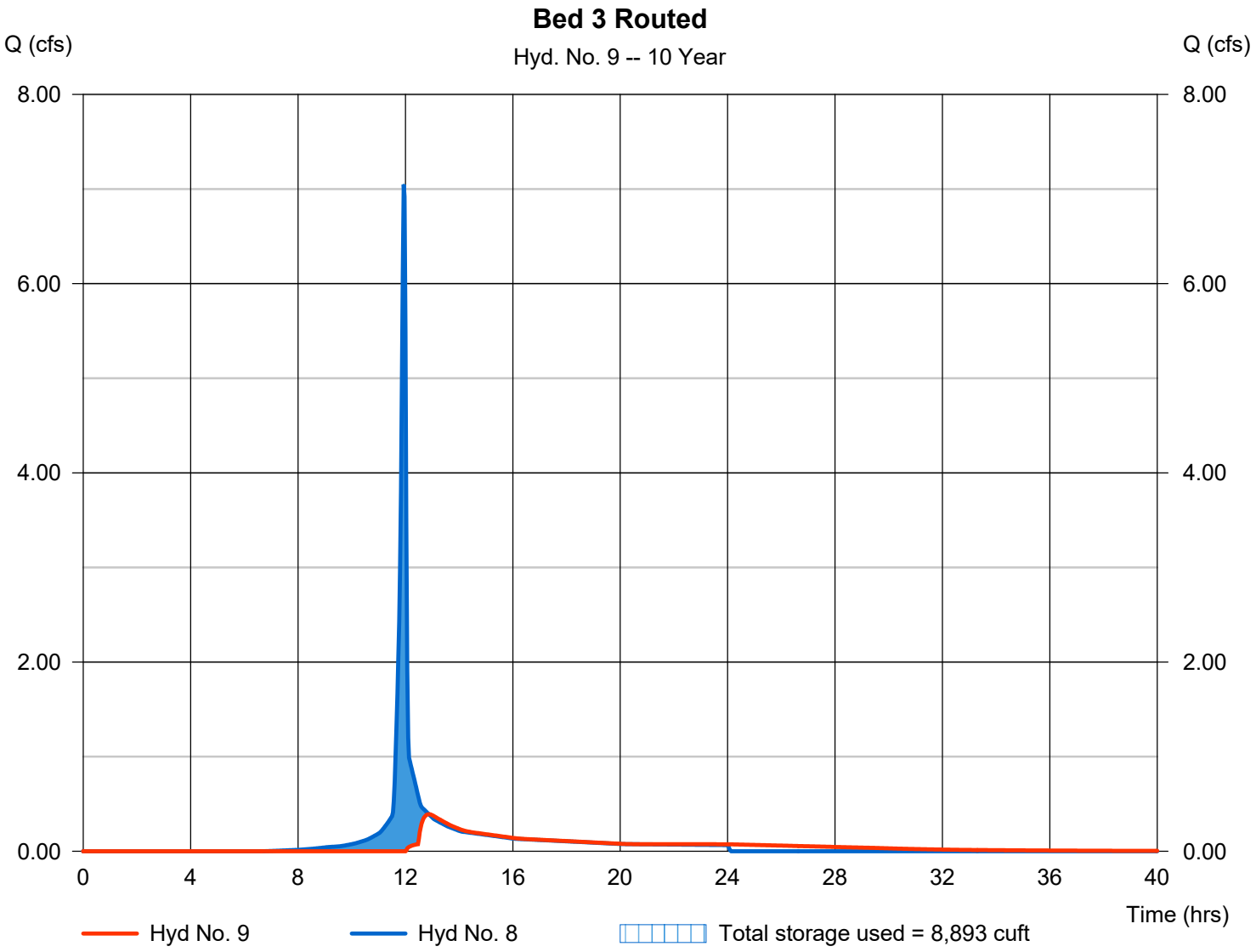
Hydrograph Report

Hyd. No. 9

Bed 3 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.391 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 7,363 cuft
Inflow hyd. No.	= 8 - Total to Bed 3	Max. Elevation	= 433.67 ft
Reservoir name	= Bed 3	Max. Storage	= 8,893 cuft

Storage Indication method used.



Hydrograph Report

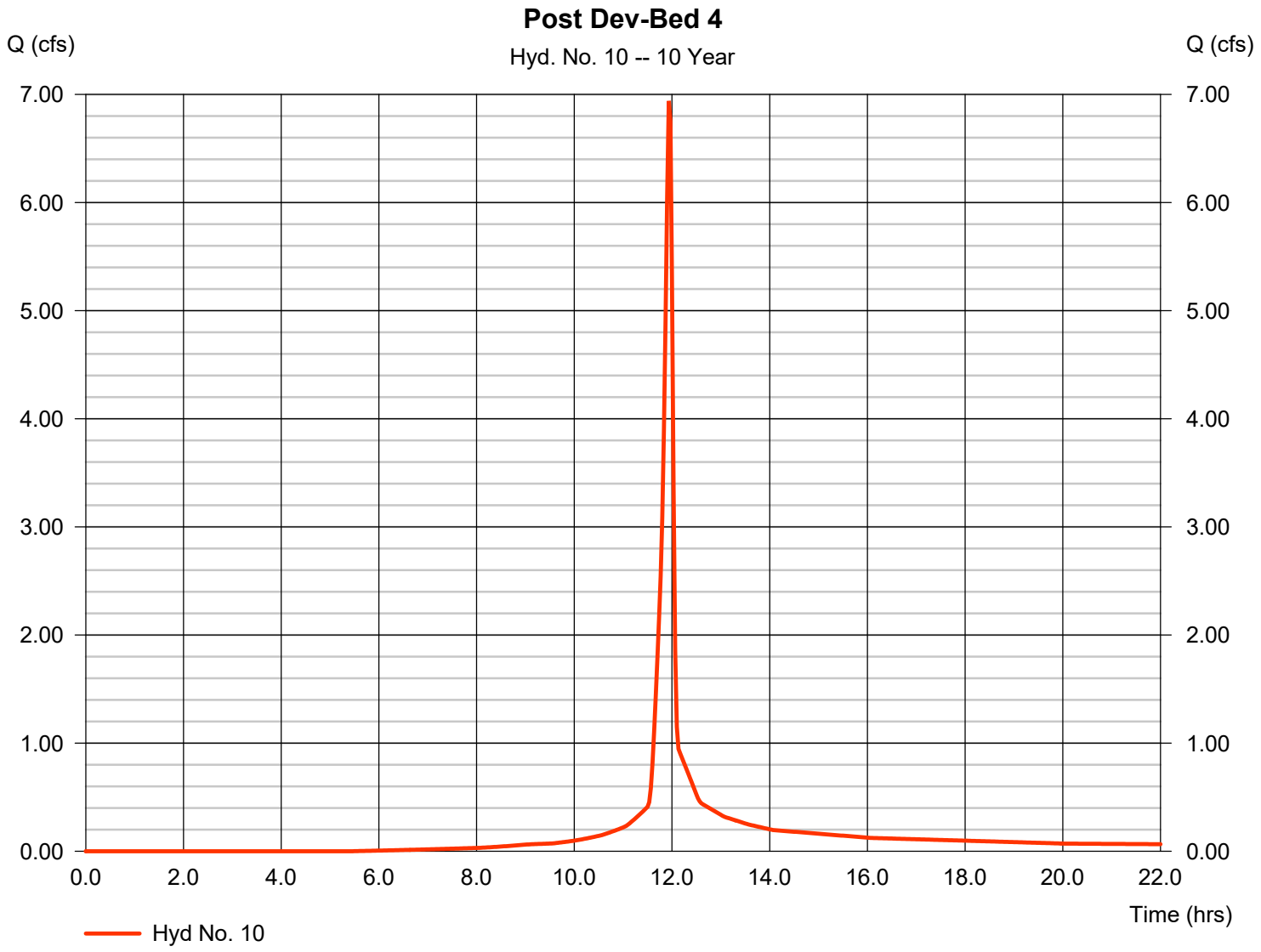
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 6.940 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 14,419 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310

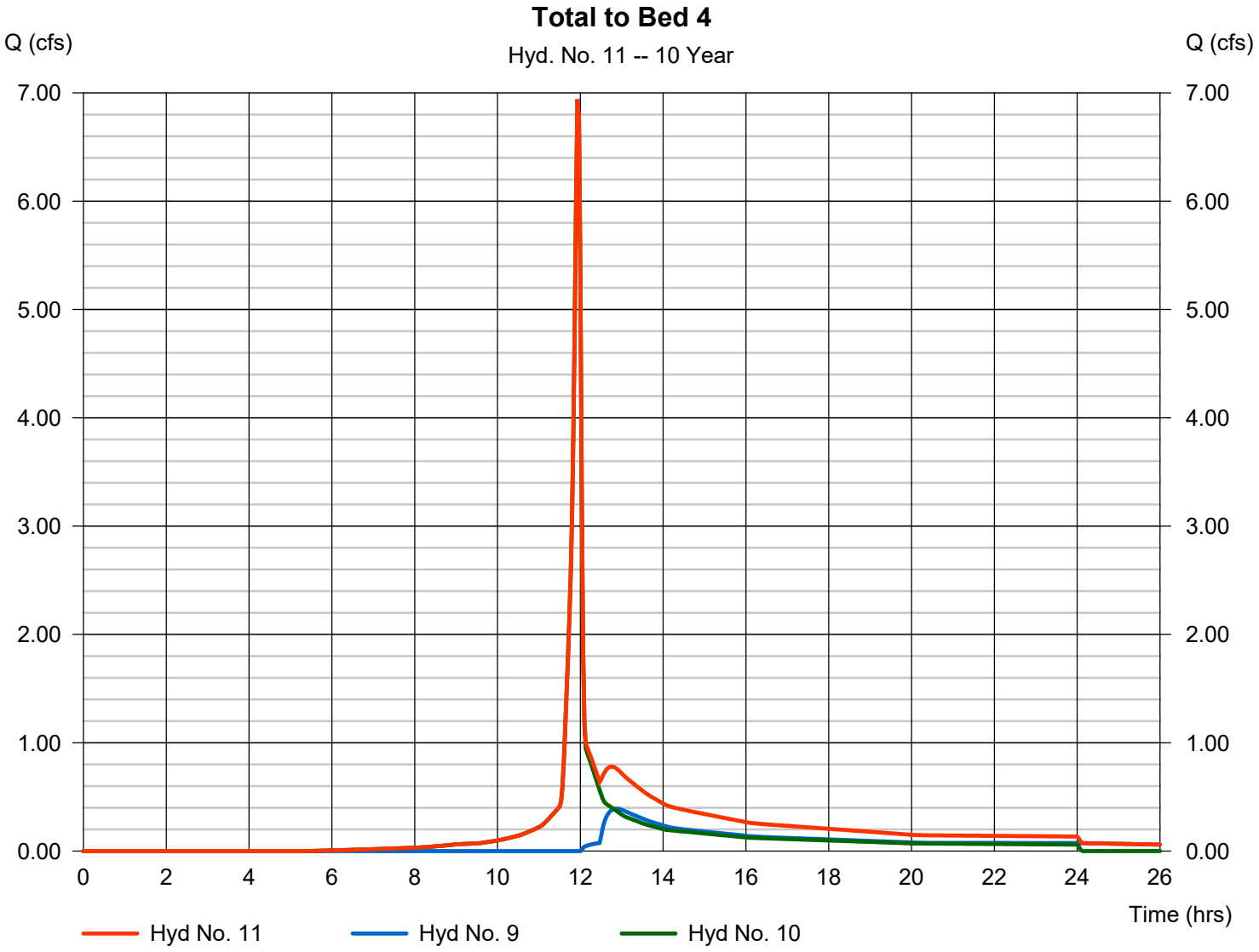


Hydrograph Report

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 6.940 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 21,782 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

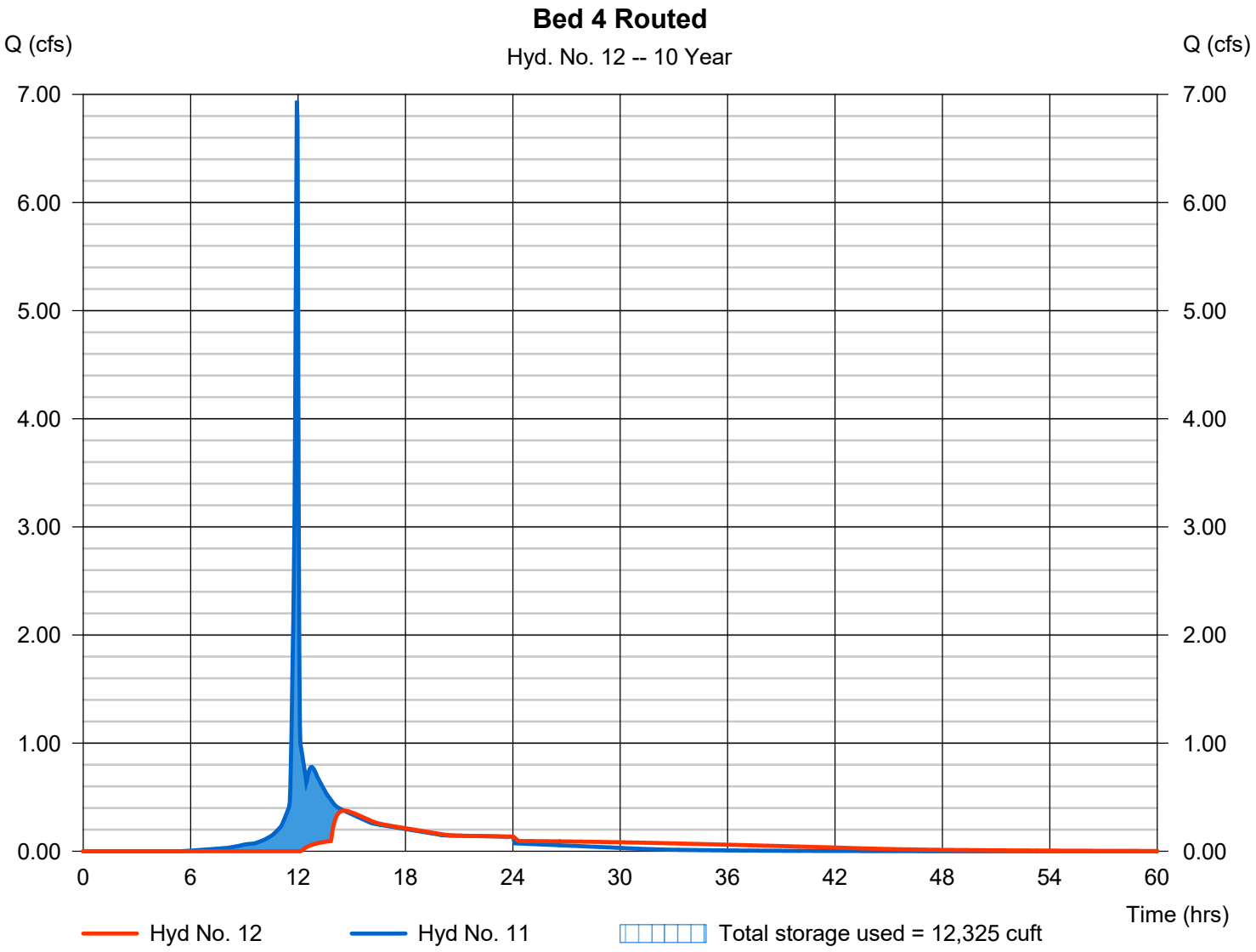
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.375 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.57 hrs
Time interval	= 2 min	Hyd. volume	= 13,442 cuft
Inflow hyd. No.	= 11 - Total to Bed 4	Max. Elevation	= 422.97 ft
Reservoir name	= Bed 4	Max. Storage	= 12,325 cuft

Storage Indication method used.



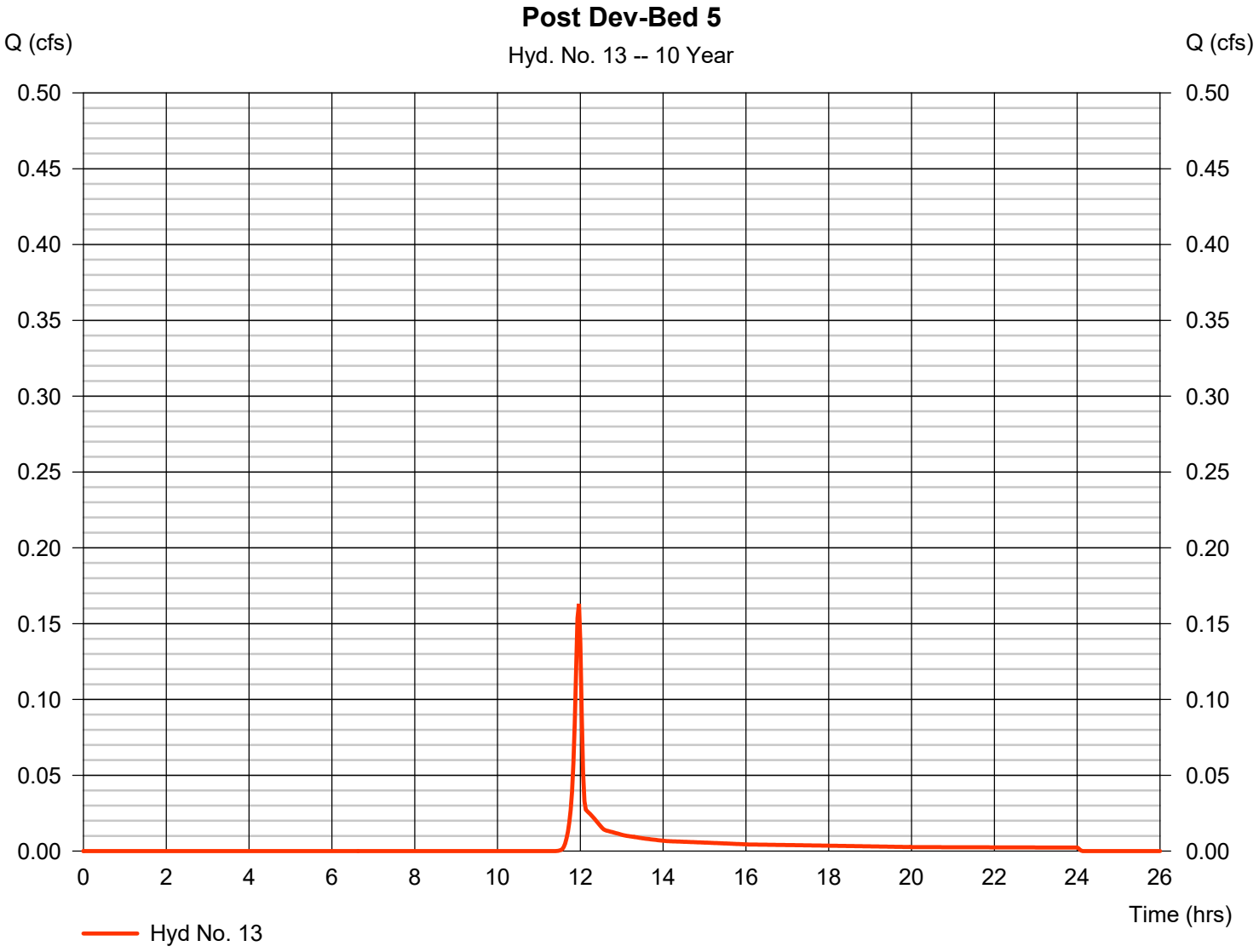
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.163 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 333 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

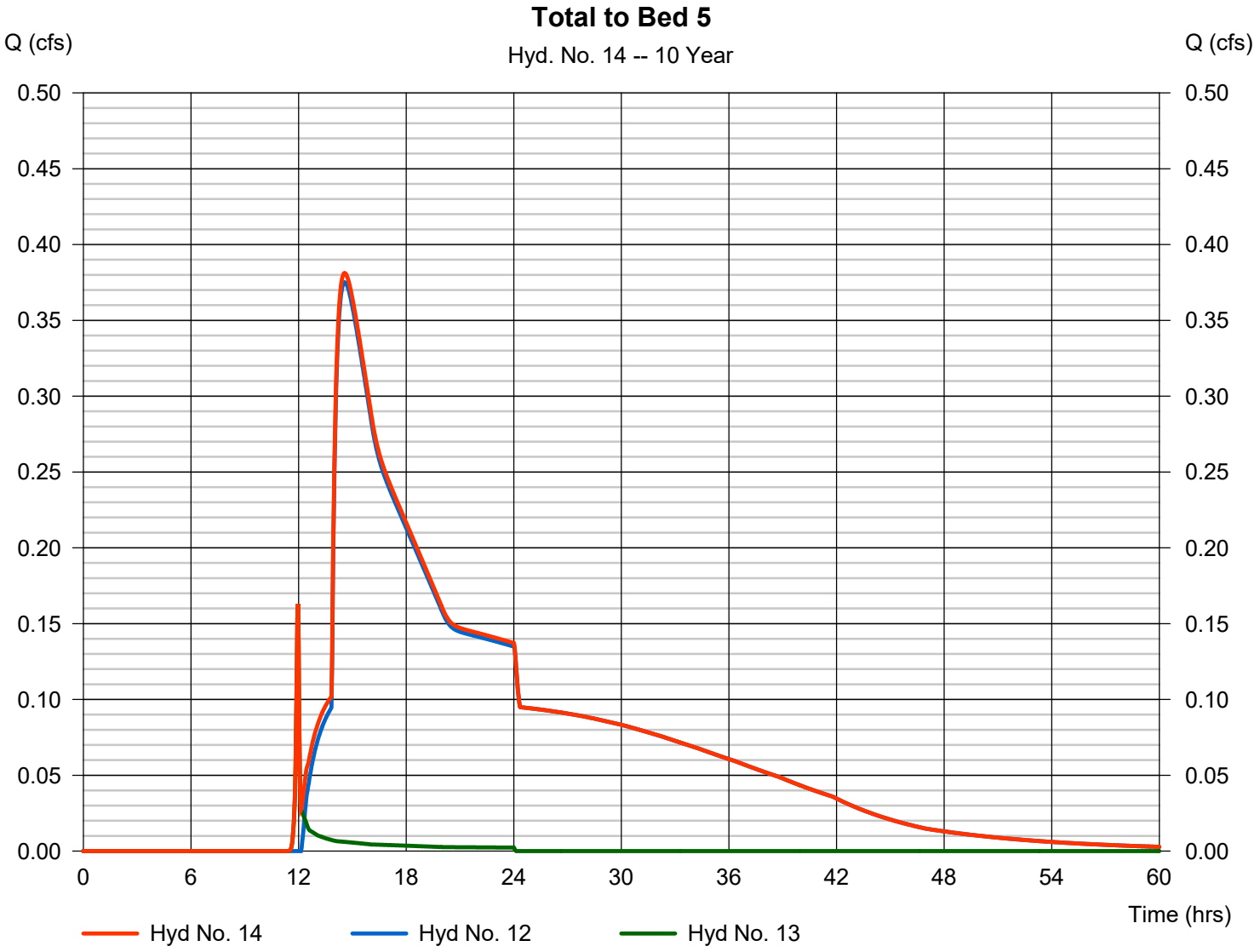


Hydrograph Report

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 0.381 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.57 hrs
Time interval	= 2 min	Hyd. volume	= 13,774 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



Hydrograph Report

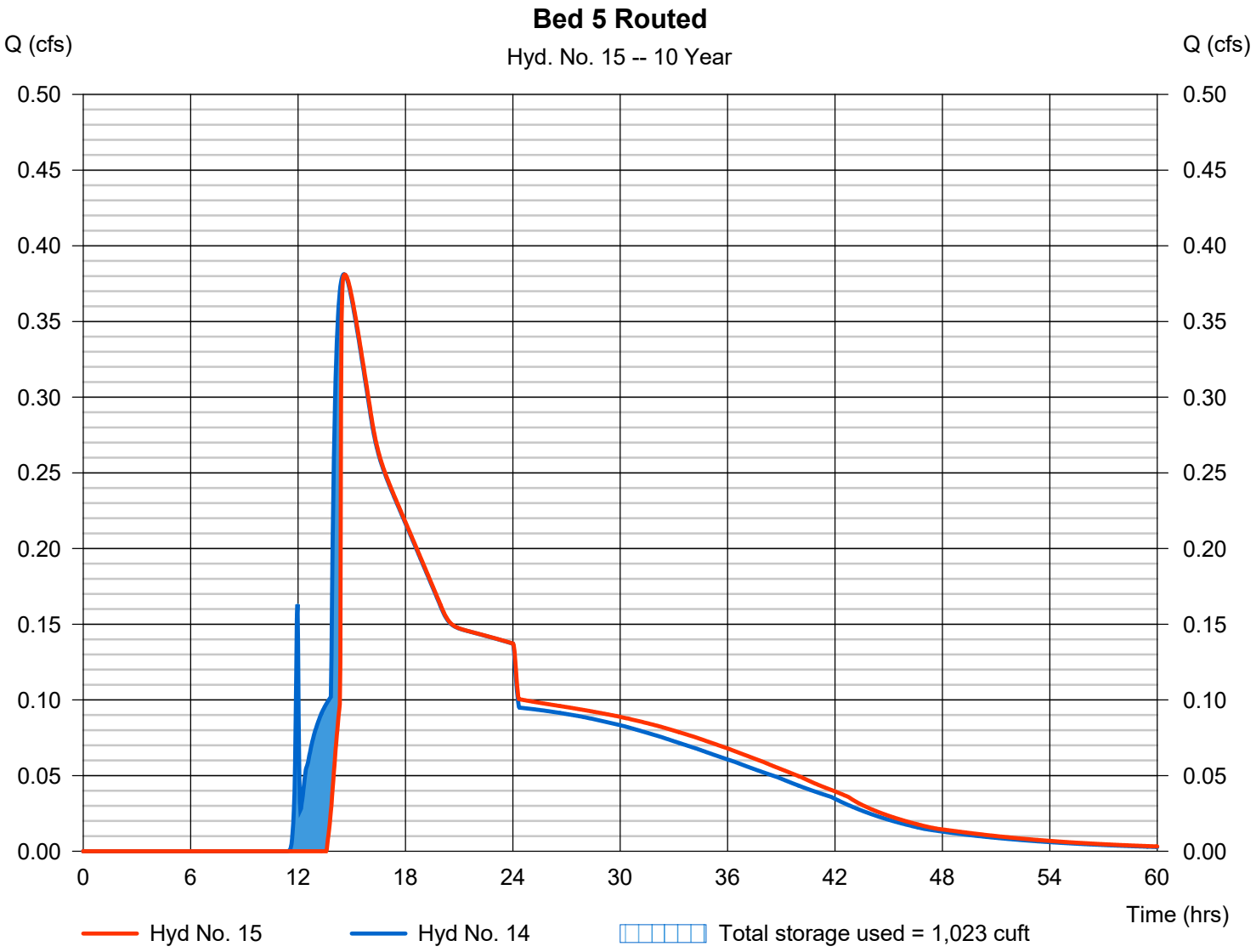
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.381 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.60 hrs
Time interval	= 2 min	Hyd. volume	= 13,276 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 421.07 ft
Reservoir name	= Bed 5	Max. Storage	= 1,023 cuft

Storage Indication method used.



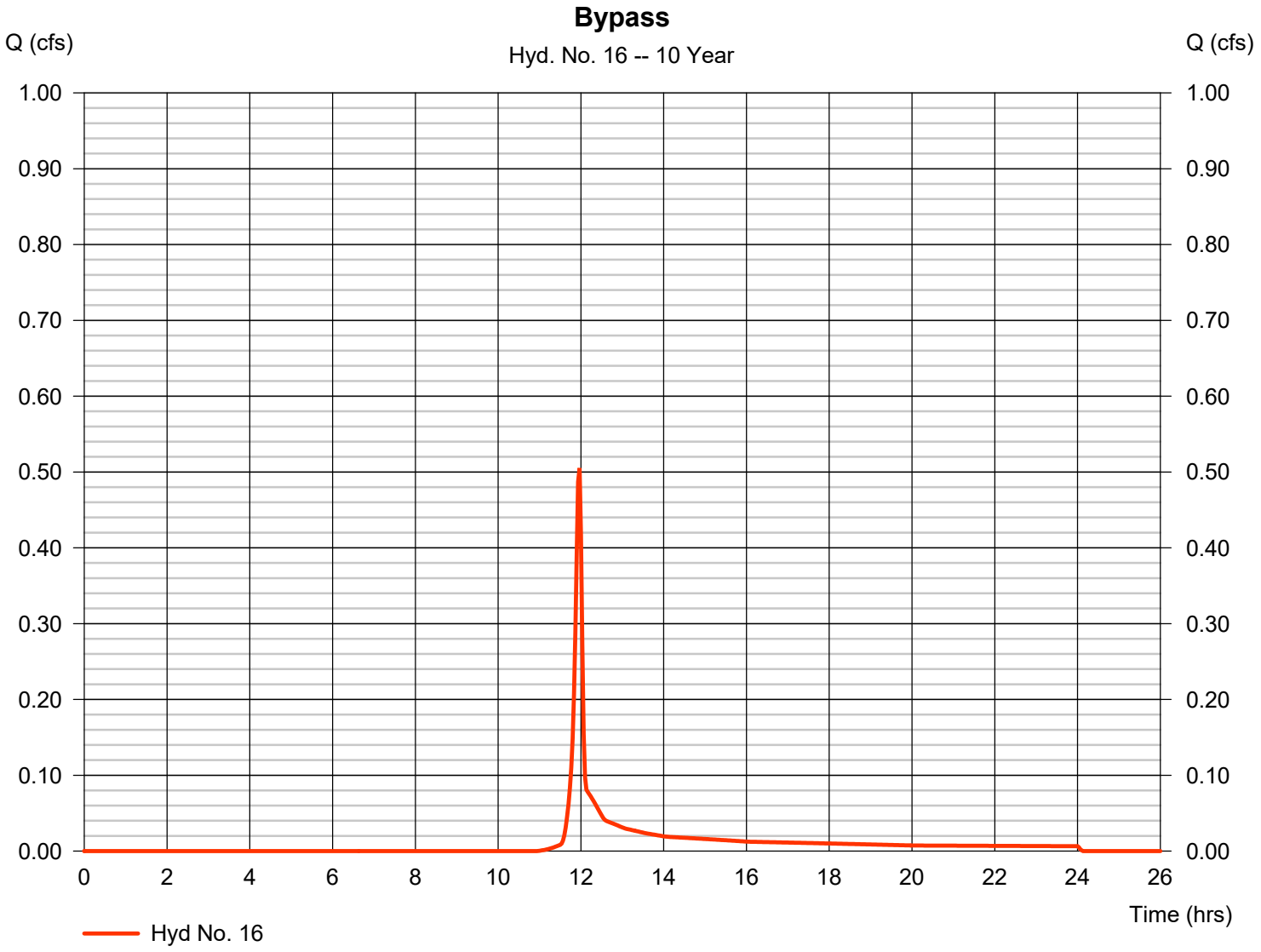
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 16

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.505 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 1,014 cuft
Drainage area	= 0.200 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

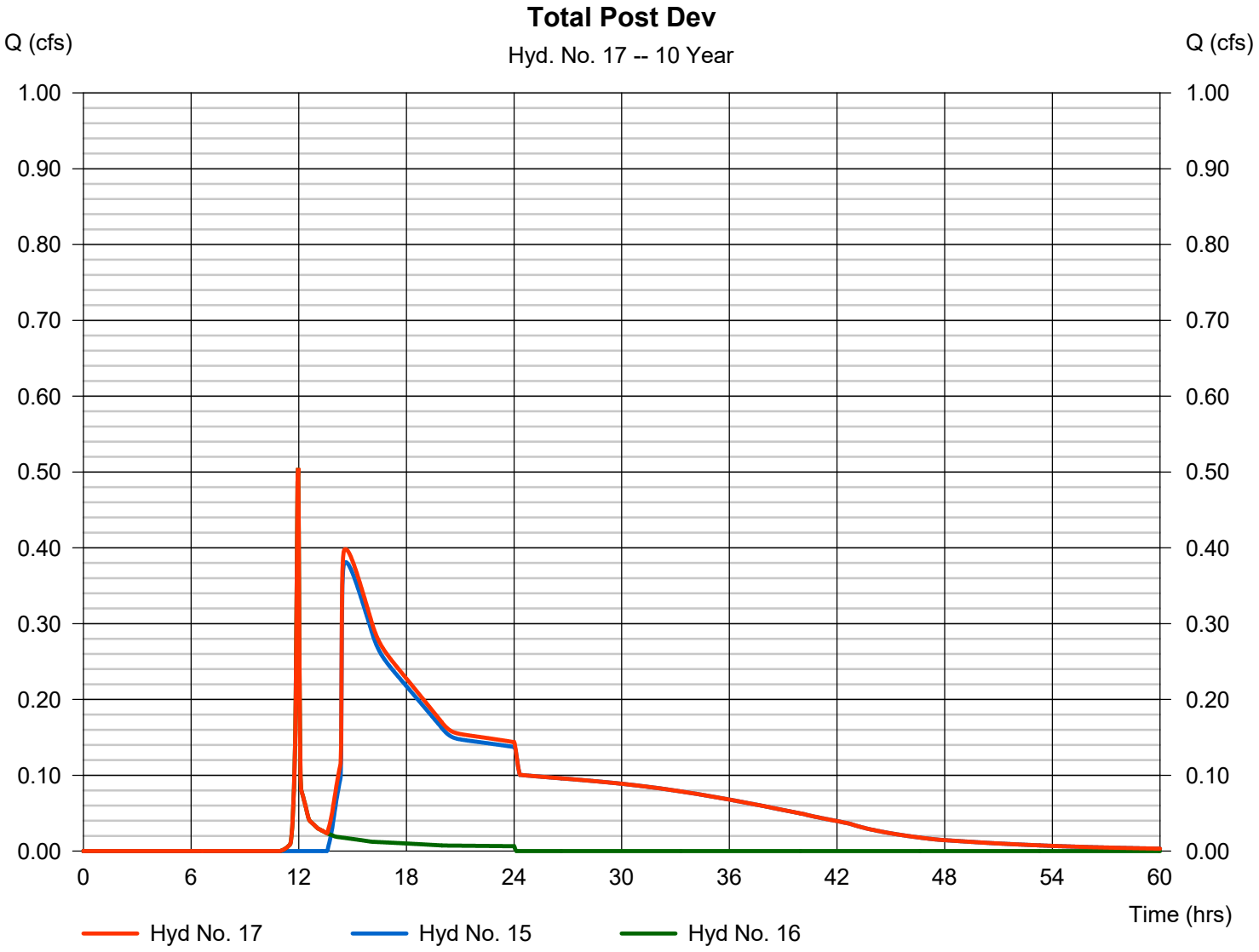


Hydrograph Report

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 0.505 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 14,290 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	12.48	2	722	32,979	------	------	------	Pre Dev
2	SCS Runoff	8.881	2	716	18,000	------	------	------	Post Dev-Bed 1
3	Reservoir	0.070	2	1442	4,172	2	440.53	16,211	Bed 1 routed
4	SCS Runoff	3.183	2	716	6,442	------	------	------	Post Dev-Bed 2
5	Combine	3.183	2	716	10,614	3, 4	------	------	Total to Bed 2
6	Reservoir	0.009	2	2494	601	5	438.06	10,194	Bed 2 Routed
7	SCS Runoff	9.131	2	716	18,835	------	------	------	Post Dev-Bed 3
8	Combine	9.131	2	716	19,436	6, 7	------	------	Total to Bed 3
9	Reservoir	2.764	2	724	12,412	8	433.95	9,640	Bed 3 Routed
10	SCS Runoff	8.794	2	716	18,516	------	------	------	Post Dev-Bed 4
11	Combine	8.794	2	716	30,928	9, 10	------	------	Total to Bed 4
12	Reservoir	1.791	2	744	22,588	11	423.15	13,088	Bed 4 Routed
13	SCS Runoff	0.248	2	718	497	------	------	------	Post Dev-Bed 5
14	Combine	1.819	2	744	23,085	12, 13	------	------	Total to Bed 5
15	Reservoir	1.848	2	744	22,587	14	421.26	1,116	Bed 5 Routed
16	SCS Runoff	0.734	2	718	1,468	------	------	------	Bypass
17	Combine	1.928	2	744	24,055	15, 16	------	------	Total Post Dev

Hydrograph Report

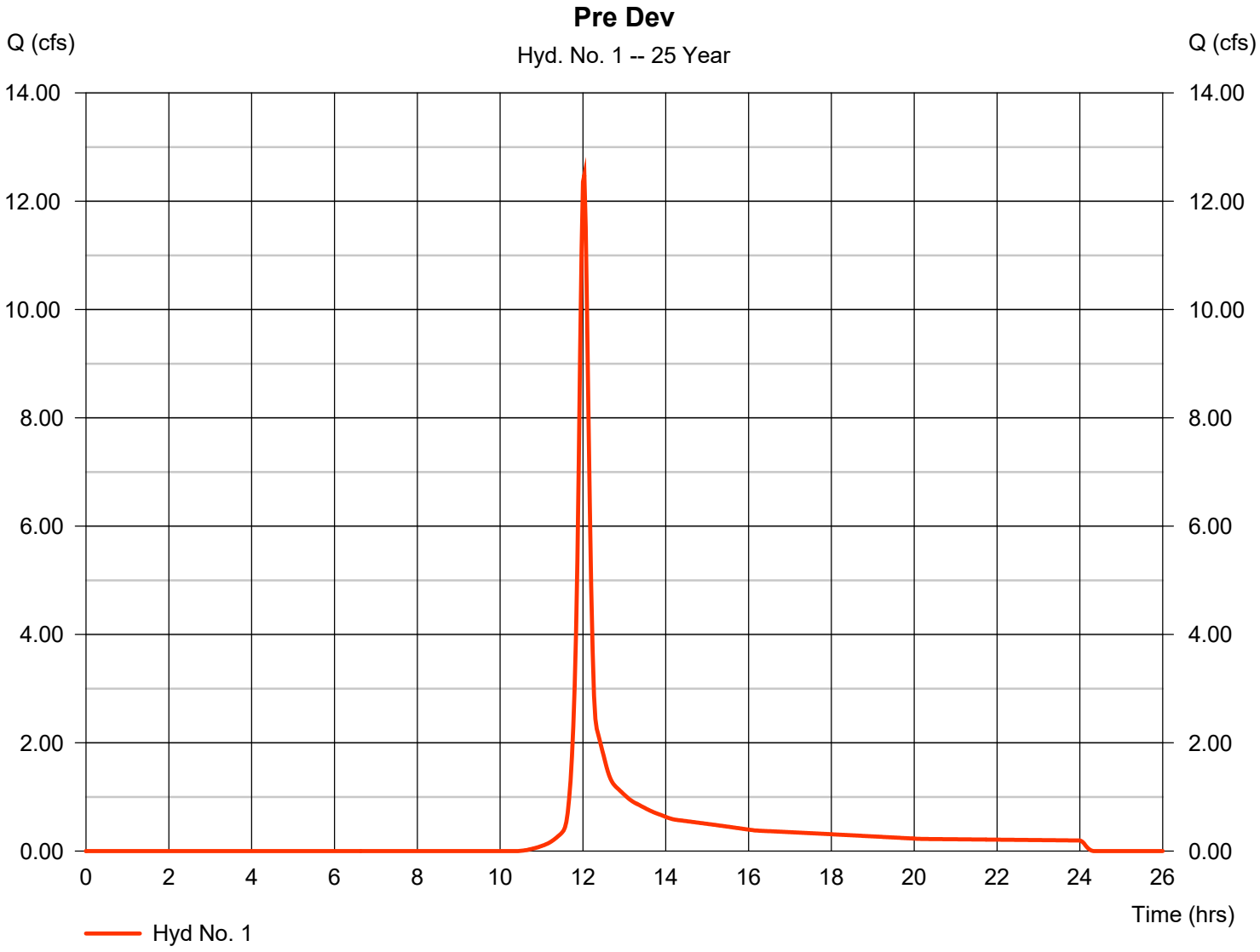
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 12.48 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 32,979 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



Hydrograph Report

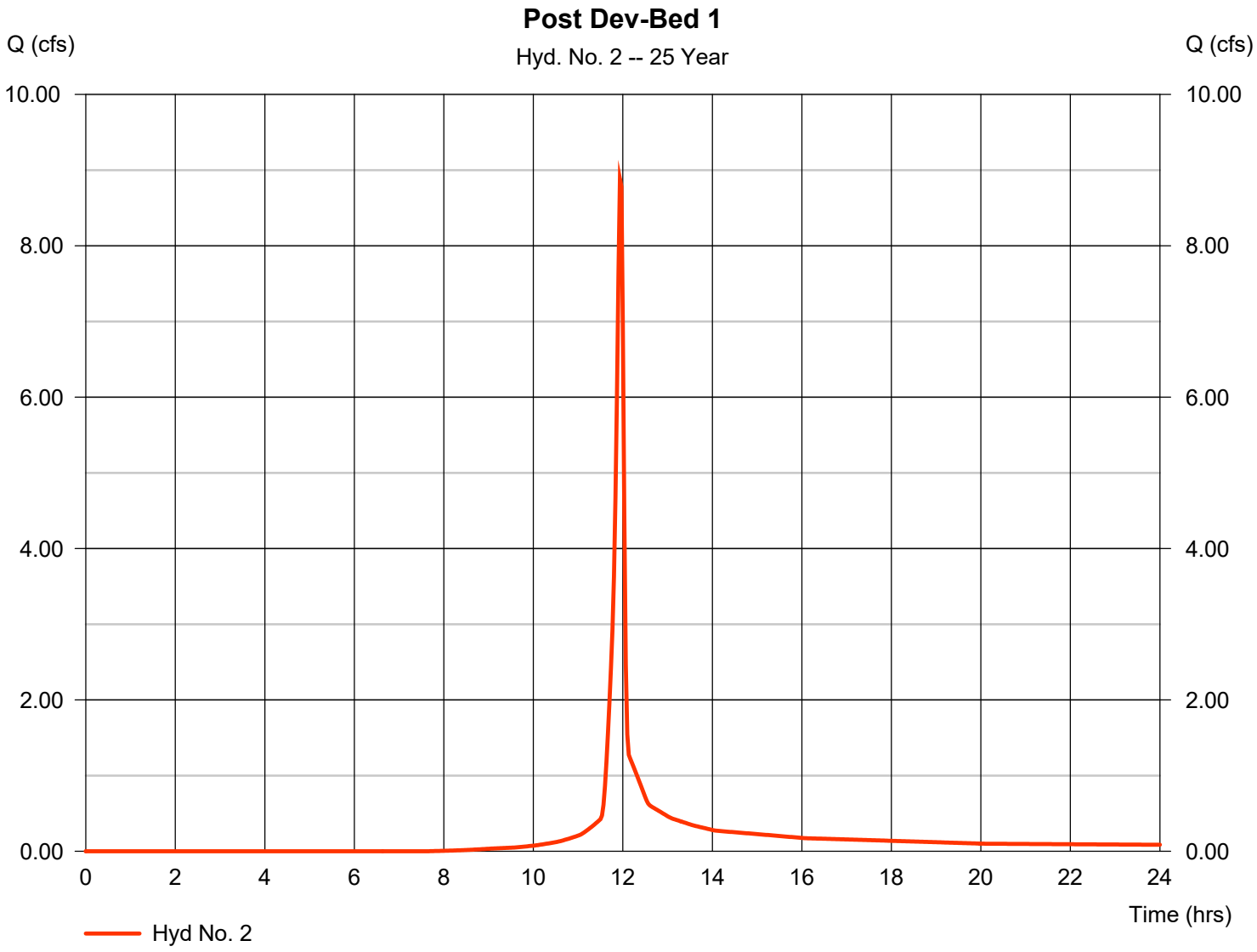
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 8.881 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 18,000 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



Hydrograph Report

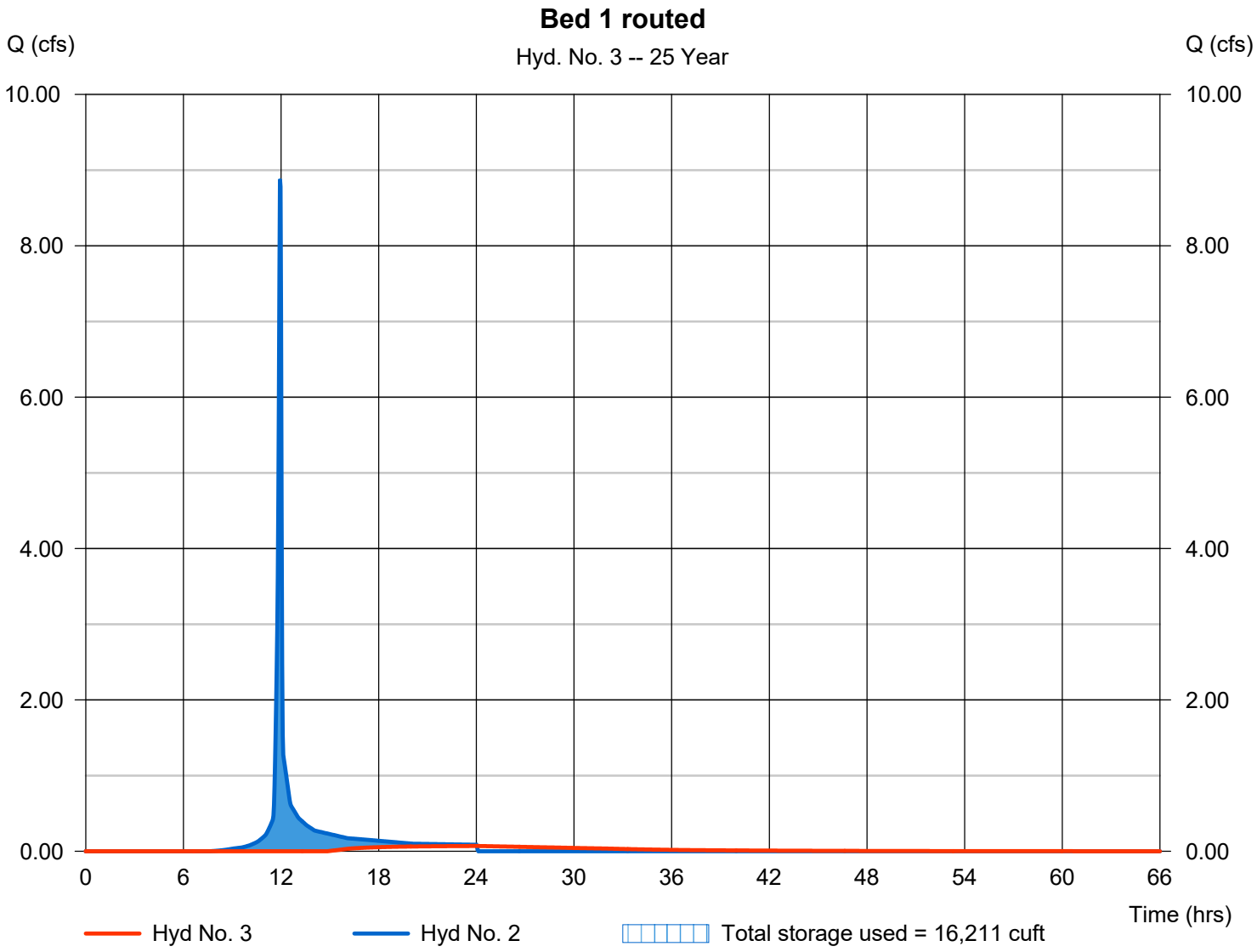
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 1 routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.070 cfs
Storm frequency	=	25 yrs	Time to peak	=	24.03 hrs
Time interval	=	2 min	Hyd. volume	=	4,172 cuft
Inflow hyd. No.	=	2 - Post Dev-Bed 1	Max. Elevation	=	440.53 ft
Reservoir name	=	Bed 1	Max. Storage	=	16,211 cuft

Storage Indication method used.



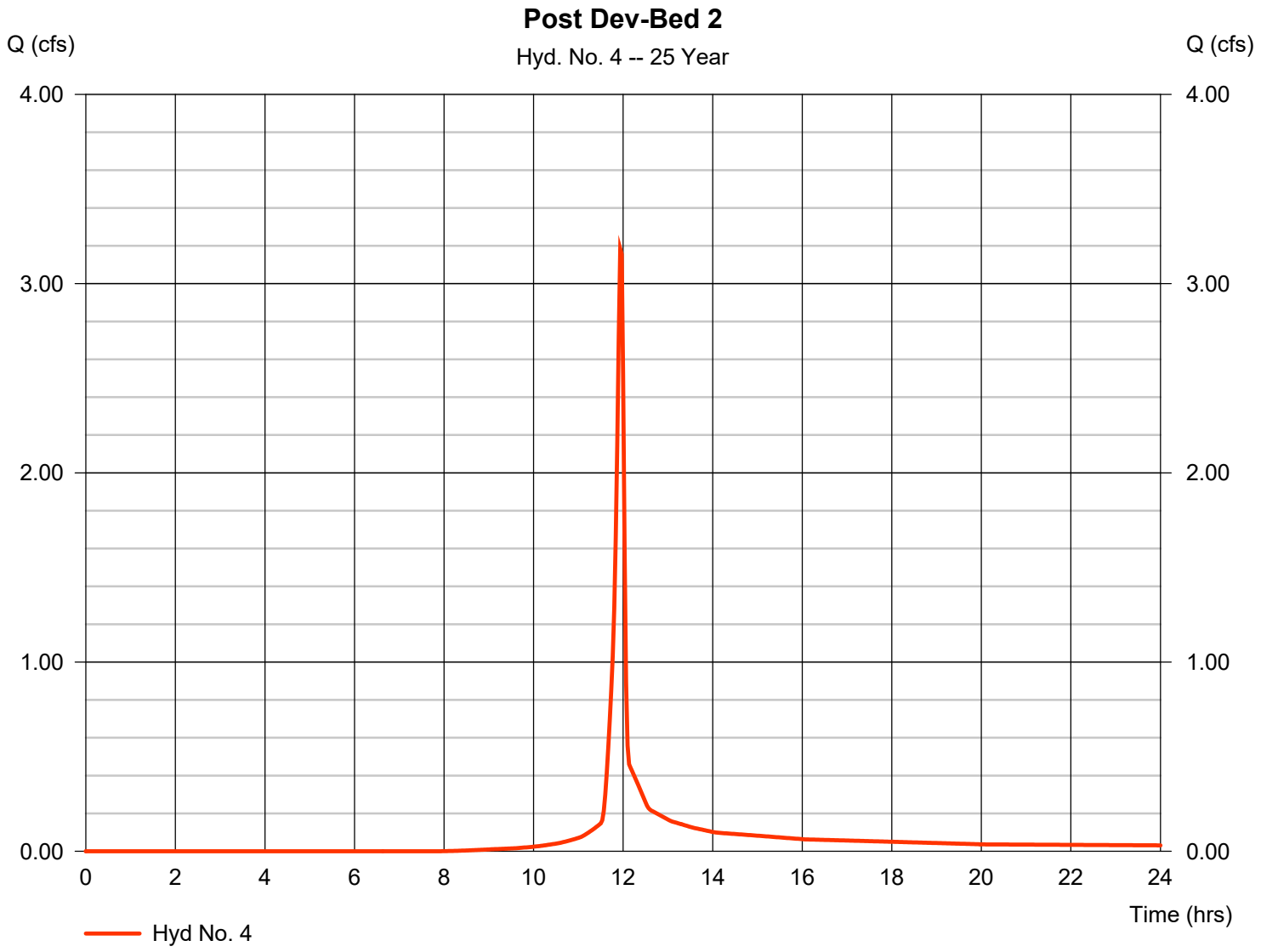
Hydrograph Report

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.183 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 6,442 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620



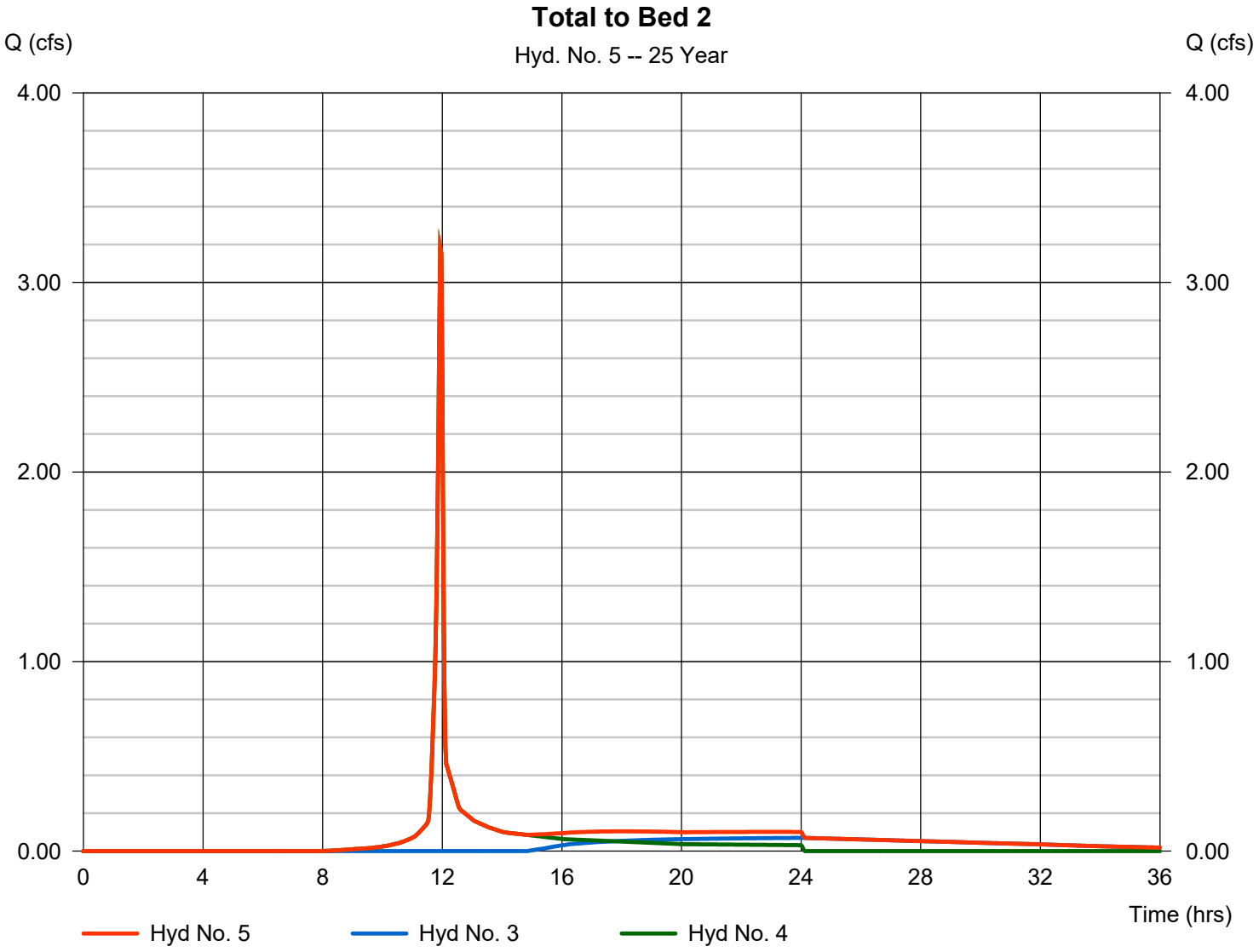
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 3.183 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 10,614 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



Hydrograph Report

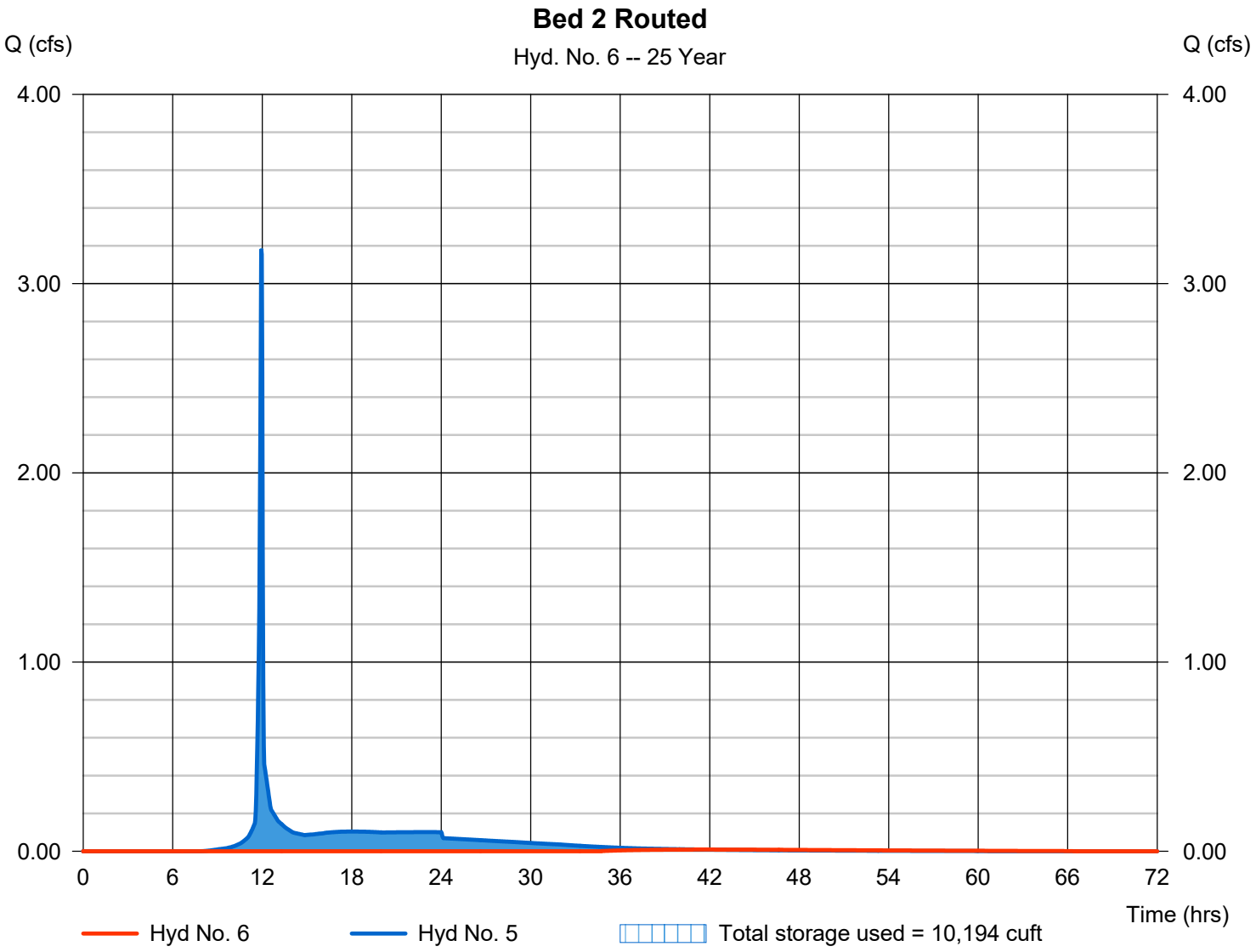
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 6

Bed 2 Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.009 cfs
Storm frequency	= 25 yrs	Time to peak	= 41.57 hrs
Time interval	= 2 min	Hyd. volume	= 601 cuft
Inflow hyd. No.	= 5 - Total to Bed 2	Max. Elevation	= 438.06 ft
Reservoir name	= Bed 2	Max. Storage	= 10,194 cuft

Storage Indication method used.



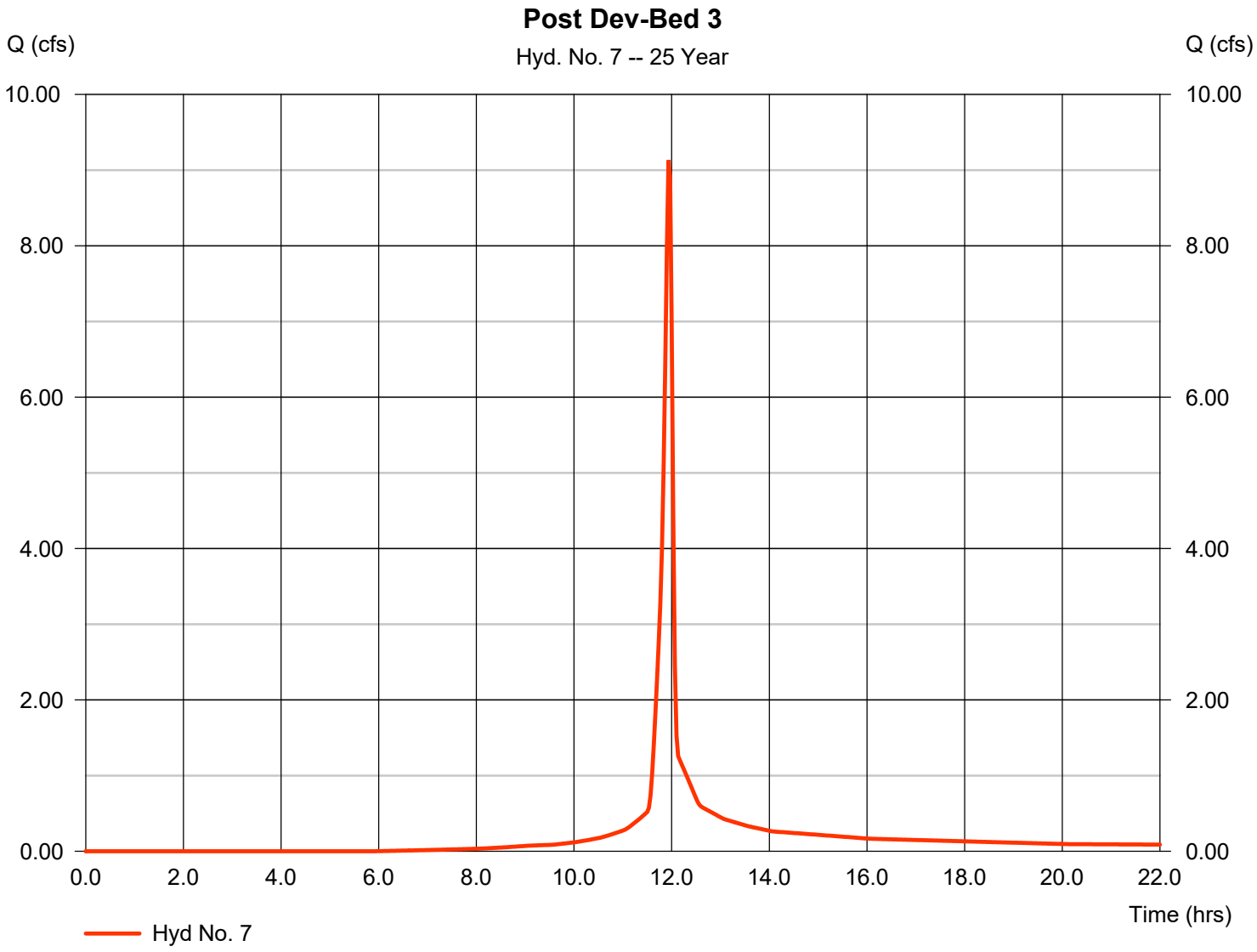
Hydrograph Report

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 9.131 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 18,835 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480

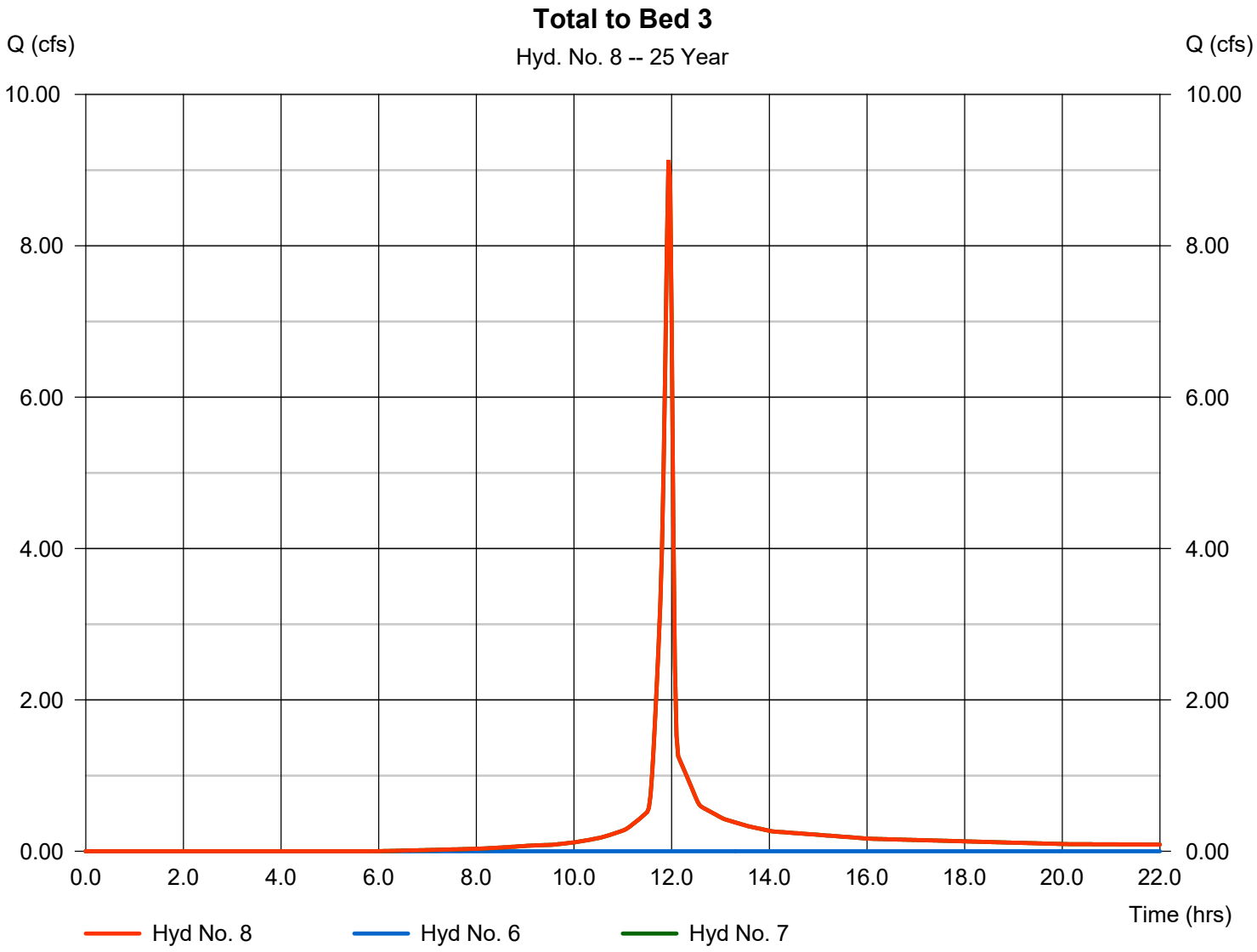


Hydrograph Report

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 9.131 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 19,436 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



Hydrograph Report

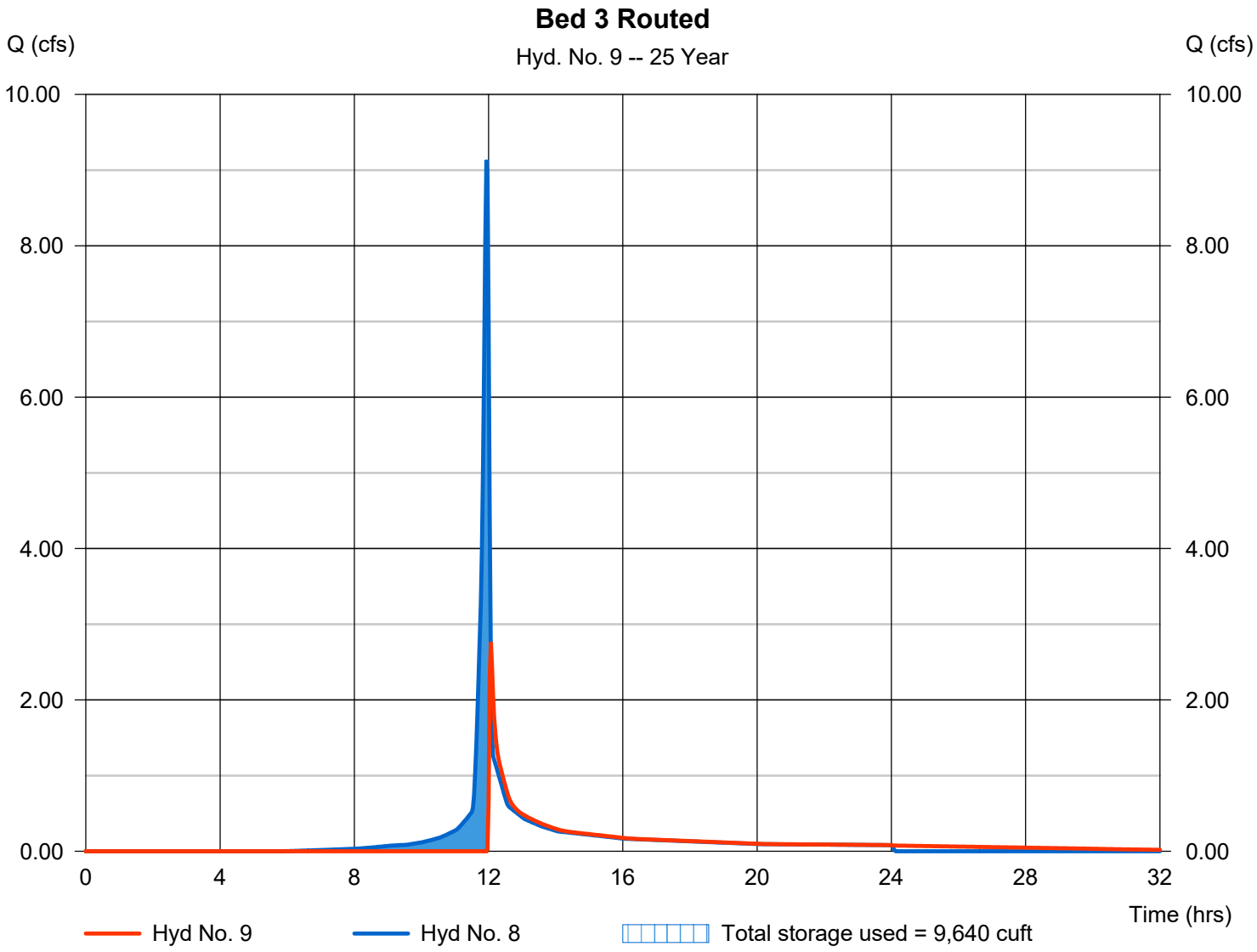
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 9

Bed 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	2.764 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	12,412 cuft
Inflow hyd. No.	=	8 - Total to Bed 3	Max. Elevation	=	433.95 ft
Reservoir name	=	Bed 3	Max. Storage	=	9,640 cuft

Storage Indication method used.



Hydrograph Report

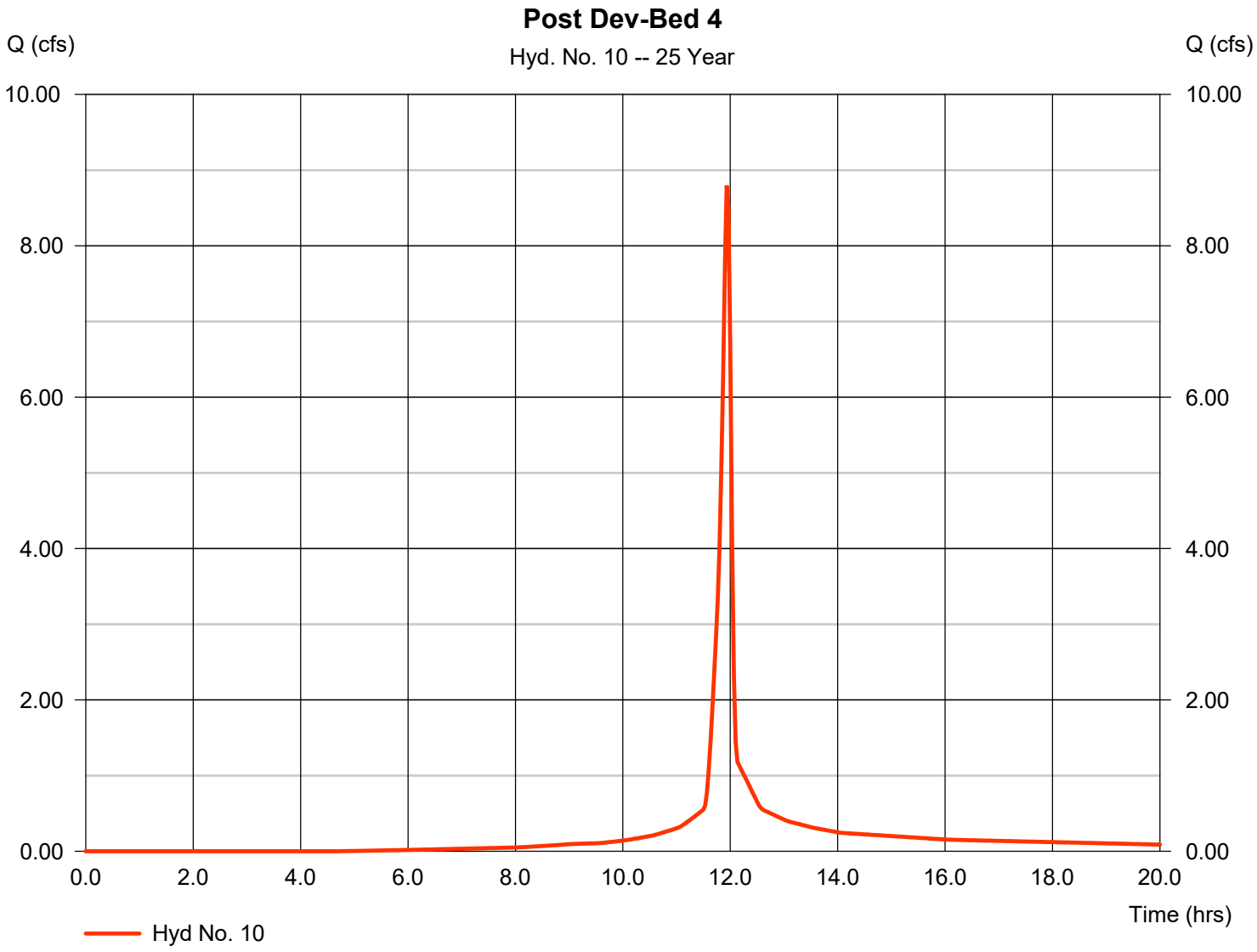
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 8.794 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 18,516 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310



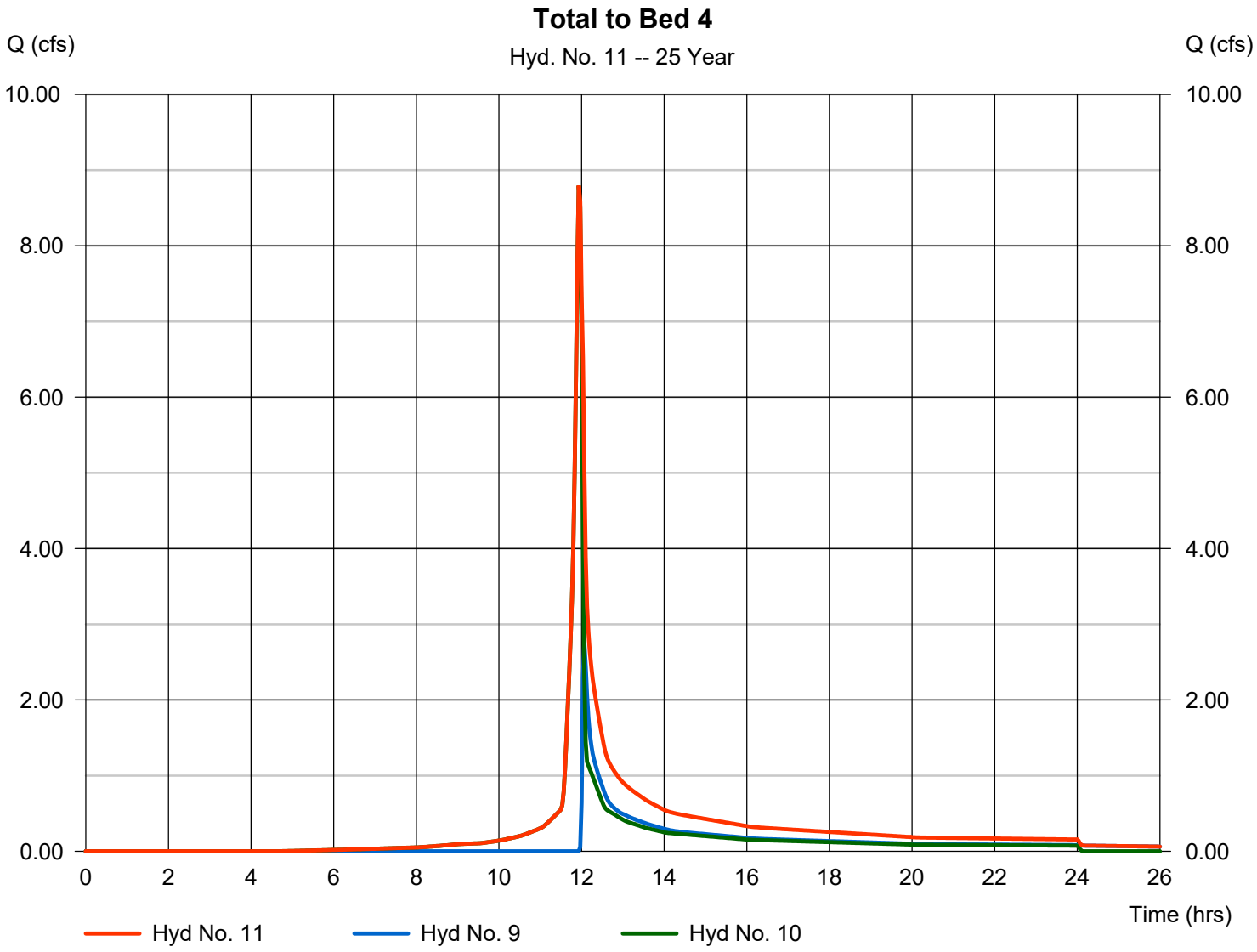
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 8.794 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 30,928 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

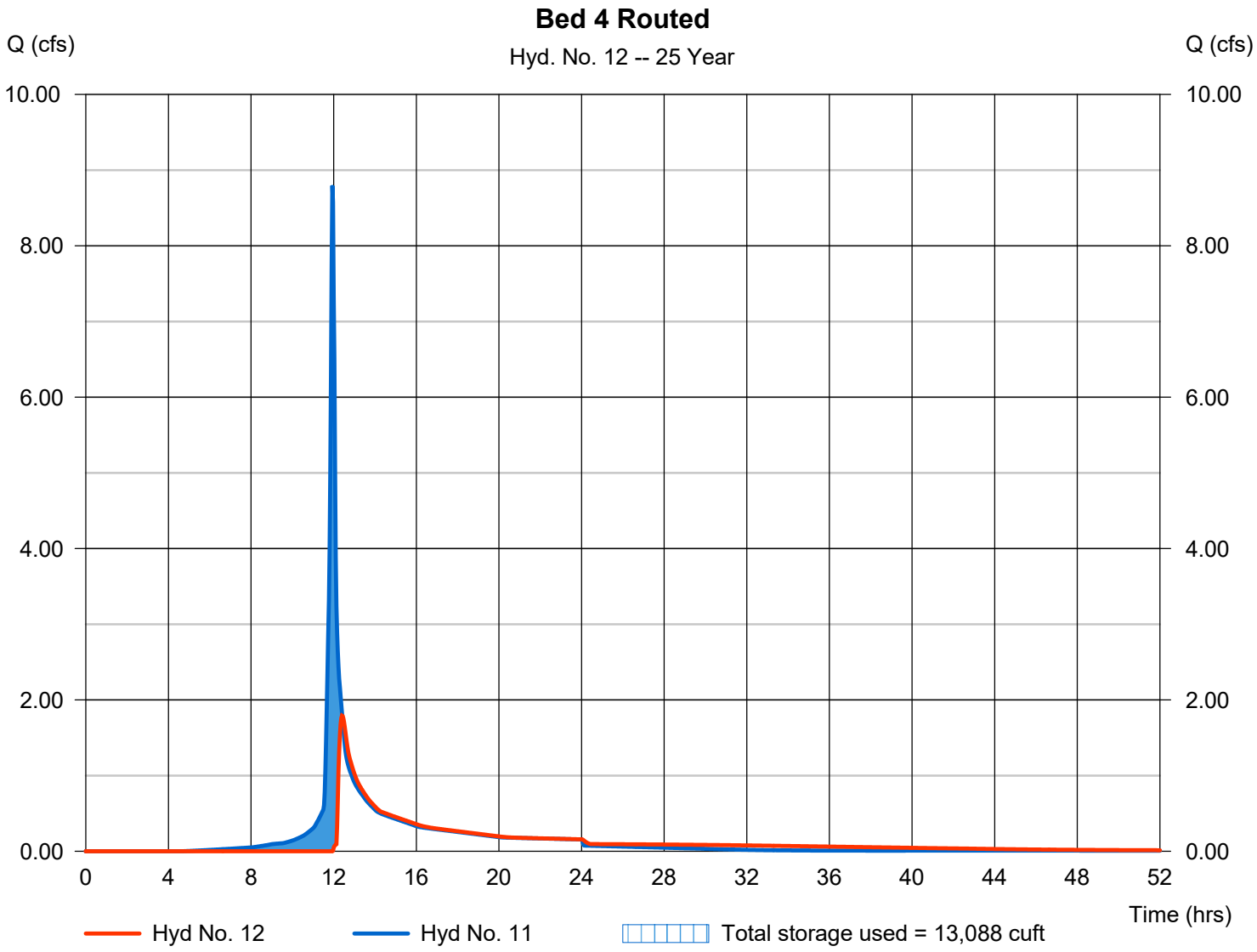
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	= Reservoir	Peak discharge	= 1.791 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 22,588 cuft
Inflow hyd. No.	= 11 - Total to Bed 4	Max. Elevation	= 423.15 ft
Reservoir name	= Bed 4	Max. Storage	= 13,088 cuft

Storage Indication method used.



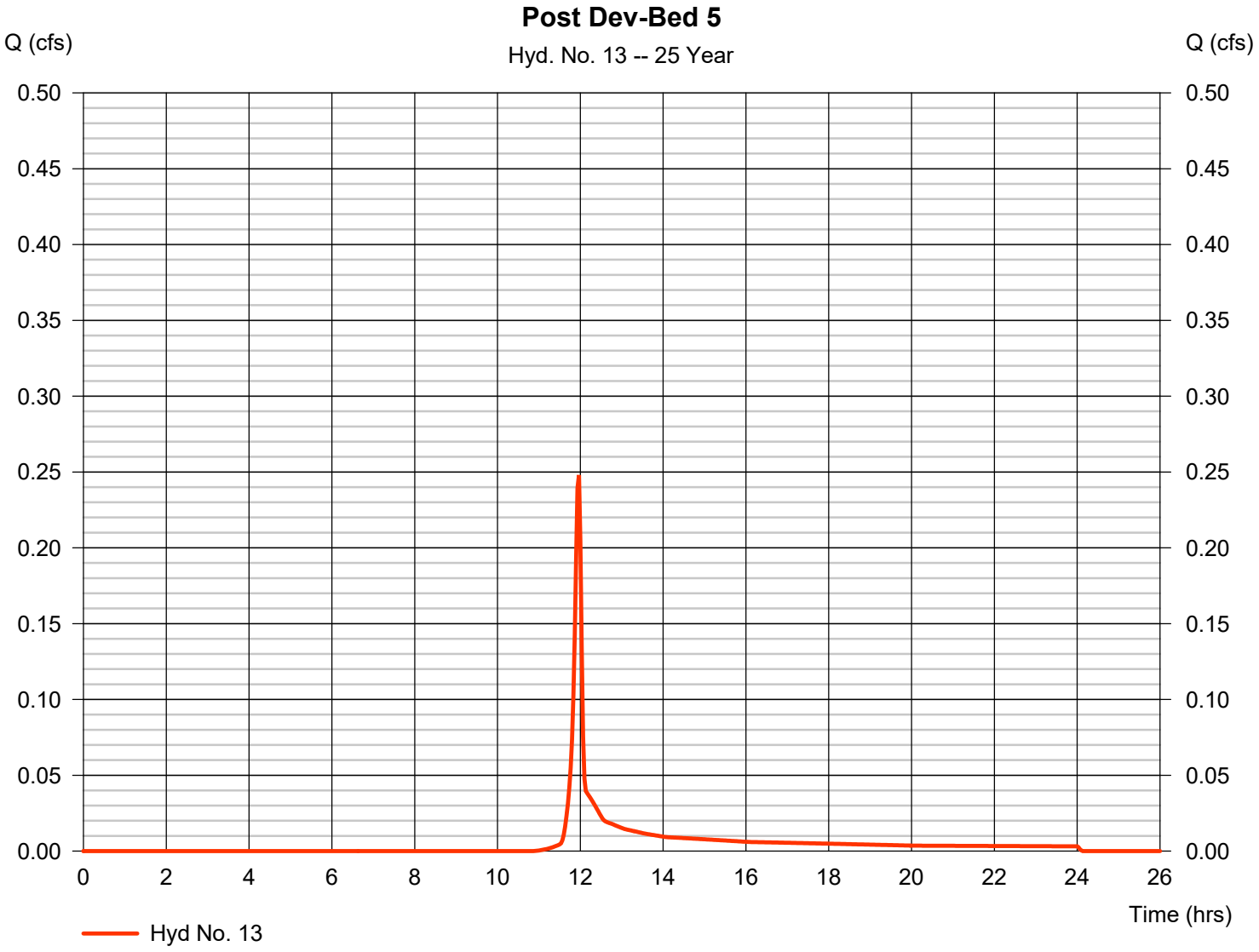
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.248 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 497 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

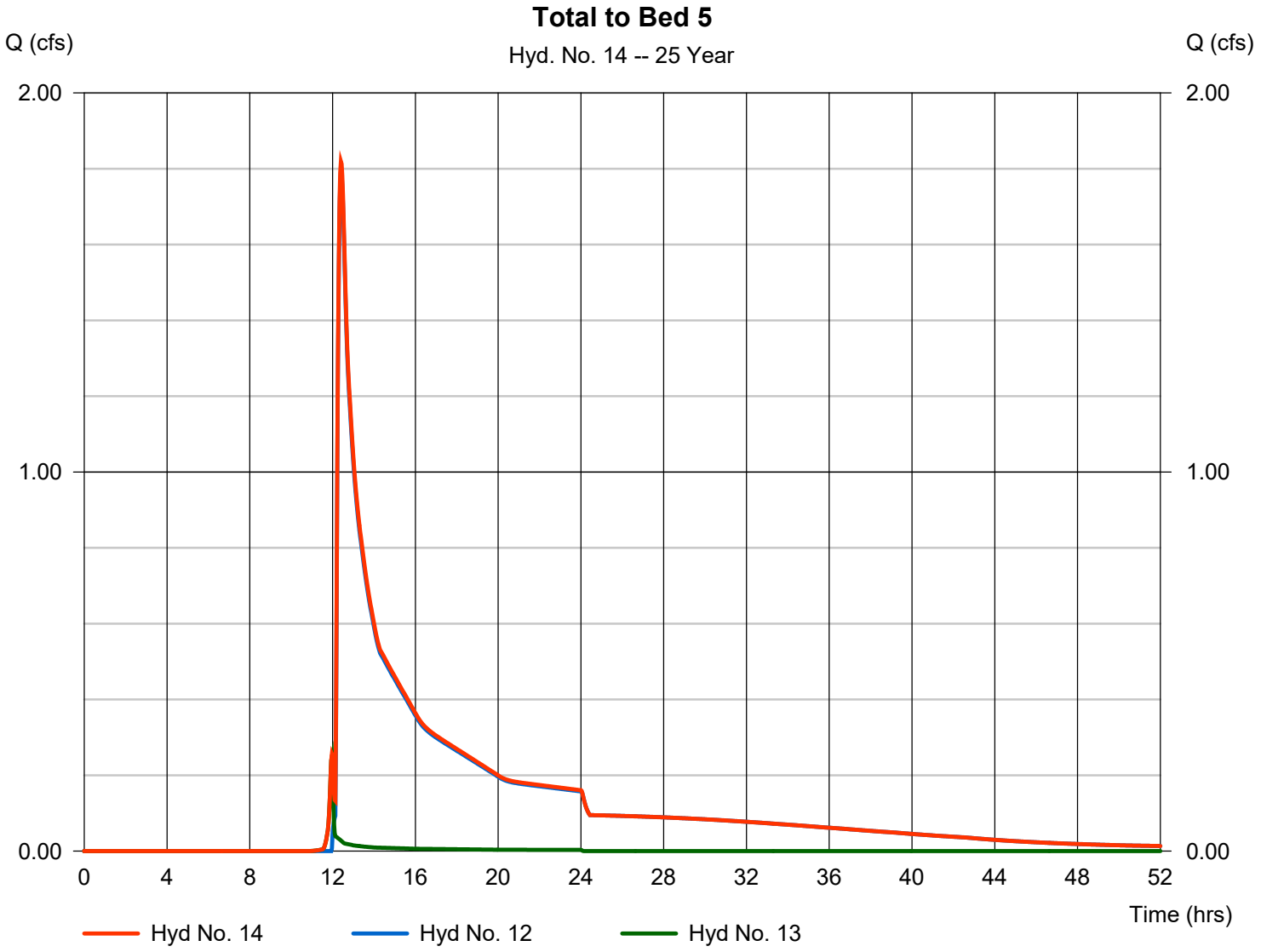


Hydrograph Report

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 1.819 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 23,085 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



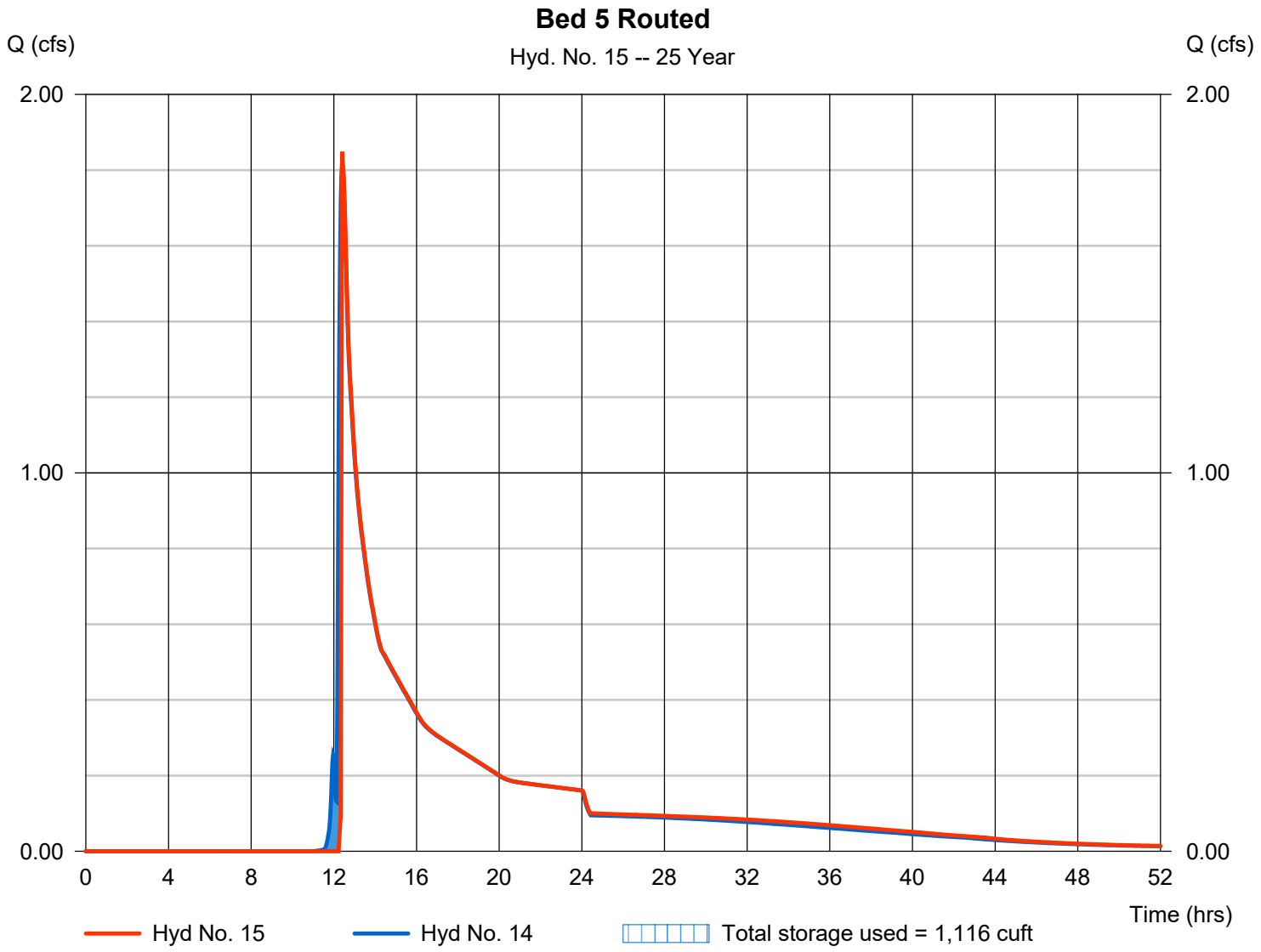
Hydrograph Report

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 1.848 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 22,587 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 421.26 ft
Reservoir name	= Bed 5	Max. Storage	= 1,116 cuft

Storage Indication method used.



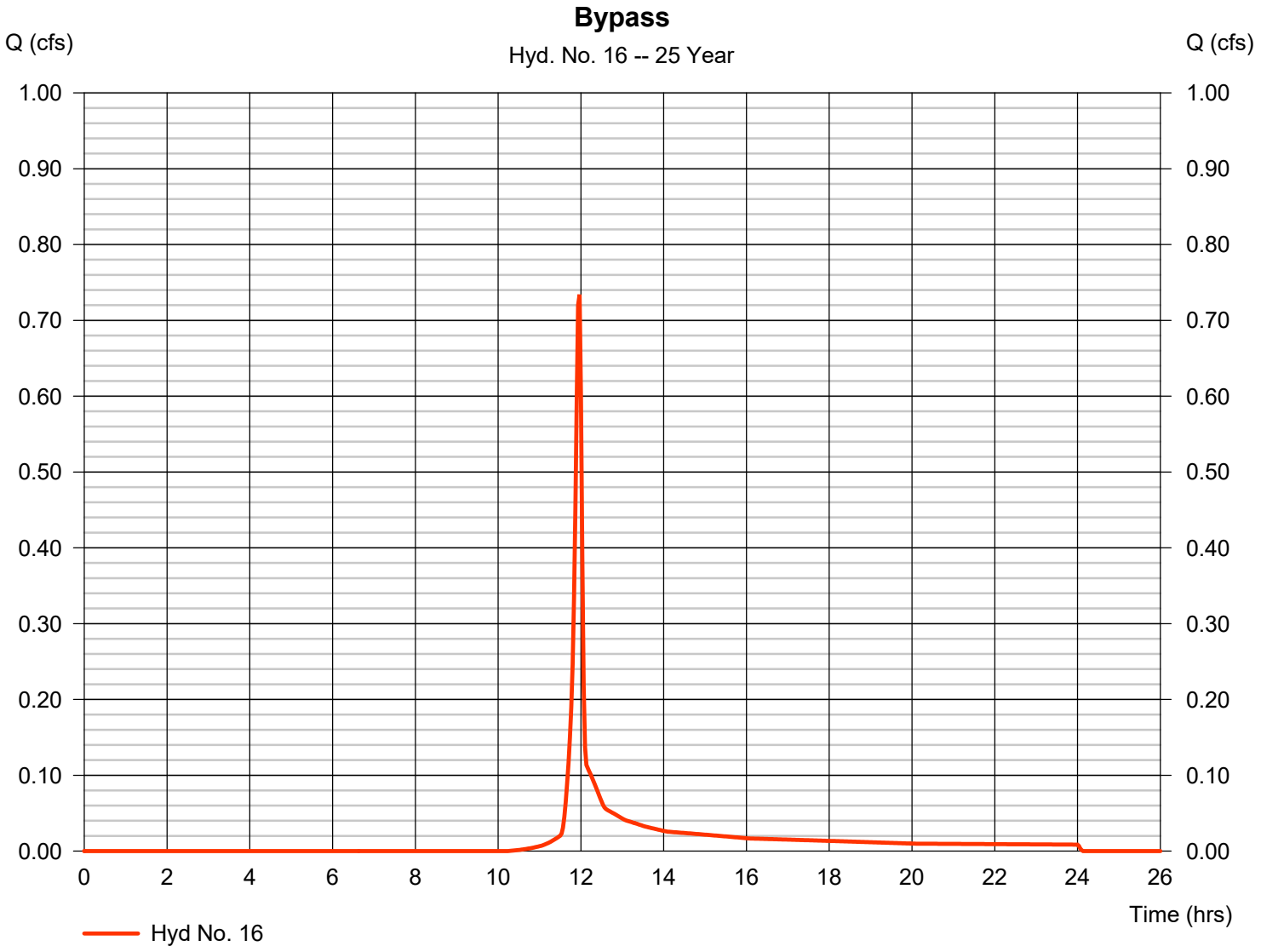
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 16

Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.734 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 1,468 cuft
Drainage area	= 0.200 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



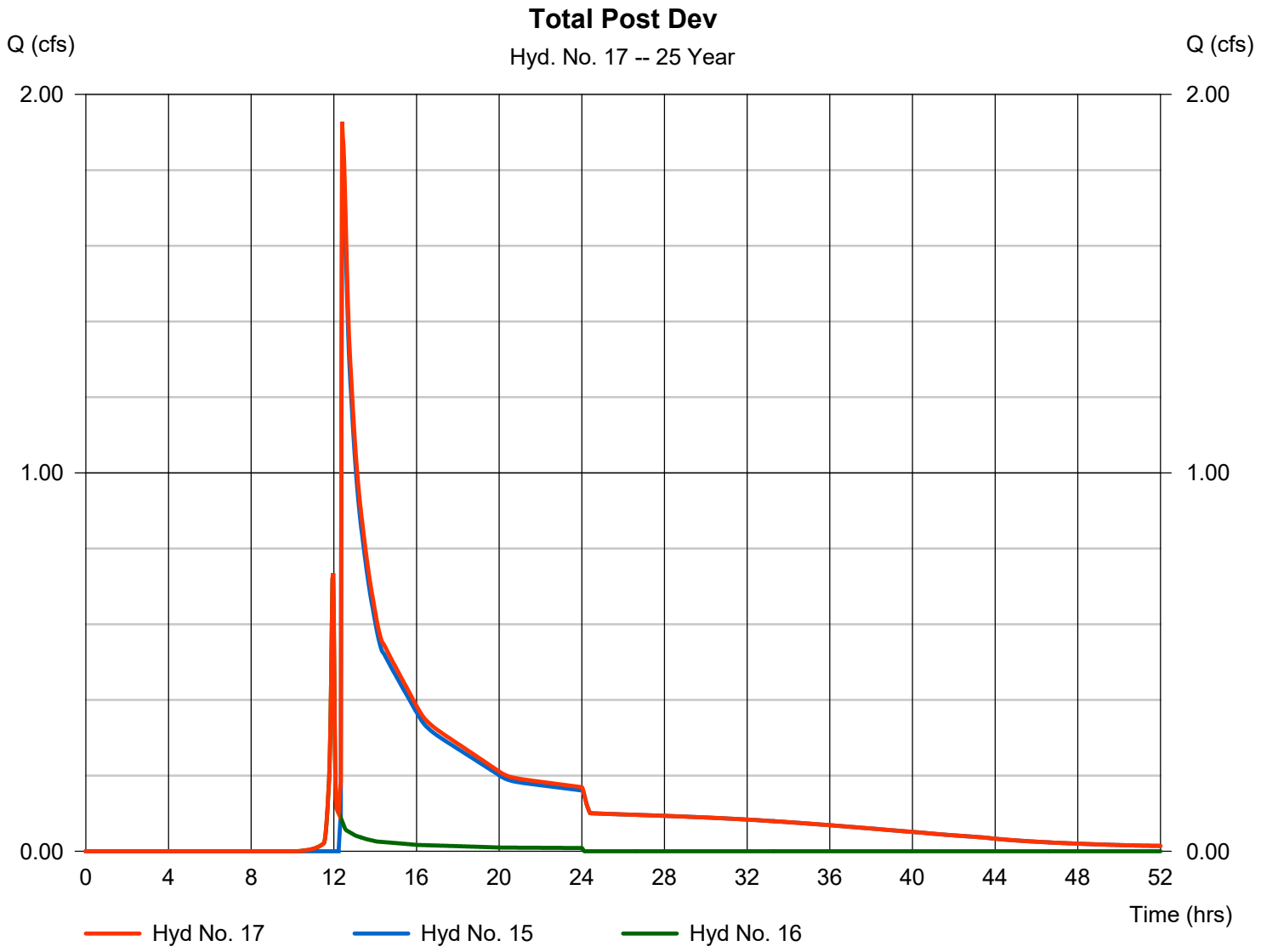
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 1.928 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 24,055 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	16.21	2	722	42,492	------	------	------	Pre Dev
2	SCS Runoff	10.85	2	716	22,115	------	------	------	Post Dev-Bed 1
3	Reservoir	0.156	2	1100	8,286	2	440.91	18,002	Bed 1 routed
4	SCS Runoff	3.907	2	716	7,942	------	------	------	Post Dev-Bed 2
5	Combine	3.907	2	716	16,229	3, 4	------	------	Total to Bed 2
6	Reservoir	0.071	2	1770	6,216	5	438.55	11,810	Bed 2 Routed
7	SCS Runoff	10.90	2	716	22,691	------	------	------	Post Dev-Bed 3
8	Combine	10.90	2	716	28,907	6, 7	------	------	Total to Bed 3
9	Reservoir	6.591	2	722	21,883	8	434.25	10,417	Bed 3 Routed
10	SCS Runoff	10.36	2	716	22,039	------	------	------	Post Dev-Bed 4
11	Combine	14.21	2	720	43,922	9, 10	------	------	Total to Bed 4
12	Reservoir	5.887	2	726	35,582	11	423.47	14,426	Bed 4 Routed
13	SCS Runoff	0.325	2	718	650	------	------	------	Post Dev-Bed 5
14	Combine	5.948	2	726	36,233	12, 13	------	------	Total to Bed 5
15	Reservoir	6.413	2	726	35,734	14	421.67	1,293	Bed 5 Routed
16	SCS Runoff	0.939	2	718	1,883	------	------	------	Bypass
17	Combine	6.585	2	726	37,617	15, 16	------	------	Total Post Dev

Hydrograph Report

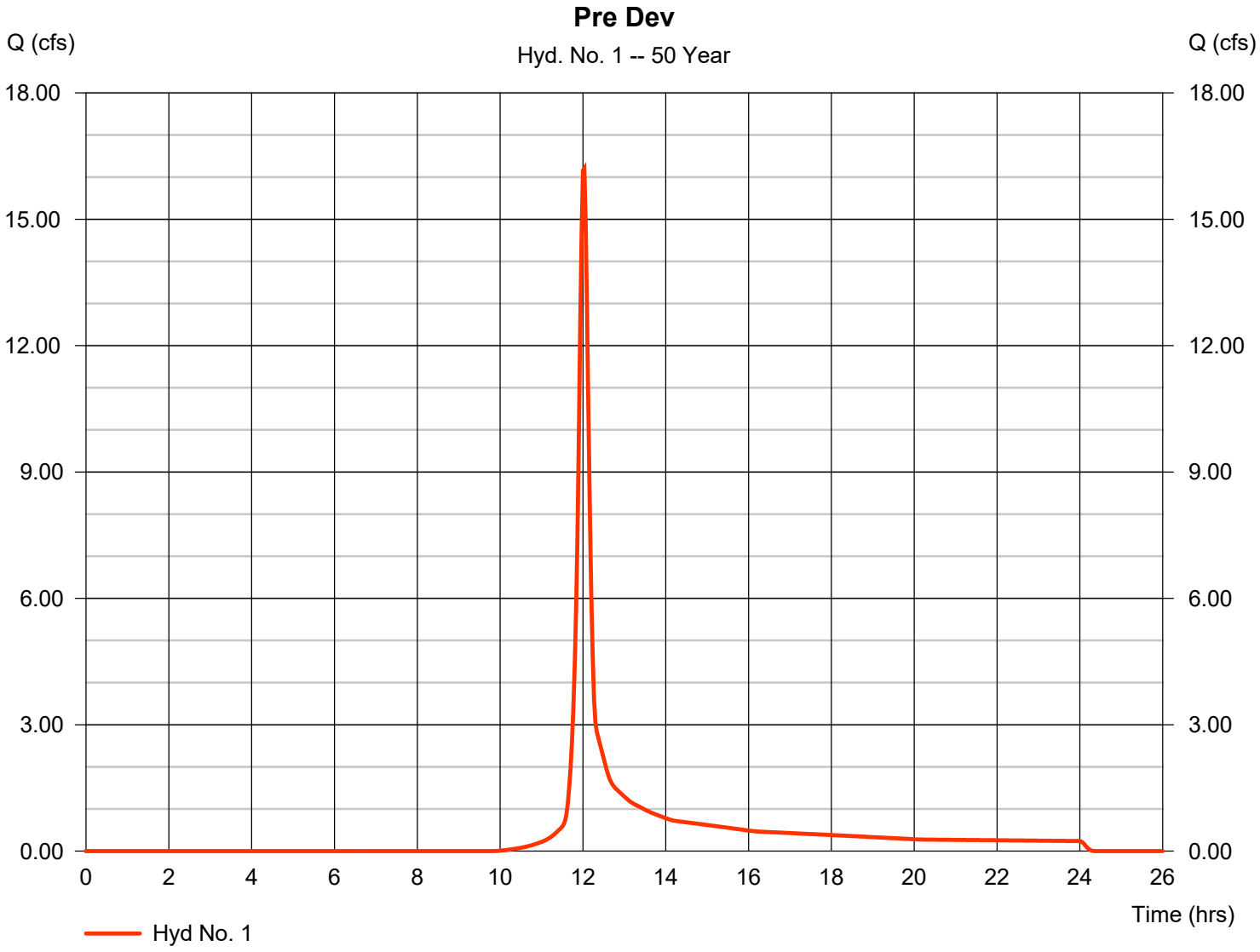
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 16.21 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 42,492 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



Hydrograph Report

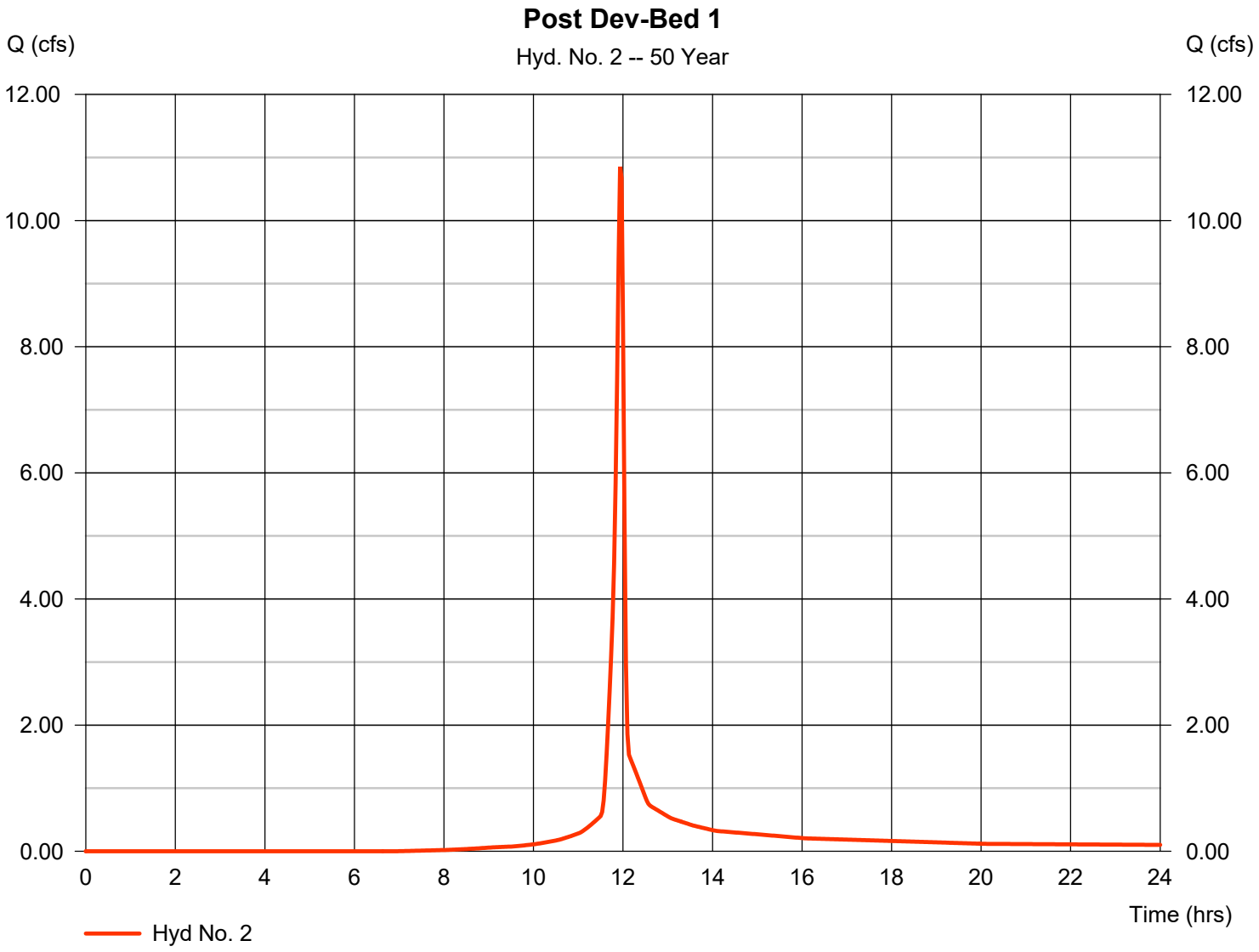
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 10.85 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 22,115 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



Hydrograph Report

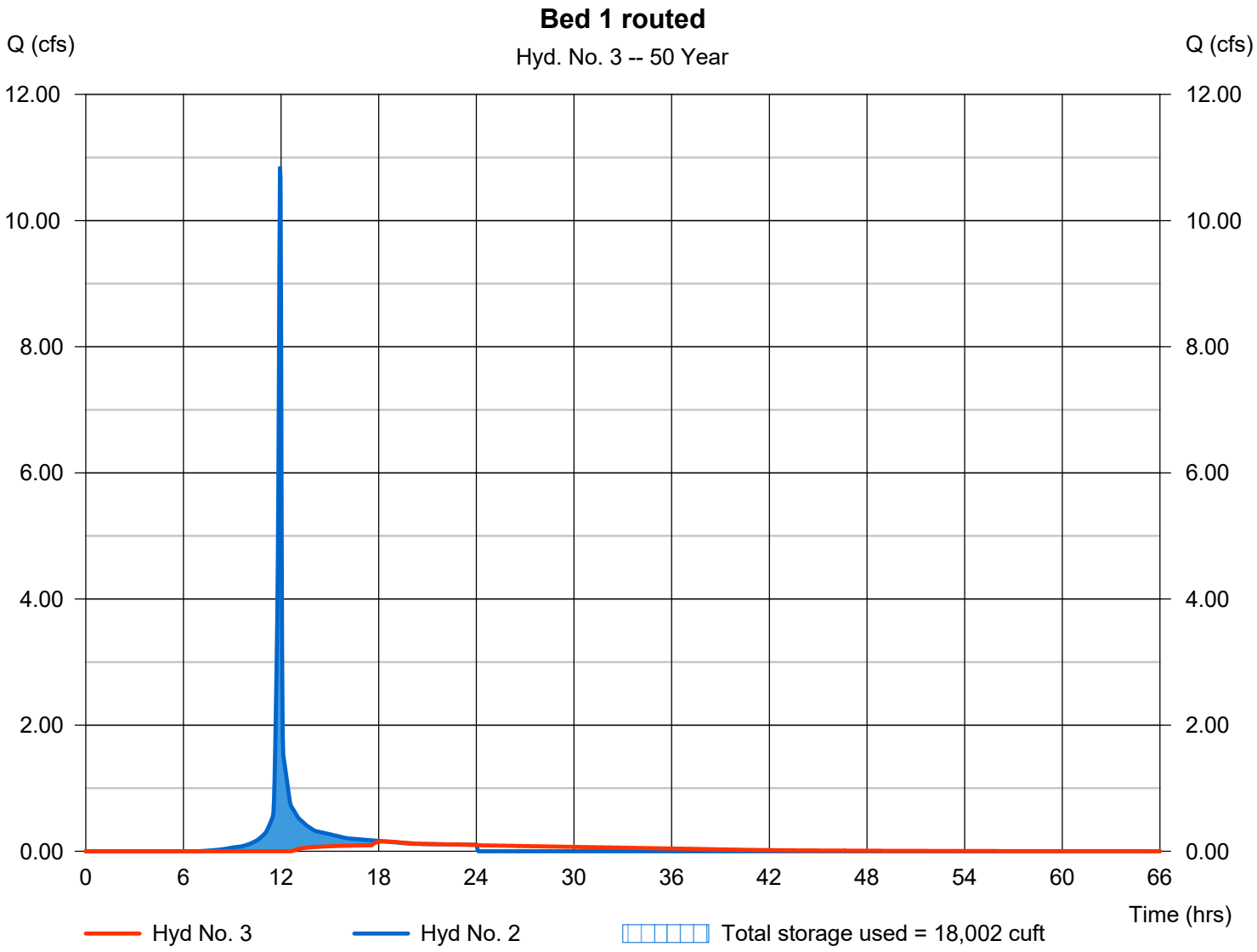
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 1 routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.156 cfs
Storm frequency	=	50 yrs	Time to peak	=	18.33 hrs
Time interval	=	2 min	Hyd. volume	=	8,286 cuft
Inflow hyd. No.	=	2 - Post Dev-Bed 1	Max. Elevation	=	440.91 ft
Reservoir name	=	Bed 1	Max. Storage	=	18,002 cuft

Storage Indication method used.



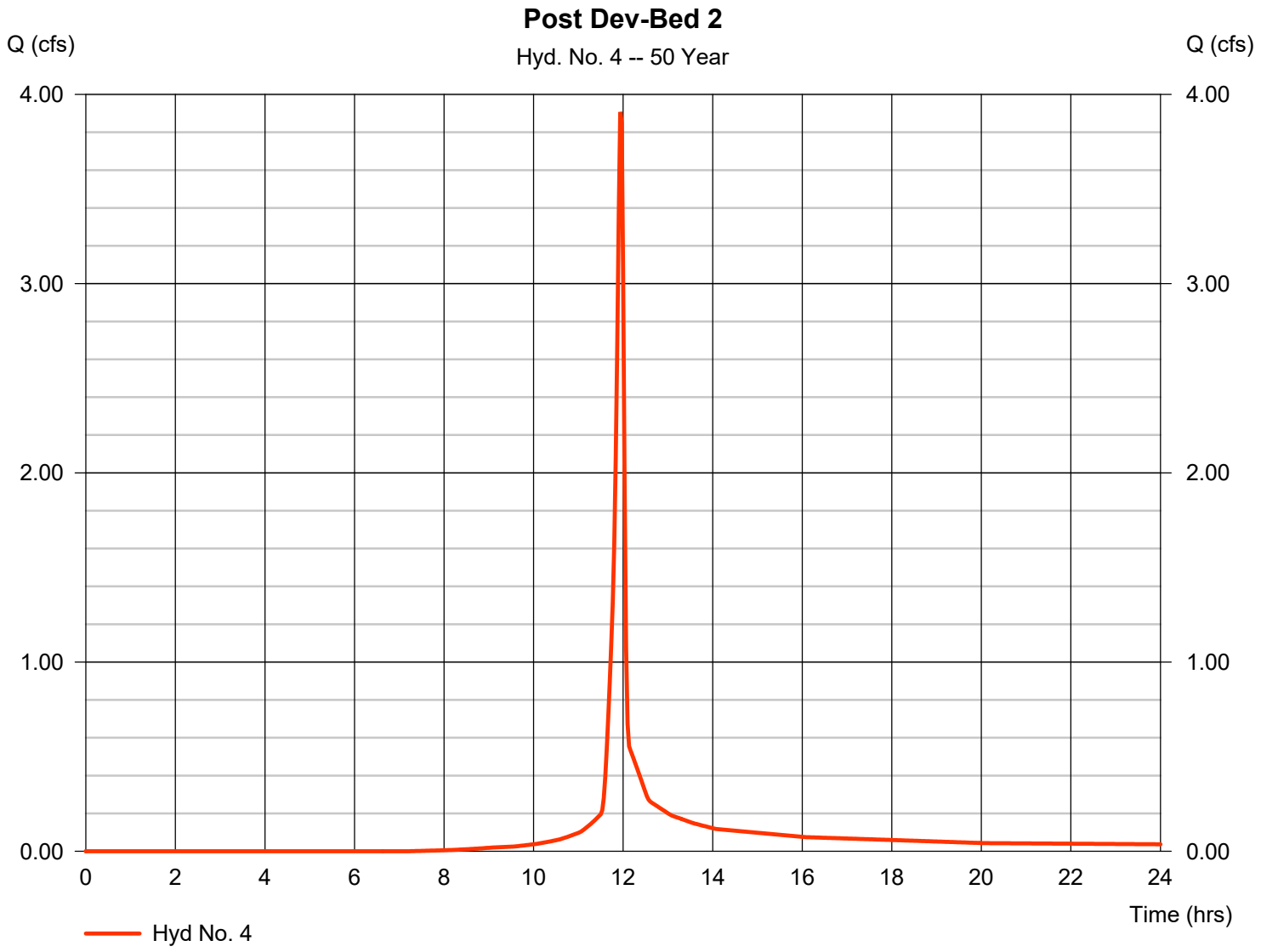
Hydrograph Report

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.907 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 7,942 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620



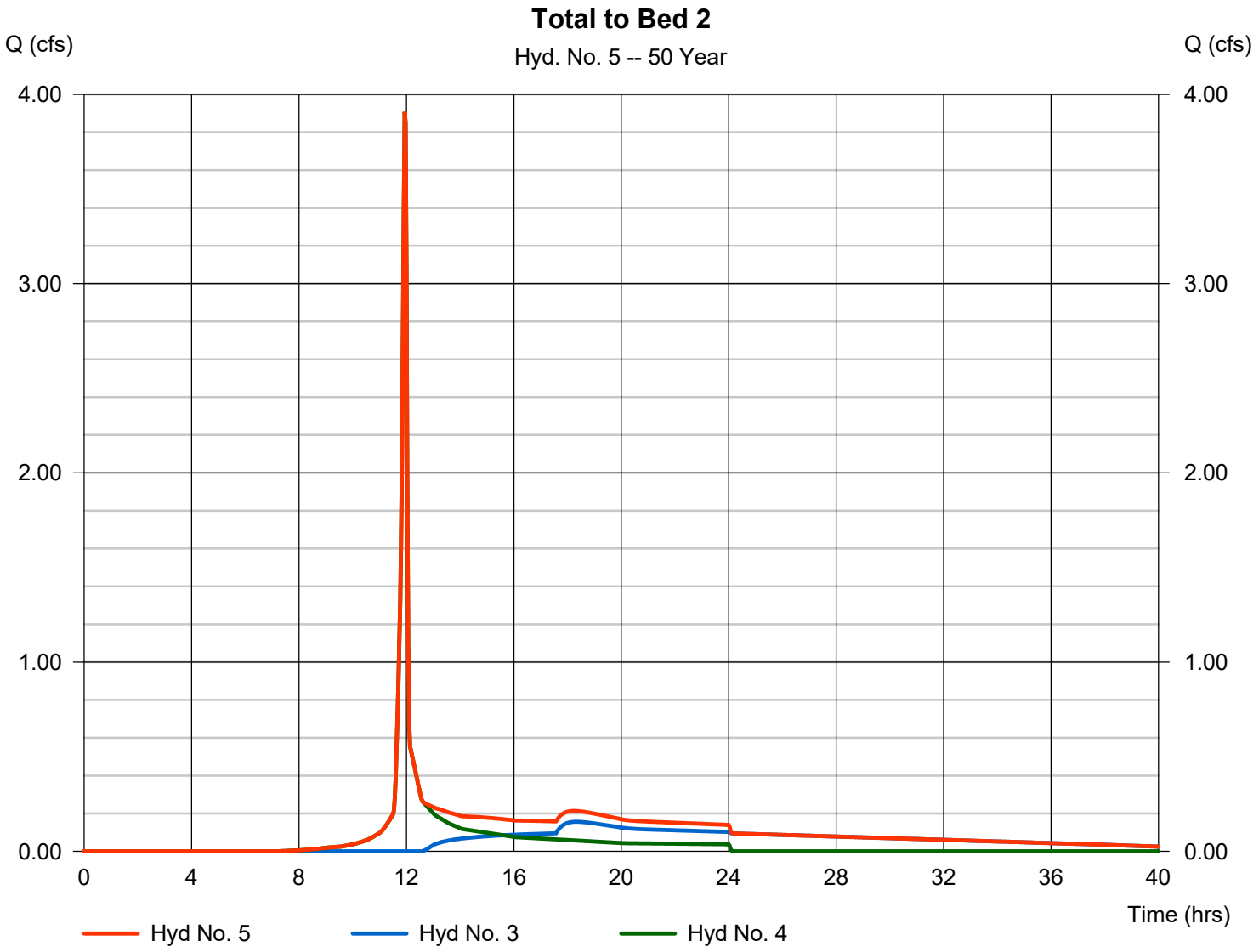
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 3.907 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 16,229 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



Hydrograph Report

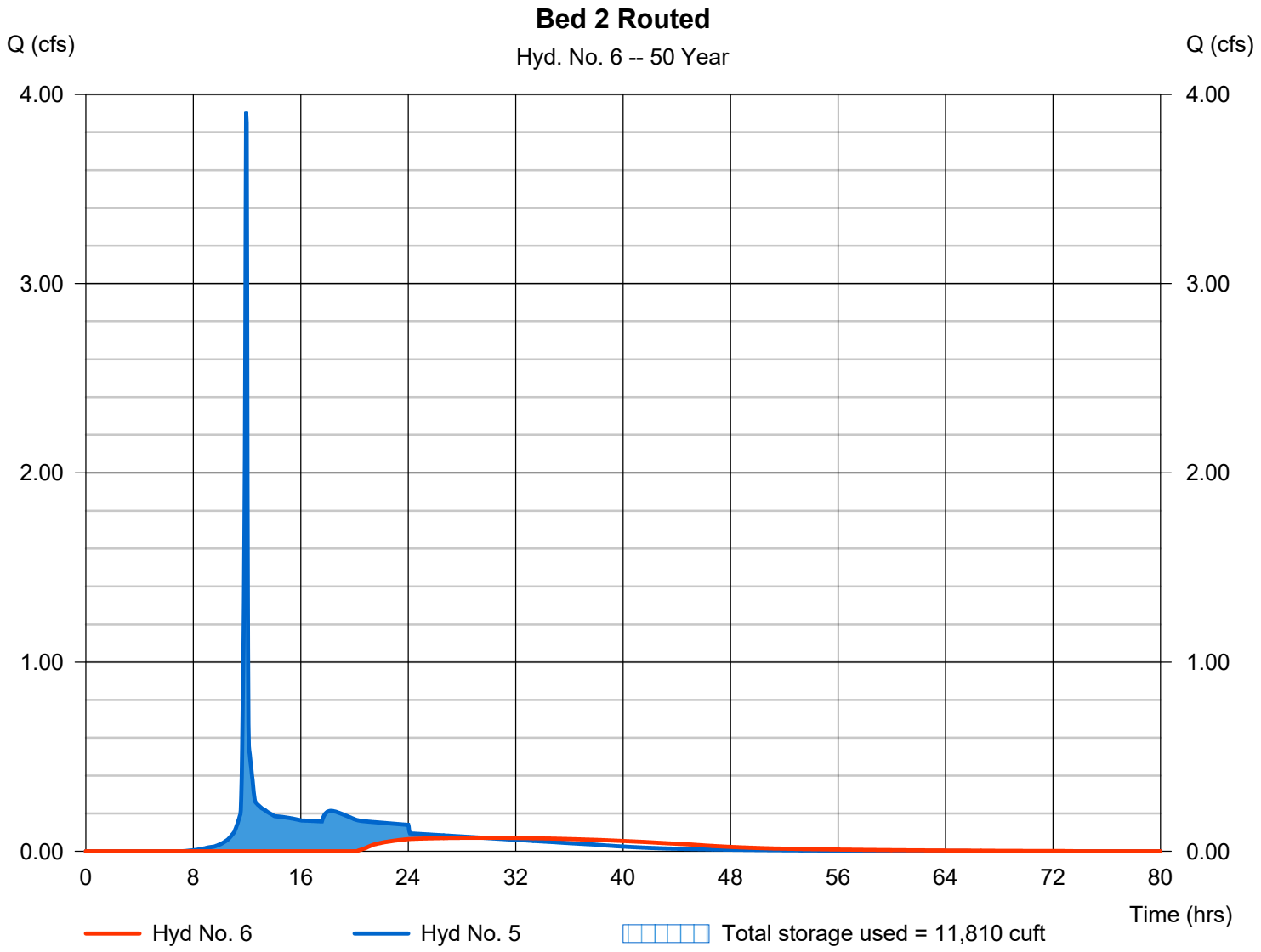
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 6

Bed 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.071 cfs
Storm frequency	=	50 yrs	Time to peak	=	29.50 hrs
Time interval	=	2 min	Hyd. volume	=	6,216 cuft
Inflow hyd. No.	=	5 - Total to Bed 2	Max. Elevation	=	438.55 ft
Reservoir name	=	Bed 2	Max. Storage	=	11,810 cuft

Storage Indication method used.



Hydrograph Report

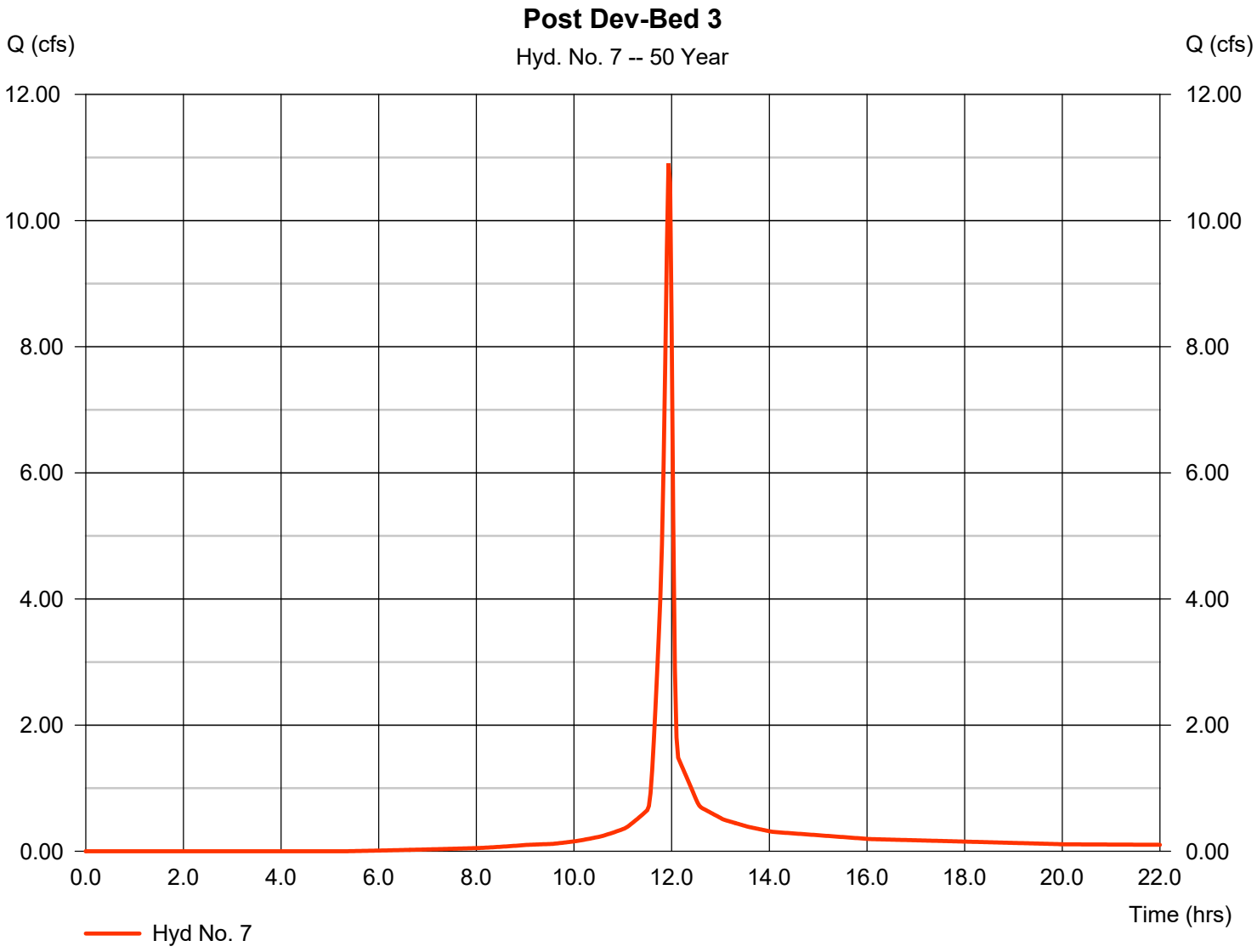
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 10.90 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 22,691 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480

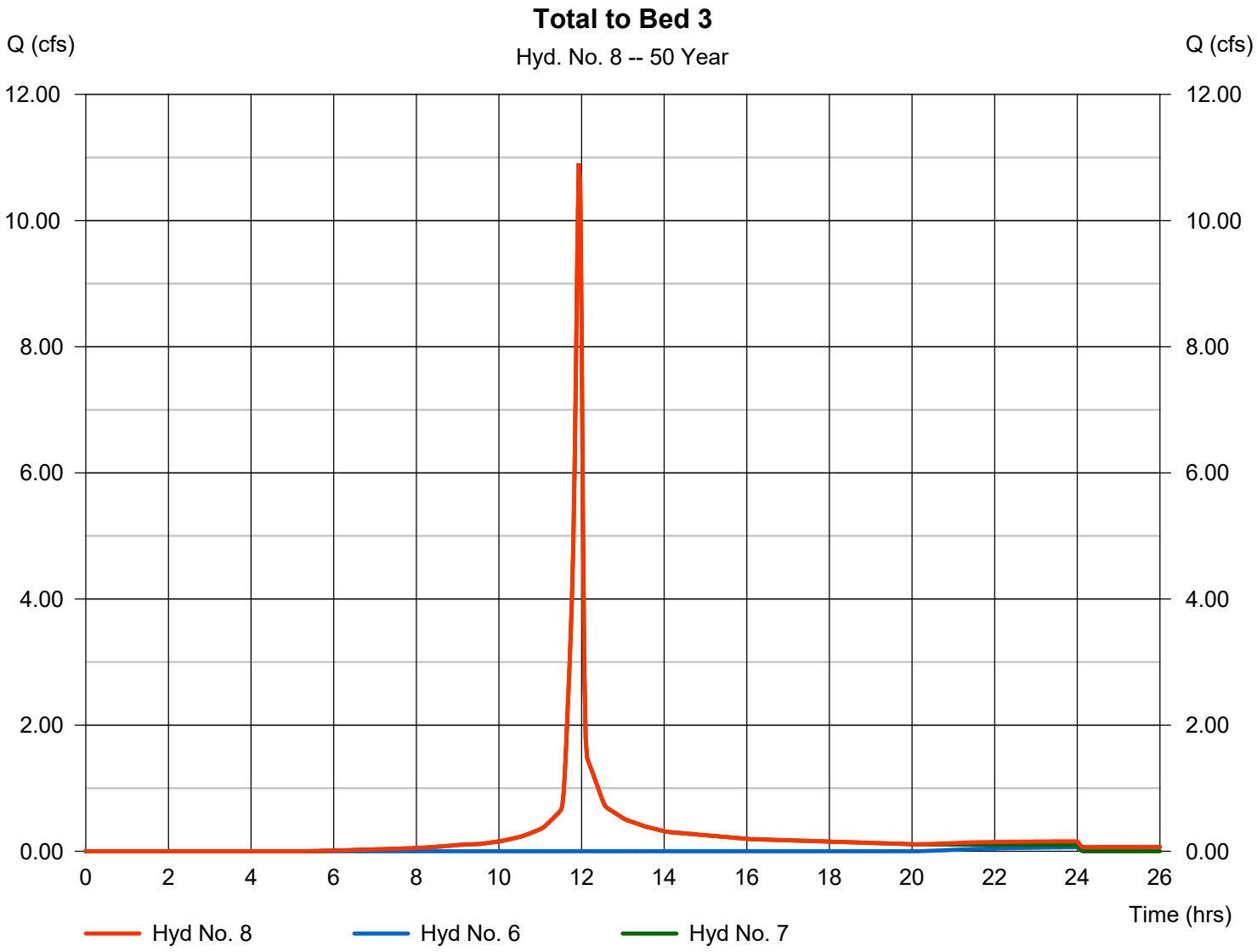


Hydrograph Report

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 10.90 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 28,907 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



Hydrograph Report

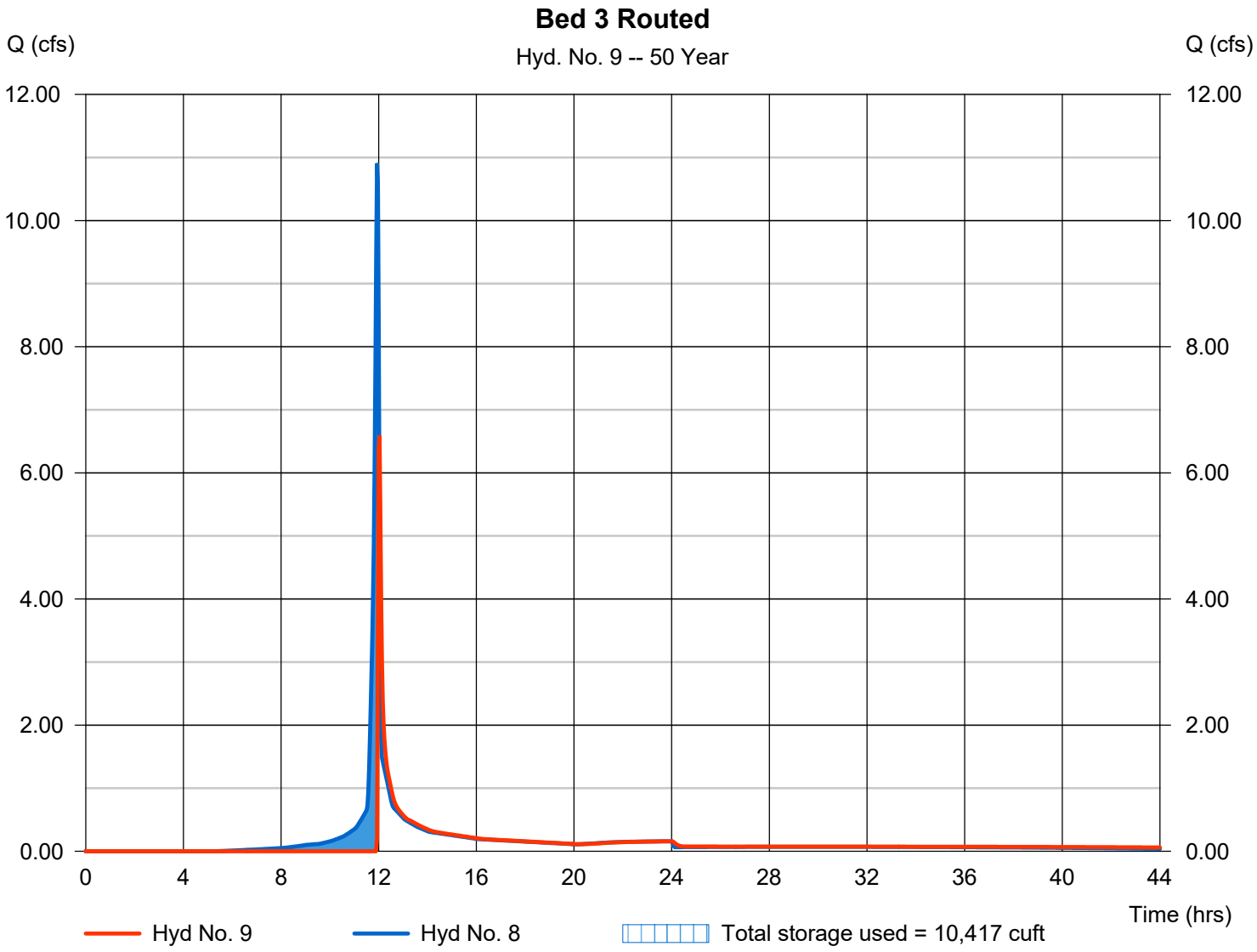
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 9

Bed 3 Routed

Hydrograph type	= Reservoir	Peak discharge	= 6.591 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 21,883 cuft
Inflow hyd. No.	= 8 - Total to Bed 3	Max. Elevation	= 434.25 ft
Reservoir name	= Bed 3	Max. Storage	= 10,417 cuft

Storage Indication method used.



Hydrograph Report

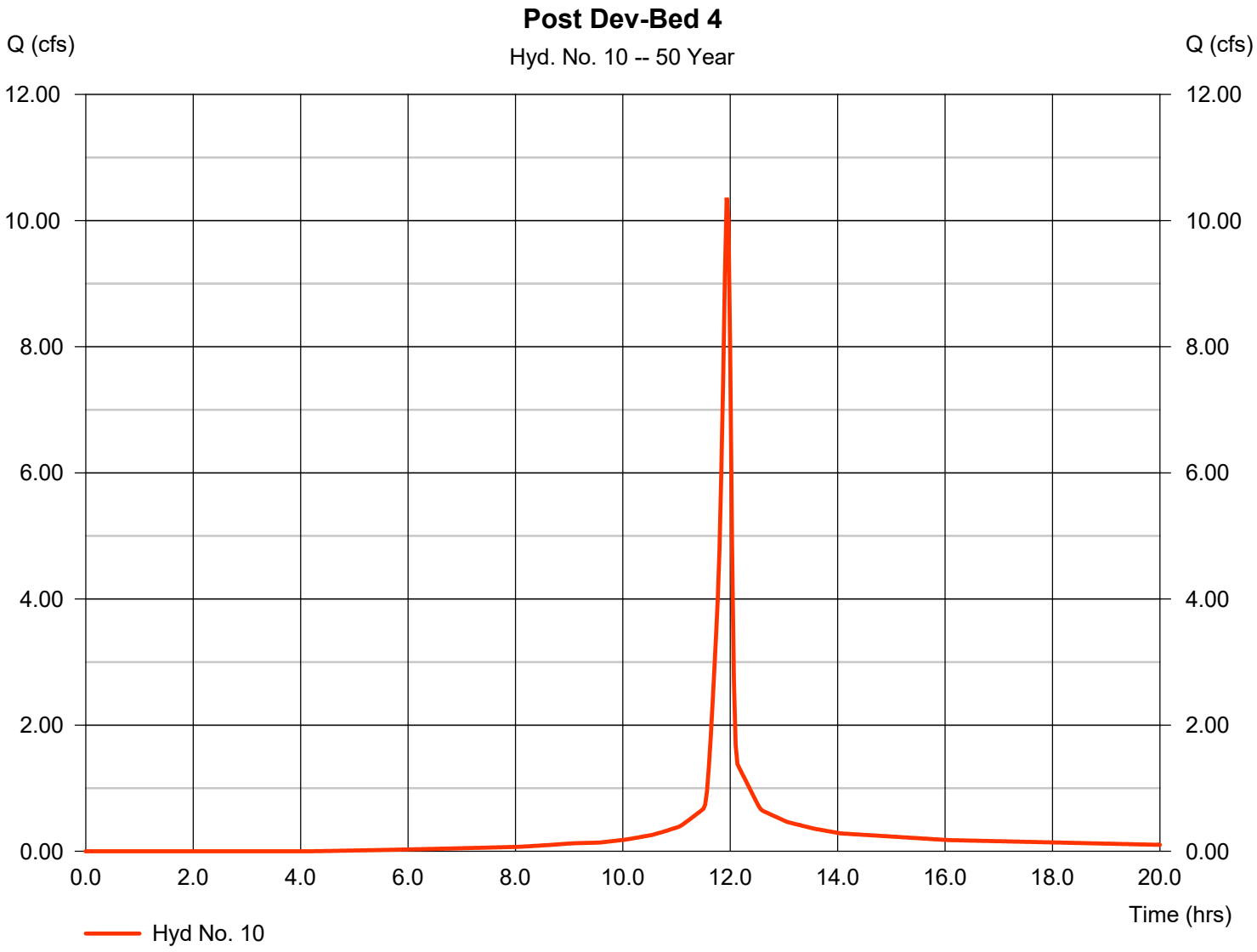
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 10.36 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 22,039 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310



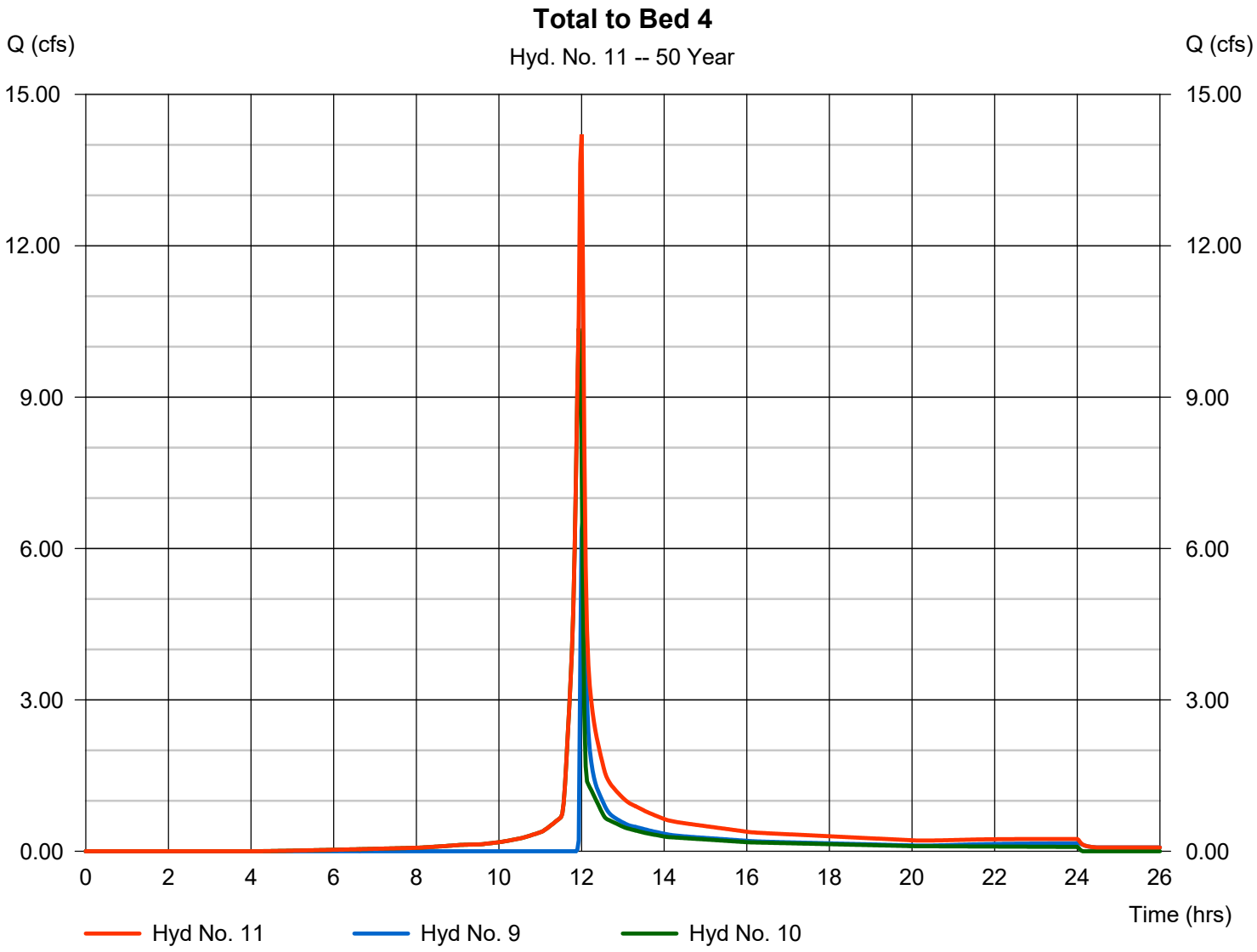
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 14.21 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 43,922 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

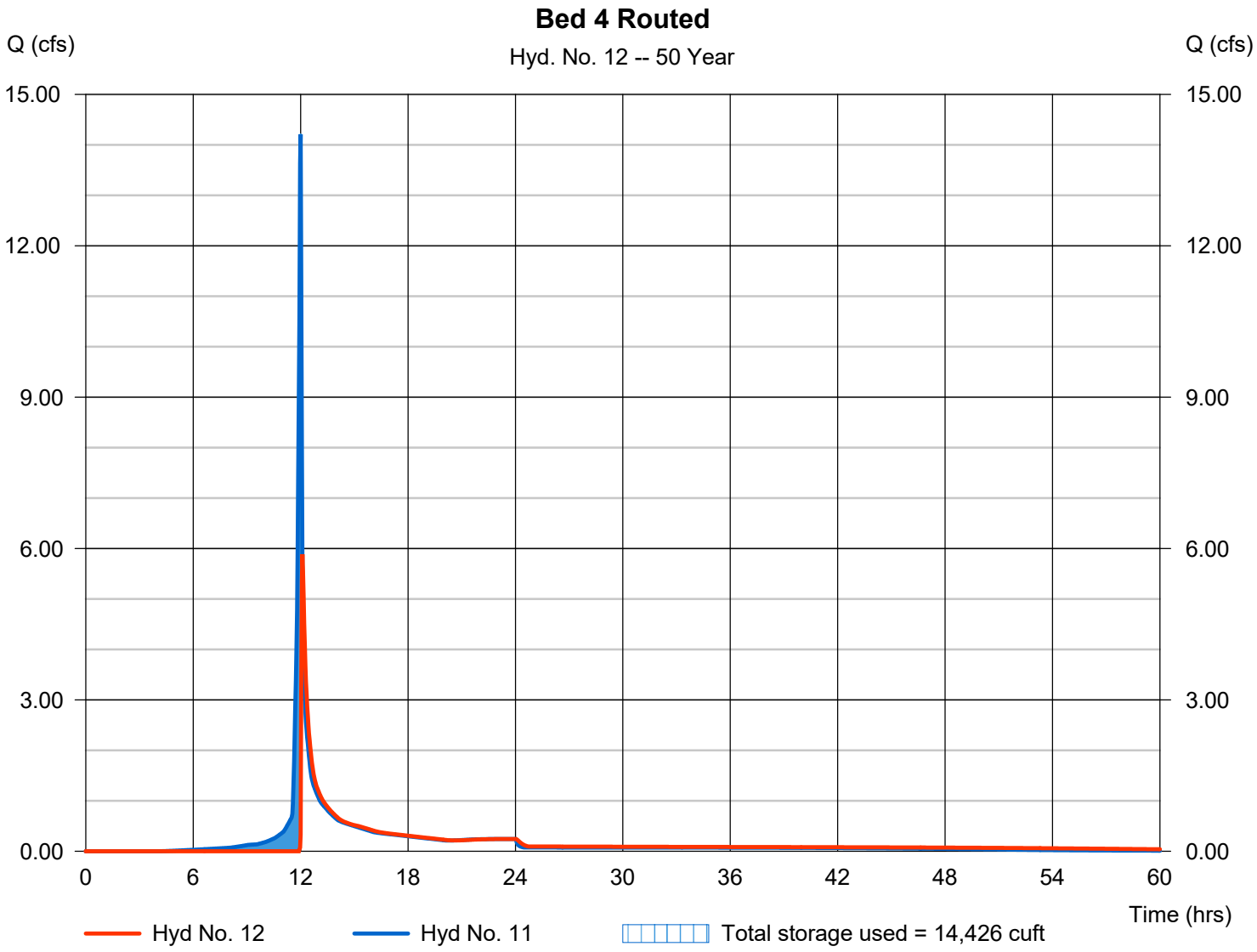
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	5.887 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	35,582 cuft
Inflow hyd. No.	=	11 - Total to Bed 4	Max. Elevation	=	423.47 ft
Reservoir name	=	Bed 4	Max. Storage	=	14,426 cuft

Storage Indication method used.



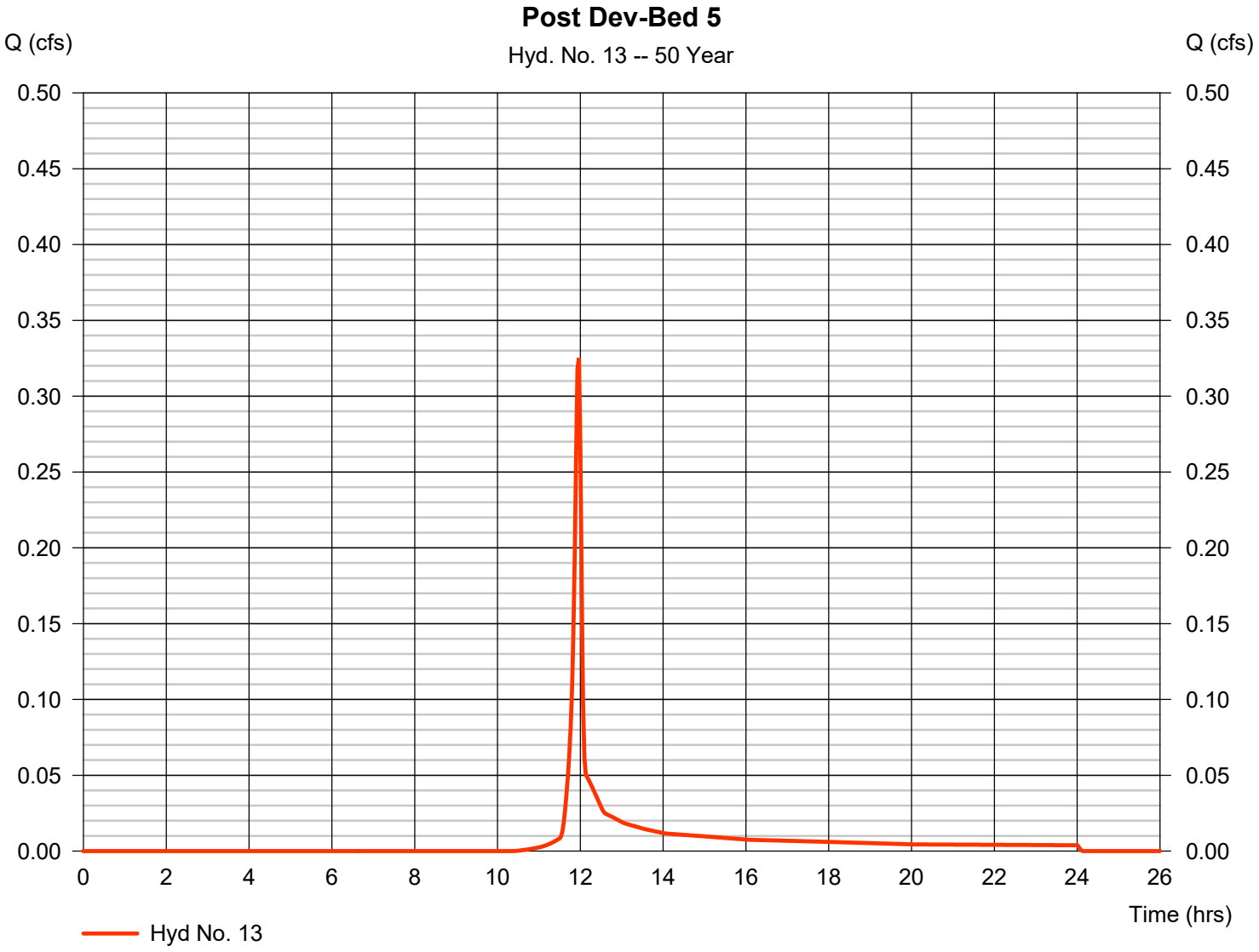
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.325 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 650 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

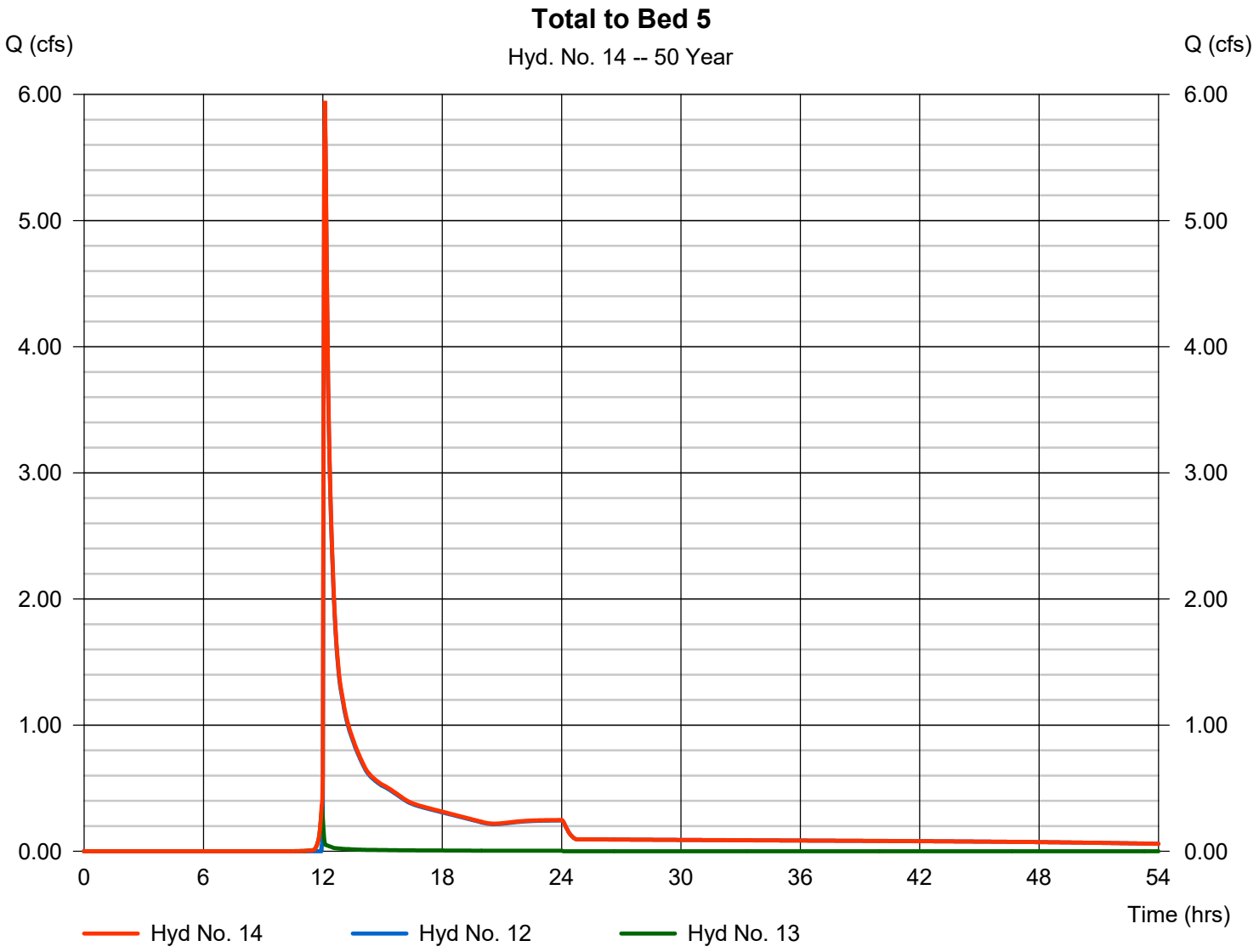


Hydrograph Report

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 5.948 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 36,233 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



Hydrograph Report

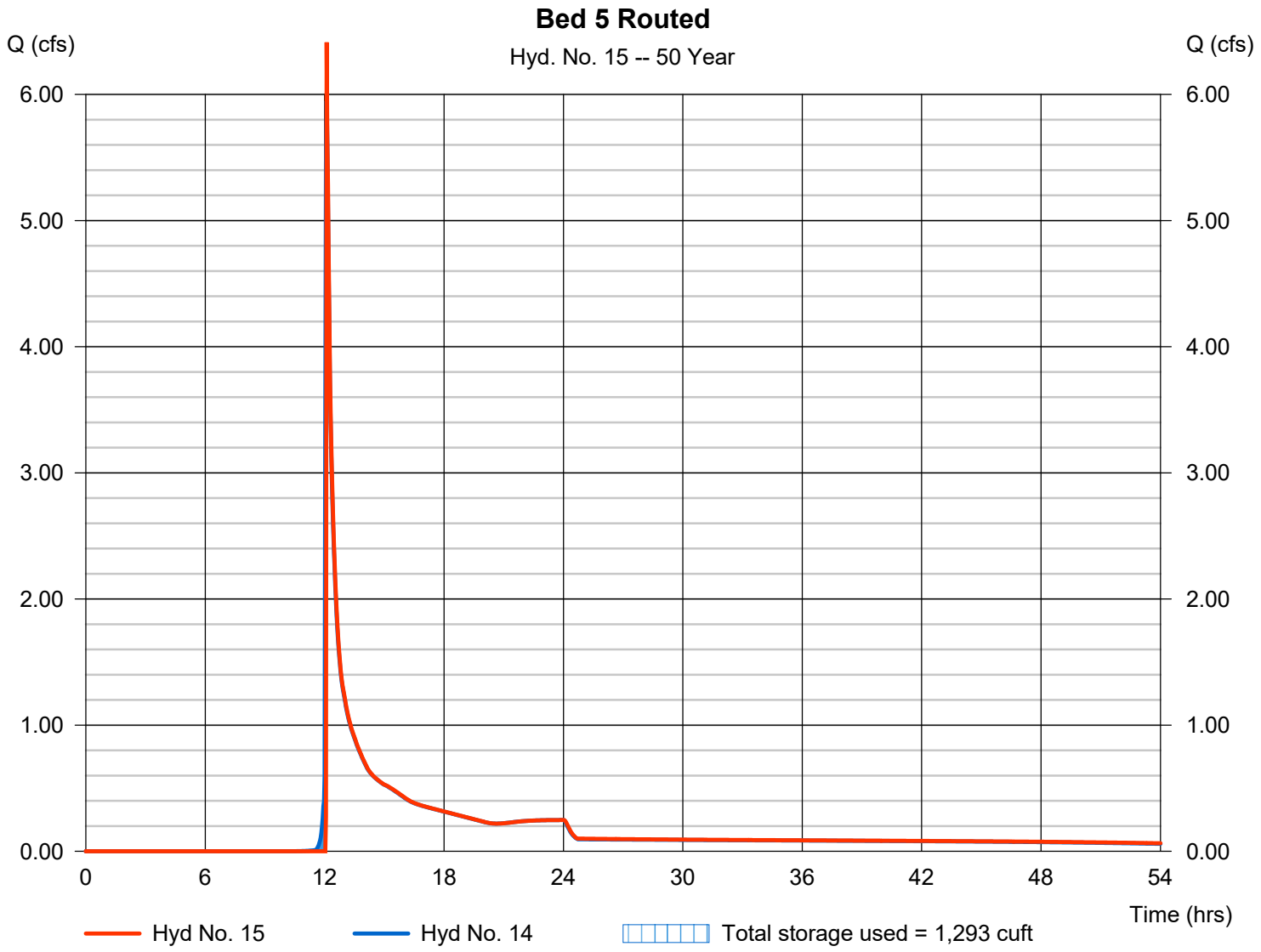
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 6.413 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 35,734 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 421.67 ft
Reservoir name	= Bed 5	Max. Storage	= 1,293 cuft

Storage Indication method used.



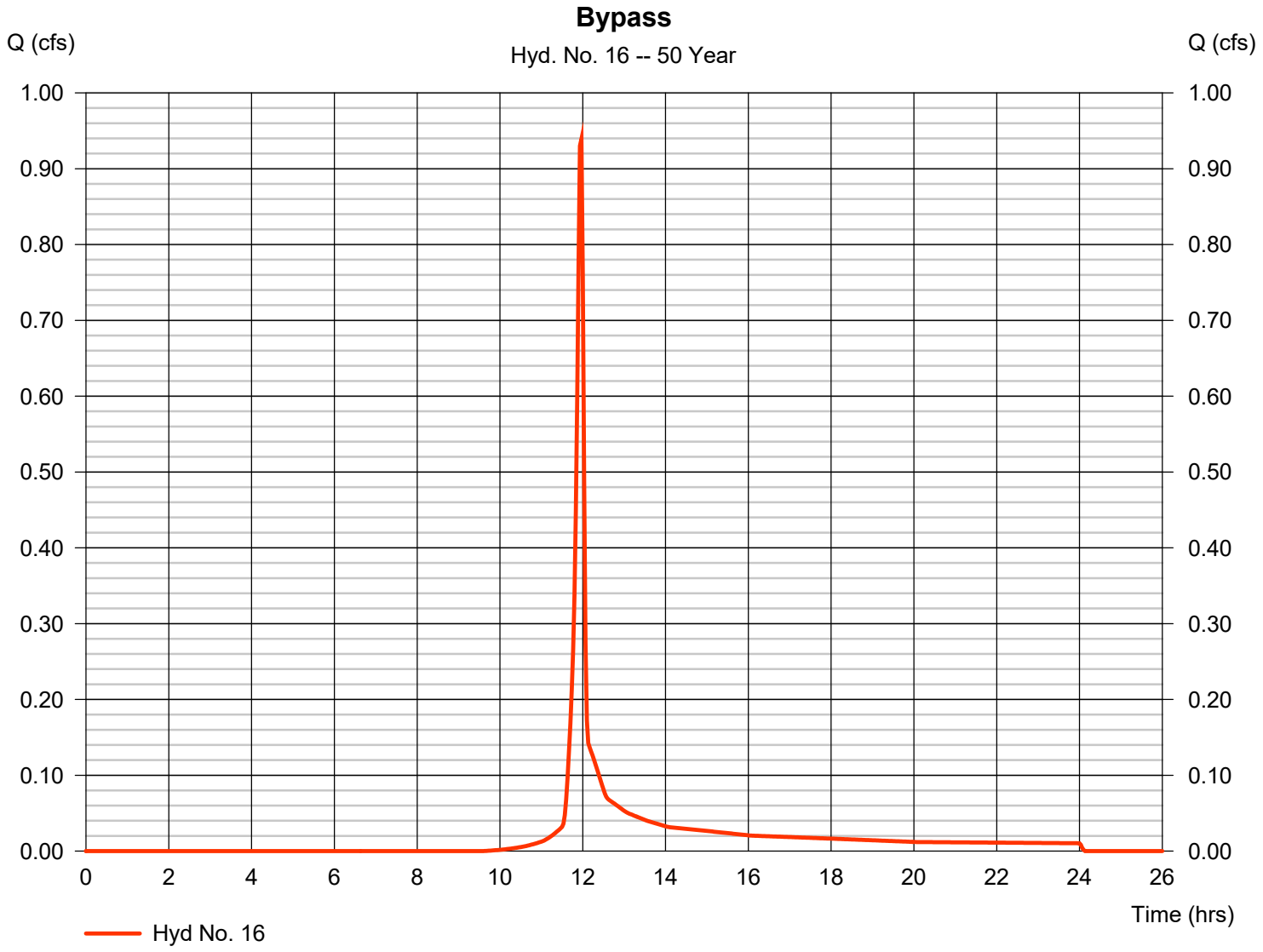
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 16

Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.939 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	1,883 cuft
Drainage area	=	0.200 ac	Curve number	=	65
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.56 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

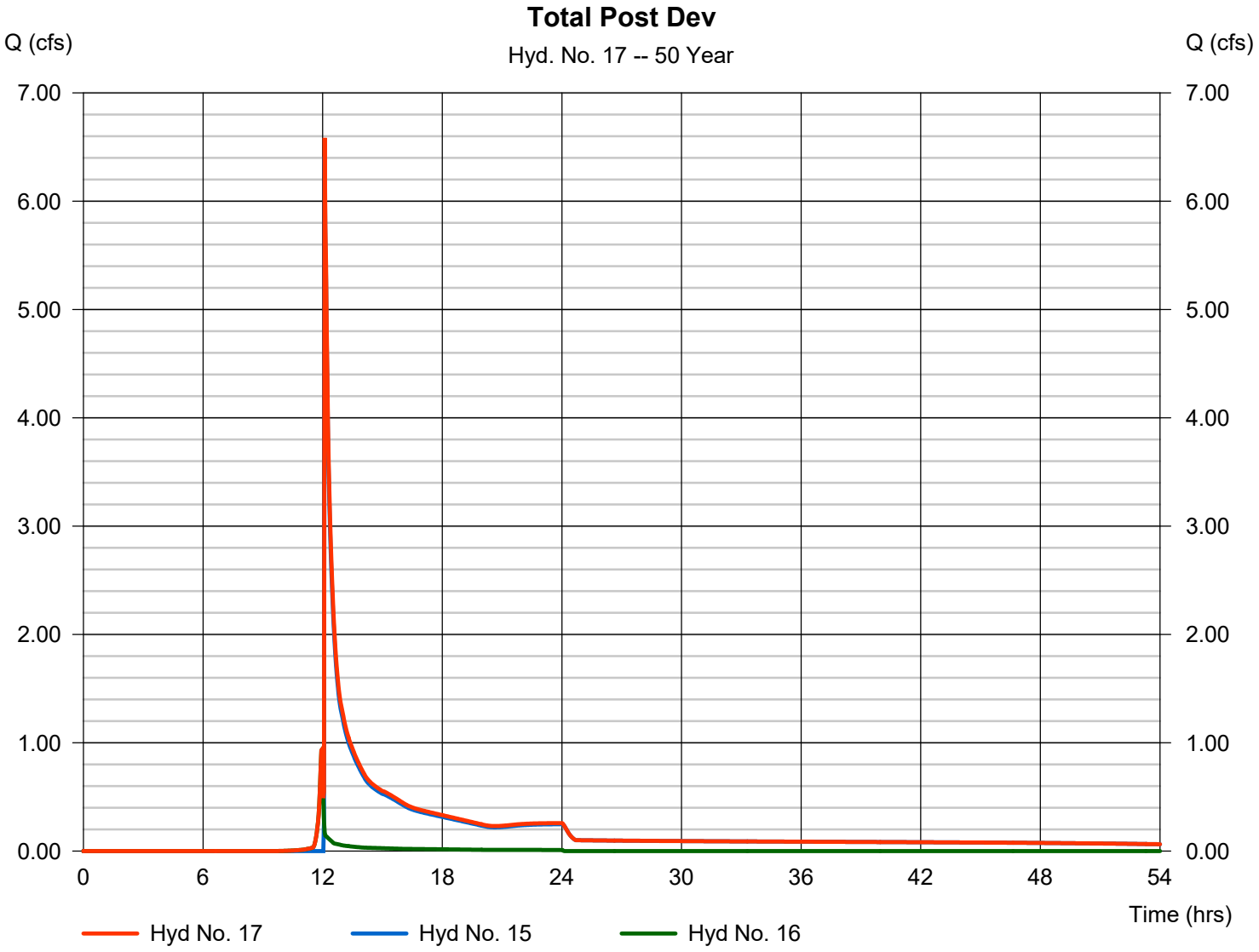


Hydrograph Report

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 6.585 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 37,617 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	20.43	2	720	53,261	------	------	------	Pre Dev
2	SCS Runoff	12.99	2	716	26,643	------	------	------	Post Dev-Bed 1
3	Reservoir	0.444	2	824	12,815	2	440.98	18,312	Bed 1 routed
4	SCS Runoff	4.693	2	716	9,597	------	------	------	Post Dev-Bed 2
5	Combine	4.693	2	716	22,412	3, 4	------	------	Total to Bed 2
6	Reservoir	0.256	2	1100	12,399	5	438.94	13,113	Bed 2 Routed
7	SCS Runoff	12.81	2	716	26,892	------	------	------	Post Dev-Bed 3
8	Combine	12.81	2	716	39,291	6, 7	------	------	Total to Bed 3
9	Reservoir	9.753	2	720	32,267	8	434.45	11,073	Bed 3 Routed
10	SCS Runoff	12.03	2	716	25,854	------	------	------	Post Dev-Bed 4
11	Combine	20.81	2	718	58,121	9, 10	------	------	Total to Bed 4
12	Reservoir	10.27	2	724	49,781	11	423.96	16,456	Bed 4 Routed
13	SCS Runoff	0.412	2	718	825	------	------	------	Post Dev-Bed 5
14	Combine	10.39	2	724	50,606	12, 13	------	------	Total to Bed 5
15	Reservoir	9.978	2	728	50,108	14	422.59	1,765	Bed 5 Routed
16	SCS Runoff	1.167	2	718	2,351	------	------	------	Bypass
17	Combine	10.18	2	726	52,459	15, 16	------	------	Total Post Dev

Hydrograph Report

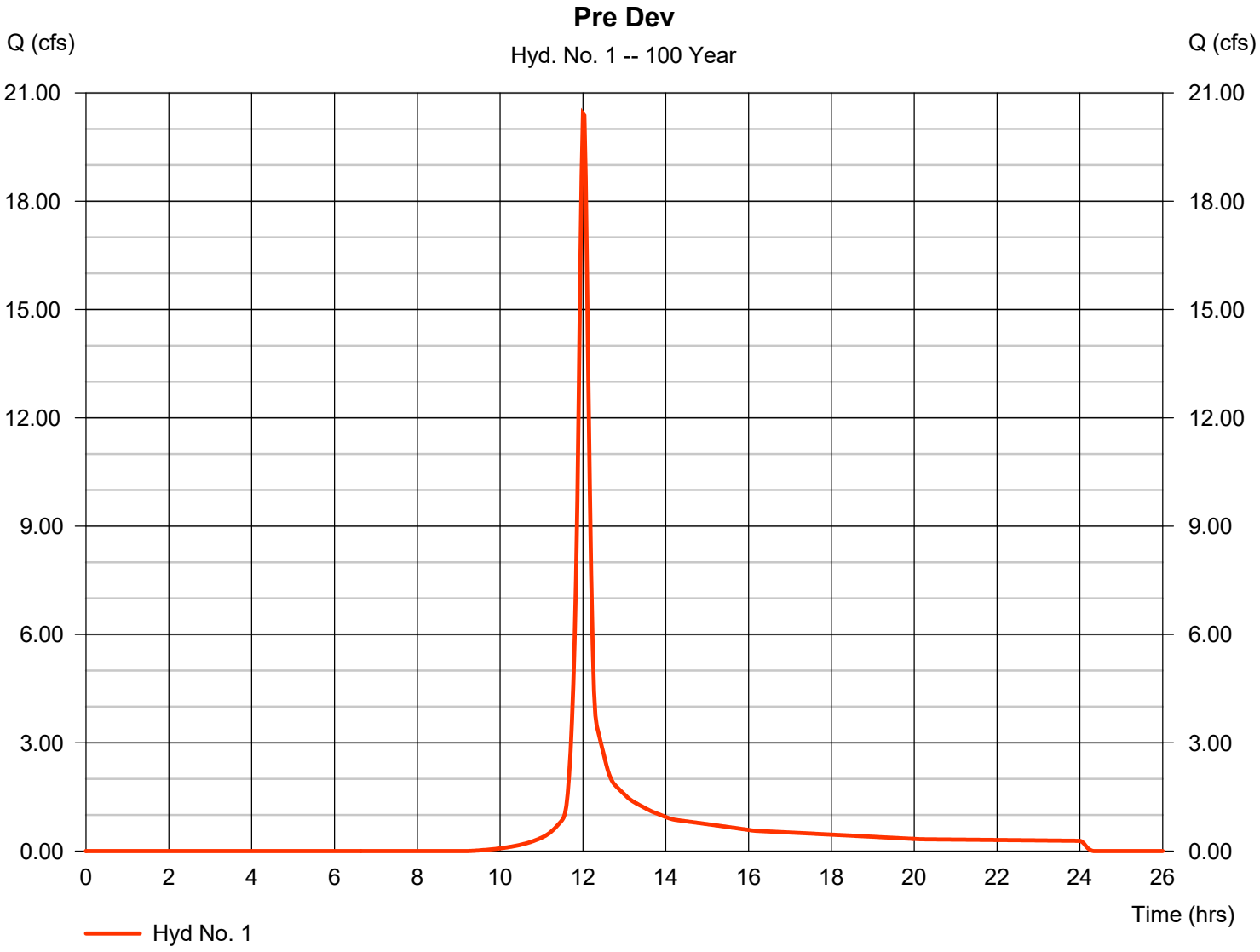
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 20.43 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 53,261 cuft
Drainage area	= 4.250 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.650 x 98) + (3.600 x 58)] / 4.250



Hydrograph Report

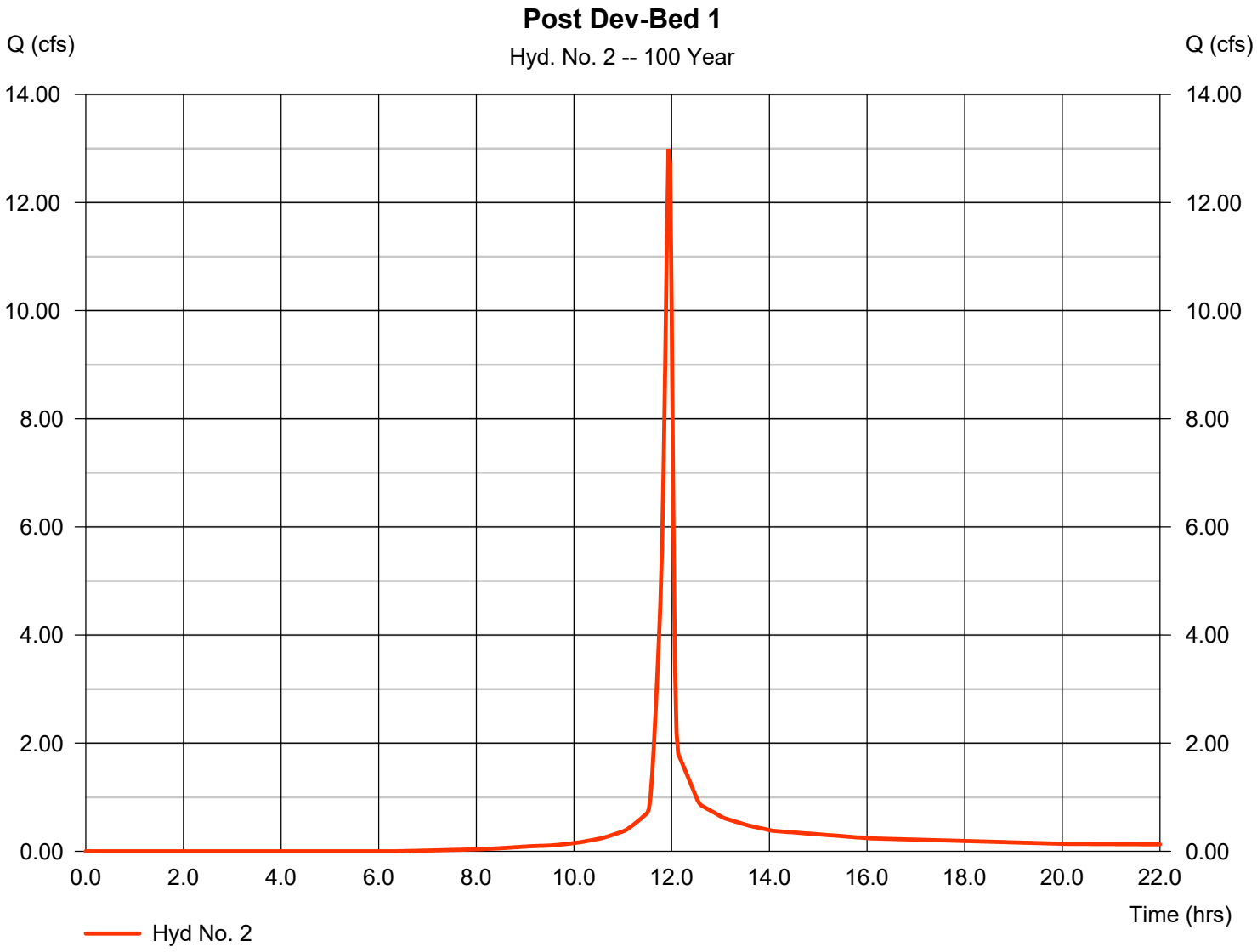
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev-Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 12.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 26,643 cuft
Drainage area	= 1.680 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.660 x 98) + (1.020 x 61)] / 1.680



Hydrograph Report

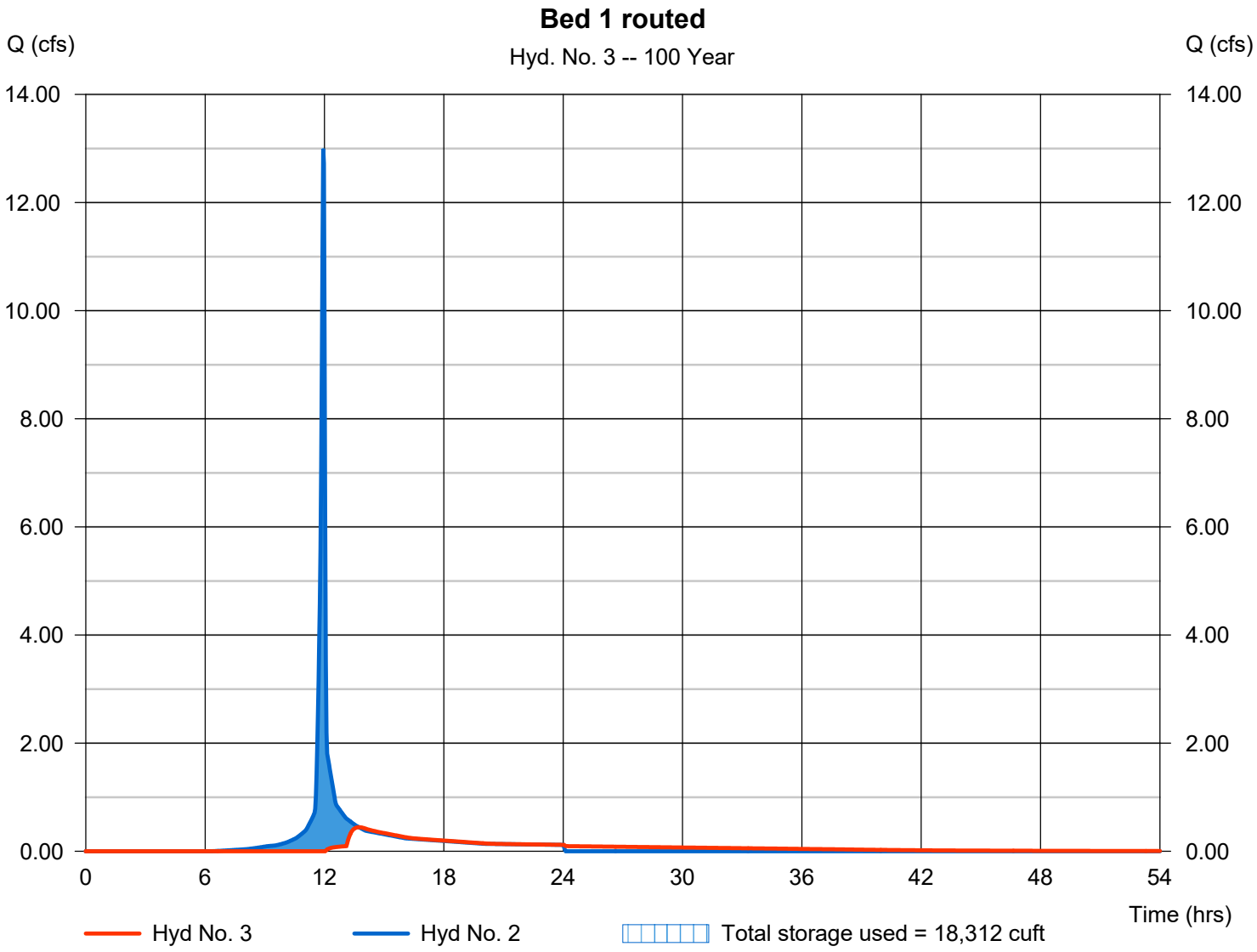
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 1 routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.444 cfs
Storm frequency	=	100 yrs	Time to peak	=	13.73 hrs
Time interval	=	2 min	Hyd. volume	=	12,815 cuft
Inflow hyd. No.	=	2 - Post Dev-Bed 1	Max. Elevation	=	440.98 ft
Reservoir name	=	Bed 1	Max. Storage	=	18,312 cuft

Storage Indication method used.



Hydrograph Report

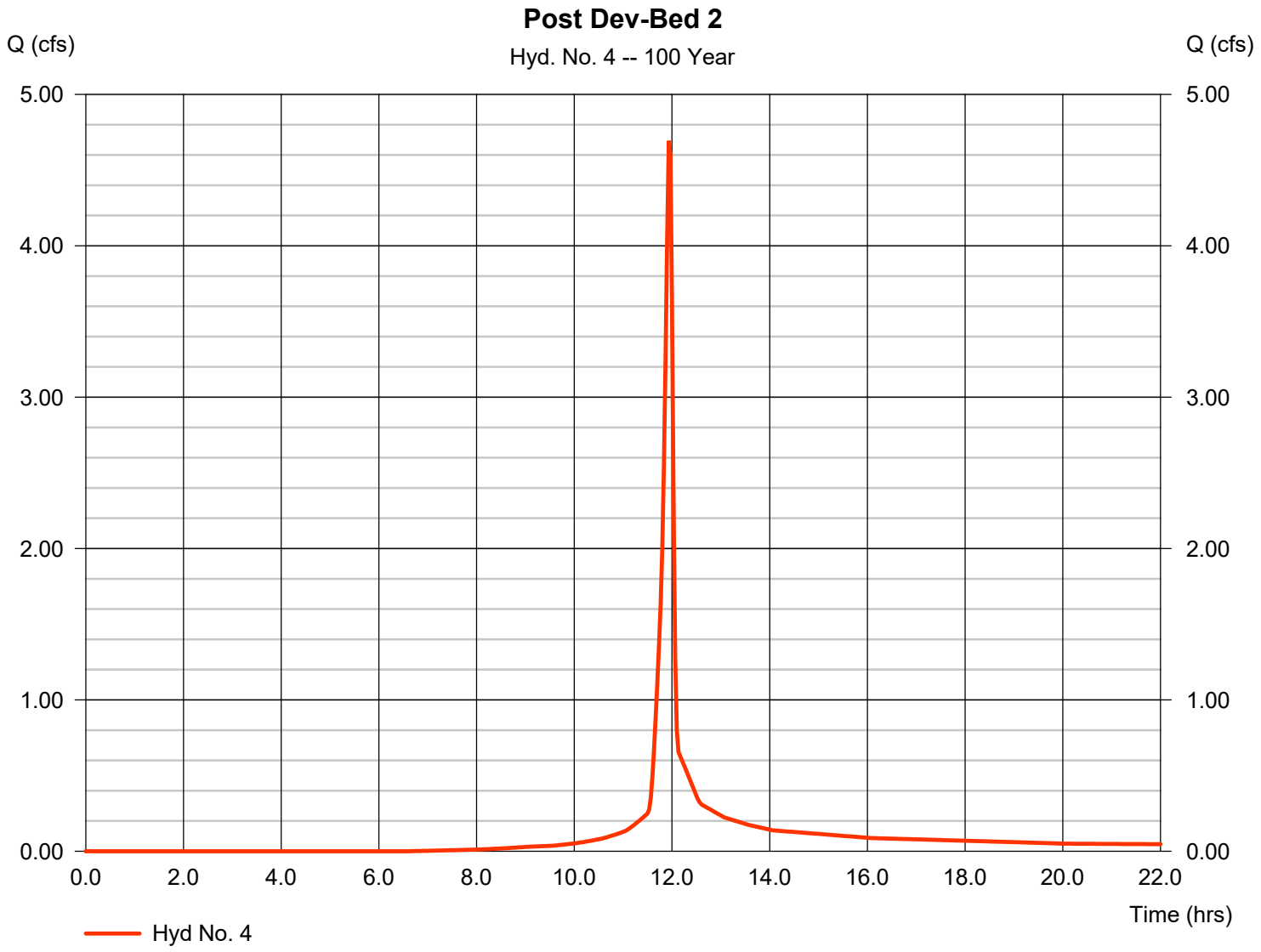
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 4

Post Dev-Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.693 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 9,597 cuft
Drainage area	= 0.620 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.230 x 98) + (0.390 x 61)] / 0.620

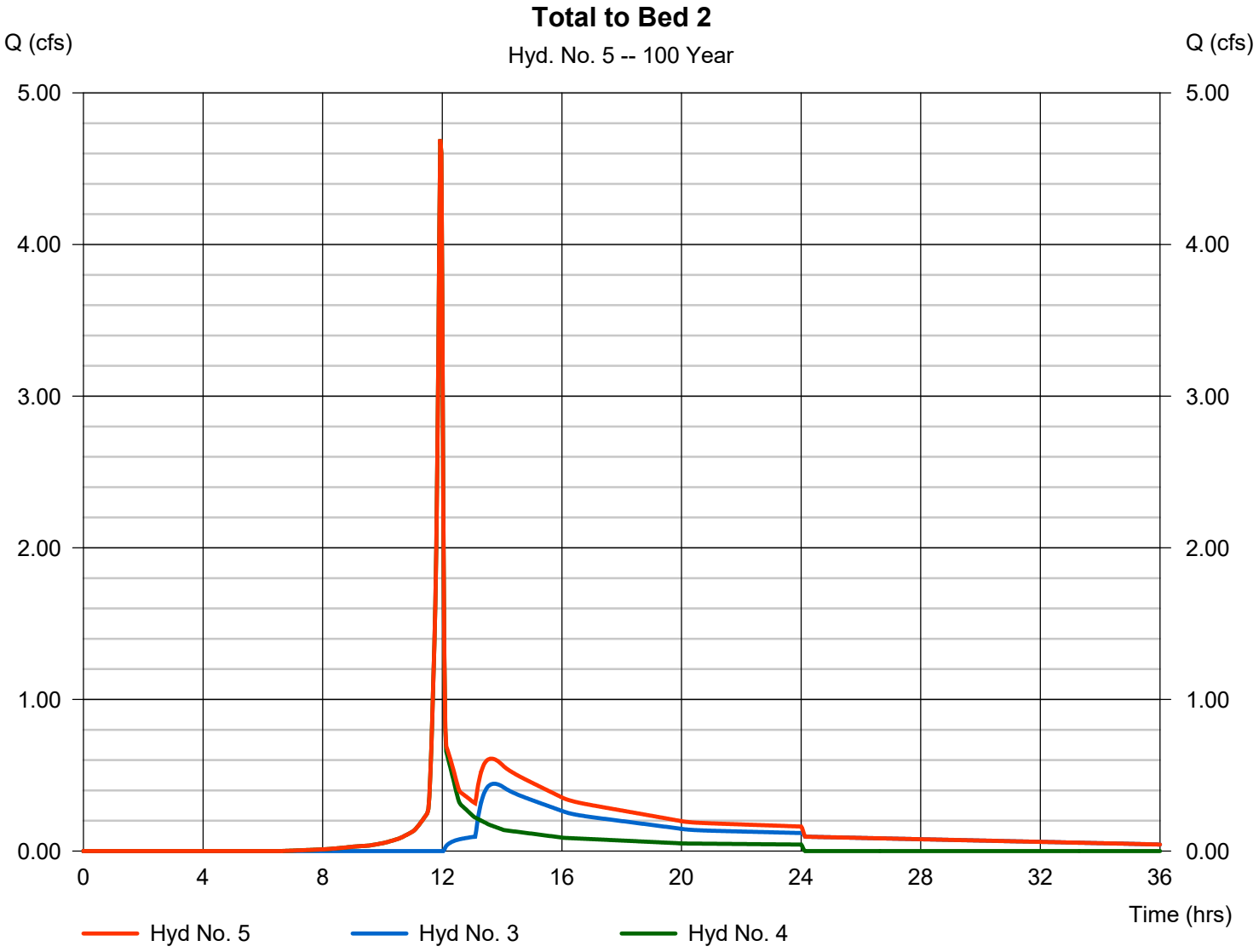


Hydrograph Report

Hyd. No. 5

Total to Bed 2

Hydrograph type	= Combine	Peak discharge	= 4.693 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 22,412 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 0.620 ac



Hydrograph Report

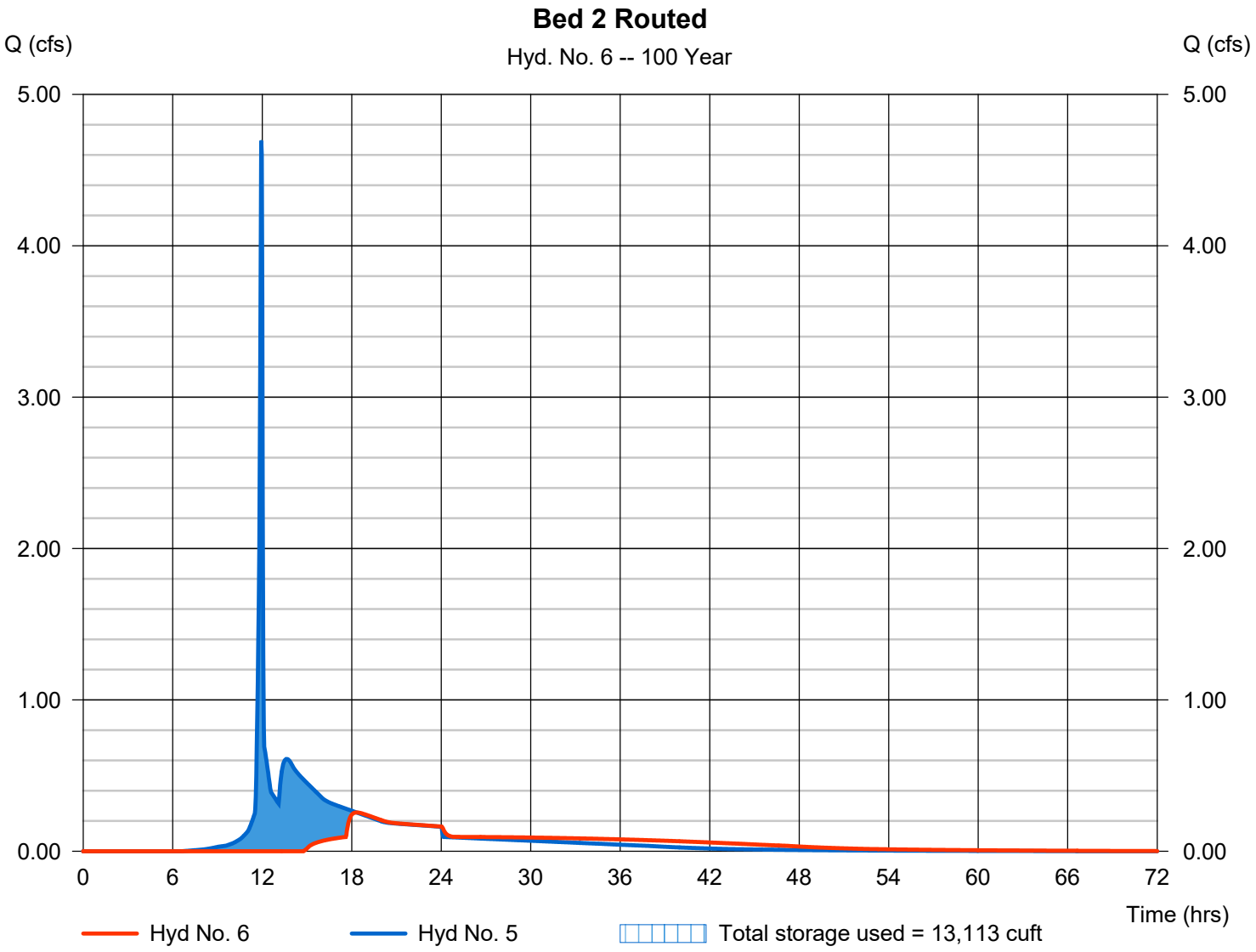
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 6

Bed 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.256 cfs
Storm frequency	=	100 yrs	Time to peak	=	18.33 hrs
Time interval	=	2 min	Hyd. volume	=	12,399 cuft
Inflow hyd. No.	=	5 - Total to Bed 2	Max. Elevation	=	438.94 ft
Reservoir name	=	Bed 2	Max. Storage	=	13,113 cuft

Storage Indication method used.



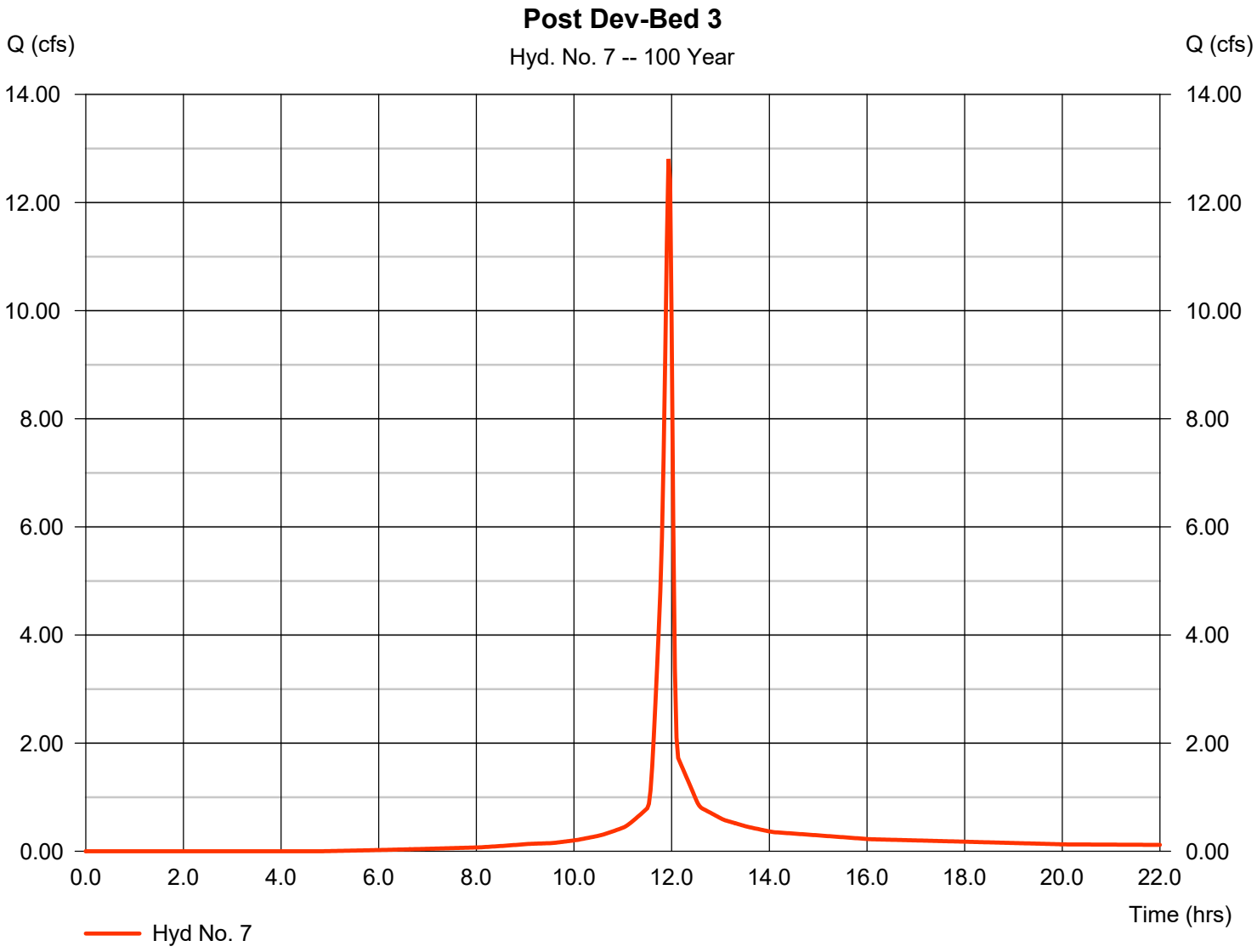
Hydrograph Report

Hyd. No. 7

Post Dev-Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 12.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 26,892 cuft
Drainage area	= 1.480 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.850 x 98) + (0.630 x 61)] / 1.480



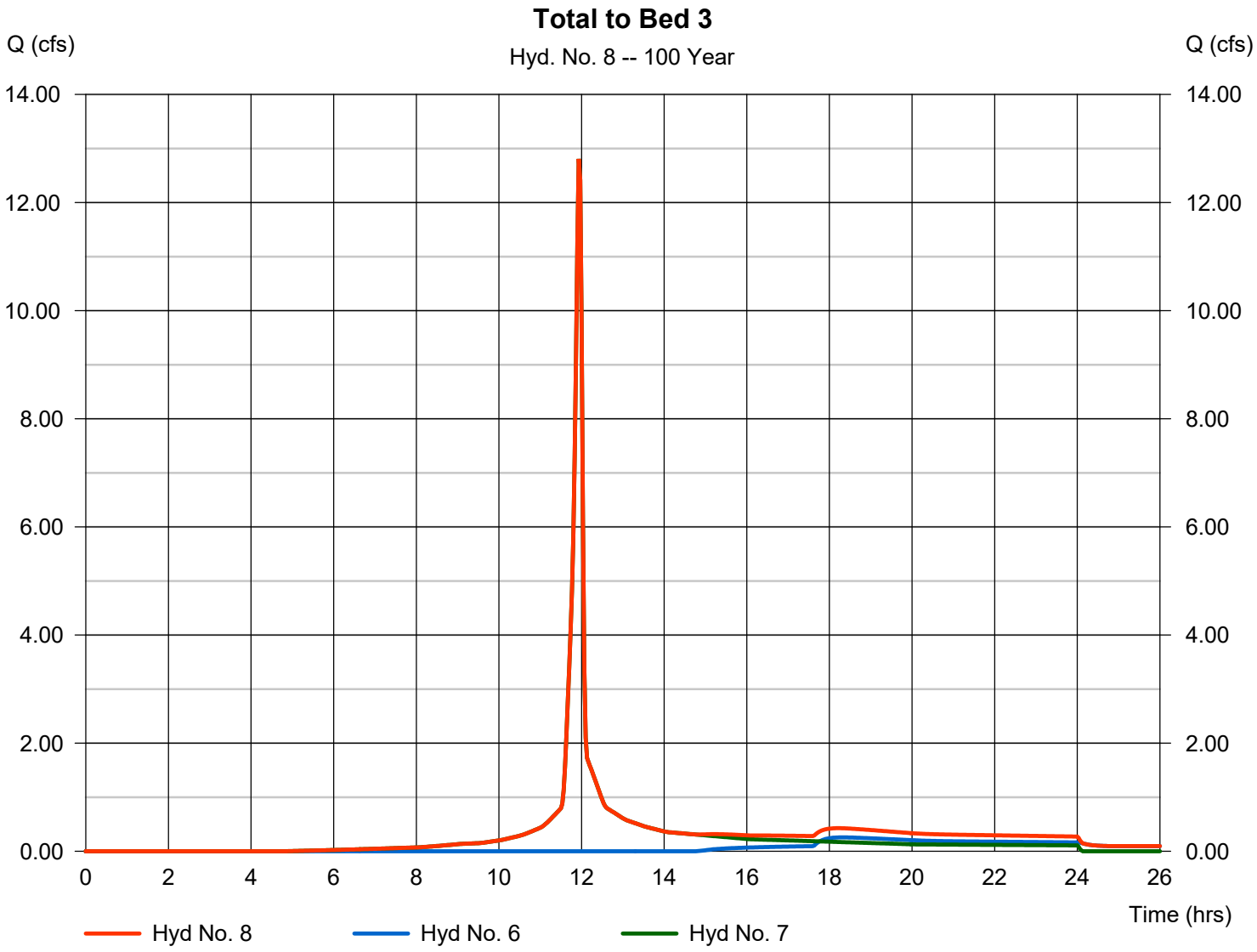
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 8

Total to Bed 3

Hydrograph type	= Combine	Peak discharge	= 12.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 39,291 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.480 ac



Hydrograph Report

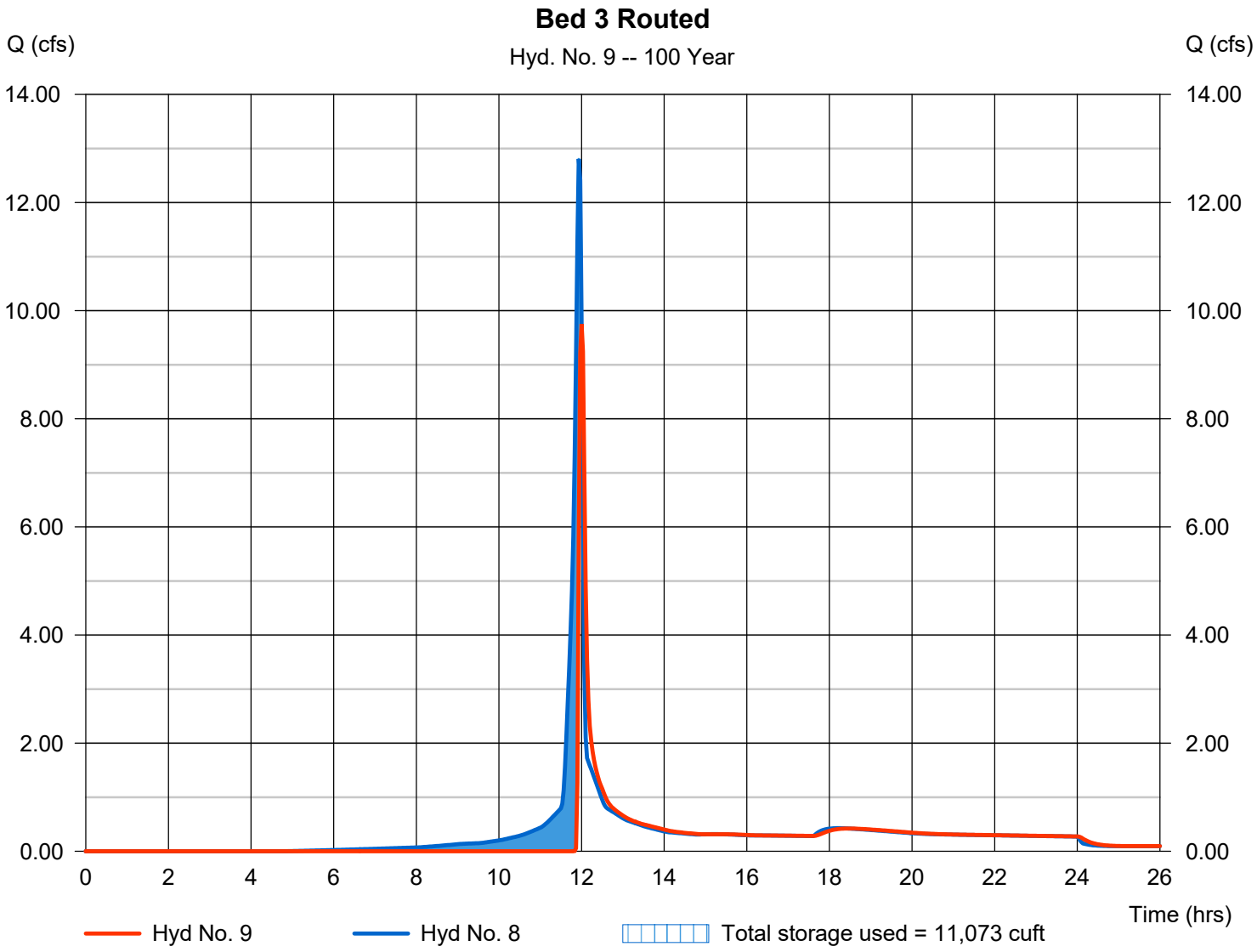
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 9

Bed 3 Routed

Hydrograph type	= Reservoir	Peak discharge	= 9.753 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 32,267 cuft
Inflow hyd. No.	= 8 - Total to Bed 3	Max. Elevation	= 434.45 ft
Reservoir name	= Bed 3	Max. Storage	= 11,073 cuft

Storage Indication method used.



Hydrograph Report

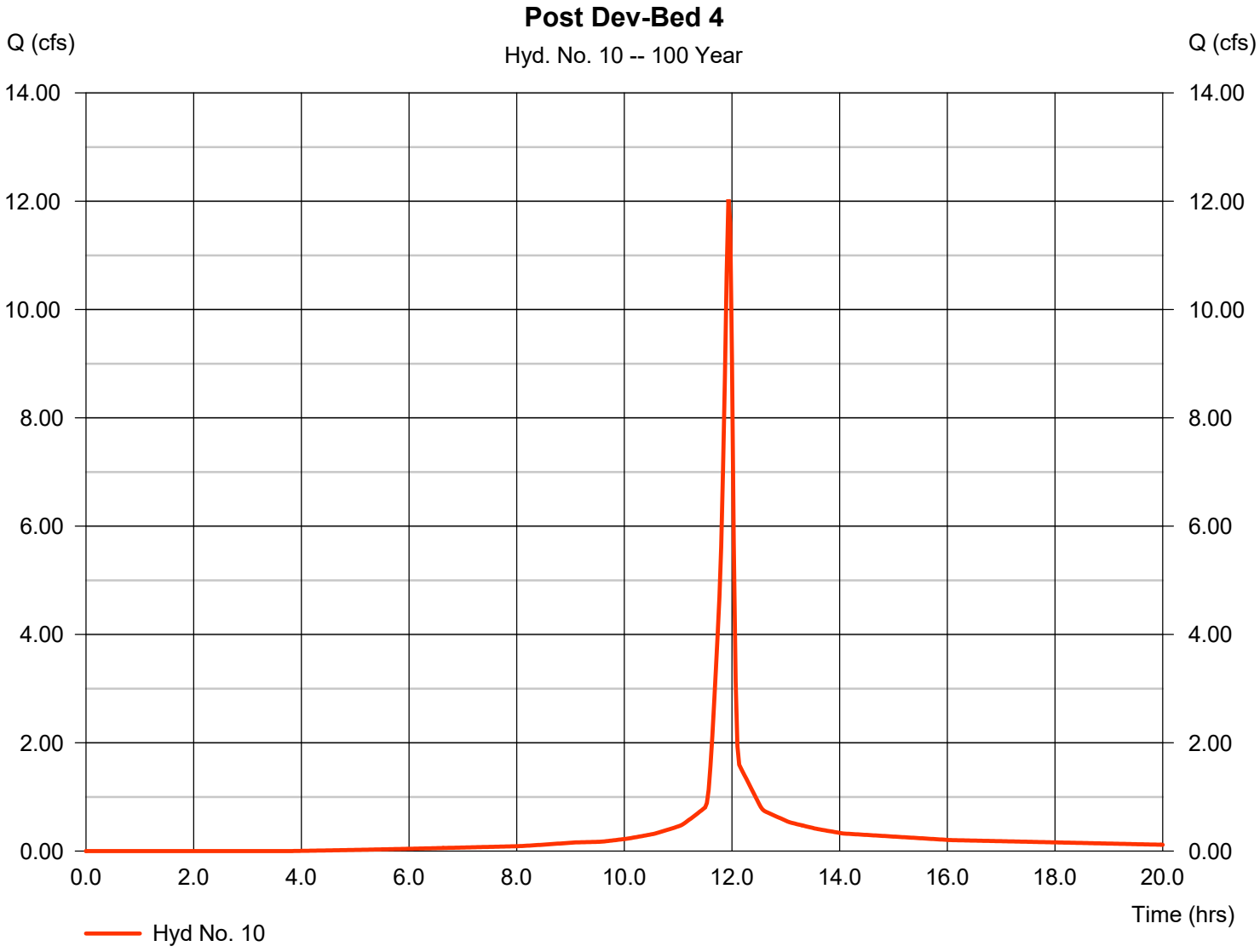
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 10

Post Dev-Bed 4

Hydrograph type	= SCS Runoff	Peak discharge	= 12.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 25,854 cuft
Drainage area	= 1.310 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.410 x 61)] / 1.310



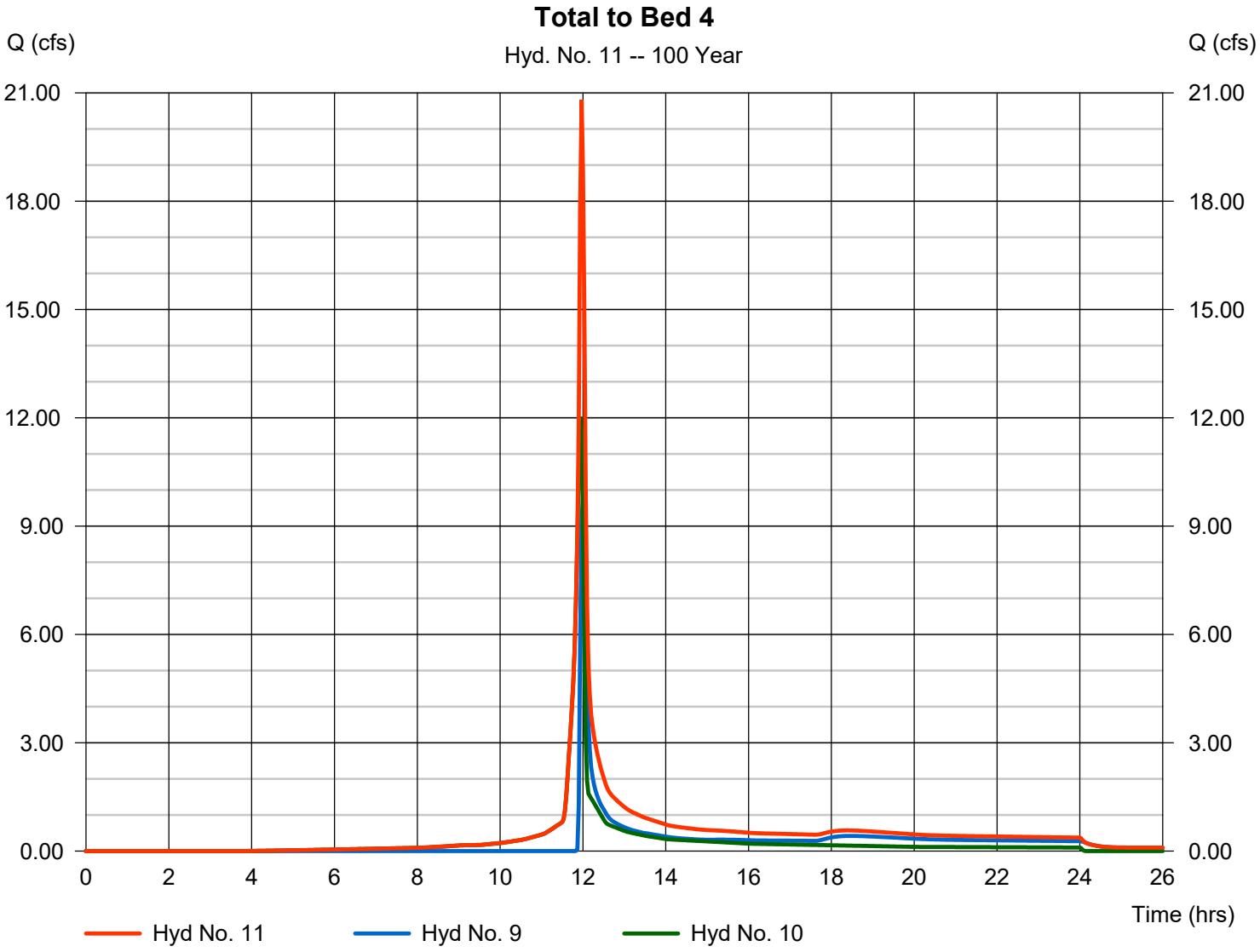
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 11

Total to Bed 4

Hydrograph type	= Combine	Peak discharge	= 20.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 58,121 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.310 ac



Hydrograph Report

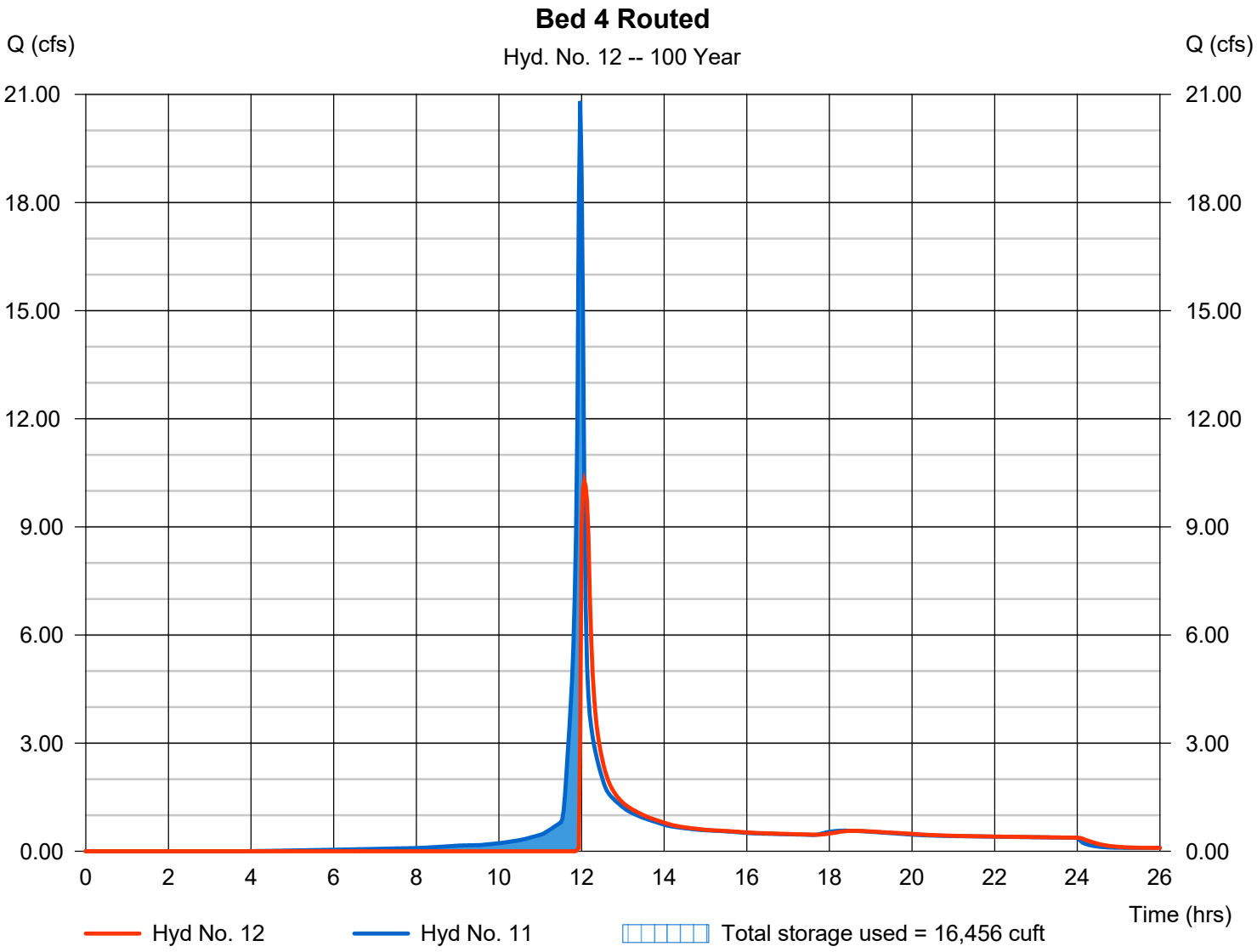
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 12

Bed 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	10.27 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	49,781 cuft
Inflow hyd. No.	=	11 - Total to Bed 4	Max. Elevation	=	423.96 ft
Reservoir name	=	Bed 4	Max. Storage	=	16,456 cuft

Storage Indication method used.



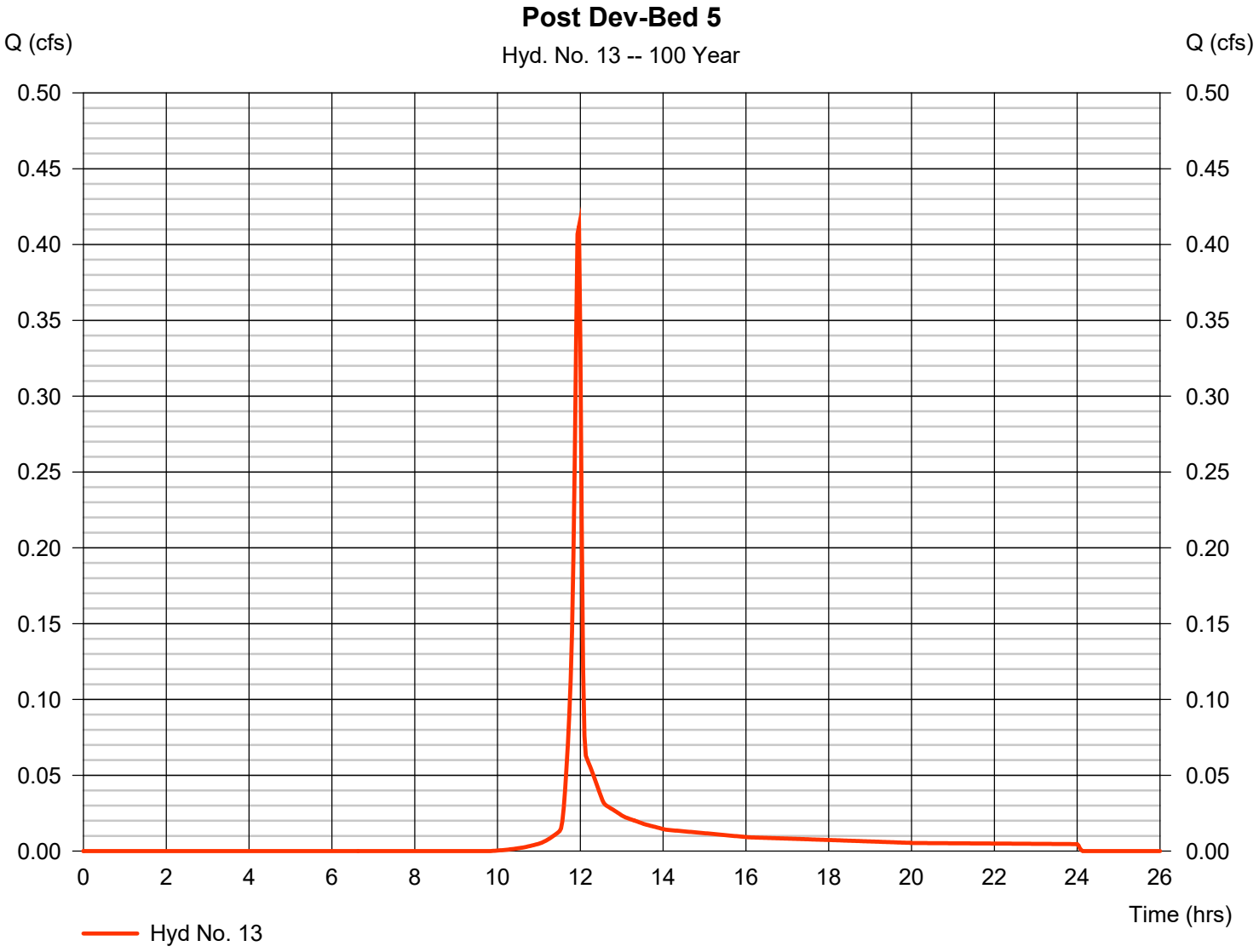
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 13

Post Dev-Bed 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.412 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 825 cuft
Drainage area	= 0.080 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



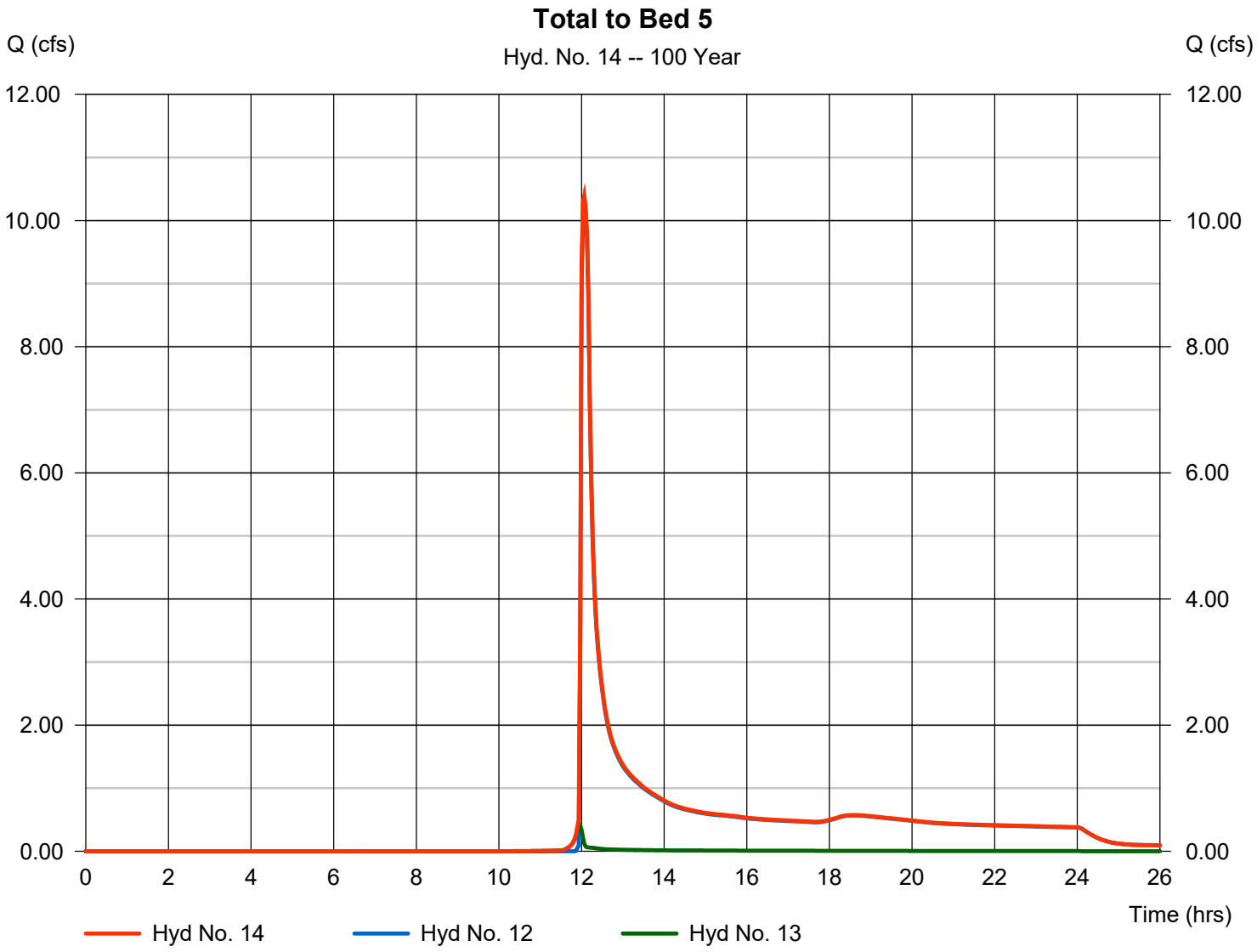
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 14

Total to Bed 5

Hydrograph type	= Combine	Peak discharge	= 10.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 50,606 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 0.080 ac



Hydrograph Report

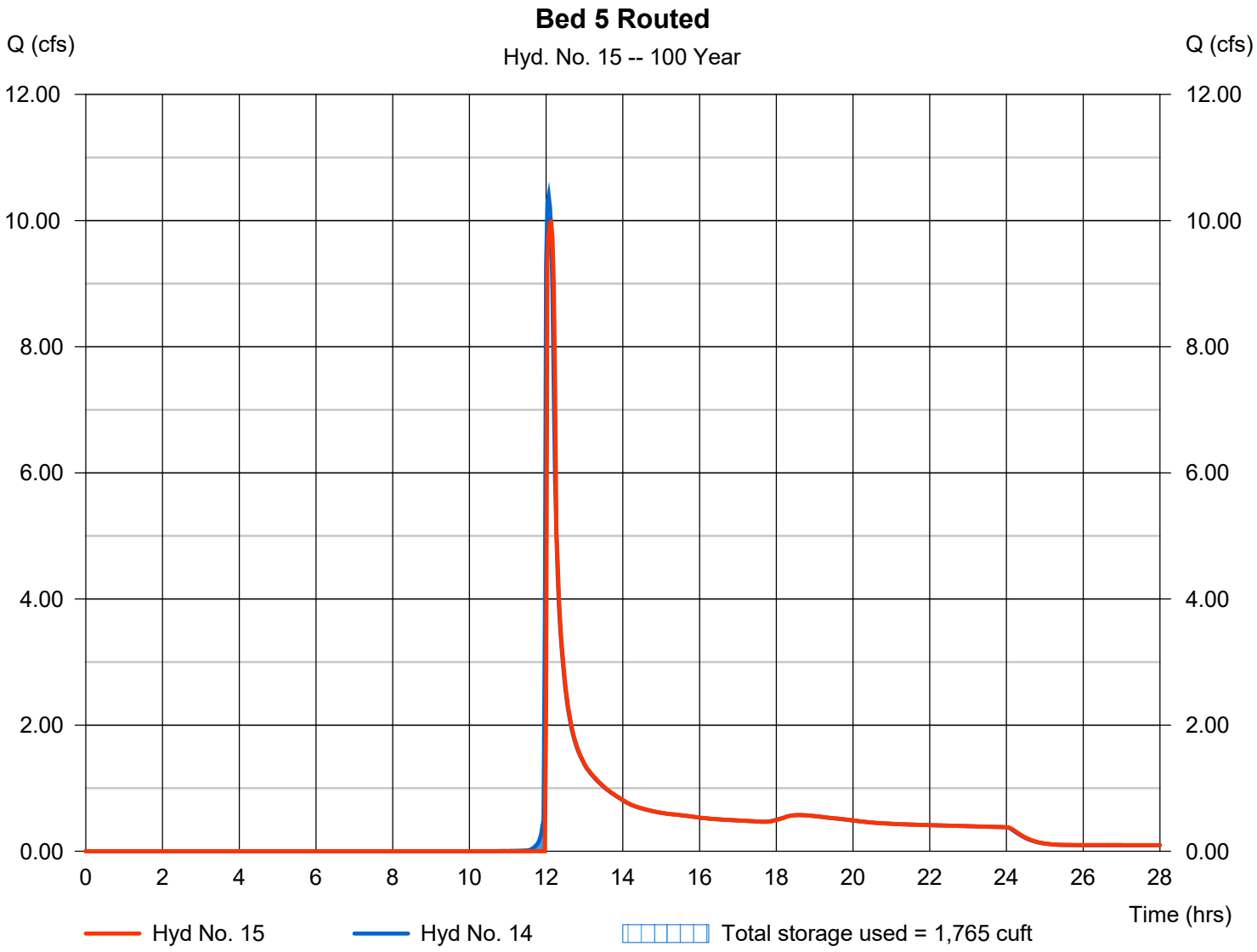
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 15

Bed 5 Routed

Hydrograph type	= Reservoir	Peak discharge	= 9.978 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 50,108 cuft
Inflow hyd. No.	= 14 - Total to Bed 5	Max. Elevation	= 422.59 ft
Reservoir name	= Bed 5	Max. Storage	= 1,765 cuft

Storage Indication method used.



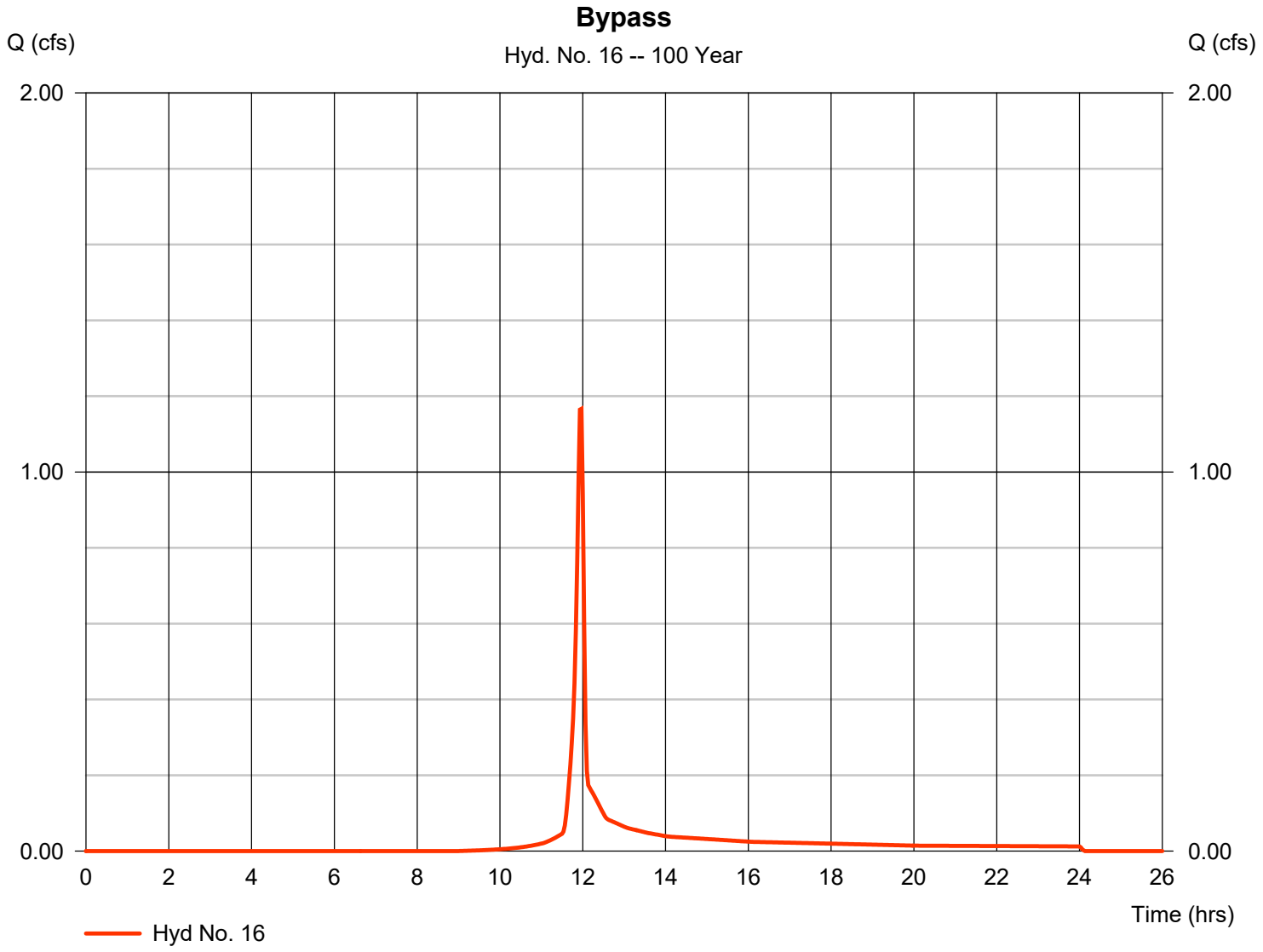
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 16

Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.167 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	2,351 cuft
Drainage area	=	0.200 ac	Curve number	=	65
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.45 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



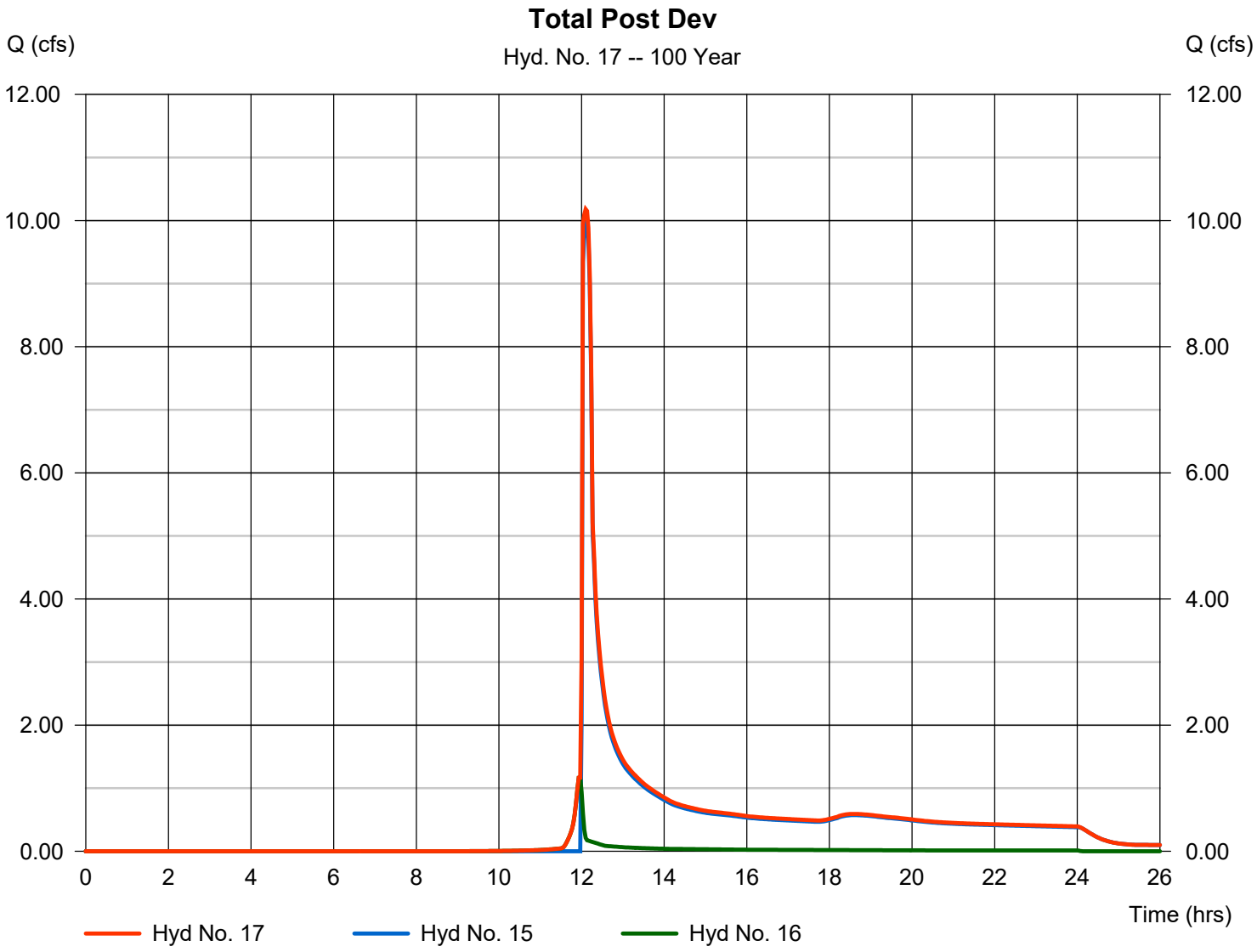
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 17

Total Post Dev

Hydrograph type	= Combine	Peak discharge	= 10.18 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 52,459 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.200 ac



STRAFFORD AVENUE

Stormwater Management Summary-Post Construction

Radnor Township Stormwater District A

Stormwater Management Summary - POI B

Yr	Pre-Development				Post Development	Compliance	Percentage Reduction
	On-Site		Allowable Release Rate*		Total Post Developed Flow		
1	1.579		1.579		0.041	-1.54	-97%
2	2.410		1.579		0.075	-1.50	-95%
5	3.768		3.768		0.316	-3.45	-92%
10	4.983		4.983		1.416	-3.57	-72%
25	6.809		6.809		5.941	-0.87	-13%
50	8.431		8.431		8.752	0.32	4%
100	10.200		10.200		9.799	-0.40	-4%

Design Storm Proposed Conditions	Reduce to	Design Storm Existing Conditions
1yr		1 yr
2 yr		1 yr
5 yr		5 yr
10 yr		10 yr
25 yr		25 yr
50 yr		50 yr
100 yr		100 yr

2-YR - 24HR DIRECT RUNOFF VOLUME

POI B

VARIABLES		
	P =	Precipitation (inches)
	Q =	Depth of Stormwater Runoff (inches)
	S =	Runoff Retention Variable
	V =	Volume of Stormwater Runoff from Drainage Area (ft^3)
	CN =	TR-55 Curve Number for Subject Drainage Area

EQUATIONS

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

CONSTANTS

Storm Event =	**2-Year 24-Hour**
P (in) =	**3.2**

PRE-DEVELOPMENT

Cover:	*Soil Type*	*Area (ft)*	*CN*	*S*	*Q (in)*	*V (ft^3)*
Impervious (80%-29410)	B	23,528	98	0.2041	2.9675	**5,818**
Meadow	B	37,892	58	7.2414	0.3412	**1,077**
	Total Area =	**61,420**			**Runoff Volume =**	**6,896**

POST-DEVELOPMENT

Cover:	*Soil Type*	*Area (ft)*	*CN*	*S*	*Q (in)*	*V (ft^3)*
Impervious	B	42,020	98	0.2041	2.9675	**10391**
Lawn	B	27,452	61	6.3934	0.4440	**1016**
	Total Area =	**69,472**			**Runoff Volume =**	**11407**

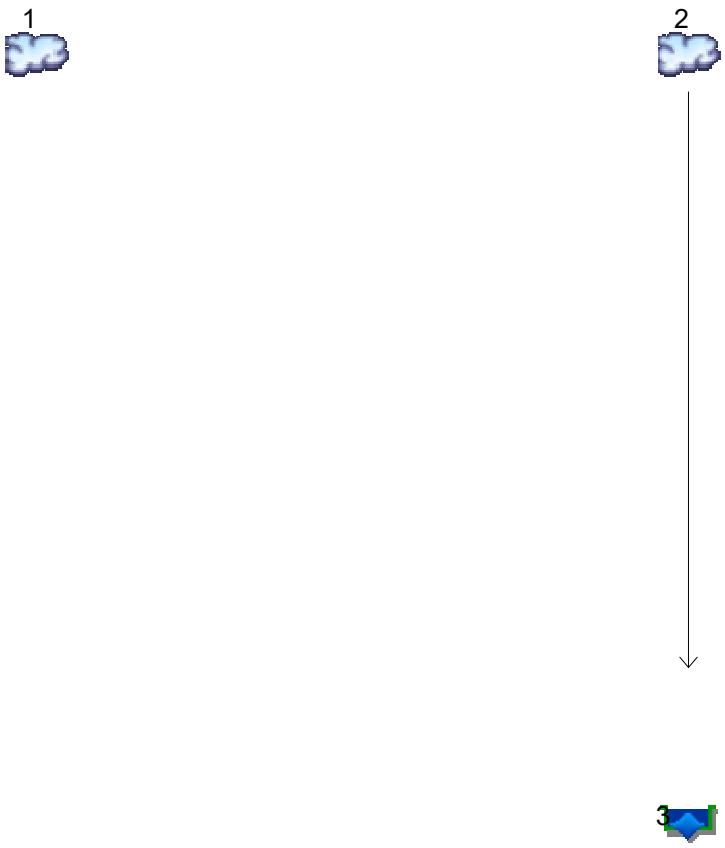
Runoff Volume Increase =	**4511**

Infiltration Volume Provided (Bed 6) =	**4580**

INFILTRATION BED 6		
Pipe Diameter =	48	inches
Pipe Length =	972	ft
Stone Bed Length	144	ft
Stone Bed Width =	80.0	ft
Stone Depth =	5.0	ft
Pipe Volume =	*12215*	*ft^2*
+ Stone Voids Volume =	*0*	*ft*
Provided V_t =	**12215**	**ft^3**

Dead Storage Depth =	1.5
Infiltration Bed Dead Storage Provided =	4,580

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre Dev
2	SCS Runoff	Post Dev
3	Reservoir	Bed 6 routed

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	1.579	2.410	-------	3.768	4.983	6.809	8.431	10.20	Pre Dev
2	SCS Runoff	------	3.233	4.398	-------	6.222	7.789	10.03	11.94	13.98	Post Dev
3	Reservoir	2	0.041	0.075	-------	0.316	1.416	5.941	8.752	9.799	Bed 6 routed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.579	2	718	3,231	------	------	------	Pre Dev
2	SCS Runoff	3.233	2	718	6,500	------	------	------	Post Dev
3	Reservoir	0.041	2	1194	1,899	2	438.24	5,318	Bed 6 routed

Hydrograph Report

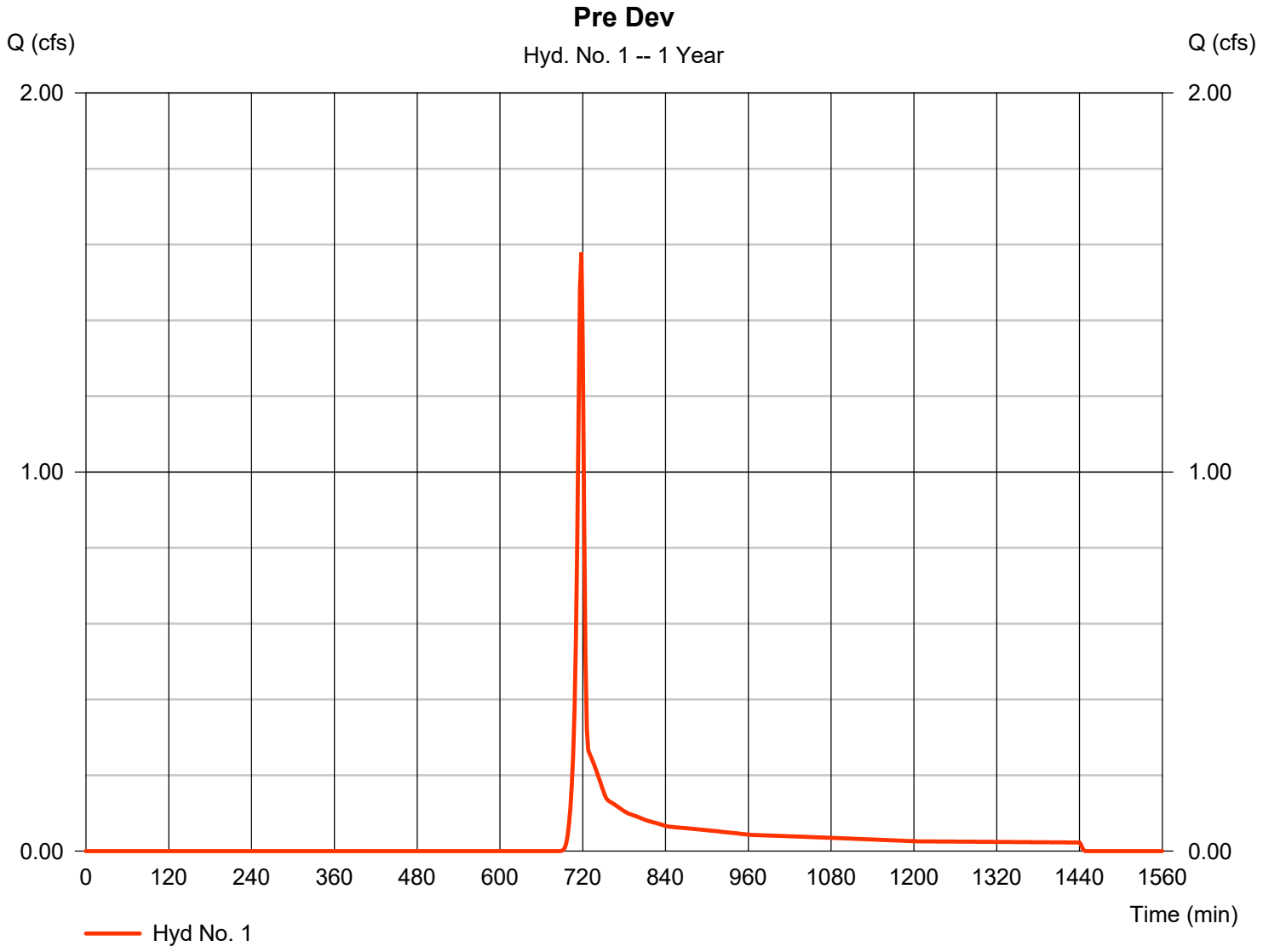
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 1.579 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 3,231 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.69 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



Hydrograph Report

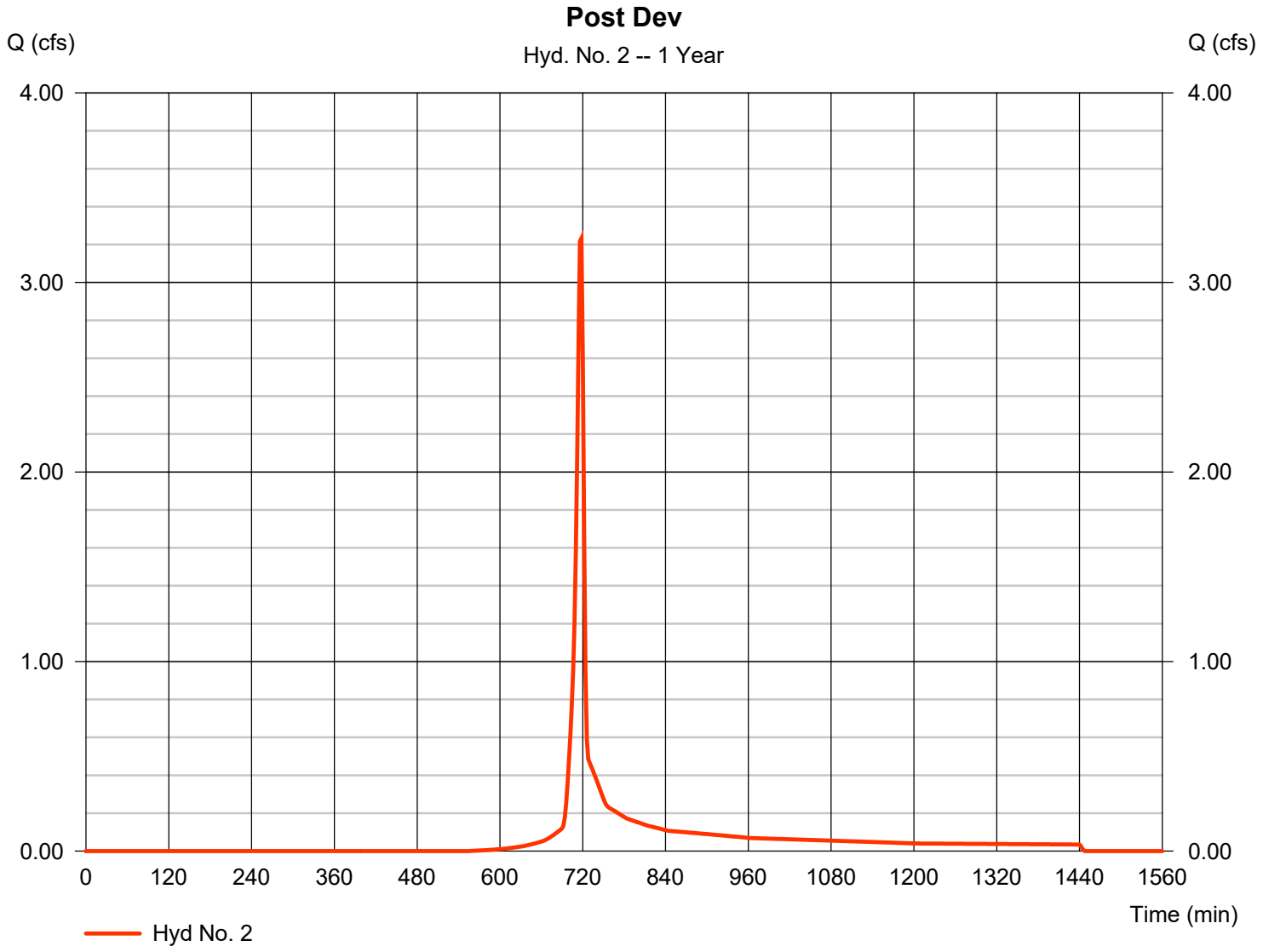
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.233 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,500 cuft
Drainage area	=	1.590 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.69 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

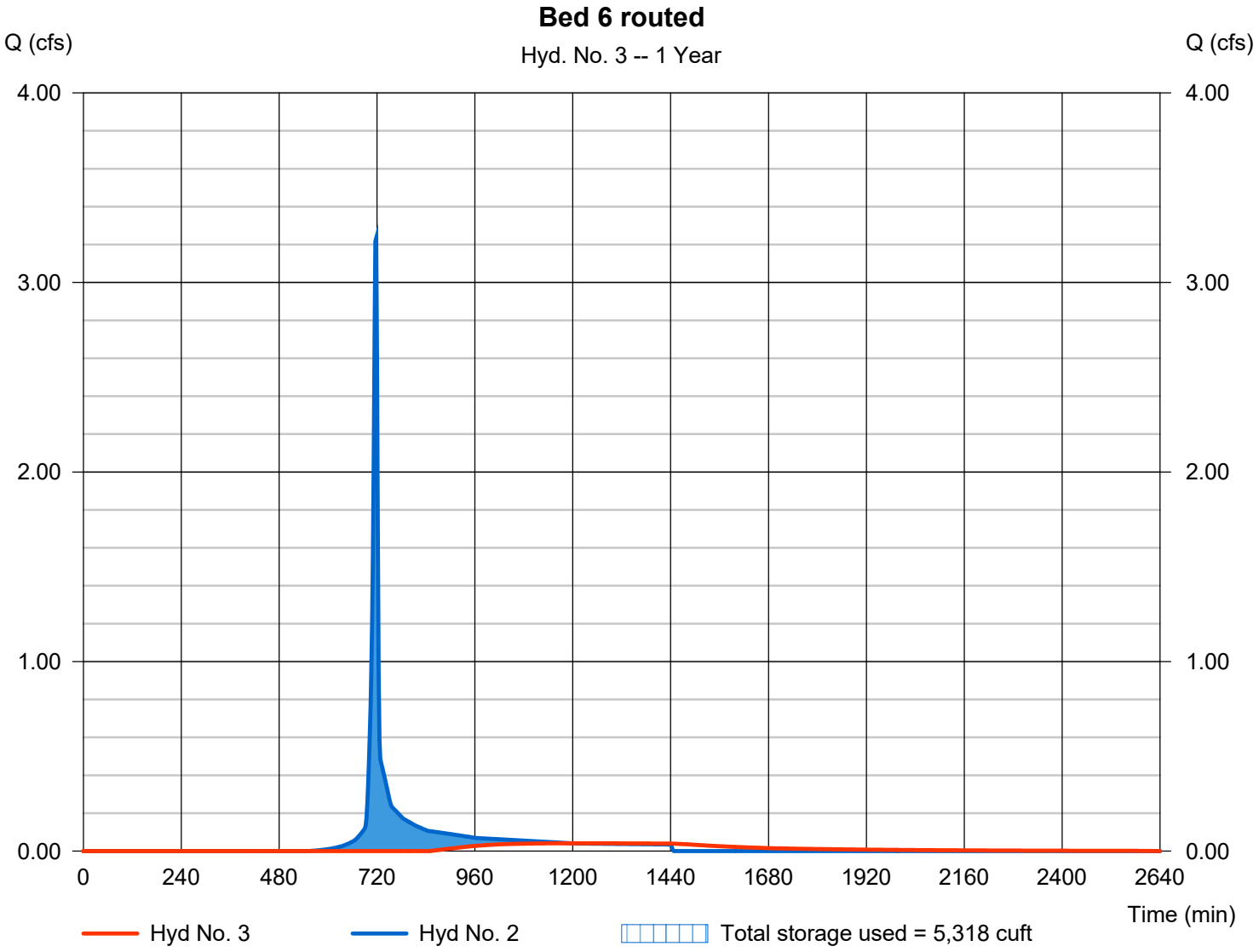
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	= Reservoir	Peak discharge	= 0.041 cfs
Storm frequency	= 1 yrs	Time to peak	= 1194 min
Time interval	= 2 min	Hyd. volume	= 1,899 cuft
Inflow hyd. No.	= 2 - Post Dev	Max. Elevation	= 438.24 ft
Reservoir name	= Bed 6	Max. Storage	= 5,318 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Bed 6

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	436.50	n/a	0	0
1.00	437.50	n/a	3,054	3,054
2.00	438.50	n/a	3,054	6,108
3.00	439.50	n/a	3,054	9,162
4.00	440.50	n/a	3,054	12,216

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	0.00	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 436.50	438.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 439.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	436.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.10	305	436.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.20	611	436.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	916	436.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.40	1,222	436.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	1,527	437.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	1,832	437.10	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.70	2,138	437.20	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.80	2,443	437.30	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	2,749	437.40	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	3,054	437.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.10	3,359	437.60	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.20	3,665	437.70	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.30	3,970	437.80	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.40	4,276	437.90	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.50	4,581	438.00	0.00 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.000
1.60	4,886	438.10	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
1.70	5,192	438.20	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
1.80	5,497	438.30	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.049
1.90	5,803	438.40	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.059
2.00	6,108	438.50	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.068
2.10	6,413	438.60	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.075
2.20	6,719	438.70	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.082
2.30	7,024	438.80	0.09 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.089
2.40	7,330	438.90	0.10 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.095
2.50	7,635	439.00	0.10 ic	0.10 ic	---	---	0.00	---	---	---	---	---	0.101
2.60	7,940	439.10	0.53 ic	0.11 ic	---	---	0.42	---	---	---	---	---	0.527
2.70	8,246	439.20	1.33 ic	0.11 ic	---	---	1.19	---	---	---	---	---	1.303
2.80	8,551	439.30	2.33 oc	0.12 ic	---	---	2.19	---	---	---	---	---	2.305
2.90	8,857	439.40	3.49 oc	0.12 ic	---	---	3.37	---	---	---	---	---	3.491
3.00	9,162	439.50	4.83 oc	0.13 ic	---	---	4.71	---	---	---	---	---	4.834
3.10	9,467	439.60	6.31 oc	0.12 ic	---	---	6.19	---	---	---	---	---	6.308
3.20	9,773	439.70	7.89 ic	0.09 ic	---	---	7.80	---	---	---	---	---	7.895
3.30	10,078	439.80	8.71 ic	0.07 ic	---	---	8.63 s	---	---	---	---	---	8.708
3.40	10,384	439.90	9.15 ic	0.06 ic	---	---	9.08 s	---	---	---	---	---	9.148
3.50	10,689	440.00	9.49 ic	0.06 ic	---	---	9.43 s	---	---	---	---	---	9.489
3.60	10,994	440.10	9.78 ic	0.05 ic	---	---	9.72 s	---	---	---	---	---	9.776
3.70	11,300	440.20	10.03 ic	0.05 ic	---	---	9.98 s	---	---	---	---	---	10.03
3.80	11,605	440.30	10.26 ic	0.04 ic	---	---	10.21 s	---	---	---	---	---	10.26

Continues on next page...

Bed 6

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.90	11,911	440.40	10.47 ic	0.04 ic	---	---	10.43 s	---	---	---	---	---	10.46
4.00	12,216	440.50	10.66 ic	0.04 ic	---	---	10.63 s	---	---	---	---	---	10.66

...End

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.410	2	718	4,839	------	------	------	Pre Dev
2	SCS Runoff	4.398	2	716	8,885	------	------	------	Post Dev
3	Reservoir	0.075	2	1056	4,284	2	438.59	6,389	Bed 6 routed

Hydrograph Report

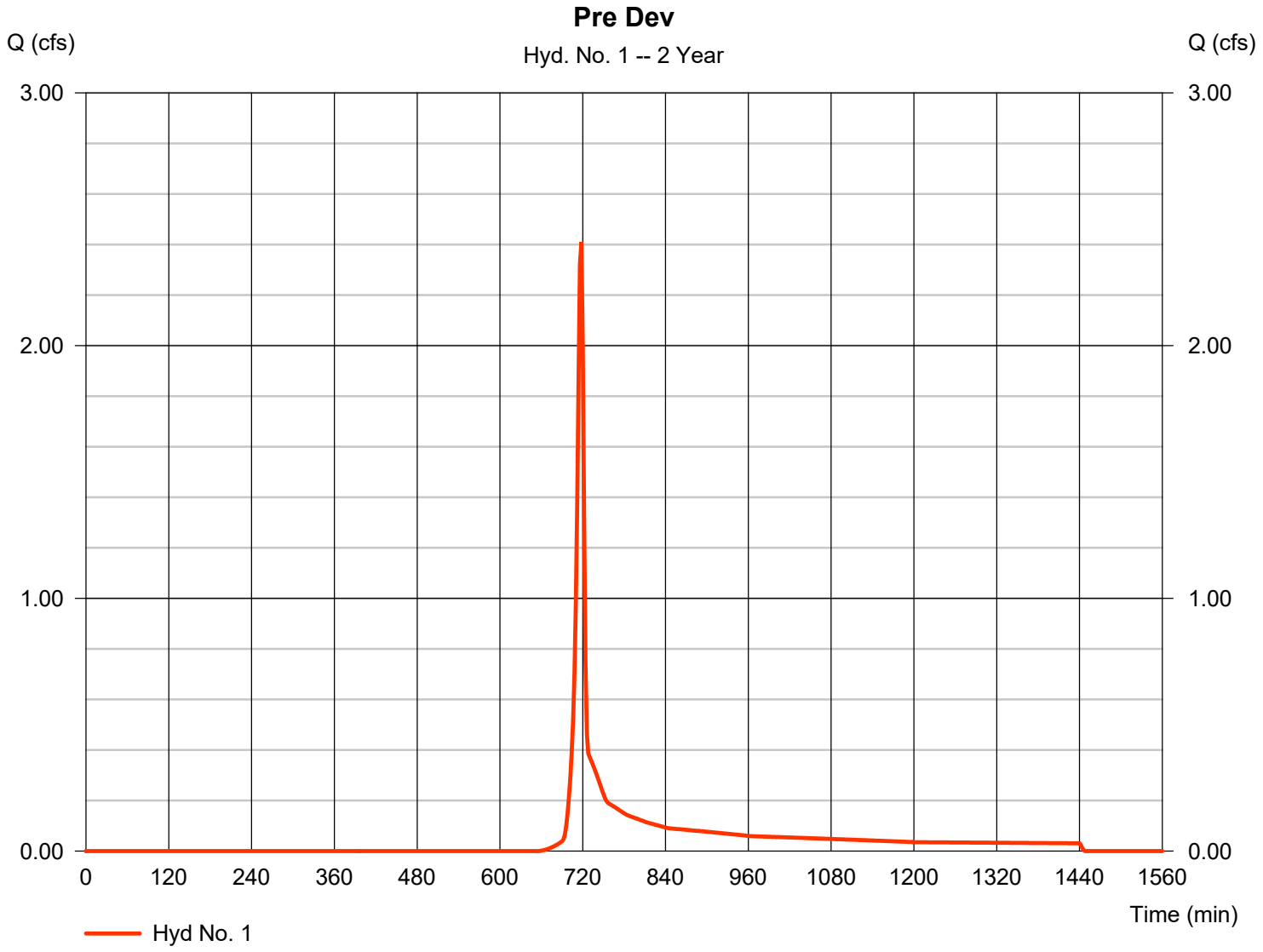
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 2.410 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 4,839 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



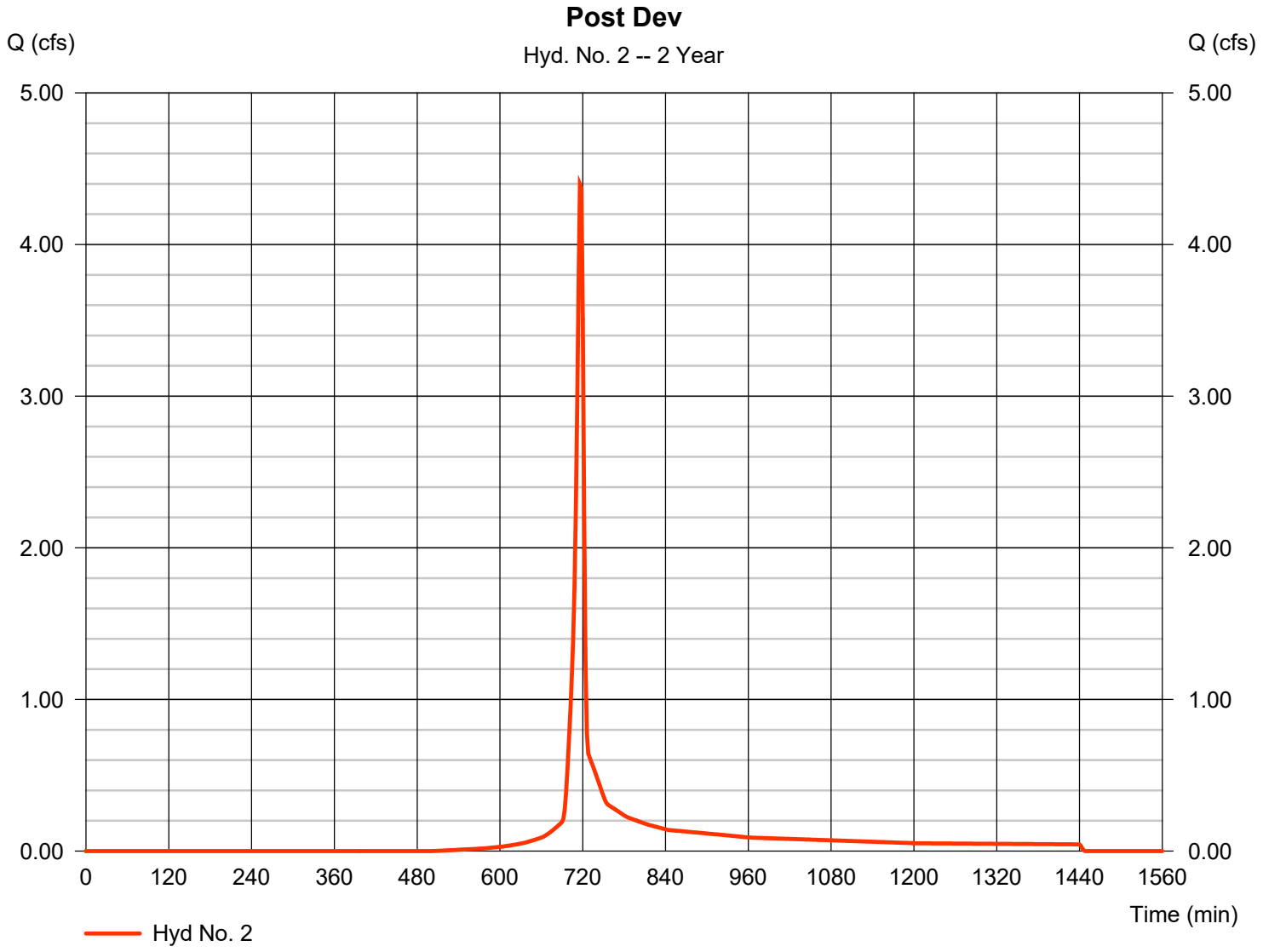
Hydrograph Report

Hyd. No. 2

Post Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 4.398 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 8,885 cuft
Drainage area	= 1.590 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

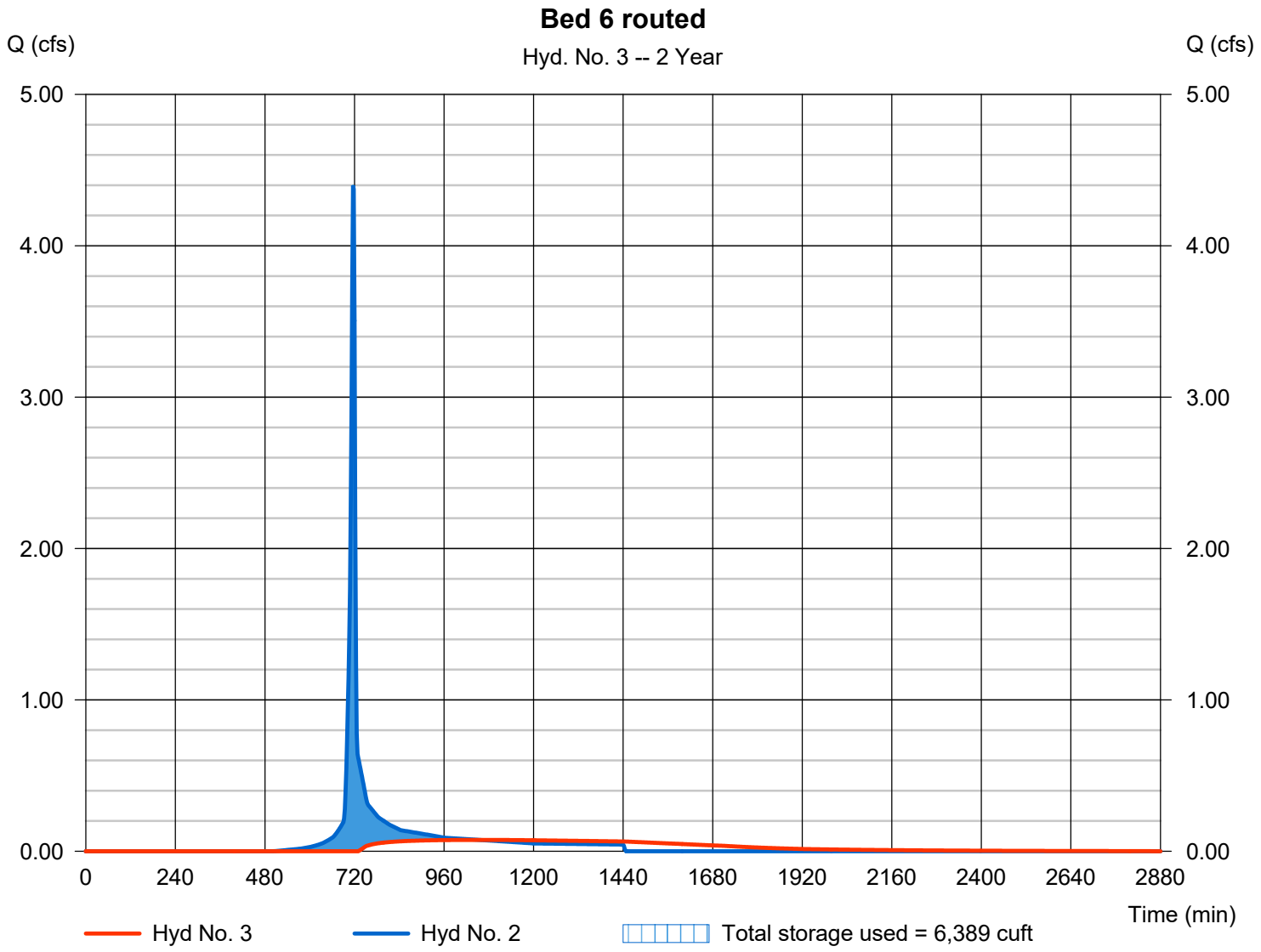
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	= Reservoir	Peak discharge	= 0.075 cfs
Storm frequency	= 2 yrs	Time to peak	= 1056 min
Time interval	= 2 min	Hyd. volume	= 4,284 cuft
Inflow hyd. No.	= 2 - Post Dev	Max. Elevation	= 438.59 ft
Reservoir name	= Bed 6	Max. Storage	= 6,389 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.768	2	718	7,537	------	------	------	Pre Dev
2	SCS Runoff	6.222	2	716	12,653	------	------	------	Post Dev
3	Reservoir	0.316	2	780	8,051	2	439.05	7,789	Bed 6 routed

Hydrograph Report

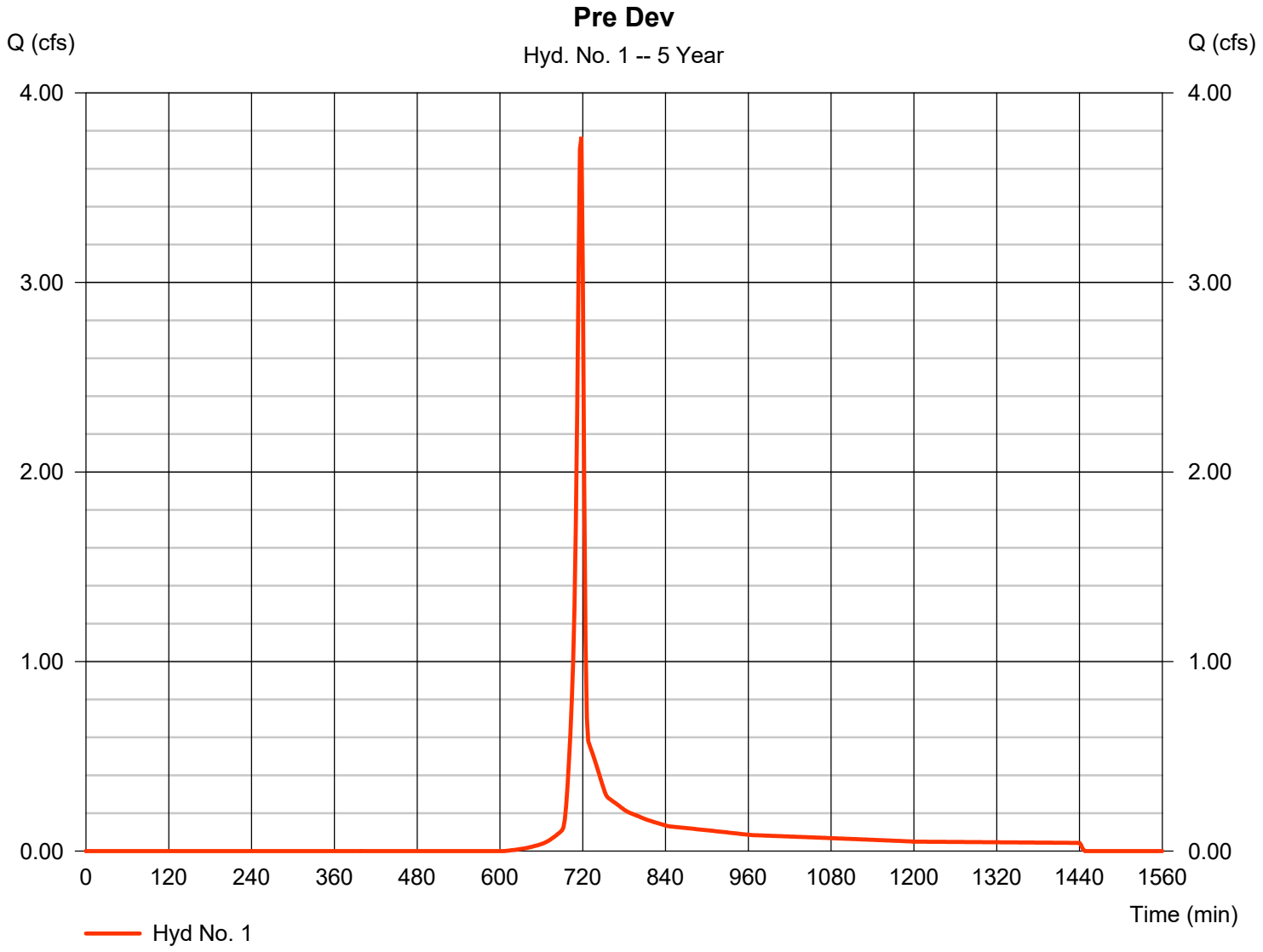
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 3.768 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,537 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.06 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



Hydrograph Report

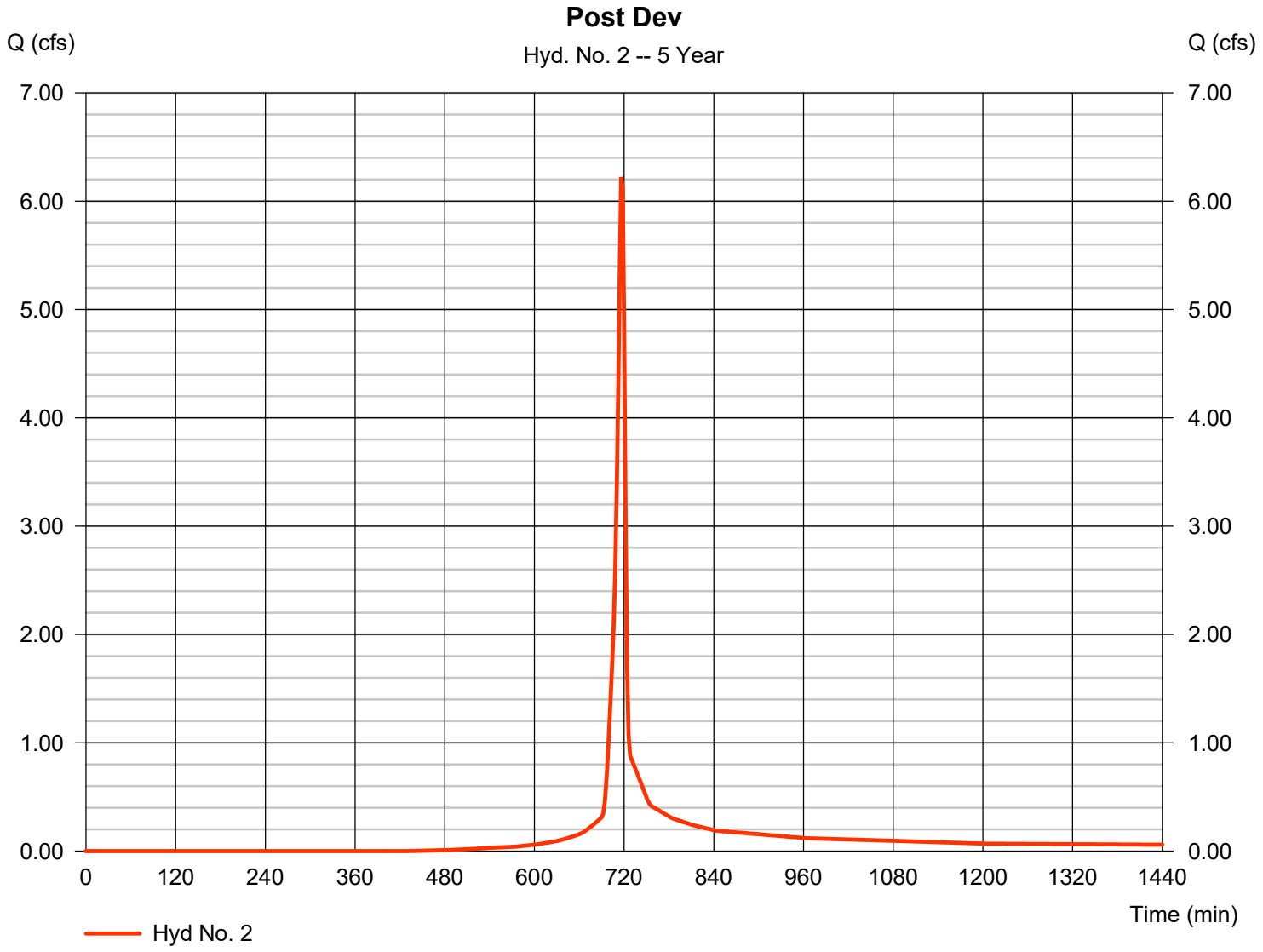
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.222 cfs
Storm frequency	=	5 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	12,653 cuft
Drainage area	=	1.590 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.06 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

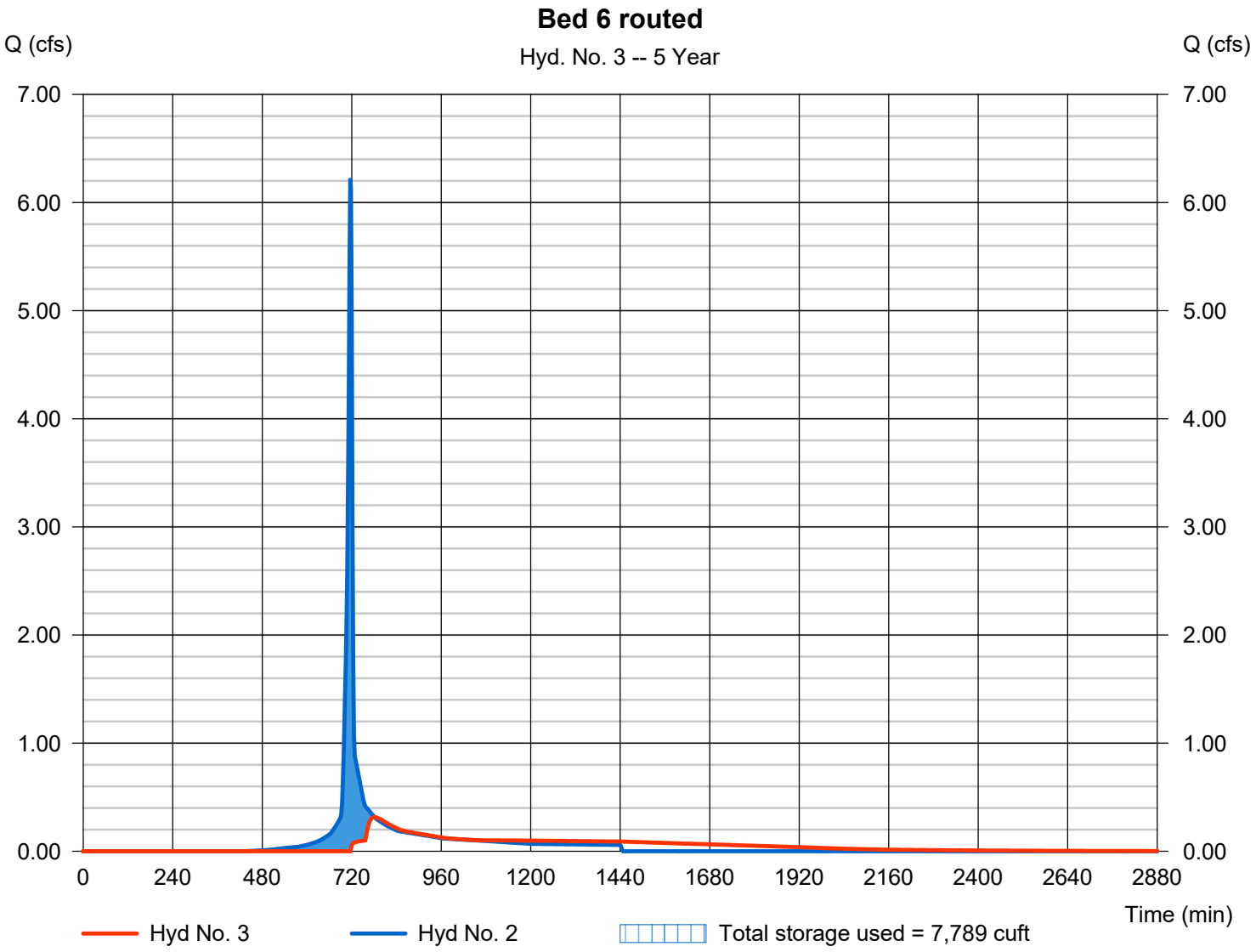
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	= Reservoir	Peak discharge	= 0.316 cfs
Storm frequency	= 5 yrs	Time to peak	= 780 min
Time interval	= 2 min	Hyd. volume	= 8,051 cuft
Inflow hyd. No.	= 2 - Post Dev	Max. Elevation	= 439.05 ft
Reservoir name	= Bed 6	Max. Storage	= 7,789 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.983	2	718	10,010	------	------	------	Pre Dev
2	SCS Runoff	7.789	2	716	15,956	------	------	------	Post Dev
3	Reservoir	1.416	2	726	11,354	2	439.21	8,280	Bed 6 routed

Hydrograph Report

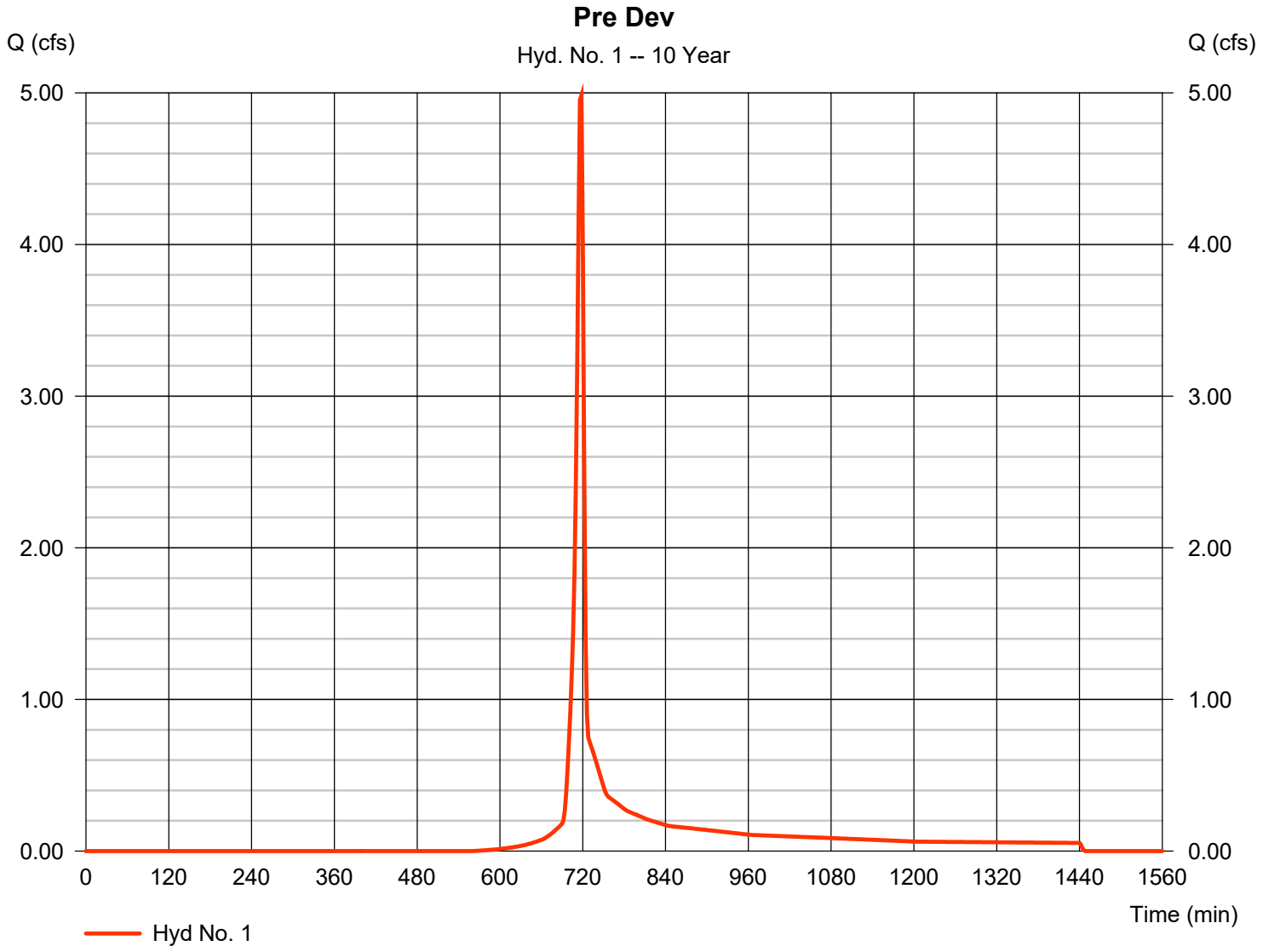
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 4.983 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 10,010 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



Hydrograph Report

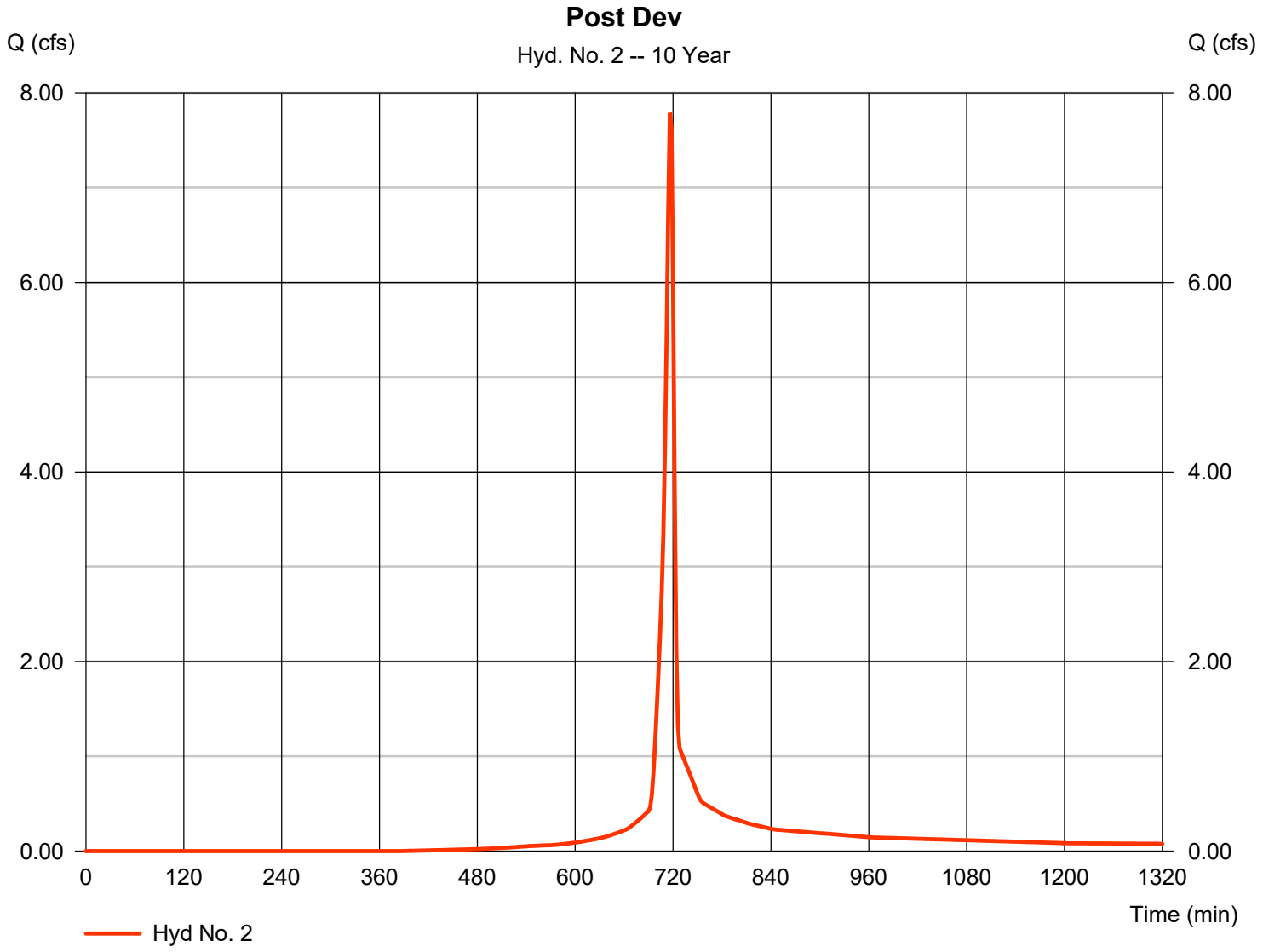
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.789 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	15,956 cuft
Drainage area	=	1.590 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.75 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

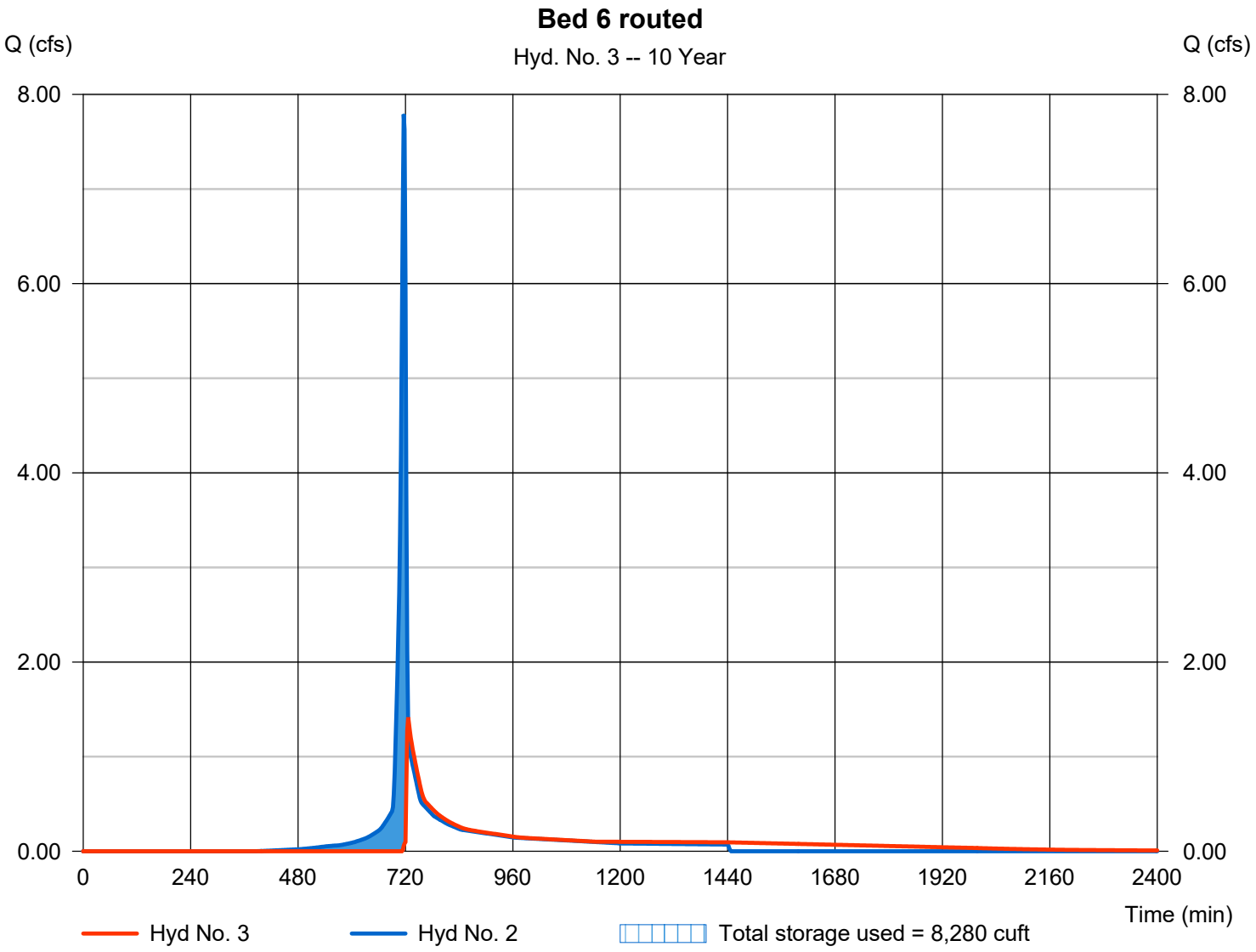
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	= Reservoir	Peak discharge	= 1.416 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 11,354 cuft
Inflow hyd. No.	= 2 - Post Dev	Max. Elevation	= 439.21 ft
Reservoir name	= Bed 6	Max. Storage	= 8,280 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	6.809	2	716	13,752	------	------	------	Pre Dev
2	SCS Runoff	10.03	2	716	20,786	------	------	------	Post Dev
3	Reservoir	5.941	2	722	16,184	2	439.60	9,391	Bed 6 routed

Hydrograph Report

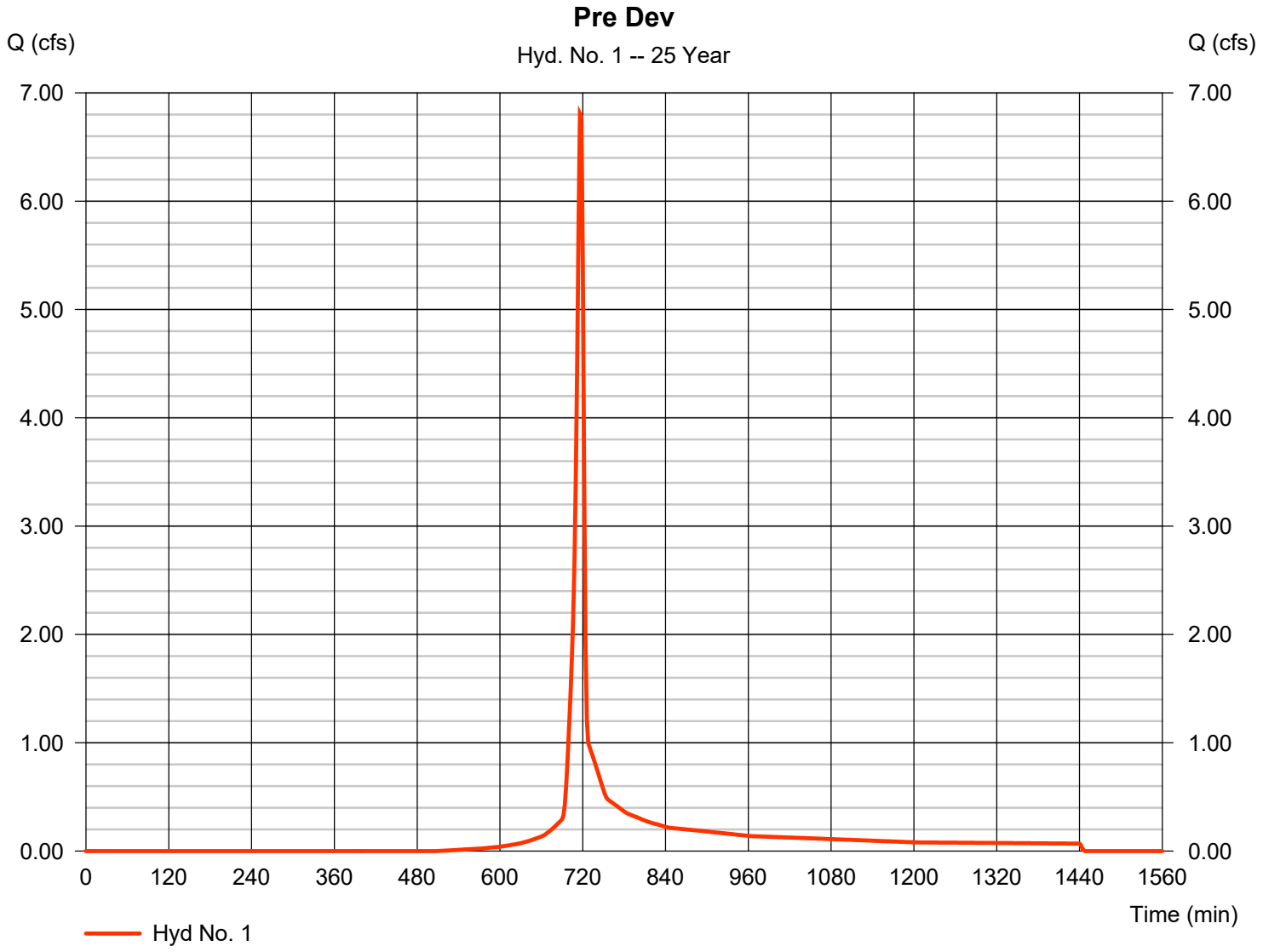
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 6.809 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 13,752 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.73 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



Hydrograph Report

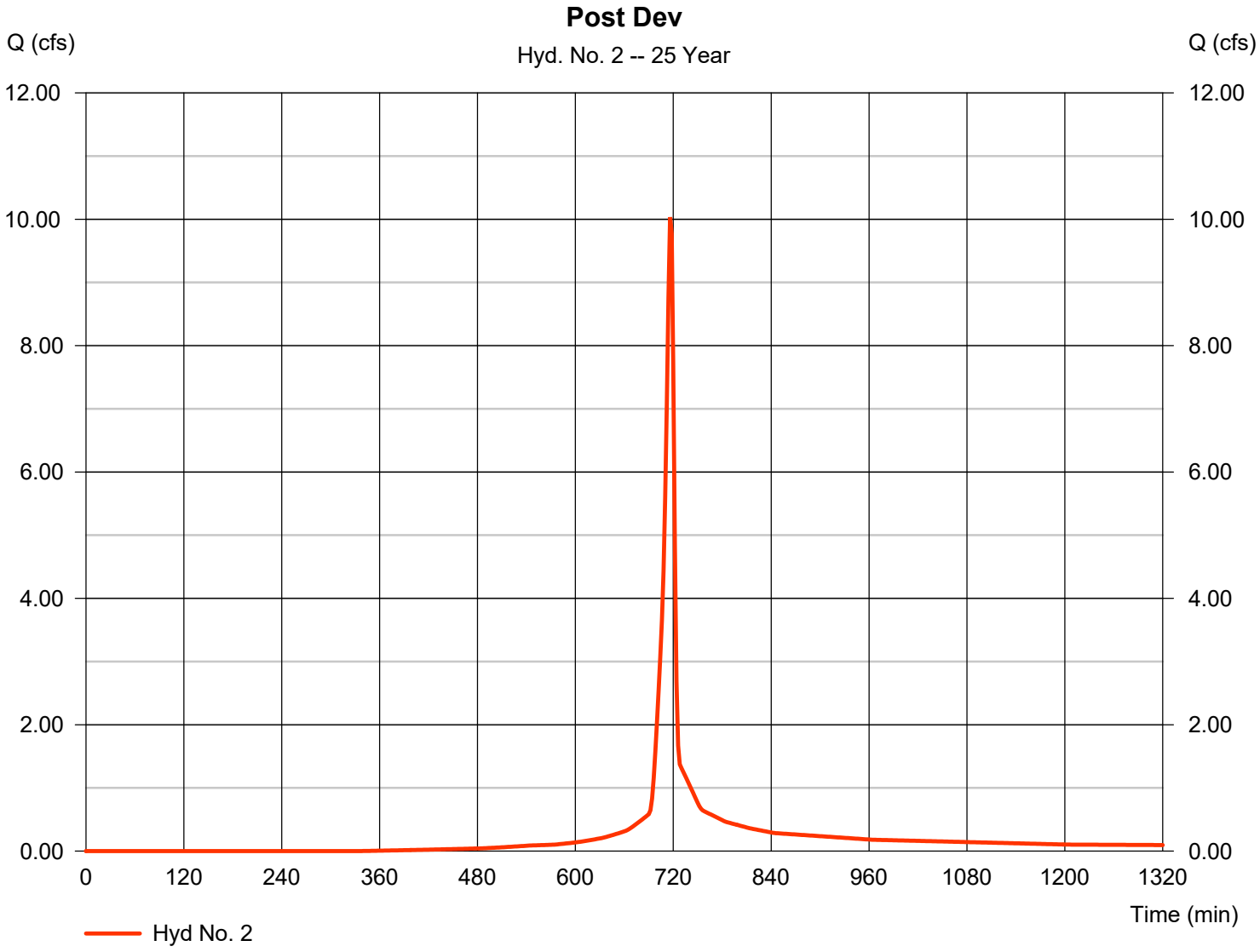
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.03 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	20,786 cuft
Drainage area	=	1.590 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.73 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

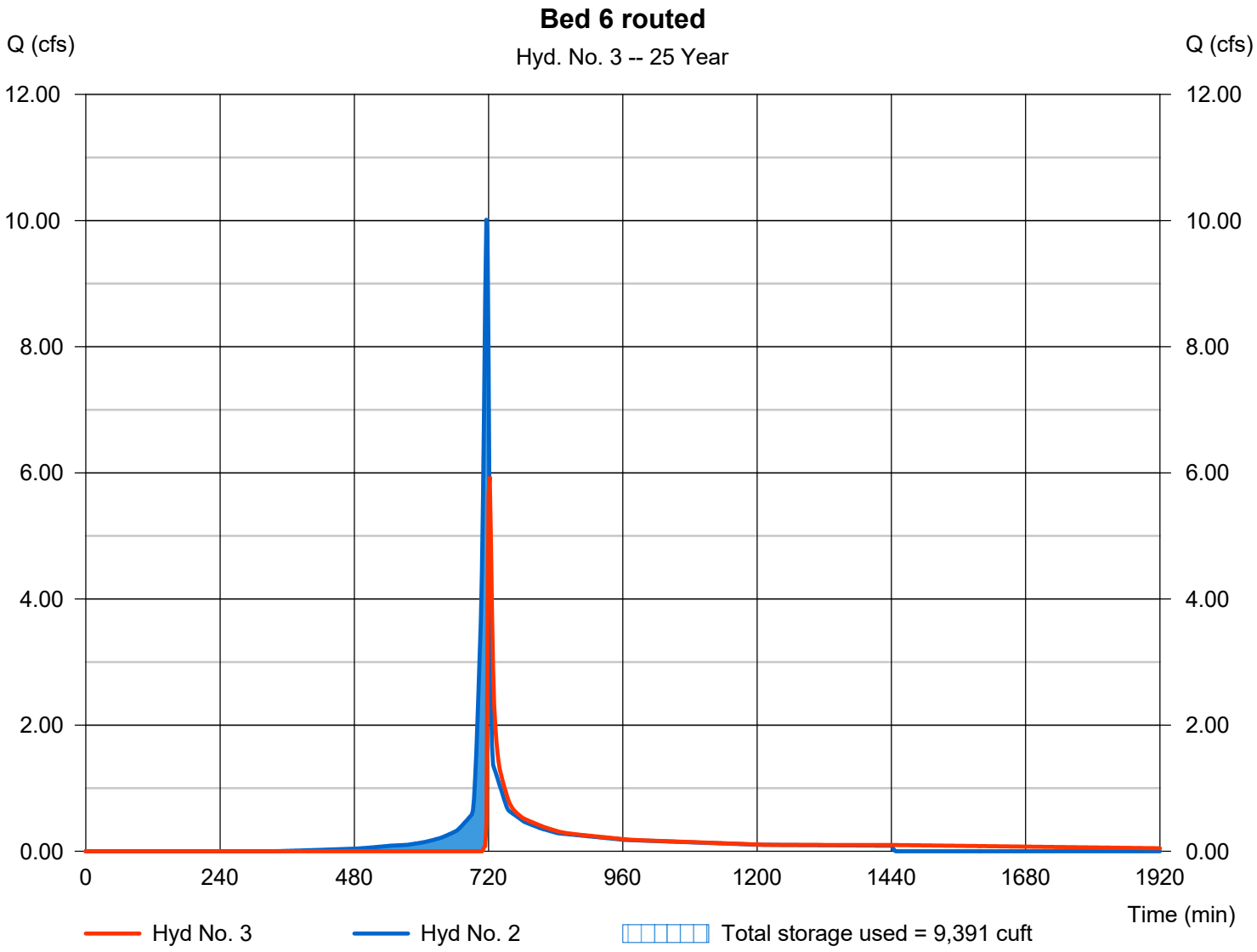
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	= Reservoir	Peak discharge	= 5.941 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 16,184 cuft
Inflow hyd. No.	= 2 - Post Dev	Max. Elevation	= 439.60 ft
Reservoir name	= Bed 6	Max. Storage	= 9,391 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	8.431	2	716	17,076	------	------	------	Pre Dev
2	SCS Runoff	11.94	2	716	24,965	------	------	------	Post Dev
3	Reservoir	8.752	2	720	20,364	2	439.82	10,109	Bed 6 routed

Hydrograph Report

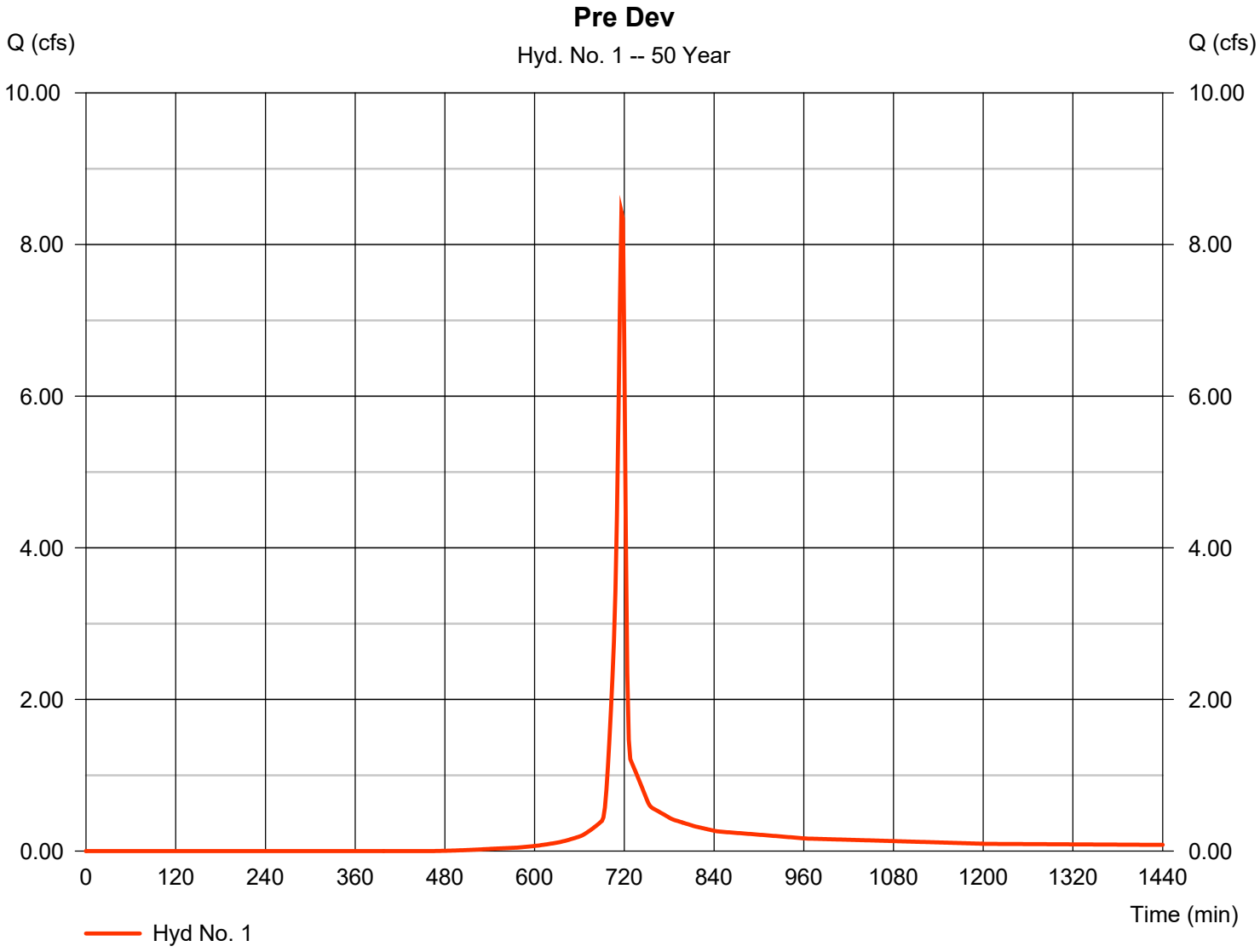
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 8.431 cfs
Storm frequency	= 50 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 17,076 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



Hydrograph Report

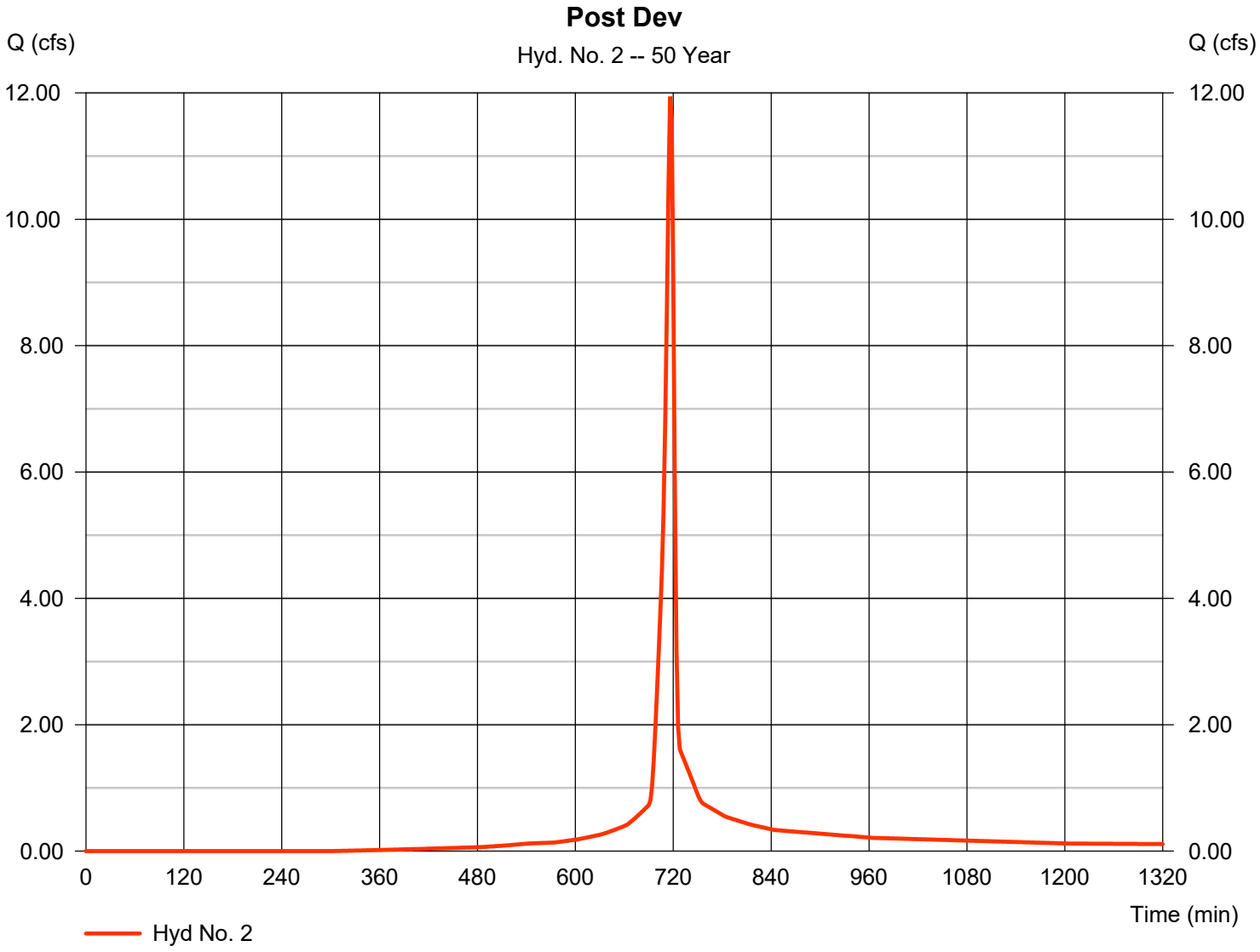
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.94 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	24,965 cuft
Drainage area	=	1.590 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.56 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

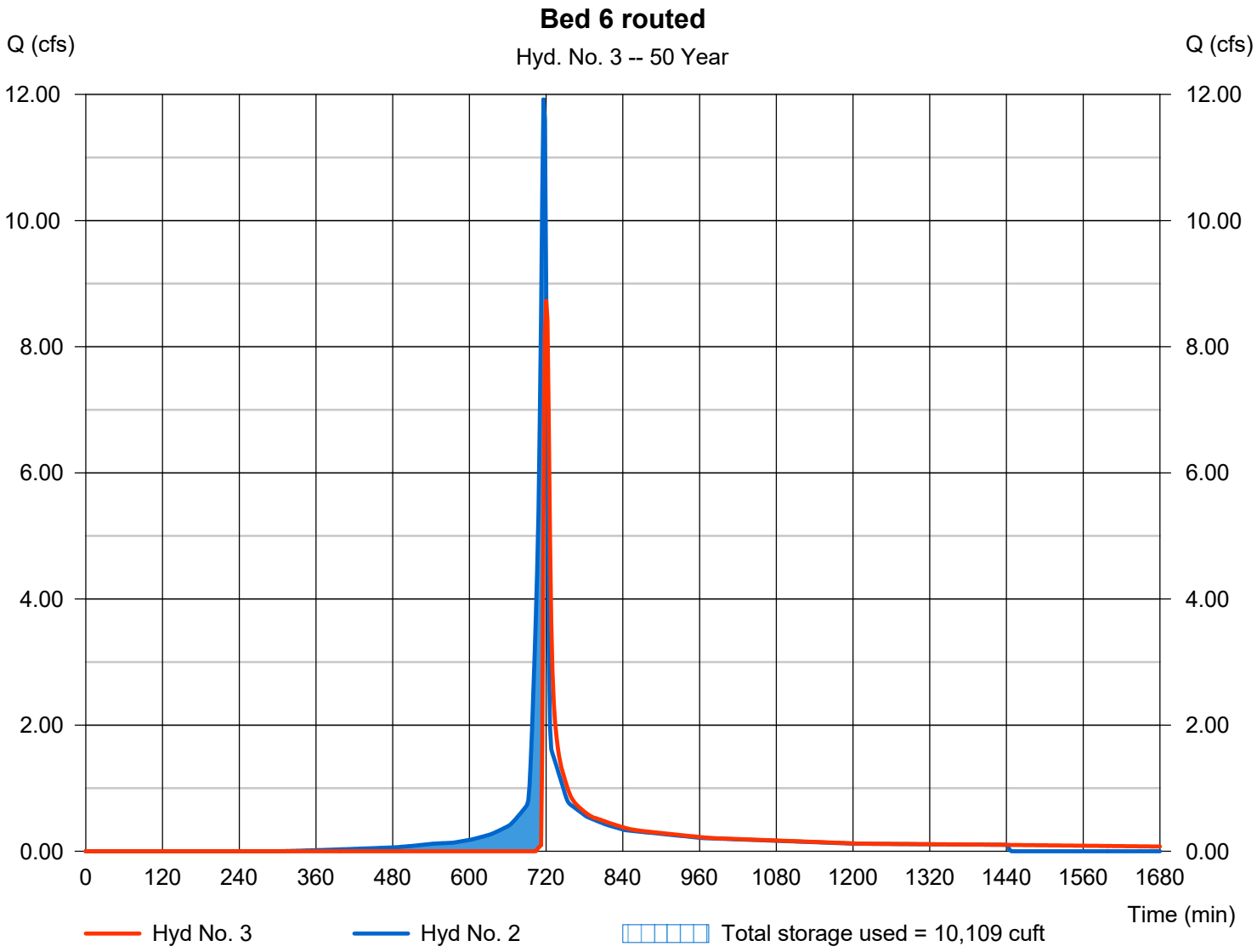
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	=	Reservoir	Peak discharge	=	8.752 cfs
Storm frequency	=	50 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	20,364 cuft
Inflow hyd. No.	=	2 - Post Dev	Max. Elevation	=	439.82 ft
Reservoir name	=	Bed 6	Max. Storage	=	10,109 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

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	10.20	2	716	20,757	------	------	------	Pre Dev
2	SCS Runoff	13.98	2	716	29,510	------	------	------	Post Dev
3	Reservoir	9.799	2	720	24,908	2	440.13	11,023	Bed 6 routed

Hydrograph Report

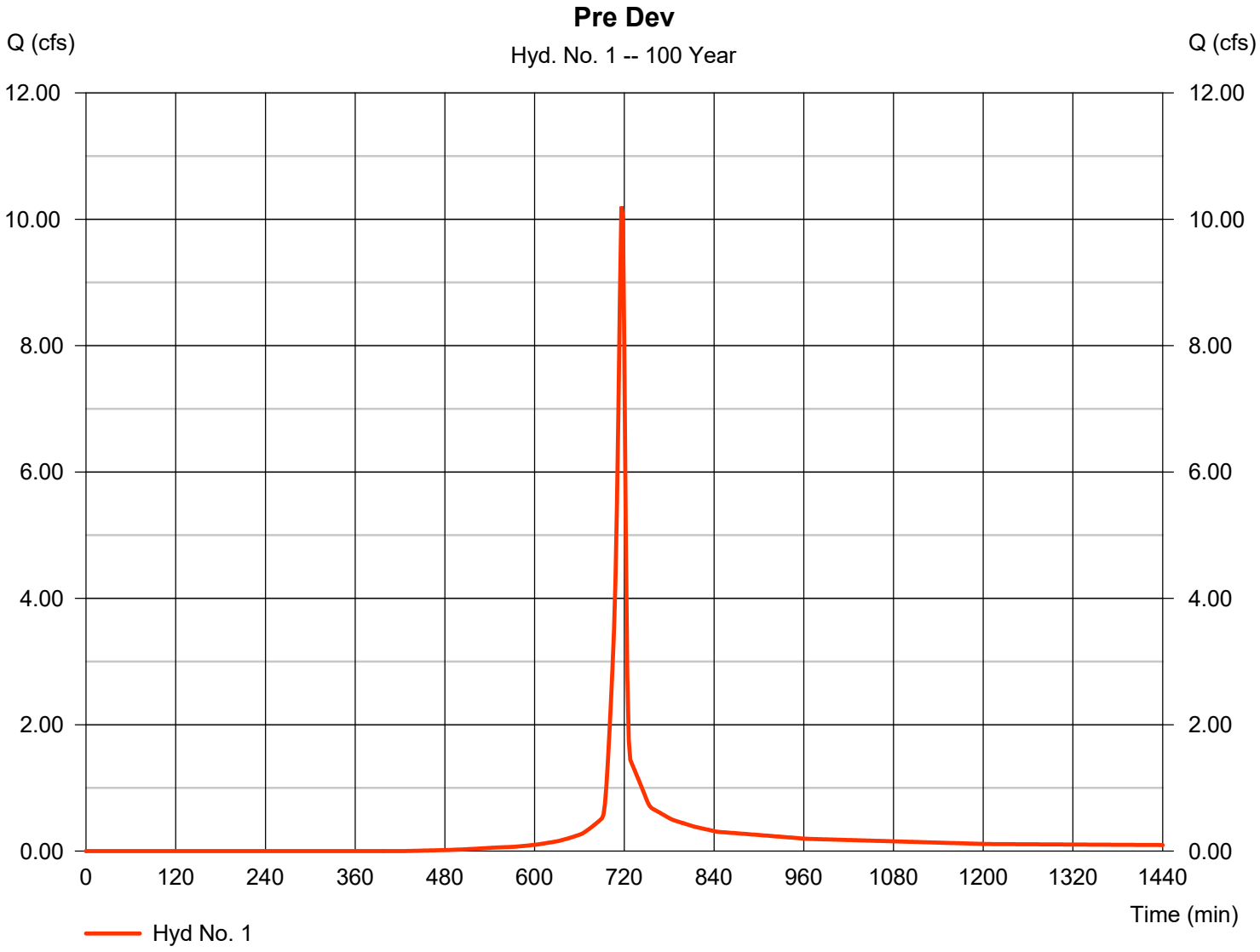
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 1

Pre Dev

Hydrograph type	= SCS Runoff	Peak discharge	= 10.20 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 20,757 cuft
Drainage area	= 1.410 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.45 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.540 x 98) + (0.870 x 58)] / 1.410



Hydrograph Report

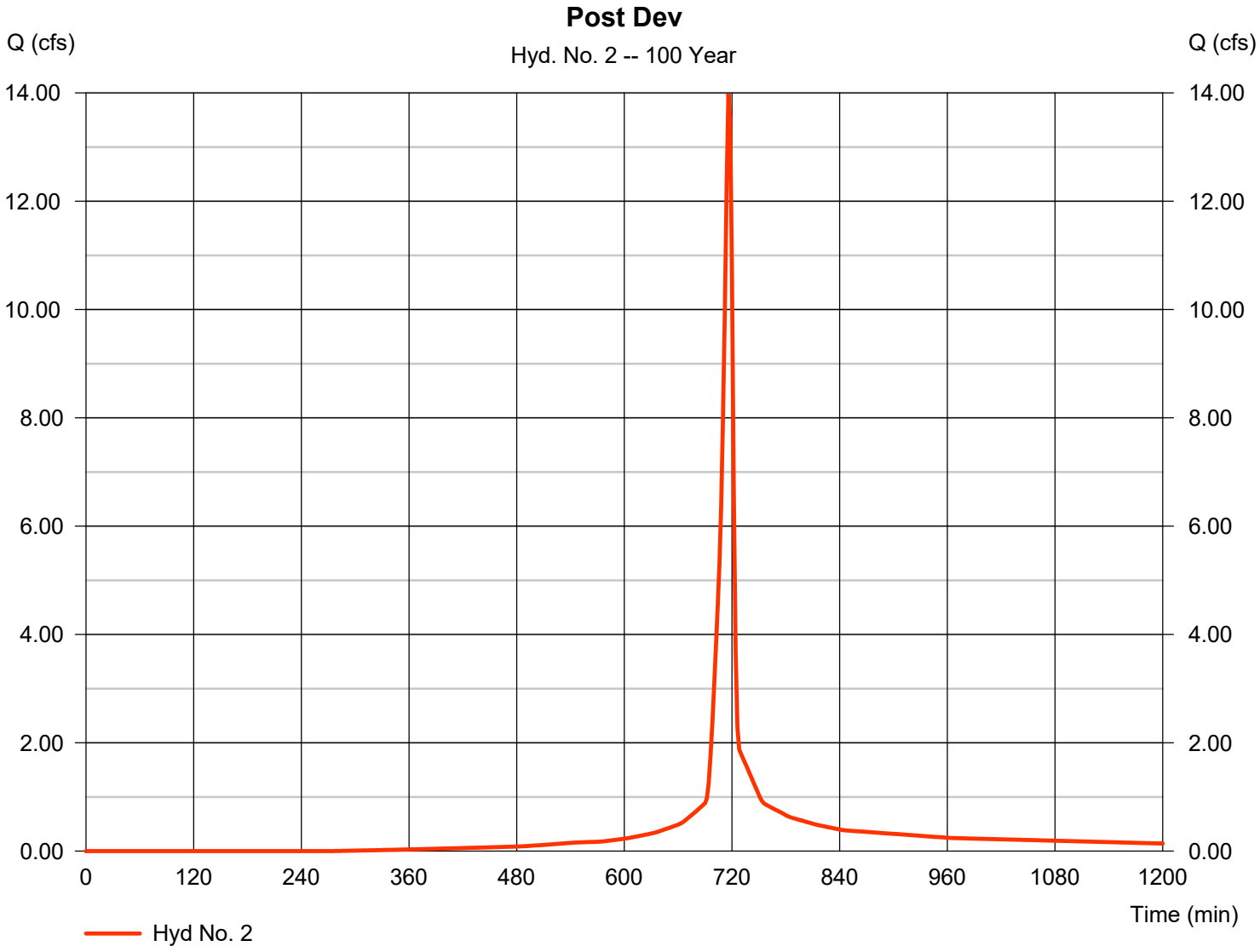
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 2

Post Dev

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.98 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	29,510 cuft
Drainage area	=	1.590 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.45 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.960 x 98) + (0.630 x 61)] / 1.590



Hydrograph Report

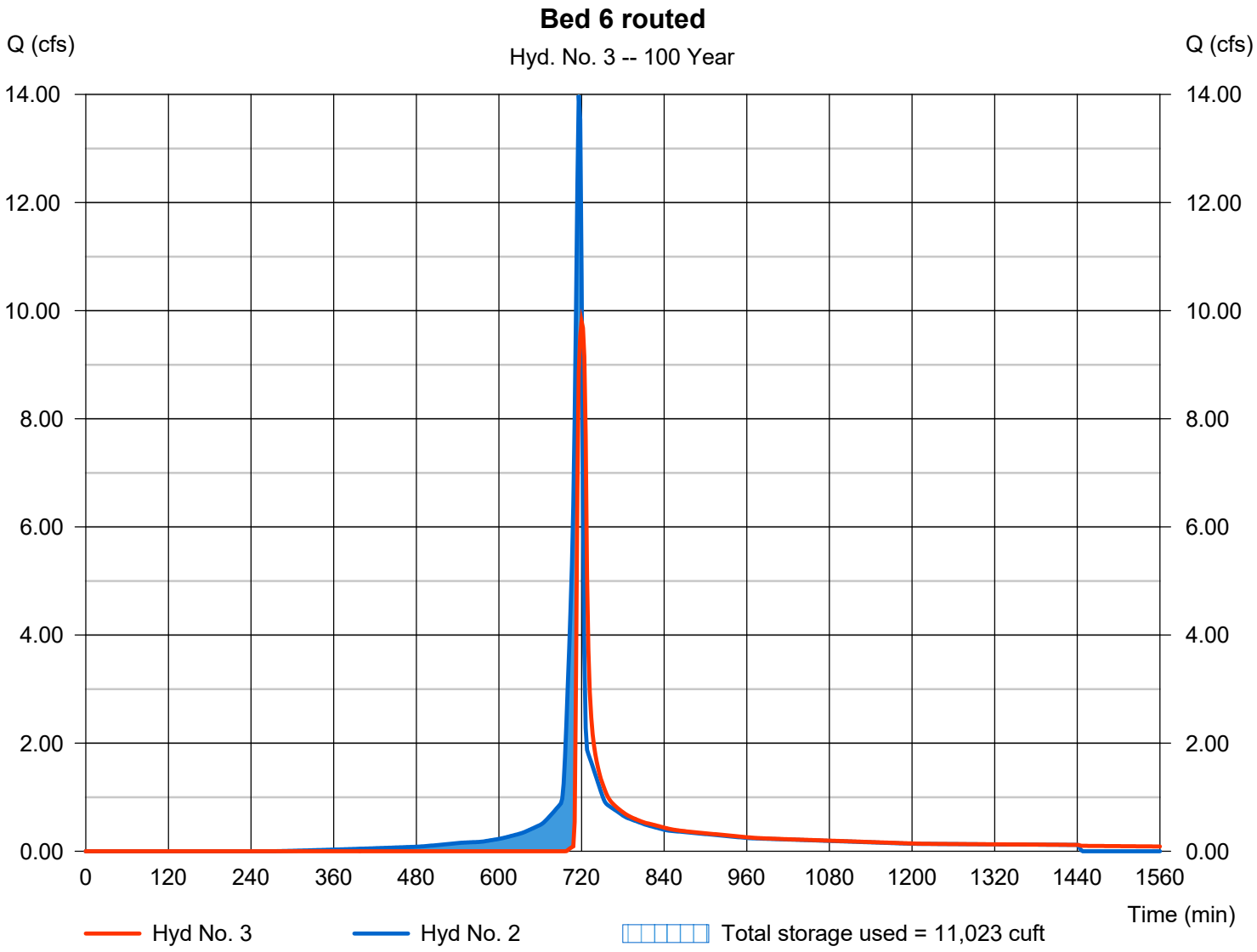
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 09 / 8 / 2020

Hyd. No. 3

Bed 6 routed

Hydrograph type	=	Reservoir	Peak discharge	=	9.799 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	24,908 cuft
Inflow hyd. No.	=	2 - Post Dev	Max. Elevation	=	440.13 ft
Reservoir name	=	Bed 6	Max. Storage	=	11,023 cuft

Storage Indication method used.



HILBEC Engineering & Geosciences, LLC

26 Beaver Run Road, Downingtown, PA 19335-2257
Office: 610.873.6204 www.hilbec.com Fax: 610.873.6206

Wastewater * Stormwater * Hydrogeology * Environmental * Testing & Design

September 30, 2019

Site Engineering Concepts, LLC
Mr. David J. Sanders, P.E.
PO Box 1992
Southeastern, PA 19399

Re: Stormwater Soil Evaluation
Hamilton: 228 Strafford Avenue
Radnor Township, Delaware County

Dear Mr. Sanders:

On September 17 & 18, 2019, I conducted soil evaluations for proposed stormwater management systems at the above noted property. A backhoe was used to excavate test pits to determine the most suitable depth to conduct permeability testing within the soil horizons. Test holes are typically excavated to the limits of the reach of the machine, bedrock, or a depth where water may be encountered entering the excavation.

Due to the size of some of the proposed drain fields, soil evaluations were conducted at either end. Existing utilities and sensitive vegetation required adjustment of the pit locations to limit damage to the area.

Test pit #SWM-01A and #SWM-01B were similar, with no observed limiting conditions to approximately 9 feet. Although the soil at depth was somewhat friable to firm, the permeability testing indicated that any applied water would be infiltrated.

Test pit #SWM-02A and #SWM-02B were similar, with no observed limiting conditions to approximately 10 feet. Below a slightly plastic horizon near three feet, the underlying soils were friable. Existing utilities consisting of water, an old terra cotta tile field, and electric wiring were observed and damaged, all above a depth of 42”.

Test #SWM-03 was located just below the pool area and situated to minimize damage to the existing sensitive vegetation. The soil was friable below 64”. Due to the length of the test pit for safety access, a drain pipe was uncovered well south and west of the proposed field.

Test #SWM-04 indicated redoximorphic features (formerly called mottles) from 10” to 30”. However, the redox features are a result of a textural discontinuity rather than an indication of a high-water table. Although no limiting horizons were noted, the second permeability test was done at 42” to account for the variations in the topography. This shallower test at 42” failed. A drainage pipe was observed in the scrape for the shallow permeability test #PS4-B above 42” and leading away from the area.

A Guelph Permeameter was used to determine the permeability of the soil. The Guelph is a constant head borehole permeameter using the principle of the Mariotte Siphon to supply a constant level of water in the hole; unlike a percolation falling head test. The depth of the holes from existing grade level were adjusted to account for topographic variations.

The Guelph allows the Field Saturated Permeability (K_{fs}) to be determined by running the test twice, at two different heads. Two tests are run at different heads or water elevations in order to provide the "gradient" portion of the required calculations. The gradient is used to measure the flux or water movement within the soil. A fluid bulb quickly forms and allows the stabilized hydraulic conductivity to be calculated. Errors inherent in other types of permeability tests that are minimized or eliminated by the Guelph Permeameter are soil fracturing, varying heads, silted in holes, estimated readings due to scale, and leaking clay seals.

Permeability tests assume that homogeneous soil conditions exist at and below the test zone, which is why the central portions of one soil horizon are typically chosen for the test depths. However, soil suitability, PA DEP guidelines, and proposed system design may alter that test parameter. Even within a consistent soil, unseen heterogeneous soil conditions can exist and may consist of:

1. Changing soil horizons across or near the test zone
2. Rock or stony soil beneath the bottom of the test hole
3. Roots, animal burrows
4. Soil fractures & thinly laminated soils

The consistency of the soil can be estimated by comparing the assumed and calculated alpha value. The alpha value is a soil parameter that depends primarily upon the soil texture and structure. By definition, it is the ratio of gravity to capillary soil-water forces. The value of typical fine to coarse-grained soils ranges between 0.01 and 0.5 cm^{-1}. Values considerably outside of this range (and negative values) suggest that heterogeneous soil conditions, such as in stony areas, may be encountered. Large alpha values suggest coarse textured or highly structured soils. Low alpha values suggest finer grained soils or a fine matrix. The geometric mean of the single head tests can be used in place of the two head approach to provide the permeability values if heterogeneous soil conditions cannot be avoided, such as in rocky areas.

A summary of the test results is noted in the table below. The base of all stormwater systems must adhere to the 24" isolation distance to any limiting horizon or pit base as required by the PA DEP guidance. Based on the observed soil in the test pits, the following tolerances are suggested:

Test ID	Test Probe #	Test Depth (inches)	Result (in/hr)	Geometric Mean
PS1-A	SWM-01A	84"	2.47	1.75
PS1-B	SWM-01B	84"	1.23	
PS2-A	SWM-02A	96"	0.88	1.06
PS2-B	SWM-02B	96"	1.27	
PS-3A	SWM-03	96"	0.53	1.26
PS-3B		96"	2.99	
PS4-A	SWM-04	84"	0.51	0.0
PS4-B		42"	Zero	

Test Pit ID	Limiting Depth	Upper Installation Limit	Lower Installation Limit
SWM-01A	110” Pit Base	44”	86”
SWM-01B	109” Pit Base	37”	85”
SWM-02A	120” Pit Base	59”	96”
SWM-02B	120” Pit Base	43”	96”
SWM-03	120” Pit Base	64”	96”
SWM-04	122” Pit Base	45” (perm Test Fail @ 42”)	98”

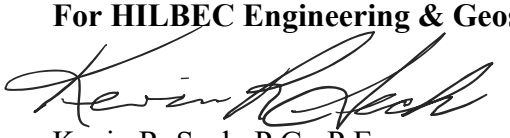
The base of the stormwater systems should be kept between the upper and lower limits of the testing as measured from existing grade while using the respective permeability test results. The base of the system could vary due to design conditions but the base should be kept as close to the test depths as possible. The base of the excavation should be scarified so as not to clog the void spaces.

The permeability test data indicates that the soil can infiltrate the applied stormwater assuming that a properly dimensioned and constructed stormwater system is provided (except for test area #SWM-04). No safety factor needs to be applied to the test results as this is a true permeability test, other than any additional safety factor the designer may choose to add. The rock underlying this site and within the test probes is not a carbonate material.

I have directly performed and/or supervised the test procedures and preparation of this report. All information contained herein is accurate to the best of my knowledge and all test procedures have been performed using accepted practices. HILBEC Engineering & Geosciences, LLC cannot and does not make claim, warranty or guarantee that surface and sub-surface site conditions other than described herein, either natural or as altered by construction activities, may be different at some time in the future and thus may affect these findings.

Please refer to the attached test logs, permeability test data, and location map of the test areas. If you have any further questions, please contact our office.

Very truly yours,
For HILBEC Engineering & Geosciences, LLC



Kevin R. Sech, P.G., P.E.

SOIL DESCRIPTIONS

HILBEC Engineering & Geosciences, LLC
26 Beaver Run Road, Downingtown, PA 19335-2257

Testing Conducted For
Stormwater Management

Project Name:	***Hamilton: 228 Strafford Ave***
Municipality:	***Radnor Township***
Soil Profile Description Prepared By:	**Kevin R. Sech, P.G., P.E.**
General Location of the Test Pit:	***Westerly side of test area near greenhouse***

Probe #:	***SWM-01A***
Test Date:	September 18, 2019
Soil Profile Limitation:	None No water or bedrock observed

Horizon	*Up*	*Low*	*Color*	*Texture*	*Structure*			*Consistence*		*CF%*	*Boundary*		*Roots*	*Coats*	*Redox*	
Ap	0	9	10YR 3/3 Dark Brown	Silt Loam	Medium	Moderate	Granular	Friable	Avg Moisture	<10%	Abrupt	Smooth	Yes	- - -	- - -	- - -
Bt 1	9	35	10YR 5/8 Yellowish Brown	Loam	Medium	Moderate	SBK	Friable	Avg Moisture	10%	Clear	Wavy	Few	- - -	- - -	- - -
Bt 2	35	44	10YR 5/6 Yellowish Brown	Silt Loam	Fine	Weak	SBK	Friable to Firm	Avg Moisture	15%	Clear	Wavy	No	- - -	- - -	- - -
BC	44	60	5YR 4/6 Variegated Yellowish Red	Loamy Sand Med	- - -	Massive	Structurless	V Firm	Avg Moisture	40%	Clear	Wavy	No	- - -	- - -	- - -
C	60	110	5YR 4/6 Variegated Yellowish Red	Sandy Loam	- - -	Single Grain	Structurless	Friable to Firm	Avg Moisture	50%	Pit Base	- - -	No	- - -	- - -	- - -

Method of Excavation:	Backhoe/Trackhoe	**Remarks:**	

PROJECT LIMITATIONS:

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Kevin R. Sech

Kevin R. Sech, P.G., P.E.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
KEVIN R. SECH
GEOLOGIST
732-G

HILBEC Engineering & Geosciences, LLC
26 Beaver Run Road, Downingtown, PA 19335-2257

Testing Conducted For
Stormwater Management

Project Name:	***Hamilton: 228 Strafford Ave***
Municipality:	***Radnor Township***
Soil Profile Description Prepared By:	**Kevin R. Sech, P.G., P.E.**
General Location of the Test Pit:	***Easterly side of the test area near Strafford Ave.***

Probe #:	***SWM-01B***
Test Date:	September 18, 2019
Soil Profile Limitation:	None No water or bedrock observed

Horizon	*Up*	*Low*	*Color*	*Texture*	*Structure*			*Consistence*		*CF%*	*Boundary*		*Roots*	*Coats*	*Redox*	
Ap	0	11	10YR 3/3 Dark Brown	Silt Loam	Medium	Moderate	Granular	Friable	Avg Moisture	<10%	Abrupt	Smooth	Yes	- - -	- - -	- - -
Bt 1	11	23	10YR 5/8 Yellowish Brown	Loam	Medium	Moderate	SBK	Friable to Firm	Avg Moisture	10%	Clear	Wavy	Few	- - -	- - -	- - -
Bt 2	23	37	10YR 5/6 Yellowish Brown	Silt Loam	Fine	Weak	SBK	Friable to Firm	Avg Moisture	20%	Clear	Wavy	No	- - -	- - -	- - -
C	37	109	10YR 5/4 Variegated Yellowish Brown	Silt Loam	- - -	Massive	Structurless	Friable	Avg Moisture	20%	Pit Base	- - -	No	- - -	- - -	- - -

Method of Excavation:	Backhoe/Trackhoe	**Remarks:**	

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KEVIN R. SECH
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732-G

HILBEC Engineering & Geosciences, LLC
26 Beaver Run Road, Downingtown, PA 19335-2257

Testing Conducted For
Stormwater Management

Project Name:	***Hamilton: 228 Strafford Ave***
Municipality:	***Radnor Township***
Soil Profile Description Prepared By:	**Kevin R. Sech, P.G., P.E.**
General Location of the Test Pit:	***Easterly side of the test area near the pool***

Probe #:	***SWM-02A***
Test Date:	September 17, 2019
Soil Profile Limitation:	None No water or bedrock observed

Horizon	*Up*	*Low*	*Color*	*Texture*	*Structure*			*Consistence*		*CF%*	*Boundary*		*Roots*	*Coats*	*Redox*	
Ap	0	25	10YR 3/3 Dark Brown	Silt Loam	Fine	Weak	Granular	Friable	Avg Moisture	30%	Abrupt	Smooth	Yes	- - -	- - -	- - -
	Historic Fill															
Bt	25	39	10YR 4/6 Dk Yellowish Brown	Silty Clay Loam	Medium	Moderate	SBK	Sl Plastic	Avg Moisture	10%	Clear	Wavy	Few	- - -	- - -	- - -
			Uncovered 1" water pipe @ 32" and terra cotta tile field at 42"													
BC	39	59	10YR 4/6 Variegated Dk Yellowish Brown	Silt Loam	Fine	Weak	SBK	Friable	Avg Moisture	20%	Clear	Wavy	No	- - -	- - -	- - -
C	59	120	10YR 4/6 Variegated Dk Yellowish Brown	Silt Loam	- - -	Massive	Structurless	Friable	Avg Moisture	35%	Pit Base	- - -	No	- - -	- - -	- - -

Method of Excavation:	Backhoe/Trackhoe	**Remarks:**	This test pit was slid to the south to avoid further damage to buried electric

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Kevin R. Sech

Kevin R. Sech, P.G., P.E.

HILBEC Engineering & Geosciences, LLC
26 Beaver Run Road, Downingtown, PA 19335-2257

Testing Conducted For
Stormwater Management

Project Name:	***Hamilton: 228 Strafford Ave***
Municipality:	***Radnor Township***
Soil Profile Description Prepared By:	**Kevin R. Sech, P.G., P.E.**
General Location of the Test Pit:	***Westerly side of the test area near Strafford Ave.***

Probe #:	***SWM-02B***
Test Date:	September 17, 2019
Soil Profile Limitation:	None No water or bedrock observed

Horizon	*Up*	*Low*	*Color*	*Texture*	*Structure*			*Consistence*		*CF%*	*Boundary*		*Roots*	*Coats*	*Redox*	
Ap	0	12	10YR 3/3 Dark Brown	Silt Loam	Medium	Moderate	Granular	Friable	Avg Moisture	<10%	Abrupt	Smooth	Yes	- - -	- - -	- - -
Bt	12	33	10YR 4/6 Dk Yellowish Brown	Silty Clay Loam	Medium	Moderate	SBK	Sl Plastic	Avg Moisture	10%	Clear	Wavy	Few	- - -	- - -	- - -
BC	33	43	10YR 4/6 Variegated Dk Yellowish Brown	Silt Loam	Fine	Weak	SBK	Friable	Avg Moisture	15%	Clear	Wavy	Few	- - -	- - -	- - -
C	43	120	10YR 4/6 Variegated Dk Yellowish Brown	Silt Loam	- - -	Massive	Structurless	Friable	Avg Moisture	25%	Pit Base	- - -	No	- - -	- - -	- - -

Method of Excavation:	Backhoe/Trackhoe	**Remarks:**	

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Kevin R. Sech

Kevin R. Sech, P.G., P.E.

HILBEC Engineering & Geosciences, LLC
26 Beaver Run Road, Downingtown, PA 19335-2257

Testing Conducted For
Stormwater Management

Project Name:	***Hamilton: 228 Strafford Ave***
Municipality:	***Radnor Township***
Soil Profile Description Prepared By:	**Kevin R. Sech, P.G., P.E.**
General Location of the Test Pit:	***Lower side of the pool***

Probe #:	***SWM-03***
Test Date:	September 17, 2019
Soil Profile Limitation:	None No water or bedrock observed Redox not a high or perched water table

Horizon	*Up*	*Low*	*Color*	*Texture*	*Structure*			*Consistence*		*CF%*	*Boundary*		*Roots*	*Coats*	*Redox*	
Ap	0	12	10YR 3/3 Dark Brown	Silt Loam	Medium	Moderate	Granular	Friable	Avg Moisture	<10%	Abrupt	Smooth	Yes	- - -	- - -	- - -
Bt	12	42	10YR 5/8 Yellowish Brown	Silty Clay Loam	Medium	Moderate	SBK	Sl Plastic	Avg Moisture	10%	Clear	Wavy	Few	- - -	Many	Prom
			Textural difference - not a high water table													
BC	42	64	10YR 4/6 Dk Yellowish Brown	Silt Loam Heavy In-Part	- - -	Massive	Structurless	Friable to Sl Plastic	Avg Moisture	15%	Clear	Wavy	No	- - -	- - -	- - -
C	64	120	10YR 4/2 Variegated Dark Grey Brown	Silt Loam	- - -	Massive	Structurless	Friable	Avg Moisture	30%	Pit Base	- - -	No	- - -	- - -	- - -

Method of Excavation:	Backhoe/Trackhoe	**Remarks:**	

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Kevin R. Sech

Kevin R. Sech, P.G., P.E.

HILBEC Engineering & Geosciences, LLC
26 Beaver Run Road, Downingtown, PA 19335-2257

Testing Conducted For
Stormwater Management

Project Name:	***Hamilton: 228 Strafford Ave***
Municipality:	***Radnor Township***
Soil Profile Description Prepared By:	**Kevin R. Sech, P.G., P.E.**
General Location of the Test Pit:	***WNW Property Corner***

Probe #:	***SWM-04***
Test Date:	September 17, 2019
Soil Profile Limitation:	None No water or bedrock observed Redox not a high or perched water table

Horizon	*Up*	*Low*	*Color*	*Texture*	*Structure*			*Consistence*		*CF%*	*Boundary*		*Roots*	*Coats*	*Redox*	
Ap	0	10	10YR 3/3 Dark Brown	Silt Loam	Medium	Moderate	Granular	Friable	Avg Moisture	<10%	Abrupt	Smooth	Yes	- - -	- - -	- - -
Bt 1	10	30	10YR 5/8 Yellowish Brown	Silty Clay Loam	Medium	Moderate	SBK	V Firm	Avg Moisture	10%	Clear	Wavy	Few	- - -	Few	Faint
			Textural difference - not a high water table													
Bt 2	30	45	10YR 5/8 Dk Yellowish Brown	Silt Loam	Fine	Weak	SBK	Friable	Avg Moisture	10%	Clear	Irregular	No	- - -	- - -	- - -
BC	45	97	10YR 4/6 Variegated Dk Yellowish Brown	Silt Loam Heavy In-Part	- - -	Massive	Structurless	Friable	Avg Moisture	10%	Clear	Irregular	No	- - -	- - -	- - -
C	97	122	10YR 4/4 Variegated Dk Yellowish Brown	Silt Loam Sandy In-Part	- - -	Massive	Structurless	Friable	Avg Moisture	20%	Pit Base	- - -	No	- - -	- - -	- - -

Method of Excavation:	Backhoe/Trackhoe	**Remarks:**	Old trench drain found in the scrape for the permeability test at the low corner of the site.

PROJECT LIMITATIONS:

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Kevin R. Sech

Kevin R. Sech, P.G., P.E.

PERMEABILITY TEST RESULTS AND CALCULATIONS

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 18, 2019
TEST ID:	PS1-A	WEATHER / TEMP:	Sunny / 70 Degrees
TEST DEPTH:	84"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-01A	SIDE OF TEST AREA:	Westerly Side

1st Level at 5 cm						2nd Level at 10 cm					
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*	
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings					
30	3.4	1.7	1.7	2	1	30	21.9	19.9	2.0	2	
30	4.8	3.4	1.4	2	2	30	23.4	21.9	1.5	2	
30	6.0	4.8	1.2	2	3	30	25.0	23.4	1.6	2	
30	7.2	6.0	1.2	2	4	30	26.5	25.0	1.5	2	
30	8.3	7.2	1.1	2	5	30	28.1	26.5	1.6	2	
30	9.6	8.3	1.3	2	6	30	29.6	28.1	1.5	2	
30	10.5	9.6	0.9	2	7	30	31.2	29.6	1.6	2	
30	11.7	10.5	1.2	2	8	30	32.8	31.2	1.6	2	
30	12.7	11.7	1.0	2	9	30	34.4	32.8	1.6	2	
30	13.7	12.7	1.0	2	10						
30	14.7	13.7	1.0	2	11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
					20						
					21						
					22						
					23						
					24						
					25						
					26						
					27						
					28						
	Stabilized At:		***1.0 cm***				***Stabilized At:***		***1.6 cm***		

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)	
0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD	
5 cm	First Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
1.0 cm	Stabilized Reading
3.33E-02 cm/sec	Average Rate of Fall (R_1)
1.77E-02 cm^2/sec	First Head Matric Flux Potential
2.13E-03 cm/sec	First Head Kfs
3.01 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD	
10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
1.6 cm	Stabilized Reading
5.33E-02 cm/sec	Average Rate of Fall (R_2)
2.84E-02 cm^2/sec	Second Head Matric Flux Potential
2.03E-03 cm/sec	Second Head Kfs
2.87 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS	
2.24E-02 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
2.08E-03 cm/sec	Geometric Mean of Field Saturated Hydraulic
1.99E-02 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
0.09 cm-1	Calculated Alpha Value (α^*)
1.74E-03 cm/sec	Calculated Field Saturated Conductivity
2.94 inches/hour	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
2.47 inches/hour	**Hydraulic Conductivity Over Gradient (Kfs)**

*The **Single Head Geometric Mean** is used when*

1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

2.47 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS1-B	WEATHER / TEMP:	Sunny / 70 Degrees
TEST DEPTH:	84"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-01B	SIDE OF TEST AREA:	Easterly Side

1st Level at 5 cm						2nd Level at 10 cm					
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*	
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings					
30	12.1	11.3	0.8	2	1	30	23.8	22.8	1.0	2	
30	12.7	12.1	0.6	2	2	30	24.7	23.8	0.9	2	
30	13.2	12.7	0.5	2	3	30	25.5	24.7	0.8	2	
30	13.7	13.2	0.5	2	4	30	26.4	25.5	0.9	2	
30	14.3	13.7	0.6	2	5	30	27.3	26.4	0.9	2	
30	14.7	14.3	0.4	2	6	30	28.1	27.3	0.8	2	
30	15.3	14.7	0.6	2	7	30	29.0	28.1	0.9	2	
30	15.8	15.3	0.5	2	8	30	29.9	29.0	0.9	2	
30	16.4	15.8	0.6	2	9	30	30.7	29.9	0.8	2	
30	16.9	16.4	0.5	2	10	30	31.5	30.7	0.8	2	
30	17.5	16.9	0.6	2	11	30	32.3	31.5	0.8	2	
30	18.0	17.5	0.5	2	12						
30	18.5	18.0	0.5	2	13						
30	19.0	18.5	0.5	2	14						
					15						
					16						
					17						
					18						
					19						
					20						
					21						
					22						
					23						
					24						
					25						
					26						
					27						
					28						
		Stabilized At:	***0.5 cm***					***Stabilized At:***	***0.8 cm***		

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)

0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD

5 cm	First Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.5 cm	Stabilized Reading
1.67E-02 cm/sec	Average Rate of Fall (R_1)
8.86E-03 cm^2/sec	First Head Matric Flux Potential
1.06E-03 cm/sec	First Head Kfs
1.51 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD

10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.8 cm	Stabilized Reading
2.67E-02 cm/sec	Average Rate of Fall (R_2)
1.63E-02 cm^2/sec	Second Head Matric Flux Potential
1.01E-03 cm/sec	Second Head Kfs
1.44 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS

1.20E-02 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
1.04E-03 cm/sec	Geometric Mean of Field Saturated Hydraulic
9.96E-03 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
0.09 cm-1	Calculated Alpha Value (α*)
8.71E-04 cm/sec	Calculated Field Saturated Conductivity
1.47 inches/hour	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
1.23 inches/hour	**Hydraulic Conductivity Over Gradient (Kfs)**

*The **Single Head Geometric Mean** is used when*

1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

1.23 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS2-A	WEATHER / TEMP:	Sunny / 70 Degrees
TEST DEPTH:	96"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-02A	SIDE OF TEST AREA:	Westerly Side

1st Level at 5 cm						2nd Level at 10 cm					
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*	
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings					
30	1.5	0.9	0.6	2	1	30	9.5	8.8	0.7	2	
30	2.0	1.5	0.5	2	2	30	10.0	9.5	0.5	2	
30	2.2	2.0	0.2	2	3	30	10.6	10.0	0.6	2	
30	2.7	2.2	0.5	2	4	30	11.1	10.6	0.5	2	
30	3.0	2.7	0.3	2	5	30	11.6	11.1	0.5	2	
30	3.3	3.0	0.3	2	6	30	12.2	11.6	0.6	2	
30	7.3	3.3	4.0	2	7	30	12.6	12.2	0.4	2	
30	7.6	7.3	0.3	2	8	30	13.3	12.6	0.7	2	
30	7.9	7.6	0.3	2	9	30	13.8	13.3	0.5	2	
30	8.3	7.9	0.4	2	10	30	14.3	13.8	0.5	2	
30	8.6	8.3	0.3	2	11	30	14.8	14.3	0.5	2	
30	8.9	8.6	0.3	2	12						
30	9.2	8.9	0.3	2	13						
					14						
					15						
					16						
					17						
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					20						
					21						
					22						
					23						
					24						
					25						
					26						
					27						
					28						
		Stabilized At:	***0.3 cm***					***Stabilized At:***	***0.5 cm***		

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)	
0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD	
5 cm	First Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.3 cm	Stabilized Reading
1.00E-02 cm/sec	Average Rate of Fall (R_1)
5.32E-03 cm^2/sec	First Head Matric Flux Potential
6.38E-04 cm/sec	First Head Kfs
0.90 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD	
10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.5 cm	Stabilized Reading
1.67E-02 cm/sec	Average Rate of Fall (R_2)
1.08E-02 cm^2/sec	Second Head Matric Flux Potential
6.34E-04 cm/sec	Second Head Kfs
0.90 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS	
7.59E-03 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
6.36E-04 cm/sec	Geometric Mean of Field Saturated Hydraulic
5.41E-03 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
0.11 cm-1	Calculated Alpha Value (α*)
6.21E-04 cm/sec	Calculated Field Saturated Conductivity
0.90 inches/hour	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
0.88 inches/hour	**Hydraulic Conductivity Over Gradient (Kfs)**

*The **Single Head Geometric Mean** is used when*

1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

0.88 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS2-B	WEATHER / TEMP:	Sunny / 70 Degrees
TEST DEPTH:	96"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-02B	SIDE OF TEST AREA:	Easterly Side

1st Level at 5 cm						2nd Level at 10 cm					
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*	
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings					
30	17.4	16.7	0.7	2	1	30	26.3	25.4	0.9	2	
30	18.1	17.4	0.7	2	2	30	27.0	26.3	0.7	2	
30	18.7	18.1	0.6	2	3	30	27.7	27.0	0.7	2	
30	19.2	18.7	0.5	2	4	30	28.3	27.7	0.6	2	
30	19.7	19.2	0.5	2	5	30	29.0	28.3	0.7	2	
30	20.1	19.7	0.4	2	6	30	29.6	29.0	0.6	2	
30	20.5	20.1	0.4	2	7	30	30.3	29.6	0.7	2	
30	21.0	20.5	0.5	2	8	30	30.9	30.3	0.6	2	
30	21.5	21.0	0.5	2	9	30	31.5	30.9	0.6	2	
30	22.0	21.5	0.5	2	10	30	32.1	31.5	0.6	2	
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
					20						
					21						
					22						
					23						
					24						
					25						
					26						
					27						
					28						
		Stabilized At:	*0.5 cm*					*Stabilized At:*	*0.6 cm*		

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)

0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD

5 cm	First Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.5 cm	Stabilized Reading
1.67E-02 cm/sec	Average Rate of Fall (R_1)
8.86E-03 cm^2/sec	First Head Matric Flux Potential
1.06E-03 cm/sec	First Head Kfs
1.51 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD

10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.6 cm	Stabilized Reading
2.00E-02 cm/sec	Average Rate of Fall (R_2)
1.22E-02 cm^2/sec	Second Head Matric Flux Potential
7.60E-04 cm/sec	Second Head Kfs
1.08 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS

1.04E-02 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
8.99E-04 cm/sec	Geometric Mean of Field Saturated Hydraulic
1.56E-02 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
See Below cm-1	Calculated Alpha Value (α*)
-1.17E-04 cm/sec	Calculated Field Saturated Conductivity
1.27 inches/hour	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
See 1 Below	**Gradient Head Does Not Apply For This Case**

*The **Single Head Geometric Mean** is used when*

1. The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists

2. The second rate is not greater than the first rate

1.27 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS3-A	WEATHER / TEMP:	Sunny / 75 Degrees
TEST DEPTH:	96"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-03	SIDE OF TEST AREA:	Northerly Side

1st Level at 5 cm						2nd Level at 10 cm				
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings				
60	2.3	1.1	1.2	2	1	30	13.6	12.6	1.0	2
60	3.6	2.3	1.3	2	2	30	14.5	13.6	0.9	2
60	4.4	3.6	0.8	2	3	30	15.2	14.5	0.7	2
60	5.4	4.4	1.0	2	4	30	16.1	15.2	0.9	2
60	6.2	5.4	0.8	2	5	30	16.9	16.1	0.8	2
60	7.2	6.2	1.0	2	6	30	17.6	16.9	0.7	2
60	8.2	7.2	1.0	2	7	30	18.3	17.6	0.7	2
60	9.2	8.2	1.0	2	8	30	18.9	18.3	0.6	2
					9	30	19.6	18.9	0.7	2
					10	30	20.3	19.6	0.7	2
					11	30	21.0	20.3	0.7	2
					12					
					13					
					14					
					15					
					16					
					17					
					18					
					19					
					20					
					21					
					22					
					23					
					24					
					25					
					26					
					27					
					28					
	Stabilized At:		***1.0 cm***				***Stabilized At:***		***0.7 cm***	

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)	
0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD	
5 cm	First Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
60 seconds	Time Interval Of Readings (T)
1.0 cm	Stabilized Reading
1.67E-02 cm/sec	Average Rate of Fall (R_1)
8.86E-03 cm^2/sec	First Head Matric Flux Potential
1.06E-03 cm/sec	First Head Kfs
1.51 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD	
10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.7 cm	Stabilized Reading
2.33E-02 cm/sec	Average Rate of Fall (R_2)
1.43E-02 cm^2/sec	Second Head Matric Flux Potential
8.87E-04 cm/sec	Second Head Kfs
1.26 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS	
1.12E-02 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
9.71E-04 cm/sec	Geometric Mean of Field Saturated Hydraulic
1.28E-02 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
0.03 cm-1	Calculated Alpha Value (α*)
3.77E-04 cm/sec	Calculated Field Saturated Conductivity
1.38 inches/hour	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
0.53 inches/hour	**Hydraulic Conductivity Over Gradient (Kfs)**

*The **Single Head Geometric Mean** is used when*

1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

0.53 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS3-B	WEATHER / TEMP:	Sunny / 75 Degrees
TEST DEPTH:	96"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-03	SIDE OF TEST AREA:	Southerly Side

1st Level at 5 cm						2nd Level at 10 cm					
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*	
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings					
30	28.7	27.1	1.6	2	1	30	40.5	38.9	1.6	2	
30	29.8	28.7	1.1	2	2	30	41.8	40.5	1.3	2	
30	30.7	29.8	0.9	2	3	30	43.5	41.8	1.7	2	
30	31.6	30.7	0.9	2	4	30	44.7	43.5	1.2	2	
30	32.4	31.6	0.8	2	5	30	45.9	44.7	1.2	2	
30	33.1	32.4	0.7	2	6	30	47.3	45.9	1.4	2	
30	33.8	33.1	0.7	2	7	30	48.4	47.3	1.1	2	
30	34.5	33.8	0.7	2	8	30	49.7	48.4	1.3	2	
					9	30	51.0	49.7	1.3	2	
					10	30	52.3	51.0	1.3	2	
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
					20						
					21						
					22						
					23						
					24						
					25						
					26						
					27						
					28						
		Stabilized At:	***0.7 cm***					***Stabilized At:***	***1.3 cm***		

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)

0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD

5 cm	First Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
0.7 cm	Stabilized Reading
2.33E-02 cm/sec	Average Rate of Fall (R_1)
1.24E-02 cm^2/sec	First Head Matric Flux Potential
1.49E-03 cm/sec	First Head Kfs
2.11 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD

10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
1.3 cm	Stabilized Reading
4.33E-02 cm/sec	Average Rate of Fall (R_2)
2.50E-02 cm^2/sec	Second Head Matric Flux Potential
1.65E-03 cm/sec	Second Head Kfs
2.33 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS

1.76E-02 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
1.57E-03 cm/sec	Geometric Mean of Field Saturated Hydraulic
8.86E-03 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
0.24 cm-1	Calculated Alpha Value (α*)
2.11E-03 cm/sec	Calculated Field Saturated Conductivity
2.22 inches/hour	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
2.99 inches/hour	**Hydraulic Conductivity Over Gradient (Kfs)**

*The **Single Head Geometric Mean** is used when*

1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

2.99 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS4-A	WEATHER / TEMP:	Sunny / 75 Degrees
TEST DEPTH:	84"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-04	SIDE OF TEST AREA:	Easterly Side

1st Level at 5 cm						2nd Level at 10 cm				
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings				
30	3.9	0.9	3.0	1	1	60	8.2	7.5	0.7	2
30	7.0	3.9	3.1	1	2	60	8.8	8.2	0.6	2
30	9.6	7.0	2.6	1	3	60	9.4	8.8	0.6	2
30	13.4	9.6	3.8	1	4	60	9.9	9.4	0.5	2
30	16.4	13.4	3.0	1	5	60	10.6	9.9	0.7	2
30	19.1	16.4	2.7	1	6	60	11.2	10.6	0.6	2
30	22.7	19.1	3.6	1	7	60	11.8	11.2	0.6	2
30	25.4	22.7	2.7	1	8	60	12.4	11.8	0.6	2
30	28.2	25.4	2.8	1	9					
30	30.8	28.2	2.6	1	10					
30	33.5	30.8	2.7	1	11					
30	36.3	33.5	2.8	1	12					
30	39.5	36.3	3.2	1	13					
30	42.2	39.5	2.7	1	14					
30	44.8	42.2	2.6	1	15					
30	47.4	44.8	2.6	1	16					
30	50.0	47.4	2.6	1	17					
					18					
					19					
					20					
					21					
					22					
					23					
					24					
					25					
					26					
					27					
					28					
	Stabilized At:		***2.6 cm***				***Stabilized At:***		***0.6 cm***	

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)	
0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD	
5 cm	First Applied Head (H)
2.15 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
30 seconds	Time Interval Of Readings (T)
2.6 cm	Stabilized Reading
8.67E-02 cm/sec	Average Rate of Fall (R_1)
2.81E-03 cm^2/sec	First Head Matric Flux Potential
3.37E-04 cm/sec	First Head Kfs
0.48 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD	
10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
60 seconds	Time Interval Of Readings (T)
0.6 cm	Stabilized Reading
1.00E-02 cm/sec	Average Rate of Fall (R_2)
3.75E-03 cm^2/sec	Second Head Matric Flux Potential
3.80E-04 cm/sec	Second Head Kfs
0.54 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS	
3.25E-03 cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
3.58E-04 cm/sec	Geometric Mean of Field Saturated Hydraulic
1.86E-03 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
See Below cm-1	Calculated Alpha Value (α*)
See 2 Below cm/sec	Calculated Field Saturated Conductivity

0.51 inches/hour — **Geometric Mean Conductivity For Single Head Analysis (Kfs)**
Gradient Head Does Not Apply For This Case

*The **Single Head Geometric Mean** is used when*

1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

0.51 inches/hour FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME:	Hamilton: 228 Strafford Ave	TEST DATE:	September 17, 2019
TEST ID:	PS4-B	WEATHER / TEMP:	Sunny / 75 Degrees
TEST DEPTH:	42"	HOLE DIAMETER:	6.0 cm or inch 2 3/8
NEAR SOIL PROBE #:	SWM-04	SIDE OF TEST AREA:	Westerly Side

1st Level at 5 cm						2nd Level at 10 cm					
Time Interval (seconds)	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*		*Time Interval (seconds)*	*Water Level Reading (cm)*	*Previous Water Level (cm)*	*Change in Level (cm)*	*Number of Tubes (1 or 2)*	
Stabilized with 3 consecutive equal readings						Stabilized with 3 consecutive equal readings					
600	15.8	15.8	0.0	1	1	600	19.5	19.5	0.0	2	
					2						
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
					20						
					21						
					22						
					23						
					24						
					25						
					26						
					27						
					28						
		Stabilized At:	***0.0 cm***					***Stabilized At:***	***0.0 cm***		

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)

0.36 cm-1	Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
0.12 cm-1	Structured Soils from Clays to Loams
0.04 cm-1	Fine & Very Fine Textured Silts and Clay
0.01 cm-1	Compacted and Structurless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD

5 cm	First Applied Head (H)
2.15 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
600 seconds	Time Interval Of Readings (T)
0.0 cm	Stabilized Reading
0.00E+00 cm/sec	Average Rate of Fall (R_1)
0.00E+00 cm^2/sec	First Head Matric Flux Potential
0.00E+00 cm/sec	First Head Kfs
0.00 in/hr	First Head Kfs (in/hr)

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD

10 cm	Second Applied Head (H)
35.22 cm^2	Cross Sectional Area of Reservoir (35.22 or 2.15)
600 seconds	Time Interval Of Readings (T)
0.0 cm	Stabilized Reading
0.00E+00 cm/sec	Average Rate of Fall (R_2)
0.00E+00 cm^2/sec	Second Head Matric Flux Potential
0.00E+00 cm/sec	Second Head Kfs
0.00 in/hr	Second Head Kfs (in/hr)

HYDRAULIC CONDUCTIVITY ANALYSIS

#NUM! cm^2/sec	Geometric Mean of Matric Flux Potential For Single Head Methods
#NUM! cm/sec	Geometric Mean of Field Saturated Hydraulic
0.00E+00 cm^2/sec	Calculated Matric Flux Potential Over Gradient (φm)
#DIV/0! cm-1	Calculated Alpha Value (α*)
0.00E+00 cm/sec	Calculated Field Saturated Conductivity

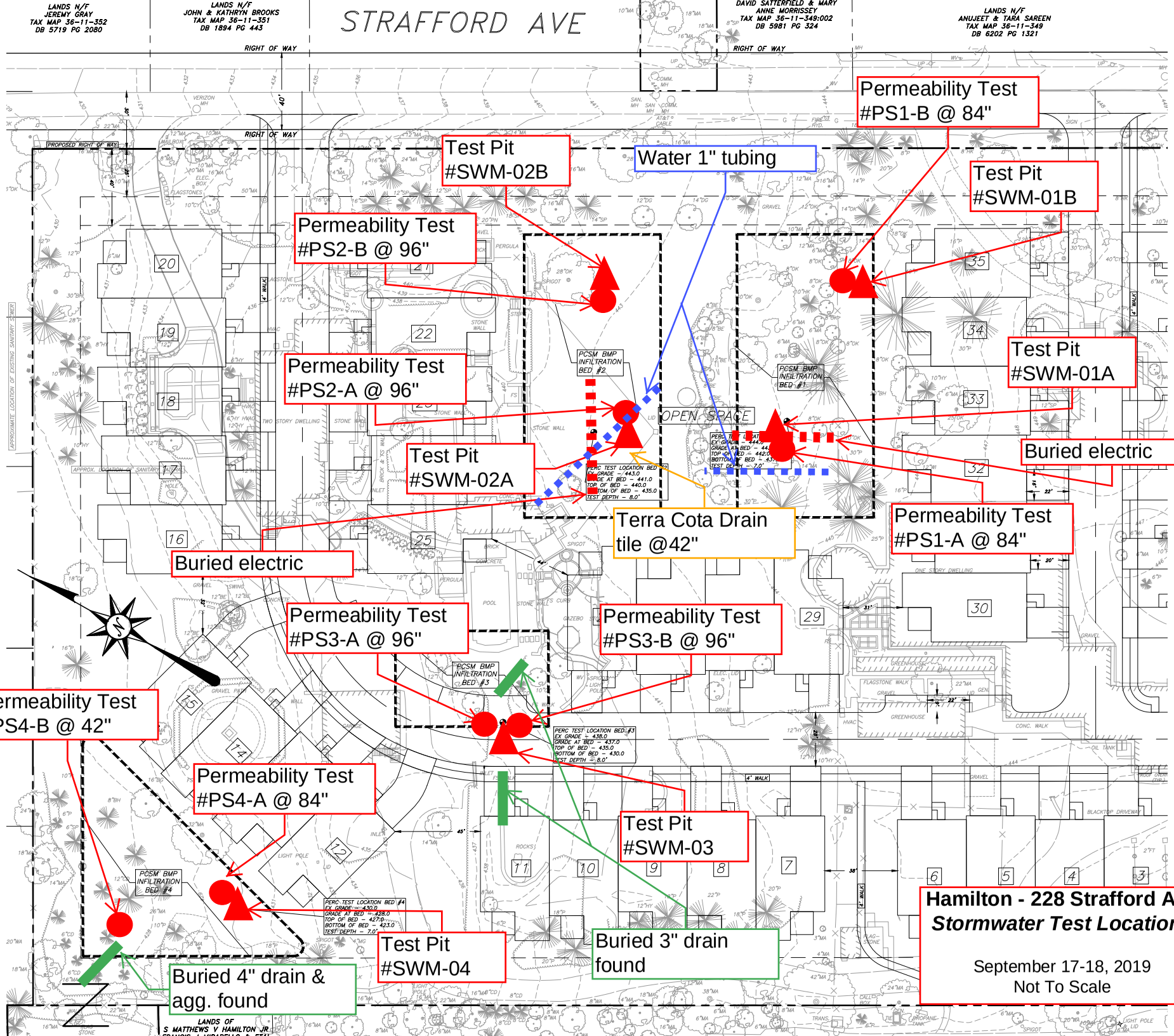
#NUM!	**inches/hour**	**Geometric Mean Conductivity For Single Head Analysis (Kfs)**
0.00	**inches/hour**	**Hydraulic Conductivity Over Gradient (Kfs)**

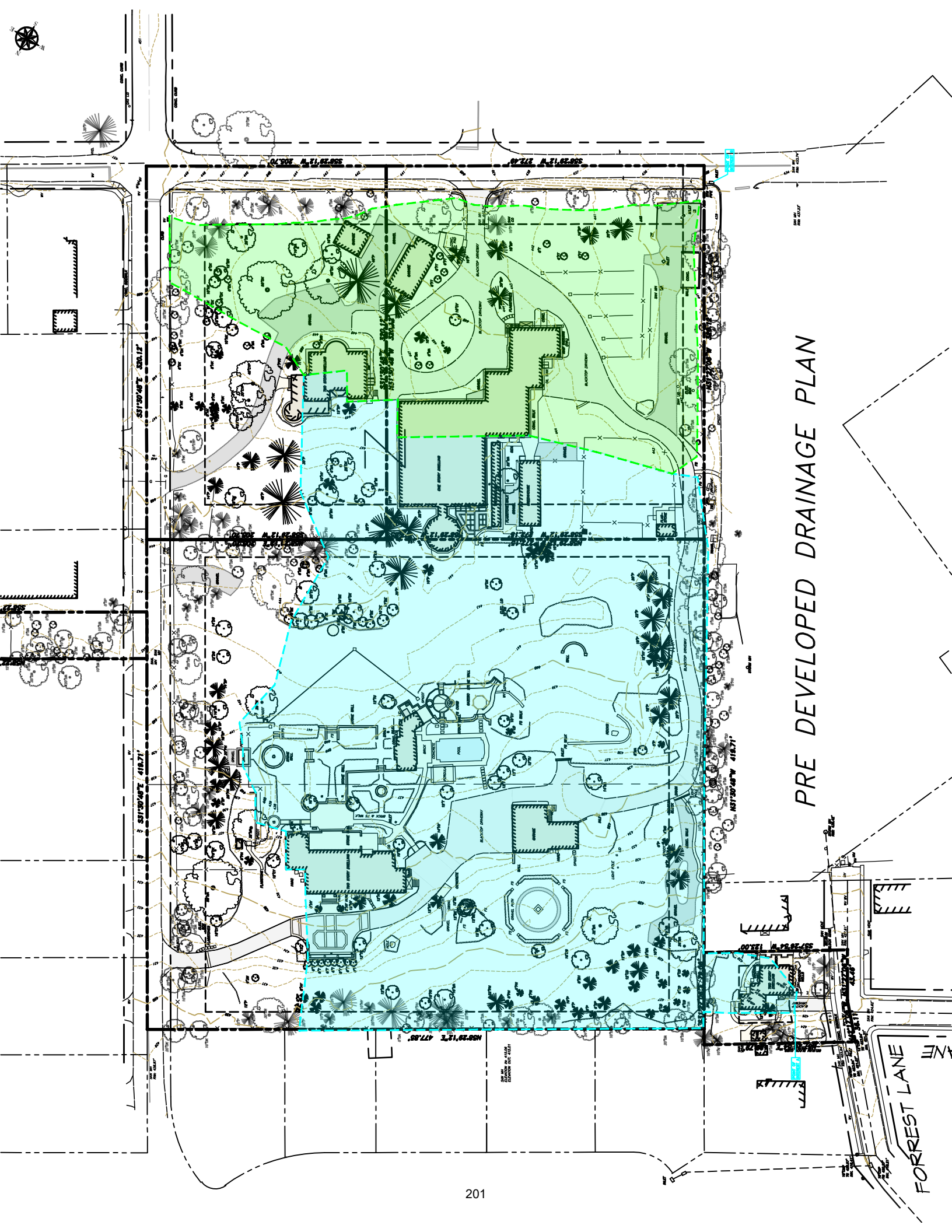
*The **Single Head Geometric Mean** is used when*

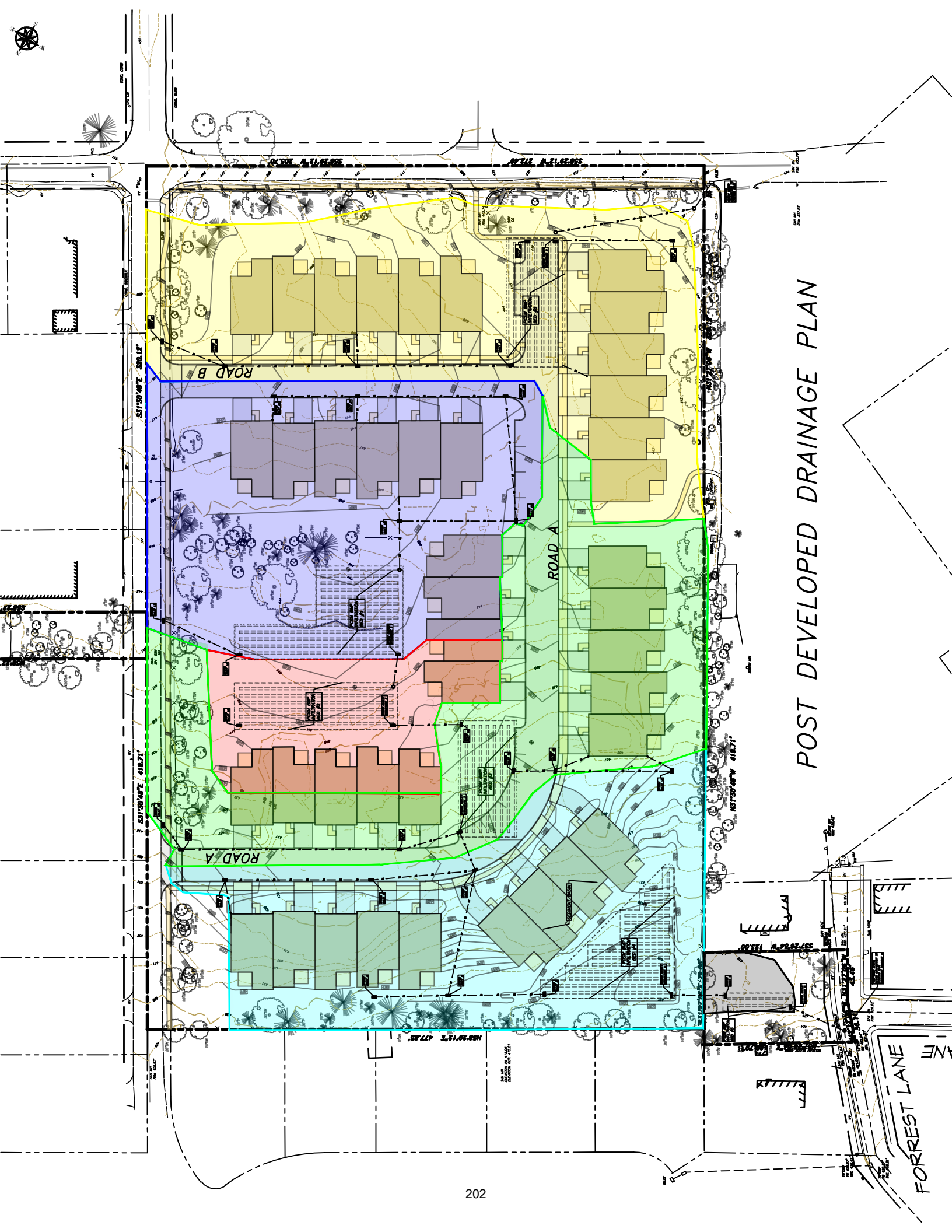
1. *The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists*
2. *The second rate is not greater than the first rate*

0.00 inches/hour FINAL CONDUCTIVITY RATE

TEST LOCATION PLAN


STRAFFORD AVE
Permeability Test #PS1-B @ 84"
Test Pit #SWM-02B
Water 1" tubing
Test Pit #SWM-01B
Permeability Test #PS2-B @ 96"
Permeability Test #PS2-A @ 96"
Test Pit #SWM-01A
Test Pit #SWM-02A
Buried electric
Terra Cota Drain tile @42"
Permeability Test #PS1-A @ 84"
Buried electric
Permeability Test #PS3-A @ 96"
Permeability Test #PS3-B @ 96"
Permeability Test #PS4-B @ 42"
Permeability Test #PS4-A @ 84"
Test Pit #SWM-03
Test Pit #SWM-04
Buried 3" drain found
Buried 4" drain & agg. found
Hamilton - 228 Strafford Ave
Stormwater Test Locations
September 17-18, 2019
Not To Scale


PRE DEVELOPED DRAINAGE PLAN
FORREST LANE


POST DEVELOPED DRAINAGE PLAN
ROAD A
ROAD B
FORREST LANE